Instruction Booklet

103-462
VOLTAGE-CONTROLLED CRYSTAL OSCILLATOR
(10 MHz)

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TRADE SECRETS

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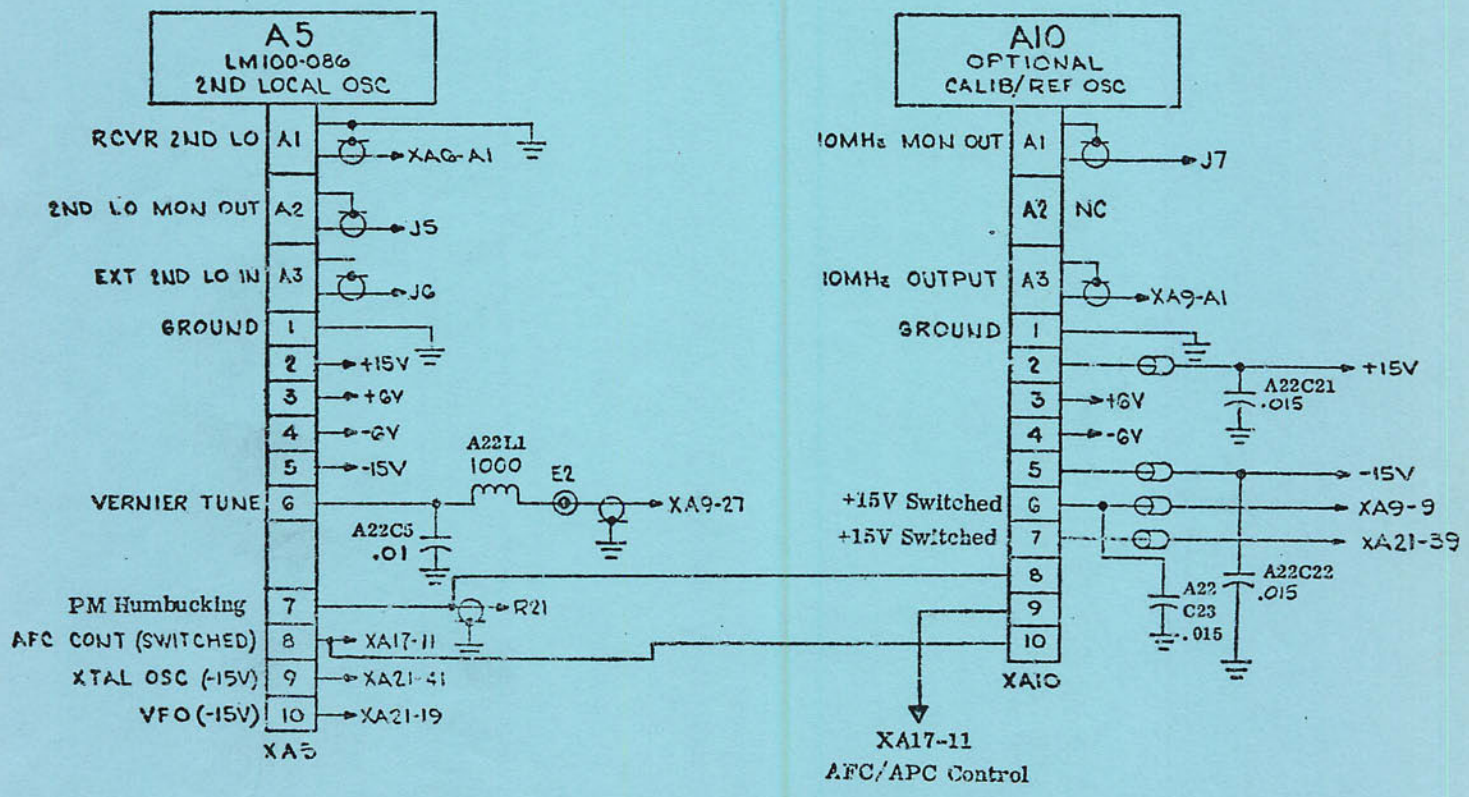
ADDENDUM

The receiver for which this manual is provided has been modified for either short-loop phase lock or long-loop phase lock operation. To convert from one operation to the other requires only the replacement of module A10.

For long-loop operation, the 100-089 Calibration/Reference Oscillator is employed in the receiver; the loop is centered around the second local oscillator. For short-loop operation, the 103-462 VCXO module is employed; the loop is centered around the VCXO (reference) oscillator. The short-loop is limited to a ±5 kHz search range.

To permit the standard 100-089 Calibration/Reference Oscillator to be used in the modified receiver, a jumper must be placed across pins 9 and 10 of the module.

The second local oscillator receptacle XA5 and the receptacle for A10 have had wiring changes as part of the modification. These are shown below.



10 MHz VCXO MODULE

DESCRIPTION

The 103-462 VCXO Module is designed for use in the Microdyne series of telemetry receivers which has the requirement for a short loop phase lock system. The VCXO Module permits a phase lock loop centered around the reference oscillator in lieu of the second local oscillator as in the long loop phase system.

A schematic diagram of the VCXO module is shown in figure 3. The module consists basically of a summing amplifier U1, crystal oscillator Q1, buffer amplifier Q2, and output drivers Q3 and Q4. U1 sums its two inputs (PM humbucking and AFC/APC control) to develop a control voltage for the crystal oscillator. The mean frequency of the oscillator is 10.005 MHz, controlled by Y1. The control voltage for U1 sets the actual frequency of the oscillator. The output of the oscillator is buffered by Q2 and applied through the output drivers to the LO monitor and LO output terminations.

MAINTENANCE

The following equipment is recommended for servicing and maintaining the VCXO module; equivalent equipment may be used:

Extender Module	Microdyne 300-355
DC Voltmeter	Fluke 8000A
Power Supply	HP6216
Frequency Counter	HP5300B
RF Millivoltmeter	HP411A

PREVENTIVE MAINTENANCE

The design of the module eleminates the need for any extensive preventive maintenance. Preventive maintenance is limited to a semiannual check of the connector for corrosion and loose pins, and the module itself for signs of damage and loose components.

TROUBLESHOOTING

In the event of a malfunction, the trouble should be isolated to one of the circuits employed in the module. This may be accomplished using normal signal tracing methods. Once the defective circuit is found, the individual components can then be checked to locate the cause of the fault.

ALIGNMENT

The following are the recommended alignment procedures for the VCXO module. These procedures should be conducted after any repair of the module and may be used as a troubleshooting aid.

a. Remove the cover from the module and connect the module to the parent receiver through the extender module, Microdyne 300-355.

b. Remove the demodulator from the receiver. Place the receiver in the BAL operate mode. Using a cliplead, ground E9 of the VCXO module.

c. Apply power to the receiver.

d. Connect the DC voltmeter to pin 6 of U1 on the VCXO module. Adjust R1 for 0.000(±0.001)V DC.

e. Connect the frequency counter to connector J7 (Ref Osc Out) on the rear panel of the receiver. Adjust R3 for a counter reading of 10.000 MHz, ±200 Hz.

f. Connect the DC voltmeter to R4 and adjust R4 for an approximate +15V DC indication on the voltmeter.

g. Remove the ground from E9 of the module. Using the power supply, apply +500(±2) mV DC to E9. Adjust R2 for a 10.005 MHz, ±200 Hz, indication on the frequency counter (J7).

h. Apply -500(±2) mV DC to E9. Adjust R4 for a 9.995 MHz, ±200 Hz, indication on the frequency counter.

i. Disconnect the frequency counter and connect the RF millivoltmeter to J7. Verify that the output level is -20(±3) dBm.

This completes the alignment; remove power from the receiver. Disconnect the test equipment and install the module in the receiver.

REPLACEABLE PARTS LIST

The following replaceable parts list provides the reference designation, description, manufacturer, and manufacturer's part number for each electrical component used in the VCXO Module. Include all information when ordering spare or replaceable components.

Module Housing

Reference Designation	Description
A1	10.0 MHz VCXO Printed Circuit Board; see breakdown listing below
P1	Connector, Cannon DBM-13W3P
P1A1	Insert, p/o W1, Cannon DM53740-1
P1A2	Not Assigned
P1A3	Insert, p/o W2, Cannon DM53740-1
W1	Cable Assembly, Microdyne 203-714-7
W2	Cable Assembly, Microdyne 203-714-4

A1, Printed Circuit Board Assembly

Reference Designation	Description
C1 thru C3	Capacitor, ceramic, 0.01 μF ±20%, 100V, Erie 8131-B106-X5V-103M
C4	Capacitor, ceramic, 0.33 μF ±20%, 100V, Erie 8131-100-651-334M
C5	Capacitor, ceramic, 0.01 μF ±20%, 100V, Erie 8131-B106-X5V-103M
C6	Capacitor, ceramic, 150 pF ±5%, 100V, Erie 8111-100-COG-151J
C7	Capacitor, ceramic, 750 pF ±5%, 100V, Erie 8111-100-COG-751J
C8	Capacitor, ceramic, 620 pF ±5%, 100V, Erie 8111-100-COG-621J
C9	Capacitor, ceramic, 0.01 μF ±20%, 100V, Erie 8131-B106-X5V-103M
C10	Capacitor, ceramic, 0.01 μF ±20%, 100V, Erie 8131-B106-X5V-103M
C11	Capacitor, ceramic, 1000 pF ±20%, 100V, Erie 8121-100-COG-102M
C12	Capacitor, ceramic, 1000 pF ±20%, 100V, Erie 8121-100-COG-102M
C13	Capacitor, ceramic, 330 pF ±5%, 100V, Erie 8111-100-COG-331J
C14 thru C18	Capacitor, ceramic, 0.01 μF ±20%, 100V, Erie 8131-B106-X5V-103M
CR1	Diode, silicon, 1N914
CR2	Diode, varactor, Microdyne 201-268
CR3	Diode, varactor, Microdyne 201-268

Replaceable Parts List - A1, Printed Circuit Board Assembly, continued

Reference Designation	Description
E1	Termination, AMP 61067-1
E2	Termination, AMP 61067-1
E3	Termination, p/o W1
E4	Termination, p/o W2
E5 thru E10	Termination, AMP 61067-1
L1	Inductor, 1000 μH, Jeffers 1331-35J
L2	Inductor, 120 μH, Jeffers 1315-14J
L3	Inductor, 120 μH, Jeffers 1315-14J
L4	Inductor, 27 μH, Jeffers 4455-2J
L5	Inductor, 120 μH, Jeffers 1315-14J
L6	Inductor, 0.47 μH, Jeffers 4425-2M
Q1 thru Q4	Transistor, RCA 2N5179
R1	Potentiometer, 10K, Bourns 66XR10K
R2	Potentiometer, 20K, Bourns 66XR20K
R3	Potentiometer, 100K, Bourns 66XR100K
R4	Potentiometer, 10K, Bourns 66XR10K
R5	Resistor, fixed composition, 5.1KΩ ±5%, ¼w, Allen Bradley CB5125
R6	Resistor, fixed composition, 5.1KΩ ±5%, ¼w, Allen Bradley CB5125
R7	Resistor, fixed composition, 110KΩ ±5%, ¼w, Allen Bradley CB1145
R8	Resistor, fixed composition, 100KΩ ±5%, ¼w, Allen Bradley CB1045
R9	Resistor, fixed composition, 100KΩ ±5%, ¼w, Allen Bradley CB1045
R10	Resistor, fixed composition, 4.3KΩ ±5%, ¼w, Allen Bradley CB4325
R11	Resistor, fixed composition, 4.3KΩ ±5%, ¼w, Allen Bradley CB4325
R12	Resistor, fixed composition, 620Ω ±5%, ¼w, Allen Bradley CB6215
R13	Resistor, fixed composition, 1KΩ ±5%, ¼w, Allen Bradley CB1025
R14	Resistor, fixed composition, 5.1KΩ ±5%, ¼w, Allen Bradley CB5125
R15	Resistor, fixed composition, 9.1KΩ ±5%, ¼w, Allen Bradley CB9125
R16	Resistor, fixed composition, 1KΩ ±5%, ¼w, Allen Bradley CB1025
R17	Resistor, fixed composition, 39Ω ±5%, ¼w, Allen Bradley CB3905
R18	Resistor, fixed composition, 10Ω ±5%, ¼w, Allen Bradley CB1005
R19	Resistor, fixed composition, 5.1KΩ ±5%, ¼w, Allen Bradley CB5125
R20	Resistor, fixed composition, 9.1KΩ ±5%, ¼w, Allen Bradley CB9125
R21	Resistor, fixed composition, 1KΩ ±5%, ¼w, Allen Bradley CB1025
R22	Resistor, fixed composition, 1KΩ ±5%, ¼w, Allen Bradley CB1025

Replaceable Parts List - A1, Printed Circuit Board Assembly, continued

Reference Designation	Description
R23	Resistor, fixed composition, 150Ω ±5%, ¼w, Allen Bradley CB1515
R24	Resistor, fixed composition, 33Ω ±5%, ¼w, Allen Bradley CB3305
R25	Resistor, fixed composition, 150Ω ±5%, ¼w, Allen Bradley CB1515
R26	Resistor, fixed composition, 150Ω ±5%, ¼w, Allen Bradley CB1515
R27	Resistor, fixed composition, 33Ω ±5%, ¼w, Allen Bradley CB3305
R28	Resistor, fixed composition, 150Ω ±5%, ¼w, Allen Bradley CB1515
R29	Resistor, fixed composition, 47KΩ ±5%, ¼w, Allen Bradley CB4735
R30	Resistor, fixed composition, 100Ω ±5%, ¼w, Allen Bradley CB1015
R31	Resistor, fixed composition, 10Ω ±5%, ¼w, Allen Bradley CB1005
R32	Resistor, fixed composition, 47Ω ±5%, ¼w, Allen Bradley CB4705
R33	Resistor, fixed composition, 10Ω ±5%, ¼w, Allen Bradley CB1005
R34	Resistor, fixed composition, 5.1KΩ ±5%, ¼w, Allen Bradley CB5125
U1	Operational Amplifier, Analog Devices AD502J
Y1	10.005 MHz Crystal, Piezo 0152617

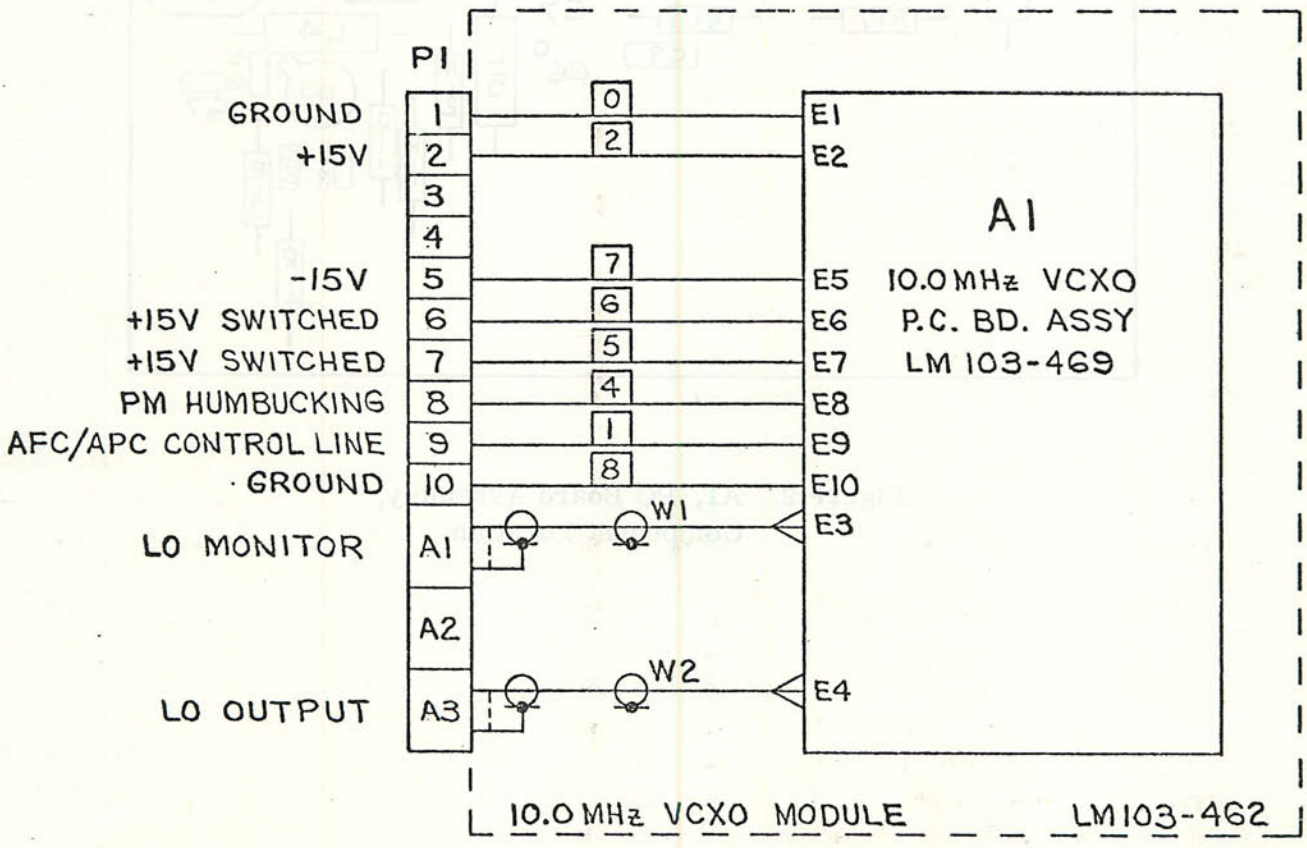


Figure 1. Module Wiring Diagram

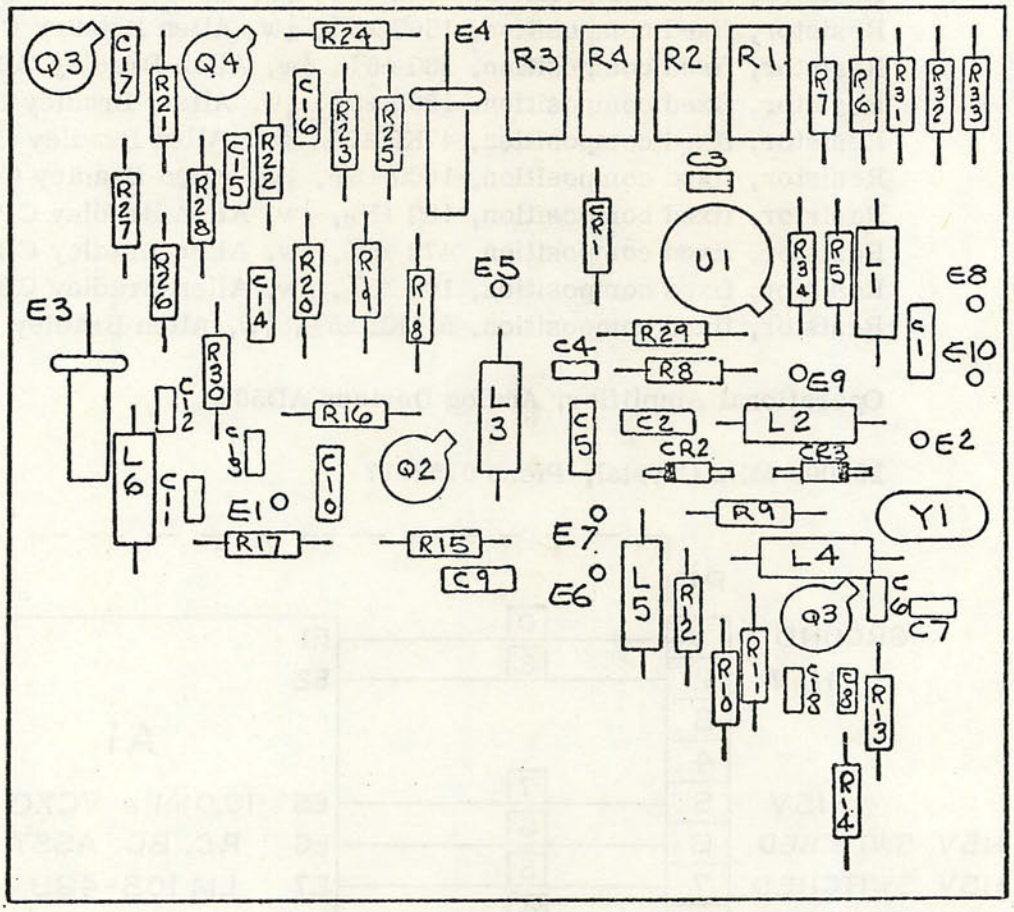


Figure 2. A1, PC Board Assembly, Component Location

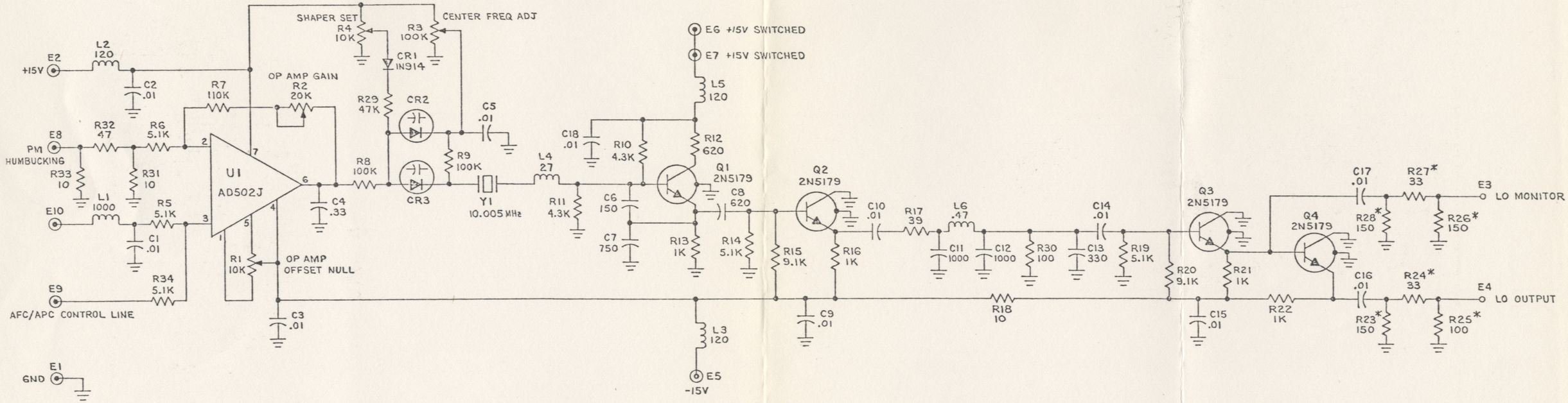


Figure 3. A1, PC Board Assembly, Schematic Diagram