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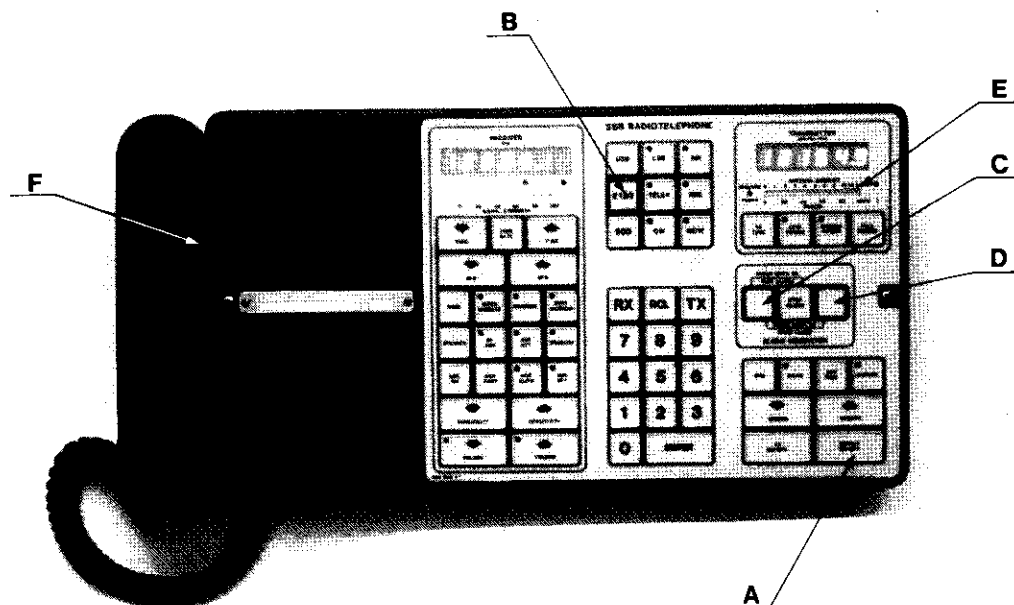
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1. DISTRESS OPERATION ON 2182 kHz



1.1 Transmission of two-tone alarm signal

1. Press "SUPPLY ON/OFF" key (A) to turn equipment on.
2. Press "2182" key (B).
3. Press ALARM GENERATOR keys (C) and (D) simultaneously.

Transmission starts immediately after the automatically initiated tuning sequence and the alarm signal is now transmitted for 45 seconds. The antenna current is displayed on the ANTENNA CURRENT meter (E) and the alarm signal is heard in the loudspeaker.

To repeat the alarm signal transmission just press the ALARM GENERATOR keys (C) and (D) again simultaneously.

An alarm signal transmission may be interrupted at any time by pressing the "STOP ALARM" key.

1.2 Transmission of distress message

When the alarm signal ceases press handset key (F), and transmit your distress message by speaking into the handset microphone with a clear and calm voice.

Release handset key and wait for reply.

Repeat the distress message at intervals until a reply is received.

Transceiver Unit (TU)



Antenna Tuning Unit (ATU)

Control Unit (CU)

Fig 2.1

2. INTRODUCTION

The TRP 8750 D SERIES is general purpose HF SSB transmitting receiving equipment covering the frequency range 1.6 to 30MHz designed for marine as well as point-to-point applications.

The standard version offers duplex, simplex and semiduplex radiotelephone communication in the maritime mobile bands and is intended for installation in voluntarily or compulsorily fitted vessels.

A selection of optional facilities permits configuring equipment fulfilling various needs, including transmission and reception of LSB, J3E signals, transmission and reception of radiotelex, transmission and reception of CW and MCW morse telegraphy. The equipment is fully transistorized and extensive use is made of the latest microprocessor technology.

The TRP 8750 D consists of a Control Unit, a fully remote controlled Transceiver Unit and an automatic Antenna Tuning Unit. The units can be placed up to 100 m apart using standard 16 x 0.5 mm sq. screened cable. An AC Power Supply Unit is used when the equipment is supplied from AC MAINS.

The Control Unit contains all receiver and transmitter operating controls. It is fully push-button controlled by means of a rugged membrane keyboard, insensitive to dust and water. Separate LED-displays show receive and transmit frequencies, and two bar-graph displays show receiver signal strength and transmitter output power respectively. When the transmitter is switched-off, time of day is displayed from a built-in realtime clock, which can also be used to switch-on the equipment at a predetermined time.

The keyboard permits the operator to program up to 76 receive and transmit frequency pairs and to recall or scan the frequencies with a few key operations.

When the equipment is switched-off the real-time clock and the memory are supplied from a built-in lithium primary cell having a lifetime of several years. The non-volatile memory also stores the current setting of the equipment when switching-off and restores it when switching-on again.

Where required by the authorities transmitter frequencies can be preprogrammed into a PROM having a capacity of 1017 frequencies. Transmitter keying can then only take place on the authorized frequencies. The keyboard permits recall of all the preprogrammed frequencies. The receiver can be tuned in 10 Hz, 100 Hz or 1 kHz steps at the choice of the operator. 5 W audio output is available to the built-in loudspeaker or to external speakers. A squelch circuit is optionally available.

The standard equipment contains the two-tone radiotelephone alarm signal generator and single key selection of 2182 kHz.

The Control Unit provides connection facilities for handset, headphones,

extension speaker, morse-key and telex-equipment. 600 ohms AF input and output terminals are provided with Line Transformers as optional extras.

The Control Unit is housed in a Noryl (PPO) cabinet suitable for tabletop or bulkhead mounting. The front panel can be tilted for convenient operation when the unit is mounted vertically as well as horizontally.

The Transceiver Unit contains all receiver and transmitter RF circuitry. The receiver signal path and the exciter signal path together with two identical fast switching synthesizers are contained in the lower front door of the unit. All frequencies are fully synthesized and derived from a Master Oscillator. The Master Oscillator is available in different stability versions. These boards are contained in screened compartments of the door of the unit. The door itself is made in moulded Noryl (PPO).

The fully protected solid state 750 W power amplifier is cooled by natural convection. It matches a 50 ohms antenna system but is normally used in connection with the Antenna Tuning Unit matching the transmitter to wire or whip antennas.

In the standard version the transmitter covers the marine bands between 1.6 and 30 MHz but PA-filters are available which in addition give coverage of the 500 kHz marine band. Also continuous coverage of the frequency range 1.6 to 30 MHz is available.

A high efficiency switched mode power supply ensures optimum output power at low power consumption and covers a supply voltage range from 21.6 to 41.6 Volts. The nylon-coated steel cabinet can be tabletop or bulkhead mounted by means of rugged nylon-coated cast brackets.

The fast tuning, microprocessor controlled Antenna Tuning Unit is based on high voltage, high current HF reed-relays. It tunes automatically to all antennas between 7 and 30 meters length and requires no presetting at the installation. Tuning is performed in 0.2 to 1.5 sec.

An optionally available Antenna Relay Board contains a simplex relay system, a dummy load and a grounding relay connecting the antenna to ground when the equipment is switched-off. The simplex antenna relay system is fast enough to permit ARQ-telex on one antenna.

The ATU cabinet is made in Lexan (Polycarbonat).

Two versions of the AC Power Supply Unit are available accepting nominal input voltages of 110/120/220/240 V, 50-60 Hz and 3x220/3x380/3x440 V, 50-60 Hz, respectively. A built-in switch permits manual switch-over to battery operation.

2.1 BASIC VERSIONS

- In common : 750 Watt P.E.P. Power Amplifier.
Simplex/Semi-duplex/Full-duplex operation 1.6-30 MHz.
- TRP 8750 D : Marine SSB Radiotelephone.
1017 preprogrammable frequencies in Marine Bands.
Automatic reduction of power below 4 MHz to 400 Watt P.E.P.
- TRP 8753 D : Marine SSB Radiotelephone.
Free frequency selection all bands.
Automatic reduction of power below 4 MHz to 400 Watt P.E.P.
- TRP 8754 D : General Purpose SSB Radiotelephone.
Free frequency selection all bands.
- TRP 8755 D : General Purpose SSB Radiotelephone.
Free frequency selection all bands.
CW and MCW facilities.
- TRP 8757 D : Marine SSB Radiotelephone.
Free frequency selection all bands.
CW and MCW facilities.
Automatic reduction of power below 4 MHz to 400 Watt P.E.P.

3. TECHNICAL DATA

Versions complying with the SOLAS 74 convention and the ITU Radio Regulations are available, meeting one or more of the specifications: CEPT, MPT, DOC and FTZ.

3.1 GENERAL

Frequency Generation: True digital frequency synthesis.

Frequency Selection: By common keyboard.
Single key selection of 2182 kHz.
76 user-programmable frequency pairs.
Scanning facilities (may be disabled).
Remote control (optional).

Frequency Presentation: Separate LED displays for receive and transmit frequencies.

Frequency Stability: 1.5 ppm
0.8 ppm (optional)
0.4 ppm (optional)

Operating modes: Duplex, semiduplex and simplex.

USB: J3E upper sideband, suppressed carrier.
R3E: Upper sideband, reduced carrier.
AM: H3E upper sideband, full carrier.
LSB: J3E lower sideband, suppressed carrier (optional).
CW: A1A morse telegraphy.
MCW: H2A modulated morse telegraphy
TELEX: F1B with center audio frequency selectable between 1500 and 2500 Hz in 100 Hz steps (optional).

Operating Temperature Range: -20 deg. C to +55 deg. C

Full Performance Temperature Range: 0 deg. C to +40 deg. C

3.2 RECEIVER CHARACTERISTICS

Frequency Range: 100 kHz to 30 MHz
(10 kHz to 100 kHz with reduced performance)

Frequency resolution: 100 Hz by numerical frequency keyboard entry. A search/fine tuning facility is provided with selectable increment steps of 10 Hz, 100 Hz or 1 kHz. In addition a user-programmed step size may be selected.

Antenna Impedance: Below 4 MHz: 10 ohm in series with 250 pF or 50 ohm (std.) internally selectable.
4 MHz to 30 MHz: 50 ohm

Input Protection: 30 V RMS (EMF) for up to 15 min.

IF Selectivity: SSB: 350 Hz to 2.7 kHz

AM: +/- 2.7 kHz or
+/- 4 kHz (optional)

CW/MCW:

Wide: +/- 2.7 kHz or
+/- 4 kHz (optional)

Inter: +/- 1.2 kHz or
+/- 2.7 kHz (optional)

Narrow: +/- 250 Hz or
+/- 500 Hz (optional)

Very
Narrow: As Telex or disabled

TELEX (optional):

+/- 150 Hz or
+/- 250 Hz or
+/- 400 Hz or
+/- 1200 Hz

Sensitivity: Max. antenna input for 10 dB SINAD, 50 ohm antenna.

SSB:
1.6 - 30 MHz: 0.8 uV

AM:
100 kHz - 400 kHz: 7 uV
400 kHz - 30 MHz: 5 uV

CW (+/- 500 Hz):
100 kHz - 30 MHz: 0.6 uV

	When RF-AMP is selected, the sensitivity is increased by 6 dB.
Intermodulation: (out-of-band)	100 dB uV per signal more than 30 kHz offset from receiver frequency produces less than an equivalent input signal of 30 dB uV.
Third order intercept point:	+22 dBm.
Cross modulation:	Unwanted signal of 118 dB uV/30 % - 400 Hz more than 20 kHz offset from receiver frequency, produces cross modulation less than -30 dB relative to a wanted signal of 60 dB uV/SSB.
Duplex Operation:	Less than -30 dB cross modulation for Transmitter/Receiver isolation greater than 30 dB and frequency offset more than 1.5 %.
Blocking:	More than 80 dB to cause a 3 dB change in output power when wanted signal gives 20 dB SINAD, and the unwanted signal is offset by more than 20 kHz from the receiver frequency.
Image Rejection:	Greater than 80 dB
IF Rejection:	Greater than 90 dB
Spurious Response Rejection:	Greater than 80 dB below 4 MHz Greater than 70 dB above 4 MHz
Internally generated spurious signals:	Less than 5 dB SINAD (SSB)
Spurious Emission:	Less than 25 pW/50 ohm at antenna connector.
RF-Amplifier:	0 dB or 10 dB
RF-Attenuator:	0 dB or 20 dB
Automatic Gain Control:	Less than 5 dB change in output for 100 dB input signal variation from 20 dB sensitivity level (SSB).
BFO Range:	+/- 3 kHz synthesized in 100 Hz steps
Line output:	Internally adjustable up to +10 dBm/600 ohm. Balanced 600 ohms output (optional).

In-band
Intermodulation: Less than -50 dB

Audio Output Power: 5 W in 8 ohm to internal and/or external loudspeaker.
Audio Squelch (optional): Speech operated.

3.3 TRANSMITTER CHARACTERISTICS

Output Power: 750 W PEP +0/-1.4 dB from Transceiver Unit into 50 ohms.
Power Reduction:
Full Medium: approx. 260 W PEP
Medium: approx. 90 W PEP
Low Medium: approx. 30 W PEP
Low: approx. 10 W PEP
Single-tone max. Power:
750 W PEP for keying duty-cycle less than 55% and modulation rates greater than 3 baud.
3 dB power reduction when continuously keyed during 1 min. Automatic power recovery when muted during 2 min.

Transmitter
Frequencies: TRP 8750 D:
Up to 1017 programmable channels, freely distributed in the ranges:
1606.5 to 4800 kHz
6200 to 8950 kHz
12230 to 17650 kHz
18780 to 27100 kHz

TRP 8753 D/8754 D/8755 D/8757 D:
Free or programmable frequency selection in the range:
1606.5 kHz to 30 MHz.

Spurious Emissions: Less than -60 dB/PEP

Alarm Generator: A two-tone alarm generator is incorporated (TRP 8750 D/8753 D/8757 D).

Audio Input Level: Telex: 0 dBm +10/-16 dB
Input impedance: 600 ohm
Aux: 0 dBm +10/-16 dB
Input impedance: 600 ohm
Mic: 20 mV to 2.5 V internally adjustable.
Input impedance: 100 kohm//6.8 nF.
Recommended source impedance: Less than 2.5 kohm.

3.4 ANTENNA TUNING UNIT

Frequency Range: 1.6 - 30 MHz

Antenna Requirements: 7 - 30 m wire and/or whip.

Antenna Tuning: Fully automatic

Tuning time: 0.2 - 1.5 sec

Input Impedance after tuning: 50 ohm. SWR \leq 1.4

Manual setting possible for 2182 kHz

Power Handling Capability: 750 W PEP
375 W Average

3.5 POWER REQUIREMENTS

Supply Voltage: 24-32 V DC (-10/+30%)
(no presetting)
Connection will not earth Supply Battery.
110/120/220/240 V AC (optional external Power Supply Unit, type P 8750).
3x380/3x220/3x440 V AC (optional external Power Supply Unit, type P 8751).

Power Consumption (approx.):

	750 W PEP	400 W PEP
Receive only:	50 W	50 W
J3E unmodulated:	300 W	300 W
H3E unmodulated:	1100 W	760 W
H3E alarm:	1300 W	950 W
CW keyed:	2000 W	1440 W
MCW keyed:	1300 W	950 W
ARQ-telex:	1000 W	760 W

3.6 DIMENSIONS AND WEIGHTS

Control Unit: Width: 372 mm
Height: 87 mm
Depth: 203 mm
Weight: 4 kg, approx.

Transceiver Unit:	Width:	473 mm (551 mm incl mounting brackets).
	Height:	741 mm
	Depth:	280 mm
	Weight:	50.2 kg, approx.
Antenna Tuning Unit:	Width:	330 mm
	Height:	440 mm (535 mm incl antenna horn).
	Depth:	130 mm
	Weight:	5.7 kg, approx.
AC Power Supply Unit (optional):	Width:	339 mm
	Height:	489 mm (560 mm incl attachment rails).
	Depth:	215 mm
	Weight:	45.5 kg, approx. P 8750 31.2 kg, approx. P 8751

4. OPERATION

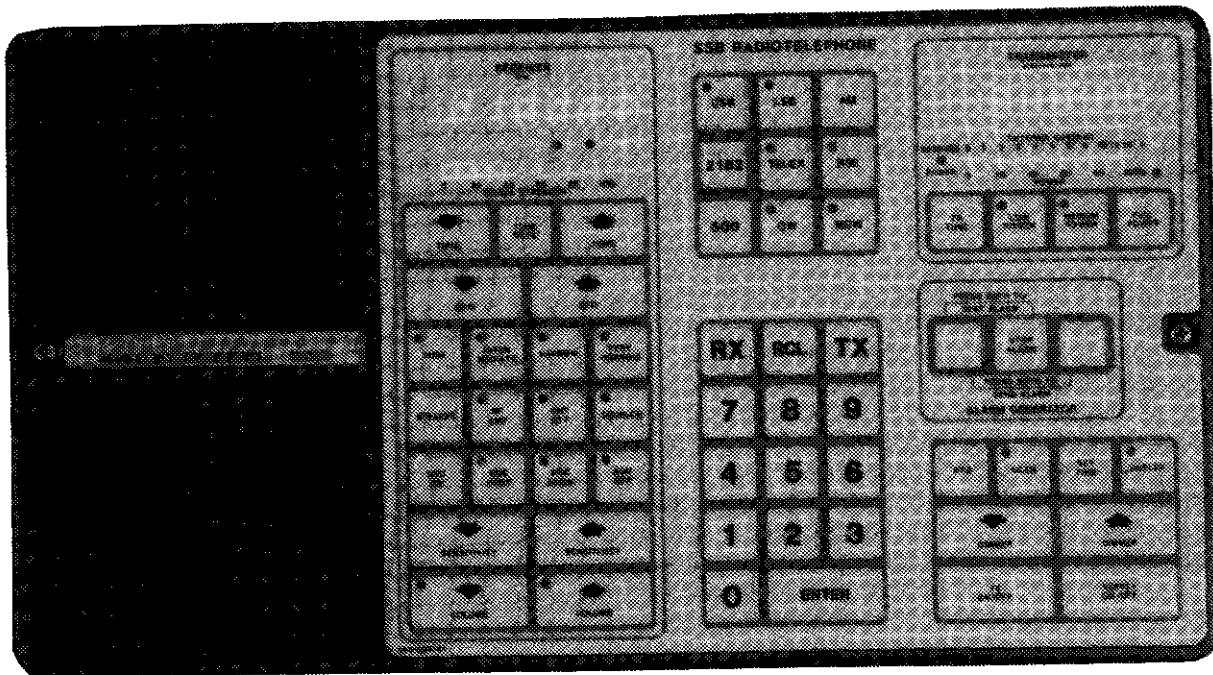
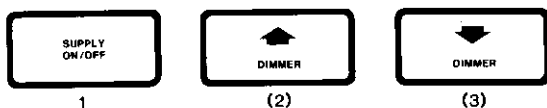


Fig. 4.1

The equipment is operated from the Control Unit (fig. 3.1) and is 100% keyboard controlled. For quick reference section 4.1 gives the operating instructions as pictures of keying sequences, followed by a short description of the action caused by each key. Parentheses around key-numbers indicate that the corresponding keys should only be pressed under the conditions described below. A description of all the keyboard operating controls is found in section 4.2.

4.1 OPERATING INSTRUCTIONS

4.1.1 SWITCH ON



- 1 Press "SUPPLY ON/OFF"
The equipment will now enter the state it was in before being switched OFF, as indicated by the displays and annunciators.
- (2) Increase light intensity of displays and annunciators if too low.
- (3) Decrease light intensity of displays and annunciators if too high.

4.1.2 TRANSMITTER ON



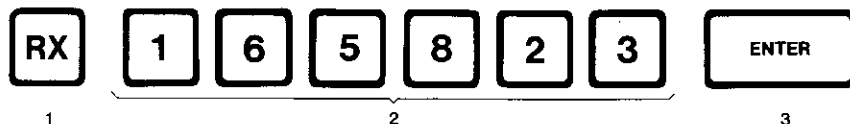
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- 1 Press "TX ON/OFF" if the transmitter is OFF.
The transmitter display will then show the transmitter frequency.

If the transmitter display is showing the time of day, as indicated by the flashing time cursor (3rd digit), the equipment is in the "Receive only" state with all transmitter functions switched OFF.

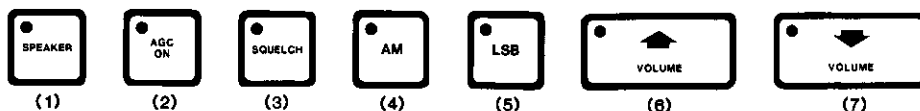
4.1.3 RECEIVING

4.1.3.1 CHANGE RECEIVER FREQUENCY (16582.3 kHz)



- 1 Press "RX"
The receiver display is blanked and its decimal point starts flashing.
- 2 Enter desired frequency in the receiver display via the numeric keys. The last digit is always interpreted as the "100 Hz" digit.
- 3 Press "ENTER"
The decimal point stops flashing if the frequency is valid. The whole display starts flashing if the frequency is invalid.

4.1.3.2 SET RECEIVER (MODE)



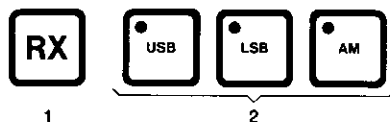
- (1) Press "SPEAKER" if the loudspeaker is OFF.
Annunciator indicates loudspeaker ON.
- (2) Press "AGC ON" if the AGC is OFF.
Annunciator indicates AGC ON.
- (3) Press "SQUELCH" if the Squelch is OFF.
Annunciator indicates Squelch ON.
- (4) Press "AM" if the received signal is an AM (A3E) signal.

(5) Press "USB" if the received signal is an SSB (J3E) signal.
Annunciators indicate the mode selected.

(6) Increase volume if sound level is too low.

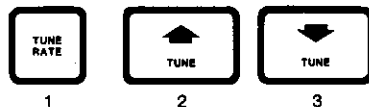
(7) Decrease volume if sound level is too high.

4.1.3.3 SELECT SEPARATE RECEIVER MODE



- 1 Press "RX"
The receiver display is blanked and its decimal point starts flashing.
- 2 Press "USB", "LSB" or "AM"
If the TX-mode is either USB, LSB, AM, or R3E then the RX-mode is accepted and the receiver display restored. If the TX-mode is neither USB, LSB, AM nor R3E then nothing will happen until either a valid mode-key, a receiver frequency or "ENTER" is pressed.
If the RX-mode is different from the TX-mode then the mode annunciators indicate the mode according to keyline. E.g. if the unit is not keyed then the RX-mode annunciator is turned ON constantly while the TX-mode annunciator is flashing very fast.

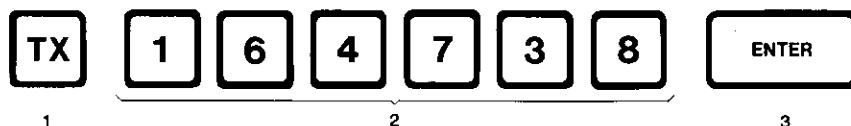
4.1.3.4 RECEIVER TUNING



- 1 Press "TUNE RATE" to change frequency step.
An annunciator below one of the three right hand digits of the receiver display indicates the frequency step selected. 10 Hz, 100 Hz and 1000 Hz steps are possible.
- 2 Increase receiver frequency in steps selected.
- 3 Decrease receiver frequency in steps selected.
If "TUNE" is pressed shortly the receiver frequency is changed one step up or down. Holding "TUNE" pressed for more than 0.5 sec. changes the receiver frequency continuously up or down with 10 steps/sec.

4.1.4 TRANSMITTING

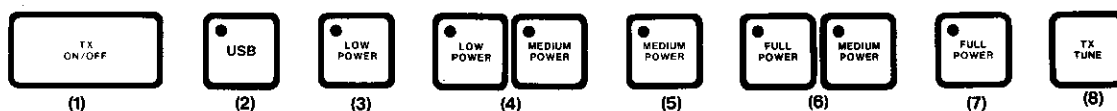
4.1.4.1 CHANGE TRANSMITTING FREQUENCY (16473.8 kHz)



- 1 Press "TX"
The transmitter display is blanked and its decimal point starts flashing.
- 2 Enter desired frequency in the transmitter display via the numeric keys.
The last digit is always interpreted as the "100-Hz" digit.
- 3 Press "ENTER"
If TX is ON then the decimal point stops flashing if both frequency and mode are valid, and the whole display starts flashing if frequency and/or mode is invalid.

If TX is OFF the transmitter display will show the time of day.

4.1.4.2 SET TRANSMITTER (Mode-Power-Tune)

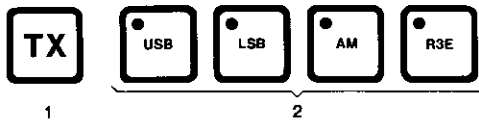


- (1) Press "TX ON/OFF" if the transmitter is OFF.
The transmitter display will then show the transmitter frequency, flashing if frequency and/or mode is invalid.
 - (2) Press "USB" to transmit an SSB (J3E) signal.
Annunciators indicate the mode selected, and the transmitter display starts flashing if the mode is invalid.
 - (3) Press "LOW POWER"
 - (4) Press "LOW POWER" and "MEDIUM POWER" simultaneously
 - (5) Press "MEDIUM POWER"
 - (6) Press "FULL POWER" and "MEDIUM POWER" simultaneously
 - (7) Press "FULL POWER"
- } according to desired power level.

Annunciators indicate the power level selected. If the transmitter frequency has been changed the Antenna Tuning Unit will automatically tune its input impedance on the new frequency in less than 1.5 sec when the handset key is pressed, and you are then ready to transmit.

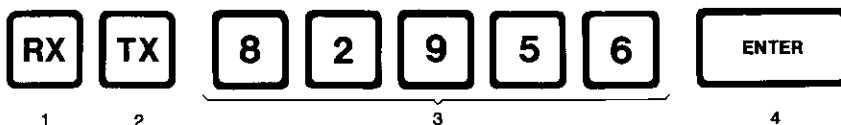
- (8) Press "TX TUNE" if the power meter annunciator starts flashing during transmission. This indicates that the Antenna Tuning Unit input SWR is greater than 1:3, and may happen if the antenna impedance has changed due to external circumstances.

4.1.4.3 SELECT SEPARATE TRANSMITTER MODE



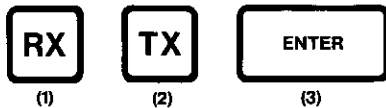
- 1 Press "TX"
The transmitter display is blanked and its decimal point starts flashing.
- 2 Press "USB", "LSB", "AM" or "R3E"
If the RX-mode is either USB, LSB, or AM then the TX-mode is accepted and the transmitter display restored. If the RX-mode is neither USB, LSB nor AM then nothing will happen until either a valid mode-key, a transmitter frequency or "ENTER" is pressed.
If the TX-mode is different from the RX-mode then the mode annunciators indicate the mode according to keyline. E.g. if the unit is keyed then the TX-mode annunciator is turned ON constantly while the RX-mode annunciator is flashing very fast.

4.1.5 FAST SET-UP FOR SIMPLEX OPERATION (8295.6 kHz)



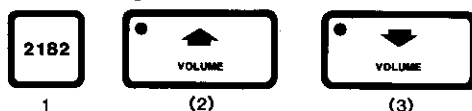
- 1 Press "RX"
- 2 Press "TX"
The receiver and transmitter displays are blanked, and their decimal points start flashing.
- 3 Enter the desired frequency in the receiver and transmitter displays via the numeric keys.
- 4 Press "ENTER"
If frequency and mode are valid the decimal points stop flashing. Set receiver and transmitter as described previously.

4.1.6 COPYING RX FREQUENCY TO TX FOR SIMPLEX OPERATION



- 1 Press "RX"
The receiver display will be blanked.
- 2 Press "TX"
The transmitter display will be blanked.
- 3 Press "ENTER"
The receiver frequency will be copied to the transmitter display, and the 10 Hz digit on the receiver display will be cleared.

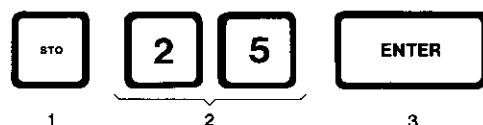
4.1.7 FAST SET-UP FOR 2182 kHz



- 1 Press "2182"
This instantly changes receiver and transmitter frequency to 2182 kHz, selects AM (H3E) mode, selects FULL POWER and enables transmitter function (TX ON). The loudspeaker and AGC are automatically switched ON and RF-AMP, ANT ATT and SQUELCH switched OFF. Antenna current is displayed when transmitting, unless PRESET bit 6 is set (see Second Functions).
- (2) Increase volume if sound level is too low.
- (3) Decrease volume if sound level is too high.
Press handset key, wait a couple of seconds for the automatic tuning, and you are ready to transmit.

4.1.8 STORING AND RECALLING FREQUENCY CHANNELS

4.1.8.1 STORING RECEIVER/TRANSMITTER FREQUENCY PAIRS AND MODE

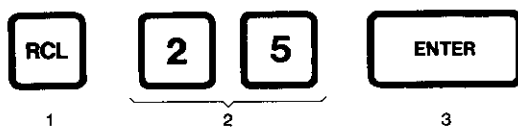


(Channel no. 25)

- 1 Press "STO"
The receiver and transmitter displays are blanked and their decimal points start flashing. If "STO" is pressed by mistake, just press "ENTER" to escape store mode.

- 2 Enter the channel-number in the receiver display via the numeric keys.
Channels 0-75 are available.
- 3 Press "ENTER"
If the channel-number is valid the receiver and transmitter displays show the stored frequency-pair. If the channelnumber is invalid the receiver display starts flashing.

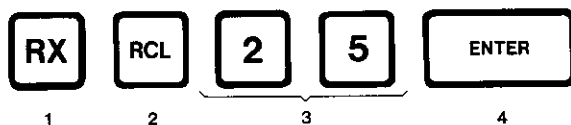
4.1.8.2 RECALLING RECEIVER/TRANSMITTER FREQUENCY PAIRS AND MODE



(Channel no. 25)

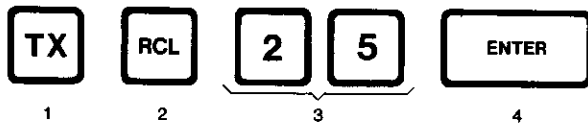
- 1 Press "RCL"
The receiver and transmitter displays are blanked and their decimal points start flashing.
- 2 Enter the channel-number in the receiver display via the numeric keys.
Channels 0-75 are available.
- 3 Press "ENTER"
If the channel-number is valid the receiver and transmitter displays show the recalled frequency-pair, an annunciator shows the recalled mode and the AGC is switched ON. If the channel-number is invalid the receiver display starts flashing.

4.1.8.3 RECALLING RECEIVER FREQUENCY



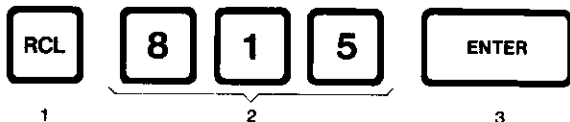
- 1 Press "RX"
The receiver display is blanked and its decimal point starts flashing.
- 2 Press "RCL"
- 3 Enter the channel-number in the receiver display via the numeric keys.
Channels 0-75 are available.
- 4 Press "ENTER"
If the channel-number or frequency is invalid the receiver display starts flashing. If both channel-number and frequency is valid the receiver display shows the recalled frequency.

4.1.8.4 RECALLING TRANSMITTER FREQUENCY



- 1 Press "TX"
The transmitter display is blanked and its decimal point starts flashing.
- 2 Press "RCL"
- 3 Enter the channel-number in the transmitter display via the numeric keys.
Channels 0-75 are available.
- 4 Press "ENTER"
If the channel-number or frequency and/or mode is invalid the transmitter display starts flashing. If both channelnumber, frequency and mode is valid the transmitter display shows the recalled frequency if TX is ON, and the time of day if TX is OFF.

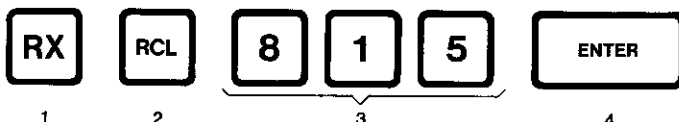
4.1.8.5 RECALLING ITU CHANNEL FREQUENCY PAIRS FROM PROM



(ITU channel no. 815)

- 1 Press "RCL"
The receiver and transmitter displays are blanked and their decimal points start flashing.
- 2 Enter the channel-number in the receiver display via the numeric keys.
- 3 Press "ENTER"
If the channel-number is invalid the receiver display starts flashing. If the channel-number (according to mode) is valid the receiver display shows the ITU receiver frequency and the transmitter display shows the ITU transmitter frequency if TX is ON, and the time-of-day if TX is OFF.

4.1.8.6 RECALLING ITU CHANNEL RECEIVER FREQUENCY FROM PROM

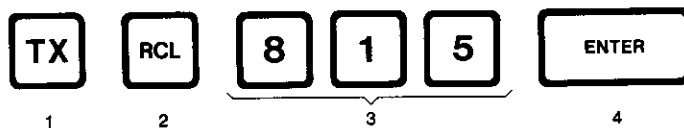


(ITU channel no. 815)

- 1 Press "RX"
The receiver display is blanked and its decimal point starts flashing.
- 2 Press "RCL"

- 3 Enter the channel-number in the receiver display via the numeric keys.
- 4 Press "ENTER"
If the channel-number is invalid the receiver display starts flashing. If the channel-number (according to mode) is valid the receiver display shows the ITU receiver frequency.

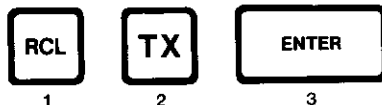
4.1.8.7 RECALLING ITU CHANNEL TRANSMITTER FREQUENCY FROM PROM



(ITU channel no. 815)

- 1 Press "TX"
The transmitter display is blanked and its decimal point starts flashing.
- 2 Press "RCL"
- 3 Enter the channel-number in the transmitter display via the numeric keys.
- 4 Press "ENTER"
If the channel-number is invalid the transmitter display starts flashing. If the channel-number (according to mode) is valid the transmitter display shows the ITU transmitter frequency if TX is ON, and the time-of-day if TX is OFF.

4.1.8.8 RECALLING TRANSMITTER FREQUENCY FROM PROM

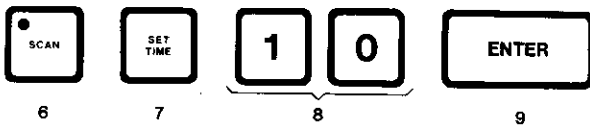


- 1 Press "RCL"
The receiver and transmitter displays are blanked and their decimal points start flashing.
- 2 Press "TX"
The receiver is reactivated and the first TX PROM frequency is shown in the transmitter display. Repressing "TX" will transfer the next TX PROM frequency to the transmitter display if the PROM location is programmed.
- 3 Press "ENTER"
If TX is ON then the decimal point stops flashing if both frequency and mode are valid, and the whole display starts flashing if frequency and/or mode is invalid.

If TX is OFF the transmitter display will show the time-of-day.

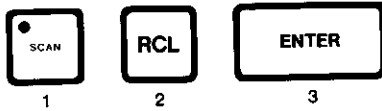
4.1.9 SCANNING STORED RECEIVER/TRANSMITTER FREQUENCY PAIRS

4.1.9.1 SET SCANNING PARAMETERS (Channel 25-50, time 1.0 sec.)



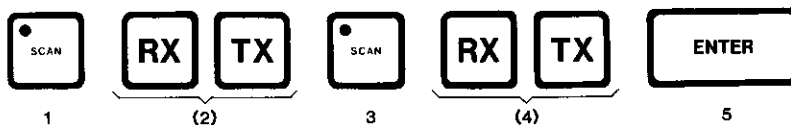
- 1 Press "SCAN"
The receiver and transmitter displays are blanked and their decimal points start flashing.
- 2 Enter the start channel-number in the receiver display via the numeric keys.
- 3 Press "ENTER"
If the channel-number is valid the receiver display is blanked. If not, it starts flashing and you must repeat steps 1,2 and 3.
- 4 Enter the stop channel-number (greater than the start channel-number) in the receiver display via the numeric keys.
- 5 Press "ENTER"
If the channel-number is valid the receiver and transmitter displays are reset to their initial states. If not, the receiver display starts flashing and you must press "SCAN", enter a valid stop channel-number and press "ENTER" again.
- 6 Press "SCAN"
The receiver and transmitter displays are blanked and their decimal points start flashing.
- 7 Press "SET TIME"
- 8 Enter the dwell time (0.1-9.9 sec.) in the receiver display via the numeric keys.
- 9 Press "ENTER"
The receiver and transmitter displays are reset to their initial states.

4.1.9.2 RECALL SCANNING PARAMETERS AND RESET SCAN POINTER



- 1 Press "SCAN"
The receiver and transmitter displays are blanked and their decimal points start flashing.
- 2 Press "RCL"
The start and stop channel-number are shown in the receiver display and the dwell time in the transmitter display. The scan pointer is reset to the start channel-number.
- 3 Press "ENTER"
The receiver and transmitter displays are reset to their initial states.

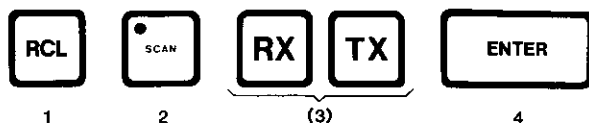
4.1.9.3 START/STOP AUTOMATIC SCANNING



- 1 Press "SCAN"
The receiver and transmitter displays are blanked and their decimal points starts flashing.
- (2) Control external scan port. Press "RX" to open port. Press "TX" to close port. If the port is open the scan s/s signal can be used to start automatic scanning. The port is initially closed.
- 3 Press "SCAN"
The scanning annunciator starts flashing indicating that the equipment is in automatic scanning mode. The receiver/ transmitter frequency pairs stored in each channel between start and stop will be shown in the receiver and transmitter displays for the dwell time set. This is repeated until "ENTER" is pressed. If the scanning parameters has been changed, some time may pass before the start channel frequencies appear in the displays.
- (4) Control external scan port. Press "RX" to open port. Press "TX" to close port. If the port is open the scan s/s signal can be used to stop automatic scanning. If neither keys are operated the port-state is as specified in (2).
- 5 Press "ENTER"
The scanning annunciator stops flashing and the receiver and transmitter are set to the frequencies indicated by the displays.

Note: When OPTION bit 3 is set (see Second Functions), the squelch may be switched on to allow a special scanning in the phone modes (USB, LSB, AM, R3E). Each channel will be muted for 1.5 seconds to provide setting time to the squelch. After this period muting is handled by the squelch in the normal way. If the squelch mutes the signal for more than the dwell time programmed, the scanning will continue.

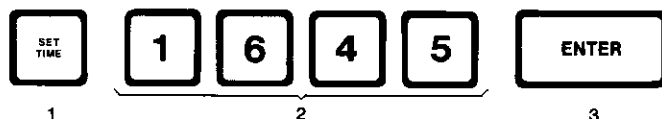
4.1.9.4 MANUAL SCANNING



- 1 Press "RCL"
The receiver and transmitter displays are blanked and their decimal points start flashing.
- 2 Press "SCAN"
The scanning annunciator is turned constantly ON indicating that the equipment is in manual scanning mode. The start or next channel-number frequency pair is recalled and shown in the receiver and transmitter displays until "SCAN" is repressed, which will recall the next pair.
- (3) Control external scan port. Press "RX" to open port. Press "TX" to close port. If the port is open the scan s/s signal can be used to step manual scanning to next frequency pair. The port is initially closed.
- 4 Press "ENTER"
Manual scan is terminated, leaving the displayed frequency pair unchanged.

4.1.10 CLOCK FUNCTIONS

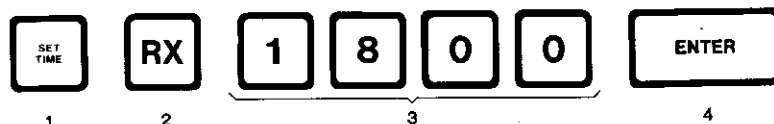
4.1.10.1 SET TIME OF DAY (16 hrs. 45 min.)



- 1 Press "SET TIME"
The transmitter display is blanked and the time cursor set (3rd digit).
- 2 Enter the time of day in the transmitter display via the numeric keys. The first two digits are interpreted as hours and the last two digits as minutes.
- 3 Press "ENTER"
The transmitter display shows the time of day if TX is OFF and the transmitter frequency if TX is ON. If you set time according to a time signal you must press "ENTER" exactly when the signal is given as this

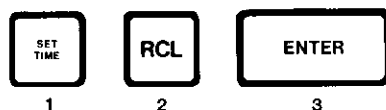
synchronizes the clock.

4.1.10.2 SET WAKE-UP TIME (18 hrs. 00 min.)



- 1 Press "SET TIME"
The transmitter display is blanked and the time cursor set (3rd digit).
- 2 Press "RX"
- 3 Enter the wake-up time in the transmitter display via the numeric keys.
The first two digits are interpreted as hours and the last two digits as minutes.
- 4 Press "ENTER"
The transmitter display is reset to its initial state.

4.1.10.3 RECALL WAKE-UP TIME



- 1 Press "SET TIME"
The transmitter display is blanked and the time cursor set (3rd digit).
- 2 Press "RCL"
The transmitter display shows wake-up time.
- 3 Press "ENTER"
The transmitter display is reset to its initial state.

4.1.10.4 START DORMANT STATE



- 1 Press "SET TIME"
The transmitter display is blanked and the time cursor set (3rd digit).
- 2 Press "ENTER"
The transmitter display is reset to its initial state.
- 3 Press "SUPPLY ON/OFF"

The equipment is switched OFF, and will automatically be switched ON again at wake-up time recalling the state it was in before being switched OFF.

4.1.11 MARITEX To select MARITEX mode just make sure that the last keying sequence has been terminated. In this state the CU responds to a frequency command from the ARQ unit by selecting TELEX mode and shifting to a special MARITEX state which is identified by the flashing TELEX annunciator.

In MARITEX mode the following keys are operative:



Switches speaker ON/OFF as described in section 4.2.



Terminates MARITEX mode. The TELEX annunciator will stop flashing and normal CU operation resumed.



If OPTION bit 6 is set this key is disabled. Otherwise it functions exactly as the TELEX key (described above).

In some situations it is desirable to interrupt the ARQ scanning temporarily while making a phone call. In this case OPTION bit 5 should be set and TELEX mode selected manually prior to ARQ scanning. A phone call is then initiated by selecting the appropriate phone mode which will lock out the ARQ frequency commands, thus enabling manual frequency selection. When the phone call is completed the TELEX mode should be reselected to allow further ARQ scanning.

TRP 8750 D will protect against erroneous transmitting by not allowing continuous keying in more than 1/2 minute in MARITEX mode. Passed this time limit the transmitter will be switched OFF and the beeper activated until a key is pressed.

When the "2182" key is pressed, the CU8000 stops listening to the ARQ until a new transmitter frequency different from 2182 is entered from the keyboard.

4.1.12 SECOND FUNCTIONS The second function level provides enhanced system control to the advanced user without sacrificing simplicity of the primary keypad functions. The level consists of 10 menus (pages) each containing a maximum of 10 functions (lines). Operation on this level will always be identified by the non-standard display symbol "□" in the left or right most tab of at least one of the displays.

4.1.12.1 SECOND FUNCTION SYNTAX



- 1 Press "2".
The transmitter display is blanked and the decimal points start flashing. The receiver display shows "□" to identify a non-standard display and "2". If "2" was pressed by mistake "ENTER" will terminate second function mode.
- 2 Press a number.
The number is passed to the receiver display. This number identifies the second function page. If the number was pressed by mistake "ENTER" will terminate second function mode.
- 3 Press a number.
The number is passed to the receiver display. This number identifies the second function line. If the number was pressed by mistake "2" will restart the second function mode.
- 4 Press "ENTER".
If page and line numbers are not valid the receiver display starts flashing and the second function mode can be either restarted by pressing "2" or terminated by pressing "ENTER". If both page and line numbers are valid the respective second function is executed and if no further keys are required in the specific function the displays are restored to the state prior to second function execution.
- (5) Most second functions require additionally keys to be pressed. Typically "2" will restart second function mode and "ENTER" terminate it. Some second functions require confirmation via the "STO" key. This situation is indicated by a special warning display-flash shifting between "JJJJJJ" and the entered number. Pressing "STO" will execute the function, "2" will restart the second function mode and any other key will terminate it.

Second functions requiring confirmation:

250: Clear RAM
251: Reset system
278: Clear "OPTION" register
280-287: Toggle "PRESET" register bit 0-7
298: Clear "GUARD" register

4.1.12.2 PAGE 0 (20#) Self test. For detailed information see self test description in chapter 8.

Executable lines:

- 200: Start automatic stepped self test.
- 201: Start manually stepped self test.
- 202: Start automatic stepped self test from an arbitrary test number.
- 203: Start manually stepped self test from an arbitrary test number.

4.1.12.3 PAGE 4 (24#) Miscellaneous functions.

Executable lines:

- 241: Read accumulated on-time. The receiver display will show total operation time of the TRP 8750 D with 1 hour resolution. Pressing "2" or "ENTER" will restart or terminate second function.
- 242: Read and program receiver tune step. The receiver display shows the present programmable tune step. A new tune step may be entered via the numeric keys.
Tune steps between 100 Hz and 99 kHz are possible.
Pressing "ENTER" will terminate second function.
To use this additional tune step, OPTION bit 4 should be set to 1 (ref. second function 274).
In this case the "TUNE RATE" key will introduce a fourth state indicated by all tune rate annunciators switched off.
- 243: Read single frequency formats in configuration PROM. The reading address is initialized to PROM address 0. The receiver display shows the programmed frequency if the RX bit = 1. The transmitter display shows the programmed frequency if the TX bit = 1.
The mode annunciators show the programmed modulation(s). Pressing "DIMMER UP" will increase the reading address to the next higher located format if it is not the "LIMITER BYTE".
Pressing "DIMMER DOWN" will decrease the reading address to the next lower located format if the present reading address is higher than PROM address 0.
Keeping either "DIMMER" key pressed will advance the reading address automatically.
Pressing "2" or "ENTER" will restart or terminate second function.
For further PROM format information refer to section 5.11.
- 244: Control BFO frequency. The receiver display shows the present BFO frequency. The transmitter display shows the stored BFO frequency selected on power-up. Pressing "STO" will store the present frequency. Pressing "RCL" will recall the stored frequency. Pressing "2" or "ENTER" will restart or terminate second function.

245: Read special system parameters in configuration PROM. The receiver display shows the PROM address in decimal initialized to top of PROM = 4095. The transmitter display shows the PROM data in decimal. Pressing "RCL" will change the displayed data to hexadecimal, useful when reading BCD. Since the display decoder is not designed for letters the following symbols are displayed for hexadecimals greater than 9:

A : C
B : J
C : U
D : M
E : E
F : blank

Pressing "DIMMER DOWN" will show the next lower PROM address.
Pressing "DIMMER UP" will show the next higher PROM address.
Pressing "2" or "ENTER" will restart or terminate second function.

246: Read CU program release date and version. The receiver display shows release date (year/month/day). The transmitter display shows version number.
Pressing "2" or "ENTER" will restart or terminate second function.

247: Read TU program release date and version. The receiver display shows release date (year/month/day). The transmitter display shows version number.
Pressing "2" or "ENTER" will restart or terminate second function.

248: Adjust beeper sound level. A continuous control beeping is started.
Pressing "VOLUME UP" will increase the sound level.
Pressing "VOLUME DOWN" will decrease the sound level.
Pressing "2" or "ENTER" will restart or terminate second function preserving the new beeper sound level.

249: Switch antenna OFF. The antenna and transmitter are switched OFF. The power annunciators are turned OFF to identify antenna OFF and transmitter display shows time of day to identify transmitter OFF. Finally second function is terminated. When "TX ON/OFF" is then pressed both antenna and transmitter are switched ON and power annunciators and transmitter display restored to normal.

4.1.12.4 PAGE 5 (25#) Miscellaneous functions. This page can not be entered when "GUARD" bit 7 is set (see second function page 9).

Executable lines:

250: Clear RAM. The function requires confirmation as described for the syntax key (5). All stored frequency pairs and modes, the "OPTION" register and "GUARD" register will be cleared (=0) and second function terminated.

251: Reset system. The function requires confirmation as described for the syntax key (5). 32 msec after releasing the "STO" key, both CU and TU processors are reset by running the power-up program.

4.1.12.5 PAGE 7 (27#) Controls an 8-bit "OPTION" register.

Executable lines:

270: Toggle "OPTION" bit 0
271: - - - - 1
272: - - - - 2
273: - - - - 3
274: - - - - 4
275: - - - - 5
276: - - - - 6
277: - - - - 7
278: Clear "OPTION" register
279: Display "OPTION" register (bits 0-3 in transmitter display, bits 4-7 in receiver display).

All lines will display the resulting "OPTION" register. Pressing "2" or "ENTER" will restart or terminate second function.

"OPTION" bit functions:

BIT	LEVEL	FUNCTION
0	-	Reserved for future use
1	-	- - - -
2	-	- - - -
3	0	Normal
	1	Enable special squelched scanning in "phone mode"
4	0	Normal
	1	Enable programmable receiver tune rate
5	0	Normal
	1	Enable phone call interrupts in MARITEX mode
6	0	Normal
	1	Disable "ENTER" key during MARITEX mode
7	0	Normal
	1	No time-display "cursor"

4.1.12.6 PAGE 8 (28#) Controls an 8 bit "PRESET" register intended for use in installation only. Special system parameters which are difficult to specify before installation can be changed on location by toggling the respective bit in this non-volatile register. To protect the "PRESET" register against erroneous changes Page 8 can not be entered when "GUARD" bit 7 is set. Toggling any bit requires confirmation as described for the syntax key (5). Further more "PRESET" is excluded from the CLEAR RAM function (250).

Executable lines:

280: Toggle "PRESET" bit 0
281: - - - - 1
282: - - - - 2
283: - - - - 3
284: - - - - 4
285: - - - - 5
286: - - - - 6
287: - - - - 7
289: Display "PRESET" register (bits 0-3 in transmitter display, bit 4-7 in receiver display).

All lines will display the resulting "PRESET" register. Pressing "2" or "ENTER" will restart or terminate second function.

"PRESET" bit functions:

BIT	LEVEL	FUNCTION
0	-	Reserved for future use
1	-	- - - -
2	-	- - - -
3	-	- - - -
4	0	Normal
	1	Enable "Key inhibit"
5	0	Normal
	1	Disable power display (ampere only)
6	0	Normal
	1	Disable ampere display (power only)
7	0	Normal
	1	Complement external scan transitions

4.1.12.7 PAGE 9 (29#) Controls an 8-bit "GUARD" register. This page can not be entered when "GUARD" bit 7 is set (see following explanation).

Executable lines:

290: Toggle "GUARD" bit 0
291: - - - - 1
292: - - - - 2
293: - - - - 3
294: - - - - 4
295: - - - - 5
296: - - - - 6
297: - - - - 7
298: Clear "GUARD" register.
299: Display "GUARD" register (bits 0-3 in transmitter display, bit 4-7 in receiver display).

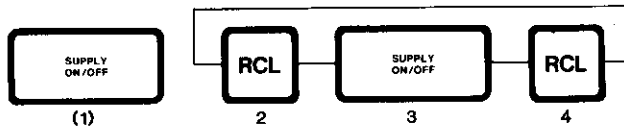
All lines will display the resulting "GUARD" register. Pressing "2" or "ENTER" will restart or terminate second function.

"GUARD" bit functions:

BIT	LEVEL	FUNCTION
0	0	Normal
	1	Inhibit direct entry of RX frequencies
1	0	Normal
	1	Inhibit "RX" key
2	0	Normal
	1	Inhibit direct entry of TX frequencies
3	0	Normal
	1	Inhibit "TX" key
4	0	Normal
	1	Inhibit store function
5	0	Normal
	1	Inhibit "STO" key
6	0	Normal
	1	Inhibit entry of scan parameters
7	0	Normal
	1	Inhibit certain second function pages

If programmed in the Configuration PROM (ref. section 5.11), either of the RX (bit 0 & 1) and TX (bit 2-3) GUARD bits set to 1 will cause the respective display to show channel numbers exclusively. If no channel number applies to the frequency then a "C" will be displayed (e.g. immediately after "SUPPLY ON").

4.1.12.7.1 Clear GUARD-bit 7 (PAGE GUARD)



(1) Switch supply OFF.

2 Press "RCL" and keep it.

3 Switch supply ON.

4 Keep "RCL" pressed until the beeper sounds.
Guard-bit 7 is now cleared and all second function pages can be entered.

To prevent unauthorized use this syntax is not described in the User Manual.

4.1.12.8 SECOND FUNCTIONS SUMMARY

200: Start automatically stepped self test
201: Start manually stepped self test
202: Start automatic stepped self test from an arbitrary test number.
203: Start manually stepped self test from an arbitrary test number.

241: Read accumulated on-time
242: Read and program receiver tune step
243: Read single frequency formats
244: Control BFO frequency
245: Read special system parameters
246: Read CU release date and version
247: Read TU release date and version
248: Adjust beeper sound level
249: Turn OFF antenna

250: Clear RAM
251: Reset system

270-277: Toggle "OPTION" register bit 0-7
278: Clear "OPTION" register
279: Read "OPTION" register

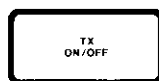
280-287: Toggle "PRESET" register bit 0-7
289: Read "PRESET" register

290-296: Toggle "GUARD" register bit 0-6
297: Set "GUARD" register bit 7
298: Clear "GUARD" register
299: Read "GUARD" register

4.2 DESCRIPTION OF OPERATING CONTROLS



Switches ON/OFF the equipment power supply. When switched ON the equipment enters the state it was in just before being switched OFF.



Switches ON/OFF the transmitter functions. The transmitter display shows the transmitter frequency when switched ON, and the time of day when switched OFF.



Increases and decreases the light intensity in the displays, meters and annunciators.



Storing of receiver/transmitter frequency pairs and mode. When "STO" is pressed the receiver and transmitter displays are blanked and their decimal points start flashing, indicating that a channel number (0-75) must be entered in the receiver display via the numeric keys.



Setting/recalling scanning parameters and start/stop scanning of stored receiver/transmitter frequency pairs. The annunciator is flashing in automatic scanning mode and turned constantly ON in manual scanning mode. (for details see section 4.1)



Setting time of day, setting/recalling wake-up time, starting dormant state and setting dwell time in scanning. (for details see section 4.1)



Switches ON/OFF duplex operation of the equipment. Annunciator ON indicates that duplex operation is selected. When duplex is ON, the receiver is constantly active, even when keying the transmitter. If transmitter and receiver frequencies are 20 kHz or less apart, the transmitter display and duplex annunciator are flashing.



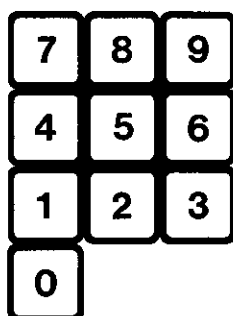
- a) Primary function: Change of receiver frequency. When "RX" is pressed the receiver display is blanked and its decimal point starts flashing, indicating that a new receiver frequency must be entered into the display via the numeric keys.
- b) Secondary function: Setting of wake-up time, when "RX" is pressed immediately after "SET TIME". Opening of the external scan port (see section 4.1)



- a) Primary function: Change of transmitter frequency. When "TX" is pressed the transmitter display is blanked and its decimal points start flashing, indicating that a new transmitter frequency must be entered into the display via the numeric keys.
- b) Secondary function: Recalling of transmitter frequency from PROM. Closing of the external scan control port (see section 4.1)



- a) Primary function: Recalling stored receiver/ transmitter frequencies. When "RCL" is pressed the receiver and transmitter displays are blanked and their decimal points start flashing, indicating that a channel-number (0-75) must be entered into the receiver display via the numeric keys.
- b) Secondary function: Recalling wake-up time, when "RCL" is pressed immediately after "SET TIME" and recalling scanning parameters when "RCL" is pressed immediately after "SCAN" (see section 4.1)



Numeric keys

- a) Primary functions:
Entering of receiver/transmitter frequencies and channel numbers.
- b) Secondary functions:
Setting scanning parameters, time of day, wake up time and sound level of beeper.
Refer to section 4.1 for further details.



Terminating keyboard operation. "ENTER" must be pressed to terminate all keyboard operations initiated by the "RX", "TX", "STO", "RCL", "SCAN", "SET TIME" or numeric keys. Generally the displays will then be reset to their initial states if the operating parameters are valid. An exception is the self test mode (see chapter 8).



Adjustment of receiver AF-amplifier gain. (Sound level of internal speaker, handset phone and headphone). Pressing one of the keys turns on the corresponding annunciator, which is turned off again when the key is released or when minimum or maximum sound level is reached.



Adjustment of receiver IF-amplifier gain when the AGC is switched OFF.



Switches ON/OFF the AGC (Automatic Gain Control). The annunciators indicate whether the AGC is ON or OFF. When the AGC is ON the receiver IF-amplifier gain is automatically adjusted and manual control disabled. When the AGC is switched OFF the receiver IF-amplifier gain is maintained on the level it had just before the AGC was switched OFF and manual control via the "SENSITIVITY" keys is enabled. When selecting a new receiver frequency the AGC should always be ON, to ensure that a suitable start level of IF-amplifier gain is set before the AGC is switched OFF for manual adjustment.



Selects AGC time constant, that is the rate at which gain is regulated. Annunciators indicate whether "AGC SLOW" or "AGC FAST" is selected. "AGC SLOW" is automatically selected when switching to the modes SSB, R3E or MCW. "AGC FAST" is automatically selected when switching to the modes AM, TELEX or CW. The settings selected by the system are assumed to give the best reception in the modes concerned but under special circumstances a better reception might be obtained by pressing "AGC FAST" if "AGC SLOW" were selected and vice versa. In the AM and the TELEX-mode only "AGC FAST" is possible.



Switches ON/OFF internal and external loudspeaker. Annunciator ON indicates loudspeaker(s) ON. If headphones are connected via the socket on the rear of the Control Unit, the internal loudspeaker is always switched OFF.



Increases receiver gain 10 dB by activating the RF-amplifier stage. Annunciator ON indicates RF-amplifier ON. The RF-amplifier may be used when the received signal is weak.



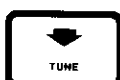
Decreases receiver gain 20 dB by inserting the antenna input attenuator. Annunciator ON indicates attenuator ON. The antenna attenuator may be used if the received signal is disturbed by strong out-of-band signals.



Switches ON/OFF Squelch function. Annunciator ON indicates Squelch ON. If the Squelch is ON a speech signal with a signal to noise ratio greater than a certain value is required to pass the signal through the receiver AF-amplifier. The Squelch is used to eliminate noise when there is no speech signal on the receiver frequency. The Squelch Board is optional. When not installed, pressing the key causes no action.



Selects frequency step in receiver tuning. An annunciator below one of the three right hand digits of the receiver display indicates the frequency step selected. 10 Hz, 100 Hz and 1000 Hz steps are possible.



Tuning of receiver frequency up or down in frequency steps selected by the "TUNE RATE" key (see section 4.1)



Adjustment of the BFO frequency down and up in CW mode. Receiver display shows BFO frequency when either of the keys are pressed.



Selects respective IF filters in CW and MCW mode. Annunciator ON indicates selected filter.



Selecting transmission of J3E and reception of J3E and R3E signals in USB (Upper Side Band). Annunciator ON indicates USB-mode selected.



Selecting transmission of J3E and reception of J3E and R3E signals in LSB (Lower Side Band). Annunciator ON indicates LSB-mode selected. If transmission of LSB is illegal and transmitter is ON, the transmitter display is flashing and transmitter function disabled.



Selecting transmission of H3E (Upper Side Band) and reception of H3E and A3E signals. Annunciator ON indicates AM mode selected. If transmission of H3E is illegal and transmitter is ON, the transmitter display is flashing and transmitter function disabled.



Selecting transmission of R3E and reception of R3E and J3E signals (Upper Side Band). Annunciator ON indicates R3E mode selected.



Selecting transmission and reception of Telex in F1B mode. Annunciator ON indicates Telexmode selected. The Telex function is optional.



Fast set up for 2182 kHz. Pressing this key will instantly change receiver and transmitter frequency to 2182 kHz, select AM (H3E) mode, select FULL POWER, and enable transmitter function (TX ON). The loudspeaker(s) and AGC are automatically switched ON and RF-AMP, ANT ATT and SQUELCH switched OFF. Antenna current is displayed when transmitting.



Fast set-up for 500 kHz. Pressing this key will instantly change receiver frequency to 500 kHz and select MCW (H2A) mode. The loudspeaker(s) and AGC are automatically switched ON and RFAMP, ANT ATT and SQUELCH switched OFF. IF FILTER keys are enabled and the intermediate type filter automatically selected.



Selecting transmission and reception of A1A morse telegraphy signals. Annunciator ON indicates CW-mode selected. If transmission of A1A is illegal and transmission is ON, the transmitter display is flashing and transmitter function disabled. IF FILTER keys are enabled and the intermediate type filter automatically selected. BFO is enabled and AGC is switched ON.



Selecting transmission and reception of H2A modulated morse telegraphy signals. Annunciator ON indicates MCW-mode selected. If transmission of H2A is illegal and transmission is ON, the transmitter display is flashing and transmitter function disabled. IF FILTER keys are enabled and the intermediate type filter automatically selected. AGC is switched ON.



Activating Antenna Tuner. Pressing this key will start the automatic tuning procedure in the ATU (Antenna Tuning Unit). Tuning is performed in less than 1.5 sec. Pressing the handset key for the first time after changing transmitter frequency will also start the tuning procedure, and it is therefore not necessary to press "TX TUNE" in this case. "TX TUNE" is normally used when the frequency has been unchanged for some time and the antenna impedance has changed due to external circumstances (see section 4.1).



Selecting low transmitter output power (approx. 10 W PEP). Annunciator ON indicates LOW POWER selected.



Pressing "LOW POWER" and "MEDIUM POWER" simultaneously selects LOW-MEDIUM output power (approx. 30 W PEP). LOW and MEDIUM power annunciators simultaneously ON indicates LOW-MEDIUM power level selected.



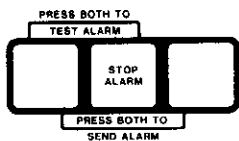
Selecting medium transmitter output power (approx. 90 W PEP). Annunciator ON indicates MEDIUM POWER selected.



Pressing "FULL POWER" and "MEDIUM POWER" simultaneously selects FULL-MEDIUM output power (approx. 260 W PEP). FULL and MEDIUM power annunciators simultaneously ON indicates FULL-MEDIUM power level selected.



Selecting full transmitter output power (approx. 750 W PEP). Annunciator ON indicates FULL POWER selected.



Testing and transmitting the two-tone alarm signal. Press "STOP ALARM" and the left key simultaneously and keep pressed to test alarm. The alarm signal is heard in the loudspeaker, and transmitter keying is disabled. If the Dummy Load option is installed the alarm generator and the transmitter is tested on the built-in dummy load of the Antenna Tuning Unit. The Antenna Current Meter indicates current into the dummy load. The Output Power and Antenna Current annunciators are flashing to show that the transmitter is in the test mode. Test on dummy load cannot be performed on 2182 kHz.

Press the left and right keys simultaneously to send alarm. The alarm signal is heard in the loudspeaker and transmitted for 45 sec. on the selected frequency if the transmitter is ON. The alarm signal may be interrupted by pressing "STOP ALARM".

4.2.1 Transmitter Display In its initial state the transmitter display shows the transmitter frequency in kHz if TX is ON or the time of day in hours and minutes if TX is OFF. Time of day is indicated by a flashing time cursor (3rd digit). A steady time cursor indicates that entering or recalling of time has not yet been terminated. A flashing decimal point indicates that entering, storing or recalling of a transmitter frequency has not yet been terminated. Flashing digits indicate that the transmitter frequency and/or mode is unauthorized, i.e. the frequency is outside the specified range and/or not contained in the frequency PROH. The transmitter cannot be keyed if the transmitter display is flashing.

4.2.2 Receiver Display In its initial state the receiver display shows the receiver frequency in kHz. A flashing decimal point indicates that entering, storing or recalling of a receiver frequency or channel-number has not yet been terminated. Flashing digits indicate that the frequency or channel-number is outside the specified range.

4.2.3 Signal Strength meter Gives a relative indication of the signal strength in the received signal.

4.2.4 Output power/Antenna current meter Measures the antenna current during transmission on 2182 kHz and 500 kHz, as indicated by the antenna current annunciator. Gives a relative indication of the transmitter output power during transmission on other frequencies by measuring the output peak voltage/current, as indicated by the output power annunciator. A flashing meter indicates a fault in the Transceiver Unit - Antenna Tuning Unit communication.

4.2.5 Output power annunciator Also serves as a mismatch indicator on all frequencies. If the input SWR of the Antenna Tuning Unit exceeds 1:3 the output power annunciator starts flashing, indicating that tuning is required.

4.2.6 Reduced power annunciator If the temperature of the Power Amplifier heatsink and/or the Antenna Tuning Unit exceeds their maximum levels, the output power is reduced by 5 dB which is indicated by the reduced power annunciator. This may occur due to extreme environmental and/or working conditions.

5. INSTALLATION

Correct installation of the equipment is important for maximum performance and reliability. Antennas and earth connections must be installed with the greatest care using corrosion resistant materials. Cable routing shall be made so the cables are protected from physical damage. Cable bends especially on coaxial cables may not be sharp and a sufficient number of clips or straps should be used for securing the cables. Before installing the equipment make sure that the Configuration PROM is properly programmed, see section 5.11.

5.1 Mounting the Control Unit

The Control Unit can be tabletop or bulkhead mounted. Fig. 5.1 shows overall dimensions and a drilling plan for the necessary holes. The unit is bolted through two holes on the bottom part of the cabinet. The unit must be opened when bolting. Loosen the two front panel screws and lift off the front panel. The front panel is hinged to the bottom part by means of two flexible straps. To enable cable entry from either side of the unit, the bottom part of the cabinet may be turned 180 degrees relative to the front panel. To alter the position, open the unit and loosen the screws of the hinges in the bottom part of the cabinet and release the hinges. Turn the front panel and fix the hinges in the opposite side of the cabinet bottom. Be careful not to damage any components or to drop any conducting objects onto the printed circuit boards of the unit. The front panel can be tilted for convenient operation. To adjust the angle loosen the two front panel screws and open the unit. Move the two stop pins in each side of the unit to the appropriate holes and refit the front panel.

5.2 Mounting the Transceiver Unit

The Transceiver Unit may be mounted up to 100 metres from the Control Unit using a screened 16 x 0.5 mm sq. multiwire cable for interconnection. The unit should be installed in a dry place and consideration should be given to accessibility for servicing. The brackets supplied allow for bulkhead or bench mounting. Fig. 5.2 shows mounting details. It is important to provide plenty of airspace below and above the unit, for adequate air circulation through the heatsink at the back of the unit.

5.3 Mounting the Antenna Tuning Unit

The Antenna Tuning Unit may be mounted up to 100 metres from the Transceiver Unit using RG-213/U (RG-8A/U) coaxial cable and a screened 16 x 0.5 mm sq. multiwire cable for interconnection. The unit should be installed near the antenna feed point. Fig. 5.3 shows mounting details.

5.4 Power Supply

The TRP 8750 D operates at voltages between 21.6 and 41.6 VDC and is to be powered from a 24 or 32 volt battery or from a separate AC Power Supply Unit. The supply leads are connected to the Transceiver Unit through the cable entry at the rear of the cabinet. The supply terminal strip is adapted for screened power supply cable as required by some administrations. The screen of the cable is connected to the center terminal. The terminal strip may be removed from the chassis for easier access. Attention should be paid to CCIR Rec. 218-1 which recommends that cables in the vicinity of the receiving antennas or the radio receiving room, and cables within the radio room, are screened by enclosing them in metal conduits, unless the cables themselves are effectively screened. The earth connection of the equipment will not cause the battery to be earthed. Maximum permissible peak voltage between the battery terminals and earth is 100 V. Note that fuses must be provided in the supply leads. Installation diagram fig. 5.3 shows the necessary cable cross sections and external fuse ratings.

5.5 Earth Connections

5.5.1 Antenna Tuning Unit As the earth connection of a transmitter is part of the total antenna system, it is of the utmost importance that the earth connection to the Antenna Tuning Unit is constructed to have the lowest possible RF-impedance. Losses in the earth connection will result in a decrease in radiated power which means that the range of the transmitter will be reduced. In steel ships a 50 x 0.5 mm copper strap as short as possible is connected between the earth terminal at the bottom of the Antenna Tuning Unit and two 1/2" or M12 bolts welded to the superstructure. Vessels constructed of non-conducting materials must be equipped with a copper earth plate having a minimum area of 1 square metre mounted below the water line. From a copper earth bolt hard soldered to the earth plate a 50 x 0.5 mm copper strap is run, preferably uninterrupted to the earth terminal at the bottom of the Antenna Tuning Unit. Should it be necessary to break the copper strap, for example to pass through a deck, two 1/2" or M12 bolts should be used for this feed through. The copper strap may not be passed through iron pipes and should be kept at minimum distance of 0.5 m from iron parts of some extent. If this minimum distance cannot be kept the copper strap must be effectively connected to these parts using a strap having the same dimensions. On wooden ships having a superstructure of metal, this superstructure should also be effectively connected to the copper strap by using stainless steel bolts and preferably pieces of stainless steel strips between the metal parts.

5.5.2 Other Units All other units must be grounded separately to the ships metal in the shortest possible way. The Control Unit is connected to ground from the ground frame at the cable entries using a 2.5 mm sq. wire. In the Transceiver Unit a ground strap is connected to the ground terminal at the cable entry. On vessels with no metallic superstructure the ground connection at the Control Unit and the Transceiver Unit may be omitted.

5.6 Antennas

The standard equipment is used with separate transmitting and receiving antennas. If, however, the Antenna Tuning Unit is fitted with the optional Antenna Relay Board [641] a common antenna may be used for transmission and reception. The antennas should be erected well in the clear, away from any objects whose influence on the antenna may vary, such as derricks etc. Insulators should be of the best type having low leakage even when wet. Stays, wires, steel masts etc. should be either effectively earthed or insulated. The receiving antenna should be kept as far as possible from electrical equipment in order to minimize noise. Electrical installation such as cable braiding (screens) and instruments in the vicinity of the receiving antenna should be earthed effectively, and the instruments in question should be fitted with noise-interference suppression devices, effective in the range 0.1 MHz to 30 MHz.

5.6.1 Transmitter Antenna The Antenna Tuning Unit will tune on any frequency in the range 1.6 to 30 MHz to wire and/or whip antennas of 7 to 30 metres total length. A long antenna is preferable with regard to radiated power. The antenna is terminated at the insulator at the top of the Antenna Tuning Unit. The insulator must be relieved from mechanical stress by using max. 1 metre flexible wire between the insulator and a support.

5.6.2 Receiver Antenna Length: 7-30 m. The antenna feed-in should be coaxial cable. The receiver antenna terminal is a UHF-connector (PL 259 type) located in the Transceiver Unit. If a long cable is used an impedance matching transformer should be inserted at the antenna end of the feeder. In one antenna installations using the optional Antenna Relay Board [641] this transformer is built-in.

5.7 Interconnection of Units

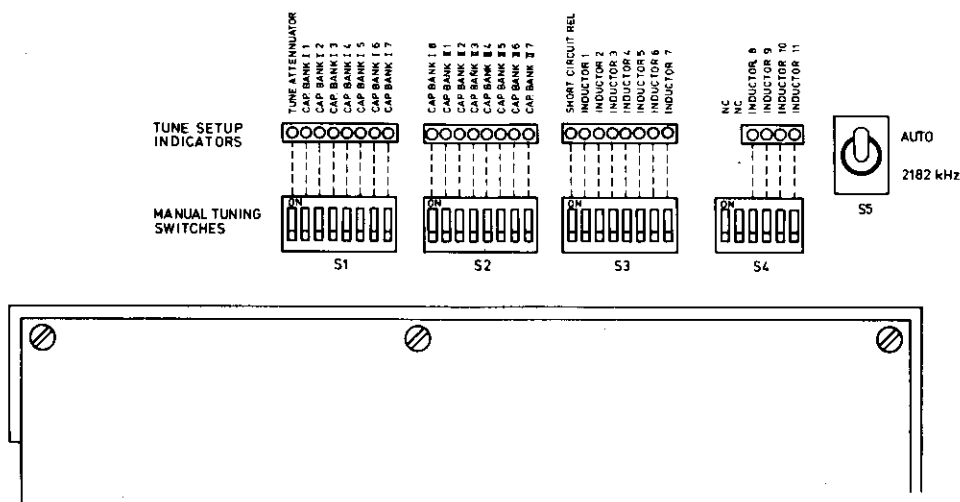
5.7.1 Control Unit-to-Transceiver Unit connections The units are interconnected by a length of 16 x 0.5 mm sq. screened multivire cable (max. 100 metres). In order to connect the cable to the Control Unit the front panel is removed. The cable is entered through the threaded cable entry and the wires are then connected to the terminal strip marked 601-TS2 Transceiver Unit. NOTE: Wire ends should be fitted with cable end sleeves before mounting. The screen is connected to the ground frame at the cable entry. To connect the cable to the Transceiver Unit the front must be opened. The cable is entered through the cable entry at the back of the unit and the wires are connected to the terminal strip marked 620-TS3 Control Unit. The screen must be connected to the chassis bracket. For connections see installation diagram fig. 5.3.

5.7.2 Transceiver Unit-to-Antenna Tuning Unit connections The units are interconnected by an RG-213/U (RG-8A/U) coaxial cable and a 16 x 0.5 mm sq. screened multiwire cable (max. 100 metres). In one-antenna installations using the optional Antenna Relay Board [641] an additional RG-213/U coaxial cable is used. The coaxial cables are terminated in UHF-connectors (PL 259 type). The sockets in the Transceiver Unit may be removed from the chassis for easier access. The multiwire cable is mounted in the same way in the Transceiver Unit as the cable from the Control Unit. The wires are connected to the terminal strip marked 620-TS1 Antenna Tuning Unit, see fig. 5.3. NOTE: If the TRP 8750 D is not operated with an ATU 8750 Antenna Tuning Unit a strap must be placed between terminal no. 6 (TUNE) and terminal no. 7 (TPR) of 620-TS1. A missing strap will cause the Power Meter display to flash 11 sec. after a TUNE sequence has been initiated. The cables enter the Antenna Tuning Unit through the threaded cable entries at the bottom of the unit. The wires must be connected as shown in fig. 5.3. The screen of the multiwire cable must be connected to the receptacle at the grounding tab next to the terminal strip. NOTE: Wire ends of the multiwire cable should be fitted with cable end sleeves before mounting. In installations with long earth straps to the Antenna Tuning Unit, high RF voltages may be present on the ATU ground terminal. To avoid this voltage being coupled to the Transceiver Unit the interconnection cables must be run from the Transceiver Unit to the point where the copper strap from the Antenna Tuning Unit is connected to earth. From this point the cables must follow the copper strap to the Antenna Tuning Unit. The cables should be placed upon the center of the copper strap to ensure good coupling. The part of the cable-run between earth and the Transceiver Unit must not be run in parallel with the earth strap within a distance of at least 1 metre.

5.8 Connection of External Equipment

Auxiliary terminals in the Control Unit and the Transceiver Unit allows various external equipment to be connected to the TRP 8750 D. In tables 5.2 and 5.5 terminal assignments are listed for the Control Unit and the Transceiver Unit respectively. Screened cable should be used with the screen connected to ground frame or chassis.

5.8.1 Timing of TELEX KEY signal The transmitter pre-keying time should be approx. 7 ms. not less. Telex modems with programmable pre-keying time must be programmed to this value. In case of telex modems with a fixed pre-keying time longer than 7 ms. a time delay may be introduced by the TELEX KEY DELAY circuit on PCB [601] in the Control Unit. The leading edge of the TELEX KEY signal may be delayed by up to 30 ms. in steps of 3.33 ms. by moving a strap to the appropriate position.



Control that all Manual Switches are in position off. With the switch AUTO/2182 kHz (S5) in position "AUTO", a normal tuning procedure is performed on 2182 kHz. The Manual Tuning Switches are then switched "ON", as indicated by light in the Tune Set-up Indicators. Ensure that the transmitter is not keyed. Check correct setting of the Manual Tuning Switches by switching S5 to position 2182 kHz and simultaneously control that none of the Tune Set-up Indicators change. If any of the indicators change, repeat the procedure. When S5 is switched back to "AUTO" the Tune Set-up will be reset.

5.10 Remote Frequency Control

TRP 8750 D is equipped with a serial interface for remote telex operation. That is, the receiver and/or transmitter frequencies may be remote controlled whereas telex mode will be automatically selected. The remote control terminals are the 601-TS1 Auxiliary Terminals no. 1 to 4, see Table 5.2. The interface, when used, has to be enabled by the appropriate Configuration PROM programming, see section 5.11. PROM addr. FEDh/4077d MARITEX.

The interface circuit conforms electrically to the EIA standard RS-232C using the following:

Baud rate	: 2400 bps
Parity	: Odd
Word length	: 8 bits
Start bits	: 1
Stop bits	: 1

5.10.1 DATA FORMAT

Address word: This word, when transmitted to TRP 8750 D, initiates the command cycle. To identify the address word bits 6 and 7 shall both be set to 1. Thus, any other word types used will have to be less than C0h/192d.

Reserved addresses:
C2h/194d : Receiver
C3h/195d : Transmitter
FFh/255d : Broadcast

Command word: The word immediately following the address word contains the command.

Reserved commands:
00h/0d : Reset.
The TRP 8750 D will run the power-up sequence.
14h/20d : Frequency input.
The next 4 words will be interpreted as a frequency.

Frequency words: After a frequency command 4 words are used to specify the frequency in packed BCD:

1.	10 MHz	1 MHz
2.	100 kHz	10 kHz
3.	1 kHz	100 Hz
4.	10 Hz	0

Status word: After having received the frequency command and all four frequency words, the TRP 8750 D transmits a status word having the following format:

Bit

7 : Interface error. When set to 1 this bit identifies either a parity, framing, overrun or data format error. The command cycle must be repeated.

6 : Always 0.

5 : Busy. When set to 1 this bit identifies that the TRP 8750 D is not ready. The command cycle must be repeated.

0-4 : Address echo. This field contains the five LSB's of the received address word.

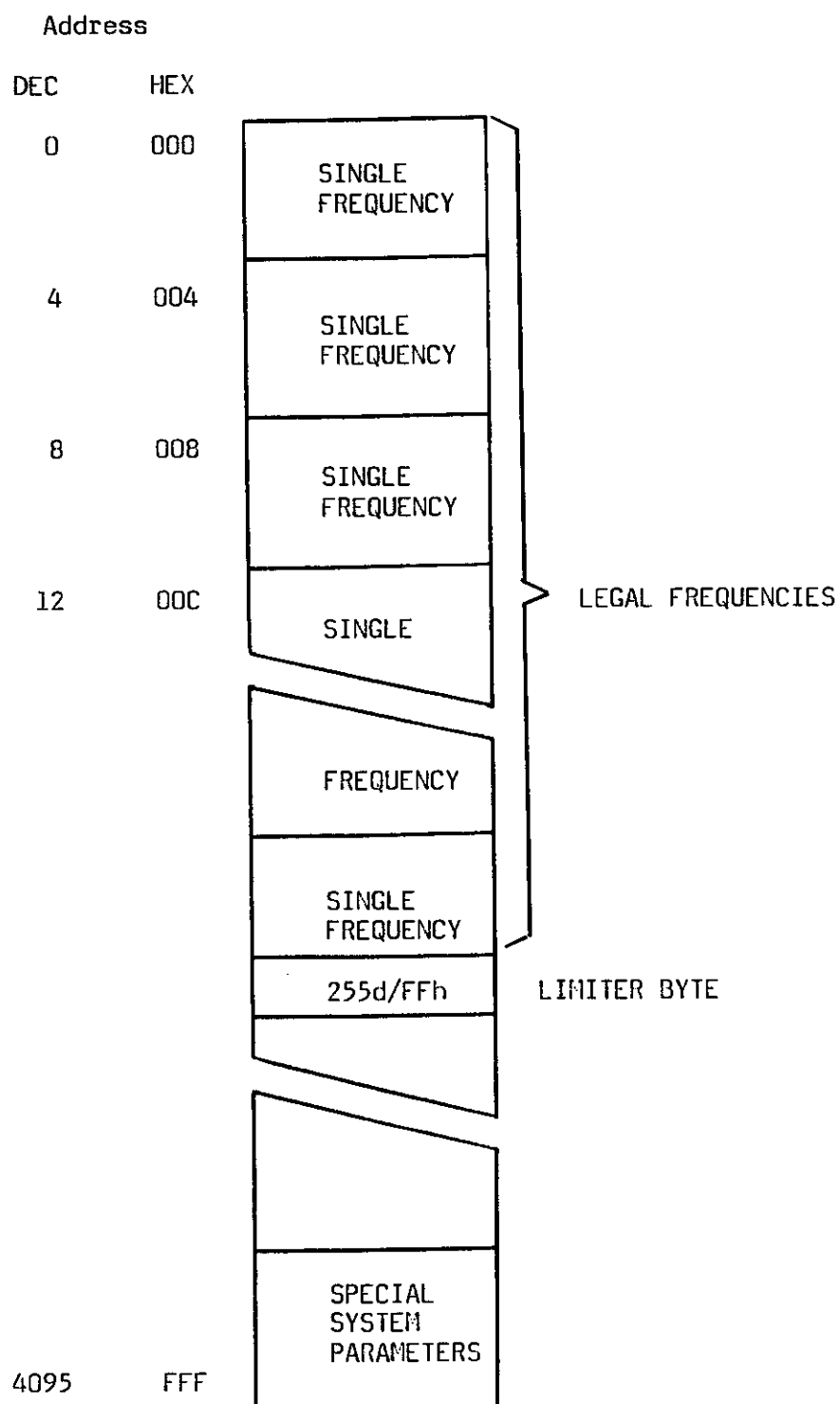
5.11 Configuration PROM Programming

The Configuration Prom contains 4 kbytes in which legal frequencies, frequency bands and special system parameters can be programmed for customizing the equipment. Legal frequencies and frequency bands are stacked in the lower part of the Prom together with legal modulation beginning at Prom address 0 and progressing upward in 4 byte steps until a limiter byte containing the data 255d/FFh is located. Special system parameters are stacked in the higher part of the Prom beginning at Prom address 4095d/FFFh progressing downward.

5.11.1 APPLICABLE PROMS:

TEXAS:	TMS2532JL
	TMS25L32JL
HITACHI:	HN462532
	HN462532G
	HN462532G-2

5.11.2 CONFIGURATION PROM MAP



5.11.3 SINGLE FREQUENCY FORMAT

ADDR	n	D7	D6	D5	D4	D3	D2	D1	D0
		TX	RX	ITU	ITU-BAND	BCD x 10 MHz			
	n + 1	BCD x 1 MHz				BCD x 100 kHz			
	n + 2	BCD x 10 kHz				BCD x 1 kHz			
	n + 3	BCD x 100 Hz				MODULATION			

5.11.3.1 MODULATION HEXADECIMAL

0 : J3E
 1 : R3E
 2 : H3E
 3 : A1A
 4 : H2A
 5 : F1B
 6 : LSB
 7 : J3E & R3E
 8 : reserved for future use
 9 : reserved for future use
 A : reserved for future use
 B : reserved for future use
 C : reserved for future use
 D : reserved for future use
 E : reserved for future use
 F : don't care

5.11.3.2 RX AND TX BITS:

0 : Frequency and modulation do not apply to RX or TX respectively.
 1 : Frequency and modulation apply to RX or TX respectively.
 Both bits may be programmed in the same array.

5.11.3.3 ITU BIT:

0 : ITU channel apply to programmed frequency in accordance with selected channel-number.
 1 : ITU channel do not apply to programmed frequency.

5.11.3.4 ITU BAND-BIT:

0 : The programmed frequency is within the band specified by the short-number.
 1 : The programmed frequency is 1 MHz above the band specified by the short-number.

5.11.3.5 ITU CHANNELS When programming a "LEGAL FREQUENCY" table consisting of the ITU channel frequencies and/or other frequencies to be selected by the "RECALL ITU - - -" syntaxes, it is necessary to consider the search-algorithm used. This algorithm initiates the search at PROM addr. 0 and progresses until either the "LIMITER BYTE" (255d/FFh) or the desired "SINGLE FREQUENCY" is found. The "RECALL ITU FREQUENCY PAIRS FROM PROM" syntax utilizes 2 separate searches to obtain the pair. Having entered "RX"-"RCL"-"8"-"1"-"5"-"ENTER" the desired frequency is found as the 15th "SINGLE FREQUENCY" in the 8 MHz band (if ITU BAND-BIT = 0) having the RX-BIT = 1, ITU-BIT = 0 and the modulation nibble validating the present receiver mode.

5.11.4 FREQUENCY BAND FORMAT The single frequency format may be used in pairs to form a frequency band format as shown below. This format is used to additionally limit the transmitter frequency range. When programmed, transmission outside this band is not possible. More than one band may be programmed. Please note that the bit- and modulation nibbles must be 0.

	D7	D6	D5	D4	D3	D2	D1	D0		
ADDR	n	always 0				BCD x 10 MHz				} lower frequency
	n + 1	BCD x 1 MHz				BCD x 100 kHz				
	n + 2	BCD x 10 kHz				BCD x 1 kHz				
	n + 3	BCD x 100 Hz				always 0				
	n + 4	always 0				BCD x 10 MHz				} upper frequency
	n + 5	BCD x 1 MHz				BCD x 100 kHz				
	n + 6	BCD x 10 kHz				BCD x 1 kHz				
	n + 7	BCD x 100 Hz				always 0				

5.11.5 SPECIAL SYSTEM PARAMETERS

ADDR	DATA	DESCRIPTION
4095d/FFFh		Telex audio center frequency
		Display of assigned frequency
	21d/15h :	1500 Hz
	22d/16h :	1600 Hz
	:	:
	:	:
	37d/25h :	2500 Hz

4095d/FFFh Display of carrier frequency

149d/95h :	1500 Hz
150d/96h :	1600 Hz
:	:
:	:
153d/99h :	1900 Hz
160d/A0h :	2000 Hz
:	:
:	:
165d/A5h :	2500 Hz

When assigned frequency display is used, an input at the programmed audio center frequency will be transmitted at the displayed frequency.
When carrier frequency display is used, an input at the programmed audio center frequency will be used as an USB signal at the displayed frequency + the audio center frequency.
Any other data are defaulted to 23d/17h

4094d/FFEh Transmitter frequency status

165d/A5h :	Free transmitter frequencies
255d/FFh :	Only transmitter frequencies contained in lower part of the Prom

Any other data are defaulted to 255d/FFh

4093d/FFDh Dummy load during alarm test

0d/00h :	Enable dummy load incl. 2182
180d/B4h :	Enable dummy load excl. 2182
255d/FFh :	Disable dummy load

Any other data are defaulted to 255d/FFh

4092d/FFCh Morse

4d/04h :	Enable 500, CW, MCW, FILTER and BFO keys. Disable transmitter in MCW mode above 1605 kHz.
195d/C3h :	Disable 500, CW, MCW, FILTER and BFO keys
255d/FFh :	Enable - - - - -

Any other data are defaulted to 255d/FFh

4091d/FFBh AGC and Sensitivity

195d/C3h :	Disable AGC and Sensitivity keys
255d/FFh :	Enable - - - - -

Any other data are defaulted to 255d/FFh

4090d/FFAh RF Amplifier and Antenna Attenuator

195d/C3h :	Disable RF-AMP and ANT-ATT keys
255d/FFh :	Enable - - - - -

Any other data are defaulted to 255d/FFh

4089d/FF9h		Alarm
	0d/00h :	Enable 500, 2182, and ALARM keys, continuous alarm
	195d/C3h :	Disable 500, 2182 and ALARM keys
	255d/FFh :	Enable - - - - -
		Any other data are defaulted to 255d/FFh
4088d/FF8h		R3E
	195d/C3h :	Disable R3E key
	255d/FFh :	Enable - - - - -
		Any other data are defaulted to 255d/FFh
4087d/FF7h		LSB
	195d/C3h :	Disable LSB key
	255d/FFh :	Enable - - - - -
		Any other data are defaulted to 255d/FFh
4086d/FF6h		SCAN
	210d/D2h :	Enable SCAN key
	255d/FFh :	Disable - - - - -
		Any other data are defaulted to 255d/FFh
4085d/FF5h		Fast AGC & Slow AGC
	210d/D2h :	Enable AGC-SLOW and AGC-FAST keys
	255d/FFh :	Disable - - - - -
		Any other data are defaulted to 255d/FFh
4084d/FF4h		LSB Transmitting
	6d/06h :	Enable transmitter in LSB mode
	255d/FFh :	Disable - - - - -
		Any other data are defaulted to 255d/FFh
4083d/FF3h		H3E Transmitting
	2d/02h :	enable transmitter in H3E mode
	255d/FFh :	disable - - - - -
		Any other data are defaulted to 255d/FFh
4082d/FF2h		VERY NARROW FILTER
	195d/C3h :	Disable VERY-NARROW key
	255d/FFh :	Enable - - - - -
		Any other data are defaulted to 255d/FFh
4081d/FF1h		Antenna in TX-Off-State
	180d/B4h :	Antenna disconnected
	255d/FFh :	Antenna connected
		Any other data are defaulted to 255d/FFh
4080d/FF0h		Distress mode
	0d/00h :	Select J3E when "2182" is pressed
	255d/FFh :	Select H3E when "2182" is pressed
		Any other data are defaulted to 255d/FFh

4079d/FEFh Numeric keyboard type
 32d/20h : CCITT. Top left key = "1"
 255d/FFh : Standard. Top right key = "9"
 Any other data are defaulted to
 255d/FFh

4078d/FEEh Alarm Band
 22d/16h : Disable alarm below 1605 kHz.
 255d/FFh : Enable alarm in all bands.
 Any other data are defaulted to
 255d/FFh

4077d/FEDh Maritex
 210d/D2h : Enable Maritex interface
 255d/FFh : Disable - - - -
 Any other data are defaulted to
 255d/FFh

4076d/FECh Receiver frequency status
 32d/20h : Only receiver frequencies contained
 in the lower part of the Prom
 255d/FFh : Free receiver frequencies
 Any other data are defaulted to
 255d/FFh

4075d/FEBh Frequency Display
 195d/C3h : Disable frequency display. Only
 channel numbers can be entered and
 displayed except using special
 procedure.
 255d/FFh : Enable frequency display
 Any other data are defaulted to
 255d/FFh

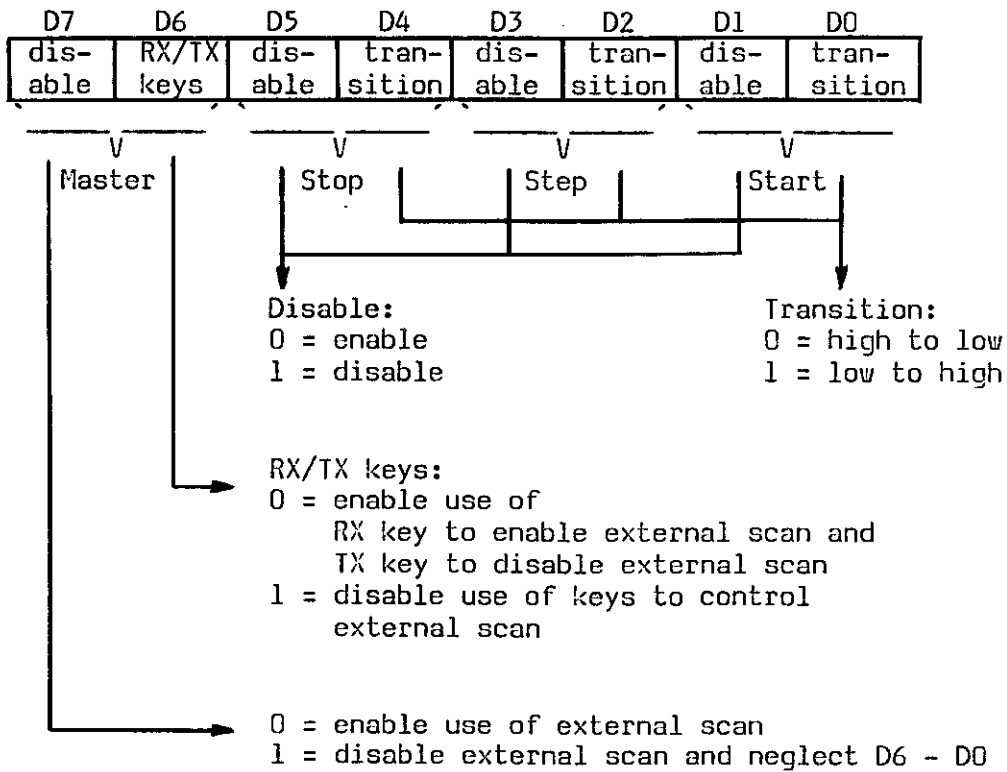
4074d/FEAh Maximum output power
 255d/FFh : Full output power range
 BCD : Programming a packed BCD number will
 limit the maximum output power to 30
 times the programmed value
 Ex: Data Output power
 16d/10h 300 W
 24d/18h 540 W

Any non-BCD data or BCD-data
 exceeding the max. power of the
 equipment are defaulted to 255d/FFh

4073d/FE9h Reduced output power between 1.6 and
 4 MHz
 117d/75h : No output power reduction
 255d/FFh : Output power reduced to 400 W when
 the transmitter frequency is between
 1.6 and 4 MHz
 Any other data are defaulted to
 255d/FFh

4072d/FE8h

External scan control



Terminal	Designation	Direction	Signal level	Remarks
No. 1	TX REM	Input	RS-232C	Remote Control Serial Data
2	GND	-		
3	RX REM	Output	RS-232C	Remote Control Serial Data
4	GND	-		
5	2182 SEL	Output	74LS00	High when 2182 is selected
6	GND	-		
7	SCAN S/S	Input	0/12 V	Start/Stop of scanning (user programmable)
8	GND	-		
9	TELEX KEY	Input	0/12 V	Keyes Tx in TELEX mode when LOW
10	GND	-		
11	AUX KEY	Input	0/12 V	Keyes Tx in USB, LSB, AM, R3E modes when LOW
12	GND	-		
13	TELEX IN	Input	-16 to +10 dBm	600 ohms audio input. Open in TELEX mode *
14	GND	-		
15	AUX IN	Input	-16 to 10 dBm	600 ohms audio input. Open in USB, LSB, AM or R3E modes when AUX KEY is LOW *
16	GND	-		
17	LINE OUT	Output	-10 to 10 dBm	600 ohms audio output. Adjustable*
18	GND	-		
19	SPEAKER -	Output	0 to 5 W	Load impedance 8 ohms
20	SPEAKER +	-	-	
21	KEY INHIBIT	Input	0/12 V	Inhibit keying when LOW **
22	GND	-		
23	OPTIONAL IN	Input	0/12 V	Reserved for future use
24	GND	-		

* An optional LINE TRANSFORMER BOARD 603 is available providing balanced input/output.

** KEY INHIBIT input is applicable only when Preset bit 4 = "1", see second function 284.

601-TS1 AUXILIARY TERMINALS, CONTROL UNIT

Table 5.2

HANDSET SOCKET:

Terminal No.	Designation	Direction	Signal level	Remarks
1	MIC	Input	50 mV - 1 V	Internally adjustable ±/-8 dB
2	GND	-		
3	EARPIECE	Output	0 - 10 mW	500 ohms. Controlled by VOLUME
4	+ 12 V	Output	+ 12 V	Supply for MIC. Amplifier
5	HANDSET KEY	Input	0/12 V	Keyes Tx in USB, LSB, AM or R3E when LOW

HEADPHONE SOCKET:

Terminal No.	Designation	Direction	Signal level	Remarks
1	-	Output	0 TO 10-160 mW	Mono or stereo headphones may be used. 8 ohm - 5 kohm
2	-			
3	- LS			Built-in speaker is disconnected when jack is inserted

MORSE KEY SOCKET:

Terminal No.	Designation	Direction	Signal level	Remarks
1	MORSE KEY	Input	0/12 V	Keyes Tx in CW or MCW when LOW
2	GND	-		

EXTERNAL CONNECTIONS, CONTROL UNIT

Table 5.3

Terminal No.	Designation	Direction	Remarks
1	+	Input	Supply from 24/32 V battery or P 8750/P 8751
2	GND	-	Screen
3	-	Input	Supply from 24/32 V battery or P 8250

TS1 SUPPLY TERMINALS, TRANSCEIVER UNIT

Table 5.4

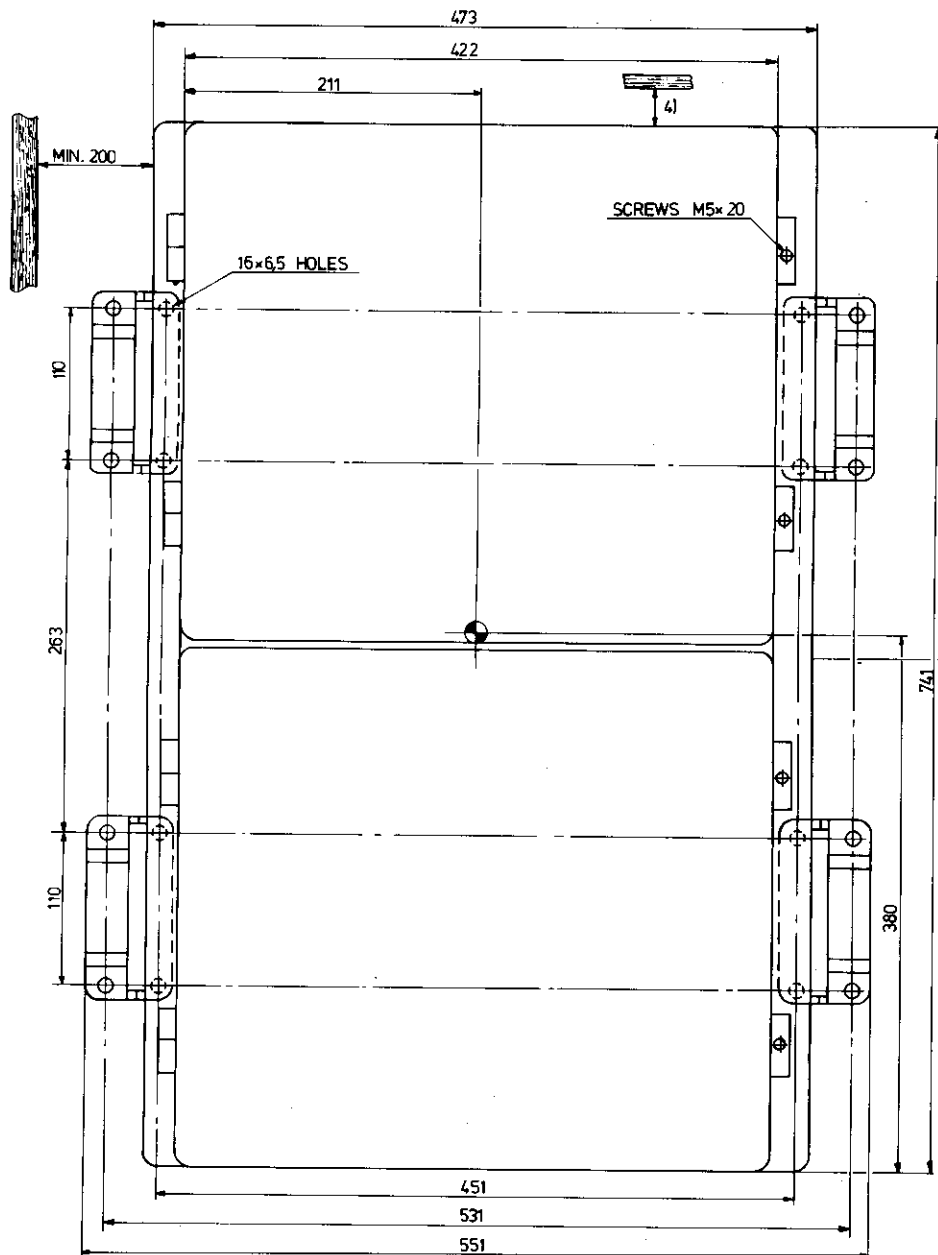
Terminal No.	Designation	Direction	Max. Current	Remarks
1	+ 24 V	Output	Note 1	+ 24 V available when equipment is ON
2	TX ON	Output	250 mA	Open collector. Low when TX on
3	+ 24 V	Output	Note 1	+ 24 V available when equipment is ON
4	TX KEYED	Output	250 mA	Open collector. Low when TX KEYED
5	+ 24 V	Output	Note 1	+ 24 V available when equipment is ON
6	2182 KEYED	Output	250 mA	Open collector. Low when TX KEYED on 2182 kHz
7	GND	-		
8	RX MUTE	Input		0/24 V. Rx is muted when connected to GND
9	+ 24 V TX ON	Output	Note 1	+ 24 V available when TX is ON
10	GND	-		

Note 1: Max. total current 1000 mA

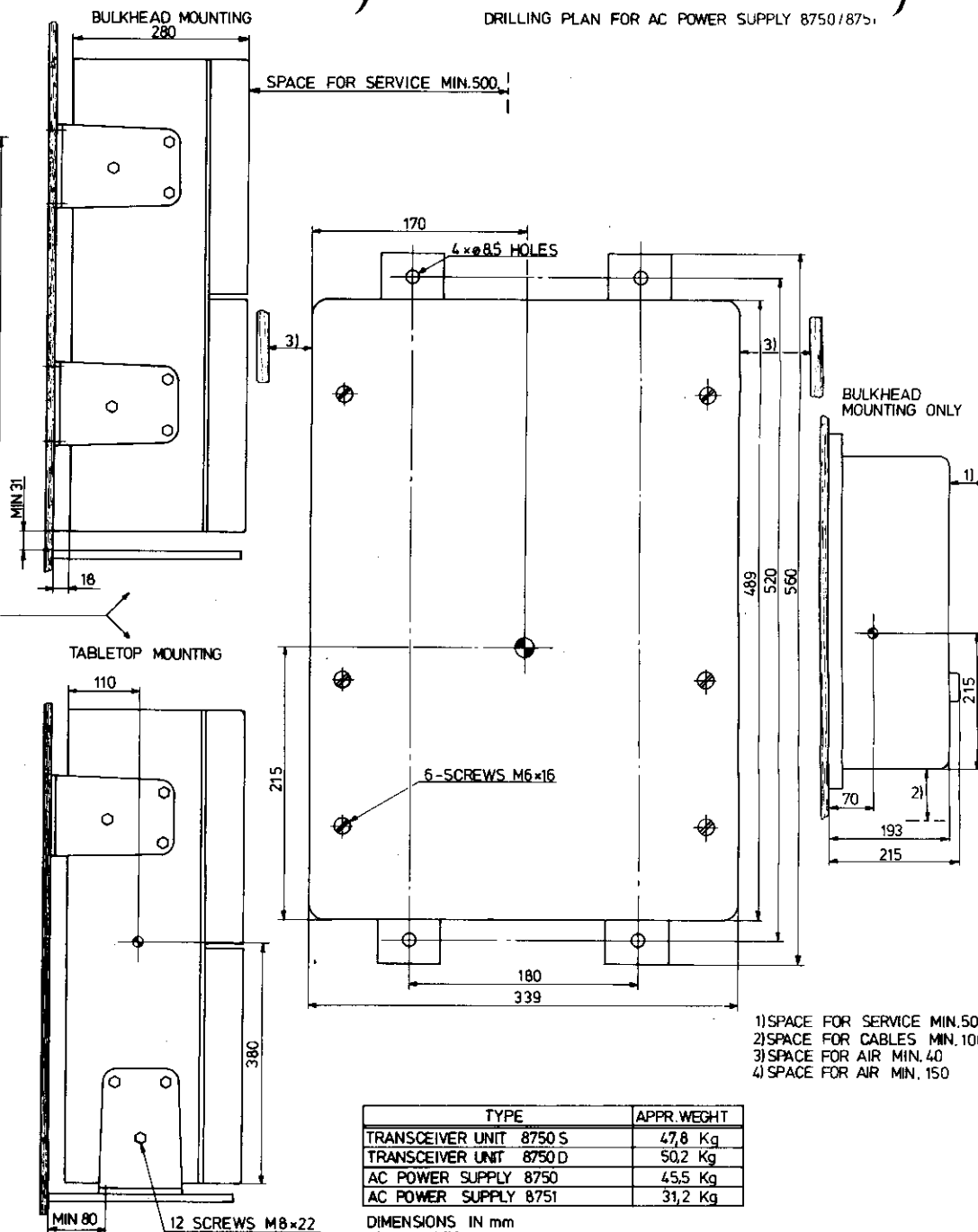
620-TS2 AUXILIARY TERMINALS, TRANSCEIVER UNIT

Table 5.5

DRILLING PLAN FOR TRANSCEIVER UNIT 8750S/D



DRILLING PLAN FOR AC POWER SUPPLY 8750/8751



- 1)SPACE FOR SERVICE MIN.500
- 2)SPACE FOR CABLES MIN.100
- 3)SPACE FOR AIR MIN.40
- 4)SPACE FOR AIR MIN.150

TYPE	APPR.WEIGHT
TRANSCEIVER UNIT 8750 S	47,8 Kg
TRANSCEIVER UNIT 8750 D	50,2 Kg
AC POWER SUPPLY 8750	45,5 Kg
AC POWER SUPPLY 8751	31,2 Kg

DIMENSIONS IN mm
TOLERANCES : ±1mm
● CENTRE OF GRAVITY

MOUNTING OF TRANSCEIVER UNITS 8750 S/D AND AC POWER SUPPLY UNITS 8750 / 8751

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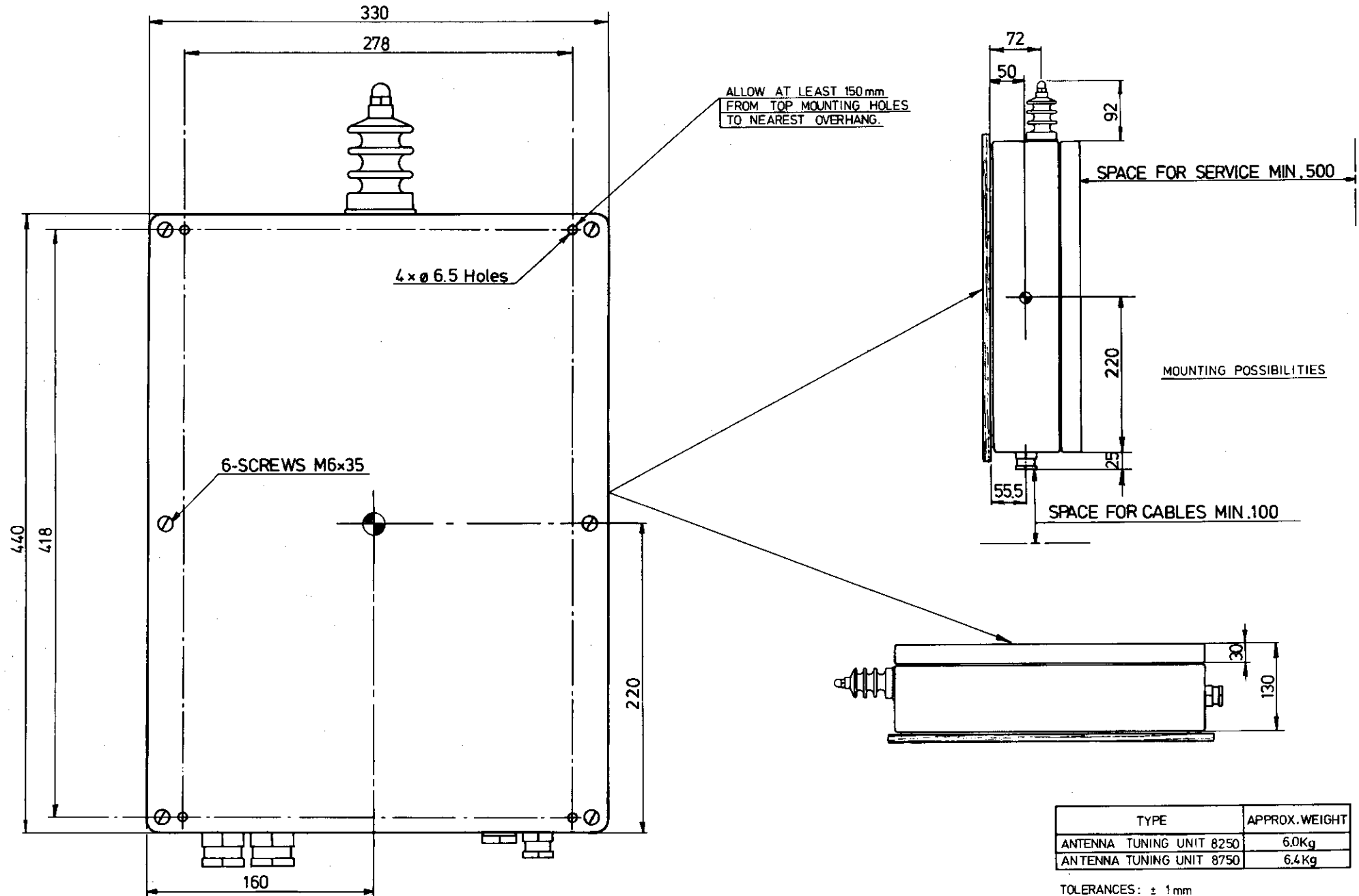
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DR.

PLAN FOR MOUNTING PLATE WITH ANTENNA TUNING.

250/8750



TYPE	APPROX. WEIGHT
ANTENNA TUNING UNIT 8250	6.0Kg
ANTENNA TUNING UNIT 8750	6.4Kg

TOLERANCES: ± 1 mm

DIMENSIONS IN mm

◆ CENTRE OF GRAVITY

MOUNTING OF ANTENNA TUNING UNIT 8250/8750

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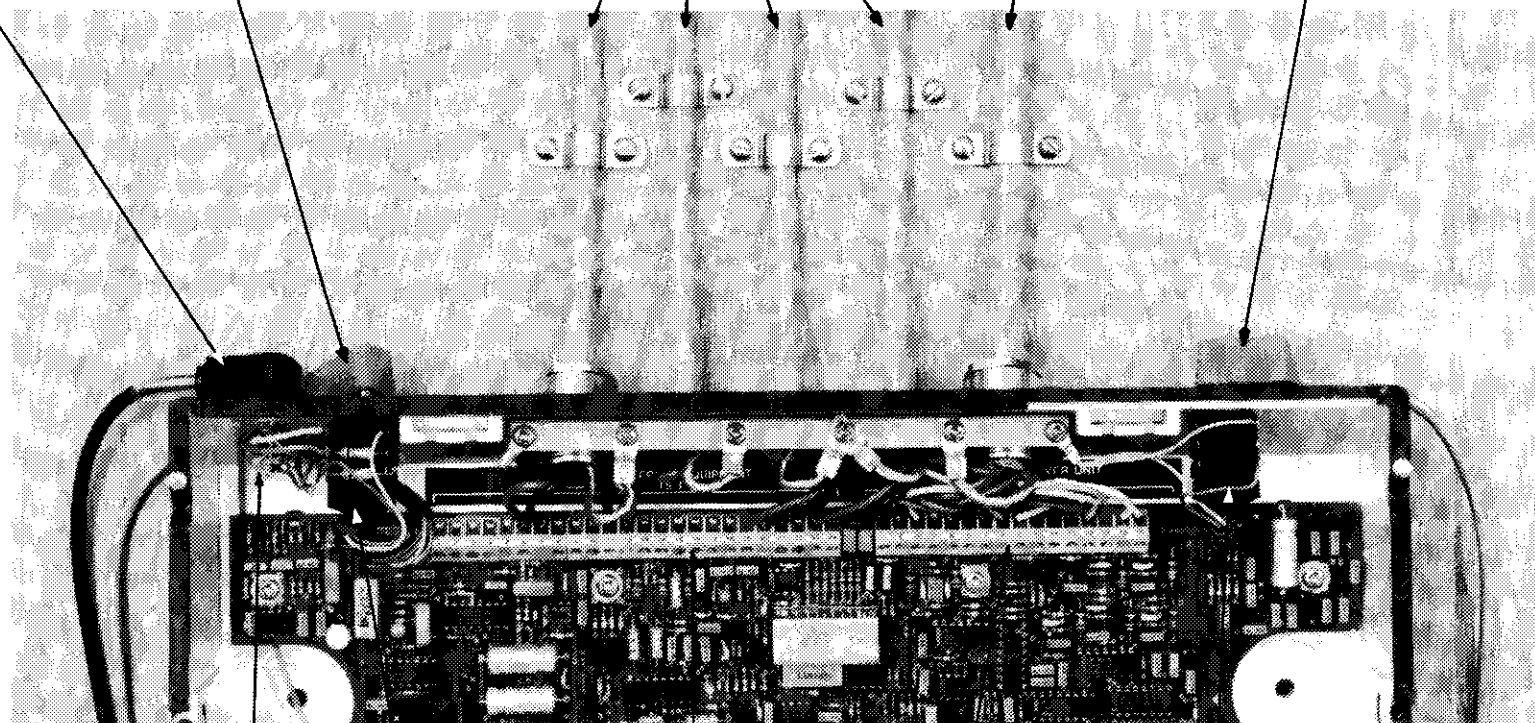
"HANDSET"
5-POLE CONNECTOR

"HEADPHONE"
2 OR 3 POLE JACK PLUG

SCREENED CABLES
2 × 0.25 - 2 × 1.5mm Sq

SCREENED MULTIWIRE
CABLE 16 × 0.5mm Sq

"MORSE KEY"
2-POLE JACK PLUG



CU-SK1

CU-SK2

601TS1

601TS2

CU-SK3

INSTALLATION WIRING OF CONTROL UNIT 8000

SCREENED MULTIWIRE CABLES
16 × 0.5mm Sq

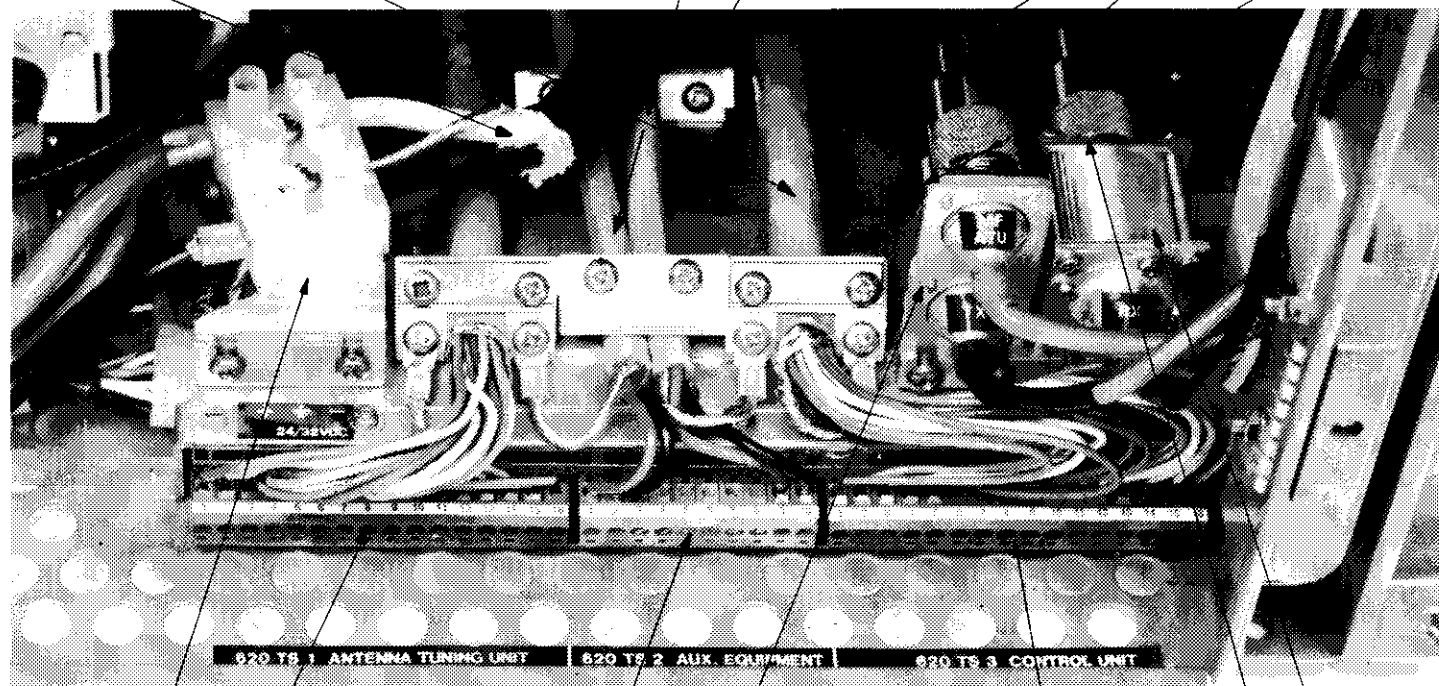
SCREENED CABLES
2 × 0.25 - 2 × 1.5mm Sq

COPPER STRAP 50 × 0.5mm

COAXIAL CABLE RG - 213/U

SCREENED CABLE

CONNECTOR PL 259



TU - TS1

620TS1

620TS2

652/653SK1

620TS3

TU - SK1

BALUNTRANSFORMER
107 606 00

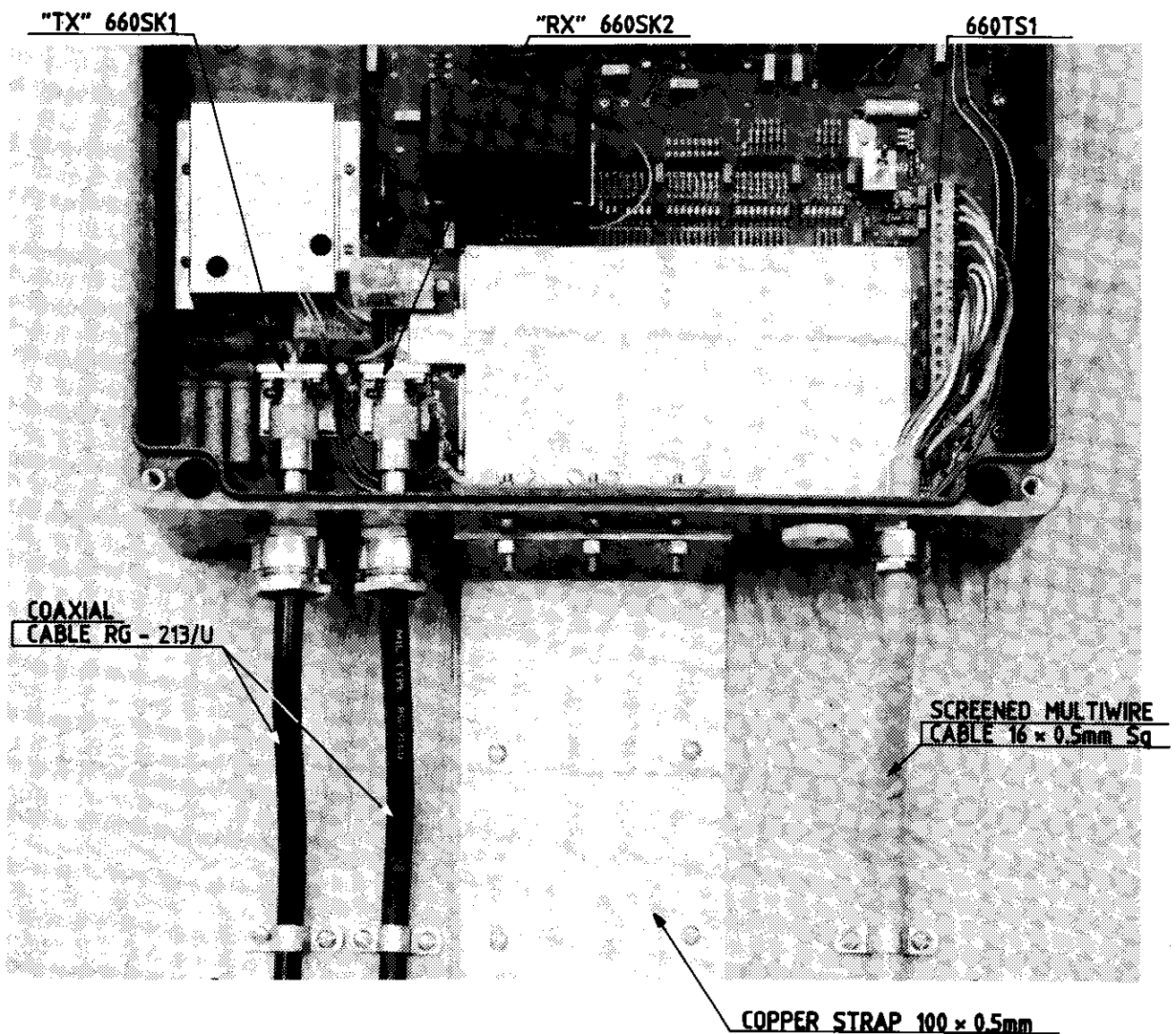
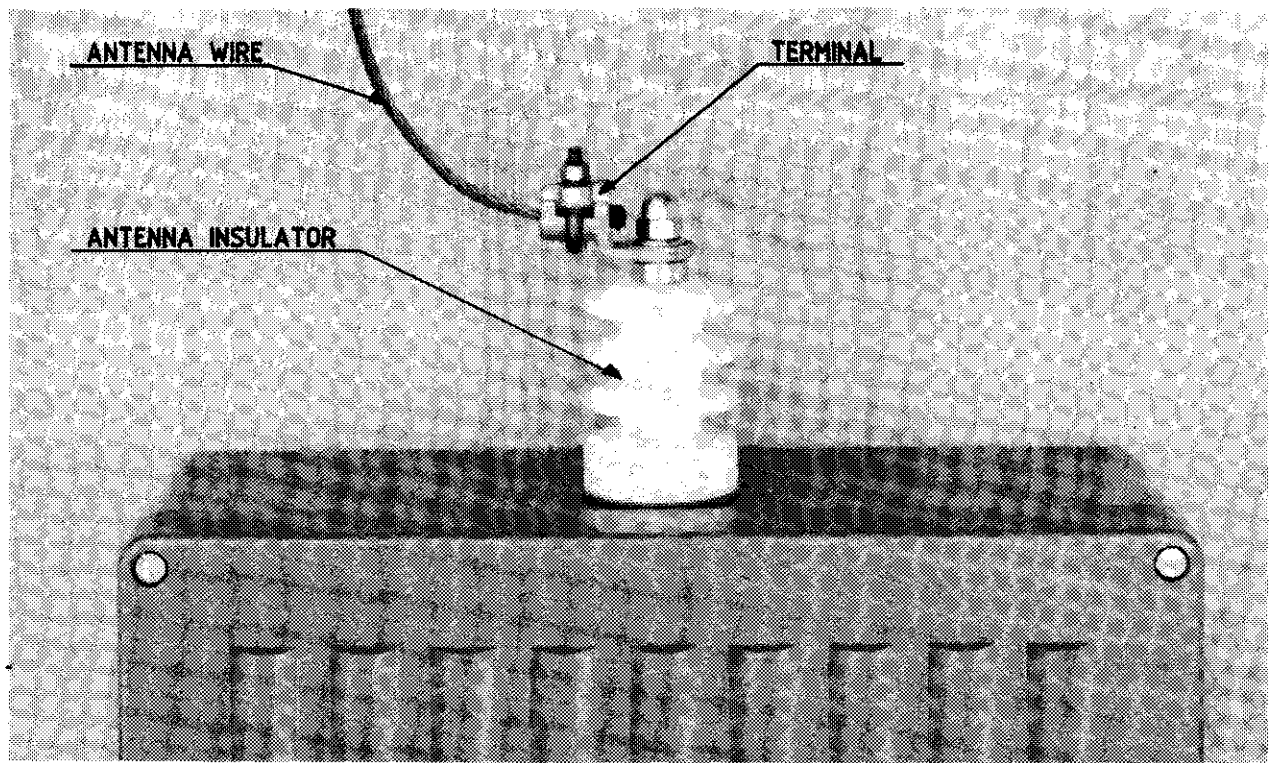
INSTALLATION WIRING OF TRANSCEIVER UNIT 8750 D

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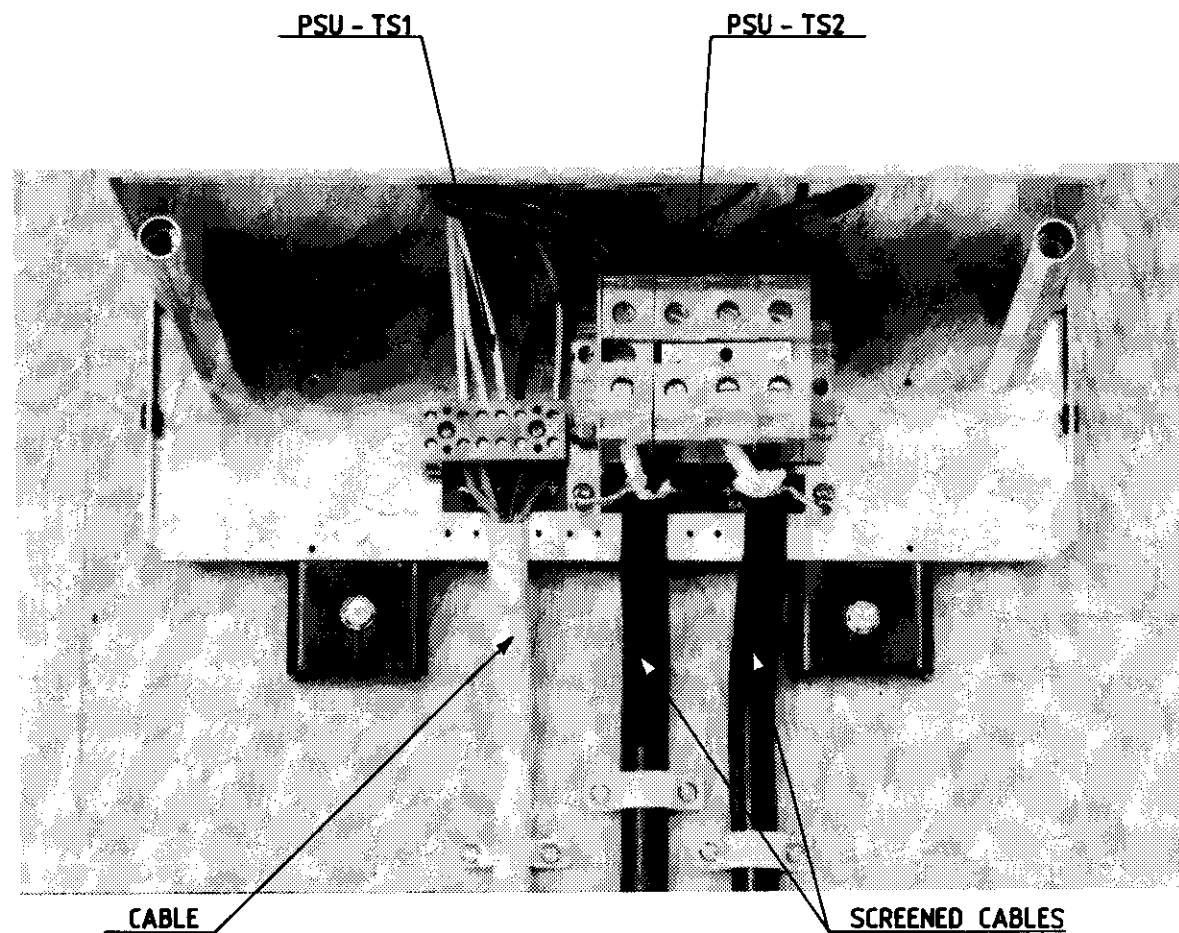


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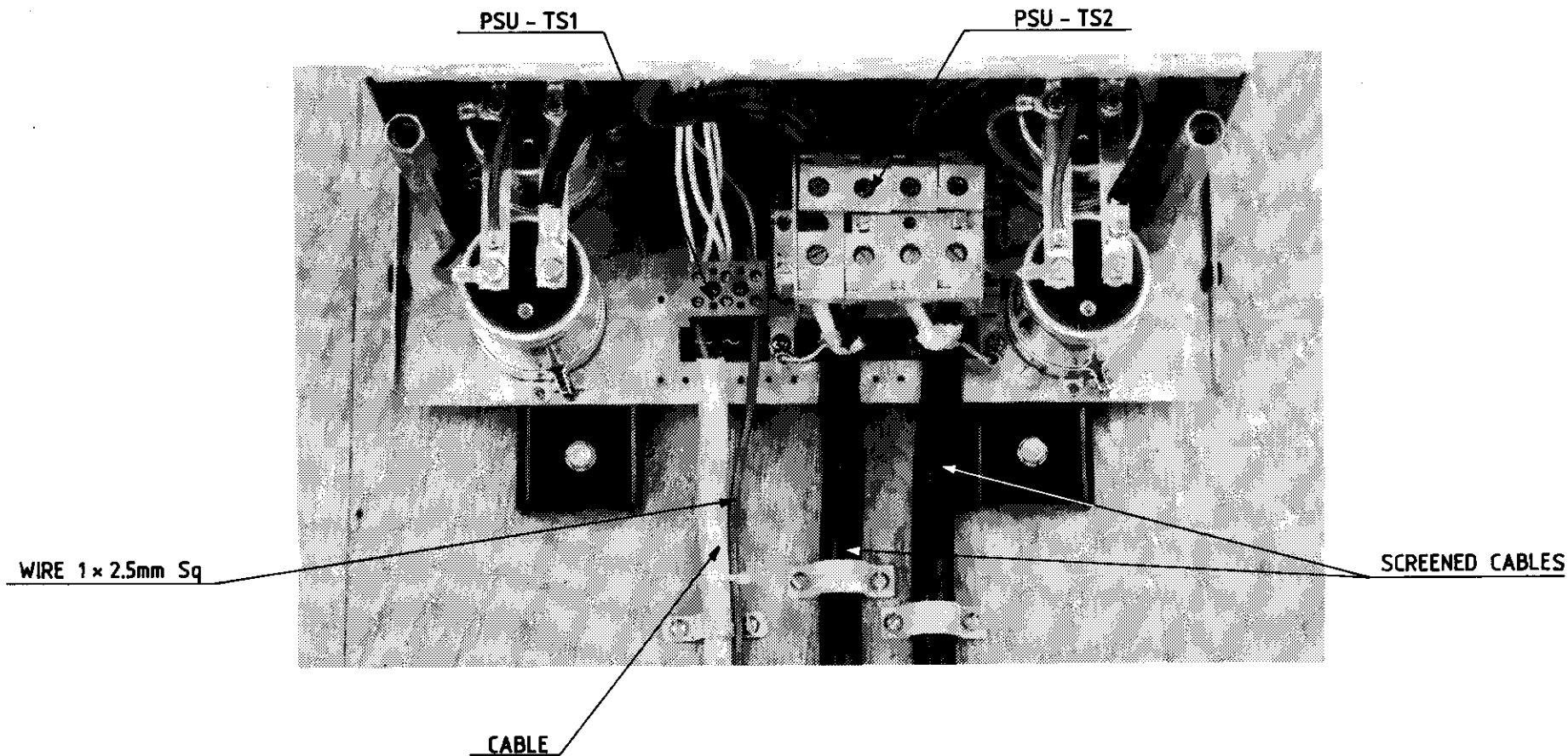
INSTALLATION WIRING OF AC POWER SUPPLY UNIT 8750

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INSTALLATION WIRING OF AC POWER SUPPLY UNIT 8751

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6. TECHNICAL DESCRIPTION

6.1 Control Unit

The Control Unit contains a loudspeaker, two printed circuit boards, Control Board [600] and Audio Processing Board [601] and a membrane keyboard. In addition an optional Squelch Board [602] and an optional Line Transformer Board [603] may be installed. It furthermore contains connections for handset, headphones, extension speaker, morse-key and telex-equipment. The Block Diagram of the Control Unit illustrates the functions of each circuit board while the Interconnection Diagram shows the interconnections between the boards (see chapter 9 for diagrams). The Control Unit is housed in a Noryl (PPO) cabinet suitable for tabletop or bulkhead mounting. The front panel can be tilted for convenient operation when the unit is mounted vertically as well as horizontally.

6.2 Transceiver Unit

The Rx/Tx Assembly of the Transceiver Unit contains the Receiver Signal Path [618], the Exciter Signal Path [619], a Master Oscillator [612] (or [613], [614]) and two Synthesizer Boards [611], one controlling the receiver the other controlling the exciter. These boards are located in the lower door of the unit. The cabinet itself contains a Switched Mode Power Supply which converts the battery voltage to a stabilized 48 V voltage supplying the Power Amplifier and the Voltage Converter Board [621]. The Voltage Converter produces various supply voltages necessary in the equipment and provides galvanic isolation from the battery. Supply voltages, signal and control voltages are distributed via the Interconnection Board [620] to external units and to the Transceiver Control Board [624] which performs the central control of the Transceiver Unit. The exciter output signal from the Rx/Tx Assembly is routed to the Power Splitter Board [654], where it is divided into three equal signals and applied to the three Power Amplifiers [626] PA1, PA2 and PA3 each delivering 250 W. The outputs of PA1-PA3 are combined in the Power Combiner [655] the output from which is filtered by the harmonic filters on P.A. Filters [652] or [653].

6.3 Antenna Tuning Unit

6.3.1 The ATU consists of a Tuning Network, a Measuring System and a Microprocessor Part. During the tune sequence a 6 dB Attenuator is switched in to keep the load of the Power Amplifier at approx. 50 ohms. The MPU will set up the Tuning Network to give the best obtainable SWR, on basis of the measuring system. The Tuning Network comprises Capacitor Bank I, Capacitor Bank II and an Inductor Bank. With these it is possible to form either an L or a pi matching network. The capacitor Banks and the Inductor Bank are built up by binary related capacitors respectively binary related coils. The setting of the Capacitors and Coils is accomplished by relays.

6.4 AC Power Supply Unit

There are two different types of Power Supplies available. P 8750 is used for single phase mains supply and P 8751 is used for three phase mains supply. In common they are combined AC/DC Power Supplies especially developed for powering the TRP 8750 Series. The input power for P 8750/P 8751 is AC, and the output is an unregulated 32 V DC voltage. Where a battery is required as a reserve source of electrical energy to the radiotelephone equipment, it can be connected via the P 8750/P 8751 power supply. By means of the switch on the front panel it is possible to select between AC or Battery operation.

6.5 ALC and Protection system

6.5.1 Automatic Level Control (ALC) The Transceiver Unit has an advanced microprocessor controlled automatic level system, which ensures that the optimum power is delivered to the Antenna Tuning Unit. The Tune Sequence, which is initiated either by pressing TUNE on the Control Unit front panel or by keying the transmitter after a frequency change has been carried out, is terminated by a CW pulse of full power with a duration of 70 ms. The signal level at the output of the Transceiver Unit is measured by means of a voltage and current peak-detector placed at the output of the P.A. Filter Assembly [652] or [653]. The detector voltage (9.0 V at 750 W output power) is applied to the Transceiver Control Board [624], PL3-9 (FILPEAK), and compared with the output voltage (8.62 V) of the "SETPOINT REGISTER" in IC42-3,2. The error signal ALC is fed to the Exciter Signal Path [619], PL1-12 driving a voltage controlled attenuator placed in the exciter signal path. Finally the ALC voltage is compared in IC42-5,6 with a ramp voltage generated by the "ALCHOLD REGISTER" and the corresponding DAC (IC24). When the two voltages equals, the ramp is stopped and switch IC44-10,11 is closed. The ALC voltage is now constant generated by the "ALCHOLD REGISTER" and thereby the gain of the Transmitter Signal Path is independent of the modulating signal. When MEDIUM POWER is selected, the ALC voltage generated by the "ALCHOLD REGISTER" is increased by 0.93 V. In LOW POWER a 14 dB attenuator placed on the Power Amplifier Assembly [626] controlled by PAATT is activated and the ALC voltage is also increased to give a total attenuation of 13 dB, together with the PAATT.

6.5.2 Protection Circuits

6.5.2.1 Power Amplifier Protection The Power Amplifier Protection can be divided into two main groups, SWR protection and thermal protection. The SWR protection contains a reflected power and output voltage detector placed at the output of the Power Amplifier Assembly [626]. The output of the detector (PAPEAK) is connected to the Transceiver Control Board [624], PL2-7 and is OR'ed together with the FILPEAK voltage from the P.A. Filter Assembly [652] or [653]. Now, if the SWR at the output of the Power Amplifier Assembly [626] increases during a transmission an error voltage is generated at IC42-1 exceeding the voltage generated by the "ALCHOLD REGISTER" thereby increasing the ALC voltage and reducing the output power within 1 ms to a permissible level. The output of the reflected power and output voltage detector is also used to make an independent local protection of the Power Amplifier by activating the 14 dB attenuator if the detector voltage exceeds 10 V. This

ensures fully protection of the Power Amplifier if the ALC loop should be faulty or disconnected. To reset the attenuator it is necessary to turn off the main power of the Transceiver in a few seconds or to switch the transmitter to TX OFF in a few seconds. The thermal protection consists of two thermostats mounted on the heatsink of the Power Amplifier Assembly and an average/peak power detector. One thermostat is activated if the heatsink temperature exceeds 80 deg. C. Thereby logical signal TCI fed to the Transceiver Control Board [624], PL2-5 goes low and the output power is reduced by 5 dB. This is carried out by changing the reference voltage from the "SETPOINT REGISTER" to 4.36 V and increasing the voltage from the "ALCHOLD REGISTER" by 0.82 V relative to the Full Power preset value. The other thermostat is activated if the temperature of the heatsink exceeds 110 deg. C. In this case the supply voltage to the preamplifier is cut off. The average power and the peak power are compared in IC41-3,2. If, in a Full Power transmission, the average power exceeds the peak power minus 3 dB, the logical signal at IC41-1 goes high. If this condition has been present during one minute, e.g. by transmitting CW with continuous key-down or broadcast mode telex, the output power will be reduced by 3 dB (SETPOINT voltage 5.71 V, ALCHOLD voltage increased by 0.54 V relative to Full Power preset value). The power will recover to Full Power level when the transmitter has been muted during two minutes. To enable Full Power ARQ Telex Transmission the system accepts keying duty cycles less than 50 % and modulation rates greater than 3 baud without power reduction. In the 750 W transmitter the signals PAPEAK, TCI and PAATT are OR'ed together at PCB [654] before they are led to the Transceiver Control Board [624]. The signal (PA OK) is derived from the three signals PAPEAK at the Power Splitter [654]. This signal informs the Transceiver Control Board if one or more of the Power Amplifiers are faulty. In this case the gain is decreased by 0.8 dB not to overload the remaining Power Amplifiers. (PA OK) is also used in the self test function.

6.5.2.2 ATU Protection To protect the Antenna Tuning Unit against excess current, for instance if the antenna is shortcircuited, an average current detector is provided. The output of the detector IANTAVR is connected to the Transceiver Control Board [624], PL4-14 and is OR'ed together with the FILPEAK voltage from the P.A. Filter Assembly [652] or [653]. Now, if the average current exceeds 8 A during a transmission an error voltage is generated at IC42-1 exceeding the voltage generated by the "ALCHOLD REGISTER" thereby increasing the ALC voltage and reducing the output power and thereby the average current. In the ATU 8750 there is also a peak voltage detector at the antenna horn to protect against excess voltage, for instance if the antenna is broken. The output from this detector is OR'ed together with IANTAVR. If the SWR at the input of the Antenna Tuning Unit exceeds 1:3 logical signal SWROK goes high and Power Display Annunciator on Control Unit front panel starts flashing informing the operator that a better antenna match might be obtained by carrying out a new Tune Sequence. To prevent overheating of the Antenna Tuning Unit a temperature sensor is incorporated. If the internal temperature of the Antenna Tuning Unit exceeds 85 deg. C, logical signal TCO goes low and the output power is reduced by 5 dB. (SETPOINT voltage 4.36 V, ALCHOLD voltage increased by 0.82 V relative to Full Power preset value).

6.5.2.3 Reduced Power-Indication In case of 5 dB reduced power condition due to thermal protection the annunciator "Reduced Power" on the Control Unit front panel is lit. The annunciator "Reduced Power" will also turn on if the average power, in a full power transmission, exceeds the peak power minus 3 dB during one minute. In this condition the power is reduced by 3 dB.

7. PREVENTIVE MAINTENANCE

Due to the modern design of the TRP 8750 D preventive maintenance can be reduced to a minimum provided the equipment is correctly installed. To ensure maximum performance and minimum repair trouble we recommend you to follow below stated headlines for preventive maintenance.

1. The condition of the battery should be checked at frequent intervals. The battery must always be fully charged and should be topped up frequently with distilled water (liquid should be 5 to 10 mm above the plates).
2. Check the condition of antenna installation, ground connection and cables at regular intervals.
3. Keep antenna feed-through insulators clean and dry.
4. Ensure that no objects are obstructing the free airflow through the cooling fins at the back of the Transceiver Unit and keep the units free of dust accumulation to prevent overheating.
5. Keep the ATU antenna insulator clean and free of salt.

7.1 Realignment of Master Oscillator **612 613 614**

The Master Oscillator frequency should be checked at least once a year. The Master Oscillator determines the exact transmit and receive frequencies of the equipment. The oscillator tends to age very slowly with time, typically with the highest drift rate the first year. The check should be performed by a qualified technician with the necessary test equipment at his disposal.

1. Measuring Equipment:

1.1 Frequency Counter: Frequency range ≥ 100 MHz
 Input impedance = 50 ohm
 Sensitivity at least > 0.2 V
 Accuracy better than 1 Hz

1.2 Thermometer: Range 0-50 deg. Celcius

2. Preparations:

- 2.1 Switch on the power at least 30 minutes before adjustment.
- 2.2 Open the lower front door of the Transceiver Unit and remove the front shielding cover of the Exciter Signal Path. Disconnect all sockets from the shielding cover of the Master Oscillator. Remove the shielding cover by unscrewing the 4 screws.
- 2.3 Note if the TCXO is marked with a frequency offset.
- 2.4 Connect all sockets again.
- 2.5 Measure the temperature close to the Master Oscillator and take the necessary arrangements to keep it between 20 and 30 deg. Celsius. Be sure that thermal equilibrium has taken place before adjustment.

3. Realignment of Master Oscillator:

- 3.1 Disconnect the socket from PL2 on the Exciter Signal Path 619 carrying the injection signal to the 1st. mixer. Connect the frequency counter to the socket.
- 3.2 Key-in USB mode and a receiver frequency of 26.68000 MHz on the Control Unit.
- 3.3 Adjust R1 until the counter reads $f = 71.680000 \text{ MHz} \pm 1 \text{ Hz}$.
If the TCXO is marked with a frequency offset, multiply the offset by 7 and add to the frequency stated above. For example:
Frequency offset +2 Hz
Add $7 * 2 = 14 \text{ Hz}$
Adjust to $f = 71.680014 \text{ MHz} \pm 1 \text{ Hz}$
- 3.4 Replace all covers and sockets again.

7.2 Replacement of backup battery

The lithium backup battery should be changed within four years after its installation in the equipment. The expiration date is marked on the battery. If the time is exceeded the battery voltage may become too low which causes the real-time clock to default to 00:00 and the contents of the user programmable memory to get lost when the equipment is switched OFF.

The battery is located in the Control Unit on Control Board 600 and should be changed by a qualified technician.

NOTE! A replacement of the backup battery will leave the system set-up, defined in the second function "pages", in a random and undefined state, and the equipment may not have the same features as prior to the battery replacement. After replacing the backup battery, the second function GUARD-bit and the OPTION-register must be cleared, and the second function pages should be re-entered, as described in the "SECOND FUNCTION SYNTAX" part of the technical manual.

8. TROUBLE SHOOTING AND SERVICE

8.1 Malfunction

If the equipment is not functioning correctly a check should be made that it is being operated properly, see chapter 3.

8.2 Replacement of FUSES

The Transceiver Unit contains four replaceable fuses located at the front of the Switched Mode Power Supply. The fuses become accessible when the lower front door is opened. Spare fuses are placed on the Switched Mode Power Supply.

The AC Power Supply Unit's contain fuses located at the front of the unit's. Spare fuses are located behind the cover.

Fuse ratings are given in table 8.1 below. Fuses with marked ratings within 5 percent of the ratings must be used. Note that fast or slow blowing fuses must be used as specified.

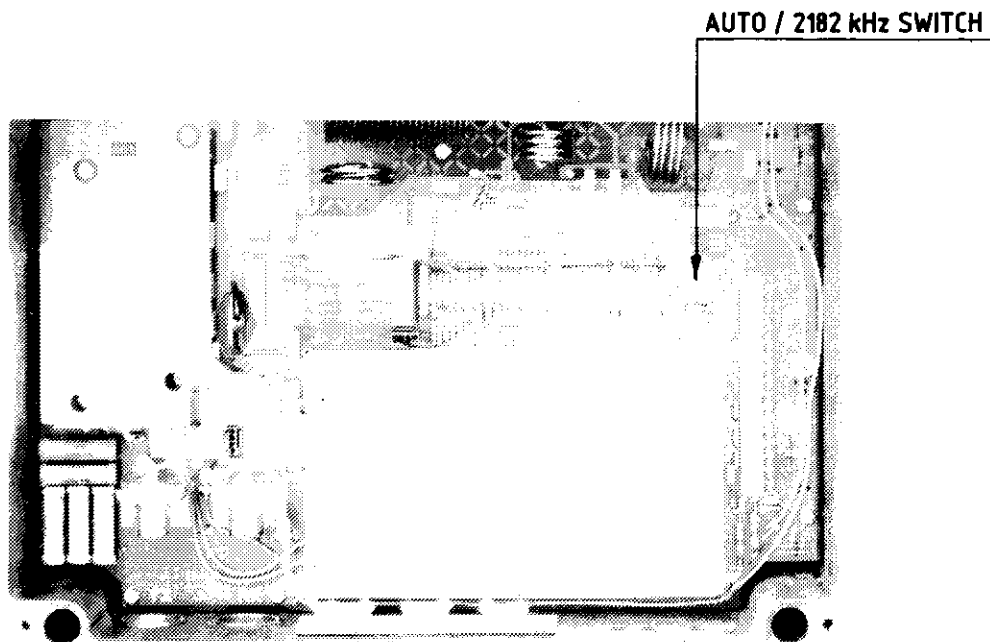
Location	Fuse Rating	Function	Symptom if fuse is blown
Transceiver Unit	4 A fast	+48 V to Voltage Converter	Equipment dead, but Main Relay operates when Supply switch is activated. Voltage-indicator lamp in Switched Mode Power Supply is lit when power is on.
	3 x 15 A fast	48 V to Power Amplifiers	Reduced or no RF output power.
AC Power Supply Unit P 8750	110/120 V: 25 A slow 220/240 V: 12.5 A slow	Mains input	No light in DC OUTPUT LAMP with mains switch position MAINS ON
AC Power Supply Unit P 8751	3 x 380/440 V: 3 x 4 A slow 3 x 220 V: 3 x 8 A slow	Mains input	No light in DC OUTPUT LAMP with mains switch position MAINS ON

Table 8.1

8.3 MANUALLY TUNING TO 2182 kHz IN CASE OF FAILURE IN THE ATU

How to manually tune the Antenna Tuning Unit to 2182 kHz in case of failure in the automatic tuning system:

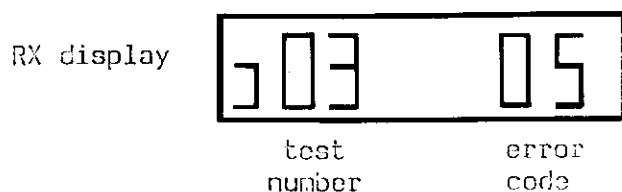
1. Switch SUPPLY OFF on Control Unit.
2. Remove cover from Antenna Tuning Unit.
3. Locate AUTO/2182 kHz toggle switch and switch it to 2182 kHz (downwards).
4. Refit the cover.
5. The radiotelephone is now ready for operation on 2182 kHz only.



LOWER PART OF ATU 8750 WITH FRONT COVER REMOVED.

3.4 DESCRIPTION OF SELF TEST FUNCTIONS

Self test can be done in two different modes, auto mode and step mode. Auto mode is intended for a quick verification of all functions, it will execute all tests in sequence and stop if a malfunction is detected. Step mode is intended for service purposes, it allows step by step testing and gives the operator the possibility to make measurements during the tests and to repeat tests. Thus it can be used as a built-in signal generator for many purposes. The results of the tests are displayed on the RX display at the Control Unit. The result consists of a test number, indicating which test has been performed, and an error code indicating if the test was OK. Please note that the transmitter must be turned ON before executing the self test, otherwise the synthesizer, exciter and transmitter tests will fail. Various tests will refer to Receiver Synthesizer and Exciter Synthesizer respectively. Both Synthesizers are of the PCB 611 type. The Receiver Synthesizer is located at the outer side of the lower unit door, the Exciter Synthesizer is located at the inner side of the door.



The error codes are to be interpreted as follows:

Error code	Meaning
00	The test has passed.
01	A malfunction has been detected, refer to specific test description for precise information.
02	
-	
-	
97	
98	Communication error The test failed due to communication error between CU and TU.
99	The test can not be executed due to missing options (special IF filters etc.)

3.4.1 EXECUTION OF SELF TEST IN AUTO MODE

The self test is executed by pressing:



The test will take several seconds, during which various sounds may be heard. The test will stop when all tests have been executed, or the first time an error is detected. When the test stops, a test number and an error-code will be displayed. If the error-code is 00 no faults has been detected. If the error-code is different from 00, an error has been detected, refer to description of specific tests for information on the fault and for appropriate actions. The test result will be displayed for 10 seconds, thereafter the Transceiver will return to normal operation.

8.4.2 EXECUTION OF SELF TEST FROM AN ARBITRARY TEST NUMBER (AUTO MODE)

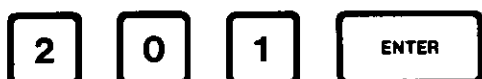
The self test is executed by pressing:



The test number is entered via the numeric keys into the receiver display. Pressing "ENTER" will start self test from the specified test number if possible. Pressing other keys than "ENTER" or numerics will resume normal operation as will pressing an invalid test number. Execution of the self test will progress as described in above passage.

8.4.3 EXECUTION OF SELF TEST IN STEP MODE

The self test is executed by pressing:



The test will start by executing test number 1 and displaying the test number and the error code. The test setup will remain until the operator presses "DIMMER UP", then it will proceed to the next test. The last test can be repeated by pressing "DIMMER DOWN". If the operator presses any key but "DIMMER UP" or "DIMMER DOWN", the Transceiver will return to normal operation. The Transceiver will return to normal operation when the last test has been executed.

8.4.4 EXECUTION OF SELF TEST FROM AN ARBITRARY TEST NUMBER (STEP MODE)

The self test is executed by pressing:



The test number is entered via the numeric keys into the receiver display. Pressing "ENTER" will start self test from the specified test number if possible. Pressing other keys than "ENTER" or numerics will resume normal operation as will pressing an invalid test number. Execution of the self test will progress as described in above passage.

8.4.5 TEST 1

Test 1 will test Audio Processing Board [601], reception signal path. Microprocessor tone generator is set to no tone, AF switch is set to microprocessor tone generator, and speaker is set ON. AF AMP is checked for silence. The test is OK if CHECK 1 = "1"

Error code	Meaning
00	The test was OK
01	Error. CHECK 1 was "0"
	Possible cause:
	Fault on [601] Audio Processing Board
	or [600] Control Board
	or cable connecting [600] and [601]

8.4.6 TEST 2

Test 2 will test Audio Processing Board [601], reception signal path. Microprocessor tone generator is set to 919 Hz, AF switch is set to microprocessor tone generator, and speaker is set ON. AF AMP is checked for tone. The test is OK if CHECK 1 = "0" A clear tone is heard during the test.

Error code	Meaning
00	The test was OK
01	Error. Check 1 was "1"
	Possible cause:
	Fault on [601] Audio Processing Board
	or [600] Control Board
	or cable connecting [600] and [601]
	or loudspeaker shortcircuited

8.4.7 TEST 3

Test 3 will test Audio Processing Board [601], transmission signal path. The input selector is grounded, the compressor is checked for silence. The execution of this test takes 5 seconds.
The test is OK if CHECK 2 = "0"

Error code	Meaning
00	The test was OK
01	Error. CHECK 2 was "1" Possible cause: Fault on [601] Audio Processing Board or [600] Control Board or cable connecting [600] and [601]

8.4.8 TEST 4

Test 4 will test Audio Processing Board [601], transmission signal path. The microprocessor tone generator is set to 919 Hz, input selector is set to microprocessor tone, the compressor is checked for compression.
The test is OK if CHECK 2 = "1"

Error code	Meaning
00	The test was OK
01	Error. CHECK 2 was "0" Possible cause: Fault on [601] Audio Processing Board or [600] Control Board or cable connecting [600] and [601]

8.4.9 TEST 5

Display test.

This test will turn all displays, annunciators and bargraph's ON for 10 seconds.

The microprocessor can not test the displays, the operator must inspect the displays visually.

Error code	Meaning
00	The test was OK, the microprocessor can not detect any faults in this test

If some displays, annunciators or bar-graph's do not turn ON, exchange or repair [600] Control Board.

8.4.10 TEST 6

Test 6 will test Master Oscillator and reference dividers on board [612], [613] or [614].

Test 6 will test that M.O.CHECK = "1"

Error code	Meaning
00	The test was OK
01	Error. M.O.CHECK was "0" Fault on: [612], [613] or [614] Master Oscillator or cable connecting [611] and [612] or [611] Synthesizer Board or cable connecting [611] and [624] or [624] Transceiver Control Board
98	Error, no response from TU Fault on: 624 Transceiver Control Board

8.4.11 TEST 7

Test 7 will test both Synthesizer Board [611].

It will set all synthesizers mid-range and test for lock.

Both 1.LO's are set to 50 MHz range = 45-52.5 MHz

Both 2.LO's are set to 43.6 MHz

Both 3.LO's are set to 1.4 MHz

The test is OK if SYNCHECK 0 = "1" and
SYNCHECK 1 = "1"

Error code	Meaning
00	The test was OK
01	Error. SYNCHECK 0 was "0" Fault on: [611] Receiver Synthesizer Board or cable connecting [611] and [624] or [624] Transceiver Control Board
02	Error. SYNCHECK 1 was "0" Fault on: [611] Exciter Synthesizer Board or cable connecting [611] and [624] or [624] Transceiver Control Board
03	Error. SYNCHECK 0 was "0" and SYNCHECK 1 was "0" Fault on: [624] Transceiver Control Board or cable connecting [611] and [624]

98

Error, no response from TU
Fault on:
[624] Transceiver Control Board

8.4.12 TEST 8

Test 8 will test both Synthesizer Boards [611].
It will bring 1.LO's out of lock to check that they can be controlled by the microprocessor.

The test is OK if SYNCHECK 0 = "0" and
SYNCHECK 1 = "0"

Error code	Meaning
00	The test was OK
01	Error. SYNCHECK 0 was "1" Fault on: [611] Receiver Synthesizer Board or cable connecting [611] and [624] or [624] Transceiver Control Board
02	Error. SYNCHECK 1 was "1" Fault on: [611] Exciter Synthesizer Board or cable connecting [611] and [624] or [624] Transceiver Control Board
03	Error. SYNCHECK 0 was "1" and SYNCHECK 1 was "1" Fault on: [624] Transceiver Control Board or cable connecting [624] and [611]
98	Error, no response from TU Fault on: [624] Transceiver Control Board

8.4.13 TEST 9

Test 9 will test both Synthesizer Boards [611].
It will set 1.LO's to 45 MHz to check if they can lock.
The test is OK if SYNCHECK 0 = "1" and
SYNCHECK 1 = "1"

Error code	Meaning
00	The test was OK

- 01 Error. SYNCHECK 0 was "0"
Fault on:
[611] Receiver Synthesizer Board or
cable connecting [611] and [624] or
[624] Transceiver Control Board
- 02 Error. SYNCHECK 1 was "0"
Fault on:
[611] Exciter Synthesizer Board or
cable connecting [611] and [624] or
[624] Transceiver Control Board
- 03 Error. SYNCHECK 0 was "0" and
SYNCHECK 1 was "0"
Fault on:
[624] Transceiver Control Board or
cable connecting [611] and [624]
- 98 Error, no response from TU
Fault on:
[624] Transceiver Control Board

8.4.14 TEST 10

Test 10 will test both Synthesizer Boards [611].
It will set LLO's to 52.5 MHz, using the 45-52.5 MHz band, to check if they
can lock.
The test is OK if SYNCHECK 0 = "1" and
SYNCHECK 1 = "1"

Error code	Meaning
00	The test was OK
01	Error. SYNCHECK 0 was "0" Fault on: [611] Receiver Synthesizer Board or cable connecting [611] and [624] or [624] Transceiver Control Board
02	Error. SYNCHECK 1 was "0" Fault on: [611] Exciter Synthesizer Board or cable connecting [611] and [624] or [624] Transceiver Control Board
03	Error. SYNCHECK 0 was "0" and SYNCHECK 1 was "0" Fault on: [624] Transceiver Control Board or cable connecting [611] and [624]

98

Error, no response from TU

Fault on:

624 Transceiver Control Board

8.4.15 TEST 11

Test 11 will test both Synthesizer Boards **611**.

It will set 1.LO's to 52.5 MHz, using the 52.5-60 MHz band, to check if they can lock.

The test is OK if SYNCHECK 0 = "1" and

SYNCHECK 1 = "1"

Error code

Meaning

00

The test was OK

01

Error. SYNCHECK 0 was "0"

Fault on:

611 Receiver Synthesizer Board or
cable connecting **611** and **624** or

624 Transceiver Control Board

02

Error. SYNCHECK 1 was "0"

Fault on:

611 Exciter Synthesizer Board or
cable connecting **611** and **624** or

624 Transceiver Control Board

03

Error. SYNCHECK 0 was "0" and

SYNCHECK 1 was "0"

Fault on:

624 Transceiver Control Board or
cable connecting **611** and **624**

98

Error, no response from TU

Fault on:

624 Transceiver Control Board

8.4.16 TEST 12

Test 12 will test both Synthesizer Boards **611**.

It will set 1.LO to 60 MHz, using the 52.5-60 MHz band, to check if they can lock.

The test is OK if SYNCHECK 0 = "1" and

SYNCHECK 1 = "1"

Error code

Meaning

00

The test was OK

- 01 Error. SYNCHECK 0 was "0"
Fault on:
[611] Receiver Synthesizer Board or
cable connecting [611] and [624] or
[624] Transceiver Control Board
- 02 Error. SYNCHECK 1 was "0"
Fault on:
[611] Exciter Synthesizer Board or
cable connecting [611] and [624] or
[624] Transceiver Control Board
- 03 Error. SYNCHECK 0 was "0" and
SYNCHECK 1 was "0"
Fault on:
[624] Transceiver Control Board or
cable connecting [611] and [624]
- 98 Error, no response from TU
Fault on:
[624] Transceiver Control Board

3.4.17 TEST 13

Test 13 will test both Synthesizer Boards [611].
It will set LLO's to 60 MHz, using the 60-67.5 MHz band, to check if they
can lock.
The test is OK if SYNCHECK 0 = "1" and
SYNCHECK 1 = "1"

Error code	Meaning
00	The test was OK
01	Error. SYNCHECK 0 was "0" Fault on: [611] Receiver Synthesizer Board or cable connecting [611] and [624] or [624] Transceiver Control Board
02	Error. SYNCHECK 1 was "0" Fault on: [611] Exciter Synthesizer Board or cable connecting [611] and [624] or [624] Transceiver Control Board
03	Error. SYNCHECK 0 was "0" and SYNCHECK 1 was "0" Fault on: [624] Transceiver Control Board or cable connecting [611] and [624]

98

Error, no response from TU
Fault on:
[624] Transceiver Control Board

8.4.18 TEST 14

Test 14 will test both Synthesizer Boards [611].
It will set 1.LO's to 67.5 MHz, using the 60-67.5 MHz band, to check if they can lock.

The test is OK if SYNCHECK 0 = "1" and
SYNCHECK 1 = "1"

Error code	Meaning
00	The test was OK
01	Error. SYNCHECK 0 was "0" Fault on: [611] Receiver Synthesizer Board or cable connecting [611] and [624] or [624] Transceiver Control Board
02	Error. SYNCHECK 1 was "0" Fault on: [611] Exciter Synthesizer Board or cable connecting [611] and [624] or [624] Transceiver Control Board
03	Error. SYNCHECK 0 was "0" and SYNCHECK 1 was "0" Fault on: [624] Transceiver Control Board or cable connecting [611] and [624]
98	Error, no response from TU Fault on: [624] Transceiver Control Board

8.4.19 TEST 15

Test 15 will test both Synthesizer Boards [611].
It will set 1.LO's to 67.5 MHz, using the 67.5-75 MHz band, to check if they can lock.

The test is OK if SYNCHECK 0 = "1" and
SYNCHECK 1 = "1"

Error code	Meaning
00	The test was OK

01	Error. SYNCHECK 0 was "0" Fault on: [611] Receiver Synthesizer Board or cable connecting [611] and [624] or [624] Transceiver Control Board
02	Error. SYNCHECK 1 was "0" Fault on: [611] Exciter Synthesizer Board or cable connecting [611] and [624] or [624] Transceiver Control Board
03	Error. SYNCHECK 0 was "0" and SYNCHECK 1 was "0" Fault on: [624] Transceiver Control Board or cable connecting [611] and [624]
98	Error, no response from TU Fault on: [624] Transceiver Control Board

8.4.20 TEST 16

Test 16 will test both Synthesizer Boards [611].
It will set 1.LO's to 75 MHz, using the 67.5-75 MHz band, to check if they
can lock.
The test is OK if SYNCHECK 0 = "1" and
SYNCHECK 1 = "1"

Error code	Meaning
00	The test was OK
01	Error. SYNCHECK 0 was "0" Fault on: [611] Receiver Synthesizer Board or cable connecting [611] and [624] or [624] Transceiver Control Board
02	Error. SYNCHECK 1 was "0" Fault on: [611] Exciter Synthesizer Board or cable connecting [611] and [624] or [624] Transceiver Control Board
03	Error. SYNCHECK 0 was "0" and SYNCHECK 1 was "0" Fault on: [624] Transceiver Control Board or cable connecting [611] and [624]

98

Error, no response from TU
Fault on:
[624] Transceiver Control Board

8.4.21 TEST 17

Test 17 will test both Synthesizer Boards [611].
It will set 2.10's to 43.597 MHz to check if they can lock.
The test is OK if SYNCHECK 0 = "1" and
SYNCHECK 1 = "1"

Error code	Meaning
00	The test was OK
01	Error. SYNCHECK 0 was "0" Fault on: [611] Receiver Synthesizer Board or cable connecting [611] and [624] or [624] Transceiver Control Board
02	Error. SYNCHECK 1 was "0" Fault on: [611] Exciter Synthesizer Board or cable connecting [611] and [624] or [624] Transceiver Control Board
03	Error. SYNCHECK 0 was "0" and SYNCHECK 1 was "0" Fault on: [624] Transceiver Control Board or cable connecting [611] and [624]
98	Error, no response from TU Fault on: [624] Transceiver Control Board

8.4.22 TEST 18

Test 18 will test both Synthesizer Boards [611].
It will set 2.10's to 43.603 MHz to check if they can lock.
The test is OK if SYNCHECK 0 = "1" and
SYNCHECK 1 = "1"

Error code	Meaning
00	The test was OK

- 01 Error. SYNCHECK 0 was "0"
Fault on:
[611] Receiver Synthesizer Board or
cable connecting [611] and [624] or
[624] Transceiver Control Board
- 02 Error. SYNCHECK 1 was "0"
Fault on:
[611] Exciter Synthesizer Board or
cable connecting [611] and [624] or
[624] Transceiver Control Board
- 03 Error. SYNCHECK 0 was "0" and
SYNCHECK 1 was "0"
Fault on:
[624] Transceiver Control Board or
cable connecting [611] and [624]
- 98 Error, no response from TU
Fault on:
[624] Transceiver Control Board

8.4.23 TEST 19

Test 19 will test both Synthesizer Boards [611].
It will set 3.LO's out of lock to check if they can be controlled by the
microprocessor.
The test is OK if SYNCHECK 0 = "0"
SYNCHECK 1 = "0"

- | Error code | Meaning |
|------------|---|
| 00 | The test was OK |
| 01 | Error. SYNCHECK 0 was "1"
Fault on:
[611] Receiver Synthesizer Board or
cable connecting [611] and [624] or
[624] Transceiver Control Board |
| 02 | Error. SYNCHECK 1 was "1"
Fault on:
[611] Exciter Synthesizer Board or
cable connecting [611] and [624] or
[624] Transceiver Control Board |
| 03 | Error. SYNCHECK 0 was "1" and
SYNCHECK 1 was "1"
Fault on:
[624] Transceiver Control Board or
cable connecting [624] and [611] |

98

Error, no response from TU
Fault on:
[624] Transceiver Control Board

8.4.24 TEST 20

Test 20 will test both Synthesizer Boards [611].
It will set 3.LO's to 1.3955 MHz to check if they can lock.
The test is OK if SYNCHECK 0 = "1" and
SYNCHECK 1 = "1"

Error code	Meaning
00	The test was OK
01	Error. SYNCHECK 0 was "0" Fault on: [611] Receiver Synthesizer Board or cable connecting [611] and [624] or [624] Transceiver Control Board
02	Error. SYNCHECK 1 was "0" Fault on: [611] Exciter Synthesizer Board or cable connecting [611] and [624] or [624] Transceiver Control Board
03	Error. SYNCHECK 0 was "0" and SYNCHECK 1 was "0" Fault on: [624] Transceiver Control Board or cable connecting [611] and [624]
98	Error, no response from TU Fault on: [624] Transceiver Control Board

8.4.25 TEST 21

Test 20 will test both Synthesizer Boards [611].
It will set 3.LO's to 1.403 MHz to check if they can lock.
The test is OK if SYNCHECK 0 = "1" and
SYNCHECK 1 = "1"

Error code	Meaning
00	The test was OK

- 01 Error. SYNCHECK 0 was "0"
Fault on:
[611] Receiver Synthesizer Board or
cable connecting [611] and [624] or
[624] Transceiver Control Board
- 02 Error. SYNCHECK 1 was "0"
Fault on:
[611] Exciter Synthesizer Board or
cable connecting [611] and [624] or
[624] Transceiver Control Board
- 03 Error. SYNCHECK 0 was "0" and
SYNCHECK 1 was "0"
Fault on:
[624] Transceiver Control Board or
cable connecting [611] and [624]
- 98 Error, no response from TU
Fault on:
[624] Transceiver Control Board

8.4.26 TEST 22

Test 22 will test Exciter Signal Path [619].
It will set [619] to J3E reception and test that EX OUT CHECK and EX AF CHECK is
LOW, this will prove that the signal path is controlled by the microprocessor.
The test is OK if EX AF CHECK = "0"
and EX OUT CHECK = "0"

- | Error code | Meaning |
|------------|--|
| 00 | The test was OK |
| 01 | Error, EX AF CHECK was "1"
Fault on:
[619] Exciter Signal Path
or cable connecting [619] and [624]
or [624] Transceiver Control Board |
| 02 | Error, EX OUT CHECK was "1"
Fault on:
[619] Exciter Signal Path
or cable connecting [619] and [624]
or [624] Transceiver Control Board |
| 98 | Error, no response from TU
Fault on:
[624] Transceiver Control Board |

8.4.27 TEST 23

Test 23 will test Exciter Signal Path [619].

It will set [619] to A1 (CW) transmission and test EX OUT CHECK, this will prove that the transmission signal path is OK for A1 mode. The frequency is 14.250 MHz.

The test is OK if EX OUT CHECK = "1"

Error code	Meaning
00	The test was OK
01	Error, EX OUT CHECK was "0", Exciter generates no RF. Fault on: [619] Exciter Signal Path or cable connecting [619] and [611] or [611] Exciter Synthesizer Board or cable connecting [619] and [624] or [624] Transceiver Control Board
98	Error, no response from TU Fault on: [624] Transceiver Control Board

8.4.28 TEST 24

Test 24 will test Exciter Signal Path [619].

It will set [619] to J3E (USB) transmission and test EX OUT CHECK and EX AF CHECK, this will prove that the signal path is OK for J3E mode, the CU will generate a 919 Hz tone to modulate the exciter. The carrier frequency is 14.250 MHz.

The test is OK if EX AF CHECK and EX OUT CHECK is "1"

Error code	Meaning
00	The test was OK
01	Error, EX AF CHECK was "0" no AF modulation is detected Fault on: cable connecting CU and TU or [601] Audio Processing Board or [619] Exciter Signal Path or cable connecting [619] and [624] or [624] Transceiver Control Board

02 Error, EX OUT CHECK was "0"
 no RF is generated on [619]
 Fault on:
 [619] Exciter Signal Path
 or cable connecting [619] and [611]
 or [611] Exciter Synthesizer Board
 or cable connecting [619] and [624]
 or [624] Transceiver Control Board

98 Error, no response from TU
 Fault on:
 [624] Transceiver Control Board

8.4.29 TEST 25

Test 25 will test Receiver Signal Path [618].
 It will set [618] to J3E (USB) reception and set the synthesizer to make a 1 kHz beat frequency, AGC voltage and AF signal level will be tested by the CU unit.
 The synthesizer frequencies are: 1.LO = 45.0 MHz, 2.LO = 43.601 MHz, 3.LO = 1.4 MHz.

A clear 1 kHz tone will be heard during this test.

The test is OK if RX RATE ([624]) < 9.1 kHz
 and CHECK 0 ([601]) = "0"
 and CHECK 1 ([601]) = "0"

Error code	Meaning
00	The test was OK
01	Error, RX RATE > 9.1 kHz AGC voltage is too low Fault on: [618] Receiver Signal Path or [624] Transceiver Control Board or cable connecting [618] and [611] or cable connecting [611] and [624] or cable connecting CU and TU or [600] Control Board
02	Error, CHECK 0 was "1" no AF signal on [601] Audio processing Board Fault on: [618] Receiver Signal Path or cable connecting [618] and [611] or cable connecting [611] and [624] or cable connecting CU and TU or [601] Audio Processing Board or [600] Control Board

- 03 Error, CHECK 1 was "1"
no AF signal on loudspeaker
Fault on:
601 Audio Processing Board
- 99 The test can not be executed because
either: filter X5 is not installed or
this is not a standard version
- 98 Error, no response from TU
Fault on:
624 Transceiver Control Board

8.4.30 TEST 26

Test 26 will test Receiver Signal Path 618.

It will set 618 to H3E (AM) reception and set the synthesizer to generate an unmodulated carrier. The CU will test AGC voltage and that no AF signal is detected.

The synthesizer frequencies are: 1.LO = 45 MHz, 2.LO = 43.6 MHz, 3.LO = 1.4 MHz

The test is OK if RX RATE (624) < 9.1 kHz
and CHECK 0 (601) = "1"
and CHECK 1 (601) = "1"

Error code	Meaning
00	The test was OK
01	Error, RX RATE > 9.1 kHz AGC voltage is too low Fault on: <u>618</u> Receiver Signal Path or <u>624</u> Transceiver Control Board or cable connecting <u>618</u> and <u>611</u> or cable connecting <u>611</u> and <u>624</u> or cable connecting CU and TU or <u>600</u> Control Board
02	Error, <u>CHECK 0</u> was "0" AF was detected on 601 Audio Processing Board Fault on: <u>618</u> Receiver Signal Path or cable connecting <u>618</u> and <u>611</u> or cable connecting <u>611</u> and <u>624</u> or cable connecting CU and TU or <u>601</u> Audio Processing Board or <u>600</u> Control Board

- 03 Error, CHECK 1 was "0"
AF was detected on loudspeaker
Fault on:
601 Audio Processing Board
- 98 Error, no response from TU
Fault on:
624 Transceiver Control Board
- 99 The test can not be executed because
this is a special version

8.4.31 TEST 27

Test 27 will test Receiver Signal Path 618.
It will set 618 to telex reception and set the synthesizer to generate a 1500 Hz tone. The CU will check AGC voltage and AF signal.
The synthesizer frequencies are: 1.LO = 45.0005 MHz, 2.LO = 43.002 MHz and 3.LO = 1.4 MHz.
The test is OK if RX RATE (624) < 9.1 kHz
and CHECK 0 (601) = "0"
and CHECK 1 (601) = "0"

- | | |
|------------|--|
| Error code | Meaning |
| 00 | The test was OK |
| 01 | Error, RX RATE > 9.1 kHz
AGC voltage is too low
Fault on:
<u>618</u> Receiver Signal Path
or <u>624</u> Transceiver Control Board
or cable connecting <u>618</u> and <u>611</u>
or cable connecting <u>611</u> and <u>624</u>
or cable connecting CU and TU
or <u>600</u> Control Board |
| 02 | Error, <u>CHECK 0</u> was "1"
no AF signal on <u>601</u> Audio processing Board
Fault on:
<u>618</u> Receiver Signal Path
or cable connecting <u>618</u> and <u>611</u>
or cable connecting <u>611</u> and <u>624</u>
or cable connecting CU and TU
or <u>601</u> Audio Processing Board
or <u>600</u> Control Board |

- 03 Error, CHECK 1 was "1"
no AF signal on loudspeaker
Fault on:
601 Audio Processing Board
- 99 The test can not be executed because
either filter X4 is not installed
or this is not a standard version
- 98 Error, no response from TU
Fault on:
624 Transceiver Control Board

8.4.32 TEST 28

Test 28 will test Receiver Signal Path 618.
It will set 618 to CW reception and set the synthesizer to generate a 1 kHz tone. The CU will check AGC voltage and AF signals. A clear 1 kHz tone will be heard during this test.

The synthesizer frequencies are: 1.LO = 45 MHz, 2.LO = 43.601 MHz, 3.LO = 1.4 MHz.

The test is OK if RX RATE (624) < 9.1 kHz
and CHECK 0 (601) = "0"
and CHECK 1 (601) = "1"

- | Error code | Meaning |
|------------|---|
| 00 | The test was OK |
| 01 | Error, RX RATE > 9.1 kHz
AGC voltage is too low
Fault on:
<u>618</u> Receiver Signal Path
or <u>624</u> Transceiver Control Board
or cable connecting <u>618</u> and <u>611</u>
or cable connecting <u>611</u> and <u>624</u>
or cable connecting CU and TU
or <u>600</u> Control Board |
| 02 | Error, <u>CHECK 0</u> was "1"
no AF signal on 601 Audio processing Board
Fault on:
<u>618</u> Receiver Signal Path
or cable connecting <u>618</u> and <u>611</u>
or cable connecting <u>611</u> and <u>624</u>
or cable connecting CU and TU
or <u>601</u> Audio Processing Board
or <u>600</u> Control Board |

- 03 Error, CHECK 1 was "1"
no AF signal on loudspeaker
Fault on:
601 Audio Processing Board
- 99 The test can not be executed because
either filter X2 is not installed
or this is a special version.
- 98 Error, no response from TU
Fault on:
624 Transceiver Control Board

8.4.33 TEST 29

Test 29 will test Receiver Signal Path 618.
It will set 618 to CW reception, narrow bandwidth, and set the synthesizer to generate a 1 kHz tone. The CU will check AGC voltage and AF signals. A clear 1 kHz tone will be heard during this test.
The synthesizer frequencies are 1.LO = 45 MHz, 2.LO = 43.6 MHz, 3.LO = 1.4 MHz.
The test is OK if RX RATE (624) < 9.1 kHz
and CHECK 0 (601) = "0"
and CHECK 1 (601) = "0"

- | Error code | Meaning |
|------------|--|
| 00 | The test was OK |
| 01 | Error, RX RATE > 9.1 kHz
AGC voltage is too low
Fault on:
<u>618</u> Receiver Signal Path
or <u>624</u> Transceiver Control Board
or cable connecting <u>618</u> and <u>611</u>
or cable connecting <u>611</u> and <u>624</u>
or cable connecting CU and TU
or <u>600</u> Control Board |
| 02 | Error, <u>CHECK 0</u> was "1"
no AF signal on <u>601</u> Audio processing Board
Fault on:
<u>618</u> Receiver Signal Path
or cable connecting <u>618</u> and <u>611</u>
or cable connecting <u>611</u> and <u>624</u>
or cable connecting CU and TU
or <u>601</u> Audio Processing Board
or <u>600</u> Control Board |

- 03 Error, CHECK 1 was "1"
no AF signal on loudspeaker
Fault on:
601 Audio Processing Board
- 99 The test can not be executed because
either filter X3 is not installed
or X3 has a center frequency of
1.3985 MHz or this is a special version
- 98 Error, no response from TU
Fault on:
624 Transceiver Control Board

8.4.34 TEST 30

Test 30 will test Receiver Signal Path 618.
It will set 618 to CW reception, narrow bandwidth, and set the synthesizer to
generate a 1.5 kHz tone. The CU will check AGC voltage and AF signals. A clear
1.5 kHz tone will be heard during the test.
The synthesizer frequencies are: 1.L0 = 45.0005 MHz, 2. L0 = 43.602 MHz, 3.L0
= 1.4 MHz.

The test is OK if RX RATE (624) < 9.1 kHz
and CHECK 0 (601) = "0"
and CHECK 1 (601) = "0"

Error code	Meaning
00	The test was OK
01	Error, RX RATE > 9.1 kHz AGC voltage is too low Fault on: <u>618</u> Receiver Signal Path or <u>624</u> Transceiver Control Board or cable connecting <u>618</u> and <u>611</u> or cable connecting <u>611</u> and <u>624</u> or cable connecting CU and TU or <u>600</u> Control Board
02	Error, <u>CHECK 0</u> was "1" no AF signal on <u>601</u> Audio processing Board Fault on: <u>618</u> Receiver Signal Path or cable connecting <u>618</u> and <u>611</u> or cable connecting <u>611</u> and <u>624</u> or cable connecting CU and TU or <u>601</u> Audio Processing Board or <u>600</u> Control Board

- 03 Error, CHECK 1 was "1"
no AF signal on loudspeaker
Fault on:
601 Audio Processing Board
- 99 The test can not be executed because
filter X3 is not installed or has a
center frequency of 1.4 MHz or this
is a special version
- 98 Error, no response from TU
Fault on:
624 Transceiver Control Board

8.4.35 TEST 31

Test 31 is a listening test at 2.0 MHz. The purpose of this test is not to test anything. The operator should listen to this frequency before proceeding with the transmitter tests. The transmitter tests will transmit at this frequency, therefore the operator must listen to ensure that this frequency is not occupied by others.

If the frequency is free proceed to next test by pressing "DIMMER UP".

If the frequency is occupied, wait until it becomes free or abort the test by pressing any key but "DIMMER UP" or "DIMMER DOWN".

NOTE: This test can be executed in step mode only.

Error code	Meaning
00	Is always returned

8.4.36 TEST 32

Test 32 will test Power Amplifiers 626, P.A. Filters and Antenna Tuning Unit. It will transmit at 2 MHz CW mode and test that ALCHECK is OK, SWROK is OK, Power is OK and that IANT (antenna current) is OK. The 1.6-2.3 MHz filter is used in this test.

NOTE: This test can be executed in step mode only.

The test is OK if ALCHECK = "1"

and SWROK (660) = "0"

and Power \geq 90 %

and IANT \geq 1A

Error code	Meaning
00	The test was OK
01	Error, ALCHECK was "0" Fault on: <u>624</u> Transceiver Control Board or cable connecting <u>624</u> and <u>626</u> or <u>626</u> Power Amplifier

- 02 Power was < 90 %
 Fault on:
 [626] Power Amplifier
 or [652], [653] P.A. Filters
 or cable connecting [619] and [654]
 or cable connecting [626] and [652] [653]
- 03 Error, SWROK was "1"
 SWR was > 3
 Fault on:
 [660] Antenna Tuning Unit or antenna
- 04 Error, IANT was < 1 A
 Fault on:
 [660] Antenna Tuning Unit or antenna
- 05 PAOK was "1", this indicates one or more
 Power Amplifiers does not deliver sufficient
 power.
 Fault on:
 [626] Power Amplifier or
 [654] Power Splitter or
 cables connecting [654] and [626] or
 [655] Power Combiner or
 cables connecting [626] and [655]

8.4.37 TEST 33

Test 33 will test P.A. Filters [652] or [653].
 It will select the 2.31-3.33 MHz filter and transmit at 2 MHz.
 NOTE: This test can be executed in step mode only.
 The test is OK if Power > 90 %.

Error code	Meaning
00	The test was OK
01	Error, Power was < 90 % Fault on: [652], [653] P.A. Filters

8.4.38 TEST 34

Test 34 will test P.A. Filters [652], [653].
 It will select the 3.3-4.8 MHz filters and transmit at 2 MHz.
 NOTE: This test can be executed in step mode only.
 The test is OK if Power > 90 %.

Error code	Meaning
00	The test was OK

01 Error, Power was < 90 %
 Fault on:
 [652], [653] P.A. Filters

8.4.39 TEST 35

Test 35 will test P.A. Filters [652], [653].
It will select the 4.8-6.9 MHz filter.
NOTE: This test can be executed in step mode only.
The test was OK if Power > 90 %

Error code	Meaning
00	The test was OK

01 Error, Power was < 90 %
 Fault on:
 [652], [653] P.A. Filters

8.4.40 TEST 36

Test 36 will test P.A. Filters [652], [653].
It will select the 6.9-10 MHz filter and will transmit at 2 MHz.
NOTE: This test can be executed in step mode only.
The test is OK if Power > 90 %.

Error code	Meaning
00	The test was OK

01 Error, Power was > 90 %
 Fault on:
 [652], [653] P.A. Filters

8.4.41 TEST 37

Test 37 will test P.A. Filters [652], [653].
It will select the 10-14.4 MHz filter and will transmit at 2 MHz.
NOTE: This test can be executed in step mode only.
The test is OK if Power > 90 %.

Error code	Meaning
00	The test was OK

01 Error, Power was > 90 %
 Fault on:
 [652], [653] P.A. Filters

8.4.42 TEST 38

Test 38 will test P.A. Filters [652], [653].

It will select the 14-20 MHz filter and transmit at 2 MHz.

NOTE: This test can be executed in step mode only.

The test is OK if Power > 90 %.

Error code	Meaning
00	The test was OK
01	Error, Power was < 90 % Fault on: [652], [653] P.A. Filters

8.4.43 TEST 39

Test 39 will test P.A. Filters [652], [653].

It will select the 20-30 MHz filter and will transmit at 2 MHz.

NOTE: This test can be executed in step mode only.

The test is OK if Power > 90 %.

Error code	Meaning
00	The test was OK
01	Error, Power was > 90 % Fault on: [652], [653] P.A. Filters

8.4.44 TEST 40

Test 40 is a listening test at 491 kHz. The purpose of this test is not to test anything, but the operator should listen at this frequency before proceeding to the transmitter test. Test 41 will transmit at this frequency, therefore the operator must listen to ensure that this frequency is not occupied by others.

If the frequency is free proceed to test 41 by pressing "DINMER UP".

If the frequency is occupied, wait until it becomes free, or abort the test by pressing any key but "DINMER UP" or "DINMER DOWN".

NOTE: This test can be executed in step mode only.

Error code	Meaning
00	The listening test is executing
99	This transceiver is not equipped with a [653] P.A.Filter which includes a 400-525 kHz filter, the test can not be executed

8.4.45 TEST 41

Test 41 will test P.A. Filters **[653]**.

It will select 400-525 kHz filter and transmit at 491 kHz.

NOTE: This test can be executed in step mode only.

The test is OK if Power > 90 %.

Error code	Meaning
00	The test was OK
01	Error, Power was < 90 % Fault on: [653] P.A.Filters
99	This transceiver is not equipped with a [653] P.A.Filter which includes a 400-525 kHz filter, the test can not be executed

8.4.46 LIST OF TESTS

TEST#	TESTS	REMARKS
01	Audio Processing Board <u>601</u>	receiver signal path
02	Audio Processing Board <u>601</u>	receiver signal path
03	Audio Processing Board <u>601</u>	transmitter signal path
04	Audio Processing Board <u>601</u>	transmitter signal path
05	Display test	
06	Master Oscillator <u>612</u>	
07	Synthesizers <u>611</u>	all synthesizers mid range
08	Synthesizers <u>611</u>	1.LO out of lock
09	Synthesizers <u>611</u>	1.LO = 45 MHz 45-52.5 MHz range
10	Synthesizers <u>611</u>	1.LO = 52.5 MHz 45-52.5 MHz range
11	Synthesizers <u>611</u>	1.LO = 52.5 MHz 52.5-60 MHz range
12	Synthesizers <u>611</u>	1.LO = 60 MHz 52.5-60 MHz range
13	Synthesizers <u>611</u>	1.LO = 60 MHz 60-67.5 MHz range
14	Synthesizers <u>611</u>	1.LO = 67.5 MHz 60-67.5 MHz range
15	Synthesizers <u>611</u>	1.LO = 67.5 MHz 67.5-75 MHz range
16	Synthesizers <u>611</u>	1.LO = 75 MHz 67.5-75 MHz range
17	Synthesizers <u>611</u>	2.LO = 43.597 MHz
18	Synthesizers <u>611</u>	2.LO = 43.603 MHz
19	Synthesizers <u>611</u>	3.LO out of lock
20	Synthesizers <u>611</u>	3.LO = 1.3955 MHz
21	Synthesizers <u>611</u>	3.LO = 1.403 MHz
22	Exciter Signal Path <u>619</u>	no signal
23	Exciter Signal Path <u>619</u>	A1 mode
24	Exciter Signal Path <u>619</u>	J3E mode
25	Receiver Signal Path <u>618</u>	J3E mode
26	Receiver Signal Path <u>618</u>	AM mode
27	Receiver Signal Path <u>618</u>	F1B mode
28	Receiver Signal Path <u>618</u>	CW inter
29	Receiver Signal Path <u>618</u>	CW narrow
30	Receiver Signal Path <u>618</u>	CW narrow
31	Listening test (2 MHz)	
32	P.A. Filters, ATU	1.6-2.3 MHz
33	P.A. Filters	2.3-3.3 MHz
34	- -	3.3-4.8 MHz
35	- -	4.8-6.9 MHz
36	- -	6.9-10 MHz
37	- -	10-14 MHz
38	- -	14-20 MHz
39	- -	20-30 MHz
40	Listening test (491 kHz)	
41	P.A. Filters	400-525 kHz

8.5 SPARE PARTS LIST, TRP 8750 D SERIES

CONTROL UNIT:

600 Control Board (configuration Prom not included)	107 560 01
601 Audio Processing Board	107 560 11
602 Squelch Board (optional)	107 560 21
603 Line Transformer Board (optional)	107 560 31
Loudspeaker	860 000 09
Membrane Keyboard (excl. overlay)	343 590 5X

HANDSET:

450 Microphone Amplifier	107 445 01
Handset complete, incl. Microphone Amplifier	107 400 60

TRANSCIVER UNIT:

618 Receiver Signal Path incl. filters	107 561 81
619 Exciter Signal Path	107 561 91
611 Synthesizer Board	107 561 11
612 Master Oscillator, 1.5 ppm	107 561 21
613 Master Oscillator, 0.8 ppm (optional)	107 561 31
614 Master Oscillator, 0.4 ppm (optional)	107 561 41
620 Interconnection Board	107 562 01
624 Transceiver Control Board	107 562 41
Voltage Converter Assembly	107 600 90
Switched Mode Power Supply incl. 655 Combiner Board	107 700 10
655 Power Combiner	107 565 51
654 Power Splitter	107 565 41
P.A. Filter Assembly	107 565 21
Power Amplifier Assembly	107 600 10
40 Lead Flat Ribbon Cable	373 590 21
2 Lead Cable	106 600 50
Coaxial Cable	106 600 00
Coaxial Cable	106 600 10
Coaxial Cable	106 600 30
Coaxial Cable	106 600 40
Coaxial Cable	106 602 90

ANTENNA TUNING UNIT:

660 ATU Board	107 566 01
641 Antenna Relay Board	107 564 11
661 Directional Coupler	107 566 11

AC POWER SUPPLY UNIT P 8750:

Transformer	383 615 51
Electrolytic capacitor 10000 uF/63 V	652 910 51
Diode PH70	831 007 00

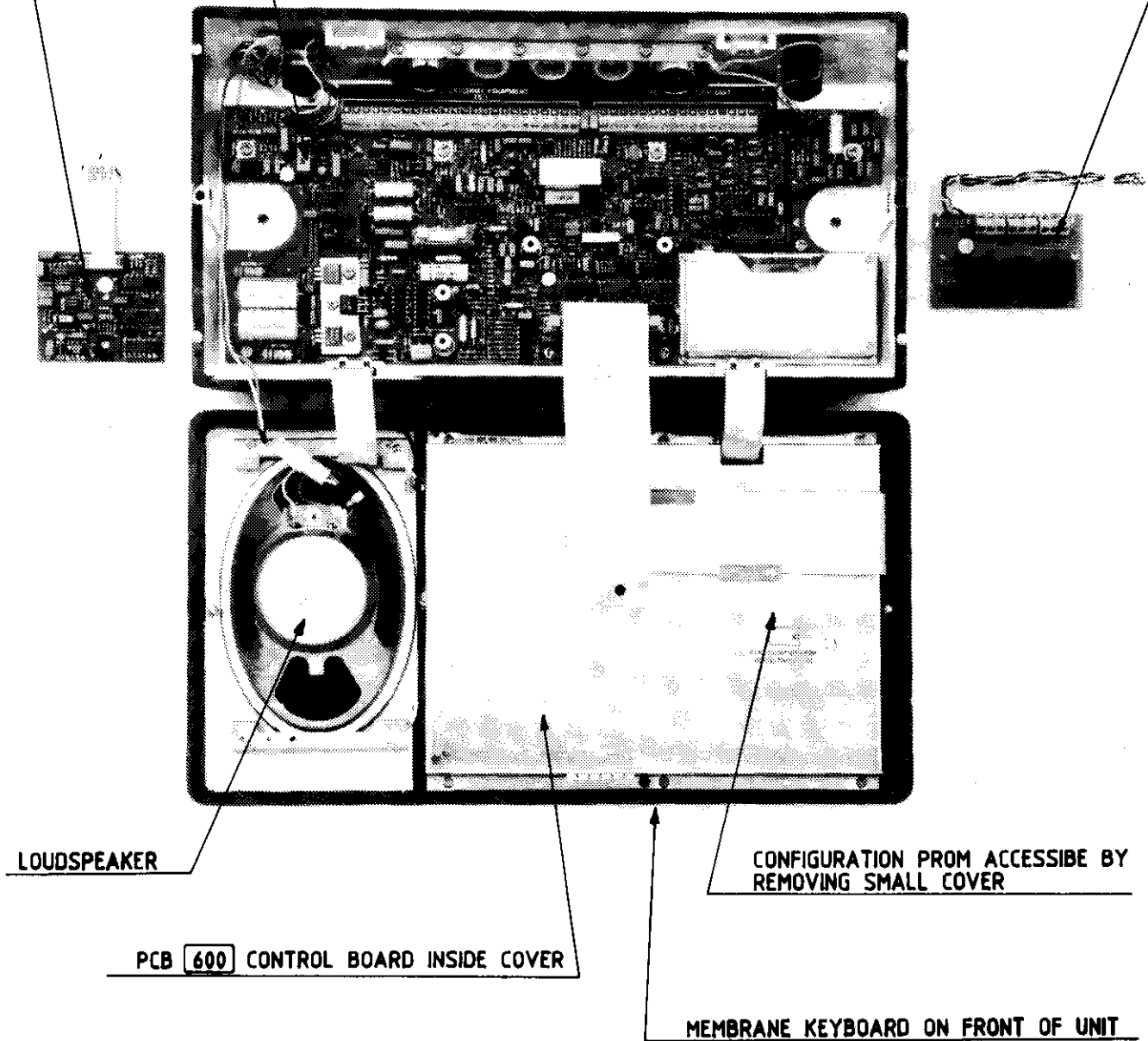
AC POWER SUPPLY UNIT P 8751:

Transformer	383 615 61
Diode KBPC 25-02	831 250 20

PCB 602 SQUELCH BOARD . OPTIONAL

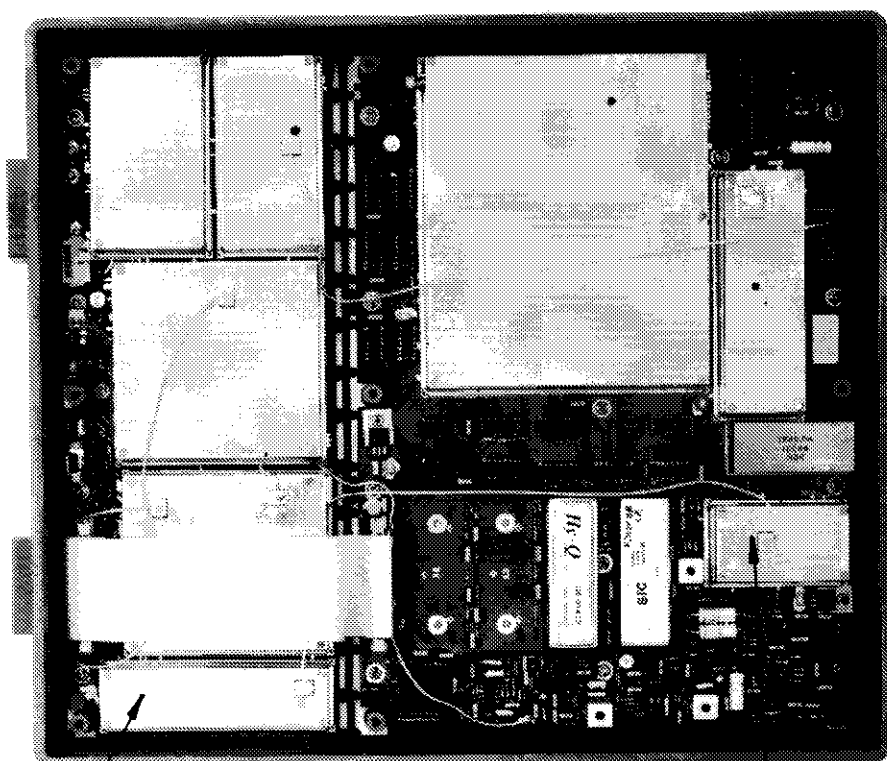
PCB 603 LINE TRANSFORMER BOARD . OPTIONAL

PCB 601 AUDIO PROCESSING BOARD



CONTROL UNIT 8000 DISASSEMBLE

INSIDE FRONT COVER

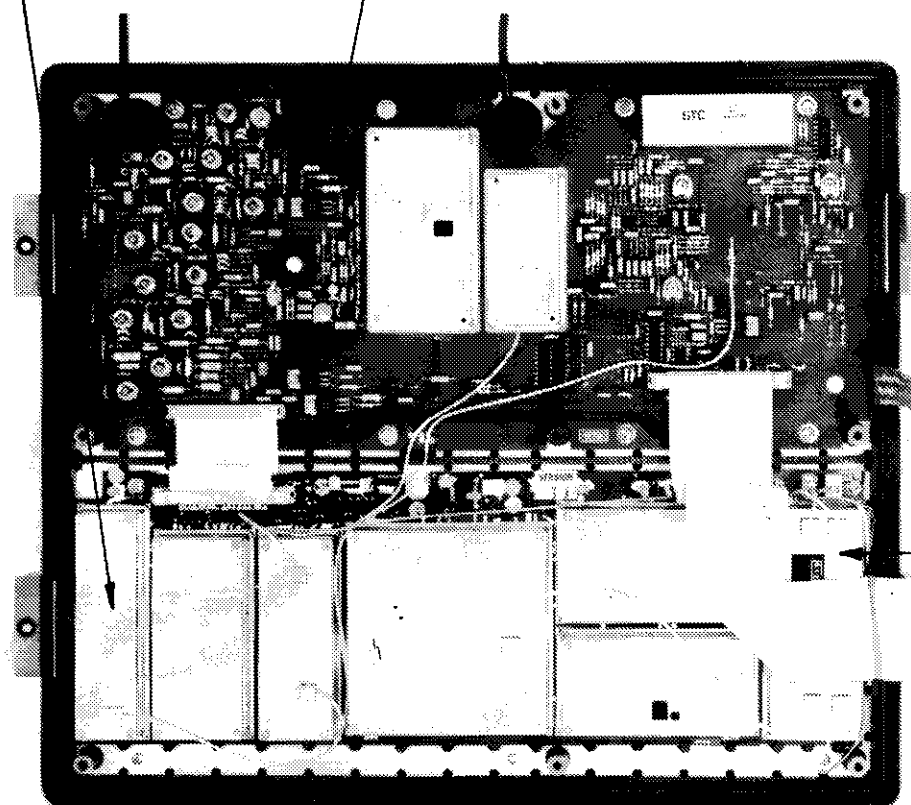


PCB 618 RECEIVER SIGNAL PATH BOARD

PCB 611 SYNTHESIZER BOARDS

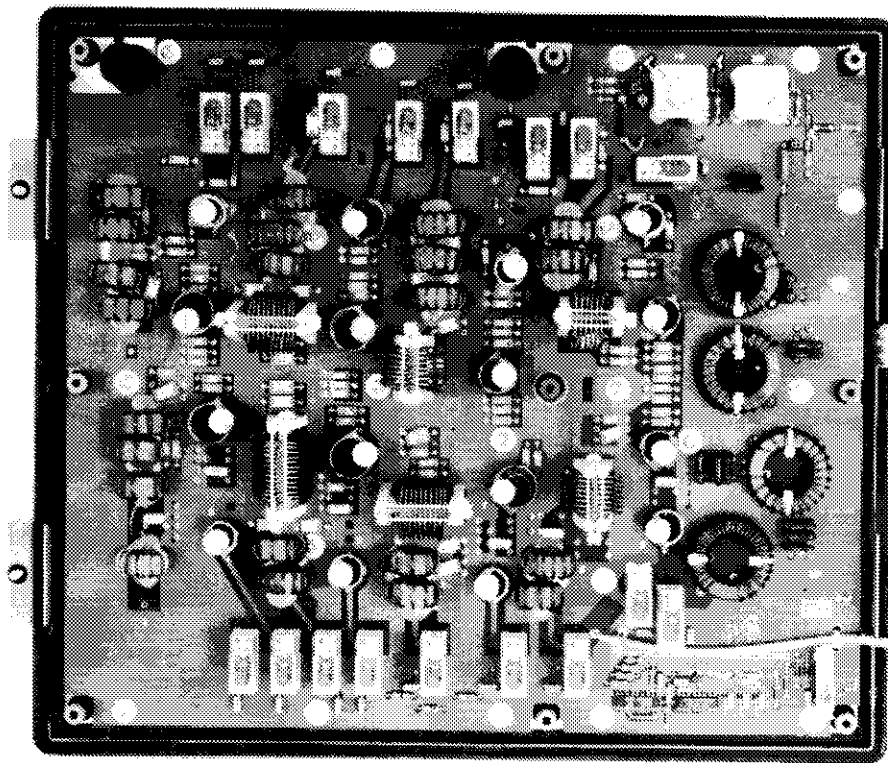
PCB 619 EXCITER SIGNAL PATH BOARD

INSIDE BACK COVER

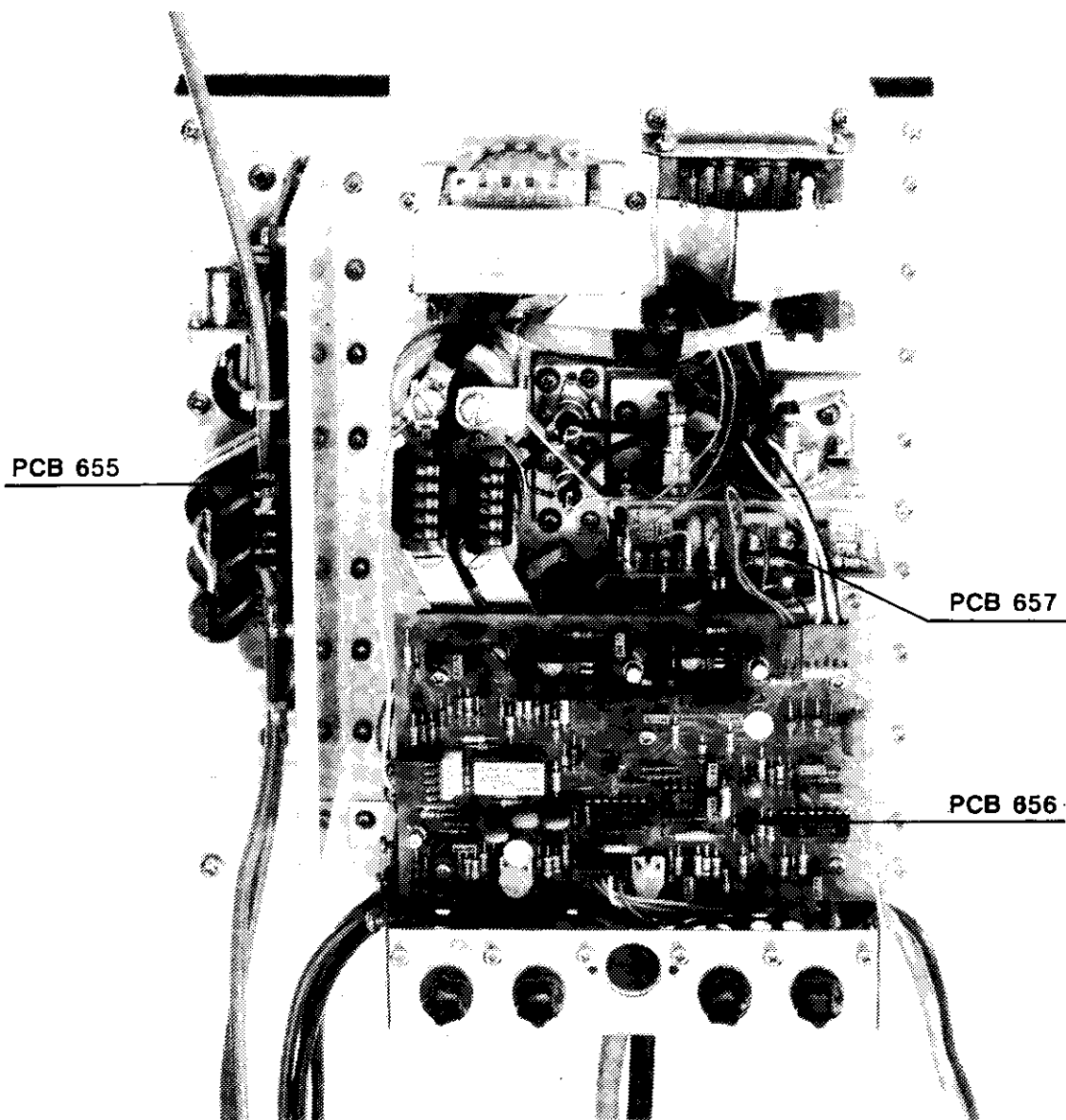


PCB 612 MASTER
OSCILLATOR BOARD

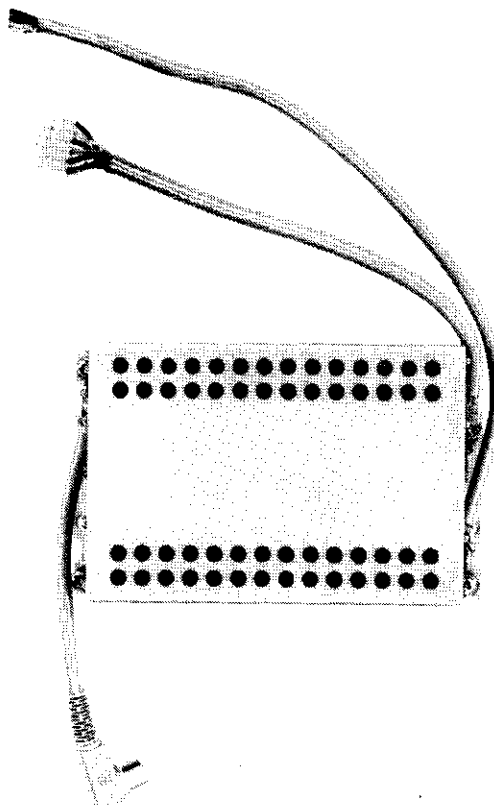
INTERIOR OF LOWER FRONT DOOR OF TRANSCEIVER UNIT



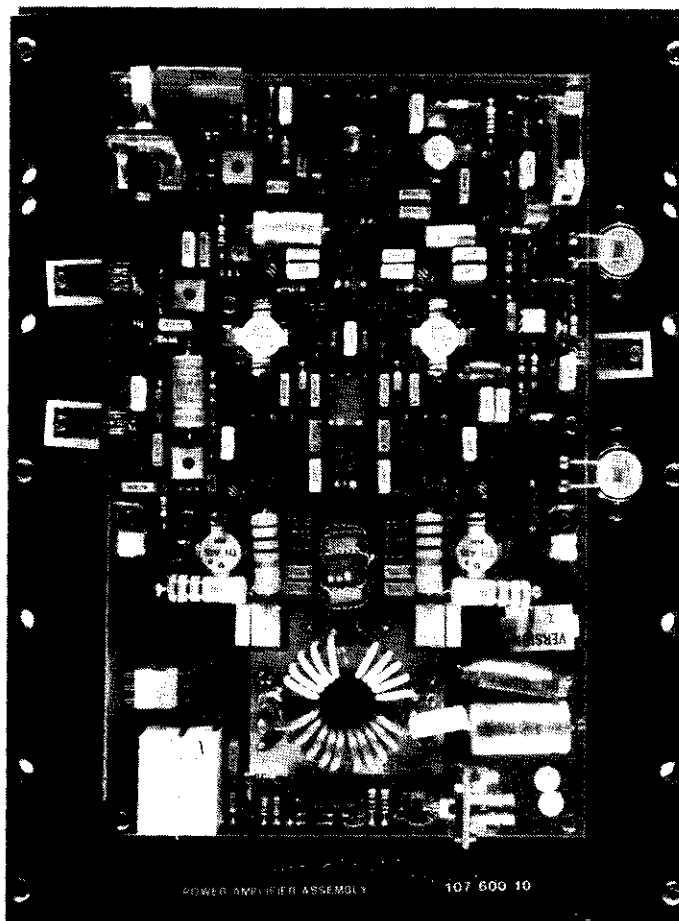
P.A. Filters Assembly



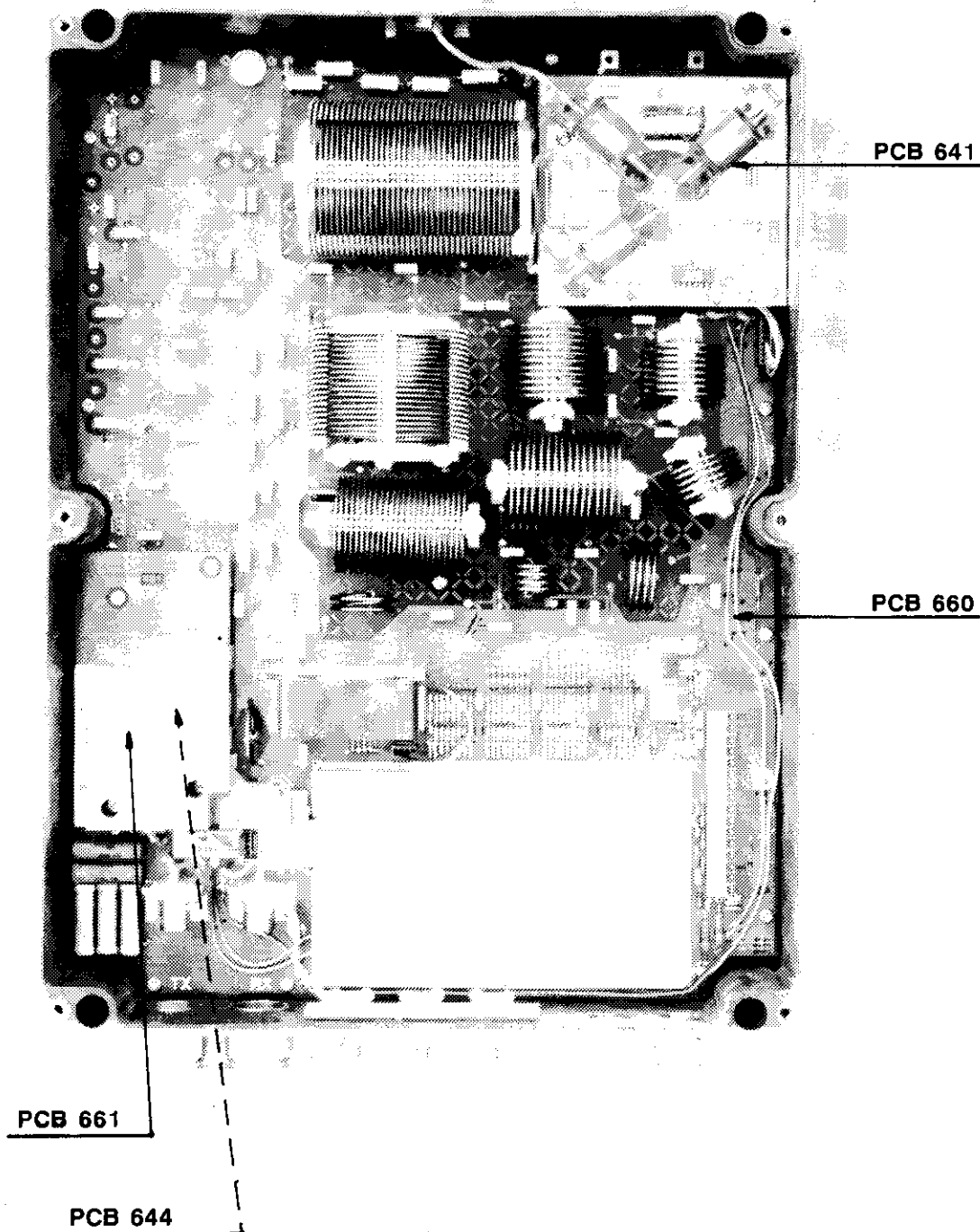
Switched Mode Power Supply



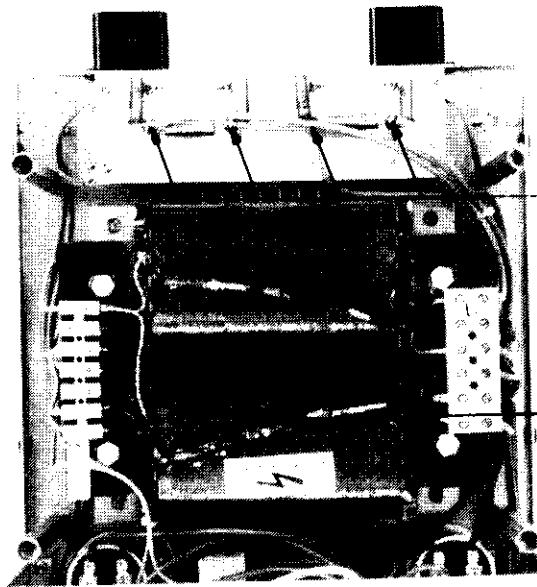
Voltage Converter Assembly



Power Amplifier Assembly



Antenna Tuning Unit 8750



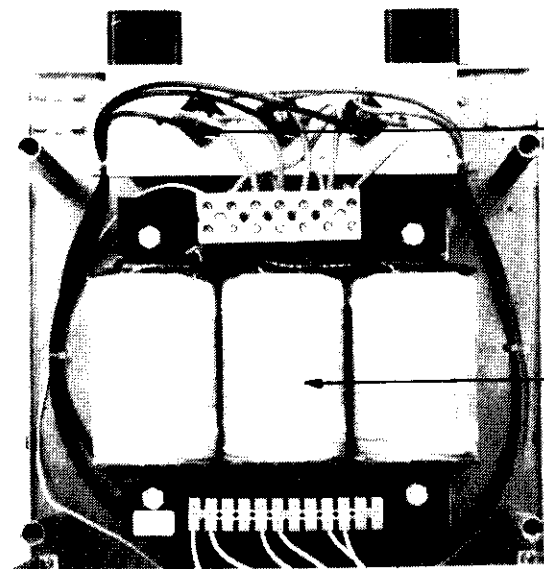
Diode
831 007 00

Transformer
383 615 51

Lamp
754 000 04



AC Power Supply Unit P 8750



Bridge
831 250 20

Transformer
383 615 61

Lamp
754 000 04



AC Power Supply Unit P 8751

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9. CIRCUIT DESCRIPTION AND DIAGRAMS

9.1 Symbol Explanation

9.1.1 Arrows A black arrow on a line indicates in which direction an AC signal flows. A white arrow on a line indicates in which direction the information of a DC signal flows. An exception from this rule is the supply lines and their connections, which are always indicated by a supply voltage level or its associated label.

9.1.2 Logic circuits A small circle at an external input means that the specific input is active LOW, i.e. it produces the desired function, in conjunction with other inputs if its voltage is the lower of the two logic levels in the system, otherwise the specific input is HIGH. A clock input is indicated by an open triangle. A small circle at a clock input means that the outputs change on the HIGH to LOW clock transition. A small circle at an output indicates that when the function designated is true, the output is LOW. Inputs and outputs are labelled with mnemonic letters as described in table 9.1.

9.1.3 Logic Functions Logic functions are labelled with mnemonic letters in brackets. An active LOW function is given a bar over the label.

9.1.4 Voltages Typical DC voltages are indicated on the circuit diagrams next to the points to which they refer and are marked with a "V". Typical logic levels are indicated in brackets (LOW/HIGH) on the circuit diagrams next to the point to which they refer and are marked with a "V". Typical AC voltages are likewise indicated on the circuit diagrams. They are marked with "Vpp" or "mVpp" and values are in RMS unless otherwise stated.

9.2 Abbreviations

A	= ampere, amperes
B	= battery, motor
C	= capacitor
Car.	= carbon
Cer.	= ceramic
CR	= thyristor
D	= diode
F	= farad, fan
FS	= fuse
H	= henry
IC	= integrated circuit
k	= kilo or 10^3
L	= inductor
LED	= light emitting diode
LS	= loudspeaker
lin.	= linear
log.	= logarithmic
m	= milli or 10^{-3}
M	= mega or 10^6
ME	= instrument
MF	= metal film
Mi	= mica
MO	= metallic oxide
MP	= metallized paper
u	= micro or 10^{-6}
n	= nano or 10^{-9}
NPO	= temp. coefficient 0
N150	= temp. coefficient -150
NTC	= neg. temp. coefficient
p	= pico or 10^{-12}
PL	= connector (plug or cable with plug)
Polyes.	= polyester
Polyst.	= polystyrene
Pot.	= potentiometer
PTC	= pos. temp. coefficient
Q	= transistor
R	= resistor
RL	= relay
SK	= connector (socket or cable with socket)
SL	= lamp
Sol. al.	= solid aluminium
SW	= switch
T	= transformer
Tan.	= tantalum electrolytic capacitor
V	= working voltage DC or volts
Vac.	= working voltage AC
Var.	= variable
Varicap	= variable capacitance diode
Vl	= valve

Vpp = peak to peak voltage
VR = neon lamp
ww = wire wound
W = watt, watts
W.alum. = wet aluminium electrolytic
X = crystal, crystal osc. or crystal filter

Table 9.1

Label	Short for	Meaning
A	Trig Input	triggers one-shot on falling edge
A _n	Address	selects a memory location (data word) or a multiplexer input
B	Trig Input	triggers one-shot on rising edge
B/D	Binary /Decimal	selects counting mode (modulus 16 or 10)
BI	Blank Input	deactivates BCD-to-7 segment decoder (blanks connected display)
CxY	Control Signal	programmable bidirectional hand-shake signal to/from peripheral
CEP, CET	Clock Enable	enables clock signal to counter
CP	Clock Pulse	edge activated input for updating synchronous circuit
CSx	Chip Select	selects a memory or peripheral circuit (bus slave)
Dx	Data	input to D flip-flop and register or bidirectional information path for bus connected device
E	Enable Input	enables clock signal
EO	Enable Output	activates output(s) from combinatorical circuit
EQ	Enable Output	activates output(s) from sequential circuit
HLT	Halt	suspends MPU activity and releases busses
IxY	Input Data	input for combinatorical circuit
IRQy	Interrupt Request	wired-OR flag from peripheral to MPU indicating interrupt detected
J, K	Data	input to J-K flip-flop
Kx	Mode Select	selects counting mode for programmable counter
LE	Latch Enable	updates latching register
LT	Lamp Test	activates all outputs on BCD-to-7 segment decoder
MR	Master Reset	input for initializing MPU or clearing programmable registers in peripheral circuit
MRDY	Memory Ready	hand-shake flag to MPU indicating new bus cycle may be started

Table 9.1 continued

Label	Short for	Meaning
NMI	Non-maskable Interrupt	flag to MPU, which cannot be masked softwarewise indicating interrupt detected
Ox	Output	output from combinatorical circuit
PxY	Data (bidirectional)	input to programmable counter or programmable bidirectional signal to/from peripheral
PE	Parallel Enable	loads Px data into programmable counter
Qx	Output	output from sequential circuit
R	Reset	forces flip-flop(s) to LOW state
RBI	Ripple Blank Input	deactivates BCD-to-7 segment decoder (blanks connected display) if data correspond to leading zero, when decoders are cascaded
RSx	Register Select	addresses programmable registers in peripheral circuit
S	Set	forces flip-flop(s) to HIGH state
Sy	Select Data	selects data path through multiplexer
SYNC	Synchronize	issued from bus master (MPU) to synchronize data transfer
TC	Terminate Count	output from counter indicating new cycle started (corresponds to carry or borrow depending on counting direction)
U/D	Up/Down	selects counting direction
VMA	Valid Memory Address	issued from bus master (MPU) to indicate stable address bus
WI	Write Input	input to bus slave to make it accept data from master
WQ	Write Output	output from master (MPU) when it is a data source

(1) "x" is a numerical index (zero origin indexing) corresponding to bit position

(2) "y" is an alphabetical index used for multiple ports

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CONTROL UNIT

PCB 600 CONTROL BOARD

PCB 601 AUDIO PROCESSING BOARD

PCB 602 SQUELCH BOARD

PCB 603 LINE TRANSFORMER BOARD

TRANSCEIVER UNIT

PCB 611 SYNTHESIZER BOARD

PCB 612 / 613 / 614 MASTER OSCILLATOR AND PCB 699 TCXO HEATER BOARD

PCB 618 RECEIVER SIGNAL PATH BOARD

PCB 619 EXCITER SIGNAL PATH BOARD

PCB 620 INTERCONNECTION BOARD

PCB 621 VOLTAGE CONVERTER BOARD

PCB 624 TRANSCEIVER CONTROL BOARD

PCB 626 / 631 POWER AMPLIFIER BOARD

PCB 630 50 OHMS ANTENNA RELAY BOARD

PCB 652 653 P.A. FILTERS BOARD

PCB 654 POWER SPLITTER BOARD

PCB 655 POWER COMBINER BOARD

SMPS AND PCB'S 656 CONTROL BOARD AND 657 DRIVER BOARD

ANTENNA TUNING UNIT

PCB 660 ANTENNA TUNING UNIT BOARD AND 641 ANTENNA RELAY BOARD

PCB 644 50 OHM ATU RELAY BOARD

AC POWER SUPPLY UNIT P 8750

AC POWER SUPPLY UNIT P 8751

HANDSET ASSY. AND PCB 450 MICROPHONE AMPLIFIER BOARD

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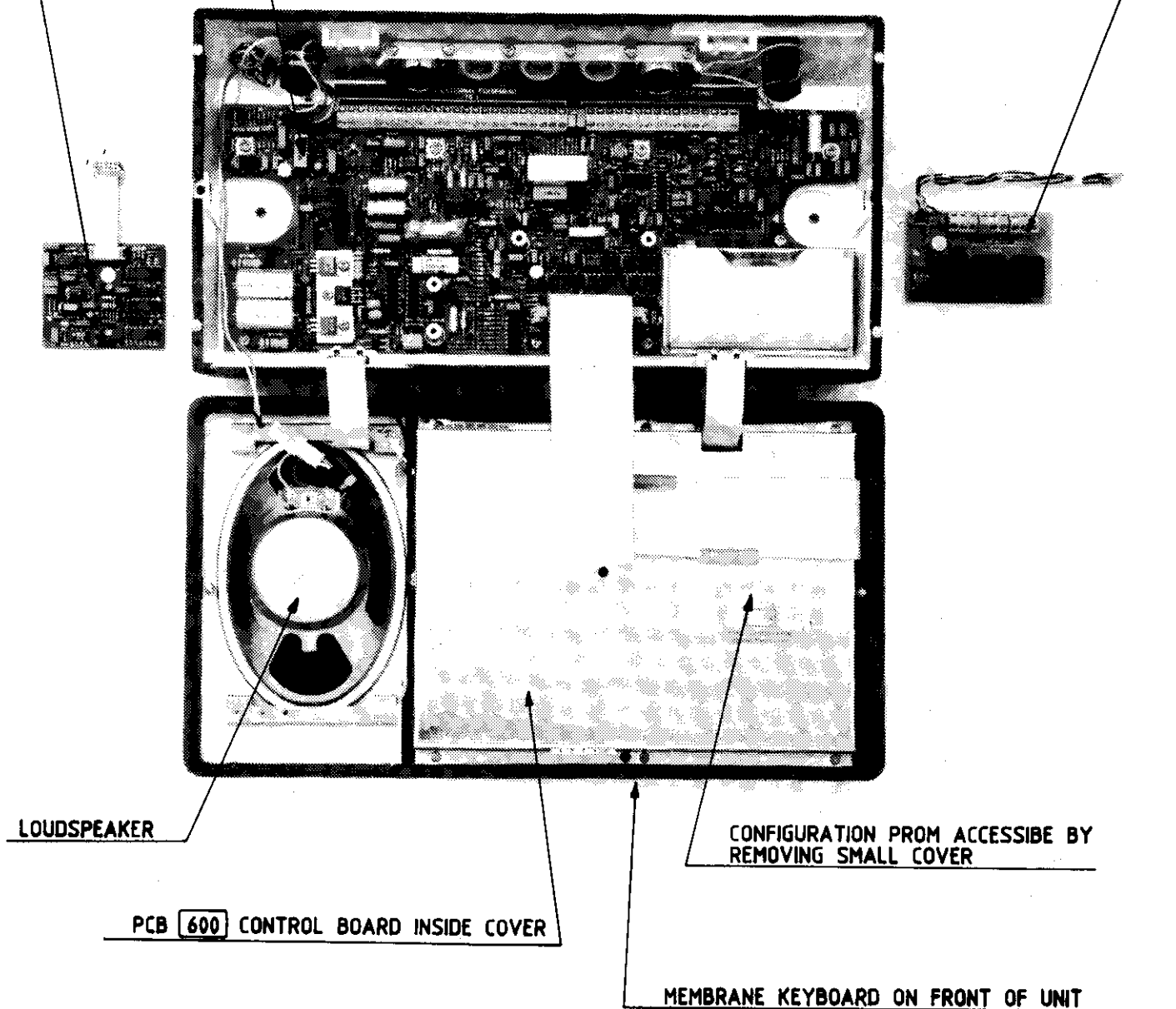
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PCB 602 SQUELCH BOARD .OPTIONAL

PCB 603 LINE TRANSFORMER BOARD .OPTIONAL

PCB 601 AUDIO PROCESSING BOARD



CONTROL UNIT 8000 DISASSEMBLE

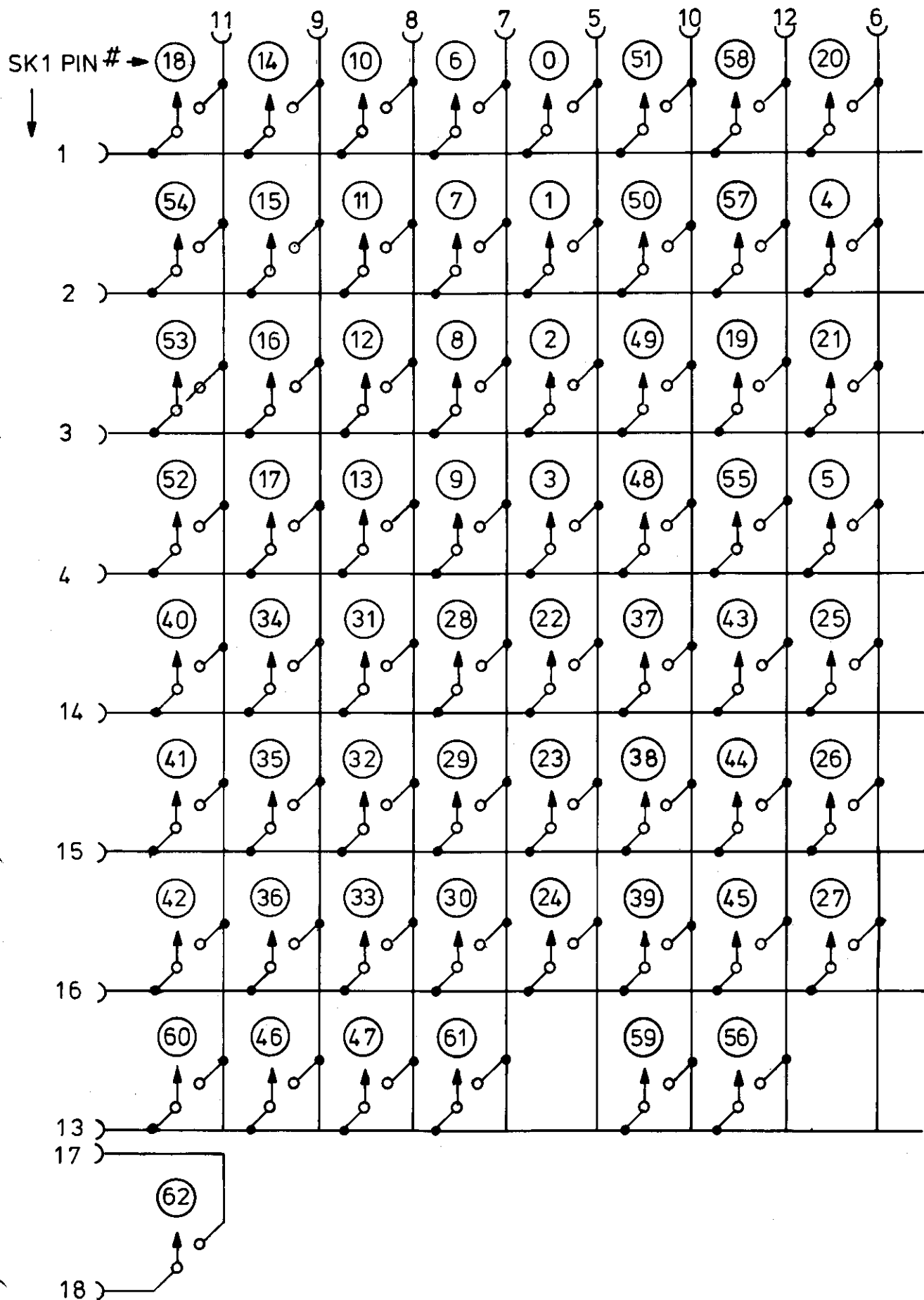
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TO RCB 600 PL 1



PARTS LIST FOR CONTROL UNIT

Control Unit complete					108 600 00
PCB 600 Control Board					107 560 02
PCB 601 Audio Processing Board					107 560 11
PCB 602 Squelch Board					107 560 21
PCB 603 Line Transformer Board					107 560 31
Keyboard					343 590 53
R1,2	100 ohm	5%	1/2W	Car.	502 210 00
C5	0.1 uF	10%	63V	Polyes.	622 510 00
LS1	Loudspeaker	15 ohm			860 000 09
SK2,3	Jack socket				750 000 46
SK5	5-pole socket incl. cable				106 603 20

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TECHNICAL DESCRIPTION

PCB [600] CONTROL BOARD

The primary functions of this module are to support the man/machine interface via keyboard and displays, control Audio Processing [601] and communicate with Transceiver Control Board [624] as a master by transmitting commands and receiving acknowledge and status messages in ASCII code according to a fixed protocol. This is accomplished through an embedded computer consisting of a microprocessor ("MPU") with the following onchip facilities: 8 bits CPU, 128 bytes RAM used as buffer area and for saving internal variables, 2 ports of which one handles the transfer of a 16 bits packet to [601] controlling loudspeaker volume, selection of keying and audio signals using the signals (COMDATA), (COMCLOCK) and (COMLOAD), while the other is connected to a serial, asynchronous interface used for communicating at 300 baud via "RS 232C INTERFACE" with [624] using the signals (TUDATA) and (CUDATA), and finally a 16 bits timer used for generating 64 Hz real-time interrupts to switch the microprocessor from back to foreground processing simultaneously measuring the period of the telemetry signals received from [624] representing signal strength and output power (i. e. (RXRATE) and (TXRATE) respectively) through "RATE MULTIPLEXER". The processor is clocked by a signal coming from "4 MHz XTAL OSCILLATOR" and is initialized by "MASTER CLEAR" combined with "MODE SWITCH". Due to "ADDRESS LATCH" being connected to the multiplexed 8 bits wide data/address bus a full 16 bits wide address bus is available for the "MAP DECODER" to select between the connected memories and peripherals, which are the following: "PROGRAM ROM" (up to 16 kbytes of object code in EPROM), "CONFIGURATION PROM" (up to 4 kbytes in EPROM containing a list of up to 1017 permitted TX frequencies and status code for enabled options of the equipment), "NON-VOLATILE RAM" (1 knibbles used for saving up to 76 RX/TX frequency pairs with corresponding modes and the present status of the equipment) powered by a lithium battery during power-off condition together with "REAL TIME CLOCK" which controlled by a 32.768 kHz crystal implements the watch function. By programming the latter it is possible to switch on the entire equipment automatically using the "OPTO COUPLER" to generate the galvanically isolated signal PWRON, which activates SPS Control [656].

Another peripheral circuit is the "KEYBOARD DISPLAY CONTROLLER", which constantly scans the membrane keyboard (organized as an 8x8 matrix) through "KEY SCAN DECODER" using the signals (DRVO--7) and (SENO--7), while it simultaneously refreshes the entire display at a rate of 508 Hz (duty cycle 1/16) by utilizing "LED DECODER/LED DRIVER" and "DISPLAY DIGIT DECODER/DISPLAY DIGIT DRIVER" for multiplexing the annunciators and seven segment displays respectively. The segments are driven from "DISPLAY SEGMENT DRIVER" and "DISPLAY SEGMENT DECODER" (performing the conversion from BCD-code). The displays may be dimmed through the last peripheral, "BEEP DIM REGISTER", by pulse width modulation via "PWM COUNTER". "BEEP DIM REGISTER" is also capable of controlling "PROGRAMMABLE DIVIDER" generating the signal SINCLOCK used by [601] to synthesize sinusoidal signals for modulation purposes and "beeping" (acoustic feedback to the operator signalling a key closure). In order to permit remote control, another "RS 232C INTERFACE" is available connected to a serial, asynchronous interface implemented by "ACIA". Both serial interfaces

are clocked by "BAUD RATE DIVIDER", which is fed by a 1 MHz clock from "FPU".
Baud rate may be set to 300 or 2400 bits/s selectable by jumper setting.

TEST POINTS FOR [600] CU CONTROL BOARD.

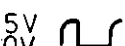
1 12V


2 5V

3 5V @ POWER ON
3V @ POWER OFF

4 -12V

5 4MHz 

6 1MHz, 50% d.c. 


7 1MHz 25% d.c. 


8 -11V (passive state)


9 -12V (passive state when connected to TU)


10 -11V (passive state)

11 5V (passive state)

12 8192 Hz 50% d.c. 

13 38462 Hz 50% d.c. 

14 2404 Hz 50% d.c. 

15 2 MHz 50% d.c. 

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PARTS LIST FOR CONTROL BOARD 600 VERSION 7A

Printed Circuit Board Complete 600
(specify program version when ordering)

IC1	74C42	850 744 20
IC2	CNY17-4	825 000 01
IC3	74LS74	850 747 40
IC4	74C00	850 740 01
IC5	4093BC	850 409 30
IC6	CD4066BC	850 406 60
IC7	6803	850 680 30
IC8	1488P	850 148 80
IC9	1489P	850 148 90
IC10	74LS373	857 437 30
IC11	74LS138	857 413 80
IC12	74LS08	850 740 80
IC13	74LS132	857 413 21
IC14	TMS27128-4 (XX denotes program version number)	383 65X X1
IC15	74LS04	850 740 41
IC16	2532-45 (unprogrammed)	852 532 45
IC17	4334P-4	850 433 41
IC18	74LS05	850 740 51
IC19	8279-5	850 827 90
IC20	CD4516BC	850 451 60
IC21	CD4516BC	850 451 60
IC22	74C161	857 416 11
IC23	CD4040BC	850 404 00
IC24	74C374	857 437 40
IC25	74C906	857 490 60
IC26	146818	851 468 18
IC27	CD4059A	850 405 90
IC28	6850	850 685 00
IC29	6885	850 688 50
IC30	74LS48	850 744 81
IC31	ULN2803	850 280 30
IC32	ULN2803	850 280 30
IC33	74C08	850 740 81
IC34	74C08	850 740 81
IC35	74LS145	857 414 50
IC36	74LS145	857 414 50
IC50	74LS145	857 414 50
IC53	74LS145	857 414 50
IC37	MAN82 DISPLAY	824 008 20
IC38	MAN82 DISPLAY	824 008 20
IC39	MAN82 DISPLAY	824 008 20
IC40	MAN82 DISPLAY	824 008 20
IC41	MAN82 DISPLAY	824 008 20
IC42	MAN82 DISPLAY	824 008 20
IC43	MAN82 DISPLAY	824 008 20
IC44	MAN82 DISPLAY	824 008 20
IC45	MAN82 DISPLAY	824 008 20
IC46	MAN82 DISPLAY	824 008 20
IC47	MAN82 DISPLAY	824 008 20
IC48	MAN82 DISPLAY	824 008 20
IC49	MAN82 DISPLAY	824 008 20
IC51	MV53164	823 000 10

PARTS LIST FOR CONTROL BOARD 600 VERSION 7A

IC52	MV53164	823 000 10
IC54	MV53164	823 000 10
IC55	MV53164	823 000 10
Q1	BC327	840 032 70
Q6	BC327	840 032 70
Q7	BC327	840 032 70
Q8	BC327	840 032 70
Q9	BC327	840 032 70
Q11	BC327	840 032 70
Q12	BC327	840 032 70
Q13	BC327	840 032 70
Q14	BC327	840 032 70
Q15	BC327	840 032 70
Q16	BC327	840 032 70
Q17	BC327	840 032 70
Q18	BC327	840 032 70
Q19	BC327	840 032 70
Q20	BC327	840 032 70
Q21	BC327	840 032 70
Q22	BC327	840 032 70
Q23	BC327	840 032 70
Q24	BC327	840 032 70
Q25	BC327	840 032 70
Q26	BC327	840 032 70
Q27	BC327	840 032 70
Q28	BC327	840 032 70
Q29	BC327	840 032 70
Q10	BC327	840 032 70
Q30	BC327	840 032 70
Q31	BC327	840 032 70
Q32	BC327	840 032 70
Q33	BC327	840 032 70
Q34	BC327	840 032 70
Q35	BC327	840 032 70
Q36	BC327	840 032 70
Q37	BC327	840 032 70
Q2	BF240	840 024 00
Q3	BF240	840 024 00
Q4	BF240	840 024 00
Q5	BF240	840 024 00
D1	1N4148	830 414 80
D2	1N4148	830 414 80
D3	1N4148	830 414 80
D4	1N4148	830 414 80
D5	1N4148	830 414 80
D6	1N4148	830 414 80
D7	1N4148	830 414 80
D8	1N4148	830 414 80
D9	1N4148	830 414 80
D10	1N4148	830 414 80
D11	1N4148	830 414 80
D13	1N4148	830 414 80
D14	1N4148	830 414 80
D15	1N4148	830 414 80

PARTS LIST FOR CONTROL BOARD 600 VERSION 7A

D16	1N4148	830	414	80
D17	1N4148	830	414	80
D18	1N4148	830	414	80
D53	1N4148	830	414	80
D12	AA143	830	014	30
D19	MV5374 G.E.YELLOW	823	000	04
D20	MV5374 G.E.YELLOW	823	000	04
D21	MV5374 G.E.YELLOW	823	000	04
D22	MV5374 G.E.YELLOW	823	000	04
D23	MV5374 G.E.YELLOW	823	000	04
D24	MV5374 G.E.YELLOW	823	000	04
D25	MV5374 G.E.YELLOW	823	000	04
D26	MV5374 G.E.YELLOW	823	000	04
D27	MV5374 G.E.YELLOW	823	000	04
D28	MV5374 G.E.YELLOW	823	000	04
D29	MV5374 G.E.YELLOW	823	000	04
D30	MV5374 G.E.YELLOW	823	000	04
D31	MV5374 G.E.YELLOW	823	000	04
D32	MV5374 G.E.YELLOW	823	000	04
D33	MV5374 G.E.YELLOW	823	000	04
D34	MV5374 G.E.YELLOW	823	000	04
D35	MV5374 G.E.YELLOW	823	000	04
D36	MV5374 G.E.YELLOW	823	000	04
D37	MV5374 G.E.YELLOW	823	000	04
D38	MV5374 G.E.YELLOW	823	000	04
D39	MV5374 G.E.YELLOW	823	000	04
D40	MV5374 G.E.YELLOW	823	000	04
D41	MV5374 G.E.YELLOW	823	000	04
D42	MV5374 G.E.YELLOW	823	000	04
D43	MV5374 G.E.YELLOW	823	000	04
D44	MV5374 G.E.YELLOW	823	000	04
D45	MV5374 G.E.YELLOW	823	000	04
D46	MV5374 G.E.YELLOW	823	000	04
D47	MV5374 G.E.YELLOW	823	000	04
D48	MV5374 G.E.YELLOW	823	000	04
D49	MV5374 G.E.YELLOW	823	000	04
D50	MV5374 G.E.YELLOW	823	000	04
D51	MV5374 G.E.YELLOW	823	000	04
D52	MV5374 G.E.YELLOW	823	000	04
X1	4MHz CRYSTAL	812	000	00
X2	32.768KHz CRYSTAL	812	000	01
R2	680 ohm 5% 1/8W MF	500	268	00
R3	10 kohm 5% 1/8W MF	500	410	00
R17	10 kohm 5% 1/8W MF	500	410	00
R18	10 kohm 5% 1/8W MF	500	410	00
R19	10 kohm 5% 1/8W MF	500	410	00
R20	10 kohm 5% 1/8W MF	500	410	00
R21	10 kohm 5% 1/8W MF	500	410	00
R30	10 kohm 5% 1/8W MF	500	410	00
R33	10 kohm 5% 1/8W MF	500	410	00
R36	10 kohm 5% 1/8W MF	500	410	00
R39	10 kohm 5% 1/8W MF	500	410	00
R40	10 kohm 5% 1/8W MF	500	410	00
R92	10 kohm 5% 1/8W MF	500	410	00

PARTS LIST FOR CONTROL BOARD 600 VERSION 7A

R4	2.7 kohm 5% 1/8W MF	500	327	00
R5	100 ohm 5% 1/8W MF	500	210	00
R24	100 ohm 5% 1/8W MF	500	210	00
R6	2.2 kohm 5% 1/8W MF	500	322	00
R98	2.2 kohm 5% 1/8W MF	500	322	00
R7	47 kohm 5% 1/8W MF	500	447	00
R8	47 kohm 5% 1/8W MF	500	447	00
R48	47 kohm 5% 1/8W MF	500	447	00
R49	47 kohm 5% 1/8W MF	500	447	00
R50	47 kohm 5% 1/8W MF	500	447	00
R51	47 kohm 5% 1/8W MF	500	447	00
R9	68 ohm 5% 1/8W MF	500	168	00
R10	12 kohm 5% 1/8W MF	500	412	00
R14	12 kohm 5% 1/8W MF	500	412	00
R37	12 kohm 5% 1/8W MF	500	412	00
R43	12 kohm 5% 1/8W MF	500	412	00
R45	12 kohm 5% 1/8W MF	500	412	00
R11	470 kohm 5% 1/8W MF	500	547	00
R42	470 kohm 5% 1/8W MF	500	547	00
R12	15 kohm 5% 1/8W MF	500	415	00
R16	15 kohm 5% 1/8W MF	500	415	00
R13	56 kohm 5% 1/8W MF	500	456	00
R15	56 kohm 5% 1/8W MF	500	456	00
R22	1 kohm 5% 1/8W MF	500	310	00
R35	1 kohm 5% 1/8W MF	500	310	00
R23	3.3 kohm 5% 1/8W MF	500	333	00
R31	3.3 kohm 5% 1/8W MF	500	333	00
R32	3.3 kohm 5% 1/8W MF	500	333	00
R25	330 ohm 5% 1/8W MF	500	233	00
R26	6.8 kohm 5% 1/8W MF	500	368	00
R27	220 ohm 5% 1/8W MF	500	222	00
R34	220 ohm 5% 1/8W MF	500	222	00
R28	3.9 kohm 5% 1/8W MF	500	339	00
R29	820 ohm 5% 1/8W MF	500	282	00
R38	4.7 kohm 5% 1/8W MF	500	347	00
R41	4.7 kohm 5% 1/8W MF	500	347	00
R46	4.7 kohm 5% 1/8W MF	500	347	00
R47	4.7 kohm 5% 1/8W MF	500	347	00
R44	10 Mohm 5% 1/4W Car.	501	710	00
R52	3.3 ohm 5% 1/8W MF	500	033	00
R53	3.3 ohm 5% 1/8W MF	500	033	00
R54	3.3 ohm 5% 1/8W MF	500	033	00
R55	3.3 ohm 5% 1/8W MF	500	033	00
R56	3.3 ohm 5% 1/8W MF	500	033	00
R57	3.3 ohm 5% 1/8W MF	500	033	00
R58	3.3 ohm 5% 1/8W MF	500	033	00
R59	3.3 ohm 5% 1/8W MF	500	033	00
R60	22 ohm 5% 1/8W MF	500	122	00
R61	22 ohm 5% 1/8W MF	500	122	00
R62	22 ohm 5% 1/8W MF	500	122	00
R63	22 ohm 5% 1/8W MF	500	122	00
R64	22 ohm 5% 1/8W MF	500	122	00
R65	22 ohm 5% 1/8W MF	500	122	00
R66	22 ohm 5% 1/8W MF	500	122	00
R67	22 ohm 5% 1/8W MF	500	122	00
R68	22 ohm 5% 1/8W MF	500	122	00

PARTS LIST FOR CONTROL BOARD 600 VERSION 7A

R69	22 ohm	5%	1/8W	MF	500	122	00
R70	22 ohm	5%	1/8W	MF	500	122	00
R71	22 ohm	5%	1/8W	MF	500	122	00
R72	22 ohm	5%	1/8W	MF	500	122	00
R73	33 ohm	5%	1/8W	MF	500	133	00
R74	33 ohm	5%	1/8W	MF	500	133	00
R75	33 ohm	5%	1/8W	MF	500	133	00
R76	33 ohm	5%	1/8W	MF	500	133	00
R77	33 ohm	5%	1/8W	MF	500	133	00
R78	33 ohm	5%	1/8W	MF	500	133	00
R79	33 ohm	5%	1/8W	MF	500	133	00
R80	33 ohm	5%	1/8W	MF	500	133	00
R81	33 ohm	5%	1/8W	MF	500	133	00
R82	33 ohm	5%	1/8W	MF	500	133	00
R83	33 ohm	5%	1/8W	MF	500	133	00
R84	33 ohm	5%	1/8W	MF	500	133	00
R85	33 ohm	5%	1/8W	MF	500	133	00
R86	33 ohm	5%	1/8W	MF	500	133	00
R87	33 ohm	5%	1/8W	MF	500	133	00
R88	33 ohm	5%	1/8W	MF	500	133	00
R89	33 ohm	5%	1/8W	MF	500	133	00
R90	33 ohm	5%	1/8W	MF	500	133	00
R91	33 ohm	5%	1/8W	MF	500	133	00
R93	9x1 kohm			SIL.	530	000	10
R94	9x1 kohm			SIL.	530	000	10
R95	9x1 kohm			SIL.	530	000	10
R96	9x12 kohm			SIL.	530	000	09
R99	9x12 kohm			SIL.	530	000	09
R97	220 kohm	5%	1/8W	Car.	500	522	00
C1	2.2 uF	20%	35V	Tan.	652	622	01
C2	100 uF	+50-10%	25V	W.alum.	652	810	00
C5	100 uF	+50-10%	25V	W.alum.	652	810	00
C3	1 nF	10%	63V	Cer.	602	310	02
C4	1 nF	10%	63V	Cer.	602	310	02
C6	1 nF	10%	63V	Cer.	602	310	02
C9	1 nF	10%	63V	Cer.	602	310	02
C10	1 nF	10%	63V	Cer.	602	310	02
C12	1 nF	10%	63V	Cer.	602	310	02
C24	1 nF	10%	63V	Cer.	602	310	02
C25	1 nF	10%	63V	Cer.	602	310	02
C28	1 nF	10%	63V	Cer.	602	310	02
C29	1 nF	10%	63V	Cer.	602	310	02
C30	1 nF	10%	63V	Cer.	602	310	02
C31	1 nF	10%	63V	Cer.	602	310	02
C32	1 nF	10%	63V	Cer.	602	310	02
C33	1 nF	10%	63V	Cer.	602	310	02
C36	1 nF	10%	63V	Cer.	602	310	02
C49	1 nF	10%	63V	Cer.	602	310	02
C55	1 nF	10%	63V	Cer.	602	310	02
C58	1 nF	10%	63V	Cer.	602	310	02
C60	1 nF	10%	63V	Cer.	602	310	02
C61	1 nF	10%	63V	Cer.	602	310	02
C62	1 nF	10%	63V	Cer.	602	310	02
C63	1 nF	10%	63V	Cer.	602	310	02

PARTS LIST FOR CONTROL BOARD 600 VERSION 7A

C81	1 nF	10%	63V	Cer.	602	310	02
C82	1 nF	10%	63V	Cer.	602	310	02
C111	1 nF	10%	63V	Cer.	602	310	02
C112	1 nF	10%	63V	Cer.	602	310	02
C7	10 nF	10%	250V	Polyes.	624	410	01
C8	10 nF	10%	250V	Polyes.	624	410	01
C11	22 uF	20%	16V	W.alum.	651	722	01
C13,18,21,23,26,34,35,37,38,41-45,48,52,53,56,59,64,73,75,78,79,109		0.1 uF	10%	63V	Polyes.	622	510 00
C14	10 nF	10%	63V	Polyes.	622	410	01
C19	10 nF	10%	63V	Polyes.	622	410	01
C20	10 nF	10%	63V	Polyes.	622	410	01
C15	39 pF	2%	63V	N150	602	139	01
C16	180 pF	10%	63V	Cer.	602	218	00
C17	1.2 nF	10%	100V	Cer.	602	312	00
C22	6.8 uF	20%	25V	Sol.al.	652	668	01
C40	6.8 uF	20%	25V	Sol.al.	652	668	01
C72	6.8 uF	20%	25V	Sol.al.	652	668	01
C74	6.8 uF	20%	25V	Sol.al.	652	668	01
C27	220 pF	10%	63V	Cer.	602	222	00
C57	220 pF	10%	63V	Cer.	602	222	00
C39	1 uF	10%	63V	MKT	622	610	02
C47	4-18 pF		63V	Var.	682	118	01
C50	18 pF	2%	63V	N150	602	118	00
C51	33 pF	2%	63V	Cer.	602	133	01
C110	33 pF	2%	63V	Cer.	602	133	01
C54	470 pF	10%	63V	Cer.	602	247	00
C65	2.7 nF			Cer.	602	327	00
C66	2.7 nF			Cer.	602	327	00
C67	2.7 nF			Cer.	602	327	00
C68	2.7 nF			Cer.	602	327	00
C69	2.7 nF			Cer.	602	327	00
C70	2.7 nF			Cer.	602	327	00
C71	2.7 nF			Cer.	602	327	00
C76	470 uF	+50-10%	16V	W.alum.	651	847	00
C77	470 uF	+50-10%	16V	W.alum.	651	847	00
C80	6.8 uF	20%	25V	Tan.	652	668	00
L1	22 uH				740	122	00
L3	22 uH				740	122	00
L2	25 uH		3A		740	125	00
CON1/SK1	34 Pol.				373	604	0X
PL1	18 Pol.				751	001	25
JP1	consisting of PLUG and SOCKET				750	000	45
B1	TL2100		3.4V		750	000	31
					890	000	02

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TECHNICAL DESCRIPTION

PCB **[601]** AUDIO PROCESSING BOARD

All power supply regulation in the Control Unit is performed on this board. Voltages of +24 V, -15 V, +15 V, -15 V are supplied from the Transceiver Unit. The +15 V and one -15 V line are current limited to approximately 0.7 A before supplying the audio power amplifier in order not to disturb the function of the equipment in case of irregularities on the loudspeaker lines. For the same reason the current from the loudspeaker is returned in these -15 V wires and not via the "GND" wire. All other circuits are supplied from the +24 V and the second -15 V voltage. To obtain the necessary regulation and isolation between the circuits, these voltages are stabilized in several small 0.1 A regulators, supplying +/-12 V and +6 V for receiver AF-circuits, +/-12 V and +6 V for transmitter AF-circuits and +/-12 V for the digital circuits. +5 V to the Control Board **[600]** is derived from +24 V by means of a switching regulator, capable of delivering 2 A. All functions on **[601]** are controlled by the microprocessor on **[600]** through a 3 wire serial interface. The 5V microprocessor signals are level-shifted to the 12 V logical level used on **[601]** and converted to a 16-bit parallel code. 3 bits control the key selector and the input selector. Before the signals enter the selectors, they pass through the filters, where they are filtered, limited and shaped (keysignals only). The microphone signal further passes through the microphone amplifier where the gain can be set from 0 to 15 dB by means of a potentiometer. A delay circuit makes it possible to delay the positive edge of the telex key signal from 0 to 30 ms in steps of 3.33 ms. The negative edge remains unaffected. Accuracy of the delay time will be within one period of the reference clock signal from the microprocessor (0.42 ms). The selectors are controlled as follows:

Mode	Keyselector	Inputselector
AM/R3E	Handset/aux.	Mic./aux.
USB/LSB		
CW	Morse	off
MCW	Morse	Sinetone
TELEX	Telex	Telex
ALARM SEND	Constant keyed	Sinetone
ALARM TEST	off	Sinetone

In the AM/SSB modes a keying signal from the handset will open the microphone input, and a signal from the aux. key input will open the aux. input. If both keying inputs are activated, the analog signals will be mixed. The sinetone to the input selector is derived from a clocksignal produced by the microprocessor on **[600]**. The squarewave is converted in the square-to-sine converter circuit to a sinewave with a frequency 16 times lower than the clock frequency. The sinetone frequency is 919 Hz in MCW mode and 1300 Hz/2200 Hz in the alarm-modes. From the input selector the signal is led to the compressor circuit, where it is levelled to a 0 dBm (0.775 V RMS) balanced signal before transmission to the Transceiver Unit. A check detector circuit informs the control board **[600]** when the input signal is compressed (in the -3 dBm -0 dBm range). From the key selector the signal is led to the debounce circuit, which will cancel any bounce on the edges of the keying signal within

approximately 10 ms from first level-shift. The signal is separated from the keyline to the Transceiver Unit by a class B driver stage. The signal is also transmitted to the control board [600]. The keyline also carries a frequency modulated signal from the Transceiver Unit to the Control Unit with information about the transmitter RF output power. The RX-RATE line carries a similar signal representing signal strength. These signals are amplified in two equal amplifiers before they continue to the control board [600]. The RX signal path on [601] starts with a check-detector, which registrates if the balanced lines from the Transceiver Unit carries a signal greater than approx. 0.5 V RMS (nominal line level is 0.775 V RMS). The input amplifier converts the differential signal to a single signal of the same level before it is fed to the Squelch Board [602] if provided. When it returns from [602] (or from the bypass socket in PL2) it enters the AF-switch. Here it is possible to select either the RX signal or the sidetone from the shaping circuit. Both shaping and AF-switch is controlled by the AF-output selector which combines RX/TX mode and keyline to obtain correct switch-timing (e.g. a 45 ms break-in time in CW and MCW modes). The clock reference is the same as for the telex key delay circuit. From the AF-switch the signal enters volume control and line amplifier. The line output signal can be adjusted from 0 to approx. 2.4 V RMS (+10 dBm) by means of a potentiometer. The volume control is build around an 8-bit digital-to-analog converter followed by a 20 dB attenuator in order to control the audio volume by the control board processor. The RX signal path further consists of a preamplifier, which also drives the earpiece, a speaker on/off switch and the audio power amplifier. The signal to the loudspeaker is monitored by a check-detector.

TEST POINTS FOR PCB 601 AUDIO PROCESSING BOARD

① + 5V DC

⑥ +12V DC

② +12V DC

⑦ -12V DC

③ +6 V DC


⑧ -12V DV


④ +12V DC


⑨ -12V DC


⑤ +6 V DC

In self test # 2 following is measured:


⑩  1.8Vpp 800Hz

⑪  2.2Vpp 800Hz

⑫  4.5Vpp 800Hz

⑬  22Vpp 800Hz

In self test # 4 following is measured:

⑭  1.8Vpp 800Hz

⑮  1Vpp 800Hz

The two signals must be in phase opposition.

SSB check

SSB-mode is selected. Key-in a TX frequency (the signal route between exciter and transmitter may be removed), talk into the microphone and check the signal in:

⑯ ca. 1-5Vpp

⑮ ca. 1Vpp

⑰ 0  +12V
-12V

CW check

check that the morse key can activate the keyline ⑰ as above.

MCW check

⑮ 1Vpp shaped when keyed from morse key.

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PARTS LIST FOR AUDIO PROCESSING BOARD 601 VERSION 4A

Printed Circuit Board Complete 601			107 560 11
IC1	SG3524		850 352 40
IC2-4	UH78L12AC	12V	850 781 21
IC5-7	LM79L12C	12V	850 791 21
IC8-9	UH78L06C	6V	850 780 61
IC10,15,36	CD40106B		854 010 60
IC11,16	CD4520B		850 452 00
IC12	74C164		857 416 40
IC13	74C906		857 490 60
IC14,18,22	MC1458N		850 145 81
IC17	CD4066BC		850 406 60
IC19,33	4017B		850 401 70
IC20	AD7523JN		850 752 30
IC21,26	4094B		850 409 40
IC23,31	4071B		850 407 10
IC24	4051B		850 405 10
IC25	4529B		850 452 90
IC27	4528B		850 452 80
IC28,34-35,37	LF353		850 035 30
IC29-30	4081B		850 408 10
IC32	TDA2006H		850 200 60
Q1	BD645		842 064 50
Q2	BD646		842 064 60
Q3,9-10,14,16, 18,20,22-24	BC547B		840 054 70
Q4-6,13,17,19,21, 25,26	BC557B		840 055 70
Q7	2N2907A		840 290 70
Q8	BUV27		842 002 70
Q11	MPSA14		840 001 40
Q12,15	J112		843 011 20
D1	10D4		831 010 40
D2,5-8,17,21-25, 27-28,31,34-38	1N4148		830 414 80
D3	BYS26		831 002 60
D4	ICTE-5		839 000 51
D9-16,32-33	BZX79C11		832 791 10
D18	SD101C		830 010 10
D19-20	BZX75C3V6		832 753 60
D26	LM329DZ		830 032 90
D29-30	10D05		831 100 51

PARTS LIST FOR AUDIO PROCESSING BOARD 601 VERSION 4A

R1-2	470 kohm	5%	1/4W	MF	502 247 00
R3,119	8.2 kohm	5%	1/8W	MF	500 382 00
R4,28,129,131, 132,134,137,147, 171,183	22 kohm	5%	1/8W	MF	500 422 00
R5-6,170	1 ohm	5%	2W	ww	525 010 00
R7-8,10,95,113,120, 144-145,172-173	4.7 kohm	5%	1/8W	MF	500 347 00
R9,124,151,159,185	15 kohm	1%	1/8W	MF	500 415 00
R11,149	3.9 kohm	5%	1/8W	MF	500 339 00
R12,168-169	2.2 kohm	5%	1/8W	MF	500 322 00
R13,23,31-34,40, 51-52,64,71,87, 91-92,100,122, 130,133,184	47 kohm	5%	1/8W	MF	500 447 00
R14,135	220 ohm	5%	1/8W	MF	500 222 00
R15,106	10 ohm	5%	1/8W	MF	500 110 01
R16,163	2.7 kohm	5%	1/8W	MF	500 327 00
R17	3.9 ohm	5%	1/8W	MF	500 039 00
R18	0.082 ohm		1W	ww	523 000 80
R19	2.2 kohm			Pot.	583 322 00
R20,120,138	12 kohm	5%	1/8W	MF	500 412 00
R21	150 kohm	5%	1/8W	MF	500 515 00
R22,24,26,29, 35-39,41,53-58, 67-70,76-77,81, 97,102-104,117-118, 143,146,175-182, 187	10 kohm	5%	1/8W	MF	500 410 00
R25,42,125	270 ohm	5%	1/8W	MF	500 227 00
R27,30	20.5 kohm	1%		MF	511 420 50
R43,50	499 kohm	1%		MF	511 549 90
R44,49	178 kohm	1%		MF	511 517 80
R45,48	118 kohm	1%		MF	511 511 80
R46-47,108	100 kohm	1%		MF	511 510 00
R59,73,142,186	1 kohm	5%	1/8W	MF	500 310 00
R60-61	5.6 kohm	5%	1/8W	MF	500 356 00
R62-63	680 ohm	5%	1/8W	MF	500 268 00
R65	14.7 kohm	1%		MF	511 414 70
R66	7.5 kohm	1%		MF	511 375 00
R72	10.5 kohm	1%		MF	511 410 50
R74	3.48 kohm	1%		MF	511 334 80
R75	3.65 kohm	1%		MF	511 336 50

PARTS LIST FOR AUDIO PROCESSING BOARD 601 VERSION 4A

R78,80,140, 150,160	1.5 kohm	5%	1/8W	MF	500 315 00
R79,82-83,86,89, 98,114,128,148, 156-157,164-165	100 kohm	5%	1/8W	MF	500 510 00
R84-85,107	1 Mohm	5%	1/8W	MF	500 610 01
R88	39 kohm	5%	1/8W	MF	500 439 00
R90,96,115	27 kohm	5%	1/8W	MF	500 427 01
R93-94	47 kohm			Pot.	583 447 01
R99	56 kohm	5%	1/8W	MF	500 456 00
R105	47 ohm	5%	1/8W	MF	500 147 00
R109	12.1 kohm	1%		MF	511 412 10
R110,112,116	180 kohm	5%	1/8W	MF	500 518 00
R111	10 kohm			MF	511 410 00
R121	1.8 kohm	5%	1/8W	MF	500 318 00
R123	470 ohm	5%	1/4W	Car.	501 247 00
R126	82 kohm	5%	1/8W	MF	500 482 00
R127	18 kohm	5%	1/8W	MF	500 418 00
R136	33 kohm	5%	1/8W	MF	500 433 00
R139	10 Mohm	5%	1/4W	Car.	501 710 00
R141	1 kohm			Pot.	581 310 00
R152	390 ohm	5%	1/8W	MF	500 239 00
R153	14.0 kohm	1%		MF	511 414 00
R154	1.0 kohm	1%		MF	511 310 00
R155	15.0 kohm	1%		MF	511 415 00
R158	270 ohm	5%	1/4W	Car.	501 227 00
R161-162,166-167	619 ohm	1%		MF	511 261 90
R174	68 ohm	5%	1.6W	MF	525 168 00
R188	68 kohm	1%	1/8W	MF	500 468 00
C1,10,43,73,76,80, 81,92-93,101,107, 117,120,134-137,140	1 nF	10%	63V	Cer.	602 310 02
C2-4	100 uF		25V	W.alum.	652 810 00
C5-6,53-57, 131-132,143,144	47 nF	20%	63V	Polyes.	622 447 01
C7	100 uF	-10+50%	40V	W.alum.	651 810 04
C8	220 uF	-10+50%	40V	W.alum.	651 822 02
C9,11-16,18-35, 37,58-60,65-66,74, 77-79,83-84,87-89, 91,97,99,104,112, 118-119,121-122, 133,145	0.1 uF	20%	63V	Polyes.	622 510 00

PARTS LIST FOR AUDIO PROCESSING BOARD 601 VERSION 4A

C17	2.2 nF	10%	63V	Cer.	602 322 00
C36	1000 uF		16V	W.alum.	651 910 00
C38,75,85,100	1 uF	10%	63V	Polyes.	622 610 02
C39-40	0.33 uF	20%	63V	Polyes.	622 533 01
C41-42,63,102, 114,129-130	0.22 uF	20%	63V	Polyes.	622 522 01
C44,67,86,94,108	2.2 uF		35V	Tan.	652 622 01
C45-49,141-142	4.7 nF	10%	63V	Cer.	602 347 02
C50-52,95	6.8 nF	1%	63V	Polyst.	612 368 00
C61	1.5 nF	1%	160V	Polyst.	613 315 01
C62,64	15 nF	1%	63V	Polyst.	612 415 00
C68,70,113,139	0.47 uF	10%	63V	Polyes.	622 547 01
C69	47 nF	1%	160V	Polyst.	613 447 00
C71	1 nF	1%	125V	Polyst.	613 310 02
C72	68 nF	20%	63V	Polyes.	622 468 00
C82	2.2 uF	10%	63V	Polyes.	622 622 00
C90	22 nF	20%	63V	Polyes.	622 422 00
C96	2.2 uF	20%	250V	Polyes.	624 622 02
C98,106	100 pF	2%	63V	N150	602 210 00
C103,146	0.68 uF	10%	63V	Polyes.	622 568 02
C105	470 pF	10%	63V	Cer.	602 247 00
C109	33 uF	-20+40%	10V	Tan.	651 733 00
C110	2.2 nF	1%	125V	Polyst.	613 322 00
C111	6.8 uF	-20+40%	25V	Tan.	652 668 00
C115	56 pF	2%	63V	N150	602 156 00
C116	220 pF	10%	63V	Cer.	602 222 00
C123,126	6.8 uF		25V	Sol.al.	652 688 01
C124-125	470 uF		40V	Tan.	652 847 00
C127	680 pF	1%	250V	Polyst.	614 268 00
C128	82 pF	2%	63V	N150	602 182 00
C147	330 pF	10%	63V	Cer.	602 233 00
L1	10 uH				740 110 00
L2	144 uH				383 576 7X
L3-12	1 mH	5%			740 310 03
T1	TRANSFORMER				103 576 81
TS1	TERMINAL STRIP			10 pcs	770 000 19
FS1	2A/125V				720 320 02
PL1	34 POL HEADER				756 034 01
PL2	10 POL HEADER				756 010 02
PL3,5	5 POL				751 001 42
PL4	2 POL				751 001 41

TECHNICAL DESCRIPTION

PCB 602 SQUELCH BOARD

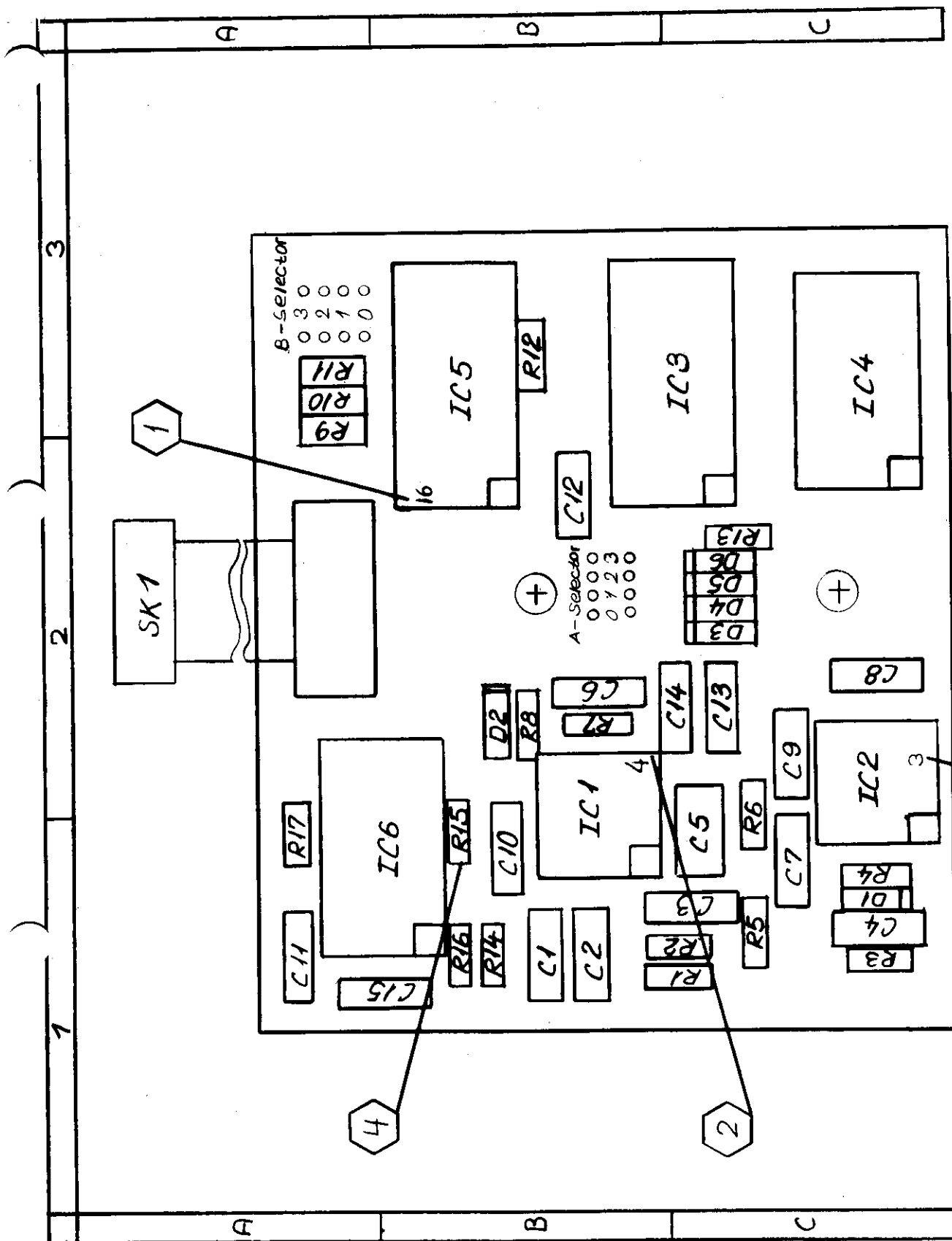
The Squelch Circuit is operating exclusively on the received AF-signal knowing its spectral distribution with and without the presence of speech. The AF-signal is fed to the AF-switch, which carries out the squelch function by turning on and off the AF-signal. The AF-signal is also fed to the input of the High Pass Filter which prevents hum and low frequency noise from disturbing the Detector. The high pass filter output signal is converted into a squarewave by the Schmitt Trigger, and the resulting signal is led to the input of the Detector. The Clock Generator produces a reference frequency for both Detector and Hold Circuit. In the presence of speech the mean frequency of the AF-signal is lowered and becomes smaller than the detector frequency limit set by the reference frequency and the A-selector. This causes the Detector via the Hold Circuit to turn on the AF signal. When speech ceases the AF-signal consists of noise only which increases the mean frequency above the detector frequency limit. The detector now triggers the Hold Circuit, which turns off the AF-signal after a certain hold time, set by the reference frequency and the B-selector.

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PCB [602] VERSION 1A
SQUELCH BOARD
VIEWED FROM COMPONENT SIDE

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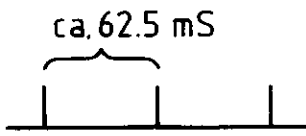
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TEST POINTS FOR 602 SQUELCH BOARD

1 + 12V

2 - 12V

3 \approx 16 Hz 

4 + 12V WHEN SQUELCH OFF

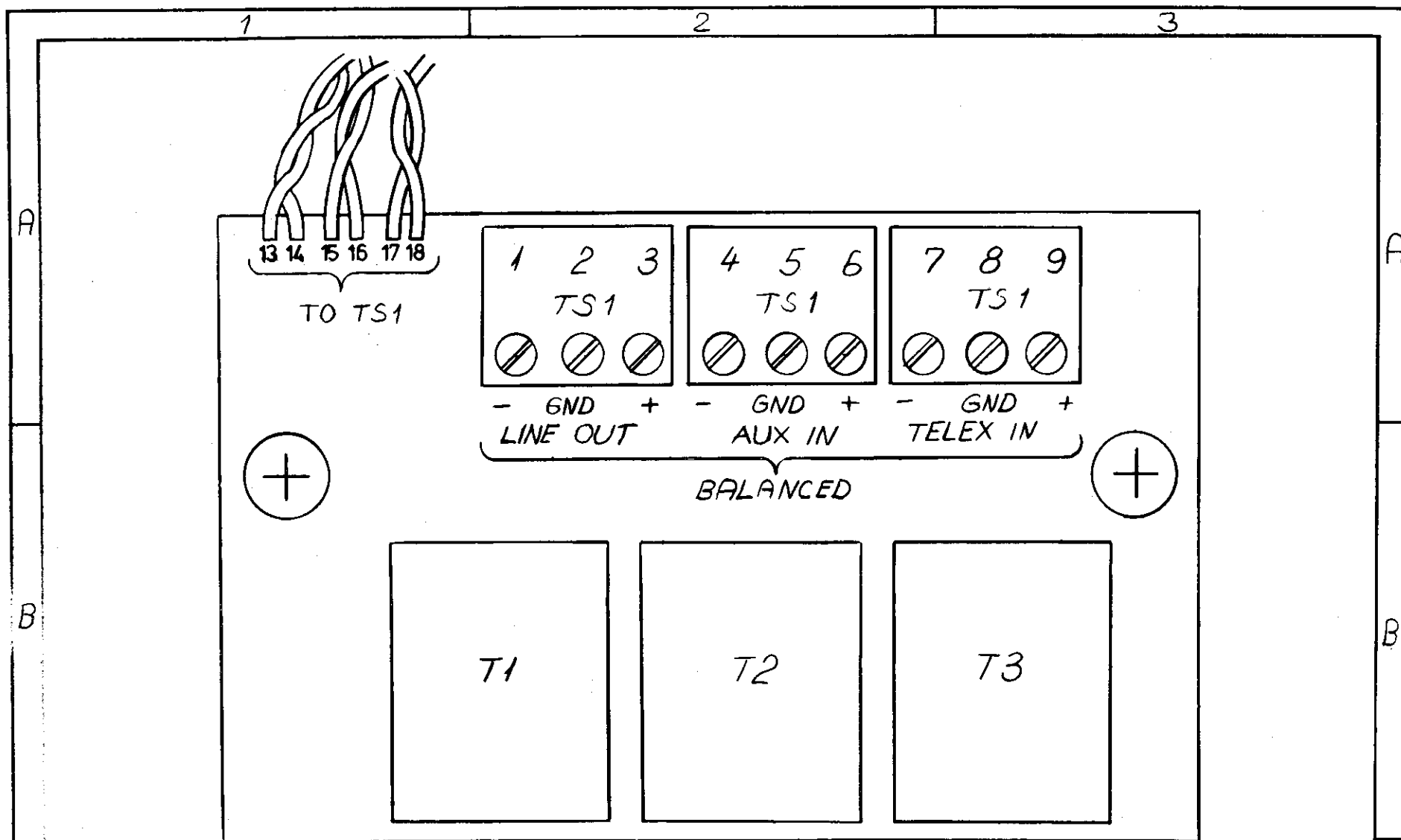
PARTS LIST FOR SQUELCH BOARD 602 VERSION 1A

Printed Circuit Board Complete 602					107 560 21
IC1	LF353				850 035 30
IC2	NE555				850 055 50
IC3	CD4520B				850 452 00
IC4	4013B				850 401 30
IC5	CD4029B				850 402 90
IC6	CD4066BC				850 406 60
D1-6	1N4148				830 414 80
R1	1.2 kohm	5%	1/8W	MF	500 312 00
R2	10 kohm	5%	1/8W	MF	500 410 00
R3	1.5 kohm	5%	1/8W	MF	500 315 00
R4	820 kohm	5%	1/8W	MF	500 582 00
R5,6	1 kohm	5%	1/8W	MF	500 310 00
R7,14,16	1 Mohm	5%	1/8W	MF	500 610 00
R8	12 kohm	5%	1/8W	MF	500 412 00
R9-12	47 kohm	5%	1/8W	MF	500 447 00
R13,15,17	22 kohm	5%	1/8W	MF	500 422 00
C1,2	0.15 uF	10%	63V	Polyes.	622 515 00
C3	1 nF	10%	63V	Cer.	602 310 02
C4,9-12,14	0.1 uF	10%	63V	Polyes.	622 510 00
C5	0.47 uF	10%	63V	Polyes.	622 547 01
C6	47 pF	+/-2%	63V	Cer.	602 147 00
C7,13	2.2 uF	20%	25V	Tan.	652 622 02
C8	10 nF	-20+50%	63V	Cer.	602 410 01
C15	0.33 uF	20%	63V	Polyes.	622 533 01
CON1/SK1	RIBBON CABLE 10 POL.				373 596 01

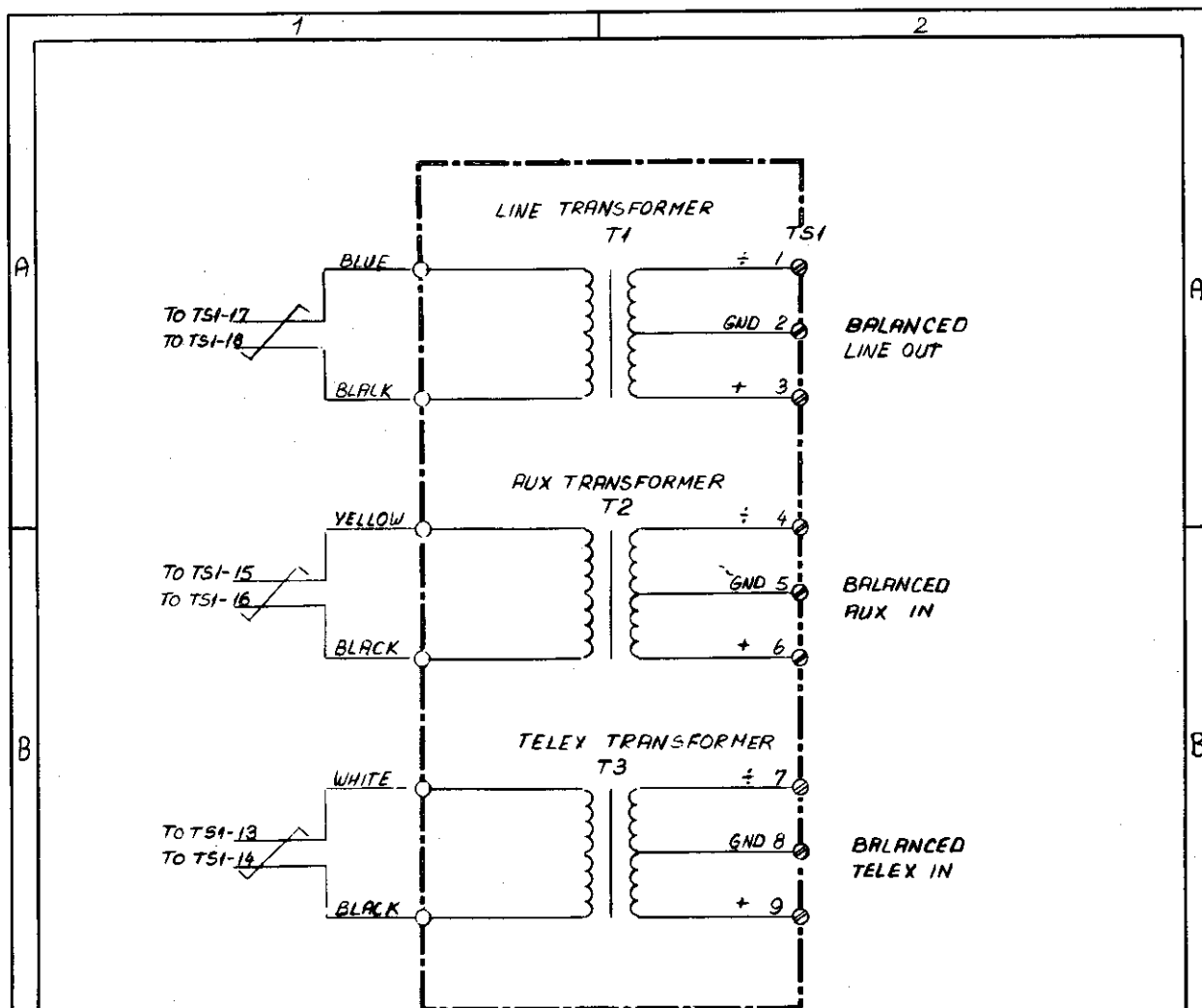
TECHNICAL DESCRIPTION

PCB **603** LINE TRANSFORMER BOARD

The Line Transformer Board is an optional available board which, when installed, is housed in the Control Unit and connected to 601-SK1. The Line Transformer Board, consisting of 3 transformers, converts the signals LINE OUT, AUX IN and TELEX IN to 600 ohms balanced lines, which enables external balanced peripherals to be connected to the equipment.



PCB 603 VERSION 1A.
LINE TRANSFORMER BOARD
VIEWED FROM COMPONENT SIDE



PARTS LIST FOR LINE TRANSFORMER BOARD 603 VERSION 1A

Printed Circuit Board Complete 603	107 560 31
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TS1	TERMINAL STRIP	770 000 30
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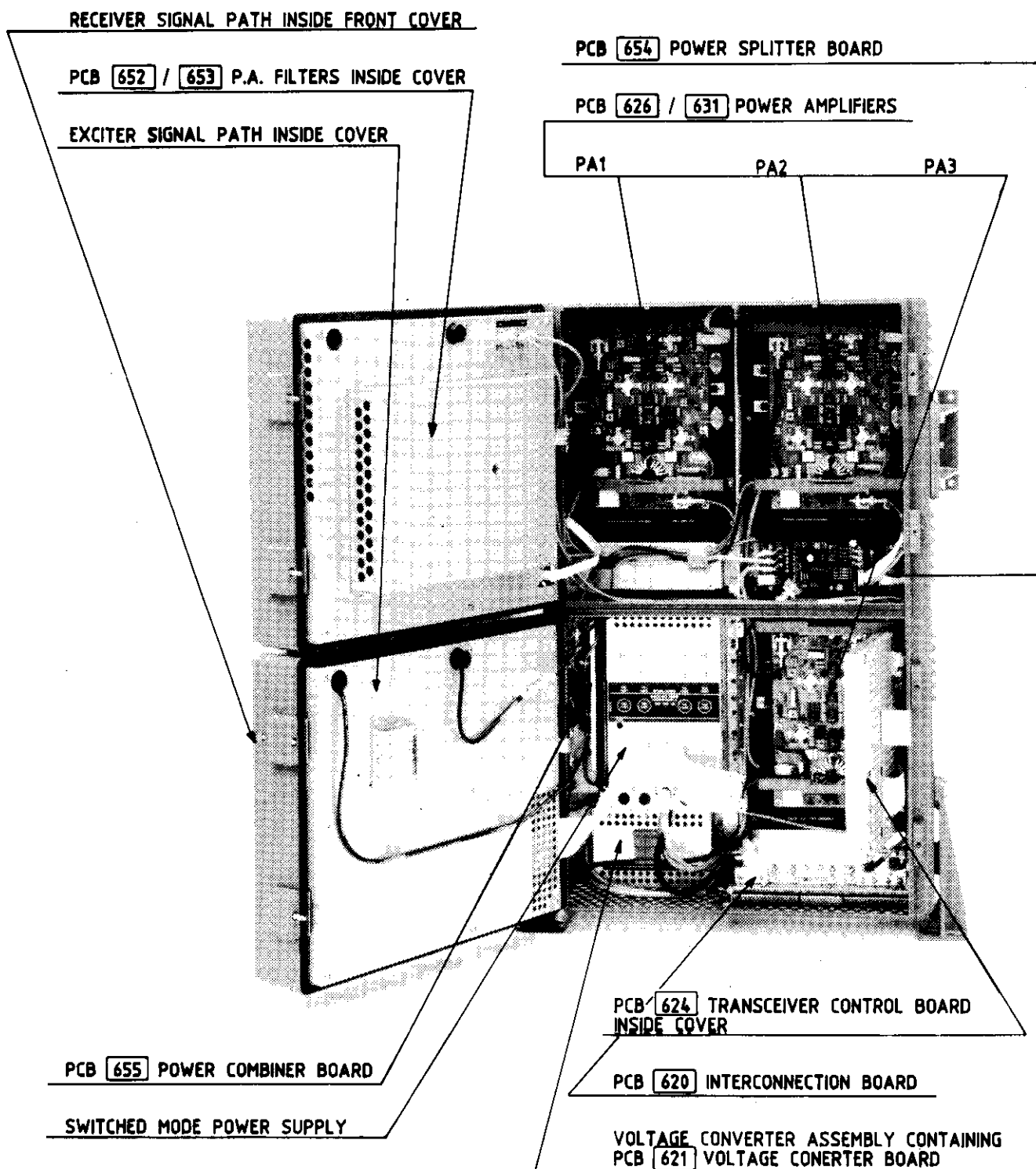
T1-3	TRANSFORMER TD3293	802 000 00
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TRANSCEIVER UNIT 8750 D WITH FRONT DOORS OPENED.

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PARTS LIST FOR TRANSCEIVER UNIT

Transceiver Unit complete					108 700 00
RX/EX Assembly					107 605 00
Voltage Converter Assembly (PCB 621)					107 600 90
P.A. Filters Assembly					107 700 00
Power Amplifier Assembly PA 1					107 600 10
Power Amplifier Assembly PA 2					107 600 10
Power Amplifier Assembly PA 3					107 600 10
Switched Mode Power Supply (incl. PCB 655)					107 700 10
PCB 620 Interconnection Board					107 562 01
PCB 624 Transceiver Control Board					107 562 42
PCB 630 50 OHM Antenna Relay Board					107 563 00
PCB 654 Power Splitter Board					107 565 41
Flat ribbon cable, P.A. filters to Control board					373 632 04
TU-C1,2	6.8 uF	10%	100V	Polyes.	623 668 01
TU-C3	10 uF	10%	63V	Polyes.	622 710 00
TU-SK1	UHF-socket and cable				106 602 90
TU-TS1	Terminal strip 3-pole				770 000 21

PARTS LIST FOR TRANSCEIVER UNIT, RX/EX ASSEMBLY

RX/EX Assembly complete				107 605 00
PCB 611 Synthesizer Board	2 pcs.			107 561 11
PCB 612 Master Oscillator				107 561 21
PCB 618 Receiver Signal Path				107 561 81
PCB 619 Exciter Signal Path				107 561 91
Ribbon cable 40-lead				373 638 23
Coax cable 2+3 LO reference				106 600 30
Coax cable 1. LO reference				106 600 40
Cable for synthesizer				106 600 50
Coax cable				106 606 10
Coax cable				106 606 20
Coax cable				106 606 30
Coax cable				106 606 50

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TECHNICAL DESCRIPTION

PCB [611] SYNTHESIZER BOARD

Two identical Synthesizer Boards are employed in the Transceiver Unit sharing the same Master Oscillator. One controls the Receiver Signal Path [618], the other controls the Exciter Signal Path [619].

45-75 MHz Synthesizer: The 45-75 MHz Synthesizer is of the Fractional-N type and has a frequency resolution of 10 Hz. The 40.96 kHz reference frequency derived from the Master Oscillator [612] is fed to both Phase Comparator and Phase/Frequency Comparator. Likewise the output signal of the Loop Divider is fed to both comparators. When the loop is locked the Phase/Frequency Comparator is turned off and there exists no difference in frequency, but a definite and time varying phase difference between the reference signal and the Loop Divider output signal. The Phase Comparator compares the phase of the two signals and if it differs from the steady state value, the Phase Comparator will produce a correction signal, which via the Loop Filter corrects the frequency and phase of the VCO until the steady state phase difference is reestablished. If the phase difference exceeds the limits of the Phase Comparator, for example during change of the synthesizer output frequency, the Phase/Frequency Comparator is automatically turned on. It will override the Phase Comparator by producing a correction signal which via the Loop Filter will alter the frequency and phase of the VCO until the difference between the reference signal and the Loop Divider output signal is well inside the working limits of the Phase Comparator. After a short amount of time the Phase/Frequency Comparator is turned off and the Phase Comparator takes over again ending up with the steady state locked condition. The Loop Filter is capable of changing parameters when required by means of four diodes. When the loop is locked the diodes are turned off, and in this condition the Loop Filter is designed to prevent noise modulation of the VCO and to give the loop a good dynamic response. During a major change in the synthesizer output frequency the diodes are turned on, and in this case the Loop Filter is designed to give the loop a fast dynamic response. The VCO covers a frequency range of 45-75 MHz which is divided in 4 bands. The bands are selected by the microprocessor on the Transceiver Control Board [624]. The amplitude stabilized output signal of the VCO is split between two buffer amplifiers. One for the output signal of the synthesizer, which is led to the 1st mixer of the Receiver Signal Path [618], or to the 1st mixer of the Exciter Signal Path [619]. The other buffer amplifier drives the input of the Loop Divider. The Transceiver Control Board determines the output frequency of the synthesizer by loading the corresponding division ratio into the Loop Divider and the Binary Accumulator. The integer part of the division ratio is stored in the Loop Divider and the fractional part is fed to the one input of the Binary Accumulator. The 12-bit Binary Accumulator enables 10 Hz resolution of the synthesizer output frequency. The output of the Binary Accumulator is fed back to one of its own inputs and in that way added to the fractional division ratio fed to the other input. The sum is transferred to the output of the Binary Accumulator when it receives an Accumulator Clock Signal. This happens in every period of the loop divider output frequency. When the sum exceeds the maximum capacity (4095) of the Binary Accumulator, it produces an Accumulator

Carry Signal, and the remainder of the contents is kept for the next addition. The carry signal increases the division ratio of the Loop Divider by one. The loop will respond to this increase by producing an output frequency corresponding to the fractional division ratio. The time varying phase difference between the reference signal and the loop divider output signal, caused by the said increase in the division ratio, is a function of the fractional division ratio. This function is derived from the output of the Binary Accumulator and converted into a current by the DA-Converter. The current is fed to the Phase Comparator where it cancels the signal produced by the time varying phase difference and thus preventing modulation of the VCO. The frequency information, loaded by the microprocessor on the Transceiver Control Board [624], is fed to the Ramp Current Generator, resulting in a current directly proportional to the output frequency of the synthesizer. As the Ramp Current controls the gain of the Phase Comparator, the dynamic response of the loop is held constant over the entire frequency range of the synthesizer. If the said cancellation of the time varying phase difference isn't complete, the Ramp Current Correction circuit measures the error at the Phase Comparator output and automatically adjusts the Ramp Current Generator until cancellation is obtained. Two signals derived from the Phase Comparator and the Phase/Frequency Comparator are combined in a check circuit with the check signals from the 43.6 MHz and 1.4 MHz Synthesizer resulting in a final check signal led to the Transceiver Control Board.

43.6 MHz Synthesizer: The synthesizer used is of the fractional-N type, which refers to the fact that the smallest step in output frequency is not equal to the reference frequency but a fractional part of this. From the Master Oscillator [612] a 1.28 MHz signal is led to the Reference Divider which divides the signal by 10 having a 128 kHz reference frequency at the input of the Phase/Frequency Comparator. The 128 kHz reference frequency and the output frequency of the Loop Divider are compared in the Phase/Frequency Comparator. When the loop is locked there exists no difference in frequency but a definite and time varying phase difference between the two signals. If the loop is out of lock the Phase/ Frequency Comparator will produce a correction voltage which will alter the frequency and phase of the VCXO until the loop is back in the locked condition. The Loop Filter is designed to give the loop a good dynamic response and to stop noise modulation of the VCXO. The VCXO covers a frequency range of 14.53333 MHz \pm 1.333 kHz/-1 kHz. The output signal of the VCXO is fed to the Tripler where the frequency is multiplied by 3, resulting in a synthesizer frequency of 43.6 MHz \pm 4 kHz - 3 kHz. The signal from the Tripler is amplified in the Buffer Amplifier and the level-stabilized output signal is led to the 2nd Mixer of the Receiver Signal Path [618], or to the 2nd Mixer of the Exciter Signal Path [619]. Another signal derived from the Buffer Amplifier is fed to the input of the Loop Divider. A 7-bit Binary Accumulator is incorporated in order to obtain a fractional division ratio in the loop, giving a 1 kHz step capability of the synthesizer output frequency. By loading the fractional division ratio into the input of the Binary Accumulator, the microprocessor on Transceiver Control Board determines the output frequency of the synthesizer. The other input of the Binary Accumulator is connected to its output. The two inputs are added and the sum is transferred to the output when the Binary Accumulator is clocked. The clock input is connected to the output of the Loop Divider. When the sum exceeds the maximum capacity (127) of the

Binary Accumulator it produces an Accumulator Carry Signal which increases the ratio of the Loop Divider by one, and the remainder of the accumulator contents is kept for the next addition. The loop responds to this increase by producing an output frequency corresponding to the fractional division ratio. As a result of the variation in the division ratio, the phase difference between the reference frequency and the output frequency of the Loop Divider will be varying and a function of the fractional division ratio. This function is derived from the output of the Binary Accumulator and converted into a voltage by the DA-converter. The output signal of the Phase/Frequency Comparator caused by time varying phase difference is cancelled at the input of the Loop Filter by the output voltage of the DA-converter, and thus preventing modulation of the VCXO. The 128 kHz reference frequency and a signal derived from Phase/Frequency Comparator are combined in the Check Detector to give information of the synthesizer lock status.

1.4 MHz Synthesizer: The synthesizer consists of a Loop Filter, a 5.6 MHz VCO, a Buffer Amplifier and a single integrated circuit which contains both Reference Divider, Loop Divider and Phase/Frequency Comparator. The division ratio of the Reference Divider and the Loop Divider are controlled by the microprocessor on the Transceiver Control Board [624]. A 1.28 MHz signal from the Master Oscillator [612] is fed to the input of the Reference Divider and divided by 3200, thus obtaining a reference frequency of 400 Hz as well as a frequency step size of 400 Hz for the synthesizer loop. The reference frequency and the Loop Divider output frequency are compared in the Phase/Frequency Comparator. In the locked condition there exists no difference between the two signals neither in frequency nor in phase. If a difference occurs, say during a change of the synthesizer output frequency, the Phase/Frequency Comparator will produce a correction voltage which will correct the frequency and phase of the VCO until the locked condition is obtained again. The Loop Filter is designed to give the loop a proper dynamic response and to prevent noise from modulating the VCO. The 5.6 MHz VCO covers the frequency range from 5.582 MHz to 5.612 MHz. The output signal of the VCO is amplified in the Buffer Amplifier and then split into two, one for the input of the Loop Divider and one for the Divide-by-4 circuit. The output frequency range of the Divide-by-4 circuit is 1.4 MHz \pm 3 kHz/4.5 kHz and the frequency step size is 100 Hz. The output signal of the Divide-by-4 circuit is fed to the Output Filter where the harmonics of the signal are reduced and the exact output level is set. The output signal is led to the 3rd Mixer of the Receiver Signal Path [618], or to the 1st Mixer of the Exciter Signal Path [619]. A check detector is incorporated to indicate the lock status of the synthesizer.

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TESTPOINTS FOR [61] SYNTHESIZER BOARD

1 - 12V .DC

2 + 5V DC

3 +12V DC

4 OUTPUT 1.L0. 45-75Mhz synthesizer 1,5Vpp

SELF TEST #	F OUT
9	45 Mhz
10	52.5Mhz
11	52.5Mhz
12	60 Mhz

SELF TEST #	F OUT
13	60 Mhz
14	67.5 Mhz
15	67.5 Mhz
16	75 Mhz

5 OUTPUT 2.LO. 43.6Mhz SYNTHESIZER

SELF TEST # 17 F OUT=43.597 Mhz 2 Vpp

SELF TEST # 18 F OUT =43.603 Mhz 2 Vpp

6 OUTPUT 3.LO. 14Mhz SYNTHESIZER

SELF TEST # 20 F OUT=1.3955 Mhz 650 mVpp

SELF TEST# 21 F OUT=1403 Mhz 650 mVpp

7 40,96 KHz FROM MASTER OSCILLATOR

8 1.28 Mhz 5Vpp FROM MASTER OSCILLATOR

9 SYNADR 0 (IC 23 PIN 5)

10 SYNADR 1 (IC 23 PIN 6)

11 SYNADR 2 (IC 23 PIN 7)

12 SYNDATA 0 (IC 28 PIN 2)

13 SYNDATA 1 (IC 28 PIN 1)

14 SYNDATA 2 (IC 28 PIN 20)

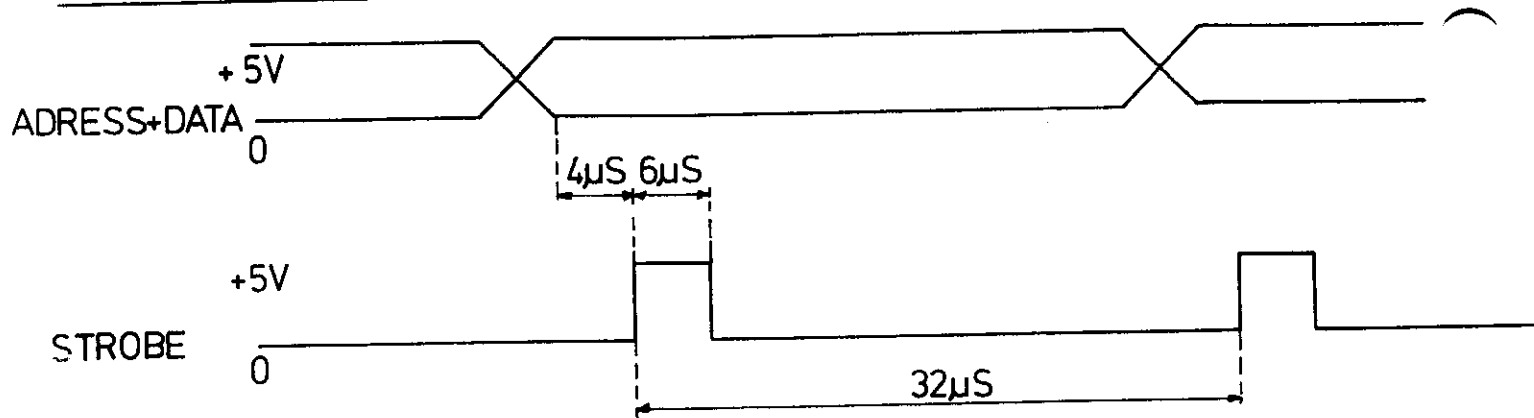
15 SYNDATA 3 (IC 28 PIN 19)

16 SYNSTR 0 (IC 28 PIN 12)

17 SYNSTR 1 (IC 42 PIN 9)

18 SYNSTR 2 (IC 46 PIN 11)

TIMING DIAGRAM



The strobe pulse is generated at each update of the frequency. e.g. the self test's # 9 to 21. or by repeating the test by pressing "DIM-MER DOWN".

PARTS LIST FOR SYNTHESIZER BOARD 611 VERSION 4A

Printed Circuit Board Complete 611		107 561 11
IC1	7912CU	850 791 20
IC2	MA7805	850 780 50
IC3	MA7812	850 781 20
IC4,10,36	MC74HC00N	850 740 04
IC5	MC74HC10N	850 741 03
IC6,12,19,23	CD4099BCN	850 409 90
IC7,11,24,38,47	MC74HC74N	850 747 42
IC8,16,41,42	CD40174BCN	854 017 40
IC9,17,22,40,43	CD4008BCN	850 400 80
IC13	LM318N	850 031 80
IC14	HEF4016BP	850 401 60
IC15	NE5009N	850 500 90
IC18	CD4528B	850 452 80
IC20,35	LF353	850 035 30
IC21	CD40175BCN	854 017 50
IC26,37	NE5007	850 500 70
IC28	MC145146P	851 451 46
IC29,45	LF356	850 035 60
IC30	CD4066BC	850 406 60
IC31	SAA1059P	850 105 90
IC32	74C160	857 416 01
IC33	CD4013B	850 401 30
IC34	CD4046B	850 404 60
IC39	MC74HC161N	857 416 10
IC44	MC3393P	850 339 30
IC46	MC145145P	851 451 45
Q1,32,37,40	BC557B	840 055 70
Q2	J112	843 011 20
Q3,6,16,18,20-23,25-31	BF240	840 024 00
Q4,7-12,14,19,33,35,38,39	BC547B	840 054 70
Q5	BFX89	840 089 00
Q13	J310	840 031 03
Q15	BSX20	840 002 00
Q17,24	BFW17A	840 001 70
Q34,36	J112 MATCHED	843 011 21

PARTS LIST FOR SYNTHESIZER BOARD 611 VERSION 4A

D1-4,6-10,19,20,25-27,32	1N4148				830 414 80
D5	BZX79C5V6				832 795 61
D11,12	SD101C				830 010 10
D13,14,18,28-31	BB109				833 010 90
D15-17	BZX79C12				832 791 21
D21-24	BA282				830 028 20
D33	BZX75C3V6				832 753 60
X1	14.5333MHZ				383 570 71
R1,4,9,13,14,17,19,22,24,25,39,40,45-48,52-53,102,106-108,115,118,136,158,163,172,195	10 kohm	5%	1/8W	MF	500 410 01
R2,42,111,126,128,151,155	100 kohm	5%	1/8W	MF	500 510 00
R3,28,100,152	6.8 kohm	5%	1/8W	MF	500 368 00
R5	1.27 kohm	1%	1/4W	MF	511 312 70
R6,20,43,79,83,150	1 kohm	5%	1/8W	MF	500 310 00
R7	1.05 kohm	1%	1/4W	MF	511 310 50
R8,10,12,15,16,36,62,68,75,117,178,179	47 kohm	5%	1/8W	MF	500 447 00
R11,33,95,103,143	56 ohm	5%	1/8W	MF	500 156 00
R18	1.2 Mohm	5%	1/4W	MF	501 612 00
R21	2.7 Mohm	5%	1/4W	MF	501 627 00
R23	150 kohm	5%	1/8W	MF	500 515 00
R26,30,160,165	150 ohm	5%	1/8W	MF	500 215 00
R27,141	10 ohm	5%	1/8W	MF	500 110 01
R29,38,49,50-51,101,133	2.2 kohm	5%	1/8W	MF	500 322 00
R31	715 ohm	1%	1/4W	MF	511 271 50

PARTS LIST FOR SYNTHESIZER BOARD 611 VERSION 4A

R32,57,69,93, 164,190	1.5 kohm	5%	1/8W	MF	500 315 00
R34	220 ohm			Pot.	583 222 00
R35	681 ohm	1%	1/4W	MF	511 268 10
R37,112,129,134, 137	100 ohm	5%	1/8W	MF	500 210 00
R41,114,116	33 kohm	5%	1/8W	MF	500 433 00
R44,185,187	820 ohm	5%	1/8W	MF	500 282 00
R54,56,60,67,82, 92,182,183,191	1.2 kohm	5%	1/8W	MF	500 312 00
R55,59,153	470 ohm	5%	1/8W	MF	500 247 00
R58,64,70	470 ohm	5%	1/2W	Car.	502 247 00
R61,63,65,73,84, 89,140,175	3.3 kohm	5%	1/8W	MF	500 333 00
R66,98,193,194	27 ohm	5%	1/8W	MF	500 127 00
R71	820 kohm	5%	1/8W	MF	500 582 00
R72	180 kohm	5%	1/8W	MF	500 518 00
R74	15 ohm	5%	1/8W	MF	500 115 00
R76	2.2 ohm	5%	1/4W	Car.	501 022 00
R77	180 ohm	5%	1/8W	MF	500 218 01
R78	330 ohm	5%	1/8W	MF	500 233 00
R80,162	39 kohm	5%	1/8W	MF	500 439 00
R81,105,135,145, 180,181	5.6 kohm	5%	1/8W	MF	500 356 00
R85	56 kohm	5%	1/8W	MF	500 456 00
R86,90	120 ohm	5%	1/8W	MF	500 212 00
R87	12 ohm	5%	1/8W	MF	500 112 00
R88	270 ohm	5%	1/8W	MF	500 227 00
R91,96,121,139, 173	220 ohm	5%	1/8W	MF	500 222 00
R94,166	680 ohm	5%	1/8W	MF	500 268 00
R97,149,169	220 kohm	5%	1/8W	MF	500 522 00
R99	100 ohm	5%	1/4W	Car.	501 210 00
R104	680 kohm	5%	1/4W	MF	500 568 00
R109	237 kohm	1%	1/4W	MF	511 523 70
R110	47 kohm			Pot.	583 447 01
R113,125,196	470 kohm	5%	1/8W	MF	500 547 00
R119,130,170,152	68 kohm	5%	1/8W	MF	500 468 00
R120,156	15 kohm	5%	1/8W	MF	500 415 00
R122-123,159	2.7 kohm	5%	1/8W	MF	500 327 00

PARTS LIST FOR SYNTHESIZER BOARD 611 VERSION 4A

R124,132,188	4.7 kohm	5%	1/8W	MF	500 347 00
R127,146	12 kohm	5%	1/8W	MF	500 412 00
R131,144,154	22 kohm	5%	1/8W	MF	500 422 00
R138	47 ohm	5%	1/8W	MF	500 147 00
R142	150 ohm	5%	1/2W	Car.	502 215 00
R147	270 kohm	5%	1/8W	MF	500 527 00
R148	18 kohm	5%	1/8W	MF	500 418 00
R157	27 kohm	5%	1/8W	MF	500 427 00
R161	560 ohm	5%	1/8W	MF	500 256 00
R167,168	4.22 kohm	1%	1/4W	MF	511 342 20
R171	2.49 kohm	1%	1/4W	MF	511 234 90
R174	3.9 kohm	5%	1/8W	MF	500 339 00
R176,186	390 ohm	5%	1/8W	MF	500 239 00
R177	48.7 ohm	1%	1/4W	MF	511 148 70
R184,189	120 kohm	5%	1/8W	MF	500 512 00
R192	1.8 kohm	5%	1/8W	MF	500 318 00
R197	1 Mohm	5%	1/8W	MF	500 610 00
C1,3,5	6.8 uF	-20+50%	25V	Sol.al.	652 668 01
C2,4,6,22,31, 141,147,148,190	0.22 uF	10%	63V	Polyes.	622 522 01
C7,9,12,18-21, 24-30,33,34, 36-37,40-46, 48-54,68,76, 80-82,84-85, 89-90,93,95, 101-111,113-115, 139,142-143, 150-151,160,167	0.1 uF	10%	63V	Polyes.	622 510 00
C8,205	150 pF	2%	63V	N150	602 215 00
C10	330 pF	1%	125V	Microp.	613 233 00
C11	1.5 nF	1%	500V	Microp.	613 315 00
C14,55,57,60, 65,70,75,78,83, 86,88,91,92,96, 99,120,138,157, 159,163,208-210	10 nF	-20+50%	100V	Cer.	602 410 01
C13	10 pF	2%	63V	N150	602 110 00
C15,58,119	1 nF	1%	125V	Microp.	613 310 00
C16,35,38,47, 112	22 uF	20%	25V	Tan.	652 722 00
C17	100 nF	10%	250V	MKP	624 510 02
C23,32,164	33 pF	2%	63V	N150	602 133 01

PARTS LIST FOR SYNTHESIZER BOARD 611 VERSION 4A

C39,144	6.8 nF	1%	63V	Microp.	612 368 00
C56,145	47 nF	10%	250V	Polyes.	624 447 01
C59,118,123,146	0.47 uF	10%	63V	Polyes.	622 547 01
C61,79	3.3 pF	+/-0.25pF	63V	NPO	602 033 01
C62,64,66,74,100	6.8 uF	-20+50%	25V	Tan.	652 668 00
C63	82 pF	2%	63V	N150	602 182 01
C67	100 pF	2%	63V	N150	602 210 01
C69	27 pF	2%	63V	N150	602 127 01
C71-72,152,155, 165	47 nF	10%	63V	Polyes.	622 447 00
C73	18 pF	2%	63V	N150	602 118 01
C77	6.8 pF	+/-0.25pF	63V	N150	602 068 01
C87,153	82 pF	2%	63V	N150	602 182 00
C94,161	33 nF	20%	63V	Polyes.	622 433 00
C116	4.7 nF	1%	63V	Microp.	612 347 00
C117	680 pF	1%	125V	Microp.	613 268 00
C121,122,127,128, 137,140,156	4.7 nF	10%	100V	Cer.	602 347 02
C124,130	15 nF	20%	63V	Polyes.	622 415 01
C125	56 pF	2%	63V	N150	602 156 00
C126	1.8 nF	1%	125V	Microp.	613 318 00
C129	100 pF	2%	63V	N150	602 210 00
C131,208	2.7 pF	+/-0.25pF	63V	NPO	602 027 00
C132	180 pF	1%	500V	Microp.	615 218 00
C133	220 pF	1%	125V	Microp.	613 222 00
C134,136	220 pF	10%	63V	Cer.	602 222 00
C135	22 nF	20%	63V	Polyes.	622 422 00
C149	10 nF	20%	63V	Polyes.	622 410 01
C154	1.2 nF	1%	125V	Microp.	613 312 00
C162	27 pF	2%	63V	N150	602 127 00
C166	0.33 uF	20%	63V	Polyes.	622 533 01
C168-203	1 nF	+/-10%	100V	Cer.	603 310 00
C204	2.2 uF	20%	25V	Tan.	652 622 02
C206	47 pF	2%	63V	N150	602 147 00
C207	330 pF	10%	63V	Cer.	602 233 00
L1,2,9,10,15	10 uH				740 110 01
L3,5,12,17,20	100 uH				740 210 07
L4	Var.		Coil		103 577 02
L6	Var.		Coil		103 577 32
L7	Var.		Coil		103 577 22
L8	Var.		Coil		103 577 12
L11,16	22 uH				740 122 03
L13,14	Var.		Coil		103 577 52
L18	Var.		Coil		103 577 62
L19	220 uH				740 222 01

PARTS LIST FOR SYNTHESIZER BOARD 611 VERSION 4A

T1				103 577 72
T2				103 577 42
PL1	40POL	MOLEX		756 040 04
PL2-6	2POL	3M		750 001 45
PL7	2POL	MOLEX		750 001 46

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TECHNICAL DESCRIPTION

PCB 612 / 613 / 614 MASTER OSCILLATOR

The three Master Oscillators available all consist of the same circuits but have different frequency stabilities determined by the 10.24 MHz Temperature Compensated Crystal Oscillator (TCXO) used. The output signal of the TCXO is split between two reference dividers. One for the 45-75 MHz Synthesizer and one for the 43.6 and 1.4 MHz Synthesizers. The Reference Divider, 45-75 MHz Synthesizer, divides the 10.24 MHz TCXO signal by 250 having a 40.96 kHz reference frequency at two outputs used for the two Synthesizer Boards 611 controlling the receiver and exciter signal path's respectively. The Reference Divider, 43.6 and 1.4 MHz Synthesizer, divides the 10.24 MHz TCXO signal by 8, obtaining a 1.28 MHz signal fed to two outputs also used for the two Synthesizer Boards 611. The output signals of the divider are fed to the Check Detector to detect the presence of both. The resulting check signal MO-Check is via the Synthesizer Board 611 fed to the Transceiver Control Board 624. For Master Oscillator 613 a heater (TCXO Heater 699) is incorporated in order to keep the TCXO ambient temperature above 0 deg. Celcius.

PARTS LIST FOR MASTER OSCILLATOR BOARD 612 VERSION 3A

Printed Circuit Board Complete 612

107 561 21

IC1,7	MC74HC00N	850 740 04
IC2,4,6	MC74HC161N	857 416 10
IC3	LM78L12ACP	850 741 20
IC5	LM78L05ACP	850 780 52

Q1	BC557B	840 055 70
Q2	BC547B	840 054 70

D1-4	1N4148	830 414 80
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R2-3,7	1 kohm	5%	1/8W	MF	500 310 00
R4	100 kohm	5%	1/8W	MF	500 510 00
R5	180 ohm	5%	1/4W	Car.	501 218 00
R6,9,11	10 kohm	5%	1/8W	MF	500 410 00
R8	330 kohm	5%	1/8W	MF	500 533 00
R10	47 kohm	5%	1/8W	MF	500 447 00

C1,2,4	6.8 uF	-20+50%	25V	Sol.al.	652 668 01
C3,7,17	100 pF	2%	63V	N150	602 210 00
C5	22 uF	20%	25V	Tan.	652 722 00
C6,8	0.1 uF	10%	63V	Polyes.	622 510 00
C9	0.33 uF	20%	63V	Polyes.	622 533 01
C10	10 nF	-20+50%	63V	Cer.	602 410 01
C11	150 pF	2%	63V	N150	602 215 00
C12-16	0.47 uF	10%	63V	Polyes.	622 457 01

L1	33 uH	740 133 01
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TCXO	10.24 MHz	383 570 11
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PL5,6,8,9	2 POL	750 001 45
PL7	2 POL	750 001 46

PARTS LIST FOR MASTER OSCILLATOR BOARD 613 VERSION 3A

Printed Circuit Board Complete 613

107 561 31

IC1,7	MC74HC00N	850 740 04
IC2,4,6	MC74HC161N	857 416 10
IC3	LM78L12ACP	850 741 20
IC5	LM78L05ACP	850 780 52

Q1	BC557B	840 055 70
Q2	BC547B	840 054 70

D1-4	1N4148	830 414 80
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R2-3,7	1 kohm	5%	1/8W	MF	500 310 00
R4	100 kohm	5%	1/8W	MF	500 510 00
R5	180 ohm	5%	1/4W	Car.	501 218 00
R6,9,11	10 kohm	5%	1/8W	MF	500 410 00
R8	330 kohm	5%	1/8W	MF	500 533 00
R10	47 kohm	5%	1/8W	MF	500 447 00

C1,2,4	6.8 uF	-20+50%	25V	Sol.al.	652 668 01
C3,7,17	100 pF	2%	63V	N150	602 210 00
C5	22 uF	20%	25V	Tan.	652 722 00
C6,8	0.1 uF	10%	63V	Polyes.	622 510 00
C9	0.33 uF	20%	63V	Polyes.	622 533 01
C10	10 nF	-20+50%	63V	Cer.	602 410 01
C11	150 pF	2%	63V	N150	602 215 00
C12-16	0.47 uF	10%	63V	Polyes.	622 457 01

L1	33 uH	740 133 01
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TCXO	10.24 MHz	383 570 21
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TCXO HEATER PCB 699		107 569 91
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PL5,6,8,9	2 POL	750 001 45
PL7	2 POL	750 001 46

PARTS LIST FOR MASTER OSCILLATOR BOARD 614 VERSION 3A

PARTS LIST FOR TCXO HEATER PCB 699 VERSION 1A

Printed Circuit Board Complete 614

107 561 41

IC1,7	MC74HC00N	850 740 04
IC2,4,6	MC74HC161N	857 416 10
IC3	LM78L12ACP	850 741 20
IC5	LM78L05ACP	850 780 52

Q1	BC557B	840 055 70
Q2	BC547B	840 054 70

D1-4	1N4148	830 414 80
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R2-3,7	1 kohm	5%	1/8W	MF	500 310 00
R4	100 kohm	5%	1/8W	MF	500 510 00
R5	180 ohm	5%	1/4W	Car.	501 218 00
R6,9,11	10 kohm	5%	1/8W	MF	500 410 00
R8	330 kohm	5%	1/8W	MF	500 533 00
R10	47 kohm	5%	1/8W	MF	500 447 00

C1,2,4	6.8 uF	+50-20%	25V	Sol.al.	652 668 01
C3,7,17	100 pF	2%	63V	N150	602 210 00
C5	22 uF	20%	25V	Tan.	652 722 00
C6,8	0.1 uF	10%	63V	Polyes.	622 510 00
C9	0.33 uF	20%	63V	Polyes.	622 533 01
C10	10 nF	-20+50%	63V	Cer.	602 410 01
C11	150 pF	2%	63V	N150	602 215 00
C12-16	0.47 uF	10%	63V	Polyes.	622 457 01

L1	33 uH	740 133 01
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TCXO (0.4 ppm)	10.24 MHz	383 570 31
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PL5,6,8,9	2 POL	750 001 45
PL7	2 POL	750 001 46

Printed Circuit Board Complete 699

107 569 91

Q1	BC557B	840 055 70
Q2	MPSA14	840 001 40

R1	22 kohm	5%	1/8W	MF	500 422 00
R2,4	47 kohm	5%	1/8W	MF	500 447 00
R3	1 kohm	+/-10%		NTC	591 310 00
R5	180 kohm	5%	1/8W	MF	500 518 00
R6-13	1 kohm	5%	1/8W	MF	501 310 00
R14-21	1.8 kohm	5%	1/8W	MF	500 318 00

C1-2	1 nF	10%	100V	Cer.	602 310 02
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TECHNICAL DESCRIPTION

PCB [618] RECEIVER SIGNAL PATH

The antenna RF signal is led through coax connector SK1 to the protection circuit, which protects the receiver against excessive RF voltages and static electricity discharges, appearing on the antenna. Through the switchable attenuator the RF signal is led to the preselector consisting of eleven fixed-tuned bandpass filters. The bandpass filters covers the frequency bands 10-405 kHz, 405-527 kHz, 527-1600 kHz, 1.6-4 MHz, 4-5.246 MHz, 5.246-7.27 MHz, 7.27-10.383 MHz, 10.383-14.695 MHz, 14.695-19.571 MHz, 19.571-24.424 MHz, 24.424-30 MHz. A change in receiver frequency will be followed by automatic selection from among the bandpass filters. The automatic selection is controlled from the Transceiver Control Board [624] via the serial data bus. The RF signal goes via the switchable RF amplifier to the high level double balanced Schottky diodes mixer, where it is mixed with the 45-75 MHz synthesizer signal from the Synthesizer Board [611] to generate the first intermediate frequency signal of 45 MHz. Before the signal is applied to the first mixer, the signal level is detected by the broadband detector. The 45 MHz IF signal is amplified in the grounded gate JFET amplifier and then filtered in the 45 MHz double sideband crystal filter, determining the overall AM selectivity. Before being fed to the 2nd mixer, the IF signal is passing through the MOSFET amplifier which has a variable gain controlled by the delayed AGC voltage. The 2nd mixer converts the 45 MHz IF signal to the 1.4 MHz IF signal by mixing with a 43.6 MHz synthesizer signal from the Synthesizer Board [611]. After amplification in the grounded gate JFET amplifier, the 1.4 MHz signal is fed to the Information filter bank. Depending on the version (i.e. crystal filter options) and the selected mode, the 1.4 MHz signal is routed through one of the filters X2, X3, X4, X5 or the wide filter, controlled by the Transceiver Control Board [624] via the serial data bus. The now filtered 1.4 MHz signal is amplified in the 1.4 MHz amplifier strip IC4, Q14 and Q15. The voltage gain of the amplifier strip is controlled partly by the AGC voltage applied to IC4 and partly by the control line "IF-GAIN", which, when in logical high condition, increases the gain of Q14 with approx. 8 dB. From the IF strip the signal is fed to the Signal Detector IC6. The integrated circuit of the Signal Detector contains a balanced mixer and a high gain limiting amplifier. The IF signal is applied to the one input port of the mixer. In the modes H3E and H2A, the IF signal is also fed to the amplified input. This signal is amplified and clipped to constant amplitude and internally connected to the other input port of the mixer where it is mixed with the modulated signal. The difference frequency contains the wanted AF signal. In other modes but H3E and H2A a 1.4 MHz signal, derived from the Synthesizer Board [611], is applied to the amplifier input. The unbalanced AF signal is filtered and converted to a balanced signal before it is fed to the flat cable connector PL1.

From the IF strip the signal is also fed to the AGC Detector consisting of two transistors in the integrated array IC28. The signal, which is now rectified to a DC voltage, is applied to the AGC Timing Circuit. The AGC voltage from the AGC Timing Circuit controls the overall gain of the receiver. The AGC voltage is also fed to the Transceiver Control Board [624], where it is used in

self test routines and, by means of a voltage to frequency converter, fed to the Control Unit controlling the signal strength meter on the front panel. When manual gain control (MGC) is selected the Transceiver Control Board 624 generates a DC voltage which is fed to the receiver signal path instead of the AGC voltage. Subdiagram 5 shows the control circuits for the board and Subdiagram 6 shows the interface circuits to the serial data busses.

TEST POINTS FOR PCB 618 RECEIVER SIGNAL PATH.

1 + 15V DC

2 - 15V DC

3 + 12V DC

4 + 5V DC

5 + 6.8V DC

6	SELF TEST #	22	7V
	—— " ——	23-24	2.9V
	—— " ——	25-30	9.8V

7 8 9 10 11 ONLY FOR USE WITH SIGNAL GENERATOR

12	SELF TEST #	25	50mV _{pp}
	—— " ——	26-30	40mV _{pp}

13	SELF TEST #	25-30	30mV _{pp}
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14	SELF TEST #	25-30	450mV _{pp} SINEWAVE 1.4 MHz
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15	SELF TEST #	22-30	650mV _{pp} —— " —— 1.4 MHz
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16	17	SELF TEST #	25	1.7V _{pp} - 1 kHz
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NOTE: KEEP GROUND CORD ON PROBE AS SHORT AS POSSIBLE..

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PARTS LIST FOR RECEIVER SIGNAL PATH BOARD 618 VERSION A7

Printed Circuit Board Complete 618		107 561 81
IC1	CB303M2 Balanced mixer	850 030 30
IC2	LM2903	850 290 30
IC3	HPF505 Balanced mixer	850 000 11
IC4	MC1350	850 135 00
IC5,7	MC1458N	850 145 80
IC6	TBA 120 T	850 012 01
IC8	CD40106B	850 010 60
IC9,14,18	4011B	850 401 10
IC10	CD4053B	850 405 30
IC11,17	CD4051B	850 405 10
IC12	4017B	850 401 70
IC13	NE555	850 055 50
IC15	4013B	850 401 30
IC16	4081B	850 408 10
IC19,20,29,30,31	2003A	850 200 30
IC21,22	74C165	850 416 50
IC23	MA7812	850 781 20
IC24	MA7805	850 780 50
IC25,26,27,28	4094B	850 409 40
IC32	ULN2083A	850 208 30
Q1	BC327	840 032 70
Q2,17,18,20,22	BC557B	840 055 70
Q3,9,11,16,18,19	BC547B	840 054 70
Q4,5,10	BFR96	840 009 60
Q6,13	J310	840 031 03
Q7	J310 2 pcs. matched	840 031 02
Q12	BF981	843 098 10
Q14,15	BF240	840 024 00
Q21	BD645	842 064 50
D1,2,5,6,30,31, 41-44,46,60-62, 65-77,79,80	1N4148	830 414 80
D3,4	388A 114A	830 011 40
D7,18-26,35	BA423	830 042 30
D8-17,27-28,32-34, 36,51,52,54,83	BA479	833 047 90
D29	BZX79C12	832 791 21
D37-40	BA282	830 028 20
D45,47,48,50,53, 55-59,63,64	1S920	830 192 00
D49	BZX79B5V1	832 795 11
D78	BZX79B5V6	832 795 60

PARTS LIST FOR RECEIVER SIGNAL PATH BOARD 618 VERSION A7

D81	BZX79C6V8				832 796 80
VR1	NEON LAMP				722 000 00
X1	45 HHZ	Filter 2.7 kHz			383 571 01
X2	LSB Filter	1.4 MHz 1 kohm			385 112 03
RL1-4	Relay	12V	DIL		780 000 25
RL5	Relay	12V	DR-12V		780 000 38
R1,204,218,223, 224,228,241,242, 244	100 kohm	5%	1/8W	Car.	500 510 00
R2,3,8,15,21,40, 41,117,120,124- 125,133,138,144, 148,152,154,157, 160,171,179,186, 201,216	100 ohm	5%	1/8W	Car.	500 210 00
R4,5	220 ohm	5%	1.5W	MO	544 222 00
R6	75 ohm	5%	5W	MO	547 175 00
R7,13,18,26, 118,121,203	3.3 kohm	5%	1/8W	Car.	500 333 00
R9	68 ohm	5%	1/4W	Car.	501 168 00
R10	82 ohm	5%	1/4W	Car.	501 182 00
R11,12	226 ohm	1%	1/4W	MF	511 222 60
R14,42,182	560 ohm	5%	1/8W	Car.	500 256 00
R16	100 ohm	1%	1/4W	MF	511 210 00
R17	68 ohm	5%	1.5W	MO	544 168 00
R19,20	120 kohm	5%	1/8W	Car.	500 512 00
R22,207,233	47 kohm	5%	1/8W	Car.	500 447 00
R23,61,106,170, 184,226	4.7 kohm	5%	1/8W	Car.	500 347 00
R24,32,50-59	470 ohm	5%	1/4W	Car.	501 247 00
R25	56 ohm	5%	1.5W	MO	544 156 00
R27,71,164,222, 234,240	33 kohm	5%	1/8W	Car.	500 433 00
R28,29,127,175, 188,208,247,249	1.8 kohm	5%	1/8W	Car.	500 318 00
R30,66	15 kohm	5%	1/8W	Car.	500 415 00
R31	2.2 kohm	5%	1/4W	Car.	501 322 00

PARTS LIST FOR RECEIVER SIGNAL PATH BOARD 618 VERSION A7

R33-38,44-47, 78	270 ohm	5%	1/4W	Car.	501 227 00
R39,230	22 ohm	5%	1/8W	Car.	500 122 00
R43,62	680 ohm	5%	1/4W	Car.	501 268 00
R48	820 ohm	5%	1/4W	Car.	501 282 00
R49,83	390 ohm	5%	1/4W	Car.	501 239 00
R60	590 ohm	1%	1/4W	MF	511 259 00
R64,65,95,102, 111,112,134, 166-168,210,229, 246	10 kohm	5%	1/8W	Car.	500 410 00
R119,173	2.7 kohm	5%	1/8W	Car.	500 327 00
R63,139,158,165	8.2 kohm	5%	1/8W	Car.	500 382 00
R67,194,206,220	56 ohm	5%	1/8W	Car.	500 156 00
R68	82 ohm	5%	1/8W	Car.	500 182 00
R69,143,215,236	470 kohm	5%	1/8W	Car.	500 547 00
R70	47 ohm	5%	1/4W	Car.	501 147 00
R72	301 ohm	1%	1/4W	MF	511 230 10
R73,113,140,142	1.5 kohm	5%	1/8W	Car.	500 315 00
R74,90,91,180, 198,239	220 ohm	5%	1/8W	Car.	500 222 00
R75	90.3 ohm	1%	1/8W	MF	511 195 30
R76,77,123,147, 199,213,217,219, 221	1 kohm	5%	1/8W	Car.	500 310 00
R79,174	10 ohm	1%	1/4W	MF	511 110 00
R80,214	390 ohm	5%	1/8W	Car.	500 239 00
R81,84	10 ohm	5%	1/8W	Car.	500 110 01
R82,88	270 ohm	5%	1/2W	Car.	502 227 00
R85,89,98, 128,145,211	47 ohm	5%	1/8W	Car.	500 147 00
R86	51.1 ohm	1%	1/4W	MF	511 151 10
R87	48.7 ohm	1%	1/4W	MF	511 148 70
R92	19.6 ohm	1%	1/4W	MF	511 119 60
R93,108,132, 254,257	56 kohm	5%	1/8W	Car.	500 456 00
R94	7.5 ohm	1%	1/4W	MF	511 075 00

PARTS LIST FOR RECEIVER SIGNAL PATH BOARD 618 VERSION A7

R96,155,178,197, 200	27 ohm	5%	1/8W	Car.	500 127 00
R97,100	27.4 ohm	1%	1/4W	MF	511 127 40
R99	237 kohm	1%	1/4W	MF	511 523 70
R101	715 ohm	1%	1/4W	MF	511 271 50
R103	56.2 kohm	1%	1/4W	MF	511 456 20
R104	6.49 kohm	1%	1/4W	MF	511 364 90
R105	14.7 kohm	1%	1/4W	MF	511 414 70
R107	270 kohm	5%	1/8W	Car.	500 527 00
R109,149,150	820 ohm	5%	1/8W	Car.	500 282 00
R110	56 ohm	5%	1/4W	Car.	501 156 00
R114	511 ohm	1%	1/4W	MF	511 251 10
R115	56.2 ohm	1%	1/4W	MF	511 156 20
R116	46.4 ohm	1%	1/4W	MF	511 146 40
R122,129,136,141, 146,151,159,161, 162,205,231,258	5.6 kohm	5%	1/8W	Car.	500 356 00
R126,227	680 ohm	5%	1/8W	Car.	500 268 00
R130,137,156	120 ohm	5%	1/8W	Car.	500 212 00
R131,235	82 kohm	5%	1/8W	Car.	500 482 00
R135	18 kohm	5%	1/8W	Car.	500 418 00
R163,237,238,248	270 ohm	5%	1/8W	Car.	500 227 00
R169,172,259	2.2 kohm	5%	1/8W	Car.	500 322 00
R176,192	1.87 kohm	1%	1/4W	MF	511 318 70
R177	33.2 ohm	1%	1/4W	MF	511 133 20
R181	562 ohm	1%	1/4W	MF	511 256 20
R183	825 ohm	1%	1/4W	MF	511 282 50
R185	3.9 kohm	5%	1/8W	Car.	500 339 00
R187	3.48 kohm	1%	1/4W	MF	511 334 80
R191	5.62 kohm	1%	1/4W	MF	511 356 20
R193,196	82.5 kohm	1%	1/4W	MF	511 482 50
R195	4.7 kohm			Pot.	582 347 00
R202,245	12 kohm	5%	1/8W	Car.	500 412 00
R209	1.5 Mohm	5%	1/4W	Car.	501 615 00
R189,190	10 kohm	1%	1/4W	MF	511 410 00
R225	68 kohm	5%	1/8W	Car.	500 468 00
R232	10 Mohm	5%	1/4W	Car.	501 710 00
R243	1 Mohm	5%	1/8W	Car.	500 610 00
R250	9x47 kohm			Sil.	530 000 07
R251-253,255	7x56 kohm			Sil.	530 000 13

PARTS LIST FOR RECEIVER SIGNAL PATH BOARD 618 VERSION A7

C1,4-6,8,9, 12-17,21,27,44, 69-72,87-92,97, 105,109-112,116, 117,132,133,140, 145,151,166,172- 174,176-178,180, 185,190,192,194, 201-203,205,211, 215,218-221,224, 226,227,231,233, 238,239,243-247, 249,251,254,258, 261,262,266,267, 269,278,285,289- 292,300,301,304- 315,320,324,325, 327,329,330	0.1 uF	10%	63V	Polyes.	622 510 00
C2,3	0.22 uF	10%	250V	Polyes.	624 522 01
C7,56,68,181, 270,277,288	22 nF	10%	63V	Polyes.	622 422 00
C10,11	4.7 nF		63V	Cer.	602 347 02
C18	2.7 nF	10%		Cer.	602 327 00
C19,64,65,67	15 nF	20%	63V	Polyes.	622 415 01
C20,114,129, 142,150,303	0.47 uF	10%	63V	Polyes.	622 547 01
C22,25,63,85	33 nF	20%	63V	Polyes.	622 433 00
C23,24	47 nF	10%	63V	Polyes.	622 447 00
C26	68 nF	20%	63V	Polyes.	622 468 00
C28,38,149,163, 170,183,200, 225,326	150 pF	2%	63V	N150	602 215 00
C29,98,235,257	220 pF	1%	500V	Polyst.	615 222 00
C30,60	270 pF	1%	500V	Polyst.	615 227 00
C31,50,76,100, 101	390 pF	1%	500V	Polyst.	615 239 00
C32	2.7 nF	1%	125V	Polyst.	613 327 00
C33,47,48,74,99, 169,236	100 pF	2%	63V	N150	602 210 00
C34,39,55,73	82 pF	2%	63V	N150	602 182 00

PARTS LIST FOR RECEIVER SIGNAL PATH BOARD 618 VERSION A7

C35	620 pF	1%	250V	Polyst.	614 262 00
C36,279	910 pF	1%	500V	Polyst.	615 291 00
C37,104	1.3 nF	1%	160V	Polyst.	613 313 00
C40,93,256	1.2 nF	1%	500V	Polyst.	615 312 00
C41,107,157,198	56 pF	2%	63V	N150	602 156 00
C42,53	33 pF	2%	63V	N150	602 133 01
C43,275	330 pF	1%	500V	Polyst.	615 233 00
C45,46,160,189, 222,223,228	120 pF	2%	63V	N150	602 212 00
C49,52,77,229, 253	470 pF	1%	630V	Polyst.	615 247 00
C51,62,154,164, 318	47 pF	2%	63V	N150	602 147 00
C57,113,138	0.33 uF	20%	63V	Polyes.	622 533 01
C58,130,131,135, 139,210	2.2 uF		25V	Sol. al.	652 622 03
C59,106,115,134, 280,281,286	6.8 uF	20%	25V	Tan.	652 668 00
C61	18 pF	2%	63V	N150	602 118 00
C66,83,96, 118-128,137,175, 182,188,191,195, 204,206-209,212, 213,214,217,230,234, 237,240,242,248, 259,268,282,284, 321,322,328	10 nF	10%	63V	Polyes.	622 410 01
C75,159,162,165, 167,168,196	15 pF	2%	63V	N150	602 115 00
C78	560 pF	1%	500V	Polyst.	615 256 00
C79,276	820 pF	1%	500V	Polyst.	615 282 00
C80,82,103	1 nF	1%	500V	Polyst.	615 310 01
C81	1.5 nF	1%	500V	Polyst.	615 315 00
C84	5.6 nF	1%	125V	Polyst.	613 356 00
C94,255	2.2 nF	1%	125V	Polyst.	613 322 00
C95	8.2 nF	1%	125V	Polyst.	613 382 00
C102	750 pF	1%	500V	Polyst.	615 275 00
C108,156	22 pF	2%	63V	N150	602 122 00

PARTS LIST FOR RECEIVER SIGNAL PATH BOARD 618 VERSION A7

C136,146,147, 148,152,153,186, 187,216,241,252, 271,283,287	1 nF	10%	63V	Cer.	602 310 02
C141,250	10 pF	2%	63V	N150	602 110 00
C143,144,171, 272,319	0.22 uF	10%	63V	Polyes.	622 522 01
C155	100 uF		25V	Sol. al.	652 810 00
C158,314	2-9 pF		100V	Var.	683 009 00
C161,184	39 pF	2%	63V	N150	602 139 01
C179	4.5-26 pF			Var.	683 126 00
C193,232,264	22 uF		16V	Tan.	651 722 01
C199	27 pF	2%	63V	N150	602 127 00
C260	1 uF		35V	Tan.	652 610 01
C263,273,274	10 uF		63V	Sol. al.	652 710 02
C293,294,302,323	6.8 uF		25V	Sol. al.	652 668 01
C295-299	470 pF	10%	63V	Cer.	602 247 00
L1-5	4.7 mH	5%	RF Choke		740 347 00
L6,7,50,51,53, 57,69	1000 uH	10%	RF Choke	IM2	740 310 04
L8,39	0.15 uH	20%	RF Choke	IM4	740 001 51
L9,37,40	0.22 uH	10%	RF Choke	IM2	740 002 21
L10,87	0.33 uH	10%	RF Choke	IM2	740 003 30
L11,19,38	0.47 uH	10%	RF Choke	IM2	740 004 70
L12,43	0.68 uH	10%	RF Choke	IR2	740 006 81
L13,44,68	0.82 uH	10%	RF Choke	IM2	740 008 20
L14,74,80	4.7 uH	10%	RF Choke	IM2	740 047 02
L26,66,67,70	0.1 uH	10%	RF Choke	IM2	740 001 00
L34	6.8 uH	10%	RF Choke	IM2	740 068 01
L35,36	33 uH		RF Choke		740 133 01
L41,86	0.39 uH	10%	RF Choke	IM2	740 003 90
L45	3.9 uH	10%	RF Choke	IM2	740 039 00
L46,55,56,72	47 uH	10%	RF Choke	IM2	740 147 03
L47,77,78,82	22 uH	10%	RF Choke	IM2	740 122 02
L48	2.7 uH	10%	RF Choke	IM2	740 027 00
L49	470 uH	10%	RF Choke	IM2	740 247 02
L52,54,75,76,88	10 uH	10%	RF Choke	IM2	740 110 04
L58,59	2.2 uH	10%	RF Choke	IM2	740 022 02
L60	0.56 uH	10%	RF Choke	IM2	740 005 60
L61-65,71	0.15 uH	10%	RF Choke	IM2	740 001 50
L73	0.33 uH	10%	RF Choke	IM4	740 003 31
L79,81	220 uH	10%	RF Choke	IM2	740 222 02
L84	470 uH	5%	RF Choke		740 247 01
L85	0.27 uH	5%	RF Choke	IM2	740 002 71

TECHNICAL DESCRIPTION

PCB [619] EXCITER SIGNAL PATH

The exciter converts the AF signal to a RF signal of the right frequency, level and modulation. The frequency conversion is controlled by the exciter Synthesizer Board [611]. The balanced AF signal with a level of 0 dBm/600 ohm from Audio Processing Board [601] is led to the double balanced mixer IC10. The 1.4 MHz LO signal from the Synthesizer Board [611] is amplified in the limiter and applied to the mixer producing a 1.4 MHz double sideband suppressed carrier output signal which is filtered in the 1.4 MHz lower sideband crystal filter. The 1.4 MHz LO signal amplified in the 1.4 MHz Carrier Amp. and the output signal of the crystal filter amplified in the 1.4 MHz Sideband Amp. are adjusted by two attenuators and combined in the common 1.4 MHz Amp. The setting of the attenuators depends on the selected operation mode and is controlled by the Transceiver Control Board [624] via the serial-to-parallel converter IC1 and IC2. In this way the peak-to-peak voltage of the combined signal is held independent of the operation mode. The combined 1.4 MHz signal is applied to a passive double balanced mixer where it is mixed with a 43.596 MHz signal from the Synthesizer Board [611] producing a IF frequency of 44.996 MHz. The IF signal is amplified in the 45 MHz Amp. 1, filtered in the 45 MHz monolithic crystal filter and further amplification takes place in 45 MHz Amp. 2. The IF signal is then led to the ALC attenuator which is the amplitude controlling element of the ALC system. The attenuation is controlled by a DC voltage generated by the Transceiver Control Board [624]. The attenuated IF signal is mixed with a 45-75 MHz signal from the Synthesizer Board [611] in a passive double balanced mixer to form the final RF signal at the actual transmitting frequency. The RF signal is led through a 30 MHz lowpass filter and applied to the Exciter Output Amp. Finally the RF signal is filtered in the Post Selector which consists of one lowpass-, six bandpass- and one highpass filter. The filter selection is carried out by the Transceiver Control Board [624] via the serial-to-parallel converter. The output signal of the exciter is applied to the Power Amplifier. For use in the self test routines two check detectors are incorporated. One at the AF input and one at the RF output. The check detectors confirm the presence of the AF- and the RF signal.

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TESTPOINTS FOR PCB 619 EXCITER SIGNAL PATH

1 +0,5V when Tx off +15V DC when Tx on

2 -0,5V when Tx off -15V DC when Tx on

3 +5V DC

4 +15V DC when Tx on and keyed, else 0V

5 -15V DC when Tx on and keyed, else 0V

SELFTEST # 23 AC MEASUREMENTS

11 Triangle 75mVpp 1,4Mhz

12 See picture 1 75mVpp 1,4Mhz Y: 50mV/Div X: 0,2 μ S/Div

13 See picture 2 Y: 50mV/Div X: 0,2 μ S/Div

14 Sinewave 150mVpp 45Mhz

15 Sinewave 400mVpp 45Mhz

16 Sinewave 200mVpp 14,250Mhz

17 Sinewave 4,5Vpp 14,250Mhz

SELFTEST # 24 AC MEASUREMENTS

6 Sinewave 0,85Vpp 800hz

7 See picture 3 0,3Vpp 1,4Mhz Y: 0,2V/Div X: 0,2 μ S/Div

8 See picture 4 0,6Vpp 1,4 Mhz Y: 0,2V/Div X: 0,5mS/Div

TESTPOINTS FOR PCB 619 EXCITER SIGNAL PATH.

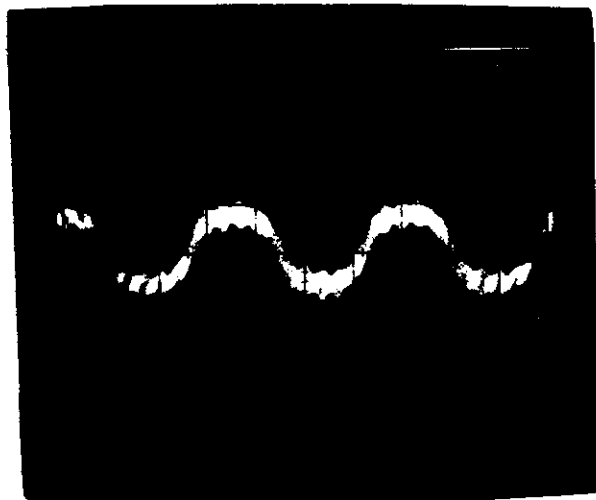
9 Sinewave 0,28Vpp 1,4Mhz

10 Sinewave 75mVpp 1,4Mhz

Oscilloscope: min 100Mhz bandwidth
probe: 10M Ω - 13pF

NOTE! Use as short groundcord as possible on probe

TESTPOINTS FOR PCB 619 EXCITER SIGNAL PATH



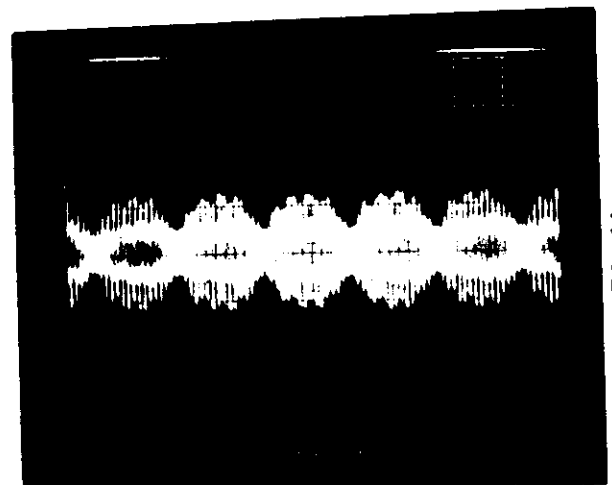
1 12

0.2μS

50mV

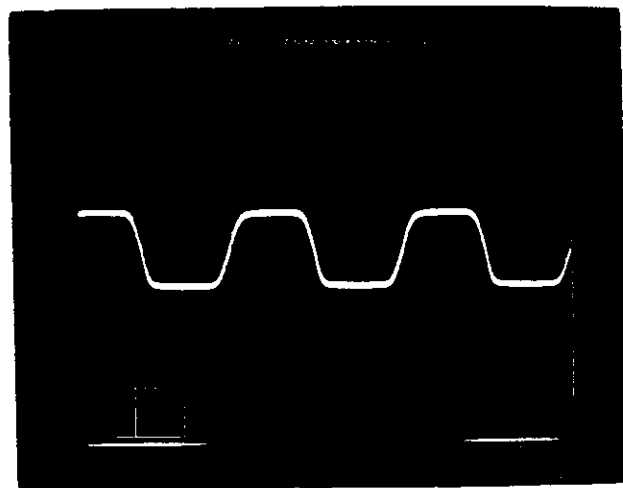
13

2



0.2μS

50mV

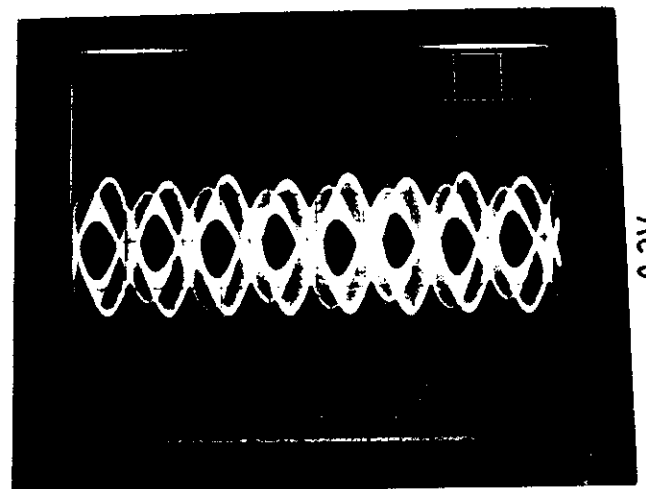


0.2μS

0.2V

3

7



0.5mS

0.2V

8

4.

1

2

3

4

PARTS LIST FOR EXCITER SIGNAL PATH BOARD 619 VERSION 2A

Printed Circuit Board Complete 619			107 561 91
IC1,2	4094B		850 409 40
IC3,4	ULN2003		850 200 30
IC5	78L05ACP		850 780 52
IC6	4093B		850 409 30
IC7,8	HPF505		850 000 11
IC9	LM348		850 034 80
IC10	LM1496		850 149 60
IC11	ULN2083		850 208 30
Q1,3	BD204		842 020 40
Q2,8,18	BC547B		840 054 70
Q4	BC327		840 032 70
Q5,11,15	BC337		840 033 70
Q6,7	BD203		842 020 30
Q9,10	J310		840 031 03
Q12,13	BF240		840 024 00
Q14	BC557B		840 055 70
Q16	BFX89		840 089 00
Q17	BFW17A		840 001 70
D1,3-5,8-17,44	1N4148		830 414 80
D2	BZX79C18V		832 791 80
D6,7	BZX75C3V6		832 753 60
D18-25	1S920		830 192 00
D26-28,36	BA479		833 047 90
D29-35,37-43	BA423		830 042 30
D45	BZX79B6V2		832 796 20
X1	45 MHz	Filter 45N20B (Matched)	810 452 00
X2	1.4 MHz	LSB Filter	385 112 03
R1,7,8,12,105	2.2 kohm	5%	1/4W Car. 501 322 00
R2,6,9,11	560 ohm	5%	1/2W Car. 502 256 00
R3	680 ohm	5%	1/2W Car. 502 268 00
R4,122	3.9 kohm	5%	1/4W Car. 501 339 00
R5,16,19,35,154	10 kohm	5%	1/4W Car. 501 410 00
R10,46	12 kohm	5%	1/4W Car. 501 412 00
R13,14	56 kohm		Sil 530 000 13
R15,41,133	27 ohm	5%	1/4W Car. 501 127 00
R17,43,74,97	120 ohm	5%	1/4W Car. 501 212 00
R18,42,48,73,98	100 ohm	5%	1/4W Car. 501 210 00
R20	100 kohm	5%	1/4W Car. 501 510 00
R21	220 kohm	5%	1/4W Car. 501 522 00
R22,135,151	680 ohm	5%	1/4W Car. 501 268 00
R23	18 kohm	5%	1/4W Car. 501 418 00
R24,26	180 ohm	5%	1/4W Car. 501 218 00
R25,27	487 ohm	1%	1/4W MF 511 248 70
R28,63	6.8 kohm	5%	1/4W Car. 501 368 00

PARTS LIST FOR EXCITER SIGNAL PATH BOARD 619 VERSION 2A

R29,59,60,106	3.3 kohm	5%	1/4W Car.	501 333 00
R30,31	619 ohm	1%	1/4W MF	511 261 90
R32,34,153	47 kohm	5%	1/4W Car.	501 447 00
R33	220 kohm		Pot.	582 522 00
R36-39,79,99,115,119	2.7 kohm	5%	1/4W Car.	501 327 00
R40,130	1.2 kohm	5%	1/4W Car.	501 312 00
R44,75-78,100,117,124,129	47 ohm	5%	1/4W Car.	501 147 00
R45,57,58,82,86-92,121	5.6 kohm	5%	1/4W Car.	501 356 00
R47,137-150	820 ohm	5%	1/4W Car.	501 282 00
R49-51,126	330 ohm	5%	1/4W Car.	501 233 00
R52,53,95,112,125,131	470 ohm	5%	1/4W Car.	501 247 00
R54,55,80,101	15 kohm	5%	1/4W Car.	501 415 00
R56,93,123	1.5 kohm	5%	1/4W Car.	501 315 00
R61	3.16 kohm	1%	1/4W MF	511 331 60
R62	6.81 kohm	1%	1/4W MF	511 368 10
R64,68,104	220 ohm	5%	1/4W Car.	501 222 00
R65	15.4 kohm	1%	1/4W MF	511 415 40
R66,67	27.4 kohm	1%	1/4W MF	511 427 40
R69	1 kohm	1%	1/4W MF	511 310 00
R70	332 kohm	1%	1/4W MF	511 533 20
R71	10 Mohm	5%	1/4W Car.	501 710 00
R72	560 kohm	5%	1/4W Car.	501 556 00
R81	56.2 ohm	1%	1/4W MF	511 156 20
R83,110	8.2 kohm	5%	1/4W Car.	501 382 00
R84,109	33 ohm	5%	1/4W Car.	501 133 00
R85	178 ohm	1%	1/4W MF	511 217 80
R94	470 ohm		Pot.	582 247 00
R96	316 ohm	1%	1/4W MF	511 231 60
R102,103	15 ohm	5%	1/4W Car.	501 115 00
R107	226 ohm	1%	1/4W MF	511 222 60
R108	237 ohm	1%	1/4W MF	511 223 70
R111	75 ohm	1%	1/4W MF	511 175 00
R113	220 ohm		Pot.	582 222 00
R114	33 kohm	5%	1/4W Car.	501 433 00
R116	56 kohm	5%	1/4W Car.	501 456 00
R118	76.8 ohm	1%	1/4W MF	511 176 80
R120	95.3 ohm	1%	1/4W MF	511 195 30
R127	10 ohm	5%	1/4W Car.	501 110 00
R128	270 ohm	5%	1/4W Car.	501 227 00
R132	18 ohm	5%	1/4W Car.	501 118 00

PARTS LIST FOR EXCITER SIGNAL PATH BOARD 619 VERSION 2A

R134,136	56 ohm	5%	1/4W	Car.	501 156 00
R152	270 kohm	5%	1/4W	Car.	501 527 00
R155	4.7 kohm	5%	1/4W	Car.	501 347 00
C1-8,13-16,20,21, 24,26,27,31-33, 35-37,43-49,51, 52,54-61,63,65, 68-78,81-83,92, 95,102,105-106, 108-118,120,197, 198,205,206,208, 209,240,241	0.1 uF	10%	63V	Polyes.	622 510 00
C9,12,103,123, 130,239	0.33 uF	20%	63V	Polyes.	622 533 01
C10,11,22,42	1 nF	10%	63V	Cer.	602 310 02
C17,18	2.2 uF		35V	Tan.	652 622 01
C23	8.2 pF	+/-0.25	63V	N150	602 082 00
C25,28,29,50, 171,174,193	12 pF	2%	63V	N150	602 112 00
C30,89,155, 179,238	56 pF	2%	63V	N150	602 156 00
C34,53,62,67,80, 99	10 nF	-20+50%		Cer.	602 410 01
C38	2-9 pF		100V	Var.	683 009 00
C39,66,79,87, 134	22 pF	2%	63V	N150	602 122 00
C40,85,90,144, 147,181	47 pF	2%	63V	N150	602 147 00
C41	6.8 uF		25V	Tan.	652 668 00
C64,129,141, 200,207	10 nF	10%	63V	Polyes.	622 410 01
C84,122,139-140, 145,152,156,170, 172,175,178,185, 186,189,199	150 pF	2%	63V	N150	602 215 00
C86,97,176,191	39 pF	2%	63V	N150	602 139 01

PARTS LIST FOR EXCITER SIGNAL PATH BOARD 619 VERSION 2A

C88,104,160, 187,192	120 pF	2%	63V	N150	602 212 00
C91	0.47 uF	10%	63V	Polyes.	622 547 01
C93,161	18 pF	2%	63V	N150	602 118 00
C96,101	0.15 uF	10%	63V	Polyes.	622 515 00
C98	4.5-26 pF			Var.	683 126 00
C100,137,148, 157,162,165	82 pF	2%	63V	N150	602 182 00
C107	2.2 uF		25V	Sol.al.	652 622 03
C119	15 nF	1%	160V	Polyst.	613 415 00
C121,124	1 nF	1%	500V	Polyst.	615 310 01
C125,133,150,167	68 pF	2%	63V	N150	602 168 00
C126,154,182	560 pF	1%	500V	Polyst.	615 256 00
C127,136	33 nF	10%	63V	Polyes.	622 433 00
C128,135,158,201	330 pF	1%	500V	Polyst.	615 233 00
C131,142,153, 168,183	820 pF	1%	500V	Polyst.	615 282 00
C132,163,188	220 pF	1%	500V	Polyst.	615 222 00
C138,237	10 pF	2%	63V	N150	602 110 00
C143,199	470 pF	1%	500V	Polyst.	615 247 00
C149	180 pF	1%	500V	Polyst.	615 218 00
C151,164,173, 177,190	100 pF	2%	63V	N150	602 210 00
C159,166	33 pF	2%	63V	N150	602 133 01
C169	390 pF	1%	500V	Polyst.	615 239 00
C180,195	27 pF	2%	63V	N150	602 127 00
C196	8.2 nF	1%	160V	Polyst.	613 382 00
C202-204	4.7 nF	10%	100V	Cer.	602 347 02
C210-222,224-235	470 pF	10%	63V	Cer.	602 247 00
L1,5	4.7 uH	10%	RF Choke	IM2	740 047 02
L2-4	1 uH				103 636 61
L6	0.47 uH	10%	RF Choke	IM2	740 004 70
L7,8,48,50	22 uH	10%	RF Choke	IM2	740 122 02
L9,10,11,58	10 uH	10%	RF Choke	IM2	740 110 04
L12,19,60	0.1 uH	10%	RF Choke	IM2	740 001 00
L13	0.33 uH	10%	RF Choke	IM2	740 003 30
L14,16	0.15 uH	10%	RF Choke	IM2	740 001 50
L15	0.39 uH	10%	RF Choke	IM2	740 003 90
L17	0.27 uH	10%	RF Choke	IM2	740 002 70
L18	0.56 uH	10%	RF Choke	IM2	740 005 60
L20	1.2 uH	10%	RF Choke	IM4	740 012 00
L21	470 uH	10%	RF Choke	IM4	740 247 01
L22	470 uH	10%	RF Choke	IM2	740 247 02

PARTS LIST FOR EXCITER SIGNAL PATH BOARD 619 VERSION 2A

L23	0.56 uH	5%	RF Choke	IM2	740 005 61
L24,29	0.22 uH	5%	RF Choke	IM2	740 002 23
L25	0.47 uH	5%	RF Choke	IM2	740 004 71
L26	0.15 uH	5%	RF Choke	IM2	740 001 52
L27,54	1.8 uH	5%	RF Choke	IM2	740 018 01
L28	0.33 uH	5%	RF Choke	IM2	740 003 32
L30	68 uH	10%	RF Choke	IM2	740 168 02
L31	1.5 uH	10%	RF Choke	IM2	740 015 00
L32	0.967 uH				103 636 7X
L33	0.716 uH				103 636 9X
L34	0.498 uH				103 637 1X
L35	0.362 uH				103 637 3X
L36	0.284 uH				103 637 5X
L37	0.16 uH				103 637 7X
L38	0.411 uH				103 637 9X
L39	12.2 uH				103 636 8X
L40	5.11 uH				103 637 0X
L41	3.8 uH				103 637 2X
L42	2.51 uH				103 637 4X
L43	1.57 uH				103 637 6X
L44	2.04 uH				103 637 8X
L45	0.895 uH				103 638 0X
L46,52,57	0.68 uH	5%	RF Choke	IM2	740 006 82
L47,49	33 uH		RF Choke		740 133 01
L51	15 uH	10%	RF Choke	IM2	740 115 00
L53,55	1.2 uH	5%	RF Choke	IM2	740 012 02
L56	0.82 uH	5%	RF Choke	IM2	740 008 21
L59	220 uH	10%	RF Choke	IM2	740 222 02
PL1	40-pole plug				756 040 04
PL2	2-pole connector				750 001 45
PL3	Coax cable				373 638 32
SK1	Flat ribbon cable				373 638 52
SK2	Coax cable				106 606 70
SK3	Coax cable				106 606 60

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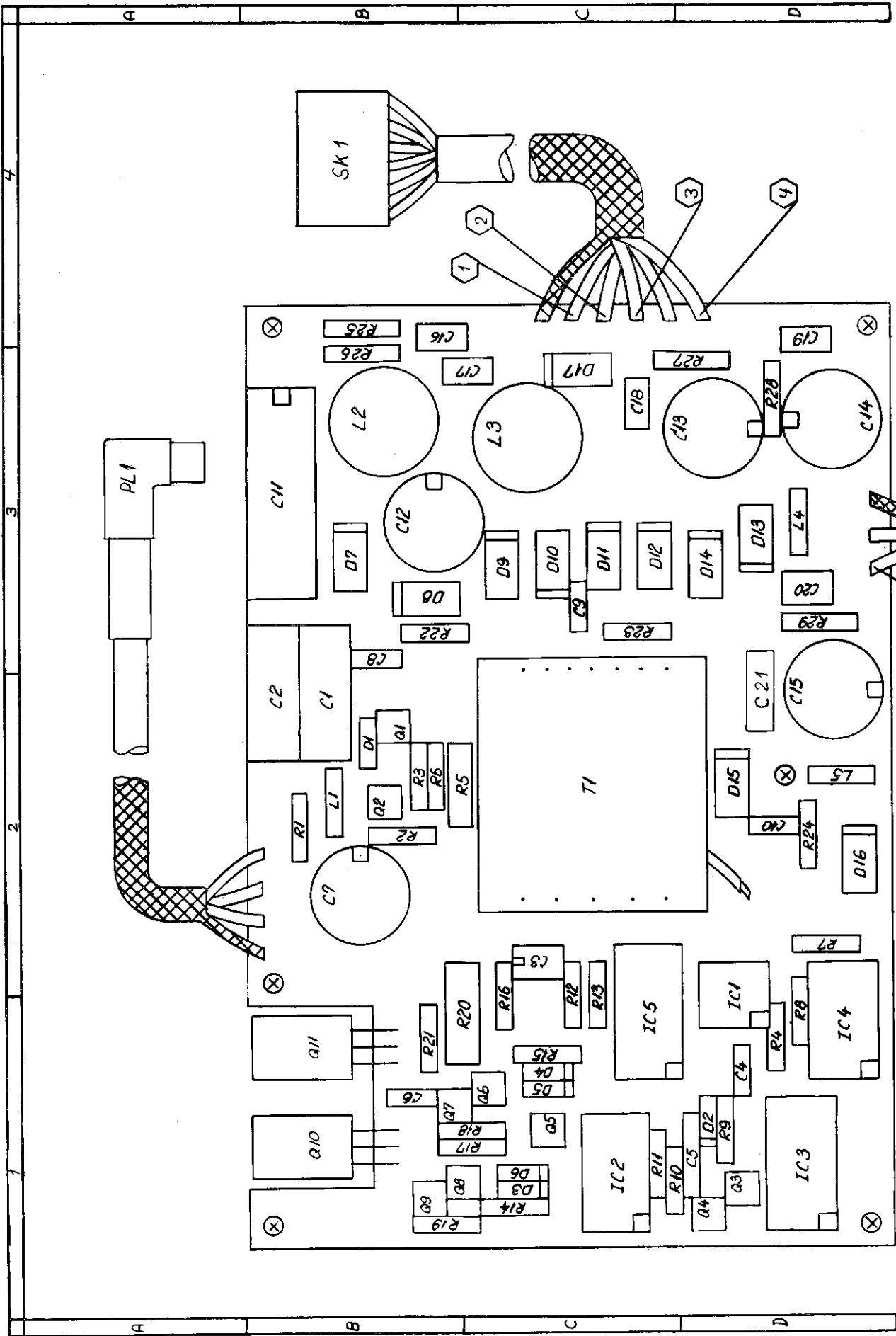
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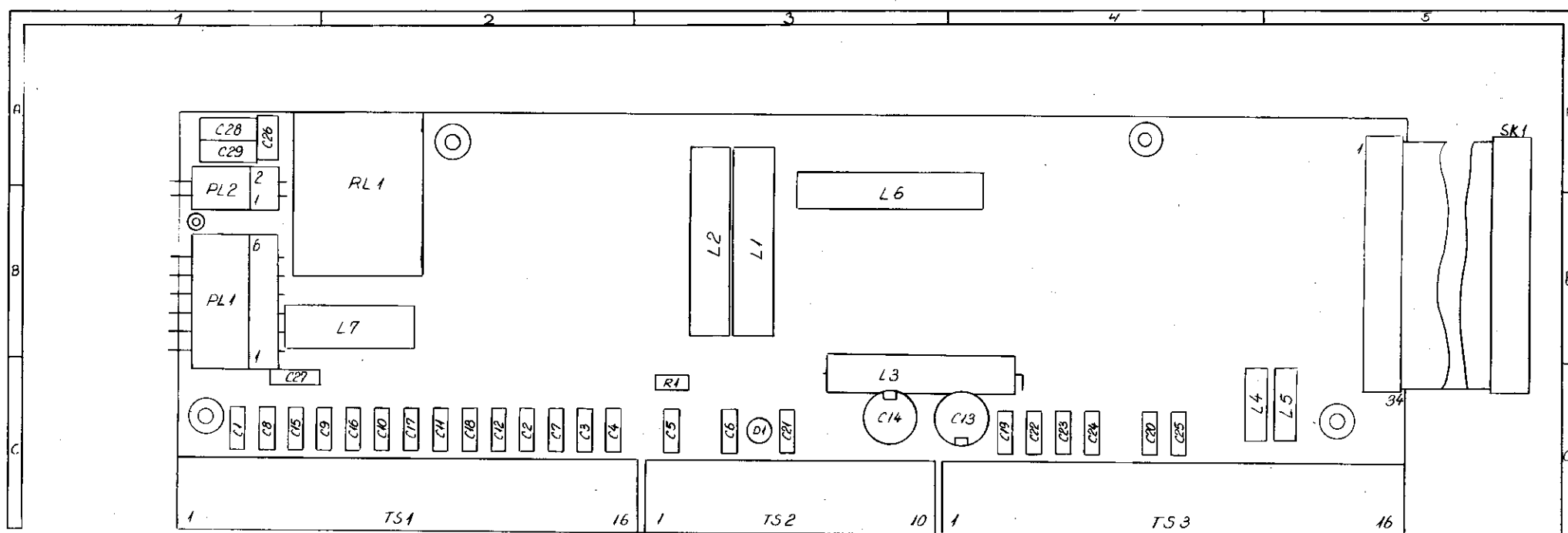
TECHNICAL DESCRIPTION

PCB 621 VOLTAGE CONVERTER BOARD

The voltage converter is a push-pull converter with isolation. There is no stabilisation, it only converts the stabilized 48 V voltage from the Switched Mode Power Supply. The converter frequency is controlled by IC2 and IC5. The converter starts when the enable input is high. The output is protected by a Short Circuit Sequencer. During a shortcircuit the gate voltage of Q10 and Q11 is controlled by Q5 so that the current through Q10 and Q11 is limited to approx. 3 A and sensed by R20. A sequence network, consisting of IC1, IC2, IC3 and IC4 is sensing the gate voltage of Q10 and Q11. If the voltage is low, the converter is shut-off for 308 msec. and then restarted as the shortcircuit sequencer is disabled for 10 msec. by IC4, thus allowing the converter to work for 10 msec. charging the output capacitors. In case of no shortcircuit the gate voltage of Q10 and Q11 will be high and the converter will continue to work. In case of a shortcircuit the gate voltage of Q10 and Q11 will remain low and the sequence network shut off the converter for 308 msec. etc. This means that the loss in Q10 and Q11 will be reduced by a duty factor 1:30. At the same time the current in the output circuit will be reduced and the wiring thereby protected.



PCB 623 VERSION 2A
VOLTAGE CONVERTER BOARD
VIEWED FROM COMPONENT SIDE



PCB 620 VERSION 2A
INTERCONNECTION BOARD
VIEWED FROM COMPONENT SIDE

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PARTS LIST FOR INTERCONNECTION BOARD 620 VERSION 2A

Printed Circuit Board Complete 620					107 562 01
D1	TIL220				823 000 02
R1	1 kohm	5%	1/4W	Car.	501 310 00
RL1					780 000 17
C1-12,15-18,21, 23,24,26,27	10 nF	10%	63V	Polyes.	622 410 01
C19,20,22,25	1 nF	10%	63V	Cer.	602 310 02
C13,14	47 uF	+50-10%	25V	W.alum.	652 747 01
C28,29	10 nF	10%	250V	Polyes.	624 410 01
L1-3,6	25 uH				740 125 00
L4,5	1 mH				
L7	100 uH				740 210 03
SK1					373 587 11
PL1					751 001 34
PL2					751 001 03
TS1,3					770 000 31
TS2					770 000 32

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PARTS LIST FOR VOLTAGE CONVERTER BOARD 621 VERSION 2A

Printed Circuit Board Complete 621 107 562 11

IC1	LM358	850	035	80
IC2	4001UB	850	400	11
IC3	4020B	850	402	00
IC4	4082B	850	408	20
IC5	40175	854	017	50

Q1	BSS89	843	008	90
Q2	BC640	840	064	00
Q3,4	BC557	840	055	70
Q5,6,8	BC337	840	033	70
Q7,9	BC327	840	032	70
Q10,11	IRF530	843	053	00

D1,2	BZX79C10	832	791	00
D3-6	1N4148	830	414	80
D7-10,13,14	BYV28	831	002	80
D11,12,15,16	BYS26	831	002	60
D17	1N5401	831	540	10

R1,8	4.7 kohm	5%	1/4W	Car.	501	347	00
R2	10 kohm	5%	1/4W	Car.	501	410	00
R3	22 kohm	5%	1/4W	Car.	501	422	00
R4	2.2 kohm	5%	1/4W	Car.	501	322	00
R5	2.2 kohm	5%	1.6W	MF	544	322	00
R6,12	100 kohm	5%	1/4W	Car.	501	510	00
R7	8.2 kohm	5%	1/4W	Car.	501	382	00
R9	47 kohm	5%	1/4W	Car.	501	447	00
R10	18 kohm	5%	1/4W	Car.	501	418	00
R11	12.1kohm	1%	1/4W	MF	511	412	10
R13	470 ohm	5%	1/4W	Car.	501	247	00
R14,15	1.2 kohm	5%	1/4W	Car.	501	312	00
R16	33 ohm	5%	1/4W	Car.	501	133	00
R17	330 ohm	5%	1/4W	Car.	501	233	00
R18,19	10 ohm	5%	1/4W	Car.	501	110	00
R20	0.18 ohm	2%	3W	ww	526	001	80
R21	47 ohm	5%	1/4W	Car.	501	147	00
R22	82 ohm	5%	1/4W	Car.	501	182	00
R23,24	12 ohm	5%	1/4W	Car.	501	112	00
R25	2.2 kohm	5%	1/2W	MF	512	322	00
R26,27	1 kohm	5%	1/2W	MF	512	310	00
R28,29	470 ohm	5%	1/2W	MF	512	247	00

C1,2	0.33 uF	10%	250V	Polyes.	624	533	00
C3	10 uF	20%	16V	Sol.al.	651	710	01
C4	0.1 uF	10%	63V	Polyes.	622	510	00
C5	330 pF	1%	500V	Microp.	615	233	00
C6,8	820 pF	10%	63V	Cer.	602	282	00
C7,12,13	220 uF	-10+50%	63V	W.alum.	652	822	02

PARTS LIST FOR VOLTAGE CONVERTER BOARD 621 VERSION 2A

C9,10	2.2 nF	10%	63V	Cer.	602	322	00
C11	100 uF	-10+50%	40V	W.alum.	652	810	01
C14,15	470 uF	-10+50%	40V	W.alum.	652	847	01
C16-20	0.47 uF	10%	63V	Polyes.	622	547	01
C21	0.15 uF				623	515	01

L1,4,5	5 uH	373	574	4X
L2	36 uH	103	574	51
L3	9 uH	103	574	61

T1	383	604	61
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PL1	106	601	80
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SK1	MOLEX SOCKET 6 POL.	106	601	60
SK2	MOLEX SOCKET 3 POL.	106	601	70

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TECHNICAL DESCRIPTION

PCB [624] TRANSCEIVER CONTROL BOARD

This module implements the following functions: Communication with Control Board [600] as a slave by receiving and executing command messages in order to control Receiver Signal Path [618], Exciter Signal Path [619], Synthesizer Board's [611] (one for the receiver and one for the exciter), P.A. Filters and Antenna Tuning Unit Board [660], and by transmitting acknowledge and status messages back to [600]. To achieve this, a structure similar to that described in the section concerning [600] is used: The "MPU" communicates with its counterpart on [600] using (TUDATA) and (CUDATA) via "RS 232C INTERFACE". Status of [618] (i.e. crystal filters installed) is read as a 16 bits packet using the signals (STAT DATA RX/EX), (CLOCK) and (STAT LOAD), while commands are transferred from [624] in the form of a 32 bits packet using (COMDATA), (CLOCK) and (COM LOAD RX/EX). This processor is also clocked by a "4 MHz XTAL OSCILLATOR" and is initialized by a "WATCHDOG" capable of automatically restarting a stalled program, which does not issue a 32 Hz trigger signal combined with "MODE SWITCH". "ADDRESS LATCH" and "MAP DECODER" operate in the same manner as on [600], "PROGRAM ROM" holds 16 kbytes in EPROM, while "SCAN BUFFER RAM" (1 knibbles) is used for holding the programmed scanning channels.

The frequency synthesizers on [611] are controlled via multiplexed data (SYNDATA 0--3) and address busses (SYNADR 0--2) using (SYNSTRO 0--5), whereas the corresponding switching between transceiving states on [618] and [619] is done by proper sequencing of the signals (TX/RX), (SHAPEKEY) and (MUTING) triggered by transitions of the signal (KEYLINE) originating from Audio Processing Board [601]. (KEYLINE) is also modulated by "VF CONVERTER" to carry a telemetry signal representing output power back to [600] via [601]. Two analog loops are located on this board. The most simple is associated with the receiving state of [618] through "MGC REGISTER" and the corresponding DAC driving "MGC LOOP" connected to another "VF CONVERTER" generating a new telemetry signal representing received signal strength (RXRATE). The other loop ("PA STRESS MONITOR/ALC LOOP") stabilizes the output in the transmitting state by comparing the output of the "SETPOINT REGISTER" and the corresponding DAC with the signals FILPEAK, PAPEAK and IANTAVR in order to generate the error signal ALC used for driving an electronically controlled attenuator placed in the transmitter signal path. If the signal (PA OK), derived from [654] Power Splitter, is high during transmission in full power, it means that one or more of the power amplifiers is faulty. In this (SET POINT) is decreased by 0.8 dB to prevent overload of the remaining power amplifiers.

Finally, another signal controlled from the processor is generated using "ALCHOLD REGISTER" and the corresponding DAC to make the gain of the transmitter signal path independent of the modulating signal. To increase the number of peripherals on this board beyond the capacity of "MAP DECODER" indirect addressing is introduced by using "SYNTHESIZER/MUXDATA REGISTER" not only for driving the synthesizers but also as a local bus feeding the following registers: "PA/LP REGISTER" (controls the relays switching the P.A. Filters depending on the TX frequency via "RELAY DRIVERS" and the power to Power Amplifier Board [626]), "MULTIPLEXER REGISTER" (controls a 16-to-1

multiplexer "MUX" used for monitoring diagnostic and status signals) and "SETPOINT REGISTER" (already mentioned). Directly driven from the databus are "STROBE REGISTER" (strokes the synthesizer as described earlier) and "SIGNAL PATH REGISTER", which via "BUFFERS" controls the keying signals mentioned before. The handshake protocol with the processor located on 660 uses the signals (TUNE) and (TPR). The status of [660] is constantly monitored via (SWROK) and (TCO) and any changes detected are signalled to [600] using appropriately coded messages. In the same way [626] is monitored via (TC1) and "PA STRESS MONITOR/ALC LOOP". The signals (FILYP 0--3) and (750/250) from P.A. Filters and [660] are used for identifying purposes by the "MPU".

TEST POINTS FOR 624 TU CONTROL BOARD

1 +8.62V (IN NORMAL CONDITION)

+5.71V WITH - 3.2dB REDUCED POWER
(IF 15 HAS BEEN "HIGH" MORE THAN ONE MIN.)

2 +5V

+4.36 WITH - 5.25dB REDUCED POWER
(IF THE INTERNAL TEMPERATURE OF THE ATU EXCEEDS 85°)


3 +24V


4 -15V


5 +15V


6 +12V


7 +5V


8 4Mhz +5V 0V 

9 32hz +5V 0V 


10 1Mhz +5V 0V 

11 1Mhz +5V 0V 

12 2400hz +5V 0V 

13 13.3Khz +2V 0V 

(NO SIGNAL RECEIVED)

14 10.5Khz +15V 0V 

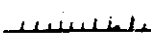
(NO KEYING)

15 NORMALLY 0V

IF IN A FULL POWER TRANSMISSION THE AVERAGE POWER EXCEEDS THE PEAK POWER MINUS 3dB IT CHANGES TO +5V THIS CAN BE TESTED BY WHISTLING IN THE MICROPHONE DURING TRANSMISSION.

16 9V dc WHEN 250W OUTPUT

17 6.5V dc WHEN 250W OUTPUT

18 3-6V dc +5V 0V 

DEPENDENT ON OUTPUT SIGNAL

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(

(

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PARTS LIST FOR TRANSCEIVER CONTROL BOARD 624 VERSION 6A

Printed Circuit Board Complete 624 (specify program version when ordering)		107 562 41	
IC1-4,38	74C904	857 490 40	
IC5	CD4070BC	850 407 00	
IC6	4020B	850 402 00	
IC7	SN74LS93	850 749 32	
IC8,39	74C04	850 740 42	
IC9,44	CD4066BC	850 406 60	
IC10	1489P	850 148 90	
IC11	1488P	850 148 80	
IC12	6803	850 680 30	
IC13	74LS373	857 437 30	
IC14	74LS138	857 413 80	
IC15	27128 (XX denotes program version number)	383 66X X1	
IC16	9124C	850 912 40	
IC17	CD4040BC	850 404 00	
IC18,20	74LS32	850 743 20	
IC21	SN74LS20	850 740 21	
IC22	74LS04	850 740 41	
IC23,25,31-33, 36,45,49	74C374	857 437 40	
IC24,26,46	NE5007	850 500 70	
IC27-29,40,41,48	MC1458N	850 145 80	
IC30,47	NE555	850 055 50	
IC34	UDN2981	850 298 10	
IC35	ULN2003A	850 200 30	
IC37	74C00	850 740 01	
IC42	LF353	850 035 30	
IC43	74C906	857 490 60	
IC50	74C150	857 415 00	
IC51,52	MA7805	850 780 50	
Q1-4	BF240	840 024 00	
D1-10,13-16,19, 20,23-25,27-29	1N4148	830 414 80	
D26	LM329DZ	830 032 90	
D11,12,17,18,21,22	AA143	830 014 30	
D30,31	BZX79C4V7	832 794 70	
X1	4MHz CRYSTAL	812 000 00	
R1,6,110,97-99	1 kohm 5% 1/8W MF	500 310 00	

PARTS LIST FOR TRANSCEIVER CONTROL BOARD 624 VERSION 6A

R2-4,26,28,35, 50,52,55,69, 90-96	10 kohm 5% 1/8W MF	500 410 00
R5,37,109,114	2.2 kohm 5% 1/8W MF	500 322 00
R7,16,17	3.3 kohm 5% 1/8W MF	500 333 00
R8	6.8 kohm 5% 1/8W MF	500 368 00
R9,18,103	220 ohm 5% 1/8W MF	500 222 00
R10	100 ohm 5% 1/8W MF	500 210 00
R11,39	330 ohm 5% 1/8W MF	500 233 00
R12	3.9 kohm 5% 1/8W MF	500 339 00
R13	820 ohm 5% 1/8W MF	500 282 00
R14,102	15 kohm 5% 1/8W MF	500 415 00
R15,48,53,101	56 kohm 5% 1/8W MF	500 456 00
R19,46,56,70-72,100	47 kohm 5% 1/8W MF	500 447 00
R21,24,25,76,78	5.62 kohm 1% 1/4W MF	511 356 20
R22,30,77	5.6 kohm 5% 1/8W MF	500 356 00
R23,80	2.87 kohm 1% 1/4W MF	511 328 70
R27,51	3.3 Mohm 5% 1/4W Car.	501 633 00
R29,32	22 kohm 5% 1/8W MF	500 422 00
R36	31.6 kohm 1% 1/4W MF	511 431 60
R38	61.9 kohm 1% 1/4W MF	511 461 90
R40	12 kohm 5% 1/8W MF	500 412 00
R41-44,104-107	56 ohm 5% 1/2W MF	512 156 00
R45,47	100 kohm 5% 1/8W MF	500 510 00
R49,54	27 kohm 5% 1/8W MF	500 427 00
R58	39 kohm 5% 1/8W MF	500 439 00
R57	82 kohm 5% 1/8W MF	500 482 00
R59	33 kohm 5% 1/8W MF	500 433 00
R60,68,108	220 kohm 5% 1/8W MF	500 522 00
R61,64	27.4 kohm 1% 1/4W MF	511 427 40
R62,65	274 kohm 1% 1/4W MF	511 527 40
R67	1 Mohm 5% 1/8W MF	500 610 00
R73,85	22.6 kohm 1% 1/4W MF	511 422 60
R74	30.1 kohm 1% 1/4W MF	511 430 10
R75	21.5 kohm 1% 1/4W MF	511 421 50
R79	33.2 kohm 1% 1/4W MF	511 433 20
R81	1.0 kohm 1% 1/4W MF	511 310 00
R82	34.8 kohm 1% 1/4W MF	511 434 80
R83	1.2 kohm 5% 1/8W MF	500 312 00
R84	46.4 kohm 1% 1/4W MF	511 446 00
R86	8.2 kohm 5% 1/8W MF	500 382 00
R87	6.81 kohm 1% 1/4W MF	511 368 10
R88	2.74 kohm 1% 1/4W MF	511 327 40
R89	5 kohm Pot.	582 310 02
R111	2.2 kohm Sil.	530 000 12
R112	47 kohm Sil.	530 000 11
R113	4.7 kohm Sil.	530 000 06
R115	3.16 kohm 1% 1/4W MF	511 331 60
R116	5.36 kohm 1% 1/4W MF	511 353 60
R117	562 ohm 1% 1/4W MF	511 256 20

PARTS LIST FOR TRANSCEIVER CONTROL BOARD 624 VERSION 6A

C1-46,60,62,65,89, 90-97,99-109, 116,117,119,120,127, 130-135,137,138,140, 144-150,156-159,163, 164-166	1 nF	10%	100V	Cer.	603 310 02
C47,52,54,55,75, 81,85,118,124	10 nF	10%	63V	Polyes.	622 410 01
C48,56,58,61,63, 66-70,72,74,76-80, 83,86-88,98,111,112, 121-123,125,128,129, 142,160	0.1 uF	10%	63V	Polyes.	622 510 00
C49	39 pF	2%	63V	N150	602 139 01
C50	1.2 nF	10%	100V	Cer.	602 312 00
C51	180 pF	10%	63V	Cer.	602 218 00
C57,82,141,155	6.8 uF	20%	25V	Sol.al.	652 668 01
C59,64,136,139	220 pF	10%	100V	Cer.	603 222 00
C71,84,126	2.2 nF	1%	125V	Polyst.	613 322 00
C110	10 uF	+50-10%	16V	W.alum.	651 710 01
C113,161	2.2 uF	20%	35V	Tantal	652 622 01
C143,154	0.47 uF	10%	63V	Polyes.	622 547 01
C151-153	100 uF	20%	25V	W.alum.	652 810 00
C162	10 nF	-20+50%	100V	Cer.	602 410 01
L1,L3	22 uH				740 122 00
L2	100 uH				740 210 06
PL1	40 Pol.				756 040 04
PL2,3	10 Pol.				756 010 02
PL4	34 Pol.				756 034 01

TECHNICAL DESCRIPTION

PCB 626 / 631 POWER AMPLIFIER BOARD

The Power Amplifier contains four active stages and has a total power gain of approx. 42 dB. The RF signal from the Exciter passes through the input-attenuator, where the gain may be adjusted within a 3 dB range, and where the gain is reduced by 14 dB when "Low Power" is activated or if a fault should occur in the ALC-loop. The signal is then amplified approx. 23 dB in the Class-A Driver stages 1 and 2 and approx. 12.5 dB in the Class-AB push-pull Driver stage 3, before being fed into the final Power Amplifier stage, which also works in Class-AB push-pull, with a gain of approx. 12.5 dB and the capability of delivering 250 W into a 50 ohm load. The DC output from the peak-detector, which monitors the reflected power and output voltage, is connected to the ALC-circuit on the microprocessor-board and to the input-attenuator via the protection-circuit. The input-power is then reduced via the ALC-loop if the reflected power from the load exceeds approx. 25 W during mismatch conditions. The Bias stabilizer circuits provide adjustable stabilized bias voltages from the 5 V source and supplies the bases of the Class-AB amplifier stages, so that the quiescent currents may be adjusted. The key-circuits give a 24 V stabilized voltage from the 48 V source, which supplies Driver 1 and 2 and enables the bias circuits whenever "Key" is activated. Thermoswitch SW2 will close and reduce the input power if the heatsink temperature exceeds 100 deg. C and thermoswitch SW1 will open and remove the supply voltage from Drivers 1, 2 and 3 if the heatsink temperature exceeds 110 deg. C.

1

2

3

4

TEST POINTS FOR PCB 626 631 POWER AMPLIFIER.

① 48 VDC - measured at PL1 relative to PL2.

In self test # 32 a signal of 4sec.
duration appears, during which following
test points can be tested:

Input:

② \approx 2Vpp 2MHz

Output:

③ \approx 300Vpp 2MHz

1

2

3

4

PARTS LIST FOR POWER AMPLIFIER BOARD 626 VERSION 6A

Printed Circuit Board Complete 626					107 562 62
IC1	CNY17				825 000 00
Q1,8	BD175				842 017 50
Q2,7,9	BD645				842 064 50
Q3	BFW 17A				840 001 70
Q4,5	S25-50				842 255 00
Q6	BLV20				842 002 00
Q10,11	CD4851				842 485 10
Q12	BC557B				840 055 70
Q13	2N5061				833 506 10
Q14	BC547B				840 054 70
D1	BZX79B3V3				832 793 30
D2	BZX79B24				832 792 41
D3	TIL220				823 000 02
D4,5,6	SD101C				830 010 10
D7,8,10	1N4148				830 414 80
D9	BZX79B9V1				832 799 10
R1,27	2.2 kohm	5%	1/2W	Car.	502 322 00
R2	23.7 ohm	1%	1/4W	MF	511 123 70
R3	301 ohm	1%	1/4W	MF	511 230 10
R4,6	68.1 ohm	1%	1/4W	MF	511 168 10
R5	50 ohm			Pot.	582 150 00
R7,35	20 ohm			Pot.	582 120 00
R8,9	8.2 ohm	5%	1/4W	Car.	501 082 00
R10,19,20	470 ohm	5%	1/2W	Car.	502 247 00
R11,50	560 ohm	5%	1/2W	Car.	502 256 00
R12,40	47 ohm	5%	1/4W	Car.	501 147 00
R13,14	22 ohm	5%	1/4W	Car.	501 122 00
R15	6.8 ohm	5%	1/4W	Car.	501 068 00
R16,41	27 ohm	5%	1/4W	Car.	501 127 00
R17	12 ohm	5%	1/4W	Car.	501 112 00
R18	270 ohm	5%	1/4W	Car.	501 227 00
R21	120 ohm	5%	2.5W	Car.	546 212 00
R22	33 ohm	5%	1/2W	Car.	502 133 00
R23	1 kohm	5%	1/2W	Car.	502 310 00
R24	330 ohm	5%	1/2W	Car.	502 233 00
R25,26	18 ohm	5%	2.5W	MF	546 118 01
R28	560 ohm	5%	1.5W	MF	544 256 00
R29-34	12 ohm	5%	2.5W	MF	546 112 00
R36,39,68	3.9 kohm	5%	1/4W	Car.	501 339 00
R37,38	22 ohm	5%	2.5W	MF	546 122 01
R51	4.7 kohm	5%	1/4W	Car.	501 347 00
R52	10 kohm	5%	1/4W	Car.	501 410 00
R53	5.6 kohm	5%	1/4W	Car.	501 356 00
R54	1 kohm	5%	1/4W	Car.	501 310 00
R55,69	100 kohm	5%	1/4W	Car.	501 510 00

PARTS LIST FOR POWER AMPLIFIER BOARD 626 VERSION 6A

R56,57	100 ohm	1%	0.5W	MF	512 210 00
R58	10 kohm	5%	2.5W	MF	546 410 00
R59	680 ohm	5%	1/4W	Car.	501 268 00
R60	220 ohm	5%	1.5W	MF	544 220 00
R61	0 ohm				501 000 00
R62	2.2 ohm	5%	1/2W	Car.	502 022 00
R63-66	12 ohm		3W		516 112 00
C1	0.22 uF	10%	250V	Polyes.	624 522 01
C2,3,8,9,21,22, 24,27,28,39,42, 75,76	0.1 uF	10%	100V	Polyes.	623 510 01
C4,7,10,11,14, 19,20,23,25,26, 29,32-34,36-38, 40,41,52,85,87	0.22 uF	10%	63V	Polyes.	622 522 00
C5	10 pF	+/-10%	100V	Polyes.	603 110 03
C6	2.2 uF		100V		623 622 00
C12,13,45,46	620 pF	5%	300V	Mi	644 262 00
C15,74	0.1 uF	10%	63V	Polyes.	622 510 00
C16,50	220 uF	+50-10%	10V	W.alum.	651 822 00
C17,18	0.22 uF	10%	63V	Polyes.	622 522 01
C30,31,53-55,58	0.15 uF	10%	100V	Polyes.	623 515 00
C43,44,47,48	750 pF	5%	300V	Mi	644 275 00
C49	470 uF	+50-10%	63V	W.alum.	652 847 02
C51	0.22 uF	10%	63V	Polyes.	622 522 00
C59-64	47 nF	10%	160V	Polyes.	623 447 01
C65,66	160 pF	5%	300V	Mi	644 216 00
C71,72	4.7 uF		100V		623 647 01
C73	4.7 nF	+/-10%	100V	Cer.	602 347 02
C75	470 nF	10%	63V	Polyes.	622 547 01
C77,80	1 nF	10%	100V	Cer.	630 310 00
C78	8 pF	+/-1/2pF	300V	Mi	644 080 00
C79	150 pF	5%	300V	Mi	644 215 00
C81	91 pF	2%	1KV	Mi	647 191 00
C84	100 pF	2%	100V	Cer.	603 210 00
C86	0.1 uF	10%	250V	Polyes.	624 510 00
C88	33 pF	2%	100V	Cer.	603 133 00
C89	82 pF	2%	500V	Mi	645 182 00
L1,2,6,7,10,12,13	15 uH				740 000 00
L3,4	2.2 uH				740 022 02
L5,9,11	100 uH				740 210 00
L8	1 uH				740 010 02
L14	5 uH				740 050 00
T1					103 573 71
T2					103 573 81

PARTS LIST FOR POWER AMPLIFIER BOARD 626 VERSION 6A

T3		103 573 91
T4		103 574 01
T5		103 574 11
T6		103 574 24
T7		103 574 31
SW1	Thermoswitch 110 C	769 000 02
SW2	Thermoswitch 100 C	769 000 01

PARTS LIST FOR POWER AMPLIFIER BOARD 631 VERSION 6A

Printed Circuit Board Complete 631					107 563 11
IC1	CNY17				825 000 00
Q1,8	BD175				842 017 50
Q2,7,9	BD645				842 064 50
Q3	BFW 17A				840 001 70
Q4,5	S25-50				842 255 00
Q6	BLV20				842 002 00
Q10,11	CD4851				842 485 10
Q12	BC557B				840 055 70
Q13	2N5061				833 506 10
Q14	BC547B				840 054 70
D1	BZX79B3V3				832 793 30
D2	BZX79B24				832 792 41
D3	TIL220				823 000 02
D4,5,6	SD101C				830 010 10
D7,8,10	1N4148				830 414 80
D9	BZX79B9V1				832 799 10
R1,27	2.2 kohm	5%	1/2W	Car.	502 322 00
R2	30 ohm	5%	1/4W	MF	501 130 00
R3	240 ohm	5%	1/4W	MF	501 224 00
R4	62 ohm	5%	1/4W	MF	501 162 00
R5,7,35	20 ohm			Pot.	582 120 00
R6	51 ohm	5%	1/4W	MF	501 151 00
R8,9	8.2 ohm	5%	1/4W	Car.	501 082 00
R10,19,20	470 ohm	5%	1/2W	Car.	502 247 00
R11,50	560 ohm	5%	1/2W	Car.	502 256 00
R12,40	47 ohm	5%	1/4W	Car.	501 147 00
R13,14	22 ohm	5%	1/4W	Car.	501 122 00
R15	6.8 ohm	5%	1/4W	Car.	501 068 00
R16,41	27 ohm	5%	1/4W	Car.	501 127 00
R17	12 ohm	5%	1/4W	Car.	501 112 00
R18	270 ohm	5%	1/4W	Car.	501 227 00
R21	120 ohm	5%	2.5W	Car.	546 212 00
R22	33 ohm	5%	1/2W	Car.	502 133 00
R23	1 kohm	5%	1/2W	Car.	502 310 00
R24	330 ohm	5%	1/2W	Car.	502 233 00
R25,26	18 ohm	5%	2.5W	MF	546 118 01
R28	560 ohm	5%	1.5W	MF	544 256 00
R29-34	12 ohm	5%	2.5W	MF	546 112 00
R36,39,68	3.9 kohm	5%	1/4W	Car.	501 339 00
R37,38	22 ohm	5%	2.5W	MF	546 122 01
R51	4.7 kohm	5%	1/4W	Car.	501 347 00
R52	10 kohm	5%	1/4W	Car.	501 410 00
R53	5.6 kohm	5%	1/4W	Car.	501 356 00
R54	1 kohm	5%	1/4W	Car.	501 310 00
R55,69	100 kohm	5%	1/4W	Car.	501 510 00

PARTS LIST FOR POWER AMPLIFIER BOARD 631 VERSION 6A

R56,57	100 ohm	1%	0.5W	MF	512 210 00
R58	10 kohm	5%	2.5W	MF	546 410 00
R59	680 ohm	5%	1/4W	Car.	501 268 00
R60	220 ohm	5%	1.5W	MF	544 220 00
R61	0 ohm				501 000 00
R62	2.2 ohm	5%	1/2W	Car.	502 022 00
R63-66	12 ohm		3W		516 112 00
C1	0.22 uF	10%	250V	Polyes.	624 522 01
C2,3,8,9,21,22,24,27,28,39,42,86	0.1 uF	10%	100V	Polyes.	623 510 01
C4,7,10,11,14,19,20,23,25,26,29,32-34,36-38,40,41,52,85,87	0.22 uF	10%	63V	Polyes.	622 522 00
C5	10 pF	+/-10%	100V	Polyes.	603 110 03
C6	2.2 uF		100V		623 622 00
C12,13,45,46	620 pF	5%	300V	Mi	644 262 00
C15,74,76	0.1 uF	10%	63V	Polyes.	622 510 00
C16,50	220 uF	+50-10%	10V	W.alum.	651 822 00
C17,18	0.22 uF	10%	63V	Polyes.	622 522 01
C30,31,53-55,58	0.15 uF	10%	100V	Polyes.	623 515 00
C43,44,47,48	750 pF	5%	300V	Mi	644 275 00
C49	470 uF	+50-10%	63V	W.alum.	652 847 02
C51	0.22 uF	10%	63V	Polyes.	622 522 00
C59-64	47 nF	10%	250V	Polyes.	624 447 00
C65,66	160 pF	5%	300V	Mi	644 216 00
C71,72	4.7 uF		100V		623 647 01
C73	4.7 nF	+/-10%	100V	Cer.	602 347 02
C75	470 nF	10%	63V	Polyes.	622 547 01
C77,80	1 nF	10%	100V	Cer.	630 310 00
C78	8 pF	+/-1/2pF	300V	Mi	644 080 00
C79	150 pF	5%	300V	Mi	644 215 00
C81	0.47 uF	10%	100V	Polyes.	623 547 00
C84	100 pF	2%	100V	Cer.	603 210 00
C88	33 pF	2%	100V	Cer.	603 133 00
L1,2,6,7,10,12,13	15 uH				740 000 00
L3,4	2.2 uH				740 022 02
L5,9,11	100 uH				740 210 00
L8	0.47 uH				740 004 70
L14	5 uH				740 050 00
T1					103 573 71
T2					103 573 81
T3					103 573 91

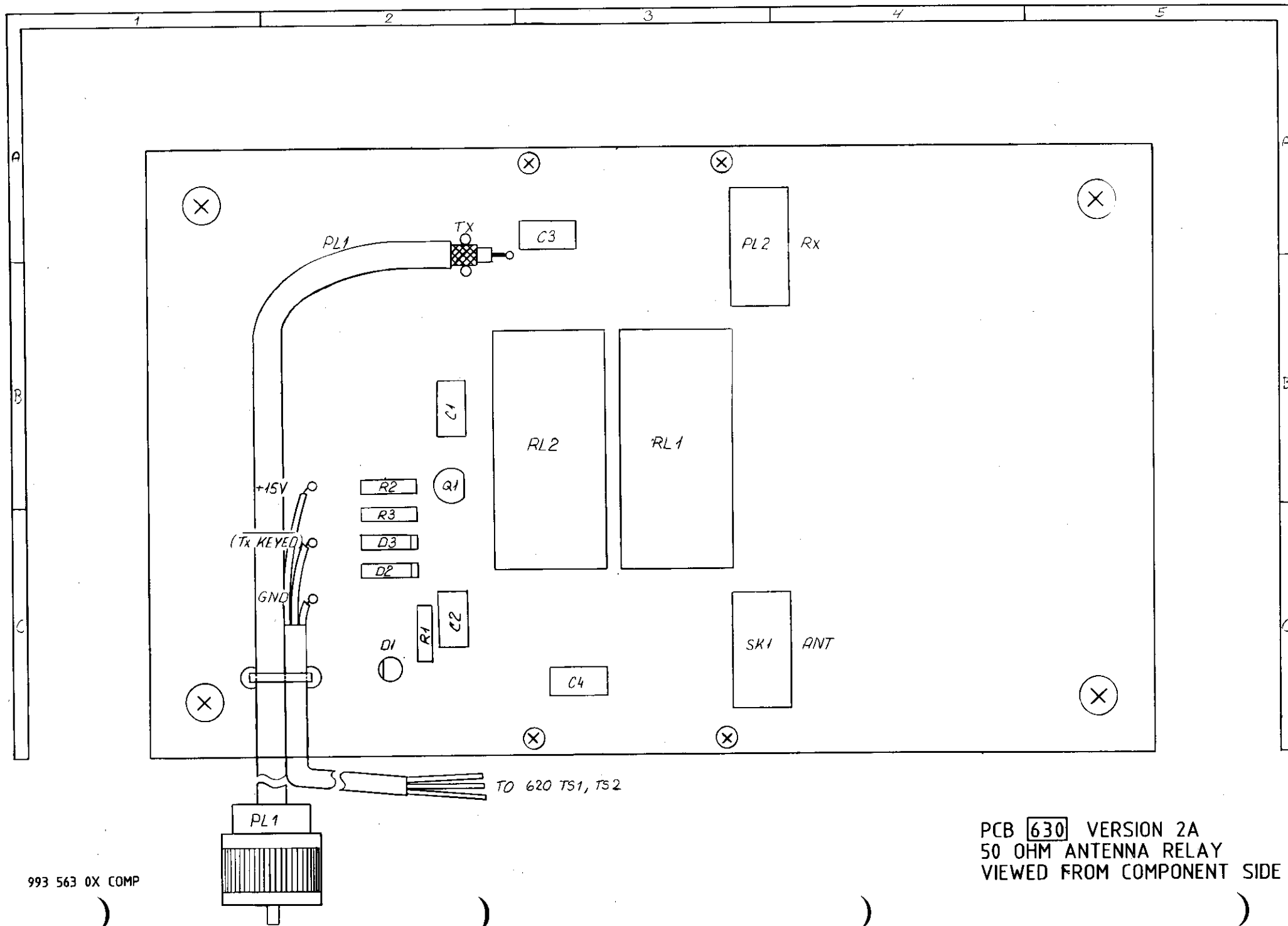
PARTS LIST FOR POWER AMPLIFIER BOARD 631 VERSION 6A .

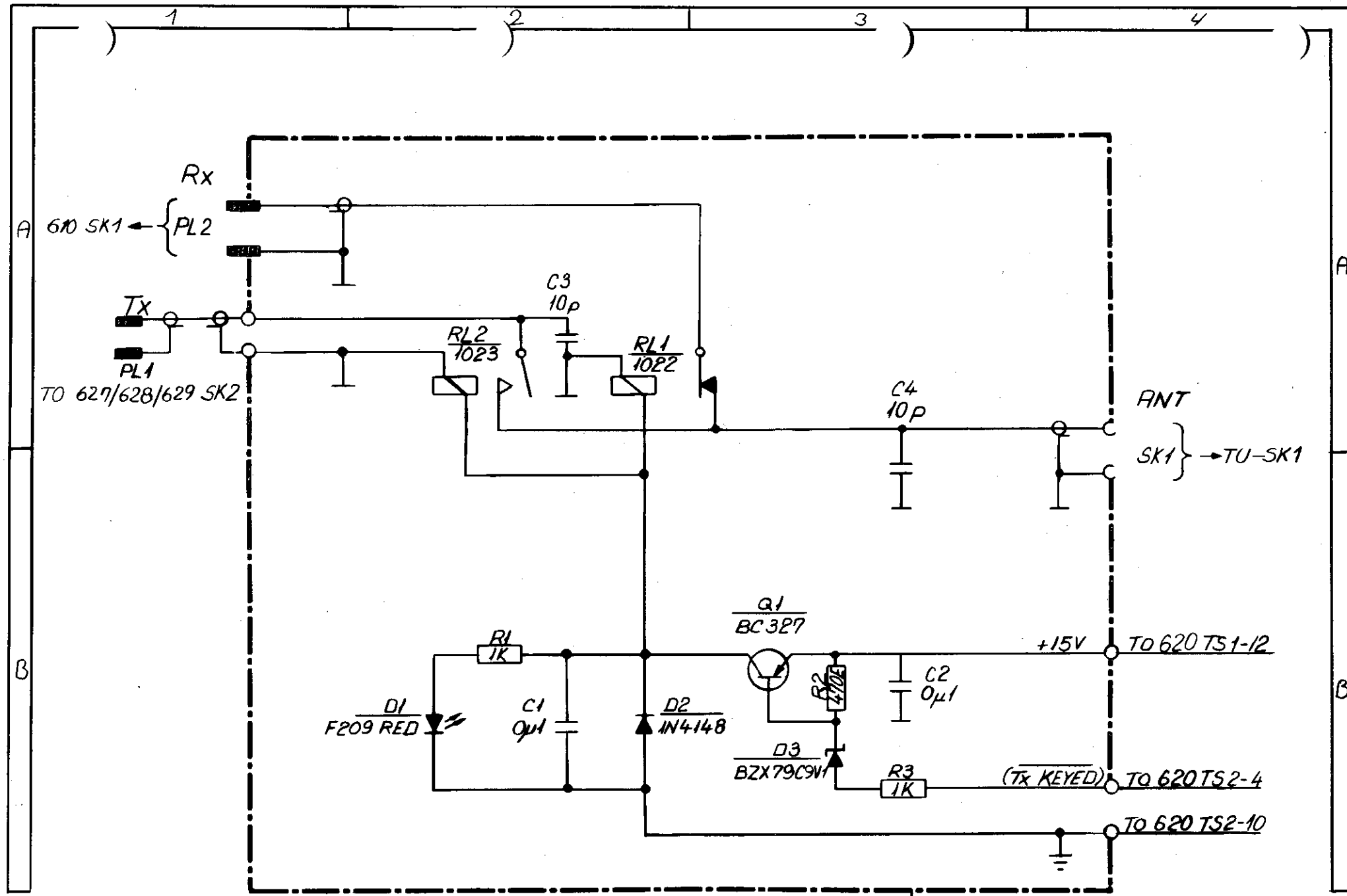
T4		103 574 01
T5		103 574 11
T6		103 574 22
T7		103 574 31
SW1	Thermoswitch 110 C	769 000 02
SW2	Thermoswitch 100 C	769 000 01

TECHNICAL DESCRIPTION

PCB 630 50 OHMS ANTENNA RELAY

When the TRP 8750 D is used without the Antenna Tuning Unit, a 50 ohms Antenna Relay Board can be incorporated in the TRP 8750 D. The Antenna Relay is a fast switching Simplex Relay (<5 msec) permitting ARQ-telex on one 50 ohms antenna. The Relay is controlled from 620 TS1 normally used to control the Antenna Tuning Unit.





PCB **630** 50 OHM ANTENNA RELAY
VERSION 2A. MAIN DIAGRAM

PARTS LIST FOR 50 OHM ANTENNA RELAY BOARD 630 VERSION 2A

Printed Circuit Board Complete 630					107 563 00
Q1	BC327				840 032 70
D1	LED F209 RED				823 000 00
D2	1N4148				830 414 80
D3	BZX79C9V1				832 799 11
RL1	1022				373 590 01
RL2	1023				373 589 81
R1,3	1 kohm	5%	1/2W	Car.	502 310 00
R2	470 ohm	5%	1/4W	Car.	501 247 00
C1-2	0.1 uF	10%	100V	Polyes.	623 510 01
C3	10 pF	+-1/2pF	500V	Mi	645 110 00
C4	12 pF	+-1/2pF	500V	Mi	645 112 00
PL1	PLUG COAXCABLE				373 607 6X
PL2	PLUG BNC FLANGE				750 000 51
SK1	BNC 290/U				750 000 10

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TECHNICAL DESCRIPTION

PCB **652** P.A.FILTERS, CONTINUOUS COVERAGE

The filterbank contains 8 lowpass filters covering the frequency range 1.6-30.0 MHz, as shown in the table below.

Filter no.	Passband MHz	Stopband MHz	Code			
			A	B	C	D
1	1.60- 2.31	3.19	0	1	0	0
2	2.31- 3.33	4.61	1	1	1	0
3	3.33- 4.80	6.64	1	0	0	1
4	4.80- 6.93	9.38	1	0	0	0
5	6.93-10.00	13.85	1	1	0	0
6	10.00-14.42	19.95	0	1	1	0
7	14.42-20.80	28.80	0	0	0	1
8	20.80-30.00	41.00	0	0	0	0

0 = off
1 = on

All filters are 7th order elliptic LP-filters (cauer-filters) with a series coil giving an inductive input impedance on the harmonics. When loaded with 50 ohms the input SWR is less than 1:1.1 and the insertion loss less than 0.2 dB in the passbands. In the stopbands the attenuation is better than 47 dB.

The filters are inserted by a system of dual pole relays controlled from the Transceiver Control Board **624** as shown in the table. Other types of filterbanks are available, and the microprocessor selects the corresponding switch pattern by sensing the type code information on 3 lines of the connector cable. If the cable is disconnected filter no. 8 is chosen, so that transmission is possible on all frequencies in case of fault in the switching system.

The DC voltage from the output peak detector, which monitors voltage and current in the load, is connected to the ALC circuit on the Transceiver Control Board **624**. This voltage is used for automatic adjustment of output power and should be 9.0 V for an output of 750 W into 50 ohms.

PCB **653** P.A.FILTERS, CONTINUOUS COVERAGE

The Filterbank 653 consists of a 652 Continuous Coverage lowpass filter as described above, and a MF lowpass filter covering the frequency range 400-525 kHz.

Filter no.	Passband kHz	Stopband kHz	Code			
			A	B	C	D
MF	400-525	670	0	1	0	1

The MF filter is a 5th order elliptic LP filter (cauer filter) with a series coil giving an inductive input impedance on the harmonics. When loaded with 50 ohms the input SWR is less than 1:1.1 and the insertion loss less than 0.2 dB in the passbands. In the stopbands the attenuation is better than 25 dB.

Type code information is given via 3 lines of the connector cable. The function of the output peak detector is described above for PCB 652.

PARTS LIST FOR PCB 652 P.A. FILTERS, CONTINUOUS COVERAGE VERSION 1A

Printed Circuit Board Complete 652					107 565 21
IC1	4028				850 402 80
IC2	UDN2981A				850 298 10
Q1	BC547B				840 054 70
D1-4	1N4001				831 400 10
D7-8	SD101C				830 010 10
D9	BZX79B5V1				832 795 11
RL2-17	RELAY 24 V				780 000 37
R1-4	15 kohm	5%	1/4W	Car.	501 415 00
R5-9	4.7 kohm	5%	1/4W	Car.	501 347 00
R10	2.2 kohm	5%	1/2W	MF	512 322 00
R11-18	33 ohm	5%	1/2W	Car.	502 133 00
R26-29	100 ohm	1%	1/2W	MF	512 210 00
R30	5.62 kohm	1%	1/4W	MF	511 356 20
C1,45	1 nF	10%	63V	Cer.	602 310 02
C2-23,47	0.1 uF	10%	63V	Polyes.	622 510 00
C43	150 pF	2%	63V	N150	602 215 00
C100	620 pF	2%	1KV	Glass 2 pcs.	647 262 01
C110	560 pF	2%	1KV	Glass	647 256 01
C120	560 pF	2%	1KV	Glass	647 256 01
plus	620 pF	2%	1KV	Glass	647 262 01
C130	510 pF	2%	1KV	Glass	647 251 01
plus	560 pF	2%	1KV	Glass	647 256 01
C140	560 pF	2%	1KV	Glass 2 pcs.	647 256 01
C150	270 pF	2%	1KV	Glass	647 227 00
C160	510 pF	2%	1KV	Glass	647 251 01
C200	430 pF	2%	1KV	Glass	647 243 01
plus	470 pF	2%	1KV	Glass	647 247 01
C210	180 pF	2%	1KV	Glass	647 218 00
plus	200 pF	2%	1KV	Glass	647 220 00
C220	300 pF	2%	1KV	Glass	647 230 00
plus	560 pF	2%	1KV	Glass	647 256 01
C230	220 pF	2%	1KV	Glass	647 222 00
plus	270 pF	2%	1KV	Glass 2 pcs.	647 227 00
C240	820 pF	2%	1KV	Glass	647 282 01
C250	200 pF	2%	1KV	Glass	647 220 00
C260	390 pF	2%	1KV	Glass	647 239 00
C300	600 pF	2%	1KV	Cer.	607 260 00
C310	130 pF	2%	1KV	Glass 2 pcs.	647 213 00
C320	200 pF	2%	1KV	Glass	647 220 00
plus	360 pF	2%	1KV	Glass	647 236 01
C330	180 pF	2%	1KV	Glass	647 218 00
plus	360 pF	2%	1KV	Glass	647 236 01
C340	270 pF	2%	1KV	Glass 2 pcs.	647 227 00

PARTS LIST FOR PCB 652 P.A. FILTERS, CONTINUOUS COVERAGE VERSION 1A

C350	130 pF	2%	1KV	Glass	647 213 00
C360	200 pF	2%	1KV	Glass	647 220 00
C400	410 pF	2%	1KV	Cer.	607 241 00
C410	100 pF	2%	1KV	Glass	647 210 00
plus	91 pF	2%	1KV	Glass	647 191 00
C420	100 pF	2%	1KV	Glass	647 210 00
plus	240 pF	2%	1KV	Glass	647 224 01
C430	120 pF	2%	1KV	Glass	647 212 00
plus	240 pF	2%	1KV	Glass	647 224 01
C440	180 pF	2%	1KV	Glass	647 218 00
plus	200 pF	2%	1KV	Glass	647 220 00
C450	100 pF	2%	1KV	Glass	647 210 00
C460	130 pF	2%	1KV	Glass	647 213 00
C500	290 pF	2%	1KV	Cer.	607 229 00
C510	62 pF	2%	1KV	Glass 2 pcs.	647 162 00
C520	82 pF	2%	1KV	Glass	647 182 00
plus	91 pF	2%	1KV	Glass	647 191 00
plus	100 pF	2%	1KV	Glass	647 210 00
C530	82 pF	2%	1KV	Glass 3 pcs.	647 182 00
C540	130 pF	2%	1KV	Glass	647 213 00
plus	150 pF	2%	1KV	Glass	647 215 00
C550	62 pF	2%	1KV	Glass	647 162 00
C560	100 pF	2%	1KV	Glass	647 210 00
C600	190 pF	2%	1KV	Cer.	607 219 00
C610	43 pF	2%	1KV	Glass 2 pcs.	647 143 00
C620	56 pF	2%	1KV	Glass 3 pcs.	647 156 00
C630	56 pF	2%	1KV	Glass 3 pcs.	647 156 00
C640	68 pF	2%	1KV	Glass	647 168 00
plus	100 pF	2%	1KV	Glass	647 210 00
C650	43 pF	2%	1KV	Glass	647 143 00
C660	47 pF	2%	1KV	Glass	647 147 00
C700	140 pF	2%	1KV	Cer.	607 214 00
C710	27 pF	2%	1KV	Glass	647 127 00
plus	30 pF	2%	1KV	Glass	647 130 00
C720	39 pF	2%	1KV	Glass 3 pcs.	647 139 00
C730	39 pF	2%	1KV	Glass 2 pcs.	647 139 00
plus	43 pF	2%	1KV	Glass	647 143 00
C740	62 pF	2%	1KV	Glass 2 pcs.	647 162 00
C750	30 pF	2%	1KV	Glass	647 130 00
C760	51 pF	2%	1KV	Glass	647 151 00
C800	100 pF	2%	1KV	Cer.	607 210 01
C810	18 pF	2%	1KV	Glass	647 118 00
plus	20 pF	2%	1KV	Glass	647 120 00
C820	20 pF	2%	1KV	Glass	647 120 00
plus	24 pF	2%	1KV	Glass 2 pcs.	647 124 00

PARTS LIST FOR PCB 652 P.A. FILTERS, CONTINUOUS COVERAGE VERSION 1A

C830	27 pF	2%	1KV	Glass 3 pcs.	647 127 00
C840	43 pF	2%	1KV	Glass	647 143 00
plus	47 pF	2%	1KV	Glass	647 147 00
C850	20 pF	2%	1KV	Glass	647 120 00
C860	30 pF	2%	1KV	Glass	647 130 00
L10	2.1 uH				373 572 3X
plus					373 572 2X
L11	3.4 uH				103 622 6X
L12	2.3 uH				103 622 7X
L13	3.1 uH			3 pcs.	373 572 2X
L20	1.6 uH			2 pcs.	373 623 3X
L21	2.3 uH				103 622 7X
L22	1.6 uH				103 622 8X
L23	2.1 uH			3 pcs.	373 623 3X
L30	1 uH			2 pcs.	373 623 2X
L31	1.6 uH				103 622 8X
L32	1.1 uH				103 622 9X
L33	1.5 uH			2 pcs.	373 623 3X
L40	0.8 uH				373 623 3X
L41	1.1 uH			2 pcs.	373 623 0X
plus					373 623 1X
L42	0.8 uH				373 623 0X
plus					373 623 1X
L43	1 uH				373 623 1X
plus					373 623 2X
L50	0.4 uH				103 576 1X
L51	0.7 uH				103 640 7X
L52	0.5 uH				103 640 6X
L53	0.7 uH				103 640 8X
L60	0.3 uH				103 576 0X
L61	0.5 uH				103 640 6X
L62	0.4 uH				103 640 5X
L63	0.5 uH				103 576 1X
L70	0.2 uH				103 575 8X
L71	0.4 uH				103 640 4X
L72	0.26 uH				103 640 3X
L73	0.3 uH				103 576 0X
L80	0.2 uH				103 575 7X
L81	0.26 uH				103 640 3X
L82	0.17 uH				103 640 2X
L83	0.26 uH				103 575 7X
T1	Transformer				103 622 2X
T2	Transformer				103 622 1X
PL1	10 POLE				756 010 02
PL2	Coax cable				373 627 22
SK1	Socket SO 239				750 000 01

PARTS LIST FOR PCB 653 P.A. FILTERS, CONTINUOUS COVERAGE VERSION 1A

Printed Circuit Board Complete 653					107 565 31
IC1	4028				850 402 80
IC2	UDN2981A				850 298 10
Q1	BC547B				840 054 70
D1-4	1N4001				831 400 10
D5-8	SD101C				830 010 10
D9	BZX79B5V1				832 795 11
RL1-17	RELAY 24 V				780 000 37
R1-4	15 kohm	5%	1/4W	Car.	501 415 00
R5-9	4.7 kohm	5%	1/4W	Car.	501 347 00
R10	2.2 kohm	5%	1/2W	MF	512 322 00
R11-18	33 ohm	5%	1/2W	Car.	502 133 00
R21	1 kohm	1%	1/4W	MF	511 310 00
R22-23	8.25 kohm	1%	1W	MF	513 382 50
R24-29	100 ohm	1%	1/2W	MF	512 210 00
R30	5.62 kohm	1%	1/4W	MF	511 356 20
C1,41,45	1 nF	10%	63V	Cer.	602 310 02
C2-23,47	0.1 uF	10%	63V	Polyes.	622 510 00
C30,31,34,35	1.6 nF	2%	500V	Mi	645 316 01
C32	1.2 nF	2%	500V	Mi	645 312 01
C33	1.8 nF	2%	500V	Mi	645 318 01
C36	2.2 nF	2%	500V	Mi	645 322 00
C37,38	2 nF	2%	500V	Mi	645 320 00
C39,40	470 pF	2%	500V	Mi	645 247 01
C43	150 pF	2%	63V	N150	602 215 00
C100	620 pF	2%	1KV	Glass 2 pcs.	647 262 01
C110	560 pF	2%	1KV	Glass	647 256 01
C120	560 pF	2%	1KV	Glass	647 256 01
plus	620 pF	2%	1KV	Glass	647 262 01
C130	510 pF	2%	1KV	Glass	647 251 01
plus	560 pF	2%	1KV	Glass	647 256 01
C140	560 pF	2%	1KV	Glass 2 pcs.	647 256 01
C150	270 pF	2%	1KV	Glass	647 227 00
C160	510 pF	2%	1KV	Glass	647 251 01
C200	430 pF	2%	1KV	Glass	647 243 01
plus	470 pF	2%	1KV	Glass	647 247 01
C210	180 pF	2%	1KV	Glass	647 218 00
plus	200 pF	2%	1KV	Glass	647 220 00
C220	300 pF	2%	1KV	Glass	647 230 00
plus	560 pF	2%	1KV	Glass	647 256 01
C230	220 pF	2%	1KV	Glass	647 222 00
plus	270 pF	2%	1KV	Glass 2 pcs.	647 227 00
C240	820 pF	2%	1KV	Glass	647 282 01
C250	200 pF	2%	1KV	Glass	647 220 00
C260	390 pF	2%	1KV	Glass	647 239 00
C300	600 pF	2%	1KV	Cer.	607 260 00
C310	130 pF	2%	1KV	Glass 2 pcs.	647 213 00

PARTS LIST FOR PCB 653 P.A. FILTERS, CONTINUOUS COVERAGE VERSION 1A

PARTS LIST FOR PCB 653 P.A. FILTERS, CONTINUOUS COVERAGE VERSION 1A

C320	200 pF	2%	1KV	Glass	647 220 00
plus	360 pF	2%	1KV	Glass	647 236 01
C330	180 pF	2%	1KV	Glass	647 218 00
plus	360 pF	2%	1KV	Glass	647 236 01
C340	270 pF	2%	1KV	Glass 2 pcs.	647 227 00
C350	130 pF	2%	1KV	Glass	647 213 00
C360	200 pF	2%	1KV	Glass	647 220 00
C400	410 pF	2%	1KV	Cer.	607 241 00
C410	100 pF	2%	1KV	Glass	647 210 00
plus	91 pF	2%	1KV	Glass	647 191 00
C420	100 pF	2%	1KV	Glass	647 210 00
plus	240 pF	2%	1KV	Glass	647 224 01
C430	120 pF	2%	1KV	Glass	647 212 00
plus	240 pF	2%	1KV	Glass	647 224 01
C440	180 pF	2%	1KV	Glass	647 218 00
plus	200 pF	2%	1KV	Glass	647 220 00
C450	100 pF	2%	1KV	Glass	647 210 00
C460	130 pF	2%	1KV	Glass	647 213 00
C500	290 pF	2%	1KV	Cer.	607 229 00
C510	62 pF	2%	1KV	Glass 2 pcs.	647 162 00
C520	82 pF	2%	1KV	Glass	647 182 00
plus	91 pF	2%	1KV	Glass	647 191 00
plus	100 pF	2%	1KV	Glass	647 210 00
C530	82 pF	2%	1KV	Glass 3 pcs.	647 182 00
C540	130 pF	2%	1KV	Glass	647 213 00
plus	150 pF	2%	1KV	Glass	647 215 00
C550	62 pF	2%	1KV	Glass	647 162 00
C560	100 pF	2%	1KV	Glass	647 210 00
C600	190 pF	2%	1KV	Cer.	607 219 00
C610	43 pF	2%	1KV	Glass 2 pcs.	647 143 00
C620	56 pF	2%	1KV	Glass 3 pcs.	647 156 00
C630	56 pF	2%	1KV	Glass 3 pcs.	647 156 00
C640	68 pF	2%	1KV	Glass	647 168 00
plus	100 pF	2%	1KV	Glass	647 210 00
C650	43 pF	2%	1KV	Glass	647 143 00
C660	47 pF	2%	1KV	Glass	647 147 00
C700	140 pF	2%	1KV	Cer.	607 214 00
C710	27 pF	2%	1KV	Glass	647 127 00
plus	30 pF	2%	1KV	Glass	647 130 00
C720	39 pF	2%	1KV	Glass 3 pcs.	647 139 00
C730	39 pF	2%	1KV	Glass 2 pcs.	647 139 00
plus	43 pF	2%	1KV	Glass	647 143 00
C740	62 pF	2%	1KV	Glass 2 pcs.	647 162 00

C750	30 pF	2%	1KV	Glass	647 130 00
C760	51 pF	2%	1KV	Glass	647 151 00
C800	100 pF	2%	1KV	Cer.	607 210 01
C810	18 pF	2%	1KV	Glass	647 118 00
plus	20 pF	2%	1KV	Glass	647 120 00
C820	20 pF	2%	1KV	Glass	647 120 00
plus	24 pF	2%	1KV	Glass 2 pcs.	647 124 00
C830	27 pF	2%	1KV	Glass 3 pcs.	647 127 00
C840	43 pF	2%	1KV	Glass	647 143 00
plus	47 pF	2%	1KV	Glass	647 147 00
C850	20 pF	2%	1KV	Glass	647 120 00
C860	30 pF	2%	1KV	Glass	647 130 00
L1	9.3 uH				373 622 4X
L2	7.9 uH			2 pcs.	373 622 3X
L3	9.3 uH				373 622 4X
L10	2.1 uH				373 572 3X
plus					373 572 2X
L11	3.4 uH				103 622 6X
L12	2.3 uH				103 622 7X
L13	3.1 uH			3 pcs.	373 572 2X
L20	1.6 uH			2 pcs.	373 623 3X
L21	2.3 uH				103 622 7X
L22	1.6 uH				103 622 8X
L23	2.1 uH			3 pcs.	373 623 3X
L30	1 uH			2 pcs.	373 623 2X
L31	1.6 uH				103 622 8X
L32	1.1 uH				103 622 9X
L33	1.5 uH			2 pcs.	373 623 3X
L40	0.8 uH				373 623 3X
L41	1.1 uH			2 pcs.	373 623 0X
plus					373 623 1X
L42	0.8 uH				373 623 0X
plus					373 623 1X
L43	1 uH				373 623 1X
plus					373 623 2X
L50	0.4 uH				103 576 1X
L51	0.7 uH				103 640 7X
L52	0.5 uH				103 640 6X
L53	0.7 uH				103 640 8X
L60	0.3 uH				103 576 0X
L61	0.5 uH				103 640 6X
L62	0.4 uH				103 640 5X
L63	0.5 uH				103 576 1X
L70	0.2 uH				103 575 8X
L71	0.4 uH				103 640 4X
L72	0.26 uH				103 640 3X
L73	0.3 uH				103 576 0X
L80	0.2 uH				103 575 7X
L81	0.26 uH				103 640 3X
L82	0.17 uH				103 640 2X

PARTS LIST FOR PCB 653 P.A. FILTERS, CONTINUOUS COVERAGE VERSION 1A

L83	0.26 uH	103 575 7X
T1,3	Transformer	103 622 2X
T2	Transformer	103 622 1X
PL1	10 POLE	756 010 02
PL2	Coax cable	373 627 22
SK1,2	Socket SO 239	750 000 01

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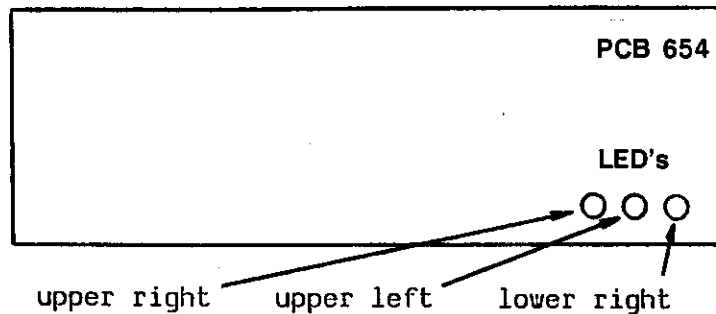
TECHNICAL DESCRIPTION

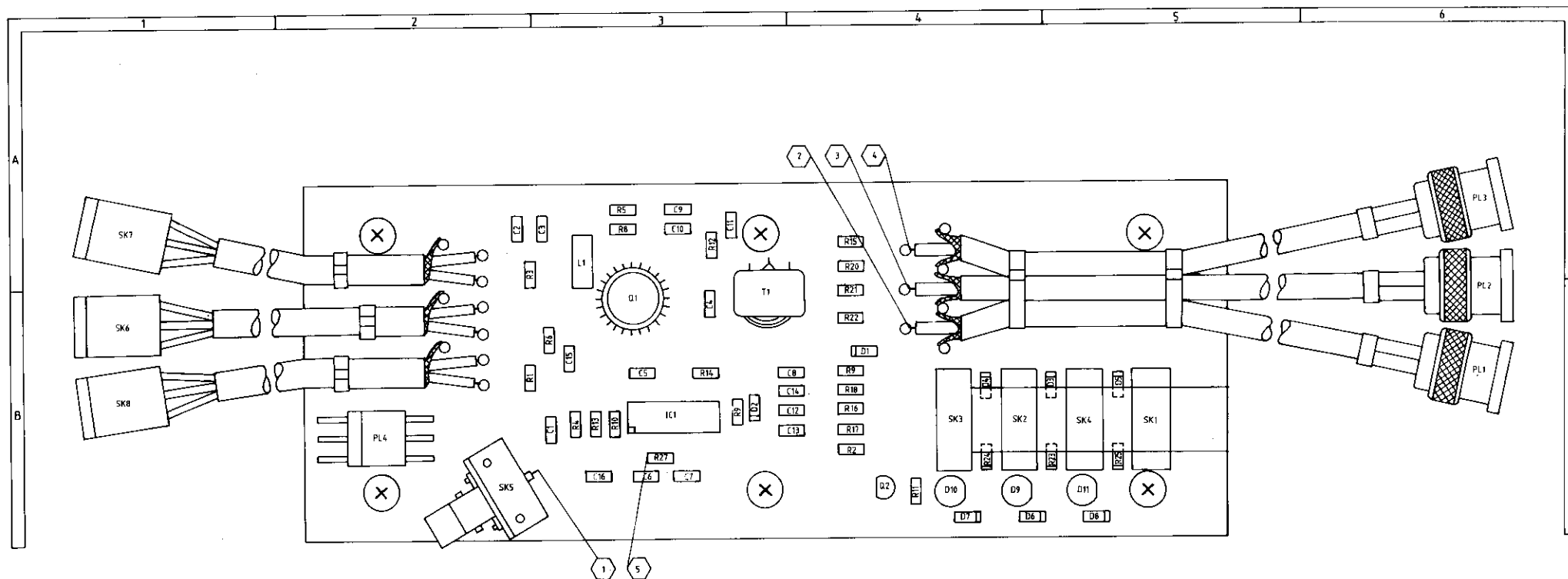
PCB 654 POWER SPLITTER

The RF signal from the exciter (2.5 Vpp 50 ohm) is amplified and divided into 3 equal 50 ohms sources with a 0 dB power gain and applied to each of the 3 Power Amplifiers 626.

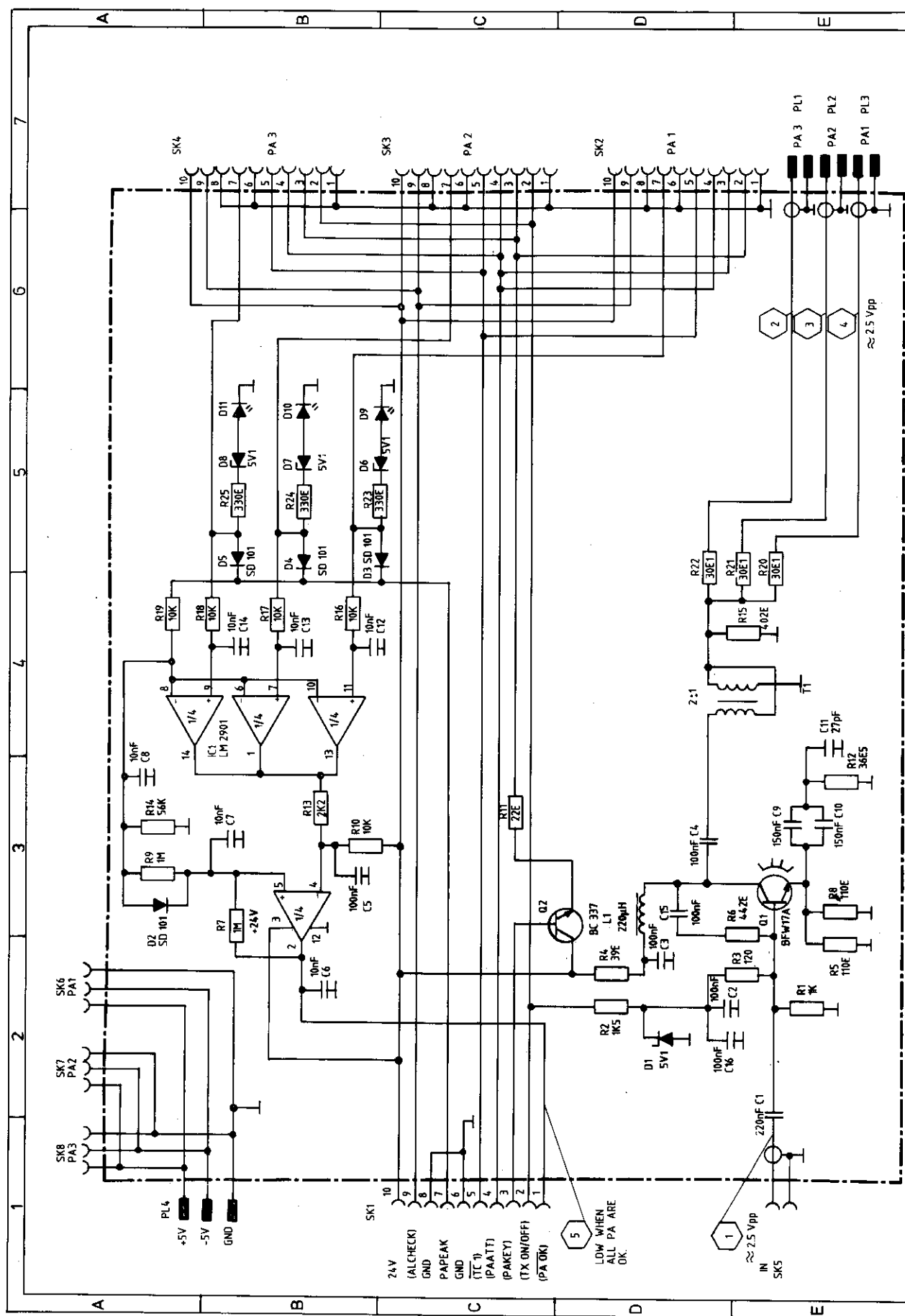
The Power Amplifier comparator detects the difference between the 3 Power Amplifier outputs. If the difference is greater than 1.6 dB the line (PA OK) goes high and the output power are reduced by 0.8 dB in order to keep the intermodulation low.

Each power amplifier 626 has an LED indicator for RF output. Starts to light around 140 W CW output.





PCB 654 VERSION 1A
POWER SPLITTER
VIEWED FROM COMPONENT SIDE



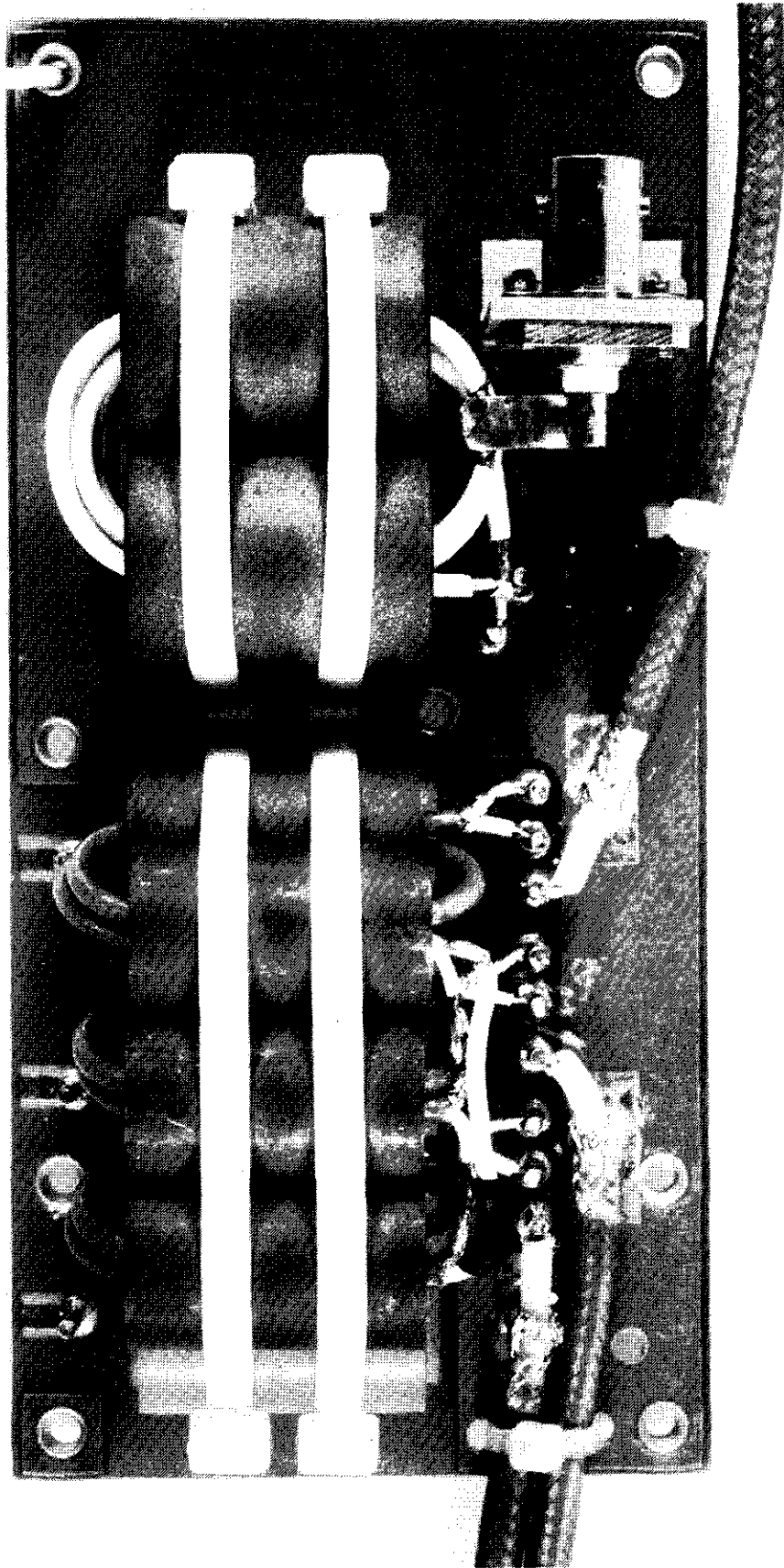
PARTS LIST FOR POWER SPLITTER BOARD 654 VERSION 1A

Printed Circuit Board Complete 654				107 565 41
IC1	LM2901			850 290 10
Q1	BFW17A			840 001 70
Q2	BC337			840 033 70
D1,6-8	BZX79B5V1			832 795 11
D2-5	SD101C			830 010 10
D9-11	TIL220 RED LED			823 000 02
R1	1 kohm	5%	1/4W Car.	501 310 00
R2	1.5 kohm	5%	1/4W Car.	501 315 00
R3	120 ohm	5%	1/4W Car.	501 212 00
R4	39 ohm	5%	1/2W Car.	502 139 00
R5,8	110 ohm	1%	1/4W MF	511 211 00
R6	442 ohm	1%	1/4W MF	511 244 20
R7,9	1 Mohm	5%	1/4W Car.	501 610 00
R10,16-19	10 kohm	5%	1/4W Car.	501 410 00
R11	22 ohm	5%	1/2W Car.	502 122 00
R12	36.5 ohm	1%	1/4W MF	511 136 50
R13	2.2 kohm	5%	1/4W Car.	501 322 00
R14	56 kohm	5%	1/4W Car.	501 456 00
R15	402 ohm	1%	1/4W MF	511 240 20
R20-22	30.1 ohm	1%	1/4W MF	511 130 10
R23-25	330 ohm	5%	1/4W Car.	501 233 00
C1	0.22 uF	10%	63V Polyes.	622 522 01
C2-5,15,16	0.1 uF	10%	63V Polyes.	622 510 00
C6-8,12-14	10 nF	-20+50%	63V Cer.	602 410 01
C9,10	0.15 uF	10%	63V Polyes.	622 515 00
C11	27 pF	2%	63V Cer.	602 127 00
L1	220 uH		RF Choke	740 222 00
T1	Transformer			103 623 51
PL1-3	Coax cable			373 632 11
PL4	Molex 3-pole			751 001 20
SK1	Ribbon cable			373 631 61
SK2	Ribbon cable			373 631 71
SK3	Ribbon cable			373 631 81
SK4	Ribbon cable			373 631 91
SK5	BNC socket			750 000 10
SK6-8	Set of cables			106 700 40

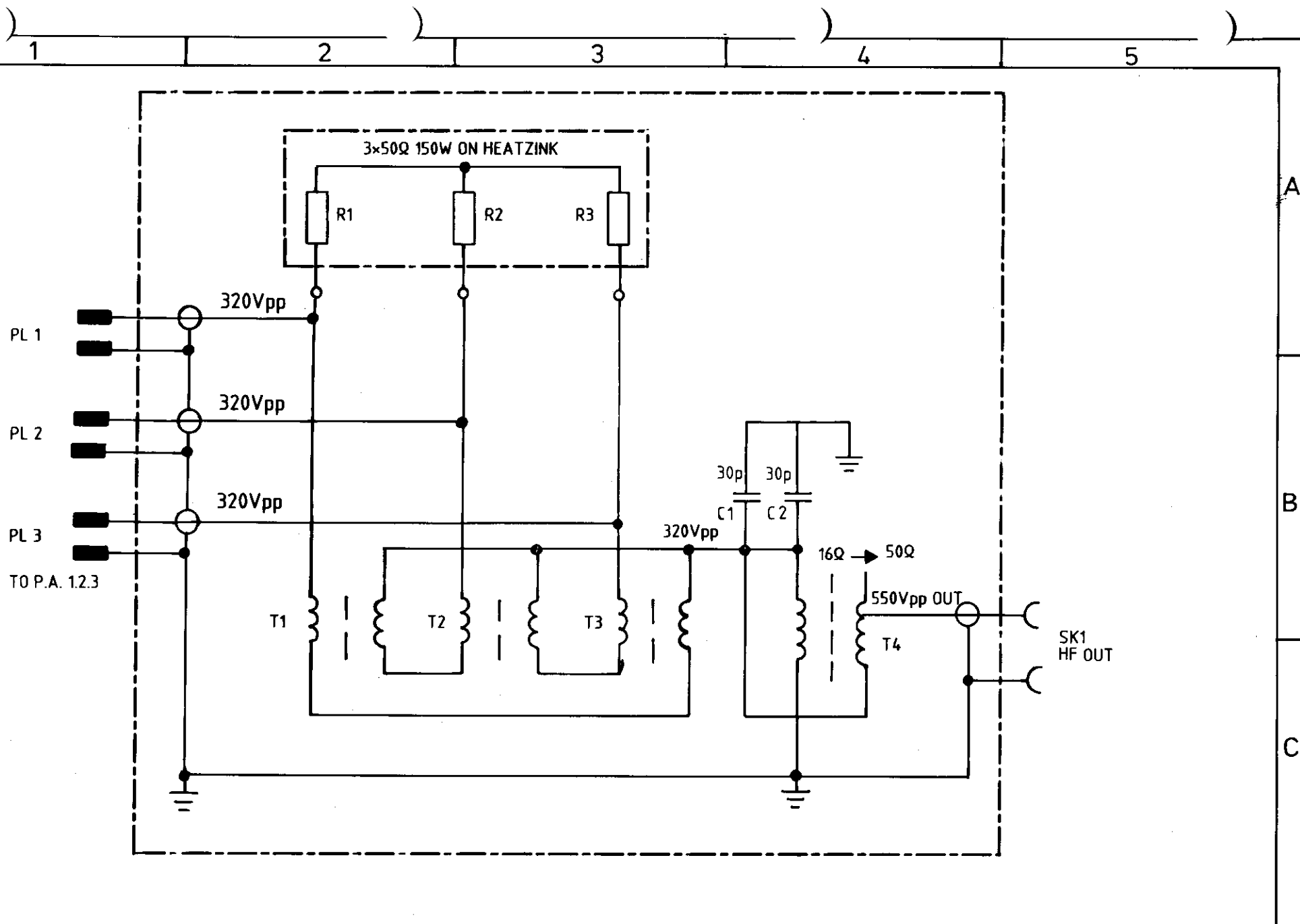
TECHNICAL DESCRIPTION

PCB 655 POWER COMBINER

The signals from the 3 Power Amplifiers, 626 or 631, each delivering 250 W is combined to 750 W in 16 ohms and transformed to 750 W into 50 ohms output which is led to the P.A. Filter.



PCB 655 Power Combiner Board



PARTS LIST FOR PCB 655 POWER COMBINER VERSION 1A

Printed Circuit Board Complete 655					107 565 51
R1-3	50 ohm		150W	Thick film	569 150 00
C1,2	30 pF	2%	500V	Mi	645 130 00
T1-3	Transformer				103 627 0X
T4	Transformer				103 627 1X
PL1-3	Coax cable				373 632 21
SK1	Socket BNC UG290/U				750 000 10

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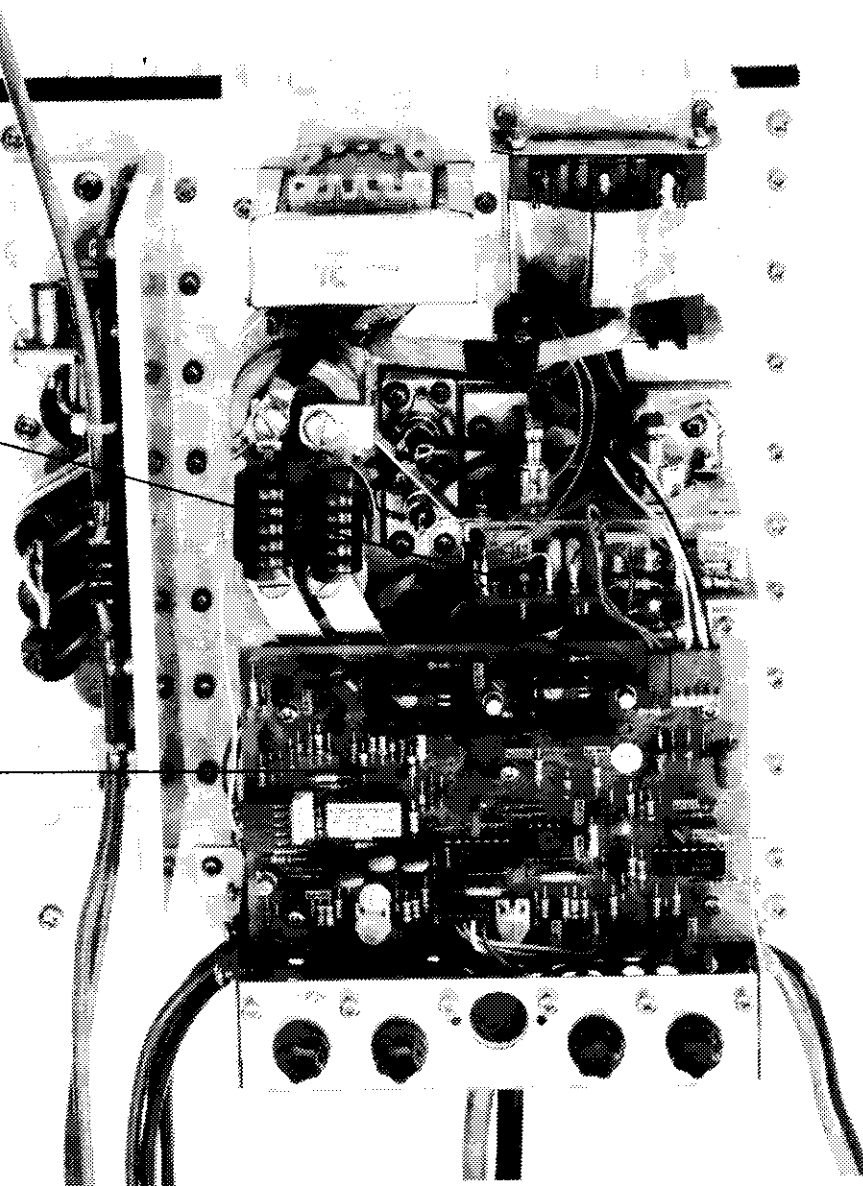
TECHNICAL DESCRIPTION

SWITCHED MODE POWER SUPPLY

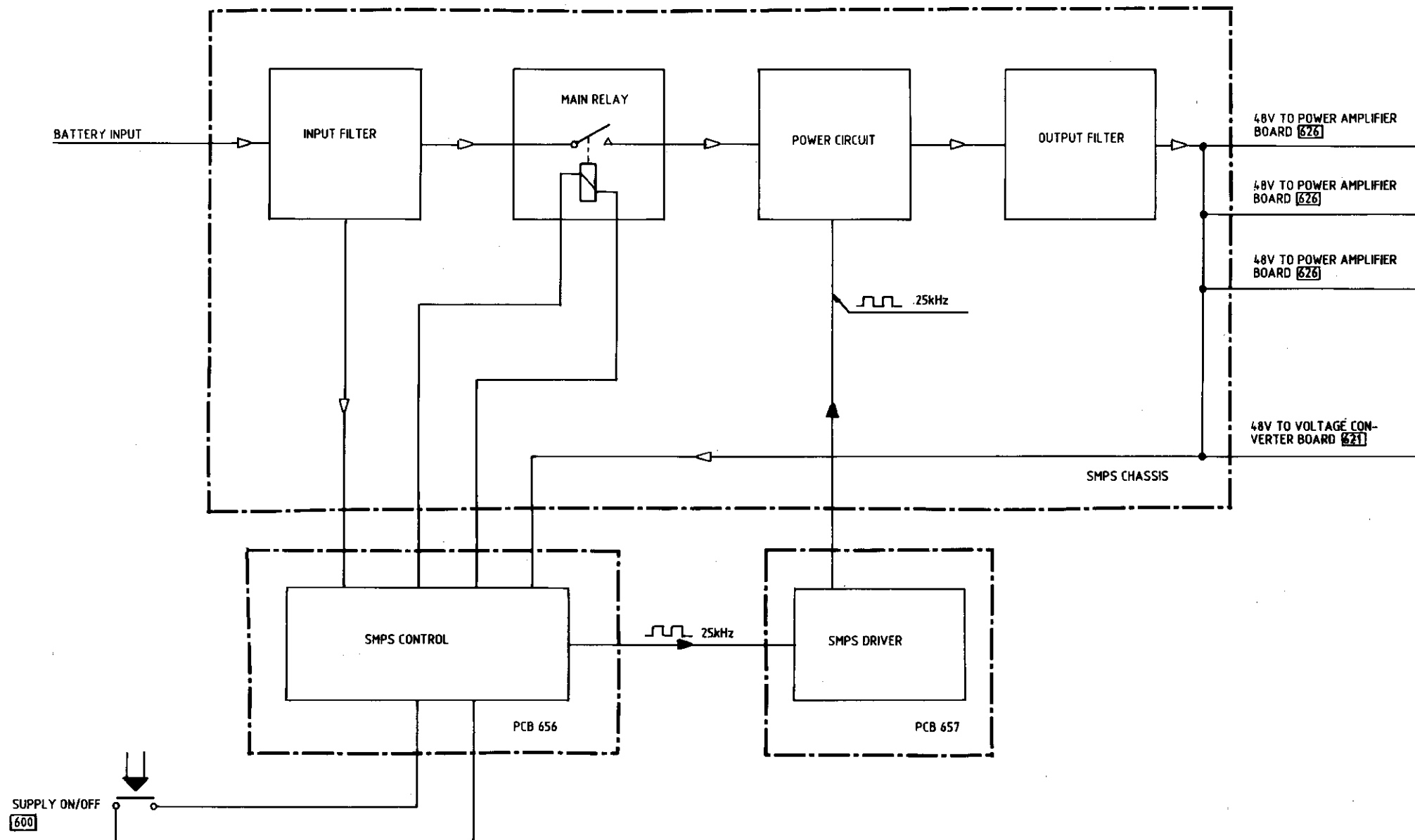
The DC-power, deriving from the battery, first has to pass an input filter and then a relay switch controlled by the overvoltage and reverse polarity protection circuit, before it is allowed to flow to the converter circuit. The converter is a boost-converter combined with a push-pull converter allowing the converter to handle duty cycles higher than fifty percent. The converter does not provide galvanic isolation. The regulating loop has been designed in order to keep the output voltage from the converter fairly stable independent of battery voltage variations and different loading conditions on the output. This is done by regulating the duty cycles of the pulses, deriving from a 25 kHz oscillator IC5, before they are forming the driving signal for the converter driver. The duty cycle regulation is located on board [656] and consists of IC1, IC2, IC6, Q3 and Q4. D12 ensures that the duty cycle does not rise to more than seventy percent. The total current in the converter is measured by means of T2, T3 and is used for the current limiting circuit located on board [656]. The output is also equipped with an overvoltage protection circuit Q9 and Q25 on board [656]. The mains relay switch is activated by a bistable circuit Q1, Q2, RL1 and is protected from "Welding" by IC3. IC4 prevents the main relay from being closed when the input voltage rises to more than 42 V. These components are located on board [656].

PCB 657 SMPS
DRIVER BOARD

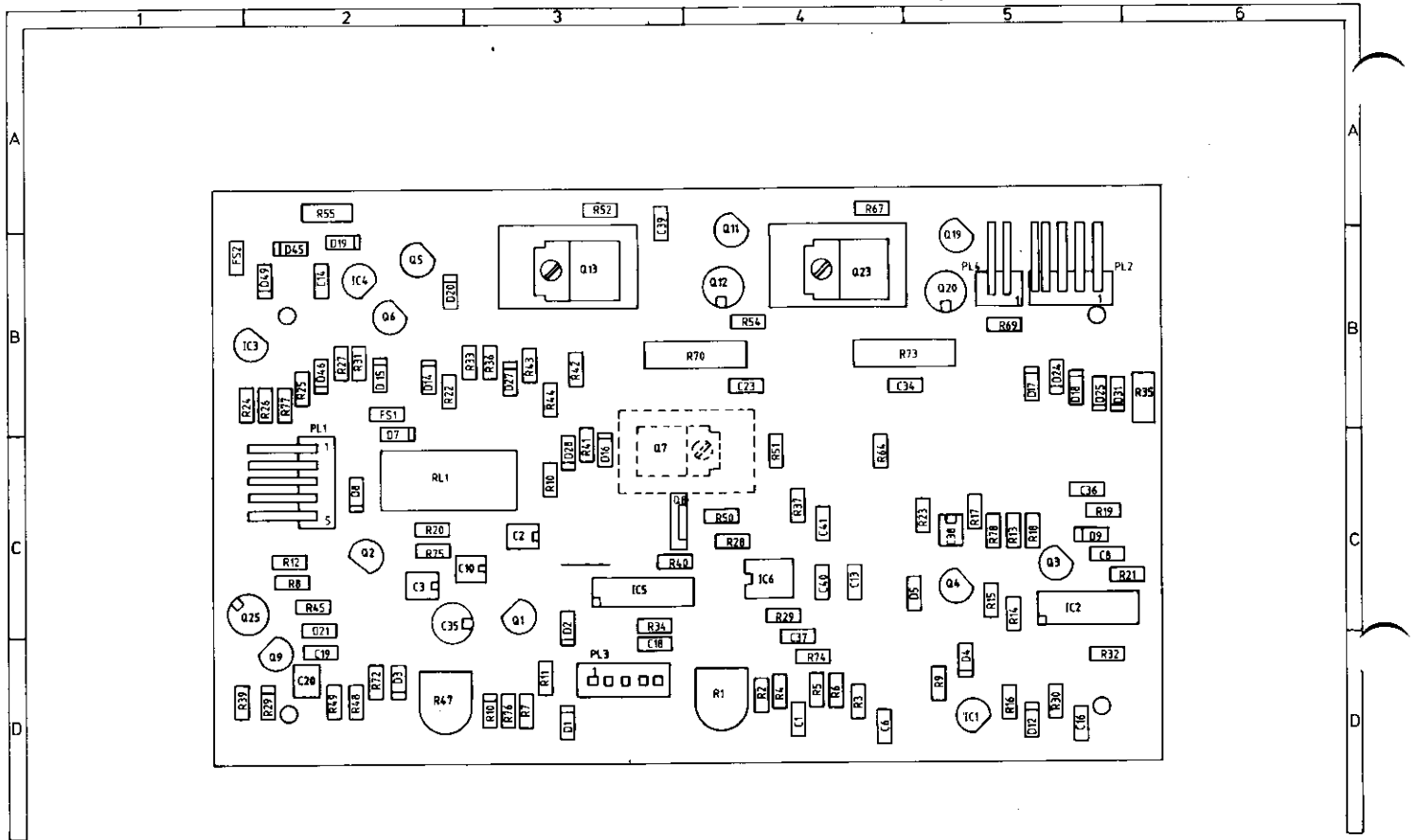
PCB 656 SMPS
CONTROL BOARD



SWITCHED MODE POWER SUPPLY WITH COVER REMOVED.

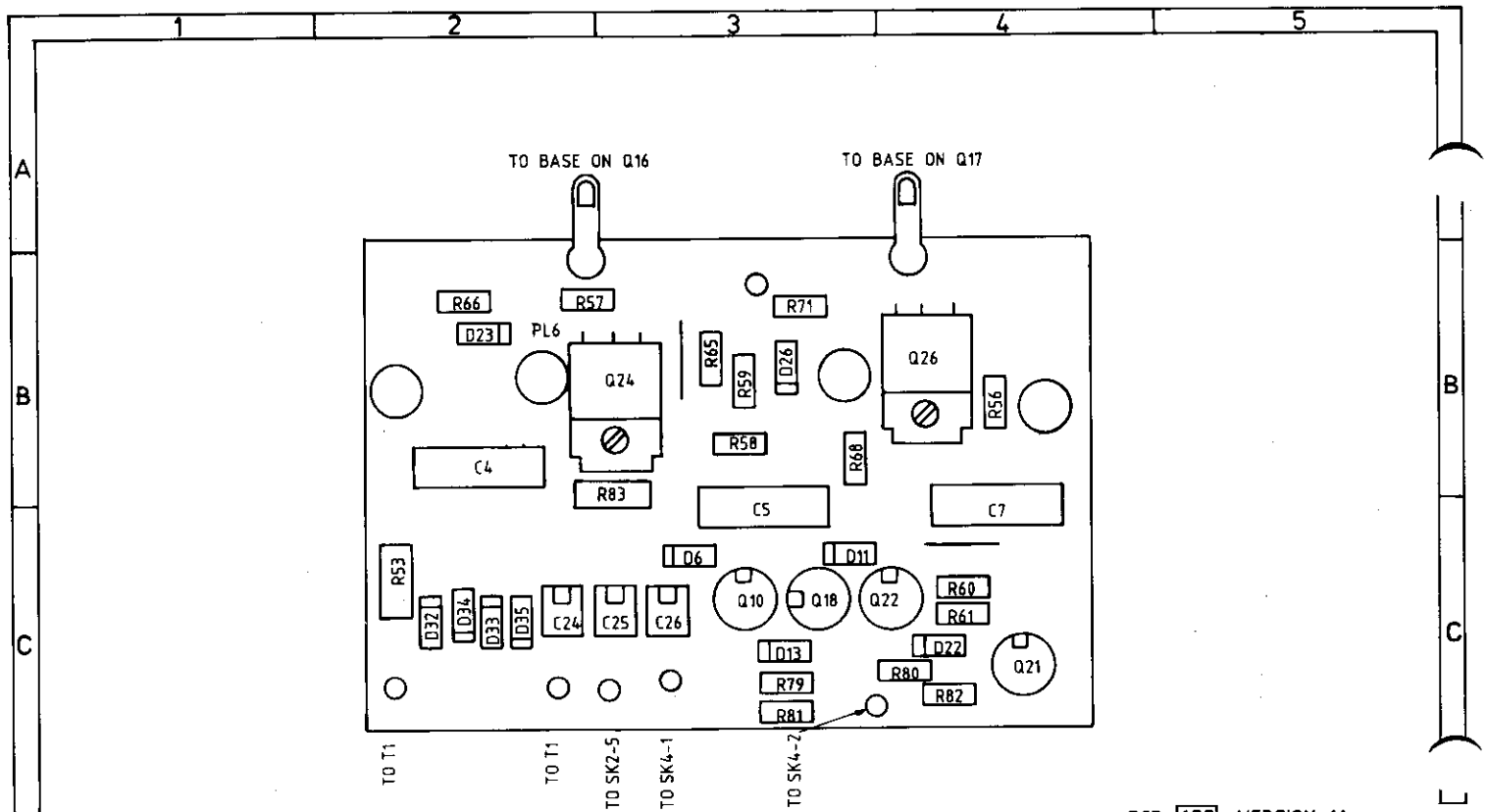


BLOCK DIAGRAM
SWITCHED MODE POWER SUPPLY 8750



993 565 6X COMP

PCB 656 VERSION 1A
SMPS CONTROL BOARD
VIEWED FROM COMPONENT SIDE

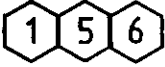


993 565 7X COMP


PCB 657 VERSION 1A
SMPS CONTROL BOARD
VIEWED FROM COMPONENT SIDE


TEST POINTS FOR SMPS 8750.

All measurements are performed relative to BAT. NEG. available on power amplifier 626 sk 10.

 +48V Measured on PCB 626 SK9, SK13 and SK14.

 +48V Measured on SMPS-SK12-1 (Din - socket).

 ENABLE 12V on SMPS-SK12-3

 PWR ON Measured on 620 SK11
Normally 9V, when activated 0.5V.

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PARTS LIST FOR SWITCHED MODE POWER SUPPLY SMPS 8750 VERSION 1A

Q14,15	IRF641 MOSFET	843 064 10
Q16,17	BUT90	842 009 00
D43,44	BYW31-150	831 311 50
RL2	RELAY 12V	780 000 33
R38	100 ohm 5% 15W ww	528 210 00
R46	220 kohm 5% 1W Car.	504 522 00
R62,63	12 ohm 5% 1/2W MF	512 112 00
C9	6,8 uF 10% 63V Polyes.	622 668 01
C21,22	2800 uF 20% 55V Elko	652 928 00
C11,12,15,17	47 nF 10% 250V Polyes.	624 447 00
C28,29	2,2 nF 1% 250V Microp.	614 322 00
C32,33	4700 uF +50/-10% 63V Elko	652 947 03
L1		732 000 39
L2,3	0.95 uH	103 575 0X
L4	Transformer	373 634 21
L5	2.6 uH	103 629 9X
T1	Transformer	383 634 31
T2,3	8.7 mH	103 574 9X
FS3-5	15 AF	720 415 01
FS6	4 AF	720 340 00

PARTS LIST FOR SMPS CONTROL BOARD 656 VERSION 1A

Printed Circuit Board Complete 656					107 562 21
IC1,3,4	TL431C				850 043 10
IC2	ULN2083A				850 208 30
IC5	CD4047B				850 404 70
IC6	LM2903				850 290 30
Q1,2,6,9	BC547B				840 054 70
Q3,4	BC557B				840 055 70
Q5,11,19	BC639				840 063 90
Q7	TIP42C				842 004 21
Q8,13,23	BD140				841 014 00
Q12,20	2N2907A				840 290 70
Q25	BRY39				844 003 90
D1,12	BZX79B9V1				832 799 10
D2-5,15,16,19, 24,25,49	1N4148				830 414 80
D7,8,21	BZX79C15				832 791 50
D9	BZX79B12				832 791 20
D10,14	BZX79B8V2				832 798 20
D17,18	BYV27-150				831 271 50
D20	BZX79B5V6				832 795 60
D27,28	BZX46C1V5				832 461 50
D29	BZX79B6V2				832 796 20
D31	BZX79C24				832 792 40
D45	TIL 220				823 000 02
D46	BZX79C39				832 793 90
RL1	RELAY				780 000 34
R1,47	10 kohm			Pot.	582 410 00
R2	44.2 kohm	1%	1/4W	MF	511 444 20
R3,9	2.7 kohm	5%	1/4W	Car.	501 327 00
R4,10,75	18 kohm	5%	1/4W	Car.	501 418 00
R5,48	39 kohm	5%	1/4W	Car.	501 439 00
R6	100 kohm	5%	1/4W	Car.	501 510 00
R7,8,13	10 kohm	5%	1/4W	Car.	501 410 00
R11,12,17	27 kohm	5%	1/4W	Car.	501 427 00
R14,15	150 ohm	5%	1/4W	Car.	501 215 00
R16,24	1.8 kohm	5%	1/4W	Car.	501 318 00
R18,23	511 ohm	1%	1/4W	MF	511 251 10
R19	15.4kohm	1%	1/4W	MF	511 415 40
R20,36,76	47 kohm	5%	1/4W	Car.	501 447 00
R21	3.9 kohm	5%	1/4W	Car.	501 339 00
R22	8.2 kohm	5%	1/4W	Car.	501 382 00
R25	30.1kohm	1%	1/4W	MF	511 430 10
R26	5.36 kohm	1%	1/4W	MF	511 353 60

PARTS LIST FOR SMPS CONTROL BOARD 656 VERSION 1A

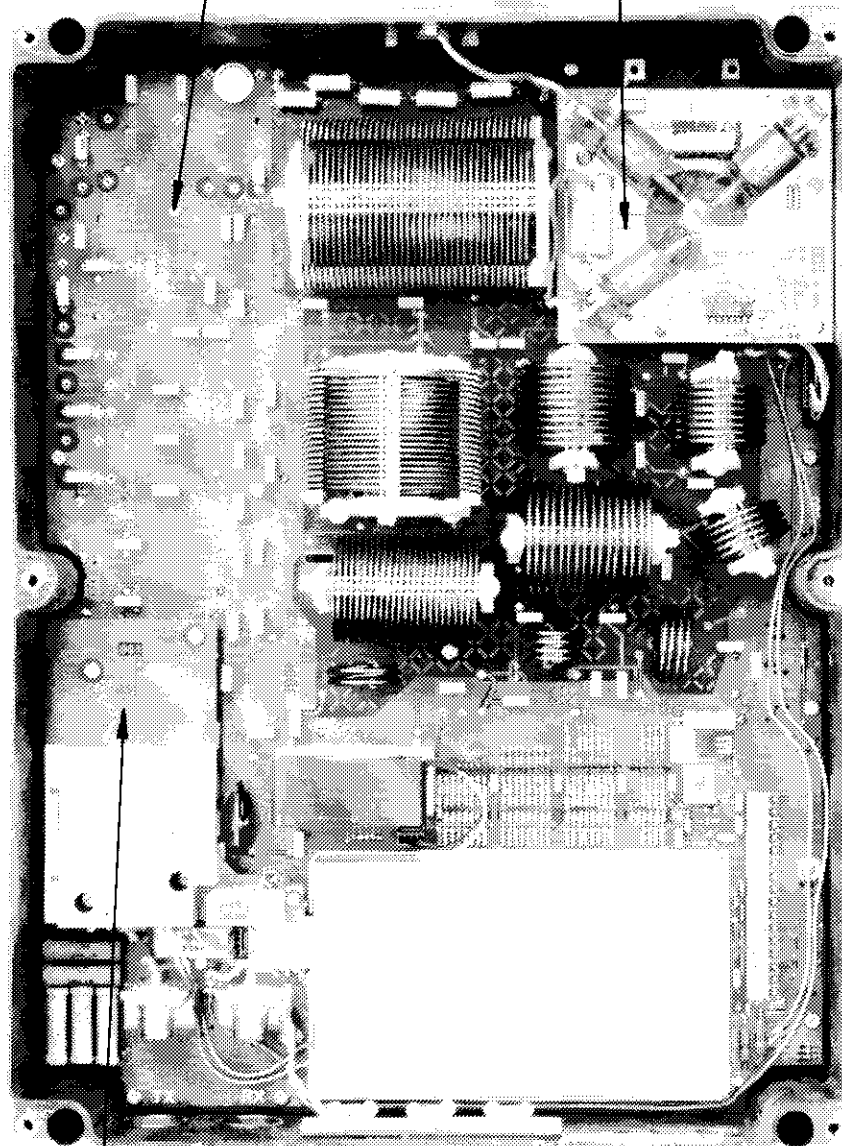
R27	1.96kohm	1%	1/4W	MF	511 319 60
R28,29	21.5kohm	1%	1/4W	MF	511 421 50
R30	4.7 kohm	5%	1/4W	Car.	501 347 00
R31,37	10 ohm	5%	1/4W	Car.	501 110 00
R32	365 ohm	1%	1/4W	MF	511 236 50
R33	270 ohm	5%	1/4W	Car.	501 227 00
R34,77	27.4kohm	1%	1/4W	MF	511 427 40
R35	0.18 ohm	2%	3W	ww	526 001 80
R39,41,43,45,78	1 kohm	5%	1/4W	Car.	501 310 00
R40,50	3.3 kohm	5%	1/4W	Car.	501 333 00
R42	3.9 ohm	5%	1/2W	MF	512 039 00
R44	22 ohm	5%	1/4W	Car.	501 122 00
R49	6.8 kohm	5%	1/4W	Car.	501 368 00
R51,52,64,67	220 ohm	5%	1/4W	Car.	501 222 00
R54,69	330 ohm	5%	1/4W	Car.	501 233 00
R55	12 ohm	5%	1.6W	MO	544 112 00
R70,73	51 ohm	5%	2.5W	MO	546 151 00
R72	1.5 kohm	5%	1/4W	Car.	501 315 00
R74	82 kohm	5%	1/4W	Car.	501 482 00
C1,8,14,16,19,23 34,36,39,40,41	0.1 uF	10%	63V	Polyes.	622 510 00
C6	1 nF	10%	63V	Cer.	602 310 02
C13,18,37	330 pF	1%	500V	Microp.	615 233 00
C10	33 uF	20%	10V	Sol.al.	651 733 01
C20	10 nF	+50-20%	100V	Cer.	602 410 01
C2,3	2.2 uF	20%	25V	Sol.al.	652 622 03
C35	47 uF	20%	25V	Sol.al.	652 747 01
C38	2.2 uF	20%	35V	Tan.	652 622 01
FS1,2	1A	SUPER FAST			720 310 02
PL1	5-pole	MOLEX			751 001 42
PL2,3	5-pole	MOLEX			751 001 31
PL4	2-pole	MOLEX			751 001 32

PARTS LIST FOR SMPS DRIVER BOARD 657 VERSION 1A

Printed Circuit Board Complete 657					107 565 71
Q10,18,21,22	2N2222A				840 222 20
Q24,26	BD646				842 064 60
D6,11	BAV21				830 002 10
D13,22	1N4148				830 414 80
D23,26	BYV28-200				831 002 80
D32-35	BYV27-150				831 271 50
R53	0.22 ohm	10%	1W	ww	523 002 20
R56,57	12 ohm	5%	1/4W	Car.	501 112 00
R58-61	68 ohm	5%	1/4W	Car.	501 168 00
R65,66,68,71	100 ohm	5%	1/4W	Car.	501 210 00
R79,80	270 ohm	5%	1/4W	Car.	501 227 00
R81,82	39 ohm	5%	1/2W	MF	512 139 00
R83	4.7 ohm	5%	1W	MO	544 047 00
C4,5,7	4.7 nF	20%	400V	Polycar.	625 347 00
C24-26	33 uF	20%	10V	Sol.al.	651 733 01

PCB 660 ANTENNA TUNING UNIT BORD

PCB 641 ANTENNA RELAY BORD



PCB 661 750W DIRECTIONAL COUPLER BOARD

ANTENNA TUNING UNIT 8750 WITH FRONT COVER REMOVED.

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TECHNICAL DESCRIPTION

PCB 660 ANTENNA TUNING UNIT BOARD

The ATU consists of a Tuning Network, a Measuring System and a Microprocessor Part. During the tune sequence a 6 dB attenuator is switched in to keep the load of the Power Amplifier at approx. 50 ohms. Simultaneously the power is feed through the low power directional coupler in the measuring system and the 750 W directional coupler is declutched. The MPU will set up the Tuning Network to give the best obtainable SWR, on basis of the measuring system. The Tuning Network comprises Capacitor Bank I, Capacitor Bank II and an Inductor Bank. With these it is possible to form either an L or a pi matching network. The capacitor Banks and the Inductor Bank are built up by binary related capacitors respectively binary related coils. The setting of the Capacitors and Coils is accomplished by relays. In the measuring system a Directional Coupler extracts information about forward and reflected RF-voltages. A 0 deg. Phasecomparator detects the phase difference between line and forward voltages, and the result is fed to the MPU via an Amplifier. A 90 deg. Phase-comparator detects the phase difference between forward and reflected voltages and the output is fed to the MPU via an Amplifier. Two detectors rectify forward and reflected voltages, and feed them to the MPU to calculate the SWR. The MPU choses the setting of the tuning network, on basis of the detector inputs. The output ports from the MPU are lead to the Port Expansions and Relay Drivers to control the Relays. The ATU is fitted with manual tuning switches for the 2182 kHz manual tune set-up (see chapter 5).

When a TUNE pulse is received from the Transceiver Unit the first steps, after the keying is inhibited are:

- to insert the 6 dB attenuator.
- to declutch the 750 W directional coupler and insert the directional coupler for the measuring system.
- to measure and store the reference voltages of the detectors.
- to send a Tune Power Request to the Transceiver Unit.

The next steps are:

- to reset the tuning set-up, i.e. all capacitors disconnected and all coils shortcircuited and bypassed. The bypass relay is incorporated to lower the inductance.
- to measure the antenna impedance.

Measuring of the antenna impedance involves the two phase-detectors. On basis of the detector outputs the MPU will define the antenna impedance to be in one of four possible impedance areas. From the 90 deg. phase-detector the MPU determines if the impedance Z is less or greater than 50 ohms, and from the 0 deg. phase-detector the MPU determines if the antenna is either inductive or capacitive. The four possible impedance areas and corresponding detector input voltages to the MPU are listed below. The detector voltages refer to V_{ref} which is for both detectors half the supply voltage, i.e. 2.5 V.

- | | |
|-----------------------------------|------------------------------|
| 1. Inductive or purely resistive: | 0 deg. detector \leq Vref |
| Z < 50 ohms: | 90 deg. detector > Vref |
| 2. Capacitive: | 0 deg. detector > Vref |
| Z < 50 ohms: | 90 deg. detector > Vref |
| 3. Capacitive: | 0 deg. detector > Vref |
| Z \geq 50 ohms: | 90 deg. detector \leq Vref |
| 4. Inductive or purely resistive: | 0 deg. detector \leq Vref |
| Z \geq 50 ohms: | 90 deg. detector \leq Vref |

Having located the antenna impedance to be in Area 1 the tuning procedure is: to increase the capacitance in Capacitor Bank I until the impedance is purely resistive (0 deg. detector \approx Vref).
to measure the admittance.

The admittance Y is separated in two areas.

1. $Y > 0.02$ mho: 90 deg. detector > Vref
2. $Y \leq 0.02$ mho: 90 deg. detector \leq Vref

For $Y > 0.02$ mho: Tuning procedure A is used: Capacitor Bank I is reset. By increasing the inductance in the Inductor Bank the impedance is transformed to lie as close as possible to Impedance Area 4 but with the impedance still being in Area 1. Then the capacitance in Capacitor Bank I is increased until Area 4 is reached, i.e. 90 deg. detector \leq Vref, and then the inductance is decreased until Impedance Area 1 is reached again. This increasing of capacitance and decreasing of inductance continues until the output from the 0 deg. detector > Vref. The antenna impedance is then transformed within one bit of resolution to constitute a pure resistance of 50 ohms, seen from the Power Amplifier.

The MPU finally calculates the SWR for the two nearest settings, chooses the best, and the tuning is completed.

For $Y \leq 0.02$ mho: Tuning Procedure B is used: Capacitor Bank I is reset, and by means of Capacitor Bank II the impedance is transformed to Impedance Area 2, i.e. 0 deg. detector > Vref and 90 deg. detector > Vref.

To optimize the efficiency, the MPU calculates the reflection coefficient ρ ($V_{\text{reflected}}$ divided by V_{forward}). If $\rho < 0.66$, the Tuning Procedure A is used to complete the tuning. The capacitance of Capacitor Bank II is retained. If $\rho \geq 0.66$, the capacitance of Capacitor Bank II is decreased until Impedance Area 3 is reached. Then the inductance of Inductor Bank is increased until Impedance Area 2 is reached again and so forth until $\rho < 0.66$. Now the Inductor Bank will be reset and Tuning Procedure A will take over and finalize the tuning. If the antenna impedance is located to be in Area 2, Tuning Procedure A is chosen.

If the antenna impedance is located to be in Area 3 the first steps are:
to increase the inductance of the Inductor Bank until the
impedance is purely resistive (0 deg. detector $\approx V_{ref}$).
to measure the admittance Y.
to reset the Inductor Bank.

For $Y > 0.02$ mho: Tuning Procedure A is used.

For $Y \leq 0.02$ mho: Tuning Procedure B is used.

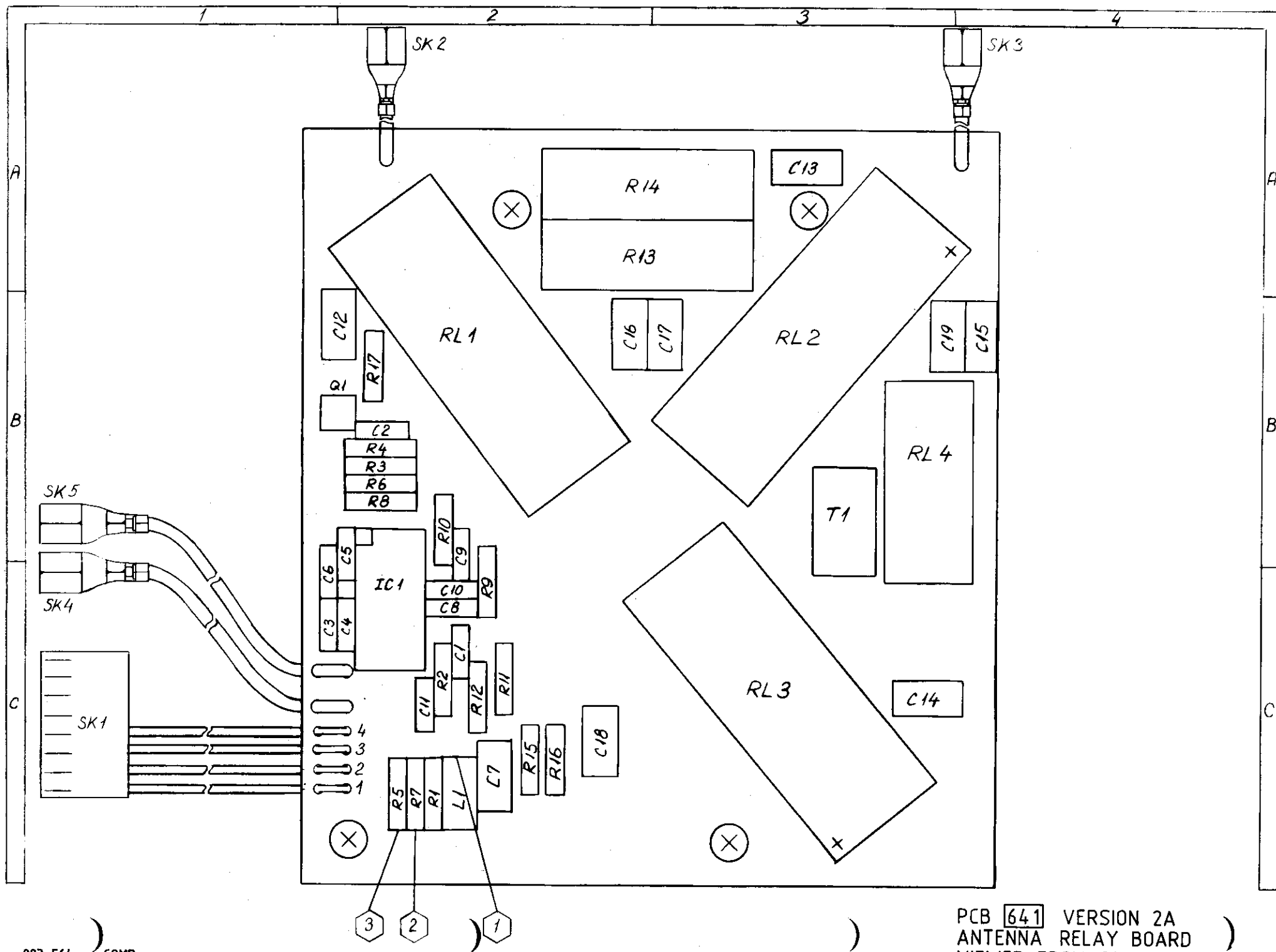
If the antenna impedance is located to be in Area 4, Tuning Procedure B is used.

When the tuning is completed, Tune Power Request is inhibited, the Tune Attenuator and low power directional coupler are declutched, the 750 W directional coupler is inserted and the ATU is ready for transmitting. Each Tuning Procedure is followed by an ALC adjust.

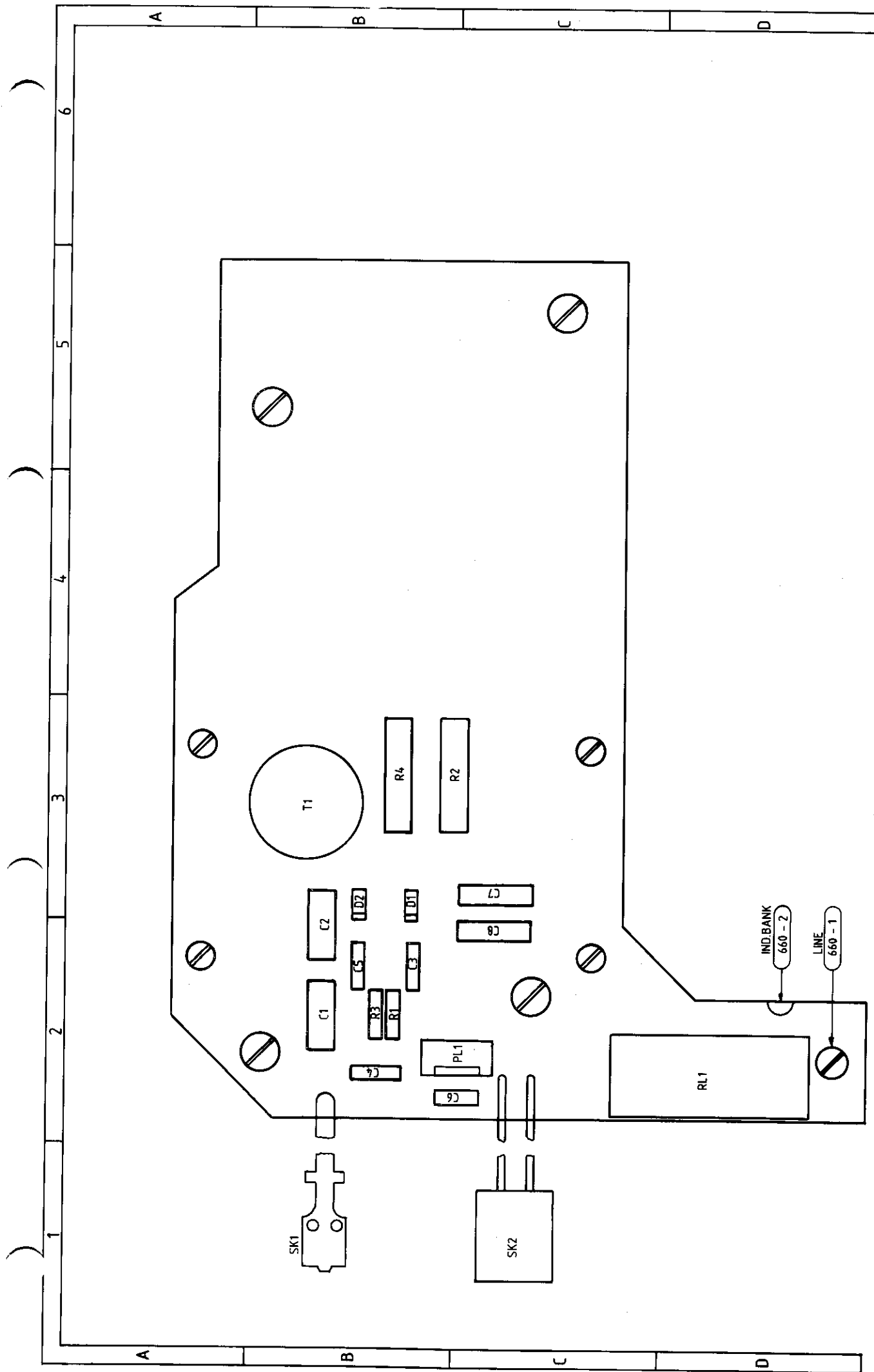
There are a few circuits incorporated in the ATU, not directly related to the tuning procedure. A current transformer at the antenna output terminal is used for measuring the antenna current. The transformed current is rectified, amplified and used as signal for the Antenna Current Display in the Control Unit. To prevent overload of the relays a current sensing transformer is incorporated. The output from the current transformer is rectified and fed to an amplifier. The output from this is led to the ALC circuit in the Transceiver Unit to decrease the output power if the maximum permissible current is exceeded. As a protection against excessive RF voltages in the ATU a capacitive divider is incorporated to measure the RF voltage at the antenna output. The voltage from the divider is rectified and led to the ALC circuit in the Transceiver Unit to decrease the output power if the maximum permissible voltage is exceeded. To prevent hot spot temperature in the ATU a fan is incorporated to cause circulation. The fan is controlled by a temperature sensor. To prevent overheating of the Antenna Tuning Unit a temperature sensor is incorporated which at excessive temperatures commands the Transceiver Unit to reduce the output power by 5 dB. The MPU constantly monitors the SWR at the input of the tuner and if it exceeds approximately 4 the Power Display Annunciator in the Control Unit starts to flash.

PCB 661 750 W DIRECTIONAL COUPLER

The 750 W Directional Coupler Board 661 constitutes a high power directional coupler which extracts two DC voltages directly related to the forward and reflected power. The MPU on 660 makes use of the DC voltages to calculate the SWR when transmitting. A relay is incorporated on Board 661 to declutch the 750 W directional coupler in Tune mode.



PCB 641 VERSION 2A
 ANTENNA RELAY BOARD
 VIEWED FROM COMPONENT SIDE



PCB 661
750W DIRECTIONAL COUPLER
VERSION 1A

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PARTS LIST FOR ANTENNA TUNING UNIT

Antenna Tuning Unit complete	108 700 20
PCB 660 ATU Board	107 566 01
PCB 661	107 566 11
PCB 641 Antenna Relay Board	107 564 11
PCB 644 50 ohm ATU Relay	107 564 41

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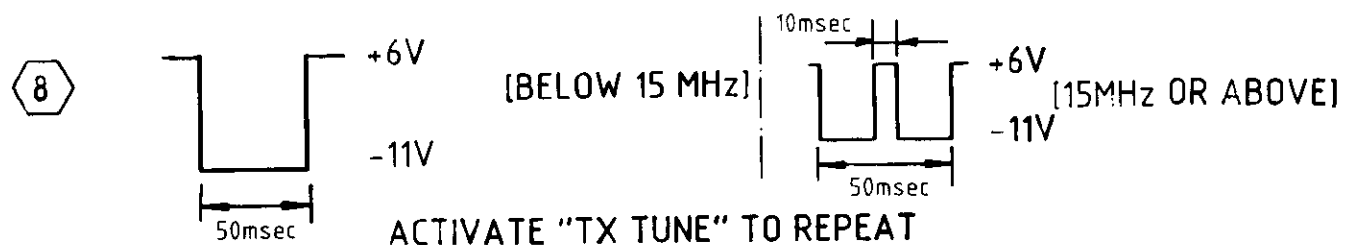
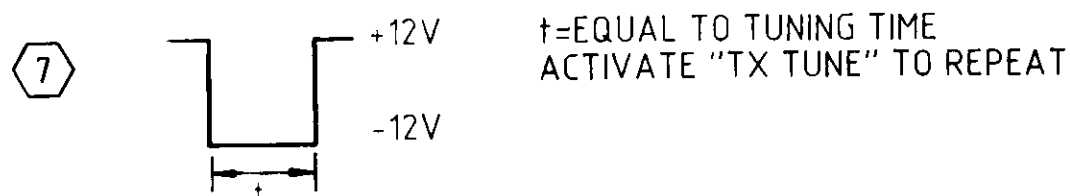
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TEST POINTS FOR ATU 8750 PCB 660

- 1 5V
- 2 24V
- 3 15V
- 4 5.3V
- 5 -15V

- 6 -12V ~ SWR < 4; +12V ~ SWR > 4



- 9 RX=5.5V TX-KEYED=-7.5V

- 10 -10V WHEN "TEST ALARM" AND IF DUMMY LOAD ENABLE
+6V DURING TEST

- 11 0.1V

- 12 0V

- 13 550V_{pp} ~ 750W_{pep} INTO 50 OHMS

TEST POINTS FOR 750W DIRECTIONAL COUPLER PCB 661

- 1 24V

TEST POINTS FOR 641 ANTENNA RELAY BOARD.

1 +15V

23 RX = 0.1V TX = 4.0V

PARTS LIST FOR ANTENNA TUNING UNIT BOARD 660 VERSION 8A

Printed Circuit Board Complete 660					107 566 01
IC1	LM317T				850 031 70
IC2	1489P				850 148 90
IC3	1488P				850 148 80
IC4	HPF505	Balanced mixer			850 000 11
IC5	MC1458N				850 145 80
IC6	LM358N				850 035 80
IC7	LM2901				850 290 10
IC8	MC68705R3CS				856 805 32
IC9-12	74C174				857 417 40
IC13-16	2003A				850 200 30
IC17	LM2903				850 290 30
Q1	2N5484				840 548 40
Q2-5	BF240				840 024 00
D1,2,7,12-41, 70,71	1N4148				830 414 80
D3-6,8,9, 49-53	SD101C				830 010 10
D10,11	BZX79B5V1				832 795 11
D42-48	Led CD464				823 000 06
X1	Xtal 4 MHz				812 000 00
RL1	Relay 24V				780 000 37
RL2-9,18-22	Reed Relay 2.5KV				373 588 61
RL10-17,24-29	Reed Relay 10KV				373 588 71
RL23	Reed Relay 5KV				373 588 41
F1	Fan				107 701 4X
R1	237 ohm	1%	1/4W	MF	511 223 70
R2	750 ohm	1%	1/4W	MF	511 275 00
R3,4	300 ohm	5%	5W	MO	547 230 00
R5,6	75 ohm	5%	5W	MO	547 175 00
R7	150 ohm		5W	MO	547 215 00
R8,16	75 ohm	1%	1/4W	MF	511 175 00
R9,11,31-33,39, 40,43	1 kohm	5%	1/4W	Car.	501 310 00
R10	121 ohm	1%	1/4W	MF	511 212 10
R12-14,57,58, 74,150,151	100 ohm	5%	1/8W	Car.	500 210 00
R15,144	27 ohm	5%	1/4W	Car.	501 127 00

PARTS LIST FOR ANTENNA TUNING UNIT BOARD 660 VERSION 8A

R17,35,36,148, 149	6.8 kohm	5%	1/4W	Car.	501 368 00
R18	4.7 kohm	5%	1/4W	Car.	501 347 00
R19	53.6 ohm	1%	1/4W	MF	511 153 60
R20,34,53-56, 145-147,85	100 ohm	5%	1/4W	Car.	501 210 00
R21,24	82.5 ohm	1%	1/4W	MF	511 182 50
R22	95.3 ohm	1%	1/4W	MF	511 195 30
R23	39 ohm	5%	2.5W	MO	546 139 00
R25	51 ohm	5%	2.5W	MO	546 151 00
R26	2.2 Mohm	5%	1/4W	MO	541 622 00
R27	2.2 kohm	5%	1/4W	Car.	501 322 00
R28	28.7 kohm	1%	1/4W	MF	511 428 70
R29	16.2 kohm	1%	1/4W	MF	511 416 20
R30,38,65	27 kohm	5%	1/8W	Car.	500 427 00
R37	43 kohm	5%	1/8W	Car.	500 443 00
R41,64	39 kohm	5%	1/8W	Car.	500 439 00
R42,45	82 kohm	5%	1/4W	Car.	501 482 00
R44	56 kohm	5%	1/4W	Car.	501 456 00
R46,47	39 kohm	5%	1/4W	Car.	501 439 00
R48,61-63,82	10 kohm	5%	1/8W	Car.	500 410 00
R49	18 kohm	5%	1/8W	Car.	500 418 00
R50,165	220 kohm	5%	1/8W	Car.	500 522 00
R51,52	470 ohm	5%	1/8W	Car.	500 247 00
R59,160,164	100 kohm	5%	1/8W	Car.	500 510 00
R60	33 kohm	5%	1/8W	Car.	500 433 00
R66,68	1 kohm	5%	1/8W	Car.	500 310 00
R67	120 kohm	5%	1/8W	Car.	500 512 00
R69	6.8 kohm	5%	1/8W	Car.	500 368 00
R70	3.3 kohm	5%	1/8W	Car.	500 333 00
R71,75	3.9 kohm	5%	1/8W	Car.	500 339 00
R72	56 kohm	5%	1/8W	Car.	500 456 00
R73	220 ohm	5%	1/8W	Car.	500 222 00
R76	330 ohm	5%	1/8W	Car.	500 233 00
R77	330 kohm	5%	1/8W	Car.	500 533 00
R78	820 ohm	5%	1/8W	Car.	500 282 00
R79	47 kohm	5%	1/8W	Car.	500 447 00
R80	5.6 kohm	5%	1/8W	Car.	500 356 00
R81	1.8 kohm	5%	1/8W	Car.	500 318 00
R83,166	270 kohm	5%	1/8W	Car.	500 527 00
R84	12 kohm			Sil	530 000 09
R86-113	10 ohm	5%	1/8W	Car.	500 110 01
R114-116	8.2 kohm			Sil	530 000 15
R117	8.2 kohm			Sil	530 000 14
R118-143,158,167, 172	56 ohm	5%	1/4W	Car.	501 156 00

PARTS LIST FOR ANTENNA TUNING UNIT BOARD 660 VERSION 8A

R152-156	3.3 Mohm	5%	1W	ww	523 633 00
R157,168,176	560 ohm	5%	1/4W	Car.	501 256 00
R159	12 kohm	5%	1/8W	Car.	500 412 00
R161	150 kohm	5%	1/8W	Car.	500 515 00
R162	1 Mohm	5%	1/8W	Car.	500 610 00
R163	4.7 kohm	5%	1/8W	Car.	500 347 00
R169,170,171	22 ohm	5%	1/4W	Car.	501 122 00
R173	33 ohm	5%	1/4W	Car.	501 133 00
R175	33 ohm	5%	1/4W	Car.	501 133 00
R177	33 ohm	5%	1/4W	Car.	501 133 00
R178	56 ohm	5%	1/4W	Car.	501 156 00
C1,2,5,8,18,26, 27,35,41,42,48,51, 57,60,62,63,65,71 71-82,201-204,218- 222	0.1 uF	10%	63V	Polyes.	622 510 00
C3	100 uF		25V		652 810 00
C4,24	680 pF	10%	63V	Cer.	602 268 00
C6,7,9,13-16,34, 36,49,50,54,59,61, 83-110,198-200, 213-216	10 nF	-20+50%	100V	Cer.	602 410 01
C10,11,113-128, 149-168,184-197, 207-212	0.1 uF	10%	100V	Polyes.	623 510 01
C12,22,31,33,112	1 nF	10%	63V	Cer.	602 310 02
C17,52,205,206,217	220 pF	10%	63V	Cer.	602 222 00
C19,25,30,32,37, 38,224	10 nF	10%	63V	Polyes.	622 410 01
C20	1.8 pF	+-0.25pF	400V	Cer.	605 018 00
C21	2.2 pF	+-0.25pF	400V	Cer.	605 022 00
C23,70	0.22 uF	10%	63V	Polyes.	622 522 01
C28,44,66-69,111, 229	4.7 nF	10%	63V	Cer.	602 347 02
C39,40	56 pF	2%	63V	Cer.	602 156 00
C43	68 nF	10%	63V	Polyes.	622 468 00
C45	1 uF	10%	63V	Polyes.	622 610 02
C46,47	47 nF	10%	63V	Polyes.	622 447 00
C53	39 pF	2%	63V	Cer.	602 139 01
C55	1.2 nF	10%	63V	Cer.	602 312 00
C56	180 pF	10%	63V	Cer.	602 218 00
C58	100 pF	2%	63V	Cer.	602 210 00

PARTS LIST FOR ANTENNA TUNING UNIT BOARD 660 VERSION 8A

C64	0.47 uF	10%	63V	Polyes.	622 547 01
C133	3950 pF	2%	1KV	Cer.	608 339 50
C141	36 pF	2%	2KV	Cer.	608 136 00
C142	70 pF	2%	2KV	Cer.	608 170 00
C143	136 pF	2%	2KV	Cer.	608 213 60
C144	260 pF	2%	2KV	Cer.	608 226 00
C145	520 pF	2%	1KV	Cer.	608 252 00
C146	1020 pF	2%	1KV	Cer.	608 310 20
C148	2010 pF	2%	1KV	Cer.	608 320 10
C177	870 pF	10%	2KV	Cer.	608 287 02
C178	450 pF	10%	2KV	Cer.	608 245 02
C179	240 pF	10%	2KV	Cer.	608 224 02
C180	124 pF	10%	2KV	Cer.	608 212 42
C181	60 pF	10%	2KV	Cer.	608 160 04
C182	30 pF	10%	2KV	Cer.	608 130 03
C183	15 pF	10%	2KV	Cer.	608 115 01
C223	0.68 uF	10%	63V	Polyes.	622 568 02
C225	3 pF	+-0.25pF	10KV	Cer.	608 003 00
C226,236,237	1000 pF	2%	100V		643 310 00
C228,230,231,234	2.7 nF	10%	63V	Cer.	602 327 00
C232	4.2 nF	2%			645 342 00
C233	2 nF	2%			645 320 00
C235	4 pF	0.5pF	4KV	Cer.	608 004 00
C238	2.2 nF	2%			645 322 00
C239	4.7 nF	10%		Cer.	602 347 02
L1	10 uH		RF Choke		740 110 00
L2-4	4.7 uH	10%	RF Choke		740 047 01
L5	100 uH		RF Choke		740 210 07
L6	10 uH	10%	RF Choke		740 110 01
L7	6.8 uH	10%	RF Choke		740 068 00
T1+T2	Directional coupler				107 600 8X
T3	Current transformer				103 578 63
T4	Antenna current transformer				103 633 93
SW1-3	Dil switch 16-pin				762 000 24
SW4	Dil switch 8-pin				762 000 26
SW5					762 000 23
SW6	Thermoswitch 85 C				769 000 05
SW7	Thermoswitch 50 C				769 000 04
PL1,3-7,13	Spade				750 001 51
PL2	8-pole Molex				751 000 98
PL9,11,12	4-pole				751 001 50
SK1,2	Socket SO 239 UHF				750 000 01
JP1	Jumper				750 000 29
TS1	Terminal strip 4 pcs.				770 000 19

PARTS LIST FOR ANTENNA RELAY BOARD 641 VERSION 2A

Printed Circuit Board Complete 641						107 564 11
IC1	2003					850 200 30
Q1	BC547					850 054 70
RL1	REED RELAY					373 589 81
RL2	REED RELAY					373 590 01
RL3	REED RELAY					373 590 0X
RL4	RELAY					780 000 35
R1	68 ohm	5%	1/4W	Car.		501 168 00
R5,7	100 ohm	5%	1/4W	Car.		501 210 00
R2	1.8 kohm	5%	1/4W	Car.		501 318 00
R3,6	2.7 kohm	5%	1/4W	Car.		501 327 00
R4	390 ohm	5%	1/4W	Car.		501 239 00
R8	3.3 kohm	5%	1/4W	Car.		501 333 00
R9-12	27 ohm	5%	1/4W	Car.		501 127 00
R13,14	22 ohm	5%	5W	MF		547 122 00
R15	47 kohm	5%	1/4W	Car.		501 447 00
R16	3.9 kohm	5%	1/4W	Car.		501 339 00
R17	10 kohm	5%	1/4W	Car.		501 410 00
C1-6,8-11	10 nF	-20+50%	63V	Cer.		602 410 02
C7,12-19	0.1 uF	10%	100V	Polyes.		623 510 01
L1	3.3 uH	10%				740 033 02
T1						103 580 21
SK1						106 602 70
SK2-5						106 602 80

PARTS LIST FOR PCB 661 750 W DIRECTIONAL COUPLER VERSION 1A

Printed Circuit Board Complete 661						107 566 11
D1,2	SD101C					830 010 10
RL1	Relay 24V					780 000 32
R1	10 kohm	5%	1/4W	Car		501 410 00
R2,4	22 ohm	5%	2.5W	MO		546 122 01
R3	15 kohm	5%	1/4W	Car		501 415 00
C1	10 pF	+/-0.5pF	500V	Mi		645 110 00
C2	560 pF	2%	500V	Mi		645 256 01
C3-6	4.7 nF	10%	63V	Cer		602 347 02
C7,8	0.1 uF	10%	100V	Polyes		623 510 01
T1	Transformer					103 626 92
PL1	Plug 4-pole					751 001 50
SK1,2	Set of cables					106 701 60

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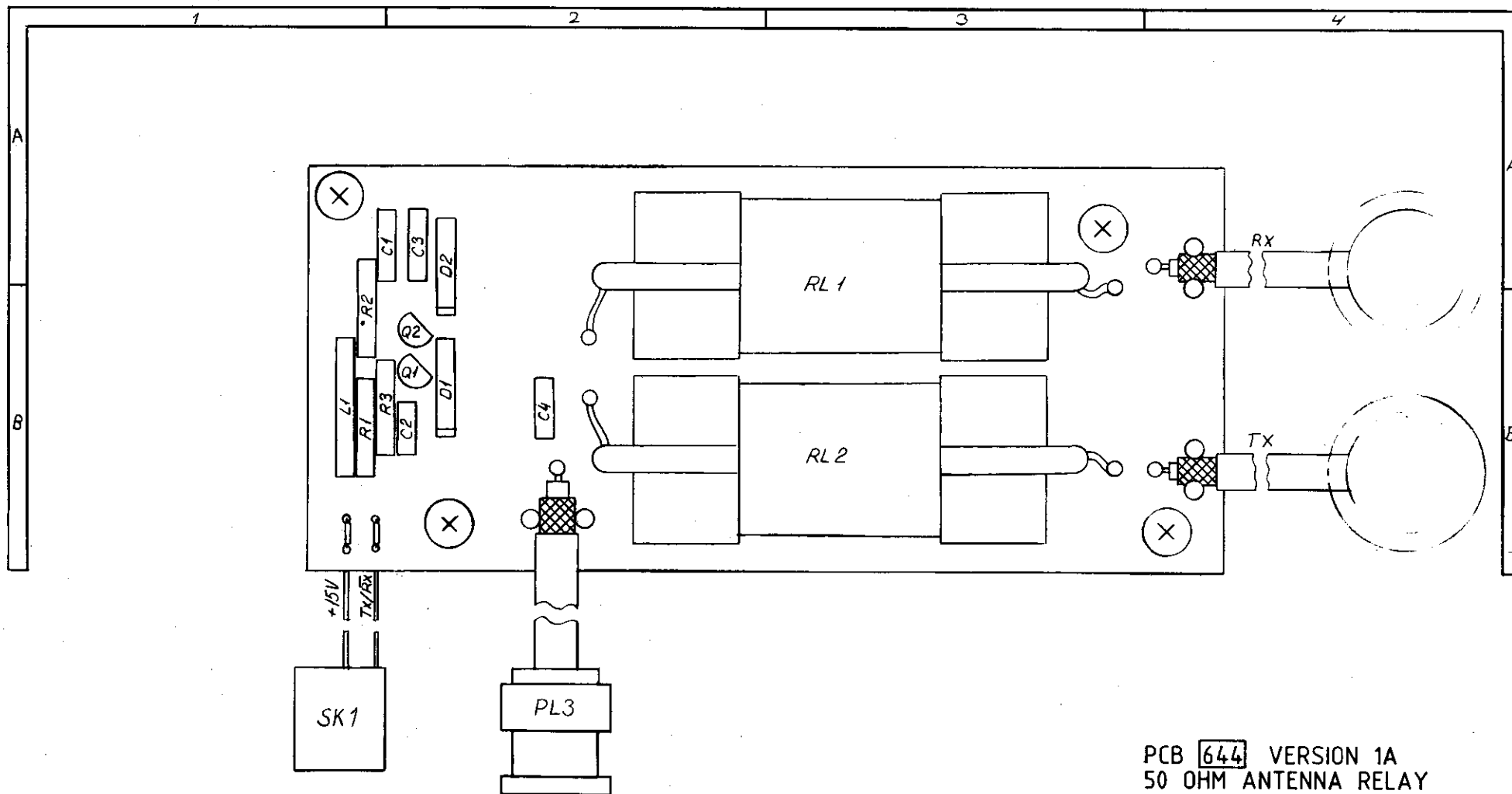
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TECHNICAL DESCRIPTION

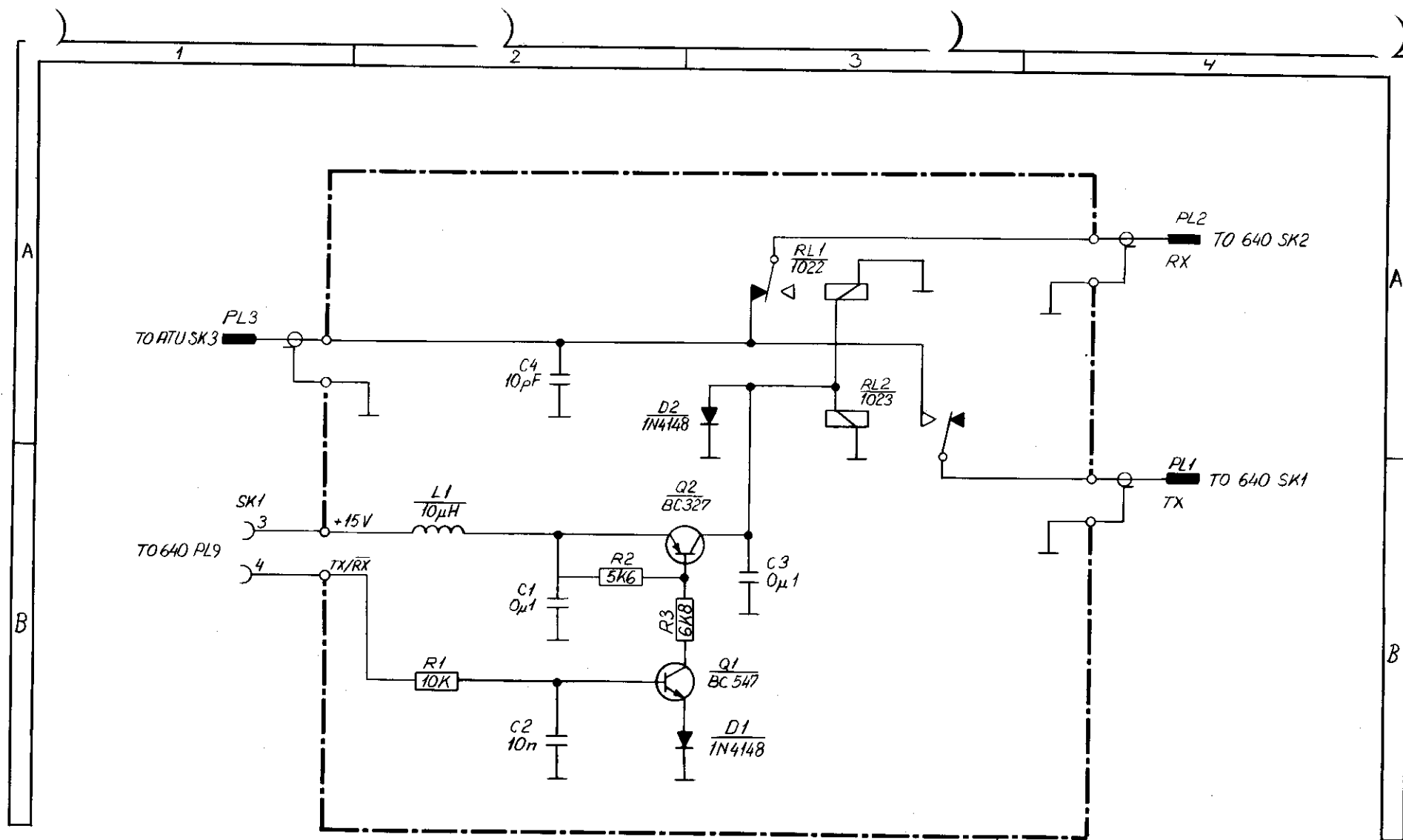
50 OHM ATU RELAY [644]

The ATU RELAY is a fast switching simplex relay (< 5 msec) which in combination with [630] requires only one coax cable to be connected between the TU and the ATU. The RELAY board is mounted inside the ATU and is controlled by PCB [660] .



993 564 4X COMP

PCB 644 VERSION 1A
50 OHM ANTENNA RELAY
VIEWED FROM COMPONENT SIDE



PARTS LIST FOR 50 OHM ATU RELAY BOARD 644 VERSION 1A

Printed Circuit Board Complete 644					107 564 41
Q1	BC547B				840 054 70
Q2	BC327				840 032 70
D1,2	1N4148				830 414 80
RL1	RELAY	1022			373 590 0X
RL2	RELAY	1023			373 589 8X
R1	10 kohm	5%	1/4W	Car.	501 410 00
R2	5.6 kohm	5%	1/4W	Car.	501 356 00
R3	6.8 kohm	5%	1/4W	Car.	501 368 00
C1,3	0.1 uF	10%	100V	Polyes.	623 510 01
C2	10 nF	-20+50%	100V	Cer.	602 410 01
C4	10 pF	+/-1/2pF	500V	Mi	645 110 00
L1	10 uH	1582/25			740 110 00
PL1,2	PLUG COAXCABLE				373 617 8X
PL3	PLUG COAXCABLE				373 617 9X
SK1	SOCKET 2-WIRE CABLE				106 605 50

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TECHNICAL DESCRIPTION

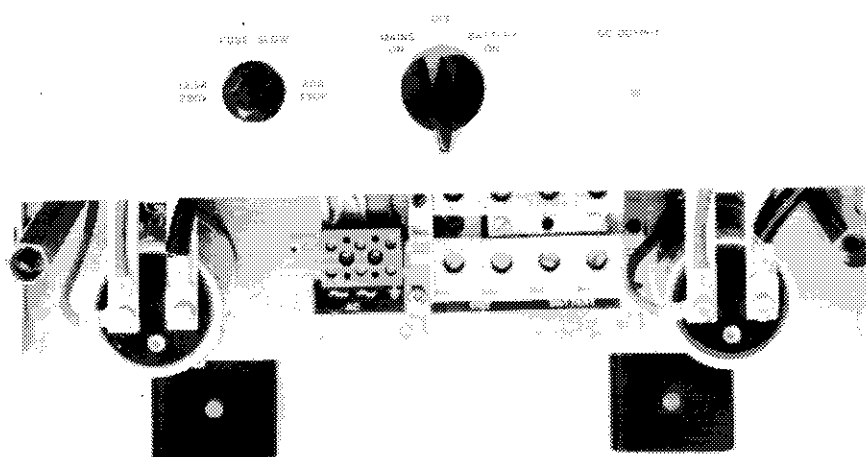
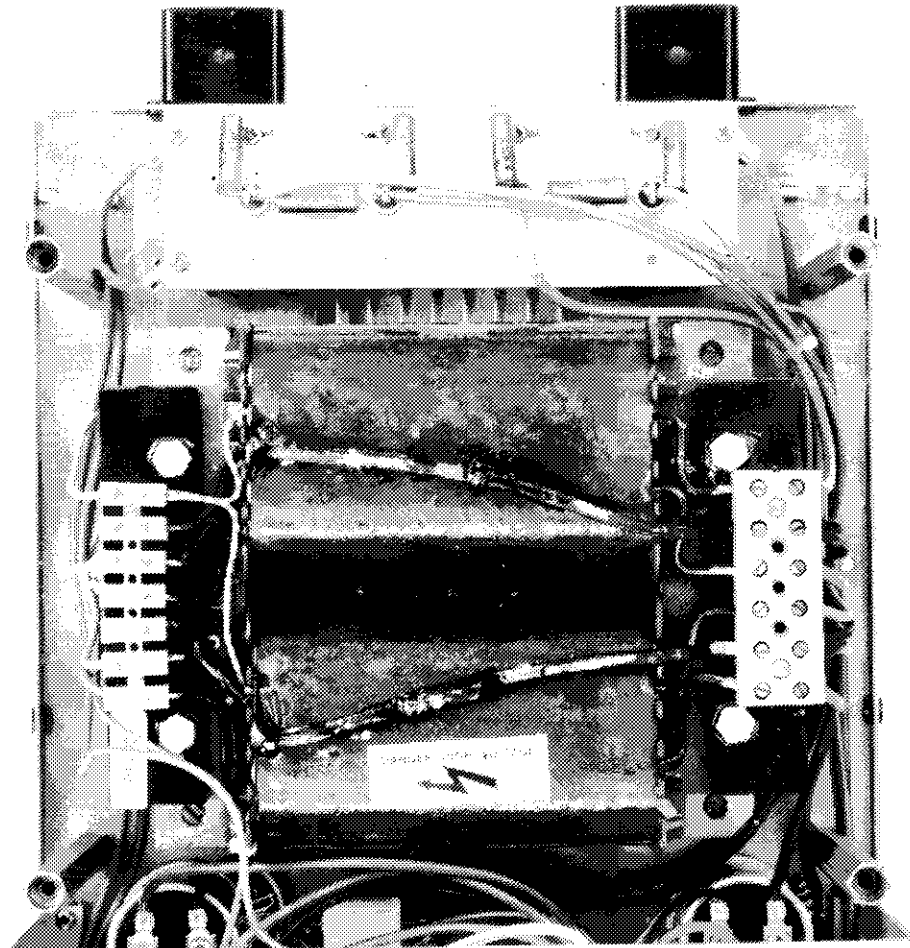
AC POWER SUPPLY UNIT P 8750

The P 8750 is a combined AC/DC Power Supply especially developed for powering the TRP 8750 D Series. The input power for P 8750 is AC, and the output is an unregulated 32 V DC voltage. Where a battery is required as a reserve source of electrical energy to the radiotelephone equipment, it can be connected via the P 8750 power supply. By means of the switch on the front panel it is possible to select between AC or Battery operation.

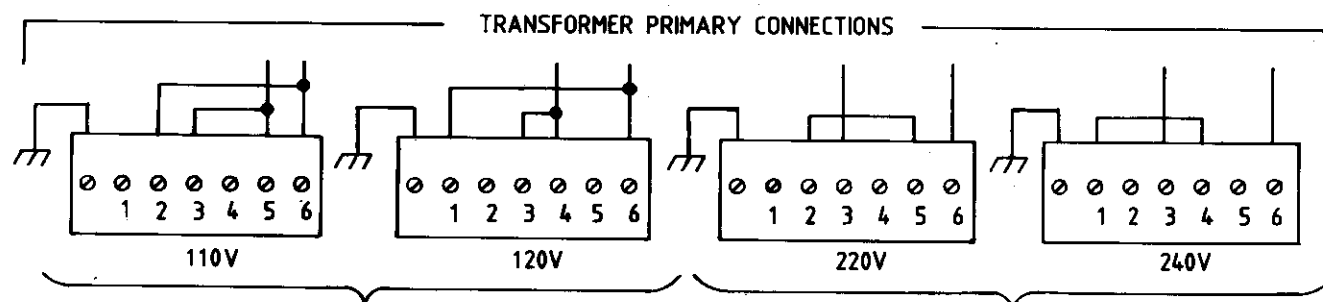
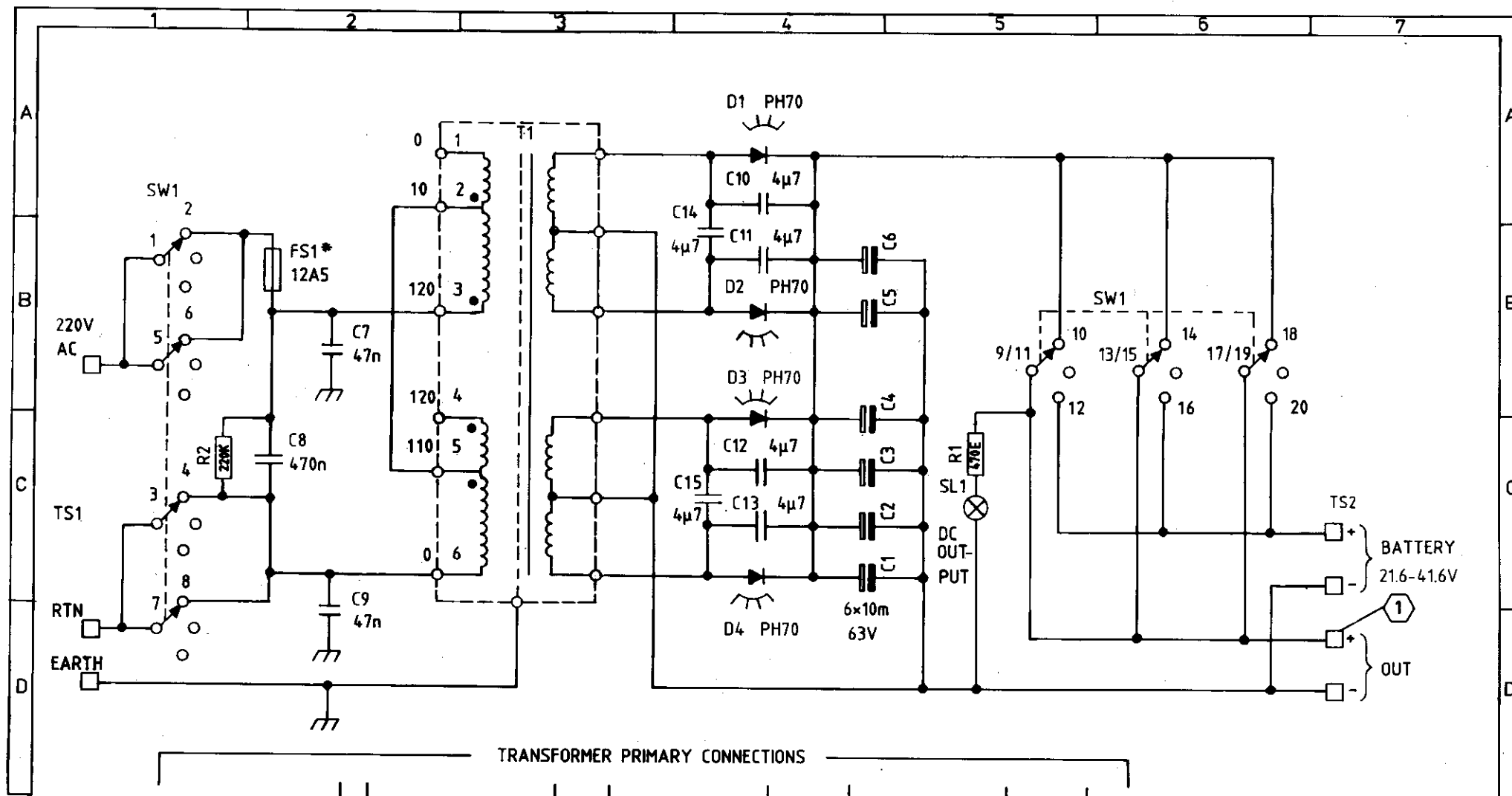
Primary connections of mains transformer: The primary connections of the mains transformer must be wired according to the diagram inside the cover of the unit depending on the mains voltage.

Fuse ratings: Only one fuse is used in the system, the Mains fuse FS1 on the front panel. From the factory the P 8750 is normally delivered wired for 220 VAC, and therefore the fuse mounted is a 12.5 A slow type. The fuse ratings are as follows:

Mains voltage (volt)	Fuse FS1 (size 6.3 X 32 mm)
110/120	25A (slow)
220/240	12A5 (slow)



AC POWER SUPPLY UNIT P 8750 WITH COVER REMOVED.



* FUSE FS1 25A

* FUSE FS1 12.5A

PARTS LIST FOR AC POWER SUPPLY UNIT P 8750 VERSION 1A

D1-4	PH70				831 007 00
R1	470 ohm	5%	2W	Carbon	503 247 00
R2	220 kohm	5%	2W	Carbon	504 522 00
C1-6	10000 uF		63V		652 910 51
C7,9	47 nF	10%	630V	Polyes	626 447 01
C8	470 nF	10%	630V	Polyes	626 547 01
C10-14	4.7 uF	10%	100V	Polyes	623 647 00
SL1	LAMP				754 000 04
T1	Transformer 1-phase				383 615 51
SW1	SWITCH				760 000 01
TS1	TERMINAL STRIP				770 000 14
TS2	TERMINAL STRIP			4 pcs.	770 000 36
FS1	Fuse 12.5 A slow blow				720 412 50

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TECHNICAL DESCRIPTION

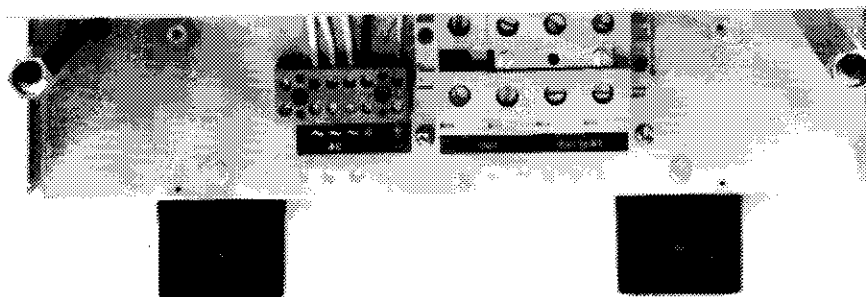
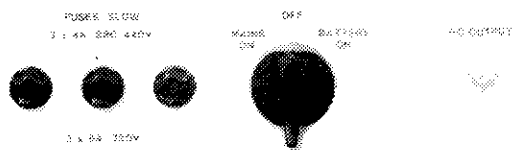
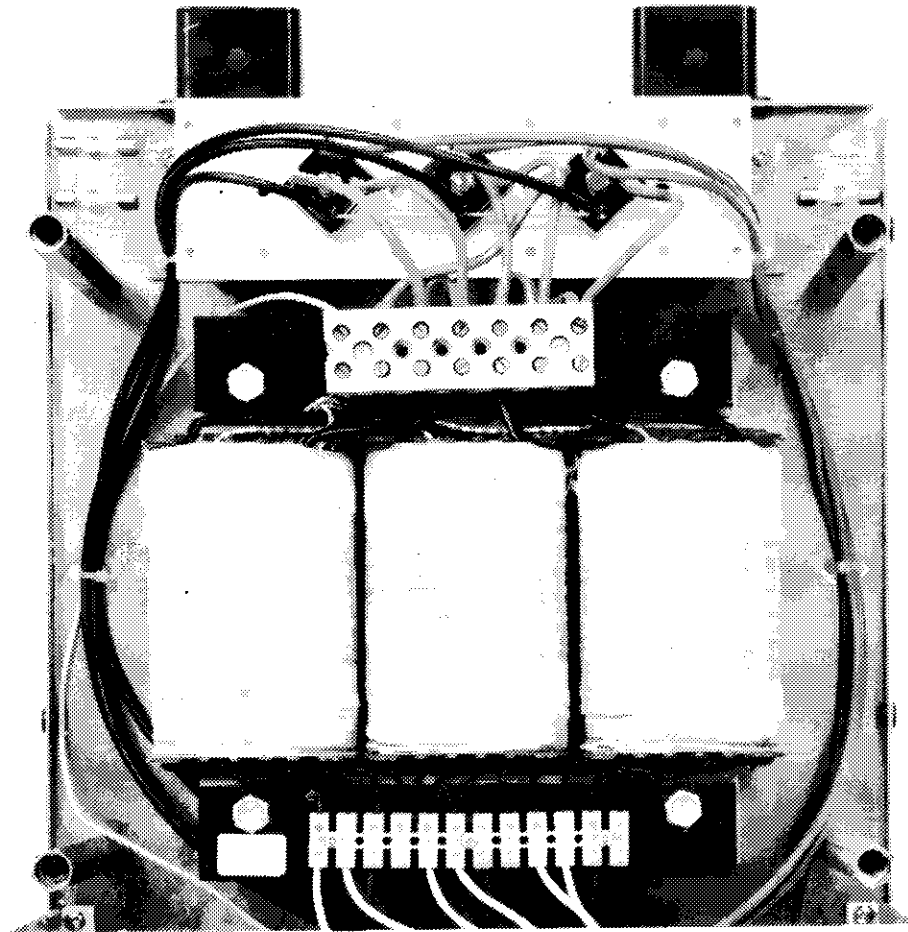
AC POWER SUPPLY UNIT P 8751

The P 8751 is a combined AC/DC Power Supply especially developed for powering the TRP 8750 D Series. The input power for P 8751 is 3-phase AC, and the output is an unregulated 32 V DC voltage. Where a battery is required as a reserve source of electrical energy to the radiotelephone equipment, it can be connected via the P 8751 power supply. By means of the switch on the front panel it is possible to select between AC or Battery operation.

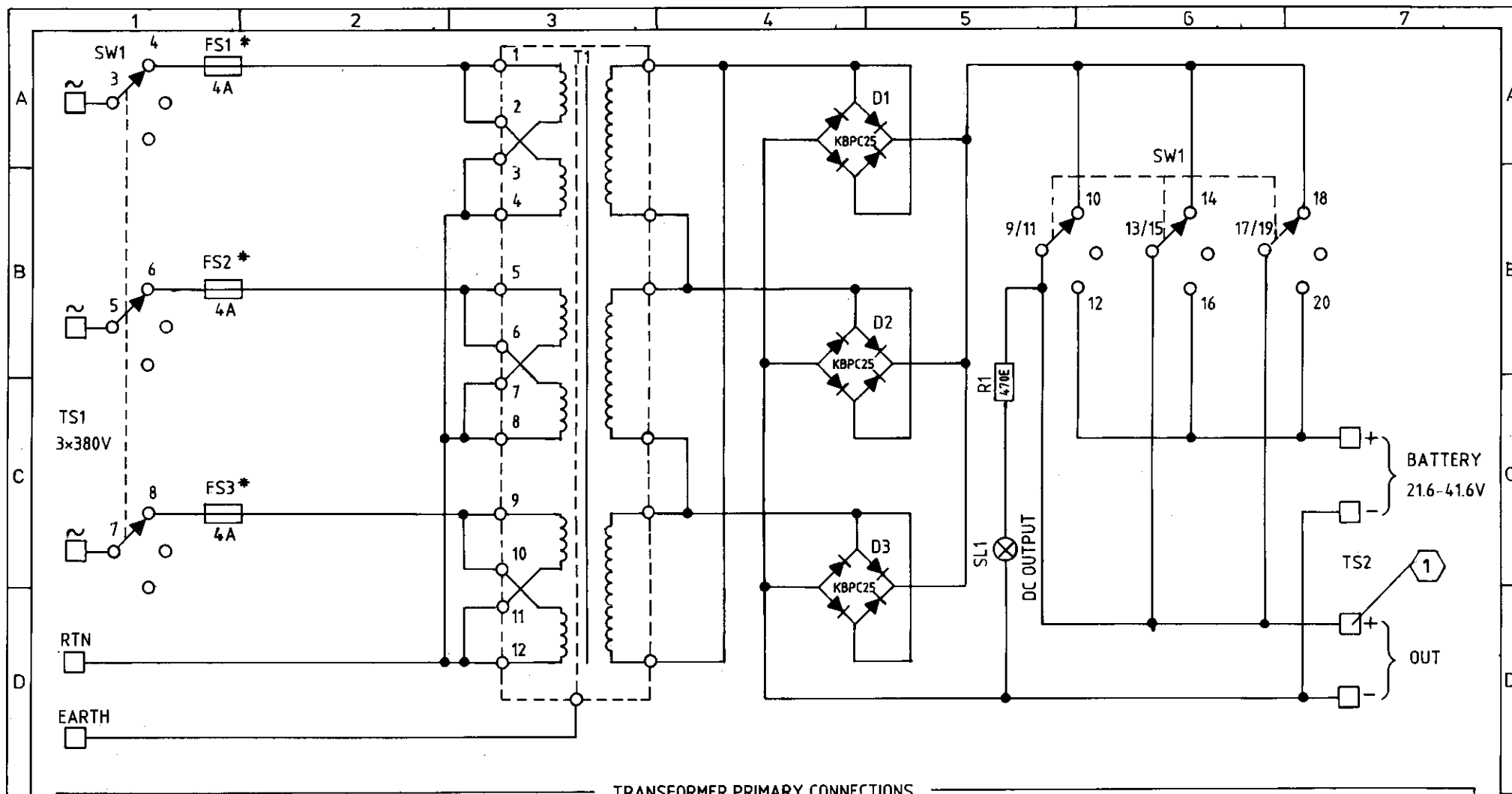
Primary connections of mains transformer: The primary connections of the mains transformer must be wired according to the diagram inside the cover of the unit depending on the mains voltage.

Fuse ratings: Three mains fuses are used in the system, FS1 - FS3, located on the front panel. From the factory the P 8751 is normally delivered wired for 3 x 380 V, and therefore the fuses mounted are 4 A slow types. The fuse ratings are as follows:

Mains voltage (volt)	Fuses FS1-FS3 (size 6.3 X 32 mm)
3 x 220	8A (slow)
3 x 380	4A (slow)
3 x 440	4A (slow)

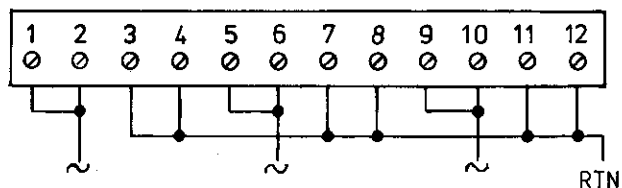


AC POWER SUPPLY UNIT P 8751 WITH COVER REMOVED.

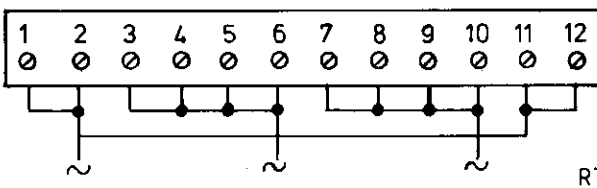


TRANSFORMER PRIMARY CONNECTIONS

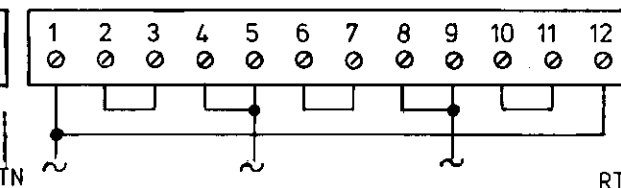
3x380V
* FUSES : FS1,FS2,FS3 : 3x4A SLOW



3x220V
* FUSES : FS1, FS2,FS3 : 3x8A SLOW



3x440V
* FUSES : FS1,FS2,FS3 : 3x4A SLOW



PARTS LIST FOR AC POWER SUPPLY UNIT P 8751 VERSION 2A

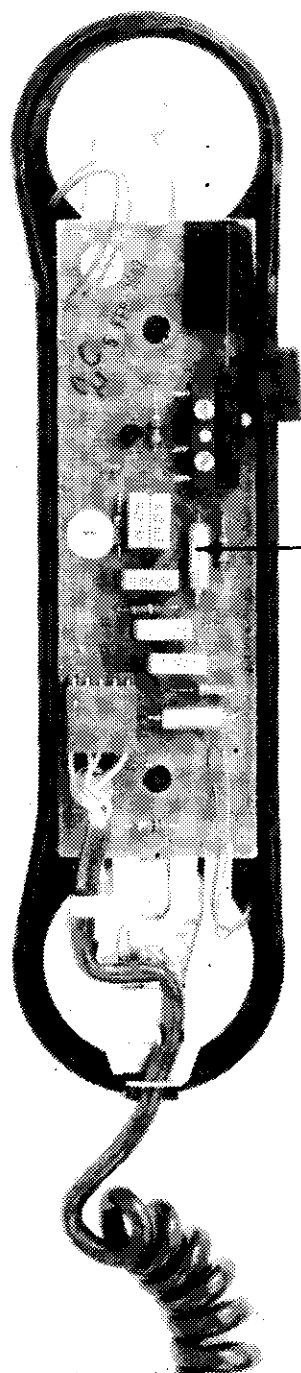
D1-3	KBPC25-02				831 250 20
R1	470 ohm	5%	2W	Carbon	503 247 00
C1-6	4.7 uF	10%	100V	Polyes.	623 647 00
SL1	LAMP				754 000 04
T1	TRANSFORMER 3-phase				383 615 61
SW1	SWITCH				760 000 01
TS1	TERMINAL STRIP				770 000 39
TS2	TERMINAL STRIP	4 pcs.			770 000 36
FS1-3	FUSE 4 AMP. SLOW BLOW				720 340 01

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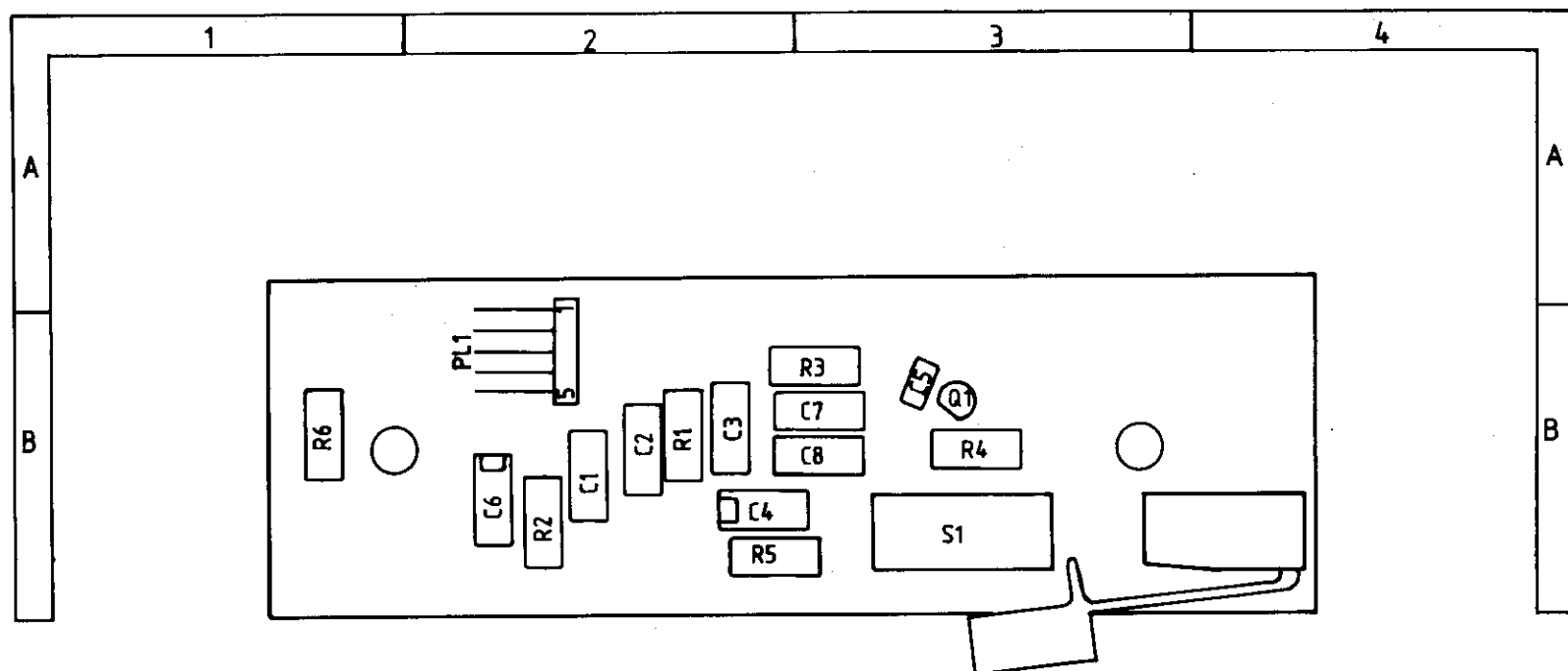
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PCB 450 MICROPHONE AMPLIFIER

HANDSET WITH COVER REMOVED.



993 445 0X

PCB **450** VERSION 2A
MICROPHONE AMPLIFIER
VIEWED FROM COMPONENT SIDE

PARTS LIST FOR MICROPHONE AMPLIFIER BOARD 450 VERSION 2A

Printed Circuit Board Complete 450					107 445 01
450C1	47nF	10%	100V	Polyes.	623 447 00
C2,3	10nF	10%	100V	Polyes.	623 410 00
C4,6	22uF	20%	15V	W.alum.	651 722 00
C5	1nF	10%	25V	Cer.	602 310 00
C7,8	0.22uF	5%	63V	Polyes.	622 522 02
450Q1	BC547B				840 054 70
450R1	22 kohm	5%	1/3W	Car.	501 422 00
R2	5.6 kohm	5%	1/3W	Car.	501 356 00
R3	820 ohm	5%	1/3W	Car.	501 282 00
R4	27 ohm	5%	1/3W	Car.	501 127 00
R5	150 ohm	5%	1/3W	Car.	501 215 00
R6	2.2 kohm	5%	1/3W	Car.	501 322 00
450S1	Micro Switch				764 000 05