

Sailor

Sailor

**INSTRUKTIONSBOG FOR
SAILOR S1301/S1301L**

**INSTRUCTION BOOK FOR
SAILOR S1301/S1301L**



A/S S. P. RADIO · AALBORG · DENMARK

CONTENTS

GENERAL DESCRIPTION	2
TECHNICAL DATA	3
CONTROLS	4
PRINCIPLE OF OPERATION	5
PRINCIPAL DESCRIPTION OF TELEGRAPHY MODE	
PRINCIPAL DESCRIPTION OF TELEX MODE	
SERVICE:	
1. MAINTENANCE	
2. NECESSARY TEST EQUIPMENT	
3. TROUBLE-SHOOTING	
4. PERFORMANCE CHECK FOR S1301	
5. ADJUSTMENT PROCEDURE FOR S1301	
6. NECESSARY ADJUSTMENTS AFTER REPAIR FOR S1301	
7. FUNCTION CHECK FOR S1301	
PIN CONFIGURATIONS	
ADJUSTMENT LOCATIONS	
MICROTELEPHONE INSTALLATION	
PARTS LIST	
CIRCUIT DESCRIPTION AND SCHEMATIC DIAGRAMS	
MAIN SCHEMATIC DIAGRAM	

GENERAL DESCRIPTION

SAILOR S1301 is a telephony exciter for use in conjunction with the transmitter T1127.

SAILOR S1301 Transmitting frequency can be free selected in the frequency range 1.6 - 4.0 MHz and the 4, 6, 8, 12, 16, 22 and 25 MHz maritime HF bands.

SAILOR S1301 uses a digital synthesizer for frequency generation. The frequency stability is controlled from one 10 MHz TCXO.

SAILOR S1301 produces completely finished signals on the transmission frequency.

SAILOR S1301 can be used for telephony in the following modes: A3J, A3A and A3H.

SAILOR S1301 can be used for telegraphy in the two modes A1 and A2H.

SAILOR S1301 can be used in conjunction with a teleprinter via e.g. a Simplex TOR equipment.

SAILOR S1301 is provided with a built-in alarm signal generator for distress calls.

SAILOR S1301 fits into SAILOR 19" rack system.

SAILOR S1301 is supplied from N1400 (24V DC) or N1401 (AC mains).

TECHNICAL DATA

The exciter S1301 delivers USB signals.

Frequency range:

MF: 1.6 - 4.0 MHz
HF: 4, 6, 8, 12, 22 and 25 MHz maritime bands.

FREQUENCY RESOLUTION:

100 Hz

Frequency stability:

Temperature range 0°C to +40°C:	Less than ± 1 ppm (± 25 Hz)
Long term stability :	Less than ± 1 ppm (± 25 Hz/year)
Short term stability :	Less than ± 2 Hz

Mode of operation:

A3J, A3A and A3H

Distress call:

Automatic A3H on 2182 kHz
Two-Tone-Alarm: 1300 and 2200 Hz.
with a duration of 45 secs.

Output power:

1 Watt PEP/50 ohm

Output power reduction:

In four 5dB steps (-20dB)

Modulation:

350 - 2700 Hz with compressor

Operation temperature range:

-15°C to + 55°C

500 kHz Version S1301L

The S1301L is identical to S1301 but is furthermore operational in the frequency range 405.0 kHz to 535.0 kHz for A1 and A2H purpose.

S1301 C

TECHNICAL DATA for connections on REAR-CONTACT-BOARD.

AF FROM TELEX TO TX: $R_{IN} = 600 \text{ Ohm}$
 $-17 \text{ dBm} \leq P_{IN} \leq 3 \text{ dBm}$
 $110 \text{ mV}_{RMS} \leq V_{IN} \leq 1.1 V_{RMS}$

AF FROM RECEIVER TO TELEX: $R_{OUT} = 600 \text{ Ohm}$
 $P_{OUT} = 0 \text{ dBm}$
 $V_{OUT} = 750 \text{ mV}_{RMS}$

TT FROM TELEX: $V_{IN} = 24V$
 $I_{IN} = 50 \text{ mA}$

TELEPRINTER START: $V_{IN} = 24V$
(HIGH TENSION ON) $I_{IN} = 13 \text{ mA}$

MUTING INPUT: $V_{IN} = 24V$
 $I_{IN} = 13 \text{ mA}$

MUTING OUTPUT: $I_{max} = 0.5A$
The contacts:
CLOSED WHEN TRANSMITTING $I_{max} = 6A$

TECHNICAL DATA FOR TELEGRAPHY AND TELEX

Data for SAILOR short-wave station.

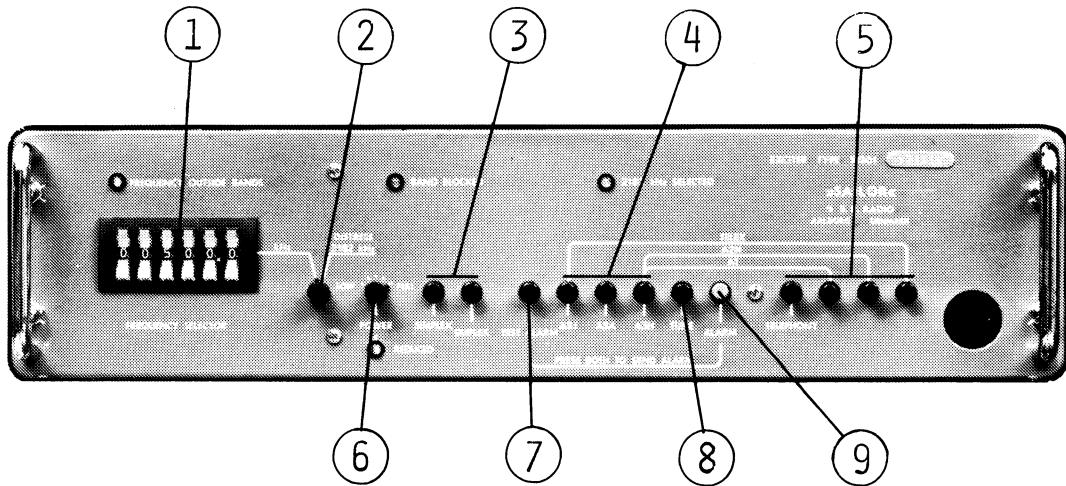
Output power A1: $200 \text{ W PEP (1.6 - 4 MHz)}$
 $400 \text{ W PEP (4 - 25 MHz)}$

Output power A2H: $400 \text{ W PEP (1.6 - 4 MHz)}$
 $800 \text{ W PEP (4 - 25 MHz)}$

Output power TELEX:
Simplex TOR mode $400 \text{ W PEP (1.6 - 4 MHz)}$
 $800 \text{ W PEP (4 - 25 MHz)}$

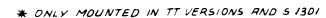
Broadcast mode $200 \text{ W PEP (1.6 - 4 MHz)}$
 $400 \text{ W PEP (4 - 25 MHz)}$

CONTROLS



- ① FREQUENCY SELECTOR
For selection of the transmitting frequency in the maritime bands.
- ② DISTRESS (2182 kHz)
For selection of the distress frequency 2182 kHz.
- ③ SIMPLEX, DUPLEX
Press button SIMPLEX for Single-Frequency Operation.
Press button DUPLEX for Two-Frequency Operation.
- ④ A3J, A3A and A3H
Select transmission mode A3J, A3A or A3H.
- ⑤ TELEPHONY-TELEGRAPHY-TELEX
TELEPHONY: To be activated for normal telephony use.
TELEGRAPHY: Activate the buttons A1 or A2H together with the button A3H ⑤.
The telegraph key is now connected to transmitter.
TELEX: Activate the button TELEX together with the button A3J ⑤.
The teleprinter is now connected via the Simplex TOR equipment to the receiver and transmitter.
- ⑥ POWER
For reducing the RF-output-Power in four 5 dB steps to about -20 dB.
- ⑦ TEST ALARM
Press button TEST ALARM and the two-tone-alarm signal will be heard in the microtelephone handset.
- ⑧ TUNE
For tuning of Transmitter T1127, a two-tone signal is generated.
- ⑨ ALARM
Press both TEST ALARM ⑥ and ALARM ⑦ for transmitting two-tone alarm signal on the DISTRESS frequency 2182 kHz.

5130011/51301 A 1/4



ⓑ *EXCITER*

EXCITER S1300TT & S1301

The SAILOR Exciter S1300TT and S1301 are fully synthesized and deliver USB signals on the carrier frequency.

The signal from the Microphone, the Alarm Generator or the Test-Tone-Generator is fed to the Microphone Amplifier, where the necessary amplification, amplitude limitation and filtering take place. The amplitude limitation is performed by a compressor stage, which regulates the amplification, so that the amplitude will always be kept below a certain max. level. The AF-signal is fed via AF Level-Control to the first Mixer. The AF-Level-Control is determining the right AF level in the modes A3J, A3A, A3H and A2H. The First Mixer is a balanced modulator where a 600 kHz double-side-band signal is generated. The DSB-signal is then fed through the 600 kHz LSB crystal-filter and out we have a lower-side-band signal to the Carrier-Level-Unit.

In the Carrier-Level-Unit reinsertion of 600-kHz carrier for A3A, A3H, A2H and A1 takes place. The 600 kHz signal is then passed on to the Second-Mixer which also receives the local-oscillator-signal f_{L01} from Loop 2. The Second-Mixer also receives a DC Drive Level Information from T1127 which can attenuate the output from the mixer to the wanted drive level. The output from the Second-Mixer is an LSB-signal f_{IF2} and it passes through a crystal filter to the Third Mixer.

PRINCIPLE OF OPERATION cont.:

Third Mixer is a double balanced mixer where both the local oscillator signal f_{LO2} and 2nd IF-signal f_{IF2} is suppressed. The output from the mixer is the carrier frequency f_{TX} , with the upper side-band. The band filter section serves the purpose of removing all undesired mixing products and the signal passes from the Band-Filters to the Driver-Unit where the final amplification to max. 1 Watt PEP/50 ohm takes place.

FREQUENCY GENERATION

The necessary frequencies are generated by two frequency synthesizers according to the Phase Locked Loop principle.

Local oscillator signal f_{LO2} to Third Mixer is generated in the Phase Locked Loop 1 and has a resolution of 1 kHz.

Local oscillator signal f_{LO1} to Second Mixer is generated in the Phase-Locked Loop 2 and has a resolution of 100 Hz.

LOOP 1

The voltage controlled oscillator (VCO) generates the necessary local oscillator frequencies in nine 2 MHz bands electronically selected by the MHz Selector via the Band and the Motor Control Unit. Inside each 2 MHz band the VCO-frequency f_{LO2} can be varied by means of a DC control voltage from the Phase-Detector. The DC control voltage is filtered in the Loop 1 Filter.

The Phase Detector receives two signals, one variable frequency f_{V1} and one reference frequency f_{R1} . The reference frequency f_{R1} is a result of the 10 MHz TCXO frequency being divided down to 1 kHz.

The variable frequency f_{V1} is generated from the VCO frequency f_{LO2} in the following way:

In the Loop 1 Mixer the counter frequency f_{T1} is produced from the VCO frequency f_{LO2} and the frequency f_{HARM} which is a multiple of 2 MHz. The 2 MHz signal is generated from the 10 MHz TCXO

$$f_{T1} = f_{LO2} - f_{HARM} = f_{LO2} - (m \times 2 \text{ MHz}) = N_1 \times 1 \text{ kHz}$$

For every 2 MHz band a new f_{HARM} is selected of the MHz Selector and it always results in a variation of 2 MHz of the frequency f_{T1} to the Programmable Divider.

The frequency f_{T1} is divided down by the dividing figure N_1 in the Programmable-Divider to the variable frequency f_{V1}

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

The working principle in a Phase-Locked-Loop is as follows:

If there is a phase error between the variable frequency f_{V1} and the reference frequency f_{R1} , the regulation system has the characteristic that the DC-Control Voltage will correct the VCO frequency and consequently the variable frequency f_{V1} , so that f_{V1} will always follow the reference frequency f_{R1} in phase

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

PRINCIPLE OF OPERATION cont.:

The VCO frequency f_{L02} is now phase locked on a fixed frequency to the reference frequency f_{R1} and has therefore the same accuracy as this.

Changing of the VCO frequency f_{L02} by e.g. 1 kHz can be performed by changing the dividing figure N_1 in the Programmable Divider by one.

$$f_{L02} = f_{HARM} + (N_1 \times 1 \text{ kHz})$$

Principle of programming is as follows:

The Programmable Divider contains a counter circuit, which is counting down from a start figure $2000 + P_1$ and stops at the stop figure S_1 . Each time the counter reaches the stop figure S_1 , a pulse (f_{V1}) is given to the Phase Detector, and the counter will start counting down again from the start figure $2000 + P_1$. Division of f_{T1} by N_1 has now been achieved

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

A special code from the MHz Selector to the Band and Motor-control-unit selects the right 2 MHz band for the VCO and Harmonic Filter.

Inside each 2 MHz band the programmable figure P_1 , is encoded from the Frequency Selector (MHz and kHz positions) in BCD-code representing the direct frequency reading of the 2 MHz band.

$$\text{Start-figure: } 2000 + P_1; 0 \leq P_1 \leq 1999$$

$$\text{Stop-figure : } S_1 = -699$$

$$N_1 = 2000 + P_1 - S_1 = P_1 + 2699$$

Output frequency from Loop 1:

$$f_{L02} = m \times 2 \text{ MHz} + (P_1 + 2699) \times 1 \text{ kHz} \quad 4 \leq m \leq 16$$

LOOP 2

Phase Locked Loop 2 has a frequency variation of 1 kHz with a resolution of 100 Hz and the working principle is the same as for Phase Locked Loop 1. Principle of programming is as follows:

The frequency shift in Loop 2 is controlled from the 100 Hz Selector.

The Programmable Divider is counting up from the start figure P_2 to the stop figure S_2 .

The 100 Hz Selector is encoding the start-figure P_2 in BCD-code to the Programmable Divider.

$$\text{Start figure} : 0 \leq P_2 \leq 9$$

$$\text{Stop figure} : S_2 = 990$$

$$\text{Dividing figure} : N_2 = S_2 - P_2 = 990 - P_2$$

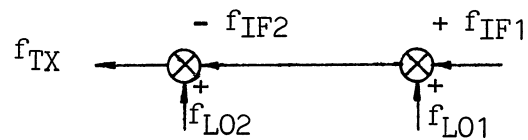
PRINCIPLE OF OPERATION cont.:

Output frequency from Loop 2:

$$f_{L01} = 10 \text{ MHz} + (N_2 \times 0,1 \text{ kHz}) = 10 \text{ MHz} + ((990 - P_2) \times 0,1 \text{ kHz});$$

$$f_{L01} = 10,099 \text{ MHz} - (P_2 \times 0,1 \text{ kHz});$$

CARRIER FREQUENCY f_{TX} FROM EXCITER S1300



$$f_{IF1} = 0,600 \text{ MHz};$$

$$f_{L01} = 10,099 \text{ MHz} - (P_2 \times 0,1 \text{ kHz});$$

$$f_{IF2} = f_{IF1} + f_{L02} = 10,699 \text{ MHz} - (P_2 \times 0,1 \text{ kHz})$$

$$f_{L02} = m \times 2 \text{ MHz} + (P_1 + 2699) \times 1 \text{ kHz} \quad 4 \leq m \leq 16$$

$$f_{TX} = f_{L02} - f_{IF2} = (m - 4) \times 2 \text{ MHz} + (P_1 + (0,1 \times P_2)) \times 1 \text{ kHz}$$

C 4/4

S1301 1/1 E

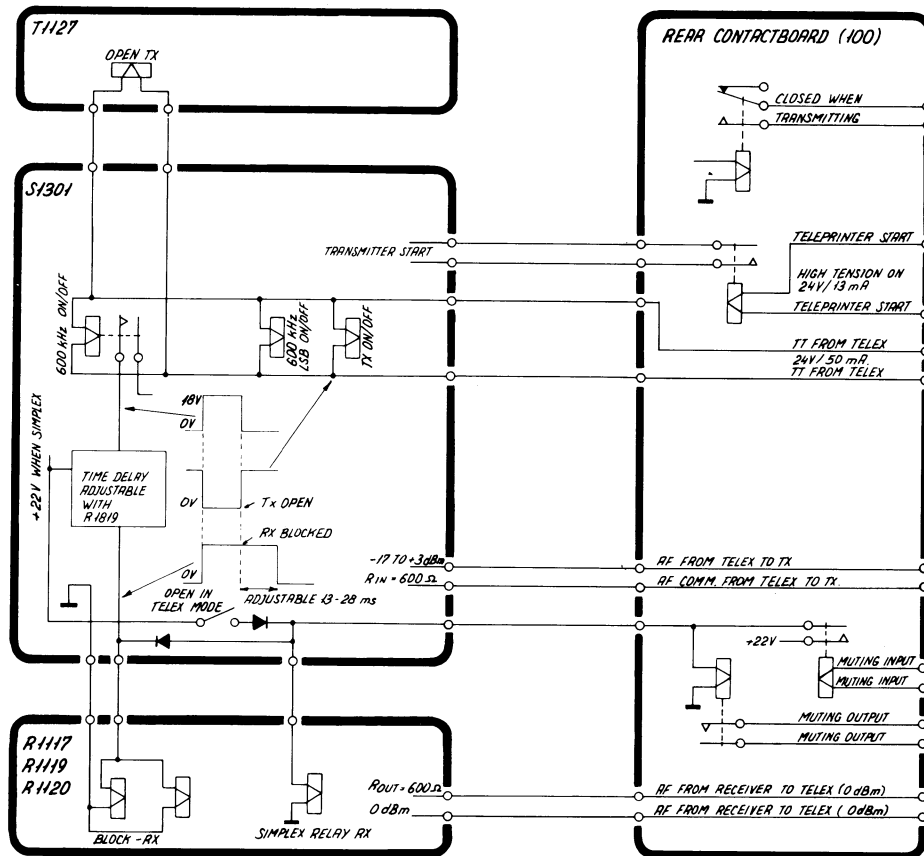


1

PRINCIPAL DESCRIPTION OF TELEX MODE

TELEX

The SAILOR short-wave station is designed to be connected to a TELEPRINTER via a SIMPLEX TOR equipment. The control signals to the exciter match with Philips Simplex TOR equipment STB75/STB750. See the principal diagram below.



TELEPRINTER START (HIGH TENSION ON)

By means of these terminals it is possible to start the transmitter from Simplex TOR equipment.

The station is switched on as described in the OPERATING INSTRUCTIONS. After that the station is controlled from the Simplex TOR equipment. When a CALL-CODE is received, the TOR connects 24V to the TELEPRINTER START TERMINALS (HIGH TENSION ON) and the station is immediately ready to send an answer.

TT FROM TELEX

This information is used to switch the station between transmit and receive mode. When TT FROM TELEX is connected to 24V the transmitter is open and the receiver is blocked. When TT FROM TELEX is disconnected the transmission stops immediately and the receiver is blocked for another 13 - 28 msecs controlled from the DELAY-UNIT (adjustable with R1819). This delay must last until the transmitter output is less than the sensitivity of the receiver. The delay is pre-adjusted from the factory to 18 msecs, which secures a good reception with only 20 dB attenuation between the transmitter and the receiver aerials.

PRINCIPAL DESCRIPTION OF TELEX MODE cont.:

MUTING INPUT

The receiver is blocked when +24V is connected.

MUTING OUTPUT

The contacts are closed when the transmitter is keyed.

CLOSED WHEN TRANSMITTING

The contacts are closed when the telephony-key on the handset is pressed.
In telegraphy-mode (A1 or A2H) the contacts are closed all the time.
In telex-mode they are closed when the TELEPRINTER START terminals are connected to 24V.

INSTALLATION

All connections are done on the REAR CONTACT BOARD placed on the mounting plate.

SERVICE

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

1. MAINTENANCE

1.1.

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

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

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

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

2. NECESSARY TEST EQUIPMENT

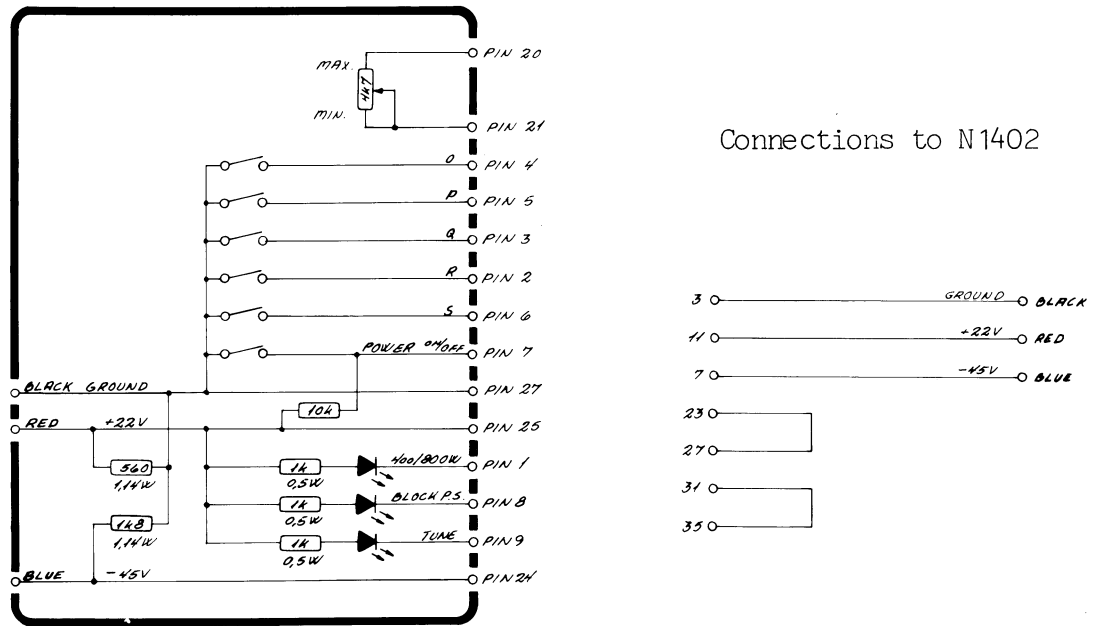
T1127	N140X	S1300	R1117	
X	X	X	X	<u>OSCILLOSCOPE:</u> Bandwidth 0-25 MHz Sensitivity 2mV/cm Input impedance 1 Mohm/30 pF Triggering EXT-INT-ENVELOPE E.g. PHILIPS PM3212
X		X	X	<u>PASSIVE PROBE:</u> Attenuation 10x Input resistance DC 10 Mohm Input capacitance 15 pF Compensation range 10 pF - 30 pF E.g. PHILIPS PM 9396
		X	X	<u>MULTIMETER:</u> Sensitivity (f.s.d.) 1V Input impedance 10 Mohm Accuracy (f.s.d.) <u>+2%</u> E.g. PHILIPS PM2503
X	X			<u>MULTIMETER:</u> Sensitivity 0.3V and 3A Input impedance 30 Kohm/V Accuracy (f.s.d.) <u>+1%</u> Current range 100A Voltage range 500V and 2.5 kV E.g. Unigor A43, with probe and shunt

NECESSARY TEST EQUIPMENT cont.:

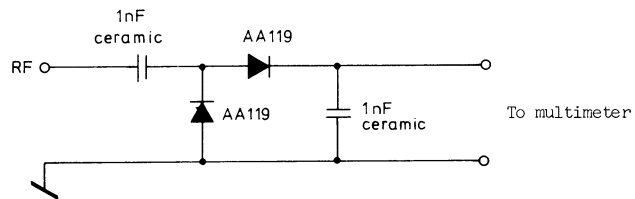
T1127	N140X	S1300	R1117
		X	
<u>TONEGENERATOR:</u>			
Frequency range			
200 - 3000 Hz			
Output			
1V RMS			
Output impedance			
≤ 600 ohm			
E.g. PHILIPS			
PM5107			
			X
<u>AF VOLTMETER:</u>			
Sensitivity (f.s.d.)			
300 mV			
Input impedance			
≥ 4 ohm			
Accuracy (f.s.d.)			
$\pm 5\%$			
Frequency range			
100 Hz - 5 kHz			
E.g. PHILIPS			
PM2503			
	X		X
<u>FREQUENCY COUNTER:</u>			
Frequency range			
100 Hz - 40 MHz			
Resolution			
0.1 Hz at $f \geq 10$ MHz			
Accuracy			
$1 \cdot 10^{-7}$			
Sensitivity			
100 mV RMS			
Input impedance			
1 Mohm			
Single period measurement range			
1 sec.			
resolution			
1 mS			
E.g. PHILIPS			
PM6611 + PM9679			
			X
<u>SIGNAL GENERATOR:</u>			
Frequency range			
550 kHz - 30 MHz			
R1118: 100 kHz - 30 MHz			
Output impedance			
50/75 ohm			
Output voltage			
1 μ V - 100 mV EMF			
Modulation			
AM, 30%, 1000 Hz			
E.g. PHILIPS			
PM5326			

NECESSARY TEST EQUIPMENT cont.:

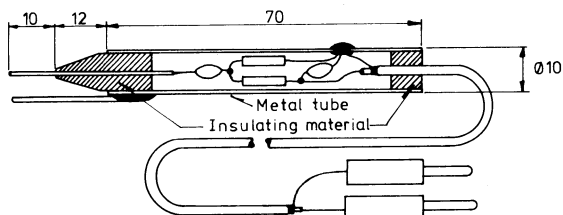
SCHEMATIC DIAGRAM FOR TESTBOX S1300/1301.



DIODE PROBE



LAYOUT OF THE PROBE



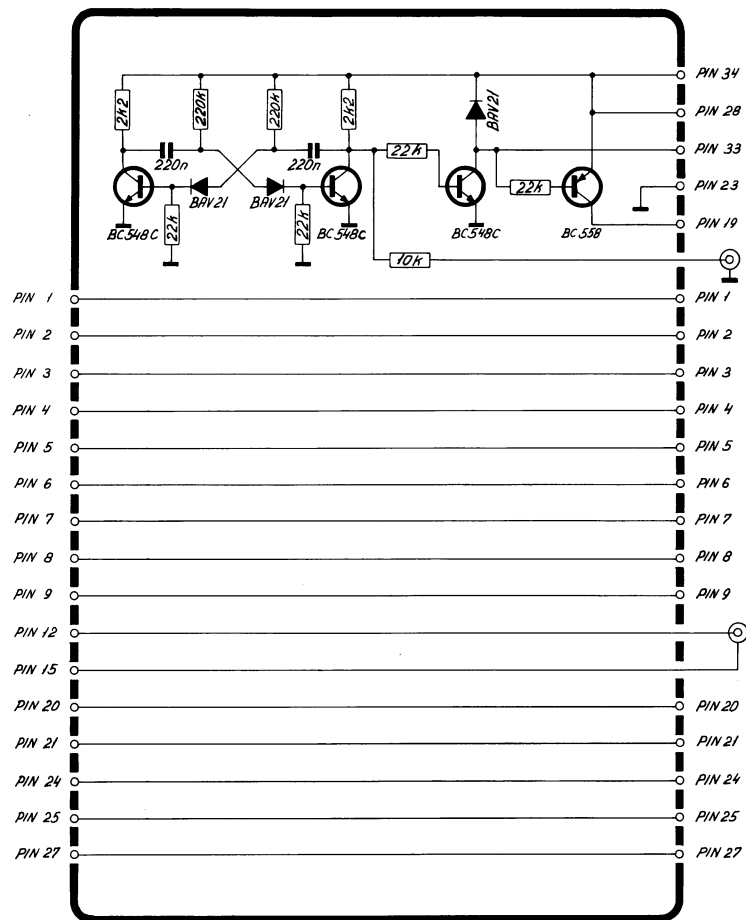
Necessary test equipment cont.:

FREQUENCY TABLE FOR TEST STRIPS

Programming Code								Programming Code							
Progr. freq.	Pos.	zyxv	M	100	10	1	0,1	Progr. freq.	Pos.	zyxv	M	100	10	1	0,1
2000,5	1A	0101	0	0000	0000	0000	0101	25999,0	10A	1100	1	1001	1001	1001	0000
2000,0	1B	0100	0	0000	0000	0000	0000	24000,0	10B	1100	0	0000	0000	0000	0000
2000,9	1C	0010	0	0000	0000	0000	1001	NONE	10C	1111	0	0000	0000	0000	0000
2000,0	1D	0001	0	0000	0000	0000	0000	NONE	10D	0000	0	0000	0000	0000	0000
2200,0	2A	0001	0	0010	0000	0000	0000	2000,0	11A	0101	0	0000	0000	0000	0000
2600,0	2B	0001	0	0110	0000	0000	0000	4400,0	11B	0110	0	0100	0000	0000	0000
1600,0	2C	0001	1	0110	0000	0000	0000	3000,0	11C	0101	1	0000	0000	0000	0000
2400,9	2D	0011	0	0100	0000	0000	1001	5000,0	11D	0110	1	0000	0000	0000	0000
1888,8	3A	0001	1	1000	1000	1000	1000	6200,0	12A	0111	0	0010	0000	0000	0000
2444,4	3B	0001	0	0100	0100	0100	0100	6263,0	12B	0111	0	0010	0110	0011	0000
4222,2	3C	0110	0	0010	0010	0010	0010	6325,0	12C	0111	0	0011	0010	0101	0000
6300,0	3D	0111	0	0011	0000	0000	0000	NONE	12D	0000	0	0000	0000	0000	0000
8300,0	4A	1000	0	0011	0000	0000	0000	8195,0	13A	1000	0	0001	1001	0101	0000
12300,0	4B	1001	0	0011	0000	0000	0000	8315,0	13B	1000	0	0011	0001	0101	0000
16300,0	4C	1010	0	0011	0000	0000	0000	8435,0	13C	1000	0	0100	0011	0101	0000
22111,1	4D	1011	0	0001	0001	0001	0001	NONE	13D	0000	0	0000	0000	0000	0000
25300,0	5A	1100	1	0011	0000	0000	0000	12330,0	14A	1001	0	0011	0011	0000	0000
NONE	5B	0000	0	0000	0000	0000	0000	12491,0	14B	1001	0	0100	1001	0001	0000
400,0	5C	1101	0	0100	0000	0000	0000	12652,0	14C	1001	0	0110	0101	0010	0000
2182,0	5D	1110	0	0001	1000	0010	0000	NONE	14D	0000	0	0000	0000	0000	0000
1999,0	6A	1101	1	1001	1001	1001	0000	16460,0	15A	1010	0	0100	0110	0000	0000
0000,0	6B	1101	0	0000	0000	0000	0000	16660,0	15B	1010	0	0110	0110	0000	0000
3999,0	6C	0010	1	1001	1001	1001	0000	16859,0	15C	1010	0	1000	0101	1001	0000
2000,0	6D	0010	0	0000	0000	0000	0000	NONE	15D	0000	0	0000	0000	0000	0000
5999,0	7A	0110	1	1001	1001	1001	0000	22000,0	16A	1011	0	0000	0000	0000	0000
4000,0	7B	0110	0	0000	0000	0000	0000	22156,0	16B	1011	0	0001	0101	0110	0000
7999,0	7C	0111	1	1001	1001	1001	0000	22311,0	16C	1011	0	0011	0001	0001	0000
6000,0	7D	0111	0	0000	0000	0000	0000	NONE	16D	0000	0	0000	0000	0000	0000
9999,0	8A	1000	1	1001	1001	1001	0000	25070,0	17A	1100	1	0000	0111	0000	0000
8000,0	8B	1000	0	0000	0000	0000	0000	25090,0	17B	1100	1	0000	1001	0000	0000
13999,0	8C	1001	1	1001	1001	1001	0000	25110,0	17C	1100	1	0001	0001	0000	0000
12000,0	8D	1001	0	0000	0000	0000	0000	NONE	17D	0000	0	0000	0000	0000	0000
17999,0	9A	1010	1	1001	1001	1001	0000	595,0	18A	1101	0	0101	1001	0101	0000
16000,0	9B	1010	0	0000	0000	0000	0000	598,0	18B	1101	0	0101	1001	1000	0000
23999,0	9C	1011	1	1001	1001	1001	0000	601,0	18C	1101	0	0110	0000	0001	0000
22000,0	9D	1011	0	0000	0000	0000	0000	NONE	18D	0000	0	0000	0000	0000	0000

NECESSARY TEST EQUIPMENT cont.:

ARTIFICIAL KEY for S1300TT and S1301.



The ARTIFICIAL KEY is designed to connect between the exciter and the TEST BOX S1300/01. The necessary wires is fed through to the TEST BOX, and a multi-vibrator keyes via two transistors the exciter in the telex and telegraphy mode. The key frequency is approx. 15 Hz. Additionally there is taken out pulses to trig an oscilloscope, an AF signal can be fed into the exciter to modulate it in the telex mode.

3. TROUBLE-SHOOTING

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

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

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

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

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

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

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

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

TROUBLE-SHOOTING IN THE FREQUENCY GENERATING CIRCUIT

LOOP 1

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

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

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

1. Check the LOOP 1 MIXER output signal on the terminal "Loop 1 out".
 - a. If there is no output signal, the failure is on LOOP 1 MIXER, HARMONIC FILTER UNIT or VCO-UNIT.
 - b. If the output frequency is approx. 2 MHz or approx. 5 MHz, the VCO-UNIT LOOP 1 MIXER and the HARMONIC FILTER UNIT are apparently ok.
2. Check that the frequency on the phase/frequency detector IC106, pin 1 is 1 kHz.
3. Check the Loop 1 Programmable Divider.
 - a. If the frequency on the input terminal "Loop 1 In" is approx. 2 MHz and the frequency on the phase/frequency detector IC106, pin 3 is lower than 1 kHz, the programmable divider is apparently ok.
 - b. If the frequency on the input terminal "Loop 1 In" is approx. 5 MHz and the frequency on the phase/frequency detector IC106, pin 3 is higher than 1 kHz, the programmable divider is apparently ok.
4. Check the phase/frequency detector IC106.
 - a. Measure 1.5V DC on the terminal "PD1 (1.5V) out" on DIVIDER-UNIT.
 - b. If the input frequency on IC106, pin 3 is higher than 1 kHz and the DC-voltage on the terminal "PD1 out" on DIVIDER-UNIT is approx. 0.7V, the phase/frequency detector is apparently ok.
 - c. If the input frequency on IC106, pin 3 is lower than 1 kHz and the DC-voltage on the terminal "PD1 out" on DIVIDER-UNIT is approx. 2.3V, the phase/frequency detector is apparently ok.
5. Check the integrator IC202 on LOOP 1 FILTER & $\pm 18V$ SUPPLY-UNIT.
 - a. If the DC voltage on the terminal "PD1 In" is approx. 0.7V and the DC voltage on output terminal of IC202, pin 6 is approx. -4V, the integrator IC202 is apparently ok.
 - b. If the DC voltage on the terminal "PD1" is approx. 2.3V and the DC voltage on the output terminal of IC202, pin 6 is approx. -17V, the integrator IC202 is apparently ok.
6. If the failure has not been found yet the 1 kHz loop filter IC201 and the wirings to the VCO must be checked.

TRUBLE-SHOOTING cont.:

LOOP 2

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

If there is no output signal from the VCXO and LOOP 2 FILTER on the terminal "VCXO out" , the failure has to be found in the VCXO.

If the output frequency from the VCXO and LOOP 2 FILTER on the terminal "VCXO out" is lower than 10.098 MHz or higher than 10.099 MHz, the phase locked loop 2 is out of lock.

1. Check the output signal on VCXO and LOOP 2 FILTER terminal "Loop 2 out".
 - a. If there is no output signal, the failure is in the loop 2 mixer or the 10 MHz injection signal is missing.
 - b. If the output frequency is slightly lower than 98 kHz or slightly higher than 99 kHz, the VCXO, LOOP 2 mixer and the 10 MHz injection signal are apparently ok.
2. Check that the frequency on the phase/frequency detector IC113, pin 1 is 100 Hz.
3. Check the LOOP 2 Programmable Divider.
 - a. If the frequency on the input terminal "Loop 2 In" is approx. 97 kHz and the frequency on the phase/frequency detector IC113, pin 3 is slightly lower than 100 Hz, the programmable divider is apparently ok.
 - b. If the frequency on the input terminal "Loop 2 In" is approx. 100 kHz and the frequency on the phase/frequency detector IC113, pin 3 is slightly higher than 100 Hz, the programmable divider is apparently ok.
4. Check the phase/frequency detector IC113.
 - a. Measure 1.5V DC on the terminal "PD2 (1.5V)" on the DIVIDER-UNIT.
 - b. If the input frequency on IC113, pin 3 is lower than 100 Hz and the DC voltage on the terminal "PD2 Out" on DIVIDER-UNIT is approx. 0.7V, the phase/frequency detector is apparently ok.
 - c. If the input voltage on IC113, pin 3 is higher than 100 Hz and the DC voltage on the terminal "PD2 Out" on DIVIDER-UNIT is approx. 2.3V the phase/frequency is apparently ok.
5. Check the integrator IC601 on VCXO and LOOP 2 FILTER.
 - a. If the DC voltage on the terminal "PD2 In" is approx. 0.7V and the DC voltage on output terminal of IC601, pin 6 is approx. 17V, the integrator IC601 is apparently ok.
 - b. If the DC voltage on the terminal "PD2 In" is approx. 2.3V and the DC voltage on the output terminal of IC601, pin 6 is approx. 1V, the integrator IC601 is apparently ok.
6. If the failure has not yet been found the 100 Hz loop filter must be checked.

4. PERFORMANCE CHECK FOR S1301

Before executing performance check the exciter must be connected to power supplies +22V and -45V via the testbox S1300/01 and the artificial key for S1300TT and S1301. The output connector shall be loaded with 50 ohm, and the exciter shall be activated by a microphone key plug with a capacitor in it for connection to tone generator.

- 4.1.1.
Connect voltmeter to TP1.
- 4.1.2.
Check the voltage to be within 18V $\pm 0.2V$.
- 4.1.3.
Connect voltmeter to TP2.
- 4.1.4.
Check the voltage to be within -18V $\pm 0.2V$.
- 4.1.5.
Connect voltmeter between TP1 and TP3.
- 4.1.6.
Check the voltage to be within 100 mV.
- 4.1.7.
Connect voltmeter to TP31.
- 4.1.8.
Check the voltage to be within 5V $\pm 0.2V$.
- 4.1.9.
Connect frequency counter to TP4.
- 4.1.10.
Check the frequency to be within 10 000 000 Hz ± 1 Hz.

4.2. MOTOR CONTROL AND FREQUENCY SELECTOR.

- 4.2.1.
Set POWER "ON/OFF" to "1".
- 4.2.2.
Connect frequency counter to TP21. Mode, A3A and full power on both front panel and power level potentiometer.
- 4.2.3.
Set the frequency selector to the first frequency indicated in fig. 1.

- 4.2.3.
Code the corresponding motor code on the testbox S1300/01.
- 4.2.4.
Check that the LEDs on the testbox is lighting as indicated in fig. 1. Note that for incorrect code TUNE lamp is lighting instead of BLOCK P.S.
- 4.2.5.
Check that the output frequency read on the frequency counter is as indicated in fig. 1.
- 4.2.6.
Go to next frequency indicated in fig. 1 and go through 4.2.3., 4.2.4., 4.2.5. and 4.2.6. until all the table is done.
- 4.2.7.
Switch off the frequency selector and go to fixed 2182 kHz.
- 4.2.8.
Code the corresponding motor code
s,r,q,p,o = 1,1,1,1,0.
- 4.2.9.
Check that only BLOCK P.S. on the testbox and the "2182 SELECTED" on front panel is lighting.
- 4.2.10.
Set "POWER ON/OFF" to "0", and check that BLOCK P.S. turns off. Set "POWER ON/OFF" back to "1".
- 4.2.11.
Change one bit in the motor code and check that the tune lamp on front panel is lighting.
- 4.2.12.
Select 26100.0 kHz and check that "FREQUENCY OUTSIDE BANDS" lamp on front panel is lighting and tune lamp not.

FREQUENCY SELECTED	MOTOR CONTROL CODE	BAND CODE			BLOCK P.S.	TUNE	400W/800W
	s r q p o	Z Y X V	A	O C B			
1600.0	0 1 0 1 1	0 0 0 1	1	0 1 1	X		
1700.0	0 1 0 1 1	0 0 0 1	1	0 1 1	X		
1800.0	0 1 1 0 0	0 0 0 1	1	1 0 0	X		
1900.0	0 1 1 0 0	0 0 0 1	1	1 0 0	X		
2000.0	0 0 0 0 0	0 0 0 1	0	0 0 0	X		
2100.0	0 0 0 0 0	0 0 0 1	0	0 0 0	X		
2200.0	0 0 0 0 1	0 0 0 1	0	0 0 1	X		
2300.0	0 0 0 0 1	0 0 0 1	0	0 0 1	X		
2400.0	0 0 0 1 0	0 0 0 1	0	0 1 0	X		
2500.0	0 0 0 1 0	0 0 0 1	0	0 1 0	X		
2600.0	0 0 0 1 1	0 0 0 1	0	0 1 1	X		
2700.0	0 0 0 1 1	0 0 0 1	0	0 1 1	X		
2800.0	1 0 0 1 0	0 0 1 0			X		
2900.0	1 0 0 1 0	0 0 1 0			X		
3000.0	1 0 0 1 0	0 0 1 0			X		
3100.0	1 0 0 1 1	0 0 1 1			X		
3200.0	1 0 0 1 1	0 0 1 1			X		
3300.0	1 0 0 1 1	0 0 1 1			X		
3400.0	1 0 1 0 0	0 1 0 0			X		
3500.0	1 0 1 0 0	0 1 0 0			X		
3600.0	1 0 1 0 0	0 1 0 0			X		
3700.0	1 0 1 0 1	0 1 0 1			X		
3800.0	1 0 1 0 1	0 1 0 1			X		
3900.0	1 0 1 0 1	0 1 0 1			X		
4000.0	1 0 1 1 0	0 1 1 0			X		X
4100.0	1 0 1 1 0	0 1 1 0			X		X
4200.0	1 0 1 1 0	0 1 1 0			X		X
6200.0	1 0 1 1 1	0 1 1 1			X		X
6300.0	1 0 1 1 1	0 1 1 1			X		X
8100.0	1 1 0 0 0	1 0 0 0			X		X
8200.0	1 1 0 0 0	1 0 0 0			X		X
8300.0	1 1 0 0 0	1 0 0 0			X		X
8400.0	1 1 0 0 0	1 0 0 0			X		X
12300.0	1 1 0 0 1	1 0 0 1			X		X
12400.0	1 1 0 0 1	1 0 0 1			X		X
12500.0	1 1 0 0 1	1 0 0 1			X		X
16400.0	1 1 0 1 0	1 0 1 0			X		X
16500.0	1 1 0 1 0	1 0 1 0			X		X
16600.0	1 1 0 1 0	1 0 1 0			X		X
16700.0	1 1 0 1 0	1 0 1 0			X		X
16800.0	1 1 0 1 0	1 0 1 0			X		X
22000.0	1 1 0 1 1	1 0 1 1			X		X
22100.0	1 1 0 1 1	1 0 1 1			X		X
22200.0	1 1 0 1 1	1 0 1 1			X		X
22300.0	1 1 0 1 1	1 0 1 1			X		X
25000.0	1 1 1 0 0	1 1 0 0			X		X
25100.0	1 1 1 0 0	1 1 0 0			X		X
405.0	1 1 1 0 1	1 1 0 1			X		X
535.0	1 1 1 0 1	1 1 0 1			X		X

FIG. 1.

PERFORMANCE CHECK FOR S1301 cont.:

4.3. FREQUENCY SELECTION.

4.3.1.
Connect frequency counter to TP21.
Mode A3A.

4.3.2.
Choose the following frequencies on the frequency selector: 1888.8 kHz, 2444.4 kHz, 2222.2 kHz and 2111.1 kHz, and check correct output frequency.

4.4.
HARMONIC FILTER
Load TP26 with 68 ohm.

4.4.1.
Connect frequency counter to TP30.

4.4.2.
Connect voltmeter to TP6.

4.4.3.
Connect voltmeter to TP7.

4.4.4.
Disconnect the grey/black (100 kHz D), yellow/brown (1 MHz A), red/black (100 kHz B) and the yellow/black (100 kHz C) wire on the frequency selector board. Connect the yellow/black and the red/black wire to chassis. Connect the brown/yellow and the grey/black together and leave them open in all A positions and short-circuit them to chassis in all B positions.

4.4.5.
Go through the frequencies indicated in fig. 5 and check the above mentioned test points.

Ad. 4.4.1.
In the A positions read 4698 kHz.
In the B positions read 2699 kHz.

Ad. 4.4.2.
In all positions check the voltage to be below 3.5V.

Ad. 4.4.3.
In the A positions read 15V \pm 1V.
In the B positions read 7.5V \pm 2.5V.

4.4.6.
Disconnect the 68 ohm load from TP26.
Reconnect the four wires disconnected in 4.4.4.

VCO under test	Pos.	Frequency selected
VC01	A	1999.0
	B	1800.0
VC02	A	2999.0
	B	2800.0
VC03	A	4199.0
	B	4000.0
VC04	A	6399.0
	B	6200.0
VC05	A	8199.0
	B	8200.0
VC07	A	12399.0
	B	12400.0
VC09	A	16599.0
	B	16600.0
VC012	A	22199.0
	B	22200.0
VC013	A	25199.0
	B	25000.0

FIG. 5.

4.5.
STEP RESPONSE.

4.5.1.
Connect oscilloscope to TP7.

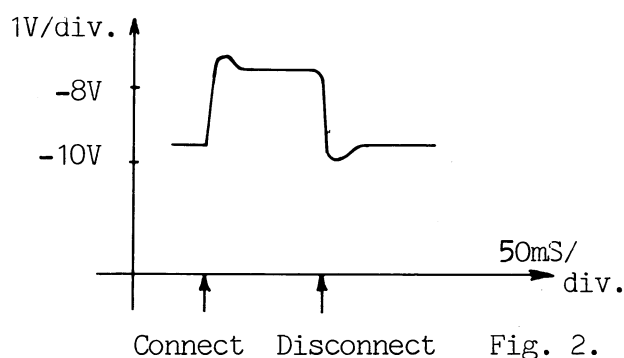
4.5.2.
Set the frequency selector to 2499.9 kHz.

4.5.3.
Short-circuit the black/yellow control wire on divider board to ground. Step response is seen on oscilloscope, compare to fig. 2. next page.

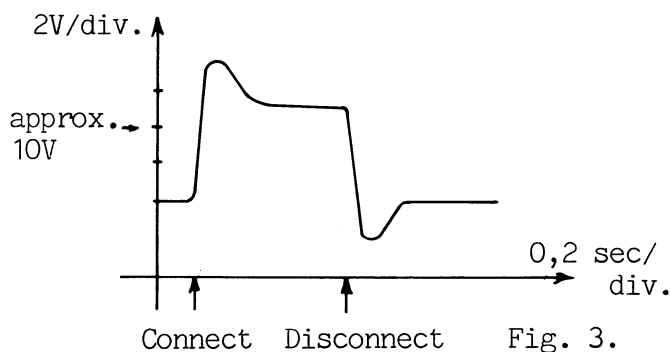
4.5.4.
Connect oscilloscope to TP8.

4.5.5.
Short-circuit the grey control wire on divider board to ground. Step response is seen on oscilloscope, compare to fig. 3.

PERFORMANCE CHECK FOR S1301 cont.:



Connect Disconnect Fig. 2.



Connect Disconnect Fig. 3.

4.6. LEVEL CHECK.

4.6.1.
Set the frequency selector to 2000.5 kHz.

4.6.2.
Connect oscilloscope to TP29 via 1:10 probe.

4.6.3.
Check the voltage to be above 1.7V pp.

4.6.4.
Connect oscilloscope to TP27 via 1:10 probe.

4.6.5.
Check the voltage to be above 1.6V pp.

4.6.6.
Connect oscilloscope to TP28 via 1:10 probe.

4.6.7.
Check the voltage to be above 2.5V pp.

4.6.8.
Connect voltmeter to TP8.

4.6.9.
Check the voltage to be within 6V to 11V.

4.6.10.
Switch the frequency selector to 2000.0 kHz, and check the voltage to be below 14.5V.

4.6.11.
Switch the frequency selector to 2000.9 kHz, and check the voltage to be above 4V.

4.7. MICROPHONE AMPLIFIER.

4.7.1.
Connect oscilloscope to TP12.

4.7.2.
Set exciter to A3J and connect tone generator, 1000 Hz, to microphone plug.

4.7.3.
Turn tone generator output control fully counter clockwise and then clockwise until the level on TP12 is just constant. This limitation shall happen at approx. 1000 mV pp. measured on TP25.

4.7.4.
Add 10 dB to tone generator output (1V pp.), and check that the measured signal is approx. symmetrical clipped.

4.7.5.
Connect oscilloscope to TP24.

4.7.6.
By connection and disconnection of the tone generator signal the measured voltage shall be as shown on fig. 4.

4.8. A2H OSCILLATOR AND DELAY UNIT.

4.8.1.
Connect frequency counter to TP32, and check the frequency to be within 455 Hz to 475 Hz in A2H position.

4.8.2.
Connect oscilloscope to TP21, and tone-generator to the artificial key. Tone-generator output: 1500Hz and 1Vpp.

PERFORMANCE CHECK FOR S1301 cont.:

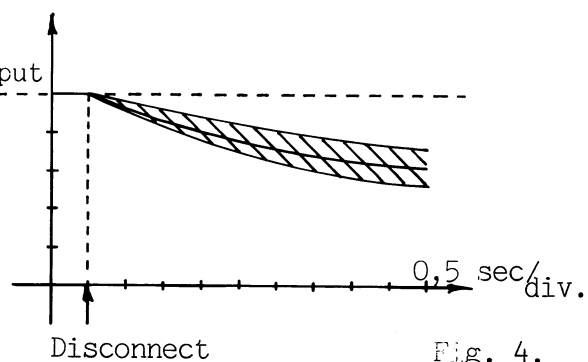
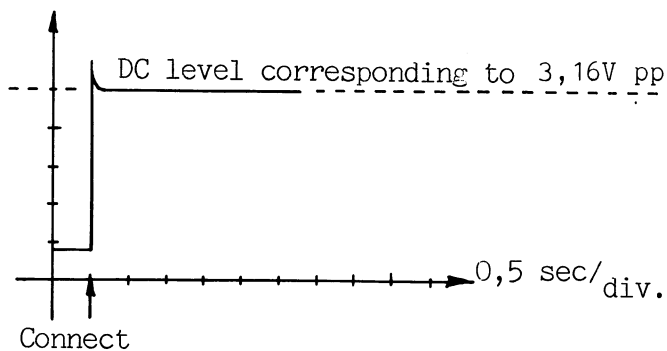
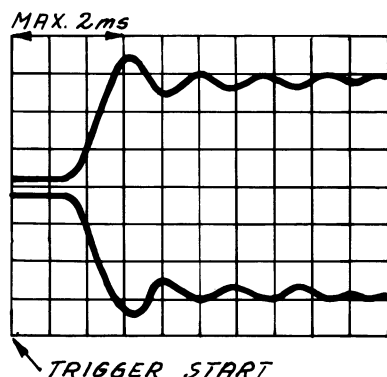


Fig. 4.

4.8.3.

Select 2000.5 kHz and telex, trig the oscilloscope from the artificial key, and check the output envelope on the oscilloscope with the figure below. Disconnect the tonegenerator.

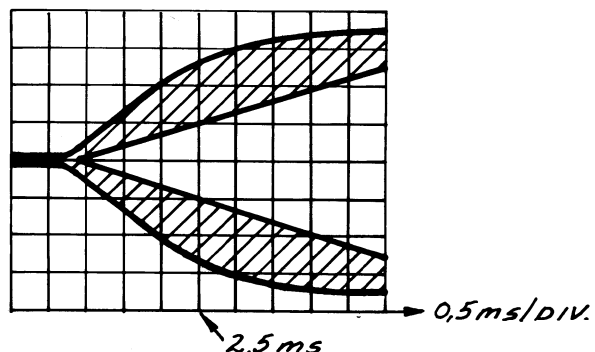


4.8.4.

Select 2000.5 kHz, A1 and oscilloscope sensitivity to 0.1V/div., adjust power level potentiometer until the steady state level is 8 cm pp. on the screen.

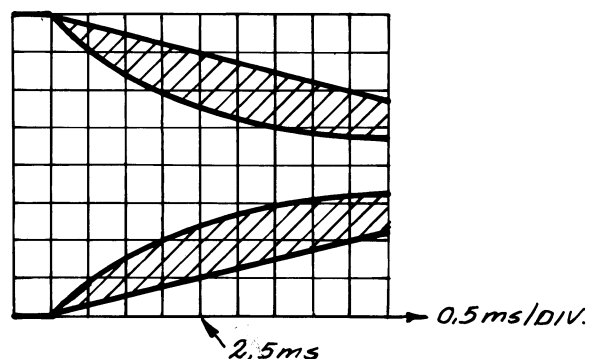
4.8.5.

Trig the oscilloscope from the artificial key and check the output envelope on the oscilloscope with the figure below.



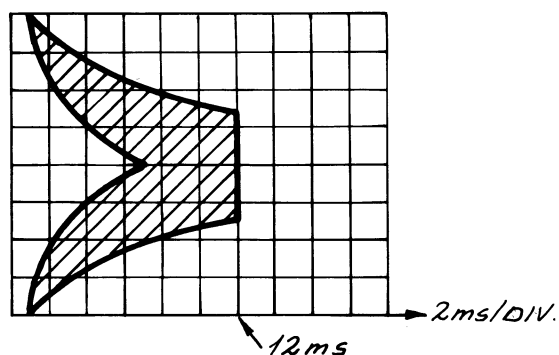
4.8.6.

Trig the oscilloscope on the opposite edge and check the output envelope with the figure below.



4.8.7.

Change sweep rate to 2 mS/div. and check the +22V from delay as indicated on the figure below.



4.8.8.

Connect the oscilloscope to TP35 on the A2H oscillator board and check that the voltage is +22V for a time period between 10 mS and 30 mS.

PERFORMANCE CHECK FOR S1301 cont.:

4.9.
OUTPUT LEVEL.

4.9.1.
Connect oscilloscope to TP21 via 1:10 probe.

4.9.2.
Select 2000.5 kHz, tune, full power and power level potentiometer fully clockwise.
Measure the voltage to be within 18V pp. and 21V pp.

4.10.
POWER REDUCTION

4.10.1.
Connect diode probe to TP21.

4.10.2.
Select 2000.5 kHz, tune and full power. Check that the power level potentiometer can change output level between 10 dB and 13 dB.

4.10.3.
With power level potentiometer fully clockwise, check the first power reduction step to be between 4 dB and 6 dB below full power, the second step 8 dB to 12 dB, the third step 12 dB to 18 dB and the fourth step 17 dB to 23 dB below full power.

4.11.
A3H, A3A, A2H, A1 and TELEX.

4.11.1.
Connect oscilloscope to TP21 via 1:10 probe.

4.11.2.
Select 2000.5 kHz, tune and full power, adjust power level potentiometer until there is full deflection (8 cm) on oscilloscope screen.

4.11.3.
Change to A3H, without modulation. Check A3H carrier, now seen to be within 4 cm and 5 cm.

4.11.4.
Connect tonegenerator, 1000 Hz and 1V pp. to microphone plug.

4.11.5.
Check the output in A3H, A3A, A2H and A3J to be within 7 cm pp. and 8 cm pp. on oscilloscope.

4.11.6.
Check the output in A1 to be within 7 cm pp. and 8 cm pp. on the oscilloscope.

4.11.7.
Select 2000.5 kHz and A3J. Connect tonegenerator, 1500 Hz and 1V pp. to the microphone plug and adjust the output level to full deflection (8 cm) on the oscilloscope screen. Connect tonegenerator to the artificial key.

4.11.8.
Select 2000.5 kHz and telex. Connect the grey/white wire W2/9-10 to the yellow wire W1/9-10 on the mode switch board. Connect TP33 to ground and check the steady state output to be within 7 cm pp. and 8 cm pp. on the oscilloscope.

4.11.9.
Connect TP33 to TP34 on the mode switch unit and check the steady state output to be within 4.5 cm pp. and 6 cm pp. Disconnect the established connections.

4.12.
BANDPASS FILTER UNIT.

Lowpass filter and bandpass filters are checked as described in adjustment procedure 5.9.1. - 5.9.4.

4.13.
ALARM GENERATOR

The alarm generator is checked as described in adjustment procedure 5.6.1. - 5.6.4.

PERFORMANCE CHECK FOR S1301 cont.:

4.14.

FREQUENCY RESPONSE

Frequency responses from microphone plug to output socket is measured as described in adjustment procedure

5.7.3.

4.15.

DISTRESS

Connect a handset to the exciter. Switch to fixed 2182 kHz and do a talk test. Check the output on TP21 with oscilloscope. Press alarm and test alarm at the same time.

The distress signal can now be seen on the oscilloscope. The time from start of alarm signal until it automatically disappears is checked by a watch to be within 35 secs. and 55 secs.

5. ADJUSTMENT PROCEDURE FOR S1301

Valid for S1301 with serial no. higher than 270081.

Before adjustment of the exciter, it must be connected to +22V and -45V power supplies via the testbox S1300/01 and the artificial key, furthermore the output connector shall be loaded with 50 ohm and the exciter shall be activated by a microphone key plug with a capacitor in it for connection to a tone generator.

The following adjustment steps are all starting with information about frequency selected and operation mode, e.g. 2000.5, tune.

The trimming cores are factory sealed. In order to break the seal, use normal cellulose thinner.

5.1. DC ADJUSTMENTS.

5.1.1.
Connect voltmeter to TP1.

5.1.2.
Adjust R902 to +18V.

5.1.3.
Connect voltmeter to TP2.

5.1.4.
Adjust R209 to -18V.

5.1.5.
Connect voltmeter between TP1 and TP3.

5.1.6.
Adjust R214 to less than 100 mV.

5.1.7.
Disconnect brown wire to TP22, and insert amperemeter.

5.1.8.
Adjust R1536 to 285 mA.

5.1.9.
Reconnect brown wire to TP22.

5.2. MICROPHONE AMPLIFIER.

5.2.1.
2000.5, A3J. Connect tone generator, 1000 Hz and 1000 mV pp. measured on TP25.

5.2.2.
Connect oscilloscope to TP12.

5.2.3.
Turn R1201 fully counter clockwise, and then clockwise until the measured level is just constant.

5.2.4.
Add 10 dB to tone generator output 3,16V pp.

5.2.5.
Adjust R1224 for symmetrical clipping.

5.2.6.
Connect oscilloscope to TP13.

5.2.7.
Change to tune position.

5.2.8.
Adjust R1232 to 80 mV pp

5.3. TCXO.

5.3.1.
Connect frequency counter to TP4.

5.3.2.
Adjust R112 to 10 000 000 Hz.

5.4. SIGNAL PATH.

5.4.1.
2000.5, A3J, with no input from tone generator. Connect oscilloscope to TP9 via 1:10 probe.

5.4.2.
Adjust L101, L1101 and L1102 for max.

ADJUSTMENT PROCEDURE FOR S1301 cont.:

Valid for S1301 with serial no. higher than 270081

5.4.3.

Adjust R1125 and C1123 for min. This adjustment shall be repeated until the measured signal is almost a 1.2 MHz sine.

5.4.4.

Turn power level potentiometer fully clockwise.

5.4.5.

Connect oscilloscope to TP23 via 1:10 probe.

5.4.6.

Adjust R1625 to min.

5.4.7.

2000.5, tune, full power. Connect oscilloscope to TP21 via 1:10 probe. If the signal is clipped, reduce output until it is undistorted.

5.4.8.

Adjust L1106, L1601, L1603 and L1504 for max.

5.4.9.

Connect oscilloscope to TP17 via 1:10 probe and set output to max.

5.4.10.

Adjust R1151 to 350 mV pp.

5.4.11.

Connect oscilloscope to TP20 via 1:10 probe.

5.4.12.

Adjust R1631 to 2.8V pp.

5.4.13.

Connect oscilloscope to TP21 via 1:10 probe.

5.4.14.

Adjust R1534 to 21V pp.

5.5.

A3H AND A2H LEVEL.

5.5.1.

Connect frequency counter to TP32.

5.5.2.

2000.5, A2H. Adjust L1801 to 465 Hz ± 5 Hz.

5.5.3.

2000.5, tune and full power. Connect oscilloscope to TP21 via 1:10 probe.

5.5.4.

Adjust power level potentiometer to full screen (8 cm).

5.5.5.

Change to A3H without modulation. Adjust the A3H carrier now seen to 4.4 cm with R1109.

5.5.6.

Change to A2H, and adjust T1806 until the A2H signal now seen is 8 cm pp.

5.5.7.

Connect oscilloscope to TP35, and trig the oscilloscope from the artificial key and load TP35 with 1 kohm.

5.5.8.

2000.5, A1. Adjust the voltage now seen to be +22V for a time period of 10 mS of 1 mS on the potentiometer R1819.

5.6.

ALARM GENERATOR.

5.6.1.

2000.5, test alarm. Short-circuit C1301. One of the two alarm tones can now be measured on TP11. By removing and establishing the short-circuit, the alarm generator can be changed to the other tone. If necessary the tones may be adjusted on L1301: 22 00 Hz ± 15 Hz and L1302 1300 Hz ± 10 Hz.

5.6.2.

Disconnect the established short-circuit.

5.6.3.

Connect frequency counter, in time period position, to TP10.

5.6.4.

Adjust R1301 to 250 mS ± 10 mS. Under adjustment the alarm generator will stop after about 45 secs. For restart, release test alarm push button and activate it again.

ADJUSTMENT PROCEDURE FOR S1301 cont.:
Valid for S1301 with serial no. higher than 270081.

The following filter adjustments shall only be carried out when some repair is done around a filter.

5.7.
600 kHz SSB FILTER.

5.7.1.
2000.5, tune. Connect oscilloscope to TP21 via 1:10 probe.

5.7.2.
Adjust L1104 and L1105 for max.

5.7.3.
Control of filter response is carried out in mode A3J, with tone generator connected to microphone plug, output 1V pp. measured on TP25.

Frequency response is measured with diode probe on TP21. Max. permissible ripple is 2 dB in the frequency range 500 Hz - 2500 Hz, -6 dB frequencies is approx. 350 Hz and 2700 Hz.

5.7.4.
Go through 5.4.9. - 5.4.14.

5.8.
10.7 MHz FILTER.

5.8.1.
598.0, A3H without modulation. Disconnect innercore of coaxial cable W1/6-16 and short-circuit the green wire (X band select) on the FREQUENCY SELECTOR UNIT to chassis.

5.8.2.
Connect point 1 to point 5 on mixer-board with an external wire.

5.8.3.
Connect oscilloscope to TP19 via 1:10 probe.

5.8.4.
Adjust L1601 and L1602 to max.

5.8.5.
Adjust slightly L1601 and/or L1602 until the amplitude is the same within +0.25 dB, with the frequencies 595.0 kHz, 598.0 kHz and 601.0 kHz selected.

5.8.6.
Remove wire between 1 and 5, reconnect W1/6-16, and the green wire on the FREQUENCY SELECTOR UNIT.

5.8.7.
Go through 5.4.9. - 5.4.14.

5.9.
BAND FILTER UNIT AND LOWPASS FILTER.

5.9.1.
2000.0, tune. Connect diode probe to TP21.

5.9.2.
Adjust power level potentiometer until 7.75V, corresponding to +20 dB on the decibel scale, is attained. Repeat adjustment of L1513 and L1514 until output difference is below 0.5 dB with the frequencies 1600.0 kHz, 2000.0 kHz, 3000 kHz and 4299.0 kHz selected.

5.9.3.
2000.0, tune. Connect diode probe to TP21.

5.9.4.
Adjust power level potentiometer to +20 dB (7.75V).

The frequencies for bandpass filter adjustments is chosen so that center frequency is in position B, and band limits in position A and C. See the table below

Every single bandpass filter shall be adjusted to max. output. The output must be within +0.25 dB in A and C relative to B. And the deflection on the center frequency, position B, shall be between 19.0 dB and 20.5 dB.

A	B	C
6200.0	6263.0	6325.0
8195.0	8315.0	8435.0
12330.0	12491.0	12652.0
16460.0	16660.0	16859.0
22000.0	22156.0	22311.0
25070.0	25090.0	25110.0

5.9.5.
Go through 5.4.9. - 5.4.14.

6. NECESSARY ADJUSTMENTS AFTER REPAIR FOR S1301

In the following paragraphs is referred to the necessary adjustment- and performance check paragraphs in chapter 4 and 5.

- 6.1.
DIVIDER UNIT
Execute 4.1.8., 5.3. and adjust L101 as described in 5.4.1. and 5.4.2.
Check 4.3.1., 4.3.2., 4.5. and 4.9.
- 6.2.
LOOP 1 FILTER & $\pm 18V$ POWER SUPPLY
Execute 5.1.1. - 5.1.6. (both incl.)
Check 4.4., 4.5.1., 4.5.2. and 4.5.3.
- 6.3.
VCO UNIT, HARMONIC FILTER OR LOOP 1 MIXER
Check 4.3., 4.4., 4.5.1., 4.5.2. and 4.5.3.
- 6.4.
VCXO AND LOOP 2 FILTER
Execute 5.4.7. - 5.4.14. (both incl.) without adjusting L1108, L1603 and L1604.
Check 4.6.6. - 4.6.11. (both incl.).
Check 4.5.4. and 4.5.5.
- 6.5.
MOTOR CONTROL UNIT
Check 4.2.
- 6.6. FILTER UNIT
Execute 5.1.1., 5.1.2., 5.1.5. and 5.1.6.
- 6.7.
MODE SWITCH UNIT
Carry out a FUNCTION CHECK 7.
- 6.8.
SSB GENERATOR
Execute 5.4., 5.5., 5.10.3. and 5.10.4., without adjusting L101, L601, L1603 and L1604.
- 6.9.
MICROPHONE AMPLIFIER
Execute 5.2. and 5.4.9. - 5.4.14. (both incl.).
Check 4.7.
- 6.10.
ALARM SIGNAL GENERATOR
Execute 5.6.
Check 4.15.
- 6.11.
DRIVER UNIT OR BANDPASS FILTER
Execute 5.1.8., 5.1.9. and 5.9., no coil adjustment will generally be necessary.
- 6.12.
MIXER UNIT
Execute 5.4.4. - 5.4.14. (both Incl.) without adjusting L1108 and L1601.
- 6.13.
A2H OSCILLATOR & DELAY UNIT
Execute 5.5. without adjusting R1109
- 6.14.
FREQUENCY SELECTOR UNIT
Execute 4.2.2., 4.2.3., and 4.2.5. for every frequency in fig. 1.
Execute 4.2.12 and 4.3.

7. FUNCTION CHECK FOR S1301

7.1.1.

Connect artificial key, S1300/01 testbox, power supplies, 50 ohm load and tonegenerator via key plug to the exciter.

7.1.2.

Connect frequency counter to output connector via 1:10 probe.

7.1.3.

Set exciter to A3A, full power, power level potentiometer fully clockwise and no modulation.

7.1.4.

Select the following frequencies: 1888.8 kHz, 2444.4 kHz, 4111.1 kHz, 6222.2 kHz, 8300.0 kHz, 12400.0 kHz, 16600.0 kHz, 22100.0 kHz and 25100.0 kHz, and check the output frequency to be within 0.5 ppm.

7.2.1.

Change to tune position.

7.2.2.

Connect diode probe to output connector.

7.2.3.

Go through the above mentioned frequencies and check the voltage to be within 16V to 20V.

7.2.4.

Check that the power level potentiometer control range is approx. 12 dB.

7.2.5.

With power level potentiometer fully clockwise, check the first power reduction step to be between 4 dB and 6 dB below full power, the second step 8 dB to 12 dB, the third step 12 dB to 18 dB and the fourth step 17 dB to 23 dB below full power.

7.3.1.

Change to A3J. Select 2000.0 kHz.

7.3.2.

Supply 1500 Hz and 3V RMS to microphone plug.

7.3.3.

Adjust power level potentiometer until meter deflection is 7.75V corresponding to +20 dB.

FUNCTION CHECK FOR S1301 cont.:

7.3.4.

Change tone generator frequency between 500 Hz and 2500 Hz, and check that the output amplitude ripple is below 2 dB. Check that -6 dB frequencies are approx. 300 Hz and 2700 Hz.

7.3.5.

Turn tone generator to 1000 Hz.

7.3.6.

Disconnect diode probe and connect oscilloscope to output connector.

7.3.7.

Change to tune position.

7.3.8.

Adjust power level potentiometer to full deflection on oscilloscope - screen (8 cm pp.).

7.3.9.

Check that the amplitude is within 7 cm pp. and 8 cm pp. in the positions A3J, A3H and A3A.

7.3.10.

Check that the steady state amplitude is within 7 cm pp. and 8 cm pp. in A2H position.

7.3.11.

Check that the steady state amplitude is within 5 cm pp. and 6.4 cm pp. in A1 position.

7.3.12.

Supply 1500 Hz and 1V RMS to the artificial key.

7.3.13.

Check that the steady state amplitude is within 6 cm pp. and 8 cm pp. in telex position.

7.4.1.

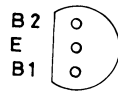
Change to fixed 2182 kHz.

7.4.2.

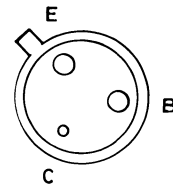
Press alarm and test alarm at the same time. The distress signal can now be seen on the oscilloscope. The time from start of alarm signal until it automatically disappears shall be between 35 secs. and 55 secs.

Check that power switch is disabled under alarm transmission.

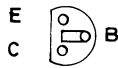
BOTTOM VIEW



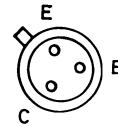
2N4871



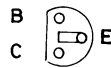
BFW17A



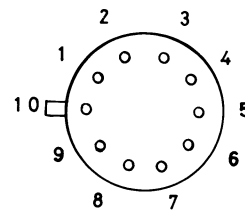
BC 328-25
BC 338
BC 547
BC 548 A,B,C
BC 556 A
BC 558 A,B,C



2N2368



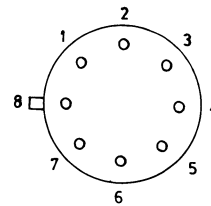
BF199
BF494



CA3019



BF256 A,B,C

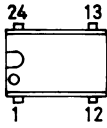


LM3053

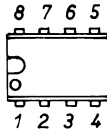


E310

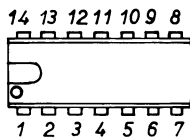
TOP VIEW



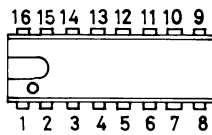
MC14515 BCB



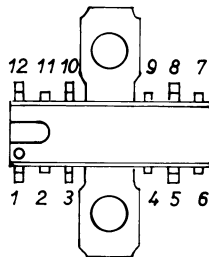
LM308N
MC1455 P1
MC1458



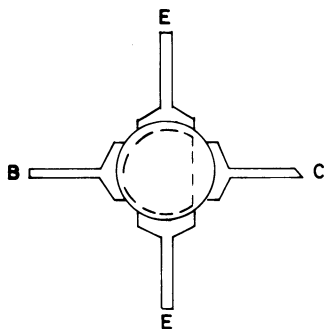
LM324
LM3086
MC4044
MC14077B CP
MC14081B CP
SN7407N
SN7410N
SN7472N
SN74LS20N
SN74LS27N
SN74LS290N



MC14519B CP
MC14530B CP
SN74LS109N
SN74LS192N
SN74LS390N

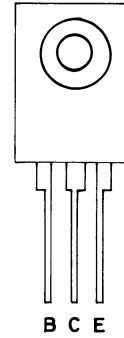


TCA940

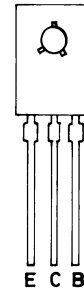


2N5641

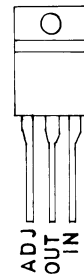
FRONT VIEW



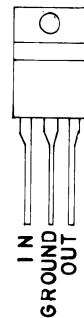
BD577



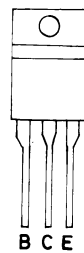
BD138
BD139



LM317T

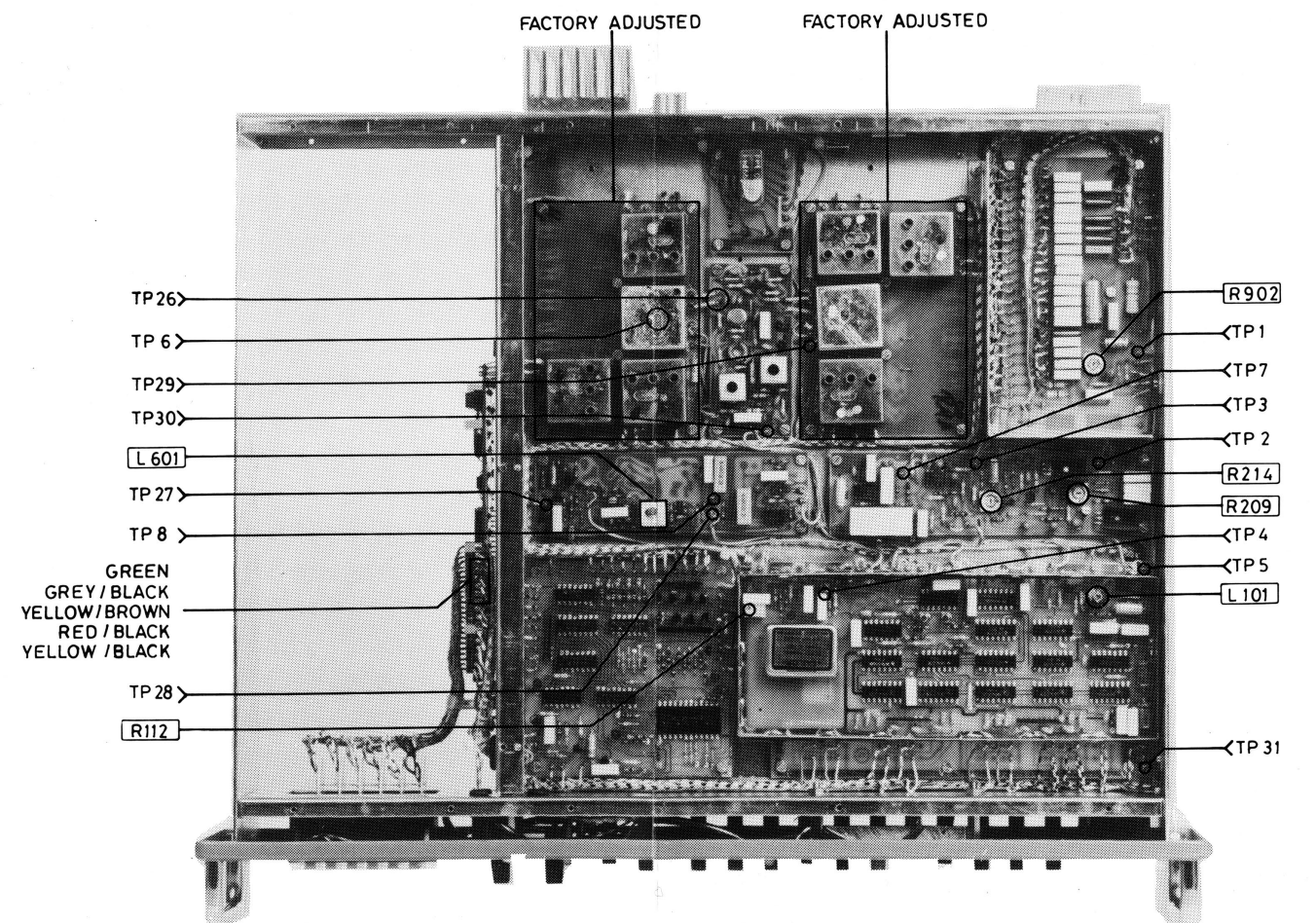
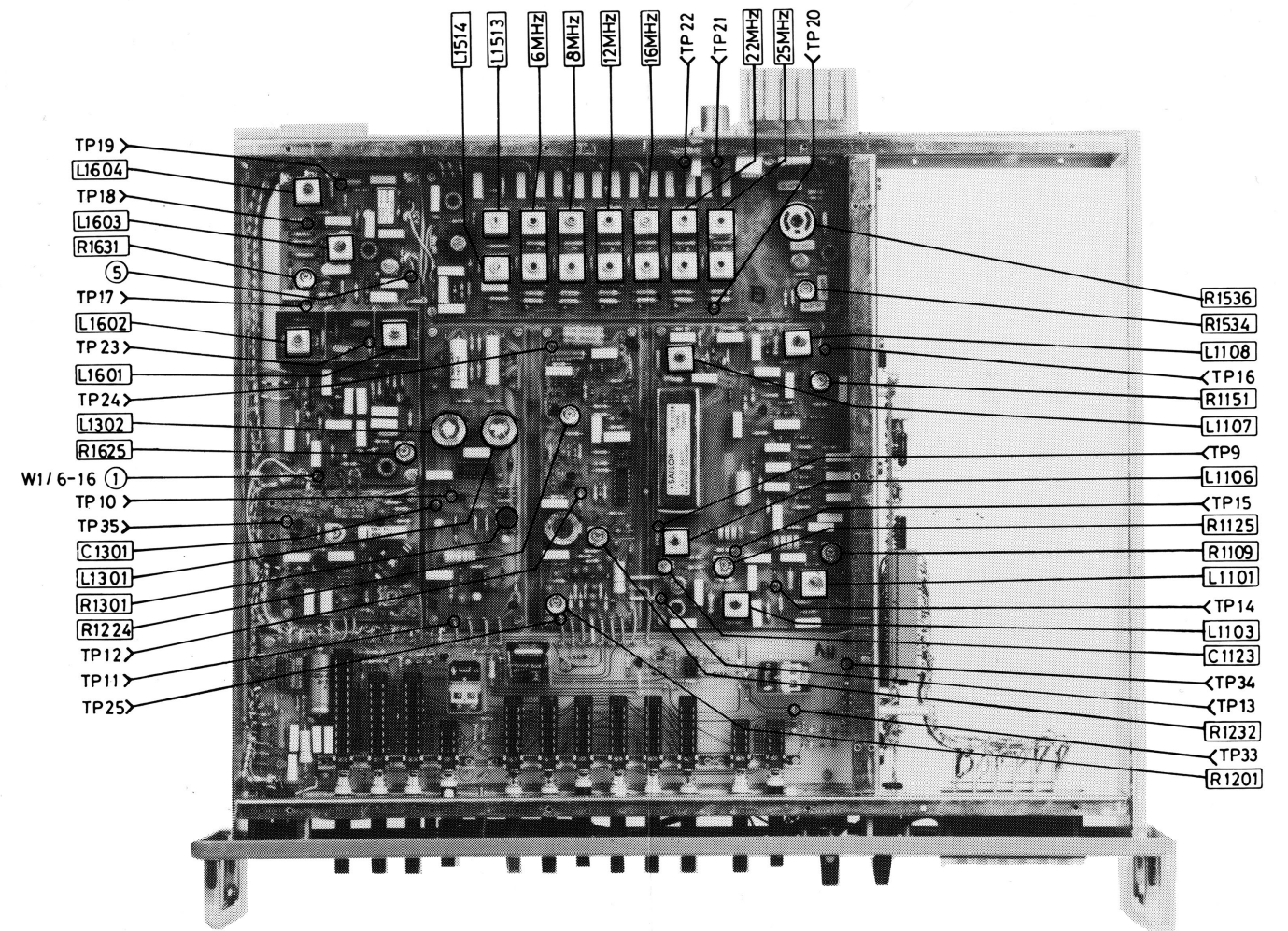
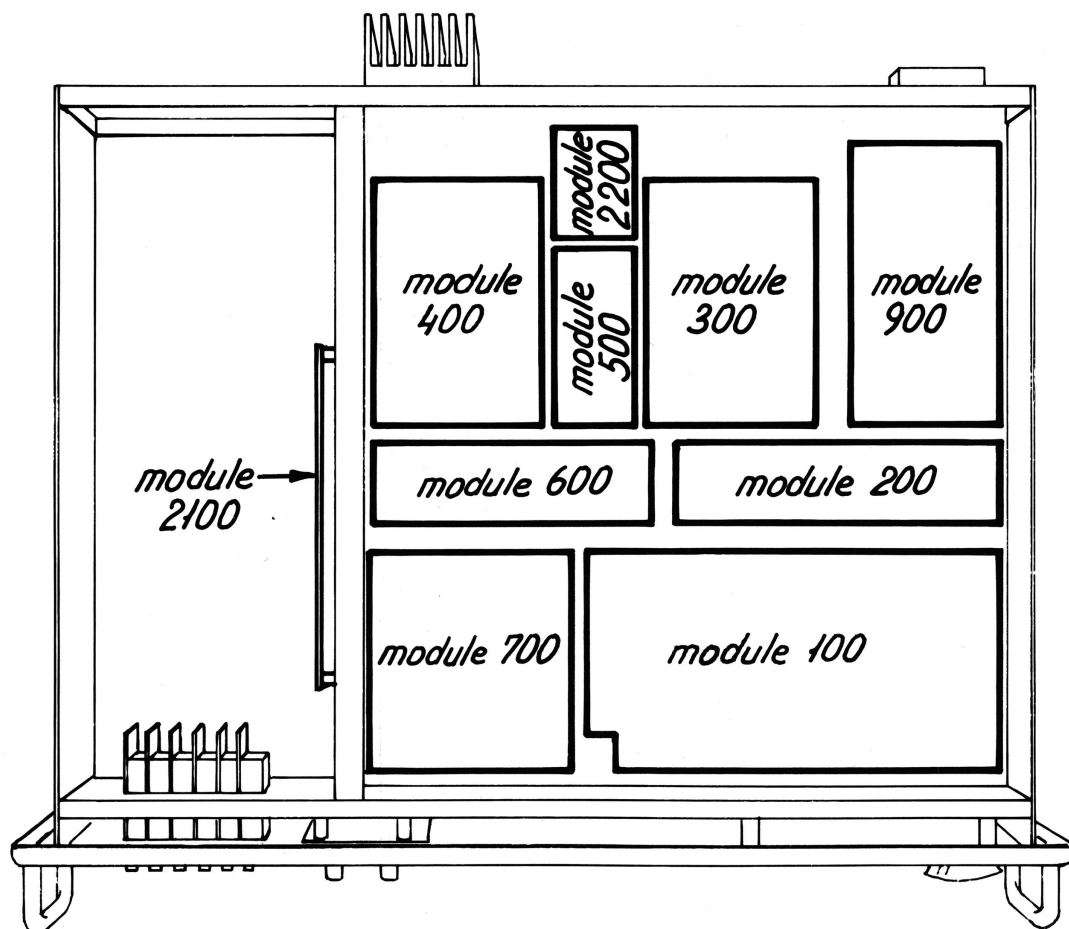
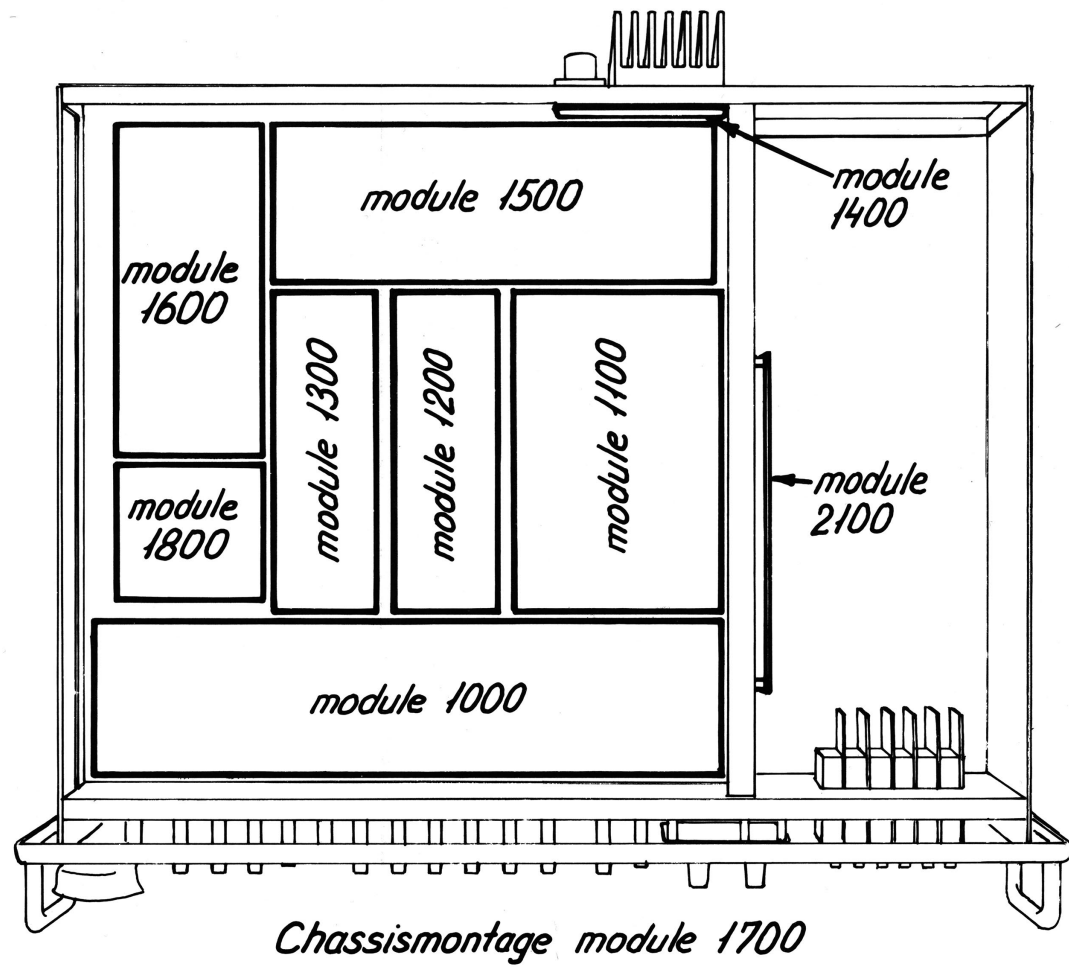


MC7805CT
MC7818CT



BD241

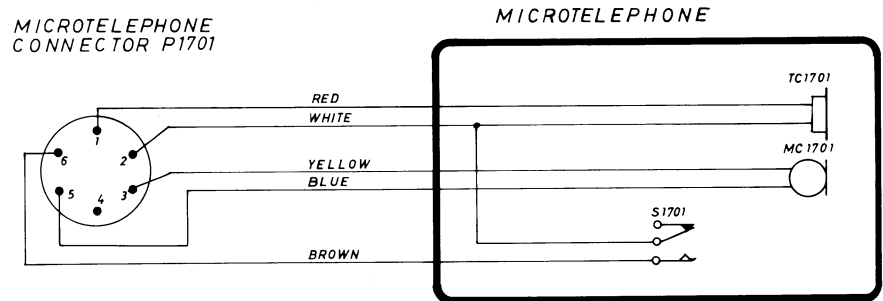
S1301B/4-0-22156
4-0-22632/4-0-22155A



MICROTELEPHONE INSTALLATION S1300

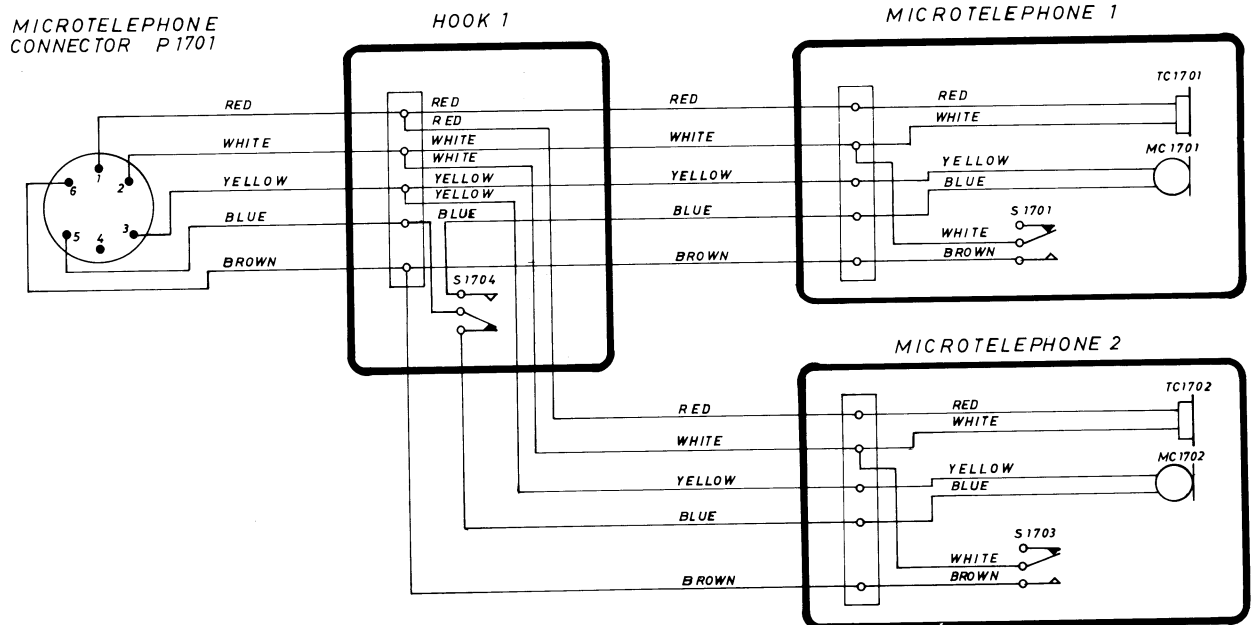
It is possible on request to get a special two microphone installation as described on the schematic diagram below.

NORMAL INSTALLATION WITH ONE MICROTELEPHONE

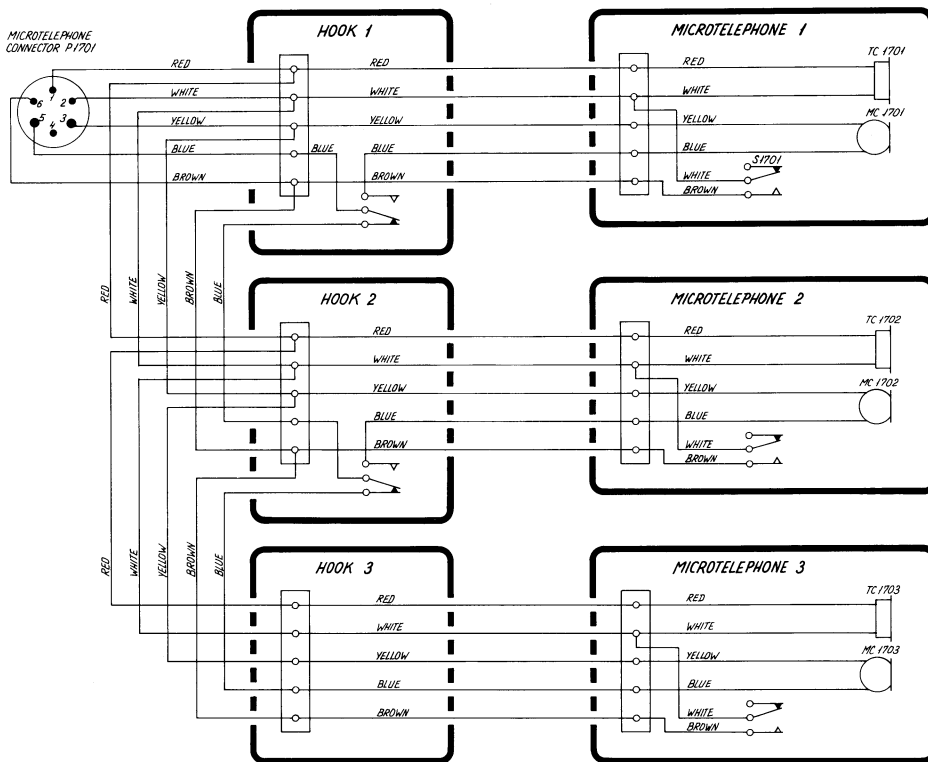


SPECIAL INSTALLATION WITH TWO MICROTELEPHONES

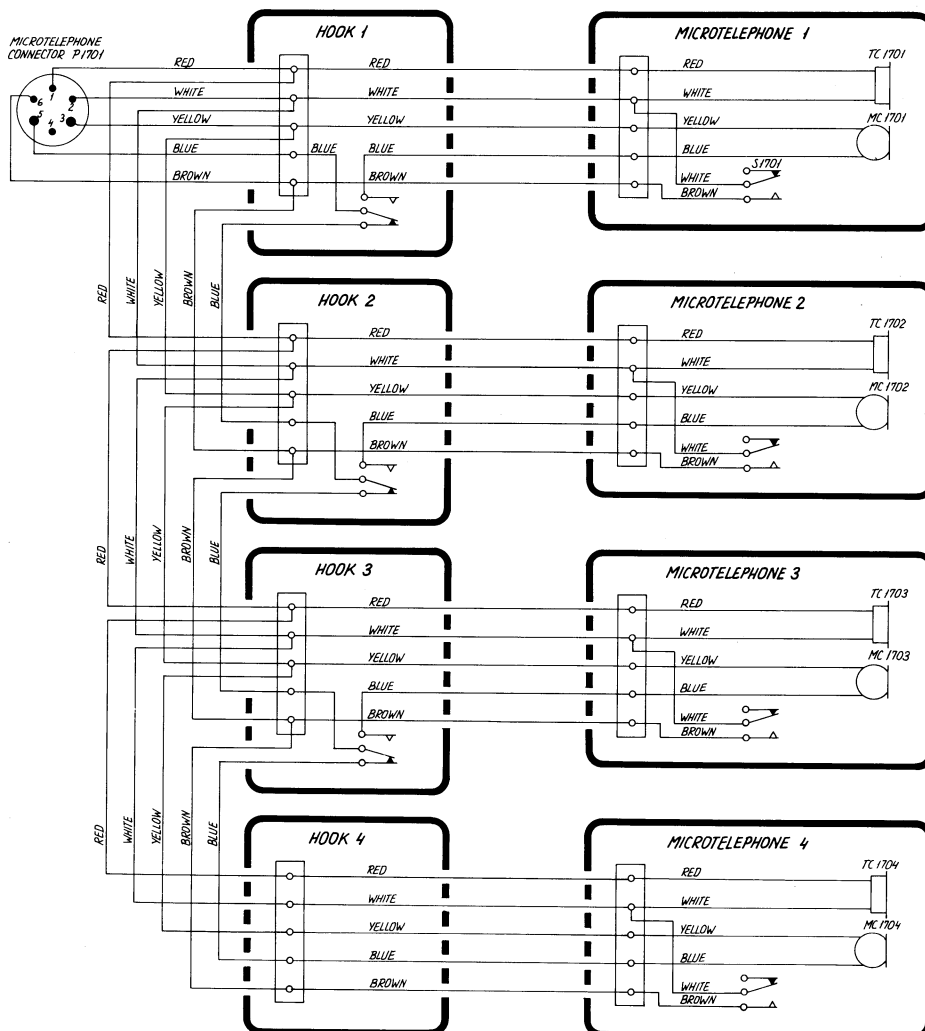
Microtelephone one with preference.



SPECIAL INSTALLATION WITH 3 MICROTELEPHONES



SPECIAL INSTALLATION WITH 4 MICROTELEPHONES



c	DIVIDER UNIT S1300/R1117			MODULE 100		1/3
Symbol	Description			Manufact.		
R101	Resistor	15Kohm \pm 5%	0,33W	Philips	2322 211 13153	
R102	Resistor	15Kohm \pm 5%	0,33W	Philips	2322 211 13153	
R103	Resistor	560 ohm \pm 5%	0.33W	Philips	2322 211 13561	
R104	Resistor	15Kohm \pm 5%	0.33W	Philips	2322 211 13153	
R105	Resistor	560 ohm \pm 5%	0.33W	Philips	2322 211 13561	
R106	Resistor	5,6Kohm \pm 5%	0.33W	Philips	2322 211 13562	
R107	Resistor	1,8Kohm \pm 5%	0.33W	Philips	2322 211 13182	
R108	Resistor	10Kohm \pm 5%	0.33W	Philips	2322 211 13103	
R109	Resistor	1,8Kohm \pm 5%	0.33W	Philips	2322 211 13182	
R110	Resistor	820 ohm \pm 5%	0.33W	Philips	2322 211 13821	
R111	Resistor	220 ohm \pm 5%	0.33W	Philips	2322 211 13221	
R112	Preset potentiometer	2Kohm \pm 10%	0.5W	Bourns	3299 W-1-202	
R113	Resistor	820 ohm \pm 5%	0.33W	Philips	2322 211 13821	
R114	Resistor	470 ohm \pm 5%	0.33W	Philips	2322 211 13471	
R115	Resistor	10Kohm \pm 5%	0.33W	Philips	2322 211 13103	
R116	Resistor	1,2Kohm \pm 5%	0.33W	Philips	2322 211 13122	
R117	Resistor	2,2Kohm \pm 5%	0.33W	Philips	2322 211 13222	
R118	Resistor	560 ohm \pm 5%	0.33W	Philips	2322 211 13561	
R119	Resistor	22Kohm \pm 5%	0.33W	Philips	2322 211 13223	
R120	Resistor	270 ohm \pm 5%	0.33W	Philips	2322 106 33271	
R121	Resistor	1,8Kohm \pm 5%	0.33W	Philips	2322 211 13182	
R122	Resistor	10Kohm \pm 5%	0.33W	Philips	2322 211 13103	
R123	Resistor	220 ohm \pm 5%	0.33W	Philips	2322 106 33221	
R124	Resistor	2,2Kohm \pm 5%	0.33W	Philips	2322 211 13222	
R125	Resistor	1Kohm \pm 5%	0.33W	Philips	2322 211 13102	
R126	Resistor	220 ohm \pm 5%	0.33W	Philips	2322 211 13221	
R127	Resistor	680 ohm \pm 5%	0.33W	Philips	2322 211 13681	
R128	Resistor	12Kohm \pm 5%	0.33W	Philips	2322 211 13123	
R129	Resistor	6,8Kohm \pm 5%	0.33W	Philips	2322 211 13682	
R130	Resistor	1Kohm \pm 5%	0.33W	Philips	2322 211 13102	
R131	Resistor	220 ohm \pm 5%	0.33W	Philips	2322 211 13221	
RA101	Resistor array	8x10Kohm \pm 5%	0,125W	ITT	VR8, 10Kohm \pm 5%	
RA102	Resistor array	8x10Kohm \pm 5%	0,125W	ITT	VR8, 10Kohm \pm 5%	

d	DIVIDER UNIT S1300/R1117			MODULE 100	2/3
Symbol	Description			Manufact.	
C101	Capacitor, polyester	10nF $\pm 20\%$	400V	Philips	2222 344 54103
C102	Capacitor, electrolytic	10uF 20%	35V	ROE	EKI00AA210F
C103	Capacitor, ceramic	10nF -20/+80%	32V	Ferroperm	9/0145.9
C104	Capacitor, ceramic	10nF -20/+80%	32V	Ferroperm	9/0145.9
C105	Capacitor, ceramic	10nF -20/+80%	32V	Ferroperm	9/0145.9
C106	Capacitor, ceramic	10nF -20/+80%	32V	Ferroperm	9/0145.9
C107	Capacitor, ceramic	12pF NPO+5%	400V	Ferroperm	9/0112.9
C108	Capacitor, ceramic	10nF -20/+80%	32V	Ferroperm	9/0145.9
C109	Capacitor, ceramic	10nF -20/+80%	32V	Ferroperm	9/0145.9
C110	Capacitor, ceramic	10nF -20/+80%	32V	Ferroperm	9/0145.9
C111	Capacitor, ceramic	10nF -20/+80%	32V	Ferroperm	9/0145.9
C112	Capacitor, ceramic	10nF -20/+80%	32V	Ferroperm	9/0145.9
C113	Capacitor, ceramic	10nF -20/+80%	32V	Ferroperm	9/0145.9
C114	Capacitor, ceramic	10nF -20/+80%	32V	Ferroperm	9/0145.9
C115	Capacitor, ceramic	10nF -20/+80%	32V	Ferroperm	9/0145.9
C116	Capacitor, ceramic	10nF -20/+80%	32V	Ferroperm	9/0145.9
C117	Capacitor, ceramic	10nF -20/+80%	32V	Ferroperm	9/0145.9
C118	Capacitor, ceramic	10nF -20/+80%	32V	Ferroperm	9/0145.9
C119	Capacitor, ceramic	10nF -20/+80%	32V	Ferroperm	9/0145.9
C120	Capacitor, ceramic	10nF -20/+80%	32V	Ferroperm	9/0145.9
C121	Capacitor, ceramic	10nF -20/+80%	32V	Ferroperm	9/0145.9
C122	Capacitor, ceramic	10nF -20/+80%	32V	Ferroperm	9/0145.9
C123	Capacitor, polyester	220nF $\pm 20\%$	100V	Philips	2222 344 24224
C124	Capacitor, polyester	15nF $\pm 20\%$	400V	Philips	2222 344 54153
C125	Capacitor, polyester	47nF $\pm 20\%$	250V	Philips	2222 344 40473
C126	Capacitor, polyester	220nF $\pm 20\%$	100V	Philips	2222 344 24224
C127	Capacitor, polyester	220nF $\pm 20\%$	100V	Philips	2222 344 24224
C128	Capacitor, electrolytic	10uF -10/+100%	40V	Siemens	B41313-A7106-V
C129	Capacitor, electrolytic	10uF -10/+100%	40V	Siemens	B41313-A7106-V
C130	Capacitor, polyester	220nF $\pm 20\%$	100V	Philips	2222 344 24224
C131	Capacitor, polyester	47nF $\pm 20\%$	250V	Philips	2222 344 40473
C132	Capacitor, polyester	220nF $\pm 20\%$	100V	Philips	2222 344 24224
C133	Capacitor, polyester	220nF $\pm 20\%$	100V	Philips	2222 344 24224
C134	Capacitor, polyester	220nF $\pm 20\%$	100V	Philips	2222 344 24224
C135	Capacitor, polyester	220nF $\pm 20\%$	100V	Philips	2222 344 24224
C136	Capacitor, polystyrene	1,2nF $\pm 5\%$	63V	Philips	2222 424 21202
C137	Capacitor, polystyrene	6,8nF $\pm 5\%$	63V	Philips	2222 424 26802
L101	Coil			S.P.	TL235

b	DIVIDER UNIT S1300/R1117			MODULE 100	3/3
Symbol	Description			Manufact.	
D101	Diode, zener	12V \pm 5%	0,4W	Philips	BZX79C12
D102	Diode, silicon			Philips	BAW62
T101	Transistor			Philips	2N2368
T102	Transistor			Philips	2N2368
T103	Transistor			Philips	BF199
T104	Transistor			Philips	2N2368
T105	Transistor			Philips	BF199
IC101	Integrated circuit			Texas	SN74LS192N
IC102	Integrated circuit			Texas	SN74LS192N
IC103	Integrated circuit			Texas	SN74LS192N
IC104	Integrated circuit			Texas	SN74LS192N
IC105	Integrated circuit			Texas	SN74LS192N
IC106	Integrated circuit			Motorola	MC4044P
IC107	Integrated circuit			Texas	SN74LS390N
IC108	Integrated circuit			Texas	SN74LS20N
IC109	Integrated circuit			Texas	SN74LS27N
IC110	Integrated circuit			Texas	SN74LS109N
IC111	Integrated circuit			Texas	SN74LS390N
IC112	Integrated circuit			Texas	SN74LS390N
IC113	Integrated circuit			Motorola	MC4044P
IC114	Integrated circuit			Texas	SN7410N
IC115	Integrated circuit			Texas	SN74LS290N
X0101	TCXO 10,0 MHz			S.P.	C1001
S101	Switch for 2182 (R1117 only)			Petrick	7-3-21412

b		LOOP 1 FILTER & +18V SUPPLY UNIT S13XX/R11XX			1/2
Symbol	Description			Manufact.	
R201	Resistor	1 Kohm $\pm 5\%$	0,33W	Philips	2322 181 13102
R202	Resistor	82 ohm $\pm 5\%$	0,33W	Philips	2322 181 13829
R204	Resistor	820 ohm $\pm 5\%$	0,33W	Philips	2322 181 13821
R205	Resistor	2,2 Kohm $\pm 5\%$	0,33W	Philips	2322 181 13222
R206	Resistor	12 Kohm $\pm 5\%$	0,33W	Philips	2322 181 13123
R207	Resistor	1,2 Kohm $\pm 5\%$	0,33W	Philips	2322 181 13122
R208	Resistor	3,3 Kohm $\pm 5\%$	0,33W	Philips	2322 181 13332
R209	Preset potmeter cermet	2,2 Kohm $\pm 10\%$	0,5W	Philips	2322 482 22222
R210	Resistor	10 Kohm $\pm 5\%$	0,33W	Philips	2322 181 13103
R212	Resistor	10 Kohm $\pm 5\%$	0,33W	Philips	2322 181 13103
R213	Resistor	10 Kohm $\pm 5\%$	0,33W	Philips	2322 181 13103
R214	Preset potmeter cermet	2,2 Kohm $\pm 10\%$	0,5W	Philips	2322 482 22222
R215	Resistor	3,3 Kohm $\pm 5\%$	0,33W	Philips	2322 181 13332
R216	Resistor	1,5 Kohm $\pm 5\%$	0,33W	Philips	2322 181 13152
R217	Resistor	10 Kohm $\pm 5\%$	0,33W	Philips	2322 181 13103
R218	Resistor	3,3 Kohm $\pm 5\%$	0,33W	Philips	2322 181 13332
R219	Resistor	2,7 Kohm $\pm 5\%$	0,33W	Philips	2322 181 13272
R220	Resistor	560 ohm $\pm 5\%$	0,33W	Philips	2322 181 13561
R221	Resistor	5,9 Kohm $\pm 1\%$	0,25W	Vitrohm	471-0
R222	Resistor	22 Kohm $\pm 5\%$	0,33W	Philips	2322 181 13223
R223	Resistor	150 ohm $\pm 5\%$	0,33W	Philips	2322 181 13151
R224	Resistor	2,7 Mohm $\pm 5\%$	0,33W	Philips	2322 181 13275
R225	Resistor	4,7 Kohm $\pm 5\%$	0,33W	Philips	2322 181 13472
R226	Resistor	2,2 Kohm $\pm 5\%$	0,33W	Philips	2322 181 13222
R227	Resistor	5,9 Kohm $\pm 1\%$	0,25W	Vitrohm	471-0
R228	Resistor	5,9 Kohm $\pm 1\%$	0,25W	Vitrohm	471-0
R229	Resistor	140 Kohm $\pm 1\%$	0,25W	Vitrohm	471-0
S13XX only					
R203	Resistor	270 Kohm $\pm 5\%$	0,33W	Philips	2322 181 13274
R211	Resistor	15 ohm $\pm 5\%$	0,33W	Philips	2322 181 13159
R11XX only					
R203	Resistor	150 Kohm $\pm 5\%$	0,33W	Philips	2322 181 13154
R211	Resistor	10 ohm $\pm 5\%$	0,33W	Philips	2322 181 13109

d		LOOP 1 FILTER & +18V SUPPLY UNIT S13XX/R11XX				2/2	
Symbol	Description				Manufact.		
C201	Capacitor ceramic	10nF	-20/+80%	50V	KCK	HE70SJYF103Z	
C202	Capacitor electrolytic	10uF	20%	35V	ERO	EK100AA210F	
C203	Capacitor electrolytic	10uF	20%	35V	ERO	EK100AA210F	
C204	Capacitor electrolytic	10uF	20%	35V	ERO	EK100AA210F	
C205	Capacitor electrolytic	10uF	20%	40V	ERO	EB	
C206	Capacitor electrolytic	10uF	20%	35V	ERO	EK100AA210F	
C207	Capacitor polycarbonate	470nF	+10%	100V	Philips	2222 344 21474	
C208	Capacitor ceramic	10nF	-20/+80%	50V	KCK	HE70SJYF103Z	
C209	Capacitor polystyrene	39nF	+1,25%	63V	Plessey	KS1.39	
C210	Capacitor electrolytic	10uF	20%	35V	ERO	EK100AA210F	
C211	Capacitor polyester	6,8uF	+10%	100V	Philips	2222 344 25685	
C212	Capacitor ceramic	220pF	+20%	400V	Ferroperm	9/0129,9	
C213	Capacitor ceramic	220nF	+20%	400V	Ferroperm	9/0129,9	
C214	Capacitor polyester	330nF	+5%	63V	ERO	MKT1822	
C215	Capacitor polyester	150nF	+20%	100V	ERO	MKT1822	
C216	Capacitor polyester	220nF	+20%	100V	ERO	MKT1822	
C217	Capacitor polyester	220nF	+20%	100V	ERO	MKT1822	
C218	Capacitor polyester	220nF	+20%	100V	ERO	MKT1822	
T201	Transistor				Philips	BD139	
T202	Transistor				Philips	BC548A	
T203	Transistor				Philips	BD138	
T204	Transistor				Philips	BC558	
T205	Transistor				Philips	BC556A	
T206	Transistor				Philips	BC548	
D201	Diode, zener	4,7V	+ 5%	0,4W	Philips	BZX79C4V7	
D202	Diode, silicon				Philips	BAW62	
D203	Diode, silicon				Philips	BAW62	
D204	Diode, silicon				Philips	BAW62	
D205	Diode, zener	4,7V	+ 5%	0,4W	Philips	BZX79C4V7	
D206	Diode, silicon				Philips	BAV21	
IC201	Integrated circuit				National	LM308N	
IC202	Integrated circuit				National	LM308N	

POSITION	DESCRIPTION	MANUFACTOR	TYPE	S.P.NUMBER
VCO UNIT MODULE 300	S130X	ESPERA	PRINT NR 5-0-24700D	607470
C301	CAPACITOR MKT	SIEMENS	B32510-D3103-K000	11.290
C302	CAPACITOR TANTAL	ERO	ETPW-3F	14.145
C303	CAPACITOR CERAMIC	FERROPERM	9/0112-9	15.521
C304	CAPACITOR CERAMIC	FERROPERM	9/0112-9	15.521
C305	CAPACITOR MKT	SIEMENS	B32510-D3103-K000	11.290
C306	CAPACITOR TANTALUM	ERO	ETP-2D	14.080
C307	CAPACITOR MKT	SIEMENS	B32510-D3103-K000	11.290
C308	CAPACITOR POLYSTYRENE	*PHILIPS	2222 431 81601	10.406
C309	CAPACITOR MKT	SIEMENS	B32510-D3103-K000	11.290
C310	CAPACITOR MKT	SIEMENS	B32510-D3103-K000	11.290
C311	CAPACITOR MKT	SIEMENS	B32510-D6102-K000	11.360
C312	CAPACITOR MKT	SIEMENS	B32510-D3103-K000	11.290
C313	CAPACITOR MKT	SIEMENS	B32510-D3103-K000	11.290
C314	CAPACITOR TANTAL	ERO	ETPW-3F	14.145
C315	CAPACITOR MKT	SIEMENS	B32510-D3103-K000	11.290
C316	CAPACITOR ELECTROLYTIC	* ERO	EKI 00 AA 210 F	14.512
C317	CAPACITOR TANTAL	ERO	ETPW-3F	14.145
C318	CAPACITOR TANTAL	ERO	ETPW-3F	14.145
C319	CAPACITOR TANTAL	ERO	ETPW-3F	14.145
C320	CAPACITOR TANTAL	ERO	ETPW-3F	14.145
C321	CAPACITOR TANTAL	ERO	ETPW-3F	14.145
C322	CAPACITOR TANTAL	ERO	ETPW-3F	14.145
C323	CAPACITOR TANTAL	ERO	ETPW-3F	14.145
C324	CAPACITOR TANTAL	ERO	ETPW-3F	14.145
C325	CAPACITOR TANTAL	ERO	ETPW-3F	14.145
C329	CAPACITOR MKT	SIEMENS	B32510-D3103-K000	11.290
C330	CAPACITOR MKT	SIEMENS	B32510-D3103-K000	11.290
C331	CAPACITOR MKT	SIEMENS	B32510-D3103-K000	11.290
C332	CAPACITOR MKT	SIEMENS	B32510-D3103-K000	11.290
C333	CAPACITOR MKT	SIEMENS	B32510-D3103-K000	11.290
C334	CAPACITOR MKT	SIEMENS	B32510-D3103-K000	11.290
C335	CAPACITOR MKT	SIEMENS	B32510-D3103-K000	11.290
C336	CAPACITOR MKT	SIEMENS	B32510-D3103-K000	11.290
C337	CAPACITOR MKT	SIEMENS	B32510-D3103-K000	11.290
C344	CAPACITOR POLYSTYRENE	*PHILIPS	2222 431 81101	10.402
C345	CAPACITOR POLYSTYRENE	*PHILIPS	2222 431 85609	10.394
C346	CAPACITOR POLYSTYRENE	*PHILIPS	2222 431 86809	10.396
C347	CAPACITOR POLYSTYRENE	*PHILIPS	2222 431 87509	10.397
C348	CAPACITOR POLYSTYRENE	*PHILIPS	2222 431 87509	10.397
C349	CAPACITOR POLYSTYRENE	*PHILIPS	2222 431 87509	10.397
C356	CAPACITOR CERAMIC	FERROPERM	9/0112-9	15.563

POSITION	DESCRIPTION	MANUFACTOR	TYPE	S.P.NUMBER
C357	CAPACITOR CERAMIC	FERROPERM	9/0112-9	15.563
C358	CAPACITOR CERAMIC	FERROPERM	9/0112-9	15.545
C360	CAPACITOR CERAMIC	FERROPERM	9/0112-9	15.565
C368	CAPACITOR POLYSTERENE	*PHILIPS	2222 431 81501	10.405
C369	CAPACITOR POLYSTYRENE	*PHILIPS	2222 431 86809	10.396
C370	CAPACITOR POLYSTYRENE	*PHILIPS	2222 431 87509	10.397
C371	CAPACITOR POLYSTYRENE	*PHILIPS	2222 431 81001	10.400
C374	CAPACITOR POLYSTYRENE	*PHILIPS	2222 431 89109	10.399
C375	CAPACITOR POLYSTYRENE	*PHILIPS	2222 431 87509	10.397
C376	CAPACITOR POLYSTYRENE	*PHILIPS	2222 431 81101	10.402
C377	CAPACITOR CERAMIC	FERROPERM	9/0112-9	15.512
C378	CAPACITOR CERAMIC	FERROPERM	9/0112-9	15.512
C379	CAPACITOR CERAMIC	FERROPERM	9/0112-9	15.512
C380	CAPACITOR MKT	SIEMENS	B32510-D3333-K000	11.498
C381	CAPACITOR MKT	SIEMENS	B32510-D3333-K000	11.498
C382	CAPACITOR MKT	SIEMENS	B32510-D3333-K000	11.498
D301	DIODE SCHOTTKY	THOMSON-CSF	BAT43	27.600
D302	DIODE CAP. SELECTED	00.753	C1067A	700934
D303	DIODE CAP. SELECTED	00.753	C1067A	700935
D304	DIODE CAP. SELECTED	00.753	C1067A	700934
D305	DIODE CAP. SELECTED	00.753	C1067A	700935
D306	DIODE CAP. SELECTED	00.753	C1067A	700934
D307	DIODE CAP. SELECTED	00.753	C1067A	700935
D308	DIODE CAP. SELECTED	00.753	C1067A	700934
D309	DIODE CAP. SELECTED	00.753	C1067A	700934
D310	DIODE CAP. SELECTED	00.753	C1067A	700934
D314	DIODE	* ITT	1N4148	25.131
D315	DIODE	* ITT	1N4148	25.131
D316	DIODE	* ITT	1N4148	25.131
D317	DIODE	* ITT	1N4148	25.131
D318	DIODE	* ITT	1N4148	25.131
D319	DIODE	* ITT	1N4148	25.131
D320	DIODE	* ITT	1N4148	25.131
D321	DIODE	* ITT	1N4148	25.131
D322	DIODE	* ITT	1N4148	25.131
D326	DIODE SWITCH	FACTORY SELECTED BA282	00.752	700885
D327	DIODE SWITCH	FACTORY SELECTED BA282	00.752	700885
D328	DIODE SWITCH	FACTORY SELECTED BA282	00.752	700885
D329	DIODE SWITCH	FACTORY SELECTED BA282	00.752	700885
D330	DIODE SWITCH	FACTORY SELECTED BA282	00.752	700885
D331	DIODE SWITCH	FACTORY SELECTED BA282	00.752	700885
D332	DIODE SWITCH	FACTORY SELECTED BA282	00.752	700885
D333	DIODE SWITCH	FACTORY SELECTED BA282	00.752	700885
D334	DIODE SWITCH	FACTORY SELECTED BA282	00.752	700885

MODULE NO: 300

POSITION	DESCRIPTION		MANUFACTOR	TYPE	S.P.NUMBER
D338	DIODE SWITCH	FACTORY SELECTED BA282	00.752	C1064A	700885
D339	DIODE SWITCH	FACTORY SELECTED BA282	00.752	C1064A	700885
D340	DIODE SWITCH	FACTORY SELECTED BA282	00.752	C1064A	700885
FP301	FERRITE BEAD	Ø3.7xØ1.2x3.5mm GRADE 4B1	*PHILIPS	4322 020 34420	35.181
L304	COIL	TL446	S.P.RADIO	6-0-24743A	400446
L305	COIL	TL447	S.P.RADIO	6-0-24744A	400447
L306	COIL	TL445	S.P.RADIO	6-0-24742A	400445
L307	COIL	TL448	S.P.RADIO	6-0-24745A	400448
L308	COIL	TL449	S.P.RADIO	6-0-24746A	400449
L309	COIL	TL447	S.P.RADIO	6-0-24744A	400447
L313	COIL	TL443	S.P.RADIO	6-0-24740A	400443
L314	COIL	TL444	S.P.RADIO	6-0-24741A	400444
L315	COIL	TL442	S.P.RADIO	6-0-24739A	400442
R301	RESISTOR	1.2 KOHM 5% 0.33W	BEYSCHLAG	MBA 0204-00-BX-1K2 5%	01.703
R302	RESISTOR	18 KOHM 5% 0.33W	BEYSCHLAG	MBA 0204-00-BX-18K 5%	01.732
R303	RESISTOR	1 KOHM 5% 0.33W	BEYSCHLAG	MBA 0204-00-BX-1K 5%	01.701
R304	RESISTOR	2.7 KOHM 5% 0.33W	BEYSCHLAG	MBA 0204-00-BX-2K7 5%	01.711
R305	RESISTOR	39 KOHM 5% 0.33W	BEYSCHLAG	MBA 0204-00-BX-39K 5%	01.740
R306	RESISTOR	1.2 KOHM 5% 0.33W	BEYSCHLAG	MBA 0204-00-BX-1K2 5%	01.703
R307	RESISTOR	560 OHM 5% 0.33W	BEYSCHLAG	MBA 0204-00-BX-560R 5%	01.694
R308	RESISTOR	56 OHM 5% 0.33W	BEYSCHLAG	MBA 0204-00-BX-56R 5%	01.669
R309	RESISTOR	220 OHM 5% 0.33W	BEYSCHLAG	MBA 0204-00-BX-220R 5%	01.684
R310	RESISTOR	12 KOHM 5% 0.33W	BEYSCHLAG	MBA 0204-00-BX-12K 5%	01.728
R311	RESISTOR	4.7 KOHM 5% 0.33W	BEYSCHLAG	MBA 0204-00-BX-4K7 5%	01.717
R312	RESISTOR	47 OHM 5% 0.33W	BEYSCHLAG	MBA 0204-00-BX-47R 5%	01.667
R313	RESISTOR	47 OHM 5% 0.33W	BEYSCHLAG	MBA 0204-00-BX-47R 5%	01.667
R314	RESISTOR	68 OHM 5% 0.33W	BEYSCHLAG	MBA 0204-00-BX-68R 5%	01.671
R315	RESISTOR	220 OHM 5% 0.33W	BEYSCHLAG	MBA 0204-00-BX-220R 5%	01.684
R316	RESISTOR	100 KOHM 5% 0.33W	BEYSCHLAG	MBA 0204-00-BX-100K 5%	01.751
R317	RESISTOR	390 OHM 5% 0.33W	BEYSCHLAG	MBA 0204-00-BX-390R 5%	01.690
R318	RESISTOR	82 OHM 5% 0.33W	BEYSCHLAG	MBA 0204-00-BX-82R 5%	01.673
R319	RESISTOR	3.3 OHM 5% 0.33W	BEYSCHLAG	MBA 0204-00-BX-3R3 5%	01.638
R320	RESISTOR	47 OHM 5% 0.33W	BEYSCHLAG	MBA 0204-00-BX-47R 5%	01.667
R321	RESISTOR	47 OHM 5% 0.33W	BEYSCHLAG	MBA 0204-00-BX-47R 5%	01.667
R322	RESISTOR	47 OHM 5% 0.33W	BEYSCHLAG	MBA 0204-00-BX-47R 5%	01.667
R323	RESISTOR	47 OHM 5% 0.33W	BEYSCHLAG	MBA 0204-00-BX-47R 5%	01.667
R324	RESISTOR	47 OHM 5% 0.33W	BEYSCHLAG	MBA 0204-00-BX-47R 5%	01.667
R325	RESISTOR	47 OHM 5% 0.33W	BEYSCHLAG	MBA 0204-00-BX-47R 5%	01.667
R326	RESISTOR	47 OHM 5% 0.33W	BEYSCHLAG	MBA 0204-00-BX-47R 5%	01.667
R327	RESISTOR	47 OHM 5% 0.33W	BEYSCHLAG	MBA 0204-00-BX-47R 5%	01.667
R328	RESISTOR	47 OHM 5% 0.33W	BEYSCHLAG	MBA 0204-00-BX-47R 5%	01.667
R329	RESISTOR	47 OHM 5% 0.33W	BEYSCHLAG	MBA 0204-00-BX-47R 5%	01.667
R330	RESISTOR	47 OHM 5% 0.33W	BEYSCHLAG	MBA 0204-00-BX-47R 5%	01.667
R331	RESISTOR	47 OHM 5% 0.33W	BEYSCHLAG	MBA 0204-00-BX-47R 5%	01.667

POSITION	DESCRIPTION		MANUFACTOR	TYPE	S.P.NUMBER
R332	RESISTOR	47 OHM 5% 0.33W	BEYSCHLAG	MBA 0204-00-BX-47R 5%	01.667
R333	RESISTOR	47 OHM 5% 0.33W	BEYSCHLAG	MBA 0204-00-BX-47R 5%	01.667
R334	RESISTOR	47 OHM 5% 0.33W	BEYSCHLAG	MBA 0204-00-BX-47R 5%	01.667
R335	RESISTOR	47 OHM 5% 0.33W	BEYSCHLAG	MBA 0204-00-BX-47R 5%	01.667
R336	RESISTOR	47 OHM 5% 0.33W	BEYSCHLAG	MBA 0204-00-BX-47R 5%	01.667
R337	RESISTOR	47 OHM 5% 0.33W	BEYSCHLAG	MBA 0204-00-BX-47R 5%	01.667
R344	RESISTOR	27 KOHM 5% 0.33W	BEYSCHLAG	MBA 0204-00-BX-27K 5%	01.736
R345	RESISTOR	27 KOHM 5% 0.33W	BEYSCHLAG	MBA 0204-00-BX-27K 5%	01.736
R346	RESISTOR	27 KOHM 5% 0.33W	BEYSCHLAG	MBA 0204-00-BX-27K 5%	01.736
R347	RESISTOR	27 KOHM 5% 0.33W	BEYSCHLAG	MBA 0204-00-BX-27K 5%	01.736
R348	RESISTOR	27 KOHM 5% 0.33W	BEYSCHLAG	MBA 0204-00-BX-27K 5%	01.736
R349	RESISTOR	27 KOHM 5% 0.33W	BEYSCHLAG	MBA 0204-00-BX-27K 5%	01.736
R350	RESISTOR	27 KOHM 5% 0.33W	BEYSCHLAG	MBA 0204-00-BX-27K 5%	01.736
R351	RESISTOR	27 KOHM 5% 0.33W	BEYSCHLAG	MBA 0204-00-BX-27K 5%	01.736
R352	RESISTOR	27 KOHM 5% 0.33W	BEYSCHLAG	MBA 0204-00-BX-27K 5%	01.736
R356	RESISTOR	330 KOHM 5% 0.33W	BEYSCHLAG	MBA 0204-00-BX-330K 5%	01.763
R357	RESISTOR	330 KOHM 5% 0.33W	BEYSCHLAG	MBA 0204-00-BX-330K 5%	01.763
R358	RESISTOR	330 KOHM 5% 0.33W	BEYSCHLAG	MBA 0204-00-BX-330K 5%	01.763
T301	TRANSISTOR	BF496	PHILIPS	BF496	28.200
T302	TRANSISTOR	FET TIS 88 A4	MOTOROLA	TM00 044-4	29.738
T303	TRANSISTOR	BC548B	* ITT/MOT.	BC548B	28.076
T304	TRANSISTOR	BF199	PHILIPS	BF199	28.179
TR301	TRANSFORMER	TL207	S.P.RADIO	6-0-21360	400207

d HARMONIC FILTER UNIT S1300, S1301, S1302, S1303, S1304				Module 400		1/3
Symbol	Description			Manufact.		
C401	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE70SJYF103Z	
C402	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE70SJYF103Z	
C403	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE70SJYF103Z	
C404	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE70SJYF103Z	
C405	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE70SJYF103Z	
C406	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE70SJYF103Z	
C407	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE70SJYF103Z	
C408	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE70SJYF103Z	
C409	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE70SJYF103Z	
C410	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE70SJYF103Z	
C411	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE70SJYF103Z	
C412	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE70SJYF103Z	
C413	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE70SJYF103Z	
C414	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE70SJYF103Z	
C415	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE70SJYF103Z	
C416	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE70SJYF103Z	
C417	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE70SJYF103Z	
C418	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE70SJYF103Z	
C419	Capacitor polystyrene	360 pF $\pm 2\%$	630V	Philips	2222 427 33601	
C420	Capacitor polystyrene	240 pF $\pm 2\%$	630V	Philips	2222 427 32401	
C421	Capacitor polystyrene	220 pF $\pm 2\%$	630V	Philips	2222 427 32201	
C422	Capacitor ceramic	180 pF $\pm 5\%$ N150	50V	KCK	HE95SJPH181J	
C423	Capacitor ceramic	180 pF $\pm 5\%$ N150	50V	KCK	HE95SJPH181J	
C424	Capacitor ceramic	110 pF $\pm 5\%$ N150	50V	KCK	HE80SJPH111J	
C425	Capacitor ceramic	100 pF $\pm 5\%$ N150	50V	KCK	HE80SJPH101J	
C426	Capacitor ceramic	82 pF $\pm 5\%$ N150	50V	KCK	HE70SJPH820J	
C427	Capacitor ceramic	91 pF $\pm 5\%$ N150	50V	KCK	HE70SJPH910J	
C428	Capacitor ceramic	2.2 pF ± 0.25 pF	250V	Ferroperm	9/0112.9	
C429	Capacitor ceramic	2.2 pF ± 0.25 pF	250V	Ferroperm	9/0112.9	
C430	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE70SJYF103Z	
C431	Capacitor polyester	0.22 uF $\pm 10\%$	63V	ERO	MKT1818 422 065	
C432	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE70SJYF103Z	
C433	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE70SJYF103Z	
C434	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE70SJYF103Z	
C435	Capacitor ceramic	8.2 nF ± 0.25 pF	400V	Ferroperm	9/0112.9	
C436	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE70SJYF103Z	
C437	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE70SJYF103Z	
C438	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE70SJYF103Z	
C439	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE70SJYF103Z	
C440	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE70SJYF103Z	

c	HARMONIC FILTER UNIT S1300, S1301, S1302, S1303, S1304			Module 400	2/3
Symbol	Description			Manufact.	
C441	Capacitor electrolytic	10 uF <u>+20%</u>	35V	Roederstein	EKI00AA210F
C442	Capacitor ceramic	2.2 pF <u>+0.25</u> pF	250V	Ferroperm	9/0112.9
D401	Diode silicon			Philips	1N4448
D402	Diode silicon			Philips	1N4448
D403	Diode silicon			Philips	1N4448
D404	Diode silicon			Philips	1N4448
D405	Diode silicon			Philips	1N4448
D406	Diode silicon			Philips	1N4448
D407	Diode silicon			Philips	1N4448
D408	Diode silicon			Philips	1N4448
D409	Diode silicon			Philips	1N4448
D410	Diode switch			Telefunken	BA243
D411	Diode switch			Telefunken	BA243
D412	Diode switch			Telefunken	BA243
D413	Diode switch			Telefunken	BA243
D414	Diode switch			Telefunken	BA243
D415	Diode switch			Telefunken	BA243
D416	Diode switch			Telefunken	BA243
D417	Diode switch			Telefunken	BA243
D418	Diode switch			Telefunken	BA243
D419	Diode switch			Telefunken	BA243
D420	Diode switch			Telefunken	BA243
D421	Diode germanium			Philips	AA143
FP401	Ferrite bead 4B1			Philips	4322 020 34420
FP402	Ferrite bead 4B1			Philips	4322 020 34420
FP403	Ferrite bead 4B1			Philips	4322 020 34420
L401	Coil			S.P.	TL346
L402	Coil			S.P.	TL335
L403	Coil			S.P.	TL353
L404	Coil			S.P.	TL350
L405	Coil			S.P.	TL347
L406	Coil			S.P.	TL336
L407	Coil			S.P.	TL338
L408	Coil			S.P.	TL340
L409	Coil			S.P.	TL352
R401	Resistor	470 ohm <u>+5%</u>	0.33W	Philips	2322 106 33471

b HARMONIC FILTER UNIT S1300, S1301, S1302, S1303, S1304 3/3

<i>Symbol</i>	<i>Description</i>				<i>Manufact.</i>	
R402	Resistor	470 ohm	+5%	0.33W	Philips	2322 106 33471
R403	Resistor	470 ohm	+5%	0.33W	Philips	2322 211 23471
R404	Resistor	470 ohm	+5%	0.33W	Philips	2322 106 33471
R405	Resistor	470 ohm	+5%	0.33W	Philips	2322 106 33471
R406	Resistor	470 ohm	+5%	0.33W	Philips	2322 211 23471
R407	Resistor	470 ohm	+5%	0.33W	Philips	2322 106 33471
R408	Resistor	470 ohm	+5%	0.33W	Philips	2322 106 33471
R409	Resistor	470 ohm	+5%	0.33W	Philips	2322 211 23471
R410	Resistor	330 kohm	+5%	0.33W	Philips	2322 106 33334
R411	Resistor	330 kohm	+5%	0.33W	Philips	2322 106 33334
R412	Resistor	10 kohm	+5%	0.33W	Philips	2322 106 33103
R413	Resistor	47 ohm	+5%	0.33W	Philips	2322 106 33479
R414	Resistor	8.2 ohm	+5%	0.33W	Philips	2322 106 33828
R415	Resistor	1.8 kohm	+5%	0.33W	Philips	2322 106 33182
R416	Resistor	390 kohm	+5%	0.33W	Philips	2322 106 33394
R417	Resistor	82 kohm	+5%	0.33W	Philips	2322 106 33823
R418	Resistor	470 kohm	+5%	0.33W	Philips	2322 211 23474
R419	Resistor	39 kohm	+5%	0.33W	Philips	2322 106 33393
R420	Resistor	47 kohm	+5%	0.33W	Philips	2322 106 33473
R421	Resistor	330 ohm	+5%	0.33W	Philips	2322 106 33331
R422	Resistor	120 ohm	+5%	0.33W	Philips	2322 106 33121
R423	Resistor	22 ohm	+5%	0.33W	Philips	2322 106 33229
R424	Resistor	1.2 kohm	+5%	0.33W	Philips	2322 106 33122
R425	Resistor	82 kohm	+5%	0.33W	Philips	2322 106 33823
R426	Resistor	100 ohm	+5%	0.33W	Philips	2322 106 33101
R427	Resistor	47 ohm	+5%	0.33W	Philips	2322 106 33479
T401	Transistor				Philips	BF494
T402	Transistor				Philips	BC548A
T403	Transistor				Philips	BF494
T404	Transistor				Philips	BF494

b		LOOP 1 MIXER S1300/R1117		MODULE 500		1/1
Symbol	Description			Manufact.		
R501	Resistor	3.3 ohm \pm 5%	0.33W	Philips	2322 211 13338	
R502	Resistor	3.3Kohm \pm 5%	0.33W	Philips	2322 211 13332	
R503	Resistor	15Kohm \pm 5%	0.33W	Philips	2322 211 13153	
R504	Resistor	2.2Kohm \pm 5%	0.33W	Philips	2322 211 13222	
R505	Resistor	270 ohm \pm 5%	0.33W	Philips	2322 211 13271	
R506	Resistor	100 ohm \pm 5%	0.33W	Philips	2322 211 13101	
R507	Resistor	10 ohm \pm 5%	0.33W	Philips	2322 211 13109	
R508	Resistor	330 ohm \pm 5%	0.33W	Philips	2322 211 13331	
R509	Resistor	2.7Kohm \pm 5%	0.33W	Philips	2322 211 13272	
R510	Resistor	680 ohm \pm 5%	0.33W	Philips	2322 211 13681	
R511	Resistor	390 ohm \pm 5%	0.33W	Philips	2322 211 13391	
R512	Resistor	470 ohm \pm 5%	0.33W	Philips	2322 211 13471	
R513	Resistor	27Kohm \pm 5%	0.33W	Philips	2322 211 13273	
R514	Resistor	2.7Kohm \pm 5%	0.33W	Philips	2322 211 13272	
R515	Resistor	560 ohm \pm 5%	0.33W	Philips	2322 211 13569	
R516	Resistor	47 ohm \pm 5%	0.33W	Philips	2322 211 13479	
C501	Capacitor ceramic	10nF -20/+80%	32V	Ferroperm	9/0145.9	
C502	Capacitor ceramic	10nF -20/+80%	32V	Ferroperm	9/0145.9	
C503	Capacitor ceramic	10nF -20/+80%	32V	Ferroperm	9/0145.9	
C504	Capacitor ceramic	10nF -20/+80%	32V	Ferroperm	9/0145.9	
C505	Capacitor ceramic	10nF -20/+80%	32V	Ferroperm	9/0145.9	
C506	Capacitor ceramic	10nF -20/+80%	32V	Ferroperm	9/0145.9	
C507	Capacitor ceramic	47pF \pm 2%	100V	Philips	2222 638 34479	
C508	Capacitor polyester	100nF \pm 20%	100V	Philips	2222 344 24104	
C509	Capacitor ceramic	10nF -20/+80%	32V	Ferroperm	9/0145.9	
C510	Capacitor ceramic	100pF \pm 2%	100V	Philips	2222 638 34101	
C511	Capacitor polystyrene	180pF \pm 1%	500V	Philips	2222 427 41801	
C512	Capacitor ceramic	33pF \pm 2%	100V	Philips	2222 638 34339	
C513	Capacitor ceramic	56pF \pm 2%	100V	Philips	2222 638 34569	
C514	Capacitor ceramic	10nF -20/+80%	32V	Ferroperm	9/0145.9	
C515	Capacitor ceramic	10nF -20/+80%	32V	Ferroperm	9/0145.9	
C516	Capacitor polyester	100nF \pm 20%	100V	Philips	2222 344 24104	
L501	Coil			S.P.	TL059	
L502	Coil	12uH \pm 5%		Kaschke	220/5	
L503	Coil	12uH \pm 5%		Kaschke	220/5	
TR501	Transformer			S.P.	TL198	
T501	Transistor			Philips	BF199	
T502	Transistor			Philips	BF199	
IC501	Integrated circuit			N.S.	LM3053	

VCXO AND LOOP 2 FILTER FOR S1300						1/2
B						
Symbol	Description				Manufact.	
R601	Resistor	2,7 Kohm	$\pm 5\%$	0,33W	Philips	2322 211 13272
R602	Resistor	22 Kohm	$\pm 5\%$	0,33W	Philips	2322 211 13223
R603	Resistor	220 ohm	$\pm 5\%$	0,33W	Philips	2322 211 13221
R604	Resistor	2,7 Mohm	$\pm 5\%$	0,33W	Philips	2322 211 13275
R605	Resistor	4,7 Kohm	$\pm 5\%$	0,33W	Philips	2322 211 13472
R606	Resistor	220 Kohm	$\pm 5\%$	0,33W	Philips	2322 211 13224
R607	Resistor	18 Kohm	$\pm 5\%$	0,33W	Philips	2322 211 13183
R608	Resistor	NTC 4,7Kohm	$\pm 5\%$	0,5 W	Philips	2322 635 02472
R609	Resistor	180 Kohm	$\pm 5\%$	0,33W	Philips	2322 211 13184
R610	Resistor	15 Kohm	$\pm 5\%$	0,33W	Philips	2322 211 13153
R611	Resistor	680 ohm	$\pm 5\%$	0,33W	Philips	2322 211 13681
R612	Resistor	180 ohm	$\pm 5\%$	0,33W	Philips	2322 211 13181
R613	Resistor	33 Kohm	$\pm 5\%$	0,33W	Philips	2322 211 13333
R614	Resistor	1,5 Kohm	$\pm 5\%$	0,33W	Philips	2322 211 13152
R615	Resistor	100 Kohm	$\pm 5\%$	0,33W	Philips	2322 211 13104
R616	Resistor	5,6 Kohm	$\pm 5\%$	0,33W	Philips	2322 211 13562
R617	Resistor	18 Kohm	$\pm 5\%$	0,33W	Philips	2322 211 13183
R618	Resistor	10 Kohm	$\pm 5\%$	0,33W	Philips	2322 211 13103
R619	Resistor	390 ohm	$\pm 5\%$	0,33W	Philips	2322 211 13391
R620	Resistor	39 Kohm	$\pm 5\%$	0,33W	Philips	2322 211 13393
R621	Resistor	5,6 Kohm	$\pm 5\%$	0,33W	Philips	2322 211 13562
R622	Resistor	560 ohm	$\pm 5\%$	0,33W	Philips	2322 211 13561
R623	Resistor	150 ohm	$\pm 5\%$	0,33W	Philips	2322 211 13151
R624	Resistor	560 ohm	$\pm 5\%$	0,33W	Philips	2322 211 13561
C601	Capacitor	ceramic	10nF-20/+80%	32V	Ferroperm	9/0145,9
C602	Capacitor	electrolytic	10uF 20%	35V	ROE	EK100AA210F
C603	Capacitor	polyester	47nF $\pm 10\%$	100V	Philips	2222 344 25473
C604	Capacitor	ceramic	33pF $\pm 2\%$	100V	Philips	2222 638 34339
C605	Capacitor	polyester	680 nF $\pm 10\%$	100V	Philips	2222 344 25684
C606	Capacitor	polyester	47nF $\pm 10\%$	100V	Philips	2222 344 25473
C607	Capacitor	polyester	470nF $\pm 10\%$	100V	Philips	2222 344 25474
C608	Capacitor	polyester	47nF $\pm 20\%$	100V	Philips	2222 344 24473
C609	Capacitor	ceramic	56pF $\pm 2\%$	100V	Philips	2222 642 34569
C610	Capacitor	polyester	51pF $\pm 1\%$	500V	Philips	2222 427 45109
C611	Capacitor	ceramic	5,6pF $\pm 0,25$	pF63V	Draloric	3x4 N150/1B
C612	Capacitor	ceramic	10nF-20/+80%	32V	Ferroperm	9/0145,9
C613	Capacitor	electrolytic	10uF 20%	35V	ROE	EK100AA210F

B		VCXO AND LOOP 2 FILTER S1300		2/2	
Symbol	Description	Manufact.			
C614	Capacitor polyester 47nF $\pm 20\%$ 100V	Philips	2222 344 24473		
C615	Capacitor electrolytic 10uF 20% 35V	ROE	EKI00AA210F		
C616	Capacitor polystyrene 220pF $\pm 5\%$ 500V	Philips	2222 427 22201		
L601	Coil	S.P.	TL 257		
T601	Transistor	Philips	BF256B		
T602	Transistor	Philips	BF199		
T603	Transistor	Philips	BC558		
D601	Diode varicap.	Motorola	MV109		
D602	Diode varicap.	Motorola	MV109		
IC601	Integrated circuit	N.S.	LM 308N		
X601	Crystal f=10097.600 kHz	S.P.	C 1010		

b		MOTOR CONTROL UNIT S1300				1/3
Symbol	Description				Manufact.	
R701	Resistor	390 ohm	$\pm 5\%$	0,33W	Philips	2322 211 13391
R702	Resistor	10Kohm	$\pm 5\%$	0,33W	Philips	2322 211 13103
R703	Resistor	3,9Kohm	$\pm 5\%$	0,33W	Philips	2322 211 13392
R704	Resistor	5,6Kohm	$\pm 5\%$	0,33W	Philips	2322 211 13562
R705	Resistor	5,6Kohm	$\pm 5\%$	0,33W	Philips	2322 211 13562
R706	Resistor	820 ohm	$\pm 5\%$	0,33W	Philips	2322 211 13821
R707	Resistor	8,2Kohm	$\pm 5\%$	0,33W	Philips	2322 211 13822
R708	Resistor	5,6Kohm	$\pm 5\%$	0,33W	Philips	2322 211 13562
R709	Resistor	5,6Kohm	$\pm 5\%$	0,33W	Philips	2322 211 13562
R710	Resistor	5,6Kohm	$\pm 5\%$	0,33W	Philips	2322 211 13562
R711	Resistor	5,6Kohm	$\pm 5\%$	0,33W	Philips	2322 211 13562
R712	Resistor	5,6Kohm	$\pm 5\%$	0,33W	Philips	2322 211 13562
R713	Resistor	5,6Kohm	$\pm 5\%$	0,33W	Philips	2322 211 13562
R714	Resistor	5,6Kohm	$\pm 5\%$	0,33W	Philips	2322 211 13562
R715	Resistor	10Kohm	$\pm 5\%$	0,33W	Philips	2322 211 13103
R716	Resistor	10Kohm	$\pm 5\%$	0,33W	Philips	2322 211 13103
R717	Resistor	5,6Kohm	$\pm 5\%$	0,33W	Philips	2322 211 13562
R718	Resistor	1Kohm	$\pm 5\%$	0,33W	Philips	2322 211 13102
R719	Resistor	1Kohm	$\pm 5\%$	0,33W	Philips	2322 211 13102
R720	Resistor	1Kohm	$\pm 5\%$	0,33W	Philips	2322 211 13102
R721	Resistor	1Kohm	$\pm 5\%$	0,33W	Philips	2322 211 13102
R722	Resistor	1Kohm	$\pm 5\%$	0,33W	Philips	2322 211 13102
R723	Resistor	3,9Kohm	$\pm 5\%$	0,33W	Philips	2322 211 13392
R724	Resistor	100Kohm	$\pm 5\%$	0,33W	Philips	2322 211 13104
R725	Resistor	3,9Kohm	$\pm 5\%$	0,33W	Philips	2322 211 13392
R726	Resistor	1Kohm	$\pm 5\%$	0,33W	Philips	2322 211 13102
R727	Resistor	100Kohm	$\pm 5\%$	0,33W	Philips	2322 211 13104
R728	Resistor	100Kohm	$\pm 5\%$	0,33W	Philips	2322 211 13104
R729	Resistor	100Kohm	$\pm 5\%$	0,33W	Philips	2322 211 13104
R730	Resistor	100Kohm	$\pm 5\%$	0,33W	Philips	2322 211 13104
R731	Resistor	100Kohm	$\pm 5\%$	0,33W	Philips	2322 211 13104
R732	Resistor	10Kohm	$\pm 5\%$	0,33W	Philips	2322 211 13103
R733	Resistor	100Kohm	$\pm 5\%$	0,33W	Philips	2322 211 13104
R734	Resistor	10Kohm	$\pm 5\%$	0,33W	Philips	2322 211 13103
R735	Resistor	10Kohm	$\pm 5\%$	0,33W	Philips	2322 211 13103
RA701	Resistor, array	8x10Kohm	$\pm 5\%$	0,125W	ITT	VR8,10Kohm $\pm 5\%$
RA702	Resistor, array	8x820ohm	$\pm 5\%$	0,125W	ITT	VR10,820 ohm $\pm 5\%$
RA703	Resistor, array	8x10Kohm	$\pm 5\%$	0,125W	ITT	VR8,10Kohm $\pm 5\%$

c	MOTOR CONTROL UNIT S1300			2/3
Symbol	Description		Manufact.	
C701	Capacitor, polyester 220nF \pm 20%	100V	Philips	2222 344 24224
C702	Capacitor,electrolytic 10uF-10/+100%	25V	Siemens	B41313-A5106-V
C703	Capacitor, polyester 10nF \pm 20%	250V	Philips	2222 344 40103
C704	Capacitor, tantalum 0,1uF-20/+50%	35V	Ero	ETP 1A
C705	Capacitor, tantalum 0,1uF-20/+50%	35V	Ero	ETP 1A
C706	Capacitor, tantalum 0,1uF-20/+50%	35V	Ero	ETP 1A
C707	Capacitor, tantalum 0,1uF-20/+50%	35V	Ero	ETP 1A
C708	Capacitor, tantalum 0,1uF-20/+50%	35V	Ero	ETP 1A
D701	Diode, silicon		Philips	BAV 21
D702	Diode, silicon		Philips	BAV 21
D703	Diode, silicon		Philips	BAV 21
D704	Diode, silicon		Philips	BAV 21
D705	Diode, silicon		Philips	BAV 21
D706	Diode, silicon		Philips	BAV 21
D707	Diode, silicon		Philips	BAV 21
D708	Diode, silicon		Philips	BAV 21
D709	Diode, silicon		Philips	BAV 21
D710	Diode, silicon		Philips	BAV 21
D711	Diode, silicon		Philips	BAV 21
D712	Diode, silicon		Philips	BAV 21
D713	Diode, silicon		Philips	BAV 21
D714	Diode, silicon		Philips	BAV 21
T701	Transistor		Philips	BC639
T702	Transistor		Philips	BC328-25
T703	Transistor		Philips	BC328-25
T704	Transistor		Philips	BC328-25
T705	Transistor		Philips	BC328-25
T706	Transistor		Philips	BC328-25
T707	Transistor		Philips	BC328-25
T708	Transistor		Philips	BC328-25
T709	Transistor		Philips	BC328-25
T710	Transistor		Philips	BC328-25
T711	Transistor		Philips	BC328-25
T712	Transistor		Philips	BC548
T713	Transistor		Philips	BC548
T714	Transistor		Philips	BC639
T715	Transistor		Philips	BC639
T716	Transistor		Philips	BC548

a MOTOR CONTROL UNIT S1300 3/3			
Symbol	Description	Manufact.	
IC701	Integrated circuit	Texas	SN7407N
IC702	Integrated circuit	Motorola	MC14519B CP
IC703	Integrated circuit	Motorola	MC14077B CP
IC704	Integrated circuit	Motorola	MC14077B CP
IC705	Integrated circuit	Motorola	MC14081B CP
IC706	Integrated circuit	Motorola	MC14530B CP
IC707	Integrated circuit	Motorola	MC14515B CP

B		FILTER-UNIT FOR S1300			1/2	
Symbol	Description			Manufact.		
R901	Resistor	220 ohm	$\pm 5\%$ 1,6W	Philips	2322 191 32201	
R902	Preset potmeter, cermet	1Kohm	$\pm 20\%$ 0.5W	Philips	2322 482 20102	
R903	Resistor	2.7kohm	$\pm 5\%$ 0.33W	Philips	2322 211 13272	
R904	Resistor	220 ohm	$\pm 5\%$ 0.33W	Philips	2322 211 13221	
R905	Not used					
R906	Resistor	1kohm	$\pm 5\%$ 0.5 W	Philips	2322 212 13102	
R907	Resistor	1kohm	$\pm 5\%$ 0.5 W	Philips	2322 212 13102	
C901	Capacitor polyester	100nF	$\pm 20\%$ 100V	Philips	2222 344 24104	
C902	Capacitor polyester	100nF	$\pm 20\%$ 100V	Philips	2222 344 24104	
C903	Capacitor polyester	100nF	$\pm 20\%$ 100V	Philips	2222 344 24104	
C904	Capacitor polyester	100nF	$\pm 20\%$ 100V	Philips	2222 344 24104	
C905	Capacitor polyester	100nF	$\pm 20\%$ 100V	Philips	2222 344 24104	
C906	Capacitor polyester	100nF	$\pm 20\%$ 100V	Philips	2222 344 24104	
C907	Capacitor polyester	100nF	$\pm 20\%$ 100V	Philips	2222 344 24104	
C908	Capacitor polyester	100nF	$\pm 20\%$ 100V	Philips	2222 344 24104	
C909	Capacitor polyester	100nF	$\pm 20\%$ 100V	Philips	2222 344 24104	
C910	Capacitor polyester	100nF	$\pm 20\%$ 100V	Philips	2222 344 24104	
C911	Capacitor polyester	100nF	$\pm 20\%$ 100V	Philips	2222 344 24104	
C912	Not used					
C913	Not used					
C914	Not used					
C915	Capacitor polyester	100nF	$\pm 20\%$ 100V	Philips	2222 344 24104	
C916	Capacitor polycarbonate	1nF	$\pm 20\%$ 630V	Ero	KC 1849 210/6	
C917	Not used					
C918	Capacitor polyester	100nF	$\pm 20\%$ 100V	Philips	2222 344 24104	
C919	Capacitor polyester	100nF	$\pm 20\%$ 100V	Philips	2222 344 24104	
C920	Capacitor polycarbonate	1nF	$\pm 20\%$ 630V	Ero	KC 1849 210/6 [†]	
C921	Capacitor polycarbonate	1nF	$\pm 20\%$ 630V	Ero	KC 1849 210/6	
C922	Capacitor polycarbonate	1nF	$\pm 20\%$ 630V	Ero	KC 1849 210/6	
C923	Capacitor electrolytic	47uF-10/+50%	63V	Siemens	B41283-C8476-T	
C924	Capacitor polyester	100nF	$\pm 20\%$ 100V	Philips	2222 344 24104	
C925	Capacitor electrolytic	10uF 20%	35V	ROE	EKI00AA210F	
C926	Capacitor electrolytic	10uF-10/+100%	40V	Siemens	B41313-A7106-V	
C927	Capacitor polyester	100nF	$\pm 20\%$ 100V	Philips	2222 344 24104	
C928	Capacitor polyester	100nF	$\pm 20\%$ 100V	Philips	2222 344 24104	
C929	Capacitor polyester	100nF	$\pm 20\%$ 100V	Philips	2222 344 24104	
C930	Capacitor polyester	100nF	$\pm 20\%$ 100V	Philips	2222 344 24104	
C931	Capacitor polyester	100nF	$\pm 20\%$ 100V	Philips	2222 344 24104	
C932	Capacitor polyester	100nF	$\pm 20\%$ 100V	Philips	2222 344 24104	

b FILTER UNIT FOR S1300 2/2					
Symbol	Description			Manufact.	
C933	Capacitor polycarbonate	1nF \pm 20%	630V	Ero	KC 1849 210/6
C934	Capacitor polycarbonate	1nF \pm 20%	630V	Ero	KC 1849 210/6
C935	Capacitor polycarbonate	1nF \pm 20%	630V	Ero	KC 1849 210/6
D901	Diode, silicon			Philips	BAV 21

F		MODE SWITCH UNIT S1300			1/2
Symbol	Description			Manufact.	
R1001	Resistor	10kohm \pm 5%	0.33W	Philips	2322 211 13103
R1002	Resistor	18kohm \pm 5%	0.33W	Philips	2322 211 13183
R1003	Resistor	47kohm \pm 5%	0.33W	Philips	2322 211 13473
R1004	Resistor	330 ohm \pm 5%	1.6 W	Philips	2322 191 33301
R1005	Resistor	68 ohm \pm 5%	0.33W	Philips	2322 211 13689
R1007	Resistor	820 ohm \pm 5%	0.33W	Philips	2322 211 13821
R1009	Resistor	1.5kohm \pm 5%	0.33W	Philips	2322 211 13152
R1010	Resistor	2.2kohm \pm 5%	0.33W	Philips	2322 211 13222
R1011	Not used				
R1012	Not used				
R1013	Resistor	820 ohm \pm 5%	0.33W	Philips	2322 211 13821
R1014	Resistor	10kohm \pm 5%	0.33W	Philips	2322 211 13103
R1015	Resistor	100kohm \pm 5%	0.33W	Philips	2322 211 13104
R1016	Resistor	47kohm \pm 5%	0.33W	Philips	2322 211 13473
R1017	Resistor	10kohm \pm 5%	0.33W	Philips	2322 211 13103
R1018	Resistor	680kohm \pm 5%	0.33W	Philips	2322 211 13684
R1019	Resistor	82.5kohm \pm 1%	0.4 W	Philips	2322 151 58253
R1020	Resistor	39.2kohm \pm 1%	0.4 W	Philips	2322 151 53923
R1021	Resistor	39.2kohm \pm 1%	0.4 W	Philips	2322 151 53923
R1022	Resistor	47kohm \pm 5%	0.33W	Philips	2322 211 13473
R1023	Resistor	10kohm \pm 5%	0.33W	Philips	2322 211 13103
R1024	Resistor	1.5kohm \pm 5%	0.33W	Philips	2322 211 13152
R1025	Resistor	820 ohm \pm 5%	0.5 W	Philips	2322 212 13821
C1001	Capacitor electrolytic 4.7uF 20% 50V			ROE	EK100AA147H
C1002	Capacitor, electrolytic 470uF-20/+50% 25V			Philips	2222 017 16471
C1003	Capacitor, polyester 100nF \pm 10% 100V			Philips	2222 344 25104
C1004	Capacitor, polyester 10nF \pm 20% 250V			Philips	2222 344 40103
C1005	Capacitor, polyester 10nF \pm 20% 250V			Philips	2222 344 40103
C1006	Capacitor, polyester 10nF \pm 20% 250V			Philips	2222 344 40103
C1007	Capacitor, tantalum 4.7uF-20/+50% 35V			Ero	ETP 2E
C1008	Capacitor, tantalum 10uF \pm 20% 35V			ITT	TAP 10M 35HE
D1001	Diode, silicon			Philips	BAV 21
D1002	Diode, silicon			Philips	BAV 21

e

MODE SWITCH UNIT S1300

2/2

<i>Symbol</i>	<i>Description</i>	<i>Manufact.</i>	
D1003	Diode, silicon	Philips	BAV 21
D1004	Diode, silicon	Philips	BAV 21
D1005	Diode, silicon	Philips	BAV 21
D1006	Diode, silicon	Philips	BAV 21
D1007	Diode, silicon	Philips	BAV 21
D1008	Diode, silicon	Philips	BAV 21
D1009	Diode, silicon	Philips	BAV 21
D1010	Diode, silicon	Philips	BAV 21
D1011	Diode, silicon	Philips	BAV 21
D1012	Diode, silicon	Philips	BAV 21
D1013	Diode, silicon	Philips	BAV 21
D1014	Diode, silicon	Philips	BAV 21
D1015	Diode, silicon	Philips	BAV 21
D1016	Diode, silicon	Philips	BAV 21
D1017	Not used		
D1018	Diode, silicon	Philips	BAV 21
D1019	Diode, silicon	Philips	BAV 21
D1020	Diode, silicon	Philips	BAV 21
D1021	Diode, silicon	Philips	BAV 62
D1022	Diode, silicon	Philips	BAV 21
D1023	Diode, silicon	Philips	BAV 21
D1024	Diode, silicon	Philips	BAV 21
D1025	Diode, silicon	Philips	BAV 21
D1026	Diode, silicon	Philips	BAV 21
RE1001	Relay	Siemens	V23154-N0721-B110
RE1002	Relay	Pasi	MS/K BV863
RE1003	Relay	Siemens	V23154-N0721-B110
RE1004	Relay	Siemens	V23100-V4024-A001
T1001	Transistor	Philips	BC 558
T1002	Transistor	Philips	BC 548
IC1001	Integrated circuit	National	LM 358
S1001	Switch	S.P.	Draw. 7-3-21346
S1002	Switch	S.P.	Draw. 7-3-20060
S1003	Switch	S.P.	Draw. 7-3-21487

a		SSB GENERATOR S130X			MODULE 1100		1/4
Symbol	Description				Manufact.		
R1101	Resistor	6K8 ohm	±5%	0.33W	Philips	2322 211 13682	
R1102	Resistor	1K0 ohm	±5%	0.33W	Philips	2322 211 13102	
R1103	Resistor	220 ohm	±5%	0.33W	Philips	2322 211 13221	
R1104	Resistor	1K0 ohm	±5%	0.33W	Philips	2322 211 13102	
R1105	Resistor	1K0 ohm	±5%	0.33W	Philips	2322 211 13102	
R1106	Resistor	1K0 ohm	±5%	0.33W	Philips	2322 211 13102	
R1107	Resistor	1K0 ohm	±5%	0.33W	Philips	2322 211 13102	
R1108	Resistor	6K8 ohm	±5%	0.33W	Philips	2322 211 13682	
R1109	Potentiometer	22K ohm		cermet	Philips	2322 482 20223	
R1110	Resistor	5K6 ohm	±5%	0.33W	Philips	2322 211 13562	
R1111	Resistor	12K ohm	±5%	0.33W	Philips	2322 211 13123	
R1112	Resistor	2K2 ohm	±5%	0.33W	Philips	2322 211 13222	
R1113	Resistor	2K2 ohm	±5%	0.33W	Philips	2322 211 13222	
R1114	Resistor	2K2 ohm	±5%	0.33W	Philips	2322 211 13222	
R1115	Resistor	2K2 ohm	±5%	0.33W	Philips	2322 211 13222	
R1116	Resistor	68 ohm	±5%	0.33W	Philips	2322 211 13689	
R1117	Resistor	150 ohm	±5%	0.33W	Philips	2322 211 13151	
R1118	Resistor	15K ohm	±5%	0.33W	Philips	2322 211 13153	
R1119	Resistor	47K ohm	±5%	0.33W	Philips	2322 211 13473	
R1120	Resistor	47K ohm	±5%	0.33W	Philips	2322 211 13473	
R1121	Resistor	47 ohm	±5%	0.33W	Philips	2322 211 13479	
R1122	Resistor	47 ohm	±5%	0.33W	Philips	2322 211 13479	
R1123	Resistor	390 ohm	±5%	0.33W	Philips	2322 211 13391	
R1124	Resistor	47K ohm	±5%	0.33W	Philips	2322 211 13473	
R1125	Potentiometer	100 ohm		cermet	Philips	2322 482 20101	
R1126	Resistor	330 ohm	±5%	0.33W	Philips	2322 211 13331	
R1127	Resistor	330 ohm	±5%	0.33W	Philips	2322 211 13331	
R1128	Resistor	470 ohm	±5%	0.33W	Philips	2322 211 13471	
R1129	Resistor	47K ohm	±5%	0.33W	Philips	2322 211 13473	
R1130	Resistor	150 ohm	±5%	0.33W	Philips	2322 211 13151	
R1131	Resistor	2K2 ohm	±5%	0.33W	Philips	2322 211 13222	
R1132	Resistor	18K ohm	±5%	0.33W	Philips	2322 211 13183	
R1133	Resistor	56K ohm	±5%	0.33W	Philips	2322 211 13563	
R1134	Resistor	100 ohm	±5%	0.33W	Philips	2322 211 13101	
R1135	Resistor	1K0 ohm	±5%	0.33W	Philips	2322 211 13102	
R1136	Resistor	1K0 ohm	±5%	0.33W	Philips	2322 211 13102	
R1137	Resistor	22K ohm	±5%	0.33W	Philips	2322 211 13223	
R1138	Resistor	68K ohm	±5%	0.33W	Philips	2322 211 13683	
R1139	Resistor	1K5 ohm	±5%	0.33W	Philips	2322 211 13152	
R1140	Resistor NTC	1K0 ohm	±5%	0.5W	Philips	2322 642 12102	

a		SSB GENERATOR S130X			MODULE 1100		2/4	
Symbol	Description				Manufact.			
R1141	Resistor	1K0 ohm	$\pm 5\%$	0.33W	Philips	2322	211	13102
R1142	Resistor	150 ohm	$\pm 5\%$	0.33W	Philips	2322	211	13151
R1143	Resistor	330 ohm	$\pm 5\%$	0.33W	Philips	2322	211	13331
R1144	Resistor	2K7 ohm	$\pm 5\%$	0.33W	Philips	2322	211	13272
R1145	Resistor	1K8 ohm	$\pm 5\%$	0.33W	Philips	2322	211	13182
R1146	Resistor	2K2 ohm	$\pm 5\%$	0.33W	Philips	2322	211	13222
R1147	Resistor	1K5 ohm	$\pm 5\%$	0.33W	Philips	2322	211	13152
R1148	Resistor	15K ohm	$\pm 5\%$	0.33W	Philips	2322	211	13153
R1149	Potentiometer	100 ohm		cermet	Philips	2322	482	20101
R1150	Resistor	47 ohm	$\pm 5\%$	0.33W	Philips	2322	211	13479
R1151	Resistor	220 ohm	$\pm 5\%$	0.33W	Philips	2322	211	13221
R1152	Resistor	270 ohm	$\pm 5\%$	0.33W	Philips	2322	211	13271
R1153	Resistor	26K7 ohm	$\pm 1\%$	0.4W	Philips	2322	151	52673
R1154	Resistor	26K7 ohm	$\pm 1\%$	0.4W	Philips	2322	151	52673
R1155	Resistor	8K2 ohm	$\pm 5\%$	0.33W	Philips	2322	211	13822
R1156	Resistor	1K8 ohm	$\pm 5\%$	0.33W	Philips	2322	211	13182
R1157	Resistor	560 ohm	$\pm 5\%$	0.33W	Philips	2322	211	13561
R1158	Potentiometer	470 ohm		cermet	Philips	2322	482	20471
R1159	Resistor	560 ohm	$\pm 5\%$	0.33W	Philips	2322	211	13561
R1160	Resistor	120 ohm	$\pm 5\%$	0.33W	Philips	2322	211	13121
R1161	Resistor	150 ohm	$\pm 5\%$	0.33W	Philips	2322	211	13151
R1162	Resistor	150 ohm	$\pm 5\%$	0.33W	Philips	2322	211	13151
R1163	Resistor	150 ohm	$\pm 5\%$	0.33W	Philips	2322	211	13151
C1101	Capacitor	Electrolyt	4u7F	$\pm 20\%$	50V	ROE	EK100AA147H	
C1102	Capacitor	polyester	100nF	$\pm 20\%$	100V	Philips	2222	344 24104
C1103	Capacitor	polyester	100nF	$\pm 20\%$	100V	Philips	2222	344 24104
C1104	Capacitor	polyester	100nF	$\pm 20\%$	100V	Philips	2222	344 24104
C1105	Capacitor	polyester	100nF	$\pm 20\%$	100V	Philips	2222	344 24104
C1106	Capacitor	polyester	100nF	$\pm 20\%$	100V	Philips	2222	344 24104
C1107	Capacitor	polyester	100nF	$\pm 20\%$	100V	Philips	2222	344 24104
C1108	Capacitor	polystyrene	1n2F	$\pm 5\%$	125V	Philips	2222	425 21202
C1109	Capacitor	polystyrene	4n7F	$\pm 5\%$	63V	Philips	2222	424 24702
C1110	Capacitor	polyester	100nF	$\pm 20\%$	100V	Philips	2222	344 24104
C1111	Capacitor	polyester	100nF	$\pm 20\%$	100V	Philips	2222	344 24104
C1112	Capacitor	polyester	100nF	$\pm 20\%$	100V	Philips	2222	344 24104
C1113	Capacitor	polyester	100nF	$\pm 20\%$	100V	Philips	2222	344 24104
C1114	Capacitor	polystyrene	1n0F	$\pm 5\%$	125V	Philips	2222	425 21002
C1115	Capacitor	polyester	100nF	$\pm 2P\%$	100V	Philips	2222	344 24104
C1116	Capacitor	electrolyt	100uF-10/+50%	25V	ROE	EKM00CC310E		

a		SSB GENERATOR S130X			MODULE 1100		3/4
Symbol	Description				Manufact.		
C1117	Capacitor polyester	100nF	$\pm 20\%$	100V	Philips	2222 344	24104
C1118	Capacitor polyester	10nF	$\pm 20\%$	250V	Philips	2222 344	40103
C1119	Capacitor polyester	100nF	$\pm 20\%$	100V	Philips	2222 344	24104
C1120	Capacitor polyester	100nF	$\pm 20\%$	100V	Philips	2222 344	24104
C1121	Capacitor polyester	10nF	$\pm 20\%$	250V	Philips	2222 344	40103
C1122	If fitted:						
	Capacitor ceramic	27pF	$\pm 5\%$	400V	Ferroperm	9/0112.9	
C1123	Capacitor trimmer teflon	2.5 - 45pF	NPO		DAU	107-5901-045	
C1124	Capacitor polyester	100nF	$\pm 20\%$	100V	Philips	2222 344	24104
C1125	Capacitor polystyrene	1nOF	$\pm 5\%$	125V	Philips	2222 425	21002
C1126	Capacitor polyester	100nF	$\pm 20\%$	100V	Philips	2222 344	24104
C1127	Capacitor polystyrene	1n5F	$\pm 5\%$	125V	Philips	2222 425	21502
C1128	Capacitor polystyrene	3n3F	$\pm 5\%$	125V	Philips	2222 425	23302
C1129	Capacitor polyester	100nF	$\pm 20\%$	100V	Philips	2222 344	24104
C1130	Capacitor polyester	100nF	$\pm 20\%$	100V	Philips	2222 344	24104
C1131	Capacitor polyester	100nF	$\pm 20\%$	100V	Philips	2222 344	24104
C1132	Capacitor polyester	100nF	$\pm 20\%$	100V	Philips	2222 344	24104
C1133	Capacitor polyester	100nF	$\pm 20\%$	100V	Philips	2222 344	24104
C1134	Capacitor polyester	100nF	$\pm 20\%$	100V	Philips	2222 344	24104
C1135	Capacitor polyester	100nF	$\pm 20\%$	100V	Philips	2222 344	24104
C1136	Capacitor polyester	100nF	$\pm 20\%$	100V	Philips	2222 344	24104
C1137	Capacitor polystyrene	560pF	$\pm 2\%$	250V	Philips	2222 426	35601
C1138	Capacitor polyester	100nF	$\pm 20\%$	100V	Philips	2222 344	24104
C1139	Capacitor polystyrene	2n2F	$\pm 5\%$	125V	Philips	2222 425	22202
C1140	Capacitor polyester	100nF	$\pm 20\%$	100V	Philips	2222 344	24104
C1141	Capacitor polyester	100nF	$\pm 20\%$	100V	Philips	2222 344	24104
C1142	Capacitor polyester	100nF	$\pm 20\%$	100V	Philips	2222 344	24104
C1143	Capacitor polyester	100nF	$\pm 20\%$	100V	Philips	2222 344	24104
D1101	Diode				Philips	1N4148	
D1102	Diode				Philips	1N4148	
D1103	Diode				Philips	1N4148	
D1104	Diode				Philips	1N4148	
D1105	Diode switch				Philips	BAW62	
D1106	Diode switch				Philips	BAW62	
D1107	Diode Zener	7.5V	$\pm 5\%$	0.4W	Philips	BZX79C7V5	
L1101	Coil	TL 013			S.P.		
L1102	Coil	TL 020			S.P.		
L1103	Coil	TL 076			S.P.		

MODULE NO: 1100

a		SSB GENERATOR S130X	MODULE 1100	4/4
Symbol	Description		Manufact.	
L1104	Coil	TL 026	S.P.	
L1105	Coil	TL 013	S.P.	
L1106	Coil	TL 309	S.P.	6-0-23161
T1101	Transistor		Philips	BC 547
T1102	Transistor		Philips	BC 547
T1103	Transistor		Philips	BC 547
T1104	Transistor		Philips	BC 547
T1105	Transistor		Philips	BF 199
T1106	Transistor		Philips	BC 547
IC1101	Integrated circuit		RCA	CA 3019
T1101	LSB crystal filter	600 kHz	S.P.	C1002

e	MICROPHONE AMPLIFIER S1300				MODULE 1200	1/3
Symbol	Description				Manufact.	
R1201	Preset pot.meter, cermet 1Kohm $\pm 20\%$ 0,5W				Philips	2322 482 20102
R1202	Resistor	560 ohm $\pm 5\%$	1,6 W	Philips	2322 191 35601	
R1203	Resistor	1Kohm $\pm 5\%$	0,33W	Philips	2322 211 13102	
R1204	Resistor	2,7Kohm $\pm 5\%$	0,33W	Philips	2322 211 13272	
R1205	Resistor	2,7Kohm $\pm 5\%$	0,33W	Philips	2322 211 13272	
R1206	Resistor	180 ohm $\pm 5\%$	0,33W	Philips	2322 211 13181	
R1207	Resistor	150 ohm $\pm 5\%$	0,33W	Philips	2322 211 13151	
R1208	Resistor	5,6Kohm $\pm 5\%$	0,33W	Philips	2322 211 13562	
R1209	Resistor	100Kohm $\pm 5\%$	0,33W	Philips	2322 211 13104	
R1211	Resistor	820 ohm $\pm 5\%$	0,33W	Philips	2322 211 13821	
R1212	Resistor	100Kohm $\pm 5\%$	0,33W	Philips	2322 211 13104	
R1213	Resistor	220Kohm $\pm 5\%$	0,33W	Philips	2322 211 13224	
R1214	Resistor	4,7Kohm $\pm 5\%$	0,33W	Philips	2322 211 13472	
R1215	Resistor	4,7Kohm $\pm 5\%$	0,33W	Philips	2322 211 13472	
R1216	Resistor	390 ohm $\pm 5\%$	0,33W	Philips	2322 211 13391	
R1217	Resistor	10Kohm $\pm 5\%$	0,33W	Philips	2322 211 13103	
R1218	Resistor	4,7Kohm $\pm 5\%$	0,33W	Philips	2322 211 13472	
R1219	Resistor	10Kohm $\pm 5\%$	0,33W	Philips	2322 211 13103	
R1220	Resistor	1Kohm $\pm 5\%$	0,33W	Philips	2322 211 13102	
R1221	Resistor	470 ohm $\pm 5\%$	0,33W	Philips	2322 211 13471	
R1222	Resistor	2,2Kohm $\pm 5\%$	0,33W	Philips	2322 211 13222	
R1223	Resistor	220Kohm $\pm 5\%$	0,33W	Philips	2322 211 13224	
R1224	Preset potmeter; cermet 100Kohm $\pm 20\%$ 0,5W				Philips	2322 482 20104
R1225	Resistor	1Kohm $\pm 5\%$	0,33W	Philips	2322 211 13102	
R1226	Resistor	10Kohm $\pm 5\%$	0,33W	Philips	2322 211 13103	
R1227	Resistor	4,53Kohm $\pm 1\%$	0,33W	Philips	2322 151 54533	
R1228	Resistor	4,53Kohm $\pm 1\%$	0,33W	Philips	2322 151 54533	
R1229	Resistor	100Kohm $\pm 5\%$	0,33W	Philips	2322 211 13104	
R1230	Resistor	1Kohm $\pm 5\%$	0,33W	Philips	2322 211 13102	
R1231	Resistor	2,2Kohm $\pm 5\%$	0,33W	Philips	2322 211 13222	
R1232	Preset potmeter cermet 470 ohm $\pm 20\%$ 0,5W				Philips	2322 482 20471
R1233	Resistor	47Kohm $\pm 5\%$	0,33W	Philips	2322 211 13473	
R1234	Resistor	47Kohm $\pm 5\%$	0,33W	Philips	2322 211 13473	
R1235	Resistor	2,2Kohm $\pm 5\%$	0,33W	Philips	2322 211 13222	
R1236	Resistor	1Kohm $\pm 5\%$	0,33W	Philips	2322 211 13102	
R1237	Resistor	1Kohm $\pm 5\%$	0,33W	Philips	2322 211 13102	
R1238	Resistor	3,9Kohm $\pm 5\%$	0,33W	Philips	2322 211 13392	
R1239	Resistor	2,2Kohm $\pm 5\%$	0,33W	Philips	2322 211 13222	
R1240	Resistor	2,2Kohm $\pm 5\%$	0,33W	Philips	2322 211 13222	

D		MICROPHONE AMPLIFIER S1300		2/3	
Symbol	Description		Manufact.		
R1241	Resistor	2,2Kohm $\pm 5\%$ 0,33W	Philips	2322 211 13222	
R1242	Resistor	390 ohm $\pm 5\%$ 0,33W	Philips	2322 211 13391	
R1243	Resistor	270 ohm $\pm 5\%$ 0,33W	Philips	2322 211 13271	
R1244	Resistor	120 ohm $\pm 5\%$ 0,33W	Philips	2322 211 13121	
R1245	Resistor	1Kohm $\pm 5\%$ 0,33W	Philips	2322 211 13102	
R1246	Resistor	1Kohm $\pm 5\%$ 0,33W	Philips	2322 211 13102	
R1247	Resistor	1Kohm $\pm 5\%$ 0,33W	Philips	2322 211 13102	
R1248	Resistor	15Kohm $\pm 5\%$ 0,33W	Philips	2422 211 13153	
R1249	Resistor	10Kohm $\pm 5\%$ 0,33W	Philips	2322 211 13102	
R1250	Resistor	1Kohm $\pm 5\%$ 0,33W	Philips	2422 211 13102	
C1201	Capacitor electrolytic	33uF 20% 16V	ROE	EKI00AA233D	
C1202	Capacitor electrolytic	4,7uF 20% 50V	ROE	EKI00AA147H	
C1203	Capacitor electrolytic	0,22uF 20% 50V	ROE	EKI00AA022H	
C1204	Capacitor ceramic	1nF-20/+80% 40V	Ferroperm	9/0129,8	
C1205	Capacitor ceramic	1nF-20/+80% 40V	Ferroperm	9/0129,8	
C1206	Capacitor electrolytic	4,7uF 20% 50V	ROE	EKI00AA147H	
C1207	Capacitor tantal	100nF-20/+50%35V	ERO	ETP 1A	
C1208	Capacitor electrolytic	470uF-10/+50%10V	Siemens	B41283-A3477-T	
C1209	Capacitor polyester	100nF $\pm 20\%$ 100V	Philips	2222 344 24104	
C1210	Capacitor electrolytic	4,7uF 20% 50V	ROE	EKI00AA147H	
C1211	Capacitor ceramic	150pF $\pm 10\%$ 25V	Ferroperm	9/0121,8	
C1212	Capacitor polyester	100nF $\pm 5\%$ 100V	Philips	2222 344 23104	
C1213	Capacitor polyester	68nF $\pm 5\%$ 250V	Philips	2222 344 43683	
C1214	Capacitor electrolytic	10uF-10/+50%63V	Siemens	B41283-A8106-T	
C1215	Capacitor polyester	68nF $\pm 5\%$ 250V	Philips	2222 344 43683	
C1216	Capacitor electrolytic	4,7uF 20% 50V	ROE	EKI00AA147H	
C1217	Capacitor electrolytic	4,7uF 20% 50V	ROE	EKI00AA147H	
C1218	Capacitor electrolytic	10uF 20% 35V	ROE	EKI00AA210F	
C1219	Capacitor polyester	47nF $\pm 10\%$ 250V	Philips	2222 344 41473	
C1220	Capacitor electrolytic	4,7uF 20% 50V	ROE	EKI00AA147H	
C1221	Capacitor electrolytic	4,7uF 20% 50V	ROE	EKI00AA147H	
C1222	Capacitor electrolytic	4,7uF 20% 50V	ROE	EKI00AA147H	
C1223	Capacitor polyester	68nF $\pm 10\%$ 250V	Philips	2222 344 41683	
C1224	Capacitor electrolytic	4,7uF 20% 50V	ROE	EKI00AA147H	
C1225	Capacitor electrolytic	4,7uF 20% 50V	ROE	EKI00AA147H	
C1226	Capacitor electrolytic	4,7uF 20% 50V	ROE	EKI00AA147H	
C1227	Capacitor polyester	220nF $\pm 20\%$ 100V	Philips	2322 344 24224	
L1201	Coil		S.P.	TL 219	

B		MICROPHONE AMPLIFIER S1300		3/3	
Symbol	Description			Manufact.	
T1201	Transistor			Philips	BC 338
T1202	Transistor			Philips	BF 256 B
T1203	Transistor			Philips	BC 548B
T1204	Transistor			Philips	BC 548B
T1205	Transistor			Philips	BC 548B
T1206	Transistor			Philips	BC 548B
T1207	Transistor			Philips	BC 558B
T1208	Transistor			Philips	BC 558B
T1209	Transistor			Philips	BC 548B
T1210	Transistor			Philips	BC 548B
T1211	Transistor			Philips	BC 548B
T1212	Transistor			Philips	BC 548B
T1213	Transistor			Philips	BC 548B
D1201	Diode, zener	5.1V $\pm 5\%$	0,4W	Philips	BZX79 C5V1
D1202	Diode, zener	5.1V $\pm 5\%$	0.4W	Philips	BZX79 C5V1
D1203	Diode, silicon			Philips	BAV 21
D1204	Diode, zener	7.5V $\pm 5\%$	0.4W	Philips	BZX79 C7V5
D1205	Diode, silicon			Philips	BAV 21
D1206	Diode, switch			Philips	BA 182
D1207	Diode, switch			Philips	BA 182
D1208	Diode, switch			Philips	BA 182
D1209	Diode, switch			Philips	BA 182
IC1201	Integrated circuit			Motorola	MC14013 BC

ALARM SIGNAL GENERATOR S1300/01/02/03/04 Module 1300

1/2

Symbol	Description				Manufact.	
R1301	Resistor	270 ohm	$\pm 5\%$	1,6W	PHILIPS	2322 191 50271
R1302	Resistor	150 ohm	$\pm 5\%$	0,33W	PHILIPS	2322 211 13151
R1303	Resistor	4,7 kohm	$\pm 5\%$	0,33W	PHILIPS	2322 211 13472
R1304	Resistor	3,3 kohm	$\pm 5\%$	0,33W	PHILIPS	2322 211 13332
R1305	Resistor	10 kohm	$\pm 5\%$	0,33W	PHILIPS	2322 211 13103
R1306	Resistor	33 kohm	$\pm 5\%$	0,33W	PHILIPS	2322 211 13333
R1307	Resistor	3,3 kohm	$\pm 5\%$	0,33W	PHILIPS	2322 211 13332
R1308	Resistor	1,2 kohm	$\pm 5\%$	0,33W	PHILIPS	2322 211 13122
R1309	Resistor	330 ohm	$\pm 5\%$	0,33W	PHILIPS	2322 211 13331
R1310	Resistor	470 ohm	$\pm 5\%$	0,33W	PHILIPS	2322 211 13471
R1311	Resistor	18 kohm	$\pm 5\%$	0,33W	PHILIPS	2322 211 13183
R1312	Resistor	10 kohm	$\pm 5\%$	0,33W	PHILIPS	2322 211 13103
R1313	Resistor	1,5 kohm	$\pm 5\%$	0,33W	PHILIPS	2322 211 13152
R1314	Resistor	4,7 kohm	$\pm 5\%$	0,33W	PHILIPS	2322 211 13472
R1315	Resistor	10 kohm	$\pm 5\%$	0,33W	PHILIPS	2322 211 13103
R1316	Resistor	10 kohm	$\pm 5\%$	0,33W	PHILIPS	2322 211 13103
C1301	Capacitor Polyester	0,1uF	$\pm 10\%$	100V	SIEMENS	B32510-D1104K
C1302	Capacitor Ceramic	10pF	$\pm 0,5pF$	50V	KCK	HE40SJPH100D
S1303	Capacitor Electrolyt	22uF	$\pm 20\%$	25V	ERO	EKI00AA222E
S1304	Capacitor Polyester	0,22uF	$\pm 10\%$	100V	SIEMENS	B32560-D1224K
S1305	Capacitor Ceramic	150pF	$\pm 5\%$	50V	KCK	HE40SJPH151J
S1306	Capacitor Ceramic	10nF	-20/+80%	50V	KCK	HE70SJYF103Z
S1307	Capacitor Polyester	0,22uF	$\pm 10\%$	100V	SIEMENS	B32560-D1224K
C1308	Capacitor Polyester	10nF	$\pm 10\%$	400V	SIEMENS	B32510-D6103K
C1309	Capacitor Polyester	10nF	$\pm 10\%$	400V	SIEMENS	B32510-D6103K
C1310	Capacitor Polyester	0,1uF	$\pm 10\%$	100V	SIEMENS	B32510-D1104K
C1311	Capacitor Polyester	0,1uF	$\pm 10\%$	100V	SIEMENS	B32510-D1104K
C1312	Capacitor Polyester	0,1uF	$\pm 10\%$	100V	SIEMENS	B32510-D1104K
C1313	Capacitor Polyester	0,1uF	$\pm 10\%$	100V	SIEMENS	B32510-D1104K

Symbol	Description	Manufact.	
C1314	Capacitor polyester 0,1uF $\pm 10\%$ 100V	SIEMENS	B32510-D1104K
C1315	Capacitor polyester 0,1uF $\pm 10\%$ 100V	SIEMENS	B32510-D1104K
L1301	Coil 6uH $\pm 5\%$	KASCHKE	Bauform 2205 type 4000
D1301	Diode Ge	ITT	AA143
T1301	Transistor	PHILIPS	BC548B
T1302	Transistor	PHILIPS	BC548B
T1303	Transistor	PHILIPS	BF199
T1304	Transistor	PHILIPS	2N2368
T1305	Transistor	PHILIPS	BC558B
IC1301	Voltage Regulator	MOTOROLA	MC78L05ACP
IC1302	Integrated Circuit	MOTOROLA	MC14081BCP
IC1303	Integrated Circuit	MOTOROLA	MC14071BCP
IC1304	Integrated Circuit	MOTOROLA	MC14082BCP
IC1305	Integrated Circuit	MOTOROLA	MC14040BCP
IC1306	Integrated Circuit	MOTOROLA	MC14040BCP
IC1307	Integrated Circuit	MOTOROLA	MC14040BCP
IC1308	Integrated Circuit	MOTOROLA	MC14027BCP
IC1309	Integrated Circuit	MOTOROLA	MC14073BCP
IC1310	Integrated Circuit	MOTOROLA	MC14040BCP
IC1311	Integrated Circuit	MOTOROLA	MC140027BCP
IC1312	Integrated Circuit	MOTOROLA	MC140073BCP
IC1313	Integrated Circuit	TEXAS	SN74LS197N

b		DRIVER-UNIT FOR S1300				1/1	
Symbol	Description				Manufact.		
R1401	Resistor	560 ohm	$\pm 5\%$	1,14W	Philips	2322 214 13561	
R1402	Resistor	15 ohm	$\pm 5\%$	0,5 W	Philips	2322 212 23159	
R1403	Resistor	15 ohm	$\pm 5\%$	0,5 W	Philips	2322 212 23159	
C1401	Capacitor polyester	220nF	$\pm 20\%$	100V	Philips	2222 344 24224	
C1402	Capacitor ceramic	10nF	-20/+80%	32V	Ferroperm	9/0145,9	
C1403	Capacitor polyester	22nF	$\pm 20\%$	250V	Philips	2222 344 40223	
C1404	Capacitor polyester	220nF	$\pm 20\%$	100V	Philips	2222 344 24224	
L1401	Coil	330nH	$\pm 10\%$		Ferroperm	1582/7	
L1402	Coil	33uH	$\pm 10\%$		Ferroperm	1583	
L1403	Coil	33uH	$\pm 10\%$		Ferroperm	1583	
T1401	Transistor, $h_{FE} > 10$ for ($V_{CE}, I_C = (5V, 0,25A)$)				Motorola	ZRF0132	
RE1401	If fitted Relay				Siemens	V23100-V4024-A001	

a		BANDFILTER S1300			1/4
Symbol	Description			Manufact.	
R1501	Resistor	220 ohm $\pm 5\%$	0,33W	Philips	2322 211 13221
R1502	Resistor	470 ohm $\pm 5\%$	0,33W	Philips	2322 106 33471
R1503	Resistor	39 ohm $\pm 5\%$	0,33W	Philips	2322 211 13399
R1504	Resistor	120 ohm $\pm 5\%$	0,33W	Philips	2322 211 13121
R1505	Resistor	10 ohm $\pm 5\%$	0,33W	Philips	2322 211 13109
R1506	Resistor	27 ohm $\pm 5\%$	0,33W	Philips	2322 211 13279
R1507	Resistor	120 ohm $\pm 5\%$	0,5 W	Philips	2322 212 13121
R1508	Resistor	390 ohm $\pm 5\%$	0,33W	Philips	2322 106 33391
R1509	Resistor	1,5Kohm $\pm 5\%$	0,33W	Philips	2322 211 13152
R1510	Not mounted				
R1511	Resistor	390 ohm $\pm 5\%$	0,33W	Philips	2322 106 33391
R1512	Resistor	1,5Kohm $\pm 5\%$	0,33W	Philips	2322 211 13152
R1513	Not mounted				
R1514	Resistor	390 ohm $\pm 5\%$	0,33W	Philips	2322 106 33391
R1515	Resistor	1,5Kohm $\pm 5\%$	0,33W	Philips	2322 211 13152
R1516	Not mounted				
R1517	Resistor	390 ohm $\pm 5\%$	0,33W	Philips	2322 106 33391
R1518	Resistor	1,5Kohm $\pm 5\%$	0,33W	Philips	2322 211 13152
R1519	Resistor	15Kohm $\pm 5\%$	0,33W	Philips	2322 211 13153
R1520	Resistor	390 ohm $\pm 5\%$	0,33W	Philips	2322 106 33391
R1521	Resistor	1,5Kohm $\pm 5\%$	0,33W	Philips	2322 211 13152
R1522	Resistor	15Kohm $\pm 5\%$	0,33W	Philips	2322 211 13153
R1523	Resistor	390 ohm $\pm 5\%$	0,33W	Philips	2322 106 33391
R1524	Resistor	1,5Kohm $\pm 5\%$	0,33W	Philips	2322 211 13152
R1525	Resistor	22Kohm $\pm 5\%$	0,33W	Philips	2322 211 13223
R1526	Resistor	180Kohm $\pm 5\%$	0,33W	Philips	2322 211 13184
R1527	Resistor	390 ohm $\pm 5\%$	0,33W	Philips	2322 106 33391
R1528	Resistor	1,5Kohm $\pm 5\%$	0,33W	Philips	2322 211 13152
R1529	Resistor	680 ohm $\pm 5\%$	0,33W	Philips	2322 211 13681
R1530	Resistor	150 ohm $\pm 5\%$	0,33W	Philips	2322 211 13151
R1531	Resistor	180 ohm $\pm 5\%$	0,33W	Philips	2322 211 13181
R1532	Resistor	68 ohm $\pm 5\%$	0,33W	Philips	2322 211 13689
R1533	Resistor	18 ohm $\pm 5\%$	0,33W	Philips	2322 211 13189

a		BANDFILTER S1300			2/4		
Symbol	Description				Manufact.		
R1534	Preset pot.meter,cermet 100 ohm \pm 20% 0,5W				Philips	2322 482 20101	
R1535	Resistor 680 ohm \pm 5% 0,5W				Philips	2322 212 13681	
R1536	Preset pot.meter 47 ohm \pm 10% 3W				A.B.Metal	115 Q 7	
R1537	Resistor 27 ohm \pm 5%0,33W				Philips	2322 211 13279	
C1501	Capacitor polyester	100 nF	\pm 20%	100V	Philips	2222 344 24104	
C1502	Capacitor polyester	100 nF	\pm 20%	100V	Philips	2222 344 24104	
C1503	Capacitor polyester	100 nF	\pm 20%	100V	Philips	2222 344 24104	
C1504	Capacitor ceramic	10 nF	-20/+80%	32V	Ferroperm	9/0145,9	
C1505	Capacitor polyester	100 nF	\pm 20%	100V	Philips	2222 344 24104	
C1506	Capacitor ceramic	10 nF	-20/+80%	32V	Ferroperm	9/0145,9	
C1507	Capacitor polyester	22 nF	\pm 20%	250V	Philips	2222 344 40223	
C1508	Capacitor polyester	22 nF	\pm 20%	250V	Philips	2222 344 40223	
C1509	Capacitor polystyrene	62 pF	\pm 2%	500V	Philips	2222 427 36209	
C1510	Capacitor ceramic	3,3 pF	\pm 0,25pF	NPO 400V	Ferroperm	9/0112,9	
C1511	Capacitor polystyrene	180 pF	\pm 2%	500V	Philips	2222 427 31801	
C1512	Capacitor polystyrene	91 pF	\pm 2%	500V	Philips	2222 427 39109	
C1513	Capacitor polyester	22 nF	\pm 20%	250V	Philips	2222 344 40223	
C1514	Capacitor polyester	22 nF	\pm 20%	250V	Philips	2222 344 40223	
C1515	Capacitor polystyrene	75 pF	\pm 2%	500V	Philips	2222 427 37509	
C1516	Capacitor ceramic	4,3pF	\pm 0,25pF	NPO 400V	Ferroperm	9/0112,9	
C1517	Capacitor polystyrene	220 pF	\pm 2%	500V	Philips	2222 427 32201	
C1518	Capacitor polystyrene	110 pF	\pm 2%	500V	Philips	2222 427 31101	
C1519	Capacitor polyester	22 nF	\pm 20%	250V	Philips	2222 344 40223	
C1520	Capacitor polyester	22 nF	\pm 20%	250V	Philips	2222 344 40223	
C1521	Capacitor polystyrene	91 pF	\pm 2%	500V	Philips	2222 427 39109	
C1522	Capacitor ceramic	5,1pF	\pm 0,25pF	NPO 400V	Ferroperm	9/0112,9	
C1523	Capacitor polystyrene	270 pF	\pm 2%	500V	Philips	2222 427 32701	
C1524	Capacitor polystyrene	130 pF	\pm 2%	500V	Philips	2222 427 31301	
C1525	Capacitor polyester	22 nF	\pm 20%	250V	Philips	2222 344 40223	
C1526	Capacitor polyester	22 nF	\pm 20%	250V	Philips	2222 344 40223	

a		BANDFILTER S1300		3/4	
Symbol	Description	Manufact.			
C1527	Capacitor polystyrene 120 pF $\pm 2\%$ 500V	Philips	2222 427 31201		
C1528	Capacitor ceramic 7,5 pF $\pm 0,25$ pF NPO 400V	Ferroperm	9/0112,9		
C1529	Capacitor polystyrene 330 pF $\pm 2\%$ 500V	Philips	2222 427 33301		
C1530	Capacitor polystyrene 180 pF $\pm 2\%$ 500V	Philips	2222 427 31801		
C1531	Capacitor polyester 22 nF $\pm 20\%$ 250V	Philips	2222 344 40223		
C1532	Capacitor polyester 22 nF $\pm 20\%$ 250V	Philips	2222 344 40223		
C1533	Capacitor polystyrene 180 pF $\pm 2\%$ 500V	Philips	2222 427 31801		
C1534	Capacitor ceramic 11 pF $\pm 5\%$ NPO 400V	Ferroperm	9/0112,9		
C1535	Capacitor polystyrene 510 pF $\pm 2\%$ 250V	Philips	2222 426 35101		
C1536	Capacitor polystyrene 270 pF $\pm 2\%$ 500V	Philips	2222 427 32701		
C1537	Capacitor polyester 22 nF $\pm 20\%$ 250V	Philips	2222 344 40223		
C1538	Capacitor polyester 22 nF $\pm 20\%$ 250V	Philips	2222 344 40233		
C1539	Capacitor polystyrene 220 pF $\pm 2\%$ 500V	Philips	2222 427 32201		
C1540	Capacitor ceramic 13 pF $\pm 5\%$ NPO 400V	Ferroperm	9/0112,9		
C1541	Capacitor polystyrene 680 pF $\pm 2\%$ 250V	Philips	2222 426 36801		
C1542	Capacitor polystyrene 330 pF $\pm 2\%$ 500V	Philips	2222 427 33301		
C1543	Capacitor polystyrene 150 pF $\pm 2\%$ 500V	Philips	2222 427 31501		
C1544	Capacitor polyester 100 nF $\pm 20\%$ 100V	Philips	2222 344 24104		
C1545	Capacitor polystyrene 390 pF $\pm 2\%$ 250V	Philips	2222 426 33901		
C1546	Capacitor polystyrene 150 pF $\pm 2\%$ 500V	Philips	2222 427 31501		
C1547	Capacitor polyester 100 nF $\pm 20\%$ 100V	Philips	2222 344 24104		
C1548	Capacitor polyester 220 nF $\pm 20\%$ 100V	Philips	2222 344 24224		
C1549	Capacitor polystyrene 3,9 nF $\pm 5\%$ 63V	Philips	2222 424 23902		
C1550	Capacitor polyester 220 nF $\pm 20\%$ 100V	Philips	2222 344 24224		
C1551	Capacitor polyester 220 nF $\pm 20\%$ 100V	Philips	2222 344 24224		
C1552	Capacitor ceramic 10 nF $-20/+80\%$ 32V	Ferroperm	9/0145,9		
C1553	Capacitor polyester 220 nF $\pm 20\%$ 100V	Philips	2222 344 24224		
L1501	Coil	S.P.	TL 247		
L1502	Coil	S.P.	TL 248		
L1503	Coil	S.P.	TL 245		
L1504	Coil	S.P.	TL 246		
L1505	Coil	S.P.	TL 243		
L1506	Coil	S.P.	TL 244		
L1507	Coil	S.P.	TL 241		
L1508	Coil	S.P.	TL 242		
L1509	Coil	S.P.	TL 239		

a BANDFILTER S1300 4/4			
<i>Symbol</i>	<i>Description</i>	<i>Manufact.</i>	
L1510	Coil	S.P.	TL 240
L1511	Coil	S.P.	TL 237
L1512	Coil	S.P.	TL 238
L1513	Coil	S.P.	TL 236
L1514	Coil	S.P.	TL 236
T1501	Transistor	Philips	BFW17A
T1502	Transistor	Philips	BFW17A
D1501	Diode, switch	Philips	BA182
D1501	Diode, switch	Philips	BA182
D1502	Diode, switch	Philips	BA182
D1503	Diode, switch	Philips	BA182
D1504	Diode, switch	Philips	BA182
D1505	Diode, switch	Philips	BA182
D1506	Diode, switch	Philips	BA182
D1507	Diode, switch	Philips	BA182
D1508	Diode, switch	Philips	BA182
D1509	Diode, switch	Philips	BA182
D1510	Diode, switch	Philips	BA182
D1511	Diode, switch	Philips	BA182
D1512	Diode, switch	Philips	BA182
D1513	Diode, switch	Philips	BA182
D1514	Diode, switch	Philips	BA182
D1515	Diode, switch	Philips	BA182
D1516	Diode, switch	Philips	BA182
D1517	Diode, switch	Philips	BA182
D1518	Diode, silicon	Philips	BAV21
TR1501	Transformer	S.P.	TL 249
TR1502	Transformer	S.P.	TL 250

b		MIXER UNIT S1300		MODULE 1600		1/3	
Symbol	Description			Manufact.			
R1601	Resistor	820 ohm \pm 5%	0.33W	Philips	2322 211 13821		
R1602	Resistor	1.5Kohm \pm 5%	0.33W	Philips	2322 211 13152		
R1603	Resistor	6.8Kohm \pm 5%	0.33W	Philips	2322 211 13682		
R1604	Resistor	820 ohm \pm 5%	0.33W	Philips	2322 211 13821		
R1605	Resistor	3.3Kohm \pm 5%	0.33W	Philips	2322 211 13332		
R1606	Resistor	33 ohm \pm 5%	0.33W	Philips	2322 211 13339		
R1607	Resistor NTC	1Kohm \pm 10%	0.5W	Philips	2322 642 12102		
R1608	Resistor	220 ohm \pm 5%	0.33W	Philips	2322 211 13221		
R1609	Resistor	330 ohm \pm 5%	0.33W	Philips	2322 211 13331		
R1610	Resistor	150 ohm \pm 5%	0.33W	Philips	2322 211 13151		
R1611	Resistor	15 ohm \pm 5%	0.33W	Philips	2322 211 13159		
R1612	Resistor	4.7Kohm \pm 5%	0.33W	Philips	2322 211 13472		
R1613	Resistor	3.3Kohm \pm 5%	0.33W	Philips	2322 211 13332		
R1614	Resistor	15 ohm \pm 5%	0.33W	Philips	2322 211 13159		
R1615	Resistor	68 ohm \pm 5%	0.33W	Philips	2322 211 13689		
R1616	Resistor	68 ohm \pm 5%	0.33W	Philips	2322 211 13689		
R1617	Resistor	180 ohm \pm 5%	0.33W	Philips	2322 211 13181		
R1618	Resistor	1Kohm \pm 5%	0.33W	Philips	2322 211 13102		
R1619	Resistor	27Kohm \pm 5%	0.33W	Philips	2322 211 13273		
R1620	Resistor	1.8Kohm \pm 5%	0.33W	Philips	2322 211 13182		
R1621	Resistor	470 ohm \pm 5%	0.33W	Philips	2322 211 13471		
R1622	Resistor	4.7Kohm \pm 5%	0.33W	Philips	2322 211 13472		
R1623	Resistor	3.9Kohm \pm 5%	0.33W	Philips	2322 211 13392		
R1624	Resistor	470 ohm \pm 5%	0.33W	Philips	2322 211 13471		
R1625	Preset pot.meter cermet	2.2Kohm \pm 20%	0.5W	Philips	2322 482 20222		
R1626	Resistor	2.2Kohm \pm 5%	0.33W	Philips	2322 211 13222		
R1627	Resistor	2.2Kohm \pm 5%	0.33W	Philips	2322 211 13222		
R1628	Resistor	10Kohm \pm 5%	0.33W	Philips	2322 211 13103		
R1629	Resistor	27Kohm \pm 5%	0.33W	Philips	2322 211 13273		
R1630	Resistor	47 ohm \pm 5%	0.33W	Philips	2322 211 13479		
R1631	Preset pot.meter cermet	220 ohm \pm 20%	0.5W	Philips	2322 482 20221		
R1632	Resistor	220 ohm \pm 5%	0.33W	Philips	2322 211 13221		
R1633	Resistor	1Kohm \pm 5%	0.33W	Philips	2322 211 13102		
R1634	Resistor	8.2Kohm \pm 5%	0.33W	Philips	2322 211 13822		
R1635	Resistor	680 ohm \pm 5%	0.33W	Philips	2322 211 13681		
R1636	Resistor	100 ohm \pm 5%	0.33W	Philips	2322 211 13101		
R1637	Resistor	5.6Kohm \pm 5%	0.33W	Philips	2322 211 13562		
R1638	Resistor	22Kohm \pm 5%	0.33W	Philips	2322 211 13223		
R1639	Resistor	330 ohm \pm 5%	0.33W	Philips	2322 211 13331		
R1640	Resistor	100 ohm \pm 5%	0.33W	Philips	2322 211 13101		
R1641	Resistor	47 ohm \pm 5%	0.33W	Philips	2322 211 13479		

e		MIXER UNIT S1300		MODULE 1600		2/3	
Symbol	Description				Manufact.		
R1642	Resistor	220 ohm \pm 5%	0.33W	Philips	2322 211 13221		
R1643	Resistor	33 ohm \pm 5%	0.33W	Philips	2322 211 13339		
R1644	Resistor	150 ohm \pm 5%	0.5W	Philips	2322 212 13151		
R1645	Resistor	18 ohm \pm 5%	0.33W	Philips	2322 211 13189		
R1646	Resistor	120 ohm \pm 5%	0.33W	Philips	2322 106 33121		
R1647	Resistor	120 ohm \pm 5%	0.33W	Philips	2322 106 33121		
R1648	Resistor	330 ohm \pm 5%	0.33W	Philips	2322 106 33331		
In exciters with 3 pos. power switch only:							
R1619	Resistor	12Kohm \pm 5%	0.33W	Philips	2322 211 13123		
C1601	Capacitor electrolytic	10uF 20%	35V	ROE	EKI00AA210F		
C1602	Capacitor polyester	47nF \pm 20%	250V	Philips	2222 344 40473		
C1603	Capacitor electrolytic	10uF 20%	35V	ROE	EKI00AA210F		
C1604	Capacitor polyester	47nF \pm 20%	250V	Philips	2222 344 40473		
C1605	Capacitor polyester	22nF \pm 20%	400V	Philips	2222 344 54223		
C1606	Capacitor polyester	47nF \pm 20%	250V	Philips	2222 344 40473		
C1607	Capacitor polyester	22nF \pm 20%	400V	Philips	2222 344 54223		
C1608	Capacitor polystyrene	2.2nF \pm 5%	160V	Philips	2222 425 22202		
C1609	Capacitor polyester	22nF \pm 20%	400V	Philips	2222 344 54223		
C1610	Capacitor polyester	47nF \pm 20%	250V	Philips	2222 344 40473		
C1611	Capacitor polyester	47nF \pm 20%	250V	Philips	2222 344 40473		
C1612	Capacitor polyester	22nF \pm 20%	400V	Philips	2222 344 54223		
C1613	Capacitor ceramic	12pF \pm 5%	400V	Ferroperm	9/0112.9		
C1614	Capacitor ceramic	15pF \pm 5%	400V	Ferroperm	9/0112.9		
C1615	Capacitor polystyrene	270pF \pm 2%	630V	Philips	2222 427 32701		
C1616	Capacitor polystyrene	680pF \pm 2%	250V	Philips	2222 426 36801		
C1617	Capacitor polyester	22nF \pm 20%	400V	Philips	2222 344 54223		
C1618	Capacitor ceramic	22pF \pm 10%	400V	Ferroperm	9/0112.9		
C1619	Capacitor polyester	22nF \pm 20%	400V	Philips	2222 344 54223		
C1620	Capacitor polystyrene	330pF \pm 2%	630V	Philips	2222 426 36801		
C1621	Capacitor polystyrene	820pF \pm 2%	630V	Philips	2222 426 38201		
C1622	Capacitor polystyrene	180pF \pm 2%	630V	Philips	2222 427 31801		
C1623	Capacitor polystyrene	1.5nF \pm 2%	160V	Philips	2222 425 31502		
C1624	Capacitor polyester	100nF \pm 20%	100V	Philips	2222 344 24104		
C1625	Capacitor polyester	100nF \pm 20%	100V	Philips	2222 344 24104		
C1626	Capacitor polyester	100nF \pm 20%	100V	Philips	2222 344 24104		
C1627	Capacitor polyester	100nF \pm 20%	100V	Philips	2222 344 24104		
C1628	Capacitor polyester	100nF \pm 20%	100V	Philips	2222 344 24104		

b		MIXER UNIT S1300	MODULE 1600	3/3	
Symbol	Description			Manufact.	
C1629	Capacitor polyester	10nF $\pm 20\%$	100V	Philips	2222 344 24103
C1630	Capacitor polyester	100nF $\pm 20\%$	100V	Philips	2222 344 24104
L1601	Coil			S.P.	TL 264
L1602	Coil			S.P.	TL 265
L1603	Coil			S.P.	TL 254
L1604	Coil			S.P.	TL 255
TR1601	W.B. Trafo			S.P.	TL 266
TR1602	W.B. Trafo			S.P.	TL 256
T1601	Transistor			Philips	BF 199
T1602	Transistor			Philips	BF 494
T1603	Transistor			Philips	BF 494
T1604	Transistor			Philips	BF 494
T1605	Transistor			Philips	BF 199
T1606	Transistor			Philips	BFW 17A
D1601	Diode, silicon			Philips	BAV 21
D1602	Diode, silicon			Philips	BAV 21
FL1601	Crystal filter 10.697 MHz			S.P.	C1012
M1601	Mixer, double balanced			S.P.	C1007

d	MAIN CHASSIS S1300		MODULE 1700	1/1
Symbol	Description		Manufact.	
LA1701	Diode, light emitting		Xciton	XC 5053Y
LA1702	Diode, light emitting		Xciton	XC 5053Y
LA1703	Diode, light emitting		Xciton	XC 5053Y
IC1701	Voltage regulator		National	LM317T
IC1702	Voltage regulator		Motorola	MC7805CT
J1701	Socket		Hirschmann	Meb 60 H-DK
J1702	Coax-socket		K.V.Hansen	SO 239
P1701	Plug		Hirschmann	Mes 60 BZ
P1702	Plug		Molex	03-06-2364
MC1701	Microphone cartridge	50 ohm	GNT	AN1-52001
TC1701	Telephone cartridge	200 ohm	Holmco	6890 350A3
R1701	Resistor	33 ohm \pm 5%	10W Danotherm	HS 10
IC1701	Voltage regulator		Motorola	MC 7805CT
S1701	Switch		Cherry	E62 10HS PDT
S1702	Not used			
S1703	Switch		GEFE	C4.5KST1
S1704	Switch		GEFE	C4.5KST1 (Spec.)
S1705	Switch		GEFE	C4.5KST1
S1706	Switch		GEFE	C4.5KST1
S1707	Switch		GEFE	C4.5KST1
S1708	Switch		GEFE	C4.5KST1
FP1701	Ferrit bead		Kaschke	K3/1200/0.1Hz4/2/7A
FP1702	Ferrit bead		Kaschke	K3/1200/0.1Hz4/2/7A
FP1703	Ferrit bead		Kaschke	K3/1200/0.1Hz4/2/7A
FP1704	Ferrit bead		Kaschke	K3/1200/0.1Hz4/2/7A
FP1705	Ferrit bead		Kaschke	K3/1200/0.1Hz4/2/7A
R1701	Resistor	2,7 Kohm \pm 5%	0,33W Philips	2322 181 13272

C		A2H - OSCILLATOR & DELAY UNIT S130X			1/2
Symbol	Description			Manufact.	
R1801	Resistor	1kohm \pm 5%	0.33W	Philips	2322 211 13102
R1802	Resistor	100kohm \pm 5%	0.33W	Philips	2322 211 13104
R1803	Resistor	39kohm \pm 5%	0.33W	Philips	2322 211 13393
R1804	Resistor	4.7kohm \pm 5%	0.33W	Philips	2322 211 13472
R1805	Resistor	33kohm \pm 5%	0.33W	Philips	2322 211 13333
R1806	Preset pot.meter	1kohm \pm 20%	0.5W	Philips	2322 482 20102
R1807	Resistor	1kohm \pm 5%	0.33W	Philips	2322 211 13102
R1808	Resistor	2.2kohm \pm 5%	0.33W	Philips	2322 211 13222
R1809	Resistor	56kohm \pm 5%	0.33W	Philips	2322 211 13563
R1810	Resistor	120kohm \pm 5%	0.33W	Philips	2322 211 13124
R1811	Resistor	10kohm \pm 5%	0.33W	Philips	2322 211 13103
R1812	Resistor	3.9kohm \pm 5%	0.33W	Philips	2322 211 13392
R1813	Resistor	10kohm \pm 5%	0.33W	Philips	2322 211 13103
R1814	Resistor	56kohm \pm 5%	0.33W	Philips	2322 211 13563
R1815	Resistor	10kohm \pm 5%	0.33W	Philips	2322 211 13103
R1816	Resistor	10kohm \pm 5%	0.33W	Philips	2322 211 13103
R1817	Resistor	3.9kohm \pm 5%	0.33W	Philips	2322 211 13392
R1818	Resistor	56kohm \pm 5%	0.33W	Philips	2322 211 13563
R1819	Preset pot.meter	100kohm \pm 20%	0.5W	Philips	2322 482 20104
R1820	Resistor	56kohm \pm 5%	0.33W	Philips	2322 211 13563
R1821	Resistor	3.9kohm \pm 5%	0.33W	Philips	2322 211 13392
R1822	Resistor	10kohm \pm 5%	0.33W	Philips	2322 211 13103
R1823	Resistor	10kohm \pm 5%	0.33W	Philips	2322 211 13103
R1824	Resistor	56kohm \pm 5%	0.33W	Philips	2322 211 13563
R1825	Resistor	10kohm \pm 5%	0.33W	Philips	2322 211 13103
R1826	Resistor	10kohm \pm 5%	0.33W	Philips	2322 211 13103
R1827	Resistor	3.9kohm \pm 5%	0.33W	Philips	2322 211 13392
C1801	Capacitor electrolytic	10uF 20%	35V	ROE	EK100AA210F
C1802	Capacitor electrolytic	10uF 20%	35V	ROE	EK100AA210F
C1803	Capacitor electrolytic	4,7uF 20%	50V	ROE	EK100AA147H
C1804	Capacitor polystyrene	56nF \pm 1%	63V	Philips	2222 444 45603
C1805	Capacitor electrolytic	4,7uF 20%	50V	ROE	EK100AA147H
C1806	Capacitor electrolytic	4,7uF 20%	50V	ROE	EK100AA147H
C1807	Capacitor polyester	100nF \pm 10%	100V	Philips	2222 344 25104
C1808	Capacitor polyester	220nF \pm 10%	400V	Philips	2222 344 25224
C1809	Capacitor polyester	220nF \pm 10%	100V	Philips	2222 344 25224
C1810	Capacitor polyester	10nF \pm 20%	400V	Philips	2222 344 54103

MODULE NO: 1800

b A2H - OSCILLATOR & DELAY UNIT S130X 2/2			
Symbol	Description	Manufact.	
L1801	Coil	S.P.	TL 267
D1801	Diode, silicon	Philips	BAV 21
D1802	Diode, silicon	Philips	BAV 21
D1803	Diode, silicon	Philips	BAV 21
D1804	Diode, silicon	Philips	BAV 21
D1805	Diode, silicon	Philips	BAV 21
D1806	Diode, silicon	Philips	BAV 21
T1801	Transistor	Philips	BC 548
T1802	Transistor	Philips	BC 548
T1803	Transistor	Philips	BC 548
T1804	Transistor	Philips	BC 548
T1805	Transistor	Philips	BC 558
T1806	Transistor	Philips	BC 548
T1807	Transistor	Philips	BC 548
T1808	Transistor	Philips	BA 548
T1809	Transistor	Philips	BC 558
RE1801	Relay	Siemens	V23100-V4024-A001

a POWER SWITCH S1301 1/1					
Symbol	Description			Manufact.	
R2001	Resistor	33kohm \pm 5%	0.33W	Philips	2322 211 13333
R2002	Resistor	10kohm \pm 5%	0.33W	Philips	2322 211 13103
R2003	Resistor	3.6kohm \pm 5%	0.33W	Philips	2322 211 13362
S2001	Switch			Jeanrenaud	RBP 12 FA.2.5.NCC
S2002	Switch			Jeanrenaud	RBP 12 FA.4.2.NCC

a FREQUENCY SELECTOR S1301 1/1					
Symbol	Description			Manufact.	
R2101	Resistor	47 ohm \pm 5%	4W	Philips	2322 330 22479
R2102	Resistor	10kohm \pm 5%	0.33W	Philips	2322 211 13103
R2103	Resistor	10kohm \pm 5%	0.33W	Philips	2322 211 13103
R2104	Resistor	4.7kohm \pm 5%	0.33W	Philips	2322 211 13472
R2105	Resistor	1kohm \pm 5%	0.5W	Philips	2322 212 13102
R2106	Resistor	2.2kohm \pm 5%	0.33W	Philips	2322 211 13222
RA2101	Resistor array	8x10 kohm \pm 5%	0.125W	ITT	VR8, 10kohm 5%
RA2102	Resistor array	8x10 kohm \pm 5%	0.125W	ITT	VR8, 10kohm 5%
RA2103	Resistor array	8x10 kohm \pm 5%	0.125W	ITT	VR8, 10kohm 5%
C2101	Capacitor, electrolytic	10uF-10/+100%40V		Siemens	B41313-A7106-V
C2102	Capacitor, polyester	220nF \pm 20%	100V	Philips	2222 344 24224
C2103	Capacitor, polyester	100nF \pm 20%	100V	Philips	2222 344 24104
C2104	Capacitor, polyester	100nF \pm 20%	100V	Philips	2222 344 24104
C2105	Capacitor, polyester	100nF \pm 20%	100V	Philips	2222 344 24104
T2101	Transistor			Philips	BC 548
IC2101	Integrated circuit			Motorola	GMM 7643
IC2102	Integrated circuit			Texas	74LS27
IC2103	Integrated circuit			Texas	7407
IC2104	Integrated circuit			Texas	74LS09
IC2105	Integrated circuit			Texas	74LS09
IC2106	Integrated circuit			Texas	74LS09
IC2107	Integrated circuit			Texas	74LS09

MF - SPECIAL - UNIT S1300 AND S1301

<i>Symbol</i>	<i>Description</i>	<i>Manufact.</i>	
R2201	Resistor 5.6 kohm $\pm 5\%$ 0,33W	Philips	2322 211 13562
R2202	Resistor 10 kohm $\pm 5\%$ 0,33W	Philips	2322 211 13103
T2201	Transistor	Philips	BC 548
T2202	Transistor	Philips	BC 548
D2201	Diode, silicon	Philips	BAV 62
RE2201	Relay	Pasi	KS/U-3-H BV997

A S1301, S1300/TT, T; R1117

CIRCUIT DESCRIPTIONS AND SCHEMATIC DIAGRAMS

CIRCUIT DESCRIPTION FOR DIVIDER UNIT S130X

This unit contains the logic part of phase locked LOOP 1 and phase locked LOOP 2.

The 10 MHz reference oscillator (TCX0), reference divider, 2 MHz spectrum generator, 600 kHz carrier generator, programmable dividers for LOOP 1 and LOOP 2 and the phase/frequency detectors for LOOP 1 and LOOP 2.

10 MHz REFERENCE

The frequency stability of the exciter is related to the 10 MHz TCX0 X0101. The 10 MHz reference signal is amplified in the transistors T103 and T104.

REFERENCE DIVIDER

The counters IC115, IC111 and IC107 divides the 10 MHz reference signal down to respectively $f_{R1} = 1 \text{ kHz}$ and $f_{R2} = 100 \text{ Hz}$.

2 MHz HARMONIC SPECTRUM GENERATOR

With a repetition frequency of 2 MHz the output Q_D of IC115 goes low and the nand-gates in IC114 will generate a narrow pulse due to the delay-time in the gates.

600 kHz GENERATOR

The output on IC111 pin 5, Q_B has a high contents of 600 kHz, which is amplified in the transistor T105 and filter in the tuned circuit L101, C136 and C137.

PROGRAMMABLE DIVIDER FOR LOOP 1

The variable frequency f_{T1} from LOOP 1 MIXER is amplified and shaped in T101 and IC109a. Independent of which 2 MHz band used the frequency f_{T1} will vary from 2699 kHz to 4698 kHz as the VCO varies 2 MHz. The programmable divider divides f_{T1} down to 1 kHz (dividing figure N_1). This means that there is 2000 frequencies in each 2 MHz band. The frequency is controlled by the FREQUENCY SELECTOR, which encodes the start figure P_1 into the BCD counters IC101, IC102, IC103 and IC104.

The stop figure S_1 is controlled from the gates IC108b and IC109c. When the counter outputs Q_A , Q_B ... etc. equals the stop figure $S_1 + 2$ the J-K flip-flop IC110b uses 2 clock pulses to load the start figure P_1 into the counters IC101, IC102, IC103 and IC104. The counter counts down from the start figure P_1 to stop figure S_1 and thus the dividing figure $N_1 = P_1 - S_1$.

LOOP 1 PHASE/FREQUENCY DETECTOR

The reference frequency $f_{R1} = 1 \text{ kHz}$ and the variable frequency $f_{V1} = 1 \text{ kHz}$ are fed into the phase/frequency detector IC106. The phase/frequency detector IC106 generates an error voltage, which is proportional to frequency or

phase difference between the two signals mentioned above. This error voltage is fed into the integrator on the LOOP 1 FILTER & \pm 18V SUPPLY UNIT.

PROGRAMMABLE DIVIDER FOR LOOP 2

The variable frequency f_{T2} from the loop 2 mixer is amplified and shaped in T102 and IC109b. The frequency f_{T2} will vary between 98.1 kHz and 99.0 kHz depending on the 100 Hz programming. The programmable divider divides f_{T1} down to 100 Hz (dividing figure N_2).

From the FREQUENCY SELECTOR the start figure P_2 encodes into the BCD counter IC105.

The stop figure S_2 is controlled from the gate IC108a. When the counter outputs Q_A , Q_B , Q_C ... etc. equals the stop figure $S_2 - 2$ the J-K flip-flop IC110a uses 2 clock pulses to load the start figure P_2 into the counters IC105 and IC112. The counter will count up from the start figure P_2 to the stop figure S_2 and thus the dividing figure is $N_2 = S_2 - P_2$.

LOOP 2 PHASE/FREQUENCY DETECTOR

The reference frequency $f_{R2} = 100$ Hz and the variable frequency $f_{V1} = 100$ Hz, are fed into the phase/frequency detector IC113. The phase/frequency detector IC113 generates an error voltage proportional to the frequency or the phase difference between the two signals mentioned above. This error voltage is fed into the integrator on the VCXO & LOOP 2 FILTER UNIT.

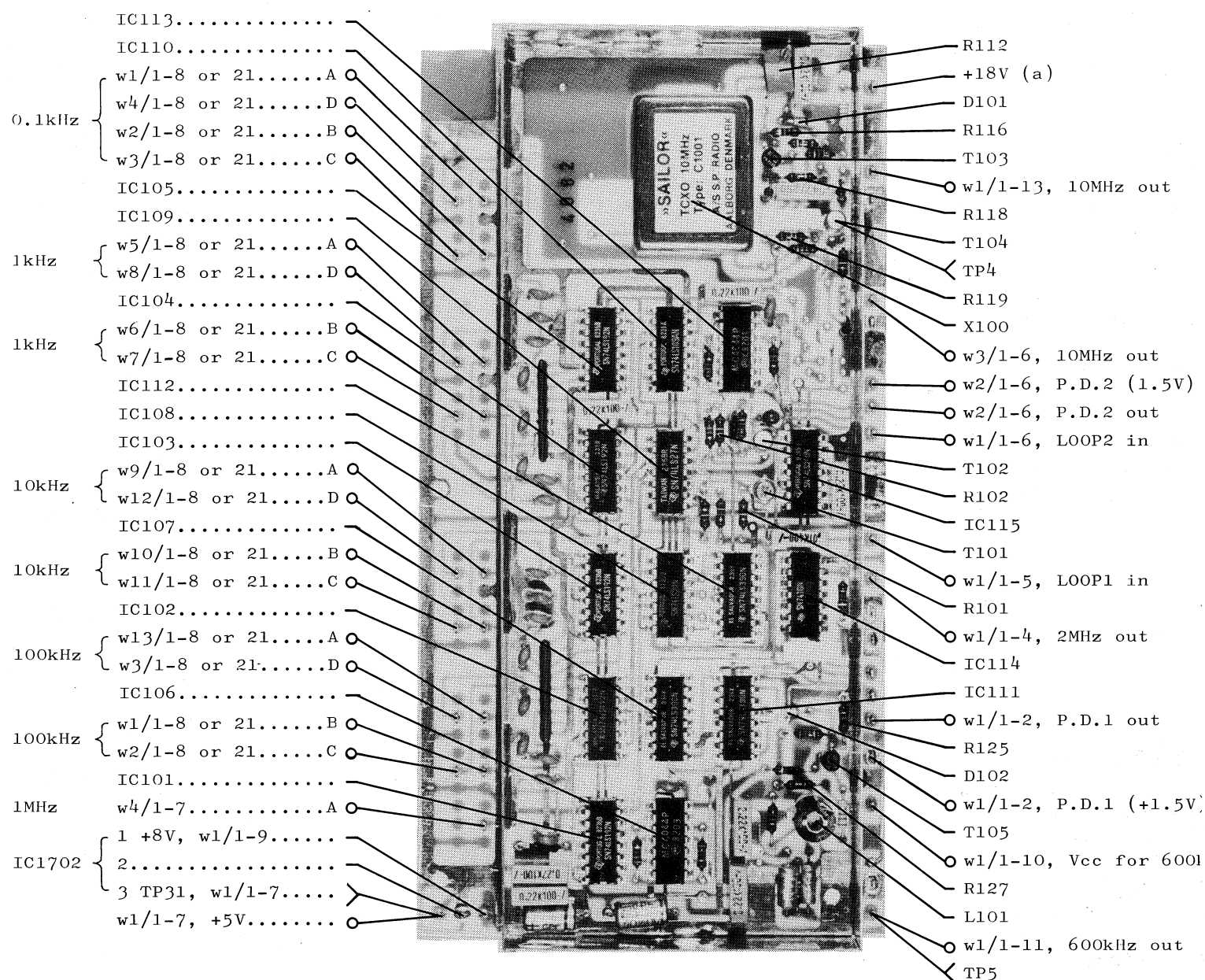
TEST CONDITIONS

Frequency selector : 1A ($f = 2.0005$ MHz)
Mode : A3J
KEY : ON
Oscilloscope input : Passive probe 10 Mohm/11 pF
DC voltmeter input : 10 Mohm

⊙ : Diode probe measurements

TP: Testpoints

All voltage statements are typical



Wire numbers in brackets: S1300, S1301 only.
 Module 800 only in S1300, S1300T, S1300TT and S1302
 Module 2100 only in S1301, S1303 and S1304

phase difference between the two signals mentioned above. This error voltage is fed into the integrator on the LOOP 1 FILTER & \pm 18V SUPPLY UNIT.

PROGRAMMABLE DIVIDER FOR LOOP 2

The variable frequency f_{T2} from the loop 2 mixer is amplified and shaped in T102 and IC109b. The frequency f_{T2} will vary between 98.1 kHz and 99.0 kHz depending on the 100 Hz programming. The programmable divider divides f_{T1} down to 100 Hz (dividing figure N_2).

From the FREQUENCY SELECTOR the start figure P_2 encodes into the BCD counter IC105.

The stop figure S_2 is controlled from the gate IC108a. When the counter outputs Q_A , Q_B , Q_C ... etc. equals the stop figure $S_2 - 2$ the J-K flip-flop IC110a uses 2 clock pulses to load the start figure P_2 into the counters IC105 and IC112. The counter will count up from the start figure P_2 to the stop figure S_2 and thus the dividing figure is $N_2 = S_2 - P_2$.

LOOP 2 PHASE/FREQUENCY DETECTOR

The reference frequency $f_{R2} = 100$ Hz and the variable frequency $f_{V1} = 100$ Hz, are fed into the phase/frequency detector IC113. The phase/frequency detector IC113 generates an error voltage proportional to the frequency or the phase difference between the two signals mentioned above. This error voltage is fed into the integrator on the VCXO & LOOP 2 FILTER UNIT.

TEST CONDITIONS

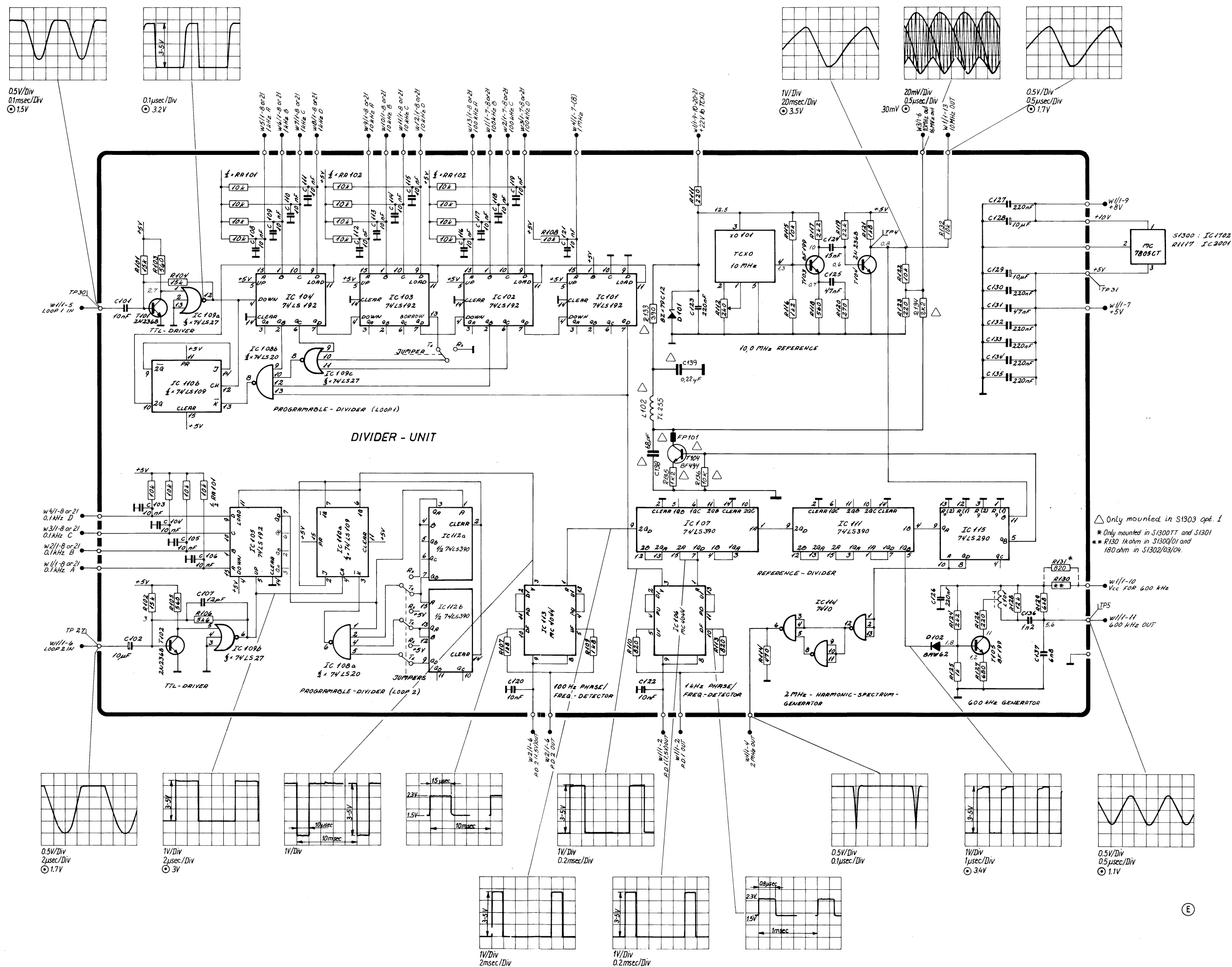
Frequency selector : 1A ($f = 2.0005$ MHz)
Mode : A3J
KEY : ON
Oscilloscope input : Passive probe 10 Mohm/11 pF
DC voltmeter input : 10 Mohm

⊙ : Diode probe measurements

TP: Testpoints

All voltage statements are typical

2/2 SI30X
4-0-21629D



MODULE 100
DIVIDER UNIT

CIRCUIT DESCRIPTION LOOP 1 FILTER & $\pm 18V$ SUPPLY UNIT S130X

This unit contains two regulated power supplies $\pm 18V$ with fold-back current limiter, the complete integrator and filter for LOOP 1.

-18V SUPPLY

The series transistor T201 supplies a -18V output controlled by the current flow into its base from T205, where a portion of the output voltage, via a voltage divider containing R209, is compared to a reference voltage created by R204, D202 and D201. The fold-back is within the circuit. When the output current from the regulator increases the base current must increase too, but this current is limited by R204. When the regulator reaches this limit T205 stops conducting and so it folds back. To ensure that T201 starts conducting R203 is added.

+18V SUPPLY

The principle of operation for this regulator is exactly as described above, with an additional current limiter containing T204 and T206 to ensure the fold-back characteristic is maintained within design limits. To ensure start-up R212 is added.

INTEGRATOR & LOOP 1 FILTER

The integrator is built-up around IC202, the integration capacitor is C211. R220 feeds current into the diode coupled Darlington pair in the phase comparator MC4044 on the divider board to perform the 1.5V reference. Output from the integrator pin 6 on IC202 feeds into the active low-pass filter IC201 to filter out the 1 kHz ripple from the phase comparator. The voltage divider R217 and R218 connected to IC202 via D206 ensure that the output voltage swing is within approx. -4V to -17V.

TEST CONDITIONS

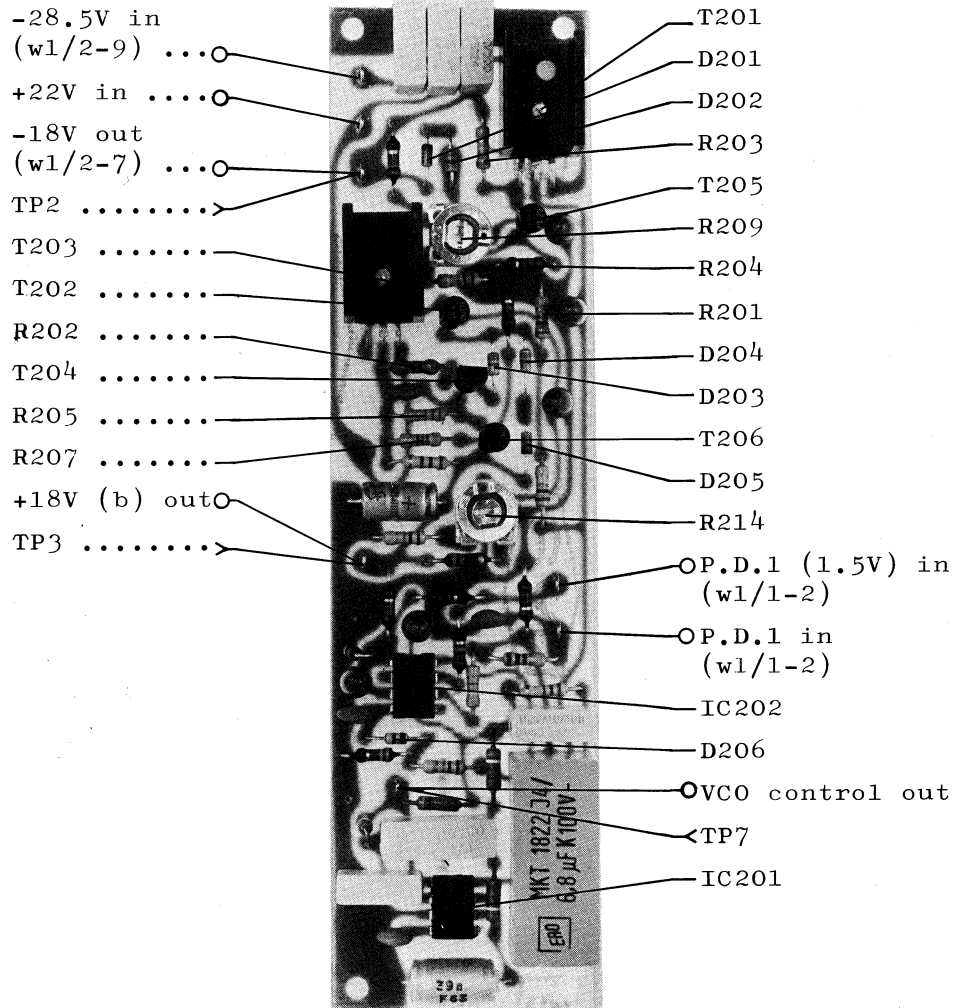
Frequency selector : 1A ($f = 2.0005 \text{ MHz}$)
Oscilloscope input : Passive probe 10 Mohm/11 pF
DC voltmeter input : 10 Mohm

⊙ : Diode probe measurements

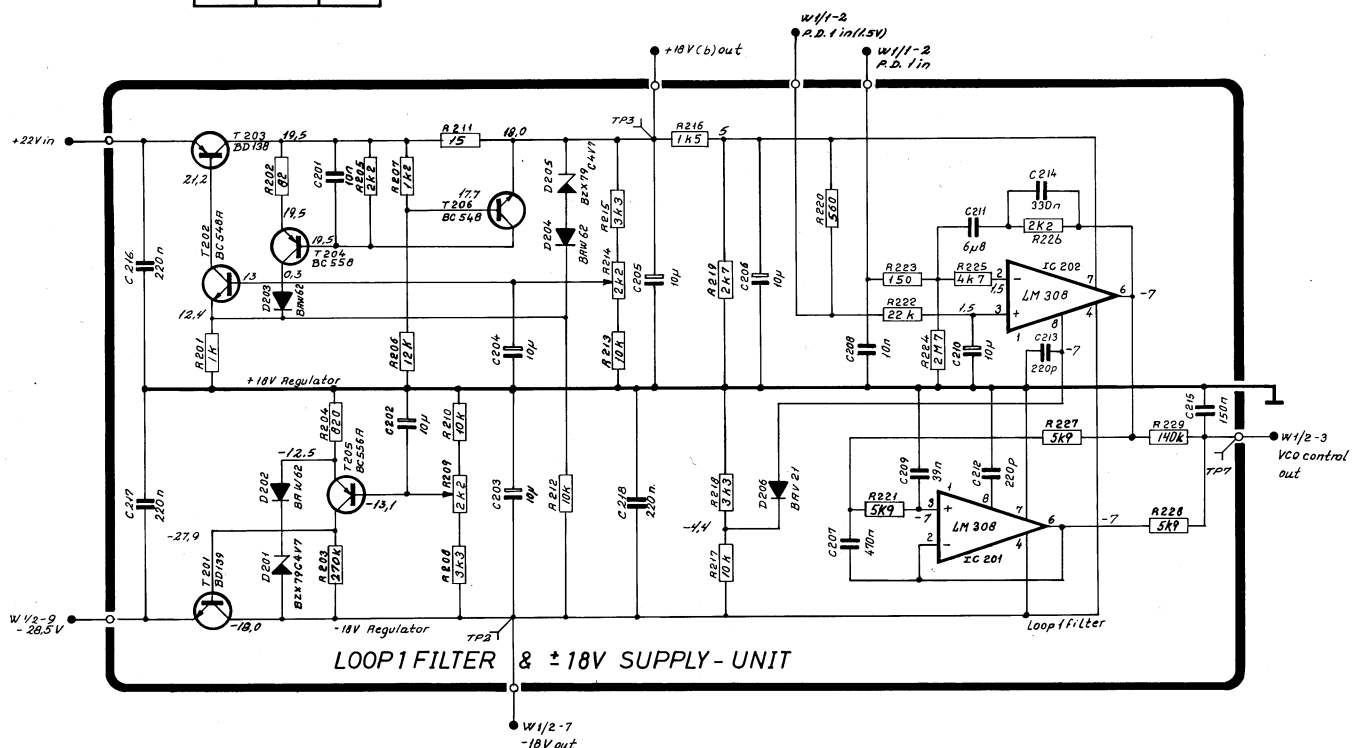
TP: Testpoints

All voltage statements are typical

D2/2 S130X 4-0-21635D
4-6-21635D/4-0-21995A



	S130X	R11XX S130XA
R203	270 k Ω	150 k Ω
R211	15 Ω	10 Ω



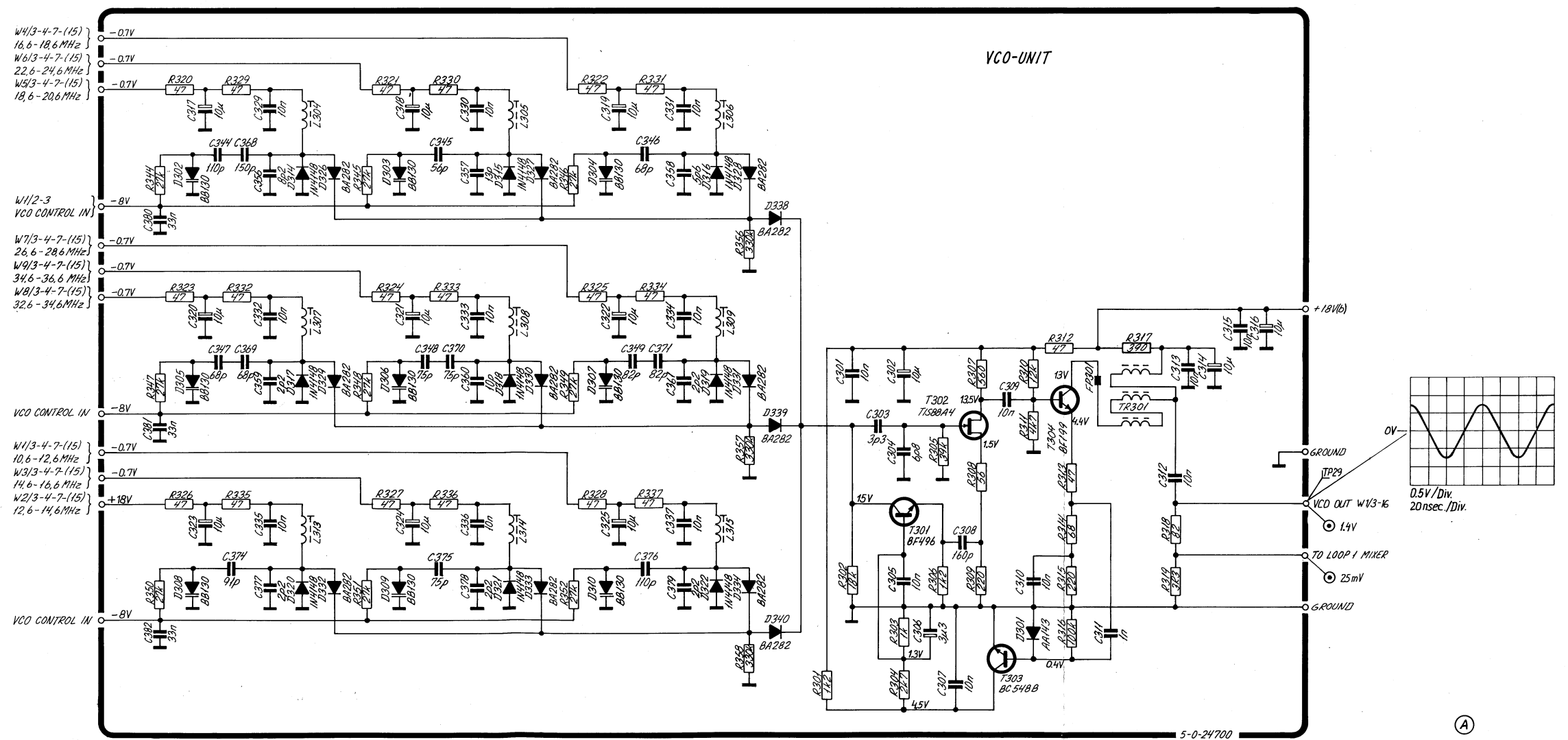
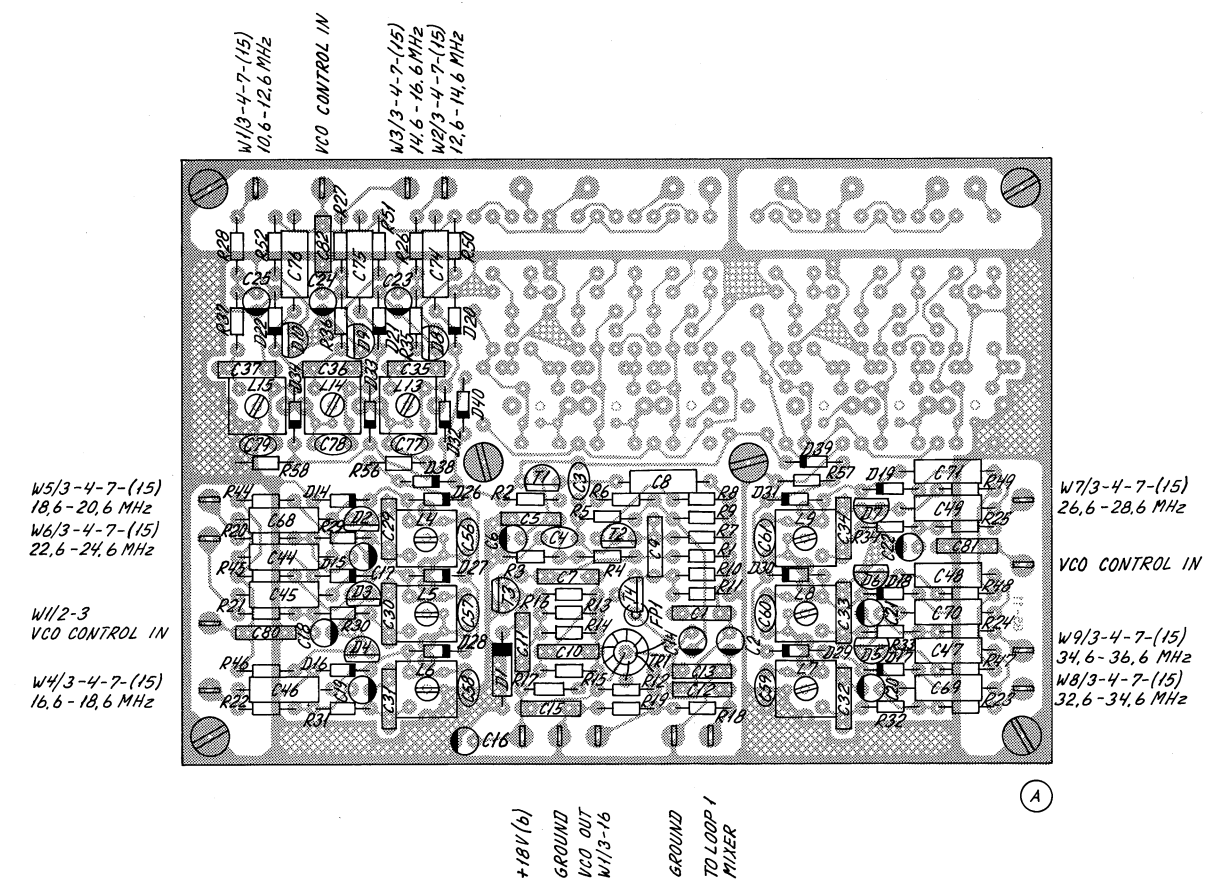
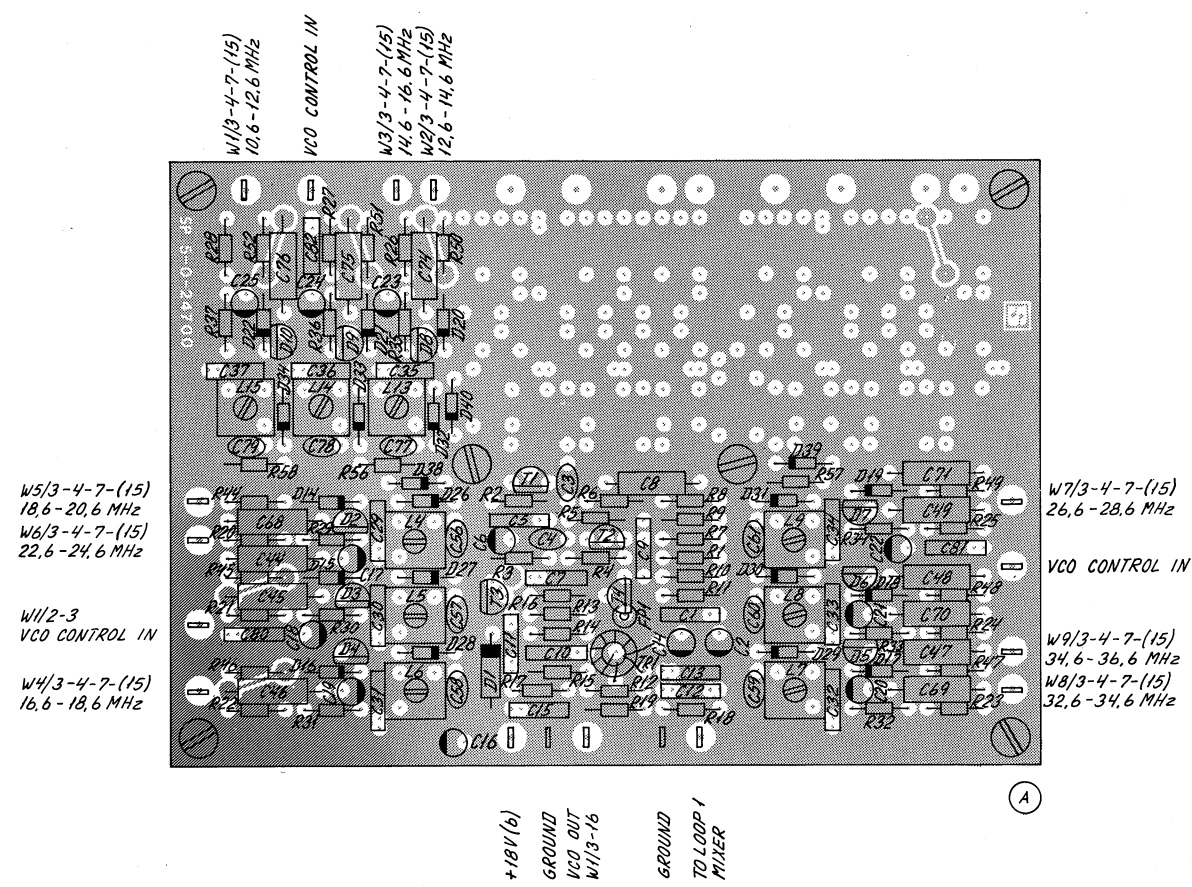
MODULE 200
LOOP 1 FILTER & ± 18V SUPPLY

CIRCUIT DESCRIPTION FOR VCO-UNIT S13XX

The VCO-unit comprises a common active negative resistance transistor-circuit and 9 parallel tuned circuits, which can be connected to the first mentioned circuit - one at a time - by means of diode switches. The negative resistance is generated by means of the feed-back around T301 and T302. When a parallel tuned circuit is connected to the collector of T301 by means of a pair of band switching diodes D326 to D334 and D338 to D340, the circuit will oscillate. Each coil section will cover an output frequency range of 2 MHz.

The frequency of oscillation can be varied by means of the VCO-control input via the appropriate variocap. diode D302 to D310. The appropriate coil L304 to L315 is adjusted to give the maximum output frequency in the selected 2 MHz band for a control voltage of $\pm 15V$. When the output frequency is varied 2.0 MHz for each coil section the control voltage will change about 6 to 9.5 Volts.

The AC amplitude level at the tuned circuit and also at the buffer output port is kept constant by means of an ALC-circuit. The output level is sensed at R314 by the level detector C311, R316, and D301. Via T303 and R301 the DC-current and so the gain in T301 are regulated to give a constant output amplitude from the buffer amplifier built around T304. The DC-level at the collector of T303 will be able to vary between about 4.5V and 10.5V over the entire frequency range. The output level will be about 1.4V_{pp} at C312 and about 50 mV_{pp} at the top of R319.



VCO UNIT (MODULE 300)

CIRCUIT DESCRIPTION HARMONIC FILTERS S130X

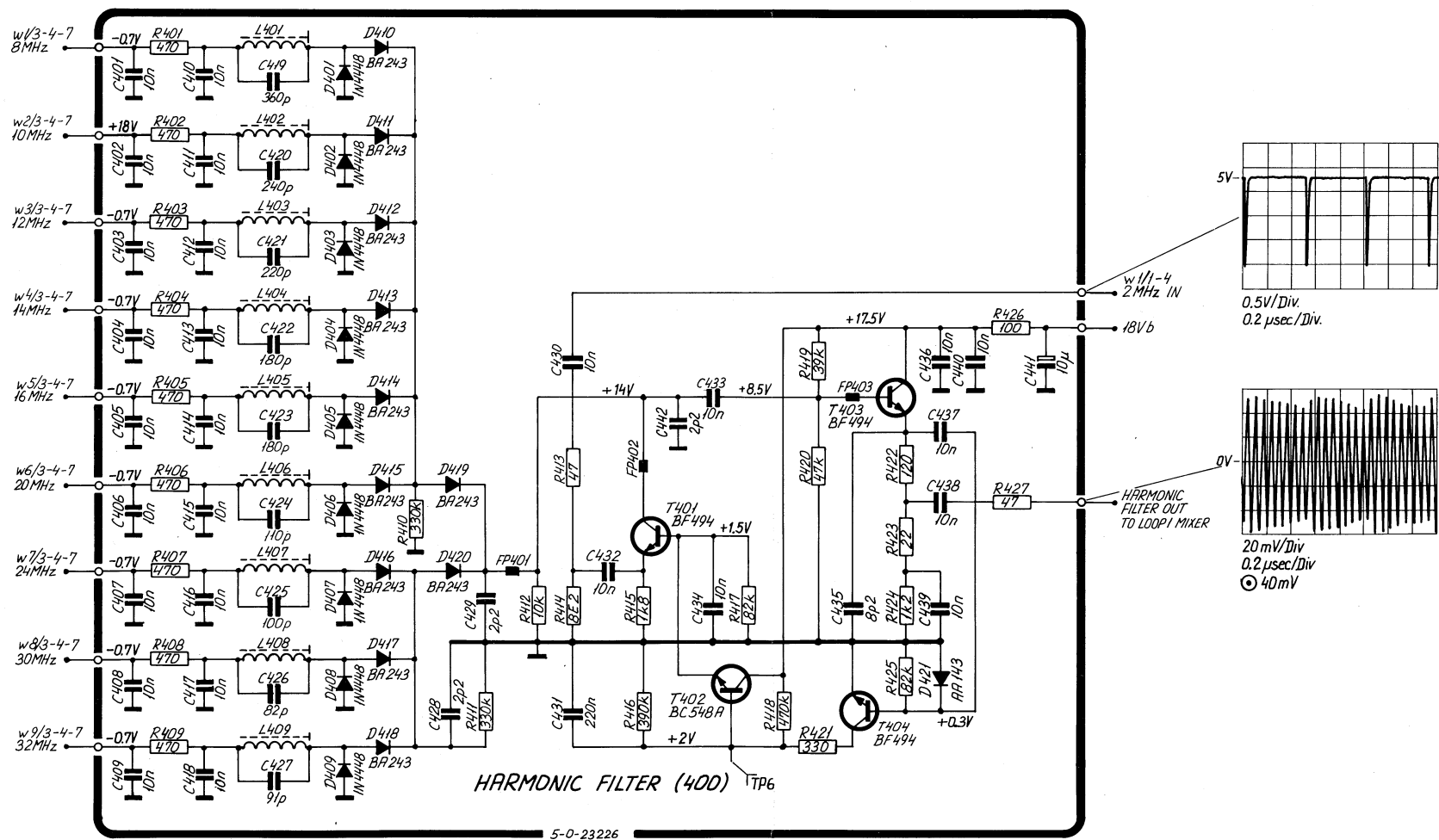
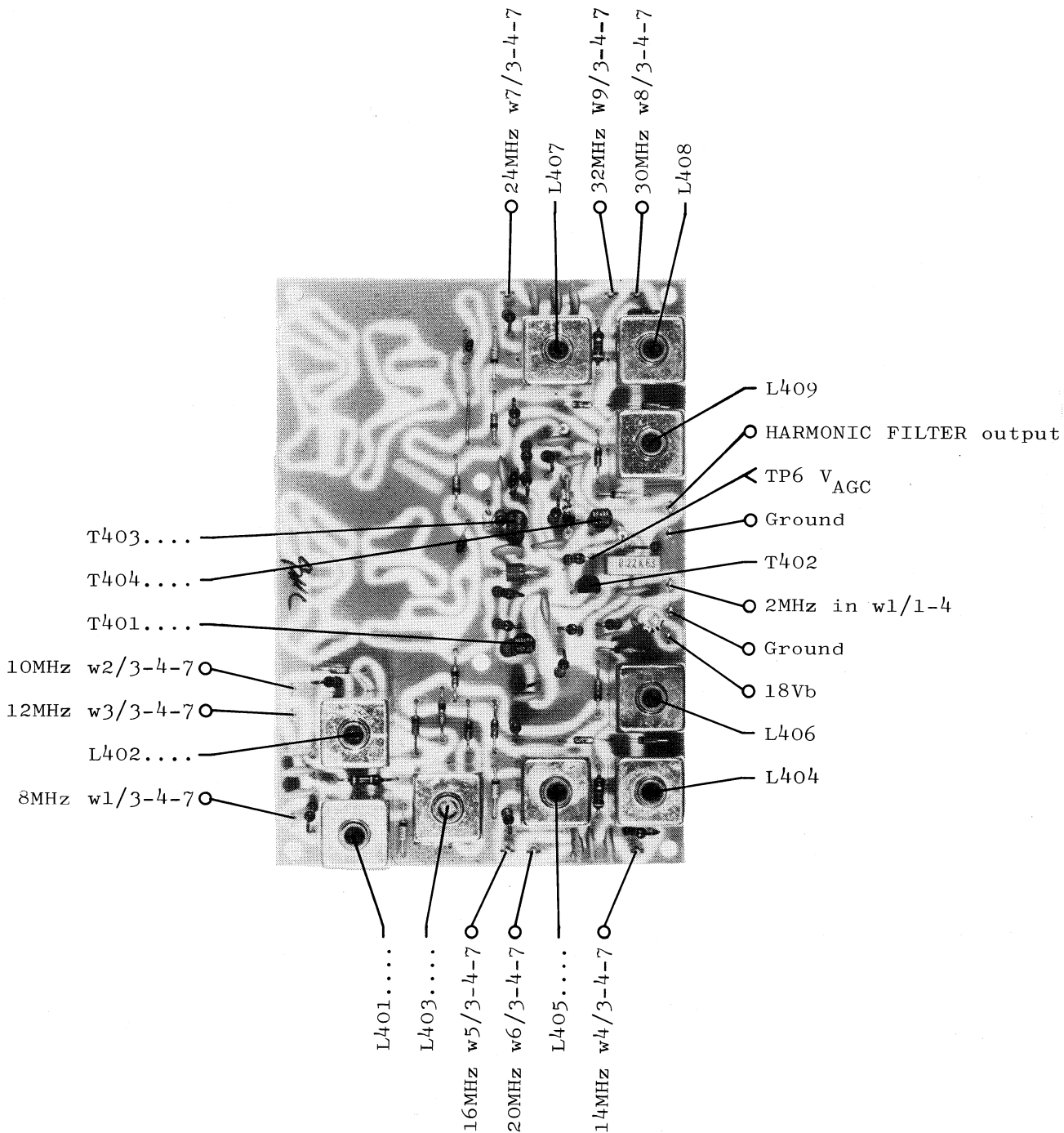
This unit consists of nine tuned LC-circuits which are switched in and out by the diodes D410-D420, and an automatic gain controlled amplifier.

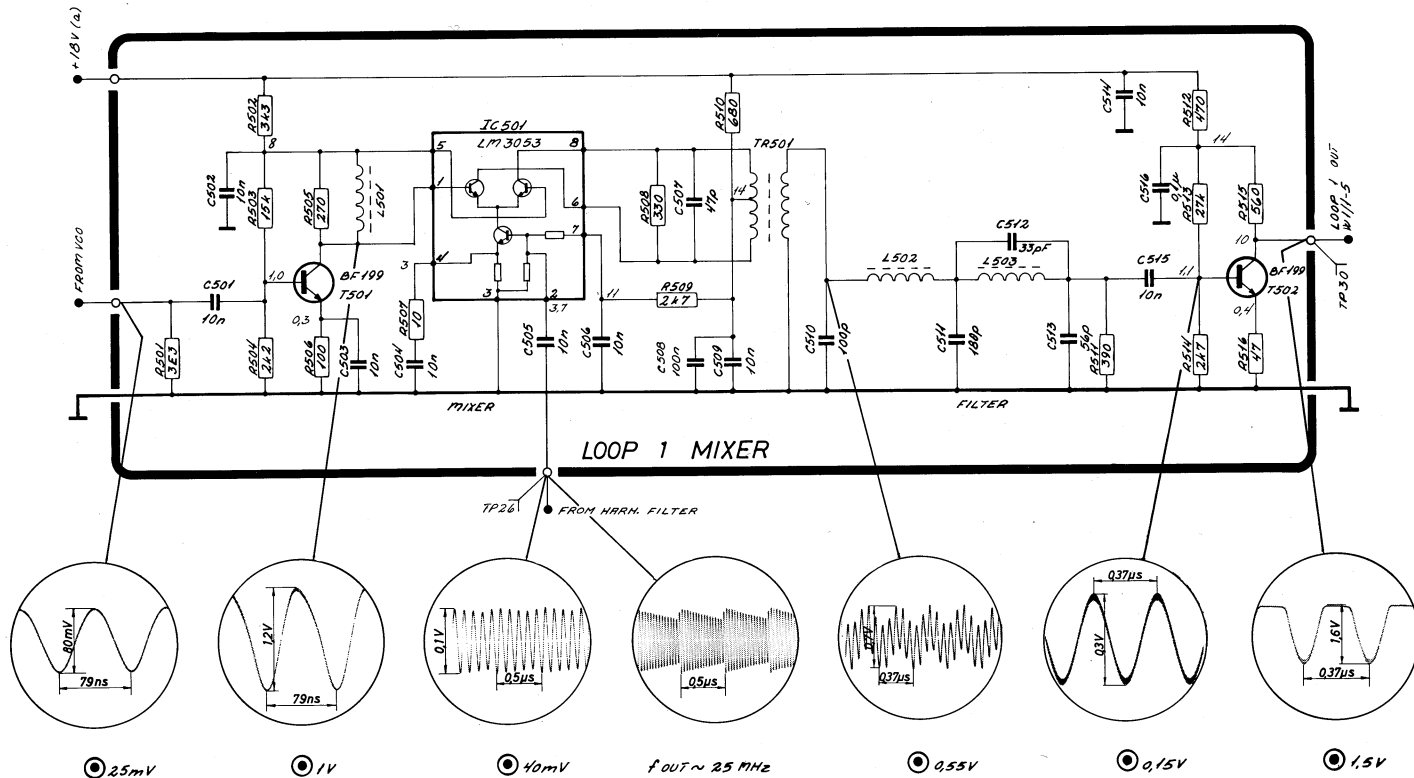
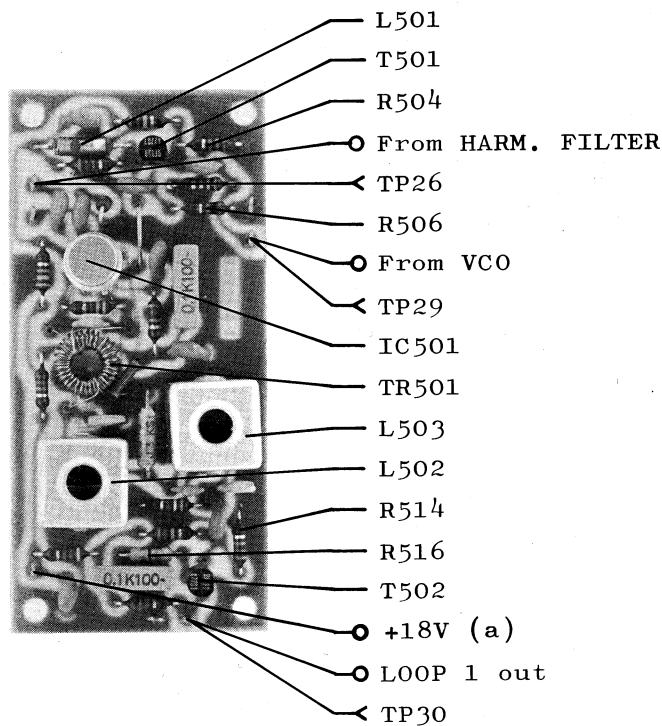
The circuit receives signal from the 2 MHz spectrum generator located on the divider board, and the selected LC-circuit together with T401 filters out and amplifies the wanted harmonic of the input signal. The collector signal of T401 is then fed to the emitter follower T403.

The output voltage of the emitter follower is detected by D421, T404 and C437. Through T404, R416, R418, R421 and C431 the AGC-voltage is generated via T402 this voltage regulates the gain in T401 to maintain constant output voltage of the filter.

TEST CONDITIONS

- Frequency selector : 1A (f = 2.0005 MHz)
- Oscilloscope input : passive probe 10 Mohm//11 pF
- DC voltmeter input : 10 Mohm
- ⊙ : Diode probe measurements
- TP : Testpoints
- All voltage are typical





CIRCUIT DESCRIPTION VCXO & LOOP 2 FILTER S130X

This unit contains the integrator and loop filter for loop 2, the voltage controlled crystal oscillator (VCXO) and the loop 2 mixer.

LOOP 2 FILTER

The integrator is built up around IC601 the integration capacitor is C605. R601 feeds current into the diode coupled Darlington pair in the phase comparator MC4044 on the divider board to make the 1.5V reference. Output from the integrator pin 6 on IC601 is fed into the low-pass filters R607, C607, R609 and C606 to filter out the 100 Hz ripple from the phase comparator. From the low-pass filter the control voltage is fed via R615 into the VCXO.

VCXO

The VCXO is built up around the FET T601. The oscillator is an ordinary Hartley oscillator with a crystal in the feed-back path. The crystal is tuned with the varicaps D601 and D602 to carry out the voltage control of the frequency. The output from the VCXO to first mixer is taken from the tap on the coil L601. From the source a portion of the oscillator signal is taken to the loop 2 mixer.

LOOP 2 MIXER

As mentioned above the VCXO signal is fed into the base of mixer transistor T602 via R610. 10 MHz from the TCXO are applied to the same base via R619. Because of the big difference between the two oscillator frequencies and the wanted output frequency the only filtering needed to filter out the wanted frequency product is R621 and C616. The mixer transistor feeds into the output amplifier T603.

TEST CONDITIONS

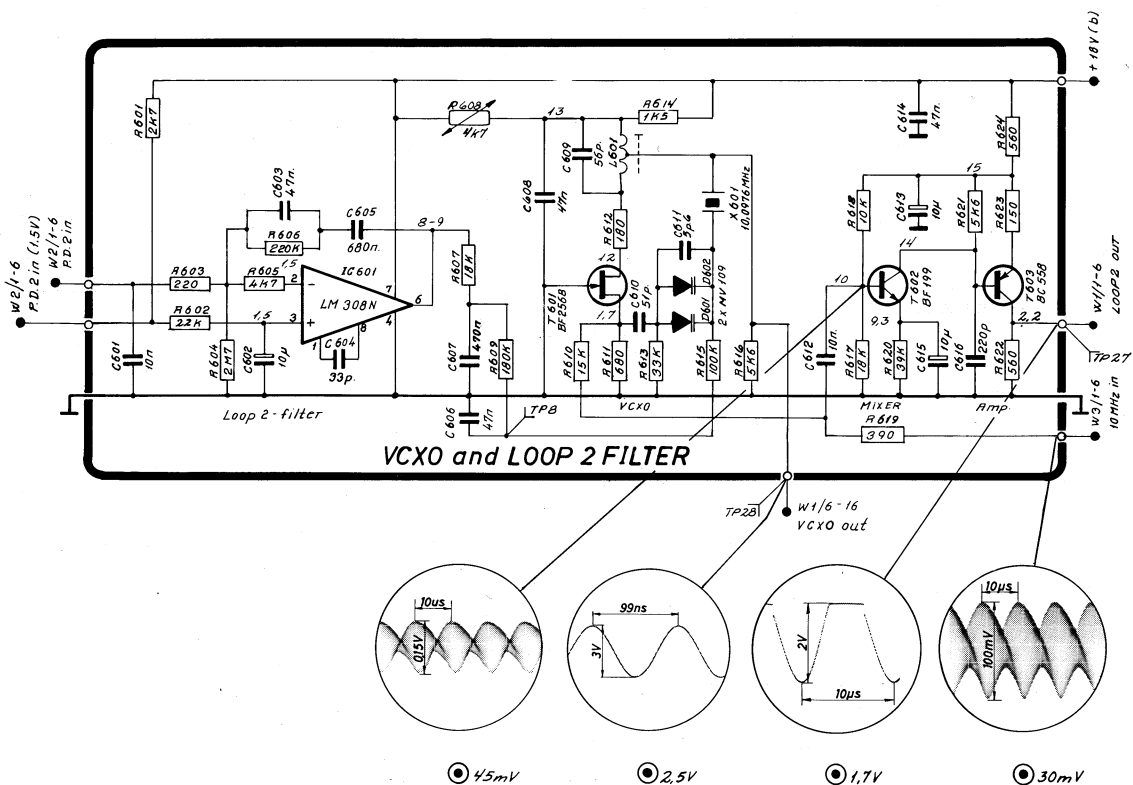
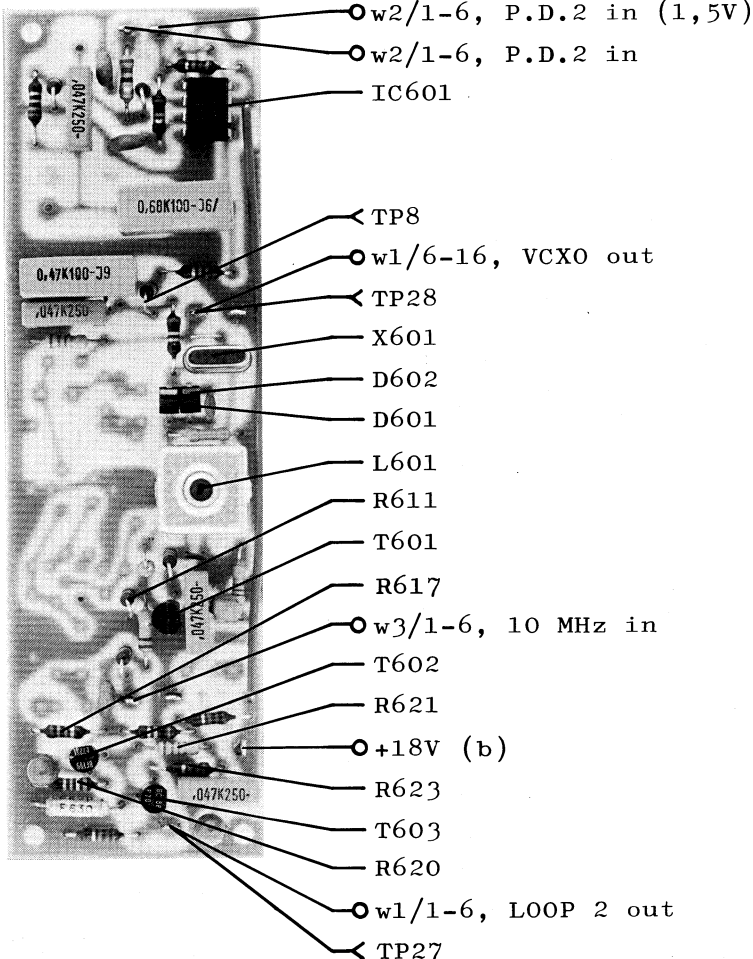
Frequency selector : 1A (f = 2.0005 MHz)
Oscilloscope input : Passive probe 10 Mohm/11 pF
DC voltmeter input : 10 Mohm

⊙ : Diode probe measurements

TP: Testpoints

All voltage statements are typical

C2/2 S130X 4-0-21622A



CIRCUIT DESCRIPTION MOTOR CONTROL UNIT S1300

SELECTION OF THE FREQUENCY BANDS IN TRANSMITTER T1127.

This unit contains the control circuits for the band selection in T1127 and S1300, output power and power supply ON/OFF.

The transmitter T1127 has a 19 position drum switch driven by a step-motor. For each position a five bit code (S,R,Q,P,O) is generated.

The FREQUENCY SELECTOR in the exciter is programmed with a code for the 19 bands corresponding to the code from the transmitter. The two codes are compared and if the codes are unequal the step-motor runs and for equal codes the step-motor stops.

From the FREQUENCY-SELECTOR the transmit band code (ZYXV), the MHz code (A) and the 100 kHz code (DCB) are delivered to MOTOR CONTROL UNIT. In the first six MF bands the DATA SELECTOR IC702 transfers the MHz code (A) and 100 kHz code (DCB) to the comparator IC703a,b,c,d and IC704c. In all other bands the DATA SELECTOR IC702 transfers the transmit band code (ZYXV) to the comparator IC703a,b,c,d and IC704c.

The information from the comparator is inverted in IC704b and via IC705c to T714 which controls the step-motor. IC705b stops the information if the decimal code of (ZYXV) is 15 or 0 indicating that no programming strip or an unprogrammed one is mounted. This information is also fed to IC705a and T715 in order to block the power supply. The information that the step-motor is running and the POWER ON/OFF information are fed to IC705a and T715 in order to block the power supply.

SELECTION OF VCO AND HARMONIC FILTER

For each 2 MHz band a VCO and a HARMONIC FILTER are used. To cover the MF and HF maritime band 9 VCO's and HARMONIC FILTERS are used.

From the FREQUENCY SELECTOR the transmit band code (ZYXV) is fed to the 4 to 16 Line Decoder IC707 and the MHz code (A) are fed to the Majority Logic IC706a.

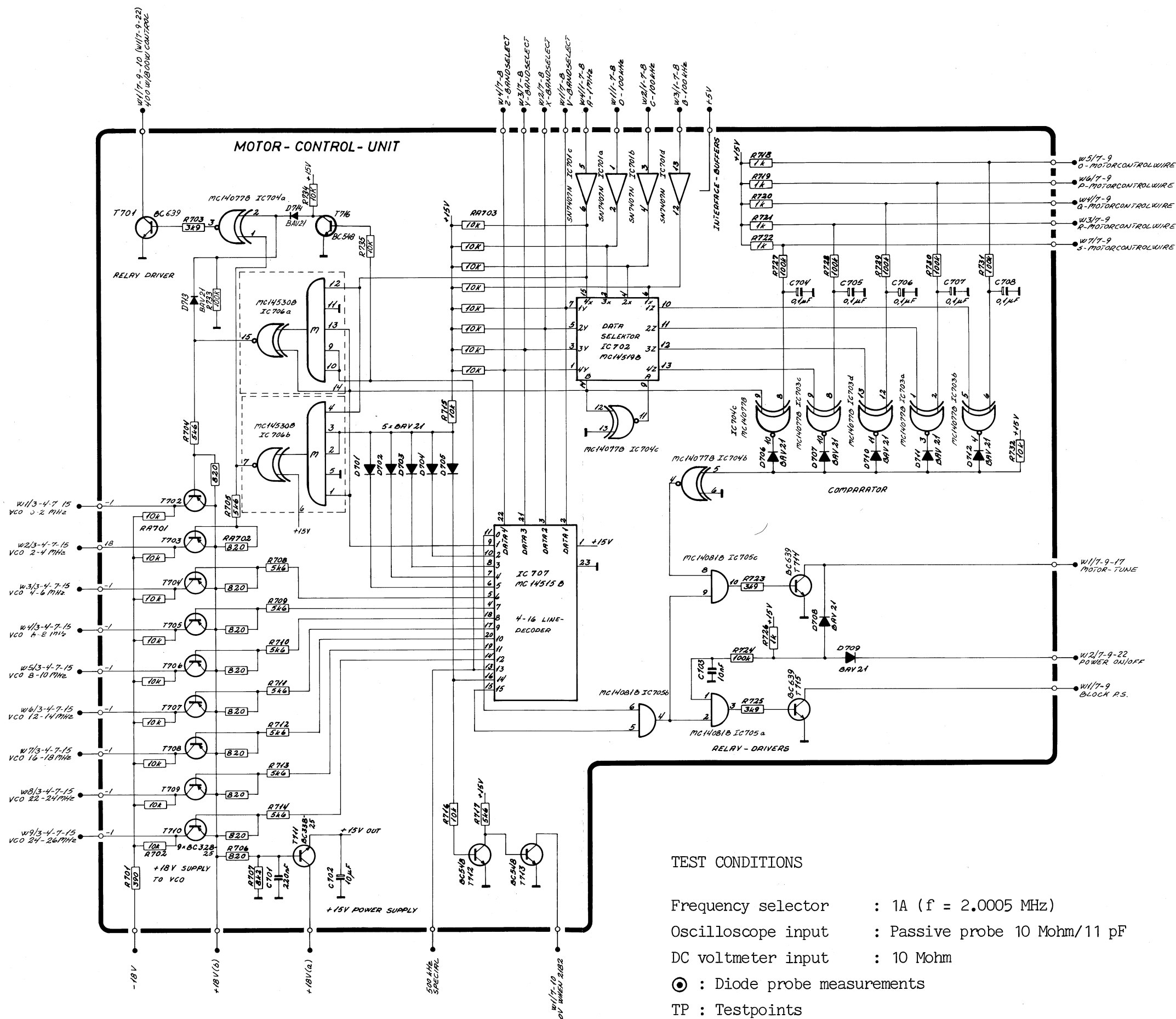
For the two frequency bands from 1.6 - 2.0 MHz the MHz code (A) controls the Majority Logic IC706a to switch on the transistor T702, and thus selects the 0 - 2 MHz VCO.

For the four frequency bands from 2.0 - 2.9 MHz the MHz code (A) controls the Majority Logic IC706b to switch on the transistor T703, and thus selects the 2 - 4 MHz VCO.

For the four frequency bands from 2.8 - 4.0 MHz the transmit band code (ZYXV) activates the outputs from 2 - 5 on the 4 to 16 Line Decoder IC707. These outputs controls the Majority Logic IC706b to switch on the transistor T703 and thus selects the 2 - 4 MHz VCO.

For the 7 HF bands the transmit band code (ZYXV) activates the outputs from 6 to 12 on the 4 to 16 Line Decoder IC707. These outputs switch on the transistors T704 to T710 in order to select the corresponding VCO's 4 - 6 MHz, 6 - 8 MHz, 8 - 10 MHz, 12 - 14 MHz, 16 - 18 MHz, 22 - 24 MHz and 24 - 26 MHz.

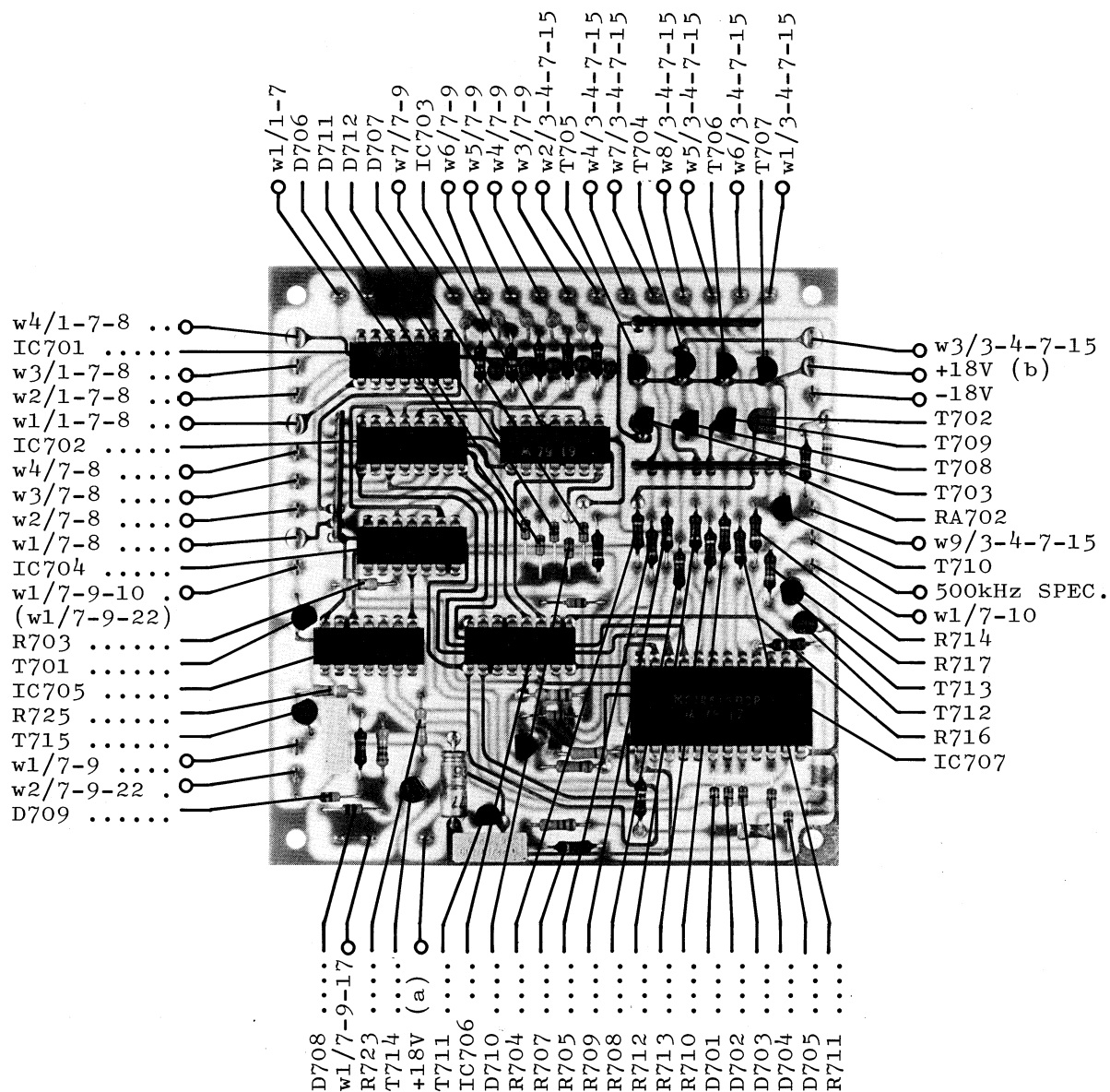
For the 2182 MHz band the transmit band code (ZYXV) activates output 14 on the 4 to 16 Line Decoder IC707. This output switches on the transistor T703 via the Majority Logic IC706b and thus selects the 2 - 4 MHz VCO. The output 14 on IC707 is fed through T712 and T713 to indicate that 2182 kHz is selected.



For the 500 kHz band the transmit band code (ZYXV) activates output 13 on the 4 to 16 Line Decoder IC707. This output switches on the transistor T702 via the Majority Logic IC706b and thus selects the 0 - 2 MHz VCO.

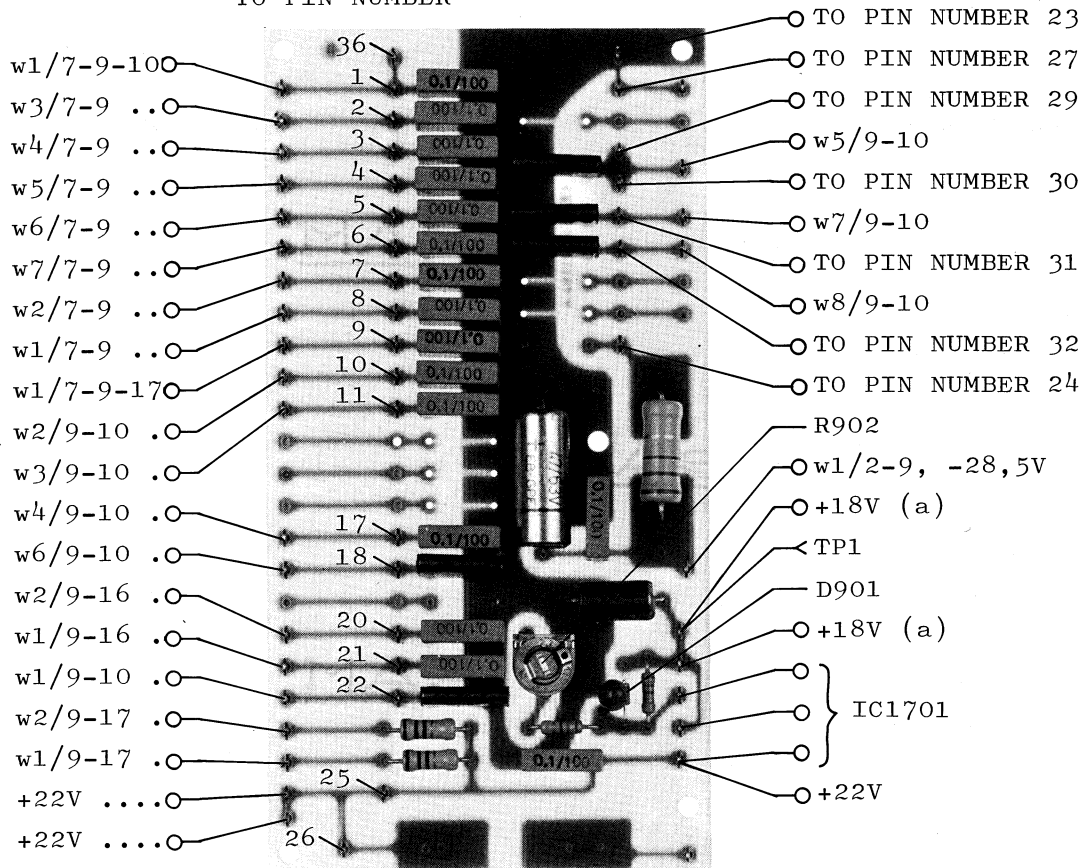
400W/800W CONTROL

In the MF band from 1.6 - 4 MHz the output power must not exceed 400W PEP. The information that a frequency below 4 MHz is selected is fed from the outputs on the Majority Logics IC706a and IC706b to the IC704a and T701.



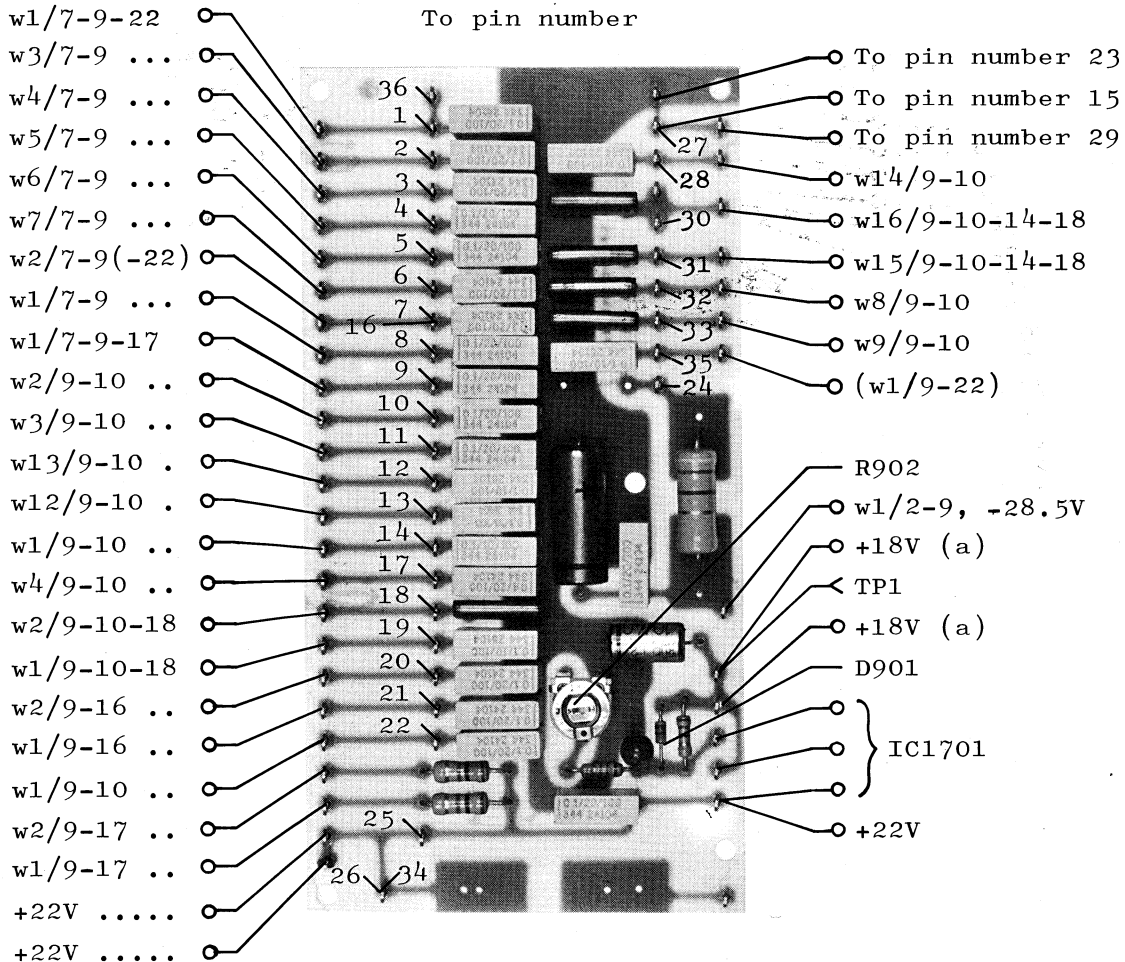
Notation in brackets: Only in S1301

TO PIN NUMBER

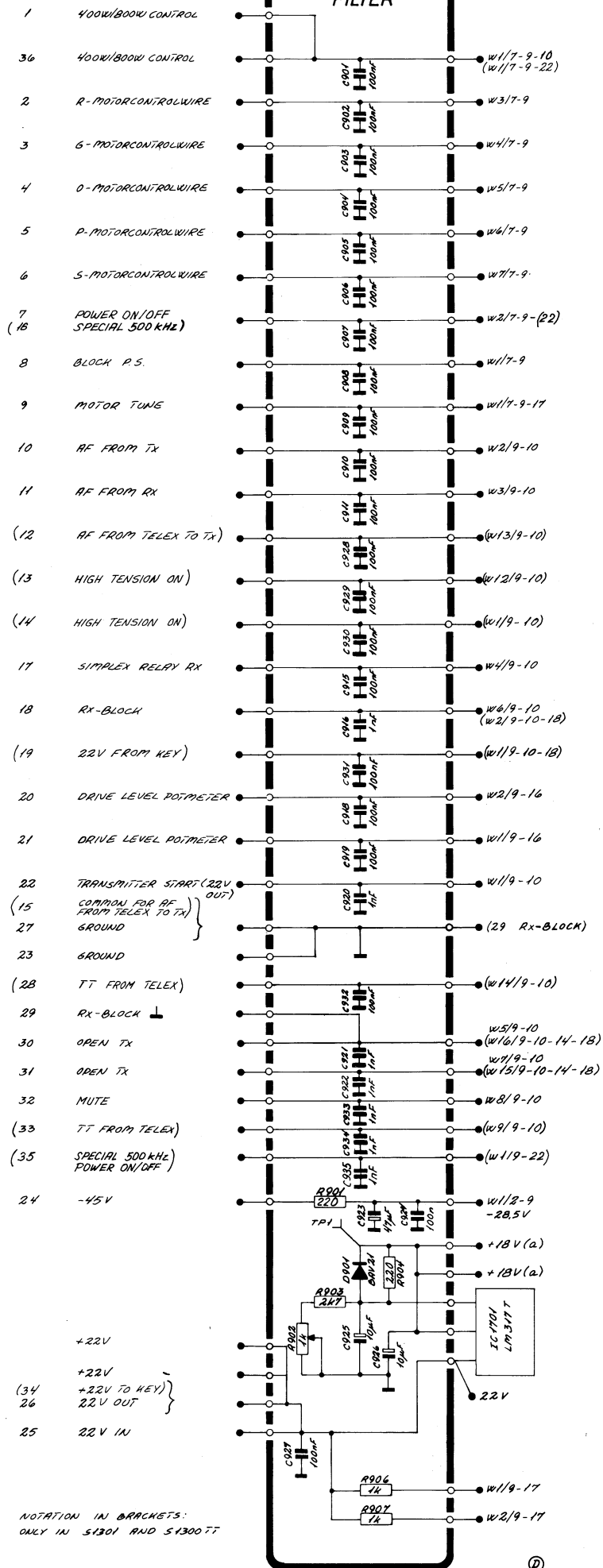


S1301

To pin number



TO PIN NUMBER



CIRCUIT DESCRIPTION SSB GENERATOR S130X

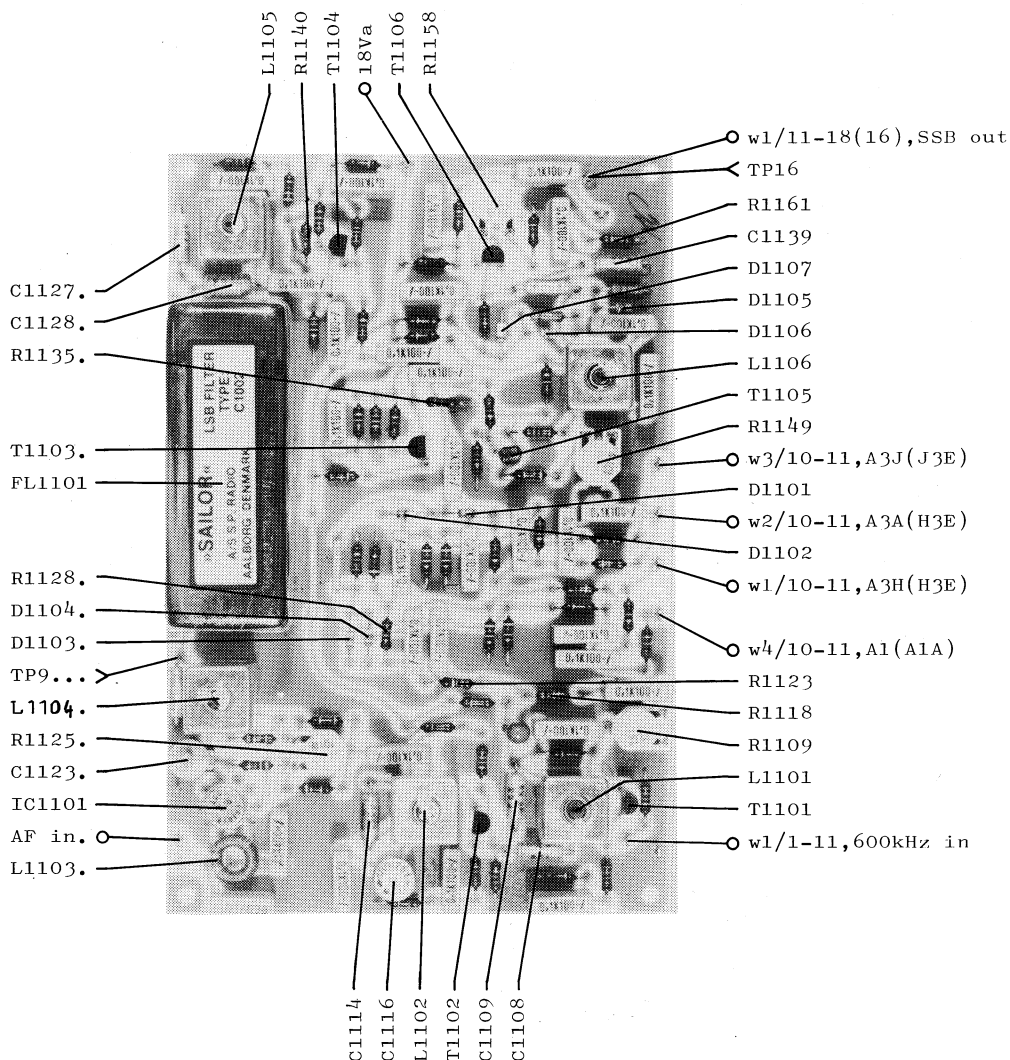
In this unit the required types of signals are generated A3A (R3E), A3H (H3E), A3J (J3E) and A1 (A1A).

SSB GENERATOR

The 600 kHz carrier signal from the divider unit is fed to the tuned amplifiers T1101 and T1102. From the collector of T1101 the 600 kHz signal is fed to the carrier reinsertion circuit. From the collector of T1102 the carrier signal is fed to the double balanced modulator IC1101, which also receives the AF signal from the microphone amplifier. The output from IC1101 is a double sideband signal, which is fed through the single sideband crystal filter for removing of the carrier and the upper sideband. The resulting lower sideband signal is fed through the impedance matching coil L1105 to the basis of transistor T1104, where the lower sideband signal and the wanted carrier voltage is added. The signal is now fed through the output amplifier consisting of T1105 and T1106 to the SSB output terminal. The amplifier T1105 and T1106 are working as a signal limit amplifier, where the maximum output voltage is controlled of the zener diode D1107 and the diodes D1106, D1105.

CARRIER INSERTION

The 600 kHz carrier signal from the collector of T1101 is fed to the voltage divider R1109, R1118, R1123, R1128 and R1130. The wanted carrier level is controlled by a DC voltage fed to one of the diodes D1101, D1102, D1103 and D1104.



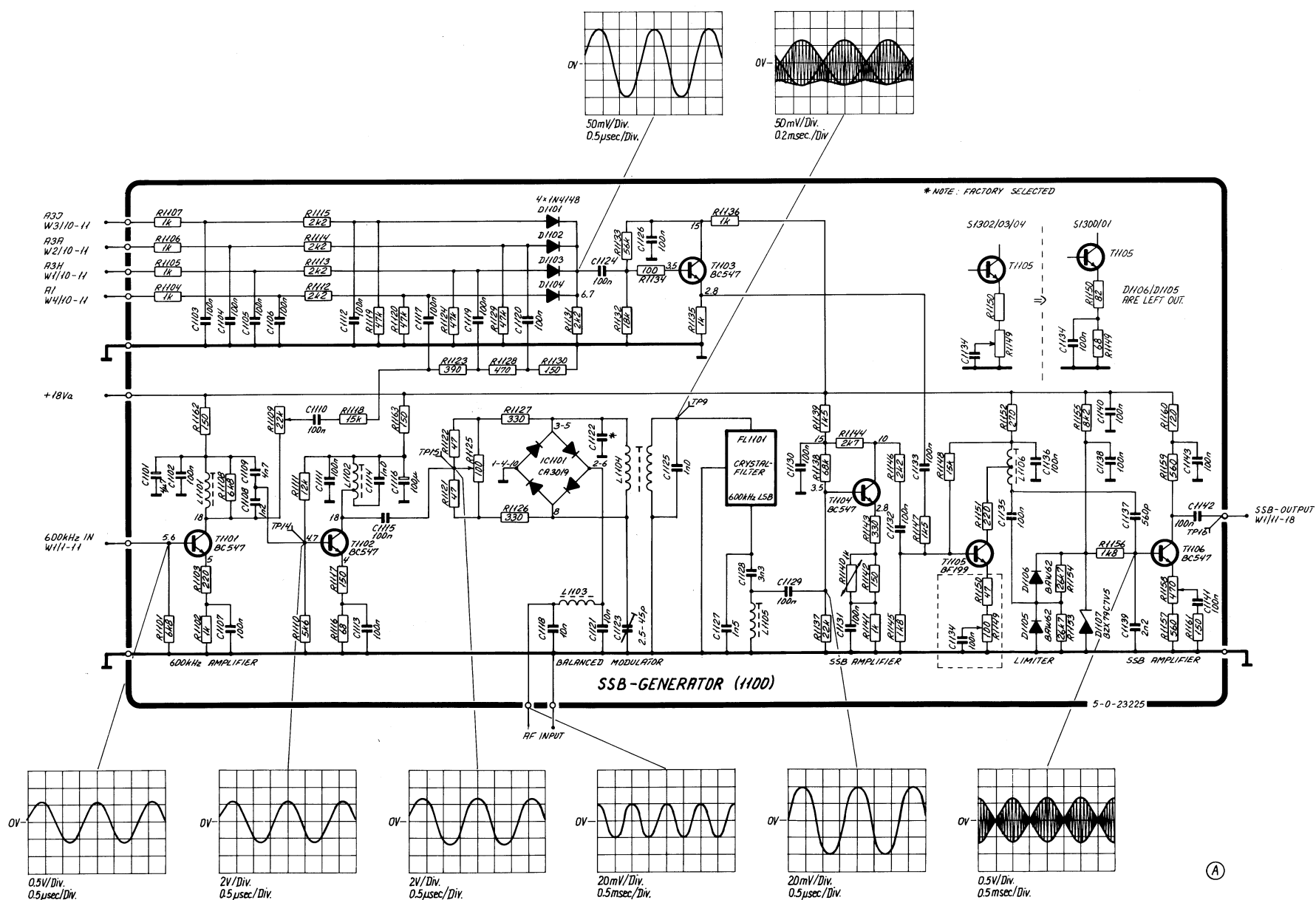
TEST CONDITIONS

Frequency selector: 1A ($f = 2.0005 \text{ MHz}$)
 Mode: A3H
 AF input 1 kHz: 3 Vpp (serial condenser) } via microphone plug
 KEY: ON
 Oscilloscope input: Passive probe 10 Mohm//11 pF
 DC voltmeter input: 10 Mohm

⊙ : Diode probe measurements

TP: Testpoints

All voltage statements are typical



CIRCUIT DESCRIPTION MICROPHONE AMPLIFIER S130X

This unit generates and processes all the AF signals used in normal operation.

COMPRESSOR

The AF signal is after level regulation in R1201 fed into a voltage divider R1204, R1205 and then the FET T1202 acts as an electronically variable attenuator. The amount of attenuation is controlled by the voltage applied to the gate of the FET T1202.

The FET T1202 is biased in the off condition by 5.1V from zenerdiode D1202, with no control voltage applied to the gate. Under these conditions no attenuation takes place. With a control voltage of 5.1V applied to the gate, max. attenuation is obtained.

The electronically controlled attenuator is used to keep the output across the FET T1202 constant independent of speech volume, so performing a compressor action.

The control voltage already mentioned is derived from the very same signal, across the FET T1202 after amplification by T1203 and T1205. The output is taken across R1219 and fed to the level detector system consisting of T1210 and D1205.

As soon as the applied voltage to the base of T1210 becomes sufficiently low (about 4.7V) the collector current in transistor T1210 cuts off. This means that transistor T1208 normally saturated by the collector current of T1210 cuts off, leading to saturation of T1207 with the result that capacitor C1214 is charged very quickly.

The voltage across C1214 is slowly discharged via R1218 and the filter circuit R1211 and C1208 and is applied to the gate of the previously mentioned FET T1202 via R1212.

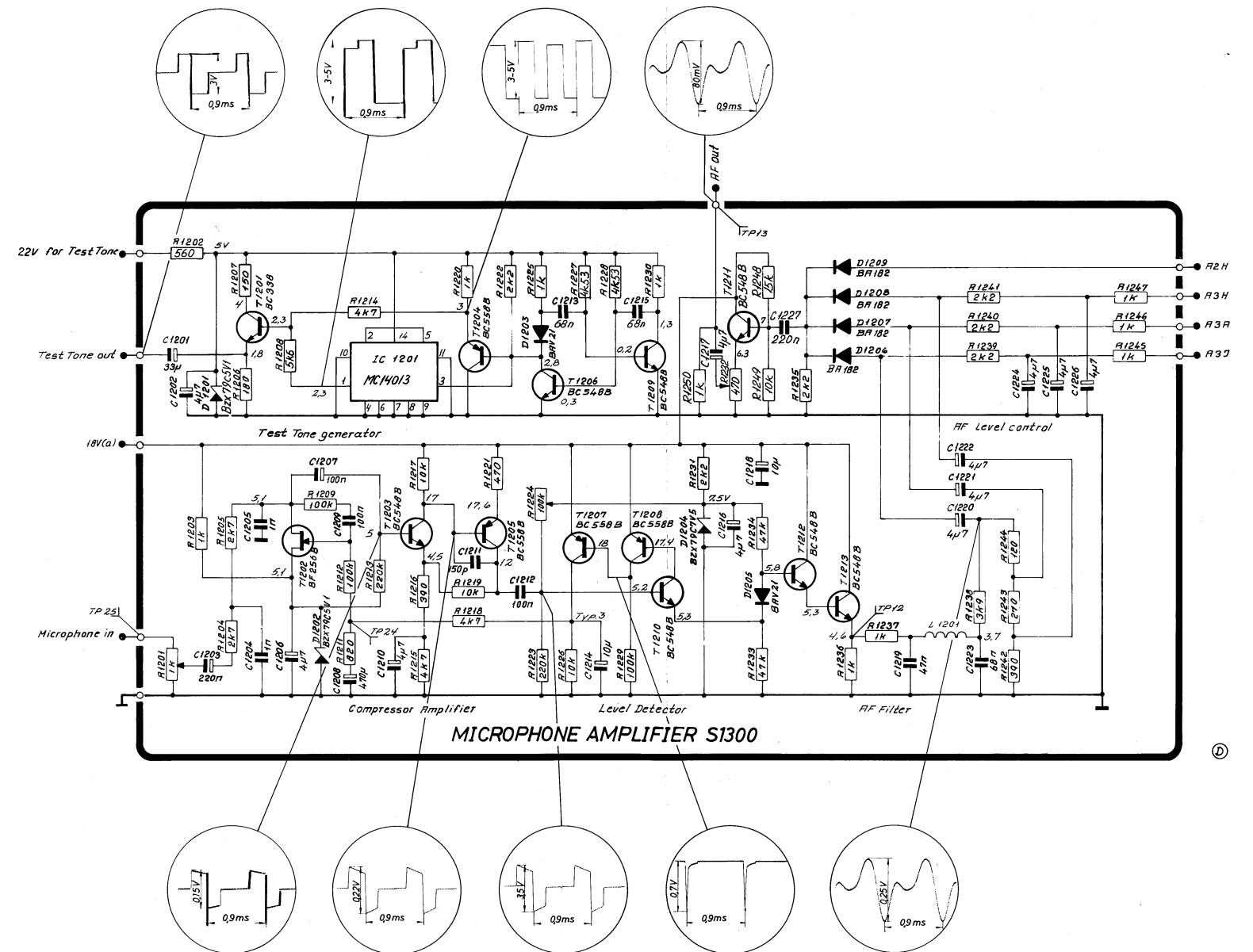
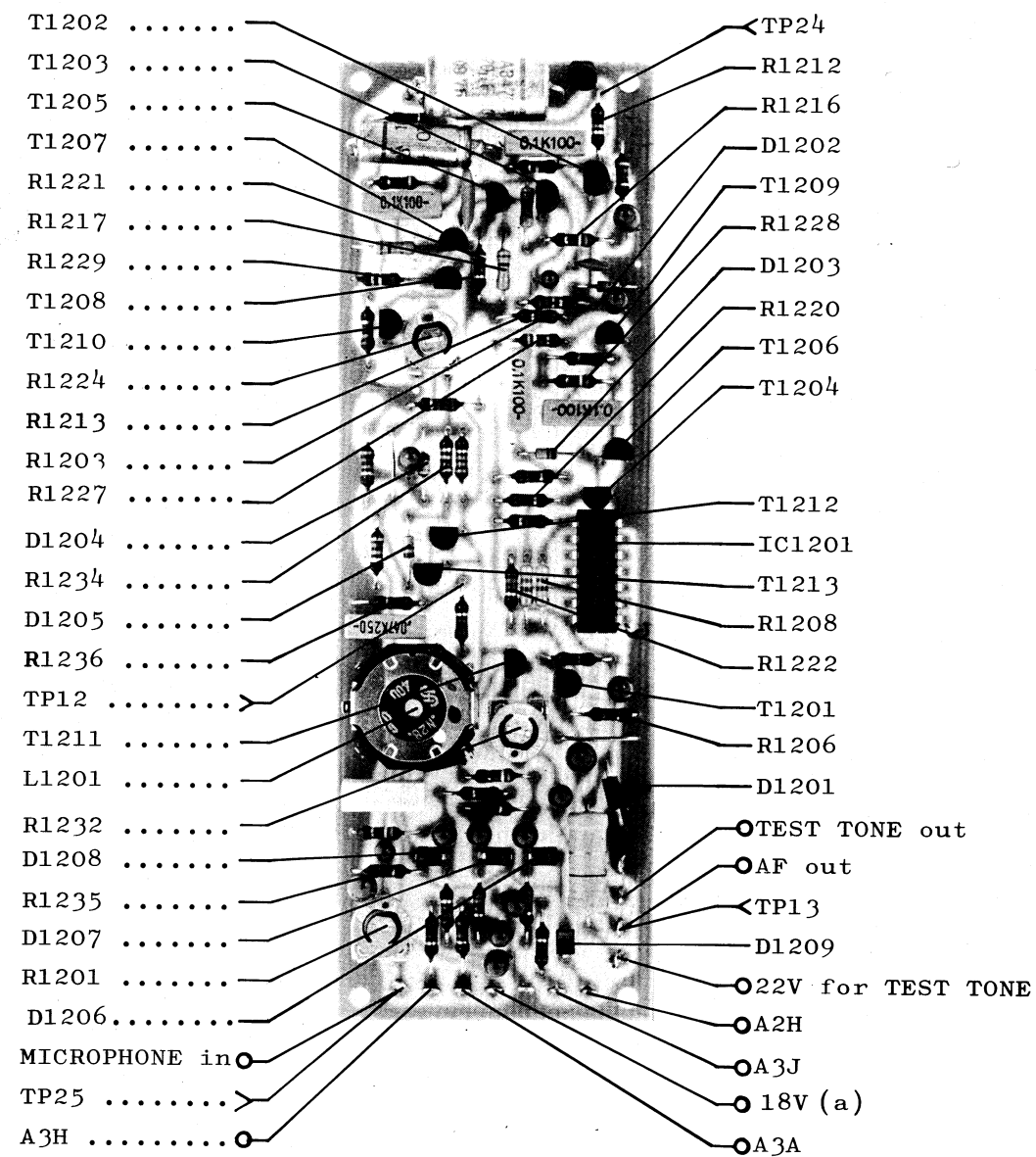
Presence of the control voltage causes the attenuation to increase until the collector current in transistor T1210 is not cut off any more, and a balanced condition is established. The amplified and compressed microphone signal then passes through to an AF filter driven by T1212 and T1213 removing signals insignificant for clarity. The AF signal from the filter is carried to the fixed voltage divider R1238, R1244, R1243 and R1242. The AF voltages from this voltage divider is chosen with the diode D1206, D1207, D1208 or D1209 feeding into the output amplifier.

TEST TONE GENERATOR

The test tone generator is a two-tone generator operating at the frequencies 2400 Hz and 1200 Hz. The multivibrator, composed of T1206, T1209 is oscillating at 2400 Hz, and in the integrated circuit IC1201 this frequency is divided to 1200 Hz, which can be measured on pin 8.

T1204 functions as emitter follower, and the 2400 Hz signal is fed from here via R1214 to the output transistor T1201. The 1200 Hz signal is also fed to T1201 via R1208 and is mixed with the 2400 Hz signal. The mixed signal is supplied to the compressor input during tuning of the transmitter and owing to the presence of the AF filter. Sinewave shaped tones are produced, as the two-tone generator itself delivers square wave voltages.

Mode : TUNE
Oscilloscope input : Passive probe 10 Mohm//11 pF
DC voltmeter input : 10 Mohm
TP: Testpoints
All voltage statements are typical



CIRCUIT DESCRIPTION ALARM SIGNAL GENERATOR S130X

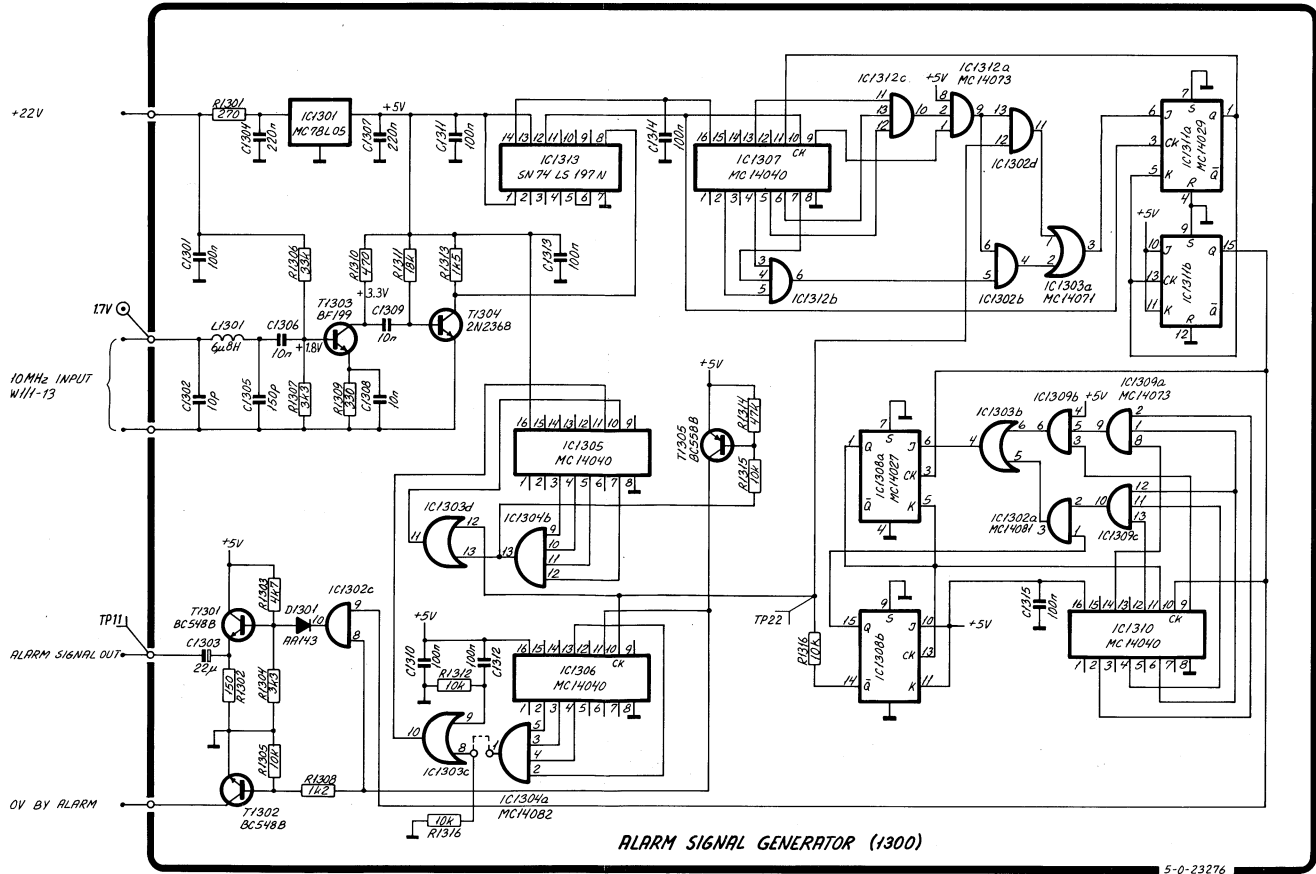
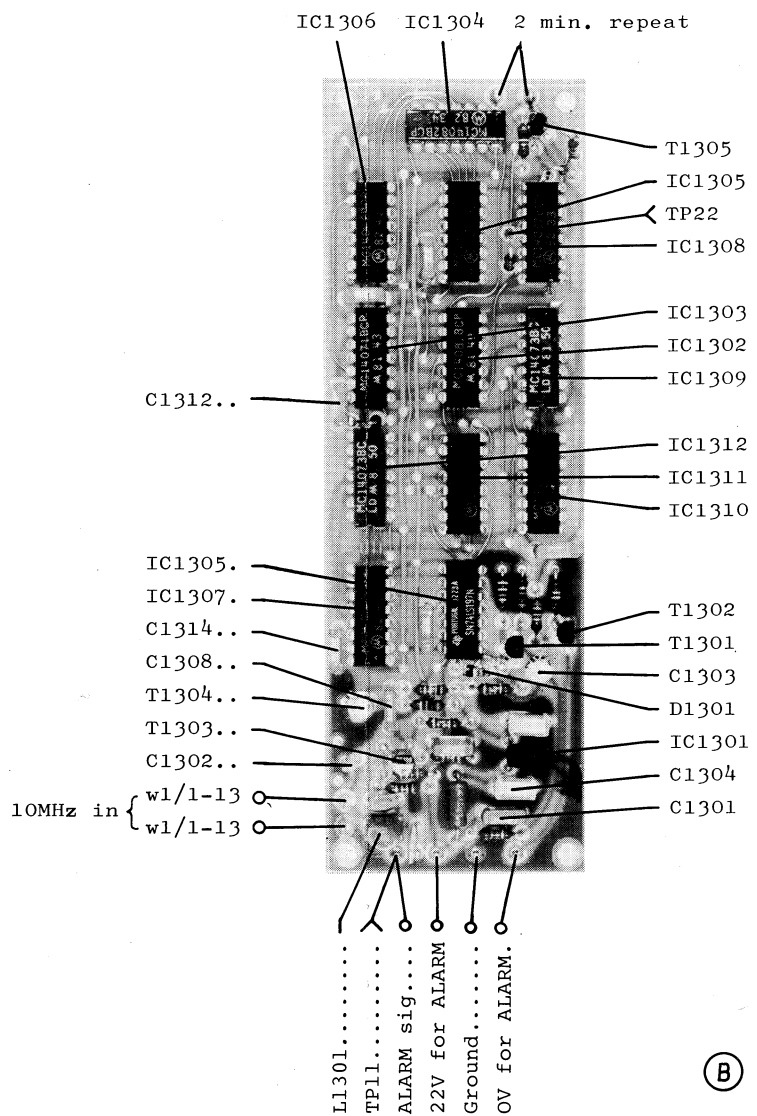
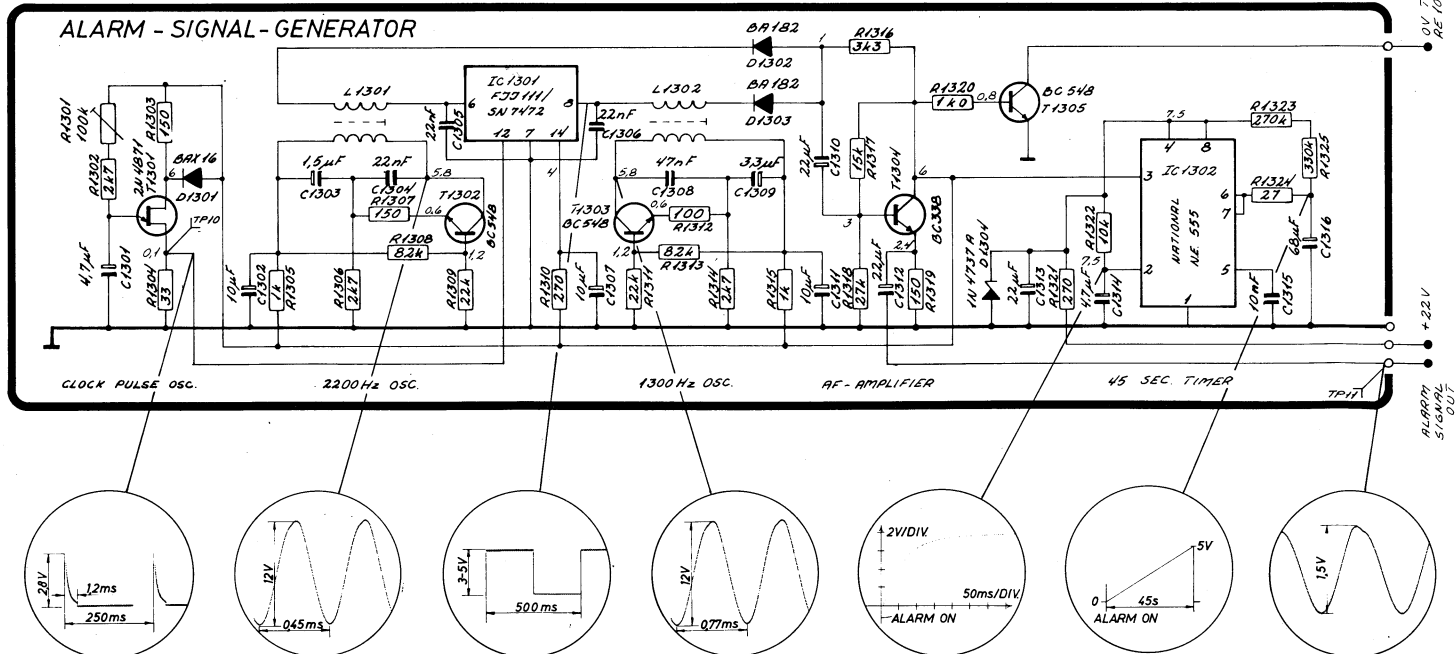
The alarm signal generator creates the alarm signal which consists of 2200 Hz and 1300 Hz - tones, which are transmitted in 45 secs alternately with intervals of 250 msecs. Additionally it is possible to strap the generator to repeat the alarm signal transmission after a 2 minutes pause.

The alarm tones are generated by dividing down the 10 MHz TCX0 signal to the wanted frequencies. The generator starts when the 22V supply is applied. T1303 and T1304 amplify the 10 MHz signal to TTL level. IC1313 is a 16 divider and its output on 625 kHz is fed to the programmable divider consisting of IC1307, IC1312, IC1302b, IC1302d, IC1303a and IC1311. Pin 9 of IC1312a goes high when IC1307 has received 141 clock pulses. If pin 12 of IC1302d is high (2200 Hz) the J input of IC1311a follows the output of IC1312a and then the FF 1311a will toggle on the next clock pulse. This clears the counter IC1307, now J and K input of IC1311a is "0" and "1" which will let it toggle on the next clock pulse and then the counter IC1307 will start counting again.

The timing is shown on fig. 1. After a division by two in IC1311b the output at pin 15 will be 2200 Hz which occurs like this $625000/(141+1)2 = 2200$. When the wanted frequency is 1300 Hz, pin 12 on IC1302d must be "0" and then the J input on IC1311a will not be "1" before the output of IC1312a and IC1312b both are "1". When this happens the amount of clock pulses to IC1307 is $141 + 98 = 239$ (141 detected by IC1312a and 98 detected by IC1312b). The dividing figure from clock input of IC1307 to Q output of IC1311b is $(141 + 98 + 1)2$ and the resulting frequency is $625000/(141 + 98 + 1)2 = 1302$ Hz. With a mode of operation similar to the before mentioned divider, which generates the 2200 Hz and the 1302 Hz tones, a circuit formed by IC1310, IC1309, IC1302a, IC1303b and IC1308 dividers. These tones down to 2 Hz which means that the output of IC1308b changes state every 250 msecs. The dividing figures detected at the output of IC1309b and IC1309c are 549 and 324 respectively.

This dividing circuit controls both its own dividing figure (IC1308b pin 15) and the dividing figure (IC1308b pin 14) in the circuit which makes the 2200 and 1302 Hz tones. The timing is shown in fig. 1.

When the alarm generator starts by power-up, IC1305 is reset via IC1303c. This turns on T1305 which gates the alarm signal to the ALARM SIGNAL OUT connection. IC1305 counts the 2 Hz pulses from IC1308b and when an amount of 90 is reached (after 45 secs) the output of IC1304b is "1" which stops the clock pulses to IC1305 and turns off T1305 which blocks the gate IC1302C and hereby stops the alarm signal transmission. However the 2 Hz pulses at IC1308b are still running as long as the unit is powered up. When alarm transmission is stopped by T1305, IC1306 is not reset any longer and it will start counting the 2 Hz pulses. After 240 pulses (2 minutes) pin 1 of IC1304a is "1" and if the strap to pin 8 of IC1303c is on, IC1305 will be reset and the alarm signal transmission starts for another 45 secs. If the mentioned strap is present the alarm signal transmission will be repeated for every 2 3/4 minutes, otherwise it is only transmitted for one 45 secs. period.



CIRCUIT DESCRIPTION DRIVER UNIT S1300TT & S1301

The driver unit produces the wanted one watt PEP into a 50 ohm load. The drive signal is applied to the base of T1401 via L1401. Combined with the drive signal the DC current is needed to bring T1401 to proper working point ($I_C = 285 \text{ mA}$). R1401, R1402 and R1403 perform feed-back and L1401 is together with input capacitance of the transistor a frequency compensation. The relay RE1401 interrupts the output signal in receive mode to prevent noise interference.

TEST CONDITIONS

Frequency selector : 1A ($f = 2.0005 \text{ MHz}$)

Power level : FULL

Mode : TUNE

Maximum drive, 50 ohm connected to TX out, J1702

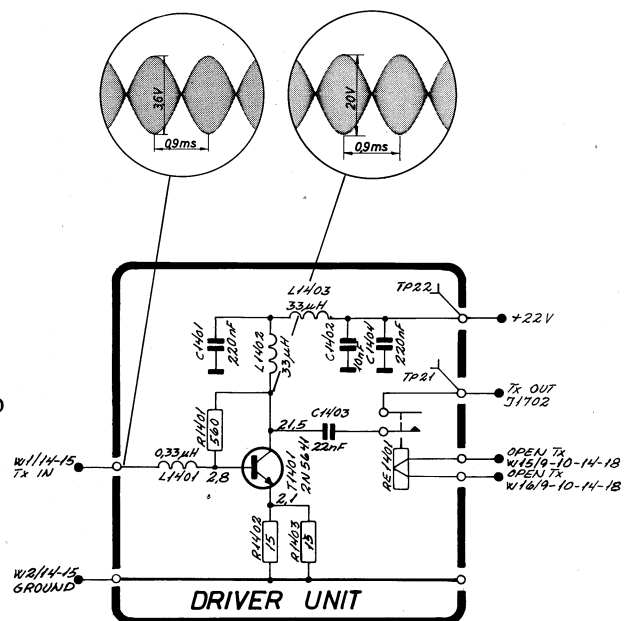
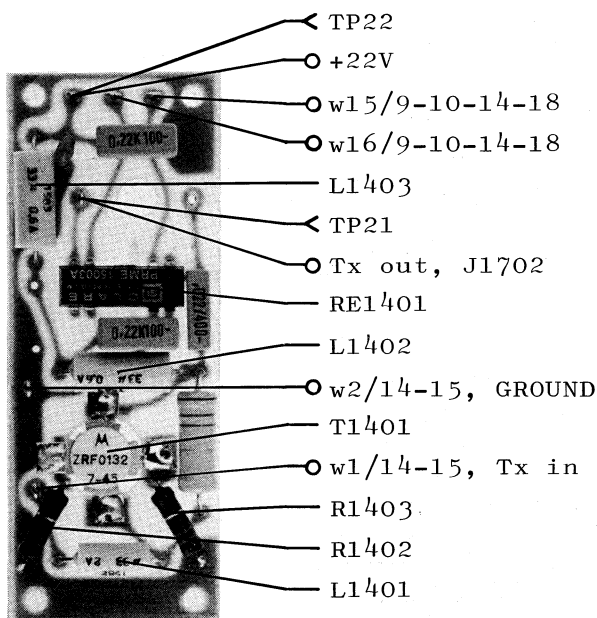
Oscilloscope input : Passive probe 10 Mohm//11 pF

DC voltmeter input : 10 Mohm

⊙ : Diode probe measurements

TP : Testpoints

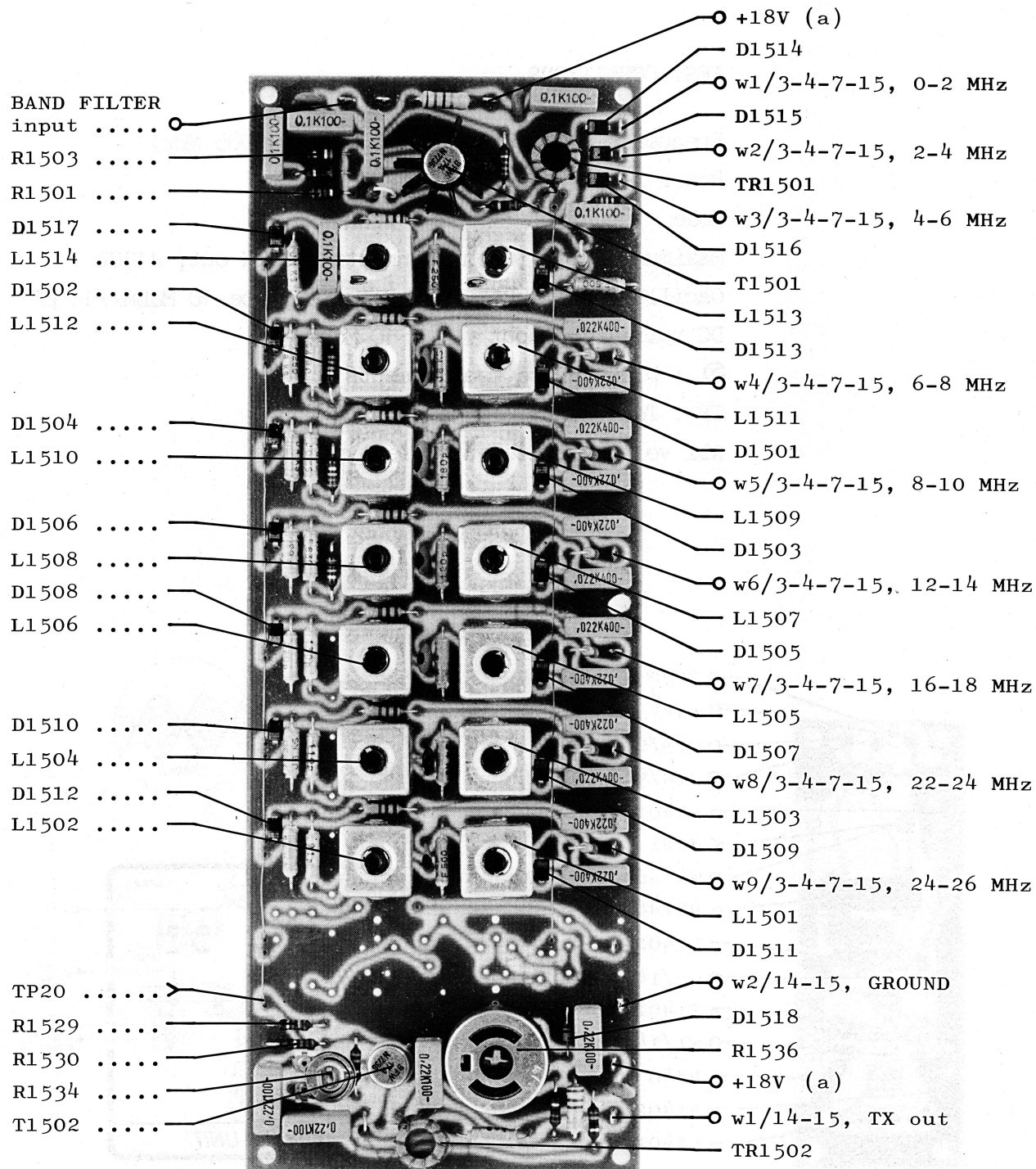
All voltage statements are typical



CIRCUIT DESCRIPTION BAND FILTER S1300

This unit contains two amplifiers, six band-pass filters and a low-pass filter.

The signal from second mixer appears at the base of first amplifier T1501 via C1501. This amplifier is supplied with feed-back via R1502 and R1505 to act as the correct load for the mixer. Output from this amplifier is via an 1:2 transformer TR1501, fed into the selected band-pass filter or low-pass filter. The band-pass filter contains two tuned circuits, each with a coilcap on the input side and a capacitor on the output. Output from the chosen filter is fed into the buffer amplifier T1502 in conjunction with the output transformer TR1502 there is frequency compensation. C1549, R1535, R1537, R1536 and D1518 produce bias for the driver transistor.



BI/2 S1301, S1300/11, 1
4-0-22018

TEST CONDITIONS

Frequency selector : 1A (f = 2.0005 MHz)

Power level : FULL

Mode : TUNE

Maximum drive, 50 ohm connected to TX out, J1702

Oscilloscope input : Passive probe 10 Mohm/11 pF

DC voltmeter input : 10 Mohm

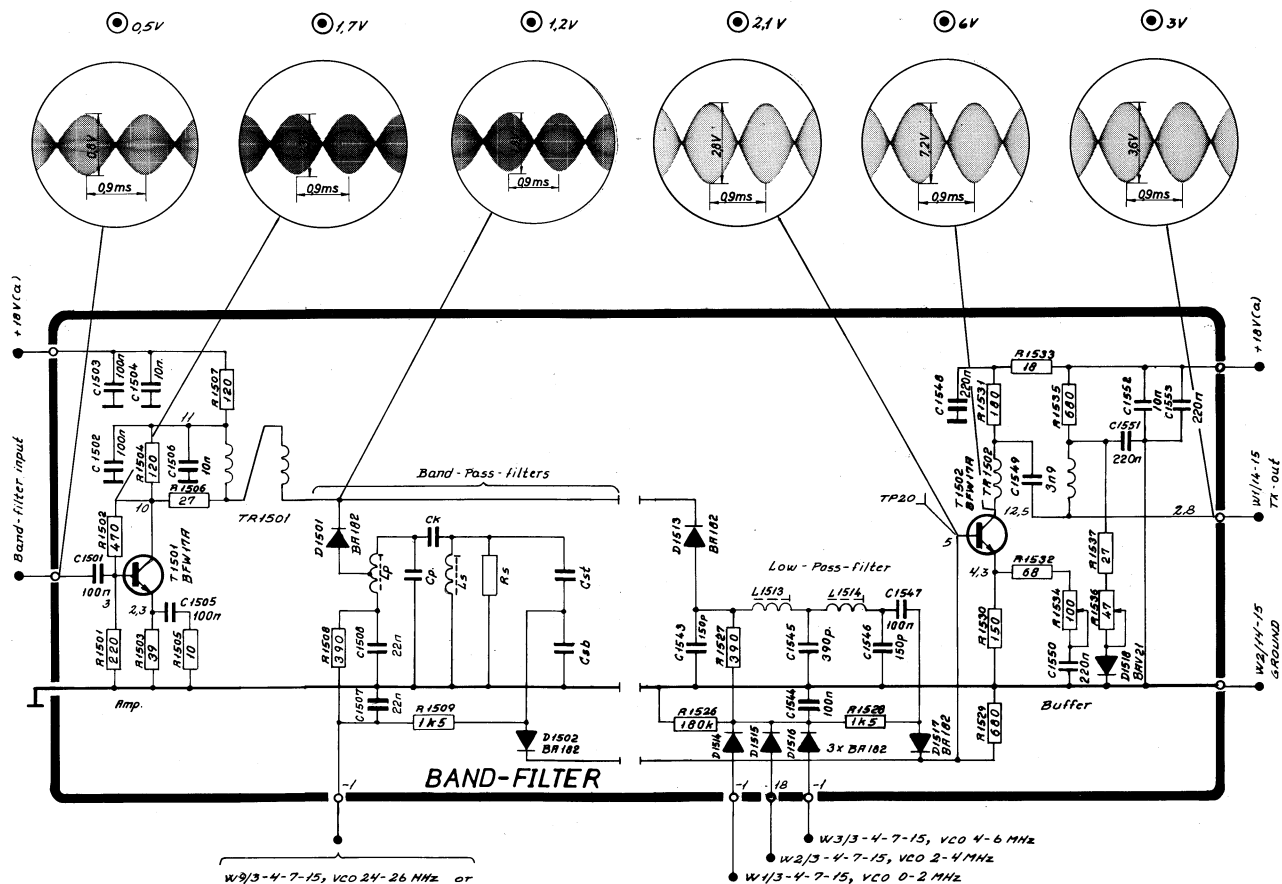
⊙ : Diode probe measurements

TP : Testpoints

ALL voltage statements are typical

Component tabel for Band-Pass-Filters

BAND	Lp	Cp	Ch	Ls	Rs	Csb	Cst
25 MHz	L1501	C1509 68pF	C1510 3.3pF	L1502	R1510 non	C1511 180pF	C1512 91pF
22 MHz	L1503	C1515 15pF	C1516 4.3pF	L1504	R1513 non	C1517 220pF	C1518 110pF
16 MHz	L1505	C1521 91pF	C1522 5.1pF	L1506	R1516 non	C1523 270pF	C1524 130pF
12 MHz	L1507	C1527 120pF	C1528 7.5pF	L1508	R1519 15 kohm	C1529 330pF	C1530 180pF
8 MHz	L1509	C1533 180pF	C1534 11pF	L1510	R1522 15 kohm	C1535 510pF	C1536 270pF
6 MHz	L1511	C1539 220pF	C1540 13pF	L1512	R1525 22 kohm	C1541 680pF	C1542 330pF



W9/3-4-7-15, VCO 24-26 MHz or
W8/3-4-7-15, VCO 22-24 MHz or
W7/3-4-7-15, VCO 16-18 MHz or
W6/3-4-7-15, VCO 12-14 MHz or
W5/3-4-7-15, VCO 8-10 MHz or
W4/3-4-7-15, VCO 6-8 MHz

CIRCUIT DESCRIPTION MIXER UNIT S130X

In this unit the 600 kHz signal from the SSB generator is mixed together with the VCXO and VCO signals in two steps to produce the wanted output frequency. In addition the necessary power level regulation is controlled in this unit.

SECOND

The transistors T1602 and T1603 form a balanced mixer. The 600 kHz signal is fed into the mixer via the phase splitting transformer TR1601. The VCXO signal is fed into the emitters via the buffer amplifier T1601. In this transistor it is possible to regulate the DC working point in two ways. One: changing the emitter resistor at the point "fixed power regulation". Two: changing the base current via a potentiometer between the two points "drive level potmeter". This DC working point regulation will control the amplitude of the VCXO signal to the mixer and in that way the output power is regulated.

FILTER AND AMPLIFIER

The second mixer feeds into the crystal filter FL1601. The tuned circuits containing L1601 and L1602 around the filter carry out proper impedance-matching to the filter. T1604 and T1605 are two buffer amplifiers, the circuit C1622, L1604, C1623 and R1643 carries out correct generator impedance for the mixer M1601.

THIRD MIXER

The third mixer M1601 is a double balanced hotcarrier diode mixer which mixes the 10.7 MHz signal together with the chosen VCO signal. The transistor T1606 is a wideband power amplifier supplying the mixer with the necessary power for proper operation. Output from the mixer is fed into the band filter unit.

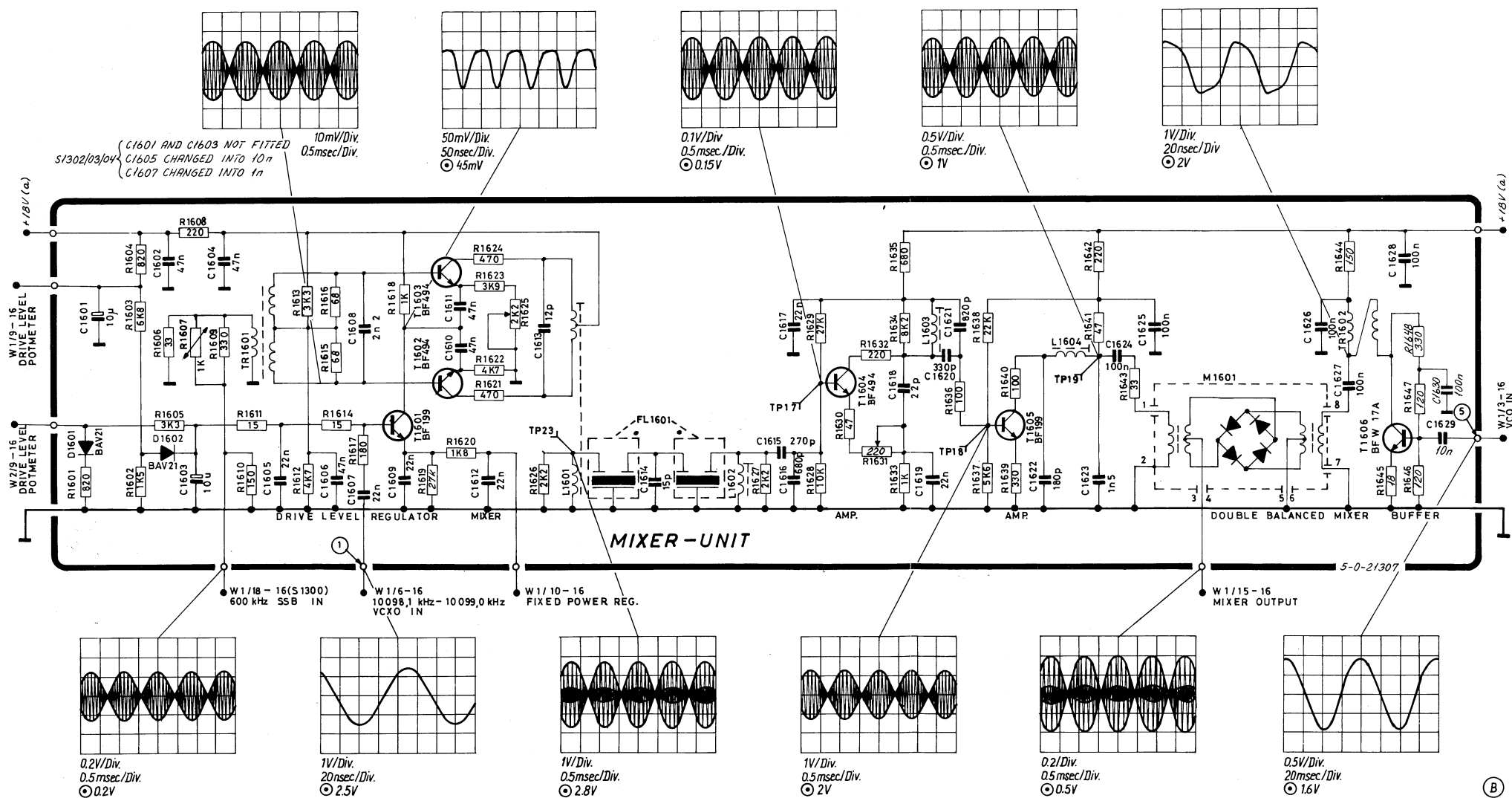
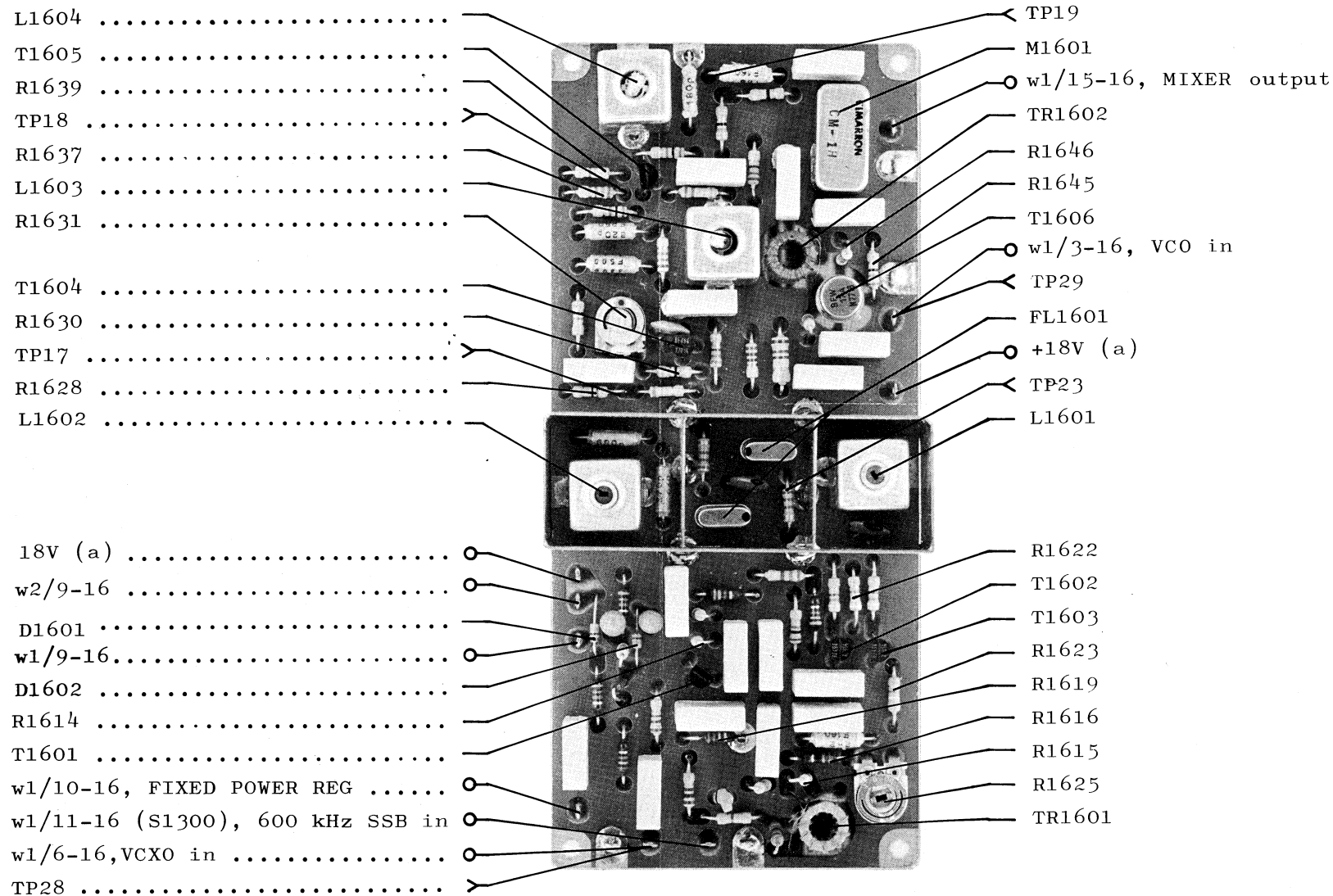
TEST CONDITIONS

Frequency selector : 1A (f = 2.0005 MHz)
Power level : FULL
Mode : TUNE
Maximum drive, 50 ohm connected to TX out, J1702
Oscilloscope input : Passive probe 10 Mohm/11 pF
DC voltmeter input : 10 Mohm

⊙ : Diode probe measurements

TP: Testpoints

All voltage statements are typical



CIRCUIT DESCRIPTION A2H OSCILLATOR AND DELAY UNIT S1300

This unit generates the necessary AF signal to modulate the exciter in the A2H mode and the necessary time delays for the telegraphy and telex operation.

A2H OSCILLATOR

The A2H AF oscillator is built-up around T1801 with the tuned circuit C1803, C1804 and L1801 adjustable to the wanted frequency 465 Hz.

The output is a combination of a DC voltage to switch on the diode in the microphone amplifier, and the AF signal which is controlled via potentiometer R1806.

TX-DELAY

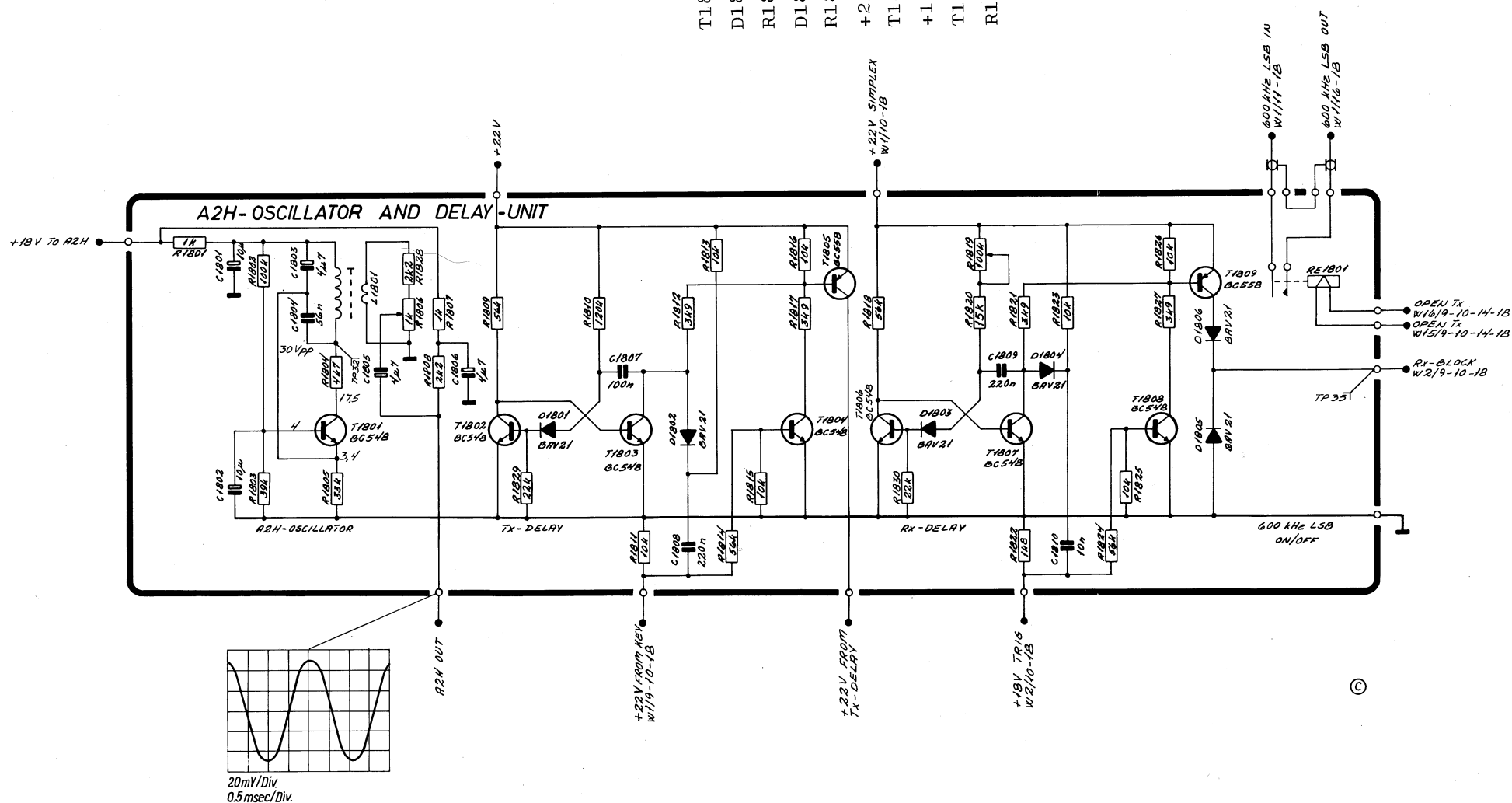
+22V FROM KEY controls T1805 to conduct, and T1805 will then supply +22V FROM TX-DELAY to the relays 600 kHz LSB ON/OFF and TX ON/OFF in telegraphy mode. When the key is released T1804 is off, but T1803 goes on for a time period of approx. 10 ms determined by the monostable multivibrator T1802 and T1803.

RX-DELAY

With the transmitter keyed there is +18V ON +18V TRIG. keeping T1809 conducting, and in this way the receiver is blocked. When the key is released T1808 is off, but T1807 goes on and stays on for a time period between 8 ms and 25 ms determined by the monostable multivibrator T1806 and T1807 and adjustable with R1819.

600 kHz LSB ON/OFF

The relay RE1801 switches the signal from the SSB generator to the mixer unit off in receive mode.



W1/10-18, +22V SIMPLEX .
 TP35
 W2/9-10-18, Rx-BLOCK ...
 T1809
 T1808
 R1825
 D1804
 T1807
 W2/10-18, +18V TRIG.
 W1/9-10-18, 22V FROM KEY
 +22V
 T1802

T1803
 D1801
 R1829
 D1802
 R1809
 +22V FROM Tx DELAY
 T1806
 +18V TO A2H
 T1805
 R1816
 D1806
 D1805
 W15/9-10-14-18
 R1826
 W16/9-10-14-18
 W1/16-18
 R1819
 GROUND
 RE1801
 W1/11-18
 GROUND
 R1805

R1803
 T1801
 R1818
 TP32
 D1803
 R1815
 L1801
 R1830
 T1804
 A2H OUT
 R1806

CIRCUIT DESCRIPTION FOR FREQUENCY SELECTOR S1301

This unit converts the coded frequency to the necessary frequency code and band select code for the divider unit and motor control unit.

Furthermore frequencies selected outside the maritime bands will be inhibited, and fixed 2182 kHz can be selected.

NORMAL FREQUENCY SELECT

The frequency code from the frequency selectors S1703 - S1706 and the "A" from S1707 are fed through the gates IC2104 - IC2107 to the divider unit.

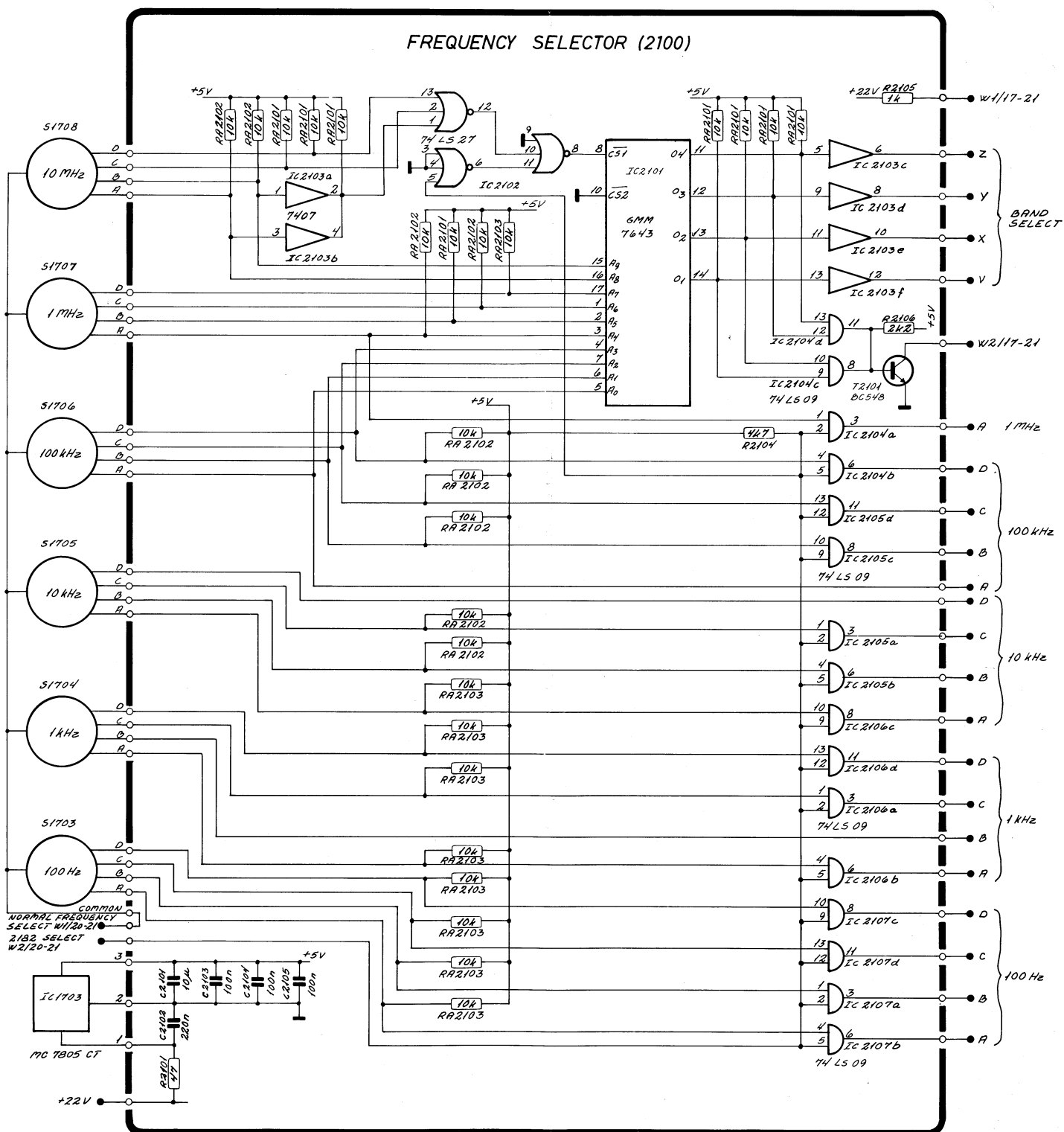
The frequency codes from S1706, S1707 and the "A" and "B" from S1708 are fed to the factory programmed read only memory (PROM) and are here used as address. For each possible address the corresponding band select code is programmed in the PROM, and on the addresses corresponding to frequencies outside the maritime bands, the band select code are "1" in both 01, 02, 03 and 04 to ensure that no frequency is selected.

In order to get "1" on the PROM outputs when 3, 4, 5, 6, 7, 8 or 9 is selected on S1708 these figures are detected by IC2103a, IC2103b and IC2102, and the detector output is fed into the PROM IC2101 and disables the outputs.

On the front panel there is a LED to indicate that a frequency outside the maritime bands is selected. This LED is controlled from T2101, and IC2104c and IC2104d detect if there is "1" on all the outputs.

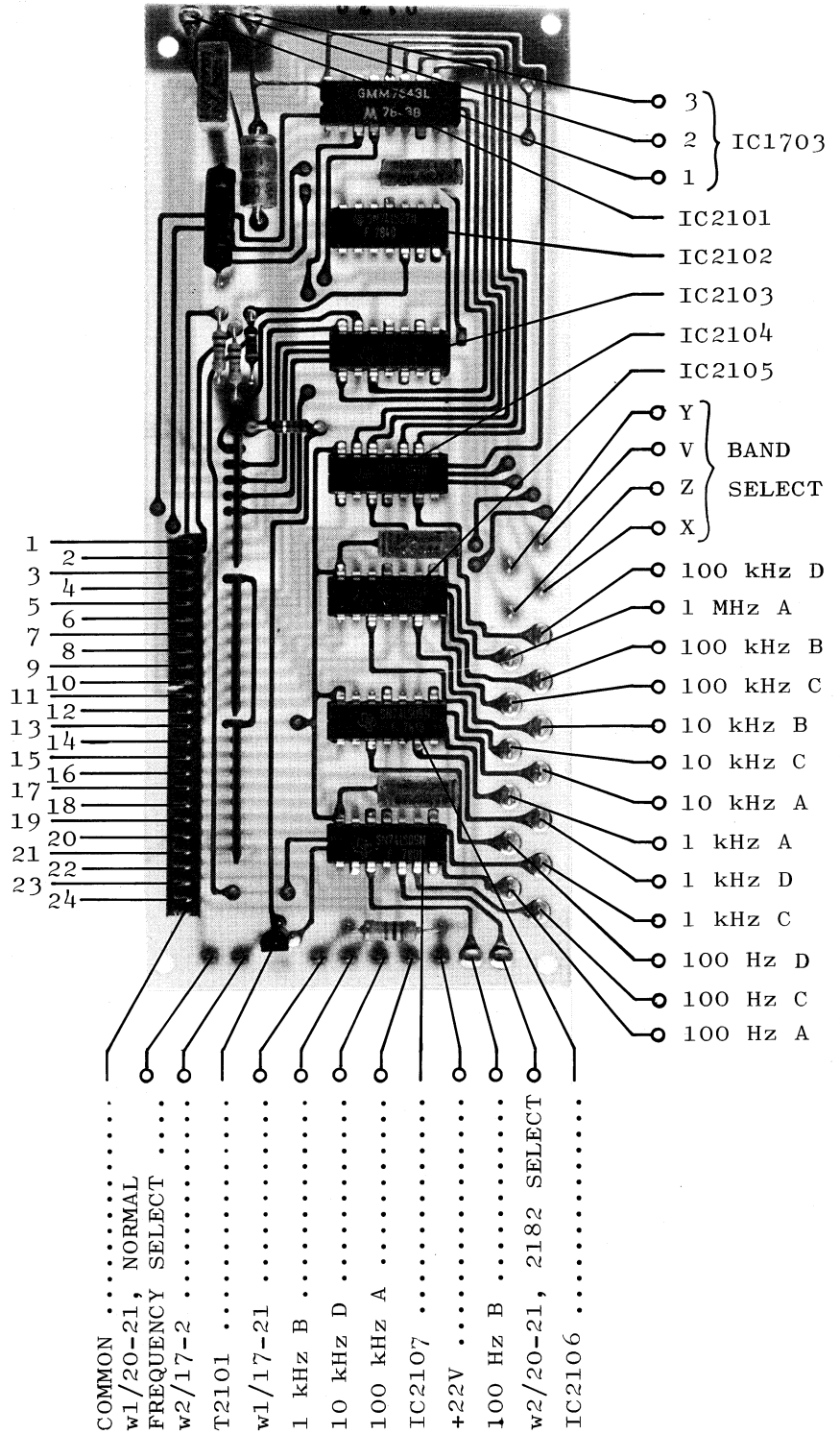
2182 kHz SELECT

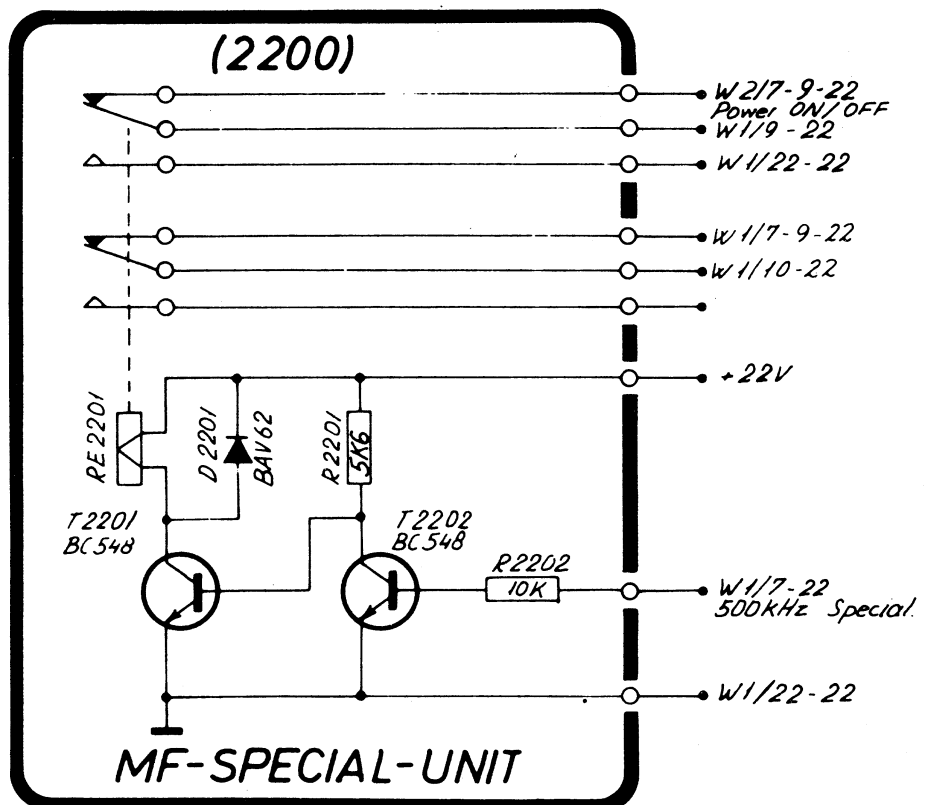
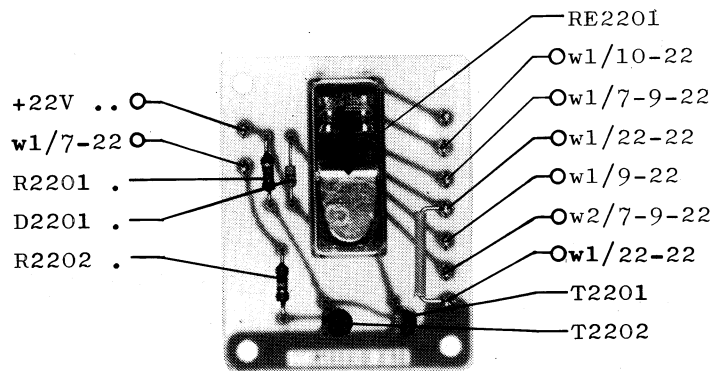
In order to select 2182 kHz the necessary code for the divider unit is fixed programmed on the gates IC2104 to IC2107. To choose this programming the common input is grounded via the 2182 kHz switch on the front panel. From the same switch the common wire for the frequency selectors is left open. This means that all the address inputs to IC2102 are high, and on this address the 2182 kHz band select code is stored.



TO S1703-S1708

- 10 MHz { A-7
B-6
C-5
D-4
- 1 MHz { A-8
B-3
C-2
D-1
- 100 kHz { A-22
B-10
C-11
D-9
- 10 kHz { A-14
B-13
C-12
D-23
- 1 kHz { A-17
B-24
C-16
D-15
- 100 Hz { A-21
B-20
C-19
D-18





CIRCUIT DESCRIPTION FOR MODE SWITCH S1300

This unit contains the necessary switches to switch between the needed operation modes, relays to activate the exciter, one for normal operation and one for 2182 kHz operation. Furthermore there is a relay to secure no A3H transmission above 4 MHz, only activated in some countries.

In the special telegraphy and telex versions there are four further push buttons, and on the printed circuit board there is a special circuit activated in telex mode. When output duty cycle is too high, the output is reduced to protect the power supplies against overload.

SIMPLEX/DUPLEX SELECTOR

The switch is controlling: The RX loudspeaker, the receiver blocking and the simplex relay in the receiver.

MODE SELECTOR

The wanted transmission mode is in the exciter chosen via a + 18V DC voltage fed to necessary diode switches on the SSB generator and the microphone amplifier.

The transmit relay RE1001 is activated via the microtelephone key or, if the TEST ALARM button is pressed, via the alarm signal generator.

The 2182 relay RE1003 is activated from the motor control unit, where it is detected if the distress frequency 2182 is selected

The A3H relay RE1002 interrupts the 18V to the SSB generator, and so ensures no output of the exciter, under two conditions. First A3H is chosen, and second a frequency above 4 MHz is selected. The second condition is detected from the motor control unit and fed via the 400W/800W control wire to the transistor T1001. If the dotted connection on S1002-D3 is removed the A3H relay is disabled and so the exciter is able to transmit A3H in the full frequency range.

Most of the diodes on the mode switch printed circuit board are transient protection diodes, these are: D1001, D1002, D1003, D1009, D1010, D1014, D1015, D1016, D1019 and D1020.

D1004 prevents the alarm signal generator to start when the exciter is keyed and the alarm button is pressed.

D1005, D1006 and D1013 prevents the reduced power to get an unwanted voltage if distress is selected.

D1007 makes it possible to choose A2H or A3H on the microphone amplifier, even if A3H is chosen on the SSB generator.

D1008 makes it impossible for an external voltage on the wire SIMPLEX RELAY RX to disturb the key circuit.

D1101 prevents the wires 22V FROM DELAY and 22V FROM KEY to be connected together and in that way make the delay circuit selflocking.

CIRCUIT DESCRIPTION FOR MODE SWITCH S1300 cont.:

D1012 prevents the SIMPLEX RELAY RX and the RX BLOCK to follow the key in telephony duplex mode.

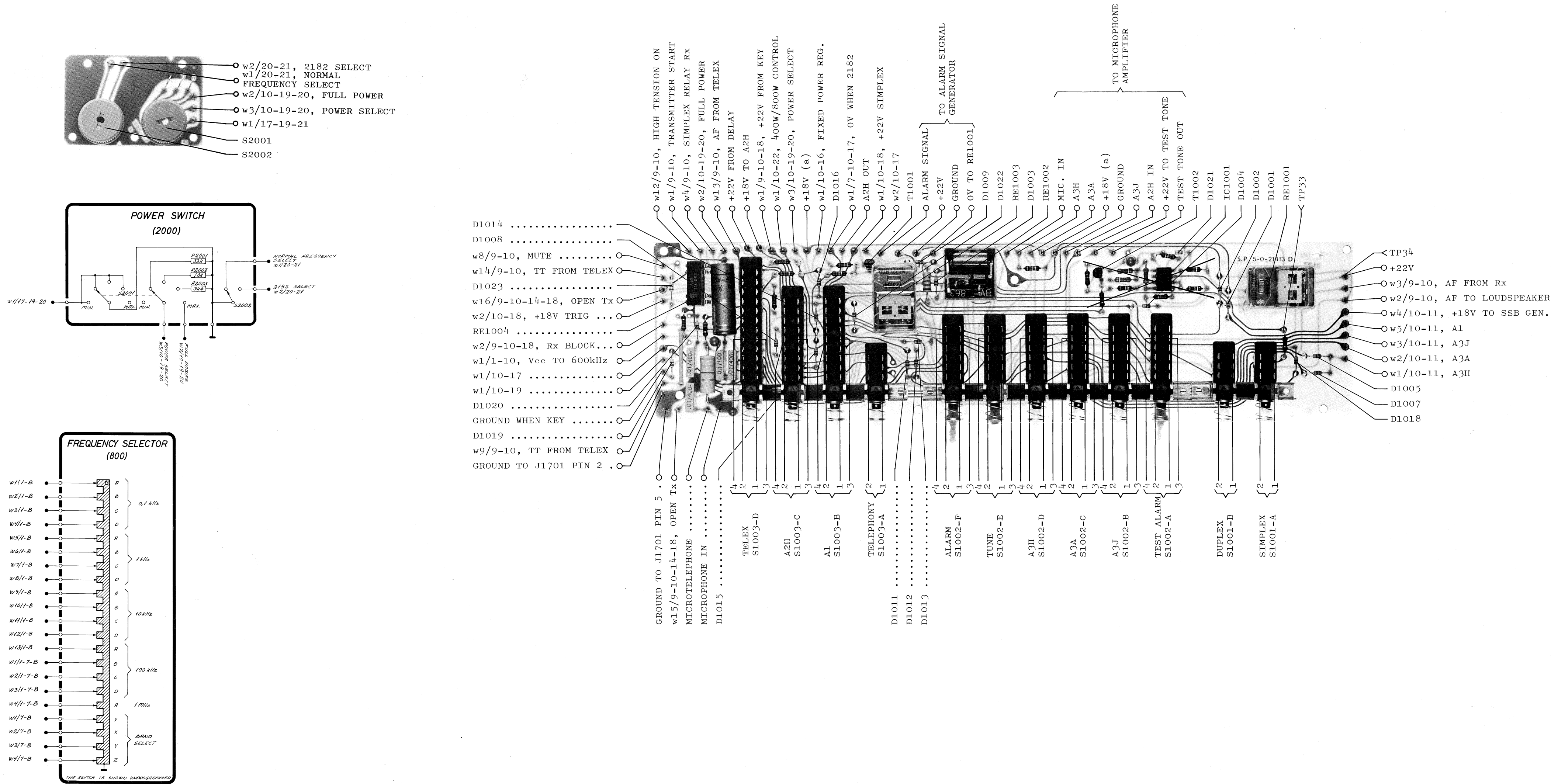
D1018 prevents an external voltage on the RX BLOCK wire to disturb the key circuit. The network: R1005, C1002, C1003, R1004 and C1005 is feeding DC into the microphone.

D1022 prevents the key circuit to be disturbed of an external voltage on the MUTING wire when 2182 kHz is selected.

D1023 prevents the SIMPLEX RELAY RX to be energized from an external voltage on the RX BLOCK wire.

TELEX POWER CONTROL

The key information is taken from the relay RE1004, and is fed into the buffer IC1001a. The switch information from there is fed into the integrator R1018 and C1008. The diode D1021 compensates the temperature dependent leak current in the capacitor C1008. When the integration voltage (pin 6. IC1001b) reaches 12.6V (approx. 55% duty cycle) the output of the comparator IC1001b goes low, and turns T1002 off, and so the output power is reduced.



MODULE NO. 1000

