SRA

SVENSKA RADIOAKTIEBOLAGET

STOCKHOLM SWEDEN

Radio-Receiver

Type ML-461

# RADIO-RECEIVER

## Type ML-46

*INSTRUCTION BULLETIN*

H. 365. 1500. 1. 47
Uno S. Anderssons Boktryckeri, Stockholm

# TABLE OF CONTENTS.

# RADIO RECEVIER TYPE ML-46.

## 1. GENERAL.

The ML-46 Radio Receiver is a 4-valve superheterodyne receiver for the frequency range 50 to 4500 kc/s in three bands.

The receiver is intended for marine and point-to-point services.

It permits reception of CW and MCW telegraphy and telephony, and is provided with a built-in loudspeaker.

The receiver is designed to operate from 110 or 220 V DC mains and 65 V battery.

The receiver is of rugged construction and care is taken to assure reliable service under adverse climatic conditions.

# 2. MAIN FEATURES.

## 2.1. Frequency Range.

The receiver covers the frequency ranges 50—150 kc/s (6000—2000 metres), 170—520 kc/s (1765—576,9 metres) and 1,5—4,5 Mc/s (200—66,7 metres).

## 2.2. Calibration.

The receiver is provided with a semi-circular dial directly calibrated in kc/s and Mc/s.

## 2.3. Sensitivity.

In the frequency range from 170—4500 kc/s an EMF of about 5 μV modulated 30 % at 400 c/s will give an output of 50 milliwatts at 220 V.

The corresponding sensitivity in the frequency range from 50—150 kc/s will be about 20 μV.

## 2.4. Selectivity.

A suppression of 40 dB is obtained for signals 9 kc/s off tune.

The second channel suppression exceeds 65 dB between 170—520 kc/s and 1,5—4,5 Mc/s and is not less than 42 dB on any frequency.

## 2.5. Beat Oscillator.

A built-in beat oscillator allows reception of unmodulated signals.

## 2.6. Variable wavetrap.

The receiver is provided with a variable wavetrap for the frequency range 1,7—3,4 Mc/s. The suppression exceeds 45 dB. The wavetrap is short-circuited on the un-calibrated part of the dial.

## 2.7. Frequency Response.

The audio frequency characteristic is better than ± 3 dB within the range 200—3200 c/s and better than ± 6 dB within the range 150—4400 c/s compared with the level at 400 c/s.

## 2.8. Output Power.

The output power at 220 V is with distortion approximately 330 mW into a load of 200 ohms.

## 2.9. Power Supply.

The receiver is designed to operate from ~~110 or 220 V DC mains or 65 V~~ 24 V battery.

## 2.10. Power Consumtion.

The power consumption from DC mains is 88 W at 220 V and 44 W at 110 V. The corresponding consumption at 65 V battery is about 26 W.

## 2.11. List of Valves.

1-type ECH 21 Frequency changer
1- » ECH 21 I. F. and A. F. amplifier.
1- » ECH 21 I. F. amplifier and 2nd detector.
1- » ECH 21 Output and beat oscillator valve.

## 2.12. Dimensions and Weight.

Width 337 mm (13 1/4")
Height 220 mm ( 8 3/4")
Depth 210 mm ( 8 1/4")
Weight 9,8 kg (22 lbs)

# 4. TECHNICAL DESCRIPTION.

## 3.1. Circuit System.

The receiver employs 4 valves in a superheterodyne circuit consisting of frequency changer, I. F. and A. F. amplifier; I. F. amplifier and 2nd detector; and output stage with beat oscillator. When the switch »Frekvensområde» is in the A, B or C position the receiver is operating on the 50—150 kc/s, 170—520 kc/s or 1,5—4,5 Mc/s bands respectively.

In the aerial circuit a variable wavetrap operating on 1,7—3,4 Mc/s is connected in series with the input stage. The suppression exceeds 52 dB on 1500 kc/s and is not less than 45 dB on any frequency.

On all bands the receiver is provided with band-pass filter in the antenna circuit.

The triode section of $V_1$ is used as a R. F. oscillator in the conventional way. The tuning condenser of the antenna circuit, with the band-pass filter and the oscillator circuits are ganged.

The I. F. amplifier operates on 720 kc/s. In order to suppress the sensitivity for this frequency there are two wavetraps between antenna and earth. The suppression for I. F. signals by 520 kc/s is 90 dB.

A double-tuned I. F. transformer $T_1$ couples the frequency changer to the pentode I. F. amplifier $V_2$ and a similar transformer $T_2$ connects this valve to the 2nd I. F. amplifier $V_3$. A third transformer $T_3$ couples $V_3$ to the 2nd detector, the grid in the triode part of valve $V_3$. The anode operates as an automatic volume control rectifier, receiving its signal energy from the anode in the pentode part of valve $V_3$ and feeding rectified negative voltage to the signal grids of $V_1$ and $V_2$.

By means of the switch »AVC-Man» on the front panel the AVC action — in position »Man.» — may be cut out. In the *»Man»* position an another volume control allowing manual adjustment of the gain of $V_1$ and $V_2$ is put in. The beat oscillator, the triode-part of $V_4$, is coupled to the signal diode of the 2nd detector. The beat note pitch is fixed and can not be adjusted.

The A. F. output from the 2nd detector diode circuit is passed to a volume control potentiometer and then to the triode section of $V_2$. The output circuit of this valve is resistance-capacity coupled to the pentode-section of the output valve.

The output transformer has two secondary windings corresponding to loads of about 20 and 200 ohms respectively, the 20-ohm-winding feeding the built-in permanent dynamic loudspeaker. The 200-ohm-winding is connected to terminals 7 and 8 of the 8-terminal plug. A separate switch is used to silence the loudspeaker when only headphone reception is wanted.

In the receiver all filaments are in series. For operation from 220 or 110 V a separate switch is placed inside the cabinet.

In case of failure of the normal mains voltage, the receiver may be connected to a 65 V emergency battery by throwing the switch »Batt-O-Nät» in front of the panel in position »Batt.»

The connections to the supplies are made through a R. F. filter circuit and a DPDT switch.

To avoid grounding of the D. C. mains, the supply leads, valve cathodes and ground sides of the tuned circuits they are carefully insulated from the chassis. An 8-terminal plug is applied for the connection of the emergency battery, D. C. mains leads, break-in relay contacts and headphone sets.

## 3.2. Construction.

The receiver is built on a nickel plated brass chassis and housed in a steel cabinet provided with rubber mounting.

The chassis and cabinet are held together by three redmarked screws at the front panel.

The front panel is attached to the chassis by means of six screws and may easily be removed for inspection.

The dial gear drive has a ratio of 1 : 10. The dial is calibrated in kc/s (bands A—B) and Mc/s (band C).

Antenna and earth connections are made to the terminals at the right side of the cabinet. Mains, battery, blocking realy and 200-ohm-phone are connected to a connection box, to which an 8-pole plug is attached through a rubber cable. The plug fits a jack at the left side of the cabinet.

The receiver is finished in grey lacquer.

# 4. INSTALLATION AND MAINTENANCE.

## 4.1. Installation.

The receiver may be fastened to the table by means of three screws through the rubber mountings.

The connections to the 8-terminal plug at the left side of the cabinet should be made as follows:

Emergency battery + pole to terminal 1
» » — » » » 2
D. C. Mains + » » » 3
D. C. » — » » » 4
Contacts of break-in relay » » 5 and 6
Headphones (200 ohms) » » 7 » 8.

If no break-in relay is used *terminals 5 and 6 should be short-circuited.*

The antenna is connected to the terminal »A» at the right side of the cabinet.

The earth is connected to the »J» terminal at the right side of the cabinet.

Make sure that the mains tap switch on the chassis is set to the correct position.

The switch »BATT-O-NAT» should be in position »NAT» when the normal D. C. mains is used. When in position »BATT» this switch connects the receiver to the 65 V emergency battery.

## 4.2. Realignment.

### 4.2.1. General.

It is recommended not to undertake any readjustment of trimmers etc. without the aid of a correctly calibrated signal generator.

**Care should be taken always to use a series condenser when connecting the output of the signal generator to the receiver.**

### 4.2.2. Realignment of I. F. circuits.

The signal generator is adjusted to 720 kc/s. Set the AVC switch to position »Man».

Connect the signal generator to the grid of $V_3$ (pin 6). Connect a resistor (10000 ohms) and a condenser (10000 pF) in series between the anode of $V_3$ (pin 2) and chassis. The inductance trimmer 2 of $T_3$, accessible through a hole in the screening can, should be adjusted for maximum output.

Change the series circuit over to the signal diode of $V_3$ (pin 4) and adjust the inductance trimmer 1 of $T_3$.

These adjustments should be made alternately and repeatedly until the filter is properly tuned. Then disconnect the series circuit. Normal I. F. sensitivity should be about 5,6 mV for 50 mW output at 220 V DC., and normal selectivity ± 65 kc/s at 40 dB down.

For alignment of the second filter ($T_2$) and first filter ($T_1$) connect the signal generator to the grid (pin 6) of $V_2$ resp. $V_1$. Adjust the trimmers 2 and of $T_2$ and $T_1$ with the aid of the series circuit following the procedure recommended for $T_3$.

The I. F. sensitivity from $V_2$ grid should be about 260 μV for 50 mW output and the selectivity about ± 20 kc/s at 40 dB and from $V_1$ grid about 6 μV and ± 9 kc/s resp. (series circuit disconnected).

The I. F. traps in the antenna circuit are accessible through two holes in the back of the big square screening can at the right of the chassis. Connect the signal generator (tuned to 720 kc/s) to the antenna terminal. The receiver is tuned to the highest frequency of band B. Adjust the trap inductance for minimum output. A fairly high input level from the signal generator is necessary to get the 720 kc/s signal through.

### 4.2.3. Realignment of Beat Oscillator.

Connect the signal generator to the receiver and cut off its modulation and set the beat frequency switch on the receiver »A1-A2A3» to position »A1». Adjust the beat oscillator inductance trimmer (accessible through a hole in the little screening can to the left on the chassis) to zero beat with the applied signal.

### 4.2.4. Realignment of R. F. Circuits.

The inductance and capacity trimmers of the frequency bands A—C are accessible from the bottom of the chassis.

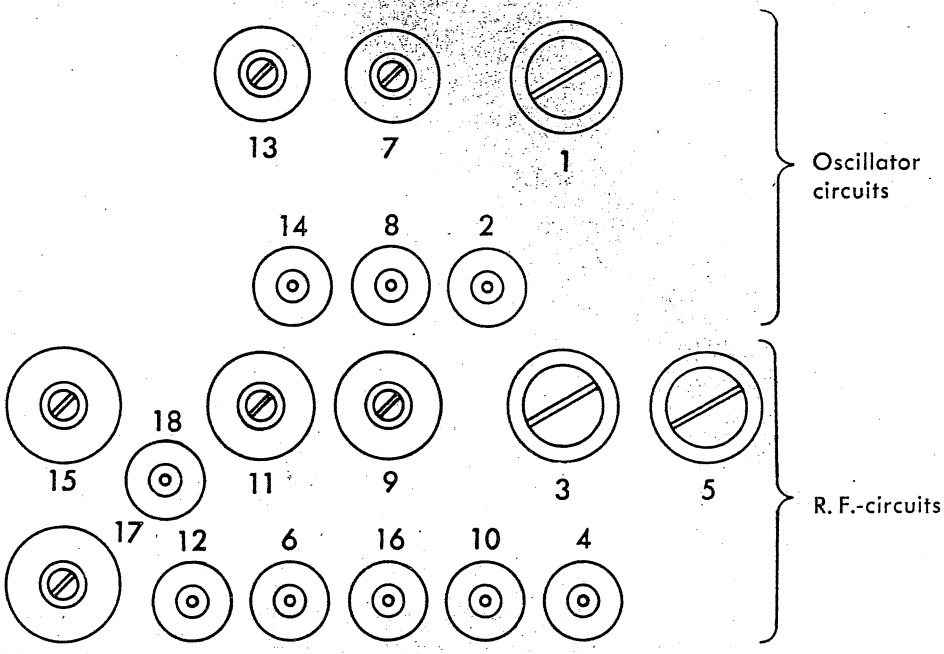
The adjustment of capacity and inductance trimmers belonging to the different bands should be made with the receiver and signal generator tuned to the frequencies given in the table below. The normal sensitivity for 50 mW output at 220 V D. C. mains will be about 5 μV on band B and C and about 20 μV on band A.

The signal generator should be connected to the antenna and earth terminals. A standard dummy antenna type »G» should be used in series with the signal generator.

The following system is used for identification of the different trimmers belonging to each frequency band.

Alignment.

| Freq. band | Freq. range kc/s | Freq. kc/s | Inductance trimmers | Capacity trimmers |
|---|---|---|---|---|
| A | 50– 150 | 50<br>150 | 13, 15 and 17<br>– | –<br>14, 16 and 18 |
| B | 170– 520 | 170<br>520 | 7, 9 and 11<br>– | –<br>8, 10 and 12 |
| C | 1500–4500 | 1500<br>4500 | 1, 3 and 5<br>– | –<br>2, 4 and 6 |
| Variable wavetrap | | | | |
| "C" trap | 1700–3400 | 1700<br>3400 | 19<br>– | –<br>20 |
| I. F. traps and Beat osc. are all adjusted to 720 kc/s. | | | | |




Trimmer lokation table.

The adjustments on each band should be made as follows:

Tune receiver and signal generator to 150 kc/s on band A. Adjust the oscillator trimmer condenser (14) until the signal is heard. Then tune receiver and signal generator to 50 kc/s on the same band and make the corresponding adjustment on the inductance trimmer (13). Return to 150 kc/s and repeat the first procedure. Next the antenna circuit is adjusted for maximum output by means of the trimmer condensers (16 and 18) and inductance trimmers (15 and 17) belonging to this circuit. The alignment operations described should then be repeated until correct readings on the dial and maximum output is obtained on all bands.

### 4.2.5. Realignment of wavetrap.

The capacity and inductance trimmers of the tuneable wavetrap on band C, frequency range 1,7—3,4 Mc/s, are accessible through holes in the top of the big screening can at the right of the chassis. Tune the signal generator, the receiver and the wavetrap to the lowest frequency of the band (1700 kc/s) and adjust the inductance trimmer (19) to minimum output. Then tune receiver, wavetrap and signal generator to 3400 kc/s and adjust the capacity trimmer (20) to minimum output. Return to the lower frequency and repeat the first procedure.

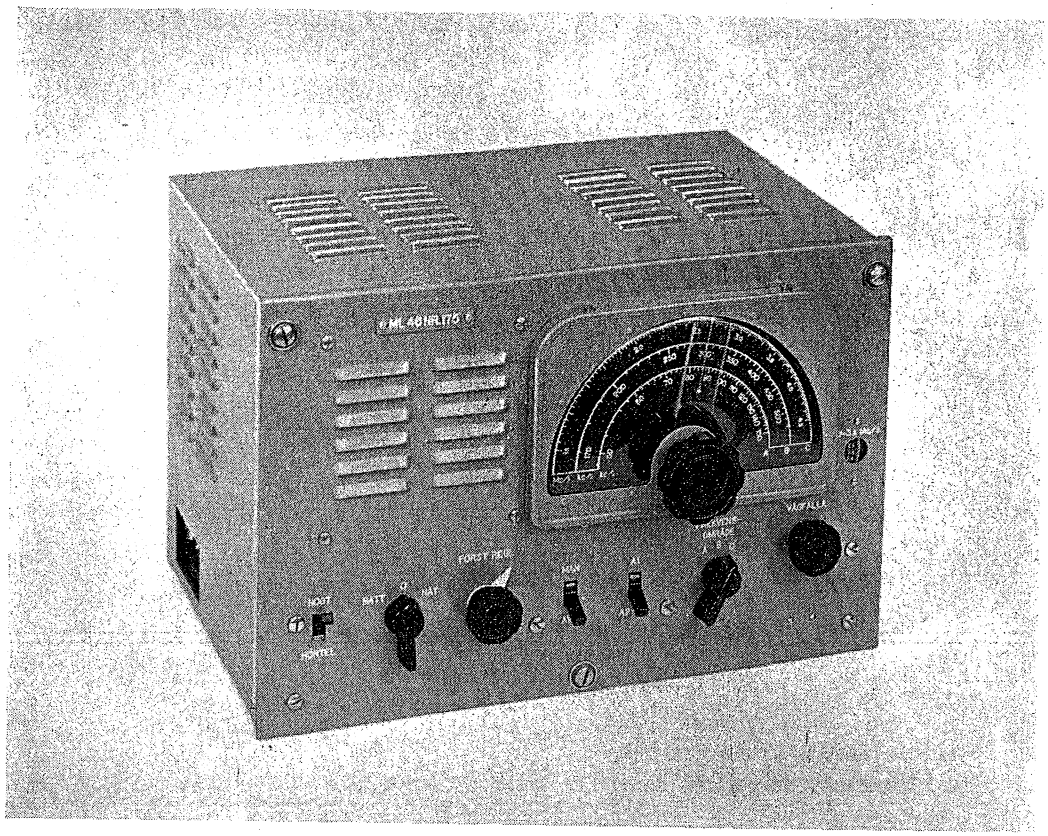


Fig. 1. Front View.

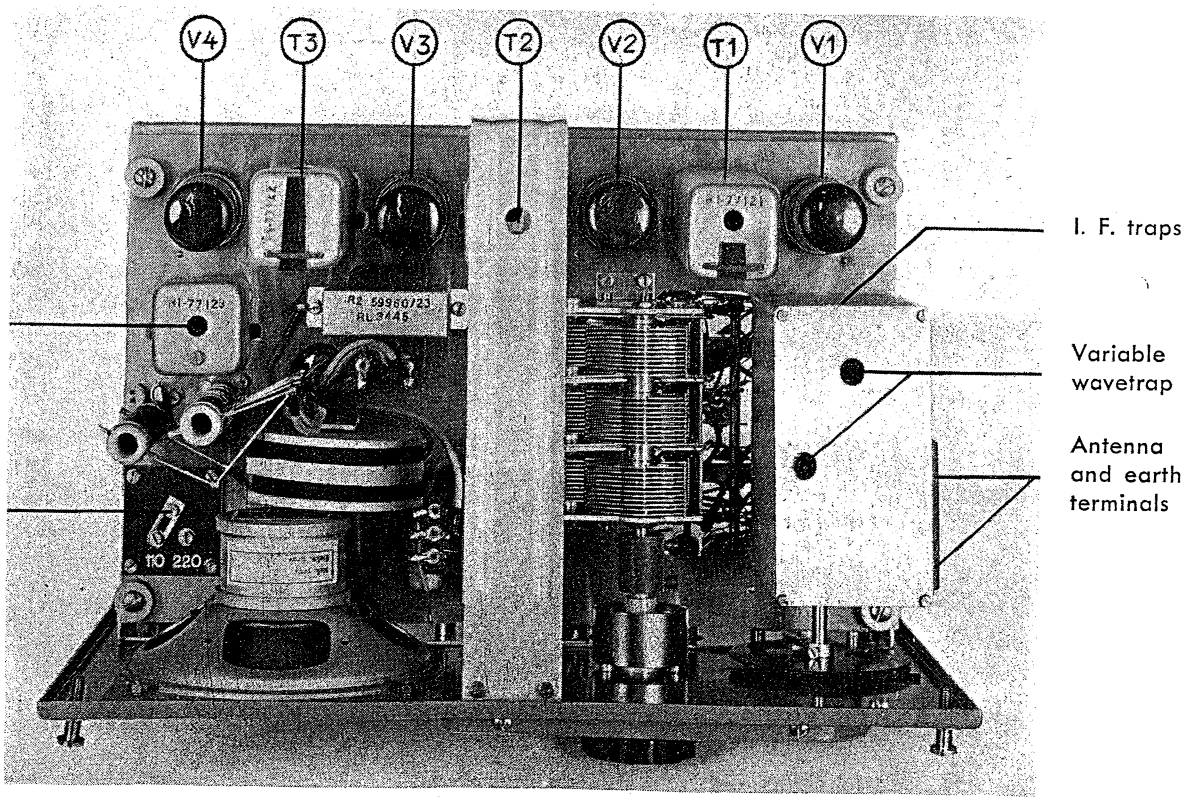



Fig. 2. Top View.

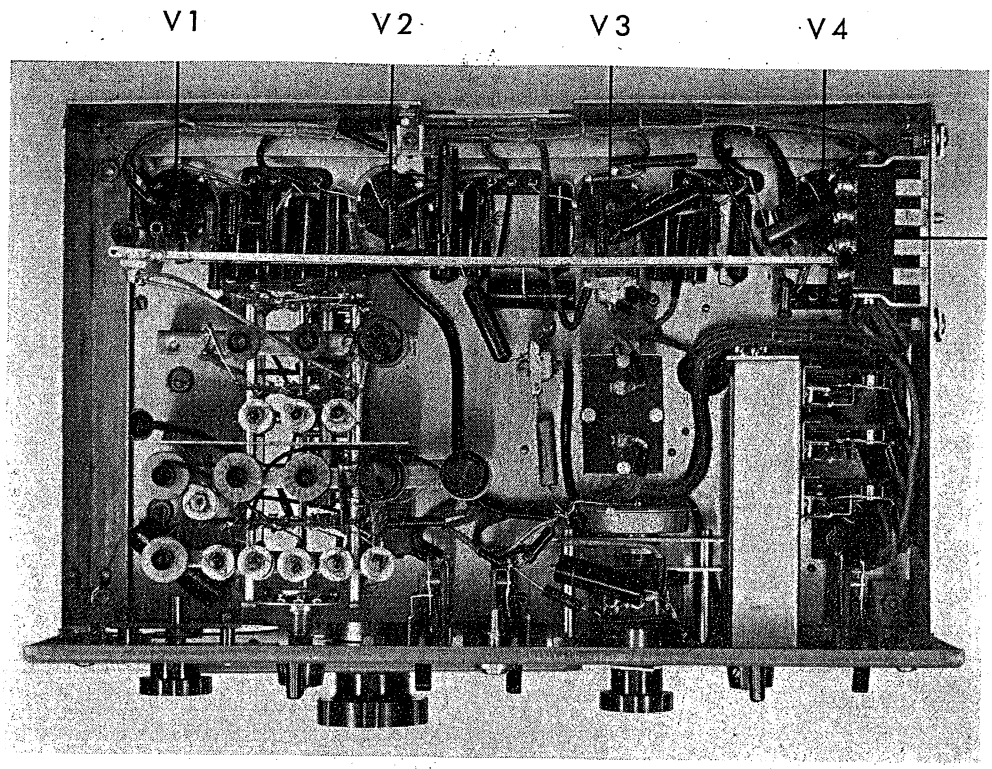



Fig. 3. Bottom View.

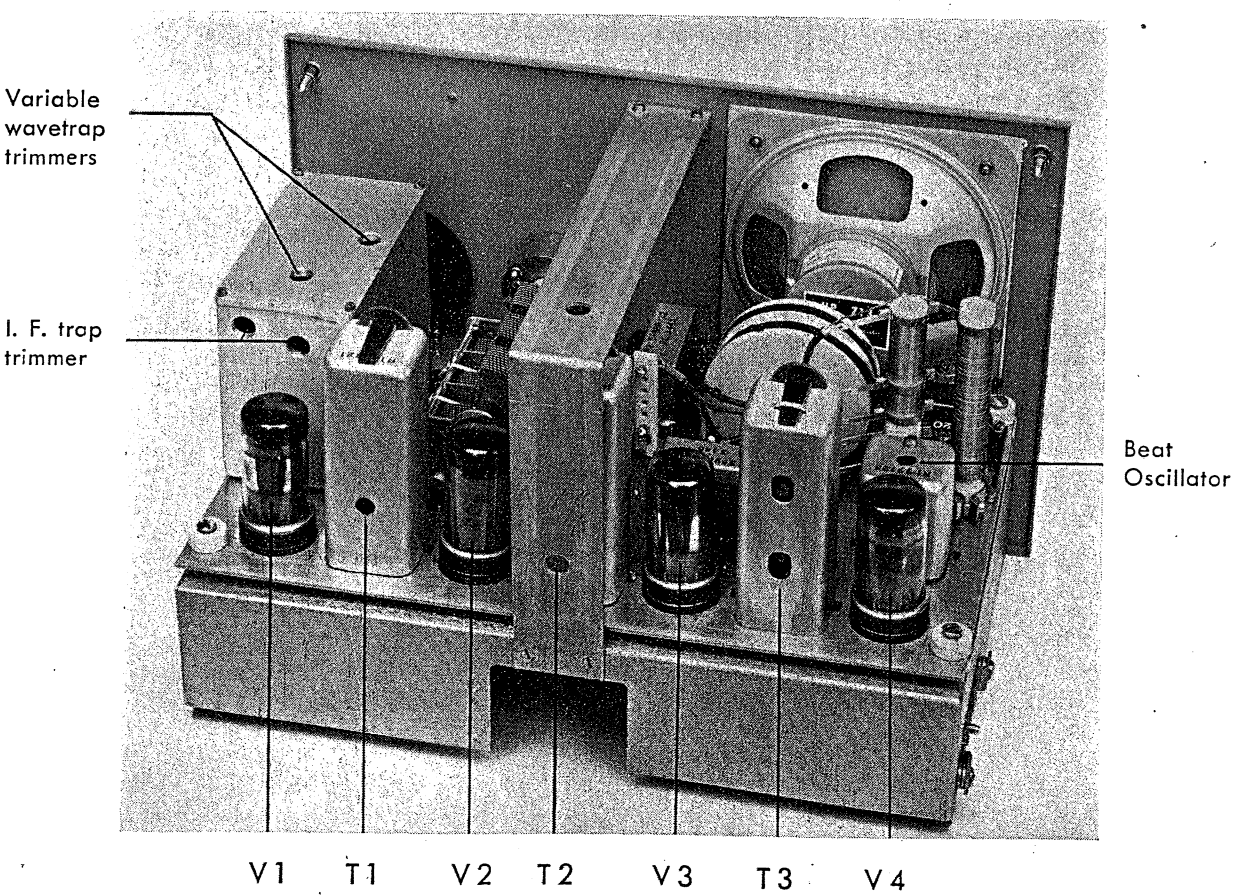



Fig. 4. Rear View.

| Diagram No | No req. | Description | Part No | Dates |
|---|---|---|---|---|
| 1 | 1 | Frequency changer | | ECH 21 |
| 2 | 1 | I. F. and A. F. amplifier | | ECH 21 |
| 3 | 1 | I. F. amplifier and 2nd detector | | ECH 21 |
| 4 | 1 | Output and beat oscillator valve | | ECH 21 |
| 8 | 1 | Speaker | R5-58950/10 | Type HP-713 |
| 11 | 1 | Coil assembly | R2-77119 | |
| 11:1 | 1 | Coil | R2-72360/40 | aA |
| 11:2 | 1 | Coil | R2-72360/41 | bB |
| 11:3 | 1 | Coil | R2-66262/96 | cC |
| 11:4 | 1 | Coil | R2-72360/75 | A′ |
| 11:5 | 1 | Coil | R2-72360/76 | B′ |
| 11:6 | 1 | Coil | R2-66268/98 | C′ |
| 11:7 | 1 | Choke | RL-3449 | |
| 11:8 | 1 | Coil | R2-72360/42 | aoAo |
| 11:9 | 1 | Coil | R2-72360/43 | boBo |
| 11:10 | 1 | Coil | R2-66262/97 | coCo |
| 11:14 | 1 | Capacity trimmer | M1-68668 | 30 pF |
| 11:15 | 1 | Capacity trimmer | M1-68668 | 30 pF |
| 11:16 | 1 | Capacity trimmer | M1-68668 | 30 pF |
| 11:17 | 1 | Capacity trimmer | M1-68668 | 30 pF |
| 11:18 | 1 | Capacity trimmer | M1-68668 | 30 pF |
| 11:19 | 1 | Capacity trimmer | M1-68668 | 30 pF |
| 11:20 | 1 | Capacity trimmer | M1-68668 | 30 pF |
| 11:21 | 1 | Capacity trimmer | M1-68668 | 30 pF |
| 11:22 | 1 | Capacity trimmer | M1-68668 | 30 pF |
| 11:23 | 1 | Condenser | 1000 pF Alpha 74752 | 1000 pF ± 2 % |
| 11:24 | 1 | Condenser | F1-77118/3 | 270 pF ± 5 % |
| 11:25 | 1 | Condenser | 180 pF Alpha 74712 | 180 pF ± 2 % |
| 11:27 | 1 | Condenser | 140 pF Alpha 74712 | 140 pF ± 2 % } 170 pF |
| | 1 | Condenser | 30 pF Alpha 74711 | 30 pF ± 5 % } in parallel |
| 11:28 | 1 | Condenser | 100 pF Alpha 74711 | 100 pF ± 5 % |
| 11:29 | 1 | Condenser | 50 pF Alpha 74711 | 50 pF ± 5 % |
| 11:31 | 1 | Condenser | F1-77118/9 | 27 pF ± 10 % |
| 11:40 | 1 | Band switch | R2-76703 | |
| 11:40:1 | 1 | Band switch section 1 | R1-77148 | |
| 11:40:2 | 1 | Band switch section 2 | R1-77148/2 | |
| 11:40:3 | 1 | Band switch section 3 | R1-77148/3 | |
| 12 | 1 | I. F. Transformer I | R1-77121 | |
| 12:1 | 1 | Coil | R2-72360/39 | M1 |
| 12:2 | 1 | Coil | R2-72360/39 | M2 |
| 12:3 | 1 | Condenser | 200 pF Ceramic Hescho CCoh | 200 pF ± 5 % |
| 12:4 | 1 | Condenser | 200 pF Ceramic Hescho CCoh | 200 pF ± 5 % |
| 13 | 1 | I. F. Transformer II | R1-77121/2 | |
| 13:1 | 1 | Coil | R2-72360/39 | M1 |
| 13:2 | 1 | Coil | R2-72360/39 | M2 |
| 13:3 | 1 | Condenser | 200 pF Ceramic Hescho CCoh | 200 pF ± 5 % |
| 13:4 | 1 | Condenser | 200 pF Ceramic Hescho CCoh | 200 pF ± 5 % |
| 14 | 1 | I. F. Transformer III | R1-77122 | |
| 14:1 | 1 | Coil | R2-72360/39 | M1 |
| 14:2 | 1 | Coil | R2-72360/39 | M2 |
| 14:3 | 1 | Condenser | 200 pF Ceramic Hescho CCoh | 200 pF ± 5 % |
| 14:4 | 1 | Condenser | 200 pF Ceramic Hescho CCoh | 200 pF ± 5 % |
| 15 | 1 | Beat oscillator | R1-77123 | |
| 15:1 | 1 | Coil | R2-72360/37 | Mo |
| 15:2 | 1 | Condenser | 200 pF Alpha 74712 | 200 pF ± 2 % |
| 15:3 | 1 | Condenser | 50 pF Ceramic Hescho CCos | 50 pF ± 10 % |
| 16 | 1 | Wave trap | R2-77128 | |
| 16:1 | 1 | Coil | R2-72360/77 | |
| 16:2 | 1 | Coil | R2-72360/38 | |
| 16:3 | 1 | Coil | R2-66262/95 | |
| 16:4 | 1 | Variable condenser | F1-77168 | 129 pF |
| 16:5 | 1 | Capacity trimmer | M1-68668 | 30 pF } Connected |
| | 1 | Capacity trimmer | M1-68668 | 30 pF } in series |
| 16:6 | 1 | Condenser | F-7103 | 0,1 μF |
| 16:7 | 1 | Condenser | F-74973 | 5000 pF Wkg max. 350 V~ |
| 16:8 | 1 | Condenser | 200 pF Alpha 74712 | 200 pF ± 2 % |
| 16:9 | 1 | Condenser | 40 pF Alpha 74711 | 40 pF ± 5 % |

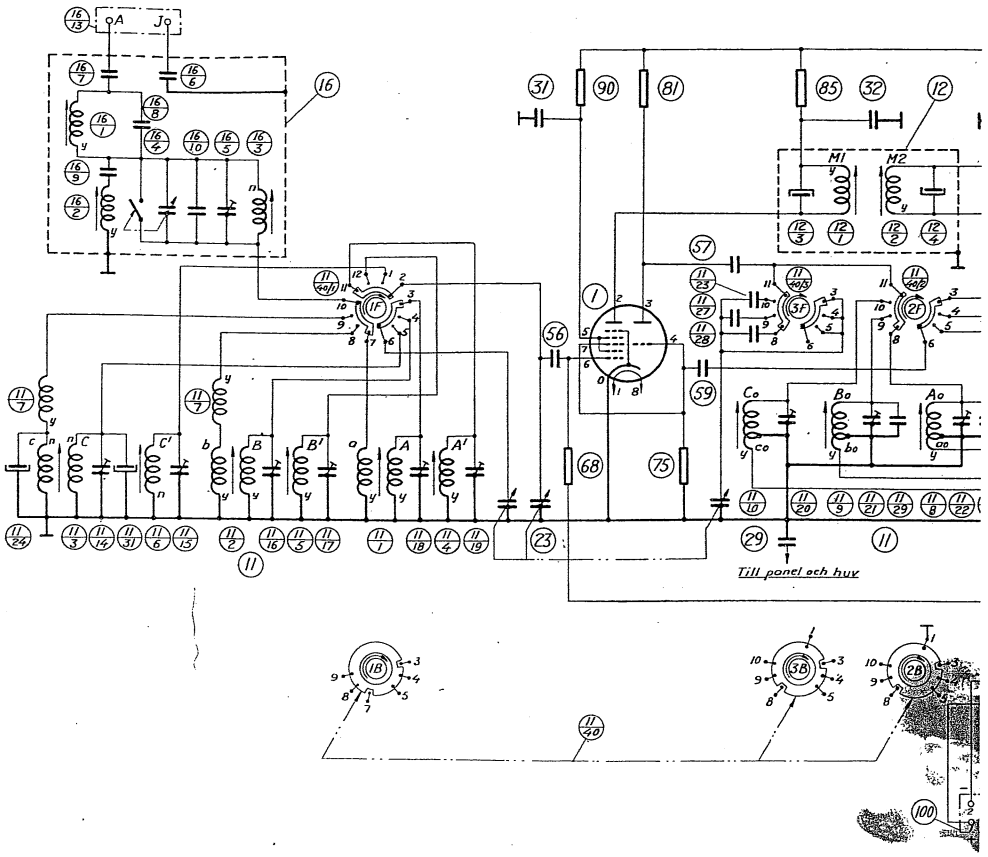
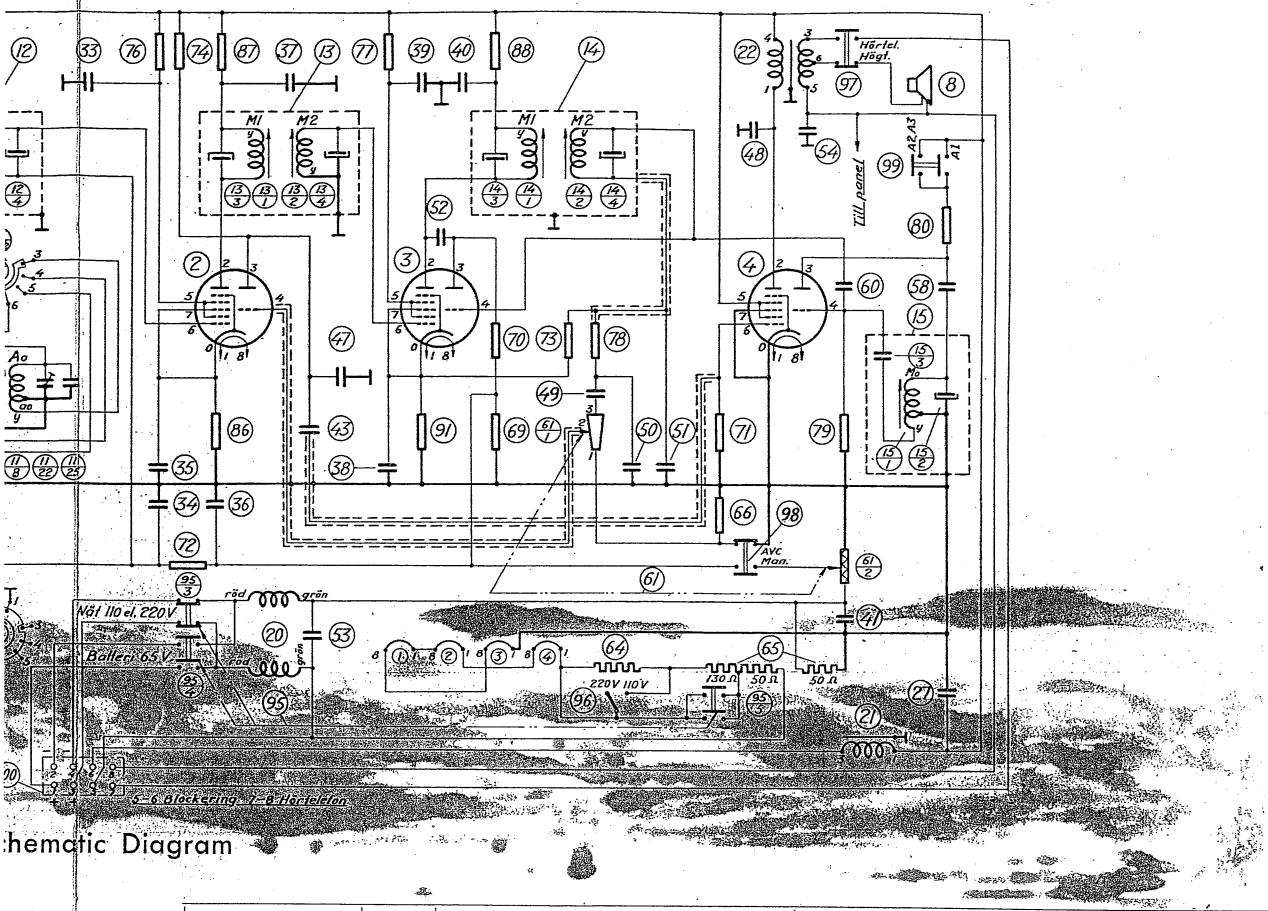


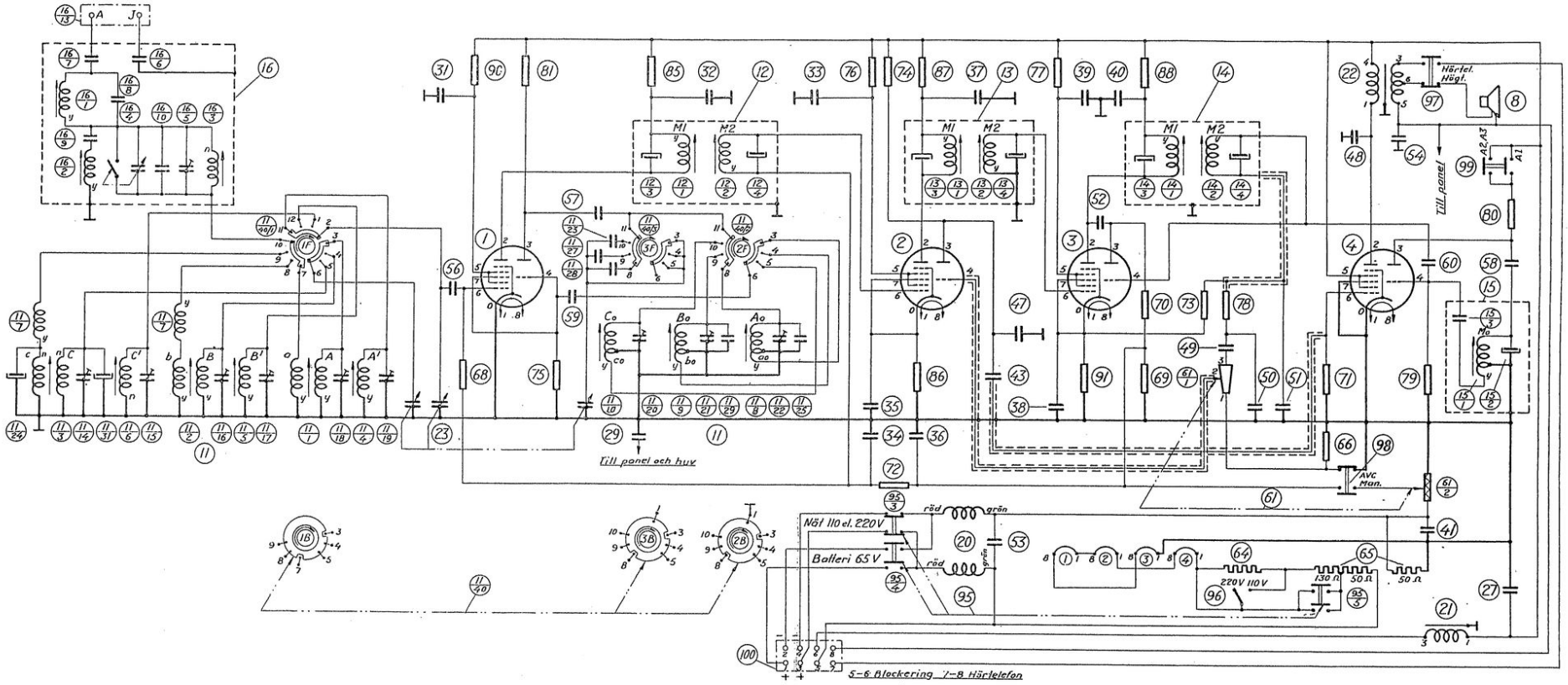

Fig. 5. Schem

| Diagram No | No req. | Description | Part No | Dates |
|---|---|---|---|---|
| 16:10 | 1 | Condenser | 10 pF Alpha 74711 | 10 pF ± 10 % |
| 16:13 | 1 | Terminal strip | R1-76711 | |
| 20 | 1 | R. F. Choke | R1-51416/4 | RL-3446 |
| 21 | 1 | L. F. Choke | R2-59960/22 | RL-3443 |
| 22 | 1 | Output transformer | R2-59960/23 | RL-3445 |
| 23 | 1 | Tuning condenser | R2-65158/3 | 3×425 pF |
| 27 | 1 | Condenser | 2 μF Alpha 76324 | 2 μF |
| 29 | 1 | Condenser | F-7103 | 0,1 μF |
| 31 | 1 | Condenser | F-7780 | 50000 pF |
| 32 | 1 | Condenser | F-7780 | 50000 pF |
| 33 | 1 | Condenser | F-7780 | 50000 pF |
| 34 | 1 | Condenser | F-7780 | 50000 pF |
| 35 | 1 | Condenser | F-7780 | 50000 pF |
| 36 | 1 | Condenser | F-7780 | 50000 pF |
| 37 | 1 | Condenser | F-7780 | 50000 pF |
| 38 | 1 | Condenser | F-7780 | 50000 pF |
| 39 | 1 | Condenser | F-7780 | 50000 pF |
| 40 | 1 | Condenser | F-7780 | 50000 pF |
| 41 | 1 | Condenser | F-7780 | 50000 pF |
| 43 | 1 | Condenser | F-7766 | 10000 pF |
| 47 | 1 | Condenser | F-6469 | 1000 pF |
| 48 | 1 | Condenser | F-6469 | 1000 pF |
| 49 | 1 | Condenser | F-7757 | 500 pF |
| 50 | 1 | Condenser | F-7757 | 500 pF |
| 51 | 1 | Condenser | F-7757 | 500 pF |
| 52 | 1 | Condenser | F-7779 | 50 pF |
| 53 | 1 | Condenser | F-74971 | 25000 pF Wkg max. 350 V~ |
| 54 | 1 | Condenser | F-74973 | 5000 pF Wkg max. 350 V~ |
| 56 | 1 | Condenser | 200 pF Ceramic Hescho CCoh | 200 pF ± 10 % |
| 57 | 1 | Condenser | 200 pF Ceramic Hescho CCoh | 200 pF ± 10 % |
| 58 | 1 | Condenser | 200 pF Ceramic Hescho CCoh | 200 pF ± 10 % |
| 59 | 1 | Condenser | 50 pF Ceramic Hescho CCos | 50 pF ± 10 % |
| 60 | 1 | Condenser | 3 pF Ceramic Hescho FCop | 3 pF ± 20 % |
| 61 | 1 | Resistor unit | R1-76719 | |




hematic Diagram

| Diagram No | No req. | Description | Part No | Dates |
|---|---|---|---|---|
| 61:1 | 1 | Variable resistor | R3-76000/6 | 1 Mohm |
| 61:2 | 1 | Resistor unit | F-8994 | 1 kohm |
| 64 | 1 | Wire-wound resistor | R2-68999/26 | 300 ohms |
| 65 | 1 | Wire-wound resistor | R2-68999/27 | 50 ohms & 50+130 ohms |
| 66 | 1 | Resistor | F-10775 | 100 kohms 0,25 W |
| 68 | 1 | Resistor | F-10773 | 1 Mohm 0,25 W |
| 69 | 1 | Resistor | F-10773 | 1 Mohm 0,25 W |
| 70 | 1 | Resistor | F-10774 | 500 kohms 0,25 W |
| 71 | 1 | Resistor | F-10774 | 500 kohms 0,25 W |
| 72 | 1 | Resistor | F-10914 | 300 kohms 0,25 W |
| 73 | 1 | Resistor | F-10914 | 300 kohms 0,25 W |
| 74 | 1 | Resistor | F-10775 | 100 kohms 0,25 W |
| 75 | 1 | Resistor | F-10895 | 50 kohms 0,25 W |
| 76 | 1 | Resistor | F-10895 | 50 kohms 0,25 W |
| 77 | 1 | Resistor | F-10895 | 50 kohms 0,25 W |
| 78 | 1 | Resistor | F-10895 | 50 kohms 0,25 W |
| 79 | 1 | Resistor | F-10895 | 50 kohms 0,25 W |
| 80 | 1 | Resistor | F-11342 | 30 kohms 0,25 W |
| 81 | 1 | Resistor | F-12335 | 20 kohms 0,25 W |
| 85 | 1 | Resistor | F-10920 | 300 ohms 0,25 W |
| 86 | 1 | Resistor | F-10920 | 300 ohms 0,25 W |
| 87 | 1 | Resistor | F-10920 | 300 ohms 0,25 W |
| 88 | 1 | Resistor | F-10920 | 300 ohms 0,25 W |
| 90 | 1 | Resistor | F-10895 | 50 kohms 0,25 W |
| 91 | 1 | Resistor | 1 kohm Alpha H5B10 | 1 kohm 0,5 W |
| 95 | 1 | Switch "Mains-Battery" | R1-76483 | |
| 95:3 | 1 | Switch | F-16348 | |
| 95:4 | 1 | Switch | F-16348 | |
| 95:5 | 1 | Switch | F-16349 | |
| 96 | 1 | Voltage switch | R1-76713 | |
| 97 | 1 | Switch "Speaker-Phones" | F-13682 | |
| 98 | 1 | Switch "AVC-Manual" | F.13683 | |
| 99 | 1 | Switch "CW-MCW" | F-13680 | |
| 100 | 1 | Eight-terminals plug | Alpha P8PI | |


Till panel och huv
Till panel
Hörlel. Högt.
AVC Man.
Nät 110 el. 220V
Batteri 65 V
röd
grön
220V 110V
130 Ω
50 Ω
50 Ω
5–6 Blockering 7–8 Hörtelefon

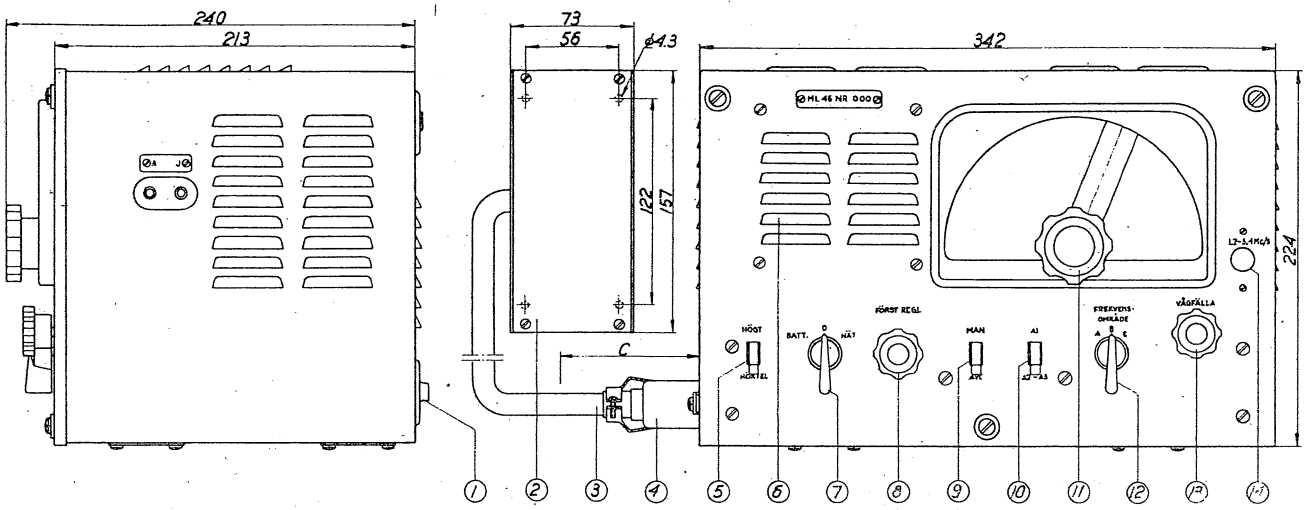


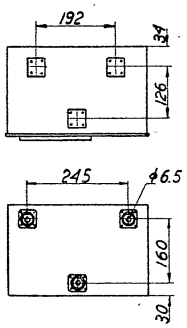

Fig. 6. Dimensions and Weight.

1. Rubber mountings.
2. Junction box.
3. Cable: Length 0,7 m.
4. 8-contact plug.
5. Loudspeaker-Phones switch.
6. Loudspeaker.
7. Emerg. Batt-Off-Mains switch.
8. Volume control.
9. Automatic volume control switch.
10. Beat frequency switch.
11. Tuning control.
12. Band switch.
13. Wave trap tuning.
14. Wave trap dial.

C. Necessary clearance to remove plug: 80 mm.

WEIGHT: Complete with junction box: 10,5 kgs (23 lbs)

Bottom




Rear