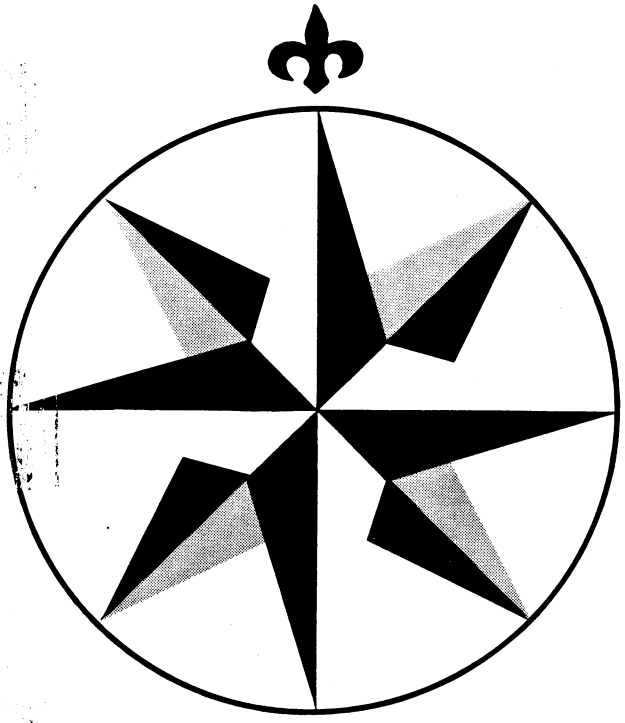


Sailor

Sailor

INSTRUCTIONS FOR IDENTITY AND SERVICE PROGRAMMING OF SAILOR VHF RT2047

A/S S. P. RADIO · AALBORG · DENMARK

ONLY FOR AGENTS AND SERVICE PERSONNEL

CONTENT

PROCEDURE FOR CHANGING THE SET INTO SERVICE MODE

Hurtig gennemgang til Sælgers Firma Standard.

① Gå i SERVICE MODE

② Tast 720 og ENT

③ Vent på AD slut.

Fig. 1.1

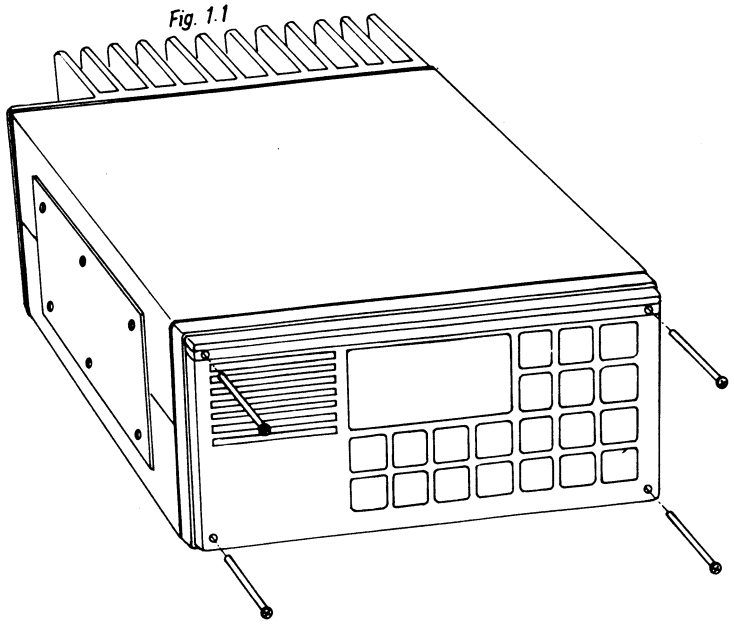


Fig. 1.2

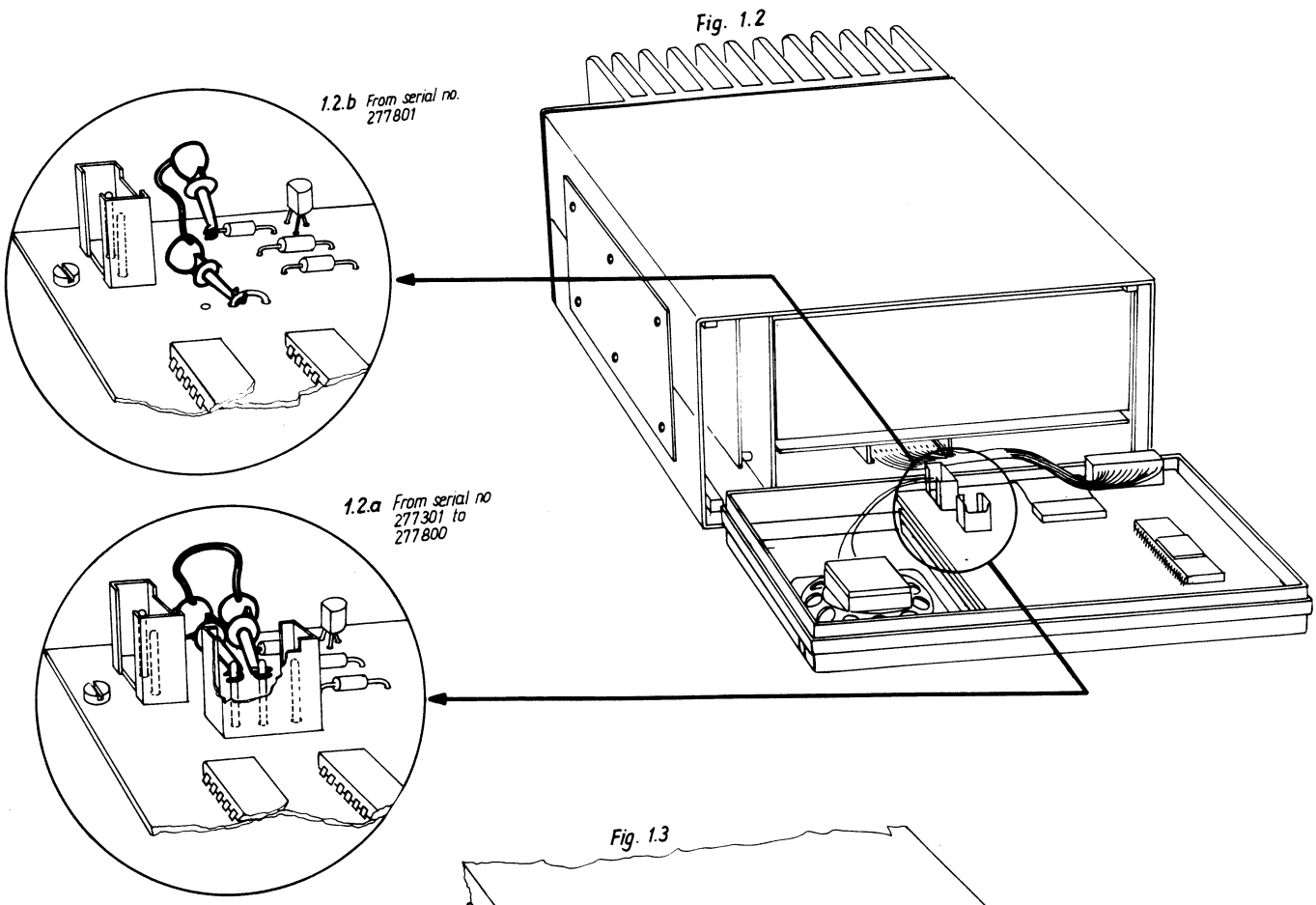
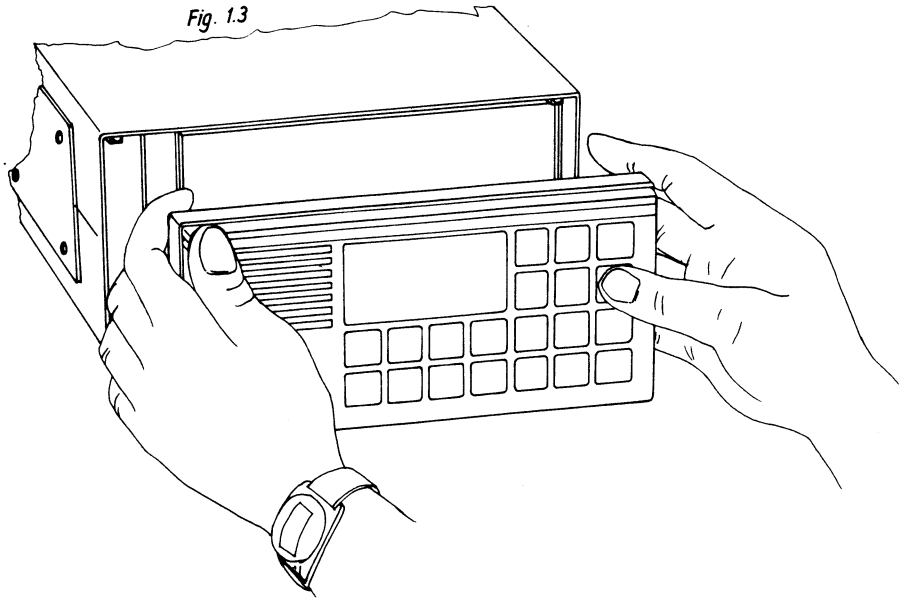


Fig. 1.3



RT2047 Service and Identity
4-0-24829 4-0-24830 4-0-24831

1. SERVICE MODE

1.0. GENERAL

In service mode it is possible to programme the EEPROMS and to use several test programmes, which are useful for fault finding.
The EEPROMS contain information about private channels, selcall number, identity codes etc. Also the last setting of volume, squelch and channel number are stored in the EEPROM every time the set is switched off, but these addresses cannot be accessed.
For normal operation with up to 20 private channels, only one PROM is necessary namely PROM No. 0 (IC609). If more than 20 private channels or a new function code for the international channels are to be used, a second PROM No. 1 (IC610) is to be inserted.

WARNING: Read this information carefully, because several of the P-codes affect the content of the PROMS, and thereby also the function of the set.

1.1. OPERATION PROCEDURE FOR SERVICE MODE

a) Unscrew the 4 screws on the frontplate (fig. 1.1.) and place the keyboard in front of the set (fig. 1.2.)

b) To enable the service mode, a jumper has to be connected on the keyboard-unit from the 3-poled socket (pin in the middle) to ground (fig. 1.2a), or from the hook to ground (fig. 1.2b).

c) Switch on the set.

d) The display will be erased and the set is ready in service mode.

e) While programming the keyboard can be held with left hand (fig. 1.3.).

f) Select the service programme by means of a P-code.

g) Select a new programme just by entering a new P-code.

h) Return to normal function by removing the jumper again.

1.2. P-CODE OVERVIEW

P No.	Function:
0	EEPROM No. 0 adr. 00-13
1	EEPROM No. 0 adr. 14-27
2	EEPROM No. 0 adr. 28-3B
3	EEPROM No. 0 adr. 3C-4F
4	EEPROM No. 0 adr. 50-63
5	EEPROM No. 0 adr. 64-77
6	EEPROM No. 1 adr. 00-13
7	EEPROM No. 1 adr. 14-27

2.0.1. KEYBOARD AND DISPLAY CONFIGURATION

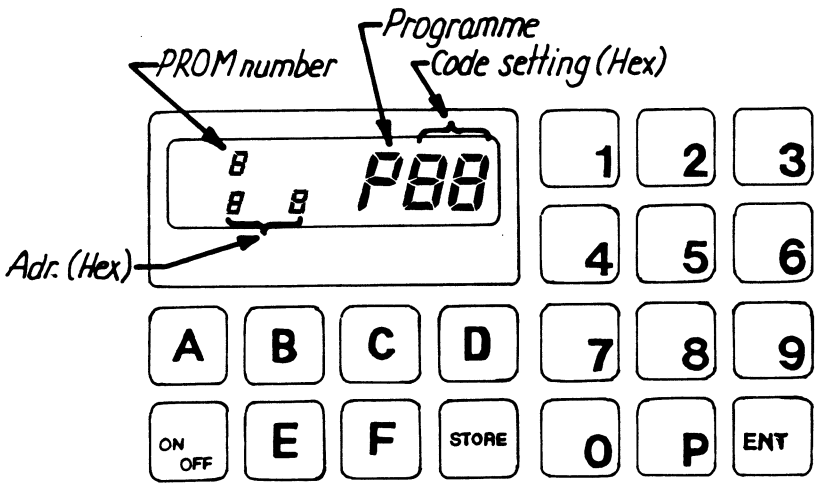


Table 1.1

2.0.2. HEXADECIMAL PROGRAMMING

In service mode all addresses and codes to be programmed are in hexadecimal notation.

2.0.2.1. CONVERSION FROM BINARY TO HEXADECIMAL NOTATION:

Binary bit number: 7 6 5 4 3 2 1 0

Group M Group L

Split up the 8 bits into 2 groups of 4 bits each as shown. Then convert each group according to the following table.

Dec.	Hex.	Bin.
0	0	0000
1	1	0001
2	2	0010
3	3	0011
4	4	0100
5	5	0101
6	6	0110
7	7	0111
8	8	1000
9	9	9009
10	A	1010
11	B	1011
12	C	1100
13	D	1101
14	E	1110
15	F	1111

Fig. 2.2. Binary to hex.

d) Find the service programme to be used.

e) Programme N(hex) at the address. See section 2.0.

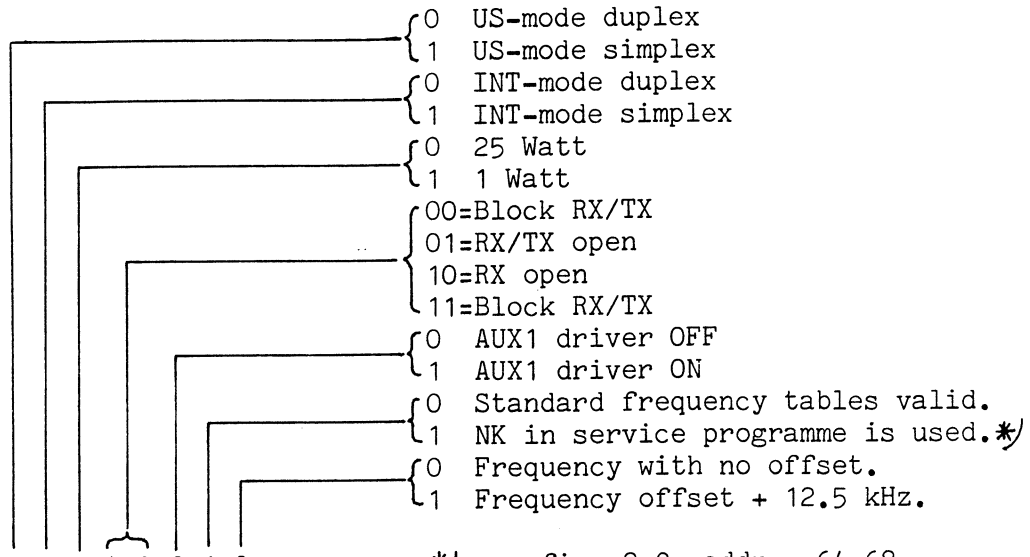
f) Set up the function code by means of fig. 2.5. and convert it to hex by means of fig. 2.2.

g) Find the address for the function code in fig. 2.7. or fig. 2.8.

h) Programme the function code.

HINT: Write down the coding in fig. 2.7. or fig. 2.8.

Fig. 2.5. Function Code.



For special purposes dividing figures can be calculated from the following formulas:

$$F = 156.0 + CH \times 0.050$$

$$N = \left(\frac{F - 16.8}{0.0125} - NK \right) : 2$$

CH = channel number
F = transmitting frequency in MHz
NK = constant for the dividing figure

The internal programme NK(TX) is 11136 (2B80 in hex) for transmitting. There is also a constant for simplex receiving NK(RX), which is 10768 (2A10 in hex). This must always be 368 less than NK(TX) to maintain a duplex distance of 4.6 MHz.

2.1.1. ADDRESSES OF PRIVATE CHANNELS FROM P0 TO P19

Fig. 2.7. Address table for private channels in PROM No. 0:

Select service programme P3:

Private channel	Addr.	N(hex)	Addr.	Function
P 0	3C		3D	
P 1	3E		3F	
P 2	40		41	
P 3	42		42	
P 4	44		45	
P 5	46		47	
P 6	48		49	
P 7	4A		4B	
P 8	4C		4D	
P 9	4E		4F	

Select service programme P4:

Private channel	Addr.	N(hex)	Addr.	Function
P 10	50		51	
P 11	52		53	
P 12	54		55	
P 13	56		57	
P 14	58		59	
P 15	5A		5B	
P 16	5C		5D	
P 17	5E		5F	
P 18	60		61	
P 19	62		63	

2.1.2. ADDRESSES OF PRIVATE CHANNELS FROM P20 TO P67

When private channels from P20 to P67 are to be used an extra EEPROM IC610 is to be inserted. This PROM is referred to as PROM No. 1.
Note that private channels from P20 to P67 cannot be used if a new function code to the international maritime channels is to be programmed, because these codes use the same locations.

Fig. 2.8. Address table for private channels in PROM No. 1:

Select service programme P6

Private channel	Addr.	N(hex)	Addr.	Function
P 20	00		01	
P 21	02		03	
P 22	04		05	
P 23	06		07	
P 24	08		09	
P 25	0A		0B	
P 26	0C		0D	
P 27	0E		0F	
P 28	10		11	
P 29	12		13	

2.2. PROGRAMMING OF USER SELECTED FUNCTIONS AND NATIONALITY

Fig. 2.9. Service programme P5, locations and content.

Addr.	Content:
64	NK(RX) MSB
65	NK(RX) LSB
66	NK(TX) MSB
67	NK(TX) LSB
68	Selcall figure No. 1
69	Selcall figure No. 2
6A	Selcall figure No. 3
6B	Selcall figure No. 4
6C	Selcall figure No. 5
6D	Min volumen level
6E	Selcall volume
6F	(Spare)
70	IDNT 0
71	IDNT 1
72	IDNT 2
73	IDNT 3
74	Preference channel to DW & Scanner
75	Quick channel
76	(Spare)
77	(Checksum No. 0)
	The locations described in paranthesis are used by the uC.

2.2.1. SELCALL NUMBER

Programme one figure in each location starting with the most significant figure as figure No. 1. Do not bother about the extra zero in the display.
If there is two identical figures in succession, the latter of them is to be programmed as an "A".

E.g. The number 67730 is to be programmed as 67A30.

Note: Remember to enable the selcall afterwards. see Fig. 2.10

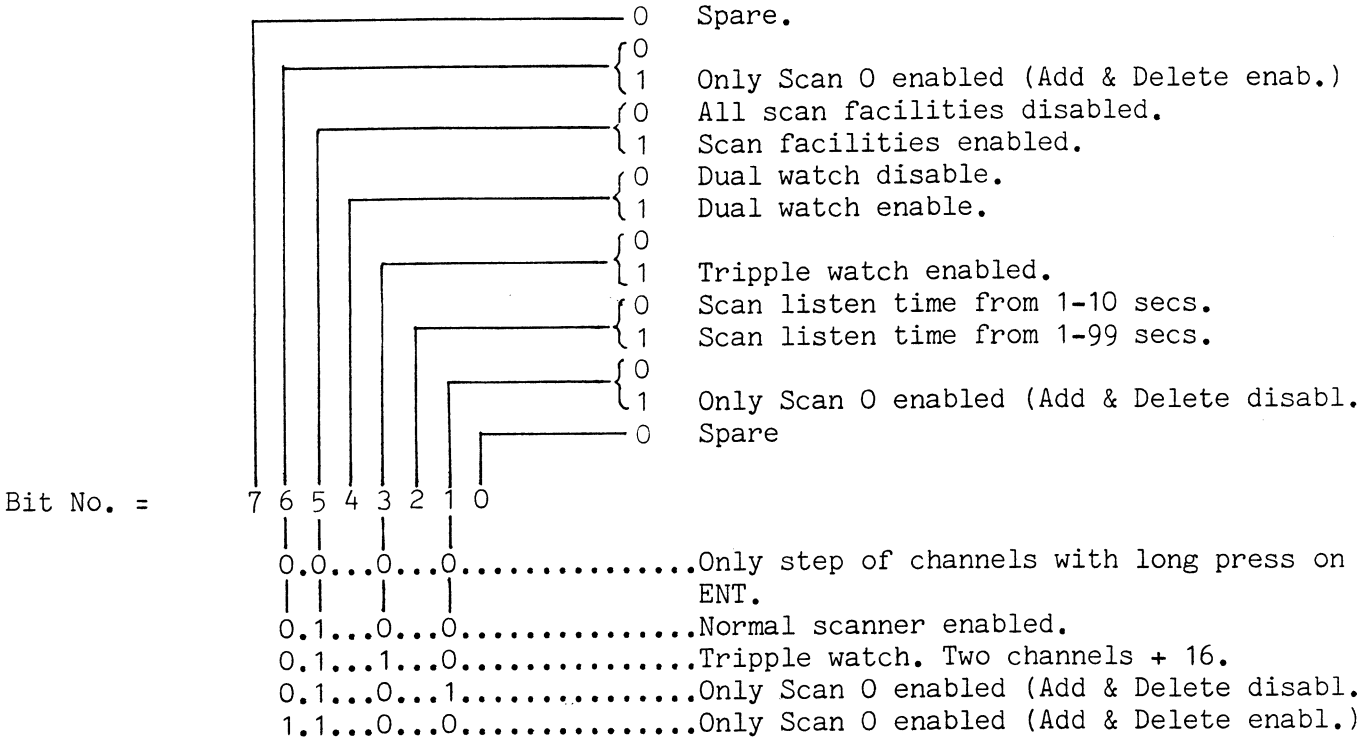
2.2.2. MINIMUM VOLUME LEVEL

The minimum volume level can be set to any step from 0 to F. This means that the volume cannot be lower than the level indicated in this address. This is to be used when the authorities do not allow the volume level to go to zero.

2.2.3. SELCALL ALARM VOLUME

The alarm volume can be preset to any step from 0 to F. The setting corresponds with the normal read-out in the display, but has to be programmed in hex.

Fig. 2.13. Identity code No. 3.



Important: Bit 0 and 7 must always be programmed as "0".

2.2.5. PREFERENCE CHANNEL FOR DW AND SCANNER

The preference can be changed to any channel, if this is more important than channel 16. Channel numbers from 0-29 shall be programmed direct in hex. For channel numbers from 60-89, 30 must be subtracted before converting to hex. Private channels from P0-P19 shall be programmed as a number from 60-89.

2.2.6. QUICK SELECT CHANNEL

This is the channel selected, when the push button, normally marked with a red 16, is activated. If another channel is programmed, the push button should be marked accordingly. Channel numbers from 0-29 shall be programmed direct in hex. For channel numbers from 60-89, 30 must be subtracted before converting to hex. Private channels from P0-P29 shall be programmed as a number from 60-89.

2.3. PROGRAMMING OF A NEW FUNCTION CODE FOR THE INTERNATIONAL CHANNELS

If a new function code for the international channel numbers is needed it can be programmed in PROM No. 1, and enabled by a bit in identity code No. 0 (see fig. 2.10.). If this is done, private channels from P20-P67 cannot be used.

In fig. 2.14. - 2.16. the internal programmed data is given at the location, where the new function code is to be programmed. For the channels to be changed find the new function code by means of fig. 2.6., and then programme the entire table into the PROM.

Fig. 2.16. Function code in ext. PROM. Use service programme P8.

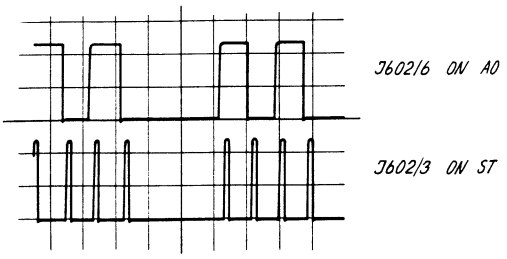
Addr.	Data	Channel number
28	C8	CH70
29	C8	CH71
2A	C8	CH72
2B	C8	CH73
2C	C8	CH74
2D	00	CH75
2E	00	CH76
2F	C8	CH77
30	88	CH78
31	88	CH79
32	88	CH80
33	88	CH81
34	88	CH82
35	88	CH83
36	08	CH84
37	08	CH85
38	08	CH86
39	08	CH87
3A	88	CH88
3B	00	CH89

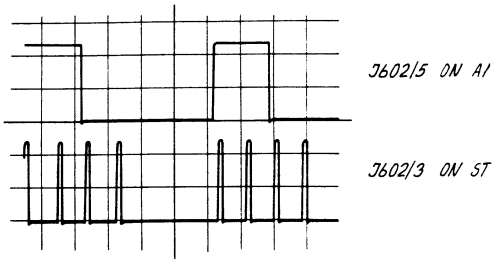
2.4. STANDARD FACTORY PROGRAMMING OF PROM NO. 0

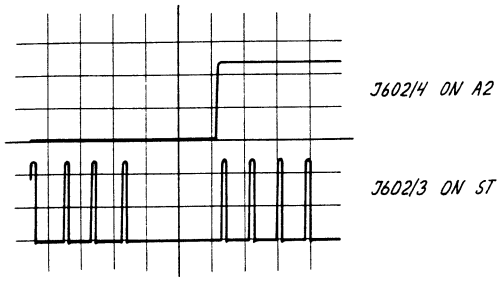
Fig. 2.17. Standard programming of PROM No. 0.

Addr.	Content	Description
0	FF	Scan 0 . 01234567
1	FF	Scan 0 . 89 etc.
2	FF	Scan 0 .
3	FF	Scan 0 .
4	FF	Scan 0 .
5	FF	Scan 0 .
6	FF	Scan 0 .
7	FF	Scan 0 .
8	FF	Scan 0 .
9	FF	Scan 0 .
A	00	Scan 1 .
B	00	Scan 1 .
C	00	Scan 1 .
D	00	Scan 1 .
E	00	Scan 1 .
F	00	Scan 1 .
10	00	Scan 1 .
11	00	Scan 1 .
12	00	Scan 1 .
13	00	Scan 1 .
14	00	Scan 2 .
15	00	Scan 2 .
16	00	Scan 2 .
17	00	Scan 2 .
18	00	Scan 2 .

Addr.	Content	Description
50	00	P10
51	00	P10
52	00	P11
53	00	P11
54	00	P12
55	00	P12
56	00	P13
57	00	P13
58	00	P14
59	00	P14
5A	00	P15
5B	00	P15
5C	00	P16
5D	00	P16
5E	00	P17
5F	00	P17
60	00	P18
61	00	P18
62	00	P19
63	00	P19
64	FF	NK(RX) MSB.
65	FF	NK(RX) LSB.
66	FF	NK(TX) MSB.
67	FF	NK(TX) LSB.
68	07	Selcall figure No. 1.
69	02	Selcall figure No. 2.
6A	03	Selcall figure No. 3.
6B	08	Selcall figure No. 4.
6C	09	Selcall figure No. 5.
6D	00	Min. volumen level.
6E	0A	Selcall volume.
6F	00	(Spare)
70	00	IDNT 0.
71	08	IDNT 1.
72	00	IDNT 2.
73	34	IDNT 3.
74	10	Preference channel to DW & Scanner.
75	10	Quick channel.
76	00	(Spare)
77	00	(Checksum No. 0).







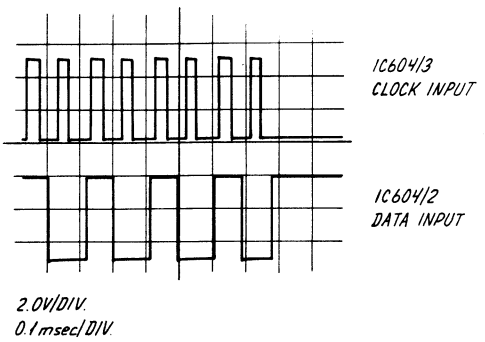
3.2. CHECK OF LATCHES TO SQUELCH AND VOLUME

The purpose is to verify the connections between the latch and the uC, as well as the function of the latch.

a) Select Service Programme P13. The uC IC619 writes continuously the hex codes 55 and AA into the latch IC604, so that the outputs of the latch should be toggling.

b) Check fig. 3.2. by means of an oscilloscope. Use the data input on IC604 pin 2 as trigger.

Fig. 3.2. Clock and data to latch.



c) Check fig. 3.3. by means of an oscilloscope. Use the strobe input on IC604 pin 1 as trigger.

3.5. TURN ALL PORTS ON IC619 TO INPUT MODE

Every pin goes into its high impedance state, so they can be checked for short circuits. This programme has the same effect as pulling the reset pin to ground.

a) Short circuit the contact in the ON/OFF relay.

b) Select service programme P16.

c) When finished, switch off the set by means of a long push.

3.6. WRITE/READ TEST OF PROM NO. 0 (IC609)

IMPORTANT: The content of the EEPROM will be destroyed.

a) Select service programme P17. The EEPROM goes through a write/read test.

b) Wait for one of the following answers in the display:
"AO" for no error. "EO" for an error.
(as long as the test goes on there is two bars in the display)

1) If no error is encountered, the EEPROM will be filled with FF in all locations.

2) If there is an error, the uC will continue to test the location, where the error is found. This gives the possibility to check the clock, data and AD/DA wires.

3.6.1. RECOMMENDED USE OF P17

a) Use service programme P13 for checking the clock and data lines to both IC609 and 610. This is possible, since these lines are shared with the latch IC604.

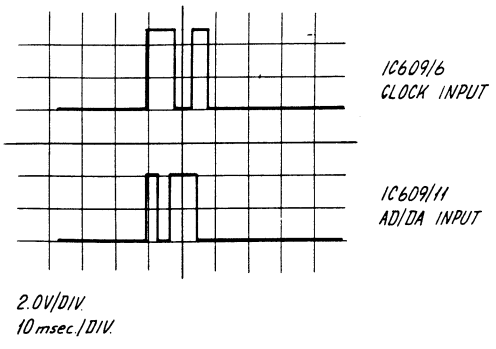
b) Check that the AD/DA line is high (bigger than 2.4V).

c) Remove the EEPROMS.

d) Select service programme P17.

e) Check fig. 3.6. by means of an oscilloscope. (Use the AD/DA input on IC609 pin 11 as trigger. Thereby also the AD/DA line is checked.

Fig. 3.6. AD/DA and clock.



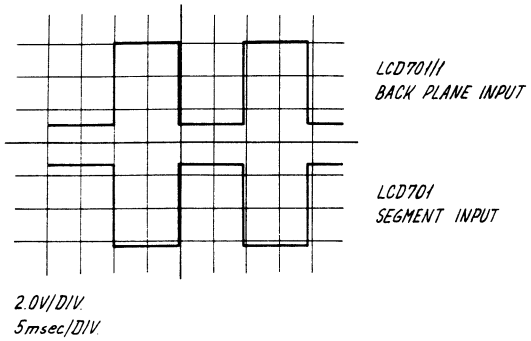
3.9. TEST OF DISPLAY

The display will show all the figures and letters.

a) Select service programme P50.

b) Check fig. 3.8., by means of an oscilloscope. Use the backplane input on LCD701 pin No. 1 for trigging of the oscilloscope.

Fig. 3.8. Display inputs.



3.10. TEST OF THE COMMUNICATION BETWEEN MICROPROCESSOR IC619 AND IC709.

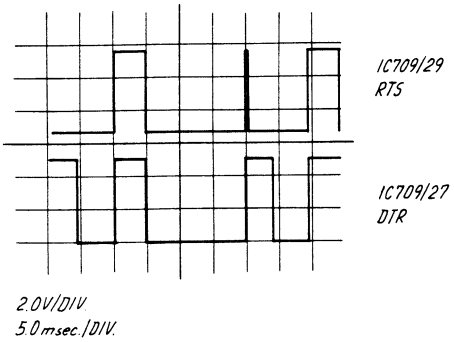
IC709 sends a character to IC619, which transmits the same character back to IC709. IC709 compares the transmitted character with the received character an if they are identical the read-out will show "A1" . If "A1" does not appear in the display, follow the check list below. Follow the signals from one uC to th other. If the signals arrive correctly, and the uC does not respond correct with the signal given by the next point, then the failure is in this uC (see section 3.12. - 3.13).

a) Check that the operating conditions for both uCs are established.

b) Select service programme P51.

c) Check the DTR- and RTS-lines: Use IC709 pin 27 output for trigging of the oscilloscope (if RTS is identical to DTR then there can be a failure on the CTS-line).

Fig. 3.9. RTS and DTR lines.



3.11. TEST OF KEYBOARD

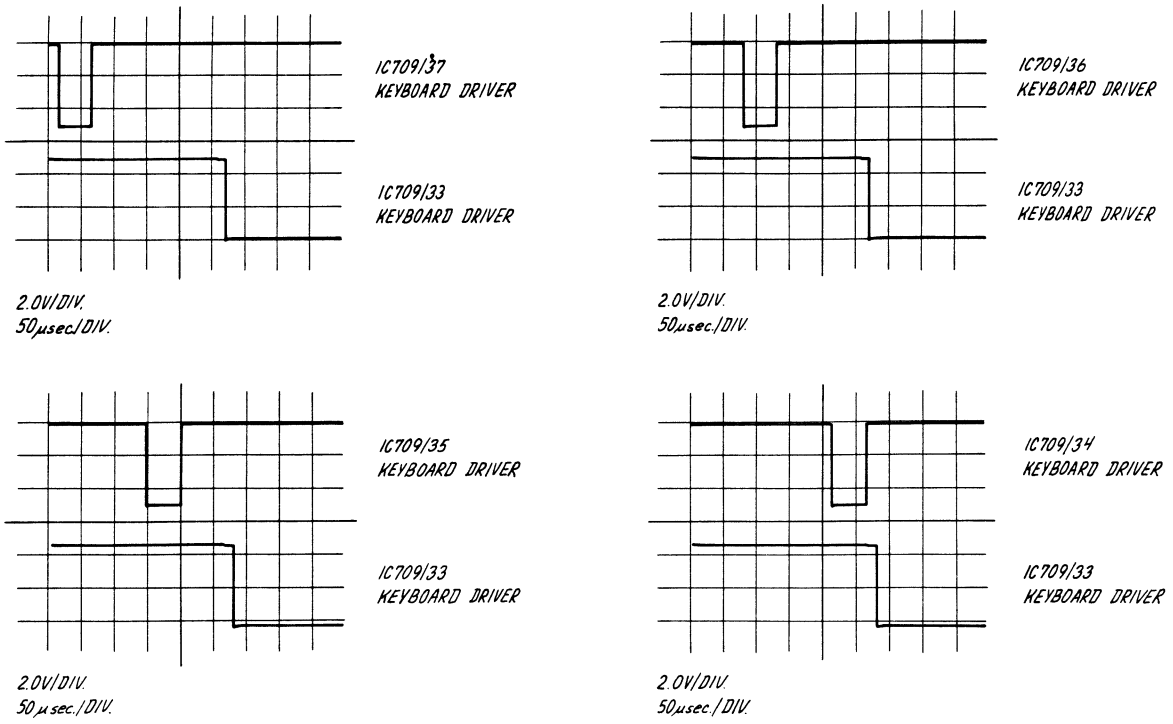
This test requires no service programme.

a) Check fig. 3.14. by means of an oscilloscope. Use IC709 pin 33 output for trigging of the oscilloscope.

b) All the inputs on IC709 pins 9,10,11,12 shall be high.

c) If a push button is activated both the PA-line and the PC-line connected this push button shall be low until the push button is released again.

Fig. 3.14. Keyboard inputs.



3.12. NORMAL OPERATING CONDITIONS FOR IC619

Pin 1: Vss : 0 V.
Pin 2: RESET : Bigger than 4.75 v.
Pin 3: INT : 5 V.
Pin 4: Vcc : 5 V
Pin 5: EXTAL : Frequency = 2.1 MHz +-20 Hz.
See fig. 3.15.
Pin 6: XTAL : 0 V.
Pin 7: NUM : 0 V. (If the uC is a MOTOROLA UV-device, then it shall be 5 V)
Pin 8: TIMER : 5 V

4. FAULT FINDING

4.1. KEYBOARD AND/OR DISPLAY DOES NOT WORK

1. Check normal operating conditions for IC709. See section 3.13.
2. Check keyboard. See section 3.11.
3. Check display. See section 3.9.
4. Check communication line to IC619. See section 3.10.

4.2. THE SET ALWAYS STARTS WITH CHANNEL 16

1. Check EEPROM No. 0. See section 3.6.

4.3. THE SET ALWAYS STARTS WITH "E0" IN THE DISPLAY

1. Check EEPROM No. 0. See section 3.6.

If a new EEPROM has been mounted, service programme P5 has to be used to set up the IDNT-codes etc., or the content of a master device has to be copied into it. See section 2.

5. FAULT FINDING WITH THE RESET PIN

If the reset pin is short-circuited to ground, the uC stops, and all ports will be turned into input mode. (High impedance level). When the short circuit is opened again the uC will start again. If this is done with IC619, remember to short-circuit the ON/OFF RELAY contact, or else the set will switch off. While the RESET pin is grounded, it is possible to force the pins, which are connected to an input terminal, high and low by means of a resistor, that is connected to ground or 5 V. This technique is of value, when one shall determine, if the line is short-circuited to another terminal).