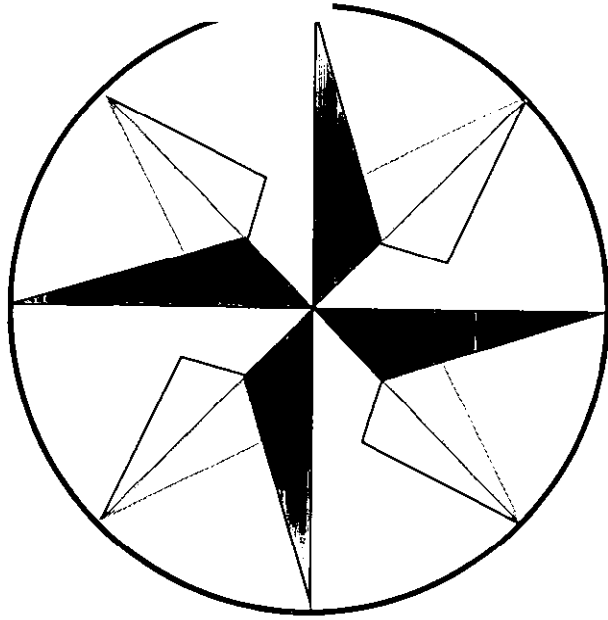


SACB-624

Radio - Holland B.V.
Installation Dept.
Postbus 5068
3008 AB ROTTERDAM

22407



Sailor

Sailor

INSTRUKTIONSBOG FOR
SAILOR R1120

INSTRUCTION BOOK FOR
SAILOR R1120



A/S S. P. RADIO · AALBORG · DENMARK

INSTRUCTION BOOK FOR
RECEIVER R1119/R1120

VALID FROM S.N. 255239

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GENERAL DESCRIPTION

INTRODUCTION

SAILOR R1120 is a main receiver intended for reception of A3, A3H, A3A, A3J, A2, A2H, A1 & F1 signals in the frequency range 10 kHz to 30 MHz.

SAILOR R1120 uses a digital synthesizer for frequency generation, and thus can be set to any frequency in the above mentioned frequency range. The digital synthesizer is controlled from a key board or the built-in continuous tuning wheel, the frequency selected is displayed on a six segment liquid crystal display (LCD). The frequency stability is controlled from one 10 MHz TCXO.

SAILOR R1120 is prepared for use in conjunction with telex and faximile equipment.

SAILOR R1120 is provided with higher order tunable RF filters to ensure good duplex performance. 0

SAILOR R1120 has automatical RF filter selection.

SAILOR R1120 fits into SAILOR 19" rack system.

SAILOR R1120 can be supplied with a selfcontaining cabinet H1225, and an AC/DC power supply N1405 with automatic change-over from AC to DC.

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TECHNICAL DATA

The receiver is fully synthesized and has a frequency resolution of 100 Hz.
 The receiver has a speech clarifier with a frequency control range of ± 150 Hz.
 The receiver is intended for reception of the following wave types A3 (A3E), A3H (H3E), A3A (R3E), A3J (J3E), A2 (A2A), A2H (H2A), A1 (A1A), F1 (F1B) and 2.4F1 (F1C).

Frequency ranges: 10 kHz - 30 MHz

Tuning error: less than 30 Hz

Frequency drift, short time: less than 5 Hz

Frequency drift, long time: less than 25 Hz per year

Frequency drift: 0 - 40°C: less than 25 Hz
 Also possibility for better figures for frequency drift when using another TCXO.

IF band width:

Mode or band width	Min. pass band at -6 dB	Max. pass band at -60 dB	Classification of reception	
			old	new
SSB/A3J	+ 350 Hz + 2700 Hz	- 300 Hz + 3400 Hz	A3A A3J F1 2.4F4	R3E J3E F1B F1C
AM/A3H	\pm 2900 Hz	\pm 9.5 kHz	A3 A3H	A3E H3E
MCW/A2 CW/A1 Interme- diate	\pm 1200 Hz	\pm 2800 Hz	A1 A2 A2H	A1A A2A H2A
CW/A1 Narrow	\pm 700 Hz	\pm 1700 Hz	A1	A1A
CW/A1 V.Narrow	max. \pm 190 Hz	\pm 600 Hz	A1	A1A

Options:

			SP TYPE
AUX Telex	+ 1300 Hz + 1700 Hz	+ 1075 Hz + 1925 Hz	C1022
AUX Telex	+ 1500 Hz + 1900 Hz	+ 1275 Hz + 2125 Hz	C1023
AUX Telex	+ 1700 Hz + 2100 Hz	+ 1475 Hz + 2375 Hz	C1024
AUX LSB	- 350 Hz - 2700 Hz	+ 300 Hz - 3400 Hz	C1013

TECHNICAL DATA cont.:

Sensitivity, 20 dB SN/N:

MF, A3J :	< 16 dB/1 uV
MF, A3H :	< 30 dB/1 uV
HF, A3J :	< 10 dB/1 uV
HF, A3H :	< 24 dB/1 uV
HF, A1/Narrow:	< 5 dB/1 uV

Adjacent Channel Selectivity:

A3J:	>50 dB at -1 and +4 kHz
	>55 dB at -2 and +5 kHz
	>75 dB at -5 and +8 kHz
A3:	>55 dB at -10 and +10 kHz
	>75 dB at -20 and +20 kHz

Blocking:

wanted signal	60 dB/1 uV
blocking level	>110 dB/1 uV

Cross Modulation:

wanted signal	60 dB/1 uV
cross modulation level	>100 dB/1 uV

Intermodulation:

3rd order intermodulation	$\Delta f = 30$ kHz
intermodulation level	>90 dB/1 uV

Operation Temperature Range:

-15°C to +55°C

Spurious rejection:

image rejection	> 60 dB
IF rejection	> 60 dB
all others	> 70 dB

Spurious emission:

$P_{out} < 0.1$ nW into 50 ohm

Audio outputs:

Loudspeaker	4W into 8 ohms
Headphones	60 mW into 8 ohms
Line	0 dBm into 600 ohms

Automatic gain control:

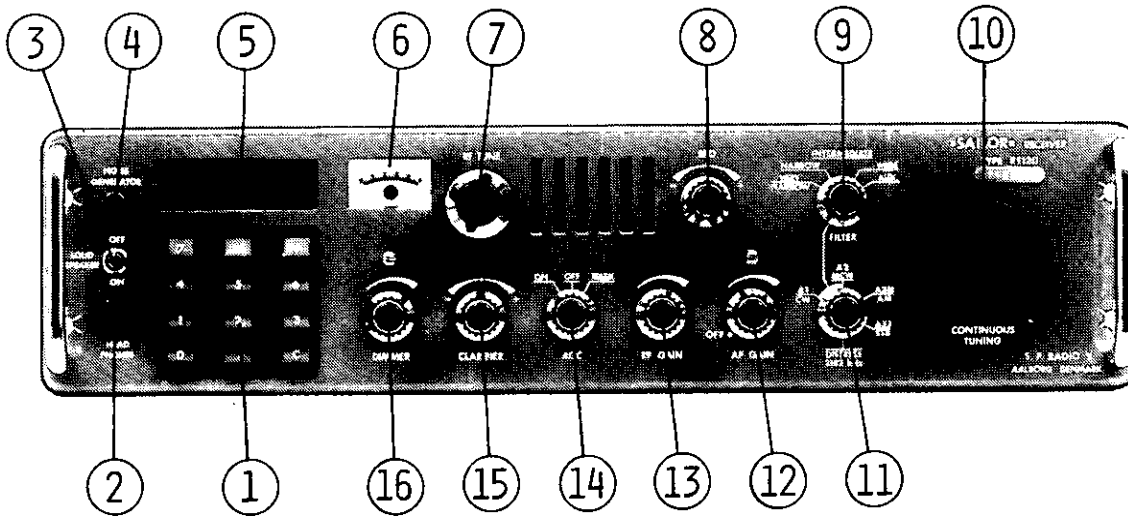
AM AGC:	attack time approx.	35 mSec
	decay time approx.	80 mSec
$\Delta V_{in} = 40$ dB		
SSB AGC:	attack time approx.	2 mSec
	hang time approx.	3 Sec
TELEX AGC:	attack time approx.	2 mS
	decay time approx.	80 mS

IF frequencies:

1st IF:	10.6085 MHz & 16.6085 MHz
2nd IF:	600 kHz

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CONTROLS R1120



- ① KEYBOARD
Enters the frequency into the frequency synthesizer. The frequency shall be entered in kHz, and only if a fractional kHz is wanted it is necessary to activate the decimal point key. Before a new frequency is entered, and if a wrong figure is keyed in all the display is cleared by means of the clear key C. After clearing and keying in a new frequency, the receiver is blocked. Furthermore the zero key and the decimal point key controls the CONTINUOUS TUNING ⑩ .
- ② HEADPHONES
Receptacle for headphones.
- ③ LOUDSPEAKER ON/OFF
Switches ON or OFF the loudspeakers.
- ④ NOISE GENERATOR
Removes the keyboard controlled receiver blocking and the aerial, and activates the built-in noise generator.
- ⑤ DISPLAY
Displays the keyed figures and finally the actual receiving frequency.
- ⑥ METER
Shows the field strength of the incoming signal.

CONTROLS cont.:

- ⑦ RF TUNE
Tunes the band filter to the chosen frequency.
- ⑧ BFO
Adjusts the beat note in A1 mode.
- ⑨ FILTER
Chooses the wanted bandwidth in A1- and A2 mode, and disables the BFO in the AUX. position.
- ⑩ CONTINUOUS TUNING
Is activated by pressing the decimal point key on the KEYBOARD ①, and tunes over the full frequency range. The tuning wheel can be disabled by pressing the zero key on the KEYBOARD ①.
- ⑪ MODE SWITCH
Switches between reception of fixed 2182 kHz (Distress), A3J - (A3J and A3A), A3H - (A3H and A3), A2 (A2 and A2H) and A1 signals.
- ⑫ AF GAIN
Controls the AF output and turns the mains on/off.
- ⑬ RF GAIN
Controls the overall RF amplification in the receiver.
- ⑭ AGC
Changes between slow (ON) and fast (TELEX) release time for the SSB AGC system or switches OFF the AGC.
- ⑮ CLARIFIER
Provides incremental tuning over a +150 Hz frequency range.
- ⑯ DIMMER
Controls the light intensity from the DISPLAY and the METER.

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DIRECTIONS FOR USE

INITIAL SETTINGS

Turn on the receiver on the AF GAIN (12) or on the power supply N1400 or N1401 and turn the AF GAIN (12) to approx. middle position.

Turn the CLARIFIER (15) to the center position, the RF GAIN (13) fully clockwise and the AGC SWITCH (14) to position ON. Choose the wanted mode of reception on the MODE SWITCH (11). (For further description of mode filter - and AGC selection, please examine the paragraphs below).

FREQUENCY CONTROL

The frequency is controlled from the KEYBOARD (1) and the CONTINUOUS TUNING (10) wheel. The wanted frequency must be entered into the KEYBOARD (1) in kHz and is then displayed on the liquid crystal DISPLAY (5). The decimal point is only to be used when a fractional kHz is wanted. After entering a frequency the receiver is blocked and the CONTINUOUS TUNING (10) wheel is disabled.

After keying in a frequency you must press the NOISE GENERATOR (4) and adjust RF TUNE (7) for maximum reading on the METER (6). For frequencies below 150 kHz chosen there is no tuning to be done on the RF TUNE (7), just press NOISE GENERATOR (4) to unblock the receiver.

Now the wanted frequency is selected and the receiver front end is tuned. The CLARIFIER (15) controls the frequency between the 100 Hz steps selectable.

For searching over a frequency range the CONTINUOUS TUNING (10) wheel is activated by pressing the decimal point key on the KEYBOARD (1). When the desired frequency is found the CONTINUOUS TUNING (10) wheel can be disabled by pressing the zero key on the KEYBOARD (1).

The CONTINUOUS TUNING (10) wheel is able to tune the receiver over the full frequency range 10 kHz to 30 MHz. It is necessary to follow the frequency tuning wheel with the front end tuning on the RF TUNE (7). Each time you pass a band limit by means of the CONTINUOUS TUNING (10) the receiver blocks. (Band-limits: 150 kHz, 530 kHz, 1.6 MHz, 4 MHz, 7 MHz, 14 MHz and 30 MHz). To unblock the receiver again you must press the NOISE GENERATOR (4) and adjust the RF-TUNE (7) for maximum METER (6) reading.

DISTRESS

With the controls set as described under INITIAL SETTINGS above just turn the MODE SWITCH (11) to DISTRESS (2182 kHz) position. Now the receiver is ready for reception on the distress frequency, mode selection (AM) and front end tuning is automatically done in the receiver.

SSB TELEPHONY

For normal telephony purpose turn the MODE SWITCH (11) to A3J (SSB) position. Now SSB reception of normal upper sideband is established.

For SSB telephony purpose the preferable AGC (14) position is ON.

DIRECTIONS FOR USE cont.:

It is possible by means of the RF GAIN (13) to control the attack level for the AGC system in such a way that signals below a certain level not attacks the AGC system.

In noisy environments it can be advantageous to switch OFF the AGC (14) and control the gain by the RF GAIN (13) to avoid that noise impulses activates the AGC circuit.

Another possibility for gain regulation under strong repetitive noise impulses is to switch the AGC (14) to the TELEX position and turn the RF GAIN (13) fully clockwise.

The AGC system now regulates the amplification down immediately and thus prevents the noise impulse to be heard in the loudspeaker. When the noise impulse disappears again the amplification increases rapidly. This fast AGC system suppresses effectively noise impulses, but for SSB purpose it furthermore introduces some distortion because of the missing hang time in this position. For that reason it is only advantageous to use the TELEX AGC system when your environments is so noisy that the ON pos. is unusable.

GENERAL BROADCASTING

With the controls set as described under INITIAL SETTINGS above, turn the MODE SWITCH (11) to A3H (AM) position. Now you are ready to key in a wanted frequency or search by means of the CONTINUOUS TUNING (10) as described under FREQUENCY CONTROL.

TELEX IN SSB MODE

For telex reception the receiver is operating as described under SSB TELEPHONY. Because of the nature of the telex signal (it contains no envelope modulation) is the most advantageous AGC (14) choice the TELEX one. The extremely good noise performance of this AGC is fully utilized because no distortion can be introduced.

Special attention must be paid to the frequency selected. The telex service frequencies listed by the authorities are assigned frequency. For that reason you must set the frequency either 1700 Hz or 1500 Hz below the assigned frequency, depending upon the telex equipment used.

TELEX IN AUX. MODE IF TELEX FILTER IS FITTED

As in the TELEX IN SSB MODE except that the MODE SWITCH (11) is set to position A1 (CW) and the FILTER SWITCH (9) to position AUX.

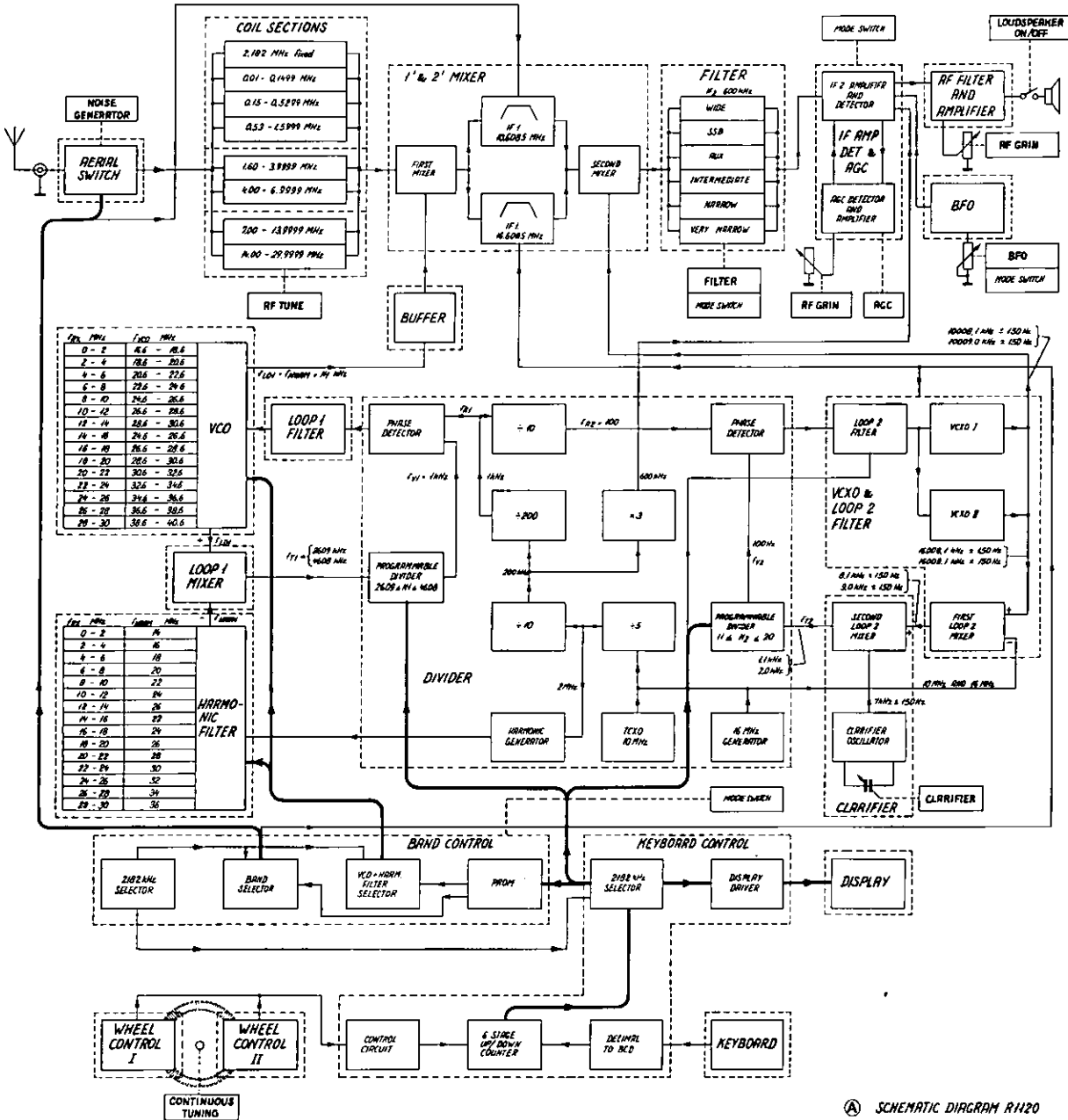
MODULATED TELEGRAPHY

With the controls set as described under INITIAL SETTINGS above, turn the MODE SWITCH (11) to position A2 (MCW) and the FILTER SWITCH (9) to INTERMEDIATE. The AGC system now chosen is the SSB one, and you must set the AGC (14) to the most suitable position (ON or TELEX) after the present noise conditions.

TELEGRAPHY

With the controls set as described under INITIAL SETTINGS above, turn the MODE SWITCH (11) to A1 (CW) position and turn the FILTER SWITCH (9) to suitable bandwidth. Now the receiver is ready for telegraphy reception and the BFO (8) is operational and can be tuned to a desirable beat note. For the same reasons as described in the telex paragraph the most advantageous AGC (14) choice is the ON one.

PRINCIPLE OF OPERATION



(A) SCHEMATIC DIAGRAM R1120

RECEIVER R 1120

The SAILOR R1120 is a fully synthesized double superheterodyne receiver with 10.6085 or 16.6085 MHz 1st IF and 600 kHz 2nd IF.

The signal from the aerial is led through the BAND FILTER UNIT to the FIRST MIXER, where the aerial signal is mixed with the f_{LO1} signal having frequency resolution of 1 kHz, and thus giving a 1st IF frequency range from 10.6081 MHz to 10.6090 MHz or 16.6081 MHz to 16.6090 MHz.

PRINCIPLE OF OPERATION cont.:

The signal is then led through a double monolithic crystal filter to the SECOND MIXER, where the signal is mixed with the f_{L02} signal having continuous tuning in the frequency range from 10.00795 MHz to 10.00915 MHz or 16.00795 MHz to 16.00915 MHz, and thus giving a 2nd IF frequency of 600 kHz.

The 16.6085 MHz 1st IF is selected in the frequency range 0.0100 MHz to 13.9999 MHz and 10.6085 MHz in the range 14.0000 MHz to 29.9999 MHz.

The produced 2nd IF signal is led through one of the five filters available on the IF FILTER UNIT. The switching takes place electronically by means of the MODE and/or the FILTER SWITCH.

The signal is then passed on to the IF2 AMPLIFIER and DETECTOR. The IF amplifier consists of 3 AGC controlled amplifier stages. The detector for both AM and SSB reception is an envelope detector, and in the SSB and CW mode the carrier is reinjected in such a way that the incoming signal is converted to an A3H signal.

The reinjected carrier in SSB mode is 600 kHz derived from the 10 MHz reference oscillator, and in CW mode the carrier signal from the beat frequency oscillator BFO is used. This frequency can be varied between 599.5 kHz and 601.8 kHz.

The AGC DETECTOR AND AMPLIFIER consists of the AM AGC system and the hang AGC system.

The audio frequency signal is fed from the detector to the AF FILTER AND AMPLIFIER, consisting of an audio filter, a preamplifier and an output power amplifier, which delivers signal to the fixed AF output (0 dBm), the headphones and the speakers.

FREQUENCY GENERATION

The necessary frequencies are generated by two frequency synthesizers according to the phase locked principle.

Local oscillator signal f_{L01} to FIRST MIXER is generated in the phase locked loop 1 and has a resolution of 1 kHz.

Local oscillator signal f_{L02} to SECOND MIXER is generated in the phase locked loop 2 and has a resolution of 100 Hz, and continuous tuning over the 100 Hz steps by means of the CLARIFIER.

LOOP 1

The voltage controlled oscillator (VCO) generates the necessary local oscillator signal to FIRST MIXER in twelve 2 MHz bands selected by the BAND CONTROL UNIT. Inside each 2 MHz band the VCO frequency f_{L01} is controlled by a DC controlled voltage derived from the PHASE DETECTOR and filtered out in the LOOP 1 FILTER.

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PRINCIPLE OF OPERATION cont.:

The PHASE DETECTOR compares two signals, a variable frequency f_{V1} and a reference frequency f_{R1} . The reference frequency f_{R1} is the 10 MHz TCXO frequency divided down to 1 kHz.

The variable frequency f_{V1} is generated from the VCO frequency f_{LO1} in the following way:

In the LOOP 1 MIXER the counter frequency f_{T1} is produced as the difference between the VCO frequency f_{LO1} and the frequency f_{HARM} which is a multiple of 2 MHz derived from the 10 MHz TCXO.

$$f_{T1} = f_{LO1} - f_{HARM} = f_{LO1} - (m \times 2 \text{ MHz}) = N_1 \times 1 \text{ kHz}$$

For each 2 MHz band a new f_{LO1} and f_{HARM} is selected by the BAND CONTROL UNIT, and it always results in a 2 MHz variation of the frequency f_{T1} to PROGRAMMABLE DIVIDER.

The frequency f_{T1} is divided down by a dividing figure N_1 in the PROGRAMMABLE DIVIDER to the variable frequency f_{V1} .

$$f_{V1} = f_{T1}/N_1 = 1 \text{ kHz}$$

The working principle in a phase locked loop is as follows:

A frequency error between the variable frequency f_{V1} and the reference frequency f_{R1} will via the PHASE DETECTOR and the LOOP 1 FILTER cause a DC control voltage controlling the VCO frequency and consequently the variable frequency f_{V1} so that f_{V1} follows the reference frequency f_{R1} in frequency.

$$f_{R1} = f_{V1} = 1 \text{ kHz}$$

The VCO frequency f_{LO1} is now phase locked on a fixed frequency to the reference frequency f_{R1} and has therefore the same accuracy as this.

Changing of the VCO frequency f_{LO1} by 1 kHz is carried out by changing the dividing figure N_1 in the PROGRAMMABLE DIVIDER by one.

$$f_{LO1} = f_{HARM} + (N_1 \times 1 \text{ kHz})$$

Principle of programming:

The PROGRAMMABLE DIVIDER contains a counter circuit counting down from a start figure $2000 + P_1$ and stops at the stop figure S_1 . Each time the counter reaches the stop figure S_1 , a pulse (f_{V1}) is fed to the PHASE DETECTOR, and the counter starts counting down again from the start figure $2000 + P_1$. Division of f_{T1} by N_1 is now achieved.

$$f_{V1} = f_{T1}/N_1; N_1 = 2000 + P_1 - S_1$$

PRINCIPLE OF OPERATION cont.:

The BAND CONTROL unit selects the correct VCO- and HARMONIC FILTER range.

Inside each 2 MHz band the programmable figure P_1 , is encoded from the KEY BOARD CONTROL unit in BCD code representing the frequency within the 2 MHz band.

Start figure: $2000 + P_1$; $0 \leq P_1 \leq 1999$

Stop figure: $S_1 = -609$

$N_1 = 2000 + P_1 - S_1 = P_1 + 2609$

Output frequency from Loop 1:

$$f_{L01} = m \times 2 \text{ MHz} + (P_1 + 2069) \times 1 \text{ kHz}; 7 \leq m \leq 18$$

LOOP 2

The voltage controlled crystal oscillator (VCXO) generates the necessary local oscillator signal to SECOND MIXER. The VCXO is in the Loop 2 system phase locked to the internal 10 MHz reference frequency.

The phase locked loop principle is the same as for the Loop 1 system. The only difference is that there are two mixers in the feed-back path, where the one injection signal is a fixed 10 MHz or 16 MHz signal and the other one f_{CL} is the CLARIFIER signal.

The CLARIFIER has a frequency variation of ± 150 Hz which results in a ± 150 Hz variation of the VCXO frequency f_{L02} .

Principle of programming:

The frequency shift in Loop 2 is controlled from the 0.1 kHz code from the KEY BOARD CONTROL UNIT.

The PROGRAMMABLE DIVIDER counts up from the start figure P_2 to the stop figure S_2 .

The 0.1 kHz code controls the start figure P_2 to the PROGRAMMABLE DIVIDER.

Start figure: $0 \leq P_2 \leq 9$

Stop figure: $S_2 = 20$

Dividing figure: $N_2 = S_2 - P_2 = 20 - P_2$

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PRINCIPLE OF OPERATION cont.:

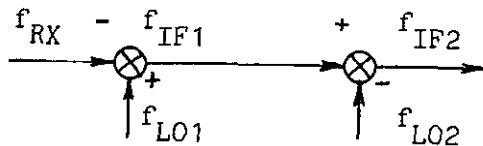
Output frequency from Loop 2:

$$\begin{aligned} f_{L02} &= 10 \text{ MHz} + f_{CL} \pm 150 \text{ Hz} + (N_2 \times 0.1 \text{ kHz}) \\ f_{L02} &= 10.007 \text{ MHz} \pm 150 \text{ Hz} + (20 - P_2) \times 0.1 \text{ kHz} \\ f_{L02} &= 10.009 \text{ MHz} \pm 150 \text{ Hz} - (P_2 \times 0.1 \text{ kHz}) \end{aligned}$$

or:

$$\begin{aligned} f_{L02} &= 16 \text{ MHz} + f_{CL} \pm 150 \text{ Hz} + (N_2 \times 0.1 \text{ kHz}) \\ f_{L02} &= 16.007 \text{ MHz} \pm 150 \text{ Hz} + (20 - P_2) \times 0.1 \text{ kHz} \\ f_{L02} &= 16.009 \text{ MHz} \pm 150 \text{ Hz} - P_2 \times 0.1 \text{ kHz} \end{aligned}$$

RECEIVING FREQUENCY f_{RX} FOR RECEIVER R1119 & R1120



$$f_{IF2} = 0.600 \text{ MHz}$$

$$f_{L02} = \begin{cases} 10.009 \text{ MHz} + 150 \text{ Hz} - (P_2 \times 0,1 \text{ kHz}) \\ 16.009 \text{ MHz} \pm 150 \text{ Hz} - (P_2 \times 0,1 \text{ kHz}) \end{cases}$$

$$f_{IF1} = f_{IF2} + f_{L02} = \begin{cases} 10.609 \text{ MHz} - (P_2 \times 0,1 \text{ kHz}) \\ 16.609 \text{ MHz} - (P_2 \times 0,1 \text{ kHz}) \end{cases}$$

$$f_{L01} = m \times 2 \text{ MHz} + (P_1 + 2609) \times 1 \text{ kHz}, 7 \leq m \leq 18$$

For $0.0100 \text{ MHz} \leq f_{RX} \leq 13.9999 \text{ MHz}$

$$f_{RX} = f_{L01} - f_{IF1} = (m-4) \times 2 \text{ MHz} + (P_1 + 0,1 P_2) \times 1 \text{ kHz}$$

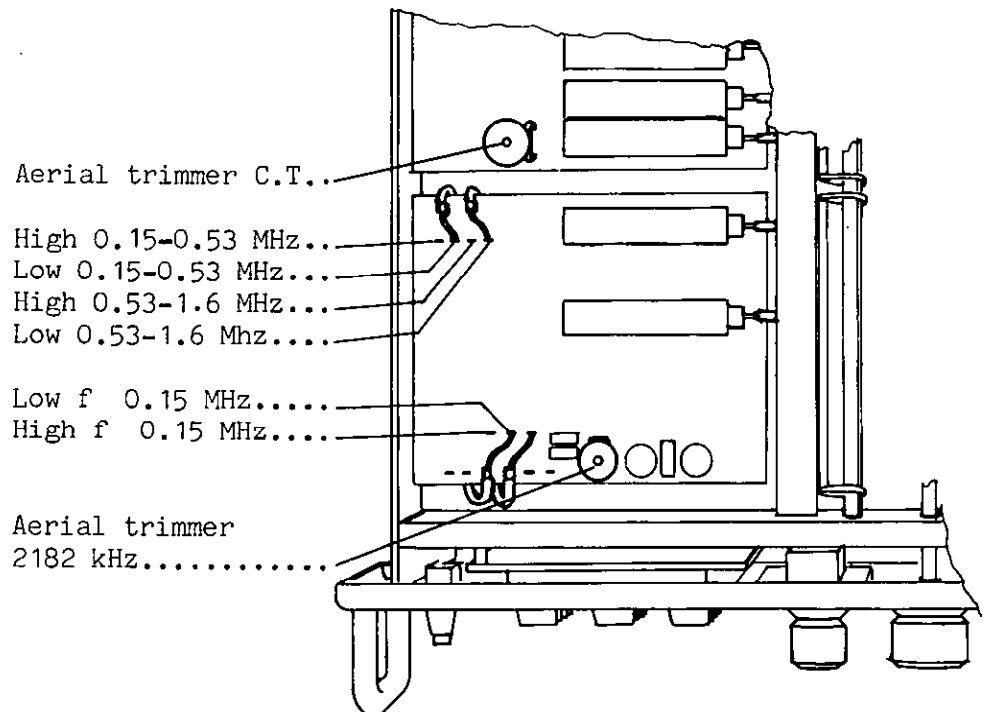
For $14.0000 \text{ MHz} \leq f_{RX} \leq 29.9999 \text{ MHz}$

$$f_{RX} = f_{L02} - f_{IF1} = (m-7) \times 2 \text{ MHz} + (P_1 + 0,1 P_2) \times 1 \text{ kHz}$$

AERIAL TUNE PROCEDURE

When the receiver has been installed the aerial trimmer for the 2182 kHz input filter must be adjusted, and for installation with short coax cables 1 - 12 m. it may be advantageous to adjust the aerial trimmer for the C.T. band 1.6 - 4 MHz.

NOTE: The length of the coax cable is from the aerial input socket of the receiver to the connection box for the aerial.



ADJUSTING PROCEDURE 2182 kHz:

1. Set mode switch to pos. 2182 kHz.
2. Set AGC switch to pos. ON.
3. Turn RF GAIN fully clockwise.
4. Turn AF GAIN to suitable volume.
5. Adjust by means of an insulated trimming stick the aerial trimmer 2182 kHz for max. METER reading or max. noise in the loudspeaker.

ADJUSTING PROCEDURE C.T. BAND (cable length 12 m.):

1. Set mode switch to pos. AM.
2. Set AGC switch to pos. ON.
3. Turn RF GAIN fully clockwise.
4. Turn AF GAIN to suitable volume.

AERIAL TUNE PROCEDURE cont.:

5. Key in a low frequency in the C.T. band e.g. 1610 kHz by means of the KEYBOARD.
6. Activate the NOISE GENERATOR and adjust RF TUNE for max. meter reading.
7. Press the decimal point key on the KEYBOARD and search by means of the CONTINUOUS TUNING wheel for a weak station in the low end of the C.T. band.
8. Adjust RF TUNE for max. METER reading.
9. Adjust by means of an insulated trimming stick the aerial trimmer C.T. for max. METER reading.
10. Repeat 8) and 9) until no essential improvement is achieved.

CHANGE OF INPUT IMPEDANCE FOR FREQUENCIES BELOW 1.6 MHz:

For installations with short coax cables and short aerials it may be advantageous to shift from 50 ohms input impedance, pos. LOW to high input impedance pos. HIGH.

To determine which pos. is the most advantageous, search for a weak station near the band limits, note the METER readings. Change for the other input impedance and check if the METER readings have increased. Remember to adjust RF TUNE.

Band limits: 150 kHz, 530 kHz and 1.6 MHz.

SERVICE

1. MAINTENANCE
2. NECESSARY TEST EQUIPMENT
3. TROUBLE-SHOOTING
4. PERFORMANCE CHECK
5. ADJUSTMENT PROCEDURE
6. NECESSARY ADJUSTMENTS AFTER REPAIR
7. FUNCTION CHECK
8. MECHANICAL DISASSEMBLING T1127 ONLY

1. MAINTENANCE

1.1.

When the SAILOR SHORT WAVE SET type 1000 has been correctly installed, the maintenance can, dependent on the environment and working hours, be reduced to a performance check at the service workshop at intervals not exceeding 5 years. A complete performance check list is enclosed in the PERFORMANCE CHECK section.

Also inspect the antennas, cables and plugs for mechanical defects, salt deposits, corrosion and any foreign bodies.

Along with each set a TEST SHEET is delivered, in which some of the measurements made at the factory are listed. If the performance check does not show the same values as those on the TEST SHEET, the set must be adjusted as described under ADJUSTMENT PROCEDURE.

Any repair of the set should be followed by a FUNCTION CHECK of the unit in question.

2. NECESSARY TEST EQUIPMENT

TX: T1127, T1127L

EXC: S1300, S1301

RX: R1119, R1120

PS: N1400, N1401

TX	EXC	RX	PS	
X	X	X	X	<u>OSCILLOSCOPE:</u> Bandwidth DC - 35 MHz Sensitivity 2 mV/cm Input impedance 1 Mohm//30 pF Triggering EXT-INT-ENVELOPE E.g. PHILIPS type PM3216
X	X	X		<u>PASSIVE PROBE:</u> Attenuation 20 dB (10X) Input resistance 10 Mohm Input capacitance 15 pF Compensation range 10 - 30 pF E.g. PHILIPS type PM8925
	X	X		<u>MULTIMETER:</u> Sensitivity DC (f.s.d.) 1V Input impedance 10 Mohm Accuracy (f.s.d.) <u>+2%</u> E.g. PHILIPS type PM2505
X			X	<u>MULTIMETER:</u> Sensitivity DC (f.s.d.) 0.3V & 3A Input impedance 30 kohm/V Accuracy (f.s.d.) <u>+1%</u> Current range 100 A Voltage range 500V & 2.5 kV E.g. Unigor type A43 Shunt type GE4277 H.T.probe type GE4196

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NECESSARY TEST EQUIPMENT cont.:

TX	EXC	RX	PS
	X	X	
		X	
	X	X	
X		X	

TONE GENERATOR:

Frequency range 200 - 3000 Hz
 Output voltage 1V RMS
 Output impedance ≤ 600 ohm
 E.g. PHILIPS type PM5107

AF VOLTMETER:

Sensitivity (f.s.d.) 300 mV
 Input impedance ≥ 4 ohm
 Accuracy (f.s.d.) $\pm 5\%$
 Frequency range 100 - 3000 Hz
 E.g. PHILIPS type PM2505

FREQUENCY COUNTER:

Frequency range 100 Hz - 30 MHz
 Resolution 0.1 Hz at $f \geq 10$ MHz
 Accuracy 1×10^{-7}
 Sensitivity 100 mV RMS
 Input impedance 1 Mohm//25 pF
 Single period range 1 sec.
 Resolution 1 mSec.
 E.g. PHILIPS type PM6611 + PM9679

SIGNAL GENERATOR:

Frequency range 0.1 - 30 MHz
 Output impedance 50/75 ohm
 Output voltage 1 uV - 100 mV EMF
 Modulation AM, 30%, 1000 Hz
 Ext. mod. 300 - 2700 Hz
 Ext. mod. sensitivity 1V for M=0.3
 E.g. PHILIPS PM5326

POWER SUPPLIES:

N1400/T1127:
 Vout 26.5V DC
 Iout 70A DC
 E.g. 2 pcs. LAMBDA type LXS-G-24-0V-R

1000 A 2/4

NECESSARY TEST EQUIPMENT cont.:

TX	EXC	RX	PS
	X		
	X	X	
	X		
	X		
X			
X			

POWER SUPPLIES:

S1300, S1301

Vout 1 22V

Iout 1 1.5A

Vout 2 -45V

Iout 2 -0.1A

E.g. SAILOR types N1402
N1402 spec.
N1405

R1119, R1120:

Vout 1 22V

Iout 1 1A

Vout 2 8V

Iout 2 1A

Vout 3 -45V

Iout 3 -0.1A

E.g. SAILOR types N1402 spec.
N1405

TEST BOX S1300/S1301:

S.P. type S1300/01 Test box

ARTIFICIAL KEY S1300TT/S1301:

S.P. type Artificial key

POWER METER:

Power range 500W

Impedance 50 ohm

E.g. Bird Thruline Wattmeter Model 43
Plug-in element 500W 2-30 MHz

RF AMMETER (Thermocross):

Current range 5A

E.g. Helweg Mikkelsen & Co. TR-68x71, 5A
Copenhagen, Denmark type

1000 A 3/4

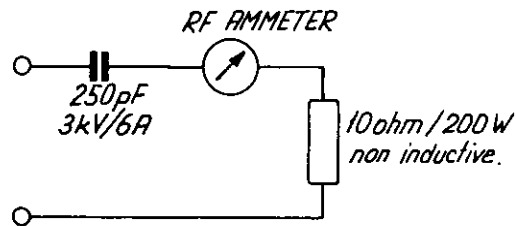
NECESSARY TEST EQUIPMENT cont.:

TX	EXC	RX	PS
X	X		
X			

DUMMY LOAD for HF bands, 4 - 25 MHz:

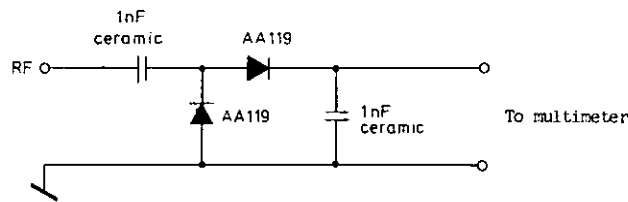
Impedance 50 ohm
 Frequency range 4 - 25 MHz
 Power range 400W
 SWR 1:1.2
 E.g. Bird Termaline Coaxial Resistor Model 8401

DUMMY LOAD for C.T. band 1.6 - 4 MHz:

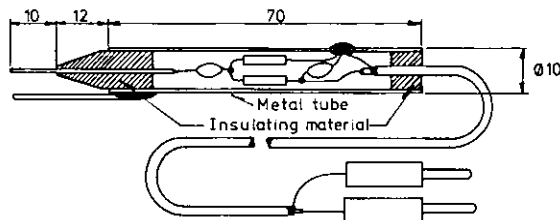


E.g. Draloric type 06-1291TD 20x50L 8kVs 250 pF $\pm 20\%$ R85
 E.g. 10 pcs. Dale type PH-25A-17, 100 ohm, 5%, 25W

DIODE PROBE



LAYOUT OF THE PROBE



1000 A 4/4

3. TROUBLE-SHOOTING

Trouble-shooting should only be performed by persons with sufficient technical knowledge, who have the necessary test equipment at their disposal, and who have carefully studied the operation principles and structure of the unit in question.

Start to find out whether the fault is somewhere in the antenna circuit, the power source, or in the short wave set.

For help with trouble-shooting in the short wave set there is a built-in test meter and test meter switch, located behind the air filter on the power supply.

When the fault has been located to a certain unit look up the PERFORMANCE CHECK list in the instruction book and make relevant performance check to incircle the fault. Then look up the CIRCUIT DESCRIPTION. This section contains schematic diagrams, description of the modules and pictures showing the location of the components. (ADJUSTMENT LOCATIONS).

Typical AC and DC voltages are indicated on the schematic diagrams.

No adjustment must take place unless the service workshop has the necessary test equipment to perform the ADJUSTMENT PROCEDURE in question.

After repair or replacement of the module look up the section NECESSARY ADJUSTMENTS AFTER REPAIR to see, whether the unit has to be adjusted or not.

Anyway the unit has to have a complete FUNCTION CHECK after repair.

TROUBLE-SHOOTING cont.:

TROUBLE-SHOOTING IN THE FREQUENCY GENERATING CIRCUIT.

LOOP 1

If the fault has been located to LOOP 1 the following hints can be used for trouble-shooting.

If there is no output signal from the VCO the fault has to be found in the VCO-UNIT.

If the output frequency from the VCO is lower than the low frequency limits or higher than the high frequency limits of the 2 MHz band in question, the phase locked loop 1 is out of lock. For VCO frequencies look-up the section PRINCIPLE OF OPERATION.

1. Check the LOOP 1 MIXER output signal on the terminal LOOP 1 OUT, module 1400.
 - a. If there is no output signal, the failure is on LOOP 1 MIXER, HARMONIC FILTER UNIT or VCO-UNIT.
 - b. If the output frequency is approx. 2 MHz or approx. 5 MHz, the VCO-UNIT, LOOP 1 MIXER and the HARMONIC FILTER UNIT are apparently ok.
2. Check that the frequency on the phase/frequency detector IC1006, pin 1 is 1 kHz.
3. Check the Loop 1 Programmable Divider, module 1000.
 - a. If the frequency on the input terminal LOOP 1 IN is approx. 2 MHz and the frequency on the phase/frequency detector IC1006, pin 3 is lower than 1 kHz, the programmable divider is apparently ok.
 - b. If the frequency on terminal LOOP 1 IN is approx. 5 MHz and the frequency on the phase/frequency detector IC1006, pin 3 is higher than 1 kHz, the programmable divider is apparently ok.
4. Check the phase/frequency detector IC1006.
 - a. Measure 1.5V DC on PD 1 OUT on the DIVIDER-UNIT.
 - b. If the input frequency on IC1006, pin 3 is higher than 1 kHz and the DC-voltage on PD 1 OUT is approx. 0.7V, the phase/frequency detector is apparently ok.
 - c. If the input frequency on IC1006, pin 3 is lower than 1 kHz and the DC-voltage on PD 1 OUT is approx. 2.3V, the phase/frequency detector is apparently ok.
5. Check the integrator IC1102 on LOOP 1 FILTER & $\pm 18V$ SUPPLY-UNIT, module 1100.
 - a. If the DC voltage on PD 1 IN is approx. 0.7V and the DC voltage on output terminal of IC1102, pin 6 is approx. -4V, the integrator IC1102 is apparently ok.
 - b. If the DC voltage on PD 1 IN is approx. 2.3V and the DC voltage on the output terminal of IC1102, pin 6 is approx. -17V, the integrator IC1102 is apparently ok.
6. If the failure has not been found yet the 1 kHz loop filter IC1101 and the selection circuit for choosing VCO- and HARMONIC FILTER must be checked.

R1119 & R1120 A 2/3

TROUBLE-SHOOTING cont.:

LOOP 2

If the fault has been located to LOOP 2 the following hints can be used for trouble-shooting.

If there is no output signal from the VCXO, 1st LOOP 2 MIXER and LOOP 2 FILTER on terminal LO 2 OUT, the failure has to be found in the VCXO.

If the output frequency from the VCXO, 1st LOOP 2 MIXER and LOOP 2 FILTER on terminal LO 2 OUT is lower than 10.008 MHz or higher than 10.009 MHz, respectively 16.008 MHz and 16.009 MHz, the phase-locked loop 2 is out of lock.

1. Set the CLARIFIER to center position and check the output signal from VCXO, 1st LOOP 2 MIXER and LOOP 2 FILTER on terminal FIRST LOOP 2 OUT.
 - a. If there is no output signal, the failure is in the 1st loop 2 mixer or that the 10 MHz and/or 16 MHz injection signal is missing.
 - b. If the output frequency is slightly lower than 8 kHz or slightly higher than 9 kHz the VCXO, the 1st loop 2 mixer and the 10 MHz and/or 16 MHz injection signal are apparently ok.
2. Set the CLARIFIER to center position and check the output signal on TP10 on the CLARIFIER AND 2nd LOOP 2 MIXER, module 1700.
 - a. If there is no output signal, the failure is on the CLARIFIER AND 2nd LOOP 2 MIXER circuit board.
 - b. If the output frequency is lower than 1 kHz or higher than 2 kHz, then the CLARIFIER AND 2nd LOOP 2 MIXER is apparently ok.
3. Check that the frequency on the phase/frequency detector IC1013, pin 1 is 100 Hz.
4. Check the LOOP 2 Programmable Divider.
 - a. If the frequency on terminal LOOP 2 IN, module 1000 is lower than 1 kHz and the frequency on the phase/frequency detector IC1013, pin 3 is lower than 100 Hz, the programmable divider is apparently ok.
 - b. If the frequency on terminal LOOP 2 IN, module 1000 is higher than 2 kHz and the frequency on the phase/frequency detector IC1013, pin 3 is higher than 100 Hz, the programmable divider is apparently ok.
5. Check the phase/frequency detector IC1013.
 - a. Measure 1.5V DC on terminal PD 2 OUT on the DIVIDER-UNIT.
 - b. If the input frequency on IC1013, pin 3 is lower than 100 Hz and the DC voltage on terminal PD 2 OUT is approx. 0.7V, the phase/frequency detector is apparently ok.
 - c. If the input frequency on IC1013, pin 3 is higher than 100 Hz and the DC voltage on terminal PD 2 OUT is approx. 2.3V, the phase/frequency detector is apparently ok.
6. Check the integrator IC1601b on VCXO, 1st LOOP 2 MIXER and LOOP 2 FILTER.
 - a. If the DC voltage on TP9 is approx. 0.7V and the DC voltage on output terminal IC1601b, pin 1 is approx. 17V, the integrator is apparently ok.
 - b. If the DC voltage on TP9 is approx. 2.3V and the DC voltage on the output terminal of IC1601b, pin 1 is approx. 1V, the integrator is apparently ok.
7. If the failure has not yet been found the summing amplifier IC1601a and the loop filter C1614 and R1616 must be checked.

4. PERFORMANCE CHECK FOR R1119 AND R1120

4.1.
DEFINITIONS USED - LOCATIONS.

4.1.1.
Definitions used refer to 5.1.

4.1.2.
Locations refer to ADJUSTMENT LOCATIONS.

4.2.
CHECK OF +18V SUPPLY UNIT.

4.2.1.
Connect the voltmeter to TP2.

4.2.2.
Check that the voltage is +18V +0.2V.

4.2.3.
Connect the voltmeter to TP1.

4.2.4.
Check that the voltage is -18V +0.2V.

4.3.
CHECK OF +5V REGULATOR.

4.3.1.
Connect the voltmeter to pin 3 of IC2602.

4.3.2.
Check that the voltage is 5V +0.2V.

4.3.3.
Connect the voltmeter to TP23.

4.3.4.
Check that the voltage is 5V +0.2V.

4.4.
CHECK OF TCXO.
The receiver must be ON for at least 5 minutes.

4.4.1.
Connect the counter to TP3.

4.4.2.
Check that the frequency is 10,000,000 +1 Hz.

4.5.
CHECK OF KEYBOARD.

4.5.1.
Press the KEYBOARD C and 1 simultaneously. The DISPLAY shows 111111.

4.5.2.
Repeat 4.5.1. for C and 2, 3 9.

4.5.3.
Press the KEYBOARD C and 9 simultaneously, release C before 9. The DISPLAY shows 999999. Check that no noise is heard from the loudspeaker.

4.5.4.
Press the KEYBOARD 0. The DISPLAY shows 999990.

4.5.5.
Press the KEYBOARD decimal point. The DISPLAY shows 99990.0.

4.5.6.
Press the KEYBOARD 1. The DISPLAY shows 99990.1.

4.5.7.
Press the KEYBOARD C. The DISPLAY shows 000000.

4.5.8.
Press the KEYBOARD 99. The DISPLAY shows 000099.

4.5.9.
Press the NOISE GENERATOR button. The DISPLAY shows 00099.0. Check that noise is heard from the loudspeaker.

4.5.10.
Press the KEYBOARD decimal point. Check that noise is heard from the loudspeaker.

4.5.11.
Turn the CONTINUOUS TUNING until the DISPLAY shows 00150.0. Check that no noise is heard from the loudspeaker.

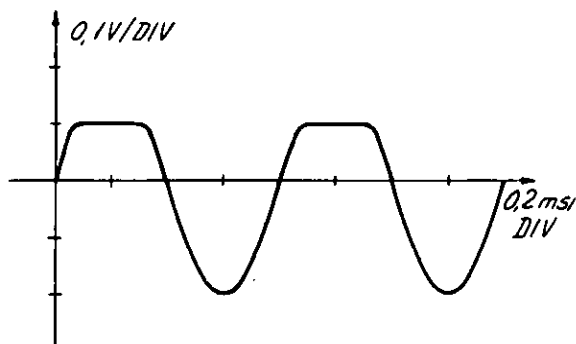
4.5.12.
Turn the CONTINUOUS TUNING until the DISPLAY shows 00149.0. Press the NOISE GENERATOR, check that noise is heard from the loudspeaker.

PERFORMANCE CHECK FOR R1119 AND R1120 cont.:

- 4.5.13.
Turn the CONTINUOUS TUNING until the DISPLAY shows 99999.9. Check that no noise is heard from the loudspeaker.
- 4.5.14.
Press the KEYBOARD 0 and turn the CONTINUOUS TUNING. The displayed figure must not change.
- 4.5.15.
Connect the passive probe to IC2020, pin 8 and to a scope.
- 4.5.16.
Turn the CONTINUOUS TUNING and check that the voltage on pin 8 is approx. 4V DC.
- 4.5.17.
Connect the passive probe to IC2020, pin 11 and to a scope.
- 4.5.18.
Turn the CONTINUOUS TUNING and check that the voltage on pin 11 is approx. 0V DC.
- 4.5.19.
Set the MODE SWITCH to DISTRESS 2182 kHz.
- 4.5.20.
Check that the DISPLAY shows 2182 kHz.
- 4.6.
CHECK OF HARMONIC FILTERS.
- 4.6.1.
Set the MODE SWITCH to A3J.
- 4.6.2.
Connect the voltmeter to TP 24.
- 4.6.3.
Enter the following f_{RX} to the KEYBOARD and press the NOISE GENERATOR.
 $f_{RX} = 1 - 2 - 4 - 6 - 8 - 10 - 12 - 14 - 16 - 18 - 20 - 22 - 24 - 26 - 28$ MHz.
- 4.6.4.
Check that the voltage is $\leq 3.5V$ DC for serial number below (21XXXX) and check that the voltage is $\leq X.XV$ DC for serial numbers above (21XXXX).
- 4.7.
CHECK OF VCO.
- 4.7.1.
Set MODE SWITCH to A3J.
- 4.7.2.
Connect the voltmeter to TP11.
- 4.7.3.
Enter the following f_{RX} to the KEYBOARD and press the NOISE GENERATOR. $f_{RX} = 1.999 - 3.999 - 5.999 - 7.999 - 9.999 - 11.999 - 13.999 - 15.999 - 17.999 - 19.999 - 21.999 - 23.999 - 25.999 - 27.999 - 29.999$ kHz.
- 4.7.4.
Check that the voltage is $15V \pm 1V$.
- 4.7.5.
Enter the following f_{RX} to the KEYBOARD and press the NOISE GENERATOR. $f_{RX} = 0 - 2 - 4 - 6 - 8 - 10 - 12 - 14 - 16 - 18 - 20 - 22 - 24 - 26 - 28$ MHz.
- 4.7.6.
Check that the voltage is $7.0V \pm 1.5V$.
- 4.8.
CHECK OF CLARIFIER.
- 4.8.1.
Set the MODE SWITCH to A3J.
- 4.8.2.
Set the CLARIFIER to center position.
- 4.8.3.
Press the CLEAR and the NOISE GENERATOR button.
- 4.8.4.
Connect the counter to TP4.
- 4.8.5.
Check that the frequency is 9000 Hz ± 10 Hz.
- 4.8.6.
Check that the CLARIFIER deviation range is more than ± 150 Hz.
- 4.8.7.
Connect the passive probe to TP10 and to a scope.

PERFORMANCE CHECK FOR R1119 AND R1120 cont.:

4.8.8.
Check that the wave form is as shown below.



4.8.9.
Enter $f_{RX} = 16$ MHz to the KEYBOARD and press the NOISE GENERATOR.

4.8.10.
Check that the wave form is as shown in point 4.8.8.

4.9.
CHECK OF VCXO.

4.9.1.
Set the MODE SWITCH to A3J.

4.9.2.
Connect +5V to TP25.

4.9.3.
Press the CLEAR, the NOISE GENERATOR button and the DECIMAL POINT key.

4.9.4.
Connect the voltmeter to TP12.

4.9.5.
Check that the voltage is $14V \pm 1V$.

4.9.6.
Turn the CONTINUOUS TUNING and check that a one decimal change in the 100 Hz display causes a 0.6V change in the meter reading.

4.9.7.
Check that the voltage is $8.5 \pm 1V$ when the 100 Hz display shows 9.

4.9.8.
Remove the +5V from TP25.

4.9.9.
Enter the following $f_{RX} = 10000.0$ kHz to the KEYBOARD, press the NOISE GENERATOR button.

4.9.10.
Turn the CLARIFIER extreme counter clockwise.

4.9.11.
Check that the voltage is $11V \pm 1V$.

4.9.12.
Enter the following $f_{RX} = 10000.9$ kHz to the KEYBOARD, press the NOISE GENERATOR button.

4.9.13.
Turn the CLARIFIER extreme clockwise.

4.9.14.
Check that the voltage is $7V \pm 1V$.

4.9.15.
Enter the following $f_{RX} = 16000.0$ kHz to the KEYBOARD, press the NOISE GENERATOR button.

4.9.16.
Turn the CLARIFIER extreme counter clockwise.

4.9.17.
Check that the voltage is $11V \pm 1V$.

4.9.18.
Enter the following $f_{RX} = 16000.9$ kHz to the KEYBOARD and press the NOISE GENERATOR button.

4.9.19.
Turn the CLARIFIER extreme clockwise.

4.9.20.
Check that the voltage is $6V \pm 1V$.

4.10.
CHECK OF 600 kHz GENERATOR.

4.10.1.
Set the MODE SWITCH to pos. A3J.

4.10.2.
Connect the diode probe to TP27.

4.10.3.
Check that the voltage is $1V \pm 0.2V$.

PERFORMANCE CHECK FOR R1119 AND R1120 cont.:

4.10.4.

Check that the voltage disappears in the A3H MODE.

4.11.

CHECK OF BFO OSCILLATOR (R1120 only).

4.11.1.

Set the MODE SWITCH to pos. A1.

4.11.2.

Set the FILTER SWITCH to pos. NARROW.

4.11.3.

Set the BFO to center position.

4.11.4.

Connect the counter to TP26.

4.11.5.

Check that the frequency is 600,000 Hz ± 10 Hz.

4.11.6.

Check that the BFO deviation range is at least 598.2 kHz to 600.5 kHz.

4.11.7.

Connect the diode probe to TP26.

4.11.8.

Check that the voltage is $1.3V \pm 0.2V$.

4.12.

CHECK OF LOOP 1 STEP RESPONSE.

4.12.1.

Connect a 68 ohm resistor across HARMONIC FILTERS output.

4.12.2.

Set the MODE SWITCH to pos. A3J.

4.12.3.

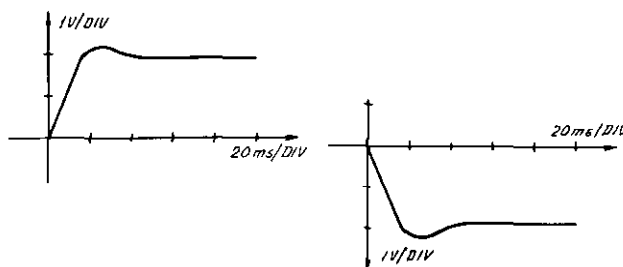
Connect the passive probe and the scope to TP11.

4.12.4.

Enter $f_{RX} = 22499.9$ kHz to the KEYBOARD and press the NOISE GENERATOR button.

4.12.5.

Short-circuit the yellow wire on the 100 Hz data input at the divider board to chassis and check the step response on the scope. Typical wave form is shown next column.



4.12.6.

Remove the 68 ohm resistor from HARMONIC FILTER output.

4.13.

CHECK OF LOOP 2 STEP RESPONSE.

4.13.1.

Set the MODE SWITCH to pos. A3J.

4.13.2.

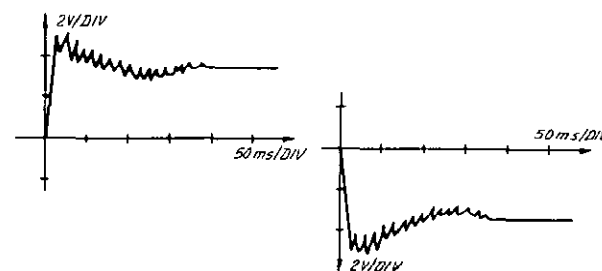
Connect the passive probe and the scope to TP12.

4.13.3.

Enter $f_{RX} = 22499.9$ kHz to the KEYBOARD and press the NOISE GENERATOR button.

4.13.4.

Short-circuit the grey wire on the 100 Hz data input at the divider board to chassis and check the step response on the scope. Typical wave form is shown below.



4.14.

CHECK OF +18V SUPPLY VOLTAGE.

4.14.1.

Connect the voltmeter to TP13.

PERFORMANCE CHECK FOR R1119 AND R1120 cont.:

4.14.2.
Measure 18V \pm 1.5V DC.

4.15.
CHECK OF +17V SUPPLY VOLTAGE.

4.15.1.
Connect the voltmeter to TP14.

4.15.2.
Turn AF GAIN fully clockwise.

4.15.3.
Measure 17.3V \pm 1.5V DC.

4.16.
CHECK OF -45V PROTECTION CIRCUIT.

4.16.1.
Connect the voltmeter to TP15.

4.16.2.
Measure approx. -45V DC.

4.16.3.
Connect output from TX-exciter S1300 to antenna input terminals of the receiver.

4.16.4.
Use the following procedure at one frequency in each of the frequency bands 2182 kHz FIXED, 0.15 - 0.53 MHz, 0.53 - 1.6 MHz, 1.6 - 4.0 MHz, 4.0 - 7.0 MHz, 7.0 - 14.0 MHz, 14.0 - 30.0 MHz.

4.16.5.
Set S1300 to FULL POWER, DUPLEX, A3H and turn POWER LEVEL potentiometer fully clockwise,

4.16.6.
Set S1300 and the receiver on the same frequency.

4.16.7.
Connect the voltmeter to TP15.

4.16.8.
Press the NOISE GENERATOR button and adjust RF TUNE to max. deflection on the METER.

4.16.9.
Key S1300 by means of the KEY plug and check that the voltage on TP15 increases.

4.17.
CHECK OF LOCAL OSCILLATOR INPUTS.

4.17.1.
Enter f_{RX} = 1.0 MHz to the KEYBOARD and press the NOISE GENERATOR button.

4.17.2.
Connect the diode probe to TP16.

4.17.3.
Measure 0.6V \pm 0.15V.

4.17.4.
Connect the diode probe to TP17.

4.17.5.
Measure 3.7V \pm 0.7V.

4.17.6.
Enter f_{RX} = 25.0 MHz to the KEYBOARD and press the NOISE GENERATOR button.

4.17.7.
Connect the diode probe to TP16.

4.17.8.
Measure 0.6V \pm 0.15V.

4.17.9.
Connect the diode probe to TP17.

4.17.10.
Measure 3.7V \pm 0.7V

4.17.11.
Set the MODE SWITCH to A3J.

4.17.12.
Turn RF GAIN fully counter clockwise.

4.17.13.
Connect diode probe to TP18.

4.17.14.
Measure 1.7V \pm 0.3V.

4.17.15. (R1120 only)
Set the MODE SWITCH to A1 and the FILTER SWITCH to NARROW.

4.17.16. (R1120 only)
Connect diode probe to TP18.

4.17.17. (R1120 only)
Measure 2.2V \pm 0.4V.

4.17.18. (R1119 fitted with AUX FILTER)
Set MODE SWITCH to AUX and repeat 4.17.13. and 4.17.14.

PERFORMANCE CHECK FOR R1119 AND R1120 cont.:

4.18.
CHECK OF LOOP 1 MIXER.

4.18.1.
Enter $f_{RX} = 28.0$ MHz to the KEYBOARD and press the NOISE GENERATOR button.

4.18.2.
Connect the diode probe to TP28.

4.18.3.
Measure $1.3V \pm 0.5V$.

4.18.4.
Enter $f_{RX} = 29.999$ MHz to the KEYBOARD and press the NOISE GENERATOR button.

4.18.5.
Connect the diode probe to TP28.

4.18.6.
Measure $1.3V \pm 0.5V$.

4.19.
CHECK OF DETECTOR LEVEL.

4.19.1.
Set MODE SWITCH to A3J.

4.19.2.
Enter $f_{RX} = 25,000$ kHz to the KEYBOARD. Press the NOISE GENERATOR button and adjust RF TUNE to max. deflection on the METER.

4.19.3.
Set the signal generator to $f_G = 25,001$ kHz and $V_G = 1$ mV.

4.19.4.
Set AGC ON/OFF to TELEX.

4.19.5.
Turn RF GAIN fully clockwise.

4.19.6.
Connect voltmeter to HEADPHONES via a screened cable and adjust AF GAIN to the meter reads 0 dB in the 1V AC range.

4.19.7.
Set AGC ON/OFF to OFF.

4.19.8.
Adjust RF GAIN until meter reading is 0 dB in the 1V range.

4.19.9.
Short-circuit carrier reinjection to ground e.g. on the anode of D812.

4.19.10.
Connect the diode probe to TP18.

4.19.11.
Measure 550 mV ± 100 mV.

4.20.
CHECK OF AGC ATTACK - AND DECAY TIME.

4.20.1.
Enter $f_{RX} = 3,900$ kHz to the KEYBOARD. Press the NOISE GENERATOR button and adjust RF TUNE to max. deflection on the METER.

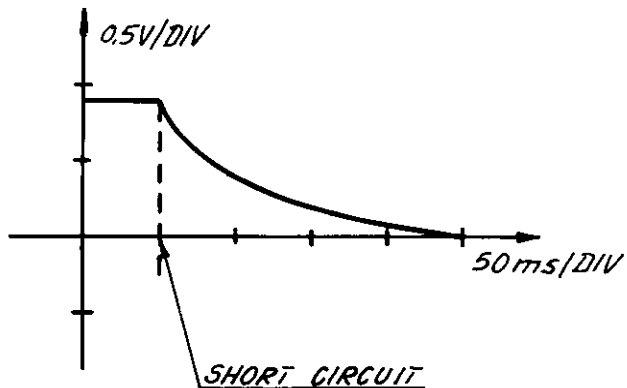
4.20.2.
Set the signal generator to $f_G = 3,901$ kHz and $V_G = 1$ mV.

4.20.3.
Set AGC ON/OFF to TELEX and turn RF GAIN fully clockwise.

4.20.4.
Connect the passive probe to the scope and to TP19.

4.20.5.
By means of e.g. a trimming tool short-circuit inner and outer conductor on the coax cable leading from IF-FILTERS to IF-AMPLIFIER, DETECTOR and AGC.

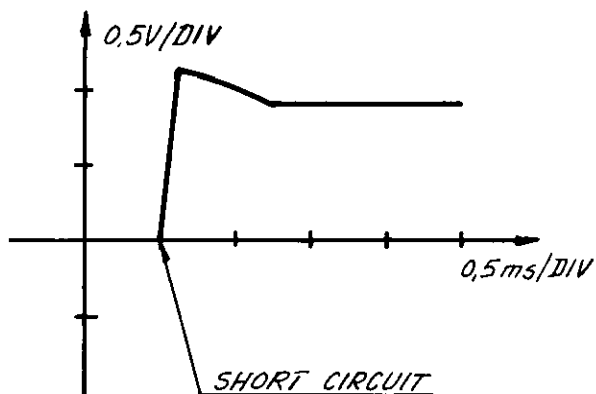
4.20.6.
When short-circuiting as mentioned above, no signal will come to the AGC-circuit, which causes the AGC voltage to decay as shown below.



PERFORMANCE CHECK FOR R1119 AND R1120 cont.:

4.20.7.

Removing the short-circuit causes the AGC-voltage to "attack" as shown below.

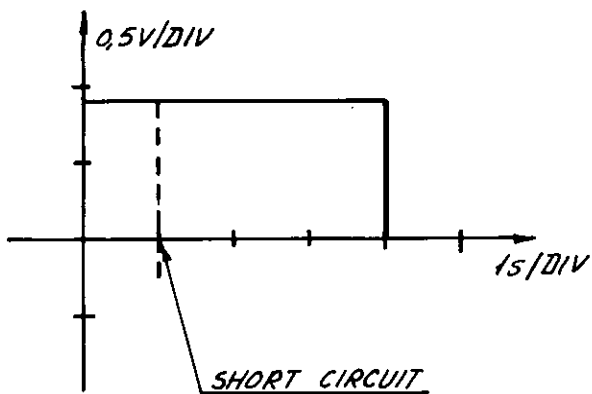


4.20.8.

Set AGC SWITCH to ON.

4.20.9.

Similar to 4.20.6. a decay will be seen.

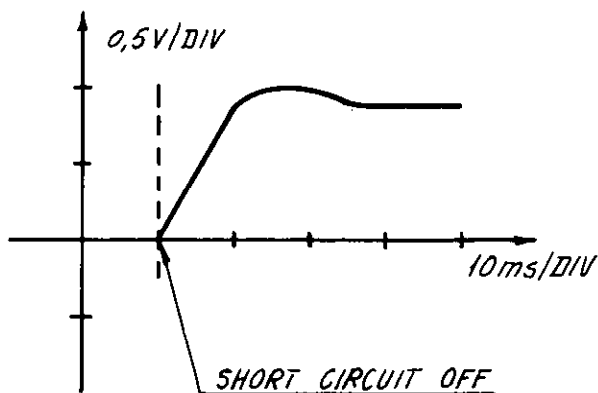


4.20.10.

Set MODE SWITCH to A3H (AM).

4.20.11.

Similar to 4.20.7. an "attack" will be seen.



4.21.

CHECK OF 0 dBm AF OUTPUT.

4.21.1.

Enter $f_{RX} = 6700$ kHz to the KEYBOARD. Press the NOISE GENERATOR button and adjust RF TUNE to max. deflection on the METER.

4.21.2.

Set the signal generator to 6701 kHz and $V_G = 1$ mV.

4.21.3.

Set the MODE SWITCH to A3J and the AGC SWITCH to ON.

4.21.4.

Connect voltmeter and 560 ohm resistor parallel to TP20 and TP21.

4.21.5.

Measure $0.9V \pm 0.2V$ AC.

4.21.6.

Set MODE SWITCH to A3H (AM).

4.21.7.

Modulate f_G to 30% with an 1 kHz tone.

4.21.8.

Measure $0.8V \pm 0.2V$ AC.

4.22.

CHECK OF AF AMPLIFIER.

4.22.1.

Perform 4.20.1. - 4.20.3.

4.22.2.

Solder a 4 ohm (min. 10 W) resistor to TP22 and connect the oscilloscope probe parallel to the resistor.

4.22.3.

Set the LOUDSPEAKER ON/OFF to OFF.

4.22.4.

Turn the AF GAIN fully clockwise and check that the AF voltage is at least 15Vpp.

4.22.5.

Reduce AF GAIN until AF voltage is 13 Vpp. Now a sinusoidal signal should be seen (distortion is typical around 3%)

PERFORMANCE CHECK FOR R1119 AND R1120 cont.:

4.23.

CHECK OF SIMPLEX RELAY.

4.23.1.

Connect an ohm-meter to the antenna input terminal and to ground.

4.23.2.

Connect TP30 to TP29 with a piece of wire and check that RE101 is activated.

4.23.3.

Check that the ohm-meter is showing a short-circuit.

4.24.9.

Fine tune RF TUNE to max. meter reading and reduce the meter reading to 0 dB with RF GAIN.

4.24.10.

Remove the modulation from V_G and notice the drop on the meter reading.

In any case this must be at least 20 dB.

4.24.11.

Table 4.24.11.(next page).

4.24.

SENSITIVITY MEASUREMENT.

4.24.1.

Choose f_{RX} and f_G according to table 4.24.11.

4.24.2.

Choose V_G according to table 4.24.12. (and refer to the definitions given in section 5.1.).

NOTE: The sensitivity measured in A3J mode must be 14 dB better than the measured sensitivity in A3H mode.

4.24.3.

Enter f_{RX} to the KEYBOARD. Press the NOISE GENERATOR button and adjust RF TUNE to max. deflection on the METER.

4.24.4.

Set the signal generator to the stated f_G and V_G .

4.24.5.

Set the MODE SWITCH to A3H.

4.24.6.

Connect the voltmeter to HEADPHONES via a screened cable and adjust AF GAIN to the meter reads 0 dB in the 1V range.

4.24.7.

Set AGC ON/OFF to OFF.

4.24.8.

Reduce RF GAIN until the meter reading again is 0 dB.

PERFORMANCE CHECK FOR R1119 AND R1120 cont.:

MODE	f_{RX}	V_G (EMF) $R_G = 50$ ohm
A3H (AM)	100 kHz - 149 kHz	50 dB above 1 uV or 320 uV
	150 kHz - 529 kHz	30 dB above 1 uV or 32 uV
	530 kHz - 1.6 MHz	30 dB above 1 uV or 32 uV
	1.6 MHz - 4.0 MHz incl. 2182 kHz	30 dB above 1 uV or 32 uV
	4.0 MHz - 30.0 MHz	25 dB above 1 uV or 18 uV

4.24.12.

Table 4.24.12.

MODE	BAND	f_{RX} MHz	f_G MHz
A3H (AM)	100 kHz - 149 kHz	100 kHz 149 kHz	f_{RX} modulated 30% with 1 kHz
	150 kHz - 529 kHz	150 kHz 280 kHz 529 kHz	
	530 kHz - 1.599 kHz	530 kHz 920 kHz 1.599 kHz	
	1.6 MHz - 3.999 MHz	1.6 MHz 2.182 MHz 2.530 MHz 3.999 MHz	
	DISTRESS 2182 kHz	2.182 kHz Fixed	
	4.0 MHz - 29.999 MHz	4.000 MHz 5.290 MHz 6.999 MHz 7.000 MHz 9.900 MHz 13.999 MHz 14.000 MHz 20.880 MHz 28.000 MHz	

5. ADJUSTMENT PROCEDURE FOR R1119 & R1120

NOTE: The trimming cores are factory sealed. Use normal cellulose thinner to break the seal.

5.1. DEFINITIONS USED.

5.1.1.

f_{RX} = frequency to which the receiver is adjusted (clarifier in the middle of its operating range).

f_G = signal generator frequency, i.e. the input frequency to the receiver.

V_G = EMF of signal generator with proper generator impedance.

f_{AF} = Audio frequency to HEADPHONES and loudspeaker.

5.2. THE FOLLOWING SEQUENCE WILL OFTEN BE USED:

5.2.1.

Connect the signal generator to the antenna input terminal on the receiver.

5.2.2.

Switch ON the receiver.

5.2.3.

Set LOUDSPEAKER ON/OFF to ON.

5.2.4.

Set AGC SWITCH to TELEX.

5.2.5.

Turn RF GAIN fully clockwise.

5.2.6.

Set AF GAIN to approx. middle position.

5.2.7.

Set the signal generator to the stated f_G and V_G .

5.2.8.

Enter the stated f_{RX} to the KEYBOARD. Press the NOISE GENERATOR button and adjust RF TUNE to max. deflection on the METER.

5.3.

ADJUSTMENT OF $\pm 18V$ SUPPLY UNIT.

5.3.1.

Connect the voltmeter to TP1.

5.3.2.

Adjust R1110 to $-18V \pm 0.2V$.

5.3.3.

Connect the voltmeter to TP2.

5.3.4.

Adjust R1114 to $+18V \pm 0.2V$.

5.4.

ADJUSTMENT OF TCXO.

5.4.1.

The receiver must be ON for at least 5 minutes.

5.4.2.

Connect the counter to TP3.

5.4.3.

Adjust R1013 to 10,000,000 Hz.

5.5.

ADJUSTMENT OF CLARIFIER.

5.5.1.

Set the CLARIFIER to its center position.

5.5.2.

Set the MODE SWITCH to position 2182 kHz.

5.5.3.

Connect the counter to TP4.

5.5.4.

Adjust L1701 to 9000 Hz.

ADJUSTMENT PROCEDURE FOR R1119 & R1120 cont.:

5.6.
ADJUSTMENT OF 600 kHz GENERATOR.

5.6.1.
Set the MODE SWITCH to pos. A3J.

5.6.2.
Connect the diode probe to TP5.

5.6.3.
Adjust L1002 for max. deflection on the TP-meter (approx. 1V).

5.7.
ADJUSTMENT OF BFO (R1120 only).

5.7.1.
Set the CLARIFIER to its center position.

5.7.2.
Set the MODE SWITCH to A1.

5.7.3.
Set the FILTER SWITCH to WIDE.

5.7.4.
Connect the frequency counter to TP6.

5.7.5.
Remove the BFO button.

5.7.6.
Adjust the potentiometer to 600,000 Hz.

5.7.7.
Mount the button with dot to dot, to indicate the center position.

5.8.
ADJUSTMENT OF 16 MHz GENERATOR.

5.8.1.
Enter $f_{RX} = 11111$ kHz to the KEYBOARD, (press 1 and C simultaneously) and execute 5.2.

5.8.2.
Connect the diode probe to TP4.

5.8.3.
Adjust L1001 to max. voltage (approx. 2V).

5.9.
ADJUSTMENT OF IF AMPLIFIER DETECTOR.

5.9.1.
Connect the signal generator to TP7 through a 10 nF capacitor, execute 5.2.2., 5.2.3., 5.2.4., 5.2.5., 5.2.6., set the signal generator to $f_G = 599$ kHz and $V_G = 10$ mV.

5.9.2.
Set MODE SWITCH to A3J.

5.9.3.
Slowly reduce V_G until noise starts to dim the AF tone; then increase V_G 20 dB.

5.9.4.
Connect voltmeter to HEADPHONES via a screened cable, and adjust AF GAIN so that the meter reads 0 dB in the 1V AC range.

5.9.5.
Adjust L805 for max. meter reading and at the same time keep this on 0 dB by reducing AF GAIN.

5.9.6.
Set AGC SWITCH to OFF.

5.9.7.
Reduce RF GAIN until meter reading again is 0 dB in the 1V range.

5.9.8.
Adjust L801 for max. meter reading and at the same time keep this on 0 dB by reducing RF GAIN.

5.10.
ADJUSTMENT OF IF FILTER.

5.10.1.
Execute 5.2. with $f_G = 600,0$ kHz, $V_G = V_G$ max. & $f_{RX} = 11111$ kHz.

5.10.2.
Connect the signal generator to TP7 through a 10 nF capacitor.

5.10.3.
Set the MODE SWITCH to A3H.

ADJUSTMENT PROCEDURE FOR R1119 & R1120 cont.:

- 5.10.4.
Turn the trimming cores in L602, L603, L604 and L605 fully counter clockwise.
- 5.10.5.
Connect the diode probe to TP8.
- 5.10.6.
Adjust L601 to max. meter deflection.
- 5.10.7.
Adjust L602 to min. meter deflection.
- 5.10.8.
Adjust L603 to max. meter deflection.
- 5.10.9.
Adjust L604 to min. meter deflection.
- 5.10.10.
Adjust L605 to max. meter deflection.
- 5.10.11.
Remove the diode probe.
- 5.10.12.
Set V_G to 10 mV and modulate the signal generator 30 per cent with 1 kHz.
- 5.10.13.
Execute 5.9.3., 5.9.4., 5.9.6. and 5.9.7.
- 5.10.14.
Modulate the signal generator with a tone generator (modulation depth 30 per cent). Vary the modulation frequency between 300 Hz and 2700 Hz and find the frequency giving max. meter deflection.
- 5.10.15.
Set meter reading to 0 dB by means of the RF GAIN.
- 5.10.16.
Adjust the modulation frequency between 300 Hz and 2700 Hz and check that the meter reading is not less than -6 dB in this range.
- 5.10.17.
Set the MODE SWITCH to A3J.
- 5.10.18.
Set the AGC SWITCH to TELEX.
- 5.10.19.
Set the $f_G = 599,0$ kHz and $V_G = 10$ mV unmodulated.
- 5.10.20.
Execute 5.9.3., 5.9.4., 5.9.6. and 5.9.7.
- 5.10.21.
Adjust L606 for max. meter reading and keep this on 0 dB by reducing RF GAIN.
- 5.10.22.
Connect the frequency counter parallel to the voltmeter, and thus measure the frequency of the detected AF signal, f_{AF} .
- 5.10.23.
Adjust f_G so that f_{AF} varies between 300 Hz and 2700 Hz and find the frequency that gives max. meter deflection.
- 5.10.24.
Set meter reading to 0 dB by means of the RF GAIN.
- 5.10.25.
Adjust f_G so that f_{AF} varies between 300 Hz and 2700 Hz and check the meter reading is not less than -6 dB in this frequency range.
- THE FOLLOWING POINTS 5.10.26. to 5.10.44. IS ONLY TO BE EXECUTED FOR R1120.
- AUX FILTER ADJUSTMENT EXECUTE 5.10.45. AND 5.10.52.
- 5.10.26.
Set $f_G = 601$ kHz and $V_G = 10$ mV unmodulated. Execute 5.10.2.
- 5.10.27.
Set MODE SWITCH to A1 and FILTER SWITCH to INTERMEDIATE.
- 5.10.28.
Set the AGC SWITCH to TELEX.
- 5.10.29.
Turn RF GAIN fully clockwise.

ADJUSTMENT PROCEDURE FOR R1119 & R1120 cont.:

5.10.30.

Set the BFO to $f_{AF} = 1000$ Hz.

5.10.31.

Execute 5.9.3., 5.9.4., 5.9.6. and 5.9.7.

5.10.32.

Adjust L608 for max. meter reading and at the same time keep this on 0 dB by reducing RF GAIN.

5.10.33.

Adjust f_G between 599.0 kHz and 601.0 kHz, and simultaneously adjust the BFO so that f_{AF} is approx. 1000 Hz. Find the frequency f_G that gives max. meter reading and adjust this reading to 0 dB by means of RF GAIN.

5.10.34.

Adjust f_G between 599.0 kHz and 601.0 kHz and simultaneously adjust the BFO so that f_{AF} is approx. 1000 Hz. Check that the meter reading is above -6 dB in this frequency range.

5.10.35.

Set the FILTER SWITCH to NARROW and $f_G = 600$ kHz.

5.10.36.

Execute 5.2.4., 5.2.5., 5.2.6., 5.9.6., 5.9.7. and adjust the BFO for f_{AF} approx. 1000 Hz.

5.10.37.

Adjust L609 for max. meter reading and keep the meter reading on 0 dB by adjusting the RF GAIN.

5.10.38.

Execute 5.10.33. and 5.10.34. by varying f_G in the frequency range 599.5 kHz to 600.5 kHz.

5.10.39.

Set the FILTER SWITCH to VERY NARROW and $f_G = 600$ kHz.

5.10.40.

Execute 5.2.4., 5.2.5., 5.9.6., 5.9.7. and adjust the BFO for f_{AF} approx. 1000 Hz.

5.10.41.

Adjust L610 for max. meter reading and keep the meter reading on 0 dB by adjusting the RF GAIN.

5.10.42.

Execute 5.10.33. by varying f_G in the frequency range 599.8 kHz to 600.2 kHz.

5.10.43.

Set f_G to 599.8 kHz and 600.2 kHz respectively. Check that the meter reading is below -6 dB at both frequencies.

5.10.44.

Remove the signal generator from TP7, and remove the plug from HEADPHONES.

R1119 TELEX AND R1120

AUX FILTER ADJUSTMENT EXECUTE 5.10.45. and 5.10.52.

5.10.45.

Set MODE SWITCH to A1, FILTER SWITCH to AUX and the AGC SWITCH to TELEX.

5.10.46.

Set $f_G = 1200$ kHz - filter center frequency, $V_G = 10$ mV unmodulated and execute 5.10.2.

Filter center frequency appears from section TECHNICAL DATA.

5.10.47.

Turn RF GAIN fully clockwise and set the BFO to $f_{AF} = 1000$ Hz (except for LSB filter adjustment).

5.10.48.

Execute 5.9.3., 5.9.4., 5.9.6. and 5.9.7.

5.10.49.

Adjust L606 for max. meter reading and keep the meter reading on 0 dB by adjusting the RF GAIN.

5.10.50.

Adjust f_G inside the min. pass band as illustrated in TECHNICAL DATA, find the frequency f_G that gives max. meter reading and adjust this reading to 0 dB by means of RF GAIN.

5.10.51.

Adjust f_G inside the min. pass band as illustrated in TECHNICAL DATA. Check that the meter reading is above -6 dB in this frequency range.

ADJUSTMENT PROCEDURE FOR R1119 & R1120 cont.:

5.10.52.

Remove the signal generator from TP7 and remove the plug from HEADPHONES.

5.11.

ADJUSTMENT OF FIRST AND SECOND MIXER.

5.11.1.

Execute 5.2. $f_{RX} = 3$ kHz and $V_G = 0$.

5.11.2.

Set the MODE SWITCH to A3H.

5.11.3.

Adjust R506 for min. deflection on the TUNE meter.

5.11.4.

Connect the signal generator to TP9.

5.11.5.

For $f_{RX} = 10000$ kHz, $f_G = 16608.5$ kHz modulated 30 per cent, 1 kHz and $V_G = 10$ mV. Execute 5.2.4., 5.2.5., 5.2.7., 5.2.8., 5.9.3., 5.9.4., 5.9.6. and 5.9.7.

5.11.6.

Remove the innercores of the six coaxial cables to the input of first mixer.

5.11.7.

Adjust C512 and L503 for max. meter reading and keep this on 0 dB by reducing RF GAIN.

5.11.8.

Change f_{RX} to 20000 kHz and f_G to 10608.5 kHz and press the NOISE GENERATOR to unblock the receiver.

5.11.9.

Adjust C511 and L501 for max. meter reading and keep the meter reading on 0 dB by adjusting the RF GAIN.

5.11.10.

Reconnect the six coaxial cables.

5.12.

MECHANICAL ADJUSTMENT OF THE FRONT-END TUNING MECHANISM.

5.12.1.

Loosen the mechanical adjusting ring mounted behind the front plate on the TUNE shaft.

5.12.2.

Mount a 3x8 mm screw DIN84 and a 6 mm spacing pipe in the square bar carrying the ferrite cores. Use the hole nearest the front plate.

5.12.3.

Turn the square bars extreme left.

5.12.4.

Turn the adjusting ring clockwise against the stop screw.

5.12.5.

Turn the TUNE shaft counter clockwise so much that you can tighten the adjusting ring through the hole in the division plate behind the front plate.

5.12.6.

Turn the TUNE shaft fully counter clockwise.

5.12.7.

Adjust the ferrite cores for L201 and L202 so that the ends of the cores are flushing with the division plate.

5.12.8.

Adjust the ferrite cores for L301, L302, L303, L304, L305, L306, L401, L402, L403, L404, L405 and L406 so that the ends of the cores are flushing in a distance of 2 mm from the division plate.

5.12.9.

Remove the screw and spacing pipe mounted in paragraph 5.12.2.

5.13.

ADJUSTMENT OF 14 - 30 MHz and 7 - 14 MHz BAND FILTERS.

5.13.1.

Set the MODE SWITCH to A3H and set C408 and C414 to middle position.

ADJUSTMENT PROCEDURE FOR R1119 & R1120 cont.:

5.13.2.
Execute 5.2. with $f_G = f_{RX} = 28000$ kHz
 $V_G = 10$ mV.

5.13.3.
Execute 5.9.4., 5.9.6. and 5.9.7.

5.13.4.
Adjust L401, L404 and L406 for max.
meter reading and keep the meter reading on 0 dB by adjusting the RF GAIN.

5.13.5.
Execute 5.2.8. for $f_{RX} = f_G = 14000$ kHz.

5.13.6.
Adjust C408 and C414 for max. meter reading and keep the meter reading on 0 dB by adjusting the RF GAIN.

5.13.7.
Execute 5.2.8. for $f_{RX} = f_G = 28000$ kHz.

5.13.8.
Repeat 5.13.4., 5.13.5., 5.13.6. and 5.13.7. successively until there is no need for further adjustments.
NOTE: You must be very careful and adjust to exactly maximum.

5.13.9.
Remove the cable from HEADPHONE.

5.13.10.
Enter f_{RX} 14000 kHz to the KEYBOARD. Press the NOISE GENERATOR and turn RF TUNE over its full range. Check that there is only one maximum on the METER. If a maximum is obtained for the RF TUNE turned fully counter clockwise it is necessary to screw the ferrite cores to L401, L404 and L406 a bit farther out of the coil formers and then repeat 5.13.3. to 5.13.10.
If a maximum is obtained for the RF TUNE turned fully clockwise it is necessary to screw the ferrite cores L401, L404 and L406 a bit farther into the coil formers and then repeat 5.13.3. to 5.13.10.

5.13.11.
Lock the cores with the counter nut.

5.13.12.
Set C413 and C418 to middle position.

5.13.13.
Execute 5.2.4., 5.2.5., 5.2.7., 5.2.8., 5.9.4., 5.9.6. and 5.9.7. with $f_{RX} = f_G = 10000$ kHz and $V_G = 10$ mV modulated 30 per cent with 1 kHz.

5.13.14.
Adjust L402, L403 and L405 for max. meter reading and keep the meter reading on 0 dB by adjusting the RF GAIN.

5.13.15.
Execute 5.2.8. for $f_{RX} = f_G = 7000$ kHz.

5.13.16.
Adjust C413 and C418 for max. meter reading and keep the meter reading on 0 dB by adjusting the RF GAIN.

5.13.17.
Execute 5.2.8. for $f_{RX} = f_G = 10000$ kHz.

5.13.18.
Repeat 5.13.14., 5.13.15., 5.13.16. and 5.13.17. successively until there is no need for further adjustments.
NOTE: You must be very careful and adjust to exactly maximum.

5.13.19.
Execute 5.2.8. for $f_{RX} = f_G = 13999$ kHz.

5.13.20.
Adjust C413 and C418 for max. meter reading and keep the meter reading on 0 dB by adjusting the RF GAIN.
NOTE: You must be very careful and adjust to exactly maximum.

5.13.21.
Lock the cores with the counter nuts.

5.13.22.
Perform a SENSITIVITY MEASUREMENT (4.24.) in the frequency band of current interest and remove the cable from HEADPHONES.

5.14.
ADJUSTMENT OF 4 - 7 MHz and 1.6 - 4 MHz.

5.14.1.
Set the MODE SWITCH to A3H.

5.14.2.
Set C312 and C318 to middle position.

ADJUSTMENT PROCEDURE FOR R1119 & R1120 cont.:

5.14.3.

Execute 5.2., 5.9.4., 5.9.6. and 5.9.7. with $f_{RX} = f_G = 6999$ kHz, $V_G = 10$ mV modulated 30 per cent with 1 kHz.

5.14.4.

Adjust L302, L304 and L305 for max. meter reading and keep the meter reading on 0 dB by adjusting the RF GAIN.

5.14.5.

Execute 5.2.8. for $f_{RX} = f_G = 4000$ kHz.

5.14.6.

Adjust C312 and C318 for max. meter reading and keep the meter reading on 0 dB by adjusting the RF GAIN.

5.14.7.

Execute 5.2.8. for $f_{RX} = f_G = 6999$ kHz.

5.14.8.

Repeat 5.14.4., 5.14.5., 5.14.6. and 5.14.7. successively until there is no need for further adjustment.

NOTE: You must be very careful and adjust to exactly maximum.

5.14.9.

Set C301, C313 and C319 to middle position.

5.14.10.

Execute 5.2., 5.9.4., 5.9.6. and 5.9.7. with $f_{RX} = f_G = 3900$ kHz, $V_G = 10$ mV modulated 30 per cent with 1 kHz.

5.14.11.

Adjust L301, L303 and L306 for max. meter reading and keep the meter reading on 0 dB by adjusting the RF GAIN.

5.14.12.

Execute 5.2.8. for $f_{RX} = f_G = 1600$ kHz.

5.14.13.

Adjust C301, C313 and C319 for max. meter reading and keep the meter reading on 0 dB by adjusting the RF GAIN.

5.14.14.

Execute 5.2.8. for $f_G = f_{RX} = 3900$ kHz.

5.14.15.

Repeat 5.14.11., 5.14.12., 5.14.13. and 5.14.14. successively until there is no need for further adjustment.

NOTE: You must be very careful and adjust to exactly maximum.

5.14.16.

Lock the cores with the counter nut.

5.14.17.

Execute 5.13.22.

5.15.

ADJUSTMENT OF 530 - 1600 kHz, 150 - 530 kHz AND 2182 kHz.

5.15.1.

Set the MODE SWITCH to A3H.

5.15.2.

Set C210 to minimum capacity.

5.15.3.

Execute 5.2., 5.9.4., 5.9.6. and 5.9.7. with $f_G = f_{RX} = 560$ kHz and $V_G = 10$ mV modulated 30 per cent with 1 kHz.

5.14.4.

$f_G = f_{RX} = 530$ kHz push the NOISE GENERATOR button, but do not touch the RF TUNE.

5.15.5.

Adjust C210 to max. meter reading and keep the meter reading on 0 dB by adjusting the RF GAIN.

5.15.6.

Execute 5.2.8. with $f_G = f_{RX} = 1599$ kHz. If no METER maximum is obtainable it is necessary to screw the ferrite core to L202 a bit farther out of the coil formers and then repeat 5.15.2. to 5.15.6.

5.15.7.

Set C209 to minimum capacity.

5.15.8.

Execute 5.2., 5.9.4., 5.9.6. and 5.9.7. with $f_G = f_{RX} = 160$ kHz and $V_G = 10$ mV modulated 30 per cent with 1 kHz.

ADJUSTMENT PROCEDURE FOR R1119 & R1120 cont.:

5.15.9.

$f_G = f_{RX} = 150$ kHz push the NOISE GENERATOR button, but do not touch the RF TUNE.

5.15.10.

Adjust C209 to max. meter reading and keep the meter reading on 0 dB by adjusting the RF GAIN.

5.15.11.

Execute 5.2.8. with $f_G = f_{RX} = 529$ kHz. If no METER maximum is obtainable it is necessary to screw the ferrite core to L201 a bit farther out of the coil formers and then repeat 5.15.7. to 5.15.11.

5.15.12.

Lock the cores with the counter nut.

5.15.13.

Set MODE SWITCH to DISTRESS 2182 kHz.

5.15.14.

Execute 5.2., 5.9.4., 5.9.6. and 5.9.7. with $f_G = f_{RX} = 2182$ kHz and $V_G = 10$ mV modulated 30 per cent with 1 kHz.

5.15.15.

Adjust the screw core of L209 to be in level with the top of the coil former.

5.15.16.

Adjust C219 and L205 to max. meter reading and keep the meter reading on 0 dB by adjusting the RF GAIN.

5.15.17.

Execute 5.13.22.

5.16.

ADJUSTMENT OF WHEEL I AND II.

5.16.1.

Switch the receiver ON.

5.16.2.

Push the NOISE GENERATOR button and the decimal point key.

5.16.3.

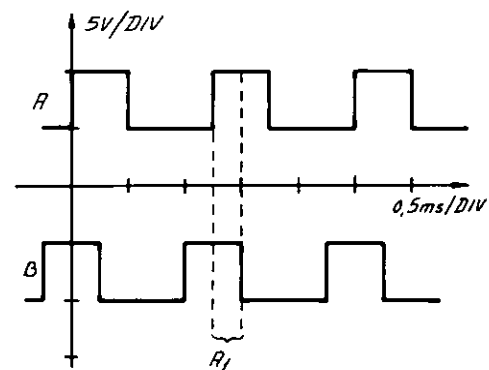
Connect a passive probe to IC2020 pin 8 and to channel A on an oscilloscope. Connect a passive probe to IC2020 pin 11 and to channel B on an oscilloscope. Let the oscilloscope be positive triggered by channel A.

5.16.4.

Turn the CONTINUOUS TUNING clockwise.

5.16.5.

Check that the waveforms are as shown below.

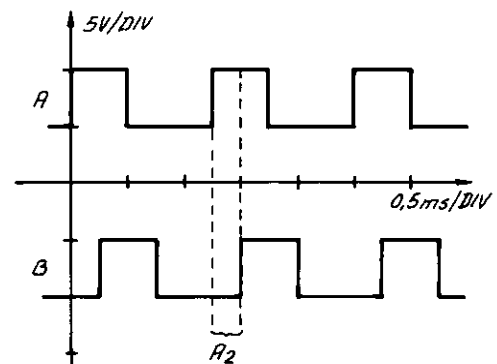


5.16.6.

Turn the CONTINUOUS TUNING counter clockwise.

5.16.7.

Check that the waveforms are as shown below.



5.16.8.

By adjusting the P.C.boards WHEEL I AND WHEEL II the sections marked A1 and A2 should be made equal.

NOTE: The adjustment should be done before remounting the front panel.

6. NECESSARY ADJUSTMENTS AFTER REPAIR FOR R1119 AND R1120

In the following paragraphs reference is made to the ADJUSTMENT PROCEDURE FOR R1119 AND R1120 and PERFORMANCE CHECK FOR R1119 AND R1120.

Definition used: refer to 5.1.

Locations: refer to ADJUSTMENT LOCATIONS.

- 6.1.
Module No. 100: AERIAL SWITCH.
- 6.1.1.
Execute 4.23.
- 6.1.2.
Enter the following f_{RX} to the KEYBOARD and press the NOISE GENERATOR button.
 f_{RX} = 240 kHz - 800 kHz - 2182 kHz - 6.0 MHz - 10.0 MHz - 20.0 MHz.
- 6.1.3.
When pressing the NOISE GENERATOR, adjust the RF TUNE to max. deflection on the METER.
- 6.1.4.
Check that max. METER deflection is at least 1.5.
- 6.1.5.
Set the MODE SWITCH to DISTRESS 2182 kHz.
- 6.1.6.
Press the NOISE GENERATOR and check that the deflection on the METER is at least 1.5.
- 6.2.
Module No. 200: BANDFILTER 0.01-1.6 MHz.
- 6.2.1.
Execute 4.15., 5.15. and 4.24. for the coil section in question.
- 6.3.
Module No. 300: BANDFILTER 1.6-4.0 MHz and 4.0 - 7.0 MHz.
- 6.3.1.
Execute 4.15., 5.14. and 4.24. for the coil section in question.
- 6.4.
Module No. 400: BANDFILTER 7.0-14.0 MHz and 14.0-30.0 MHz.
- 6.4.1.
Execute 4.15., 5.13. and 4.24. for the coil section in question.
- 6.5.
Module No. 500: 1st and 2nd MIXER.
- 6.5.1.
Execute 5.11. and 4.17.
- 6.5.2.
Enter f_{RX} = 2.182 MHz to the KEYBOARD and press the NOISE GENERATOR button.
- 6.5.3.
Check that the deflection on the METER is at least 1.5.
- 6.6.
Module No. 600 or 700: IF FILTER.
- 6.6.1.
Execute 5.10., 6.5.2. and 6.5.3.
- 6.7.
Module No. 800: IF AMPLIFIER, AGC AND DETECTOR.
- 6.7.1.
Execute 5.9., 4.19., 4.20., 6.5.2. and 6.5.3.
- 6.8.
Module No. 900: AUDIO AMPLIFIER.

NECESSARY ADJUSTMENTS AFTER REPAIR FOR R1119 AND R1120 cont.:

6.8.1.
Execute 4.21. and 4.22.

6.9.
Module No. 1000: DIVIDER-UNIT.

6.9.1.
Execute 4.3., 5.4., 5.6., 5.8., 4.12.,
4.13. and 4.24.

6.10.
Module No. 1100: LOOP 1 FILTER AND $\pm 18V$
SUPPLY-UNIT.

6.10.1.
Execute 5.3., 4.6. with $f_{RX} = 10.0$ MHz,
4.12. and 4.18.

6.11.
Module No. 1200: VCO-UNIT.

6.11.1.
Execute 4.7., 4.12. and 4.17.

6.12.
Module No. 1300: HARMONIC FILTER-UNIT.

6.12.1.
Execute 4.6., 4.12.

6.13.
Module No. 1400: LOOP 1. MIXER-UNIT.

6.13.1.
Execute 4.7. and 4.12.

6.14.
Module No. 1500: VCO BUFFER-UNIT.

6.14.1.
Execute 4.17. with the exception of
point 2, 3, 7 and 8.

6.15.
Module No. 1600: VCXO, 1st LOOP 2 MIXER
AND LOOP 2 FILTER.

6.15.1.
Execute 4.8.1. to 4.8.5.(both incl.),
4.9., 4.13. and 6.17. with the excep-
tion of point 4, 5, 9 and 10.

6.16.
Module No. 1700: CLARIFIER AND 2nd
LOOP 2 MIXER.

6.16.1.
Execute 5.5. and 4.8.

6.17.
Module No. 1800: BFO-UNIT.

6.17.1.
Execute 5.7. and 4.11.

6.18.
Module No. 1900: BAND CONTROL.

6.18.1.
Press the KEYBOARD CLEAR, the NOISE
GENERATOR button and the KEYBOARD DECI-
MAL POINT.

6.18.2.
Turn the CONTINUOUS TUNING clockwise.

6.18.3.
Check that noise is heard from the loud-
speaker until the DISPLAY shows 150.0
kHz then the receiver is blocked.

6.18.4.
Press the NOISE GENERATOR button. Check
that noise is heard from the loudspeaker.

6.18.5.
Turn the CONTINUOUS TUNING clockwise.

6.18.6.
Check that noise is heard from the loud-
speaker until the DISPLAY shows 530.0
kHz then the receiver is blocked.

NECESSARY ADJUSTMENTS AFTER REPAIR FOR R1119 AND R1120 cont.:

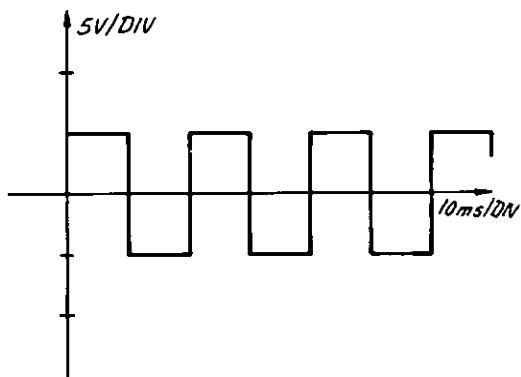
6.18.7.
Repeat 4.18.4. to 4.18.6. and check that the receiver has the following blocking frequencies 1.6 MHz, 4.0 MHz, 7.0 MHz, 14.0 MHz and 30.0 MHz.

6.18.8.
Execute 4.24.

6.19.
Module No. 2000: KEYBOARD CONTROL.

6.19.1.
Connect the passive probe to TP29 and to the scope.

6.19.2.
Check that the wave form seen on the scope is as shown below.



6.19.3.
Execute 4.3.3., 4.3.4. and 4.5.

6.19.4.
Execute 6.18.1. - 6.18.7. (both incl.).

6.19.5.
Enter $f_{RX} = 1111.1$ kHz to the KEYBOARD.

6.19.6.
Connect the voltmeter to the wires of 100 Hz, 1 kHz, 10 kHz, 100 kHz and 1 MHz data input terminals at the divider-unit.

6.19.7.
Check that the voltmeter shows 5V DC on the brown wires and the brown/black wire and that the voltmeter shows 0V DC on the other wires.

6.19.8.
Enter $f_{RX} = 222.2$ kHz to the KEYBOARD.

6.19.9.
Repeat 6.19.6.

6.19.10.
Check that the voltmeter shows 5V DC on the red wires and that the voltmeter shows 0V DC on the other wires.

6.19.11.
Enter $f_{RX} = 444.4$ kHz to the KEYBOARD.

6.19.12.
Repeat 6.19.6.

6.19.13.
Check that the voltmeter shows 5V DC on the yellow wires and that the voltmeter shows 0V DC on the other wires.

6.19.14.
Enter $f_{RX} = 888.8$ kHz to the KEYBOARD.

6.19.15.
Repeat 6.19.6.

6.19.16.
Check that the voltmeter shows 5V DC on the grey wires and that the voltmeter shows 0V DC on the other wires.

6.20.
Module No. 2100: KEYBOARD.

6.20.1.
Execute 4.5.1. - 4.5.5. (both incl.).

6.21.
Module No. 2200: DISPLAY.

6.21.1.
Execute 6.19.1. and 6.19.2.

6.21.2.
Execute 4.5.1. - 4.5.5. (both incl.).

R1119 & R1120 A 3/4

NECESSARY ADJUSTMENTS AFTER REPAIR FOR R1119 AND R1120 cont.:

6.22.

Module No. 2300 and 2400: WHEEL I AND II.

6.22.1.

Execute 5.16., 4.5.14. - 4.5.18. (both incl.).

6.23.

Module No. 2500: INPUT FILTER.

6.23.1.

Execute 4.14., 4.15., 4.16.1., 4.16.2., 4.21.1. - 4.21.5. (both incl.) and 4.23.

6.24.

Module No. 2600: CLARIFIER CAPACITOR.

6.24.1.

Adjust knob for symmetrical variation range.

6.24.2.

Execute 5.5. and 4.8.4. - 4.8.6. (both incl.).

7. FUNCTION CHECK R1119 AND R1120

NECESSARY TEST EQUIPMENT:

POWER SUPPLY E.g. SAILOR N1405
MULTIMETER E.g. PHILIPS PM2503

If a signal generator is by hand this can be used.

SIGNAL GENERATOR E.g. PHILIPS PM5326

INITIAL SETTINGS:

1.
Set the CLARIFIER to center position.
2.
Set the AGC SWITCH to TELEX MODE.
3.
Turn the RF GAIN fully clockwise.
4.
Turn the AF GAIN fully counter clockwise.
5.
Set the MODE SWITCH to DISTRESS 2182 kHz.
6.
Set the LOUDSPEAKER ON/OFF to ON.
7.
Set the BFO to center position (R1120 only).
8.
Set the FILTER SWITCH to WIDE (R1120 only).
9.
Connect the receiver to the power supply (N1405).
10.
Connect the antenna input terminals to the antenna or to the signal generator.

FUNCTION CHECK:

- 7.1.
Turn AF GAIN to suitable volume.
- 7.2.
Check that the LOUDSPEAKER ON/OFF is functional.
- 7.3.
Connect headphones to HEADPHONES socket.
- 7.4.
Check that the loudspeaker now is off and the noise is heard in the headphones.
Remove the headphones.
- 7.5.
Turn RF GAIN fully counter clockwise.
- 7.6.
Check that the noise in the loudspeaker disappears and the RF METER reading is now approx. 5. Turn RF GAIN fully clockwise.
- 7.7.
Press the NOISE GENERATOR button.
- 7.8.
Check that the RF METER reading is at least 1.5.
- 7.9.
Check that the DISPLAY shows 2182 kHz.
- 7.10.
Set the MODE SWITCH to A3J.
- 7.11.
Press the KEYBOARD C. The DISPLAY shows 000000.
- 7.12.
Check that no noise is heard from the loudspeaker.
- 7.13.
Press the KEYBOARD C and 1 simultaneously. The DISPLAY shows 111111.
- 7.14.
Repeat 7.13. for C and 2, 3 ---- 9,0.

FUNCTION CHECK R1119 AND R1120 cont.:

7.15.
Press the KEYBOARD C and the NOISE GENERATOR button. The DISPLAY shows 00000.0.

Check that noise is heard from the loudspeaker.

7.16.
Press the KEYBOARD decimal point. The DISPLAY shows 00000.0.

7.17.
Turn the CONTINUOUS TUNING clockwise until the DISPLAY shows 00150.0 kHz. Check that no noise is heard from the loudspeaker.

7.18.
Press the KEYBOARD 0 and turn the CONTINUOUS TUNING. The displayed figure must not change.

7.19.
Press the KEYBOARD C and the NOISE GENERATOR button.

7.20.
Turn the CLARIFIER extreme clockwise and check that the beat note heard from the loudspeaker change.

7.21.
Repeat 7.20. within the CLARIFIER extreme counter clockwise.

7.22. (R1120 only)
Set the MODE SWITCH to A1.

7.23. (R1120 only)
Adjust the BFO until no beat note is heard from the loudspeaker. Check that the BFO now is in its counter position.

7.24. (R1120 only)
Turn the BFO extreme clockwise. Check that a beat note is heard from the loudspeaker.

7.25. (R1120 only)
Repeat 7.24. with the BFO extreme counter clockwise.

7.26. (R1120 only)
Set the FILTER SWITCH to VERY NARROW.

7.27. (R1120 only)
Set the CLARIFIER to center position.

7.28. (R1120 only)
Turn the BFO to center position and then clockwise until a proper beat note is heard from the loudspeaker.

7.30. (R1120 only)
Connect the voltmeter to HEADPHONES via a screened cable and adjust AF GAIN to the meter reads 0 dB in the 0.3V range.

7.31. (R1120 only)
Set the AGC ON/OFF to OFF.

7.32. (R1120 only)
Reduce RF GAIN until the meter reading is 0 dB again.

7.33. (R1120 only)
Press the KEYBOARD decimal point.

7.34. (R1120 only)
Turn the CONTINUOUS TUNING clockwise until the DISPLAY shows 00000.4 kHz.

7.35. (R1120 only)
Check that the meter reading is \leq -10 dB.

7.36. (R1120 only)
Set the FILTER SWITCH to NARROW.

7.37. (R1120 only)
Adjust the RF GAIN until the meter reading is 0 dB again.

7.38. (R1120 only)
Turn the CONTINUOUS TUNING clockwise until the DISPLAY shows 00001.0 kHz.

7.39. (R1120 only)
Check that the meter reading is \leq -10 dB.

7.40. (R1120 only)
Set the FILTER SWITCH to INTERMEDIATE.

7.41. (R1120 only)
Repeat 7.37.

7.42. (R1120 only)
Turn the CONTINUOUS TUNING clockwise until the DISPLAY shows 00001.5 kHz.

FUNCTION CHECK R1119 AND R1120 cont.:

- 7.43. (R1120 only)
Check that the meter reading is ≤ -10 dB.
- 7.44. (R1120 only)
Set the FILTER SWITCH to WIDE.
- 7.45. (R1120 only)
Repeat 7.37.
- 7.46. (R1120 only)
Turn the CONTINUOUS TUNING clockwise until the DISPLAY shows 00003.0 kHz.
- 7.47. (R1120 only)
Check that the meter reading is ≤ -10 dB.
- 7.48. (R1120 only)
Set the FILTER SWITCH to AUX.
- 7.49. (R1120 only)
If an AUX FILTER is fitted find a radio station and check that the filter bandwidth is correct.
- 7.50. (R1120 only)
Set the FILTER SWITCH to WIDE.
- 7.51. (R1120 only)
Set the MODE SWITCH to A2.
Set the AGC SWITCH to TELEX.
Turn the RF GAIN fully clockwise.
- 7.52. (R1120 only)
Press the KEYBOARD C and the NOISE GENERATOR button.
- 7.53. (R1120 only)
Press the KEYBOARD decimal point.
Turn the CONTINUOUS TUNING clockwise.
- 7.54. (R1120 only)
Check that the RF METER deviation begins to drop when the DISPLAY shows 00003.0 kHz and that the RF METER is approx. 0 when the DISPLAY shows 00010.0 kHz.
- 7.55. (R1120 only)
Set the MODE SWITCH to A3J.
- 7.56. (R1120 only)
Disconnect the meter from HEADPHONES.
- 7.57. (R1120 only)
Press the KEYBOARD C and the NOISE GENERATOR button.
- 7.58. (R1120 only)
Turn the CLARIFIER extreme counter clockwise.
- 7.59.
Press the KEYBOARD decimal point.
- 7.60.
Check that the RF METER shows approx. 3.
- 7.61.
Turn the CONTINUOUS TUNING until the DISPLAY shows 00000.5 kHz.
- 7.62.
Check that the RF METER shows approx. 0.
- 7.63.
Set the MODE SWITCH to A3H (AM).
- 7.64.
Check that the RF METER shows approx. 3.
- 7.65.
Turn the CONTINUOUS TUNING clockwise.
- 7.66.
Check that the RF METER deviation begins to drop when the DISPLAY shows 00003.0 kHz and that the RF METER is approx. 0 when the DISPLAY shows 00010.0 kHz.
- 7.67. (R1119 only)
Set the MODE SWITCH to TELEX.
- 7.68. (R1119 only)
If an AUX filter is fitted. Check the filter bandwidth by means of a suitable broadcast station or the signal generator.
- 7.69. (R1119 only)
Set the MODE SWITCH to A3H (AM).
- 7.70.
Set the MODE SWITCH to A3J (SSB).
- 7.71.
Set the AGC SWITCH to ON.
- 7.72.
Press the KEYBOARD C and the NOISE GENERATOR button.
- 7.73.
Press the KEYBOARD decimal point.

FUNCTION CHECK R1119 AND R1120 cont.:

- 7.74.
Turn the CLARIFIER extreme counter clockwise.
- 7.75.
Notice the position of the RF METER pointer.
- 7.76.
Turn the CONTINUOUS TUNING counter clockwise.
- 7.77.
Check that it takes approx. 3 secs. after turning the CONTINUOUS TUNING until the pointer of the RF METER is approx. 0.
- 7.78.
If a signal generator is by hand, set $f_G = f_{RX}$, $V_G = 1$ mV modulated 30 per cent with 1 kHz.
- 7.79.
If no signal generator is by hand, connect a DC voltmeter to TP11.
- 7.80.
Set the MODE SWITCH to A3H (AM).
- 7.81.
Enter $f_{RX} = 1.999$ MHz to the KEYBOARD.
- 7.82.
Press the NOISE GENERATOR and adjust the RF TUNE to max. deflection on the RF METER and check that the RF METER deflection is at least 1.5.
- 7.83.
Check that a 1000 Hz tone is heard from the loudspeaker if a signal generator is used.
- 7.84.
If no signal generator is used check that the voltmeter measures $15V \pm 1.5V$ DC.
- 7.85.
Repeat 7.82. - 7.84. for $f_{RX} = f_G =$
3.999 - 5.999 - 7.999 - 9.999 - 11.999 -
13.999 - 15.999 - 17.999 - 19.999 -
21.999 - 23.999 - 25.999 - 27.999 -
29.999 MHz.

- 7.86.
Turn the DIMMER extreme clockwise.
- 7.87.
Check that the DISPLAY and the RF METER is illuminated.