NASA CR-166350

XV-15 RESEARCH INSTRUMENTATION
AND
DATA ACQUISITION MANUAL

(NASA-CR-166350) V/STOL TILT ROTOR RESEARCH AIRCRAFT. VOLUME 4: CFE TECHNICAL DATA (Textron Bell Helicopter) 319 p
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V/STOL TILT ROTOR RESEARCH AIRCRAFT

VOLUME IV — CFE TECHNICAL DATA

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BELL HELICOPTER COMPANY
POST OFFICE BOX 482 · FORT WORTH, TEXAS 76101 A textron COMPANY

FOREWORD

This manual defines the configuration, operation, and maintenance requirements for the contractor-furnished portion of the XV-15 research instrumentation and data acquisition system. Interface with Government Furnished Equipment (GFE) is established through schematics and block diagrams. Operation, maintenance, and checkout procedures for GFE are not included in this manual. Organization of the Research Instrumentation and Data Acquisition Manual is as follows:

VOLUME I - GENERAL INFORMATION:
This volume contains descriptions of systems operation, maintenance and checkout procedures, calibration procedures, cable designations and definition of the CFE/GFE interface.

VOLUME II - AIRCRAFT S/N 702 CONFIGURATION:
This volume establishes the instrumentation configuration for XV-15 Aircraft No. 1 (S/N 702). Transducer calibration data and PCM setup sheets applicable to Aircraft No. 1 are included.

VOLUME III - AIRCRAFT S/N 703 CONFIGURATION:
This volume establishes the instrumentation configuration for XV-15 Aircraft No. 2 (S/N 703). Transducer calibration data and PCM setup sheets applicable to Aircraft No. 2 are included.

VOLUME IV - CFE TECHNICAL DATA:
This volume contains manufacturer drawings and specifications for contractor-furnished transducers and related equipment.

INTRODUCTION

This Volume IV of the Research Instrumentation and Data Acquisition Manual contains the manufacturer drawings and specification sheets for Contractor-Furnished Equipment used in the XV-15 research instrumentation and data acquisition system.

The manual is divided into tabbed sections identified according to manufacturer. Specification sheets and drawings outlining description and interface data in the manufacturer's own literature are included.

The equipment is indexed in alphabetical order by component in addition to the manufacturer's alphabetical index. Data may be located using either procedure.

When required, a revision record may be added.

CFE TECHNICAL DATA

Abbott Transistor Laboratories, Inc. (15755)

Power Supply	CC 3D3.5
Power Supply	CC 15D1.0
Power Supply	C5D5.0
Power Supply	C28D3.5

28 VDC TO DC (MODEL C's)

HI-PERFORMANCE

POWER MODULES

5 TO 100 VDC

FEATURES

- Low Peak-to-Peak Ripple
- RFI/EMI to MIL-STD-461
- Small Size
- Hermetically Sealed
- + 100°C Operation
- 0.1% Regulation
- Reverse Polarity Protected

Over the years, we talked with engineers throughout the country about DC to DC converters. They expressed one common need . . . converters with smaller volume, lower weight, and higher performance. More and more DC to DC applications were requiring lower peak to peak ripple and closer regulation. So we went to work. We spent over a year designing and testing a new line of DC to DC converters that not only would meet, but exceed the most stringent specifications we had seen. We have now produced over 10,000 of these units for use in systems throughout the world.

Abbott's new model C line converts 24-30 volts DC to any output between 5 and 100 volts DC. Three different power ratings are available for each output voltage listed. These converters feature a line and load regulation of 0.1%. Peak to peak ripple is less than 50 millivolts. And you won't have to worry about conducted or radiated noise since every model C is designed to meet the EMI (electromagnetic interference) requirements of MIL-STD-461.

To build a power supply with these specifications, Abbott employs more than three times the number of components used in other standard DC to DC converters. The difficult task is integrating all of these parts in a package 2" x 3" x 3½", weighing only 1.2 pounds. Like our other aerospace units, each module is encapsulated and hermetically sealed to meet the rugged environments of MIL-STD-810B and MIL-E-5400K, Class 2. On the next page, 99 models are listed with specifications and prices. You may be pleasantly surprised to find a power supply listed that meets your needs.

SPECIFICATIONS

INPUT VOLTAGE RANGE: 24 to 30 VDC. For other input voltage ranges, see page 41

INPUT CURRENT: See table IV on page 53

LINE REGULATION: 0.1% or 10 mV (whichever is greater) for input change of 24 to 30 VDC with load constant

LOAD REGULATION: 0.1% or 20 mV (whichever is greater) for load change of no load to full load with line constant

RIPPLE: 0.02% or 5 mV RMS (whichever is greater)
50 mV peak-to-peak maximum measured with a scope having a 25 MHz bandwidth

OUTPUT VOLTAGE ADJUSTMENT: Voltage is continuously adjustable between the limits shown in the table by means of an externally accessible screwdriver adjustment potentiometer

ADJUSTMENT RESOLUTION:

Nominal Output Voltage	Resolution
5 thru 16 VDC	35 mV max
18 thru 50 VDC	60 mV max
55 thru 95 VDC	90 mV max

ISOLATION VOLTAGE: 200 volts DC between input and output, input and case, and output and case

INSULATION RESISTANCE: 50 megohms minimum at 50 volts DC between input and output, input and case, and output and case

POLARITY: Inputs and outputs are isolated, either positive or negative side may be grounded

TEMPERATURE RANGE: Operating —55°C to +100°C maximum at center of mounting base. Storage —65°C to +125°C

TEMPERATURE COEFFICIENT: 0.015%/°C from —20°C to +80°C base plate temperature; 0.03%/°C maximum over entire temperature range

ENVIRONMENT: Encapsulated to meet the environmental requirements of MIL-STD-810C and MIL-E-5400P, Class 2, including altitude (to a vacuum), vibration, shock, acceleration, sand, dust, humidity, saltspray, fungus, explosion, etc. For further information please see page 48

SHORT CIRCUIT PROTECTION: Each unit is completely protected against an overload or short circuit of any duration. The output voltage automatically restores to normal when the overload is removed

INPUT TRANSIENT PROTECTION: In accordance with MIL-STD-704A, Figure 9, Limit 1 (80 VDC for 0.1 sec.)

OVERVOLTAGE PROTECTION: Overvoltage protection modules are available for use with these units. Please see page 38 for complete information

REMOTE ERROR SENSING: Available as an optional feature. For complete information, please see page 41

LOAD TRANSIENT RECOVERY TIME: Output voltage returns to regulation limits within 100 microseconds after a 50% step change in load current

TURN ON / TURN OFF OVERSHOOT: The output voltage overshoot during "turn on" or "turn off" will not exceed 0.1% of the output voltage, or 20 mV, whichever is greater

OUTPUT IMPEDANCE: DC to 1K Hz—0.004 R_L or 0.04 ohm max.
1K Hz to 10K Hz—0.015 R_L or 0.15 ohms max.
10K Hz to 100K Hz—0.030 R_L or 0.50 ohms max.

R_L = Rated Load

ELECTROMAGNETIC INTERFERENCE: Built to meet the requirements of MIL-STD-461 for generation of and susceptability to radiated and conducted interference. Please see page 43 for additional information

RELIABILITY: The mean time between failure (MTBF) per MIL-HDBK-217 under worst case operating conditions of full rated output current, 30 VDC input voltage and +100°C base plate temperature, ranges from 41,305 hours for Model C5D10 to 55,463 for Model C9500-25. Please see page 46 for further information

abbott transistor
LABORATORIES, INCORPORATED

GENERAL OFFICES
5200 W. Jefferson Blvd.
Los Angeles, Calif. 90016
(213) 936-8185
Telex: 69-1398

EASTERN OFFICES
1224 Anderson Avenue
Fort Lee, New Jersey 07024
(201) 224-6900
Telex: 13-5332

POWER MODULES

5 TO 100 VDC

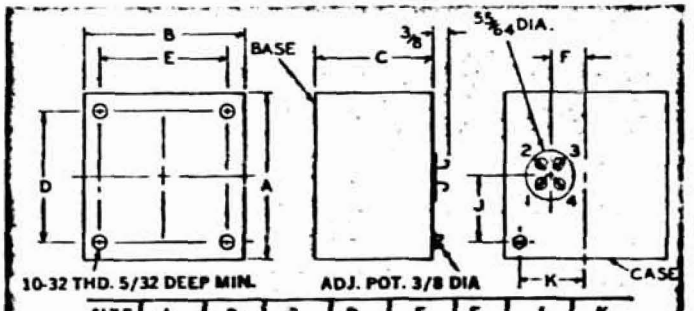
28 VDC TO DC (illegible)

HI-PERFORMANCE

Output Voltage Range	Output Current (Amps)	Size (See Dwg.)	Weight (Lbs.)	Model Number	Price * 1 pc.	Price * 2-4 pcs.
4.5-5.5	2.5	2D	1.2	C5D2.5	$291	$265
	5.0	6B	1.7	C5D5.0	319	290
	10.0	7A	2.6	C5D10	395	359
5.5-6.5	2.5	2D	1.2	C6D2.5	291	265
	5.0	6B	1.7	C6D5.0	319	290
	10.0	7A	2.6	C6D10	395	359
6.5-7.5	2.5	2D	1.2	C7D2.5	291	265
	5.0	6B	1.7	C7D5.0	319	290
	10.0	7A	2.6	C7D10	395	359
7.5-8.5	1.8	2D	1.2	C8D1.8	291	265
	3.5	6B	1.7	C8D3.5	319	290
	7.5	7A	2.6	C8D7.5	395	359
8.5-9.5	1.8	2D	1.2	C9D1.8	291	265
	3.5	6B	1.7	C9D3.5	319	290
	7.5	7A	2.6	C9D7.5	395	359
9.5-10.5	1.8	2D	1.2	C10D1.8	291	265
	3.5	6B	1.7	C10D3.5	319	290
	7.5	7A	2.6	C10D7.5	395	359
10.5-11.5	1.8	2D	1.2	C11D1.8	291	265
	3.5	6B	1.7	C11D3.5	319	290
	7.5	7A	2.6	C11D7.5	395	359
11-13	1.2	2D	1.2	C12D1.2	291	265
	2.5	6B	1.7	C12D2.5	319	290
	5.0	7A	2.6	C12D5.0	395	359
13-15	1.2	2D	1.2	C14D1.2	291	265
	2.5	6B	1.7	C14D2.5	319	290
	5.0	7A	2.6	C14D5.0	395	359
14-16	1.2	2D	1.2	C15D1.2	291	265
	2.5	6B	1.7	C15D2.5	319	290
	5.0	7A	2.6	C15D5.0	395	359
15-17	1.2	2D	1.2	C16D1.2	291	265
	2.5	6B	1.7	C16D2.5	319	290
	5.0	7A	2.6	C16D5.0	395	359
17-19	1.2	2D	1.2	C18D1.2	291	265
	2.5	6B	1.7	C18D2.5	319	290
	5.0	7A	2.6	C18D5.0	395	359
19-21	0.8	2D	1.2	C20D0.8	291	265
	1.8	6B	1.7	C20D1.8	319	290
	3.5	7A	2.6	C20D3.5	395	359
21-23	0.8	2D	1.2	C22D0.8	291	265
	1.8	6B	1.7	C22D1.8	319	290
	3.5	7A	2.6	C22D3.5	395	359
23-25	0.8	2D	1.2	C24D0.8	291	265
	1.8	6B	1.7	C24D1.8	319	290
	3.5	7A	2.6	C24D3.5	395	359
25-27	0.8	2D	1.2	C26D0.8	291	265
	1.8	6B	1.7	C26D1.8	319	290
	3.5	7A	2.6	C26D3.5	395	359

Output Voltage Range	Output Current (Amps)	Size (See Dwg.)	Weight (Lbs.)	Model Number	Price * 1 pc.	Price * 2-4 pcs.
27-29	0.8	2D	1.2	C28D0.8	$291	$265
	1.8	6B	1.7	C28D1.8	319	290
	3.5	7A	2.6	C28D3.5	395	359
29-31	0.6	2D	1.2	C30D0.6	291	265
	1.2	6B	1.7	C30D1.2	319	290
	2.5	7A	2.6	C30D2.5	395	359
31-33	0.6	2D	1.2	C32D0.6	291	265
	1.2	6B	1.7	C32D1.2	319	290
	2.5	7A	2.6	C32D2.5	395	359
33-35	0.6	2D	1.2	C34D0.6	291	265
	1.2	6B	1.7	C34D1.2	319	290
	2.5	7A	2.6	C34D2.5	395	359
35-37	0.6	2D	1.2	C36D0.6	291	265
	1.2	6B	1.7	C36D1.2	319	290
	2.5	7A	2.6	C36D2.5	395	359
37-39	0.6	2D	1.2	C38D0.6	291	265
	1.2	6B	1.7	C38D1.2	319	290
	2.5	7A	2.6	C38D2.5	395	359
39-41	0.5	2D	1.2	C40D0.5	291	265
	0.8	6B	1.7	C40D0.8	319	290
	1.8	7A	2.6	C40D1.8	395	359
41-43	0.5	2D	1.2	C42D0.5	291	265
	0.8	6B	1.7	C42D0.8	319	290
	1.8	7A	2.6	C42D1.8	395	359
43-45	0.5	2D	1.2	C44D0.5	291	265
	0.8	6B	1.7	C44D0.8	319	290
	1.8	7A	2.6	C44D1.8	395	359
45-47	0.5	2D	1.2	C46D0.5	291	265
	0.8	6B	1.7	C46D0.8	319	290
	1.8	7A	2.6	C46D1.8	395	359
47-49	0.5	2D	1.2	C48D0.5	291	265
	0.8	6B	1.7	C48D0.8	319	290
	1.8	7A	2.6	C48D1.8	395	359
49-51	0.5	2D	1.2	C50D0.5	291	265
	0.8	6B	1.7	C50D0.8	319	290
	1.8	7A	2.6	C50D1.8	395	359
50-60	0.25	2D	1.2	C55D0.25	277	252
	0.5	6B	1.7	C55D0.5	319	290
	1.0	7A	2.6	C55D1.0	395	359
60-70	0.25	2D	1.2	C65D0.25	277	252
	0.5	6B	1.7	C65D0.5	319	290
	1.0	7A	2.6	C65D1.0	395	359
70-80	0.25	2D	1.2	C75D0.25	277	252
	0.5	6B	1.7	C75D0.5	319	290
	1.0	7A	2.6	C75D1.0	395	359
80-90	0.25	2D	1.2	C85D0.25	277	252
	0.5	6B	1.7	C85D0.5	319	290
	1.0	7A	2.6	C85D1.0	395	359
90-100	0.25	2D	1.2	C95D0.25	277	252
	0.5	6B	1.7	C95D0.5	319	290
	1.0	7A	2.6	C95D1.0	395	359

*Discounts for quantities greater than four pieces are shown on page 56.

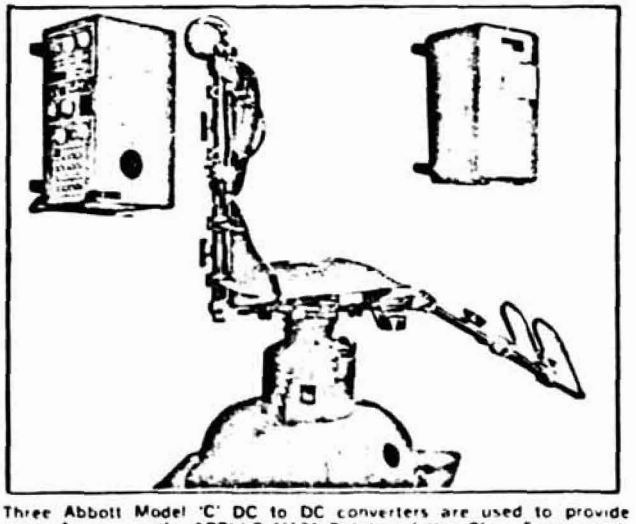


SIZE	A	B	C	D	E	F	J	K
2D	2	3	3-1/2	1.50	2.50	3/4	3/4	1-1/4
6B	2-3/4	3-1/8	3-5/8	2.25	2.62	3/4	1-1/8	1-5/16
7A	2-7/8	3-3/8	4-1/2	2.37	2.87	3/4	1-3/16	1-7/16

TOLERANCES: FRACTION = ± 1/32, DECIMAL = ± 0.015
MATERIAL: BASE - ALUMINUM 6061-T6
CASE - STEEL

FINISH: BLACK SEMIGLOSS LACQUER FED. STD. 595 COLOR 37038

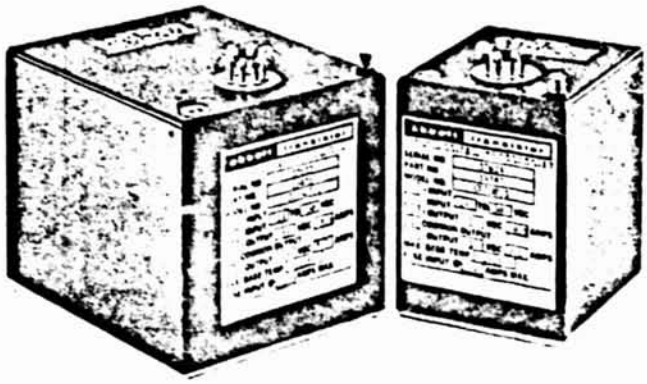
PIN DESIGNATIONS
1 + 28 VDC INPUT
2 - 28 VDC INPUT
3 + OUTPUT (DC)
4 - OUTPUT (DC)



Three Abbott Model 'C' DC to DC converters are used to provide power for use in the APOLLO M131 Rotating Litter Chair Experiment. Astronauts will perform this experiment aboard the SKYLAB orbiting work station. The Rotating Litter Chair is built by John Hopkins University, Applied Physics Laboratory, Under Navy contract for NASA

28 VDC TO DC (MODEL CC's)

DUAL OUTPUT



POWER MODULES

±3 to ±30 VDC

FEATURES

- 1% Tracking Accuracy
- 0.2% Regulation
- Low Peak-To-Peak Ripple
- RFI/EMI to MIL-STD-461
- Hermetically Sealed
- +100°C Operation
- Reverse Polarity Protected

Now Abbott offers a line of dual output DC to DC converters with the same high-performance specifications as our single-output Model C series. This new line is specifically designed to power differential and operational amplifiers, as well as other circuits that require stable driving and reference voltages. The CC series meets all appropriate airborne specifications; including MIL-STD-810C and MIL-E-5400P for environment, MIL-STD-461 for EMI and MIL-STD-704A for input power. Models are available in twenty-two output voltage levels between ±3 and ±30 VDC in current ratings up to 3.5 amperes.

The CC features line and load regulation of 0.2% and a tracking accuracy of better than 1% for any combination of specified input voltage, output current, operating temperature and output voltage adjustment. Each output is converted, filtered, and regulated independently, sharing only a transformer and a master-slave tracking circuit. More than twice the number of high quality components have been packaged in 10% less volume than two of our equivalent single output supplies.

If you need a dual-output supply that will help maximize the performance-to-volume ratio of your system, look through the models listed on the following page. In choosing a dual CC model, you will save about thirty percent of the total cost of two single-output C models.

SPECIFICATIONS

INPUT VOLTAGE RANGE: 24 to 30 VDC. For other input voltage ranges, see page 41

INPUT CURRENT: See table V on page 54

LINE REGULATION: 0.2% or 10 mV (whichever is greater) for input change of 24 to 30 VDC with load constant

LOAD REGULATION: 0.2% or 20 mV (whichever is greater) for load change of no load to full load with line constant

RIPPLE: 0.02% or 5 mV RMS (whichever is greater)
50 mV peak to-peak maximum measured with a scope having a 25 MHz bandwidth

TRACKING ACCURACY: The negative output will track the positive output to within 1.0% or 100 mV (whichever is greater) for all rated conditions of input voltage, output current, operating temperature, and output voltage adjustment

OUTPUT VOLTAGE ADJUSTMENT: Voltage is continuously adjustable between the limits shown in the table by means of an externally accessible screwdriver adjustment potentiometer

ADJUSTMENT RESOLUTION:

Nominal Output Voltage	Resolution
3 thru 4.5	25 mV max.
5 thru 15	35 mV max.
16 thru 30	60 mV max.

ISOLATION VOLTAGE: 200 volts DC between input and output, input and case, and output and case.

INSULATION RESISTANCE: 50 megohms minimum at 50 volts DC between input and output, input and case, and output and case

POLARITY: Inputs and outputs are isolated; positive or negative output may be grounded

TEMPERATURE RANGE: Operating −55°C to +100°C maximum at center of mounting base
Storage −65°C to +125°C

TEMPERATURE COEFFICIENT: 0.015%/°C from −20°C to +80°C base plate temperature; 0.03%/°C maximum over entire temperature range

ENVIRONMENT: Encapsulated to meet the environmental requirements of MIL-STD-810C and MIL-E-5400P, Class 2, including altitude (to a vacuum), vibration, shock, acceleration, sand, dust, humidity, saltspray, fungus, explosion, etc. For further information please see page 48

SHORT CIRCUIT PROTECTION: Each unit is completely protected against an overload or short circuit of any duration. The output voltage automatically restores to normal when the overload is removed

INPUT TRANSIENT PROTECTION: In accordance with MIL-STD-704A, Figure 9, Limit 1 (80 VDC for 0.1 sec.)

OVERVOLTAGE PROTECTION: Overvoltage protection modules are available for use with these units. Please see page 38

LOAD TRANSIENT RECOVERY TIME: Output voltage returns to regulation limits within 200 microseconds after a 50% step change in load current

TURN ON/ TURN OFF OVERSHOOT: The output voltage overshoot during "turn on" or "turn off" will not exceed 0.2% of the output voltage, or 30 mV, whichever is greater

ELECTROMAGNETIC INTERFERENCE: Built to meet the requirements of MIL-STD 461 for generation of and susceptability to radiated and conducted interference. Please see page 43 for additional information

RELIABILITY: The Mean Time Between Failure (MTBF) per MIL-HDBK-217 under worst case operating conditions of full rated output current, 30 VDC input voltage and +100°C base plate temperature, ranges from 20,105 hours for Model CC3D3.5 to 34,710 hours for CC3D3.5. Please see page 46 for further information

OUTPUT IMPEDANCE	RATED OUTPUT CURRENT (amps)			
	0.5	1.0	2.0	3.5
DC - 1 KHz	0.15Ω	0.1Ω	0.08Ω	0.04Ω
1 KHz - 10 KHz	0.4 Ω	0.3Ω	0.2 Ω	0.1 Ω
10 KHz - 100 KHz	0.5 Ω	0.5Ω	0.5 Ω	0.3 Ω

POWER MODULES

±3 to ±30 VDC

28 VDC TO DC (MODELS, [illegible])

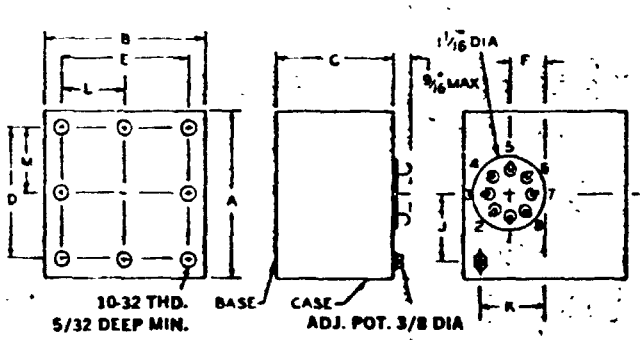
DUAL OUTPUT

Output Voltage Range	Output Current (Amps) *	Size (Size Dwg.)	Weight (Lbs.)	Model Number	Price † 1 pc.	Price † 2-4 pcs.
±2.75-±3.25	0.5	10C	2.3	CC3D0.5	$352	$320
	1.0	10C	2.3	CC3D1.0	380	346
	2.0	10D	2.5	CC3D2.0	409	372
	3.5	11E	3.9	CC3D3.5	455	414
±3.25-±3.75	0.5	10C	2.3	CC3.5D0.5	352	320
	1.0	10C	2.3	CC3.5D1.0	380	346
	2.0	10D	2.5	CC3.5D2.0	409	372
	3.5	11E	3.9	CC3.5D3.5	455	414
±3.75-±4.25	0.5	10C	2.3	CC4D0.5	352	320
	1.0	10C	2.3	CC4D1.0	380	346
	2.0	10D	2.5	CC4D2.0	409	372
	3.5	11E	3.9	CC4D3.5	455	414
±4.25-±4.75	0.5	10C	2.3	CC4.5D0.5	352	320
	1.0	10C	2.3	CC4.5D1.0	380	346
	2.0	10D	2.5	CC4.5D2.0	409	372
	3.5	11E	3.9	CC4.5D3.5	455	414
±4.5-±5.5	0.5	10C	2.3	CC5D0.5	352	320
	1.0	10C	2.3	CC5D1.0	380	346
	2.0	10D	2.5	CC5D2.0	409	372
	3.5	11E	3.9	CC5D3.5	455	414
±5.5-±6.5	0.5	10C	2.3	CC6D0.5	357	325
	1.0	10C	2.3	CC6D1.0	387	352
	2.0	10D	2.5	CC6D2.0	426	388
	3.5	11E	3.9	CC6D3.5	485	441
±6.5-±7.5	0.5	10C	2.3	CC7D0.5	357	325
	1.0	10C	2.3	CC7D1.0	387	352
	2.0	10D	2.5	CC7D2.0	426	388
	3.5	11E	3.9	CC7D3.5	485	441
±7.5-±8.5	0.5	10C	2.3	CC8D0.5	357	325
	1.0	10C	2.3	CC8D1.0	387	352
	2.0	10D	2.5	CC8D2.0	426	388
	3.5	11E	3.9	CC8D3.5	485	441
±8.5-±9.5	0.5	10C	2.3	CC9D0.5	357	325
	1.0	10C	2.3	CC9D1.0	387	352
	2.0	10D	2.5	CC9D2.0	426	388
	3.5	11E	3.9	CC9D3.5	485	441
±9.5-±10.5	0.5	10C	2.3	CC10D0.5	357	325
	1.0	10C	2.3	CC10D1.0	387	352
	2.0	10D	2.5	CC10D2.0	426	388
	3.5	11E	3.9	CC10D3.5	485	441
±10.5-±11.5	0.5	10C	2.3	CC11D0.5	357	325
	1.0	10C	2.3	CC11D1.0	387	352
	2.0	10D	2.5	CC11D2.0	426	388
	3.5	11E	3.9	CC11D3.5	485	441

Output Voltage Range	Output Current (Amps) *	Size (Size Dwg.)	Weight (Lbs.)	Model Number	Price † 1 pc.	Price † 2-4 pcs.
±11-±13	0.5	10C	2.3	CC12D0.5	$363	$3[illegible]
	1.0	10C	2.3	CC12D1.0	392	3[illegible]
	2.0	10D	2.5	CC12D2.0	444	4[illegible]
	3.5	11E	3.9	CC12D3.5	519	4[illegible]
±13-±15	0.5	10C	2.3	CC14D0.5	363	3[illegible]
	1.0	10C	2.3	CC14D1.0	392	3[illegible]
	2.0	10D	2.5	CC14D2.0	444	4[illegible]
	3.5	11E	3.9	CC14D3.5	519	4[illegible]
±14-±16	0.5	10C	2.3	CC15D0.5	363	3[illegible]
	1.0	10C	2.3	CC15D1.0	392	3[illegible]
	2.0	10D	2.5	[illegible]	444	4[illegible]
	3.5	11E	3.9	[illegible]	519	4[illegible]
±15-±17	0.5	10C	2.3	CC16D0.5	369	3[illegible]
	1.0	10D	2.5	CC16D1.0	403	36
	2.0	11E	3.9	CC16D2.0	462	42
	3.5	14D	7.9	CC16D3.5	547	49
±17-±19	0.5	10C	2.3	CC18D0.5	369	33
	1.0	10D	2.5	CC18D1.0	403	36
	2.0	11E	3.9	CC18D2.0	462	42
	3.5	14D	7.9	CC18D3.5	547	49.
±19-±21	0.5	10C	2.3	CC20D0.5	369	33.
	1.0	10D	2.5	CC20D1.0	403	36
	2.0	11E	3.9	CC20D2.0	462	42
	3.5	14D	7.9	CC20D3.5	547	49.
±21-±23	0.5	10C	2.3	CC22D0.5	375	34
	1.0	10D	2.5	CC22D1.0	415	378
	2.0	11E	3.9	CC22D2.0	485	44
	3.5	14D	7.9	CC22D3.5	565	51.
±23-±25	0.5	10C	2.3	CC24D0.5	375	34
	1.0	10D	2.5	CC24D1.0	415	378
	2.0	11E	3.9	CC24D2.0	485	44
	3.5	14D	7.9	CC24D3.5	565	514
±25-±27	0.5	10C	2.3	CC26D0.5	380	346
	1.0	10D	2.5	CC26D1.0	426	388
	2.0	11E	3.9	CC26D2.0	508	462
	3.5	14D	7.9	CC26D3.5	594	540
±27-±29	0.5	10C	2.3	CC28D0.5	380	346
	1.0	10D	2.5	CC28D1.0	426	388
	2.0	11E	3.9	CC28D2.0	508	462
	3.5	14D	7.9	CC28D3.5	594	540
±29-±31	0.5	10C	2.3	CC30D0.5	386	351
	1.0	10D	2.5	CC30D1.0	438	399
	2.0	11E	3.9	CC30D2.0	531	483
	3.5	14D	7.9	CC30D3.5	617	561

*Each output

† Discounts for quantities greater than four pieces are shown on page S6.



Size	A	B	C	D	E	F	J	K	L	M
10C	3 3/8	3 3/8	3 3/4	2.87	2 87	3 4	1 7 16	1 7/16	–	–
10D	3 1/2	3 1/2	4	3.00	3 00	3/4	1 1/2	1 1/2	–	–
11E	3 3/4	4 1/2	4 1/4	3 25	4 00	3/4	1 5/8	2	–	–
14D	6	6 1/4	3 7/8	5 50	5.75	1 1/4	2 3/4	2 7/8	2 87	2.75

TOLERANCE: FRACTION = ± 1/32
DECIMAL = ± .015

FINISH: BLACK SEMIGLOSS LACQUER FED. STD. 595 COLOR 37038

MATERIAL: BASE – ALUMINUM 6061-T6
CASE – STEEL

PIN DESIGNATIONS:
1 +28 VDC INPUT
2 -28 VDC INPUT
3 + OUTPUT (DC)
4 COMMON OUTPUT
5 – OUTPUT (DC)
6, 7, 8 } NOT USED

transistor
LABORATORIES, INCORPORATED

GENERAL OFFICES
5200 W. Jefferson Blvd.
Los Angeles, Calif. 90016
(213) 936-8185
Telex: 69-1398

EASTERN OFFICES
1224 Anderson Avenue
Fort Lee, New Jersey 07024
(201) 224-6900
Telex: 13-5332

CFE TECHNICAL DATA

Anadex, Inc. (14010)

Converter, Frequency PI-355-100 Hz

ADDENDUM TO

PI-355, PI-375 SERIES

Transient Response: Time for output to change to 63% of final value after a step change in the input, is approximately 30/f, where f is maximum full scale frequency with a minimum response of 7 ms.

FOR UNITS WITH A FULL SCALE INPUT TO 5 KHz

Input Sensitivity: 5 Hz to 5 KHz less than 10 MV RMS

FOR UNITS WITH A FULL SCALE INPUT FROM 10 KHz to 50 KHz

Input Sensitivity: 100 Hz to 50 KHz less than 10 MV RMS

6/20/72

ANADEX
INSTRUMENTS, INC.

the instrument people!

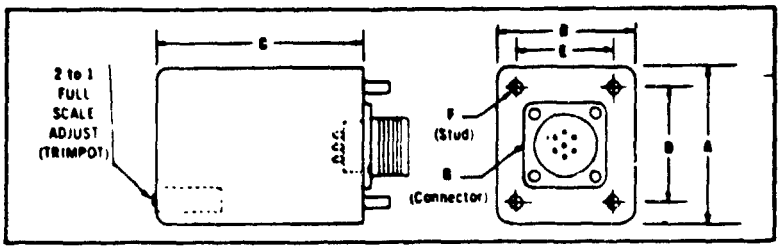
PI-355

~~PI-335~~, PI-375 SERIES

- ☑ RUGGED — DESIGNED FOR AIRBORNE AND MISSILE USAGE.
- ☑ WIDE RANGE — 5 Hz TO 50 KHz
- ☑ LINEARITY — ±0.03%
- ☑ INPUT -- TRANSFORMER COUPLED
- ☑ SENSITIVITY — 10 MV RMS
- ☑ ISOLATION — OUTPUTS ISOLATED WITH RESPECT TO INPUT AND POWER SUPPLY

7833 HASKELL AVENUE, VAN NUYS, CALIFORNIA 91406 / PHONE 213-782-9527 / TWX 910-495-1762

SPECIFICATIONS



MODEL NO	A	B	C	D	E	F	G
PI-3XX Series	2 9/16	2 1/16	3 1/8	1 11/16	1 1/16	6-32 x 3/8	MS 3102A 16S 1P
PI-3XXP Series	2 3/4	2 3/8	3 13/16	2 1/4	1 3/4	6-32 x 3/8	MS 3102A 16S 1P

Full Scale Frequencies: The following full scale frequencies are standard. 100 Hz, 200 Hz, 300 Hz, 500 Hz, 1 KHz, 2 KHz, 3 KHz, 5 KHz, 10 KHz, 20 KHz, 30 KHz, 50 KHz. Two-to-one adjustment provides full scale output down to one half maximum full scale frequency.

Input Characteristics: Minimum frequency for specified sensitivity is 5 Hz for square waves, sine waves and approximations thereof. Input for both PI-355 and PI 375 is transformer coupled and may be operated either differential or single ended. The two basic models differ only in input sensitivity and input impedance (see Table below) For pulse input, minimum duration must equal 20% of the Period of the maximum full scale input frequency on any given range

Common Mode Rejection, PI-355 Only: 60 db at 60 Hz with input connected in differential mode.

Temperature Coefficient: ±0.005%/°F of full scale frequency maximum.

Long Term Stability: ±0.2% of full scale frequency/year.

Temperature Range: −55° to +165°F ambient.

Ripple: Less than 0.1% pk pk of full scale output at maximum full scale input frequency, increasing to approximately 1% pk pk of full scale at 1/10 maximum full scale input frequency

Transient Response: Time for output to change to 63% of final value, after a step change in input frequency, is approximately 30/f, where f is maximum full scale frequency.

Linearity. ±0.03% of full scale frequency, terminal linearity

Square Wave Output: 25V pk pk (unloaded) at input frequency from 15 K source impedance. Output swings symmetrically plus and minus with respect to DC Output COMMON

DC Output: 0 to 5 V full scale with 5 ma maximum current Output is short circuit protected BOTH OUTPUTS ARE ISOLATED WITH RESPECT TO SIGNAL INPUT AND POWER SUPPLY.

Output Impedance: Less than 0.5 Ω.

Power Supply: Standard PI 355 and PI-375 models operate from 22 to 30 VDC at 120 ma maximum.

Both models may be provided with Option "P" for operation directly from 105-125 V RMS, 60 400 Hz power supply.

Input Connector: Standard models have MS Connector, as shown. Mating Connector is included with unit For Solder Header, add "S" after I.D.

Ordering Information: Select basic model number per table. If operation from AC power source is required, add the letter "P". Specify full scale frequency. Example PI-355P-500 Hz Frequency to DC Converter has 10 MV differential input sensitivity and will generate 5 V full scale DC output for any input frequency between 250 and 500 Hz. Input power is 105-125 V RMS and unit will include MS-3102A-16S 1P Connector.

Model PI-355PS-500 Hz is identical to above but includes Solder Header rather than connector.

Special Models: The following features can be supplied on special ord

Higher or lower full scale frequencies
Higher input impedance
Higher or lower output voltage
High current output for galvanometers up to 10 ma
High transient response
Special current or voltage pulse outputs
Custom packaging
Expanded range models to measure frequency deviation from a center frequency

Model	INPUT[1]	Input Sens. 5 Hz to 10 KHz	Input Sens.[3] at 50 KHz	Max. Permissible Input Signal	Input Impedance	F.S. DC Output	Output Impedance
PI-355	Transformer coupled	10 MV RMS	2.5 V RMS	50 V RMS[3]	5K[4]	5 V	0.5 ohms
PI-375	Transformer coupled	1 V RMS	25 V RMS	250 V RMS	47K	5 V	0.5 ohms

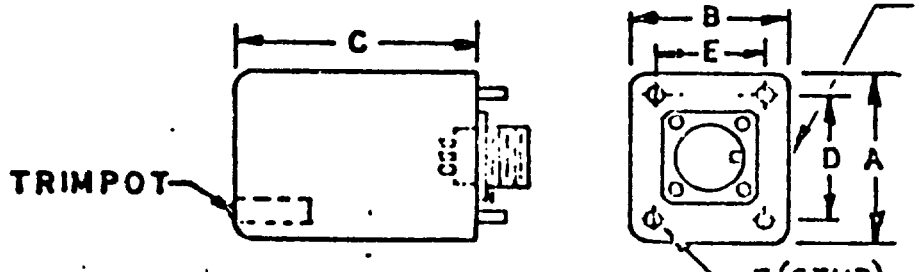
NOTES:
1. May be connected either differential or single ended. PI 355 connected differentially is designed to operate from low level frequency generating transducers where maximum common mode rejection is required.
2. Sensitivity rolls off rapidly above 10 KHz.
3. Maximum input signal is a function of input frequency

   $$E \text{ in (V RMS)} = \frac{\text{Input Frequency in Hz}}{2} \text{ up to 150 V RMS absolute max.}$$

4. 5K is best match for flow sensors, tachometers, etc.

NOTES [1]

0100-5067-02



MS CONN	SOLDER HEADER	PIN CONNECTIONS
A	1	+22 TO +30 VDC
B	2	GND
C	3	SQUARE WAVE OUTPUT
D	4	} DIFFERENTIAL INPUT
E	5	}
F	6	} (-) DC OUTPUT
G	7	} (+)
	8	N.C.

MIL-T-27 CAN	TYPE - FA					
	A	B	C	D	E	F
DIMENSION	2 5/16	2 1/16	3 1/8	1 11/16	1 7/16	6-32x3/8
TOLERANCE	± 0 -1/8	± 0 -1/8	± 0 -3/16	± 1/64	± 1/64	± 1/16

SOLDER HEADER	8 PIN (OPTIONAL)
CONNECTOR	MS 3102 E-16S-1P
TRIMPOT	SCREWDRIVER ADJ.

ORIGINAL PAGE IS OF POOR QUALITY

CHANGE LTR.	BY	DATE	DESCRIPTION

TOLERANCES AND DIMENSIONING BEFORE PLATING UNLESS OTHERWISE NOTED

X	± .05	HOLES:	+.003 -.001
XX	± 03	TO .5 DIA	
XXX	± 015	Over 5 DIA	+.00 -.01
ANGLES	± 03		

SURFACE ± 1/2° (UNLESS OTHERWISE 03)

LOCATE ℄ TO ± 015

1. CONCENTRICITY .003 TIR
2. REMOVE BURRS, BREAK SHARP EDGES 125 MIL STD-10

ITEM NO.	DESCRIPTION	PART NO.	NO. REQ

SCALE ——

Anadex INSTRUMENTS, INC. Van Nuys, California

CHECKED	APPROVED

PIN CONNECTIONS & MOUNTING

PI-35X-XXX

DATE	DRAWN	SHEET OF	DWG NO.	CHNG
10-K	00H	1 / 1	0100-5067-02	

Belden Corp. (16428)

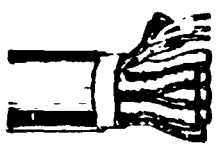
Cable, Signal	No. 8723
Cable, Signal	No. 8769

Individually Shielded Pair Cables

SHIELDED AUDIO AND CONTROL CABLES

22 GAGE
SOLID CONDUCTORS .64 mm diam.

PRODUCT DESCRIPTION: *22 AWG tinned copper, vinyl insulated, twisted pairs, each pair and its drain wire under BELDFOIL aluminum-polyester shield, overall chrome vinyl jacket. Color code chart on page 8. Insulation resistance between shields 100 megohms/M nom. Capacitance between adjacent shields 150 pF/ft nom. Voltage breakdown between adjacent shields 1500 volts nom. Working voltage between adjacent shields 50 volts max. Vinyl insulation is used for ease of stripping and soldering. Recommended for audio frequency applications requiring excellent circuit isolation.* **Suggested working voltage: 300**

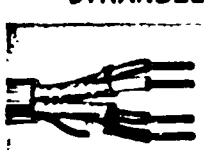


BELDFOIL
100% Shield Coverage

8767•† [UL LISTED] 2464 300V	100 U-500 500 1000	30 5 U-152 4 152 4 304 8	96193 96347 96191 96198	3	.013	.33	.037	.94	.279	7.09	40	131	77	252
8768•† [UL LISTED] 2464 300V	100 500 1000	30 5 152 4 304 8	96189 96188 96187	6	.013	.33	.037	.94	.379	9 63	40	131	77	252
8764•† [UL LISTED] 2464 300V	100 500 1000	30 5 152 4 304 8	96202 96201 96200	9	.013	.33	.040	1.02	.425	10 80	40	131	77	252
8765•† [UL LISTED] 2464 300V	100 500 1000	30 5 152 4 304 8	96199 96198 96197	11	.013	.33	.040	1.02	.470	11.94	40	131	77	252
8766•† [UL LISTED] 2464 300V	100 500 1000	30 5 152 4 304 8	96196 96195 96194	15	.013	.33	.045	1.14	.525	13 34	40	131	77	252

SHIELDED AUDIO AND DATA CABLES

22 GAGE
STRANDED CONDUCTORS (7 x 30) .076 mm diam.



BELDFOIL
100% Shield Coverage

8723•	100 U-500 500 U-10uu 1000	30 5 U-152 4 152 4 U 304 8 304 8	96354 96356 96353 96355 96352	2	.008	.20	.019	.48	.165	4 19	35	115	62	203

PRODUCT DESCRIPTION:
Tinned copper polypropylene insulated black and red under a BELDFOIL aluminum-polyester shield, green and white under a BELDFOIL aluminum-polyester shield, 24 AWG stranded tinned copper common drain wire, chrome vinyl jacket, pairs cabled on common axis to reduce diameter. ⊖
Color code: Red, Black, Green, White. **Suggested working voltage: 600**

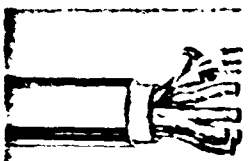
*Capacitance between conductors
**Capacitance between 1 conductor and other conductors connected to shield
@Technical Bulletin TB-51, Issue 2

†Passes the FR 1 vertical flame test.
•Belden U S. Patent 3 032 604

S ELDED AUDIO AND DATA CABLES (cont'd)

22 GAGE
STRANDED CONDUCTORS
(7 x 30) .76 mm diam. (cont'd)

PRODUCT DESCRIPTION
Tinned copper polypropylene insulated twisted pairs each pair and its stranded tinned copper drain wire (22 AWG on 22 AWG and 20 AWG series 20 AWG on 18 AWG series) under BELDFOIL aluminum-polyester shield overall chrome vinyl jacket Color code chart on page 6



BELDFOIL®
100% Shield Coverage

8777•† UL LISTED 2493	100 U 250 250 U 500 500 1000	30 5 U-76 2 76 2 U-152 4 152 4 304 8	96149 96346 96148 96345 96147 96146	3	.010	.25	.048	1.22	.301	7.65	30	98	55	180
8778•† UL LISTED 2493	100 250 500 1000	30 5 76 2 152 4 304 8	96145 96144 96143 96142	6	.010	.25	.048	1.22	.416	10.57	30	98	55	180
8774•† UL LISTED 2493	100 250 500 1000	30 5 76 2 152 4 304 8	96161 96160 96159 96158	9	.010	.25	.048	1.22	.443	11.26	30	98	55	180
8775•† UL LISTED 2493	100 250 500 1000	30 5 76 2 152 4 304 8	96157 96156 96155 96154	11	.010	.25	.048	1.22	.486	12.34	30	98	55	180
9768•† UL LISTED 2493	100 250 500 1000	30 5 76 2 152 4 304 8	94961 94960 94959 94958	12	.010	.25	.048	1.22	.486	12.34	30	98	55	180
8776•† UL LISTED 2493	100 250 500 1000	30 5 76 2 152 4 304 8	96153 96152 96151 96150	15	.010	.25	.065	1.65	.565	14.35	30	98	55	180
9769•† UL LISTED 2493	100 250 500 1000	30 5 76 2 152 4 304 8	94957 94956 94955 94954	17	.010	.25	.065	1.65	.615	15.62	30	98	55	180
8769•† UL LISTED 2493	100 250 500 1000	30 5 76 2 152 4 304 8	96186 96185 96184 96183	19	.010	.25	.065	1.65	.625	15 88	30	98	55	180
8773•† UL LISTED 2493	100 250 500 1000	30 5 76 2 152 4 304 8	96165 96164 96163 96162	27	.010	.25	.070	1.78	.745	18 92	30	98	55	180

250, 500 & 1000 ft lengths + 20% – 0 length tolerance

20 GAGE
STRANDED CONDUCTORS (10 x 30) .94 mm diam.

PRODUCT DESCRIPTION *Tinned copper vinyl insulated twisted pairs each pair BELDFOIL aluminum polyester shielded #22 AWG stranded tinned copper drain wire chrome vinyl jacket Color code 1 pair Red Black 1 pair Green White*

BELDFOIL
100% Shield Coverage

★9402 UL LISTED & 2464 300V	U-500 U-1000	U-152 4 U-304 8	87829 87819	2	.010	.25	.035	89	300	7 62	55	180	95	312

★New Item *Capacitance between conductor
**Capacitance between 1 conductor and other conductor connected to shield
†Passes the FR 1 vertical flame test
•Belden U S Patent 3 032 604

Bendix (77820)

Connector, Circular, Box Mount	PC06W-8-4S

TYPE PC

GENERAL DESCRIPTION

The Bendix PC type PYGMY electrical connector offers the answer to your requirements for the most critical electrical circuits. PC connectors accommodate about 3 times as many circuits, size for size, as comparable MS connectors (MIL-C-5015). Please see general description regarding ("H") hermetic seal connectors on page 10-PC. The PC type makes available a quick-disconnect, double stub thread main coupling. In addition, the PC type offers:

- . . Both pin and socket contacts machined from high grade copper alloy.
- . . . Closed entry, probe proof socket contacts.
- . . . Resilient inserts —performance proved in millions of Bendix connectors over the past ten years
- . . . Machined bar stock or impact extruded shell components, cadmium plated to QQ-P-416 with a clear chromate after-treatment. Finish is golden in color and conductive.
- . . Single key and keyway polarization represents maximum simplicity in a design proven in millions of AN connectors.
- . . . Special thread cross-section cannot be cross-threaded.
- . . . Complete mechanical assistance in both engaging and disengaging.

SERVICE CLASSES

The PC miniature electrical connectors are available in the six service classes listed below. Each class except the hermetic receptacles may have one or more means of terminating or supporting a cable or wire bundle. See page 4-PC.

A General duty connectors. Supplied with a back shell for conduit attachment and solder well protection.

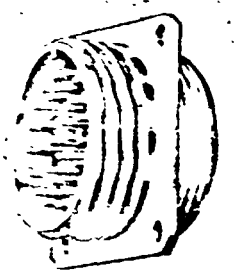
"C" Pressurized receptacles. Less than 1 cu. in. per hour leakage at 30 psi over a temperature range of −65°F. to +257°F. in accordance with BSC-C3P specification.

"E" Environment resisting connectors. Equipped with multi-holed grommet and follower for moisture proofing single conductor open wires in accordance with BSC-C3P specification.

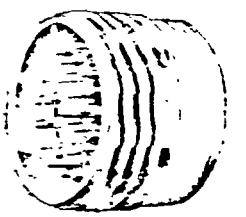
"P" For potting applications. Connectors supplied with a translucent nylon boot for retention of customer applied potting compound.

"W" Cable moistureproofing. Radial compression of neoprene around jacketed, multi-conductor cables.

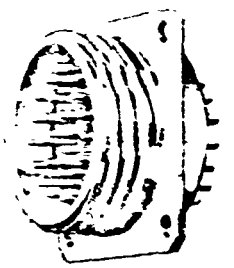
"H" Hermetic seal receptacle. Fused compression glass inserts available in several shell styles.



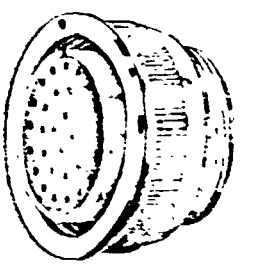
PC00 Wall Mounting Receptacle



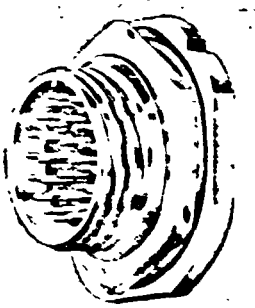
PC01 Cable Connecting Plug



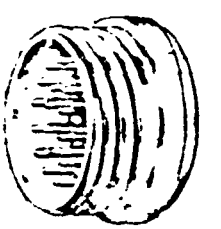
PC02 Box Mounting Receptacle
(Available in hermetic class)



PC06 Straight Plug



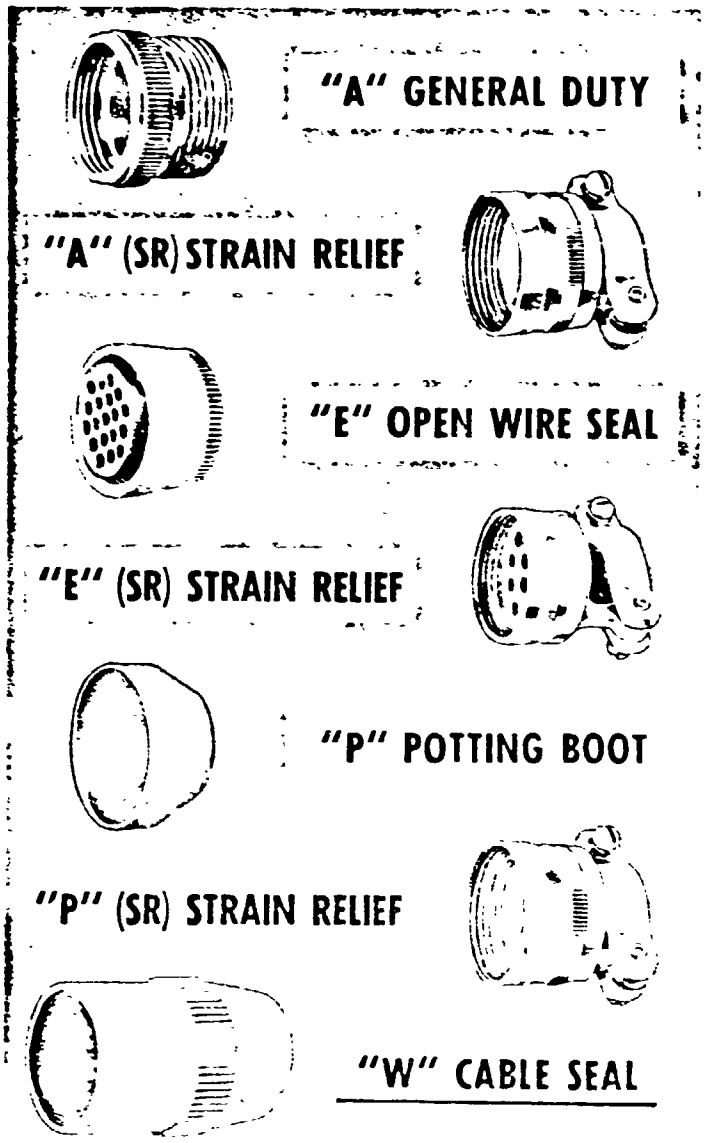
PC07 Jam Nut Receptacle
(Available in hermetic class)



PCIH Solder Mount Receptacle
Available ONLY in hermetic class

PYGMY
ELECTRICAL CONNECTORS

TYPE PC — TERMINATIONS & ORDER INFORMATION



TERMINATIONS

The PC miniature electrical connectors are available in the seven styles of terminations shown to the left, each designed to fulfill one of the following requirements:

"A"	General duty, with a back shell threaded for conduit attachment or MS3057B cable clamp
"A" (SR)	General duty, with strain relief clamp for cable or wire bundle support.
"E"	Environmental resistant, with a nut and grommet for moisture proofing individual wires.
"E" (SR)	Environmental resistant, with a strain relief clamp and grommet for moisture proofing individual wires and provides added wire bundle support.
"P"	Translucent nylon boot for retaining customer applied potting compounds. Held in place by a threaded ring.
"P" (SR)	Strain relief clamp suitable for retaining customer applied potting compounds, with provision for wire support.
"W"	Compressing clamp and neoprene gland for moisture proofing multi-conductor jacketed cables. Telescoping sleeve (AN 3420A) can be used to adapt to cables smaller than the minimum close down.

HOW TO ORDER PC CONNECTORS

1. Select basic shell type from page 3-PC Example. PC00
2. Select service class from page 3-PC and termination from page 4-PC. Example "E".
3. Select insert arrangement from page 4-PG Example 18-32
*4. Add pins P or sockets S

Complete order number PC00E-18-32P

If an alternate position is required (see page 4-PG) order, for example PC00E-18-32PW.

The class E is also available with a strain relief clamp, order number: PC00E-18-32P(SR)

*Note: The hermetic receptacles are available with pin contacts only

SHELL STYLE	CLASS A*	CLASS C*	CLASS E	CLASS P	CLASS W	CLASS H
Wall Mounting Receptacle	PC00A	PC00C	PC00E	PC00P	PC00W	
Cable Connecting Plug	PC01A		PC01E	PC01P	PC01W	
Box Mounting Receptacle*	PC02A	PC02C	PC02E	PC02P	PC02W	PC02H
Straight Plug	PC06A		PC06E	PC06P	PC06W	
Jam Nut Receptacle	PC07A	PC07C	PC07E	PC07P		PC07H
Solder Mount Receptacle						PC1H

*The PC02 Box Mounting Receptacle is made only to complete a series and no provision is made for accessories or potting on the rear shell

PYGMY PC06 STRAIGHT PLUG

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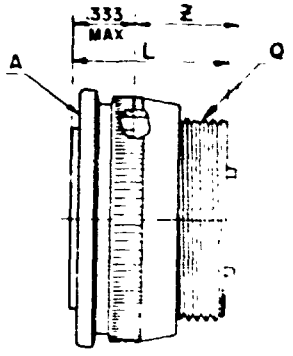
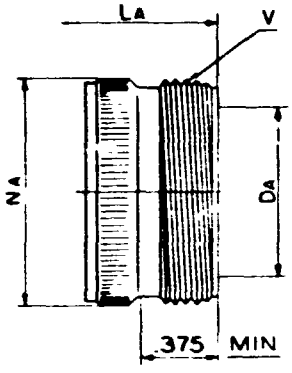
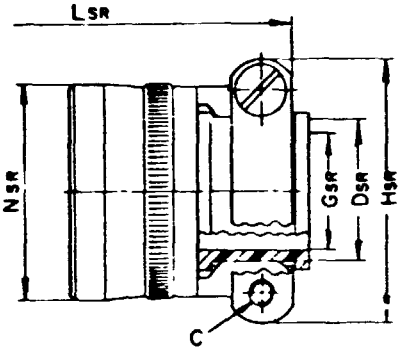
PLUG ASSEMBLY



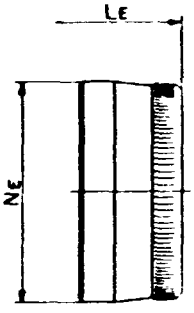
TERMINATION ASSEMBLIES



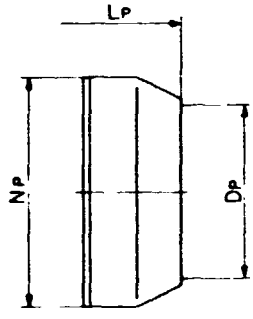
"A" General Duty



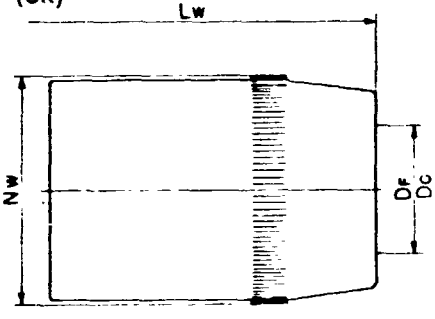
"A" (SR)
"E" (SR) Strain Relief
"P" (SR)



"E" Open Wire Seal



"P" Potting Boot



"W" Cable Seal

Shell Size	PC Number	A Thread Class 2B	G Max.	L Max	Q Thread Class 2A	Z Max.	DA Min	LA Max	NA Max	V Thread Class 2A
6	PC06*-6-**	.3750 DS	.604	.875	.3125-32 NEF	.627	.175	1.400	.462	.3750-32 NEF
8	PC06*-8-**	.5000 DS	.729	.875	.4375-28 UNEF	.627	.297	1.400	.590	.5000-28 UNEF
10	PC06*-10-**	.6250 DS	.854	.875	.5625-24 NEF	.627	.421	1.400	.717	.6250-24 NEF
12	PC06*-12-**	.7500 DS	.979	.875	.6875-24 NEF	.627	.546	1.400	.834	.7500-20 UNEF
14	PC06*-14-**	.8750 DS	1.104	.875	.8125-20 UNEF	.627	.663	1.400	.970	.8750-20 UNEF
16	PC06*-16-**	1.0000 DS	1.229	.875	.9375-20 UNEF	.627	.787	1.400	1.088	1.0000-20 UNEF
18	PC06*-18-**	1.1250 DS	1.354	.875	1.0625-18 NEF	.627	.879	1.400	1.216	1.1875-18 NEF
20	PC06*-20-**	1.2500 DS	1.478	1.031	1.1875-18 NEF	.783	1.014	1.616	1.332	1.1875-18 NEF
22	PC06*-22-**	1.3750 DS	1.604	1.031	1.3125-18 NEF	.783	1.135	1.616	1.460	1.4375-18 NEF

Continued below

Shell Size	PC Number	C Thread	DSR Min	GSR ± .010	HSR Max	LSR Max	NSR Max	LE Max	NE Max	DF Min	LP Max	NP Max	DG Min	DP Max	LW Max.	NW Max
6	PC06*-6-**	—	—	—	—	—	—	1.250	.440	.192	1.406	.474	—	—	—	—
8	PC06*-8-**	6-32	.240	.125	.812	1.740	.550	1.250	.560	.317	1.406	.600	.168	.230	1.680	.547
10	PC06*-10-**	6-32	.302	.188	.875	1.740	.675	1.250	.685	.434	1.406	.724	.205	.312	1.680	.675
12	PC06*-12-**	6-32	.428	.312	1.000	1.740	.803	1.250	.813	.548	1.406	.850	.338	.442	1.823	.812
14	PC06*-14-**	6-32	.552	.375	1.125	1.740	.920	1.250	.930	.673	1.406	.974	.416	.539	2.015	.940
16	PC06*-16-**	6-32	.615	.500	1.188	1.872	1.047	1.250	1.057	.798	1.406	1.100	.550	.616	2.231	1.067
18	PC06*-18-**	8-32	.740	.625	1.438	1.872	1.165	1.250	1.175	.899	1.406	1.224	.600	.672	2 461	1.194
20	PC06*-20-**	8-32	.740	.625	1.438	2 061	1.290	1.434	1.301	1.024	1.562	1.350	.635	.747	2 835	1.322
22	PC06*-22-**	8-32	.928	.750	1.719	2.061	1.418	1.434	1.430	1.149	1.562	1.474	.670	.846	2 999	1.449

*Add desired service class letter, see page 4 PC

**Add desired arrangement number and contact letter, see page 4 PG

PYGMY ELECTRICAL DATA

The Bendix pygmy connector features closed entry socket contacts. Both pins and sockets are machined from low loss copper alloy and are heavily gold plated over copper. This heavy gold plating eliminates contact corrosion and offers an indefinite shelf life. The closed entry socket contacts will withstand the MIL-C-5015 probe test using an eight ounce inch moment.

Size 16 pygmy contacts are rated at 22 amperes, and size 20 pygmy contacts are rated at 7½ amperes. It should be recognized that no pygmy connector can withstand full rated current through all contacts continuously. (Hermetic class, see pages 11-PT, 10-PC.)

Service rating I is comparable to MS service rating A. Pygmy connectors rated Service I will provide a minimum flashover voltage at sea level of 2000 volts AC (rms). Service rating II is comparable to MS service rating D, and will provide a minimum flashover voltage of 2800 volts AC (rms) at sea level. Hermetic class ratings appear on pages 11-PT, 10-PC.

A curve showing actual flashover versus altitude (pressure) is shown below for both service ratings. Please note that the establishment of electrical safety factors is left entirely in the designer's hands, since he is in the best position to know what peak voltages, switching surges, transients, etc., can be expected on a particular circuit.

A time versus temperature curve, shown below, gives operating life of pygmy connectors at elevated temperatures. This information is significant in missile work. Also available from Bendix are pygmy coaxial and thermocouple arrangements. Consult the factory or our field representative for further information.

CONTACT RATINGS

CONTACT SIZE	RATED AMPERES	TEST CURRENT	MILLIVOLT DROP
20	7.5	7.5	25
16	22	20	21

SERVICE RATINGS

SERVICE RATING	SUGGESTED OPERATING VOLTAGE SEA LEVEL	
	AC (RMS)	DC
I	500	700
II	900	1250

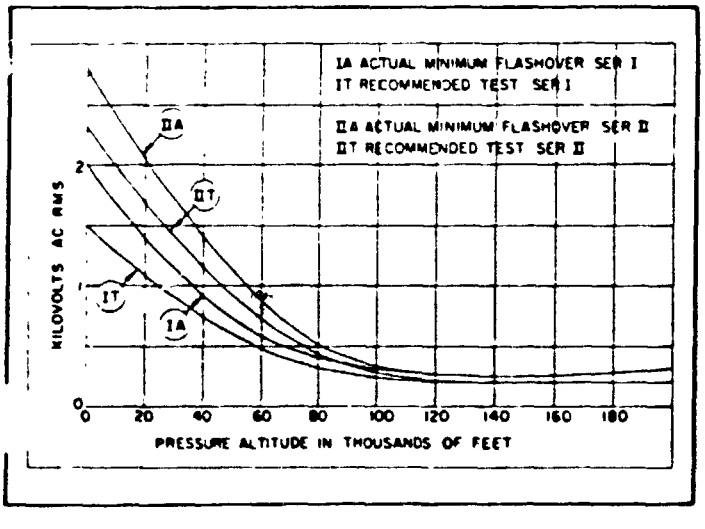
SOLDERWELL DATA

CONTACT SIZE	WELL DIAMETER	WELL DEPTH
20	.04[illegible] $^{.004}_{-.000}$	.125 $^{+.031}_{-.000}$
16	.078 $^{+.005}_{-.003}$	.188 $^{+.031}_{-.000}$

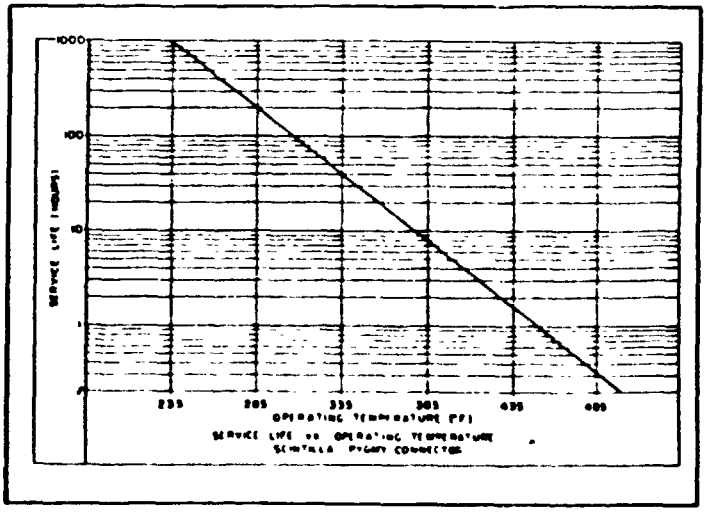
CONTACT SPACING

SERVICE RATINGS	CREEPAGE DISTANCE	MECHANICAL SPACING
I	3/32"	3/64"
II	1/8"	5/64"

Flashover versus Altitude (Pressure)



Time versus Temperature



Bendix

PYGMY
CONTACT ARRANGEMENTS
Listed by shell sizes and arrangement numbers

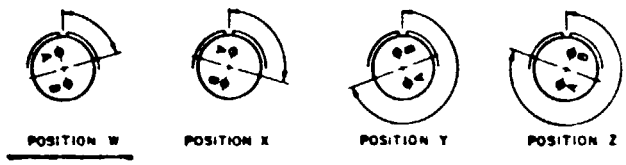
INSERT ARRANGEMENT	TOTAL CONTACTS	CONTACT SIZE	
		20	16
6-1	1	1	
8-2	2	2	
-3	3	3	
-4	4	4	
10-6	6	6	
-98	6	6	
12 3	3		3
-8	8	8	
-10	10	10	
14-5	5		5
-12	12	8	4
-15	15	14	1
-18	18	18	
-19	19	19	
-91*	3	3	
16-8	8		8
-23	23	22	1

INSERT ARRANGEMENT	TOTAL CONTACTS	CONTACT SIZE	
		20	16
-26	26	26	
18-11	11		11
-30	30	29	1
-32	32	32	
-80*	8	6	2 #8 Coax.
20-16	16		16
-24*	24	24	
-25*	25	25	
-27*	27	27	
-39	39	37	2
-41	41	41	
22-7*	7		7 #8 Coax.
-21	21		21
-32*	32	32	
-34*	34	34	
-36*	36	36	
-55	55	55	
24-61	61	61	

ALTERNATE POSITIONS of contact arrangement:

To prevent cross-plugging in applications requiring the use of more than one Pygmy connector, of the same size and arrangement, we have established the following tabulated pin insert alternate positions.

As shown in the diagram at the right, the front face of the pin insert is rotated within the shell in a clockwise direction from the normal shell key. The socket insert would thus be rotated counterclockwise the same number of degrees in respect to the normal shell key.



VIEWS LOOKING INTO FRONT FACE OF PIN INSERT OR REAR OF SOCKET INSERT. TABULATED BELOW ARE THE PIN INSERT ROTATIONS.

SHELL SIZE	INSERT ARRANGEMENT	DEGREES			
		W	X	Y	Z
8	8-2	58	122		
8	8-3	60	210		
8	8-4	45			
10	10-6	90			
10	10-98	90	180	240	270
12	12-3			180	
12	12 8	90	112	203	292
12	12 10	60	155	270	295
14	14-5	40	92	184	273
14	14-12	43	90		
14	14-15	17	110	155	234
14	14 18	15	90	180	270
14	14-19	30	165	315	
14	14-91*		60		
16	16-8	54	152	180	331
16	16 23	158	270		
16	16-26	60		275	338

SHELL SIZE	INSERT ARRANGEMENT	DEGREES			
		W	X	Y	Z
18	18-11	62	119	241	340
18	18-30	180	193	285	350
18	18-32	85	138	222	265
18	18-80*	45	93	135	160
20	20-16	238	318	333	347
20	20-24*	70	145	215	290
20	20 25*	72	144	216	288
20	20-27*	72	144	216	288
20	20-39	63	144	252	333
20	20-41	45	126	225	
22	22 7*	19	41		
22	22 21	16	135	175	349
22	22 32*	72	145	215	288
22	22 34*	62	142	218	298
22	22 36*	72	144	216	288
22	22 55	30	142	226	314
24	24-61	90	180	270	324

*NOTE Arrangements not presently available in the H hermetic class

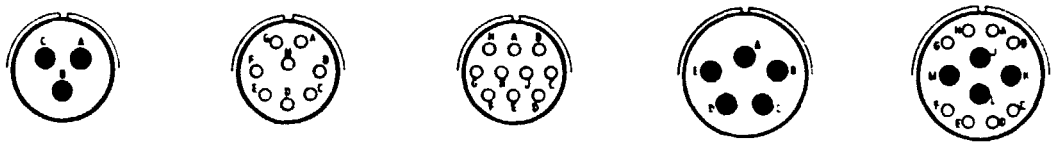
Bendix

CONTACT ARRANGEMENTS

and their service ratings

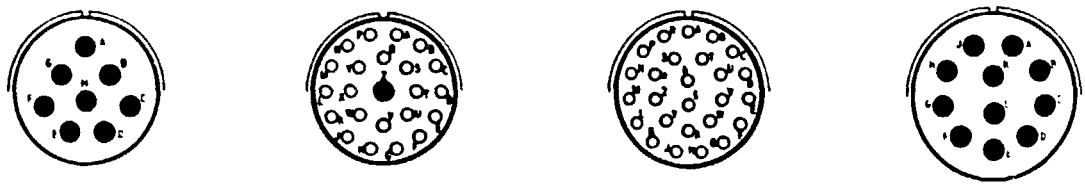
These illustrations are actual size looking into front of pin insert.

INSERT ARRANGEMENT	6-1	8-2	8-3	8-4	10-6	10-98
SERVICE RATING	I	I	I	I	I	I
NUMBER OF CONTACTS	1	2	3	4	6	6
CONTACT SIZE	20	20	20	20	20	20



INSERT ARRANGEMENT	12-3	12-8	12-10	14-5	14-12
SERVICE RATING	II	I	I	II	I
NUMBER OF CONTACTS	3	8	10	5	8 4
CONTACT SIZE	16	20	20	16	20 16

INSERT ARRANGEMENT	14-15	14-18	14-19	14-91
SERVICE RATING	I	I	I	Flashover 5,000 VAC (rms)
NUMBER OF CONTACTS	14 1	18	19	3
CONTACT SIZE	20 16	20	20	20



INSERT ARRANGEMENT	16-8	16-23	16-26	18-11
SERVICE RATING	II	I	I	II
NUMBER OF CONTACTS	8	22 1	26	11
CONTACT SIZE	16	20 16	20	16

Legend ● 16 ○ 20 ⊙ HI-VOLT. ◎ CO-AX

BH Electronics (08450)

Power Supply, DC to DC 2055-28-15

B.H. INDUSTRIES

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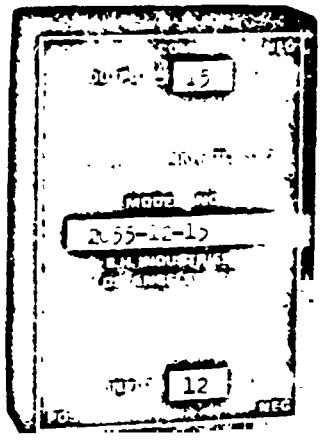
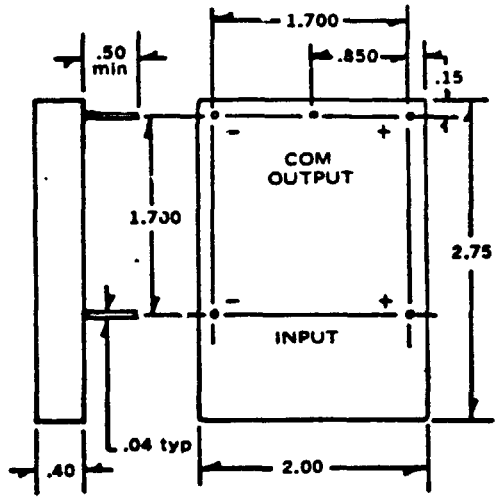
NEW

3 WATT DC-DC REGULATED CONVERTER MODULE

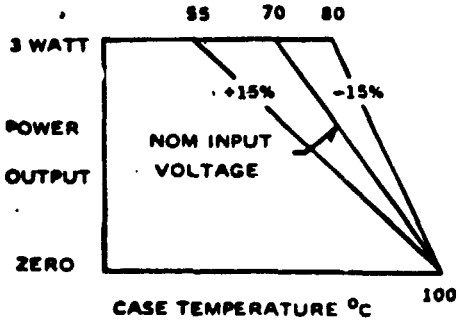
SERIES 2055



- LOW PROFILE - .40 INCH THIN
- DUAL OUTPUT
- REVERSE VOLTAGE PROTECTION
- FOLD BACK CURRENT LIMITING
- PRINTED CIRCUIT BOARD MOUNTING



DIMENSIONS IN INCHES



OUTPUT DERATING CURVE

COMMON SPECIFICATIONS

REGULATION: Line (30% change): 10 mv typ
Load (F.L. change): 10 mv typ
Temperature: .01%/°C typ

NOISE: Measured with 10 mhz bandwidth.
Input current: 10% lin p-p max (5% p-p typ)
Output voltage: 25 mv p-p max (10 mv p-p typ)
1 mv rms max (.25 mv rms typ)

WEIGHT: 2.5 ounce max

(1) Maximum voltage transient, 1 second max duration.

(2) Maximum current at full load and nom. input voltage.

(3) Accuracy is ± 1.0% or 100 mv, whichever is less.

(4) Nominal current. Short circuit limit is 40% of nom. Knee is 125% of nom. See temperature derating curve.

(5) Input/output isolation is .002 mfd at 100 vdc.

(6) Case operating temperature is -40°C to +70°C. Storage temperature is -65°C to +100°C. Case temperature rise is 40°C in free air at full load and nominal input voltage.

Special units are available at no extra charge. Specify MODEL 2055-XX-YY.

XX is input voltage (Min input is XX less 15%). YY is output voltage.

MODEL SPECIFICATIONS @ 25°C Case Temperature (6)

MODEL	INPUT				OUTPUT (5)		PRICE (1 to 9)
	Voltage			Current	Voltage	Current	
	Nom	Min	Max(1)	ma (2)	±vdc (3)	ma (4)	
2055-12-15	12	10	20	700	15	100	$ 65.50
2055-12-22	12	10	20	700	22	68	
2055-24-15	24	20.4	41	300	15	100	
2055-26-15	26	22.1	43	280	15	100	
2055-28-9	28	24	46	260	9	166	
2055-28-12	28	24	46	260	12	125	
2055-28-15	28	24	46	260	15	100	

B.H. INDUSTRIES, 2218 COTNER AVENUE, LOS ANGELES, CALIFORNIA 90064 TELEPHONE (213) 479-827

Bell Helicopter Textron (97499)

Bell Helicopter Textron (97499) (Cont)

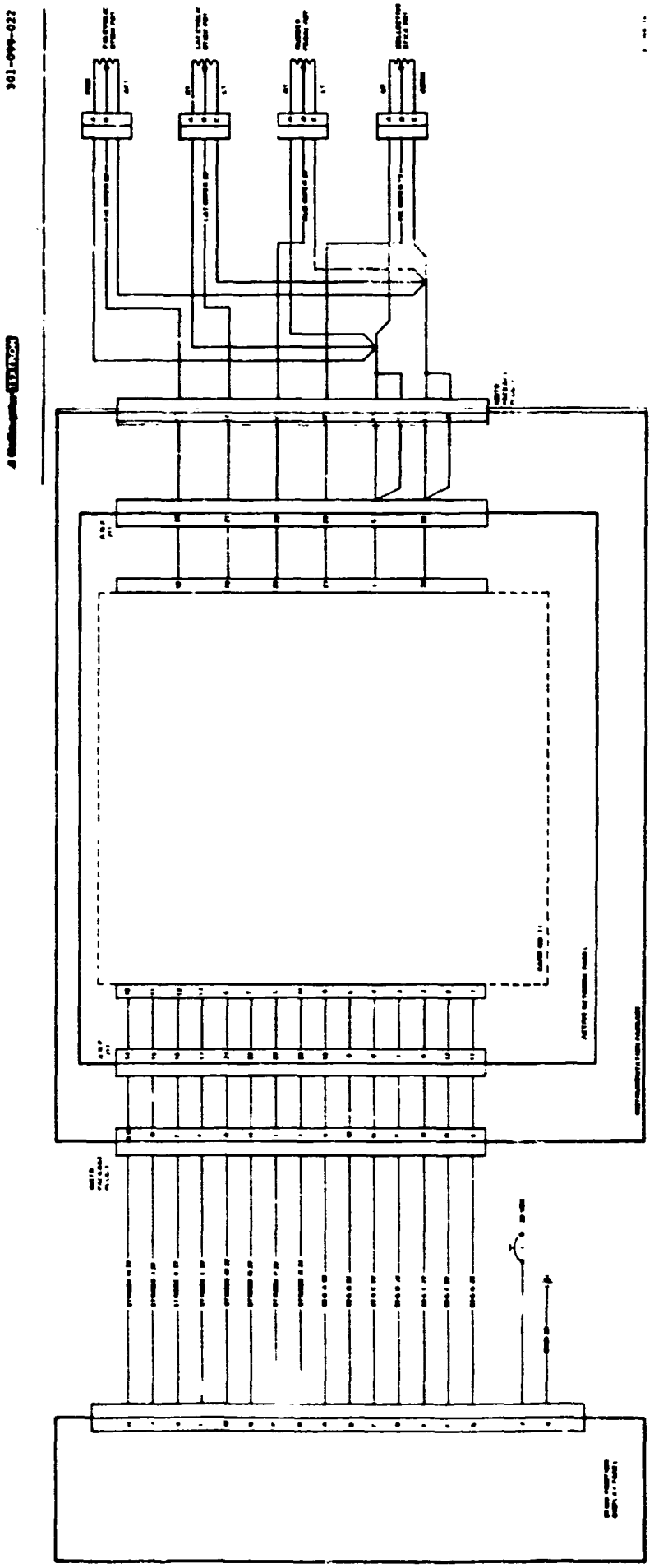


Figure RHT-1. Flow Diagram, Stick Position

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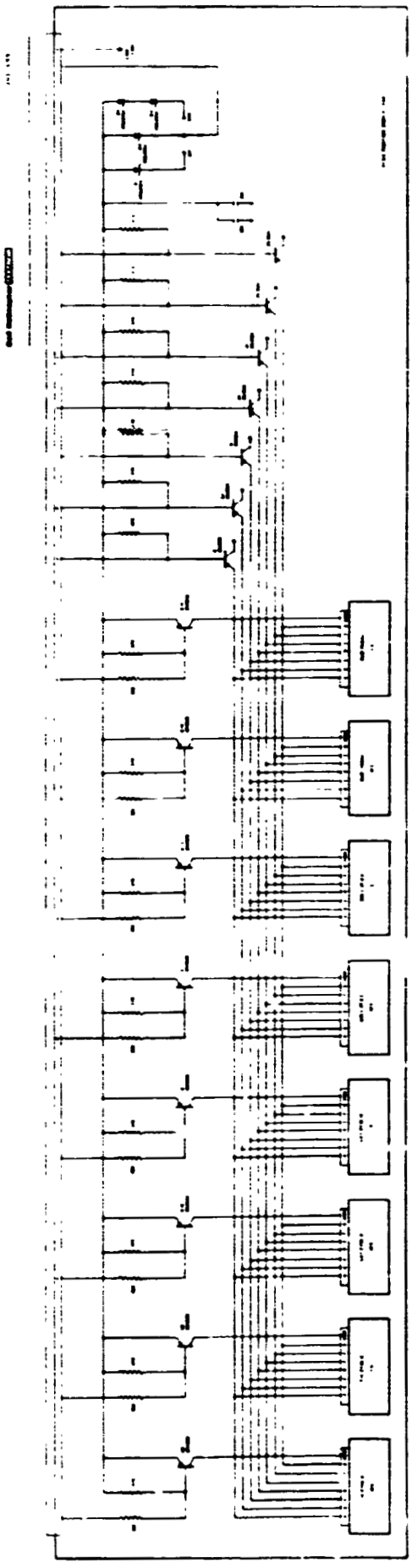


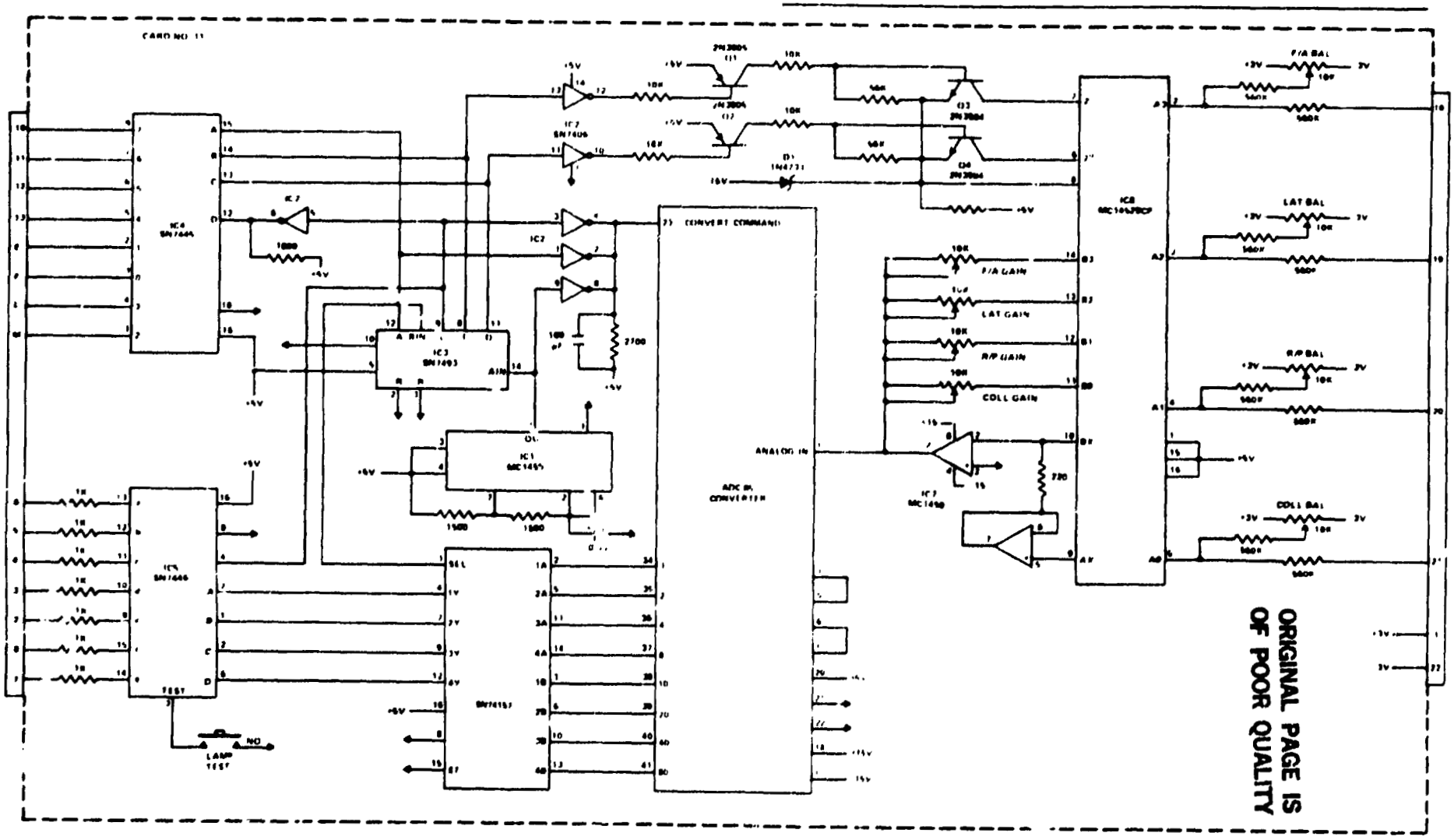
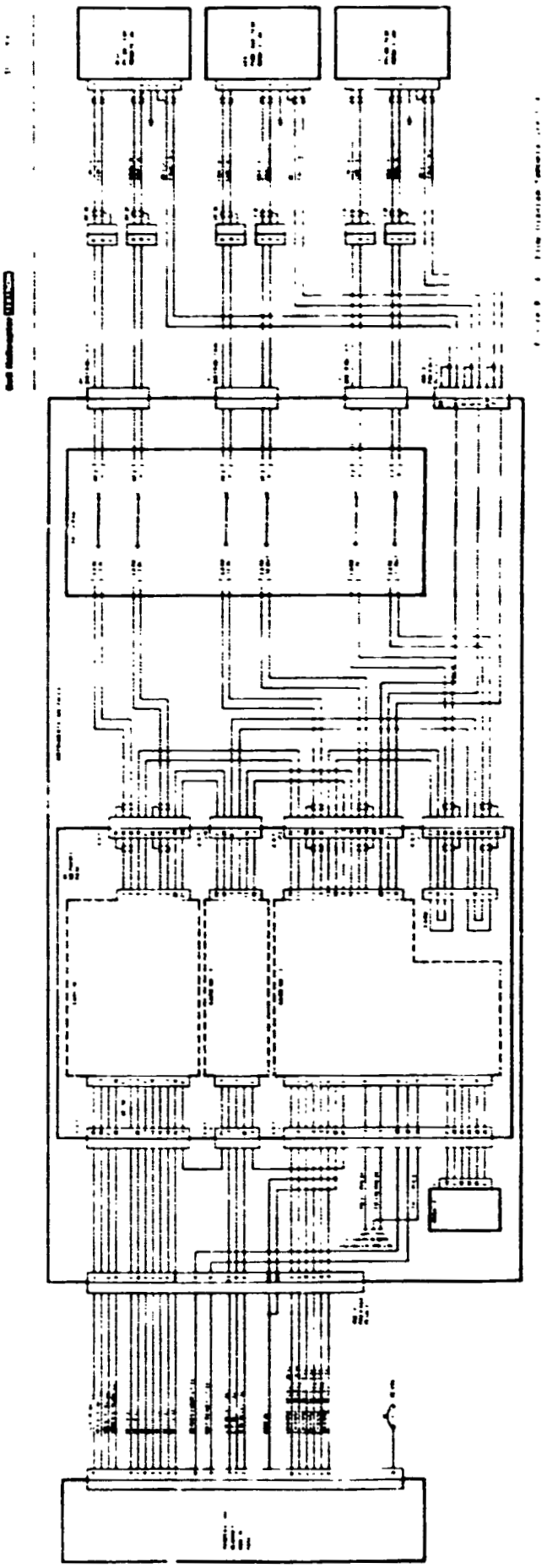


Figure BHT-3. Stick Positions AND Card 11



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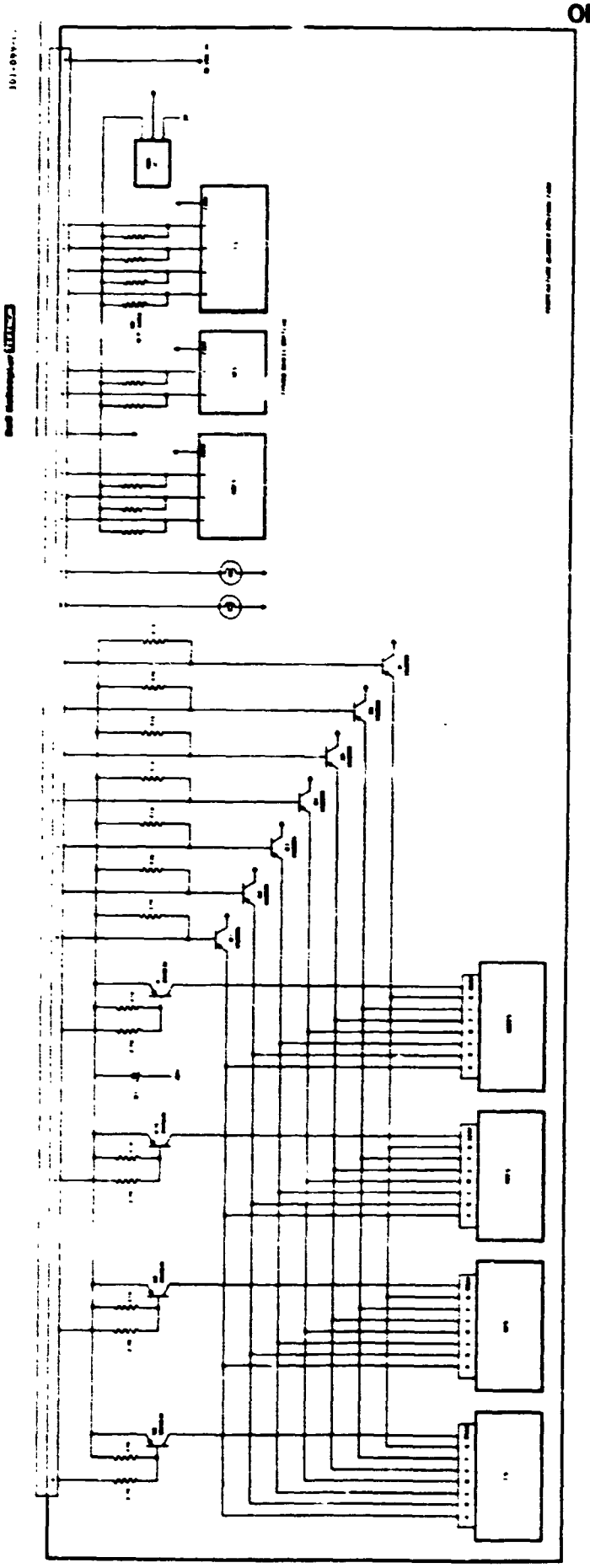

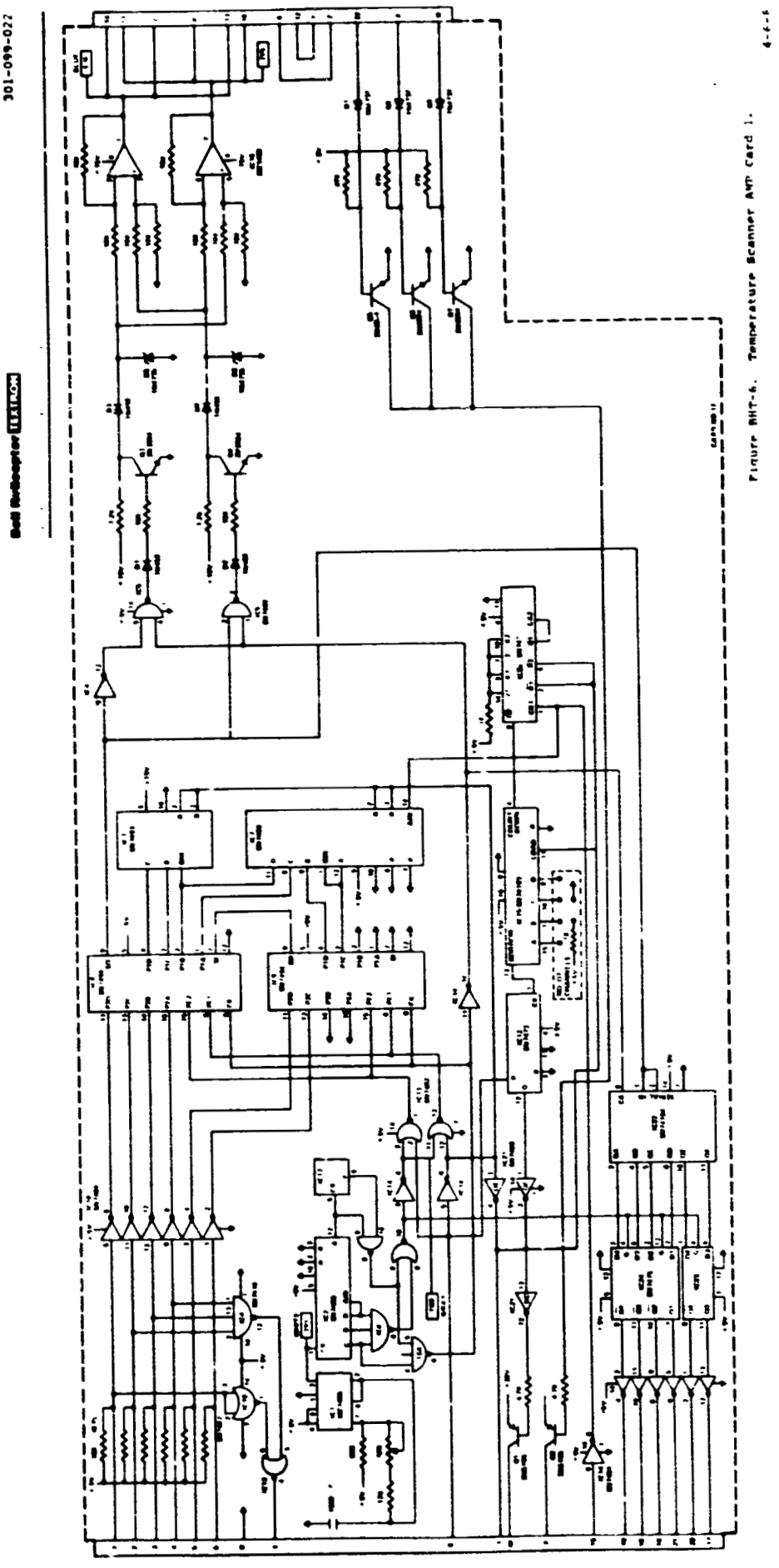

Figure RHT-6. Temperature Scanner AMP Card 1.

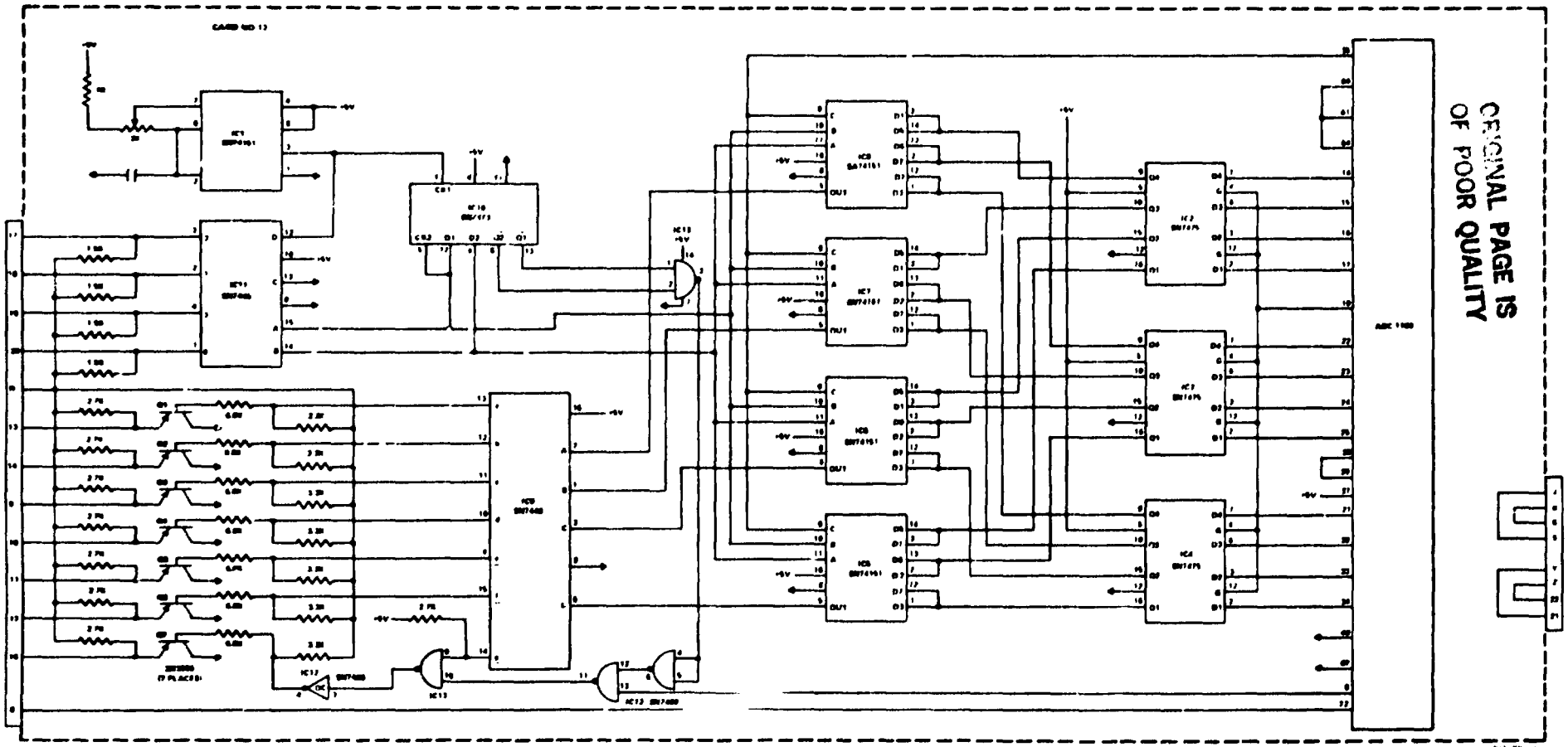

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Figure RHT-7. Temperature Scanner AMP Card 13

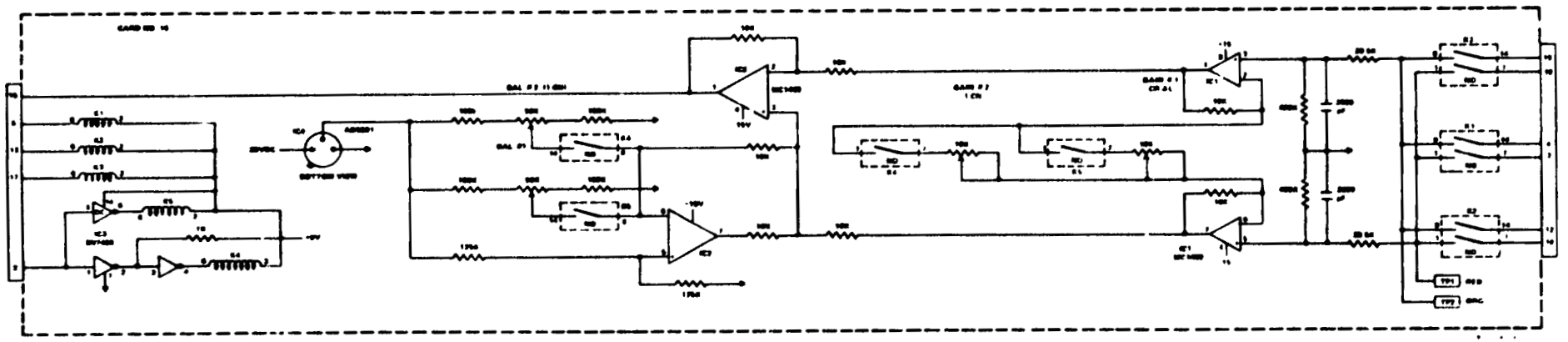

Figure BIT-8. Temperature Scanner ANT Card 1/

4-4-1

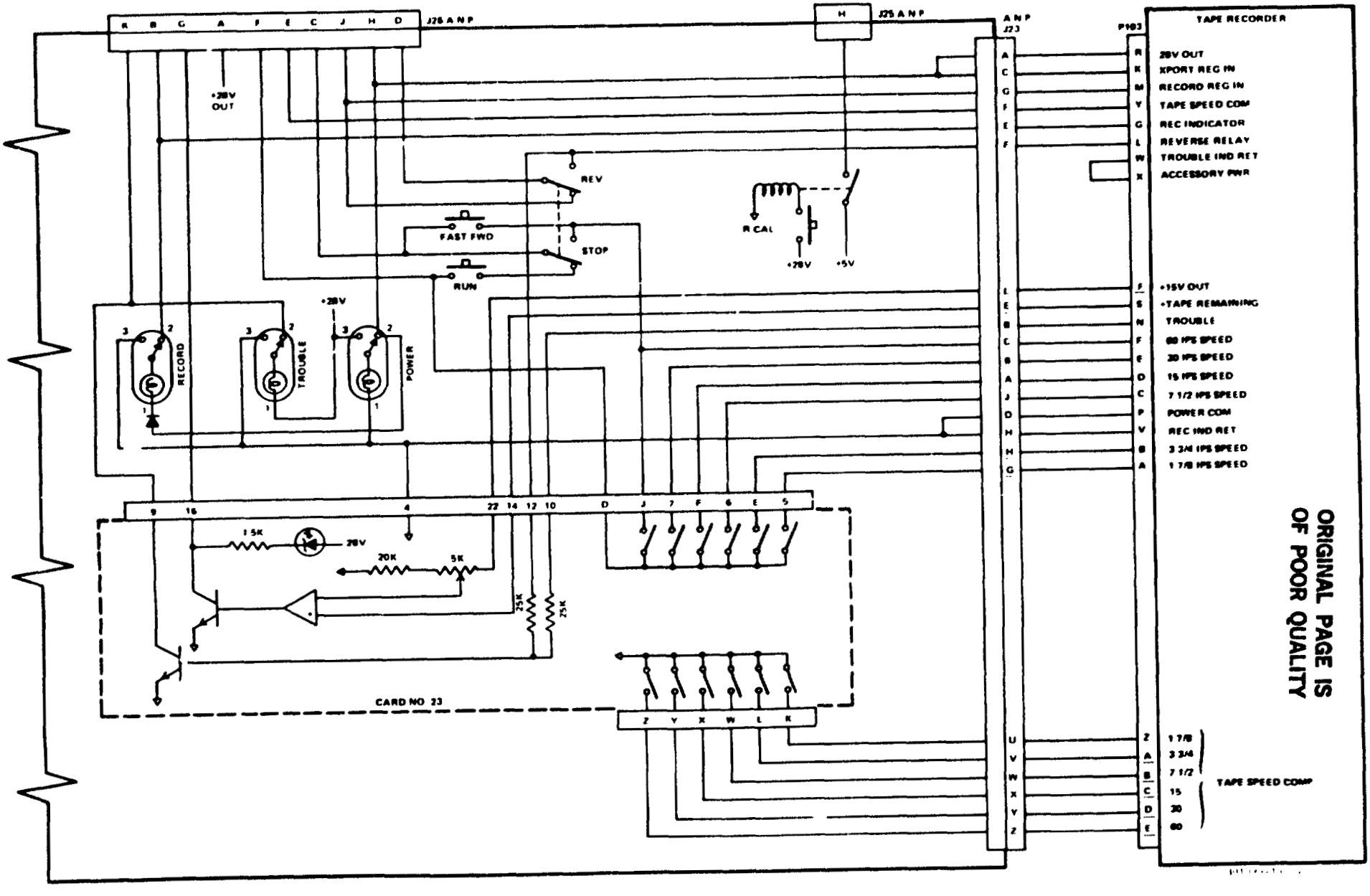

Figure BHT-9. Tape Deck Control

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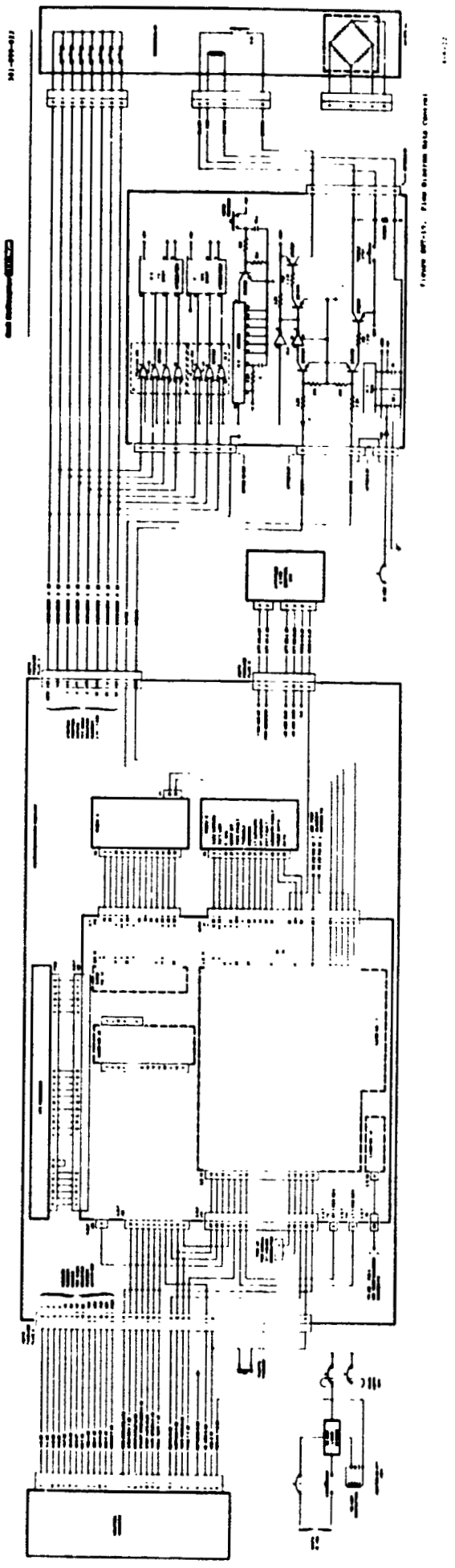

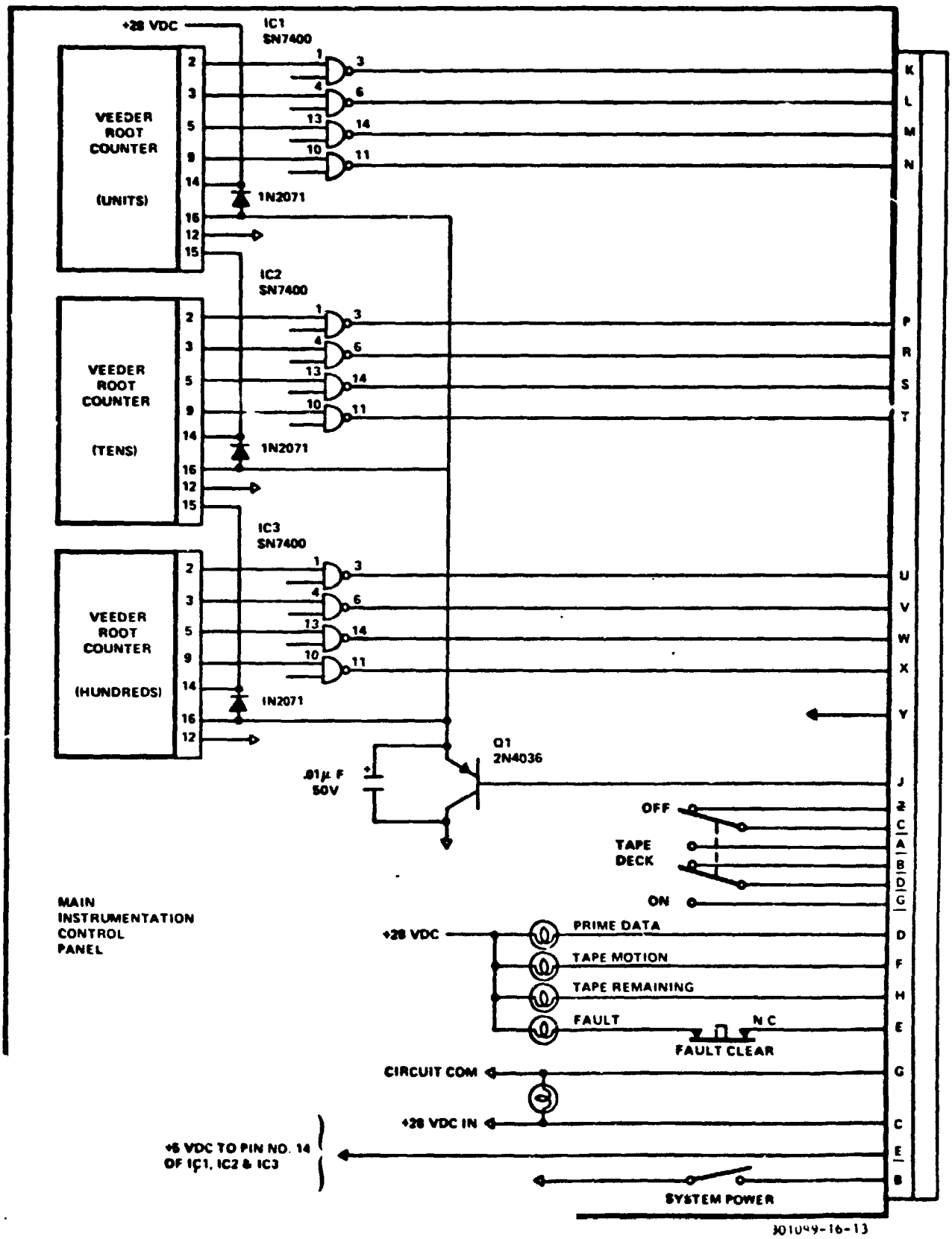

Figure BHT-11. Control Monitor Panel

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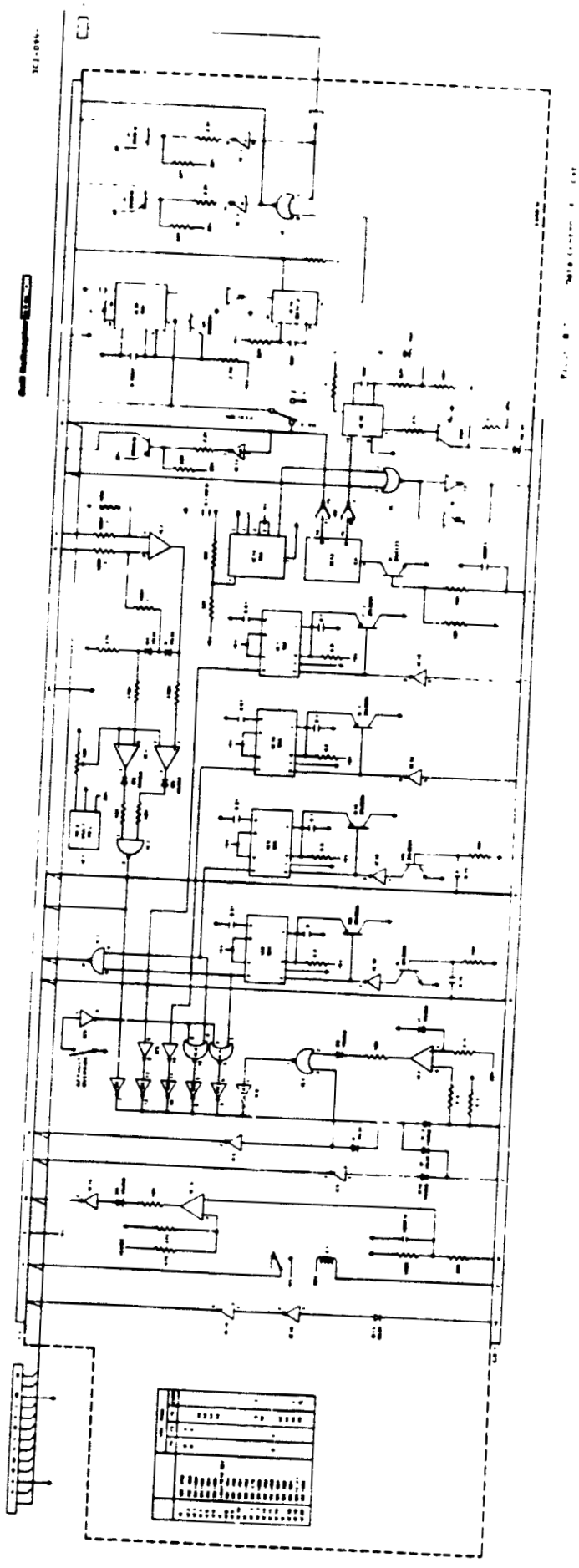

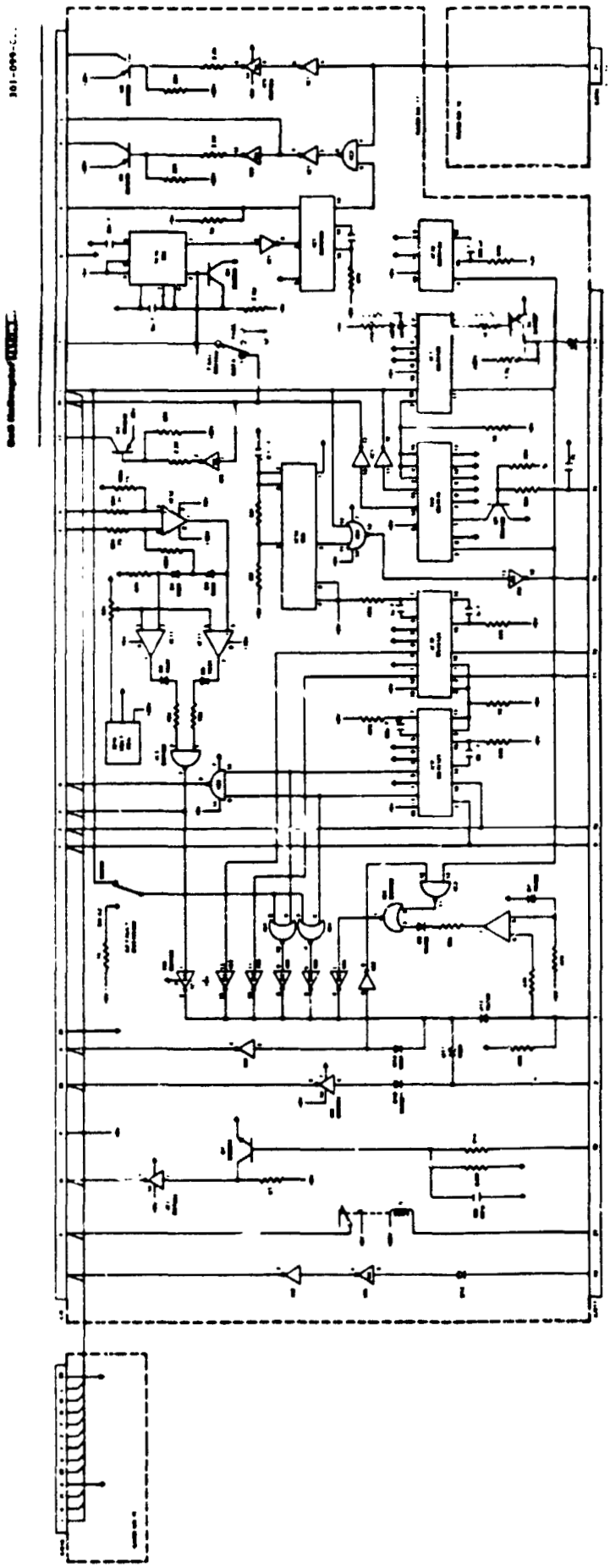

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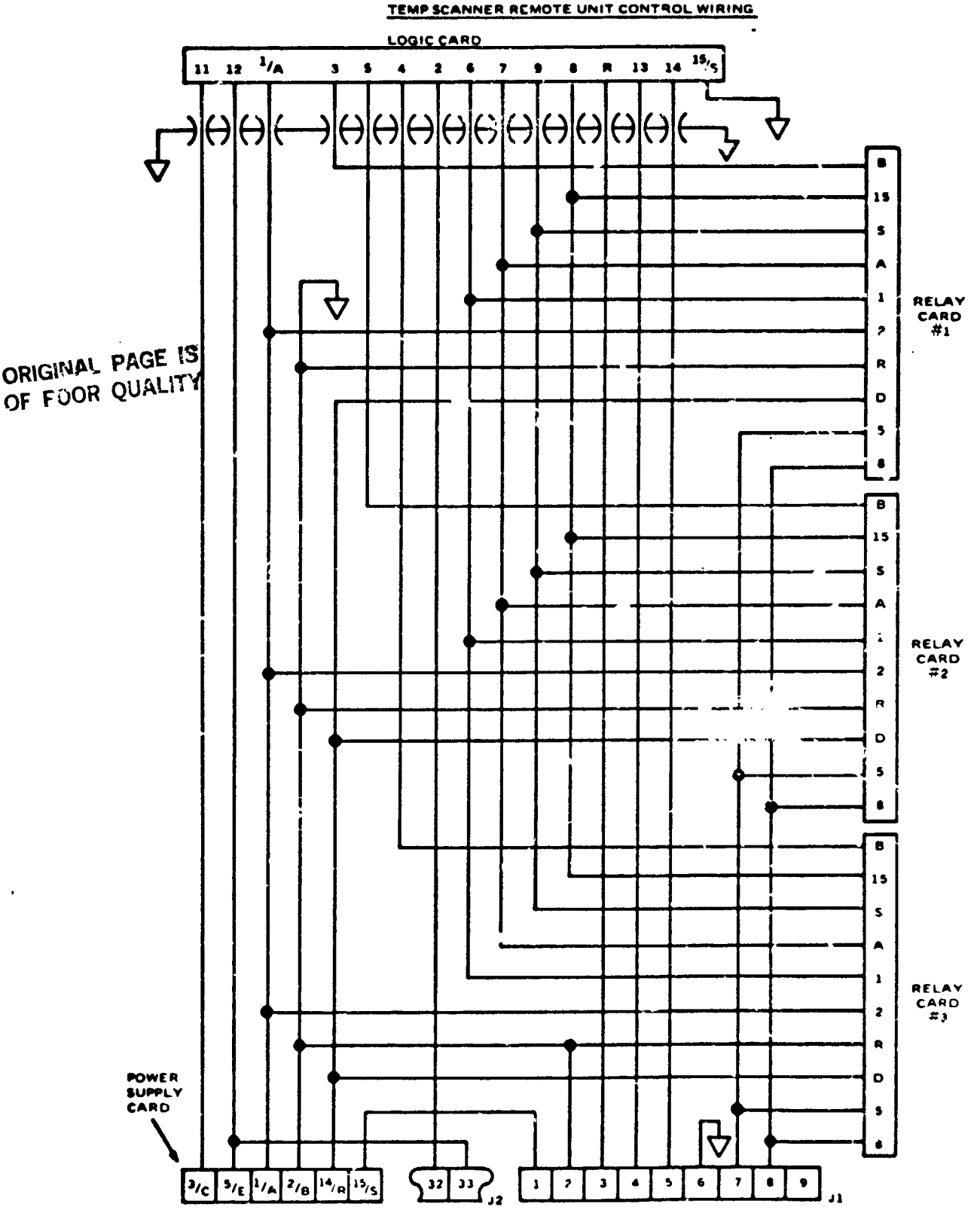

Figure BHT-14. Temperature Scanner Remote Unit - Internal Wiring (Sheet 1 of 9)

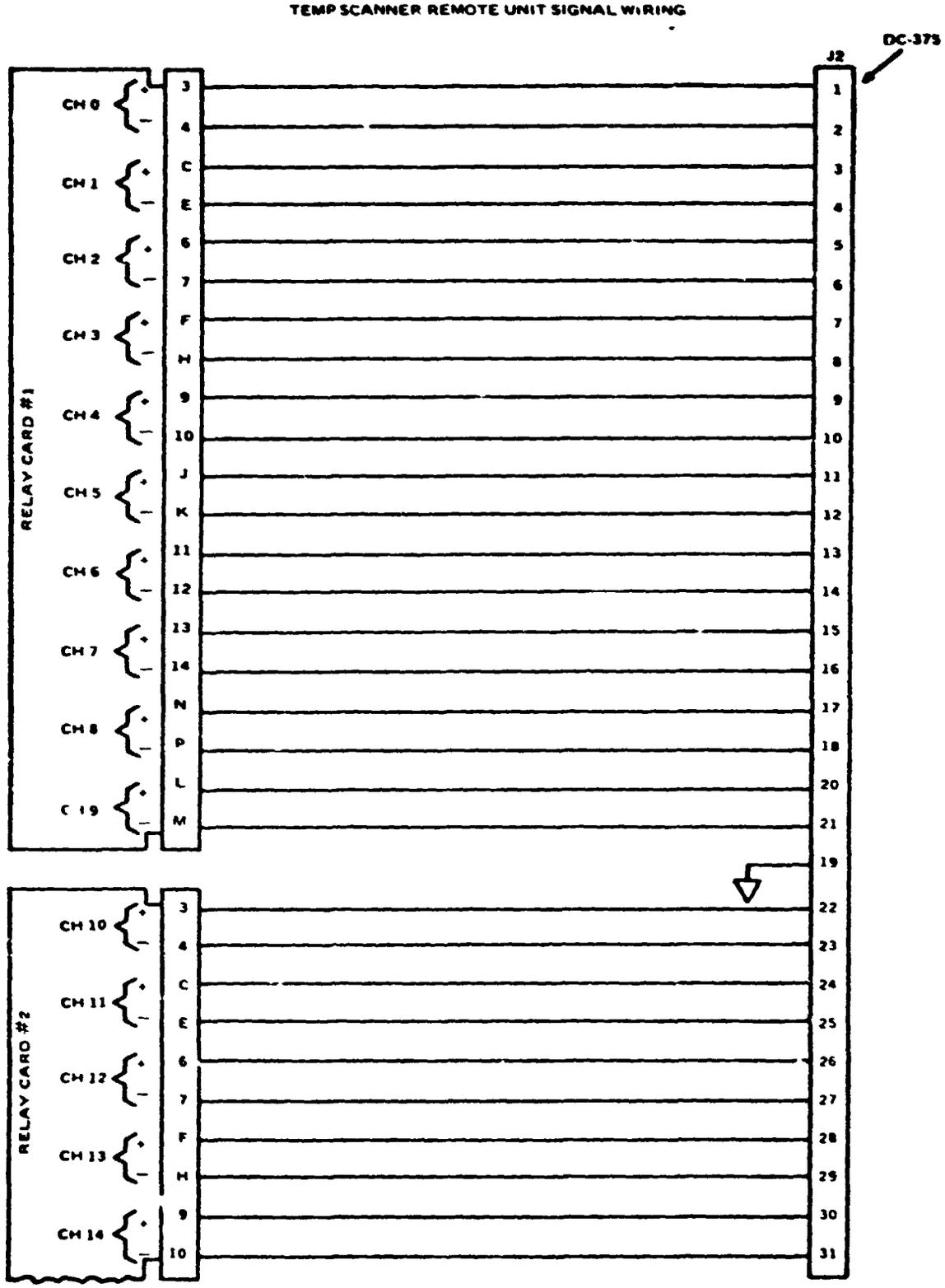

Figure BHT-14. Temperature Scanner Remote Unit - Internal Wiring (Sheet 2 of 9)

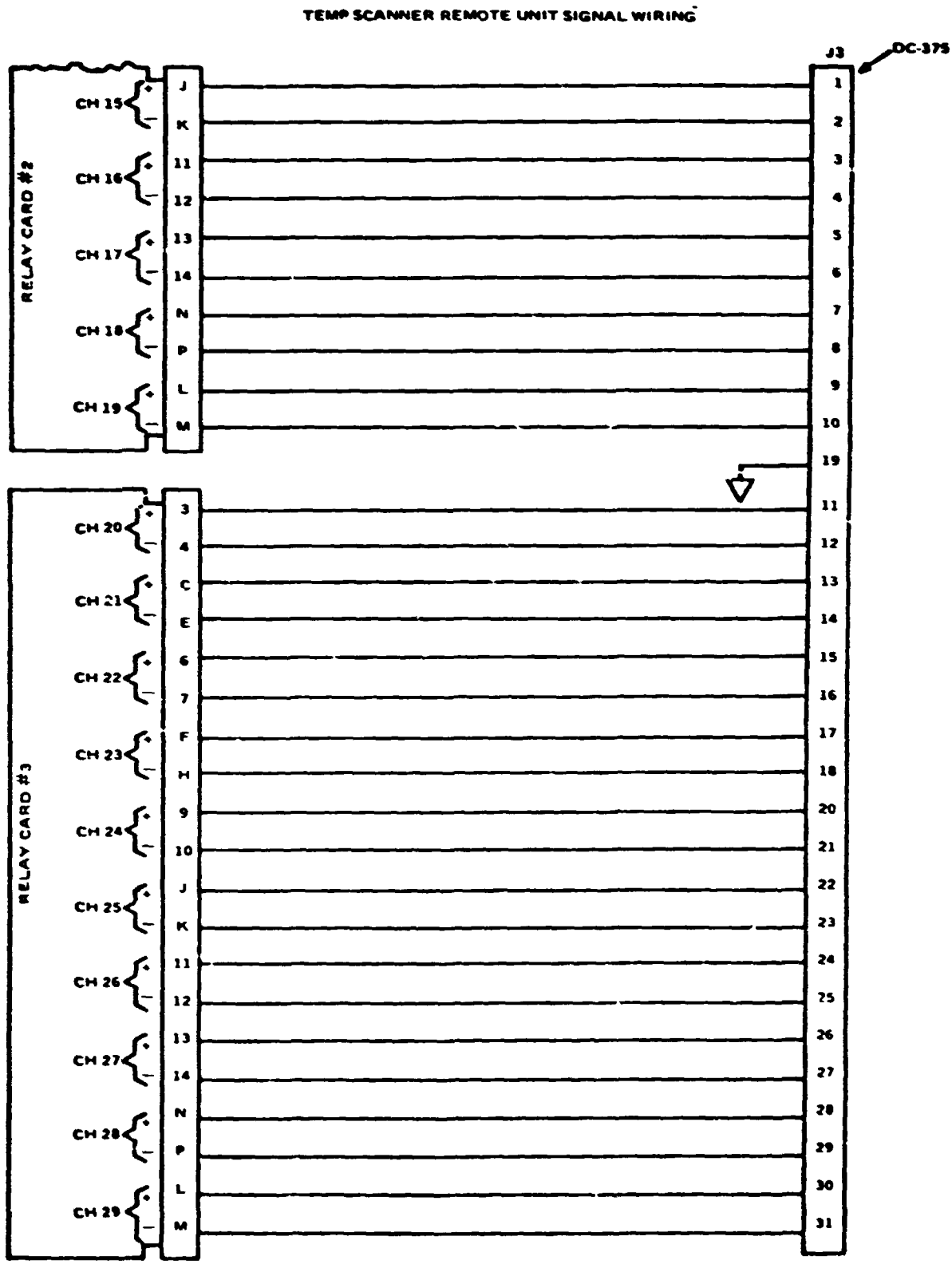

Figure BHT-14. Temperature Scanner Remote Unit - Internal Wiring (Sheet 3 of 9)

RELAY CARD SIGNAL WIRING

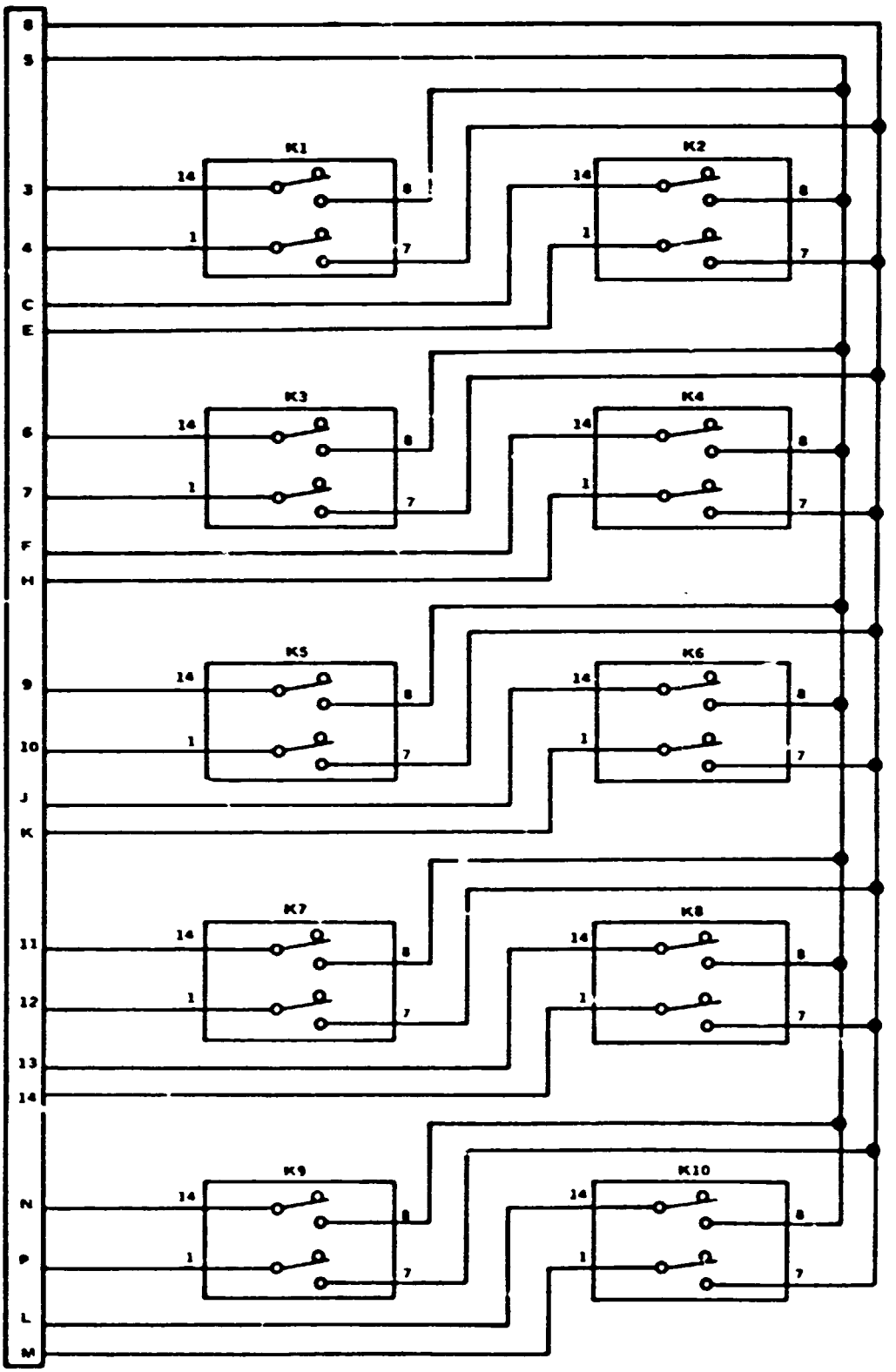

Figure BHT-14. Temperature Scanner Remote Unit - Relay Card Schematic (Sheet 4 of 9)

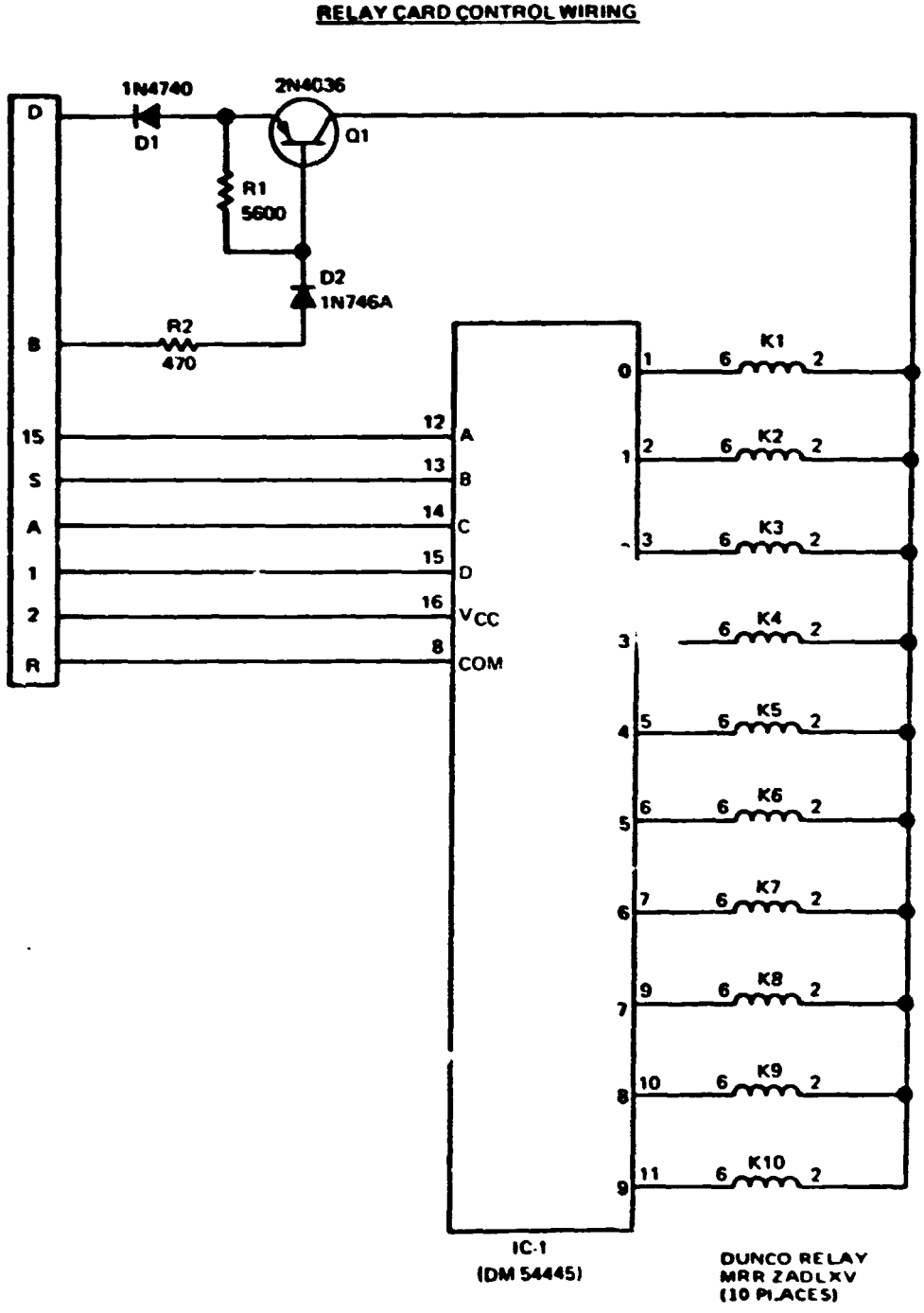

Figure BIT-14. Temperature Scanner Remote Unit - Relay Card Schematic (Sheet 5 of 9)

RELAY CARD COMPONENT LOCATION

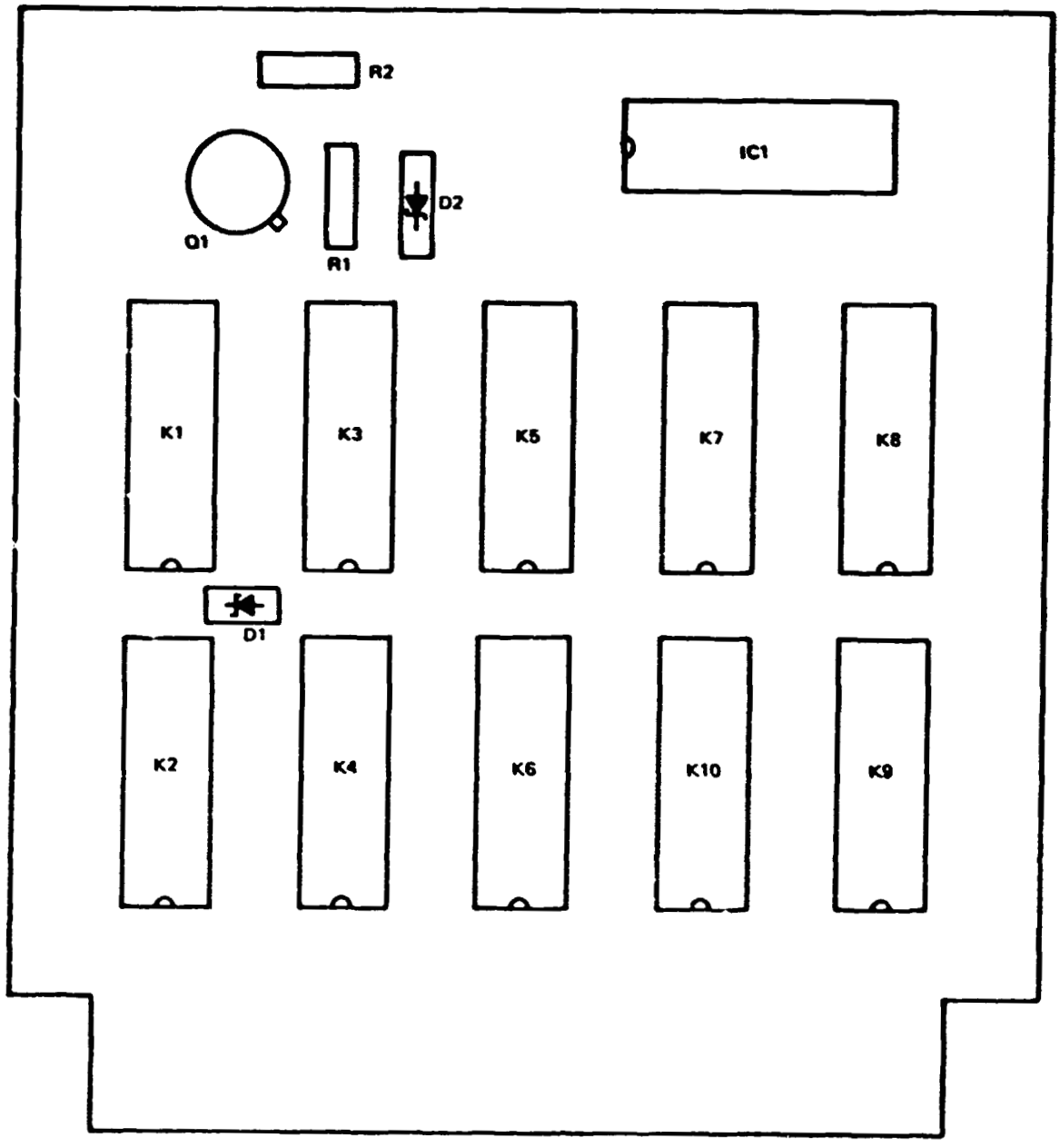

Figure BHT-14. Temperature Scanner Remote Unit - Relay Card Layout (Sheet 6 of 9)

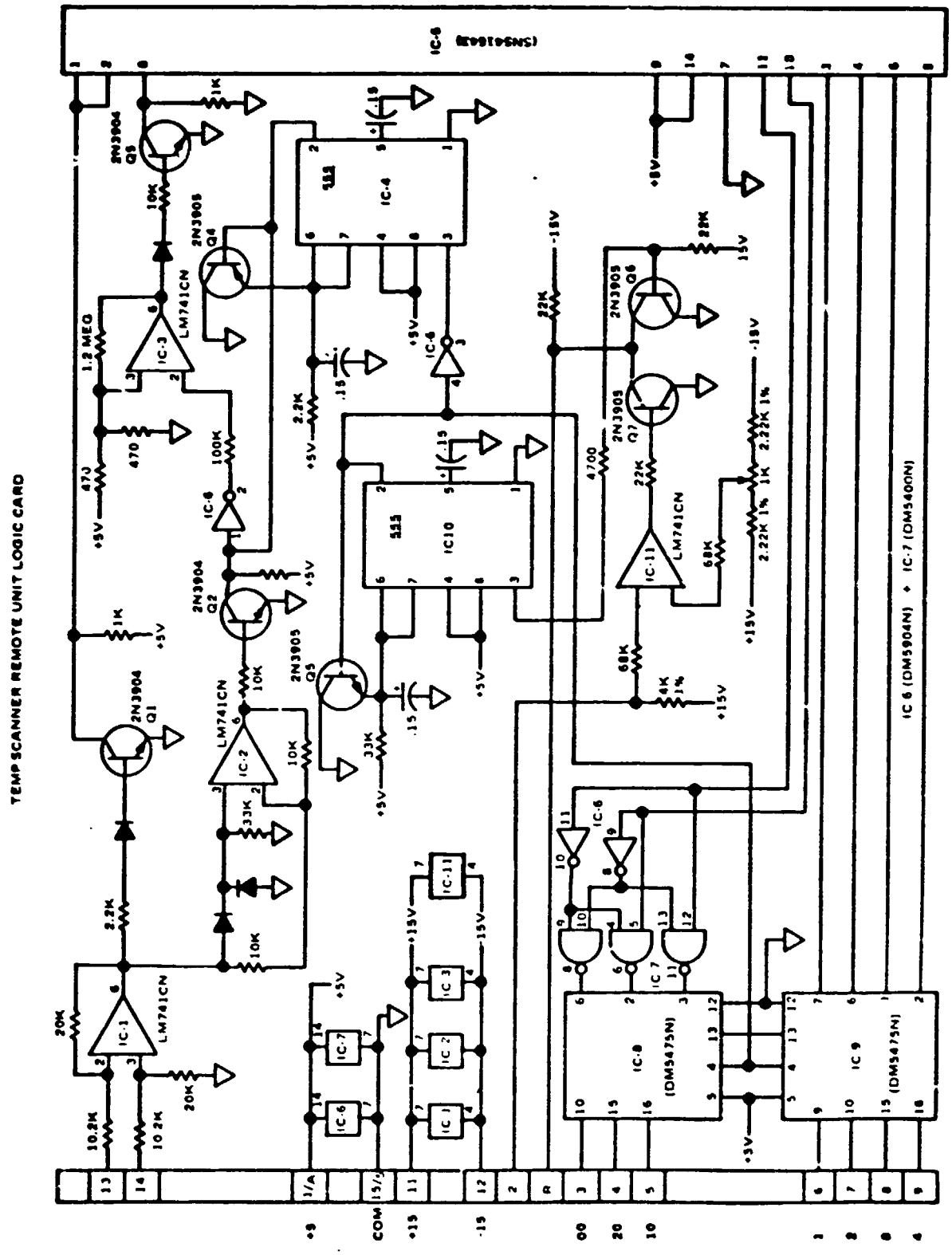

Figure BHT-14. Temperature Scanner Remote Unit - Logic Card Schematic (Sheet 7 of 9)

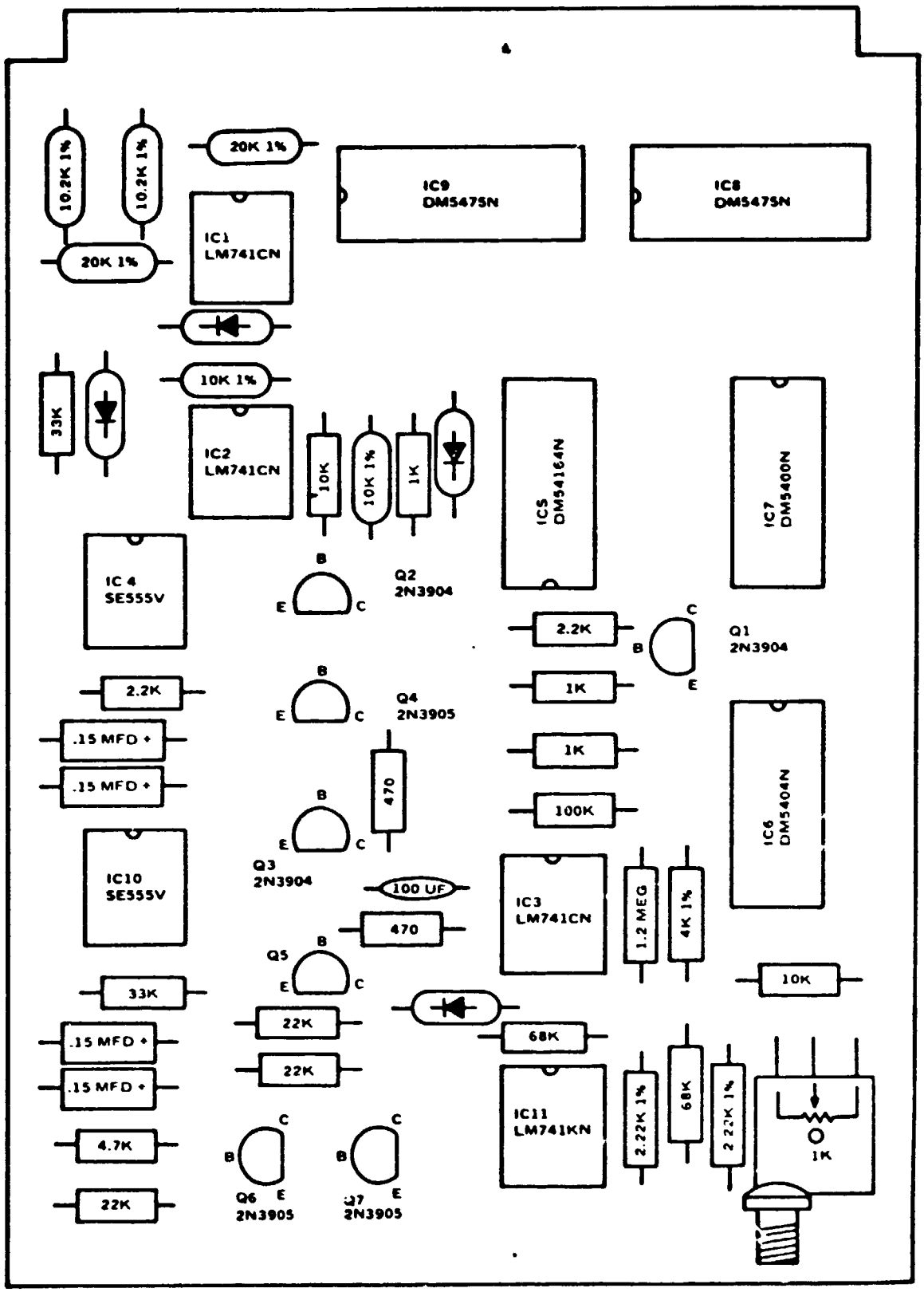

Figure BHT-14. Temperature Scanner Remote Unit - Logic Card Layout (Sheet 8 of 9)

TEMP SCANNER REMOTE UNIT POWER SUPPLY

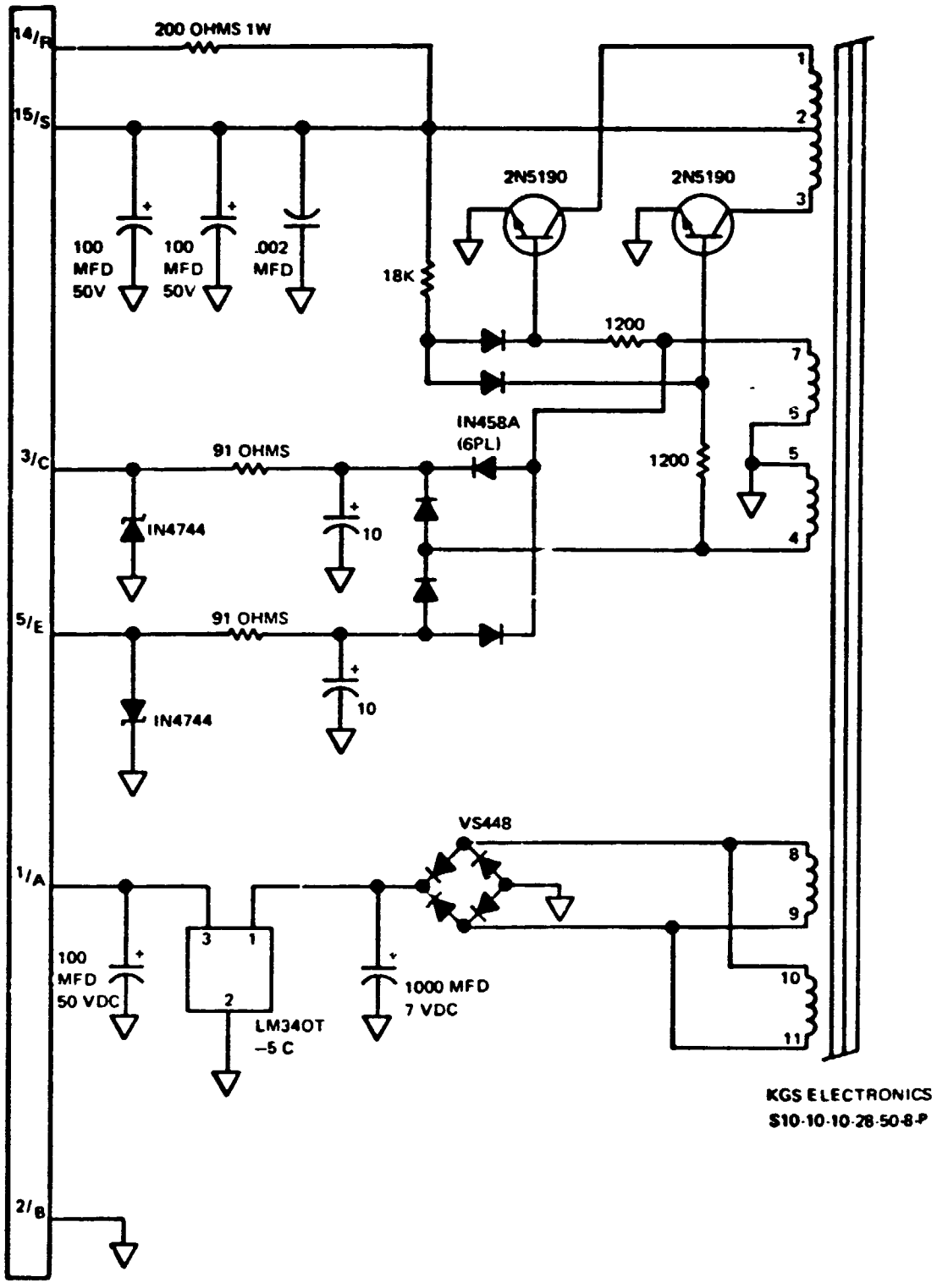

Figure BHT-14. Temperature Scanner Remote Unit - Power Supply Card (Sheet 9 of 9)

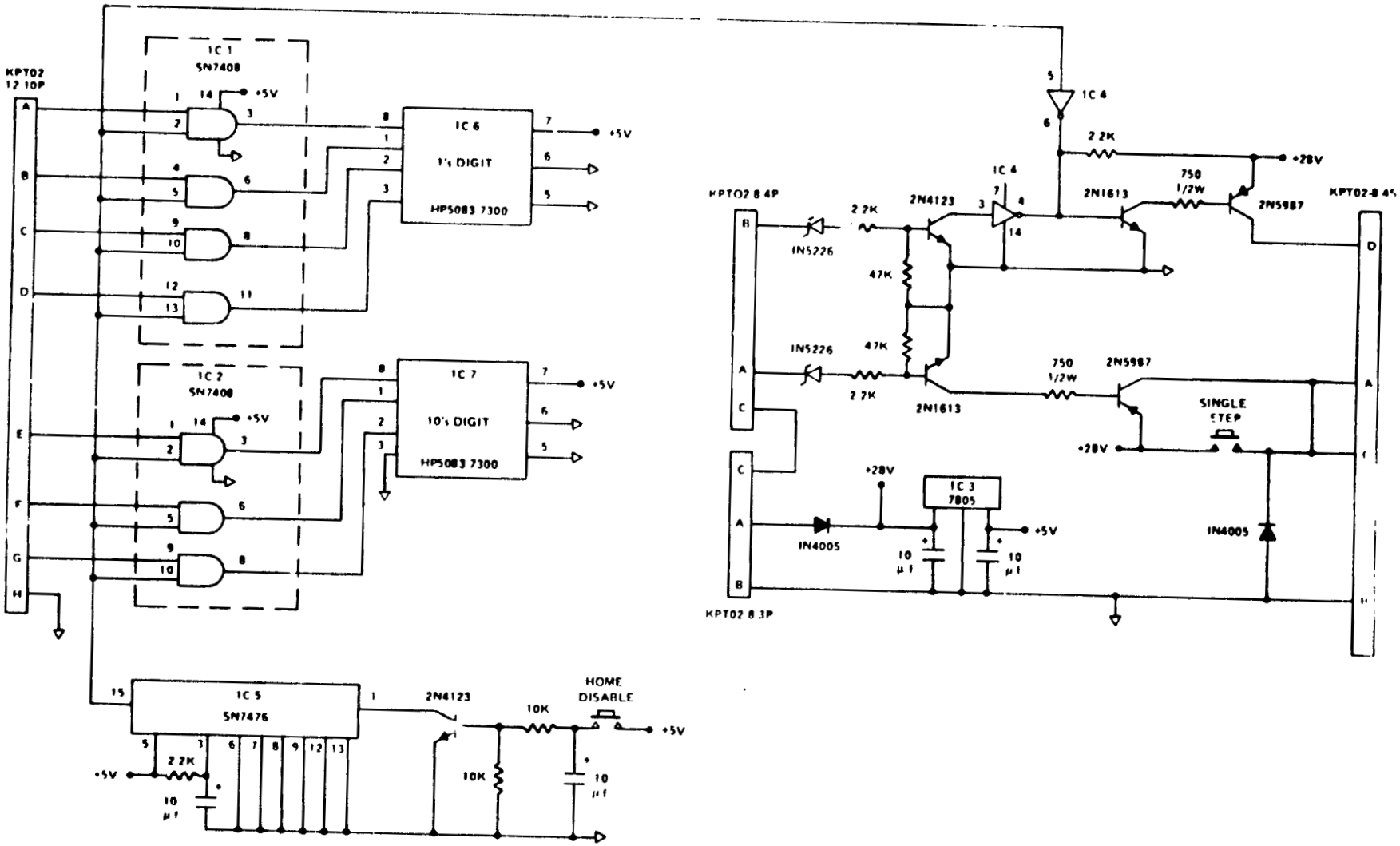

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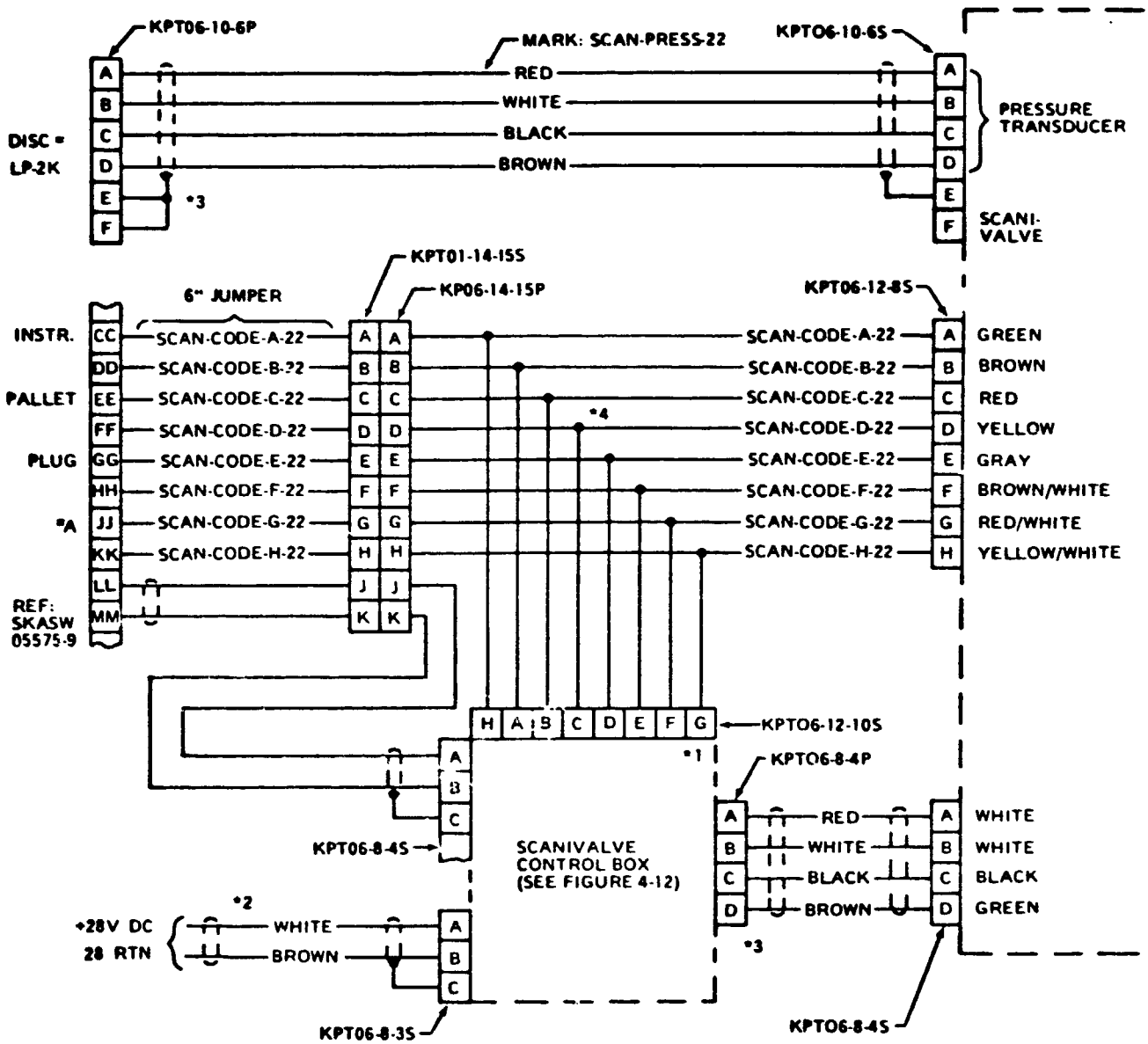
Figure BHT-15. Scanivalve Control Box



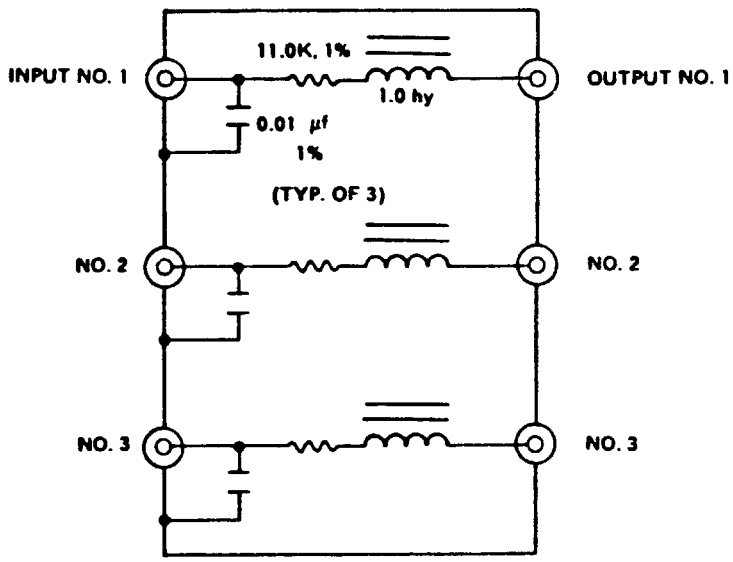
*1-CONTROL BOX MOUNTED ON LEFT PYLON
*2-USE 2 CONDUCTOR, 20 GAGE ORANGE WIRE
*3-USE 4 CONDUCTOR, 22 GAGE ORANGE WIRE
*4-MAKE THESE SPLICES AT THE SCANIVALVE CONNECTOR

SCANIVALVE CONTROL WIRING

301099-13

Figure BHT-16. Scanivalve Control Wiring

ENGINE VIBRATION ACCELEROMETER FILTER

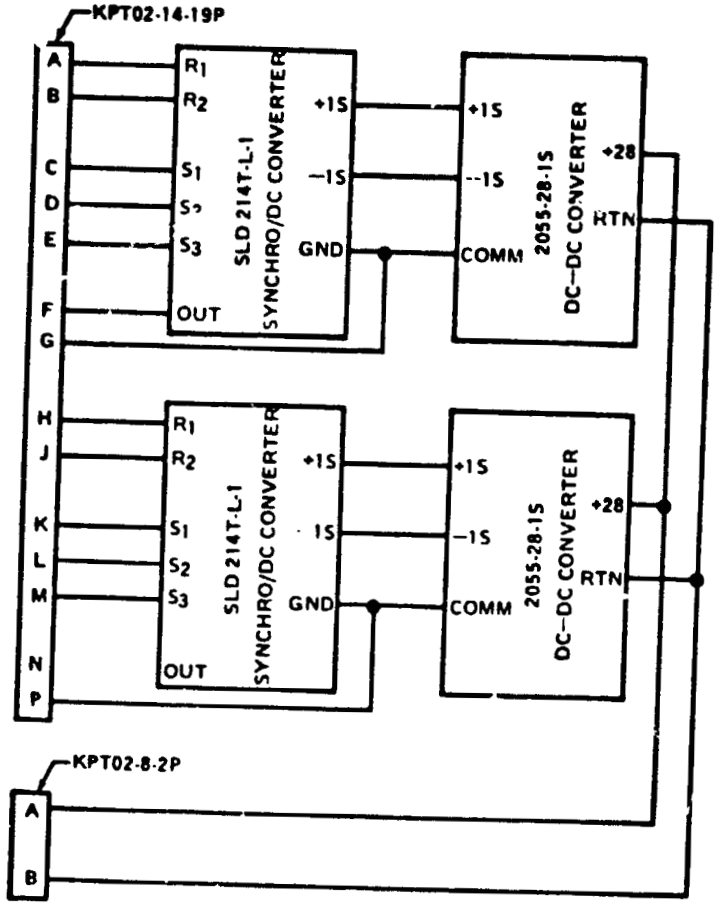


1. CONNECTORS ARE FOR MICRODOT CABLE
2. INDUCTORS ARE TRIP-UTRAD EC-1000
3. CAPACITORS ARE VITRAMON VK30BA103F
4. ACCELEROMETERS TO INPUTS, OUTPUTS TO CHARGE CONVERTERS. DO NOT REVERSE.

301099-15

Figure BHT-17. Engine Vibration Accelerometer Filter

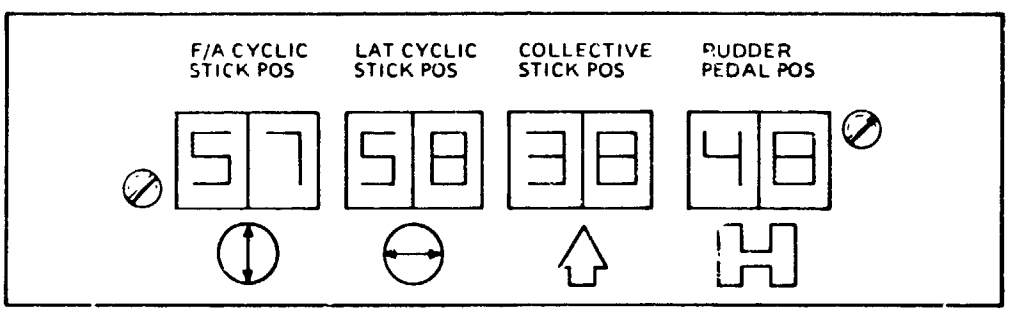
SYNCHRO CONVERTER CONTROL UNIT



301099-18

Figure BHT-18. Synchro Converter Control Unit

CONTROL POSITION INDICATOR

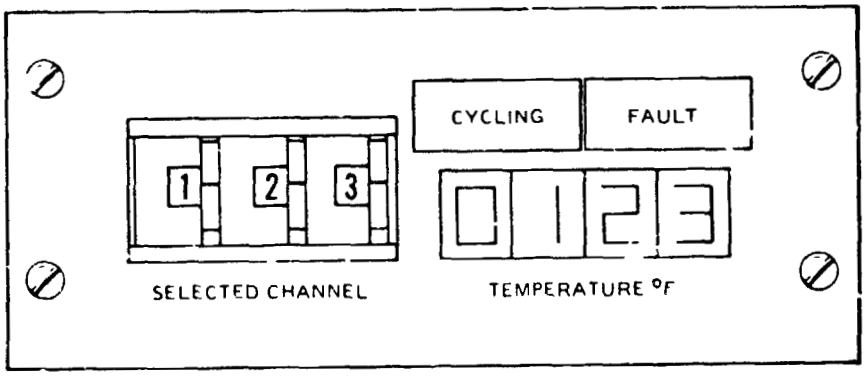


301075-20

NOTE:

Control Positions are as follows:
F/A Cyclic Stick — 0% Full Aft, 100% Full Forward
Lateral Stick — 0% Full Left, 100% Full Right
Collective Stick — 0% Full Down, 100% Full Up
Rudder Pedal — 0% Full Left, 100% Full Right
100% — 00

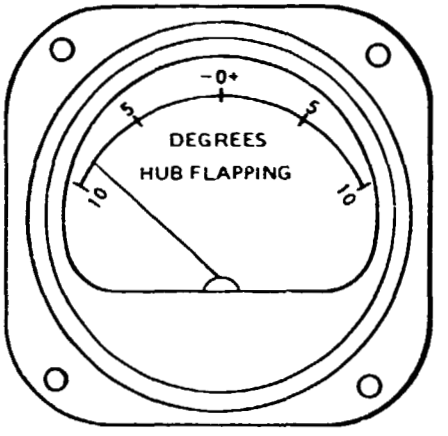
Figure BHT-19. Control Position Indicator



301075-22

Figure BIIT-20. Temperature Monitor

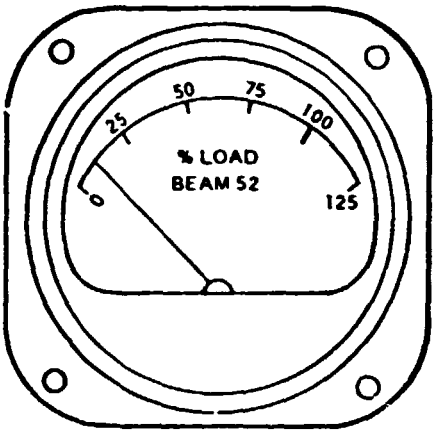
ROTOR FLAPPING INDICATOR



301075-23

Weston Meter: 50—0—50 μ amp

Figure BHT-21. Flapping Indicator

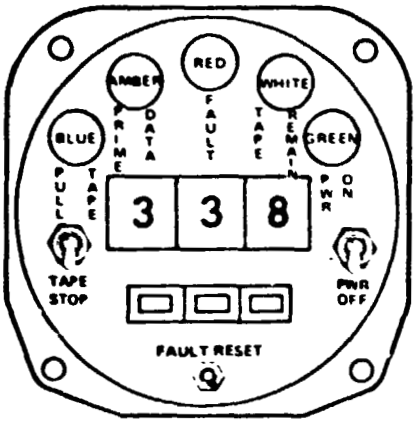


GREEN ARC — 0 TO 100%

RED ARC — 100 TO 125%

301075-24A

Figure BHT-22. Critical Load Meter



301075-25A

Figure BHT-23. Control - Monitor

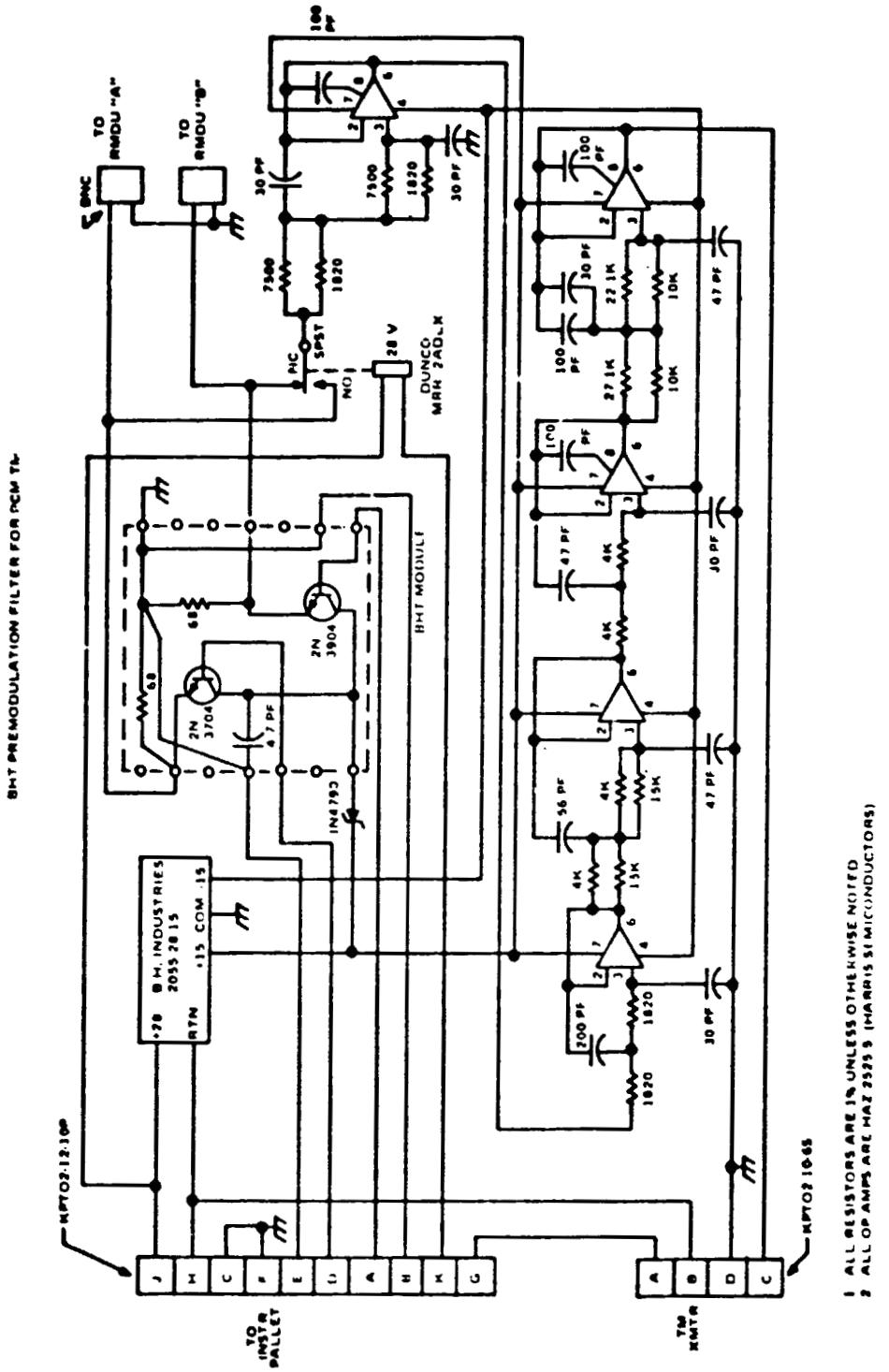
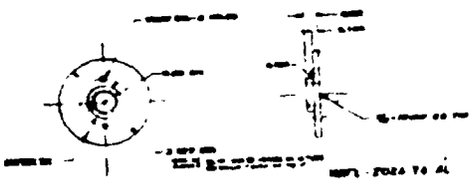
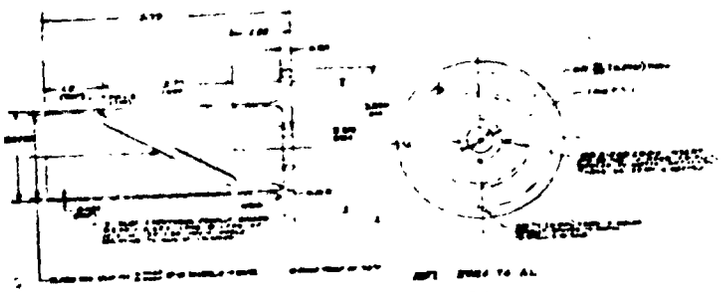


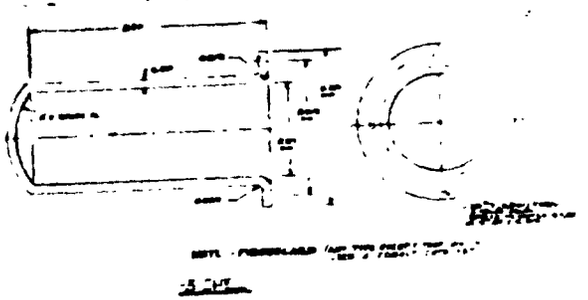
Figure BHT-24. BHT Premodulation Filter For PCM TM



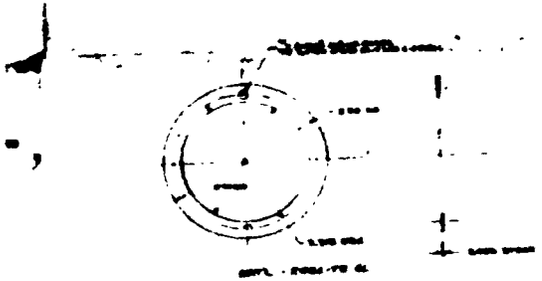
-9 COVER



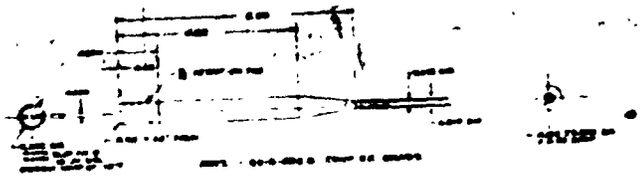
-5 STUD



-3 CAP



-11 RING



-7 ELECTRODE

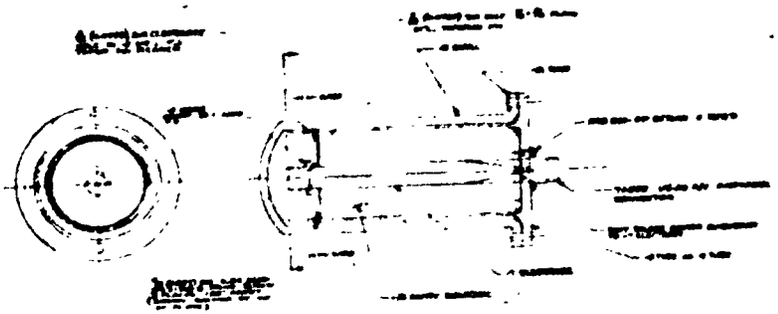
NOTES:

1. THIS IS A COPY OF THE [illegible] BAND HELICAL SLOT ANTENNA DESIGNATE BY [illegible] AND MODIFIED TO [illegible] BY [illegible]

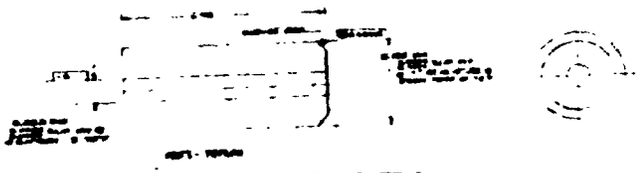
2. BREAK ALL SHARP EDGES

3. [illegible] COVER TO BE DETERMINED BY THE [illegible]

4. SECTION LINES NOT SHOWN



-1 ASSEMBLY



-13 CAVITY DIELECTRIC

INSTRUMENTATION [illegible] BAND HELICAL SLOT ANTENNA [illegible]

97699 74 IL 003

CFE TECHNICAL DATA

Bourns (80294)

Potentiometer, Linear, 12-Inch	80294-2001941502
Potentiometer, Linear, 6-Inch	80294-2001841100

BOURNS®

AEROSPACE VERSION MODEL 194 AVAILABLE

MODEL 5194

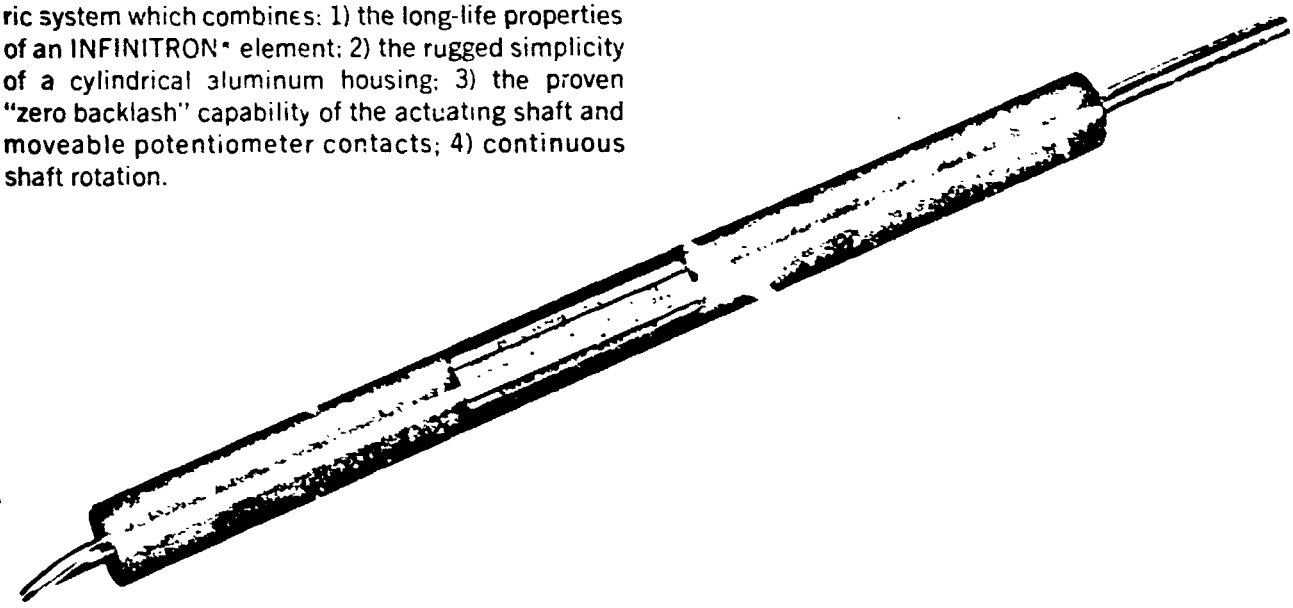
LONG TRAVEL LINEAR POSITION TRANSDUCER

PRODUCT DESCRIPTION

The 5194 offers a convenient method of measuring displacement in actuators, valves and linkage systems. It is a high-performance instrument designed to provide a precise electrical signal proportional to the actual physical position of the actuated shaft.

The transducer is an infinite resolution potentiometric system which combines: 1) the long-life properties of an INFINITRON* element; 2) the rugged simplicity of a cylindrical aluminum housing; 3) the proven "zero backlash" capability of the actuating shaft and moveable potentiometer contacts; 4) continuous shaft rotation.

Utilizing a voltage divider network, the 5194 will provide the user with an analog signal proportional to element position. This signal can be directly used in recording, monitoring, control and telemetry systems.



FEATURES

- INFINITRON Element Provides Continuous Resolution
- Long Life
- Single and Dual Output (special order)
- Compact size — ¾" diameter
- Low Cost
- Rugged Construction
- Sand, Dust and Fungus Protection

PRINCIPLE OF OPERATION

The transducer contacts are positioned along a precision electrical element which varies the resistance. Excited by either an AC or DC input voltage, mechanical backlash is eliminated by a positive connection between the shaft and contact assembly.

LONG TRAVEL LINEAR POSITION TRANSDUCER

SPECIFICATIONS

Standard Ranges ..... 8, 12, 16, 20 inches

Linearity 0.5%

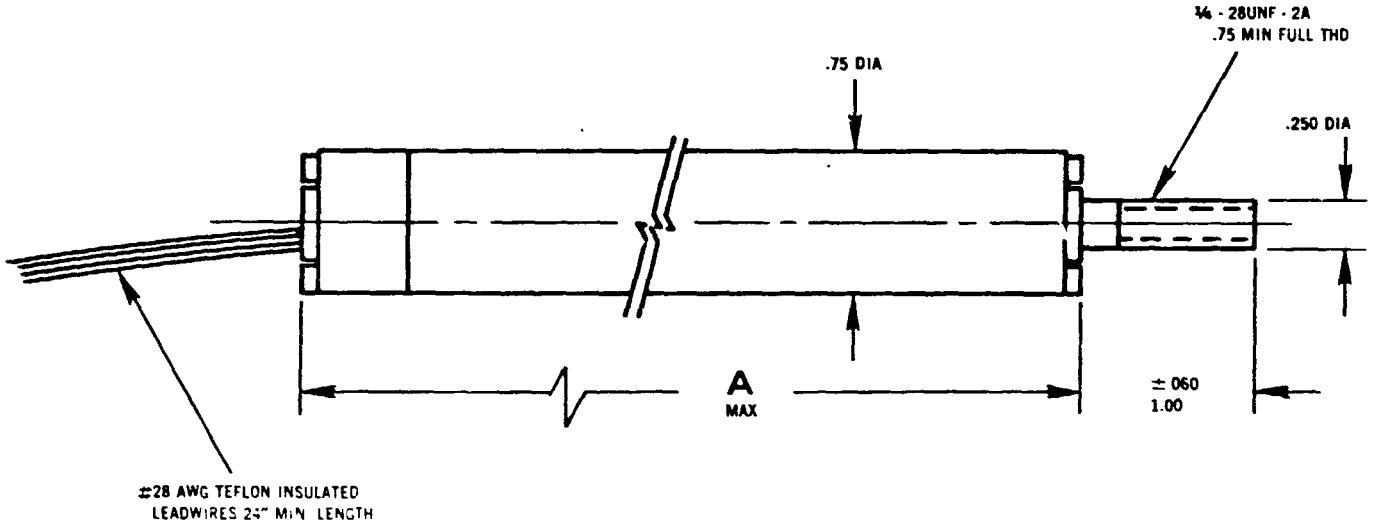
Resistance ..... 500 ohms/in.

Insulation Resistance ..... @ 500 VDC, 50 megohms

Power Rating ..... 1.0 watt/inch @ 70°F
0.1 watt/inch @ 225°F

Shaft Actuation Force ..... 1 lb. maximum

Life ..... Full Scale — 10^6 cycles
Dither — 40×10^6 cycles



RANGE	RESISTANCE	A DIM
8.00	4KΩ	11.00
12.00	6KΩ	15.00
16.00	8KΩ	19.00
20.00	10KΩ	23.00

ORDERING INFORMATION

Specify range and if single or dual output is required

BOURNS INSTRUMENT DIVISION
6135 MAGNOLIA AVE. • RIVERSIDE, CALIF. 92506
TELEPHONE: 714 684 1700 TWX 910-332-6105

LITHO IN USA

BOURNS INC

Model 184
Linear Position Transducer

CONDUCTIVE PLASTIC — CONTINUOUS RESOLUTION

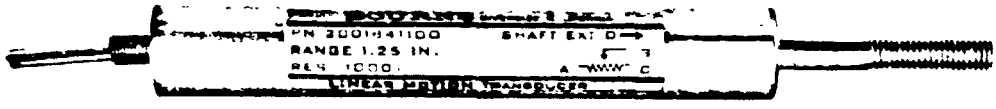
DESCRIPTION

Bourns Model 184 Linear Motion Potentiometer is a rugged, miniature instrument designed for internal installation in hydraulic actuators and other telescoping assemblies. The ½" diameter case with concentric actuating shaft is sealed against contamination when operating in hydraulic fluids or high humidity conditions.

Model 184 features Bourns exclusive INFINITRON® Conductive Plastic Element. The simplicity of the basic design provides exceptional performance even when subjected to the extreme shock, vibration and acceleration conditions typical of missile and aircraft applications.

Standard travel ranges are from 1" to 4". Special end fittings, electrical connectors, with taps, switches, and potentiometer elements with special characteristics can be incorporated in the basic design to meet your requirements.

actual size



FEATURES

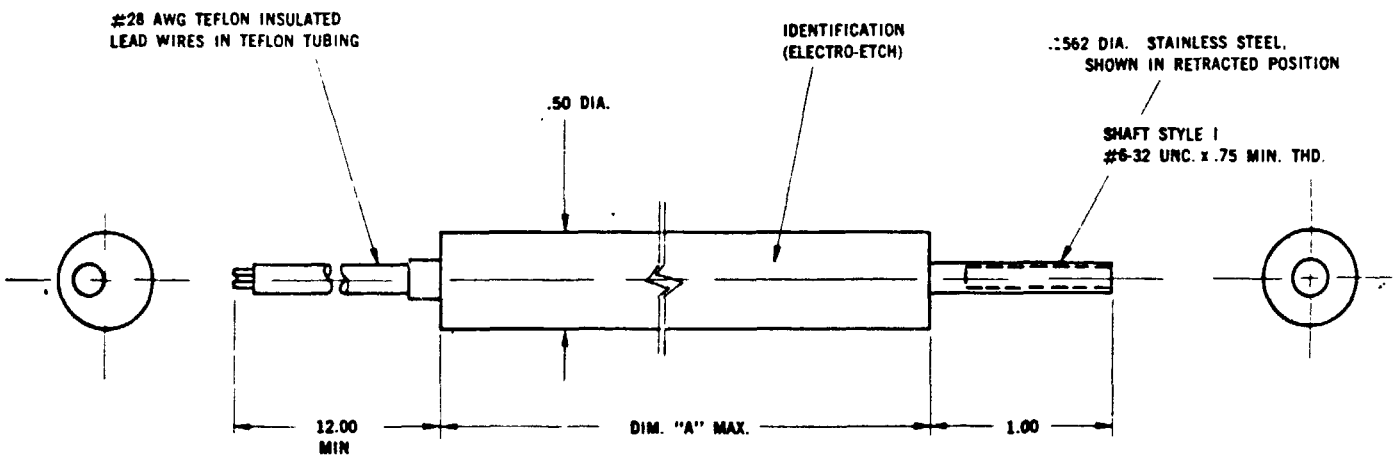
- Bourns INFINITRON element provides continuous resolution.
- Compact case: ½ inch diameter.
- Designed to mount inside hydraulic actuators.
- Long life: 1 million cycles full scale.
  40 million cycles — dither.
- Linearity: ±0.5 percent.
- High level output.

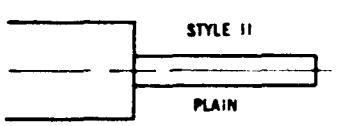
SPECIFICATIONS

Measurement Range	1, 2 and 4 inches
Standard Resistances	1,000, 2,000 and 10,000 ohms
Resistance Tolerance	±10 percent
Resolution	Continuous
Residual Voltage Ratio at Range Extremities	0.1 - 3.0 percent
Power Rating	
70°F	0.5 watt/inch
225°F	0.1 watt
Insulation Resistance	50 megohms at 500 volts DC
Independent Linearity (continuous plot)*	±0.5 to ±1.0 percent
Life — Full Scale	1,000,000 cycles
— Dither	40,000,000 cycles
Mechanical Travel	Equal to or greater than measurement range
Shaft actuation force	1 pound maximum
Mechanical backlash	None
Shaft Rotation	Continuous
Temperature Range	—65 to +225°F
Vibration Without Electrical Discontinuity or Error Greater than 0.5 Percent	10Gs, 20-2,000 Hz
Acceleration Without Electrical Discontinuity or Error Greater than 0.5 Percent	100Gs
Shock	15 Gs
Humidity	Resistance change: less than ±2 percent
Other Environments	Meets MIL-E-5272 for fungus, altitude, sand and dust

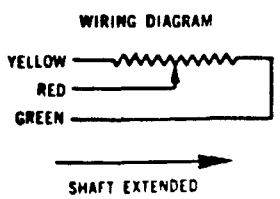
RANGE	RESISTANCE	DIM "A"	WEIGHT
1.00*	1000Ω	3.00	2.0 oz.
1.00*	5000Ω	3.00	2.0 oz.
2.00*	2000Ω	4.00	3.0 oz.
2.00*	5000Ω	4.00	3.0 oz.
4.00	5000Ω	6.00	6.0 oz.
4.00	10000Ω	6.00	6.0 oz.

*1.0% LINEARITY





NOTES:
1. WEIGHT. SEE CHART, APPROX.
2. CASE- STAINLESS STEEL.



SPECIFICATIONS AND DIMENSIONS SUBJECT TO CHANGE PER APPLICABLE CONTROL SPECIFICATION AND OUTLINE DRAWING

BOURNS

BOURNS, INC., INSTRUMENT DIVISION, 6135 MAGNOLIA AVE., RIVERSIDE, CALIF. 92506

LITHO IN U.S.A.

ITT Cannon Electric (91577)

Component Description	Part Number
Connector, Bulkhead Pass Thru	KPTB-14-15SP
Connector, Circular, Box Mount	KPT02-8-3P
Connector, Circular, Box Mount	KPT02-8-2P
Connector, Circular, Box Mount	KPT02-8-45
Connector, Circular, Box Mount	KPT02-8-4P
Connector, Circular, Box Mount	KPT02-10-6P
Connector, Circular, Box Mount	KPT02-12-8P
Connector, Circular, Box Mount	KPT02-12-10S
Connector, Circular, Box Mount	KPT02-12-14S
Connector, Circular, Box Mount	KPT02-14-15S
Connector, Circular, Box Mount	KPT02-14-19P
Connector, Circular, Box Mount	KPT02-16-26P
Connector, Circular, Box Mount	KPT02-24-61P
Connector, Circular, Box Mount	KPT02-24-61S
Connector, Circular, Cable	KPT01-8-3P
Connector, Circular, Cable	KPT01-8-45
Connector, Circular, Cable	KPT01-12-8S
Connector, Circular, Cable	KPT01-14-18P
Connector, Circular, Straight Plug	KPT06-8-4S
Connector, Circular, Straight Plug	KPT06-8-4P
Connector, Circular, Straight Plug	KPT06-8-25
Connector, Circular, Straight Plug	KPT06-8-35
Connector, Circular, Straight Plug	KPT06-10-6S

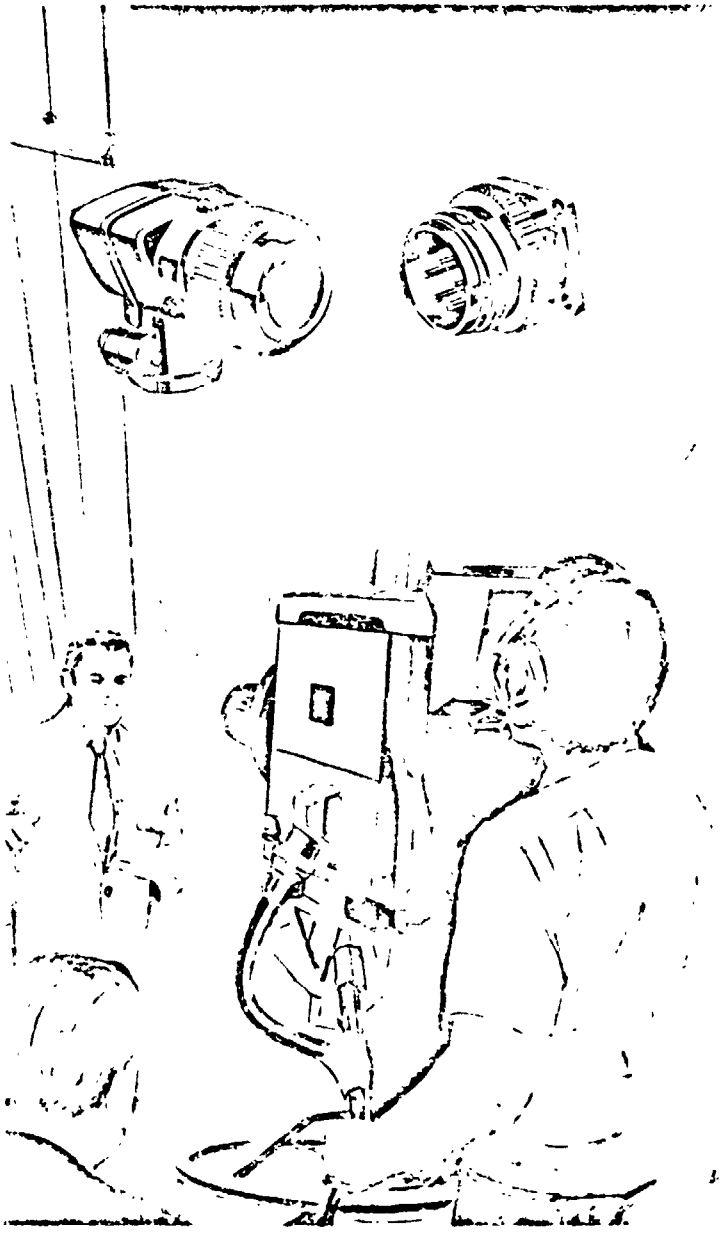
Component Description	Part Number
Connector, Circular, Straight Plug	KPT06-12-8S
Connector, Circular, Straight Plug	KPT06-12-8P
Connector, Circular, Straight Plug	KPT06-12-10P
Connector, Circular, Straight Plug	KPT06-12-10S
Connector, Circular, Straight Plug	KPT06-12-14P
Connector, Circular, Straight Plug	KPT06-14-15S
Connector, Circular, Straight Plug	KPT06-14-15P
Connector, Circular, Straight Plug	KPT06-14-18S
Connector, Circular, Straight Plug	KPT06-14-19S
Connector, Circular, Straight Plug	KPT06-16-8P
Connector, Circular, Straight Plug	KPT06-16-8S
Connector, Circular, Straight Plug	KPT06-16-26S
Connector, Circular, Straight Plug	KPT06-18-32S
Connector, Circular, Straight Plug	KPT06-22-5SP
Connector, Circular, Straight Plug	KPT06-24-61S
Connector, Circular, Straight Plug	KPT06-24-61P
Connector, Circular, Straight Plug	MS3106-14S-5S
Connector, Circular, Straight Plug	MS3106-16S-1S
Connector, Circular, Straight Plug	MS3106-22-14S
Connector, Circular, Straight Plug	MS3106-24-11S
Connector, Circular, Straight Plug	WK-4-21C1

K Connectors

**rugged circular connectors
with quick connect/disconnect
Acme threads**

Six decades on
the leading edge of
interconnect technology.

CANNON ITT



General Information

K standard circular connectors with special Acme thread coupling are rugged, lightweight and economical. These connectors are extremely versatile, with eight shell types and insert diameters, totaling more than 350 contact arrangements, in a variety of amperage and voltage capacities. K connectors have made the quick disconnect concept a standard in the industry, saving time and money in servicing, assembly, testing and inspection. K connectors are used on aircraft, transmitters, instrument panels, Geiger counters, television cameras, potentiometers, cathode ray recorders and other equipment.

There are two general basic categories of K connectors discussed in this catalog:

K — with special Acme thread coupling nut;

RK — with coupling nut on the receptacle instead of the plug (will not mate with K connectors).

Also described are special connectors developed for the television and communications industry. Some of the contact arrangements and shell styles are not recommended for new designs or applications, but these items are readily available from ITT Cannon authorized distributors and from the factory direct.

For additional information please contact your nearest ITT Cannon Electric sales office or write to 666 East Dyer Road, Santa Ana, California 92702.

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QUICK SELECTOR CHART

Series	Description	Page
K/RK	Standard circular connector with special Acme thread couplings for quick connect and disconnect. Used in color and monochrome TV cameras, transmitters, telephone circuits, etc.	11-16
AK/AKT	Versatile solder type for color TV cameras, mobile units, and color audio/visual communications.	17
LK/LKT	Rugged, dependable solder type connectors for use on monochrome TV camera equipment, and black and white audio/visual applications.	18-19
SK	"BEEP" telephone connectors — special telephone, television applications, and for use on general ground support equipment.	19

CONTACT ARRANGEMENTS BY NUMBER OF CONTACTS

SPACING/VOLTAGE CODE

There shall be no evidence of breakdown when the test voltages indicated below are applied, for a period of one minute, between the contacts and between the shell and the contacts with spacings as noted below:

Laboratory Conditions

Ambient Temperature ..... **23°C to 27°C**
Relative Humidity ..... **69% to 73%**
Barometric Pressure ..... **29.70" to 29.75"**
Insert Material ..... **Phenolic XXX-P or molded melamine**

CODE	CONTACT SPACING	TEST VOLTAGE 60 cps. (ac rms)
A	1/64	540 volts
B	1/32	1000 volts
C	3/64	1300 volts
D	1/16	1700 volts
E	5/64	2050 volts
F	3/32	2350 volts
G	7/64	2600 volts
H	1/8	2900 volts
J	9/64	3050 volts
K	5/32	3250 volts
L	11/64	3450 volts
M	3/16	3650 volts
N	13/64	3850 volts
O	7/32	4050 volts
P	15/64	4240 volts
Q	1/4	4420 volts
R	9/32	4780 volts
S	19/64	4940 volts
T	5/16	5100 volts
U	23/64	5580 volts
V	3/8	5750 volts
W	25/64	5890 volts
X	13/32	6020 volts
Y	7/16	6300 volts
Z	1/2	6800 volts

CONTACT ARRANGEMENTS

*Not recommended for new designs.

CONTACT ARR NO.	Contacts	Wire Size	Amps	Code	Page No.
1 CONTACT					
*WK-1	1	#10	30	L	6
2 CONTACTS					
WK-M2	2	#16	10	F	6
GK-V2	2	#14	15	L	6
*GK-V2	2	#14	15	L	6
GK-N2	1	#14			
	1	#10			
SK-S2	2	#4	80	E	7
3 CONTACTS					
WK-3	3	#14	15	D	6
WK-C3	2	#10	30	C	6
	1	#16	10	C	
GK-C3	2	#6	60	C	6
	1	#14	15	C	
*GK-E3	3	#8	40	C	6
*GK-M3	3	#14	15	E	6
GK-S3	3	#10	30	E	6
SK-L3	3	#10	30 grounding unit	C	7
*NK-E3	3	#4	80	F	7
4 CONTACTS					
WK-4	4	#16	10	C	6
WK-S4	2	#16	10	C	6
	2	#10	30	C	
GK-4	4	#10	30	C	6
*GK-C4	2	#8	40	E	6
	2	#14	15	E	
*SK-U4	3	#16	10	C	7
	1	coax		C	
*NK-P4	4	#6	60	F	7
5 CONTACTS					
WK-5	5	#16	10	C	6
*WK-S5	1	#10	30	C	6
	4	#16	10	C	
*GK-G5	1	#16	10	C	6
	4	#10	30	C	
*GK-M5	2	#10	30	E	6
	3	#16	10	E	
SK-5	5	#10	30	E	7
*FK-G5C	5	R coax grounded	10	C	6

CONTACT ARR NO.	Contacts	Wire Size	Amps	Code	Page No.
6 CONTACTS					
WK-6	6	#16	10	C	6
*WK-M6	6	#16	10	B	6
*GK-P6	3	#10	30	B	6
	3	#14	15		
SK-6	6	#10	30	D	7
7 CONTACTS					
WK-A7	7	#16	10	C	6
GK-R7	2	#14	15	7—J	6
	5	#16	10	1-6—C	
SK-M7	4	#10	30	E	
	3	#16	10	E	7
*SK-V7	3	#8	40	1-4—C	7
	4	#16	10	5-7—E	
*IK-M7	7	#6	60	J	9
8 CONTACTS					
*WK-8	8	#20	5	E	6
GK-8	8	#14	15	C	6
*GK-C8	5	#16	10	C	6
	3	#10	30	C	
GK-S8	4	#16	10	C	6
	4	#10	30	C	
*SK-8	8	#16	10	F	7
*SK-A8	7	#14	15	C	7
	1	#6	60	C	
*NK-D8	8	#14	15	G	7
*NK-L8	4	#14	15	E	7
	4	#8	40	E	
*NK-M8	8	#10	30	E	7
9 CONTACTS					
GK-9	9	#16	10	D	6
SK-C9	2	#6	60	C	7
	2	#10	30	C	
	5	#16	10	C	
*NK-C9	2	#4	80	E	7
	1	#10	30	E	
	6	#16	10	E	
*NK-P9	9	#16	10	1-3 5-7—G 4—P 8—E 9—L	7
*AK-9	9	#6	60	1-4, 6-9—J 5—U	10
*AK-C9	9	coax.		1-4, 6-9—J 5—K	10

Dimensions subject to change.

CONTACT ARR NO	Contacts	Wire Size	Amps	Code	Page No
10 CONTACTS					
SK-M10	2	#10	30	E	7
	8	#16	10	E	
*NK-M10	2	#8	40	E	7
	8	#14	15	E	
*NK-S10	4	#10	30	E	7
	6	#16	10	E	
11 CONTACTS					
*SK-W11	11	#16	10	C	7
NK-L11	2	#10	30	E	7
	8	#14	15	E	
	1	#16	10	E	
12 CONTACTS					
GK-12	12	#16	10	C	6
SK-D12	4	#10	30	C	7
	8	#16	10	C	
NK-12	12	#14	15	E	8
*NK-L12	4	#6	60	1-8—C	8
	8	#16	10	9-12—E	
FK-12	12	#10	30		
14 CONTACTS					
*NK-N14	5	#10	30	E	8
	9	#16	10	E	
*FK-B14	14	#14	15	1-13—F 14—W	8
*FK-R14	14	#16	10	11-14—P 1-10—E	8
15 CONTACTS					
NK-L15	15	#14	15	D	8
*FK-L15	4	#10	30	1-10—G	11
	11	#14	15	11-14—C 15—V	
16 CONTACTS					
SK-C16	2	#10	30	C	7
	14	#16	10	C	
17 CONTACTS					
NK-V17	6	#10	30	C	8
	11	#16	10	C	
FK-G17	2	#4	80	C	8
	2	#8	40	C	
	2	#10	30	C	
	2	#14	15	C	
	9	#16	10	C	
FK-L17	2	#10	30	17—V	8
	15	#14	15	1-16—C	
19 CONTACTS					
SK-19	19	#16	10	C	7
*FK-19	19	#14	15	E	8
20 CONTACTS					
*NK-L20	7	#14	15	1-13, 15, 16—C	8
	13	#16	10	14, 17-20—E	
FK-L20	7	#10	30	E	8
	13	#16	10	E	
*FK-W20	20	min coax		B	11
21 CONTACTS					
*NK-L21	4	#10	30	C	8
	17	#16	10	C	
FK-21	17	#16	10	D	9
	2	#8	40		
	2	#4	80		
23 CONTACTS					
NK-L23	2	#10	30	C	8
	2	#14	15	C	
	19	#16	10	C	

CONTACT ARR NO	Contacts	Wire Size	Amps	Code	Page No
24 CONTACTS					
SK-24	24	#20	5	D	7
*FK-24	23	#16	10	1-11—B 12-23—E 24—H	9
	1	coax			
*FK-V24	1	#4	80	C	9
	2	#10	30	C	
	21	#16	10	C	
LK-R24C	21	#14	15	1, 2, 3, 5-8, 13, 15, 20, 22, 23, 24—C	10
	3	coax.		4, 9-12, 14, 16-21—G	
26 CONTACTS					
IK-26	26	#14	15	E	9
27 CONTACTS					
NK-27	27	#16	10	C	8
*FK-27	27	#16	10	E	9
32 CONTACTS					
*FK-32	32	#16	10	1, 2—H 3-32—D	9
*FK-C32	32	#16	10	C	9
FK-L32	7	#10	30	C	9
	25	#16	10	C	
FK-W32	4	#14	15	B	9
	28	#16	10	B	
36 CONTACTS					
IK-A36	21	#16	10	1-26—C	9
	5	#14	15	29-36—D	
	10	#10	30		
37 CONTACTS					
FK-37	37	#16	10	C	9
*LK-37	37	#14	15	E	10
44 CONTACTS					
*FK-44	44	#20	5	F	9
46 CONTACTS					
FK-46	46	#16	10	C	9
50 CONTACTS					
*LK-A50	4	#10	30	1-46—C	10
	46	#16	10	47-50—E	
53 CONTACTS					
LK-A53	4	#10	30	1-49—C	10
	49	#16	10	50-53—G	
57 CONTACTS					
*LK-57	53	#16	10	50-53—E	10
	4	#10	30	54-57—C	
68 CONTACTS					
*LK-68	68	#16	10	D	10
75 CONTACTS					
FK-75	75	#20	5	C	9
81 CONTACTS					
LK-81	81	#16	10	C	10
82 CONTACTS					
AK-82	82	#16	10	C	10
110 CONTACTS					
LK-110	110	#20	5	B	10

CONTACT ARRANGEMENTS FRONT VIEW, PIN INSERT

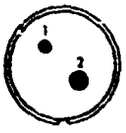
Shell Size WK

* Not recommended for new designs.

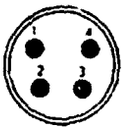
	WK-1 *	WK-M2	WK-3	WK-C3	WK-4	WK-S4
CONTACTS	1	2	3	3	4	4
WIRES	1-#10	2-#16	3-#14	1-#16 (3) 2-#10 (1 & 2)	4-#16	2-#16 (1 & 3) 2-#10 (2 & 4)
CLEARANCE	11, 64	3/32	1/16	3/64	3/64	3/64

	WK-5	WK-S5	WK-M6 *	WK-6	WK-A7	WK-8 *
CONTACTS	5	5	6	6	7	8
WIRES	5-#16	4-#16 (1-4) 1-#10 (5)	6-#16	6-#16	7-#16	8-#20
CLEARANCE	3, 64	3, 64	1/32	3/64	3/64	5/64

Shell Size GK



	GK-N2	GK-V2 *	GK-C3	GK-E3 *	GK-M3 *	GK-S3
CONTACTS	2	2	3	3	3	3
WIRES	1-#14 (1) 1-#10 (2)	2-#14	1-#14 (1) 2-#6 (2 & 3)	3-#8	3-#14	3-#10
CLEARANCE	9/64	11/64	3/64	3/64	5/64	5/64



	GK-4	GK-C4 *	GK-G5	GK-M5 *	GK-P6	GK-R7
CONTACTS	4	4	5	5	6	7
WIRES	4-#10	2-#14 (1 & 2) 2-#8 (3 & 4)	1-#16 (5) 4-#10 (1-4)	3-#16 (1, 3 & 5) 2-#10 (2 & 4)	3-#14 (2, 4 & 6) 3-#10 (1, 3 & 5)	5-#16 (1, 2, 5, 6 & 7) 2-#14 (3 & 4)
CLEARANCE	3/64	5/64	3/64	5, 64	1/32	9 64 (7) 3 64 (1-6)

	GK-8	GK-C8 *	GK-S8	GK-9	GK-12
CONTACTS	8	8	8	9	12
WIRES	8-#14	5-#16 (2, 3, 5, 6 & 8) 3-#10 (1, 4 & 7)	4-#16 (2, 3, 5 & 6) 4-#10 (1, 7 & 8)	9-#16	12-#16
CLEARANCE	3/64	3/64		1/16	3/64

Dimensions subject to change.

* Not recommended for new designs.

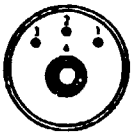
Shell Size SK

SK-S2

CONTACTS	2
WIRES	2-#4
CLEARANCE	5/64

SK-L3

CONTACTS	3
WIRES	skt. contacts 1-2 #(#10) grd. to skt. contact G(#10) when pin insert is removed for RG-7/U cable
CLEARANCE	3/64

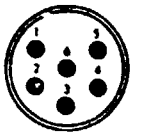


SK-U4*

CONTACTS	4
WIRES	3-#16 (1-3) 1-#16 coax. (4)
CLEARANCE	3/64

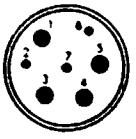
SK-5

CONTACTS	5
WIRES	5-#10
CLEARANCE	5/64



SK-6

CONTACTS	6
WIRES	6-#10
CLEARANCE	1/16

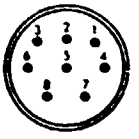


SK-M7

CONTACTS	7
WIRES	3-#16 (2, 6 & 7) 4-#10 (1, 3, 4 & 5)
CLEARANCE	5/64

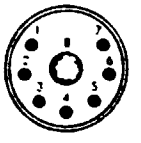
SK-V7*

CONTACTS	7
WIRES	4-#16 (1-4) 3-#8 (5-7)
CLEARANCE	3/64 (1-4) 5/64 (5-7)



SK-8*

CONTACTS	8
WIRES	8 #16
CLEARANCE	5/64

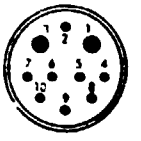


SK-A8*

CONTACTS	8
WIRES	7-#14 (1-7) 1-#6 (8)
CLEARANCE	3/64

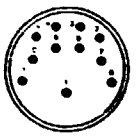
SK-C9

CONTACTS	9
WIRES	5-#16 (3-5, 8, 9) 2 #10 (1 & 2) 2-#6 (6 & 7)
CLEARANCE	3/64



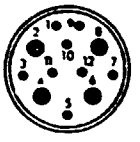
SK-M10

CONTACTS	10
WIRES	8-#16 (2, 4-10) 2 #10 (1 & 3)
CLEARANCE	5/64



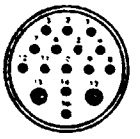
SK-W11*

CONTACTS	11
WIRES	11-#16
CLEARANCE	3/64



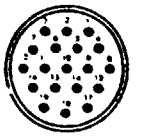
SK-D12

CONTACTS	12
WIRES	8-#16 (1, 3, 5, 7, 9-12) 4-#10 (2, 4, 6 & 8)
CLEARANCE	3/64



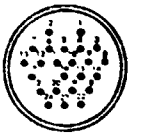
SK-C16

CONTACTS	16
WIRES	14-#16 (1-12, 14, 16) 2-#10 (13 & 15)
CLEARANCE	3/64



SK-19

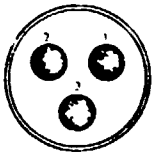
CONTACTS	19
WIRES	19-#16
CLEARANCE	3/64



SK-24

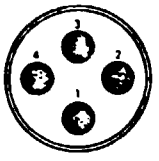
CONTACTS	24
WIRES	24-#20
CLEARANCE	1/16

Shell Size NK



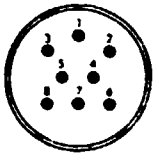
NK-E3*

CONTACTS	3
WIRES	3-#4
CLEARANCE	3/32



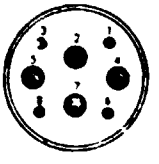
NK-P4*

CONTACTS	4
WIRES	4-#6
CLEARANCE	5/64



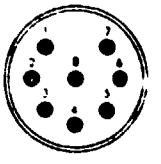
NK-D8*

CONTACTS	8
WIRES	8-#14
CLEARANCE	7/64



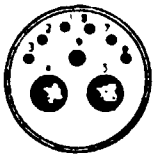
NK-L8

CONTACTS	8
WIRES	4-#14 (1, 3, 6, 8) 4-#8 (2, 4, 5, 7)
CLEARANCE	5/64



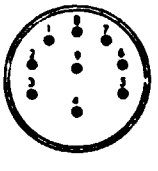
NK-M8

CONTACTS	8
WIRES	8-#10
CLEARANCE	5/64



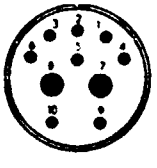
NK-C9*

CONTACTS	9
WIRES	6-#16 (1, 3, 6-8) 1-#10 (9) 2-#4 (4, 5)
CLEARANCE	5/64



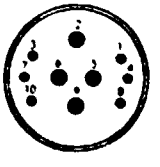
NK-P9*

CONTACTS	9
WIRES	9-#16
CLEARANCE	15/64 (4), 11/64 (9) 7/64 (1, 2, 3, 5, 6, 7), 5/64 (8)



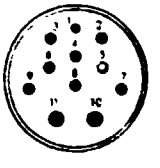
NK-M10*

CONTACTS	10
WIRES	8-#14 (1-6, 9 & 10) 2-#8 (7 & 8)
CLEARANCE	5/64



NK-S10*

CONTACTS	10
WIRES	6-#16 (1, 3, 4, 7, ..., 10) 4-#10 (2, 5, 6, 9)
CLEARANCE	5/64



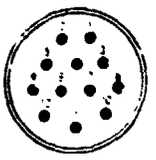
NK-L11

CONTACTS	11
WIRES	1-#16 (1), 8-#14 (2-9) 2-#10 (10 & 11)
CLEARANCE	5/64

CONTACT ARRANGEMENTS FRONT VIEW, PIN INSERT

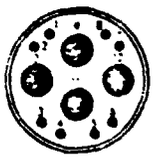
* Not recommended for new designs.

Shell Size NK



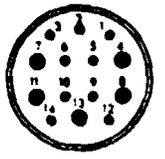
NK-12

CONTACTS: 12
WIRES: 12-#14
CLEARANCE:



NK-L12

12
8-#16 (1-8)
4-#6 (9-12)
3/64 (1-8)
5/64 (9-12)

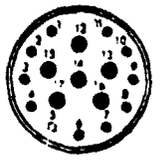


NK-N14

14
9-#16 (1-3, 5, 6, 9, 10, 12, 14)
5-#10 (4, 7, 8, 11, 13)
5/64

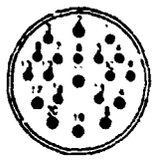
NK-L15

15
15-#14
1/16



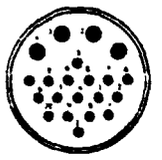
NK-V17

17
11-#16 (1-11)
6-#10 (12-17)
3/64



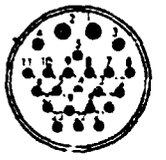
NK-L20*

CONTACTS: 20
WIRES: 7-#14 (2, 11, 14, 17-20)
13-#16 (1, 3-10, 12, 13, 15, 16)
CLEARANCE: 3/64 (1-13, 15, 16)
5/64 (14, 17-20)



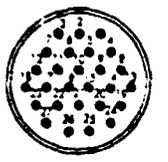
NK-L21*

21
17-#16 (5-21)
4-#10 (1-4)
3/64



NK-L23

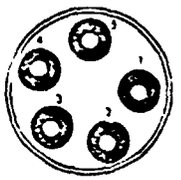
23
19-#16(5-23)
2-#14 (3, 4), 2-#10 (1, 2)
3/64



NK-27

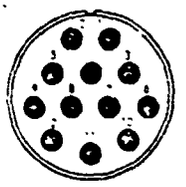
27
27-#16
3/64

Shell Size FK



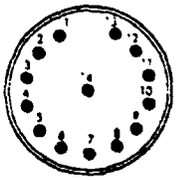
FK-G5C*

CONTACTS: 5
WIRES: 5-#16 coax, aluminum insulator grounded to shell for RG-71/U cable
CLEARANCE: 3/64



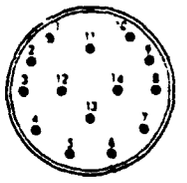
FK-12*

12
12-#10
7/64



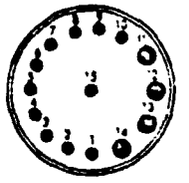
FK-B14

14
14-#14
3/32 (1-13)
25/64 (14)



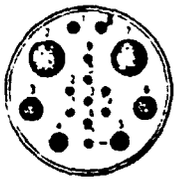
FK-R14

14
14-#16
5/64 (1-10)
15/64 (11-14)



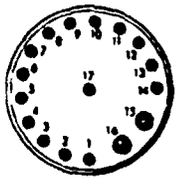
FK-L15*

15
11-#14 (1-10 & 15)
4-#10 (11-14)
7/64 (1-10)
3/64 (11-14), 3/8 (15)



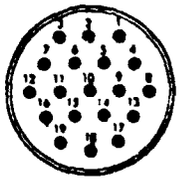
FK-G17

CONTACTS: 17
WIRES: 9-#16 (9-17), 2-#14 (1 & 8)
2-#10 (4 & 5), 2-#8 (3 & 6)
CLEARANCE: 2-#4 (2 & 7)
3/64



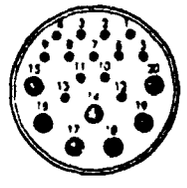
FK-L17

17
15-#14 (1-14 & 17)
2-#10 (15 & 16)
3/8 (17)
3/64 (1-16)



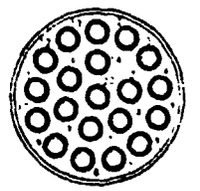
FK-19

19
19-#14
5/64



FK-L20

20
13-#16 (1-13)
7-#10 (14-20)
5/64



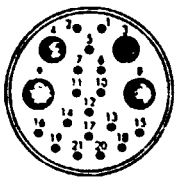
FK-W20*

20
20 min. coax.
1/32

Dimensions subject to change

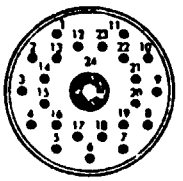
* Not recommended for new designs.

Shell Size FK (cont.)



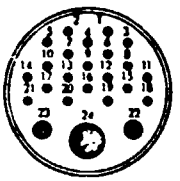
FK-21

CONTACTS	21
WIRES	17-#16 (1, 2, 5, 6, 7, 10-21) 2-#8 (3, 4) 2-#4 (8, 9)
CLEARANCE	1/16



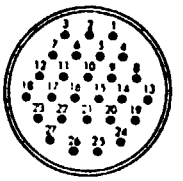
FK-24*

CONTACTS	24
WIRES	23-#16 (1-23) 1-#16 coax for RG 58 U cable 1 32 (1-11) 5/64 (12-23), 1/8 (24)



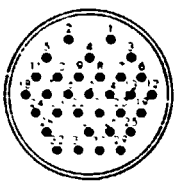
FK-V24*

CONTACTS	24
WIRES	21-#16 (1-21) 2-#10 (22 & 23), 1-#4 (24)
CLEARANCE	3/64



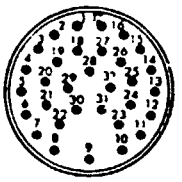
FK-27*

CONTACTS	27
WIRES	27-#16
CLEARANCE	5/64



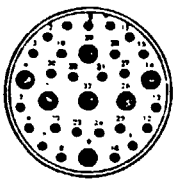
FK-32

CONTACTS	32
WIRES	32-#16 1-8 (1-2)
CLEARANCE	1/16 (3-32)



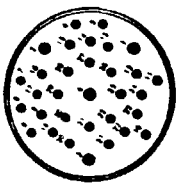
FK-C32*

CONTACTS	32
WIRES	32-#16
CLEARANCE	3/64



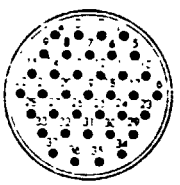
FK-L32

CONTACTS	32
WIRES	25-#16 (1-3, 5-8, 10-13, 15-20, 22-25, 27, 28, 30, 31) 7-#10 (4, 9, 14, 21, 26, 29, 32)
CLEARANCE	3/64



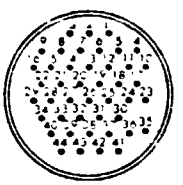
FK-W32

CONTACTS	32
WIRES	28-#16 (5-32) 4-#14 (1-4)
CLEARANCE	1/32



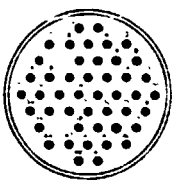
FK-37

CONTACTS	37
WIRES	37-#16
CLEARANCE	3/64



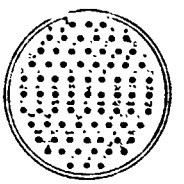
FK-44*

CONTACTS	44
WIRES	44-#20
CLEARANCE	3/32



FK-46

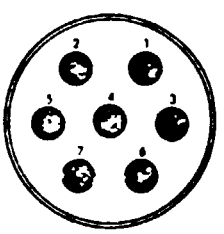
CONTACTS	46
WIRES	46-#16
CLEARANCE	3/64



FK-75

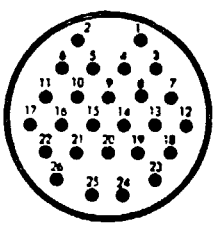
CONTACTS	75
WIRES	75-#20
CLEARANCE	3/64

Shell Size IK



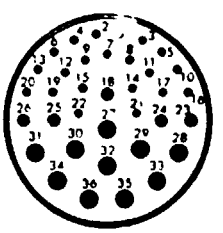
IK-M7*

CONTACTS	7
WIRES	7-#6
CLEARANCE	9/64



IK-26

CONTACTS	26
WIRES	26-#14
CLEARANCE	5/64



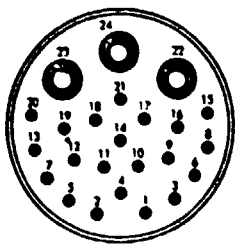
IK-A36

CONTACTS	36
WIRES	21-#16 (1-17, 19-22) 5-#14 (18, 23-26), 10-#10 (27-36)
CLEARANCE	3 64 (1-26) 1 16 (29-36)

CONTACT ARRANGEMENTS FRONT VIEW, PIN INSERT

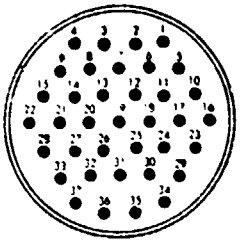
* Not recommended for new designs.

Shell Size LK



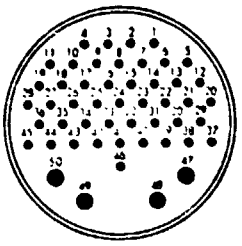
LK-R24C

CONTACTS	24
WIRES	21 #14 (1 21), 3 #16 coax (22-24) for RG-7 U cable
CLEARANCE	3 64 (1-3, 5 8, 13, 15, 20, 22-24) 7 64 (4, 9 12, 14, 16 19, 21)



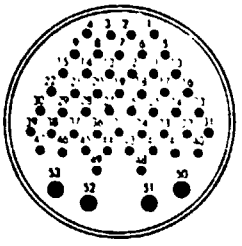
LK-37*

CONTACTS	37
WIRES	37-#14
CLEARANCE	5/64



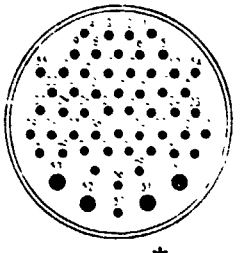
LK-A50*

CONTACTS	50
WIRES	46-#16 (1-46) 4-#10 (47 50)
CLEARANCE	3/64 (1-46) 5/64 (47-50)



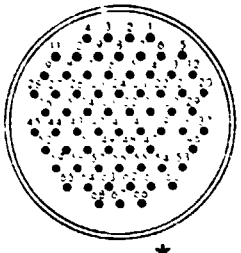
LK-A53

CONTACTS	53
WIRES	49-#16 (1-49) 4-#10 (50-53)
CLEARANCE	3/64 (1 49) 7/64 (50-53)



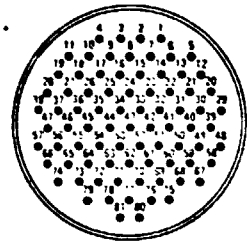
LK-57*

CONTACTS	57
WIRES	53-#16 (1 49, 54-57) 4 #10 (50-53)
CLEARANCE	3 64 (1-49, 54 57) 7 64 (50-53)



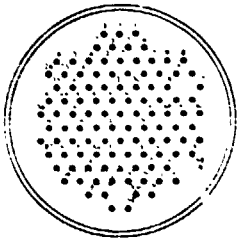
LK-68*

CONTACTS	68
WIRES	68-#16
CLEARANCE	1/16



LK-81

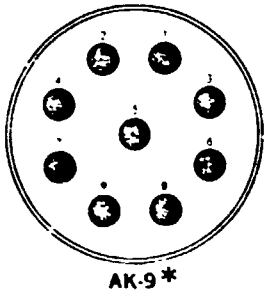
CONTACTS	81
WIRES	81 #16
CLEARANCE	3/64



LK-110

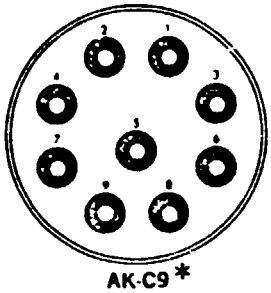
CONTACTS	110
WIRES	110-#20
CLEARANCE	1/16

Shell Size AK



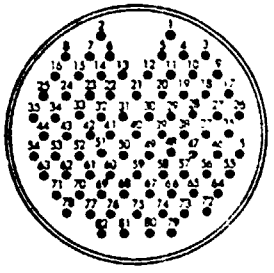
AK-9*

CONTACTS	9
WIRES	9 #6
CLEARANCE	9 64 (1 4, 6 9) 23 64 (5)



AK-C9*

CONTACTS	9
WIRES	9-#8 coax for RG-7 U cable
CLEARANCE	9/64 (1-4, 6-9) 5/32 (5)



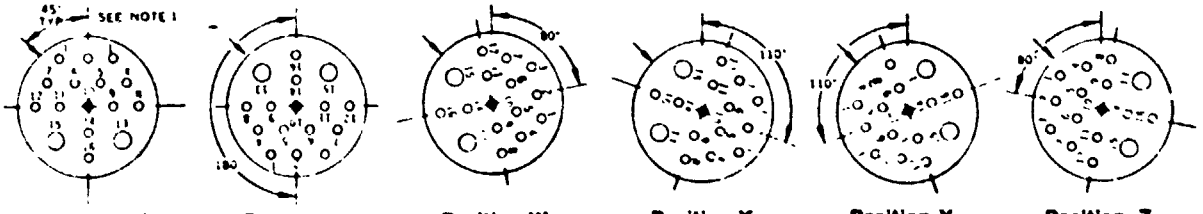
AK-82

CONTACTS	82
WIRES	82-#16
CLEARANCE	3/64

POLARIZATION POSITIONS

Face View—Pin Insert (As viewed from engaging end)

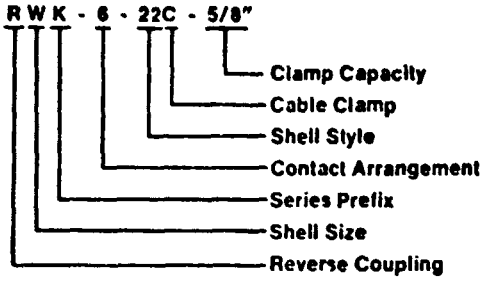
Notes 1 Shell polarizing means is indicated by arrow at 45° and will remain constant regardless of insert rotation
2 Insert to be rotated within the shell to the required position as viewed from engaging end
3 For alternate positions not shown consult factory



Position N Position V Position W Position X Position Y Position Z

Dimensions subject to change.

PART NUMBER EXPLANATION



Reverse Coupling: R — pin insert typical in plug, socket insert typical in receptacle and coupling nut reversed; will not mate with K connectors

Shell Size: W — 7/8" threaded coupling dia.
N — 1-9/16" threaded coupling dia.
L — 2-1/2" threaded coupling dia
G — 1-3/16" threaded coupling dia.
F — 1-13/16" threaded coupling dia
A — 2-13/16" threaded coupling dia.
S — 1-5/16" threaded coupling dia.
I — 2-1/4" threaded coupling dia.

Series Prefix: K — ITT Cannon Prefix

Contact Arrangement: See pages 4 thru 10

Shell Style: 21 — Straight plug, socket insert
22 — Straight plug, pin insert
23 — 90° plug, socket insert
24 — 90° plug, pin insert
31S — Small flange recept., socket insert
31SL — Large flange recept., socket insert
32S — Small flange recept., pin insert
32SL — Large flange recept., pin insert

Cable Clamp: C — cable clamp

Clamp Capacity: See pages 12, 13 and 14.

MATING GUIDE

	K-21	K-22	K-23	K-24	K-31	K-32
K-21		●		●		●
K-22	●		●		●	
K-23		●		●		●
K-24	●		●		●	
K-31		●		●		●
K-32	●		●		●	

CONDENSED DATA*

STANDARD MATERIALS AND FINISHES

Shell — aluminum alloy, cadmium plate
Insulator — thermosetting plastic or fabricated phenolic
Contacts — copper alloy, silver plate (gold plate for size 20 contact only)

ELECTRICAL DATA

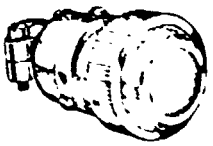
Number of Contacts — 1 thru 110
Wire Size/Amps — #20—7.5 amps
#16—10 amps
#14—15 amps
#10—30 amps
#8 —40 amps
#6 —60 amps
#4 —80 amps
#2 —115 amps
#0 —200 amps
Other Contacts Available — coax, min. coax
Termination — solder pot

*not applicable to hermetic versions

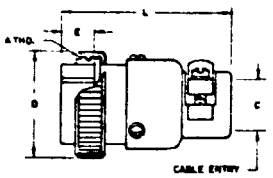
MECHANICAL FEATURES

Shell Styles — 21—straight plug, socket insert
22—straight plug, pin insert
23—90° angle plug, socket insert
24—90° angle plug, pin insert
31S—small flange receptacle, socket insert
31SL—large flange receptacle, socket insert
32S—small flange receptacle, pin insert
32SL—large flange receptacle, pin insert
Shell Sizes — 7/8" to 2-1/4" by coupling thread diameter
Coupling — K—Special Acme thread coupling nut
RK—reverse coupling nut
Conduit Entry — Cable clamp or threaded

K-21C
STRAIGHT PLUG
socket inserts



K-21C



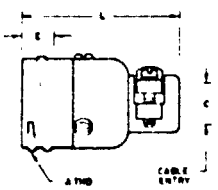
K-21C (cable clamp)

PART NUMBER	C ±1/64	D ±1/64	E ±1/64	L ±3/64	A THD.
WK-(*)-21C 5/16"	11/32	1- 3/64	7/16	2- 3/32	7/8-6
WK-(*) 21C 3/8"	13/32	1- 3/64	7/16	2- 3/32	7/8 6
WK-(*)-21C 1/2"	17/32	1- 3/64	7/16	2- 3/32	7/8 6
WK-(*)-21C 5/8"	21/32	1- 3/64	7/16	2- 3/32	7/8 6
GK-(*) 21C-1/2"	17/32	1-23/64	7/16	2- 3/16	1- 3/16-6
GK-(*)-21C 5/8"	21/32	1-23/64	7/16	2- 3/16	1- 3/16 6
SK-(*) 21C-1/2"	17/32	1-15/32	7/16	2- 3/16	1- 5/16 6
SK-(*)-21C-5/8"	21/32	1-15/32	7/16	2- 3/16	1- 5/16 6
SK-(*)-21C 3/4"	25/32	1-15/32	7/16	2- 3/16	1- 5/16-6
NK-(*)-21C 1/2"	17/32	1-47/64	7/16	2- 5/32	1- 9/16-6
NK-(*)-21C 5/8"	21/32	1 47/64	7/16	2- 5/32	1- 9/16 6
NK-(*)-21C 3/4"	25/32	1-47/64	7/16	2- 5/32	1- 9/16 6
NK-(*)-21C-7/8"	29/32	1-47/64	7/16	2- 5/32	1- 9/16 6
FK-(*)-21C-9/16"	19/32	2- 1/64	7/16	2- 5/16	1 13/16 6
FK-(*)-21C-5/8"	21/32	2- 1/64	7/16	2- 5/16	1-13/16-6
FK-(*)-21C-7/8"	29/32	2- 1/64	7/16	2- 5/16	1-13/16 6
FK-(*)-21C-1"	1- 1/16	2- 1/64	7/16	2-15/32	1 13/16-6
IK-(*) 21C 7/8"	29/32	2- 1/2	1/2	3	2- 1/4 6
IK-(*)-21C 1"	1- 1/16	2- 1/2	1/2	3- 5/32	2- 1/4 6
IK-(*)-21C-1-1/8"	1- 3/16	2- 1/2	1/2	3	2- 1/4 6
LK-(*)-21C-1"	1- 1/16	2- 7/8	1/2	3- 5/64	2- 1/2-6
LK-(*)-21C-1 1/2"	1- 9/16	2- 7/8	1/2	3 1/8	2- 1/2 6
AK-(*)-21C-1 1/4"	1- 1/4	3- 1/8	9/16	4- 1/2	2 13/16 18 (NS-2 Thd)

*Add contact arrangement.

K-22C
STRAIGHT PLUG
pin inserts

K 22C



K-22C (cable clamp)

PART NUMBER	C ±1/64	E ±1/64	L ±3/64	A THD.
WK-(*) 22C-5/16"	11/32	7/16	1 29/32	7/8 6
WK-(*)-22C 3/8"	13/32	7/16	1-29/32	7/8 6
WK (*) 22C 1/2"	17/32	7/16	1-29/32	7/8 6
WK (*) 22C 5/8"	21/32	7/16	1-29/32	7/8 6
GK (*) 22C 1/2"	17/32	7/16	2	1- 3/16 6
GK-(*) 22C 5/8"	21/32	7/16	2	1- 3/16 6
SK (*) 22C 1/2"	17/32	7/16	2	1 5/16 6
SK (*)-22C 5/8"	21/32	7/16	2	1 5/16 6
SK (*) 22C-3/4"	25/32	7/16	2	1 5/16 6
NK (*) 22C 1/2"	17/32	7/16	1 31/32	1- 9/16 6
NK-(*) 22C 5/8	21/32	7/16	1 31/32	1 9/16 6
NK-(*) 22C 3/4"	25/32	7/16	1 31/32	1 9/16 6
NK (*) 22C 7/8"	29/32	7/16	1 31/32	1- 9/16 6
FK (*) 22C 9/16"	19/32	7/16	2 5/32	1 13/16 6
FK (*) 22C 5/8"	21/32	7/16	2 5/32	1 13/16 6
FK-(*)-22C 7/8"	29/32	7/16	2- 5/32	1 13/16 6
FK (*) 22C 1"	1 1/16	7/16	2 5/16	1 13 16 6
IK (*) 22C 7/8"	29/32	1/2	2 13/16	2 1/4 6
IK (*) 22C 1"	1- 1/16	1/2	2 31/32	2 1/4 6
IK-(*) 22C-1-1/8"	1- 3/16	1/2	2 13/16	2 1/4 6
LK (*) 22C 1"	1- 1/16	1/2	2 57/64	2 1/2 6
LK (*) 22C-1-1/2"	1- 9/16	1/2	2 15/16	2 1/2 6
AK-(*) 22C 1-1/4"	1- 1/14	19/32	4 17/32	2 13/16 18 (NS 2 Thd)

*Add contact arrangement.

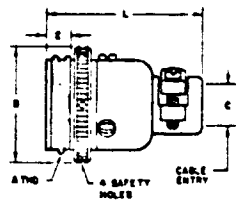
Dimensions subject to change.

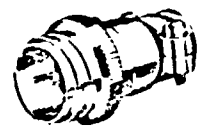
RK-22C
STRAIGHT PLUG
reverse coupling
pin inserts

RK-22C (cable clamp)

PART NUMBER	C ±1/64	D ±1/64	E ±1/64	L ±3/64	A THD.
RWK (*) 22C 5/16"	11/32	1- 9/64	7/16	1-29/32	15/16-6
RWK (*) 22C-3/8"	13/32	1- 9/64	7/16	1-29/32	15/16-6
RWK-(*) 22C-1/2"	17/32	1- 9/64	7/16	1-29/32	15/16-6
RWK (*)-22C-5/8"	21/32	1- 9/64	7/16	1 29/32	15/16-6
RGK (*) 22C-1/2"	17/32	1- 7/16	7/16	2	1- 1/4-6
RGK (*)-22C 5/8"	21/32	1 7/16	7/16	2	1- 1/4-6
RSK (*) 22C-1/2"	17/32	1- 9/16	7/16	2	1- 3/8 6
RSK (*) 22C-5/8"	21/32	1- 9/16	7/16	2	1- 3/8 6
RSK-(*)-22C-3/4"	25/32	1- 9/16	7/16	2	1- 3/8-6
RNK-(*)-22C-1/2"	17/32	1- 9/16	7/16	1-31/32	1- 5/8-6
RNK-(*)-22C-5/8"	21/32	1-13/16	7/16	1-31/32	1- 5/8-6
RNK-(*)-22C 3/4"	25/32	1-13/16	7/16	1-31/32	1- 5/8-6
RNK-(*)-22C-7/8"	29/32	1-13/16	7/16	1-31/32	1- 5/8 6
RFK (*) 22C 9/16"	19/32	2- 1/8	7/16	2- 5/32	1-15/16-6
RFK-(*)-22C 5/8"	21/32	2 1/8	7/16	2- 5/32	1-15/16-6
RFK (*)-22C 7/8"	29/32	2- 1/8	7/16	2- 5/32	1-15/16-6
RFK (*)-22C 1"	1-1/16	2- 1/8	7/16	2- 5/16	1-15/16-6
RJK (*)-22C 7/8"	29/32	2- 9/16	1/2	2-13/16	2- 5/16-6
RJK (*) 22C-1"	1- 1/16	2- 9/16	1/2	2-31/32	2- 5/16-6
RJK (*)-22C 1-1/8"	1- 3/16	2- 9/16	1/2	2-13/16	2- 5/16-6
RLK (*)-22C-1"	1- 1/16	2 13/16	1/2	2-57/64	2- 9/16-6
RLK-(*)-22C-1 1/2"	1- 9/16	2-13/16	1/2	2-15/16	2- 9/16-6

*Add contact arrangement.





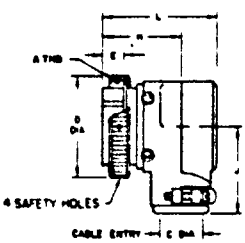
RK-22C

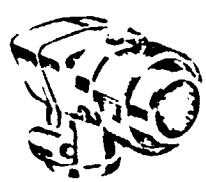
K-23
90° ANGLE PLUG
socket inserts

K-23C (cable clamp)

PART NUMBER	C ±1/64	D ±1/64	E ±1/64	H ±3/64	J ±1/64	L ±1/16	A THD.
WK (*)-23C 3/8"	13/32	1- 3/64	7/16	1 23/64	1	1- 3/4	7/8-6
WK (*)-23C 1/2"	17/32	1- 3/64	7/16	1-31/64	1	2	7/8-6
GK (*)-23C-3/8"	25/64	1-23/64	7/16	1 7/16	1- 9/32	1-15/16	1- 3/16 6
GK (*)-23C 1/2"	17/32	1-23 64	7/16	1 7/16	1- 9/32	1-15/16	1- 3/16 6
GK-(*)-23C 5 8	21/32	1 23 64	7/16	1 9/16	1- 9/32	2- 5/32	1- 3/16 6
SK (*) 23C-1 2"	17/32	1-15/32	7/16	1 29/64	1- 7/16	1 15/16	1- 5/16-6
SK-(*)-23C 5/8"	21/32	1-15/32	7/16	1-17/32	1- 7/16	2- 3/32	1- 5/16-6
SK-(*)-23C 3/4"	25 32	1-15/32	7/16	1 19/32	1- 7/16	2 7/32	1- 5/16-6
NK (*)-23C 9/16"	19/32	1 47/64	7/16	1-35/64	1- 9/16	2- 1/8	1- 9/16 6
NK (*) 23C 5/8"	21/32	1 47 64	7/16	1 35/64	1 9/16	2- 1/8	1- 9/16 6
NK-(*)-23C 11/16"	23/32	1 47/64	7/16	1-35/64	1 9/16	2 1/8	1- 9/16-6
FK (*) 23C 9/16"	19/32	2- 1/64	7/16	1 33/64	1 2/32	2- 1/32	1-13/16 6
FK-(*)-23C 5/8"	21/32	2 1/64	7/16	1-33 64	1-23/32	2- 1/16	1-13/16-6
JK (*)-23C-1-1/8"	1- 3/16	2- 1/2	1/2	2 1/32	2 5/32	2-55/64	2- 1/4-6
LK-(*)-23C 1"	1 1/16	2-13/16	1/2	1-31/32	2- 1/8	2-25/32	2- 1/2-6

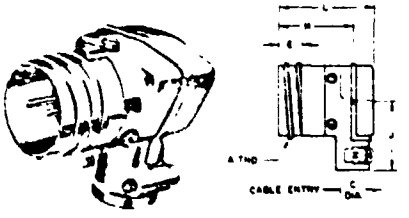
*Add contact arrangement.





K23C

K-24
90° ANGLE PLUG
pin inserts



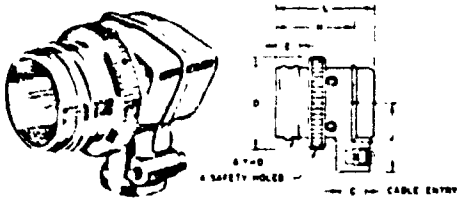
K-24C

K-24C (cable clamp)

PART NUMBER	C ±1/64	E ±1/64	H ±3/64	J ±1/64	L ±1/16	A THD.
WK (*) 24C 3/8"	13/32	7/16	1 11/64	1	1 9/16	7/8 6
WK (*) 24C 1/2"	17/32	7/16	1 19/64	1	1 13/16	7/8 6
GK (*) 24C-1/2"	17/32	7/16	1 1/4	1 9/32	1 3/4	1 3/16 6
GK-(*)-24C 3/8"	25/64	7/16	1 1/4	1 9/32	1 3/4	1 3/16 6
GK (*) 24C 5/8"	21/32	7/16	1 3/8	1 9/32	1 31/32	1 3/16 6
SK (*) 24C 1/2"	17/32	7/16	1 17/64	1 7/16	1 3/4	1 5/16 6
SK (*) 24C 5/8"	21/32	7/16	1 11/32	1 7/16	1 29/32	1 5/16 6
SK (*) 24C 3/4"	25/32	7/16	1 13/32	1 7/16	2 1/32	1 5/16 6
NK (*) 24C 9/16"	19/32	7/16	1 23/64	1 9/16	1 15/16	1 9/16 6
NK-(*) 24C 5/8"	21/32	7/16	1 23/64	1 9/16	1 15/16	1 9/16 6
NK (*)-24C 11/16"	23/32	7/16	1 23/64	1 9/16	1 15/16	1 9/16 6
FK (*)-24C 9/16"	19/32	7/16	1 23/64	1 23/32	1 7/8	1 13/16 6
FK (*)-24C 5/8"	21/32	7/16	1 23/64	1 23/32	1 7/8	1 13/16 6
IK (*) 24C 1 1/8"	1 3/16	1/2	1 27/32	2 5/32	2 43/64	2 1/4 6

*Add contact arrangement.

RK-24C
90° ANGLE PLUG
reverse coupling
pin inserts



RK-24C

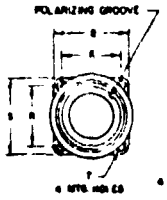
RK-24C (cable clamp)

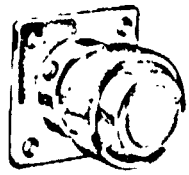
PART NUMBER	C ±1/64	D ±1/64	E ±1/64	H ±3/64	J ±1/64	L ±1/16	A THD
RWK (*) 24C 3/8"	13/32	1 9/64	7/16	1 11/64	1	1 9/16	15/16 6
RWK (*) 24C 1/2"	17/32	1 9/64	7/16	1 19/64	1	1 13/16	15/16 6
RGK (*) 24C 1/2	17/32	1 7/16	7/16	1 1/4	1 9/32	1 3/4	1 1/4 6
RGK (*) 24C 5/8"	21/32	1 7/16	7/16	1 3/8	1 9/32	1 31/32	1 1/4 6
RSK (*) 24C 1/2"	17/32	1 9/16	7/16	1 17/64	1 7/16	1 3/4	1 3/8 6
RSK (*) 24C 5/8"	21/32	1 9/16	7/16	1 11/32	1 7/16	1 29/32	1 3/8 6
RSK (*) 24C 3/4"	25/32	1 9/16	7/16	1 13/32	1 7/16	2 1/32	1 3/8 6
RNK (*) 24C 9/16"	19/32	1 13/16	7/16	1 23/64	1 9/16	1 15/16	1 5/8 6
RNK (*) 24C 5/8"	21/32	1 13/16	7/16	1 23/64	1 9/16	1 15/16	1 5/8 6
RNK (*) 24C 11/16	23/32	1 13/16	7/16	1 23/64	1 9/16	1 15/16	1 5/8 6
RFK (*) 24C 9/16"	19/32	2 1/8	7/16	1 23/64	1 23/32	1 7/8	1 15/16 6
RFK (*) 24C 5/8"	21/32	2 1/8	7/16	1 23/64	1 23/32	1 7/8	1 15/16 6
RIK (*) 24C 1 1/8"	1 3/16	2 9/16	1/2	1 27/32	2 5/32	2 43/64	2 5/16 6
RLK (*) 24C 1"	1 1/16	2 13/16	1/2	1 25/32	2 1/8	2 19/32	2 9/16 6

*Add contact arrangement.

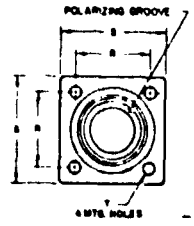
Dimensions subject to change.

K-31S





K-31SL



K-31S, K-31SL WALL MOUNTING RECEPTACLE

pin inserts

K-31S (small flange) and K-31SL (large flange)

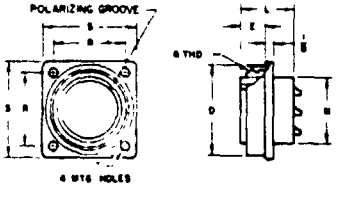
PART NUMBER	FOR K-31S and K-31SL D ±1/64	E ±1/64	L ±3/64	A THD.	FOR K-31S R ±.005	S ±1/64	T ±.005	FOR K-31SL R ±.005	S ±1/64	T ±.005
WK (*) 31S	1- 3/64	7/16	1 3/16	7/8 6	.730	15/16	120	.972	1 5/16	144
GK (*) 31S	1 23/64	7/16	1- 7/32	1 3/16 6	972	1- 1/4	120	1.192	1- 9/16	.169
SK (*) 31S	1 15/32	7/16	1 7/32	1 5/16 6	1 038	1- 3/8	120	1 282	1-11/16	169
NK (*) 31S	1 47/64	7/16	1- 7/32	1 9/16 6	1 259	1 5/8	169	1 500	1-15/16	.169
FK (*) 31S	2 1/64	7/16	1- 1/4	1 13/16 6	1 502	1- 7/8	169	1 678	2- 1/8	.169
JK (*) 31S	2 1/2	1/2	1-13/32	2 1/4 6	1 941	2 5/16	169	2 031	2- 9/16	.169
LK (*) 31S	2 7/8	1/2	1-13/32	2- 1/2 6	2 077	2- 9/16	169	2 210	2- 7/8	.169
AK (*) 31S	3 1/8	9/16	1- 3/8	2 13/16 18 NS 2				2 386	3- 1/8	.169

For K31SL (large flange), add "L" to nomenclature, e.g., WK-(*)-31S becomes WK-(*)-31SL.
*Add contact arrangement.

RK-31SL WALL MOUNTING RECEPTACLE

reverse coupling pin inserts

RK-31SL

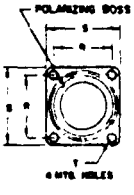


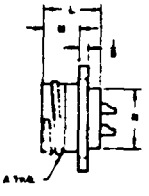
RK-31SL (large flange)

PART NUMBER	L ±3/64	N ±.005	E ±1/64	A THD.	D ±1/64	R ±.005	S ±1/64	T ±.005
RAK (*) 31SL	15/16	3/4	7/16	15/16 6	1- 1/16	972	1- 5/16	.144
RGK (*) 31SL	15/16	1	7/16	1- 1/4 6	1- 3/8	1 192	1- 9/16	.168
RSK (*) 31SL	15/16	1- 1/8	7/16	1- 3/8 6	1- 1/2	1 282	1-11/16	.169
RNK (*) 31SL	15/16	1 3/8	7/16	1- 5/8-6	1- 3/4	1 502	1-15/16	.169
RFK (*) 31SL	15/16	1- 5/8	7/16	1-15/16 6	2- 1/16	1 680	2- 1/8	.169
RJK (*) 31SL	15/16	1-15/16	1/2	2 5/16 6	2 1/2	2 032	2- 9/16	.169
RLK (*) 31SL	15/16	2- 1/4	1/2	2- 9/16 6	2- 3/4	2 210	2- 7/8	169

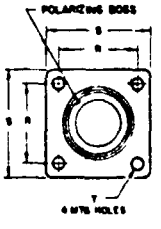
*Add contact arrangement.

K-32S





K-32SL



K-32S, K-32SL WALL MOUNTING RECEPTACLE

pin inserts

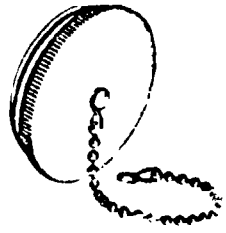
K-32S (small flange) and K-32SL (large flange)

PART NUMBER*	FOR K-32S and K-32SL L ±3/64	N ±.005	M ±1/64	A THD.	FOR K-32S R ±.005	S ±1/64	T ±.005	FOR K-32SL R ±.005	S ±1/64	T ±.005
WK (*) 32S	3/4	3/4	7/16	7/8 6	729	15/16	120	972	1- 5/16	144
GK (*) 32S	3/4	1	7/16	1- 3/16 6	97?	1- 1/4	120	1 193	1- 9/16	.169
SK (*) 32S	3/4	1- 1/8	7/16	1- 5/16-6	1 039	1 3/8	.120	1 282	1 11/16	169
NK (*) 32S	3/4	1 3/8	7/16	1- 9/16 6	1 259	1- 5/8	144	1 503	1 15/16	.169
FK (*) 32S	3/4	1 5/8	7/16	1-13/16 6	1 503	1 7/8	144	1 679	2- 1/8	169
JK (*) 32S	27/32	1 15/16	1/2	2- 1/4 6	1 944	2 5/16	169	2 031	2- 9/16	169
LK (*) 32S	27/32	2 1/4	1/2	2- 1/2-6	2 077	2- 9/16	169	2 210	2- 7/8	169
AK-(*) 32SL	1- 1/32	2 1/2	19/32	2-13/16-18 NS-2A				2.386	3- 1/8	.169

For K 32SL (large flange), add "L" to nomenclature, e.g., WK-(*) 32S becomes WK-(*)-32SL
*Add contact arrangement.

K and RK SERIES ACCESSORIES

K & RK-59A DUST CAPS



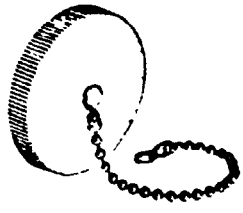
K-59A (for K-21, K-23 plugs, K-31SL receptacle)

SHELL SIZE	CHAIN	SHELL SIZE	CHAIN
WK-59A-1	No chain	FK-59A-1	No chain
WK-59A-2	#6	FK-59A-2	#6
GK-59A-1	No chain	IK-59A-1	No chain
GK-59A-2	#6	IK-59A-2	#10
SK-59A-1	No chain	LK-59A-1	No chain
SK-59A-2	#6	LK-59A-2	#10
NK-59A-1	No chain	AK-59A-2	#10
NK-59A-2	#6		

RK-59A (for RK-31SL receptacle)

SHELL SIZE	CHAIN	SHELL SIZE	CHAIN
RWK-59A-1	No chain	RNK-59A-2	#6
RWK-59A-2	#6	RFK-59A-1	No chain
RGK-59A-1	No chain	RFK-59A-2	#6
RGK-59A-2	#6	RIK-59A-1	No chain
RSK-59A-1	No chain	RIK-59A-2	#10
RSK-59A-2	#6	RLK-59A-1	No chain
RNK-59A-1	No chain	RLK-59A-2	#10

K & RK-60A DUST CAPS



K-60A (for K-22 plug and K-32S, K-32SL receptacles)

SHELL SIZE	CHAIN	SHELL SIZE	CHAIN
WK-60A-1	No chain	FK-60A-1	No chain
WK-60A-2	#6	FK-60A-2	#6
GK-60A-1	No chain	IK-60A-1	No chain
GK-60A-2	#6	IK-60A-2	#10
SK-60A-1	No chain	LK-60A-1	No chain
SK-60A-2	#6	LK-60A-2	#10
NK-60A-1	No chain	AK-60A-2	#10
NK-60A-2	#6		

K-60A (for RK-22 and RK-24 plugs)

SHELL SIZE	CHAIN	SHELL SIZE	CHAIN
RWK-60A-1	No chain	RNK-60A-2	#6
RWK-60A-2	#6	RFK-60A-1	No chain
RGK-60A-1	No chain	RFK-60A-2	#6
RGK-60A-2	#6	RIK-60A-1	No chain
RSK-60A-1	No chain	RIK-60A-2	#10
RSK-60A-2	#6	RLK-60A-1	No chain
RNK-60A-1	No chain	RLK-60A-2	#10

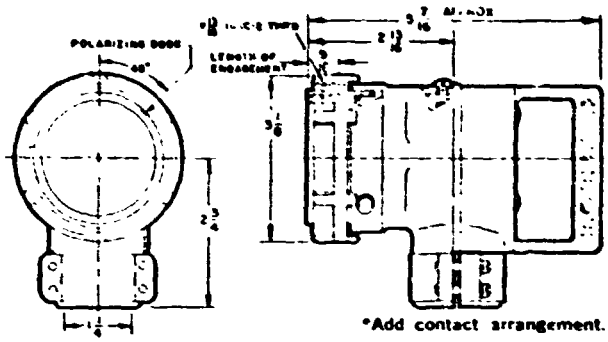
BARREL EXTENSIONS

SHELL SIZE	LENGTH	PART NUMBER
WK	1/2"	019961-0017
	1"	019961-0009
GK	1/2"	019961-0023
	1"	019961-0011
SK	1/2"	019961-0010
	3/4"	019961-0020
	1-7/32"	019961-0001
NK	1/2"	019961-0014
	3/4"	019961-0021
	1-1/8"	019961-0006
FK	17/32"	019961-0003
	1"	019961-0016
	1-7/32	019961-0004
IK	1/2"	019961-0018
	3/4"	019961-0019

Dimensions subject to change.

AK 90° ANGLE HANDLE PLUG

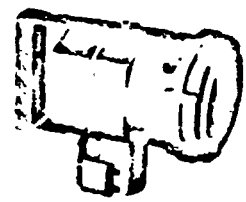
socket inserts



*Add contact arrangement.

AK-(*)-23CH-1 ¼

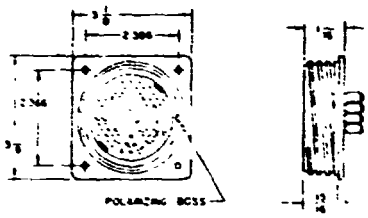
Integral cable clamp has rib type coupling nut with 2 13/16-18 NS-2 thread. Mates with any standard AK receptacle with pin insert.



for television applications

WALL MOUNTING RECEPTACLE

socket inserts

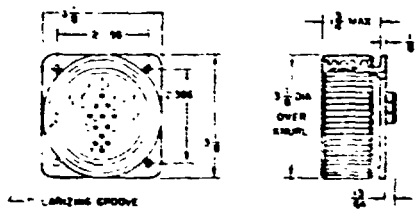


AKT 36196

Mates with AKT-36195 plug. Insert: 8-min. R. coax. for RG-58/U cable; 4-15 amp, 71-10 amp contacts.

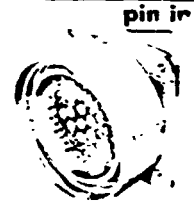
WALL MOUNTING RECEPTACLE

pin inserts



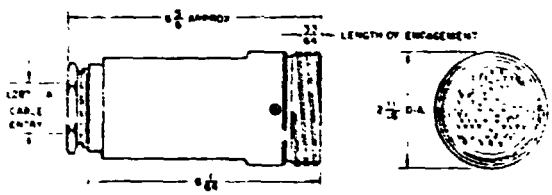
AKT 36197

Mates with AKT-36194 straight plug. Insert: 8-min. R coax. for RG-58/U cable; 4-15 amp, 71-10 amp contacts.



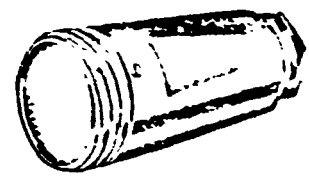
STRAIGHT PLUG

socket inserts



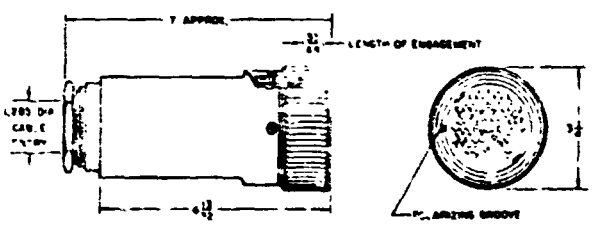
AKT 36194

Mates with AKT-36197 receptacle. Insert: 8-min. R. coax. for RG-58/U cable; 4-15 amp, 71-10 amp contacts.



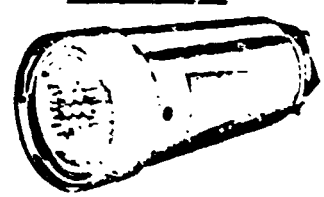
STRAIGHT PLUG

pin inserts



AKT 36195

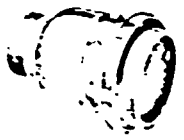
Mates with AKT-36196 receptacle. Insert: 8-min. R. coax. for RG-58/U cable; 4-15 amp, 71-10 amp contacts.



LK/LKT MONOCHROME TELEVISION

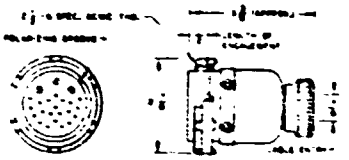
The specialized connectors shown on this page are not recommended for new designs or applications.

STRAIGHT PLUG
socket inserts



LK-R24C-21-7/8T

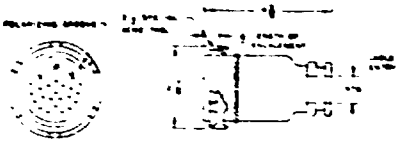
Mates with any LK, LKT plug or receptacle with pin insert. Insert: 21-15 amp contacts; 3-coax. for RG-7/U cable.



STRAIGHT PLUG
socket inserts

LKT-R24C-21-7/8

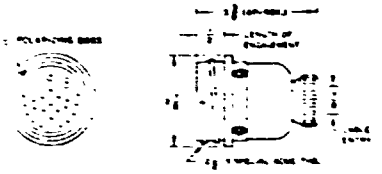
Mates with any LK, LKT plug or receptacle with pin insert. Insert: 21-15 amp contacts; 3-coax. for RG-58/U cable.



STRAIGHT PLUG
pin inserts

LK-R24C-22-7/8T

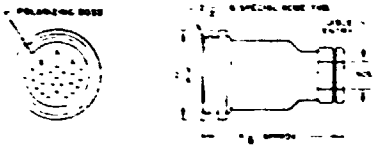
Mates with any LK, LKT plug or receptacle with socket insert. Insert: 21-15 amp contacts; 3-coax. for RG-7/U cable.



STRAIGHT PLUG
pin inserts

LKT-R24C-22-7/8

Mates with any LK, LKT plug or receptacle with socket insert. Insert: 21-15 amp contacts; 3-coax. for RG-58/U cable.



90° ANGLE PLUG
socket inserts

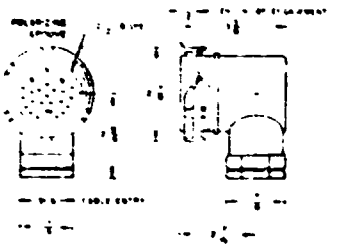
LK-R24C-23-7/8T

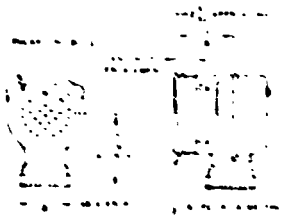
Mates with any LK, LKT plug or receptacle with pin insert. Insert: 21-15 amp contacts; 3-coax. for RG-7/U cable.

90° ANGLE PLUG
socket inserts

LKT-R24C-23-7/8

Mates with any LK, LKT plug or receptacle with pin insert. Insert: 21-15 amp contacts; 3-coax. for RG/58/U cable.

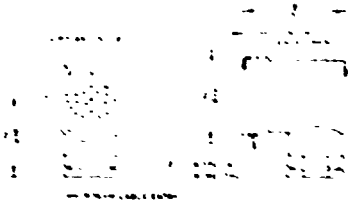




LK-R24C-24-7/8T

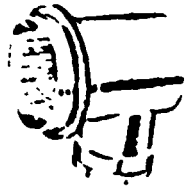
Mates with any LK, LKT plug or receptacle with socket insert. Insert 21 15 amp contacts, 3 coax for RG-7/U cable

90° ANGLE PLUG
pin inserts

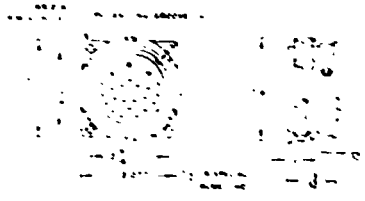


LKT-R24C-24-7/8

Mates with any LK, LKT plug or receptacle with socket insert. Insert 21 15 amp contacts, 3 coax for RG 58/U cable.



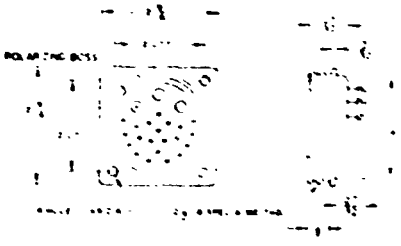
90° ANGLE PLUG
socket inserts



LK-R24C-31S

Mates with any LK, LKT receptacle or plug with pin insert. Insert 21-15 amp contacts; 3-coax for RG-7/U cable.

WALL MOUNTING RECEPTACLE
socket inserts



LK-R24C-32S

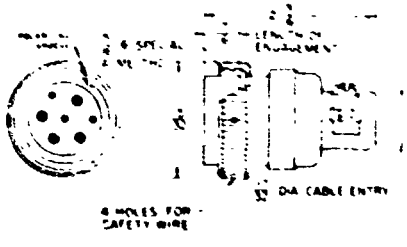
Mates with any LK, LKT plug or receptacle with socket insert. Insert 21 15 amp contacts, 3-coax for RG 7/U cable.

WALL MOUNTING RECEPTACLE
pin inserts

SK-M7-21C-1/2

"BEEP" CONNECTOR

Telephone plug. Mates with SK M7 32S receptacle. Insert 3-10 amp, 4 30 amp contacts

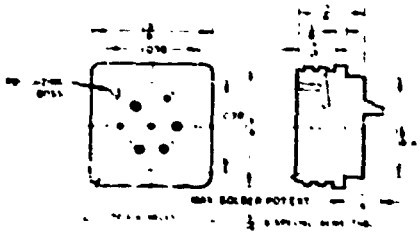


STRAIGHT PLUG
socket inserts

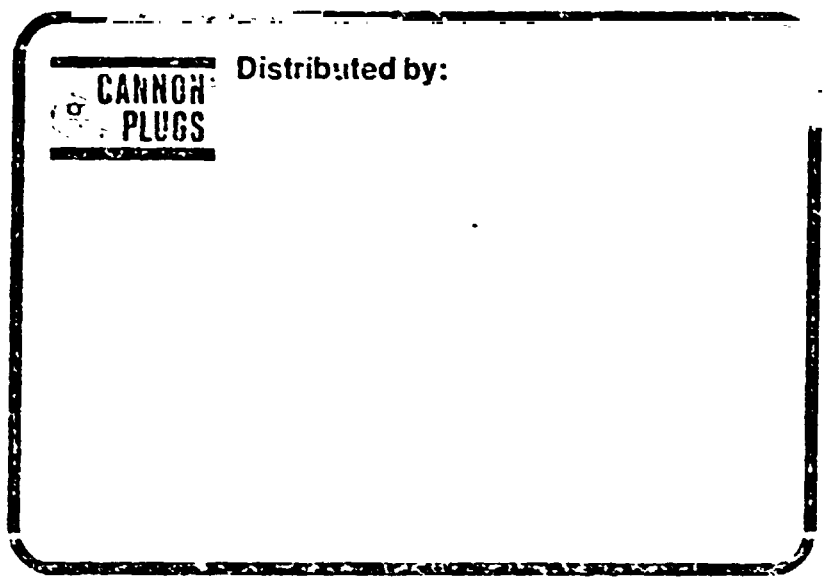
SK-M7-32S

"BEEP" CONNECTOR

Telephone plug. Mates with SK M7 21C-1/2 plug. Insert. 3 10 amp, 4 30 amp contacts.



WALL MOUNTING RECEPTACLE
pin inserts



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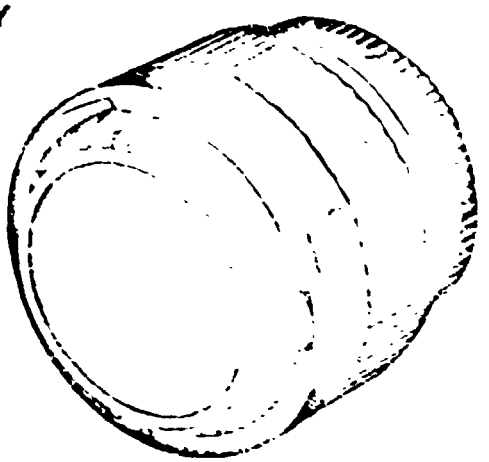
ITALY: Cannon Electric Italiana S.P.A., Via ..., 11, 20123 Milano
GERMANY: Cannon Electric GmbH, P.O. Box 1120, Poststrasse 75, D-7055 Weinstadt, Beutelsbach
JAPAN: Japan Aviation Electronics Industry Ltd., 21-..., Dogenzaka 1-chome, Shibuya-ku, Tokyo 150
NORWAY: Cannon Electric Division, Teknisk Interiør, Box ..., Oslo 1
SWITZERLAND: Cannon Electric GmbH, Friedenstr. 15, CH-8104 Weiningen



Standard Data

Standard Materials and Finishes	KPT	KPTM	KPSE
SHELL	aluminum alloy, conductive olive drab chromate over cadmium finish per QQ-P-416		
INSULATOR	polychloroprene	polychloroprene	polychloroprene
GROMMET AND SEAL	polychloroprene	polychloroprene	polychloroprene
CONTACTS	Copper alloy, gold over copper plate per MIL-G 45204 type II, Class I		
Mechanical Data			
SHELL STYLES	00 — wall mounting receptacle 01 — cable connecting plug 02 — box mounting receptacle 06 — straight plug	07 — jam nut receptacle 08 — 90° angle plug B — thru-bulkhead receptacle (KPT only)	
SHELL SIZES	KPT/KPTM 8 thru 24		KPSE 10 thru 24
POLARIZATION/COUPLING	five keyway . three point bayonet		
SERVICE CLASSES	A — general duty B — general duty with strain relief E — grommet seal F — grommet seal with strain relief	J — gland nut with strain relief for jacketed cable P — potted	

Electrical Data					
NUMBER OF CONTACTS	KPT/KPTM 2 thru 61				KPSE 3 thru 61
WIRE SIZE, AWG	KPT/KPTM 12 thru 24				KPSE 16 thru 24
WIRE RANGE ACCOMMODATIONS	INSULATION OD LIMITS (INCH)				
CONTACT SIZE	AWG WIRE SIZE	MIN KPT	MIN KPTM/KPSE	MAX KPT/KPTM/KPSE	
20	24, 22, and 20	.060	.047	.083	
16	20, 18, and 16	.066	.066	.109	
12	14 and 12	.097		.142	
CONTACT TERMINATION	solder			crimp snap in	

Contact Rating	CONTACT SIZE	RATED AMPS	TEST CURRENT	MILLIVOLT DROP
	20	7.5	7.5	less than 55
	16	22.0	13.0	less than 50

Service Rating	TEST VOLT	SERVICE	AC (rms)	DC
	Sea Level	1	1500	2100
		2	2300	3200
	70,000 ft	1	375	535
		2	550	770

MAXIMUM OPERATING VOLTAGE	SERVICE	AC (rms)	DC
Sea Level	1	600	850
	2	1000	1275

Coaxial Contacts	—	RG 55/U, RG 59/U, RG 62/U, and RG 223/U	—

KPT
General Purpose, MIL-C-26482 Series I
Solder Contact Connectors

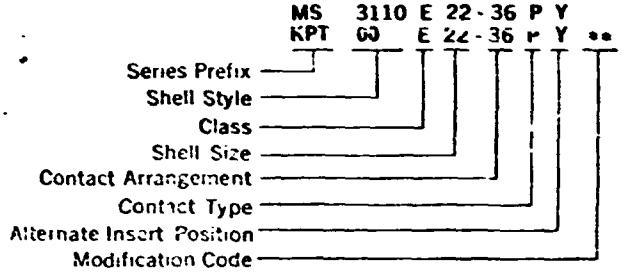
KPT CONNECTORS

- general purpose
- closed-entry socket contacts
- solder termination

KPT connectors are a series of general-purpose, environment-resistant, miniature circular connectors, qualified for use in military applications. KPT connectors are also widely used in industrial applications calling for quick-disconnect connectors with fixed contacts for solder termination.

The KPT series is intermateable and intermountable with all MIL-C-26482 connectors, whether solder or crimp type and is available with many materials, finishes and configurations.

How To Order



SERIES PREFIX
KPT — ITT Cannon prefix
MS — MIL-C-26482 prefix

SHELL STYLE
ITT Cannon number
00 — wall mounting receptacle
01 — cable connecting plug
02 — box mounting receptacle (Class E only)
06 — straight plug
07 — jam nut receptacle (available in hermetic version also)
08 — 90° plug
*B — thru bulkhead receptacle (Class E only)
* See Step III How to Order Nomenclature

MS Designation
3110 — wall mounting receptacle
3111 — cable connecting plug
3112 — box mounting receptacle (Class E only)
3114 — jam nut receptacle
3116 — straight plug
3119 — thru bulkhead receptacle (Class E only)

CLASS
A — general duty (not MIL-C-26482 approved)
B — environment resistant (MIL-C-26482 Series I, Form III only)
E — environment resistant (not on 02 and 3112 MS specification)
F — grommet sealed with strain relief (MS specification)
J — environment resistant with strain relief for jacketed cable (MS specification)
P — printed MS specification)

SHELL SIZE
8, 10, 12, 14, 16, 18, 20, 22, and 24

CONTACT ARRANGEMENT
See pages 10 and 11

CONTACT TYPE
P — pin S — socket

ALTERNATE INSERT POSITION
W, X, Y, or Z (Omit for normal) See page 11

MODIFICATION CODE
Consult factory (omit first 2 of shell style indication when using modification code

KPTB CONNECTORS

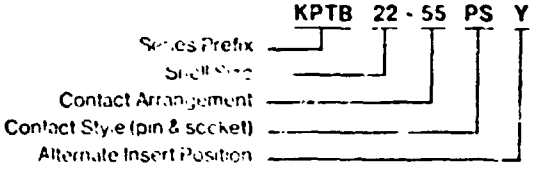
- general purpose
- double ended pin and socket contacts
- contains KPT socket insert
- nonremovable contacts

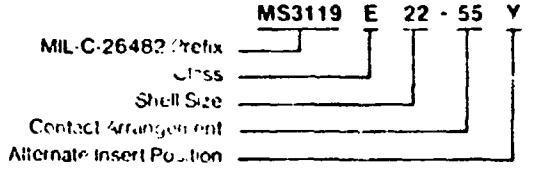
KPTB connectors are a series of general purpose, miniature circular connectors, qualified for use in military applications. They are also widely used in industrial applications. The KPTB is a thru-bulkhead version with double faced pin and socket insert construction allowing mating from both ends. They contain KPT socket inserts with feedthru (pin/socket) nonremovable contacts.

The thru-bulkhead receptacle is provided for applications requiring the disconnection of a power source from either side of a panel. A typical connector to be used if air leakage requirements are critical.

How To Order

Thru-Bulkhead Receptacle Connectors.





Test Data

Test Name and MIL-C-0026482 F Ref. Paragraph	KPT/KPTM/KPSE
OPERATING FORCES Para 4.6.3	Engaging and disengaging torque (in /lbs) limits were satisfactory within those specified for shell sizes involved.

Shell Size	8	10	12	14	16	18	20	22	24
Engaging Torque (Max)	8	12	16	20	24	28	32	36	44
Disengaging Torque (Min)	1	1	2	4	4	5	6	7	7

MAINTENANCE AGING Para 4.6.2	Contact insertion forces measured on 20% of contacts, but not less than 3 contacts, of each connector for size 20 and size 16 contacts, do not exceed 20 lbs at the ninth insertion
THERMAL SHOCK Para 4.6.12	There was no evidence of cracking or other damage detrimental to connector operation after exposure to 5 cycles of temperature change from −55°C to +125°C, 1 hour per cycle, divided equally between temperature extremes.
INSULATION RESISTANCE (elev temp) Para 4.6.7	While applying 500 VDC for 250 hours at 125°C, the insulation resistance was greater than 50 megohms between all adjacent contact pairs, shell, and its closest contacts. Insulation resistance was greater than 25 megohms at 105°C for 1000 hrs
DIELECTRIC WITHSTANDING VOLTAGE (sea level) Para 4.6.9.1	There was no evidence of breakdown or flashover with 1500VAC applied for 1 min between 5 pairs of adjacent contacts and between contacts closest to shell and shell for Service Rating 1 and 2300VAC applied in the same manner for Service Rating 2
DURABILITY Para 4.6.17	There was no evidence of mechanical or electrical damage to connectors after 500 engagements and disengagements as in service
VIBRATION Para 4.6.21	With contacts wired in series and monitored for continuity, there was no mechanical damage and no electrical discontinuity greater than 10 microseconds. Connectors mounted and mated as in service and vibrated through a range of 10 cps to 2K cps for 20 min in each of 3 mutually perpendicular axes at a double amplitude of 0.06", or 15g's max
SHOCK Para 4.6.23	With contacts wired in series and monitored for continuity, there was no mechanical damage and no electrical discontinuity greater than 10 microseconds while the connector was subjected to an 11 millisecond, 50g sawtooth shock in each of three major axes
INSULATION RESISTANCE (after vib & shock) Para 4.6.25	With 500VDC applied, insulation resistance was greater than 5,000 megohms between each pair of adjacent contacts and between shell and its closest contacts
MOISTURE RESISTANCE Para 4.6.25	With 500VDC applied, insulation resistance between any two contacts or any contact and the shell was no less than 100 megohms while mated connectors were exposed to high humidity environment, in humidity chamber adjusted to cause condensation at prescribed intervals
SOLVENT IMMERSION Para 4.6.27	Engaging and disengaging torques and dielectric withstanding voltages were within the limits previously indicated after unmated connectors had been immersed in aviation hydraulic fluid for 20 hours followed by 1 hour drying in free air
CONTACT RESISTANCE Para 4.6.5	For size 16 contacts minimum voltage drop was less than 50MV with a DC current for 13 amps flowing, and for size 20 contacts the corresponding voltage drop was less than 50MV with a DC current of 7.5 amps flowing, in accordance with MIL-STD 202, Method 307
INSERT RETENTION Para 4.6.29	Inserts within wired connectors (less grommets and endbells) did not dislodge when subjected to pressures of 75 psi on each insulator face for a period of 5 seconds.
HIGH ALTITUDE IMMERSION (per MIL-C-26500B)	Wires and mated connectors immersed in 50% salt water solution. Pressure reduced to 6,000 ft. altitude (5.41 cm Hg) and maintained for 30 minutes prior to measurement of insulation resistance while still immersed in salt solution. In no case was insulation resistance found to be less than 100 megohms — Not applicable to KPSE.
CONTACT RETENTION Para 4.6.32	In no case did axial contact displacement exceed .012" after the application of a 5 lb preload, followed by application of 15 lbs and 25 lbs axial load at engaging end of size 20 and 16 contacts respectively. Displacement is measured after a minimum of 5 seconds and while still under load. This test does not apply to KPTM connectors
SALT SPRAY MIL-STD 202B, Method 101A, Condition B	No damage or unacceptable increase in contact resistance after mated sample subjected to 48 hours of salt spray
AIR LEAKAGE	30 psi differential at 67° (KPT only) — less than 1 atmosphere cubic inch per hour
TEMPERATURE RANGE	−55°C to +125°C
CONTACT INSERTION AND EXTRACTION	Insertion force does not exceed 20 lbs. Extraction force does not exceed 20 lbs

Contact Arrangements

Drawing not to scale:
face view of pin insert shown
(socket view is opposite)

LEGEND

- ▲ KPT
- ● KPTM
- ◆ KPSE
- △ Authorized per MIL-C-26482 (NAVY)
- □ Authorized per SCL-6019 (SIGNAL CORPS)

SHELL SIZE 8

	8-2	8-3	8-4	8-33
No. of Contacts and Contact Size	2-#20	3-#20	4-#20	3-#20
Service	1	1	1	1

SHELL SIZE 10

	10-6	10-98
No. of Contacts and Contact Size	6-#20	6-#20
Service	1	1

SHELL SIZE 12

	12-3	12-8	12-10
No. of Contacts and Contact Size	3-#16	8-#20	10-#20
Service	2	1	1

SHELL SIZE 14

	14-5	14-12	14-15	14-18	14-19
No. of Contacts and Contact Size	5-#16	8-#20 4-#16	14-#20 1-#16	18 #20	19-#20
Service	2	1	1	1	1

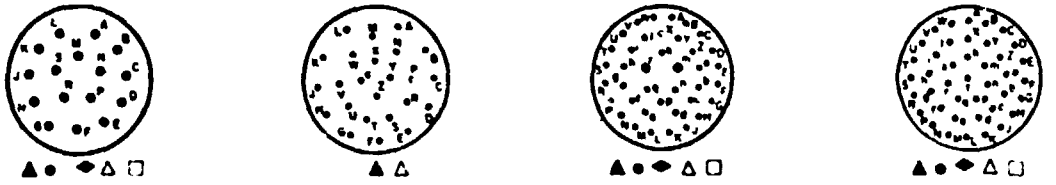
SHELL SIZE 16

	16-8	16-23	16-26	16A99
No. of Contacts and Contact Size	8-#16	22-#20 1-#16	26-#20	21-#20 2-#16
Service	2	1	1	1

SHELL SIZE 18

	18-11	18A28	18-30	18-32
No. of Contacts and Contact Size	11-#16	26-#20 2-#16	29-#20 1-#16	32-#20
Service	2	1	1	1

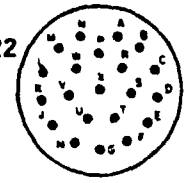
SHELL SIZE 20



	20-16	20-24	20-39	20-41
No. of Contacts and Contact Size	16-#16	24-#20	37-#20 2-#16	41-#20
Service	2	1	1	1

Contact Arrangements

SHELL SIZE 22



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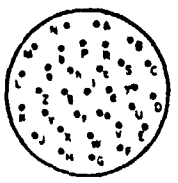
22-21

No. of Contacts and Contact Size: 21-#15

Service: 2

PIN INSERT ONLY KPTM



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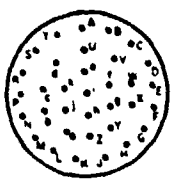
22-32

No. of Contacts and Contact Size: 32-#20

Service: 1



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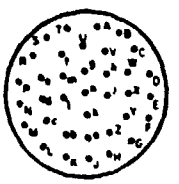
22-34

No. of Contacts and Contact Size: 34-#20

Service: 1



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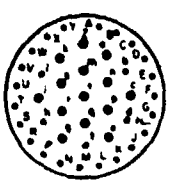
22-36

No. of Contacts and Contact Size: 36-#20

Service: 1



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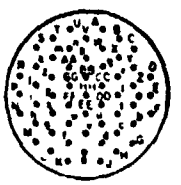
22-41

No. of Contacts and Contact Size: 27-#20, 14-#16

Service: (#20's); 2 (#16's)



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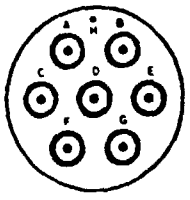
22-55

No. of Contacts and Contact Size: 55-#20

Service: 1

SHELL SIZE 24



●

24A4

No. of Contacts and Contact Size: 1-#20

Service: 2-RG 55/U, 5-RG-59/U

●

24A8

No. of Contacts and Contact Size: 1-#20

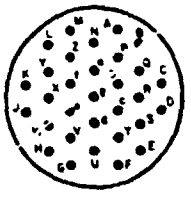
Service: 7-RG 59/U or 62/U

●

24A9

No. of Contacts and Contact Size: 1-#20

Service: 7 RG 223/U



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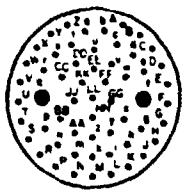
24A31

No. of Contacts and Contact Size: 31-#16

Service: 1



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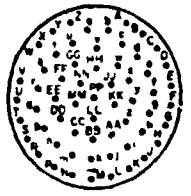
24A57

No. of Contacts and Contact Size: 55-#20, 2-#12

Service: 1



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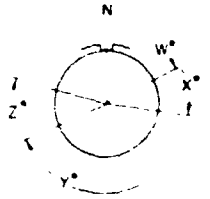
24-61

No. of Contacts and Contact Size: 61-#20

Service: 1

INSERT POSITION
(Face view of pin insert)



Alternate Insert Positions

The diagram at the left indicates alternate insert positions. The five positions (W, X, Y, Z and Normal) differ in degree of rotation for various sizes and arrangements. For the exact degree of rotation, and for the list of contact arrangements and alternate positions available, refer to the tabulation below.

NO. OF CONTACTS	SHELL SIZE	ARR. NO.	Degrees of Rotation W	X	Y	Z
2	8	8-2	58	122	-	-
3	8	8-3	60	210	-	-
	8	8-33	90	-	-	-
	12	12-3	-	-	180	-
4	8	8-4	45	-	-	-
5	14	14-5	40	92	184	273
6	10	10-6	90	-	-	-
	10	10-98	90	180	240	270
8	12	12-8	90	112	203	292
	16	16-8	54	152	180	331
	24	24A8	-	-	-	-
	24	24A8	-	-	-	-
	24	24A9	-	-	-	-
10	12	12-10	60	155	270	295
11	18	18-11	62	119	241	340
12	14	14-12	43	90	-	-
15	14	14-15	17	110	155	234
16	20	20-16	238	318	333	347
18	14	14-18	15	90	180	270

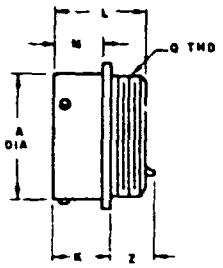
NO. OF CONTACTS	SHELL SIZE	ARR. NO.	Degrees of Rotation W	X	Y	Z
19	14	14-19	30	165	315	-
21	22	22-21	16	135	175	349
23	16	16-23	158	270	-	-
	16	16A99	66	156	223	340
24	20	20-24	70	145	215	290
26	16	16-26	60	-	275	338
28	18	18A28	-	-	-	-
30	18	18-30	180	193	285	350
31	24	24A31	90	225	-	-
32	18	18-32	85	138	222	265
	22	22-32	72	145	215	288
34	22	22-34	72	142	218	298
36	22	22-36	72	144	216	288
39	20	20-39	60	144	252	333
41	20	20-41	45	126	225	-
	22	22-41	39	135	264	-
55	22	22-55	30	142	226	314
57	24	24A57	90	180	270	324
61	24	24-61	90	180	270	324

Blue numbers indicate contact arrangements are not to MIL C 26482

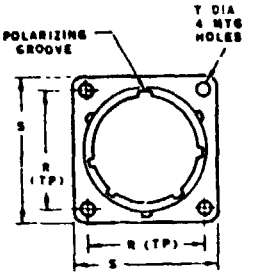
Wall Mounting Receptacles

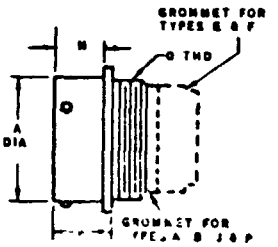
KPT00/MS3110 (MS service class E, F, J, P)
KPSE00/MS3120 (MS service class E, F, P)
KPTM00

WITHOUT TERMINATION ASSEMBLIES



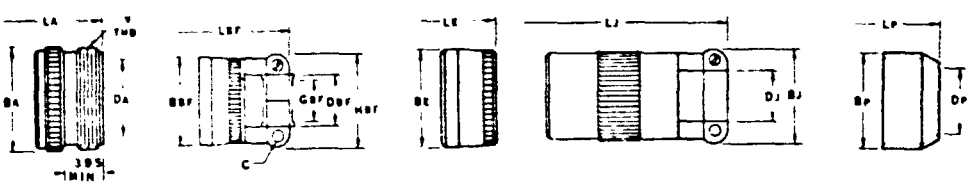
SOLDER
KPT00/MS3110





CRIMP
KPTM00/KPSE00/MS3120

Shell Size*	KPT/KPTM/KPSE A ± .003	KPT/KPTM/KPSE L Max	KPT/KPTM/KPSE Q Thread Class 2A	KPT/KPTM/KPSE K ± .010	KPT/KPTM/KPSE M ± .005	KPT/KPTM/KPSE R• (TP)	KPT/KPTM/KPSE S Max	KPT/KPTM/KPSE T ± .005	KPT Z Max.
48	.471	.848	7/16-28UNEF	.530	.457	.594	.828	.120	.433
10	.588	.848	9/16-24UNEF	.530	.457	.719	.954	.120	.483
12	.748	.848	11/16 24UNEF	.530	.457	.812	1.047	.120	.483
14	.873	.848	13/16 20UNEF	.530	.457	.906	1.141	.120	.483
16	.998	.848	15. 16 20UNEF	.530	.457	.969	1.234	.120	.483
18	1.123	.848	1 1/16 18UNEF	.530	.457	1.062	1.328	.120	.483
20	1.248	1.055	1- 3 16 18UNEF	.650	.561	1.156	1.453	.120	.427
22	1.373	1.055	1- 5/16 18UNEF	.650	.561	1.250	1.578	.120	.427
24	1.498	1.055	1- 7/16 18UNEF	.683	.594	1.375	1.703	.147	.393



TYPE A TYPE B AND F TYPE E TYPE J TYPE P

WITH TERMINATION ASSEMBLIES

Shell Size*	TYPE A BA Max.	TYPE A DA Min.	TYPE A LA Max.	TYPE A V Thread Class 2A	TYPE B and F BBF Max	TYPE B and F C Thd.	TYPE B and F DBF Min	TYPE B and F GBF Min.	TYPE B and F HBF Max.	TYPE B and F LBF Max
48	.590	.335	1.444	1/2 28UNEF	.552	6-32	.234	.115	.760	1.828
10	.717	.466	1.444	5/8 24UNEF	.677	6 32	.297	.178	.820	1.828
12	.834	.597	1.444	3/4 20UNEF	.802	6 32	.422	.302	.960	1.828
14	.970	.705	1.444	7/8 20UNEF	.927	6-32	.547	.365	1.070	1.938
16	1.088	.830	1.444	1 20UNEF	1.052	6 32	.609	.490	1.130	1.993
18	1.216	.948	1.444	1 3/16 18UNEF	1.161	8 32	.740	.615	1.390	1.993
20	1.332	1.043	1.728	1 3/16 18UNEF	1.286	8 32	.770	6 [illegible]	1.490	2.031
22	1.460	1.198	1.728	1-7/16 18UNEF	1.411	8 32	.928	.740	1.570	2.031
24	1.585	1.293	1.738	1 7/16 18UNEF	1.536	8 32	.984	.790	1.730	2.031

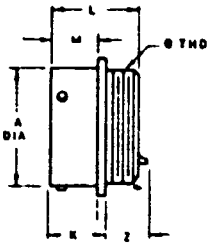
Shell Size*	TYPE E BE Max.	TYPE E LE Max	TYPE J BJ Max	TYPE J DJ Min	TYPE J DJ Max	TYPE J LJ Max	TYPE P BP Max	TYPE P DP Min.	TYPE P LP Max
48	.557	1.328	.838	.168	.200	2.270	.650	.427	1.450
10	.577	1.328	.931	.205	.312	2.270	.671	.444	1.450
12	.802	1.328	1.016	.338	.442	2.410	.852	.558	1.450
14	.920	1.328	1.141	.416	.539	2.600	.956	.583	1.450
16	1.015	1.328	1.203	.550	.616	2.980	1.088	.808	1.450
18	1.165	1.328	1.469	.600	.672	3.170	1.220	.909	1.450
20	1.290	1.406	1.469	.6[illegible]	.747	3.610	1.349	1.014	1.650
22	1.415	1.406	1.656	.670	.846	3.760	1.461	1.159	1.660
24	1.540	1.406	1.750	.740	.804	3.9[illegible]	1.593	1.284	1.730

* See pages 4, 5, and 6 for ordering number information and pages 8 and 9 for contact arrangements
▲ Not available in KPSE
• (T P) located within .010 T P with respect to diameter A and master keyway.

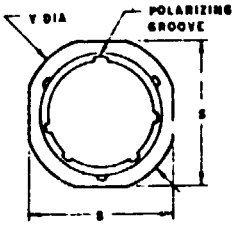
Dimensions subject to change

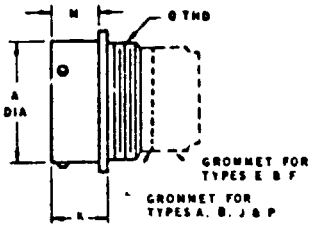
Cable Connecting Plugs

KPT01/MS3111 (MS service class E, F, J, P)
KPSE01/MS3121 (MS service class E, F, P)
KPTM01



SOLDER
KPT01/MS3111

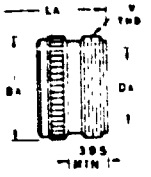




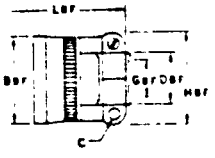
CRIMP
KPTM01/KPSE01/MS3121

WITHOUT TERMINATION ASSEMBLIES

Shell Size*	KPT/KPTM/KPSE A ±.003	K ±.010	L Max	M ±.005	Q Thread Class 2A	S Max	Y Max.	KPT Z Max.
▲8	.471	530	.848	.425	7/16-28UNEF	.828	.958	.483
10	.588	.530	848	425	9 16-24UNEF	.954	1 082	.483
12	.748	.530	848	.425	11 16-24UNEF	1 047	1 176	.483
14	.873	530	848	.425	13 16 20UNEF	1 141	1 270	483
16	998	530	.848	425	15 16 20UNEF	1 234	1 364	.483
18	1.123	530	.848	.425	1- 1 16 18UNEF	1 328	1 458	.483
20	1.248	.650	1 055	.540	1- 3 16 18UNEF	1 453	1 582	427
22	1 373	650	1.055	540	1- 5 16 18UNEF	1 578	1 709	427
24	1 498	683	1 055	.573	1 7 16 18UNEF	1 703	1 812	393

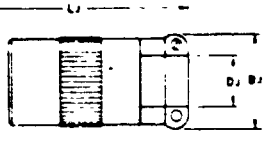


TYPE A

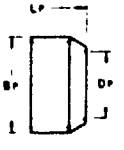


TYPE B AND F

TYPE E



TYPE J



TYPE P

WITH TERMINATION ASSEMBLIES

Shell Size*	TYPE A BA Max.	DA Min.	LA Max.	V Thread Class 2A	TYPE B and F BBF Max	C Thd.	DBF Min	GBF Min	HBF Max	LBF Max
▲8	.590	335	1 444	1/2-28UNEF	.552	6 32	.234	.115	760	1 828
10	.717	.466	1 [illegible]	5/8 24UNEF	677	6-32	297	.178	820	1 828
12	834	.591	1.44[illegible]	3/4-20UNEF	802	6 32	422	302	960	1 828
14	970	705	1 444	7/8 20UNEF	927	6-32	547	365	1 070	1 828
16	1 088	830	1 444	1 -20UNEF	1 052	6 32	609	490	1 130	1 953
18	1 216	948	1 444	1-3/16 18UNEF	1.161	8 32	740	615	1 390	1 953
20	1.332	1 043	1 728	1-3/16 18UNEF	1 286	8-32	.740	615	1 330	2 031
22	1 460	1 198	1 728	1 7/16-1[illegible]NEF	1 411	8 32	928	.740	1 570	2 031
24	1 585	1 293	1 738	1 7/16-18UNEF	1 536	8 32	984	790	1 700	2 031

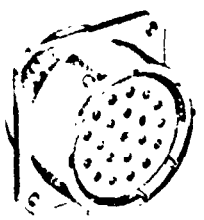
Shell Size*	TYPE E BE Max	LE Max	TYPE J BJ Max	DJ Min.	DJ Max	LJ Max	TYPE P BP Max	DP Min.	LP Max.
▲8	557	1 328	828	168	.230	2 270	602	327	1 450
10	677	1 328	891	.205	.312	2 270	691	.444	1 450
12	.802	1 328	1 016	.338	442	2 410	852	.558	1.450
14	920	1 328	1.141	416	539	2 600	[illegible]	.683	1 450
16	1 045	1 328	1 203	550	616	2 880	1 088	808	1 450
18	1 165	1 328	1 469	600	672	3 170	1 220	909	1 450
20	1 290	1 406	1 469	.635	747	3 610	1 349	1 034	1 660
22	1 415	1 406	1 656	670	846	3 760	1 461	1 159	1 660
24	1 540	1 406	1 750	.740	894	3 900	1 593	1 284	1 730

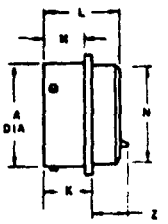
* See pages 4, 5, and 6 for ordering number information and pages 8 and 9 for contact arrangements
▲ Not available in KPSE
• (T P) located within .010 T P with respect to diameter A and master keyway

Box Mounting Receptacles

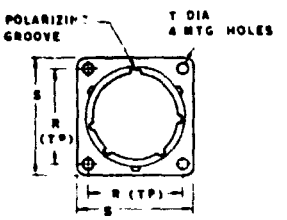
KPT02/MS3112 (MS service class E)
KPSE02/MS3122 (MS service class E)
KPTM02

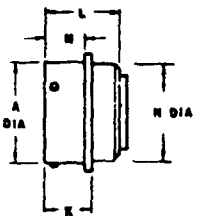
ORIGINAL PAGE IS
OF POOR QUALITY





SOLDER
KPTO2/MS3112





CRIMP
KPTM02/KPSE02

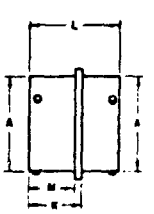
WITHOUT TERMINATION ASSEMBLIES

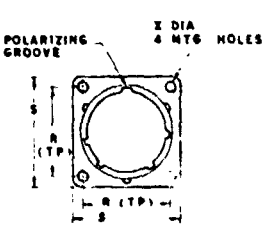
Shell Size*	KPT/KPTM/KPSE A Dia. ± .003	L Max	N Dia. Max	K ± .010	KPT/KPTM/KPSE M ± .005	R• (TP)	S Max.	T ± .005	KPT Z Max
▲8	.471	.832	.436	.530	.457	.594	.828	.120	.483
10	.588	.832	.562	.530	.457	.719	.954	.120	.483
12	.748	.832	.687	.530	.457	.812	1.047	.120	.483
14	.873	.832	.812	.530	.457	.906	1.141	.120	.483
16	.998	.832	.936	.530	.457	.969	1.234	.120	.483
18	1.123	.832	1.061	.530	.457	1.062	1.328	.120	.483
20	1.248	.895	1.186	.650	.561	1.156	1.453	.120	.427
22	1.373	.895	1.31[illegible]	.650	.56[illegible]	1.250	1.578	.120	.427
24	1.498	.895	1.436	.683	.594	1.375	1.703	.147	.393

* See pages 4, 5 and 6 for ordering number information
▲ Not available in KPSE
• (T.P.) located within .010 T.P. with respect to diameter A and master keyway.

Thru-Bulkhead Receptacles

KPTB/MS3119 (MS service class E)





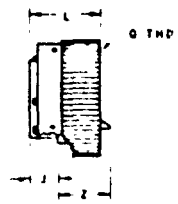
KPT/MS3119

Shell Size*	A Dia. ± .003	K ± .020	L Max	M .010	R• (TP)	S Max	X ± .005
8	.471	.634	1.125	.572	.594	.828	.120
10	.588	.634	1.125	.572	.719	.954	.120
12	.748	.634	1.125	.572	.812	1.047	.120
14	.873	.634	1.125	.572	.906	1.141	.120
16	.998	.634	1.125	.572	.969	1.234	.120
18	1.123	.634	1.125	.572	1.062	1.328	.120
20	1.248	.792	1.255	.698	1.156	1.453	.120
22	1.373	.792	1.255	.698	1.250	1.578	.120
24	1.498	.792	1.255	.698	1.375	1.703	.147

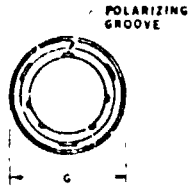
* See page 4 for ordering information
• (T.P.) located within .010 T.P. with respect to diameter A and master keyway

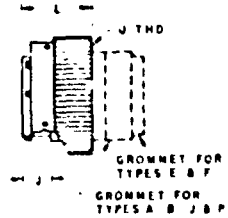
Straight Plugs

KPT06/MS3116 (MS service class E, F, J, P)
KPSE06/MS3126 (MS service class E, F, P)
KPTM06



SOLDER
KP106/MS3116

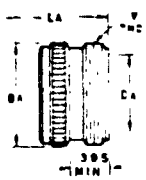




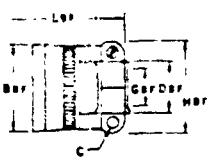
CRIMP
KPTM06/KPSE06/MS3126

WITHOUT TERMINATION ASSEMBLIES

Shell Size*	KPT/KPTM/KPSE G Max	J .005	L Max	Q Thread Class 2A	KPT Z Max
48	.782	.359	.844	7/16 28UNEF	.641
10	.926	.358	.844	9/16 24UNEF	.641
12	1.043	.358	.844	11/16 24UNEF	.641
14	1.183	.358	.844	13/16 20UNEF	.641
16	1.305	.358	.844	15/16 20UNEF	.641
18	1.391	.358	.844	1 1/16 18UNEF	.641
20	1.531	.420	.989	1 3/16 18UNEF	.584
22	1.656	.420	.989	1 5/16 18UNEF	.584
24	1.777	.420	.989	1 7/16 18UNEF	.584

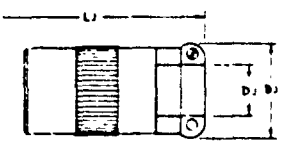


TYPE A

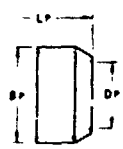


TYPE B AND F

TYPE E



TYPE J



TYPE P

WITH TERMINATION ASSEMBLIES

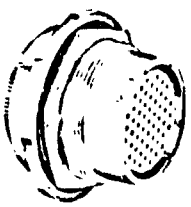
Shell Size*	TYPE A BA Max	DA Min	LA Max	V Thread Class 2A	TYPE B and F BBF Max	C Thd	DBF Min	GBF Min	HBF Max.	LBF Max
48	.590	.335	1.440	1/2 28UNEF	.552	6-32	.234	.115	.700	1.812
10	.717	.466	1.440	5/8 24UNEF	.677	6-32	.297	.178	.820	1.812
12	.834	.591	1.440	3/4 20UNEF	.802	6-32	.422	.302	.960	1.812
14	.970	.705	1.440	7/8 20UNEF	.927	6-32	.547	.365	1.070	1.812
16	1.058	.830	1.440	1 20UNEF	1.052	6-32	.609	.490	1.130	1.938
18	1.216	.948	1.440	1 3/16 18UNEF	1.161	8-32	.740	.615	1.390	1.938
20	1.332	1.043	1.662	1 3/16 18UNEF	1.286	8-32	.740	.615	1.390	1.953
22	1.460	1.198	1.662	1 7/16 18UNEF	1.411	8-32	.928	.740	1.570	1.953
24	1.585	1.293	1.672	1 7/16 18UNEF	1.536	8-32	.994	.790	1.700	1.953

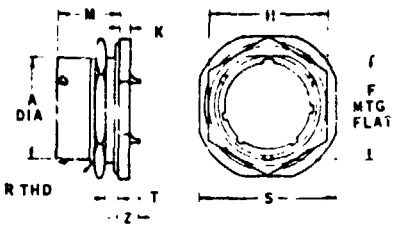
Shell Size*	TYPE E BE Max	LE Max	TYPE J BJ Max	DJ Min	DJ Max	LJ Max	TYPE P BP Max	DP Min	LP Max
48	.557	1.328	.828	.168	.230	2.270	.602	.327	1.450
10	.677	1.328	.891	.205	.312	2.270	.691	.444	1.450
12	.802	1.328	1.016	.338	.442	2.410	.752	.558	1.450
14	.920	1.328	1.141	.416	.539	2.600	.956	.683	1.450
16	1.045	1.328	1.203	.550	.616	2.880	1.088	.808	1.450
18	1.165	1.328	1.469	.600	.672	3.170	1.220	.909	1.450
20	1.290	1.344	1.469	.635	.74	3.510	1.349	1.034	1.600
22	1.415	1.344	1.656	.670	.848	3.670	1.461	1.159	1.600
24	1.540	1.344	1.750	.740	.894	3.800	1.593	1.284	1.600

* See pages 4, 5, and 6 for ordering number information and pages 8 and 9 for contact arrangements
▲ Not available in KPSE

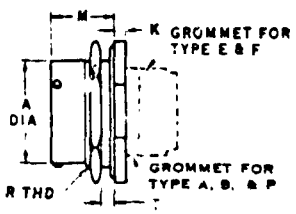
Jam Nut Receptacles

KPT07/MS3114 (MS service class E, F, P)
KPSE07/MS3124 (MS service class E, F, P)
KPTM07





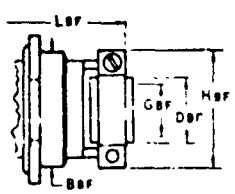
SOLDER
KPT07/MS3114
TYPE A



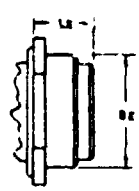
KPTM[illegible]E/MS3124
TYPE A

WITHOUT TERMINATION ASSEMBLIES

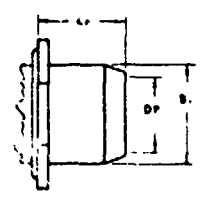
Shell Size*	KPT/KPTM/KPSE A ±.003	F ±.005	H ±.005	K ±.010	M ±.005	R Thread Class 2A	S ±.010	T Panel Thk Min	T Panel Thk Max	KPT Z Max
08	.471	.525	.750	.125	.696	9/16-24UNEF	.938	.062	.125	.312
10	.588	.650	.875	.125	.696	11/16-24UNEF	1.062	.062	.125	.312
12	.748	.813	1.062	.125	.696	7/8 [illegible]UNEF	1.250	.062	.125	.312
14	.873	.937	1.188	.125	.696	1 [illegible]20UNEF	1.375	.062	.125	.312
16	.998	1.061	1.312	.125	.696	1- 1/8 -18UNEF	1.500	.062	.125	.312
18	1.123	1.186	1.438	.125	.696	1 1/4 -18UNEF	1.625	.062	.125	.312
20	1.248	1.311	1.562	.156	.884	1- 3/8 -18UNEF	1.812	.062	.250	.187
22	1.373	1.436	1.688	.156	.884	1- 1/2 -18UNEF	1.938	.062	.250	.187
24	1.498	1.561	1.812	.156	.917	1- 5/8 -18UNEF	2.062	.062	.250	.150



TYPE B & F



TYPE E



TYPE P

WITH TERMINATION ASSEMBLIES

Shell Size*	TYPE B and F Bbf Max	Dbf Min	Gbf Min	Hbf Max	Lbf Max	TYPE E Be Max	Le Max	TYPE P Bp Max	Dp Min	Lp Max
08	.717	.274	.115	.760	1.912	.717	.672	.592	.327	.625
10	.843	.297	.138	.820	1.812	.843	.672	.717	.444	.625
12	.968	.422	.302	.953	1.812	.968	.672	.852	.568	.625
14	1.093	.547	.365	1.070	1.812	1.093	.672	.956	.[illegible]	.625
16	1.218	.609	.490	1.130	1.938	1.218	.672	1.088	.808	.625
18	1.343	.740	.615	1.[illegible]90	1.938	1.343	.672	1.220	.903	.625
20	1.500	.810	.615	1.[illegible]90	2.016	1.530	.692	1.349	1.034	.746
22	1.625	.928	.740	1.568	2.016	1.625	.632	1.461	1.159	.746
24	1.750	.959	.790	1.[illegible]03	2.016	1.750	.658	1.593	1.284	.716

* See Pages 4, 5, and 6 for ordering information and Pages 8 and 9 for contact arrangements.
▲ Not available in K, SE.

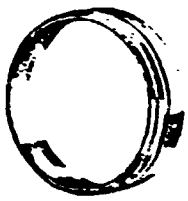
Dimensions subject to change

For Standard Plastic Insulator MS and CA receptacles

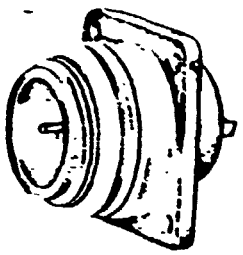
CA22181 Adapters

The CA22181 adapter is designed to screw over the coupling threads of a standard MS or CA receptacle with plastic insulator. It has a locking groove, which receives the formed end of the coupler latch when fully engaged.

Adapters may be ordered as part of a standard plastic insulator MS or CA receptacle, or they may be ordered separately. To order adapters separately, a listing is given in the table to the right. To order complete assemblies (standard plastic insulator MS or CA receptacles with adapters), see page 28.

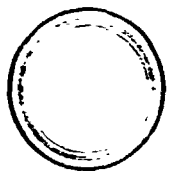


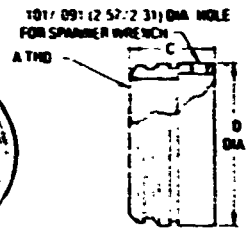
ADAPTER



MS3101 RECEPTACLE WITH ADAPTER

ADAPTER PART NUMBER	FOR SHELL SIZE	A Thread	INCHES C Max.	INCHES D Max.	MILLIMETERS C Max.	MILLIMETERS D Max.
CA22181 8	8S	⅝-28UNEF 2B	.480	.615	12.19	15.62
CA22181 10	10S 10SL	⅝-24UNEF 2B	.480	.740	12.19	18.80
CA22181 12	12S	¾-20UNEF 2B	.480	.915	12.19	23.24
CA22181 14	14S	⅞-20UNEF 2B	.480	1.045	12.19	26.54
CA22181 16	16S	1-20UNEF 2B	.480	1.170	12.19	29.72
CA22181 13	12	¾-20UNEF 2B	.665	.915	16.89	23.24
CA22181 15	14	⅞-20UNEF 2B	.665	1.045	16.89	26.54
CA22181 17	16	1-20UNEF 2B	.665	1.170	16.89	29.72
CA22181 19	18	1⅛-18UNEF 2B	.540	1.305	13.72	33.15
CA22181 20	20	1¼-18UNEF 2B	.540	1.405	13.72	35.69
CA22181 22	22	1⅜-18UNEF 2B	.540	1.530	13.72	38.86
CA22181 24	24	1½-18UNEF 2B	.575	1.655	14.61	42.04
CA22181 28	28	1¾-16UN 2B	.575	1.905	14.61	48.39



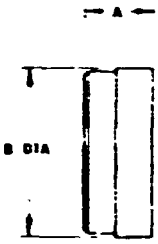


For Standard Plastic Insulator MS and CA Plugs

CA22182 Couplers

CA22182 couplers are designed to replace the coupling nut on standard ITT Cannon plastic insulator MS or CA connectors. A standard manual coupler (AQ and BQ) is available.

Couplers may be ordered separately or as part of a standard plastic insulator MS or CA connector assembly (see page 28).



Manual Type Coupler

PART NUMBER	TYPE DISCONNECT	FOR SHELL SIZE	INCHES A Max.	INCHES B Max.	MILLIMETERS A Max.	MILLIMETERS B Max.
CA22182 7	AQ	8S	.740	1.040	18.80	26.42
CA22182 8	BQ					
CA22182 9	AQ	10S &	.740	1.165	18.80	29.59
CA22182 10	BQ	10SL				
CA22182 11	AQ	12 &	.740	1.290	18.80	32.77
CA22182 12	BQ	12S				
CA22182 14	AQ	14 &	.740	1.415	18.80	35.94
	BQ	14S				
CA22182-16	AQ	16 &	.740	1.540	18.80	39.12
	BQ	16S				
CA22182 18	AQ	18	.880	1.665	22.35	42.29
CA22182 20	AQ & BQ	20	.880	1.780	22.35	45.21
CA22182 21	AQ	22	.880	1.910	22.35	48.51
CA22182 22	BQ					
CA22182 23	AQ	24	.950	1.995	24.13	50.67
CA22182 24	BQ					
CA22182 27	AQ	28	.950	2.240	24.13	56.90
CA22182 28	BQ					

MS-E/MS-R/MS-F Solder/F80 Crimp Environmental

In the latest revision of MIL-C-5015 a new class of environment-resistant connectors was added. This new class F connector supersedes the previous class E connector. The MS-3106F is identical to the MS3106E except that the MS3106F has an "O" ring under the coupling nut. The class E will still be available upon request for existing programs and upon ordering will also bear the E nomenclature on the shell.

ITT Cannon MS-F and MS-R connectors are designed to operate in the extreme environmental conditions of high altitude flight. These connectors must be completely sealed to withstand moisture, condensation, vibration, corona and flashover caused by high altitude environments.

MS-F and MS-R connectors have a resilient grommet with internal restrictions in the wire cavities which act as O rings around the wires. This allows the wires to slide thru the grommet with a minimum of friction, yet when the ferrule is seated and the endbell tightened it provides a perfect wire seal thru a wide variety of wire diameters. This seal at the rear, plus the interfacial seal at the front effects a completely environment-resistant assembly when the plug is mated to an F or R receptacle. Sockets are of the closed-entry type.

The F-80 modification (crimp contact termination) is available in resilient insulators in the E, R, F and BFR styles, creating a large selection of insert assemblies and hardware. Components are identical to the MS5015 except that the contacts are modified for crimp termination providing an inexpensive crimp contact connector with the proven reliability of and complete intermateability with the MS5015 series. See page 39 for assembly instructions.)

Cable clamps have been integrally designed with the endbell on MS-E and MS-F connectors. Class R is without the cable clamp.

Standard Data

SHELL	**MATERIAL**	Aluminum alloy
	FINISH	Chromate coating over cadmium plating
INSULATOR	**MATERIAL**	Polychloroprene (resilient)
CONTACTS	**MATERIAL**	Brass or copper alloy
	FINISH	Silver plate
	TERMINATION	Tinned solder pot

How to Order

CA	3106	R	20-27	P	W	*
MS	3106	R	20-27	P	W	—

Prefix
Shell Style
Class
Shell Size
Contact Arrangement
Contact Type
Alternate Insert Position
Modification Code

PREFIX
MS — Conforms to latest MIL-C-5015 revision
CA — Cannon designation for any modification

SHELL STYLE
3100 — Wall mounting receptacle
3102 — Box mounting receptacle
3106 — Straight plug
3108 — 90° angle plug

CLASS
E,F — Environmental with resilient insulators and integral cable clamp
R — Environmental with resilient insulators and shortened lightweight end bell and additional sealing with O-ring seal under coupling nut in styles 3106 and 3108

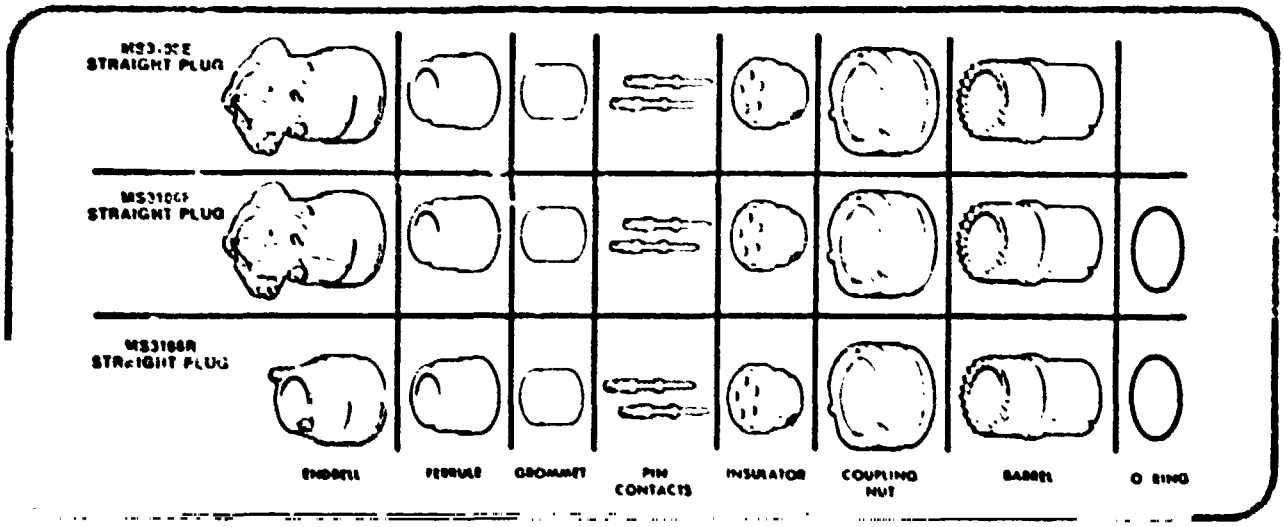
SHELL SIZE
Coupling thread diameter in sixteenths of an inch

CONTACT ARRANGEMENT
See pages 6-17

CONTACT TYPE
P for pin, S for socket

ALTERNATE INSERT POSITION
See page 18

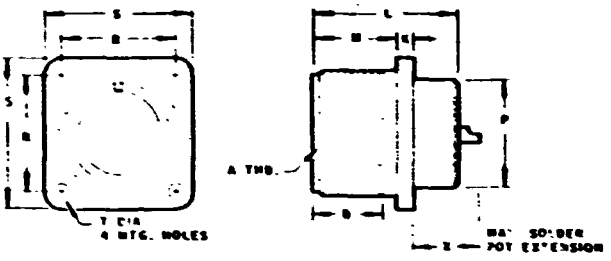
MODIFICATION CODE
F80 — Crimp type contacts. See pages 39-40 for assembly instructions.

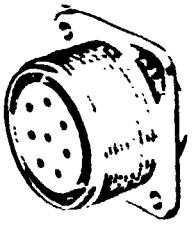


Dimensions subject to change

BOX MOUNTING RECEPTACLE

MS3102E
MS3102R





MS3102E and MS3102R box mounting receptacles are used in junction boxes or as an integral part of equipment. These connectors are identical in construction and will mate with 3106, 3107 and 3108 plugs. For new equipment customer should specify MS3102R.

X DIMENSION
Max. Solder Pot Ext. — Pin or Socket

SHELL SIZE	INCHES CONTACT SIZE 16	12	8	4	0	MILLIMETERS CONTACT SIZE 16	12	8	4	0
8S 10S 10SL	534	—	—	—	—	13 56	—	—	—	—
12S 14S 16S	518	—	—	—	—	13 16	—	—	—	—
12	705	705	—	—	—	17 91	17 91	—	—	—
14	705	705	767	—	—	17 91	17 91	19 48	—	—
16	705	705	767	767	—	17 91	17 91	19 48	19 48	—
18	674	674	736	736	—	17 12	17 12	18 69	18 69	—
20 22	674	674	736	736	971	17.12	17 12	18 69	18 69	24 66
24 28	612	612	674	674	909	15 54	15 54	17 12	17.12	23 09
32 36	549	549	611	611	846	13 94	13 94	15 52	15 52	21 49

INCHES

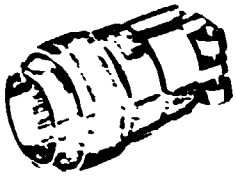
SHELL SIZE	A Thread	B Min.	K Max.	L Max.	M +.031 −.000	P Max.	R ±.005	S ±.031	T +.010 −.005
8S	⅞-28UNEF-2A	375	129	1 040	562	426	594	.875	.120
10S	⅞-24UNEF-2A	375	129	1 040	562	520	719	1.000	120
10SL	⅞-24UNEF-2A	375	129	1 040	562	614	719	1 000	.120
12S	⅞-20UNEF-2A	375	145	1 040	562	614	812	1 094	120
14S	⅞-20UNEF-2A	375	145	1 040	562	739	906	1 188	.120
16S	1 -20UNEF-2A	375	145	1 040	562	864	969	1 281	.120
12	⅞-20UNEF-2A	625	145	1 400	750	614	812	1 094	.120
14	⅞-20UNEF-2A	625	145	1 400	750	739	906	1 188	.120
16	1 -20UNEF-2A	625	145	1 400	750	864	969	1.281	.120
18	1⅛-18UNEF-2A	625	176	1 400	.750	989	1.062	1.375	.120
20	1 -18UNEF-2A	625	176	1 400	750	1 145	1 156	1 500	.120
22	1⅜-18UNEF-2A	625	176	1 400	750	1 270	1 250	1 625	120
24	1⅝-18UNEF-2A	625	176	1 400	812	1 395	1 375	1 750	147
28	1⅞-18UNS-2A	625	176	1 400	812	1 614	1 562	2 000	.147
32	2 -18UNS-2A	625	176	1 400	875	1 864	1 750	2 250	173
36	2⅛-16UN-2A	625	176	1 400	875	2 051	1 938	2 500	173
40	2⅜-16UN-2A	625	176	1 400	.875	2.390	2 188	2 750	173

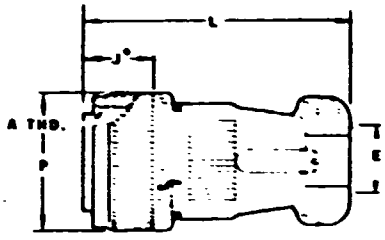
MILLIMETERS

SHELL SIZE	A Thread	B Min.	K Max.	L Max.	M +0.79 −0.00	P Max.	R ±0.13	S ±0.79	T +.025 −0 13
8S	⅞-28UNEF-2A	9 53	3 28	26 42	14 28	10 82	15 09	22 23	3 05
10S	⅞-24UNEF-2A	9 53	3 28	26 42	14 28	13 21	18 26	25 40	3 05
10SL	⅞-24UNEF-2A	9 53	3 28	26 42	14 28	15 60	18 26	25 40	3 05
12S	⅞-20UNEF-2A	9 53	3 68	26 42	14 28	15 60	20 62	27 79	3 05
14S	⅞-20UNEF-2A	9 53	3 68	26 42	14 28	18 77	23 01	30 18	3 05
16S	1 -20UNEF-2A	9 53	3 68	26 42	14 28	21 95	24 61	32 54	3 05
12	⅞-20UNEF-2A	15 88	3 68	35 56	19 05	15 60	20 62	27 79	3 05
14	⅞-20UNEF-2A	15 88	3 68	35 56	19 05	18 77	23 01	30 18	3 05
16	1 -20UNEF-2A	15 88	3 68	35 56	19 05	21 95	24 61	32 54	3 05
18	1⅛-18UNEF-2A	15 88	4 47	35 56	19 05	25 12	26 97	34 93	3 05
20	1⅜-18UNEF-2A	15 88	4 47	35 56	19 05	29 08	29 16	38 10	3 05
22	1⅜-18UNEF-2A	15 88	4 47	35 56	19 05	32 26	31 75	41 28	3 05
24	1⅝-18UNEF-2A	15 88	4 47	35 56	20 62	35 43	34 93	44 45	3 73
28	1⅞-18UNS-2A	15 88	4 47	35 56	20 62	41 00	39 67	50 80	3 73
32	2 -18UNS-2A	15 88	4 47	35 56	22 23	47 35	44 45	57 15	4 39
36	2⅛-16UN-2A	15 88	4 47	35 56	22 23	52 10	49 23	63 50	4 39
40	2⅜-16UN-2A	15 88	4 47	35 56	22 23	60 71	55 58	69 85	4 39

MS3106E
MS3106F

STRAIGHT PLUG
Integral Cable Clamp





MS3106E is identical to MS3106F except for "O" ring under the coupling nut. For new equipment, customer should specify MS3106F. The MS3106E is available upon request. MS3106F straight plugs mate with 3100 and 3102 receptacles and 3101 plugs.

INCHES

SHELL SIZE	A Thread	E Min.	E Max.	J Max.	L Max.	P Max.	V Max.	W Max.
8S	⅝-28UNEF-2B	.102	.235	.536	2.250	.844	.840	1.046
10S	⅝-24UNEF-2B	.102	.235	.536	2.250	.969	.840	1.046
10SL	⅝-24UNEF-2B	.140	.297	.536	2.250	.969	.900	1.125
12S	¾-20UNEF-2B	.140	.297	.536	2.250	1.062	.900	1.125
14S	⅞-20UNEF-2B	.195	.422	.536	2.250	1.156	1.130	1.343
16S	1 -20UNEF-2B	.255	.547	.536	2.250	1.250	1.200	1.484
12	¾-20UNEF-2B	.140	.297	.724	2.625	1.062	.900	1.125
14	⅞-20UNEF-2B	.195	.422	.724	2.625	1.156	1.130	1.343
16	1 -20UNEF-2B	.255	.547	.724	2.625	1.250	1.200	1.484
18	1⅛-18UNEF-2B	.285	.610	.724	2.668	1.344	1.300	1.609
20	1¼-18UNEF-2B	.350	.735	.724	2.750	1.469	1.500	1.890
22	1⅜-18UNEF-2B	.350	.735	.724	2.750	1.594	1.500	1.890
24	1½-20UNEF-2B	.468	.922	.724	2.969	1.719	1.740	2.170
28	1¾-18UNS-2B	.468	.922	.724	3.031	1.969	1.740	2.170
32	2 -18UNS-2B	.664	1.235	.724	3.031	2.219	2.075	2.656
36	2¼-16UN-2B	.694	1.360	.724	3.281	2.469	2.330	2.922
40	2½-16UN-2B	.911	1.630	.724	3.577†	2.723†	—	—

†Not to MS specification (shell size 40, L dim.).
*Barrel engaging face to shoulder.

MILLIMETERS

SHELL SIZE	A Thread	E Min.	E Max.	J Max.	L Max.	P Max.	V Max.	W Max.
8S	⅝-28UNEF-2B	2.59	5.97	13.61	57.15	21.44	21.34	26.57
10S	⅝-24UNEF-2B	2.59	5.97	13.61	57.15	24.61	21.34	26.57
10SL	⅝-24UNEF-2B	3.56	7.54	13.61	57.15	24.61	22.86	28.58
12S	¾-20UNEF-2B	3.56	7.54	13.61	57.15	26.97	22.86	28.58
14S	⅞-20UNEF-2B	4.95	10.72	13.61	57.15	29.36	27.94	34.11
16S	1 -20UNEF-2B	6.48	13.89	13.61	57.15	31.75	30.48	37.69
12	¾-20UNEF-2B	3.56	7.54	18.39	66.68	26.97	22.86	28.58
14	⅞-20UNEF-2B	4.95	10.72	18.39	66.68	29.36	27.94	34.11
16	1 -20UNEF-2B	6.48	13.89	18.39	66.68	31.75	30.48	37.69
18	1⅛-18UNEF-2B	7.24	15.49	18.39	67.82	34.14	33.02	40.86
20	1¼-18UNEF-2B	8.89	18.67	18.39	69.85	37.31	38.10	48.01
22	1⅜-18UNEF-2B	8.89	18.67	18.39	69.85	40.49	38.10	48.01
24	1½-20UNEF-2B	11.89	23.42	18.39	75.41	43.66	44.20	55.12
28	1¾-18UNS-2B	11.89	23.42	18.39	76.99	50.01	44.20	55.12
32	2 -18UNS-2B	16.87	31.37	18.39	76.99	56.36	52.71	67.46
36	2¼-16UN-2B	16.87	34.54	18.39	83.34	62.71	58.42	74.22
40	2½-16UN-2B	23.14	41.40	18.39	90.86†	69.16†	—	—

†Not to MS specification (shell size 40, L dim.).
*Barrel engaging face to shoulder

STRAIGHT PLUG **MS3106R**

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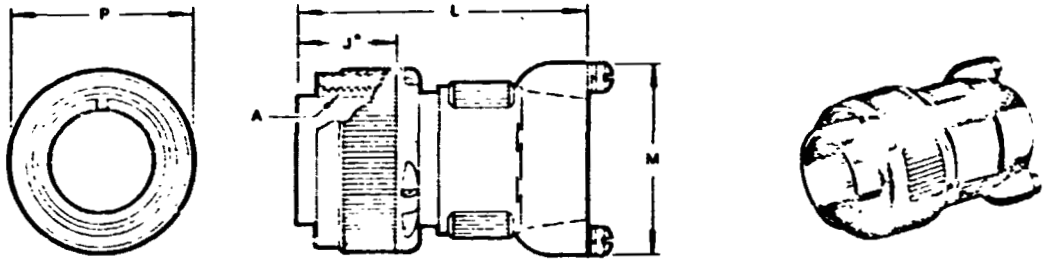


The MS3106R straight plug is identical in purpose to the MS3106F. The MS3106R has the shorter endbell.

This plug will mate with 3100 and 3102 receptacles and 3101 plugs.

INCHES

SHELL SIZE	A Thread	J Max.	L Max.	M Max.	P Max.	Shell Wt lbs.
8S	⅝-26UNEF-2B	.536	1.838	.890	.844	—
10S	⅝-24UNEF-2B	.536	1.838	.890	.969	—
10SL	⅝-24UNEF-2B	.536	1.838	.970	.969	.0356
12S	¾-20UNEF-2B	.536	1.838	.970	1.062	.0416
14S	⅞-20UNEF-2B	.536	1.838	1.150	1.156	.0532
16S	1 -20UNEF-2B	.536	1.838	1.250	1.250	.0629
12	¾-20UNEF-2B	.724	2.181	.970	1.062	—
14	⅞-20UNEF-2B	.724	2.181	1.150	1.156	—
16	1 -20UNEF-2B	.724	2.181	1.250	1.250	—
18	1⅛-18UNEF-2B	.724	2.281	1.450	1.344	.0931
20	1¼-18UNEF-2B	.724	2.281	1.570	1.469	.0991
22	1⅜-18UNEF-2B	.724	2.281	1.570	1.594	.1164
24	1½-18UNEF-2B	.724	2.281	1.880	1.719	.1330
28	1¾-18UNS-2B	.724	2.281	1.880	1.969	.1530
32	2 -18UNS-2B	.724	2.322	2.205	1.219	.1923
36	2¼-16UN-2B	.724	2.322	2.400	2.469	.2307
40	2½-16UN-2B	.724	2.430	2.840	2.723†	—

†Not to MS specification.
*Barrel engaging face to shoulder

MILLIMETERS

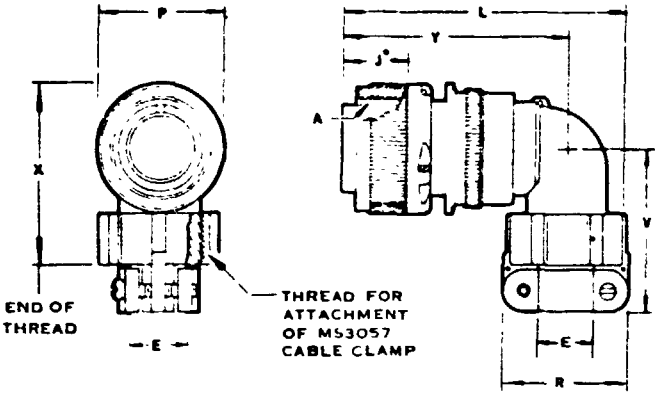
SHELL SIZE	A Thread	J Max.	L Max.	M Max.	P Max.	Shell Wt gms.
8S	⅝-26UNEF-2B	13.61	46.69	22.61	21.44	—
10S	⅝-24UNEF-2B	13.61	46.69	22.61	24.61	—
10SL	⅝-24UNEF-2B	13.61	46.69	24.64	24.61	16.15
12S	¾-20UNEF-2B	13.61	46.69	24.64	26.97	18.37
14S	⅞-20UNEF-2B	13.61	46.69	29.21	29.36	24.13
16S	1 -20UNEF-2B	13.61	46.69	31.75	31.75	28.53
12	¾-20UNEF-2B	19.15	55.40	24.64	26.97	—
14	⅞-20UNEF-2B	19.15	55.40	29.21	29.36	—
16	1 -20UNEF-2B	19.15	55.40	31.75	31.75	—
18	1⅛-18UNEF-2B	19.15	57.94	36.83	34.14	42.23
20	1¼-18UNEF-2B	19.15	57.94	39.88	37.31	44.95
22	1⅜-18UNEF-2B	19.15	57.94	39.88	40.49	52.80
24	1½-18UNEF-2B	19.15	57.94	47.75	43.66	60.33
28	1¾-18UNS-2B	19.15	57.94	47.75	50.01	69.40
32	2 -18UNS-2B	19.15	58.98	56.01	30.96	87.23
36	2¼-16UN-2B	19.15	58.98	60.96	62.71	104.64
40	2½-16UN-2B	19.15	61.72	72.14	69.16†	—

†Not to MS specification
*Barrel engaging face to shoulder

MS3108E
MS3108R

90° ANGLE PLUG

Note: Class R is without the cable clamp.



MS3108R 90° angle plugs (with O ring seal less cable clamp) and the MS3108E 90° angle plugs (less O ring seal with cable clamp) are used where there is limited space and where wires must be brought at abrupt angles.

This plug will mate with 3100 and 3102 receptacles and 3101 plugs.

INCHES

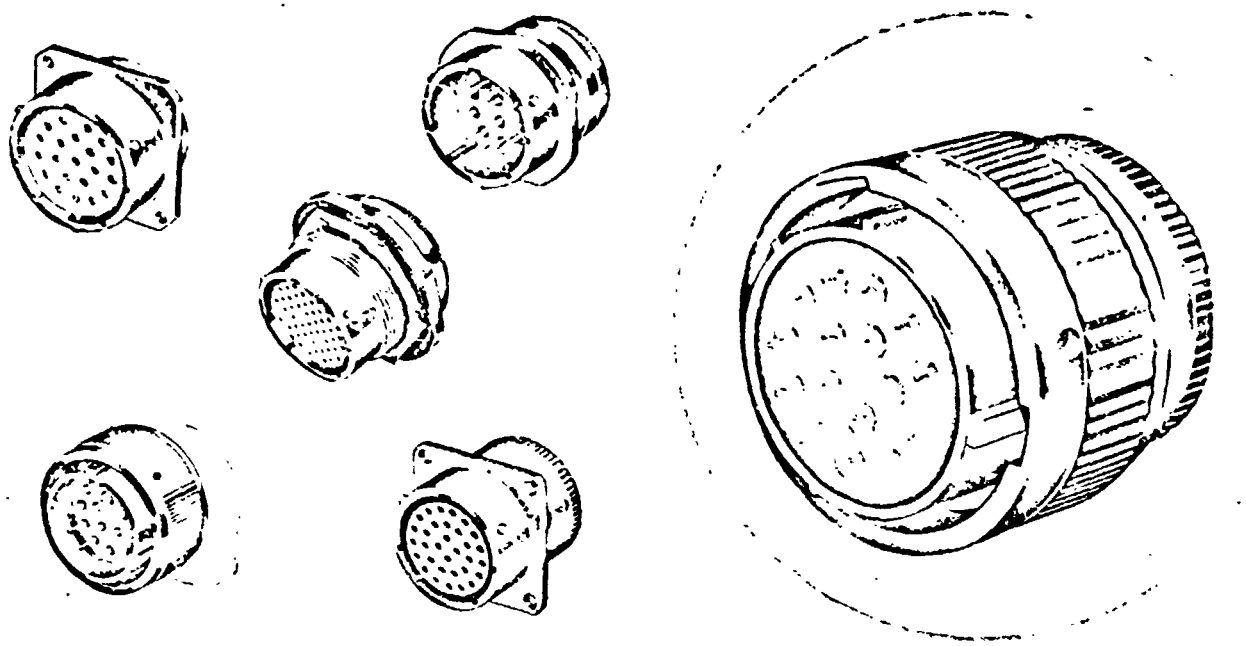
SHELL SIZE	A Thread	E Min.	E Max.	J Max.	L Max.	P Max.	R Max.	V Max.	X Max.	Y Max.	Shell Wt. lbs.
10SL	⅝-24UNEF-2B	140	297	536	2 188	969	895	1 281	1 728	1 703	0776
12S	¾-20UNEF-2B	140	297	536	2 188	1 062	895	1 281	1 858	1 703	0817
14S	⅞-20UNEF-2B	195	422	536	2 312	1 156	1 085	1 406	2 041	1 765	1156
16S	1 -20UNEF 2B	255	547	536	2 406	1 250	1 180	1 531	2 223	1 796	1371
12	¾-20UNEF-2B	140	297	724	2 531	1 062	895	1 281	1 8 3	2 062	—
14	⅞-20UNEF-2B	195	422	724	2 688	1 156	1 085	1 406	2	2 125	—
16	1 -20UNEF-2B	255	547	724	2 781	1 250	1 180	1 531	2 223	2 156	1577
18	1⅛-18UNEF 2B	265	610	724	2 844	1 344	1 275	1 593	2 376	2 250	1714
20	1¼-18UNEF-2B	350	735	724	3 250	1 469	1 475	1 656	2 567	2 312	2213
22	1⅜-18UNEF-2B	350	735	724	3 250	1 594	1 475	1 718	2 751	2 312	2369
24	1⅝-18UNEF-2B	468	922	724	3 719	1 719	1 715	1 890	2 957	2 531	3223
28	1⅝-18UNS 2B	468	922	724	3 719	1 969	1 715	1 968	3 272	2 531	3556
32	2 -18UNS-2B	664	1 235	724	4 188	2 219	2 040	2 187	3 755	2 750	4833
36	2¼-16UN-2B	694	1 360	724	4 297	2 469	2 285	2 406	4 078	2 875	.5874
40	2½ 16UN-2B	911	1 630	724	7 211†	2.723†	2 948	5 875	6 152	5 690	—

†Not to MS specification (shell size 40, L dim.)
*Barrel engaging face to shoulder

MILLIMETERS

SHELL SIZE	A Thread	E Min.	E Max.	J Max.	L Max.	P Max.	R Max.	V Max.	X Max.	Y Max.	Shell Wt. gms.
10SL	⅝-24UNEF-2B	3 56	7 54	13 61	55 58	24 61	22 73	32 54	43 89	43 26	35 20
12S	¾-20UNEF 2B	3 56	7 54	13 61	55 58	26 97	22 73	32 54	47 19	43 26	37 06
14S	⅞-20UNEF 2B	4 95	10 72	13 61	58 72	29 36	27 56	35 71	51 84	44 83	52 44
16S	1 -20UNEF 2B	6 48	13 89	18 39	61 11	31 75	29 97	38 89	56 46	45 62	62 19
12	¾-20UNEF 2B	3 56	7 54	18 39	64 29	26 97	22 73	32 54	47 19	52 37	—
14	⅞-20UNEF 2B	4 95	10 72	18 39	68 28	29 36	27 56	35 71	51 84	53 98	—
16	1 -20UNEF 2B	6 48	13 89	18 39	70 64	31 75	29 97	38 89	56 46	54 76	71 53
18	1⅛-18UNEF 2B	7 24	15 49	18 39	72 24	34 14	32 39	40 46	60 35	57 15	77 75
20	1¼-18UNEF 2B	8 89	18 67	18 39	82 55	37 31	37 47	42 06	65 20	58 72	100 38
22	1⅜-18UNEF-2B	8 89	18 67	18 39	82 55	40 49	37 47	43 64	69 88	58 72	107 46
24	1⅝-18UNEF 2B	11 89	23 42	18 39	94 46	43 66	43 56	48 00	75 11	64 29	146 19
28	1⅝-18UNS-2B	11 89	23 42	18 39	94 46	50 01	43 56	49 99	83 11	64 29	161 30
32	2 -18UNS 2B	16 87	31 37	18 39	106 38	56 36	51 82	55 55	95 38	69 85	219 22
36	2¼-16UN 2B	17 63	34 54	18 39	109 14	62 71	58 04	61 11	103 58	73 03	266 44
40	2½ 16UN 2B	23 14	41 40	18 39	183 16†	60 16†	74 88	149 23	156 26	144 53	—

†Not to MS specification (shell size 40, L dim.)
*Barrel engaging face to shoulder



KPT/KSP
General Purpose, Solder Contact Connectors

KPT CONNECTORS
- general purpose
- closed-entry socket contacts
- solder termination

KSP CONNECTORS
- hard, black anodize Alumilite, non-conductive finish
- large flange with #6 mounting holes (receptacles)

KPT general purpose miniature circular connectors are widely used in commercial, industrial and deep-space applications. Utilizing solder terminated contacts, KPT connectors feature closed-entry sockets for positive mating.

KSP connectors are identical to KPT connectors except for a hard anodic, non-conductive finish. Receptacles have a larger flange with #6 mounting holes for rear panel mounting.

KPT and KSP connectors mate with all 26482 connectors.

ORDERING NUMBER INFORMATION

KPT 2 E 22-36 P W ••
MS 3110 E 22-36 P Y

- Modification Code
- Alternate Insert Position
- Contact Type
- Contact Arrangement
- Shell Size
- Class
- Shell Style
- Series Prefix

SERIES PREFIX
KPT, KSP — ITT Cannon prefix
MS — complies with MIL-C-26482

SHELL STYLE
ITT Cannon number:
00 — wall mounting receptacle
01 — cable connecting plug
02 — box mounting receptacle (Class E only)
06 — straight plug
07 — jam nut receptacle (available in hermetic version also)
08 — 90° angle plug
8 — thru-bulkhead receptacle (Class E only)

MS Designation:
3110 — wall mounting receptacle
3111 — cable connecting plug
3112 — box mounting receptacle (Class E only)
3114 — jam nut receptacle
3116 — straight plug
3119 — thru-bulkhead receptacle (Class E only)

CLASS
A — general duty
B — general duty with strain relief (may be used for potting when strain relief is desired)
E — grommet seal except on 02 and 3112 (MS specification)
F — grommet seal with strain relief (MS specification)
G — gland seal for jacketed cable
J — gland seal with strain relief for jacketed cable (MS specification)
P — potted (MS specification)

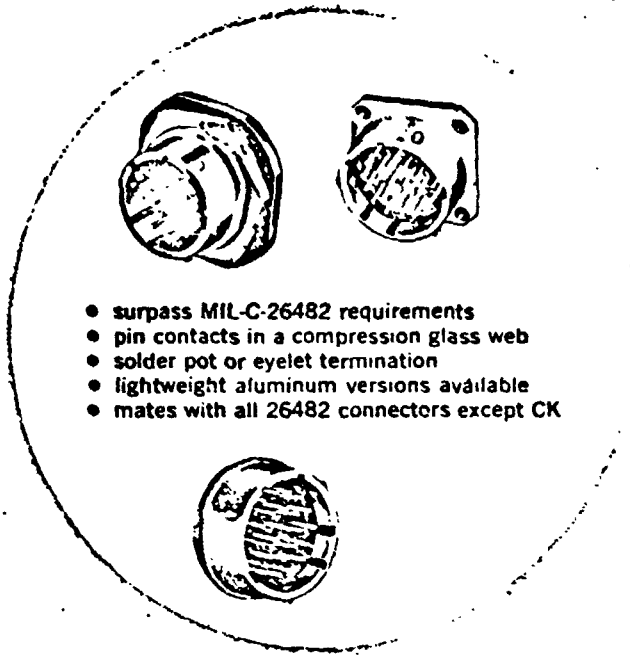
SHELL SIZE
8, 10, 12, 14, 16, 18, 20, 22, and 24

CONTACT ARRANGEMENT
See pages 10 and 11.

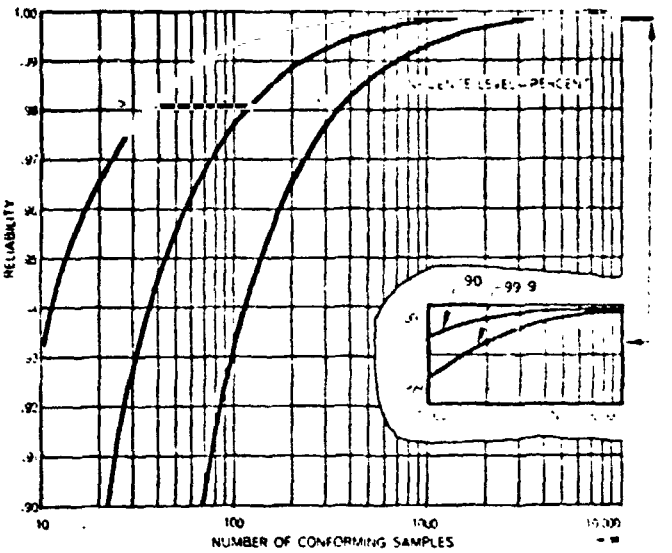
CONTACT TYPE
P — pin, S — socket

ALTERNATE INSERT POSITION
W, X, Y and Z (Omit for normal.) See page 11.

MODIFICATION CODE
Consult factory. Omit first digit (0) of shell style indication when using modification code. See page 8 for modification codes.



- surpass MIL-C-26482 requirements
- pin contacts in a compression glass web
- solder pot or eyelet termination
- lightweight aluminum versions available
- mates with all 26482 connectors except CK



KPTH

Hermetically Sealed, Solder Contact Connectors

Hermetically sealed KPT receptacles fulfill the high reliability requirements of space age applications and environments. Far surpassing the requirements of MIL-C-26482, these receptacles have proven statistically reliable in leakage tests 100 times as severe as required by MIL-C-26482 with a reliability of .9995 at a confidence level of 95% with these results:

- Leak rate not in excess of .001 micron cu. ft./hr.
- 100 psi differential causes no detectable leakage in excess of .001 cu. ft./hr.
- 100 g shock with no loss of hermeticity
- Thermal shock from −70° to +200°C without affecting leakage rate

These receptacles are available with pin contacts only in three shell styles: a box mounting receptacle, KPT02H; a solder mounting receptacle, KPT1H; and a jam nut receptacle, KPT07H. Contact arrangements are tooled in a full lead-free compression glass web.

ORDERING NUMBER INFORMATION

KPT I H 18-32 P N *
MS 3113 H 18-32 P X

- Modification Code
- Alternate Insert Position
- Contact Type
- Contact Arrangement
- Shell Size
- Class
- Shell Style
- Series Prefix

SERIES PREFIX
KPT — ITT Cannon Prefix
MS — complies with MIL-C-26482 without resilient interfacial seal

SHELL STYLE
ITT Cannon number:
02 — box mounting receptacle
1 — solder mounting receptacle
07 — jam nut receptacle

MS Designation:
3113 — solder mounting receptacle
3114 — jam nut receptacle

CLASS
H — hermetic seal (MS specification applies to KPT1H and KPT07H only)

SHELL SIZE
8, 10, 12, 14, 16, 18, 20, 22, and 24

CONTACT ARRANGEMENT
See pages 10 and 11.

CONTACT TYPE
P — pin

ALTERNATE INSERT POSITION
N (normal), W, X, Y, and Z

MODIFICATION CODE
Consult factory. See page 8 for modification codes.

MODIFICATION CODES

Preferred Modification Code	Description	Intended Usage
A106	Gold over copper per FS 4456, Class A, and per MIL-G 45204, type 2 Class 2 over .00005 min copper per MIL-C-14550	High reliability finish for contacts
F0	Connectors less contacts (contacts purchased separately)	Applicable to all crimp removable connectors (KPTM, KPSE, KSPM, KSSE)

STANDARD DATA

Standard Materials and Finishes	KPT/KSP	KPTM/KSPM
SHELL	KPT/KPTM — aluminum alloy, conductive olive drab chromate over cadmium finish per QQ-P-416 KSP/KSPM — aluminum alloy, black non conductive Alumilite finish	
INSULATOR	KPT/KSP — 80 shore gray polychloroprene	80 shore green polychloroprene
GROMMET AND SEAL	50 shore gray polychloroprene	50 shore green polychloroprene
CONTACTS	Copper alloy, gold over silver plate per MIL-G 45204 type II, Class I	
Mechanical Features		
SHELL STYLES	00 — wall mounting receptacle 01 — cable connecting plug 02 — box mounting receptacle 06 — straight plug 07 — jam nut receptacle 08 — 90° angle plug B — thru-bulkhead receptacle (KPT only)	
SHELL SIZES	8 thru 24	
POLARIZATION COUPLING	five keyway / three point bayonet	
SERVICE CLASSES	A — general duty B — general duty with strain relief E — grommet seal F — grommet seal with strain relief G — gland nut for jacketed cable J — gland nut with strain relief for jacketed cable P — potted	
Electrical Data		
NUMBER OF CONTACTS	2 thru 61	3 thru 61
WIRE SIZE, AWG	16 thru 24	16 thru 24
CONTACT TERMINATION	solder	crimp snap-in
CONTACT RATING	SIZE 20: RATED AMPS 7.5, TEST CURRENT 7.5 SIZE 16: RATED AMPS 22.0, TEST CURRENT 13.0	
SERVICE RATING	TEST VOLT. Sea Level: SERVICE 1 — AC (rms) 1500, DC 2100; SERVICE 2 — AC (rms) 2300, DC 3200 TEST VOLT. 70,000 ft.: SERVICE 1 — AC (rms) 375, DC 535; SERVICE 2 — AC (rms) 550, DC 770	
COAXIAL CONTACTS	—	RG 55/U, RG-59/U, RG-62/U, RG-195, J, and RG-223/U

Standard Materials and Finishes	KPSE/KSSE	KPTH
SHELL	KPSE — aluminum alloy, conductive olive drab chromate over cadmium finish per QQ-P-416 KSSE — aluminum alloy, black non-ductive alumilite finish	steel, electrodeposited tin over cadmium
INSULATOR	60 shore green polychloroprene	compression glass
GROMMET AND SEAL	60 shore green polychloroprene	—
CONTACTS	copper alloy, gold over silver plate	steel, electrodeposited tin over cadmium
Mechanical Features		
SHELL STYLES	00 — wall mounting receptacle 01 — cable connecting plug 02 — box mounting receptacle 06 — straight plug 07 — jam nut receptacle 08 — 90° angle plug	1 — solder mounting receptacle 02 — box mounting receptacle 07 — jam nut receptacle
SHELL SIZES	10 thru 24	8 thru 24
POLARIZATION/COUPLING	five keyway / three point bayonet	
SERVICE CLASSES	A — general duty B — general duty with strain relief E — grommet seal F — grommet seal with strain relief G — gland nut for jacketed cable J — gland nut with strain relief for jacketed cable P — potted	H — hermetic
Electrical Data		
NUMBER OF CONTACTS	3 thru 61	2 thru 61
WIRE SIZE AWG	16 thru 24	—
CONTACT TERMINATION	crimp snap in	solder
CONTACT RATING	CONTACT SIZE 20: MILLIVOLT DROP less than 55 CONTACT SIZE 16: MILLIVOLT DROP less than 50	SIZE 20: RATED AMPS 7.5, TEST CURRENT 5.0, MV DROP 70 SIZE 16: RATED AMPS 22.0, TEST CURRENT 13.0, MV DROP 75
SERVICE RATING	MAXIMUM OPERATING VOLTAGE Sea Level: SERVICE 1 — AC (rms) 600, DC 850; SERVICE 2 — AC (rms) 1000, DC 1275	TEST VOLT Sea Level: SERVICE 1 — AC (rms) 1500, DC 2100; SERVICE 2 — AC (rms) 2300, DC 3200

TEST DATA

Test Name and MIL-C-26482 Ref. Para.	KPT/KPSE/KPTM/KPTH	KPSE/KPSSE
MAINTENANCE AGING Para. 4.7.5	Engaging and disengaging torque (in./lbs.) limits were satisfactory within those specified for shell sizes involved.	
THERMAL SHOCK Para. 4.7.6	There was no evidence of cracking or other damage detrimental to connector operation after exposure to 5 cycles of temperature change from —55°C to +125°C. 1 hour per cycle, divided equally between temperature extremes.	
INSULATION RESISTANCE (elev. temp) Para. 4.7.3	While applying 500 VDC for 250 hours at 125°C, the insulation resistance was greater than 50 megohms between all adjacent contact pairs, shell, and its closest contacts. Insulation resistance was greater than 25 megohms at 105°C for 1000 hrs.	
DIELECTRIC WITHSTANDING VOLTAGE (sea level) Para. 4.7.4	There was no evidence of breakdown or flashover with 1500VAC applied for 1 min. between 6 pairs of adjacent contacts and between contacts closest to shell and shell for Service Rating 1 and 2300VAC applied in the same manner for Service Rating 2.	
DURABILITY Para 4.7.9	There was no evidence of mechanical or electrical damage to connectors after 500 engagements and disengagements as in service.	
VIBRATION Para. 4.7.11	With contacts wired in series and monitored for continuity, there was no mechanical damage and no electrical discontinuity greater than 10 microseconds. Connectors mounted and mated as in service and vibrated through a range of 10 cps to 2K cps for 20 min. in each of 3 mutually perpendicular axes at a double amplitude of 0.06", or 15g's max.	
SHOCK Para. 4.7.12	With contacts wired in series and monitored for continuity, there was no mechanical damage and no electrical discontinuity greater than 10 microseconds while the connector was subjected to an 11 millisecond, 50g mechanical shock in each of three major axes.	
INSULATION RESISTANCE (after vib. & shock) Para. 4.7.13	With 500VDC applied to mated connectors, insulation resistance was greater than 5,000 megohms between each pair of adjacent contacts and between shell and its closest contacts.	
MOISTURE RESISTANCE Para. 4.7.13.2	With 500VDC applied, insulation resistance between any two contacts or any contact and the shell was no less than 100 megohms while mated connectors were exposed to the following high humidity environment; 10 cycles, 24 hours each, in humidity chamber adjusted to cause condensation at prescribed intervals.	
SOLVENT IMMERSION Para. 4.7.14	Engaging and disengaging torques and dielectric withstanding voltages were within the limits previously indicated after unmated connectors had been immersed in aviation hydraulic fluid for 20 hours followed by 1 hour drying in free air.	
CONTACT RESISTANCE Para. 4.7.2	For size 16 contacts, minimum voltage drop was less than 50MV with a DC current for 13 amps flowing, and for size 20 contacts, the corresponding voltage drop was less than 50MV with a DC current of 7.5 amps flowing, in accordance with MIL-STD-202, Method 307.	
INSERT RETENTION Para. 4.7.15	Inserts within wired connectors (less grommets and endbells) did not dislodge when subjected to pressures of 75 psi on each insulator face for a period of 5 seconds.	
HIGH ALTITUDE IMMERSION (per MIL-C-26500B)	Wires and mated connectors immersed in 50% salt water solution Pressure reduced to 6,000 ft. altitude (5.41 cm Hg) and maintained for 30 minutes prior to measurement of insulation resistance while still immersed in salt solution. In no case was insulation resistance found to be less than 100 megohms.	Not applicable to KPSE.
CONTACT RETENTION (5 min. test) Para. 4.7.16	In no case did axial contact displacement exceed .012" after the application of a 5 lb. preload, followed by application of 15 lbs. and 25 lbs. axial load at engaging end of size 20 and 16 contacts respectively. Displacement is measured after a minimum of 5 seconds and while still under load. This test does not apply to KPTM connectors.	
SALT SPRAY MIL-STD-202B, Method 101A, Condition B	No damage or unacceptable increase in contact resistance after mated sample subjected to 48 hours of salt spray.	
AIR LEAKAGE	30 psi differential at —67°F (KPT only) — less than 1 atmosphere cubic inch per hour	
TEMPERATURE RANGE	—55°C to +125°C	
CONTACT INSERTION AND EXTRACTION	Insertion force does not exceed 20 lbs. Extraction force does not exceed 20 lbs.	

Shell Size	8	10	12	14	16	18	20	22	24
Engaging Torque (Max.)	8	12	16	20	24	28	32	36	44
Disengaging Torque (Max.)	1	1	2	4	4	5	6	7	7

Contact insertion forces measured on 20% of contacts, but not less than 3 contacts, of each connector for size 20 and size 16 contacts, do not exceed 20 lbs. at the ninth insertion.

CONTACT ARRANGEMENTS

Drawings not to scale;
face view of pin insert shown
(socket view is opposite)

2 Contacts

	8-2
CONTACTS	2-#20
SERVICE	1

3 Contacts

	8-3	8-33	12-3
CONTACTS	3-#20	3-#20	3-#16
SERVICE	1	1	2

4 Contacts

	8-4
CONTACTS	4-#20
SERVICE	1

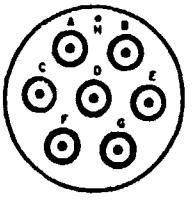
5 Contacts

	14-5
CONTACTS	5-#16
SERVICE	2

6 Contacts

	10-6	10-98	12-8	16-8
CONTACTS	6-#20	6-#20	8-#20	8-#16
SERVICE	1	1	1	2

8 Contacts



	24A2	24A4	24A8	24A9
CONTACTS	1-#20	1-#20	1-#20	1-#20
SERVICE	7-RG-195/U	2-RG 55/U 5-RG-59/U	7-RG-59/U or -62/U	7-RG-223/U

10 Contacts

	12-10
CONTACTS	10-#20
SERVICE	1

11 Contacts

	18-11
CONTACTS	11-#16
SERVICE	2

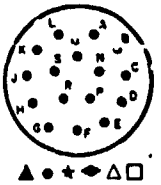
12 Contacts

	14-12
CONTACTS	8-#20 4-#16
SERVICE	1

15 Contacts

	14-15
CONTACTS	14-#20 1-#16
SERVICE	1

16 Contacts



	20-16
CONTACTS	16-#16
SERVICE	2

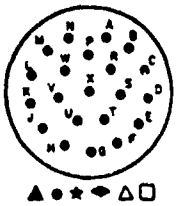
18 Contacts

	14-18
CONTACTS	18-#20
SERVICE	1

19 Contacts

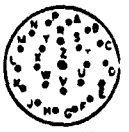
	14-19
CONTACTS	19-#20
SERVICE	1

21 Contacts



	22-21
CONTACTS	21-#16
SERVICE	2

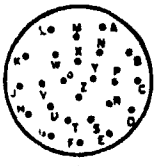
23 Contacts



	16-23
CONTACTS	22-#20 1-#16
SERVICE	1

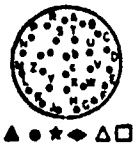
24 Contacts

	16A99
CONTACTS	21-#20 2-#16
SERVICE	1



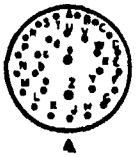
	20-24
CONTACTS	24-#20
SERVICE	1

26 Contacts



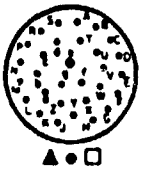
	16-26
CONTACTS	26-#20
SERVICE	1

28 Contacts



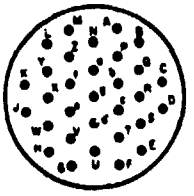
	15A28
CONTACTS	26-#20 2-#16
SERVICE	1

30 Contacts



	18-30
CONTACTS	29-#20 1-#16
SERVICE	1

31 Contacts



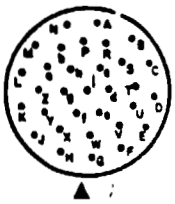
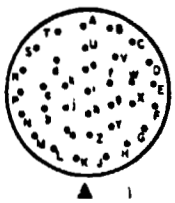
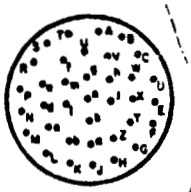
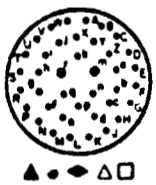
	24A31
CONTACTS	31-#16
SERVICE	1

32 Contacts

	18-32
CONTACTS	32-#20
SERVICE	1

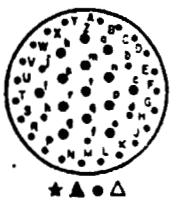
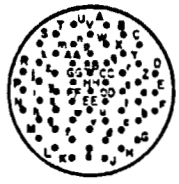
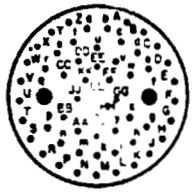
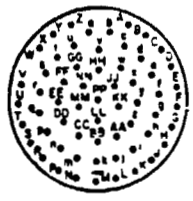
KPTMCTE-22 ...

CONTACT ARRANGEMENTS

32 Contacts	34 Contacts	36 Contacts	39 Contacts	41 Contacts
				
▲	▲	▲●□	▲●◆△□	▲●★◆△□
22-32	**22-34**	**22-36**	**20-39**	**20-41**
32-#20	34-#20	36-#20	37-#20 2-#16	41-#20
1	1	1	1	1

CONTACTS

SERVICE

47 Contacts	55 Contacts	57 Contacts	61 Contacts
			
★▲●△	▲●★◆△□	▲	▲●★◆△
22-41	**22-55**	**24A57**	**24-61**
27-#20 14-#16	55-#20	55-#20 2-#12	61-#20
1 (#20's); 2 (#16's)	1	1	1

CONTACTS

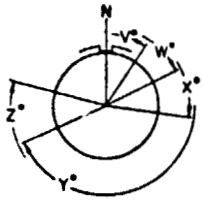
SERVICE

LEGEND

- ▲ KPT/KSP
- ● KPTM/KSPM
- ★ KPTH (hermetic)
- ◆ KPSE/KSSE
- △ Authorized per MIL-C-26482 (NAVY)
- □ Authorized per SCL-6019 (SIGNAL CORPS)

NOTE: Red symbol indicates "Preferred" contact arrangements, featuring short lead-time availability.

INSERT POSITION
(Face view of pin insert)



ALTERNATE INSERT POSITIONS

The diagram at the left indicates alternate insert positions. The six positions (V, W, X, Y, Z and Normal) differ in degree of rotation for various sizes and arrangements. For the exact degree of rotation, and for the list of contact arrangements and alternate positions available, refer to the tabulation below.

SHELL SIZE	NO. OF CONTACTS	ARR. NO.	DEGREES OF ROTATION V	W	X	Y	Z
8	2	8-2	—	58	122	—	—
	3	8-3	—	60	210	—	—
	3	8-33	—	90	—	—	—
	4	8-4	—	45	—	—	—
10	6	10-6	—	90	—	—	—
	6	10-98	—	90	180	240	270
12	2	12A3	—	—	—	—	—
	3	12-3	—	—	—	180	—
	8	12-8	—	90	112	203	292
	10	12-10	—	60	155	270	295
14	5	14-5	—	40	92	184	273
	12	14-12	—	43	90	—	—
	15	14-15	—	17	110	155	234
	18	14-18	—	15	90	180	270
	19	14-19	—	30	155	315	—
16	8	16-8	—	54	152	180	331
	23	16-23	—	158	270	—	—
	23	16A99	—	66	156	223	340
	26	16-26	—	60	—	275	338

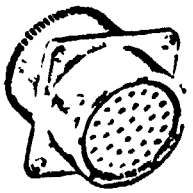
SHELL SIZE	NO. OF CONTACTS	ARR. NO.	DEGREES OF ROTATION V	W	X	Y	Z
18	11	18-11	—	62	119	241	340
	28	18A28	—	—	—	—	—
	30	18-30	—	180	193	285	350
	32	18-32	—	85	138	222	265
20	16	20-16	—	238	318	333	347
	24	20-24	—	70	145	215	290
	39	20-39	—	63	144	252	333
	41	20-41	—	45	126	225	—
22	21	22-21	—	16	135	175	349
	32	22-32	—	72	145	215	288
	34	22-34	—	62	142	218	298
	36	22-36	—	72	144	216	288
	41	22-41	—	39	73	149	196
	55	22-55	—	30	142	226	314
24	8	24A2	—	—	—	—	—
	8	24A3	—	—	—	—	—
	8	24A8	—	—	—	—	—
	8	24A9	—	—	—	—	—
	31	24A31	—	90	225	—	—
	57	24A57	—	90	180	270	324
	61	24-61	—	90	180	270	324

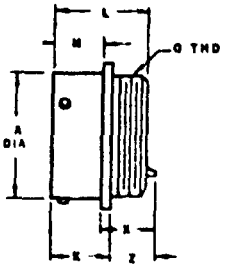
Red numbers indicate contact arrangements are not to MIL-C-26482.

WALL MOUNTING RECEPTACLES

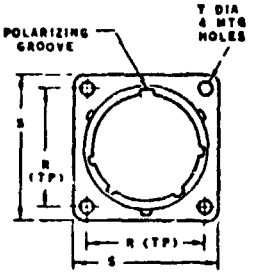
KPT00/KSP00/MS3110
KPTM00/KSPM00
KPSE00/KSSE00/MS3120

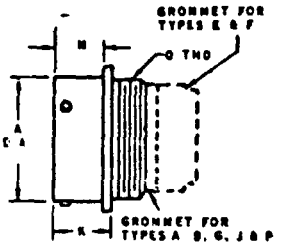
RECEPTACLE ASSEMBLY





SOLDER
KPT00/KSP00/MS3110



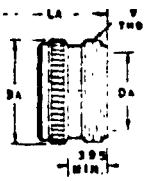


CRIMP
KPTM00/KSPM00
KPSE00/KSSE00/MS3120

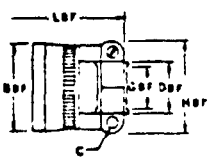
RECEPTACLE ASSEMBLY WITHOUT TERMINATION

Shell Size*	KPT/KPTM/KSP/KSPM/KPSE/KSSE A ± .003	L Max	Q Thread Class 2A	KPT/KPTM/KPSE K ± .010	M ±.005	R (TP)	S Max	T ± .005	KPT Z Max.	KSP/KSPM/KSSE K ±.010	M ±.005	R (TP)	S Max.	T ±.005	KSP X Max.
48	.471	.848	7/16 28UNEF	.530	.457	.594	.828	.120	.483	.524	.467	.734	1.057	.150	.542
10	.583	.848	9/16 24UNEF	.530	.457	.719	.954	.120	.483	.524	.467	.812	1 135	.150	.543
12	.748	.848	11/16 24UNEF	.530	.457	.812	1.047	.120	.483	.524	.467	938	1.260	.150	.543
14	.873	.848	13/16 20UNEF	.530	.457	.906	1.141	.120	.483	.524	.467	1.031	1.354	.150	.543
16	.998	.848	15/16 20UNEF	.530	.457	.969	1.234	.120	.483	.524	.467	1.125	1.448	.150	.543
18	1 123	.848	1- 1/16 18UNEF	.530	.457	1.062	1 328	.120	.483	.524	.467	1 203	1 526	.150	.543
20	1 248	1.055	1 3/16 18UNEF	.650	.561	1.156	1.453	.120	.427	.650	.561	1.297	1.682	.150	.500
22	1 373	1 055	1- 5/16 18UNEF	650	561	1 250	1 578	.120	.427	.650	.561	1 375	1 760	.150	.500
24	1 498	1.055	1- 7/16 18UNEF	.683	.594	1.375	1.703	.147	.393	683	.594	1.500	1 885	.150	.467

TERMINATION ASSEMBLIES

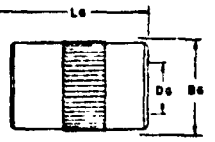


TYPE A

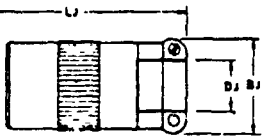


TYPE B AND F

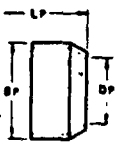
TYPE E



TYPE G



TYPE J



TYPE P

WITH TERMINATION ASSEMBLIES

Shell Size*	TYPE A BA Max.	DA Min.	LA Max	V Thread Class 2A	TYPE B and F BBF Max	C Thd.	DBF Min.	GBF Min.	HBF Max.	LBP Max.
48	.590	335	1 444	1/2 28UNEF	552	6-32	.234	.115	.760	1 776
10	.717	.466	1 444	5/8-24UNEF	.677	6 32	297	.178	820	1.776
12	.834	.591	1 444	3/4 20UNEF	802	6-32	422	.302	960	1 776
14	970	.705	1 444	7/8 20UNEF	927	6-32	547	.365	1 070	1.776
16	1.088	.830	1 444	1 .20UNEF	1.052	6-32	.609	.490	1.130	1.896
18	1 216	948	1 444	1-3/16 18UNEF	1.161	8 32	.740	615	1 350	1.896
20	1.332	1 073	1 728	1-3/16 18UNEF	1 286	8 32	.740	615	1 390	1 970
22	1 460	1 198	1 728	1-7/16 18UNEF	1 411	8 32	928	.740	1.570	1 970
24	1 585	1 323	1.738	1-7/16 18UNEF	1 536	8-32	.984	.790	1.700	1.970

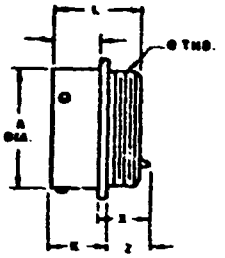
Shell Size*	TYPE E BE Max	LE Max	TYPE G BG Max	DG Min	DG Max	LG Max	TYPE J BJ Max	DJ Min	DJ Max.	LJ Max	TYPE P BP Max	DP Min.	LP Max.
48	557	1.281	592	168	.230	1 720	.828	.168	230	2 270	602	.327	1 450
10	.677	1.281	712	205	.312	1 720	891	205	312	2 270	.691	.444	1 450
12	802	1.281	.837	338	442	1 86	1 716	338	442	2 410	852	.558	1 450
14	920	1 281	.995	416	539	2 050	1 141	416	539	2 600	.956	683	1.450
16	1 045	1 281	1 080	.550	.616	2 270	1 203	.550	616	2 880	1 088	808	1 450
18	1 165	1 281	1 200	600	672	2 500	1 469	600	672	3 170	1 220	.909	1.450
20	1 290	1 360	1 325	635	747	2 960	1.469	635	747	3 610	1 349	1 034	1 660
22	1 415	1 360	1 450	670	846	3 120	1 656	670	846	3 760	1 461	1 159	1 660
24	1 540	1 360	1 575	.740	894	3 250	1 750	740	894	3 900	1 593	1 284	1 730

* See pages 4, 5, and 6 for ordering number information and pages 10 and 11 for contact arrangements
▲ Not available in KPSE/KSSE
● (MMC) located within .005 of (TP).

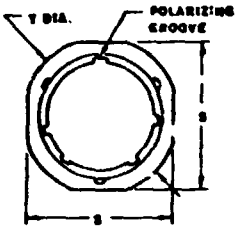
Dimensions subject to change

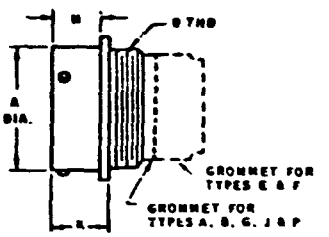
CABLE CONNECTING PLUGS

KPT01/KSP01/MS3111
KPTM01/KSPM01
KPSE01/KSSE01/MS3121



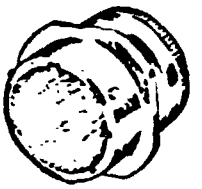
SOLDER
KPT01/KSP01/MS3111





CRIMP
KPTM01/KSPM01
KPSE01/KSSE01/MS3121

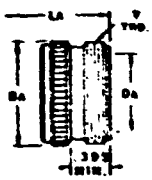
PLUG ASSEMBLY



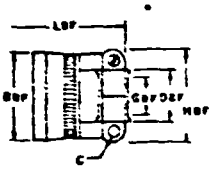
PLUG ASSEMBLY WITHOUT TERMINATION

Shell Size*	A ±.003	K ±.010	L Max.	KPT/KSP/KPTM/KSPM/KPSE/KSSE M ±.005	Q Thread Class 2A	S Max.	Y Max.	KPT Z Max.	KSP X Max.
48	.471	.530	.848	.425	7/16-28UNEF	.828	.958	.483	.574
10	.588	.530	.848	.425	9/16-24UNEF	.954	1.082	.483	.574
12	.748	.530	.848	.425	11/16-24UNEF	1.047	1.176	.483	.574
14	.873	.530	.848	.425	13/16-20UNEF	1.141	1.270	.483	.574
16	.998	.530	.848	.425	15/16-20UNEF	1.234	1.364	.483	.574
18	1.123	.530	.848	.425	1- 1/16-18UNEF	1.328	1.458	.483	.574
20	1.248	.650	1.055	.540	1- 3/16-18UNEF	1.453	1.582	.427	.521
22	1.373	.650	1.055	.540	1- 5/16-18UNEF	1.578	1.708	.427	.521
24	1.498	.683	1.055	.573	1- 7/16-18UNEF	1.703	1.832	.393	.488

TERMINATION ASSEMBLIES

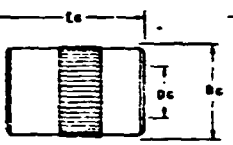


TYPE A

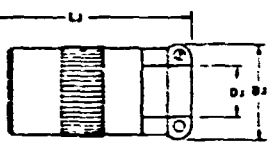


TYPE B AND F

TYPE E



TYPE G



TYPE J

TYPE P

WITH TERMINATION ASSEMBLIES

Shell Size*	TYPE A BA Max.	DA Min.	LA Max.	V Thread Class 2A	TYPE B and F BBF Max.	C Thd.	DBF Min	GBF Min.	HBF Max.	LBF Max
48	.590	.335	1.444	1/2-28UNEF	.552	6-32	.234	.115	.760	1.776
10	.717	.466	1.444	5/8-24UNEF	.677	6-32	.297	.178	.820	1.776
12	.834	.591	1.444	3/4-20UNEF	.802	6-32	.422	.302	.950	1.776
14	.970	.705	1.444	7/8-20UNEF	.927	6-32	.547	.355	1.070	1.776
16	1.038	.830	1.444	1 -20UNEF	1.052	6-32	.609	.490	1.130	1.836
18	1.216	.948	1.444	1-3/16-18UNEF	1.161	8-32	.740	.615	1.390	1.815
20	1.332	1.073	1.728	1-3/16-18UNEF	1.286	8-32	.740	.615	1.390	1.970
22	1.460	1.198	1.728	1-7/16-18UNEF	1.411	8-32	.928	.740	1.570	1.970
24	1.585	1.323	1.738	1-7/16-18UNEF	1.536	8-32	.984	.790	1.760	1.970

Shell Size*	TYPE E BE Min.	LE Max	TYPE G BG Max	DG Min	DG Max.	LG Max	TYPE J BJ Max	DJ Min	DJ Max	LJ Max	TYPE P BP Max	DP Min.	LP Max
48	557	1.241	592	168	230	1.770	878	168	230	2.270	602	327	1.450
10	577	1.281	.712	205	312	1.770	891	295	312	2.270	591	444	1.450
12	802	1.281	837	338	442	1.860	1.016	338	442	2.410	852	558	1.450
14	970	1.281	995	416	539	2.050	1.141	416	539	2.600	956	683	1.450
16	1.045	1.281	1.080	550	616	2.270	1.203	550	616	2.880	1.038	908	1.450
18	1.165	1.281	1.200	600	672	2.560	1.469	600	672	3.170	1.220	1.029	1.450
20	1.290	1.360	1.325	635	747	2.960	1.469	635	747	3.610	1.343	1.038	1.660
22	1.415	1.360	1.450	670	846	3.120	1.656	670	846	3.760	1.461	1.159	1.660
24	1.540	1.360	1.575	740	894	3.250	1.750	740	894	3.900	1.593	1.284	1.730

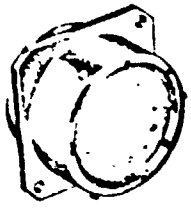
* See Pages 4, 5, and 6 for ordering number information and pages 10 and 11 for contact arrangements
◆ Not available on KPSE/KSSE
● (MMC) located within .005 of (TP).

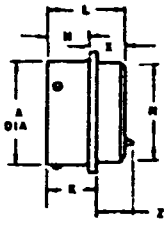
BOX MOUNTING RECEPTACLES

KPT02/KSP02/MS3112
KPT02/KSPM02
KPSE02/KSSE02/MS3122

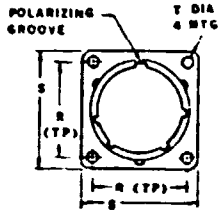
ORIGINAL PAGE IS
OF POOR QUALITY

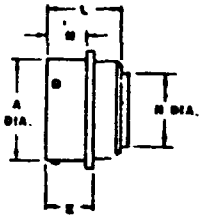
RECEPTACLE ASSEMBLY





SOLDER
KPT02/KSP02/MS3112





CRIMP
KPTM02/KSPM02
KPSE02/KSSE02

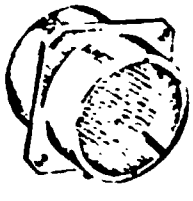
RECEPTACLE ASSEMBLY WITHOUT TERMINATION

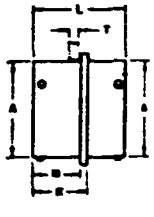
Shell Size*	KPT/KSP/KPTM/KSPM/KPSE/KSSE A Dia. ± .003	L Max	N Dia. Max	KPT/KPTM/KPSE K ± .010	M ± .005	R (TP)	S Max	T ± .005	KPT Z Max	KSP/KSPM/KSSE K ± .010	M ± .005	R (TP)	S Max	T ± .005	KSP X Max.
▲8	.471	.832	.436	.530	.457	.594	.828	.120	.483	.524	.467	.734	1.057	.150	.542
10	.588	.832	.562	.530	.457	.719	.954	.120	.483	.524	.467	.812	1.135	.150	.542
12	.748	.832	.687	.530	.457	.812	1.047	.120	.483	.524	.467	.938	1.260	.150	.542
14	.873	.832	.812	.530	.457	.906	1.141	.120	.483	.524	.467	1.031	1.354	.150	.542
16	.998	.832	.936	.530	.457	.969	1.234	.120	.483	.524	.467	1.125	1.448	.150	.542
18	1.123	.832	1.061	.530	.457	1.062	1.328	.120	.483	.524	.467	1.203	1.526	.150	.542
20	1.248	.895	1.186	.650	.561	1.156	1.453	.120	.427	.650	.561	1.297	1.682	.150	.500
22	1.373	.895	1.311	.650	.561	1.250	1.578	.120	.427	.650	.561	1.375	1.760	.150	.500
24	1.498	.895	1.436	.650	.594	1.375	1.703	.147	.393	.650	.594	1.500	1.885	.150	.467

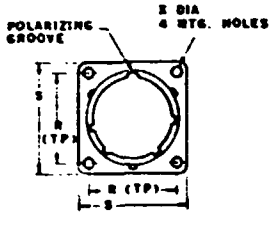
* See pages 4 5 and 6 for ordering number information.
▲ Not available in KPSE/KSSE
● (MMC) located within .005 of (TP).

THRU-BULKHEAD RECEPTACLES

KPTB/KSPB/MS3119







SOLDER
KPTB/KSPB/MS3119

RECEPTACLE ASSEMBLY

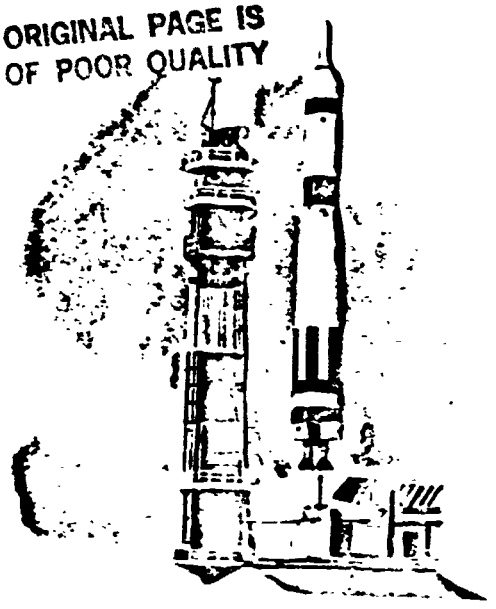
Shell Size*	KPTB/KSPB A Dia. ± .003	K ± .020	L Max	M ± .010	T Max	KPTB R (TP)	KPTB S Max	KPTB X ± .005	KSPB R (TP)	KSPB S Max	KSPB X ± .005
8	.471	.634	1.175	.572	.188	.594	.828	.120	.734	1.057	.150
10	.588	.634	1.125	.572	.188	.719	.954	.120	.812	1.135	.150
12	.748	.634	1.125	.572	.188	.812	1.047	.120	.938	1.260	.150
14	.873	.634	1.125	.572	.188	.906	1.141	.120	1.031	1.354	.150
16	.998	.634	1.125	.572	.188	.969	1.234	.120	1.125	1.448	.150
18	1.123	.634	1.125	.572	.188	1.062	1.328	.120	1.203	1.526	.150
20	1.248	.792	1.255	.698	.312	1.156	1.453	.120	1.297	1.682	.150
22	1.373	.792	1.255	.698	.312	1.250	1.578	.120	1.375	1.760	.150
24	1.498	.792	1.255	.698	.312	1.375	1.703	.147	1.500	1.885	.150

* See page 4 for ordering number information and pages 10 and 11 for contact arrangements.
●(MMC) located within .005 of (TP)

TRW-Cinch (71785)

Connector, Rectangular, Rack Mount	DB-25S
Connector, Rectangular, Rack Mount	DC-37P
Connector, Rectangular, Rack Mount	DC-37S
Connector, Rectangular, Rack Mount	DE-9S
Connector, Rectangular, Rack Mount	DE-9P

ORIGINAL D



GENERAL INFORMATION

The Cinch Original D Plug utilizes a two-piece nylon insulator housed in a variety of five basic shell sizes: E, A, B, C, and D. These shell sizes contain 9, 15, 25, 37, and 50 #20 solder pot contacts respectively. Standard contact terminations accommodate up to #20 AWG stranded wire. Current rating is 5 amperes*.

The keystone shape of the shell assures proper polarization. Coupling is by means of friction; locking accessories are available. Also available are shells with float mounts.

With standard nylon insulators, operating temperatures range from −65°F to +250°F (the limiting factor being the insulator material). When a (C7) or (C33) diallyl phthalate insulator is substituted, the operating temperature range is from −65°F to +275°F.

*Military rating of #20 contacts or wires is 1.5 amps average, and 7.5 amps maximum. See explanation on page 20.

MATERIALS AND FINISHES

SHELLS:	Steel, cadmium plated with yellow chromate supplementary coating.
PIN CONTACTS:	Brass, gold plated (.00003) over silver plate (.0002).
SOCKET CONTACTS:	Phosphor bronze, gold plated (.00003) over silver plate (.0002).
INSULATORS:	Nylon, two-piece
FLOAT MOUNTING RIVETS & WASHERS	Stainless steel

For listing of applicable specifications see page 20.

PERFORMANCE DATA

VOLTAGE RATING:	See tabulation on page 20
INSULATION RESISTANCE:	Greater than 5,000 megohms, determined in accordance with MIL STD-202A, Method 302
CONTACT VOLTAGE DROP:	2.67 Millivolts, maximum, per ampere.
INDIVIDUAL CONTACT SEPARATION FORCE:	1 to 8 ounces.
MOISTURE RESISTANCE:	Exceeds test requirements of MIL-STD-202A, Method 106.†
VIBRATION:	Exceeds test requirements of MIL-STD-202A, Method 204, Condition B †
SHOCK:	Exceeds test requirements of MIL-STD-202A, Method 202A.†
CORROSION RESISTANCE:	Exceeds requirements of 50 hour exposure to salt spray in accordance with MIL STD 202A, Method 101A, Condition B †

†*As referenced in MIL C-83481B*

ORDERING NOMENCLATURE

D A —15 P (C33)
D A F —15 S —2

- Modification Codes
- Contact Type
- Insert Arrangement
- Float mount
- Shell Size
- Prefix

NOMENCLATURE EXPLANATION

PREFIX	Series identification.
SHELL SIZE	Five basic shell sizes: E, A, B, C, D.
FLOAT MOUNT	Stainless steel washers and rivets.
INSERT ARRANGEMENTS	See below.
CONTACT TYPE	P for pin; S for socket.

MODIFICATIONS

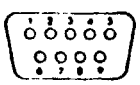
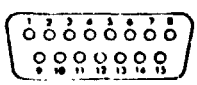
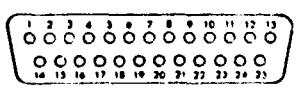
CONTACT TERMINATIONS*	(F32)	Tapered terminals (available in Nylon inserts only) for use with AMP #37 tapered sockets.
SHELL INSULATOR*	(F115)	With #4-40 clinch nuts rear mounted in flange rivet holes.
	(C7)	Diallyl phthalate, asbestos filler, per MIL-M-14F, Type MDG.
	(C33)	Diallyl phthalate, glass fiber filled, per MIL-M-19833, Type GDI-30.
	(F114)	Nylon front insulator combined with (C7) rear insulator.
CONTACT FINISH*	(A106)	Heavy hard gold plate (.0001) over copper flash.
	(A115)	Heavy hard gold plate (0001) over silver plate (.0002)
	(A125)	Heavy soft gold plate (.0001) over copper flash.
NON-MAGNETIC PLUG	—NM	Non-Magnetic version includes soft rolled brass shell and Nylon insulator. Brass rivets and washers are used for float mounting.
PRINTED CIRCUIT TERMINALS		Terminals .040 diameter by .093 nominal beyond barriers for use on boards of .062 nominal thickness. For greater board thicknesses consult factory.

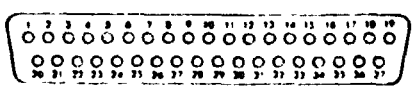
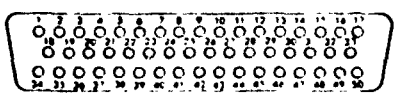
	ORDERING CODE NUMBER	
SHELL SIZE	FOR PIN	FOR SOCKET
(Nylon insulators)		
DE-9	—1	—1
DA-15	—6	—2
DB-25	—3	—3
DC-37	—4	—4
DD-50	—6	—6
(C7 insulators) All Shell Sizes	—1 C7	—1 C7

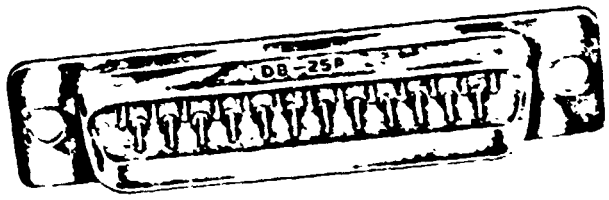
*Consult factory for other modifications.

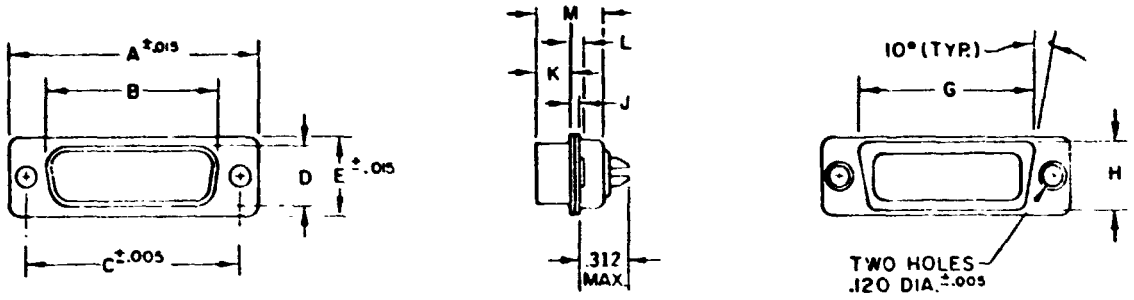
INSERT ARRANGEMENTS

actual size

FACE VIEW PIN INSERT			
SHELL SIZE	E	A	B
NO OF CONTACTS	9	15	25
CONTACT SIZE	#20	#20	#20

FACE VIEW PIN INSERT		
SHELL SIZE	C	D
NO OF CONTACTS	37	50
CONTACT SIZE	#20	#20





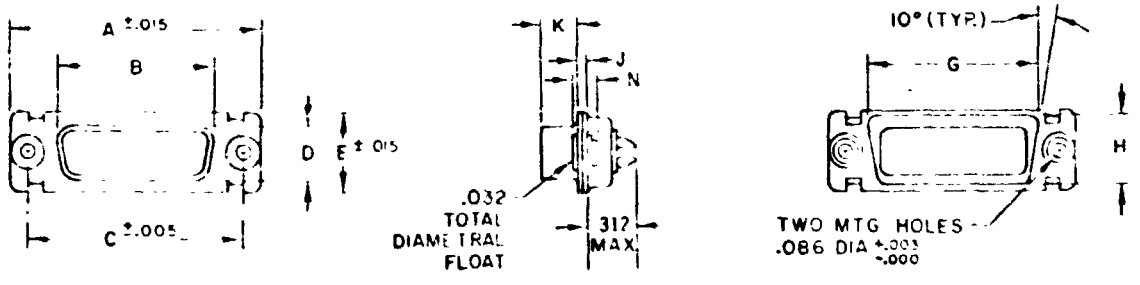
STANDARD SHELL

Part Number by Shell Size	A	B	C	D	E	S	H	J	K	L	M	N
DE 9P	1 213	697	.984	.360	.494	.759	.422	.030	236	045	422	.120
DE 9S	1 213	.640	.984	.308	.494	.759	.422	030	243	.045	.429	.120
DA 15P	1 541	1 025	1.312	.360	.494	1 083	.422	.030	.236	.045	422	.120
DA 15S	1 541	.968	1.312	.308	.494	1 083	.422	030	.243	045	.429	.120
DB-25P	2 088	1 583	1 852	.378	.494	1 625	.422	.039	231	.060	426	.129
DB 25S	2 088	1 508	1 852	308	.494	1 625	.422	.030	.243	.045	429	.120
DC 37P	2 729	2 231	2 500	378	.494	2 272	422	039	231	060	.426	129
DC 37S	2 729	2 156	2 500	.308	.494	2 272	.422	030	.243	045	429	.120
DD 50P	2 635	2 127	2 406	.484	.605	2 178	.534	.039	.231	.060	426	.129
DD 50S	2 635	2 062	2 405	.420	.605	2 178	.534	.030	.243	.045	.429	.120

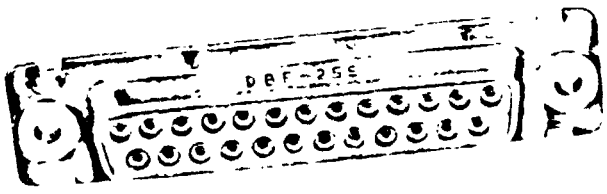
All tolerances are ± .010 unless noted otherwise

Dimensions B and D are measured as outside dimensions at the bottom of the draw

SHELL WITH FLOAT MOUNTS*



*Add F to part Nos. in the above table for Float Mounts (Ex. DEF 9P)



ACCESSORIES

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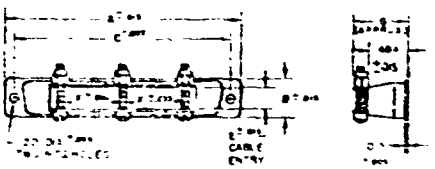
OF POOR QUALITY

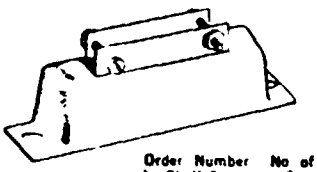
ACCESSORY CHART

ACCESSORIES	APPLICATION				
	D*	D*M	D*M COMBINATION	D*SM	D*H
Junction Shells -19678 Straight Clamp	•	•			
Junction Shells Round Clamp	•	•		•	
Junction Shells – Deep, Straight Clamp	•	•	•	•	
Junction Shells Right Angle	•	•		•	
Potting Shells with or without Grips	•	•			
Dust Caps–Polyethylene	•	•	•	•	•
Screw Lock Assemblies Male & Female	•	•	•	•	

JUNCTION SHELLS

19678 STRAIGHT CLAMP

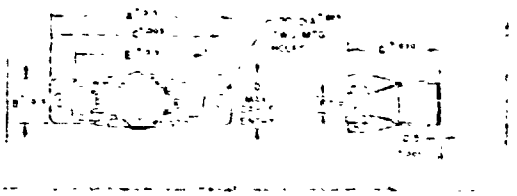


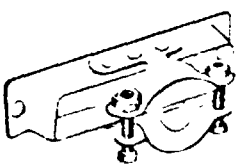


MATERIAL: Low carbon steel
FINISH: Cadmium plate, yellow chromate
CORROSION RESISTANCE: Passes 50 hour exposure to salt spray in accordance with MIL-STD-202A, Method 101A, Condition B.

Order Number by Shell Size	No. of Cable Locking Screws Required	A	B	C	E	F	G
DA 19678-1	2	1.531	.500	1.312	.296	.312	.640
DB-19678-2	2	2.078	.500	1.852	.296	.796	.640
DC-19678-3	3	2.718	.500	2.500	.296	.687	.640
DD-19678-4	3	2.625	.609	2.406	.390	.687	.703

ROUND CLAMP



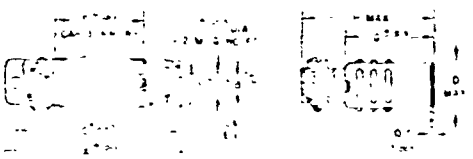


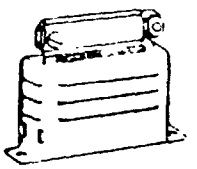
MATERIAL: Low carbon steel
FINISH: Cadmium plate, yellow chromate
CORROSION RESISTANCE: Passes 50 hour exposure to salt spray in accordance with MIL-STD-202A, Method 101A, Condition B

All tolerances are ± .010 unless noted otherwise

Order Number by Shell Size	A	B	C	D	E	F	G
DA 20961	1.531	.500	1.312	.406	.984	.125	1.031
DB 20962	2.078	.500	1.852	.593	1.515	.187	1.062
DC 20963	2.718	.500	2.500	.718	2.171	.250	1.062
DD 20964	2.625	.609	2.406	.812	2.093	.312	1.062

DEEP, STRAIGHT CLAMP

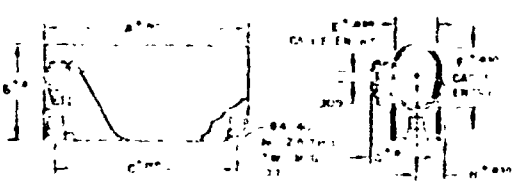


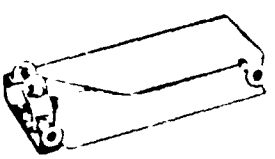


MATERIAL: Low carbon steel
FINISH: Cadmium plate, yellow chromate
CORROSION RESISTANCE: Passes 50 hour exposure to salt spray in accordance with MIL-STD-202A, Method 101A, Condition B.

Order Number by Shell Size	A	B	C	D	E	F	G	H
DE 24657	1.203	.484	.984	.578	.375	.375	.750	1.219
DA 24658	1.531	.484	1.312	.578	.713	.312	.750	1.250
DB 24659	2.078	.484	1.852	.578	1.000	.312	1.000	1.531
DC 24660	2.718	.484	2.500	.578	1.375	.312	1.000	1.531
DD 24661	2.625	.593	2.406	.687	1.406	.406	1.125	1.656

19977 RIGHT ANGLE





MATERIAL: Low carbon steel
FINISH: Cadmium plate, yellow chromate
CORROSION RESISTANCE: Passes 50 hour exposure to salt spray in accordance with MIL-STD-202A, Method 101A, Condition B

Order Number by Shell Size	A	B	C	E	F	G	H
DE 19977-5	1.203	.718	.984	.437	.437	.468	.281
DA 19977-1	1.531	.718	1.312	.437	.437	.468	.281
DB 19977-2	2.078	.968	1.852	.437	.625	.468	.281
DC 19977-3	2.718	1.187	2.500	.437	.812	.468	.281
DD 19977-4	2.625	1.250	2.406	.562	.906	.531	.343

All "A" std. type junction shell hoods also available. Consult factory for further information.

POTTING SHELLS

MATERIAL: Low carbon steel
FINISH: Cadmium plate, yellow chromate
CORROSION RESISTANCE: Passes 50 hour exposure to salt spray in accordance with MIL-STD-202A, Method 101A, Condition B.

Order Number by Shell Size	A	B	C	D	E
DA 19678 10	1 531	500	1 312	300	588
DB 19678 11	2 078	500	1 852	300	1 125
DC 19678 12	2 718	500	2 500	300	1 750
DD 19678 13	2 625	609	2 406	390	1 750

MATERIAL: Low carbon steel
FINISH: Cadmium plate, yellow chromate
CORROSION RESISTANCE: Passes 50 hour exposure to salt spray in accordance with MIL-STD-202A, Method 101A, Condition B.

Order Number by Shell Size	A	B	C	D	E
DA 19678 14	1 531	500	1 312	300	588
DB 19678 15	2 078	500	1 852	300	1 125
DC 19678 16	2 718	500	2 500	300	1 750
DD 19678 17	2 625	609	2 406	390	1 750

DUST CAPS

Order Number by Shell Size	For Use with	A	B	C	D
DE 59 20	DE 9S	.694	.627	.362	.295
DE 60 20	DE 9P	.749	.682	.412	.345
DA 59 20	DA 15S	1 022	.955	.362	.295
DA 60 20	DA 15P	1 077	1 010	.412	.345
DB 59 20	DB 25S	1 562	1 495	.362	.295
DB 60 20	DB 25P	1 635	1 568	.430	.363
DC 59 20	DC 37S	2 210	2 143	.362	.295
DC 60 20	DC 37P	2 283	2 216	.430	.363
DD 59 20	DD 50S	2 116	2 049	.474	.407
DD 60 20	DD 50P	2 179	2 112	.536	.469

MATERIAL: Polyethylene (red)
FINISH: None

All tolerances are ± .010 unless noted otherwise

SCREW LOCK ASSEMBLIES

MALE

MATERIAL: Clip: sheet steel. Hardware: cold rolled steel.
FINISH: Cadmium plate, yellow chromate
CORROSION RESISTANCE: Passes 50 hour exposure to salt spray in accordance with MIL-STD-202A, Method 101A, Condition B.

FEMALE

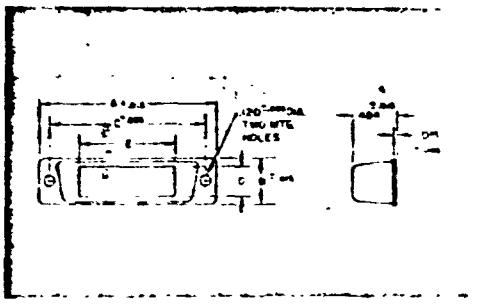
MATERIAL: Cold rolled steel.
FINISH: Cadmium plate, yellow chromate
CORROSION RESISTANCE: Passes 50 hour exposure to salt spray in accordance with MIL-STD-202A, Method 101A, Condition B.

Order Number	Type	Shell Size	For use with plug	For use with plug and junction shell
D20418-2	Female	DE, DA, DB, DC, DD	Yes	Yes
D20419	Male	DE, DA, DB, DC	Yes	No
D20419 16	Male	DE, DA, DB, DC	No	Yes
D20420	Male	DD	Yes	No
D20420-12	Male	DD	No	Yes

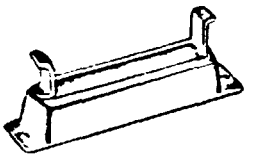
NOTES (1) An 8 inch/pound (female) and 4 inch/pound (male) maximum torque during assembly as recommended on screw lock assemblies

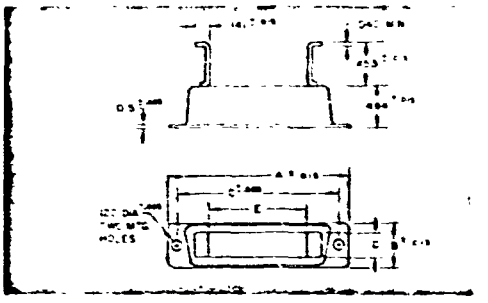
(2) For non-magnetic versions consult factory.

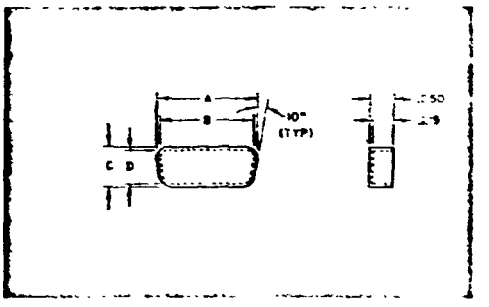
19678 LESS GRIPS

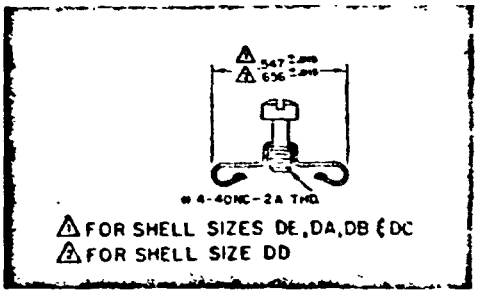


19678 WITH GRIPS



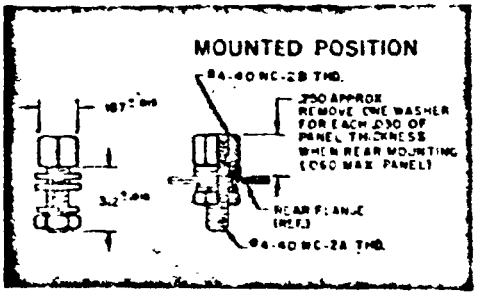






MALE

FEMALE

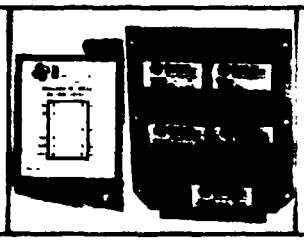


Computer Conversions Corp. (51086)

Converter, Synchro to Linear DC — SLD 214L-1

COMPUTER CONVERSIONS CORPORATION

ST NORTHPORT, N.Y. 11731 - 516 261-3300



SYNCHRO TO LINEAR DC CONVERTERS

SLD SERIES

DESCRIPTION

The SLD Series are low cost, high accuracy, miniature synchro or resolver to linear DC angle converters designed for military and industrial control applications. They will accept any three wire synchro or four wire resolver input and convert it into linear DC voltage proportional to the input shaft angle. Virtually any scale factor can be provided. Units that can track input rates smoothly up to 1440°/sec are available. Both full (±180°) or limited angle (±90°) models are standard. This series of converters is insensitive to signal and reference amplitude variation. Standard accuracies are ±6', ±15' or ±30' of arc. Extremely high accuracy units that maintain ±6' of arc error, even over the full temperature range, with no input velocity errors can also be provided. These features make the SLD Series the smallest, easiest to use and most accurate units available in their price range.

FEATURES

- Infinite Resolution
- Limited Angle Units require no reference
- Insensitive to input amplitude variations
- Accepts bi-directional input data
- Hi Accuracy
- Multiplexed units available.
- Synchro & Reference Inputs Transformer Isolated
- Sampling & tracking units available.
- No adjustments required
- Repairable or hermetically sealed units are available.
- Output short circuit protected.

SPECIFICATIONS

at 25° C.

MODELS	Full Angle	Limited Angle	Full Angle (Hi-Accuracy Tracking)
400 Hz.	SLD214	SLD214L	SLD214T
60 Hz	SLD216	SLD216L	SLD216T
ACCURACY (1)	±6 minutes of arc	±15 minutes of arc	±6 minutes of arc
RESOLUTION	Infinite	Infinite	5.27 minutes
TEMP'. DRIFT	.2'/°C	.4'/°C	.04'/°C
OUTPUTS (5)	(A) ±10VDC representing ±180° of input angle (standard)	(A) ±10VDC representing ±90° of input angle	(A) *
	(B) 0 to +10VDC representing 0 to 360° of input angle (special)	(B) 0 to +10VDC representing 0 to 180° of input angle	(B) *
RIPPLE	5mv	10mv	5mv
SYNCHRO INPUT (2)	11.8V RMS L-L 400 Hz into 15K ohm min. L-L balanced (SLD214-L)	•	•
OR			
RESOLVER INPUT (RLD)	90V RMS L-L 400 Hz into 750K ohm min. L-L balanced (SLD214-H)	•	•
	90V RMS L-L 60 Hz into 200K ohm min. L-L balanced (SLD216-H)	•	•
(TRANSFORMER) ISOLATED	26V RMS L-L 400 Hz into 20K ohms min. L-L balanced (RLD214)	•	•
SYNCHRO/ RESOLVER INPUT RATES	0 to 720°/sec (400 Hz)	•	0 to 360°/sec or 0 to 1440°/sec (400 Hz)
	0 to 100°/sec (60 Hz)	•	0 to 180°/sec (60 Hz)
LAG ERROR	.0025° per °/sec (400 Hz) .0167° per °/sec. (60 Hz)	.01° per °/sec (400 Hz) .07° per °/sec. (60 Hz)	None None
REFERENCE INPUT (2)	26V @ 2 ma RMS 400 Hz (SLD214-L)	None	26V @ 5 ma RMS 400 Hz (SLD214-L)
	115V @ 6ma RMS 400 Hz (SLD214-H)	None	115V @ 1.2 ma RMS 400 Hz (SLD214-H)
(TRANSFORMER ISOLATED)	115V @ 1.5 ma RMS 60 Hz (SLD216-H)	None	115V @ 3.2 ma RMS 60 Hz (SLD216-H)
POWER SUPPLIES (3)	+15V @ 60 ma max -15V @ 90 ma max	±15V @ 60 ma ea	+15V @ 90 ma -15V @ 65 ma +5V @ 415 ma
TEMPERATURE RANGE			
OPERATING	0°C to 70°C (SLD214L or H-1 -55°C to +85°C (SLD214L or H-2)	•	•
		•	•
STORAGE	-55°C to +125°C	•	•
SIZE	(A) 2.6 x 3.1 x .82" H (A)	•	(A) 3.06" x 2.6" x 3.18" H HB Can
	(B) 60 Hz units have external transformer	(B) 4.5" x 6.5" x 1" H P.C. card with 22 pin edge connect (SLD214 LPC)	(B) 4½" x 6¼" x 1" H P.C. card with 22 pin edge conn.
		(C) 60 Hz units have external transformer	(C) 60 Hz units have external transformer
Loading	2K ohms min.	•	•

* Same as full angle unit

NOTES

(1) Accuracy applies at 25°C over ±10% amplitude and frequency and ±5% power supply variations. Lower accuracy units available
(2) Different input voltages and frequencies available
(3) Available for ±12V operation
(4) Other scale factors available (i.e. ±5V, 0 to 5V, etc.)

ORDERING GUIDE:

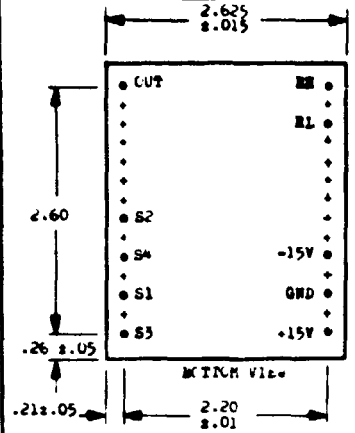
(1) Specify basic model desired
(2) Add operating temperature range
(3) To order a full angle (± 180° scale factor), 11.8V L-L 400 Hz synchro input to ±10V DC output unit, operating from 0 to 70°C use Pt. No. SLD214-L-1
(4) To order a limited angle (±90°), 90V L-L, 60 Hz synchro input to ±10V DC output unit, operating from -55°C to +85°C, use Pt. No. SLD216L-H-2

COMPUTER CONVERSIONS CORPORATION

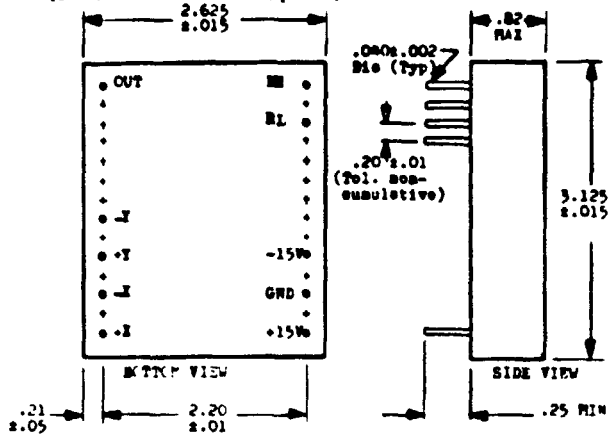
6 DUNTON COURT - EAST NORTHPORT, N.Y. 11731 - 516 261-3300

INPUT/OUTPUT CONNECTIONS SLD214, 214L, 216	
PIN	FUNCTION (SLD214, 214L, 216)
S1	SYNCHRO INPUT
S2	SYNCHRO INPUT
S3	SYNCHRO INPUT
S4	RESOLVER INPUT
RH	REFERENCE (HIGH) (Not used for SLD214L)
RL	REFERENCE (LOW) (not used for SLD214L)
+15V	DC POWER
-15V	DC POWER
GND	COMMON
OUT	DC OUTPUT
+X	Connect to +X pin of transformer (SLD216 only)
+Y	Connect to +Y pin of transformer (SLD216 only)
-X	Connect to -X pin of transformer (SLD216 only)
-Y	Connect to -Y pin of transformer (SLD216 only)

SLD214



SLD216
(External Transformer Required)



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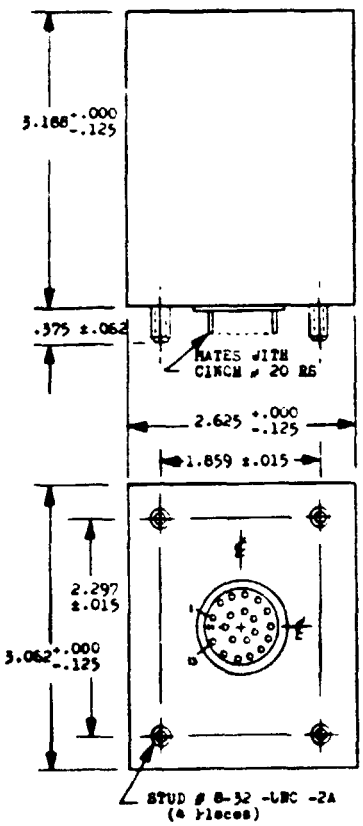
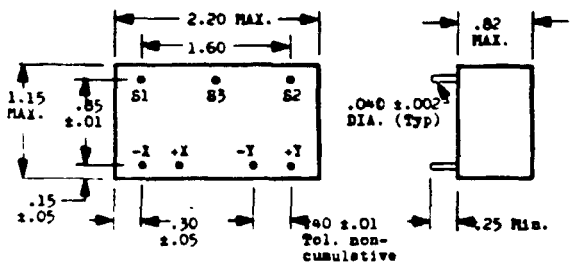
SLD214T



PIN CONNECTIONS	
PIN	FUNCTION
1	RH
2	RL
3	S1
4	S3
5	S2
6	S4
7	+15V
8	GND
9	-15V
10	OUTPUT
11	N.C.
12	N.C.
13	N.C.
14	CASE GND
15 -20	N.C.

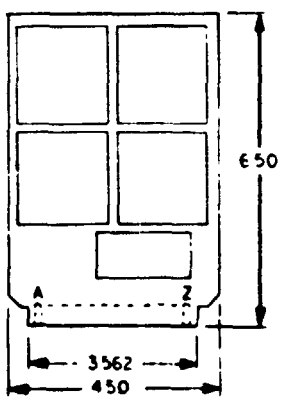
NOTE: SLD216T has external transformer - 1⅝" x 3 1/8" x 1" H

60 Hz TRANSFORMER



NOTE: CONNECT -X, +X, -Y & +Y to corresponding pins on converter module.

SLD214LPC, SLD216LPC



MATING CONN. CPC.:
CINCH 50-...-A-20 or
AMPHENOL 143-022-01

PIN CONNECTIONS	
PIN	FUNCTION
1A	N.C.
2B	DC OUTPUT
3C	N.C.
4D	DC OUTPUT GND
5E	N.C.
6F	N.C.
7H	N.C.
8J	N.C.
9K	N.C.
10L	N.C.
11M	RESOLVER INPUT - S4
12N	N.C.
13P	DC POWER: +15V
14R	N.C.
15S	SYNCHRO INPUT - S2
16T	SYNCHRO INPUT - S3
17U	N.C.
18V	DC POWER: -15V
19W	N.C.
20X	N.C.
21Y	SYNCHRO INPUT: S1
22Z	POWER GND

OTHER CCC PRODUCTS

CCC also manufactures synchro to DC, digital to synchro, DC to synchro, rectangular to polar and Binary to BCD converters. Other standard products are solid state C.T.'s CDX's, absolute encoders and readouts, and angle indicators. Special units available on request.

COMPUTER CONVERSIONS CORPORATION 6 DUNTON COURT, EAST NORTHPORT, NEW YORK 11731 / (516) 261-3300

CFE TECHNICAL DATA

Disc Instruments, Inc.

Encoder, Shaft 815-512-IBLP-TTL

ROTASWITCH™ INCREMENTAL SHAFT ENCODERS

SIZE 23 SERVO HOUSED UNITS

MODELS 814, 815, 834 & 835

Designed to withstand most industrial environments, the Size 23 servo housed units are sealed against oil, moisture and dust. They have a 0.25" diameter stainless steel shaft, ABEC Class 5 or better SS ball bearings and a 5 pin MS connector. Available in both sine wave and TTL or optional HTL square wave, single or quadrature output, the servo models are offered with an optional once-per-revolution index pulse. This unit incorporates a solid state light emitting diode (LED) source for greater reliability. Standard pulse rates of up to 2540 pulses per revolution are available and these units have a 75 kHz output capability. For further information, please contact our Application Engineering Department.

NOTE: Past Rotaswitch customers will find that the ROTASWITCH SV 800 Series models when ordered with positive or negative HTL output are compatible and directly replaceable with old-style units.

SPECIFICATIONS

Mechanical

Physical Characteristics	See reverse side
Weight	9 ounces max.
Starting Torque at 25°C	0.1 inch-ounces max. (0.9 inch-ounces with sealed bearings)
Running Torque at 25°C	0.09 inch-ounces max. (0.8 inch-ounces with sealed bearings)
Moment of Inertia	1.4×10^{-4} inch-ounces sec.^{2} max.
Shaft Rotation	Continuous and reversible
Slew Speed	5,000 rpm
Shaft	1/4" diameter stainless steel
Shaft Loading	
Axial	5 lb. max.
Radial	8 lb. max.
Bearings	ABEC Class 5 or better (Class 7 on special order)
Bearing Life	$\frac{16 \times 10^6}{\text{rpm}}$ = hours min.

Electrical

Code	Incremental
Index	Optional, once per revolution
Pulses Per Revolution	As specified; see Pulse Rate Availability Sheet
Accuracy	±2.5 min. of arc standard
Illumination Source	LED
Sensor	Silicon solar cell standard. Phototransistor available for higher temperatures and higher speeds.
Output Signal	
Sine Wave Models	See curves
Square Wave Models	
TTL Compatible (vcc = 5 vdc ± 10%)	Logic "1" VCC @ 1K ohm. Logic "0" 0.5V max @ 10 ma max. sink current.
HTL Compatible (vcc = 12 vdc or 15 vdc ± 10%)	Logic "1" VCC @ 2.2 K ohm; 3.3 K ohm if 15 vdc. Logic "0" 0.7V max @ 10 ma max. sink current.
Input Power Requirement	
TTL Compatible Units	+5 vdc ± 10% 150 ma max. with LED.
Input Power Equipment *(cont'd)*	
HTL Compatible Units	vdc or + 15 vdc ± 10% ma max. with LED.
Operating Speed	– 75 kHz – 20 kHz
Operating Temperature	0°C to + 55°C
Electrical Connector	MS-3102E-14S-5P o08
Mating Connector	MS-3106E-14S-5S (ordered separately)

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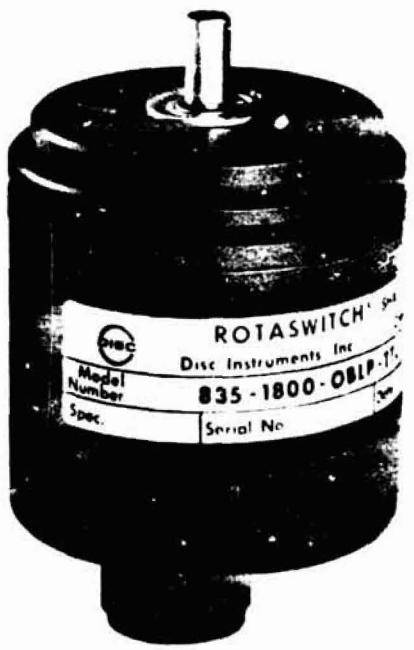
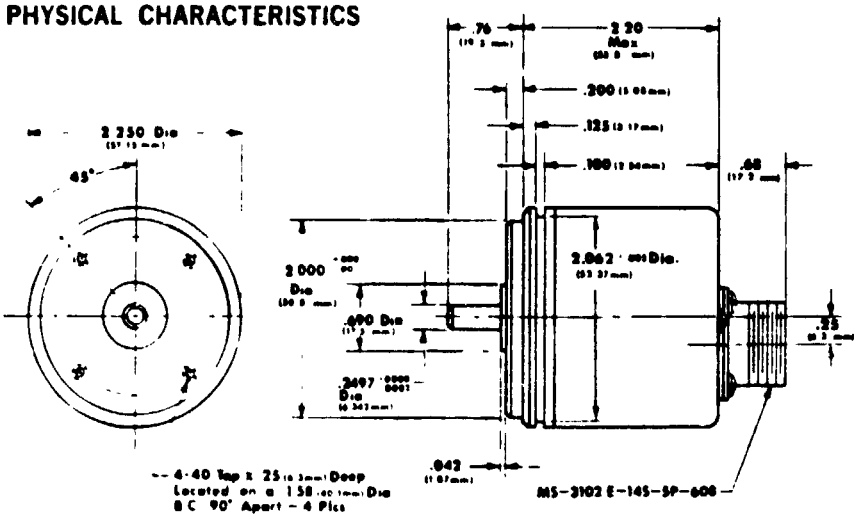
BLACK AND WHITE PHOTOGRAPH



PHYSICAL CHARACTERISTICS



ELECTRICAL CONNECTIONS

Models 814 and 815

A	OUTPUT A
B	NOT USED
C	INDEX (OPTION)
D	VCC *
E	GROUND

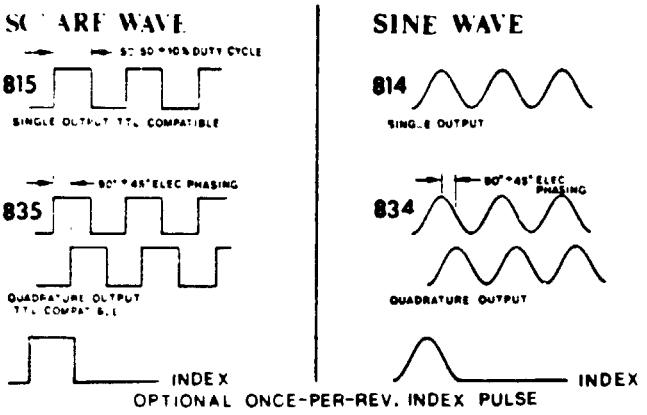
Models 834 and 835

A	OUTPUT A
B	OUTPUT B
C	INDEX (OPTION)
D	VCC *
E	GROUND

*POWER SOURCE REQUIRED
+5 vdc ± 10% on TTL units.
+12 vdc ± 10% on sine wave units.
+12 or +15 vdc ± 10% on HTL units.

OUTPUT CONFIGURATIONS

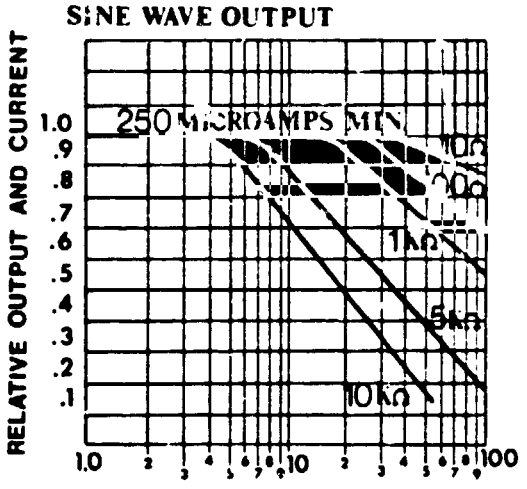
[Output shown CW rotation]



OPTIONAL ONCE-PER-REV. INDEX PULSE

NOTE: Negative polarity output available simply specify at time of order

FREQUENCY IN KHz



MODEL DESIGNATION

Model 835 – 500 – O B L S – TTL – (LD)**

Basic Model	Pulses Per Rev	O – No Index I – Index (Optional)	Shaft Diameter	Source	Sensor	OUTPUT (Sq. Wave Models)
	As specified		B – .2497	L - LED	P - Photo-transistor S - Solar cell	TTL Compatible HTL Compatible (Optional specify + 12 or + 15 vdc)

* 815 . . . Single square wave output
835 . . . Dual square wave, quadrature output.

814 . . . Single sine wave output
834 . . . Dual sine wave, quadrature output

**Line Driver option if required.

ORDERING INFORMATION

Call out per Model Designation above, specifying:

1. Model number
2. Pulses per revolution
3. Index or No Index (optional)
4. Shaft dia ("B")
5. Source (LED)
6. Sensor (Solar cell, standard; or phototransistor)
7. Output (TTL or HTL if square wave. If HTL, specify + 12 or + 15 vdc)
8. Line Driver option, if required.

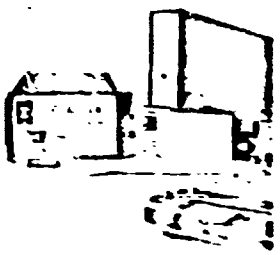
DISC INSTRUMENTS, INC • 102 East Baker Street • Costa Mesa, California 92626 • Phone (714) 979-5300 • TWX 910 595-1987 DISC CSMA

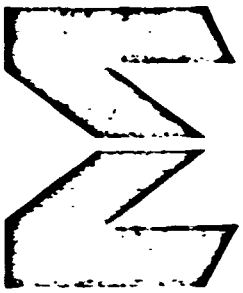
379 5BCP PRINTED IN U.S.A.

ENDEVCO (95411)

Accelerometer	Model 2271A
Charge Amplifier	Model 2647M77

ENDEVCO PRODUCT DATA





MODELS 2271A· 2275

Low Strain Sensitivity
Flat Charge-Temperature Response
Electrical Insulation

PRECISION ISOBASE® ACCELEROMETER

The Models 2271A and 2275 Accelerometers featuring ISOBASE® construction have proven themselves in high reliability laboratory and aerospace applications for many years. ISOBASE construction provides mechanical isolation of the seismic system from the base, resulting in very low strain sensitivity.

The Models 2271A and 2275 are precision accelerometers for use in the laboratory or in airborne applications. They feature extremely flat charge-temperature response over a broad temperature range, from −185°C to +260°C, and excellent stability with time. Their high internal capacitance permits operation directly into oscilloscopes or voltmeters.

In the Model 2271A, the signal ground is insulated from the case; in the Model 2275, signal ground is connected to the case. The Models 2271AM20 and 2275M15, with dynamic characteristics identical to the above, respectively, feature top connectors.

These accelerometers are self-generating piezoelectric transducers, *require no* external power for operation and may be used with either charge or voltage amplifiers.

2271AM20
2275M15

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ACTUAL SIZE

SPECIFICATIONS FOR MODEL 2271A AND 2275 ACCELEROMETERS

(According to ANSI and ISA Standards)

DYNAMIC

CHARGE SENSITIVITY[1]	11.5 pC/g, nominal 10 pC/g, minimum
VOLTAGE SENSITIVITY[1]	5.0 mV/g, nominal
MOUNTED RESONANCE FREQUENCY	27 000 Hz ± 3 kHz
FREQUENCY RESPONSE (± 5%)[2]	2 to 5500 Hz, reference 100 Hz
TRANSVERSE SENSITIVITY	2% maximum; 1% on special selection
AMPLITUDE LINEARITY, RANGE	Sensitivity increases approximately 1% per 1000 g, 0 to 10 000 g
TRANSDUCER CAPACITANCE	2000 pF, nominal
TRANSDUCER RESISTANCE	20 000 MΩ, minimum at −72°F (22°C); 100 MΩ, minimum at +500°F (260°C)
INSULATION RESISTANCE (2271A)	10 MΩ minimum[4]

NOTES

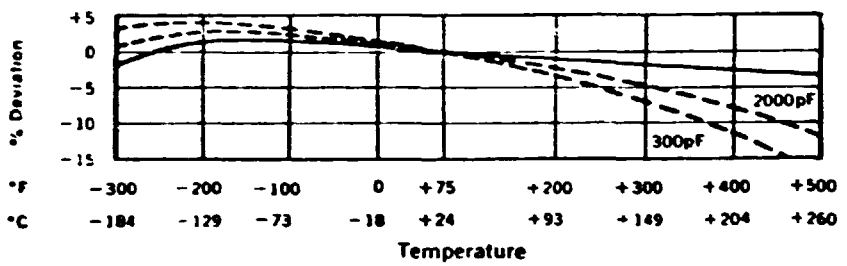
[1] With 500 pF external capacitance

[2] In shock measurement, minimum pulse duration for half-sine or triangular pulses should exceed 0.20 msec to avoid high frequency ringing. See Endevco Piezoelectric Instruction Manual.

[3] Use ENDEVCO® Charge Amplifier Series 2735 or 2680.

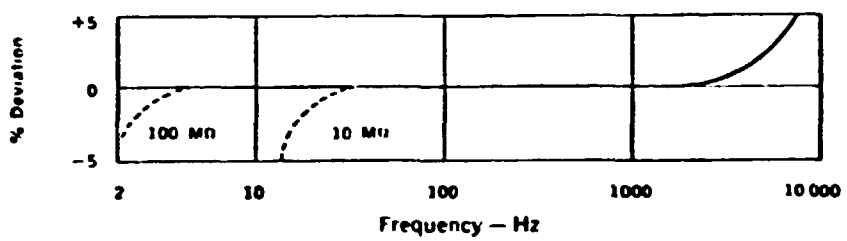
[4] Case of 2271A must be connected somewhere to the signal ground of the measuring system.

TYPICAL TEMPERATURE RESPONSE



The solid line shows the nominal charge-temperature response. The broken lines show the nominal voltage-temperature response with the cable supplied and also with an external capacitance of 2000 pF.

TYPICAL FREQUENCY RESPONSE



The solid curve shows the charge-frequency response. The broken lines show the voltage-frequency response with the loads shown and cable as supplied.

PT 4/29/76	SPECIFICATION MODEL 2647M77	A-2647M77- 1 6 1 EO 5/3/

1.0 DESCRIPTION

This specification describes the ENDEVCO® Model 2647M77 Charge Amplifier. The unit is a solid state, airborne device designed for use with piezoelectric transducers. The unit has two outputs, an AC output with a range of 2-20 mV/pC, and a DC output (AC rectified) proportional to the peak-to-peak value of the input signal. Both outputs are adjustable with a common gain control.

2.0 ELECTRICAL CHARACTERISTICS

2.1 Input Characteristics

2.1.1 Input Connection: The input is single ended with one side connected to signal ground.

2.1.2 Input Source Impedance

2.1.2.1 Source Resistance: The input amplifier is restricted to capacitive type devices and should not be loaded with less than 25 Megohms. Input source resistances less than this may cause the amplifier to become inoperative.

2.1.2.2 Source Capacitance: The maximum allowable source capacitance to meet all specifications is 10,000 pF except where noted.

2.1.3 Overload Recovery: At any amplifier gain, a half sine pulse of 1 millisecond duration and an amplitude of 1800 pC or less will cause no spurious effects at the amplifier output other than clipping.

2.2 Output Characteristics

The following characteristics apply to both outputs except where otherwise noted.

2.2.1 Output Connections: There are two outputs, one AC and one DC (rectified AC). Both outputs are single ended with one side connected to circuit ground.

2.2.2 Output Impedance

2.2.2.1 AC Output: Less than 50 ohms in series with at least 16μF.

2.2.2.2 Rectified Output: To match 150K ohms ±10% load.

2.2.3 DC Output Bias Voltage: 0.00 Volts +0.05 Volts

2.2.4 Minimum Load Impedance: The minimum load impedance to meet all specifications is 10 kΩ for the AC output and 150 k ±10% for the rectified output.

2.2.5 Minimum Linear Output Voltage

2.2.5.1 AC Output: 5.00 pk-pk (1.77 volts rms)

2.2.5.2 Rectified Output: +1.0V ±5% with a load resistance of 150K ohms ±1% and AC output of 5V peak-peak. Ripple on rectified output: Approximately 5% of the DC output voltage at 20 Hz, as measured with rms voltmeter. Ripple decreases with increasing frequency at about 6 db/octave when operating into a constant 150 k ohm ±10% load.

2.2.6 Maximum Limited Output Voltage

2.2.6.1 AC Output: 6.00 Volts pk-pk

2.2.6.2 Rectified Output: +1.5 Volts DC

2.2.7 Maximum Linear Output Current

2.2.7.1 AC Output: 0.500 mA pk-pk (0.164 mA rms)

2.2.7.2 Rectified Output:

2.2.8 Residual Noise: 0.019 pC per 1000 pF rms referred to the input or 1.5 mV rms referred to the AC output, whichever is greater.

2.2.9 Shock and Vibration Sensitivity: The shock and vibration sensitivity of the amplifier referred to the input is less than 0.02 pC/g.

2.3 Transfer Characteristics

2.3.1 Gain

2.3.1.1 Gain Range

2.3.1.1.1 AC Output: 2 to 20 mV/pC

2.3.2 Frequency Response

2.3.2.1 Gain versus Frequency Response: AC and Rectified Outputs with reference to 100 Hz response at temperature of interest.

±5%, 20 Hz to 20 kHz

-3 dB nom @ 7 Hz

2.3.3 Gain Stability

2.3.3.1 Gain Stability with Source Capacity: The gain will change less than 0.2% per 1000 pF change in source capacity at the input.

2.3.3.2 Gain Stability with Temperature

2.3.3.2.1 AC Output: The gain will change less than ±2% referred to room temperature gain over the range -55°C to +85°C.

2.3.3.2.2 Rectified Output: The gain will change less than ±2% referred to room temperature gain over the range of 0°C to +40°C.

2.3.3.3 Gain Stability vs. Supply Voltage: The gain will change less than 0.25% with changes in supply voltages over the specified limits.

2.3.4 Amplitude Linearity

2.3.4.1 AC Output: ±1% of reading from best straight line approximation to the curve of output amplitude versus input amplitude.

2.3.4.2 Rectified Output: ±2% of full scale from best straight line from 10% to 100% of full scale.

2.3.5 Total Harmonic Distortion: Less than 1% at any output level up to level as specified in paragraph 2.2.5.

2.4 <u>Power Requirements</u>

2.4.1 Supply Voltage: 20 to 32 volts DC (28 volts nominal).

2.4.2 Supply Current: Under normal operating conditions and with any supply voltage as specified in paragraph 2.4.1 the maximum supply current will be 25 mA.

2.4.3 Power Transients and Ripple Characteristics: The maximum transient or ripple output from the amplifier over the frequency range of from 0 to 20 kHz is 10 mV per volt change on the supply.

2.4.4 Warmup Time: 30 seconds maximum to meet all specifications.

2.4.5 Isolation

2.4.5.1 Case Isolation: The case and signal grounds are isolated from each other by 10 Megohms or greater, at 50 VDC. Case ground must be connected to signal ground at some point in the system to keep the residual noise within specifications.

3.0 PHYSICAL

3.1 Dimensions

2.620" long x 1.00" wide x 1.120" high (exclusive of mounting flange and connectors).

3.2 Weight

4.0 ounces nominal.

3.3 Mounting

Units mount with two 4-40 screws. See outline drawing page

3.4 Case Material and Finish

3.4.1 Case Material: Aluminum

3.4.2 Finish: Electroless Nickel Plate

3.5 Connections

3.5.1 Input Connector: The input connector is a Microdot Type 51-49, or equivalent, coaxial receptacle.

3.5.2 Output Connector: The output connector is a Viking VRS/4AG15. Pin A is the +28 VDC, Pin B is the AC output, Pin C is the rectified output, Pin D is the signal and power ground, Pin E is case ground.

3.6 Controls

3.6.1 Gain Control: The gain control is a 25 turn wire wound trim pot, and varies the gain of both outputs as specified in Paragraph 2.3.1. It is mounted on the opposite end of the unit from the connectors.

4.0 ENVIRONMENTAL CHARACTERISTICS

4.1 Temperature

Operating:	-55°C to +85°C
Non-Operating:	-73°C to +125°C

4.2 Humidity

The unit will stand 100% Relative Humidity when adjustment screw is soldered; meets MIL-E-5272C, paragraph 4.4.1.

4.3 Altitude

No effect when adjustment screw is soldered.

4.4 Vibration

0.120" D.A.	5 Hz to 55 Hz
20 g's	55 Hz to 2000 Hz

4.5 Shock

100 g's, 6.5 millisecond sawtooth.

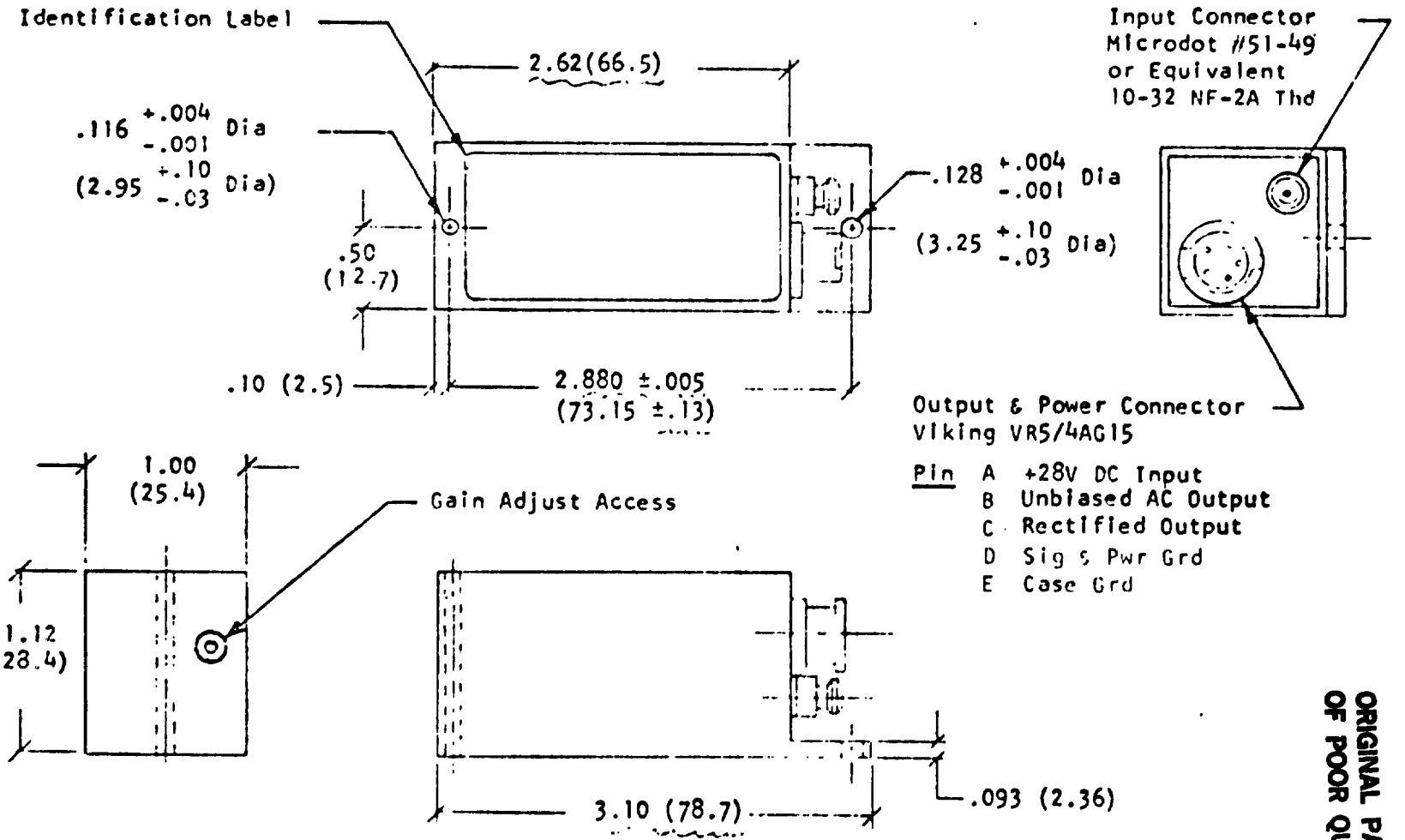
4.6 E.M.C. Capability

4.6.1 Interference Generation: The unit will meet MIL-I-6181D, except Audio Frequency conducted susceptibility is per paragraph 2.4.3.

5.0 ACCESSORIES

The following accessories are supplied with the unit:

QUANTITY	ITEM	ENDEVCO P/N
1	Instruction Manual	
1	Cap Screw, #4-40 x 3/8 Hex Socket HD	EHH09
1	Cap Screw, #4-40 x 1-1/2 Hex Socket HD	EHH10
2	Lockwasher #4	EHW164
2	Fiber Washer	EHW25
1	Wrench	EHM35
1	Instruction Card, Gain Adjust	2970-4
1	Connector, Viking VP5/4CE6	EP38
1	Hood, Viking VS4/16C5	EP35
1	Potting Sleeve, Viking VS4/16C9	EP31



STANDARD TOLERANCE

Inches	(Millimetres)
.XX = ±.03	(.X = ±.8)
.XXX = ±.010	(.XX = ±.25)

ENDEVCO

SPECIFICATION
MODEL 2647M77

A-2647M77-AE

6 / 6

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Flite-Tronics, Inc. (07181)

Inverter, Static, 750 VA PC-17A

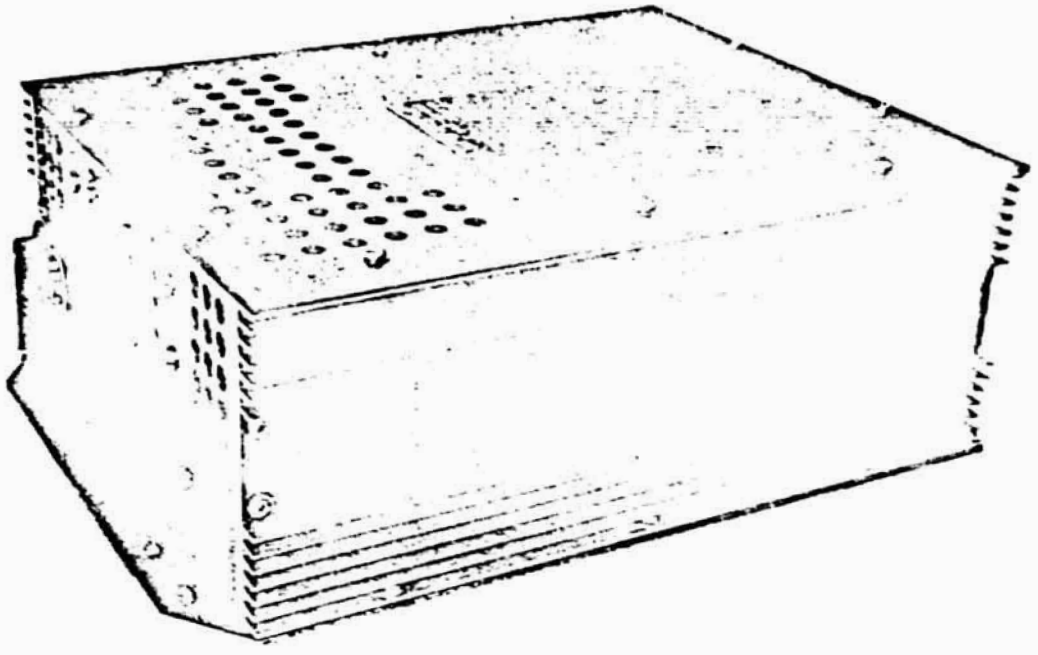


Figure 1.1 Flite-Tronics Model PC-17A

Section I

General Information

1.1 Introduction

This instruction manual has been prepared to provide information concerning installation, performance, operation, identification of parts, and maintenance of the Flite-Tronics' Model PC-17A Transistorized Power Inverter.

The unit is capable of delivering a current overload of 150% for a minimum duration of 5 minutes at full rated output voltage. This permits the PC-17A to power equipment that requires momentary surges of power during turn on.

1.2 Purpose of Equipment

The PC-17A shown in Figure 1.1, is a transistorized inverter designed to supply AC power at 400 hertz.

1.3 SPECIFICATIONS FOR MODEL PC-17A SERIES STATIC INVERTER

Input Voltage:

Nominal: 28.0 VDC
Range: 22 to 30 VDC operate down to 20 VDC

Input Overvoltage:

Withstands 130% overvoltage(37 VDC) for five minutes minumun while delivering full rated 750 VA output power. Output voltage under this condition 115 VAC +5%, -7%

Input Current:

39 amperes full load
1.5 amperes no load typical

Output Voltage:

115 VAC rms +5%, -7% 22 to 30 VDC. Greater than 100 VAC down to input of 20 VDC

Output Voltage:

26.0 VAC rms +5%, -7% 22 to 30 VDC

Output Voltage:

Auxilliary(Pin G) output @ 20 VDC input: 115 VAC +5%, -7% @ 90% load.

Output Power:

750 VA continuous for 115 VAC output
150 VA continuous for 26 VAC output
NOTE: Total continuous output power 750 VA

Overload Capability:

Delivers 150% of rated output current at rated output voltage for a duration of not less than 5 minutes. (i.e.,1125 volt ampere load)

Output Frequency: .....400 HZ ±1%

Output Waveform: .....Sine Wave Single Phase

Harmonic Distortion: ....7% Maximum
26-30VDC Input (Typically 3%)

Power Factor: ..... .8 to -.9

Input Voltage Protection:

Unit withstands transients of 88 volts lasting 1 millisecond on the 28.0 VDC input line.

Excessive Overload and Output Short Circuit:

Withstands without damage or degradation loads exceeding 165% nominal to an output short circuit. Unit delivers rated output on removal of above condition.

Altitude: ..... 45,000 feet

Efficiency: 70% Typical at Full Load

Temperature: -65°F. to 160°F.

Emission RFI:

Radiated & Conducted...
90 KC to 1000 MC
Far below levels specified in Appendix A of RTCA Paper 120-61/DO-108 Category "A"

Weight: .....16.2 lbs.

Size:

Width 8½"
Length 12"
Height 4 1/16"

Humidity:

Greater than 95% for ten days, Temperature cycled between 75°F. to 160°F.

Vibration:

Qualified to meet .08 double amplitude 5-17 HZ,.036 inch double amplitude 17-74 HZ and an acceleration of 10 G's whichever is limiting value from 75 to 500 cycles per second in three directions for 60 minutes each direction.

Shock:

To withstand at least 10 G's for 11 milliseconds in three directions.

1.4 Description

The PC-17A is a transistorized airborne static power inverter. The unit operates from 28.0 VDC aircraft power source and delivers 115 VAC or 26 VAC at 400 HZ. The total continuous power drawn from the two outputs should not exceed 750 VA.

An L/C tuned 400 HZ oscillator operating in a class B push-pull mode is used to generate the 400 HZ signal.

This signal is amplified by 4 stages of class B push-pull emitter follower amplifiers. Protective circuits for output overload, thermal runaway and input voltage transient are incorporated to make the PC-17As an extremely reliable equipment

Frequency and output voltages are adjustable. However, once set at the factory, they should not require readjusting for the life of the equipment.

Pages 4 and 5 illustrates the RFI generated by the model PC-17 and PC-17A. Page 4 shows Broadband Radiated. Page 5 shows the Broadband Conducted. The curves show the RFI levels are far below the minumum specified in the RTCA Paper 120-61/DO-138.

TEST CONDITION: Broadband Radiated
TEST MODE: Steady State Mode
LEGEND: SPECIFICATION ————
MEASURED LEVEL — - — - —
AMBIENT LEVEL - - - - - - -
› rarrow band C.W. detected.

TEST SPECIMEN: Flite-Tronics Co. Static Inverter M/N PC-17,PC-17A
SPECIFICATION: R.T.C.A. Paper 120-61/DO-108, Appendix A

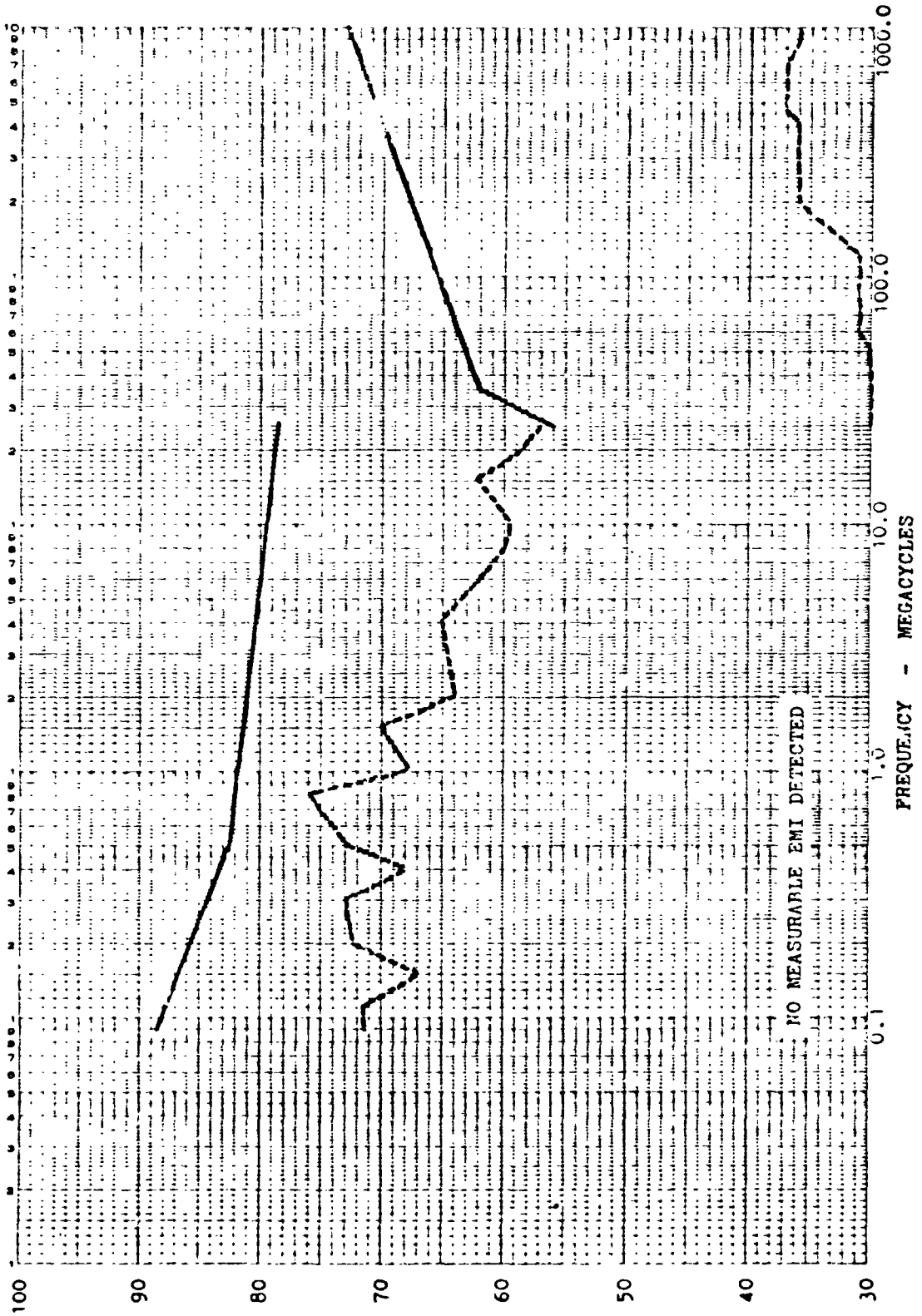


FIGURE 1.2 EMISSION RFI RADIATED

D.B. ABOVE ONE MICROVOLT PER MEGACYCLE A.I.

TEST CONDITION: Broadband Conducted
TEST MODE: Steady State Mode
LEGEND: SPECIFICATION ————
MEASURED LEVEL - - - - - -
AMBIENT LEVEL - - - - - -
o narrow band C.W. detected.

TEST SPECIMEN: Flite-Tronics Co. Static Inverter M/N PC-17,PC-17A
SPECIFICATION: R.T.C.A. Paper 120-61/DO-108, Appendix A

Statement by Test Lab.: Cornell-Dubilier Electronics Division.
Summary of Results for Radiated and Conducted RFI:
The Static Inverter M/N PC-17, S/N C05, was subjected to an electromagnetic interference investigation test program per R.T.C.A. Paper 120-61/DO-108, Appendix A. Upon evaluation of the test data, it was found that the above referenced static inverter generated interference which was below the specification limits of R.T.C.A. Paper 120-61/DO-108, Appendix A.

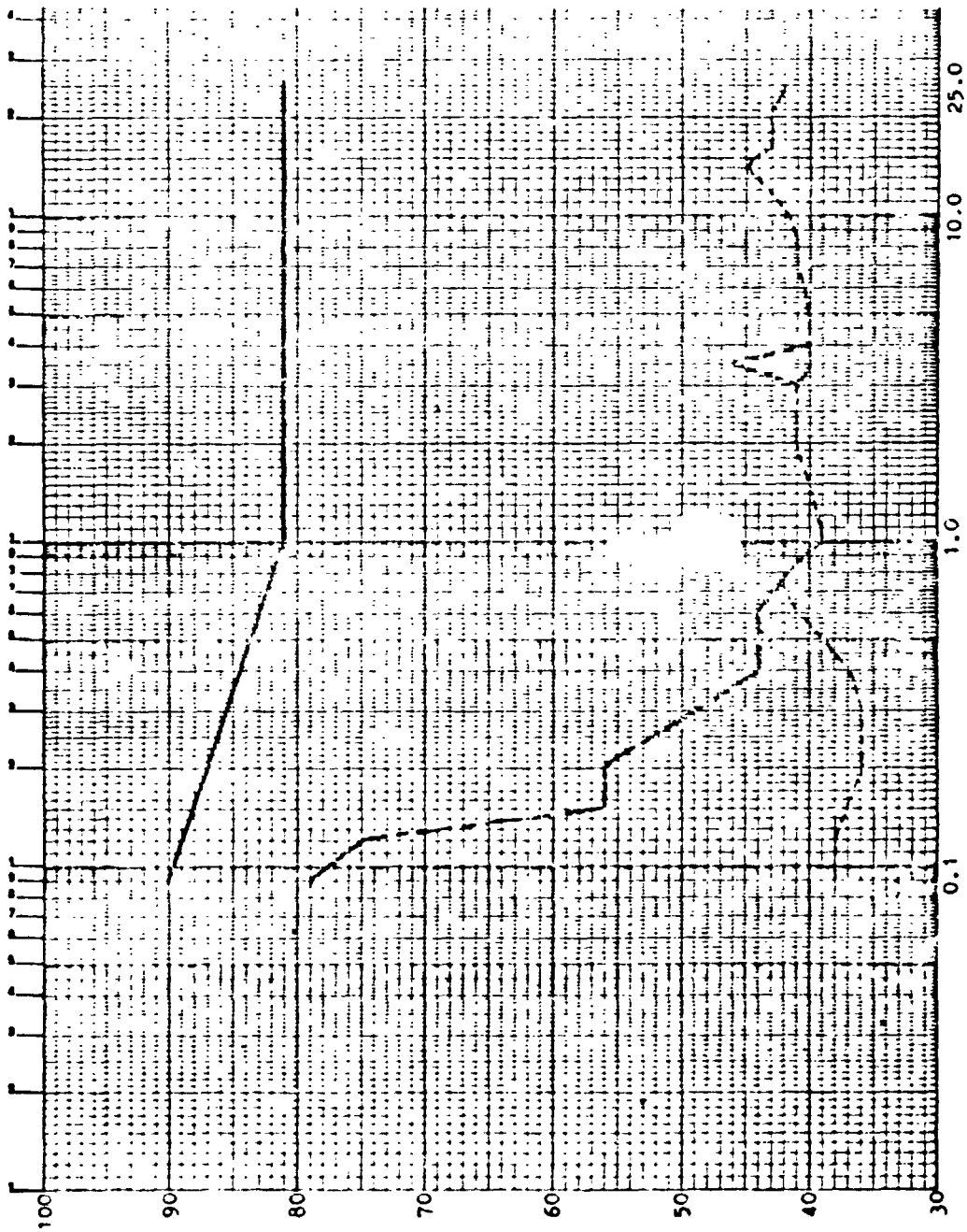
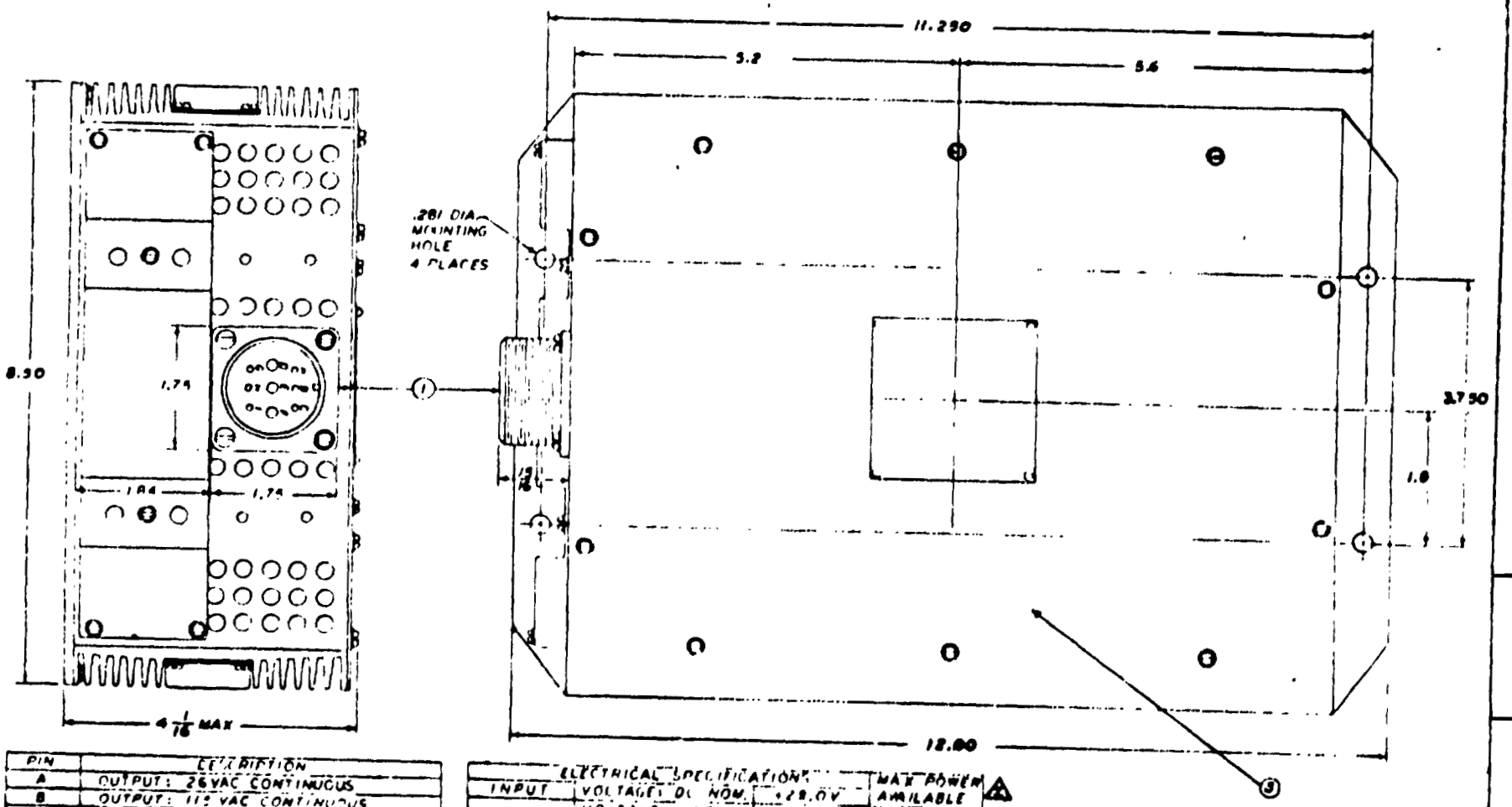


FIGURE 1.3 EMISSION RFI CONDUCTED



PIN	DESCRIPTION
A	OUTPUT: 26VAC CONTINUOUS
B	OUTPUT: 115 VAC CONTINUOUS
C	OUTPUT: COMMON AC RETURN
D	INPUT: +28.0 VDC NOMINAL
E	REMOTE ON-OFF, 4A FUSE LOW SIDE
F	CHASSIS GROUND & INPUT DC RETURN
G	115VAC OUTPUT, AT 20VDC INPUT
H	REMOTE ON-OFF
I	OSCILLATOR SYNC.

ELECTRICAL SPECIFICATIONS			MAX POWER AVAILABLE		
INPUT	VOLTAGE: DC NOM.	+28.0V			
OUTPUT	VOLTAGE: AC	115 V	750	0	600
	VOLTAGE: AC	26 V	0	150	150
	FREQUENCY: HZ	400			
	POWER FACTOR (P.F.)	.8 TO .95			
	PHASE	1			
EFFICIENCY	% AT FULL LOAD	70 PLUS			
ALTITUDE	FEET	45,000			
WEIGHT	POUNDS	18.2			

NOTE:
1. FOR SHORT TIME OPERATION WHEN INPUT VOLTAGE IS DOWN AT 20 VDC.
2. TOTAL CONTINUOUS OUTPUT POWER SHOULD NOT EXCEED 750 VA.
3. JUMPER PIN E LH ON MS3106R24-11S FOR NORMAL OPERATION.
4. CONNECT SPST SWITCH BETWEEN PIN E LH FOR REMOTE ON-OFF.
5. SUBSTITUTE FOR ITEM 1 IS MS3102E24-11P AND FOR ITEM 2 IS MS3106E24-11S

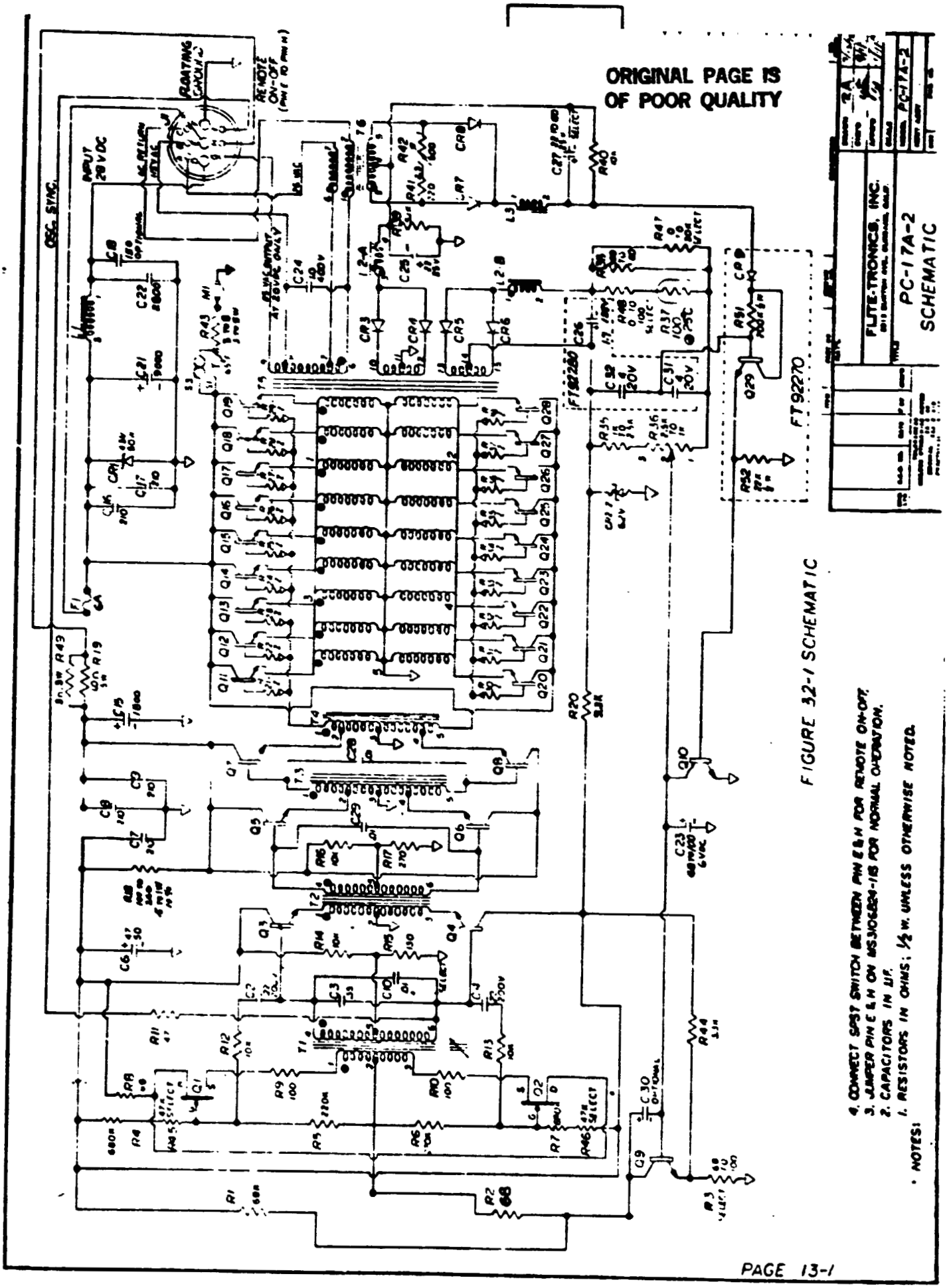
REV	DESCRIPTION	PCB'A MASTER ASSEMBLY	1
		MATING PLUG, 9 PINS	1
		RECEPTACLE, 9 PINS	

FLITE-TRONICS, INC.

INSTALLATION AND MOUNTING DIMENSIONS

PC 17A
STATIC INVERTER
MOUNTING DETAIL

C 925088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FLITE-TRONICS, INC.
PC-17A-2
SCHEMATIC
FT92270
FIGURE 32-1 SCHEMATIC
4. CONNECT SPST SWITCH BETWEEN PIN E & H FOR REMOTE ON-OFF.
3. JUMPER PIN E & H ON MS3106B24-1S FOR NORMAL OPERATION.
2. CAPACITORS IN μF.
1. RESISTORS IN OHMS; ½ W. UNLESS OTHERWISE NOTED.
NOTES:
PAGE 13-1

Gould, Inc. (57187)

Accelerometer, Strain Gage, 05g	A69TC-05-350
Accelerometer, Strain Gage 10g	A69TC-10-350
Accelerometer, Strain Gage, 25g	A69RC-25-350
Transducer, Air Pressure	PM6TC-2.5-350
Transducer, Oil Pressure	PL722TC-150-350
Transducer, Oil Pressure	PL722TC-5M-350
Transducer, Pressure Sampling Switch	PM131TC-2.5-350

Thin Film Strain Gage Pressure Transduc
Model PA82

DESCRIPTION

The Gould Statham Model PA822 Transducer is the culmination of extensive research and development in thin film strain gage techniques. The sensing element of the Model PA822 utilizes a vacuum-deposited, fully active strain gage bridge.

The diaphragm of the Model PA822 is constructed from 15-5 PH, 17-4 PH, and 17-7 PH types stainless steel, used either singly or in combination.

The sensing element consists of a beam-diaphragm assembly with the thin film strain gage bridge circuit located on the bending beam. A ceramic material is deposited on the beam to provide electrical insulation for the bridge elements. The four strain gages are vacuum-deposited onto the insulator material and connected electrically into a bridge circuit. The strain gage material has the stability, gage factor and resistance characteristics required in a high reliability strain gage transducer.

SPECIFICATIONS

Model Designation, Typical Pressure Ranges, Natural Frequency, and Static Acceleration Response: (The acceleration response quoted represents the output of the transducer due to stimulus applied in the sensitive axis, including vibration at frequencies up to approximately 20% of the natural frequency. Above this frequency, the response will increase in accordance with the behavior of an undamped single-degree-of-freedom system.)

Model Designation	Range		Approximate Natural Frequency (Hz)	Static Response (%FS/g)
	psia	(pascal)		
PA822-15	0-15	(103 k)	3,000	0.06
PA822-25	0-25	(172 k)	3,500	0.05
PA822-50	0-50	(345 k)	5,000	0.03
PA822-100	0-100	(690 k)	9,000	0.01
PA822-200	0-200	(1.38 M)	11,000	0.01
PA822-500	0-500	(3.45 M)	15,000	0.01
PA822-1M	0-1000	(6.9 M)	20,000	0.01
PA822-2M	0-2000	(13.8 M)	23,000	0.01
PA822-5M	0-5000	(34.5 M)	28,000	0.01

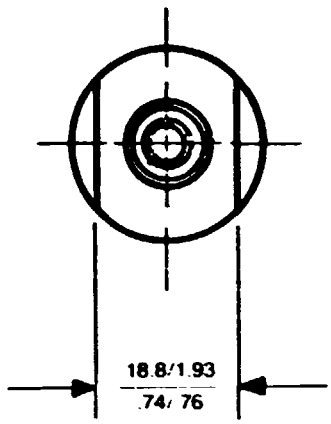
SPECIFICATION NO. 16653 REVISION 1-1/76

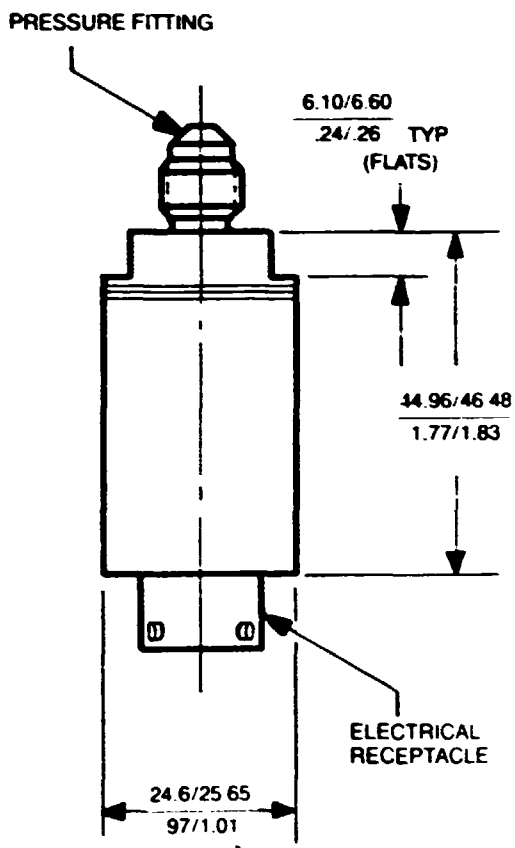
MODEL PA822

Maximum overload	200% of rated range through 500 psi range, 150% for 500 psi and above
[illegible]ire media	Fluids compatible with types 15-5 PH, 17-4 PH, and 17-7 PH stainless steel
Transduction	Resistive, balanced, fully active strain gage bridge
Nominal bridge resistance	350 ohms
Excitation	10V DC or AC (rms) through carrier frequencies
Full-scale output (open circuit)	3 mV/V nominal
Resolution	Infinitesimal
Nonlinearity	Less than ±0.3% FS (terminal)
Hysteresis	Less than 0.1% FS
Zero balance	Less than ±2% FS
Temperature range	−65° to +250°F (−54° to +121°C)
Thermal sensitivity shift	Less than 0.005%/°F
Thermal zero shift	Less than 0.005% FS/°F
Pressure connection	7/16-20 external fitting per MS 33656-E4
Electrical connection	Case-mounted electrical receptacle to mate with Bendix PT06-10-6S
Weight	Approximately 4.5 oz (125 grams)
Identification	The model, serial number, range, maximum excitation, and manufacturer are engraved on each unit.
Dimensions	Outline Drawing No. 27106 applies
Calibration	Gould Statham pressure transducers are calibrated individually by qualified technicians using specialized equipment of laboratory accuracy. Pertinent data are furnished at time of shipment

OUTLINE DRAWING NO. 27106

DIMENSIONS	min/max in mm / min/max in inches





All correspondence relating to the equipment described herein must reference this Specification Number 16653.

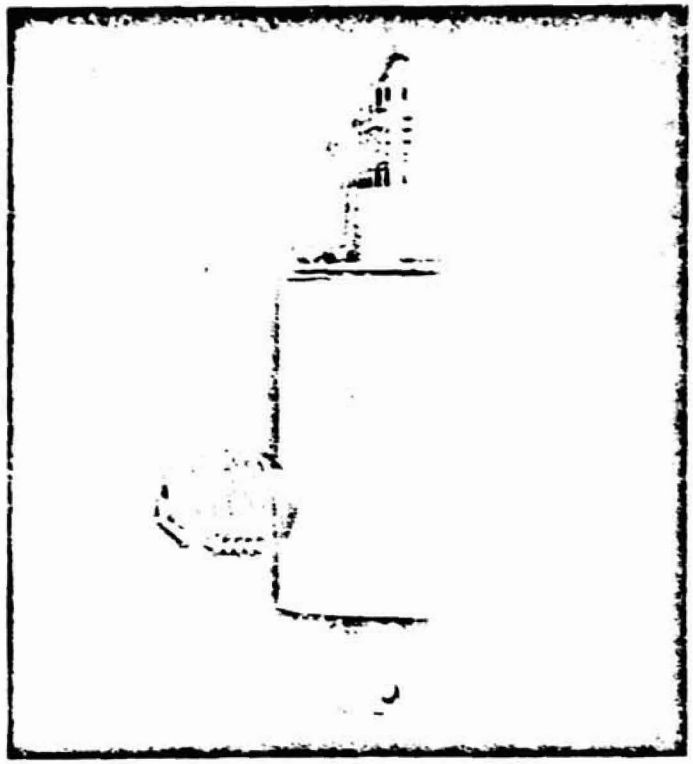
For special ranges, higher accuracies, or other modifications to parameters, please contact the factory or our sales office in your area.

Gould Inc. Measurement Systems Division
2230 Statham Boulevard, Oxnard, California 93030
Telephone (805) 487-85[illegible] Telex 6[illegible]9223

Europe
Gould Godart B.V.
P.O. Box 73, 3720 AB Bilthoven, The Netherlands
Telephone (030) 78711 Telex 47131 PULMO NL

GOULD

Thin Film Strain Gage Differential Pressure Transducer Model PL822



DESCRIPTION

The Model PL822 Differential Transducer represents the culmination of several years of extensive research and development in thin film strain gage techniques. The sensing element of the model PL822 utilizes a vacuum-deposited, fully active strain gage bridge.

The diaphragm of the Model PL822 is constructed from 15-5 PH, 17-4 PH, and 17-7 PH types stainless steel, used either singly or in combination.

A ceramic film is deposited on the sensing element to provide electrical insulation for the bridge elements. Four strain gages are vacuum-deposited onto the insulator and are electrically connected into a bridge circuit. The specially developed strain gage material exhibits the excellent stability, gage factor, and resistance characteristics required in a strain gage transducer.

SPECIFICATIONS

Model Designation, Typical Pressure Ranges, Natural Frequency, and Static Acceleration Response (The acceleration response quoted represents the output of the transducer due to stimulus applied in the sensitive axis, including vibration at frequencies up to approximately 20% of the natural frequency. Above this frequency, the response will increase in accordance with the behavior of an undamped single-degree-of-freedom system.)

Model Designation	Range (psid)	Approximate Natural Frequency (Hz)	Static Response (%FS/g)
PL822-15	0-15	3,000	0.06
PL822-25	0-25	3,500	0.05
PL822-35	0-35	4,000	0.04
PL822-50	0-50	5,000	0.03
PL822-100	0-100	9,000	0.01
PL822-200	0-200	11,000	0.01
PL822-500	0-500	15,000	0.01
PL822-1M	0-1000	20,000	0.01
PL822-2M	0-2000	23,000	0.01
PL822-5M	0-5000	28,000	0.01

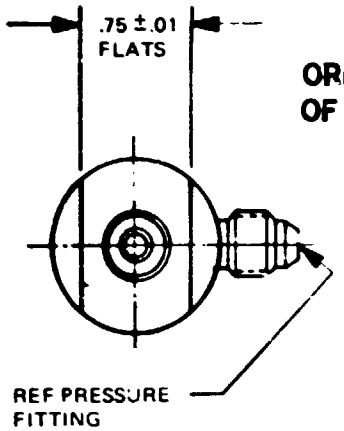
SPECIFICATION NO. 17653 REVISION 1-1/76

GOULD

MODEL PL822 SPECIFICATIONS

Maximum overload	200% of rated range
Positive pressure media	Fluids compatible with types 15-5 PH, 17-4 PH, and 17-7 PH stainless steel
Reference pressure media	Dry, non-corrosive gases
Transduction	Resistive, balanced, fully active strain gage bridge
Internal case (line) pressure	1-1000 psia
Nominal bridge resistance	350 ohms
Excitation	10V DC or AC (rms) through carrier frequencies
Full-scale output (open circuit)	3 mV/V nominal
Resolution	Infinitesimal
Non-linearity	±0.3% FS (terminal)
Hysteresis	0.1% FS
Zero balance	±2% FS
Temperature range	−65° to +250°F
Thermal sensitivity shift	0.005%/°F
Thermal zero shift	0.005%FS/°F
Pressure connections	7/16-20 external fitting per MS33656 E4 positive port; MS33656-G4 reference port
Electrical connection	Case-mounted electrical receptacle to mate with Bendix PT06-10-6S
Weight	Approximately 4.5 oz
Identification	The model designation, serial number, range, maximum excitation, and manufacturer are engraved on each unit.
Dimensions	Outline Drawing No. 51547 shall apply.
Calibration	Gould Statham pressure transducers are calibrated individually by qualified technicians using specialized equipment of laboratory accuracy. Pertinent data will be furnished at time of shipment.

OUTLINE DRAWING NO. 51547



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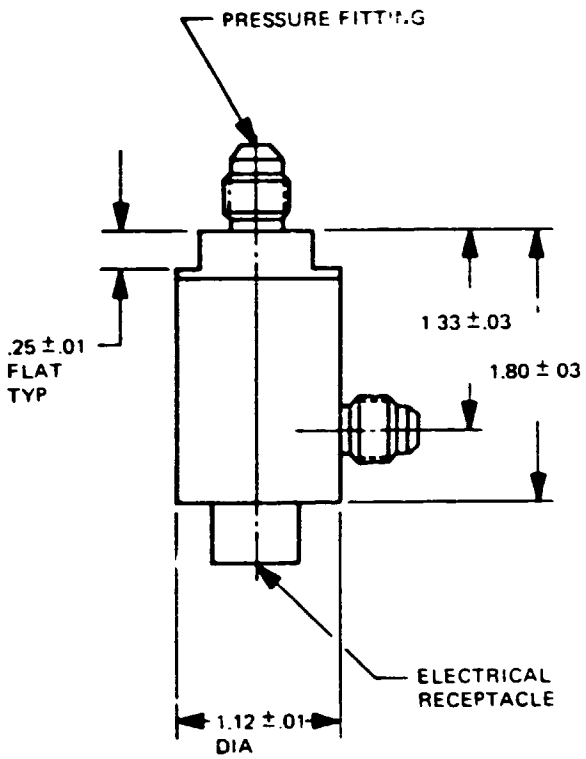


All correspondence relating to the equipment described herein must reference this Specification Number 17653.

For special ranges, higher accuracies, or other modifications to parameters, please contact the factory or our sales office in your area.

Gould Inc., Measurement Systems Division
2230 Statham Boulevard Oxnard, California 93030
Telephone (805) 487 8511 Telex 65 9223

Europe
Gould Godart BV
Jan van Eycklaan 2, Bilthoven 2660, Holland
Telephone (030) 787811
Telex 47131 PULMO NL

Bulletin TP 0013 3 77 Printed in USA

GOULD

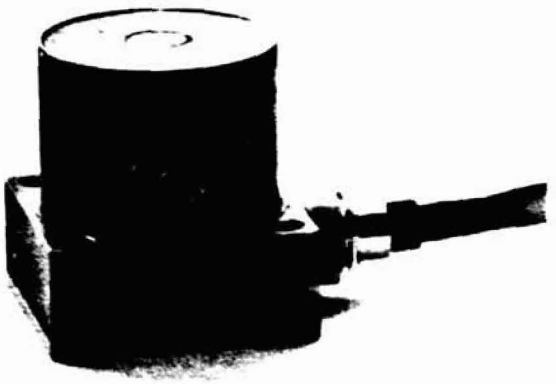
Unbonded Strain Gage Linear Accelerometer Temperature-Compensated, Model A69TC

DESCRIPTION

The Gould Statham Model A69TC Linear Accelerometer incorporates an unbonded, balanced, fully active strain gage bridge. The instrument has proven its reliability during many years of dependable operation.

A viscous liquid is used to damp Model A69TC at 0.7 (±0.1) of critical at room temperature. Outstanding features of this unit are its rugged construction, low response to transverse acceleration, temperature compensation, high natural frequency, and its ability to withstand high static overloads.

For acceleration ranges above 100g the frequency response at room temperature is defined as flat (±5%) to 0.35 natural frequency, in lieu of the requirement for 0.7 (±0.1) of critical damping at room temperature.



SPECIFICATIONS

Model Designation, Range, Approximate Natural Frequency, and Static Overload

Model Designation	Range (g)	Approximate Natural Frequency (Hz)	Static Overload (g)
A69TC-5-350	±5	375	±100
A69TC-10-350	±10	500	±100
A69TC-15-350	±15	700	±100
A69TC-25-350	±25	900	±200
A69TC-50-350	±50	1,300	±250
A69TC-100-350	±100	1,800	±500
A69TC-150-350	±150	2,100	±600
A69TC-250-350	±250	2,800	±750
A69TC-500-350	±500	3,800	±1,000

SPECIFICATION NO. 15299 REVISION 2-8/76

GOULD

MODEL A69TC

Direction of sensitivity	Perpendicular to mounting base
Transduction	Resistive, balanced, unbonded, fully active strain gage bridge
Nominal bridge resistance	350 ohms
Excitation	5V DC or AC (rms) through carrier frequencies
Full-scale output	±4 mV/V nominal
Resolution	Infinitesimal
Non-linearity and hysteresis	±0.75%FS
Temperature range	−65° to +250°F −54° to 121°C
Thermal sensitivity shift	Less than 0.01%/°F
Thermal zero shift	Less than 0.01%FS/°F
Transverse acceleration response	Less than 0.01 g/g
Weight	Approximately 3 oz. (85 grams)
Electrical connection	2-foot, 4-conductor cable with connector and mate
Identification	The model designation, range, serial number, maximum excitation, direction of sensitivity, and manufacturer are engraved on each unit
Calibration	Gould Accelerometers are calibrated individually by qualified technicians using specialized equipment of laboratory accuracy Pertinent performance data are furnished at time of shipment

All correspondence relating to the equipment described herein must reference this Specification Number 15299

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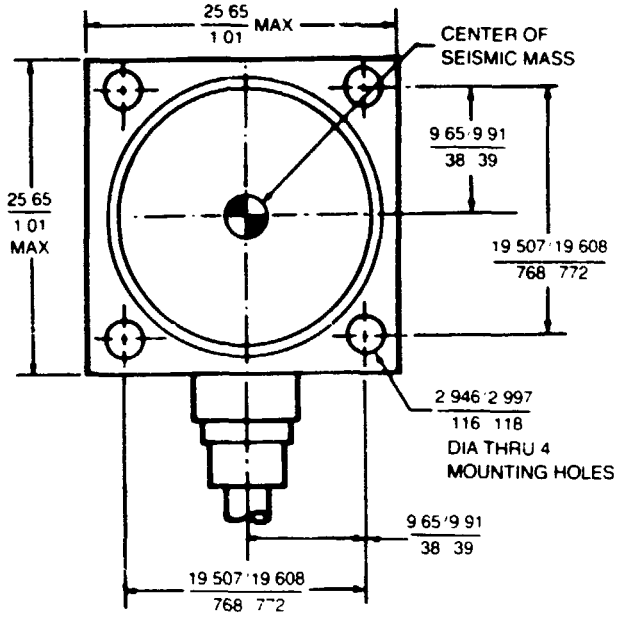
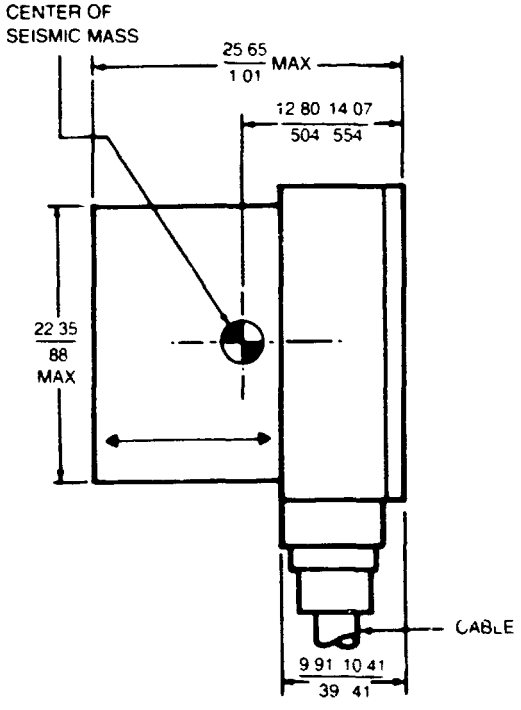
OUTLINE DRAWING NO. 20394

DIMENSIONS: min/max in mm / min/max in inches





Note: Arrow indicates direction of sensitivity

Gould Inc. Measurement Systems Division
2230 Statham Boulevard, Oxnard, California 93030
Telephone (805) 487 8511 Telex 65 9223

Europe
Gould Godart BV
Jan Van Eyckiaar 2, Bilthoven 3723BC, Holland
Telephone (030) 787811 Telex 47131 PULMO NL

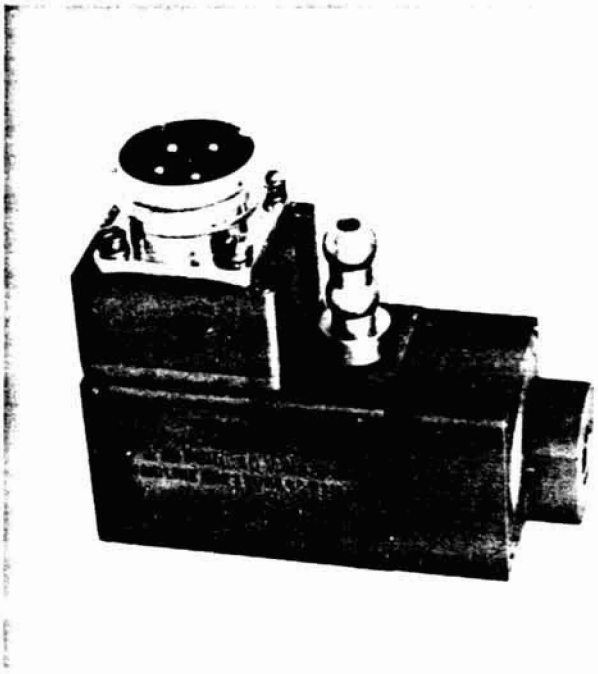
GOULD

Bulletin AC20064 3/78 Printed in USA

Differential Pressure Transducer Model PM6TC

DESCRIPTION

The Gould Statham Model PM6TC is a bi-directional differential pressure transducer with high-overload capacity. This instrument is designed to operate with non-corrosive fluids or gases at the positive port, and dry, non-corrosive gases at the reference port. It is particularly well suited for intermediate-range applications.



SPECIFICATIONS

Model Designation, Typical Pressure Ranges, Maximum Differential Overload

Model Designation	Range psid	Range (pascal)	Maximum psid	Maximum (pascal)
PM6TC±1-350	±1	(±7 k)	±10	(±69 k)
PM6TC±2.5-350	±2.5	(±17 k)	±10	(±69 k)
PM6TC±5-350	±5	(±34 k)	±15	(±103 k)
PM6TC±10-350	±10	(±69 k)	±25	(±172 k)
PM6TC±15-350	±15	(±103 k)	±30	(±207 k)
PM6TC±25-350	±25	(±172 k)	±50	(±345 k)
PM6TC±50-350	±50	(±345 k)	±100	(±690 k)

SPECIFICATION NO. 15225 REVISION 1

GOULD

MODEL PM6TC

Positive pressure media	Fluids or gases compatible with brass, solder, aluminum
Reference pressure media	Dry, non-corrosive gases
rnal case (line) pressure	1 to 65 psia (7 to 450 kPa Ab)
Transduction	Resistive, balanced, fully active strain gage bridge
Nominal bridge resistance	350Ω
Excitation	10V DC or AC (rms) through carrier frequencies
Full-scale output (open circuit)	±4 mV/V nominal, ±3.5 mV/V for ±0.5 and ±1 psid ranges (±7 kPa D)
Resolution	Infinitesimal
Combined non-linearity and hysteresis	Less than ±0.5%FS
Temperature range	−65° to +250°F (−54 to +121°C)
Thermal sensitivity shift	Less than 0.01%FS/°F (0.02%FS/°C) from −65° to +250°F (−54° to +121°C)
Thermal zero shift	Less than 0.01%FS/°F (0.02%FS/°C) from −65° to +250°F (−54° to +121°C)
Positive pressure connection	1/8-27 NPT, internal
Reference pressure connection	1/4" ID hose fitting (6.3 mm)
Electrical connection	4-pin electrical receptacle and mating Cannon WK4-21C plug, or equivalent
Weight	Approximately 6 oz (170 grams)
Identification	The model designation, serial number, range, maximum excitation, and manufacturer are engraved on each unit
Dimensions	See Outline Drawing Number 4934-6.
Calibration	Gould Statham pressure transducers are calibrated individually by qualified technicians using specialized equipment of laboratory accuracy. Pertinent data are furnished at time of shipment

All correspondence relating to the equipment described herein must reference this Specification Number 15225

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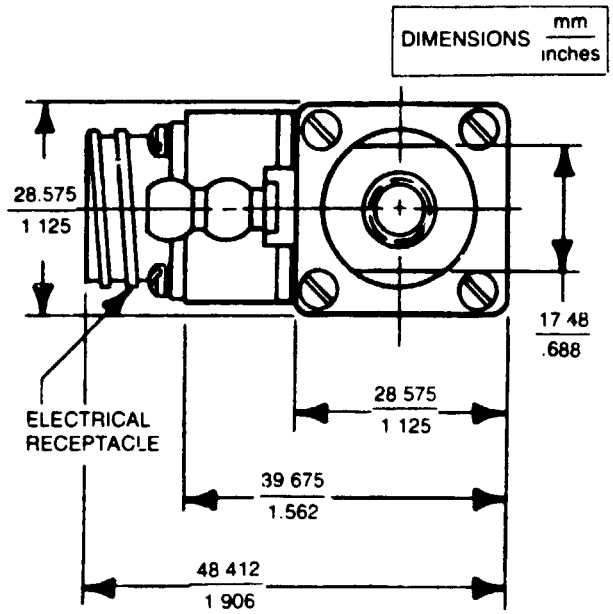
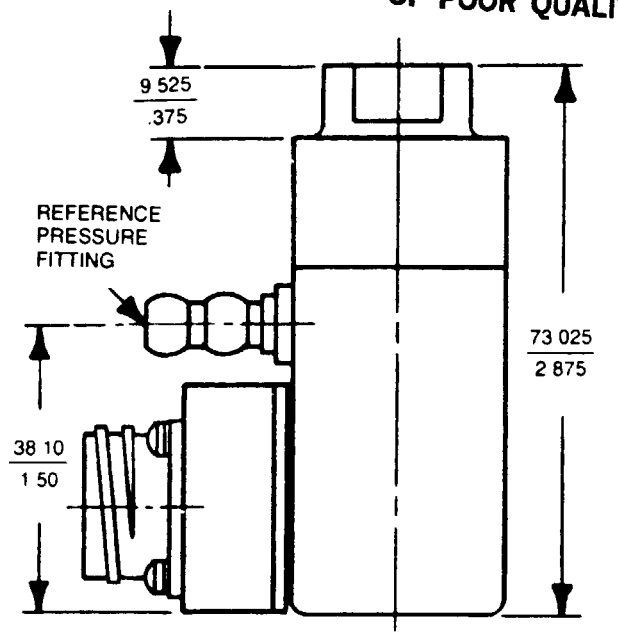
OUTLINE DRAWING NO. 4934-6





Gould Inc. Measurement Systems Division
2230 Statham Boulevard, Oxnard, California 93033
Telephone (805) 487-8511 Telex 65-1922

Europe
Gould Godart BV
Telephone (040) 787811 Telex 47131 PULMO NL

GOULD

Differential Pressure Transducer Model PL732TC

DESCRIPTION

The Gould Statham Model PL732TC Uni-directional Differential Pressure Transducer is designed specifically for use in radiation environments. This rugged instrument, which features totally inorganic construction, will operate continuously at temperatures to +600° F (316° C).

The pressure-sensing element of the Model PL732TC Transducer is a zero-length, unbonded, fully active strain gage bridge. A significant feature in the design of the Model PL732TC is low sensitivity to static and vibratory accelerations.

SPECIFICATIONS

Model Designation, Typical Pressure Ranges, Maximum Differential Overload, Natural Frequency, Static and Dynamic Acceleration Response. (The acceleration response quoted represents the output of the transducer due to stimulus applied in the sensitive axis, including vibration at frequencies to approximately 20% of the natural frequency. Above this frequency, the response will increase in accordance with the behavior of an undamped single-degree-of-freedom system.)

	Range		Maximum		Approximate Natural Frequency (Hz)	Static Response (%FS/g)
Model Designation	**psid**	**(pascal)**	**psid**	**(pascal)**		
PL732TC-2.5-350	0 - 2.5	(17 k)	5	(34 k)	2,300	0.15
PL732TC-5-350	0 - 5	(34 k)	10	(69 k)	3,100	0.08
PL732TC-10-350	0 - 10	(69 k)	20	(138 k)	4,400	0.04
PL732TC-15-350	0 - 15	(103 k)	30	(207 k)	5,400	0.03
PL732TC-25-350	0 - 25	(172 k)	50	(345 k)	6,100	0.02
PL732TC-50-350	0 - 50	(345 k)	100	(690 k)	7,500	0.01
PL732TC-100-350	0 - 100	(690 k)	200	(1.72 M)	8,700	0.01
PL732TC-150-350	0 - 150	(1.03 M)	300	(2.07 M)	10,000	0.01
PL732TC-250-350	0 - 250	(1.72 M)	500	(3.45 M)	13,000	0.01
PL732TC-500-350	0 - 500	(3.45 M)	1,000	(6.89 M)	17,000	0.01
PL732TC-1M-350	0 - 1,000	(6.89 M)	2,000	(13.8 M)	23,000	0.01
PL732TC-1.5M-350	0 - 1,500	(10.3 M)	3,000	(20.7 M)	28,000	0.01
PL732TC-2.5M-350	0 - 2,500	(17.2 M)	5,000	(34.5 M)	31,000	0.01
PL732TC-5M-350	0 - 5,000	(34.5 M)	7,500	(51.7 M)	40,000	0.01

SPECIFICATION NO. 14906 REVISION 2-8/77

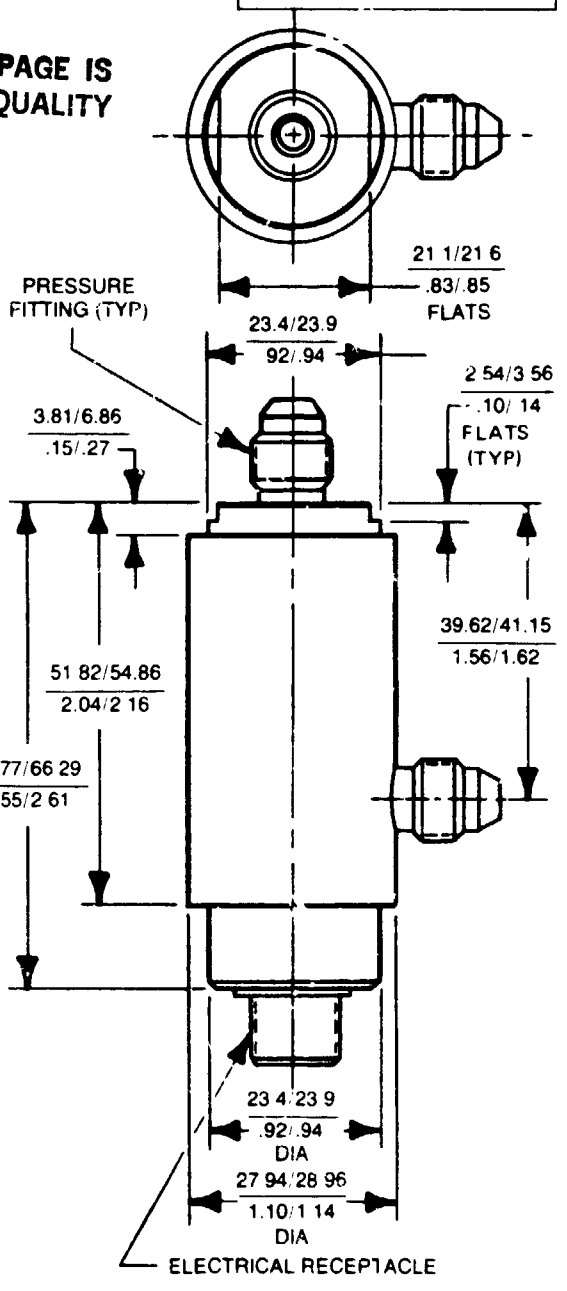
GOULD

MODEL PL732TC

Positive pressure media	Fluids compatible with stainless steel
Reference pressure media	Dry, non-corrosive gases
nal case (line) pressure	1 to 500 psia (7 to 3450 kPa D)
Transduction	Resistive, balanced, fully active strain gage bridge
Nominal bridge resistance	350Ω
Excitation	5V DC or AC (rms) through carrier frequencies
Full-scale output (open circuit)	3 mV/V nominal
Resolution	Infinitesimal
Combined non-linearity and hysteresis	Less than ±0.75%FS
Temperature range	+75° to +600°F (+24° to +316°C)
Thermal sensitivity shift	Less than 0.01%/°F (0.02%/°C) from +75° to +600°F (+24° to +316°C)
Thermal zero shift	Less than 0.01%FS/°F (0 02%FS/°C) from +72° to +600°F (+24° to +316°C)
Positive pressure connection erence pressure connection	7/16-20 UNF-3A external thread per MS33656G4
Electrical connection	Integral case-mounted 4-pin Gould Statham CR60120-8S-4P Receptacle. A 600°F (316°C) mating connector CP60316-8-4S-Rh-CC is available. A Bendix PCO6W-8-4S also mates.
Weight	Approximately 7 oz (198 g)
Identification	The model designation, serial number, range, maximum excitation, and manufacturer are engraved on each unit.
Dimensions	See Outline Drawing Numbe. 20913.
ca bration	Gould Statham pressure transducers are calibrated individually by qualified technicians using specialized equipment of laboratory accuracy Pertinent data are furnished at time of shipment

OUTLINE DRAWING NO. 20913

DIMENSIONS. min/max in mm / min/max in inches



All correspondence relating to the equipment described herein must reference this Specification Number 14906.

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Gould Inc , Measurement Systems Division
2230 Statham Boulevard Oxnard California 93030
Telephone (805) 487 8511 Telex 65 9223

Europe
Gould Godart BV
Jan van Eycklaan 2 Bilthoven 3723BC Holland
Telephone (030) 787811 Telex 47131 PULMO NL

Bulletin DD2019 8 7 Printed in USA

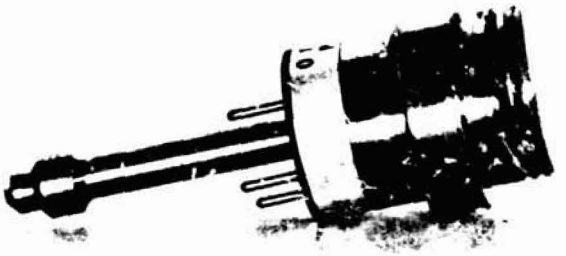
GOULD

Differential Pressure Transducer Model PM131TC

DESCRIPTION

The Gould Statham Model PM131TC Bidirectional Differential Pressure Transducer is a small, lightweight instrument, utilizing an unbonded, fully active strain gage bridge.

The instrument's flush-diaphragm construction permits direct exposure to pressure media, and provides a system response flat to one-fifth the transducer's natural frequency. Either lightweight aluminum or corrosion-resistant steel adapters may be used to convert the Model PM131TC to a cavity-type instrument. Adapters are available in a variety of pipe and tube fittings.



SPECIFICATIONS

Model Designation, Typical Pressure Ranges, Maximum Differential Overload, Natural Frequency, Static and Dynamic Acceleration Response (The acceleration response quoted represents the output of the transducer due to stimulus applied in the sensitive axis, including vibration at frequencies to approximately 20% of the natural frequency. Above this frequency, the response will increase in accordance with the behavior of an undamped single-degree-of-freedom system.)

Model Designation	Range psid	Range (kPa)	Approximate Natural Frequency (Hz)	Static Response (%FS/g)
PM131TC+2.5-350	+2.5	(+17.2)	3,500	0.2
PM131TC+5-350	+5	(+34.5)	5,000	0.1
PM131TC+10-350	+10	(+68.9)	7,000	0.05
PM131TC+15-350	+15	(+103)	8,500	0.03
PM131TC+25-350	+25	(+172)	9,000	0.02

SPECIFICATION NO. 16232 REVISION 1-8/76

GOULD

MODEL PM131TC

Maximum overload	±200% of rated range
Positive pressure media	Fluids and gases compatible with stainless steel
Reference pressure media	Dry, non-corrosive gases
Internal case (line) pressure	1 to 65 psia (6.89 to 448 kPa)
Transduction	Resistive, balanced, fully active strain gage bridge
Nominal bridge resistance	350 ohms
Excitation	5V DC or AC (rms) through carrier frequencies
Full scale output (open circuit)	+.5 mV/V nominal
Resolution	Infinitesimal
Combined non-linearity and hysteresis	Less than +0.75% FS
Temperature range	−65° to +250°F (−54° to +121°C)
Thermal sensitivity shift	Less than 0.01%/°F from −65° to +250°F (−54° to +121°C)
Thermal zero shift	Less than 0.01% FS/°F from −65° to +250°F (−54° to +121°C)
Positive pressure connection	Flush diaphragm
Reference pressure connection	1/8" ID hose fitting (3.2 mm)
Electrical connection	4 numbered terminal pins. An electrical disconnect assembly, Model DC-12, is available
Weight	Approximately 0.25 oz (7 grams)
Identification	The model designation, serial number, range, maximum excitation, and manufacturer are engraved on each unit
Dimensions	Outline Drawing No. 25766 applies
Calibration	Gould Statham pressure transducers are calibrated individually by qualified technicians using specialized equipment of laboratory accuracy. Pertinent data are furnished at time of shipment

OUTLINE DRAWING NO. 25766

DIMENSIONS	min/max in mm min/max in inches

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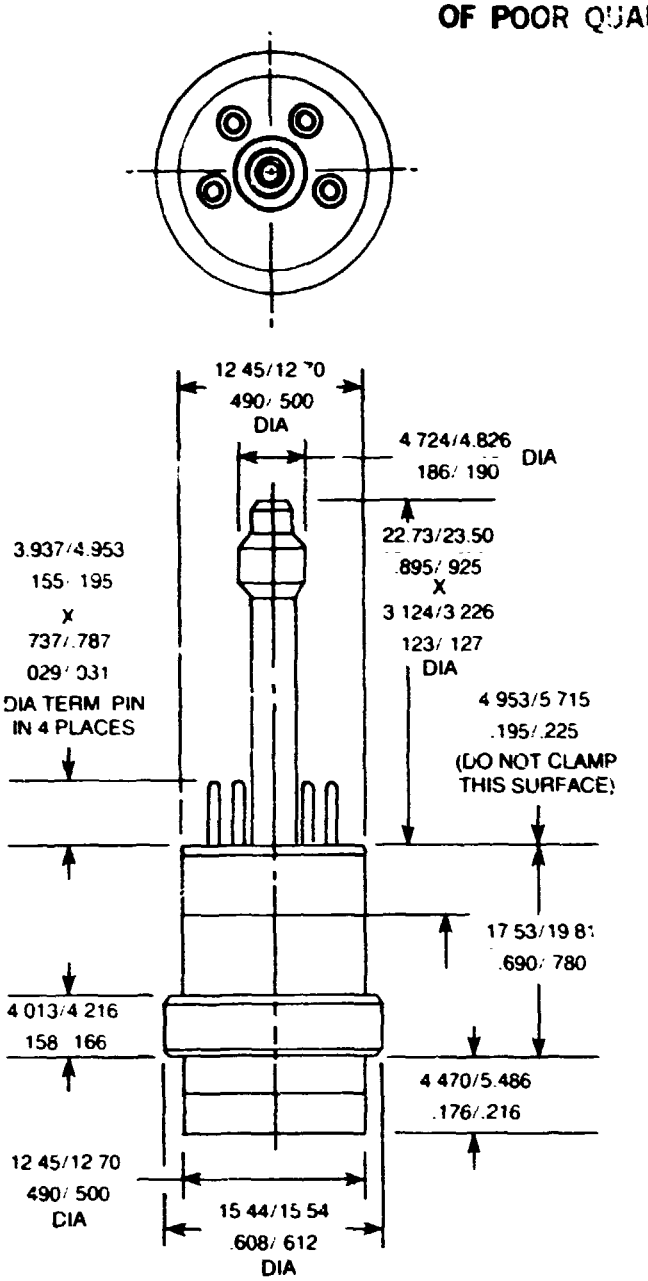

All correspondence relating to the equipment described herein must reference this Specification Number 16232.

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Gould Inc. Measurement Systems Division
2230 Statham Boulevard, Oxnard, California 93030
Telephone (805) 487-8511 Telex 65-9223

Europe
Gould Godart B.V.
P.O. Box 73, 3720 AB Bilthoven, The Netherlands
Telephone (030) 787811 Telex 47131 PULMO NL

GOULD

CFE TECHNICAL DATA

Hewlett-Packard (56296)

Transducer, Displacement	7DCDT-1000

HEWLETT hp PACKARD

DISPLACEMENT TRANSDUCERS

(Strokes from ±0.05" to ±3.0")

series 7DCDT & 24DCDT

TECHNICAL DATA 10/68

DESIGN FEATURES

- *High Resolution*
- *Zero Hysteresis*
- *Linearity Error Less than 0.5%*
- *Built-in Carrier Oscillator*
- *Built-in Phase Sensitive Demodulator*
- *DC Input — DC Output*
- *No Phasing Problems*
- *No Harmonic and Quadrature Null Problems*
- *Easy to Use*

CONDENSED SPECIFICATIONS

TRANSDUCER TYPE: DC-input, DC-output differential transformer with built-in carrier oscillator and phase sensitive demodulator providing DC output proportional to linear displacement.

INPUT: Displacements of ±0.050" to ±3.0" full scale.

OUTPUT: DC voltage amplitude proportional to core (armature) displacement and polarity related to the direction of displacement. Deviation from the best straight line through zero not more than 0.5% of total stroke range.

SENSITIVITY: Series 7DCDT: Full scale outputs from ±1.5 VDC (for ±0.050" stroke range model) to ±5 VDC (for ±3.0" stroke range model). Requires 6 VDC nominal excitation.

Series 24DCDT: Full scale outputs from ±5 VDC (for ±0.050" stroke range model) to ±13.5 VDC for (±3.0" stroke range model). Requires 24 VDC nominal excitation.

SIZE AND WEIGHT: Series 7DCDT: 0.75" diameter x 0.81" long to 0.75" diameter x 10.50" long; 22.6 to 208 grams.

Series 24DCDT: 0.75" diameter x 0.88" long to 0.75" diameter x 10.52" long; 23 to 208 grams.

TYPICAL USES: To measure, monitor, and/or control mechanical displacements where high accuracy and resolution are desired.

Examples: Measurement of strain in structural members; position indication and/or position-feedback in control systems; automatic dimensioning in tape-controlled machine tools; as the sensor in a pressure transducer i.e., Bourdon tube or bellows displacement.

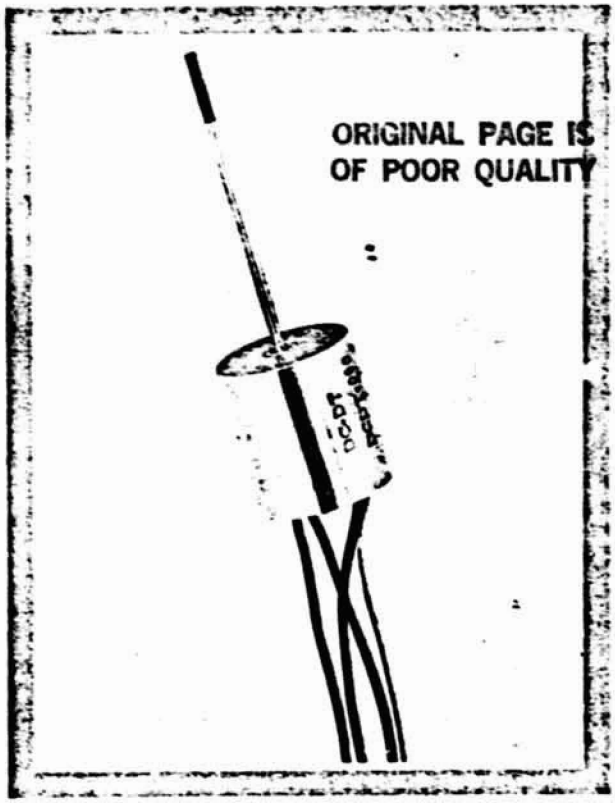


Figure 1. Model 7DCDT-050

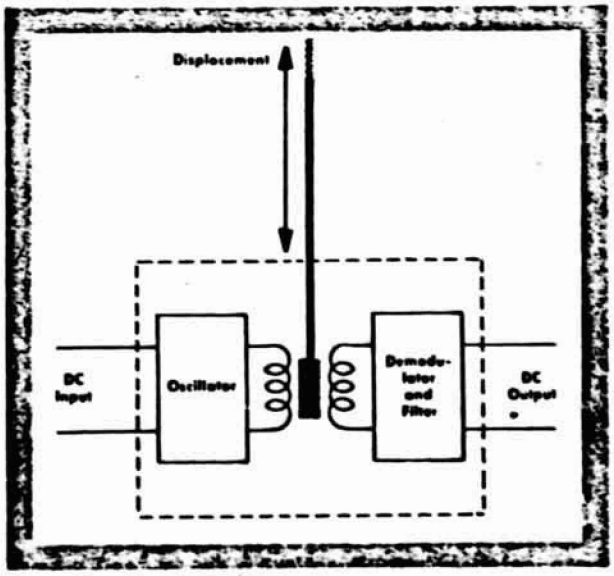


Figure 2. Functional Diagram

DESCRIPTION

The HP 7DCDT and 24DCDT Series of displacement transducers are linear variable differential transformers with built-in 6 or 24-volt DC excited carrier oscillator and phase sensitive demodulator systems. Though small in size, they are ruggedly constructed. They provide the unlimited resolution, high accuracy and sensitivity of HP displacement transducers while eliminating the extra space and cost of complex carrier systems. Input and output circuits are electrically isolated from each other and the coil assembly case, making them usable directly in floating or ground return systems. The DC output is sufficient to drive most standard DC indicators, recorders or control systems. The design of these transducers eliminates the usual phase shift correction and harmonic-and-quadrature null problems associated with differential transformers.

A DCDT consists of a coil assembly and a core which, when displaced linearly along the axis and within the bore of the coil assembly, produces a voltage change in the output proportional to the displacement. Both series of transducers are available in seven stroke ranges. Cores are available with either a 0.001" or 0.013" radial clearance between the coil bore and core OD; and with (1) an integral core extension rod, (2) a tapped hole at each end, or (3) a blind hole at each end.

THEORY OF OPERATION

A DCDT coil assembly consists of a differential transformer coil, a DC-excited solid-state oscillator and a phase-sensitive demodulator all in one small package. The oscillator converts the DC input power to AC which is used to excite the primary winding. The axial core position determines the amount of voltage induced in the secondary windings. Each of the two secondary circuits contains a secondary winding, a full-wave bridge, and an RC filter. These secondary circuits are connected in series opposition so that the resultant output is a DC voltage proportional to the core displacement from electrical center. The polarity of the voltage is a function of the location of the core with respect to electrical center.*

A simplified functional diagram of the transducer is shown in Figure 2.

PERFORMANCE CHARACTERISTICS

The frequencies at which transducer outputs are down 3 db are listed in the specifications on page 4 and are based on test data. Output amplitudes and phase relationships at other frequencies can be approximated from the following equations.

$$\theta = \arctan \frac{f_e}{f_{-3db}}$$

$$A_r = \frac{1}{\sqrt{1 + \left(\frac{f_e}{f_{-3db}}\right)^2}}$$

Where:

θ = phase angle between displacement and electrical output
A_r = amplitude ratio
f_e = displacement frequency
f_{-3db} = displacement frequency where the DCDT output is down 3 db

**Electrical center is the position of the core relative to the coil when the output is zero and is located approximately ½ way along the coil length*

If less ripple is desired, additional external filtering may be added, but a consequent loss of frequency response should be expected. If, on the other hand, better frequency response is desired, DCDTs with networks having shorter time constants can be supplied on special order. Then, if the ripple is excessive, the user can add an external network with sharper cut-off characteristics than those ordinarily supplied as an integral part of the transducer. The sensitivity specifications listed on page 4 are derived from tests taken with the transducers operating into an infinite impedance. For other values of load impedances, the output impedance of the DCDT should be taken into consideration. Typical output characteristics are shown in Figure 3.

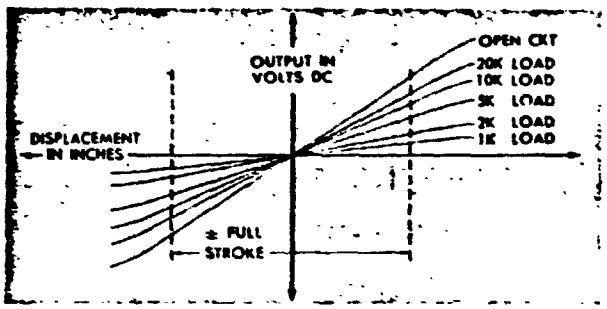


Figure 3. Typical Output Characteristics

To realize the guaranteed linearity of 0.5% of full scale, the load impedance should not be less than 10,000 ohms. Load impedances less than 10,000 ohms may be used, but the linearity range of the transducer will be reduced. The resolution capability of DCDTs is theoretically infinite, being limited only by the read-out device. If a Model 7DCDT-050 is used with an HP recording system having a Model 350-1000 DC coupling preamplifier, the sensitivity of the system will be a 30 division stylus deflection for a 0.001 inch displacement of the transducer core. If connected to a portable HP single channel Model 299 recorder, the maximum sensitivity would be a three division stylus deflection for a 0.001 inch displacement of the transducer core.

Nominal excitation is 6 VDC, 20 milliamps for the 7DCDT Series and 24 VDC, 38 milliamps for the 24DCDT Series. These values are the basis for the listed specifications. The excitation voltage range for 7DCDTs is 5 to 7 VDC and 20 to 28 VDC for 24DCDTs. The scale factor is a function of the amplitude of the excitation voltage. The percentage change in scale factor as a function of the excitation voltage will not exceed the percentage change of the excitation voltage.

APPLICATION CONSIDERATIONS

The 7DCDT and 24DCDT Series have identical stroke ranges. 24DCDTs have sensitivities that are approximately three times those of comparable 7DCDT models. The power consumption of a 7DCDT is approximately 120 milliwatts; 24DCDT, approximately 900 milliwatts. 24DCDT models can be used in temperature environments up to 250°F, whereas 7DCDT models must not be subjected to temperatures greater than 140°F. When selecting a DCDT, the maximum peak-to-peak displacement to be measured, the operating temperature range and the full scale sensitivity of the associated [illegible] equipment should be considered.

INSTALLATION AND OPERATION

DCDTs are easily installed. The core should be connected to the moving member and the coil mounted to a mechanical reference point in a device such as a HP 14072A Mounting Block, tubular clamp or similar fixture. The mounting setup should have provisions for adjusting both the radial and axial alignment between the coil and the core. Connection to the moving member is accomplished by coupling the moving member to the threaded connecting rod (standard models) or to the core by means of an extension rod 14073A or 14073B, see back page. The extension rod can either be threaded or cemented to the core, (using LOCTITE Sealant, Grade A), depending on the core type. The mounting hardware should be made of non-magnetic materials such as brass or 303 stainless steel.

Two different diameter cores are available; the 0.120-inch diameter core makes a sliding fit when inserted into the coil so that the coil may be used as a supporting bearing. In some applications, particularly where a line has already been established by two or more points, the lack of clearance when using the 0.120-inch diameter core may make it difficult to align the core with the coil bore. In this case, the 0.098-inch diameter core is recommended as it will provide 0.026-inch diametrical clearance between the coil ID and the core OD. After the transducer has been installed, the core and coil should be adjusted for radial alignment and then zeroed.

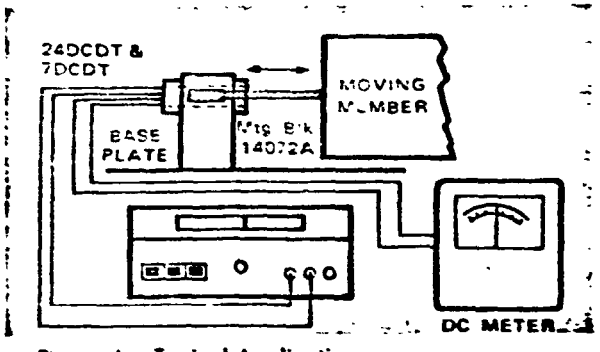


Figure 4. Typical Application

TYPICAL APPLICATIONS

Figure 4 shows an application which includes a Harrison Laboratories Model 6204B power supply connected to the transducer excitation terminals (red lead to +, black lead to −)* and a zero-centered meter connected to the output terminals.

The moving member (and consequently the transducer core) is first placed at mid-travel which is mechanical zero. The coil or the core is then adjusted axially until the meter reads zero. The core will then be axially positioned approximately in the center of the coil. No additional balancing, phasing, quadrature rejection or other usual adjustments for differential transformers are required.

The combination of an HP DCDT and LVsyn (linear velocity transducer) is often used in servo linear positioning systems. An example is a hydraulic

Proper excitation polarity must be observed. Reversal of excitation leads will burn out the primary circuits

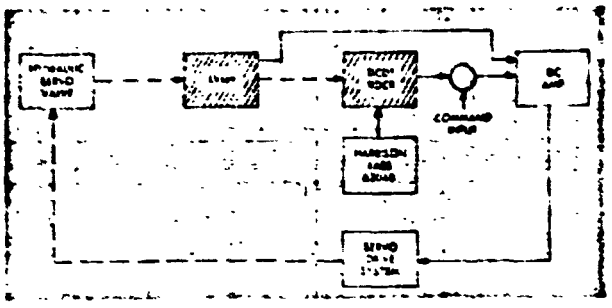


Figure 5. HP transducers as sensing devices in a closed-loop servo system

servo control system shown in Figure 5. The DCDT provides spool position feedback and the LVsyn, spool velocity feedback for servo stability. Another example is the use of a DCDT and LVsyn combination in a counter-measure system to provide linear position and velocity feedback in the magnetron magnet servo positioning system. (A separate data sheet describing HP LVsyns is available on request.)

CONNECTORS AND ACCESSORIES

All DCDTs are supplied with 18" long #22 AWG teflon insulated leads.

DCDTs should be energized by a low impedance 6 or 24 VDC power supply, which has regulation of at least 0.1%, such as Harrison Labs Model 6204B Power Supply (see Figure 6). This Power Supply features low ripple and noise and freedom from drift. The supply automatically regulates with respect to either the front or rear terminals, according to where the load is attached. The 6204B has sufficient power to drive several 7DCDTs or 24DCDTs.

HP mounting block, core extension rods and extension rod coupler accessories for DCDTs are described and illustrated on page 4.

ASSOCIATED READOUT INSTRUMENTS

For maximum simplicity and economy, the output of DCDTs can be fed directly to a DC voltmeter which will give a voltage indication proportional to displacement. The signal may also be fed to signal conditioning equipment, for recording and/or control, such as: HP single, dual, 4, 6, or 8-channel recording systems; HP Model 405 Automatic Digital Voltmeter; Dymec Model 2401B Integrating Digital Voltmeter; Moseley Autograf high input impedance X-Y Plotters; etc.

For a comprehensive review of the many combinations of Hewlett-Packard and other instrumentation available for use with HP transducers, consult your nearest Hewlett-Packard field office.

Figure 6. Model 6204B
Harrison Laboratories Power Supply

SPECIFICATIONS FOR MODELS 7/24DCDT

MODEL	7DCDT-050	7DCDT-100	7DCDT-250	7DCDT-500	7DCDT-1000	7DCDT-3000	24DCDT-050	24DCDT-100	24DCDT-250	24DCDT-500	24DCDT-1000	24DCDT-3000
Full Scale Output (VDC)	1.5	2.8	1.5	3.3	4.8	5.0	5.0	9.0	7.0	12.5	18.0	13.0
Displacement Range Full Scale (inches)	±.050	±.100	±.250	±.500	±1.000	±3.000	±.050	±.100	±.250	±.500	±1.000	±3.000
Scale Factor v/in	30	28	6.0	6.6	4.8	1.4	100	90	28	25	18.0	4.3
Maximum Non-Linearity (% of full scale)	±0.5	±0.5	±0.5	±0.5	±0.5	±0.5	±0.5	±0.5	±0.5	±0.5	±0.5	±0.5
*Excitation Voltage (Volts DC), Nominal	6	6	6	6	6	6	24	24	24	24	24	24
Internal Carrier Freq. (KC), Nominal	9.0	9.0	1.2	2.4	1.5	1.0	14	15	4.0	3.8	3.6	1.6
% Ripple (RMS), Nominal	0.7	0.7	2.2	1.2	1.5	3.0	0.6	0.7	0.85	0.75	0.8	1.5
Output Impedance (K ohms)	2.2	3.0	5.0	5.3	5.5	5.0	2.5	3.5	5.2	5.5	5.6	5.6
Freq. Response 3 db Down at CPS	350	170	120	135	114	100	300	140	115	110	100	75
Temperature Range	—65°F to 140°F						—65°F to 250°F					
Weight (Grams) Typical Coil	21	26	64	74	95	200	27.4	33	67	76	98	211
Weight (Grams) Core Assembly	1.6	2.1	3.4	3.8	4.3	8.1	1.6	2.0	3.4	3.8	4.3	8.1

*Series 7DCDT: max excitation voltage 7 VDC, min 5 VDC. Series 24DCDT: max excitation voltage 28 VDC, min 20 VDC.

ORDERING INFORMATION

DCDT DISPLACEMENT TRANSDUCER: Specify the basic model number, e.g., Model 7DCDT-050 for 6-volt excitation and a ±0.050 inch displacement range. If you want this transducer with other than a standard core assembly, select the core configuration desired (see outline drawings) and add the proper suffix to the basic model number, e.g., Model 7DCDT-050-B12. Twenty-four volt operation transducers can be ordered by substituting the prefix (24) for (7) in the above numbers.

ACCESSORIES: Spare cores can be ordered with transducers. These cores are carefully manufactured from selected, heat-treated materials to obtain the desired magnetic properties. When cores are ordered with coil assemblies they are carefully matched to insure transducer operation within rated specifications. Specify the model or part number given in the price list. When ordering cores separately, refer to the outline drawing and select the model number of the desired core style. Then, refer to the price list for the actual part number, e.g., if you want a core for use in a 7DCDT-0-B13 Transducer, order core part number 00007-23085.

PRICES

TRANSDUCERS

7DCDT	-050	$100.00	24DCDT	-050	$145.00
	-100	105.00		-100	150.00
	-250	120.00		-250	165.00
	-500	130.00		-500	175.00
	-1000	140.00		-1000	185.00
	-3000	160.00		-3000	210.00

NOTE: *Prices for 7/24DCDT-X-B11, -B12, -B13, etc., same as for equivalent stroke standard models listed above (where X equals stroke in thousandths).*

POWER SUPPLIES

Harrison Laboratories 6204B $144.00

ACCESSORIES

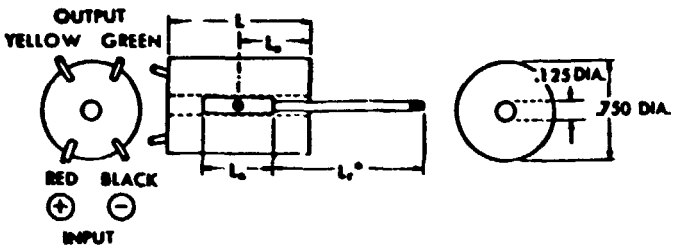
14072A Mtg. Block	$25.00
14073A 7" Extension Rod	4.00
14073B 15" Extension Rod	10.00

REPLACEMENT CORES/CORE ASSEMBLIES

TRANSDUCER	STD	-B11	-B12	-B13	-B14	-B15
7/24DCDT-050	00007-63051 $6.00	00007-63141 $8.50	00595-23019 $7.00	00007-23041 $7.00	00007-23041 $6.00	00007-23071 $6.00
7DCDT-100	00007-63052 $6.00	00007-63142 $8.50	00595-23017 $4.00	00007-23042 $7.00	00007-23042 $6.00	00007-23072 $6.00
24DCDT-100	00007-63057 $8.50	00007-63147 $7.50	00595-23014 $4.00	00007-23047 $7.00	00007-23047 $6.00	00007-23077 $8.50
7/24DCDT-250	00007-63053 $6.00	00007-63143 $7.00	00595-23019 4.00	00007-23043 $7.00	00007-23043 $6.00	00007-23073 $6.00
7/24DCDT-500	00007-63054 $6.50	00007-63144 $8.00	00595-23021 $7.00	00007-23044 $7.00	00007-23044 $6.50	00007-23074 $6.50
7/24DCDT-1000	00007-63055 $6.50	00007-63145 $6.50	00595-23022 $6.50	00007-23045 $7.00	00007-23045 $6.50	00007-23075 $6.50
7/24DCDT-3000	00007-63056 $7.00	00007-63146 $9.00	00595-23023 $7.00	00007-23046 $7.00	00007-23046 $6.50	00007-23076 $6.50

For more information, call your local HP Sales Office or East (201) 265 5000 • Midwest (312) 677 0400 • South (404) 436 6181 West (213) 877 1282. Or, write Hewlett Packard, Waltham Division, 175 Wyman Street, Waltham, Mass. 02154. In Europe, 54 Route Des Acacias, Geneva

TRANSDUCERS



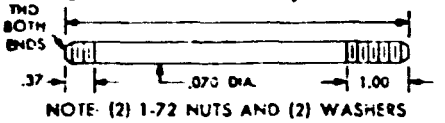
7 DCDT MODELS	L	L_c*	L_r*	L_c
—050	0.81	0.56	1.90	0.33
—100	1.06	0.81	1.90	0.45
—250	3.00	1.75	1.90	1.40
—500	3.50	1.87	2.4	1.65
—1000	4.50	2.00	3.2	2.20
—3000	10.50	3.50	8.4	5.06
* STANDARD CORES				

24 DCDT MODELS	L	L_c*	L_r*	L_c
—050	0.87	0.56	1.90	0.33
—100	1.12	0.75	1.90	0.48
—250	3.21	1.75	1.90	1.40
—500	3.71	1.87	2.4	1.65
—1000	4.71	2.00	3.2	2.20
—3000	10.52	3.50	8.4	5.06
* STANDARD CORES				

CORES

Core Style	Core Style No.	D
.070 DIA 1-72 THD, .37	STD	0.120
	B11	0.098
1-72 THD .187 DP BOTH ENDS	B12	0.098
	B13	0.120
.073 DIA .093 DP BOTH ENDS	B14	0.120
	B15	0.098

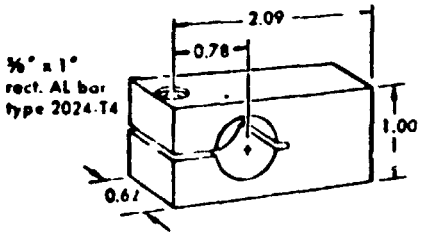
EXTENSION RODS, COUPLER



NOTE: (2) 1-72 NUTS AND (2) WASHERS SUPPLIED WITH EACH ROD

EXTENSION ROD MODEL NO	L
14073A	7.0
14073B	15.0

MOUNTING BLOCK



Mounting Block 14072A

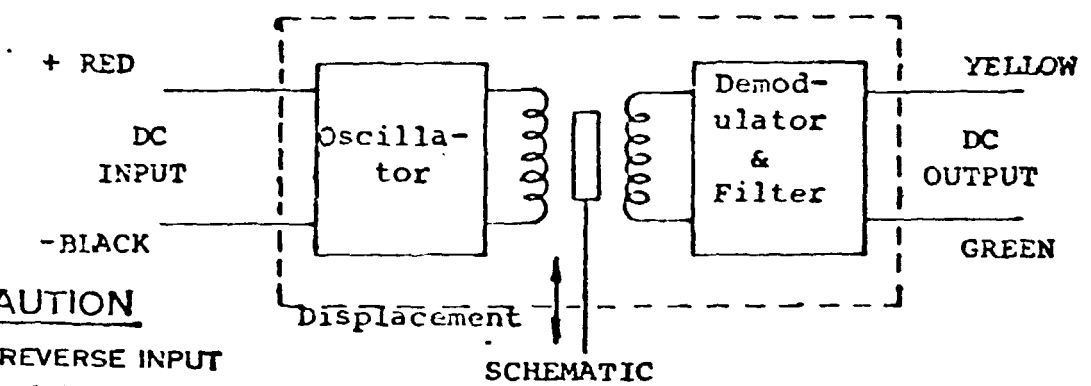
HEWLETT PACKARD
MEDICAL ELECTRONICS DIVISION

DCDT TRANSDUCER CALIBRATION RECORD

MODEL _____ SERIAL NO _____

INPUT VOLTAGE 6 V DC SCALE FACTOR 36 v dc/in

STROKE ± 1/2 in LINEARITY ±.5 % full scale



SCHEMATIC

CAUTION

DO NOT REVERSE INPUT VOLTAGE POLARITY

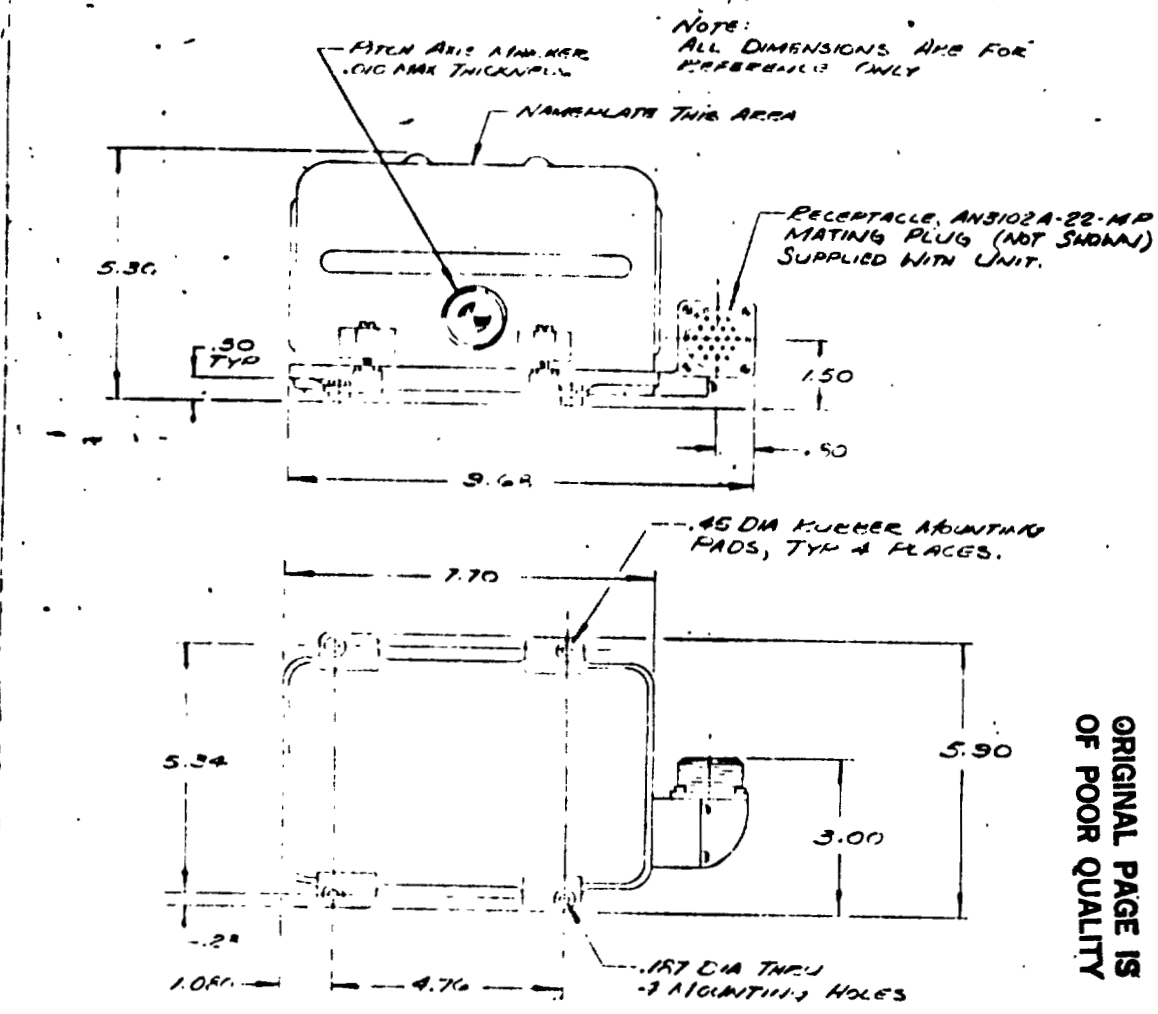
FOR "C1" MODELS SUPPLIED WITH AMPHENOL CONNECTOR NO. 126-195 (SANBORN NO. 10B7-3MW), PIN CONNECTIONS ARE:

	EXCITATION	OUTPUT
7DCDT	B (+), D (-)	A & H
2-4DCDT	B (+), C (-)	A & H

T38-6

Humphrey, Inc. (98284)

Gyro, Attitude VM02-0110-1



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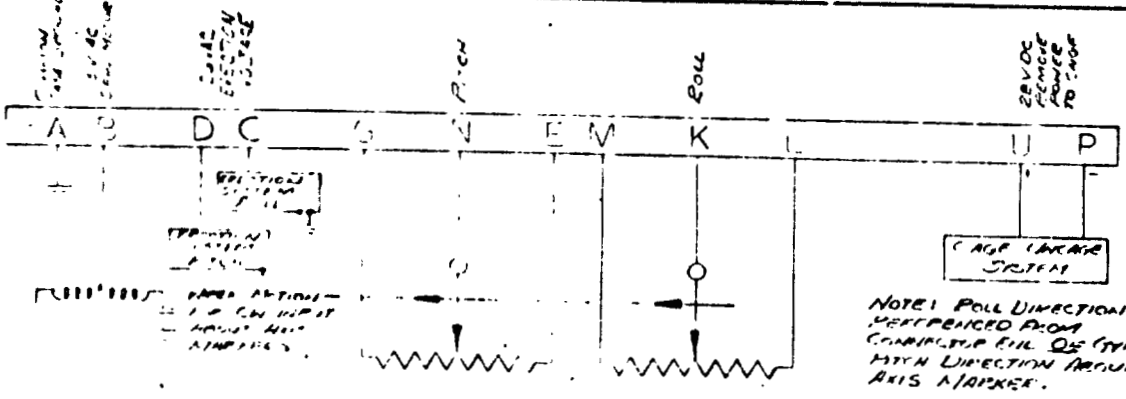

SPECIFICATIONS

1.0	ELECTRICAL CHARACTERISTICS	
1.1	SPIN MOTOR	
1.1.1	VOLTAGE	115 VAC, 400 CPS, SINGLE PHASE
1.1.2	POWER	50 WATTS STARTING, 20 WATTS RUNNING
1.2	CAGING CIRCUIT	
*1.2.1	VOLTAGE	28 VDC
1.2.2	POWER	42 WATTS MAXIMUM
2.0	CAGING TIME	10 SECONDS NOMINAL
*3.0	CAGING ACCURACY	WITHIN 0.5¢ OF ELECTRICAL CENTER
4.0	POTENTIOMETER CHARACTERISTICS	
4.1	ROLL AND PITCH	
*4.1.1	RESISTANCE	5,000 ± 5.0¢ OHMS
4.1.2	RESOLUTION	THEORETICALLY INFINITE (CONDUCTIVE PLASTIC)
4.1.3	POWER DISSIPATION	0.5 WATTS MAXIMUM
*4.1.4	ACTIVE ELEMENT	ROLL ±175° ± 2°, PITCH ±85° ± 2°
4.1.5	LINEARITY	±2.0% OF FULL SCALE
5.0	MECHANICAL FREEDOM	ROLL 360°, PITCH ±67° MINIMUM
*6.0	FREE GYRO DRIFT	0.5°/MINUTE MAXIMUM AVERAGE DRIFT. DRIFT TEST TO BE CONDUCTED ON A SCORSBY TABLE SET AT ±7.5° ROLL, PITCH AND YAW AT RATE OF 6 CPM. SCORSBY TABLE TO BE ON AUTOMATIC REVERSING DURING TEST. GYRO DISPLACEMENT DUE TO EARTH'S ROTATION TO BE CORRECTED FOR, WHEN COMPUTING DRIFT RATE.
7.0	ERECTION MOTORS	
7.1	VOLTAGE	26 VAC, 400 CPS, SINGLE PHASE
7.2	POWER	5.5 WATTS
7.3	ACCURACY	±0.25° OF TRUE VERTICAL
8.0	REMARKS	
8.1	ITEMS MARKED WITH (*) ARE CHECKED ON ORDER BY PRODUCTION TESTS. OTHER ITEMS FOR REFERENCE MAY BE CHECKED ON ORDER BY QUALIFICATION TESTS.	
8.2	THIS INSTRUMENT CONSISTS OF A MINNEAPOLIS HONEYWELL VERTICAL GYRO NUMBER J67044A MODIFIED TO THE ABOVE SPECIFICATIONS.	

Honeywell — ELECTRO MECHANICAL INSTRUMENTS

TITLE: ENVELOPE DRAWING VERTICAL GYROSCOPE

CFE TECHNICAL DATA TO BE ADDED:

MAC Panel (16654)	
Program Board Receiver	929/0109392

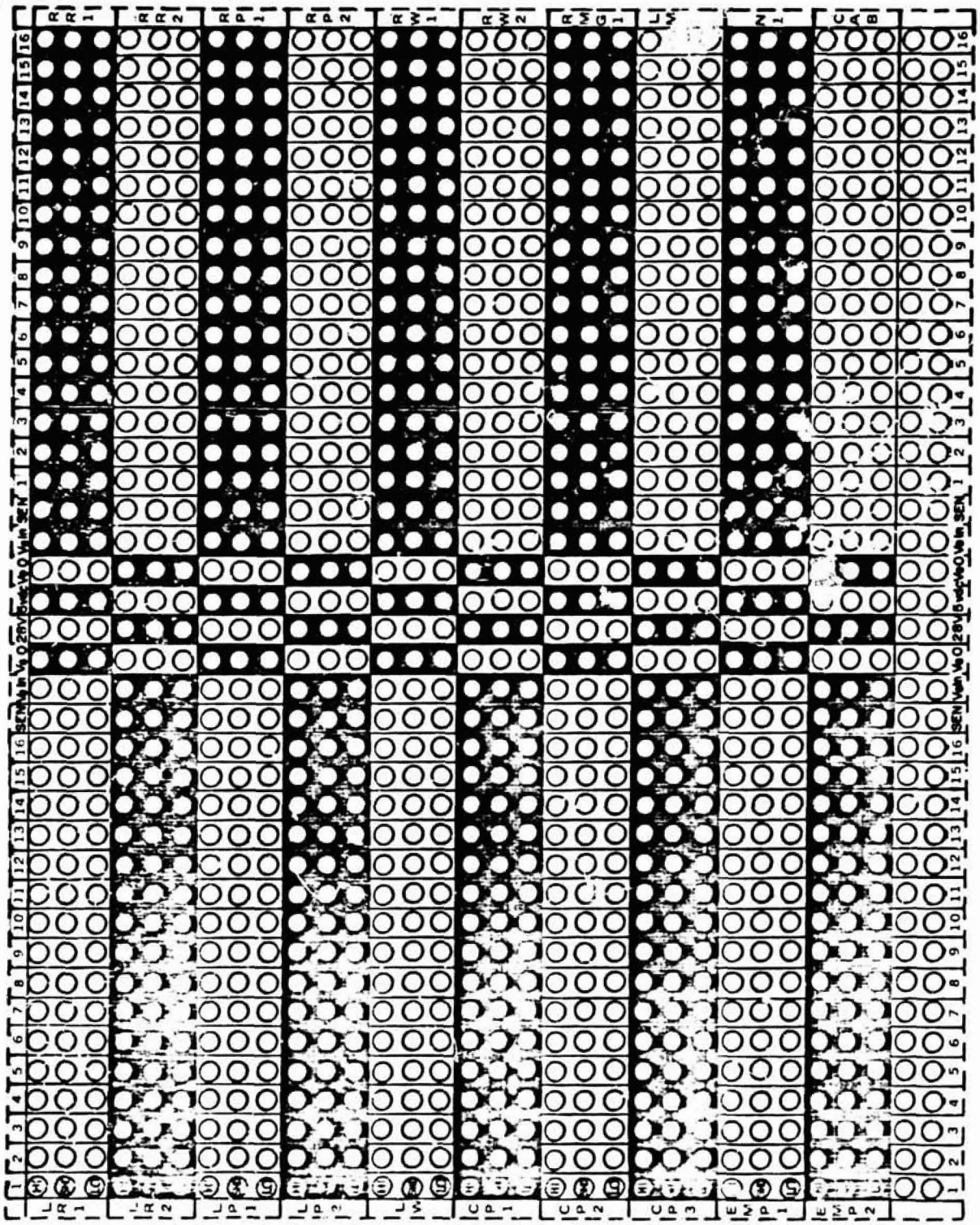

Figure MAC-1. Program Board - Signal Cable.

MAC PANEL RECEIVERS

Model	Contact Format		Insert Material	Contact Plating	Catalog Number			Approximate Dimensions
	H	V			Taper Pin	Tab D-Tent	"Wire-Wrap"	
939	40	64	Phenolic	Nickel	0109391	1109391	2109391	Width .135" Height .220" Thickness .25"
				Gold	0109392	1109392	2109392	
			Diallyl Phthalate	Nickel	0129391	1129391	2129391	
				Gold	0129392	1129392	2129392	

PLUGBOARDS COVERS

Panel Material	Silk Screened Legend	Catalog Number	Approximate Dimensions	Depth	Catalog Number
Phenolic	Blank	0219390	Width 11.2"	1"	0219390
	General Purpose	0219391			
	Special	0219392	Height 18.6"		
Diallyl Phthalate	Blank	0239390		2.5"	0239390
	General Purpose	0239391	Thickness: 1.3"		
	Special	0239392			

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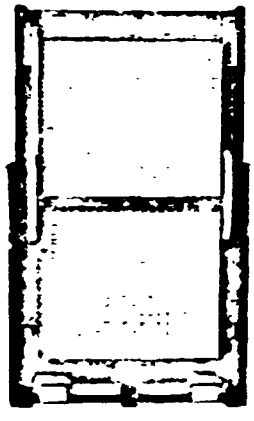
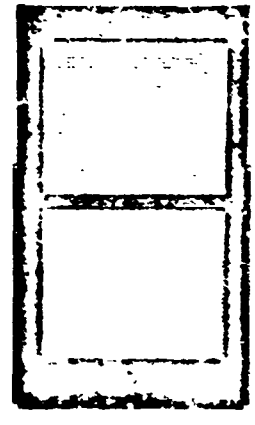


MODEL 939 FRONT

SIDE



BACK

PLUGWIRES

Type	Conductor	Voltage Rating	Insulation	Jacket	Tip Molding	Capacitance	Impedance
Single Conductor Plugwires	#20 AWG	600V RMS	Polyvinyl Chloride Plastic (PVC)		PVC		
Coaxial Plugwires	7 strands of 0.0063"	1500V RMS	Teflon	PVC	PVC	30 mmf/ft.	50Ω
Shielded Twisted Pair Plugwires	#20 AWG	600V RMS	Teflon	PVC	PVC	Conductor to Conductor: 33.3 mmf/ft. Conductor to Shield 56.8 mmf/ft.	Conductor to Conductor: 44.3Ω Conductor to Shield: 27.0Ω
Three Conductor Shielded Plugwires	#24 AWG	600V RMS	PVC	PVC	PVC		
Four Conductor Shielded Plugwires	#24 AWG	1000V RMS	PVC	PVC	PVC		

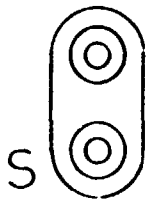
MANUAL SINGLE CONDUCTOR PLUGWIRES

Overall Length	Contact Plating	Catalog Number	Insulation Color
5"	Nickel	5001201	Red
	Gold	5000101	
7"	Nickel	5001202	Gray
	Gold	5000102	
9"	Nickel	5001203	Blue
	Gold	5000103	
11"	Nickel	5001204	Green
	Gold	5000104	
13"	Nickel	5001205	Yellow
	Gold	5000105	
15"	Nickel	5001206	Orange
	Gold	5000106	
19"	Nickel	5001207	Black
	Gold	5000107	
23"	Nickel	5001208	Yellow
	Gold	5000108	
27"	Nickel	5001209	Brown
	Gold	5000109	
35"	Nickel	5001201	Red
	Gold	5000110	
Jack Plug	Nickel	5001300	
	Gold	5000200	

FIXED SINGLE CONDUCTOR PLUGWIRES

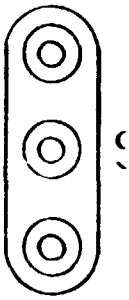
Overall Length	Contact Plating	Catalog Number	Insulation Color
5"	Nickel	5007701	Red
	Gold	5007801	
7"	Nickel	5007702	Gray
	Gold	5007802	
9"	Nickel	5007703	Blue
	Gold	5007803	
11"	Nickel	5007704	Green
	Gold	5007804	
13"	Nickel	5007705	Yellow
	Gold	5007805	
15"	Nickel	5007706	Orange
	Gold	5007806	
19"	Nickel	5007707	Black
	Gold	5007807	
23"	Nickel	5007708	Yellow
	Gold	5007808	
27"	Nickel	5007709	Brown
	Gold	5007809	
35"	Nickel	5007710	Red
	Gold	5007810	

MANUAL SINGLE CONDUCTOR COAXIAL PLUGWIRES



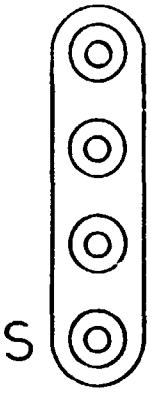
Overall Length	Contact Plating	Catalog Number	Insulation Color
7"	Gold	5000802	Gray
9"	Gold	5000803	Blue
11"	Gold	5000804	Green
13"	Gold	5000805	Yellow
15"	Gold	5000806	Orange
19"	Gold	5000807	Black
23"	Gold	5000808	Yellow
27"	Gold	5000809	Brown
35"	Gold	5000810	Red

MANUAL SHIELDED TWISTED PAIR PLUGWIRES



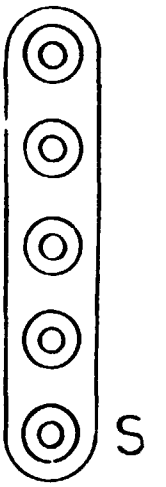
Overall Length	Contact Plating	Catalog Number	Insulation Color
7"	Gold	5000902	Gray
9"	Gold	5000903	Blue
11"	Gold	5000904	Green
13"	Gold	5000905	Yellow
15"	Gold	5000906	Orange
19"	Gold	5000907	Black
23"	Gold	5000908	Yellow
27"	Gold	5000909	Brown
35"	Gold	5000910	Red

MANUAL THREE CONDUCTOR SHIELDED PLUGWIRES



Overall Length	Contact Plating	Catalog Number	Insulation Color
9"	Gold	5001003	Blue
11"	Gold	5001004	Green
13"	Gold	5001005	Yellow
15"	Gold	5001006	Orange
19"	Gold	5001007	Black
23"	Gold	5001008	Yellow
27"	Gold	5001009	Brown
35"	Gold	5001010	Red

MANUAL FOUR CONDUCTOR SHIELDED PLUGWIRES



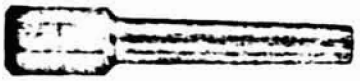
Overall Length	Contact Plating	Catalog Number	Insulation Color
9"	Gold	5001103	Blue
11"	Gold	5001104	Green
13"	Gold	5001105	Yellow
15"	Gold	5001106	Orange
19"	Gold	5001107	Black
23"	Gold	5001108	Yellow
27"	Gold	5001109	Brown
35"	Gold	5001110	Red

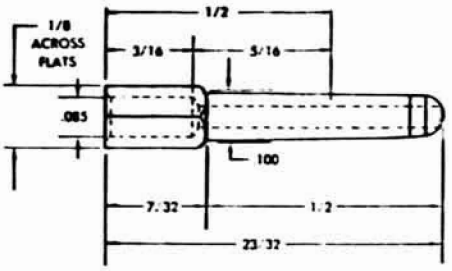
HARDWARE AND TOOLS FOR

CONTACT SPRINGS

Taper pin receptacle type used in MAC Panel Plugboard Programming Systems **Catalog Numbers:** Nickel Plated, 0411101; Gold Plated, 0411062.

TAPER PIN TERMINAL
SERIES 157-16/20/22



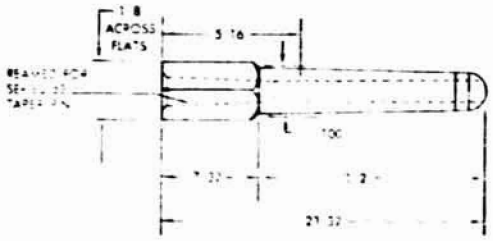


Make single connection between internal equipment wiring and receptacle of contact spring. Made of brass, drilled for various wires which can be either soldered or crimped. Supplied unplated, nickel plated, or gold plated. Nickel plating is .0001" thick. Gold plating is hard gold, .00003" thick over .0001" thick nickel plating.

CATALOG NUMBERS

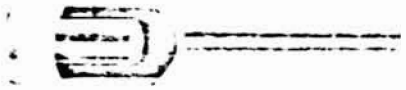
Plating	157-18	157-20	157-22
Unplated	423200	423000	423300
Nickel	423201	423101	423301
Gold	423232	423032	423332

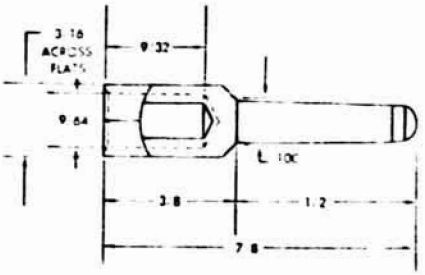
TAPER PIN TERMINAL
SERIES 157-53



Used as an adapter between contact spring receptacle and series 53 taper pin Plating specifications identical to taper pin terminal above. **Catalog Numbers:** Unplated, 423004; Nickel Plated, 423105; Gold Plated, 423036.

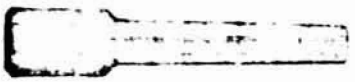
TAPER PIN TERMINAL
MULTIPLE-SERIES 157

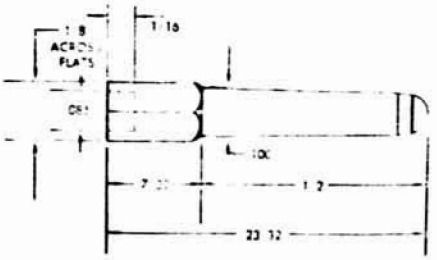




Used to terminate several wires of internal equipment wiring at one point. Side vent in taper pin permits easy soldering of wire endings. Plating specifications identical to taper pin terminal above. **Catalog Numbers:** Unplated, 425004; Nickel Plated, 425105; Gold Plated, 425036.

TAPER PLUG
SERIES 157





Used with shunts below to shunt contact springs on rear of receiver panel. Plating specifications identical to taper pin terminal above. **Catalog Numbers:** Unplated, 422004; Nickel Plated, 422105; Gold Plated, 422036.

TAPER PIN RECEPTACLES

STRAIGHT SHUNTS

Used with taper plugs and/or pin terminals to shunt adjacent positions of contact springs on rear of receiver panel. Contact spring spacing is .250" on all models. Made of phosphor bronze, with plating same as taper pin terminal.

Catalog Numbers:	Unplated	Nickel	Gold
.250" Centers	408000	408101	408032

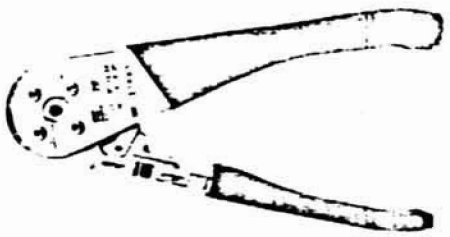
STRIP SHUNTS

Shunts as shown above are also available in strip form. Shunts are on .250" centers and cover 40 consecutive positions on the receiver. Shunts may be cut to length as required. **Catalog Numbers:** Nickel 417401, Gold 417402.

DIAGONAL SHUNTS

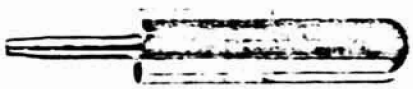
Used with taper plugs and/or pin terminals above to shunt adjacent diagonal contact springs on rear of receiver panel. Plating specifications identical to taper pin terminal above. Made of phosphor bronze. **Catalog Numbers:** Unplated, 409000; Nickel Plated, 409101; Gold Plated, 409032.

HAND CRIMPING TOOL



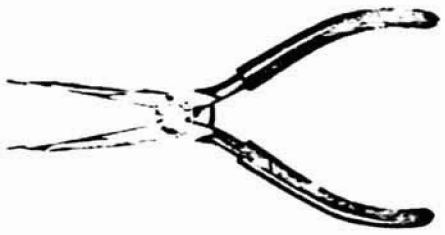
Used to crimp taper pin terminals series 157-18/20/22 to internal equipment wiring. Tool is crimping cycle controlled to assure the quality of the four-indent crimp. **Catalog Numbers:** Crimping Tool Frame, 452000; Taper Pin Positioner, 452001; Gaging Pin, 452002.

TAPER PIN INSERTION TOOL



Used to insert all taper pin terminals. Tool provides for manual insertion of pins into contact springs. Tool is spring controlled to give a constant insertion energy and to limit compressive stresses in the board to a safe level. **Catalog Number:** 413001.

TAPER PIN EXTRACTION TOOL



For use in the removal of all taper pin terminals with the exception of multiple taper pin. **Catalog Number:** 415000.

CFE TECHNICAL DATA

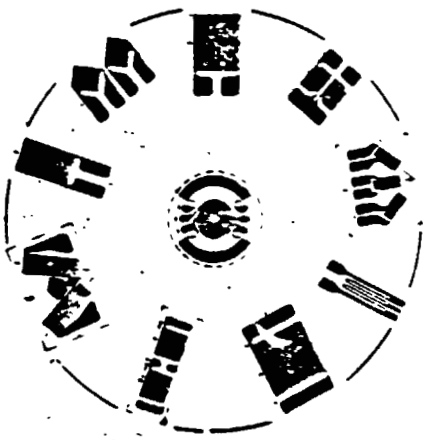
Micro-Measurements (19612)

Strain Gage EA-13-125-350 (typical)

CATALOG 200

MEM

GAGE LISTINGS SECTION



REVISION
1/1/79

GENERAL INFORMATION

Micro-Measurements produces the widest selection of strain gages available. Considering the variations in pattern designs, grid alloys, S-T-C (Self-Temperature Compensation) numbers, backing materials, and optional features, there are over 40,000 possible gage types from which to select. Although it is impractical to stock all variations, many general purpose gages are maintained in stock. Other less common types are available on short delivery cycles. Some special purpose gages are ordinarily manufactured to order.

This Catalog includes an actual size reproduction of each strain gage pattern, with 2X enlargements of some miniature patterns for gage geometry definition. The listing sequence is in order of increasing gage length, with the exception of the diaphragm gages where the numerical code group which normally describes active gage length defines active pattern diameter. *All dimensions throughout Catalog 200 are provided in dual Customary English and Metric SI Units.*

All available series within each pattern design are listed to the near-right and far-right of the illustration. Specifications, descriptions, and available options are also included. The following notes explain certain details of these listings, and must be read carefully before ordering or specifying gage types.

GAGE CODING SYSTEM

The gage coding system is fully described on Page 2I. The special features of the CEA Series strain gages are also described in this section, but separately from the basic gage coding section.

GAGE SELECTION CHART:

The Standard Strain Gage Selection Chart shown on Page 3L provides performance data for most common gage series of 1/8" *(3.2mm)* gage lengths and longer. Since optional features may influence certain performance characteristics, contact our Applications Engineering Department for specific recommendations when performance requirements are critical.

STOCK STATUS SYMBOLS:

Symbols are assigned to each basic gage series to define a specific stock status as detailed below. These symbols apply only to basic gage types without optional features, although widely used gage/option combinations are sometimes in stock.

Commonly used gage types which satisfy most requirements are normally in stock items. Less common types are generally manufactured on order and subject to a Minimum Order Requirement (MOR). The MOR for a single gage type is three packages, where the basic gage list price, excluding options, is $50.00 or more. The MOR for basic gage list prices under $50.00 is five packages.

Symbol Definitions:

- **[A]** Most widely used gage type. MM guarantees sufficient stock for immediate shipment of at least ten packages in 06 or 13 S-T-C numbers (where S-T-C numbers are applicable), for which no MOR is required.
- **A:** Commonly used gage type. Normally stocked in 06 and 13 S-T-C numbers, and sometimes in stock with one or more optional features in the EA Series. An MOR may apply to S-T-C numbers other than 06 and 13, or to gages with optional features, when not available from stock.
- **B:** Less widely used gage type. Short delivery cycle. An MOR will apply when not available from stock.
- **C:** Infrequently used gage type. Normally manufactured to order with two- to four-week delivery cycle, depending on gage construction. An MOR will apply when not available from stock.

Standard gages with optional features and gages specified as Stock Status B and C, are sometimes maintained in stock due to customer activity, and would therefore not require an MOR. Specific availability information on any gage type can be obtained immediately by contacting our Order Service Department in Romulus. Our sales representative serving your area can also provide assistance.

OPTION AVAILABILITY:

The various optional features available on specific gage patterns are priced in the 'Optional Features' column. These prices are added to the basic list package price. Options not priced cannot be supplied on that particular gage type. The addition of optional features often requires an MOR, and the stock status symbols for basic gage designations no longer apply. In addition to common optional features, specialized features for specific applications are available on certain gage types. Refer to Page 2I for option descriptions.

SELF-TEMPERATURE COMPENSATION (S-T-C):

All gages with XX as the second code group in the gage designation are self-temperature compensated for use on structural materials with specific thermal expansion coefficients. The Table on Page 4I lists test specimen materials and S-T-C numbers to which gages are thermally matched. A graph illustrates typical apparent strain curves of gage alloys. Specific data for the particular lot is included in the gage package.

When ordering, it is necessary to replace the XX code group with the desired S-T-C number, which is the approximate thermal expansion coefficient of the structural material in PPM/°F. The Gage Coding System on Page 2I lists the available S-T-C numbers for specific gage alloys. The 06 and 13 values, available in A and K alloys, are most common and more likely to be in stock. *When not otherwise specified, the 06 compensation is automatically shipped.*

GAGE DIMENSIONS:

Dimensions listed for Gage Length (as measured inside the grid end loops) and Gage Width refer to active grid dimensions. Overall Length and Width refer to the actual foil pattern, not including alignment marks or backing.

The Matrix Size represents the approximate dimensions of the backing/matrix of the gage as shipped. If the pattern includes Trim Marks, the 'Matrix Size' column will so indicate, in which case the dimensions refer to these marks. When the matrix is pretrimmed to an exact size, it is noted. For use in a restrictive area, the backing/matrix may be field trimmed on all sides to within 0.01" *(0.25mm)* of the foil pattern without affecting gage performance.

GAGE FACTOR:

Gage Factor (GF) is the measure of sensitivity, or "output," produced by a resistance strain gage. Gage factor is determined through calibration of the specific gage type, and is the ratio between $\Delta R/R_0$ and $\Delta \ell/\ell$ (strain), where R_0 is the initial resistance of the gage. It is affected somewhat by pattern size, geometry, S-T-C number, and temperature. Each gage package is supplied with the exact GF, tolerance, and temperature sensitivity. Typical GF versus temperature curves are included on Page 4L. Nominal Gage Factors for various alloys are: A-205, K-71, N-22, D-32, P-200, C-76.

TRANSVERSE SENSITIVITY:

All gages are to some degree sensitive to strains transverse to the grid direction. The transverse sensitivity factor (K_t) is included in the package with all gage types for which the data is relevant.

ORDERING INFORMATION:

Basic Ordering Unit: Gages are packaged five to a package. Be sure to specify the number of *packages* of each type, including the exact gage description and options required. Example: 10 Pkgs. EA-06-250BG-120 with Option W.

Pricing: Prices shown are list. When specifying an optional feature, add this to the basic package list price of the gage. All prices are subject to change without notice.

Discounts: Quantity discounts are automatically applied to any eligible purchase order.

Minimum Order Value: $15.00 FOB: Romulus, Michigan

Purchase Orders and Requests for Quotation must be made out to Micro-Measurements, and may be sent directly to the main plant in Romulus or forwarded through the local representative.

STRAIN GAGE CODING SYSTEM

SELF TEMPERATURE COMPENSATION
FOIL ALLOY
CARRIER MATRIX (BACKING)
ACTIVE GAGE LENGTH IN MILS
GRID AND TAB GEOMETRY
RESISTANCE IN OHMS

EA-06-250BB-120 OPTION LE

E: Open faced general purpose gage with a tough, flexible polyimide backing. Many options are available, covering lead connection features and protective encapsulation

M: A special proprietary epoxy backing used on open faced Constantan gages for high-accuracy transducers. This backing is too delicate for general purpose use

W: The 'W' matrix provides a gage fully encapsulated in glass fiber reinforced epoxy phenolic resin. High endurance leadwires

S: Full encapsulation identical to the 'W' matrix but with solder dot connections instead of lead wires

T: Open face gages on a thin glass fiber reinforced epoxy backing. Used on transducers where the temperature requirements exceed the capability of the 'M' backing. Replaces the former 'L' backing

V: This is a strippable backing used on certain special patterns intended for high temperature strain measurement where ceramic adhesives are employed

A: Constantan alloy in self temperature compensated form

P: Annealed Constantan. Used for high elongation or post yield gages

D: Isoelastic alloy. High gage factor and high fatigue life

K: A nickel chromium alloy (similar to Karma) used for high performance self temperature compensated gages

C: An iron chromium aluminum alloy (similar to Armour D) used for special applications at high temperatures or at deep cryogenic temperatures

N: A nickel chromium alloy similar to Nichrome V. Used in strippable gages for high temperature service

The S-T-C number is the approximate thermal expansion coefficient in PPM/°F of the structural material on which the gage is to be used. The following S-T-C numbers are available:

'A' Alloy: 00, 03, 05, 06, 09, 13, 15, 18, 41, 50.

'P' Alloy: 08 only

'K' Alloy: 00, 03, 05, 06, 09, 13, 15

'D', 'C', and 'N' alloys are not available in self temperature compensated form

NOTE: The S-T-C numbers for 'A' and 'K' alloys are available as listed above when needed. However, the 06 and 13 compensations are the most widely used, and are therefore most likely to be in stock.

OPTIONAL FEATURES

Most of the following options apply to the EA or ED series gages as indicated in the Gage Listings Section:

W: Integral printed circuit terminal with polyimide encapsulation

E: Polyimide encapsulation, leaving a portion of the solder tab exposed.

S: Solder dots on tabs

SE: Solder dots plus polyimide encapsulation.

L: Preattached, soft formable copper leads

LE: Leads plus polyimide encapsulation

NOTE: The encapsulation process for Options W, E, SE, and LE will usually alter gage resistance slightly. The tolerance figures shown in the Gage Listings should be doubled when these options are specified.

SPECIAL PURPOSE FEATURES

SWL 2: Preattached spot welded Nichrome V lead ribbons 0.001" X 0.015" X 1" *(0.025mm X 0.38mm X 25.4mm)* Applicable to VC, VK, and VN Series Gages only as indicated in the Gage Listings Section.

B 67: Special leadwire feature available on most WA and WK Series gages. Standard beryllium copper lead ribbons are replaced by 0.8" *(20.5mm)* long, round, nickel clad copper wire 0.005" *(0.13mm)* in diameter. Very formable, with excellent resistance to oxidation. Fatigue life lower than standard leads; tab area strain should not exceed ±1000 microstrain. No additional charge above basic WA or WK Series gage price.

B 129: Same as Option B 67, except leads are 1" long X 1/32" X 0.002" *(25mm X 0.8mm X 0.05mm)* Available on all WA and WK Series gages at no additional charge above basic gage price.

'C' FEATURE — CEA-XX-032UW-120

The CEA Series strain gages are polyimide encapsulated Constantan ('A' Alloy) gages featuring large, integral, copper coated terminals. This construction provides optimum capability for direct leadwire attachment. The CEA gage is extremely thin and flexible (0.0022" *(.056mm)*), and can be contoured to almost any radius. In most applications, the CEA strain gage is preferred over EA Series gages with Options E, L, LE, and W.

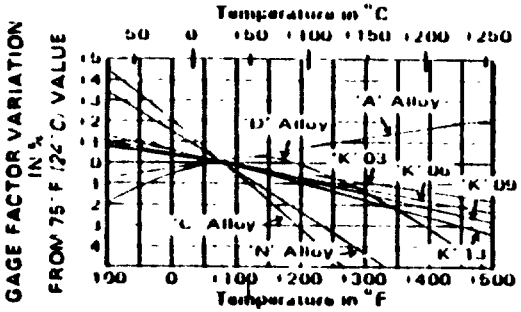
The addition of the prefix 'C' to the conventional gage coding system distinguishes the CEA Series from the standard EA Series. Special treatment throughout the Gage Listings Section further highlights 'C' Feature gages. Stock Status Symbols detailed on Page 11 apply. No special options are applicable.

STANDARD STRAIN GAGE SELECTION CHART

The general performance data listed in this chart is intended for comparative purposes in selecting gage types, and applies primarily to gages of 1/8" (3.2mm) gage length and larger. In applications where performance specifications are critical, it is advisable to contact our Applications Engineering Department for specific recommendations.

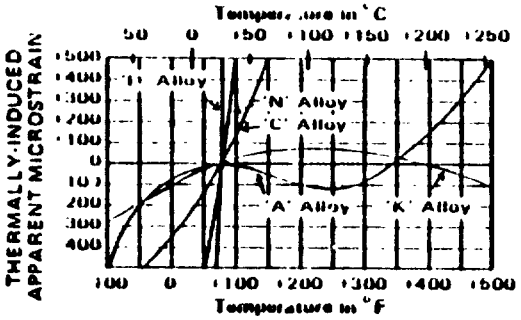
Gage Series	DESCRIPTION AND PRIMARY APPLICATION	TEMPERATURE RANGE	STRAIN RANGE	FATIGUE LIFE	
				Strain Level in Microstrain	Number of Cycles
EA	Constantan foil in combination with a tough, flexible, polyimide backing. Wide range of options available. Primarily intended for general purpose static and dynamic stress analysis. Not recommended for highest accuracy transducers.	Normal: -100°F to +350°F (-75°C to +175°C) Special or Short Term: -320°F to +400°F (-195°C to +205°C)	±3% for gage lengths under 1/8" (3.2mm) ±5% for 1/8" and over	±1800 ±1500 ±1200	10^5 10^6 10^8
CEA	Universal general purpose strain gage. Constantan grids completely encapsulated in polyimide, with large, integral, copper coated terminals. Primarily used for general purpose static and dynamic stress analysis. See Page 21 for details. Fatigue life improved with use of low modulus solder.	-100°F to +400°F (-75°C to +205°C) Stacked rosettes limited to +125°F (+50°C)	±3% for gage lengths under 1/8" (3.2mm) ±5% for 1/8" and over	±1500 ±1500 *Fatigue life improved using low modulus solder	10^5 10^6 *
MA	Open faced Constantan gage on a thin special epoxy cast film backing. Recommended for highest accuracy transducers. Somewhat brittle nature of backing too delicate for general purpose use. Only Option S is available.	Precision Static Transducer Service 100°F to +200°F (-75°C to +95°C) Dynamic: 320°F to +350°F (-195°C to +175°C)	±2%	±1900 ±1700 ±1500	10^5 10^6 10^7
ED	Isoelastic foil in combination with tough, flexible polyimide film. High gage factor and extended fatigue life excellent for dynamic measurements. Not normally used in static measurements because of very high apparent strain characteristic.	Dynamic: -320°F to +400°F (-195°C to +205°C)	±2% Nonlinear at strain levels over ±5%	±2500 ±2200	10^6 10^7
WA	Fully encapsulated Constantan gages with high endurance leadwires. Useful over wider temperature ranges and in more extreme environments than EA Series. Option W available on some patterns, but restricts fatigue life to some extent. Recommended for both stress analysis and transducer applications.	Normal: -100°F to +400°F (-75°C to +205°C) Special or Short Term: 320°F to +500°F (-195°C to +260°C)	±2%	±2000 ±1800 ±1500	10^5 10^6 10^7
WK	Fully encapsulated 'K' alloy gage with high endurance leadwires. Widest temperature range and most extreme environmental capability of any general-purpose gage when self temperature compensation is required. Option W available on some patterns, but restricts both fatigue life and maximum operating temperature.	Normal: -452°F to +550°F (-269°C to +290°C) Special or Short Term: -452°F to +750°F (-269°C to +400°C)	±1.5%	±2400 ±2200 ±2000	10^5 10^7 10^8
EP	Special annealed Constantan foil with tough, high elongation polyimide backing. Used primarily for measurements of large post-yield strains. The 08 self temperature compensation value is the best compromise in the 06 to 13 range normally encountered. Available with Options F, S, SF, L, and LF.	-100°F to +400°F (-75°C to +205°C)	±10% for gage lengths under 1/8" (3.2mm) ±20% for 1/8" and over	±4000 EP gages show zero shift under high cycle strains	10^4
SA	Fully encapsulated Constantan gages with solder dots. Same matrix as WA Series, but slightly thinner. Same uses as WA Series but derated somewhat in maximum temperature and operating environment because of solder dots. Often used in transducer service.	Normal: -100°F to +400°F (-75°C to +205°C) Special or Short Term: 320°F to +450°F (-195°C to +230°C)	±2%	±1800 ±1500	10^5 10^7
SK	Fully encapsulated 'K' alloy gages with solder dots. Same uses as WK Series, but derated in maximum temperature and operating environment because of solder dots.	Normal: -452°F to +450°F (-269°C to +230°C) Special or Short Term: -452°F to +500°F (-269°C to +260°C)	±1.5%	±2200 ±2000	10^6 10^7
WD	Fully encapsulated Isoelastic gages with high endurance leadwires. Used in wide range dynamic strain measurement applications in severe environments.	Dynamic: -320°F to +500°F (-195°C to +260°C)	±1.5% Nonlinear at strain levels over ±5%	±3000 ±2500 ±2200	10^5 10^7 10^8
SD	Equivalent to WD Series, but with solder dots instead of leadwires.	Dynamic: -320°F to +400°F (-195°C to +205°C)	±1.5% See above note	±2500 ±2200	10^6 10^7
TA	Open faced Constantan gages on thin reinforced laminated backing. Primarily used in transducers where temperatures exceed capability of MA Series. Option S available.	-100°F to +400°F (-75°C to +205°C)	±2%	±2000 ±1700	10^5 10^6
TK	Open faced 'K' alloy gages on a thin reinforced laminated backing for transducer use. Option S available.	-452°F to +450°F (-269°C to +230°C)	±1.5%	±2000	10^6
TD	Open faced Isoelastic gages on a thin reinforced laminated backing for transducer use. Option S available.	Dynamic: -320°F to +400°F (-195°C to +205°C)	±1.5%	±2400	10^7
VK VC VN	Open faced gages on a strippable backing. Normally installed with ceramic adhesives for special high temperature and/or cryogenic measurements.	-452°F to over +800°F (-269°C to +425°C) depending on specific application	±1%		

TECHNICAL DATA



GAGE FACTOR VERSUS TEMPERATURE

As shown in the accompanying curves, gage factor change with temperature for each alloy varies, and, with modified Karma, is also a function of the S-T-C number. Gage Factor is determined in a uniaxial stress field with a Poisson's ratio of 0.285. Adjustment for other types of stresses may be made by transverse sensitivity correction as detailed in M-M Tech Note TN-137.



TYPICAL APPARENT STRAIN VERSUS TEMPERATURE

To produce a self-temperature-compensated strain gage, the electrical properties of the alloy must be adjustable in a predictable manner, as with Constantan and modified Karma, to provide a reasonable match to structural materials. Static strain measurement errors may be significant when operating in a varying temperature environment where the apparent strain slope is steep. S-T-C numbers higher than the expansion coefficient of the test specimen will tend to rotate the curve clockwise.

SELF-TEMPERATURE-COMPENSATION (S-T-C) FOR COMMON MATERIALS

S-T-C NUMBER	THERMAL EXPANSION COEFFICIENT IN PPM/°F (32–212°F)	THERMAL EXPANSION COEFFICIENT IN PPM/°C (0–100°C)	MATERIAL
00	0.8	1.4	Invar
	0.28	5	Quartz, Fused
	0.017	03	Titanium Silicate*
03	3.0	5.4	Alumina, Fired
	2.2	4.0	Molybdenum*
	2.4	4.3	Tungsten
	3.1	5.6	Zirconium
05	5.1	9.2	Glass, Soda-Lime
	5.0	9.0	Steel, 15-7 Mo PH
	5.5	9.9	Steel, 410 S.S.
	4.8	8.6	Titanium, Pure*
	4.9	8.8	Titanium, 6 AL 4V*
06	6.4	11.5	Beryllium
	7.0	12.6	Inconel, Wrought
	6.7	12.1	Inconel X
	6.0	10.8	Iron, Gray Cast
	7.5	13.5	Monel
	6.6	11.9	Nickel, A
06	6.7	12.1	Steel, 1008, 1018*
	6.3	11.3	Steel, 4340
	6.0	10.8	Steel, 17-4 PH
	5.7	10.3	Steel, 17-7
09	9.3	16.7	Beryllium Copper 25
	10.2	18.4	Bronze, Phos. (10%)
	9.3	16.7	Copper
	9.6	17.3	Steel, 304 S.S.*
	8.0	14.4	Steel, 310 S.S.
	8.9	16.0	Steel, 316 S.S.
13	12.9	23.2	Aluminum, 2024-T4*, 7075-T6
	11.1	20.0	Brass, 30/70
	13.0	23.0	Tin (Pure)
15	14.5	26.1	Magnesium, AZ-31B*

*Indicates type of material used in determining apparent strain curves

STRAIN GAGE AND ADHESIVE SELECTION

The following charts cover most testing situations where some degree of stability under static test conditions is required. For absolute stability with Constantan gages over long periods of time and temperatures above +150°F (65°C), it may be necessary to employ half- or full-bridge configurations. Protective coatings may also influence stability in cases other than transducer applications where the element is hermetically sealed.

It is inappropriate to quantify "accuracy" as used in these tables without consideration of various aspects of the actual test program and the instrumentation used. In general, "moderate" for stress analysis purposes is in the 2% - 5% range, "high" in the 1% - 3% range, and "very high" 1% or better.

If a specific test profile is not included in the table, performance limits are likely being approached or exceeded, and the interaction of test characteristics too complex to present here. For further information, contact our Applications Engineering Department.

Static Strain Measurements

OPERATING TEMPERATURE RANGE	TEST DURATION IN HOURS	ACCURACY REQUIRED	TYPICAL SELECTION: Gage Series	TYPICAL SELECTION: M-Bond Adhesive
-50 to +150°F (-45 to +65°C)	<10³	Moderate	EA, CEA	200 or AE-10
	>10³	Moderate	EA, CEA	AE-10 or AE-15
	>10³	Very High	WA, SA	AE-15 or 610
-50 to +400°F (-45 to +205°C)	<10³	Moderate	WA, SA	600 or 610
	>10³	High	WK, SK	600 or 610
-452 to +450°F (-269 to +230°C)	>10³	Moderate	WK, SK	610
-600°F (-315°C)	<10³	Moderate	WK	610
-700°F (-375°C)	<10	Moderate	WK	610

High Elongation Measurements

OPERATING TEMPERATURE RANGE	MAXIMUM STRAIN	ACCURACY REQUIRED	TYPICAL SELECTION: Gage Series	TYPICAL SELECTION: M-Bond Adhesive
-50 to +150°F (-45 to +65°C)	+50,000	Moderate	EA, CEA	200 or AL-10
	+100,000	Moderate	LP	AE-15
	+200,000	Moderate	LP	Armstrong A-12*
0 to +500°F (-20 to +250°C)	+15,000	Moderate	SA, SK, WA, WK	610
-452 to -50°F (-269 to -45°C)	+10,000	Moderate	SK, WK	600 or 610

*Available from Armstrong Products, Warsaw, Indiana USA

Transducer Applications

OPERATING TEMPERATURE RANGE	Operating: Strain	Operating: Cycle	ACCURACY REQUIRED	TYPICAL SELECTION: Gage Series	TYPICAL SELECTION: M-Bond Adhesive
-50 to +150°F (-45 to +65°C)	±1500	10⁸	1% to 5%	EA, CEA	200 or AL-10
-50 to +200°F (-45 to +95°C)	±1500	10⁸	>0.2%	MA	610 or 43-B
-50 to +300°F (-45 to +150°C)	±1500	10⁸	0.2% to 0.5%	SA, WA, TA	610
-120 to +350°F (-195 to +175°C)	±1800	10⁸	>0.5%	SK, WK, TK	610

GAGE PATTERN (Actual Size) Grids are Vertical Except as Noted	GAGE DESIGNATION Insert Desired S T C No. in Spaces Marked XX	STOCK STATUS	RES. IN OHMS	LIST PKG. PRICE (Five Gages)	OPTIONS AVAILABLE Add Indicated Price to Package Price Note: Stock Status Symbols Do Not Apply to Gages with Optional Features							DIMENSIONS IN M - Matrix S - Section (e.g. S1 - Sec. 1) FS - Each Section INCHES / MILLIMETERS CG - Gauge Pat. GD - Grid Dia PD - Pad Dia APD - Act Pad Dia				OTHER SERIES AVAILABLE		
						W	E	S	SE	L	LE	GAGE LENGTH	OVERALL LENGTH	GRID WIDTH	OVERALL WIDTH	GAGE DESIGNATION	STOCK STATUS	LIST PKG PRICE
008CL	MA-XX-008CL-120	C	120 ± 0.5%	60.00				3.50				0.008	0.080	0.010	0.068			
												0.20	2.03	0.25	1.73			
												Matrix Size →		0.21L x 0.13W				
	SA XX 008CL-120	B	120 ± 1%	70.00										5.3L x 3.3W				
(1X) (2X)					Pattern Description: Micro grid gage for strain measurement in high gradient areas. Recommended in the SA Series for best performance.													
015CK	EA-XX-015CK-120	A	120 ± 0.3%	44.00		9.00	2.75	3.50	6.25	3.50	6.25	0.015	0.065	0.020	0.064	EP 08 015CK 120	B	50.00
	MA XX 015CK-120	B	120 ± 0.3%	44.00				3.50				0.38	1.65	0.51	1.63	SA XX 015CK 120	B	60.00
												Matrix Size →		0.19L x 0.12W				
	WA XX 015CK-120	B	120 ± 0.5%	60.00		11.50*								4.8L x 3.0W				
(1X) (2X)					Pattern Description: Micro miniature pattern with enlarged solder tabs													
015DJ	EA-XX-015DJ-120	A	120 ± 0.3%	44.00				3.50	6.25	4.00	7.50	0.015	0.100	0.020	0.020	EP 08 015DJ 120	B	50.00
	MA-XX-015DJ-120	B	120 ± 0.3%	44.00				3.50				0.38	2.54	0.51	0.51	SA XX 015DJ 120	B	60.00
												Matrix Size →		0.23L x 0.12W		SK XX 015DJ 120	B	65.00
														5.8L x 3.0W				
(1X) (2X)					Pattern Description: Micro miniature pattern with tab at each end of grid													
015EH	EA-XX-015EH-120	A	120 ± 0.3%	44.00				3.50	6.25	4.00	7.50	0.015	0.025	0.020	0.100	EP 08 015EH 120	B	50.00
	MA XX 015EH 120	B	120 ± 0.3%	44.00				3.50				0.38	0.64	0.51	2.54	SA XX 015EH 120	B	60.00
												Matrix Size →		0.15L x 0.19W		SK XX 015EH 120	B	65.00
														3.8L x 4.8W				
(1X) (2X)					Pattern Description: Similar to 015DJ pattern preceding but with tabs at sides of grid													
015DV	EA-XX 015DV-120	A	120 ± 0.3%	37.00				3.50	6.25	4.00	7.50	0.015	0.080	0.050	0.050	EP 08 015DV 120	C	42.00
	MA XX 015DV-120	B	120 ± 0.3%	39.00				3.50				0.38	2.03	1.27	1.27	SA XX 015DV 120	B	52.00
												Matrix Size →		0.17L x 0.14W				
														4.3L x 3.6W		TA XX 015DV 120	C	41.00
(1X) (2X)					Pattern Description: Micro minute transducer gage													
015LA	EA XX-015LA 120	A	120 ± 0.3%	44.00								0.015	0.070	0.020	0.020	EP 08 015LA 120	C	55.00
	MA XX-015LA-120	B	120 ± 0.3%	44.00								0.38	1.78	0.51	0.51			
												Matrix Size →		0.28L x 0.17W				
														7.1L x 4.3W				
(1X) (2X)					Pattern Description: Primarily used in the MA Series on miniature transducers such as sting balances													

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*NOTE Options available but not normally recommended. See 'Optional Features' Section

GAGE PATTERN (Actual Size) Grids are Vertical Except as Noted	GAGE DESIGNATION Insert Desired S T C No in Spaces Marked XX	STOCK STATUS	RES. IN OHMS	LIST PKG. PRICE (Five Gages)	OPTIONS AVAILABLE Add Indicated Price to Package Price Note: Stock Status Symbols Do Not Apply to Gages with Optional Features							DIMENSIONS IN M - Matrix S - Section (e g S1 - Sec 1) LS - Each Section — INCHES / MILLIMETRES — CP - Comp Patt GD - Grid Dia PD - Patt Dia APD - Act Patt Dia				OTHER SERIES AVAILAB		
						W	E	S	SE	L	LE	GAGE LENGTH	OVERALL LENGTH	GRID WIDTH	OVERALL WIDTH	GAGE DESIGNATION	Stock Status	LIST PKG PRICE
015RC	EA XX 015RC-120 MA-XX 015RC-120	B C	120 ± 0 6% 120 ± 0 6%	105 00 105 00			7 00	7 00	12 50			0 015 ES 0 38 ES	0 070 CP 1 78 CP	0 020 ES 0 51 ES	0 140 CP 3 56 CP	SA XX 015RC 120	C	132 00
												Matrix Size (Trim Marks) →		0 101 x 0 16W 2 5L x 4 1W		TA XX 015RC 120	C	116 00
(1X) (2X)							Pattern Description Micro miniature 3 element 45° rosette with one tab common to all sections											
015RJ	EA-XX-015RJ-120 MA XX-015RJ-120	B C	120 ± 0 6% 120 ± 0 6%	105 00 105 00			9 00	10 50	18 50			0 015 ES 0 38 ES	0 070 CP 1 78 CP	0 020 ES 0 51 ES	0 140 CP 3 56 CP	SA XX 015RJ 120	C	148 00
												Matrix Size (Trim Marks) →		0 101 x 0 16W 2 5L x 4 1W		TA XX 015RJ 120	C	116 00
(1X) (2X)							Pattern Description Micro miniature 3 element 45° rosette identical to 015RC preceding except each section has separate tabs for electrical isolation											
015SE	EA-XX-015SE-120 MA XX-015SE-120	B B	120 ± 0 3% 120 ± 0 3%	44 00 44 00		9 00	2 75	3 50 3 50	6 25	3 50	6 25	0 015 0 38	0 064 1 63	0 020 0 51	0 065 1 65	EP 08 015SE 120 SA XX 015SE 120	C B	51 00 60 00
												Matrix Size →		0 18L x 0 15W 4 6L x 3 8W				
(1X) (2X)							Pattern Description Micro miniature pattern with tabs at side for use near abutments											
015YC	EA-XX-015YC 120 MA-XX-015YC-120	B B	120 ± 0 6% 120 ± 0 6%	105 00 105 00			7 00	7 00	12 50			0 015 ES 0 38 ES	0 063 CP 1 60 CP	0 020 ES 0 51 ES	0 140 CP 3 56 CP	SA XX 015YC 120	B	132 00
												Matrix Size (Trim Marks) →		0 090L x 0 160W 2 3L x 4 1W				
(1X) (2X)							Pattern Description Micro miniature 3 element 60° delta rosette with one tab common to all sections											
015YD	EA XX 015YD-120 MA XX-015YD-120	B C	120 ± 0 6% 120 ± 0 6%	105 00 105 00			9 00	10 50	18 50			0 015 ES 0 38 ES	0 063 CP 1 60 CP	0 020 ES 0 51 ES	0 140 CP 3 56 CP	SA XX 015YD 120	C	148 00
												Matrix Size (Trim Marks) →		0 090L x 0 160W 2 3L x 4 1W				
(1X) (2X)							Pattern Description Micro miniature 3 element 60° delta rosette identical to 015YC pattern preceding except each section has separate tabs for electrical isolation											
020MT	EA XX 020MT 120	B	120 ± 1%	150 00			16 50	19 00	34 50	22 00	38 50	0 020 ES 0 51 ES	0 385 CP 9 78 CP	0 025 ES 0 64 ES	0 100 CP 2 54 CP	SA XX 020MT 120	C	220 00
												Matrix Size →		0 48L x 0 19W 12 2L x 4 8W				
(1X) (2X)							Pattern Description Miniature 10 element step gage for strain gradient determination One tab common to all sections Grid centerline spacing 0 035" (0 889mm)											

*NOTE Options available but not normally recommended
See 'Optional Features' Section

GAGE PATTERN (Actual Size) Grids are Vertical Except as Noted	GAGE DESIGNATION Insert Desired S T C No in Spaces Marked XX	STOCK STATUS	RES. IN OHMS	LIST PKG. PRICE (Five Gages)	OPTIONS AVAILABLE Add Indicated Price to Package Price Note: Stock Status Symbols Do Not Apply to Gages with Optional Features							DIMENSIONS IN M - Matrix S - Section (e.g. S1 - Sec 1) FS - Each Section	INCHES / MILLIMETERS	CP - Comp Pad GD - Grid Dia PD - Pad Dia AD - Act Pad Dia			OTHER SERIES AVAILABLE		
						W	E	S	SE	L	LE	GAGE LENGTH	OVERALL LENGTH	GRID WIDTH	OVERALL WIDTH	GAGE DESIGNATION	Stock Status	LIST PKG. PRICE
030CG	EA XX-030CG-120	B	120 ± 0.2%	22.00		9.00	2.75	3.50	6.25	.50	6.25	0.030	0.082	0.054	0.054	SA XX 030CG 120	A	41.00
	MA XX 030CG-120	B	120 ± 0.2%	22.00				3.50				0.76	2.08	1.37	1.37			
												Matrix Size (Trim Marks) →		0.100L x 0.070W				
														2.5L x 1.8W		TA XX 030CG 120	C	26.00
							Pattern Description: Miniature transducer pattern											
030CM	EA XX 030CM-030	C	30 ± 0.2%	20.00			2.75	3.50	6.25			0.030	0.082	0.054	0.054	SA XX 030CM 030	C	40.00
	EA XX 030CM-060	C	60 ± 0.2%	20.00			2.75	3.50	6.25			0.76	2.08	1.37	1.37	SA XX 030CM 060	C	40.00
	MA XX 030CM-030	C	30 ± 0.2%	22.00				3.50				Matrix Size (Trim Marks) →		0.100L x 0.070W				
	MA XX 030CM-060	C	60 ± 0.2%	22.00				3.50						2.5L x 1.8W		TA XX 030CM 030	C	24.00
							Pattern Description: Identical to 030CG pattern preceding, but with low resistance grid for multiple gage bridge circuit									TA XX 030CM 060	C	24.00
030LB	EA XX 030LB-120	A	120 ± 0.2%	28.00				3.50	6.25			0.030	0.094	0.030	0.030	EP 08 030LB 120	C	34.00
	MA XX 030LB-120	A	120 ± 0.2%	34.00				3.50				0.76	2.39	0.76	0.76	SA XX 030LB 120	B	45.00
												Matrix Size →		0.74L x 0.15W				
														6.1L x 3.8W		TA XX 030LB 120	C	30.00
(1X) (2X)							Pattern Description: Miniature transducer pattern. Often used on sting balances											
030TS	EA XX 030TS 120	B	120 ± 0.2%	44.00				5.25	10.25			0.030 ES	0.160 CP	0.044 ES	0.044 CP	SA XX 030TS 120	C	77.00
	MA XX 030TS 120	B	120 ± 0.2%	50.00								0.76 ES	4.06 CP	1.12 ES	1.12 ES	SK XX 030TS 350	C	95.00
												Matrix Size →		0.27L x 0.14W				
														6.9L x 3.6W				
(1X) (2X)							Pattern Description: Miniature 90° "tee" rosette with narrow geometry. Sections have a common electrical connection											
030TY	EA XX-030TY-120	B	120 ± 0.2%	49.00				5.25	10.25			0.030 ES	0.190 CP	0.044 ES	0.060 CP	EP 08 030TY 120	C	60.00
	MA XX-030TY-120	B	120 ± 0.2%	55.00								0.76 ES	4.83 CP	1.12 ES	1.52 CP			
												Matrix Size →		0.31L x 0.15W				
														7.9L x 3.8W		TA XX 030TY 120	C	57.00
(1X) (2X)							Pattern Description: Miniature 90° "tee" rosette. Similar to 030TS pattern preceding but with larger solder tabs									TK XX 030TY 350	C	71.00
030TU	EA XX-030TU-120		120 ± 0.2%	38.00			5.50	7.00	12.50	7.00	12.50	0.030 ES	0.110 CP	0.044 ES	0.148 CP	EP 08 030TU 120	B	45.00
	MA XX 030TU 120		120 ± 0.2%	47.00				7.00				0.76 ES	2.79 CP	1.12 ES	3.76 CP	SK XX 030TU 350	B	85.00
	ED DY 030TU 350	C	350 ± 0.5%	50.00				7.5	12.50			Matrix Size →		0.24L x 0.15W				
														5.1L x 6.4W		TA XX 030TU 120	C	45.00
(1X) (2X)							Pattern Description: Miniature 90° "tee" rosette, as above, electrically separate									TK XX 030TU 350	C	53.00

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*NOTE: Options available but not normally carried in stock. See "Optional Features" Section.

GAGE PATTERN (Actual Size) Grids are Vertical Except as Noted	GAGE DESIGNATION Insert Desired S T C No in Spaces Marked ? X	STOCK STATUS	RES. IN OHMS	LIST PKG. PRICE (Five Gages)	OPTIONS AVAILABLE Add Indicated Price to Package Price Note: Stock Status Symbols Do Not Apply to Gages with Optional Features							DIMENSIONS IN (INCHES / MILLIMETERS) M - Matrix S - Semiconductor Set - Set B - Each Section				OTHER SERIES AVAILABLE		
						P	E	S	SE	L	LE	GAGE LENGTH	OVERALL LENGTH	GAGE WIDTH	OVERALL WIDTH	GAGE DESIGNATION	Stock Status	LIST PKG. PRICE
030WH	WA-XX-030WH 120	A	120 ± 0.5%	101.00								0.030 ES	0.175 M	0.030 ES	0.190 M	SA XX 030WH 120	C	101.00
	WK-XX-030WH 120	B	120 ± 0.5%	116.00								0.76 ES	4.45 M	0.76 ES	4.83 M	SK XX 030WH 120	C	116.00
												Matrix Size (Preliminary)		0.175L x 0.190W				
														4.4L x 4.8W				
							Pattern Description: Miniature 3 element 45° rectangular stacked rosette											
030WT	WA XX 030WT 120	A	120 ± 0.5%	79.00								0.030 ES	0.175 M	0.030 ES	0.190 M	SA XX 030WT 120	C	79.00
	WK XX 030WT 120	B	120 ± 0.5%	94.00								0.76 ES	4.45 M	0.76 ES	4.83 M	SK XX 030WT 120	C	94.00
												Matrix Size (Preliminary)		0.175L x 0.190W				
														4.4L x 4.8W				
							Pattern Description: Miniature 2 element 90° tee stacked rosette											
030WY	WA-XX-030WY-120	A	120 ± 0.5%	101.00								0.030 ES	0.175 M	0.030 ES	0.190 M	SA XX 030WY 120	C	101.00
	WK-XX-030WY-120	B	120 ± 0.5%	116.00								0.76 ES	4.45 M	0.76 ES	4.83 M	SK XX 030WY 120	C	116.00
												Matrix Size (Preliminary)		0.175L x 0.190W				
														4.4L x 4.8W				
							Pattern Description: Miniature 3 element 60° delta stacked rosette											
030YB (1X) (2X)	EA-XX-030YB 120	A	120 ± 0.4%	69.00			9.00	10.60	18.50			0.030 ES	0.104 CP	0.030 ES	0.200 CP	SA XX 030YB 120	C	99.00
	MA-XX-030YB-120	B	120 ± 0.4%	74.00				10.60				0.76 ES	2.64 CP	0.76 ES	5.08 CP			
												Matrix Size (Trim Marks)		0.116 x 0.210W				
														2.9L x 5.3W				
							Pattern Description: Miniature 3 element 60° delta single plane rosette											
031CE	EA XX-031CE 350	A	350 ± 0.2%	23.00		9.50	2.75	3.50	6.25	3.50	6.25	0.011	0.0..	0.062	0.062	EP 08 031CE 350	C	31.00
	MA-XX-031CE-350	A	350 ± 0.2%	26.00				3.50				0.79	1.93	1.57	1.57	SA XX 031CE 350	C	44.00
B												Matrix Size		0.231 x 0.18W				
	WA-XX-031CE-350	C	350 ± 0.4%	44.00										5.8L x 4.6W		SA XX 031CE 350	C	44.00
							Pattern Description: General purpose high resistance miniature gage											
031CF	EA XX-031CF-120	A	120 ± 0.2%	19.00		9.00	2.75	3.50	6.25	3.50	6.25	0.011	0.078	0.062	0.062	EP 08 031CF 120	B	25.00
	MA-XX-031CF-120	A	120 ± 0.2%	23.00				3.50				0.79	1.93	1.57	1.57	SA XX 031CF 120	B	37.00
B	ED DY-031CF-350	A	350 ± 0.4%	26.00			2.75	3.50	6.25	3.50	6.25	Matrix Size		0.231 x 0.18W		SK XX 031CF 120	B	50.00
	WA-XX-031CF-120	B	120 ± 0.4%	37.00										5.8L x 4.1W		SK XX 031CF 350	B	64.00
	WK-XX-031CF-350	B	350 ± 0.4%	64.00												SD DY 031CF 350	B	40.00
							Pattern Description: Identical to 031CE pin wiring except for grid resistance									EA XX 031CF 120	C	26.00
																SK XX 031CF 120	C	50.00
																EA XX 031CF 350	C	34.00
																SD DY 031CF 350	C	34.00

*NOTE: Options available but not normally recommended. See 'Optional Features' Section.

GAGE PATTERN (Actual Size) Grids are Vertical Except as Noted	GAGE DESIGNATION Insert Desired S T C No in Space Marked XX	STOCK STATUS	RES. IN OHM	LIST PKG. PRICE (Five Gages)	OPTIONS AVAILABLE Add Indicated Price to Package Price Note: Stock Status Symbols Do Not Apply to Gages with Optional Features						DIMENSIONS IN M - Metric S - Section (e.g. "S1" - Sec. 1) EA - Each Section [INCHES / MILLIMETRES] GP - Comp. Pad GD - Grid Dia PD - Pad Dia APD - Act. Pad Dia				OTHER SERIES AVAILABLE		
					W	E	S	3E	L	1F	GAGE LENGTH	OVERALL LENGTH	GRID WIDTH	OVERALL WIDTH	GAGE DESIGNATION	Stock Status	LIST PKG. PRICE
032UW C FEATURE	CEA XX 032UW 120	A	120 ± 0.3%	27.00	CEA Series Strain Gages feature large integral copper solder tabs and a completely encapsulated grid. Refer to the front of this Catalog for details.						0.032 0.81	0.180 4.57	0.060 1.52	0.120 3.05			
											Matrix Size (Part Number) →		0.270L x 0.190W 6.9L x 4.8W				
					Pattern Description: General purpose miniature gage. Exposed solder tab area 0.07" x 0.04" (1.8mm x 1.0mm)												
031DE	EA-XX-031DE-120	A	120 ± 0.2%	21.00		3.50	3.50	6.25	4.00	7.50	0.031 0.79	0.140 3.56	0.032 0.81	0.032 0.81	EP-08-031DE-120	A	25.00
	EA-XX-031DE-350	C	350 ± 0.2%	25.00		3.50	3.50	6.25	4.00	7.50	Matrix Size →		0.27L x 0.12W 6.9L x 3.0W		SA-XX-031DE-120	C	42.00
	MA-XX-031DE-120	A	120 ± 0.2%	23.00			3.50								SA-XX-031DE-350	C	48.00
	MA-XX-031DE-350	C	350 ± 0.2%	27.00			3.50								SK-XX-031DE-120	C	52.00
	ED-DY-031DE-350	B	350 ± 0.4%	28.00		3.50	3.50	6.25	4.00*	7.50*	Pattern Description: General purpose miniature gage				SK-XX-031DE-350	B	57.00
	WA-XX-031DE-120	C	120 ± 0.4%	42.00											SD-DY-031DE-350	C	55.00
	WA-XX-031DE-350	C	350 ± 0.4%	48.00											TA-XX-031DE-120	C	25.00
	WK-XX-031DE-350	C	350 ± 0.4%	57.00											TA-XX-031DE-350	C	31.00
															TK-XX-031DE-120	C	30.00
															TK-XX-031DE-350	C	33.00
															TD-DY-031DE-350	C	32.00
031EC	EA-XX-031EC-120	A	120 ± 0.2%	21.00		3.50	3.50	6.25	4.00	7.50	0.031 0.79	0.042 1.07	0.032 0.81	0.140 3.56	EP-08-031EC-120	A	25.00
	EA-XX-031EC-350	C	350 ± 0.2%	25.00		3.50	3.50	6.25	4.00	7.50	Matrix Size →		0.17L x 0.23W 4.3L x 5.8W		SA-XX-031EC-120	A	42.00
	MA-XX-031EC-120	B	120 ± 0.2%	23.00			3.50								SA-XX-031EC-350	C	48.00
	MA-XX-031EC-350	C	350 ± 0.2%	27.00			3.50								SK-XX-031EC-120	B	52.00
	ED-DY-031EC-350	B	350 ± 0.4%	28.00		3.50	3.50	6.25	4.00*	7.50*	Pattern Description: General purpose miniature gage. Similar to 031DE pre ceding but with tabs at sides of grid				SK-XX-031EC-350	B	57.00
	WA-XX-031EC-120	C	120 ± 0.4%	42.00											SD-DY-031EC-350	C	55.00
	WA-XX-031EC-350	C	350 ± 0.4%	48.00											TA-XX-031EC-120	C	25.00
	WK-XX-031EC-350	C	350 ± 0.4%	57.00											TA-XX-031EC-350	C	31.00
															TK-XX-031EC-120	C	30.00
															TK-XX-031EC-350	C	33.00
															TD-DY-031EC-350	C	32.00
031FL	FA-XX-031FL-030	C	30 ± 0.2%	20.00		3.50	3.50	6.25	4.00	7.50	0.031 0.79	0.042 1.07	0.032 0.81	0.140 3.56	FA-XX-031FL-060	C	20.00
	MA-XX-031FL-030	C	30 ± 0.2%	22.00			3.50				Matrix Size →		0.17L x 0.23W 4.3L x 5.8W		MA-XX-031FL-060	C	22.00
															SA-XX-031FL-060	C	40.00
	WA-XX-031FL-030	C	30 ± 0.4%	40.00											TA-XX-031FL-030	C	24.00
					Pattern Description: Low resistance version of 031EC preceding. For multiple gage transducer bridge circuits										TA-XX-031FL-060	C	24.00

*NOTE: Options available but not normally recommended See 'Optional Features' Section.

GAGE PATTERN (Actual Size) Grids are Vertical Except as Noted	GAGE DESIGNATION Insert Desired S T C No in Spaces Marked XX	STOCK STATUS	RES. IN OHMS	LIST PKG PRICE (Five Gages)	OPTIONS AVAILABLE Add Indicated Price to Package Price Note Stock Status Symbols Do Not Apply to Gages with Optional Features							DIMENSIONS IN M Matrix S Section Gage Sx Sec to Sec Lb Last Section — INCHES / MILLIMETERS — CP Comp Path GP Grid Line PP Path Line APD Act Path Line				OTHER SERIES AVAILABLE		
						W	E	S	SE	L	LE	GAGE LENGTH	OVERALL LENGTH	GRID WIDTH	OVERALL WIDTH	GAGE DESIGNATION	Stock Status	LIST PKG PRICE
031ME	EA XX 031ME 120	B	120 ± 0.5%	160.00			16.50	36.00	61.50			0.031 ES	0.090 CP	0.072 ES	0.790 CP	EP 08 031ME 120	C	195.00
												0.79 ES	2.29 CP	0.81 ES	20.07 CP	SA XX 031ME 120	C	220.00
	ED DY 031ME 350	C	350 ± 1%	195.00			16.50	36.00	61.50			Matrix Size (Trim Border)		0.8301 x 0.120W		SK XX 031ME 350	C	275.00
														21.1L x 3.0W		SD DY 031ME 350	C	275.00
							Pattern Description Miniature 10 element strip gage with electrically independent grids. All grids transverse to long axis of pattern. Grid centerline spacing 0.080" (2.0mm). Companion pattern to 031MJ.												
031MF	EA XX 031MF 120	B	120 ± 0.5%	160.00			16.50	36.00	61.50			0.031 ES	0.790 CP	0.03 ES	0.080 CP	EP 08 031MF 120	C	195.00
												0.79 ES	20.07 CP	0.81 ES	2.01 CP	SA XX 031MF 120	C	220.00
	ED DY 031MF 350	B	350 ± 1%	195.00			16.50	36.00	61.50			Matrix Size (Trim Border)		0.8301 x 0.120W		SK XX 031MF 350	C	275.00
														21.1L x 3.0W		SD DY 031MF 350	C	275.00
							Pattern Description Miniature 10 element strip gage with electrically independent grids. All grids parallel to long axis of strip. Grid centerline spacing 0.080" (2.0mm).												
031MH	EA XX 031MH 120	B	120 ± 0.5%	195.00			16.50	36.00	61.50			0.031/0.020	0.790 CP	0.032/0.070	0.080 CP	SA XX 031MH 120	C	220.00
												0.79/0.51	20.07 CP	0.81/1.78	2.01 CP			
												Matrix Size (Trim Border)		0.8301 x 0.120W				
														21.1L x 3.0W				
							Pattern Description Similar to 031MF preceding except alternate grids transverse to long axis of strip. Grid centerline spacings 0.080" and 0.070" (2.29mm and 1.78mm) alternately.												
031MJ	EA XX 031MJ 120	B	120 ± 0.5%	160.00			16.50	36.00	61.50			0.031 ES	0.790 CP	0.070 ES	0.080 CP	EP 08 031MJ 120	C	195.00
												0.79 ES	20.07 CP	1.78 ES	2.29 CP	SA XX 031MJ 120	C	220.00
												Matrix Size (Trim Border)		0.8301 x 0.120W		SK XX 031MJ 350	C	275.00
														21.1L x 3.0W				
							Pattern Description Similar to 031MF preceding but with all grids transverse to long axis of strip. Grid centerline spacing 0.080" (2.0mm).												
032SG	EA XX 032SG 120	B	120 ± 0.2%	22.00		9.00	2.76	3.50	6.25	3.50	6.25	0.032	0.064	0.032	0.072	EP 08 032SG 120	C	26.00
	MA XX 032SG 120	B	120 ± 0.2%	24.00				3.50				0.81	1.63	0.81	1.83	SA XX 032SG 120	C	40.00
												Matrix Size		0.16L x 0.19W				
	WA XX 032SG 120	C	120 ± 0.4%	40.00										4.1L x 4.8W		TA XX 032SG 120	C	30.00
							Pattern Description Miniature gage with all [illegible] geometry												

*NOTE: Options available but not normally recommended
See 'Optional Features' Section

GAGE PATTERN (Actual Size) Grids are Vertical Except as Noted	GAGE DESIGNATION Insert Desired S T C No in Spaces Marked XX	STOCK STATUS	RES. IN OHMS	LIST PKG. PRICE (Five Gages)	OPTIONS AVAILABLE Add Indicated Price to Package Price. Note: Stock Status Symbols Do Not Apply to Gages with Optional Features							DIMENSIONS IN (INCHES / MILLIMETRES) M - Matrix S - Section (e.g. S1 - Sec 1) LG - Gage Length				OTHER SERIES AVAILABLE		
						W	E	S	SE	L	LE	GAGE LENGTH	OVERALL LENGTH	GRID WIDTH	OVERALL WIDTH	GAGE DESIGNATION	STOCK STATUS	LIST PKG PRICE
040HD	VC ST 040HD 120 VK XX 040HD-120 VN ST 040HD 120	C B C	120 ± 0.1% 120 ± 0.1% 120 ± 0.1%	50.00 50.00 50.00	10.00† 10.00† 10.00†							0.040 1.02	0.175 4.45	0.032 0.81	0.032 0.81	YD DY 040HD 120	C	50.00
												Matrix Size →		0.23L x 0.09W 5.8L x 2.3W				
						Pattern Description: Miniature free grid pattern on strippable backing. Usually installed with ceramic adhesives for operation at high temperatures.													
041TP	EA XX 041TP 350 MA XX 041TP 350	B A	350 ± 0.2% 350 ± 0.2%	71.00 74.00			5.50	5.25 5.25	10.25			0.044 ES 1.12 ES	0.098 CP 2.49 CP	0.044 ES 1.12 ES	0.158 CP 4.01 CP	SA XX 041TP 350	B	96.00
												Matrix Size (Trim Marks) →		0.120L x 0.180W 3.0L x 4.6W		TA XX 041TP 350	C	79.00
(1X) (2X)																		
						Pattern Description: Miniature high resistance "W" type reactor. Used primarily in the MA Series on miniature transducers.													
045AL	EA XX 045AL 350 MA XX 045AL 350	A A	350 ± 0.15% 350 ± 0.15%	35.00 39.00			2.75	3.50 3.50	6.25			0.045 1.14	0.090 2.29	0.045 1.14	0.045 1.14	SA XX 045AL 350	B	60.00
												Matrix Size →		0.21L x 0.14W 5.3L x 3.6W		TA XX 045AL 350	C	43.00
						Pattern Description: Miniature high resistance transducer gage.												
050AH	EA XX 050AH 120 MA XX 050AH 120 ED DY 050AH 350	A A C	120 ± 0.15% 120 ± 0.15% 350 ± 0.4%	21.00 23.00 30.00			2.75 2.75	3.50 3.50 3.50	6.25 6.25	3.50* 3.50*	6.25* 6.25*	0.050 1.27	0.100 2.54	0.040 1.02	0.040 1.02	EP 08 050AH 120 SA XX 050AH 120 SK XX 050AH 350 SD DY 050AH 350	C C C C	32.00 41.00 62.00 51.00
												Matrix Size →		0.24L x 0.14W 6.1L x 3.6W		TA XX 050AH 120 TK XX 050AH 350 TD DY 050AH 350	C C C	26.00 33.00 32.00
						Pattern Description: Miniature transducer gage.												
050AR	EA XX 050AR 120 MA XX 050AR 120 ED DY 050AR 350 WA XX 050AR 120 WK XX 050AR 350	A B B C C	120 ± 0.15% 120 ± 0.15% 350 ± 0.4% 120 ± 0.1% 350 ± 0.5%	19.00 24.00 29.00 39.00 60.00		9.00 11.50* 11.50*	2.75 2.75	3.50 3.50 3.50	6.25 6.25	3.50* 3.50*	6.25* 6.25*	0.050 1.27	0.100 2.54	0.050 1.27	0.078 1.98	EP 08 050AR 120 SA XX 050AR 120 SK XX 050AR 350 SD DY 050AR 350 WD DY 050AR 350	B B B B C	25.00 39.00 50.00 49.00 49.00
												Matrix Size (Trim Marks) →		0.115L x 0.095W 2.9L x 2.4W		TA XX 050AR 120 TK XX 050AR 350 TD DY 050AR 350	C C C	25.00 31.00 30.00
						Pattern Description: General purpose miniature gage with large solder tabs.												
050SB	EA XX 050SB 120 MA XX 050SB 120 ED DY 050SB 350 WA XX 050SB 120 WK XX 050SB 350	A B A C C	120 ± 0.15% 120 ± 0.15% 350 ± 0.4% 120 ± 0.3% 350 ± 0.5%	22.00 25.00 30.00 40.00 50.00		9.00 11.50* 11.50*	2.75 2.75	3.50 3.50 3.50	6.25 6.25	3.50* 3.50*	6.25* 6.25*	0.050 1.27	0.070 1.78	0.040 1.02	0.080 2.03	EP 08 050SB 120 SA XX 050SB 120 SK XX 050SB 350 SD DY 050SB 350 WD DY 050SB 350	C C C C C	32.00 41.00 62.00 51.00 51.00
												Matrix Size →		0.22L x 0.21W 6.6L x 5.3W		TA XX 050SB 120 TK XX 050SB 350 TD DY 050SB 350	C C C	27.00 33.00 32.00
						Pattern Description: Similar to the 050AH pattern preceding but with solder tabs at side of grid.												

*NOTE: Options available but not normally recommended. See 'Optional Features' Section.
†Option SW1 2. See 'Optional Features' Section.

GAGE PATTERN (Actual Size) Grids are Vertical Except as Noted	GAGE DESIGNATION Insert Desired S T C No in Spaces Marked XX	STOCK STATUS	RES. IN OHMS	LIST PKG. PRICE (Five Gages)	OPTIONS AVAILABLE Add Indicated Price to Package Price Note: Stock Status Symbols Do Not Apply to Gages with Optional Features							DIMENSIONS IN INCHES / MILLIMETRES				OTHER SERIES AVAILABLE		
						W	E	S	SE	L	LE	GAGE LENGTH	OVERALL LENGTH	GRID WIDTH	OVERALL WIDTH	GAGE DESIGNATION	Stock Status	LIST PKG. PRICE
060TG	EA-XX-060TG-350	C	350 ± 0.2%	57.00				5.25	10.25	6.00	13.00	0.060 ES	0.250 CP	0.070 ES	0.070 CP	EP 08 060TG 350	C	70.00
	MA-XX-060TG-350	B	350 ± 0.2%	62.00				6.25				1.27 ES	6.35 CP	1.78 ES	1.78 CP	SA XX 060TG 350	C	81.00
												Matrix Size (Trim Marks) →		0.290 x 0.110W				
	WA-XX-060TG-350	C	350 ± 0.4%	81.00										7.41 x 2.8W		TA XX 060TG 350	C	67.00
(1X) (2X)					Pattern Description: Miniature high resistance 90° two resistor Sections have a common solder tab													
0608N	EA-XX-0608N-120	C	120 ± 0.15%	20.00			2.75	3.50	6.25			0.060	0.108	0.054	0.054	SA XX 0608N 120	B	43.00
	MA-XX-0608N-120	C	120 ± 0.15%	22.00				3.50				1.52	2.74	1.37	1.37	SK XX 0608N 350	C	48.00
	ED DY 0608N 350	C	350 ± 0.4%	27.00			2.75	3.50	6.25			Matrix Size (Trim Marks) →		0.126t x 0.070W		SD DY 0608N 350	C	47.00
														3.1L x 1.8W		TA XX 0608N 120	C	28.00
					Pattern Description: Miniature high performance transducer gage											TK XX 0608N 350	C	34.00
																TD DY 0608N 350	C	33.00
060CC	EA-XX-060CC-350	A	350 ± 0.15%	26.00		9.00	2.75	3.50	6.25	3.50	6.25	0.060	0.200	0.180	0.180	EP 08 060CC 350	C	34.00
	MA-XX-060CC-350	A	350 ± 0.15%	27.00				3.50				1.52	5.08	4.57	4.57	SA XX 060CC 350	B	48.00
	ED DY 060CC 10C	B	1000 ± 0.4%	35.00			2.75	3.50	6.25	3.50*	6.25*	Matrix Size →		0.33L x 0.21W		SK XX 060CC 10C	C	55.00
	WA-XX-060CC-350	C	350 ± 0.3%	48.00		11.50*								8.4L x 6.9W		SD DY 060CC 10C	C	54.00
	WK-XX-060CC-10C	C	1000 ± 0.3%	55.00		11.50*	Pattern Description: Small high resistance transducer gage with high power handling capability									WD DY 060CC 10C	C	54.00
																TA XX 060CC 350	C	30.00
																TK XX 060CC 10C	C	35.00
																TD DY 060CC 10C	C	35.00
060CJ	EA-XX-060CJ-175	B	175 ± 0.15%	23.00		9.00	2.75	3.50	6.25	3.50	6.25	0.060	0.200	0.180	0.180	SA XX 060CJ 175	B	45.00
	MA-XX-060CJ-175	B	175 ± 0.15%	26.00				3.50				1.52	5.08	4.57	4.57	SK XX 060CJ 500	B	52.00
	ED DY-060CJ-500	B	500 ± 0.4%	30.00			2.75	3.50	6.25	3.50*	6.25*	Matrix Size →		0.33L x 0.21W		SD DY 060CJ 500	C	51.00
	WA XX 060CJ 175	C	175 ± 0.3%	45.00		11.50*								8.4L x 6.9W		WD DY 060CJ 500	C	51.00
	WK XX-060CJ-500	C	500 ± 0.3%	52.00		11.50*	Pattern Description: Identical to the 060CC preceding except for resistance. Intended for use in 8 gage bridge circuits									TA XX 060CJ 175	C	27.00
																TK XX 060CJ 500	C	31.00
																TD DY 060CJ 500	C	31.00
060CP	EA XX-060CP 120	A	120 ± 0.15%	22.00		9.00	2.75	3.50	6.25	3.50	6.25	0.060	0.200	0.180	0.180	EP 08 060CP 120	B	29.00
	MA XX 060CP-120	B	120 ± 0.15%	23.00				3.50				1.52	5.08	4.57	4.57	SA XX 060CP 120	B	43.00
	ED DY-060CP 350	B	350 ± 0.4%	27.00			2.75	3.50	6.25	3.50*	6.25*	Matrix Size →		0.35L x 0.21W		SK XX 060CP 350	B	50.00
	WA XX 060CP 120	C	120 ± 0.3%	43.00		11.50*								8.9L x 6.9W		SD DY 060CP 350	B	50.00
	WK XX 060CP-350	C	350 ± 0.3%	50.00		11.50*	Pattern Description: Identical to the 060CC and 060CJ pattern preceding except for grid resistance									WD DY 060CP 350	B	50.00
																TA XX 060CP 120	C	25.00
																TK XX 060CP 350	C	32.00
																TD DY 060CP 350	C	32.00
060CD	EA-XX-060CD-350	A	350 ± 0.15%	22.00		9.00	2.75	3.50	6.25	3.50	6.25	0.060	0.150	0.100	0.100	EP 08 060CD 350	C	32.00
	MA XX 060CD-350	A	350 ± 0.15%	23.00				3.50				1.52	3.81	2.54	2.54	SA XX 060CD 350	A	44.00
	ED DY 060CD-10C	C	1000 ± 0.4%	32.00			2.75	3.50	6.25	3.50*	6.25*	Matrix Size →		0.28t x 0.20W		SK XX 060CD 10C	C	51.00
	WA XX 060CD 350	C	350 ± 0.3%	44.00		11.50*								7.1L x 5.1W		SD DY 060CD 10C	C	51.00
	WK XX 060CD 10C	C	1000 ± 0.3%	51.00		11.50*	Pattern Description: Small high resistance transducer gage									WD DY 060CD 10C	C	51.00
																TA XX 060CD 350	C	27.00
																TK XX 060CD 10C	C	32.00
																TD DY 060CD 10C	C	32.00

*NOTE: Options available but not normally recommended. See 'Optional Features' Section.

GAGE PATTERN (Actual Size) Grids are Vertical Except as Noted	GAGE DESIGNATION Insert Desired S T C No in Spaces Marked XX	STOCK STATUS	RES. IN OHMS	LIST PKG. PRICE (Five Gages)	OPTIONS AVAILABLE Add Indicated Price to Package Price Note: Stock Status Symbols Do Not Apply to Gages with Optional Features							DIMENSIONS IN M - Matrix S - See Note 8 Sec. 1 FS - Each Section [INCHES / MILLIMETERS] CP - Comp Pair GD - Grid Die PD - Pair Die APD - Act Pair Die				OTHER SERIES AVAILABLE		
						W	F	S	SF	I	IF	GAGE LENGTH	OVERALL LENGTH	GRID WIDTH	OVERALL WIDTH	GAGE DESIGNATION	Stock Status	LIST PKG. PRICE
060CN	EA XX 060CN 120	B	120 ± 0.15%	19.00		9.00	2.75	3.50	6.25	3.50	6.25	0.060	0.150	0.100	0.100	EP 08 060C N 120	C	25.00
	MA XX 060CN 120	B	120 ± 0.15%	21.00				3.50				1.52	3.81	2.54	2.54	SA XX 060C N 120	B	39.00
	ED DY 060CN 350	C	350 ± 0.4%	24.00			2.75	3.50	6.25	3.50*	6.25*	Matrix Size →		0.280 x 0.20W		SK XX 060C N 350	B	46.00
	WA XX 060CN 120	C	120 ± 0.3%	39.00		11.50*								7.1L x 5.1W		SD DY 060C N 350	B	46.00
	WK XX 060CN 350	C	350 ± 0.3%	46.00		11.50*	Pattern Description: Small transducer gage. Identical to 060CD pattern preceding except for grid resistance.									WD DY 060C N 350	C	46.00
																TA XX 060C N 120	C	23.00
																TK XX 060C N 350	C	30.00
																TD DY 060C N 350	C	30.00
060EK	EA XX 060EK 350	B	350 ± 0.15%	27.00			3.50	3.50	6.25	4.00	7.50	0.060	0.080	0.150	0.230	EP 08 060E K 350	C	33.00
	MA XX 060EK 350	B	350 ± 0.15%	29.00				3.50				1.52	2.03	3.81	5.84	SA XX 060E K 350	C	47.00
	ED DY 060EK 10C	C	1000 ± 0.4%	34.00			3.50	3.50	6.25	4.00*	7.50*	Matrix Size (Trim Mark) →		0.120L x 0.270W		SK XX 060E K 10C	C	54.00
														3.0L x 6.9W		SD DY 060E K 10C	C	54.00
							Pattern Description: Small transducer gage with large grid area and side tab geometry.									TA XX 060E K 350	C	30.00
																TK XX 060E K 10C	C	35.00
																TD DY 060E K 10C	C	35.00
	ORIGINAL PAGE IS OF POOR QUALITY																	
060MU	EA XX 060MU 175	C	175 ± 0.15%	58.00				7.00	7.00	12.50		0.060 LS	0.070 CP	0.180 ES	0.180 CP	SA XX 060MU 175	C	88.00
	MA XX 060MU 175	B	175 ± 0.15%	64.00					7.00			1.52 LS	2.10 CP	4.57 ES	4.57 CP	SK XX 060MU 350	C	96.00
	MA XX 060MU 350	C	350 ± 0.15%	68.00					7.00			Matrix Size (Trim Mark) →		0.930L x 0.240W				
														23.6L x 6.1W				
							Pattern Description: Dual grid pattern for bending beam transducers. Normally used in 8 gage bridge circuits. Grid centerlines spaced 0.560" (14.22mm) apart.											
060MZ	EA XX 060MZ 120	C	120 ± 0.5%	100.00				8.75				0.060 ES	0.060 CP	0.160 ES	0.320 CP			
												1.52 ES	2.438 CP	4.06 ES	8.13 CP			
	ED DY 060MZ 350	C	350 ± 1%	120.00				8.75				Matrix Size (Untrimmed) →		0.980L x 0.360W				
	SA XX 060MZ 120	C	120 ± 1%	140.00										24.9L x 9.1W		TA XX 060MZ 120	C	100.00
GRIDS HORIZONTAL	SK XX 060MZ 350	C	350 ± 1%	155.00			Pattern Description: Full bridge pattern for use on 1.0" (25.4mm) diameter diaphragm transducers.									TK XX 060MZ 350	C	120.00

*NOTE: Options available but not normally recommended. See 'Optional Features' Section.

GAGE PATTERN (Actual Size) Grids are Vertical Except as Noted	GAGE DESIGNATION Insert Desired S T C No. in Spaces Marked XX	STOCK STATUS	RES. IN OHMS	LIST PKG. PRICE (Five Gages)	OPTIONS AVAILABLE Add Indicated Price to Package Price. Note: Stock Status Symbols Do Not Apply to Gages with Optional Features							DIMENSIONS IN (INCHES / MILLIMETRICS) M = Matrix; S = Section Line; L = Lead Section; CP = Compensated Grid Dia.; PD = Pitch Dia.; APD = Active Pitch Dia.				OTHER SERIES AVAILABLE		
						W	E	S	SE	L	LE	GAGE LENGTH	OVERALL LENGTH	GRID WIDTH	OVERALL WIDTH	GAGE DESIGNATION	Stock Status	LIST PKG. PRICE
060PB	EA XX 060PB 120	B	120 ± 0.2%	35.00		18.00	6.50	7.00	12.50	7.00	12.50	0.060 ES / 1.52 ES	0.120 CP / 3.05 CP	0.066 ES / 1.65 ES	0.150 CP / 3.81 CP	SA XX 060PB 120	C	67.00
	EA XX 060PB 350	B	350 ± 0.2%	40.00		18.00	6.50	7.00	12.50	7.00	12.50	Matrix Size → (Preformed)		0.180 x 0.200 / 4.6L x 5.1W		SA XX 060PB 350	C	68.00
	MA XX 060PB 120	B	120 ± 0.2%	38.00				7.00								SK XX 060PB 350	C	70.00
	MA XX 060PB 350	B	350 ± 0.2%	46.00				7.00								SK XX 060PB 500	C	79.00
	ED DY 060PB 350	C	350 ± 0.4%	40.00			6.50	7.00	12.50			Pattern Description: Dual pattern for testing from transducers. Compensated grid centerlines spaced 0.085" (2.16mm) apart				SD DY 060PB 350	C	70.00
	ED DY 060PB 500	C	500 ± 0.4%	51.00			6.50	7.00	12.50							SD DY 060PB 500	C	78.00
	WA XX 060PB 120	C	120 ± 0.3%	57.00		21.00*										WD DY 060PB 350	C	70.00
	WA XX 060PB 350	C	350 ± 0.3%	68.00		21.00*										WD DY 060PB 500	C	78.00
	WK XX 060PB 350	C	350 ± 0.3%	70.00		21.00*										TA XX 060PB 120	C	39.00
	WK XX 060PB 500	C	500 ± 0.3%	79.00		21.00*										TA XX 060PB 350	C	47.00
																TK XX 060PB 350	C	48.00
																TK XX 060PB 500	C	53.00
																TD DY 060PB 350	C	52.00
																TD DY 060PB 500	C	53.00
060WR	WA XX 060WR 120	A	120 ± 0.4%	91.00								0.060 ES / 1.52 ES	0.240 M / 6.10 M	0.060 ES / 1.52 ES	0.300 M / 7.62 M	SA XX 060WR 120	C	91.00
	WK XX 060WR 120	B	120 ± 0.4%	119.00								Matrix Size → (Preformed)		0.240L x 0.300W / 6.1L x 7.6W		SK XX 060WR 120	C	119.00
	WK XX 060WR 350	B	350 ± 0.4%	131.00			Pattern Description: Small 3 element 45° rectangular stacked rosette									SK XX 060WR 350	C	131.00
060WT	WA XX 060WT 120	A	120 ± 0.4%	70.00								0.060 ES / 1.52 ES	0.240 M / 6.10 M	0.060 ES / 1.52 ES	0.300 M / 7.62 M	SA XX 060WT 120	C	70.00
	WK XX 060WT 120	B	120 ± 0.4%	92.00								Matrix Size → (Preformed)		0.240L x 0.300W / 6.1L x 7.6W		SA XX 060WT 120	C	92.00
	WK XX 060WT 350	B	350 ± 0.4%	104.00			Pattern Description: Small 2 element 90° "tee" stacked rosette									SK XX 060WT 350	C	104.00
062WT 'C' FEATURE	CEA XX 062WT 120	C	120 ± 0.5%	50.00	CEA Series Strain Gages feature large integral copper solder tabs and a completely encapsulated grid. Refer to the front of this Catalog for details.							0.062 ES / 1.57 ES	0.220 CP / 5.59 CP	0.120 ES / 3.05 ES	0.220 CP / 5.59 CP			
	CEA XX 062WT 350	C	350 ± 0.5%	66.00								Matrix Size → (Preformed)		0.310L x 0.310W / 7.9L x 7.9W				
							Pattern Description: Small 2 element 90° "tee" stack rosette. Exposed solder tabs are 0.07 x 0.04 (1.8mm x 1.0mm). Maximum operating temperature +125°F (+50°C)											
060WY	WA XX 060WY 120	B	120 ± 0.4%	91.00								0.060 ES / 1.52 ES	0.240 M / 6.10 M	0.060 ES / 1.52 ES	0.300 M / 7.62 M	SA XX 060WY 120	C	91.00
	WK XX 060WY 120	C	120 ± 0.4%	119.00								Matrix Size → (Preformed)		0.240L x 0.300W / 6.1L x 7.6W		SK XX 060WY 120	C	119.00
	WK XX 060WY 350	C	350 ± 0.4%	131.00			Pattern Description: Small 3 element 60° delta stacked rosette									SK XX 060WY 350	C	131.00

*NOTE: Options available but not normally recommended. See 'Optional ... ves' Section.

GAGE PATTERN (Actual Size) Grids are Vertical Except as Noted	GAGE DESIGNATION Insert Desired S T C No in Spaces Marked XX	STOCK STATUS	RES. IN OHMS	LIST PKG. PRICE (Five Gages)	OPTIONS AVAILABLE Add Indicated Price to Package Price Note: Stock Status Symbols Do Not Apply to Gages with Optional Features							DIMENSIONS IN M - Matrix S - Section (e.g. S1 - Sec. 1) FG - Each Section [INCHES] [MILLIMETRES] CP - Comp Pair GD - Grid Die PD - Pair Die APD - Act Pair Die				OTHER SERIES AVAILABLE		
						W	E	S	SE	L	LE	GAGE LENGTH	OVERALL LENGTH	GRID WIDTH	OVERALL WIDTH	GAGE DESIGNATION	Stock Status	LIST PKG. PRICE
062AA	EA XX 062AA 120	A	120 ± 0.15%	19.00			2.75					0.062	0.150	0.062	0.100	EP 08 062AA 120	A	25.00
	MA XX-062AA-120	B	120 ± 0.15%	24.00								1.57	3.81	1.57	2.54			
	ED DY-062AA-350	A	350 ± 0.4%	26.00			2.75					Matrix Size →		0.35L x 0.21W				
														8.9L x 5.7W		TA XX 062AA 120	C	26.00
																TK XX 062AA 350	C	34.00
																TD DY 062AA 350	C	34.00
					Pattern Description: General purpose pattern with large solder tabs. See the 062AP design for WA, WK, and other series with this grid size														
062AK	EA XX 062AK-1	A	120 ± 0.15%	18.50			2.75					0.062	0.160	0.062	0.062	EP 08 062AK 120	A	25.00
	MA XX 062AK-120	B	120 ± 0.15%	23.00								1.57	4.06	1.57	1.57			
	ED DY 062AK 350	A	350 ± 0.4%	25.00			2.75					Matrix Size →		0.29L x 0.15W				
														7.4L x 3.8W		TA XX 062AK 120	C	25.00
																TK XX 062AK 350	C	33.00
																TD DY 062AK 350	C	33.00
					Pattern Description: General purpose pattern with elongated solder tabs. See the 062AP design for WA, WK, and other series with this grid size														
062AP	EA XX 062AP 120	A	120 ± 0.15%	15.50		9.00	2.75	3.50	6.25	3.50	6.25	0.062	0.114	0.062	0.062	EP 08 062AP 120	B	20.00
	MA XX-062AP-120	A	120 ± 0.15%	19.00				3.50				1.57	2.90	1.57	1.57	SA XX 062AP 120	A	27.00
	ED DY-062AP-350	B	350 ± 0.4%	21.00			2.75	3.50	6.25	3.50*	6.25*	Matrix Size →		0.25L x 0.16W		SK XX 062AP 350	A	41.00
	WA XX 062AP-120	A	120 ± 0.3%	27.00		11.50*								6.4L x 4.1W		SD DY 062AP 350	B	40.00
	WK XX 062AP-350	A	350 ± 0.3%	41.00		11.50*	Pattern Description: Widely used general purpose pattern									WD DY 062AP 350	A	40.00
																TA XX 062AP 120	C	21.00
																TK XX 062AP 350	C	27.00
																TD DY 062AP 350	C	27.00
062AQ	EA XX-062AQ-350	A	350 ± 0.15%	21.00		9.00	2.75	3.50	6.25	3.50	6.25	0.062	0.114	0.062	0.062	EP 08 062AQ 350	C	28.00
	MA XX 062AQ-350	A	350 ± 0.15%	24.00				3.50				1.57	2.90	1.57	1.57	SA XX 062AQ 350	A	32.00
	ED DY-062AQ 500	B	500 ± 0.4%	27.00			2.75	3.50	6.25	3.50*	6.25*	Matrix Size →		0.25L x 0.16W		SK XX 062AQ 500	C	47.00
	WA XX 062AQ-350	B	350 ± 0.3%	32.00		11.50*								6.4L x 4.1W		SD DY 062AQ 500	C	46.00
	WK XX 062AQ-500	C	500 ± 0.3%	47.00		11.50*	Pattern Description: General purpose pattern identical to 062AP pattern preceding but with high resistance grid									WD DY 062AQ 500	B	46.00
																TA XX 062AQ 350	C	27.00
																TK XX 062AQ 500	C	35.00
																TD DY 062AQ 500	C	34.00
062UW C FEATURE	CEA-XX-062UW-120	A	120 ± 0.3%	23.00	CEA Series Strain Gages feature large integral copper solder tabs and a completely encapsulated grid. Refer to the front of this Catalog for details.							0.062	0.270	0.120	0.120			
	CEA XX 062UW 350	A	350 ± 0.3%	28.00								1.57	6.59	3.05	3.05			
												Matrix Size (Prethinned) →		0.310L x 0.190W				
														7.9L x 4.8W				
					Pattern Description: General purpose gage. Exposed solder tab area 0.07" x 0.04" (1.8mm x 1.0mm)														
062AU	EA-XX 062AU-040	C	40 ± 0.15%	14.00		9.00	2.75	3.50	6.25	3.50	6.25	0.062	0.114	0.062	0.062	SA XX 062AU 040	C	25.00
	MA-XX 062AU-040	C	40 ± 0.15%	17.00				3.50				1.57	2.90	1.57	1.57	SK XX 062AU 120	A	32.00
	ED-DY-062AU-120	B	120 ± 0.4%	20.00			2.75	3.50	6.25	3.50*	6.25*	Matrix Size →		0.25L x 0.16W		SD DY 062AU 120	C	31.00
	WA XX 062AU-040	C	40 ± 0.3%	25.00										6.4L x 4.1W		WD DY 062AU 120	C	31.00
	WK-XX 062AU-120	A	120 ± 0.3%	32.00		11.00*	Pattern Description: Identical to 062AP pattern preceding but with low resistance grid. Normally used when 120 ohm resistance is needed in FD, WK, or SK Series									TA XX 062AU 040	C	18.00
																TK XX 062AU 120	C	23.00
																TD DY 062AU 120	C	22.00

*NOTE: Options available but not normally recommended
See 'Optional Features' Section.

GAGE PATTERN (Actual Size) Grids are Vertical Except as Noted	GAGE DESIGNATION Insert Desired S T C No in Spaces Marked XX	STOCK STATUS	RES. IN OHMS	LIST PKG. PRICE (Five Gages)	OPTIONS AVAILABLE Add Indicated Price to Package Price Note: Stock Status Symbols Do Not Apply to Gages with Optional Features							DIMENSIONS IN M - Matrix b - Section to g b1 - Sec 1) L5 - Last Section INCHES MILLIMETRES CP - Comp Pad GP - Grid Dia PD - Pad Dia APD - Act Pad Dia				OTHER SERIES AVAILABLE		
						W	E	S	SE	L	LE	GAGE LENGTH	OVERALL LENGTH	GRID WIDTH	OVERALL WIDTH	GAGE DESIGNATION	Stock Status	LIST PKG PRICE
062DF	EA XX 062DF 120	A	120 ± 0 15%	17 50			3 50	3 50	6 25	4 00	7 50	0 062	0 190	0 062	0 062	EP 08 062DF 120	B	22 00
	MA XX-062DF-120	A	120 ± 0 15%	20 00				3 50				1 57	4 83	1 57	1 57	SA XX 062DF 120	C	40 00
	ED DY-062DF 350	B	350 ± 0 4%	22 00			3 50	3 50	6 25	4 00*	7 50*	Matrix Size →		0 321 x 0 10W		SK XX 062DF 350	A	45 00
	WA XX-062DF-120	C	120 ± 0 3%	40 00										8 1L x 4 1W		SD DY 062DF 350	C	43 00
	WK XX-062DF-350	C	350 ± 0 3%	45 00			Pattern Description General purpose pattern with solder tabs at ends of grid									WD DY 062DF 350	C	43 00
																TA XX 062DF 120	C	22 00
																TK XX 062DF 350	C	29 00
																TD DY 062DF 350	C	27 00
062ED	EA XX-062ED-120	A	120 ± 0 15%	17 50			3 50	3 50	6 25	4 00	7 50	0 062	0 076	0 062	0 190	EP 08 062ED 120	B	22 00
	MA XX-062ED 120	A	120 ± 0 15%	20 00				3 50				1 57	1 93	1 57	4 83	SA XX 062ED 120	C	40 00
	ED DY-062ED-350	B	350 ± 0 4%	22 00			3 50	3 50	6 25	4 00*	7 50*	Matrix Size →		0 21L x 0 20W		SK XX 062ED 350	A	45 00
	WA XX-062ED 120	C	120 ± 0 3%	40 00										5 3L x 7 4W		SD DY 062ED 350	C	43 00
	WK-XX-062ED-350	C	350 ± 0 3%	45 00			Pattern Description General purpose pattern Similar to 062DF preceding but with tabs at sides of grid									WD DY 062ED 350	C	43 00
																TA XX 062ED 120	C	22 00
																TK XX 062ED 350	C	29 00
																TD DY 062ED 350	C	27 00
062DN	EA XX-062DN-350	A	350 ± 0 15%	23 00			3 50	3 50	6 25	4 00	7 50	0 062	0 190	0 062	0 062	EP 08 062DN 350	C	30 00
	MA XX-062DN-350	B	350 ± 0 15%	26 00				3 50				1 57	4 83	1 57	1 57	SA XX 062DN 350	B	42 00
	ED-DY-062DN-500	C	500 ± 0 4%	29 00			3 50	3 50	6 25	4 00*	7 50*	Matrix Size →		0 341 x 0 18W		SK XX 062DN 500	C	47 00
	WA XX-062DN-350	C	350 ± 0 3%	42 00										8 6L x 4 6W		SD DY 062DN 500	C	46 00
	WK-XX-062DN-500	C	500 ± 0 3%	47 00			Pattern Description Identical to 062DF preceding except for grid resistance									WD DY 062DN 500	C	46 00
																TA XX 062DN 350	C	28 00
																TK XX 062DN 500	C	35 00
																TD DY 062DN 500	C	33 00
062EN	EA-XX-062EN 350	A	350 ± 0 15%	23.00			3.50	3 50	6 25	4.00	7.50	0 062	0 076	0 062	0 190	EP 08 062EN 350	C	30 00
	MA-XX-062EN-350	B	350 ± 0 15%	26 00				3 50				1 57	1 93	1 57	4 83	SA XX 062EN 350	B	42 00
	ED DY-062EN-500	C	500 ± 0 4%	29.00			3.50	3 50	6 25	4 00*	7 50*	Matrix Size →		0 23L x 0 31W		SK XX 062EN 500	C	47 00
	WA XX-062EN 350	C	350 ± 0 3%	42.00										5 8L x 7 9W		SD DY 062EN 500	C	46 00
	WK-XX-062EN 500	C	500 ± 0 3%	47.00			Pattern Description. Identical to 062ED preceding except for grid resistance									WD DY 062EN 500	C	46 00
																TA XX 062EN 350	C	28 00
																TK XX 062EN 500	C	35 00
																TD DY 062EN 500	C	33 00
062DL	EA-XX-062DL 060	B	60 ± 0 15%	16 50			3.50	3.50	6 25	4 00	7.50	0 062	0 175	0 055	0 055	SA XX 062DL 060	B	40 00
	MA-XX-062DL-060	B	60 ± 0 15%	20.00				3 50				1 57	4 45	1 40	1 40	SK XX 062DL 175	B	45 00
	ED-DY-062DL 175	C	175 ± 0 4%	22.00			3.50	3 50	6 25	4.00*	7.50*	Matrix Size →		0 301 x 0 15W		SD DY 062DL 175	C	43 00
	WA XX 062DL 060	C	60 ± 0 3%	40.00										7 6L x 3 8W		WD DY 062DL 175	C	43 00
	WK XX-062DL-175	C	175 ± 0 3%	45 00			Pattern Description 45° Torque gage See 062DW pattern below for higher resistance version of this pattern									TA XX 062DL 060	C	22 00
																TK XX 062DL 175	C	30 00
																TD DY 062DL 175	C	27 00
062DR	EA XX 062DR 060	B	60 ± 0 15%	16.50			3.50	3 50	6 25	4.00	7.50	0 062	0 175	0 055	0 055	SA XX 062DR 060	B	40 00
	MA-XX 062DR 060	B	60 ± 0 15%	20 00				3 50				1 57	4 45	1 40	1 40	SK XX 062DR 175	B	45 00
	ED DY-062DR 175	C	175 ± 0 4%	22.00			3.50	3.50	6.25	4 00*	7.50*	Matrix Size →		0 30L x 0 15W		SD DY 062DR 175	C	43 00
	WA-XX-062DR 060	C	60 ± 0 3%	40 00										7 6L x 3 8W		WD DY 062DR 175	C	43 00
	WK-XX-062DR-175	C	175 ± 0 3%	45.00			Pattern Description 45° Torque gage Identical to 062DL pattern preceding but with opposite grid angle									TA XX 062DR 060	C	22 00
																TK XX 062DR 175	C	30 00
																TD DY 062DR 175	C	27 00

*NOTE Options available but not normally recommended See 'Optional Features' Section

GAGE PATTERN (Actual Size) Grids are Vertical Except as Noted	GAGE DESIGNATION Insert Desired S T C No in Spaces Marked XX	STOCK STATUS	RES. IN OHMS	LIST PKG. PRICE (Five Gages)	OPTIONS AVAILABLE Add Indicated Price to Package Price. Note: Stock Status Symbols Do Not Apply to Gages with Optional Features							DIMENSIONS IN M - Matrix S - Section (e g S1 - Sec 1) EA - Each Section — INCHES / MILLIMETRES — CP - Comm Patt GD - Grid Dia PD - Patt Dia APD - Act Patt Dia				OTHER SERIES AVAILABLE		
						W	F	S	SE	I	LE	GAGE LENGTH	OVERALL LENGTH	GRID WIDTH	OVERALL WIDTH	GAGE DESIGNATION	Stock Status	LIST PKG PRICE
062DW	EA XX 062DW 120	B	120 ± 0 15%	17.50			3 50	3 50	6 25	4.00	7 50	0 062	0 175	0 055	0 055	SA XX 062DW 120	B	41 00
	MA XX 062DW 120	B	120 ± 0 15%	21 00				3 50				1 57	4 45	1 40	1 40	SK XX 062DW 350	B	53 00
	ED DY 062DW 350	B	350 ± 0 4%	25 00			3 50	3 50	6.25	4 00*	7.50*	Matrix Size →		0 30L x 0 15W		SD DY 062DW 350	B	53 00
	WA XX 062DW 120	C	120 ± 0 3%	41 00										7 6L x 3 8W		WD DY 062DW 350	C	53 00
	WK XX 062DW 350	C	350 ± 0 3%	53 00												1A XX 062DW 120	C	23 00
																1K XX 062DW 350	C	33 00
																1D DY 062DW 350	C	33 00
							Pattern Description: 45° Torque gage Identical to 062DL pattern preceding except for grid resistance											
062DY	EA XX 062DY 120	B	120 ± 0 15%	17 50			3 50	3 50	6.25	4.00	7.50	0 062	0 175	0 055	0 055	SA XX 062DY 120	B	41 00
	MA XX 062DY 120	B	120 ± 0 15%	21 00				3 50				1 57	4 45	1 40	1 40	SK XX 062DY 350	B	53 00
	ED DY 062DY 350	B	350 ± 0 4%	25 00			3.50	3.50	6 25	4.00*	7.50*	Matrix Size →		0 30L x 0 15W		SD DY 062DY 350	B	53 00
	WA XX 062DY 120	C	120 ± 0 3%	41 00										7 6L x 3 8W		WD DY 062DY 350	C	53 00
	WK XX 062DY 350	C	350 ± 0 3%	53 00												1A XX 062DY 120	C	23 00
																1K XX 062DY 350	C	33 00
																1D DY 062DY 350	C	33 00
							Pattern Description: 45° Torque gage Identical to 062DW pattern preceding but with opposite grid angle											
062HB	VC ST 062HB 120	B	120 ± 0 3%	45 00	10 00							0 062	0 265	0 150	0 190	VD DY 062HB 120	C	45 00
	VK XX 062HB 120	A	120 ± 0 3%	45 00	10 00							1 57	6 73	3 81	4 83			
	VN ST 062HB 120	B	120 ± 0 3%	45 00	10 00							Matrix Size →		0 38L x 0 25W				
														9 7L x 6 4W				
							Pattern Description: "Free grid" pattern supplied on a strippable backing for use with the tape handling method Normally installed with ceramic adhesives											
062MD 062MJ	EA XX 062MD 120	B	120 ± 0 5%	195.00								0 062 ES	0 795 CP	0 062 ES	0 350 CP	EP 08 062MD 120	C	270 00
												1 57 ES	20 19 CP	1 57 ES	8 89 CP			
												Matrix Size →		0 95L x 0 45W				
														24 1L x 11 4W				
							Pattern Description: 10 Element strip gage with one tab common to all sections All grids parallel to long axis of strip Grid centerline spacing 0 080" (2 03mm)											
	EA XX 062MJ 120	B	120 ± 0 5%	150 00			16 50	35 00	51 50			0 062 ES	1 580 CP	0 140 ES	0 180 CP	EP 08 062MJ 120	C	180 00
												1 57 ES	40 13 CP	3 56 ES	4 57 CP	SA XX 062MJ 120	C	240 00
	ED DY 062MJ 350	C	150 ± 1%	180 00			16 50	35 00	51 50			Matrix Size (Term Border) →		1 66L x 0 24W		SK XX 062MJ 350	C	270 00
														42 2L x 6 1W		SD DY 062MJ 350	C	270 00
							Pattern Description: 10 Element strip gage with electrically independent grids All grids transverse to long axis of strip Grid centerline spacing 0 160" (4 06mm)											
062MW	EA XX 062MW 120	B	120 ± 0 5%	160 00								0 062 ES	0 795 CP	0 050 ES	0 168 CP	EP 08 062MW 120	C	190 00
												1 57 ES	20 19 CP	1 27 ES	4 27 CP			
												Matrix Size →		0 89L x 0 26W				
														22 6L x 6 6W				
							Pattern Description: 10 Element strip gage with one tab common to all sections Similar to 062MD preceding but narrower geometry All grids parallel to long axis of strip Grid centerline spacing 0 080" (2 03mm)											

*NOTE: Options available but not normally recommended See 'Optional Features' Section
†Option SWI 2 See 'Optional Features' Section

GAGE PATTERN (Actual Size) Grids are Vertical Except as Noted	GAGE DESIGNATION Insert Desired S T C No in Spaces Marked XX	STOCK STATUS	RES. IN OHMS	LIST PKG. PRICE (Five Gages)	OPTIONS AVAILABLE Add Indicated Price to Package Price. Note: Stock Status Symbols Do Not Apply to Gages with Optional Features							DIMENSIONS IN M - Metric S - Section (e g S1 - Sec 1) LS - Lead Section INCHES / MILLIMETRES CP - Comp Path GD - Grid Dia PD - Path Dia APD - Act Path Dia				OTHER SERIES AVAILABLE		
						W	E	S	SE	L	LE	GAGE LENGTH	OVERALL LENGTH	GRID WIDTH	OVERALL WIDTH	GAGE DESIGNATION	Stock Status	LIST PKG. PRICE
062MV	EA XX 062MV 350	C	350 ± 0.2%	40.00			7.00	7.00	12.50			0.062 ES	0.213 CP	0.062 ES	0.062 CP	SA XX 062MV 350	C	62.00
	MA XX 062MV 350	C	350 ± 0.2%	46.00				7.00				1.57 ES	5.92 CP	1.57 ES	1.57 CP	SK XX 062MV 500	C	70.00
	ED DY 062MV 500	C	500 ± 0.5%	52.00			7.00		12.50			Matrix Size (Trim Marks) →		0.260L x 0.100W		SD DY 062MV 500	C	73.00
														6.6L x 2.5W		TA XX 062MV 350	C	50.00
							Pattern Description: Dual grid pattern used primarily on bonding transducer elements									TK XX 062MV 500	C	56.00
																TD DY 062MV 500	C	56.00
062RB	EA XX 062RB 120	A	120 ± 0.2%	65.00			8.00	10.50	18.50	10.50	18.50	0.062 ES	0.175 CP	0.062 ES	0.300 CP	EP 08 062RB 120	B	82.00
	MA XX 062RB 120	C	120 ± 0.2%	78.00								1.57 ES	4.45 CP	1.57 ES	7.62 CP	SA XX 062RB 120	B	92.00
	ED DY 062RB 350	C	350 ± 0.5%	82.00			8.00	10.50	18.50	10.50	18.50	Matrix Size →		0.41L x 0.45W		SK XX 062RB 350	B	104.00
	WA XX 062RB 120	A	120 ± 0.4%	92.00		28.00								10.4L x 11.4W				
	WK XX 062RB 350	B	350 ± 0.4%	104.00		28.00	Pattern Description: Small 45° rectangular single plane rosette with compact geometry											
062RG	EA XX 062RG 120	A	120 ± 0.2%	63.00		24.00						0.062 ES	0.162 CP	0.062 ES	0.400 CP			
	ED DY 062RG 350	C	350 ± 0.5%	78.00		24.00						1.57 ES	3.86 CP	1.57 ES	10.16 CP			
												Matrix Size (Trim Marks) →		0.230L x 0.440W				
														5.8L x 11.2W				
							Pattern Description: Small 45° rectangular single plane rosette. Similar to 062RB preceding but specifically designed for use with Option W in the EA & ED Series											
062RF	EA XX 062RF 350	B	350 ± 0.2%	73.00		24.00	8.00	10.50	18.50	10.50	18.50	0.062 ES	0.152 CP	0.062 ES	0.400 CP	SA XX 062RF 350	B	98.00
	MA XX 062RF 350	C	350 ± 0.2%	83.00				10.50				1.57 ES	3.86 CP	1.57 ES	10.16 CP			
	ED DY 062RF 500	B	500 ± 0.5%	87.00		24.00	8.00	10.50	18.50			Matrix Size (Trim Marks) →		0.235L x 0.440W				
														6.0L x 11.2W				
							Pattern Description: Small 45° rectangular single plane rosette designed for use with Option W identical to preceding 062RG pattern except for resistance											
062UR 'C' FEATURE	CEA XX 062UR 120	A	120 ± 0.4%	81.00	CEA Series Strain Gages feature large integral copper solder tabs and a completely encapsulated grid. Refer to the front of this Catalog for details							0.062 ES	0.220 CP	0.062 ES	0.420 CP			
	CEA XX 062UR 350	B	350 ± 0.4%	92.00								1.57 ES	5.59 CP	1.57 ES	10.67 CP			
												Matrix Size (Preliminary) →		0.320L x 0.480W				
														8.1L x 12.2W				
							Pattern Description: Small 45° rectangular single plane rosette in a compact geometry. Exposed solder tab area 0.07" x 0.04" (1.8mm x 1.0mm)											
062RE	EA XX 062RE 120	A	120 ± 0.2%	70.00				10.50	18.50			0.0625 ES	0.360 PD	0.0625 ES	0.360 PD	SA XX 062RE 120	C	95.00
	MA XX 062RE 120	C	120 ± 0.2%	75.00				10.50				1.59 ES	9.14 PD	1.59 ES	9.14 PD			
												Matrix Size →		0.42L x 0.42W				
														10.7L x 10.7W				
							Pattern Description: 45° Rectangular rosette used for residual stress measurement with the hole drilling method. Each verse grid centerline are on a 0.202" (5.13mm) diameter circle											

*NOTE: Options available but not normally recommended
See 'Optional Features' Section

GAGE PATTERN (Actual Size) Grids are Vertical Except as Noted	GAGE DESIGNATION Insert Desired S T C No in Spaces Marked XX	STOCK STATUS	RES. IN OHMS	LIST PKG. PRICE (Five Gages)	OPTIONS AVAILABLE Add Indicated Price to Package Price. Note: Stock Status Symbols Do Not Apply to Gages with Optional Features							DIMENSIONS IN M = Matrix S = Section (e.g. 01 for 1) EA = Each Section — INCHES / MILLIMETRES — CP = Comp Pad, GD = Grid Dia, PD = Pad Dia, APD = Art Pad Dia				OTHER SERIES AVAILABLE		
						W	F	S	SE	L	LE	GAGE LENGTH	OVERALL LENGTH	GRID WIDTH	OVERALL WIDTH	GAGE DESIGNATION	Stock Status	LIST PKG PRICE
0621H	FA XX 0621H-120	A	120 ± 0.2%	37.00			7.00	7.00	12.50	8.00	15.00	0.062 ES	0.175 CP	0.055 ES	0.115 CP	FP 08 0621H 120	C	50.00
	MA XX 0621H-120	B	120 ± 0.2%	44.00				7.00				1.57 ES	4.45 CP	1.40 ES	2.92 CP	SA XX 0621H 120	A	60.00
	ED DY 0621H 350	C	350 ± 0.5%	49.00			7.00	7.00	12.50	8.00*	15.00*	Matrix Size →		0.31L x 0.21W		SK XX 0621H 350	B	72.00
														7.9L x 5.3W		SD DY 0621H 350	C	72.00
							Pattern Description: 2 Element 90° torque gage. Sections are electrically independent.									TA XX 0621H 120	C	46.00
																TK XX 0621H 350	C	53.00
																TD DY 0621H 350	C	57.00
0621V	FA XX 0621V 350	A	350 ± 0.2%	48.00			7.00	7.00	12.50	8.00	15.00	0.062 ES	0.175 CP	0.055 ES	0.115 CP	SA XX 0621V 350	A	70.00
	MA XX 0621V 350	B	350 ± 0.2%	54.00				7.00				1.57 ES	4.45 CP	1.40 ES	2.92 CP	SK XX 0621V 500	C	75.00
	ED DY 0621V 500	C	500 ± 0.5%	57.00			7.00	7.00	12.50	8.00*	15.00*	Matrix Size →		0.27L x 0.21W		SD DY 0621V 500	C	75.00
														6.9L x 5.3W		TA XX 0621V 350	C	57.00
							Pattern Description: 2 Element 90° torque gage. Identical to 0621H preceding except for resistance.									TK XX 0621V 500	C	62.00
																TD DY 0621V 500	C	61.00
0621W	EA XX 0621W 120	A	120 ± 0.2%	37.00			7.00	5.25	10.25	6.00	13.00	0.062 ES	0.175 CP	0.055 ES	0.115 CP	SA XX 0621W 120	C	66.00
	MA XX 0621W-120	C	120 ± 0.2%	44.00				5.25				1.57 ES	4.45 CP	1.40 ES	2.92 CP	SK XX 0621W 350	C	72.00
	ED DY 0621W 350	C	350 ± 0.5%	49.00			7.00	5.25	10.25	6.00*	13.00*	Matrix Size →		0.32L x 0.23W		SD DY 0621W 350	C	72.00
														8.1L x 5.8W		TA XX 0621W 120	C	46.00
	WK XX 0621W-350	C	350 ± 0.4%	72.00			Pattern Description: 2 Element 90° torque gage. Identical to 0621H preceding except sections have a common solder tab.									TK XX 0621W 350	C	53.00
																TD DY 0621W 350	C	53.00
0621J	EA XX 0621J 350	B	350 ± 0.2%	46.00				5.25	10.25			0.062 ES	0.295 CP	0.080 ES	0.080 CP	SA XX 0621J 350	B	71.00
	MA XX 0621J 350	C	350 ± 0.2%	56.00				5.25				1.57 ES	7.49 CP	2.03 ES	2.03 CP			
												Matrix Size →		0.45L x 0.19W				
														11.4L x 4.8W		TA XX 0621J 350	C	58.00
							Pattern Description: General purpose 90° "tee" rosette. Sections have a common solder tab.											
0621T	FA XX 0621T-120	A	120 ± 0.2%	37.00		18.00	5.50	7.00	12.50	7.00	12.50	0.062 ES	0.133 CP	0.075 ES	0.168 CP	FP 08 0621T 120	B	48.00
	FA XX-0621T-350	A	350 ± 0.2%	45.00		18.00	5.50	7.00	12.50	7.00	12.50	1.57 ES	3.38 CP	1.91 ES	4.27 CP	FP 08 0621T 350	B	57.00
	MA XX-0621T-120	B	120 ± 0.2%	44.00				7.00				Matrix Size →		0.28L x 0.26W		SA XX 0621T 120	A	60.00
	MA XX 0621T-350	B	350 ± 0.2%	54.00				7.00						7.1L x 6.6W		SA XX 0621T 350	B	70.00
	ED DY-0621T 350	C	350 ± 0.5%	49.00		18.00*	5.50	7.00	12.50	7.00*	12.50*	Pattern Description:				SK XX 0621T 350	A	73.00
												General purpose 90° "tee" rosette. Sections are electrically independent.				SD DY 0621T 350	C	72.00
	WA XX-0621T 120	B	120 ± 0.4%	60.00		21.00*										WD DY 0621T 350	C	72.00
	WA XX-0621T-350	C	350 ± 0.4%	70.00		21.00*										TA XX 0621T 120	C	46.00
	WK XX 0621T 350	B	350 ± 0.4%	73.00		21.00*										TA XX 0621T 350	C	53.00
																TK XX 0621T 350	C	57.00
																TD DY 0621T 350	C	56.00

*NOTE: Options available but not normally recommended. See 'Optional Features' Section

GAGE PATTERN (Actual Size) Leads are Vertical except as Noted	GAGE DESIGNATION Insert Desired S T C No in Spaces Marked XX	STOCK STATUS	RES. IN OHMS	LIST PKG. PRICE (Five Gages)	OPTIONS AVAILABLE Add Indicated Price to Package Price. Note: Stock Status Symbols Do Not Apply to Gages with Optional Features	W	E	S	SE	L	LE	DIMENSIONS IN M - Matrix; S - Section to g; S1 - Sec 1); LS - Last Section. INCHES / MILLIMETRES. CP - Comp Pad; GD - Grid Dia; PD - Pad Dia; APD - Act Pad Dia. GAGE LENGTH	OVERALL LENGTH	GRID WIDTH	OVERALL WIDTH	OTHER SERIES AVAILABLE GAGE DESIGNATION	Stock Status	LIST PKG PRICE
062TZ	EA-XX-062TZ-350	B	350 ± 0.2%	45.00		18.00	5.50	5.25	10.25	5.25	10.75	0.062 ES	0.133 CP	0.075 ES	0.165 CP	EP-XX-062TZ-350	C	57.00
												1.57 ES	3.38 CP	1.91 ES	4.27 CP	SA-XX-062TZ-350	C	70.00
	MA-XX-062TZ-350	C	350 ± 0.2%	54.00				5.25								SA-XX-062TZ-120	C	73.00
												Matrix Size →		0.28L x 0.26W				
	WA-XX-062TZ-350	C	350 ± 0.4%	70.00										7.1L x 6.6W		EA-XX-062TZ-350	C	53.00
	WK-XX-062TZ-120	C	120 ± 0.4%	73.00														
	Pattern Description General purpose 90° "fan" rosette. Similar in geometry to 062TT preceding except common tab version																	
062YE	EA-XX-062YE-350	B	350 ± 0.2%	73.00		24.00	8.00	10.50	18.50			0.062 ES	0.151 CP	0.062 ES	0.400 CP	SA-XX-062YE-350	B	98.00
	MA-XX-062YE-350	C	350 ± 0.2%	83.00								1.57 ES	3.84 CP	1.57 ES	10.16 CP			
												Matrix Size (Trim Marks) →		0.235L x 0.440W				
														6.0L x 11.2W				
	Pattern Description Small 60° delta single plane rosette. Normally used in the EA Series with Option W																	
070LC	EA-XX-070LC-350	C	350 ± 0.15%	51.00				3.50	6.25			0.070	0.164	0.022	0.022			
												1.78	4.17	0.56	0.56			
	MA-XX-070LC-350	C	350 ± 0.15%	53.00				3.50										
												Matrix Size (Trim Marks) →		0.180L x 0.30W				
	SA-XX-070LC-350	C	350 ± 0.3%	70.00										4.6L x 0.8W		EA-XX-070LC-350	C	55.00
	Pattern Description Very narrow gage for use in restricted areas and on special transducer designs																	
075AA	EA-XX-075AA-120	B	120 ± 0.15%	19.00			2.75					0.075	0.180	0.075	0.120	EP-XX-075AA-120	C	24.00
												1.91	4.57	1.91	3.05			
	MA-XX-075AA-120	C	120 ± 0.15%	25.00														
	ED-DY-075AA-350	C	350 ± 0.3%	27.00			2.75					Matrix Size →		0.31L x 0.18W				
														7.9L x 4.6W		EA-XX-075AA-120	C	26.00
																EK-XX-075AA-350	C	34.00
																ED-DY-075AA-350	C	34.00
	Pattern Description General purpose pattern with large solder tabs																	
075AM	EA-XX-075AM-350	B	350 ± 0.15%	24.00			2.75					0.075	0.180	0.075	0.120	EP-XX-075AM-350	C	29.00
												1.91	4.57	1.91	3.05			
	MA-XX-075AM-350	C	350 ± 0.15%	30.00														
	ED-DY-075AM-100	C	1000 ± 0.4%	32.00			2.75					Matrix Size →		0.31L x 0.18W				
														7.9L x 4.6W		EA-XX-075AM-350	C	31.00
																EK-XX-075AM-100	C	39.00
																ED-DY-075AM-100	C	39.00
	Pattern Description General purpose pattern with large solder tabs																	
090BU	EA-XX-090BU-175	C	175 ± 0.15%	20.00			2.75	3.50	6.25	3.50	6.25	0.090	0.160	0.036	0.040	SA-XX-090BU-175	C	40.00
												2.29	4.06	0.91	1.02			
	MA-XX-090BU-175	C	175 ± 0.15%	23.00				3.50								SK-XX-090BU-500	C	48.00
	ED-DY-090BU-500	C	500 ± 0.4%	29.00			2.75	3.50	6.25			Matrix Size (Trim Marks) →		0.18L x 0.050W		SD-DY-090BU-500	C	48.00
														4.6L x 1.3W		EA-XX-090BU-175	C	25.00
																EK-XX-090BU-500	C	33.00
	Pattern Description Narrow special purpose transducer gage															ED-DY-090BU-500	C	33.00

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*NOTE Options available but not normally recommended
See 'Optional Features' Section

GAGE PATTERN (Actual Size) Grids are Vertical Except as Noted	GAGE DESIGNATION Insert Desired S T C No in Spaces Marked XX	STOCK STATUS	RES. IN OHMS	LIST PKG. PRICE (Five Gages)	OPTIONS AVAILABLE Add Indicated Price to Package Price. Note: Stock Status Symbols Do Not Apply to Gages with Optional Features	W	E	S	SE	L	LE	DIMENSIONS IN M = Matrix, S = Section (e.g. S1 = Sec. 1), FS = Each Section. INCHES / MILLIMETRES. CP = Comp Patt, GD = Gold Dia, PD = Patt Dia, APD = Act Patt Dia. GAGE LENGTH	OVERALL LENGTH	GRID WIDTH	OVERALL WIDTH	OTHER SERIES AVAILABLE GAGE DESIGNATION	Stock Status	LIST PKG. PRICE
0900G	EA-XX-0900G-120	A	120 ± 0.15%	18.50			3.50	3.50	6.25	4.00	7.50	0.000	0.250	0.125	0.125	EP OR 0900G 120	B	24.00
	MA-XX-0900G-120	B	120 ± 0.15%	22.00				3.50				2.29	6.35	3.18	3.18	SA XX 0900G 120	B	42.00
	ED-DY-0900G-350	A	350 ± 0.4%	24.00			3.50	3.50	6.25			Matrix Size →		0.45L x 0.27W		SK XX 0900G 350	B	47.00
														11.4L x 6.9W		SD DY 0900G 350	C	46.00
																TA XX 0900G 120	C	24.00
																TK XX 0900G 350	C	31.00
																TD DY 0900G 350	C	29.00
					Pattern Description: Widely used in precision transducer applications, particularly in the MA Series													
090EF	EA-XX-090EF-120	A	120 ± 0.15%	18.50			3.50	3.50	6.25	4.00	7.50	0.000	0.125	0.125	0.250	EP OR 090EF 120	B	24.00
	MA-XX-090EF-120	B	120 ± 0.15%	22.00				3.50				2.29	3.18	3.18	6.35	SA XX 090EF 120	B	42.00
	ED-DY-090EF-350	C	350 ± 0.4%	24.00			3.50	3.50	6.25			Matrix Size →		0.33L x 0.40W		SK XX 090EF 350	B	47.00
														8.4L x 10.2W		SD DY 090EF 350	C	46.00
																TA XX 090EF 120	C	24.00
																TK XX 090EF 350	C	31.00
																TD DY 090EF 350	C	29.00
					Pattern Description: Similar to 0900G preceding but with opposite solder tab geometry													
0900H	EA-XX-0900H-350	A	350 ± 0.15%	22.00			3.50	3.50	6.25	4.00	7.50	0.000	0.250	0.125	0.125	EP OR 0900H 350	C	30.00
	MA-XX-0900H-350	B	350 ± 0.15%	26.00				3.50				2.29	6.35	3.18	3.18	SA XX 0900H 350	B	47.00
	FD-DY-0900H-10C	C	1000 ± 0.4%	30.00			3.50	3.50	6.25			Matrix Size →		0.45L x 0.27W		SK XX 0900H 10C	C	57.00
														11.4L x 6.9W		SD DY 0900H 10C	C	56.00
																TA XX 0900H 350	C	28.00
																TK XX 0900H 10C		37.00
																TD DY 0900H 10C	C	36.00
					Pattern Description: Precision transducer gage. High resistance version of the 0900G pattern preceding													
090EG	EA-XX-090EG-350	B	350 ± 0.15%	22.00			3.50	3.50	6.25	4.00	7.50	0.000	0.125	0.125	0.250	EP OR 090EG 350	C	30.00
	MA-XX-090EG-350	B	350 ± 0.15%	26.00				3.50				2.29	3.19	3.18	6.35	SA XX 090EG 350	C	47.00
		C	1000 ± 0.4%	30.00			3.50	3.50	6.25			Matrix Size →		0.33L x 0.40W		SK XX 090EG 10C	C	56.00
														8.4L x 10.2W		SD DY 090EG 10C	C	56.00
																TA XX 090EG 350	C	26.00
																TK XX 090EG 10C	C	37.00
																TD DY 090EG 10C	C	36.00
					Pattern Description: Similar to the 0900H pattern preceding with opposite solder tab geometry													
0900W	EA-XX-0900W-120	C	120 ± 0.15%	18.00			3.50	3.50	6.25	4.00	7.50	0.000	0.252	0.080	0.080	EP OR 0900W 120	C	23.00
	MA-XX-0900W-120	C	120 ± 0.15%	22.00				3.50				2.29	6.40	2.03	2.03	SA XX 0900W 120	C	41.00
	FD-DY-0900W-350	C	350 ± 0.3%	24.00			3.50	3.50	6.25			Matrix Size →		0.38L x 0.17W		SK XX 0900W 350	C	53.00
	WA-XX-0900W-120	C	120 ± 0.3%	41.00										9.7L x 4.3W		SD DY 0900W 350	C	53.00
	WK-XX-0900W-350	C	350 ± 0.3%	53.00												WD DY 0900W 350	C	53.00
																TA XX 0900W 120	C	24.00
																TK XX 0900W 350	C	31.00
																TD DY 0900W 350	C	31.00
					Pattern Description: 45° Torque gage. Larger version of the 0620W pattern preceding													
0900Y	EA-XX-0900Y-120	C	120 ± 0.15%	18.00			3.50	3.50	6.25	4.00	7.50	0.000	0.252	0.080	0.080	EP OR 0900Y 120	C	23.00
	MA-XX-0900Y-120	C	120 ± 0.15%	22.00				3.50				2.29	6.40	2.03	2.03	SA XX 0900Y 120	C	41.00
	FD-DY-0900Y-350	C	350 ± 0.3%	24.00			3.50	3.50	6.25			Matrix Size →		0.38L x 0.17W		SK XX 0900Y 350	C	53.00
	WA-XX-0900Y-120	C	120 ± 0.3%	41.00										9.7L x 4.3W		SD DY 0900Y 350	C	53.00
	WK-XX-0900Y-350	C	350 ± 0.3%	53.00												WD DY 0900Y 350	C	53.00
																TA XX 0900Y 120	C	24.00
																TK XX 0900Y 350	C	31.00
																TD DY 0900Y 350	C	31.00
					Pattern Description: 45° Torque gage. Identical to the 0900W pattern preceding except opposite gold angle													

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*NOTE: Options available but not normally stocked. See 'Optional Features' Section.

GAGE PATTERN (Actual Size) Grids are Vertical Except as Noted	GAGE DESIGNATION Insert Desired S T C No. in Spaces Marked XX	STOCK STATUS	RES. IN OHMS	LIST PKG. PRICE (Five Gages)	OPTIONS AVAILABLE Add Indicated Price to Package Price Note: Stock Status Symbols Do Not Apply to Gages with Optional Leads	W	E	S	SE	L	LE	DIMENSIONS (M = Matrix; S = Section to be Cut Out; LD = Lead Diameter) ALL DIMENSIONS IN INCHES (MILLIMETERS)				OTHER SERIES AVAILABLE		
												GAGE LENGTH	OVERALL LENGTH	GRID WIDTH	OVERALL WIDTH	GAGE DESIGNATION	STOCK STATUS	LIST PKG. PRICE
090SC	EA XX 090SC 120	B	120 ± 0.2%	28.00		9.00	2.75	3.50	6.25	3.50	6.25	0.000	0.120	0.010	0.000	EP 090SC 120	C	31.00
	MA XX 090SC 120	C	120 ± 0.2%	33.00				3.50				2.29	.XX	0.25	1.52	SA XX 090SC 120	C	36.00
												Matrix Size →		0.181 x 0.14W				
	WA XX 090SC 120	C	120 ± 0.4%	46.00		11.50								4.61 x 3.6W		TA XX 090SC 120	C	56.00
(1X) (2X)							Pattern Description: Slide tab gage with extremely narrow grid for use near discontinuities ... special transducer elements											
100BR	EA-XX-100BR-120	B	120 ± 0.15%	19.00		9.00	2.75	3.50	6.25	3.50	6.25	0.100	0.225	0.060	0.100	EP 100BR 120	C	24.00
	MA-XX-100BR 120	C	120 ± 0.15%	23.00				3.50				2.54	5.72	1.27	2.54	SA XX 100BR 120	B	31.00
	ED-DY-100BR-350	C	350 ± 0.4%	26.00			2.75	3.50	6.25			Matrix Size →		0.351 x 0.16W		SK XX 100BR 120	B	38.00
	WA-XX-100BR-120	C	120 ± 0.3%	31.00		11.50								8.91 x 4.1W		SD DY 100BR 350	C	38.00
	WK-XX-100BR-350	C	350 ± 0.3%	38.00		11.50	Pattern Description: Narrow grid transducer gage									WD DY 100BR 350	C	38.00
																TA XX 100BR 120	C	25.00
																TK XX 100BR 350	C	29.00
																TD DY 100BR 350	C	29.00
100TG	EA-XX-100TG 350	A	350 ± 0.2%	44.00				6.25	10.25			0.100 ES	0.400 CP	0.120 ES	0.120 CP	SA XX 100TG 350	C	60.00
	MA-XX-100TG 350	B	350 ± 0.2%	46.00				6.25				2.54 ES	10.16 CP	3.05 ES	3.05 CP	SK XX 100TG 10K	C	77.00
	ED-DY-100TG 10C	C	1000 ± 0.5%	58.00				6.25	10.25			Matrix Size → (Trim Marks)		0.430L x 0.145W		SD DY 100TG 10K	C	77.00
														10.9L x 3.7W		TA XX 100TG 350	C	40.00
							Pattern Description: Small high resistance 90° tee rosette for general purpose use									TK XX 100TG 10K	C	56.00
																TD DY 100TG 10K	C	56.00
100VA	EA-XX 100VA 350	B	350 ± 0.2%	44.00				7.00	12.50			0.100 ES	0.400 CP	0.120 ES	0.120 CP	EP 100VA 350	C	56.00
	MA-XX 100VA-350	C	350 ± 0.2%	46.00				7.00				2.54 ES	10.16 CP	3.05 ES	3.05 CP	SA XX 100VA 350	C	63.00
	ED-DY-100VA-10C	C	1000 ± 0.5%	56.00				7.00	12.50			Matrix Size → (Trim Marks)		0.465L x 0.175W		SK XX 100VA 10K	C	70.00
														11.6L x 4.4W		SD DY 100VA 10K	C	70.00
							Pattern Description: Small high resistance 90° tee rosette similar to 100TG providing two gage sections are electrically independent									TA XX 100VA 350	C	49.00
																TK XX 100VA 10K	C	66.00
																TD DY 100VA 10K	C	66.00
120NB	EA-XX 120NB 120	A	120 ± 0.3%	75.00				8.75	20.00			0.120 ES	0.410 CP	0.160 ES	0.410 CP	SA XX 120NB 120	A	110.00
	MA-XX-120NB 120	C	120 ± 0.3%	85.00				8.75				3.05 ES	10.41 CP	3.81 ES	10.41 CP	SK XX 120NB 350	C	150.00
												Matrix Size → (Trim Marks)		0.460L x 0.460W				
														11.4L x 11.4W		TA XX 120NB 120	C	90.00
	WK-XX-120NB 350	C	350 ± 0.4%	150.00			Pattern Description: Full bridge pattern for shear strain measurement. Very compact geometry. All grid material in gage for low end R, for highest overall accuracy									TK XX 120NB 350	C	110.00
120NC	EA-XX 120NC 350	B	350 ± 0.3%	90.00				8.75	20.00			0.120 ES	0.410 CP	0.160 ES	0.410 CP	SA XX 120NC 350	B	140.00
	MA-XX 120NC 350	C	350 ± 0.3%	105.00				8.75				3.05 ES	10.41 CP	3.81 ES	10.41 CP	SK XX 120NC 10K	B	190.00
												Matrix Size → (Trim Marks)		0.460L x 0.460W				
														11.4L x 11.4W		TA XX 120NC 350	C	115.00
							Pattern Description: Full bridge pattern for shear strain measurement. Identical to the 120NB pattern preceding except for resistance									TK XX 120NC 10K	C	135.00

*NOTE: Options available but not normally recommended. See 'Optional Features' Section

GAGE PATTERN (Actual Size) Grids are Vertical Except as Noted	GAGE DESIGNATION Insert Desired S T C No in Spaces Marked XX	STOCK STATUS	RES. IN OHMS	LIST PKG. PRICE (Five Gages)	OPTIONS AVAILABLE Add Indicated Price to Package Price. Note: Stock Status Symbols Do Not Apply to Gages with Optional Features	W	F	S	SF	I	IF	DIMENSIONS IN M = Metric; S = Section to g; FS = Each Section; (Ref Only) ALL LEAD LINES; CP = Center Pad; CD = Grid Dia; PD = Pad Dia; APD = Act Pad Dia	GAGE LENGTH	OVERALL LENGTH	GRID WIDTH	OVERALL WIDTH	OTHER SERIES AVAILABLE GAGE DESIGNATION	Stock Status	LIST PKG PRICE
120WR	WA XX 120WR 120	A	120 ± 0.3%	110.00									0.120 FS	0.340 M	0.080 FS	0.400 M	SA XX 120WR 120	R	110.00
	WA XX 120WR 350	A	350 ± 0.3%	135.00									3.05 FS	8.64 M	2.03 FS	10.16 M	SA XX 120WR 350	R	135.00
	WD DY 120WR 350	C	350 ± 0.5%	140.00									Matrix Size (Pretrimmed) →		0.341 x 0.40W		SK XX 120WR 120	C	135.00
	WK XX 120WR 120	A	120 ± 0.3%	135.00											8.6L x 10.2W		SK XX 120WR 350	C	152.00
	WK XX 120WR 350	A	350 ± 0.3%	152.00	Pattern Description: 11 Element 45° rectangular stacked rosette												SD DY 120WR 350	C	140.00
120WT	WA XX 120WT 120	A	120 ± 0.3%	70.00									0.120 FS	0.340 M	0.080 FS	0.400 M	SA XX 120WT 120	R	70.00
	WA XX 120WT 350	A	350 ± 0.3%	86.00									3.05 FS	8.64 M	2.03 FS	10.16 M	SA XX 120WT 350	R	86.00
	WD DY 120WT 350	C	350 ± 0.5%	97.00									Matrix Size (Pretrimmed) →		0.341 x 0.40W		SK XX 120WT 120	C	93.00
	WK XX 120WT 120	B	120 ± 0.3%	93.00											8.6L x 10.2W		SK XX 120WT 350	C	105.00
	WK XX 120WT 350	B	350 ± 0.3%	105.00	Pattern Description: 2 Element 90° tee stacked rosette												SD DY 120WT 350	C	97.00
125WT C' FEATURE	CFA XX 125WT 120	C	120 ± 0.5%	51.00	CEA Series Strain Gages feature large integral copper solder tabs and a completely encapsulated grid. Refer to the front of this Catalog for details.								0.125 FS	0.325 CP	0.100 FS	0.125 CP			
	CFA XX 125WT 350	C	350 ± 0.5%	66.00									3.18 FS	8.26 CP	4.57 FS	8.26 CP			
													Matrix Size (Pretrimmed) →		0.425L x 0.425W				
															10.8L x 10.8W				
					Pattern Description: 2 Element 90° tee stacked rosette. Exposed solder tab area 0.10" x 0.01" (2.54mm x 1.8mm). Maximum operating temperature for stacked rosettes is +125°F (+50°C)														
120WY	WA XX 120WY 120	B	120 ± 0.3%	110.00									0.120 FS	0.340 M	0.080 FS	0.400 M	SA XX 120WY 120	R	110.00
	WA XX 120WY 350	B	350 ± 0.3%	135.00									3.05 FS	8.64 M	2.03 FS	10.16 M	SA XX 120WY 350	R	135.00
	WD DY 120WY 350	C	350 ± 0.5%	140.00									Matrix Size (Pretrimmed) →		0.341 x 0.40W		SK XX 120WY 120	C	135.00
	WK XX 120WY 120	C	120 ± 0.3%	135.00											8.6L x 10.2W		SK XX 120WY 350	C	152.00
	WK XX 120WY 350	C	350 ± 0.3%	152.00	Pattern Description: 11 Element 60° delta stacked rosette												SD DY 120WY 350	C	140.00
125AA	EA XX 125AA 120	A	120 ± 0.15%	20.00			2.75						0.125	0.300	0.125	0.200	EC 08 125AA 120	R	20.00
	MA XX 125AA 120	B	120 ± 0.15%	24.00									3.18	7.62	3.18	5.08			
	ED DY 125AA 350	C	350 ± 0.3%	26.00			2.75						Matrix Size →		0.50L x 0.28W				
															12.7L x 7.1W		1A XX 125AA 120	C	26.00
					Pattern Description: General purpose pattern with large solder tabs. See the 125AD design for WA, WK, and other series with this grid size													1K XX 125AA 350	C	30.00
																	1D DY 125AA 350	C	29.00
125AC	EA XX 125AC 350	(A)	350 ± 0.15%	20.00		0.00	2.75	3.50	6.25	3.50	6.25		0.125	0.250	0.125	0.125	EC 08 125AC 350	R	25.00
	MA XX 125AC 350	A	350 ± 0.15%	22.00				3.50					3.18	6.35	3.18	3.18	SA XX 125AC 350	A	32.00
	ED DY 125AC 10C	B	1000 ± 0.3%	22.00			2.75	3.50	6.25	3.50*	6.25*		Matrix Size →		0.40L x 0.22W		SK XX 125AC 10C	C	38.00
	WA XX 125AC 350	B	350 ± 0.3%	32.00		11.50*									10.2L x 5.6W		SD DY 125AC 10C	C	38.00
	WK XX 125AC 10C	B	1000 ± 0.3%	38.00	Pattern Description: Widely used general purpose pattern with high resistance grid	11.50*											WD DY 125AC 10C	C	38.00
																	1A XX 125AC 350	C	25.00
																	1K XX 125AC 10C	C	29.00
																	1D DY 125AC 10C	C	29.00

*NOTE: Options available but not normally recommended. See 'Optional Features' Section.

GAGE PATTERN (Actual Size) Grids are Vertical Except as Noted	GAGE DESIGNATION Insert Desired S T C No in Space Marked XX	STOCK STATUS	RES. IN OHMS	LIST PKG. PRICE (Five Gages)	OPTIONS AVAILABLE Add Indicated Price to Package Price. Note: Stock Status Symbols Do Not Apply to Gages with Optional Features							DIMENSIONS IN M - Metric S - Solderless Leg SI - Use In LS - Left Version [Inch] ALL LINE FIELDS LP - Large Pad GD - Grid Dia PD - Pad Dia APD - Add Pad Dia				OTHER SERIES AVAILABLE		
						W	E	S	SE	L	LE	GAGE LENGTH	OVERALL LENGTH	GRID WIDTH	OVERALL WIDTH	GAGE DESIGNATION	Stock Status	LIST PKG. PRICE
125AD	EA XX-125AD 120	[A]	120 ± 0.15%	14.50		9.00	2.75	3.50	6.25	3.50	6.25	0.125	0.250	0.125	0.125	EP 08-125AD-120	A	10.00
	MA XX-125AD 120	A	120 ± 0.15%	17.50				3.50				3.18	6.35	3.18	3.18	SA XX-125AD-120	A	27.00
	ED DY-125AD 350	[A]	350 ± 0.3%	19.00			2.75	3.50	6.25	3.50	6.25	Matrix Size →		0.401 x 0.27W		SA XX-125AD-350	A	35.00
	WA XX-125AD 120	A	120 ± 0.3%	27.00		11.50								10.21 x 6.6W		SD DY-125AD-350	B	33.00
	WK XX-125AD-350	[A]	350 ± 0.3%	35.00		11.50	Pattern Description: Widely used general purpose pattern									WD DY-125AD-350	[A]	31.00
																1A XX-125AD-120	C	20.00
																1K XX-125AD-350	C	25.00
																1D DY-125AD-350	C	23.00
125UW 'C' FEATURE	CEA XX-125UW 120	[A]	120 ± 0.3%	21.00	CEA Series Strain Gages feature large integral copper solder tabs and a completely encapsulated grid. Refer to the front of this Catalog for details							0.125	0.325	0.180	0.180			
	CEA-XX-125UW 350	[A]	350 ± 0.3%	26.00								3.18	8.26	4.57	4.57			
												Matrix Size → (Preliminary)		0.4251 x 0.270W				
														10.81 x 6.9W				
							Pattern Description: General purpose gage. Exposed solder tab area 0.10" x 0.07" (2.6mm x 1.8mm)										
125AM	EA XX 125AM 350	C	350 ± 0.15%	22.00			2.75					0.125	0.300	0.125	0.200	EP 08-125AM-350	C	26.00
	MA XX 125AM 350	C	350 ± 0.15%	26.00								3.18	7.62	3.18	5.08			
	ED DY-125AM 10C	C	1000 ± 0.4%	30.00			2.75					Matrix Size →		0.501 x 0.28W				
														12.7L x 7.1W		1A XX-125AM-350	C	29.00
																1K XX-125AM-10K	C	32.00
							Pattern Description: General purpose pattern with large solder tabs and high resistance grid. See the 125AC design for WA SK and other series with this grid size									1D DY-125AM-10K	C	32.00
125AS	EA XX-125AS 500	B	500 ± 0.15%	27.00		9.00	2.75	3.50	6.25	3.50	6.25	0.125	0.250	0.125	0.125	EP 08-125AS-500	C	35.00
	MA-XX-125AS 500	C	500 ± 0.15%	32.00				3.50				3.18	6.35	3.18	3.13	SA XX-125AS-500	C	52.00
	ED DY-125AS-15C	C	1500 ± 0.4%	40.00			2.75	3.50	6.25			Matrix Size →		0.381 x 0.22W		SA XX-125AS-15K	C	65.00
	WA XX 125AS 500	C	500 ± 0.3%	52.00		11.50								9.7L x 5.6W		SD DY-125AS-15K	C	66.00
	WK-XX-125AS-15C	C	1500 ± 0.3%	65.00		11.50	Pattern Description: High resistance pattern									WD DY-125AS-15K	C	65.00
																1A XX-125AS-500	C	35.00
																1K XX-125AS-15C	C	45.00
																1D DY-125AS-15C	C	45.00

*NOTE. Options available but not normally recommended. See 'Optional Features' Section.

GAGE PATTERN (Actual Size) Grids are Vertical Except as Noted	GAGE DESIGNATION Insert Desired S T C No in Spaces Marked XX	STOCK STATUS	RES. IN OHMS	LIST PKG. PRICE (Five Gages)	OPTIONS AVAILABLE Add Indicated Price to Package Price. Note: Stock Status Symbols Do Not Apply to Gages with Optional Features							DIMENSIONS IN INCHES / MILLIMETERS				OTHER SERIES AVAILABLE		
						W	F	S	SE	L	LF	GAGE LENGTH	OVERALL LENGTH	GRID WIDTH	OVERALL WIDTH	GAGE DESIGNATION	Stock Status	LIST PKG PRICE
125BB	FA XX 125BB 120	A	120 ± 0.15%	16.00			2.75					0.125	0.245	0.000	0.000	FP OR 125BB 120	A	19.00
	MA XX 125BB 120	A	120 ± 0.15%	18.00								3.18	6.22	2.24	2.24	SA XX 125BB 120	B	27.00
	FD DY 125BB 350	B	350 ± 0.3%	21.00			2.75					Matrix Size		0.43L x 0.22W		SK XX 125BB 350	B	36.00
	WA XX 125BB 120	C	120 ± 0.3%	27.00										10.9L x 5.6W		SD DY 125BB 350	B	36.00
	WK XX 125BB 350	C	350 ± 0.3%	36.00			Pattern Description: Narrow general purpose pattern									WD DY 125BB 350	B	36.00
																TA XX 125BB 120	C	20.00
																TK XX 125BB 350	C	26.00
																TD DY 125BB 350	C	25.00
125BO	FA XX 125BO 060	C	60 ± 0.15%	12.00		9.00	2.75	3.50	6.25	3.50	6.25	0.125	0.230	0.000	0.000	SA XX 125BO 060	B	25.00
	MA XX 125BO 060	C	60 ± 0.15%	14.00				3.50				3.18	5.84	2.29	2.29	SK XX 125BO 175	C	35.00
	FD DY 125BO 175	C	175 ± 0.3%	17.00			2.75	3.50	6.25			Matrix Size		0.36L x 0.10W		SD DY 125BO 175	C	35.00
	WA XX 125BO 060	C	60 ± 0.3%	25.00		11.50*								9.1L x 4.8W		WD DY 125BO 175	C	35.00
	WK XX 125BO 175	C	175 ± 0.3%	35.00		11.50*	Pattern Description: Compact low resistance pattern. Often used in Kapp bridge circuits									TA XX 125BO 060	C	15.00
																TK XX 125BO 175	C	19.00
																TD DY 125BO 175	C	19.00
125BS	FA XX 125BS 040	C	40 ± 0.15%	11.00		9.00	2.75	3.50	6.25	3.50	6.25	0.125	0.250	0.050	0.000	SA XX 125BS 040	C	24.00
	MA XX 125BS 040	C	40 ± 0.15%	12.00				3.50				3.18	6.35	1.27	1.52	SK XX 125BS 120	B	30.00
	FD DY 125BS 120	C	120 ± 0.3%	15.00			2.75	3.50	6.25	3.50*	6.25*	Matrix Size		0.38L x 0.14W		SD DY 125BS 120	C	30.00
	WA XX 125BS 040	C	40 ± 0.3%	24.00		11.50*								9.7L x 3.6W		WD DY 125BS 120	C	30.00
	WK XX 125BS 120	C	120 ± 0.3%	30.00		11.50*	Pattern Description: Narrow pattern primarily used in the WK and SK Series for 120 ohm resistance									TA XX 125BS 040	C	13.00
																TK XX 125BS 120	C	18.00
																TD DY 125BS 120	C	17.00
125BT	FA XX 125BT 120	A	120 ± 0.15%	13.00		9.00	2.75	3.50	6.25	3.50	6.25	0.125	0.215	0.062	0.062	FP OR 125BT 120	C	18.00
	MA XX 125BT 120	B	120 ± 0.15%	15.00				3.50				3.18	5.46	1.57	1.57	SA XX 125BT 120	B	23.00
	FD DY 125BT 350	A	350 ± 0.3%	17.00			2.75	3.50	6.25	3.50*	6.25*	Matrix Size		0.35L x 0.15W		SK XX 125BT 350	B	34.00
	WA XX 125BT 120	B	120 ± 0.3%	23.00		11.50*								8.9L x 3.8W		SD DY 125BT 350	C	34.00
	WK XX 125BT 350	A	350 ± 0.3%	34.00		11.50*	Pattern Description: General purpose pattern with narrow grid and compact geometry									WD DY 125BT 350	A	34.00
																TA XX 125BT 120	C	17.00
																TK XX 125BT 350	C	23.00
																TD DY 125BT 350	C	22.00
125BZ	FA XX 125BZ 350	A	350 ± 0.15%	17.50		9.00	2.75	3.50	6.25	3.50	6.25	0.125	0.220	0.062	0.062	SA XX 125BZ 350	C	28.00
	MA XX 125BZ 350	C	350 ± 0.15%	20.00				3.50				3.18	5.59	1.57	1.57	SK XX 125BZ 10K	C	36.00
	FD DY 125BZ 10L	C	1000 ± 0.4%	30.00			2.75	3.50	6.25	3.50*	6.25*	Matrix Size		0.35L x 0.15W		SD DY 125BZ 10K	C	35.00
	WA XX 125BZ 350	B	350 ± 0.3%	28.00		11.50*								8.9L x 3.8W		WD DY 125BZ 10K	C	35.00
	WK XX 125BZ 10K	C	1000 ± 0.3%	36.00		11.50*	Pattern Description: Narrow high resistance pattern with compact geometry									TA XX 125BZ 350	C	22.00
																TD DY 125BZ 10K	C	28.00
125CA	FA XX 125CA 120	B	120 ± 0.15%	22.00		9.00	2.75	3.50	6.25	3.50	6.25	0.125	0.315	0.180	0.180	FP OR 125CA 120	C	25.00
	MA XX 125CA 120	B	120 ± 0.15%	25.00				3.50				3.18	8.00	4.57	4.57	SA XX 125CA 120	C	43.00
	FD DY 125CA 350	A	350 ± 0.1%	28.00			2.75	3.50	6.25	3.50*	6.25*	Matrix Size		0.47L x 0.28W		SK XX 125CA 350	C	49.00
	WA XX 125CA 120	C	120 ± 0.3%	43.00		11.50*								11.9L x 7.1W		SD DY 125CA 350	C	47.00
	WK XX 125CA 350	C	350 ± 0.3%	49.00		11.50*	Pattern Description: High dissipation pattern with large solder tabs									WD DY 125CA 350	C	47.00
																TA XX 125CA 120	C	26.00
																TK XX 125CA 350	C	31.00
																TD DY 125CA 350	C	30.00

*NOTE: Options available but not normally recommended. See 'Optional Features' Section

GAGE PATTERN (Actual Size) Grids are Vertical Except as Noted	GAGE DESIGNATION Insert Desired S T C No in Spaces Marked XX	STOCK STATUS	RES. IN OHMS	LIST PKG. PRICE (Five Gages)	OPTIONS AVAILABLE Add Indicated Price to Package Price Note: Stock Status Symbols Do Not Apply to Gages with Optional Features							DIMENSIONS IN M - Matrix; b - Section (e.g. 1st Sec. 1); LS - Last Section; (INCHES) (ALL DIMENSIONS IN MILLIMETERS); GP - Grid Pair; GPD - Grid Die; PPD - Path Die; APD - Act Path Die				OTHER SERIES AVAILABLE		
						W	E	S	SE	L	LE	GAGE LENGTH	OVERALL LENGTH	GRID WIDTH	OVERALL WIDTH	GAGE DESIGNATION	Stock Status	LIST PKG PRICE
125CH	EA XX-125CH 060	C	60 ± 0 15%	17 00		9 00	2 75	3 50	6 25	3 50	6 25	0 125	0 790	0 175	0 175	SA XX 125CH 060	C	40 00
	MA XX 125CH 060	B	60 ± 0 15%	20.00				3 50				3 18	7 37	4 45	4 45	SK XX 125CH 175	C	45 00
	ED DY 125CH 175	C	175 ± 0 3%	26.00			2.75	3.50	6 25			Matrix Size →		0 42L x 0 27W		SD DY 125CH 175	C	43 00
	WA XX 125CH 060	C	60 ± 0 3%	40 00		11.50								10 7L x 6 9W		WD DY 125CH 175	C	43 00
	WK XX 125CH 175	C	175 ± 0 3%	46.00		11 50	Pattern Description: High dissipation, low resistance pattern used in 8 gage bridge circuits									TA XX 125CH 060	C	22 00
																TK XX 125CH 175	C	25 00
																TD DY 125CH 175	C	25 00
125DL	EA XX-125DL 060	C	60 ± 0 15%	16 00			3.50	3.50	6 25	4 00	7.50	0 125	0 350	0 110	0 110	SA XX 125DL 060	C	38 00
	MA XX-125DL-060	B	60 ± 0.15%	18 00				3 50				3 18	8 89	2 79	2 79	SK XX 125DL 175	C	43 00
	ED DY-125DL-175	C	175 ± 0 3%	22 00			3.50	3 50	6.25	4 00	7 50	Matrix Size →		0 48L x 0 20W		SD DY 125DL 175	C	42 00
	WA XX 125DL-060	C	60 ± 0 3%	38 00										12 2L x 5 1W		WD DY 125DL 175	C	42 00
	WK XX 125DL-175	C	175 ± 0 3%	43 00			Pattern Description: 45° Torque gage. See 125DW pattern for higher resistance version of this design									TA XX 125DL 060	C	19 00
																TK XX 125DL 175	C	24 00
																TD DY 125DL 175	C	23 00
125DR	EA XX-125DR-060	C	60 ± 0 15%	16 00			3.50	3 50	6 25	4.00	7.50	0 125	0 350	0 110	0 110	SA XX 125DR 060	C	38 00
	MA XX-125DR-060	B	60 ± 0 15%	18 00				3.50				3 18	8 89	2 79	2 79	SK XX 125DR 175	C	43 00
	ED DY-125DR-175	C	175 ± 0 3%	22 00			3 50	3 50	6 25	4 00	7 50	Matrix Size →		0 48L x 0 20W		SD DY 125DR 175	C	42 00
	WA XX-125DR 060	C	60 ± 0 3%	38 00										12 2L x 5 1W		WD DY 125DR 175	C	42 00
	WK XX-125DR-175	C	175 ± 0 3%	43 00			Pattern Description: 45° Torque gage. Identical to 125DL pattern preceding but with opposite grid angle									TA XX 125DR 060	C	19 00
																TK XX 125DR 175	C	24 00
																TD DY 125DR 175	C	23 00
125DW	EA XX-125DW-120	B	120 ± 0 15%	16 00			3 50	3 50	6 25	4.00	7 50	0 125	0 350	0 110	0 110	SA XX 125DW 120	B	38 00
	MA XX-125DW-120	C	120 ± 0 15%	18 00				3 50				3 18	8 89	2 79	2 79	SK XX 125DW 350	C	43 00
	ED DY-125DW-350	C	350 ± 0 3%	22 00			3 50	3 50	6 25	4 00	7.50	Matrix Size →		0 48L x 0 19W		SD DY 125DW 350	C	42 00
	WA XX-125DW 120	C	120 ± 0 3%	38 00										12 2L x 4 8W		WD DY 125DW 350	C	42 00
	WK XX-125DW-350	C	350 ± 0 3%	43 00			Pattern Description: 45° Torque gage. Identical to 125DR pattern except for grid resistance									TA XX 125DW 120	C	19 00
																TK XX 125DW 350	C	24 00
																TD DY 125DW 350	C	23 00
125DY	EA XX-125DY-120	B	120 ± 0 15%	16.00			3.50	3.50	6 25	4 00	7.50	0 125	0 350	0 110	0 110	SA XX 125DY 120	B	38 00
	MA XX 125DY 120	C	120 ± 0 15%	18 00				3 50				3 18	8 89	2 79	2 79	SK XX 125DY 350	C	43 00
	ED DY 125DY-350	C	350 ± 0 3%	22.00			3 50	3.50	6 25	4 00	7 50	Matrix Size →		0 48L x 0 19W		SD DY 125DY 350	C	42 00
	WA XX-125DY-120	C	120 ± 0 3%	38.00										12 2L x 4 8W		WD DY 125DY 350	C	42 00
	WK XX-125DY 350	C	350 ± 0 3%	43 00			Pattern Description: 45° Torque gage. Identical to 125DW pattern preceding but with opposite grid angle									TA XX 125DY 120	C	19 00
																TK XX 125DY 350	C	24 00
																TD DY 125DY 350	C	23 00
125DP	EA XX 125DP 350	B	350 ± 0 15%	20 00			3.50	3 50	6 25	4 00	7 50	0 125	0 270	0 125	0 125	EP OR 125DP 350	C	26 00
	MA XX 125DP 350	C	350 ± 0 15%	23 00				3 50				3 18	6 86	3 18	3 18	SA XX 125DP 350	B	34 00
	ED DY-125DP 10C	C	1000 ± 0 3%	29 00			3 50	3 50	6 25			Matrix Size →		0 30L x 0 22W		SK XX 125DP 10C	C	41 00
														9 9L x 5 6W		SD DY 125DP 10C	C	40.00
							Pattern Description: High resistance pattern with tabs at ends of grid									TA XX 125DP 350	C	25 00
																TK XX 125DP 10C	C	31 00
																TD DY 125DP 10C	C	30 00

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*NOTE. Options available but not normally recommended
See 'Optional Features' Section

GAGE PATTERN (Actual Size) Grids are Vertical Except as Noted	GAGE DESIGNATION Insert Desired S T C No in Spaces Marked XX	STOCK STATUS	RES. IN OHMS	LIST PKG. PRICE (Five Gages)	OPTIONS AVAILABLE Add Indicated Price to Package Price Note: Stock Status Symbols Do Not Apply to Gages with Optional Features							DIMENSIONS IN (INCHES / MILLIMETRES) M - Matrix S - Section (e.g., S1 = Sec 1) FS - Each Section				OTHER SERIES AVAILABLE		
						W	F	S	SE	L	LE	GAGE LENGTH	OVERALL LENGTH	GRID WIDTH	OVERALL WIDTH	GAGE DESIGNATION	Stock Status	LIST PKG PRICE
125EP	EA XX 125EP 350	B	350 ± 0.15%	20.00			3.50	3.50	6.25	4.00	7.50	0.125	0.150	0.125	0.250	EP 08 125EP 350	C	26.00
	MA XX 125EP 350	C	350 ± 0.15%	23.00				3.50				3.18	3.81	3.18	6.35	SA XX 125EP 350	B	14.00
	ED DY 125EP 10C	C	1000 ± 0.3%	29.00			3.50	3.50	6.25			Matrix Size →		0.281 x 0.35W		SK XX 125EP 350	C	41.00
														7.11 x 8.9W		SD DY 125EP 10C	C	40.00
																TA XX 125EP 350	C	25.00
																TK XX 125EP 10C	C	31.00
																TD DY 125EP 10C	C	30.00
					Pattern Description: High resistance pattern with tabs at side of grid. Used in transducer applications matched with 125DP pattern preceding													
125DQ	EA XX 125DQ 120	B	120 ± 0.15%	16.50			3.50	3.50	6.25	4.00	7.50	0.125	0.270	0.125	0.125	EP 08 125DQ 120	C	21.00
	MA XX 125DQ 120	B	120 ± 0.15%	19.00				3.50				3.18	6.86	3.18	3.18	SA XX 125DQ 120	B	30.00
	ED DY 125DQ 350	C	350 ± 0.3%	24.00			3.50	3.50	6.25			Matrix Size →		0.401 x 0.27W		SK XX 125DQ 350	B	36.00
														10.21 x 5.6W		SD DY 125DQ 350	C	35.00
																TA XX 125DQ 120	C	20.00
																TK XX 125DQ 350	C	24.00
																TD DY 125DQ 350	C	24.00
					Pattern Description: Tabs at each end of grid. Used in transducer applications matched with 125EQ													
125EQ	EA XX-125EQ-120	B	120 ± 0.15%	16.50			3.50	3.50	6.25	4.00	7.50	0.125	0.150	0.125	0.250	EP 08 125EQ 120	C	21.00
	MA XX-125EQ-120	B	120 ± 0.15%	19.00				3.50				3.18	3.81	3.18	6.35	SA XX 125EQ 120	B	30.00
	ED DY 125EQ 350	C	350 ± 0.3%	24.00			3.50	3.50	6.25			Matrix Size →		0.281 x 0.35W		SK XX 125EQ 350	B	36.00
														7.1L x 8.9W		SD DY 125EQ 350	C	35.00
																TA XX 125EQ 120	C	20.00
																TK XX 125EQ 350	C	24.00
																TD DY 125EQ 350	C	24.00
					Pattern Description: Tabs at each side of grid. Used in transducer applications matched with 125HQ													
12[illegible]	VC ST 125HA 120	B	120 ± 0.3%	40.00	10.00†							0.125	0.325	0.110	0.150			
	VK XX-125HA-120	A	120 ± 0.3%	40.00	10.00†							3.18	8.26	2.79	3.81			
	VN ST-125HA-120	B	120 ± 0.3%	40.00	10.00†							Matrix Size →		0.441 x 0.21W				
														11.2L x 5.3W		VD DY 125HA 120	C	40.00
					Pattern Description: Free grid pattern supplied on a strippable backing for use with the tape handling method. Normally installed with ceramic adhesives													
125MG	EA XX-125MG-120	A	120 ± 0.2%	35.00		18.00	5.50	7.00	12.50	7.00	12.50	0.125 ES	0.220 CP	0.126 ES	0.375 CP	SA XX 125MG 120	C	70.00
	MA XX 125MG 120	A	120 ± 0.2%	39.00				7.00				3.18 ES	5.59 CP	3.18 ES	9.53 CP	SK XX 125MG 350	C	85.00
	ED DY 125MG 350	C	350 ± 0.4%	41.00			5.50	7.00	12.50			Matrix Size →		0.321 x 0.47W		SD DY 125MG 350	C	83.00
	WA XX 125MG 120	C	120 ± 0.3%	70.00		21.00†								8.1L x 11.9W		WD DY 125MG 350	C	83.00
	WK XX 125MG 350	C	350 ± 0.3%	85.00		21.00†	Pattern Description: Dual pattern gage for use in bending beam transducers. Longitudinal grid centerlines spaced 0.250" (6.35mm) apart									TA XX 125MG 120	C	40.00
																TK XX 125MG 350	C	45.00
																TD DY 125MG 350	C	44.00
125MK	EA XX 125MK 120	A	120 ± 0.2%	34.00		18.00	5.50	7.00	12.50	7.00	12.50	0.125 ES	0.235 CP	0.030 ES	0.130 CP	SA XX 125MK 120	C	70.00
	MA XX 125MK 120	B	120 ± 0.2%	37.00				7.00				3.18 ES	5.97 CP	0.76 ES	3.30 CP	SK XX 125MK 350	C	85.00
												Matrix Size →		0.301 x 0.24W				
	WA XX 125MK-120	C	120 ± 0.4%	70.00		21.00†								9.9L x 6.1W		TA XX 125MK 120	C	40.00
	WK XX 125MK 350	C	350 ± 0.4%	85.00		21.00†	Pattern Description: Dual pattern gage for transducer use. Very narrow grid geometry. Longitudinal grid centerlines spaced 0.040" (1.02mm) apart									TK XX 125MK 350	C	45.00

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*NOTE: Options available but not normally recommended. See 'Optional Features' Section

†Option SW1-2. See 'Optional Features' Section

GAGE PATTERN (Actual Size) Grids are Vertical Except as Noted	GAGE DESIGNATION Insert Desired S I C No. in Spaces Marked XX	STOCK STATUS	RES. IN OHMS	LIST PKG. PRICE (Five Gages)	OPTIONS AVAILABLE Add Indicated Price to Package Price. Note: Stock Status Symbols Do Not Apply to Gages with Optional Features							DIMENSIONS IN M - Metric B - Section (e.g. 5A Sec. 1) LS - Lead Section (INCHES / MILLIMETERS) GP - Gauge Point GEL - Grid End Line PEL - Pitch End Line AEL - Act. Pitch End Line				OTHER SERIES AVAILABLE		
						W	E	S	SL	I	LL	GAGE LENGTH	OVERALL LENGTH	GRID WIDTH	OVERALL WIDTH	GAGE DESIGNATION	STOCK STATUS	LIST PKG. PRICE
125MW	EA XX 125MW 120	B	120 ± 0.5%	180.00								0.125 ES	1.600 CP	0.100 ES	0.336 CP	EP 00 125MW 120	C	250.00
												3.18 ES	40.39 CP	2.54 ES	8.51 CP			
												Matrix Size →		1.681 x 0.43W				
														42.71 x 10.9W				
					Pattern Description: 10 Element strip gage with one tab common to all sections. All grids parallel to long axis of strip. Grid centerline spacing is 0.100" (4.06mm)													
125PC	EA-XX-125PC-120	B	120 ± 0.2%	26.00		18.00	6.50	7.00	12.50	7.00	12.50	0.125 ES	0.205 CP	0.065 ES	0.150 CP			
	EA-XX-125PC-350	B	350 ± 0.2%	36.00		18.00	6.50	7.00	12.50	7.00	12.50	3.18 ES	5.21 CP	1.65 ES	3.81 CP	5A XX 125PC 120	C	52.00
	MA-XX-125PC 120	B	120 ± 0.2%	28.00				7.00				Matrix Size → (Trim Marks)		0.260L x 0.200W		5A XX 125PC 350	C	63.00
	MA-XX-125PC-350	B	350 ± 0.2%	38.00				7.00						6.4L x 5.1W		5K XX 125PC 350	C	65.00
	ED-DY-125PC 350	C	350 ± 0.4%	37.00			6.50	7.00	12.50			Pattern Description: Dual pattern for bonding beam transducers. Longitudinal grid centerlines spaced 0.085" (2.16mm) apart				5K XX 125PC 10K	C	70.00
	ED-DY-125PC-10C	C	1000 ± 0.4%	47.00			6.50	7.00	12.50							5D DY 125PC 350	C	64.00
	WA XX-125PC-120	C	120 ± 0.3%	62.00		21.00										5D DY 125PC 10K	C	77.00
	WA XX-125PC 350	C	350 ± 0.3%	63.00		21.00										WD DY 125PC 350	C	64.00
	WK XX 125PC 350	C	350 ± 0.3%	66.00		21.00										WD DY 125PC 10K	C	77.00
	WK XX-125PC-10C	C	1000 ± 0.4%	79.00		21.00										1A XX 125PC 120	C	31.00
																1A XX 125PC 350	C	40.00
																1K XX 125PC 350	C	41.00
																1K XX 125PC 10K	C	47.00
																1D DY 125PC 350	C	40.00
																1D DY 125PC 10K	C	46.00
125RA	EA XX-125RA 120	A	120 ± 0.2%	66.00		24.00	7.00	10.50	18.50	10.50	18.50	0.125 ES	0.275 CP	0.062 ES	0.433 CP	EP 00 125RA 120	C	68.00
												3.18 ES	6.99 CP	1.57 ES	11.00 CP	5A XX 125RA 120	B	87.00
	ED DY-125RA-350	C	350 ± 0.5%	66.00			7.00	10.50	18.50	10.50	18.50	Matrix Size → (Trim Marks)		0.370L x 0.445W		5K XX 125RA 350	C	102.00
	WA XX-125RA-120	B	120 ± 0.4%	87.00		28.00								9.4L x 11.3W		5D DY 125RA 350	C	101.00
	WK XX-125RA 350	C	350 ± 0.4%	102.00		28.00	Pattern Description: General purpose 3 element 45° rectangular rosette. Compact geometry.									WD DY 125RA 350	C	101.00
125RD	EA XX-125RD 350	A	350 ± 0.2%	64.00			8.00	10.50	18.50	10.50	18.50	0.125 ES	0.275 CP	0.062 ES	0.433 CP	5A XX 125RD 350	B	93.00
												3.18 ES	6.99 CP	1.57 ES	11.00 CP			
	WA XX-125RD 350	C	350 ± 0.4%	93.00								Matrix Size → (Trim Marks)		0.370L x 0.445W				
														9.4L x 11.3W				
					Pattern Description: General purpose 3 element 45° rectangular rosette. Identical to 125RA preceding except for grid resistance.													
125RS	EA XX-125RS 350	B	350 ± 0.2%	66.00		24.00						0.125 ES	0.245 CP	0.060 ES	0.620 CP			
												3.18 ES	6.22 CP	1.52 ES	15.75 CP			
	WA-XX-125RS 350	B	350 ± 0.4%	95.00		28.00						Matrix Size → (Trim Marks)		0.335L x 0.700W				
														8.5L x 17.8W				
					Pattern Description: 3 Element 45° rectangular rosette with high resistance grid. Similar to 125RD preceding but designed particularly for use with Option W in the EA Series.													

*NOTE: Options available but not normally recommended. See 'Optional Features' Section.

GAGE PATTERN (Actual Size) Grids are Vertical Except as Noted	GAGE DESIGNATION Insert Desired S T C No in Spaces Marked XX	STOCK STATUS	RES. IN OHMS	LIST PKG. PRICE (Five Gages)	OPTIONS AVAILABLE Add Indicated Price to Package Price Note: Stock Status Symbols Do Not Apply to Gages with Optional Features							DIMENSIONS IN M Matrix G Grid S Section (e.g. S1 Sec 1) FS Each Section [INCHES / MILLIMETRES] CP Comp Path GD Grid Dia PD Path Dia APD Act Path Dia				OTHER SERIES AVAILABLE		
						W	E	S	SF	L	LE	GAGE LENGTH	OVERALL LENGTH	GRID WIDTH	OVERALL WIDTH	GAGE DESIGNATION	Stock Status	LIST PKG PRICE
125UR 'C' FEATURE	CEA XX 125UR-120 CEA XX 125UR 350	A A	120 ± 0.4% 350 ± 0.4%	66.00 84.00	*CEA Series Strain Gages feature large integral copper solder tabs and a completely encapsulated grid. Refer to the front of this Catalog for details*							0.125 ES 3.18 ES	0.300 CP 7.62 CP	0.060 ES 1.52 ES	0.560 CP 14.22 CP			
												Matrix Size (Preferred) →		0.420L x 0.620W 10.7L x 15.7W				
					Pattern Description General purpose 45° single plane rosette. Compact geometry. Exposed solder tab area 0.06 x 0.06 (2.0mm x 1.5mm)													
125RE	EA XX-125RE-120	A	120 ± 0.2%	80.00			10.50	18.50				0.125 ES 3.18 ES	0.720 PD 18.29 PD	0.125 ES 3.18 ES	0.720 PD 18.29 PD	SA XX 125RE 120 TA XX 125RE 120	C C	99.00 85.00
												Matrix Size →		0.7IL x 0.7IW 19.81 x 19.8W				
					Pattern Description 45° rectangular rosette, primarily used for residual stress determinations by the hole-drilling method. Transverse grid centerlines are on a 0.404" (10.26mm) diameter circle													
125TA	EA XX-125TA-120 MA XX 125TA-120 ED DY 125TA-350 WA XX 125TA-120 WK-XX-125TA-350	A B A B C	120 ± 0.2% 120 ± 0.2% 350 ± 0.5% 120 ± 0.4% 350 ± 0.4%	35.00 41.00 46.00 63.00 69.00		18.00 21.00* 21.00*	5.50 5.50 	5.25 5.25 5.25 	10.25 10.25 	5.25 5.25* 	10.75 10.75* 	0.125 ES 3.18 ES	0.213 CP 5.41 CP	0.150 ES 3.81 ES	0.340 CP 8.64 CP	EP 08 125TA 120 SA XX 125TA 120 SK XX 125TA 350 SD DY 125TA 350 WD DY 125TA 350 TA XX 125TA 120 TK XX 125TA 350 TD DY 125TA 350	C B B C C C C C	46.00 63.00 69.00 68.00 68.00 44.00 50.00 50.00
												Matrix Size →		0.41L x 0.50W 10.4L x 12.7W				
					Pattern Description General purpose 2 element 90° 'tee' rosette. Sections have a common electrical connection													
125TB	EA XX 125TB-350 MA-XX-125TB 350 ED-DY 125TB 10C WA-XX-125TB-350 WK XX-125TB-10C	A B C C C	350 ± 0.2% 350 ± 0.2% 1000 ± 0.5% 350 ± 0.4% 1000 ± 0.4%	47.00 51.00 57.00 75.00 86.00		18.00 21.00* 21.00*	5.50 5.50 	5.25 5.25 5.25 	10.25 10.25 	5.25 5.25* 	10.75 10.75* 	0.125 ES 3.18 ES	0.213 CP 5.41 CP	0.150 ES 3.81 ES	0.340 CP 8.64 CP	EP 08 125TB 350 SA XX 125TB 350 SK XX 125TB 10C SD DY 125TB 10C WD DY 125TB 10C TA XX 125TB 350 TK XX 125TB 10C TD DY 125TB 10C	C C C C C C C C	58.00 75.00 86.00 84.00 84.00 55.00 66.00 64.00
												Matrix Size →		0.36L x 0.44W 9.1L x 11.2W				
					Pattern Description: General purpose 2 element 90° 'tee' rosette. Same geometry as 125TA but with higher resistance. Sections have common electrical connections													
125TM	EA XX-125TM-120 MA-XX-125TM-120 ED DY-125TM 350 WA XX-125TM 120 WK-XX-125TM 350	A B B C C	120 ± 0.2% 120 ± 0.2% 350 ± 0.5% 120 ± 0.4% 350 ± 0.4%	35.00 41.00 46.00 63.00 69.00		18.00 21.00* 21.00*	5.50 5.50 	7.00 7.00 7.00 	12.50 12.50 	7.00 7.00* 	12.50 12.50* 	0.125 ES 3.18 ES	0.215 CP 5.46 CP	0.150 ES 3.81 ES	0.335 CP 8.51 CP	EP 08 125TM 120 SA XX 125TM 120 SK XX 125TM 350 SD DY 125TM 350 WD DY 125TM 350 TA XX 125TM 120 TK XX 125TM 350 TD DY 125TM 350	C C C C C C C C	46.00 63.00 69.00 68.00 68.00 44.00 50.00 50.00
												Matrix Size →		0.42L x 0.47W 10.7L x 11.9W				
					Pattern Description General purpose 2 element 90° 'tee' rosette. Sections are electrically independent													
125TQ	EA XX 125TQ-350 MA-XX 125TQ 350 ED DY 125TQ 10C WA XX-125TQ 350 WK XX 125TQ 10C	A B C C C	350 ± 0.2% 350 ± 0.2% 1000 ± 0.5% 350 ± 0.4% 1000 ± 0.4%	47.00 51.00 57.00 75.00 86.00		18.00 21.00* 21.00*	5.50 5.50 	7.00 7.00 7.00 	12.50 12.50 	7.00 7.00* 	12.50 12.50* 	0.125 ES 3.18 ES	0.215 CP 5.46 CP	0.150 ES 3.81 ES	0.335 CP 8.51 CP	EP 08 125TQ 350 SA XX 125TQ 350 SK XX 125TQ 10C SD DY 125TQ 10C WD DY 125TQ 10C TA XX 125TQ 350 TK XX 125TQ 10C TD DY 125TQ 10C	C C C C C C C C	58.00 75.00 86.00 84.00 84.00 55.00 66.00 64.00
												Matrix Size →		0.40L x 0.47W 10.2L x 11.9W				
					Pattern Description General purpose 2 element 90° 'tee' rosette. Identical to 125TM preceding except for resistance													

*NOTE: Options available but not normally recommended
See 'Optional Features' Section

GAGE PATTERN (Actual Size) Grids are Vertical Except as Noted	GAGE DESIGNATION Insert Desired S T C No in Spaces Marked XX	STOCK STATUS	RES. IN OHMS	LIST PKG. PRICE (Five Gages)	OPTIONS AVAILABLE Add Indicated Price to Package Price Note Stock Status Symbols Do Not Apply to Gages with Optional Features							DIMENSIONS IN M - Matrix S - Section (e.g. S1 - Sec. 1) LS - Last Section — INCHES / MILLIMETRES — CP Comp Path GD Grid Dia PD Path Dia APD Act Path Dia				OTHER SERIES AVAILABLE		
						W	E	S	SE	L	LE	GAGE LENGTH	OVERALL LENGTH	GRID WIDTH	OVERALL WIDTH	GAGE DESIGNATION	Stock Status	LIST PKG. PRICE
125UT 'C' FEATURE	CEA XX-125UT-120	A	120 ± 0.4%	60.00	*CEA Series Strain Gages feature large integral copper solder tabs and a completely encapsulated grid* *Refer to the front of this Catalog for details*							0.125 ES / *3.18 ES*	0.325 CP / *8.26 CP*	0.165 ES / *4.19 ES*	0.350 CP / *9.04 CP*			
	CEA XX-125UT-350	A	350 ± 0.4%	60.00										Matrix Size (Pretrimmed) →	0.420L x 0.455W / *10.8L x 11.6W*			
					Pattern Description 2 Element 90° "tee" rosette for general purpose use Exposed solder tab area 0.10" x 0.07" (2.5mm x 1.8mm)													
125TD	EA-XX-125TD-120	A	120 ± 0.2%	42.00		18.00	5.50	7.00	12.50	7.00	12.50	0.125 ES / *3.18 ES*	0.328 CP / *8.33 CP*	0.125 ES / *3.18 ES*	0.392 CP / *9.96 CP*	EP 08 125TD 120	C	52.00
	MA-XX-125TD-120	A	120 ± 0.2%	47.00				7.00								SA XX 125TD 120	C	69.00
	ED-DY-125TD-350	C	350 ± 0.5%	53.00			5.50	7.00	12.50	7.00*	12.50*	Matrix Size →		0.43L x 0.53W / *10.9L x 13.5W*		SK XX 125TD 350	C	75.00
	WA-XX-125TD-120	C	120 ± 0.4%	69.00		21.00*										SD DY 125TD 350	C	73.00
	WK-XX-125TD-350	C	350 ± 0.4%	75.00		21.00*										WD DY 125TD 350	C	73.00
					Pattern Description 2 Element 90° rosette used for shear strain measurement and in torque transducers											TA XX 125TD 120	C	61.00
																TK XX 125TD 350	C	58.00
																TD DY 125TD 350	C	67.00
125TR	EA XX-125TR-350	B	350 ± 0.2%	47.00		18.00	5.50	7.00	12.50	7.00	12.50	0.125 ES / *3.18 ES*	0.273 CP / *6.93 CP*	0.125 ES / *3.18 ES*	0.392 CP / *9.96 CP*	EP 08 125TR 350	C	68.00
	MA XX-125TR 350	B	350 ± 0.2%	52.00				7.00								SA XX 125TR 350	C	76.00
	ED-DY-125TR-10C	C	1000 ± 0.5%	60.00			5.50	7.00	12.50	7.00*	12.50*	Matrix Size →		0.39L x 0.62W / *9.9L x 13.2W*		SK XX 125TR 10K	C	87.00
	WA-XX-125TR-350	C	350 ± 0.4%	76.00		21.00*										SD DY 125TR 10K	C	86.00
	WK-XX-125TR 10C	C	1000 ± 0.4%	87.00		21.00*										WD DY 125TR 10K	C	86.00
					Pattern Description 2 Element 90° rosette Higher resistance version of the 125TD pattern, with more compact geometry											TA XX 125TR 350	C	57.00
																TK XX 125TR 10K	C	64.00
																TD DY 125TR 10K	C	63.00
125TF ORIGINAL PAGE IS OF POOR QUALITY	EA XX-125TF 120	A	120 ± 0.2%	38.00				5.25	10.25	6.00	13.00	0.125 ES / *3.18 ES*	0.600 CP / *12.70 CP*	0.150 ES / *3.81 ES*	0.150 CP / *3.81 CP*	EP 08 125TF 120	C	48.00
	MA-XX-125TF-120	B	120 ± 0.2%	46.00				5.25								SA XX 125TF 120	B	66.00
	ED-DY-125TF-350	B	350 ± 0.4%	50.00				5.25	10.25			Matrix Size (Trim Marks) →		0.535L x 0.185W / *13.6L x 4.7W*		SK XX 125TF 350	C	71.00
																SD DY 125TF 350	C	70.00
					Pattern Description General purpose 2 element 90° "tee" rosette with narrow pattern geometry Sections have a common electrical connection											TA XX 125TF 120	C	49.00
																TK XX 125TF 350	C	55.00
																TD DY 125TF 350	C	55.00
125VB	EA XX-125VB 120	B	120 ± 0.2%	39.00				7.00	12.50			0.125 ES / *3.18 ES*	0.500 CP / *12.70 CP*	0.150 ES / *3.81 ES*	0.150 CP / *3.81 CP*	EP 08 125VB 120	C	49.00
	MA-XX-125VB-120	B	120 ± 0.2%	46.00				7.00								SA XX 125VB 120	B	66.00
	ED-DY-125VB-350	C	350 ± 0.5%	51.00				7.00	12.50			Matrix Size (Trim Marks) →		0.570L x 0.220W / *14.5L x 5.6W*		SK XX 125VB 350	C	72.00
																SD DY 125VB 350	C	71.00
					Pattern Description General purpose 2 element 90° "tee" rosette identical to 125TF preceding except sections are electrically independent											TA XX 125VB 120	C	50.00
																TK XX 125VB 350	C	56.00
																TD DY 125VB 350	C	56.00
125TG	EA-XX-125TG 350	A	350 ± 0.2%	49.00				5.25	10.25	6.00	13.00	0.125 ES / *3.18 ES*	0.600 CP / *12.70 CP*	0.150 ES / *3.81 ES*	0.150 CP / *3.81 ES*	EP 08 125TG 350	C	58.00
	MA-XX-125TG 350	C	350 ± 0.2%	56.00				5.25								SA XX 125TG 350	C	74.00
	ED-DY-125TG-10C	C	1000 ± 0.5%	58.00				5.25	10.25			Matrix Size (Trim Marks) →		0.535L x 0.185W / *13.6L x 4.7W*		SK XX 125TG 10C	C	91.00
	WA-XX-125TG 350	C	350 ± 0.4%	74.00												SD DY 125TG 10C	C	89.00
					Pattern Description General purpose 2 element 90° "tee" rosette with high resistance grid Sections have a common electrical connection											TA XX 125TG 350	C	59.00
																TK XX 125TG 10C	C	69.00
																TD DY 125TG 10C	C	67.00

*NOTE. Options available but not normally recommended
See 'Optional Features' Section.

GAGE PATTERN (Actual Size) Grids are Vertical Except as Noted	GAGE DESIGNATION Insert Desired S T C No in Spaces Marked XX	STOCK STATUS	RES. IN OHMS	LIST PKG. PRICE (Five Gages)	OPTIONS AVAILABLE Add Indicated Price to Package Price. Note: Stock Status Symbols Do Not Apply to Gages with Optional Features							DIMENSIONS IN M - Matrix S - Section (e g S1 - Sec 1) LS - Each Section — INCHES / MILLIMETRES — CP - Comp Pat GD - Grid Dia PD - Patt Dia APD - Art Patt Dia				OTHER SERIES AVAILABLE		
						W	E	S	SE	L	LE	GAGE LENGTH	OVERALL LENGTH	GRID WIDTH	OVERALL WIDTH	GAGE DESIGNATION	STOCK STATUS	LIST PKG PRICE
125VA	EA XX-125VA 350	B	350 ± 0 2%	51 00				7 00	12.50			0 125 ES	0 500 CP	0 150 ES	0 150 CP	EP 08 125VA 350	C	60 00
	MA XX 125VA 350	C	350 ± 0 2%	57.00				7.00				7 18 ES	12 70 CP	3 81 ES	3 81 CP	SA XX 125VA 350	C	76 00
	ED DY 125VA 10C	C	1000 ± 0 5%	60 00				7 00	12.50			Matrix Size (Trim Marks) →		0 570L x 0 720W		SK XX 125VA 10C	C	73 00
														14 5L x 5 6W		SD DY 125VA 10C	C	91 00
																TA XX 125VA 350	C	61 00
																TK XX 125VA 10C	C	71 00
																TD DY 125VA 10C	C	69 00
					Pattern Description: General purpose 2 element 90° "tee" rosette with high resistance grid Identical to 125TG preceding except sections are electrically independent													
125TH	EA XX-125TH 120	A	120 ± 0 2%	40.00			7 00	7.00	12.50	8.00	15 00	0 125 ES	0 350 CP	0 110 ES	0 230 CP	EP 08 125TH 120	C	50 00
	MA-XX-125TH-120	A	120 ± 0 2%	46 00				7.00				3 18 ES	8 89 CP	2 79 ES	5 84 CP	SA XX 125TH 120	B	61 00
	ED-DY-125TH-350	B	350 ± 0 5%	52 00			7 00	7 00	12 50	8.00*	15 00*	Matrix Size →		0 48L x 0 33W		SK XX 125TH 350	B	69 00
	WA-XX-125TH 120	C	120 ± 0 4%	61 00										12 2L x 8 4W		SD DY 125TH 350	C	69 00
	WK XX-125TH 350	C	350 ± 0 4%	69 00												WD DY 125TH 350	C	69 00
																TA XX 125TH 120	C	49 00
																TK XX 125TH 350	C	53 00
																TD DY 125TH 350	C	53 00
					Pattern Description: 2 Element 90° torque gage Sections are electrically independent													
125TW	EA XX-125TW 120	B	120 ± 0 2%	40.00			7 00	5 25	10.25	6.00	13 00	0 125 ES	0 350 CP	0 110 ES	0 230 CP	EP 08 125TW 120	C	50 00
	MA XX-125TW 120	B	120 ± 0.2%	46.00				5 25				3 18 ES	8 89 CP	2 79 ES	5 84 CP	SA XX 125TW 120	C	61 00
	ED DY-125TW 350	B	350 ± 0 5%	52.00			7.00	5.25	10.25	6.00*	13 00*	Matrix Size →		0 48L x 0 33W		SK XX 125TW 350	C	69 00
	WA-XX-125TW 120	C	120 ± 0 4%	61.00										12 2L x 8 4W		SD DY 125TW 350	C	69 00
	WK XX-125TW-350	C	350 ± 0 4%	69.00												WD DY 125TW 350	C	69 00
																TA XX 125TW 120	C	49 00
																TK XX 125TW 350	C	53 00
																TD DY 125TW 350	C	53 00
					Pattern Description: 2 Element 90° torque gage Identical to 125TH preceding except sections have a common solder tab													
125TK	EA-XX-125TK-350	A	350 ± 0 2%	50.00			7.00	7.00	12.50	8.00	15.00	0 125 ES	0 320 CP	0 110 ES	0 225 CP	EP 08 125TK 350	C	60 00
	MA XX-125TK-350	A	350 ± 0 2%	55.00				7.00				3 18 ES	8 13 CP	2 79 ES	5 72 CP	SA XX 125TK 350	B	70 00
	ED-DY-125TK 10C	C	1000 ± 0 5%	60.00			7.00	7.00	12.50	8.00*	15.00*	Matrix Size →		0 45L x 0 32W		SK XX 125TK 10C	C	75 00
	WA XX 125TK-350	C	350 ± 0 4%	70.00										11 4L x 8 1W		SD DY 125TK 10C	C	75 00
	WK XX-125TK-10C	C	1000 ± 0 4%	75.00												WD DY 125TK 10C	C	75 00
																TA XX 125TK 350	C	58 00
																TK XX 125TK 10C	C	66 00
																TD DY 125TK 10C	C	65 00
					Pattern Description: 2 Element 90° torque gage Similar to 125TH preceding except for resistance													
125YA	EA XX 125YA-120	A	120 ± 0.2%	50.00				10.50	18.50	12.00	21.00	0 125 ES	0 375 CP	0 062 ES	0 375 CP	EP 08 125YA 120	C	67 00
	MA-XX-125YA-120	C	120 ± 0 2%	61.00				10.50				3 18 ES	9 53 CP	1 57 ES	9 53 CP	SA XX 125YA 120	C	87 00
	ED DY-125YA-350	C	350 ± 0 5%	69.00				10.50	18 50	12.00*	21.00*	Matrix Size →		0 57L x 0 45W		SK XX 125YA 350	C	92.00
														14 5L x 11 4W		SD DY 125YA 350	C	92 00
					Pattern Description: Compact 3 element 60° delta rosette with large solder tabs													
125YF	EA XX-125YF-350	B	350 ± 0 2%	64 00		1 00	8 00	10.50	18.50	10.50	18 50	0 125 ES	0 283 CP	0 060 ES	0 620 CP			
												3 18 ES	7 19 CP	1 52 ES	15 75 CP			
												Matrix Size →		0 360L x 0 700W				
	WA-XX 125YF-350	B	350 ± 0 4%	98 00		28 00*								9 1L x 17 8W				
					Pattern Description: 3 Element 60° delta rosette with high resistance grid Designed particularly for use with Option W in the EA Series													

*NOTE: Options available but not normally recommended
See "Optional Features" page

GAGE PATTERN (Actual Size) Grids are Vertical Except as Noted	GAGE DESIGNATION Insert Desired S T C No in Spaces Marked XX	STOCK STATUS	RES. IN OHMS	LIST PKG. PRICE (Five Gages)	OPTIONS AVAILABLE Add Indicated Price to Package Price Note Stock Status Symbols Do Not Apply to Gages with Optional Features							DIMENSIONS IN M - Metric S - Standard (e g S1 - Sec T) ES - Each Section [INCHES / MILLIMETERS] CP - Comp Pad GD - Grid Dia PD - Pad Dia APD - Act Pad Dia				OTHER SERIES AVAILABLE		
						W	E	S	SE	L	LE	GAGE LENGTH	OVERALL LENGTH	GRID WIDTH	OVERALL WIDTH	GAGE DESIGNATION	STOCK STATUS	LIST PKG. PRICE
182JB (6)	EA XX 182JB 350	B	350 ± 1%	98 00				10.50	18 50			See Below	0 182 APD		0 182 APD	SA XX 182JB 350	C	150 00
	MA XX 182JB 350	C	350 ± 1%	110 00				10 50					4 62 APD		4 62 APD			
												Matrix Size → (Nominal Trim Diameter)		0 195		TA XX 182JB 350	C	114 00
														5 0				
					Pattern Description: Full bridge diaphragm gage. Radial gage length is 0.014" (0.36mm), tangential grids are 0.080" (2.03mm) diameter. For diaphragm of 0.187" to 0.700" (4.75mm to 5.08mm) diameter.												
182JC (6)	EA XX 182JC 120	B	120 ± 1%	88 00				10 50	18 50			--	0 182 APD		0 182 APD	SA XX 182JC 120	C	138 00
	MA XX 182JC 120	C	120 ± 1%	99 00				10 50				- -	4 62 APD	-	4 62 APD			
												Matrix Size → (Nominal Trim Diameter)		0 195		TA XX 182JC 120	C	105 00
														5 0				
					Pattern Description: Full bridge diaphragm gage. Similar to 182JB preceding except for resistance													
183CQ	EA XX 183CQ 10C	C	1000 ± 0.15%	84 00			2.75	3.50	6 25	3.50	6 25	0 183	0 255	1 124	1 502			
												4 65	6 48	28 55	38 15			
												Matrix Size → (Trim Marks)		0 335L x 1 540W				
														8 5L x 39 1W				
					Pattern Description: High resistance gage with extremely wide grid. Used in certain transducer designs													
187BB	EA XX 187BB 120	A	120 ± 0.15%	15.50		9 00	2 75	3 50	6 25	3.50	6 25	0 187	0 368	0 131	0 131	EP OR 187BB 120	B	22 00
	MA XX 187BB 120	B	120 ± 0.15%	18.50				3.50				4 75	9 35	3 33	3 33	SA XX 187BB 120	A	33 00
	ED DY 187BB 350	C	350 ± 0 3%	21 00			2 75	3 50	6 25	3 50*	6 25*	Matrix Size →		0 55L x 0 20W		SK XX 187BB 350	C	42 00
	WA XX 187BB 120	C	120 ± 0.3%	33 00		11 50*								14 0L x 6 6W		SD DY 187BB 350	C	41 00
	WK XX 187BB 350	C	350 ± 0 3%	42 00		11 50*										WD DY 187BB 350	C	41 00
					Pattern Description: Narrow general purpose pattern											TA XX 187BB 120	C	20 00
																TK XX 187BB 350	C	20 00
																TD DY 187BB 350	C	25 00
187UW 'C' FEATURE	CEA XX 187UW 120	B	120 ± 0 3%	22 00	CEA Series Strain Gages feature large integral copper solder tabs and a completely encapsulated grid. Refer to the front of this Catalog for details							0 187	0 387	0 180	0 180	ORIGINAL PAGE IS OF POOR QUALITY		
	CEA XX 187UW 350	B	350 ± 0 3%	27.00								4 75	9.83	4 57	4 57			
												Matrix Size → (Pretrimmed)		0 485L x 0 270W				
														12 3L x 6 9W				
					Pattern Description: General purpose gage. Exposed solder tab area 0.10" x 0.01" (2.5mm x 1.8mm)														
187UV 'C' FEATURE	CEA XX 187UV 120	A	120 ± 0 .%	53 00	CEA Series Strain Gages feature large integral copper solder tabs and a completely encapsulated grid. Refer to the front of this Catalog for details							0 187 ES	0 560 CP	0 150 ES	0 330 CP			
	CEA XX 187UV 350	B	350 ± 0 4%	59 00								4 75 ES	14 22 CP	3 81 ES	8 38 CP			
												Matrix Size → (Pretrimmed)		0 640L x 0 390W				
														16 3L x				
					Pattern Description: 2 Elems x 90° rosette for torque and shear strain measurement. Sections have a common elect connection. Exposed solder tab area 0.13" x 0.08" (3.3mm x 2.0mm)													

M-M

*NOTE Options available but not normally recommended
See 'Optional Features' Section

GAGE PATTERN (Actual Size) Grids are Vertical Except as Noted	GAGE DESIGNATION Insert Desired S T C No. in Spaces Marked XX	STOCK STATUS	RES. IN OHMS	LIST PKG. PRICE (Five Gages)	OPTIONS AVAILABLE Add Indicated Price to Package Price. Note: Stock Status Symbols Do Not Apply to Gages with Optional Features							DIMENSIONS IN M Matrix S Section (e g S1 Sec 1) ES Each Section — INCHES / MILLIMETRES — CP Comp Pad GD Grid Dia PD Pad Dia APD Act Pad Dia				OTHER SERIES AVAILABLE		
						W	E	S	SE	L	LE	GAGE LENGTH	OVERALL LENGTH	GRID WIDTH	OVERALL WIDTH	GAGE DESIGNATION	Stock Status	LIST PKG PRICE
200MB	EA XX 200MB-120	B	120 ± 0.2%	41.00		18.00	5.50	7.00	12.50	7.00	12.50	0.200 ES	0.330 CP	0.020 ES	0.130 CP	SA XX 200MB 120	C	64.00
	MA XX 200MB-120	B	120 ± 0.2%	43.00				7.00				*5.08 ES*	*8.38 CP*	*0.51 ES*	*3.30 CP*	SK XX 200MB 350	C	74.00
												Matrix Size →		0.54L x 0.19W				
	WA-XX 200MB 120	C	120 ± 0.4%	64.00		21.00*								*13.7L x 4.8W*		TA XX 200MB 120	C	49.00
	WK XX-200MB-350	C	350 ± 0.4%	74.00		21.00*	*Pattern Description* Dual grid gage for transducer use. Narrow pattern geometry. Grid centerlines are spaced 0.030" (0.8mm) apart									TK XX 200MB 350	C	57.00
210DA	EA-XX-210DA-350	B	350 ± 0.15%	30.00			3.50	3.50	6.25	4.00	7.50	0.210	0.500	0.300	0.300	EP 08 210DA 350	C	38.00
	MA XX 210DA-350	B	350 ± 0.15%	33.00				3.50				*5.33*	*12.70*	*7.62*	*7.62*	SA XX 210DA 350	C	48.00
	ED DY 210DA-10C	C	1000 ± 0.3%	38.00			3.50	3.50	6.25			*Matrix Size* →		0.70L x 0.45W		SK XX 210DA 10C	C	60.00
	WA XX-210DA-350	C	350 ± 0.3%	48.00										*17.8L x 11.4W*		SD DY 210DA 10C	C	59.00
	WK-XX-210DA-10C	C	1000 ± 0.3%	60.00			*Pattern Description* Transducer gage with high dissipation grid. Low hysteresis and creep									WD DY 210DA 10C	C	59.00
																TA XX 210DA 350	C	35.00
																TK XX 210DA 10C	C	43.00
																TD DY 210DA 10C	C	43.00
210EA	EA-XX-210EA-350	A	350 ± 0.15%	30.00			3.50	3.50	6.25	4.00	7.50	0.210	0.300	0.300	0.500	EP 08 210EA 350	C	38.00
	MA XX 210EA-350	B	350 ± 0.15%	33.00				3.50				*5.33*	*7.62*	*7.62*	*12.70*	SA XX 210EA 350	C	48.00
	ED DY-210EA-10C	C	1000 ± 0.3%	38.00			3.50	3.50	6.25			*Matrix Size* →		0.50L x 0.65W		SK XX 210EA 10C	C	60.00
	WA-XX-210EA 350	C	350 ± 0.3%	48.00										*12.7L x 16.5W*		SD DY 210EA 10C	C	59.00
	WK-XX-210EA-10C	C	1000 ± 0.3%	60.00			*Pattern Description* Similar to 210DA pattern preceding but with tabs at sides of grid									WD DY 210EA 10C	C	59.00
																TA XX 210EA 350	C	35.00
																TK XX 210EA 10C	C	43.00
																TD DY 210EA 10C	C	43.00
228JB (2)	EA XX-228JB-350	A	350 ± 1%	79.00				10.50	18.50			See Below	0.228 APD	—	0.228 APD	SA XX 228JB 350	B	128.00
	MA-XX-228JB-350	C	350 ± 1%	90.00				10.50					*5.79 APD*	—	*5.79 APD*			
												Matrix Size → (Nominal Trim Diameter)		0.245				
														6.2		TA XX 228JB 350	C	96.00
							Pattern Description: Full bridge diaphragm gage. Radial gage length is 0.018" (0.46mm), tangential grids are 0.100" (2.54mm) diameter. For diaphragm of 0.230" to 0.250" (5.84mm to 6.35mm) diameter.											
228JC (2)	EA-XX-228JC-120	C	120 ± 1%	70.00				10.50	18.50			—	0.228 APD	—	0.228 APD	SA XX 228JC 120	B	117.00
	MA XX-228JC-120	C	120 ± 1%	81.00				10.50				— —	*5.79 APD*	— —	*5.79 APD*	SK XX 228JC 350	B	137.00
												Matrix Size → (Nominal Trim Diameter)		0.245				
														6.2		TA XX 228JC 120	C	78.00
																TK XX 228JC 350	C	98.00
							Pattern Description Full bridge diaphragm gage. Similar to 228JB preceding except for resistance											
230DS	EA XX 230DS-120	A	120 ± 0.15%	24.00			3.50	3.50	6.25	4.00	7.50	0.230	0.375	0.022	0.030	EP 08 230DS 120	C	17.00
												5.84	*9.53*	*0.56*	*0.76*	SA XX 230DS 120	C	50.00
	ED DY 230DS-350	C	350 ± 0.3%	30.00			3.50	3.50	6.25			*Matrix Size* →		0.50L x 0.12W		SK XX 230DS 350	C	56.00
	WA XX 230DS-120	C	120 ± 0.3%	50.00										*12.7L x 3.0W*		SD DY 230DS 350	C	55.00
	WK-XX 230DS-350	C	350 ± 0.3%	56.00			*Pattern Description* [illegible] purpose gage with very narrow geometry									WD DY 230DS 350	C	55.00
																TA XX 230DS 120	C	30.00
																TK XX 230DS 350	C	36.00
																TD DY 230DS 350	C	35.00

*NOTE: Options available but not normally recommended. See 'Optional Features' Section.

GAGE PATTERN (Actual Size) Grids are Vertical Except as Noted	GAGE DESIGNATION Insert Desired S T C No. in Spaces Marked XX	STOCK STATUS	RES. IN OHMS	LIST PKG PRICE (Five Gages)	OPTIONS AVAILABLE Add Indicated Price to Package Price. Note: Stock Status Symbols Do Not Apply to Gages with Optional Features	W	E	S	SE	L	LE	DIMENSIONS IN M - Metric S - Section (e.g. S1, S2, S3) LS - Lead Section INCHES / MILLIMETRES CP - Comp Part GD - Grid Dia PD - Pad Dia APD - Active Pad Dia	GAGE LENGTH	OVERALL LENGTH	GRID WIDTH	OVERALL WIDTH	OTHER SERIES AVAILABLE GAGE DESIGNATION	STOCK STATUS	LIST PKG PRICE
250AE	EA-XX-250AE-350	A	350 ± 0.15%	24.00		9.00	2.75	3.50	6.25	3.50	6.25		0.250	0.425	0.250	0.250	EP 08 250AE 350	C	31.00
	MA-XX-250AE-350	A	350 ± 0.15%	27.00				3.50					6.35	10.80	6.35	6.35	SA XX 250AE 350	C	43.00
	ED-DY-250AE-10C	C	1000 ± 0.3%	32.00			2.75	3.50	6.25	3.50*	6.25*		Matrix Size →		0.63L x 0.40W		SK XX 250AE 10K	C	50.00
	WA-XX-250AE-350	B	350 ± 0.3%	43.00		11.50*									16.0L x 10.2W		SD DY 250AE 10K	C	50.00
	WK-XX-250AE-10C	C	1000 ± 0.3%	50.00		11.50*	Pattern Description: General purpose gage with high dissipation grid										WD DY 250AE 10K	C	50.00
																	TA XX 250AE 350	C	36.00
																	TK XX 250AE 10K	C	36.00
																	TD DY 250AE 10K	C	36.00
250AF	EA-XX-250AF-120	A	120 ± 0.15%	19.00		9.00	2.75	3.50	6.25	3.50	6.25		0.250	0.425	0.250	0.250	EP 08 250AF 120	B	26.00
	MA-XX-250AF-120	A	120 ± 0.15%	22.00				3.50					6.35	10.80	6.35	6.35	SA XX 250AF 120	C	36.00
	ED-DY-250AF-350	B	350 ± 0.3%	25.00			2.75	3.50	6.25	3.50*	6.25*		Matrix Size →		0.63L x 0.38W		SK XX 250AF 350	C	43.00
	WA-XX-250AF-120	B	120 ± 0.3%	36.00		11.50*									16.0L x 9.7W		SD DY 250AF 350	C	42.00
	WK-XX-250AF-350	B	350 ± 0.3%	43.00		11.50*	Pattern Description: General purpose gage with high dissipation grid. Identical to 250AE preceding except for resistance										WD DY 250AF 350	A	42.00
																	TA XX 250AF 120	C	24.00
																	TK XX 250AF 350	C	32.00
																	TD DY 250AF 350	C	32.00
250BA	EA-XX-250BA-175	B	175 ± 0.15%	16.50		9.00	2.75	3.50	6.25	3.50	6.25		0.250	0.375	0.125	0.125	EP 08 250BA 175	C	27.00
	MA-XX-250BA-175	B	175 ± 0.15%	20.00				3.50					6.35	9.53	3.18	3.18	SA XX 250BA 175	C	37.00
	ED-DY-250BA-500	B	500 ± 0.3%	23.00			2.75	3.50	6.25	3.50*	6.25*		Matrix Size →		0.52L x 0.24W		SK XX 250BA 500	C	40.00
	WA-XX-250BA-175	C	175 ± 0.3%	33.00		11.50*									13.2L x 6.1W		SD DY 250BA 500	C	40.00
	WK-XX-250BA-500	C	500 ± 0.3%	40.00		11.50*	Pattern Description: Primarily used in 8 gage transducer bridge circuits										WD DY 250BA 500	C	40.00
																	TA XX 250BA 175	C	22.00
																	TK XX 250BA 500	C	30.00
																	TD DY 250BA 500	C	29.00
250BB	EA-XX-250BB-120	A	120 ± 0.15%	17.00		9.00	2.75	3.50	6.25	3.50	6.25		0.250	0.490	0.175	0.175	EP 08 250BB 120	B	24.00
	MA-XX-250BB-120	C	120 ± 0.15%	20.00				3.50					6.35	12.45	4.45	4.45			
	ED-DY-250BB-350	B	350 ± 0.3%	23.00			2.75	3.50	6.25	3.50*	6.25*		Matrix Size →		0.64L x 0.27W				
															16.3L x 6.9W				
							Pattern Description: General purpose pattern with large solder tabs												
250BG	EA-XX-250BG-120	A	120 ± 0.15%	15.00		9.00	2.75	3.50	6.25	3.50	6.25		0.250	0.375	0.126	0.125	EP 08 250BG 120	A	18.00
	MA-XX-250BG-120	A	120 ± 0.15%	17.00				3.50					6.35	9.53	3.18	3.18	SA XX 250BG 120	B	28.00
	ED-DY-250BG-350	A	350 ± 0.3%	19.00			2.75	3.50	6.25	3.50*	6.25*		Matrix Size →		0.52L x 0.22W		SK XX 250BG 350	B	37.00
	WA-XX-250BG-120	A	120 ± 0.3%	28.00		11.50*									13.2L x 5.6W		SD DY 250BG 350	B	34.00
	WK-XX-250BG-350	A	350 ± 0.3%	37.00		11.50*	Pattern Description: Widely used general purpose pattern. Compact geometry										WD DY 250BG 350	B	34.00
																	TA XX 250BG 120	C	19.00
																	TK XX 250BG 350	C	24.00
																	TD DY 250BG 350	C	23.00
																	EA XX 250BG 000	C	14.00
250BF	EA-XX-250BF-350	A	350 ± 0.15%	18.00		9.00	2.75	3.50	6.25	3.50	6.25		0.250	0.375	0.126	0.125	EP 08 250BF 350	B	23.00
	MA-XX-250BF-350	A	350 ± 0.15%	21.00				3.50					6.35	9.53	3.18	3.18	SA XX 250BF 350	B	30.00
	ED-DY-250BF-10C	C	1000 ± 0.3%	25.00			2.75	3.50	6.25	3.50*	6.25*		Matrix Size →		0.52L x 0.22W		SK XX 250BF 10K	B	44.00
	WA-XX-250BF-350	A	350 ± 0.3%	30.00		11.50*									13.2L x 5.6W		SD DY 250BF 10K	C	43.00
	WK-XX-250BF-10C	C	1000 ± 0.3%	44.00		11.50*	Pattern Description: General purpose pattern with high resistance grid. Compact geometry. Identical to 250BG preceding except for resistance										WD DY 250BF 10K	C	43.00
																	TA XX 250BF 350	C	23.00
																	TK XX 250BF 10K	C	30.00
																	TD DY 250BF 10K	C	29.00

*NOTE. Options available but not normally recommended. See 'Optional Features' Section

GAGE PATTERN (Actual Size) Grids are Vertical Except as Noted	GAGE DESIGNATION Insert Desired S T C No. in Spaces Marked XX	STOCK STATUS	RES. IN OHMS	LIST PKG. PRICE (Five Gages)	OPTIONS AVAILABLE Add Indicated Price to Package Price. Note: Stock Status Symbols Do Not Apply to Gages with Optional Features	W	P	S	SE	I	LE	DIMENSIONS IN [INCHES / MILLIMETERS] M - Matrix; S - Section (e.g. S1 - Sec. 1); LS - Last Section; CP - Center Pad; GD - Grid Dia.; PD - Pad Dia.; APD - Act. Pad Dia.	GAGE LENGTH	OVERALL LENGTH	GRID WIDTH	OVERALL WIDTH	OTHER SERIES AVAILABLE GAGE DESIGNATION	Stock Status	LIST PKG PRICE
250UW C FEATURE	CFA XX 250UW 120 CFA XX 250UW 350	A A	120 ± 0.3% 350 ± 0.3%	22.00 27.00	*CFA Series Strain Gages feature large integral copper solder tabs and a completely encapsulated grid. Refer to the front of this Catalog for details*								0.250 6.35	0.450 11.43	0.180 4.57	0.180 4.57			
													Matrix Size (Preliminary) →		0.550L x 0.270W 14.0L x 6.9W				
					Pattern Description General purpose gage 4 special solder tabs are 0.10" x 0.01" (2.6mm x 1.8mm)														
250BK	FA XX 250BK 10C MA XX 250BK 10C FD DY 250BK 30C WA XX 250BK 10C WK XX 250BK 30C	A A C C C	1000 ± 0.15% 1000 ± 0.15% 3000 ± 0.3% 1000 ± 0.3% 3000 ± 0.3%	30.00 35.00 44.00 49.00 66.00		9.00 11.50*	2.75 2.75	3.50 3.50 3.50	6.25 6.25	3.50	6.25		0.250 6.35	0.430 10.92	0.175 4.45	0.175 4.45			
													Matrix Size →		0.58L x 0.27W 14.7L x 6.9W				
					Pattern Description High resistance pattern with good power dissipation capability for high output applications														
250BM	FA XX 250BM 500 MA XX 250BM 500 FD DY 250BM 15C WA XX 250BM 500 WK XX 250BM 15C	A C C C C	500 ± 0.15% 500 ± 0.15% 1500 ± 0.3% 500 ± 0.3% 1500 ± 0.3%	24.00 29.00 38.00 43.00 59.00		9.00 11.50*	2.75 2.75	3.50 3.50 3.50	6.25 6.25	3.50	6.25		0.250 6.35	0.375 9.53	0.125 3.18	0.125 3.18			
													Matrix Size →		0.58L x 0.27W 14.7L x 6.9W				
					Pattern Description A higher resistance version of the 250BF preceding. Primarily used in transducer applications														
250BP	SK XX 250BP 120 WK XX 250BP 120 FD DY 250BP 120 SD DY 250BP 120 WD DY 250BP 120	B A C C C	120 ± 0.3% 120 ± 0.3% 120 ± 0.3% 120 ± 0.3% 120 ± 0.3%	33.00 33.00 19.00 30.00 30.00		11.50*	2.75	3.50	6.25	3.50*	6.25*		0.250 6.35	0.375 9.53	0.125 3.18	0.125 3.18			
													Matrix Size →		0.53L x 0.27W 13.5L x 6.6W				
					Pattern Description A general purpose pattern used primarily to obtain 120 ohm grid resistance in K alloy foil														
250DM	FA XX 250DM 120 MA XX 250DM 120 FD DY 250DM 350 WA XX 250DM 120 WK XX 250DM 350	B C C C C	120 ± 0.15% 120 ± 0.15% 350 ± 0.3% 120 ± 0.3% 350 ± 0.3%	24.00 29.00 34.00 40.00 48.00			3.50 3.50	3.50 3.50 3.50	6.25 6.25	4.00 4.00*	7.50 7.50*		0.250 6.35	0.450 11.43	0.250 6.35	0.250 6.35			
													Matrix Size →		0.64L x 0.38W 16.3L x 9.7W				
					Pattern Description General purpose pattern with solder tabs at ends of grid														
250FM	FA XX 250FM 120 MA XX 250FM 120 FD DY 250FM 350 WA XX 250FM 120 WK XX 250FM 350	B C C C C	120 ± 0.15% 120 ± 0.15% 350 ± 0.3% 120 ± 0.3% 350 ± 0.3%	24.00 29.00 34.00 40.00 48.00			3.50 3.50	3.50 3.50 3.50	6.25 6.25	4.00 4.00*	7.50 7.50*		0.250 6.35	0.300 7.62	0.250 6.35	0.400 10.16			
													Matrix Size →		0.48L x 0.53W 12.2L x 13.5W				
					Pattern Description General purpose pattern. Similar to 250DM preceding but with tabs at sides of grid														

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*NOTE: Options available but not normally recommended. See 'Optional Features' Section

GAGE PATTERN (Actual Size) Grids are Vertical Except as Noted	CAGE DESIGNATION Insert Desired S T C No in Spaces Marked XX	STOCK STATUS	RES. IN OHMS	LIST PKG. PRICE (Five Gages)	OPTIONS AVAILABLE Add Indicated Price to Package Price Note: Stock Status symbols Do Not Apply to Gages with Optional Features							DIMENSIONS IN M - Main S - Secondary (e.g. SE, SW, E) Each Section (INCHES / MILLIMETERS) CP - Comp Pad ES - Each Side PD - Pattern Dia. AD - Add Pad Dia.				OTHER SERIES AVAILABLE		
						W	E	S	SE	L	LE	GAGE LENGTH	OVERALL LENGTH	GRID WIDTH	OVERALL WIDTH	GAGE DESIGNATION	STOCK STATUS	LIST PKG. PRICE
250HC	VC ST 250HC 120 VK XX 250HC 120 VN ST 250HC 120	B A B	120 ± 0.3% 120 ± 0.3% 120 ± 0.3%	60.00 60.00 60.00	10.00 10.00 10.00							0.250 6.35 Matrix Size →	0.450 11.43	0.114 2.90 0.501 x 0.21W 14.21 x 5.3W	0.154 3.91	VN DY 250HC 120	C	60.00
							Pattern Description This is a "free grid" pattern supplied on a strippable backing for use with the tape transfer method. This type of gage is normally installed with ceramic adhesive.										
250MQ	EA XX 250MQ 350 MA XX 250MQ 350 ED DY 250MQ 10C WA XX 250MQ 350 WK XX 250MQ 10C	A B C C C	350 ± 0.2% 350 ± 0.2% 1000 ± 0.4% 350 ± 0.3% 1000 ± 0.4%	40.00 43.00 52.00 67.00 84.00		18.00 21.00 21.00	5.50 5.50	7.00 7.00 7.00 7.00	12.50 12.50	7.00 7.00	12.50 12.50	0.250 ES 6.35 ES Matrix Size →	0.375 CP 9.53 CP	0.125 ES 3.18 ES 0.471 x 0.40W 11.9L x 10.2W	0.310 CP 7.87 CP	EP 08 250MQ 350 SA XX 250MQ 350 SK XX 250MQ 10C SD DY 250MQ 10C WD DY 250MQ 10C TA XX 250MQ 350 TK XX 250MQ 10C TD DY 250MQ 10C	C C C C C C C C	48.00 67.00 84.00 82.00 82.00 44.00 66.00 67.00
							Pattern Description Dual pattern for bending beam transducers. Longitudinal grid centerlines are spaced 0.185" (4.70mm) apart.										
250PD	EA XX 250PD 120 EA XX 250PD 350 MA XX 250PD 120 MA XX 250PD 350 ED DY 250PD 350 ED DY 250PD 10C WA XX 250PD 120 WA XX 250PD 350 WK XX 250PD 350 WK XX 250PD 10C*	B B B B C C C C C C	120 ± 0.2% 350 ± 0.2% 120 ± 0.2% 350 ± 0.2% 350 ± 0.4% 1000 ± 0.4% 120 ± 0.3% 350 ± 0.3% 350 ± 0.4% 1000 ± 0.4%	29.00 38.00 33.00 41.00 42.00 49.00 56.00 66.00 68.00 82.00		18.00 18.00 21.00 21.00 21.00 21.00	5.50 5.50 6.50 6.50	7.00 7.00 7.00 7.00 7.00 7.00	12.50 12.50 12.50 12.50	7.00 7.00	12.50 12.50	0.250 ES 6.35 ES Matrix Size (Trim Marks) →	0.360 CP 9.14 CP	0.110 ES 2.79 ES 0.430 x 0.200W 10.9L x 7.4W	0.240 CP 6.10 CP	SA XX 250PD 120 SA XX 250PD 350 SK XX 250PD 350 SK XX 250PD 10C SD DY 250PD 350 SD DY 250PD 10C WD DY 250PD 350 WD DY 250PD 10C TA XX 250PD 120 TA XX 250PD 350 TK XX 250PD 350 TK XX 250PD 10C TD DY 250PD 350 TD DY 250PD 10C	C C C C C C C C C C C C C C	56.00 66.00 68.00 82.00 64.00 80.00 64.00 80.00 34.00 42.00 44.00 66.00 43.00 62.00
							Pattern Description Dual element pattern with longitudinal grid centerlines spaced 0.190" (4.80mm) apart.										
250NA	EA XX 250NA 120 PA XX 250NA 120 ED DY 250NA 350 WA XX 250NA 120 WK XX 250NA 350	B C C C C	120 ± 0.2% 120 ± 0.2% 350 ± 0.3% 120 ± 0.4% 350 ± 0.4%	35.00 46.00 48.00 60.00 70.00				3.50 3.50 3.50	6.25	3.50	6.25	0.250 ES 6.35 ES Matrix Size (Trim Marks) →	0.300 CP 7.62 CP	0.102 ES 2.59 ES 0.370L x 0.560W 9.4L x 14.2W	0.501 CP 12.73 CP	SA XX 250NA 120 SK XX 250NA 350 SD DY 250NA 350 WD DY 250NA 350	C C C C	60.00 70.00 68.00 68.00
							Pattern Description Stress gage. Electrically balanced for highest accuracy. Included angle is 57°, corresponding to Poisson's ratio of .29.										
250HA	EA XX 250HA 120 ED DY 250HA 350 WA XX 250HA 120 WK XX 250HA 350	A C C C	120 ± 0.2% 350 ± 0.5% 120 ± 0.4% 350 ± 0.4%	61.00 70.00 100.00 110.00		24.00 28.00 28.00	8.00 8.00	10.50 10.50	18.50 18.50	10.50 10.50	18.50 18.50	0.250 ES 6.35 ES Matrix Size (Trim Marks) →	0.660 CP 13.97 CP	0.125 ES 3.18 ES 0.745L x 0.89W 18.9L x 22.6W	0.866 CP 21.97 CP	EP 08 250HA 120 SA XX 250HA 120 SK XX 250HA 350 SD DY 250HA 350 WD DY 250HA 350	C C C C C	74.00 100.00 110.00 108.00 108.00
							Pattern Description Large Element 45° rectangular rosette with convenient solder tab arrangement.										

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*NOTE: Options available but not normally recommended. See 'Optional Features' Section
†Option SWL 2. See 'Optional Features' Section

GAGE PATTERN (Actual Size) Grids are Vertical Except as Noted	GAGE DESIGNATION Insert Desired S T C No in Spaces Marked XX	STOCK STATUS	RES. IN OHMS	LIST PKG. PRICE (Five Gages)	OPTIONS AVAILABLE Add Indicated Price to Package Price. Note: Stock Status Symbols Do Not Apply to Gages with Optional Features							DIMENSIONS IN (M = Matrix, S = Section (e.g. S1 = Sec. 1), ES = Each Section; INCHES / MILLIMETERS; CP = Center Path, GD = Grid Dia, PD = Path Dia, ACD = Act. Path Dia)				OTHER SERIES AVAILABLE		
						W	F	S	SF	I	LF	GAGE LENGTH	OVERALL LENGTH	GRID WIDTH	OVERALL WIDTH	GAGE DESIGNATION	Stock Status	LIST PKG. PRICE
250RD	FA XX 250RD 350	A	350 ± 0.2%	70.00		24.00	8.00	10.50	18.50	10.50	18.50	0.250 ES	0.500 CP	0.125 ES	0.005 CP	EF 08 250RD 350	C	82.00
												6.35 ES	13.92 CP	3.18 ES	21.92 CP	SA XX 250RD 350	C	105.00
	FD DY 250RD 10C	C	1000 ± 0.5%	94.00			8.00	10.50	18.50	10.50*	18.50*	Matrix Size (Trim Marked)		0.145L x 0.005W		SK XX 250RD 10C	C	160.00
	WA XX 250RD 350	C	350 ± 0.4%	105.00		28.00*								18.91 x 22.7W				
	WK XX 250RD 10C	C	1000 ± 0.4%	160.00		28.00*	Pattern Description: Large 3 element 45° rectangular rosette. Identical to the 250RA pattern preceding except for resistance.											
250UR	CFA XX 250UR 120	A	120 ± 0.4%	78.00	CFA Series Strain Gages feature large integral copper solder tabs and a completely encapsulated grid. Refer to the front of this Catalog for details.							0.250 ES	0.500 CP	0.120 ES	0.100 CP			
	CFA XX 250UR 350	A	350 ± 0.4%	88.00								6.35 ES	12.70 CP	3.05 ES	19.30 CP			
												Matrix Size (Prelimined)		0.050L x 0.080W				
														16.51 x 20.3W				
							Pattern Description: Large 3 element 45° single plane rosette. Exposed solder tab max 0.13" x 0.08" (3.1mm x 2.0mm)										
250SD	FA XX 250SD 350	B	350 ± 0.15%	21.00		9.00		3.50	6.25	3.50	6.25	0.250	0.320	0.120	0.100	EF 08 250SD 350	C	75.00
	MA XX 250SD 350	C	350 ± 0.15%	23.00				3.50				6.35	8.13	3.05	4.83	SA XX 250SD 350	C	72.00
	FD DY 250SD 10C	C	1000 ± 0.3%	29.00				3.50	6.25	3.50*	6.25*	Matrix Size		0.471 x 0.30W		SK XX 250SD 10C	C	90.00
	WA XX 250SD 350	C	350 ± 0.3%	32.00		11.50*								11.91 x 7.6W		SD DY 250SD 10C	C	48.00
	WK XX 250SD 10C	C	1000 ± 0.3%	50.00		11.50*	Pattern Description: General purpose pattern for use where elements are in restricted areas.									WD DY 250SD 10C	C	48.00
																TA XX 250SD 350	C	25.00
																TK XX 250SD 10C	C	35.00
																TD DY 250SD 10C	C	14.00
250TA	FA XX 250TA 120	A	120 ± 0.2%	46.00		18.00	5.50	5.25	10.25	5.25	10.75	0.250 ES	0.425 CP	0.300 ES	0.600 CP	EF 08 250TA 120	B	66.00
												6.35 ES	10.80 CP	7.62 ES	17.27 CP	SA XX 250TA 120	C	80.00
	FD DY 250TA 350	C	350 ± 0.5%	66.00			5.50	5.25	10.25	5.25*	10.75*	Matrix Size		0.631 x 0.81W		SK XX 250TA 120	C	92.00
	WA XX 250TA 120	C	120 ± 0.4%	80.00		21.00*								16.01 x 20.6W		SD DY 250TA 350	C	88.00
	WK XX 250TA 350	C	350 ± 0.4%	92.00		21.00*	Pattern Description: General purpose 2 element 90° "tee" rosette. Sections have a common electrical connection.									WD DY 250TA 120	C	88.00
																TA XX 250TA 120	C	55.00
																TK XX 250TA 120	C	64.00
																TD DY 250TA 350	C	62.00
250TB	FA XX 250TB 350	A	350 ± 0.2%	57.00		18.00	5.50	5.25	10.25	5.25	10.75	0.250 ES	0.425 CP	0.300 ES	0.600 CP	EF 08 250TB 350	C	75.00
												6.35 ES	10.80 CP	7.62 ES	17.27 CP	SA XX 250TB 350	C	92.00
	FD DY 250TB 10C	C	1000 ± 0.5%	80.00			5.50	5.25	10.25	5.25*	10.75*	Matrix Size		0.631 x 0.82W		SK XX 250TB 10C	C	101.00
	WA XX 250TB 350	C	350 ± 0.4%	92.00		21.00*								16.01 x 20.8W		SD DY 250TB 10C	C	100.00
	WK XX 250TB 10C	C	1000 ± 0.4%	103.00		21.00*	Pattern Description: General purpose 2 element 90° "tee" rosette. High resistance version of 250TA pattern preceding.									WD DY 250TB 10C	C	100.00
																TA XX 250TB 350	C	62.00
																TK XX 250TB 10C	C	81.00
																TD DY 250TB 10C	C	79.00
250TM	FA XX 250TM 120	A	120 ± 0.2%	46.00		18.00	5.50	7.00	12.50	7.00	12.50	0.250 ES	0.430 CP	0.300 ES	0.610 CP	EF 08 250TM 120	C	66.00
												6.35 ES	10.92 CP	7.62 ES	17.02 CP	SA XX 250TM 120	C	80.00
	FD DY 250TM 350	C	350 ± 0.5%	66.00			5.50	7.00	12.50	7.00*	12.50*	Matrix Size		0.641 x 0.82W		SK XX 250TM 120	C	92.00
	WA XX 250TM 120	C	120 ± 0.4%	80.00		21.00*								16.31 x 20.8W		SD DY 250TM 350	C	88.00
	WK XX 250TM 350	C	350 ± 0.4%	92.00		21.00*	Pattern Description: General purpose 2 element 90° tee rosette. Sections are electrically independent.									WD DY 250TM 350	C	88.00
																TA XX 250TM 120	C	55.00
																TK XX 250TM 350	C	64.00
																TD DY 250TM 350	C	62.00

FEATURE

*NOTE: Options available but not normally recommended. See 'Optional Features' Section.

GAGE PATTERN (Actual Size) Grids are Vertical Except as Noted	GAGE DESIGNATION Insert Desired S T C No in Spaces Marked XX	STOCK STATUS	RES. IN OHMS	LIST PKG. PRICE (Five Gages)	OPTIONS AVAILABLE Add Indicated Price to Package Price Note: Stock Status Symbols Do Not Apply to Gages with Optional Features							DIMENSIONS IN M Metric, B Section Leg, S1 Sec. 1, S2 Sec. 2 — INCHES / MILLIMETERS — LP Grid Pitch Perpendicular to Leg, PD Pitch Diameter, APD Average Pitch Dia.				OTHER SERIES AVAILABLE		
						W	E	S	SE	L	LE	GAGE LENGTH	OVERALL LENGTH	GRID WIDTH	OVERALL WIDTH	GAGE DESIGNATION	STOCK STATUS	LIST PKG. PRICE
250UT 'C' FEATURE 	CEA XX 250UT 120	A	120 ± 0.4%	58.00	*CEA Series Strain Gages feature large integral copper solder tabs and a completely encapsulated grid* *Refer to the front of this Catalog for details*							0.260 ES / 6.35 ES	0.460 CP / 11.43 CP	0.200 ES / 7.17 ES	0.660 CP / 16.51 CP	ORIGINAL PAGE IS OF POOR QUALITY		
	CEA XX 250UT 350	B	350 ± 0.4%	70.00								Matrix Size (Predimensional)		0.560L x 0.740W / 14.01 x 18.80W				
					Pattern Description 2 Element 90° tee rosette for general purpose use. Exposed solder tab area 0.13" x 0.10" (3.3mm x 2.5mm)													
250TD 	EA XX 250TD 120	A	120 ± 0.2%	52.00		18.00	5.50	7.00	12.50	7.00	12.50	0.260 ES / 6.35 ES	0.660 CP / 16.66 CP	0.260 ES / 6.35 ES	0.784 CP / 19.91 CP	EP or XX 250TD 120	C	69.00
																SA XX 250TD 120	B	80.00
																SK XX 250TD 350	C	92.00
	ED DY 250TD 350	C	350 ± 0.5%	63.00			5.50	7.00	12.50	7.00	12.50	Matrix Size		0.801 x 0.90W / 20.31 x 24.99W		SD DY 250TD 350	C	80.00
																WD DY 250TD 350	C	88.00
	WA XX 250TD 120	C	120 ± 0.4%	80.00		21.00										TA XX 250TD 120	C	57.00
	WK XX 250TD 350	C	350 ± 0.4%	92.00		21.00	*Pattern Description* 2 Element 90° rosette used for shear strain measurement and in torque transducers									TK XX 250TD 350	C	71.00
																TD DY 250TD 350	C	69.00
250TR 	EA XX 250TR 350	B	350 ± 0.2%	63.00		18.00	5.50	7.00	12.50	7.00	12.50	0.260 ES / 6.35 ES	0.640 CP / 13.87 CP	0.260 ES / 6.35 ES	0.784 CP / 19.91 CP	EP or XX 250TR 350	C	74.00
																SA XX 250TR 350	B	90.00
																SK XX 250TR 10K	C	101.00
	ED DY 250TR 10C	C	1000 ± 0.5%	78.00			5.50	7.00	12.50	7.00	12.50	Matrix Size		0.701 x 0.97W / 17.81 x 24.66W		SD DY 250TR 10K	C	96.00
																WD DY 250TR 10K	C	96.00
	WA XX 250TR 350	C	350 ± 0.4%	90.00		21.00										TA XX 250TR 350	C	67.00
	WK XX 250TR 10C	C	1000 ± 0.4%	101.00		21.00	*Pattern Description* 2 Element 90° rosette. High resistance version of the 250TD pattern preceding, with more compact geometry									TK XX 250TR 10K	C	81.00
																TD DY 250TR 10K	C	79.00
250TK 	EA XX 250TK 120	B	120 ± 0.2%	40.00			7.00	7.00	12.50	8.00	16.00	0.260 ES / 6.35 ES	0.640 CP / 16.26 CP	0.220 ES / 5.59 ES	0.460 CP / 11.43 CP	SA XX 250TK 120	B	64.00
	EA XX 250TK 350	A	350 ± 0.2%	52.00			7.00	7.00	12.50	8.00	16.00					SA XX 250TK 350	B	74.00
	EA XX 250TK 10C	B	1000 ± 0.2%	68.00			7.00	7.00	12.50	8.00	16.00					SA XX 250TK 10K	C	91.00
	MA XX 250TK 120	B	120 ± 0.2%	48.00				7.00								SK XX 250TK 350	B	82.00
	MA XX 250TK 350	A	350 ± 0.2%	59.00				7.00				Matrix Size		0.771 x 0.64W / 19.61 x 13.74W		SK XX 250TK 10K	C	97.00
	MA XX 250TK 10C	B	1000 ± 0.2%	74.00				7.00								SK XX 250TK 30K	C	120.00
	ED DY 250TK 350	C	350 ± 0.5%	61.00			7.00	7.00	12.50							SD DY 250TK 350	C	80.00
	ED DY 250TK 10C	C	1000 ± 0.5%	63.00			7.00	7.00	12.50			*Pattern Description* 2 Element 90° torque gage with compact geometry. Sections are electrically independent				SD DY 250TK 10K	C	92.00
	ED DY 250TK 30C	C	3000 ± 0.5%	80.00			7.00	7.00	12.50							WD DY 250TK 350	C	80.00
	WA XX 250TK 120	C	120 ± 0.4%	64.00												WD DY 250TK 10K	C	92.00
	WA XX 250TK 350	C	350 ± 0.4%	74.00												TA XX 250TK 120	C	50.00
	WA XX 250TK 10C	C	1000 ± 0.4%	91.00												TA XX 250TK 350	C	61.00
	WK XX 250TK 350	C	350 ± 0.4%	82.00												TA XX 250TK 10K	C	76.00
	WK XX 250TK 10C	C	1000 ± 0.4%	97.00												TK XX 250TK 350	C	68.00
	WK XX 250TK 30C	C	3000 ± 0.4%	120.00												TK XX 250TK 10K	C	79.00
																TK XX 250TK 30K	C	99.00
																TD DY 250TK 350	C	67.00
																TD DY 250TK 10K	C	77.00
250TL 	EA XX 250TL 350	B	350 ± 0.2%	52.00			7.00	5.25	10.25	6.00	13.00	0.260 ES / 6.35 ES	0.640 CP / 16.26 CP	0.220 ES / 5.59 ES	0.460 CP / 11.43 CP	EP or XX 250TL 350	C	57.00
																SA XX 250TL 350	C	74.00
	MA XX 250TL 350	B	350 ± 0.2%	59.00				5.25								SK XX 250TL 10K	C	97.00
	ED DY 250TL 10C	C	1000 ± 0.5%	63.00			7.00	5.25	10.25			Matrix Size		0.771 x 0.64W / 19.61 x 13.74W		SD DY 250TL 10K	C	92.00
																WD DY 250TL 10K	C	92.00
	WA XX 250TL 350	C	350 ± 0.4%	74.00												TA XX 250TL 350	C	63.00
	WK XX 250TL 10C	C	1000 ± 0.4%	97.00												TK XX 250TL 10K	C	79.00
																TD DY 250TL 10K	C	77.00
							Pattern Description 2 Element 90° torque gage. Identical to the 250TK preceding except sections have a common electrical connection											

*NOTE: Options available but not normally recommended. See 'Options' ' atures' Section.

GAGE PATTERN (Actual size) Grids are Vertical Except as Noted	GAGE DESIGNATION Insert Desire[illegible] in Spaces Mark # XX	OPTIONS AVAILABLE Add Indicated Price to Basic Price. Note: Stock status Symbols Do Not Apply to Gages with Optional Features	RES. IN OHMS	LIST PKG. PRICE (Five Gages)	OPTIONS AVAILABLE							DIMENSIONS IN M = Metric [illegible] (Inches) [illegible] MILLIMETERS				OTHER SERIES AVAILABLE		
						W	E	S	SZ	L	LE	GAGE LENGTH	OVERALL LENGTH	GRID WIDTH	OVERALL WIDTH	GAGE DESIGNATION	STOCK STATUS	LIST PKG. PRICE
250TF	EA XX 250TF 120	B	120 ± 0.2%	46.00				5.25	10.25	6.00	13.00	0.250 FS	1.000 CP	0.300 FS	0.300 CP	EP 08 250TF 120	C	52.00
												6.35 FS	25.40 CP	7.62 FS	7.62 CP	SA XX 250TF 120	C	25.00
	ED DY 250TF 350	C	350 ± 0.5%	58.00				5.25	10.25			Matrix Size (Trim Marks) →		1.070L x 0.370W		SK XX 250TF 350	C	81.00
														27.2L x 9.4W		SD DY 250TF 350	C	81.00
HORIZONTAL POSITION																TA XX 250TF 120	C	58.00
																TK XX 250TF 350	C	63.00
																TD DY 250TF 350	C	63.00
					Pattern Description: General purpose 2 element 90° "tee" rosette with narrow pattern geometry. Sections have a common electrical connection.														
250VB	EA XX 250VB 120	B	120 ± 0.2%	46.00				7.00	12.50			0.250 FS	1.000 CP	0.300 FS	0.300 CP	EP 08 250VB 120	C	52.00
												6.35 FS	25.40 CP	7.62 FS	7.62 CP	SA XX 250VB 120	C	25.00
	ED DY 250VB 350	C	350 ± 0.5%	58.00				7.00	12.50			Matrix Size (Trim Marks) →		1.130L x 0.440W		SK XX 250VB 350	C	81.00
														28.7L x 11.2W		SD DY 250VB 350	C	81.00
HORIZONTAL POSITION																TA XX 250VB 120	C	58.00
																TK XX 250VB 350	C	63.00
																TD DY 250VB 350	C	63.00
					Pattern Description: General purpose 2 element 90° "tee" rosette identical to the 250TF pattern preceding except sections are electrically independent.														
250TG	EA XX 250TG 350	A	350 ± 0.2%	52.00				5.25	10.25	6.00	13.00	0.250 FS	1.000 CP	0.300 FS	0.300 CP	EP 08 250TG 350	C	63.00
												6.35 FS	25.40 CP	7.62 FS	7.62 CP	SA XX 250TG 350	C	80.00
	ED DY 250TG-10C	C	1000 ± 0.5%	69.00				5.25	10.25			Matrix Size (Trim Marks) →		1.070L x 0.370W		SK XX 250TG 10C	C	94.00
														27.2L x 9.4W		SD DY 250TG 10C	C	94.00
HORIZONTAL POSITION																TA XX 250TG 350	C	69.00
																TK XX 250TG 10C	C	80.00
																TD DY 250TG 10C	C	80.00
					Pattern Description: General purpose 2 element 90° "tee" rosette. High resistance version of the 250TF preceding.														
250VA	EA XX 250VA 350	B	350 ± 0.2%	52.00				7.00	12.50			0.250 FS	1.000 CP	0.300 FS	0.300 CP	EP 08 250VA 350	C	63.00
												6.35 FS	25.40 CP	7.62 FS	7.62 CP	SA XX 250VA 350	C	80.00
	ED DY 250VA-10C	C	1000 ± 0.5%	69.00				7.00	12.50			Matrix Size (Trim Marks) →		1.40L x 0.440W		SK XX 250VA 10C	C	94.00
														35.6L x 11.2W		SD DY 250VA 10C	C	94.00
HORIZONTAL POSITION																TA XX 250VA 350	C	69.00
																TK XX 250VA 10C	C	80.00
																TD DY 250VA 10C	C	80.00
					Pattern Description: General purpose 2 element 90° "tee" rosette. High resistance version of the 250VB preceding.														
250US ☆ FEATURE	CEA XX 250US-120	B	120 ± 0.4%	115.00	CEA Series Strain Gages feature large integral copper solder tabs and a completely encapsulated grid. Refer to the front of this Catalog for details.							0.250 FS	0.820 CP	0.120 FS	0.700 CP			
	CEA XX 250US 350	B	350 ± 0.4%	138.00								6.35 FS	20.83 CP	3.05 FS	17.78 CP			
												Matrix Size (Pretrimmed) →		0.960L x 0.800W				
														24.4L x 20.3W				
					Pattern Description: 4 Element full bridge pattern for shear strain measurement. Grids are spaced 90° apart, and 45° from pattern centerlines. Exposed solder tab area 0.16" x 0.10" (4.1mm x 2.5mm).														
250WR	WA XX 250WR 120	B	120 ± 0.3%	90.00								0.250 FS	0.510 M	0.125 FS	0.600 M	SA XX 250WR 120	C	90.00
	WA XX 250WR 350	B	350 ± 0.3%	114.00								6.35 FS	12.95 M	3.18 FS	15.24 M	SA XX 250WR 350	C	114.00
	WD DY 250WR 350	B	350 ± 0.5%	126.00								Matrix Size (Pretrimmed) →		0.51L x 0.60W		SK XX 250WR 120	C	144.00
	WK XX 250WR 120	B	120 ± 0.3%	144.00										13.0L x 15.2W		SK XX 250WR 350	C	162.00
	WK XX 250WR 350	B	350 ± 0.3%	162.00												SD DY 250WR 350	C	126.00
					Pattern Description: 3 Element 45° rectangular stacked rosette.														

*NOTE: Options available but not normally recommended. See "Optional Features" Section.

GAGE PATTERN (Actual Size) Grids are Vertical Except as Noted	GAGE DESIGNATION Insert Desired S T C No in Spaces Marked XX	STOCK STATUS	RES. IN OHMS	LIST PKG. PRICE (Five Gages)	OPTIONS AVAILABLE Add Indicated Price to Package Price. Note: Stock Status Symbols Do Not Apply to Gages with Optional Features	W	E	S	SL	L	LL	DIMENSIONS IN M Matrix S Separation Leg CL Centerline Leg Pitch AIN LIMETALS APD Active Pattern Dia Gage Pad Centerline Pattern Dia ACPD Active Pattern Dia	GAGE LENGTH	OVERALL LENGTH	GRID WIDTH	OVERALL WIDTH	OTHER SERIES AVAILABLE GAGE DESIGNATION	Stock Status	LIST PKG PRICE
250WT	WA XX 250WT 120	B	120 ± 0 3%	66 00									0 250 ES / 6 35 ES	0 510 M / 12 95 M	0 125 ES / 3 18 ES	0 600 M / 15 24 M	SA AK 250WT 120	C	66 00
	WA XX 250WT 350	B	350 ± 0 3%	78 00													SA AK 250WT 350	C	78 00
	WD DY 250WT 350	B	350 ± 0 6%	90 00									Matrix Size (Predimmed) →		0 51L x 0 60W / 13 0L x 15 2W		SK AK 250WT 120	C	114 00
	WK XX 250WT 120	B	120 ± 0 3%	114 00													SK AK 250WT 350	C	126 00
	WK XX 250WT 350	B	350 ± 0 3%	126 00													SD DY 250WT 350	C	90 00
							Pattern Description: 2 Element 90° "tee" stacked rosette												
250WY	WA XX 250WY 120	B	120 ± 0 3%	90 00									0 250 ES / 6 35 ES	0 510 M / 12 95 M	0 125 ES / 3 18 ES	0 600 M / 15 24 M	SA AK 250WY 120	C	90 00
	WA XX 250WY 350	C	350 ± 0 3%	114 00													SA AK 250WY 350	C	114 00
	WD DY 250WY 350	C	350 ± 0 6%	126 00									Matrix Size (Predimmed) →		0 51L x 0 60W / 13 0L x 15 2W		SK AK 250WY 120	C	144 00
	WK XX 250WY 120	B	120 ± 0 3%	144 00													SK AK 250WY 350	C	162 00
	WK XX 250WY 350	C	350 ± 0 3%	162 00													SD DY 250WY 350	C	126 00
							Pattern Description: 3 Element 60° delta stacked rosette												
250WF	WA XX 250WF 120	B	120 ± 0 3%	126 00									0 250 ES / 6 35 ES	0 510 M / 12 95 M	0 125 ES / 3 18 ES	0 600 M / 15 24 M	SA AK 250WF 120	C	126 00
	WA XX 250WF 350	C	350 ± 0 3%	150 00													SA AK 250WF 350	C	150 00
	WD DY 250WF 350	C	350 ± 0 6%	167 00									Matrix Size (Predimmed) →		0 51L x 0 60W / 13 0L x 15 2W		SK AK 250WF 120	C	196 00
	WK XX 250WF 120	C	120 ± 0 3%	196 00													SK AK 250WF 350	C	219 00
	WK XX 250WF 350	C	350 ± 0 3%	219 00													SD DY 250WF 350	C	167 00
							Pattern Description: 4 Element 1 rectangular stacked rosette. This is a 45° rectangular configuration with another element at 90° to the center gage.												
250YA	EA XX 250YA 120	A	120 ± 0 2%	60 00				10 50	18 50	12 00	21 00		0 250 ES / 6 35 ES	0 750 CP / 19 05 CP	0 125 ES / 3 18 ES	0 750 CP / 19 05 CP	EP 08 250YA 120	C	76 00
																	SA XX 250YA 120	C	94 00
	ED DY 250YA 350	C	350 ± 0 6%	74 00				10 50	18 50				Matrix Size →		0 99L x 0 85W / 25 1L x 21 6W		SK XX 250YA 350	C	115 00
																	SD DY 250YA 350	C	115 00
																	TA XX 250YA 350	C	98 00
							Pattern Description: 3 Element 60° delta single plane rosette												
270TN	EA XX 270TN 350	B	350 ± 0 2%	48 00				7 00	7 00 / 7 00	12 50	8 00	15 00	0 270 S1 / 6 86 S1	0 120 S2 / 3 05 S2	0 450 CP / 11 43 CP	0 160 S1 / 4 06 S1	0 330 S2 / 7 87 S2	0 330 CP / 8 38 CP	SA AK 270TN 350	C	68 00
	MA XX 270TN 350	B	350 ± 0 2%	54 00													SA AK 270TN 10K	C	90 00
	ED DY 270TN 10C	C	1000 ± 0 6%	62 00				7 00	7 00 / 7 00	12 50			Matrix Size (Trim Marks) →		0 615L x 0 365W / 13 1L x 9 4W		SD DY 270TN 10K	C	94 00
	WA XX 270TN 350	C	350 ± 0 4%	68 00													WD DY 270TN 10K	C	94 00
	WK XX 270TN 10C	C	1000 ± 0 4%	96 00													TA XX 270TN 350	C	59 00
							Pattern Description: Transducer gage for direct stress element designs. Section 1 is aligned with the principal strain axis. Section 2 responds to the Poisson strain.												TA XX 270TN 10K	C	77 00
																	TD DY 270TN 10K	C	76 00
350DD	EA XX 350DD 350	B	350 ± 0 15%	24 00				3 50	3 50 / 3 50	6 25	4 00	7 50	0 350 / 8 89	0 500 / 12 70	0 100 / 2 54	0 100 / 2 54	EP 08 350DD 350	C	30 00
	MA XX 350DD 350	A	350 ± 0 15%	30 00													SA XX 350DD 350	C	42 00
	ED DY 350DD 10C	C	1000 ± 0 3%	32 00				3 50	3 50	6 25			Matrix Size →		0 63L x 0 19W / 16 0L x 4 8W		SK XX 350DD 10K	C	60 00
	WA XX 350DD 350	C	350 ± 0 3%	42 00													SD DY 350DD 10K	C	48 00
	WK XX 350DD 10C	C	1000 ± 0 3%	50 00													WD DY 350DD 10K	C	48 00
							Pattern Description: High performance transducer gage with narrow pattern geometry												TA XX 350DD 350	C	32 00
																	TA XX 350DD 10K	C	39 00
																	TD DY 350DD 10K	C	38 00

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*NOTE: Options available but not normally recommended. See 'Optional Features' Section

GAGE PATTERN (Actual Size) Grids are Vertical Except as Noted	GAGE DESIGNATION Insert Desired S T C No. in Spaces Marked XX	STOCK STATUS	RES. IN OHMS	LIST PKG. PRICE (Five Gages)	OPTIONS AVAILABLE Add Indicated Price to Package Price. Note: Stock Status Symbols Do Not Apply to Gages with Optional Features	W	F	S	SE	L	LE	DIMENSIONS IN (M Matrix; S Section (+ SX Sec 11; LS Each Section; INCHES / MILLIMETERS; CP Compt Part; GD Grid Dia; PD Pattern Dia; APD Avg Part Dia) GAGE LENGTH	OVERALL LENGTH	GRID WIDTH	OVERALL WIDTH	OTHER SERIES AVAILABLE GAGE DESIGNATION	Stock Status	LIST PKG. PRICE
364JB	FA XX 364JB 350	C	350 ± 0.5%	72.00				10.50	18.50			See Below	0.364 APD		0.364 APD	SA XX 364JB 350	C	119.00
	MA XX 364JB 350	C	350 ± 0.5%	82.00				10.50					9.25 APD		9.25 APD			
												Matrix Size → (Nominal Trim Diameter)		0.390				
														9.9		TA XX 364JB 350	C	86.00
					Pattern Description: Full bridge displacement gage. Radial gage length is 0.028" (0.71mm), tangential grids are 0.160 (4.06mm) diameter. For displacements of 0.370" to 0.400" (9.40mm to 10.16mm) diameter.														
364JC	EA XX 364JC 120	C	120 ± 0.5%	63.00				10.50	18.50				0.364 APD		0.364 APD	SA XX 364JC 120	C	108.00
	MA XX 364JC 120	C	120 ± 0.5%	73.00				10.50					9.25 APD	-	9.25 APD	SK XX 364JC 350	C	116.00
	ED DY 364JC 350	C	350 ± 1%	86.00				10.50	18.50			Matrix Size → (Nominal Trim Diameter)		0.390				
														9.9		TA XX 364JC 120	C	79.00
					Pattern Description: Full bridge displacement gage. Similar to 364JB preceding except for resistance.											TK XX 364JC 350	C	99.00
375BG	FA XX 375BG 120	A	120 ± 0.15%	19.00		9.00	2.75	3.50	6.25	3.50	6.25	0.375	0.563	0.187	0.187	TF XX 375BG 120	C	24.00
	MA XX 375BG 120	C	120 ± 0.15%	24.00				3.50				9.53	14.30	4.75	4.75	SA XX 375BG 120	B	35.00
	ED DY 375BG 350	B	350 ± 0.3%	26.00			2.75	3.50	6.25	3.50*	6.25*	Matrix Size →		0.71L x 0.20W		SK XX 375BG 350	B	45.00
	WA XX 375BG 120	C	120 ± 0.3%	35.00		11.50*								18.0L x 7.4W		ED DY 375BG 350	C	44.00
	WK XX 375BG 350	C	350 ± 0.3%	45.00		11.50*										WD DY 375BG 350	C	44.00
					Pattern Description: General purpose gage.											TA XX 375BG 120	C	25.00
																TK XX 375BG 350	C	29.00
																TD DY 375BG 350	C	28.00
375UW C FEATURE	CEA-XX-375UW-120	B	120 ± 0.3%	25.00	CEA Series Strain Gages feature large integral copper solder tabs and a completely encapsulated grid. Refer to the front of this Catalog for details.							0.375	0.575	0.100	0.100	ORIGINAL PAGE IS OF POOR QUALITY.		
	CEA XX 375UW 350	B	350 ± 0.3%	31.00								9.53	14.61	4.57	4.57			
												Matrix Size → (Pretrimmed)		0.675L x 0.270W				
														17.1L x 6.9W				
					Pattern Description: General purpose gage. Exposed solder tab area 0.10" x 0.07" (2.5mm x 1.8mm).														
455JB	FA XX 455JB 350	A	350 ± 0.5%	74.00				10.50	18.50			See Below	0.456 APD	-	0.456 APD	SA XX 455JB 350	C	126.00
	FA XX 455JB 10C	B	1000 ± 0.5%	98.00				10.50	18.50				11.56 APD	--	11.56 APD	SA XX 455JB 10C	C	142.00
	MA XX 455JB 350	C	350 ± 0.5%	84.00				10.50				Matrix Size → (Nominal Trim Diameter)		0.490				
	MA XX 455JB 10C	B	1000 ± 0.5%	108.00				10.50						12.4		TA XX 455JB 350	C	88.00
					Pattern Description: Full bridge displacement gage. Radial gage length is 0.035" (0.89mm), tangential grids are 0.200" (5.08mm) diameter. For displacements of 0.460" to 0.500" (11.68mm to 12.70mm) diameter.											TA XX 455JB 10C	C	112.00
455JC	EA XX 455JC 120	C	120 ± 0.5%	66.00				10.50	18.50				0.456 APD		0.456 APD	SA XX 455JC 120	C	109.00
	MA XX 455JC 120	C	120 ± 0.5%	75.00				10.50					11.56 APD		11.56 APD	SK XX 455JC 350	C	120.00
	ED DY 455JC 350	C	350 ± 1%	90.00				10.50	18.50			Matrix Size → (Nominal Trim Diameter)		0.490				
														12.4		TA XX 455JC 120	C	82.00
					Pattern Description: Full bridge displacement gage. Similar to 455JB preceding except for resistance.											TK XX 455JC 350	C	90.00

*NOTE: Options available but not normally recommended. See "Optional Features" Section.

GAGE PATTERN (Actual Size) Leads are Vertical Except as Noted	GAGE DESIGNATION Insert Desired S T C No in Spaces Marked XX	STOCK STATUS	RES. IN OHMS	LIST PKG PRICE (Five Gages)	OPTIONS AVAILABLE Add Indicated Price to Package Price. Note: Stock Status Symbols Do Not Apply to Gages with Optional Features	W	E	S	SE	L	LE	DIMENSIONS IN M Matrix S Section (e.g. 5A, 5B, 5E) C Code Section — INCHES (MILLIMETRES) — GAGE LENGTH	OVERALL LENGTH	OPTD WIDTH	OVERALL WIDTH	OTHER SERIES AVAILABLE GAGE DESIGNATION	Stock Status	LIST PKG PRICE
500AE 	EA XX 500AE 350	B	350 ± 0.15%	66.00		9.00	2.75	3.50	6.25	3.50	6.25	0.500 (12.70)	0.850 (21.59)	0.500 (12.70)	0.500 (12.70)	EP 00 500AE 350		71.00
																SA XX 500AE 350		88.00
																SK XX 500AE 10K		97.00
	ED DY 500AE 10C	C	1000 ± 0.3%	72.00			2.75	3.50	6.25	3.50*	6.25*	Matrix Size →		0.98L x 0.60W		SD DY 500AE 10K		95.00
																WD DY 500AE 10K		95.00
	WA XX 500AE 350	C	350 ± 0.3%	88.00		11.50*								24.9L x 15.2W		TA XX 500AE 350		72.00
	WK XX 500AE 10C	C	1000 ± 0.3%	97.00		11.50*										TK XX 500AE 10K		75.00
																TD DY 500AE 10K		74.00
												Pattern Description Large gage with very high power dissipation capability. Similar to the 500AF pattern but higher resistance						
500AF 	EA XX 500AF 120	A	120 ± 0.15%	50.00		9.00	2.75	3.50	6.25	3.50	6.25	0.500 (12.70)	0.850 (21.59)	0.500 (12.70)	0.500 (12.70)	EP 00 500AF 120		55.00
																SA XX 500AF 120		80.00
																SK XX 500AF 350		88.00
	ED DY 500AF 350	C	350 ± 0.3%	56.00			2.75	3.50	6.25	3.50*	6.25*	Matrix Size →		1.00L x 0.61W		SD DY 500AF 350		86.00
																WD DY 500AF 350		86.00
	WA XX 500AF 120	C	120 ± 0.3%	80.00		11.50*								26.9L x 16.0W		TA XX 500AF 120		56.00
	WK XX 500AF 350	C	350 ± 0.3%	88.00		11.50*										TK XX 500AF 350		55.00
												Pattern Description Large gage with very high power dissipation capability				TD DY 500AF 350		58.00
500BC 	EA XX 500BC 200	C	200 ± 0.15%	20.00		9.00	2.75	3.50	6.25	3.50	6.25	0.500 (12.70)	0.720 (18.29)	0.175 (4.45)	0.175 (4.45)	EP 00 500BC 200	C	24.00
	MA XX 500BC 200	C	200 ± 0.15%	24.00				3.50								SA XX 500BC 200	C	34.00
																SK XX 500BC 600	C	44.00
	ED DY 500BC 600	C	600 ± 0.3%	26.00			2.75	3.50	6.25	3.50*	6.25*	Matrix Size →		0.82L x 0.27W		SD DY 500BC 600	C	43.00
																WD DY 500BC 600	C	43.00
	WA XX 500BC 200	C	200 ± 0.3%	34.00		11.50*								20.8L x 6.9W		TA XX 500BC 200	C	26.00
	WK XX 500BC 600	C	600 ± 0.3%	44.00		11.50*										TK XX 500BC 600	C	28.00
												Pattern Description Special resistance pattern, primarily for transducer use. Otherwise similar to the 500BH following				TD DY 500BC 600	C	28.00
500BH 	EA XX 500BH 120	A	120 ± 0.15%	20.00		9.00	2.75	3.50	6.25	3.50	6.25	0.500 (12.70)	0.720 (18.29)	0.175 (4.45)	0.175 (4.45)	EP 00 500BH 120	A	24.00
	MA XX 500BH 120	B	120 ± 0.15%	24.00				3.50								SA XX 500BH 120	B	31.00
																SK XX 500BH 350	B	40.00
	ED DY 500BH 350	B	350 ± 0.3%	25.00			2.75	3.50	6.25	3.50*	6.25*	Matrix Size →		0.92L x 0.30W		SD DY 500BH 350	C	39.00
																WD DY 500BH 350	B	39.00
	WA XX 500BH 120	B	120 ± 0.3%	31.00		11.50*								23.4L x 7.6W		TA XX 500BH 120	C	25.00
	WK XX 500BH 350	B	350 ± 0.3%	40.00		11.50*										TK XX 500BH 350	C	27.00
												Pattern Description Widely used general purpose gage with compact geometry				TD DY 500BH 350	C	27.00
500BL 	EA XX 500BL 350	B	350 ± 0.15%	26.00		9.00	2.75	3.50	6.25	3.50	6.25	0.500 (12.70)	0.720 (18.29)	0.175 (4.45)	0.175 (4.45)	EP 00 500BL 350	C	29.00
	MA XX 500BL 350	B	350 ± 0.15%	30.00				3.50								SA XX 500BL 350	B	35.00
																SK XX 500BL 10K	C	47.00
	ED DY 500BL 500	B	500 ± 0.3%	32.00			2.75	3.50	6.25	3.50*	6.25*	Matrix Size →		0.86L x 0.27W		SD DY 500BL 10K	C	47.00
																WD DY 500BL 10K	C	47.00
	WA XX 500BL 350	C	350 ± 0.3%	35.00		11.50*								21.8L x 6.9W		TA XX 500BL 350	C	30.00
	WK XX 500BL 10C	C	1000 ± 0.3%	47.00		11.50*										TK XX 500BL 10K	C	30.00
												Pattern Description General purpose gage. Identical to 500BH preceding except for resistance				TD DY 500BL 10K	C	30.00
																ED DY 500BL 10K	C	35.00
500BV 	EA XX 500BV 100	C	100 ± 0.15%	20.00		9.00	2.75	3.50	6.25	3.50	6.25	0.500 (12.70)	0.720 (18.29)	0.175 (4.45)	0.175 (4.45)	EP 00 500BV 100	C	24.00
	MA XX 500BV 100	C	100 ± 0.15%	24.00				3.50								SA XX 500BV 100	C	31.00
																SK XX 500BV 300	C	40.00
	ED DY 500BV 300	C	300 ± 0.3%	25.00			2.75	3.50	6.25	3.50*	6.25*	Matrix Size →		0.82L x 0.27W		SD DY 500BV 300	C	39.00
																WD DY 500BV 300	C	39.00
	WA XX 500BV 100	C	100 ± 0.3%	31.00		11.50*								20.8L x 6.9W		TA XX 500BV 100	C	25.00
	WK XX 500BV 300	C	300 ± 0.3%	40.00		11.50*										TK XX 500BV 300	C	27.00
												Pattern Description Another special resistance variation of the 500BH pattern				TD DY 500BV 300	C	27.00

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*NOTE: Options available but not normally recommended. See "Optional Features" Section.

GAGE PATTERN (Actual Size) Grids are Vertical Except as Noted	GAGE DESIGNATION Insert Desired S T C No in Spaces Marked XX	STOCK STATUS	RES. IN OHMS	LIST PKG. PRICE (Five Gages)	OPTIONS AVAILABLE Add Indicated Price to Package Price. Note: Stock Status Symbols Do Not Apply to Gages with Optional Features	DIMENSIONS IN (INCHES / MILLIMETERS) M Matrix, G Section (e g S1 Sec 1), LG Each Section; GP Gage Pat, GD Grid Dia, PD Pat Dia, AGD Act Grid Dia, APD Act Pat Dia	OTHER SERIES AVAILABLE
					W F S SE L LE	GAGE LENGTH / OVERALL LENGTH / GRID WIDTH / OVERALL WIDTH	GAGE DESIGNATION / Stock Status / LIST PKG. PRICE
500UW 'C' FEATURE	CEA XX 500UW 120	A	120 ± 0.3%	30.00	*CEA Series Strain Gages feature large integral copper solder tabs and a completely encapsulated grid. Refer to the front of this Catalog for details*	0.500 / 0.700 / 0.180 / 0.180 12.70 / 17.78 / 4.57 / 4.57 Matrix Size (Pretrimmed) → 0.080L x 0.270W / 20.3L x 6.9W	
	CEA XX 500UW 350	A	350 ± 0.3%	38.00			
					Pattern Description: General purpose gage. Exposed solder tab area 0.10" x 0.01" (2.5mm x 1.8mm)		
500GA	SK XX 500GA 120	B	120 ± 0.3%	34.00	11.50* 2.75 3.50 6.25 3.50* 6.25*	0.500 / 0.600 / 0.016 / 0.060 12.70 / 15.24 / 0.41 / 1.52 Matrix Size → 0.13L x 0.15W / 18.5L x 3.8W	SN SI 500GA 120 C 34.00 WN SI 500GA 120 C 34.00 SC SI 500GA 120 C 35.00 WC SI 500GA 120 C 35.00 EA XX 500GA 040 C 15.00 MA XX 500GA 040 C 19.00
	WK XX 500GA 120	B	120 ± 0.3%	34.00			
	ED DY 500GA 120	C	120 ± 0.3%	18.00			
	SD DY 500GA 120	C	120 ± 0.3%	33.00			
	WD DY 500GA 120	C	120 ± 0.3%	33.00	*Pattern Description*: Very narrow gage. Variation of the 500GB following, used primarily to obtain 120 ohm resistance in K alloy foil		
500GB ORIGINAL PAGE IS OF POOR QUALITY	EA XX 500GB 120	B	120 ± 0.15%	18.00	9.00 2.75 3.50 6.25 3.50 6.25	0.500 / 0.620 / 0.060 / 0.060 12.70 / 15.75 / 1.52 / 1.52 Matrix Size → 0.75L x 0.15W / 19.1L x 3.8W	EP 08 500GB 120 C 22.00 SA XX 500GB 120 C 30.00 SK XX 500GB 350 C 38.00 SD DY 500GB 350 C 38.00 WD DY 500GB 350 C 38.00 TA XX 500GB 120 C 24.00 TK XX 500GB 350 C 28.00 TD DY 500GB 350 C 27.00
	MA XX 500GB 120	C	120 ± 0.15%	22.00	3.50		
	ED DY 500GB 350	C	350 ± 0.3%	24.00	2.75 3.50 6.25 3.50* 6.25*		
	WA XX 500GB 120	C	120 ± 0.3%	30.00	11.50*		
	WK XX 500GB 350	C	350 ± 0.3%	38.00	11.50* *Pattern Description*: General purpose gage with very narrow geometry for use in restricted area		
500GC	EA XX 500GC 350	B	350 ± 0.15%	21.00	9.00 2.75 3.50 6.25 3.50 6.25	0.500 / 0.620 / 0.060 / 0.060 12.70 / 15.75 / 1.52 / 1.52 Matrix Size → 0.75L x 0.15W / 19.1L x 3.8W	EP 08 500GC 350 C 30.00 SA XX 500GC 350 C 34.00 SK XX 500GC 10C C 46.00 SD DY 500GC 10C C 45.00 WD DY 500GC 10C C 45.00 TA XX 500GC 350 C 28.00 TK XX 500GC 10C C 35.00 TD DY 500GC 10C C 34.00
	MA XX 500GC 350	C	350 ± 0.15%	24.00	3.50		
	ED DY 500GC 10C	C	1000 ± 0.3%	29.00	2.75 3.50 6.25 3.50* 6.25*		
	WA XX 500GC 350	C	350 ± 0.3%	34.00	11.50*		
	WK XX 500GC 10C	C	1000 ± 0.3%	46.00	11.50* *Pattern Description*: General purpose gage with very narrow geometry. Similar to the 500GB preceding except for resistance		
500JD	EA XX 500JD 120	B	120 ± 0.15%	40.00	3.50 6.25	0.500 GD / 0.670 PD / — / 0.670 PD 12.70 GD / 17.02 PD / — / 17.02 PD Matrix Size (Trim Marks) → 0.630L x 0.670W / 16.0L x 17.0W	SA XX 500JD 120 C 57.00 SK XX 500JD 350 C 67.00 SD DY 500JD 350 C 67.00 WD DY 500JD 350 C 67.00 TA XX 500JD 120 C 50.00 TK XX 500JD 350 C 55.00 TD DY 500JD 350 C 54.00
	MA XX 500JD 120	B	120 ± 0.15%	48.00	3.50		
	ED DY 500JD 350	C	350 ± 0.3%	48.00	3.50 6.25		
	WA XX 500JD 120	C	120 ± 0.3%	57.00			
	WK XX 500JD 350	C	350 ± 0.3%	67.00	*Pattern Description*: Bilite special gage for use on diaphragms. Often used when a half bridge can be formed with one gage on each side of diaphragm		
500WR	WA XX 500WR 120	B	120 ± 0.3%	101.00		0.500 FS / 0.760 M / 0.120 FS / 0.840 M 12.70 FS / 19.30 M / 3.05 FS / 21.34 M Matrix Size (Pretrimmed) → 0.760L x 0.840W / 19.3L x 21.3W	SA XX 500WR 120 C 101.00 SA XX 500WR 350 C 130.00 SK XX 500WR 350 C 180.00 SD DY 500WR 350 C 141.00
	WA XX 500WR 350	B	350 ± 0.3%	130.00			
	WD DY 500WR 350	B	350 ± 0.5%	141.00			
	WK XX 500WR 350	B	350 ± 0.3%	180.00	*Pattern Description*: 3 Element 45° rectangular stacked rosette		

*NOTE: Options available but not normally recommended. See 'Optional Features' Section.

GAGE PATTERN (Actual Size) Grids are Vertical Except as Noted	GAGE DESIGNATION Insert Desired S T C No in Spaces Marked XX	STOCK STATUS	RES. IN OHMS	LIST PKG. PRICE (Five Gages)	OPTIONS AVAILABLE Add Indicated Price to Package Price Note: Stock Status Symbols Do Not Apply to Gages with Optional Features							DIMENSIONS IN M = Matrix S = Section (e.g. S1, S2, S3) E = Each Section [INCHES / MILLIMETERS] CP = Comp Path Dia CD = Card Dia PD = Path Dia APD = Active Path Dia				OTHER SERIES AVAILABLE		
						W	E	S	SE	L	LE	GAGE LENGTH	OVERALL LENGTH	GRID WIDTH	OVERALL WIDTH	GAGE DESIGNATION	Stock Status	LIST PKG. PRICE
500WT	WA XX 500WT 120	B	120 ± 0.3%	75.00								0.500 ES	0.760 M	0.120 ES	0.840 M			
	WA XX 500WT 350	B	350 ± 0.3%	84.00								12.70 ES	19.30 M	3.05 ES	21.34 M			
	WD DY 500WT 350	B	350 ± 0.5%	94.00								Matrix Size (Pretrimmed) →		0.760L x 0.840W				
	WK XX 500WT 350	B	350 ± 0.3%	130.00										19.3L x 21.3W				
					Pattern Description: 2 Element 90° "tee" stacked rosette													
500WY	WA XX 500WY 120	B	120 ± 0.3%	101.00								0.500 ES	0.760 M	0.120 ES	0.840 M			
	WA XX 500WY 350	C	350 ± 0.3%	130.00								12.70 ES	19.30 M	3.05 ES	21.34 M			
	WD DY 500WY 350	C	350 ± 0.5%	141.00								Matrix Size (Pretrimmed) →		0.760L x 0.840W				
	WK XX 500WY 350	C	350 ± 0.3%	180.00										19.3L x 21.3W				
					Pattern Description: 3 Element 60° delta stacked rosette													
683JB	EA XX 683JB 350	A	350 ± 0.5%	100.00				10.50	18.50			See Below	0.683 APD		0.683 APD			
													17.35 APD		17.35 APD			
												Matrix Size (Nominal Trim Diameter) →		0.736				
														18.7				
					Pattern Description: Full bridge diaphragm gage. Radial gage length is 0.053" (1.35mm), tangential grids are 0.800" (7.62mm) diameter. For diaphragm of 0.670" to 0.750" (17.02mm to 19.05mm) diameter.													
683JC	EA XX 683JC 120	C	120 ± 0.5%	95.00				10.50	18.50			-	0.683 APD	-	0.683 APD			
												-	17.35 APD	-	17.35 APD			
												Matrix Size (Nominal Trim Diameter) →		0.736				
														18.7				
					Pattern Description: Full bridge diaphragm gage. Similar to 683JB preceding except for resistance.													
750DT 750DU	EA XX 750DT 120	B	120 ± 0.15%	26.00			3.50	3.50	6.25	4.00	7.50	0.750	1.000	0.110	0.110			
												19.05	25.40	2.79	2.79			
	ED DY 750DT 350	C	350 ± 0.3%	32.00			3.50	3.50	6.25	4.00	7.50	Matrix Size →		1.141 x 0.21W				
	WA XX 750DT 120	C	120 ± 0.3%	46.00										29.01 x 5.3W				
	WK XX 750DT 350	C	350 ± 0.3%	55.00														
					Pattern Description: Large general purpose gage with tabs at ends of grid													
	EA XX 750DU 350	B	350 ± 0.15%	30.00			3.50	3.50	6.25	4.00	7.50	0.750	1.000	0.110	0.110			
												19.05	25.40	2.79	2.79			
	ED DY 750DU 10C	C	1000 ± 0.3%	36.00			3.50	3.50	6.25	4.00	7.50	Matrix Size (Trim Marks) →		1.060L x 0.160W				
	WA XX 750DU 350	C	350 ± 0.3%	50.00										26.91 x 4.1W				
	WK XX 750DU 10C	C	1000 ± 0.3%	65.00														
					Pattern Description: Large general purpose gage. Identical to 750DT preceding except for resistance.													

*NOTE: Options available but not normally recommended. See 'Optional Features' Section.

GAGE PATTERN (Actual Size) Grids are Vertical Except as Noted	GAGE DESIGNATION Insert Desired S T C No in Spaces Marked XX	STOCK STATUS	RES. IN OHMS	LIST PKG. PRICE (Five Gages)	OPTIONS AVAILABLE Add Indicated Price to Package Price Note: Stock Status Symbols Do Not Apply to Gages with Optional Features							DIMENSIONS IN M - Matrix S - Section (e.g. S1, S2, S3) ES - Each Section [INCHES / MILLIMETERS] CP - Comp Path GD - Grid Dia PD - Path Dia APD - Act Path Dia				OTHER SERIES AVAILABLE		
						W	E	S	SE	L	LE	GAGE LENGTH	OVERALL LENGTH	GRID WIDTH	OVERALL WIDTH	GAGE DESIGNATION	Stock Status	LIST PKG PRICE
910JB 910JC	EA XX 910JB 350	A	350 ± 0.5%	140.00				10.50	18.50			See Below	0.910 APD 23.11 APD		0.910 APD 23.11 APD			
												Matrix Size → (Nominal Trim Diameter)		0.980 24.9				
							Pattern Description: Full bridge displacement gage. Radial gage length is 0.070" (1.78mm), tangential grids are 0.400" (10.16mm) diameter. For displacement of 0.920" to 1.00" (23.37mm to 25.40mm) diameter.										
	EA XX 910JC 120	C	120 ± 0.5%	138.00				10.50	18.50				0.910 APD 23.11 APD		0.910 APD 23.11 APD			
												Matrix Size → (Nominal Trim Diameter)		0.980 24.9				
							Pattern Description: Full bridge displacement gage. Similar to 910JB preceding except for resistance.										
10CBE SEE PATTERN BELOW	EA XX 10CBE 120	B	120 ± 0.15%	30.00		9.00	2.75	3.50	6.25	3.50	6.25	1.000 25.40	1.250 31.75	0.250 6.35	0.250 6.35	EP OR 10CBE 120 SA XX 10CBE 120	C C	40.00 45.00
	ED DY 10CBE 350	C	350 ± 0.3%	40.00			2.75	3.50	6.25	3.50*	6.25*	Matrix Size →		1.40L x 0.35W		SK XX 10CBE 350	C	50.00
	WA XX 10CBE 120	C	120 ± 0.3%	45.00		11.50*								35.6L x 8.9W		SD DY 10CBE 350	C	60.00
	WK XX 10CBE 350	C	350 ± 0.3%	50.00		11.50*	Pattern Description: Large general purpose gage.									WD DY 10CBE 350	C	60.00
11CJB 11CJC	EA XX 11CJB 350	C	350 ± 0.5%	160.00				10.50	18.50			See Below	1.138 APD 28.91 APD		1.138 APD 28.91 APD			
												Matrix Size → (Nominal Trim Diameter)		1.225 31.1				
							Pattern Description: Full bridge displacement gage. Radial gage length is 0.088" (2.24mm), tangential grids are 0.500" (12.70mm) diameter. For displacement of 1.15" to 1.25" (29.2mm to 31.8mm) diameter.										
	EA XX 11CJC 120	C	120 ± 0.5%	155.00				10.50	18.50				1.138 APD 28.91 APD		1.138 APD 28.91 APD			
												Matrix Size → (Nominal Trim Diameter)		1.225 31.1				
							Pattern Description: Full bridge displacement gage. Similar to 11CJB preceding except for resistance.										

*NOTE: Options available but not normally recommended. See 'Optional Features' Section.

10CBE (SHOWN FULL SIZE IN HORIZONTAL POSITION)

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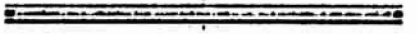
GAGE PATTERN (Actual Size) Grids are Vertical Except as Noted	GAGE DESIGNATION Insert Desired S T C No in Space Marked XX	STOCK STATUS	RES. IN OHMS	LIST PKG. PRICE (Five Gages)	OPTIONS AVAILABLE Add Indicated Price to Package Price Note Stock Status Symbols Do Not Apply to Gages with Optional Features							DIMENSIONS IN M Matrix S Sensitive Grid SA Solder Tab SB Solder Tab LS Each Section INCHES MILLIMETRES LG Gage Length OAL Overall Length GW Grid Width OAW Overall Width				OTHER SERIES AVAILABLE		
						W	E	S	SE	I	LE	GAGE LENGTH	OVERALL LENGTH	GRID WIDTH	OVERALL WIDTH	GAGE DESIGNATION	Stock Status	LIST PKG. PRICE
19CDK	EA XX-19CDK 120	A	120 ± 0.2%	30.00				3.50	6.25	4.00	7.50	1.900	2.071	0.028	0.040	EP 08 19CDK 120	C	40.00
												48.26	52.60	0.71	1.02	SA XX 19CDK 120	C	55.00
																SB XX 19CDK 350	C	65.00
SEE PATTERN BELOW	ED DY 19CDK 350	C	350 ± 0.4%	40.00				3.50	6.25	4.00*	7.50*	Matrix Size →		2.286 x 0.26W		SD DY 19CDK 350	C	80.00
														57.91 x 6.6W				
							Pattern Description Long narrow pattern with tabs at ends of grid. Used in both strain measurement and resistor applications. The solders stabilize the backing to prevent distortion of the grid.									TA XX 19CDK 120	C	50.00
																TB XX 19CDK 350	C	60.00
																TD DY 19CDK 350	C	75.00
19CDZ	EA XX-19CDZ 350	C	350 ± 0.2%	35.00				3.50	6.25	4.00	7.50	1.900	2.071	0.033	0.040	EP 08 19CDZ 350	C	50.00
												48.26	52.60	0.84	1.02	SA XX 19CDZ 350	C	65.00
																SB XX 19CDZ 10K	C	75.00
SEE PATTERN BELOW	ED DY-19CDZ-10C	C	1000 ± 0.4%	50.00				3.50	6.25	4.00*	7.50*	Matrix Size →		2.261 x 0.23W		SD DY 19CDZ 10K	C	100.00
														57.41 x 5.8W				
							Pattern Description Identical to 19CDK preceding except for resistance									TA XX 19CDZ 350	C	60.00
																TB XX 19CDZ 10K	C	70.00
																TD DY 19CDZ 10K	C	95.00
20CBW	EA XX 20CBW-120	A	120 ± 0.2%	30.00		9.00	2.75	3.50	6.25	3.50	6.25	2.000	2.250	0.188	0.188	EP 08 20CBW 120	C	40.00
												50.80	57.15	4.78	4.78	SA XX 20CBW 120	C	50.00
																SB XX 20CBW 350	C	65.00
SEE PATTERN BELOW	ED DY 20CBW 350	C	350 ± 0.4%	40.00			2.75	3.50	6.25	3.50*	6.25*	Matrix Size →		2.68L x 0.32W		SD DY 20CBW 350	C	90.00
	WA-XX-20CBW-120	C	120 ± 0.4%	50.00		11.50*								68.1L x 8.1W		WD DY 20CBW 350	C	90.00
	WK-XX-20CBW-350	C	350 ± 0.4%	65.00		11.50*	Pattern Description For use on concrete and in strain integration on large specimen											
40CBY	EA XX 40CBY-120	B	120 ± 0.2%	50.00		9.00	2.75	3.50	6.25	3.50	6.25	4.00	4.250	0.160	0.160	EP 08 40CBY 120	C	60.00
												101.60	107.95	4.06	4.06	SA XX 40CBY 120	C	100.00
																SB XX 40CBY 350	C	110.00
SEE PATTERN BELOW	ED DY-40CBY-350	C	350 ± 0.4%	90.00			2.75	3.50	6.25	3.50*	6.25*	Matrix Size →		4.48L x 0.31W		SD DY 40CBY 350	C	100.00
	WA XX-40CBY-120	C	120 ± 0.4%	100.00		11.50*								113.8L x 7.9W		WD DY 40CBY 350	C	100.00
	WK XX 40CBY 350	C	350 ± 0.4%	110.00		11.50*	Pattern Description For use on concrete and in strain integration on large specimen											

*NOTE. Options available but not normally recommended. See 'Optional Features' Section.

19CDK & 19CDZ (SHOWN FULL SIZE IN HORIZONTAL POSITION)



20CBW (SHOWN FULL SIZE IN HORIZONTAL POSITION)

40CBY (SHOWN FULL SIZE IN HORIZONTAL POSITION)

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CFE TECHNICAL DATA

Research, Inc. (09327)

Potentiometer, Cable (3.5 inch)	4046-3½
Potentiometer, Cable	7101-16

DISPLACEMENT TRANSDUCERS

For Remote MEASUREMENT

SIGNAL VOLTAGE

FROM

- LINEAR MOTION
- DISPLACEMENT
- DEFLECTION
- SEPARATION

D521.1A

POTENTIOMETRIC DISPLACEMENT TRANSDUCER

A potentiometric displacement transducer offers a simple means for remotely measuring deflection or relative motion in both static and dynamic applications. The transducer, when energized from any stable voltage source, can provide a precise electrical signal proportional to the actual physical displacement of the subject. This signal can be used to monitor deflection or to provide feedback information in automated closed-loop servo-systems.

A wide selection of displacement ranges (½" up to 144") is offered in this series of compact, versatile designs. Each transducer basically consists of a flexible steel cable wound on a precision reel directly coupled to a potentiometer. The linear action of extending the cable is translated into a corresponding movement of the potentiometer wiper arm with negligible hysteresis, providing excellent measuring accuracy and resolution. The cable retracting action is obtained from a self-contained constant force spring motor. The compact aluminum cases are designed for rugged service and versatile mounting.

Typical applications include aircraft structural loading tests, tensile elongation tests, signaling missile stage separation, railroad car in-transit sway measurement, and monitoring or controlling mechanical motion in process machinery.

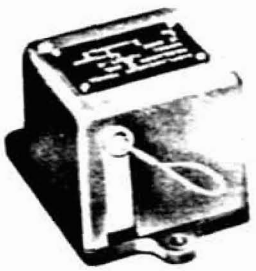
FEATURES

- Wide selection of displacement ranges.
- Compact, easily mounted cases.
- Wirewound potentiometer for high power levels.
- All ball bearing construction.
- Zero backlash.
- Standardized AN electrical connector, including mating receptacle.
- Provision for operating at elevated ambient temperature.

0-12 INCH RANGE (0-30CM)

The 7100 is a "Separable Cable" Model which permits the complete removal of the extension cable slightly beyond its maximum range with no increase in force. After separation, the potentiometer returns to a zero signal condition. A mechanical stop equipped with a shock absorber prevents damage to the component parts.

Model 7101 is the less expensive companion to the 7100 and features a fixed extension cable that does not separate from the case. Measurements to 16 inches are possible with the 7101. Both models incorporate safety features to prevent damaging parts in the event of cable breakage or misuse.



MODELS 7100 AND 7101

0-3½ INCH RANGE (0-9CM)

MODEL 4046

This miniaturized transducer is easily mounted on any of its six surfaces. Resolution and measuring accuracy have not been sacrificed in achieving its reduced size. Multiple units can be stacked to form a compact bank of transducers. A pre-loaded variable force spring motor provides cable tension. All moving parts use ball bearings for long life. Forced air cooling allows this transducer to be operated at ambients as high as 500° F. This unit has 60 inches of Teflon jacketed connector wire.

0-12 FOOT RANGE (0-3.7M)

This popular transducer is built for rugged service, yet offers a fast response rate from low inertia components. The black anodized cast aluminum case houses a constant force spring motor for uniform cable tension throughout its full range. An over-running clutch protects the potentiometer in the event of over travel or cable breakage. Air cooling provisions are standard on all models for operation in 500°F environments. A supply of 80 to 100 psi air is all that is required for air cooling.

Also available in an infinite resolution film-pot model.

MODEL 4040

0-4 FOOT RANGE (0-1.2M)

MODELS 6704 AND 6705

This model is built to operate in high ambient temperatures without additional cooling. A special high temperature potentiometer, operable to 400°F, is directly coupled to a ball bearing-supported cable reel. A high temperature constant force spring motor develops a cable tension force of 6 pounds through a gear train. An internal chrome/alumel thermocouple has lead wires to the connector for monitoring the transducer temperature.

Model 6705 is identical but uses a standard linear potentiometer as a cost saver where operating temperatures are not expected to exceed 200°F.

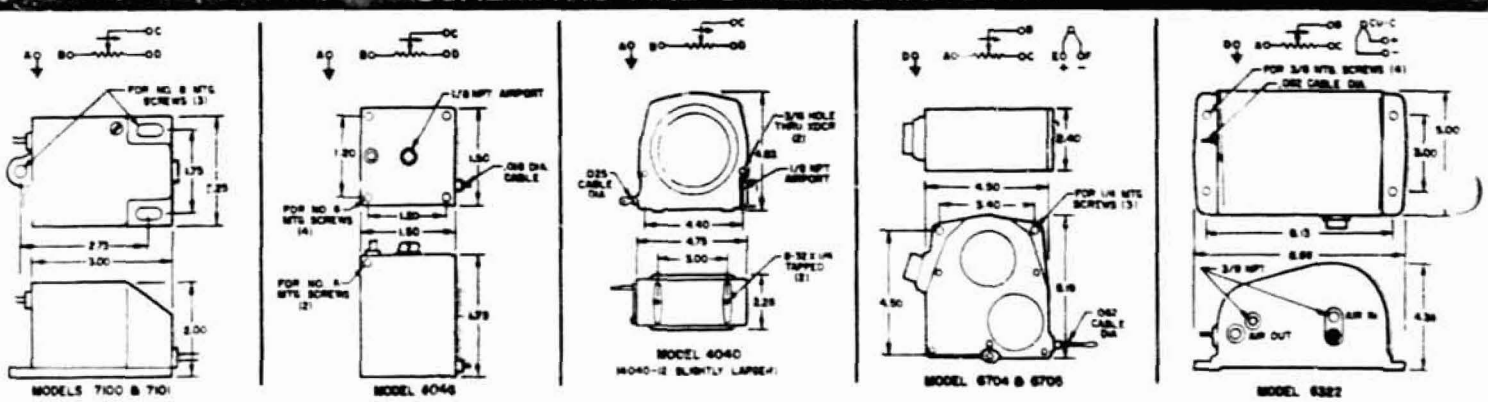
0-9 FOOT RANGE (0-2.7M)

This rugged transducer offers long displacement ranges and high cable tensions. All components are designed for heavy duty service and have a higher inertial load and a lower response rate than other models.

An internal copper-constantan thermocouple can be used for monitoring transducer temperatures. It also has provisions for closed circuit air cooling through the two #3/8 NPT ports in case.

MODEL 6322

SCHEMATIC AND DIMENSIONAL DATA



MODEL NUMBER	RANGE 0 TO (Inches)	(Cm)	RESISTANCE ① (Ohms)	POT LINEARITY (Percent)	RESOLUTION (Inches)	EXCITATION ② MAX VOLTS	AMBIENT TEMP. LIMITS Uncooled °F	Air Cooled °F	CABLE STATIC TENSION (Oz.)±20%	CABLE ACCELERATION ③ Ft/Sec²	CONNECTOR TYPE	LIFE ④ Approx Cycles At Max Response	WEIGHT (Pounds)
4040 – ½	6	15.2		0.70	0.017	25			9				
4040 – 1	12	30.5		0.40	0.021	25			9				
040 – 2	24	61.0		0.30	0.030	25			14				
4040 – 3	36	91.4		0.20	0.032	25			14				
4040 – 4	48	122.0		0.20	0.038	25			14				
4040 – 5	60	152.4		0.20	0.034	30	−70		20				
4040 – 6	72	182.9	1000 ±3%	0.20	0.038	30	TO	TO	20	50	MS3106A-14S-5P	13,000	2.06
4040 – 7	84	213.4		0.20	0.040	35	+220	500	20				
4040 – 8	96	243.8		0.10	0.040	35			20				
4040 – 9	108	274.3		0.10	0.040	35			20				
4040 – 10	120	304.8		0.10	0.041	40			20				
4040 – 12	144	365.8		0.10	0.049	40			16				
4046 – ½	0.5	1.3			0.001				16	85			
4046 – 1	1.0	2.5			0.002				9	50			
4046 – 1½	1.5	3.8			0.003		−70		7	40			
4046 – 2	2.0	5.1	1000 ±3%	0.35	0.004	30	TO	TO	6	33	MS3106A-14S-5P	100,000	0.6
4046 – 2½	2.5	6.4			0.005		+220	500	5	31			
4046 – 3	3.0	7.6			0.006				4.5	29			
4046 – 3½	3.5	8.9			0.007				4	28			
7100 – 4	4	10.2		0.50	0.003	20							
7100 – 6	6	15.2	1000 ±3%	0.30	0.009	20	0⑤	NA	19	75	MS3106A-14S-5P	13,000	1.0
7100 – 8	8	20.3		0.30	0.010	20	TO						
7100 – 12	12	30.5		0.20	0.011	30	220						
7101 – 4	4	10.2		0.50	0.003	20							
7101 – 6	6	15.2		0.30	0.009	20	0⑤						
7101 – 8	8	20.3	1000 ±3%	0.30	0.010	20	TO	NA	19	75	MS3106A-14S-5P	13,000	1.0
7101 – 12	12	30.5		0.20	0.011	30	220						
7101 – 16	16	40.6		0.20	0.015	30			14	50			
6704 – 5	4.8	12.2		0.10	0.006	50	−70						
6704 – 14	14	36.6	25,000±3%	0.10	0.007	50	TO	NA	96	16	Harco HA1840P	10,000	4.0
704 – 48	48	122.0		0.10	0.007	50	+400						
6705 – 5	4.8	12.2			0.008	30	−70						
6705 – 14	14.4	36.6	1000±3%	0.075	0.009	30	TO	NA	96	16	MS3106A-14S-5P	13,000	4.0
6705 – 48	48	122.0			0.010	30	+220						
6322 – 4	48	122.0		0.20	0.043	30	−70		144	15			
6322 – 6	72	213.4	1000±3%	0.20	0.059	30	TO	TO	105	9	MS3106A 14S-5P	13,000	7.5
6322 – 9	108	274.3		0.20	0.098	30	+160	400	80	7			

Models shown in **bold** type are generally available from stock:

① Other values and tolerances available.

② At operating temperatures up to 104 °F.

③ Acceleration of cable during retraction by the internal spring motor. Extending acceleration can be greater.

④ Life based on minimum useful life of spring motor in continuous operation at maximum rate over maximum range. Useful life of remaining components is 250,000 cycles.

⑤ Furnished with special lubricant for operation from −70 F to +100 F when so ordered.

TRANSDUCER SELECTION TABLE

	RANGE (Inches) 0 to →	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.8	6	8	12	14.4	16	24	36	48	60	72	84	96	108	120	144
	4040										-½		-1			-2	-3	-4	-5	-6	-7	-8	-9	-10	-12
M	4046	-½	-1	-1½	-2	-2½	-3	-3½																	
O	7100								-4		-6	-8	-12												
D	7101								-4		-6	-8	-12		-16										
E	6704									-5				-14				-48							
L	6705									-5				-14				-48							
	6322																	-4		-6			-9		

HOW IT WORKS

A potentiometer is a voltage divider. A voltmeter connected from one end of the resistance element to the wiper indicates a voltage that is an exact percentage of the supply voltage as determined by the position of the wiper on the resistance element. The position of the wiper is accurately determined by the distance the cable is extended.

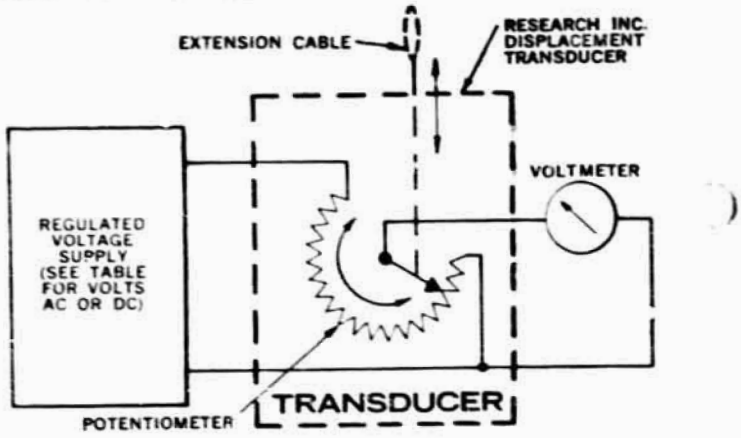
Example: Model 4040-10 Transducer (0-10 foot range).

Extension cable retracted – voltmeter indicates 0 volts.

Cable extended 5 feet – voltmeter indicates 50% of full output voltage.

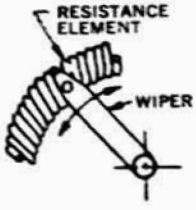
Cable extended 10 feet – voltmeter indicates 100% of full output voltage.

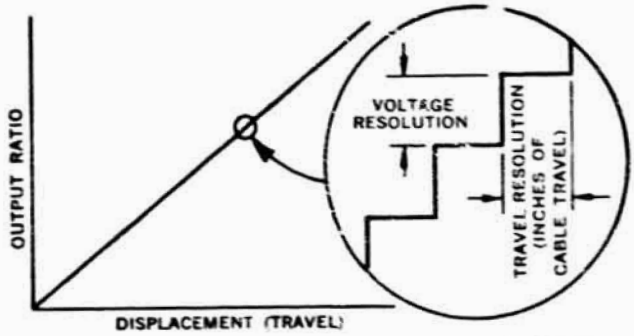
NOTE: Full output voltage is approximately 94% of supply voltage.



RESOLUTION

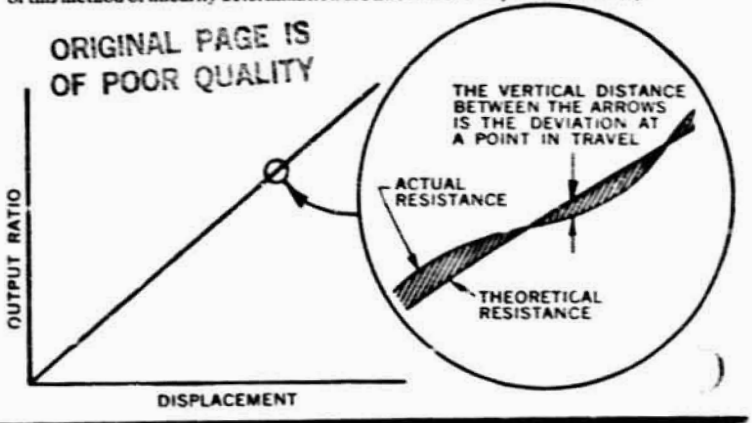
The resistance of a potentiometer changes by small steps as the wiper contacts each loop of a wirewound resistance element. The output voltage changes by corresponding steps as the wiper rotates. Resolution as listed in the specification table is travel resolution, or the cable travel required to advance the wiper one loop.



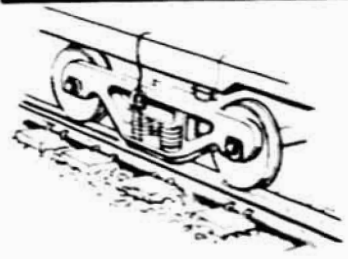


LINEARITY

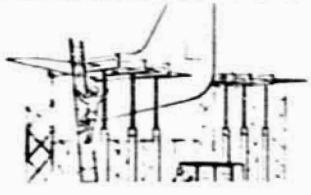
The best potentiometers available do not offer exact linear resistance conditions through the full travel of the wiper. The theoretical resistance reference line is drawn through a plot of actual resistance values such that the maximum deviations from the reference line are minimized. These maximum deviations are expressed as a percentage of the full output voltage and are shown in the specification table in the linearity column. The results of this method of linearity determination are known as "independent linearity."



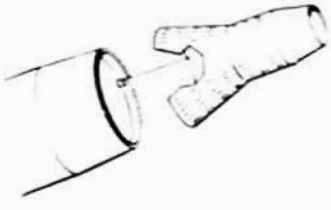
TYPICAL APPLICATIONS



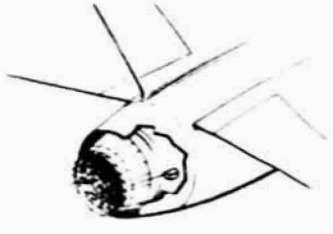
Monitoring railroad car in-transit movements with Model 4040 or Model 7101.



Measuring structural deflections during combined dynamic loading and heating tests with Models 4040 or 4046.



Signaling payload or stage separation characteristic with the Model 7100.

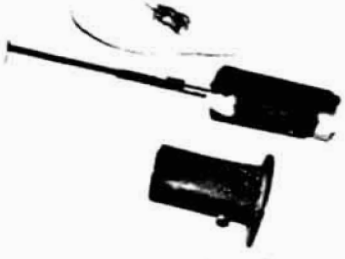


Measuring the variable nozzle opening of a jet engine afterburner with Model 6704.

NON-STANDARD TRANSDUCERS

Model 4041 has a 24 inch range utilizing a linear type potentiometer, and features an automatic stroke uncoupling actuator rod.

Model 7521 has a 24 inch range with a separable cable and latching reel contained in a sealed enclosure. Used in vibrating and dusty environments.



Model 6708 has ½ to 3½ inch ranges with an adjustable spring loaded "Ceragold" coated heat protected probe to detect specimen displacements in a radiant heating chamber.

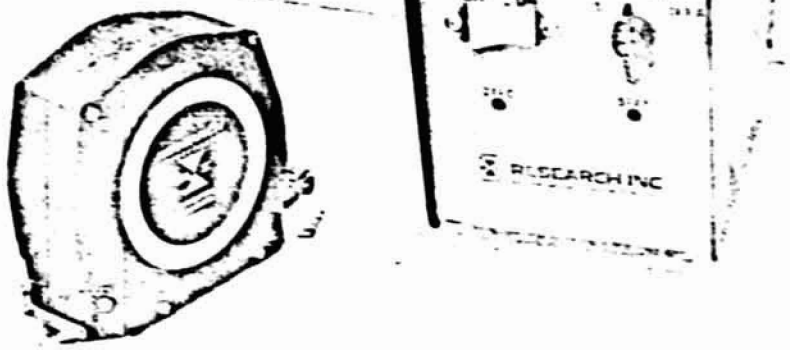
Model 5148 has a 48 inch range high cable tension and a radiant heat shield on one side.

RESEARCH INC
BOX 24064 MINNEAPOLIS, MINNESOTA USA 55424

MODEL 4564
DISPLACEMENT INDICATOR

Description:

The Model 4564 Displacement Indicator is a combination digital indicator and power supply for use with the Research, Inc. 4000 and 7000 series Linear Displacement Transducers. It consists of a bipolar 19.999 volt digital (4½ digits) voltmeter and a ± 15 volt power supply. Full zero or span adjustments, plus selective decimal placement, allows calibration for decimal display of any engineering unit of measurement having a linear relationship with the extending cable of the Displacement Transducer.



Features:

- Direct digital readout of desired engineering units; inches, feet, degrees, meters.
- Zero and Span adjustment for calibration to desired engineering units, accessible from the front of the case.
- Operates on 115 V.A.C., 60 HZ low current (optional 240 V.A.C., 50-60 HZ).
- Binary coded decimal output - serial standard - isolated parallel (optional.)
- 4½ digit readout (0-19999).
- Repeatability ± .1%, accuracy ± .1% with ± 5% voltage shift (dependent on accuracy of initial operator calibration).
- Seven bar liquid crystal display.
- Bench or panel mount versions available.

Option:

0 -- Parallel Binary Coded Decimal output of engineering units displayed on meter.

RESEARCH INC
BOX 24064 MINNEAPOLIS, MINNESOTA USA 55424

CFE TECHNICAL DATA

Rosemount, Inc. (04274)

Signal Conditioner, OAT	510BF65
Transducer, Airspeed-Altitude	542K2
Transducer, Outside Air Temp	101F

SPECIFICATIONS

1. SCOPE. The Model 101F is a total temperature probe particularly intended for regular flight service operation. It has a platinum resistance temperature sensing element which is fully encased and hermetically sealed in a platinum shell. The sensing element is shielded by a gold-platinum alloy radiation shield and an outer stainless steel shield. Refer to REC Bulletin 7037 for additional details.

2. DESIGN AND PERFORMANCE SPECIFICATIONS. The Model 101F Probe conforms to all requirements of Specification MIL-P-25736B (ASG) for the Type MA-1 Total Temperature Probe.

2.1. Specification MIL-P-25736B (ASG) may be summarized as follows:

2.1.1. Temperature Range: Minus 70° C to +350° C.

2.1.2. Mach Number: Zero to approximately three

2.1.3. Altitude: Sea Level to 100,000 feet

2.1.4. Vibration: 10 g's to 500 cps (considerably more can be survived)

2.1.5. Sensing Element: Pure platinum wire which has a resistance-temperature relationship of:

$$R_T / R_0 = 1 + \alpha \left[T - \delta \left(\frac{T}{100} - 1\right)\left(\frac{T}{100}\right) - \beta \left(\frac{T}{100} - 1\right)\left(\frac{T}{100}\right)^3 \right]$$

where $R_0 = 50.00$, $\alpha = 0.003925$, $\delta = 1.45$, $\beta = 0.0$ for positive T and $\beta = 0.1$ for negative T,

T = temperature in °C, and R_T = resistance in ohms at temperature T.

The static calibration follows the above calibration curve within 0.25°C + 0.8 percent of the magnitude of the temperature in °C.

2.2. Identification Data. The following identification data shall be electroetched per MIL-STD-130 in the location shown:

PROBE, TOTAL TEMPERATURE
TYPE MA-1
STOCK NO. 6685-078-1002
SERIAL NO. _____
ROSEMOUNT ENGINEERING CO.
MODEL NO. 101F
CONTRACT NO. xx(xxx)xxxx (If applicable)
U.S. (If applicable)

3. INDIVIDUAL TESTS. Individual tests shall be passed by each article shipped and will consist of:

3.1. Examination of Product. Inspection to determine conformance to the requirements of Specification MIL-P-25736B (ASG) with respect to materials, workmanship, and marking.

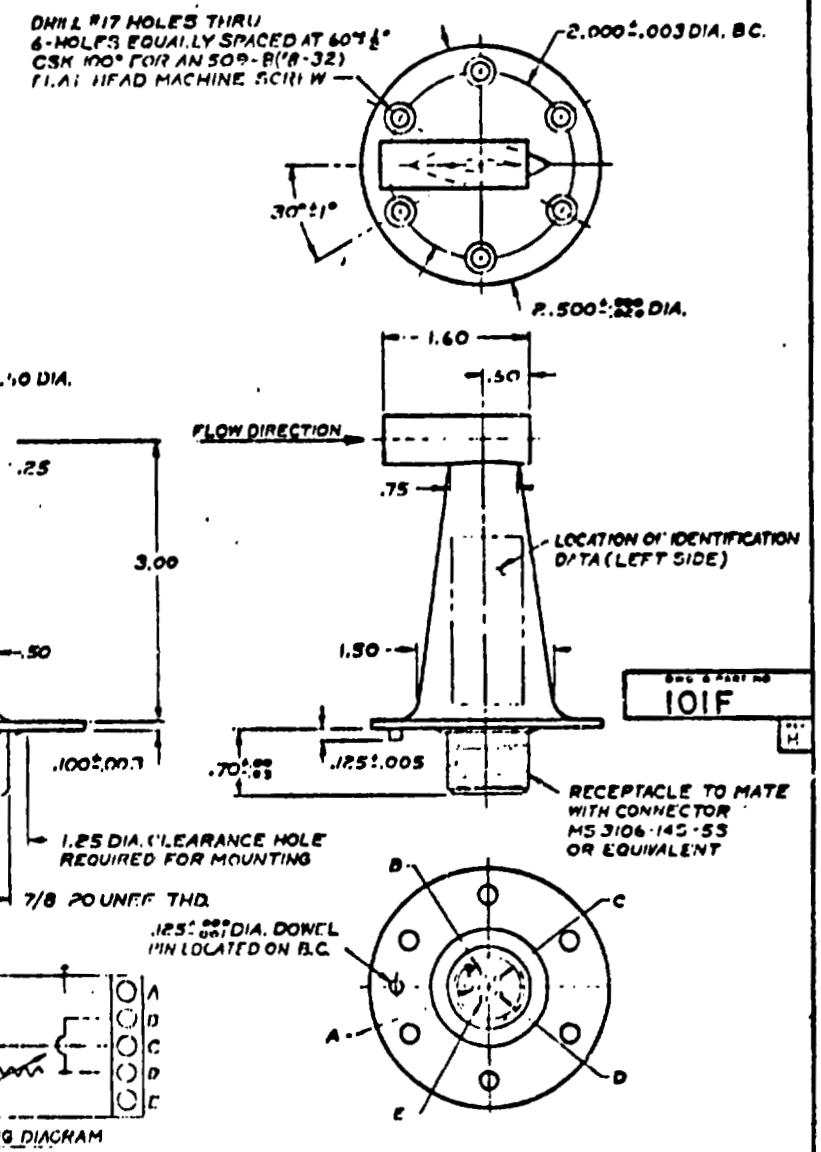
3.2. Temperature-Resistance. Calibration at 0° C and 100° C to be within the allowable tolerance of paragraph 4.6.2 of Specification MIL-P-25736B (ASG).

3.3. Insulation. Electrical insulation test of paragraph 4.6.3 of MIL-P-25736B (ASG).

4. PRODUCTION SAMPLING TESTS. Production Sampling Tests will be proposed and quoted upon request.

5. QUALIFICATION TESTS. Qualification Tests will be proposed and quoted upon request.

REVISIONS					
SYM	DESCRIPTION	CHKD	ITEM	CHKD	APPD
H	PER DRAWING MR [illegible] AND NOTE, DWG. NO 101F WAS 101-09				



DWG & PART NO
101F
H

SYM	ITEM	PART NO	DESCRIPTION

LIST OF MATERIAL

TOLERANCES UNLESS OTHERWISE SPECIFIED
DECIMALS: 0 ± .1; .00 ± .02; .000 ± .010
FRACTION: ± 1/32
ANGLES: ± 1/2°

MATL / --
HT TR -- / -- --
FINISH -- /
NEXT ASSY -- / --

REMOVE ALL BURRS & SHARP EDGES UNLESS OTHERWISE SPECIFIED MACHINE SURFACES TO 125

DRAWN [illegible]
CHKD [illegible]
APPD [illegible]
MODEL 101F

SPECIFICATION DRAWING
PROBE, TOTAL TEMPERATURE

SCALE FULL | WT 100 GRAMS

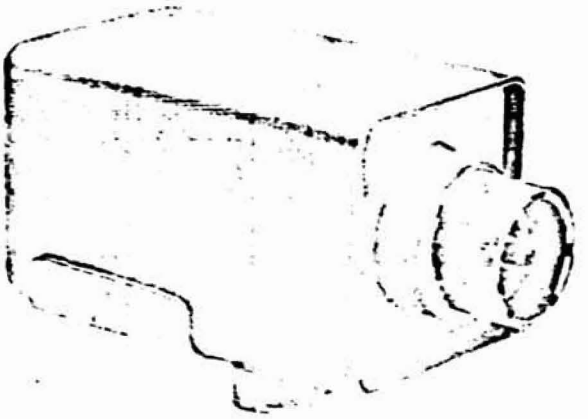
MFR 04274

ROSEMOUNT ENGINEERING COMPANY

DWG & PART NO
101F

SIZE C | SHEET 1 OF 1 | REV H

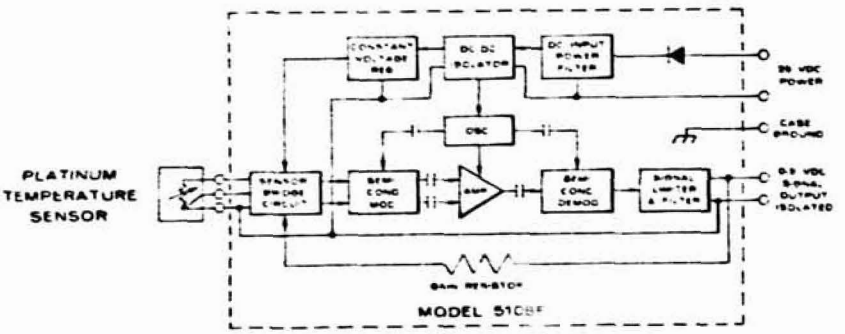
MODEL 510BF SIGNAL CONDITIONING AMPLIFIER



Linear 0 to 5 VDC output with platinum resistance temperature sensors

RSS error less than ±0.4% FS (ambient temperature range −65°F to +212°F)

Output-supply voltage isolation



ELECTRICAL BLOCK DIAGRAM

DESCRIPTION

The Model 510BF signal conditioning amplifier is designed to provide accurate, linear 0 to 5 VDC output signals from platinum resistance temperature sensors while operating in severe aerospace environments. Model 510BF is built around a carrier type amplifier which has much better stability than a straight DC amplifier over wide ambient temperature variations and long periods of time. This unit also contains voltage regulation, resistance bridge, linearization, output-supply voltage isolation and output limitation and protection circuitry. All circuitry is solid state. Model 510BF and a platinum resistance temperature sensor make a complete temperature measurement channel.

OTHER MODELS

Other Model 510 type signal conditioning amplifiers are available with the following features:

- Resistance input from other types of resistance temperature sensors.
- Millivolt input from temperature, pressure or strain sensor resistance bridges or thermocouples.
- 115 VAC supply voltage.

APPLICATIONS

- Aircraft, spacecraft and rocket systems.

Rosemount

*U.S. Patent No. 3,341,835.
Foreign patents issued or pending.

Rosemount Inc.

PHONE (612) 941-5560 TWX: 910 576-3103 TELEX 29-0183 CABLE: ROSEMOUNT

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11/15/69

	510BF	A
REVISIONS		
A	ADDED SPEC. WEIGHT, MATERIALS AND FINISH, ALTER. ... QUALLY TESTED, REVISED SIGNAL CONDITIONING CONFIGURATION	PLP 11/6/69
A1	ADDED ORDERING INFORMATION TO SPEC.	DLC 12/8/69
A2	ADDED PARAGRAPH ON ADJUSTMENT	DLC 12/8/69

SPECIFICATIONS

SCOPE The 510BF solid state signal conditioning unit contains the excitation, bridge, and amplifier for 0 to 5 VDC platinum thermometry

ACCURACY

Signal Conditioner Unit Error. ±0.4% full scale, based on root mean square (RMS) error of zero shift sensitivity coefficient for a 277 deg. F instrument span stability for 90 days, repeatability and supply effect

* **Zero Shift.** Less than ±0.010 VDC
* **Sensitivity Coefficient.** Less than ± .001% full scale/deg. F ambient change from room temperature

Stability. Better than 0.15% full scale for 90 days

Repeatability. Better than ±0.1% full scale

* **Supply Effect.** Less than ±0.005 VDC on full scale output for ±4 VDC supply variation about 20 VDC
* **Linearity.** Fits stated non-linearity less than ±0.20% F.S. including platinum sensor non linearity for measurement ranges between 250 deg. F and +800 deg. F. Over shorter temperature ranges a non-linearity of ±0.10% full scale can be provided

OUTPUT

Range. Zero to 5,000 VDC

* **Isolation.** Greater than 100 megohms at 100 VDC
* **Impedance.** Less than 100 ohms
* **Noise.** Less than 10 millivolts P-P at full scale output

Load. Not lower than 25 K ohms

* **Limits.** Will not exceed -0.5 VDC to +6.5 VDC
* **Protection.** Accidental application of ±28 VDC on signal output lead causes no damage
* **Short Circuit.** May be shorted indefinitely without damage

Response. Flat with 3 db to 3 Hz.

SENSOR PROVISIONS

Bridge. Supplied internally for resistance sensor having at least 40 ohm change in resistance

Excitation. Internally supplied 1.3 milliamperes D.C. max

Lead Resistance. 3 or 2 wire sensor required. Lead resistance not to exceed ohms and ± ohms variation. Customer specify

Sensor Characteristics. When specific sensor data is known

Temperature	Resistance Ohms
Min	
Mid	
Max	

Sensor Model Number To Be Determined

GENERAL

Power. 28 ±4 VDC 35 MA maximum at 28 VDC

* **Internal Signal Check.** On special order a temperature simulating signal for 50° ±1% full scale can be provided independent of actual sensor temperature. Shorting two pins at connector checks performance of entire system
* **Reverse Polarity.** Protected
* **Noise Feedback.** Less than 0.01 volts P-P to 2,000 Hz on 1 ohm power source

Warm Up Time. Less than 5 minutes

Service Life. 5000 hours. MTBF 140,000 hours. Calculated per MIL HDBK-217, assuming 25 deg. C ambient temperature

* **Insulation.** 100 megohms at 100 VDC case to all pins except pin H (GND)
* **Dielectric.** No breakdown 220 v rms 60 Hz case to all pins

MECHANICAL

Weight. Less than 9 ounces

Construction. All metal hermetically sealed

Soldering. Conforms to MIL-S-6872A

Materials. Case STAINLESS STEEL
Connector PTIH 12-10P or equivalent

Finish. SAND BLASTED

Label. Electrotech per customer's request. Label will include as a minimum
Model 510BF
S/N
Rosemount Engineering Co
Minneapolis Minnesota

ENVIRONMENTAL

* **Temperature.** -65 deg. F to +212 deg. F ambient

Sinusoidal Vibration. Any axis 30 G's 5 Hz to 200 Hz per MIL-STD-810, Method 514, Curve I of Figure 514.3 Procedure I

Random Vibration. Any axis per MIL-STD-81 Method 514, Curve B of Figure 514.4 Procedure I

Acceleration. Any axis 20G for 5 minutes per MIL-STD-810, Method 513, Procedure II

Altitude. Any altitude

Humidity. MIL-STD-810, Method 507 Procedure I

Salt Spray. MIL-STD-810, Method 509 Procedure I

Sand and Dust. MIL-STD-810, Method 510 Procedure I

Rain. MIL-STD-810, Method 506, Procedure I

Fungus. MIL-STD-810, Method 508 Procedure I

Ozone. Customer specify

Acoustic Noise. Customer specify

Solar Radiation. Customer specify

Nuclear Radiation. Customer specify

Pressure. Customer specify

Electromagnetic Compatability. Performance meets requirements of MIL-I-6181D

Shock. 15 G for 11 ±1 milliseconds for any axis

TESTS

Individual. These shall include examination for workmanship, conformance to this drawing and tests deliberately implied in the parts relating to accuracy, output and power.

Qualification and Acceptance. These will be proposed and quoted upon request

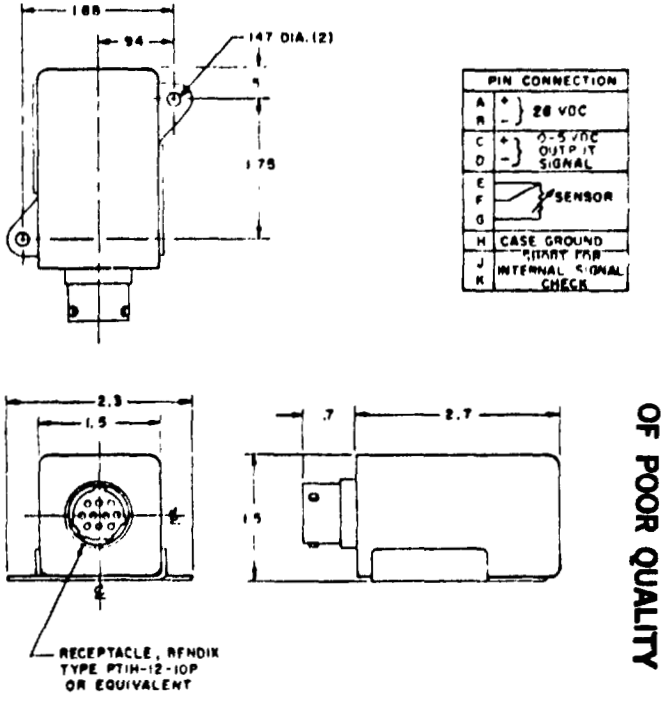
ORDERING INFORMATION

The following information must be supplied by the customer

1) Sensor Model or Characteristics
2) Sensor End Point Temperatures
3) Sensor Lead Resistance
4) Load Resistance

This information determines the range of the unit. A range number will be assigned which will then become part of the Model number (example, 510BF3)

* INDIVIDUALLY TESTED



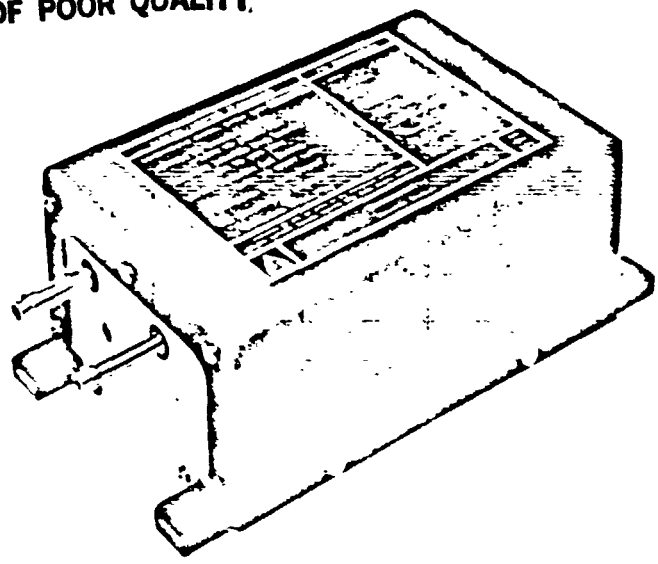
ORIGINAL PAGE IS OF POOR QUALITY

ROSEMOUNT ENGINEERING COMPANY MINNEAPOLIS MINN

SPECIFICATION DRAWING
AMPLIFIER
SIGNAL CONDITIONING

04274	C	510BF	
SCALE FULL			SHEET 1 OF 1

MODEL 542K ALTITUDE/AIRSPEED TRANSDUCER



Three high level DC output signals

- *Altitude: -1,000 to 40,000 feet*
- *Indicated Airspeed: 125 to 550 or 75 to 350 knots*
- *Impact Pressure (q_c): 0.75 to 17.16" or 0.27 to 6.29"Hg*

Solid state, modular construction

Rapid, critically damped response

0.02% relative (hold) accuracy

INTRODUCTION

Rosemount's Model 542K Altitude/Airspeed Transducer is designed for use in RPV and aircraft flight control systems where precision air data measurements are required at reasonable cost. The transducer is a flight proven solid state design that provides outputs proportional to barometric altitude, indicated airspeed, and impact pressure (q_c). Rosemount's patented* capacitive pressure sensing capsule is used in the Model 542K and provides infinite resolution, superior repeatability and negligible hysteresis. These three parameters determine inherent relative accuracy of the transducer, and therefore largely establish the sensitivity and responsiveness of the basic flight control system. Excellent relative accuracy ensures that the aircraft will maintain level, constant airspeed flight when the autopilot is engaged. It also assures that the aircraft will return precisely to a preestablished flight condition after completion of a programmed maneuver or if disturbed by turbulence.

TYPICAL APPLICATIONS

- RPV and Aircraft Flight Control Systems
- Special Purpose Test Instrumentation
- Flight Test

Rosemount

*U.S. Patents 3,195,028, 3,271,669 and 3,318,153.

DESIGN SPECIFICATIONS

OPERATING RANGE

The 542K Altitude/Airspeed transducer provides high level dc output signals proportional to barometric altitude, indicated airspeed and impact pressure ($q_c = P_t - P_s$), while operating over a flight envelope of −1,000 to 40,000 feet altitude, for indicated airspeeds ranging from either 125 to 550 knots or 75 to 350 knots.

OVERPRESSURE RANGE

The transducer will withstand static (P_s) and impact (q_c) pressures of 150% of full scale operating pressure without damage or performance degradation.

Operation over these flight envelopes establishes the following air data pressure ranges:

	542K1	542K2
Static Pressure (P_s)	5.54 to 31.02 "hg	5.54 to 31.02 "hg
Total Pressure (P_t)	6.29 to 46.18 "hg	5.81 to 37.30 "hg
Impact Pressure (q_c)	0.76 to 17.16 "hg	0.27 to 6.29 "hg

PERFORMANCE SPECIFICATIONS

RELATIVE ACCURACY

Relative accuracy is defined as the root-sum-square total of resolution, repeatability, and hysteresis errors. It defines the accuracy with which the transducer can hold constant altitude and airspeed flight, irrespective of the absolute accuracy of the transducer.

These three parameters are inherent design characteristics of the pressure sensing capsule. Because they are a function of sensed pressure, they are nonlinear with respect to altitude and airspeed. Listed below are relative accuracies for the three output signals, based on the root-sum-square total of the following errors:

Resolution: ±0.005% of f.s. pressure
Repeatability: ±0.010% of f.s. pressure
Hysteresis: ±0.015% of f.s. pressure
RSS TOTAL: ±0.02% of f.s. pressure

		OPERATING POINT	RELATIVE ACCURACY
542K1	h	−1,000 Feet	±5.6 Feet
		20,000 Feet	±10.8 Feet
		40,000 Feet	±23.4 Feet
	IAS	125 KIAS	±0.28 Knots
		250 KIAS	±0.13 Knots
		550 KIAS	±0.05 Knots
	q_c	0.755 to 17.159 "hg	±3.43 x 10^{-3} "hg
542K2	h	−1,000 Feet	±5.6 Feet
		20,000 Feet	±10.8 Feet
		40,000 Feet	±23.4 Feet
	IAS	125 KIAS	±0.17 Knots
		250 KIAS	±0.05 Knots
		350 KIAS	±0.03 Knots
	q_c	0.270 to 6.286 "hg	±1.26 x 10^{-3} "hg

OPERATING ACCURACY

Operating accuracy includes resolution, repeatability and hysteresis errors, as well as nonlinearity, calibration tolerances and the error due to ambient temperature variations over the operating temperature range of −45° F to 160° F. It defines the maximum error band limits of the transducer, exclusive of vibration and acceleration errors, which are transient in nature and can be minimized by proper mounting in the vehicle.

Operating accuracy of the 542K is as follows:

	OUTPUT SIGNAL	OPERATING ACCURACY
542K1	h	± (40 Feet + 0.7% of Rdg)
	IAS	± (3.5 Knots or 1.0% of Rdg)
	q_c	± (0.5% of f.s. + 1.0% of Rdg)
542K2	h	± (40 Feet + 0.7% of Rdg)
	IAS	± (2.5 Knots + 0.4% of Rdg)
	q_c	± (0.5% of f.s. + 1.0% of Rdg)

TIME CONSTANT

The output signals reach 63% of their final value within 20 milliseconds after application of a step pressure change.

WARMUP TIME

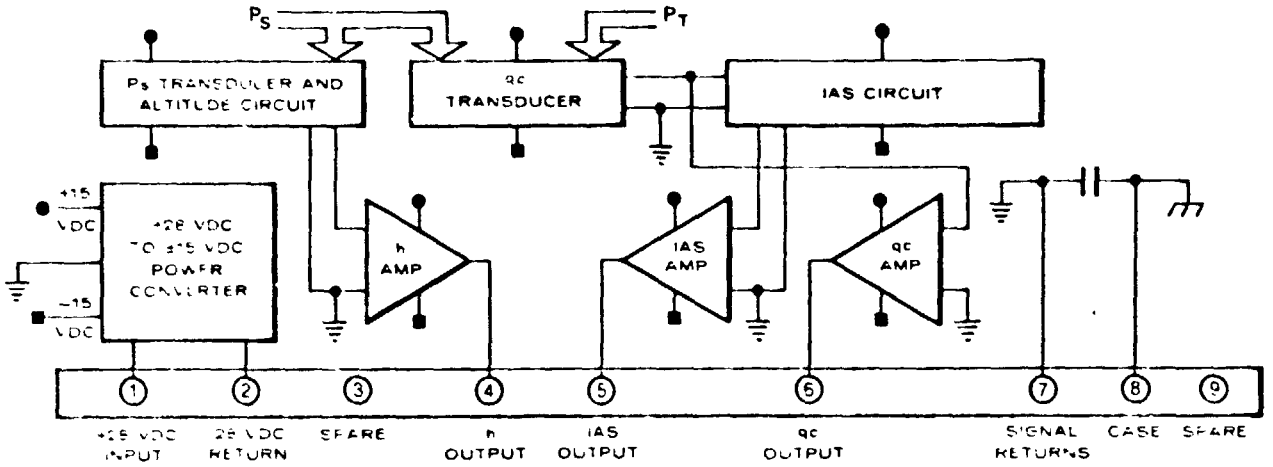
The transducer is operational at turn-on. However, a five minute warmup time to allow for equipment stabilization is recommended prior to starting quality assurance testing.

POWER SUPPLY EFFECT

Power supply effect is ±0.025% of full scale output per volt of variation of the +28 vdc input voltage.

VIBRATION AND ACCELERATION SENSITIVITY

Vibration and acceleration sensitivity, in the most sensitive axis of the transducer, will not exceed ±0.035% of full scale static pressure (P_s) per g, and ±0.045% (542K1) or ±0.095% (542K2) of full scale impact pressure (q_c) per g. It is recommended that the transducer be mounted such that the most sensitive axis of the transducer is in the lateral plane of the vehicle, since the g sensitivity of the transducer is approximately ten times less in either of the two least sensitive axes.



ELECTRICAL SPECIFICATIONS

ELECTRICAL INTERFACE

An electrical interface diagram, including connector pin designations, is shown in Figure 1.

INPUT VOLTAGE

$+28^{+2}_{-4}$ vdc, at 4 watts maximum, per MIL-STD-704A for Equipment Category B.

OUTPUT VOLTAGE SIGNALS

	OUTPUT SIGNAL	OPERATING RANGE	x	OUTPUT SIGNAL VOLTAGE GRADIENT	=	OUTPUT SIGNAL VOLTAGE RANGE
542K1	h	−1 000 to 40 000 Feet		0.2mv/foot		0 000 to 8.200 vdc
	IAS	125 to 550 Knots		10mv/knot		1 250 to 5 500 vdc
	q_c	0 755 to 12 159 "hg		0 4v/"hg		0 302 to 6 864 vdc
542K2	h	−1,000 to 40 000 Feet		0 2mv/foot		0 000 to 8 200 vdc
	IAS	75 to 350 Knots		20mv/knot		1 500 to 7 000 vdc
	q_c	0 270 to 6 286 "hg		1 0v/"hg		0 270 to 6 286 vdc

OUTPUT SIGNAL CURRENT CAPABILITY

Each of the output signals will supply current to load impedances of 10,000 ohms or higher.

OUTPUT SIGNAL IMPEDANCE

Each of the output signals has an impedance of less than 10 ohms.

OUTPUT SIGNAL NOISE

With the 28 vdc return externally connected to case ground, noise on each of the output signals shall not exceed 10 millivolts peak-to-peak at the internal oscillator frequency of approximately 400 Khz. Noise at all other frequencies shall not exceed 5 millivolts peak-to-peak.

OUTPUT SIGNAL ISOLATION

One common signal return is used for all three output signals. However, each output signal is obtained from an integrated circuit amplifier so that a short circuit applied to any one output will not adversely affect either of the other two outputs.

INPUT-OUTPUT ISOLATION

The 28 vdc input power leads are electrically isolated from the output signal leads by 100 megohms minimum at 100 vdc. However, it is recommended that the 28 vdc return (pin 2) be externally connected to case ground (pin 8) to minimize output signal noise.

INSULATION RESISTANCE

Insulation resistance between the +28 vdc input power leads and case ground is 100 megohms minimum at 100 vdc. Insulation resistance between all signal leads tied together and case ground is 100 megohms minimum at 50 vdc (50 vdc is the voltage rating of internal ceramic capacitors connected between signal circuits and case ground).

ENVIRONMENTAL SPECIFICATIONS

OPERATING TEMPERATURE RANGE

The transducer is calibrated for operation over the temperature range of −45° F to +160° F.

NON-OPERATING TEMPERATURE RANGE

The transducer may be stored at any temperature between −65° F and +160° F.

VIBRATION

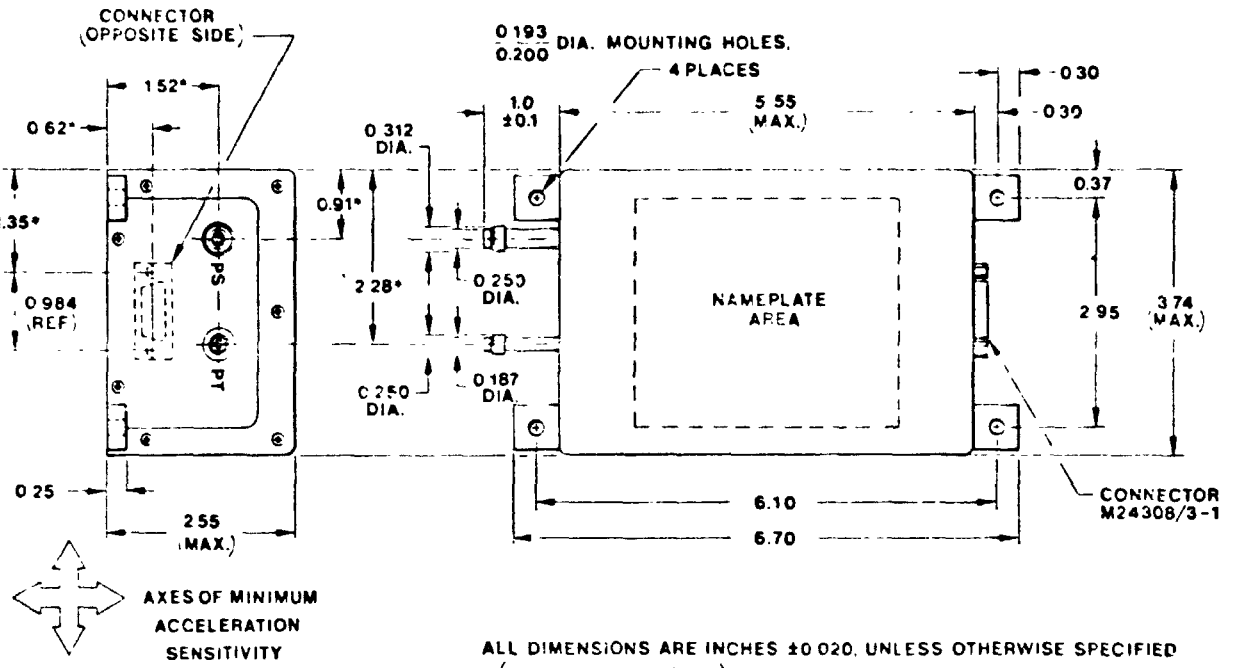
±0.1" double amplitude, or 5 g's, from 5 to 2000 Hz, while operating.

ACCELERATION

10 g's, all axes, while operating.

SHOCK

15 g's, 11 milliseconds, half-sine shock pulse, while operating.



MECHANICAL SPECIFICATIONS

CONFIGURATION

A dimensional drawing of the 542K1 is shown in Figure 2.

FINISH

The aluminum enclosure is black anodized per MIL-A-8625.

WEIGHT

Transducer weight is 2.0 pounds maximum.

MOUNTING PROVISIONS

Four point attachment is provided as shown in Figure 2.

PRESSURE FITTINGS

The static pressure (P_S) fitting is a 1/4" O.D. hose fitting and the total pressure (P_T) fitting is a 3/16" O.D. hose fitting as shown in Figure 2.

ELECTRICAL CONNECTOR

The connector is an M24308/3-1 (Cannon P/N DEMM9P), as shown in Figure 2.

INTERNAL CONSTRUCTION

The transducer is constructed using plug-in circuit cards and easily removable pressure sensing capsules. Modular construction, used to facilitate assembly and maintenance, is illustrated in Figure 3.

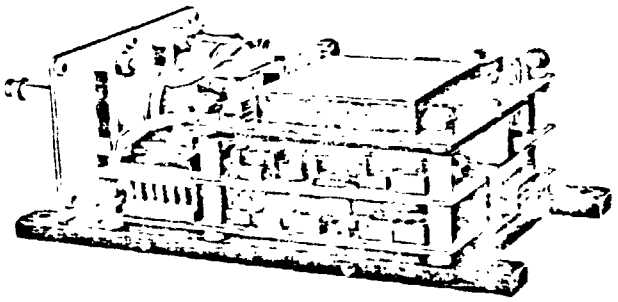


FIGURE 3–INTERNAL CONFIGURATION

QUALITY ASSURANCE

GENERAL

Rosemount's quality control system conforms to MIL-Q-9858A, MIL-C-45662A, NASA Publication NPC 200-3 and Federal Aviation Regulations Part 21 and 37.

INDIVIDUAL ACCEPTANCE TESTING

Each transducer is mechanically and electrically inspected for good workmanship and proper operation. Calibration data is recorded at a minimum of five points at room temperature for each of the three output signals. A copy of the calibration data is supplied with each transducer.

Rosemount Inc.

POST OFFICE BOX 35129 MINNEAPOLIS, MINNESOTA 55435

PHONE (612) 941-5560 TWX 910-576-3103 TELEX: 29-0183 CABLE: ROSEMOUNT

12/73

Scanivalve Corp. (22422)

Switch, Pressure Sampling 48J4-1

INSTRUCTION MODEL J4/XMTR/DRIVE

DRIVE -

We manufacture several drives for this Scanivalve. These drives can easily be removed and exchanged in the field. First remove the phasing screw on the side of the case nearest the drive end of the Scanivalve then remove the drive retainer ring. The drive, with its position transmitter can now be pulled out of the Scanivalve case. As the drive is removed a polarized dog clutch, which is cut into the end of the Scanivalve drive shaft, disengages.

XMITTER -

The position transmitter is mechanically assembled to the end of the drive. Access to the position transmitter can be had when the drive is removed from the Scanivalve case. See the position transmitter instruction sheet, which was shipped with your Scanivalve and covers the type of position transmitter which you chose to use in your Scanivalve.

TRANSDUCER -

The pneumatic connector has to be removed before a transducer can be installed into your Scanivalve. It is removed by unscrewing the six screws on the tubulation end of the Scanivalve. Use the enclosed ScanCo #1847* cap for your Statham P-ducer. Use ScanCo #1848* for your C.E.C. P-ducer. See the attached drawing 0003 on fitting procedure. The Druck PDCR22 (0.06%) P-ducer comes fitted with a cap.

SCANNER - CAUTION -

This Scanivalve shipped with a solid screw in the breather hole. This must be replaced with the enclosed ventilated screw BEFORE THE SCANIVALVE IS USED or EXPLOSIVE damage may result.

The scanner mechanism operates in an oil bath. No balance pressure is needed for operating. The rotor which carries the pressure collector hole sequentially pass the P_x ports is mechanically supported by thrust bearing. The stator is elastically connected to the stator body, i.e. block, so that the stator can intimately follow the rotating face of the rotor. Pressures in the P_x ports cannot force the rotor to separate from the stator because the rotor is supported by the thrust bearing. We definitely recommend that the Scanivalve should not be taken apart by our customer, but should be sent back to the factory for service, if and when their leak rate becomes too high to be practical.

However, the disassembly procedure is as follows:

To disassemble the Scanivalve remove the drive assembly. Hold the Scanivalve case vertical with the pneumatic connector (48JM) removed. Remove block phasing screw and lift out block. The stator will stay with

*ScanCo #1847 marked STATHAM ; ScanCo # 1848 marked CEC

the rotor but the "elastic connectors" (O-rings in a cage plate) will stay on the block dowels. The Scanivalve should be laid horizontal to drain out the oil. Remove housing phasing screw to lift out housing, use snap ring tool provided and remove snap ring around scanner shaft (drive end), the rotor driving hub can now be pushed out (up). Followed by thrust bearing, O-ring retainer, spacer, and O-ring. The Scanivalve is assembled in reverse order.

This Scanivalve was given a leak test which consists of pumping each tubulation to 24 in. Hg. with total included volume of 5 cc. Then the manometer is observed to fall not more than 0.5 in. per hr.

When using the Scanivalves with digital readout equipment it is ABSOLUTELY necessary to install either an oscillograph or oscilloscope so that the "square" pressure waves can be monitored every 1/2 hour. This analogue monitor gives valuable information as to the pressure wave form. It is useless to continue to digitize pressures if the monitor does not show a good "square" wave shape for the last 1/3 of the pressure sampling period. The main cause of "square" wave deterioration is from oil which migrates into the P-ducer cavity when this Scanivalve is operated at pressures near or below ambient. To clear out this oil, remove the P-ducer and replace it with a dummy P-ducer connected to vacuum. Rotate the Scanivalve thru several scans to suck air thru all P_x ports. Replace P-ducer. All unused P_x ports should be connected to positive pressure to reduce the oil collection in these ports. Another trick which reduces this oil migration, is operate the Scanivalve with vacuum connected to breather hole. If your pressures are below 30 psia you should use model J9 (oiless) Scanivalve.

OIL -

To check oil level; position the Scanivalve vertical with (tubulation end up). Remove O-ring sealed breather screw from side of Scanivalve. Add ScanCo No. 2 oil thru this hole via a piece of tubing of about .090 O.D. Fill to bottom of 10-32 thread J hole. Fill each January. This technique only applies to S/N 1351 and above.

POSITION TRANSMITTER OR CHANNEL IDENTIFIER

BINARY CODED DECIMAL - Models Mfd. for all Scanivalves

INSTR'N: X1248BCD POSITION XMITTER
XGM1248BCD POSITION XMITTER

SCANIVALVE

8558

DWN | CH
CKD |
APR F.I.O.

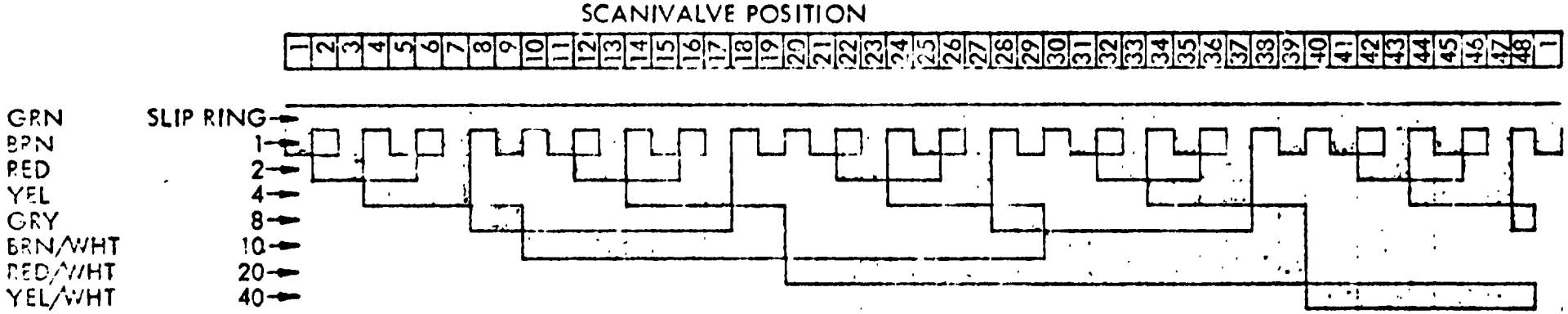
This transmitter consists of a coding disc which generates 1248BCD channel identification numbers. The coding disc is rhodium plated and the wipers are made of Ney Company's Paliney 7. The wipers are rated at 10 ma non-inductive, sliding or 900 ma non-sliding.

This transmitter is usually used with a stepper driven Scanivalve which is feeding pressure signals into a digitizer for tape type data storage.

When used with Models DV, JV and/or LV Scanivalves:

1. Scanivalve Home on vacuum between 0 & 1 (Identifier numbers).
2. Xmitter reads "1" when unit homed.
3. To find actual Scanivalve position from Xmitter output divide by 2.
4. Odd Xmitter output numbers are vacuum ports.
5. Even Xmitter output numbers are Px ports.

To advance or retard this transmitter, loosen the hub set screw 1/4 turn and turn the hub relative to the Scanivalve drive shaft the proper amount, and retighten the set screw. When the transmitter is correctly posed, the line scribed on the hub face should be approximately parallel with the drive shaft slot.

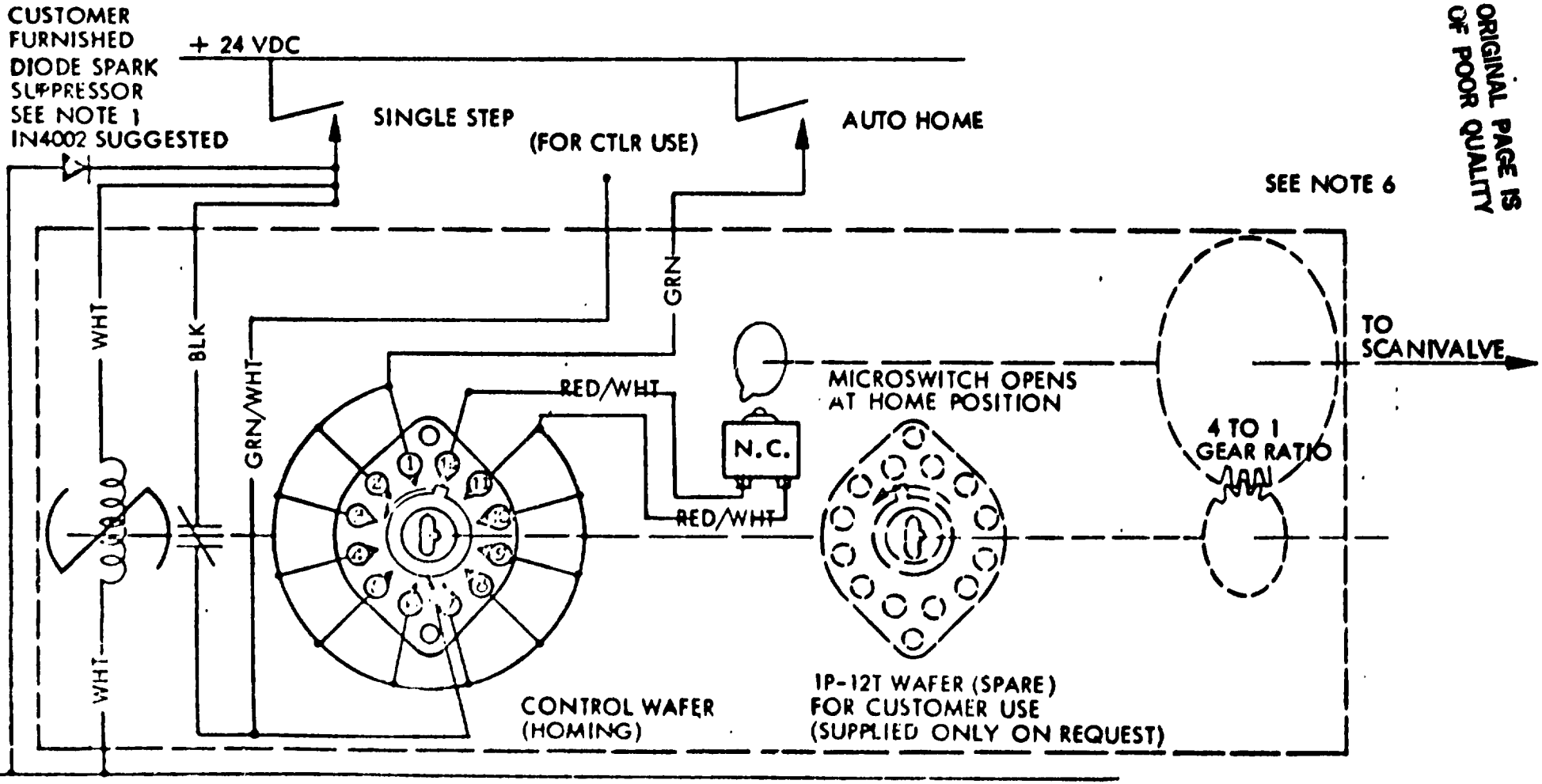


SHADED AREA REPRESENTS ENERGIZED STATE

NOTE: CAUTION - ALWAYS REMOVE DIODE BEFORE DRIVING SOLENOID WITH SCANCO NO. CTLR2/S2-56

2. 12.2 Ω FOR S3 SOLENOID RESISTANCE AT 20° C FOR 24 VDC OPERATION. 1/4 DUTY CYCLE
3. 8.0 Ω FOR S4 SOLENOID RESISTANCE AT 20° C FOR 24 VDC OPERATION. 1/4 DUTY CYCLE
4. 7.7 Ω FOR S5 SOLENOID RESISTANCE AT 20° C FOR 24 VDC OPERATION. 1/4 DUTY CYCLE
5. 5.2 Ω FOR S6 SOLENOID RESISTANCE AT 20° C FOR 24 VDC OPERATION. 1/4 DUTY CYCLE
6. ONLY COMPONENTS INDICATED WITHIN FENCE ARE SUPPLIED BY SCANCO

WIRING DIAG. OF AUTO HOME CIRCUIT FOR: DS3-48, JS4-48, LS5-48, HS6-48		
SCANIVALVE, INC.	8211	
	DWN. [illegible]	CH. A [illegible]
	CKD.	
	APR. F10	



NOTES:

1. The ScanCo transducer (P-ducer) cap does the following:
   A. Protects diaphram. (Membrane)
   B. Insures that the P-ducer is adjusted to the "[illegible]" traveling volume required for high speed scanning.
2. CAUTION: P-ducer is fragile and expensive. handle with care. Do not over pressure by compressing trapped air during cap installation or removal. Do not touch the membrane.
3. Coat "O" rings with a thin layer of Dow Corning high vacuum silicone grease before installation.
4. Use ScanCo #1848 cap for Bell & Howell (CEC) and ScanCo #PDCR4 P-ducers, and also drop in ScanCo #1009 (black anodized) ring above P-ducer before installing retainer.
5. For Model L Scanivalve, use ScanCo #1927 cap for 5/8 in. dia. Bell & Howell (CEC) P-ducer.
6. For Model 24C Scanivalve, use ScanCo #2227-1 cap for Statham P-ducer and ScanCo #2228-1 cap for Bell & Howell (CEC) P-ducer.
7. This fitting procedure does not apply to Druck #PDCR22 transducer. The Druck #PDCR22 is manufactured with its own cap.

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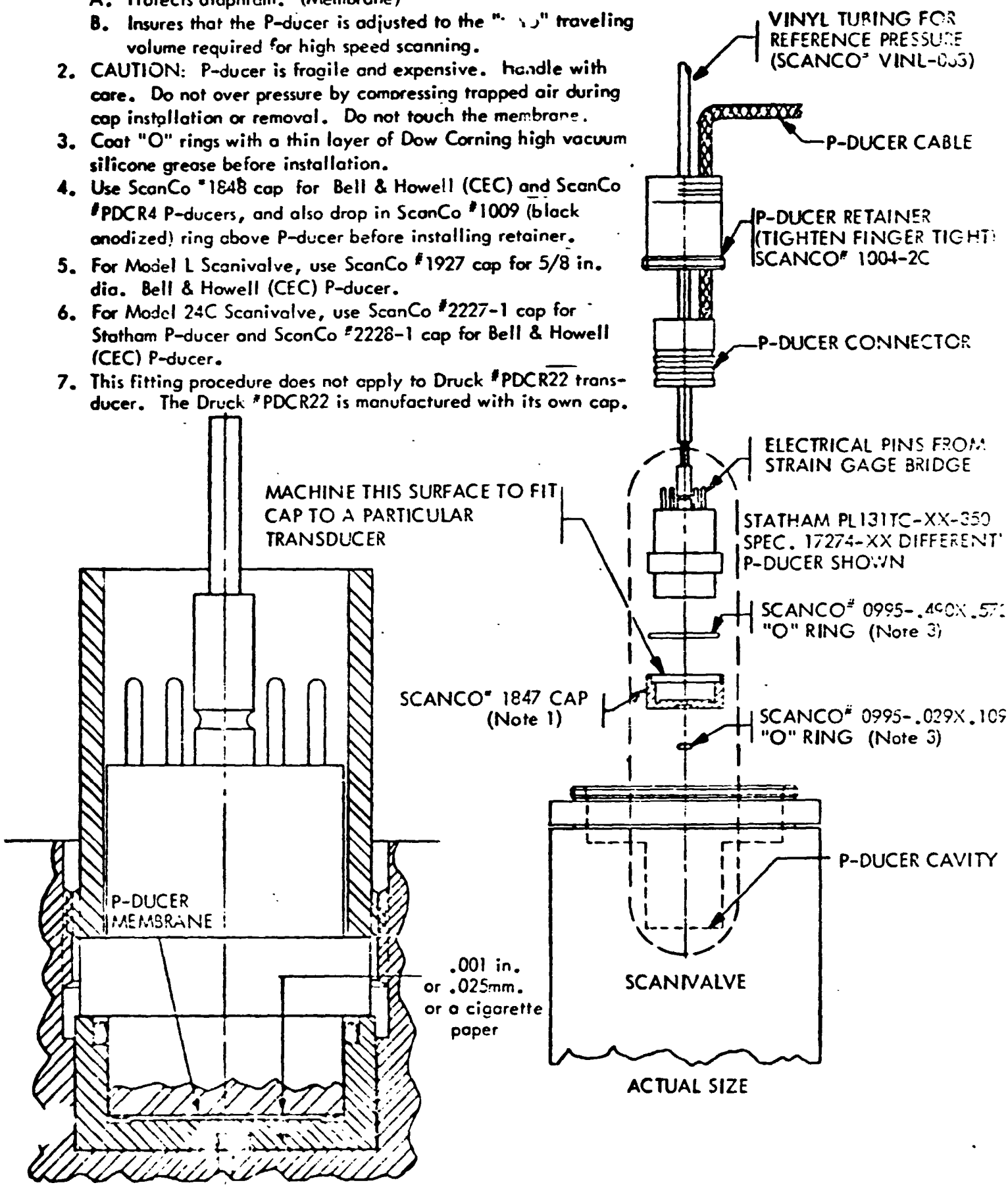
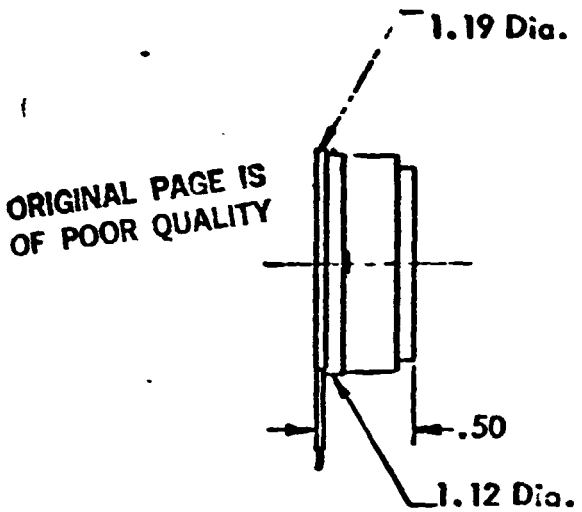
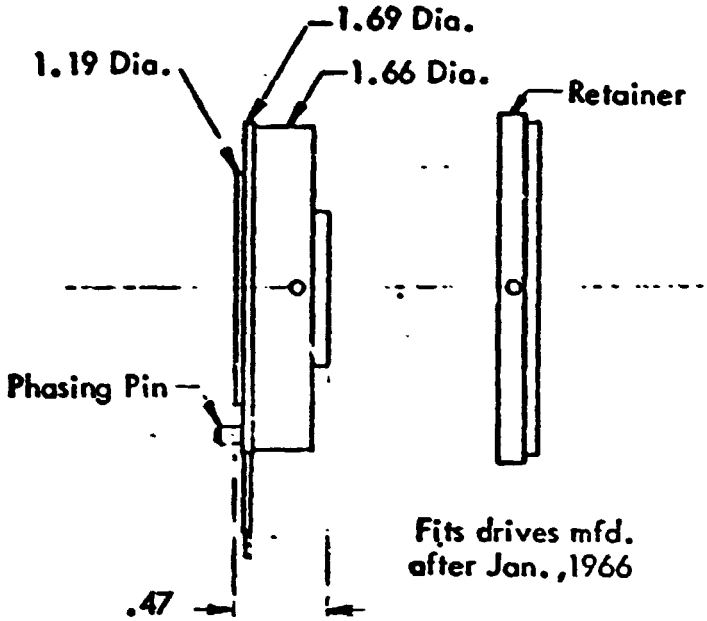
OF POOR QUALITY



ANGULAR POSITION TRANSMITTERS



Tube Marker, Slide Wire,
STM & SW200 Combination



Fits drives mfd.
after Jan., 1966

Binary, Binary Coded Decimal, Decimal

SPECIFICATIONS

Contacts: Rhodium plated slip rings and commutators. Wipers are made of Paliney #7 alloy.
Current: 10 milliamps maximum, non-inductive and sliding, or 900 milliamps non-sliding.
Temperature: - 60° to + 125° C. 165° C. on special order.

TUBE MARKER

STM is a commutator type switch which closes each time the Scanivalve is oriented to a port. This transmitter has one unique insulated bar which corresponds to Scanivalve position zero (tube 48). This dual purpose Xmitter can be operated as Oscillograph Tube Marker by dropping the 10s lead wire. It then operates the same as Standard Tube Marker except every tenth bar is missing.
ScanCo # JSTM or ScanCo # JOTM----------dual purpose transmitter

SLIDE WIRE

1 ohm, 360° - ScanCo # JSW1----------for slaving an X-Y plotter
200 ohm, 358° - ScanCo # JSW200----------for analog position signal

DIGITAL

JSTM and SW200 Combination
The STM's pulse is used to trigger a digitizer twice. First, digitize the pressure signal, second digitize the analog position voltage on the SW200.
ScanCo # JSTM & SW200----------for slaving a digitizer to motor driven Scanivalve

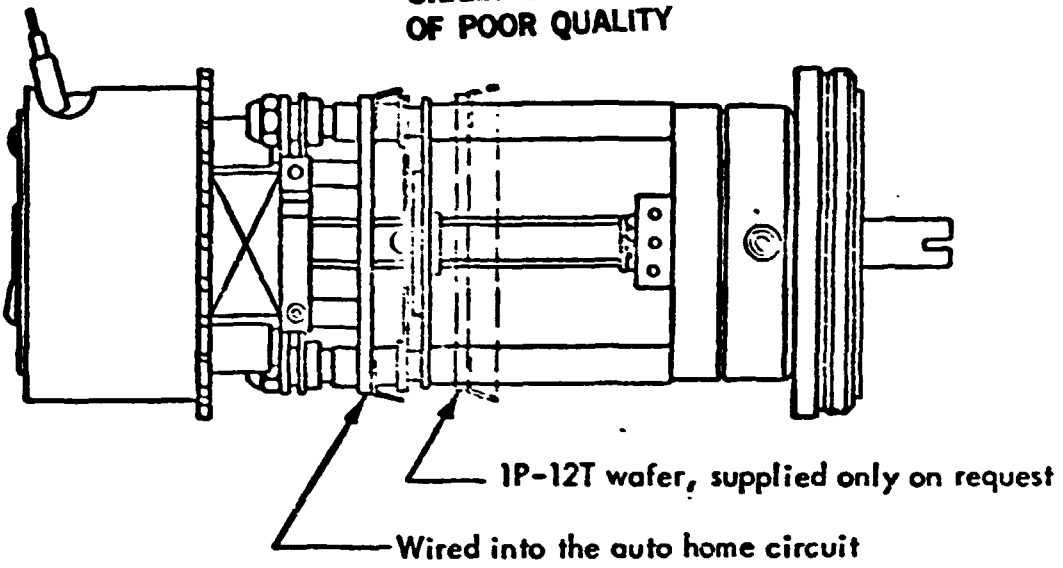
Binary Code
ScanCo # JBINY----------use with stepper driven Scanivalve

Binary Coded Decimal, available in 1248 count or 1224 count. 1248 count is standard.
ScanCo # J1248BCD or ScanCo # J1224BCD----------use with stepper driven Scanivalve

cimal - Base 10 Code
ScanCo # JDCML----------use with stepper driven Scanivalve

NOTE: These transmitters are mounted on the Scanivalve drive and located inside the Scanivalve case. To advance or retard the transmitter, the drive has to be removed from the case.

SOLENOID DRIVE



This stepper drive consists of a 12 step, size 4 Ledex solenoid driving a 4-1 gear reducer. This combination makes 48 steps per revolution. It auto homes 48 steps in two seconds. Both wafers rotate at solenoid rpm.

Drives manufactured after January, 1966 have means for mounting both the small and large model J position transmitters. If you wish to change from small to large (digital) transmitters on drives manufactured before January, 1966, return your drive to the factory to have the threads cut on the gear box end. This drive requires 30 milsec. to step and 15 milsec. for spring return. For stepping at speeds above 10 steps per second, use ScanCo# CTLR2/S2-S6, which is a solid state pulse length feed back driving circuit.

ScanCo # JS4-24 ---------- wired to double step, wired for auto home
ScanCo # JS4-43 ---------- wired for auto home

SPECIFICATIONS

Duty Cycle: 1/4 at 24 vdc or 44 seconds on period.
Resistance: Stocked with 8.03 ohm coil for operation at 24 vdc. Can be supplied in wide range of resistance on special order.
Switch Decks: One auto home wafer. One 1P-12T wafer, shorting (supplied only on request). Wafer switches have solid silver contacts (lubricate with light grease).
Temperature: -60°C to 125°C, can be operated up to 175°C (at sol. not ambient).

Spectrol Electronics Corp. (02111)

Potentiometer, Rotary, Series 708

Single Section (1K)

PRECISION POTENTIOMETERS

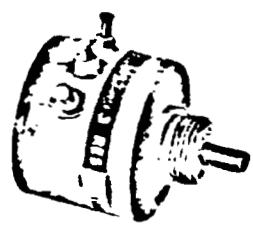
7/8 INCH
SINGLE-TURN
CONDUCTIVE PLASTIC

MODEL 708

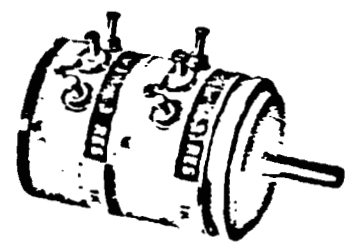
500 to 50K

- VIRTUALLY INFINITE RESOLUTION
- DESIGNED-IN RELIABILITY
- ROTATIONAL LIFE EXCEEDS 20 MILLION SHAFT REVOLUTIONS
- CO-MOLDED ELEMENT & MULTI-FINGER WIPER PROVIDE LOW NOISE OPERATION
- EXCELLENT TEMPERATURE & ENVIRONMENTAL STABILITY

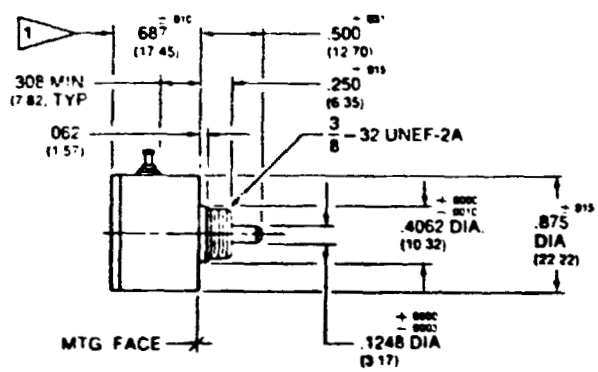
ACTUAL SIZE

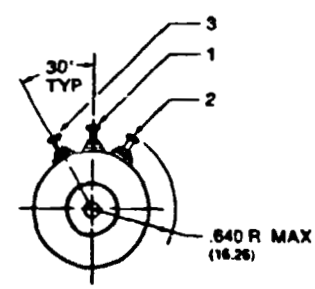


Model 708
Bushing Mount
Single Section

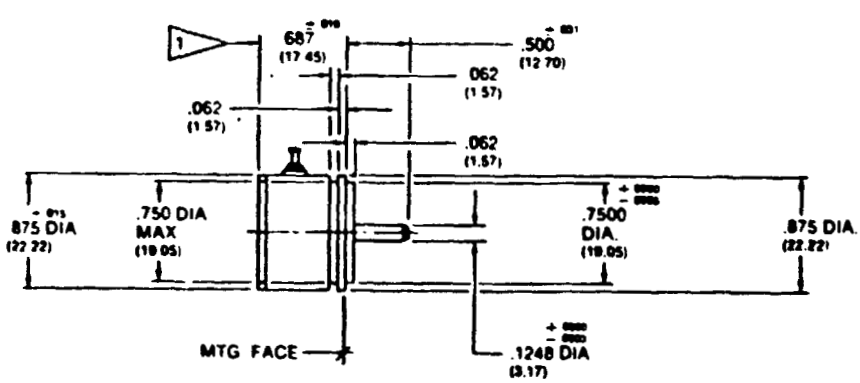


Model 708
Servo Mount
Two Section





BUSHING MOUNT



SERVO MOUNT

TOLERANCES UNLESS OTHERWISE NOTED
DECIMALS ± .005 ANGLES ± 2°
BASIC DIMENSIONS ARE IN INCHES
MILLIMETER DIMENSION IN PARENTHESES

1 ADD .500 (12.70) FOR EACH ADDITIONAL SECTION

SCHEMATIC

MODEL 708

PRECISION POTENTIOMETERS

SPECIFICATIONS: (MIL-R-39023 Test Procedures Apply)

ELECTRICAL

TOTAL RESISTANCE	Standard range, 500Ω to 50KΩ Tolerance: Standard ±10%, Special to ±5%
LINEARITY (INDEPENDENT)	Standard ±0.5%, Special to ±0.2%
ROTATION	340° ±5°
POWER RATING	Section 1: 1.0 watts at 70°C ambient derated to zero at 125°C Additional sections 75% of the rating of section 1
MINIMUM VOLTAGE	0.5% maximum
OUTPUT SMOOTHNESS	0.1% maximum
INSULATION RESISTANCE	1000 megohms min. 500 VDC
DIELECTRIC STRENGTH	1000 volts RMS 60 Hz from terminals to shaft
TAPS (EXTRA)	Extra taps available as special
PHASING	Points at which output ratio is 0.5 aligned ±1° (Ref to Section 1)
TEMPERATURE COEFFICIENT OF RESISTANCE	±400 PPM/°C maximum

MECHANICAL

ROTATION	360° continuous
BEARING TYPE	Servo Mount: Ball bearing Bushing Mount: Sleeve bearing

TORQUE (MAXIMUMS oz-in (gm cm))	Starting	Running
Servo, 1 Section	0.10 (7.20)	0.055 (6.12)
Bushing, 1 Section	0.25 (18.00)	0.20 (14.40)
Each Additional Section	0.10 (7.20)	0.075 (5.40)

MECHANICAL (Cont.)

RUNOUTS (MAXIMUMS)

	Servo	Bushing
Shaft Runout (TIR/in.)	.002 (0.05)	.002 (0.05)
Pilot Dia. Runout (TIR)	.002 (0.05)	.002 (0.05)
Lateral Runout (TIR)	.002 (0.05)	.005 (0.13)
Shaft End Play	.005 (0.13)	.005 (0.13)
Shaft Radial Play	.002 (0.05)	.004 (0.10)

WEIGHT (MAXIMUMS)	Single Section 0.6 oz (17.0 gm) Each Additional Section 0.2 oz (5.67 gm)
GANGING	6 sections max. terminal alignment added sections, within ±10° of section 1 terminals
MOMENT OF INERTIA	0.12 gm-cm² per section max.

MATERIALS

HOUSING AND LIDS	Aluminum, anodized
SHAFT	Stainless steel, non-magnetic, passivated
TERMINALS	Brass, gold plated
BUSHING MOUNT HARDWARE	Lockwasher, Internal tooth steel, nickel plated Panel Nut: Brass, nickel plated

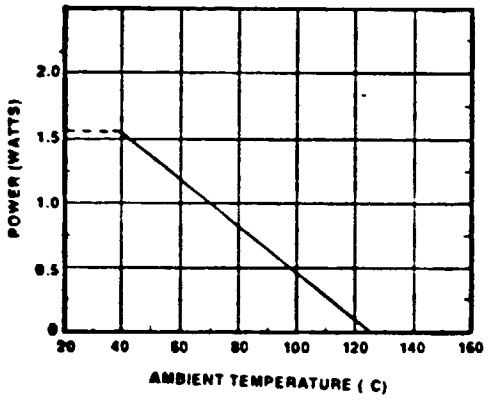
ENVIRONMENTAL

VIBRATION	15G thru 2000 Hz
SHOCK	50G's
SALT SPRAY	96 hours
ROTATIONAL LIFE	Servo: 20 million shaft revolutions Bushing: 5 million shaft revolutions
LOAD LIFE	500 hours
TEMPERATURE RANGE	−55° C to +125°C
MOISTURE RESISTANT	

MARKING Units shall be marked with Spectrol name, model no., and date code, and on each section, resistance, resistance tolerance, linearity and terminal identification

POWER RATING CHART

(Ratings for cup No. 1. Additional Cups, 75% of values shown.)



RESISTANCE ELEMENT DATA

RESISTANCE VALUE (OHMS)	MAXIMUM VOLTAGE ACROSS COIL (VOLTS)
500	22
1K	32
2K	45
5K	71
10K	100
20K	141
50K	224

HOW TO ORDER THE MODEL 708

The Model 708 can be ordered from this specification sheet with a variety of alternate characteristics, as shown above. For most rapid service on your order, please state

1. Model 708
2. Mounting type (servo or bushing)
3. Total resistance of each section, beginning with the section nearest the mounting end.
4. The number of sections.

Example—Model 708, Servo, 10K/10K/30K/500Ω, 4 sections
Example—Model 708, Bushing, 5K, single section

Other characteristics will be standard as described on this specification sheet. If special characteristics are required, such as special linearity tolerance, special resistance tolerance, extra taps, non-linear functions, etc., please state these on your order and allow additional lead time for delivery.

SPECTROL ELECTRONICS GROUP

Spectrol

Spectrol Reliance Ltd.
Drakes Way
Swallowfield, Berkshire, England
Swallowfield 2351 • TELEX 847401

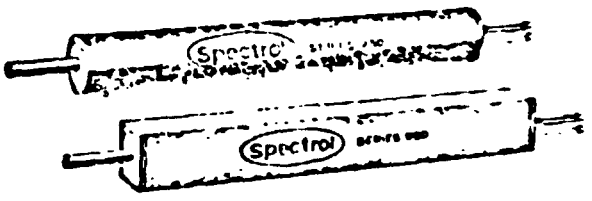
Spectrol Electronics Corporation
17070 East Gale Avenue
City of Industry, Calif. 91745 U.S.A.
(213) 964-6565 • TWX (910) 584-1314

SP Elettronica spa
Via Cadorna
20090 Trezzano (Milano) Italy
35.30.241 • TELEX 36020

LINEAR MOTION

CONDUCTIVE PLASTIC POTENTIOMETERS

SERIES 950



- **HIGH ACCURACY POSITION INDICATION.**
- **INFINITE RESOLUTION.**
- **VIRTUALLY UNLIMITED PACKAGING FLEXIBILITY.**

Spectrol linear-motion potentiometers provide extremely accurate position indication with the same conductive plastic element technology used in high-precision rotary models. The adjustment shaft may be rotated freely without affecting the voltage output. Linear-motion designs are often used in automatic machinery, process equipment, and particularly in hydraulic systems coupled directly to an actuating piston. Complete packaging flexibility is offered by Spectrol to meet your application needs. These Spectrol linear-motion designs also include wirewound elements. Both element types can be provided with non-linear outputs and electrical taps. Mechanical or electrical travel can be provided in most any length, with either in-line or perpendicular shaft extensions from the potentiometer assembly.

GENERAL SPECIFICATIONS: Listed for reference only. Designs are fitted to application requirements:

BODY STYLES (STANDARD)

	BODY	SHAFT
Round	¾-inch dia	⅜-inch dia
	1-inch dia	¼-inch dia
Square	1-inch sq	¼-inch dia

ELECTRICAL:

Resistance range (ohms per inch ± 10%)	300 Ω to 25 K
Resolution	Virtually infinite
Linearity, independent Standard	± 0.5%
*Special to	± 0.03%
Electrical travel (± ¼ inches)	1 inch increments through 12 inches
Power rating	.8 watts/inch at 40°C.
Dielectric strength	500 volts rms at 60 cps from terminals to shaft

MECHANICAL:

Mechanical travel:	Coincides with electrical travel ± 1/32 inches.
Terminal position	End opposite shaft (standard)
Mounting	tapped holes front and rear
Weight	2 oz plus 1 oz per inch.

ENVIRONMENTAL: (Meets applicable specifications of MIL-R-39023)

Operating temperature range	−55°C. to +125°C

SPECIAL FEATURES AVAILABLE:

Extra taps, nonlinear functions, electrical and mechanical travel, special mounting configurations, provided with leads or connectors, self-aligning shaft, sealed construction, shaft configuration.

*Depends on travel

HOW TO SPECIFY SPECTROL CONDUCTIVE PLASTIC POTENTIOMETERS:

Any of Spectrol's Conductive Plastic potentiometer models may be specified to meet your exacting applications. This checklist can be used when considering your electrical and mechanical requirements:

☐ Basic Model Series Model No _____
☐ MiniLine, slim-profile potentiometers Model No _____

☐ **ELECTRICAL REQUIREMENTS:**
☐ Resistance and tolerance ☐ Additional taps (location)
☐ Linearity ☐ Output smoothness
☐ Power rating ☐ Tempco
☐ Electrical rotation
☐ Required function ☐ Linear; ☐ Non-linear

☐ **MECHANICAL REQUIREMENTS:**
☐ Type of mounting ☐ Servo ☐ Bushing ☐ Other_____
☐ Number of additional sections
☐ Package dimension requirements
☐ Mechanical rotation
☐ Torque
☐ Shaft extension
☐ Other special requirements

☐ **GENERAL CHARACTERISTICS:**
☐ Rotational life
☐ Temperature range
☐ Special environmental requirements

☐ Spectrol Linear-Motion Potentiometers

SPECIFIC PACKAGE OR HOUSING CONFIGURATION (BASIC DESCRIPTION):
☐ Dimensions:
☐ Linear-motion life required _____ (in strokes)

MECHANICAL:
☐ Stroke or travel (inches) _____.
☐ Termination method: ☐ Std Terminals ☐ Leads
☐ Connector
☐ Other _____.
☐ Shaft extension (retracted position) _____ (in inches).

ELECTRICAL CHARACTERISTICS: Use same as Basic Rotary Models

Spectrol — FOR COMPLETE DESIGN ASSISTANCE OR FURTHER INFORMATION ON ANY REQUIREMENTS NOT COVERED BY THIS DATA SHEET, CONTACT YOUR SPECTROL REPRESENTATIVE OR FACTORY OFFICE.

SPECTROL ELECTRONICS CORPORATION 17070 E GALE AVE., CITY OF INDUSTRY, CALIF. 91745 • PHONE (213) 964-6565 • TWX (910) 584-1314

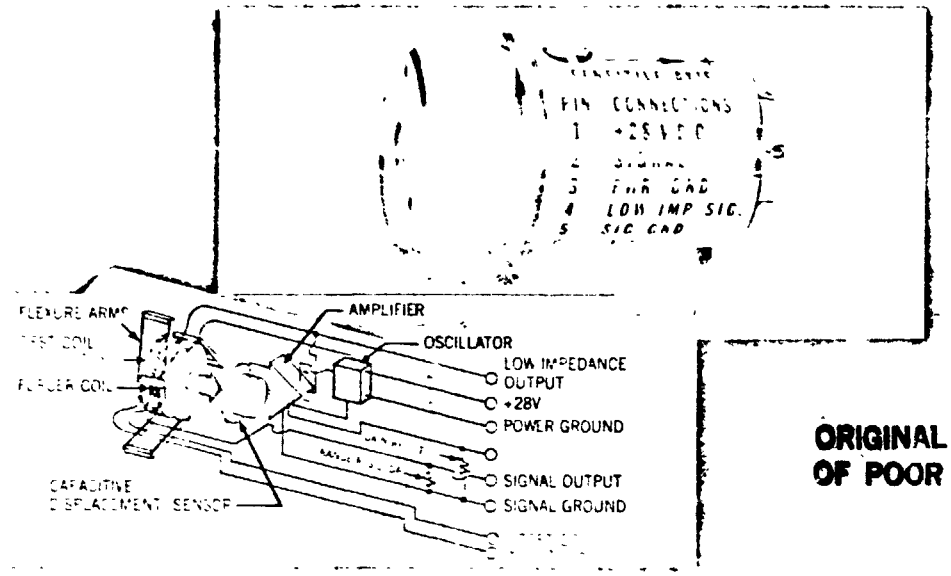
March 17, 1970 AL

Sundstrand, Inc. (97896)

Accelerometer, Vertical Servo 303T16

SUNDSTRAND DATA CONTROL

MODELS 303B&T SERVO ACCELEROMETERS



Features

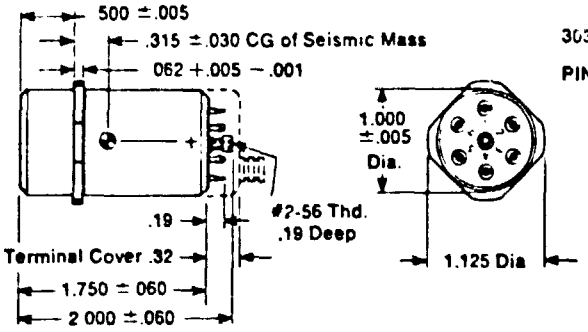
- NON-PENDULOUS FLEXURE SUSPENSION -- NO PENDULOSITY ERROR, NO HYSTERESIS ERROR
- +28 VOLT FOR AIRBORNE OPERATION
- ELECTRICALLY ISOLATED OUTPUT
- EXTERNAL RANGE ADJUSTMENT
- UNIQUE SUSPENSION ELIMINATES SENSITIVITY TO ANGULAR ACCELERATION

Description

Models 303B and 303T Servo Accelerometers offer the convenience and value of multirange instruments. Simply changing resistors on the accelerometer's header changes the unit's gain and range characteristics . . . enabling you to purchase one accelerometer for a specific application and, later, re-range it for others. Now you can even afford to stock servo accelerometers. Even more important, though, is performance . . . which, in a servo accelerometer, depends on the suspension of the internal sensing element, and none performs better than the unique patented non-pendulous flexure suspension.

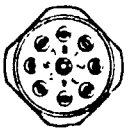
Model 303T offers an integral self-test coil. Current through this electrically-isolated coil applies a force to the sensing element and enables a valid check of accelerometer functioning prior to use. The self-test coil also permits nulling the effect of earth's gravity field for low-level acceleration measurements perpendicular to the earth's surface.

MODELS 303B, 303BF, 303T and 303TF SERVO ACCELEROMETERS



303B/BF PIN CONFIGURATION

PIN 1. +28 VDC
2 SIGNAL
3 POWER GROUND
4. LOW IMPEDANCE SIGNAL
5 SIGNAL GROUND
6. GAIN



303T/TF PIN CONFIGURATION

PIN 1. +28 VDC
2. POWER GROUND
3. LOW IMPEDANCE SIGNAL
4. SIGNAL GROUND
5. GAIN
6. SIGNAL
7. +TEST
8. −TEST

SPECIFICATIONS

	MODELS 303B & 303T	303BF & 303TF HEAVY DUTY
Ranges (full scale)	±0.5 g to ±40 g	±0 5 g t o ±40 g
Voltage sensitivity (adjustable)	10 V/g to 0.1 V/g	10 V/g to 0.1 V/g
Current sensitivity (nominal)	0.24 ma/g	0.24 ma/g
Output voltage	to ±5.0 V	to ±5.0 V
Noise: 1 MHz to 8 MHz (less than)	5 mV, rms	5 mV, rms
below 1 MHz (less than)	1 mV, rms	1 mV, rms
DC to 1 Hz (resolution)	5 micro-g	5 micro-g
Supply voltage and current	+28 .DC ±10%; 40 ma, max.	+28 VDC ±10%; 40 ma, max.
Electrical isolation at 50 VDC, pins to case	50 megohms	50 megohms
input to output at 50 VDC	50 megohms	50 megohms
Linearity (to 5 0 volts any range)	±0.05% full scale	±0 05% full scale
Hysteresis and repeatability	0.0005 g	0 0005 g
Output at 0 g (max.)	± 50 mg	±500 mg (303TF), ±300 mg (303BF)
Zero shift with line voltage (max)	0 005 g/V	0 005 g/V
Sensitivity shift with line voltage (max.)	0.05%/V	0 05%/V
Temperature range	−65°F to +185°F	−65°F to +185°F
Zero shift with temperature variation	0 030 g/100°F	0 150 g/100°F
Sensitivity shift with temperature variation	0 01%/°F	0 01%/°F
Transverse acceleration—DC to 5 Hz	±50 g	±100 g
5 Hz to 2000 Hz	20 g peak	40 g peak
Cross coupling coefficient (pendulosity error)	none	none
Case alignment (to true sensitivity axis)	0 002 g/g	0 002 g/g
Acceleration limit (non-operating, sensitive axis)	100 g	200 g
Shock limit (5 msec pulse)	100 g (any axis)	200 g
Weight (with terminal cover)	3 4 oz.	3 4 oz.

MODEL NUMBER		303B	B11	B12	B13	B14	B15	B16	B20
MODEL NUMBER (HEAVY DUTY)		303BF	BF11	BF12	BF13	BF14	BF15	BF16	BF20
MODEL NO. (WITH SELF-TEST COIL)		303T	T11	T12	T13	T14	T15	T16	T20
MODEL NUMBER (HEAVY DUTY)		303TF	TF11	TF12	TF13	TF14	TF15	TF16	TF20
Range (nom nal)	±g	*	0.5	1.0	2.0	5.0	10 0	20.0	40.0
Sensitivity (±2%)	V/g	*	10 0	5.0	2.50	1.0	0.50	0.25	0 10
Frequency response (±5%)	Hz	*	180	270	330	390	425	455	480
Natural frequency	Hz	*	300	450	550	650	710	760	800
Output impedance (nom.)	ohms	*	100	100	100	4200	2100	1050	500
Thermal sensitivity (max.)	%/°F	*	.018	.019	.020	.015	.015	.015	.015
Signal connections (303B)	pin #'s	*	4 & 5	4 & 5	4 & 5	2 & 5	2 & 5	2 & 5	2 & 5
Signal connections (303T)	pin #'s	*	3 & 4	3 & 4	3 & 4	4 & 6	4 & 6	4 & 6	4 & 6

*These units supplied with protective ranging only—customer shall adjust range and gain per manual.

TO ORDER, Specify:

Specify appropriate model number to obtain desired factory ranging and/or isolated test coil. Each series 303 Accelerometer is supplied with Model 300A9 terminal cover, Model 300A1 clamp ring, instruction manual and calibration certificate

TYPICAL OPTIONS WITH	STANDARD CASE	CASE EXTENSION	SPECIAL CASE
Special Ranging	yes	yes	yes
Chart indicating range & gain resistors for field ranging	yes	yes	no
Telemetry version 0 to 5 VDC	no	yes	yes
2nd order filter—low frequency	no	no	yes
Limiting—1.0V to +6.5V	no	no	yes

OPTIONAL ACCESSORIES:

Clamp Ring*	Model 300A1
End Mounting Adaptor	Model 300A2
Side Mounting Adaptor	Model 300A3
3-Axis Adaptor	Model 300A6
Cable w/connector (10 ft)	Model 155A10
Terminal Cover*	Model 300A9

*Supplied with accelerometer.

Sundstrand Data Control, Inc.
subsidiary of Sundstrand Corporation

OVERLAKE INDUSTRIAL PARK · REDMOND WASHINGTON 98052
PHONE 206/885-3711 · TWX 910/449 2860 · TELEX 32 0313

Timex (61515)

Gyro, Rate, 3-Axis 402405

Rate Gyroscope, Model CF000 - Data

3-Axis Rate Sensor - Data

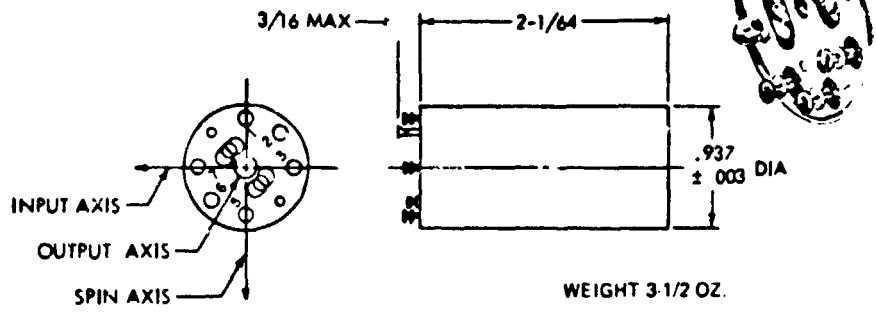
Outline Drawing 402405-0

Schematic Diagram 402356

RATE GYROSCOPE

DAMPING COMPENSATED

MODEL CD 000



WEIGHT 3-1/2 OZ.

TIMEX RATE GYRO WITH VARIABLE-ORIFICE COMPENSATED DAMPER

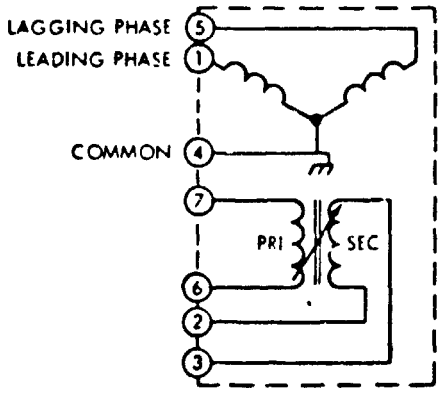
The major components of this instrument are: the gyroscopic element housed in a hermetically sealed cylindrical shell (gimbal) filled with an inert gas, the gimbal suspension, the gimbal position pickoff and the temperature-compensated damping mechanism. The gimbal shell and other components are contained in a cylindrical gyro case, and are immersed in the high viscosity silicone oil with which the case is filled.

The gyroscopic element is an inertia wheel driven by a synchronous hysteresis motor. The co-axial arrangement of gimbal shell and outer case provides a thin, fluid filled annular gap between these two elements, and achieves excellent damping of transverse shock and vibration inputs. Similarly the fluid between the end faces of the case and gimbal shell cylinders permits the gyro to tolerate high axial shock.

The gimbal suspension restricts the motion of the gimbal to rotation about the output axis and provides elastic restraint in this mode by means of a torsion bar attached to one end of the gimbal. A shaft extending from the other end is supported by a ball bearing.

The pickoff measuring the angular displacement of the gimbal is a rotary differential transformer producing an AC output voltage proportional to the angular rate input.

An outstanding feature of this gyro is the damper mechanism, which maintains the damping ratio substantially constant over a wide range of temperatures, as shown by the accompanying plot. Rotation of the gimbal forces silicone fluid to flow through variable-aperture orifices. The resulting energy dissipation provides the damping action. The resistance to the flow of fluid is determined by the effective aperture of the orifices which are controlled by temperature sensitive elements in such a manner as to compensate for the large changes in fluid viscosity with temperature.



SCHEMATIC DIAGRAM

NOTES:

1. With motor connections as shown, wheel rotates CW looking along spin axis.
2. For an angular rate input in the CW direction (looking along input axis), the gimbal rotation is CW (looking along output axis), and the voltages at pins 3 and 7 are nominally in phase (pins 2 and 6 joined).

RATE GYROSCOPE, DAMPING COMPENSATED, MODEL CD 000

TYPICAL DATA

MODEL NO		CD-010	CD-040	CD-060	CD-100	CD-200	CD-400
Full Scale Input Range, nom	deg/sec	10	40	60	100	200	400
Min Detectable Rate	deg/sec	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Non-Linearity, max							
To Half Scale	% of F.S	±0.2	±0.1	±0.1	±0.1	±0.1	±0.1
To Full Scale	% of F.S	±0.4	±2	±2	±2	±2	±2
Zero Offset at 20°C., max	% of F.S.	0.2	0.05	0.05	0.05	0.05	0.05
Change of Zero Offset with temperature (from 20°C to either extreme of oper temp.), max							
a) Uncompensated	% of F.S	0.5	0.14	0.14	0.14	0.14	0.14
b) Compensated*	% of F.S	0.18	0.05	0.05	0.05	0.05	0.05
Mass Unbalance, max	deg sec/g	0.05	0.05	0.05	0.05	0.05	0.05
Hysteresis, max	% of F.S	0.15	0.15	0.15	0.15	0.15	0.15
Scale Factor, nom	mv rms/deg/sec	140	140	93	56	28	14
Scale Factor Variation							
a) with temperature**	%/deg C	0.07	0.07	0.07	0.07	0.07	0.07
b) with motor supply frequency				Directly proportional			
c) with pickoff supply voltage				Directly proportional			
d) with pickoff supply frequency				Independent***			
Total Output at Null, max	mv rms	25	25	25	25	25	25
Noise, 0-100 Hz, peak to peak, max	% of F.S	1.2	0.3	0.3	0.3	0.3	0.3
Typical Damping Ratio and tolerance over operating temp. range				0.7 ±0.3 (See typical damping curve)			
Undamped Natural Frequency, nominal (operating, at 20°C.	Hz	23	23	29	37	52	74
Sustained Acceleration, max. (any axis, either direction)	g	50	50	60	100	150	> 200
Shock, max (Amplitude of 6 millisec. half sine pulse	g	50	50	100	150	200	300
Vibration, 20-2000 Hz	g	15	15	20	25	30	> 30
Operating Temp. Range	°C			−55 to +85			

STANDARD OPERATING CONDITIONS.

Motor Excitation	400 Hz, 26 volt, two-phase. (May be operated from single phase line with series capacitor in leading motor phase. Three-phase motor available.
Pickoff Excitation	400 Hz, synchronized with motor excitation. Pickoff excited from 26 volt supply through series choke of 50 millihenry (nom.), Q = 15 (min.)
Pickoff Secondary Load (external)	10,000 ohm, resistive.

* Compensation by means of external trim components

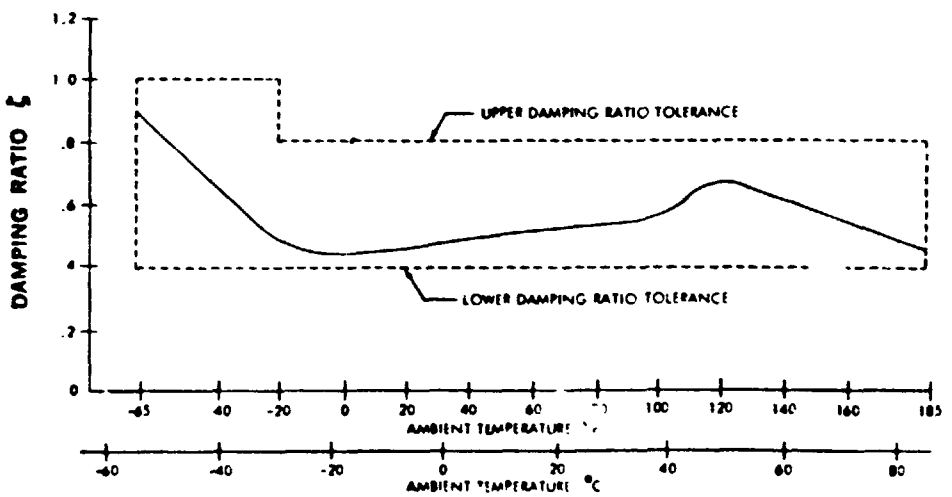
** Variation of Scale Factor with temperature may be reduced to 0.02%/deg C (at slight sacrifice in scale factor) by decreasing the standard 10,000 ohm external load resistance across the pickoff secondary

*** Pickoff excited through series choke, see Standard Operating Conditions.

NOTES:

1. Special models with tighter tolerances and exceptional ruggedness are available. Additional features such as self-test capability and fast run up may be incorporated.
2. Data above apply to standard operating conditions (excitation and load) listed at end of table. Many other operating conditions can be accommodated. At pickoff excitation frequencies of 800 Hz and higher the series choke can often be omitted and larger output signals may be obtained.

TYPICAL TEMPERATURE DEPENDENCE OF DAMPING RATIO AND TYPICAL TOLERANCE BAND



TIMEX CORPORATION

EASTERN SALES WATERBURY CONNECTICUT 06720 PHONE (203) 758-1911 TELEX 96-2416
WESTERN SALES 34 TEJON PLACE PALOS VERDES, CALIF 90274 PHONE (213) 375-9526 AND 9540 TELEX 65-3432

THREE AXIS RATE SENSOR
DC-DC

- FLIGHT PROVEN, QUALIFIED
- RUGGEDIZED DESIGN
- MINIMIZED SIZE AND WEIGHT
- BROAD APPLICATION USAGE
- WIDE RANGE OF PERFORMANCE AND CONFIGURATION OPTIONS

TIMEX THREE-AXIS RATE SENSOR DC-DC

This system is a compact three axis (e g , roll, pitch, and yaw) rate sensor, comprising three TIMEX rate gyros with mutually perpendicular axes mounted together with auxiliary components in a single sealed enclosure Except for the DC power input (28V), the system is completely self contained The three output signals are DC voltages proportional to the angular rate inputs about the respective axes. These rate sensors have passed numerous qualification tests and have been furnished in production quantities for many major military aircraft, missile and space programs.

In addition to the three TIMEX rate gyros, the sensor includes a DC to AC power inverter as well as a phase-sensitive demodulator, an output filter and a scale factor trim for each axis. All components are mounted on a frame designed for maximum rigidity and minimum weight, and the enclosure is sealed against space environments

The inverter delivers precise AC square wave power for the excitation of the gyro pickoffs and of the two phase gyro spin motors In addition, three isolated windings on the inverter transformer furnish the reference voltages for the phase-sensitive demodulator Frequency as well as amplitude of the inverter output are well regulated against variations in input voltage and against changes in temperature This feature achieves excellent stability of the sensor scale factor under widely varying environmental conditions, it also eliminates the need for a series choke, which is usually required in the pickoff primary circuit Protection of the inverter against reverse polarity input, brief short circuiting of the output and against transient spikes in the input voltage is provided

The AC output signal of each gyro pickoff is rectified by a phase-sensitive demodulator employing highly reliable diode bridges The resulting rectified signal passed through a low pass filter which attenuates ripple A resistor in the output circuit permits fine adjustment of the scale factor

The frequency response of the system is determined mostly by the frequency response of the gyros (approximately represented by a second order system with the values of natural frequency and damping ratio as listed in the data section) and is further modified by the response of the low pass output filter.

The system described is but one of a variety of single and multiple axis rate sensing systems made by the TIMEX Corporation to meet aircraft, missile and space requirements The interface and configuration characteristics of some of many available three axis, DC to DC rate sensor models are tabulated for reference Installation information for these units is given on the following page

Furthermore, accelerometers, signal amplifiers, torquer and motor rotation self test circuits and other auxiliary equipment may be incorporated to meet application needs

The tabulated data reflect system performance with a typical gyro, many other gyros with a wide range of characteristics are available from the TIMEX Corporation and can be supplied with the system.

SYSTEM INTERFACE FOR TYPICAL MODELS
Other configurations available to comply with application needs

Type Designation		Type A	Type B	Type C	Type D
Excitation					
Voltage	vdc	28 + 4, -8	28 ± 4.2	28 ± 4	28 ± 4
Power, Max	watts	18 4	19	18	25 6
Full Scale Output - Std					
@ + Full Scale Rate	vdc	+ 4.8	+ 5.0	+ 2.5	+ 5.0
@ — Full Scale Rate	vdc	+ .2	0	—2 5	0
@ Zero Input Rate	vdc	+ 2.5	+ 2.5	0	+ 2 5
Size					
Dimensions - Flange	inxin	2.88x3 55	3.28x4 78	2.52x3.20	4 76x6 70
- Height	in	2.75	3.26	2.52	1.89
Volume	cubic in.	27	43	15	54
Weight	lb.	2.0	3.0	1.6	1.75
Connector					
Brand		Cannon	Bendix	Cannon	Bendix
Part Number		MDM-15S	PTP7H-14-19PW	DE50904 1	PTO2E-12-8P
Mating Part Number		MDM 15P	PTO6H-14-19SW	DEM 9S	PTO6E 12-8S
Special Feature		Wide excitation volt range	biased output	minimum size and weight	heater control (optional)

SYSTEM PERFORMANCE (EACH AXIS) WITH TYPICAL GYRO
Other ranges scale factors, tolerances, etc are available to meet specific customer requirements

Model No		10	40	100	600	4000
Full Scale Input Range Nom	°/sec	10	40	100	600	400
Min Detectable Rate	°/sec	01	01	.01	02	04
Non Linearity Max						
to Half Scale	% FS	± 2	± 5	± 5	± 5	
to Full Scale	% FS	± 4	±2 0	±2 0	±2 0	±2 0
Zero Offset @ 20°C Max	% FS	± 2	± 05	± 05	± 05	± 05
Change of Zero Offset w Temp	% FS	±1 2	± 3	± 3	± 3	± 3
Mass Unbalance Max	°/sec/g	05	05	05	10	35
Hysteresis Max	% FS	15	.15	.15	.15	15
Scale Factor Nom 20K Load	mvdc/°/sec	62 5	62 5	25	4 2	63
Scale Factor Variation						
a) with temperature	% FS/°C	.07	.07	07	07	07
b) with input voltage	% FS	within 1 % of nominal value				
Noise 0 100 hz peak to peak max	% FS	1 2	.3	3	3	3
* Typical Damping Ratio and Tolerance over Oper Temp Range		4 to 1 0 (2 to 6 0)				
* Undamped Natural Freq nom operating @ 20 C	hz	23 (26)	23 (26)	37 (44)	91 (108)	234 (278)
Sustained Acceleration Max any axis	g	50	50	100	300	>300
* Shock Max (amplitude 6 ms half sine pulse)	g	50 (100)	50 (100)	150 (300)	200 (>500)	>300 (>500)
* Vibration 20 to 2000 hz	g	10 (10)	10 (10)	20 (25)	25 (30)	>30 (>35)
** Oper Temp Range	°C	—30 to + 65				

* Values given for both Timex's standard SD and CD Rate Gyro Values in parentheses are applicable to the SD unit
** Operating temperature range can be extended as required to meet application needs

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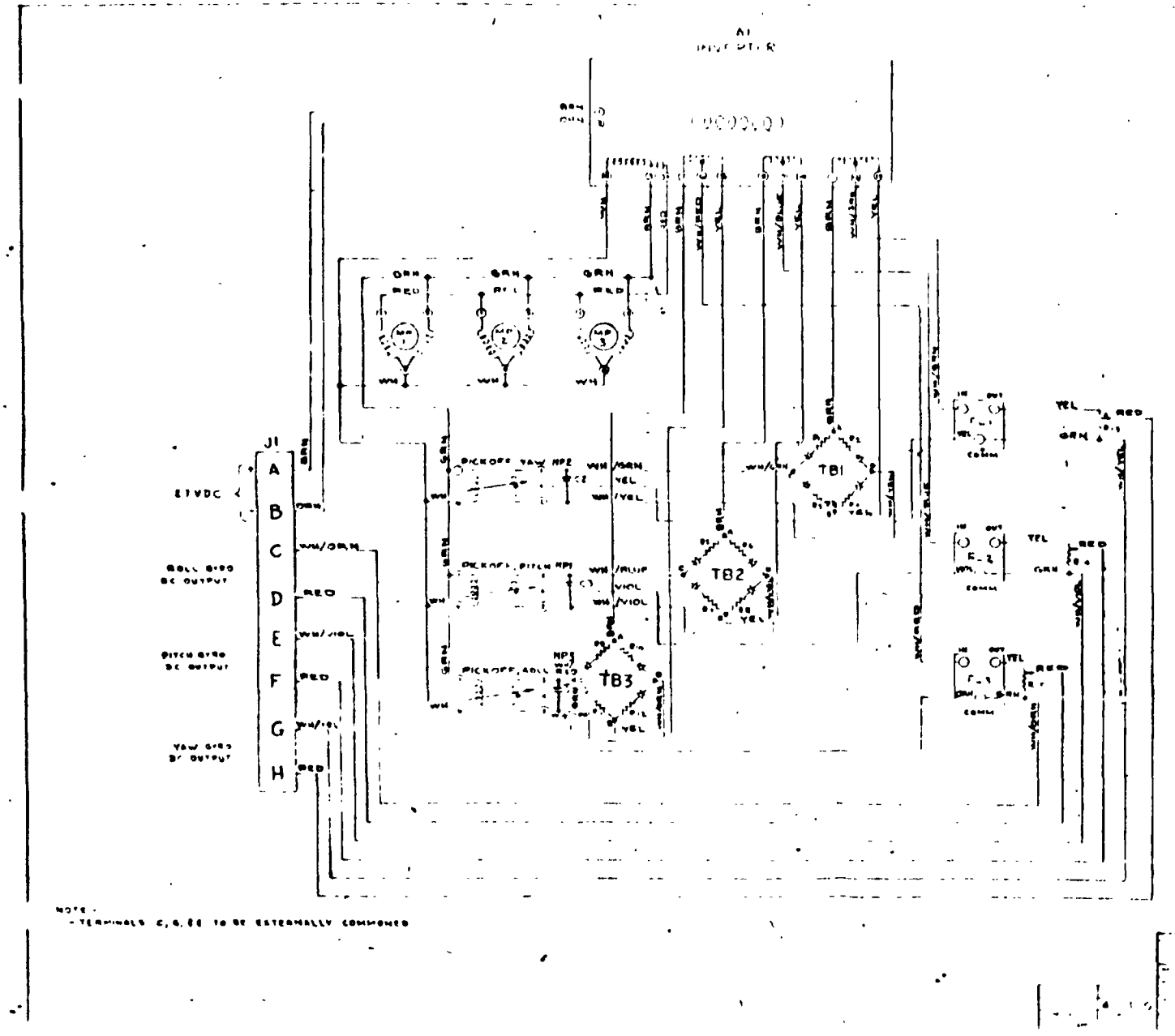

NOTE:
1. TERMINALS C, G, EE TO BE EXTERNALLY CONNECTED

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402356

ELECTRICAL SCHEMATIC DIAGRAM

402356

TIMEX CORPORATION

FOR

Acceptance Test Procedure 1317 A

P/N 402405

THREE AXIS RATE SENSOR PACKAGE

DC Input - DC Output

FOR

BELL HELICOPTER

PREPARED BY:	TIMEX CORPORATION	TEST PROC
[signature] 1/29/77		TIMEX T.P. Page 1 of 7
PROVED BY: [signature] 2/1/77		

REVISIONS

PAGE	PARAGRAPH	SYMBOL	DESCRIPTION	DATE
4	3.6	A	A down was B down, C down was D down, E down was F down.	6/10/77
Data Sheet	Page 2		DC output @50°/sec. was DC output @100°/sec.	

1. DESCRIPTION

This specification describes the procedure for testing a Three Axis Ra
Gyro Assembly, TIMEX Corporation Part No. 402405.

2. SPECIFICATION, DRAWING AND PART NUMBER

TIMEX Corporation

Outline Drawing: 402405

Electrical Schematic: 402356

3. ACCEPTANCE TESTS

3.1 Test Equipment:

(a) Rate Table - Genisco C181

(b) Insulation Resistance Tester - James Biddle Megger

(c) D.C. Voltmeter - John Fluke, Model 803

(d) Torsional Vibrator, Micro GEE Model 60

(e) Oscilloscope - Analog Labs. Type 1100

(f) VTVM - HP 400H

(g) Power Supply - DC ± 28 volts.

EQUIVALENT EQUIPMENT MAY BE USED

3.2 Standard Conditions:

Unless otherwise stated, the tests shall be performed under the followin
conditions:

(a) In 77° ambient surrounding

(b) Humidity 95% or less

(c) 28 ± 3V DC Package Excitation

(d) Output Load 10 K ohms resistive

3.3 Natural Frequency and Damping:

3.3.1 This test shall be performed on the individual roll, pitch and yaw gyro before it is assembled into the package.

Place the Roll gyro on the Torsional Vibrator and connect to the dampin chassis equipment and energize. Determine the natural frequency and re on the data sheet. Drive the gyro at half natural frequency and determi the damping ratio. The damping ratio shall be recorded on the data shee

NOTE: Allow gyro to operate 15 minutes at room temperature before measuring natural frequency and damping.

3.3.2 Repeat 3.3.1 for Pitch and Yaw gyros.

3.4 Insulation Resistance: (See Figure 1)

Short pins A to B and apply a 100 Volt D.C. potential between pins G and C and E, C and G, A and C, A and E, A and G and pins C, A, E and G to cas The insulation resistance reading shall be 10 megohms minimum in all case

3.5 Input Current:

Measure the input current at 31 Volts. Record the value on data sheet.

3.6 Polarity (See Figure 1)

With A to B vertical, A down, the Roll gyro output shall be positive with a CW input. With C to D vertical, C down, the Yaw gyro output shall be positive with a CW input. With E to F vertical, E down, the Pitch gyro output shall be positive with a CW input.

3.7 Resolution:

With zero rate input, slowly apply a CW rate to the Roll gyro until a char in output is observed. Repeat for CCW input rate. The necessary rate shall not exceed .01°/sec. Repeat for the Pitch and Yaw gyros.

3.8 Hysteresis:

Apply a 100°/sec. CW input rate to the Roll gyro for 10 seconds and remove Read and record the gyro output 10 seconds after the table has come to rest Repeat for a 100°/sec CCW input rate. The hysteresis spread is the algebraic difference between the two readings divided by 2. Record on the data sheet. Repeat for the Pitch and Yaw gyros.

3.9 D.C. Output:

Orient the package so that the Roll gyro input axis is vertical (B dow Measure the output at 0°/sec. rate. Apply a CW rate of 50°/sec. Repeat for the Pitch axis (F down) and the Yaw axis (D down).

3.10 Linearity:

With the Roll gyro input axis vertical, B down, apply rates listed on the data sheet, recording the D.C. output for each rate. If outside tl limits on the data sheet, plot actual vs. best straight line output on graph paper. The maximum difference between the actual measured output and the best straight line drawn through the output curve shall not exceed 150 millivolts.

Repeat for the Pitch and Yaw gyros.

3.11 Output Ripple:

Connect the AC voltmeter across the output of the Roll, Pitch and Yaw Channels and measure the total RMS voltage. Record the values on the data sheets.

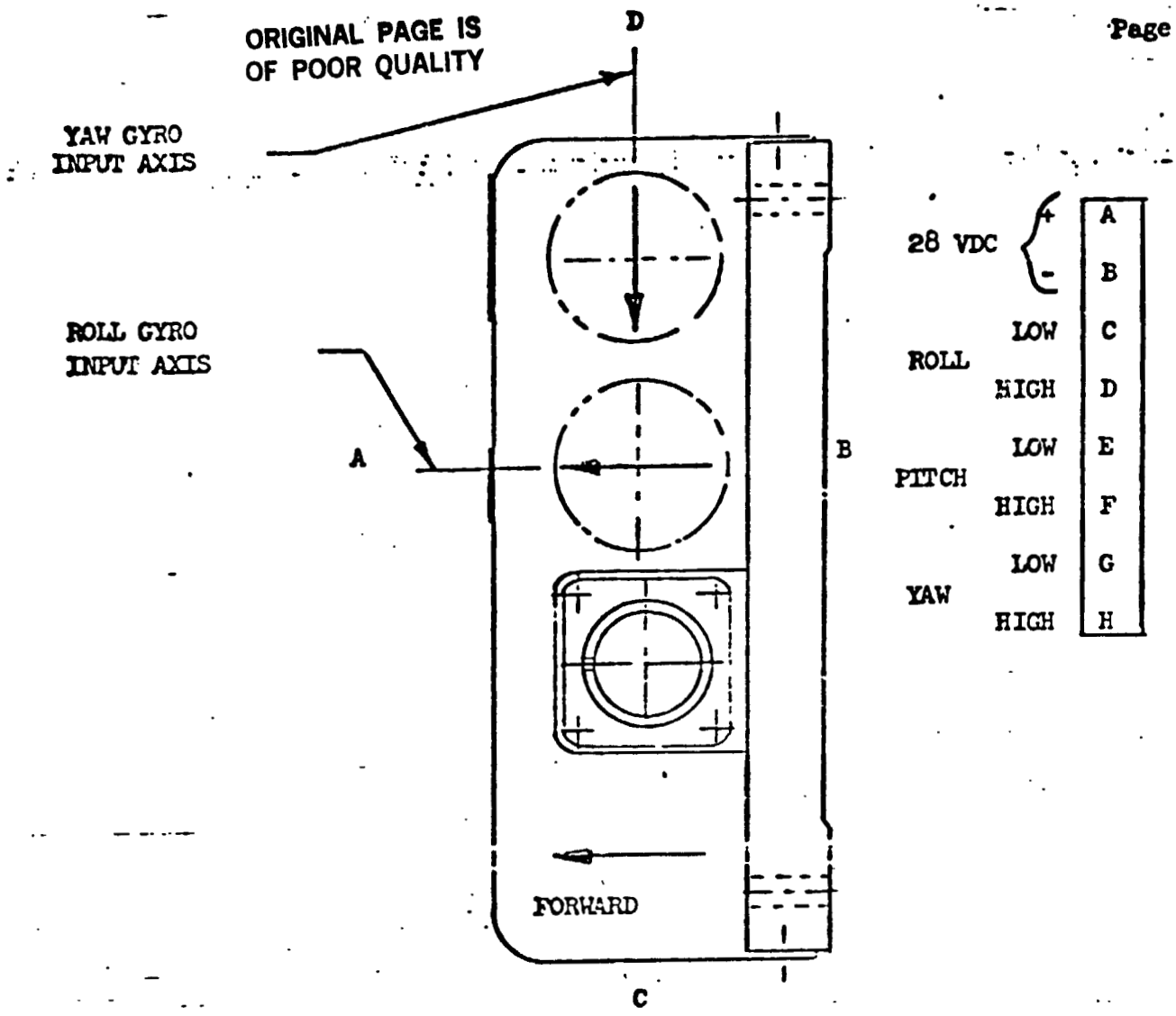
3.12 Stops:

By observing the Roll gyro output and slowly increasing the CW input rat above 100°/sec., determine the stop setting by the abrupt change in outp sensitivity. Repeat for a CCW input rate.

3.13 Cross Coupling:

Position the package on the rate table with the Roll gyro input axis vertical, (B down) and measure the outputs of Pitch and Yaw gyros (Null) Apply a CW and CCW rate of 100 deg/sec. and measure the outputs of Pitch and Yaw gyros. (See Figure 1). Subtract algebraically the null value f the outputs at 100 deg/sec. input and enter the largest value in the difference line on the data sheet. Repeat with Pitch gyro input axis ve (E down) ar measure the outputs of Roll and Yaw gyros at 100 deg/sec. r input.

Repeat with Yaw gyro input axis vertical (D down) at an input rate of 1 deg/sec. and measure the outputs of Roll and Pitch gyros.



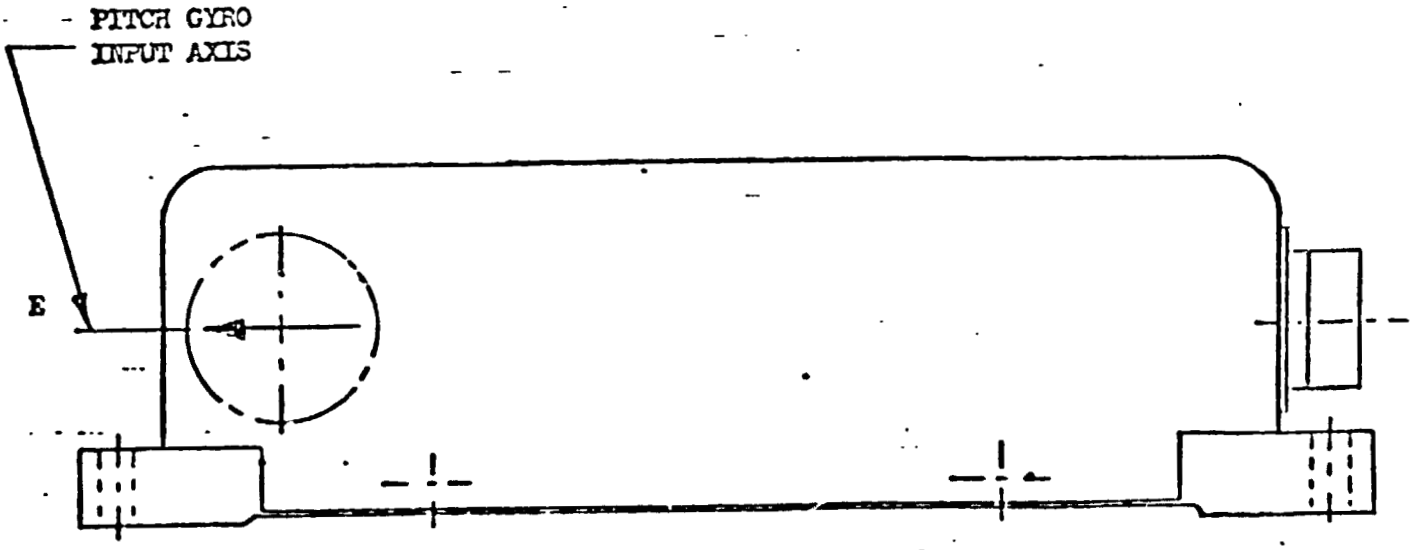


FIGURE 1

TIMEX CORPORATION, WATERBURY, CONNECTICUT

QUALITY CONTROL FINAL TEST RECORD

Mfg. Spec. 698
T ~ 1317 A

CUSTOMER P/N _____

S/N _____

TIMEX P/N 40240

ATION: 28 ± 3V D.C.

Load: 10 K

PARAMETER	TOLERANCE	MEASURED		
Insulation Resistance	10 Megs Min. @200 VDC	Acc.	Rej.	
Input Current @ 31 V				
Polarity and Phasing	CW Input - Positive Output	Acc.	Rej.	
		ROLL	PITCH	YAW
CROSS COUPLING				
ROLL Gyro Input Axis	NULL			
Vertical	CW			
@ 100 deg/sec	CCW			
	44 mv Max. Diff.			
PITCH Gyro Input Axis	NULL			
Vertical	CW			
@ 100 deg/sec	CCW			
	44 mv Max. Diff.			
YA Gyro Input Axis	NULL			
Vertical	CW			
@ 100 deg/sec	CCW			
	44 mv Max. Diff.			

CHECKED BY INSPECTOR: _____ DATE: _____

SHIPPED TO: BELL HELICOPTER APPROVED: _____

TIMEX CORPORATION, WATERBURY, CONNECTICUT

QUALITY CONTROL FINAL TEST RECORD

Mfg. Spec. 698
TP 1317 A

CUSTOMER P/N _____
S/N _____

EXCITATION: 28 ± 3 V D.C.

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TIMEX P/N 40240
Load: 10 K

PARAMETER	TOLERANCE	MEASURED					
		ROLL		PITCH		YAW	
Natural Frequency	40 to 48 Hz						
Damping Ratio @ 25°C	.3 to .5 of critical						
Resolution	0.01°/sec Max.	Acc.	Rej.	Acc.	Rej.	Acc.	Re
Hysteresis	5 MV Max.						
D.C. Output 0°/sec	± 5 MV Max.						
50°/sec	2.375 to 2.625 volts						
A.C. Ripple	Reference only						
		CW	CCW	CW	CCW	CW	CC
Stops	100 to 115°/sec						
Linearity Input	Limits	CW	CCW	CW	CCW	CW	CC
0°/sec	[illegible] Volts						
25°/sec	1.212 to 1.288 Volts						
50°/sec	2.425 to 2.575 Volts						
75°/sec	3.637 to 3.763 Volts						
100°/sec	4.850 to 5.150 Volts						

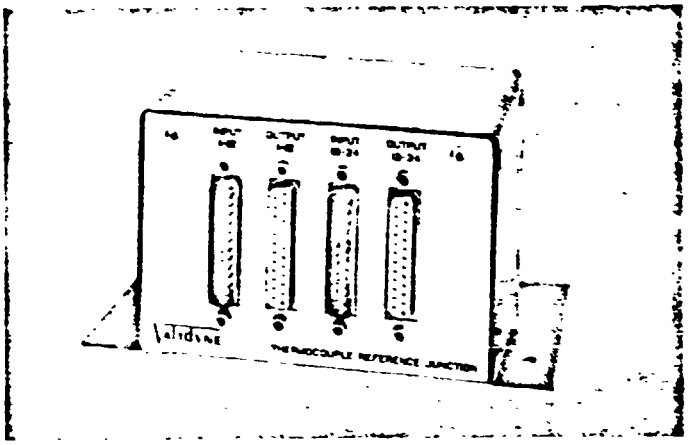
CHECKED BY INSPECTOR: _____ DATE: _____

SHIPPED TO: BELL HELICOPTER APPROVED: _____

CFE TECHNICAL DATA

Validyne (33107)

Junction, Temperature Reference	TR34-24PP
Specification Sheet	
Irstruction Manual	
Schematic Drawing	



Features

Solid state proportional control
Temperature stability ±0.1°C
Minimum weight, power & space utilization
Available in 12 or 24 channels
Power Requirements: 22 to 35 VDC
Draft Shield furnished

Description

The TR34 is designed to provide a highly stable reference unit for thermocouple measurements in applications requiring a small lightweight system. The solid state temperature control circuit, with integral heater and resistance sensor elements, achieves the maximum precision for minimum weight, power and space utilization. A multi-channel capacity of 12 or 24 measurement circuits offers high reliability at low cost. Prime power in vehicles and aircraft can be used directly.

Optional Features

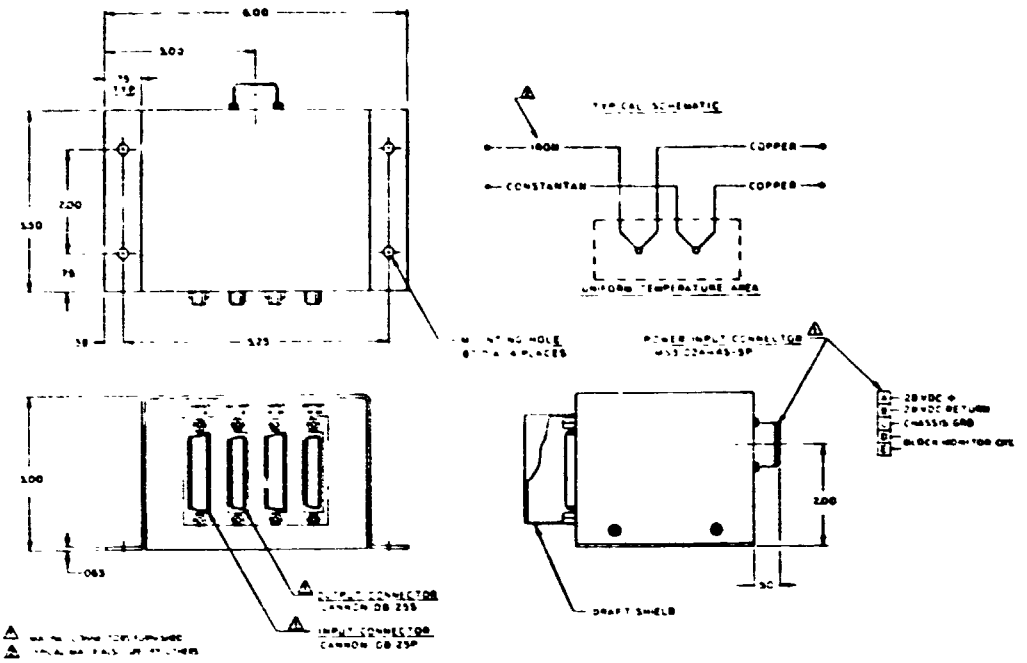
12 VDC power
110 VAC, 400 Hz power
Block temperature monitor

Specifications

Junction Temperature:	100°C standard (Optional 10°C above highest ambient to 125°C)
Junction Accuracy:	Calibrated premium thermocouple wire matches NBS Curves within 0.1°C
Temperature Stability:	±0.1°C
Temperature Uniformity:	±0.2°C
Ambient Temperature:	– 55°C to +90°C with less than 0.2°C reference temperature variation
Channel Capacity:	12 or 24 channels, junctions as specified
Warm-up Time:	15 minutes
Power Requirements:	22 to 35 VDC
Power Consumption:	20 watts nominal during warmup 5 watts nominal normal operation
Mating Connectors (furnished):	Input — Cannon DB25S Output — Cannon DB25P
Weight:	2 pounds avdp (0.91 Kg)
Price:	12 channel $370, delivery 4 wks 24 channel $490

INSTALLATION DRAWING

TR34 Thermocouple Multi-Channel Reference Junction



Other Capabilities

Thermocouple Calibrator
Thermocouple Control Unit
Digital Transducer Indicator
Accelerometer
Microbarograph
Custom Transducer & Electronics
Temperature Transducers & Signal Conditioning
Thermocouple Reference Junctions

or additional information, call or write

Prices and Specifications Subject to Change Without Notice

INSTRUCTION MANUAL

THERMOCOUPLE REFERENCE JUNCTION

MODEL TR34

ValidyNE ENGINEERING CORPORATION

19414 LONDELIUS STREET • NORTHRIDGE • CALIF. 91324 • (213) 886-8488 • Telex No. 65-1303

WARRANTY POLICY

VALIDYNE ENGINEERING CORPORATION warrants equipment of its own manufacture to be free from defects in material and workmanship under normal conditions of use and service.

VALIDYNE will replace any component found to be defective on its return, transportation charges prepaid, within one year of its original purchase.

This warranty carries no liability, either expressed or implied, beyond our obligation to replace the unit which carries the warranty. Prices, specifications and designs subject to change without notice. This warranty is void if the product is subjected to misuse, accident, neglect or improper application, installation or operation.

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1.0 General

1.1 Description

The TR34 is a 12 or 24 channel heated-block type Thermocouple Reference Junction assembly designed for applications in vehicles, aircraft or any system requiring light weight, small size, and rugged construction.

A specified combination of thermocouple metal input wires are joined to copper thermocouple wires, and encapsulated in an aluminum block with a large thermal mass. The encapsulation provides good thermal conductivity and electrical isolation. An external plastic draft shield protects the connectors from thermal gradients.

The electrically heated block is held at the reference temperature by a solid-state proportional controller. Thermal insulation isolates the effect of ambient temperature on the reference junctions.

The optional block monitor resistor allows remote confirmation of reference temperature.

2.0 Specifications

2.1 Thermal

Channel Capacity:	12 or 24 channels, junctions as specified.
Junction Temperature:	100°C standard. (Optional 10°C above highest ambient to 125°C)
Junction Accuracy:	Calibrated premium thermocouple wire matches NBS Curves within 0.1°C.
Temperature Stability:	±0.1°C
Temperature Uniformity:	±0.2°C
Ambient Temperature·	-55°C to +90°C with less than 0.2°C reference temperature variation.
Warm-up Time:	15 minutes
Thermocouple Metals:	
Input:	As specified; 2-wire input, maximum
Output:	Copper, thermocouple grade.

2.2 Electrical

Power Required:	+22 to +35V DC; +12V DC or 110V 400Hz Optional
Power Consumption:	20 watts nominal during warmup 5 watts nominal normal operation.

2.3 Mechanical

Size:	6.00"Wx3.00"Hx3.50"D (15.3cm x 7.6cm x 8.9cm)
Weight:	2 lbs avdp., (0.91Kg)

3.0 Operation

3.1 Unpacking and Installation

Carefully unpack the TR34, noting that the mating Cannon DB25 Connectors are packed separately in a zip-lock bag.

Connect the DC power supply (or 115VAC 400 Hz if specified) to the rear connector. Since the TR34 is often used in remote locations, no power switch or pilot light is included.

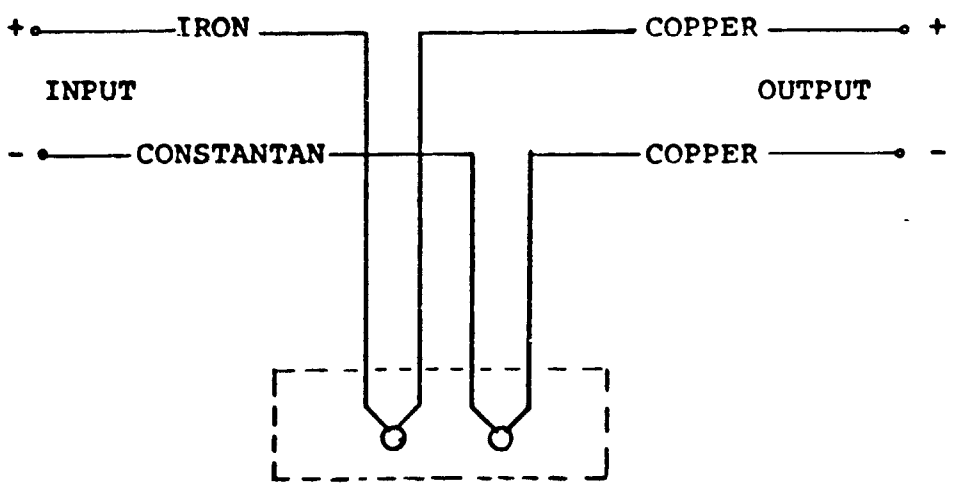
Allow 15 minutes for the block heater system to bring the block within tolerance at the reference temperature.

Wire the mating connectors and plug in to the front panel. Replace the plastic draft shield.

The TR34 is now ready for use.

3.2 Input/Output Connections

Two Wire Input (Typical)



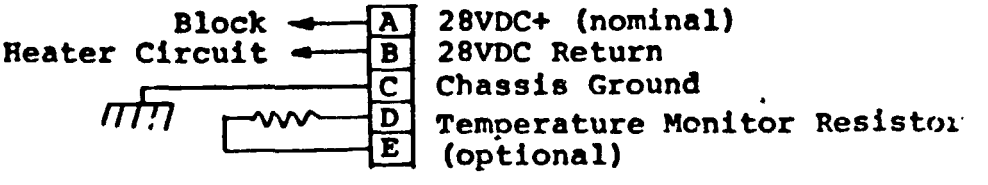
Uniform Temperature Area

3.2 (Cont.) Connector Wiring

Thermocouple Circuit Connector Wiring

Connector#	1	2		3*	4*
Channel	Input (DB25P) Pins	Output (DB25S) Pins	Channel	Input (DB25P) Pins	Output (DB25S) Pins
1	+1 -14	+1 -14	13	+1 -14	+1 -14
2	+2 -15	+2 -15	14	+2 -15	+2 -15
3	+3 -16	+3 -16	15	+3 -16	+3 -16
4	+4 -17	+4 -17	16	+4 -17	+4 -17
5	+5 -18	+5 -18	17	+5 -18	+5 -18
6	+6 -19	+6 -19	18	+6 -19	+6 -19
7	+7 -20	+7 -20	19	+7 -20	+7 -20
8	+8 -21	+8 -21	20	+8 -21	+8 -21
9	+9 -22	+9 -22	21	+9 -22	+9 -22
10	+10 -23	+10 -23	22	+10 -23	+10 -23
11	+11 -24	+11 -24	23	+11 -24	+11 -24
12	+12 -25	+12 -25	24	+12 -25	+12 -25

Power Connector Wiring (MS102A-14S-5P)



* In a 12 Channel Unit, Connectors 3 and 4 are omitted.

3.3 Calibration

Aging of the temperature determining components and calibration of the block temperature are done before the instrument leaves the factory.

A simple test can verify the proper operation of the TR34. Build a simple thermocouple of the specified materials, connect it to the TR34, and insert it in an ice bath of water and ice chips. If the TR34 is at the reference temperature, the open circuit voltage at the output leads will be exactly as indicated in the 0°C/32°F NBS tables for the thermocouple type.

If the test indicates a deviation exceeding $\pm$0.25°C from the specified temperature, the TR34 should be returned to the factory for repair.

4.0 Principles of Operation

4.1 Temperature Control Circuit

A wire-wound temperature sensitive resistor is embedded in the block adjacent to the thermocouples. This sensor is connected in a DC bridge circuit whose output drives a high gain amplifier with feedback compensation to provide stable thermal control. The amplifier drives a power transistor mounted directly on the block. The power dissipated by the transistor is used to heat the block.

4.2 Temperature Monitor

When the optional block monitor is specified, a temperature sensitive resistor is embedded in the block near the control resistor. The resistor is calibrated to measure ~~exactly 10K ohms~~ 10KΩ ±5% at the specified reference temperature.

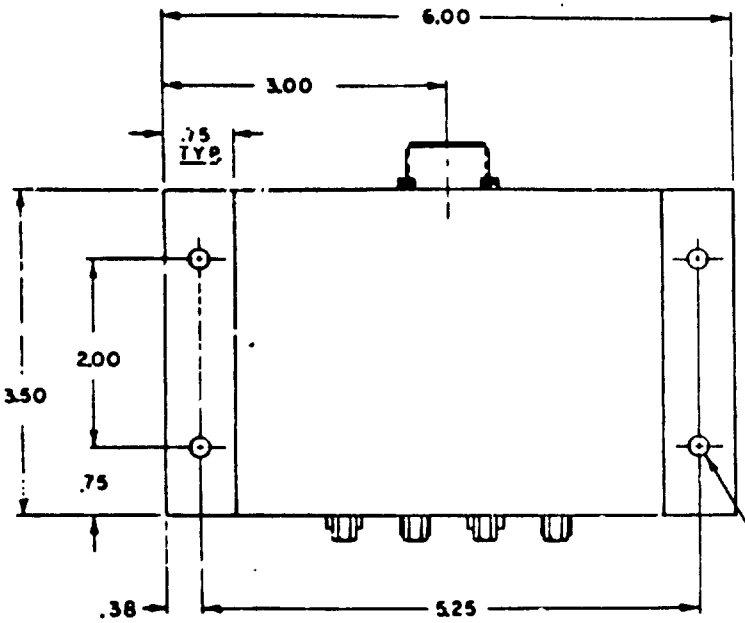
4.3 Power Supply

The input DC supply, which is protected against inadvertent polarity reversal, is zener regulated to +10V DC to operate the control circuit.

5.0 Maintenance

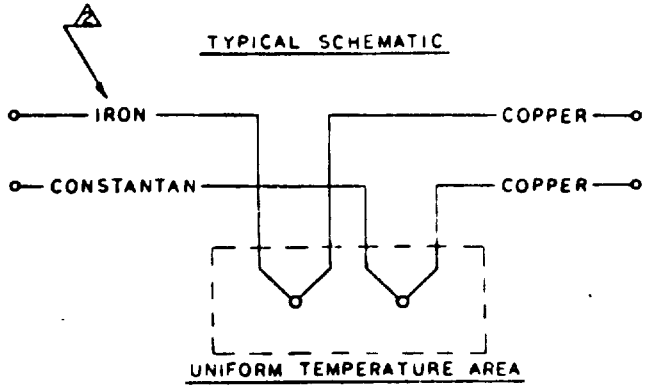
The TR34 is not repairab e in the field. If a malfunction occurs, return the unit to the factory for repair.

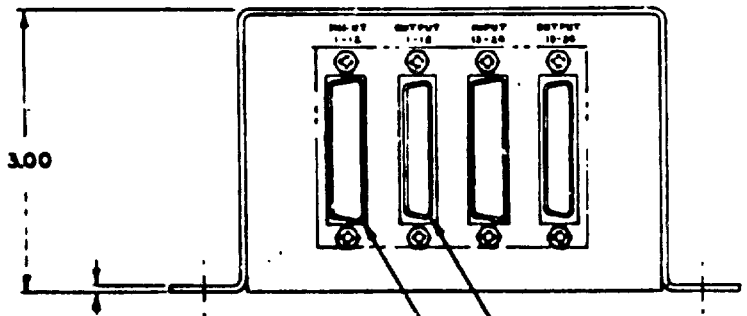
SYM	DESCRIPTION	DATE	APPROVED
A	ADDED CONNECTOR WIRING		JT



MOUNTING HOLE
.187 DIA- 4 PLACES

TYPICAL SCHEMATIC

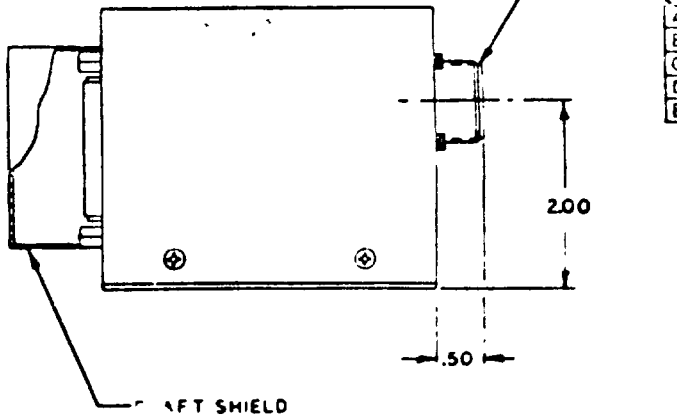




OUTPUT CONNECTOR
CANNON DB-25S

INPUT CONNECTOR
CANNCN DB-25P

POWER INPUT CONNECTOR
MS3102A-14S-5P



SHIELD

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THERMOCOUPLE MATERIALS TO BE SPECIFIED BY CUSTOMER.

MATING ELECTRICAL CONNECTOR FURNISHED.

NOTES:

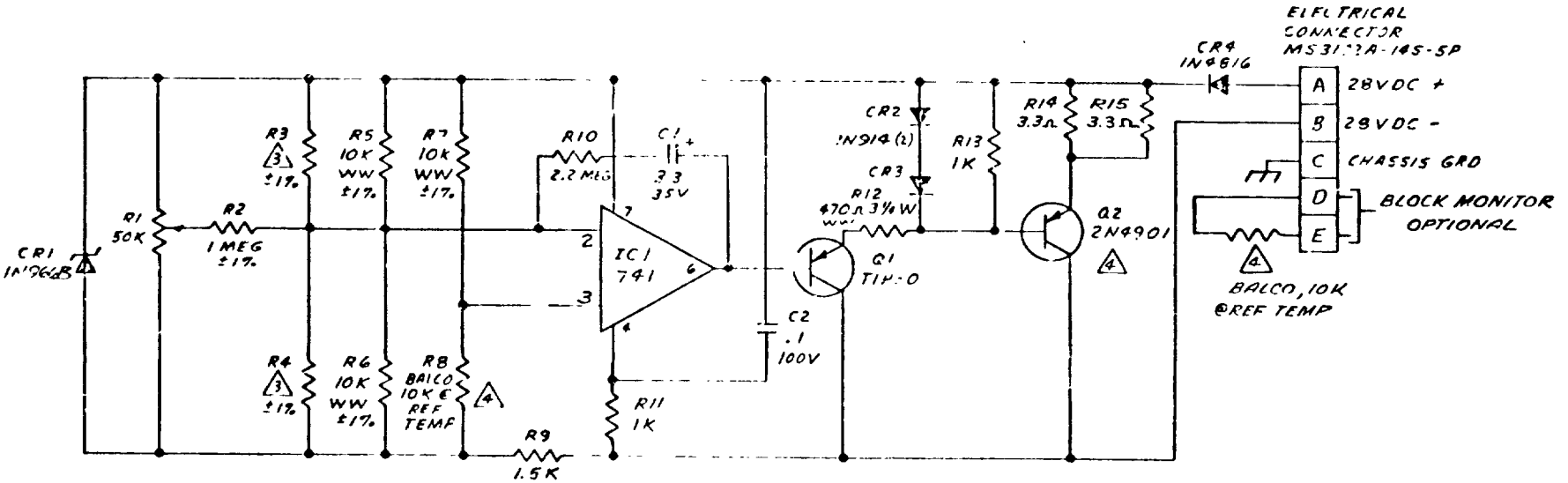
Validyne ENGINEERING CORPORATION

THERMOCOUPLE RE JUNCTION

17192

7192 D

REVISIONS			
SYM	DESCRIPTION	DATE	APPROVAL
A	SEE DCN	10-12-72	ED
B	C1 WAS 1μF	9 15 73	GS
C	[illegible]	10-[illegible]	
D	[illegible] DCN	9-21-77	CD



HIGHEST REF DES USED							
C2	CR4	IC1	Q2	R15			

REF DES NOT USED

1. MOUNT [illegible] BOARD ON BLOCK.
2. VALUE [illegible] DETERMINED
2. CAPACITOR VALUES ARE IN MICROFARADS
1. RESISTOR VALUES ARE IN OHMS ±10% 1/4 WATT.

NOTES. [illegible]

TOL UNLESS NOTED
DEC .XXX
FRAC & DEC .XX
ANGLES
DRAWINGS WITH SAME # SHALL BE CONCENTRIC WITHIN .005 TIR
SURFACES MUST BE FLAT WITHIN .002
BREAK
MAX FILLET .015 UNLESS NOTED
[illegible]

SCALE ---
DWN
CKD
APPVD

Validyne ENGINEERING CORPORATION
NORTHRIDGE, CALIFORNIA

MODEL TR34
MATL
FINISH

TITLE SCHEMATIC - THERMOCOUPLE REFERENCE JUNCTION

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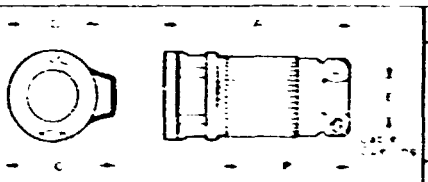
CFE TECHNICAL DATA

Viking (05574)	
Connector, Environmental	VP5/4CE15
Connector, Environmental	VP3/4CE15

3 ENVIRONMENTAL PLUG and RECEPTACLE ASSEMBLIES – PLASTIC INSULATORS (pins or sockets)

This section features the basic plug and receptacle with environmental accessories included as a single assembly.

Cable Plug *Accessories Back Shell, Sealing Grommet and Ferrule*



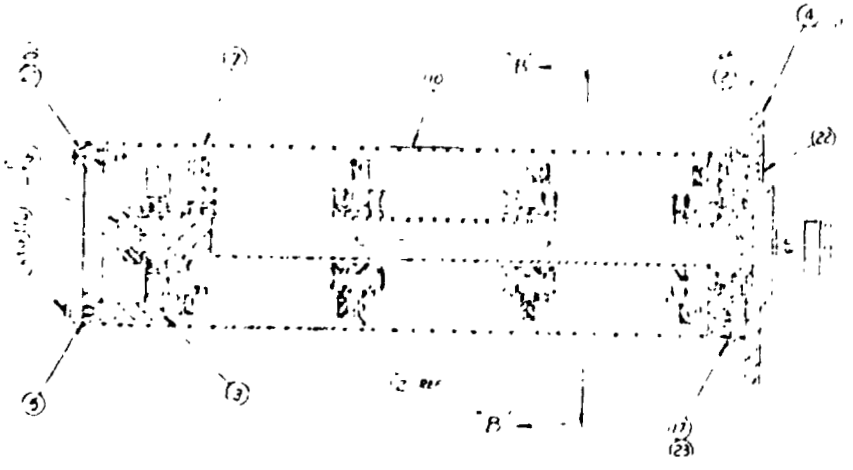
	A	B	C	D	E	PART NUMBER			
						SOLDER POT CONTACTS		CRIMP REMOVABLE CONTACTS	
						Sockets	Pins	Sockets	Pins
4A Series 2 3 4 5 6 Contacts	1.23 (31.2)	.84 (21.3)	.72 (18.2)	.56 (14.2)	.26 (6.6)	VP* 4CE15	VP* 4RP15	VP* 4CS*5	VP* 4CP15
5 Series 5 6 & 7 Contacts	1.36 (34.5)	.95 (24.1)	.99 (25.1)	.81 (20.6)	.38 (9.6)	VP* 2CE15	VP* 2RP15	VP* 2CS*5	VP* 2CP15
9 Series 9 Contacts	1.36 (34.5)	.95 (24.1)	.99 (25.1)	.81 (20.6)	.38 (9.6)	VP9 2CE15	VP9 2RP15	VP9 2CS15	VP9 2CP15
13 Series 13 & 19 Contacts	1.68 (42.7)	1.25 (31.7)	1.25 (31.7)	1.06 (26.9)	.56 (14.2)	VP* 2CE15	VP* 2RP15	VP* 2CS*5	VP* 2CP15

301099-19

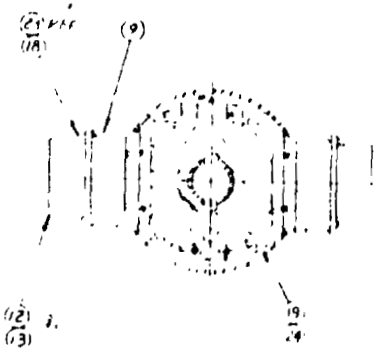
VIKING ENVIRONMENTAL PLUG ASSEMBLIES

Wendon (04155)

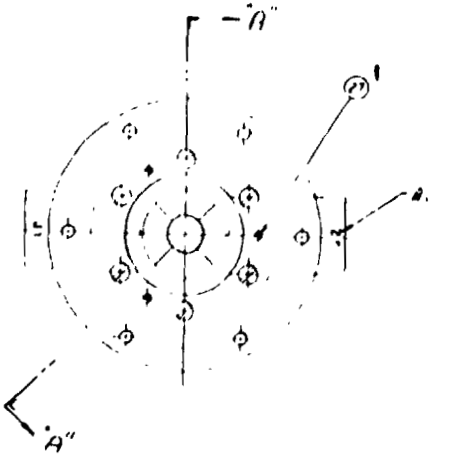
Slip Ring Assembly	W84-100
Outline Drawing	W84-101
Wiring Information	W84-103



SECTION A-A



SECTION 'B-B'



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NOTES:

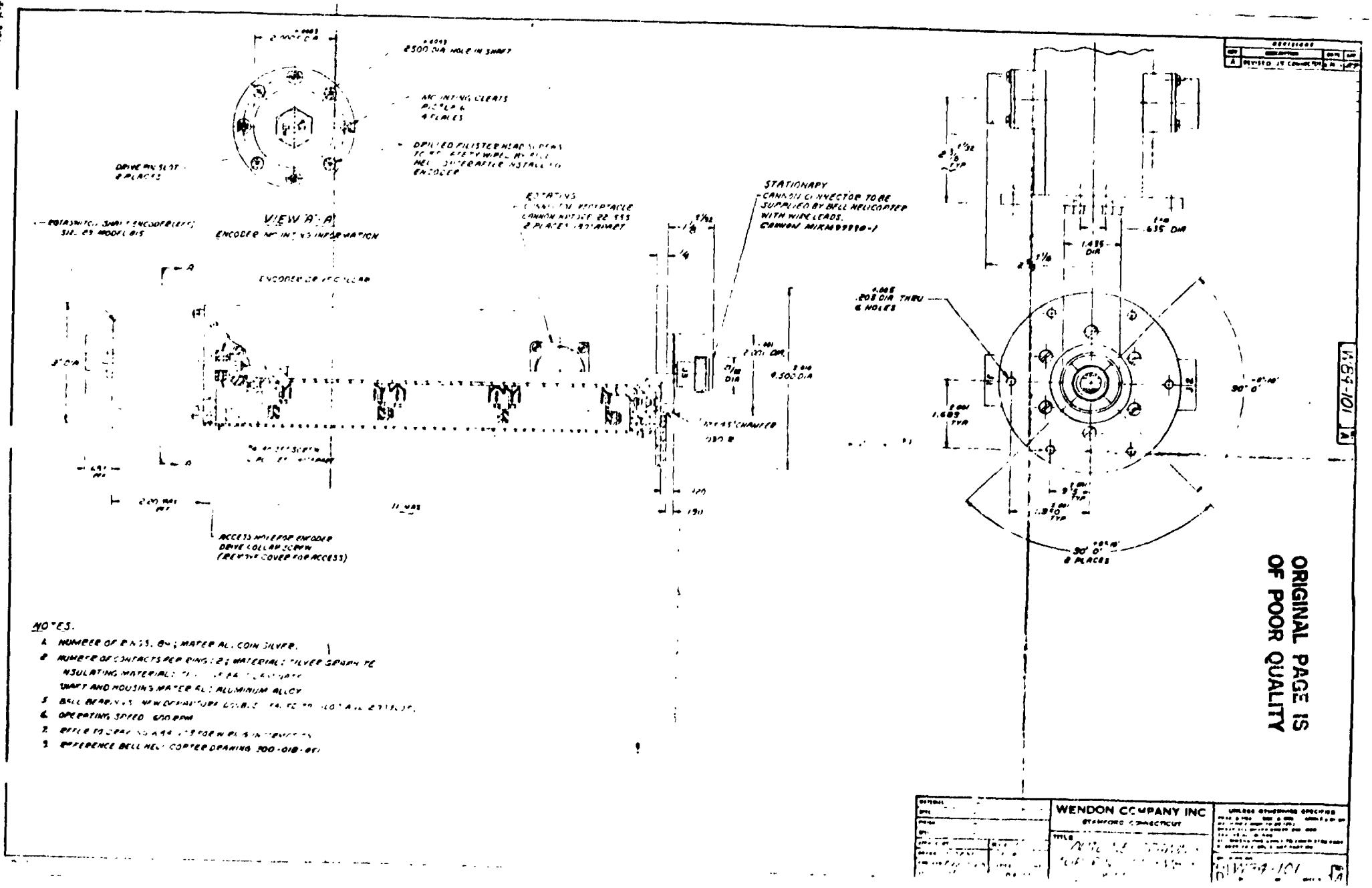
1. [illegible]
2. [illegible]
3. [illegible]
4. [illegible]
5. [illegible]
6. [illegible]
7. [illegible]

3	27		PIN-DOWEL .188 DIA x 5/8 LG ST STL
PA*	26		WIRE-ELECTRICAL TYPE [illegible]
4	25	MS15795-813	WASHER-FLAT #8 MED ST STL
24	24	MS15795-808	WASHER-FLAT #6 MED ST STL
-	-	437** 4C	WASHER-FLAT #4 LIGHT ST STL
5	22		SCREW-FIL HD #8 32 UNC-2 x 5/8 LG ST STL
4	21		
4	20		SCREW-FIL HD CR*8 32 UNC-2 x 1/2 LG ST STL
24	19	MS35206-[illegible]	SCREW-FIL HD #6 32 UNC-2 x 3/8 LG ST STL
9	18		SCREW-FIL HD #4 40 UNC-2 x 11/16 LG ST STL
6	17	MS35235-[illegible]	SCREW-PAN HD #4 40 UNC-2 x 3/8 LG ST STL
6	16		SCREW-FIL HD CR*4 40 UNC-2 x 3/8 LG ST STL
6	15		WASHER-CLEARANCE #4 .120-.6
	14		
2	13		CONNECTOR-BLOCK #40 (MS27497-20)
2	12		[illegible]
	11		
1	10	D3915	NAMEPLATE
2	9	W47-3-004	STRIP-SW CONNECTOR
	8		
1	7	W48-103	CLIPS
1	6	W48-104	[illegible]
1	5	W48-101	[illegible]
1	4	W48-105	[illegible]
1	3	W48-106	[illegible]
2	2	W-[illegible]	[illegible]
1	1	W48-102	[illegible]
QTY	REQ	[illegible]	DESCRIPTION

WENDON COMPANY INC
STAMFORD CONNECTICUT

TITLE [illegible]

DWG W84-10



NOTES.

1. NUMBER OF RINGS, 6; MATERIAL: COIN SILVER.
2. NUMBER OF CONTACTS PER RING: 2; MATERIAL: SILVER GRAPHITE
   INSULATING MATERIAL:
   SHAFT AND HOUSING MATERIAL: ALUMINUM ALLOY
3. BALL BEARINGS:
4. OPERATING SPEED: 600 RPM
5. REFER TO DRAWING
6. REFERENCE BELL HELICOPTER DRAWING 300-018-001

WENDON COMPANY INC
STAMFORD, CONNECTICUT

REVISION			
V.	DESCRIPTION	DATE	APP

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REV.																																								
SHT.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

WENDON COMPANY INC.
STAMFORD, CONNECTICUT

TITLE
WIRING INFORMATION
FOR
SLIP RING ASSEMBLY
W84-100

PREPARED BY	M.V.	6-25-75
CHECKED	P.R.Y.	6-25-75
APPROVED		6-26-75

CODE IDENT NO.	SIZE	DRAWING NO.	REV.
04155	A	W84-103 SHEET 1 OF 2 SHEETS	

FROM	RING/BRUSH	TO
J3-29	1	J1-A
-57	2	J2-A
-43	3	J1-B
-38	4	J2-B
-20	5	J1-C
-66	6	J2-C
-39	7	J1-D
-47	8	J2-D
-58	9	J1-E
J3-28	10	J2-E
J3-12	11	J1-F
-24	12	J2-F
-30	13	J1-G
-56	14	J2-G
-49	15	J1-H
-37	16	J2-H
-67	17	J1-J
-19	18	J2-J
-5	19	J1-K
J3-81	20	J2-K
J3-21	21	J1-L
-65	22	J2-L
-40	23	J1-M
-46	24	J2-M
-59	25	J1-N
-27	26	J2-N
-75	27	J1-P
-11	28	J2-P
-82	29	J1-R
J3-4	30	J2-R
J3-83	31	J1-S
-3	32	J2-S
-84	33	J1-T
-2	34	J2-T
-85	35	J1-U
-1	36	J2-U
-76	37	J1-V
-10	38	J2-V
-77	39	J1-W
J3-9	40	J2-W

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FROM	RING/BRUSH	TO
J3-78	41	J1-X
-8	42	J2-X
-79	43	J1-Y
-7	44	J2-Y
-80	45	J1-Z
-6	46	J2-Z
-68	47	J1-a
-18	48	J2-a
-69	49	J1-b
J3-17	50	J2-b
J3-70	51	J1-c
-16	52	J2-c
-71	53	J1-d
-15	54	J2-d
-72	55	J1-e
-14	56	J2-e
-13	57	J1-f
-73	58	J2-f
-31	59	J1-g
J3-55	60	J2-g
J3-50	61	J1-h
-36	62	J2-h
-22	63	J1-i
-64	64	J2-i
-41	65	J1-j
-45	66	J2-j
-60	67	J1-k
-26	68	J2-k
-32	69	J1-m
J3-54	70	J2-m
J3-51	71	J1-n
-35	72	J2-n
-23	73	J1-p
-63	74	J2-p
-42	75	J1-q
-44	76	J2-q
-61	77	J1-r
-25	78	J2-r
-33	79	J1-s
J3-53	80	J2-s
J3-52	81	J1-t
-34	82	J2-t
-24	83	J1-u
J3-62	84	J2-u

NOTES:

1. Connector J1 and J2 - CANNON KPT02E22-55S.
2. Connector J3 - CANNON MIM97330-1 prewired with #26 AWG super-flex wire.
3. Brush wiring to connector J1 and J2 to be E-22 teflon per MIL-W-16878.

WENDON COMPANY INC. STAMFORD, CONNECTICUT	CODE IDENT NO. 04155	SIZE A	DRAWING NO. W84-103 SHEET 2 OF 2 SHEETS	REV.

Index of Contractor Furnished Equipment - Alphabetical Order by Component
(Sheet 1 of 4)

Component Description	Model No./Part No.	Manufacturer	FSCM
Accelerometer, Engine Vibration	2271A	Endevco	95411
Accelerometer, Strain Gage, 05 g	A69TC-05-350	Gould	57187
Accelerometer, Strain Gage, 10 g	A69TC-10-350	Gould	57187
Accelerometer, Strain Gage, 25 g	A69TC-25-350	Gould	57187
Accelerometer, Vertical Servo	303T16	Sundstrand	97896
Amplifier, Charge, Er Vibration	2647M77	Endevco	95411
Antenna, Telemetry	741L003	BHT	97499
Cable, Signal	No. 8723	Belden	16428
Cable, Signal	No. 8769	Belden	16428
Ckt Assy, Data Control Word, C/S 17	SKHD3-20-78-1-17	BHT	97499
Ckt Assy, Digital Stick Position	SKHD3-20-78-3-11	BHT	97499
Ckt Assy, Mean/Peak-to-Peak Detector	301ASW220-1	BHT	97499
Ckt Assy, Temperature Scanner, C/S 12	SKHD3-20-78-2-12	BHT	97499
Ckt Assy, Temperature Scanner, C/S 13	SKHD3-20-78-2-13	BHT	97499
Ckt Assy, Temperature Scanner, C/S 16	SKHD3-20-78-2-16	BHT	97499
Connector, Bulkhead Pass Thru	KPTB-14-15SP	ITT Cannon Electric	91577
Connector, Circular, Box Mount	KPT02-8-3P	ITT Cannon Electric	91577
Connector, Circular, Box Mount	KPT02-8-2P	ITT Cannon Electric	91577
Connector, Circular, Box Mount	KPT02-8-4S	ITT Cannon Electric	91577
Connector, Circular, Box Mount	KPT02-8-4P	ITT Cannon Electric	91577
Connector, Circular, Box Mount	KPT02-10-6P	ITT Cannon Electric	91577
Connector, Circular, Box Mount	KPT02-12-8P	ITT Cannon Electric	91577
Connector, Circular, Box Mount	KPT02-12-10S	ITT Cannon Electric	91577
Connector, Circular, Box Mount	KPT02-12-14S	ITT Cannon Electric	91577
Connector, Circular, Box Mount	KPT02-14-15S	ITT Cannon Electric	91577
Connector, Circular, Box Mount	KPT02-14-19P	ITT Cannon Electric	91577
Connector, Circular, Box Mount	KPT02-16-26P	ITT Cannon Electric	91577
Connector, Circular, Box Mount	KPT02-24-61P	ITT Cannon Electric	91577
Connector, Circular, Box Mount	KPT02-24-61S	ITT Cannon Electric	91577

Index of Contractor Furnished Equipment - Alphabetical Order by Component
(Sheet 2 of 4)

Component Description	Model No./Part No.	Manufacturer	FSCM
Connector, Circular, Box Mount	PC06W-8-4S	Bendix	77820
Connector, Circular, Cable	KPT01-8-3P	ITT Cannon Electric	91577
Connector, Circular, Cable	KPT01-8-4S	ITT Cannon Electric	91577
Connector, Circular, Cable	KPT01-12-8S	ITT Cannon Electric	91577
Connector, Circular, Cable	KPT01-14-18P	ITT Cannon Electric	91577
Connector, Circular, Straight Plug	KPT06-8-4S	ITT Cannon Electric	91577
Connector, Circular, Straight Plug	KPT06-8-4P	ITT Cannon Electric	91577
Connector, Circular, Straight Plug	KPT06-8-2S	ITT Cannon Electric	91577
Connector, Circular, Straight Plug	KPT06-8-3S	ITT Cannon Electric	91577
Connector, Circular, Straight Plug	KPT06-10-6S	ITT Cannon Electric	91577
Connector, Circular, Straight Plug	KPT06-12-8S	ITT Cannon Electric	91577
Connector, Circular, Straight Plug	KPT06-12-8P	ITT Cannon Electric	91577
Connector, Circular, Straight Plug	KPT06-12-10P	ITT Cannon Electric	91577
Connector, Circular, Straight Plug	KPT06-12-10S	ITT Cannon Electric	91577
Connector, Circular, Straight Plug	KPT06-12-14P	ITT Cannon Electric	91577
Connector, Circular, Straight Plug	KPT06-14-15S	ITT Cannon Electric	91577
Connector, Circular, Straight Plug	KPT06-14-15P	ITT Cannon Electric	91577
Connector, Circular, Straight Plug	KPT06-14-18S	ITT Cannon Electric	91577
Connector, Circular, Straight Plug	KPT06-14-19S	ITT Cannon Electric	91577
Connector, Circular, Straight Plug	KPT06-16-8P	ITT Cannon Electric	91577
Connector, Circular, Straight Plug	KPT06-16-8S	ITT Cannon Electric	91577
Connector, Circular, Straight Plug	KPT06-16-26S	ITT Cannon Electric	91577
Connector, Circular, Straight Plug	KPT06-18-32S	ITT Cannon Electric	91577
Connector, Circular, Straight Plug	KPT06-22-55P	ITT Cannon Electric	91577
Connector, Circular, Straight Plug	KPT06-24-61S	ITT Cannon Electric	91577
Connector, Circular, Straight Plug	KPT06-24-61P	ITT Cannon Electric	91577
Connector, Circular, Straight Plug	MS3106-14S-5S	ITT Cannon Electric	91577
Connector, Circular, Straight Plug	MS3106-16S-1S	ITT Cannon Electric	91577
Connector, Circular, Straight Plug	MS3106-22-14S	ITT Cannon Electric	91577
Connector, Circular, Straight Plug	MS3106-24-11S	ITT Cannon Electric	91577
Connector, Circular, Straight Plug	WK-4-21C1	ITT Cannon Electric	91577
Connector, Printed Circuit	VP5/4CE15	Viking	05574
Connector, Printed Circuit	VP3/4CE15	Viking	05574

Index of Contractor Furnished Equip. it - Alphabetical Order by Component
(Sheet 3 of 4)

Component Description	Model No./Part No.	Manufacturer	FSCM
Connector, Retangular, Rack Mount	DB-25S	TRW-Cinch	71785
Connector, Retangular, Rack Mount	DC-37P	TRW-Cinch	71785
Connector, Retangular, Rack Mount	DC-37S	TRW-Cinch	71785
Connector, Retangular, Rack Mount	DE-9S	TRW-Cinch	71785
Connector, Retangular, Rack Mount	DE-9P	TRW-Cinch	71785
Control Unit, Scannivalve	SKTASW166-2	BHT	97499
Control Unit, Scannivalve	SKTASW166-2	BHT	97499
Control Unit, Synchro Converter	SKHD121476-1	BHT	97499
Control Unit, Temperature Scanner	SKASW-5479-1	BHT	97499
Converter, Frequency	PI-355-100 Hz	Anadex Inc	14010
Converter, Synchro to Linear DC	SLD 214 L-1	Computer Conversions Corp	51086
Current Limiter	7235-1-70	Texas Instruments	82647
Encoder, Shaft	815-512-IBLP-TTL	Disc	15686
Filter, Premodulation	SKASW-2479-1	BHT	97499
Filter Unit, Eng Vib	301ASW6780-1	BHT	97499
Gyro, Attitude	VM02-0110-1	Humphrey	98284
Gyro, Rate, 3-Axis	402405	Timex	61515
Indicator, Control Position	301075-20	BHT	97499
Indicator, Critical Load	301075-24	BHT	97499
Indicator, Data System Control Monitor	301075-25	BHT	97499
Indicator, Hub, Flapping	301075-23	BHT	97499
Indicator, Temperature Monitor	301075-22	BHT	97499
Inverter, Static, 750 VA	PC-17A	Flite-Tronics	07181
Junction, Temperature Reference	TR34-24PP	Validyne	33107
Potentiometer, Cable	7101-16	Research Inc	09327
Potentiometer, Cable (3.5 in)	4046-3 1/2	Research Inc	09327
Potentiometer, Linear (6 in)	Series 950	Spectrol Electronics Corp	02111
Potentiometer, Linear, 12-inch	80294-2001941502	Bourns	80294
Potentiometer, Linear, 6-inch	80294-200184-1100	Bourns	80294
Potentiometer, Rotary, Single Section (1K)	Series 708	Spectrol Electronics Corp	02111
Power Supply	CC3D3.5	Abbott	15755

Index of Contractor Furnished Equipment - Alphabetical Order by Component
(Sheet 4 of 4)

Component Description	Model No./Part No.	Manufacturer	FSCM
Power Supply	CC15D1.0	Abbott	15755
Power Supply	C5D5.0	Abbott	15755
Power Supply	C28D3.5	Abbott	15755
Power Supply, DC to DC	2055-28-15	BH Electronics	08450
Program Board Receiver	939/0109392	MAC Panel	16654
Signal Conditioner, OAT	510BF65	Rosemont	04274
Slip Ring Assembly	W84-100	Wendon	04155
Strain Gage	EA-13-125-350 (typical)	Micro-Measurements	19612
Switch, Pressure Sampling	48J4-1	Scannivalve	22422
Transducer, Air Pressure	PM6TC-2.5-350	Gould	57187
Transducer, Airspeed-Altitude	542K2	Rosemont	04274
Transducer, Displacement	7DCDT-1000	Hewlett-Packard	56286
Transducer, Oil Pressure (150 psi)	PL722TC-150-350	Gould	57187
Transducer, Oil Pressure (5000 psi)	PL722TC-5M-350	Gould	57187
Transducer, Outside Air Temp	101 F	Rosemont	04274
Transducer, Press Sampling Switch	PM131TC-2.5-350	Gould	57187

INDEX OF EQUIPMENT BY MANUFACTURER

MANUFACTURER (FSCM) COMPONENT DESCRIPTION	MODEL NO./PART NO.
Abbott Labs, Inc. (15755)	
Power Supply	CC3D3.5
Power Supply	CC15D1.0
Power Supply	C5D5.0
Power Supply	C28D3.5
Anadex, Inc. (14010)	
Converter, Frequency	P1-355-100Hz
Belden (16428)	
Cable, Signal	No. 8723
Cable, Signal	No. 8769
Bendix (77820)	
Connector, Circular, Box Mount	PC06W-8-4S
BH Electronics (08450)	
Power Supply, DC to DC	2055-28-15
Bell Helicopter Textron (97400)	
Antenna, Telemetry	7411003
Circuit Assy, Data Control Word C/S 17	SKHD3-20-78-1-17
Circuit Assy, Digital Stick Position	SKHD3-20-78-3-11

INDEX OF EQUIPMENT BY MANUFACTURER (Cont)

MANUFACTURER (FSCM) COMPONENT DESCRIPTION	MODEL NO./PART NO.
Bell Helicopter Textron (97499) (Cont)	
Circuit Assy, Mean/Peak-to-Peak Detector	301ASW220-1
Circuit Assy, Temperature Scanner C/S 12	SKHD3-20-78-2-12
Circuit Assy, Temperature Scanner C/S 13	SKHD3-20-78-2-13
Circuit Assy, Temperature Scanner C/S 16	SKHD3-20-78-2-16
Control Unit, Scannivalve	SKTASW160-2
Control Unit, Synchro Converter	SKHD121476-1
Control Unit, Temperature Scanner	SKASW-5479-1
Filter Unit, Engine Vibration	301ASW6780-1
Indicator, Control Position	301075-20
Indicator, Critical Load	301075-24
Indicator, Data System Control Monitor	301075-25
Indicator, Hub, Flapping	301075-23
Indicator, Temperature Monitor	301075-22

INDEX OF EQUIPMENT BY MANUFACTURER (Cont)

MANUFACTURER (FSCM) COMPONENT DESCRIPTION	MODEL NO./PART NO.
Bourns (80294)	
Potentiometer, Linear, 12-inch	80294-2001941502
Potentiometer, Linear, 6-inch	80294-2001841100
Computer Conversions Corp. (51086)	
Converter, Synchro to Linear DC	SLD214-L-1
Disc Instruments (15686)	
Encoder, Shaft	815-512-1BLP-TTL
Endevco (95411)	
Accelerometer	2271A
Amplifier, Charge, Engine Vibration	2647M77
Flite-Tronics (07181)	
Inverter, Static, 750VA	PC-17A
Gould (57187)	
Accelerometer, Strain Gage, 05g	A69TC-05-350
Accelerometer, Strain Gage, 10g	A69TC-10-350
Accelerometer, Strain Gage, 25g	A69RC-25-350
Transducer, Air Pressure	PM6TC-2.5-350
Transducer, Oil Pressure	PL722TC-150-350
Transducer, Oil Pressure	PL722TC-5M-350
Transducer, Press Sampling Switch	PM131TC-2.5-350

Research, Inc. (09327)

Potentiometer, Cable (3.5 inch)	4046-3½
Potentiometer, Cable	7101-16

INDEX OF EQUIPMENT BY MANUFACTURER (Cont)

MANUFACTURER (FSCM) COMPONENT DESCRIPTION	MODEL NO./PART NO.
Hewlett-Packard (56286)	
Transducer, Displacement	7DCDT-1000
Humphrey (98284)	
Gyro, Attitude	VM02-0110-1
ITT Cannon Electric (91577)	
Connector, Bulkhead Pass Thru	KPTB-14-15SP
Connector, Circular, Box Mount	KPT02-8-3P
Connector, Circular, Box Mount	IPT02-8-2P
Connector, Circular, Box Mount	KPT02-8-45
Connector, Circular, Box Mount	KPT02-8-4P
Connector, Circular, Box Mount	KPT02-10-6P
Connector, Circular, Box Mount	KPT02-12-8P
Connector, Circular, Box Mount	KPT02-12-10S
Connector, Circular, Box Mount	KPT02-12-14S
Connector, Circular, Box Mount	KPT02-14-15S
Connector, Circular, Box Mount	KPT02-14-19P
Connector, Circular, Box Mount	KPT02-16-26P
Connector, Circular, Box Mount	KPT02-24-61P
Connector, Circular, Box Mount	KPT02-24-61S
Connector, Circular, Cable	KPT01-8-3P
Connector, Circular, Cable	KPT01-8-45
Connector, Circular, Cable	KPT01-12-8S
Connector, Circular, Cable	KPT01-14-18P

INDEX OF EQUIPMENT BY MANUFACTURER (Cont)

MANUFACTURER (FSCM) COMPONENT DESCRIPTION	MODEL NO./PART NO.
ITT Cannon Electric (91577) (Cont)	
Connector, Circular, Straight Plug	KPT06-8-4S
Connector, Circular, Straight Plug	KPT06-8-4P
Connector, Circular, Straight Plug	KPT06-8-25
Connector, Circular, Straight Plug	KPT06-8-35
Connector, Circular, Straight Plug	KPT06-10-6S
Connector, Circular, Straight Plug	KPT06-12-8S
Connector, Circular, Straight Plug	KPT06-12-8P
Connector, Circular, Straight Plug	KPT06-12-10P
Connector, Circular, Straight Plug	KPT06-12-10S
Connector, Circular, Straight Plug	KPT06-12-14P
Connector, Circular, Straight Plug	KPT06-14-15S
Connector, Circular, Straight Plug	KPT06-14-15P
Connector, Circular, Straight Plug	KPT06-14-18S
Connector, Circular, Straight Plug	KPT06-14-19S
Connector, Circular, Straight Plug	KPT06-16-8P

INDEX OF EQUIPMENT BY MANUFACTURER (Cont)

MANUFACTURER (FSCM) COMPONENT DESCRIPTION	MODEL NO./PART NO.
ITT Cannon Electric (91577) (Cont)	
Connector, Circular, Straight Plug	KPT06-16-8S
Connector, Circular, Straight Plug	KPT06-16-26S
Connector, Circular, Straight Plug	KPT06-1[illegible] 32S
Connector, Circular, Straight Plug	KPT06-22-5SP
Connector, Circular, Straight Plug	KPT06-24-61S
Connector, Circular, Straight Plug	KPT06-24-61P
Connector, Circular, Straight Plug	MS3106-14S-5S
Connector, Circular, Straight Plug	MS3106-16S-1S
Connector, Circular, Straight Plug	MS3106-22-14S
Connector, Circular, Straight Plug	MS3106-24-11S
Connector, Circular, Straight Plug	WK-4-21C1
MAC Panel (16654)	
Program Board Receiver	929/0109392
Micro-Measurements (19612)	
Strain Gage	EA-13-125-350 (Typical)

INDEX OF EQUIPMENT BY MANUFACTURER (Cont)

MANUFACTURER (FSCM) / COMPONENT DESCRIPTION	MODEL NO./PART NO.
Research, Incorporated (09327)	
Potentiometer, Cable	7101-16
Potentiometer, Cable (3.5 inch)	4046-3½
Rosemount (04274)	
Signal Conditioner, OAT	510BF65
Transducer, Airspeed-Altitude	542K2
Transducer, Outside Air Temp	101F
Scanivalve Corp. (22422)	
Switch, Pressure Sampling	48J4-1
Spectrol Electronics Corp. (02111)	
Potentiometer, Rotary, Single Section (1K)	Series 708
Sundstrand (97896)	
Accelerometer, Vertical Servo	303T16
Timex (61515)	
Gyro, Rate, 3-Axis	402405
TRW-Cinch (71785)	
Connector, Rectangular, Rack Mount	DB-25S
Connector, Rectangular, Rack Mount	DC-3 P
Connector, Rectangular, Rack Mount	DC-37S

INDEX OF EQUIPMENT BY MANUFACTURER (Cont)

MANUFACTURER (FSCM) COMPONENT DESCRIPTION	MODEL NO./PART NO.
TRW-Cinch (71785) (Cont)	
Connector, Rectangular, Rack Mount	DE-9S
Connector, Rectangular, Rack Mount	DE-9P
Validyne (33107)	
Junction, Temperature Reference	TR34-24PP
Viking (05574)	
Connector, Printed Circuit	VP5/4CE15
Connector, Printed Circuit	VP3/4CE15
Wendon (04155)	
Slip Ring Assembly	W84-100