

Section III. TROUBLESHOOTING

3-7. Preparation for Troubleshooting

The PRC-2200 has an extensive self-test and diagnostics facility, which is described in detail in para. 2-6. Before starting PRC-2200 troubleshooting, make sure you are thoroughly familiar with the use and technical details of the self-test and diagnostics facility.

a. General Troubleshooting Procedures.

(1) The first step in the troubleshooting of a defective PRC-2200 is to classify the problem according to the four categories listed below:

- (a) Total failure: the PRC-2200 cannot receive, nor transmit.
- (b) Transmit failure: the failure mainly affects the transmit functions (e.g. loss of output power, transmission of unmodulated carrier, no transmission in certain bands or frequencies, etc.).
- (c) Receive failure: the failure mainly affects the receive functions (e.g. loss of sensitivity, squelch inoperative, distorted reception, etc.).
- (d) Control system failure: failure is apparently related to the control interfacing and display functions (e.g. no display, incomplete display, no response to keyboard inputs, etc.)

(2) After broadly identifying the general category that best describes the failure, operate the self-test and diagnostics function as follows:

- (a) Turn lighting on, select CLR operation and set CHANNEL selector to M.
- (b) Activate the off-line test (BIT).

(c) To display alarm messages stored in the HRD-ERR table, perform the following actions:

1. Press the TEST key several times, until the message BUG LIST appears on the display, then press ENT.
2. Press TEST key until the message HRD-ERR is displayed, then press ENT.
3. The display now shows the first hardware failure code. To see the additional failure codes, press the TEST key. After the last code is displayed, or when no failures are detected, you will see END-OF-TB.
4. Repeat 1 thru 3 for the PRSNT-ERR, and PASS-ERR messages.

(d) To display the password-protected alarm messages, perform the following actions:

1. Press the TEST key until the message PASSWORD appears on the display, then press ENT.
2. Enter the number of the channel now in use. For example, enter 00 if channel M is selected. Enter 01 if CH1 is selected.
3. The message MC PASS will appear on the display. Press ENT: the message READY will appear.
4. Enter the number 07, then press ENT.
5. The message READY ON appears on the display, press the RST key.
6. To display the failures contained in the HRD-ERR table, perform the actions described in para.(a) thru (c) above.

NOTE

To display the password-protected fail messages CP FLT 30 thru CP FLT 97, related to fail message CP FLT 06, perform para. (d) above.

To display the password-protected alarm messages related to alarm messages RT FLT 01 thru RT FLT 15 see para (e) below.

Table 3-4 lists all the failure messages. The messages are arranged in alphabetic order.

NOTE

The malfunctions marked with an asterisk in parentheses (*) could also be caused by a malfunction in the self-test system, therefore modules MCU and MB should also be checked.

Table 3-4. Failure Codes

No.	FAIL Code or Message	Description and Probable Cause
1	ADC FAIL	A/D converter problem in the MCU module. Followed by TRNS FAIL message. Transmission is disabled. Indicates hardware problem in the MCU module.
2	ANT SLC	Antenna selector or connections are defective. Followed by CP FAIL message. Transmission is disabled. Indicates hardware problem in the CP-2003.
3	COMM FAIL	Failure in serial communication between module MCU and CP-2003. Check module MNC of CP-2003 (*).

Table 3-4. Failure Codes (Cont'd)

No.	FAIL Code or Message	Description and Probable Cause
4	CP DRIVE	CP-2003 sensors did not detect RF power during matching. Followed by NO MATCH message. Indicates hardware problem in the CP-2003 or in the transmit path.
5	CP FAIL	CP-2003 defective. Transmission is disabled.
6	CP FLT 01	Defective EPROM U23, address bus or data bus in module MNC.
7	CP FLT 02	Defective RAM U22, address bus or data bus in module MNC.
8	CP FLT 03	Defective I/O interface in module MNC. Check U6-9, U7-2, U20, CR6 and CR7 in module MNC.
9	CP FLT 04	WHIP/DIP selector does not operate properly. Check WHIP/DIP selector and buffer U7 (pins 4, 5) in module MNC.
10	CP FLT 05	The DC test of the CP-2003 RF switches cannot be activated: - Defective DC test circuit in module RF3. Check U3, Q6, Q40 and Q41. - Defective test control circuit in module MNC. Check U7-6, U7-7 and U12-19. - +12V is missing. - V1 (+5V/+2V) is shorted to ground.
11	CP FLT 06	Failure in the DC test of the CP-2003 RF switches. For more details refer to the password protected section of the BUG LIST (see para. 3-7(2)(c)).

Table 3-4. Failure Codes (Cont'd)

No.	FAIL Code or Message	Description and Probable Cause
12	CP FLT 30	Failure of I/O interface test, L3, latch U9-18 in module MNC
13	CP FLT 31	Failure of I/O interface test, C11, latch U8-6 in module MNC
14	CP FLT 32	Failure of I/O interface test, L9, latch U10-16 in module MNC
15	CP FLT 33	Failure of I/O interface test, ST5, latch U11-15 in module MNC
16	CP FLT 34	Failure of I/O interface test, C7, latch U12-2 in module MNC
17	CP FLT 66	WHIP/DIP switch does not operate properly. - Check U11 (pins 2 and 5) and U24 (pins 4, 6, 7 and 8) in module MNC. - Check K1 in module RF1.
18	CP FLT 67	The TUNE/NORM switch does not operate properly. - Check U1(3) and U5(16) in module MNC. - Check Q1, CR1, CR2, L27 and R91 in module RF3.
19	CP FLT 68	Tune control circuit and TUNE switch do not operate properly. - Check U1(4) and U24(14) in module MNC. - Check Q7, R4, Q2, CR3, CR4, L28, R90, Q3, CR5, CR6, L29 and R92 in module RF3.

Table 3-4. Failure Codes (Cont'd)

No.	FAIL Code or Message	Description and Probable Cause
20	CP FLT 69	BP1* switch does not operate properly. - Check U1(15) and U5(15) in module MNC. - Check Q4, CR7, CR8, L30 and R93 in module RF3.
21	CP FLT 70	The switch of capacitor C9 does not operate properly. - Check U8(2) in module MNC. - Check Q30, CR64, CR65, L52 and R116 in module RF2.
22	CP FLT 71	The switch of capacitor C10 does not operate properly. - Check U8(5) in module MNC. - Check Q29, CR62, CR63, L51 and R115 in module RF2.
23	CP FLT 72	The switch of capacitor C11 does not operate properly. - Check U8(6), U14(4) in module MNC. - Check Q27, CR54, CR55, CR71, L13, L45 and L46 in module RF2.
24	CP FLT 73	The switch of inductor L14 (LP1) does not operate properly. - Check U8(9) in module MNC. - Check Q8, L14, CR12, CR20, L32 and R5 in module RF2.
25	CP FLT 74	BP1 switch does not operate properly. - Check U11(6) in module MNC. - Check Q5, CR9, CR10, L31 and R94 in module RF3.

Table 3-4. Failure Codes (Cont'd)

No.	FAIL Code or Message	Description and Probable Cause
26	CP FLT 75	BP2 switch does not operate properly. - Check U11(9) in module MNC. - Check Q19, CR34, CR35, L36 and R95 in module RF3.
27	CP FLT 77	ST5 switch does not operate properly. - Check U11(15) in module MNC. - Check Q18, CR32, CR33, L35 and R96 in module RF3.
28	CP FLT 78	The switch of capacitor C12 does not operate properly. - Check U11(16) in module MNC. - Check Q16, CR28, CR29, R118 and L33 in module RF2.
29	CP FLT 79	The switch of capacitor C13 does not operate properly. - Check U11(19) in module MNC. - Check Q17, CR30, CR31, R119 and L34 in module RF2.
30	CP FLT 80	The switch of inductor L4 does not operate properly. - Check U9(19), U13(5) in module MNC. - Check Q33, CR80, CR81, L54, R70 and R78 in module RF1.

Table 3-4. Failure Codes (Cont'd)

No.	FAIL Code or Message	Description and Probable Cause
31	CP FLT 81	The switch of inductor L3 does not operate properly. - Check U9(18), U13(11) in module MNC. - Check Q34, CR82, CR83, CR84, CR85, L55 and R72 in module RF1. - If CP FLT 81 occurs together with CP FLT 66 and CP FLT 82 failures, check first the WHIP/DIP switch in module RF1.
32	CP FLT 82	The switch of inductor L2 does not operate properly. - Check U9(17), U13(13) in module MNC. - Check Q35, CR86, CR87, CR88, CR89, L56 and R73 in module RF1. - If CP FLT 82 occurs together with CP FLT 66 and CP FLT 81 failures, check first the WHIP/DIP switch in module RF1.
33	CP FLT 83	The switch of inductor L12 does not operate properly. - Check U10(19) in module MNC. - Check Q22, CR44, CR45, CR66 and L39 in module RF2.
34	CP FLT 84	The switch of inductor L11 does not operate properly. - Check U10(18) in module MNC. - Check Q23, CR46, CR47, CR67 and L40 in module RF2.

Table 3-4. Failure Codes (Cont'd)

No.	FAIL Code or Message	Description and Probable Cause
35	CP FLT 85	The switch of inductor L10 does not operate properly. - Check U10(17) in module MNC. - Check Q24, CR48, CR49, CR68 and L41 in module RF2.
36	CP FLT 86	The switch of inductor L9 does not operate properly. - Check U10(16) in module MNC. - Check Q25, CR50, CR51, CR69 and L42 in module RF2.
37	CP FLT 87	The switch of inductor L8 does not operate properly. - Check U10(15), U14(5) in module MNC. - Check Q26, CR52, CR53, CR70, L43 and L44 in module RF2.
38	CP FLT 88	The switch of inductor L7 does not operate properly. - Check U10(14), U14(11) in module MNC. - Check Q28, CR56, CR57, CR72, L47 and L48 in module RF2.
39	CP FLT 89	The switch of inductor L6 does not operate properly. - Check U10(13), U14(13) in module MNC. - Check Q31, CR58, CR59, CR73, L49 and L50 in module RF2.

Table 3-4. Failure Codes (Cont'd)

No.	FAIL Code or Message	Description and Probable Cause
40	CP FLT 90	The switch of inductor L5 does not operate properly. - Check U10(12), U13(4) in module MNC. - Check Q32, CR60, CR61, CR74, L53 and R69 in module RF2.
41	CP FLT 91	The switch of capacitor C7 does not operate properly. - Check U12(2) in module MNC. - Check Q9, CR13, CR21 and R6 in module RF2.
42	CP FLT 92	The switch of capacitor C6 does not operate properly. - Check U12(5) in module MNC. - Check Q10, CR14, CR22 and R7 in module RF2.
43	CP FLT 93	The switch of capacitor C5 does not operate properly. - Check U12(6) in module MNC. - Check Q11, CR15, CR23 and R8 in module RF2.
44	CP FLT 94	The switch of capacitor C4 does not operate properly. - Check U12(9) in module MNC. - Check Q12, CR16, CR24 and R9 in module RF2.

Table 3-4. Failure Codes (Cont'd)

No.	FAIL Code or Message	Description and Probable Cause
45	CP FLT 95	The switch of capacitor C3 does not operate properly. - Check U12(12) in module MNC. - Check Q13, CR17, CR25 and R10 in module RF2.
46	CP FLT 96	The switch of capacitor C2 does not operate properly. - Check U12(15) in module MNC. - Check Q14, CR18, CR26 and R11 in module RF2.
47	CP FLT 97	The switch of capacitor C1 does not operate properly. - Check U12(16) in module MNC. - Check Q15, CR19, CR27, R12 in module RF2.
48	CP MISING	No communication between the microprocessors in the MCU and MNC modules. Followed by PWR 0.1W message. Indicates hardware problem in the CP-2003 (*).
49	DEFLT CHN	The RT-2001 loads automatically the default parameters. Followed by LOAD PARM message. Check backup battery on module AUDIO.
50	FATAL FLT	Major problem that prevents normal operation. See suspected modules in BUG LIST (*).
51	FRQ FAIL	Frequency fault in the CP-2003. Followed by FATAL FLT message. Check the CP-2003, module MCU or module SYNT (*).

Table 3-4. Failure Codes (Cont'd)

No.	FAIL Code or Message	Description and Probable Cause
52	INV PARM	Parameter entered by the operator is invalid, e.g. a frequency out of range, selection of squelch off in secure operation, etc.
53	INV KEY	Operator pressed an invalid button on the keypad, e.g. a function key during frequency entry, etc.
54	INV KY/CS	SEC or AJ key entered by the operator is invalid and/or has incorrect checksum.
55	LOAD FAIL	Loading of parameters from a loader (G-10) or from another radio set failed. Check connections, loader, and modules PANEL and MCU in the radio.
56	LOAD PARM	Usually appears after activation of the ERS function. Indicates that the operational parameters were lost. If appearing without previously erasing the memory, may indicate problem with backup battery (in module AUDIO) or RAM, U11 in module MCU (*).
57	LOW BATT!	Supply voltage is too low. Transmission is disabled. Replace battery or troubleshoot power supply (PS) module (*)
58	LRN FAIL	Antenna matching problem, for AJ or AUTO operation, which causes VSWR larger than 3:1. Check antenna, CP-2003, module AM and module RF (*).

Table 3-4. Failure Codes (Cont'd)

No.	FAIL Code or Message	Description and Probable Cause
59	NO LOADER	Loading of parameters from a loader (G-10) or from another radio set failed. Check connections, loader, and modules PANEL and MCU in the radio.
60	NO MATCH	Antenna matching problem for CLR and SEC operation, causing the VSWR to exceed 3:1. Check antenna, CP-2003, module AM and module RF (*).
61	NO TARGET	Loading of parameters into another radio set or to (G-10) loader failed. Check connections, loader modules PANEL and MCU in the radio.
62	PS FAIL	Problem with +5V/+2V voltage on transmission. Indicates hardware problem in the CP-2003 or in the PS module (*).
63	PTT FAIL	Disconnection or short-circuit on the PTT line to the CP-2003. Followed by TRNS FAIL message. Transmission is disabled. Indicates hardware problem in the CP-2003 (*).
64	PWR FAIL	Before performing antenna matching, the RF output power differs slightly from the required level. This malfunction does not necessarily require corrective actions. Check modules AM, CP-2003 (*).

Table 3-4. Failure Codes (Cont'd)

No.	FAIL Code or Message	Description and Probable Cause
65	PWR 0.1W	If followed by FATAL FLT, check module AM *. If followed by CP MISSING, check module CP *.
66	RT FLT 01	Failure in primary tests on CPU and RTC. Check module MCU. Check U4, U8 and inputs in module MCU (for more information see para (e) below).
67	RT FLT 02	Failure in CPU tests. Check module MCU. Check U4, U6, U30 in module MCU. (For more information see para. (e) below).
68	RT FLT 03	Failure in DC voltages test: +5V, -5V, +12V in module AUDIO. Check modules AUDIO, MCU, PS (*). Check U8, U30, U29 in module MCU. (For more information see para. (e) below).
69	RT FLT 04	Failure in INT SW, INT MC interrupt tests. Check module MCU. Check U4, U8, U9 in module MCU. (For more information see para. (e) below).
70	RT FLT 05	Failure in RAM tests. Check module MCU. Check U6, U4, U1, U2, U3, U7 in module MCU. (For more information see para. (e) below).

Table 3-4. Failure Codes (Cont'd)

No.	FAIL Code or Message	Description and Probable Cause
71	RT FLT 06	Failure in PGA-XC3042 loops tests INT BIT, UNLOCK/NMI. Check modules MCU, SYNTHESIZER, CP (*). Check U8, U9, U30, U4 in module MCU. Check U6 in module MB. (For more information see para. (e) below).
72	RT FLT 07	Failure in LSI TIMING and interface circuits tests. Check module MCU. Check U8, U9, U4 in module MCU. (For more information see para. (e) below).
73	RT FLT 08	Failure in PANEL port test. Check modules MCU, PANEL. Check U30 in module MCU, U3 in module DISPLAY. (For more information see para. (e) below).
74	RT FLT 09	Failure in FSK TIMERS on CPU and loops test. Check module MCU. Check U4, U30, U8, U9 in module MCU. (For more information see para. (e) below).
75	RT FLT 10	Failure in FSK tones loops test. Check modules AUDIO, MCU (*). (For more information see para. (e) below).
76	RT FLT 11	Failure in 1KHz CW tone loops test. Check modules AUDIO, MCU, SYNTHESIZER (*). Check the path of the 10KHz signal from SYNTHESIZER module to AUDIO. (For more information see para. (e) below).

Table 3-4. Failure Codes (Cont'd)

No.	FAIL Code or Message	Description and Probable Cause
77	RT FLT 12	Failure in CODEC and DMA loops tests. Check modules MCU, AUDIO (*). (For more information see para. (e) below).
78	RT FLT 13	Failure in LPF1 and LPF2 loops tests. Check modules MCU, AUDIO (*). (For more information see para. (e) below).
79	RT FLT 14	Failure in EPROM test. Check module MCU. Check U5, U7, U4 in module MCU. (For more information see para. (e) below).
80	RT FLT 15	Failure in WATCH DOG test. Check module MCU. Check U30, reset line to U30, U29 in module MCU. (For more information see para. (e) below).
81	RT FLT 61	Failure in USB and RF FILTER No. 1 on S-METER, in RECEIVE test. Check modules RF, IF (*).
82	RT FLT 62	Failure in USB and RF FILTER No. 2 on S-METER, in RECEIVE test. Check modules RF, IF (*).
83	RT FLT 63	Failure in USB and RF FILTER No. 3 on S-METER, in RECEIVE test. Check modules RF, IF (*).

Table 3-4. Failure Codes (Cont'd)

No.	FAIL Code or Message	Description and Probable Cause
84	RT FLT 64	Failure in USB and RF FILTER No. 4 on S-METER, in RECEIVE test. Check modules RF, IF (*).
85	RT FLT 65	Failure in USB and RF FILTER No. 5 on S-METER, in RECEIVE test. Check modules RF, IF (*).
86	RT FLT 66	Failure in USB and RF FILTER No. 6 on S-METER, in RECEIVE test. Check modules RF, IF (*).
87	RT FLT 67	Failure in USB and RF FILTER No. 7 on S-METER, in RECEIVE test. Check modules RF, IF (*).
88	RT FLT 68	Failure in LSB and RF FILTER No. 6 on S-METER, in RECEIVE test. Check modules RF, IF (*).
89	RT FLT 69	Failure in IF-IO-LEVEL in TRANSMIT test. Check modules AUDIO, IF (*).
90	RT FLT 70	Failure in AM-ENVELOPE in TRANSMIT test. Check modules IF, AM (*).
91	RT FLT 71	Failure in SIGNALING test. Check modules AUDIO, MCU.

Table 3-4. Failure Codes (Cont'd)

No.	FAIL Code or Message	Description and Probable Cause
92	RT FLT 72	Failure in SIDE TONE test. Check modules AUDIO, MCU.
93	RT FLT 73	Failure in module AM existence test (5V test on module AM). Check module AM (*).
94	RT FLT 74	Failure in AM CURRENT test in receive. Check module AM (*).
95	RT FLT 75	Failure in AM CURRENT measurement in transmit. Check module AM (*).
96	RT FLT 76	Failure in LEARN FAIL on transmit BIT test. Check module CP (*). See other possible failures in BUG-LIST.
97	RT FLT 77	Failure in POWER on transmit BIT test. Check module AM (*). See other possible failures in BUG-LIST.
98	RT FLT 78	Failure in module RF existence test (PTT line check). Check module RF (*).
99	RT FLT 79	Failure in module IF existence test (IF DC voltages measurement on IF-AM-METER). Check module IF (*).

Table 3-4. Failure Codes (Cont'd)

No.	FAIL Code or Message	Description and Probable Cause
100	RT FLT 80	Failure in ADC on end of conversion tests. Check module MCU.
101	RT FLT 81	Failure in +5V measurement. Check module PS (*).
102	RT FLT 82	Failure in Main battery 12V test. Same as in message No. 57. Check main battery. Check module PS (*).
103	RT FLT 83	Failure in BACKUP BATTERY test. Check backup battery in module AUDIO (*).
104	RT FLT 84	Failure in MB test No. 4. Check modules MB, MCU. Check U1, U5 in module MB.
105	RT FLT 85	Failure in MB test No. 3 (power control). Check modules MB, MCU. Check U2, U5 in module MB.
106	RT FLT 86	Failure in MB test No. 2 (RST AGC control). Check modules MB, MCU. Check U3, U5 in module MB.
107	RT FLT 87	Failure in MB test No. 1 (PTT OUT control). Check modules MB, MCU. Check U4, U5 in module MB.

Table 3-4. Failure Codes (Cont'd)

No.	FAIL Code or Message	Description and Probable Cause
108	RT FLT 89	Failure in RECEIVE test on PHONE (AUDIO OUTPUT POWER test). Check modules AUDIO, IF (*).
109	RT FLT 90	Failure in RECEIVE current measurement. Hardware problem which causes ADC failure and disables transmission. Check module PS, any module (*).
110	RT FLT 91	Failure in module AUDIO existence test (5V measurement AUDIO module). Check module AUDIO (*).
111	RTSF FAIL	Failure of serial communication between module MCU and the external equipment connected to the RMT/DATA connector. COMM REQ FRONT line is active constantly. - Check connection to external equipment. - Check modules PANEL and MCU.
112	RTSR FAIL	Failure of serial communication between module MCU and CP-2003, via the rear connector. COMM REQ REAR line is active constantly. Check CP-2003 (*).
113	SILENT	Operator pressed PTT when the radio set is in the receive-only (RCV ONLY) state.

Table 3-4. Failure Codes (Cont'd)

No.	FAIL Code or Message	Description and Probable Cause
114	TRNS FAIL	1. Major transmitter hardware problem, which disables transmission. May also appear when a fault does not allow antenna matching. See suspected modules in BUG LIST. - Check antenna, CP-2003 and modules AM, RF (*). or 2. Battery not able to supply power for transmission.
115	UNLOCK	Synthesizer unlocked. Transmission is disabled. Check module SYNT and CP-2003 (*).
116	USE H/S	The control handset is connected to the radio set, and its selectors are not at the PNL (PANEL) position, but the operator used a front panel control.

- (e) Table 3-5 lists the password-protected alarm coded messages related to alarm messages RT FLT 01 thru RT FLT 15 that are described in Table 3-4. The password-protected alarm coded messages listed in Table 3-5 are listed to be used for troubleshooting at D level senior technicians who have been trained and are proficient in performing depot-level maintenance on this type of electronic equipment.

To display the password-protected alarm coded messages that are listed in Table 3-5, perform the following procedure:

1. Press the TEST key several times, until the message PASSWORD appears on the display, then press ENT.

2. Enter the number of the channel now in use (00-19), then press ENT. The message MC PASS will appear on the display.
3. Press TEST key until 'AJ PASS' appears on the display.
4. Press ENT. The message READY will appear on the display.
5. Enter 52 and then press ENT.
6. A message that has a format XXXX=CD AB shall appear on the display. This message comprises two alarm code fields, AB and CD. For the interpretation of these alarm codes, see table 3-5.
7. If the content of field AB is "FF", this indicates that there are no more alarms - press RST.
8. If the content of field CD is FF:
 - a. Record the content of the AB field (this is the last alarm).
 - b. Press the RST key.
9. If the contents of fields AB and CD differ from FF act as follows:
 - a. Record the content of the AB and of the CD fields.
 - b. There are additional alarm codes. To display the additional alarm codes press 41, then ENT.

NOTE

The malfunctions marked with an asterisk could also be caused by a malfunction in the self-test system, therefore, modules MCU and MB should also be checked.

Table 3-5. Password Protected Failure Codes

Message and Recommended action in Table 3-4	Activated by Failure Code	Interpretation, Probable Cause and Recommended Action
RT FLT 01 (Check module MCU)	11	No change in Real Time Clock (RTC). In module MCU check LSI timing U8 and the following inputs to U8: - U8-2 for 560 KHz - U8-66 for 2688 KHz - U8-83 for 32 KHz. If input signals do not exist, check U30.
	12	Failure in LSI timing (U8) or CPU (U4) in module MCU. Data reading from RTC not good: check U8. Failure in CPU interrupt controller: check U4.
	13-15	Failure in CPU timer: In module MCU check U4.
RT FLT 02 (Check module MCU)	21	Failure in CPU register. In module MCU check U4.
	22-23	Failure in DMA 0: In module MCU check U4, U6 and U30.
	24-25	Failure in DMA 1: In module MCU check U4, U6 and U30.

Table 3-5. Password Protected Failure Codes (Cont'd)

Message and Recommended action in Table 3-4	Activated by Failure Code	Interpretation, Probable Cause and Recommended Action
RF FLT 03 (Check modules AUDIO, MCU, PS)	31	Failure in voltage measurement in module AUDIO. Failure in measurement of ripple on DC voltages +5V, -5V, +12V.
	32	Failure in voltage measurement in module AUDIO. Failure in measurement of DC voltages: +5V, -5V, +12V.
	33	Failure in voltage measurement in module AUDIO. Failure in measurement of DC voltages: +5V, -5V.
RF FLT 04 (Check module MCU)	41	Failure of INT SW on interrupt test. In module MCU check U8, U9, U4.
	42	Failure of INT MC on interrupt test. In module MCU check U8, U9, U4.
RF FLT 05 (Check module MCU)	51	Failure in RAM write/read test. In module MCU check U6, U4.
	52	Failure in RAM address test. In module MCU check U6, U4, U1, U2, U3.
	53	Failure in RAM 1K full test. In module MCU check U6, U4.
	54	Failure in RAM 32K full test. In module MCU check U6, U4.
	55	Failure in RAM overlap test. In module MCU check U6, U4, U7.

Table 3-5. Password Protected Failure Codes (Cont'd)

Message and Recommended action in Table 3-4	Activated by Failure Code	Interpretation, Probable Cause and Recommended Action
RT FLT 06 (Check modules MCU, SYNT, CP, MB)	61	Failure of U30 in INT BIT test. In module MCU check U8, U9, U4, U30.
	63	Failure in UNLOCK port test (frequency bus data is valid). In module MCU check U8, U9, U4, U30.
	64	Failure in NMI interrupt test (frequency bus data is not valid). In module MCU check U8, U9, U4, U30.
	65	Failure in UNLOCK port test (frequency bus data is not valid). In module MCU check U8, U9, U4, U30.
RT FLT 07 (Check module MCU)	72-75	Failure in LSI TIMING internal clocks or in counters test. In module MCU check the following inputs to U8: - U8-2 for 560 kHz - U8-66 for 2688 kHz - U8-83 for 32 kHz. In module MCU check U8, U9.
	76-78	Failure in LSI timing test using U30. In module MCU check the following inputs to U8: - U8-2 for 560 kHz - U8-66 for 2688 kHz - U8-83 for 32 kHz. In module MCU check U8, U9, U30.
RT FLT 08 (Check modules MCU, PANEL)	81	Failure in PANEL port test. In module MCU check U30[in module DISPLAY check U3.

Table 3-5. Password Protected Failure Codes (Cont'd)

Message and Recommended action in Table 3-4	Activated by Failure Code	Interpretation, Probable Cause and Recommended Action
RT FLT 09 (Check module MCU)	91-97	Failure in FSK timers on CPU and loops test. In module MCU check U4, U30, U8, U9.
RT FLT 10 (Check modules AUDIO, MCU, (*))	A1-AA	Test FSK tones loops. If tones do not appear on FSK GEN line (module AUDIO, P1-43), check module MCU. <u>A1, A2, A3, A5 alarm codes:</u> Each time one of these alarm codes is displayed it indicates a failure in a tone test on the following path: FSK GEN line, module AUDIO: LPF 3.5KHz (U6-7), TX selector (U3), TR combiner (U17-13, 14) ALC bypass (U16-3), BIT-2 line, input selector (U1), G1 line to BPF (U8), detectors CODEC input selector (U15) and back to MCU module via line CODEC IN, according to the following codes:
	A1	Failure in 2.4 kHz tone test in the above described path.
	A2	Failure in 2.7 kHz tone test in the above described path.
	A3	Failure in 3.0 kHz tone test in the above described path.
	A5	Failure in 3.3 kHz tone test in the above described path.
		<u>A4, A6, A7, A8 alarm codes:</u> Each time one of these alarm codes is displayed, it indicates a failure in the following path of the FSK tones:

Table 3-5. Password Protected Failure Codes (Cont'd)

Message and Recommended action in Table 3-4	Activated by Failure Code	Interpretation, Probable Cause and Recommended Action
RT FLT 10 (Cont'd)		FSK GEN line, SPF 3150Hz, HTX selector (U10), TR combiner (U17-3), ALC bypass (U16-3), BIT-2 line, input selector (U1), G1 line to BPF (U8), detectors CODEC input selector (U15) and back to MCU module via line CODEC IN, according to the following codes:
	A4	Failure in 3.0 kHz tone test on the above described path.
	A6	Failure in 3.3 kHz tone test or in selector U10 and controls test in the above described path.
	A7	Failure in 3.3 kHz tone test in the above described path.
	A8	Failure in 3.3 kHz tone test within the ALC circuit (U16-5), in the above described path.
		A9 and AA alarm codes indicate a failure in the test performed by comparing two tones in the following path from module MCU to module AUDIO: FSK GEN line, LPF 3.500 Hz, TX selector U3, TR combiner, U16-3, BIT-2 line, U1, G1 line to U8, detector, LOH switch (U23), comparator (U13), HARD FSK line and back to TIMING circuit on module MCU, according to the following failure codes:
	A9	Failure in activated 3.3 kHz tone, compared to not activated 3.0 kHz tone. "1" logic (+5V) expected on HARD FSK line (pin 31) if test is good.
	AA	Failure in activated 3.0 kHz tone, compared to not activated 3.3 kHz tone. "0" logic (0V) expected on HARD FSK line (pin 31) if test is good.

Table 3-5. Password Protected Failure Codes (Cont'd)

Message and Recommended action in Table 3-4	Activated by Failure Code	Interpretation, Probable Cause and Recommended Action
RT FLT 11 (Check modules AUDIO, MCU, SYNTHESIZER, (*))		Check the 10 kHz signal path from module SYNTHESIZER to module AUDIO (pin 29) divider to 1 kHz (U22), line CW GEN, BPF 1 kHz (U6), TX selector (U3), TR combiner (U17), ALC BYPASS (U16-3), BIT-2 line, input selector (U1), LPF1 (U14), line LPF OUT, codec input selector (U15), and via line CODEC IN to the MCU module. If the above loop is good, check module MCU.
	B1	Failure in 1 kHz tone test in the above described path.
	B2	Failure in TX0 control to TX selector test: check TX0 control circuit or selector.
	B3	Failure in TX1 control to TX selector test: check TX1 control circuit or selector.
	B4	Failure in testing the FOR (Front or Rear) control to input selector. Check FOR control or selector.
	B5	Failure in DOV (Data or Voice) control to input selector test: Check DOV control or selector.
	B6	Failure in FMI control to input selector test: Check control or selector.
	B7	Failure in ALC BY control to ALC bypass selector test: Check control or selector.

Table 3-5. Password Protected Failure Codes (Cont'd)

Message and Recommended action in Table 3-4	Activated by Failure Code	Interpretation, Probable Cause and Recommended Action
RT FLT 12 (Check modules MCU, AUDIO, (*))	C1	Failure in CODEC and DMA loops test in the following loop: 3.0 kHz tone from module MCU via line CODEC OUT to CODEC input selector (U15) in module AUDIO and back to module MCU via line CODEC IN. If the loop is good, check module MCU.
RT FLT 13 (Check modules MCU, AUDIO, (*))	D1-D7	Failure in LPF1 and LPF2 loops test in the following loop: 2.7 KHz signal from MCU module via line CODEC OUT to AUDIO module, LPF2 (U18), VO line, TX SELECTOR (U3), TR COMBINER (U17), ALC BYPASS (U16-3), line BIT-2, INPUT SELECTOR (U1), LPF1 (U14), line LPF1 OUT, INPUT SELECTOR CODEC (U15), back to MCU module through line CODEC IN, according to the following alarm codes:
	D1-D3	Failure in LPF1 loop test.
	D4-D7	Failure in LPF2 loop test.
RT FLT 14	E1, E2	Failure in EPROM (U5) test. In module MCU check U5, U7.
	E1	Failure in checksum test.
	E2	Failure in overlap test.
RT FLT 15	F1, F2	Failure in watchdog test. In module MCU check U30 and reset line to U30, U24.
	F1	Failure in watchdog test.
	F2	U30 does not receive reset.