SKANTI TRP 9500

500 Watt Radio Transceiver for MF/HF

Technical Manual

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1. INTRODUCTION Table of Contents

GENERAL DESCRIPTION

The TRP 9500 is a general purpose HF SSB transceiver designed for maritime applications covering the frequency range 1.6 - 30 MHz. The standard version offers simplex and semiduplex radiotelephone communication in the maritime mobile bands and is intended for installation in voluntarily as well as compulsorily fitted vessels. With the optional built-in DSC and Radiotelex the TRP 9500 forms a integrated communication system ideal for simplified GMDSS installations. The TRP 9500 can be fitted in the SKANTI COMBRIDGE communication system for GMDSS.

The TRP9500 consists of a compact Transceiver Control Unit, a fully remote controlled Transceiver Unit and an automatic Antenna Tuning Unit. The Transceiver Control Unit and the Transceiver Unit may be installed more than 100 m apart using standard screened cables. The distance between the Transceiver Unit and the Antenna Tuning Unit is up to100m requiring just one coaxial cable connection offering a simplified installation.

Up to 5 Control units are easily connected to the same transceiver unit increasing the flexibility of the installation.

The Transceiver Control Unit contains all receiver and transmitter operating controls. It is fully push-button controlled by means of a splash-proof keyboard with tactile and audible feed-back . The LCD-display shows several information including receive and transmit frequencies, the mode of operation and time of day. Back-light with dimmer function is included for both LCD-display and keyboard to ease operation in any light condition. Mode, receive and transmit frequency set-ups can be stored and recalled directly from keyboard or used in conjunction with the 10 scan programs. Sweeping of a selected frequency range is also possible with the sweep function.

Where required by authorities transmitter frequencies can be preprogrammed into a PROM allowing transmission only on these frequencies. The compact Transceiver Control Unit is easily installed horizontally as well as vertically and with the optional rotatable wedge tilted to fit any installation.

The Transceiver Unit contains all receiver and transmitter circuitry and all connections for external equipment. The standard equipment has a built-in two-tone alarm generator and single key selection of 2182kHz. A squelch circuit, an low noise RF-amplifier and RF-attenuator are also included. The transceiver is fully synthesized and the receiver may be tuned in selectable steps of 1kHz, 100Hz and 10Hz.

The fully protected solid state 500W Power Amplifier, cooled by forced convection, matches a 50 ohms antenna system, but is normally used in connection with the Antenna Tuning Unit.

In the standard version, the transmitter covers the marine bands between 1.6 to 30MHz, but an optional PA-filter is available which give continuous coverage of the frequency range 1.6 to 30MHz.

The microprocessor controlled Antenna Tuning Unit tunes to automatically all antennas between 7 and 18 meters and requires no presetting at the installation. The typical tune time is reduced to 0.5s.

The TRP 9500 is designed for 24V DC operation but will operate on the wide supply voltage range 10.8V - 41.6V DC. Mains operation is possible with the optional AC-power supply.

The built-in test facilities and easy-to-replace module design of the TRP 9500 simplifies the service concept.

BASIC VERSIONS

TRP 9500 Marine HF-SSB Radio System

- 500 Watt P.E.P. Power Amplifier.
- Simplex / Semi-duplex operation.
- 896 Pre-Programmable Frequencies. Free RX Frequency.
- ITU Frequencies Pre-Programmed.
- Marine Bands: 1.6 - 30MHz.
  (1.60-4.80MHz, 6.20-8.95MHz, 12.23-17.65MHz,18.78-27.10MHz)
- Labelling of Units. Transceiver Control Unit Type TCU 9000 S, Transceiver Unit Type TU 9500 S, Antenna Tuning Unit Type ATU 9500.

TRP 9501 Marine HF-SSB Radio System

- 500 Watt P.E.P. Power Amplifier.
- Simplex / Semi-duplex operation.
- Free TX frequency selection in marine bands. Free RX Frequency.
- ITU Frequencies Pre-Programmed.
- Marine Bands: 1.6 - 30MHz.
  (1.60-4.80MHz, 6.20-8.95MHz, 12.23-17.65MHz,18.78-27.10MHz)
- Labelling of Units. Transceiver Control Unit Type TCU 9000 S, Transceiver Unit Type TU 9501 S, Antenna Tuning Unit Type ATU 9500.

TRP 9502 Marine HF-SSB Radio System with CW facility

- 500 Watt P.E.P. Power Amplifier.
- Simplex / Semi-duplex operation.
- CW operation
- Free TX frequency selection in marine bands. Free RX Frequency.
- ITU Frequencies Pre-Programmed.
- Marine Bands: 1.6 - 30MHz.
  (1.60-4.80MHz, 6.20-8.95MHz, 12.23-17.65MHz,18.78-27.10MHz)
- Labelling of Units. Transceiver Control Unit Type TCU 9002 S, Transceiver Unit Type TU 9502 S, Antenna Tuning Unit Type ATU 9500.

TRP 9503 Marine HF-SSB Radio System

- 500 Watt P.E.P. Power Amplifier.
- Simplex / Semi-duplex Operation.
- Free TX Frequency Selection 1.6 - 30MHz. Free RX Frequency.
- ITU Frequencies Pre-Programmed.
- Labelling of Units. Transceiver Control Unit Type TCU 9000 S, Transceiver Unit Type TU 9503 S, Antenna Tuning Unit Type ATU 9500.

TRP 9504 General Purpose HF-SSB Radio System

- 500 Watt P.E.P. Power Amplifier.
- Simplex / Semi-duplex operation.
- Free TX Frequency Selection 1.6 - 30MHz. Free RX Frequency.
- Labelling of Units. Transceiver Control Unit Type TCU 9004 S, Transceiver Unit Type TU 9504 S, Antenna Tuning Unit Type ATU 9500.

TRP 9505 General Purpose HF SSB-Radio System with CW facility

- 500 Watt P.E.P. Power Amplifier.
- Simplex / Semi-duplex operation.
- CW operation
- Free TX Frequency Selection 1.6 - 30MHz. Free RX Frequency.
- Labelling of Units. Transceiver Control Unit Type TCU 9005 S, Transceiver Unit Type TU 9505 S, Antenna Tuning Unit Type ATU 9500.

TRP 9507 Marine HF-SSB Radio System with CW facility

- 500 Watt P.E.P. Power Amplifier.
- Simplex / Semi-duplex Operation.
- CW operation
- Free TX Frequency Selection 1.6 - 30MHz. Free RX Frequency.
- ITU Frequencies Pre-Programmed.
- Labelling of Units. Transceiver Control Unit Type TCU 9002 S, Transceiver Unit Type TU 9507 S, Antenna Tuning Unit Type ATU 9500.

TECHNICAL DATA

GENERAL

Complies with the relevant IMO performance standards, the ITU Radio Regulations, the relevant ITU-R recommendations and meets the performance specifications of ETSI and CEPT. Complies with the relevant CE-marking standards.

Frequency Range:
1.6 - 30 MHz

Frequency Generation:
True digital frequency synthesis.

Frequency Selection:
Direct by the keyboard.
Up to 896 single pre-programmed frequencies with direct recall of the first 200.
All relevant ITU frequencies.
GMDSS Safety and Distress frequencies.
100 user-programmable channels (RX/TX frequency pair).
Single key selection of 2182 kHz
Scanning facilitiy
Sweep facility

Frequency Presentation:
Backlit LCD display with simultaneous presentation of receive and transmit frequencies.

Frequency Stability:
0.35 ppm
0.1 ppm (optional)
Aging: Less than 1 ppm/year

Operating Modes:
Simplex and semiduplex
SSB: Upper sideband suppressed carrier (J3E, USB). Same as USB.
LSB: Lower sideband suppressed carrier (J3E, LSB).
R3E: Upper sideband reduced carrier (R3E).
AM: Reception/Transmission: Compatible AM single sideband full carrier (H3E).
Reception: Double sideband full carrier (A3E).
TLX: Reception/Transmission: Single sideband suppressed carrier with modulating sub-carrier (J2B).
Sub-carrier user-programmable from 1500 Hz to 2950 Hz, default 1700 Hz.
Reception: Frequency shift keyed carrier (F1B).
CW: Morse telegraphy keyed carrier(A1A)

Displayed Frequency:
Operating modes SSB (USB), LSB, R3E, AM: Carrier Frequency.
Operating mode TLX: Upconverted sub-carrier frequency
Operating mode CW: Carrier frequency

Other Facilities:
Real time clock
User-programmable Sleep Timer with up to 10 setups
Built-in selftest programme
Continouosly operating Power and Protection Monitor.

Supply Voltage:
10.8 VDC - 41.6 VDC

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

Compass Safe Distance:
Refer to table at page 1-10

RECEIVER CHARACTERISTICS

Frequency Range:
100 kHz to 30 MHz (10 kHz to 150 kHz with reduced performance).

Frequency Resolution:
100 Hz by keyboard entry. 10 Hz, 100 Hz or 1 kHz with the search/fine tuning facility.

Antenna Impedance:
50 ohm. Automatically matched by the Antenna Tuning Unit.

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

IF Selectivity:
SSB: 350 Hz to 2.7 kHz
AM: +/- 3 kHz
TLX: +/- 150 Hz (optional)
CW: +/- 150 Hz, +/- 1.20 kHz and +/- 3.00 kHz (relevant versions only)

Sensitivity:
Antenna input for 10 dB SINAD, 50 ohm antenna.
SSB: 0.6 µV
AM: 4 µV
TLX: 0.25µV
CW: 0.25 µV with +/- 150 Hz bandwidth
When HiSens is selected, the sensitivity is increased by approx. 5 dB.

Out-of-band Intermodulation:
Two 93 dBµV signals more than 30 kHz off tune produces less output than an equivalent input signal of 30 dBµV.

In-band Intermodulation:
Less than -40 dB.

Cross Modulation:
Unwanted signal of 105 dBµV/30%-400Hz more than 20 kHz offset from receiver frequency, produces cross modulation less than -30dB relative to wanted signal of 60 dBµV/SSB.

Blocking:
With a wanted signal of 60 dBµV, an unwanted signal 20 kHz off tune 110 dBµV will affect the output level by less than 3 dB or cause a reduction in SINAD of less than 6 dB (SSB).

Reciprocal Mixing:
With a wanted signal giving 20 dB SINAD, an unwanted signal 20 kHz off tune and 80 dB above the wanted signal level will cause less than 6 dB reduction in SINAD (SSB).

Image Rejection:
Greater than 80 dB.

IF Rejection:
Greater than 80 dB.

Spurious Response Rejection:
Greater than 80 dB.

Internally Generated Spurious Signals:
Less than 5 dB SINAD (SSB).

Spurious Emission:
Less than 20 pW/50 ohm at antenna connector

RF-Amplifier:
HiSens selected: Gain 12 dB
HiSens not selected: Gain 0 dB

RF-Attenuator:
Att selected: Attenuation 20 dB
Att not selected: Attenuation 0 dB

Squelch:
Voice controlled squelch.

Line Output :
-10 dBm to +10 dBm, 600 ohm.

Audio Output Power:
Internal speaker: 6 W with less than 10% distortion.
External speaker: 6 W in 8 ohm with less than 10% distortion.

TRANSMITTER CHARACTERISTICS

Output Power:
500 W PEP +/-1.4 dB into 50 ohm

Single Tone max. Power:
500 W CW +/-1.4 dB into 50 ohm for a duty cycle less than 55% and a modulation rate greater than 3 baud.
Reduction to 400 W after continuously keyed during 1 min.. Automatic full power recovery after 1 min..

Power Reduction:
Medium: 250 W, 125 W or 50 W (user-programmable, default 125 W)
Low: approx. 20 W

Frequency Range:
1.605 MHz - 30 MHz

Frequency Resolution:
100 Hz step

Intermodulation:
Better than -31 dB PEP in standard two-tone test

Hum and Noise:
Less than -50 dB PEP (SSB)

Spurious Emissions:
Less than 43 dB/PEP, typical better than 60 dB/PEP

Supression of Unwanted Sideband:
Greater than 60 dB/PEP (1 kHz, SSB)

Line Input:
-10 dBm to +10 dBm, 600 ohm

ANTENNA TUNING UNIT

Frequency Range:
1.605 MHz - 30 MHz

Antenna Requirements:
7 - 18 m wire or whip antenna

Antenna Tuning:
Fully automatic with no presetting

Tuning Speed:
0.5 - 2 sec.

Input Impedance:
Nominel 50 ohm

Power Handling Capability:
500 W PEP, voice or ARQ radiotelex
400 W CW

REMOTE CONTROL

LINE, KEY CONNECTORS

Line Input

Input Impedance:
600 ohm, balanced with center tap
Galvanic isolated

Input Level:
-10 to +10 dBm

Line Output

Output Impedance:
600 ohm, balanced with center tap
Galvanic isolated

Output Level:
0 dBm +/- 10 dB adjustable

COM AND PRN/RCI CONNECTORS

Data Interface

Interface Type:
RS-232-C with optical isolation

Interface Protocol:
Remote Control using the T+Bus Protocol.
Full Remote Control using the NMEA 0183 protocol.

Total System Delay in TLX mode

$\overline{\text{Ext key}}$ on to TX audio in: ≥ 5 ms

TX audio end to $\overline{\text{Ext key}}$ off: 0 ms

$\overline{\text{Ext key}}$ off to RX audio ready: typ. 9 ms

Scan Program Start/stop Input

Scan Start:
Programmable to negative or positive transition

Scan Stop
Programmable to negative or positive transition

Sweep Program Start/Stop Input

The scan start/stop input can alternatively be coupled to the sweep programme in the TRP 9500.

Sweep Start
Programmable to negative or positive transition

Sweep Stop
Programmable to negative or positive transition

POWER REQUIREMENTS

Supply Voltage:
10.8 V DC to 41.6 V DC.
Output reduction below 13 V.

Power Consumption (approx. at 24V DC):
RX: 75 W
TX SSB unmodulated: 125 W
TX SSB 2 tones: 925 W
TX DSC, FEC Telex: 1350 W

DIMENSIONS AND WEIGHTS

Transceiver Control Unit:
Width: 374 mm
Height: 213 mm
Depth: 124 mm
Weight: 3.4 kg

Transceiver Unit:
Width: 495 mm
Height: 696mm
Depth: 356 mm
Weight: 54 kg, approx.

Antenna Tuning Unit:
Width: 401 mm
Height incl. antenna horn: 617 mm
Depth: 171 mm
Weight: 17 kg,approx.

Compass safe distance:

Compass safe distance in accordance with ISO/R 694 are given below in metres.

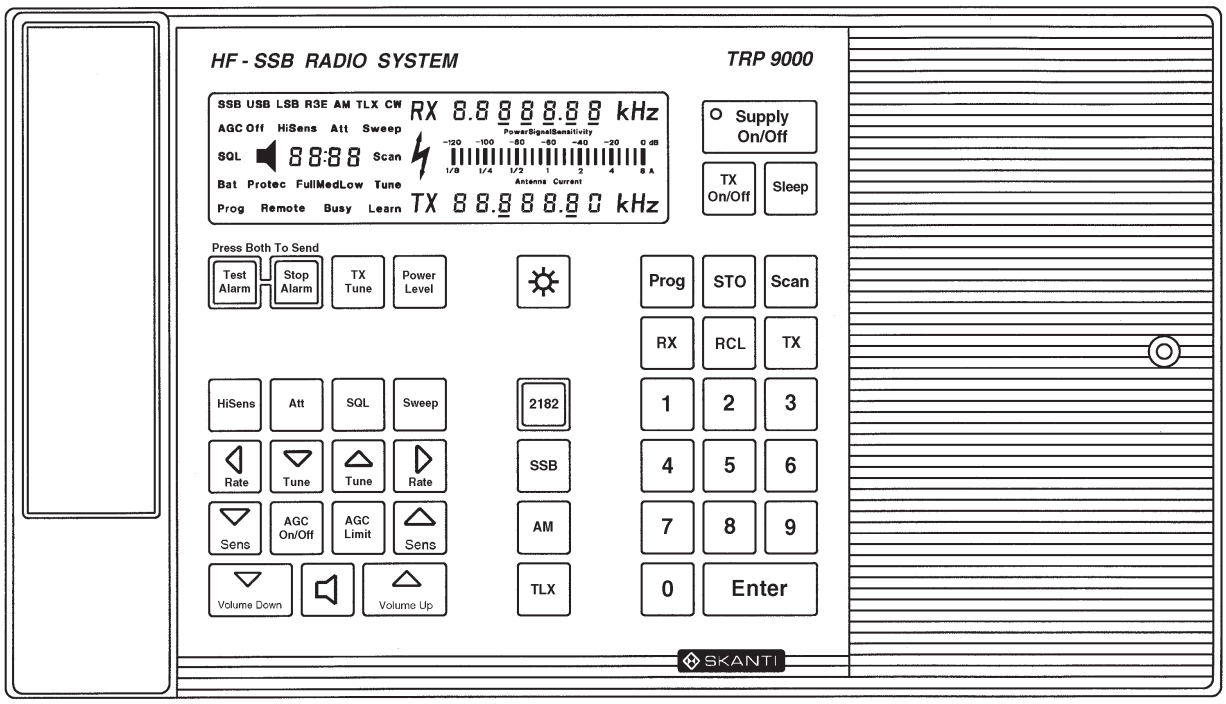
Unit	Standard 5.4 /H	Steering 18 /H
TCU 9500	2.0	1.5
TU 9500	2.4	1.6
ATU 9500	1.0	0.6
DCU 9000	1.1	0.8
PC 9000	0.3	0.3
PRN 9000	0.9	0.5
P 8750	2.2	1.4
P 8751	2.1	1.4

All distances have been rounded up to the nearest 0.1 metres in order to allow for the maximum deviation which might be caused by the most offensive sample of all units manufactured

2. OPERATION Table of Contents

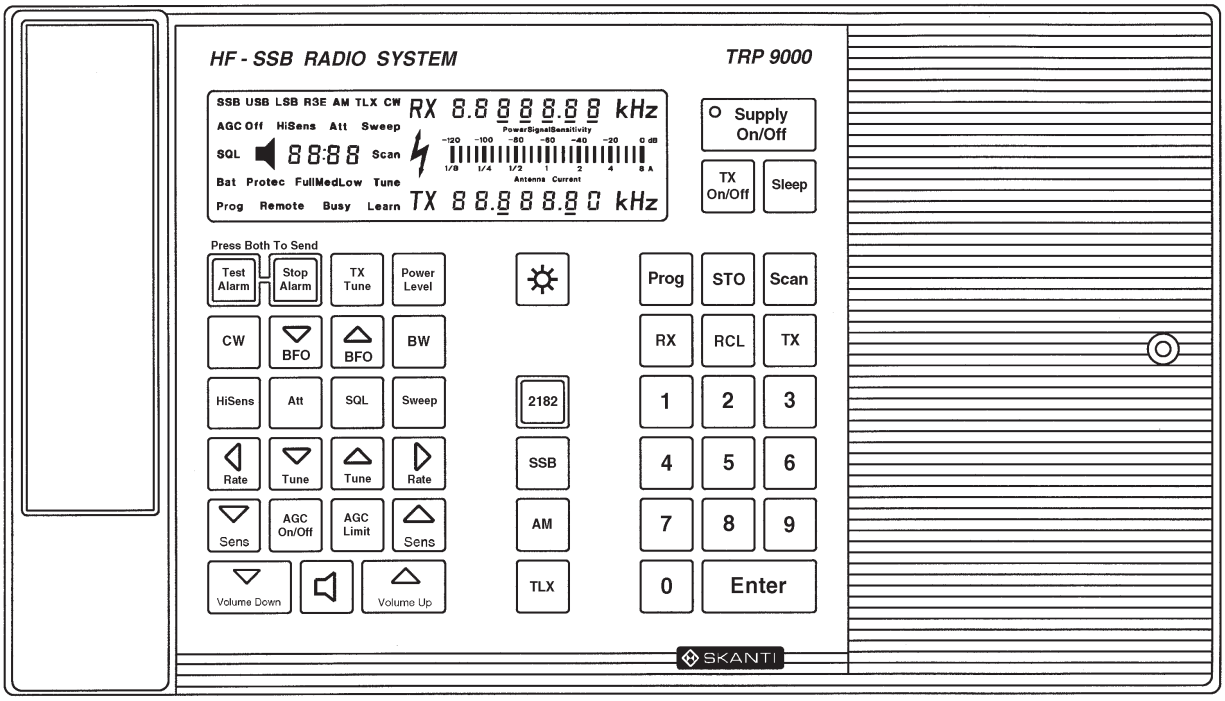
TRANSCEIVER CONTROL UNIT KEYS AND ANNUNCIATORS

TCU 9000 for versions TRP 9500 S, 9501 S and 9503 S.



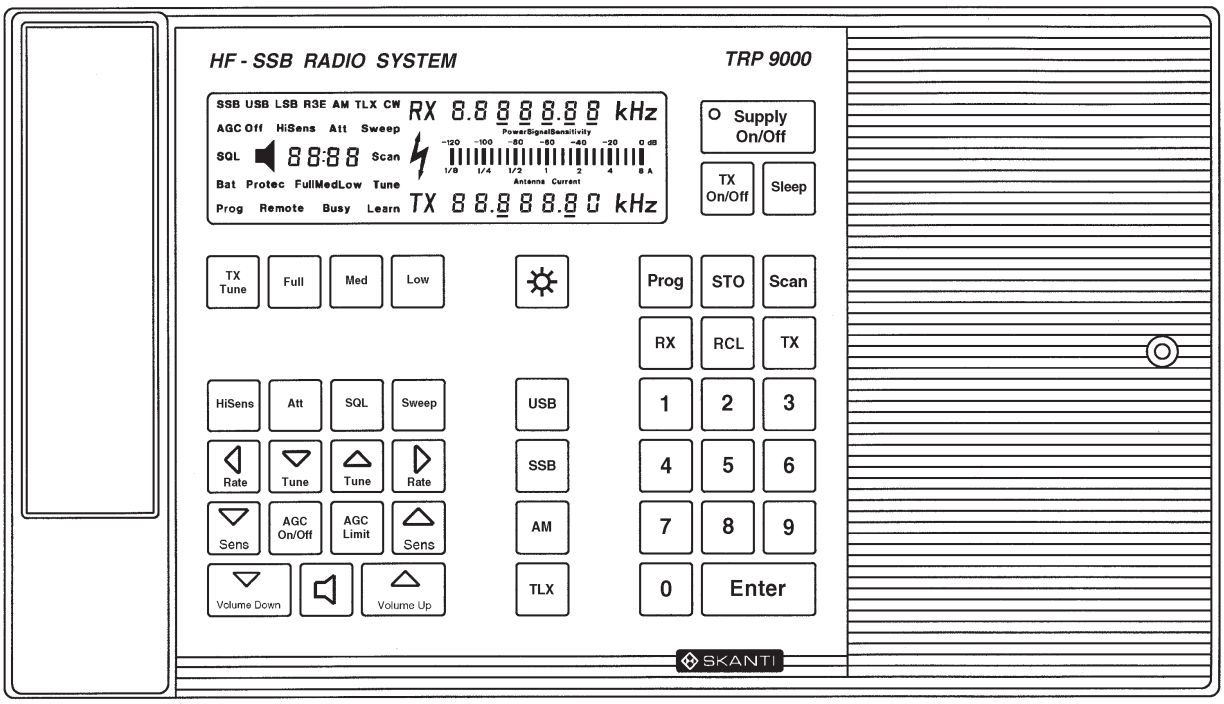
CONTROL UNIT KEYS AND ANNUNCIATORS

TCU 9002 for versions TRP 9502 S and 9507 S.



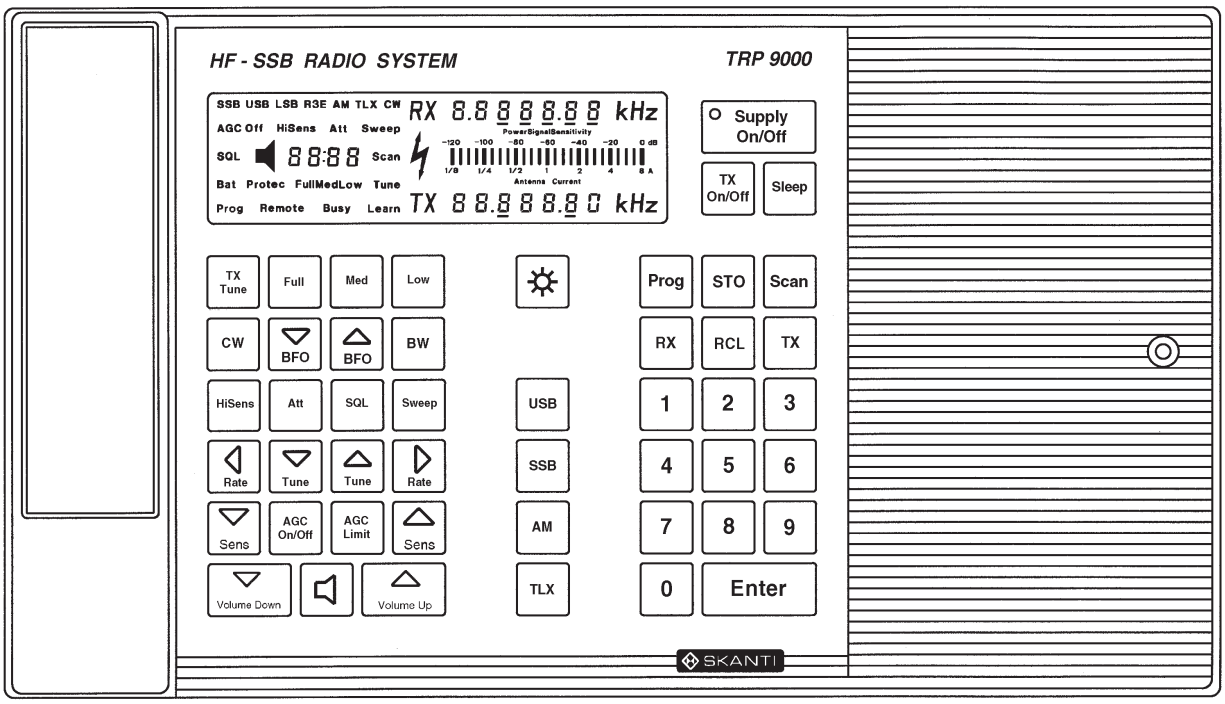
CONTROL UNIT KEYS AND ANNUNCIATORS

TCU 9004 for version TRP 9504 S.



CONTROL UNIT KEYS AND ANNUNCIATORS

TCU 9005 for version TRP 9505 S.



SYMBOL EXPLANATION

Symbol	Description
	Keying sequence This symbol is printed on top of the decription of the keys used to perform a given operation.
	Display guidance This symbol is printed on top of the pictures which will show you the annunciators that a given keying sequence will activate and in this way confirm to you that you have pressed the correct keys.
	Info This symbol is printed next to additional information on the operation described above it.
	Flashing annunciator When an annunciator (e.g. kHz) is printed in reverse it indicates that the annunciator is flashing in the Control Unit display.

POWER ON

Turning on the TRP 9500

1. Press Supply On/Off to turn on the TRP 9500.
   The display will return the last set-up from when the transceiver was turned off.

2. Select the required illumination level for the Keyboard and Display.

   The illumination has 4 different levels:

   Press ☼ to toggle the illumination level.

   This example starts with no illumination.

   Press ☼ to switch to 'Day'. Maximum illumination of the display and no illumination of the keyboard..

   Press ☼ to switch to 'Twilight'. Full illumination of both display and keyboard.

   Press ☼ to switch to 'Dusk'. Medium illumination of both display and keyboard.

   Press ☼ to switch to 'Night'. Minimum illumination of both display and keyboard.

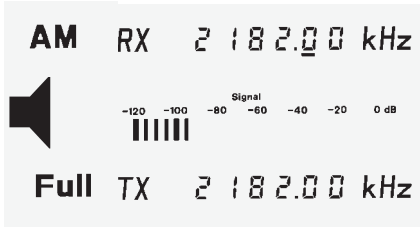
   Press ☼ to switch to no illumination, and turn on the Supply On/Off light.

DISTRESS OPERATION

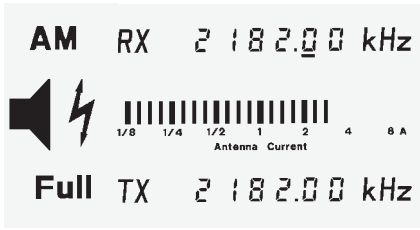
Using the 2182 kHz Distress mode.

1. Press Supply On/Off to switch on the TRP 9500.

2. Press 2182 to select the pre-set Distress mode.

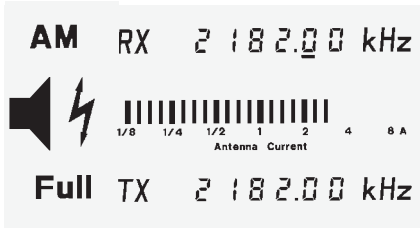


3. Press Test Alarm Stop Alarm simultaneously to transmit the Two-Tone Alarm Signal.

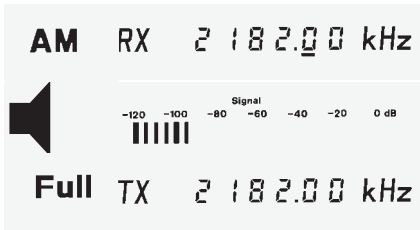


The Alarm Signal will continue for 45 seconds or untill Stop Alarm is pressed.

4. Press the handset key and transmit your distress message.



5. Release the handset key and wait for a reply.

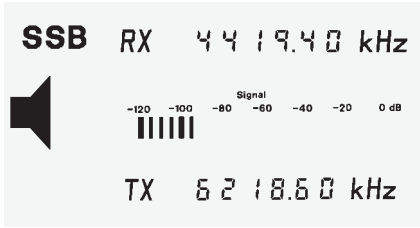


6. Repeat your distress message untill a reply is received.

TEST OF ALARM GENERATOR

Without theDummy load 741/742 installed

Keep Test Alarm pressed on any transmitter frequency to test the audio part of the 2-tone Alarm Generator.



With theDummy load 741/742 installed

Keep Test Alarm pressed on any transmitter frequency in SSB mode (apart from2182 kHz*).
This will perform a complete test of the 2-tone Alarm Generator.

After the ATU tuning the bar-graph will display the RF current in the dummy load.

The symbol is not displayed as no power is applied to the antenna.

* If the transmitter frequency is 2182 kHz, only the audio part of the 2-tone Alarm Generator is tested.

If TX Off is selected, only the audio part of the 2-tone Alarm Generator is tested.

In some countries it is permitted to test the 2-tone Alarm Generator into dummy load in AM mode on 2200 kHz.

RECEIVER FREQUENCY

Entering a receiver frequency

1. Press **RX** to clear the receiver display.

2. Enter the receiver frequency that you wish to use.
   e.g. **4419.4 kHz**.

3. Press **Enter** to complete your frequency choise

Receiver frequency range: 150 kHz to 30 MHz.
The receiver display will flash if an invalid frequency is entered .

AUDIO CONTROL

Operating Speaker, Volume and Squelch

1. Press  to switch the internal as well as the external Speaker on and off.
   The Speaker annunciator will be displayed when the Speaker is on.

2. Press  or  to adjust the Speaker Level.
   The Speaker annunciator will flash when minimum or maximum speaker level is reached.

3. Press  to turn the Squelch on and off.
   The Squelch will switch on the audio in periods where a voice signal is received.
   The Squelch annunciator will be displayed when the Squelch is on.

RECEIVER TUNING

Tuning the Receiver frequency.

1. Press [Rate] or [Rate] to select the Tune Rate.
   The display bar will indicate the selected rate.
   e.g. **1 kHz** rate.

2. Press [Tune] or [Tune] to tune the receiver
   to the required frequency.
   e.g. Tuning down **2 kHz** from **4143.62** to **4141.62 kHz**.

User-programmable Tune Rate

Press [Prog] [Rate] or [Prog] [Rate] and key
in a Tune Rate in the range 0.01 kHz - 99.99 kHz.
Press ,to store the rate e.g. 3 kHz.

To select the user-programmable Tune Rate press [RCL] [Rate] or [RCL] [Rate] and
the display bar is switched off to indicate that the user-programmable Tune Rate is used.

Press [Tune] or [Tune] to manually tune the receiver up or down in the programmed step.

Press [Rate] or [Rate] to return to a standard Tune Rate. The display bar will indicate which standard Tune Rate is selected.

Automatic Receiver Tuning

Press [Prog] [△ Tune] or [Prog] [▽ Tune] to start automatic receiver tuning with the selected Tune Rate (standard- / or user-programmable- as indicated by the RX display bar).

While tuning, the Tune Rate may be changed by pressing [◁ Rate], [▷ Rate] or [RCL] [◁ Rate].

While tuning, the dwell-time (for how long the receiver stays on each receiver frequency) may be selected in the range 0.1 second - 1.0 second by pressing a numeric key. 1 corresponds to the shortest dwell-time (0.1 second) and 0 corresponds to the longest dwell-time (1.0 second).

Pressing [Enter] will stop Automatic Receiver Tuning.

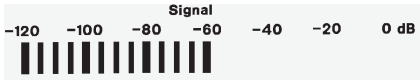
Pressing [TX] will stop Automatic Receiver Tuning and transfer current receiver frequency to the transmitter.

AUTOMATIC GAIN CONTROL

Adjusting the receiver gain.

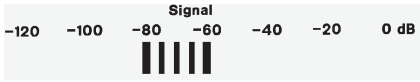
1. For normal operation the AGC should be switced on.

2. **AGC on**.



The receiver sensitivity will automatically be adjusted to the received signal level.
The Signal strength of the received signal is displayed.
No further adjustment of the AGC is needed.

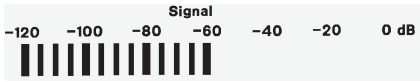
3. **AGC on / Minimum Signal Threshold**.



Press Sens to adjust the Minimum Signal Threshold.
Signals and noise below the selected Threshold will now be cut off.
Is usefull when noise keeps comming up in signal pauses.

4. **AGC on / Automatic Minimum Signal Threshold**.

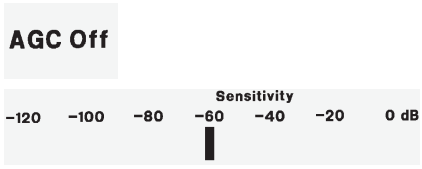
Press Prog and Sens to adjust the Minimum Signal Threshold automatically.



Press Prog and Sens to remove the Minimum Signal Threshold and return to normal AGC mode.

5. **AGC off**

Press AGC On/Off to turn the AGC off.



The Sensitivity is now adjusted to the same Signal strength level as when the AGC was on.

Press Sens Sens to adjust the Sensitivity level.

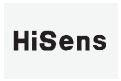
Press AGC On/Off to switch AGC on again.

DIFFICULT RECEIVER CONDITIONS

Receiving signals under difficult conditions.

1. High Sensitivity

Press HiSens to increase the Sensitivity by approx. 5dB. The HiSens annunciator is on when High Sensitivity is selected.The HiSens should be used if very weak signals are receiced.



High Sensitivity is switched off by pressing HiSens once more.

2. Antenna Attenuator

Press Prog 6 Enter to switch on and off the receiver Antenna Attenuator. The Att annunciator is on in the display when the Antenna Attenuator is switched on.
The Antenna attenuator should be used when strong interferring signals are present at the receiver antenna input.

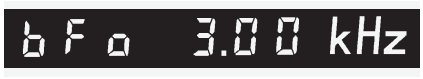
Strong interferring signals may distort the wanted signal by overloading the receiver input.

ADJUST BFO

For versions TRP 9505 and 9507 only.
Adjusting the BFO in CW mode .

1. Press BFO and BFO keys to adjust frequency of the received morse signal to the wanted pitch. When a BFO key is pressed the beat frequency is shortly shown in the receiver display.

2. The display will flash when the minimum or maximum BFO frequency is reached.



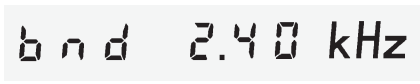
The BFO keys can only be operated in CW mode.
The BFO frequency range is 0.3 kHz to 3.0 kHz.

CHANGE BANDWIDTH

For versions TRP 9505 and 9507 only.
Operating the Band Width key in CW mode.

1. Press BW

2. Press BW



3. Press BW

The receiver bandwidth is stepped through the available bandwidths.

0.3 kHz - 2.4 kHz - 6.0 kHz - 0.3 kHz -

The actual receiver bandwidth is shown shortly in the receiver display.

The BW key can only be operated in CW mode.

TRANSMITTER ON/OFF

Turning the transmitter on or off.

1. Press TX On/Off to turn the transmitter on.
   The TX display will display the selected transmitter frequency.

2. Press TX On/Off to turn the transmitter off.
   The TX display will be extinguished.

To save battery, turn the transmitter off when only receiving is required.

TRANSMITTER FREQUENCY

Selecting a transmitter frequency

1. Press TX to clear the transmitter display

2. Enter the transmitter frequency that you wish to use. e.g. 4125 kHz.

3. Press Enter to complete your frequency choise.

Transmitter frequency range: Dependent of Transceiver version (See below).
The transmitter display will flash if an invalid frequency is entered. Pressing Enter will return to the previous selected TX frequency.

Transceiver Unit 9500: TX frequencies pre-programmed in the Configuration Prom. The corresponding mode will automatically be selected

Transceiver Unit 9501: TX frequencies in the Marine Bands (1.60 - 4.80 MHz, 6.20 - 8.95 MHz, 12.23 - 17.65 MHz, 18.78 - 27.10 MHz).

Transceiver Unit 9503, 9504, 9505, 9507: TX frequencies from 1.6 MHz to 30 MHz.

POWER LEVEL

Changing The Transmitter Power Level on versions TRP 9500, 9501, 9503 and 9507.

1. Press [Power Level] to switch from Full to Medium power. **Med**

2. Press [Power Level] to switch from Medium to Low power. **Low**

3. Press [Power Level] to switch from Low back to Full power. **Full**

Changing The Transmitter Power Level on versions TRP 9504 and 9505.

1. Press [Full] for full output power. **Full**

2. Press [Med] for medium output power. **Med**

3. Press [Low] for low output power. **Low**

NEW MEDIUM POWER LEVEL

Selecting a new level for Medium power on versions TRP 9500, 9501, 9503 and 9507.

1. Press Prog Power Level and the first option for Medium power will be displayed: **125** W.

2. Press Power Level and the second option for Medium power will be displayed: **250** W.

3. Press Power Level and the third and last option for Medium power will be displayed: **50** W.

4. When the required level for Medium power is displayed , press to Store the new Medium power level.

Selecting a new level for Medium power on versions TRP 9504 and 9505.

Press the Med key instead of the Power Level key in the above described operation.

TUNE THE ATU

Tuning the Automatic Antenna Tuner .

1. The Automatic Antenna Tuner will tune the antenna to the best possible transmission condition the first time that the handset key is pressed after a new transmit frequency has been selected.

   The conditions might change during a transmission and a new tune up will be needed.
   For example if ice is building up on the antenna or the vessel is heeling.

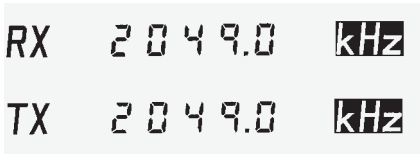
2. Press TX Tune to perform a new Tune procedure.

SIMPLEX FREQUENCY

Selecting the same frequency for both receiver and transmitter.

1. Press RX TX to clear both the receiver and the transmitter displays.

2. Enter the frequency that you wish to use for both receiving and transmitting. e.g.2049 kHz

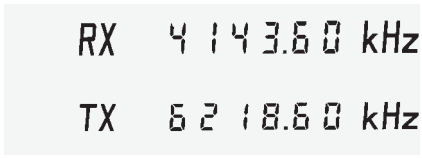


3. Press Enter to complete your frequency choise.

COPY RX FREQUENCY

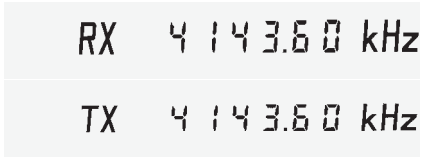
Copying the receiver frequency to the transmitter.

1. You start with different frequencies in the RX and the TX displays.



2. Press Prog RX to copy the receiver frequency. Prog and the RX Bar will flash in the display.

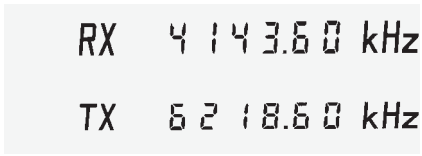
3. Press TX to transfer the RX frequency to the transmitter. The receiver frequency is now displayed in both the RX and the TX display.



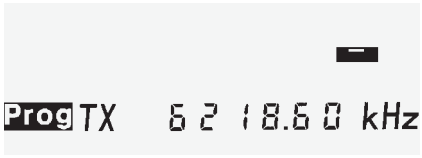
COPY TX FREQUENCY

Copying the transmitter frequency to the receiver.

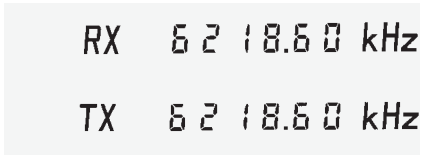
1. You start with different frequencies in the RX and the TX displays.



2. Press Prog TX to copy the transmitter frequency. Prog and the RX Bar will flash in the display.



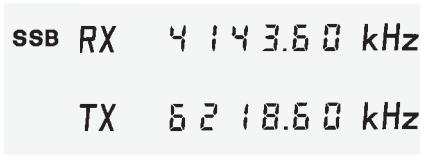
3. Press RX to transfer the TX frequency to the receiver. The transmitter frequency is now displayed in both the RX and the TX display.



STORE A CHANNEL

Storing a channel in the User Programmable Memory

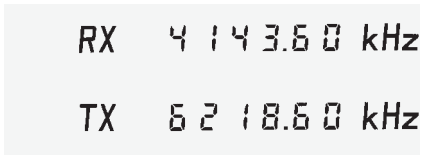
1. Enter the required Receiver and Transmitter frequencies as well as the operating mode.
   e.g. RX 4143.6, TX 6218.6 and mode SSB.



2. Press Prog STO to activate storage of the present set-up. The Prog and the RX bar will flash.

3. Enter the channel number that you wish to use as as storage for the set-up.
   e.g. User Programmable channel **76**.

4. Press Enter to enter your choise of User Programmable channel.



User Programmable Channels: 100 from channel no. 0 to 99.

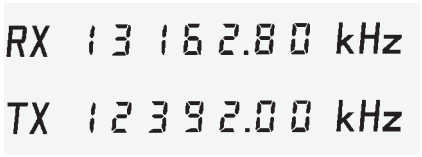
RECALL A CHANNEL

Recalling an ITU channel or a channel stored in the User Programmable Memory.

1. Press RCL and the display will be cleared.

2. Enter the required channel number.
   e.g. ITU channel 1221.

3. Press Enter .The Receiver and the Transmitter frequencies stored in channel 1221 is now selected and will be displayed.



Recall Numbers:

0 - 99 :	User Programmable Channels.
100 - 129 :	GMDSS Distress and Safety Frequencies.
200 - 399 :	Direct Recall of the first 200 of up to 896 Pre-Programmed frequencies.
401 and up:	ITU Frequencies.

CHANGE MODE

Switching to a different operating mode.

For all versions:

Press [AM] to switch to AM mode.

Press [TLX] to switch to TELEX mode. **TLX**

Press [Prog] [3] [Enter] to switch to R3E mode. **R3E**

For versions TRP 9500, 9501, 9503 and 9507:

Press [SSB] to switch to SSB mode. **SSB**

Where enabled - press [Prog] [2] [Enter] to switch to LSB mode. **LSB**

For versions TRP 9504 and 9505.

Press [USB] to switch to USB mode. **USB**

Press [LSB] to switch to LSB mode. **LSB**

For versions TRP 9505 and 9507.

Press CW to switch to CW mode.

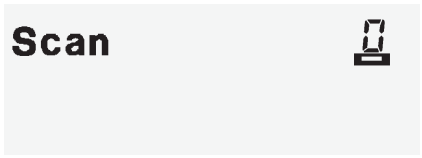
CW

As standard LSB is only enabled in the Basic version TRP 9504.

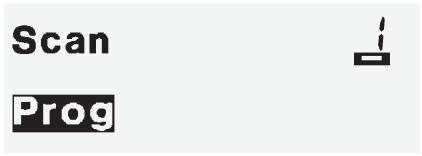
CHANNEL SCANNING, SET UP

Setting up a Channel Scanning program

1. Press [Prog] [Scan] to start the programming.
The currently selected Scan Program Number is displayed. e.g. **0**.



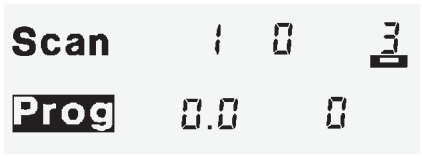
2. Enter the Scan Program Number that you wish to programme.
e.g. **1**.



Press [Enter] to select the Program Number.

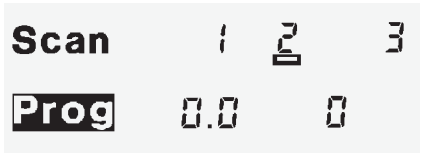
Start programming.

3. Enter the Number Of Channels that you wish to scan.
e.g. **3**.



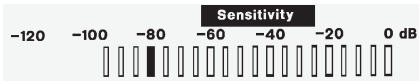
Press [STO] to store the Number Of Channels.

4. Enter the number of the Trigger Source that you want to use : **0** = no trigger source, **1** = squelch,
2 = signal strength, **3** = squelch or signal strength,
4 = squelch and signal strength.
e.g. **2**.



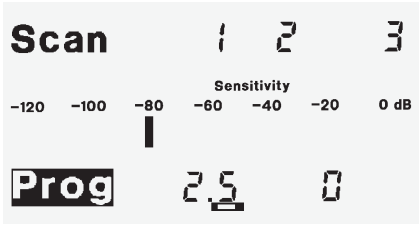
Press [STO] to store the Trigger Source.

Because signal strength is selected as Trigger Source in this example, you must set the corresponding sensitivity level now.



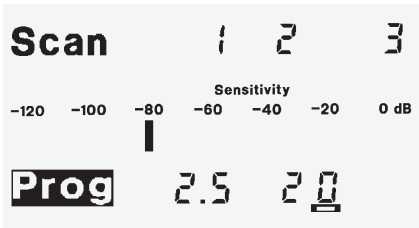
5. Press Sens or Sens to adjust the sensitivity level.
e.g. sensitivity **-80** dB

Press STO to store the level.



6. Enter the Dwell Time which is the period in which the receiver will "listen" for a signal on each frequency.
e.g. **2.5** seconds.

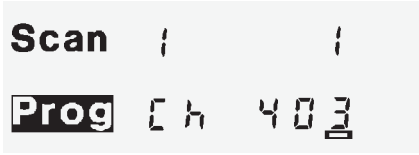
Press STO to store the Dwell Time.



7. Enter the Hold Time which is the period in which the receiver will stay on a frequency if the Trigger Source has detected a signal.
e.g. **20** seconds.

Press STO to store the Hold Time.

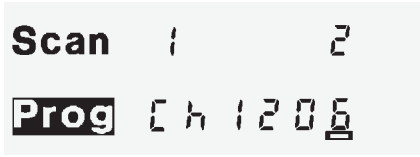
Now the channels that you wish to scan must be stored in the Scan Table.



8. Enter the first Channel Number to be scanned.
e.g. ITU ch. **403**

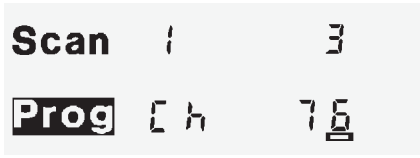
Press STO to store the channel.

9. Enter the second Channel Number to be scanned.
e.g. ITU ch. **1206**



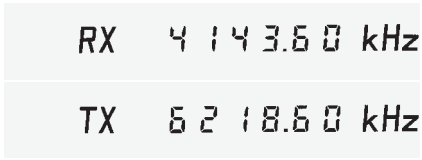
Press STO to store the channel.

10. Enter the third Channel Number to be scanned.
e.g. ch. **76** from the User Programmable Memory.



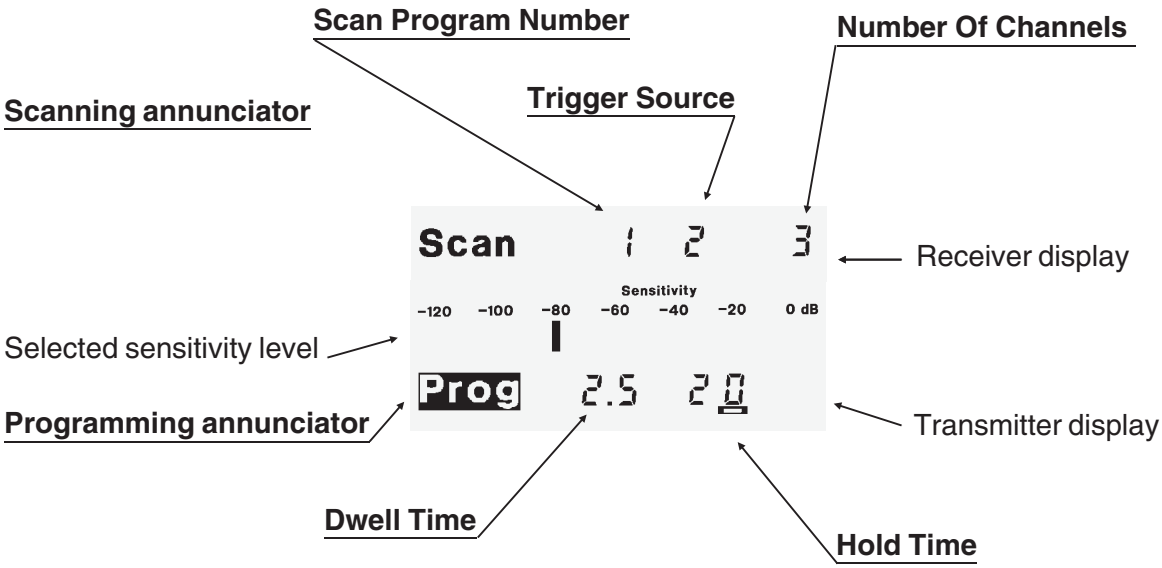
Press STO to store the channel.

When the last channel is stored, the transceiver will return to normal operation.



CHANNEL SCANNING, SET UP *INFO*

Scanning parameters:



Scanning annunciator: Will be on during the programming.

Scan Program Number: **10** Scan Programs. Selectable from number **0** to number **9**.

Trigger Source: Selectable with number **0** to **4**. **0** = no trigger source, **1** = squelch, **2** = signal strength, **3** = squelch or signal strength, **4** = squelch and signal strength. (**5** to **9** will be defaulted to **0**).

Number Of Channels to be scanned: The maximum number is depending on the currently occupied scan memory, however not bigger than **99**. Enter the required number and TRP 9500 will inform you if the available memory is too small, by flashing the number.
If you store a bigger number of channels than required TRP 9500 will reduce the alocated memory to the actual need, after the scan table has been stored and then update the Number Of Channels to be scanned to the actual number.

Insert extra channels: Add the number of extra channels to the current number and store the new number as the Number Of Channels to be scanned. You may now store the new channels at the end of the Scan Table.

Delete a number of channels from the end of the scan table: Subtract the number of channels that you wish to delete from the current number and store the new number as the Number Of Channels to be scanned.

Delete a Scan Program: Store **00** as the Number Of Channels to be scanned.

Programming annunciator: Will flash during the programming.

Dwell Time: The period in which the receiver will "listen" for a signal on each frequency in the Scan Table. Selectable from **0.1** seconds to **9.9** seconds.

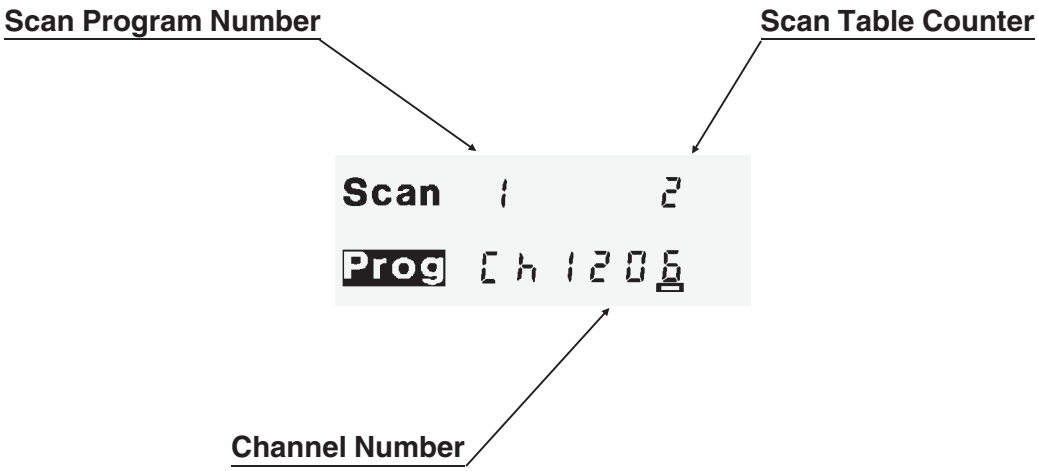
Hold time: The period in which the receiver will stay on a frequency in the Scan Table if the Trigger Source has detected a signal. Selectable from **1** second to **98** seconds.

No Hold Time: Store a Hold Time = **0** seconds.

Manual scanning: If you want to scan manually (press the Scan key to step to the next frequency in the Scan Table), store a Dwell Time = **0** seconds.

Automatic Stop: If you want to stop the scanning when the Trigger Source detects a signal , store a Hold Time = **99**.

Scan Table:



Scan Program Number: **10** Scan Programs. Selectable from number **0** to number **9**.

Scan Table Counter: Displays the current position in the Scan Table.
e.g. ITU channel 1206 will be stored as the second channel in this Scan Table.

Channel Number: An ITU channel or a channel stored in the User Programmable Memory.

View parameters and channels of a Scan Program: Press Prog Scan STO STO.

Delete a channel: Store **9999** as Channel Number in the scan table position that you wish to delete.

Replace a channel: Store the new Channel Number in the position of the channel you want to replace.

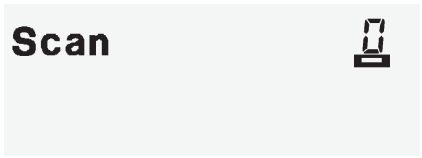
Leave a Scan Program: You may leave the programming at any time by pressing **Enter**

Remote Scan start/stop facility: Is available with optional radiotelex modem "PCP717tlx" or remote control interface "Interface-A 718" installed.

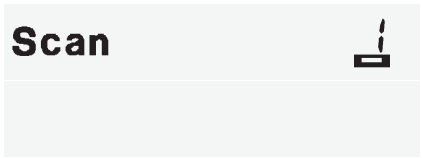
CHANNEL SCANNING, RECALL PROGRAM

Recalling a Scan Program

1. Press RCL Scan to recall one of the 10 Scan Programs. The latest selected Scan Program will be displayed.
   e.g. Scan Program Number 0.
   Scan Programs are selected with numbers from 0 to 9.

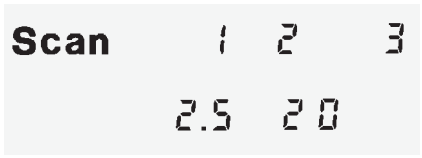


2. Choose and enter the Scan Program Number
   e.g. Scan Program Number 1.

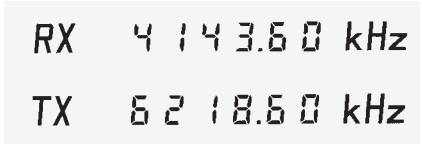


   Press Enter to complete your choise.

3. The Scanning parameters for the selected Scan Program will now be displayed.
   e.g.
   Scan Program Number = 1
   Trigger Sourse = Signal Strength (2)
   Number of Channels to be scanned = 3
   Dwell time = 2.5 seconds
   Hold Time = 20 seconds



   Press Enter to return.
   The Transceiver will now return to normal operation.

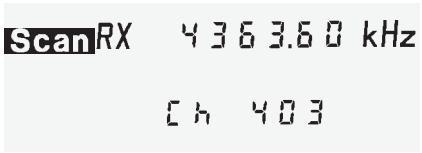


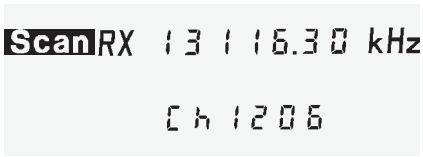
CHANNEL SCANNING, START/STOP

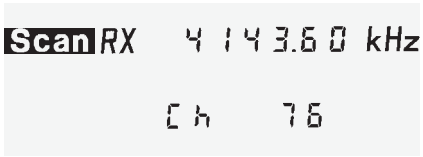
Operating the Channel Scanning.

1. Press Scan to start Channel Scanning.
   The Scan Program Number of the selected Scan Program will shortly be displayed.
   e.g.Scan Program Number 1.

2. Channel Scanning:

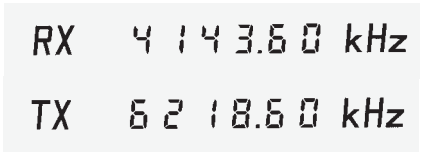






3. Stop Channel Scanning:

3a. Press Scan to stop the Channel Scanning.
Scanning will start on the next channel in the Scan Table when you press Scan again.



3b. Press Enter to stop the Channel Scanning.
Scanning will start on the first channel in the Scan Table when you press Scan again.

Receiver and Transmitter frequency of the channel which was displayed when you stopped the scanning will now be displayed.
e.g. User Programmable channel 76: RX= 4143.6 kHz and TX= 6218.6 kHz.

FREQUENCY SWEEPING, SET UP

Setting up the Sweep Program.

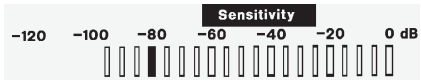
1. Press [Prog] [Sweep] to start the programming.
   The currently stored Sweep parameters are displayed.
   e.g. No parameters are stored.

2. Enter the number of the Trigger Source that you want to use: 0 = no trigger source, 1 = squelch
   2 = signal strength, 3 = squelch or signal strength,
   4 = squelch and signal strength.
   e.g. 2.

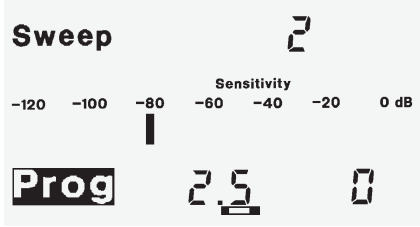
   Press [STO] to store the Trigger Source.

   Because signal strength is selected as Trigger Source in this example, you must now set the sensitivity level.

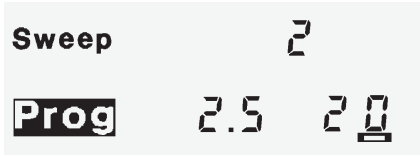
3. Press [Sens] or [Sens] to adjust the sensitivity level.
   e.g. Sensitivity -80 dB.
   Press to store the level.



4. Enter the Dwell Time which is the period in which the receiver will "listen" for a signal on each frequency.
   e.g. 2.5 seconds.

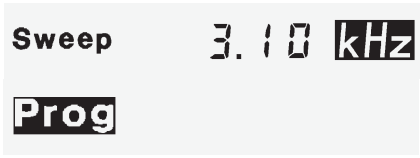


   Press [STO] to store the Dwell Time.



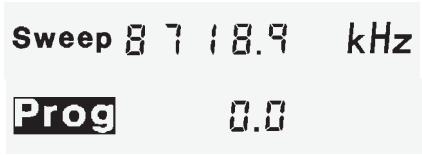
5. Enter the Hold Time which is the period in which the receiver will stay on a frequency when the Trigger Source has detected a signal.
e.g. 20 seconds.

Press STO to store the Hold Time.



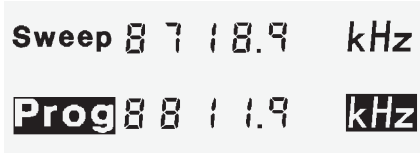
6. Enter the Step Frequency which is the frequency distance between all frequencies in the sweep.
e.g. 3.1 kHz.

Press STO to store the Step Frequency.



7. Enter the Start Frequency .
e.g. 8718.9 kHz.

Press STO to store the Start Frequency.

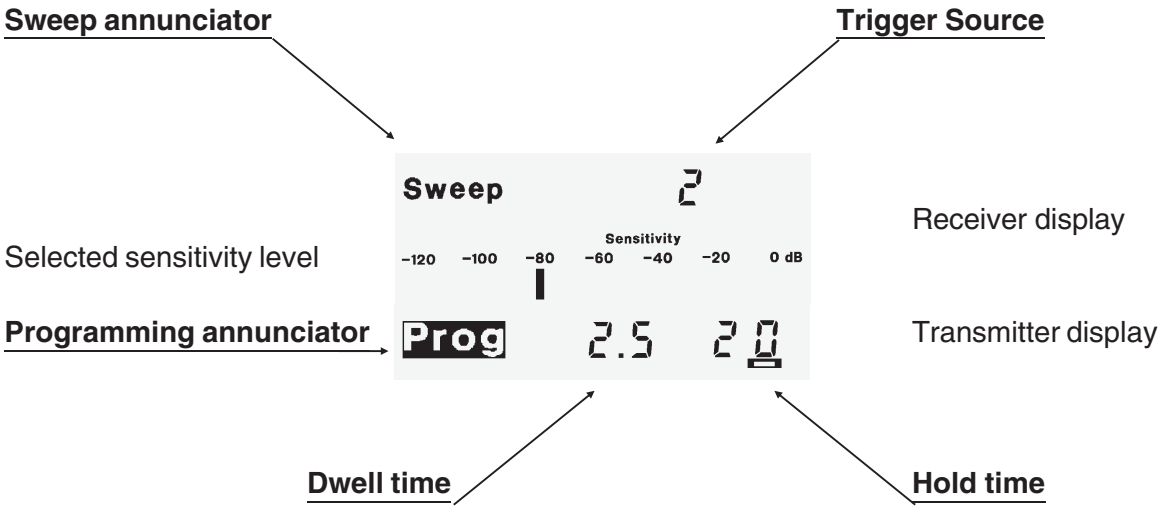


8. Enter the Stop Frequency .
e.g. 8811.9 kHz.

Press STO to store the Stop Frequency.

FREQUENCY SWEEPING, SET UP *INFO*

Sweep parameters:



Sweep annunciator : Will be on during the programming and will flash during a frequency Sweep.

Trigger Source : Selectable with number 0 to 4. 0 = no trigger source, 1 = squelch, 2 = signal strength, 3 = squelch or signal strength, 4 = squelch and signal strength. (5 to 9 will be defaulted to 0).

Programming annunciator : Will flash during the programming.

Dwell time : The period in which the receiver will "listen" for a signal on each frequency in the Sweep Band. Selectable from 0.4 seconds to 9.9 seconds.

Hold time : The period in which the receiver will stay on a frequency in the Sweep Band if the Trigger Source has detected a signal. Selectable from 1 second to 98 seconds.

Step Frequency : The distance between the frequencies in the Sweep Band.

Start Frequency : The first frequency in the Sweep Band.

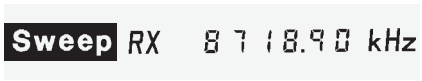
Stop Frequency : The last frequency in the Sweep Band.

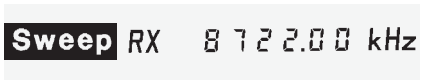
Remote Sweep start/stop facility: Is available with optional radiotelex modem "PCP717tlx" or remote control interface "Interface-A 718" installed.

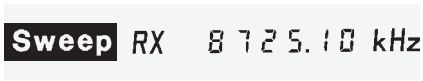
FREQUENCY SWEEPING, START/STOP

Operating the frequency Sweeping

1. Press Sweep to start frequency sweeping using the stored Sweep parameters.

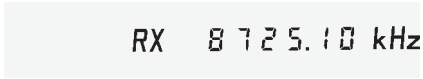






2a. Press Sweep to stop the frequency sweep. Sweeping will start on the next frequency in the band when you press Sweep again.

2b. Press Enter to stop the frequency sweep. Sweeping will start on the first frequency in the band when you press Sweep again.

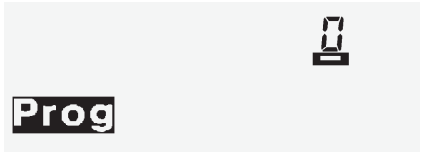


The Receiver frequency which was displayed when you stopped the Sweep will now be displayed.

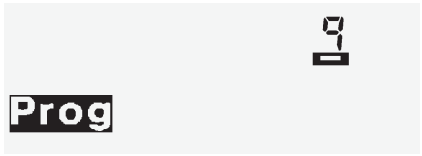
SLEEP TIMER, SET UP

Setting up a Sleep Program.

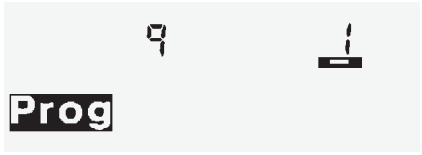
1. Press [Prog] [Sleep] to start the programming. The currently selected Sleep Program is displayed. e.g. 0.



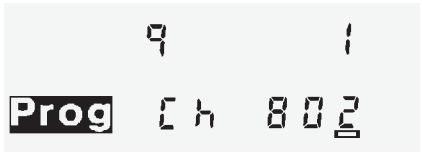
2. Enter the Sleep Program Number that you whish to programme.
   e.g. 9.
   Press [Enter] to select the program number.



3. Enable/Disable the Sleep Program:
   0 = Disable Sleep Program
   1 = Enable Sleep Program
   e.g. 1.
   Press [STO] to store your choise.

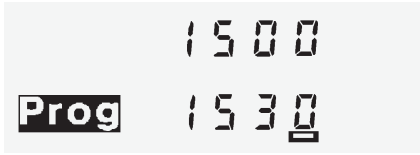


4. Enter the Channel Number that you whish to use when the Sleep Program turns on the transceiver.
   e.g. ITU channel 802.
   Press [STO] to store the Channel Number .



5. Enter the Wake Up Time which is the time of day that you wish this program shall turn on the transceiver. e.g. 15.00 (3.00 PM).
Press to store the Wake Up Time.

6. Enter the Fall Asleep Time which is the time of day that you wish this program shall turn off the transceiver. e.g. 15.30 (3.30 PM).
Press to store the Fall Asleep Time.

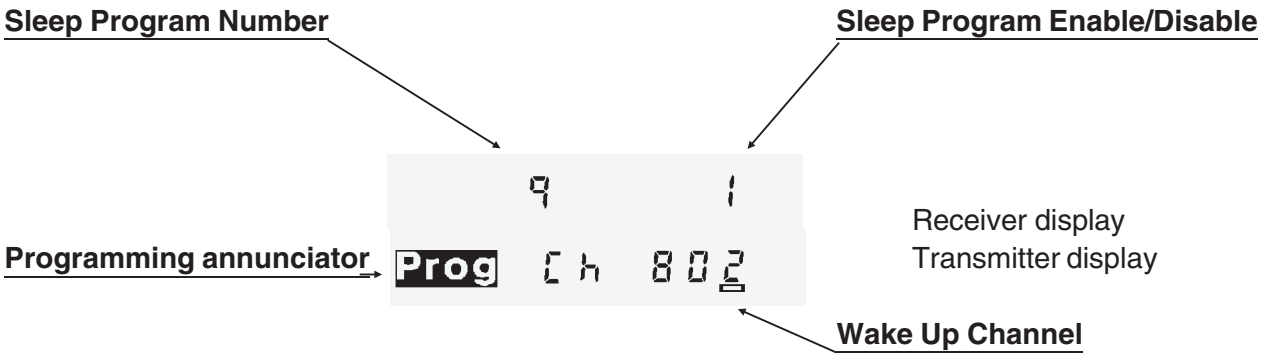


When the Fall Asleep Time is stored, the transceiver will return to normal operation.

Note:

SLEEP TIMER *INFO*

Timer parameters:

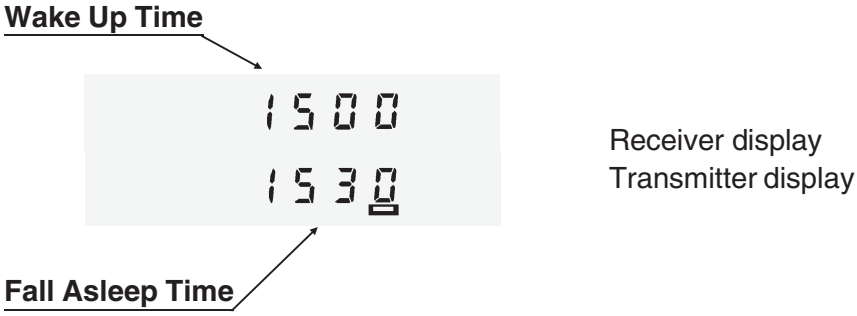


Sleep Program Number: 10 Sleep Programs. Selectable from **0** to **9**.

Sleep Program Enable/Disable: 0 = Disable Sleep Program, **1** = EnableSleep Program.

Programming annunciator: Will flash during the programming.

Wake Up Channel: The receiver and transmitter will be set to the frequencies of this channel when the Sleep Program turns on the transceiver.



Wake Up Time: At this time the Sleep Program will switch on the transceiver.

Fall Asleep Time: At this time the Sleep Program will switch off the transceiver.

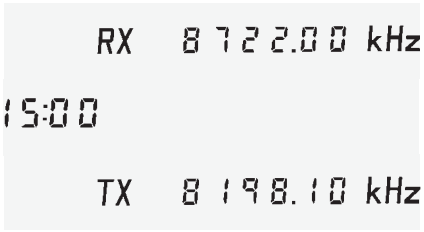
Wake Up and Stay On: If the the Fall Asleep time is set to the same time as the Wake Up time the Transceiver will switch on and stay on at this time.

SLEEP TIMER ON

Switching on the Sleep Timer.

1. Press Sleep to switch off the transceiver and activate the Sleep Programs.

2. When the Wake Up Time of one of the enabled Sleep Programs is reached the transceiver will automatically switch on.
e.g. 15:00.
The receiver and the transmitter frequency will be set up to the channel which was stored in this program.
e.g. ITU channel 802
with RX frequency 8722 kHz
and TX frequency 8198.1 KHz.



3. When the Fall Asleep Time of a Sleep Program is reached the transceiver will be switched off.

When the Sleep Timer is activated and has switched on the Transceiver, you may operate the Volume Up, Volume Down and Speaker On/Off switch. If you want to deactivate the Sleep Timer, just press any other key than the Volume and Speaker keys.If you want to activate the Sleep Timer again, it is necessary to press the Sleep key.When the transceiver is switched on by the Sleep Timer this is indicated by a flashing colon in the watch display. The colon will stop flashing if the Sleep Timer is deactivated as described above.

NOTE. Sleep and DSC/Telex operation
If TRP 9500 includes the optional built-in DSC/Telex the Sleep function is modified to a pseudo-Sleep function complying with the GMDSS requirements on DSC/Telex distress operation as follows.

Press "Sleep" to acticate the pseudo-Sleep timer.

The TRP 9500 will:

Switch TX off to save power.
Display "Sleep" in the TX display.
Switch all loudspeakers off (mute).
Flash the ":" symbol of the watch
and respond to all keying, key entries and remote control commands.

The TRP 9500 will disable the pseudo-Sleep and return to normal operation on a remote control command, keying and key entry except RX-freq./mode command, volume up/down and speaker (scanning of RX DSC or Telex frequencies via PCP 717S will not disable pseudo-Sleep).

OPERATION RELATED 'PROG' KEY OPERATIONS

By using the 'Prog' key extra functions and features may be selected, and programming of the equipment is possible.

'Prog' operations are selected by pressing:

Prog **0-99** Enter

Some functions requires further key entries where as others requires storing of parameters with the 'STO' key or stepping forward with the 'Volume Up' key.

The following is a list of the related operations which are selected by their number:

0 - 9 : Select modes and features.

10 - 19 : Select special functions.

20 - 74 : Installation and service. Refer to SERVICE section.

98 : Security Code.

99 : Select Configuration Mode. Refer to INSTALLATION section.

No.	Function
0 :	**Leave System to other User.**
1:	**Connect TCU Remote Control port**
2 :	**Select LSB Mode.**
3 :	**Select R3E Mode.**
4:	**Set Side Tone frequency for CW.**
5:	**Set Break-in Time for CW.**
6 :	**Switch RF Attenuator On/Off.**
7 :	**Float Antenna.**
8 :	**Ground Antenna.**
9 :	**Switch "Boop" Sound On/Off.**
10:	**Select Intercom.**
11:	**Set Real Time Clock.**
12:	**Switch Treble Cut On/Off**
13:	**Tilt Viewing Angle of Display.**
14:	**Toggle Bar-graph Reading, Power or Amperes.**

15: Set Beep Level.

16: Select HST mode.

20: Automatic Stepped Self-test.

21: Manually Stepped Self-test.

22: Read Protection Code.

23: View ATU Relay Setting.

25: Read CU Priority / Intercom Number.

26: View CU Software Version, Release and Release Date.

27: View TU Software Version, Release and Release Date.

28: View TU Configuration Customer ID, Version, Release and Release Date.

29: View ATU Software Version, Release and Release Date.

30: Read Accumulated On Time.

31: Read Frequency Error

32: View RX / EX Signal Path 715 Version.

33: View Option Filter.

34: View Power Amplifier Version.

35: View PA Filter Version.

36: View ATU Status.

37: View Dummy Load.

39: View Optional Interface Board.

40 Switch all Annunciators On in Display.

41 Switch Beep Sound On.

42 Switch Boop Sound On.

43 Switch High-beep Sound On.

45 Display Customer Secified Frequencies Pre-Programmed in Configuration PROM.

46 Display Configuration parameters pre-programmed in Configuration PROM.

74 View Supply Voltage

98 View and Change Security Code.

99 Select Configuration Mode.

Description of 'Prog' operations

No.	Function
0	**Leave System to other User.** Applicable with a Multi Control Unit operated transceiver .
1	**Connect TCU Remote Control port.** Applicable with a Multi Control Unit operated transceiver .
2	**Select LSB Mode.** Both Receiver and Transmitter is set to LSB (J3E) mode. "LSB" annunciator is switched on.
3	**Select R3E Mode.** Receiver is set to USB (J3E) mode, Transmitter to R3E (USB) mode and "R3E"annunciator is switched on.
4	**Set Side Tone frequency and level for CW.** When CW mode is selected the Side Tone frequency, heard during transmit, can be adjusted from 300Hz to 3kHz by using the "Volume Up"and "Volume Down" keys. Likewise the Side Tone level can be adjusted between 0 and 64 to suit the individual operator. The actual Side Tone frequency is displayed in the receiver display and the Side Tone level is displayed in the transmitter display. **ton 0.80kHz** **LE 52** When the wanted Side Tone frequency is obtained press "STO" to store the new frequency. Now the Side Tone level can be adjusted with the volume keys. Press "STO" to store the wanted level and to return to the normal display. If "Enter" is pressed instead the old Side Tone frequency and level are retained and the transceiver will return to normal display. Both Side Tone frequency and level are adjustable during transmit condition.

5

Set Break-in Time for CW.
Break-in Time is the time elapsed from the morse key is released to the received signal is heard in the loudspeaker. To adapt the Break-in Time to the morse speed of the operator, it can be adjusted between 0.020 seconds to 1 second with the use of the "Volume Up" and "Volume Down" keys. The receiver display shows the actual Break-in Time in milliseconds.

b-t 40

When the Break-in Time is adjusted to the wanted value press "STO" to store it and to return to the normal display. If "Enter" is pressed instead the old Break-in Time is retained and the transceiver will return to normaldisplay. The Break-in Time is adjustable during transmit condition.

6

Switch RF Attenuator On/Off.
When heavy interfering signals are present at the receiver input, reception quality can be improved by switching on the RF Attenuator."Att" annunciator is switched on when the RF Attenuator is on.

7

Float Antenna.
When the optional Dummy Load is installed in the ATU it is possible to disconnect (Float) the antenna.When the antenna is floating the display shows:

Float

ant

and the Transceiver can neither receive nor transmit.Press "Enter" to connect the antenna again and return to normal operation.

8

Ground Antenna.
When the optional Dummy Load is installed in the ATU it is possible to connect the antenna to ground.When the antenna is grounded the display shows:

gnd ant

and the Transceiver can neither receive nor transmit.Press "Enter" to return to normal operation.

9

Switch "Boop" sound On/Off .
If an illegal key is pressed the CU will sound a "Boop". This feature may be selected / inhibited to suit the individual operator.

1 0

Select Intercom.
When more than one Control Unit is connected the TRP 7200 can act as a normal telephone with intercommunication between any two control units.After "Prog" "10" "Enter" is pressed the display shows

Phone _

Enter "phone number" of the wanted Control Unit and press "Enter".The wanted CU will start beeping until the handset is hooked-off.Normal intercommunication in full duplex can now take place with all other control units muted.The Intercom facility is automatically disabled first time the handset of the calling CU is hooked-on, and the Transceiver returns to normal operation.Please refer to @ @

1 1

Set Real Time Clock.
After "Prog" "11" "Enter" is pressed the Clock Display is cleared and the correct time of day can be entered with the numeric keys.Press "STO" and the Real Time Clock is started in the same moment.

1 2

Switch Treble Cut On/Off
During difficult atmospheric conditions and reception of weak signals, the intelligibility of the received signal may deteriorate due to high frequency noise. The Intelligibility may be greately improved by switching Treble Cut on during these conditions. The Treble Cut may be selected individually on each TCU connected.

1 3

Tilt Viewing Angle of Display.
To obtain the best possible legibility the viewing angle of the display may be toggled between two positions by pressing "Prog" "13" "Enter".

1 4

Toggle Bar-graph Reading, Power or Amperes.
By pressing "Prog" "14" "Enter" it is possible to change the transmitter Bar-graphdisplay between either power or antenna current.

1 5

Set Beep Level.
To adjust the keyboard Beep to a convenient level switch the loudspeaker on and press "Prog" "15" "Enter". The keyboard Beep is constantly beeping and may be adjusted to a convinient sound level by the "Volume up" and "Volume down" keys. Press "STO" to store the new Beep level. Pressing "Enter" instead will maintain the previous Beep level setting.

1 6

Select HST mode.
Pressing "Prog" "16" "Enter" will select High Speed Telex mode. This mode is indicated by both the "SSB" and "TLX" annunciators in the display.

9 8

View or change Security Code.
Once encoded the Security Code provides the equipment with a psychological barrier against theft as the equipment is not operational before the correct code is entered.
A "Security Code" sticker is supplied together with the transceiver. It must preferably be placed on a visible spot near the equipment.
As the Security Code is assigned only to the currently used Control Unit, it is necessary to store a Security Code in all CU's where more than 1 is installed. A different Security Code may be used for each Control Unit as a protectiaon gainst unauthorized use.
For Security Code, numbers between "1" and "9999999" may be used providing a total of 9999999 different numbers.Factory setting is "0" which means no entry of Security Codeis required to operate the transceiver.
If the Security Code feature is desired, the following syntax must be used:

"Prog" "98" "Enter"

The Receiver Display shows the current Security Code. Key-in the wanted Security Code and store it:

"Security Code" "STO"

The Security Code is now stored in the currently used CU and must be entered every time the power supply is switched on:

"Security Code"

"Enter"

NOTE

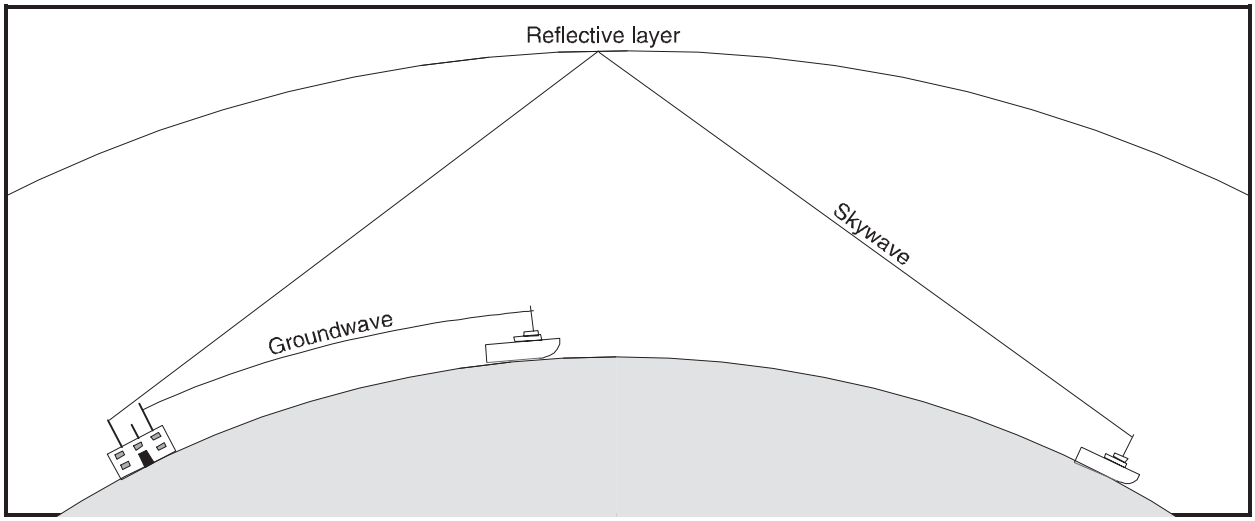
- To disable the Security Code a "0" is stored meaning no Security Code.
- The Handset must be hooked on before the Supply is switched on and the Security Code is entered.
- If a wrong Security Code is entered the equipment is not operational.
- If a wrong Security Code is entered by mistake, just press "Enter" and enter the correct Security Code.
- Write down your Security Code and keep it in a non conspicuous place.
- If the Security Code is forgotten contact the local dealer.
- If the Security Code is used as a preventive measure against theft, it is recommended to enable the Security Code only when the ship is in port and disable the Security Code when the ship is at sea, giving quick radio-access to all on board in case of an emergency situation.

PROPAGATION OF HF AND MF RADIO WAVES

Introduction

The TRP 7200 is able to operate on frequencies from 1.605 MHz to 30 MHz. This frequency span covers the upper part of the MF range (0.3 - 3 MHz) and the whole HF range (3 - 30 MHz). In this wide frequency area the propagation properties of radio waves differs markedly from one edge to the other.

The propagation in the MF and HF frequency bands takes place in two different ways, namely one in which the radio waves follows the surface of the Earth ("Groundwaves") and one in which the radio waves are reflected from the Ionosphere ("Skywaves"). Both propagation modes are influenced by many factors, the major being the Sun, the position of the vessel on Earth and the time of day.



Groundwave propagation

In the MF band and the lower part of the HF band, at frequencies up to 5 MHz the predominant propagation mode is groundwave propagation.

In this mode the waves originating from the transmitter antenna will follow the Earths curvature to the receiver antenna. It is not necessary to have direct line of sight between the antennas as it is in the case of VHF radiotelephones. Under normal conditions the range of communication can be expected to be up to 800 Km at 1.6 MHz decreasing to about 500 Km at 5 MHz. The reason for the shorter range on the higher frequencies is that the attenuation in the atmosphere increases with the frequency and at the same time the radio waves' ability to follow the curvature of the Earth decreases.

The time of day will also influence on the propagation. During the day, the atmosphere, due to the radiation from the Sun, will be more absorptive than during the night when a range of up to 1000 Km can be expected.

MF band radio waves are radiated with the highest efficiency from a long antenna. This is due to the long wavelength of the signal.

At frequencies above 5 MHz the radio waves ability to follow the Earth's curvature decreases and at 30 MHz the propagation is almost along a straight line. Therefore if ground wave propagation is to be used on 30 MHz the range is confined to distances at which there will be optical sight between the antennas in question.

Skywave propagation

At frequencies between 5 MHz and 30 MHz long distance propagation is achieved by skywave propagation. Certain layers of the Earth's upper atmosphere, in the Ionosphere, called the E-layer and the F1- and the F2-layers are able to act as a sort of mirror to the radio waves in the above mentioned frequency range. A signal of the appropriate frequency will therefore be reflected by the mirror and will return to the Earth beyond the horizon of the transmitter antenna.

The reflection properties of the Ionosphere are strongly dependent of the state of the Ionosphere. During the day the Sun's radiation will increase the reflection, while the reflection during the night will be lower. At the same time the radiation will however, increase the attenuation of the radio waves.

The highest frequency that can be used to communication on a certain distance is called the Maximum Usable Frequency (MUF). This frequency is, however, subject to great variation in propagation. The best frequency to use is about 15 pct. lower than the MUF. This frequency is called the FOT, Frequence Optimal du Travail.

Besides the diurnal variations due to the Sun's radiation, the propagation is also dependent of the solar activity in general. During periods of high solar activity the MUF will be higher, but at the same time disturbances in the Ionosphere, due to the high activity, will be more frequent.

Tables of MUFs covering various radio paths are published monthly by many telecom administrations.

3. INSTALLATION Table of contents

DESCRIPTION

General

Correct installation of the TRP 9500 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. Sharp cable bends especially on coaxial cables must be avoided and a sufficient number of clips or straps should be used to secure the cables.

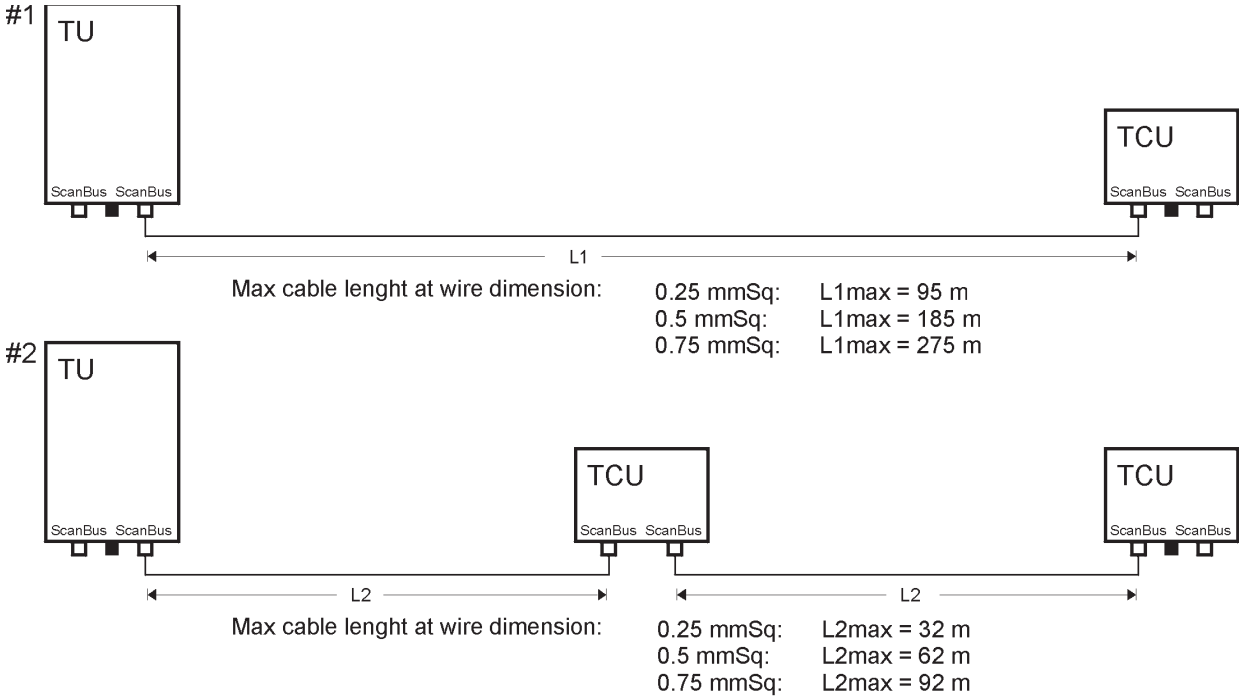
MOUNTING THE UNITS

Mounting the Transceiver Control Unit

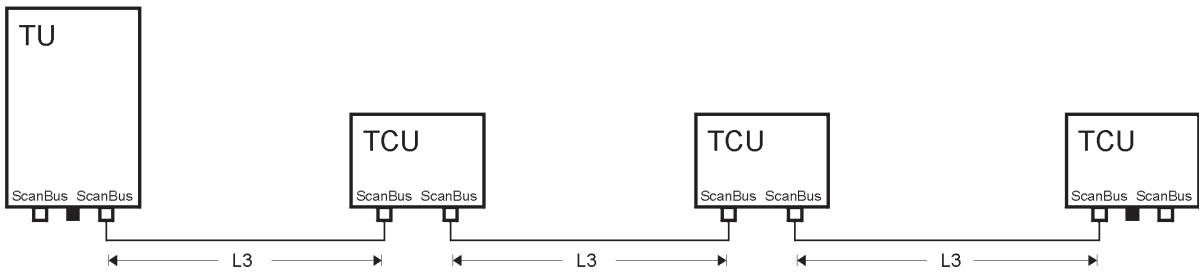
Up to 5 Transceiver Control Units may be connected to the Transceiver Unit using the build-in local area network (ScanBus). The Transceiver Control Units must be chain connected and the maximum distance from the Transceiver Unit to the most distant Transceiver Control Unit is 100m. The required type of screened multiwire cable depends on the number of Control Units and the distance between the units. See fig.1.
If the DCS option is included in Transceiver Unit one or more DSC Control Units may be connected. The total number of Transceiver Control Units and DSC Control Units connected to the Transceiver Unit must not exceed 5.

Installation examples and recommanded cable specification.
Cable type: 5 x 2 screened multiwire
ScanBus termination jumper: ■

fig.1

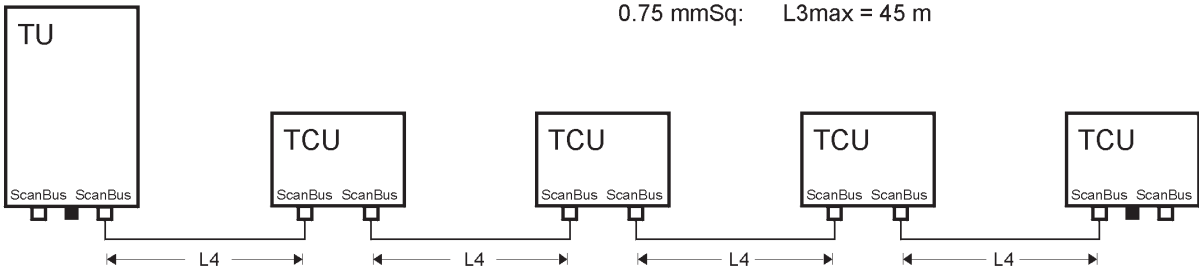


#3



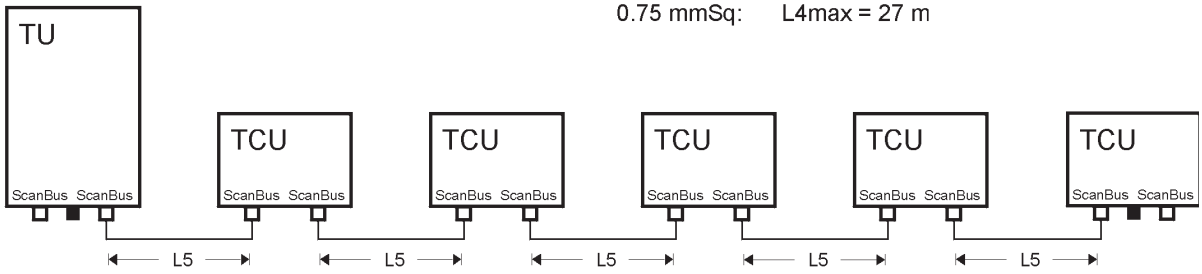
Max cable lenght at wire dimension: 0.25 mmSq: L3max = 15 m
0.5 mmSq: L3max = 30 m
0.75 mmSq: L3max = 45 m

#4



Max cable lenght at wire dimension: 0.25 mmSq: L4max = 9 m
0.5 mmSq: L4max = 18 m
0.75 mmSq: L4max = 27 m

#5



Max cable lenght at wire dimension: 0.25 mmSq: L5max = 6 m
0.5 mmSq: L5max = 12 m
0.75 mmSq: L5max = 18 m

Installation examples and recommanded cable specification including the DSC option.
Cable type: 2 x 5 screened multiwire
ScanBus termination jumper: ■

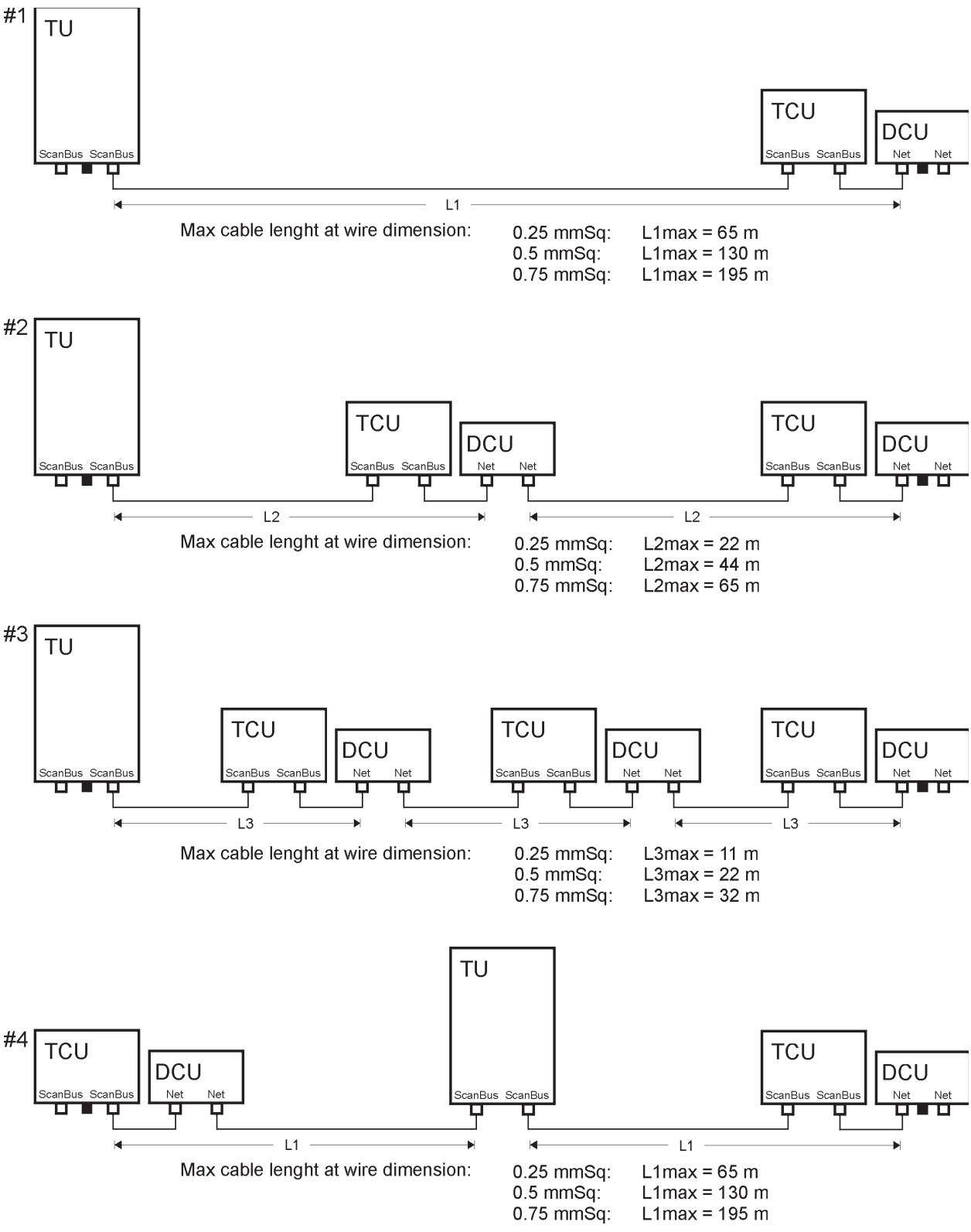
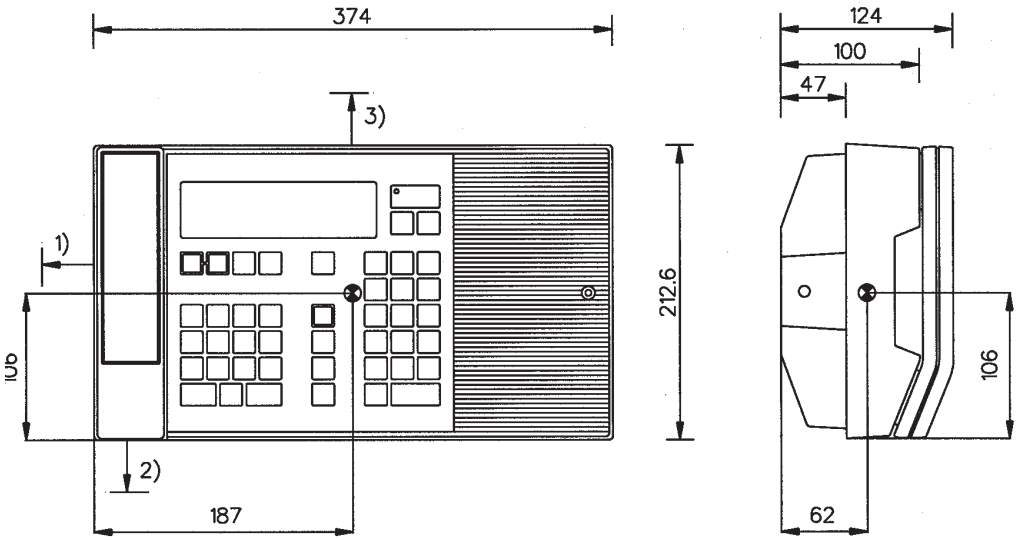


fig.3

The Transceiver Control Unit may be tabletop or bulkhead mounted. Fig. 2 and 3 shows different possibilities to obtain the best possible viewing and operation position and fig.3 includes the use of the optional bracket . Overall dimensions and a drilling plan for the necessary holes is also shown in fig.s 2 and 3. If the mounting surface is not sufficiently plane then apply washers between the Transceiver Control Unit and the surface.



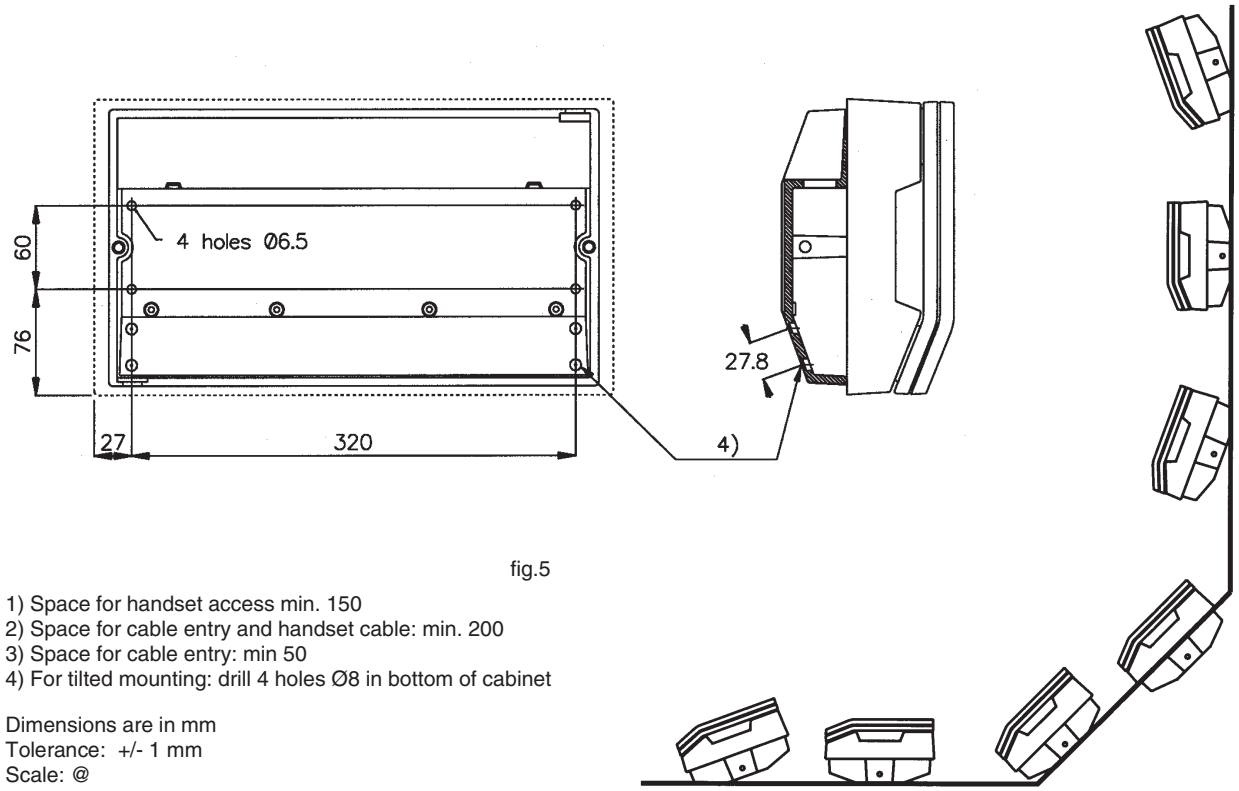


fig.5

1) Space for handset access min. 150
2) Space for cable entry and handset cable: min. 200
3) Space for cable entry: min 50
4) For tilted mounting: drill 4 holes Ø8 in bottom of cabinet

Dimensions are in mm
Tolerance: +/- 1 mm
Scale: @
Weight: 3.4 Kg
Doc.: 4-0-31441

fig.4

Mounting options

Transceiver Control Unit with Mounting Bracket.

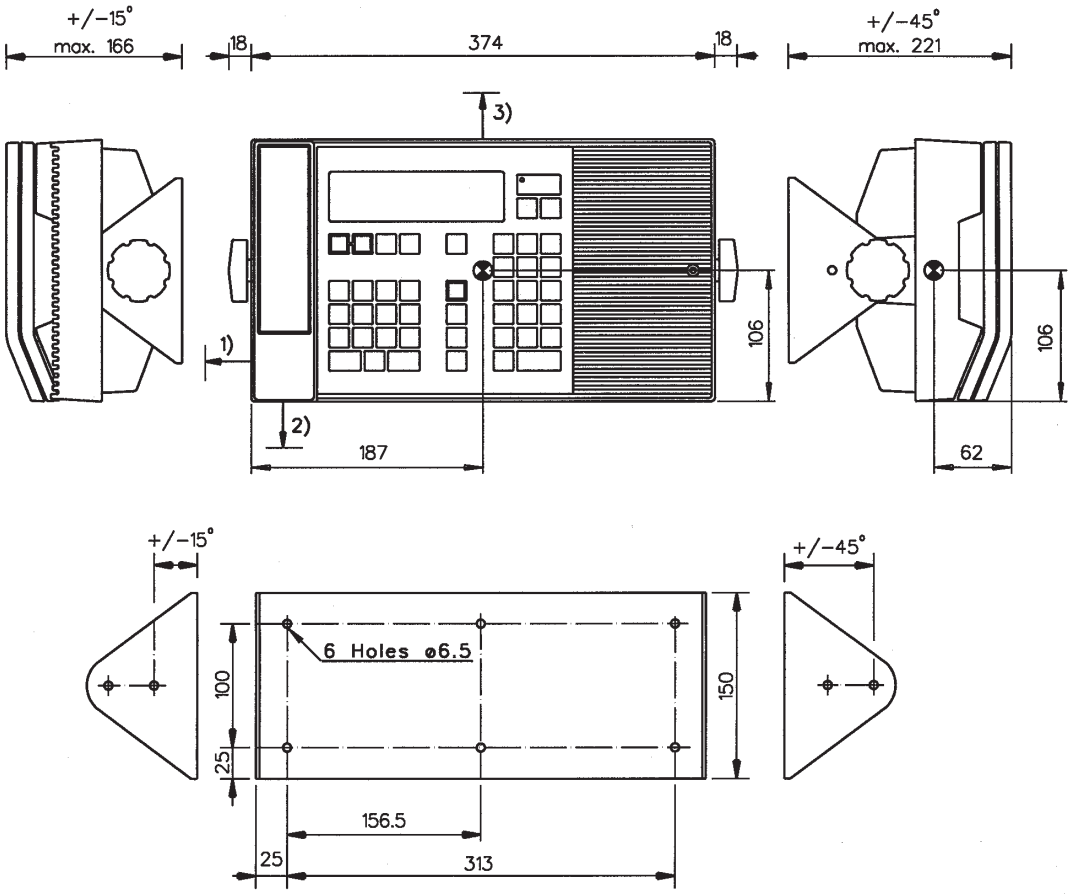


fig.7

1) Space for handset access min. 150
2) Space for cable entry and handset cable: min. 200
3) Space for cable entry: min 50

Dimensions are in mm
Tolerance: +/- 1 mm
Scale: @
Weight TCU: 3.4 Kg
Weight Mounting Bracket: 1.7 Kg
Doc.: 4-0-31437

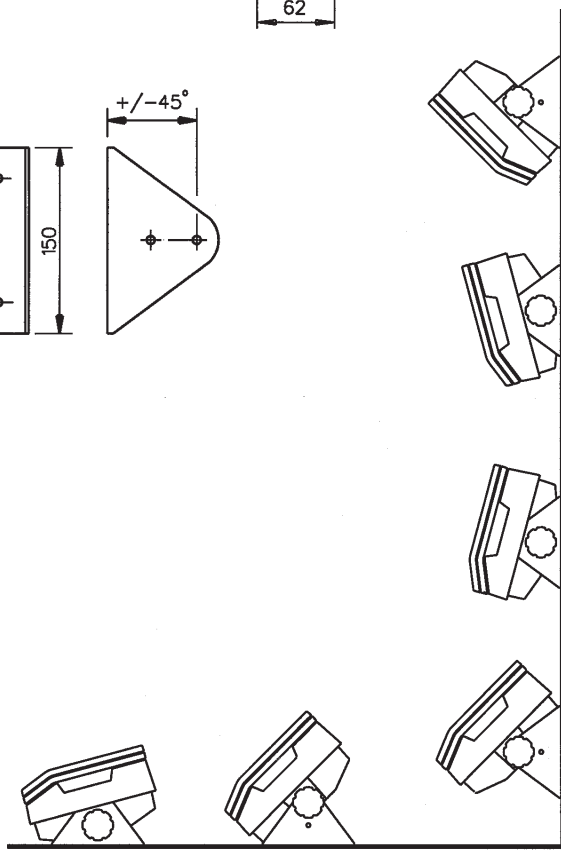


fig.6

Mounting options

The cables may enter the Transceiver Control Unit from either side. The control panel is turned 180 degrees (relative to the bottom part) to enable cable entry from the opposite side.
The viewing angle of the LCD display can be optimized for best performance by using the 'Prog' '13' function. The level of the Beep sound (when pressing a key) may be adjusted by pressing 'Prog' '@' function. See description of the User Programmable Functions.

Mounting the Transceiver Unit

The Transceiver Unit should be installed in a dry place and consideration should be given to accessibility for servicing. It is important to provide plenty of airspace on the sides for adequate fan driven air circulation through the unit . Figures - shows the outer dimensions, mounting possibilities and the minimum distances to other objects ensuring good cooling, as well as a drilling plan.

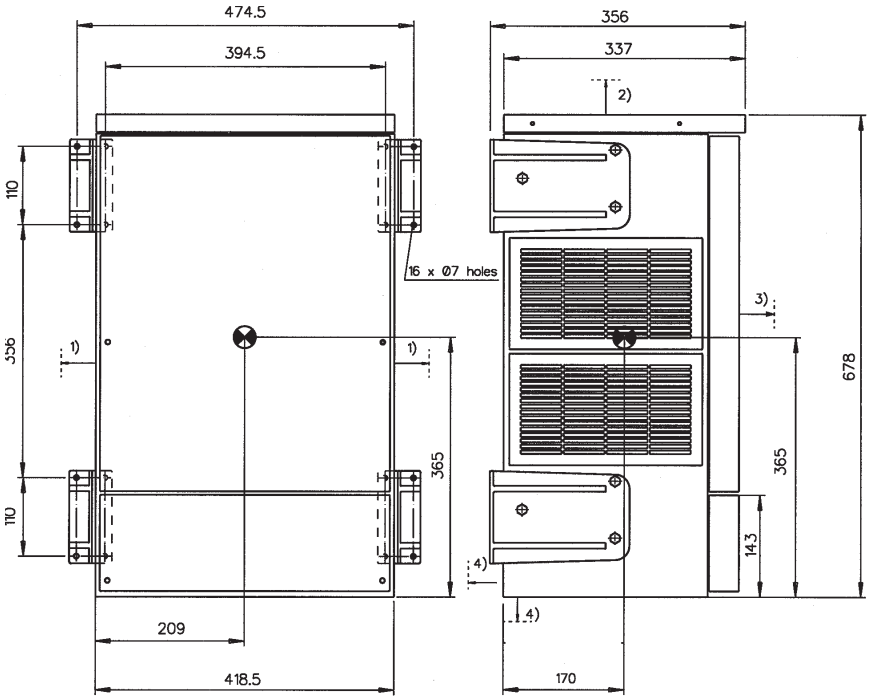


fig.8

Bulkhead mounting

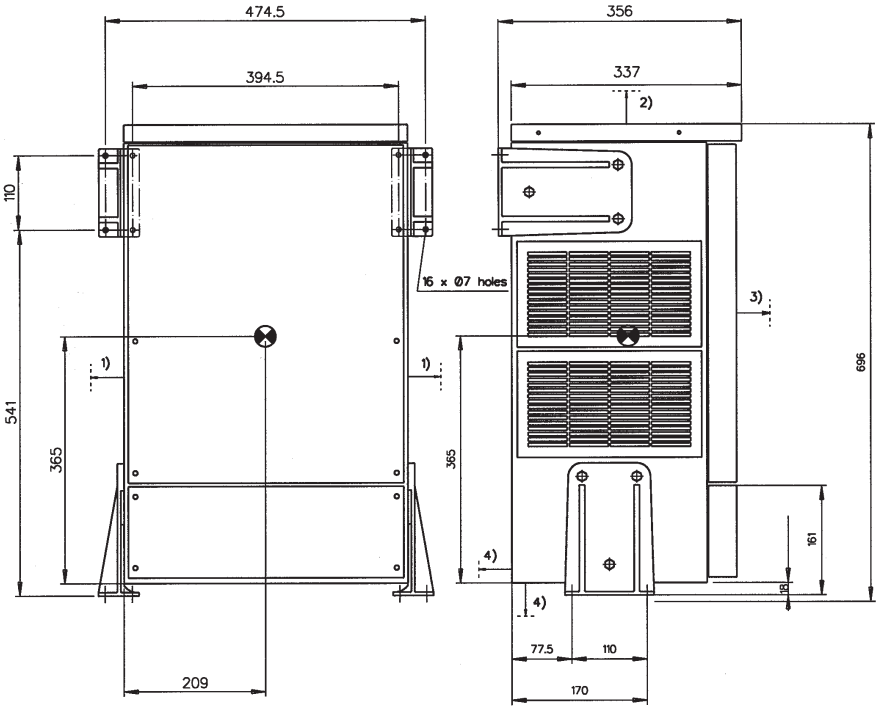


fig.9

Tabletop mounting

1) Space for airflow: min. 200
2) Space for service access: min. 500
3) Space for service access: min. 1000
4) Cable entry

Dimensions are in mm
Tolerance: +/- 1 mm
Scale: @
Weight: 53.5 Kg
Doc.: 4-0-31424 / 4-0-31425

Mounting the Antenna Tuning Unit

The Antenna Tuning Unit may be mounted up to 100 metres from the Transceiver Unit using just one RG-213/U coaxial cable for interconnection. The unit should be installed near the antenna feed point. Fig.14 shows mounting details.

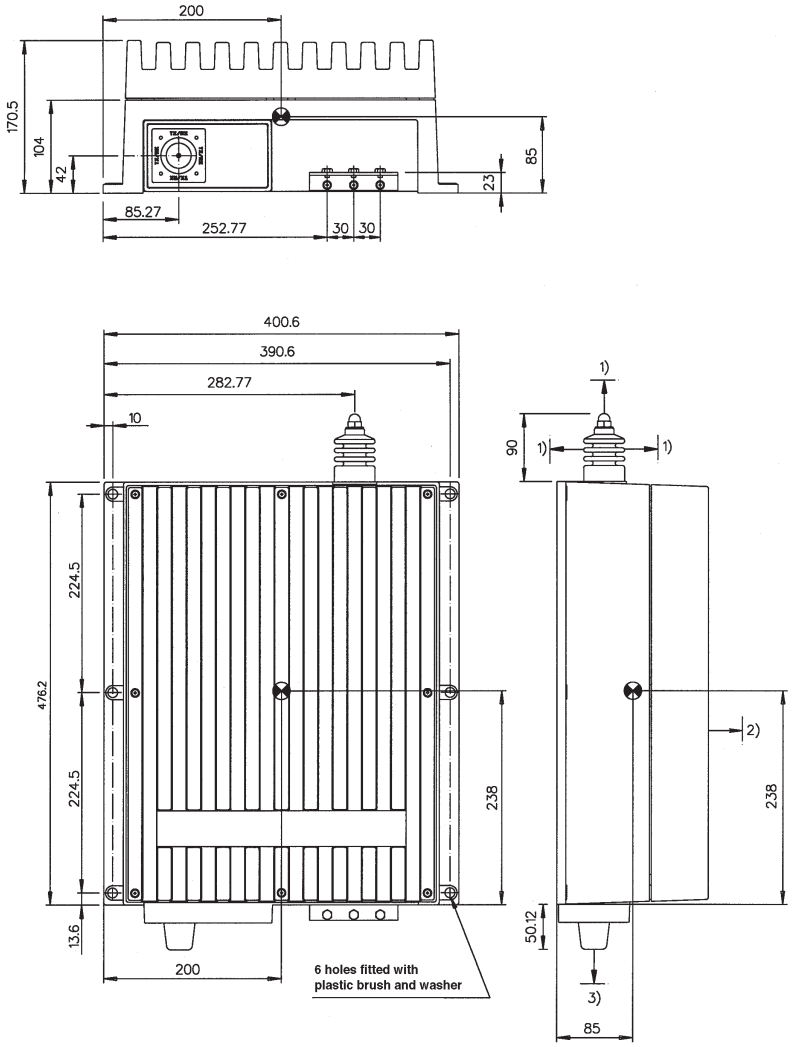


fig.10

1) Space to nearest overhang: min. 100
2) Space for service access: min. 500
3) Space for cable and service access: min. 200

Dimensions are in mm
Tolerance: +/- 1 mm
Scale: @
Weight: 17 Kg
Doc.: 4-0-31426

POWER SUPPLY

The supply leads are connected to the supply terminal strip of the Transceiver Unit located in the installation compartment. 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 left terminal. 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.Table below shows the necessary cable cross sections and external fuse ratings.

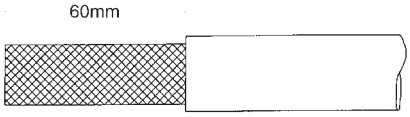


fig.11

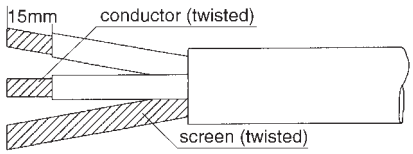


fig.12

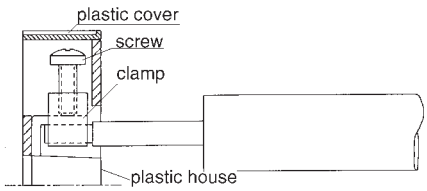


fig.13

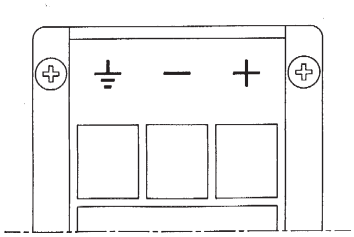


fig.14

Battery voltage	Max. cable length to battery *	Recommended cable	External fuses
12V	2.0m	Screened multiwire 2 x 16mm^2	150 A
12V	3.0m	Screened multiwire 2 x 25mm^2	150 A
24V	2.5m	Screened multiwire 2 x 10mm^2	100 A
24V	4.0m	Screened multiwire 2 x 16mm^2	100 A
24V	6.0m	Screened multiwire 2 x 25mm^2	100 A
32V	3.0m	Screened multiwire 2 x 10mm^2	100 A
32V	5.0m	Screened multiwire 2 x 16mm^2	100 A
32V	8.0m	Screened multiwire 2 x 25mm^2	100 A
* The maximum cable lengths are specified for continuos two tone operation. For ARQ or speech operation only, the maximum cable length figures are doubled.			

EARTH CONNECTIONS

Antenna Tuning Unit

As the earth connection of a transmitter is a very important part of the antenna system, it is of the utmost importance to keep in mind that the earth connection of the Antenna Tuning Unit must 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 100 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 or three 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 100 x 0.5 mm copper strap is run, preferably uninterrupted to the earth terminal at the bottom of the Antenna Tuning Unit.

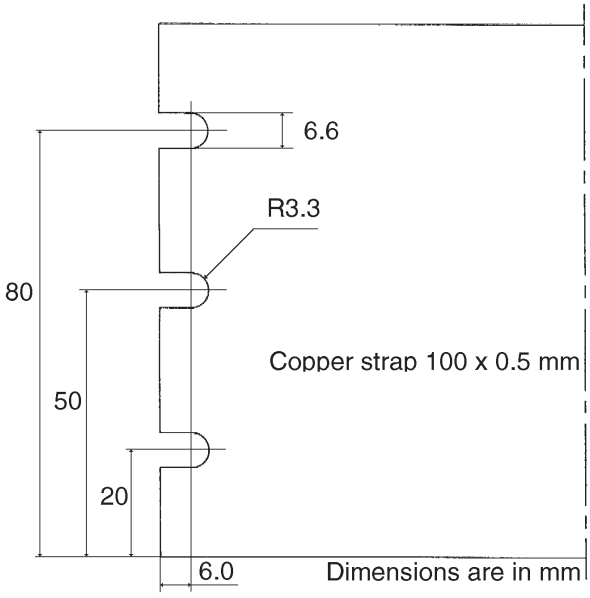


fig.15

Should it be necessary to break the copper strap, for example to pass through a deck, two or three 1/2" or M12 bolts should be used for this feed through.
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.
On fibre glass boats, such as yachts and sailing boats, it may be difficult to install a sufficiently good earth. Short copper straps are bolted to conducting parts on the engine, the keel and other conducting objects. Many copper straps can be glued to the inner surface of the hull below the water line to produce a large capacitance to the water. It is important that the total area of copper is large and that the distance between the copper surface and the water is as small as possible. The copper straps are connected directly to the ATU.

Transceiver Unit

The Transceiver Unit is preferably grounded separately to the ships metal in the shortest possible way. A 10 to 16mm sq. ground wire is connected to the ground terminal at the end of the unit. On vessels with no metallic superstructure the ground connection may be omitted.

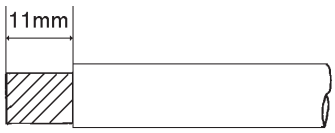


fig.16

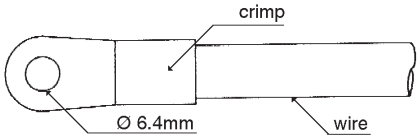


fig.17

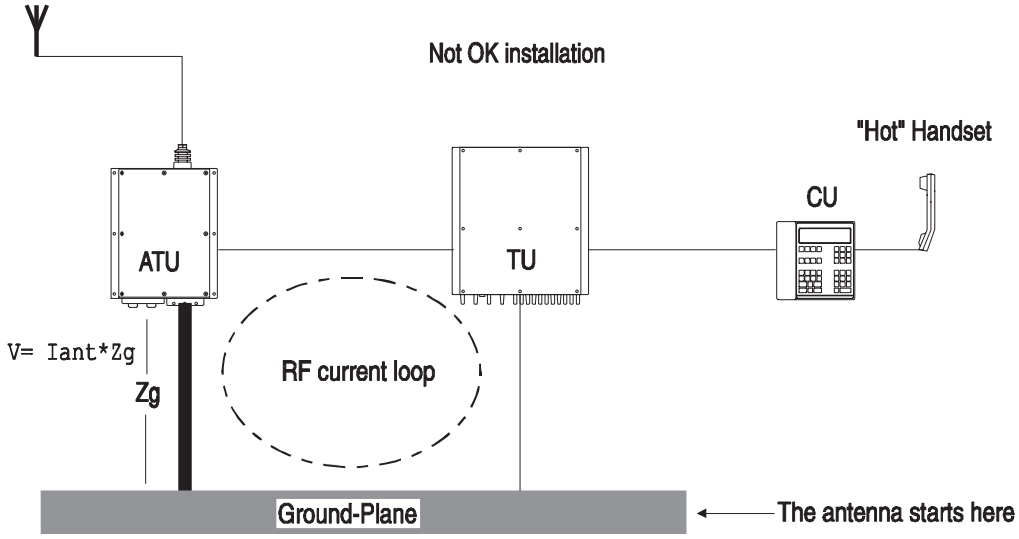
Grounding considerations

Proper system grounding is one of the most important installation details. Two types of grounding must be considered:
a) cabinet or equipment bonding together and to earth.
b) The antenna ground-plane.

Each type requires seperate considerations even though the 2 types of grounding are interrelated.

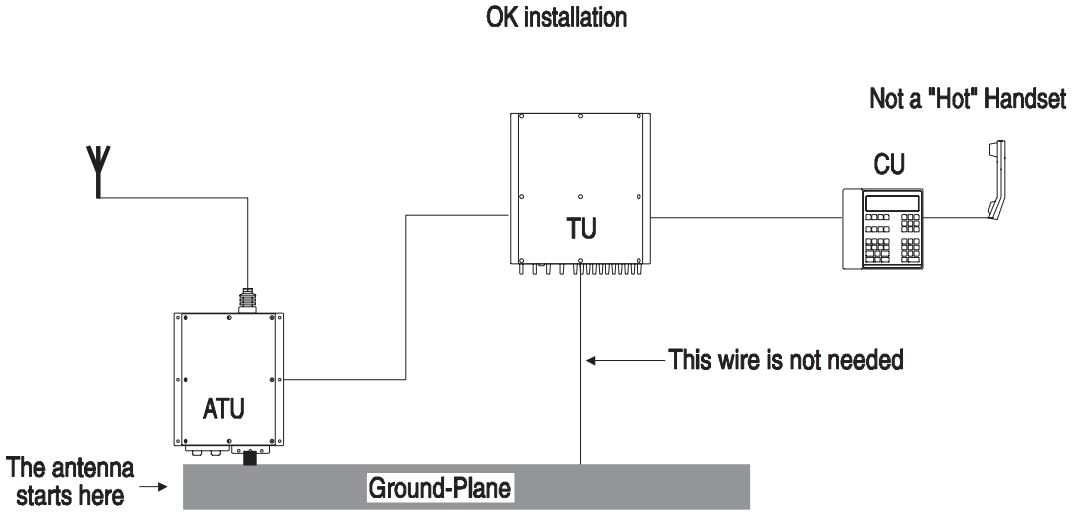
Ideally the Control Unit, Transceiver Unit, Antenna Tuning Unit and Antenna ground-plane must be at the same R.F. ground potential. Unfortunately this situation is seldomly achieved. Tune problems caused by the grounding will be reduced along with how close to this 'ideal' the grounding of the installation is performed.
On some installations ground loops will course problems. A ground loop is caused by more than one ground path for a given unit. This may introduce difference in the R.F. voltage potentials and circulating currents may be generated, inducing unwanted voltages into the control circuits or on the handset.

fig.18



Keep in mind that the vertical antenna always starts at its electrical ground-plane, whether or not you physically put the antenna there. First determine the antenna's electrical ground-plane. This is where the Antenna Tuning Unit must be mounted. Always think in terms of taking the Antenna Tuning Unit to the ground, rather than taking the ground to the Antenna Tuning Unit. In case of a a fiberglass boat, the ground-plane may well be at the hull grounding terminal. Then this is where the Antenna Tuning Unit should go and this is where the antenna actually starts.

fig.19



On fiberglass or wooden boats, the hull grounding plate system should be 10 to 30 square metres of physical surface area , where 10 square meters is the absolute minimum. Please note that the small porous bronze plates advertised as having a large surface unfortunately are not suitable. Large surface areas with small plates refers only to D.C. applications and not to H.F. applications. In order to have an effective radio system the grounding system must be physically large. The lager the better. There is no substitute.

There are however some marginally acceptable alternatives to an optimum ground-plane system. For example. If the fiberglass or wooden hulled boat has two rather large engines, which are well bonded together, this will provide an alternative ground system. Keep in mind that the Antenna Tuning Unit must be mounted and bonded to the engine framework with a short and large square ground strap.

On fiberglass or wooden boats, it is preferable to have a ground-plane screen imbedded on, in, or under the deck on which the antenna is mounted. The Antenna Tuning Unit is then bonded to this screen. The ground-plane is made of copper mesh or copper foil

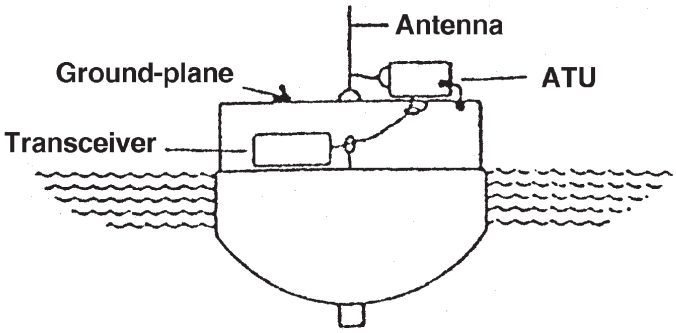


fig.20
Put the ATU at the antenna groundplane on a metal boat

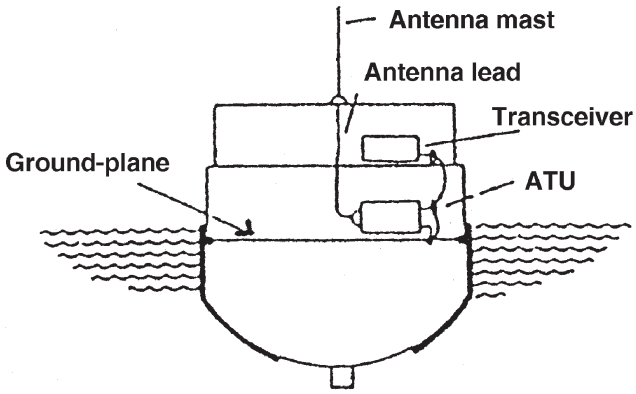


fig.21
Put the ATU at the antenna groundplane on a fiberglass or wooden boat

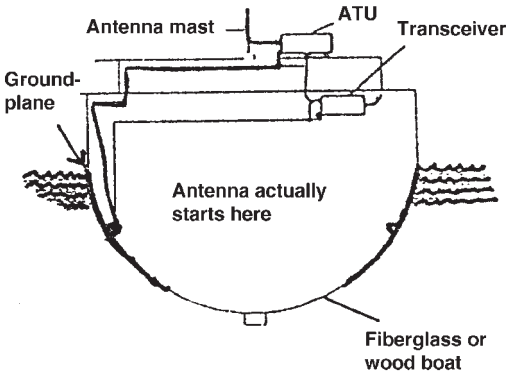


fig.22
Wrong ATU placement on a fiberglass or wooden boat. All boxes, including the operator, is part of the antenna.

It is not always possible or practical to mount and bond the Antenna Tuning Unit with a very short strap to the ground-plane. But it is possible to overcome this problem.

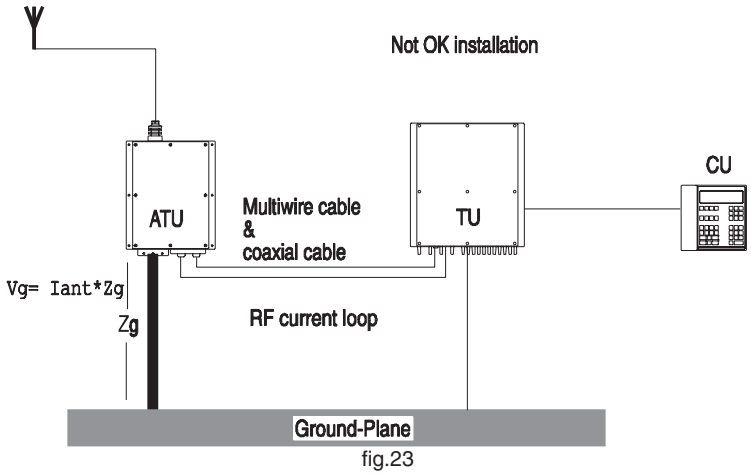


fig.23
The coaxial- and multicables may be connected to equipment with a different ground potential.
This will cause a loop-current.

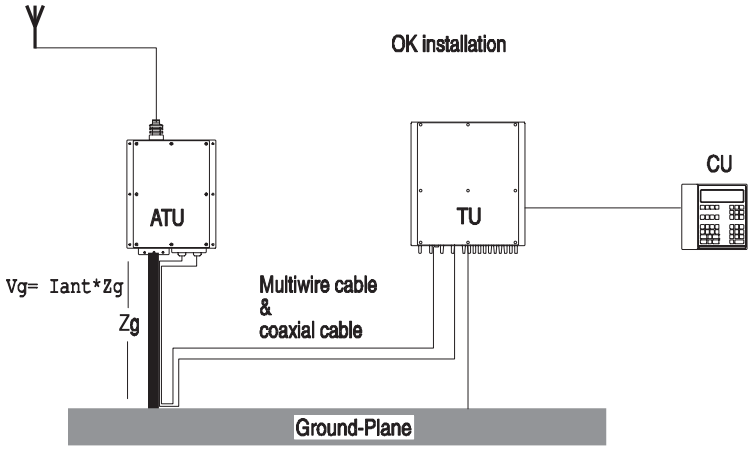


fig.24
If there is no potential difference, there will be no current.

B

y running the multicable and the coaxial cable very closely to the atu ground-strap(good coupling) down to the ground-plane, there will be no ILoop introduced by a potential difference between the ATU and other equipment.

How to avoid disturbing other equipment in fiberglass or wooden boats

Make a ground-plane by covering the bottom (indoor) of the boat with copper foil or - mesh. We recommend a wide ground-plane in the bottom of the vessel, as wide as possible.

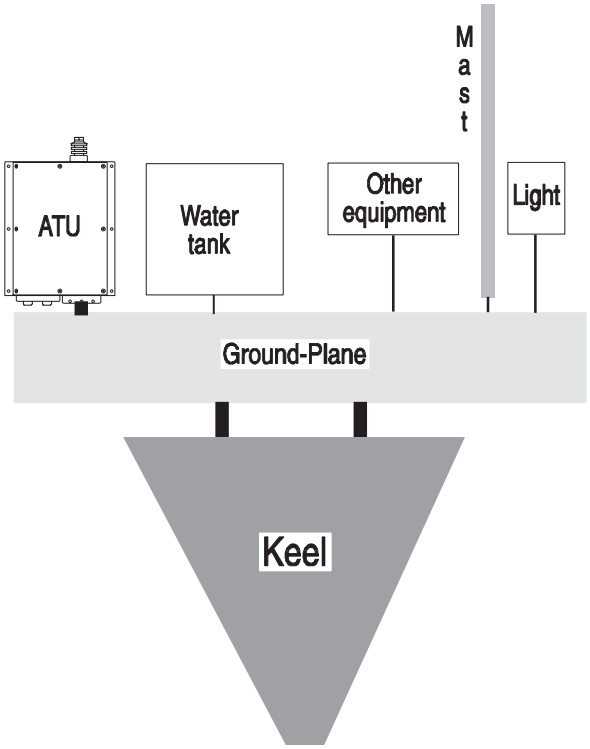


fig.25
All equipment, mast, and ligtht should be connected to this ground-plane seperately - not in the "daisey chain" manner.

When the mast and the shrouds have a big capacitance to the antenna, the grounding of these are very important. As is the case of the atu, the cables inside (or outside) the mast must follow the ground strap very closely(good coupling) down to the ground plane, before they are running to the installation or to other equipments. If the cables leave the mast at the deck ground loops may be introduced.

The copper foil and screen does not actually need contact with seawater in order to create the ground system. Radio frequency energy passes quite nicely through fiberglass, so an incapsulated ground system works just as well as one that is actually exposed to seawater. Incapsulated lead keels with half an inch of resin also works well. Any ground system that is capacitively coupled to the seawater is enhanced by the seawater itself.
Make the ground-plane before the boat is completed. It's so easy to build-in when the hull is under construction, and far more difficult to add after the vessel is fully completed.

Grounding "Ground Rules"

Use copper or bronze plate for lightning and 2 MHz RF.

Add copper under or near tuner. On deck under carpet, on overhead of bilge, etc.

Add radials, as many as possible; should be out of sight.

Ground to copper control tubing, railings, water tank and line.

Use 2" wide copper strap. Never use bread or steel wire.

Run independent bonds to the central point just under tuner, never a "daisy chain".

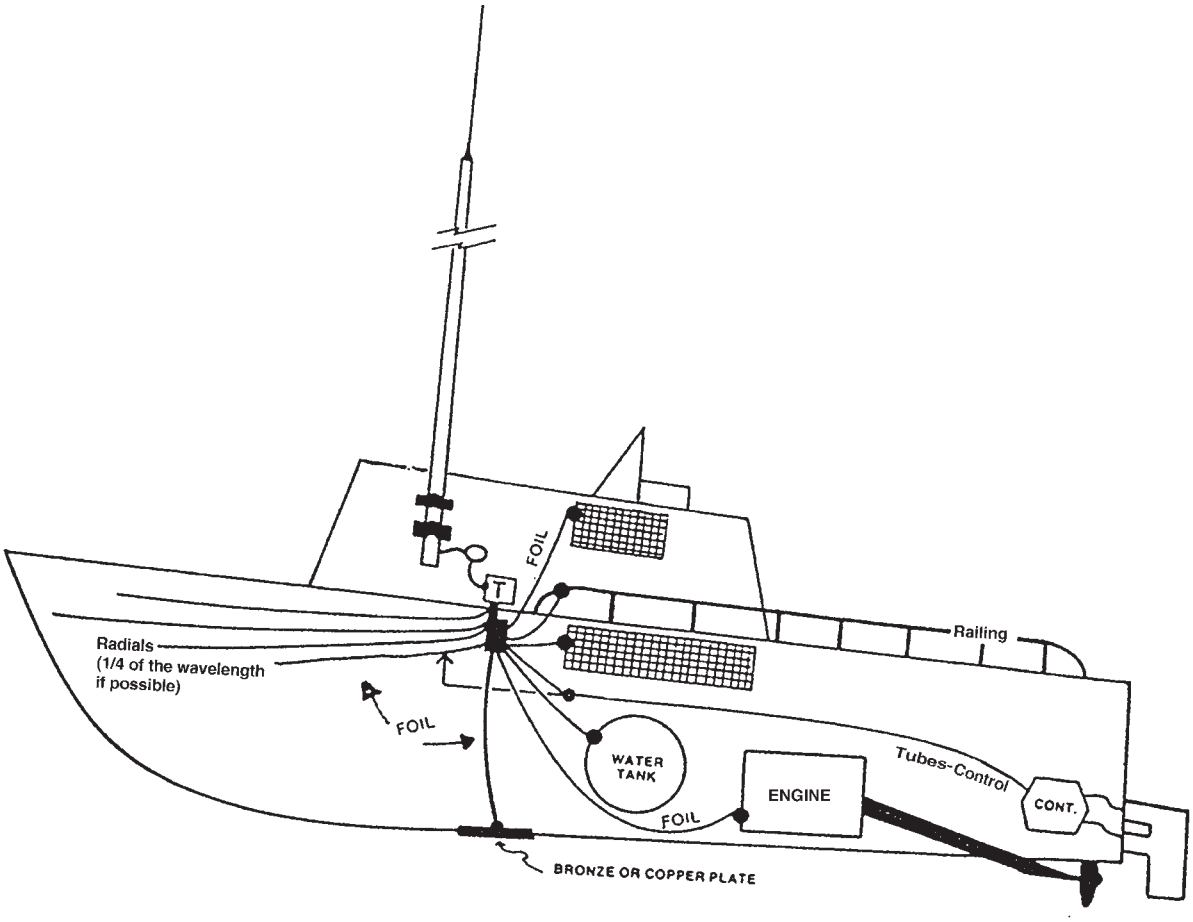


fig.26
Non-Metal Hull Grounding

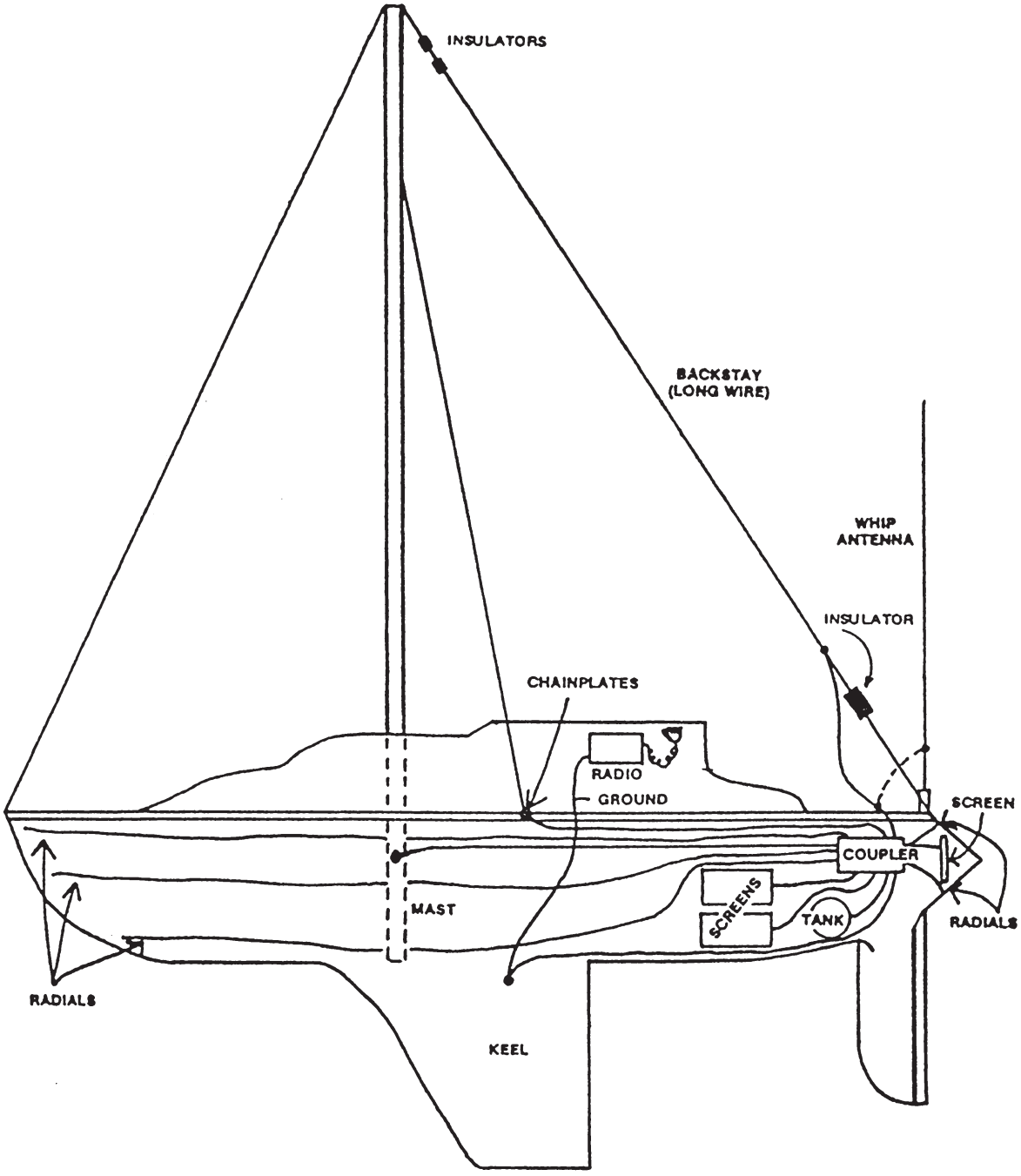


fig.27

Whip an/or Backstay Antenna and counterpoise system for Sailboat

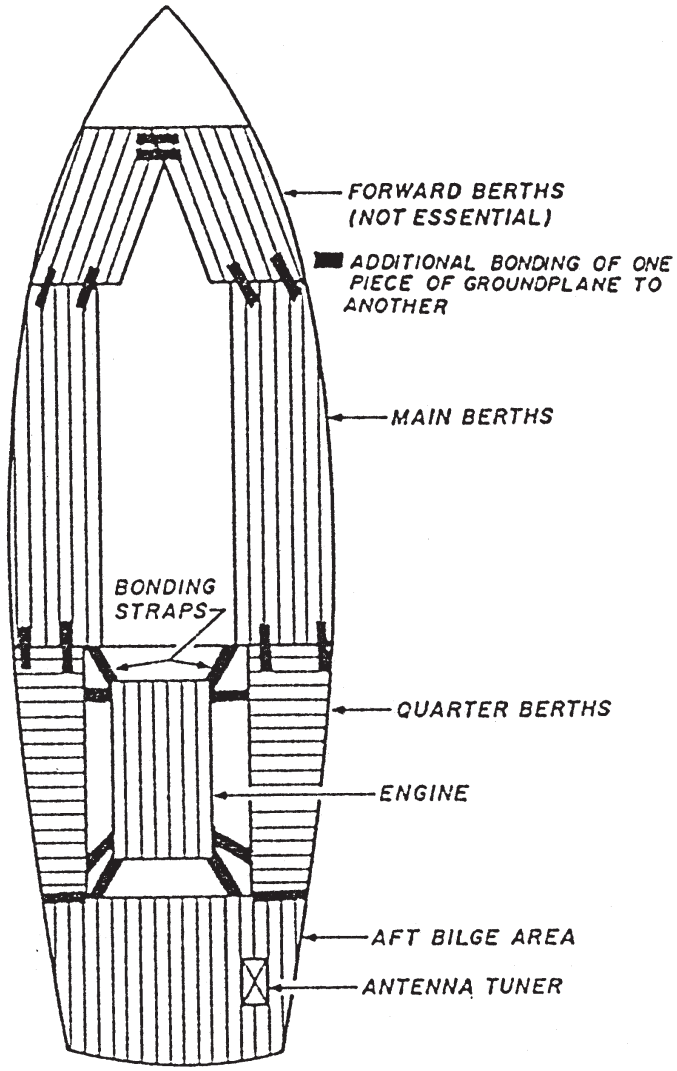


fig.28

What the antenna would see, if it were to search out possible candidates for ground plane or counterpoise areas.
The areas of the cabin sole would add to this, but only if neatness could be maintaned by covering screening with carpeting. However, in heavy weather cruising carpeting isn't always practical because it will get wet.

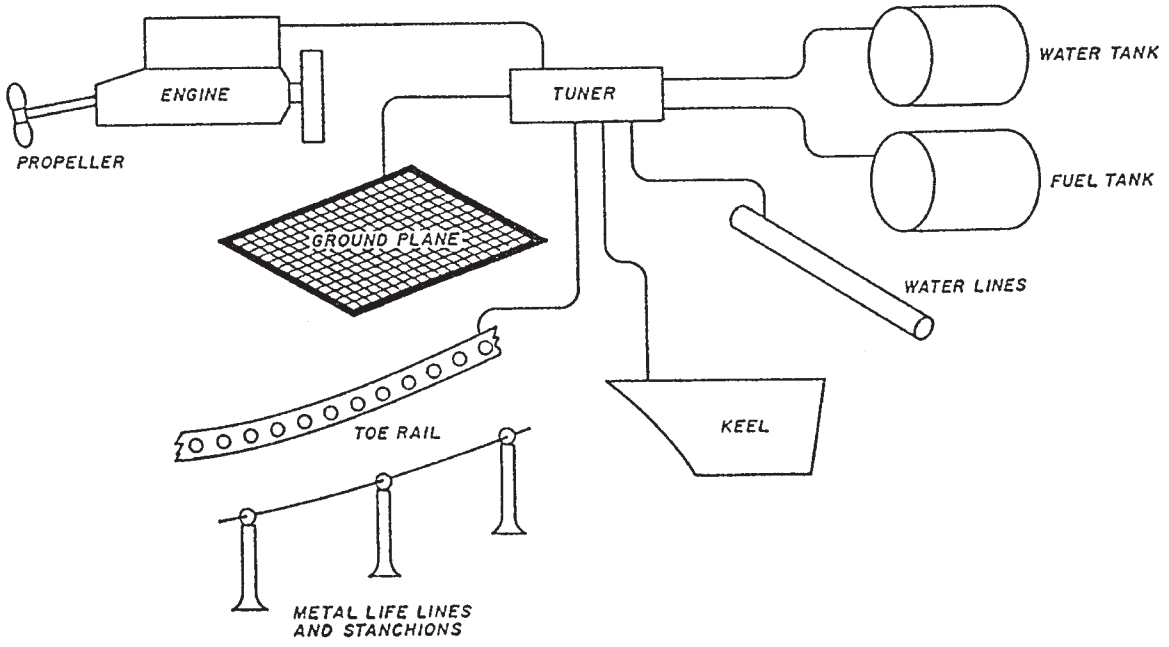


fig.29
Make sure you ground to everything for a good ground plane or counterpoise.

RECOMMENDED ATU INSTALLATION

on a metal-hull vessel.

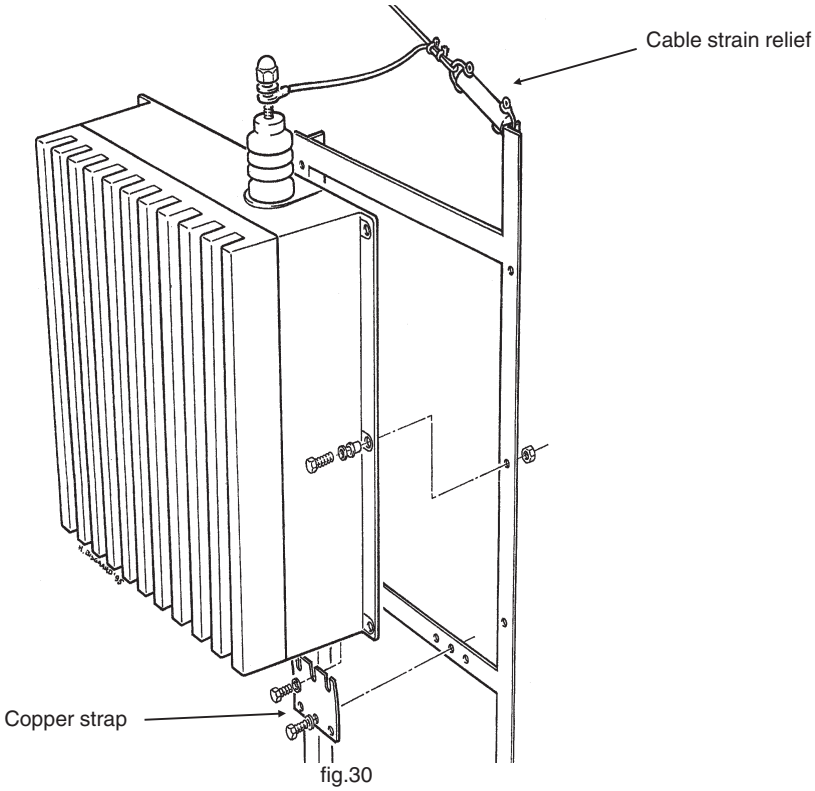


fig.30
Mount the ATU on a custom-built bracket made from iron angle bars

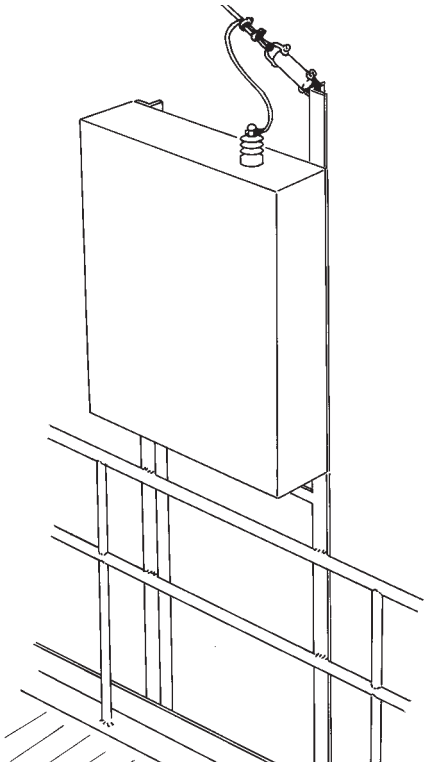


fig.31
ATU bracket welded to the railing

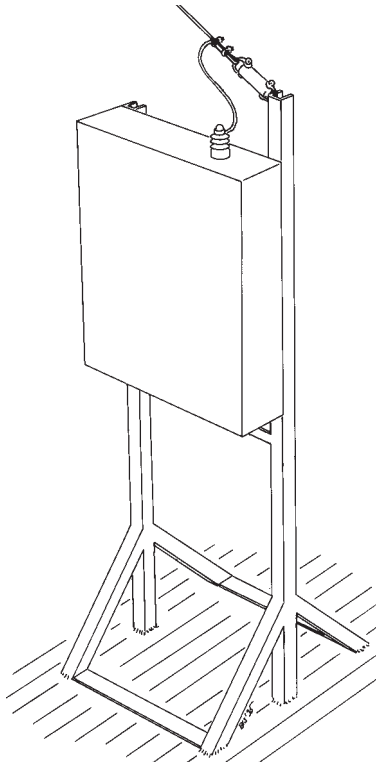


fig.32
ATU bracket welded to the floor

ANTENNAS

The standard equipment is used with common transmitting and receiving antenna. The antenna should be erected in the open, away from conducting object such as derricks etc. which may cause reduction of the radiated power. 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 antenna should also be kept as far away as possible from electrical equipment in order to minimize noise. Electrical installation such as cable braiding (screens) and instruments in the vicinity of the 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 to avoid malfunction of these instruments. 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 18 metres total length. If possible long antenna should be installed to avoid reduction of the radiated power in the lower frequency bands. Short antennas of 7 metres length should therefore only be installed where it is impossible to install a longer and more efficient antenna.

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 (fig.15).
To maximize the radiated power and avoid flash over keep distance to metal parts as long as possible. All wire junctions in the antenna system must be made with cable lugs of correct size according to the wire gauge. This will prevent bad connections due to corrosion. For further corrosion proofing silicone grease may be applied to the cable joints.

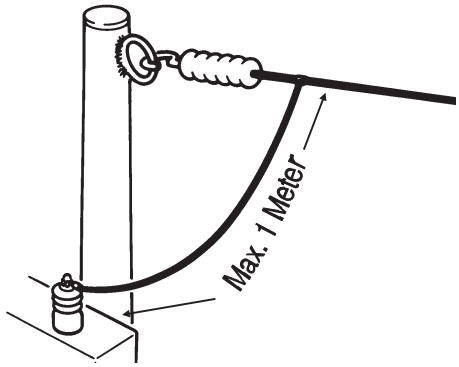


fig.33

Antenna considerations.

Your HF communication system will be no better than your antenna. Plan it carefully.

There is no single antenna which is the best solution to all situations. Selection of antenna is a series of compromises.

Choose the "fatest" or thickest antenna possible for a low Q antenna which makes it easier to tune and gives the best efficiency.

Do not use "loaded" or "trap" antennas for "all frequency" applications. However, they are very good for single frequency or very narrow band applications.

The 12m vertical is preferred over the 7m for most communication requirements, because it gives a better efficiency in the lower frequency band.

Mount the antenna as far from shadowing structurres as possible, for more efficiency and more predictable radiation pattern.

INTERCONNECTION OF UNITS

Transceiver Control Unit-to-Transceiver Unit connections

The cable is prepared by soldering D-sub connectors at both ends as described below.

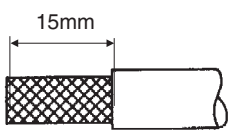


fig.34

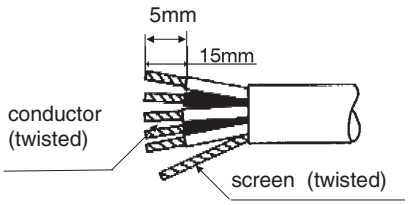


fig.35

Identify twisted pairs.
Before contacts of plug are soldered: slide the plastic cover over the cable.

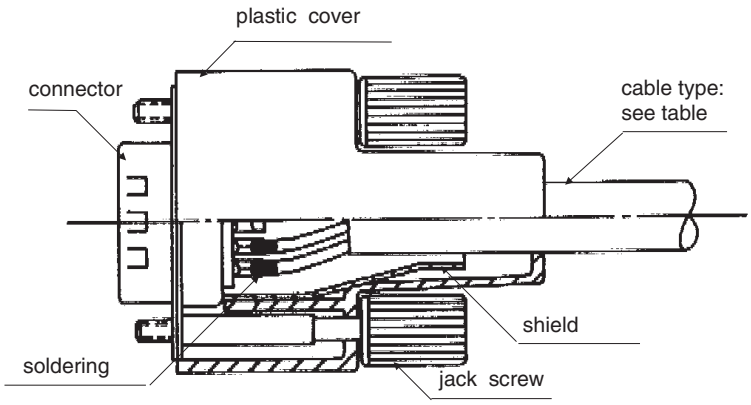


fig.36

Contact arrangement
(viewed from solder side)

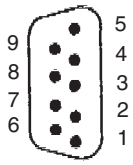


fig.37

After the contacts are soldered: latch the inner and outer shields into the connectors from the rear and snap in. Finally slide the plastic cover over the shield and fix the two jack screws into the plastic cover.

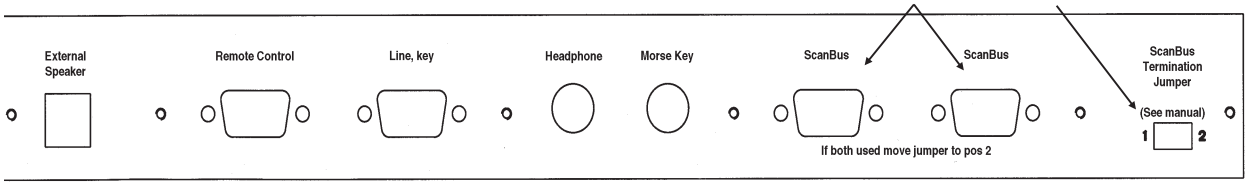
'ScanBus'		
Connector Terminal no.	Designaltion	Remarks
1	Supply On	Common 'supply on' signal for all xCUs on the 'ScanBus'. Active when connected to ground
2 3	Data+ Data-	Data communication between units. CAN Net. Baud rate: 76.8 kb/s. Spec.: ISO/DIS 11898
4 5	AF+ AF-	TX AF modulation including CW/TLX Tone Key. Vnom = 0.775 Vrms diff.. Vmax= 12V Vpp diff.
6	GND	System GND
7	+24V	Supply voltage for all xCUs on the 'ScanBus'
8 9	RXAF+ RXAF-	RX AF signal. Vnom = 0.775 Vrms diff.. Vmax= 12V Vpp diff.
Shield	Screen	Screen connected to System GND.

Cable type: 5 x 2 multiwire twisted pair.
For cable square refer to installation examples at pages 3-3 to 3-5.

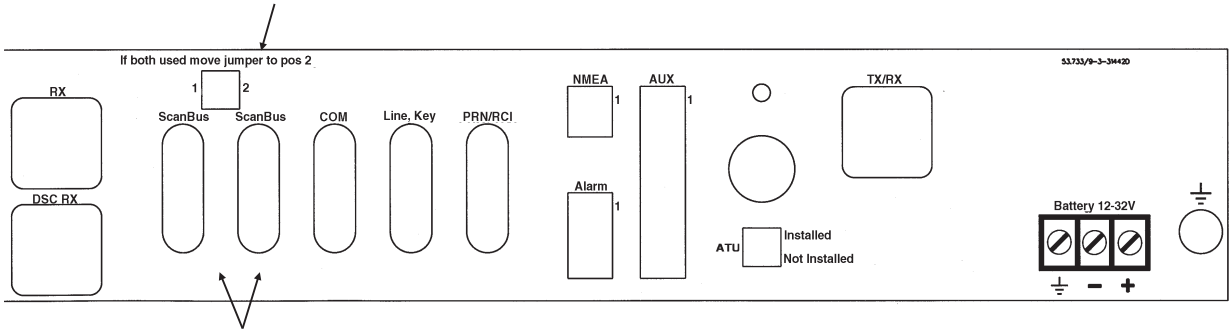
Twisted pairs: 1 and 6
2 and 3
4 and 5
6 and 7
8 and 9

To connect the cable to the Transceiver Control Unit and the Transceiver Unit simply connect to one of the D-sub sockets marked "ScanBus".

TCU Connector Panel



TU Connector Panel



The ScanBus termination jumper must be set to pos. 1 if just one of the ScanBus connectors are used - and to pos. 2 if both ScanBus are used.

Transceiver Unit-to-Antenna Tuning Unit connection

The units are interconnected by an RG-213/U coaxial cable with a maximum length of 100 meters. The coaxial cable are terminated in UHF-connectors (PL 259 type) and connected at both ends to the sockets marked "TX/RX".

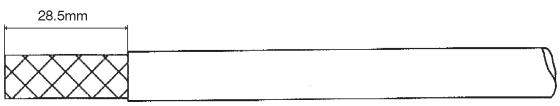


fig.38

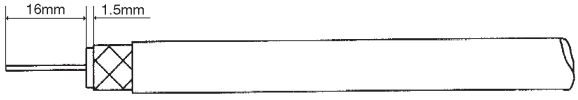


fig.39

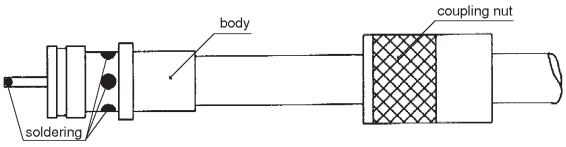


fig.40

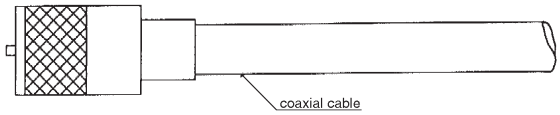


fig.41

Remember to fit the rubber gasket on the coaxial cable before soldering.

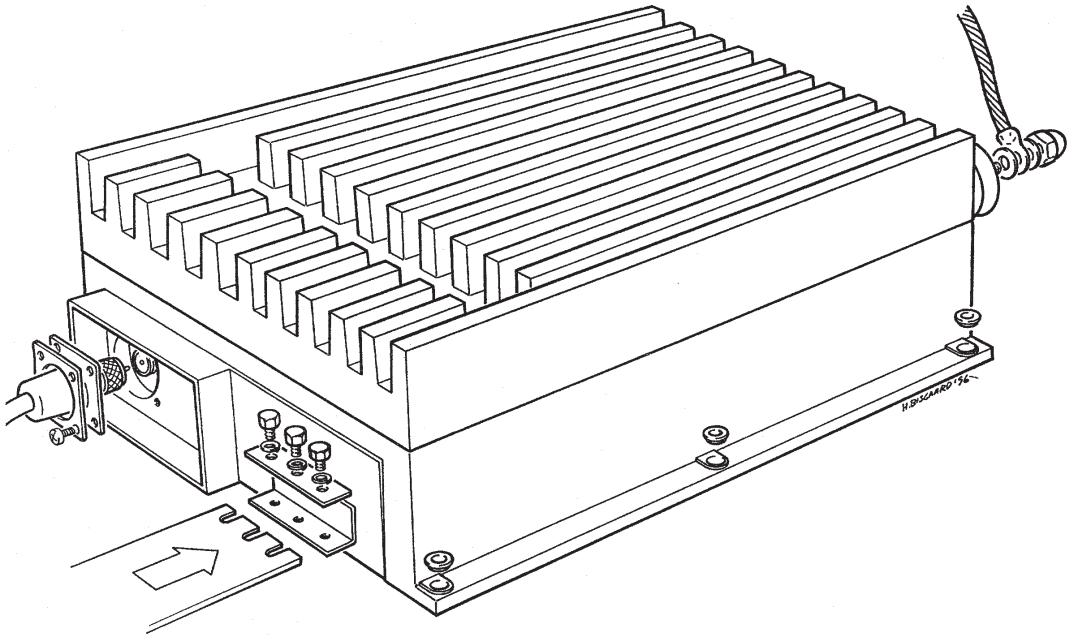


fig.42

Use a second wrench for backstop when fastening the Antenna Horn nut

NOTE:

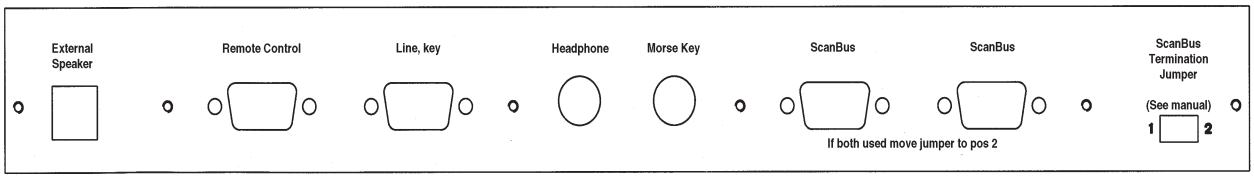
TRP 9500 may be operated without the ATU 9500. Just connect the 50 ohms antenna system to the coaxial socket marked "TX/RX" at the end of the Transceiver Unit and set the jumper located in the Transceiver Unit installation compartment to position 'ATU not installed'.

Important:

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 coaxial cable 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 coaxial cable must follow the copper strap to the Antenna Tuning Unit. The coaxial cable should be placed upon the centre 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.

CONNECTORS FOR EXTERNAL EQUIPMENT

Transceiver Control Unit connector panel



Remote Control

Control signals from a computer system or a external telex/DSC modem.
Protocol is NMEA or T-Bus

The cable is prepared at TCU end by soldering a D-sub connector as described below.

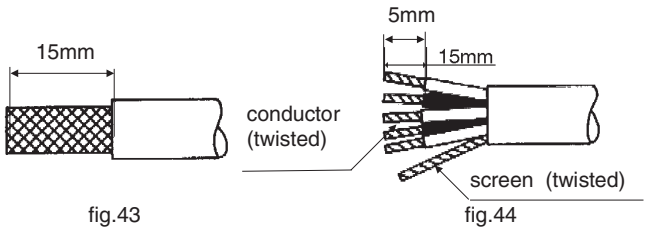


fig.43

fig.44

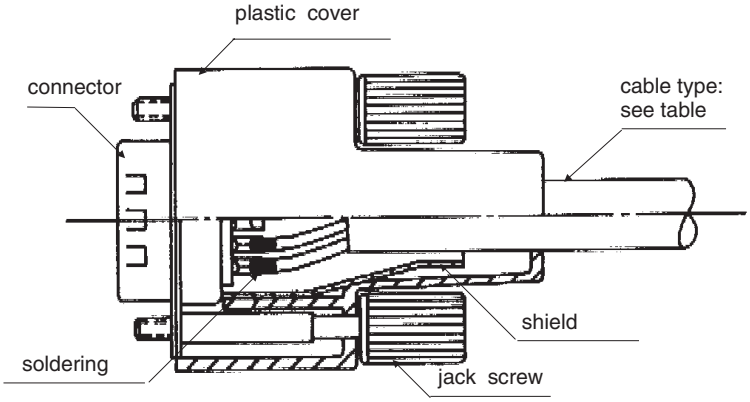


fig.45

Before contacts of plug are soldered: slide the plastic cover over the cable.

Contact arrangement
(viewed from solder side)

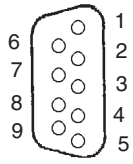


fig.46

After the contacts are soldered: latch the inner and outer shields into the connectors from the rear and snap in. Finally slide the plastic cover over the shield and fix the two jack screws into the plastic cover.

'Remote Control'. Equipment connector 9 way D-sub male.		
Pin	Designation	Description
1	DCD	Input. Data Carrier Detected or Scan S/S
2	RXD	Input. Receive Data.
3	TXD	Output. Transmit Data.
4	nc	No connection.
5	RCI-GND	Galvanic isolated ground return for Remote Control Interface. Not connected to system ground
6	nc	No connection.
7	nc	
8	nc	
9	RI	Input. Ring indicator.
-	Screen	Cable screen. Connected to system ground.

Line, Key
The Remote Control audio and key signals.

The cable is prepared at TCU end by soldering a D-sub connector as described below.

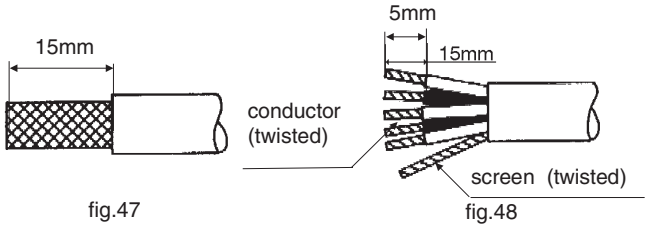


fig.47

fig.48

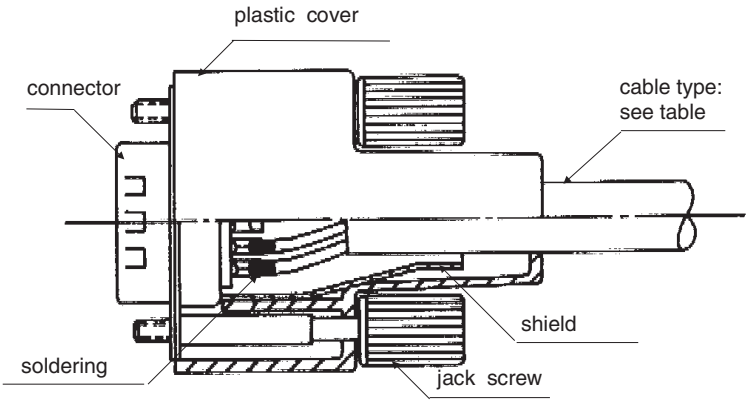


fig.49

Before contacts of plug are soldered: slide the plastic cover over the cable.

Contact arrangement
(viewed from solder side)

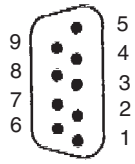
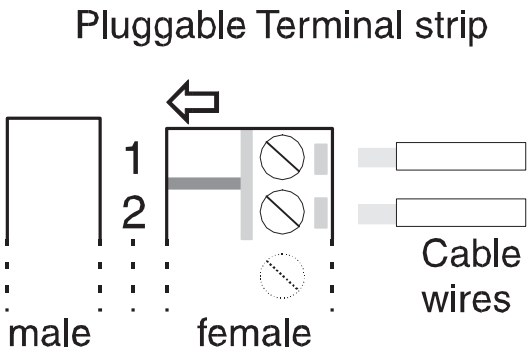


fig.50

After the contacts are soldered: latch the inner and outer shields into the connectors from the rear and snap in. Finally slide the plastic cover over the shield and fix the two jack screws into the plastic cover.

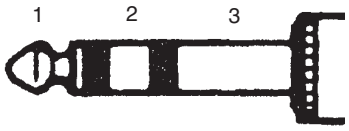
'Line, Key'. Equipment connector 9 way D-sub female.		
Pin	Designation	Description
1 6 2	Line In + Line In C Line In -	Balanced 600 Ohm 0 dBm line input. Accepts -15 dBm to +10 dBm.
3 8 4	Line Out + Line Out C Line Out -	Balanced 600 Ohm 0 dBm line ouput. Adjustable from -15 dBm to +10 dBm.
5 9	'Key' RCI-GND	Galvanic isolated external key input. Pulled up to +12V. Active when pulled down to RCI-GND.
7	nc	No connection.
-	Screen	Cable screen. Connected to system ground.

External Speaker



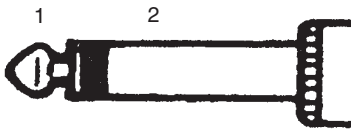
'External Speaker'. Equipment connector 2 way pluggable terminal strip male.		
Pin	Designation	Description
1	SPK+	Output. 5 watt into 8 ohms. 4 ohms speaker may be connected.
2	SPK-	

Headphone
for CW operation



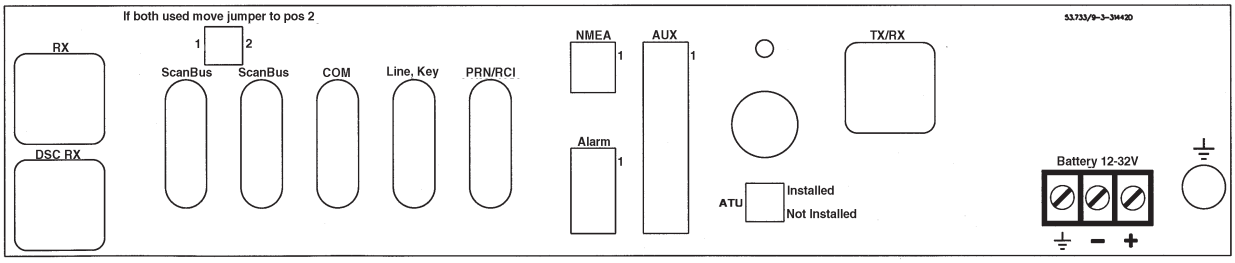
'Headphone'. Stereo jack female .		
Pin	Designation	Description
1	H-phone+	Output. Hot left and right headphone drive signal.
2	H-phone+	
3	H-phone-	Output. Common left and right headphone drive signal.

Morse Key
for CW operation



'Morse Key'. Mono jack female		
Pin	Designation	Description
1	Morse Key	Input. Pulled up to +12v. Activated when connected to system ground
2	GND	

Transceiver Unit connector panel



COM

a. Control signals for PC 9000 operating the SCANCOMM telex software.
PCB 717S must be installed.

b. Remote Control signals from a computer system or a external telex/DSC modem. NMEA or T-Bus protocol. PCB 718S must be installed.

The cable is prepared at TU end by soldering a D-sub connector as described below.

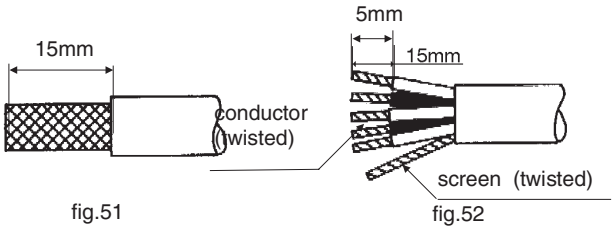


fig.51

fig.52

Before contacts of plug are soldered: slide the plastic cover over the cable.

Contact arrangement
(viewed from solder side)

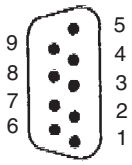


fig.54

After the contacts are soldered: latch the inner and outer shields into the connectors from the rear and snap in. Finally slide the plastic cover over the shield and fix the two jack screws into the plastic cover.

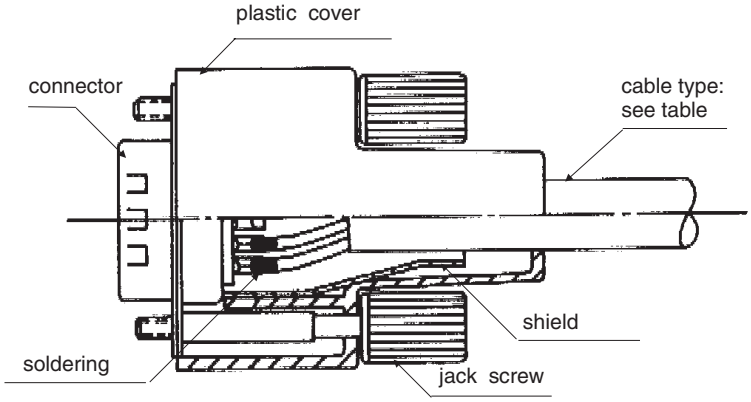


fig.53

'COM'. Equipment connector 9 way D-sub female.		
Pin	Designation	Description
2	PC TX	Galvanic isolated output. Transmit Data
3	PC RX	Galvanic isolated input. Receive Data
4	PC DTR	Galvanic isolated input. Data Terminal Ready. *)
5	PC GND	Galvanic isolated ground return for PC RX and PC TX.
1	nc	No connection.
6	nc	
7	nc	
8	nc	
9	nc	
-	Screen	Cable screen. Connected to system ground.

Line, Key
The Remote Control audio and key signals.

The cable is prepared at TU end by soldering a D-sub connector as described below.

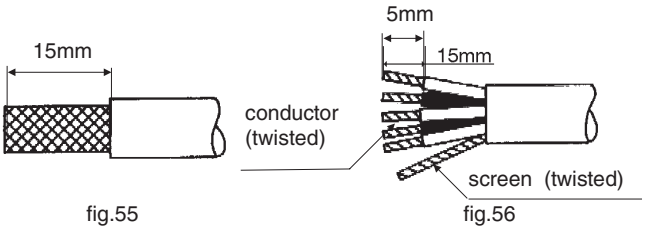


fig.55

fig.56

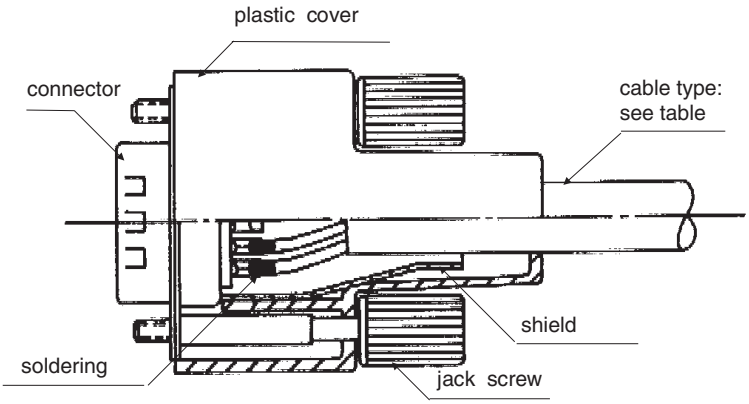


fig.57

Before contacts of plug are soldered: slide the plastic cover over the cable.

Contact arrangement
(viewed from solder side)

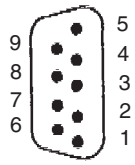


fig.58

After the contacts are soldered: latch the inner and outer shields into the connectors from the rear and snap in. Finally slide the plastic cover over the shield and fix the two jack screws into the plastic cover.

'Line, Key'. Equipment connector 9 way D-sub female.		
Pin	Designation	Description
1 6 2	Line In + Line In C Line In -	Balanced 600 Ohm 0 dBm line input. Accepts -15 dBm to +10 dBm.
3 8 4	Line Out + Line Out C Line Out -	Balanced 600 Ohm 0 dBm line ouput. Adjustable from -15 dBm to +10 dBm.
5 9	'Ext Key' GND	Transmitter key input. Active when connected to GND. System ground used in combination with Ext key.
7	nc	No connection.
-	Screen	Cable screen. Connected to system ground.

PRN/RCI

a. DSC serial printer signals. PCB 717S must be installed.

b. Remte control from a computer system. Protocol NMEA. PCB 717S must be installed.

The cable is prepared at TCU end by soldering a D-sub connector as described below.

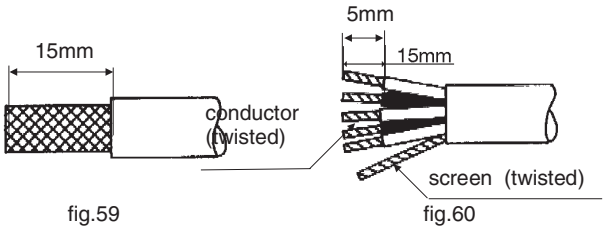


fig.59

fig.60

Before contacts of plug are soldered: slide the plastic cover over the cable.

Contact arrangement
(viewed from solder side)

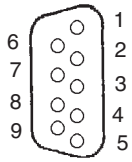


fig.62

After the contacts are soldered: latch the inner and outer shields into the connectors from the rear and snap in. Finally slide the plastic cover over the shield and fix the two jack screws into the plastic cover.

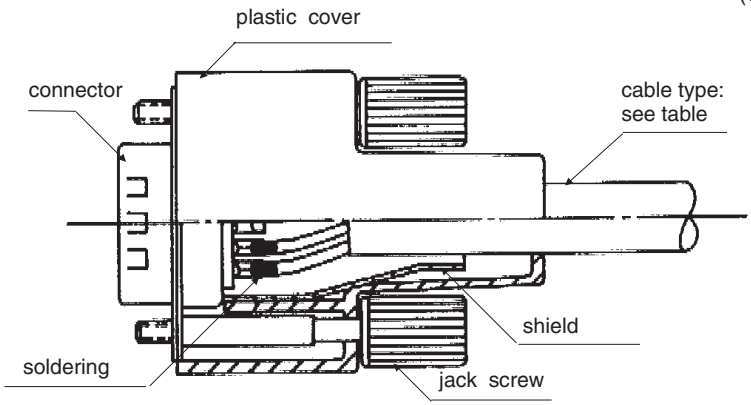
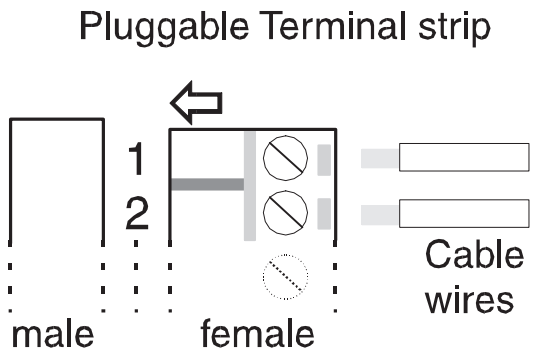


fig.61

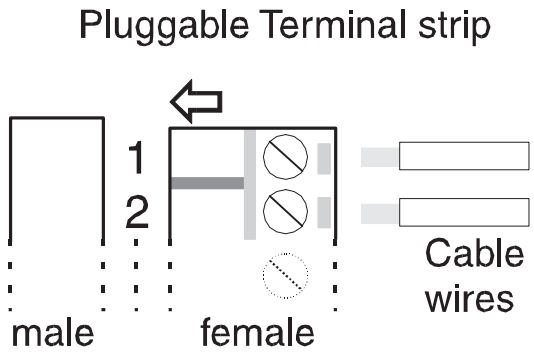
'PRN/RCI'. 9 away D-sub male.		
Pin	Designation	Description
2	RXD	Input. Receive Data
3	TXD	Output. Transmit Data
4	DTR	Output. Pulled-up to+15V through 470 ohm.
5	GND	Ground return for RXD and TXD. Connected to system ground.
1	nc	No connection.
6	nc	
7	nc	
8	nc	
9	nc	
-	Screen	Cable screen. Connected to system ground.

NMEA
Position information input for DSC. PCB 717S must be installed.



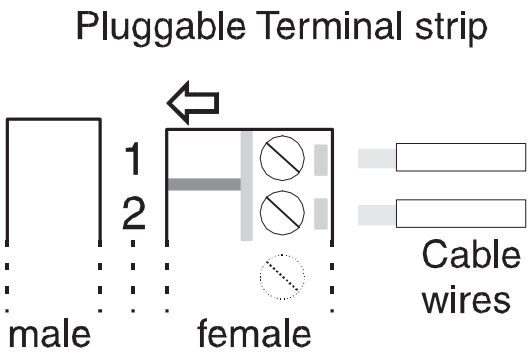
'NMEA'. Equipment connector 2 way pluggable terminal strip male.		
Pin	Designation	Description
1	NMEA RX+	Input. Gaslvanic isolated balanced serial interface. The cable screen must not be connected to system ground but be continued if the cable is routed to other listeners.
2	NMEA RX-	

Alarm
DSC Distress key/lampsignals for alarm panel.



'ALARM'.Equipment connector 4 way pluggable terminal strip male.		
Pin	Designation	Description
1	'Alarm Input'	Distress button. Alarm is activated when connected to GND.
2	GND	Ground return for 'Alarm Input' Connected to system ground (Only valid when 717-DSC is installed).
3	'Alarm 1'	Distress Lamp. Open collector output for driving lamp when connected between +24V and 'Alarm 1'. Max. 50mA. ('On-Hook with 718 installed).
4	+24V	Ground return for 'Alarm Input' Connected to system ground (Only valid when 717-DSC is installed).

AUX
Auxiliary input/outputs. 'Alarm 2' is the external telex alarm signal.



'AUX'. Equipment connector 10 way pluggable terminal strip male.		
Pin	Designation	Description
1	On-Hook	Output. High when handset is on-hook (Updated via lacal 937 register includoing output buffer).
2	Scan S/S	Scan Start/Stop input. Activated user-programmable Scan and Sweep programmes (717/718 required).
3	GND	System ground.
4	'2182 SEL'	Open collector output. Low when 2182 kHz is selcted.
5	'TX KEYED'	Open collector output. Low when transmitter is keyed.
6	'Alarm 2'	Open collector output. Low when alarm is on. Max. 50mA. (717 required).
7	+24V	+24V supply for external equipment. Max. 200mA (Multifuse).
8	'TX Inhibit'	Input. Transmitter inhibeted when connected to GND.
9	'RX Mute'	Input. Receiver muted when connected to GND.
10	GND	System ground.

Final Installation Check

For operation of the equipment please refer to chapter 2. Note that an appropriate programmed Configuration PROM must be installed in the Transceiver Unit, see section on page 3-xx.

The Antenna Tuning Unit will tune automatically to the antenna first time the equipment is keyed on a new frequency or when the "TX Tune" button is pressed. During the tune sequence and normal transmission all transmitter circuits are monitored to ensure safe operating conditions. If transmission conditions are bad (bad antenna installation, high temperatures, etc.) the transmitted power will be reduced to a safe limit. If the transmission condition is improved automatic recovery to full power takes place.
The reason for the protection can be investigated by pressing "Prog" "22" "Enter" (Read Protection Code). The displayed protection code(s) is described on page @ of this manual.
If transmission conditions becomes too severe (a broken antenna, too high temperature, etc.) or a fault occurs in the equipment the "Protec" annunciator will flash in the display, indicating that radiated power no longer can be maximized. The output power will be reduced or totally switched off. When such a condition occurs, read the Protection Code as described above to investigate the nature of the fault.

Installation of optional Telex Filter

To enable telex/DSC operation a receiver crystal filter must be installed in position 'Option Filter' on PCB 'RX/EX Signal Path 715' in the Transceiver Unit. The centre frequency of the filter must be 455kHz and the bandwidth must be in accordance with baud rate and frequency shift of the transmission. The centre audio input/output frequency is adapted to the associated telex modem by programming of Telex Subcarrier. See 3-XX Configuration.

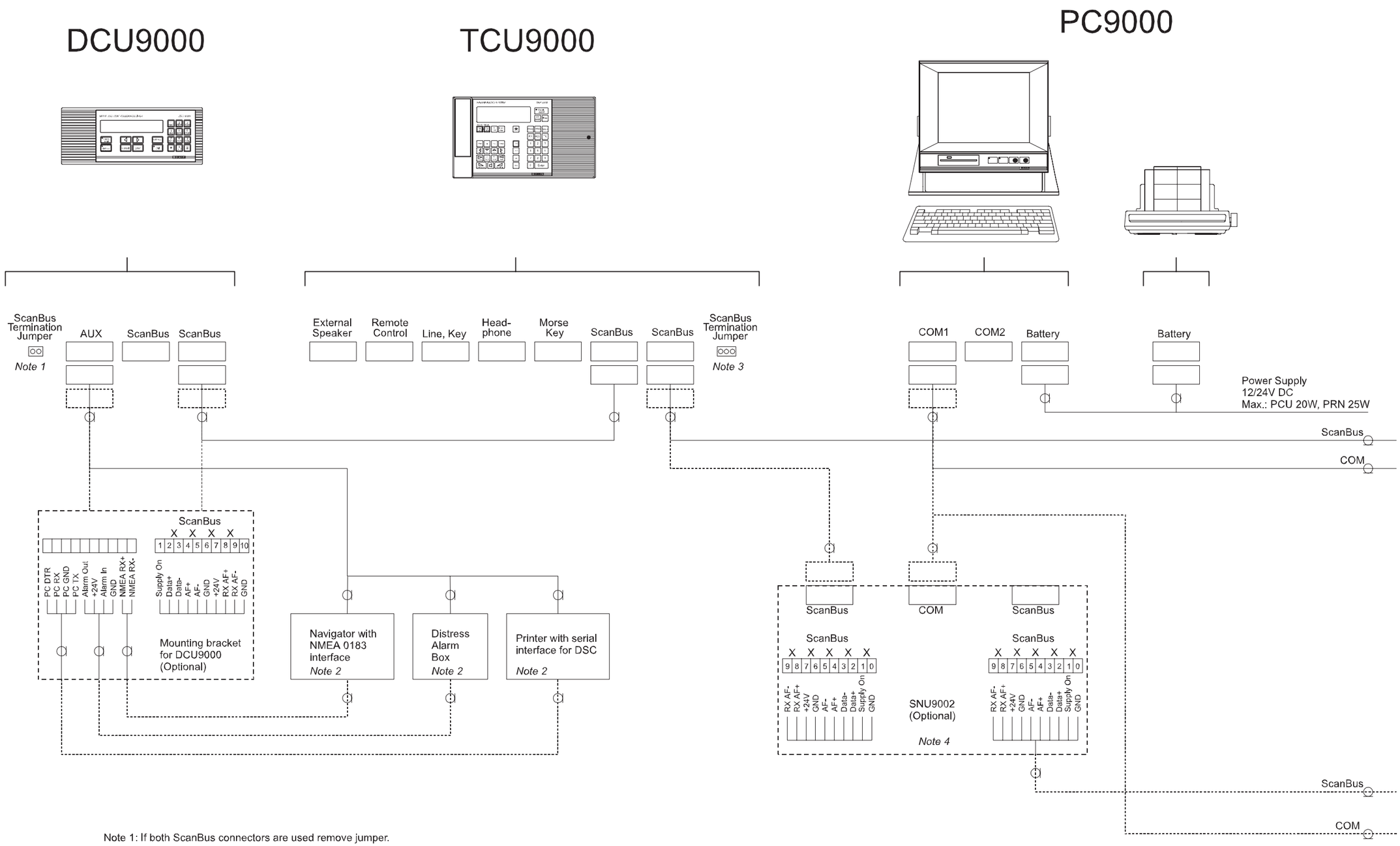
To install the filter remove the top cover of the Transceiver Unit and unplug the ribbon cables and the coaxial cables from PCB 715S. Loosen the two screws from the module and remove it.

Locate position 'Option Filter' on the PCB. Mount the telex filter in that position and solder the terminations. Reassemble the Transceiver Unit. Fitting the filter in position 'OptionFilter' along with either the PCP 717 or the Interface-A 718S automatically enables the "TLX" key on the Transceiver Control Unit front panel and telex/DSC operation may now be tested.

Installation of Master Oscillator

Higher frequency stability is obtained by installing a different type of Master Oscillator. To install a new Master Oscillator remove the top cover of the Transceiver Unit and unplug the ribbon cables and the coaxial cables from the Synthesizer Board 711S/911. Loosen the two screws of the module and remove it. Locate the shielding box on the PCB containing the Master Oscillator. Remove the box lid and exschange Master Oscillators. Reassemble the Transceiver in the reverse order.

INSTALLATION WIRING DIAGRAM FOR TRP 9500 S D6 T (1 of 2)



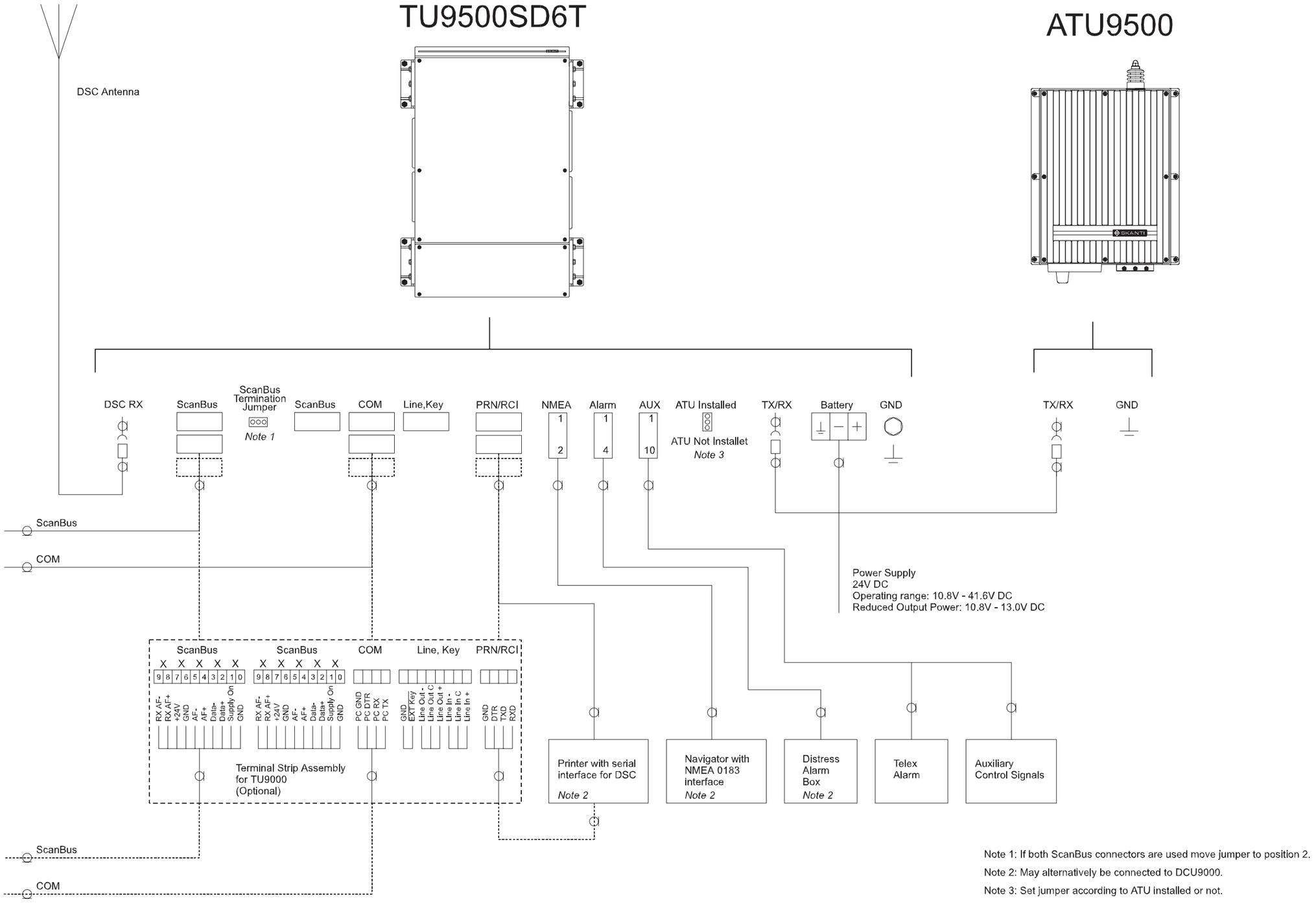
Note 1: If both ScanBus connectors are used remove jumper.

Note 2: May alternatively be connected to Transceiver Unit.

Note 3: If both ScanBus connectors are used move jumper to position 2.

Note 4: If SNU9002 is installed TU - PC data communication is transfred via the ScanBus making the TU-COM to PC-COM1 connection obsolete.

INSTALLATION WIRING DIAGRAM FOR TRP 9500 S D6 T (2 of 2)



Note 1: If both ScanBus connectors are used move jumper to position 2.

Note 2: May alternatively be connected to DCU9000.

Note 3: Set jumper according to ATU installed or not.

CONFIGURATION PROM

The TRP 9500 series Configuration PROM contains frequencies, frequency bands and system configuration parameters for customizing the equipment.

Legal frequencies with corresponding legal mode and frequency bands are programmed in the PROM address area from 256d/0100h to 7167d/1BFFh. The PROM area is divided into three sub-areas, each with a specific frequency information and representation.

256d/0100h to 4095d/0FFFh:
PROM area reserved for customer specified frequencies. Up to 959 single or simplex frequencies or up to 479 duplex frequencies may be programmed in the 4-byte **Frequency Record Format**. The first 200 single, simplex or duplex frequencies including their corresponding mode can be recalled directly via the keyboard as successively short-numbers (200 to 399) are assigned. If a limited transmitter frequency range is wanted one or more frequency bands may be programmed in this PROM area, using the 8-byte **Frequency Band Format**. A **Limiter Byte** containing 255d/FFh must be programmed to indicate the end of frequency information.

4096d/1000h to 5119d/13FFh:
PROM area reserved for GMDSS Distress and Safety Frequencies and other safety frequencies. The frequencies and their corresponding mode can be recalled with short-numbers from 100 to 199, which are successively assigned. The PROM area will contain up to 256 single or simplex frequencies or 128 duplex frequencies represented in the 4-byte **Frequency Record Format**. If the whole PROM area is not filled, a **Limiter Byte** containing 255d/FFh must be programmed to indicate the end of frequency information.

5120d/1400h to 7167d/1BFFh:
This PROM area contains all ITU SSB channels and DSC and Telex TX frequencies. All ITU SSB channels can be recalled directly with the mode automatically set to SSB by using the ITU channel number as short-number. SSB ITU channels without number can also be recalled as successively higher numbers are assigned. The frequencies are represented in the 11-byte **Fixed Step Frequencies Format**. A **Limiter Byte** containing 255d/FFh must always be programmed to indicate the end of frequency information.

7168d/1C00h to 8191d/1FFFh:
System configuration parameters are programmed in the higher part of the PROM from 8191d/1FFFh and downwards.

PROM Type: **27C64, 200nS, 8K x 8**

PROM Location: **Transceiver Unit, TU Control Board 910**

Configuration PROM Map:

Address dec	Address hex	Contents
0	0000	**Not usable**
255	00FF	
256	0100	**Customer Specified Frequencies** **TX Band Limits. Versions 9500, 01, 02**
xxxx	xxxx	**Limiter Byte 255d / FFh**
4095	0FFF	
4096	1000	**GMDSS Distress and Safety Frequencies**
xxxx	xxxx	**Limiter Byte 255d / FFh**
5119	13FF	
5120	1400	**ITU Channels (SSB)** **ITU DSC and Telex TX Frequencies**
xxxx	xxxx	**Limiter Byte 255d / FFh**
7167	1BFF	
7168	1C00	**System Configuration Parameters**
8191	1FFF	

Frequency Record Format

		D7	D6	D5	D4	D3	D2	D1	D0
Addr	n	RX	TX	S-F	0	Modulation			
	n+1	BCD X 10MHz				BCD X 1MHz			
	n+2	BCD X 100kHz				BCD X 10kHz			
	n+3	BCD X 1kHz				BCD X 100Hz			

Single-, Simplex- and Duplex-frequencies can be mixed and recalled with the short-numbers 100 to 199 and 200 to 399 if their relative position in the tables do not exceed 100 and 200 respectively.

RX, TX and S-F bits:

RX and TX bits indicates receiver and transmitter frequency respectively.

S-F bit indicates a Single Frequency (RX or TX) which may be recalled with a short-number.

Examples:

D7	D6	D5	
RX	TX	S-F	
1	0	0	Receiver part of duplex frequency
0	1	0	Transmitter part of duplex frequency
1	1	0	Simplex frequency
1	0	1	Single receiver frequency which can be recalled with a short-number
0	1	1	Single transmitter frequency which can be recalled with a short-number
0	0	1	Empty channel which occupy a short-number

D4: Always set to 0.

Modulation nibble:

0:	SSB (USB)
1:	LSB
2:	R3E
3:	AM
4:	CW
5:	TLX (Telex, DSC)
6:	Reserved for future use
7:	SSB + 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

Fixed Step Frequencies Format

		D7	D6	D5	D4	D3	D2	D1	D0
Addr	n	RX	TX	ITU	0	Modulation			
		Start Channel							
	n+1	BCD X 1000				BCD X 100			
	n+2	BCD X 10				BCD X 1			
		Number Of Channels							
	n+3	BCD X 1000				BCD X 100			
	n+4	BCD X 10				BCD X 1			
		Start Frequency							
	n+5	BCD X 10MHz				BCD X 1MHz			
	n+6	BCD X 100kHz				BCD X 10kHz			
	n+7	BCD X 1kHz				BCD X 100Hz			
	n+8	BCD X 10Hz							
		Step Frequency							
	n+9	BCD X 10kHz				BCD X 1kHz			
	n+10	BCD X 100Hz				BCD X 10Hz			

A large group of frequencies with uniform channel spacing are easily represented by programming the 11-byte Fixed Step Frequencies Format.

RX and TX bits:

0: Frequencies do not apply to RX or TX respectively.
1: Frequencies apply to RX or TX respectively.
Both bits are set to "1" for simplex frequencies.

ITU bit:

0: The programmed frequencies are not ITU channels.
1: The programmed frequencies are ITU channels and if the mode is SSB (Modulation nibble: 0 or 7) they can be recalled with the ITU short-number.

D4:

Always set to 0.

Modulation nibble:

0: SSB (USB)
1: LSB
2: R3E
3: AM
4: CW
5: TLX (Telex, DSC)
6: Reserved for future use
7: SSB + 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

Start Channel:
The start channel number for the group.
E.g. 401 for the ITU channel 401.

Number Of Channels:
The total number of frequencies or channels in the group. Legal numbers: 1 to 9998.

Start Frequency:
The first frequency in the group.

Step Frequency:
The fixed frequency- or channel-spacing for the group.

Frequency Band format

		D7	D6	D5	D4	D3	D2	D1	D0
Addr	n	Always 0				Always 0			
	n+1	BCD X 10MHz				BCD X 1MHz			
	n+2	BCD X 100kHz				BCD X 10kHz			
	n+3	BCD X 1kHz				BCD X 100Hz			
	n+4	Always 0				Always 0			
	n+5	BCD X 10MHz				BCD X 1MHz			
	n+6	BCD X 100kHz				BCD X 10kHz			
	n+7	BCD X 1kHz				BCD X 100Hz			

By programming a Frequency Band the transmitter frequency range may be limited to the specified band and transmission outside the band is inhibited. The first 4 bytes specifies the lower legal frequency limit and the next 4 bytes specifies the upper legal frequency limit. Several bands may be programmed.

Limiter byte
If the programmed Frequencies and possible Frequency Bands do not use all the available bytes in the relevant PROM areas a Limiter Byte must be programmed to indicate the end of frequency information.
The Limiter Byte contains the value 255d / FFh.

Pre-programmed ITU frequencies

GMDSS Distress and Safety Frequencies

Freq. kHz	Designation	Mode	Type	RCL
2182.0	J3E Distress Safety	SSB	Simplex	100
2174.5	NBDP Distress Safety	TLX	Simplex	101
2187.5	DSC Distress Safety	TLX	Simplex	102
4125.0	J3E Distress Safety	SSB	Simplex	103
4177.5	NBDP Distress Safety	TLX	Simplex	104
4207.5	DSC Distress Safety	TLX	Simplex	105
6215.0	J3E Distress Safety	SSB	Simplex	106
6268.0	NBDP Distress Safety	TLX	Simplex	107
6312.0	DSC Distress Safety	TLX	Simplex	108
8291.0	J3E Distress Safety	SSB	Simplex	109
8376.5	NBDP Distress Safety	TLX	Simplex	110
8414.5	DSC Distress Safety	TLX	Simplex	111
12290.0	J3E Distress Safety	SSB	Simplex	112
12520.0	NBDP Distress Safety	TLX	Simplex	113
12577.0	DSC Distress Safety	TLX	Simplex	114
16420.0	J3E Distress Safety	SSB	Simplex	115
16695.0	NBDP Distress Safety	TLX	Simplex	116
16804.5	DSC Distress Safety	TLX	Simplex	117
5680.0	J3E Coordinated SAR	SSB	RX freq	118
490.0	NBDP Meteorology Nav	TLX	RX freq	119
518.0	NBDP Navtex	TLX	RX freq	120
4209.5	NBDP Navtex	TLX	RX freq	121
4210.0	NBDP Safety	TLX	RX freq	122
6314.0	NBDP FC Safety Info	TLX	RX freq	123
8416.5	NBDP FC Safety Info	TLX	RX freq	124
12579.0	NBDP FC Safety Info	TLX	RX freq	125
16806.5	NBDP FC Safety Info	TLX	RX freq	126
19680.5	NBDP FC Safety Info	TLX	RX freq	127
22376.0	NBDP FC Safety Info	TLX	RX freq	128
26100.5	NBDP FC Safety Info	TLX	RX freq	129

May be recalled directly by entering the relevant number from 100 to 129. Mode will automatically be set according to the table.

TRP 9500: Subsequent selection of other modes will disable the transmitter except when the mode is SSB and R3E is selected.

Ship station RX and TX frequencies for SSB duplex operation in the Maritime Mobile Bands between 4 and 27.5MHz.
ITU Radio Regulations Appendix 16, Section A.

HF Duplex Telephony Channels:

Ch.	401 - 427	Ch. 428 - 429
Ch.	601 - 608	
Ch.	801 - 833	Ch. 834 - 837
Ch.	1201 - 1241	
Ch.	1601 - 1656	
Ch.	1801 - 1815	
Ch.	2201 - 2253	
Ch.	2501 - 2510	
	243 RX/TX frequency pairs	6 RX frequencies

May be recalled directly by entering ITU channel number. Mode will automatically be set to SSB.

TRP 9500: Subsequent selection of other modes except R3E will disable the transmitter.

Inter-ship SSB Simplex frequencies in the Maritime Mobile Bands between 4 and 27.5MHz. Successive channel numbers are assigned.
ITU Radio Regulations Apendix 16, Section B.

HF Simplex Telephony Frequencies.

Ch.	430 - 431
Ch.	609 - 611
Ch.	838 - 839
Ch.	1242 - 1246
Ch.	1657 - 1663
Ch.	1816 - 1822
Ch.	2254 - 2260
Ch.	2511 - 2517
	40 Simplex frequencies

May be recalled directly by entering channel number. Mode will automatically be set to SSB.

TRP 9500: Subsequent selection of other modes except R3E will disable the transmitter.

Ship station SSB TX frequencies in the 4000 - 4063kHz band. Successive channel numbers are assigned.
ITU Radio Regulations Appendix 16, Section C-1.

HF TX Telephony Frequencies

Ch. 432 - 452

21 TX frequencies

May be recalled directly by entering channel number. Mode will automatically be set to SSB.

TRP 9500: Subsequent selection of other modes except R3E will disable the transmitter.

Ship station SSB TX frequencies in the 8100 - 8195kHz band. Successive channel numbers are assigned.
ITU Radio Regulations Appendix 16, Section C-2.

HF TX Telephony Frequencies

Ch. 840 - 870

31 TX frequencies

May be recalled directly by entering channel number. Mode will automatically be set to SSB.

TRP 9500: Subsequent selection of other modes except R3E will disable the transmitter.

Extra frequencies for TRP 9500:

International ship station DSC TX frequencies for purposes other than distress and safety.

2177.0	2189.5	kHz
4208.0	4208.5	4209.0 kHz
6312.5	6313.0	6313.5 kHz
8415.0	8415.5	8416.0 kHz
12577.5	12578.0	12578.5 kHz
16805.0	16805.5	16806.0 kHz
18898.5	18899.0	18899.5 kHz
22374.5	22375.0	22375.5 kHz
25208.5	25209.0	25209.5 kHz

26 TX frequencies

For verification of TX frequency only. TX frequencies are only selectable in Telex mode. Subsequent selection of other modes will disable the transmitter.

Extra frequencies for TRP 9500:

National ship station MF DSC TX frequencies for purposes other than distress and safety.

2156.0	2156.5 kHz
2157.0	2157.5 kHz
2158.0	2158.5 kHz
2159.0	2159.5 kHz

8 TX frequencies

For verification of TX frequency only. TX frequencies are only selectable in Telex mode. Subsequent selection of other modes will disable the transmitter.

Extra frequencies for TRP 9500:

Ship station paired NBDP frequencies in the Maritime Mobile Bands between 4 and 27.5MHz. ITU Radio Regulations Apendix 32.

Paired Telex Frequencies.

4	MHz	Band	Ch.	1 - 19
6	MHz	Band	Ch.	1 - 34
8	MHz	Band	Ch.	1 - 40
12	MHz	Band	Ch.	1 - 156
16	MHz	Band	Ch.	1 - 193
18/19	MHz	Band	Ch.	1 - 45
22	MHz	Band	Ch.	1 - 135
25/26	MHz	Band	Ch.	1 - 40

662 frequency pair

For verification of TX frequency only. TX frequencies are only selectable in Telex mode. Subsequent selection of other modes will disable the transmitter.

Extra frequencies for TRP 9500:

Ship station non-paired NBDP frequencies in the Maritime Mobile Bands between 4 and 27.5MHz. ITU Radio Regulations Apendix 33.

Non-paired Telex Frequencies.

4MHz Band	Ch.	1 - 10
6MHz Band	Ch.	1 - 23
8MHz Band	Ch.	1 - 36
12MHz Band	Ch.	1 - 34
16MHz Band	Ch.	1 - 39
18/19MHz Band	Ch.	1 - 11
22MHz Band	Ch.	1 - 45
25/26MHz Band	Ch.	1 - 31

229 TX frequencies

For verification of TX frequency only. TX frequencies are only selectable in Telex mode. Subsequent selection of other modes will disable the transmitter.

Total number of frequencies: 1539

System Configuration Parameters

The System Configuration Parameters programmed in the higher part of the prom (reserved area 5120d/1400h to 8191d/1FFFh) determines the function of the equipment. The most important parameters for customizing the equipment are listed below. The parameters are global and cannot be changed by programming via the keyboard.

Designation

Cold Boot Frequency
+ Mode Set-up

Address	Data D7 D6 D5 D4	Data D3 D2 D1 D0	Description
7593d/1DA9h	Always 0	RX Modulation	
7594d/1DAAh	BCD X 10MHz	BCD X 1MHz	**RX frequency**
7595d/1DABh	BCD X 100kHz	BCD X 10kHz	
7596d/1DACh	BCD X 1kHz	BCD X 100Hz	
7597d/1DADh	Always 0	TX Modulation	
7598d/1DAEh	BCD X 10MHz	BCD X 1MHz	**TX frequency**
7599d/1DAFh	BCD X 100kHz	BCD X 10kHz	
7600d/1DB0h	BCD X 1kHz	BCD X 100Hz	

Data for the Modulation nibble
see description of the Single
Frequency Format

Designation	Address (**d**ecimal / **h**exadecimal)	Data	Description
Max TX Power	7601d/1DB1h	Pm:	Maximum TX power = 20 x Pm W Pm = values from 1d/01h to 25d/19h corresponds to 20Watt to 500Watt
Security Code Enable	7602d/1DB2h	0d/00h: 1d/01h:	Disable Security Code Enable Security Code All other data are defaulted to 1d/01h

Designation	Address (**d**ecimal / **h**exadecimal)	Data	Description
Customer ID	7603d/1DB3h		
		ID:	Customer identification number ID: 0d/00h to 99d/63h
Power reduction by $\overline{\text{TX inhibit}}$	7604d/1DB4h		
		0d/00h	TX inhibit
		Pinh:	TX power by $\overline{\text{TX inhibit}}$= 20 x Pinh W Pinh=values from 1d/01h to 25d/19h corresponds to 20Watt to 500Watt
Enable HST mode	7605d/1DB5h		
		0d/00h:	Disable HST mode
		1d/01h:	Enable HST mode All other data are defaulted to 1d/01h
Enable SSB mode	7606d/1DB6h		
		0d/00h:	Disable SSB mode
		1d/01h:	Enable SSB mode All other data are defaulted to 1d/01h
Enable LSB mode	7607d/1DB7h		
		0d/00h:	Disable LSB mode
		1d/01h:	Enable LSB mode All other data are defaulted to 1d/01h
Enable R3E mode	7608d/1DB8h		
		0d/00h:	Disable R3E mode
		1d/01h:	Enable R3E mode All other data are defaulted to 1d/01h
Enable CW mode	7609d/1DB9h		
		0d/00h:	Disable CW mode
		1d/01h:	Enable CW mode All other data are defaulted to 1d/01h

Designation	Address (**d**ecimal / **h**exadecimal)	Data	Description
Enable TLX mode	7610d/1DBAh		
		0d/00h:	Disable TLX mode
		1d/01h:	Enable TLX mode
			All other data are defaulted to 1d/01h
Reduce TX power below 4MHz	7611d/1DBBh		
		0d/00h:	Disable reduction
		1d/01h:	400 W
		2d/02h:	150 W
			All other data are defaulted to 0d/00h
Alarm test in Dummy Load	7612d/1DBCh		
		0d/00h:	Disable test in Dummy Load
		1d/01h:	Enable test in Dummy Load
			All other data are defaulted to 0d/00h
Enable RX in AM mode	7613d/1DBDh		
		0d/00h:	Disable RX in AM mode
		1d/01h:	Enable RX in AM mode
			All other data are defaulted to 1d/01h
Enable TX in AM mode	7614d/1DBEh		
		0d/00h:	Disable TX in AM mode
		1d/01h:	Enable TX on 2182kHz only
		2d/02h:	Enable TX on 2182 + 2200kHz only
		255d/FFh:	Free TX in AM mode
			All other data are defaulted to 255d/FFh
Distress mode	7615d/1DBFh		
		0d/00h:	SSB mode when 2182 is pressed
		3d/03h:	AM mode when 2182 is pressed
			All other data are defaulted to 3d/03h
Receiver frequency status	7616d/1DC0h		
		0d/00h:	RX on PROM frequencies only
		1d/01h:	Free RX frequency
			All other data are defaulted to 1d/01h

Designation	Address (**d**ecimal / **h**exadecimal)	Data	Description
Transmitter frequency status	7617d/1DC1h		
		0d/00h:	TX on PROM frequencies only
		1d/01h:	Free TX frequency
			All other data are defaulted to 1d/01h
Single sideband mode display	7618d/1DC2h		
		0d/00h:	Display upper-sideband as USB
		1d/01h:	Display upper-sideband as SSB
			All other data are defaulted to 1d/01h

Standard Programming

The Standard Programming shows how the different standard types are programmed unless otherwise agreed. Only the above described parameters are shown. A total PROM listing and Master PROM's are available on request.

Address	Data					
	TRP 9500	**TRP 9501**	**TRP 9503**	**TRP 9504**	**TRP 9505**	**TRP 9507**
7593d/1DA9h	0d/00h	0d/00h	0d/00h	0d/00h	0d/00h	0d/00h
7594d/1DAAh	2d/02h	2d/02h	2d/02h	17d/11h	17d/11h	2d/02h
7595d/1DABh	24d/18h	24d/18h	24d/18h	80d/50h	80d/50h	24d/18h
7596d/1DACh	32d/20h	32d/20h	32d/20h	0d/00h	0d/00h	32d/20h
7597d/1DADh	0d/00h	0d/00h	0d/00h	0d/00h	0d/00h	0d/00h
7598d/1DAEh	2d/02h	2d/02h	2d/02h	17d/11h	17d/11h	2d/02h
7599d/1DAFh	24d/18h	24d/18h	24d/18h	80d/50h	80d/50h	24d/18h
7600d/1DB0h	32d/20h	32d/20h	32d/20h	0d/00h	0d/00h	32d/20h
7601d/1DB1h	25d/19h	25d/19h	25d/19h	25d/19h	25d/19h	25d/19h
7602d/1DB2h	1d/01h	1d/01h	1d/01h	1d/01h	1d/01h	1d/01h
7603d/1DB3h	0d/00h	1d/01h	3d/03h	4d/04h	5d/05h	7d/07h
7604d/1DB4h	0d/00h	0d/00h	0d/00h	0d/00h	0d/00h	0d/00h
7605d/1DB5h	0d/00h	0d/00h	0d/00h	0d/00h	0d/00h	0d/00h
7606d/1DB6h	1d/01h	1d/01h	1d/01h	1d/01h	1d/01h	1d/01h
7607d/1DB7h	0d/00h	0d/00h	0d/00h	1d/01h	1d/01h	0d/00h
7608d/1DB8h	1d/01h	1d/01h	1d/01h	1d/01h	1d/01h	1d/01h
7609d/1DB9h	0d/00h	0d/00h	0d/00h	0d/00h	1d/01h	1d/01h
7610d/1DBAh	1d/01h	1d/01h	1d/01h	1d/01h	1d/01h	1d/01h
7611d/1DBBh	1d/01h	1d/01h	1d/01h	1d/01h	1d/01h	1d/01h
7612d/1DBCh	1d/01h	1d/01h	1d/01h	0d/00h	0d/00h	1d/01h
7613d/1DBDh	1d/01h	1d/01h	1d/01h	1d/01h	1d/01h	1d/01h
7614d/1DBEh	1d/01h	1d/01h	1d/01h	255d/FFh	255d/FFh	1d/01h
7615d/1DBFh	3d/03h	3d/03h	3d/03h	3d/03h	3d/03h	3d/03h
7616d/1DC0h	1d/01h	1d/01h	1d/01h	1d/01h	1d/01h	1d/01h
7617d/1DC1h	0d/00h	1d/01h	1d/01h	1d/01h	1d/01h	1d/01h
7618d/1DC2h	1d/01h	1d/01h	1d/01h	0d/00h	0d/00h	1d/01h

INSTALLATION RELATED 'PROG' KEY OPERATIONS

By using the 'Prog' key extra functions and features may be selected, and programming of the equipment is possible.

'Prog' operations are selected by pressing:

Prog **0-99** Enter

Some functions requires further key entries where as others requires storing of parameters with the 'STO' key or stepping forward with the 'Volume Up' key.

The following is a list of the Functions which are selected by their number:

0 - 9 : Select modes and features. Refer to OPERATION section.

10 - 19 : Select special functions. Refer to OPERATION section.

20 - 74 : Serviceand installation. Refer to SERVICE section.

98 : Security Code.Refer to OPERATION section.

99 : Select Configuration Mode.

No.	Function
0 :	*Leave System to other User.*
1 :	*Connect TCU Remote Control port.*
2 :	*Select LSB Mode.*
3 :	*Select R3E Mode.*
4:	*Set Side Tone frequency for CW.*
5:	*Set Break-in Time for CW.*
6 :	*Switch RF Attenuator On/Off.*
7 :	*Float Antenna.*
8 :	*Ground Antenna.*
9 :	*Switch "Boop" Sound On/Off.*
10:	*Select Intercom.*
11:	*Set Real Time Clock.*
12:	*Switch Treble Cut On/Off*
13:	*Tilt Viewing Angle of Display.*
14:	*Toggle Bar-graph Reading, Power or Amperes.*
15:	*Set Beep Level.*
16:	*Select HST mode.*

20: Automatic Stepped Self-test.

21: Manually Stepped Self-test.

22: Read Protection Code.

23: View ATU Relay Setting.

25: Read CU Priority / Intercom Number.

26: View CU Software Version, Release and Release Date.

27: View TU Software Version, Release and Release Date.

28: View TU Configuration Customer ID, Version, Release and Release Date.

29: View ATU Software Version, Release and Release Date.

30: Read Accumulated On Time.

31: Read Frequency Error

32: View RX / EX Signal Path 715 Version.

33: View Option Filter.

34: View Power Amplifier Version.

35: View PA Filter Version.

36: View ATU Status.

37: View Dummy Load.

39: View Optional Interface Board.

40 Switch all Annunciators On in Display.

41 Switch Beep Sound On.

42 Switch Boop Sound On.

43 Switch High-beep Sound On.

45 Display Customer Secified Frequencies Pre-Programmed in Configuration PROM.

46 Display Configuration parameters pre-programmed in Configuration PROM.

74 View Supply Voltage

98 View and Change Security Code.

99 Select Configuration Mode.

Description of related 'Prog' operations

No.	Function

[2] [0] - [7] [4]

This range of 'Prog' operations are related to both Installation and Service. Please refer to the SERVICE section for the description.

[9] [9]

Select Configuration Mode.
If no Password has been programmed (Password = 0) the transceiver is ready for changing configurable parameters.
If a Password has been programmed (Password: 1 - 9999999) it is necessary to enter the correct Password to get access to the Configuration Mode.

Press "Password" "Enter"

To make a re-configuration of a function enter the number of the function and use the "STO" key and the numeric keys to store the wanted parameter value(s). It is now possible to select another function by entering the corresponding number.Pressing "Enter" will make a return to normal operation.
For further information see the description of the Configuration.

CONFIGURATION

TRP9500 has a pre-programmed Configuration PROM containing the necessary parameters to control the function of the equipment. Some of these parameters are also contained in the non-volatile memory and may therefore be changed by simple programming via the keyboard to suit the individual user.

As the non-volatile memory has battery back-up, all changes in the configuration together with other user-programmable functions and channels will be preserved with a good back-up battery.

To change the configuration of a function, select Configuration Mode and enter the number of the function in question. Some functions requires only to be selected by their number to execute the change, but most functions has several parameters with values which must be changed and stored with the "STO" key to store the change.

To prevent unauthorized programming of the configuration, the Configuration Mode may be protected with a Password. As default the Password is equal to 0 which requires no confirmation when selecting Configuration Mode. The Password may be changed by selecting Function Number 99 in the Configuration Mode. Next time Configuration Mode is selected the correct Password must be entered to get access to the mode. Passwords from 1 to 9999999 may be used.

Select Configuration Mode

Press [Prog] [9] [9] [Enter]

If no Password has been programmed (Password = 0) the transceiver is ready for changing configurable functions.

If a Password has been programmed (Password: 1 - 9999999) it is necessary to enter the correct Password to get access to the Configuration Mode.

Press *"Password"* [Enter]

Reconfiguration of a Function with Parameters

To make a reconfiguration of a Function with parameters enter the number of the Function in the Transmitter Display.

Press *"Function No."* [Enter]

The current corresponding parameters are displayed in the Receiver Display with a flashing bar below the first parameter to be changed.

Use STO to store the same value again if no change is wanted, or use the numeric keys to change the value and STO to store a change. If the Function has more than one parameter the flashing bar will shift right to the next parameter. When the last parameter has been stored another Function Number may be entered as described above. If Enter is pressed instead, the Transceiver will return to normal operation.

Some functions requires to be activated once, after a change has been made, in order to invoke the reconfiguration. For example if Power Level is "Full" and Full Power is disabled by configuration, the transmitter will stay on Full Power and next time Power Level is changed, only Medium and Low are available.

Directly Executable Functions

Some Functions are directly executable and requires no storing of parameters.

Press "Function No." Enter

The Function will be executed immediately and another Function Number may be entered. If Enter is pressed instead, the Transceiver will return to normal operation.

Functions:

Disable / Enable of keys

When a key is disabled no change will take place when pressed.

If the key has a toggle function (TX On/Off, "Light", etc.) select the wanted state with the key before going to the Configuration Mode, disable the key by storing a "**0**" as the value of the parameter. Press Enter to return to normal operation. The key is now disabled and the state is stable and not changeable.

Disabled keys can be enabled again by storing a "**1**" as a value of the parameter.

Keyboard keys: TRP9500, TRP9501 and TRP9503 all with standard Transceiver Control Unit.

No. 1 to 28. "**1**" will enable the key.

"**0**" will disable the key.

Double keys (Tune, Rate, Sensitivity, Volume and AGC) are displayed simultaneously with a position in the display corresponding to the keyboard layout.

Default values shown.

No.	Function	Parameter	Value	
1	RX key	Disable/Enable	1	
2	TX key	Disable/Enable	1	
3	RCL key	Disable/Enable	1	
4	STO key	Disable/Enable	1	
5	TX On/Off key	Disable/Enable	1	
6	Power Level key	Disable/Enable	1	
7	TX Tune key	Disable/Enable	1	
8	SSB key	Disable/Enable	1	
9	AM key	Disable/Enable	1	
10	TLX key	Disable/Enable	1	
11	2182 key	Disable/Enable	1	
12	Alarm Keys	Disable/Enable	1	
13	HiSens key	Disable/Enable	1	
14	SQL key	Disable/Enable	1	
15	Tune keys	Disable/Enable	1	1
16	Rate keys	Disable/Enable	1	1
17	AGC On/Off , AGC limit keys	Disable/Enable	1	1
18	Sensitivity keys	Disable/Enable	1	1
19	"Loudspeaker" key	Disable/Enable	1	
20	Volume keys	Disable/Enable	1	1
21	Scan key	Disable/Enable	1	
22	Sweep key	Disable/Enable	1	
23	Sleep key	Disable/Enable	1	
24	"Light" key	Disable/Enable	1	
28	Att key	Disable/Enable	1	

"Hidden keys":

26	"Prog 2" (LSB)	Disable/Enable	1
27	"Prog 3" (R3E)	Disable/Enable	1
35	"Prog 16" (HST)	Disable/Enable	1

Keyboard keys: TRP 9504 with standard Transceiver Control Unit.

No. 1 to 32. "**1**" will enable the key.

"**0**" will disable the key.

Double keys (Tune, Rate, Sensitivity, Volume and AGC) are displayed simultaneously with a position in the display corresponding to the keyboard layout.

Default values shown.

No.	Function	Parameter	Value	
1	RX key	Disable/Enable	1	
2	TX key	Disable/Enable	1	
3	RCL key	Disable/Enable	1	
4	STO key	Disable/Enable	1	
5	TX On/Off key	Disable/Enable	1	
7	TX Tune key	Disable/Enable	1	
8	USB key	Disable/Enable	1	
9	AM key	Disable/Enable	1	
10	TLX key	Disable/Enable	1	
13	HiSens key	Disable/Enable	1	
14	SQL key	Disable/Enable	1	
15	Tune keys	Disable/Enable	1	1
16	Rate keys	Disable/Enable	1	1
17	AGC On/Off , AGC limit keys	Disable/Enable	1	1
18	Sensitivity keys	Disable/Enable	1	1
19	"Loudspeaker" key	Disable/Enable	1	
20	Volume keys	Disable/Enable	1	1
21	Scan key	Disable/Enable	1	
22	Sweep key	Disable/Enable	1	
23	Sleep key	Disable/Enable	1	
24	"Light" key	Disable/Enable	1	
26	LSB key	Disable/Enable	1	
28	Att key	Disable/Enable	1	
30	Full key	Disable/Enable	1	
31	Med key	Disable/Enable	1	
32	Low key	Disable/Enable	1	

"Hidden keys":

27	"Prog 3" (R3E)	Disable/Enable	1	
35	"Prog 16" (HST)	Disable/Enable	1	

Keyboard keys: TRP 9505 with standard Transceiver Control Unit.

No. 1 to 32. "**1**" will enable the key.

"**0**" will disable the key.

Double keys (Tune, Rate, Sensitivity, Volume and AGC) are displayed simultaneously with a position in the display corresponding to the keyboard layout.

Default values shown.

No.	Function	Parameter	Value	
1	RX key	Disable/Enable	1	
2	TX key	Disable/Enable	1	
3	RCL key	Disable/Enable	1	
4	STO key	Disable/Enable	1	
5	TX On/Off key	Disable/Enable	1	
7	TX Tune key	Disable/Enable	1	
8	USB key	Disable/Enable	1	
9	AM key	Disable/Enable	1	
10	TLX key	Disable/Enable	1	
13	HiSens key	Disable/Enable	1	
14	SQL key	Disable/Enable	1	
15	Tune keys	Disable/Enable	1	1
16	Rate keys	Disable/Enable	1	1
17	AGC On/Off , AGC limit keys	Disable/Enable	1	1
18	Sensitivity keys	Disable/Enable	1	1
19	"Loudspeaker" key	Disable/Enable	1	
20	Volume keys	Disable/Enable	1	1
21	Scan key	Disable/Enable	1	
22	Sweep key	Disable/Enable	1	
23	Sleep key	Disable/Enable	1	
24	"Light" key	Disable/Enable	1	
26	LSB key	Disable/Enable	1	
28	Att key	Disable/Enable	1	
29	CW key	Disable/Enable	1	
30	Full key	Disable/Enable	1	
31	Med key	Disable/Enable	1	
32	Low key	Disable/Enable	1	
33	BW key	Disable/Enable	1	
34	BFO keys	Disable/Enable	1	1

"Hidden keys":

27	"Prog 3" (R3E)	Disable/Enable	1	
35	"Prog 16" (HST)	Disable/Enable	1	

Keyboard keys: TRP 9502 and TRP9507 with standard Transceiver Control Unit.

No. 1 to 34. "**1**" will enable the key.

"**0**" will disable the key.

Double keys (Tune, Rate, Sensitivity, Volume and AGC) are displayed simultaneously with a position in the display corresponding to the keyboard layout.

Default values shown.

No.	Function	Parameter	Value	
1	RX key	Disable/Enable	1	
2	TX key	Disable/Enable	1	
3	RCL key	Disable/Enable	1	
4	STO key	Disable/Enable	1	
5	TX On/Off key	Disable/Enable	1	
6	Power Level key	Disable/Enable	1	
7	TX Tune key	Disable/Enable	1	
8	SSB key	Disable/Enable	1	
9	AM key	Disable/Enable	1	
10	TLX key	Disable/Enable	1	
11	2182 key	Disable/Enable	1	
12	Alarm Keys	Disable/Enable	1	
13	HiSens key	Disable/Enable	1	
14	SQL key	Disable/Enable	1	
15	Tune keys	Disable/Enable	1	1
16	Rate keys	Disable/Enable	1	1
17	AGC On/Off , AGC limit keys	Disable/Enable	1	1
18	Sensitivity keys	Disable/Enable	1	1
19	"Loudspeaker" key	Disable/Enable	1	
20	Volume keys	Disable/Enable	1	1
21	Scan key	Disable/Enable	1	
22	Sweep key	Disable/Enable	1	
23	Sleep key	Disable/Enable	1	
24	"Light" key	Disable/Enable	1	
28	Att key	Disable/Enable	1	
29	CW key	Disable/Enable	1	
33	BW key	Disable/Enable	1	
34	BFO keys	Disable/Enable	1	1

"Hidden keys":

26	"Prog 2" (LSB)	Disable/Enable	1	
27	"Prog 3" (R3E)	Disable/Enable	1	
35	"Prog 16" (HST)	Disable/Enable	1	

Enable Power Levels

No. 50. Enable/Disable Power Level.
If all levels are disabled the transmitter will stay on the current power level.
"**1**" enables the Power Level.
"**0**" disables the Power Level.

Default values	Receiver Display		
	Power Level		
Parameter	Full	Med	Low
Enable/Disable	1	1	1

Input Selector versus TX Mode

No. 51. Select Transmitter AF Input Source versus transmitter mode.
External Line input is available only when 717S is installed and not engaged with DSC/telex or Interface-A 718 is installed.
"**0**": AF is taken from "Line, Key" input on TU or TCU according to function no. 73.
"**1**": Handset microphone input.
"**2**": Key-selected input. AF input follows active key input.

Default values	Receiver Display	
	TX Mode	
Parameter	SSB	AM
AF Input	1	1

Select Transmitter Key Input versus TX Mode

No. 52. Select Transmitter Key Input versus transmitter mode.
"**0**": External Key active. See function no. 73.
"**1**": Handset Key active.
"**2**": Both key inputs active. The keying Key excludes the other.

Default values	Receiver Display	
	TX Mode	
Parameter	SSB	AM
Key Input	1	1

Compressor Time Constant versus TX Mode

No. 53. Select Time Constant for the transmitter AF compressor versus transmitter mode.
"**1**" corresponds to a normal time constant.
"**0**" corresponds to a long time constant.

Default values	Receiver Display			
	TX Mode			
Parameter	SSB	AM	TLX	HST
Time Constant	1	1	0	1

AGC Parameters versus RX Mode

Select receiver AGC Parameters versus receiver mode.

No. 54. "Hang" the AGC during transmit.
"**1**": The AGC action is disabled during transmit.
"**0**": The AGC action continues during transmit.

Default values	Receiver Display				
	RX Mode				
Parameter	SSB	AM	CW	TLX	HST
Hang	1	1	0	0	1

No. 55. Select Hang AGC function versus receiver mode.
"**1**": The AGC operates with disabled Hang function.
"**0**": The AGC operates with enabled Hang function.

Default values	Receiver Display				
	RX Mode				
Parameter	SSB	AM	CW	TLX	HST
Hang AGC	0	1	0	1	0

No. 56. Select AGC Decay Time versus receiver mode.
"**1**" corresponds to Slow Decay Time.
"**0**" corresponds to Fast Decay Time.

Default values	Receiver Display				
	RX Mode				
Parameter	SSB	AM	CW	TLX	HST
Decay Time	1	1	0	0	1

No. 57. Select AGC Hang Time versus receiver mode.
"**1**" corresponds to Long Hang Time.
"**0**" corresponds to Short Hang Time.

If Hang AGC (see No. 55) is disabled the AGC Hang Time has no influence.

Default values	Receiver Display				
	RX Mode				
Parameter	SSB	AM	CW	TLX	HST
Hang Time	1	1	0	0	1

No. 58. Select AGC Suppressor function versus receiver mode.
"**1**": Activate the AGC Suppressor.
"**0**": Disable the AGC Suppressor.

Default values	Receiver Display				
	RX Mode				
Parameter	SSB	AM	CW	TLX	HST
Suppressor	0	0	0	1	0

No. 59. Select additional AGC Filter.
"**1**": Disable the additional AGC Filter.
"**0**": Enable the additional AGC Filter.

Default values	Receiver Display				
	RX Mode				
Parameter	SSB	AM	CW	TLX	HST
AGC Filter	1	0	1	1	1

AF Bandwith

No. 60. Select AF Bandwidth in telex mode.
"**1**" corresponds to a large AF bandwidth.
"**0**" corresponds to the normal AF bandwidth.
Default value is "0".

Default values	Receiver Display				
	RX Mode				
Parameter	SSB	AM	CW	TLX	HST
AF Bandwith	0	1	0	0	1

Split Mode Disable/Enable tables

Disable/Enable receiver transmitter Split Mode.
"**1**": Enable Split Mode.
"**0**": Disable Split Mode.

No. 61. RX mode = USB versus TX modes.

Default values	Receiver Display	
	TX Mode	
Parameter	LSB	AM
RX Mode USB	1	1

No. 62. RX mode = LSB versus TX modes.

Default values	Receiver Display	
	TX Mode	
Parameter	USB	AM
RX Mode LSB	1	1

No. 63. RX mode = AM versus TX modes.

Default values	Receiver Display	
	TX Mode	
Parameter	USB	LSB
RX Mode AM	1	1

Disable / Enable "Prog" functions

"**1**" enables the "Prog" function.
"**0**" disables the "Prog" function.
Default value shown below.

No.	Function	Parameter	Value
65	Prog Scan	Disable/Enable	1
66	Prog Sweep	Disable/Enable	1
67	Prog Sleep	Disable/Enable	1
68	Prog Power Level	Disable/Enable	1
69	Prog STO	Disable/Enable	1

Disable / Enable "Prog" "98" function

No. 70. Disable/Enable view and change of the Security Code.

"**1**" makes it possible to view and change Security Code.
"**0**" makes it impossible to view or change Security Code.
Default value is "1".

TCU backlight step mode

No. 71. Select TCU backlight step mode
"**0**" Selects sawtooth shaped backlight step mode.
"**1**" Selects triangle shaped backlight step mode.

External "Line, key" input versus TX mode
See also functions no. 51 and 52

No. 73 View/change External key input versus telephony mode
"**0**" Enables external key input in the TU "Line. key" socket.
"**1**" Enables external key input in the TCU "Line. key" socket.

Default values	Receiver Display	
	TX Mode	
Parameter	SSB	AM
External key input	1	1

No. 74 View/change External "Line, key" audio / key inputs versus TLX and HST mode
"**0**" Enables external audio/key inputs in the TU "Line. key" socket.
"**1**" Enables external audio/key inputs in the TCU "Line. key" socket.

Default values	Receiver Display	
	TX Mode	
Parameter	TLX	HST
External "Line, key" input	0	1

View / change Remote Control set-up of DSC and Telex Option Interface-A 718S or PCP 717S

Interface-A 718S is the remote control interface for operation with external equipment. With the optional Interface-A 718S installed in the Transceiver Unit one of the below listed Remote Control modes is selected to obtain the required operation for the installation.

No. 75. View / change set-up of DSC/Telex and HST mode interaction and Control Protocol.

Store the wanted 3 values to select:
One out of seven possible interaction configurations and the protocol for remote control of TU and TCU.
Default values "6 0 0". Must be used with PCP 717S installed.

Parameter	Interaction	Remote Control Protocol	
TELEX with local frequency control	0		
REMOTE FREQUENCY CONTROL	1		
AUTOTELEX	2		
AUTOTELEX with telephony option	3		
MARITEX	4		
MARITEX with telephony option	5		
DSC/Telex	6		
		TU	TCU
T-Bus protocol		0	0
NMEA protocol		1	1

TELEX with local frequency control: Value = 0

When "TELEX with local frequency control" is enabled all control of TRP9500 must be carried out manually. When "TLX" on the keyboard is pressed TRP9500 will enter telex mode and respond to keying signals on the "EXT KEY" input in the "Line, key" connector. All RX/TX frequencies are changed via the keyboard.
Controlled scanning of RX frequencies is possible. Programming one of the TRP9500 scanning programs and the external Scan S/S (Scan Start/Stop) input enables remote control of the scanning. See "Setting up a scan program" in the 'Operation' section and the description of Function no. 77 "Scan S/S input" .

REMOTE FREQUENCY CONTROL: Value = 1

"REMOTE FREQUENCY CONTROL" enables remote set-up of RX and TX frequencies. Sending frequency commands to the "PC RX" input in the 2COM" connector, TRP9500 will change frequency and indicate the remote controlled status by flashing the "Remote" annunciator in the display.
TRP9500 will at all time respond to all manual key entries. The "Remote" annunciator is then switched off indicating that the last entry was made manually.

AUTOTELEX: Value = 2

If "AUTOTELEX" is enabled automatic frequency and scanning control from the Radio-Telex modem is possible. When TRP9500 is in the normal state (last keying sequence terminated) it will respond to commands on the "PC RX" input in the "COM" connector by selecting telex mode and flashing the "Remote" annunciator in the display indicating remote control. Control is now transferred to the Radio-Telex modem and only the "Volume Up/Down", "Speaker On/Off", "Back- light key" and "Supply On/Off" keys can be operated.
The "AUTOTELEX" mode can temporarily be terminated by pressing the "TLX" or the "Enter" key. The "Remote" annunciator is switched off in the display and TRP9500 may be operated manually. TRP9500 will reenter "AUTOTELEX" mode immediately when a new Radio-Telex modem command is received.
When the "2182" key is pressed, TRP7000 will return to manual control from the keyboard and normal operation is possible. All control commands from the Radio-Telex modem are blocked until the "TLX" key is pressed.

AUTOTELEX with telephony option: Value = 3

If it is desirable to interrupt the Radio-Telex modemARQ scanning temporarily while making a phone call "AUTOTELEX with telephony option" should be enabled. It has the same features as AUTOTELEX" but with the following additional facilities.
Pressing the wanted telephony mode-key on TRP9500 the scanning is interrupted and normal operation of the keyboard is possible. To reenter control from the Radio-Telex modem and hence allow scanning again, press the "TLX" key. TRP 9500 will automatically return to "Autotelex with telephony option" if a transmitter frequency command is received from the Radio-Telex modem.
While TRP9500 is controlled by the Radio-Telex modem the "Remote" annunciator is flashing in the display and only the "Volume Up/Down", "Speaker On/Off", "Back-light key", "Supply On/Off" and mode-keys can be operated.

MARITEX: Value = 4

When "MARITEX" is enabled all the features of "AUTOTELEX" are retained. Additionally, TRP9500 will protect against erroneous continuous keying in more than half a minute by un-keying the transmitter and sounding the beeper. Beeping will continue until a key is pressed.

MARITEX with telephony option: Value = 5

If "MARITEX with telephony option" is enabled all the features of "AUTOTELEX with telephony option" and the continuous keying protection of "MARITEX" are combined.

DSC/Telex: Value = 6

Automatic control of the TRP9500 MF/HF receiver and transmitter is possible with the optional built-in DSC/Telex Controller-Receiver (PCP 717S and additional boards). TRP9500 will at all time respond to commands from PCP 717S by entering "DSC/Telex" mode and flashing the "Remote" annunciator in the display. In this state only the "Volume Up/Down", "Speaker On/Off" and "Back-light key" can be operated.
The "DSC/Telex" mode can temporarily be terminated by pressing the "TLX" or the "Enter" key.

The "Remote" annunciator is switched off in the display and TRP9500 may be operated manually. TRP9500 will reenter "DSC/Telex" mode immediately when a new command from PCP 717S is received.

NOTE: 2182 distress operation

When the "2182" key is pressed, TRP9500 will enter the distress mode and ignore all commands except a transmitter frequency command, which will make the TRP 9500 return to remote controlled mode. A return from distress mode to remote controlled mode may also be performed by pressing the "TLX" key.

On-Hook:
When the installation includes an external DSC Controller and the TRP9500 receiver is used for DSC scanning, an On-Hook signal is needed. The On-Hook signal shows if the handset is operated and is available in the AUX connector (pin 1) of the Transceiver Unit.

Handset hooked on: On-Hook = high
Handset hooked off: On-Hook = low

The On-Hook signal is available in all modes (value = 0 through 6 programmed).

More Control Units
When TRP9500 includes the optional built-in DSC/Telex Controller-Receiver, TRP9500 will react on any control command received, regardless of the Priority System state and current programming. Control commands will even overrule all programmed Security Codes and enable normal operation securing transmission of a DSC message.

When a handset is lifted off-hook on a TCU an Off-Hook signal is generated and is available to the optional built-in DSC/Telex Controller-Receiver. The DSC/Telex Controller-Receiver will on reception of this signal stop scanning control of the TRP9500 MF/HF receiver, and thus enable manual control of the transceiver. To transfer control to the TCU in question press any key, preferably the "Enter" key.

View / change Telex Audio Centre Frequency

No. 76. View / change Telex Audio Centre Frequency.

Centre Freq. = 1500Hz + N2 x 500Hz + N1 x 50Hz

N1 values: 0 to 9
N2 values: 0 to 2

Default Audio Centre Frequency = 1700Hz

Default values	Receiver Display	
	Multipliers	
Parameter	N2	N1
Centre Frequency	0	4

View / change External Scan S/S input

With the optional board, Interface-A 718S, installed the available Scan S/S (Scan Start/Stop) input can be used to control the scanning of the 10 build-in user-programmable scan programs or the user-programmable sweep program. The Scan S/S input transition must be enabled to one out of four possibilities, and the input coupled to either Scan or Sweep.

No. 77. View / change External Scan S/S input

Scan S/S Input Transition:

Parameter	Value
Disable	0
Start/Stop on positive/negative transition	1
Start/Stop on negative/positive transition	2
Start/Stop on positive/positive transition	3
Start/Stop on negative/negative transition	4

If a step function is wanted select value = 1 or 2 and store a Dwell Time = 0 during the programming of the scan or sweep program. See "Channel Scanning, Set Up" or "Frequency Sweeping, Set Up".

Scan S/S Coupling:

Parameter	Value
Coupled to Scan	0
Coupled to Sweep	1

Store the wanted values to select the required transition and coupling.

Default values	Receiver Display	
Parameter	Transition	Coupling
Scan Start/Stop	0	0

View / change TCU Priority System

No.: 90 View / Change TCU Priority System

Enable/Disable Master Priority, Privacy and Exclusive Access in Multi-Control Unit system.

"**1**" enables the parameter

"**0**" disables the parameter

Default values shown below

Default values	Receiver Display		
	TX Mode		
Parameter	Master Priority	Privacy	Exclusive Access
Enable/Disable	0	0	0

The Priority System is adapted to various needs by configuration of three parameters:

EXCLUSIVE ACCESS

PRIVACY

MASTER PRIORITY

EXCLUSIVE ACCESS

By enabling/disabling this parameter it is selected whether the currently used TCU has Exclusive Access to the transceiver with no interruption from other TCU's possible, or that control can take place from any CU at any time.

Exclusive Access Enabled:
Only key entries on the currently used TCU are executed. The "Busy" annunciator is flashing in the display of all other TCU's to indicate that the transceiver is in use.
When control from the currently used TCU no longer is needed, it is necessary to press "Prog" "0" "Enter" (Leave System To Other User) to enable control transfer to another TCU. The "Busy" annunciators is then switched off to indicate that the transceiver is no longer in use.
When the "Busy" annunciator is switched off in the display of a TCU, control can be transferred to that TCU simply by pressing any key (preferably the "Enter" key). All other TCU's are immediately locked out and "Busy" is flashing in all other displays, indicating that the transceiver is now in use.

Exclusive Access Disabled:
Control is automatically transferred to the TCU where the last key entry was made. The "Busy" annunciator is switched off in all TCU's indicating that operation can take place on any TCU. (Busy switched off in all TCU's except when a Master Priority TCU is in use).

PRIVACY

By enabling/disabling Privacy the received signal and information displayed in the TCU's can be controlled. This enables either normal use where the communication can be followed in another room, or private conversation. When Privacy is disabled all key entries are reflected in all displays and the received signal is led to all TCU's. Enabled Privacy shuts down all displays and switches off the received signal except for the currently used TCU.

Privacy Enabled:
Only the TCU in use shows the current status in the display. All other TCU's shows only the time of day and the "Busy" annunciator, which is updated according to the Exclusive Access parameter. The received signal is only led to the currently used TCU securing privacy. If the external speaker is assigned to the currently used TCU, it can be switched on/off by pressing "Prog" "1" "Enter", else it is switched off.
When the equipment is switched on only Time Of Day is displayed. Press any key (preferably the "Enter" key) on a TCU and the last frequency set-up is shown. If the Exclusive Access parameter is enabled, "Busy" is flashed in all other displays.

Privacy Disabled:
All displays shows the same information and are updated simultaneously, except for the "Busy" annunciators which are updated according to the Exclusive Access parameter. The received signal is led to all TCU's, and all internal speakers may locally be switched on/off. The external speaker may be switched on/off according to it's configuration. See description below.

MASTER PRIORITY

If it is desirable to have one TCU with higher priority than the rest, Master Priority (1st Priority) should be enabled. When Master Priority is enabled the TCU with Priority/Intercom number equal to "1" gets the Master Priority.
From the TCU with Master Priority, it is always possible to break in and take over the control of the transceiver just by pressing any key (preferably the "Enter" key) on the TCU. Having taken over, no other TCU can interrupt the Master TCU.

Master Priority Disabled:
All TCU's have equal priority and the system set-up is determined by the Exclusive Access and Privacy parameters alone.

Master Priority Enabled:
The TCU with Priority/Intercom number = "1" is given Master Priority. The Master TCU can at all time break in and take over control of the transceiver. All other TCU's are updated according to the Privacy parameter, and "Busy" is flashed.
When the Master TCU has taken over no other TCU can interrupt the Master.
When control from the Master is finished press "Prog" "0" "Enter" (Leave System To Other User). Displays are updated according to the Privacy parameter and "Busy" is switched off in all TCU's.

Assign TCU Priority / Intercom No.

The Priority/Intercom number is common for both the Priority System and the Intercom facility. Each Transceiver Control Unit connected to the ScanBus must have different numbers to enable selective data communication. The numbers range from 1 to 5.

The assigned Priority/Intercom number can be read by pressing "Prog" "25" "Enter" (Read TCU Priority/Intercom Number) on each TCU. In some installations it might be necessary to change the numbers, for example if Master Priority is enabled.

No. 91 Assign TCU Priority / Intercom Number.

The current TCU Priority/Intercom Number is displayed in the receiver frequency display. Change the number with the numeric keys and store it with the "STO" key. Press "Enter" to return to normal operation.
Repeat the above procedure on each TCU, storing the individual Priority/Intercom numbers. When the last number is stored the whole system is updated.

Reset Scan, Sweep and Sleep

No. 95 When function number 95 is selected all parameters and frequency tables of Scan, Sweep and Sleep programmes are deleted and reset to factory setting.

Reset currently used Transceiver Control Unit

No. 96 When function number 96 is selected on a Transceiver Control Unit connected to the ScanBus, the contents of it's EEPROM is reset to factory setting. The EEPROM contains information about ScanBus, Keyboard parameters, Security Code and Priority/Intercom number. If this function is selected, especially in installations where more than one Transceiver Control Unit is connected, the set-up made by the user may be changed.

Reset System Parameters to default values

No. 97 When function number 97 is selected, all System Parameters are reset to default values. The System Parameters are those listed under function number 1 to 94.

Reset total memory and system parameters to default values

No. 98 Function number 98 deletes the total user-programmable channel memory, executes function number 95 and 97, and resets the Password for the Configuration Mode.

View / change Password

No. 99 To prevent unauthorized programming of the configuration, the Configuration Mode may be protected with a Password. As default the Password is 0 which requires no confirmation when selecting Configuration Mode. The Password may be viewed or changed by selecting Function Number 99. Next time Configuration Mode is selected the correct Password must be entered to get access to the mode. Passwords from 1 to 9 999 999 may be used.
When function number 99 is selected the current Password is displayed. To change the Password key-in the new Password and press STO to store it.

If no change is wanted press Enter.

Press Enter to get back to normal operation.

4. TECHNICAL DESCRIPTION Table of Contents

TRANSCEIVER CONTROL UNIT 9000

The Transceiver Control Unit TCU 9000 consists of a handset and a control box and operates like a terminal connected to a computer meaning that all operations which are entered on the Transceiver Control Unit will be performed by the Transceiver Unit. The Transceiver Control Unit contains the following PCBs including the described circuits:

Microphone Board 908:

Microphone Board 908: The board is located inside the handset and includes Microphone and HOOK ON detector Microphone and HOOK ON detector

AF Amplifier Board 907:

The board is located inside the handset and includes OP-AMPs to amplify the earpiece signal and to add gain to the microphone signal. The microphone signal level can be adjusted here.AF Amplifier Board 707:

TCU Transceiver Control Board 904:

The Transceiver Control Board includes Display, Keyboard and a microprocessor. The microprocessor performs the keyboard scanning, display driving, data communication with the Transceiver Unit as well as controlling the Display and Keyboard Backlight. The beep tone is generated on this board and the connectors for the handset and internal loudspeaker are also located on this board.

TCU Audio Board 905:

The Transceiver Audio Board includes AF receiver/driver, AF amplifier and volume control. It performs the handling of the bidirectional AF lines, amplifying AF signals for the earpiece, the internal and external speaker and the line output. The connector for external speaker, phone and morse key is located on this board.

TRANSCEIVER UNIT 9500

The Transceiver Unit 9500 contains receiver, exciter, power amplifier, switch mode power supply and microprocessor PCBs, which are listed below with a description of the circuits they include.

TU Control Board 910:

The digital part includes the MCU, address decoder, Program PROM, Configuration PROM, Non volatile RAM, Real Time Clock, ScanBus data communication driver, partial ATU interface, digital TU-bus driver, Remote interface and drivers for the analog circuits. The analog part includes voltage regulators, analog interface circuits and analog output drivers. The TU Control Board is the main control board of the TRP 9500. It controls the digital and analog operations required when the Transceiver Control Unit 9500 is operated.TRANSCEIVER UNIT 7200

Synthesizer Board 911:

The synthesizer board includes synthesizers, dividing/multiplication circuits and check detectors. The 1st, 2nd and 3rd local oscillator receive their reference signal from the master oscillator PCB 713.The 1. local oscillator covers the frequency range from 45 MHz to 75 MHz and generates the injection signal for the 1. mixer on RX/EX signal path 715S. The 2. local oscillator generates by division and multiplication a 44.544 MHz signal for the 2. mixer. The 3. local oscillator generates a 456.5 kHz signal for the modulation/demodulation process.

Synthesizer Board 912 (option):

The Synthesizer Board 912 is similar to PCB 911 but without master oscillator and gets the reference signal from PCB 911. The Synthesizer Board 912 is used together with the optional board 915S to constitute a built in DSC Scanning Receiver.

Master Oscillator 713:

The master oscillator includes a highly stable Oven Controlled Crystal Oscillator (OCXO). The master oscillator generates the accurate 17.8176 MHz reference signal for the Synthesizer Board 911 and sets the 10 Hz frequency stability of the equipment.

RX / EX Signal Path 715S:

The RX signal path includes protection, antenna attenuator, RF- and IF amplifiers, mixers, filter bank, demodulator, squelch and audio line drivers. The RX signal path performs the handling of the received antenna signal and delivers an AF signal to the Transceiver Control Unit via Wiring Support Board 939 and Interconnection Board 937/938. On the Interconnection Board the AF-signal is converted from an unbalanced to a balanced signal. The EX signal path includes the AF compressor, modulator, filter bank, mixers and EX amplifier. The EX signal path generates the modulated RF signal for the power amplifier. The RX / EX signal path is controlled by the TU Control Board 910 and receives its injection signals from the Synthesizer Board 911.

Programmable Communication Processor 717S (option):

The built-in DSC/Telex controller PCP 717S includes a microprocessor with its peripherals, modulator and demodulators as well as driver/receivers for PC interface and driver/receivers for connection of the built in DSC Scanning-Receiver or DSC Single Channel Receiver. The drivers/receivers for external data communication are opto-isolated and may be disabled by inserting appropriate jumpers.

Interface-A 718S (option):

PCB 718 consists of Drivers and Receivers, General Purpose Input/Output circuits and supply voltage filtering and regulation circuits. The Drivers and Receivers includes optical isolated data drivers/receivers for control of the Transceiver from an external modem. Galvanic isolated balanced 600 ohms input and output lines are available for transfer of the AF signals with a +/- 10 dB adjustment possibility of the AF output.

Single Channel Receiver Board 914S (option):

The Single Channel Receiver 914S, is an DSC distress single channel receiver operating on the frequency 2187.5 KHz.

Receiver signal path 915S (option):

The Receiver Signal Path 915S is used in combination with the optional Synthsizer Board 912 and together they constitutes a complete built in DSC Scanning Receiver.

Power Amplifier 920:

The Power Amplifier includes input attenuator, PA drivers, PA-stage, fan circuit, self protection, key circuit and SWR detector. The Power Amplifier receives the modulated RF input signal from the RX/EX Signal Path 715S and delivers the amplified output signal to the low-pass filters, PCB 926 or 927. The SWR detector output is a monitor signal for the TU Control Board 910. The fan circuit drives the fan in accordance with the temperature signal monitored on the Power Amplifier.

Marine Filters 926/Continuous Filters 927:

The PA filters includes low-pass filters, relay drivers and a peak detector. The PA Filters removes the unwanted harmonic frequencies from the PA signal received from the Power Amplifier. The output of the PA Filters is connected to the input of the ATU via RX/TX Relay on the Interconnection Board 937. The selection of low-pass filter is controlled by the TU Control Board 910. The Peak Detector monitors the output power and the Peak Detector output is used for power level adjustments and for displaying the power level in the Transceiver Control Unit. The PA filters is available in 2 versions: PCB 926 for transmission in the Marine Bands and PCB 927 for transmission with continuous coverage from 1.6 MHz to 30 MHz.

SMPS 931:

The Switched Mode Power Supply generates 48V DC for the Power Amplifier 920, and does not provide galvanic isolation. The SMPS includes an input filter, three relays in parallel for on/off switching, two for the SMPS 931 and one for the Hex Output SMPS 932, in this way it is possible to save current in RX-only, and reverse polarity protection. The three relays are controlled by the short circuit, over and under voltage protection circuits on the SMPS 931

Hex Output SMPS 932:

The Hex Output Switched Mode Power Supply generates the 6 different galvanic isolated voltages for the internal circuits in TRP 9000. The Hex Output SMPS 932 includes a booster SMPS followed by the Hex Output SMPS and short circuit protection. The battery supply for 932 is taken via the relay on SMPS 931, and this includes the over voltage protection facilities on SMPS 931.

SMPS Connection Board 933:

The SMPS Connection Board 933 includes the on/off circuit controlling the three relays on the SMPS 931, check detectors, battery monitoring, SMPS temperature monitoring, SMPS fan control circuit and all the connectors for supply voltages to the internal circuits in TRP9000 except supply voltage for the Power Amplifier.

Interconnection board 937:

The Interconnection Board 937 includes all connectors between TU9500 and other units, RX AF-signal converter from unbalanced to balanced, ATU communication modem, RX/TX simplex relay, and digital interface to the microprocessor.

Wiring Support Board 938:

The Wiring Support Board serves as connection board between the Module Assembly and the rest of the TU, to give easy access to the Module Assembly. The Module Assembly also includes a filter for DC-voltages and a temperature sensor monitoring the temperature in the TU. The temperature sensor controls, together with the sensor in the SMPS unit, the fans of the SMPS.

ANTENNA TUNING UNIT 9500

The Antenna Tuning Unit 9500 contains the ATU Board 940 and the optional Dummy Load/Antenna Amp 941.

ATU Board 940:

The ATU board includes tuning network, measuring system, micro controlling circuits and TU-ATU communication modem. The ATU board matches the impedance of the antenna to 50 ohm in order to gain the best possible SWR. The ATU board communicates tuning process- and frequency information with the Transceiver Unit.

Dummy Load/Antenna Amp 941 (option):

The Dummy Load/Antenna Amp 941 includes relays, load resistors, and an RX-amplifier for frequencies below 1.6MHz.The Dummy Load/Antenna Amp permits Alarm test into Dummy Load as well as grounding or floating the antenna.

ALC and Protection System

Block diagram: page 4-x

REMOTE CONTROL COMMANDS

The commands are :

1) Reset.

2) Telex mode & frequency.

3) USB mode & frequency.

4) AM mode & frequency.

5) CW mode & frequency.

6) Load scan entry.

7) Step to next entry.

8) Delete scan table.

9) Step to specific entry.

10) Check legality of TX freq.

11) Change power level.

Where:

1 resets the transceiver, by transferring the control from the remote controlling unit to the keyboard. This command can only be addressed to the broadcast address.

2 to 5 acts in a similar way, where the command is followed by a 4 byte frequency input. This makes the receiver or transmitter set the corresponding mode and frequency up.

6 consists of the load command followed by a combined mode- and entry-byte and a 4 byte frequency input. This entry will then be saved in memory.

7 has no further data. It loads the next valid entry from the scan table, and the mode and frequency will be set up on the receiver or transmitter.

8 has no further data. This command empties either the receiver or the transmitterscan table.

9 is followed by an entry number. It loads the entry from the scan table, and the mode and frequency will be set up on the receiver or transimitter. The word formats are shown in the next section.

10 is performed to check if the current TX frequency is legal. This is checked by testing the reqbit in the received Status word, which will be set if the TX-frequency is illegal.

11 is followed by specific power level (low/medium/high) and sets the transmitter power level.

Notes:

A load of a TX-frequency will turn on TX, if it's off.

REMOTE INTERFACE & PROTOCOL

Physical characteristics

8 data, 1 start, 1 stop, 1 parity bits,

odd parity,

2400 bit/second.

Protocol characteristics

A command transmission looks as follows.

Data transmitter to receiver: Address word

Command word

Data word(s) (0-15)

Data receiver to transmitter: Status word (not if received Address word was broadcast)

Address word

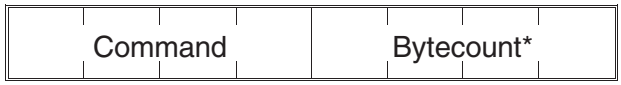
Reserved addresses:

C2h : Receiver (02h in address field)

C3h : Transmitter (03h in address field)

FFh : Broadcast (1fh in address field)

Command word



* bytes to follow

Reserved commands:

00h : Reset

14h : Telex mode & frequency
frequency input (4 bytes)

24h : USB mode & frequency
frequency input (4 bytes)

34h : AM mode & frequency

frequency input (4 bytes)

44h : CW mode & frequency
frequency input (4 bytes)

61h : Change power level
level (1 byte)

70h : Check legality of TX frequency

85h : Load scan entry
radiomode+entry nr (1 byte)
frequency input (4 bytes)

90h : Step to next entry

A0h : Delete scan table

B1h : Step to specific entry
entry nr (1 byte)

Data words

Frequency input:

10 MHz	1 MHz
100 kHz	10 kHz
1 kHz	100 Hz
10 Hz	1 Hz

Radio mode+entry nr. :

Radio mode	Entry nr

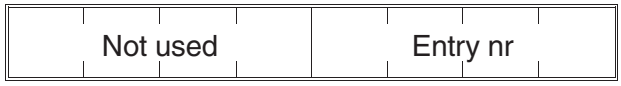
1h : Telex mode Entry nr. = { 0h .. Fh }

2h : USB mode

3h : AM mode

4h : CW mode

Entry nr. :



Entry nr. = { 0h .. Fh }

Level:

Power level = 0 : low

1 : medium

2 : high

Status word

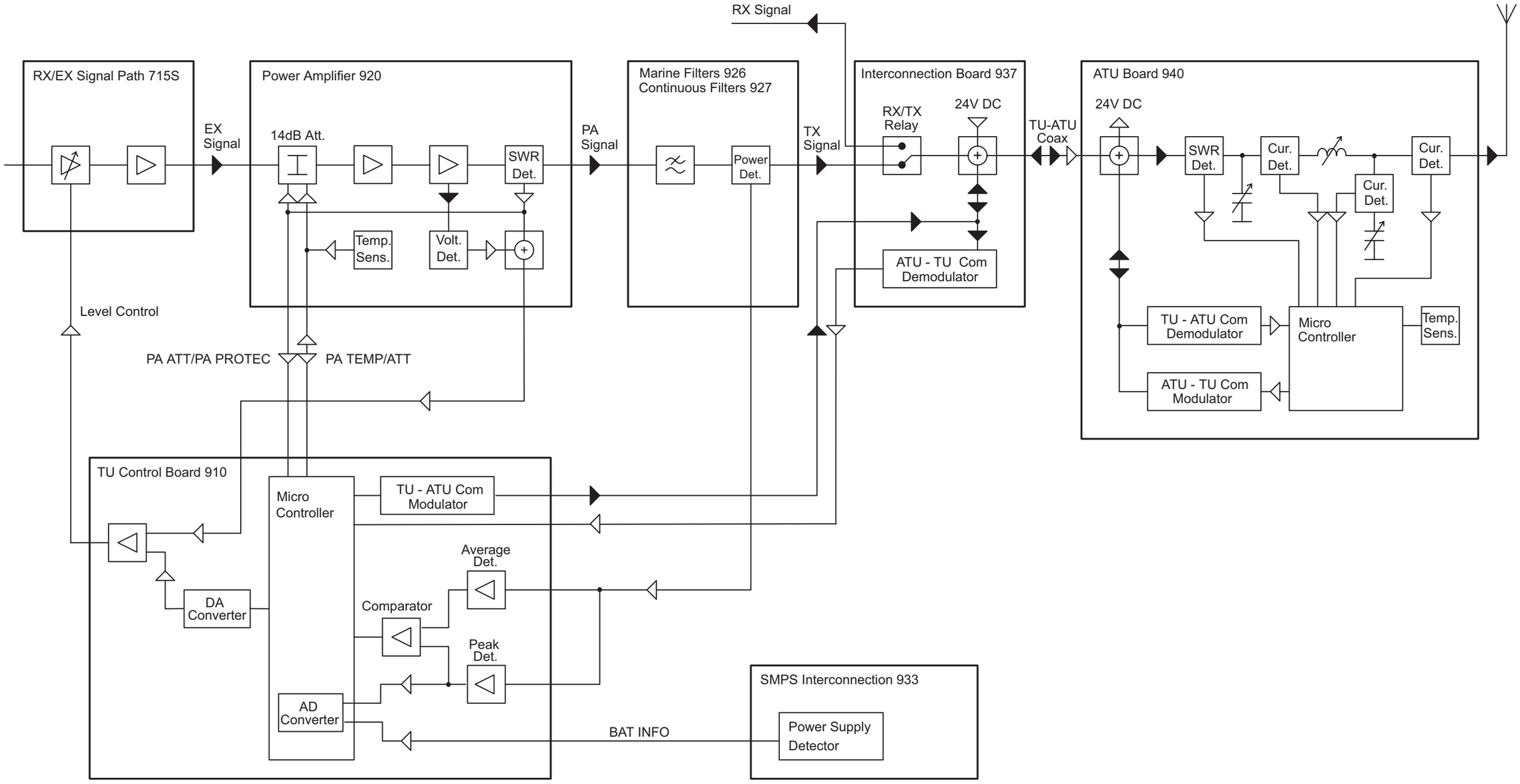
*Own address

Err : Error return status.
0: ok, 1: error.
Retransmission necessary.

Req : TX frequency status, if requested.
0: ok, 1: TX frequency illegal.

Bsy : Busy return status.
0: ok, 1: busy.
Retransmission necessary.

TRP 9500 S POWER CONTROL AND PROTECTION SYSTEM



5. SERVICE Table of contents

PREVENTIVE MAINTENANCE

Due to the modern design of the TRP 9500 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 the 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, groundconnection 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 channels of the Transceiver Unit and keep the units free of dust accumulation to prevent overheating.

5. For cleaning use a damp cloth. Sticky dirt may be removed using a cloth with a weak soap solution. Wipe off with a clean cloth.

Realignment of Master Oscillator 713

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. All oscillators age very slowly with time, typically with the highest drift rate the first year, approaching zero drift after some years.

There are two methods to realign the Master Oscillator. The first method is the most accurate and utilize a frequency counter. The adjustment should be performed by a qualified technician with the necessary test equipment at his disposal. The second method is based on the reception of an AM broadcast station or a CW signal with known good frequency accuracy. By using the User Programmable function: "Prog" "31" "Enter" (Show Frequency Error) TRP 9500 is able to display its own frequency error, which may be reduced to zero by simple adjustment of the Master Oscillator frequency. This method eliminates the need for an accurate frequency counter.

Method 1: Realignment using a frequency counter.

1. Measuring Equipment:

1.1	Frequency Counter:	Frequency range 100 MHz
		Input impedance = 50 ohm
		Sensitivity at least 0.2 Vrms
		Accuracy better than 0.01ppm

2. Preparations:

2.1 Switch on the power at least 30 minutes before adjustment.

2.2 Remove the front cover of the Transceiver Unit.

2.3 Locate and disconnect X10 carrying the 2. Local Oscillator signal from the Synthesizer Board 911 to RX/EX Signal Path 715S. Connect the frequency counter to the X10 socket on the synthesizer.

2.4 The ambient temperature should be within 10 to 30 deg. Celsius. Do not adjust the Master Oscillator shortly after long keying sequences of the transmitter. Be sure that thermal equilibrium has taken place before adjustment.

3. Realignment of Master Oscillator:

3.1 Locate the Master Oscillator adjustment hole in the metal shield of Synthesizer Board 911. Use a small screwdriver to gently adjust the frequency.

3.2 Adjust the frequency as close as possible to 44.544 000 MHz. Adjustment tolerance +/-1Hz.

3.3 Connect X10 and refit the top cover.

Method 2: Realignment using the built-in 'Frequency Error' test.

Note: A telex- or a narrow CW-filter must be installed before this method can be used.

Most AM broadcast stations have a frequency error in the order for 1 to 3 Hz and some have extremely high accuracy as they are frequency locked to atomic standards.
As the necessary measurement time is shorter on higher receiver frequencies choose higher frequencies for quick adjustment. The displayed frequency error of the equipment will be updated every 4 seconds when frequencies above 16 MHz are received. Below 500 kHz the displayed frequency error is updated every 256 seconds.
If the frequency accuracy of the received station is not known use the "Prog" "31" "Enter" feature on several stations to get a general picture of the frequency error.
This function can also be used frequently to check the frequency error of the equipment.

1. Preparations:

1.1 Switch on the power at least 30 minutes before adjustment.

1.2 The ambient temperature should be within 10 to 30 deg. Celsius. Do not adjust the Master Oscillator shortly after long keying sequences of the transmitter. Be sure that thermal equilibrium has taken place before adjustment.

1.3 Remove the top cover of the Transceiver Unit.

1.4 Choose a strong AM or CW signal with know good frequency stability.

1.5 Enter as receiver frequency the exact carrier frequency of the station to be used.

1.6 If an AM broadcast station is used, select AM mode and observe that the signal is received with not too strong fading and a reasonable signal to noise ratio. If these requirements are not fulfilled choose another station.

1.7 Press "Prog" "31" "Enter". The frequency error on the actual receiver frequency is shown in the receiver display and a clean 300 Hz tone should be heard in the loudspeaker. After each error measurement, at intervals depending on the magnitude of the receiver frequency, the display is updated and a short beep is heard in the loudspeaker.

2. Realignment of Master Oscillator:

2.1 Locate the Master Oscillator adjustment hole in the metal shield of Synthesizer Board 911. Use a small screwdriver to gently adjust the frequency.

2.2 Adjust the Master Oscillator until the displayed frequency error is as close as possible to zero. A clean 300 Hz tone should be heard in the loudspeaker.

2.3 If the bar-graph in the display, indicating the received signal strength, is changing rapidly by a large amount or the 300 Hz tone heard in the loudspeaker is not clean choose another station with better reception quality.

2.4 Refit the top cover.

Replacement of Backup Battery

TRP 9500 uses standard 1.5 V alkaline batteries to back-up the memory when the power supply is switched off. Use only the best quality for replacement to avoid leakage.

Skanti recommends:

DURACELL
Alkaline
1.5 V
MN1500 / LR6 / Size AA
3 pieces

The battery life time depends especially on temperature and working conditions, but is estimated to 3 to 4 years.

Every time the power supply is switched on the capacity of the back-up batteries is checked. When the capacity is becoming low the "Bat" annunciator in the display is switched on, showing that it is time to replace batteries. If the capacity becomes critically low the "Bat" annunciator will flash, indicating that memory contents may be lost when the power supply is switched off.

Note that only last set-up, user-programmable memory, Scan, Sweep and Sleep programs and user-configurable parameters are lost with a low voltage back-up battery, and that TRP 9500 is fully operational even without a back-up battery.

Battery Replacement:

Switch on the power supply to ensure no loss of memory contents when the battery pack is removed. Remove the front top cover and top cover of the Transceiver Unit. The back-up battery pack is located behind the front top cover . Disconnect the battery supply connectors from the Transceiver Control Board 910(rear) and the optional PCP 717S(front) located in the top PCB assembly. Remove the battery pack. Change all three batteries and be sure to replace with correct polarity. Refit battery pack, connectors and the covers. The power supply may now switched off.

Cleaning the Air Filter

TRP 9500 uses 4 fans to cool all circuitry inside the Transceiver Unit. To keep the cooling air clean an Air Filter is placed in front of each fan. These Air Filters should be cleaned frequently, especially under dusty working conditions. A dusty Air Filter will block efficient cooling and the transmitter output power is hence reduced to avoid over-heating.
Remove the 4 Air Filter Covers from the sides of the Transceiver Unit by gently pushing them toward the front of the transceiver and the pulling them out from the cabinet. Take out the Air Filters from the cover. Clean the Air Filters refit them and re-assemble the unit.

TROUBLE SHOOTING

If a malfunction should occur in the TRP 9500, the following instructions should be followed in order to locate the module which is causing the malfunction :

1. If possible execute the built in selftest. An 'Error Code' for the failing module will be displayed. A description of the 'Error codes' is included on the following pages..

2. If an execution of the selftest failed, check that all cables and plugs are correctly connected, and that the supply voltage is correct. At this point the fuses should be checked. If the TRP 9500 is supplied from an AC Power Supply, the fuse located on the Power Supply Unit must be checked.

3. If the Control Unit display is flashing all annunciators, it indicates missing data communication between the Control Unit and the Transceiver Unit. This could be caused by a bad cable connection on the data wire between the 2 units.

4. The next step is to open the Transceiver Unit and :

   a. Check cables and plugs.

   b. Check that the left LED (Light Emitting Diode) on the SMPS assembly is constantly on; indicating that the Switch Mode Power Supply is on and able to produce +7.5 V DC.

   c. Switch on TX and check that the right LED (Light Emitting Diode) on the SMPS assembly is constantly on; indicating that the Switch Mode Power Supply for the power amplifier is on and able to produce +48 V DC.

   d. Check that the second left LED on TU Control Board 910 is flashing twice a second, indicating that the microcomputer is operating properly.

   e. Check that the LED on the optional PCP 717S is flashing once every 2 seconds, indicating that the microprocessor is operating properly.

5. If the above steps did not help, please contact your local SKANTI Service Agent. A list of SKANTI Service Agents is found in the rear part of this chapter.

POWER PROTECTION

The TRP 9500 Power and Protection system is monitoring the transmitter circuits during transmission and will automatcally maximize the radiated power to safe limits. If a problem occurs the flashing 'Protec' annunciator on the Control Unit display shows that protection is activated. The current status of the Power and Protection monitor is presented in form of protection codes and may be requested at any time by pressing:

Prog 2 2 Enter.

The Receiver Display will show the Protection Code. If more than one Protection Code is set, successively pressing "Enter" will show the rest and finally make a return to normal operation. Protection is automatically reset when the transmit conditions are normalized.

Protection Code Groups:

No.	Group
00	No protection set
10 - 17	TU power regulation problems. Perform a Self Test.
20 - 23	TU hardware protection.
40 - 51	ATU protection.

Protection Code explanation:

0 **No protection**

Protection codes10 - 17 in general: Failure in power regulation loop
Perform an Automatic Self Test for tests 1 -33 and a Step Mode Self Test for tests 34 and 35.

10

Tune Power Low

Measurement:	TU Control Board measures too low power output. Tune power < 50W.
Protection made:	ATU selects feed through setting after "TU Failure" command. Power regulation inhibited
Display:	Flash "Protec".
Possible error source:	TU - ATU coaxial cable open.

11

Tune Power High

Measurement:	TU Control Board measures too high power output. Tune power > 70W.
Protection made:	ATU selects feed through setting after "TU Failure" command.
Display:	Flash "Protec".

12

ALC Power High

Measurement:	TU Control Board measures too high power output. ALC power was too high.
Protection made:	Exciter level set to ~+12dBm.
Display:	Flash "Protec".

13

Supply failure

Measurement:	Supply voltage high.
Protection made:	TX key inbitit.
Display:	Flash "Protec".

14

ALC Power Low

Measurement: TU Control Board measures too low power output. ALC power was too low.

Protection made: Exciter level set to ~+12dBm.

Display: Flash "Protec".

15

TU-ATU Failure

Measurement: TU Control Board measures too high power output. TX power was too high.

Protection made: Automatic power regulation inhibited.

Display: Flash "Protec".

16

Med/Low High

Measurement: TU Control Board measures too high power output. Medium or Low Power was too high.

Protection made: Power set as Low as possible.

Display: Flash "Protec".

17

Full High

Measurement: TU Control Board measures too high power output. Full Power was too high.

Protection made: Automatic power regulation inhibited.

Display: Flash " Protec".

20 - 23: TU protection by TU hardware

20

PA Temp

Measurement:	PA temperature too high. PA/Temp Att = 1 and PA Att/PA Protect = 1.
Protection made:	Output power decreased by 14 dB.
Display:	Flash "Protec".
Possible cause:	Air filter blocked.

21

PA SWR high

Measurement:	PA SWR was too high. Reflected power was detected. PA Temp Att = 0 and PA Att PA Protect = 1.
Protection made:	Output power decreased by 14 dB.
Display:	Flash "Protec".
Possible cause:	TU - ATU coaxial cable or antenna.
Note:	It is necessary to select low power or to switch off the equipment to reset the protection

22

High Average

Measurement:	Average power reduced to 400W.
Possible cause:	CW keyed for more than 1 minute.

23

PA Hot

Measurement:	PA temperature continously high. PA/Temp Att = 1 and PA At/ PA Protect = 1 in more than 5 min.
Protection made:	Key inhibit for 5 min.
Display:	Flash "Protec".
Possible cause:	Fan failure or air filter blocked.

24

TX Inhibit

Measurement:	External "TX Inhibit" input is activated.
Action made:	TX key inhibit.

25

PA SWR

Measurement:	PA SWR was high.
Protection made:	Output power reduced to safe limits.
Possible cause:	High SWR or change in antenna impedance.

40 - 51: ATU protection

40

Not Tuned

Measurement: ATU failed tuning the antenna.

Protection made: ATU selects feed through setting.

Display: Flash "Protec".

Possible cause: Antenna installation.

41

No Tune Power

Measurement: ATU measured no tune power.

Protection made: ATU selects feed through setting.

Display: Flash "Protec".

Possible cause: TU - ATU coaxial cable shorted.

42

Bad SWR

Measurement: ATU measured SWR>8 during Tune Procedure.

Protection made: ATU selects feed through setting.

Display: Flash "Protec".

Possible cause: Bad antenna impedance on the selected frequency.

43

High SWR

Measurement: ATU measured SWR >3 but <8 during Tune Procedure.

Possible cause: Poor antenna impedance on the selected frequency.

44

V or I

Measurement: ATU measured that the maximum voltage or current rating is reached during ALC adjustment.

Possible cause: A short antenna and a low frequency.

45

Temp

Measurement: ATU requests for lower power during TX.

Possible cause: Temperature inside ATU cabinet is too high.

46

Bad SWR TX

Measurement: ATU measured SWR>8 during transmission.

Display: Flash "Protec".

Possible cause: Bad antenna impedance on the selected frequency.

47

High SWR TX

Measurement: ATU measured SWR >3 but <8 during transmission.

Possible cause: Poor antenna impedance on the selected frequency.

48

V or I high TX

Measurement: ATU measured that the maximum voltage or current rating is reached during transmission.

Possible cause: A short antenna and a low frequency.

50

V or I high

Measurement: ATU measured that the maximum voltage or current rating is reached during ALC adjustment and the power had to be reduced more than 6 dB.

Possible cause: A bad antenna and a low frequency.

51

TU-ATU com bad

Measurement: TU - ATU communication isnot operating.

Protection made: Key inhibit.

Display: Flash "Protec".

Possible cause: TU - ATU communication problem.

SERVICE RELATED 'PROG' KEY OPERATIONS

By using the 'Prog' key extra functions and features may be selected, and programming of the equipment is possible.

'Prog' operations are selected by pressing:

Prog **0-99** Enter

Some functions requires further key entries where as others requires storing of parameters with the 'STO' key or stepping forward with the 'Volume Up' key.

The following is a list of the Functions which are selected by their number:

0 - 9 : Select modes and features. Refer to OPERATION section.

10 - 19 : Select special functions. Refer to OPERATION section.

20 - 74 : Service or installation.

98 : Security Code. Refer to OPERATION section.

99 : Select Configuration Mode. Refer to INSTALLATION section.

No.	Function
0 :	*Leave System to other User.*
1:	*Connect TCU Remote Control port*
2 :	*Select LSB Mode.*
3 :	*Select R3E Mode.*
4:	*Set Side Tone frequency for CW.*
5:	*Set Break-in Time for CW.*
6 :	*Switch RF Attenuator On/Off.*
7 :	*Float Antenna.*
8 :	*Ground Antenna.*
9 :	*Switch "Boop" Sound On/Off.*
10:	*Select Intercom.*
11:	*Set Real Time Clock.*
12:	*Switch Treble Cut On/Off*
13:	*Tilt Viewing Angle of Display.*
14:	*Toggle Bar-graph Reading, Power or Amperes.*
15:	*Set Beep Level.*

16: *Select HST mode.*

20: **Automatic Stepped Self-test.**

21: **Manually Stepped Self-test.**

22: **Read Protection Code.**

23: **View ATU Relay Setting.**

25: **Read CU Priority / Intercom Number.**

26: **View CU Software Version, Release and Release Date.**

27: **View TU Software Version, Release and Release Date.**

28: **View TU Configuration Customer ID, Version, Release and Release Date.**

29: **View ATU Software Version, Release and Release Date.**

30: **Read Accumulated On Time.**

31: **Read Frequency Error**

32: **View RX / EX Signal Path 715 Version.**

33: **View Option Filter.**

34: **View Power Amplifier Version.**

35: **View PA Filter Version.**

36: **View ATU Status.**

37: **View Dummy Load.**

38: **View ATU Fan.**

39: **View Optional Interface Board.**

40 **Switch all Annunciators On in Display.**

41 **Switch Beep Sound On.**

42 **Switch Boop Sound On.**

43 **Switch High-beep Sound On.**

45 **Display Customer Secified Frequencies Pre-Programmed in Configuration PROM.**

46 **Display Configuration parameters pre-programmed in Configuration PROM.**

74 **View Supply Voltage**

98 *View and Change Security Code.*

99 **Select Configuration Mode.**

Description of related 'Prog' operations

No.	Function
2 0	**Automatic Stepped Self-test**. The Automatic Stepped Self-test is started and the step number together with the error code is shown in the Display. The Self-test may be interrupted by pressing the "Enter" key.If an error is detected the Self-test is stopped with step number and error code constantly displayed, until "Enter" is pressed which makes a return to normal operation. See description of the Self-test.
2 1	**Manually Stepped Self-test.** The Manually Stepped Self-test is started from a user selectable step number. **Press: "Prog" "21" "Enter" "Step Number" "Enter"** The step number and error code is displayed as under Automatic Stepped Self-test.To perform the same step number once more press: "Volume Down"To perform the next step number press: "Volume Up"Pressing "Enter" will make a return to normal operation.See description of the Self-test.
2 2	**Read Protection Code.** Press "Prog" "22" "Enter" and the Protection Code will be shown in the Receiver Display if protection is activated. If more than one Protection Code is set, successively pressing "Enter" will show all codes and finally make a return to the normal operation. If environmental or installational conditions, such as too high temperature or bad antenna installation is encountered, protection automatically takes place. The radiated power is adjusted to the best possible performance under the deteriorated operating conditions. If operating conditions becomes too bad forcible protection takes place in order not to destroy the equipment. This condition is shown by flashing the "Protec" annunciator in the Display.See description of the Protection Codes.
2 3	**View ATU Relay Setting.** This function starts the ATU tuning the antenna on the displayed transmitter frequency. After tuning, the ATU relay setting is displayed as 0's and 1's. The first 12 relay settings are displayed and then by successively pressing "Enter" the following are displayed: the next 12 relay settings, the remaining 3 relay settings and finally the current limit values in amperes, obtained from one of the three current detectors. Pressing "Enter" once more will make a return to normal operation.

2 5

Read CU Priority / Intercom Number.
The Receiver Display will show the Priority / Intercom Number of the Control Unit in use.
Pressing "Enter" will make a return to normal operation.

2 6

View CU Software version, release and release date.
Displays CU Software version, release and release date.

Receiver Display: Version and Release number as**VV.RR**.

Transmitter Display: Release date as **YY MM DD**.

Pressing "Enter" will make a return to normal operation.

2 7

View TU Software version, release and release date.
Displays TU Software version, release and release date.

Receiver Display: Version and Release number as **VV.RR**.

Transmitter Display: Release date as **YY MM DD**.

Pressing "Enter" will make a return to normal operation.

2 8

View TU Configuration version, release, customer ID and release date.
Displays TU Configuration version, release, customer ID and release date.

Receiver Display: Customer ID, Version and Release number as **II VV.RR**

Transmitter Display: Release date as **YY MM DD**.

Pressing "Enter" will make a return to normal operation.

2 9

View ATU Software version, release and release date.
Displays ATU software version and release date.

Receiver Display: Version and Release number as **VV.RR**.

Transmitter Display: Release date as **YY MM DD**.

Pressing "Enter" will make a return to normal operation.

3 0

Read Accumulated On Time.
The Accumulated On Time in hours is displayed in the Receiver Display.
Pressing "Enter" will make a return to normal state.
If the build-in back-up battery is removed while the supply is switched off, the total user-programmable memory will be erased and the Accumulated On Time will be set to "0".

3 1

Show Frequency Error.
For Master Oscillator check/realignment without a frequency counter.Please refer to Preventive Maintenance description at page 5-4.

3 2

View RX / EX Signal Path 715.
The Receiver Display shows version number.

"7" is the standard version.

Pressing "Enter" will make a return to normal operation.

3 3

View Option Filter used for telex/DSC or CW reception.
The Receiver Display shows if an optional filter is installed on RX / EX Signal Path 715:

"0" if no Option Filter is installed.

"1" if the Option Filter is installed
.
Pressing "Enter" will make a return to normal operation.

3 4

View Power Amplifier Version.
The Receiver Display shows the PCB number of the installed Power AmplifierAssembly.

Power Amplifier 920

Pressing "Enter" will make a return to normal operation.

3 5

View PA Filter Version.
The Receiver Display shows the PCB number of the installed PA Filter.

Marine Filters 926

Continuous Filters 927

Pressing "Enter" will make a return to normal operation.

3 6

View ATU Status.
The Receiver Display shows the status of the ATU:

"0" if the ATU is not installed.

"1" if the ATU is installed.

"3" if the TU - ATU data communication has failed.

Pressing "Enter" will make a return to normal operation.

3 7

View Dummy Load.
The Receiver Display shows if the optional Dummy Load / Antenna amp.941 is installed in the ATU:

"0" if no optional board is installed in the ATU.

"941" if the Dummy Load/Antenna amp. 941 is installed.

Pressing "Enter" will make a return to normal operation.

3 9

View Optional Interface Board
The PCB number will be displayed in the Receiver Display.

4 0

Switch All Annunciators On in display.
All annunciators in the display are switched on.
Pressing "Enter" will make a return to normal operation.

4 1

Switch Beep Sound On.
The Beep is sounded constantly.
Pressing "Enter" will make a return to normal operation.

4 2

Switch Boop Sound On.
The Boop is sounded constantly.
Pressing "Enter" will make a return to normal operation.

4 3

Switch High-beep Sound On.
The High-beep is sounded constantly.
Pressing "Enter" will make a return to normal operation.

4 5

Display Customer Specified Frequencies pre-programmed in Configuration PROM.
By pressing "Volume Up" all the frequencies and their corresponding modesare successively displayed.If "RX" / "TX" is pressed the displayed frequency will be transferred to theReceiver / Transmitter respectively.
Pressing "Enter" while the pre-programmed frequencies are displayed will make a return to normal operation.

4 6

Display Configuration parameters pre-programmed in Configuration PROM.
By pressing "Volume up" the address and corresponding data are successively shown in the receiver and transmitter display e.g.:

```
RX  a    7593

TX  d       0
```

Pressing "Volume down" will display the data on the previous address.
Pressing "Enter will make a return to normal operation.

7 4

View Supply Voltage
Displays the actual TU supply voltage at the moment the function is executed.e.g. 24.7 Volt is displayed as "24.7" in the receiver display.
Pressing "Enter" will make a return to normal operation.

SELF TEST INTRODUCTION

The 'SELF TEST' BITE (Built-In Test Equipment) of the TRP 9500 is used as a fault diagnosing tool for the service technician. It may also be used by the operator to obtain additional information on a problem when ordering service.
The 'SELF TEST' checks the vital functions of the TRP 9500 by performing and monitoring a sequence of operations. The program controls the analog and digital set ups necessary to perform each test step in the line of tests executed during the 'SELF TEST'. These set ups will result in a digital feed back from the 'Check Detectors' located on most of the PCBs in the TRP 9500. The test-result from each test step will be displayed on the Receiver display of the Transceiver Control Unit

SELF TEST DESCRIPTION

The self test is performed in two different modes : 'Automatic Mode' and 'Manual Mode'.
'Automatic Mode' is used for verification of all functions, except the ones where PA power is applied. All tests will automatically be performed succesively until the last test has passed or an error condition has occurred.
The 'Manual Mode' is used to test the transmitter or for service purposes. In this mode the tests are performed one by one. Tests may be repeated several times giving a technician the opportunity to make measurements.
A 'Self Test' should always be initiated in 'Automatic Mode' as this will start the test at 'Test 1' and automatically proceed until an error is encountered. Note. If a 'Self Test' is started in 'Manual Mode' on an arbitrary test number this may provide false indication to where the problem lies as the 'Self Test' assumes that all previous test numbers has been performed and found OK.
During the 'Self Test' the test number is displayed in the 'RX' display and the test result is displayed in the 'TX' display. "Passed" is displayed when the test has passed and "Bypass" is displayed if the module to test is optional and not installed. If an error is encountered the 'TX' display shows an 'Error Code'. Explanations to the 'Error Codes' are listed on the following pages.

RX display

3 types of test result may be displayed for each test step:

1. This test is OK.

TX display

2. This test has failed.
Refer to Error Code description.

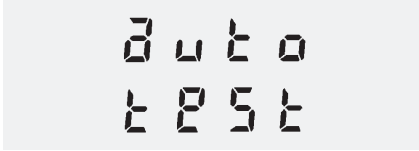
3. This test is not performed because the module to be tested is not installed.

EXECUTION OF THE AUTOMATIC STEPPED SELFTEST

The automatic stepped test sequence is started by pressing :

Prog 2 0 Enter . Test numbers **1 to 33** will be performed.

When this test mode is chosen, the display will show "auto test" a few seconds.



Then all tests except transmitter test, will be carried out, until an error condition occurs, or all tests are finished.

If an error is detected, please refer to descriptions of 'Error Codes' where a possible error source is listed.

When the 'Automatic Stepped Self Test' has stopped, the test result is displayed for a few seconds, whereupon the transceiver returns to normal operation.

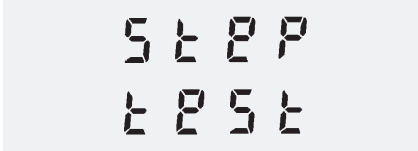
It is possible to interrupt the automatic test, by pressing Enter

EXECUTION OF THE MANUAL STEPPED SELFTEST

This test is carried out by entering :

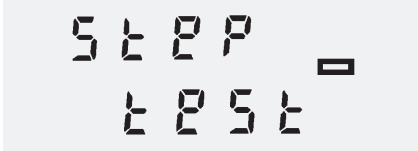
Prog 2 1 Enter . Test numbers **1 to 35** may be performed.

The display will now show "step test" a few seconds.



Enter the number of the test you want to performe.

and press Enter :



The selected test number is now performed.

There are three options to proceed , either press Volume to perform the next test or press Volume to perform the same test again.

If Enter is pressed, the transceiver will return to normal operation.

This will happen too, if Volume is pressed after test number 35 has been performed.

DESCRIPTION OF TEST STEPS

TEST 1

Test 1 will test the supply voltages geberated by the Hex Output SMPS 932 and test for high temperature of the SMPS Assembly heatsink.

Error code	Possible error source	PCB
PASSEd	OK	
Err 1	+15 VDC, +30 VDC, -15 VDC	932, 933
Err 2	SMPS hot	

TEST 2

Test 2 will test AF path on PCB 715S, PCB 905 and PCB 937. The test is carried out, by switching off the microprocessor controlled tone generator and switching on the TCU speaker.
AF check, RX AF line check and TCU loudspeaker check are checked for silence.

Error code	Possible error source	PCB
PASSEd	OK	
Err 1	AF line, tone shape, volume Cabling 910 - 715S	715S
Err 2	RX AF linedriver Cabling 715S - 937	937
Err 3	TCU speaker amplifier	905

TEST 3

Test 3 will test AF path on PCB 715S, PCB 905 and PCB 937. The test is carried out, by switching on the microprocessor controlled tone generator and switching the TCU loudspeaker on. A clear 1 kHz tone will be heard during this test.
AF check, RX AF line check and TCU loudspeaker check are all checked for tone.

Error code	Possible error source	PCB
PASSEd	OK	
Err 1	AF line, tone shape, volume, tone generator Cabling 910 - 715S	715S
Err 2	RX AF Line driver Cabling 715S - 937	937
Err 3	TCU speaker amplifier, speaker shortcircuit Cabling 937 - 904/905	905

TEST 4

Test 4 tests volume control on RX/EX Signal Path PCB 715S.
The test is carried out, by turning on the microprocessor controlled tone generator, and verifying that RX AF line check toggles condition, and keeps it with increasing volume level. Mute is checked in a similar way.

Error code	Possible error source	PCB
PASSEd	OK	
Err 1	Volume control Cabling 910 - 715S	715S
Err 2	AF mute Cabling 910 - 715S	715S

TEST 5

Test 5 checks the beeper on Transceiver Control Unit PCB 905.
Test if beeper generates right condition on speaker check detector.

Error code	Possible error source	PCB
PASSEd	OK	
Err 1	TCU speaker amplifier, beeper Cabling 910 - 904/905	905

TEST 6

Test 6 is a display test on Transceiver Control Unit PCB 904.
Switch on all annunciators in display. Visual control must be carried out.

Error code	Possible error source	PCB
PASSEd	OK	

TEST 7

Test 7 tests Master Oscillator PCB 712/713 mounted on PCB 911.
Test if MO is oscillating, using MO check.

Error code	Possible error source	PCB
PASSEd	OK	
Err 1	Master oscillator Cabling 910 - 911 or 911 - 712/713	712/713

TEST 8

Test 8 tests Synthesizer PCB 911 all local oscillators.
Test that synthesizer is able to lock in midrange
Band : 45 - 52.5 MHz
1.LO : 50.00000 MHz
3.LO : 456.50 kHz
The test is OK if SYNCHECK = 1.

Error code	Possible error source	PCB
PASSEd	OK	
Err 1	Synthesizer Cabling 910 - 911	911

TEST 9

Test 9 tests Synthesizer PCB 911 1. LO
Test if 1.LO is able to get out of lock to check that microprocessor can control synthesizer.
Band : 45 - 52.5 MHz
1.LO : 75.00000 MHz
3.LO : 456.50 kHz
The test is OK if SYNCHECK = 0.

Error code	Possible error source	PCB
PASSEd	OK	
Err 1	Synthesizer Cabling 910 - 911	911

TEST 10

Test 10 tests Synthesizer PCB 911 1. LO
Test if 1. LO is able to lock in band 0 low border
Band : 45 - 52.5 MHz
1.LO : 45.00000 MHz
3.LO : 456.50 kHz
The test is OK if SYNCHECK = 1.

Error code	Possible error source	PCB
PASSEd	OK	
Err 1	Synthesizer Cabling 910 - 911	911

TEST 11

Test 11 tests Synthesizer PCB 911 1. LO
Test if 1. LO is able to lock in band 0 high border
Band : 45 - 52.5 MHz
1.LO : 52.50000 MHz
3.LO : 456.50 kHz
The test is OK if SYNCHECK = 1.

Error code	Possible error source	PCB
PASSEd	OK	
Err 1	Synthesizer Cabling 910 - 911	911

TEST 12

Test 12 tests Synthesizer PCB 911 1. LO
Test if 1. LO is able to lock in band 1 low border
Band : 52.5 - 60 MHz
1.LO : 52.50000 MHz
3.LO : 456.50 kHz
The test is OK if SYNCHECK = 1.

Error code	Possible error source	PCB
PASSEd	OK	
Err 1	Synthesizer Cabling 910 - 911	911

TEST 13

Test 13 tests Synthesizer PCB 911 1. LO
Test if 1. LO is able to lock in band 1 high border
Band : 52.5 - 60 MHz
1.LO : 60.00000 MHz
3.LO : 456.50 kHz
The test is OK if SYNCHECK = 1.

Error code	Possible error source	PCB
PASSEd	OK	
Err 1	Synthesizer Cabling 910 - 911	911

TEST 14

Test 14 tests Synthesizer PCB 911 1. LO
Test if 1. LO is able to lock in band 2 low border
Band : 60 - 67.5 MHz
1.LO : 60.00000 MHz
3.LO : 456.50 kHz
The test is OK if SYNCHECK = 1.

Error code	Possible error source	PCB
PASSEd	OK	
Err 1	Synthesizer Cabling 910 - 911	911

TEST 15

Test 15 tests Synthesizer PCB 911 1. LO
Test if 1. LO is able to lock in band 2 high border
Band : 60 - 67.5 MHz
1.LO : 67.50000 MHz
3.LO : 456.50 kHz
The test is OK if SYNCHECK = 1.

Error code	Possible error source	PCB
PASSEd	OK	
Err 1	Synthesizer Cabling 910 - 911	911

TEST 16

Test 16 tests Synthesizer PCB 911 1. LO
Test if 1. LO is able to lock in band 3 low border
Band : 67.5 - 75 MHz
1.LO : 67.50000 MHz
3.LO : 456.50 kHz
The test is OK if SYNCHECK = 1.

Error code	Possible error source	PCB
PASSEd	OK	
Err 1	Synthesizer Cabling 910 - 911	911

TEST 17

Test 17 tests Synthesizer PCB 911 1. LO
Test if 1. LO is able to lock in band 3 high border
Band : 67.5 - 75 MHz
1.LO : 75.00000 MHz
3.LO : 456.50 kHz
The test is OK if SYNCHECK = 1.

Error code	Possible error source	PCB
PASSEd	OK	
Err 1	Synthesizer Cabling 910 - 911	911

TEST 18

Test 18 tests Synthesizer PCB 911 3. LO
Test if 3.LO is able to get out of lock to check that the microprocessor can control the synthesizer.
Band : 67.5 - 75 MHz
1.LO : 75.00000 MHz
3.LO : 400.00 kHz
The test is OK if SYNCHECK = 0.

Error code	Possible error source	PCB
PASSEd	OK	
Err 1	Synthesizer Cabling 910 - 911	911

TEST 19

Test 19 tests Synthesizer PCB 911 3. LO
Test if synthesizer is able to lock 3. LO low border
Band : 67.5 - 75 MHz
1.LO : 70.00000 MHz
3.LO : 452.50 kHz
The test is OK if SYNCHECK = 1.

Error code	Possible error source	PCB
PASSEd	OK	
Err 1	Synthesizer Cabling 910 - 911	911

TEST 20

Test 20 tests Synthesizer PCB 911 3. LO
Test if synthesizer is able to lock 3. LO high border
Band : 67.5 - 75 MHz
1.LO : 70.00000 MHz
3.LO : 460.50 kHz
The test is OK if SYNCHECK = 1.

Error code	Possible error source	PCB
PASSED	OK	
Err 1	Synthesizer Cabling 910 - 911	911

TEST 21

Test 21 performs receiver test on RX/EX Signal Path PCB 715S in SSB mode and with SSB filter. By choosing the right synthesizer frequency the signal passes the 45 MHz filter and is mixed to a 1 kHz tone in the audio part. This makes the Automatic Gain Control lower the sensitivity and the RX AF line check indicating AF. RX mute is also checked.
Band : 45 - 52.5 MHz
1.LO : 44.99900 MHz
3.LO : 456.00 kHz

Error code	Possible error source	PCB
PASSED	OK	
Err 1	Receiving signal path Cabling 910 - 715S or 911 - 715S - 937	715S
Err 2	AGC Cabling 910 - 715S or 911 - 715S - 937	715S
Err 3	RX mute	715S

TEST 22

Test 22 performs receiver test on RX/EX Signal Path PCB 715S in AM mode and with AM filter. By choosing the right synthesizer frequency the signal passes the 45 MHz filter and is mixed to generate an unmodulated carrier . This makes the Automatic Gain Control lower the sensitivity and the RX AF line check indicating no AF.
Band : 45 - 52.5 MHz
1.LO : 44.99900 MHz
3.LO : 456.00 kHz

Error code	Possible error source	PCB
PASSEd	OK	
Err 1	Receiving signal path, AM detector Cabling 910 - 715S or 911 - 715S - 937	715S
Err 2	AGC Cabling 910 - 715S or 911 - 715S - 937	715S

TEST 23

Test 23 performs receiver test on RX/EX Signal Path PCB 715S in Telex mode and with Telex filter, if a such is mounted.
By choosing the right synthesizer frequency the signal passes the 45 MHz filter and is mixed to a 1 kHz tone in the audio part. This makes the Automatic Gain Control lower the sensitivity and the RX AF line check indicating AF.
Band : 45 - 52.5 MHz
1.LO : 44.99900 MHz
3.LO : 456.00 kHz

Error code	Possible error source	PCB
PASSEd	OK	
Err 1	Receiving signal path, option filter Cabling 910 - 715S or 911 - 715S - 937	715S
Err 2	AGC Cabling 910 - 715S or 911 - 715S - 937	715S
bYPASS	No optional filter installed	715S

TEST 24

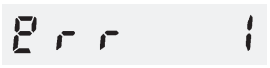
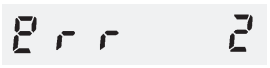
Test 24 tests squelch on RX/EX Signal Path PCB 715S
By choosing the right synthesizer frequency the signal passes the 45 MHz filter and is mixed to a 500 Hz tone in the audio part. This makes the squelch open. Then a 2 kHz is generated making the squelch close. Squelch hold time is also checked.
Band : 45 - 52.5 MHz
1.LO : 44.99900 MHz
3.LO : 456.00 kHz

3.LO : 457.00 kHz

Error code	Possible error source	PCB
	OK	
	Squelch circuit not able to open Cabling 910 - 715S or 911 - 715S	715S
	Squelch circuit not able to close Cabling 910 - 715S or 911 - 715S	715S
	Squelch hold time	715S

TEST 25

Test 25 tests manual Gain Control on RX/EX Signal Path PCB 715S. By choosing the right synthesizer frequency the signal passes the 45 MHz filter and is mixed to a 1 kHz tone in the audio part. By controlling the Manual Gain Control to low sensitivity the RX AF line check indicates no AF. High sensitivity shows AF present.
Band : 45 - 52.5 MHz
1.LO : 44.99900 MHz
3.LO : 456.00 kHz

Error code	Possible error source	PCB
	OK	
	Not able to lower MGC Cabling 910 - 715S or 911 - 715S - 937	715S
	Not able to rise MGC Cabling 910 - 715S or 911 - 715S - 937	715S

TEST 26

Test 26 tests Automatic Gain Control Hang facility on RX/EX Signal Path PCB 715S.
Examine hang function in three steps :
1) Check normally AGC (with 1 kHz tone)
2) Check that AGC hangs (without signal)
3) Check that AGC hang has ended (without signal)

Band : 45 - 52.5 MHz
1.LO : 44.99900 MHz
3.LO : 456.00 kHz

Band : 67.5 - 75 MHz
1.LO : 80.00000 MHz
3.LO : 456.00 kHz

Error code	Possible error source	PCB
PASSEd	OK	
Err 1	AGC Cabling 910 - 715S or 911 - 715S	715S
Err 2	AGC hang facility	715S

TEST 27

Test 27 performs exciter test on RX/EX Signal Path PCB 715S in SSB mode and with SSB filter and no input.
The exciter is set up to produce 15 MHz SSB signal. With input grounded; no RF is detected at RF check.
Band : 60 - 67.5 MHz
1.LO : 60.00000 MHz
3.LO : 455.00 kHz

Error code	Possible error source	PCB
PASSEd	OK	
Err 1	Exciter signal path Cabling 910 - 715S or 911 - 715S	715S

TEST 28

Test 28 performs exciter test on RX/EX Signal Path PCB 715S in SSB with SSB filter and tone input.
The exciter is set up to produce 15 MHz SSB signal. With tone input; RF is detected at RF check. Shape key is also checked.
Band : 60 - 67.5 MHz
1.LO : 60.00000 MHz
3.LO : 456.00 kHz

Error code	Possible error source	PCB
	OK	
	Exciter signal path Cabling 910 - 715S or 911 - 715S	715S
	Shape key	715S

TEST 29

Test 29 performs exciter test on RX/EX Signal Path PCB 715S in R3E with SSB filter and tone input.
The exciter is set up to produce 15 MHz R3E signal. With tone input; RF is detected at RF check.

Band : 60 - 67.5 MHz
1.LO : 60.00000 MHz
3.LO : 455.00 kHz

Error code	Possible error source	PCB
	OK	
	Exciter signal path Cabling 910 - 715S or 911 - 715S	715S

TEST 30

Test 30 performs exciter test on RX/EX Signal Path PCB 715S in AM with SSB filter and no input. The exciter is set up to produce 15 MHz AM carrier. With input grounded; RF is detected at RF check.
Band : 60 - 67.5 MHz
1.LO : 60.00000 MHz
3.LO : 455.00 kHz

Error code	Possible error source	PCB
PASSEd	OK	
Err 1	Exciter signal path Cabling 910 - 715S or 911 - 715S	715S

TEST 31

Test 31 performs exciter test on RX/EX Signal Path PCB 715S in CW mode with SSB filter and no input.
The exciter is set up to produce 15 MHz carrier. With input grounded; RF is detected at RF check.
Band : 60 - 67.5 MHz
1.LO : 60.00000 MHz
3.LO : 455.00 kHz

Error code	Possible error source	PCB
PASSEd	OK	
Err 1	Exciter signal path Cabling 910 - 715S or 911 - 715S	715S

TEST 32

Test 32 tests Automatic Level Control on RX/EX Signal Path PCB 715S. The exciter is set up to produce 15 MHz CW carrier. With input grounded and low ALC level; no RF is detected at RF check. With high ALC level RF is present.
Band : 60 - 67.5 MHz
1.LO : 60.00000 MHz
3.LO : 455.00 kHz

Error code	Possible error source	PCB
PASSEd	OK	
Err 1	Not able to lower ALC Cabling 910 - 715S or 911 - 715S	715S
Err 2	Not able to rise ALC Cabling 910 - 715S or 911 - 715S	715S

TEST 33

Test 33tests Antenna Tuning Unit PCB 940 without power.
The TU checks that an ATU is connected and if it is able to communicate with the TU.
The ATU tests : RAM, Vforward-, Vreflected-, 0 degrees-, 90 degrees- and temperature- detector.

Error code	Possible error source	PCB
PASSEd	OK	
Err 2	ATU - TU communication failure Cabling 937 - 910 or 937 - 740	940,910
Err 3	ATU ram error	940
Err 4	Vforward detector	940
Err 5	Vreflected detector	940
Err 6	0 detector	940

TEST 33 (continued)

Err 7	90 detector	940
Err 8	Temperature sensor	940
Err 9	TU - ATU data communication TU receives errors Coaxial cable TU-ATU, PCB 937	940
Err 10	TU - ATU data communication ATU receives errors Coaxial cable TU-ATU, PCB 940	910, 937
bYPASS	No ATU connected	

TEST 34

Test 34 tests correspondence between battery voltage and power amplifier.
Supply voltage is read from PCB 937 and compared with PA module id. PA id is performed by a voltage divider and read by the A/D converter.

Error code	Possible error source	PCB
PASSEd	OK	
Err 5	Supply voltage too low	
Err 6	Supply voltage too high on	
Err 7	Unidentified PA module Cabling 910 - 920	920

TEST 35

Test 35 is a listening test to ensure that the selected transmitter-test frequency is vacant, before the transmitter test is carried out.

Procedure: Press ’35’ ’Enter’. Enter the selected transmitter-test frequency and listen for signals. If no signals are heard then proceed to ’Test 36’ by pressing the ’Volume up’ key.

Error code	Possible error source	PCB
PASSEd	OK	

TEST 36

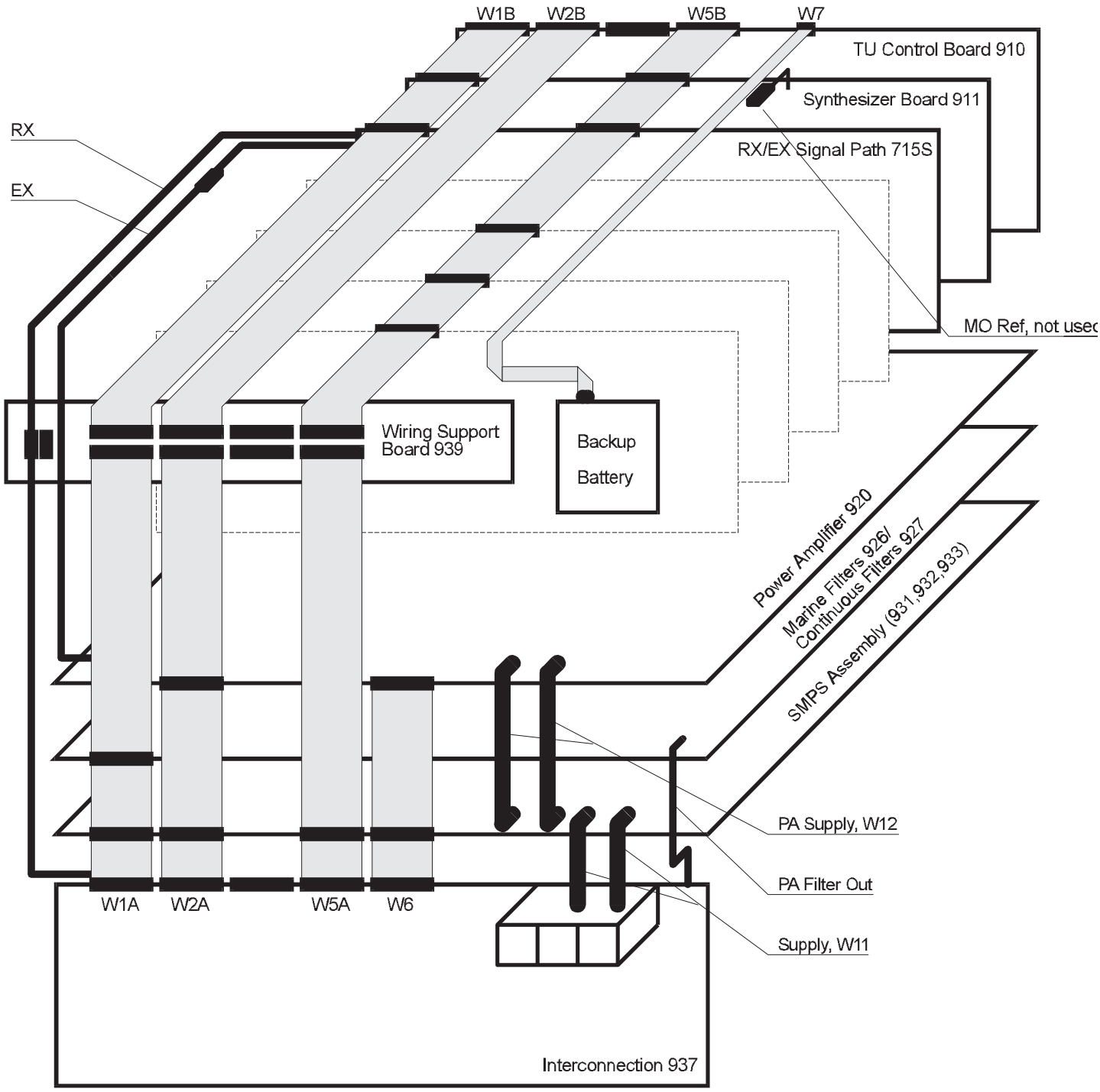
Test 36 tests PA - module PCB 920, PA - filters PCB 926/927 and ATU PCB 940.
A full tune and ALC procedure is performed on a frequency chosen by the user. Then a transmission with full power is carried out for 10 seconds, followed by a transmission in low power mode also lasting 10 seconds.

Error code	Possible error source	PCB
PASSEd	OK	
Err 1	PA Attenuator Relay Cabling 910 - 920	920
Err 10	Tune Power Low Coax 715S - 920 or 920 - 926/927 Coax cables 920 - 926/927 - 937 Cabling 910 - 715S or 910 - 926/927	
Err 11	Tune Power High Cabling 910 - 715S or 910 - 926/927	
Err 12	ALC Power High Cabling 910 - 715S or 910 - 926/927	
Err 13	Supply failure Cabling 910 -933	
Err 14	ALC Power Low Cabling 910 - 715S or 910 - 926/927	

TEST 36 (continued)

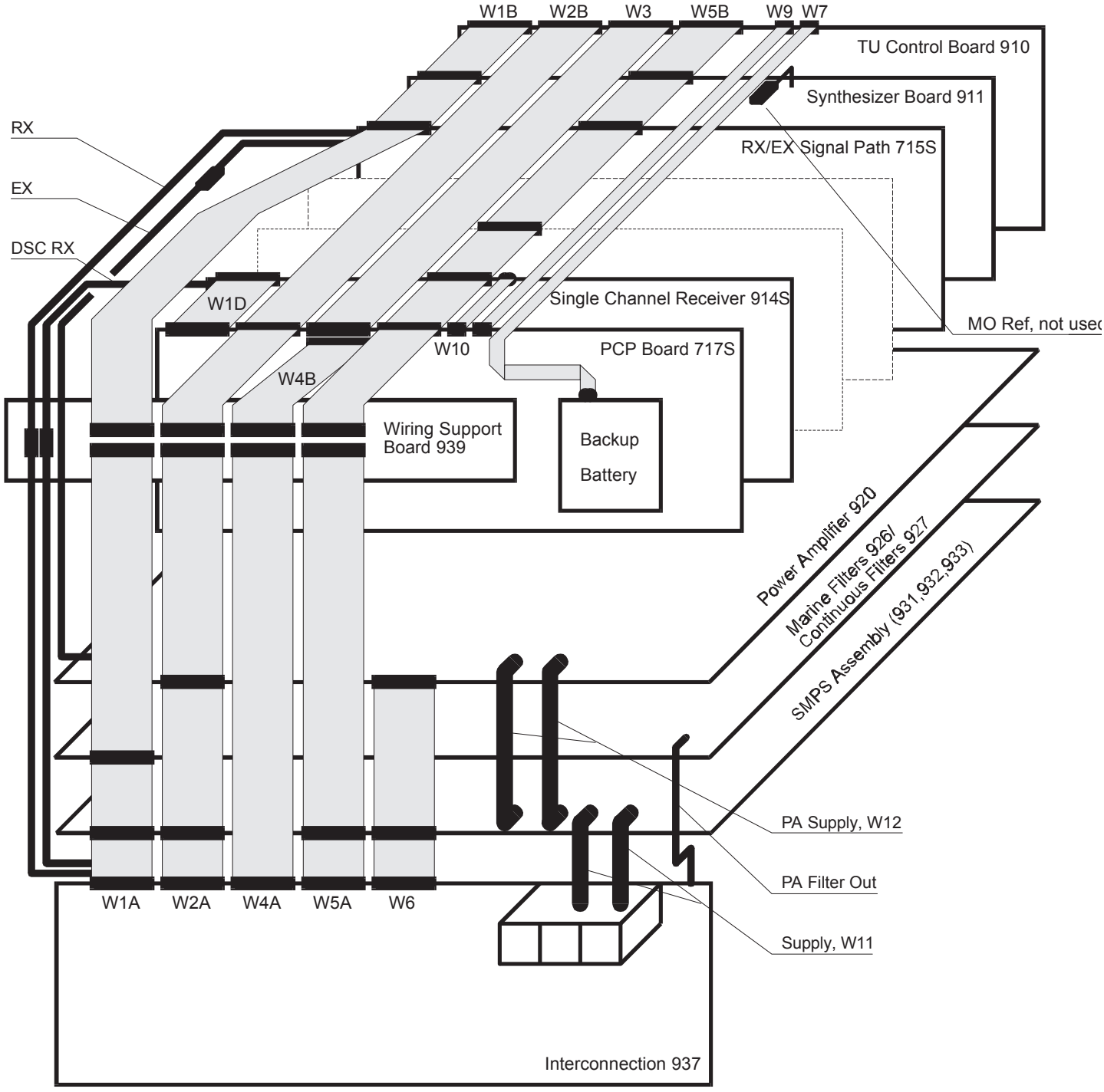
Err 15	TU - ATU Failure Cabling 910 - 937 or 937 - 940 Antenna installation or ATU	
Err 16	Med/Low High Cabling 910 - 920 or 910 - 926/927	
Err 17	Full High Cabling 910 - 720 or 910 - 926/927	
Err 20	PA Temp Check all Blowers & Blower Filters	920
Err 21	PA SWR Coax 920 - 926/927 Antenna installation	920
Err 40	Not Tuned Antenna installation or ATU	940
Err 41	No Tune Power RX/TX relay PCB 937 or coax connectors Coax cables 926/927 - 937, TU - ATU shorted. ATU	940
Err 42	Bad SWR Antenna installation or ATU	940
Err 46	Bad SWR TX Antenna installation or ATU	940

TU9500S
TU Interconnection



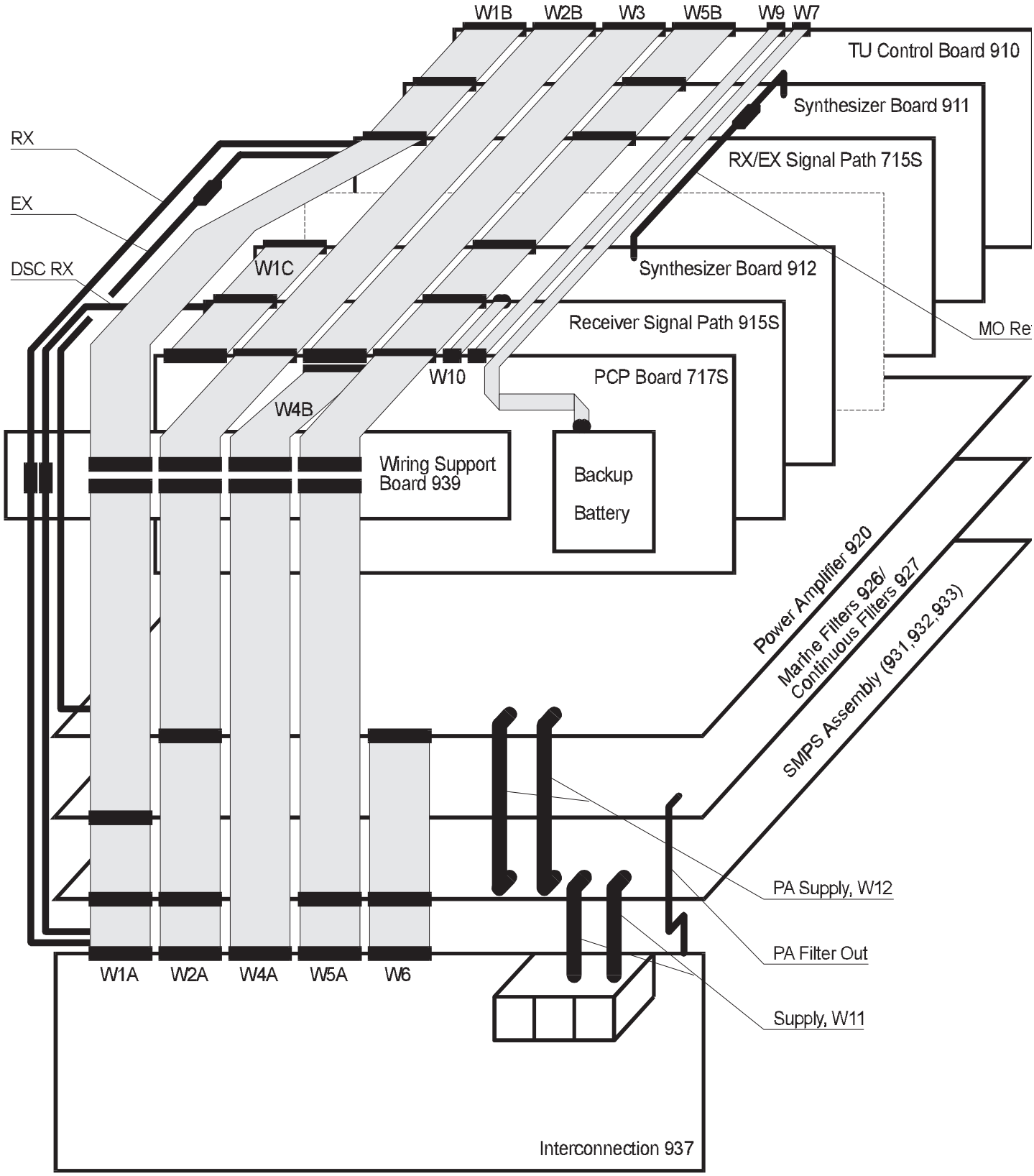
Local coax connections between Synthesizers and Receivers / Exciters are not shown.

TU9500SD1T
TU Interconnection



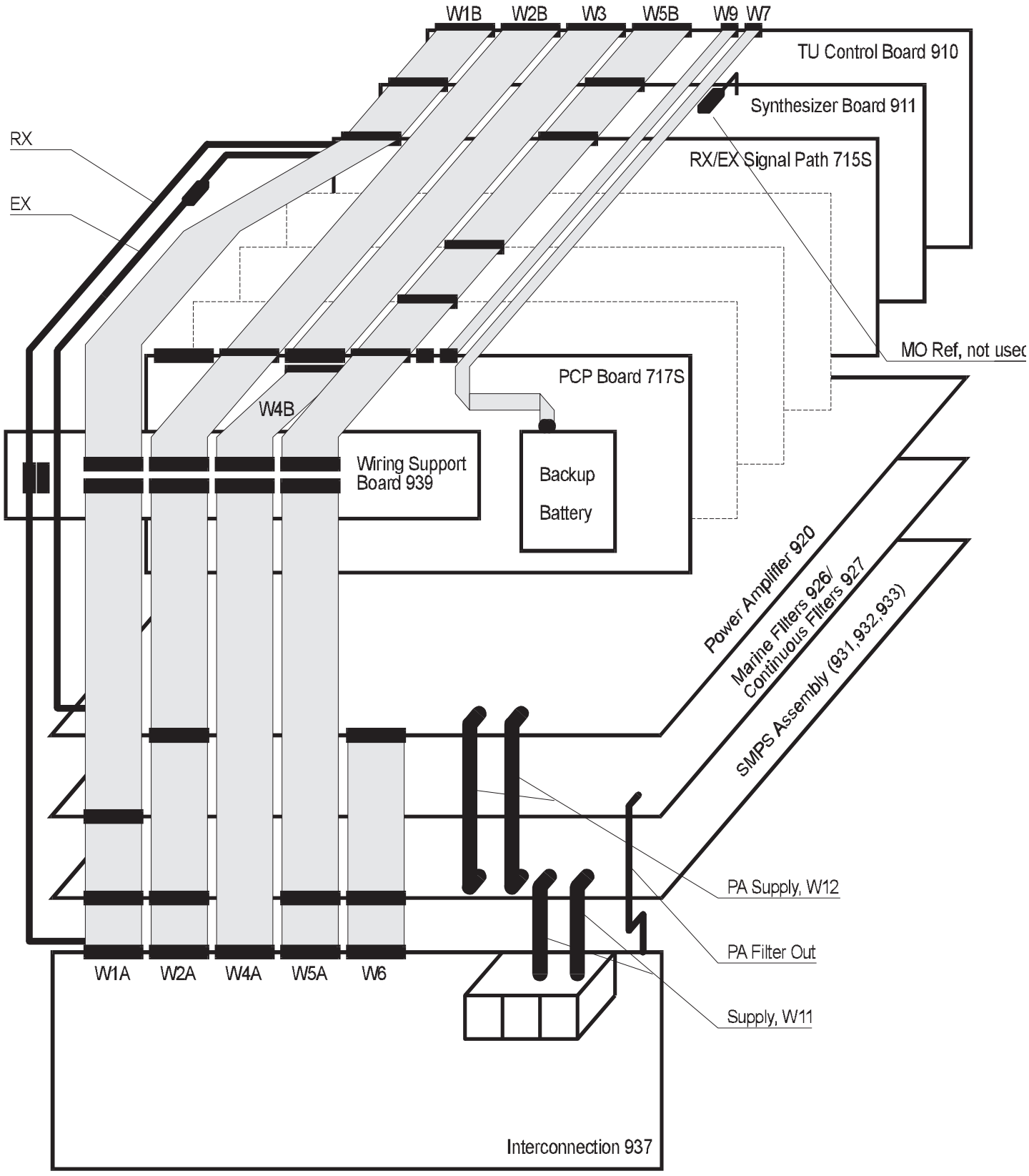
Local coax connections between Synthesizers and Receivers / Exciters are not shown.

TU9500SD6T
TU Interconnection



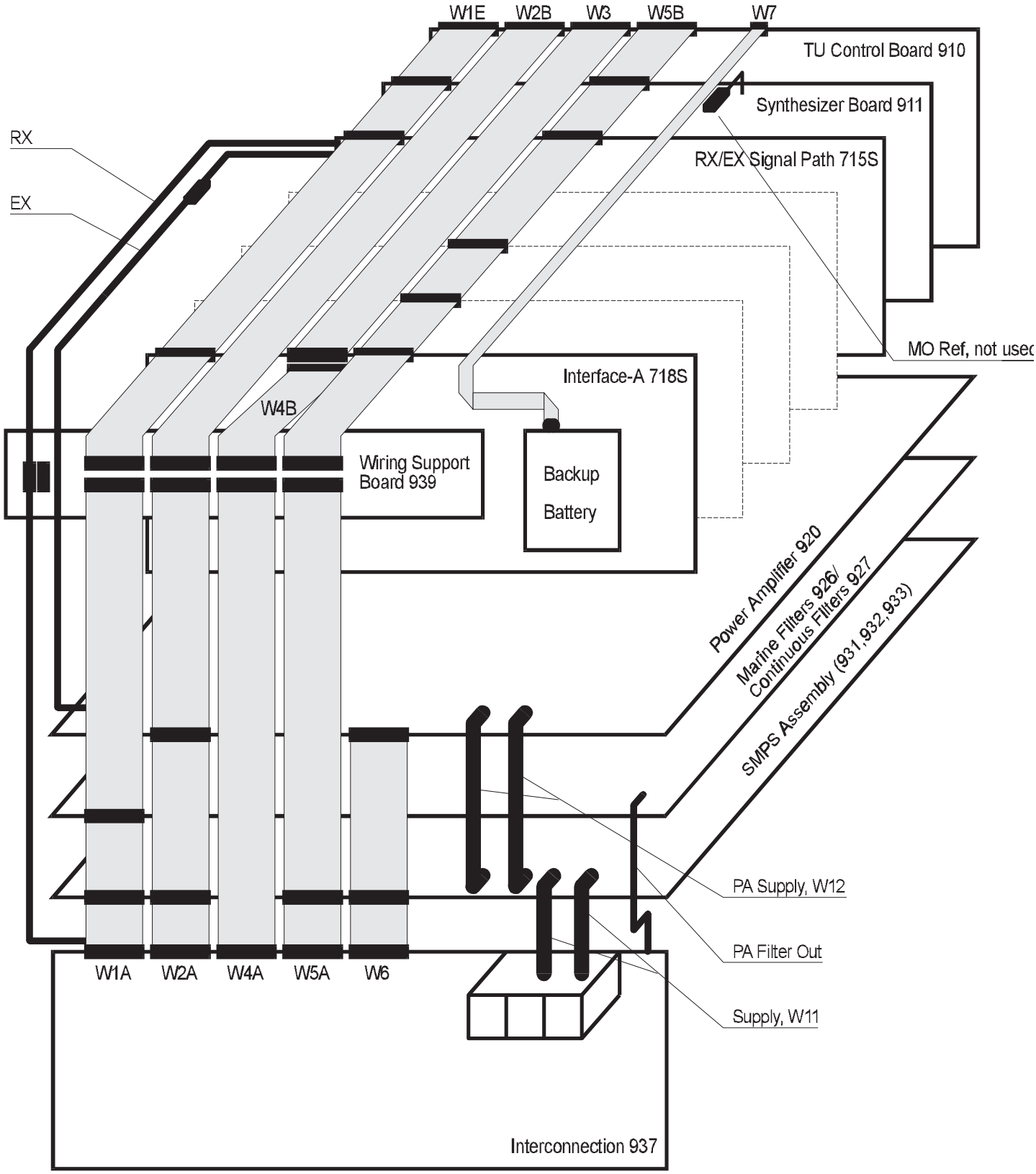
Local coax connections between Synthesizers and Receivers / Exciters are not shown.

TU9500ST & TU9500SDT
TU Interconnection

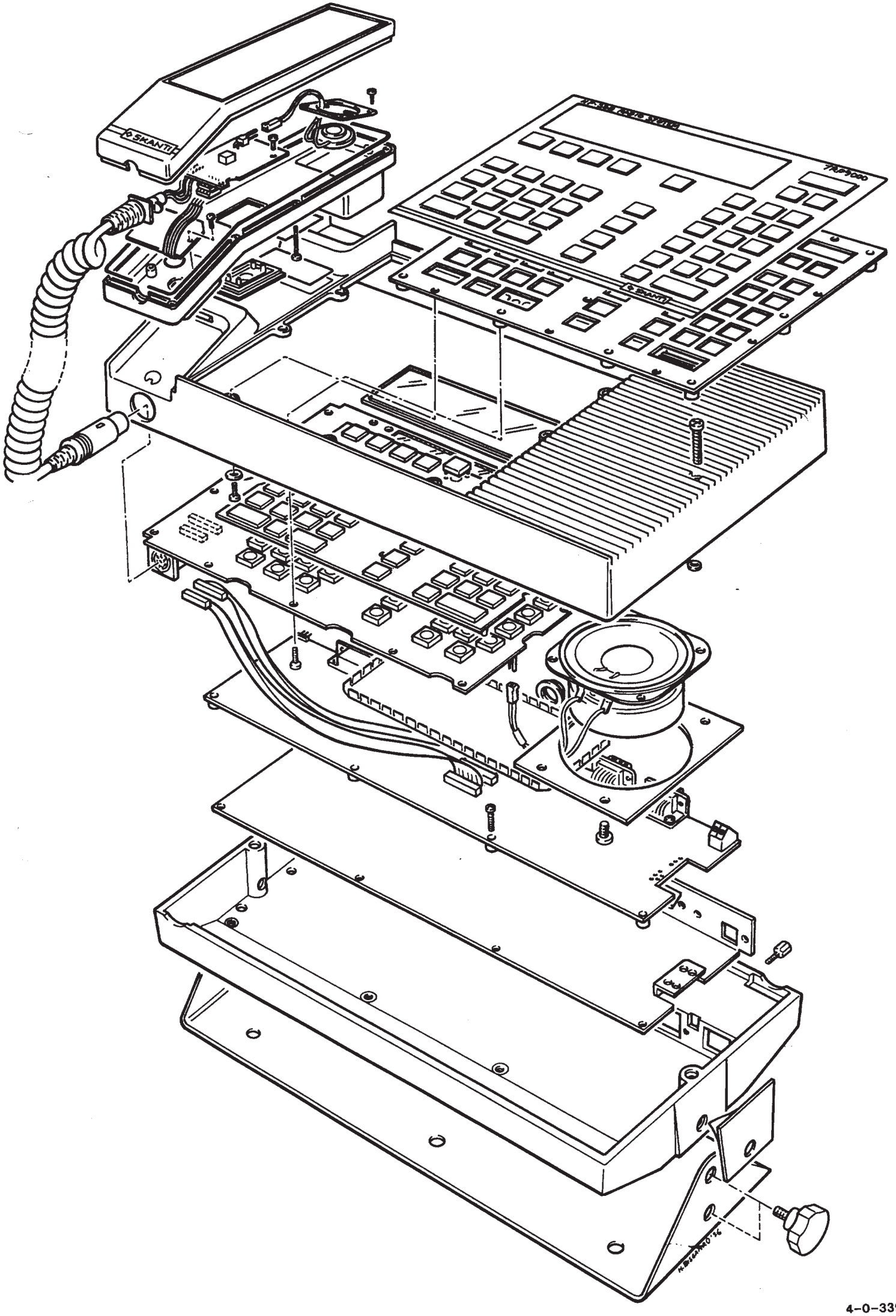


Local coax connections between Synthesizers and Receivers / Exciters are not shown.

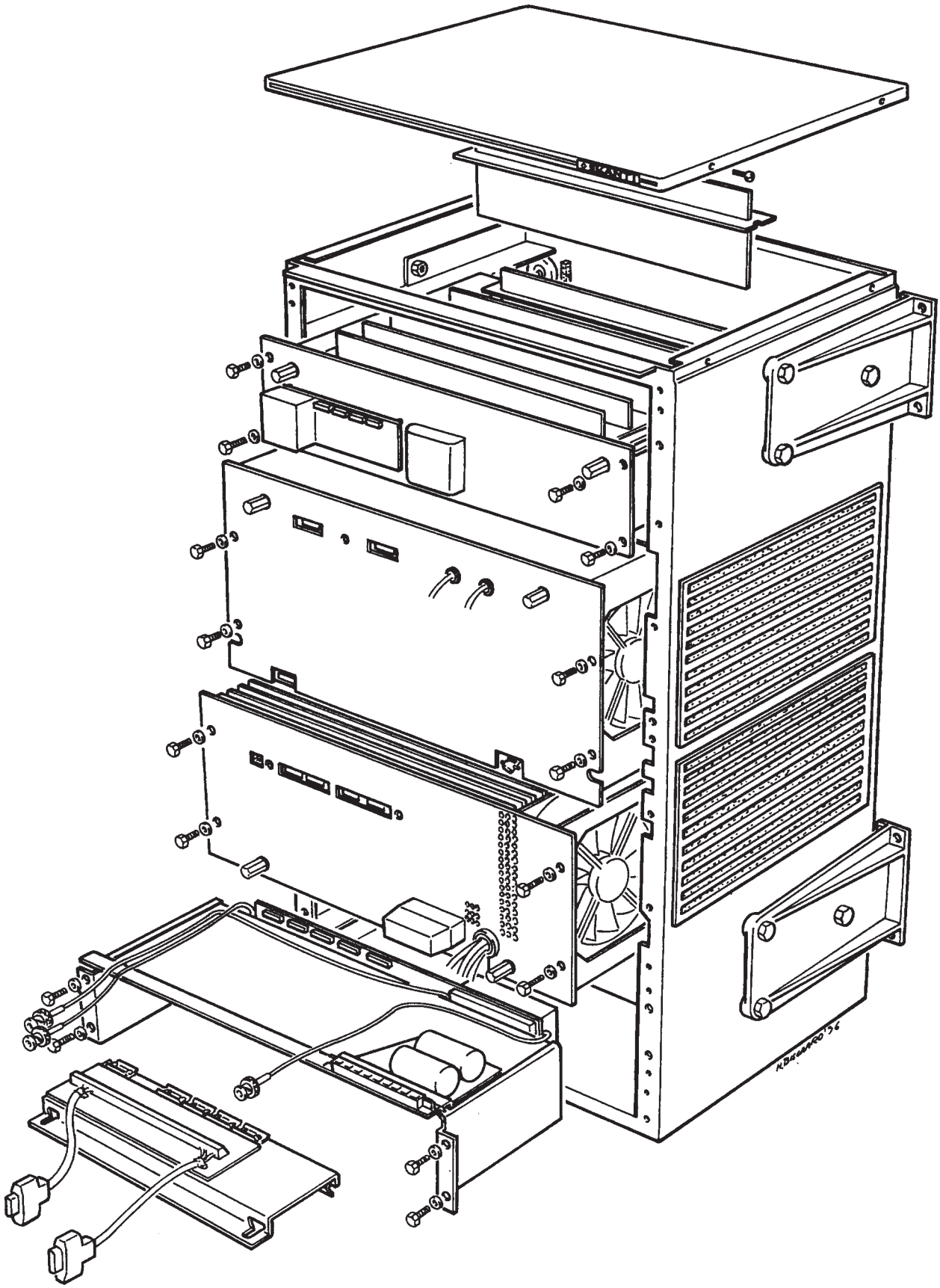
TU9500SI
TU Interconnection

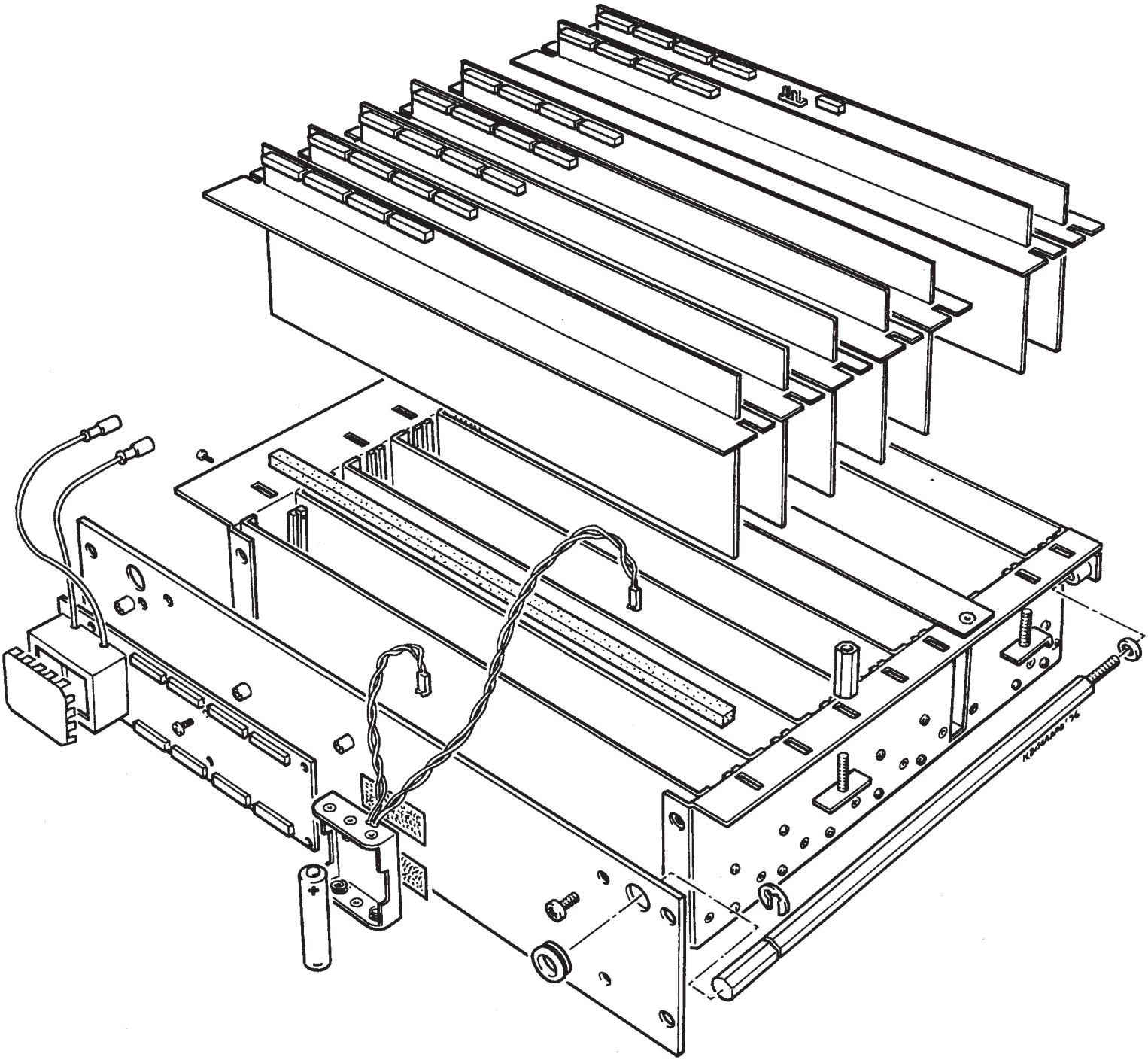


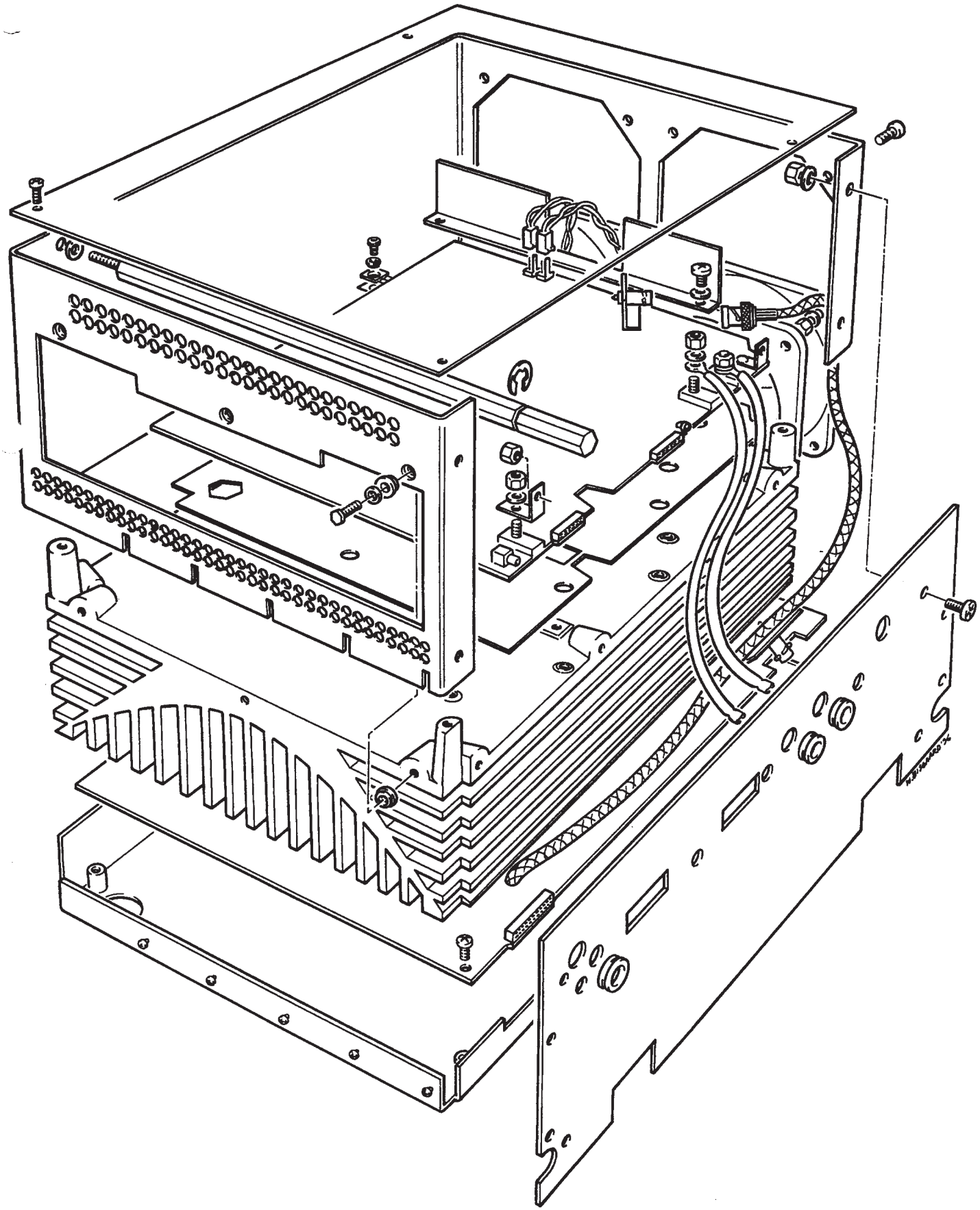
Local coax connections between Synthesizers and Receivers / Exciters are not shown.

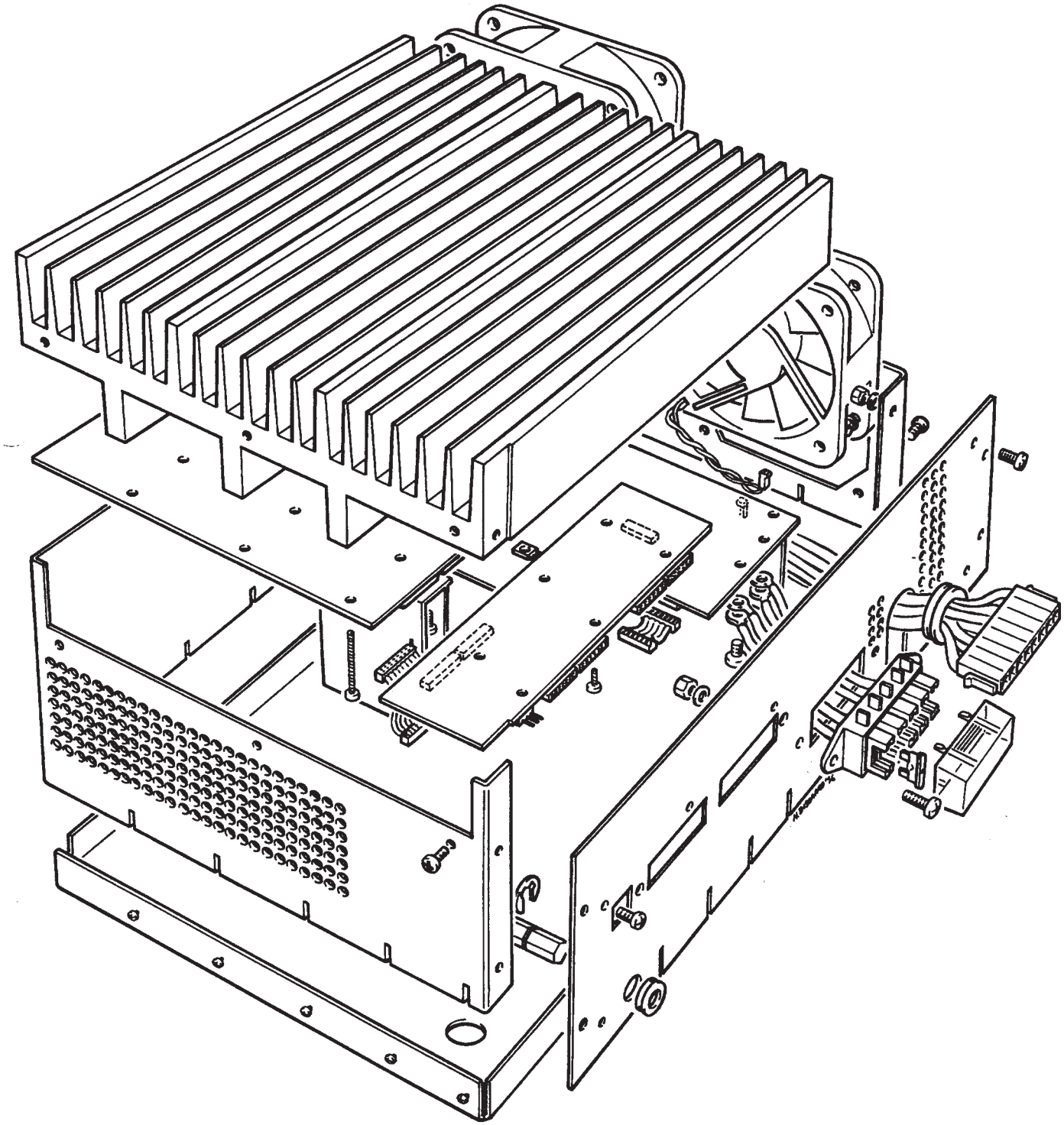


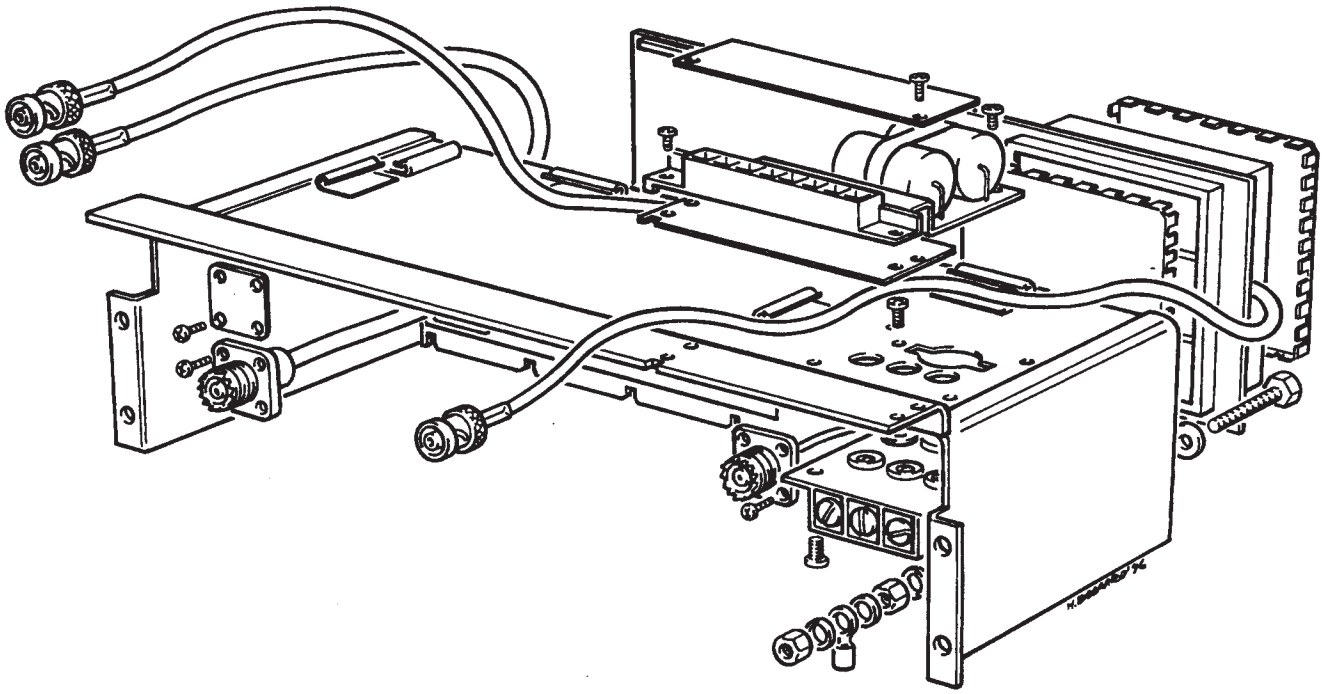
4-0-33951

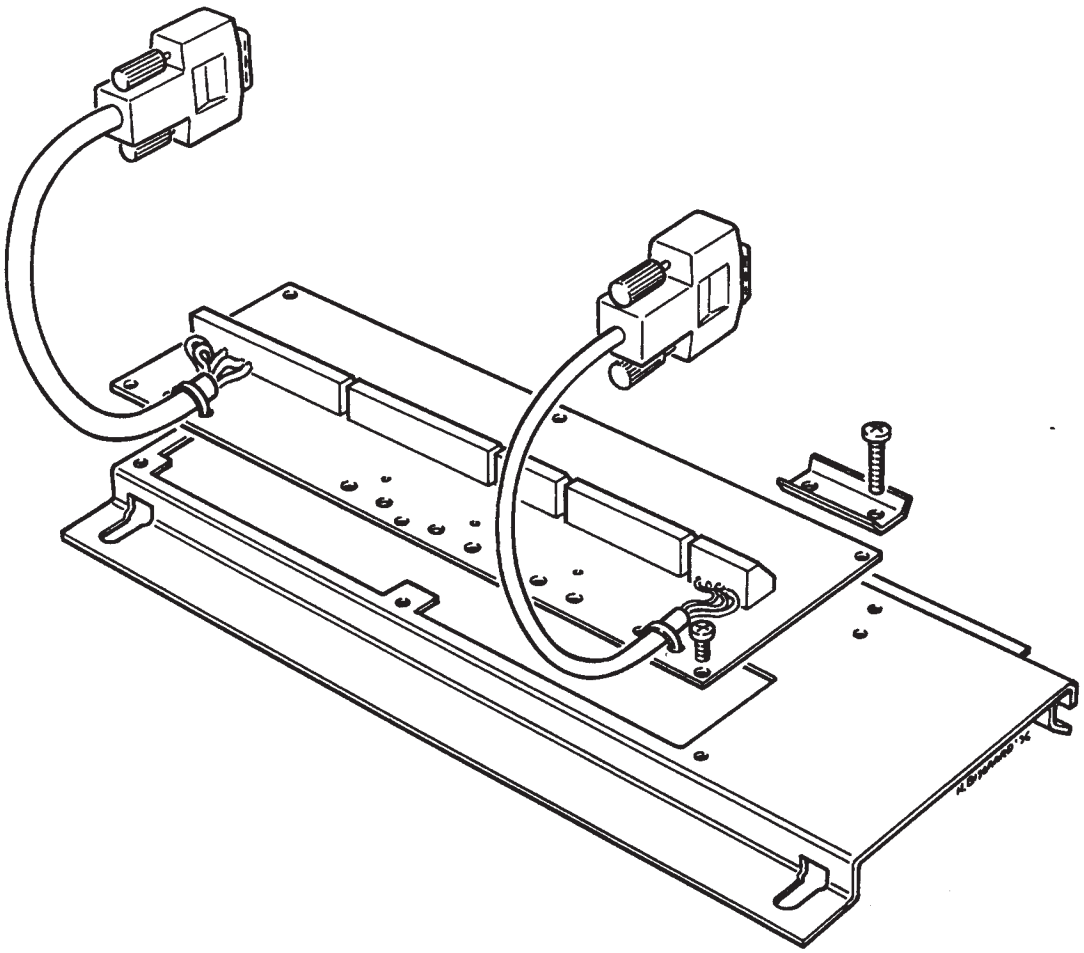


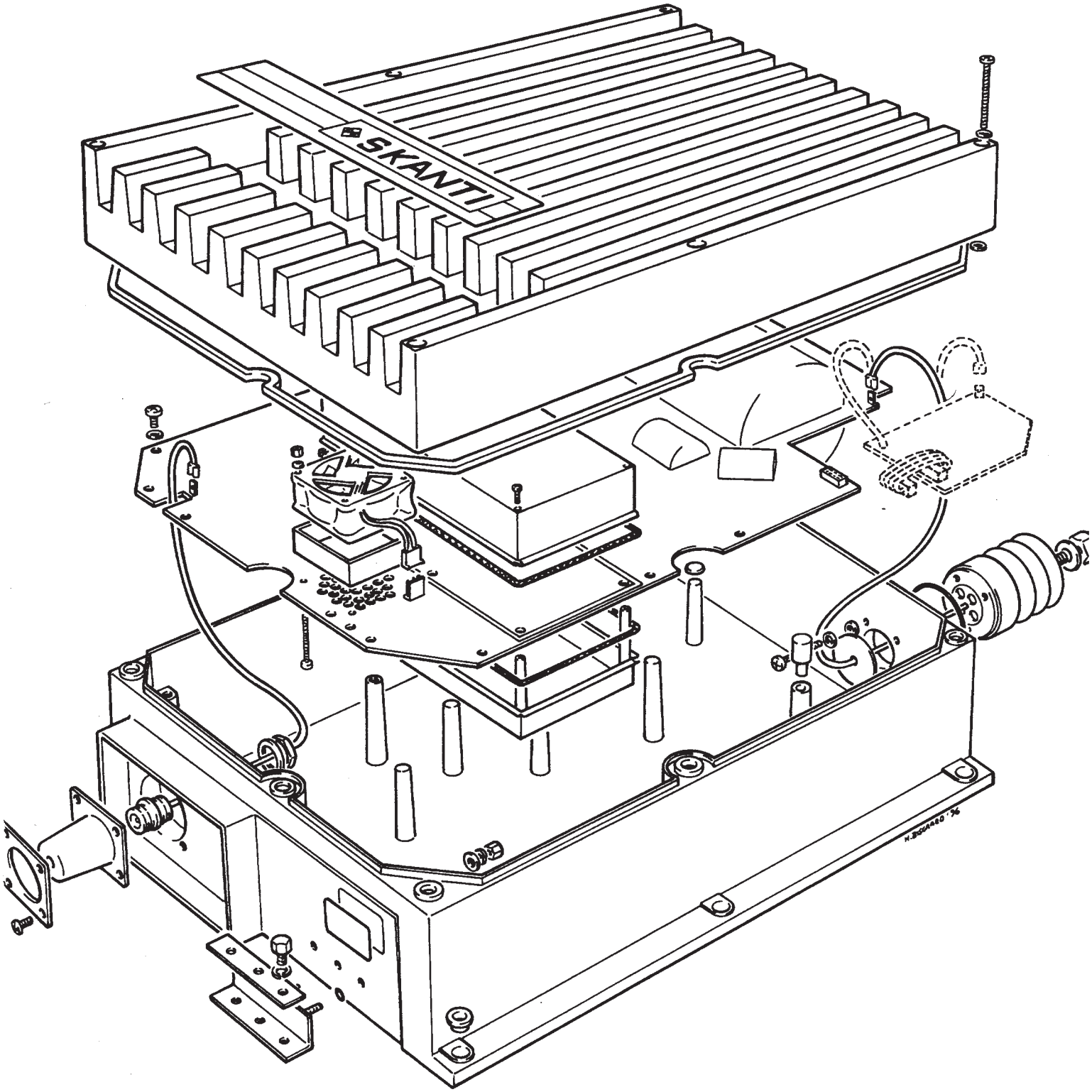






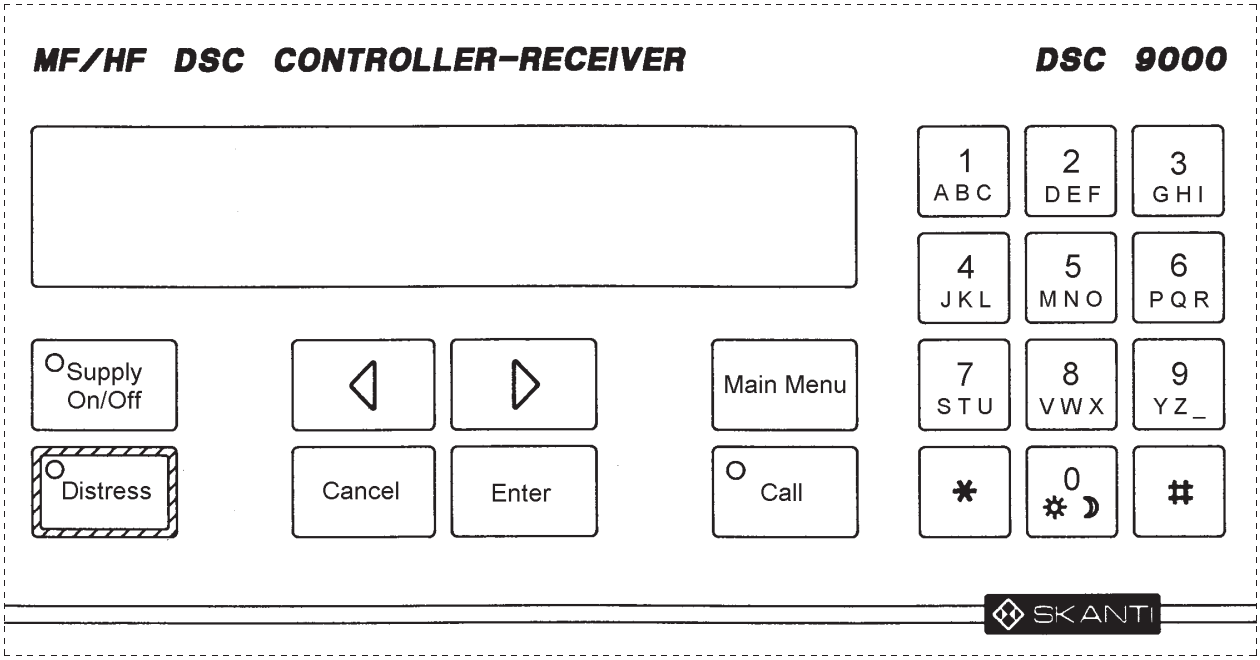





SKANTI

6. DSC OPERATION Table of Contents

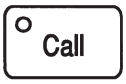
DSC 9000 FRONT PANEL



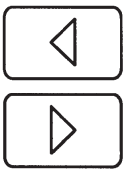
KEYS AND INDICATORS

Switches DSC 9000 on.
Switches DSC 9000 off when pressed for 6 seconds.

Selects DISTRESS mode.
Starts transmission of a distress alert if pressed for 6 seconds.



Selects TX-CALL menu.
Completes a composition of a TX-CALL using the information from the last call in the selected Format.
Starts transmission of a composed call if so is indicated.
Starts transmission of an acknowledgement if a call requiring acknowledgement is displayed.

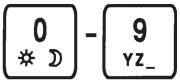


Change the content of a selection field.
Move between commands.
Change list numbers.
Change between numbers and letters in alpha-numeric fields.

Enters the content of a selection or entry field and moves to the next step.
Executes a selected command.

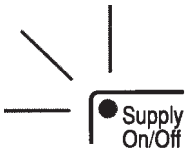
Moves to the previous step.
Deletes the character at the cursor when keying in a value.
Interrupts transmission of a call in progress.
Stops an aural alarm signal.

Selects the MAIN-MENU.



Enter numbers or letters in entry fields.

Switches illumination of display and keyboard backlight between "day" and "night" settings (unless a numeric entry is expected).



Steady green light

Indicates that the supply is on.

Slow flashing red light

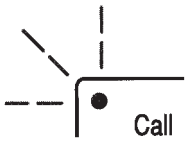
A distress call (distress format or category) has been received . The lamp remains flashing until the call has been read out.

Quick flashing red light

A distress alert will be transmitted if the Distress key is kept pressed for 5 seconds.

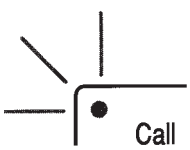
Steady red light

A distress alert transmission is in progress. Distress alert will be automatically retransmitted.



Slow flashing yellow light

A call other than distress has been received. The lamp remains flashing until the call has been read out.



Steady yellow light

Transmission of a call (other than distress) is in progress.

AURAL ALARM SIGNALS

Distress Alarm: User-programmable sound indicating that a distress or urgency call has been received. Remain activated until a key is pressed

Call alarm: User-programmable sound indicating that a call (other than distress or urgency) has been received. Remain activated for 1/4 - 4 minutes (programmable) or until a key is pressed or, for Direct-dial and Selective telephony calls, the handset of the radiotelephone is lifted off-hook.

REMOTE ALARMS

External alarm devices may be connected to DSC 9000 and configurated to be active when

- the aural distress alarm sounds, or
- the aural call alarm sounds, or
- either alarm sounds *), or
- the distress lamp is illuminated and when the aural distress alarm sounds

*)Different on/off patterns so it is possible to distinguish between distress alarm and call alarm.

REMOTE ACTIVATION OF DISTRESS ALERT

An external push button may be connected to the equipment for remote initiation of a distress alert.

The external push button may be combined with a lamp configurated to follow the distress lamp.

The external push button is operated in the same way as the Distress key on DCU 9000. To initiate a distress alert press the push-button for 6 sec (until the distress lamp stops quick-flashing and shows steady light). Then release. If not released within 5 s transmission does not start.

MULTIPLE CONTROL UNITS

Up to 5 DCU 9000 control units may be connected simultaneously to a DU 9000. One of the control units may be given priority (by configuration).

Only one control unit can be *active* at a time while all others are *passive*. When switching on, the control unit on which the SUPPLY ON/OFF button was pressed becomes *active*. After an interruption in external power supply all control units will be *passive*.

If the active control unit is in the MAIN-MENU, STATUS or RX-CALL states or if all control units are passive, the display of a passive control unit shows:

```
STAND-BY

                    >STATUS<
```

If the active control unit is in any other state the display of a passive control unit shows:

```
BUSY
```

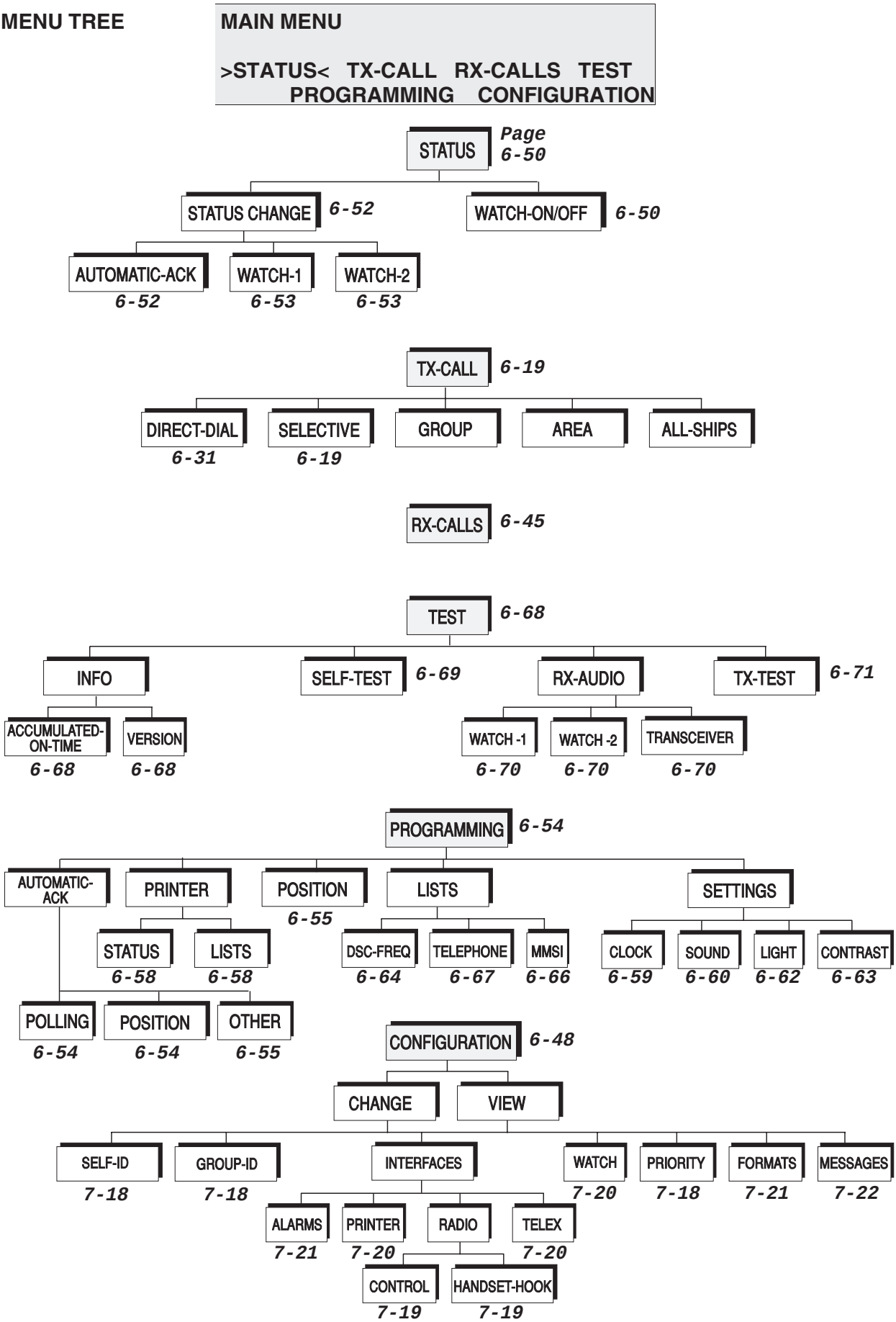
Only a passive control unit with higher priority can interrupt the active control unit in this case.

Only the keys Main Menu , Distress , Call , Enter and 0 ☼ ☽ are functioning on a passive control unit.

An incoming call activates the visual and audible indicators of all control units. Light and sound levels are induvidually adjustable.

The RX-CALL is displayed only on the active control unit.

MENU TREE


MAIN MENU
>STATUS< TX-CALL RX-CALLS TEST
PROGRAMMING CONFIGURATION
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STATUS CHANGE
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RADIO
TELEX
7-20
CONTROL
7-19
HANDSET-HOOK
7-19

DISTRESS ALERT, *INFO*

To edit the Information, release 

immediately.

DISTRESS ALERT

1. Press Distress for 6 seconds.

   The displayed distress alert information will be transmitted when the key is released after the 6 seconds has elapsed.

Example:

DISTRESS
Position: 55 59'N 133 22'W at 1229 UTC
Undesignated distress USB telephony
- Keep pressing 5 sec to send message -

EDITING A DISTRESS ALERT, *INFO*

Position

The position is updated automatically by the ships navigational equipment or it may have been keyed in manually, see PROGRAMMING POSITION.
Automatic updated position information is 'frozen' at the moment the Distress button is pressed and may be corrected manually by selecting >EDIT<.

Nature of Distress

Selectable Options:
- Fire, explosion
- Flooding
- Collision
- Grounding
- Danger of capsizing
- Sinking
- Disabled and adrift
- Undesignated distress
- Abandoning ship

Type of Subsequent Distress Communication

Selectable Options:
- USB telephony
- AM telephony
- FEC telex

EDITING A DISTRESS ALERT

1. Press and release Distress.

2. Accept the **Position** if ok.

   Press Enter.

```
DISTRESS
Position: (55 59'N 133 22'W at 1229 UTC)

      >POSITION OK<   EDIT  UNKNOWN
```

3. Select the **Nature of Distress** using the ◁ ▷ keys.

   Press Enter.

```
DISTRESS
Position:  55 59'N 133 22'W at 1229 UTC
 <Undesignated distress>     USB telephony
 - - Change by [<]  [>] or press [Enter] - -
```

4. Select the **Type of Subsequent Distress Communication** using the ◁ ▷ keys.

   Press Enter.

```
DISTRESS
Position:  55 66'N 133 22'W at 1229 UTC
 Undesignated distress  <USB telephony>
 - - Change by [<]  [>] or press [Enter] - -
```

5. To send on one DSC distress frequency select >SINGLE<.

   Press Enter.

```
DISTRESS
Position:  55 59'N 133 22'W at 1229 UTC
 Undesignated distress   USB telephony
 DSC distress freq:        ALL   >SINGLE<
```

EDITING A DISTRESS ALERT, *INFO*

DSC Distress frequency

If >ALL< is selected, the distress alert will be sent on all six DSC Distress frequencies in turn.

Note:The Frequency is preset to 2187.5 kHz if watch receiver 1 is set to 'Distress watch MF' (DSC 9001).

If a single frequency is selected the Distress Alert will be sent on that frequency 5 times, in each transmission.

EDITING A DISTRESS ALERT Cont'd

6. Select a DSC Distress Frequency using the ◁ ▷ keys.

   Press Enter.

DSC FREQUENCY SELECTION
<97 DISTRESS Tx: 8414.5 Rx: 8414.5 kHZ>

-- Change by [<] [>] or press [Enter] --

7. Press Distress for 6 seconds to transmit the Distress Alert immediately
   or
   press Main Menu to return to the Main Menu.

DISTRESS
Position: 55 59'N 133 22'W at 1229 UTC
Undesignated distress USB telephony
- Press [Distress] 6 sec to send message

SENDING DISTRESS ALERT, *INFO*

If the transmitter is off the light in the distress lamp does not turn into steady light and the last line shows " -- Switch transmitter on --".

If the distress alert was transmitted on a single frequency, the transceiver is set automatically to telephony or telex mode as indicated in the call and to the appropriate distress frequency in the same band as the call.
After 3 minutes, if a single frequency was selected, the last line shows "-Press [Enter] to select DSC frequency-". Another DSC frequency may then be selected and the distress alert repeated on this frequency.
Automatic transmission if [Enter] is not pressed.

SENDING DISTRESS ALERT

1. Press Distress for 6 seconds.
   The Distress key lamp flashes quickly.
   The display shows the Distress Message.

DISTRESS
Position: 55 59'N 133 22'W at 1229 UTC
Undesignated distress USB telephony
- Keep pressing 5 sec to send message -

2. The display shows the remaining number of seconds

DISTRESS
Position: 55 59'N 133 22'W at 1229 UTC
Undesignated distress USB telephony
- Keep pressing 1 sec to send message -

DISTRESS
Position: 55 59'N 133 22'W at 1229 UTC
Undesignated distress USB telephony
---------- Release button ----------

When the time is out the Distress lamp will light steady.

3 Release Distress to start the transmission..

DISTRESS
Position: 55 59'N 133 22'W at 1229 UTC
Undesignated distress USB telephony
------- Tuning transmitter -------
---------- Transmitting ----------

4. The Distress Alert Transmission is automatically repeated at intervals of 3.5 - 4.5 minuttes.

DISTRESS
Position: 55 59'N 133 22'W at 1229 UTC
Undesignated distress USB telephony
- Awaiting acknowledgement -

5. The Distress Alert repetition continues until: the Distress Acknowledgement is received or Cancel is pressed.

RECEIVING DISTRESS ACKNOWLEDGEMENT, *INFO*

If SET UP is entered, the transceiver is set automatically to telephony or telex mode as indicated , and to the appropriate distress and safety frequency in the same band as the acknowledgement call.

END should be entered when communication is completed. The display returns to STATUS display or to RX-CALL if not all received calls have been read out and scanning is resumed on the transceiver if so selected.

The Distress Acknowledgement is an All Ships Call and therefore received not only by the ship in distress.

RECEIVING DISTRESS ACKNOWLEDGEMENT

1. The Distress Acknowledgement is received. The Distress lamp flashes slowly.

   The display shows which station has acknowled the Distress Alert.

   Press Enter.

RX-CALL All ships from: 001234567
Category: Distress Distress ack

Received on 8414.5 kHz > MORE<

2. The display shows the Distress message acknowledged.

DISTRESS-ACKNOWLEDGEMENT TO:123456789
Position: 55 66'N 133 22'W at 1229 UTC
Undesignated distress USB telephony
>SET UP< QUIT

3. Enter SET UP and hook off the Transceiver handset to commence the Distress traffic by telephony.
   The Transceiver is automatically set to the Distress traffic frequency.

DISTRESS-ACKNOWLEDGEMENT TO:123456789
Position: 55 66'N 133 22'W at 1229 UTC
Undesignated distress USB telephony
>END<

4. When communication is completed, enter END.

SENDING DISTRESS RELAY CALL, INFO

To relay a received distress alert please refer to page 2-41

SENDING DISTRESS RELAY CALL

1. Press Call
   Select the format e.g. Selective call.

   Press Enter.

```
TX-CALL   Saved call: Enter number 0-9

 DIRECT-DIAL
>SELECTIVE< GROUP AREA ALL-SHIPS
```

2. Key in the Maritime Mobile Service Identity number of the coast station.

   Press Enter.

```
TX-CALL   Selective      to: (001234567 )

 - Enter maritime mobile service identity -
```

3. Select Distress Category.

   Press Enter.

```
TX-CALL   Selective      to: 001234567
 Category:  <Distress>

 --  Change by [<]    [>] or press [Enter]  --
```

4. Select Distress Relay.

   Press Enter.

```
TX-CALL   Selective      to: 001234567
 Category:  Distress        <Distress relay>

 --  Change by [<]    [>] or press [Enter]  --
```

5. Key in the Maritime Mobile Service Identity of the ship in distress if known.

   Press Enter.

```
DISTRESS-RELAY      Ship: (123456789)

 - Enter maritime mobile service identity -
```

6. Key in the position.

   Press Enter.

```
DISTRESS-RELAY          Ship:123456789
 Position:  55 59'N 133 22'W at 1229 UTC

                    >POSITION-OK<   EDIT
```

SENDING DISTRESS RELAY CALL, INFO

Nature of Distress

Selectable Options:
- Fire, explosion
- Flooding
- Collision
- Grounding
- Danger of capsizing
- Sinking
- Disabled and adrift
- Undesignated distress
- Abandoning ship

Type of Subsequent Distress Communication

Selectable Options:
- USB telephony
- AM telephony
- FEC telex

The distress relay call is automatically transmitted 5 times, total duration approx. 50 sec.

Following transmission of a selective call the receiver is set to the DSC RX frequency and awaits an acknowledgement within 5 minutes.

For All ships, Group or Area calls no acknowledgement is expected. In this case the transceiver is set automatically to telephony or telex mode as indicated in the call and to the appropriate distress and safety frequency in the same band as the call.

SENDING DISTRESS RELAY CALL Cont'd

7. Select the nature of distress.

   Press Enter.

```
DISTRESS-RELAY          Ship:123456789
 Position:  55 59'N 133 22'W at 1229 UTC
<Undesignated distress>
  --  Change by [<]    [>] or press [Enter]  --
```

8. Select the type of subsequent distress communication.

   Press Enter.

```
DISTRESS-RELAY          Ship:123456789
 Position:  55 59'N 133 22'W at 1229 UTC
Undesignated distress <USB telephony>
  --  Change by [<]    [>] or press [Enter]  --
```

9. Press Enter.

```
DISTRESS-RELAY          Ship:123456789
 Position:  55 59'N 133 22'W at 1229 UTC
Undesignated distress   USB telephony
 - Press [Enter] to select DSC frequency -
```

10. Select one of the DSC Distress Frequencies (94-99).

    Press Enter.

```
DSC FREQUENCY SELECTION
<97 DISTRESS Tx:8414.5 Rx:8414.5 kHz>

 --  Change by [<]    [>] or press [Enter]  --
```

11. Press Call to transmit the message.

```
TX-CALL   Selective       to: 001234567
 Category:  Distress      Distress relay

 -  Press [Call] to send on  8414.5 kHz  -
      -------     Tuning transmitter     -------
      -----     Checking for free channel     -----
      -----------     Transmitting     -----------
      ----   Awaiting ack on 8414.5 kHz   ----
```

If no acknowledgement has been received when the time expires, the display shows.

The call may be repeated on another frequency by selecting REPEAT.

```
No acknowledgement received

                          REPEAT  >QUIT<
```

RECEIVING DISTRESS RELAY ACKNOWLEDGEMENT, *INFO*

If SET UP is entered, the appropriate transmitter and receiver are set automatically to telephony or telex mode as indicated in the acknowledgement, and to the appropriate distress and safety frequency in the same band as the acknowledgement call. (If not configurated for automatic control of telex receiver and transmitter, the telephony receiver and transmitter are set to USB at the telephony distress frequency in the same band.)

If the handset is lifted off-hook while the acknowledgement is displayed, the telephony transmitter and receiver are set automatically to the telephony distress and safety frequency in the same band as the acknowledgement call.

END should be entered when communication is completed. The display returns to STATUS or to RX-CALL if not all received calls have been read out and scanning is resumed on the transceiver if so selected.

RECEIVING DISTRESS RELAY ACKNOWLEDGEMENT

1. The Distress Acknowledgement is received. The Distress lamp flashes slowly.

RX-ACKNOWLEDGEMENT from: 001234567
Category: Distress Distress relay

Received on 8414.5 kHz > MORE<

Press Enter.

2. The display shows the Distress relay message acknowledged.

DISTRESS-RELAY Ship:123456789
Position: 55 59'N 133 22'W at 1229 UTC
Undesignated distress USB telephony
>SET UP< QUIT

3. Enter SET UP or hook off the Transceiver handset to commence the Distress traffic by telephony.
The Transceiver is automatically set to the Distress traffic frequency.

DISTRESS-RELAY Ship:123456789
Position: 55 59'N 133 22'W at 1229 UTC
Undesignated distress USB telephony
>END<

4. When communication is completed, enter END.

SENDING A CALL, *INFO*

Note: Some formats may be disabled by configuration.

Categories
Selecable options:

All ships call	Area / Group / Selective
Distress	Distress
Urgency	Urgency
Safety	Safety
	Ship's business
	Routine

Type of subsequent communication / Telecommand.
Selecable options:

USB telephony
FEC telex
ARQ telex

For distresss category additionally:

Distress relay

Note: Telecommands may be added dependent on configuration.

SENDING A CALL

1. Press Call.

TX-CALL Saved call: 0-9

DIRECT-DIAL
>SELECTIVE< GROUP AREA ALL-SHIPS

2. Select the format. e.g. Selective call .

   Press Enter.

3. Key in the Maritime Mobile Service Identity of the station you want to call.

   Press Enter.

TX-CALL Selective to: (001234567)

- Enter maritime mobile service identity -

4. Select the Category.

   Press Enter.

TX-CALL Selective to: 001234567
Category: <Routine>

-- Change by [<] [>] or press [Enter] --

5. Select the type of subsequent communication/telecommand.

   Press Enter.

TX-CALL Selective to: 001234567
Category: Routine < USB telephony>

-- Change by [<] [>] or press [Enter] --

SENDING A CALL, *INFO*

Additional information
When calling a coast station select NONE.
When calling another ship select FERQUENCY and key-in the proposed working frequencies.

Note: Transmission is prevented until the channel is free. This feature may be overruled by pressing Call again.

The duration of an MF/HF DSC call is approx. 10 sec.Following transmission of selective or direct-dial calls the receiver is set to the DSC RX frequency and awaits an acknowledgement within 5 minutes for selective calls and 25 seconds for direct-dial calls.

All ships, group and area calls require no acknowledgement. When the transmission is completed the transceiver is set to the mode and frequencies indicated in the call by pressing ENTER or, for telephony calls, lifting the handset off hook within 1 minute.

END should be entered when communication is completed. For telephony calls just place the handset on-hook. The display returns to STATUS or to RX-CALL if not all received calls have been read out and scanning is resumed on the transceiver if so selected.

SENDING A CALL Cont'd

6. Select the Additional information.
e.g. "NONE"

TX-CALL Selective to: 001234567
Category: Routine USB telephony
Additional information:
>NONE< POSITION FREQUENCY CHANNEL

Press Enter.

TX-CALL Selective to: 001234567
Category: Routine USB telephony

- Press [Enter] to select DSC frequency -

Press Enter.

7. Select the DSC Frequency using the ◁ ▷ keys or by entering a List number.

DSC FREQUENCY SELECTION
<08 NATIONAL Tx: 2159.5 Rx 1624.5>

-- Change by [<] [>] or press [Enter] --

Press Enter.

8. Select SEND.

TX-CALL Selective to: 001234567
Category: Routine USB telephony

DSC Tx: 2159.5 kHz EDIT SAVE >SEND<

Press Enter.

9. Press Call to send the Selective call.

TX-CALL Selective to: 001234567
Category: Routine USB telephony

- Press [Call] to send on 2159.5 kHz -

------- Tuning transmitter -------
----- Checking for free channel -----
---------- Transmitting ----------
---- Awaiting ack on 1624.5 kHz ----

If no acknowledgement has been received when the time expires, the display shows.

No acknowledgement received

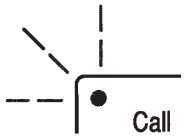
REPEAT >QUIT<

The call may be repeated on the same or another DSC frequency .Further call attempts to the same coast station should be delayed at least 15 minutes, if acknowledge is still not received.

RECEIVING ACKNOWLEDGEMENT, *INFO*

If SET UP is entered the mode and frequency of the transceiver is set as indicated in the call.
If the handset is lifted off-hook while an RX-call indicating telephony mode is displayed, the mode and frequency is set as indicated in the call.
END should be entered when communication is completed. For telephony calls just place the handset on hook. The display returns to STATUS or to RX-CALL if not all received calls have been read out and scanning is resumed on the transceiver if so selected.

RECEIVING ACKNOWLEDGEMENT



1. The Acknowledment is received.
   The Call lamp flashes.

RX-ACKNOWLEDGEMENT from: 001234567
Category: Routine USB telephony
Working freq. Tx: 2076.0 Rx: 1813.0 kHz
>SET UP< QUIT

2. Enter SET UP or hook off the Transceiver handset to commence the communication by telephony.
   The Transceiver is automatically set to the mode and frequencies indicated in the acknowledgement.

RX-ACKNOWLEDGEMENT from: 001234567
Category: Routine USB telephony
Working freq. Tx: 2076.0 Rx: 1813.0 kHz
>END<

3. When communication is completed, enter END.

SENDING A DIRECT-DIAL CALL, *INFO*

Direct-dial calls are used for direct telephone dialling of a land subscriber through an appropriate coast station providing automatic connection with the public switched telephone network.

Note: Not all coast stations provide this service.

To recall a saved call press the short-dial number (0-9).
To repeat a call press the call button.

Alternatively the MMSI list number (0-99) may be entered if the coast station has been programmed into the MMSI list. When Enter is pressed the programmed name of the coast station will be shown next to the 9-digit MMSI number.

Alternatively the telephone list number (0-99) may be entered if the number has been programmed into the telephone list. When Enter is pressed the programmed name of the coast station will be shown next to the telephone number.

The name of the coast station or the country may be used instead of NATIONAL, please refer to page 2-64 PROGRAMMING DSC-FREQUENCY LIST for further information.

SENDING A DIRECT-DIAL CALL

1. Press Call.

```
TX-CALL                          Saved call: 0-9
                                   Repeat: Call
>DIRECT-DIAL<
 SELECTIVE     GROUP     AREA     ALL-SHIP
```

2. Select Direct-dial.

   To edit the call
   Press Enter.

```
TX-CALL   Direct-dial     to: (002192000 )

 - Enter Maritime Mobile Service Identity -
```

3. Key in the Maritime Mobile Service Identity of the coast station.

   Press Enter.

```
TX-CALL   Direct-dial     to: 002192000
Tel:(         42482544)

------      Enter telephone number      ------
```

4. Key in the telephone no. of the land subscriber

   Press Enter.

```
TX-CALL   Direct-dial     to: 002192000
Tel:          42482544

 -- Press [Enter to select DSC frequency--
```

   Press Enter.

```
DSC FREQUENCY SELECTION
 <08  NATIONAL Tx:  2159.5  Rx  1624.5>

 --  Change by [<]    [>] or press [Enter]  --
```

5. Select the DSC frequency of the coast station using the keys or by entering a List number.

   Press Enter.

SENDING A DIRECT-DIAL CALL, *INFO*

To save the call select SAVE and press the Enter button.

Acknowledgement from the coast station is normally received within 25 sec.

If the coast station cannot comply immediately with the call request due to the appropriate working frequencies being busy or for other reasons, this will be indicated in the acknowledgement.

The coast station evaluates the working channel quality during the DSC call. If quality is satisfactory the acknowledgement contains the same working frequencies. The coast station then starts dialling the subscriber.

If the working channel quality evaluation indicates that quality is not satisfactory the coast station may suggest other working frequencies. In this case the DSC calls are repeated on the new working frequencies.

If the working channel quality evaluation again indicates that quality is not satisfactory and no other channels are available the coast station sends an acknowledgement indicating -Cannot use Channel-.

SENDING A DIRECT-DIAL CALL Cont'd

5. Select SEND

Press Enter.

TX-CALL Direct-dial to: 002192000
Tel: 42482544

DSC tx: 2159.5 kHz EDIT SAVE > SEND<

6. Press Call

TX-CALL Direct-dial to: 002192000
Tel: 42482544

-- Press [Call] to send on 2159.5 kHz --
----- Tuning transmitter -----
----- Checking for free channel -----
---------- Transmitting ----------
---- Awaiting ack on 1624.5 kHz ----

When acknowledgement is received and the coast station can comply immediately the call is automatically repeated on the working frequency contained in the acknowledment.

TX-CALL Direct-dial to: 002192000
Tel: 42482544
Working freq. Tx: 2076.0 Rx: 1813.0 kHz
----- Setting-up transceiver -----
--------- Tuning transmitter ---------
---------- Transmitting ----------
---- Awaiting ack on 1813.0 kHz ----

RX-ACKNOWLEDGEMENT from: 002192000
Tel: 42482544 USB telephony
Working freq. Tx: 2076.0 Rx: 1813.0 kHz
Received on 1813.0 kHz >END<

Lift the handset off hook and wait for the called subscriber to answer the telephone

When the call is completed or in case of no answer, place the handset on-hook. An 'End of call' DSC message is then sent to the coast station to stop call timing.

TX-CALL Direct-dial to: 002192000
Tel: 42482544 End of call

--------- Tuning transmitter ---------
---------- Transmitting ----------
---- Awaiting ack on 1813.0 kHz ----

SENDING A DIRECT-DIAL CALL, *INFO*

SENDING A DIRECT-DIAL CALL Cont'd

The acknowledgement from the coast station may contain information on the chargeable duration of the call.

RX-ACKNOWLEDGEMENT from: 002192000
Tel: 42482544 End of call
Duration: 0 hours 6 min 35 sec
>QUIT<

RECEIVING DISTRESS ALERT, *INFO*

If SET UP is entered, the transceiver is set automatically to telephony or telex mode as indicated in the call, and to the appropriate distress and safety frequency in the same band as the call.

If received on an HF Distress frequency ACK is replaced by RELAY.
See page 2-39 for acknowledgeing a Distress Alert and page 2-41 for Relaying a Distress Alert.

END should be entered when communication is completed. The display returns to STATUS or to RX-CALL if not all received calls have been read out and scanning is resumed on the transceiver if so selected.

Note: A Distress Alert may be received on more frequencies.

RECEIVING DISTRESS ALERT

1. A Distress Alert is received.

RX-CALL Distress from: 123456789
Position: 55 59'N 133 22'W at 1229 UTC
Undesignated distress USB telephony
Received on 2187.5 kHz > SET UP< END

2. Enter SET UP. The transceiver is now automatically set to the Distress traffic frequency.

   Hook off the transceiver handset to acknowledge the receipt of the Distress alert by telephony.

RX-CALL Distress from: 123456789
Position: 55 59'N 133 22'W at 1229 UTC
Undesignated distress USB telephony
Received on 2187.5 kHz ACK > END <

3. When communication is completed, enter END.

ACKNOWLEDGING A DISTRESS ALERT, *INFO*

Ships receiving a DSC distress alert from another ship should defer the acknowledgement of the distress alert for a short interval, if the ship is within an area covered by one or more coast stations, in order to give the coast station time to acknowledge the DSC distress alert first.

Start of transmission is automatically delayed until 1 minute has passed since receipt of the Distress Alert. In this periode the displays shows ' Call in progress '.

END should be entered when communication is completed. The display returns to STATUS or to RX-CALL if not all received calls have been read out and scanning is resumed on the transceiver if so selected.

ACKNOWLEDGEING A DISTRESS ALERT

1. A distress alert is received on 2187.5 kHz and SET UP is selected

2. Select ACK.

   Press Enter

```
RX-CALL   Distress      from: 123456789
 Position:  55 59'N 133 22'W at 1229 UTC
 Undesignated distress   USB telephony
 Received on 2187.5 kHz  >ACK<   END
```

3. Select Continue.

   Press Enter

```
 DSC distress acknowledgements are
 normally made by coast stations only.

                    >CONTINUE<  RETURN
```

4. Press Call to transmit the Distress Acknowledgement.

```
DISTRESS-ACKNOWLEDGEMENT TO:987654321
Position:  55 59'N 133 22'W at 1229 UTC
 Undesignated distress   USB telephony
  - Press [Call] to send on 2187.5 kHz -
      -------    Call in progress    -------
      -------  Tuning transmitter    -------
      -----  Checking for free channel  -----
      ----------    Transmitting    ----------
```

5. When communication is completed, enter END.

```
DISTRESS-ACKNOWLEDGEMENT TO:987654321
Position:  55 59'N 133 22'W at 1229 UTC
 Undesignated distress   USB telephony
                              > END <
```

RELAYING A RECEIVED DISTRESS ALERT, *INFO*

The distress relay call is automatically transmitted 5 times.

Regarding receiving distress relay acknowledgement, please refer to page 2-23

RELAYING A RECEIVED DISTRESS ALERT

1. A Distress Alert is received on an HF frequency and SET UP is selected. Select RELAY.

   Press Enter.

```
RX-CALL:  Distress      from:123456789
Position:  55 59'N 133 22'W at 1229 UTC
Undesignated distress   USB telephony
Received on 8414.5 kHz RELAY >END<
```

2. Key in the Maritime Mobile Service Identity number of the coast station.

   Press Enter.

```
TX-CALL   Selective     to: (001234567 )

 - Enter maritime mobile service identity -
```

3. The Distress message is displayed.

   Press Enter.

```
DISTRESS-RELAY          Ship:123456789
Position:  55 59'N 133 22'W at 1229 UTC
Undesignated distress   USB telephony
 - Press [Enter] to select DSC frequency -
```

4. Select the DSC distress frequency using the ◁ ▷ keys.

   Press Enter.

```
DSC FREQUENCY SELECTION
<97 DISTRESS Tx:8414.5 Rx:8414.5 kHz>

 --  Change by [<]    [>] or press [Enter]  --
```

5. Press Call to transmit the message.

```
TX-CALL   Selective     to: 001234567
 Category:  Distress     Distress relay

 -  Press [Call] to send on  8414.5 kHz  -
      -------     Tuning transmitter     -------
      -----     Checking for free channel     -----
      ----------     Transmitting     ----------
      ----   Awaiting ack on 8414.5 kHz   ----
```

RECEIVING DISTRESS RELAY, *INFO*

If SET UP is entered, the transceiver is set automatically to telephony or telex mode as indicated in the call, and to the appropriate distress and safety frequency in the same band as the call.

END should be entered when communication is completed. The display returns to STATUS or to RX-CALL if not all received calls have been read out and scanning is resumed on the transceiver if so selected.

RECEIVING DISTRESS RELAY

1. A Distress Relay is received.

RX-CALL All ships from: 001234567
Category: Distress Distress relay

Received on 8414.5 kHz >MORE<

Press Enter

2. Enter SET UP. The transceiver is now automatically set to the Distress traffic frequency.

DISTRESS-RELAY Ship:123456789
Position: 55 59'N 133 22'W at 1229 UTC
Undesignated distress USB telephony
>SET UP< QUIT

Hook off the transceiver handset to acknowledge the receipt of the call by telephony.

DISTRESS-RELAY Ship:123456789
Position: 55 59'N 133 22'W at 1229 UTC
Undesignated distress USB telephony
> END<

3. When communication is completed, enter END.

RECEIVING A CALL, *INFO*

For calls requiring acknowledgement, please refer to page 2-47.

An incoming call will be displayed immediately if the equipment is in the MAIN-MENU or STATUS states. From other states the display returns to the last received RX-CALL instead of STATUS display if a call has been received.
The visual and audible indicators will signal that a call has been received. The visual indicator remains activated until the call has been read out.

If the call does not contain mode information ACCEPT is omitted.

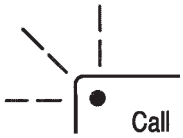
If SET UP is entered the mode and frequency of the transceiver is set as indicated in the call.

END should be entered when communication is completed. The display returns to STATUS or to RX-CALL if not all received calls have been read out and scanning is resumed on the transceiver if so selected.

All-ships, Group and Area calls, not having Distress or Urgency catagory, are considered obsolete when 5 minutes have passed since the reception of the call. The call is then treated as 'read-out'.

RECEIVING A CALL

1. A Call is received.



RX-CALL All ships to: 001234567
Category: Safety USB telephony
Working freq. TX: -----.- RX: 1734.0
Received on 2187.5 kHz >SET UP< QUIT

2. Enter SET UP.
   The transceiver in now automatically set to the mode and frequencies indicated in the call.

RX-CALL All ships to: 001234567
Category: Safety USB telephony
Working freq. TX: -----.- RX: 1734.0
Received on 2187.5 kHz > END<

3. When communication is completed, enter END.

All incomming calls are stored. The store has capacity for storing 20 different Distress calls and 20 different other calls. The oldest call in the group in question is deleted when the capacity is exceeded.

To see the content of the store,

RX-CALLS 1229 UTC 1 JUL 1992
Distress call from: 123456789
Received on 2187.5 kHz
- Change by [<] [>] or [Enter] to view --

press Main Menu **>RX-CALLS<** Enter

 selects next or previous call,

Enter displays the complete call.

SENDING AN ACKNOWLEDGEMENT, *INFO*

Selective calls and Direct-dial calls require acknowledgement.

If the call contains Polling, Ship position, or legal mode and Frequency information, transmission of acknowledgement may be initiated by just pressing [Call]. Steps 2 to 5 are then automatically performed.
If the call is a telephony call the same is obtained by just lifting the handset off hook.

When transmission is completed and if the acknowledgement contains mode information, the transceiver is set to the mode and frequencies indicated in the acknowledgement call by pressing [Enter] or, for telephony calls, lifting the handset off-hook within one minute..

END should be entered when communication is completed. For telephony calls just place the handset on hook. The display returns to STATUS or to RX-CALL if not all received calls have been read out and scanning is resumed on the transceiver if so selected.

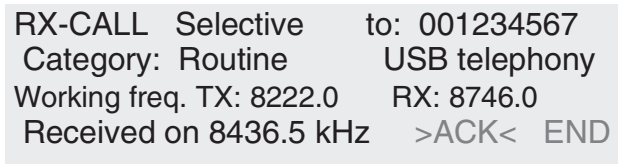
Note: If the call is not acknowledged within 4.5 minutes ACK is replaced by >TX-CALL<. If this is entered the information in the received call is transfered to a TX-CALL.

SENDING AN ACKNOWLEDGEMENT

1. A CALL requiring acknowledgement is received.

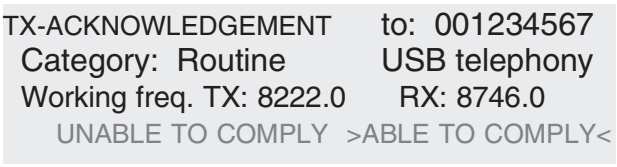
2. Select ACK

   Press Enter



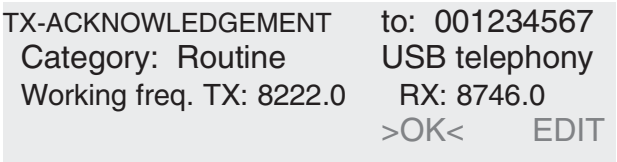
3. Information is transferred from the received call.
   If able to answer the call, select ABLE TO COMPLY

   Press Enter



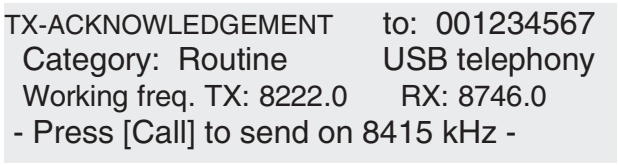
4. If frequencies are ok, select OK

   Press Enter



5. Press Call to send the acknowledgement.

   or
   provided the call is a telephony call:
   Just hook off the Transceiver handset.
   Steps 2 to 5 are then automatically performed.



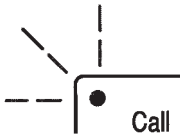
RECEIVING A DIRECT-DIAL CALL, *INFO*

Direct-dial calls are used for direct telephone dialling of the ship by a land subscriber through an appropriate coast station providing automatic connection with the public switched telephone network.

If incomming telephone calls cannot be answered for a period, the automatic acknowledgement status of the DSC 9000 should be changed to 'Unable to comply with telephony calls'. In this case the acknowledgement will contain the message 'Unable to comply', and the coast station will after receipt of that message transmit a busy signal to the calling subscriber.

The coast station evaluates the working channel quality during the DSC call. If quality is satisfactory the acknowledgement contains the same working frequencies. The coast station then starts dialling the subscriber.
If the working channel quality evaluation indicates that quality is not satisfactory the coast station may suggest other working frequencies. In this case the DSC calls are repeated on the new working frequencies.
If the working channel quality evaluation again indicates that quality is not satisfactory and no other channels are available the coast station sends an acknowledgement indicating -Cannot use Channel-.

RECEIVING A DIRECT-DIAL CALL



1. A call is received and an acknowledgement is initiated automatically.

```
TX-ACKNOWLEDGEMENT      to:  002192000
 Tel :  --                  USB telephony
 Working freq. TX: 2076.0    RX: 1813.0
     -------  Tuning transmitter  -------
    -----  Checking for free channel  -----
     -----------  Transmitting  -----------
                                > SET UP <
```

2. Lift handset off-hook
   or
   press Enter
   within one minute.
   A DSC call is then sent on the working frequency.

```
TX-CALL   Direct-dial    to:  002192000
 Tel :  --                  USB telephony
 Working freq. TX: 2076.0    RX: 1813.0
     -------  Setting-up transceiver  -------
      -------  Tuning transmitter  -------
       -----------  Transmitting  -----------
        ----- Awaiting ack on 1813.0 kHz  -----
```

The coast station evaluates channle quality. If satisfactory no acknowledgement is sent and communication with the land subscriber may begin. After 15 sec the bottom line changes to

```
                                > END <
```

When the call is completed place the handset on-hook. An 'End of call' DSC message is sent to the coast station to stop call timing.

```
TX-CALL   Direct-dial    to:  002192000
 Tel :  --                  USB telephony
 Working freq. TX: 2076.0    RX: 1813.0
     -------  Tuning transmitter  -------
    -----  Checking for free channel  -----
     -----------  Transmitting  -----------
      ----- Awaiting ack on 1813.0 kHz  -----
```

The acknowledgement from the coast station may contain information on the chargeable duration of the call.

```
RX-ACKNOWLEDGEMENT      to: 123456789
Tel: --                        End of call
Duration:  0 hours  6 min  35 sec
                                >QUIT<
```

STATUS DISPLAY

Main Menu **>STATUS<** Enter

The STATUS display comes up when power is switched on or when selected from the MAIN-MENU by selecting STATUS and pressing "Enter". The equipment automatically returns to STATUS display after 10 minutes unless an RX-CALL is displayed or if in Distress Transmit mode.

```
STATUS                          1107  UTC
 Distress watch:  2   4   6   8   12   16  MHz
 Calling watch:  08  09  11  17  20
          >WATCH ON/OFF< STATUS CHANGE
```

Status display example.

WATCH ON/OFF is omitted if DSC watch-reciver 2 is an additional DU 9006 configured as a DSC watch receiver.

The STATUS display shows the present status of:

Time
Automatic acknowledgement
DSC watch-receiver 1
DSC watch-receiver 1's watch frequency or frequencies
DSC watch-receiver 2
DSC watch-receiver 2's watch frequency or frequencies

Time (UTC) may be set in the programming menu.

Automatic acknowledgement status:

(Empty)
Aut ack: Unable

The Automatic ack display field is empty if automatic acknowledgement is set to able to comply. May be changed by selecting >STATUS CHANGE<.

DSC watch-receiver 1 status:

Distress watch
Calling watch
none

Watch-receiver 1 is the built-in receiver of DSC 9001/6. Its status is selelected in the configuration menu.

DSC watch-receiver 1 frequency status:

Distress watch MF	2187.5 kHz
Distress watch MF/HF	2, 4, 6, 8, 12, 16 MHz (DSC 9006 only,example)
Calling watch	08, 09, 10, 11, 17, 20 (DSC 9006 only,example)

Shows the frequency(ies) watched by watch-receiver 1.
Calling watch frequencies may be changed by selecting >STATUS CHANGE<.

DSC watch-receiver 2 status:

Distress watch
Calling watch
none

Watch-receiver 2 is either the receiver of the associated MF/HF transceiver (WATCH ON/OFF displayed) or an additional DU 9006 configured as a DSC watch receiver (continuously on). Its status is selelected in the configuration menu.

Note: The STATUS line is empty if 'None' is selected by configuration.

DSC watch-receiver 2 frequency status:

Distress watch MF	2187.5 kHz
Distress watch MF/HF	2, 4, 6, 8, 12, 16 MHz (example)
Calling watch	08, 09, 10, 11, 17, 20 (example)

Shows the frequency(ies) watched by watch-receiver 2.
Shows 'Off' if the receiver is switched off.
Calling watch frequencies may be changed by selecting >STATUS CHANGE<.
Watch on the associated MH/HF transceiver may be interrupted/restarted by selecting >WATCH ON/OFF<.

CHANGE STATUS

Main Menu **>STATUS<** Enter **>STATUS CHANGE<** Enter

The change status menu allows sellection of:

Automatic acknowledgement
DSC watch-receiver 1's watch frequencies
DSC watch-receiver 2's watch frequencies

Automatic acknowledgement may be set to
Able to comply
Unable to comply with telephony calls

For 'Unable to comply with telephony calls' the reason may be set to

- No reason given
- Congestion
- Station barred
- No operator
- Temporarily no operator
- Equipment disabled

When set to 'Unable to comply with telephony calls' automatic acknowledgement transmissions in response to calls containing a telephony telecommand will contain 'Unable to comply' and the additional message selected.

Automatic acknowledgement transmission takes place only if enabled by automatic ack programming. Automatic acknowledgement of direct-dial calls takes place if Direct-dial format is enabled by configuration. If Direct-dial format is enabled automatic ack of polling calls from coast stations is automatically enabled.

Automatic acknowledgement transmissions does not take place if the handset is off-hook or the equipment is not in STATUS, MAIN-MENU, or RX-CALL state.

Automatic acknowledgement transmissions does not take place if the call is received with error or has distress category.

DSC watch-receiver frequency may be changed as follows:

Distress watch	No change possible.
Calling watch	Frequencies may be selected from the DSC frequency list. The arrow keys will switch between the selected frequency numbers. The Enter key will display the frequencies selected and the arrow keys wil now move between the frequencies of the DSC frequency list or a list number may be entered. Pressing Enter will select the displayed frequency pair.

PROGRAMMING: AUTOMATIC ACKNOWLEDGEMENT

Main Menu >PROGRAMMING< Enter >AUTOMATIC-ACK< Enter

Polling calls

press Enter.

```
PROGRAMMING Automatic acknowledgement

          >POLLING<  POSITION  OTHER
```

Select between:
Off
All stations
Specific stations only

```
PROGRAMMING       Aut ack of polling calls
< Specific stations only>

 --  Change by [<]  [>] or press [Enter]  --
```

press Enter

If 'Specific stations only' is selected, enter the MMSI number of the stations.

```
PROGRAMMING       Aut ack of polling calls
 Specific stations only      (002191000)
                             (          _ )
  --  Enter MMSI;  use # for any digit  --
```

press Enter

Position calls

press Enter.

```
PROGRAMMING Automatic acknowledgement

          POLLING  >POSITION<  OTHER
```

Select between:
Off
All stations
Specific stations only

```
PROGRAMMING       Aut ack of position calls
< Specific stations only>

 --  Change by [<]  [>] or press [Enter]  --
```

press Enter

If 'Specific stations only' is selected, enter the MMSI number of the stations.

press Enter

```
PROGRAMMING        Aut ack of position calls
Specific stations only      (002191000)
                                (          _ )
 --  Enter MMSI;  use # for any digit  --
```

Other calls

press Enter.

```
PROGRAMMING Automatic acknowledgement


          POLLING   POSITION  > OTHER<
```

Select between: Off
All stations
Specific stations only

press Enter

```
PROGRAMMING          Aut ack of other calls
< Specific stations only>

 --  Change by [<]  [>] or press [Enter]  --
```

If 'Specific stations only' is selected, enter the MMSI number of the stations.

press Enter

```
PROGRAMMING          Aut ack of other calls
Specific stations only      (002191000)
                                (          _ )
 --  Enter MMSI;  use # for any digit  --
```

PROGRAMMING: POSITION

Main Menu >PROGRAMMING< Enter >POSITION< Enter

Automatic updating

If automatic updating from the NMEA input is used the actual position is displayed, Enter will return to the STATUS display
If not automatically updated, the DSC 9000 should be regularly updated manually in order to be able to receive Area calls correctly.

Manual updating

Select >EDIT< .

Press Enter.

```
PROGRAMMING                    Position
  55  59 ' N  133  20' W  at  1229  UTC

                              OK   > EDIT<
```

Enter the latitude.

Press Enter

```
PROGRAMMING                    Position
     (55  59 ')              '  at     UTC

----------------- Enter latitude -------------------
```

Select S or N using an arrow key.

Press Enter

```
PROGRAMMING                    Position
     55  59 ' <N>           '  at     UTC

--  Change by [<]  [>] or press [Enter]  --
```

Enter the longtitude.

Press Enter

```
PROGRAMMING                    Position
     55  59 ' N  (133  20')    at     UTC

---------------- Enter longtitude ------------------
```

Select E or W using an arrow key.

Press Enter

```
PROGRAMMING                    Position
  55  59 ' N  133  20' <W>  at     UTC

--  Change by [<]  [>] or press [Enter]  --
```

Enter the time.

Press Enter

```
PROGRAMMING                    Position
  55  59 ' N  133  20' W   at (1229) UTC

  ---    Enter the time of the position    ---
```

Press Enter to return to the STATUS display.

```
PROGRAMMING                    Position
  55  59 ' N  133  20' W   at  1229  UTC

                                  >END<
```

If more than 12 hours have elapsed since the last updating, the time will be deleted.

PROGRAMMING: PRINTER

Printer Status

Main Menu >PROGRAMMING< Enter >PRINTER< Enter >STATUS< Enter

The **Printer Status** menu allows selection of:

Print all calls
Print all distress and safety calls
Print all RX calls
Print distress and safety RX calls
Print all RX calls with symbols
No print-out

The arrow key switches beween the above options and Enter selects the displayed option and returns to STATUS menu.

Print Lists

Main Menu >PROGRAMMING< Enter >PRINTER< Enter >LISTS< Enter

The **Print Lists** menu allows selection of:

Print short-dial list
Print DSC frequency list
Print Channel list
Print MMSI number list
Print telephone list
Print configuration settings

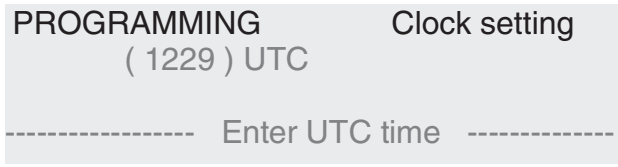
The arrow key switches beween the above options and Enter selects the displayed option, starts print-out and returns to STATUS menu.

PROGRAMMING: CLOCK SETTING

Main Menu >PROGRAMMING< Enter >SETTINGS< Enter >CLOCK< Enter

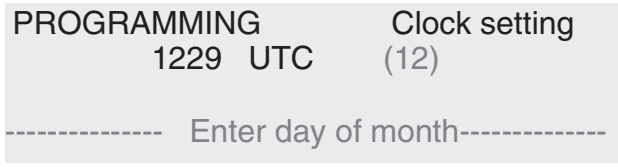
Enter the UTC time

Press Enter



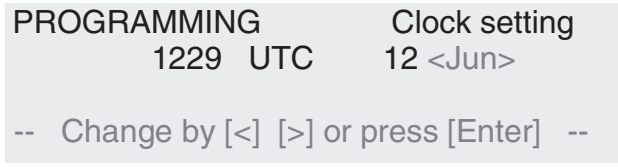
Enter the day of month

Press Enter



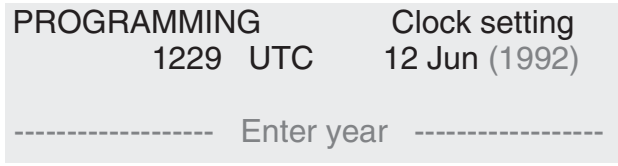
Select the month using an arrow key

Press Enter

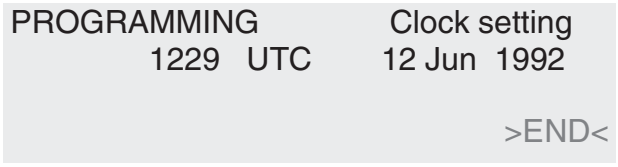


Enter the year

Press Enter



Press Enter to return to the STATUS display.



PROGRAMMING: SOUND SETTING

Main Menu >PROGRAMMING< Enter >SETTINGS< Enter >SOUND< Enter

Distress-alarm sound

>DISTRESS-ALARM< Enter

Select sound type A or B using an arrow key.

Press Enter

```
PROGRAMMING     Distress-alarm sound
     Type <A >      Volume  *****. . .

--  Change by [<]  [>] or press [Enter]  --
```

Select the volume level using the arrow keys.

Press Enter

```
PROGRAMMING     Distress-alarm sound
     Type A         < Volume  **. . . . . .>

--  Change by [<]  [>] or press [Enter]  --
```

Press Enter to return to the STATUS display.
>CHANGE< will return to the beginning of distress-alarm sound programming.
>TEST< will generate the selected sound in the loudspeaker.

```
PROGRAMMING     Distress-alarm sound
     Type A          Volume  **. . . . . .

                  CHANGE  TEST  >END<
```

Call-alarm sound

>CALL-ALARM< Enter

Select for how long the call-alarm shall last using the arrow keys.

Press Enter

```
PROGRAMMING          Call-alarm sound
Duration <.5>  Type      Volume  *****. . .

--  Change by [<]  [>] or press [Enter]  --
```

Select sound type C or D using an arrow key.

Press Enter

```
PROGRAMMING          Call-alarm sound
Duration .5   Type <C>   Volume  *****. . .

--  Change by [<]  [>] or press [Enter]  --
```

Select the volume level using the arrow keys.

Press Enter

```
PROGRAMMING        Call-alarm sound
Duration .5    Type C  < Volume**. . . . . .>
```

Press Enter to return to the STATUS display.
>CHANGE< will return to the beginning of call-alarm sound programming.
>TEST< will generate the selected sound in the loudspeaker.

```
PROGRAMMING        Call-alarm sound
Duration .5    Type C   Volume  **. . . . . .

                              CHANGE  TEST  >END<
```

Key-beep sound

>KEY-BEEP< Enter

Select the volume level using the arrow keys.

Press Enter to return to the STATUS display.

```
PROGRAMMING        Key-beep sound
     Illegal key volume  < Volume**. . . . . .>

--  Change by [<]  [>] or press [Enter]   --
```

PROGRAMMING: LIGHT SETTING

Main Menu >PROGRAMMING< Enter >SETTINGS< Enter >LIGHT< Enter

Select the "Day" setting for the display backlight using the arrow keys.

Press Enter

```
PROGRAMMING    Backlight      Indicators
Day:           <******. .>    ******. .
Night:         **.....        ***.....
-- Change by [<]  [>] or press [Enter]  --
```

Select the "Day" setting for the indicators using the arrow keys.

Press Enter

```
PROGRAMMING    Backlight      Indicators
Day:           ******. .      <******. .>
Night:         **.....        ***.....
-- Change by [<]  [>] or press [Enter]  --
```

Select the "Night" setting for the display backlight using the arrow keys.

Press Enter

```
PROGRAMMING    Backlight      Indicators
Day:           ******. .      ******. .
Night:         <**.....>      ***.....
-- Change by [<]  [>] or press [Enter]  --
```

Select the "Night" setting for the indicators using the arrow keys.

Press Enter to return to the STATUS display.

```
PROGRAMMING    Backlight      Indicators
Day:           ******. .      ******. .
Night:         **.....        <***.....>
-- Change by [<]  [>] or press [Enter]  --
```

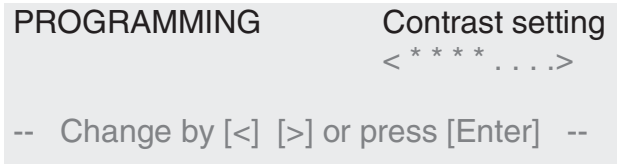
The light in the Distress and Call indicators cannot be reduced completely.

PROGRAMMING: CONTRAST SETTING

Main Menu **>PROGRAMMING<** Enter **>SETTINGS<** Enter **>CONTRAST<** Enter

Select the contrast setting using the arrow keys.

Press Enter to return to the STATUS display.



PROGRAMMING: DSC-FREQUENCY LIST

Main Menu >PROGRAMMING< Enter >LISTS< Enter >DSC-FREQ< Enter

The DSC-frequency list is pre-programmed but can be changed as described below.

Use the arrow key to change between the DSC-frequency numbers or enter the DSC-frequency number of the the frequency pair that you want to change and press Enter

PROGRAMMING DSC frequency list
<01 NATIONAL TX: 2156.0 RX: 1621.0 kHz>

-- Change by [<] [>] or press [Enter] --

Press Enter to edit the displayed frequency pair.

Enter a name for this frequency number.

Press Enter

PROGRAMMING DSC frequency list
01 (NATIONAL) TX: 2156.0 RX: 1621.0 kHz

---------- Enter name ----------

Enter the DSC transmit frequency.

Press Enter

PROGRAMMING DSC frequency list
01 NATIONAL (TX: 2156.0) RX: 1621.0 kHz

---- Enter own DSC transmit frequency ----

Enter the DSC receive frequency.

Press Enter

PROGRAMMING DSC frequency list
01 NATIONAL TX: 2156.0 (RX: 1621.0) kHz

---- Enter own DSC receive frequency ----

If all fields are empty or "0" the number is deleted from the list.
The distress and safety frequencies (94-99) cannot be edited.
The pre-programmed DSC frequency list is printed on the next page.

PRE-PROGRAMMED DSC FREQUENCIES

01	NATIONAL	Tx:	2156.0	Rx:	1621.0 kHz
02	NATIONAL		2156.5		1621.5
03	NATIONAL		2157.0		1622.0
04	NATIONAL		2157.5		1622.5
05	NATIONAL		2158.0		1623.0
06	NATIONAL		2158.5		1623.5
07	NATIONAL		2159.0		1624.0
08	NATIONAL		2159.5		1624.5
09	SHIP		2177.0		2177.0
10	INTER		2189.5		2177.0
11	INTER 1		4208.0		4219.5
12	INTER 2		4208.5		4220.0
13	INTER 3		4209.0		4220.5
14	INTER 1		6312.5		6331.0
15	INTER 2		6313.0		6331.5
16	INTER 3		6313.5		6332.0
17	INTER 1		8415.0		8436.5
18	INTER 2		8415.5		8437.0
19	INTER 3		8416.0		8437.5
20	INTER 1		12577.5		12657.0
21	INTER 2		12578.0		12657.5
22	INTER 3		12578.5		12658.0
23	INTER 1		16805.0		16903.0
24	INTER 2		16805.5		16903.5
25	INTER 3		16806.0		16904.0
26	INTER 1		18898.5		19703.5
27	INTER 2		18899.0		19704.0
28	INTER 3		18899.5		19704.5
29	INTER 1		22374.5		22444.0
30	INTER 2		22375.0		22444.5
31	INTER 3		22375.5		22445.0
32	INTER 1		25208.5		26121.0
33	INTER 2		25209.0		26121.5
34	INTER 3		25209.5		26122.0
35	INTER		458.5		455.5
94	DISTRESS		2187.5		2187.5
95	DISTRESS		4207.5		4207.5
96	DISTRESS		6312.0		6312.0
97	DISTRESS		8414.5		8414.5
98	DISTRESS		12577.0		12577.0
99	DISTRESS		16804.5		16804.5

PROGRAMMING: MMSI LIST

Main Menu >PROGRAMMING< Enter >LISTS< Enter >MMSI< Enter

Use the arrow key to change between the MMSI list numbers or enter the MMSI list number that you want to program and press Enter

```
PROGRAMMING                    MMSI list
<01   Name: LYNGBY    MMSI: 002191000>

--  Change by [<]  [>] or press [Enter]  --
```

Press Enter to edit the displayed MMSI list number.

Enter a name for the vessel or coast station.

Press Enter

```
PROGRAMMING                    MMSI list
01   Name: (LYNGBY)    MMSI: 002191000

----------  Enter name  ----------
```

Enter the MMSI number of the vessel or coast station.

Press Enter

```
PROGRAMMING                    MMSI list
01   Name: LYNGBY    MMSI: (002191000)

- Enter maritime mobile service identity -
```

If all fields are empty or "0" the number is deleted from the list.

Either the nine-digit MMSI number or the MMSI list number (0-99) may be entered when composing a TX-CALL.

When [Enter] is pressed the name and the nine-digit MMSI number is displayed.

When entering an unprogrammed list number the illegal-key sound is given and the number is deleted.

If, when receiving a call, the MMSI number of the calling station is found in the MMSI list, the name of the station will be displayed along with the nine-digit MMSI number.

PROGRAMMING: TELEPHONE LIST

Main Menu >PROGRAMMING< Enter >LISTS< Enter >TELEPHONE< Enter

Use the arrow key to change between the telephone list numbers or enter the telephone list number that you want to program and press Enter

```
PROGRAMMING          Telephone list
<01        4542482544          SKANTI>

--  Change by [<]  [>] or press [Enter]  --
```

Press Enter to edit the displayed telephone list number.

Enter the telephone number.

Press Enter

```
PROGRAMMING          Telephone list
01        (4542482544)          SKANTI

------  Enter telephone number  ------
```

Enter the name of the subscriber.

Press Enter

```
PROGRAMMING          Telephone list
01        4542482544          (     SKANTI)

----------  Enter name  ----------
```

If all fields are empty or "0" the number is deleted from the list.

Either the telephone number or the telephone list number (1-99) may be entered when composing a Direct-dial call.

When [Enter] is pressed the telephone number and the name is displayed.

When entering an unprogrammed list number the illegal-key sound is given and the number is deleted.

TEST: INFO

Main Menu >TEST< Enter >INFO< Enter

Accumulated ON-time

>ACCUMULATED-ON-TIME< Enter

The number of operating hours is displayed.

Press Enter to return to the STATUS display.

```
TEST                    Accumulated ON-time
 Operating hours:  128

                                   >END<
```

Version

>VERSION< Enter

```
TEST                                Version


                                DCU  > DU <
```

> DCU < Enter

The program version and date for DCU is displayed.

```
TEST                                Version
 DCU program: 01.07.00      Date: 930621

                                   >END<
```

Press Enter to return to the STATUS display.

The program version and date is displayed if selecting DU.
If an additional DU is connected the program version and date for both units are shown. DU 2 denotes the additional unit.

TEST: SELF-TEST

Main Menu >TEST< Enter >SELF-TEST< Enter

The test starts immediately and will continue until all test are completed and found ok.

Press Enter to end the test and return to status display.

```
TEST                    Automatic Self-test
Completed               19 steps ok
                        0 bypassed
                        0 failed        >END<
```

If a test fails the self-test will stop and display: test step no.
name of the failing test
error code

```
TEST                    Automatic Self-test
03  Synthesizer test:                Failed

Error code: 0301        >CONTINUE< END
```

Press Enter to continue.

If any the self test will stop on the next failure.

Press Enter to continue.

```
TEST                    Automatic Self-test
04  Synthesizer test:                Failed

Error code: 0411        >CONTINUE< END
```

When all test are completed a test status is displayed.

Press Enter to end the test and return to status display.

```
TEST                    Automatic Self-test
Completed               19 steps ok
                        0 bypassed
                        2 failed        >END<
```

The error code consists of step number (2 digits), indication of previous faults (1 digit: 0=no, 1=yes) and failure type (1 digit).

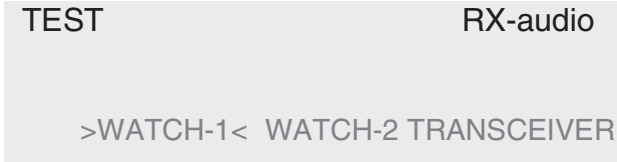
If an additional DU is connected a selftest on that is included in the sequence. The display will indicate that DU 2 is tested.

TEST: RX-AUDIO

Main Menu >**TEST**< Enter >**RX-AUDIO**< Enter

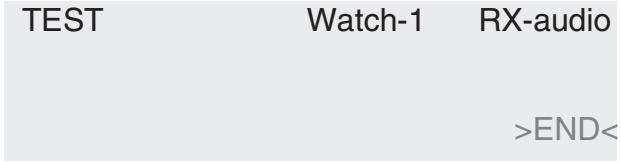
Select which receiver to test using the arrow keys.

Press Enter to performe the audio test.



Adjust the volume level using the arrow keys.

Press Enter to end the test and return to the status display.



TEST: TX-TEST

Main Menu >**TEST**< Enter >**TX-TEST**< Enter

A message of warning is displayed.

Press Enter to continue with the test.

```
TEST                                  TX-test
      A test message is transmitted on a
        distress frequency in this test
                          >CONTINUE<     END
```

Enter the MMSI number of the coast station to receive the test call.

Press Enter .

```
TX-CALL       Selective     to: (00123456)

-Enter the maritime mobile service identity-
```

Press Enter to select the DSC frequency.

```
TX-CALL       Selective     to: ( 00123456)

- Press [Enter] to select DSC frequency -
```

Select a DSC distress frequency using the arrow keys.

Press Enter.

```
DSC FREQUENCY SELECTION
<94  DISTRESS Tx:  2187.5  Rx  2187.5>

 --  Change by [<]    [>] or press [Enter]  --
```

Press Call to transmit the test.

```
 TX-CALL       Selective     to:  00123456
Category: Safety                        Test

-  Press [Call] to send on 2187.5 kHz  -
       -------     Tuning transmitter     -------
        -----     Checking for free channel     -----
         -----------        Transmitting        -----------
          ----   Awaiting ack on 2187.5 kHz   ----
```

Press Enter to return to status display.

```
RX-ACKNOLEDGEMENT from:  00123456
Category: Safety                        Test
No additional information
 Received on 2187.5 kHz                >END<
```

7. DSC INSTALLATION Table of Contents

DESCRIPTION

General

Correct installation of the DSC 9000 is important for maximum performance and reliability. This chapter provides specific information about the installation of each unit, their interconnection and connection to other equipment.

Mounting the Units

DCU 9000 Control Unit

The DCU 9000 control unit is adaptable to a variety of mounting methods and should be placed with convenient operation in mind. It is installed separately with or without the mounting bracket.

DCU 9000 with Mounting Bracket

The mounting bracket (fig. 5 at page 7-4) is used for table mounting of the DCU 9000, and may also be used for bulkhead and console mounting as shown in fig.6 at page 7-5 and fig.7 at page 7-6. Fig.7 shows how the mounting bracket may be installed behind a bulkhead or a console panel for low profile mounting. Fig.8a and 8b at page 7-7 and fig.9a and 9b at page 7-8 shows how flush mounting may be obtained and gives the dimensions for the necessary hardware.

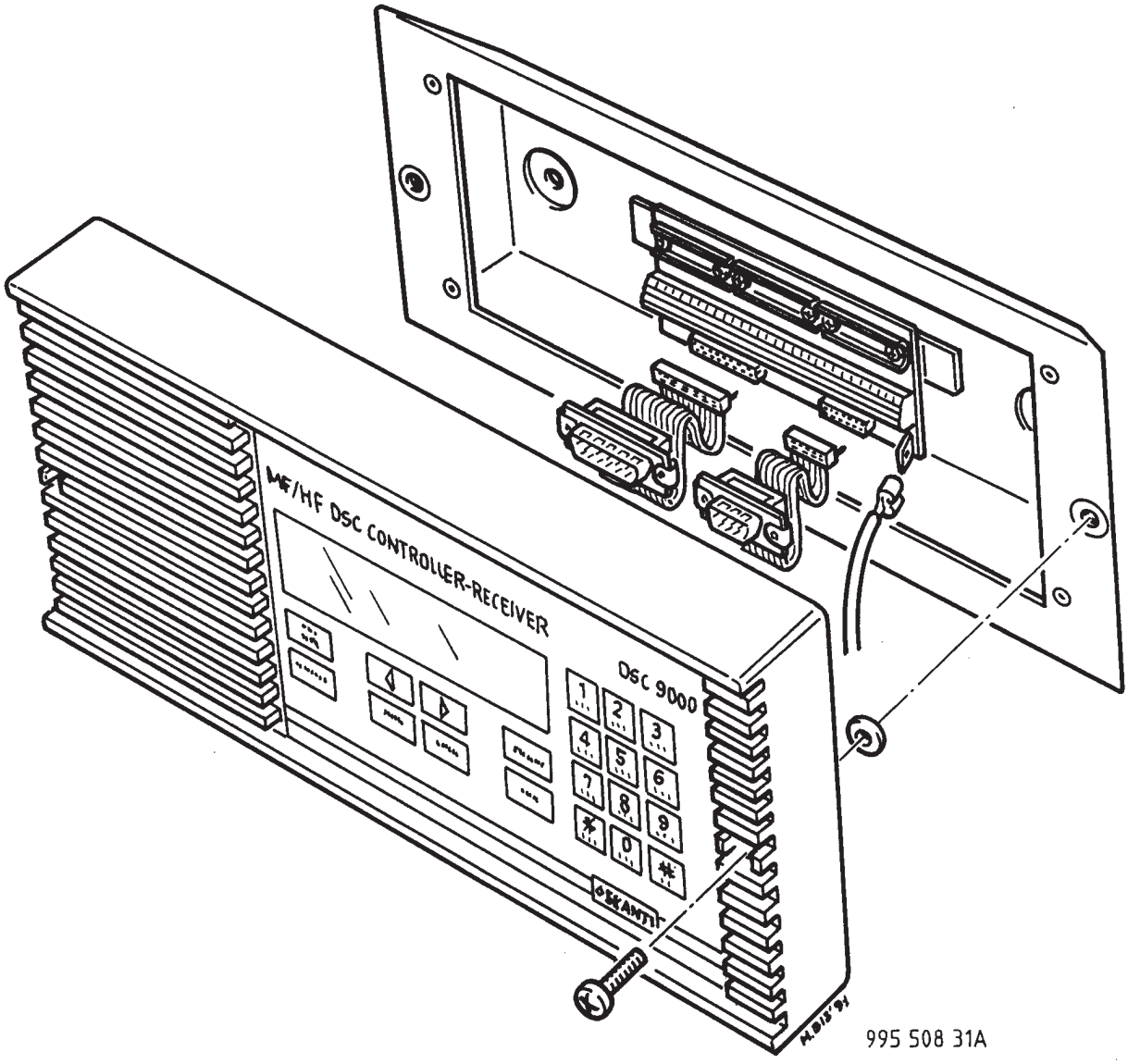
External connections to the DCU 9000 are made to the terminal strips of the mounting bracket. For top side cable entry the Terminal Board may be dismantled and turned 180 degrees as illustrated in fig.10b at page 7-9.

DCU 9000 without Mounting Bracket

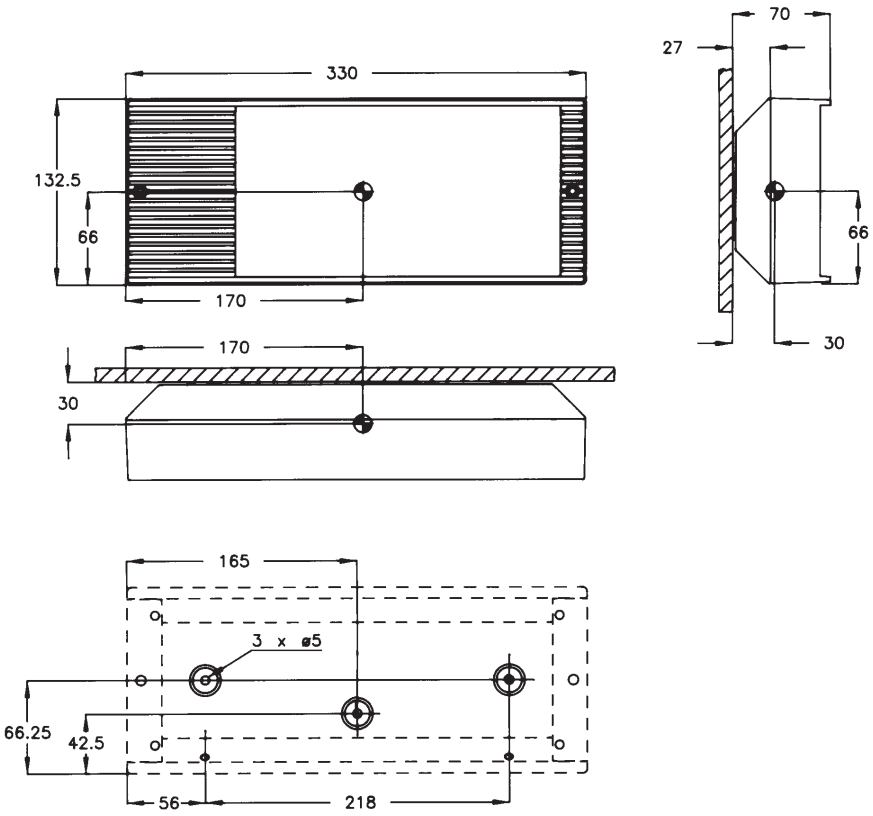
The DCU 9000 without mounting bracket may be bulkhead or console mounted as shown in fig.11 at page 7-10. Fig.12a and 12b at page 7-11 shows how flush mounting may be obtained and gives the dimensions for the necessary hardware.

External connections to the DCU 9000 are made to the connectors at the back of the unit as illustrated in fig.13 at page 7-12.

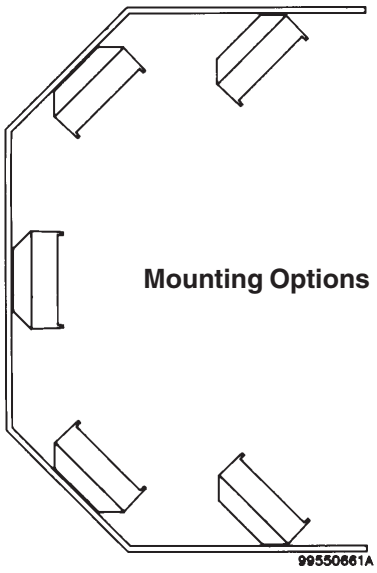
DCU 9000 WITH MOUNTING BRACKET
Fig.5



DCU 9000 INSTALLATION WITH MOUNTING BRACKET
Fig.6

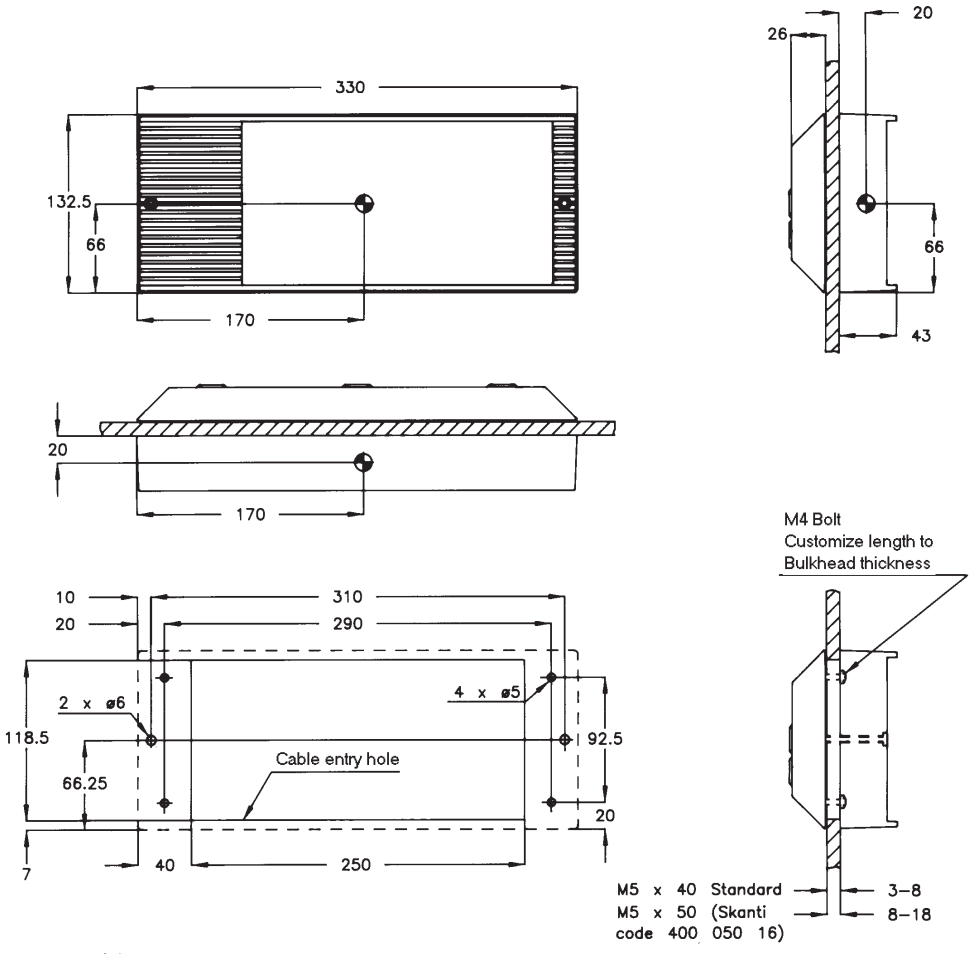


1) Space for cable entry min. 50

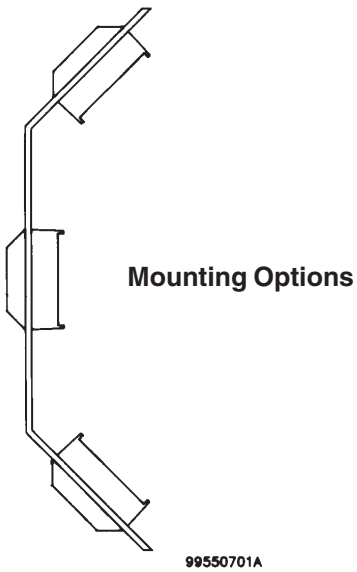


Dimensions are in mm
Tolerance: +/- 1 mm
Centre of Gravity
Weight: DCU 1.2 Kg
Weight: Mounting Bracket 0.7 Kg

DCU 9000 INSTALLATION WITH MOUNTING BRACKET
"LOW PROFILE MOUNTING" Fig.7



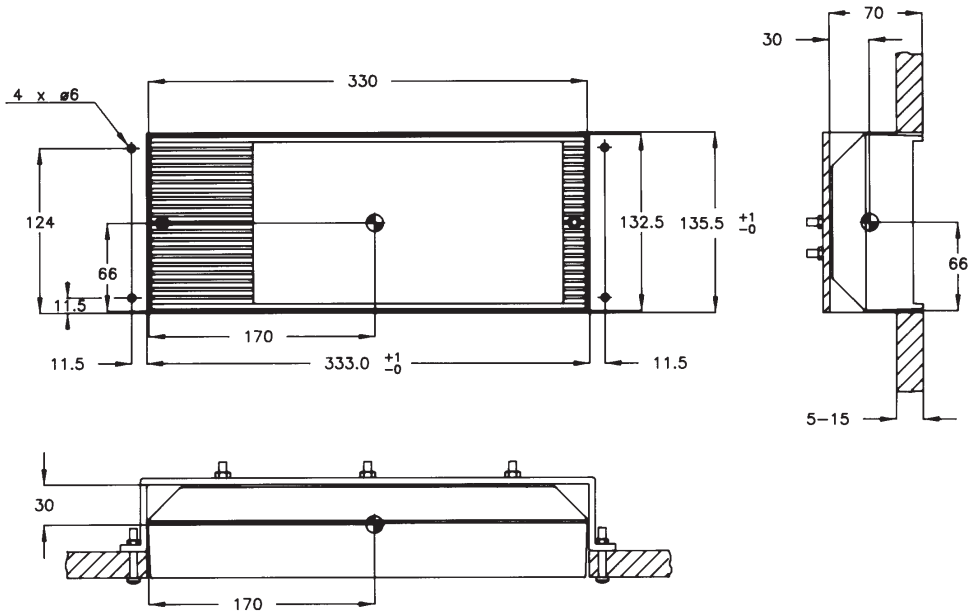
1) Space for cable entry min. 50



Mounting Options

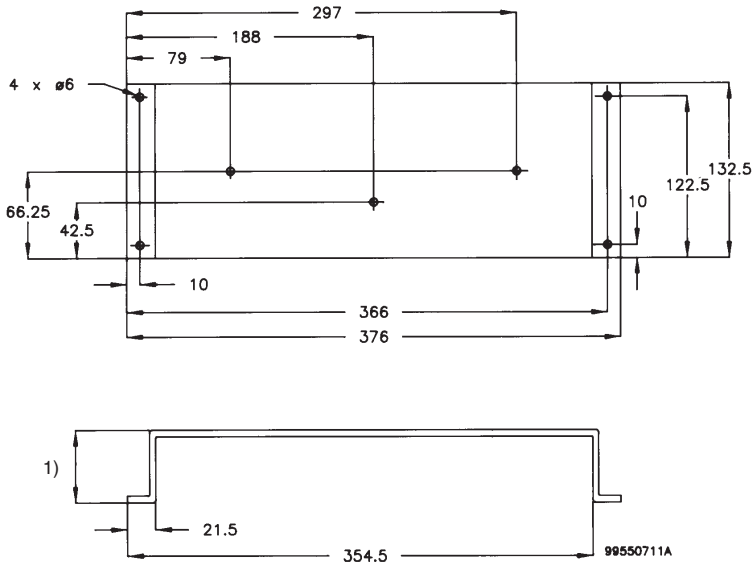
Dimensions are in mm
Tolerance: +/- 1 mm
Centre of Gravity
Weight: DCU 1.2 Kg
Weight: Mounting Bracket 0.7 Kg

DCU 9000 INSTALLATION WITH MOUNTING BRACKET "FLUSH MOUNTING" Fig.8a



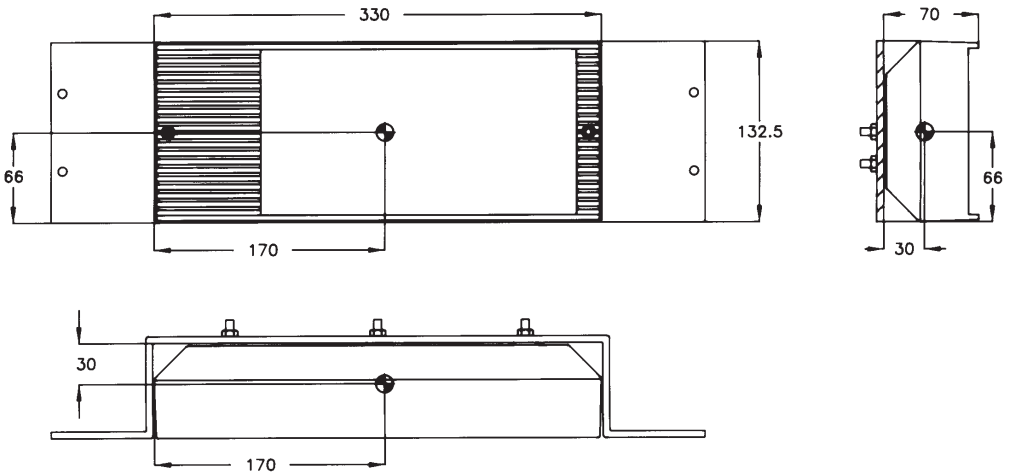
Dimensions are in mm Weight: DCU 1.2 Kg
Tolerance: +/- 1 mm Weight: Mounting Bracket 0.7 Kg
Centre of Gravity

Construction drawing for Fixture. Fig.8b



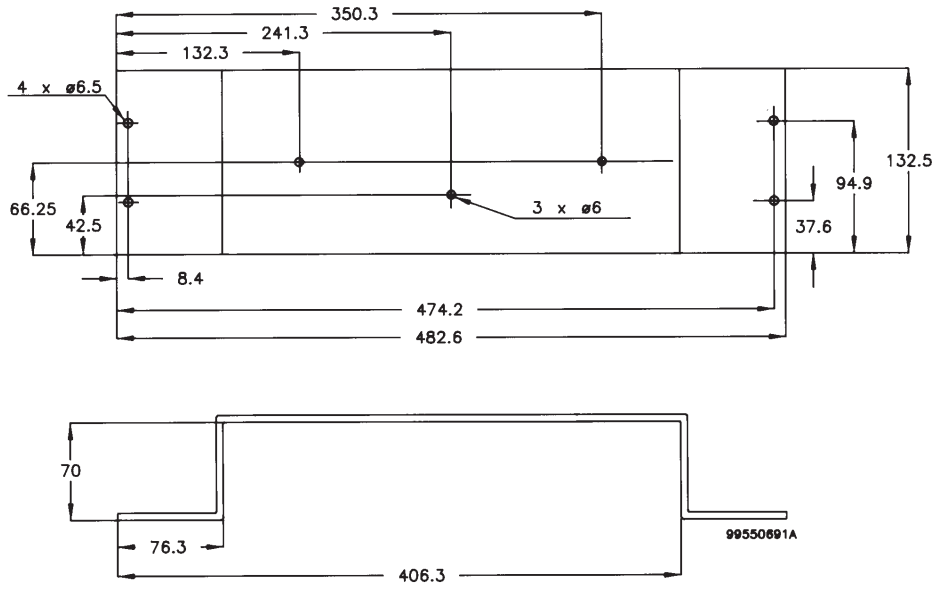
1) Customize to Bulkhead thickness.
Dimensions are in mm
Tolerance: +/- 0.2 mm

DCU 9000 INSTALLATION WITH MOUNTING BRACKET
19 INCH PANEL MOUNTING Fig.9a



Dimensions are in mm Weight: DCU 1.2 Kg
Tolerance: +/- 1 mm Weight: Mounting Bracket 0.7 Kg
Centre of Gravity

Construction drawing for Fixture. Fig.9b

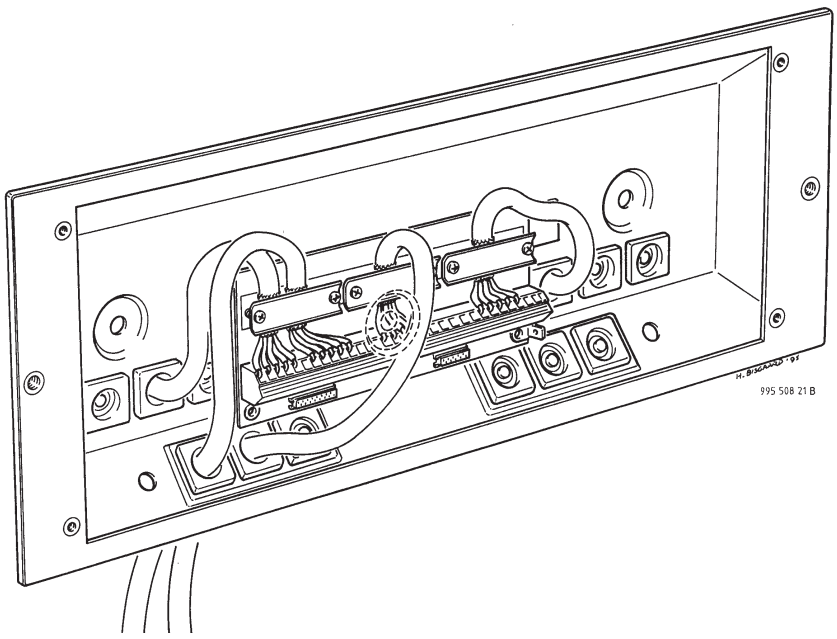


Dimensions are in mm
Tolerance: +/- 0.2 mm

TERMINAL BOARD MOUNTING OPTIONS

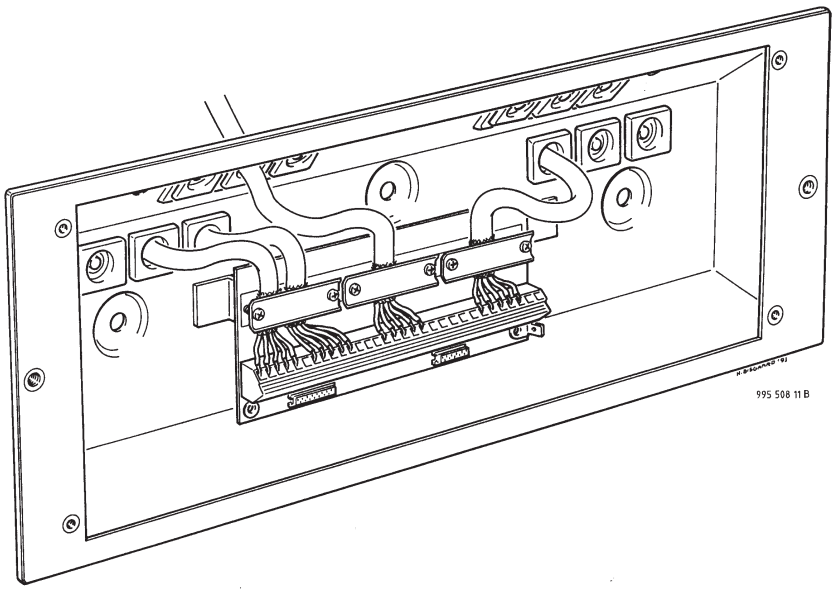
NORMAL MOUNTING OF TERMINAL BOARD

Fig.10a

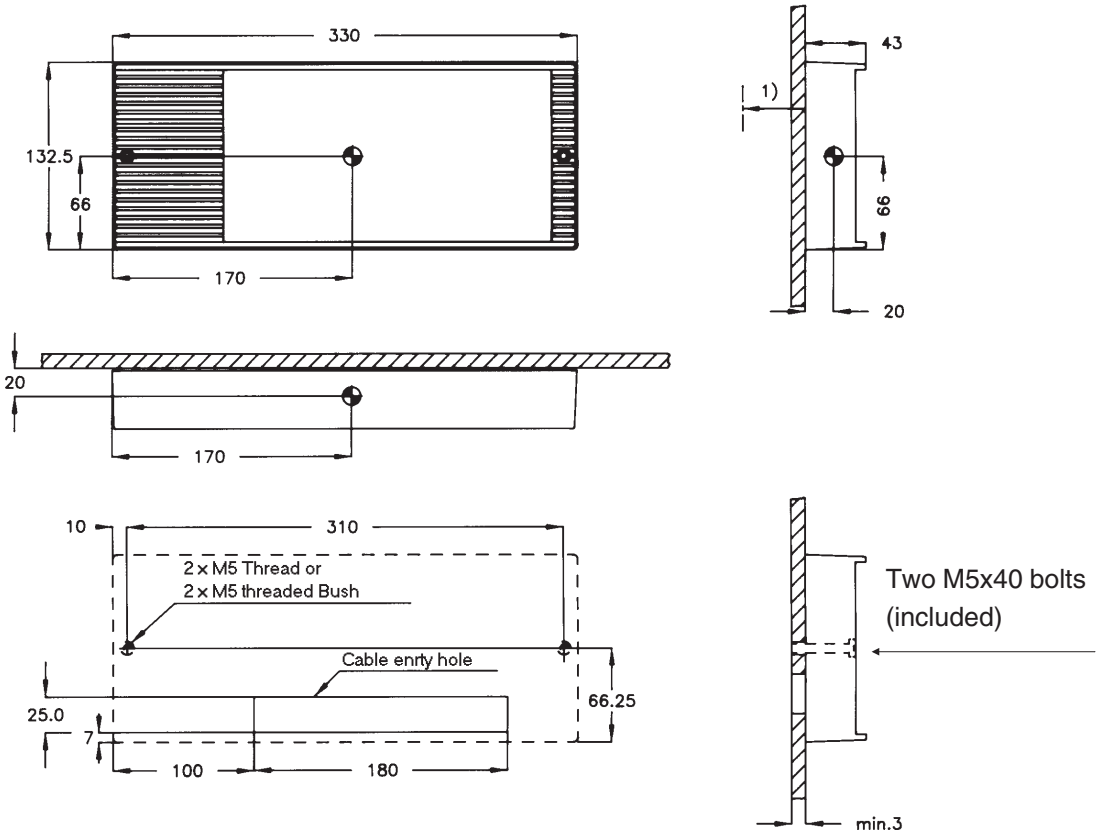


180 MOUNTING OF TERMINAL BOARD

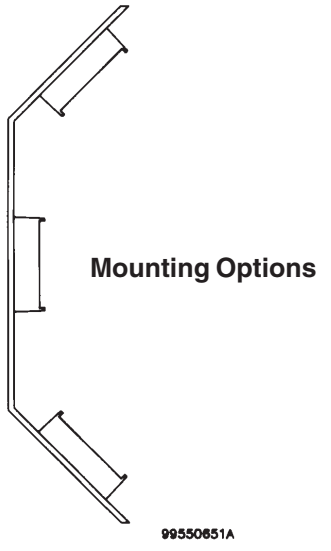
Fig.10b



DCU 9000 WITHOUT MOUNTING BRACKET
Fig.11

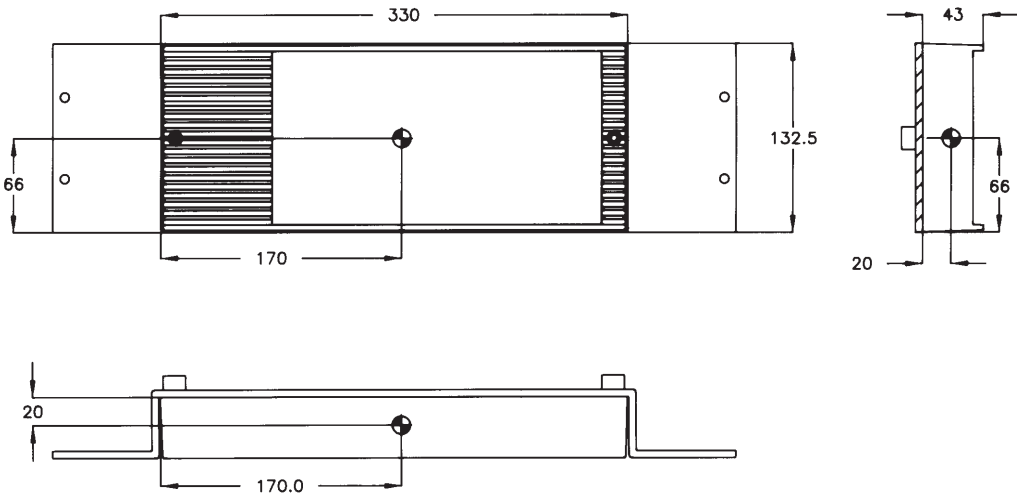


1) Space for cable entry min. 100



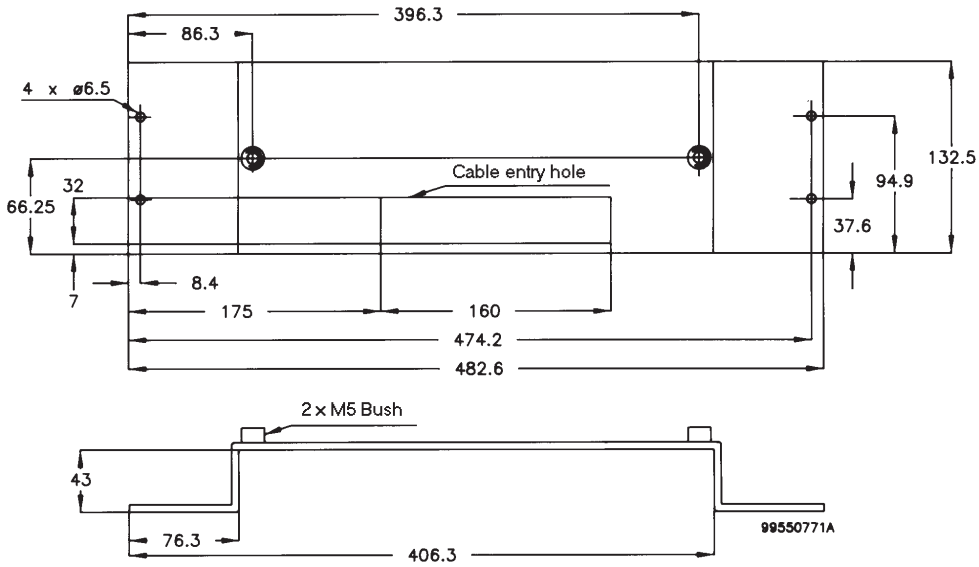
Dimensions are in mm
Tolerance: +/- 1 mm
Centre of Gravity
Weight: 1.2 Kg

DCU 9000 WITHOUT MOUNTING BRACKET
19 INCH PANEL MOUNTING Fig.12a



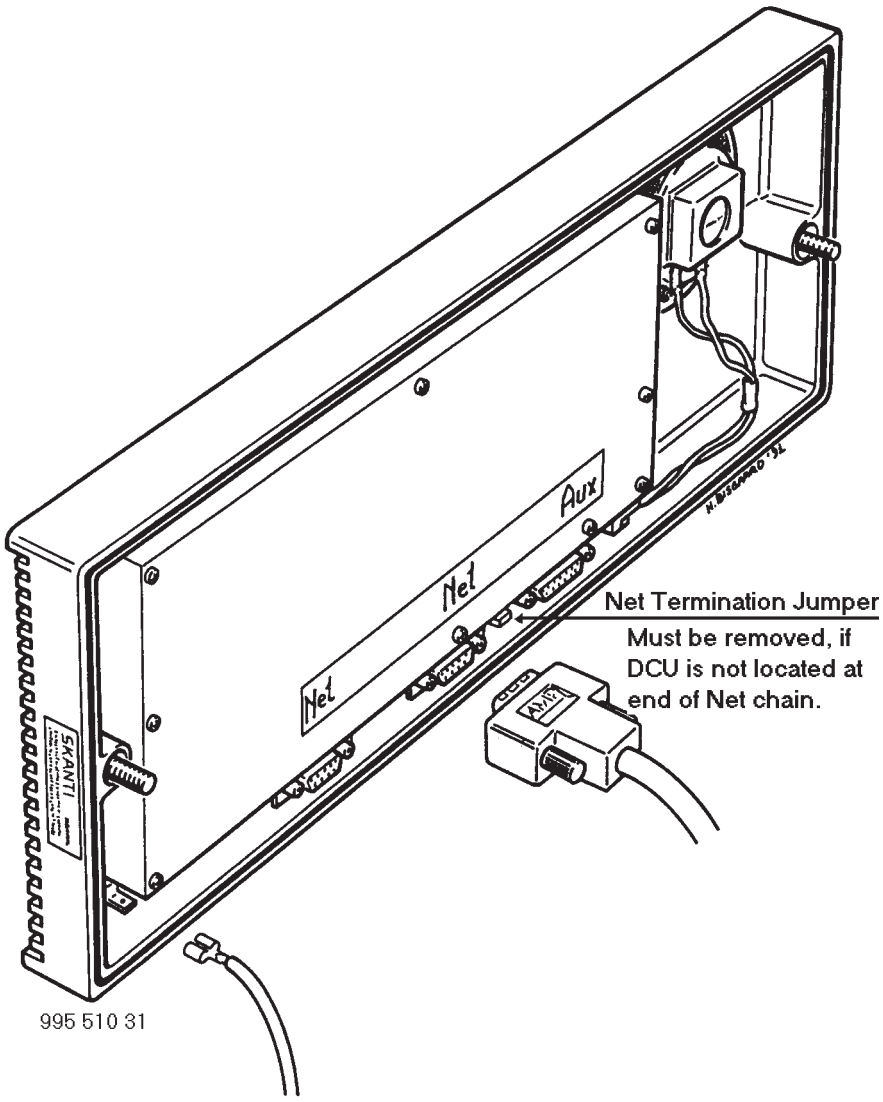
Dimensions are in mm Weight: DCU 1.2 Kg
Tolerance: +/- 1 mm
Centre of Gravity

Construction drawing for Fixture. Fig.12b



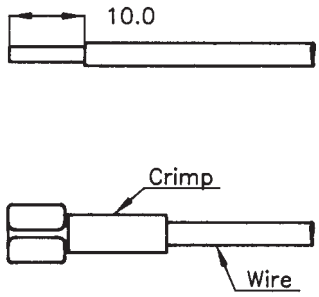
Dimensions are in mm
Tolerance: +/- 0.2 mm

CABLE CONNECTIONS FOR DCU WITHOUT MOUNTING BRACKET
Fig.13



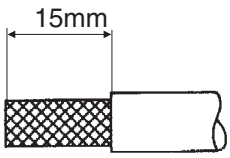
EARTH CONNECTIONS
Fig.18

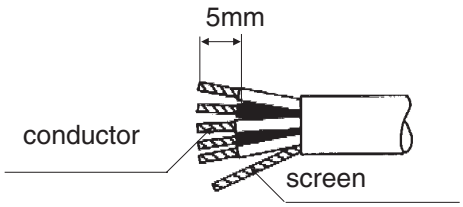
DCU 9000, EARTH CONNECTION
Skanti part no. 772 000 17



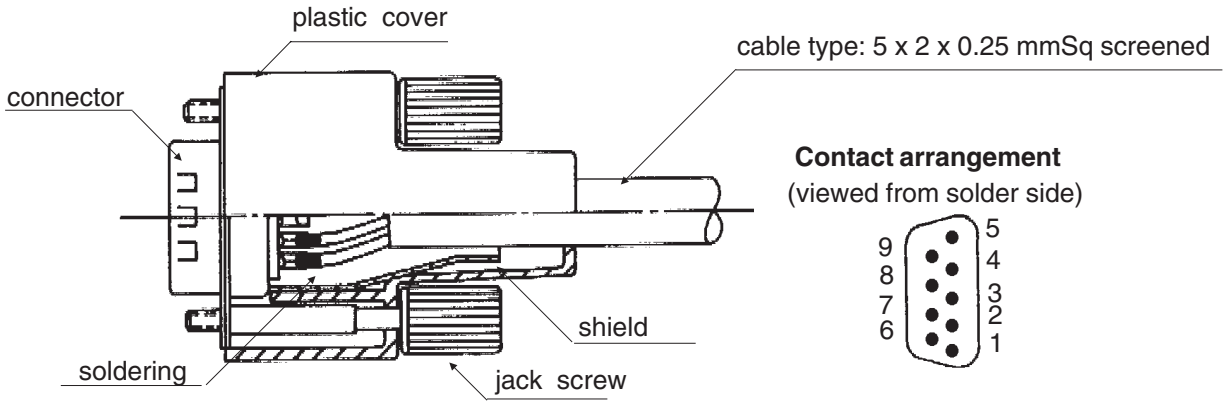
Wire specification
Recommended wire dimension: min. 2.5 mm Sq .
Wire length as short as possible.

NET CONNECTOR, DCU 9000
Fig.21
SKANTI part no. 751 000 64.





Identify twisted pairs.
Before contacts of plug are soldered: slide the plastic cover over the cable .
After the contacts are soldered: latch the inner and outer shields into the connectors from the rear and snap in.
Finally slide the plastic cover over the shield and fix the two jack screws into the plastic cover.

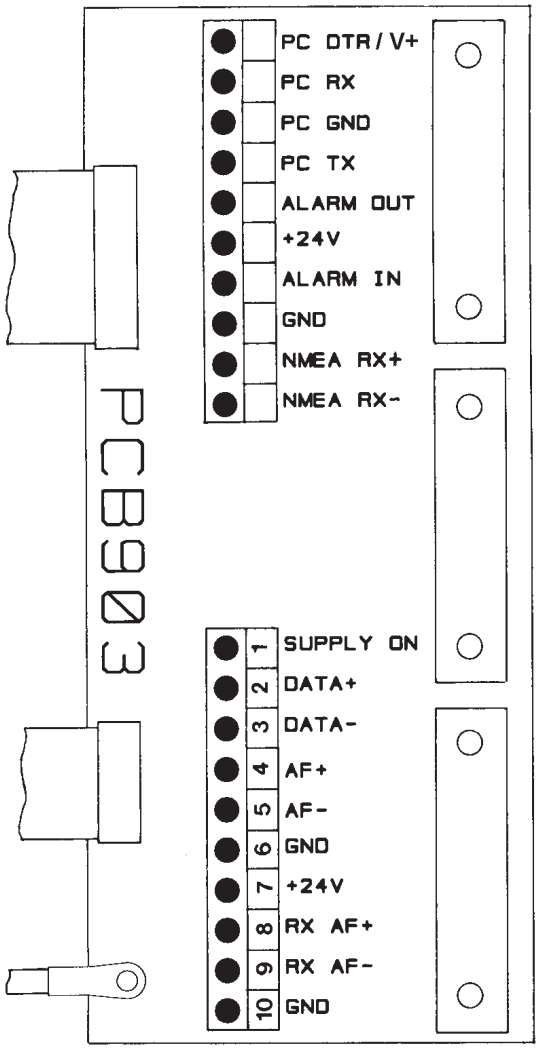


Pin no.	Designation	Remarks
1	Supply On	For switching-on power supply
2	Data+	For data communication between units
3	Data-	For data communication between units
4	AF+	Balanced audio signals
5	AF-	Balanced audio signals
6	GND	Ground reference
7	+24V	Supply voltage to control units
8	RXAF+	Not used in DSC 9000
9	RXAF-	Not used in DSC 9000
Shield	Cable screen	

Table 3

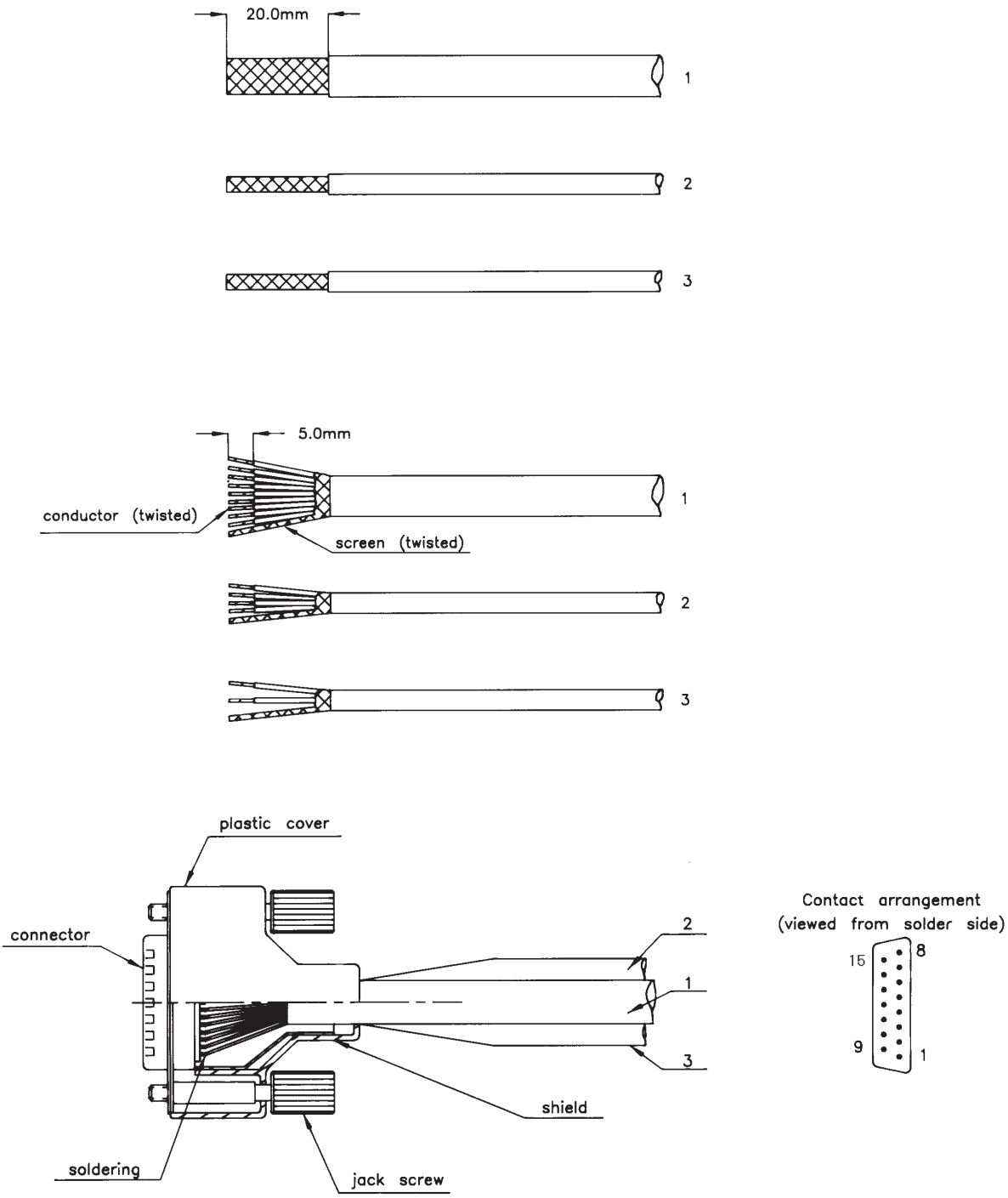
Twisted pairs: 1 and 6
2 and 3
4 and 5
6 and 7
8 and 9

MOUNTING BRACKET TERMINAL BOARD
Fig.22



995 509 91 A

AUX CONNECTOR, DCU 9000
Fig.23
SKANTI part no. 751 000 65.



Cable specification
Acommodate cable outer diameter from 4.4 to 11.0 mm

Pin no.	Designation	Direction	Remarks
1	PC DTR / V+	Input	+5V/+15V supply for opto-isolated serial data interface for printer (RS-232) *)
2	PC GND		Power supply reference for serial data interface for printer (RS-232) *)
3	Alarm Out	Output	Open collector (RS-410N) for external alarm. Max 50mA, 32V. Active Low
4	Alarm In	Input	For external distress alarm button. Internal pull-up to 15V through 2.5kohm.
5	NMEA Rx+	Input	Opto-isolated serial interface for navigation equipment (NMEA 0183)
6	n.c.		
7	n.c.		
8	n.c.		
9	PC Rx	Input	Serial data input or busy input for printer (RS-232) *)
10	PC Tx	Output	Serial data output for printer (RS-232) *)
11	+24 V	Output	+24V for use with 'Alarm Out'. Max 100 mA. Internally protected.
12	GND		
13	NMEA Rx-	Input	Opto-isolated serial interface for navigation equipment (NMEA 0183)
14	n.c.		
15	n.c.		

Table 4

*) The printer interface is opto-isolated with driver power delivered from the printer. Most printers deliver a High (+5V to +15V) signal on one of the connector pins when the printer is operational. Opto-isolation may be disabled by connecting the terminals PC GND and GND and connecting a 2.2 kohm resistor between the terminals +24V and PC DTR/V+.

The terminal 'PC RX' is used for handshake signal input:

If Xon/Xoff handshake is used, the terminal must be connected to the outgoing serial data pin of the printer.

If Busy (High/Low) handshake is used, the terminal must be connected to the printer Ready/Busy signal output.

See page 3-20 for configuration of printer interface.

INSTALLATION CONFIGURATION

The DSC 9000 is factory configured to standard settings, stored in a non-volatile EEPROM. Change of these settings is possible from the front panel of the DCU 9000.

To view or change configuration settings, switch the equipment on, press [Main Menu], select CONFIGURATION and press [Enter]. Select VIEW or CHANGE and press [Enter].

To protect against unintensional changes a password must be entered if CHANGE is selected. The figures are not displayed while keyed-in.

Note: Following any change in configuration setting the supply must be switched off-on to implement the changes.

Configuration of Self-ID

The Maritime Mobile Service Identity assigned to the station must be stored in the DSC 9000 before it can be used.

Select SELF-ID in the CONFIGURATION menu and press [Enter]. Key-in the MMSI and press [Enter].

To prevent the operator from changing the self-ID, it must be protected by entering PROTECT. *Please note that once PROTECT has been entered, change of self-ID is not possible* (only after a factory resetting. See page 3-47). Therefore, check the numbers carefully for correctness before pressing [Enter].

Configuration of Group-ID

One or more group call identities may be assigned to the station. Group call identity numbers always contains a leading zero. The group call identities assigned to the station must be stored in the DSC 9000 before it is able to respond to group calls. Up to six group call identity numbers may be stored.

Select GROUP-ID in the CONFIGURATION menu and press [Enter]. Key-in the group call identities and press [Enter]. Check that the self-ID is correct after having switched the equipment off and on.

Configuration of Control Unit Priority

Where more control units are connected to a DU 9000 each control unit may be given a priority.

Only a control unit with higher priority can interrupt a control unit which is in any other state than MAIN-MENU or STATUS states.

To change the priority level select PRIORITY in the CONFIGURATION menu and press [Enter]. Select the desired priority level (1. priority is the highest level) and press [Enter].

Note: If an external distress alarm button is connected to a control unit, this control unit should be given priority

Configuration of Radio Interface

The DSC 9000 may be configured for different protocols for control of the associated radio equipment:

T+Bus (default)
T+Bus, one way
NMEA

Baudrate 2400 bps for T+Bus and 4800 bps for NMEA is implicitly selected.

Following NMEA sentences are used to set frequency, mode of operation and transmitter power level of the radio equipment.

```
RX frequency:

$CDFSI,,xxxxxx,c,*hh<CR><LF>
                — Mode of operation[1]
           — Receiving frequency[2]

TX frequency:

$CDFSI,xxxxxx,,c,9*hh<CR><LF>
                  — Power level (9=highest)
                — Mode of operation[1]
           — Transmitting frequency[2]

Notes:

1) Mode of operation:

    m = J3E, telephone
    o = H3E, telephone
    w = F1B/J2B, teleprinter/DSC
    { = A1A Morse, morse key/headset

2) Frequency in 100 Hz increments.
```

To change configuration select INTERFACES in the CONFIGURATION menu and press [Enter]. Select RADIO in the Interfaces menu and press [Enter]. Select CONTROL in the Radio interface menu and press [Enter]. Select the desired option and press [Enter].

Configuration of Handset Hook-Switch Interface

The handset hook interface may be configured for either polarity of the input signal or for ignoring the input, i.e. if no hook-switch is connected.

To change configuration select INTERFACES in the CONFIGURATION menu and press [Enter] . Select RADIO in the Interfaces menu and press [Enter] . Select HANDSET-HOOK in the Radio interface menu and press [Enter]. Select the correct option Normal, Reverse or Ignore. 'Normal' corresponds to off-hook = low input signal. Press [Enter] .
TRP 7000: Normal
TRP 8000 handset with built-in hook switch: Reverse

The handset hook signal is utilized as follows:

When the receiver of the radiotelephone is used for scanning controlled from the DSC 9000 or radiotelex equipment, scanning is interrupted while the handset is off-hook. At the same time automatic DSC acknowledgement transmissions are disabled. Scanning is automatically resumed when the handset is placed on-hook.

When a Selective or Direct-dial telephony call is received, lifting the handset off-hook will stop the acoustic alarm, start transmission of an acknowledgement, and set the radiotelephone to the appropriate working frequencies.

Configuration of DSC-watch

The DSC 9000 enables two DSC watch receivers to be used simultaneously. The status display contains a line for each receiver/demodulator, indicating the DSC watch frequencies.

It is possible by configuration to select between different DSC watch lay-outs in the status display:

Distress watch MF

Distress watch MF/HF

Calling watch

None

One of the lay-outs may be selected for each watch receiver.

To change the configuration, select WATCH in the CONFIGURATION menu and press [Enter]. Select the desired configuration for each watch receiver and press [Enter].

Note: When the TRP 7000 or TRP 8000 is intended to be used for automated radiotelex and no additional DU configured as a DSC watch receiver is connected (see page 3-7 'Connection of an additional DU'), 'None' should be selected for 'watch receiver 2'.

Configuration of Telex Interface

Select INTERFACES in the CONFIGURATION menu and press [Enter]. Select TELEX in the Interfaces menu and press [Enter]. Select 'External modem' if an external radiotelex modem is used and press [Enter].

Configuration of Printer Interface

Select INTERFACES in the CONFIGURATION menu and press [Enter]. Select PRINTER in the Interfaces menu and press [Enter]. Select between connection to

This DCU, None/other DCU, or DU*

and press [Enter]. Select between Baud rates of

300, 600, 1200, 2400, 4800*, or 9600

and press [Enter]. Select between Parity/data bits

None/7, None/8*, Even/7, Even/8, Odd/7, or Odd/8

and press [Enter]. Select between handshake types

Xon/xoff, Busy High, Busy Low, None*

and press [Enter]. Select between paper feed

Up* or Down

and press [Enter].

*) Default

Configuration of External Alarms

Select INTERFACES in the CONFIGURATION menu and press [Enter]. Select ALARMS in the Interfaces menu and press [Enter]. Select for each output in turn the desired activation conditions:

Distress alarm only

Call alarm only

Distress + Call alarm

Distress alarm + lamp

Configuration of Formats

Certain call formats may be omitted. This enables the DSC 9000 to be adapted to specific applications where it is desirable to avoid unintended use of these formats.

The formats that can be disabled are:

Distress

Group + Area

Direct-dial

To change the configuration, select FORMAT in the CONFIGURATION menu and press [Enter]. Select 'Yes' to include a format, or 'No' to disable a format, and press [Enter].

All formats can be received and displayed in RX-calls irrespective of the configuration settings.

Configuration of Messages

It is possible to select between the full set of telecommands or a reduced set. The reduced set may be selected where it is desirable to avoid unintended use of the telecommands.

Full set of telecommands:

Polling
Unable to comply
-Congestion
-Busy
-Queue
-Station barred
-No operator
-Temporarily no opr
-Equipment disabled
-Cannot use channel
-Cannot use mode
Data V.21
Data V.22
Data V.22 bis
Data V.23
Data V.26 bis
Data V.26 ter
Data V.27 ter
Data V.32
USB telephony
AM telephony
Distress relay
FEC telex
ARQ telex
RTTY receive
RTTY
A1A/CW tape
Ship position
A1A/CW Morse
Facsimile
No information

Reduced set of telecommands:

USB telephony
Distress relay
FEC telex
ARQ telex

Only messages enabled by configuration are selectable in TX-calls. All messages may be displayed in RX-calls and TX-acknowledgements, irrespective of the configuration.

ACCESSORIES INCLUDED

DCU 9000:

DESIGNATION	QUANTITY	SKANTI PART NUMBER
Mounting bracket for DCU 9000	1	107 810 40
D-sub connector, 9 pole, male	2	751 000 64
D-sub connector, 15 pole, male	1	751 000 65
Tab connector, female	1	772 000 17

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