

## 7. PREVENTIVE MAINTENANCE

Due to the modern design of the TRP 8250 D preventive maintenance can be reduced to a minimum provided the equipment is correctly installed. To ensure maximum performance and minimum repair trouble we recommend you to follow below stated headlines for preventive maintenance.

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

### 7.1 Realignment of Master Oscillator 612 613 614

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

#### 1. Measuring Equipment:

1.1 Frequency Counter:	Frequency range $\geq 100$ MHz Input impedance = 50 ohm Sensitivity at least $> 0.2$ V Accuracy better than 1 Hz
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1.2 Thermometer:	Range 0-50 deg. Celcius
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#### 2. Preparations:

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

2.2 Open the front door of the Transceiver Unit and remove the shielding cover of the Exciter Signal Path. Disconnect all sockets from the shielding cover of the Master Oscillator. Remove the shielding cover by unscrewing the 4 screws.

2.3 Note if the TCXO is marked with a frequency offset.

2.4 Connect all sockets again.

2.5 Measure the temperature close to the Master Oscillator and take the necessary arrangements to keep it between 20 and 30 deg. Celsius. Be sure that thermal equilibrium has taken place before adjustment.

### 3. Realignment of Master Oscillator:

3.1 Disconnect the socket from PL2 on the Exciter Signal Path 619 carrying the injection signal to the 1st. mixer. Connect the frequency counter to the socket.

3.2 Key-in USB mode and a receiver frequency of 26.68000 MHz on the Control Unit.

3.3 Adjust R1 until the counter reads  $f = 71.680000 \text{ MHz} \pm 1 \text{ Hz}$ . If the TCXO is marked with a frequency offset, multiply the offset by 7 and add to the frequency stated above. For example:

Frequency offset +2 Hz

Add  $7 * 2 = 14 \text{ Hz}$

Adjust to  $f = 71.680014 \text{ MHz} \pm 1 \text{ Hz}$

3.4 Replace all covers and sockets again.

## 7.2 Realignment of Master Oscillator 615, 616

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

### 1. Measuring Equipment:

Frequency Counter: Frequency range  $> 100 \text{ MHz}$

Input impedance =  $50 \text{ ohm}$

Sensitivity at least  $> 0.2 \text{ Vrms}$

Accuracy better than  $0.005\text{ppm}$

### 2. Preparations:

2.1 Switch on the power at least one hour before adjustment.

2.2 Remove the front shielding cover of the RX/EX Assembly.

- 2.3 Open the front door of the Transceiver Unit and locate Master Oscillator 615/616. Disconnect all socket from the shielding cover of the Master Oscillator. Do not remove the two sockets mounted directly on the PCB in front of the cover.
- 2.4 Remove the shielding cover of the Master Oscillator by unscrewing the 4 screws.
- 2.5 Connect all sockets again.
- 2.6 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 Disconnect the socket from PL2 on the RX/EX Signal Path 610 carrying the injection signal to 1st. mixer. Connect the frequency counter to the socket.
- 3.2 Key-in USB mode and a receiver frequency of 25.0000 MHz on the Control Unit.
- 3.3 Locate the Master Oscillator adjustment hole in the top end of metal box mounted in the middle of the PCB 615/616. Use a small screwdriver to gently adjust the frequency.
- 3.4 Adjust the frequency as close as possible to 70.000 000 MHz.

Adjustment tolerance:

Master Oscillator 615:	+/- 3Hz
Master Oscillator 616:	+/- 1Hz

- 3.5 Replace all sockets and both covers again.

### 7.3 Replacement of backup battery

The lithium backup battery should be changed within four years after its installation in the equipment. The expiration date is marked on the battery. If the time is exceeded the battery voltage may become too low which causes the real-time clock to default to 00:00 and the contents of the user programmable memory to get lost when the equipment is switched OFF. The battery is located in the Control Unit on Control Board 600 and should be changed by a qualified technician.

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



## 8. TROUBLE SHOOTING AND SERVICE

### 8.1 Malfunction

If the equipment is not functioning correctly a check should be made that it is being operated properly, see chapter 4.

### 8.2 Replacement of FUSES

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

The AC Power Supply Unit contains a fuse located at the front of the unit. Spare fuses are located behind the cover.

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

Location	Fuse Rating	Function	Symptom if fuse is blown
Transceiver Unit	4 A fast	+48 V to Voltage Converter	Equipment dead, but Main Relay operates when Supply switch is activated. Voltage-indicator lamp in Switched Mode Power Supply is lit when power is on.
	15 A fast	48 V to Power Amplifier	No RF output power
AC Power Supply Unit	110/120 V: 12.5 A slow 220/240 V: 6.3 A slow	Mains input	No light in DC OUTPUT LAIIP with mains switch position MAINS ON

Table 8.1

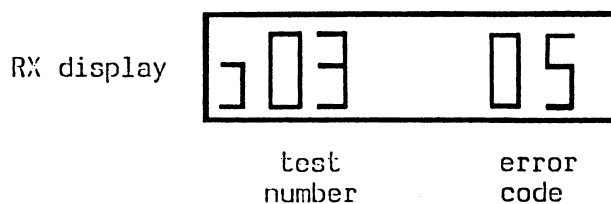
### 8.3 MANUALLY TUNING TO 2182 kHz IN CASE OF FAILURE IN THE ATU

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

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

## 8.4 DESCRIPTION OF SELF TEST FUNCTIONS

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



The error codes are to be interpreted as follows:

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

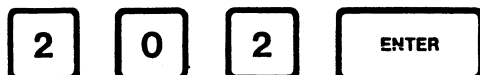
8.4.1 EXECUTION OF SELF TEST IN AUTO MODE The self test is executed by pressing:



The test will take several seconds, during which various sounds may be heard.

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

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



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

#### 8.4.3 EXECUTION OF SELF TEST IN STEP MODE The self test is executed by pressing:



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

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



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



#### 8.4.5 TEST 1

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

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

#### 8.4.6 TEST 2

Test 2 will test Audio Processing Board [601], reception signal path. Microprocessor tone generator is set to 800 Hz, AF switch is set to microprocessor tone generator, and speaker is set ON. AF AMP is checked for tone. The test is OK if CHECK 1 = "0"  
A clear tone is heard during the test.

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

#### 8.4.7 TEST 3

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

Error code	Meaning
00	The test was OK

01	Error. CHECK 2 was "1" Possible cause: Fault on <span style="border: 1px solid black; padding: 0 2px;">601</span> Audio Processing Board or <span style="border: 1px solid black; padding: 0 2px;">600</span> Control Board or cable connecting <span style="border: 1px solid black; padding: 0 2px;">600</span> and <span style="border: 1px solid black; padding: 0 2px;">601</span>
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#### 8.4.8 TEST 4

Test 4 will test Audio Processing Board 601, transmission signal path. The microprocessor tone generator is set to 800 Hz, input selector is set to microprocessor tone, the compressor is checked for compression. The test is OK if CHECK 2 = "1"

Error code 00	Meaning The test was OK
01	Error. CHECK 2 was "0" Possible cause: Fault on <span style="border: 1px solid black; padding: 0 2px;">601</span> Audio Processing Board or <span style="border: 1px solid black; padding: 0 2px;">600</span> Control Board or cable connecting <span style="border: 1px solid black; padding: 0 2px;">600</span> and <span style="border: 1px solid black; padding: 0 2px;">601</span>

#### 8.4.9 TEST 5

Display test.  
This test will turn all displays, annunciators and bargraph's ON for 10 seconds.  
The microprocessor can not test the displays, the operator must inspect the displays visually.

Error code 00	Meaning The test was OK, the microprocessor can not detect any faults in this test
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If some displays, annunciators or bar-graph's do not turn ON, exchange or repair 600 Control Board.

#### 8.4.10 TEST 6

Test 6 will test Master Oscillator and reference dividers on board 612, 613 or 614.  
Test 6 will test that N.O.CHECK = "1"

Error code 00	Meaning The test was OK
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01 Error. N.O.CHECK was "0"  
 Fault on:  
 [612], [613] or [614] Master Oscillator  
 or cable connecting [611] and [612]  
 or [611] Synthesizer Board  
 or cable connecting [611] and [624]  
 or [624] Transceiver Control Board

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

### 3.4.11 TEST 7

Test 7 will test both Synthesizer Boards [611].  
 It will set all synthesizers mid range and test for lock.  
 Both 1.LO's are set to 50 MHz range = 45-52.5 MHz  
 Both 2.LO's are set to 43.6 MHz  
 Both 3.LO's are set to 1.4 MHz  
 The test is OK if SYNCHECK 0 = "1" and  
 SYNCHECK 1 = "1"

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

#### 8.4.12 TEST 8

Test 8 will test both Synthesizer Boards [611].

It will bring 1.LO's out of lock to check that they can be controlled by the microprocessor.

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

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

#### 8.4.13 TEST 9

Test 9 will test both Synthesizer Boards [611].

It will set 1.LO's to 45 MHz to check if they can lock.

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

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

02 Error. SYNCHECK 1 was "0"  
 Fault on:  
 [611] Exciter Synthesizer Board or  
 cable connecting [611] and [624] or  
 [624] Transceiver Control Board

03 Error. SYNCHECK 0 was "0" and  
 SYNCHECK 1 was "0"  
 Fault on:  
 [624] Transceiver Control Board or  
 cable connecting [611] and [624]

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

#### 8.4.14 TEST 10

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

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

#### 8.4.15 TEST 11

Test 11 will test both Synthesizer Boards [611].

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

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

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

#### 8.4.16 TEST 12

Test 12 will test both Synthesizer Boards [611].

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

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

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

02 Error. SYNCHECK 1 was "0"  
 Fault on:  
 [611] Exciter Synthesizer Board or  
 cable connecting [611] and [624] or  
 [624] Transceiver Control Board

03 Error. SYNCHECK 0 was "0" and  
 SYNCHECK 1 was "0"  
 Fault on:  
 [624] Transceiver Control Board or  
 cable connecting [611] and [624]

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

#### 0.4.17 TEST 13

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

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

#### 8.4.18 TEST 14

Test 14 will test both Synthesizer Boards [611].

It will set 1.LO's to 67.5 MHz, using the 60-67.5 MHz band, to check if they can lock.

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

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

#### 8.4.19 TEST 15

Test 15 will test both Synthesizer Boards [611].

It will set 1.LO's to 67.5 MHz, using the 67.5-75 MHz band, to check if they can lock.

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

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



02 Error. SYNCHECK 1 was "0"  
 Fault on:  
 [611] Exciter Synthesizer Board or  
 cable connecting [611] and [624] or  
 [624] Transceiver Control Board

03 Error. SYNCHECK 0 was "0" and  
 SYNCHECK 1 was "0"  
 Fault on:  
 [624] Transceiver Control Board or  
 cable connecting [611] and [624]

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

#### 8.4.20 TEST 16

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

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

#### 8.4.21 TEST 17

Test 17 will test both Synthesizer Boards 611 .

It will set 2.LO's to 43.597 MHz to check if they can lock.

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

SYNCHECK 1 = "1"

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

#### 8.4.22 TEST 18

Test 18 will test both Synthesizer Boards 611 .

It will set 2.LO's to 43.603 MHz to check if they can lock.

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

SYNCHECK 1 = "1"

Error code	Meaning
00	The test was OK
01	Error. SYNCHECK 0 was "0" Fault on: <u>611</u> Receiver Synthesizer Board or cable connecting <u>611</u> and <u>624</u> or <u>624</u> Transceiver Control Board

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

#### 8.4.23 TEST 19

Test 19 will test both Synthesizer Boards [611].  
It will set 3.LO's out of lock to check if they can be controlled by the  
microprocessor.

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

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

#### 8.4.24 TEST 20

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

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

#### 8.4.25 TEST 21

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

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

02 Error. SYNCHECK 1 was "0"  
 Fault on:  
 [611] Exciter Synthesizer Board or  
 cable connecting [611] and [624] or  
 [624] Transceiver Control Board

03 Error. SYNCHECK 0 was "0" and  
 SYNCHECK 1 was "0"  
 Fault on:  
 [624] Transceiver Control Board or  
 cable connecting [611] and [624]

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

#### 8.4.26 TEST 22

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

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

#### 8.4.27 TEST 23

Test 23 will test Exciter Signal Path [619].  
 It will set [619] to A1 (CW) transmission and test EX OUT CHECK, this will prove  
 that the transmission signal path is OK for A1 mode. The frequency is 14.250  
 MHz.  
 The test is OK if EX OUT CHECK = "1"

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

#### 8.4.28 TEST 24

Test 24 will test Exciter Signal Path [619].  
It will set [619] to J3E (USB) transmission and test EX OUT CHECK and EX AF CHECK, this will prove that the signal path is OK for J3E mode, the CU will generate a 919 Hz tone to modulate the exciter. The carrier frequency is 14.250 MHz.

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

Error code	Meaning
00	The test was OK
01	Error, EX AF CHECK was "0" no AF modulation is detected Fault on: cable connecting CU and TU or [601] Audio Processing Board or [619] Exciter Signal Path or cable connecting [619] and [624] or [624] Transceiver Control Board
02	Error, EX OUT CHECK was "0" no RF is generated on [619] Fault on: [619] Exciter Signal Path or cable connecting [619] and [611] or [611] Exciter Synthesizer Board or cable connecting [619] and [624] or [624] Transceiver Control Board
98	Error, no response from TU Fault on: [624] Transceiver Control Board

#### 0.4.29 TEST 25

Test 25 will test Receiver Signal Path 618.

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

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

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

Error code	Meaning
00	The test was OK
01	Error, RX RATE > 9.1 kHz AGC voltage is too low Fault on: <u>618</u> Receiver Signal Path or <u>624</u> Transceiver Control Board or cable connecting <u>618</u> and <u>611</u> or cable connecting <u>611</u> and <u>624</u> or cable connecting CU and TU or <u>600</u> Control Board
02	Error, CHECK 0 was "1" no AF signal on <u>601</u> Audio processing Board Fault on: <u>618</u> Receiver Signal Path or cable connecting <u>618</u> and <u>611</u> or cable connecting <u>611</u> and <u>624</u> or cable connecting CU and TU or <u>601</u> Audio Processing Board or <u>600</u> Control Board
03	Error, CHECK 1 was "1" no AF signal on loudspeaker Fault on: <u>601</u> Audio Processing Board
99	The test can not be executed because either: filter X5 is not installed or this is not a standard version
98	Error, no response from TU Fault on: <u>624</u> Transceiver Control Board

#### 8.4.30 TEST 26

Test 26 will test Receiver Signal Path 618.

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

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

The test is OK if RX RATE ( 624 ) < 9.1 kHz

and CHECK 0 ( 601 ) = "1"

and CHECK 1 ( 601 ) = "1"

Error code	Meaning
00	The test was OK
01	Error, RX RATE > 9.1 kHz AGC voltage is too low Fault on: <u>618</u> Receiver Signal Path or <u>624</u> Transceiver Control Board or cable connecting <u>618</u> and <u>611</u> or cable connecting <u>611</u> and <u>624</u> or cable connecting CU and TU or <u>600</u> Control Board
02	Error, CHECK 0 was "0" AF was detected on <u>601</u> Audio Processing Board Fault on: <u>618</u> Receiver Signal Path or cable connecting <u>618</u> and <u>611</u> or cable connecting <u>611</u> and <u>624</u> or cable connecting CU and TU or <u>601</u> Audio Processing Board or <u>600</u> Control Board
03	Error, CHECK 1 was "0" AF was detected on loudspeaker Fault on: <u>601</u> Audio Processing Board
98	Error, no response from TU Fault on: <u>624</u> Transceiver Control Board
99	The test can not be executed because this is a special version



#### 8.4.31 TEST 27

Test 27 will test Receiver Signal Path 618.

It will set 618 to telex reception and set the synthesizer to generate a 1500 Hz tone. The CU will check AGC voltage and AF signal.

The synthesizer frequencies are: 1.LO = 45.0005 MHz, 2.LO = 43.002 MHz and 3.LO = 1.4 MHz.

The test is OK if RX RATE ( 624 ) < 9.1 kHz

and CHECK 0 ( 601 ) = "0"

and CHECK 1 ( 601 ) = "0"

Error code	Meaning
00	The test was OK
01	Error, RX RATE > 9.1 kHz AGC voltage is too low Fault on: <u>618</u> Receiver Signal Path or <u>624</u> Transceiver Control Board or cable connecting <u>618</u> and <u>611</u> or cable connecting <u>611</u> and <u>624</u> or cable connecting CU and TU or <u>600</u> Control Board
02	Error, CHECK 0 was "1" no AF signal on <u>601</u> Audio processing Board Fault on: <u>618</u> Receiver Signal Path or cable connecting <u>618</u> and <u>611</u> or cable connecting <u>611</u> and <u>624</u> or cable connecting CU and TU or <u>601</u> Audio Processing Board or <u>600</u> Control Board
03	Error, CHECK 1 was "1" no AF signal on loudspeaker Fault on: <u>601</u> Audio Processing Board
99	The test can not be executed because either filter X4 is not installed or this is not a standard version
98	Error, no response from TU Fault on: <u>624</u> Transceiver Control Board

#### 8.4.32 TEST 28

Test 28 will test Receiver Signal Path 618.

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

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

The test is OK if  $\overline{\text{RX RATE}}$  (624) < 9.1 kHz  
and  $\overline{\text{CHECK 0}}$  (601) = "0"  
and  $\overline{\text{CHECK 1}}$  (601) = "1"

Error code	Meaning
00	The test was OK
01	Error, RX RATE > 9.1 kHz AGC voltage is too low Fault on: <u>618</u> Receiver Signal Path or <u>624</u> Transceiver Control Board or cable connecting <u>618</u> and <u>611</u> or cable connecting <u>611</u> and <u>624</u> or cable connecting CU and TU or <u>600</u> Control Board
02	Error, $\overline{\text{CHECK 0}}$ was "1" no AF signal on <u>601</u> Audio processing Board Fault on: <u>618</u> Receiver Signal Path or cable connecting <u>618</u> and <u>611</u> or cable connecting <u>611</u> and <u>624</u> or cable connecting CU and TU or <u>601</u> Audio Processing Board or <u>600</u> Control Board
03	Error, $\overline{\text{CHECK 1}}$ was "1" no AF signal on loudspeaker Fault on: <u>601</u> Audio Processing Board
99	The test can not be executed because either filter X2 is not installed or this is a special version.
98	Error, no response from TU Fault on: <u>624</u> Transceiver Control Board

### 3.4.33 TEST 29

Test 29 will test Receiver Signal Path 618.

It will set 618 to CW reception, narrow bandwidth, and set the synthesizer to generate a 1 kHz tone. The CU will check AGC voltage and AF signals. A clear 1 kHz tone will be heard during this test.

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

The test is OK if RX RATE ( 624 ) < 9.1 kHz

and CHECK 0 ( 601 ) = "0"

and CHECK 1 ( 601 ) = "0"

Error code	Meaning
00	The test was OK
01	Error, RX RATE > 9.1 kHz AGC voltage is too low Fault on: <u>618</u> Receiver Signal Path or <u>624</u> Transceiver Control Board or cable connecting <u>618</u> and <u>611</u> or cable connecting <u>611</u> and <u>624</u> or cable connecting CU and TU or <u>600</u> Control Board
02	Error, CHECK 0 was "1" no AF signal on <u>601</u> Audio processing Board Fault on: <u>618</u> Receiver Signal Path or cable connecting <u>618</u> and <u>611</u> or cable connecting <u>611</u> and <u>624</u> or cable connecting CU and TU or <u>601</u> Audio Processing Board or <u>600</u> Control Board
03	Error, CHECK 1 was "1" no AF signal on loudspeaker Fault on: <u>601</u> Audio Processing Board
99	The test can not be executed because either filter X3 is not installed or X3 has a center frequency of 1.3985 MHz or this is a special version
98	Error, no response from TU Fault on: <u>624</u> Transceiver Control Board

#### 8.4.34 TEST 30

Test 30 will test Receiver Signal Path 618.

It will set 618 to CW reception, narrow bandwidth, and set the synthesizer to generate a 1.5 kHz tone. The CU will check AGC voltage and AF signals. A clear 1.5 kHz tone will be heard during the test.

The synthesizer frequencies are: 1.LO = 45.0005 MHz, 2. LO = 43.602 MHz, 3.LO = 1.4 MHz.

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

Error code	Meaning
00	The test was OK
01	Error, RX RATE > 9.1 kHz AGC voltage is too low Fault on: <u>618</u> Receiver Signal Path or <u>624</u> Transceiver Control Board or cable connecting <u>618</u> and <u>611</u> or cable connecting <u>611</u> and <u>624</u> or cable connecting CU and TU or <u>600</u> Control Board
02	Error, CHECK 0 was "1" no AF signal on <u>601</u> Audio processing Board Fault on: <u>618</u> Receiver Signal Path or cable connecting <u>618</u> and <u>611</u> or cable connecting <u>611</u> and <u>624</u> or cable connecting CU and TU or <u>601</u> Audio Processing Board or <u>600</u> Control Board
03	Error, CHECK 1 was "1" no AF signal on loudspeaker Fault on: <u>601</u> Audio Processing Board
99	The test can not be executed because filter X3 is not installed or has a center frequency of 1.4 MHz or this is a special version
98	Error, no response from TU Fault on: <u>624</u> Transceiver Control Board

#### 8.4.35 TEST 31

Test 31 is a listening test at 2.0 MHz. The purpose of this test is not to test anything. The operator should listen to this frequency before proceeding with the transmitter tests. The transmitter tests will transmit at this frequency, therefore the operator must listen to ensure that this frequency is not occupied by others. If the frequency is free proceed to next test by pressing "DIMMER UP". If the frequency is occupied, wait until it becomes free or abort the test by pressing any key but "DIMMER UP" or "DIMMER DOWN".  
NOTE: This test can be executed in step mode only.

Error code	Meaning
00	Is always returned

#### 8.4.34 TEST 32

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

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

The test is OK if ALCHECK = "1"  
and SWROK ( [640] ) = "0"  
and Power = 90 %  
and IANT = 1A

Error code	Meaning
00	The test was OK
01	Error, ALCHECK was "0" Fault on: [624] Transceiver Control Board or cable connecting [624] and [626] or [626] Power Amplifier
02	Power was < 90 % Fault on: [626] Power Amplifier or [627], [628], [629] P.A. Filters or cable connecting [619] and [626] or cable connecting [626] and [627] [628] [629] or antenna too short for full power on 2 MHz
03	Error, SWROK was "1" SWR was > 3 Fault on: [640] Antenna Tuning Unit or antenna

04 Error, IANT was < 1 A  
Fault on:  
[640] Antenna Tuning Unit or antenna

#### 8.4.37 TEST 33

Test 33 will test PA-filters [627], [628] or [629].  
It will select the 2.31-3.33 MHz filter and transmit at 2 MHz.  
NOTE: This test can be executed in step mode only.  
The test is OK if Power > 90 %.

Error code	Meaning
00	The test was OK
01	Error, Power was < 90 % Fault on: [627], [628], [629] PA-filters

#### 8.4.38 TEST 34

Test 34 will test PA-filters [627], [628], [629].  
It will select the 3.3-4.8 MHz filters at continuous coverage transceiver, and transmit at 2 MHz. Marine bands transceivers can not execute this test.  
NOTE: This test can be executed in step mode only.  
The test is OK if Power > 90 %.

Error code	Meaning
00	The test was OK
01	Error, Power was < 90 % Fault on: [629] PA-filters
99	This is a marine bands transceiver, this unit can not execute the test

#### 8.4.39 TEST 35

Test 35 will test PA-filters [627], [628], [629].  
It will select the 4.8-6.9 MHz filter for continuous coverage transceivers or the 3.3-4.8 MHz filter for marine bands transceivers.  
NOTE: This test can be executed in step mode only.  
The test was OK if Power > 90 %

Error code	Meaning
00	The test was OK
01	Error, Power was < 90 % Fault on: [627], [628], [629] PA-filters

#### 8.4.40 TEST 36

Test 36 will test PA-filters [627], [628], [629].

It will select the 6.9-10 MHz filter for continuous coverage transceivers or the 6.2-8.45 MHz filter for marine bands transceivers. It will transmit at 2 MHz.

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

The test is OK if Power > 90 %.

Error code	Meaning
00	The test was OK
01	Error, Power was > 90 % Fault on: [627], [628], [629] PA-filters

#### 8.4.41 TEST 37

Test 37 will test PA-filters [627], [628], [629].

It will select the 10-14.4 MHz filter for continuous coverage transceivers or the 12-17 MHz filter for marine bands transceivers. It will transmit at 2 MHz.

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

The test is OK if Power > 90 %.

Error code	Meaning
00	The test was OK
01	Error, Power was > 90 % Fault on: [627], [628], [629] PA-filters

#### 8.4.42 TEST 38

Test 38 will test PA-filters [627], [628], [629].

It will select the 14-20 MHz filters at continuous coverage transceiver, and transmit at 2 MHz. Marine bands transceivers can not execute this test.

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

The test is OK if Power > 90 %.

Error code	Meaning
00	The test was OK
01	Error, Power was < 90 % Fault on: [629] PA-filters
99	This is a marine bands transceiver, this unit can not execute the test

#### 8.4.43 TEST 39

Test 39 will test PA-filters 627, 628, 629.

It will select the 20-30 MHz filter for continuous coverage transceivers or the 14-27 MHz filter for marine bands transceivers. It will transmit at 2 MHz.

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

The test is OK if Power > 90 %.

Error code	Meaning
00	The test was OK
01	Error, Power was > 90 % Fault on: <u>627</u> , <u>628</u> , <u>629</u> PA-filters

#### 8.4.44 TEST 40

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

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

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

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

Error code	Meaning
00	The listening test is executing
99	This transceiver is not a marine bands version with 400-525 kHz filter, this test can not be executed

#### 8.4.45 TEST 41

Test 41 will test PA-filters 628.

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

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

The test is OK if Power > 90 %.

Error code	Meaning
00	The test was OK
01	Error, Power was < 90 % Fault on: <u>628</u> PA-filters



99

This is not a marine bands version with  
400-525 kHz filter, the test can not be  
executed

# 8.4.46 LIST OF TESTS

TEST#	TESTS	REMARKS
01	Audio Processing Board <span>601</span>	receiver signal path
02	Audio Processing Board <span>601</span>	receiver signal path
03	Audio Processing Board <span>601</span>	transmitter signal path
04	Audio Processing Board <span>601</span>	transmitter signal path
05	Display test	
06	Master Oscillator <span>612</span>	
07	Synthesizers <span>611</span>	all synthesizers mid range
08	Synthesizers <span>611</span>	1.LO out of lock
09	Synthesizers <span>611</span>	1.LO = 45 MHz 45-52.5 MHz range
10	Synthesizers <span>611</span>	1.LO = 52.5 MHz 45-52.5 MHz range
11	Synthesizers <span>611</span>	1.LO = 52.5 MHz 52.5-60 MHz range
12	Synthesizers <span>611</span>	1.LO = 60 MHz 52.5-60 MHz range
13	Synthesizers <span>611</span>	1.LO = 60 MHz 60-67.5 MHz range
14	Synthesizers <span>611</span>	1.LO = 67.5 MHz 60-67.5 MHz range
15	Synthesizers <span>611</span>	1.LO = 67.5 MHz 67.5-75 MHz range
16	Synthesizers <span>611</span>	1.LO = 75 MHz 67.5-75 MHz range
17	Synthesizers <span>611</span>	2.LO = 43.597 MHz
18	Synthesizers <span>611</span>	2.LO = 43.603 MHz
19	Synthesizers <span>611</span>	3.LO out of lock
20	Synthesizers <span>611</span>	3.LO = 1.3955 MHz
21	Synthesizers <span>611</span>	3.LO = 1.403 MHz
22	Exciter Signal Path <span>619</span>	no signal
23	Exciter Signal Path <span>619</span>	A1 mode
24	Exciter Signal Path <span>619</span>	J3E mode
25	Receiver Signal Path <span>618</span>	J3E mode
26	Receiver Signal Path <span>618</span>	AM mode
27	Receiver Signal Path <span>618</span>	FLB mode
28	Receiver Signal Path <span>618</span>	CW inter
29	Receiver Signal Path <span>618</span>	CW narrow
30	Receiver Signal Path <span>618</span>	CW narrow
31	Listening test (2 MHz)	Marine-band Continuous
32	PA-filters, ATU	1.6-2.3 MHz 1.6-2.3 MHz
33	PA-filters	2.3-3.3 MHz 2.3-3.3 MHz
34	- -	- - 3.3-4.8 MHz
35	- -	3.3-4.8 MHz 4.8-6.9 MHz
36	- -	6.2-8.9 MHz 6.9-10 MHz
37	- -	12-17 MHz 10-14 MHz
38	- -	- - 14-20 MHz
39	- -	19-27 MHz 20-30 MHz
40	Listening test (491 kHz)	
41	PA-filters	400-525 kHz

### 3.5 SPARE PARTS LIST, TRP 8250 D SERIES

#### CONTROL UNIT:

[600] Control Board (configuration Prom not included) (specify program version when ordering)	107 560 01
[601] Audio Processing	107 560 11
[602] Squelch Board (optional)	107 560 21
[603] Line Transformer Board (optional)	107 560 31
Membrane Keyboard (excl. graphics overlay)	343 590 5X
Loudspeaker	860 600 00
Lithium back-up battery	890 000 02

#### HANDSET:

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

#### TRANSCEIVER UNIT:

[611] Synthesizer Board	107 561 11
[612] Master Oscillator, 1.5 ppm	107 561 21
[613] Master Oscillator, 0.8 ppm (optional)	107 561 31
[614] Master Oscillator, 0.4 ppm (optional)	107 561 41
[618] Receiver Signal Path incl. filters	107 561 81
[619] Exciter Signal Path	107 561 91
40 Lead Flat Ribbon Cable	373 590 21
2 Lead Cable	106 600 50
Coaxial Cable	106 600 00
Coaxial Cable	106 600 10
Coaxial Cable	106 600 30
Coaxial Cable	106 600 40
Coaxial Cable	106 602 90
[620] Interconnection Board	107 562 01
Voltage Converter Assembly	107 600 90
Switched Mode Power Supply	107 600 20
[624] Transceiver Control Board (specify program version when ordering)	107 562 41
Power Amplifier Assembly	107 600 10
Power Amplifier Assembly, FCC	107 603 40
P.A. Filter Assembly, Marine Bands (TRP 8250 D/8251 D/8252 D) (without PCB [624] and cover)	107 601 70
P.A. Filter Assembly, Continuous Coverage (TRP 8253 D/8254 D/8255 D), (without PCB [624] and cover)	107 601 90
P.A. Filter Assembly, Marine Bands incl. 500 kHz (optional)	107 601 80
[630] 50 ohm Antenna Relay (optional)	107 563 01

#### ANTENNA TUNING UNIT:

[640] ATU Board	107 564 01
[641] Antenna Relay Board	107 564 11

AC POWER SUPPLY UNIT:

Transformer

383 597 31

Electrolytic capacitor 10000 uF/63 V

652 910 51

Lamp 24 V

754 000 04

Diode PH70

831 007 00