

# Sailor

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**INSTRUKTIONSBOG FOR  
SAILOR T1130**

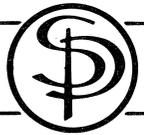
**INSTRUCTION BOOK FOR  
SAILOR T1130**



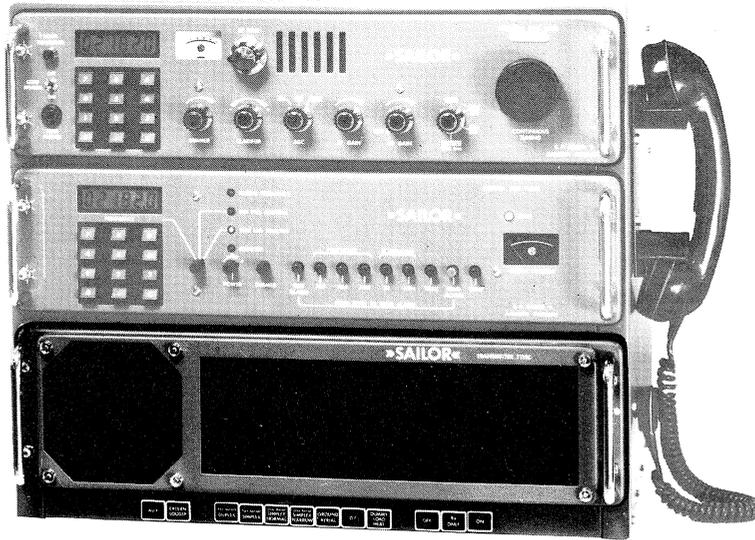
**A/S S. P. RADIO · AALBORG · DENMARK**



S.P. Radio A/S · Aalborg · Denmark



S.P. RADIO A/S - PORSVEJ 2 - 9200 AALBORG SV. - DENMARK - PHONE (08) 18 09 99 - INT. +45 8 18 09 99 - TELEGRAMS: ESPERA - TELEX 69 789



T 1130

## INSTRUCTION BOOK FOR TRANSMITTER T1130

Valid from serial No. 261639



## GENERAL DESCRIPTION

SAILOR T1130 is a 500 Watt PEP SSB transmitter.

SAILOR T1130 has 50 ohm output impedance.

SAILOR T1130 has continuously frequency covering from 1.6 MHz to 28 MHz.

SAILOR T1130 is constructed to be used together with AERIAL COUPLER AT1500.

SAILOR T1130 is automatically tuning the AT1500.

SAILOR T1130 has built-in power supply.

SAILOR T1130 can be supplied from:

- N1406 12V DC
- N1407 24V DC
- N1408 32V DC
- N1409 110/220/240V AC

SAILOR T1130 can be used in conjunction with exciter S1302, S1303 and S1304.

SAILOR T1130 fits into SAILOR 19" rack system.

SAILOR T1130 can operate automatic radiotelex in connection with exciter S1303, scanning receiver R1121 and radiotelex modem ARQ H1240

## PRINCIPLE OF OPERATION

The SAILOR Transmitter T1130 has built-in power supply and is constructed to be used together with Aerial Coupler AT1500, Exciters S1302, S1303 and S1304. Receivers R1119 and R1120.

The RF signal from the exciter is amplified in a full-transistorized Power Amplifier delivering a power output of 550W PEP at 50 ohm. The power output from the Power Amplifier is feed through a Directional Coupler and then to a Low Pass Filter section. The output power after the low pass filter section is 500W PEP at 50 ohm and all harmonics are more than 43dB below the fundamental for the frequency range 1.6 MHz to 28 MHz.

The Directional Coupler is connected to a VSWR-CALCULATOR which is calculating the reflections coefficient. The output is connected to the Protection Circuit and the TUNE LOGIC.

The Protection Circuit is controlling the drive level from the exciter in such a way that the Power Amplifier is protected against excessive VSWR.

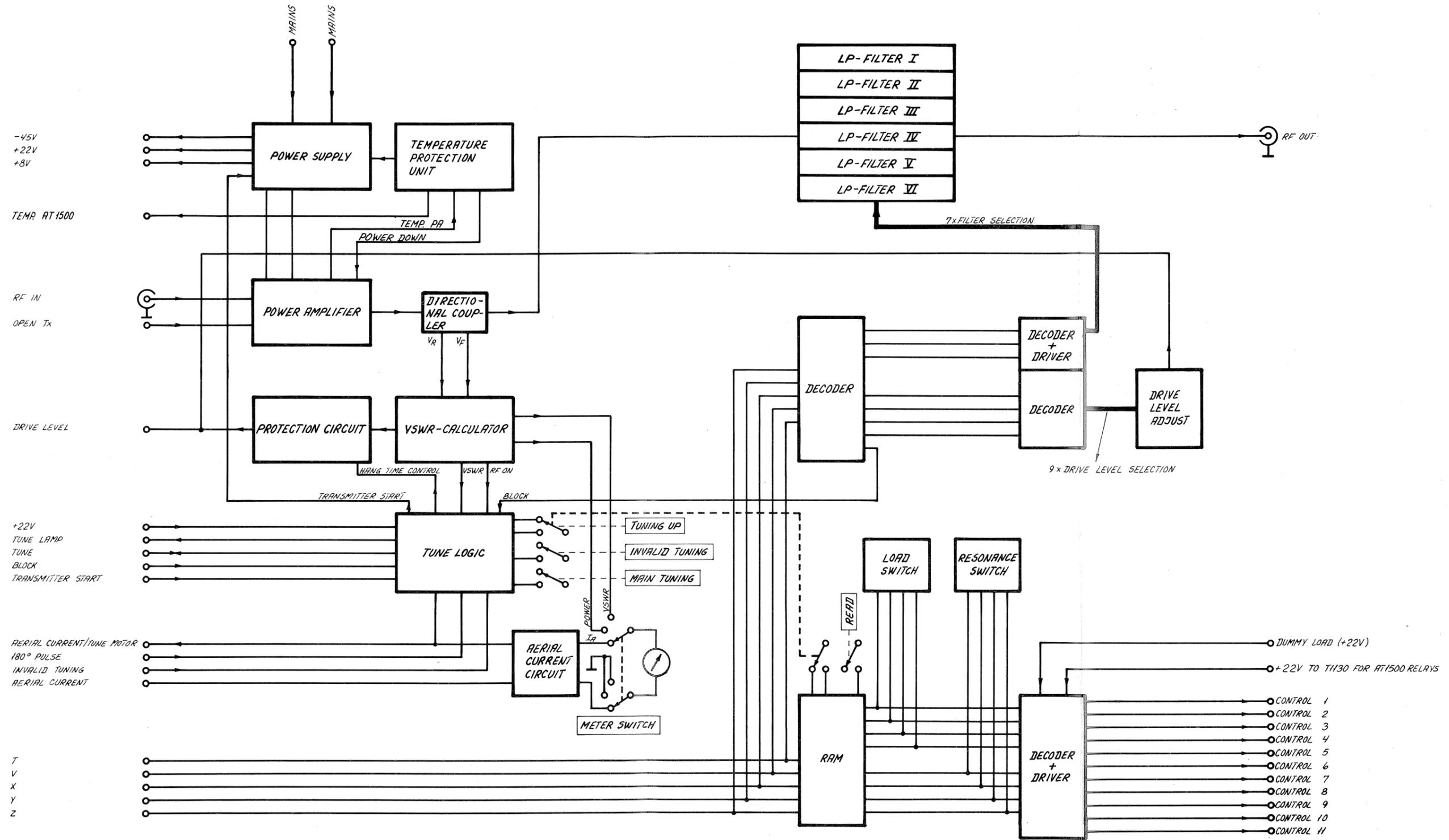
The TUNE logic is controlling the tune motor of the Aerial Coupler AT1500 and it is also controlling the power supply through Transmitter start.

The Aerial Current Circuit is receiving a DC voltage propotional to the aerial current from the Aerial Coupler AT1500.

By means of the METER SWITCH it is possible to measure the Aerial Current, Power output and VSWR.

From S130x a 5 bit Frequency Band code is received. This code is Decoded and then controlling the Low Pass Filter selection and drive level adjusting. Further more it is controlling the date selection of the RAM. This RAM is programmeable under tuning up by means of the Load Switch and Resonance Switch. These switches are controlling the presetings of the Aerial Coupler AT1500 through the Decoder and Driver. The RAM has litium battery back up so the pre-setings of the Load and Resonance will be remembered for at least 5 years. If the Aerial has been changed it is possible to change the presetings of Load and Resonance. The only necessary tool for tuning up is a screw-driver and all tuning up facilities are accessible, from the Front of the Transmitter.

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TRANSMITTER TH30 (C)



## TUNE-UP PROCEDURE

When installing T1130/AT1500 or changing the aerial it is necessary to retune the pre-settings of AT1500. The procedure for this is as follows:

### COARSE TUNING

1. Remove the filter at the front of T1130.
2. Set the uppermost switch at the extreme right in position AUTO, the second in position TUNE-UP and the fourth in position S.
3. Select the highest programmed frequency in each band listed in table 1.
4. Select the lowest permitted resonance number on the RESONANCE switch (see fig. 1) for the band in question according to table 2.
5. Select the lowest permitted load number on the LOAD switch (see fig. 1), for the band in question according to table 2.
6. Push the TUNE button on the exciter, and wait until the tune lamp on the exciter stops lighting or starts to flash. (Max. tune time 20 secs).
7. If the TUNE lamp stops lighting then press the button INVALID TUNING (see fig. 1). (If the TUNE lamp starts to flash after pressing INVALID TUNING - don't care!)
  - a. If the red lamp below the push button does not light up you have found a tuning with a voltage standing wave ratio (VSWR) less than 2 and can go to FINAL TUNING point 1.
  - b. If the red lamp lights up, then select a resonance number higher according to table 2, and start from point 5.
  - c. If the TUNE lamp starts to flash, select the next load number according to table 2. Now repeat point 6 and 7, until the highest load number is reached.
8. Select the next resonance number on the RESONANCE switch and repeat point 5, 6 and 7.

### FINAL TUNING

1. Set the uppermost switch in position MAN and record the reading on the AERIAL CURRENT meter and switch off again.
2. Select the next higher load number.
3. Push the TUNE button and wait for the tuning.
4. Set the uppermost switch in position MAN and record the reading on the AERIAL CURRENT meter, and switch off again.
5. If the TUNE lamp starts to flash or the reading is less than under previous tuning, then press the button INVALID TUNING (if the TUNE lamp starts to flash after pressing INVALID TUNING - don't care!)
  - a. If the red lamp does not light up, set the LOAD switch to the previous number and procede with BANDWIDTH CHECK point 1.
  - b. If the red lamp lights up then select a number higher resonance and continue from point 3.
6. If the reading is higher then press the button INVALID TUNING.
  - a. If the red lamp does not light up then select a number higher load and continue from point 3.
  - b. If the red lamp lights up then select a number higher resonance and continue from point 3.

## BANDWIDTH CHECK

1. Select the lowest frequency in the band according to table 1.
2. Push the TUNE button.
3. If the TUNE lamp stops lighting press the button INVALID TUNING.
  - a. If the red lamp does not light up the tuning of this frequency band is completed. Go to point 6.
  - b. If the red lamp lights up, select a higher resonance number and continue from point 2.
4. If the TUNE lamp starts to flash, try the possibilities 1 to 5 in the table below (when changing RESONANCE/LOAD press TUNE button and wait for the tuning), until the tune lamp stops flashing then go to point 3.

|   | RESONANCE     | LOAD          |
|---|---------------|---------------|
| 1 | one step up   | the same      |
| 2 | one step up   | one step down |
| 3 | one step down | one step up   |
| 4 | the same      | one step up   |
| 5 | the same      | one step down |

5. If it has been necessary to change RESONANCE or LOAD number then continue from point 2 on the highest frequency in the band.
6. You have now found the right settings of RESONANCE/LOAD note the figures in the TUNING TABLE T1130/AT1500. Then press the button PROGRAMME; now the settings of RESONANCE/LOAD switches are programmed into the memory. Put meter switch in position AERIAL CURRENT, TUNING switch in position MAN. and note the aerial current in the TABLE T1130/AT1500, and please send the copy to S. P. Radio. When all frequency bands have been programmed then set the switches in position: AUTO, NORMAL, and AERIAL CURRENT. Replace the air filter.

THIS TUNING PROCEDURE HAS TO BE CARRIED OUT FOR ALL FREQUENCY BANDS  
IN WHICH THE EXCITER HAS PROGRAMMED FREQUENCIES!

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TABLE 1

| BANDS in T1130          | MARITIME BANDS          |
|-------------------------|-------------------------|
| 2182.0 kHz              |                         |
| 1 600.0 - 1 799.9 kHz   | 1 600.0 - 1 799.9 kHz   |
| 1 800.0 - 1 999.9 kHz   | 1 800.0 - 1 999.9 kHz   |
| 2 000.0 - 2 199.9 kHz   | 2 000.0 - 2 199.9 kHz   |
| 2 200.0 - 2 399.9 kHz   | 2 200.0 - 2 399.9 kHz   |
| 2 400.0 - 2 599.9 kHz   | 2 400.0 - 2 599.9 kHz   |
| 2 600.0 - 2 799.9 kHz   | 2 600.0 - 2 799.9 kHz   |
| 2 800.0 - 2 999.9 kHz   | 2 800.0 - 2 999.9 kHz   |
| 3 000.0 - 3 099.9 kHz   | 3 000.0 - 3 099.9 kHz   |
| 3 100.0 - 3 399.9 kHz   | 3 100.0 - 3 399.9 kHz   |
| 3 400.0 - 3 699.9 kHz   | 3 400.0 - 3 699.9 kHz   |
| 3 700.0 - 3 999.9 kHz   | 3 700.0 - 3 999.9 kHz   |
| 4 000.0 - 4 299.9 kHz   | 4 063.0 - 4 219.4 kHz   |
| 4 300.0 - 4 599.9 kHz   |                         |
| 4 600.0 - 4 999.9 kHz   |                         |
| 5 000.0 - 5 499.9 kHz   |                         |
| 5 500.0 - 5 999.9 kHz   |                         |
| 6 000.0 - 6 399.9 kHz   | 6 200.0 - 6 325.4 kHz   |
| 6 400.0 - 6 999.9 kHz   |                         |
| 7 000.0 - 7 599.9 kHz   |                         |
| 7 600.0 - 7 999.9 kHz   |                         |
| 8 000.0 - 8 499.9 kHz   | 8 195.0 - 8 435.4 kHz   |
| 12 300.0 - 12 699.9 kHz | 12 330.0 - 12 652.3 kHz |
| 16 400.0 - 16 899.9 kHz | 16 460.0 - 16 859.4 kHz |
| 22 000.0 - 22 399.9 kHz | 22 000.0 - 22 310.5 kHz |
| 25 000.0 - 25 199.9 kHz | 25 070.0 - 25 110.0 kHz |
| Optional                |                         |
| Optional                |                         |

TABLE 2: PERMITTED RESONANCE AND LOAD NUMBERS

RESONANCE

| Frequency MHz | Permitted Numbers |   |   |   |   |   |   |   |   |   |       |
|---------------|-------------------|---|---|---|---|---|---|---|---|---|-------|
| 1.6 - 3.1     | 0                 | 1 | 2 | 3 |   |   |   |   |   |   |       |
| 3.1 - 4.3     |                   | 1 | 2 | 3 |   |   |   |   |   |   |       |
| 6.2 - 6.4     |                   |   | 2 | 3 | 4 | 5 |   |   |   |   |       |
| 8.1 - 8.5     |                   |   | 2 | 3 | 4 | 5 | 6 | 7 |   |   |       |
| 12.3 - 12.7   |                   |   |   |   |   |   | 6 | 7 | 8 | 9 |       |
| 16.4 - 16.9   |                   |   |   |   |   |   |   | 7 | 8 | 9 | 10    |
| 22 - 22.4     |                   |   |   |   |   |   |   |   |   |   | 10 11 |
| 25 - 25.2     |                   |   |   |   |   |   |   |   |   |   | 10 11 |

LOAD

| Frequency MHz | Permitted Numbers |   |   |   |   |   |   |   |   |   |    |
|---------------|-------------------|---|---|---|---|---|---|---|---|---|----|
| 1.6 - 2.6     | 0                 | 1 |   |   |   |   |   |   |   |   |    |
| 2.6 - 3.1     | 0                 | 1 | 2 |   |   |   |   |   |   |   |    |
| 3.1 - 3.9     | 0                 | 1 | 2 | 3 | 4 | 5 | 6 |   |   |   |    |
| 4.0 - 4.3     | 0                 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 6 - 8.5       | 0                 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |    |
| 12.3 - 16.9   | 0                 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |   |   |    |
| 22 - 25.1     | 0                 | 1 | 2 | 3 | 4 |   |   |   |   |   |    |

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## TUNE-UP PROCEDURE VALID FOR T1130 WITH SERIAL NO. HIGHER THAN 261800

After installation of T1130/AT1500 it is necessary to set the pre-setting of AT1500 for the aerial in question.

Aerial to be used must be between 5 - 15 metres, but where it is possible we recommend that aerials between 8 - 15 metres are used.

Before starting the tuning-up be sure that other aerials, crane derricks, booms, etc. are in the same position as when the ship is in open sea. If the ship is moored it must be away from cranes on land, high buildings, bridges, other ships, and any other source of interference.

For tune-up use the below description and table 2. If it is not possible to tune when using table 2, then check for resonances in wires etc. If nothing is found then use table 2a for selection of resonance/load.

### COARSE TUNING

1. Remove the filter at the front of T1130.
2. Set the uppermost switch at the extreme right in position AUTO, the second in position TUNE-UP and the fourth in position S.
3. Select the highest programmed frequency in each band listed in table 2.
4. Select the lowest permitted resonance number on the RESONANCE switch (see fig. 1) for the band in question according to table 2.
5. Select the lowest permitted load number on the LOAD switch (see fig. 1), for the band in question according to table 2.
6. Push the TUNE button on the exciter, and wait until the tune lamp on the exciter stops lighting or starts to flash. (Max. tune time 20 secs).
7. If the TUNE lamp stops lighting then press the button INVALID TUNING (see fig. 1). (If the TUNE lamp starts to flash after pressing INVALID TUNING - don't care!)
  - a. If the red lamp below the push button does not light up you have found a tuning with a voltage standing wave ratio (VSWR) less than 2 and can go to FINAL TUNING point 1.
  - b. If the red lamp lights up, then select a resonance number higher according to table 2, and start from point 5.
  - c. If the TUNE lamp starts to flash, select the next load number according to table 2. Now repeat point 6 and 7, until the highest load number is reached.
8. Select the next resonance number on the RESONANCE switch and repeat point 5, 6, and 7.

### FINAL TUNING

1. Set the uppermost switch in position MAN and record the reading on the AERIAL CURRENT meter and switch off again.
2. Select the next higher load number.
3. Push the TUNE button and wait for the tuning.
4. Set the uppermost switch in position MAN and record the reading on the AERIAL CURRENT meter, and switch off again.

5. If the TUNE lamp starts to flash or the reading is less than under previous tuning, then press the button INVALID TUNING (if the TUNE lamp starts to flash after pressing INVALID TUNING - don't care!)
  - a. If the red lamp does not light up, set the LOAD switch to the previous number and procede with BANDWIDTH CHECK point 1.
  - b. If the red lamp lights up then select a number higher resonance and continue from point 3.
6. If the reading is higher then press the button INVALID TUNING.
  - a. If the red lamp does not light up then select a number higher load and continue from point 3.
  - b. If the red lamp lights up then select a number higher resonance and continue from point 3.

### BANDWIDTH CHECK

1. Select the lowest frequency in the band according to table 2.
2. Push the TUNE button.
3. If the TUNE lamp stops lighting press the button INVALID TUNING.
  - a. If the red lamp does not light up the tuning of this frequency band is completed. Go to point 6.
  - b. If the red lamp lights up, select a higher resonance number and continue from point 2.
4. If the TUNE lamp starts to flash, try the possibilities 1 to 5 in the table below (when changing RESONANCE/LOAD press TUNE button and wait for the tuning), until the tune lamp stops flashing then go to point 3.

|   | RESONANCE     | LOAD          |
|---|---------------|---------------|
| 1 | one step up   | the same      |
| 2 | one step up   | one step down |
| 3 | one step down | one step up   |
| 4 | the same      | one step up   |
| 5 | the same      | one step down |

5. If it has been necessary to change RESONANCE or LOAD number then continue from point 2 on the highest frequency in the band.
6. You have now found the right settings of RESONANCE/LOAD note the figures in the TUNING TABLE T1130/AT1500. Then press the button PROGRAMME; now the settings of RESONANCE/LOAD switches are programmed into the memory. Put meter switch in position AERIAL CURRENT, TUNING switch in position MAN. and note the aerial current in the TUNING TABLE T1130/AT1500, and please send the copy to S. P. Radio. When all frequency bands have been programmed, then set the switches in position: AUTO, NORMAL, and AERIAL CURRENT. Replace the air filter.

THIS TUNING PROCEDURE HAS TO BE CARRIED OUT FOR ALL FREQUENCY BANDS  
IN WHICH THE EXCITER HAS PROGRAMMED FREQUENCIES!



TABLE 2a. Valid for T1130 with serial No. higher than 261800.

The table covers all permitted RESONANCE and LOAD numbers.

| FREQUENCY BANDS IN T1130 | AERIAL LENGTH  |      |                |      |
|--------------------------|----------------|------|----------------|------|
|                          | 5 - 8 m        |      | 8 - 15 m       |      |
|                          | Reso-<br>nance | Load | Reso-<br>nance | Load |
| 2 182.0 kHz              | 0- 3           | 0- 1 | 4- 7           | 0- 1 |
| 1 600.0 - 1 799.9 kHz    | 0- 3           | 0- 1 | 4- 7           | 0- 1 |
| 1 800.0 - 1 999.9 kHz    | 0- 3           | 0- 1 | 4- 7           | 0- 1 |
| 2 000.0 - 2 199.9 kHz    | 0- 3           | 0- 1 | 4- 7           | 0- 1 |
| 2 200.0 - 2 399.9 kHz    | 0- 3           | 0- 1 | 4- 7           | 0- 1 |
| 2 400.0 - 2 599.9 kHz    | 0- 3           | 0- 1 | 4- 7           | 0- 1 |
| 2 600.0 - 2 799.9 kHz    | 0- 3           | 0- 2 | 4- 7           | 0- 2 |
| 2 800.0 - 2 999.9 kHz    | 0- 3           | 0- 2 | 4- 7           | 0- 2 |
| 3 000.0 - 3 099.9 kHz    | 0- 3           | 0- 2 | 4- 7           | 0- 2 |
| 3 100.0 - 3 399.9 kHz    | 0- 3           | 0- 6 | 4- 7           | 0- 6 |
| 3 400.0 - 3 699.9 kHz    | 0- 3           | 0- 6 | 4- 7           | 0- 6 |
| 3 700.0 - 3 999.9 kHz    | 0- 3           | 0- 6 | 4- 7           | 0- 6 |
| 4 000.0 - 4 299.9 kHz    | 1- 3           | 0-10 | 5- 7           | 0-10 |
| 4 300.0 - 4 599.9 kHz    | 4- 7           | 0-10 | 5- 7           | 0-10 |
| 4 600.0 - 4 999.9 kHz    | 4- 7           | 0-10 | 5- 7           | 0-10 |
| 5 000.0 - 5 499.9 kHz    | 5- 7           | 0- 9 | 5- 7           | 0- 9 |
| 5 500.0 - 5 999.9 kHz    | 5- 8           | 0- 9 | 5- 8           | 0- 9 |
| 6 000.0 - 6 399.9 kHz    | 6- 9           | 0- 9 | 6- 9           | 0- 9 |
| 6 400.0 - 6 999.9 kHz    | 6- 9           | 0- 9 | 6- 9           | 0- 9 |
| 7 000.0 - 7 599.9 kHz    | 6-10           | 0- 9 | 6-10           | 0- 9 |
| 7 600.0 - 7 999.9 kHz    | 6-11           | 0- 9 | 6-11           | 0- 9 |
| 8 000.0 - 8 499.9 kHz    | 6-11           | 0- 9 | 6-11           | 0- 9 |
| 12 300.0 - 12 699.9 kHz  | 10-13          | 0- 7 | 10-13          | 0- 7 |
| 16 400.0 - 16 899.9 kHz  | 11-14          | 0- 7 | 11-14          | 0- 7 |
| 22 000.0 - 22 399.9 kHz  | 14-15          | 0- 4 | 14-15          | 0- 4 |
| 25 000.0 - 25 199.9 kHz  | 14-15          | 0- 4 | 14-15          | 0- 4 |

## SERVICE

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

### 1. MAINTENANCE

#### 1.1.

When the SAILOR SHORT WAVE PROGRAMME 1000/B has been correctly installed, the maintenance can, depending 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, T1130  
 EXC: S1300, S1301, S1302, S1303, S1304  
 RX: R1119, R1120  
 PS: N1400, N1401, N1407, N1409

| TX | EXC | RX | PS |
|----|-----|----|----|
| X  | X   | X  | X  |
| X  | X   | X  |    |
|    | X   | X  |    |
| X  |     |    | X  |
|    | X   | X  |    |

OSCILLOSCOPE:

Bandwidth DC - 35 MHz  
 Sensitivity 2 mV/cm  
 Input impedance 1 Mohm/30 pF  
 Triggering EXT-INT-ENVELOPE  
 E.g. PHILIPS type PM3216

PASSIVE PROBE:

Attenuation 20 dB (10X)  
 Input resistance 10 Mohm  
 Input capacitance 15 pF  
 Compensation range 10 - 30 pF  
 E.g. PHILIPS type PM8925

MULTIMETER:

Sensitivity DC (f.s.d.) 1V  
 Input impedance 10 Mohm  
 Accuracy (f.s.d.) +2%  
 E.g. PHILIPS type PM2505

MULTIMETER:

Sensitivity DC (f.s.d.) 0.3V & 3A  
 Input impedance 30 kohm/V  
 Accuracy (f.s.d.) +1%  
 Current range 100 A  
 Voltage range 500V & 2.5 kV  
 E.g. Unigor type A43  
       Shunt type GE4277  
       H.T. probe type GE4196

TONE GENERATOR:

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

NECESSARY TEST EQUIPMENT cont.:

| TX | EXC | RX | PS |
|----|-----|----|----|
|    |     | X  |    |
|    | X   | X  |    |
|    |     | X  |    |
| X  |     |    | X  |
|    | X   |    |    |

AF VOLTMETER:

Sensitivity (f.s.d.) 300 mV  
 Input impedance 4 ohm  
 Accuracy (f.s.d.) +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 10 MHz  
 Accuracy  $1 \times 10^{-7}$   
 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, N1407/T1130  
 $V_{out}$  26.5V DC  
 $I_{out}$  N1400/T1127 70A DC  
 $I_{out}$  N1407/T1130 35A DC  
 E.g. 2 pcs. LAMBDA type (N1400/T1127) LXS-G-24-0V-R  
 1 pc. LAMBDA type (N1407/T1130) LXS-G-24-0V-R

POWER SUPPLIES:

S1300, S1301  
 $V_{out}$  1 22V  
 $I_{out}$  1 1.5A  
 $V_{out}$  2 -45V  
 $I_{out}$  2 -0.1A  
 E.g. SAILOR types N1402  
 N1402 spec.  
 N1405

NECESSARY TEST EQUIPMENT cont.:

| TX | EXC | RX | PS |  |
|----|-----|----|----|--|
|    | X   | X  |    | R1119, R1120; S1302, S1303, S1304<br>Vout 1 22V<br>Iout 1 1A<br>Vout 2 8V<br>Iout 2 1A<br>Vout 3 -45V<br>Iout 3 -0.1A<br>E.g. SAILOR types N1402 spec.<br>N1405  |
|    | X   |    |    | <u>TEST BOX S1300/S1301:</u><br>S.P. type S1300/01 Test box  |
|    | X   |    |    | <u>ARTIFICIAL KEY S1300TT/S1301:</u><br>S.P. type Artificial key   |
|    | X   |    |    | <u>TEST BOX S1302/S1303/S1304:</u><br>S.P. type S1302/03/04 Test box   |
|    | X   |    |    | <u>ARTIFICIAL KEY S1303/04:</u><br>S. P. type Artificial key<br>S1303/S1304  |
| X  |     |    |    | <u>POWER METER:</u><br>Power range T1127 500W<br>Power range T1130 250W<br>Impedance 50 ohm<br>E.g. Bird Thruline Wattmeter Model 43<br>Plug-in element T1127 500W 2-30 MHz<br>Plug-in element T1130 250W 2-30 MHz |
| X  |     |    |    | <u>RF AMMETER (Thermocross):</u><br>Current range 5A<br>E.g. Helweg Mikkelsen & Co.<br>Copenhagen, Denmark type TR-68x71, 5A   |
|    | X   |    |    | <u>DUMMY LOAD:</u><br>Impedance 50 ohm<br>Frequency range 0-30 MHz<br>Power range<br>E.g. Fixed resistor 2 pcs. in<br>parallel PHILIPS type 2322 212 13101   |

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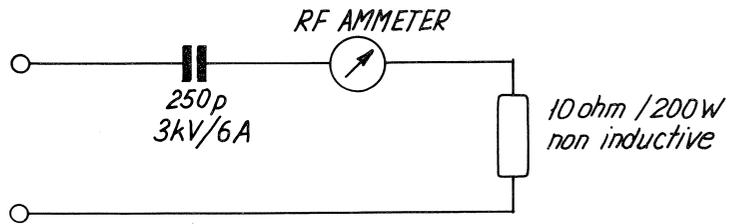
NECESSARY TEST EQUIPMENT cont.:

| 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

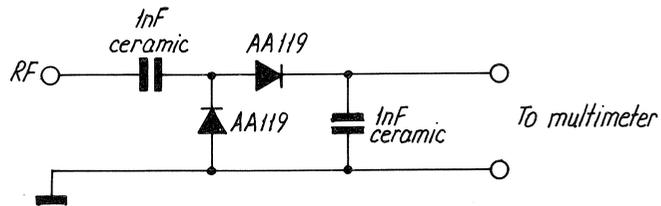
DUMMY LOAD for C.T. band 1.6 - 4 MHz:



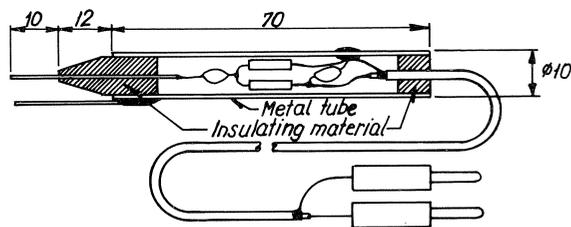
E.g. Draloric type 06-1291TD 20x50L 8KV 250 pF  $\pm 20\%$  R85

E.g. 10 pcs. Dale type PH-25A-17, 100 ohm, 5%, 25W

*DIODE PROBE*



*LAYOUT OF THE PROBE*



T 1130

### 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.

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

The unit has to have a complete FUNCTION CHECK after repair.

## 4. PERFORMANCE CHECK FOR T1130

To carry out the performance check it is necessary to have a complete station, consisting of: T1130, N1407 or N1409, S1302 or S1303/4, H1235, H1233, and AT1500.

If the station is working as a 50 ohm transmitter without AT1500 then AT1500 is not necessary.

If S1302, then it is necessary to have a set of test strips for testing of T1130. For inserting of test strips in the exciter see instruction book for SAILOR S1302.

If S1304, then you have to take out the plug to the frequency check module (2500) located on frequency control module (2100).

When T1130 is working without AT1500, then exclude the below noted sections when doing the performance check:

4.1.1. to 4.1.5.

4.1.16. to 4.1.25.

4.1.27. to 4.1.46.

4.2.1. to 4.2.10.

FREQUENCY TABLE FOR TEST STRIPS FOR TESTING OF T1130

| Carrier Frequency kHz | Pos. | Programming code |   |   |   |   |         |   |   |   |        |   |   |   |       |   |   |   |         |   |   |   |
|-----------------------|------|------------------|---|---|---|---|---------|---|---|---|--------|---|---|---|-------|---|---|---|---------|---|---|---|
|                       |      | Z Y X V T        |   |   |   |   | 100 kHz |   |   |   | 10 kHz |   |   |   | 1 kHz |   |   |   | 0.1 kHz |   |   |   |
|                       |      | Z                | Y | X | V | T | D       | C | B | A | D      | C | B | A | D     | C | B | A | D       | C | B | A |
| 1600.0                | 1A   | 1                | 0 | 1 | 1 | 0 | 0       | 1 | 1 | 0 | 0      | 0 | 0 | 0 | 0     | 0 | 0 | 0 | 0       | 0 | 0 | 0 |
| 2199.0                | 1B   | 0                | 1 | 0 | 0 | 0 | 0       | 0 | 0 | 1 | 1      | 0 | 0 | 1 | 1     | 0 | 0 | 1 | 0       | 0 | 0 | 0 |
| 3099.0                | 1C   | 1                | 0 | 0 | 1 | 0 | 0       | 0 | 0 | 0 | 1      | 0 | 0 | 1 | 1     | 0 | 0 | 1 | 0       | 0 | 0 | 0 |
| 4299.0                | 1D   | 0                | 0 | 1 | 1 | 0 | 0       | 0 | 1 | 0 | 1      | 0 | 0 | 1 | 1     | 0 | 0 | 1 | 0       | 0 | 0 | 0 |
| 6399.0                | 2A   | 0                | 1 | 0 | 0 | 1 | 0       | 0 | 1 | 1 | 1      | 0 | 0 | 1 | 1     | 0 | 0 | 1 | 0       | 0 | 0 | 0 |
| 8499.0                | 2B   | 0                | 1 | 0 | 1 | 1 | 0       | 1 | 0 | 0 | 1      | 0 | 0 | 1 | 1     | 0 | 0 | 1 | 0       | 0 | 0 | 0 |
| 12699.0               | 2C   | 0                | 1 | 1 | 0 | 0 | 0       | 1 | 1 | 0 | 1      | 0 | 0 | 1 | 1     | 0 | 0 | 1 | 0       | 0 | 0 | 0 |
| 16899.0               | 2D   | 0                | 1 | 1 | 0 | 1 | 1       | 0 | 0 | 0 | 1      | 0 | 0 | 1 | 1     | 0 | 0 | 1 | 0       | 0 | 0 | 0 |
| 22399.0               | 3A   | 0                | 1 | 1 | 1 | 0 | 0       | 0 | 1 | 1 | 1      | 0 | 0 | 1 | 1     | 0 | 0 | 1 | 0       | 0 | 0 | 0 |
| 25199.0               | 3B   | 1                | 1 | 0 | 1 | 0 | 0       | 0 | 0 | 1 | 1      | 0 | 0 | 1 | 1     | 0 | 0 | 1 | 0       | 0 | 0 | 0 |

PERFORMANCE CHECK FOR T1130 cont.:

4.1.  
TRANSMITTER CONTROL UNIT (300).

4.1.1.  
CHECK OF AERIAL CURRENT CIRCUIT.

4.1.2.  
Set meter switch S301 in position aerial current.

4.1.3.  
Connect terminal W4/3-2 to ground and terminal W5/3-2 + 15V (IC101).

4.1.4.  
Switch the set on and check meter reading on the aerial current meter S130X is  $3.5 \pm 0.5A$ .

4.1.5.  
CHECK OF POWER METER CIRCUIT.

4.1.6.  
Set meter switch in position power.

4.1.7.  
Disconnect W41/3-4 and connect +8V to terminal W41/3-4.

4.1.8.  
Switch the set on.

4.1.9.  
Check meter reading on aerial current meter on S130X is  $3 \pm 0.5A$ .

4.1.10.  
CHECK OF VSWR METER CIRCUIT.

4.1.11.  
Set meter switch in position S.

4.1.12.  
Disconnect W41/3-4 and connect +8V to terminal W41/3-4.

4.1.13.  
Disconnect W39/3-4 and connect a 2 kohm resistor (two 1 kohm resistors in series) between terminal W41/3-4 and terminal W39/3-4 and a 1 kohm resistor from terminal W39/3-4 to ground.

4.1.14.  
Switch the set on.

4.1.15.  
Check the meter reading on the aerial current meter is  $3 \pm 0.2$ , and the voltage in tp 12 is  $4.8 \pm 0.2V$ .

4.1.16.  
CHECK OF TUNING SWITCH.

4.1.17.  
Disconnect the aerial (dummy load).

4.1.18.  
Switch the set on.

4.1.19.  
Key in a frequency e.g. 1600 kHz.

4.1.20.  
Set the switch tuning in position manual.

4.1.21.  
Check that the transmitter starts (+38V, +28V and blower starts).

4.1.22.  
Switch the switch back to position automat.

4.1.23.  
Key the transmitter with the micro-telephone key.

4.1.24.  
Check that the transmitter starts (+38V, +28V and blower starts).

4.1.25.  
CHECK OF TUNE UP - NORMAL SWITCH AND PROGRAMME PUSH BUTTON.  
See performance check of tuner control unit (500).

4.1.26.  
CHECK OF DRIVE LEVEL.  
See performance check PA-unit (1200).

4.1.27.  
CHECK OF VSWR REFERENCE COUNTER (IC318).

4.1.28.  
Connect terminal W3/3-2 to ground.

4.1.29.  
Connect a voltmeter to tp 5.

4.1.30.  
Disconnect the two coax cables at the rear of T1130.

4.1.31.  
Disconnect W41/3-4 and connect +8V to terminal W41/3-4.

PERFORMANCE CHECK FOR T1130 cont.:

4.1.32.

Disconnect W39/3-4 and connect a 2 kohm resistor from W41/3-4 to W39/3-4 and a 1 kohm resistor from W39/3-4 to ground.

4.1.33.

Switch the set on.

4.1.34.

Key in a frequency e.g. 1600 kHz.

4.1.35.

Press the tune button, and check that the lamp lights up and the tune motor starts to run.

4.1.36.

Check that the voltage on W37/3-2 is  $1.5 \pm 0.5V$ .

4.1.37.

Check that the voltage at tp 5 is  $1.2 \pm 0.2V$ .

4.1.38.

Press the button invalid tuning and check the voltage at tp 5 is  $1.2 \pm 0.2V$ .

4.1.39.

Press the button invalid tuning and check the voltage at tp 5 is  $2.8 \pm 0.3V$ .

4.1.40.

Press the button invalid tuning and check the voltage at tp 5 is  $4.9 \pm 0.5V$ .

4.1.41.

Check that the tune lamp stops lighting, the tune motor stops and the voltage at W37/3-2 is 0V.

4.1.42.

Press the button invalid tuning and check the voltage at tp 5 is  $6.1 \pm 0.6V$ .

4.1.43.

Press the button invalid tuning and check the voltage at tp 5 is  $7.5 \pm 0.8V$ .

4.1.44.

Press the button invalid tuning and check the voltage at tp 5 is  $8.8 \pm 1V$ .

4.1.45.

Press the button invalid tuning and check that the tune lamp starts to wink.

4.1.46.

When pressing invalid tuning, check that the lamp invalid tuning lights up.

4.1.47.

CHECK OF TRANSMITTER BLOCKING.

4.1.48.

Press tune button. The transmitter starts.

4.1.49.

Select dummy load and check that the transmitter stops and the tune lamp starts to wink.

4.1.50.

CHECK OF VSWR PROTECTION CIRCUIT.

4.1.51.

Check the voltage at the emitter of T332 is less than 10 mV.

4.1.52.

Disconnect the 2 kohm resistor W41/3-4 and W39/3-4.

4.1.53.

Connect a 1 kohm resistor between W41/3-4 and W39/3-4.

4.1.54.

Check the voltage at the emitter of T327 is  $350 \pm 30$  mV.

4.1.55.

Check that the meter reading on the aerial current meter is  $2 \pm 0.5$ .

4.1.56.

Disconnect the 1 kohm resistor from W39/3-4 to ground.

4.1.57.

Connect a 2 kohm resistor from W39/3-4 to ground.

4.1.58.

Connect the black coax at the rear of T1130.

4.1.59.

Connect a dummy load 50 ohm/250W to the white coax socket, at the rear of T1130 and an oscilloscope with a 10:1 probe.

4.1.60.

Set meter switch to power.

PERFORMANCE CHECK FOR T1130 cont.:

4.1.61.

Check that the voltage at the emitter of T327 is  $840 \pm 60$  mV.

4.1.62.

Short circuit the terminal W39/3-4 to ground.

4.1.63.

Press the tune button and note the peak to peak voltage.

4.1.64.

Remove the short circuit from W39/3-4 to ground and check that the peak to peak voltage decreases to between 0.63 to 0.75 times the value, previously noted.

4.2.

TUNER CONTROL UNIT (500).

4.2.1.

Switch the set on and select simplex narrow.

4.2.2.

Set S302 in position tune up.

4.2.3.

Key in a frequency e.g. 1600 kHz.

4.2.4.

Check the voltage of the lithium battery B501 is more than 3V.

4.2.5.

Set the switches RESONANCE and LOAD to 0, 1, 2 ... 15, and check the control outputs 1 to 11 is in accordance with the table below.

| Resonance and Load | the voltage at control output No. |    |    |    |    |    |    |    |    |    |    |
|--------------------|-----------------------------------|----|----|----|----|----|----|----|----|----|----|
|                    | 1                                 | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 |
| 0                  | 0                                 | 0  | 22 | 22 | 0  | 22 | 0  | 0  | 0  | 0  | 0  |
| 1                  | 22                                | 0  | 22 | 22 | 22 | 22 | 0  | 0  | 0  | 0  | 22 |
| 2                  | 22                                | 22 | 22 | 22 | 0  | 22 | 0  | 0  | 0  | 22 | 0  |
| 3                  | 22                                | 22 | 0  | 22 | 0  | 22 | 0  | 0  | 0  | 22 | 22 |
| 4                  | 22                                | 22 | 22 | 0  | 0  | 22 | 0  | 0  | 22 | 0  | 0  |
| 5                  | 22                                | 22 | 0  | 0  | 0  | 22 | 0  | 0  | 22 | 22 | 0  |
| 6                  | 22                                | 22 | 22 | 22 | 22 | 22 | 0  | 22 | 0  | 0  | 0  |
| 7                  | 22                                | 22 | 0  | 22 | 22 | 22 | 0  | 22 | 22 | 0  | 0  |
| 8                  | 22                                | 22 | 22 | 0  | 22 | 22 | 0  | 22 | 22 | 22 | 22 |
| 9                  | 22                                | 22 | 0  | 0  | 22 | 22 | 22 | 0  | 22 | 22 | 22 |
| 10                 | 22                                | 22 | 22 | 22 | 22 | 0  | 22 | 22 | 22 | 22 | 22 |
| 11                 | 22                                | 22 | 0  | 0  | 22 | 0  | 22 | 22 | 22 | 22 | 22 |
| 12                 | 22                                | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 |
| 13                 | 22                                | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 |
| 14                 | 22                                | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 |
| 15                 | 0                                 | 0  | 0  | 0  | 0  | 0  | 22 | 22 | 22 | 22 | 22 |
| Dummy load         | 0                                 | 0  | 0  | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 |

PERFORMANCE CHECK FOR T1130 cont.: (Valid from serial No. 261800)

4.1.61.  
Check that the voltage at the emitter of T327 is 840  $\pm$ 60 mV.

4.1.62.  
Short circuit the terminal W39/3-4 to ground.

4.1.63.  
Press the tune button and note the peak to peak voltage.

4.1.64.  
Remove the short circuit from W39/3-4 to ground and check that the peak to peak voltage decreases to between 0.63 to 0.75 times the value, previously noted.

4.2.  
TUNER CONTROL UNIT (500).

4.2.1.  
Switch the set on and select simplex narrow.

4.2.2.  
Set S302 in position tune-up.

4.2.3.  
Key in a frequency e.g. 1600 kHz.

4.2.4.  
Check the voltage of the lithium battery B501 is more than 3V.

4.2.5.  
Set the switches RESONANCE and LOAD to 0, 1, 2 ... 15, and check the control outputs 1 to 11 is in accordance with the table below.

Valid from serial No. 261800.

| Resonance and Load | the voltage at control output No. |    |    |    |    |    |    |    |    |    |    |
|--------------------|-----------------------------------|----|----|----|----|----|----|----|----|----|----|
|                    | 1                                 | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 |
| 0                  | 0                                 | 0  | 22 | 22 | 0  | 22 | 0  | 0  | 0  | 0  | 0  |
| 1                  | 0                                 | 0  | 0  | 22 | 0  | 22 | 0  | 0  | 0  | 0  | 22 |
| 2                  | 0                                 | 0  | 22 | 0  | 0  | 22 | 0  | 0  | 0  | 22 | 0  |
| 3                  | 0                                 | 0  | 0  | 0  | 0  | 22 | 0  | 0  | 0  | 22 | 22 |
| 4                  | 0                                 | 0  | 22 | 22 | 0  | 22 | 0  | 0  | 22 | 0  | 0  |
| 5                  | 22                                | 0  | 22 | 22 | 22 | 22 | 0  | 0  | 22 | 22 | 0  |
| 6                  | 22                                | 22 | 22 | 22 | 0  | 22 | 0  | 22 | 0  | 0  | 0  |
| 7                  | 22                                | 22 | 0  | 22 | 0  | 22 | 0  | 22 | 22 | 0  | 0  |
| 8                  | 22                                | 22 | 22 | 0  | 0  | 22 | 0  | 22 | 22 | 22 | 22 |
| 9                  | 22                                | 22 | 0  | 0  | 0  | 22 | 22 | 0  | 22 | 22 | 22 |
| 10                 | 22                                | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 |
| 11                 | 22                                | 22 | 0  | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 |
| 12                 | 22                                | 22 | 22 | 0  | 22 | 22 | 22 | 22 | 22 | 22 | 22 |
| 13                 | 22                                | 22 | 0  | 0  | 22 | 22 | 22 | 22 | 22 | 22 | 22 |
| 14                 | 22                                | 22 | 22 | 22 | 22 | 0  | 22 | 22 | 22 | 22 | 22 |
| 15                 | 22                                | 22 | 0  | 0  | 22 | 0  | 22 | 22 | 22 | 22 | 22 |
| Dummy load         | 0                                 | 0  | 0  | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 |



PERFORMANCE CHECK FOR T1130 cont.: (valid to serial No. 284451)

- 4.2.6.  
Select dummy load/ heat and check the code for dummy load is in accordance with the table above.
- 4.2.7.  
Set RESONANCE and LOAD to zero. Press the button programme, the code for zero is now programmed into the RAM.
- 4.2.8.  
Set switch S302 in position normal.
- 4.2.9.  
Switch the set off/on some times.
- 4.2.10.  
Check that the code at the control outputs 1 to 11 is still ok.
- 4.3.  
CHECK OF PA-MODULE 1200.
- 4.3.1.  
CHECK OF D.C. CONDITIONS.
- 4.3.2.  
Remove the two coax cables at the rear of T1130.
- 4.3.3.  
Key in a frequency e.g. 1600 kHz and put the switch tuning in position manual.
- 4.3.4.  
Check of supply voltage to PA-module.  
+28V T1213 : 28  $\pm$ 1V  
+38V T1215 : 38  $\pm$ 1V  
Open TX : 22  $\pm$ 1V
- 4.3.5.  
Check of zero signal current.
- 4.3.6.  
Connect an ammeter in series with +28V to T1212, and check that the current is 90  $\pm$ 20 mA.
- 4.3.7.  
Connect the ammeter in series with +28V to T1213, and check that the current is 90  $\pm$ 20 mA.
- 4.3.8.  
Remove the wire open Tx and check that the current is zero amps.
- 4.3.9.  
Remount open Tx wire.
- 4.3.10.  
Connect the ammeter in series with +38V to T1214 and check that the current is 150  $\pm$ 20 mA.
- 4.3.11.  
Connect the ammeter in series with +38V to T1215 and check that the current is 150  $\pm$ 20 mA.
- 4.3.12.  
Remove the wire open Tx and check that the current is zero amps.
- 4.3.13.  
Remount open Tx wire.
- 4.3.14.  
Check that the voltage on the basis of T1207 is 12.3  $\pm$ 0.5V.
- 4.3.15.  
Remove open Tx wire and check that the voltage is less than 0.5V.
- 4.3.16.  
Remount open Tx wire.
- 4.3.17.  
Set the switch tuning to position automat.
- 4.3.18.  
Switch the set off.
- 4.3.19.  
CHECK OF RF CONDITIONS.
- 4.3.20.  
Connect the coax cable from the exciter (black coax) to T1130, and connect a 50 ohm dummy load (250W mean power) to the output socket (marked white) at the rear side of T1130.
- 4.3.21.  
Connect the ammeter in series with +38V to T1214 (10 amps.)
- 4.3.22.  
Connect an oscilloscope with a 10 : 1 probe to the output socket of T1130.
- 4.3.23.  
Switch the set on and select following frequencies: 2199 kHz, 3099 kHz, 4299 kHz, 6399 kHz, 8499 kHz, 12699 kHz, 16899 kHz, 22399 kHz, and 25199 kHz.

PERFORMANCE CHECK FOR T1130 cont.:

4.3.24.

Check at each frequency, that the current is 5 to 6.5 amps., and the peak to peak output voltage is 330V to 450V, and the envelope of the two tone test signal is ok, when keying the transmitter by means of the switch tuning.

4.4.

CHECK OF TEMPERATURE PROTECTION UNIT (1300).

4.4.1.

Measure the temperature at R109 (located on T1214) if the set has been switched off for some time, then the temperature can be set equal to run temperature.

4.4.2.

Switch the set on and measure the voltage across R109 and calculate the voltage at pin 3 IC1301a:  $V_{pin3} = (90 - T_A) \cdot 0.0075 \cdot V_{R109} + V_{R109}$   
 $T_A$  is the temperature at R109.  
 $V_{R109}$  is the voltage across R109.  
 $V_{pin3}$  is the voltage at pin 3 of IC1301a.

4.4.3.

Measure the voltage at pin 3 and check that it is equal to the calculated  $V_{pin3} \pm 5\%$ .

4.4.4.

Measure the voltage at pin 5 IC1301a and check that the voltage is  $V_{pin3} \cdot 1.12$ .

4.4.5.

Unsolder R109 and insert a 4.7 kohm potentiometer instead of R109.

4.4.7.

Connect the coax cable from the exciter (black coax) to T1130, and the 50 ohm dummy load (250W mean power) to the output socket (marked white) at the rear side of T1130.

4.4.8.

Connect an oscilloscope with a 10 : 1 probe to the output socket of T1130, and a voltmeter to +38V to T1214.

4.4.9.

Switch the set on and key in a frequency e.g. 1600 kHz.

4.4.10.

Set the switch to position manual. You will now see the two tone test signal at the output.

4.4.11.

Check that the voltages at P102 pin 1 is 22V, pin 2 is 22V, pin 3 is 0V and at drive reduction is 22V.

4.4.12.

Adjust the potentiometer until +38V to T1214 drops to  $29 \pm 2V$  and the output drops to approx. 40% of full power for transmitters with serial numbers below 261938 and for transmitters with serial numbers above 261938 it drops to approx. 70% of full power.

4.4.13.

Check that the voltages at P102 pin 3 is 22V and drive reduction is 0V.

4.4.14.

Adjust the potentiometer for a higher value until the transmitter stops.

4.4.15.

Check that the blowers are still running.

4.4.16.

Check that the voltage at P102 pin 2 is 0V.

PERFORMANCE CHECK FOR T1130 cont.: (valid from serial No. 284451.)

4.2.6.

Select dummy load/heat and check the code for dummy load is in accordance with the table above.

4.2.7.

Set RESONANCE and LOAD to zero. Press the button programme, the code for zero is now programmed into the RAM.

4.2.8.

Set switch S302 in position normal.

4.2.9.

Switch the set off/on some times.

4.2.10.

Check that the code at the control outputs 1 to 11 is still ok.

4.3.

CHECK OF PA-MODULE 1200.

4.3.1.

CHECK OF D.C. CONDITIONS.

4.3.2.

Remove the two coax cables at the rear of T1130.

4.3.3.

Key in a frequency e.g. 1600 kHz and put the switch tuning in position manual.

4.3.4.

Check of supply voltage to PA-module.

+28V T1213 : 28  $\pm$ 1V

+38V T1215 : 38  $\pm$ 1V

Open TX : 22  $\pm$ 1V

4.3.5.

Check of zero signal current.

4.3.6.

Connect an ammeter in series with +28V to T1212, and check that the current is 200  $\pm$ 20 mA.

4.3.7.

Connect the ammeter in series with +28V to T1213, and check that the current is 200  $\pm$ 20 mA.

4.3.8.

Remove the wire open Tx and check that the current is zero amps.

4.3.9.

Remount open Tx wire.

4.3.10.

Connect the ammeter in series with +38V to T1214 and check that the current is 45 mA  $\pm$ 5 mA.

4.3.11

Remove the wire open Tx and check that the current is zero amps.

4.3.12.

Remount open Tx wire.

4.3.13.

Check that the voltage on the basis of T1207 is 12.3  $\pm$ 0.5V.

4.3.14.

Remove open Tx wire and check that the voltage is less than 0.5V.

4.3.15.

Remount open Tx wire.

4.3.16.

Set the switch tuning to position automat.

4.3.17.

Switch the set off.

4.3.19.

CHECK OF RF CONDITIONS.

4.3.20.

Connect the coax cable from the exciter (black coax) to T1130, and connect a 50 ohm dummy load (250W mean power) to the output socket (marked white) at the rear side of T1130.

4.3.21.

Connect the ammeter in series with +38V to T1214 (10 amps.)

4.3.22.

Connect an oscilloscope with a 10 : 1 probe to the output socket of T1130.

4.3.23.

Switch the set on and select following frequencies: 2199 kHz, 3099 kHz, 4299 kHz, 6399 kHz, 8499 kHz, 12699 kHz, 16899 kHz, 22399 kHz, and 25199 kHz.

PERFORMANCE CHECK FOR T1130 cont.:

4.3.24.

Check at each frequency, that the current is 5 to 6.5 amps., and the peak to peak output voltage is 330V to 450V, and the envelope of the two tone test signal is ok, when keying the transmitter by means of the switch tuning.

4.4.

CHECK OF TEMPERATURE PROTECTION UNIT (1300).

4.4.1.

Measure the temperature at R109 (located on T1214) if the set has been switched off for some time, then the temperature can be set equal to run temperature.

4.4.2.

Switch the set on and measure the voltage across R109 and calculate the voltage at pin 3 IC1301a:  $V_{pin3} = (90 - T_A) \cdot 0.0075 \cdot V_{R109} + V_{R109}$   
T<sub>A</sub> is the temperature at R109.  
V<sub>R109</sub> is the voltage across R109.  
V<sub>pin3</sub> is the voltage at pin 3 of IC1301a.

4.4.3.

Measure the voltage at pin 3 and check that it is equal to the calculated  $V_{pin3} \pm 5\%$ .

4.4.4.

Measure the voltage at pin 5 IC1301a and check that the voltage is  $V_{pin3} \cdot 1.12$ .

4.4.5.

Unsolder R109 and insert a 4.7 kohm potentiometer instead of R109.

4.4.7.

Connect the coax cable from the exciter (black coax) to T1130, and the 50 ohm dummy load (250W mean power) to the output socket (marked white) at the rear side of T1130.

4.4.8.

Connect an oscilloscope with a 10 : 1 probe to the output socket of T1130, and a voltmeter to +38V to T1214.

4.4.9.

Switch the set on and key in a frequency e.g. 1600 kHz.

4.4.10.

Set the switch to position manual. You will now see the two tone test signal at the output.

4.4.11.

Check that the voltages at P102 pin 1 is 22V, pin 2 is 22V, pin 3 is 0V and at drive reduction is 22V.

4.4.12.

Adjust the potentiometer until +38V to T1214 drops to  $29 \pm 2V$  and the output drops to approx. 40% of full power for transmitters with serial numbers below 261938 and for transmitters with serial numbers above 261938 it drops to approx. 70% of full power.

4.4.13.

Check that the voltages at P102 pin 3 is 22V and drive reduction is 0V.

4.4.14.

Adjust the potentiometer for a higher value until the transmitter stops.

4.4.15.

Check that the blowers are still running.

4.4.16.

Check that the voltage at P102 pin 2 is 0V.

## 5. ADJUSTMENT PROCEDURE FOR T1130

To carry out the adjustment procedure it is necessary to have a complete station consisting of: H1235, S1302/3/4 and N1407/9.

For location of the modules see fig.

For location of test points and adjustments see fig.

5.1.  
ADJUSTMENT OF TRANSMITTER CONTROL UNIT  
(300).

5.1.1.  
ADJUSTMENT OF VSWR CALCULATOR.

5.1.2.  
Disconnect W39/3-4 and W41/3-4.

5.1.3.  
Connect one 1 kohm resistor from terminal W39/3-4 to ground, two 1 kohm resistors in series from terminal W39/3-4 to terminal W41/3-4 and connect terminal W41/3-4 to +5V.

5.1.4.  
Connect a voltmeter across R342a, and set R334a fully clockwise.

5.1.5.  
Switch the set on, and adjust R334a so that the voltage is approx. zero volts.

5.1.6.  
ADJUSTMENT OF METER AMPLIFIER.

5.1.7.  
Disconnect W39/3-4 and W41/3-4.

5.1.8.  
Connect terminal W39/3-4 to terminal W41/3-4 and connect them to +5V.

5.1.9.  
Switch the set on.

5.1.10.  
Set the meter switch S301 to position S.

5.1.11.  
Set R329a fully clockwise and adjust R318a to zero reading on the aerial meter on S130X.

5.1.12.  
Connect terminal W41/3-4 to +5V.

5.1.13.  
Connect two 1 kohm resistors in series between terminal W41/3-4 and terminal W39/3-4 and connect a 1 kohm resistor from terminal W39/3-4 to ground.

5.1.14.  
Adjust R329a to a meter reading of 3 (the line just above 3).

5.1.15.  
ADJUSTMENT OF POWER METER SENSITIVITY.

5.1.16.  
Disconnect W41/3-4.

5.1.17.  
Connect +8V to terminal W41/3-4.

5.1.18.  
Set meter switch S301 to position power.

5.1.19.  
Switch the set on.

5.1.20.  
Adjust R399 to a meter reading of 3 (the line just above 3) on the aerial current meter S130X.

5.1.21.  
ADJUSTMENT OF AERIAL CURRENT METER SENSITIVITY.

5.1.22.  
Connect terminal W4/3-2 to ground and terminal W5/3-2 to +15V.

5.1.23.  
Set meter switch to position I<sub>A</sub>.

ADJUSTMENT PROCEDURE FOR T1130 cont.:

5.1.24.  
Switch the set on.

5.1.25.  
Adjust R302 to a meter reading of 3.5 on the aerial current meter on S130X.

5.1.26.  
ADJUSTMENT OF  $\frac{VR}{VF}$  COMPARATOR.

5.1.27.  
Disconnect W39/3-4 and W41/3-4.

5.1.28.  
Connect a 1 kohm resistor from terminal W39/3-4 to ground, two 1 kohm resistors in series from terminal W39/3-4 to terminal W41/3-4 and connect terminal W41/3-4 to +5V.

5.1.29.  
Connect terminal W3/3-2 to ground.

5.1.30.  
Connect a voltmeter between pin 7 IC318 and ground.

5.1.31.  
Key the button invalid tuning until pin 7 IC318 goes high,

5.1.32.  
With pin 7 IC318 high, measure the voltage between tp 5 and tp 12 and adjust R345 to zero volt.

5.1.33.  
ADJUSTMENT OF DRIVE LEVEL.  
See adjustment of PA-unit (1200).

5.2.  
ADJUSTMENT OF FILTER SWITCH/DIRECTIONAL COUPLER (400).

5.2.1.  
Disconnect input coax to filter 6 module 1100 W9/3-11, and connect the 50 ohm dummy load (250W mean power) to the coax cable.

5.2.2.  
Select a frequency near to 22 MHz.

5.2.3.  
Connect a voltmeter to terminal W39/3-2 (VR).

5.2.4.  
Put the switch tuning in position manual.

5.2.5.  
Adjust C405 to minimum reading on the voltmeter.

5.3.  
ADJUSTMENT OF PA-UNIT (1200).

5.3.1.  
ADJUSTMENT OF ZERO SIGNAL CURRENTS.

5.3.2.  
Remove the two coax connectors at the rear of T1130.

5.3.3.  
Insert an ammeter in series with the driver supply +28V to T1212.

5.3.4.  
Set the switch tuning in position manual.

5.3.5.  
Adjust R1220 to a meter reading of 90 mA.

5.3.6.  
Insert the ammeter in series with the driver supply +28V to T1213, and check that the current is 90 +20 mA.

5.3.7.  
Insert the ammeter in series with PA-supply +38V to T1214.

5.3.8.  
Set the switch tuning in position manual.

5.3.9.  
Adjust R1232 to a meter reading of 150 mA.

5.3.10.  
Insert the ammeter in series with PA-supply +38V to T1215 and check that the current is 150 +20 mA.

5.3.11.  
Connect the two coax connectors at the rear of T1130.

ADJUSTMENT PROCEDURE FOR T1130 cont.: (valid to serial No. 284451).

5.3.12.  
ADJUSTMENT OF DRIVE LEVEL.

5.3.13.  
Disconnect the coax cable RF in from PA on filterswitch/directional coupler module (400).

5.3.14.  
Connect a 50 ohm dummy load (250W mean power) to the coax cable.

5.3.15.  
Insert an ammeter in +38V to T1214 (10A).

5.3.16.  
Select a frequency according to the table below.

5.3.17.  
Adjust the drive level potentiometer in question, to a meter reading of 6.5A.

5.3.18.  
The points 5.3.16. to 5.3.17. has to be carried out for all frequencies in the table below.

5.4.3.  
Measure the heatsink temperature (room temperature).

5.4.4.  
Calculate the voltage on pin 3 of IC 1301a from the equalition below.  
$$V_{pin3} = (90 - T_A) \times 0.0075 \times VR109 + VR109.$$

$T_A$  is the actual temperature of the heat sink.

$V_{pin3}$  is the voltage at pin 3 of IC1301

5.4.5.  
Adjust R1305 for a voltmeter reading equal to the just calculated  $V_{pin3}$ .

T1130

| Frequency kHz | Drive level potentiometer in question |
|---------------|---------------------------------------|
| 1600          | R330                                  |
| 4125          | R328                                  |
| 6215          | R326                                  |
| 8257          | R324                                  |
| 12392         | R322                                  |
| 16522         | R320                                  |
| 22062         | R318                                  |
| 25020         | R316                                  |

5.4.  
ADJUSTMENT OF TEMPERATURE PROTECTION UNIT (1300).

5.4.1.  
Connect a voltmeter across R109.

5.4.2.  
Be sure that the heat sink is cool. Then switch the set on and measure the voltage immediately after switching on.



ADJUSTMENT PROCEDURE FOR T1130 cont.: (valid from serial No. 284451)

5.3.12.  
ADJUSTMENT OF DRIVE LEVEL.

5.3.13.  
Disconnect the coax cable RF in from PA on filterswitch/directional coupler module (400).

5.3.14.  
Connect a 50 ohm dummy load (250W mean power) to the coax cable.

5.3.15.  
Insert an ammeter in +38V to T1214 (15A).

5.3.16.  
Select a frequency according to the table below.

5.3.17.  
Adjust the drive level potentiometer in question, to a meter reading of 13A.

5.3.18.  
The points 5.3.16. to 5.3.17. have to be carried out for all frequencies in the table below.

| Frequency kHz | Drive level potentiometer in question |
|---------------|---------------------------------------|
| 1600          | R330                                  |
| 4125          | R328                                  |
| 6215          | R326                                  |
| 8257          | R324                                  |
| 12392         | R322                                  |
| 16522         | R320                                  |
| 22062         | R318                                  |
| 25020         | R316                                  |

5.4.3.  
Measure the heatsink temperature (room temperature).

5.4.4.  
Calculate the voltage on pin 3 of IC1301a from the equalition below.

$$V_{pin3} = (90 - T_A) \times 0.0075 \times V_{R109} + V_{R109}.$$

$T_A$  is the actual temperature of the heat sink.

$V_{pin3}$  is the voltage at pin 3 of IC1301a.

5.4.5.  
Adjust R1305 for a voltmeter reading equal to the just calculated  $V_{pin3}$ .

T1130

5.4.  
ADJUSTMENT OF TEMPERATURE PROTECTION UNIT (1300).

5.4.1.  
Connect a voltmeter across R109.

5.4.2.  
Be sure that the heat sink is cool. Then switch the set on and measure the voltage immediately after switching on.



## 7. FUNCTION CHECK FOR T1130

To carry out the function check following equipment is necessary:

Power supply: N1407 or N1409.

Rack : H1235

Aerial coupler: AT1500

Dummy load: : 250 pF in series with 10 ohm e.g. SAILOR H1228.  
For the frequency range 1.6 - 3.9 MHz.  
50 ohm for the frequency range 4 - 28 MHz.

If installed with an aerial then use the aerial instead of dummy loads.

- T 1130
- 7.1.1. Switch the set on.
  - 7.1.2. Check that the tune lamp starts to wink.
  - 7.1.3. Select two aerials duplex.
  - 7.1.4. Connect 250 pF/10 ohm dummy load for frequencies between 1.6 - 3.9 MHz and 50 ohm for frequencies between 4 - 28 MHz to AT1500 or use the aerial.
  - 7.1.5. Select a frequency in the lowest band according to the table below.
  - 7.1.6. Set S302 to tune up.
  - 7.1.7. When using dummy load select resonance and load according to table I below. When using an aerial see tuning table T1130/AT1500.
  - 7.1.8. Press the push button programme.
  - 7.1.9. Set S301 to position S.
  - 7.1.10. Press the tune button on S130X.
  - 7.1.11. When the tune sequence is finessed, then set the switch tuning S305 to position manual and check that the aerial current meter reading is more than 3.
  - 7.1.12. Set the meter switch to position power and check that the aerial current meter reading is more than 2.
  - 7.1.13. Set the meter switch to position aerial current and check that the aerial current reading is in accordance with the table below, when dummy load is used, or if an aerial is used in accordance with the noted value on the tuning table T1130/AT1500.
  - 7.1.14. Set tuning switch to position automat.
  - 7.1.15. Press the button invalid tuning and check that the red lamp does not light up. If the lamp lights up when an aerial is used, then the set has to be returned. See tuning up procedure.
  - 7.1.16. Select the next higher band according to the table below, and start from point 7.1.7. on this frequency.
  - 7.1.17. Set the switch S302 to position normal.
  - 7.1.18. Check that the transmitter will now work in all frequency bands, check with meter switch in position S that the meter reading is more than 3 on the aerial current meter.
  - 7.1.19. Check that the tune lamp starts to wink when pressing DUMMY LOAD HEAT.

FUNCTION CHECK FOR T1130 cont.:

7.1.20.

Select an illegal frequency and check that the transmitter will not tune.

7.1.21.

Set meter switch to position aerial current.

TABLE I

| Frequency MHz | Resonance | Load | Aerial current |
|---------------|-----------|------|----------------|
| 2.182 Fixed   | 1         | 0    | 3.1            |
| 1.6 - 1.799   | 1         | 0    | 3.1            |
| 1.8 - 1.999   | 1         | 0    | 3.1            |
| 2.0 - 2.199   | 1         | 0    | 3.1            |
| 2.2 - 2.399   | 1         | 0    | 3.1            |
| 2.4 - 2.599   | 1         | 0    | 3.1            |
| 2.6 - 2.799   | 2         | 0    | 3.1            |
| 2.8 - 2.999   | 2         | 0    | 3.1            |
| 3.0 - 3.099   | 2         | 0    | 3.1            |
| 3.1 - 3.399   | 2         | 0    | 3.1            |
| 3.4 - 3.699   | 2         | 0    | 3.1            |
| 3.7 - 3.999   | 3         | 0    | 3.1            |
| 4.0 - 4.299   | 3         | 9    | 1.8            |
| 4.3 - 4.599   | 3         | 9    | 1.8            |
| 4.6 - 4.999   | 3         | 9    | 1.8            |
| 5.0 - 5.499   | 4         | 9    | 1.8            |
| 5.5 - 5.999   | 4         | 9    | 1.8            |
| 6.0 - 6.399   | 4         | 7    | 1.8            |
| 6.4 - 6.999   | 4         | 8    | 1.8            |
| 7.0 - 7.599   | 5         | 8    | 1.8            |
| 7.6 - 7.999   | 5         | 8    | 1.8            |
| 8.0 - 8.499   | 7         | 8    | 1.8            |
| 12.3 - 12.699 | 8         | 6    | 1.8            |
| 16.4 - 16.899 | 9         | 5    | 1.3A           |
| 22.0 - 22.399 | 10        | 4    | 0.7A           |
| 25.0 - 25.199 | 11        | 4    | 0.7A           |

FUNCTION CHECK FOR T1130 cont.: (Valid from serial No. 261800)

7.1.20.

Select an illegal frequency and check that the transmitter will not tune.

7.1.21.

Set meter switch to position aerial current.

TABLE I valid from serial No. 261800

| Frequency MHz | Resonance | Load | Aerial Current |
|---------------|-----------|------|----------------|
| 2.182 fixed   | 5         | 0    | 3.1            |
| 1.6 - 1.799   | 5         | 0    | 3.1            |
| 1.8 - 1.999   | 5         | 0    | 3.1            |
| 2.0 - 2.199   | 5         | 0    | 3.1            |
| 2.2 - 2.399   | 5         | 0    | 3.1            |
| 2.4 - 2.599   | 5         | 0    | 3.1            |
| 2.6 - 2.799   | 6         | 0    | 3.1            |
| 2.8 - 2.999   | 6         | 0    | 3.1            |
| 3.0 - 3.099   | 6         | 0    | 3.1            |
| 3.1 - 3.399   | 6         | 0    | 3.1            |
| 3.4 - 3.699   | 6         | 0    | 3.1            |
| 3.7 - 3.999   | 7         | 0    | 3.1            |
| 4.0 - 4.299   | 7         | 9    | 1.8            |
| 4.3 - 4.599   | 7         | 9    | 1.8            |
| 4.6 - 4.999   | 7         | 9    | 1.8            |
| 5.0 - 5.499   | 8         | 9    | 1.8            |
| 5.5 - 5.999   | 8         | 9    | 1.8            |
| 6.0 - 6.399   | 8         | 7    | 1.8            |
| 6.4 - 6.999   | 8         | 8    | 1.8            |
| 7.0 - 7.599   | 9         | 8    | 1.8            |
| 7.6 - 7.999   | 9         | 8    | 1.8            |
| 8.0 - 8.499   | 11        | 8    | 1.8            |
| 12.3 - 12.699 | 12        | 6    | 1.8            |
| 16.4 - 16.899 | 13        | 5    | 1.3A           |
| 22.0 - 22.399 | 14        | 4    | 0.7A           |
| 25.0 - 25.199 | 15        | 4    | 0.7A           |

T 1130 A



FUNCTION CHECK FOR T1130 cont.:

T1130 MADE SPECIAL FOR 50 OHM OUTPUT IMPEDANCE.

To carry out the function check following equipment is necessary:

Power supply: N1407 or N1409

Rack : H1235

Dummy load : 50 ohm

TABLE II

|        |                   |
|--------|-------------------|
| Band 1 | 1.6 - 2.199 MHz   |
| Band 2 | 2.2 - 3.099 MHz   |
| Band 3 | 3.1 - 4.299 MHz   |
| Band 4 | 4.3 - 8.499 MHz   |
| Band 5 | 8.5 - 16.899 MHz  |
| Band 6 | 16.9 - 27.999 MHz |

7.2.1.

Connect the 50 ohm dummy load to the output terminal of the transmitter.

7.2.2.

Select two aerials duplex.

7.2.3.

Switch the set on.

7.2.4.

Select a frequency as high as possible in the lowest band according to the table II below.

7.2.5.

Set tuning switch to position manual.

7.2.6.

Set meter switch to position S and check that the aerial current meter reading is higher than 3.

7.2.7.

Set meter switch to position power and check that the aerial current meter reading is higher than 2.

7.2.8.

Set tuning switch to position normal.

7.2.9.

Select a frequency as high as possible in the next higher band according to the table II below, and start from point 5.

7.2.10.

Press DUMMY LOAD HEAT and check that tune lamp starts to wink.

7.2.11.

Select an illegal frequency and check that the transmitter will not tune.



| b      |                   | CHASSIS T1130     |     | 1/1                 |               |
|--------|-------------------|-------------------|-----|---------------------|---------------|
| Symbol | Description       |                   |     | Manufact.           |               |
| M0101  | Blower            | 24V 50 Hz         |     | PABST               | 4624N         |
| M0102  | Blower            | 24V 50 Hz         |     | PABST               | 4624N         |
| R101   | Resistor          | 100 ohm 5%        | 25W | ARCOL/<br>DANOTHERM | NHS 25        |
| R102   | Resistor          | 100 ohm 5%        | 25W | ARCOL/<br>DANOTHERM | NHS 25        |
| R103   | Resistor          | 100 ohm 5%        | 25W | ARCOL/<br>DANOTHERM | NHS 25        |
| R104   | Resistor          | 100 ohm 5%        | 25W | ARCOL/<br>DANOTHERM | NHS 25        |
| R105   | Resistor          | 100 ohm 5%        | 25W | ARCOL/<br>DANOTHERM | NHS 25        |
| R106   | Resistor          | 100 ohm 5%        | 25W | ARCOL/<br>DANOTHERM | NHS 25        |
| R107   | Resistor          | 22 ohm <u>+5%</u> | 25W | ARCOL/<br>DANOTHERM | HS 25         |
| R108   | Resistor          | 82 ohm <u>+5%</u> | 10W | ARCOL/<br>DANOTHERM | HS 10         |
| R109   | Resistor PTC      | KTY-11-2D         |     | Siemens             | Q62705-K56    |
| IC101  | Voltage regulator | 15V               |     | Motorola            | LM340T15      |
| IC102  | Voltage regulator | 5V                |     | Motorola            | LM340T5       |
| T101   | Transistor        |                   |     | Motorola            | BDX53         |
| T102   | Transistor        |                   |     | Motorola            | BDX53         |
| TR101  | Balun.            |                   |     | S.P.                | TL298         |
| L101   | Choke             |                   |     | S.P.                | SP no. 14576  |
| L102   | Choke             |                   |     | S.P.                | SP no. 400383 |

| b      |                     | INPUT FILTER UNIT T1130 |      |           | 1/2             |  |
|--------|---------------------|-------------------------|------|-----------|-----------------|--|
| Symbol | Description         |                         |      | Manufact. |                 |  |
| C201   | Capacitor polyester | 100 nF $\pm 10\%$       | 100V | Siemens   | B325 10-D1104-K |  |
| C202   |                     |                         |      |           |                 |  |
| C203   | Capacitor polyester | 100 nF $\pm 10\%$       | 100V | Siemens   | B325 10-01104-K |  |
| C204   |                     |                         |      |           |                 |  |
| C205   | Capacitor polyester | 100 nF $\pm 10\%$       | 100V | Siemens   | B325 10-D1104-K |  |
| C206   |                     |                         |      |           |                 |  |
| C207   | Capacitor polyester | 100 nF $\pm 10\%$       | 100V | Siemens   | B325 10-D1104-K |  |
| C208   |                     |                         |      |           |                 |  |
| C209   | Capacitor polyester | 100 nF $\pm 10\%$       | 100V | Siemens   | B325 10-D1104-K |  |
| C210   |                     |                         |      |           |                 |  |
| C211   | Capacitor polyester | 1 nF $\pm 10\%$         | 400V | Siemens   | B325 10-D6102-K |  |
| C212   | Capacitor polyester | 100 nF $\pm 10\%$       | 100V | Siemens   | B325 10-D1104-K |  |
| C213   | Capacitor polyester | 1 nF $\pm 10\%$         | 400V | Siemens   | B325 10-D6102-K |  |
| C214   | Capacitor polyester | 100 nF $\pm 10\%$       | 100V | Siemens   | B325 10-D1104-K |  |
| C215   | Capacitor polyester | 100 nF $\pm 10\%$       | 100V | Siemens   | B325 10-D1104-K |  |
| C216   | Capacitor polyester | 100 nF $\pm 10\%$       | 100V | Siemens   | B325 10-D1104-K |  |
| C217   | Capacitor polyester | 100 nF $\pm 10\%$       | 100V | Siemens   | B325 10-D1104-K |  |
| C218   | Capacitor polyester | 100 nF $\pm 10\%$       | 100V | Siemens   | B325 10-D1104-K |  |
| C219   | Capacitor polyester | 100 nF $\pm 10\%$       | 100V | Siemens   | B325 10-D1104-K |  |
| C220   | Capacitor polyester | 100 nF $\pm 10\%$       | 100V | Siemens   | B325 10-D1104-K |  |
| C221   | Capacitor polyester | 100 nF $\pm 10\%$       | 100V | Siemens   | B325 10-D1104-K |  |
| C222   | Capacitor polyester | 100 nF $\pm 10\%$       | 100V | Siemens   | B325 10-D1104-K |  |
| C223   | Capacitor polyester | 100 nF $\pm 10\%$       | 100V | Siemens   | B325 10-D1104-K |  |
| C224   | Capacitor polyester | 100 nF $\pm 10\%$       | 100V | Siemens   | B325 10-D1104-K |  |
| C225   | Capacitor polyester | 100 nF $\pm 10\%$       | 100V | Siemens   | B325 10-D1104-K |  |
| C226   | Capacitor polyester | 100 nF $\pm 10\%$       | 100V | Siemens   | B325 10-D1104-K |  |
| C227   | Capacitor polyester | 100 nF $\pm 10\%$       | 100V | Siemens   | B325 10-D1104-K |  |
| C228   | Capacitor polyester | 100 nF $\pm 10\%$       | 100V | Siemens   | B325 10-D1104-K |  |
| C229   | Capacitor polyester | 100 nF $\pm 10\%$       | 100V | Siemens   | B325 10-D1104-K |  |
| C230   | Capacitor polyester | 100 nF $\pm 10\%$       | 100V | Siemens   | B325 10-D1104-K |  |
| C231   | Capacitor polyester | 100 nF $\pm 10\%$       | 100V | Siemens   | B325 10-D1104-K |  |
| C232   | Capacitor polyester | 100 nF $\pm 10\%$       | 100V | Siemens   | B325 10-D1104-K |  |
| C233   | Capacitor polyester | 100 nF $\pm 10\%$       | 100V | Siemens   | B325 10-D1104-K |  |
| C234   | Capacitor polyester | 100 nF $\pm 10\%$       | 100V | Siemens   | B325 10-D1104-K |  |
| C235   | Capacitor polyester | 100 nF $\pm 10\%$       | 100V | Siemens   | B325 10-D1104-K |  |
| C236   | Capacitor polyester | 100 nF $\pm 10\%$       | 100V | Siemens   | B325 10-D1104-K |  |
| C237   | Capacitor polyester | 100 nF $\pm 10\%$       | 100V | Siemens   | B325 10-D1104-K |  |
| C238   | Capacitor polyester | 100 nF $\pm 10\%$       | 100V | Siemens   | B325 10-D1104-K |  |
| C239   | Capacitor polyester | 100 nF $\pm 10\%$       | 100V | Siemens   | B325 10-D1104-K |  |
| C240   | Capacitor polyester | 100 nF $\pm 10\%$       | 100V | Siemens   | B325 10-D1104-K |  |

| a             |                    | INPUT FILTER UNIT T1130 |       | 2/2              |                |
|---------------|--------------------|-------------------------|-------|------------------|----------------|
| <i>Symbol</i> | <i>Description</i> |                         |       | <i>Manufact.</i> |                |
| FP201         | Ferroxcube beads   | 3B                      |       | Philips          | 4322 020 34400 |
| FP202         | Ferroxcube beads   | 3B                      |       | Philips          | 4322 020 34400 |
| FP203         | Ferroxcube beads   | 3B                      |       | Philips          | 4322 020 34400 |
| FP204         | Ferroxcube beads   | 3B                      |       | Philips          | 4322 020 34400 |
| FP205         | Ferroxcube beads   | 3B                      |       | Philips          | 4322 020 34400 |
| FP206         | Ferroxcube beads   | 3B                      |       | Philips          | 4322 020 34400 |
| FP207         | Ferroxcube beads   | 3B                      |       | Philips          | 4322 020 34400 |
| FP208         | Ferroxcube beads   | 3B                      |       | Philips          | 4322 020 34400 |
| FP209         | Ferroxcube beads   | 3B                      |       | Philips          | 4322 020 34400 |
| FP210         | Ferroxcube beads   | 3B                      |       | Philips          | 4322 020 34400 |
| FP211         | Ferroxcube beads   | 3B                      |       | Philips          | 4322 020 34400 |
| FP212         | Ferroxcube beads   | 3B                      |       | Philips          | 4322 020 34400 |
| FP213         | Ferroxcube beads   | 3B                      |       | Philips          | 4322 020 34400 |
| FP214         | Ferroxcube beads   | 3B                      |       | Philips          | 4322 020 34400 |
| FP215         | Ferroxcube beads   | 3B                      |       | Philips          | 4322 020 34400 |
| FP216         | Ferroxcube beads   | 3B                      |       | Philips          | 4322 020 34400 |
| FP217         | Ferroxcube beads   | 3B                      |       | Philips          | 4322 020 34400 |
| FP218         | Ferroxcube beads   | 3B                      |       | Philips          | 4322 020 34400 |
| FP219         | Ferroxcube beads   | 3B                      |       | Philips          | 4322 020 34400 |
| FP220         | Ferroxcube beads   | 3B                      |       | Philips          | 4322 020 34400 |
| FP221         | Ferroxcube beads   | 3B                      |       | Philips          | 4322 020 34400 |
| FP222         | Ferroxcube beads   | 3B                      |       | Philips          | 4322 020 34400 |
| FP223         | Ferroxcube beads   | 3B                      |       | Philips          | 4322 020 34400 |
| FP224         | Ferroxcube beads   | 3B                      |       | Philips          | 4322 020 34400 |
| FP225         | Ferroxcube beads   | 3B                      |       | Philips          | 4322 020 34400 |
| FP226         | Ferroxcube beads   | 3B                      |       | Philips          | 4322 020 34400 |
| FP227         | Ferroxcube beads   | 3B                      |       | Philips          | 4322 020 34400 |
| FP228         | Ferroxcube beads   | 3B                      |       | Philips          | 4322 020 34400 |
| FP229         | Ferroxcube beads   | 3B                      |       | Philips          | 4322 020 34400 |
| FP230         | Ferroxcube beads   | 3B                      |       | Philips          | 4322 020 34400 |
| R201          | Resistor           | 47 ohm <u>+5%</u>       | 0.33W | Philips          | 2322 211 13479 |
| R202          | Resistor           | 47 ohm <u>+5%</u>       | 0.33W | Philips          | 2322 211 13479 |
| R203          | Resistor           | 47 ohm <u>+5%</u>       | 0.33W | Philips          | 2322 211 13479 |
| R204          | Resistor           | 47 ohm <u>+5%</u>       | 0.33W | Philips          | 2322 211 13479 |
| R205          | Resistor           | 47 ohm <u>+5%</u>       | 0.33W | Philips          | 2322 211 13479 |

| <i>Symbol</i> | <i>Description</i>        |        |      | <i>Manufact.</i> |         |                 |
|---------------|---------------------------|--------|------|------------------|---------|-----------------|
| C301          | Capacitor polyester       | 100 nF | +10% | 100V             | Siemens | B325 10-D1104-K |
| C302          | Capacitor polyester       | 100 nF | +10% | 100V             | Siemens | B325 10-D1104-K |
| C303          | Capacitor polyester       | 680 nF | +10% | 100V             | Siemens | B32560-D1684-K  |
| C304          | Capacitor polyester       | 150 nF | +10% | 100V             | Siemens | B325 10-D1154-K |
| C305          | Capacitor polyester       | 10 nF  | +10% | 400V             | Siemens | B325 10-D6103-K |
| C306          | Capacitor polyester       | 47 nF  | +10% | 250V             | Siemens | B325 10-D3473-K |
| C307          | Capacitor polyester       | 1 nF   | +10% | 400V             | Siemens | B325 10-D6102-K |
| C308          | Capacitor polyester       | 1 nF   | +10% | 400V             | Siemens | B325 10-D6102-K |
| C309          | Capacitor polyester       | 3.3 nF | +10% | 400V             | Siemens | B325 10-D6332-K |
| C310          | Capacitor polyester       | 470 nF | +10% | 100V             | Siemens | B32560-D1474-K  |
| C311          | Capacitor polyester       | 1 nF   | +10% | 400V             | Siemens | B325 10-D6102-K |
| C312          | Capacitor electrolytic    | 10 uF  |      | 35V              | ERO     | EKI 00 AA 210F  |
| C313          | Capacitor polyester       | 10 nF  | +10% | 400V             | Siemens | B325 10-D6103-K |
| C314          | Capacitor electrolytic    | 10 uF  |      | 35V              | ERO     | EKI 00 AA 210F  |
| C315          | Capacitor polyester       | 100 nF | +10% | 100V             | Siemens | B325 10-D1104-K |
| C316          | Capacitor polyester       | 3.3 nF | +10% | 400V             | Siemens | B325 10-D6332-K |
| C317          | Capacitor polyester       | 100 nF | +10% | 100V             | Siemens | B325 10-D1104-K |
| C318          | Capacitor polyester       | 100 nF | +10% | 100V             | Siemens | B325 10-D1104-K |
| C319          | Capacitor polyester       | 1 nF   |      | 400V             | Siemens | B325 10-D6102-K |
| C320          | Capacitor polyester       | 1 nF   | +10% | 400V             | Siemens | B325 10-D6102-K |
| C321          | Capacitor polyester       | 1 nF   | +10% | 400V             | Siemens | B325 10-D6102-K |
| C322          | Capacitor polyester       | 1 uF   | +10% | 250V             | Siemens | B325 13-D3105-K |
| C323          | Capacitor polyester       | 10 nF  | +50% | 400V             | Siemens | B325 10-D6103-K |
| C324          | Capacitor polyester       | 1 nF   |      | 400V             | Siemens | B325 10-D6102-K |
| C325          |                           |        |      |                  |         |                 |
| C326          | Capacitor electrolytic    | 10uF   |      | 35V              | ERO     | EKI 00 AA 210F  |
| C327          | Capacitor polyester       | 220 nF | +10% | 100V             | Siemens | B32560-D1224-K  |
| C328          | Capacitor polyester       | 100 nF | +10% | 100V             | Siemens | B325 10-D1104-K |
| C329          | Capacitor polyester       | 100 nF | +10% | 100V             | Siemens | B325 10-D1104-K |
| C330          | Capacitor polyester       | 100 nF | +10% | 100V             | Siemens | B325 10-D1104-K |
| D301          | Diode                     |        |      |                  | Philips | AA143           |
| D302          | Diode                     |        |      |                  | Philips | AA143           |
| D303          | Diode                     |        |      |                  | Philips | BAV21           |
| D304          | Diode                     |        |      |                  | Philips | BAV21           |
| D305          | Diode light emitting red. |        |      |                  | Xciton  | XC 5053Y        |
| D306          | Diode                     |        |      |                  | Philips | BAV21           |

| c             |                    | TRANSMITTER CONTROL UNIT T1130 |     |                  | 2/7     |                 |
|---------------|--------------------|--------------------------------|-----|------------------|---------|-----------------|
| <i>Symbol</i> | <i>Description</i> |                                |     | <i>Manufact.</i> |         |                 |
| D307          | Diode              |                                |     | Philips          |         | BAV21           |
| D308          | Diode              |                                |     | Philips          |         | BAV21           |
| D309          | Diode              |                                |     | Philips          |         | BAV21           |
| D310          | Diode              |                                |     | Philips          |         | BAV21           |
| D311          | Diode              |                                |     | Philips          |         | BAV21           |
| D312          | Diode              |                                |     | Philips          |         | BAV21           |
| D313          | Diode              |                                |     | Philips          |         | BAV21           |
| D314          | Diode              |                                |     | Philips          |         | BAV21           |
| D315          | Diode              |                                |     | Philips          |         | BAV21           |
| D316          | Diode              |                                |     | Philips          |         | BAV21           |
| D317          | Diode              |                                |     | Philips          |         | BAV21           |
| D318          | Diode              |                                |     | Philips          |         | BAV21           |
| D319          | Diode, zener       |                                |     | Philips          |         | BZX 79 C15      |
| D320          | Diode              |                                |     | Philips          |         | AA143           |
| D321          | Diode              |                                |     | Philips          |         | 1N4448          |
| D322          | Diode              |                                |     | Philips          |         | 1N4448          |
| D323          | Diode              |                                |     | Philips          |         | AA143           |
| D324          | Diode              |                                |     | Philips          |         | 1N4448          |
| D325          | Diode              |                                |     | Philips          |         | BAV21           |
| D326          | Diode              |                                |     | Philips          |         | BAV21           |
| D327          | Diode              |                                |     | Philips          |         | BAV21           |
| D328          | Diode              |                                |     | Philips          |         | BAV21           |
| D329          | Diode              |                                |     | Philips          |         | BAV21           |
| D330          | Diode              |                                |     | Philips          |         | BAV21           |
| D331          | Diode              |                                |     | Philips          |         | BAV21           |
| D332          | Diode              |                                |     | Philips          |         | BAV21           |
| D333          | Diode              |                                |     | Philips          |         | BAV21           |
| D334          | Diode              |                                |     | Philips          |         | BAV21           |
| D335          | Diode              |                                |     | Philips          |         | BAV21           |
| RA301         | Resistor array     | 8x10 kohm                      | +5% | 0.125W           | ITT     | UR8 10 kohm +5% |
| R301          | Resistor           | 22 kohm                        | +5% | 0.33W            | Philips | 2322 211 13223  |
| R302          | Preset potmeter    | 10 kohm                        |     |                  | Philips | 2322 410 03357  |
| R303          | Resistor           | 1.5 kohm                       | +5% | 0.33W            | Philips | 2322 211 13152  |
| R304          | Resistor           | 820 ohm                        | +5% | 0.33W            | Philips | 2322 211 13821  |
| R305          | Resistor           | 5.6 kohm                       | +5% | 0.33W            | Philips | 2322 211 13562  |

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|---------------|--------------------|--------------------------------|-----|------------------|----------|----------------|
| <i>Symbol</i> | <i>Description</i> |                                |     | <i>Manufact.</i> |          |                |
| R306          | Resistor           | 5.6 kohm                       | +5% | 0.33W            | Philips  | 2322 211 13562 |
| R307          | Resistor           | 5.6 kohm                       | +5% | 0.33W            | Philips  | 2322 211 13562 |
| R308          | Resistor           | 5.6 kohm                       | +5% | 0.33W            | Philips  | 2322 211 13562 |
| R309          | Resistor           | 5.6 kohm                       | +5% | 0.33W            | Philips  | 2322 211 13562 |
| R310          | Resistor           | 5.6 kohm                       | +5% | 0.33W            | Philips  | 2322 211 13562 |
| R311          | Resistor           | 5.6 kohm                       | +5% | 0.33W            | Philips  | 2322 211 13562 |
| R312          | Resistor           | 5.6 kohm                       | +5% | 0.33W            | Philips  | 2322 211 13562 |
| R313          | Resistor           | 5.6 kohm                       | +5% | 0.33W            | Philips  | 2322 211 13562 |
| R314          | Preset potmeter    | 4.7 kohm                       |     | 0.5W             | Philips  | 2322 482 30472 |
| R315          | Resistor           | 100 kohm                       | +5% |                  |          |                |
| R316          | Preset potmeter    | 4.7 kohm                       |     | 0.5W             | Philips  | 2322 482 30472 |
| R317          | Resistor           | 100 kohm                       | +5% | 0.33W            | Philips  | 2322 211 13104 |
| R318          | Preset potmeter    | 4.7 kohm                       |     | 0.5W             | Philips  | 2322 482 30472 |
| R319          | Resistor           | 100 kohm                       | +5% | 0.33W            | Philips  | 2322 211 13104 |
| R320          | Preset potmeter    | 4.7 kohm                       |     | 0.5W             | Philips  | 2322 482 30472 |
| R321          | Resistor           | 100 kohm                       | +5% | 0.33W            | Philips  | 2322 211 13104 |
| R322          | Preset potmeter    | 4.7 kohm                       |     | 0.5W             | Philips  | 2322 482 30472 |
| R323          | Resistor           | 100 kohm                       | +5% | 0.33W            | Philips  | 2322 211 13104 |
| R324          | Preset potmeter    | 4.7 kohm                       |     | 0.5W             | Philips  | 2322 482 30472 |
| R325          | Resistor           | 100 kohm                       | +5% | 0.33W            | Philips  | 2322 211 13104 |
| R326          | Preset potmeter    | 4.7 kohm                       |     | 0.5W             | Philips  | 2322 482 30472 |
| R327          | Resistor           | 100 kohm                       | +5% | 0.33W            | Philips  | 2322 211 13104 |
| R328          | Preset potmeter    | 4.7 kohm                       |     | 0.5W             | Philips  | 2322 482 30472 |
| R329          | Resistor           | 100 kohm                       | +5% | 0.33W            | Philips  | 2322 211 13104 |
| R330          | Preset potmeter    | 4.7 kohm                       |     | 0.5W             | Philips  | 2322 482 30472 |
| R331          | Resistor           | 100 kohm                       | +5% | 0.33W            | Philips  | 2322 211 13104 |
| R332          | Resistor           | 22 kohm                        | +5% | 0.33W            | Philips  | 2322 211 13223 |
| R333          | Resistor           | 2.7 kohm                       | +5% | 0.5W             | Philips  | 2322 212 13272 |
| R334          | Resistor           | 150 ohm                        | +5% | 0.33W            | Philips  | 2322 211 13151 |
| R335          | Resistor           | 270 kohm                       | +5% | 0.33W            | Philips  | 2322 211 13274 |
| R336          | Resistor           | 680 kohm                       | +5% | 0.33W            | Beysclag | MBA 0204-55-BX |
| R337          | Resistor           | 1 Mohm                         | +5% | 0.33W            | Philips  | 2322 211 13105 |
| R338          | Resistor           | 330 kohm                       | +5% | 0.33W            | Philips  | 2322 211 13334 |
| R339          | Resistor           | 10 kohm                        | +5% | 0.33W            | Beysclag | MBA 0204-55-BX |
| R340          | Resistor           | 1.8 Mohm                       | +5% | 0.33W            | Beysclag | MBA 0204-55-BX |
| R341          | Resistor           | 10 kohm                        | +5% | 0.33W            | Philips  | 2322 211 13103 |
| R342          | Resistor           | 10 kohm                        | +5% | 0.33W            | Beysclag | MBA 0204-55-BX |
| R343          | Resistor           | 1 Mohm                         | +5% | 0.33W            | Beysclag | MBA 0204-55-BX |
| R344          | Resistor           | 1.8 Mohm                       | +5% | 0.33W            | Beysclag | MBA 0204-55-BX |
| R345          | Preset potmeter    | 10 kohm                        |     |                  | Philips  | 2322 410 03357 |
| R346          | Resistor           | 22 kohm                        | +5% | 0.33W            | Philips  | 2322 211 13223 |

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## TRANSMITTER CONTROL UNIT T1130

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| <i>Symbol</i> | <i>Description</i> |          |     | <i>Manufact.</i> |          |                |
|---------------|--------------------|----------|-----|------------------|----------|----------------|
| R347          | Resistor           | 270 kohm | +5% | 0.33W            | Beysclag | MBA 0204-55-BX |
| R348          | Resistor           | 270 kohm | +5% | 0.33W            | Beysclag | MBA 0204-55-BX |
| R349          | Resistor           | 39 kohm  | +5% | 0.33W            | Philips  | 2322 211 13393 |
| R350          | Resistor           | 100 kohm | +5% | 0.33W            | Beysclag | MBA 0204-55-BX |
| R351          | Resistor           | 100 kohm | +5% | 0.33W            | Beysclag | MBA 0204-55-BX |
| R352          | Resistor           | 100 kohm | +5% | 0.33W            | Beysclag | MBA 0204-55-BX |
| R353          | Resistor           | 10 Mohm  | +5% | 0.33W            | Philips  | 2322 211 12106 |
| R354          | Resistor           | 47 kohm  | +5% | 0.33W            | Beysclag | MBA 0204-55-BX |
| R355          | Resistor           | 100 kohm | +5% | 0.33W            | Beysclag | MBA 0204-55-BX |
| R356          | Resistor           | 33 kohm  | +5% | 0.33W            | Beysclag | MBA 0204-55-BX |
| R357          | Resistor           | 10 kohm  | +5% | 0.33W            | Beysclag | MBA 0204-55-BX |
| R358          | Resistor           | 10 kohm  | +5% | 0.33W            | Beysclag | MBA 0204-55-BX |
| R359          | Resistor           | 22 kohm  | +5% | 0.33W            | Beysclag | MBA 0204-55-BX |
| R360          | Resistor           | 1 Mohm   | +5% | 0.33W            | Beysclag | MBA 0204-55-BX |
| R361          | Resistor           | 10 kohm  | +5% | 0.33W            | Philips  | 2322 211 13103 |
| R362          | Resistor           | 3.3 kohm | +5% | 0.33W            | Philips  | 2322 211 13334 |
| R363          | Resistor           | 15 kohm  | +5% | 0.33W            | Beysclag | MBA 0204-55-BX |
| R364          | Resistor           | 10 kohm  | +5% | 0.33W            | Beysclag | MBA 0204-55-BX |
| R365          | Resistor           | 10 kohm  | +5% | 0.33W            | Beysclag | MBA 0204-55-BX |
| R366          | Resistor           | 10 kohm  | +5% | 0.33W            | Beysclag | MBA 0204-55-BX |
| R367          | Resistor           | 10 kohm  | +5% | 0.33W            | Beysclag | MBA 0204-55-BX |
| R368          | Resistor           | 18 kohm  | +5% | 0.33W            | Philips  | 2322 211 13183 |
| R369          | Resistor           | 10 kohm  | +5% | 0.33W            | Philips  | 2322 211 13103 |
| R370          | Resistor           | 100 kohm | +5% | 0.33W            | Philips  | 2322 211 13104 |
| R371          | Resistor           | 5.6 kohm | +5% | 0.33W            | Beysclag | MBA 0204-55-BX |
| R372          | Resistor           | 10 kohm  | +5% | 0.33W            | Philips  | 2322 211 13103 |
| R373          | Resistor           | 10 kohm  | +5% | 0.33W            | Beysclag | MBA 0204-55-BX |
| R374          | Resistor           | 10 kohm  | +5% | 0.33W            | Beysclag | MBA 0204-55-BX |
| R375          | Resistor           | 10 kohm  | +5% | 0.33W            | Beysclag | MBA 0204-55-BX |
| R376          | Resistor           | 5.6 kohm | +5% | 0.33W            | Beysclag | MBA 0204-55-BX |
| R377          | Resistor           | 5.6 kohm | +5% | 0.33W            | Beysclag | MBA 0204-55-BX |
| R378          | Resistor           | 680 ohm  | +5% | 0.33W            | Beysclag | MBA 0204-55-BX |
| R379          | Resistor           | 5.6 kohm | +5% | 0.33W            | Beysclag | MBA 0204-55-BX |
| R380          | Resistor           | 150 ohm  | +5% | 1.15W            | Philips  | 2322 214 13151 |
| R381          | Resistor           | 1 kohm   | +5% | 0.33W            | Philips  | 2322 211 13102 |
| R382          | Resistor           | 1.8 kohm | +5% | 0.33W            | Beysclag | MBA 0204-55-BX |
| R383          | Resistor           | 10 kohm  | +5% | 0.33W            | Beysclag | MBA 0204-55-BX |
| R384          | Resistor           | 2.2 Mohm | +5% | 0.33W            | Beysclag | MBA 0204-55-BX |
| R385          | Resistor           | 10 kohm  | +5% | 0.33W            | Philips  | 2322 211 13103 |
| R386          | Resistor           | 3.9 Mohm | +5% | 0.33W            | Beysclag | MBA 0204-55-BX |
| R387          | Resistor           | 3.3 kohm | +5% | 0.33W            | Philips  | 2322 211 13332 |

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|--------|-----------------|--------------------------------|-----|-----------|---------|----------------|
| Symbol | Description     |                                |     | Manufact. |         |                |
| R388   | Resistor        | 5.6 kohm                       | +5% | 0.33W     | Philips | 2322 211 13562 |
| R389   | Resistor        | 1 kohm                         | +5% | 0.33W     | Philips | 2322 211 13102 |
| R390   | Resistor        | 10 kohm                        | +5% | 0.33W     | Philips | 2322 211 13103 |
| R391   | Resistor        | 15 kohm                        | +5% | 0.33W     | Philips | 2322 211 13153 |
| R392   | Resistor        | 5.6 kohm                       | +5% | 0.33W     | Philips | 2322 211 13562 |
| R393   | Resistor        | 5.6 kohm                       | +5% | 0.33W     | Philips | 2322 211 13562 |
| R394   | Resistor        | 5.6 kohm                       | +5% | 0.33W     | Philips | 2322 211 13562 |
| R395   | Resistor        | 10 kohm                        | +5% | 0.33W     | Philips | 2322 211 13103 |
| R396   | Resistor        | 1 kohm                         | +5% | 0.33W     | Philips | 2322 211 13102 |
| R397   | Resistor        | 6.8 kohm                       | +5% | 0.33W     | Philips | 2322 211 13682 |
| R398   | Resistor        | 33 kohm                        | +5% | 0.33W     | Philips | 2322 211 13333 |
| R399   | Preset potmeter | 10 kohm                        |     |           | Philips | 2322 410 03357 |
| R301a  | Resistor        | 39 kohm                        | +5% | 0.33W     | Philips | 2322 211 13393 |
| R302a  | Resistor        | 1 kohm                         | +5% | 0.33W     | Philips | 2322 211 13102 |
| R303a  | Resistor        | 3.9 kohm                       | +5% | 0.33W     | Philips | 2322 211 13392 |
| R304a  | Resistor        | 100 kohm                       | +5% | 0.33W     | Philips | 2322 211 13104 |
| R305a  | Resistor        | 10 kohm                        | +5% | 0.33W     | Philips | 2322 211 13103 |
| R306a  | Resistor        | 100 kohm                       | +5% | 0.33W     | Philips | 2322 211 13104 |
| R307a  | Resistor        | 100 kohm                       | +5% | 0.33W     | Philips | 2322 211 13104 |
| R308a  | Resistor        | 1 Mohm                         | +5% | 0.33W     | Philips | 2322 211 13105 |
| R309a  | Resistor        | 3.3 kohm                       | +5% | 0.33W     | Philips | 2322 211 13332 |
| R310a  | Resistor        | 10 kohm                        | +5% | 0.33W     | Philips | 2322 211 13103 |
| R311a  | Resistor        | 100 kohm                       | +5% | 0.33W     | Philips | 2322 211 13104 |
| R312a  | Resistor        | 100 kohm                       | +5% | 0.33W     | Philips | 2322 211 13104 |
| R313a  | Resistor        | 3.3 kohm                       | +5% | 0.33W     | Philips | 2322 211 13332 |
| R314a  | Resistor        | 5.6 kohm                       | +5% | 0.33W     | Philips | 2322 211 13562 |
| R315a  | Resistor        | 10 Mohm                        | +5% | 0.33W     | Philips | 2322 211 12106 |
| R316a  | Resistor        | 100 kohm                       | +5% | 0.33W     | Philips | 2322 211 13104 |
| R317a  | Resistor        | 10 kohm                        | +5% | 0.33W     | Philips | 2322 211 13103 |
| R318a  | Preset potmeter | 4.7 kohm                       |     |           | Philips | 2322 410 03356 |
| R319a  | Resistor        | 22 kohm                        | +5% | 0.33W     | Philips | 2322 211 13223 |
| R320a  | Resistor        | 100 kohm                       | +5% | 0.33W     | Philips | 2322 211 13104 |
| R321a  | Resistor        | 100 kohm                       | +5% | 0.33W     | Philips | 2322 211 13104 |
| R322a  | Resistor        | 22 kohm                        | +5% | 0.33W     | Philips | 2322 211 13223 |
| R323a  | Resistor        | 8.2 kohm                       | +5% | 0.33W     | Philips | 2322 211 13822 |
| R324a  | Resistor        | 100 kohm                       | +5% | 0.33W     | Philips | 2322 211 13104 |
| R325a  | Resistor        | 3.3 kohm                       | +5% | 0.33W     | Philips | 2322 211 13332 |
| R326a  | Resistor        | 100 kohm                       | +5% | 0.33W     | Philips | 2322 211 13104 |
| R327a  | Resistor        | 100 kohm                       | +5% | 0.33W     | Philips | 2322 211 13104 |
| R328a  | Resistor        | 47 kohm                        | +5% | 0.33W     | Philips | 2322 211 13473 |
| R329a  | Preset potmeter | 10 kohm                        |     |           | Philips | 2322 410 03357 |

| D             |                    | TRANSMITTER CONTROL UNIT T1130 |     |                  | 6/7      |                |
|---------------|--------------------|--------------------------------|-----|------------------|----------|----------------|
| <i>Symbol</i> | <i>Description</i> |                                |     | <i>Manufact.</i> |          |                |
| R330a         | Resistor           | 820 ohm                        | +5% | 0.33W            | Philips  | 2322 211 13821 |
| R331a         | Resistor           | 3.3 kohm                       | +5% | 0.33W            | Philips  | 2322 211 13332 |
| R332a         | Resistor           | 100 kohm                       | +5% | 0.33W            | Philips  | 2322 211 13104 |
| R333a         | Resistor           | 1 Mohm                         | +5% | 0.33W            | Philips  | 2322 211 13105 |
| R334a         | Preset potmeter    | 100 ohm                        |     |                  | Philips  | 2322 410 03352 |
| R335a         | Resistor           | 100 kohm                       | +5% | 0.33W            | Philips  | 2322 211 13104 |
| R336a         | Resistor           | 10 kohm                        | +5% | 0.33W            | Philips  | 2322 211 13103 |
| R337a         | Resistor           | 10 kohm                        | +5% | 0.33W            | Philips  | 2322 211 13103 |
| R338a         | Resistor           | 120 ohm                        | +5% | 0.33W            | Philips  | 2322 211 13121 |
| R339a         | Resistor           | 120 kohm                       | +5% | 0.33W            | Philips  | 2322 211 13124 |
| R340a         | Resistor           | 2.7 kohm                       | +5% | 0.33W            | Beysclag | MBA 0204-55-BX |
| R341a         | Resistor           | 2.7 kohm                       | +5% | 0.33W            | Beysclag | MBA 0204-55-BX |
| R342a         | Resistor           | 82 ohm                         | +5% | 0.33W            | Philips  | 2322 211 13829 |
| R343a         | Resistor           | 2.7 kohm                       | +5% | 0.33W            | Beysclag | MBA 0204-55-BX |
| R344a         | Resistor           | 2.7 kohm                       | +5% | 0.33W            | Beysclag | MBA 0204-55-BX |
| R345a         | Resistor           | 2.7 kohm                       | +5% | 0.33W            | Beysclag | MBA 0204-55-BX |
| R346a         | Resistor           | 2.7 kohm                       | +5% | 0.33W            | Beysclag | MBA 0204-55-BX |
| R347a         | Resistor           | 2.7 kohm                       | +5% | 0.33W            | Beysclag | MBA 0204-55-BX |
| R348a         | Resistor           | 2.7 kohm                       | +5% | 0.33W            | Beysclag | MBA 0204-55-BX |
| R349a         | Resistor           | 2.7 kohm                       | +5% | 0.33W            | Beysclag | MBA 0204-55-BX |
| RE301         | Relay              | 24V                            |     |                  | National | HB2-DC-24V     |
| S301          | Switch             |                                |     |                  | ALCO     | MSSA 2350R     |
| S302          | Switch             |                                |     |                  | ALCO     | MSS 2250R      |
| S303          | Switch             |                                |     |                  | C&K      | SPDT AV2 8125  |
| S304          | Switch             |                                |     |                  | C&K      | SPDT AV2 8125  |
| S305          | Switch             |                                |     |                  | ALCO     | MSS 2250R      |
| T301          | Transistor         |                                |     |                  | Philips  | BC327-25       |
| T302          | Transistor         |                                |     |                  | Philips  | BC327-25       |
| T303          | Transistor         |                                |     |                  | Philips  | BC327-25       |
| T304          | Transistor         |                                |     |                  | Philips  | BC327-25       |
| T305          | Transistor         |                                |     |                  | Philips  | BC327-25       |
| T306          | Transistor         |                                |     |                  | Philips  | BC327-25       |

| <i>Symbol</i> | <i>Description</i> | <i>Manufact.</i> |           |
|---------------|--------------------|------------------|-----------|
| T307          | Transistor         | Philips          | BC327-25  |
| T308          | Transistor         | Philips          | BC327-25  |
| T309          | Transistor         | Philips          | BC327-25  |
| T310          | Transistor         | Philips          | BC338     |
| T311          | Transistor         | Philips          | BC338     |
| T312          | Transistor         | Philips          | BC338     |
| T313          | Transistor         | Philips          | BC338     |
| T314          | Transistor         | Philips          | BD138     |
| T315          | Transistor         | Philips          | BC328     |
| T316          | Transistor         | Philips          | BC338     |
| T317          | Transistor         | Philips          | BC328     |
| T318          | Transistor         | Philips          | 2N2368    |
| T319          | Transistor         | Philips          | BC338     |
| T320          | Transistor         | Philips          | BC338     |
| T321          | Transistor         | Philips          | BC338     |
| T322          | Transistor         | Philips          | BC141-10  |
| IC301         | Integrated circuit | MMI              | 6330-1    |
| IC302         | Integrated circuit | Motorola         | MC14028B  |
| IC303         | Integrated circuit | Motorola         | MC14028B  |
| IC304         | Integrated circuit | Texas            | SN74LS06  |
| IC305         | Integrated circuit | Texas            | SN74LS06  |
| IC306         | Integrated circuit | Texas            | SN74LS06  |
| IC307         | Integrated circuit | Motorola         | LM324     |
| IC308         | Integrated circuit | Motorola         | MC14093B  |
| IC309         | Integrated circuit | Motorola         | MC14093B  |
| IC310         | Integrated circuit | Motorola         | MC14049B  |
| IC311         | Integrated circuit | Motorola         | LM339     |
| IC312         | Integrated circuit | Motorola         | MC14071B  |
| IC313         | Integrated circuit | Motorola         | MC14043B  |
| IC314         | Integrated circuit | Motorola         | MC14072B  |
| IC315         | Integrated circuit | Texas            | NE 555P   |
| IC316         | Integrated circuit | Motorola         | LM1458    |
| IC317         | Integrated circuit | Motorola         | MC 14007B |
| IC318         | Integrated circuit | Motorola         | MC 14017B |

| a      |                      | FILTER SWITCH/DIRECTION COUPLER T1130 |       |           | 1/2              |  |
|--------|----------------------|---------------------------------------|-------|-----------|------------------|--|
| Symbol | Description          |                                       |       | Manufact. |                  |  |
| C401   | Capacitor, ceramic   | 5.6 pF $\pm 0.5$ pF                   | 400V  | Ferroperm | 9/0112.9         |  |
| C402   | Capacitor, ceramic   | 220 pF $\pm 10\%$                     | 50V   | K.C.K.    | HE 11 SJ CH 221K |  |
| C403   | Capacitor, ceramic   | 110 pF $\pm 10\%$                     | 500V  | K.C.K.    | HM 11 SJ 111K    |  |
| C404   | Capacitor, ceramic   | 110 pF $\pm 10\%$                     | 500V  | K.C.K.    | HM 11 SJ 111K    |  |
| C405   | Capacitor, trimmer   | 8-80 pF                               |       | DAU       | 009.4601.080     |  |
| C406   | Capacitor, ceramic   | 220 pF $\pm 10\%$                     | 50V   | K.C.K.    | HE 11 SJ CH 221K |  |
| C407   | Capacitor, ceramic   | 110 pF $\pm 10\%$                     | 500V  | K.C.K.    | HM 11 SJ 111K    |  |
| C408   | Capacitor, ceramic   | 110 pF $\pm 10\%$                     | 500V  | K.C.K.    | HM 11 SJ 111K    |  |
| C409   | Capacitor, polyester | 1 nF $\pm 10\%$                       | 250V  | Siemens   | B32510-D6102-K   |  |
| C410   | Capacitor, polyester | 150 nF $\pm 10\%$                     | 250V  | Siemens   | B32510-D1154-K   |  |
| C411   | Capacitor, polyester | 150 nF $\pm 10\%$                     | 250V  | Siemens   | B32510-D1154-K   |  |
| C412   | Capacitor, polyester | 10 nF $\pm 10\%$                      | 250V  | Siemens   | B32510-D6103-K   |  |
| C413   | Capacitor, polyester | 10 nF $\pm 10\%$                      | 250V  | Siemens   | B32510-D6103-K   |  |
| C414   | Capacitor, polyester | 10 nF $\pm 10\%$                      | 250V  | Siemens   | B32510-D6103-K   |  |
| C415   | Capacitor, polyester | 10 nF $\pm 10\%$                      | 250V  | Siemens   | B32510-D6103-K   |  |
| C416   | Capacitor, polyester | 100 nF $\pm 10\%$                     | 250V  | Siemens   | B32510-D1104-K   |  |
| D401   | Diode                |                                       |       | Philips   | BAV21            |  |
| D402   | Diode                |                                       |       | Philips   | BAV21            |  |
| D403   | Diode                |                                       |       | Philips   | BAV21            |  |
| D404   | Diode                |                                       |       | Philips   | BAV21            |  |
| D405   | Diode                |                                       |       | Philips   | BAV21            |  |
| D406   | Diode                |                                       |       | Philips   | BAV21            |  |
| D407   | Diode                |                                       |       | Philips   | AA143            |  |
| D408   | Diode                |                                       |       | Philips   | AA143            |  |
| D409   | Diode                |                                       |       | Philips   | 1N4448           |  |
| D410   | Diode                |                                       |       | Philips   | 1N4448           |  |
| IC401  | Integrated circuit   |                                       |       | Motorola  | LM324            |  |
| R401   | Resistor             | 3.9 kohm $\pm 5\%$                    | 0.33W | Philips   | 2322 211 13392   |  |
| R402   | Resistor             | 56 kohm $\pm 5\%$                     | 0.33W | Philips   | 2322 211 13563   |  |
| R403   | Resistor             | 100 ohm $\pm 5\%$                     | 0.33W | Philips   | 2322 211 13101   |  |
| R404   | Resistor             | 100 ohm $\pm 5\%$                     | 0.33W | Philips   | 2322 211 13101   |  |
| R405   | Resistor             | 100 ohm $\pm 5\%$                     | 0.33W | Philips   | 2322 211 13101   |  |
| R406   | Resistor             | 100 ohm $\pm 5\%$                     | 0.33W | Philips   | 2322 211 13101   |  |
| R407   | Resistor             | 56 kohm $\pm 5\%$                     | 0.33W | Philips   | 2322 211 13563   |  |
| R408   | Resistor             | 220 kohm $\pm 5\%$                    | 0.33W | Philips   | 2322 211 13224   |  |
| R409   | Resistor             | 220 kohm $\pm 5\%$                    | 0.33W | Philips   | 2322 211 13224   |  |

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a FILTER SWITCH/DIRECTIONAL COUPLER T1130 2/2

| <i>Symbol</i> | <i>Description</i>                 | <i>Manufact.</i> |                |
|---------------|------------------------------------|------------------|----------------|
| R4 10         | Resistor 100 kohm <u>+5%</u> 0.33W | Philips          | 2322 211 13104 |
| R4 11         | Resistor 100 kohm <u>+5%</u> 0.33W | Philips          | 2322 211 13104 |
| R4 12         | Resistor 150 kohm <u>+5%</u> 0.33W | Philips          | 2322 211 13154 |
| R4 13         | Resistor 150 kohm <u>+5%</u> 0.33W | Philips          | 2322 211 13154 |
| R4 14         | Resistor 220 kohm <u>+5%</u> 0.33W | Philips          | 2322 211 13224 |
| R4 15         | Resistor 1 kohm <u>+5%</u> 0.33W   | Philips          | 2322 211 13102 |
| R4 16         | Resistor 2.7 Mohm <u>+5%</u> 0.33W | Philips          | 2322 211 12275 |
| R4 17         | Resistor 100 kohm <u>+5%</u> 0.33W | Philips          | 2322 211 13104 |
| R4 18         | Resistor 100 kohm <u>+5%</u> 0.33W | Philips          | 2322 211 13104 |
| RE401         | Relay                              | PASI             | MK/Z BV1222    |
| RE402         | Relay                              | PASI             | MK/Z BV1222    |
| RE403         | Relay                              | PASI             | MK/Z BV1222    |
| RE404         | Relay                              | PASI             | MK/Z BV1222    |
| RE405         | Relay                              | PASI             | MK/Z BV1222    |
| RE406         | Relay                              | PASI             | MK/Z BV1222    |
| TR401         | Transformer                        | S.P.             | TL.310         |

b

TUNER CONTROL UNIT T1130

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| <i>Symbol</i> | <i>Description</i>       |                    |       | <i>Manufact.</i> |                  |
|---------------|--------------------------|--------------------|-------|------------------|------------------|
| C501          | Capacitor polyester      | 10 nF $\pm 10\%$   | 400V  | Siemens          | B325 10-D6 103-K |
| C502          | Capacitor polyester      | 10 nF $\pm 10\%$   | 400V  | Siemens          | B325 10-D6 103-K |
| C503          | Capacitor polyester      | 10 nF $\pm 10\%$   | 400V  | Siemens          | B325 10-D6 103-K |
| C504          | Capacitor polyester      | 10 nF $\pm 10\%$   | 400V  | Siemens          | B325 10-D6 103-K |
| C505          | Capacitor polyester      | 10 nF $\pm 10\%$   | 400V  | Siemens          | B325 10-D6 103-K |
| C506          | Capacitor polyester      | 10 nF $\pm 10\%$   | 400V  | Siemens          | B325 10-D6 103-K |
| C507          | Capacitor polyester      | 10 nF $\pm 10\%$   | 400V  | Siemens          | B325 10-D6 103-K |
| C508          | Capacitor polyester      | 10 nF $\pm 10\%$   | 400V  | Siemens          | B325 10-D6 103-K |
| C509          | Capacitor polyester      | 220 nF $\pm 10\%$  | 100V  | Siemens          | B32560-D1224-K   |
| C510          | Capacitor polyester      | 100 nF $\pm 10\%$  | 100V  | Siemens          | B325 10-D1104-K  |
| C511          | Capacitor electrolytic   | 10 uF $\pm 20\%$   | 35V   | ERO              | EKI 00AA 210F    |
| C512          | Capacitor polyester      | 10 nF $\pm 10\%$   | 400V  | Siemens          | B325 10-D6 103-K |
| C513          | Capacitor polyester      | 10 nF $\pm 10\%$   | 400V  | Siemens          | B325 10-D6 103-K |
| C514          | Capacitor electrolytic   | 1 uF $\pm 20\%$    | 50V   | ERO              | EKI00A 110H      |
| C515          | Capacitor polyester      | 100 nF             | 100V  | Siemens          | B325 10-D1104-K  |
| C516          | Capacitor electrolytic   | 1 uF $\pm 20\%$    | 50V   | ERO              | EKI 00AA 110H    |
| C517          | Capacitor electrolytic   | 1 uF $\pm 20\%$    | 50V   | ERO              | EKI 00AA 110H    |
| D501          | Diode, Silicon           |                    |       | Motorola         | BY601            |
| D502          | Diode, Germanium         |                    |       | Philips          | AA143            |
| D503          | Diode, Zener             |                    |       | Philips          | BZX79C6V2        |
| D504          | Diode, Zener             |                    |       | Philips          | BZX79C4V3        |
| D505          | Diode, Silicon           |                    |       | Philips          | 1N4448           |
| D506          | Diode, Silicon           |                    |       | Philips          | 1N4448           |
| D507          | Diode, Zener             |                    |       | Philips          | BZX79C6V2        |
| D508          | Diode, Silicon           |                    |       | Philips          | BAV21            |
| D509          | Diode, Silicon           |                    |       | Philips          | BAV21            |
| IC501         | Integrated circuit, PROM |                    |       | MMI              | 6330-1           |
| IC502         | Integrated circuit       |                    |       | TEXAS            | SN74LS173        |
| IC503         | Integrated circuit, PROM |                    |       | MMI              | 6330-1           |
| IC504         | Integrated circuit       |                    |       | TEXAS            | SN74LS173        |
| IC505         | Integrated circuit, RAM  |                    |       | Motorola         | MCM51L01         |
| IC506         | Integrated circuit       |                    |       | TEXAS            | SN74LS09         |
| IC507         | Integrated circuit       |                    |       | TEXAS            | SN74LS00         |
| IC508         | Integrated circuit       |                    |       | TEXAS            | SN74LS109        |
| IC509         | Integrated circuit       |                    |       | TEXAS            | NE555            |
| R501          | Resistor                 | 100 kohm $\pm 5\%$ | 0.33W | Philips          | 2322 211 13103   |
| R502          | Resistor                 | 10 kohm $\pm 5\%$  | 0.33W | Philips          | 2322 211 13103   |

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| Symbol | Description                        | Manufact. |                |
|--------|------------------------------------|-----------|----------------|
| R503   | Resistor 100 kohm <u>+5%</u> 0.33W | Philips   | 2322 211 13103 |
| R504   | Resistor 8.2 kohm <u>+5%</u> 0.33W | Philips   | 2322 211 13822 |
| R505   | Resistor 2.7 kohm <u>+5%</u> 0.33W | Philips   | 2322 211 13272 |
| R506   | Resistor 10 kohm <u>+5%</u> 0.33W  | Philips   | 2322 211 13103 |
| R507   | Resistor 8.2 kohm <u>+5%</u> 0.33W | Philips   | 2322 211 13822 |
| R508   | Resistor 2.7 kohm <u>+5%</u> 0.33W | Philips   | 2322 211 13272 |
| R509   | Resistor 10 kohm <u>+5%</u> 0.33W  | Philips   | 2322 211 13103 |
| R510   | Resistor 8.2 kohm <u>+5%</u> 0.33W | Philips   | 2322 211 13822 |
| R511   | Resistor 2.7 kohm <u>+5%</u> 0.33W | Philips   | 2322 211 13272 |
| R512   | Resistor 10 kohm <u>+5%</u> 0.33W  | Philips   | 2322 211 13103 |
| R513   | Resistor 8.2 kohm <u>+5%</u> 0.33W | Philips   | 2322 211 13822 |
| R514   | Resistor 2.7 kohm <u>+5%</u> 0.33W | Philips   | 2322 211 13272 |
| R515   | Resistor 10 kohm <u>+5%</u> 0.33W  | Philips   | 2322 211 13103 |
| R516   | Resistor 10 kohm <u>+5%</u> 0.33W  | Philips   | 2322 211 13103 |
| R517   | Resistor 10 kohm <u>+5%</u> 0.33W  | Philips   | 2322 211 13103 |
| R518   | Resistor 10 kohm <u>+5%</u> 0.33W  | Philips   | 2322 211 13103 |
| R519   | Resistor 10 kohm <u>+5%</u> 0.33W  | Philips   | 2322 211 13103 |
| R520   | Resistor 8.2 kohm <u>+5%</u> 0.33W | Philips   | 2322 211 13822 |
| R521   | Resistor 2.7 kohm <u>+5%</u> 0.33W | Philips   | 2322 211 13272 |
| R522   | Resistor 10 kohm <u>+5%</u> 0.33W  | Philips   | 2322 211 13103 |
| R523   | Resistor 8.2 kohm <u>+5%</u> 0.33W | Philips   | 2322 211 13822 |
| R524   | Resistor 820 ohm <u>+5%</u> 0.5W   | Philips   | 2322 212 13821 |
| R525   | Resistor 1 kohm <u>+5%</u> 0.33W   | Philips   | 2322 211 13102 |
| R526   | Resistor 8.2 kohm <u>+5%</u> 0.33W | Philips   | 2322 211 13822 |
| R527   | Resistor 2.7 kohm <u>+5%</u> 0.33W | Philips   | 2322 211 13272 |
| R528   | Resistor 10 kohm <u>+5%</u> 0.33W  | Philips   | 2322 211 13103 |
| R529   | Resistor 8.2 kohm <u>+5%</u> 0.33W | Philips   | 2322 211 13822 |
| R530   | Resistor 820 ohm <u>+5%</u> 0.5W   | Philips   | 2322 212 13821 |
| R531   | Resistor 1 kohm <u>+5%</u> 0.33W   | Philips   | 2322 211 13102 |
| R532   | Resistor 8.2 kohm <u>+5%</u> 0.33W | Philips   | 2322 211 13822 |
| R533   | Resistor 2.7 kohm <u>+5%</u> 0.33W | Philips   | 2322 211 13272 |
| R534   | Resistor 10 kohm <u>+5%</u> 0.33W  | Philips   | 2322 211 13103 |
| R535   | Resistor 8.2 kohm <u>+5%</u> 0.33W | Philips   | 2322 211 13822 |
| R536   | Resistor 2.7 kohm <u>+5%</u> 0.33W | Philips   | 2322 211 13272 |
| R537   | Resistor 10 kohm <u>+5%</u> 0.33W  | Philips   | 2322 211 13103 |
| R538   | Resistor 8.2 kohm <u>+5%</u> 0.33W | Philips   | 2322 211 13822 |
| R539   | Resistor 2.7 kohm <u>+5%</u> 0.33W | Philips   | 2322 211 13272 |
| R540   | Resistor 10 kohm <u>+5%</u> 0.33W  | Philips   | 2322 211 13103 |
| R541   | Resistor 1 kohm <u>+5%</u> 0.33W   | Philips   | 2322 211 13102 |
| R542   | Resistor 10 kohm <u>+5%</u> 0.33W  | Philips   | 2322 211 13103 |

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## TUNER CONTROL UNIT T1130

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| <i>Symbol</i> | <i>Description</i>                | <i>Manufact.</i> |                        |
|---------------|-----------------------------------|------------------|------------------------|
| R543          | Resistor 100 ohm $\pm 5\%$ 0.33W  | Philips          | 2322 211 13101         |
| R544          | Resistor 10 kohm $\pm 5\%$ 0.125W | ITT              | UR 8 10 kohm $\pm 5\%$ |
| R545          | Resistor 10 kohm 0.125W           | ITT              | UR 8 10 kohm $\pm 5\%$ |
| R546          | Resistor 10 kohm $\pm 5\%$ 0.125W | ITT              | UR 8 10 kohm $\pm 5\%$ |
| R547          | Resistor 10 kohm $\pm 5\%$ 0.125W | ITT              | UR 8 10 kohm $\pm 5\%$ |
| R548          | Resistor 10 kohm $\pm 5\%$ 0.125W | ITT              | UR 8 10 kohm $\pm 5\%$ |
| R549          | Resistor 10 kohm $\pm 5\%$ 0.125W | ITT              | UR 8 10 kohm $\pm 5\%$ |
| R550          | Resistor 10 kohm $\pm 5\%$ 0.125W | ITT              | UR 8 10 kohm $\pm 5\%$ |
| R551          | Resistor 10 kohm $\pm 5\%$ 0.125W | ITT              | UR 8 10 kohm $\pm 5\%$ |
| R552          | Resistor 33 kohm $\pm 5\%$ 0.33W  | Philips          | 2322 211 13333         |
| R553          | Resistor 3.3 kohm $\pm 5\%$ 0.33W | Philips          | 2322 211 13332         |
| R554          | Resistor 100 ohm $\pm 5\%$ 0.33W  | Philips          | 2322 211 13101         |
| R555          | Resistor 1 kohm $\pm 5\%$ 0.33W   | Philips          | 2322 211 13102         |
| R556          | Resistor 390 ohm $\pm 5\%$ 0.33W  | Philips          | 2322 211 13391         |
| R557          | Resistor 1 kohm $\pm 5\%$ 0.33W   | Philips          | 2322 211 13102         |
| R558          | Resistor 2.7 kohm $\pm 5\%$ 0.33W | Philips          | 2322 211 13272         |
| R559          | Resistor 560 kohm $\pm 5\%$ 0.33W | Philips          | 2322 211 13561         |
| R560          | Resistor 10 kohm $\pm 5\%$ 0.33W  | Philips          | 2322 211 13103         |
| R561          | Resistor 1 kohm $\pm 5\%$ 0.33W   | Philips          | 2322 211 13102         |
| R562          | Resistor 47 ohm $\pm 5\%$ 0.33W   | Philips          | 2322 211 13479         |
| R563          | Resistor 10 kohm $\pm 5\%$ 0.33W  | Philips          | 2322 211 13103         |
| R564          | Resistor 390 ohm $\pm 5\%$ 0.33W  | Philips          | 2322 211 13391         |
| R565          | Resistor 1 kohm $\pm 5\%$ 0.33W   | Philips          | 2223 211 13102         |
| S501          | Switch, 16 pos.                   | AB               | 235-H                  |
| S502          | Switch, 16 pos.                   | AB               | 235-H                  |
| T501          | Transistor                        | Philips          | BC548                  |
| T502          | Transistor                        | Philips          | BC548                  |
| T503          | Transistor                        | Philips          | BC327                  |
| T504          | Transistor                        | Philips          | BC548                  |
| T505          | Transistor                        | Philips          | BC327                  |
| T506          | Transistor                        | Philips          | BC548                  |
| T507          | Transistor                        | Philips          | BC327                  |
| T508          | Transistor                        | Philips          | BC548                  |
| T509          | Transistor                        | Philips          | BC327                  |
| T510          | Transistor                        | Philips          | BC548                  |
| T511          | Transistor                        | Philips          | BC327                  |
| T512          | Transistor                        | Philips          | BC548                  |
| T513          | Transistor                        | Philips          | BC327                  |
| T514          | Transistor                        | Philips          | BC548                  |

MODULE NO: 500

b TUNER CONTROL UNIT T1130 4/4

| <i>Symbol</i> | <i>Description</i> | <i>Manufact.</i> |         |
|---------------|--------------------|------------------|---------|
| T515          | Transistor         | Philips          | BC327   |
| T516          | Transistor         | Philips          | BC548   |
| T517          | Transistor         | Philips          | BC327   |
| T518          | Transistor         | Philips          | BC548   |
| T519          | Transistor         | Philips          | BC327   |
| T520          | Transistor         | Philips          | BC548   |
| T521          | Transistor         | Philips          | BC327   |
| T522          | Transistor         | Philips          | BC548   |
| T523          | Transistor         | Philips          | BC327   |
| T524          | Transistor         | Philips          | BC558   |
| T525          | Transistor         | Philips          | BC548   |
| T526          | Transistor         | Philips          | BC558   |
| T527          | Transistor         | Philips          | BC548   |
| B501          | Battery, lithium   | TADIRAN          | TL-2150 |

| a             | LP-FILTER 1.6 - 2.2 MHz T1130 |         | 1/1              |
|---------------|-------------------------------|---------|------------------|
| <i>Symbol</i> | <i>Description</i>            |         | <i>Manufact.</i> |
| C601          | Capacitor, Mica               | 267 pF  | S.P.             |
| C602          | Capacitor, Mica               | 365 pF  | S.P.             |
| C603          | Capacitor, Mica               | 1.96 nF | S.P.             |
| C604          | Capacitor, Mica               | 2.17 nF | S.P.             |
| C605          | Capacitor, Mica               | 1.96 nF | S.P.             |
| L601          | Inductor                      | 2.14 uH | S.P.             |
| L602          | Inductor                      | 1.46 uH | S.P.             |
| L603          | Inductor                      | 4.07 uH | S.P.             |
| L604          | Inductor                      | 7.22 uH | S.P.             |
| L605          | Inductor                      | 7.22 uH | S.P.             |
| L606          | Inductor                      | 4.07 uH | S.P.             |

MODULE NO: 700

a LP-FILTER 2.2 - 3.1 MHz T1130 1/1

| <i>Symbol</i> | <i>Description</i>       | <i>Manufact.</i> |
|---------------|--------------------------|------------------|
| C701          | Capacitor, Mica 194 pF   | S.P.             |
| C702          | Capacitor, Mica 266 pF   | S.P.             |
| C703          | Capacitor, Mica 1.39 nF  | S.P.             |
| C704          | Capacitor, Mica 1.145 nF | S.P.             |
| C705          | Capacitor, Mica 1.39 nF  | S.P.             |
| L701          | Inductor 1.56 uH         | S.P.             |
| L702          | Inductor 1.06 uH         | S.P.             |
| L703          | Inductor 2.89 uH         | S.P.             |
| L704          | Inductor 5.12 uH         | S.P.             |
| L705          | Inductor 5.12 uH         | S.P.             |
| L706          | Inductor 2.89 uH         | S.P.             |

a LP-FILTER 3.1 - 4.3 MHz T1130 1/1

| <i>Symbol</i> | <i>Description</i>      | <i>Manufact.</i> |
|---------------|-------------------------|------------------|
| C801          | Capacitor, Mica 138 pF  | S.P.             |
| C802          | Capacitor, Mica 188 pF  | S.P.             |
| C803          | Capacitor, Mica 1.00 nF | S.P.             |
| C804          | Capacitor, Mica 1.10 nF | S.P.             |
| C805          | Capacitor, Mica 1.00 nF | S.P.             |
| L801          | Inductor 1.11 uH        | S.P.             |
| L802          | Inductor 755 nH         | S.P.             |
| L803          | Inductor 2.09 uH        | S.P.             |
| L804          | Inductor 3.70 uH        | S.P.             |
| L805          | Inductor 3.70 uH        | S.P.             |
| L806          | Inductor 2.09 uH        | S.P.             |

MODULE NO: 900

a LP-FILTER 4.3 - 8.5 MHz T1130 1/1

| <i>Symbol</i> | <i>Description</i>      | <i>Manufact.</i> |
|---------------|-------------------------|------------------|
| C901          | Capacitor, Mica 99.1 pF | S.P.             |
| C902          | Capacitor, Mica 136 pF  | S.P.             |
| C903          | Capacitor, Mica 508 pF  | S.P.             |
| C904          | Capacitor, Mica 536 pF  | S.P.             |
| C905          | Capacitor, Mica 508 pF  | S.P.             |
| L901          | Inductor 798 nH         | S.P.             |
| L902          | Inductor 545 nH         | S.P.             |
| L903          | Inductor 1.06 uH        | S.P.             |
| L904          | Inductor 1.87 uH        | S.P.             |
| L905          | Inductor 1.87 uH        | S.P.             |
| L906          | Inductor 1.06 uH        | S.P.             |

a

LP-FILTER 8.5 - 16.9 MHz T1130

1/1

| <i>Symbol</i> | <i>Description</i>      | <i>Manufact.</i> |  |
|---------------|-------------------------|------------------|--|
| C1001         | Capacitor, Mica 50.2 pF | S.P.             |  |
| C1002         | Capacitor, Mica 68.7 pF | S.P.             |  |
| C1003         | Capacitor, Mica 255 pF  | S.P.             |  |
| C1004         | Capacitor, Mica 282 pF  | S.P.             |  |
| C1005         | Capacitor, Mica 255 pF  | S.P.             |  |
| L1001         | Inductor 404 nH         | S.P.             |  |
| L1002         | Inductor 275 nH         | S.P.             |  |
| L1003         | Inductor 530 nH         | S.P.             |  |
| L1004         | Inductor 940 nH         | S.P.             |  |
| L1005         | Inductor 940 nH         | S.P.             |  |
| L1006         | Inductor 530 nH         | S.P.             |  |

MODULE NO: 1100

a

LP-FILTER 16.9 - 28 MHz T1130

1/1

| <i>Symbol</i> | <i>Description</i>      | <i>Manufact.</i> |
|---------------|-------------------------|------------------|
| C1101         | Capacitor, Mica 26.7 pF | S.P.             |
| C1102         | Capacitor, Mica 36.5 pF | S.P.             |
| C1103         | Capacitor, Mica 147 pF  | S.P.             |
| C1104         | Capacitor, Mica 163 pF  | S.P.             |
| C1105         | Capacitor, Mica 147 pF  | S.P.             |
| L1101         | Inductor 214 nH         | S.P.             |
| L1102         | Inductor 146 nH         | S.P.             |
| L1103         | Inductor 305 nH         | S.P.             |
| L1104         | Inductor 542 nH         | S.P.             |
| L1105         | Inductor 542 nH         | S.P.             |
| L1106         | Inductor 305 nH         | S.P.             |

| a      |                        | P.A. UNIT T1130  |      |           | 1/4               |  |
|--------|------------------------|------------------|------|-----------|-------------------|--|
| Symbol | Description            |                  |      | Manufact. |                   |  |
| C1201  | Capacitor polyester    | 100 nF           | 100V | ERO       | MKT1822-410-01    |  |
| C1202  | Capacitor electrolytic | 1 uF             | 50V  | ROE       | EKI 00AA 110H     |  |
| C1203  | Capacitor electrolytic | 1 uF             | 50V  | ROE       | EKI 00AA 110H     |  |
| C1204  | Capacitor polyester    | 100 nF           | 100V | ERO       | MKT1822-410-01    |  |
| C1205  | Capacitor polyester    | 100 nF           | 100V | ERO       | MKT1822-410-01    |  |
| C1206  | Capacitor polyester    | 100 nF           | 100V | ERO       | MKT1822-410-01    |  |
| C1207  | Capacitor ceramic      | 150 pF 10%       | 25V  | FerropERM | 9/0116.8          |  |
| C1208  | Capacitor polyester    | 100 nF           | 100V | ERO       | MKT1822-410-01    |  |
| C1209  | Capacitor polyester    | 100 nF           | 100V | ERO       | MKT1822-410-01    |  |
| C1210  | Capacitor polyester    | 100 nF           | 100V | Siemens   | B32510-D1104-K    |  |
| C1211  | Capacitor polyester    | 100 nF           | 100V | ERO       | MKT1822-410-01    |  |
| C1212  | Capacitor polyester    | 100 nF           | 100V | ERO       | MKT1822-410-01    |  |
| C1213  | Capacitor polyester    | 100 nF           | 100V | ERO       | MKT1822-410-01    |  |
| C1214  | Capacitor polypropylen | 560 pF           | 630V | Philips   | 2222 458 65601    |  |
| C1215  | Capacitor polypropylen | 1100 pF          | 630V | Philips   | 2222 458 61102    |  |
| C1216  | Capacitor polypropylen | 1100 pF          | 630V | Philips   | 2222 458 61102    |  |
| C1217  | Capacitor electrolytic | 100 uF           | 16V  | ROE       | EKM 00CC 310D     |  |
| C1218  | Capacitor electrolytic | 100 uF           | 16V  | ROE       | EKM 00CC 310D     |  |
| C1219  | Capacitor polyester    | 100 nF           | 100V | ERO       | MKT1822-410-01    |  |
| C1220  | Capacitor polyester    | 100 nF           | 100V | ERO       | MKT1822-410-01    |  |
| C1221  | Capacitor polyester    | 100 nF           | 100V | ERO       | MKT1822-410-01    |  |
| C1222  | Capacitor polyester    | 100 nF           | 100V | ERO       | MKT1822-410-01    |  |
| C1223  | Capacitor polyester    | 100 nF           | 100V | ERO       | MKT1822-410-01    |  |
| C1224  | Capacitor polyester    | 100 nF           | 100V | ERO       | MKT1822-410-01    |  |
| C1225  | Capacitor polyester    | 100 nF           | 100V | ERO       | MKT1822-410-01    |  |
| C1226  | Capacitor polyester    | 100 nF           | 100V | ERO       | MKT1822-410-01    |  |
| C1227  | Capacitor polypropylen | 33 nF 10%        | 250V | ERO       | MKP1841-333-25-5  |  |
| C1228  | Capacitor polypropylen | 33 nF 10%        | 250V | ERO       | MKP1841-333-25-5  |  |
| C1229  | Capacitor polypropylen | 100 pF           | 630V | Philips   | 2222 458 61001    |  |
| C1230  | Capacitor polyester    | 100 nF           | 100V | ERO       | MKT1822-410-01    |  |
| C1231  | Capacitor electrolytic | 470 uF           | 10V  | ROE       | EB00 GC 347C      |  |
| C1232  | Capacitor mica         | 2.4 nF 10%       | 250V | JAHRE     | 49.54/2400/10/250 |  |
| C1233  | Capacitor mica         | 2.4 nF 10%       | 250V | JAHRE     | 49.54/2400/10/250 |  |
| C1234  | Capacitor mica         | 2.4 nF 10%       | 250V | JAHRE     | 49.54/2400/10/250 |  |
| C1235  | Capacitor              | Factory selected |      |           |                   |  |
| C1236  | Capacitor polyester    | 100 nF           | 100V | ERO       | MKT1822-410-01    |  |
| C1237  | Capacitor polyester    | 100 nF           | 100V | ERO       | MKT1822-410-01    |  |
| C1238  | Capacitor polypropylen | 100 nF 10%       | 100V | ERO       | MKT1841-410-01    |  |
| C1239  | Capacitor polypropylen | 100 nF 10%       | 100V | ERO       | MKT1841-410-01    |  |
| C1240  | Capacitor polypropylen | 100 nF 10%       | 100V | ERO       | MKT1841-410-01    |  |

MODULE NO: 1200

b.

P.A. UNIT T1130

2/4

| Symbol | Description                            | Manufact. |                    |
|--------|--|-----------|--------------------|
| C1241  | Capacitor polypropylen 100 nF 10% 100V | ERO       | MKT184 1-4 10-01   |
| C1242  | Capacitor polypropylen 100 nF 10% 100V | ERO       | MKT184 1-4 10-01   |
| C1243  | Capacitor polypropylen 100 nF 10% 100V | ERO       | MKT184 1-4 10-01   |
| C1244  | Capacitor mica 270 pF 10% 500V         | JAHRE     | 49.54/270/10/500   |
| C1245  | Capacitor mica 15 nF 10% 100V          | SOSHIN    | DM20C153K1ICR      |
| C1246  | Capacitor mica 15 nF 10% 100V          | SOSHIN    | DM20C153K1ICR      |
| C1247  | Capacitor polypropylen 33 nF 10% 250V  | ERO       | MKP 184 1-333-25-5 |
| C1248  | Capacitor polypropylen 33 nF 10% 250V  | ERO       | MKP 184 1-333-15-5 |
| C1249  | Capacitor polypropylen 33 nF 10% 250V  | ERO       | MKP 184 1-333-15-5 |
| C1250  | Capacitor polypropylen 33 nF 10% 250V  | ERO       | MKP 184 1-333-15-5 |
| C1251  | Capacitor polypropylen 33 nF 10% 250V  | ERO       | MKP 184 1-333-25-5 |
| C1252  | Capacitor polypropylen 33 nF 10% 250V  | ERO       | MKP 184 1-333-25-5 |
| C1253  | Capacitor mica 2.4 nF 10% 250V         | JAHRE     | 49.54/2400/10/250  |
| C1254  | Capacitor mica 2.4 nF 10% 250V         | JAHRE     | 49.54/2400/10/250  |
| C1255  | Capacitor electrolytic 1 uF 50V        | ROE       | EKIOOAA110H        |
| C1256  | Capacitor electrolytic 10 uF 63V       | ROE       | EBOOCA210J         |
| C1257  | Capacitor electrolytic 10 uF 63V       | ROE       | EBOOCA210J         |
| C1258  | Capacitor electrolytic 470 uF 40V      | ROE       | EBOOHE347G         |
| R1201  | Resistor 180 ohm 5% 0.33W              | Philips   | 2322 211 13181     |
| R1202  | Resistor 10 ohm 5% 0.33W               | Philips   | 2322 211 13109     |
| R1203  | Resistor 680 ohm 5% 0.33W              | Philips   | 2322 211 13681     |
| R1204  | Resistor 680 ohm 5% 0.33W              | Philips   | 2322 211 13681     |
| R1205  | Resistor 820 ohm 5% 0.33W              | Philips   | 2322 211 13821     |
| R1206  | Resistor 820 ohm 5% 0.33W              | Philips   | 2322 211 13821     |
| R1207  | Resistor 470 ohm 5% 0.33W              | Philips   | 2322 211 13471     |
| R1208  | Resistor 470 ohm 5% 0.33W              | Philips   | 2322 211 13471     |
| R1209  | Resistor 82 ohm 5% 2.5W                | Philips   | 2322 192 38209     |
| R1210  | Resistor 82 ohm 5% 2.5W                | Philips   | 2322 192 38209     |
| R1211  | Resistor 15 ohm 5% 0.33W               | Philips   | 2322 211 13159     |
| R1212  | Resistor 22 ohm 5% 0.33W               | Philips   | 2322 211 13229     |
| R1213  | Resistor 1.78kohm 1% 0.25W             | Philips   | 2322 150 51782     |
| R1214  | Resistor 2.67kohm 1% 0.25W             | Philips   | 2322 150 52672     |
| R1215  | Resistor 15kohm 5% 0.33W               | Philips   | 2322 211 13153     |
| R1216  | Resistor 1.8kohm 5% 0.33W              | Philips   | 2322 211 13182     |
| R1217  | Resistor 1.8kohm 5% 0.5W               | Philips   | 2322 212 13182     |
| R1218  | Resistor 3.3kohm 5% 0.33W              | Philips   | 2322 211 13332     |
| R1219  | Resistor 10 ohm 5% 0.33W               | Philips   | 2322 211 13109     |
| R1220  | Resistor preset 22 ohm                 | A.B.      | HC10P-22 ohm       |
| R1221  | Resistor 2.2kohm 5% 2.5W               | Philips   | 2322 192 32202     |
| R1222  | Resistor 22 ohm 5% 0.33W               | Philips   | 2322 211 13229     |
| R1224  | Resistor 8.2 ohm 5% 0.33W              | Philips   | 2322 211 13828     |

| b.            |                    | P.A. UNIT T1130 |       |           | 3/4               |  |
|---------------|--------------------|-----------------|-------|-----------|-------------------|--|
| <i>Symbol</i> | <i>Description</i> |                 |       |           | <i>Manufact.</i>  |  |
| R1225         | Resistor           | 8.2 ohm 5%      | 0.33W | Philips   | 2322 211 13828    |  |
| R1226         | Resistor           | 2.2 ohm 5%      | 0.33W | Philips   | 2322 211 13228    |  |
| R1227         | Resistor           | 2.2 ohm 5%      | 0.33W | Philips   | 2322 211 13228    |  |
| R1228         | Resistor           | 18 ohm 5%       | 0.33W | Philips   | 2322 211 13189    |  |
| R1229         | Resistor           | 18 ohm 5%       | 0.33W | Philips   | 2322 211 13189    |  |
| R1230         | Resistor           | 33 ohm 5%       | 0.33W | Philips   | 2322 211 13339    |  |
| R1231         | Resistor           | 33 ohm 5%       | 0.33W | Philips   | 2322 211 13339    |  |
| R1232         | Resistor preset    | 22 ohm 10%      |       | A.B.      | HC 10P 22 ohm     |  |
| R1233         | Resistor           | 560 ohm 5%      | 4W    | Philips   | 2322 330 22561    |  |
| R1234         | Resistor           | 22 ohm 5%       | 0.33W | Philips   | 2322 211 13229    |  |
| R1235         | Resistor           |                 |       |           |                   |  |
| R1236         | Resistor           | 6.8 ohm 5%      | 2.5W  | Philips   | 2322 192 36808    |  |
| R1237         | Resistor           | 6.8 ohm 5%      | 2.5W  | Philips   | 2322 192 36808    |  |
| R1238         | Resistor           | 6.8 ohm 5%      | 2.5W  | Philips   | 2322 192 36808    |  |
| R1239         | Resistor           | 6.8 ohm 5%      | 2.5W  | Philips   | 2322 192 36808    |  |
| R1240         | Resistor           | 2.7 ohm 5%      | 2.5W  | Philips   | 2322 192 32708    |  |
| R1241         | Resistor           | 2.7 ohm 5%      | 2.5W  | Philips   | 2322 192 32708    |  |
| R1242         | Resistor           | 2.7 ohm 5%      | 2.5W  | Philips   | 2322 192 32708    |  |
| R1243         | Resistor           | 2.7 ohm 5%      | 2.5W  | Philips   | 2322 192 32708    |  |
| R1244         | Resistor           | 10 ohm 5%       | 2.5W  | Philips   | 2322 192 31009    |  |
| R1245         | Resistor           | 10 ohm 5%       | 2.5W  | Philips   | 2322 192 31009    |  |
| R1246         | Resistor           | 10 ohm 5%       | 2.5W  | Philips   | 2322 192 31009    |  |
| R1247         | Resistor           | 10 ohm 5%       | 2.5W  | Philips   | 2322 192 31009    |  |
| R1248         | Resistor           | 2.2 ohm 5%      | 0.35W | Philips   | 2322 211 13228    |  |
| RE1201        | Relay              |                 |       | Siemens   | V23100-V4324-C010 |  |
| FP1201        | Ferroxcube bead    |                 |       | Philips   | 4322 020 34400    |  |
| FP1202        | Ferroxcube bead    |                 |       | Philips   | 4322 020 34400    |  |
| FP1203        | Ferroxcube bead    |                 |       | Philips   | 4322 020 34400    |  |
| FP1204        | Ferroxcube bead    |                 |       | Philips   | 4322 020 34400    |  |
| FP1205        | Ferroxcube bead    |                 |       | Philips   | 4322 020 34400    |  |
| FP1206        | Ferroxcube bead    |                 |       | Philips   | 4322 020 34400    |  |
| FP1207        | Ferroxcube bead    |                 |       | Philips   | 4322 020 34400    |  |
| FP1208        | Ferroxcube bead    |                 |       | Philips   | 4322 020 34400    |  |
| L1201         | Coil               | 2.2 uH 10%      |       | Ferroperm | 1582              |  |
| L1202         | Coil               |                 |       | S.P.      | TL067             |  |
| L1203         | Coil               |                 |       | S.P.      | TL067             |  |
| L1204         | Coil               |                 |       | S.P.      | TL067             |  |
| L1205         | Coil               |                 |       | S.P.      | TL067             |  |
| L1206         | Coil               |                 |       | S.P.      | TL067             |  |

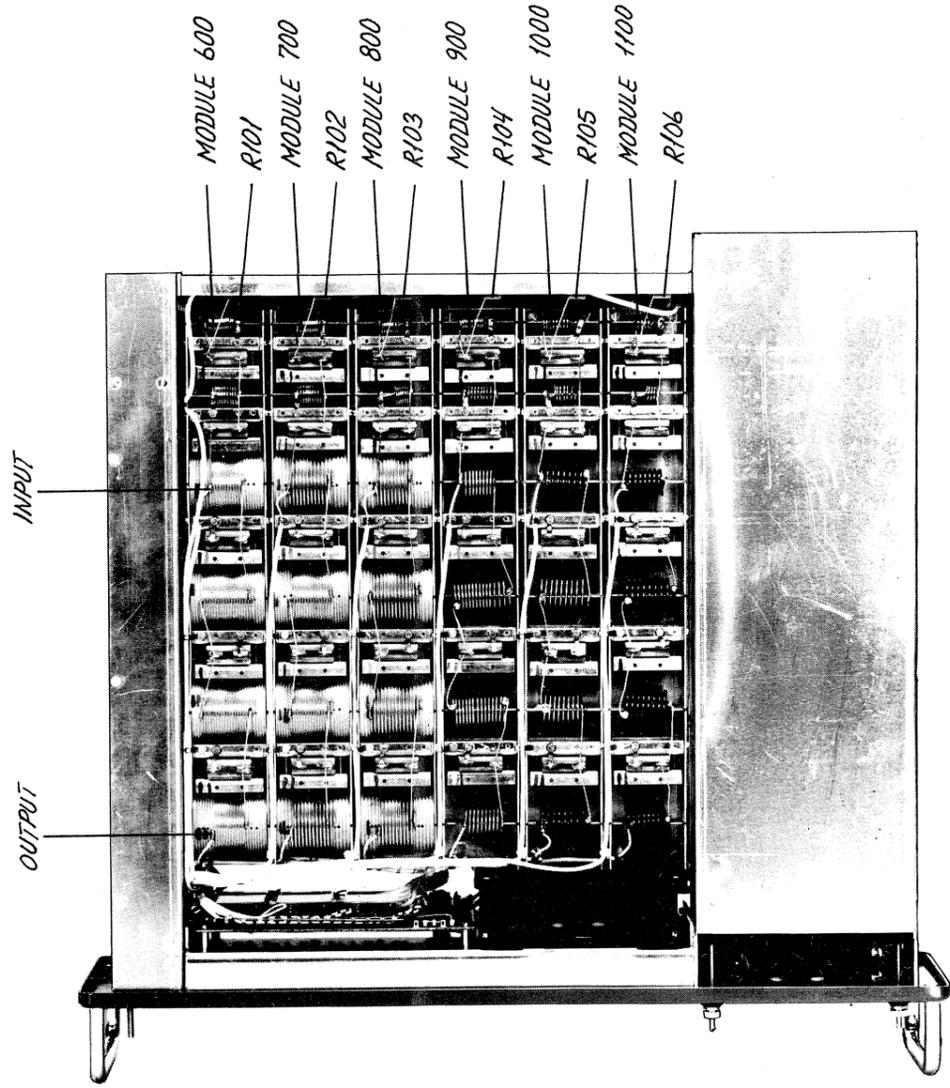
| <i>Symbol</i> | <i>Description</i> | <i>Manufact.</i> |        |
|---------------|--------------------|------------------|--------|
| L1207         | Coil               | S.P.             | TL306  |
| L1208         | Coil               | S.P.             | TL306  |
| L1209         | Coil               | S.P.             | TL305  |
| L1210         | Coil               | S.P.             | TL305  |
| L1211         | Coil               | S.P.             | TL304  |
| L1212         | Coil               | S.P.             | TL304  |
| L1213         | Coil               | S.P.             | TL301  |
| L1214         | Coil               | S.P.             | TL301  |
| TR1201        | Transformer        | S.P.             | TL308  |
| TR1202        | Transformer        | S.P.             | TL307  |
| TR1203        | Transformer        | S.P.             | TL303  |
| TR1204        | Transformer        | S.P.             | TL302  |
| TR1205        | Transformer        | S.P.             | TL300  |
| TR1206        | Transformer        | S.P.             | TL299  |
| T1201         | Transistor         | Motorola         | BC328  |
| T1202         | Transistor         | Motorola         | BC548  |
| T1203         | Transistor         | Motorola         | BC548  |
| T1204         | Transistor         | Motorola         | BC548  |
| T1205         | Transistor         | Motorola         | BC548  |
| T1206         | Transistor         | Motorola         | 2N3553 |
| T1207         | Transistor         | Motorola         | 2N3553 |
| T1208         | Transistor         | Motorola         | 2N5190 |
| T1209         | Transistor         | Motorola         | 2N5190 |
| T1210         |                    |                  |        |
| T1211         |                    |                  |        |
| T1212         | Transistor         | Motorola         | MRF426 |
| T1213         | Transistor         | Motorola         | MRF426 |
| T1214         | Transistor         | Thomson          | TH430  |
| T1215         | Transistor         | Thomson          | TH430  |
| D1201         | Diode              | Philips          | BAV21  |

| a      |                      | TEMPERATURE PROTECTION UNIT T1130 |             | 1/            |                |
|--------|----------------------|-----------------------------------|-------------|---------------|----------------|
| Symbol | Description          |                                   |             | Manufact.     |                |
| C1301  | Capacitor polyester  | 100 nF                            | <u>+10%</u> | Siemens       | B32510-D1104-K |
| C1302  | Capacitor polyester  | 100 nF                            | <u>+10%</u> | Siemens       | B32510-D1104-K |
| C1303  | Capacitor polyester  | 100 nF                            | <u>+10%</u> | Siemens       | B32510-D1104-K |
| C1304  | Capacitor polyester  | 100 nF                            | <u>+10%</u> | Siemens       | B32510-D1104-K |
| R1301  | Resistor             | 18.2 kohm                         | <u>+1%</u>  | 0.4W Philips  | 2322 151 51823 |
| R1302  | Resistor             | 18.2 kohm                         | <u>+1%</u>  | 0.4W Philips  | 2322 151 51823 |
| R1303  | Resistor             | 191 ohm                           | <u>+1%</u>  | 0.4W Philips  | 2322 151 51911 |
| R1304  | Resistor             | 1.65 kohm                         | <u>+1%</u>  | 0.4W Philips  | 2322 151 51652 |
| R1305  | Preset potentiometer | 22 kohm                           | <u>+10%</u> | AB            | HC 10-22k 10%  |
| R1306  | Resistor             | 680 kohm                          | <u>+5%</u>  | 0.33W Philips | 2322 211 13684 |
| R1307  | Resistor             | 680 kohm                          | <u>+5%</u>  | 0.33W Philips | 2322 211 13684 |
| R1308  | Resistor             | 15 kohm                           | <u>+1%</u>  | 0.4W Philips  | 2322 151 51503 |
| R1309  | Resistor             | 33 kohm                           | <u>+5%</u>  | 0.33W Philips | 2322 211 13333 |
| R1310  | Resistor             | 33 kohm                           | <u>+5%</u>  | 0.33W Philips | 2322 211 13333 |
| R1311  | Resistor             | 33 kohm                           | <u>+5%</u>  | 0.33W Philips | 2322 211 13333 |
| R1312  | Resistor             | 33 kohm                           | <u>+5%</u>  | 0.33W Philips | 2322 211 13333 |
| R1313  | Resistor             | 6.8 kohm                          | <u>+5%</u>  | 0.33W Philips | 2322 211 13682 |
| R1314  | Resistor             | 22 ohm                            | <u>+5%</u>  | 0.33W Philips | 2322 211 13229 |
| R1315  | Resistor             | 6.8 kohm                          | <u>+5%</u>  | 0.33W Philips | 2322 211 13682 |
| R1316  | Resistor             | 22 ohm                            | <u>+5%</u>  | 0.33W Philips | 2322 211 13229 |
| R1317  | Resistor             | 22 ohm                            | <u>+5%</u>  | 0.33W Philips | 2322 211 13229 |
| T1301  | Transistor           |                                   |             | Philips       | BC639          |
| T1302  | Transistor           |                                   |             | Philips       | BC639          |
| T1303  | Transistor           |                                   |             | Philips       | BC639          |
| T1304  | Transistor           |                                   |             | Philips       | BC640          |
| T1305  | Transistor           |                                   |             | Philips       | BC639          |
| IC1301 | Integrated circuit   |                                   |             | National      | LM358          |

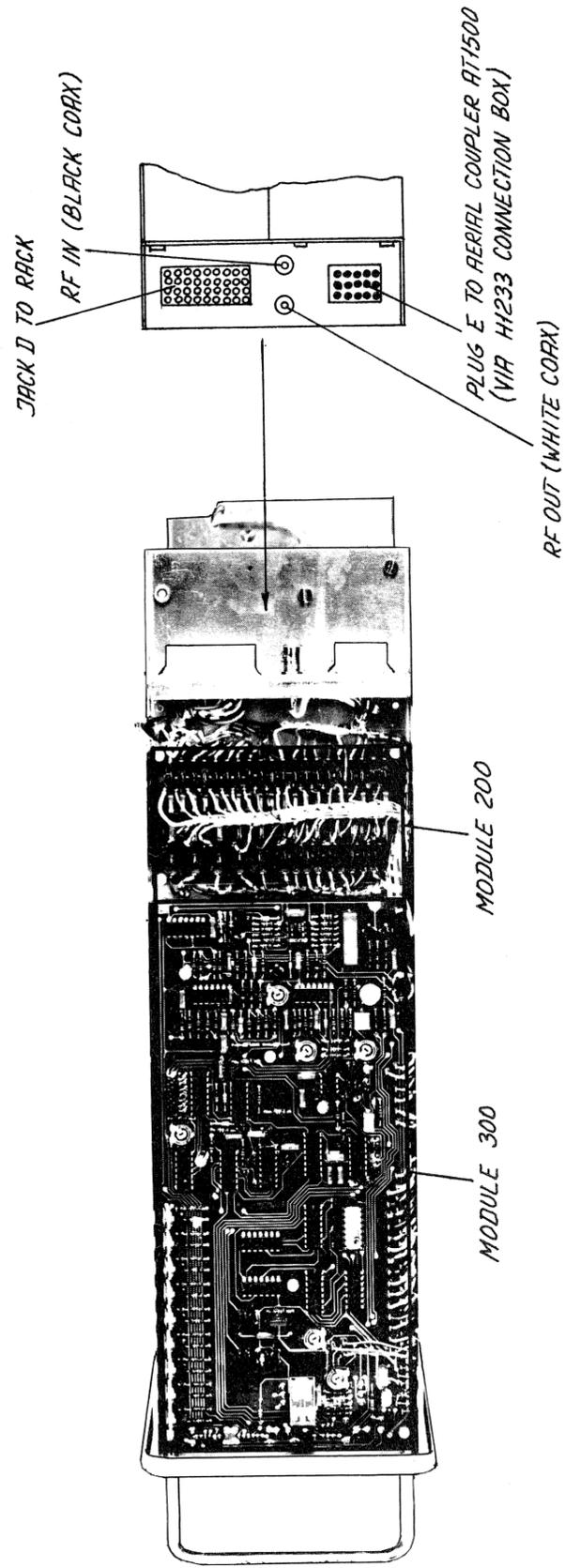


## CIRCUIT DESCRIPTIONS AND SCHEMATIC DIAGRAMS

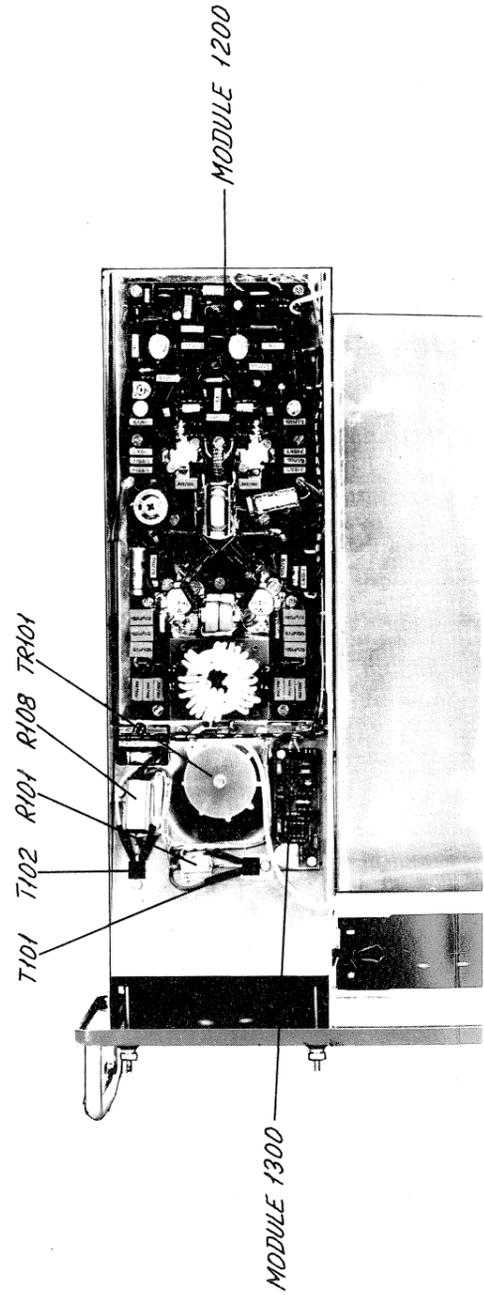




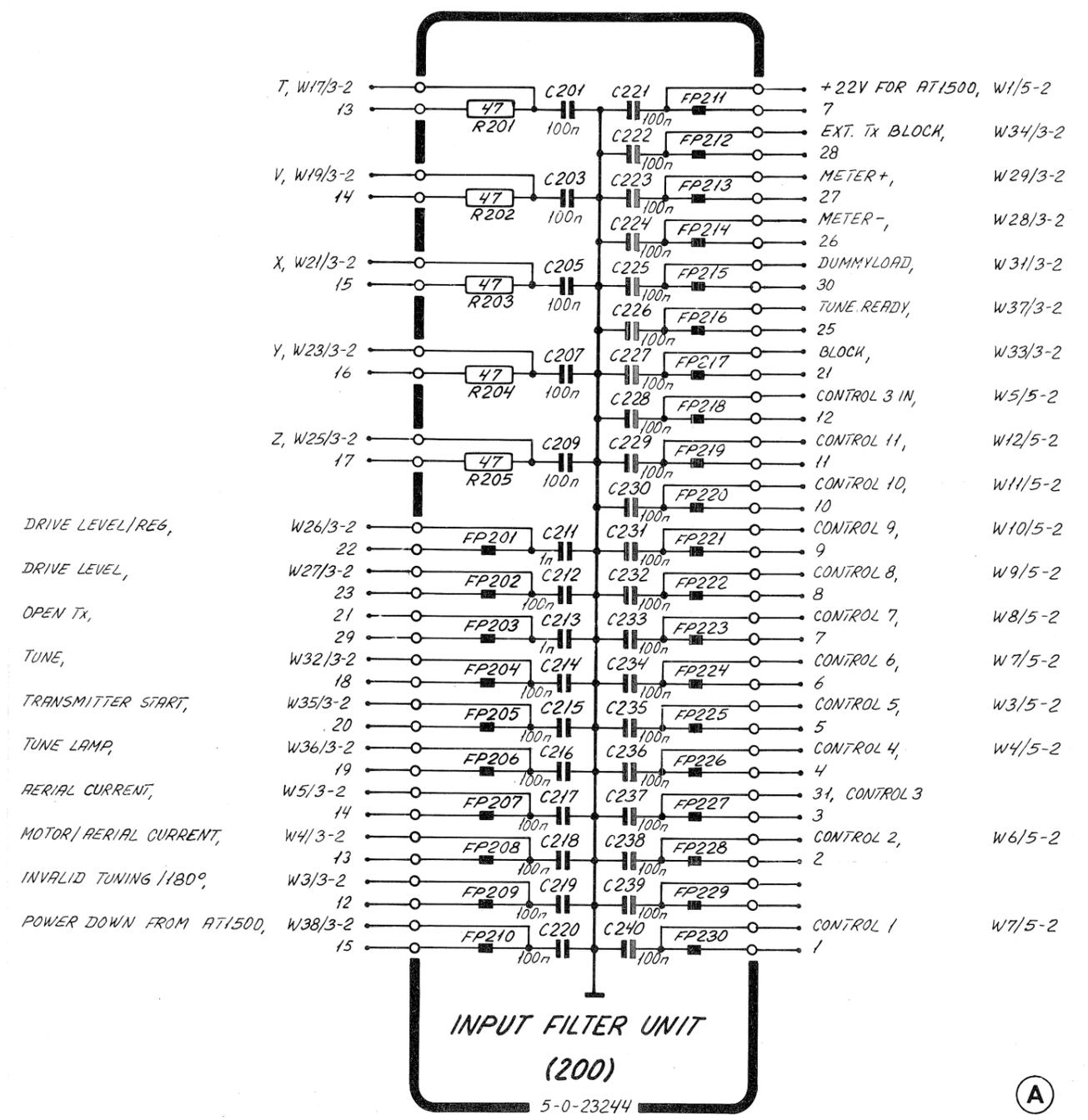
BOTTOM VIEW



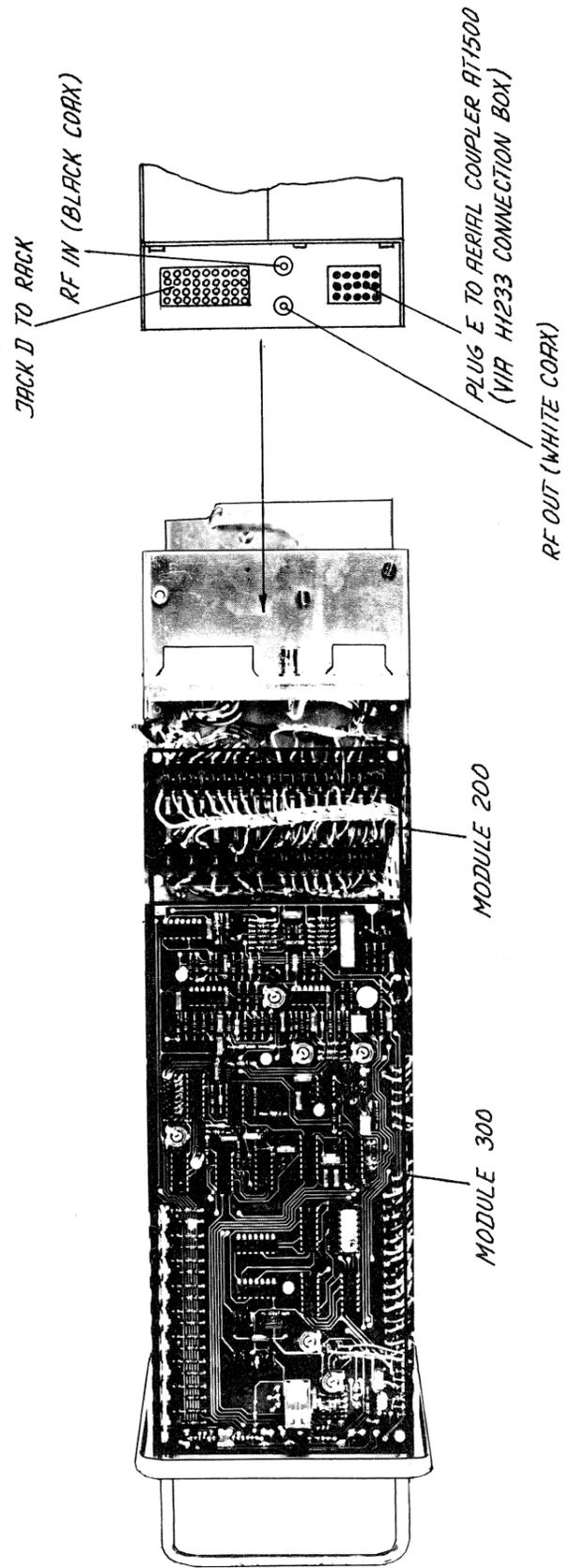
RIGHT SIDE VIEW



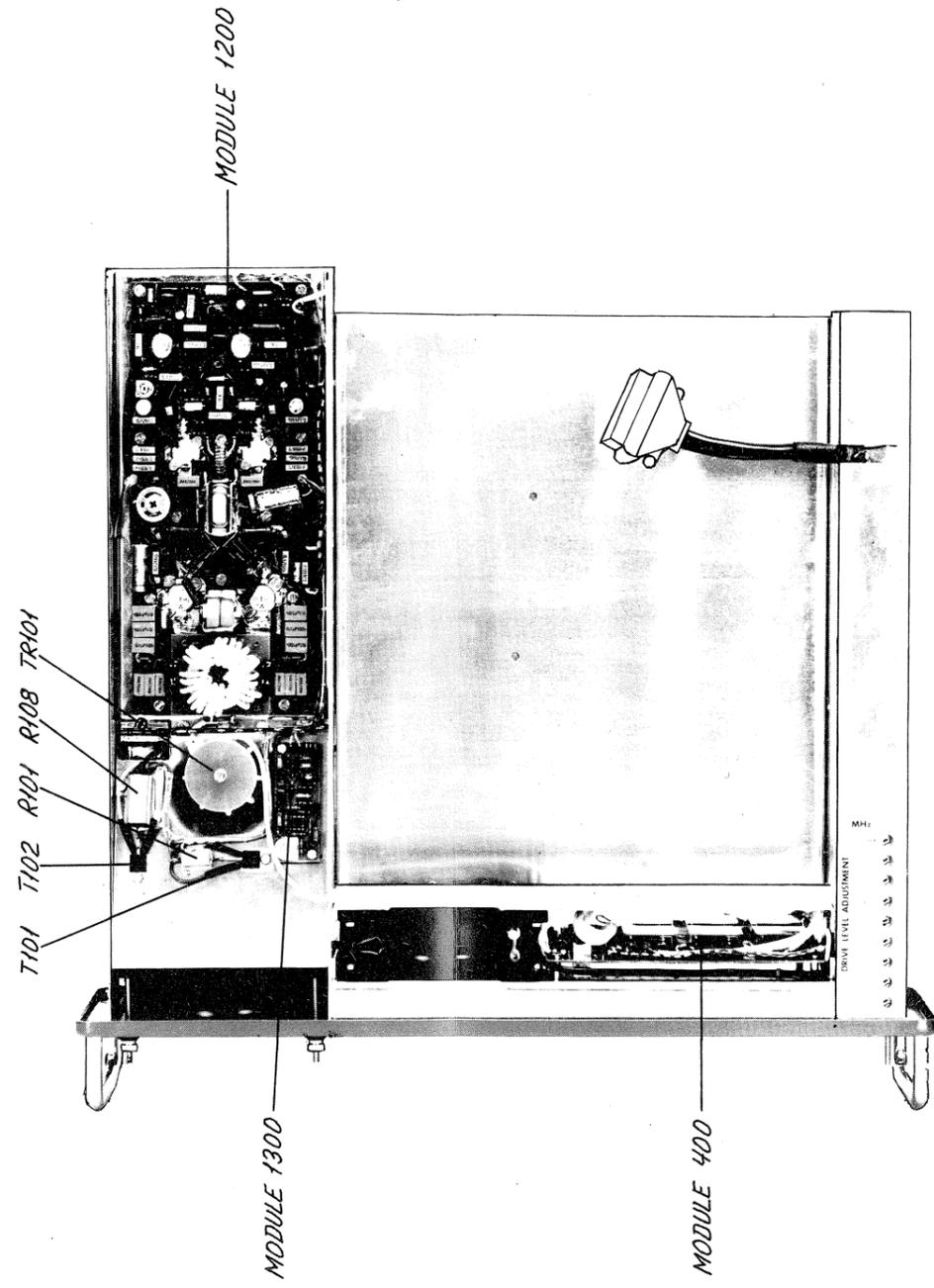
TOP



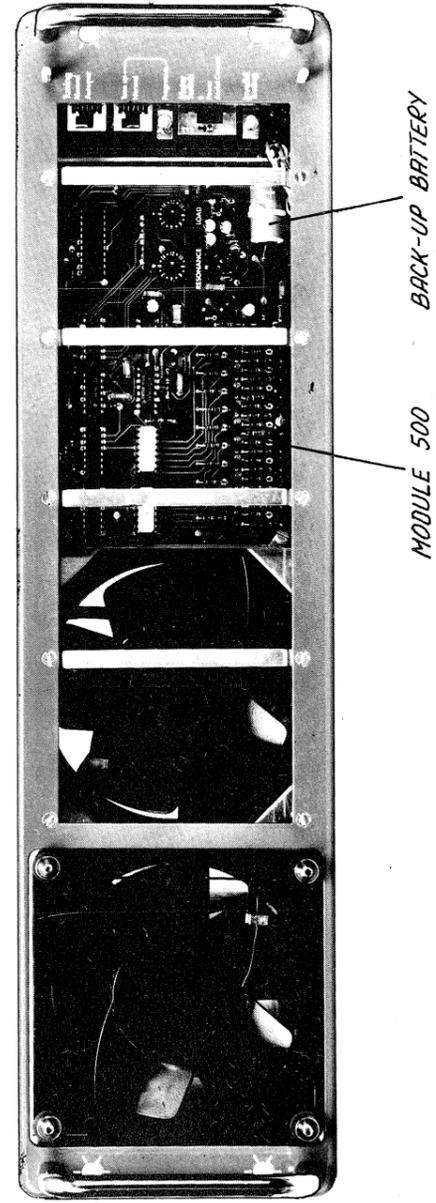
DRIVE LEVEL/RES,  
DRIVE LEVEL,  
OPEN Tx,  
TUNE,  
TRANSMITTER START,  
TUNE LAMP,  
AERIAL CURRENT,  
MOTOR/AERIAL CURRENT,  
INVALID TUNING /180°,  
POWER DOWN FROM AT1500,



RIGHT SIDE VIEW



TOP VIEW



FRONT VIEW

DRIVE

DRIVE

OPEN

TUNE,

TRANS

TUNE

REPAIR

MOTOR

INVAL.

POWER

# CIRCUIT DESCRIPTION TRANSMITTER CONTROL UNIT T1130

The transmitter control unit consists of four circuits:

1. Meter switch S301.
2. Drive level and filter selector.
3. Tune logic.
4. VSWR-calculator, protection circuit.

## 1. METER SWITCH

By means of the meter switch it is possible to switch the aerial current meter between Aerial current, Power, and Standing wave ratio.

The aerial current detector is placed inside the aerial coupler AT1500. The detector gives a d.c. output voltage which is led to the transmitter control unit W4/3-2 and W5/3-2.

The meter sensitivity for small currents is set with R301 and R302, and for higher currents the diode D302 starts to conduct and thus reduces the meter sensitivity.

Power is measured by the directional coupler (400). The output voltage from module 400 is led to W41/3-2 and the meter sensitivity is set by R301a and R399. Full power is set to a meter reading of approx. 3 on the meter. When the output power is zero the voltage on W41/3-2 is 1.5V. In order to get the meter to show zero the diodes D321 and D322 are put in to give a voltage drop of 1.5V.

The standing wave ratio is calculated in the VSWR-calculator and amplified in IC307c.  $VSWR = 1$  gives zero reading on the meter and is adjusted with R318a.  $VSWR = 1$  gives max. reading and is adjusted with R329a. The meter shows zero reading until the output power is more than 20W. This is controlled by the comparator IC311d.

## 2. DRIVE LEVEL AND FILTER SELECTOR

The exciter gives a five bit frequency band code T,V,X,Y,Z. This code is decoded in IC301 into one four bit code and one three bit code. The last output from IC301 gives a block output when T,V,X,Y,Z is either one or zero. The four bit code goes to IC303, which is a 4 to 10 line decoder, selecting one of the nine drive level potentiometers. The three bit code goes to IC302, which is a 4 to 10 line decoder, selecting one of the 6 relays for low-pass filter switching on module 400. For the code see table 1.

### 3. TUNE LOGIC

The Tune logic takes care of controlling the tune sequence and blocking of the power supply to the PA-module.

A tune sequence always starts with a tune signal from the exciter on W32/3-2. The tune signal resets the tune logic and starts up the tune sequence. In the Aerial Coupler AT1500 there are some presettings which are set by the tuner control unit and a variometer controlled by a motor. When tuning, this motor drives the variometer. For every half turn, the variometer takes the same value. If we now look at the VSWR at the output of the power amplifier it will vary and reach the same value every half turn. If now the presettings are set correct, resonance in AT1500 will occur for every half turn and VSWR will have a minimum value. This minimum value is compared with a reference value from the reference counter IC318. On the first full turn it will be VSWR = 1.2; on the next it will be VSWR = 1.5 and so on. When the VSWR measured at the output of the PA-module is less than the reference VSWR from IC318 the tune sequence will stop.

On the next pages you will find the block diagram and a time table showing tune and blocking sequences.

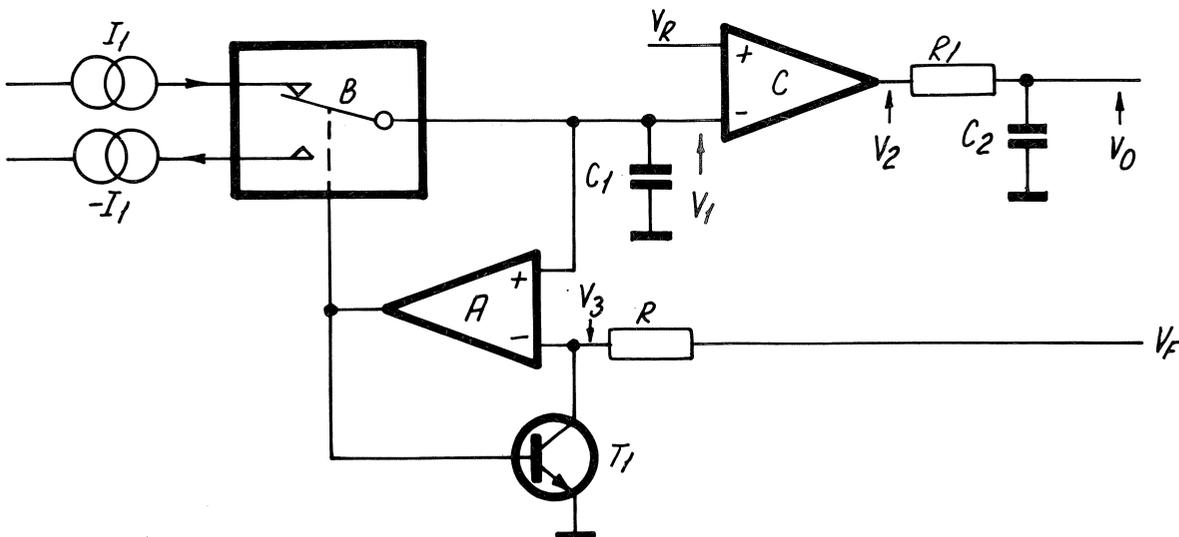
When the transmitter is blocked, the tune lamp on the exciter will wink to indicate that the transmitter is blocked. To cancel the blocking of the transmitter a tune pulse is needed.

When the transmitter, under an automatical tune-up procedure is unable to find a VSWR less than 5, the tune lamp will start to wink. But the transmitter will still be able to transmit with reduced power.

### 4. VSWR-CALCULATOR, PROTECTION CIRCUIT

The VSWR-calculator consists of IC316, IC317, IC311a, IC311b, and T318. Actually it is not calculating the VSWR but it is calculating the reflection coefficient  $\rho = \frac{V_R}{V_F}$ .  $V_R$  = reflected voltage and  $V_F$  = forward voltage from the directional coupler (400).

#### Block Diagram of the Divider

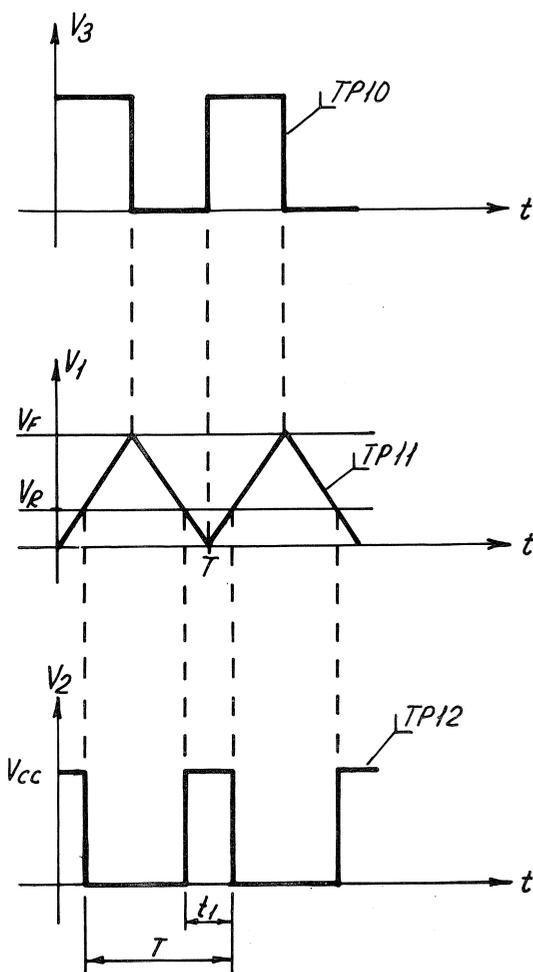


$C_1$  is charged (IC316b, T317) or discharged (IC316a, T316) with a constant current, depending on the position of the analog switch B (IC317) which is controlled by the comparator A. When  $V_1$  is less than  $V_F$ ,  $C_1$  is charged with  $I_1$  until  $V_1 = V_F$  then B switches and  $C_1$  is discharged with  $-I_1$  and T1 is switched on.  $C_1$  is discharging until  $V_1 = 0$ .  $V_1$  is now a triangle wave with a periode time  $T$  depending on  $V_F$ ,  $T = \frac{2 \times V_F \times C}{I_1}$  (see wave forms below).

$V_1$  is compared with  $V_R$  in comparator C (IC311b). The output  $V_2$  has same periode time as  $V_1$  and a pulse with  $t_1$  depending on  $V_R$   $t_1 = \frac{2 \times V_R \times C_1}{C_1}$  (see wave forms below).

$V_2$  is fed into mean value detector  $R_1$  and  $C_2$ . The mean value of  $V_2$  is  $\frac{V_{CC} \times t_1}{T} = V_{CC} \times \frac{V_R}{V_F} = V_0$ .

This means that  $V_0$  is proportional to  $\frac{V_R}{V_F}$ . Below is shown the wave forms with numbers referring to the diagram.



$V_2$  is mean value rectified (R321a, C320) and then fed to the meter amplifier (IC307c). The meter amplifier inverts the mean value, so when  $V_{CC} \times \frac{V_R}{V_F} = 0$  then the output voltage is 13.5V and when  $V_{CC} \times \frac{V_R}{V_F} = V_{CC}$  the output voltage is zero.

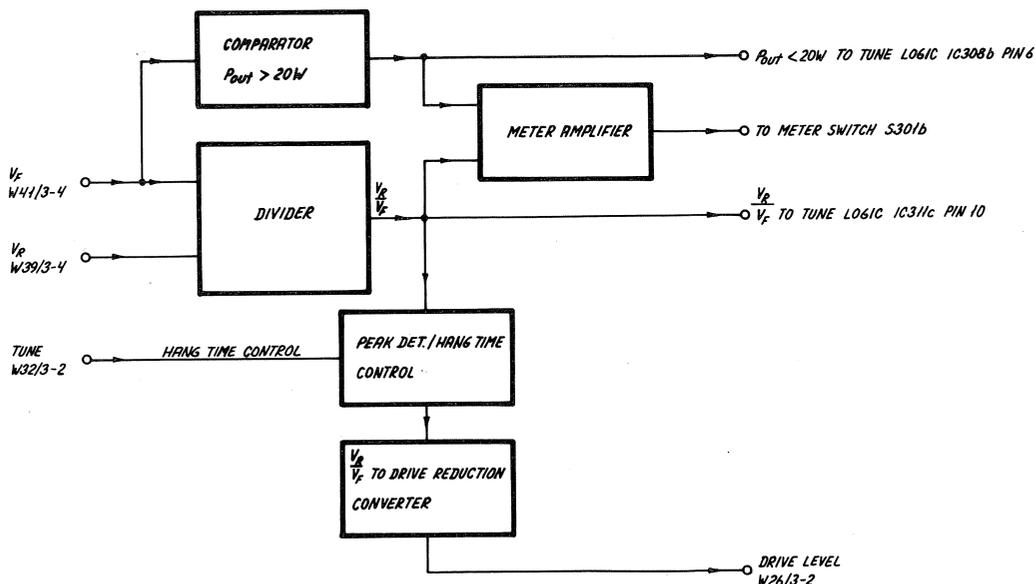
$V_2$  is also mean value rectified by R324a and C321 and fed into a peak value detector (IC307b, T321), the hangtime is controlled by T320, T319. When tuning T320 is off and C323 is determining the hangtime. When no tuning, T320 is on and the hangtime is controlled by C322, giving a long hangtime, so when speaking to the microphone the output voltage of the peak detector is constant.

The output of the peak detector is fed to a voltage to current converter (IC307a, T322). The output of this is connected to the drive level adjusting circuit. When the current floating through T322 is zero the drive level is max. When the current floating through T322 is 23 mA the drive level is reduced approx. 10 dB.

IC311d is a comparator and the output of this is zero, when  $V_F \leq 1.6V \sim P_{out} \leq 20W$ . When  $P > 20W$  the output goes high and thus allows the tuning logic to use the VSWR.

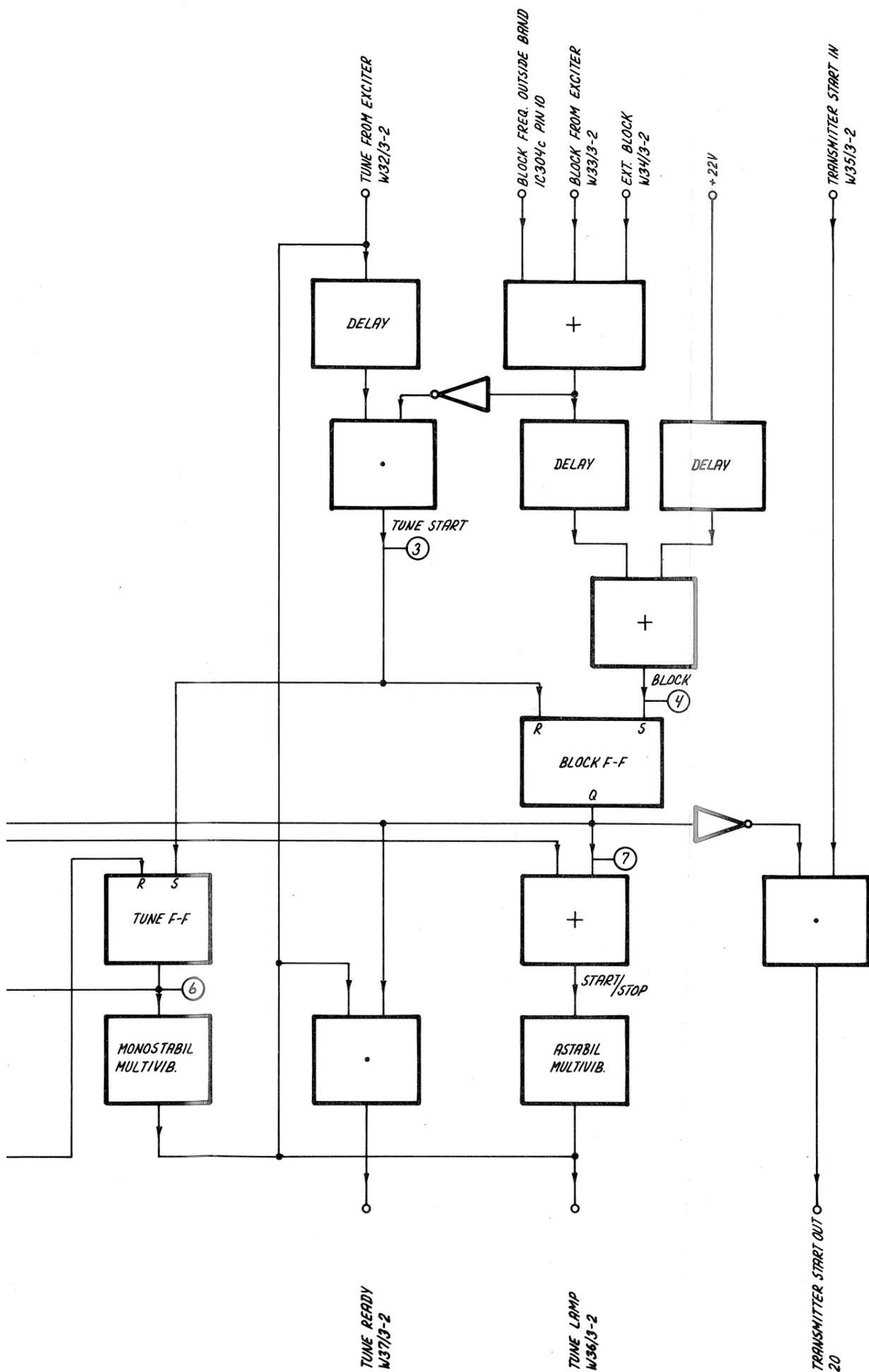
T 1130

**BLOCK DIAGRAM WSWR CALCULATOR**









TIME TABLE FOR TUNING SEQUENCE

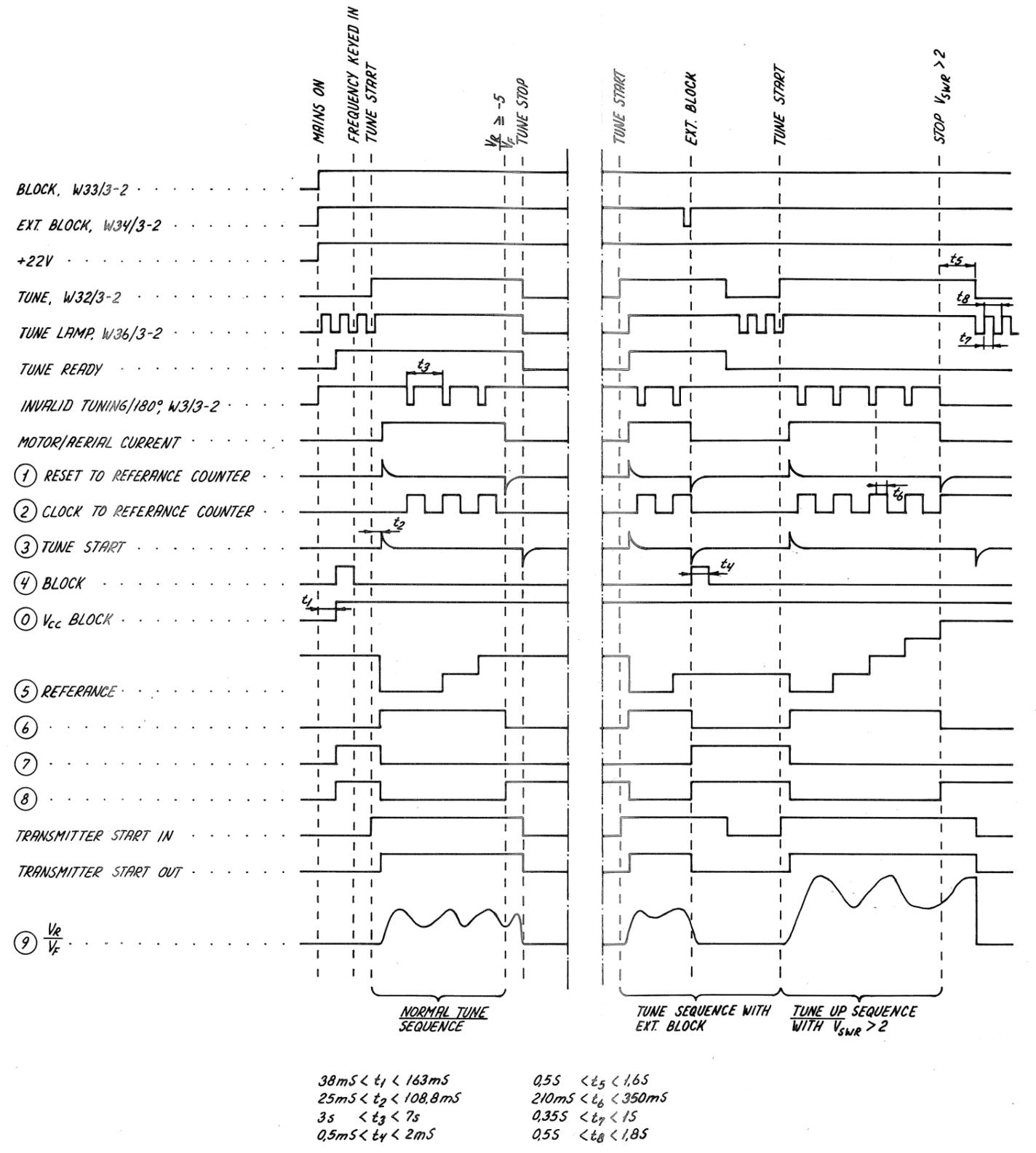
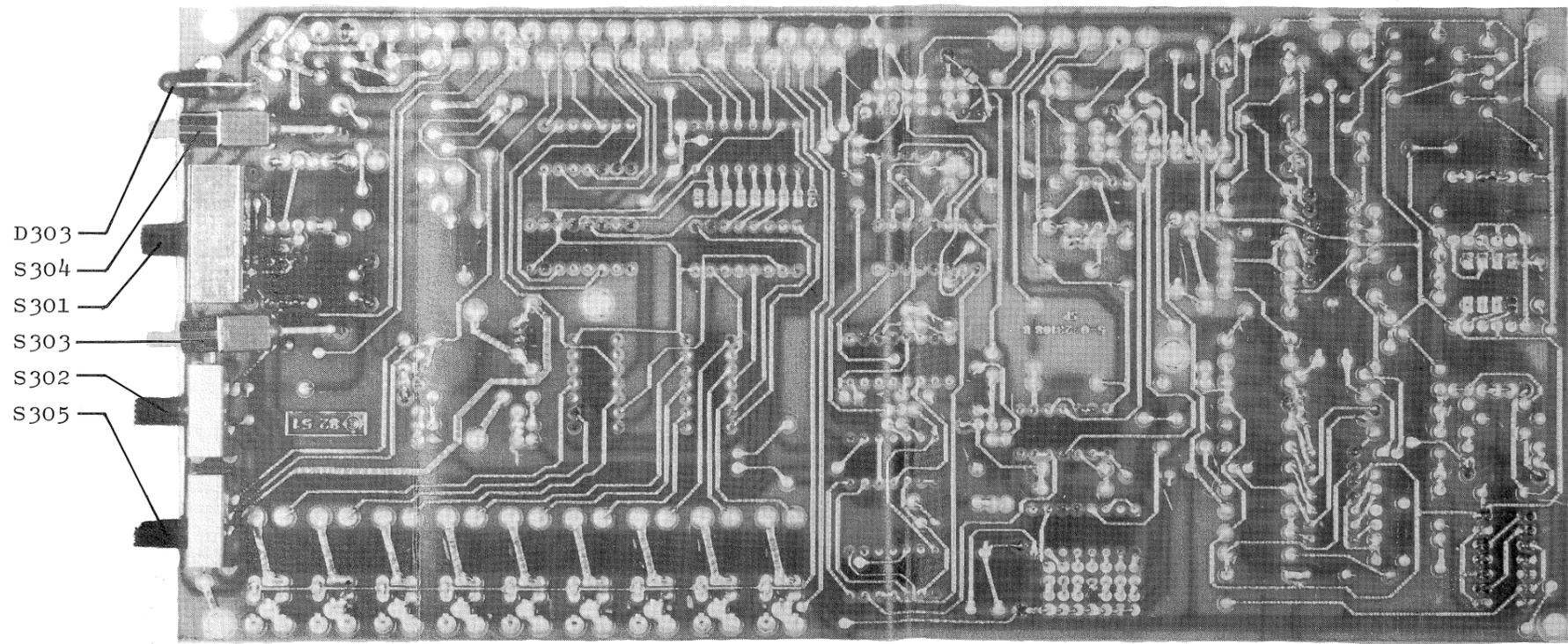
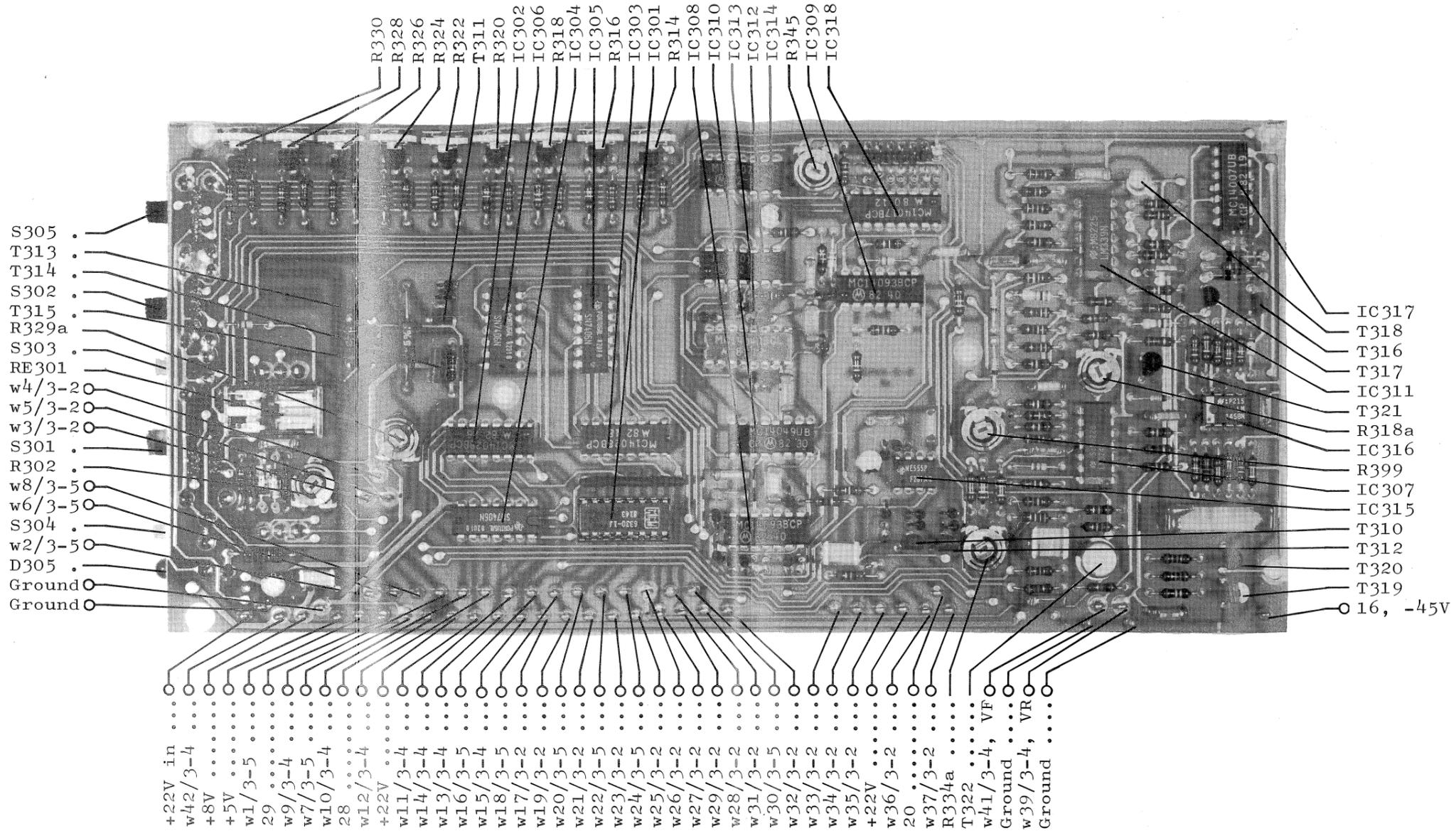




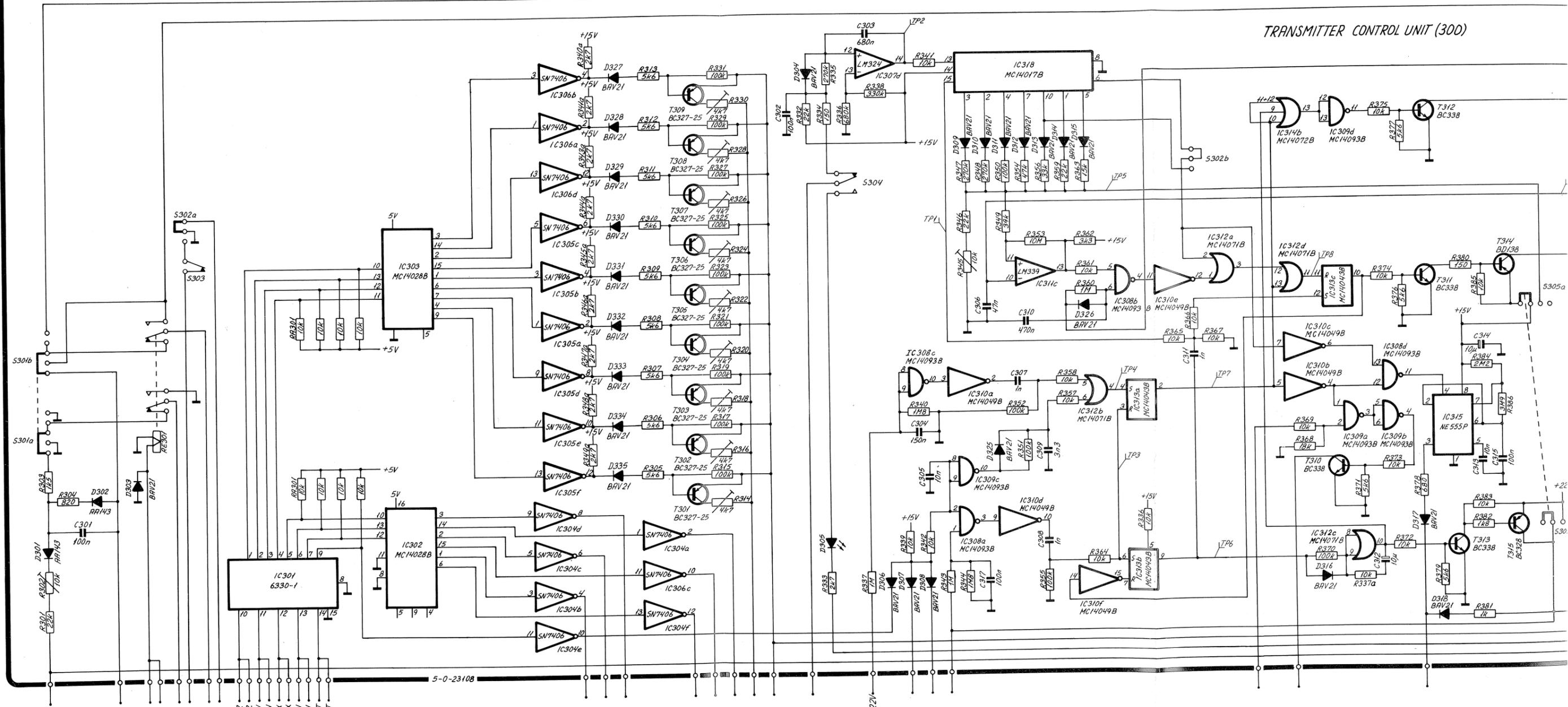
Table 1.

| Frequency MHz | Z Y X V T | Output of IC301 |   |   |   |   |   |   |   | Selected drive level potentiometer | Low-pass Filter |
|---------------|-----------|-----------------|---|---|---|---|---|---|---|------------------------------------|-----------------|
|               |           | 1               | 2 | 3 | 4 | 5 | 6 | 7 | 8 |                                    |                 |
| 1.6 - 1.799   | 1 0 1 1 0 | 0               | 0 | 0 | 0 | 0 | 1 | 1 | 0 | R330                               | 1               |
| 1.8 - 1.999   | 1 0 0 0 1 | 0               | 0 | 0 | 0 | 0 | 1 | 1 | 0 | R330                               | 1               |
| 2.0 - 2.199   | 0 1 0 0 0 | 0               | 0 | 0 | 0 | 0 | 1 | 1 | 0 | R330                               | 1               |
| 2.2 - 2.399   | 0 0 0 0 1 | 0               | 0 | 0 | 0 | 1 | 0 | 1 | 0 | R330                               | 2               |
| 2.4 - 2.599   | 0 0 0 1 1 | 0               | 0 | 0 | 0 | 1 | 0 | 1 | 0 | R330                               | 2               |
| 2.6 - 2.799   | 0 0 1 0 0 | 0               | 0 | 0 | 0 | 1 | 0 | 1 | 0 | R330                               | 2               |
| 2.8 - 2.999   | 0 0 1 0 1 | 0               | 0 | 0 | 0 | 1 | 0 | 1 | 0 | R330                               | 2               |
| 3.0 - 3.099   | 1 0 0 1 0 | 0               | 0 | 0 | 0 | 1 | 0 | 1 | 0 | R330                               | 2               |
| 3.1 - 3.399   | 1 0 0 1 1 | 0               | 0 | 0 | 0 | 0 | 0 | 1 | 0 | R330                               | 3               |
| 3.4 - 3.699   | 1 0 1 0 0 | 0               | 0 | 0 | 0 | 0 | 0 | 1 | 0 | R330                               | 3               |
| 3.7 - 3.999   | 1 0 1 0 1 | 0               | 0 | 0 | 0 | 0 | 0 | 1 | 0 | R330                               | 3               |
| 4.0 - 4.299   | 0 0 1 1 0 | 1               | 0 | 0 | 0 | 0 | 0 | 1 | 0 | R328                               | 3               |
| 4.3 - 4.599   | 0 0 1 1 1 | 1               | 0 | 0 | 0 | 1 | 1 | 0 | 0 | R328                               | 4               |
| 4.6 - 4.999   | 0 0 0 1 0 | 1               | 0 | 0 | 0 | 1 | 1 | 0 | 0 | R328                               | 4               |
| 5.0 - 5.499   | 1 1 0 1 1 | 1               | 0 | 0 | 0 | 1 | 1 | 0 | 0 | R328                               | 4               |
| 5.5 - 5.999   | 1 0 1 1 1 | 1               | 0 | 0 | 0 | 1 | 1 | 0 | 0 | R328                               | 4               |
| 6.0 - 6.399   | 0 1 0 0 1 | 0               | 1 | 0 | 0 | 1 | 1 | 0 | 0 | R326                               | 4               |
| 6.4 - 6.999   | 0 1 0 1 0 | 0               | 1 | 0 | 0 | 1 | 1 | 0 | 0 | R326                               | 4               |
| 7.0 - 7.599   | 1 1 0 0 0 | 1               | 1 | 0 | 0 | 1 | 1 | 0 | 0 | R324                               | 4               |
| 7.6 - 7.999   | 1 1 0 0 1 | 1               | 1 | 0 | 0 | 1 | 1 | 0 | 0 | R324                               | 4               |
| 8.0 - 8.499   | 0 1 0 1 1 | 1               | 1 | 0 | 0 | 1 | 1 | 0 | 0 | R324                               | 4               |
| 12.3 - 12.699 | 0 1 1 0 0 | 0               | 0 | 1 | 0 | 0 | 1 | 0 | 0 | R322                               | 5               |
| 16.4 - 16.899 | 0 1 1 0 1 | 1               | 0 | 1 | 0 | 0 | 1 | 0 | 0 | R320                               | 5               |
| 22.0 - 22.399 | 0 1 1 1 0 | 0               | 1 | 1 | 0 | 1 | 0 | 0 | 0 | R318                               | 6               |
| 25.0 - 25.199 | 1 1 0 1 0 | 1               | 1 | 1 | 0 | 1 | 0 | 0 | 0 | R316                               | 6               |
| 2.182 Fixed   | 1 0 0 0 0 | 0               | 0 | 0 | 0 | 0 | 1 | 1 | 0 | R330                               | 1               |
| Block         | 0 0 0 0 0 | 1               | 1 | 1 | 1 | 1 | 1 | 1 | 1 |                                    |                 |
| Block         | 1 1 1 1 1 | 1               | 1 | 1 | 1 | 1 | 1 | 1 | 1 |                                    |                 |
| Spare         | 0 1 1 1 1 | 0               | 0 | 0 | 1 | 1 | 0 | 0 | 0 | R314                               | 6               |
| Spare         | 1 1 1 0 0 | 0               | 0 | 0 | 1 | 1 | 0 | 0 | 0 | R314                               | 6               |
| Spare         | 1 1 1 0 1 | 0               | 0 | 0 | 1 | 1 | 0 | 0 | 0 | R314                               | 6               |
| Spare         | 1 1 1 1 0 | 0               | 0 | 0 | 1 | 1 | 0 | 0 | 0 | R314                               | 6               |

T 1130 a



A



TRANSMITTER CONTROL UNIT (300)

- MOTOR SERIAL CURRENT W413-2
- SERIAL CURRENT W513-2
- DUMMYLOAD W3013-5
- DUMMYLOAD W3013-5
- METER - W2813-2
- PROGRAM W413-5
- METER + W2913-2
- TONE UNIFORMAL W613-5
- W1613-5
- W1713-2
- W1813-5
- W1913-2
- W2013-5
- W2113-2
- W2213-5
- W2313-2
- W2413-5

- FILTER 2 CONTROL W1313-4
- FILTER 4 CONTROL W1013-4
- FILTER 6 CONTROL W1213-4
- FILTER 1 CONTROL W1113-4
- FILTER 3 CONTROL W1513-4
- FILTER 5 CONTROL W1413-4
- DRIVE LEVEL W2713-2
- DRIVE LEVEL W2813-2

INVALID TUNING / 180° W313-2

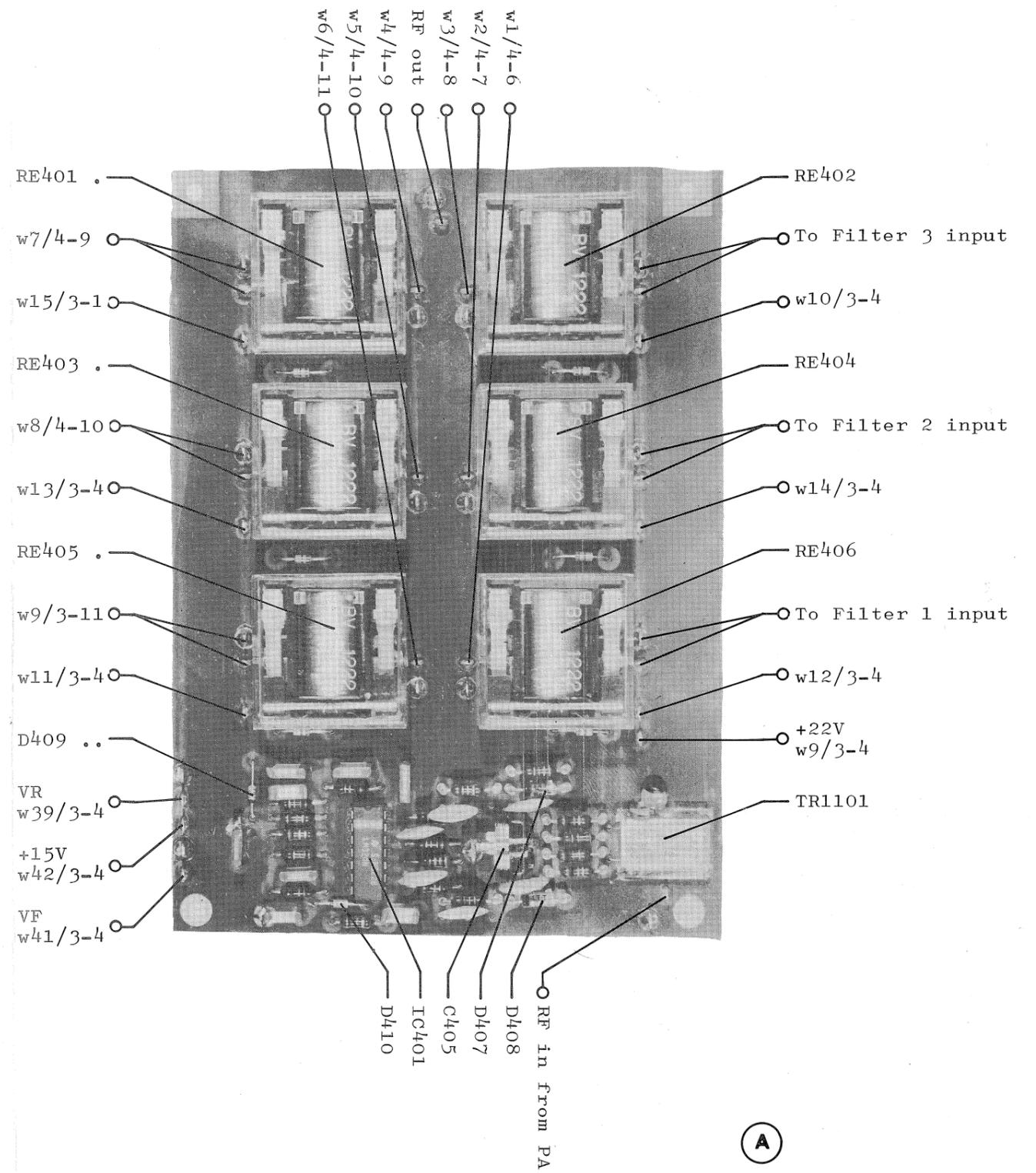
- BLACK W3313-2
- EXT. BLOCK W3413-2
- TUNE W3213-2

TRANSMITTER START IN W3513-2

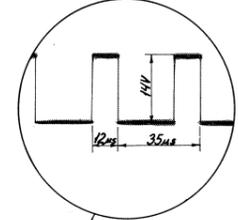
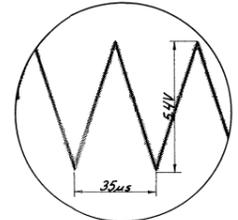
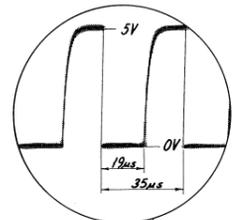
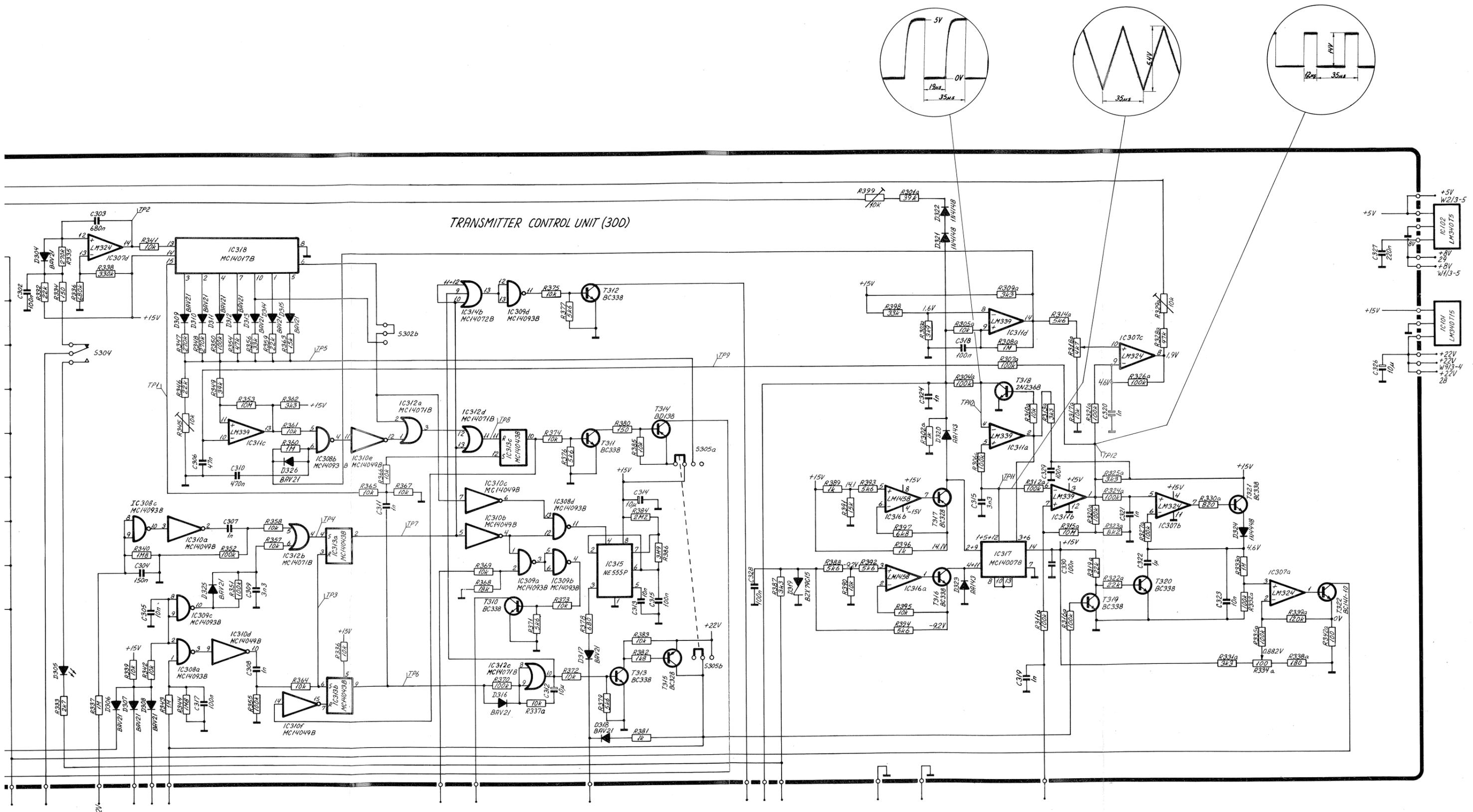
TRANSMITTER START OUT 20

TUNE LAMP W3613-2

5-0-23108



(A)



TRANSMITTER CONTROL UNIT (300)

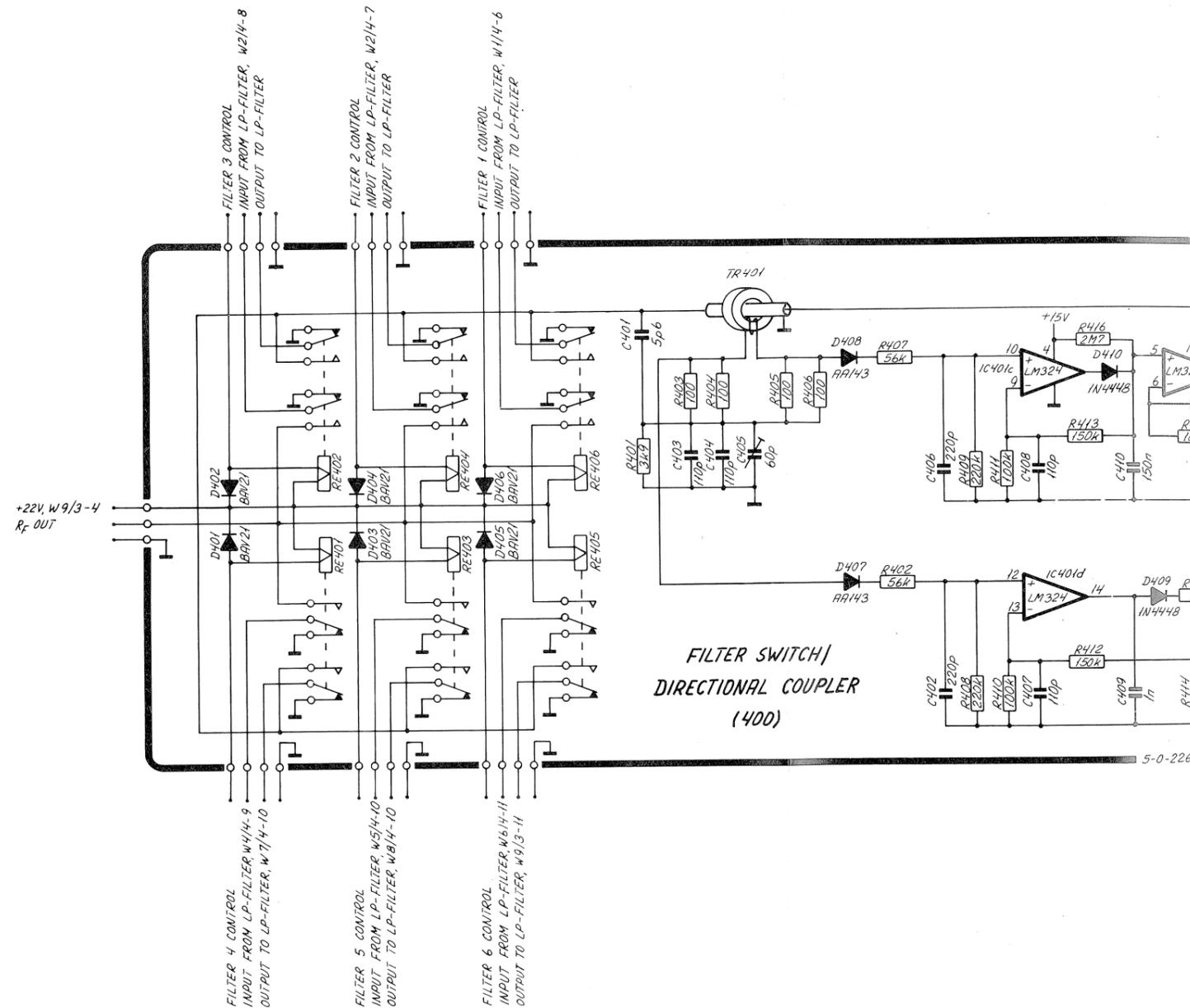
- DRIVE LEVEL W31/3-2
- INVALID TUNING/180° W31/3-2
- BLOCK W33/3-2
- EXT. BLOCK W34/3-2
- TUNE W32/3-2
- TRANSMITTER START IN W35/3-2
- TRANSMITTER START OUT W36/3-2
- TUNE LAMP W36/3-2
- TUNE READY W37/3-2
- W41/3-4
- 45V W41/3-4
- W7/3-5
- W40/3-4
- W39/3-4



# CIRCUIT DESCRIPTION FOR FILTER SWITCH/DIRECTIONAL COUPLER T1130

This unit takes care of the switching in and out of the lowpass filters and measures the forward travelling wave and the reflected wave (directional coupler) on the transmission line.

The directional coupler consists of a current transformer TR401. This transformer is loaded with two times 50 ohm forming a center tap. The voltage across one of the 50 ohm loads is proportional to the current in the transmission line. Into the center tap a voltage is fed which is proportional to the voltage on the transmission line. The current ratio of the current transformer and the voltage ratio of the voltage divider are adjusted so that when the transmission line is loaded with 50 ohm, the voltage from the voltage divider is equal to the voltage across one of the 50 ohm resistors in the current transformer. The voltage measured from ground to one end of the current transformer will be equal to zero (reflected voltage  $V_R$ ) and at the other end the voltage will be two times the voltage across one 50 ohm resistor (forward voltage  $V_F$ ). When the transmission line is misloaded the reflection coefficient will be  $\Gamma = V_R/V_F$ . The  $V_F$  and  $V_R$  are detected with a quasi effective value detector (D408, C406, R407, D407, C402, and R402) which gives an output voltage proportional to the effective value of the  $V_F$  and  $V_R$ . The output of the detector is buffered and peak rectified in IC401, the output voltage  $V_F$  and  $V_R$  is now a DC-voltage proportional to the peak of the effective value of the voltage on the transmission line. This means that  $V_F^2$  WILL BE PROPORTIONAL TO THE Peak Envelope Power. These two voltages are fed to the reflection coefficient calculator in the transmitter control unit.



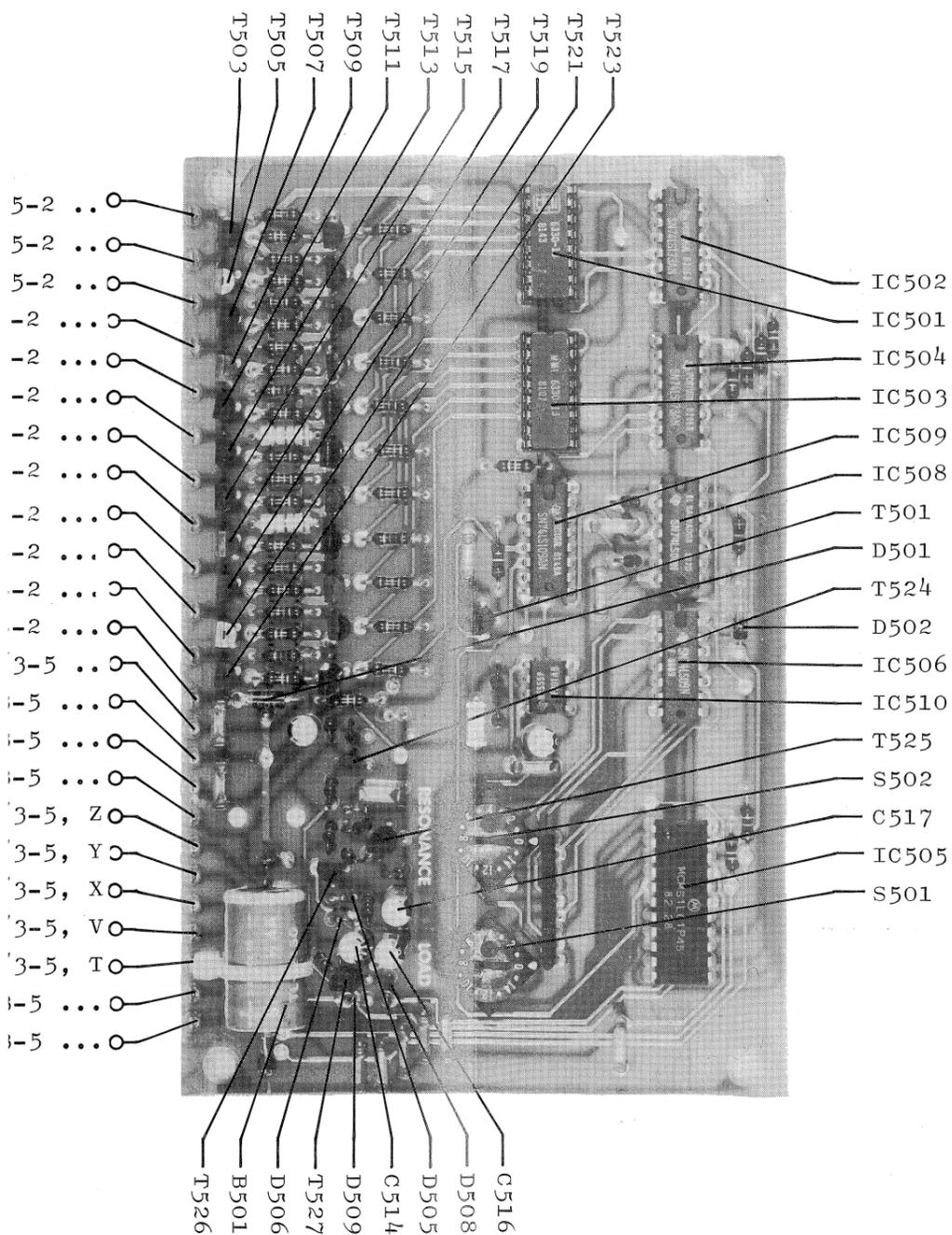
## CIRCUIT DESCRIPTION FOR TUNER CONTROL UNIT T1130

This unit takes care of controlling the presettings of the aerial coupler AT1500.

The input is a five bit bandcode coming from the exciter. This bandcode selects an address in the RAM IC505. Each address consists of two four bit words selected by pin 5. These two words are set by S501 RESONANCE and S502 LOAD. S501 and S502 are multiplexed into the RAM. The inputs and outputs of the RAM are connected in parallel. When programming the RAM pin 18 (output disable) is high (TUNE-UP position) and every time the push button PROGRAMME is activated pin 20 (read/write) goes low and the settings of S501/S502 are programmed into the RAM. If pin 18 is low (NORMAL position) it is not possible to programme the RAM. The multiplexing is controlled by a J-K flip-flop IC508 and IC509 as a clock generator. The outputs from the RAM go to two latches where the information are held so the outputs are steady (no multiplexing). The outputs from the latches go to two PROM's which converts the two times four bit codes to an eleven bit code for the presetting of the aerial coupler AT1500. Each output of the PROM's is buffered with two transistors.

When dummy load is selected there will be 22V on the wire dummy load (W 30/3-5) and T501 will conduct, and pin 14 on IC501/IC503 will be low. Now a special code will be set for AT1500, and AT1500 will act as dummy load.

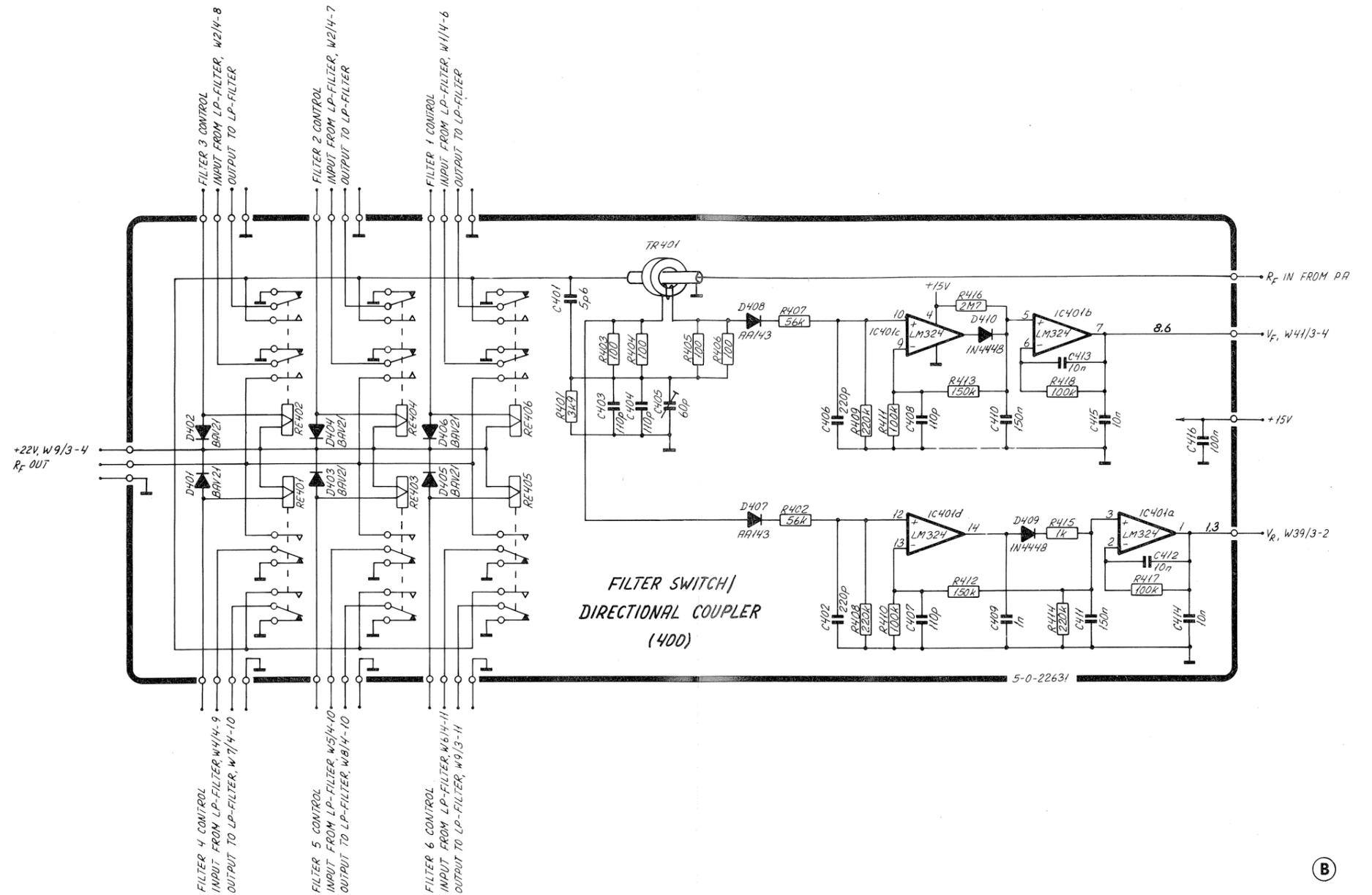
The power supply for the RAM consists of T524, T525, T526 and T527. The power supply is constructed so that, when switching on, pin 17 of the RAM is kept low, until pin 22 has reached 5V. When switching off, pin 17 will go low before the voltage on pin 22 drops. When switching off, the Litium Battery B501 will supply the RAM and all data in the RAM will be preserved. The Litium Battery will have a life of 9 years.



# OPTION FOR FILTER SWITCH/DIRECTIONAL COUPLER T1130

care of the switching in and out of the lowpass filters and forward travelling wave and the reflected wave (directional coupler transmission line).

The coupler consists of a current transformer TR401. This transformer has two times 50 ohm forming a center tap. The voltage across the center tap is proportional to the current in the transmission line. The voltage across the center tap is fed which is proportional to the voltage on the transmission line. The current ratio of the current transformer and the voltage divider are adjusted so that when the transmission line is terminated with 50 ohm, the voltage from the voltage divider is equal to the voltage across one of the 50 ohm resistors in the current transformer. The voltage across the center tap to one end of the current transformer will be equal to the voltage across one 50 ohm resistor (forward voltage  $V_R$ ). When the transmission line is terminated with a quasi effective value detector (D408, C406, R407, R402) which gives an output voltage proportional to the effective value  $V_F$  and  $V_R$ . The output of the detector is buffered and peak detected by D401, the output voltage  $V_F$  and  $V_R$  is now a DC-voltage proportional to the effective value of the voltage on the transmission line.  $V_F^2$  WILL BE PROPORTIONAL TO THE Peak Envelope Power. These two outputs are fed to the reflection coefficient calculator in the transmitter control.



(B)

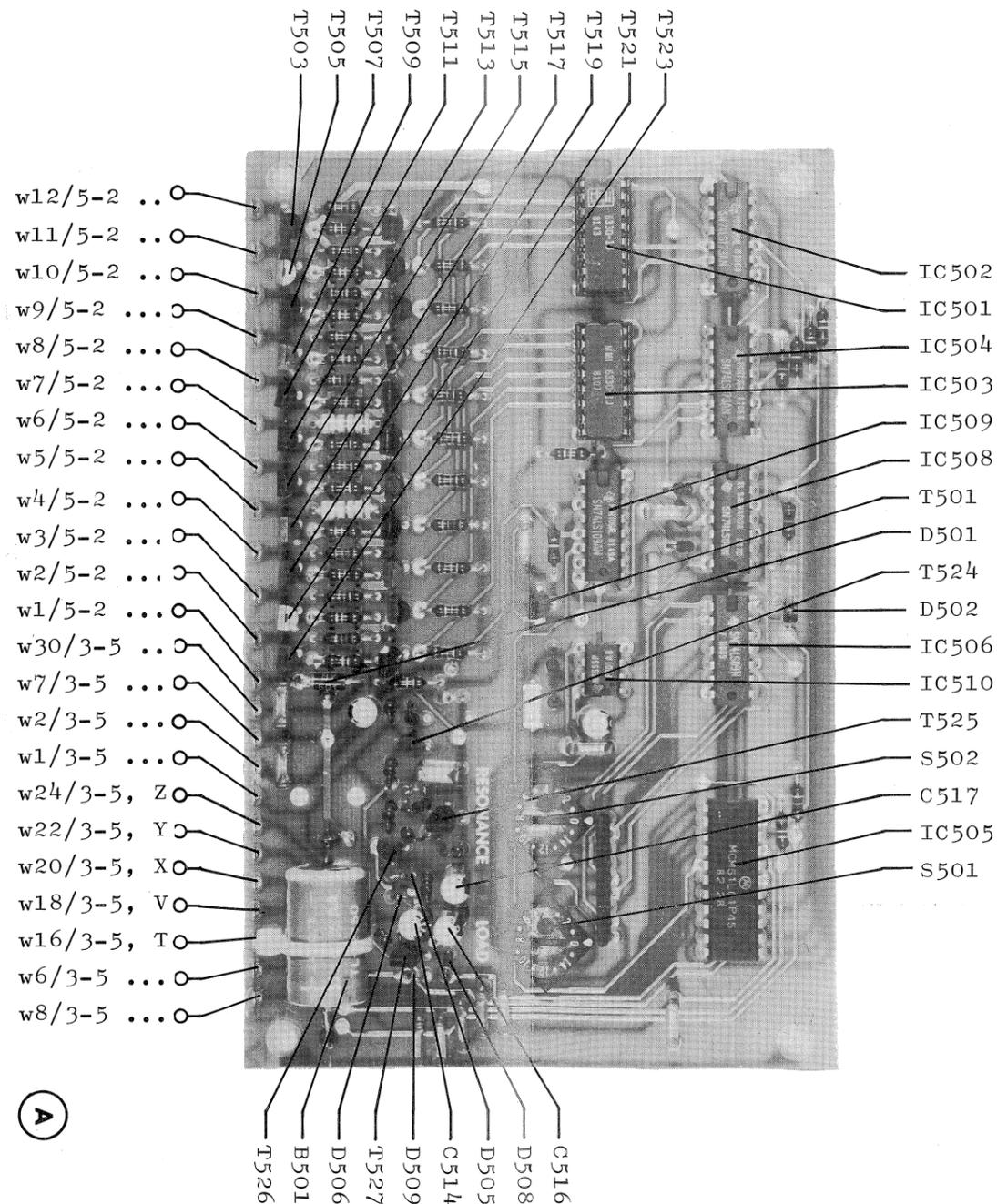
## CIRCUIT DESCRIPTION FOR TUNER CONTROL UNIT T1130

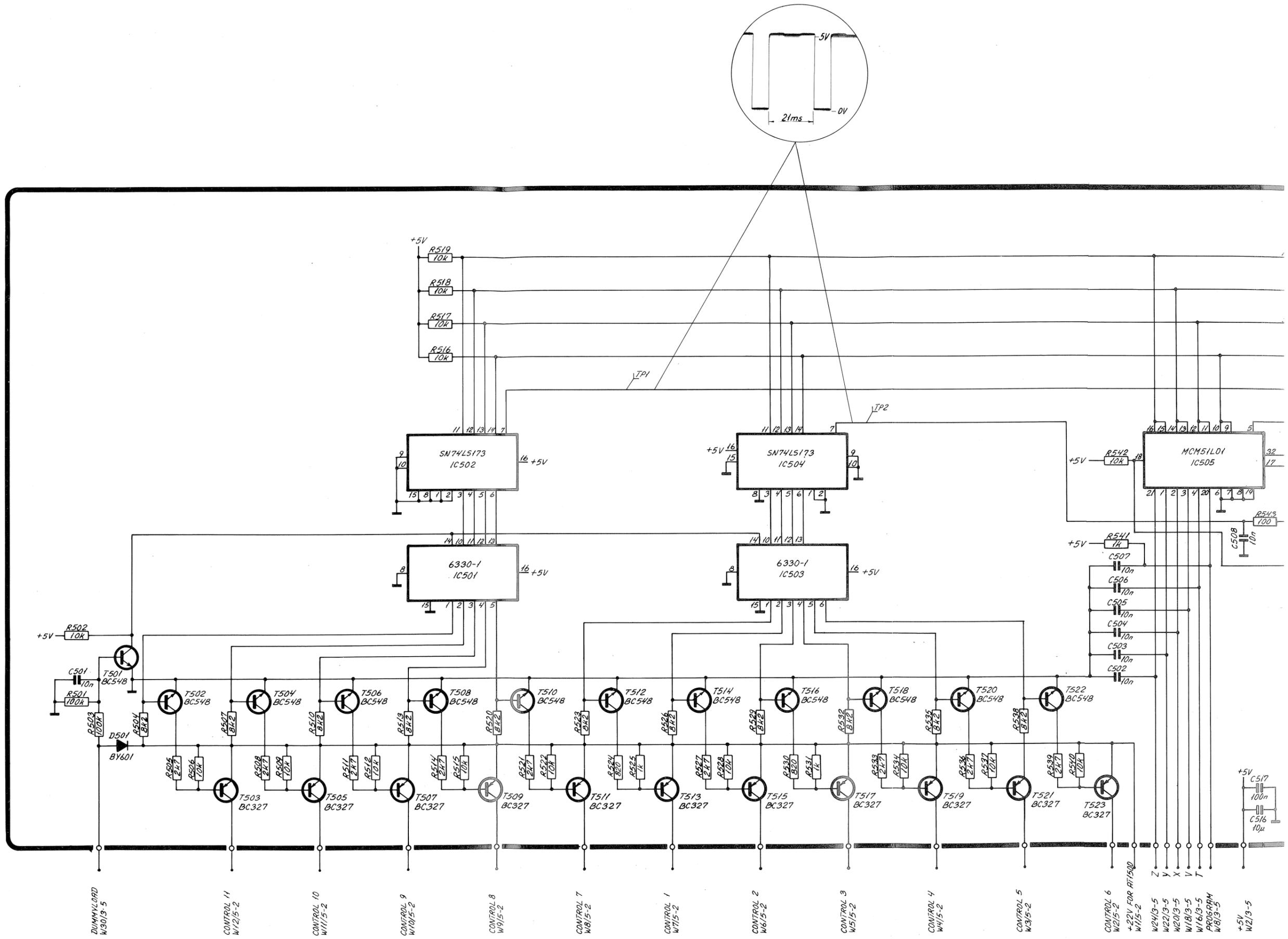
This unit takes care of controlling the presettings of the aer

The input is a five bit bandcode coming from the exciter. This is an address in the RAM IC505. Each address consists of two four bit words by pin 5. These two words are set by S501 RESONANCE and S502 LOAD are multiplexed into the RAM. The inputs and outputs of the RAM are parallel. When programming the RAM pin 18 (output disable) is active low. When the push button PROGRAMME is activated pin 18 goes low and the settings of S501/S502 are programmed into the RAM. When pin 18 is low (NORMAL position) it is not possible to programme the RAM. The RAM is controlled by a J-K flip-flop IC508 and IC509 as a clock generator. The outputs from the RAM go to two latches where the information are held steady (no multiplexing). The outputs from the latches go to two inverters which converts the two times four bit codes to an eleven bit code for the aerial coupler AT1500. Each output of the PROM's is buffered by diodes.

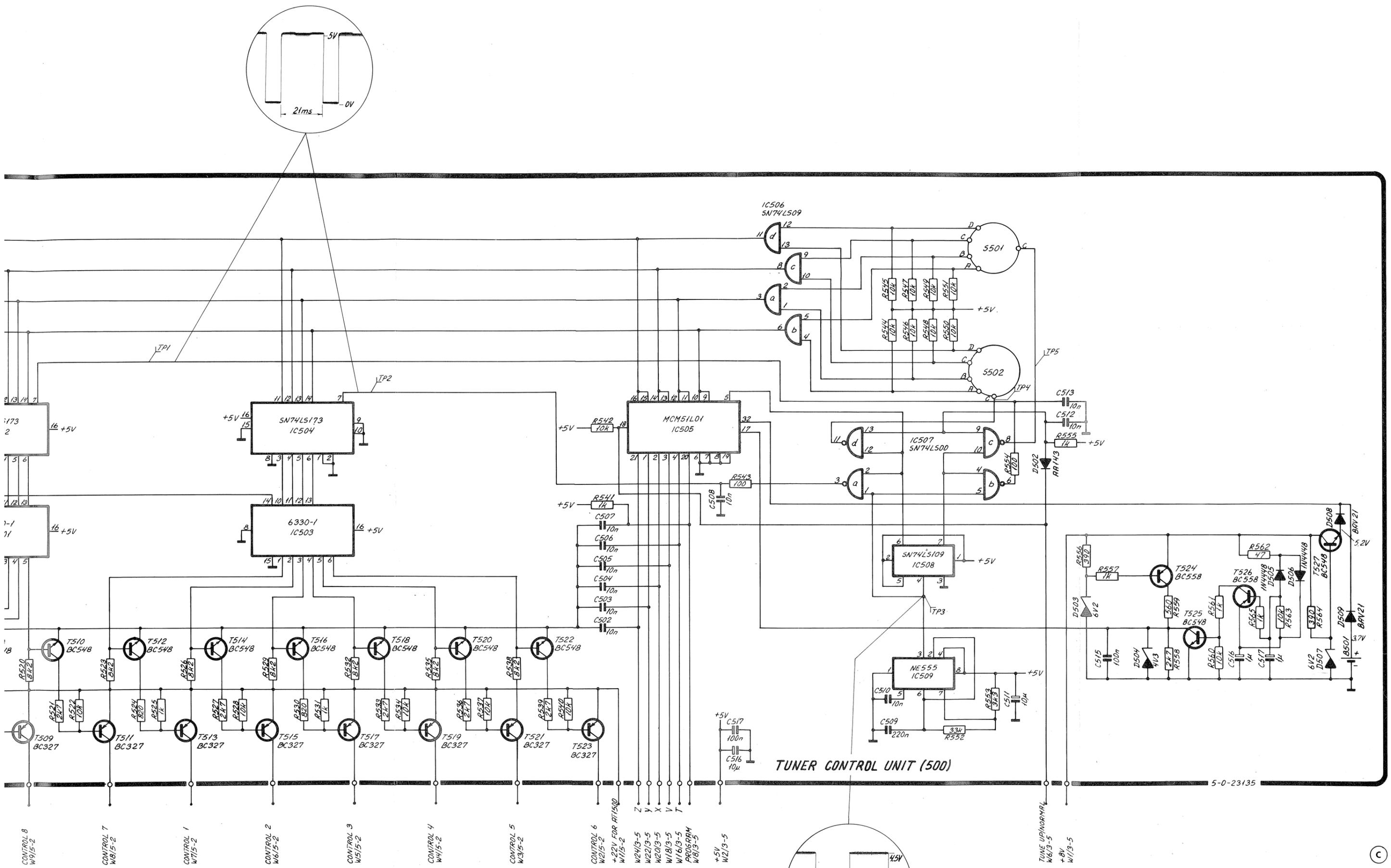
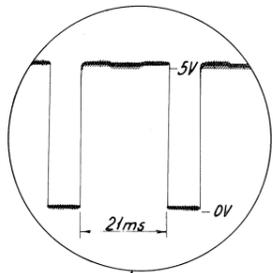
When dummy load is selected there will be 22V on the wire dummy load and T501 will conduct, and pin 14 on IC501/IC503 will be low. The output of the RAM will be set for AT1500, and AT1500 will act as dummy load.

The power supply for the RAM consists of T524, T525, T526 and the power supply is constructed so that, when switching on, pin 17 of the RAM until pin 22 has reached 5V. When switching off, pin 17 will pull the voltage on pin 22 drops. When switching off, the Lithium Battery will power the RAM and all data in the RAM will be preserved. The Lithium Battery has a life of 9 years.





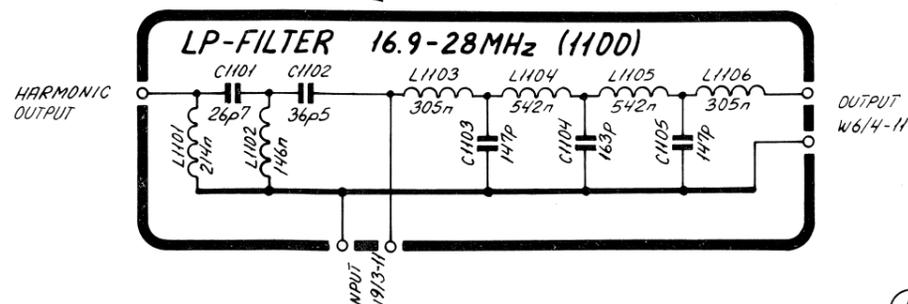
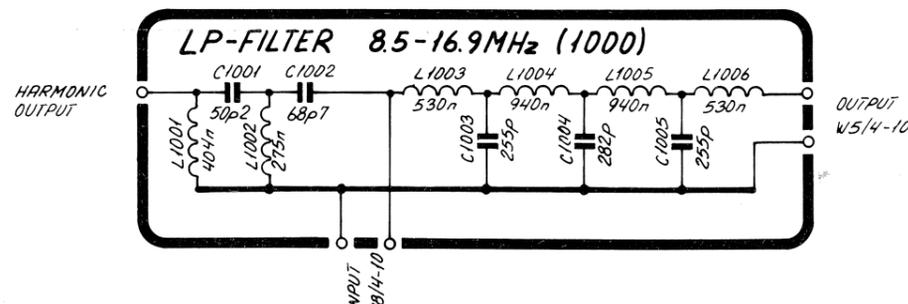
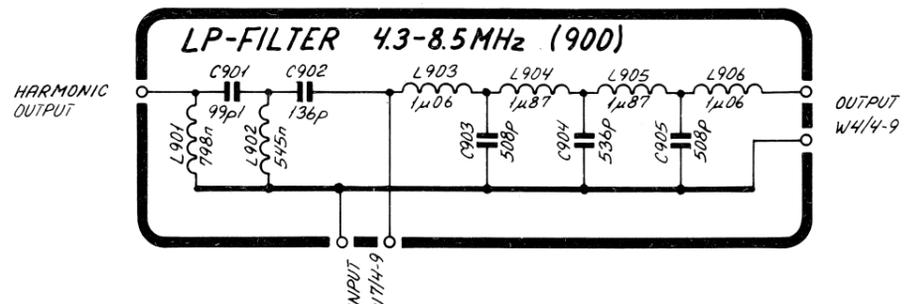
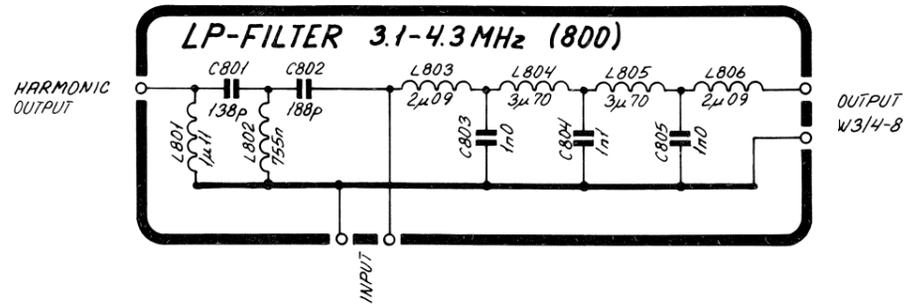
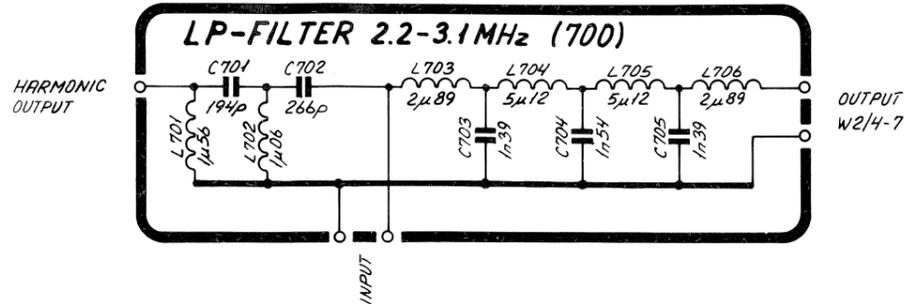
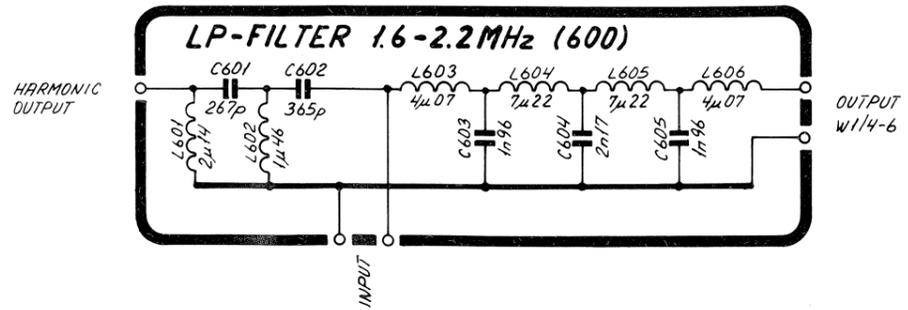




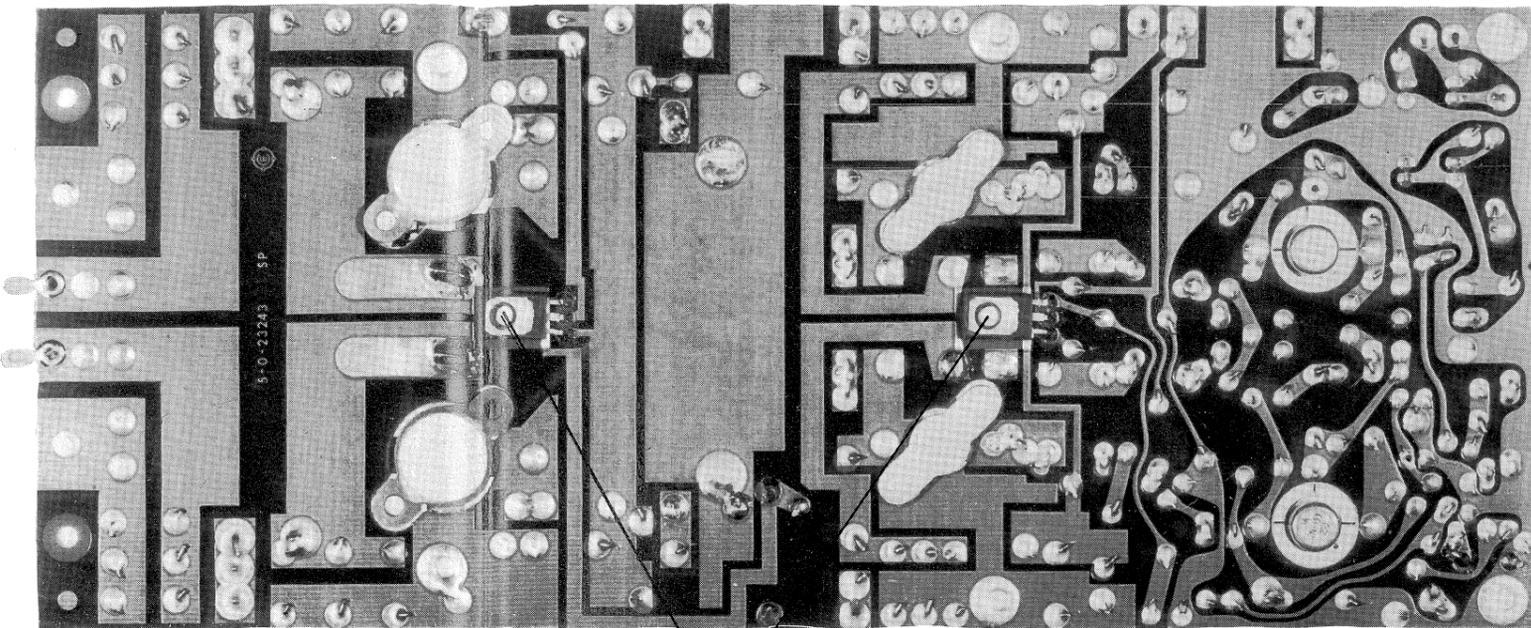
TUNER CONTROL UNIT (500)

5-0-23135



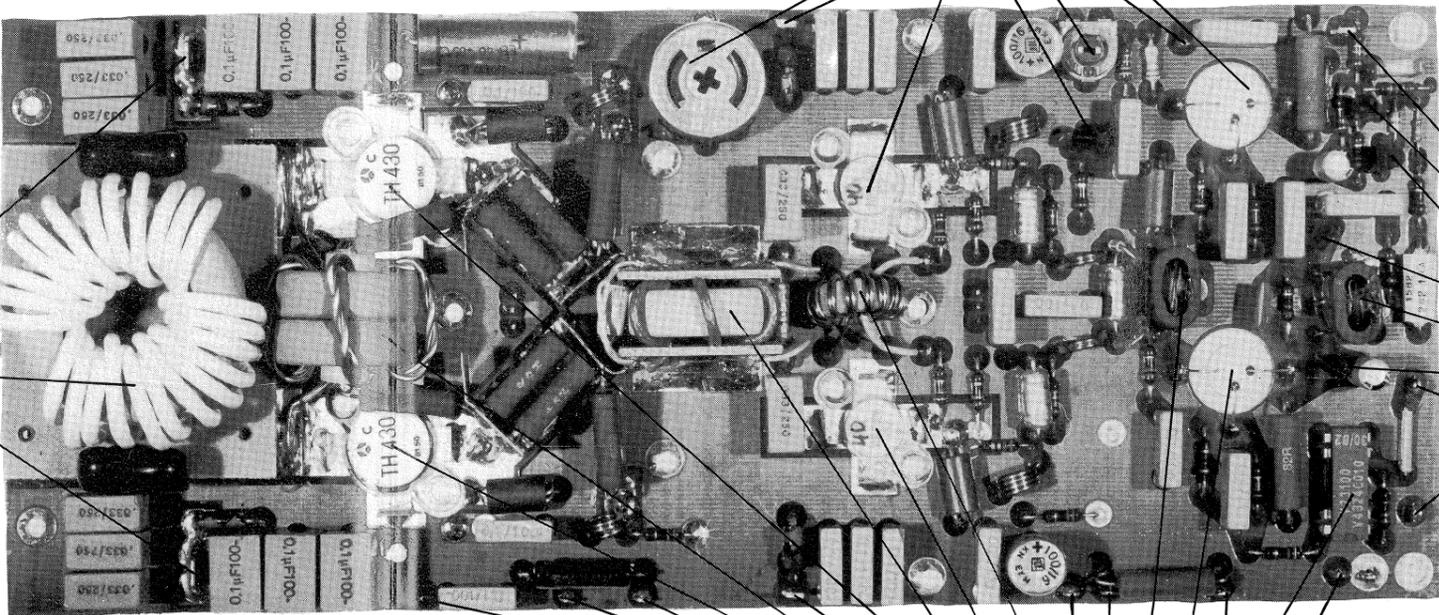


(A)



T1207 .....  
 +28V .....  
 R1220 .....  
 T1205 .....  
 T1213 .....  
 +28V for T1212  
 R1232 .....

T1208  
 T1209



+38V for T1214  
 To TR101 ...  
 TR1206 .....  
 +38V for T1215

Open TX  
 T1204  
 T1201  
 T1203  
 TR1201  
 T1202  
 Power down

RF in  
 RE1201  
 +28V  
 T1206  
 TR1202  
 To basis of T101  
 To emitter of T101  
 TR1203  
 T1212  
 TR1204  
 T1215  
 +28V for T1213  
 TR1205  
 T1214  
 +28V  
 To emitter of T102  
 To basis of T1214

(A)

PA-UNIT

MODULE 1200

# CIRCUIT DESCRIPTION PA-UNIT T1130

The power amplifier has a power gain of 45 dB.

The predriver is a push-pull class A amplifier, consisting of T1206 and T1207 with a power gain of 15 dB.

The transistors T1202 and T1203 is blocking transistors, When they are switched on, T1206 and T1207 are cut off and the gain is less than 0 dB. The predriver is blocked when open TX is low.

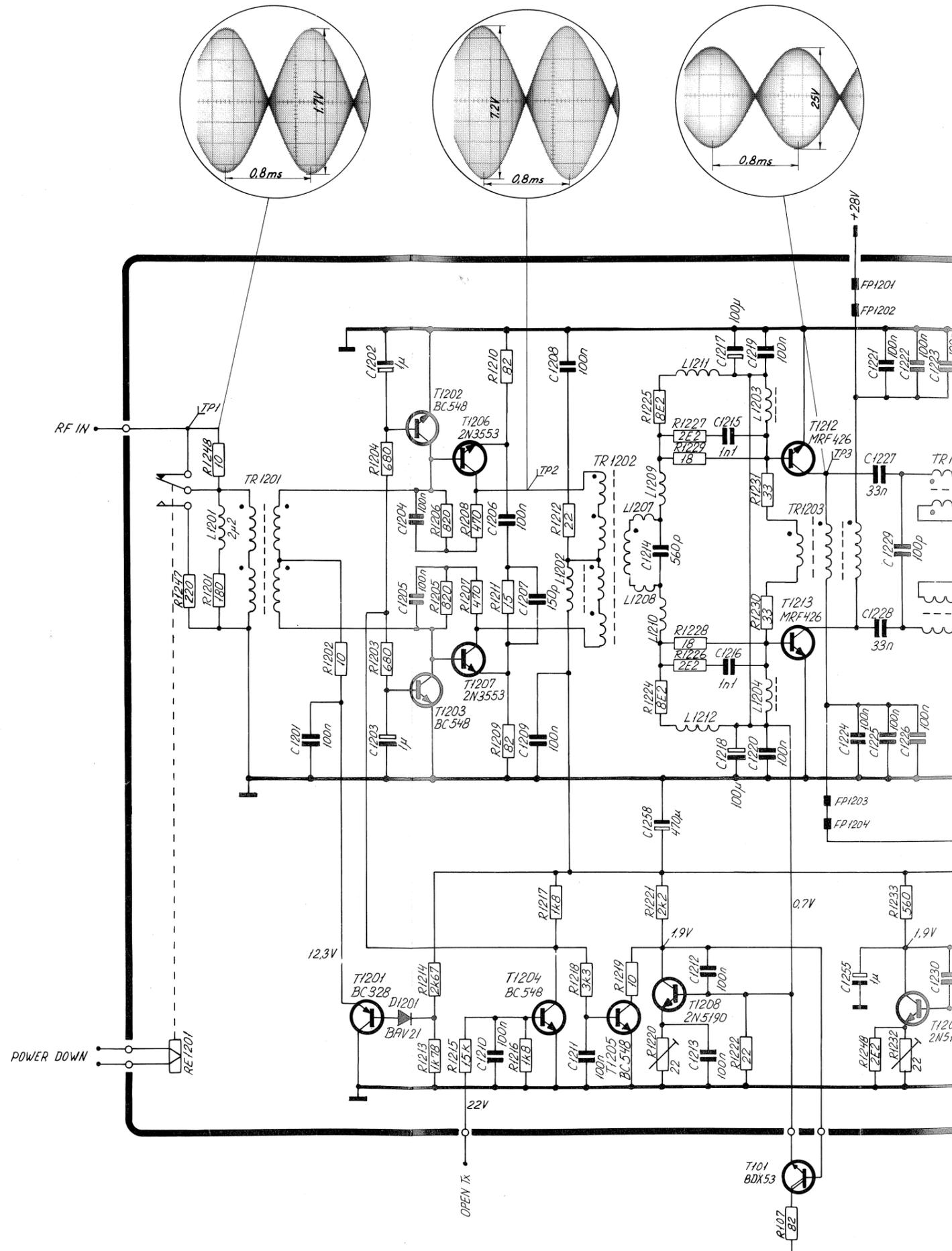
The driver is a push-pull class B amplifier, consisting of T1212 and T1213 with a power gain of 17 dB.

The bias supply regulator consists of T1208 and T101. T1208 is mounted on the heatsink in good terminal contact with the driver transistors. T1208 gives temperature compensation of the zero signal current in the driver and R1220 adjusts the zero signal current.

The output amplifier is a push-pull class B amplifier, consisting of T1214 and T1215 with a power gain of 13 dB.

The bias supply regulator consists of T1209 and T102. T1209 is mounted on the heatsink in good terminal contact with the output transistors. T1209 gives temperature compensation of the zero signal current in the output transistors and R1220 adjusts the zero signal current.

At the input there is a relay controlled attenuator (R1247, R1248, and RE1201). This attenuator is controlled from the temperature protection unit (1300).



4-0-23243D/T1130

## CIRCUIT DESCRIPTION FOR TEMPERATURE PROTECTION UNIT T1130

This unit protects the power amplifier from overheating. If the temperature of the R109 is higher than  $95^{\circ}\text{C}$ , the supply voltage to the output stage will be reduced from 38V to 32V and the RF input will be reduced by 6 dB. If the temperature of R109 is higher than  $115^{\circ}\text{C}$  the power supply will be blocked and the blowers will run continuously until the temperature gets below  $110^{\circ}\text{C}$ .

The temperature sensor R109 has a positive temperature coefficient and is placed in the bottom of a voltage divider. The voltage at pin 2 of IC1301a will rise when temperature at R109 is rising. When the voltage at pin 2 gets higher than the voltage at pin 3 ( $t = 95^{\circ}\text{C}$ ), then the output pin 1 will change to zero. T1301 will stop conducting and thus reduce the 38V for the output stage to 32V. T1303 will stop conducting and T1305 will start conducting and activate the relay RE1201 at the input of the output stage. This will reduce the drive by 6 dB. When the temperature rises further the voltage at pin 6 of IC1301b will get higher than the voltage at pin 5 ( $t = 115^{\circ}\text{C}$ ), then the output pin 7 will change to zero. T1302 will stop conducting. T1304 will also stop conducting and the power supply for the output stage will be blocked. The two voltage comparators IC1301a/IC1301b have a hysteresis of approximately  $5^{\circ}\text{C}$ .

T1206 and T1207

They are switched  
The predriver

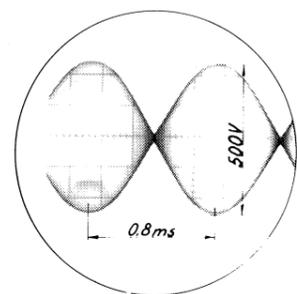
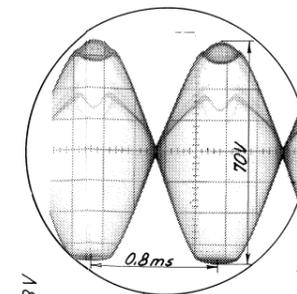
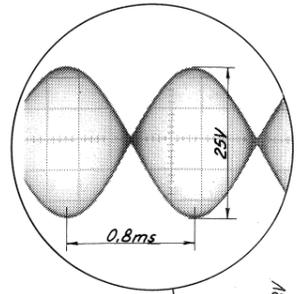
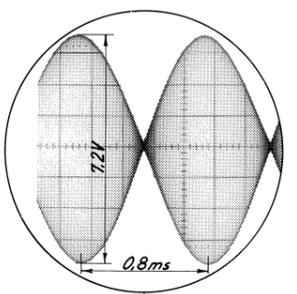
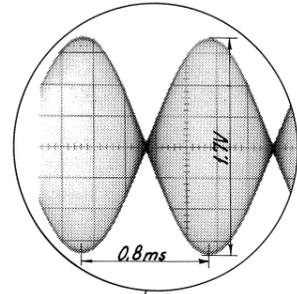
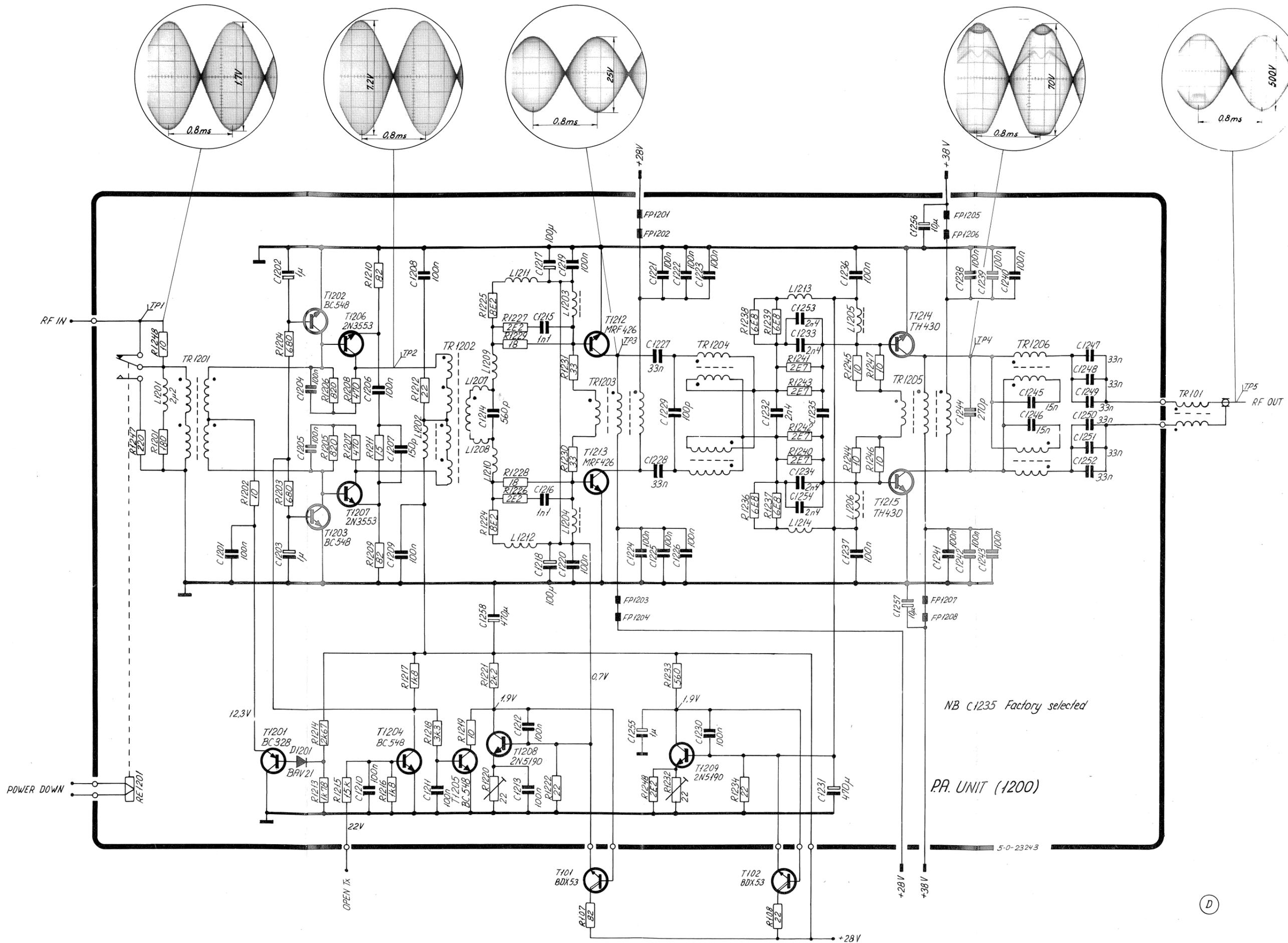
and T1213

Mounted on the  
T1208 gives tem-  
and R1220 adjusts

of T1214 and

Mounted on the  
T1209 gives  
transistors

3, and RE1201).  
it (1300).

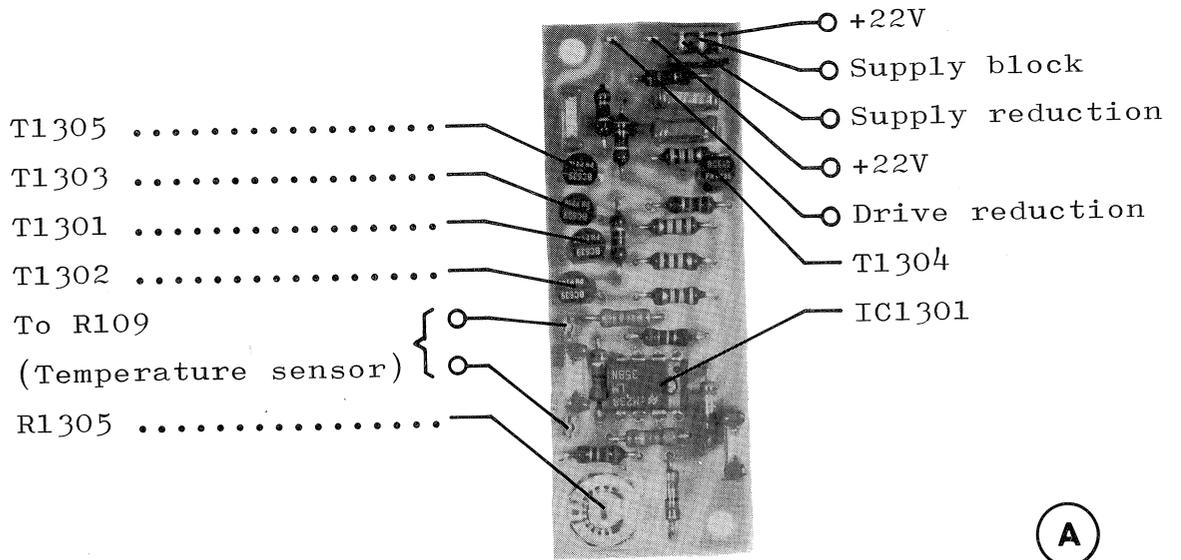
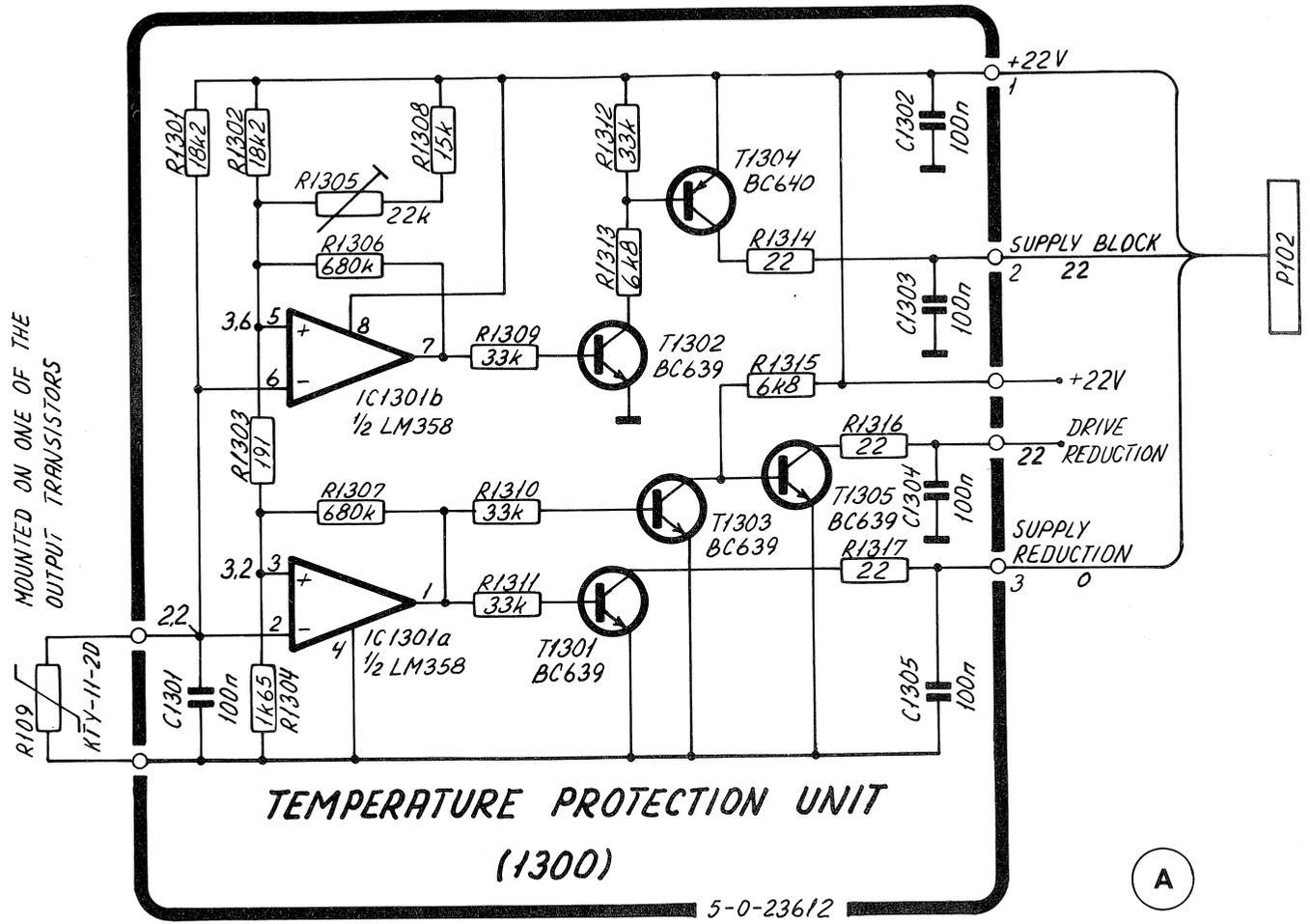


(D)

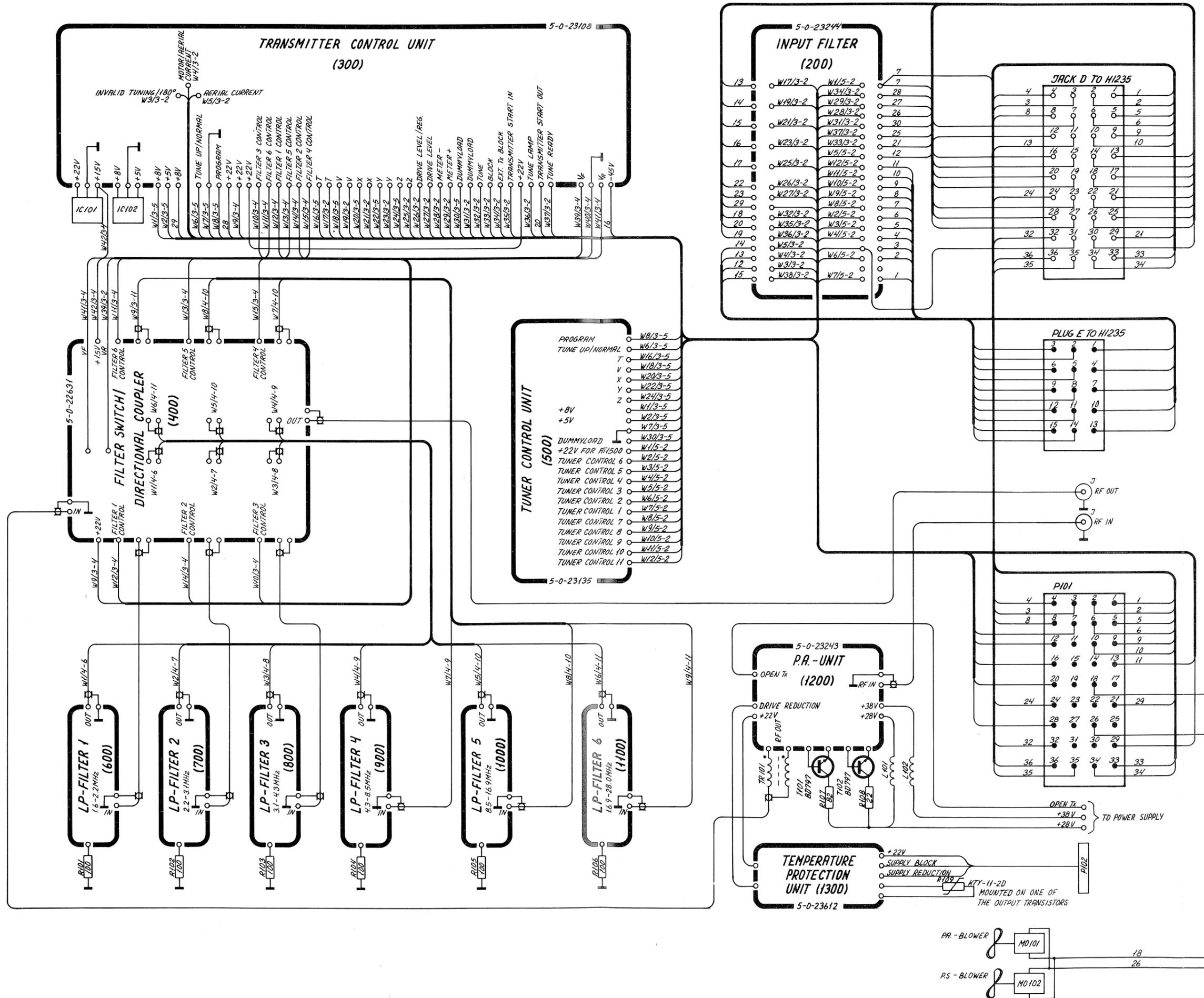
## CIRCUIT DESC

This unit prot  
the R109 is hi  
duced from 38V  
ture of R109 i  
wers will run

The temperatur  
in the bottom  
when temperatu  
the voltage at  
will stop cond  
will stopcond  
at the input o  
temperature ri  
the voltage at  
T1302 will sto  
for the output  
have a hystere







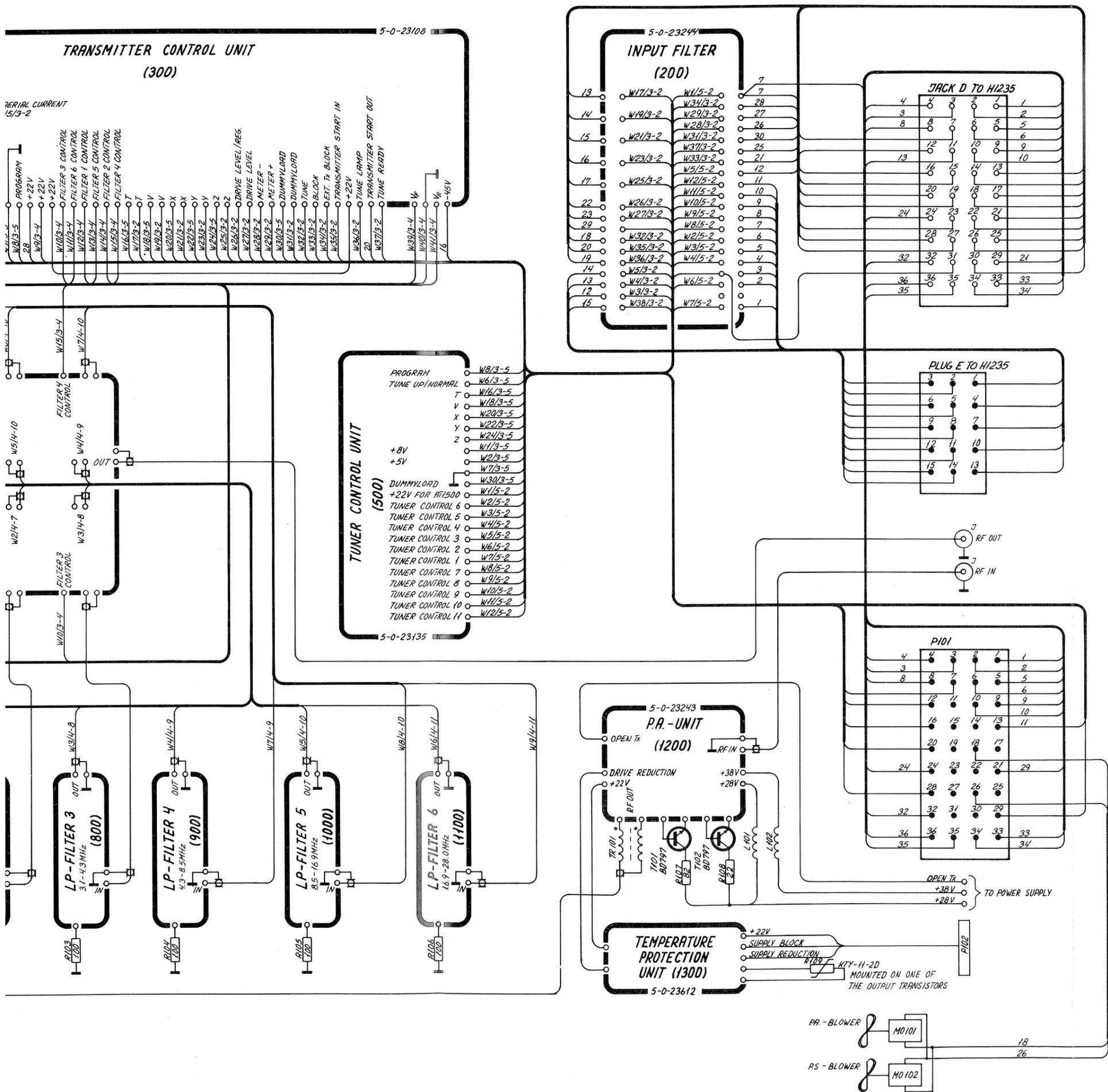
- 1 +22V TO Rx
- 2 +8V TO Rx
- 3 -45V TO Rx
- 4 +22V TO Ex
- 5 +8V TO Ex
- 6 -45V TO Ex
- 7 +22V FOR AT
- 8 Rx ON
- 9 GROUND TO Rx
- 10 GROUND TO Ex
- 11 GROUND
- 12 CONTROL 3 IN
- 13 T
- 14 V
- 15 X
- 16 Y
- 17 Z
- 18 TUNE

- 1 TUNER CONTROL
- 2 TUNER CONTROL
- 3 TUNER CONTROL
- 4 TUNER CONTROL
- 5 TUNER CONTROL
- 6 TUNER CONTROL
- 7 TUNER CONTROL
- 8 TUNER CONTROL
- 9 TUNER CONTROL
- 10 TUNER CONTROL
- 11 TUNER CONTROL
- 12 INVALID TUNING
- 13 MOTOR/AERIAL
- 14 AERIAL CURRENT
- 15 POWER DOWN

- 1 +22V TO Rx
- 2 +8V TO Rx
- 3 -45V TO Rx
- 4 +22V TO Ex
- 5 +8V TO Ex
- 6 -45V TO Ex
- 7 +22V FOR AT
- 8 Rx ON
- 9 GROUND TO Rx
- 10 GROUND TO Ex
- 11 GROUND
- 12 POWER DOWN
- 13 GROUND
- 14
- 15 -45V TO TH3L
- 16
- 17
- 18 BLOWER

- 1 +22V
- 2 SUPPLY BLOCK
- 3 SUPPLY REDUCED





**JACK D**

|    |                 |    |                     |
|----|-----------------|----|---------------------|
| 1  | +22V TO Rx      | 19 | TUNE LAMP           |
| 2  | +8V TO Rx       | 20 | TRANSMITTER START   |
| 3  | -45V TO Rx      | 21 | BLOCK               |
| 4  | +22V TO Ex      | 22 | DRIVE LEVEL/REG.    |
| 5  | +8V TO Ex       | 23 | DRIVE LEVEL         |
| 6  | -45V TO Ex      | 24 | HT ON               |
| 7  | +22V FOR AT1500 | 25 | TUNE READY          |
| 8  | Rx ON           | 26 | METER -             |
| 9  | GROUND TO Rx    | 27 | METER +             |
| 10 | GROUND TO Ex    | 28 | EXT. TX BLOCK       |
| 11 | GROUND          | 29 | OPEN TX             |
| 12 | CONTROL 3 IN    | 30 | DUMMYLOAD           |
| 13 | T               | 31 | CONTROL 3 TO AT1500 |
| 14 | V               | 32 | OFF                 |
| 15 | X               | 33 | +BAT.               |
| 16 | Y               | 34 | +22V                |
| 17 | Z               | 35 | ON                  |
| 18 | TUNE            | 36 | -45V                |

**PLUG E**

|    |                        |
|----|------------------------|
| 1  | TUNER CONTROL 1        |
| 2  | TUNER CONTROL 2        |
| 3  | TUNER CONTROL 3        |
| 4  | TUNER CONTROL 4        |
| 5  | TUNER CONTROL 5        |
| 6  | TUNER CONTROL 6        |
| 7  | TUNER CONTROL 7        |
| 8  | TUNER CONTROL 8        |
| 9  | TUNER CONTROL 9        |
| 10 | TUNER CONTROL 10       |
| 11 | TUNER CONTROL 11       |
| 12 | INVALID TUNING/180°    |
| 13 | MOTOR/AERIAL CURRENT   |
| 14 | AERIAL CURRENT         |
| 15 | POWER DOWN FROM AT1500 |

**PI01**

|    |                              |    |                   |
|----|------------------------------|----|-------------------|
| 1  | +22V TO Rx                   | 19 | TRANSMITTER START |
| 2  | +8V TO Rx                    | 20 | OPEN TX           |
| 3  | -45V TO Rx                   | 21 | HT ON             |
| 4  | +22V TO Ex                   | 22 | BLOWER            |
| 5  | +8V TO Ex                    | 23 | +22V TO TH30      |
| 6  | -45V TO Ex                   | 24 | +8V TO TH30       |
| 7  | +22V FOR AT1500              | 25 | GROUND            |
| 8  | Rx ON                        | 26 | OFF               |
| 9  | GROUND TO Rx                 | 27 | +BAT.             |
| 10 | GROUND TO Ex                 | 28 | +22V              |
| 11 | POWER DOWN FROM POWER SUPPLY | 29 | ON                |
| 12 | GROUND                       | 30 | -45V              |
| 13 | OFF                          |    |                   |
| 14 | +BAT.                        |    |                   |
| 15 | +22V                         |    |                   |
| 16 | -45V TO TH30                 |    |                   |
| 17 | ON                           |    |                   |
| 18 | BLOWER                       |    |                   |

**PI02**

|   |                  |
|---|------------------|
| 1 | +22V             |
| 2 | SUPPLY BLOCK     |
| 3 | SUPPLY REDUCTION |

MAIN SCHEMATIC DIAGRAM FOR SAILOR TRANSMITTER TH30 (D)

