



Sailor

Sailor

**INSTRUKTIONSBOG FOR
SAILOR T1130**

**INSTRUCTION BOOK FOR
SAILOR T1130**



A/S S. P. RADIO · AALBORG · DENMARK

CONCERNING BIAS CURRENT ADJUSTMENT OF POWER AMPLIFIER T1130

NOTE:

We now use different types of driving transistors for the power amplifier. The bias current has to be adjusted differently depending on the type as shown in the table below:

MRF 426	-	200 mA
MRF 427	-	200 mA
PT 9798	-	25 mA
TH 571	-	25 mA
BLW 83	-	25 mA

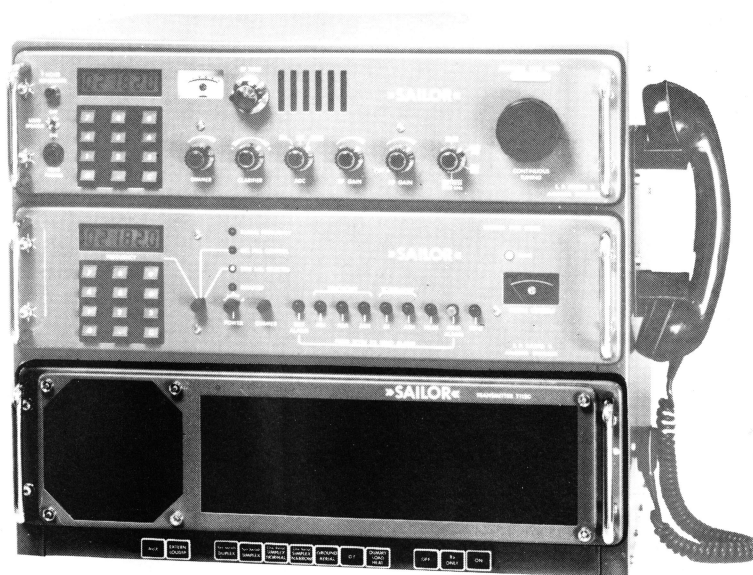
Use always transistors of equal type for driving stages.



S.P. Radio A/S · Aalborg · Denmark



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INSTRUCTION BOOK FOR TRANSMITTER T1130

Valid from serial No. 313105

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LP FILTERS (MODULE 600, 700, 800, 900, 1000, 1100)

POWER AMPLIFIER (MODULE 1200)

TEMPERATURE PROTECTION UNIT (MODULE 1300)

MAIN SCHEMATIC DIAGRAM FOR T1130 TRANSMITTER

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.

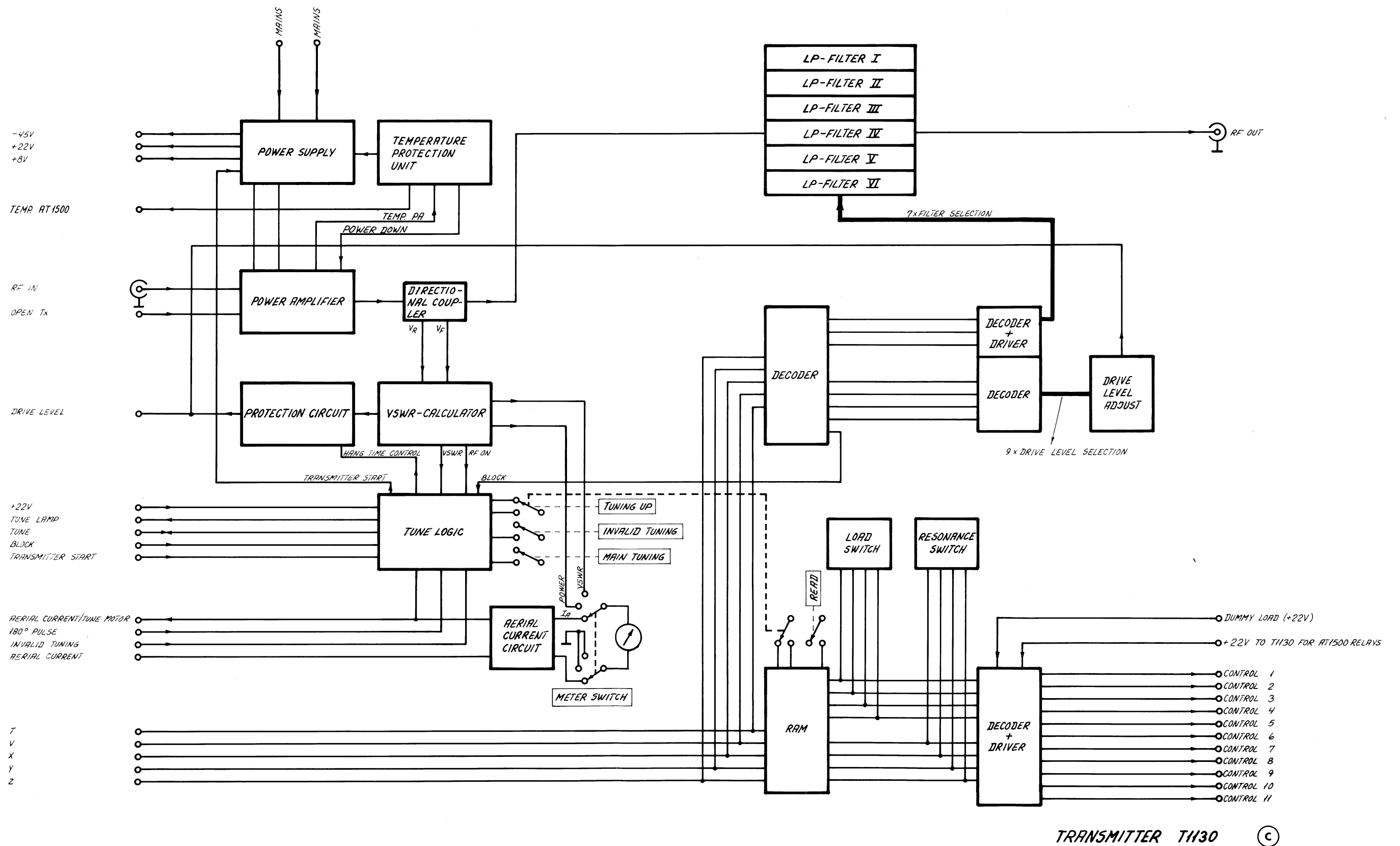
The Protection Circuit is controlling the drive level from the exciter in such a way that the Power Amplifier is protected against excessive VSWR.

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.



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 aeralis, 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!

T 1130 B

To make the table more complete it is most important that you fill in the TUNING TABLE FOR T1130 which is in the back of this manual, and return it to S. P. Radio.

	AERIAL LENGTH																					
	5 m		6 m		7 m		8 m		9 m		10 m		11 m		12 m		13 m		14 m		15 m	
MARITIME FREQUENCY BANDS	Reso- nance	Load	Reso- nance	Load	Reso- nance	Load	Reso- nance	Load	Reso- nance	Load	Reso- nance	Load	Reso- nance	Load	Reso- nance	Load	Reso- nance	Load	Reso- nance	Load	Reso- nance	Load
1 600.0 - 1 799.9 kHz	0- 3	1	0- 3	1	0- 3	1	4- 6	1	4- 6	1	4- 6	0-1	4- 6	0-1	4- 6	0-1	4- 6	0	4- 6	0	4- 6	0
1 800.0 - 1 999.9 kHz	0- 3	1	0- 3	1	0- 3	1	4- 6	0-1	4- 6	0-1	4- 6	0	4- 6	0	4- 6	0	4- 6	0	4- 6	0	4- 6	0
2 000.0 - 2 199.9 kHz	0- 3	0	0- 3	0	0- 3	0	4- 6	0	4- 6	0	4- 6	0	4- 6	0	4- 6	0	4- 6	0	4- 6	0	4- 6	0
2 200.0 - 2 399.9 kHz	0- 3	0	0- 3	0	0- 3	0	4- 6	0	4- 6	0	4- 6	0	4- 6	0	4- 6	0	4- 6	0	4- 6	0	4- 6	0
2 400.0 - 2 599.9 kHz	0- 3	0	0- 3	0	0- 3	0	4- 6	0	4- 6	0	4- 6	0	4- 6	0	4- 6	0	4- 7	0	4- 7	0	4- 7	0
2 600.0 - 2 799.9 kHz	0- 3	0	0- 3	0	0- 3	0	4- 6	0	4- 6	0	4- 6	0	4- 6	0	4- 6	0	4- 7	0-1	4- 7	0-1	4- 7	0-1
2 800.0 - 2 999.9 kHz	0- 3	0	0- 3	0	0- 3	0	4- 7	0	4- 7	0	4- 7	0	4- 7	0	4- 7	0	4- 7	0-1	4- 7	0-1	4- 7	0-1
3 000.0 - 3 099.9 kHz	0- 3	0	0- 3	0	0- 3	0	4- 7	0	4- 7	0	4- 7	0	4- 7	0	4- 7	0	4- 7	0-1	4- 7	0-1	4- 7	0-1
3 100.0 - 3 399.9 kHz	0- 3	0	0- 3	0	0- 3	0	4- 7	0	4- 7	0	4- 7	0	4- 7	0	4- 7	0	4- 7	0-1	4- 7	0-1	4- 7	0-1
3 400.0 - 3 699.9 kHz	0- 3	0	0- 3	0	0- 3	0	4- 7	0	4- 7	0	4- 7	0-1	4- 7	0-1	4- 7	0-1	4- 7	0-1	4- 7	1-2	4- 7	1-2
3 700.0 - 3 999.9 kHz	1- 3	0	1- 3	0	1- 3	0	4- 7	0-1	4- 7	0-1	4- 7	0-1	4- 7	0-2	4- 7	0-2	4- 7	0-3	4- 7	0-3	4- 7	0-4
4 063.0 - 4 219.4 kHz	1- 3	0	1- 3	0	1- 3	0-1	5- 7	0-2	5- 7	0-2	5- 7	0-2	5- 7	0-2	5- 7	0-2	5- 8	0-3	5- 8	1-7	5- 8	1-7
6 200.0 - 6.325.4 kHz	6- 8	0-1	6- 8	0-1	6- 9	0-2	6- 9	0-2	6- 9	1-5	6- 9	5-9	7- 9	5-9	7- 9	5-9	7- 9	5-8	7- 9	4-8	7- 9	4-8
8 195.0 - 8 435.4 kHz	9-11	0-1	9-11	0-2	9-11	0-5	9-11	2-7	9-11	2-8	9-11	2-6	9-11	2-5	9-11	1-4	8-10	1-4	8-10	1-5	8-10	1-5
12 330.0 - 12 652.3 kHz	10-12	3-6	10-12	2-6	10-12	1-5	10-13	0-4	10-13	0-4	10-13	0-4	10-13	0-4	10-13	0-5	10-13	0-5	10-13	0-5	10-13	0-5
16 460.0 - 16 859.4 kHz	11-13	0-2	11-13	0-2	11-13	0-2	11-13	1-5	11-13	1-4	11-13	1-4	11-13	1-4	12-14	2-5	12-14	2-5	12-14	1-5	12-14	1-5
22 000.0 - 22 310.5 kHz	14-15	1-3	14-15	1-3	14-15	1-3	14-15	1-4	14-15	1-4	14-15	1-4	14-15	1-4	14-15	1-4	14-15	1-4	14-15	1-4	14-15	1-4
25 070.0 - 25 110.0 kHz	14-15	0-3	14-15	0-3	14-15	0-3	14-15	0-4	14-15	0-4	14-15	0-4	14-15	0-4	14-15	0-4	14-15	0-4	14-15	0-4	14-15	0-4
Fixed 2 182.0 kHz	0- 3	0																				

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- nance	Load	Reso- 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 1×10^{-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
			Vout 1 22V
			Iout 1 1A
			Vout 2 8V
			Iout 2 1A
			Vout 3 -45V
			Iout 3 -0.1A
			E.g. SAILOR types N1402 spec. N1405
	X		<u>TEST BOX S1300/S1301:</u>
			S.P. type S1300/01 Test box
	X		<u>ARTIFICIAL KEY S1300TT/S1301:</u>
			S.P. type Artificial key
	X		<u>TEST BOX S1302/S1303/S1304:</u>
			S.P. type S1302/03/04 Test box
	X		<u>ARTIFICIAL KEY S1303/04:</u>
			S. P. type Artificial key S1303/S1304
X			<u>POWER METER:</u>
			Power range T1127 500W
			Power range T1130 250W
			Impedance 50 ohm
			E.g. Bird Thruline Wattmeter Model 43
			Plug-in element T1127 500W 2-30 MHz
			Plug-in element T1130 250W 2-30 MHz
X			<u>RF AMMETER (Thermocross):</u>
			Current range 5A
			E.g. Helweg Mikkelsen & Co. Copenhagen, Denmark type TR-68x71, 5A
	X		<u>DUMMY LOAD:</u>
			Impedance 50 ohm
			Frequency range 0-30 MHz
			Power range
			E.g. Fixed resistor 2 pcs. in parallel PHILIPS type 2322 212 13101

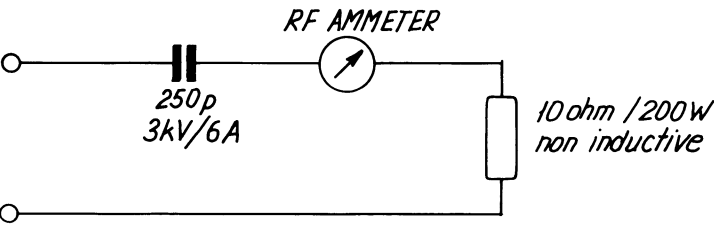
NECESSARY TEST EQUIPMENT cont.:

TX	EXC	RX	PS
X	X		
X			

DUMMY LOAD for HF bands, 4 - 25 MHz:

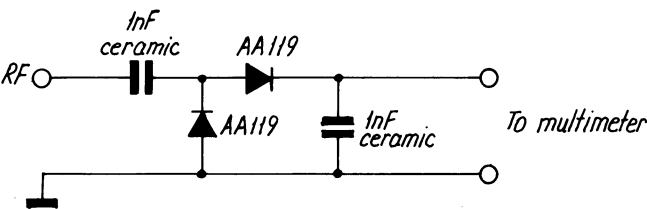
Impedance 50 ohm
Frequency range 4 - 25 MHz
Power range 400W
SWR 1:1.2
E.g. Bird Termaline Coaxial Resistor Model 8401

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

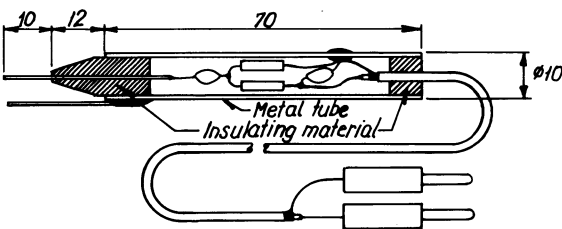


E.g. Draloric type 06-1291TD 20x50L 8KV 250 pF $\pm 20\%$ R85
E.g. 10 pcs. Dale type PH-25A-17, 100 ohm, 5%, 25W

DIODE PROBE



LAYOUT OF THE PROBE



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											
							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	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	1	0	0	1	1	0	0	0	0	0	0	0
3099.0	1C	1	0	0	1	0	0	0	0	0	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0	0	0	0	0	0
4299.0	1D	0	0	1	1	0	0	0	1	0	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0	0	0	0	0	0
6399.0	2A	0	1	0	0	1	0	0	1	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0	0	0	0	0	0
8499.0	2B	0	1	0	1	1	0	1	0	0	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0	0	0	0	0	0
12699.0	2C	0	1	1	0	0	0	1	1	0	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0	0	0	0	0	0
16899.0	2D	0	1	1	0	1	1	0	0	0	1	0	0	0	1	0	0	1	1	0	0	1	1	0	0	0	0	0	0	0
22399.0	3A	0	1	1	1	0	0	0	1	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0	0	0	0	0	0
25199.0	3B	1	1	0	1	0	0	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0	0	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 ± 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 ± 30 mV.

4.1.55.

Check that the meter reading on the aerial current meter is 2 ± 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.: (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 from serial No. 284451)

4.2.6.

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

4.2.7.

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

4.2.8.

Set switch S1302 in position normal.

4.2.9.

Switch the set off/on a number of 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 DC 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 named 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 Amp.

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 \pm 5 mA.

4.3.11.

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

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.

4.3.18.

Not used.

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 (15 Amps).

PERFORMANCE CHECK FOR T1130 cont.:

(Valid from serial No. 284451)

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.

4.3.24.

Check at each frequency that the current is 10 to 13 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 named tuning.

4.4.

CHECK OF TEMPERATURE PROTECTION UNIT (S1300).

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 room 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 +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 to serial No. 284451)

4.2.6.

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

4.2.7.

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

4.2.8.

Set switch S1302 in position normal.

4.2.9.

Switch the set off/on a number of 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 DC 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 named 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 Amp.

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 Amp.

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).

PERFORMANCE CHECK FOR T1130 cont.:

(Valid to serial No. 284451)

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.

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 named tuning.

4.4.

CHECK OF TEMPERATURE PROTECTION UNIT (S1300).

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 room 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 +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_A.

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.

ADJUSTMENT PROCEDURE FOR T1130
cont.:

(Valid from serial No. 284451)

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 named tuning in position manual.

5.3.5.
Adjust R1220 to a meter reading of 200 mA.

5.3.6.
Insert the ammeter in series with the driver supply +28V to T1213 and check that the current is 200 \pm 20 mA.

5.3.7.
Insert the ammeter in series with PA-supply +38V to T1214, and disconnect +38V to T1215.

5.3.8.
Set the switch named tuning in position manual.

5.3.9.
Adjust R1232 to a meter reading of 45 mA \pm 5 mA.

5.3.10.
Connect the two coax connectors at the rear of T1130.

5.3.11.
Not used.

5.3.12.
ADJUSTMENT OF DRIVE LEVEL.

5.3.13.
Disconnect the coax cable RF in from PA on filter switch/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), and disconnect +38V to T1215.

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. has 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.
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.

5.4.3.
Measure the heat sink temperature (room temperature).

ADJUSTMENT PROCEDURE FOR T1130
cont.:

(Valid from serial No. 284451)

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 IC1301.

5.4.5.

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

ADJUSTMENT PROCEDURE FOR T1130
cont.:

(Valid to serial No. 284451)

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 named 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 \pm 20 mA.

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

5.3.8.
Set the switch named 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 \pm 20 mA.

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

5.3.12.
ADJUSTMENT OF DRIVE LEVEL.

5.3.13.
Disconnect the coax cable RF in from PA on filter switch/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.

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.

5.4.3.
Measure the heat sink temperature (room temperature).

ADJUSTMENT PROCEDURE FOR T1130
cont.:

(Valid to serial No. 284451)

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 IC1301.

5.4.5.

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

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.

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

8.1. FUNCTION CHECK FOR T1130 50 OHMS VERSION.

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

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.

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

8. HOW TO MODIFY T1130 TO WORK INTO A 50 OHMS AERIAL WITHOUT THE AERIAL COUPLER AT1500.

The transmitter T1130 can work without the aerial coupler AT1500 and still fulfil the requirements given by CEPT and MPT1224 etc.

Following modifications have to be done:

1. Cut the 22 kohm resistor R346 on module 300, see fig. 1.
2. Connect your 50 ohms antenna cable to the terminal labelled AT1500 in the connection box H1233.

When this modification has been carried out, the SWR Safety system in the transmitter will still be operative. If the Load SWR is higher than 2, the output power will be reduced to guarantee safe operation.

OPERATION INSTRUCTIONS

Key-in the frequency and push the tune button.

The transmitter is ready to transmit when the tune lamp extinguishes (within 1.5 sec.).

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/ DANOTHERM	NHS 25
R102	Resistor	100 ohm 5%	25W	ARCOL/ DANOTHERM	NHS 25
R103	Resistor	100 ohm 5%	25W	ARCOL/ DANOTHERM	NHS 25
R104	Resistor	100 ohm 5%	25W	ARCOL/ DANOTHERM	NHS 25
R105	Resistor	100 ohm 5%	25W	ARCOL/ DANOTHERM	NHS 25
R106	Resistor	100 ohm 5%	25W	ARCOL/ DANOTHERM	NHS 25
R107	Resistor	22 ohm <u>+5%</u>	25W	ARCOL/ DANOTHERM	HS 25
R108	Resistor	82 ohm <u>+5%</u>	10W	ARCOL/ 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

MODULE NO: 200

b INPUT FILTER UNIT T1130 1/2					
<i>Symbol</i>	<i>Description</i>			<i>Manufact.</i>	
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-O1104-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

Symbol	Description			Manufact.	
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

MODULE NO: 300

D

TRANSMITTER CONTROL UNIT T1130

1/7

Symbol	Description			Manufact.	
C301	Capacitor polyester	100 nF $\pm 10\%$	100V	Siemens	B325 10-D1104-K
C302	Capacitor polyester	100 nF $\pm 10\%$	100V	Siemens	B325 10-D1104-K
C303	Capacitor polyester	680 nF $\pm 10\%$	100V	Siemens	B32560-D1684-K
C304	Capacitor polyester	150 nF $\pm 10\%$	100V	Siemens	B325 10-D1154-K
C305	Capacitor polyester	10 nF $\pm 10\%$	400V	Siemens	B325 10-D6103-K
C306	Capacitor polyester	47 nF $\pm 10\%$	250V	Siemens	B325 10-D3473-K
C307	Capacitor polyester	1 nF $\pm 10\%$	400V	Siemens	B325 10-D6102-K
C308	Capacitor polyester	1 nF $\pm 10\%$	400V	Siemens	B325 10-D6102-K
C309	Capacitor polyester	3.3 nF $\pm 10\%$	400V	Siemens	B325 10-D6332-K
C310	Capacitor polyester	470 nF $\pm 10\%$	100V	Siemens	B32560-D1474-K
C311	Capacitor polyester	1 nF $\pm 10\%$	400V	Siemens	B325 10-D6102-K
C312	Capacitor electrolytic	10 uF	35V	ERO	EKI 00 AA 210F
C313	Capacitor polyester	10 nF $\pm 10\%$	400V	Siemens	B325 10-D6103-K
C314	Capacitor electrolytic	10 uF	35V	ERO	EKI 00 AA 210F
C315	Capacitor polyester	100 nF $\pm 10\%$	100V	Siemens	B325 10-D1104-K
C316	Capacitor polyester	3.3 nF $\pm 10\%$	400V	Siemens	B325 10-D6332-K
C317	Capacitor polyester	100 nF $\pm 10\%$	100V	Siemens	B325 10-D1104-K
C318	Capacitor polyester	100 nF $\pm 10\%$	100V	Siemens	B325 10-D1104-K
C319	Capacitor polyester	1 nF	400V	Siemens	B325 10-D6102-K
C320	Capacitor polyester	1 nF $\pm 10\%$	400V	Siemens	B325 10-D6102-K
C321	Capacitor polyester	1 nF $\pm 10\%$	400V	Siemens	B325 10-D6102-K
C322	Capacitor polyester	1 uF $\pm 10\%$	250V	Siemens	B325 13-D3105-K
C323	Capacitor polyester	10 nF $\pm 10\%$	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 $\pm 10\%$	100V	Siemens	B32560-D1224-K
C328	Capacitor polyester	100 nF $\pm 10\%$	100V	Siemens	B325 10-D1104-K
C329	Capacitor polyester	100 nF $\pm 10\%$	100V	Siemens	B325 10-D1104-K
C330	Capacitor polyester	100 nF $\pm 10\%$	100V	Siemens	B325 10-D1104-K
C331	Capacitor polyester	10 nF $\pm 10\%$	400V	Siemens	B325 10-D6103-K
C332	Capacitor polyester	10 nF $\pm 10\%$	400V	Siemens	B325 10-D6103-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

D		TRANSMITTER CONTROL UNIT T1130			2/7	
Symbol	Description			Manufact.		
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	
D336	Diode			Philips	BAV21	
RA301	Resistor array	8x10 kohm <u>+5%</u>	0.125W	ITT	UR8 10 kohm <u>+5%</u>	
R301	Resistor	22 kohm <u>+5%</u>	0.33W	Philips	2322 211 13223	
R302	Preset potmeter	10 kohm		Philips	2322 410 03357	
R303	Resistor	1.5 kohm <u>+5%</u>	0.33W	Philips	2322 211 13152	
R304	Resistor	820 ohm <u>+5%</u>	0.33W	Philips	2322 211 13821	
R305	Resistor	5.6 kohm <u>+5%</u>	0.33W	Philips	2322 211 13562	

MODULE NO: 300

c TRANSMITTER CONTROL UNIT T1130 3/7

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

D							TRANSMITTER CONTROL UNIT T1130							4/7	
Symbol		Description					Manufact.								
R347	Resistor	100 kohm	$\pm 5\%$	0.33W	Beysclag	MBA 0204-55-BX									
R348	Resistor	100 kohm	$\pm 5\%$	0.33W	Beysclag	MBA 0204-55-BX									
R349	Resistor	39 kohm	$\pm 5\%$	0.33W	Philips	2322 211 13393									
R350	Resistor	68 kohm	$\pm 5\%$	0.33W	Beysclag	MBA 0204-55-BX									
R351	Resistor	100 kohm	$\pm 5\%$	0.33W	Beysclag	MBA 0204-55-BX									
R352	Resistor	100 kohm	$\pm 5\%$	0.33W	Beysclag	MBA 0204-55-BX									
R353	Resistor	10 Mohm	$\pm 5\%$	0.33W	Philips	2322 211 12106									
R354	Resistor	47 kohm	$\pm 5\%$	0.33W	Beysclag	MBA 0204-55-BX									
R355	Resistor	100 kohm	$\pm 5\%$	0.33W	Beysclag	MBA 0204-55-BX									
R356	Resistor	33 kohm	$\pm 5\%$	0.33W	Beysclag	MBA 0204-55-BX									
R357	Resistor	10 kohm	$\pm 5\%$	0.33W	Beysclag	MBA 0204-55-BX									
R358	Resistor	10 kohm	$\pm 5\%$	0.33W	Beysclag	MBA 0204-55-BX									
R359	Resistor	22 kohm	$\pm 5\%$	0.33W	Beysclag	MBA 0204-55-BX									
R360	Resistor	1 Mohm	$\pm 5\%$	0.33W	Beysclag	MBA 0204-55-BX									
R361	Resistor	10 kohm	$\pm 5\%$	0.33W	Philips	2322 211 13103									
R362	Resistor	3.3 kohm	$\pm 5\%$	0.33W	Philips	2322 211 13334									
R363	Resistor	15 kohm	$\pm 5\%$	0.33W	Beysclag	MBA 0204-55-BX									
R364	Resistor	10 kohm	$\pm 5\%$	0.33W	Beysclag	MBA 0204-55-BX									
R365	Resistor	10 kohm	$\pm 5\%$	0.33W	Beysclag	MBA 0204-55-BX									
R366															
R367	Resistor	10 kohm	$\pm 5\%$	0.33W	Beysclag	MBA 0204-55-BX									
R368	Resistor	18 kohm	$\pm 5\%$	0.33W	Philips	2322 211 13183									
R369	Resistor	10 kohm	$\pm 5\%$	0.33W	Philips	2322 211 13103									
R370	Resistor	100 kohm	$\pm 5\%$	0.33W	Philips	2322 211 13104									
R371	Resistor	5.6 kohm	$\pm 5\%$	0.33W	Beysclag	MBA 0204-55-BX									
R372	Resistor	10 kohm	$\pm 5\%$	0.33W	Philips	2322 211 13103									
R373	Resistor	10 kohm	$\pm 5\%$	0.33W	Beysclag	MBA 0204-55-BX									
R374	Resistor	10 kohm	$\pm 5\%$	0.33W	Beysclag	MBA 0204-55-BX									
R375	Resistor	10 kohm	$\pm 5\%$	0.33W	Beysclag	MBA 0204-55-BX									
R376	Resistor	5.6 kohm	$\pm 5\%$	0.33W	Beysclag	MBA 0204-55-BX									
R377	Resistor	5.6 kohm	$\pm 5\%$	0.33W	Beysclag	MBA 0204-55-BX									
R378	Resistor	680 ohm	$\pm 5\%$	0.33W	Beysclag	MBA 0204-55-BX									
R379	Resistor	5.6 kohm	$\pm 5\%$	0.33W	Beysclag	MBA 0204-55-BX									
R380	Resistor	150 ohm	$\pm 5\%$	1.15W	Philips	2322 214 13151									
R381	Resistor	1 kohm	$\pm 5\%$	0.33W	Philips	2322 211 13102									
R382	Resistor	1.8 kohm	$\pm 5\%$	0.33W	Beysclag	MBA 0204-55-BX									
R383	Resistor	10 kohm	$\pm 5\%$	0.33W	Beysclag	MBA 0204-55-BX									
R384	Resistor	2.2 Mohm	$\pm 5\%$	0.33W	Beysclag	MBA 0204-55-BX									
R385	Resistor	10 kohm	$\pm 5\%$	0.33W	Philips	2322 211 13103									
R386	Resistor	3.9 Mohm	$\pm 5\%$	0.33W	Beysclag	MBA 0204-55-BX									
R387	Resistor	3.3 kohm	$\pm 5\%$	0.33W	Philips	2322 211 13332									

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

E

TRANSMITTER CONTROL UNIT T1130

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<i>Symbol</i>	<i>Description</i>			<i>Manufact.</i>	
R330a	Resistor	820 ohm $\pm 5\%$	0.33W	Philips	2322 211 13821
R331a	Resistor	3.3 kohm $\pm 5\%$	0.33W	Philips	2322 211 13332
R332a	Resistor	100 kohm $\pm 5\%$	0.33W	Philips	2322 211 13104
R333a	Resistor	1 Mohm $\pm 5\%$	0.33W	Philips	2322 211 13105
R334a	Preset potmeter	100 ohm		Philips	2322 410 03352
R335a	Resistor	100 kohm $\pm 5\%$	0.33W	Philips	2322 211 13104
R336a	Resistor	10 kohm $\pm 5\%$	0.33W	Philips	2322 211 13103
R337a	Resistor	10 kohm $\pm 5\%$	0.33W	Philips	2322 211 13103
R338a	Resistor	120 ohm $\pm 5\%$	0.33W	Philips	2322 211 13121
R339a	Resistor	120 kohm $\pm 5\%$	0.33W	Philips	2322 211 13124
R340a	Resistor	2.7 kohm $\pm 5\%$	0.33W	Beysclag	MBA 0204-55-BX
R341a	Resistor	2.7 kohm $\pm 5\%$	0.33W	Beysclag	MBA 0204-55-BX
R342a	Resistor	82 ohm $\pm 5\%$	0.33W	Philips	2322 211 13829
R343a	Resistor	2.7 kohm $\pm 5\%$	0.33W	Beysclag	MBA 0204-55-BX
R344a	Resistor	2.7 kohm $\pm 5\%$	0.33W	Beysclag	MBA 0204-55-BX
R345a	Resistor	2.7 kohm $\pm 5\%$	0.33W	Beysclag	MBA 0204-55-BX
R346a	Resistor	2.7 kohm $\pm 5\%$	0.33W	Beysclag	MBA 0204-55-BX
R347a	Resistor	2.7 kohm $\pm 5\%$	0.33W	Beysclag	MBA 0204-55-BX
R348a	Resistor	2.7 kohm $\pm 5\%$	0.33W	Beysclag	MBA 0204-55-BX
R349a	Resistor	2.7 kohm $\pm 5\%$	0.33W	Beysclag	MBA 0204-55-BX
R350a	Resistor	10 kohm $\pm 5\%$	0.33W	Philips	2322 211 13103
R351a	Resistor	10 kohm $\pm 5\%$	0.33W	Philips	2322 211 13103
R352a	Resistor	10 kohm $\pm 5\%$	0.33W	Philips	2322 211 13103
R353a	Resistor	10 kohm $\pm 5\%$	0.33W	Philips	2322 211 13103
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

MODULE NO: 300

c TRANSMITTER CONTROL UNIT T1130 7/7			
<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 ± 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

MODULE NO: 400

a FILTER SWITCH/DIRECTIONAL COUPLER T1130 2/2

Symbol	Description	Manufact.	
R4 10	Resistor 100 kohm $\pm 5\%$ 0.33W	Philips	2322 211 13104
R4 11	Resistor 100 kohm $\pm 5\%$ 0.33W	Philips	2322 211 13104
R4 12	Resistor 150 kohm $\pm 5\%$ 0.33W	Philips	2322 211 13154
R4 13	Resistor 150 kohm $\pm 5\%$ 0.33W	Philips	2322 211 13154
R4 14	Resistor 220 kohm $\pm 5\%$ 0.33W	Philips	2322 211 13224
R4 15	Resistor 1 kohm $\pm 5\%$ 0.33W	Philips	2322 211 13102
R4 16	Resistor 2.7 Mohm $\pm 5\%$ 0.33W	Philips	2322 211 12275
R4 17	Resistor 100 kohm $\pm 5\%$ 0.33W	Philips	2322 211 13104
R4 18	Resistor 100 kohm $\pm 5\%$ 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

1/4

Symbol	Description			Manufact.	
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

MODULE NO: 500

a

TUNER CONTROL UNIT T1130

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

b

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

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

Symbol	Description	Manufact.
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
Symbol	Description		Manufact.	
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	

b

P.A. UNIT T1130

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Symbol	Description				Manufact.	
C1241	Capacitor polypropylen	100 nF 10%	100V	ERO	MKT 184 1-4 10-01	
C1242	Capacitor polypropylen	100 nF 10%	100V	ERO	MKT 184 1-4 10-01	
C1243	Capacitor polypropylen	100 nF 10%	100V	ERO	MKT 184 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	EK100AA110H	
C1256	Capacitor electrolytic	10 uF	63V	ROE	EB00CA210J	
C1257	Capacitor electrolytic	10 uF	63V	ROE	EB00CA210J	
C1258	Capacitor electrolytic	470 uF	40V	ROE	EB00HE347G	
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

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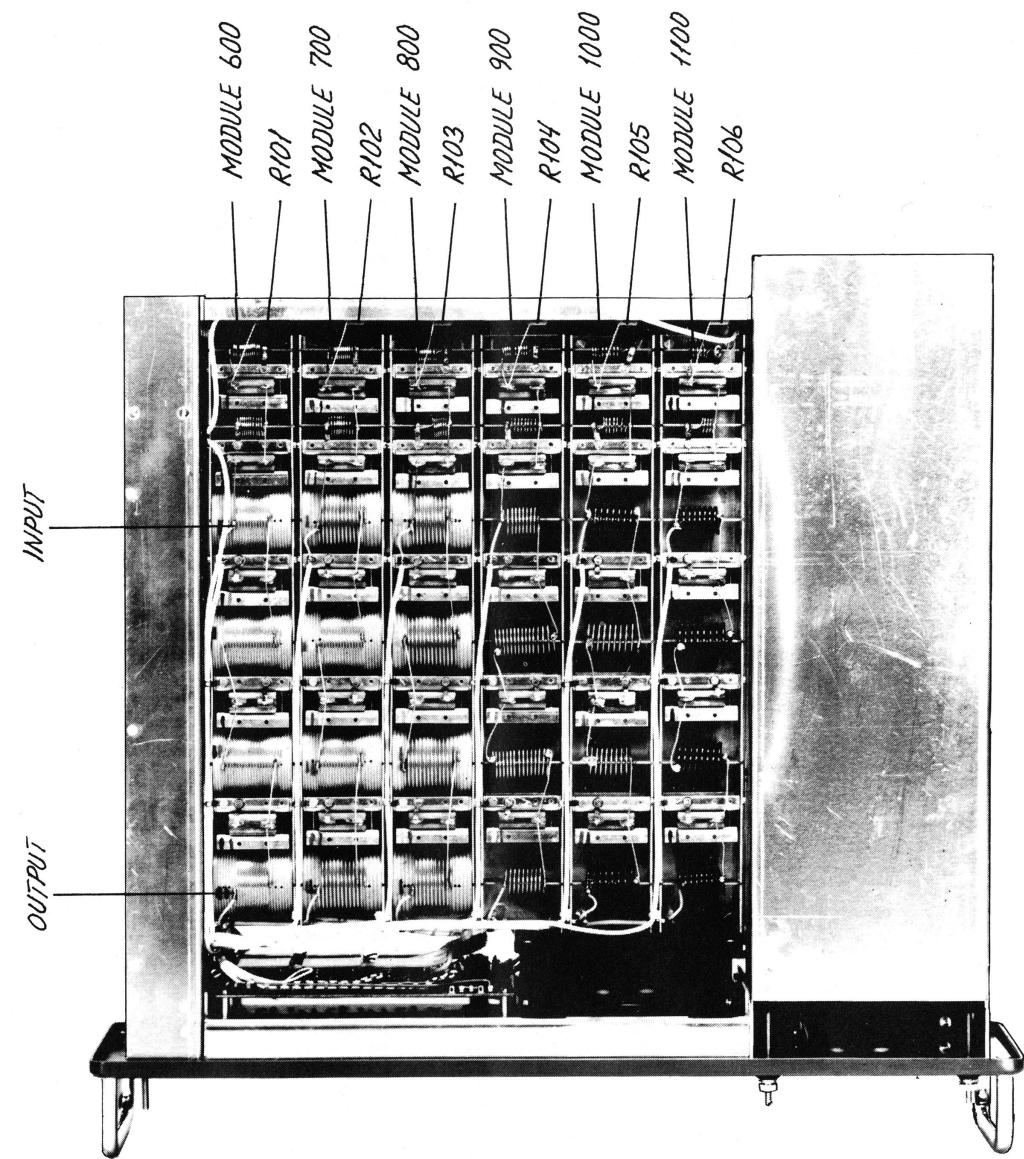
Symbol	Description				Manufact.	
R1225	Resistor	8.2 ohm 5%	0.33W	Philips	2322 211 13828	
R1226	Resistor	2.2 ohm 5%	0.33W	Philips	2322 211 13228	
R1227	Resistor	2.2 ohm 5%	0.33W	Philips	2322 211 13228	
R1228	Resistor	18 ohm 5%	0.33W	Philips	2322 211 13189	
R1229	Resistor	18 ohm 5%	0.33W	Philips	2322 211 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	

MODULE NO: 1200

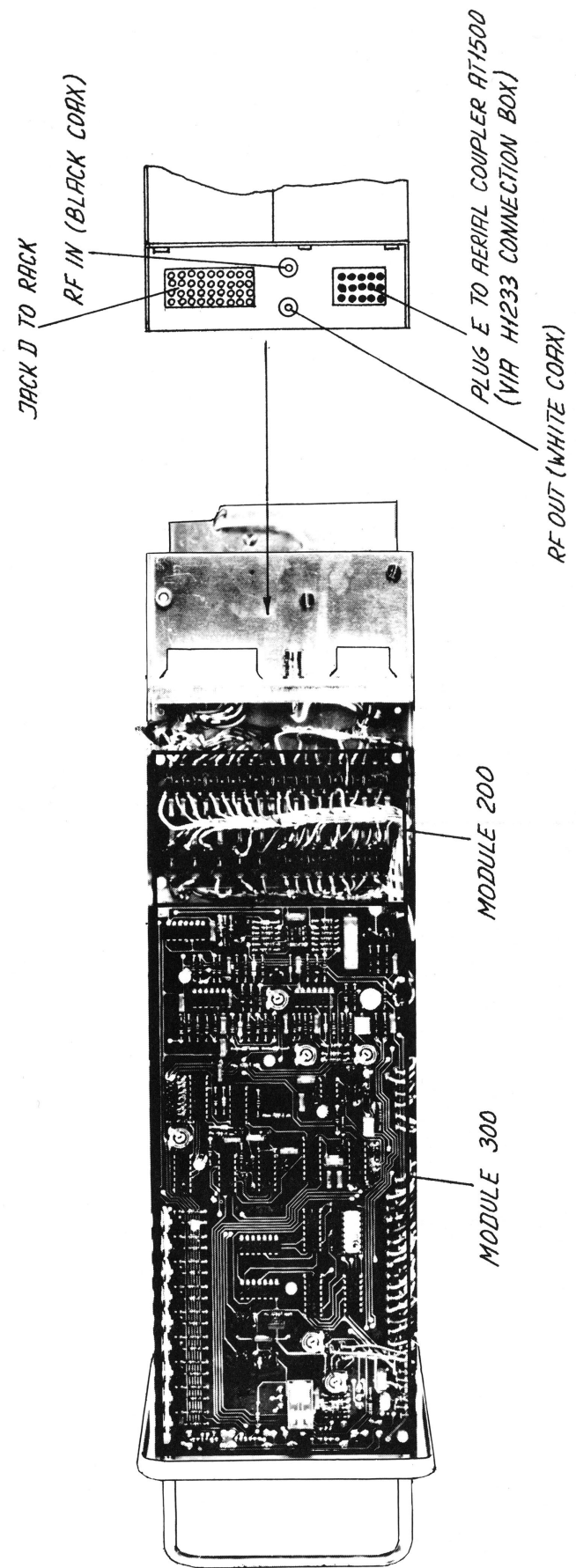
a P.A. UNIT T1130 4/4			
Symbol	Description	Manufact.	
L1207	Coil	S.P.	TL306
L1208	Coil	S.P.	TL306
L1209	Coil	S.P.	TL305
L1210	Coil	S.P.	TL305
L1211	Coil	S.P.	TL304
L1212	Coil	S.P.	TL304
L1213	Coil	S.P.	TL301
L1214	Coil	S.P.	TL301
TR1201	Transformer	S.P.	TL308
TR1202	Transformer	S.P.	TL307
TR1203	Transformer	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	$\pm 10\%$	Siemens	B325 10-D1104-K
C1302	Capacitor polyester	100 nF	$\pm 10\%$	Siemens	B325 10-D1104-K
C1303	Capacitor polyester	100 nF	$\pm 10\%$	Siemens	B325 10-D1104-K
C1304	Capacitor polyester	100 nF	$\pm 10\%$	Siemens	B325 10-D1104-K
R1301	Resistor	18.2 kohm	$\pm 1\%$	0.4W Philips	2322 151 51823
R1302	Resistor	18.2 kohm	$\pm 1\%$	0.4W Philips	2322 151 51823
R1303	Resistor	191 ohm	$\pm 1\%$	0.4W Philips	2322 151 51911
R1304	Resistor	1.65 kohm	$\pm 1\%$	0.4W Philips	2322 151 51652
R1305	Preset potentiometer	22 kohm	$\pm 10\%$	AB	HC 10-22k 10%
R1306	Resistor	680 kohm	$\pm 5\%$	0.33W Philips	2322 211 13684
R1307	Resistor	680 kohm	$\pm 5\%$	0.33W Philips	2322 211 13684
R1308	Resistor	15 kohm	$\pm 1\%$	0.4W Philips	2322 151 51503
R1309	Resistor	33 kohm	$\pm 5\%$	0.33W Philips	2322 211 13333
R1310	Resistor	33 kohm	$\pm 5\%$	0.33W Philips	2322 211 13333
R1311	Resistor	33 kohm	$\pm 5\%$	0.33W Philips	2322 211 13333
R1312	Resistor	33 kohm	$\pm 5\%$	0.33W Philips	2322 211 13333
R1313	Resistor	6.8 kohm	$\pm 5\%$	0.33W Philips	2322 211 13682
R1314	Resistor	22 ohm	$\pm 5\%$	0.33W Philips	2322 211 13229
R1315	Resistor	6.8 kohm	$\pm 5\%$	0.33W Philips	2322 211 13682
R1316	Resistor	22 ohm	$\pm 5\%$	0.33W Philips	2322 211 13229
R1317	Resistor	22 ohm	$\pm 5\%$	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

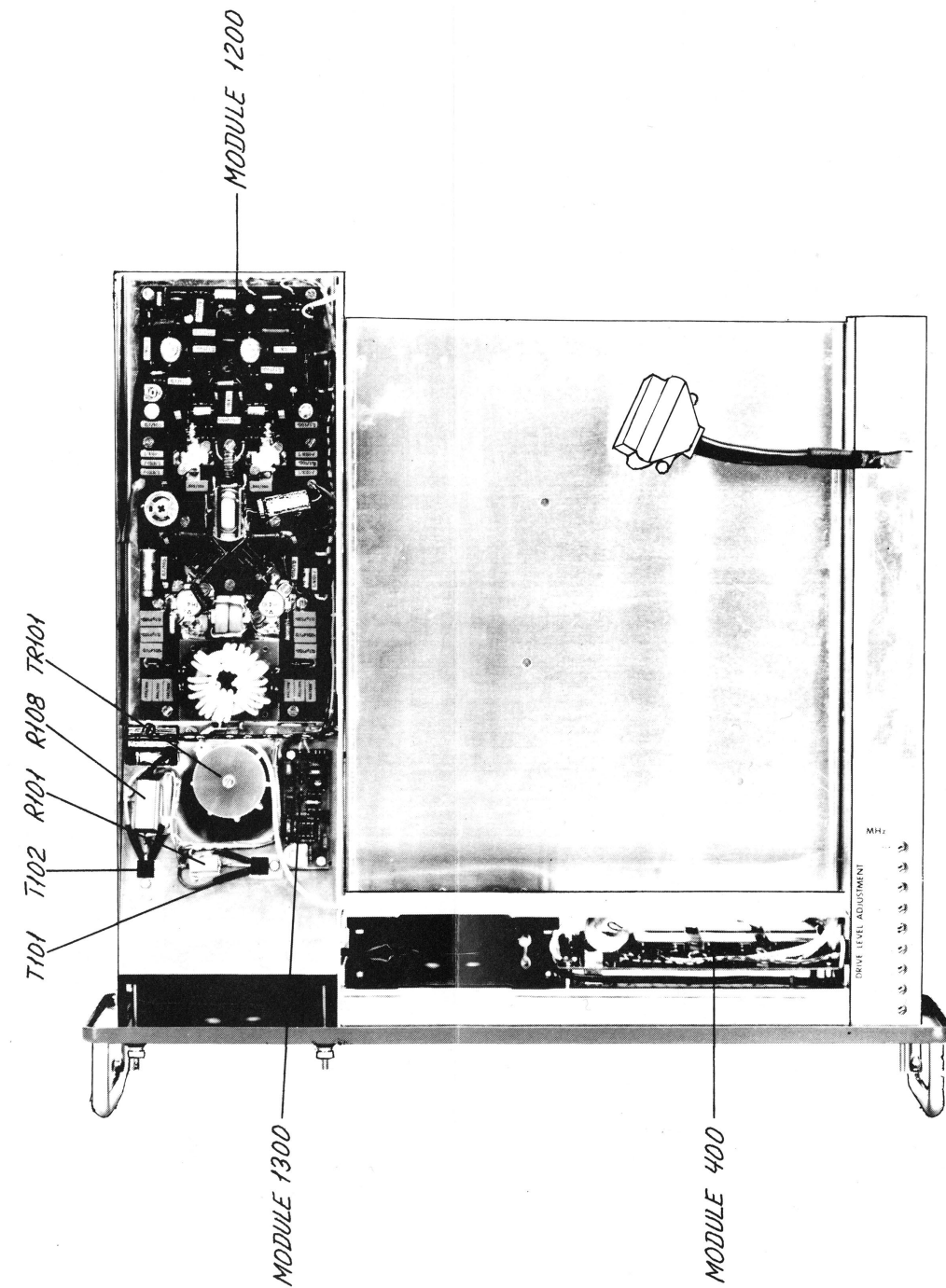
CIRCUIT DESCRIPTIONS AND SCHEMATIC DIAGRAMS



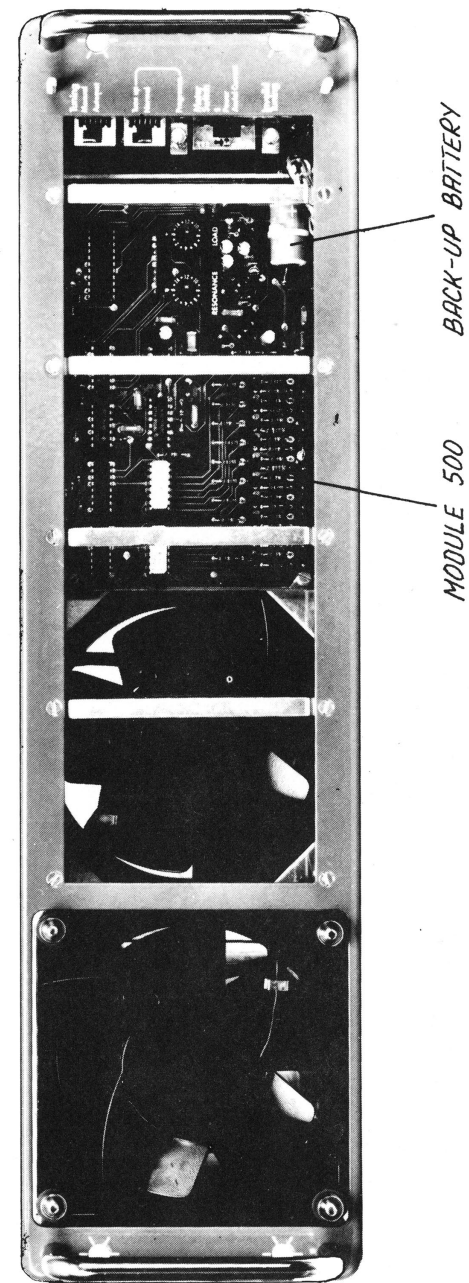
BOTTOM VIEW



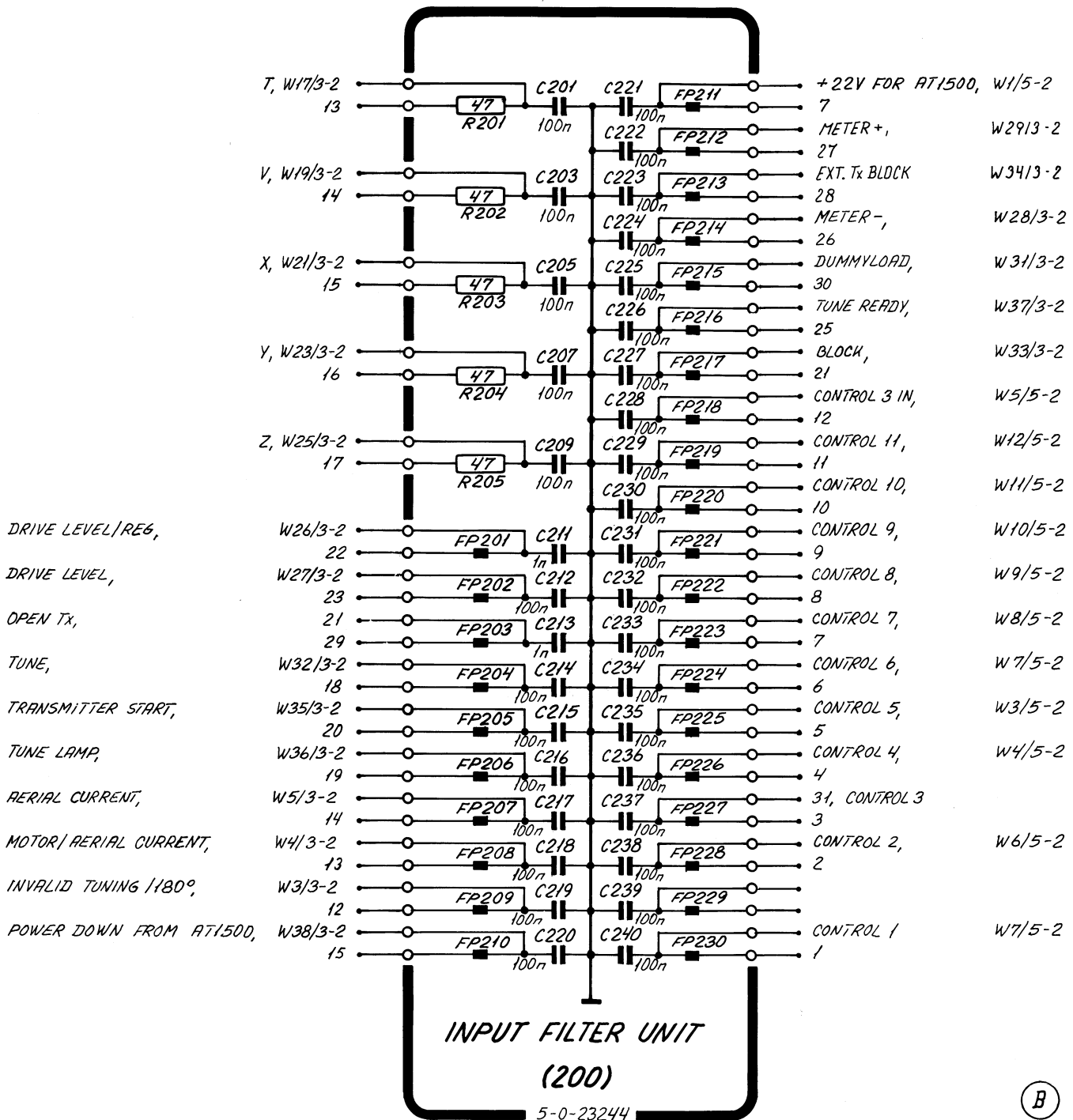
RIGHT SIDE VIEW



TOP VIEW



FRONT VIEW



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 = 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 variate 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 $VSWR = 1.5$: on the next it will be $VSWR = 1.7$ 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.

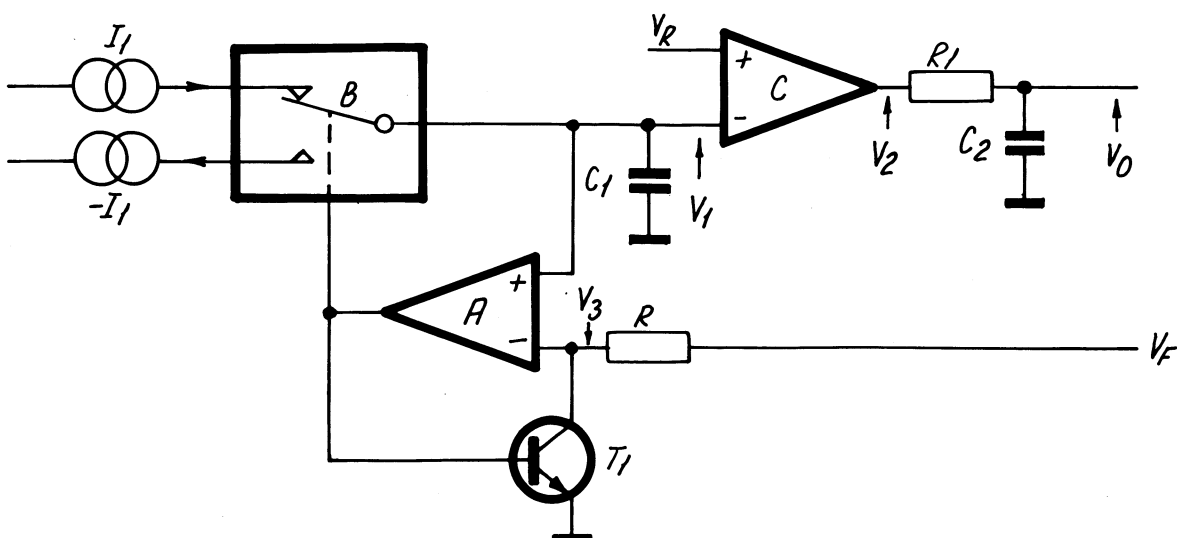
When the transmitter is blocked, the tune lamp on the exciter will wink to indicate that the transmitter is blocked. To cancel the blocking of the transmitter a tune pulse is needed.

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

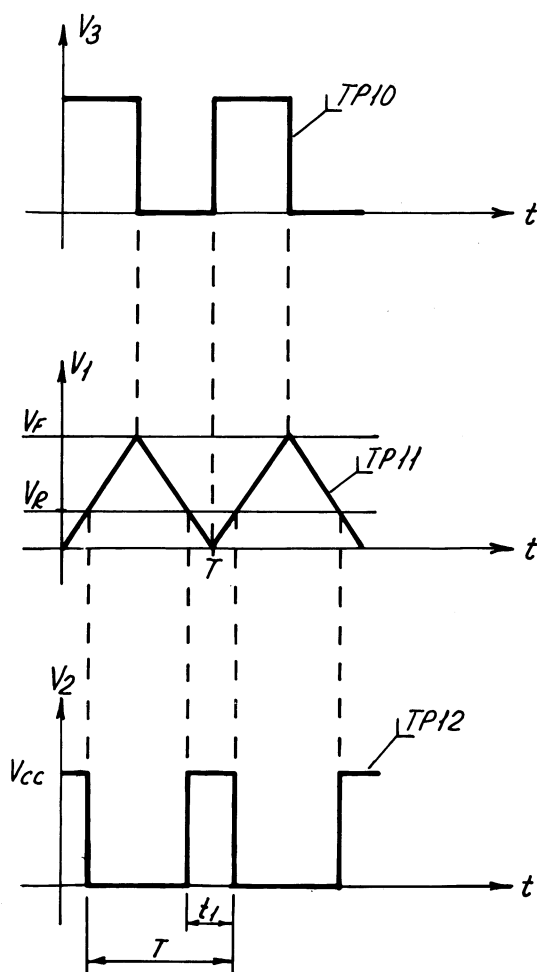


C₁ is charged (IC316b, T317) or discharged (IC316a, T316) with a constant current, depending on the position of the analog switch B (IC317) which is controlled by the comparator A. When V₁ is less than V_F, C₁ is charged with I₁ until V₁ = V_F then B switches and C₁ is discharged with -I₁ and T₁ is switched on. C₁ is discharging until V₁ = 0. V₁ 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).

V₁ is compared with V_R in comparator C (IC311b). The output V₂ has same periode time as V₁ and a pulse with t₁ depending on V_R $t_1 = \frac{2 \times V_R \times C_1}{C_1}$ (see wave forms below).

V₂ is fed into mean value detector R₁ and C₂. The mean value of V₂ is $\frac{V_{CC} \times t_1}{T} = V_{CC} \times \frac{V_R}{V_F} = V_O$.

This means that V_O 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

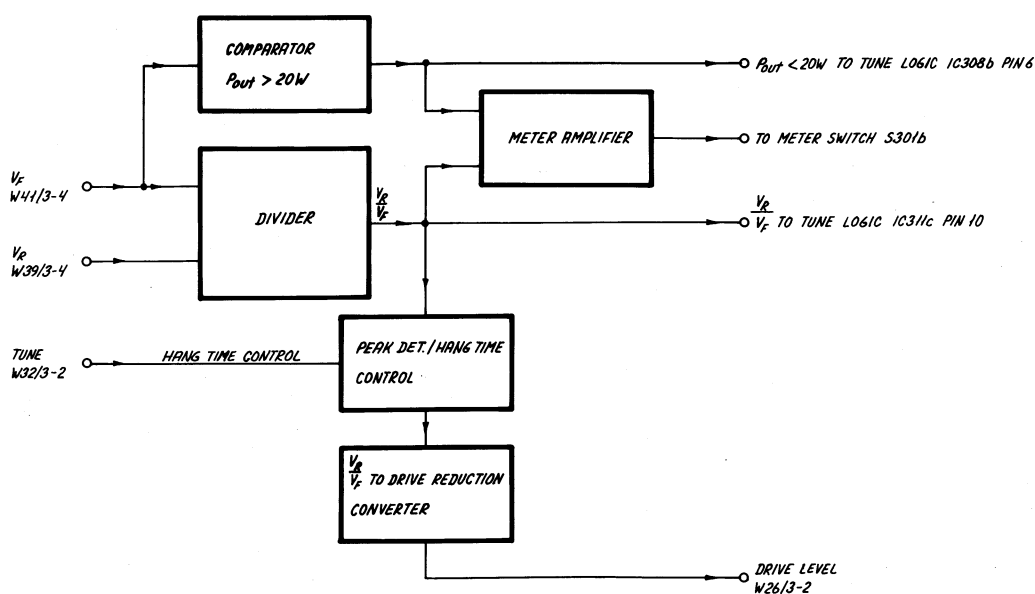
$V_{CC} \times \frac{V_R}{V_F} = 0$ then the output voltage is 13.5V and when $V_{CC} \times \frac{V_R}{V_F} = V_{CC}$ the output voltage is zero.

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.

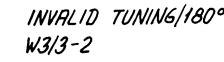
The output of the peak detector is fed to a voltage to current converter (IC307a, T322). The output of this is connected to the drive level adjusting circuit. When the current floating through T322 is zero the drive level is max. When the current floating through T322 is 23 mA the drive level is reduced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

BLOCK DIAGRAM WSWR CALCULATOR



VALID UP TO SERIAL No. 307246



$\frac{V_R}{V_F}$ FROM $\frac{V_R}{V_F}$ CALCULATOR
IC311b PIN 1

$P_{out} < 20W$ FROM $\frac{V_R}{V_F}$ CALCULATOR, IC311d PIN 14

BLOCK, W33/3-2

EXT BLOCK, W34/3-2

+22V

TUNE, W32/3-2

TUNE LAMP, W36/3-2

TUNE READY

INVALID TUNING/180°, W3/3-2

MOTOR/AERIAL CURRENT

(1) RESET TO REFERENCE COUNTER

(2) CLOCK TO REFERENCE COUNTER

(3) TUNE START

(4) BLOCK

(0) V_{cc} BLOCK

(5) REFERENCE

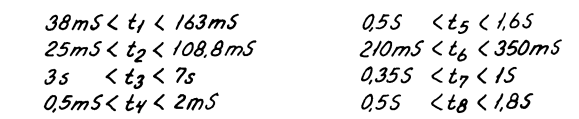
(6)

(7)

(8)

TRANSMITTER START IN

TRANSMITTER START OUT

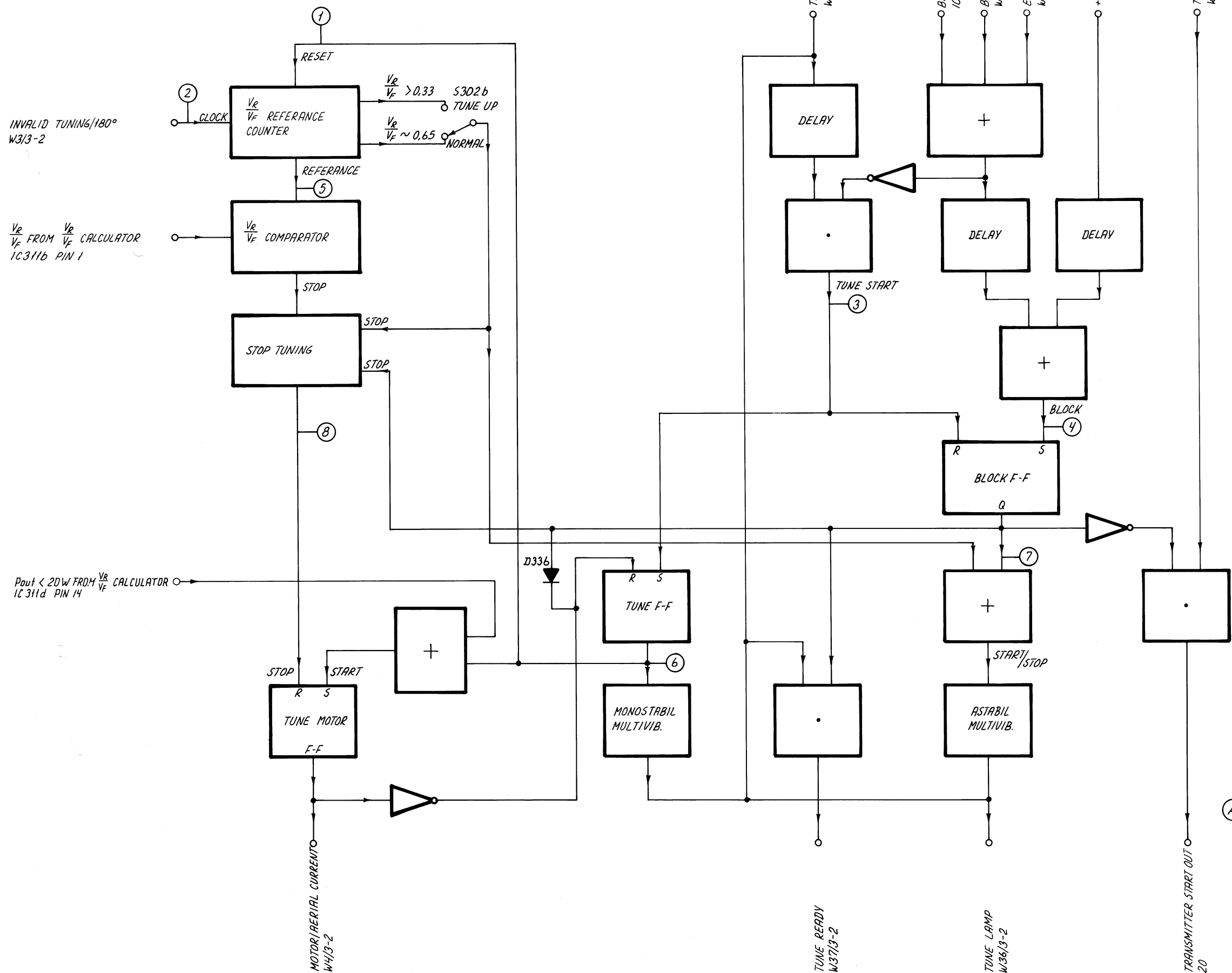


20 TR

BLOCK DIAGRAM

TUNE LOGIC

VALID FROM SERIAL No. 30 7246



TIME TABLE FOR TUNING SEQUENCE

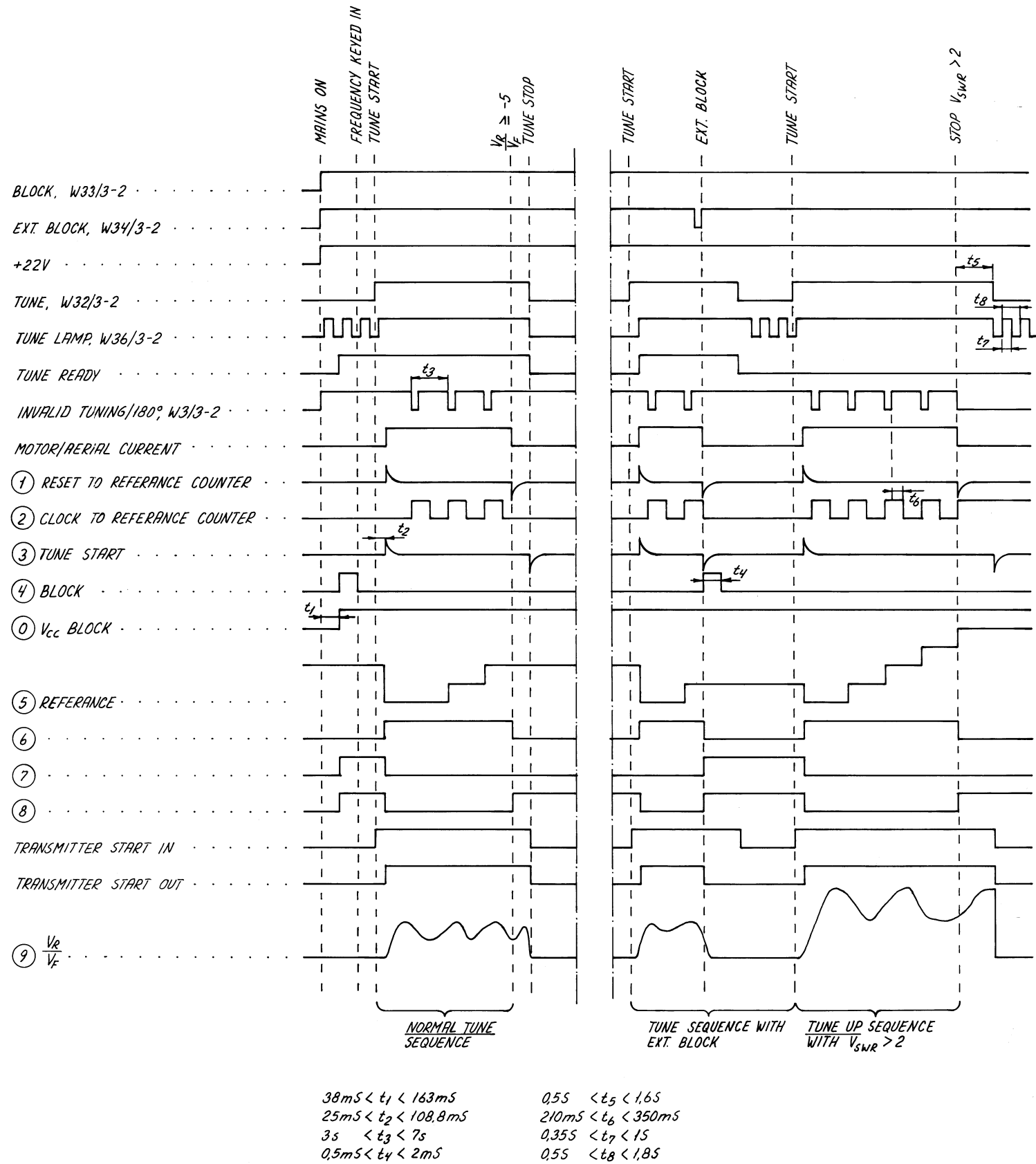
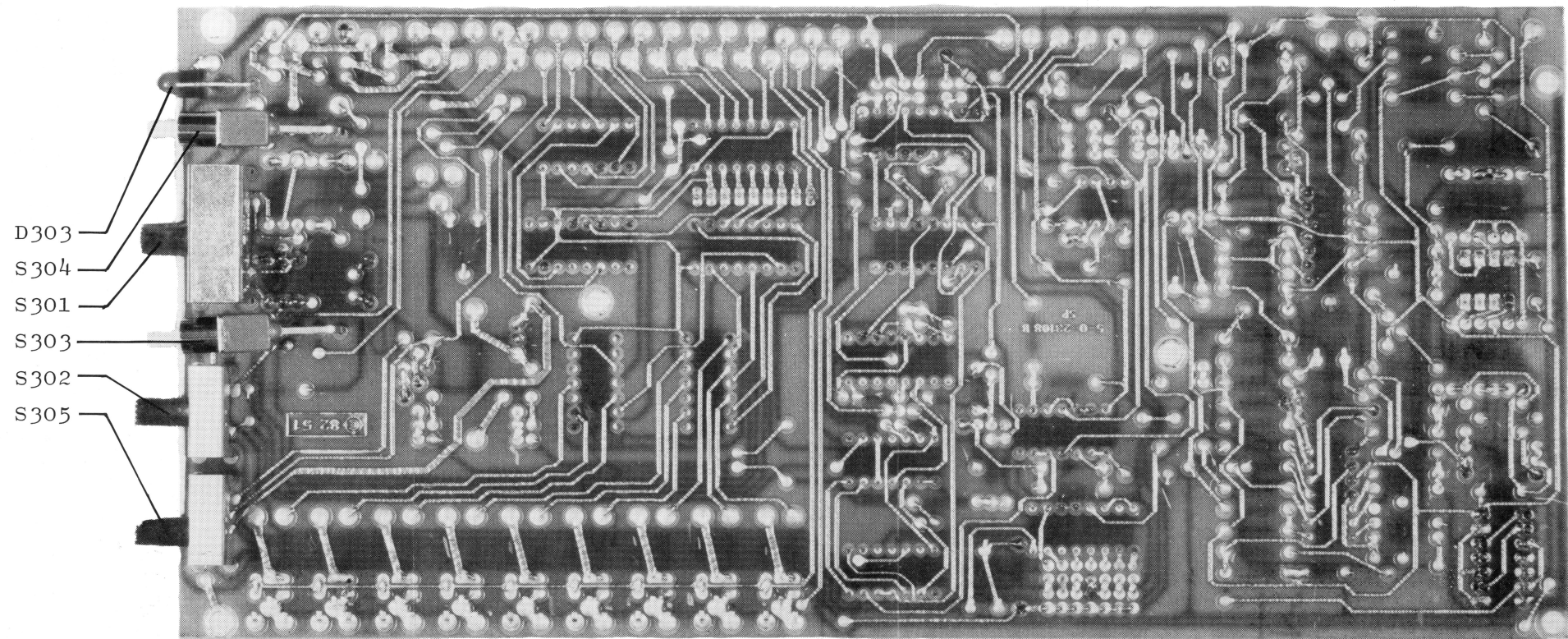
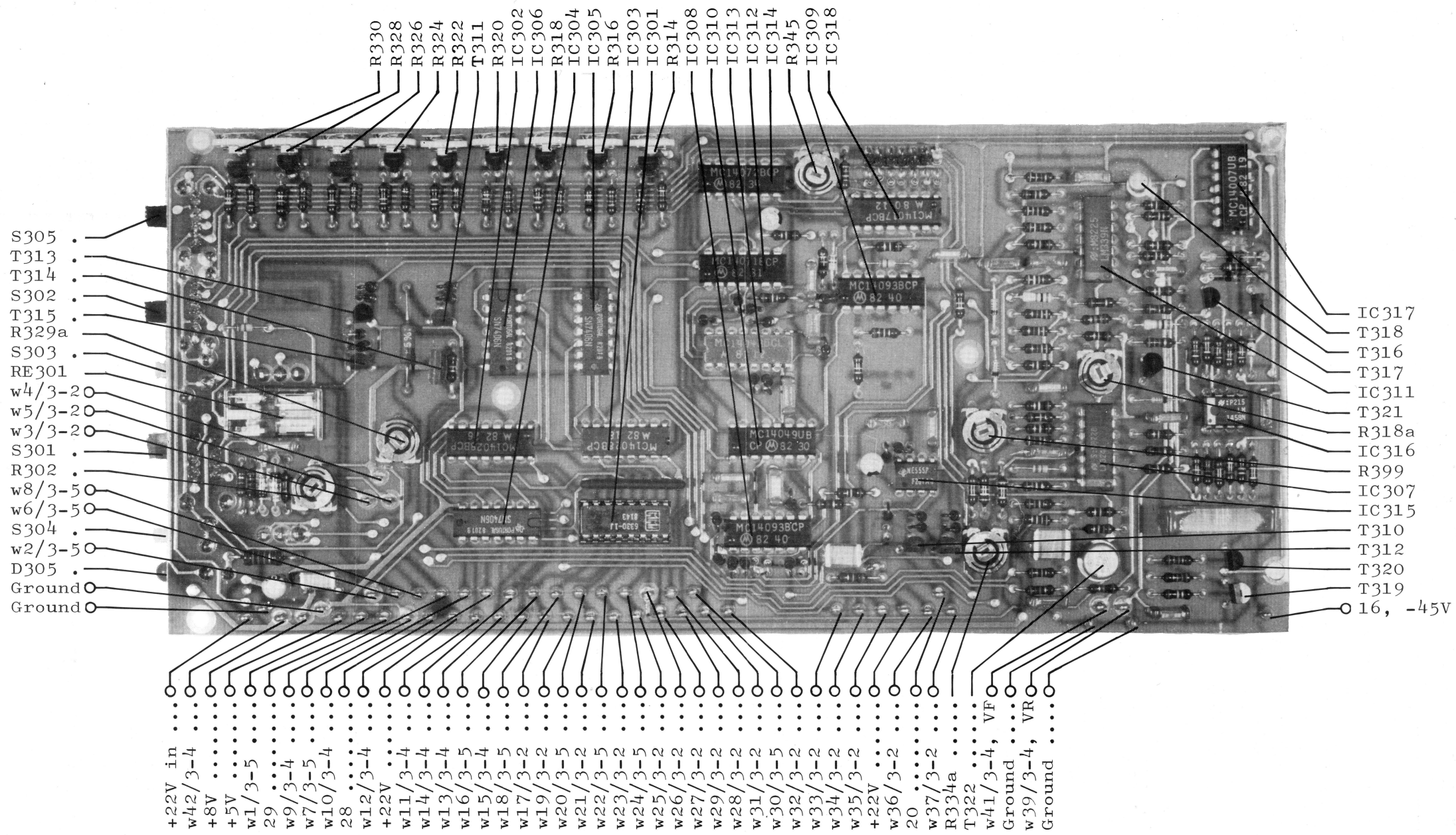


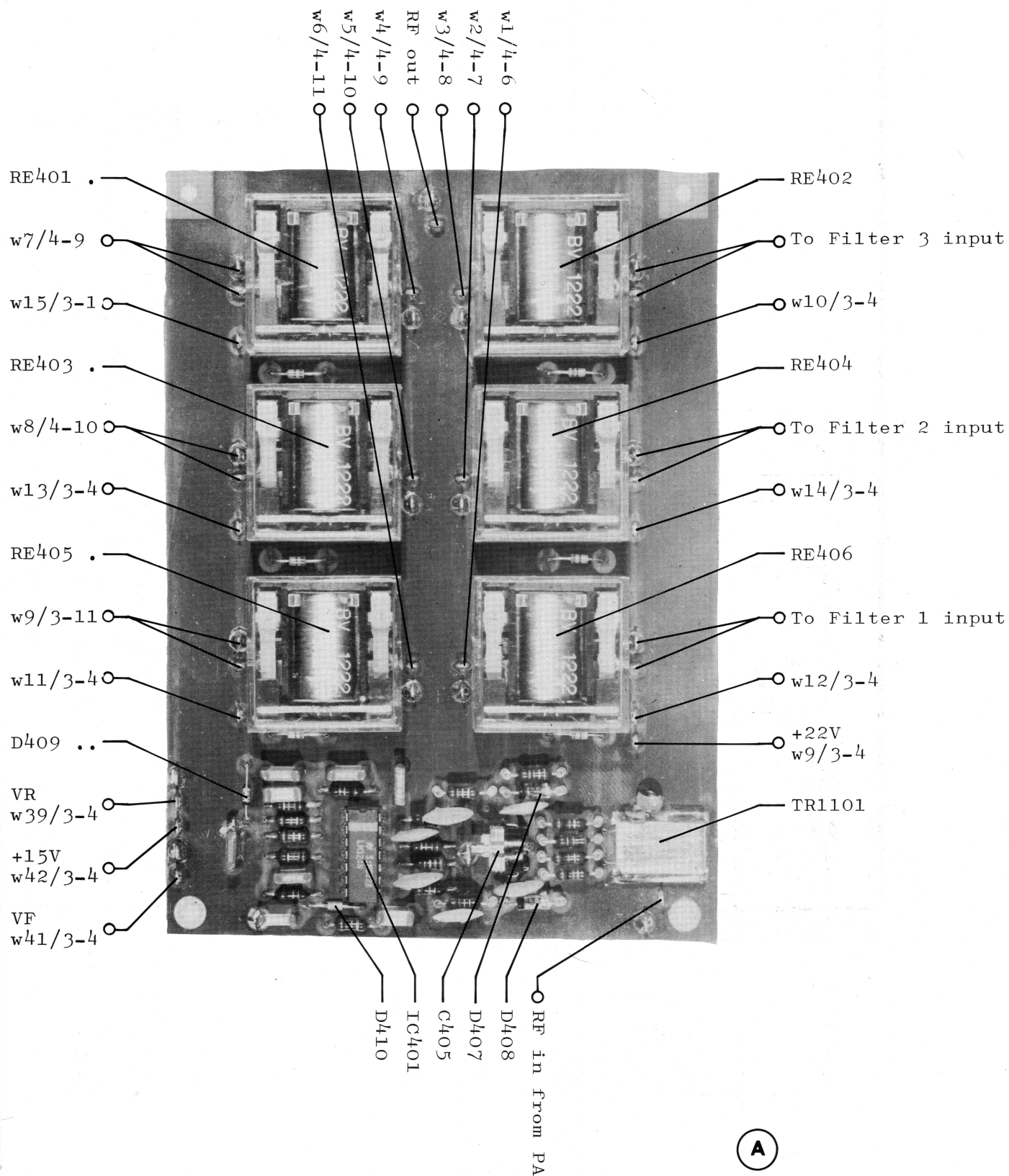
Table 1.

Frequency MHz	Z Y X V T	Output of IC301 1 2 3 4 5 6 7 8	Selected drive level potentiometer	Low-pass Filter
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

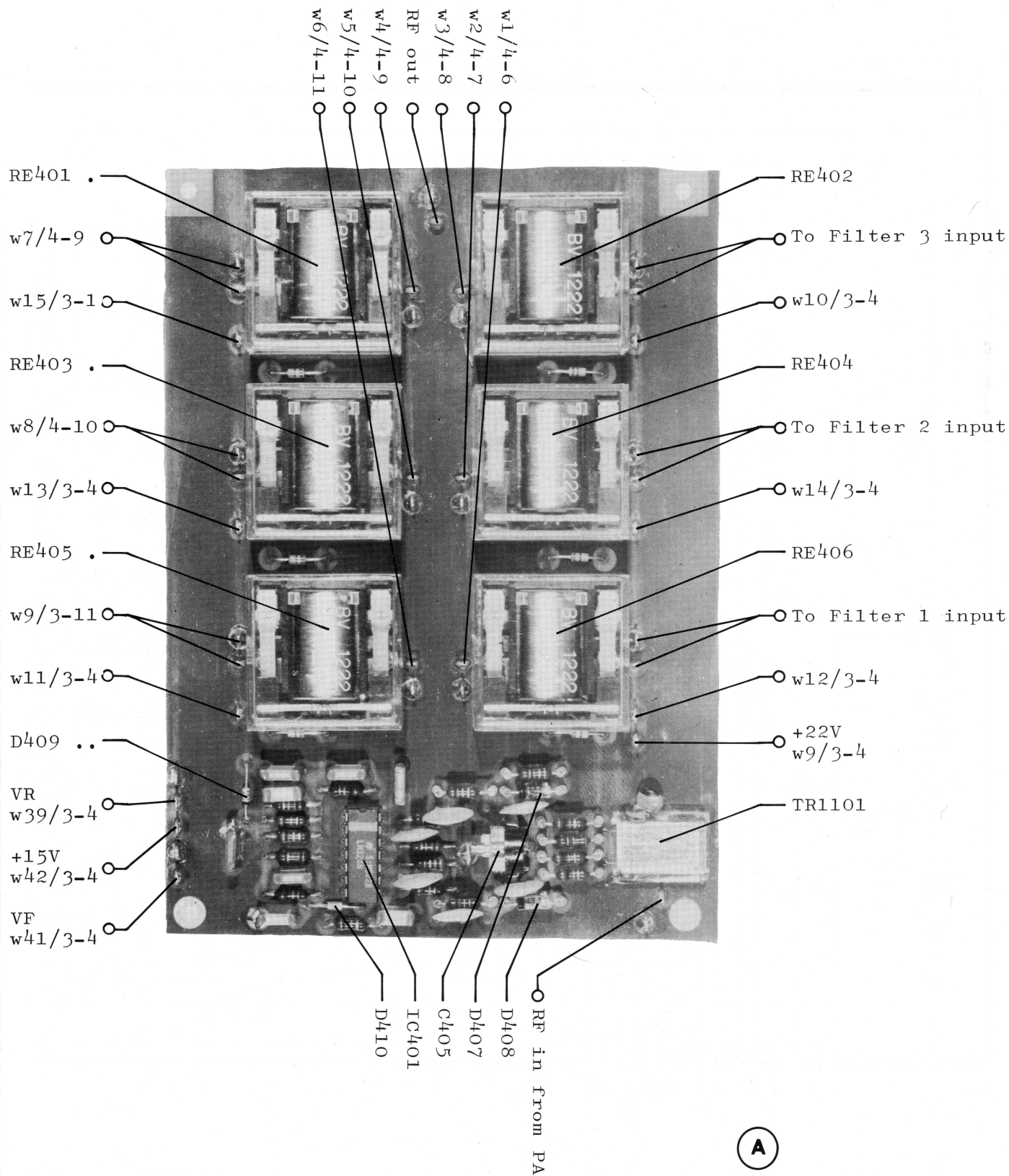


(A)





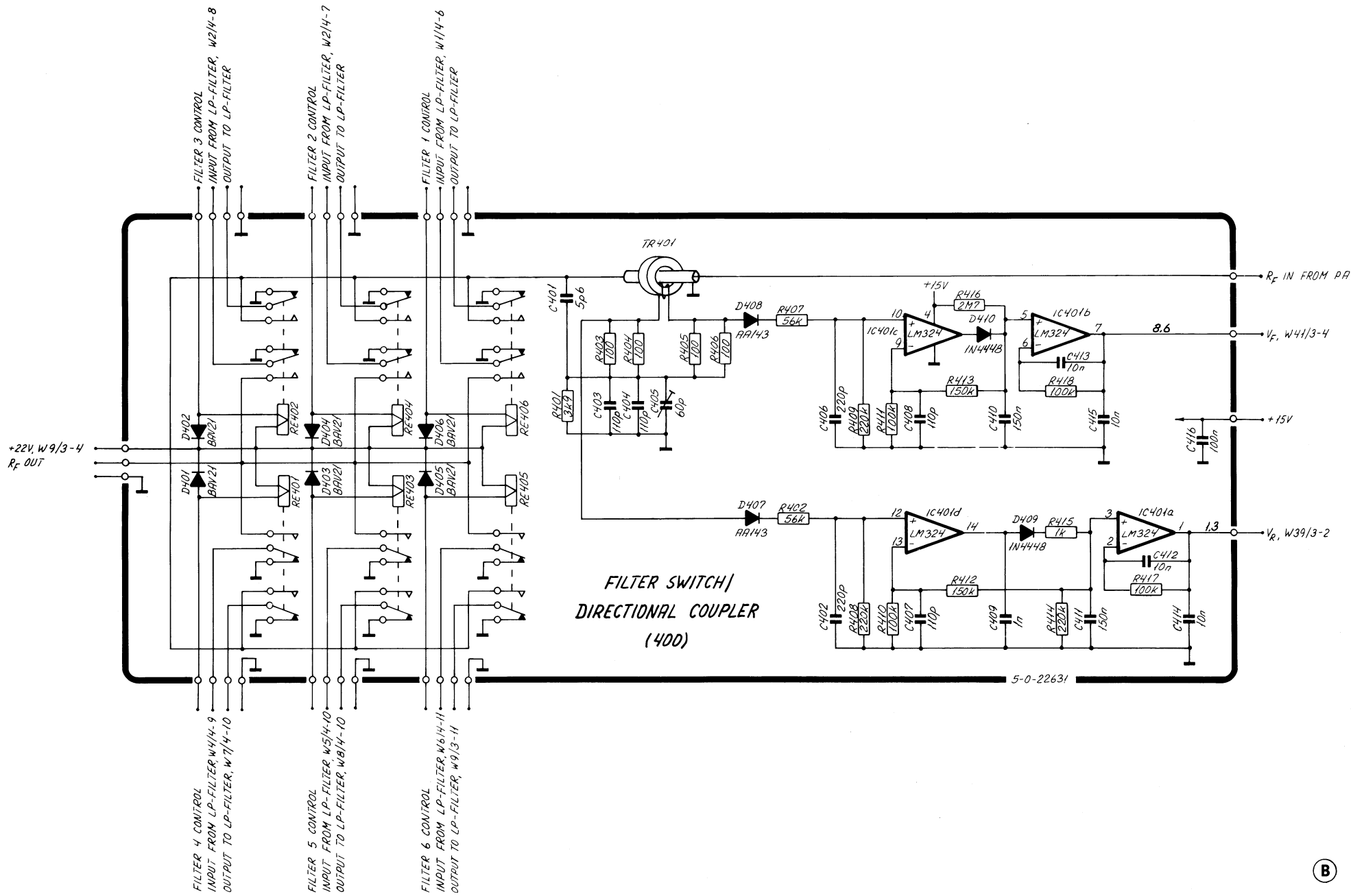




CIRCUIT DESCRIPTION FOR FILTER SWITCH/DIRECTIONAL COUPLER T1130

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 $= V_R/V_F$. 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.



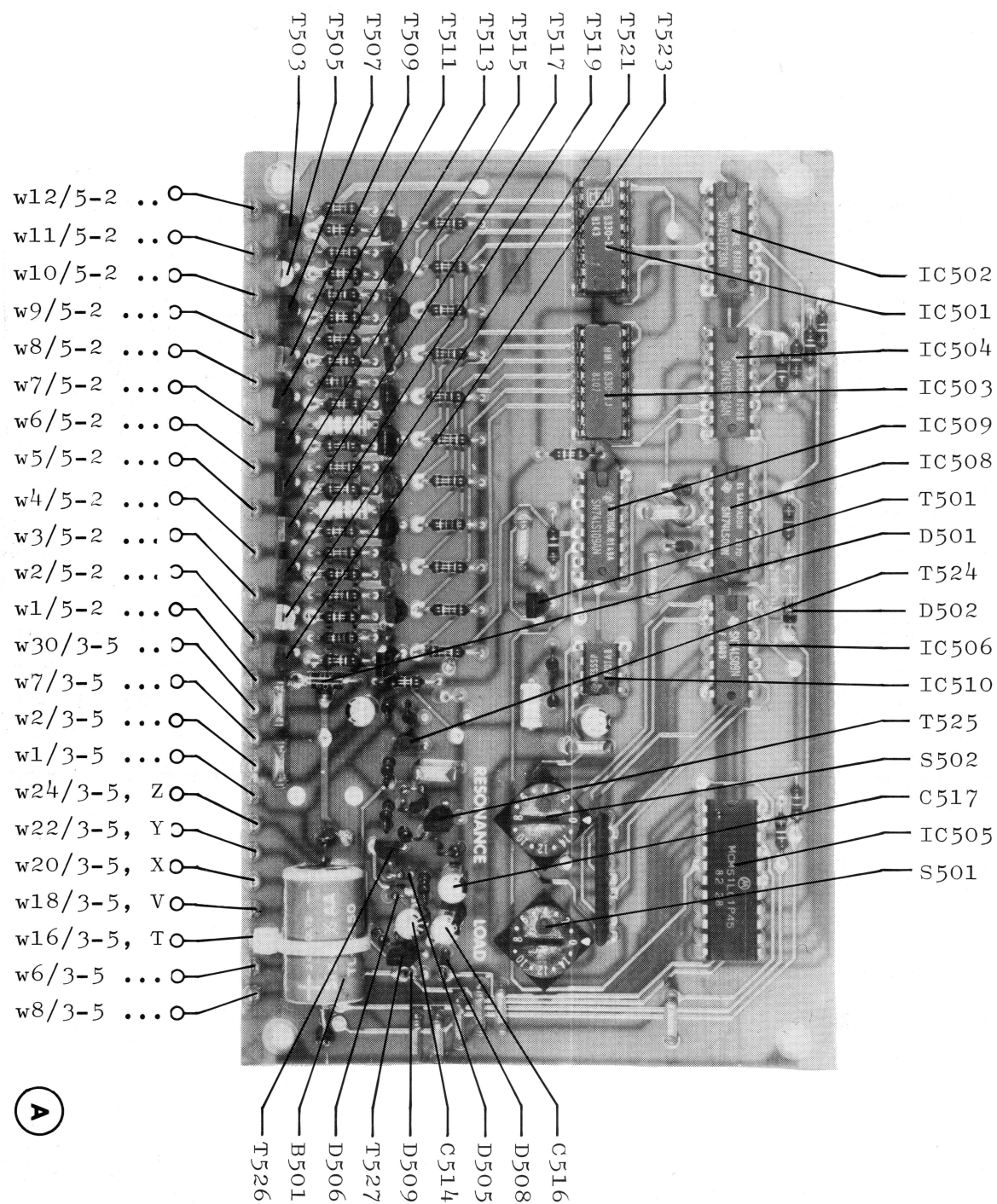
CIRCUIT DESCRIPTION FOR TUNER CONTROL UNIT T1130

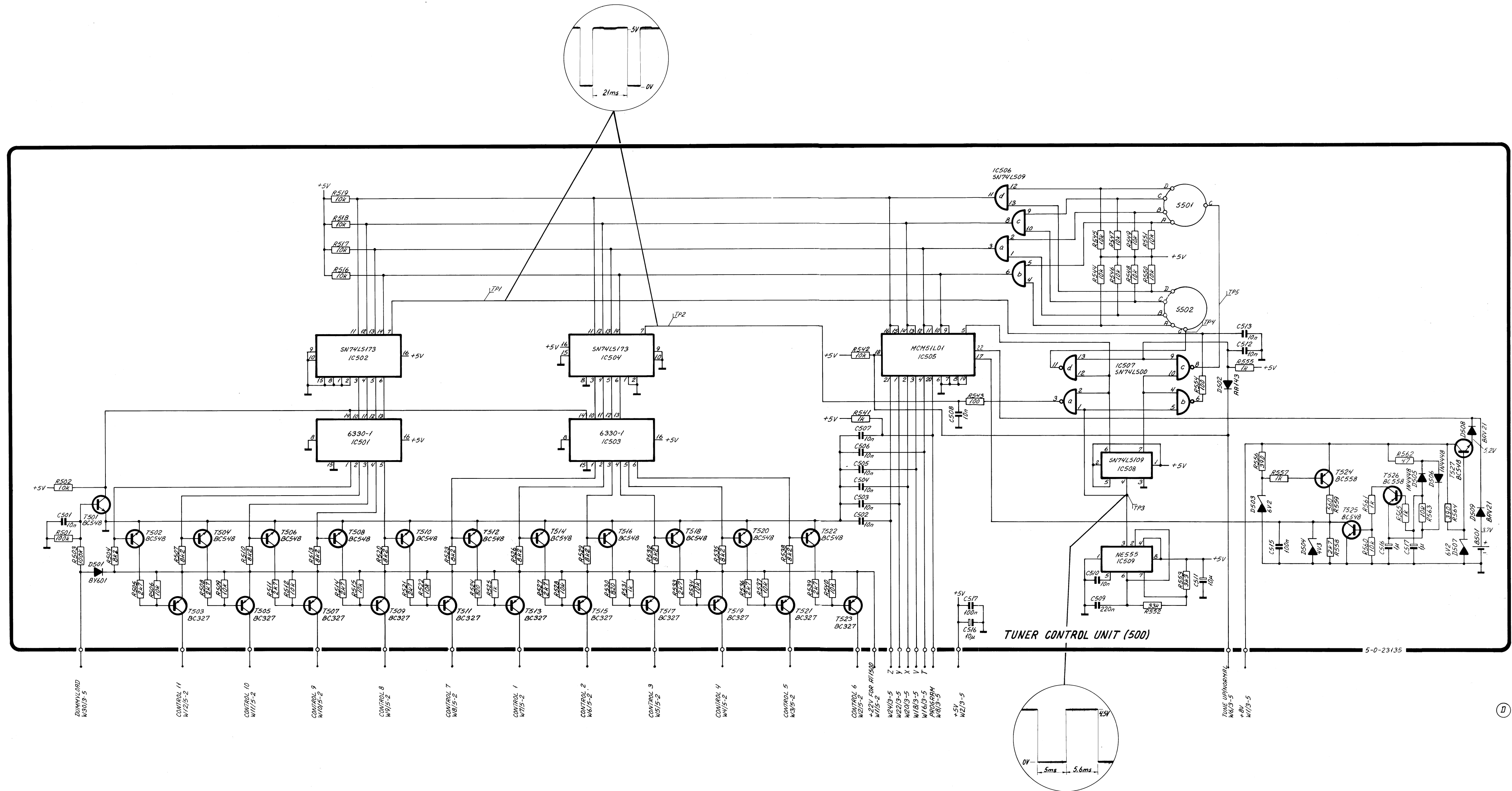
This unit takes care of controlling the presettings of the aerial coupler AT1500.

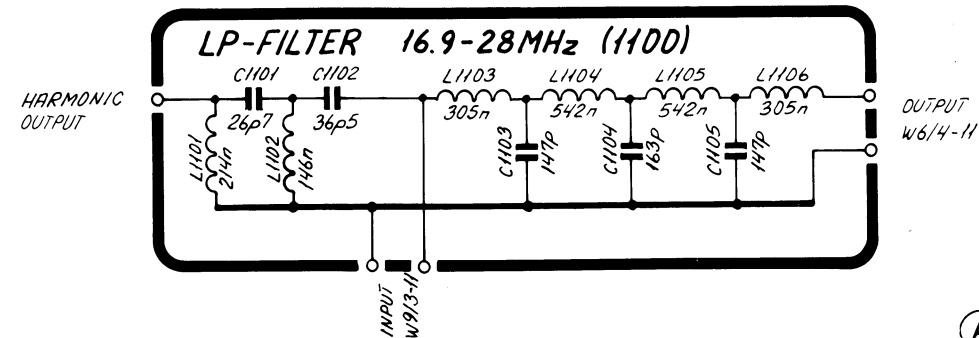
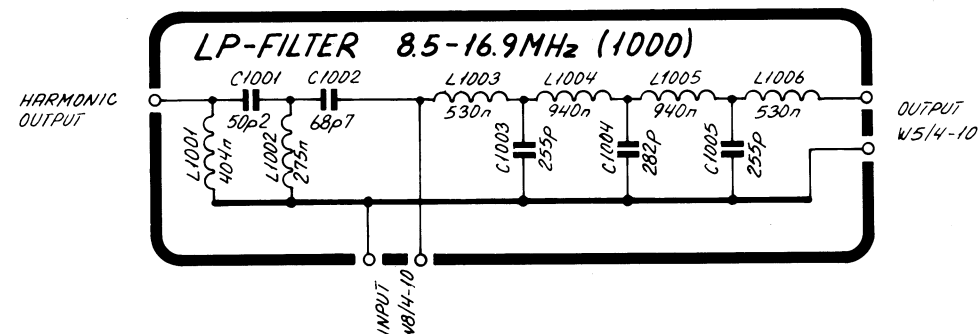
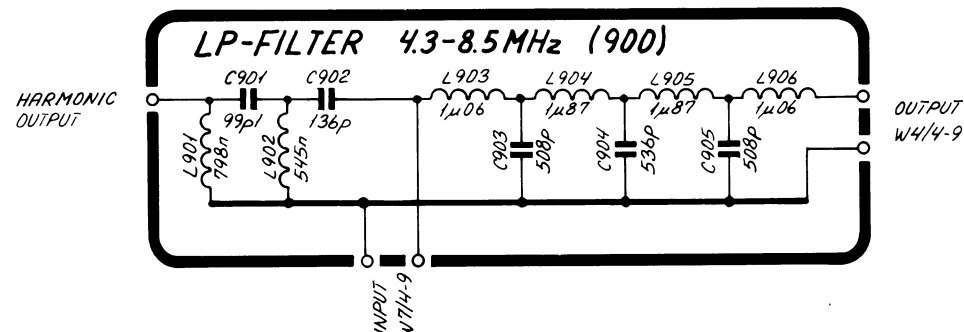
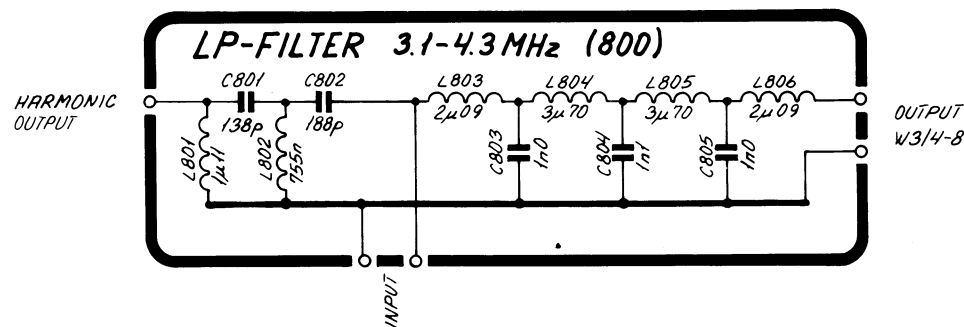
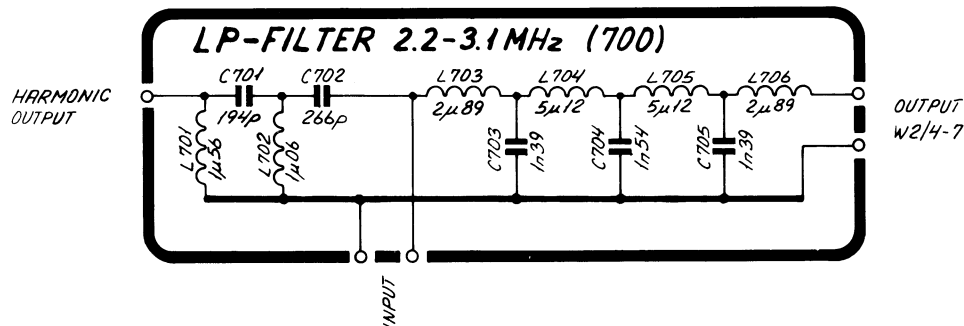
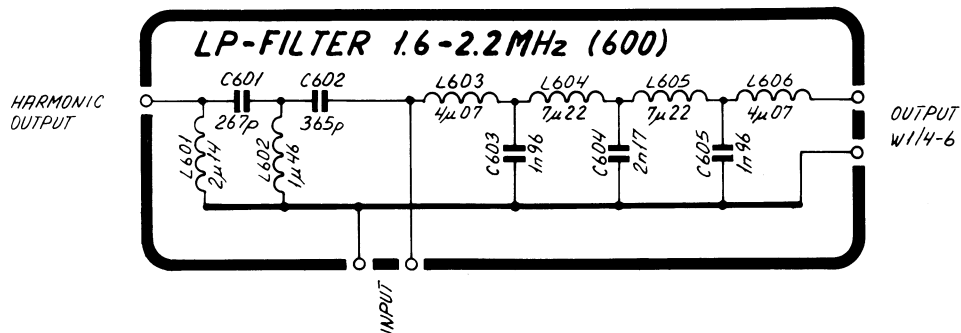
The input is a five bit bandcode coming from the exciter. This bandcode selects an address in the RAM IC505. Each address consists of two four bit words selected by pin 5. These two words are set by S501 RESONANCE and S502 LOAD. S501 and S502 are multiplexed into the RAM. The inputs and outputs of the 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.

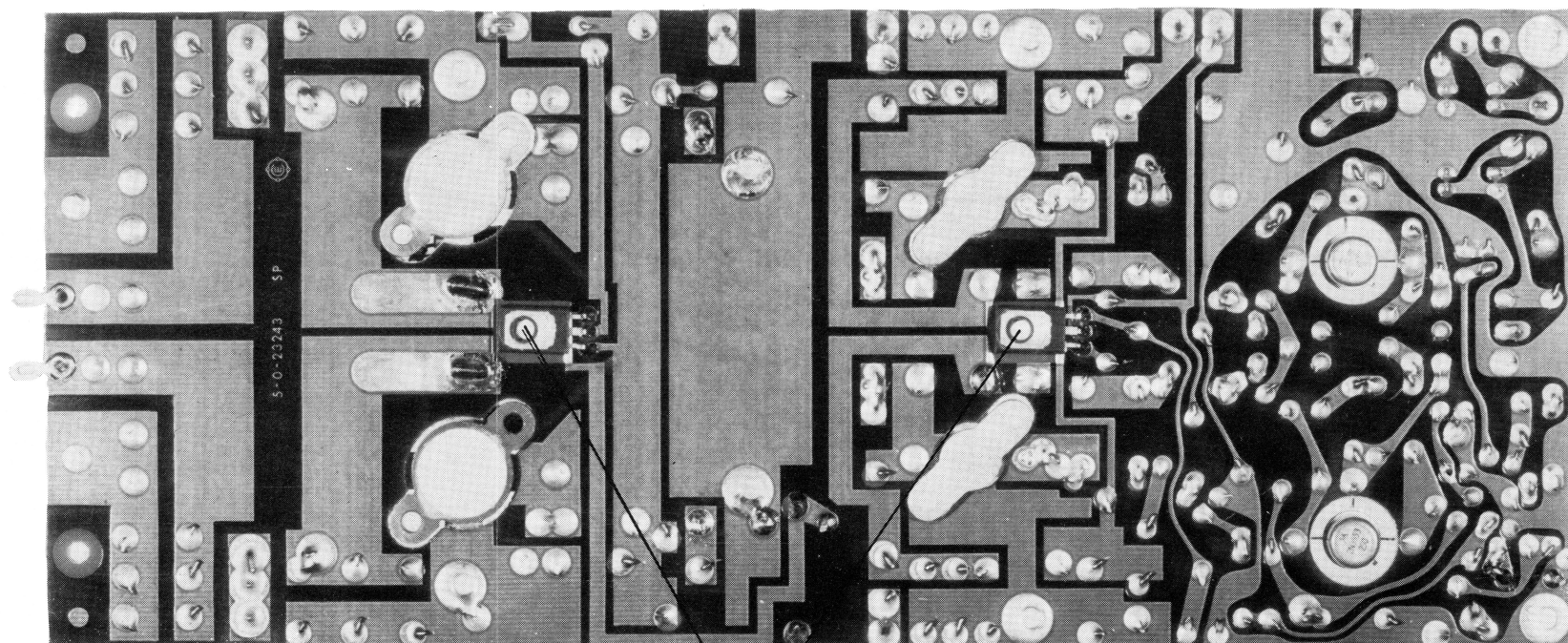
When dummy load is selected there will be 22V on the wire dummy load (W 30/3-5) and T501 will conduct, and pin 14 on IC501/IC503 will be low. Now a special code will be set for AT1500, and AT1500 will act as dummy load.

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.



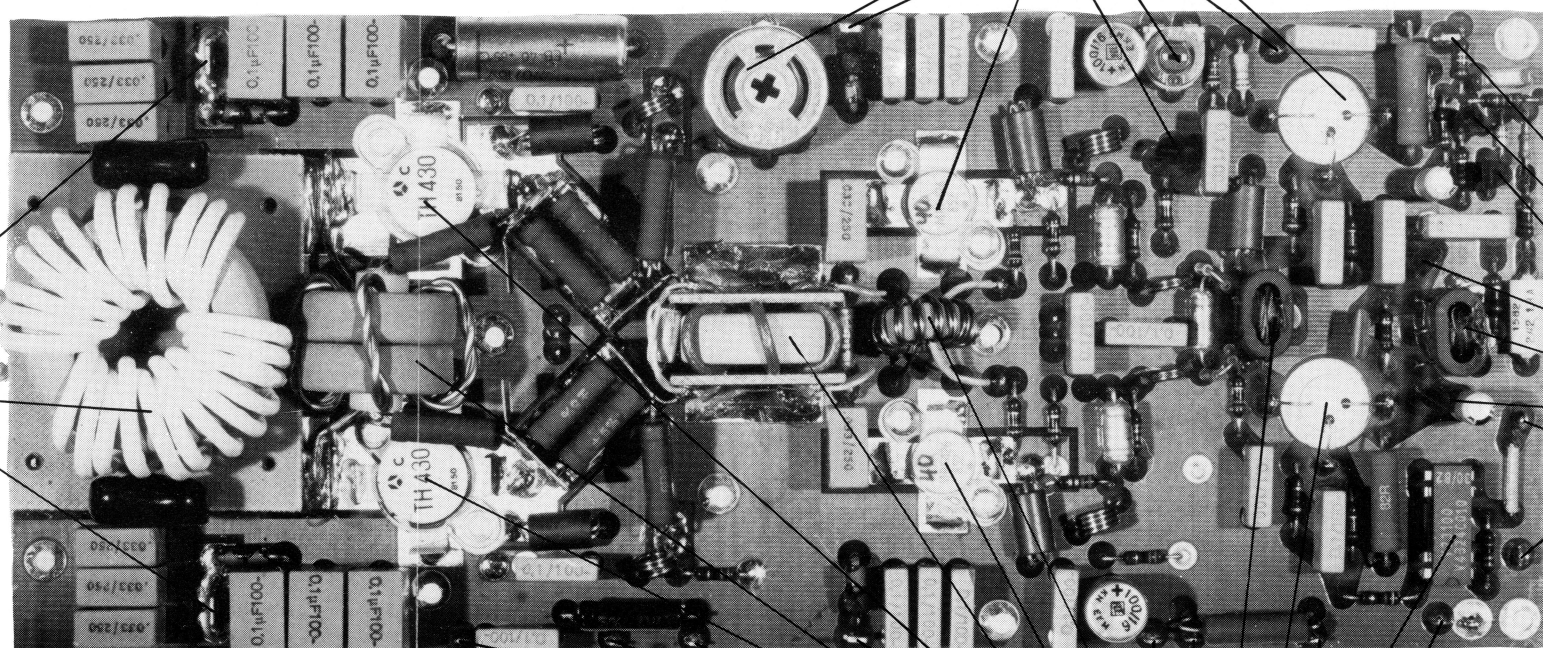






T1208
T1209

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



Open TX
T1204
T1201
T1203
TR1201
T1202
Power down

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

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

PA-UNIT

MODULE 1200

A

4-0-23243D/TII30

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

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

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

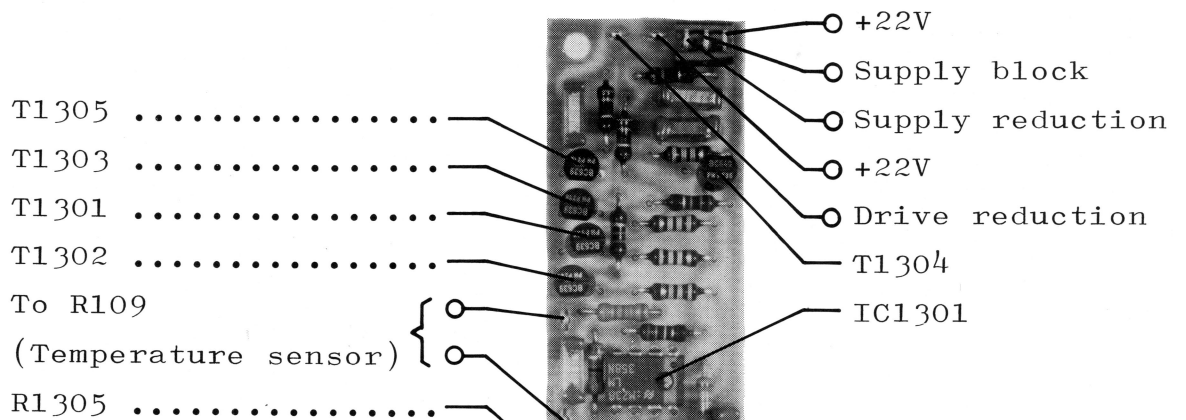
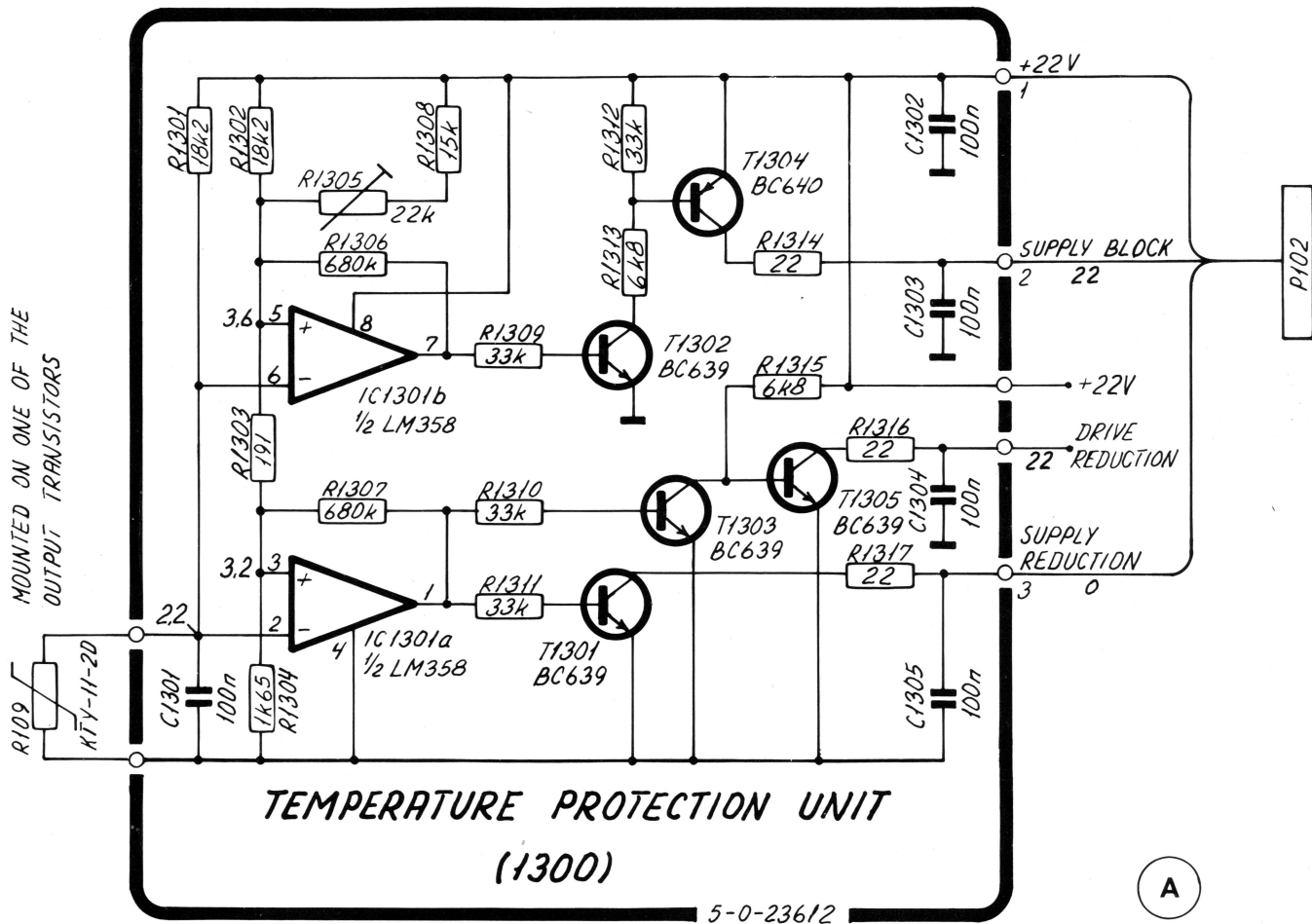
At the input there is a relay controlled attenuator (R1247, R1248, and RE1201). This attenuator is controlled from the temperature protection unit (1300).



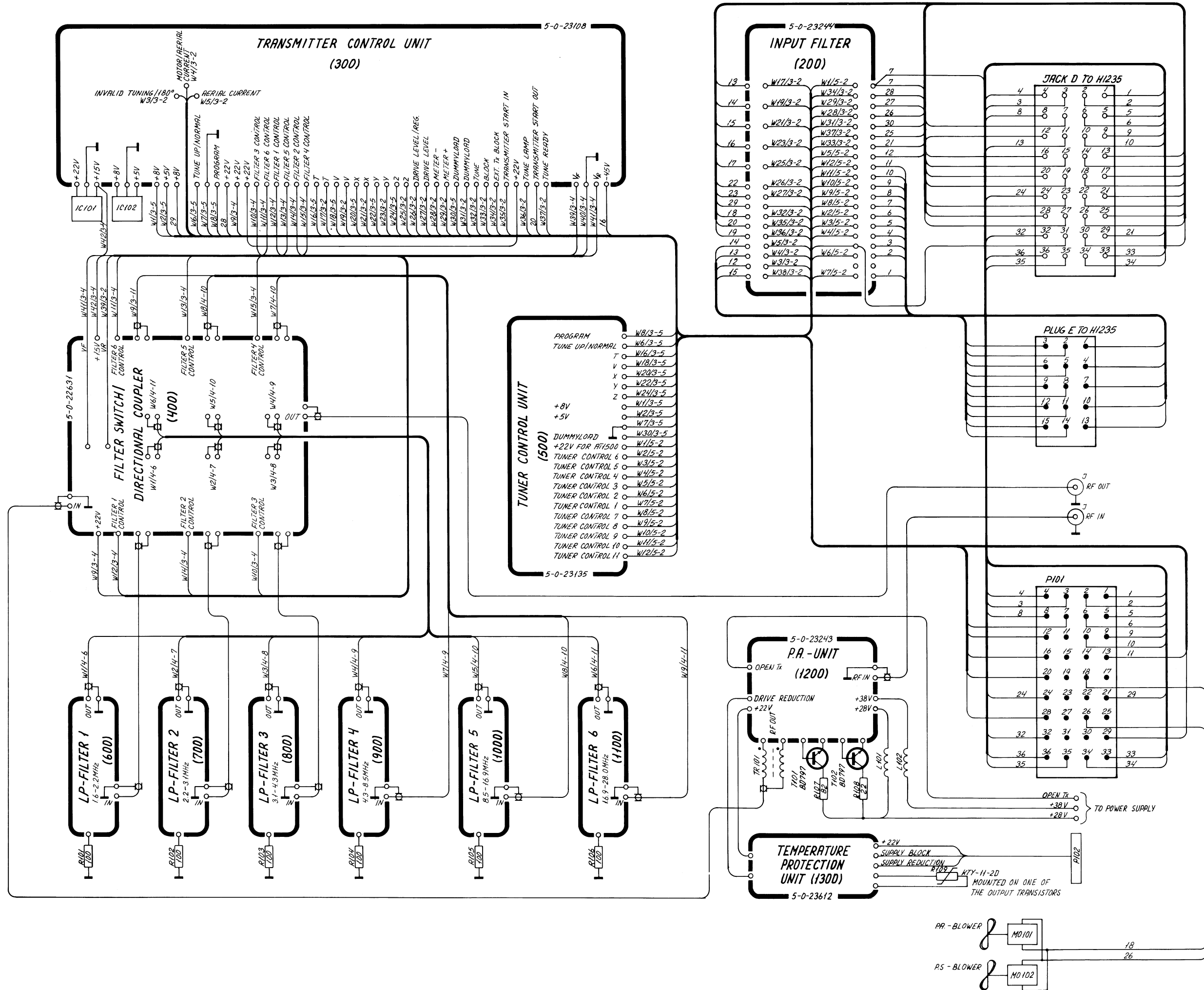
CIRCUIT DESCRIPTION FOR TEMPERATURE PROTECTION UNIT T1130

This unit protects the power amplifier from overheating. If the temperature of the R109 is higher than 95°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°C the power supply will be blocked and the blowers will run continuously until the temperature gets below 110°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°C .



(A)



JACK D	
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 AT1500
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
19	TUNE LAMP
20	TRANSMITTER START
21	BLOCK
22	DRIVE LEVEL/REG
23	DRIVE LEVEL
24	HT ON
25	TUNE READY
26	METER -
27	METER +
28	EXT TX BLOCK
29	OPEN TX
30	DUMMYLOAD
31	CONTROL 3 TO AT1500
32	OFF
33	+BAT
34	+22V
35	ON
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/ SERIAL CURRENT
14	SERIAL CURRENT
15	POWER DOWN FROM AT1500

P101	
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 AT1500
8	Rx ON
9	GROUND TO Rx
10	GROUND TO Ex
11	GROUND
12	POWER DOWN FROM POWER SUPPLY
13	GROUND
14	-45V TO TII30
15	GROUND
16	-45V TO TII30
17	BLOWER
18	BLOWER
19	TRANSMITTER START
20	OPEN TX
21	OPEN TX
22	OPEN TX
23	HT ON
24	HT ON
25	BLOWER
26	BLOWER
27	+22V TO TII30
28	+8V TO TII30
29	+8V TO TII30
30	GROUND
31	GROUND
32	OFF
33	+BAT
34	+22V
35	ON
36	-45V

P102	
1	+22V
2	SUPPLY BLOCK
3	SUPPLY REDUCTION

MAIN SCHEMATIC DIAGRAM
FOR
SAILOR TRANSMITTER TII30 (D)

TUNING TABLE T1130/AT1500

When tuning please note the recorded figures in the table.

BANDS in T1130	MARITIME BANDS	RES.	LOAD	I _A
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				

T1130 No.: _____ Name of ship: _____

AT1500 No.: _____ Call signal: _____

Aerial type: _____ Installed/tuned by: _____

Length of aerial: _____

Return one TUNING CHART to S. P. Radio, Denmark, the other remains on board in the book.