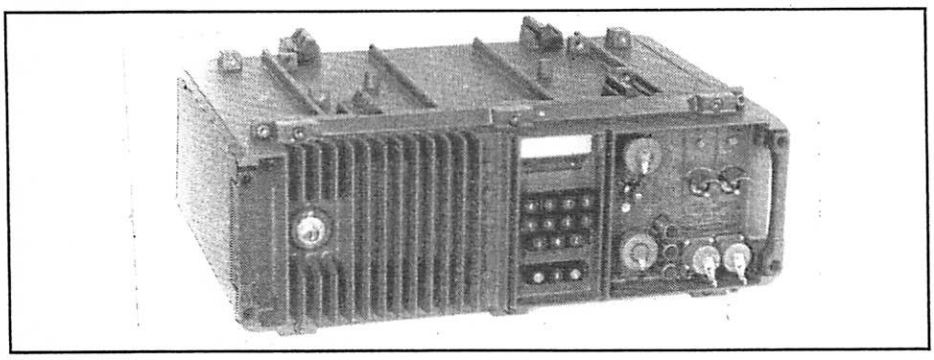
Eindhoven
Nederland

Philips Usfa B.V.

MUCOLEX

LINK ENCRYPTION EQUIPMENT "MUCOLEX"



TYPE UA8451

USE

The Philips Usfa Link Encryption Equipment "MUCOLEX", type UA8451, is used on full duplex transmission links for the on-line, automatic and synchronous encryption and decryption of digital bitstreams such as occur between Time Division Multiplex systems. The maximum bitrate is 1024 kbits/sec, which is sufficient for processing beams of 24 channels of 6-bit Pulse Code Modulation Systems or beams of some 60 channels of the Digitally Controlled Delta Modulation Multiplex ("DELTAMUX") as made by Philips Telecommunication.
MUCOLEX is connected between the Multiplex and the radio relay transmitters or line adaptors for transmission via microwave or spiral-4 cable.
The error extension, caused by MUCOLEX, is zero.

DESCRIPTION.

MUCOLEX is housed in a single waterproof housing of small dimensions (445 × 320 × 180 mm) of the same type as used for the Philips DELTAMUX. These housings can be stacked on top of each other, fit in a 19-inch rack or schockmounting frames and have been designed for use in tactical vehicles.
As is the case with most T.D.M. equipments for military use, MUCOLEX is suitable for operation off a mains supply of 220 Volt AC and/or a 24 Volt DC accumulator, with automatic preference for the 220 Volt mains. The power consumption is in the order of 60 W.
The plug-in printed circuits of 80 × 100 mm are equipped with 28-pole MIL-type connectors. The 43 boards which together form the electronic part of MUCOLEX, are all plugged into a large printed circuit which also serves as the main wiring form.

TECHNICAL DATA

Physical data:
Housed in a steel casing, equipped with handles and rubber buffers;
dimensions 445 × 320 × 180 mm;
weight approx. 24 kg;
stackable on the Philips DELTAMUX T.D.M. equipment;
all connections and controls on the front panel.

ELECTRICAL DATA:

Power supplies:
220 Volt AC ± 10%, and/or 21 to 29 Volt DC, minus to mass;
power consumption circa 60 W;
Eurocom interface;
maximum bitrate 1,024 Mbits/sec;
impedance 130 Ohms symmetrical;
duration of crypto start circa 500 bits.

CLIMATIC DATA:

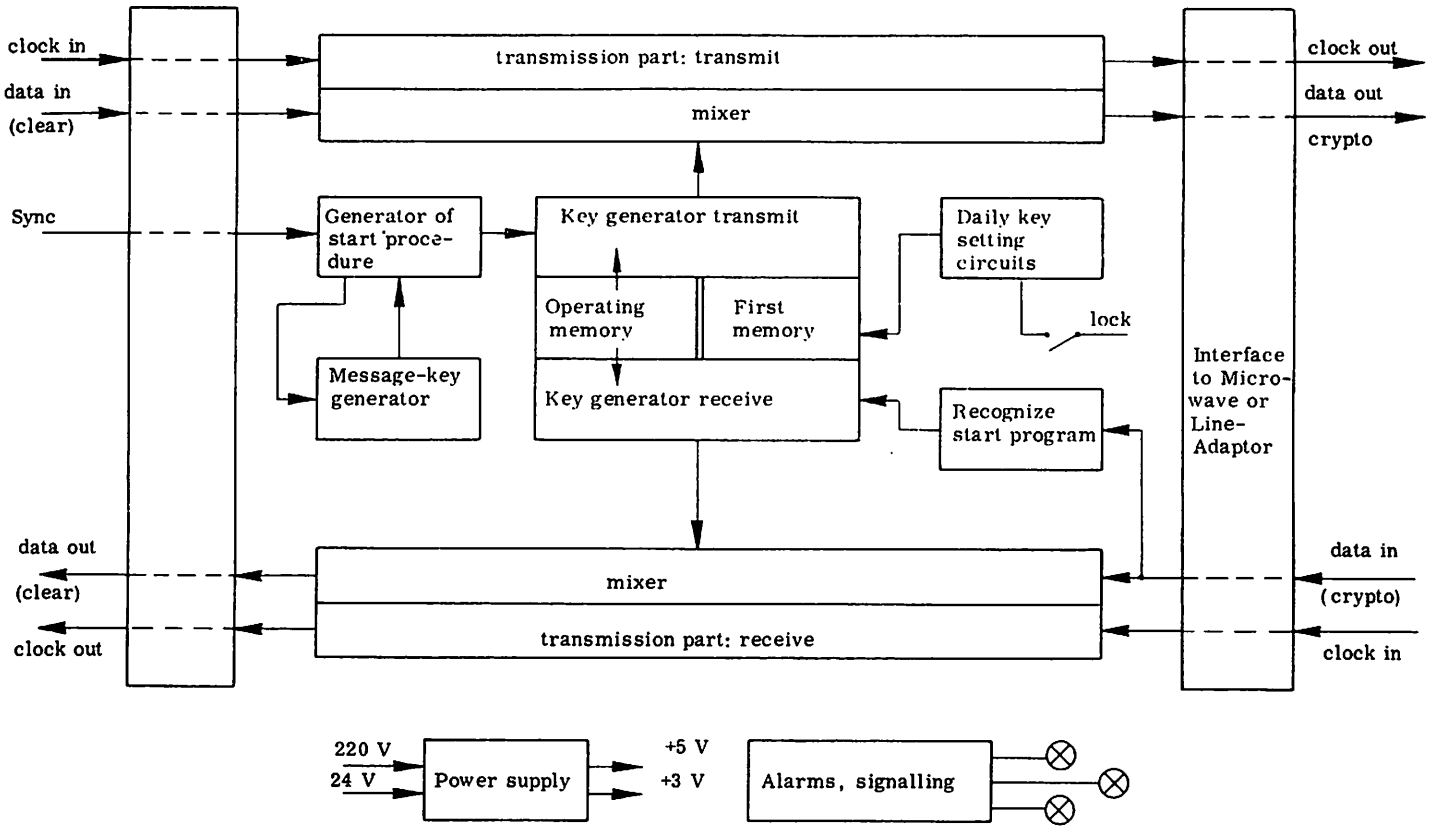
Operating temperature range between — 25 and + 55 degrees centigrade;
storage temperature range between — 40 and + 70 degrees centigrade;
suppression of radio interference according to VDE 0875;
to be tested in accordance with DEF 133, category L2;
built entirely from components which comply with MIL SPECS;
Mean Time Between Failures estimated at more than 2000 hours.

RESTRICTED

13809/E 1077

PHILIPS

PHILIPS



OPERATION

Apart from the setting of the daily key and the check on the proper operation of the built-in alarm circuits, MUCOLEX does not need any operation at all. There are no calibrations or special adjustments to be made. As MUCOLEX is the "slave" of the T.D.M. and the stability is entirely determined by the clockpulses of the T.D.M. system, MUCOLEX can in principle cooperate with equipment of any bitrate.

The series of key-bits produced by MUCOLEX, is entirely determined by the setting of the daily key which consists of 9 groups each of 4 octal figures, giving a possible total of roughly 10^{30} different key setting possibilities.

Starting with the first group of 4 figures, the daily key is instructed in the correct sequence by pushing the pushbuttons 0...7 on the front panel.

The introduced figures and the number of the group appear on a read-out so that an immediate check on the key setting is provided. The group is transferred into a first memory by pushing another button, after which the next group can be introduced. When all 9 groups have been introduced into the first memory, the now complete daily key setting is transferred in total into the operating memory by pushing yet another button. The next key setting can now be introduced into the first memory to serve as reserve. The transfer of a new key setting into operating memory causes an automatic start procedure as described in the next paragraph. When the station is in danger of falling into enemy hands, the key setting can be zeroized immediately by pushing two clearly marked buttons simultaneously.

Checking facilities are incorporated on the front panel to allow of a quick check by the operator on the proper functioning of both the overall operation of MUCOLEX and the built-in alarm circuitry: a "check transmission" switch loops MUCOLEX back into itself and a "check alarm" switch checks the proper functioning of the alarm circuits.

CRYPTO START PROCEDURES

In order to ensure synchronized crypto traffic, sophisticated crypto start procedures are incorporated. MUCOLEX is the slave of the T.D.M. and therefore reacts to synchronization commands from the T.D.M. In order to avoid encryption in depth, a message key is added to each crypto start which partly determines the series of key bits to be produced, so that a different key series is produced after every start. An automatic check on the correct crypto start is provided in that the receiving T.D.M. must find its decrypted synchronization pulses in the correct timeslots: if these pulses are not found, a new synchronization command will be given to the transmitting MUCOLEX. Crypto start procedures of course also follow when the daily key setting has been changed. The total time for changing the key setting takes 500 bits, less than 1 millisecond.