Sailor

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INSTRUKTIONSBOG FOR SAILOR R1121

INSTRUCTION BOOK FOR SAILOR R1121

A/S S. P. RADIO · AALBORG · DENMARK

GENERAL DESCRIPTION

INTRODUCTION

SAILOR R1121 is a scanning receiver intended for reception of F1 radio telex signals.

SAILOR R1121 covers the following frequency bands:

1.60 MHz - 3.80 MHz
4.20 MHz - 4.36 MHz
6.32 MHz - 6.51 MHz
8.43 MHz - 8.72 MHz
12.65 MHz - 13.11 MHz
16.85 MHz - 17.24 MHz
22.31 MHz - 22.60 MHz

SAILOR R1121 uses a digital synthesizer for frequency generation, and thus it can be set to any frequency in the above mentioned frequency ranges. The digital synthesizer is controlled from keyboard of the V.D.U. via a built-in microprocessor. The frequency stability is controlled from one 10 MHz TCXO.

SAILOR R1121 is provided with high order RF band pass filter to ensure good communication performance.

SAILOR R1121 scanning facilities are controlled from V.D.U. keyboard via the ARQ H1240.

SAILOR R1121 can be supplied with a self-contained cabinet H1225 and an AC/DC power supply N1405.

TECHNICAL DATA

The receiver is fully synthesized and has a frequency resolution of 100 Hz.

The receiver is intended for reception of the following wave types F1 (F1B).

Frequency ranges: 1.60 - 3.80 MHz and the maritime radiotelex HF bands (4 - 22 MHz)

Frequency drift, short time: less than 5 Hz

Frequency drift, long time: less than 20 Hz per year

Frequency drift: 0 - 40°C: less than 20 Hz
Also possibility for better figures for frequency drift when using another TCXO.

IF bandwidth:

Min. pass band at -6 dB	Max. pass band at -60 dB	Classification of reception old	new
+150 Hz -150 Hz	-750 Hz +750 Hz	F1	F1B

Sensitivity, 20 dB SN/N: <5 dB/1 uV

Blocking:

wanted signal	20 dB/1 uV
blocking level	>100 dB/1 uV

Intermodulation:

wanted signal	30 dB/1 uV
3rd order intermodulation	Δf = 30 kHz
intermodulation level	>90 dB/1 uV

Operation Temperature Range: -15°C to +55°C

Spurious rejection:

0-30 MHz;	>80 dB

Spurious emission: P_{out} < 0.1 nW into 50 ohm

Audio outputs:

Loudspeaker	4W into 8 ohms
Line	0 dBm into 600 ohms

Automatic gain control:

Δ Vin = 40 dB	attack time	<2 mS
	decay time approx.	80 mS

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

R1121

SCANNING FACILITIES FOR SAILOR AUTOMATIC RADIOTELEX STATION

Possibility for 15 radiostations with call-code and name.

Each station has 7 receiving and transmitting frequencies.

The scanning table can by the operator be created with up to 21 frequency pairs.

The 15 groups are named A to O.

The first 5 groups from A to E can only be stored with the strap W8 not inserted.

The last 10 groups from F to O can be stored by the operator and later changed if necessary.

The 7 frequency pairs in each group is named from A1 to A7 and O1 to O7 etc.

STATION TABLE CONTROL

To enter call-code and name into the station table.

STN A = (call-code)(name)(return)

STN B = (call-code)(name)(return)

etc.

To erase one group (A) from the station table.

CREATE A (return)

To enter receive and transmit frequencies into the station table.

STN A1 = (receive frequency)(transmit frequency)(return)

STN A2 = (receive frequency)(transmit frequency)(return)

etc.

To erase the frequency in A1.

STN A1 = (Ø.Ø)(Ø.Ø)(return)

etc.

Listing of:

STN (return) List all the stored stations, call-code and name.

STN A (return) List station A particulary.

STN A1 (return) List A1 frequency pair.

SCANNING CONTROL

The scanning table can be stored into default (the non-volatile memory).

When power-up and after power failure the default channels will be loaded into the scanning table.

To create a scanning table:

SCAN A, B1, B7, F (return) for A it is the complete group.

To delete or add channels into the scanning table:

ADD C2, B3 (return)

DELETE A, B1 (return)

To store the scanning table into default.

STORE (return)

To scan the default channels:

SCAN X (return)

or

SCAN A1, X (return)

To stop the scanning.

STOP (return)

SCAN A1 (return) Only one channel.

To stop the scanning when receiving a free-signal.

SEL (return)

DESEL (return) (to annulment)

To list the scanning table:

SCAN (return)

COMMUNICATION CONTROL COMMANDS

FEC and ARQ mode can only be used after a STOP command or when a single channels is scanned.

FEC (return)

ARQ (return) use the call-code and name related to the STATION TABLE

ARQ 12345 (return)

ARQ A to O (return) use the call-code and name related to the STATION TABLE

ARQ R (return) repeat the call with the last used call-code

When using the CABLE command the call will first be initiated when receiving a free-signal.

To initiate a call at the first free channel:

CALL (return) call the first free channel in the scanning sequence.

CALL 12345 (return)

CALL A to O (return) use the call code and name related to the STATION TABLE

CALL R (return) repeat the call with the last used call-code.

When the station is waiting for a free-signal from e.g. LYNGBY all the other channels in the scanning table will be checked for an incoming call.

OPERATING INSTRUCTIONS FOR AUTOMATIC RADIOTELEX STATION

SAILOR R1121 can receive in the maritime telex frequencies.

SAILOR S1303/04 can be set for any frequency in the ranges 1.6 - 8.4 MHz and the 12-16-22-25 MHz maritime HF bands.

AUTOTELEX

1. Switch on the station by activating the ON (24) button.

2. Turn the AF GAIN (18) to suitable volume.

3. Turn DISTRESS SWITCH (3) to center position. (EXTERNAL FREQUENCY CONTROL).

4. Turn POWER SWITCH (2) fully clockwise.

5. Press the button TELEX (22).

6. Press the button SIMPLEX TWO AERIALS (32).

7. Turn on the ARQ H1240.

8. The station is now ready for operation.

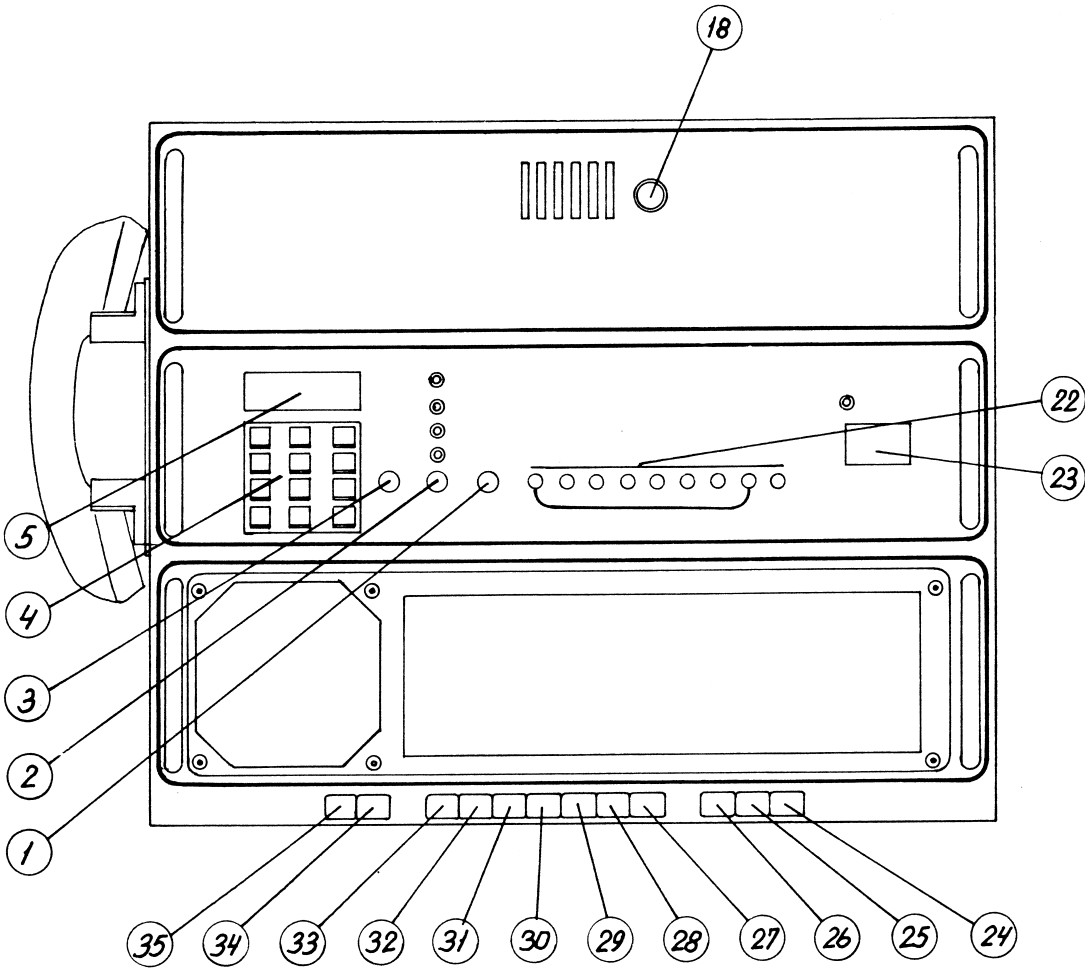
9. For manual communication use Communication Procedure 1.13.
   Stop the scanner on the station wanted and activate an ARQ Call.
   E.g. ARQ D Return.

10. For automatic call in MARITEX Mode use the soft keyes.
    E.g.
    CALL - AUTOTX (soft keyes)

    A-Space-TLX1235678+-letter-Return (keyboard)

Important! The working frequency for Radiotelex communication is given as assigned frequency (center frequency for the modulation).
The frequencies in the quick select register (the STATION TABLE) must be the carrier frequenvy.

The carrier frequency = assigned frequency - 1700 Hz.


18
22
23
5
4
3
2
1
35
34
33
32
31
30
29
28
27
26
25
24

SERVICE

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 measurings made at the factory are listed. If the performance check does not show the same values as those on the TEST SHEET, the set must be adjusted as described under ADJUSTMENT PROCEDURE.

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

2. NECESSARY TEST EQUIPMENT

TX: T1127, T1127L
EXC: S1300, S1301
RX: R1119, R1120
PS: N1400, N1401

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

NECESSARY TEST EQUIPMENT cont.:

TX	EXC	RX	PS		
	X	X		TONE GENERATOR:	
				Frequency range	200 - 3000 Hz
				Output voltage	1V RMS
				Output impedance	≤600 ohm
				E.g. PHILIPS type	PM5107
		X		AF VOLTMETER:	
				Sensitivity (f.s.d.)	300 mV
				Input impedance	≥4 ohm
				Accuracy (f.s.d.)	±5%
				Frequency range	100 - 3000 Hz
				E.g. PHILIPS type	PM2505
	X	X		FREQUENCY COUNTER:	
				Frequency range	100 Hz - 30 MHz
				Resolution	0.1 Hz at f≧10 MHz
				Accuracy	**1×10^{-7}**
				Sensitivity	**100 mV RMS**
				Input impedance	**1 Mohm//25 pF**
				Single period range	**1 sec.**
				Resolution	1 mSec.
				E.g. PHILIPS type	PM6611 + PM9679
		X		SIGNAL GENERATOR:	
				Frequency range	0.1 - 30 MHz
				Output impedance	50/75 ohm
				Output voltage	1 uV - 100 mV EMF
				Modulation	AM, 30%, 1000 Hz
				Ext. mod.	300 - 2700 Hz
				Ext. mod. sensitivity	1V for M=0.3
				E.g. PHILIPS	PM5326
				POWER SUPPLIES:	
X		X		N1400/T1127:	
				Vout	26.5V DC
				Iout	70A DC
				E.g. 2 pcs. LAMBDA type	LXS-G-24-OV-R

TX	EXC	RX	PS		
				POWER SUPPLIES:	
	X			S1300, S1301	
				Vout 1	22V
				Iout 1	1.5A
				Vout 2	-45V
				Iout 2	-0.1A
				E.g. SAILOR types	N1402 N1402 spec. N1405
	X	X		R1119, R1120:	
				Vout 1	22V
				Iout 1	1A
				Vout 2	8V
				Iout 2	1A
				Vout 3	-45V
				Iout 3	-0.1A
				E.g. SAILOR types	N1402 spec. N1405
	X			TEST BOX S1300/S1301:	
				S.P. type	S1300/01 Test box
	X			ARTIFICIAL KEY S1300TT/S1301:	
				S.P. type	Artificial key
X				POWER METER:	
				Power range	500W
				Impedance	50 ohm
				E.g. Bird Thruline Wattmeter Plug-in element	Model 43 500W 2-30 MHz
X				RF AMMETER (Thermocross):	
				Current range	5A
				E.g. Helweg Mikkelsen & Co. Copenhagen, Denmark type	TR-68x71, 5A

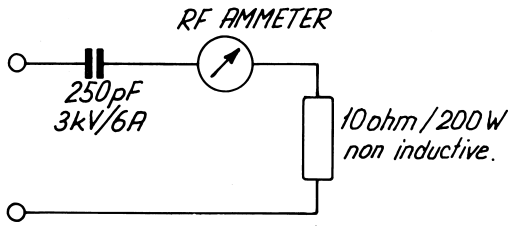
NECESSARY TEST EQUIPMENT cont.:

TX	EXC	RX	PS
X	X		
X			

DUMMY LOAD for HF bands, 4 - 25 MHz:

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

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

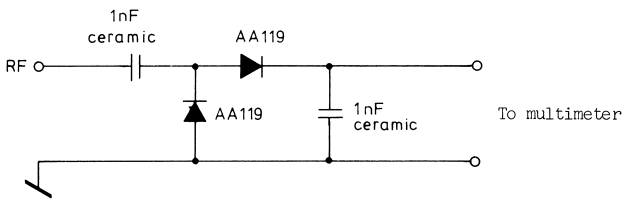


E.g. Draloric type 06-1291TD 20x50L 8KVs 250 pF ±20% R85

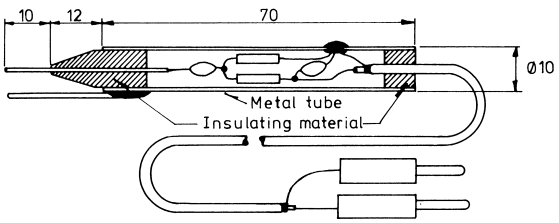
E.g. 10 pcs. Dale type PH-25A-17, 100 ohm, 5%, 25W

1000 A 4/4

DIODE PROBE



LAYOUT OF THE PROBE



3. TROUBLE-SHOOTING

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

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

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

LOOP 2

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

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

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

1. Set the CLARIFIER to center position and check the output signal from VCXO, 1st LOOP 2 MIXER and LOOP 2 FILTER on terminal FIRST LOOP 2 OUT.
   a. If there is no output signal, the failure is in the 1st loop 2 mixer or that the 10 MHz and/or 16 MHz injection signal is missing.
   b. If the output frequency is slightly lower than 8 kHz or slightly higher than 9 kHz the VCXO, the 1st loop 2 mixer and the 10 MHz and/or 16 MHz injection signal are apparently ok.

2. Set the CLARIFIER to center position and check the output signal on TP10 on the CLARIFIER AND 2nd LOOP 2 MIXER, module 1700.
   a. If there is no output signal, the failure is on the CLARIFIER AND 2nd LOOP 2 MIXER circuit board.
   b. If the output frequency is lower than 1 kHz or higher than 2 kHz, then the CLARIFIER AND 2nd LOOP 2 MIXER is apparently ok.

3. Check that the frequency on the phase/frequency detector IC1013, pin 1 is 100 Hz.

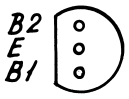
4. Check the LOOP 2 Programmable Divider.
   a. If the frequency on terminal LOOP 2 IN, module 1000 is lower than 1 kHz and the frequency on the phase/frequency detector IC1013, pin 3 is lower than 100 Hz, the programmable divider is apparently ok.
   b. If the frequency on terminal LOOP 2 IN, module 1000 is higher than 2 kHz and the frequency on the phase/frequency detector IC1013, pin 3 is higher than 100 Hz, the programmable divider is apparently ok.

5. Check the phase/frequency detector IC1013.
   a. Measure 1.5V DC on terminal PD 2 OUT on the DIVIDER-UNIT.
   b. If the input frequency on IC1013, pin 3 is lower than 100 Hz and the DC voltage on terminal PD 2 OUT is approx. 0.7V, the phase/frequency detector is apparently ok.
   c. If the input frequency on IC1013, pin 3 is higher than 100 Hz and the DC voltage on terminal PD 2 OUT is approx. 2.3V, the phase/frequency detector is apparently ok.

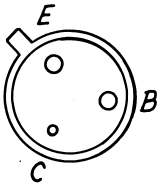
6. Check the integrator IC1601b on VCXO, 1st LOOP 2 MIXER and LOOP 2 FILTER.
   a. If the DC voltage on TP9 is approx. 0.7V and the DC voltage on output terminal IC1601b, pin 1 is approx. 17V, the integrator is apparently ok.
   b. If the DC voltage on TP9 is approx. 2.3V and the DC voltage on the output terminal of IC1601b, pin 1 is approx. 1V, the integrator is apparently ok.

7. If the failure has not yet been found the summing amplifier IC1601a and the loop filter C1614 and R1616 must be checked.

BOTTOM VIEW

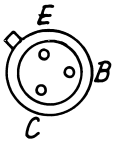


2N 4871



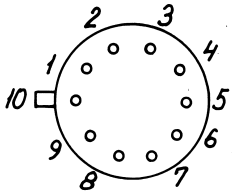
BFW 17A

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

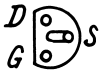


2N 2368

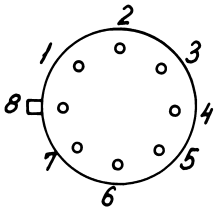
BF 199
BF 494



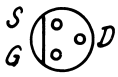
CA 3019



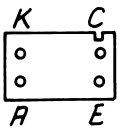
BF 256 A, B, C



LM 3053

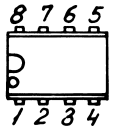


E 310

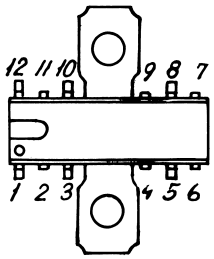


OPB 825

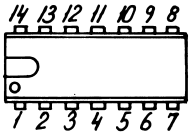
TOP WIEW



LM 308 N
MC 1455 P1
MC 1458 C

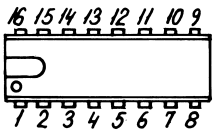


TCA 940

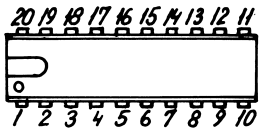


LM 324 N
LM 3086
MC 4044 P
MC 14011 B CP
MC 14077 B CP
MC 14081 B CP
SN 7406 N
SN 7407 N
SN 74010 N
SN 74072 N

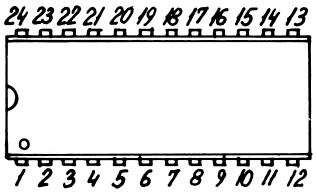
SN 74 LS 00 N
SN 74 LS 04 N
SN 74 LS 08 N
SN 74 LS 11 N
SN 74 LS 20 N
SN 74 LS 27 N
SN 74 LS 32 N
SN 74 LS 74 N
SN 74 LS 86 N
SN 74 LS 132 N
SN 74 LS 290 N



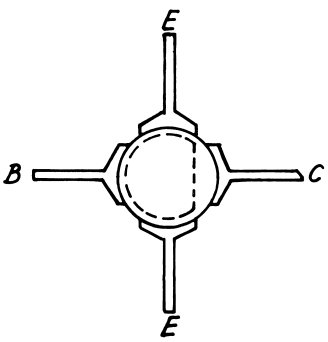
CD 4056 B
MC 14519 B CP
MC 14530 B CP
SN 74 LS 42 N
SN 74 LS 109 N
SN 74 LS 123 N
SN 74 LS 138 N
SN 74 LS 148 N
SN 74 LS 192 N
SN 74 LS 390 N
SN 74 LS 668 N



6308-1

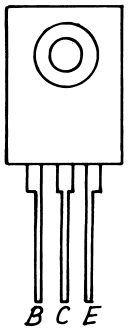


MC 14515 BCP

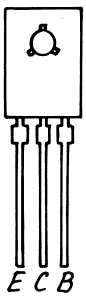


2N 5641

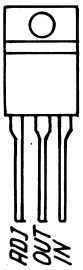
FRONT WIEW



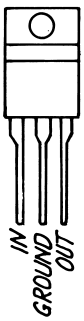
BD 577



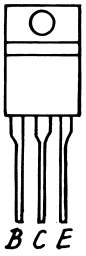
BD 138
BD 139



LM 317 T

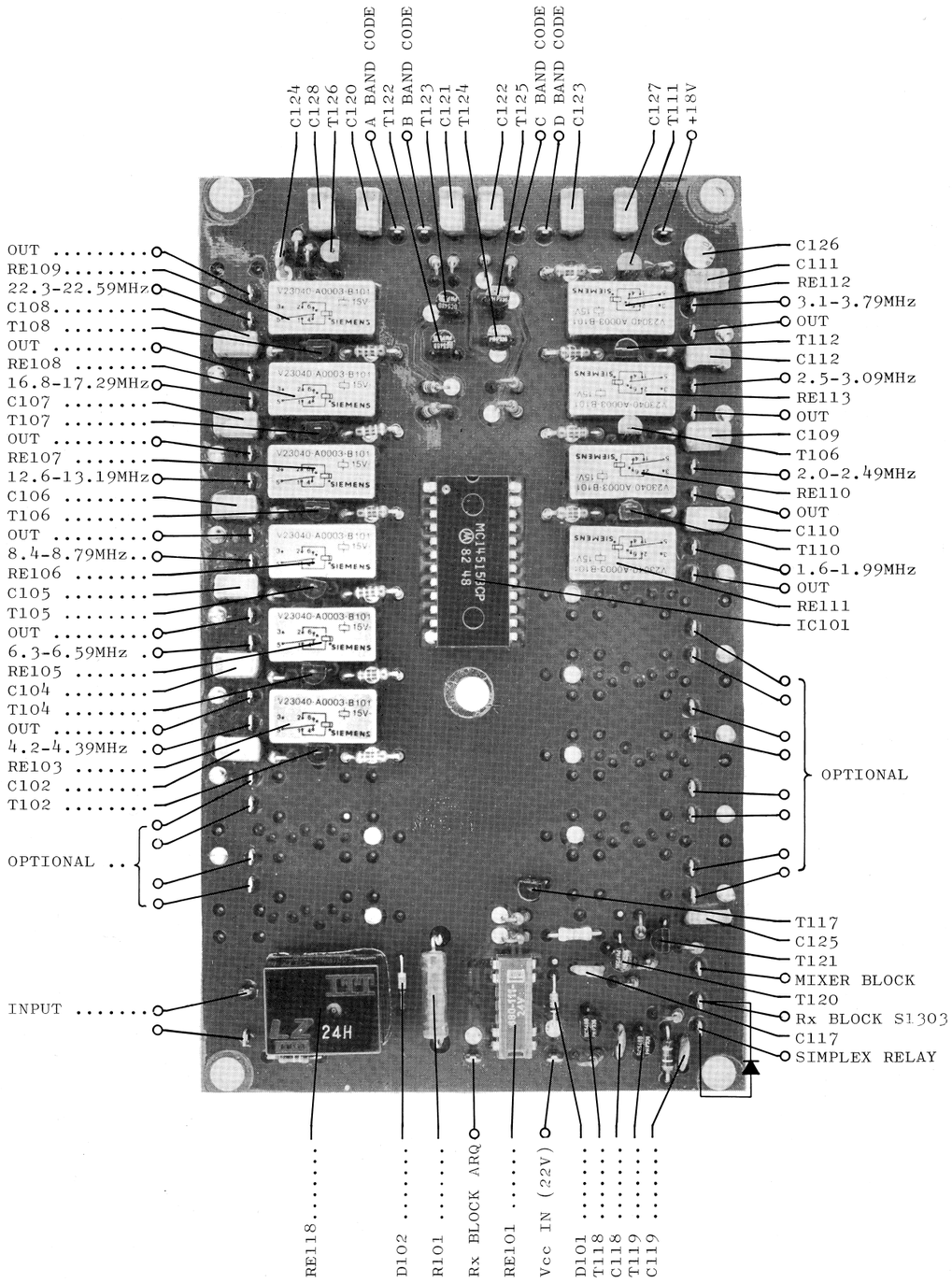


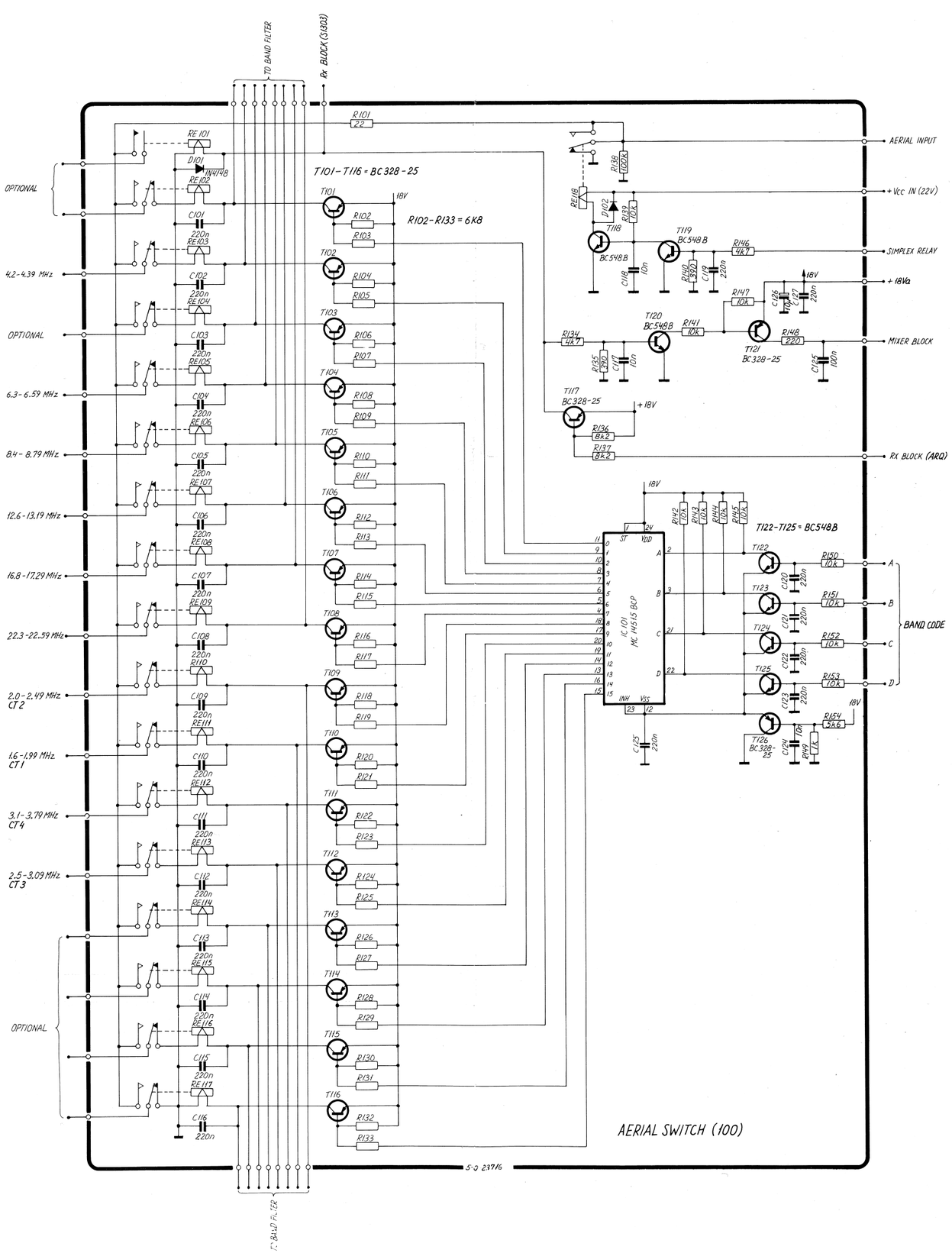
MC 7805 CT
MC 7818 CT

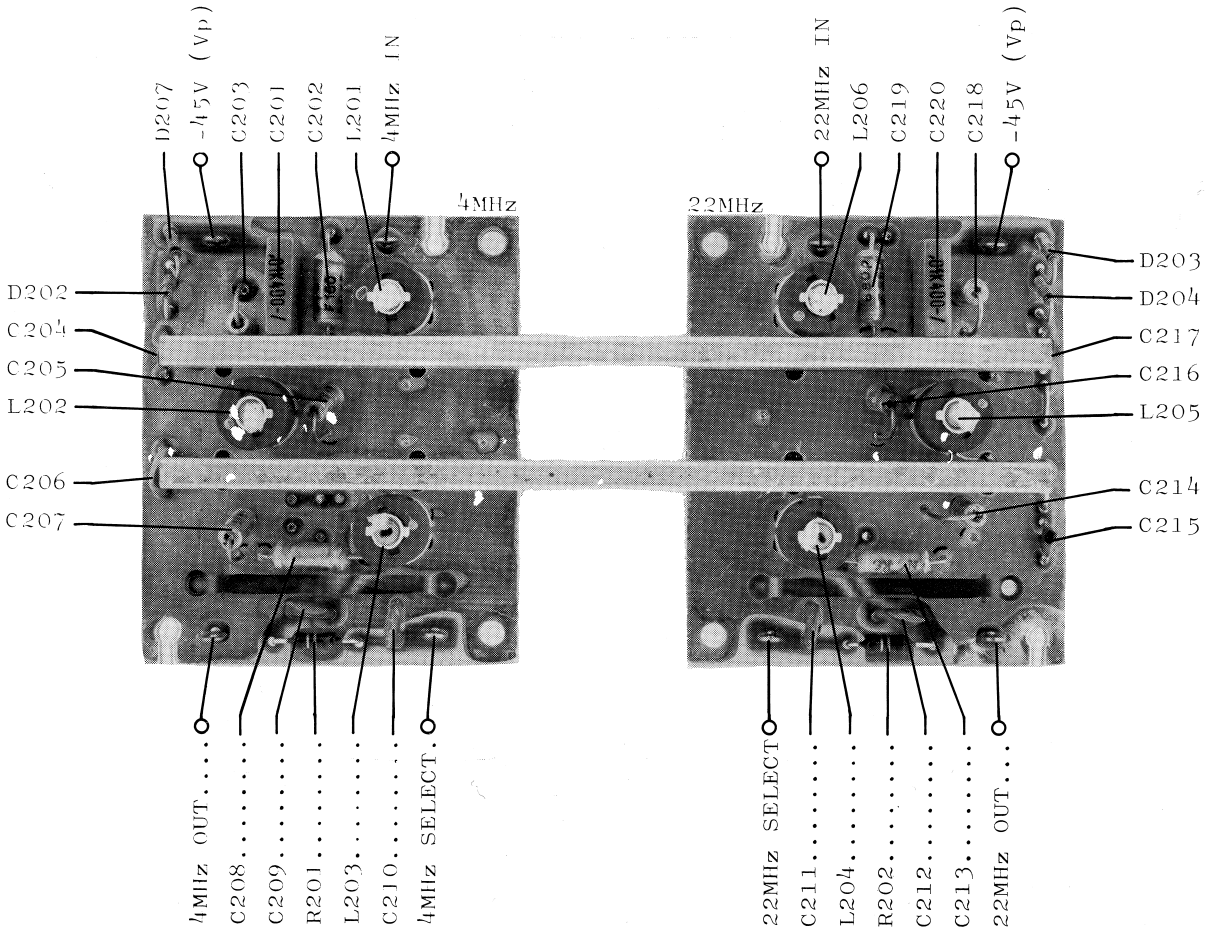


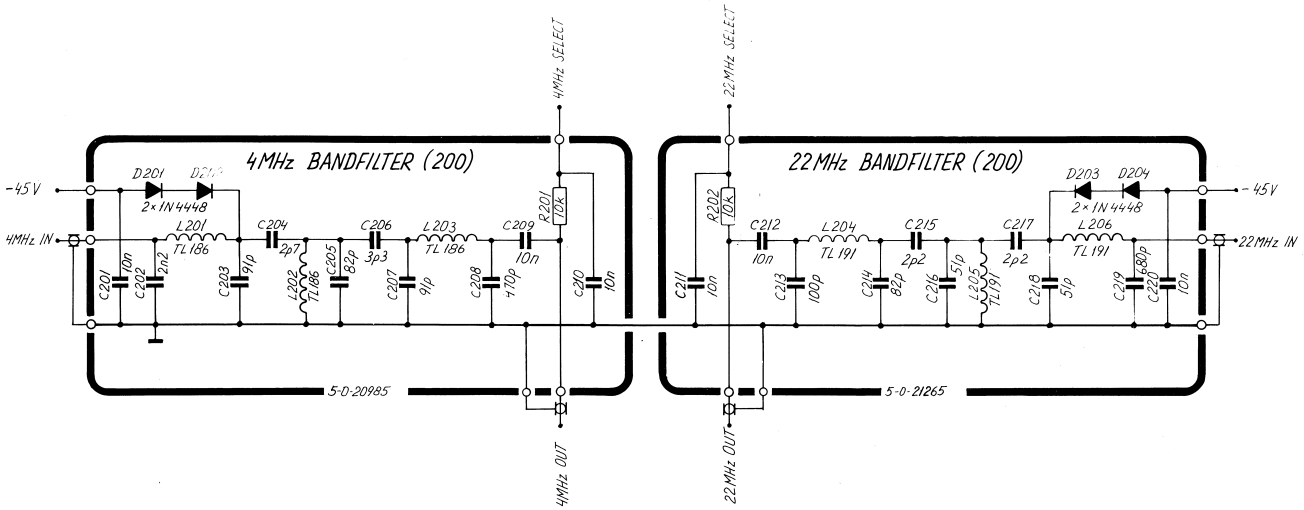
BD 241

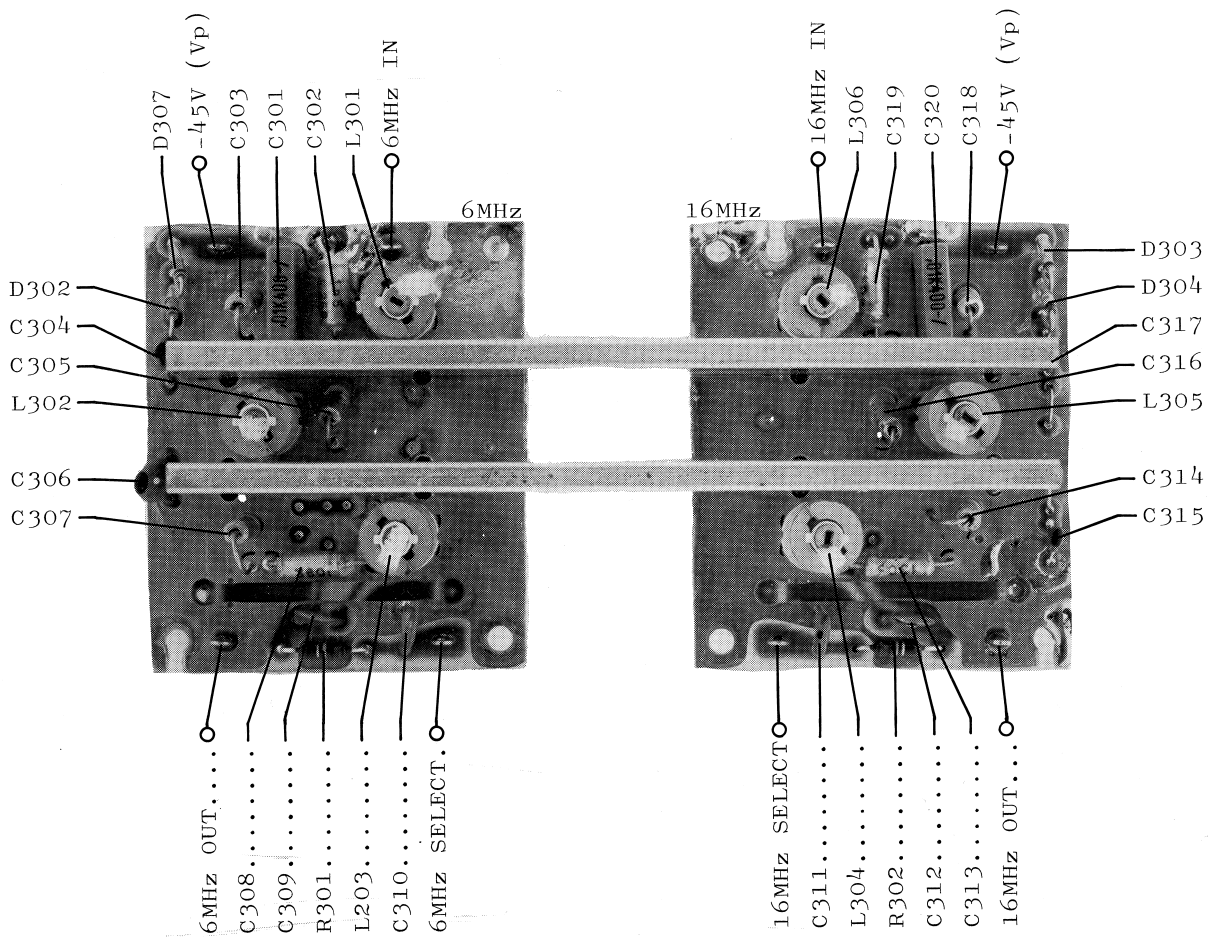
R1119 & R1120 A 2/2

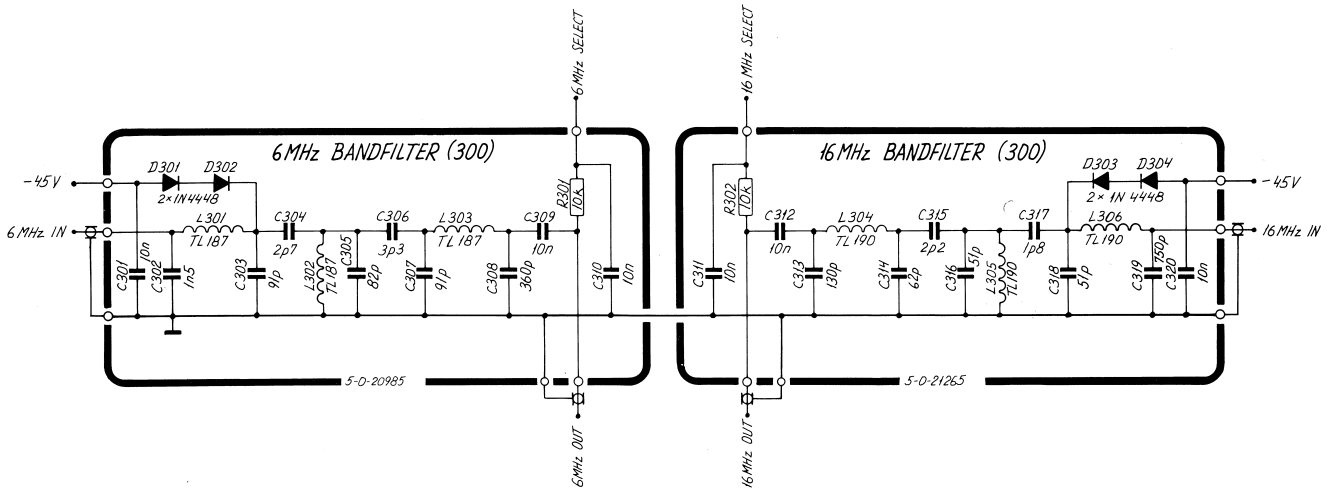

C124
C128
T126
C120
A BAND CODE
T122
B BAND CODE
T123
C121
T124
C122
T125
C BAND CODE
D BAND CODE
C123
C127
T111
+18V
OUT .....
RE109.....
22.3-22.59MHz
C108.....
T108 .....
OUT .....
RE108 .....
16.8-17.29MHz
C107 .....
T107 .....
OUT .....
RE107 .....
12.6-13.19MHz
C106 .....
T106 .....
OUT .....
8.4-8.79MHz..
RE106 .....
C105 .....
T105 .....
OUT .....
6.3-6.59MHz .
RE105 .....
C104 .....
T104 .....
OUT .....
4.2-4.39MHz .
RE103 .....
C102 .....
T102 .....
OPTIONAL ..
INPUT .....
C126
C111
RE112
3.1-3.79MHz
OUT
T112
C112
2.5-3.09MHz
RE113
OUT
C109
T106
2.0-2.49MHz
RE110
OUT
C110
T110
1.6-1.99MHz
OUT
RE111
IC101
OPTIONAL
T117
C125
T121
MIXER BLOCK
T120
Rx BLOCK S1303
C117
SIMPLEX RELAY
RE118.....
D102 .....
R101 .....
Rx BLOCK ARQ
RE101 .....
Vcc IN (22V)
D101 .....
T118 .....
C118 .....
T119 .....
C119 .....

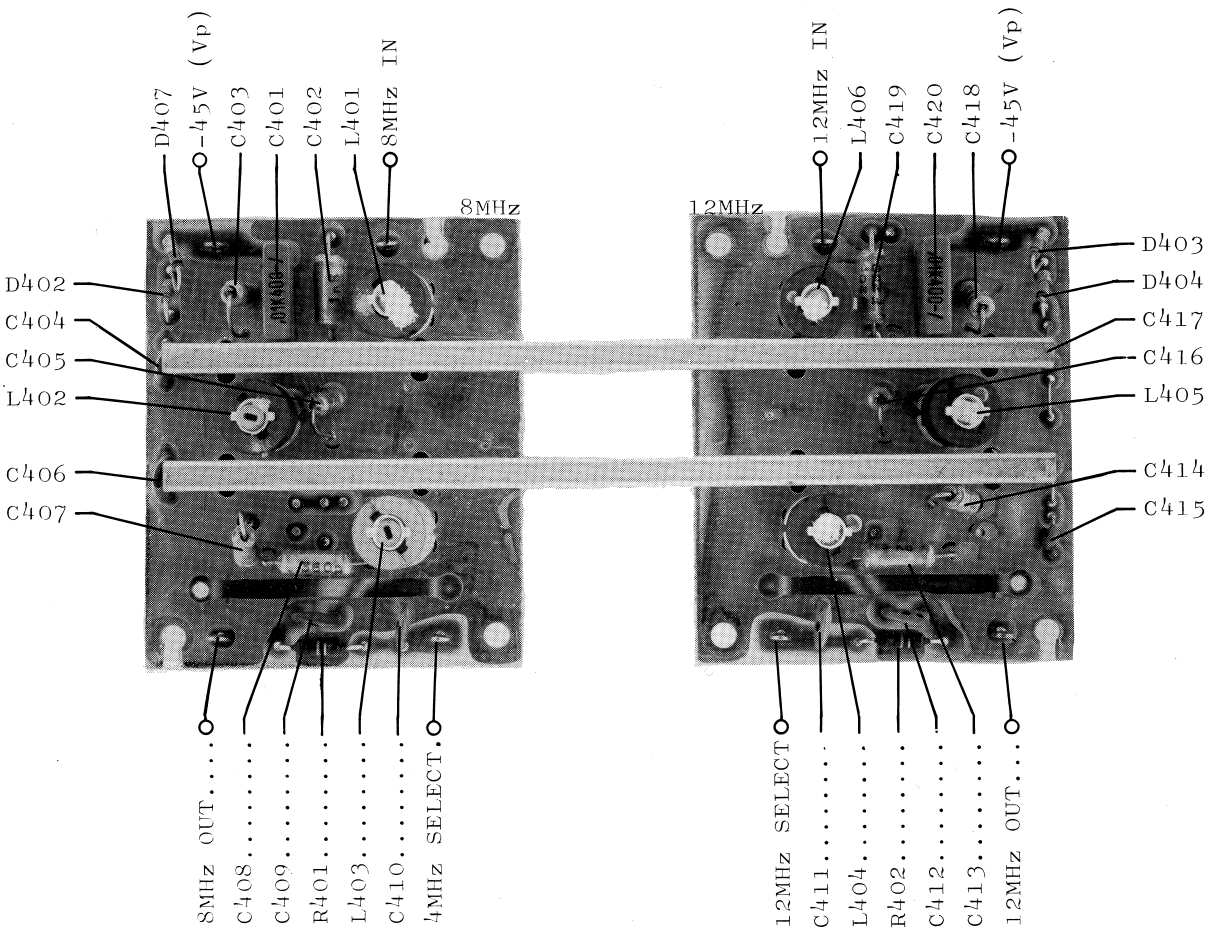

TO BAND FILTER
Rx BLOCK (S1303)
OPTIONAL
4.2-4.39 MHz
OPTIONAL
6.3-6.59 MHz
8.4-8.79 MHz
12.6-13.19 MHz
16.8-17.29 MHz
22.3-22.59 MHz
2.0-2.49 MHz
CT2
1.6-1.99 MHz
CT1
3.1-3.79 MHz
CT4
2.5-3.09 MHz
CT3
OPTIONAL
T101-T116 = BC328-25
R102-R133 = 6K8
T122-T125 = BC548B
IC101
MC 14515 BCP
AERIAL INPUT
+Vcc IN (22V)
SIMPLEX RELAY
+18Va
MIXER BLOCK
Rx BLOCK (ARQ)
BAND CODE
AERIAL SWITCH (100)
5-0 23716
TO BAND FILTER

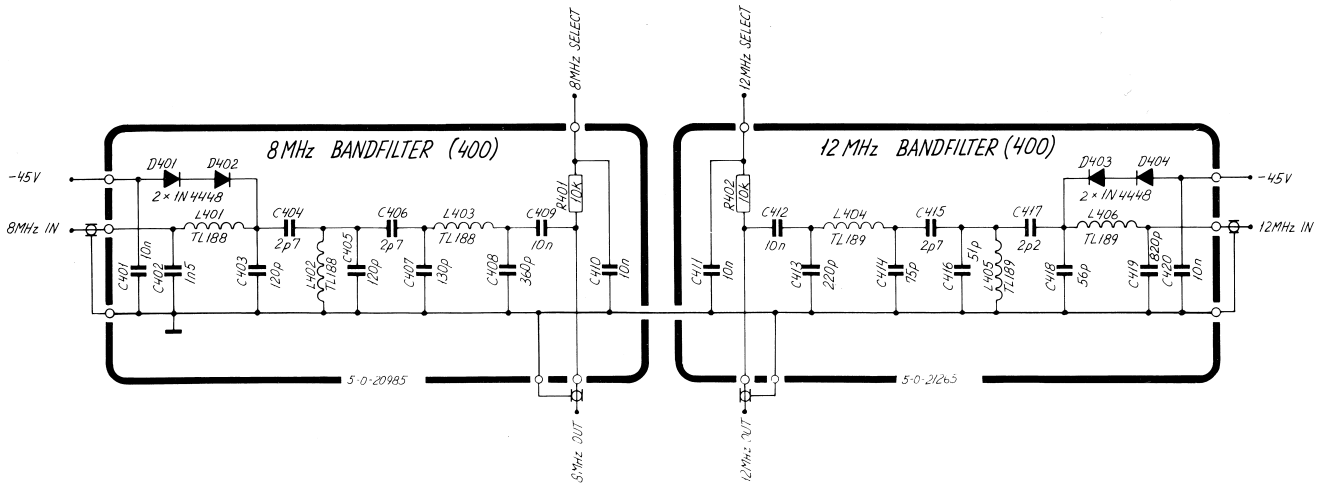

D207
-45V (Vp)
C203
C201
C202
L201
4MHz IN
4MHz
22MHz
22MHz IN
L206
C219
C220
C218
-45V (Vp)
D202
C204
C205
L202
C206
C207
D203
D204
C217
C216
L205
C214
C215
4MHz OUT.....
C208.....
C209.....
R201.....
L203.....
C210.....
4MHz SELECT.
22MHz SELECT
C211.....
L204.....
R202.....
C212.....
C213.....
22MHz OUT...


4MHz SELECT
22MHz SELECT
4MHz BANDFILTER (200)
22MHz BANDFILTER (200)
-45V
4MHz IN
D201
2×1N4448
L201
TL186
C201 10n
C202 2n2
C203 91p
C204 2p7
L202 TL186
C205 82p
C206 3p3
C207 91p
L203 TL186
C208 470p
C209 10n
R201 10K
C210 10n
5-D-20985
4MHz OUT
R202 10K
C211 10n
C212 10n
L204 TL191
C213 100p
C214 82p
C215 2p2
C216 51p
L205 TL191
C217 2p2
C218 51p
L206 TL191
C219 68p
C220 10n
D203
D204
2×1N4448
-45V
22MHz IN
5-D-21265
22MHz OUT


D307
-45V (Vp)
C303
C301
C302
L301
6MHz IN
6MHz
16MHz
16MHz IN
L306
C319
C320
C318
-45V (Vp)
D302
C304
C305
L302
C306
C307
D303
D304
C317
C316
L305
C314
C315
6MHz OUT....
C308.....
C309.....
R301.....
L203.....
C310.....
6MHz SELECT.
16MHz SELECT
C311.....
L304.....
R302.....
C312.....
C313.....
16MHz OUT...

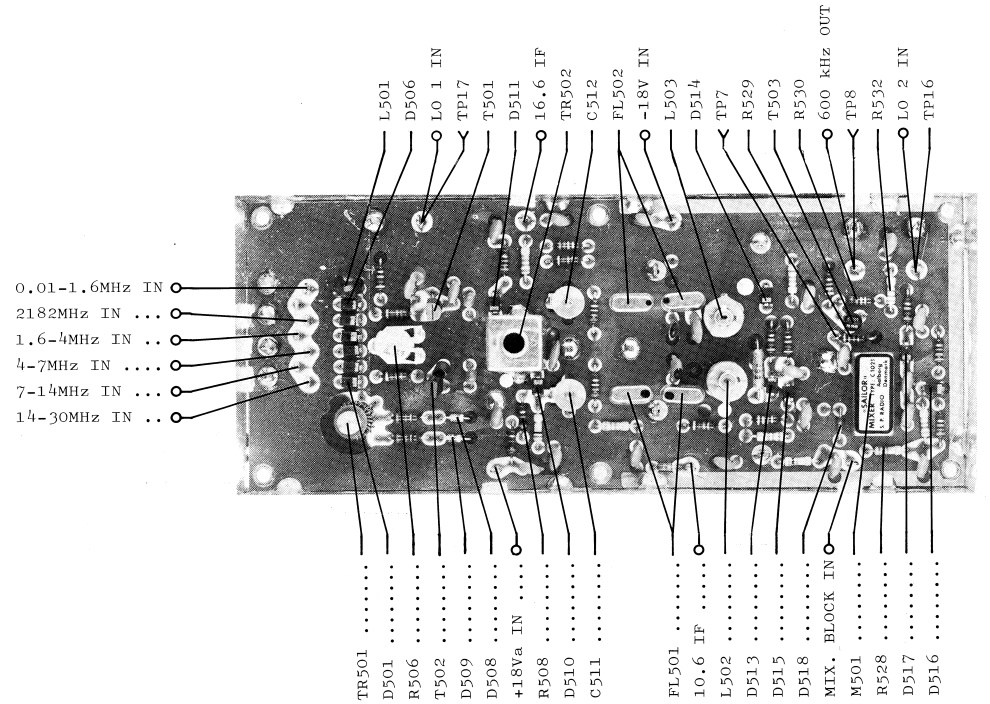

6MHz SELECT
16MHz SELECT
6MHz BANDFILTER (300)
16MHz BANDFILTER (300)
-45V
6MHz IN
D301
D302
2×IN4448
L301
TL187
C304
2p7
C306
3p3
L303
TL187
C309
10n
R301
10K
C301
10n
C302
1n5
C303
9p
L302
TL187
C305
82p
C307
9p
C308
360p
C310
10n
C311
10n
R302
10K
C312
10n
L304
TL190
C315
2p2
C317
1p8
D303
D304
2×IN4448
L306
TL190
C313
130p
C314
62p
C316
51p
L305
TL190
C318
51p
C319
150p
C320
10n
16MHz IN
5-0-20985
5-0-21265
6MHz OUT
16MHz OUT

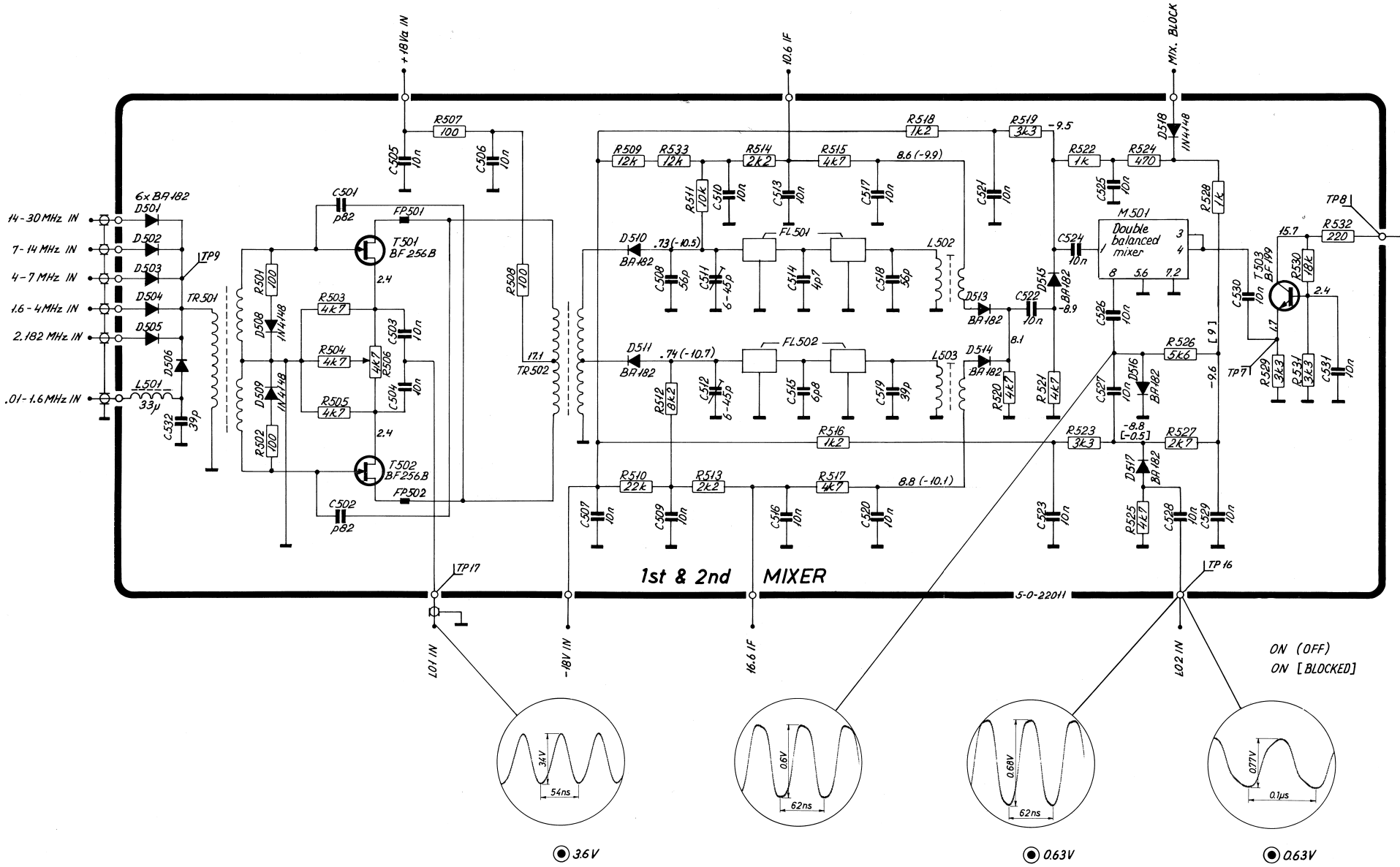

D407
-45V (Vp)
C403
C401
C402
L401
8MHz IN
8MHz
12MHz
12MHz IN
L406
C419
C420
C418
-45V (Vp)
D402
C404
C405
L402
C406
C407
D403
D404
C417
C416
L405
C414
C415
8MHz OUT....
C408.....
C409.....
R401.....
L403.....
C410.....
4MHz SELECT.
12MHz SELECT
C411.....
L404.....
R402.....
C412.....
C413.....
12MHz OUT...


8MHz SELECT
12MHz SELECT
8MHz BANDFILTER (400)
12 MHz BANDFILTER (400)
D401
D402
2 × IN 4448
D403
D404
2 × IN 4448
-45V
-45V
8MHz IN
12MHz IN
L401 TL188
C404 2p7
C406 2p7
L403 TL188
C409 10n
R401 10K
R402 10K
C412 10n
L404 TL189
C415 2p7
C417 2p2
L406 TL189
C401 10n
C402 1n5
C403 120p
L402 TL188
C405 120p
C407 130p
C408 360p
C410 10n
C411 10n
C413 220p
C414 15p
C416 51p
L405 TL189
C418 56p
C419 820p
C420 10n
5-0-20985
5-0-21265
8MHz OUT
12MHz OUT

TEST CONDITIONS

Frequency setting : 2.0005 MHz
Oscilloscope input : Passive probe 10:1
DC voltmeter input : 10 Mohm
⊙: Diode probe measurement
TP: Testpoint
All voltage statements are typical





CIRCUIT DESCRIPTION IF FILTER R1120

This unit contains the AM filter, the SSB filter, the telegraphy filters, the external circuit for an auxiliary filter and a tuned 600 kHz amplifier.

The fifth order AM filter C1016 ensures the necessary adjacent channel selectivity and far away attenuation in the AM mode.

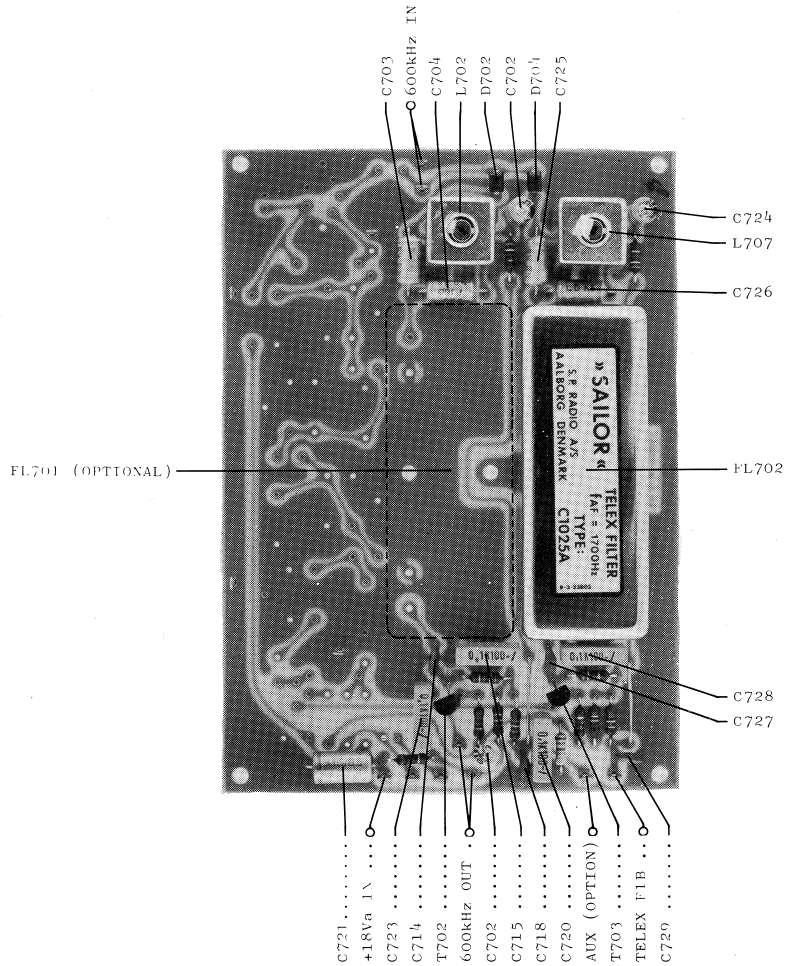
The high order SSB filter FL601 together with the tuned circuit L606, C615 and C616 ensures the necessary carrier rejection, adjacent channel selectivity and far away attenuation in the SSB mode.

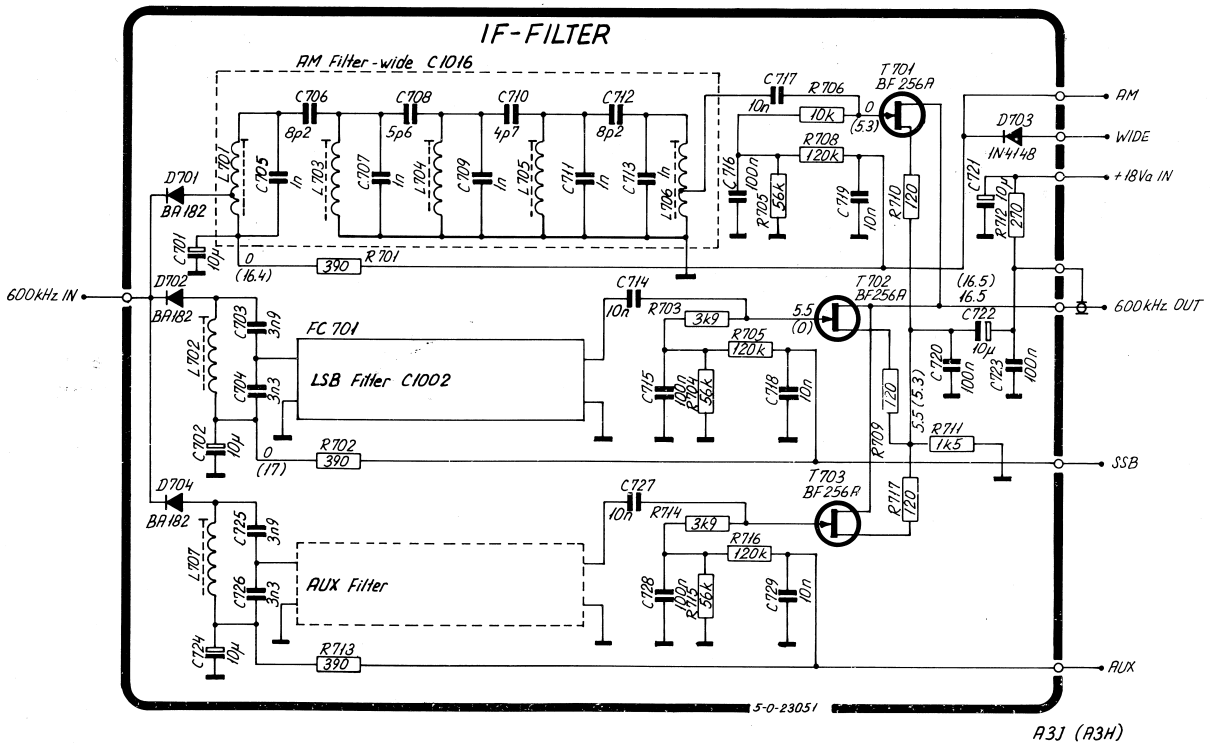
The high order telegraphy filters FL603, FL604 and FL605 together with their tuned circuits ensures the necessary adjacent channel selectivity and far away attenuation in the A1 and A2 modes.

Depending on the filter chosen one of the FET's T601, T602, T603, T604, T605 and T606 is a 600 kHz tuned amplifier stage. The tuned circuit is located on the IF AMPLIFIER, DETECTOR AND AGC PCB.

The switching in and out takes place by means of the switching diodes D601, D602, D603, D604, D605, D606 and the above mentioned FET's.

The center frequency of the second IF is 600 kHz.


C703
600kHz IN
C704
L702
D702
C702
D704
C725
C724
L707
C726
FL701 (OPTIONAL)
FL702
C728
C727
C721 .....
+18Va IN .....
C723 .....
C714 .....
T702 .....
600kHz OUT .....
C702 .....
C715 .....
C718 .....
C720 .....
AUX (OPTION)
T703 .....
TELEX FIB .....
C729 .....


IF-FILTER
AM Filter-wide C1016
LSB Filter C1002
AUX Filter
FC 701
600kHz IN
600kHz OUT
AM
WIDE
+18Va IN
SSB
AUX
5-0-23051

A3J (A3H)

CIRCUIT DESCRIPTION IF AMPLIFIER, DETECTOR AND AGC R1119 & R1120

This unit contains the 600 kHz IF amplifier, the AM and SSB detector and the AM and SSB AGC system.

IF AMPLIFIER

The IF signal from the IF FILTERS enters the 600 kHz tuned circuit L801, C802 and C803. From a tap on L801 the signal is fed to the gate of T804 where it is amplified. The load of T804 consists of a 600 kHz fixed tuned circuit L802, C810 and C811.

From the drain of T804 the signal is fed to the gate of T808. The load of T808 consists of a 600 kHz fixed tuned circuit L803, C818 and C819. The diodes D805 and D806 are amplitude limiters to protect T814.

From the drain of T808 the signal is fed to the base of the untuned amplifier T814. From the collector of T814 the signal is fed to the base of the tuned amplifier T817D. The tuned circuit consists of L805, C834 and C837.

The stabistors D814 and D815 are amplitude limiters to limit the output in the AGC OFF mode.

DETECTOR

From L805 the signal is fed to the bases of T817A and T817B, which are an envelope transistor detector suitable for AM signals.

In the SSB mode a carrier reinjection signal is added to the IF signal via T817C and L805 in such a way that the modulation percent is kept low, approx. 11% in the resulting A3H signal to ensure low detector distortion.

R1120 only:

In the A1 mode the BFO signal is added to the IF signal instead of the fixed 600 kHz carrier reinjection signal.

AGC SYSTEM

The control of the IF amplification is carried out by negative feed-back and decreasing of the load impedance of the three tuned amplifier stages by means of the transistors T801, T806 and T809. That will say increasing current means decreasing gain. The AGC voltage is fed to T801, T806 and T809 from C813 via the amplifier consisting of T803 and T805.

A3H (AM) MODE

The information to the AGC system is taken at the emitter of T817D and fed to the emitter follower T813 via C825 to a peak detector consisting of D808 and T812.

T812 acts as a DC amplifier with a ripple filter R835 and C820. The signal is then fed to another emitter follower T810. The signal from T811 is grounded through R826. From T810 the signal is fed to the capacitor C813, thus feeding the AGC voltage to transistor T805. C813 is discharged through R820 and R827 which in A3H mode is grounded.

The discharge path through R841 is off because T815 is off.

A3J (SSB) MODE

Charge of C813 and C816.

As in the A3H mode the signal is taken at the emitter of T817D and passed through T813, T812 and R835 to the transistors T811 and T810, transistor T811 is charging C816 through R826 and T810 is charging C813 through R820. C816 is charged very fast to the AGC voltage, but because of the voltage divider R826 and R824 the voltage on C813 is taking over after a while, meaning that in the steady state condition the AGC voltage is the voltage on C813.

At the same time C832 is charged to 4.2V via T807 and R828, giving a reference voltage for the hang AGC system. When the voltage on C828 is over 1.2V transistor T816 is on and T815 is off meaning that the discharge path of C813 through R841 is off.

When the IF signal disappears the only discharge path of C813 is via the base of T805 as T815 is off. C832 is now discharged through R865, T816 and D810. When the voltage across C832 is so low that T816 goes off, T815 goes on and C813 is discharged through R841.

When the AGC switch is in TELEX MODE, R827 is grounded and C813 is discharged through R820 and R827 when the IF signal disappears.

Remaining functions of the unit:

The transistor T802 is the emitter follower for the AGC meter.

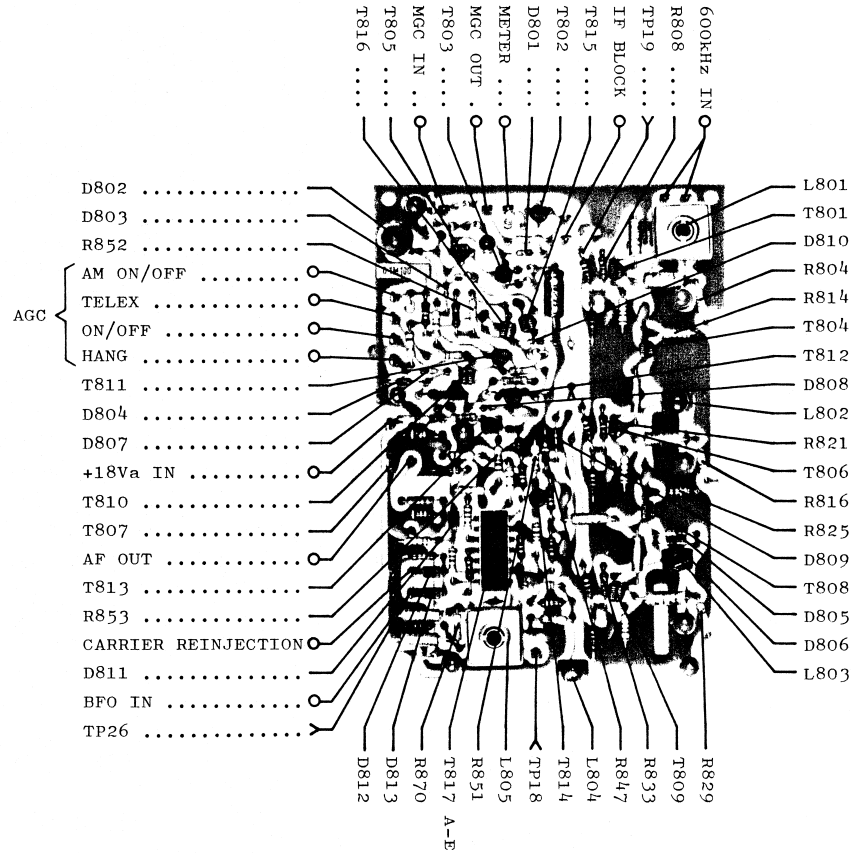
The AGC ON/OFF function is performed by grounding the base of T810 and T811.

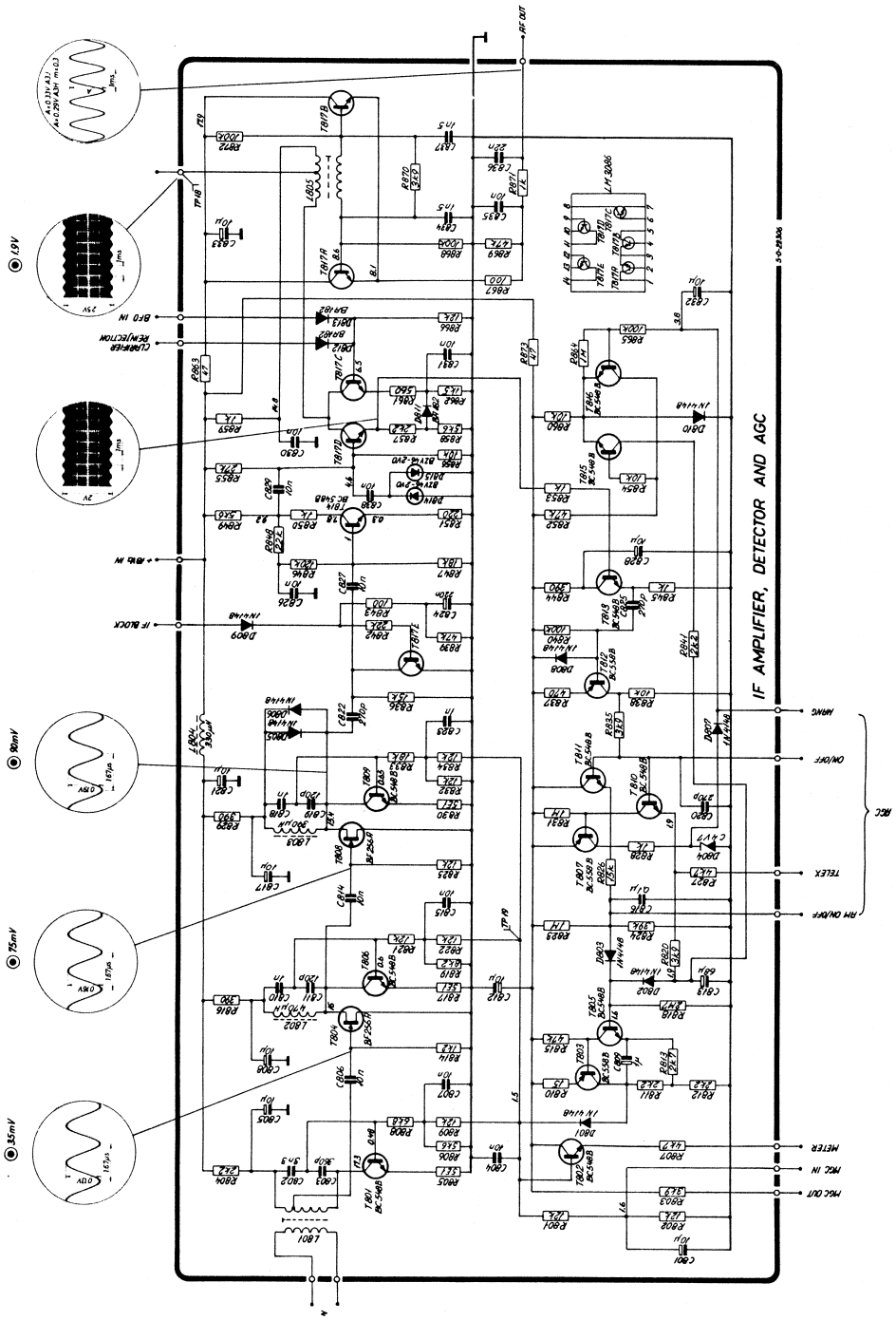
The MGC function is performed by means of the voltage divider R801, R802, R2604 (RF-GAIN) R2603 and R803.

TEST CONDITIONS

Frequency setting	: f = 2.0005 MHz
Mode	: A3J (A3H)
Clarifier	: Center position
RF input	: 1 mW EMF/50 ohm
AGC	: ON
RF gain	: Maximum
Front end tuned to max. meter reading	
Oscilloscope input	: Passive probe 10:1
DC voltmeter input	: 10 Mohm

⊙: Diode probe measurements
TP: Testpoints
All voltage statements are typical





CIRCUIT DESCRIPTION AUDIO AMPLIFIER R1119 & R1120

This unit contains the AF preamplifier, the active low pass filter, the 0 dBm fixed AF output amplifier and the AF power amplifier.

AF PREAMPLIFIER AND LOW PASS FILTER

The AF signal from the detector is amplified in the operational amplifier IC901d and fed to the fifth order active LP filter with a cut-off frequency of 2.9 kHz. The active filter is built-up around the operational amplifiers IC901c and IC901b. The signal is then fed to the 0 dBm fixed AF output amplifier IC901a, the output from which enters the output transformer L2502 located on the INPUT FILTER circuit board.

AF POWER AMPLIFIER

From the output of the active filter, R921, the signal is fed to the AF GAIN, R2607, and from there to the input of the power amplifier C914.

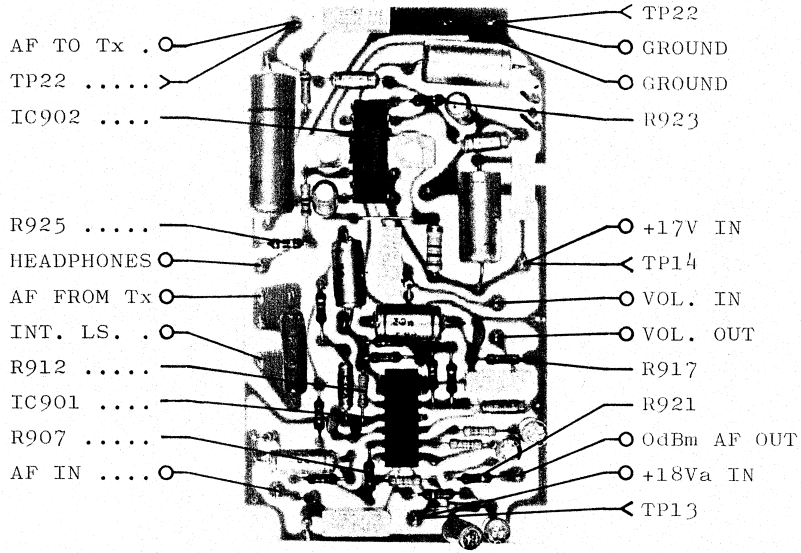
The integrated power amplifier IC902 has two built-in protection facilities, namely output current limiter and thermal shut-down, which means that the power amplifier cannot be destroyed by overload.

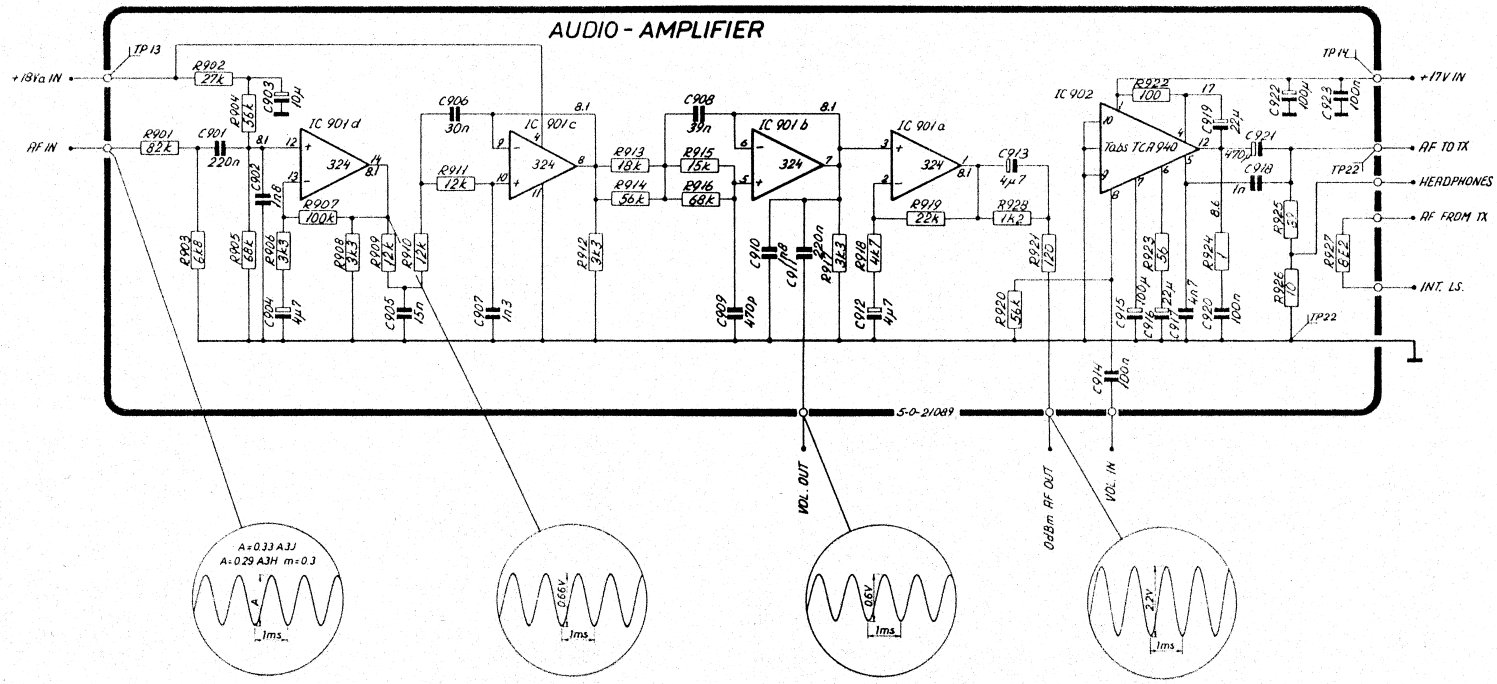
From the output terminal, pin 12, the signal is fed to the loudspeaker and the voltage divider for headphones output, J2602.

TEST CONDITIONS

Frequency setting	: f = 2.0005 MHz
Mode	: A3J (A3H)
Clarifier	: Center position
RF input	: 1 mW EMF/50 ohm
AGC	: ON
RF gain	: Maximum
Front end tuned to max. meter reading	
Oscilloscope input	: Passive probe 10:1
DC voltmeter input	: 10 Mohm

⦿: Diode probe measurements
TP: Testpoints
All voltage statements are typical


AF TO Tx .
TP22 .....
IC902 ....
R925 .....
HEADPHONES
AF FROM Tx
INT. LS. .
R912 .....
IC901 ....
R907 .....
AF IN ....
TP22
GROUND
GROUND
R923
+17V IN
TP14
VOL. IN
VOL. OUT
R917
R921
0dBm AF OUT
+18Va IN
TP13


AUDIO - AMPLIFIER
+18Va IN
AF IN
TP13
IC 901 d
IC 901 c
IC 901 b
IC 901 a
IC 902
TDA TCA 940
+17V IN
AF TO TX
HEADPHONES
AF FROM TX
INT. LS.
TP22
TP14
5-0-2/089
VOL. OUT
0dBm AF OUT
VOL. IN
A=0.33 A3J
A=0.29 A3H m=0.3
1ms
0.66V
0.6V
2.2V

CIRCUIT DESCRIPTION FOR DIVIDER UNIT R1119 & R1120

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

The 10 MHz reference oscillator (TCXO), reference divider, 2 MHz spectrum generator, 600 kHz carrier generator, programmable dividers for LOOP 1 and LOOP 2, the phase/frequency detectors for LOOP 1 and LOOP 2 and the 10/16 MHz output for the VCXO 1st LOOP 2 MIXER & LOOP 2 FILTER.

10 MHz REFERENCE

The frequency stability of the receiver is related to the 10 MHz TCXO X01001. The 10 MHz reference signal is amplified in the transistors T1004 and T1005.

REFERENCE DIVIDER

The counters IC1015, IC1011 and IC1007 divides the 10 MHz reference signal down to respectively f_{R1} = 1 kHz and f_{R2} = 100 Hz.

2 MHz HARMONIC SPECTRUM GENERATOR

With a repetition frequency of 2 MHz the output Q_D of IC1015 goes low and the nand-gates in IC1014 will generate a narrow pulse due to the delay-time in the gates.

600 kHz GENERATOR

The output on IC1011 pin 5, Q_B has a high contents of 600 kHz, which is amplified in the transistor T1006 and filter in the tuned circuit L1002, C1021 and C1022.

PROGRAMMABLE DIVIDER FOR LOOP 1

The variable frequency f_{T1} from LOOP 1 MIXER is amplified and shaped in T1001 and IC1009a. 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 KEY-BOARD CONTROL, which encodes the start figure P_1 into the BCD counters IC1001, IC1002, IC1003 and IC1004.

The stop figure S_1 is controlled from the gates IC1008b and IC1009c. When the counter outputs Q_A, Q_B ... etc. equals the stop figure S_1 + 2 the J-K flip-flop IC1010b uses 2 clock pulses to load the start figure P_1 into the counters IC1001, IC1002, IC1003 and IC1004. 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 kHz and the variable frequency f_{V1} = 1 kHz are fed into the phase/frequency detector IC1006. The phase/frequency detector IC1006 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 T1002 and IC1009b. The frequency f_{T2} will vary between 7.85 kHz and 9.25 kHz depending on the 100 Hz programming. The programmable divider divides f_{T1} down to 100 Hz (dividing figure N_2).

From the KEYBOARD CONTROL the start figure P_2 encodes into the BCD counter IC1005.

The stop figure S_2 is controlled from the gate IC1008a. When the counter outputs Q_A, Q_B, Q_C ... etc. equals the stop figure S_2 - 2 the J-K flip-flop IC1010a uses 2 clock pulses to load the start figure P_2 into the counters IC1005 and IC1012. 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 IC1013. The phase/frequency detector IC1013 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 1st LOOP 2 MIXER & LOOP 2 FILTER.

10/16 MHz OUTPUT

The 10 MHz and the 16 MHz outputs are respectively taken from the 10 MHz amplifier T1005 and the 16 MHz tuned amplifier T1003 which is fed from pin 11 of the reference divider IC1015. This output has a high content of 16 MHz. The signals are added in the resistors R1027, R1025 and R1026 and fed to the VCXO 1st LOOP 1 MIXER & LOOP 2 FILTER.

TEST CONDITIONS

Frequency setting	: 2.0005 MHz
Mode	: A3J
Clarifier	: Center position
Oscilloscope input	: Passive probe 10:1
DC voltmeter input	: 10 Mohm

⊙: Diode probe measurements
TP: Testpoints
All voltage statements are typical

1.7V 3.2V 460mV 3.5mV

1.6V 0.38µs 3-5V 0.38µs 0.1µs 3-5V 0.12ms 0.15V

1kHz 10kHz 100kHz 1 MHz +18V/0 IN 10 & 16 MHz OUT 10 MHz OUT

LOOP 1 IN

C1004 10n TJ001 2N2368 TTL - driver

R1004 15k R1003 560 R1001 15k +5V

IC 1009a 1/3 × 74 LS 27

IC 1004 74 LS 192 Down

IC 1003 74 LS 192 Clear

IC 1002 74 LS 192 Clear

IC 1001 74 LS 192 Clear

IC 1008b 1/2 × 74 LS 20

IC 1009c 1/3 × 74 LS 27

IC 1010 b 1/2 × 74 LS 109

PROGRAMABLE - DIVIDER (LOOP 1)

DIVIDER

R1012 220

TCXO 10 MHz X01001

R1018 10k R1020 2k2 R1022 22k R1024 1k8 TP3 +5V

C1009 15n BF199 T1004 C1010 47n 2N2368 T1005

R1025 10k R1026 220 R1027 2k2 R1028 47k

R1011 390 D1001 BZX79C12 C1008 220n R1013 2k2 R1019 1k2 R1021 560 R1023 270

C1006 22n

10.0 MHz REFERENCE

L1001 TL235

FP1001 T1003 BF494 C1005 68p R1014 1k2 R1015 10k

C1011 220n C1012 10µ C1013 10µ C1014 220n C1015 47n C1016 220n C1017 220n C1018 220n C1019 220n

+8V +5V MC 7805 CT

IC 1007 74 LS 390

IC 1011 74 LS 390

IC 1015 74 LS 290

REFERENCE - DIVIDER

IC 1005 74 LS 192

IC 1008a 1/2 × 74 LS 109

IC 1012a 1/2 × 74 LS 390

IC 1012b 1/2 × 74 LS 390

100 Hz D C B A

LOOP 2 IN

C1002 10µ T1002 2N2368 TTL - DRIVER

R1002 15k R1005 560 C1003 12p R1006 5k6 IC 1009b 1/3 × 74 LS 27

IC 1008a 1/2 × 74 LS 20

PROGRAMABLE - DIVIDER (LOOP 2)

IC 1013 MC 4044

IC 1006 MC 4044

R1007 1k8 R1009 1k8 R1010 820 R1016 820

C1004 10n 100 Hz PHASE/ FREQ.-DETECTOR

C1007 10n 1 kHz PHASE/ FREQ.-DETECTOR

R1017 270

IC 1014 74 10

2 MHz - HARMONIC - SPECTRUM GENERATOR

C1020 220n R1029 2k2 R1031 220 R1033 12k R1034 6k8 C1021 7n2 C1022 6n8 D1002 BAW 62 T1006 BF199 R1030 1k R1032 680

600 kHz GENERATOR

R1035 1k Vcc FOR 600kHz CARRIER

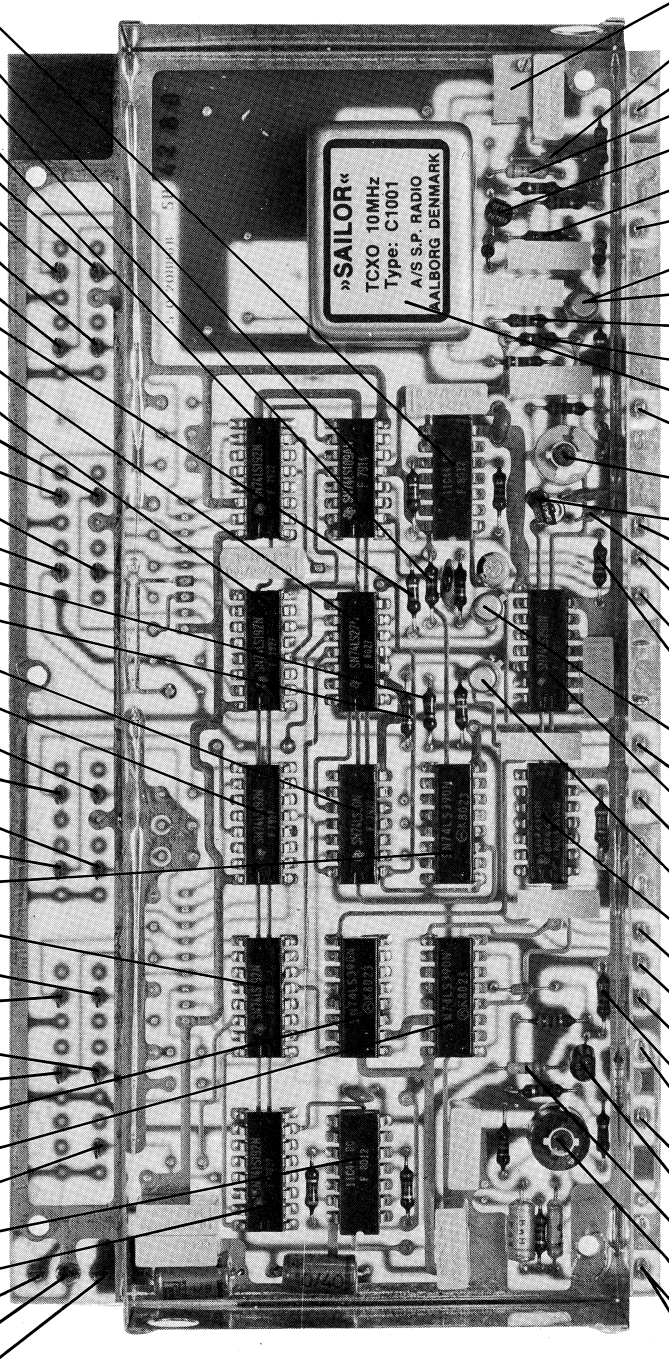
600 kHz OUT TP5

5-0-20886

PD2 (+1.5V) OUT PD2 OUT 100 Hz OUT PD1 (+1.5V) OUT PD1 OUT 10 kHz OUT 2 MHz OUT

3V 0.67ms 3-5V 0.67ms 3-5V 10ms 15µs 10ms 2.3V 1.5V 3-5V 10ms 3-5V 1ms 1ms 2.3V 1.5V 3-5V 1ms 1.7V 0.5µs 3-5V 5µs 1.3V 1.67µs

3.4V IV



IC1013 .....
IC1010 .....
R1002 .....
IC1005 .....
100Hz .... A
.... D
.... B
.... C
R1005 .....
IC1009 .....
IC1004 .....
1kHz .... A
.... D
.... B
.... C
R1003 .....
R1001 .....
IC1008 .....
IC1003 .....
10kHz .... A
.... D
.... B
.... C
IC1012 .....
IC1002 .....
100kHz .... A
.... D
.... B
.... C
IC1007 .....
IC1011 .....
1MHz A .....
IC1006 .....
IC1001 .....
IC2602 .. +5V
GROUND
.. +8V

R1013
D1001
+18Vb IN
R1019
T1004
R1021
10MHz OUT
T1005
TP3
R1022
R1024
X01001
10 & 16MHz OUT
L1001
T1003
PD2 (+1.5V) OUT
R1014
PD2 OUT
LOOP 2 IN
R1015
T1002
LOOP 1 IN ≺ TP28
IC1015
2MHz OUT
T1001
IC1014
100Hz OUT
10kHz OUT
PD1 OUT
R1030
PD1 (+1.5V) OUT
Vcc FOR 600kHz CARRIER
T1006
R1032
L1002
600kHz OUT
TP5

CIRCUIT DESCRIPTION LOOP 1 FILTER & ± 18V SUPPLY UNIT R1119 & R1120

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

-18V SUPPLY

The series transistor T1103 supplies a -18V output controlled by the current flow into its base from T1105, where a portion of the output voltage, via a voltage divider containing R1110, is compared to a reference voltage created by R1103, D1102 and D1103. 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 R1103. When the regulator reaches this limit, T1105 stops conducting and so it folds back. To ensure that T1103 starts conducting R1104 is added.

+18V SUPPLY

The principle of operation for this regulator is exactly as described above, with an additional current limiter containing T1104 and T1106 to ensure the fold-back characteristic is maintained within design limits. To ensure start-up R1112 is added.

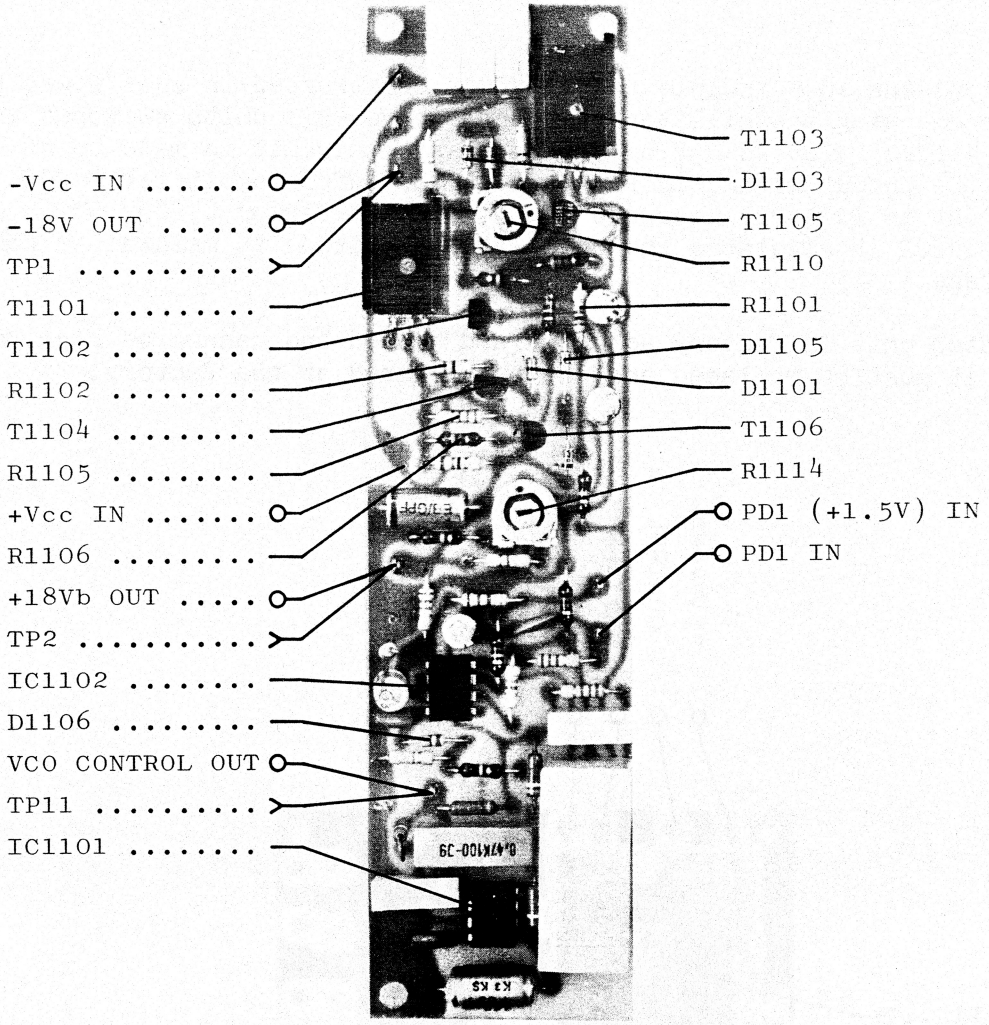
INTEGRATOR & LOOP 1 FILTER

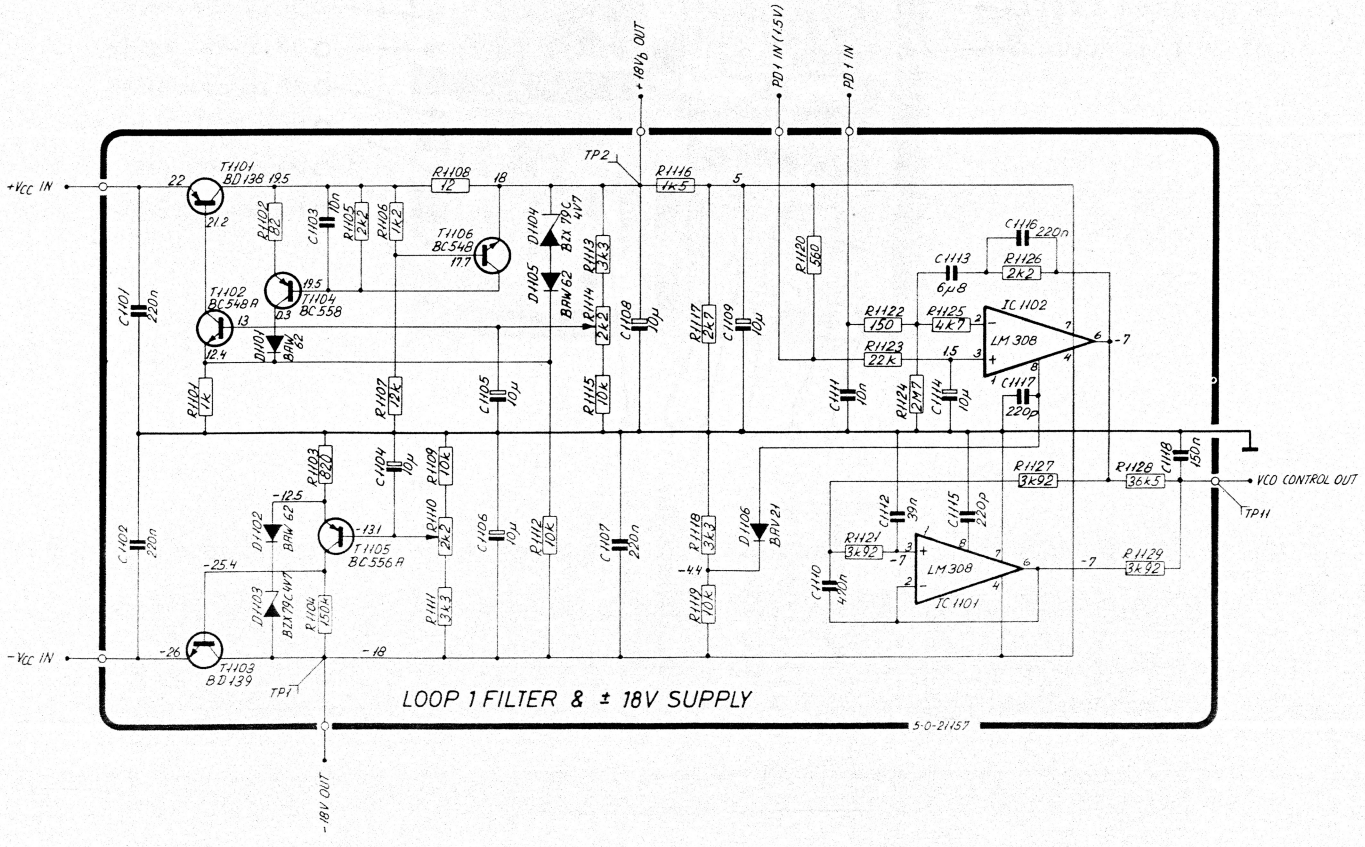
The integrator is built-up around IC1102, the integration capacitor is C1113. R1120 feeds current into the diode coupled Darlington pair in the phase comparator MC4044 on the divider board to perform the 1.5V reference. Output from the integrator pin 6 on IC1102 feeds into the active low pass filter IC1101 to filter out the 1 kHz ripple from the phase comparator. The voltage divider R1118 and R1119 connected to IC1102 via D1106 ensure that the output voltage swing is within approx. -4V to -17V.

TEST CONDITIONS

Frequency setting : 2.0005 MHz
Oscilloscope input : Passive probe 10:1
DC voltmeter input : 10 Mohm
⦿: Diode probe measurement
TP: Testpoint
All voltage statements are typical

MODULE NO. 1100

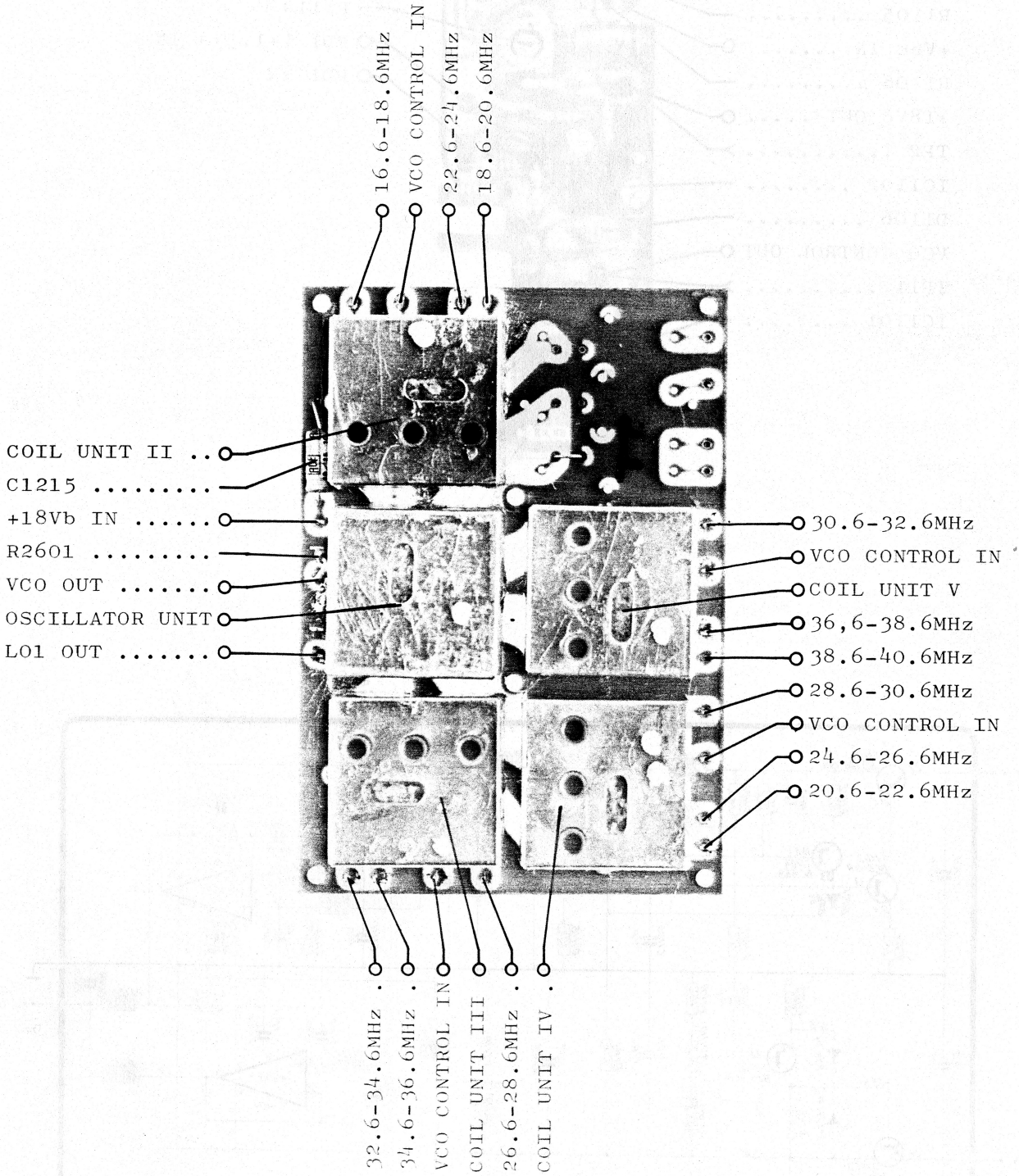

-Vcc IN .....
-18V OUT .....
TP1 .....
T1101 .....
T1102 .....
R1102 .....
T1104 .....
R1105 .....
+Vcc IN .....
R1106 .....
+18Vb OUT .....
TP2 .....
IC1102 .....
D1106 .....
VCO CONTROL OUT
TP11 .....
IC1101 .....
T1103
D1103
T1105
R1110
R1101
D1105
D1101
T1106
R1114
PD1 (+1.5V) IN
PD1 IN


+18Vb OUT
PD1 IN (1.5V)
PD1 IN
+Vcc IN
-Vcc IN
TP2
TP1
TP11
-18V OUT
VCO CONTROL OUT
T1101 BD138 195
T1102 BC548A
T1103 BD139
T1104 BC558
T1105 BC556A
T1106 BC548
D1101 BAW62
D1102 BAW62
D1103 BZX79C4V7
D1104 BZX79C4V7
D1105 BAW62
D1106 BAW62
IC1102 LM308
IC1101 LM308
LOOP 1 FILTER & ± 18V SUPPLY
5-0-21157

CIRCUIT DESCRIPTION VCO-UNIT R1119 & R1120

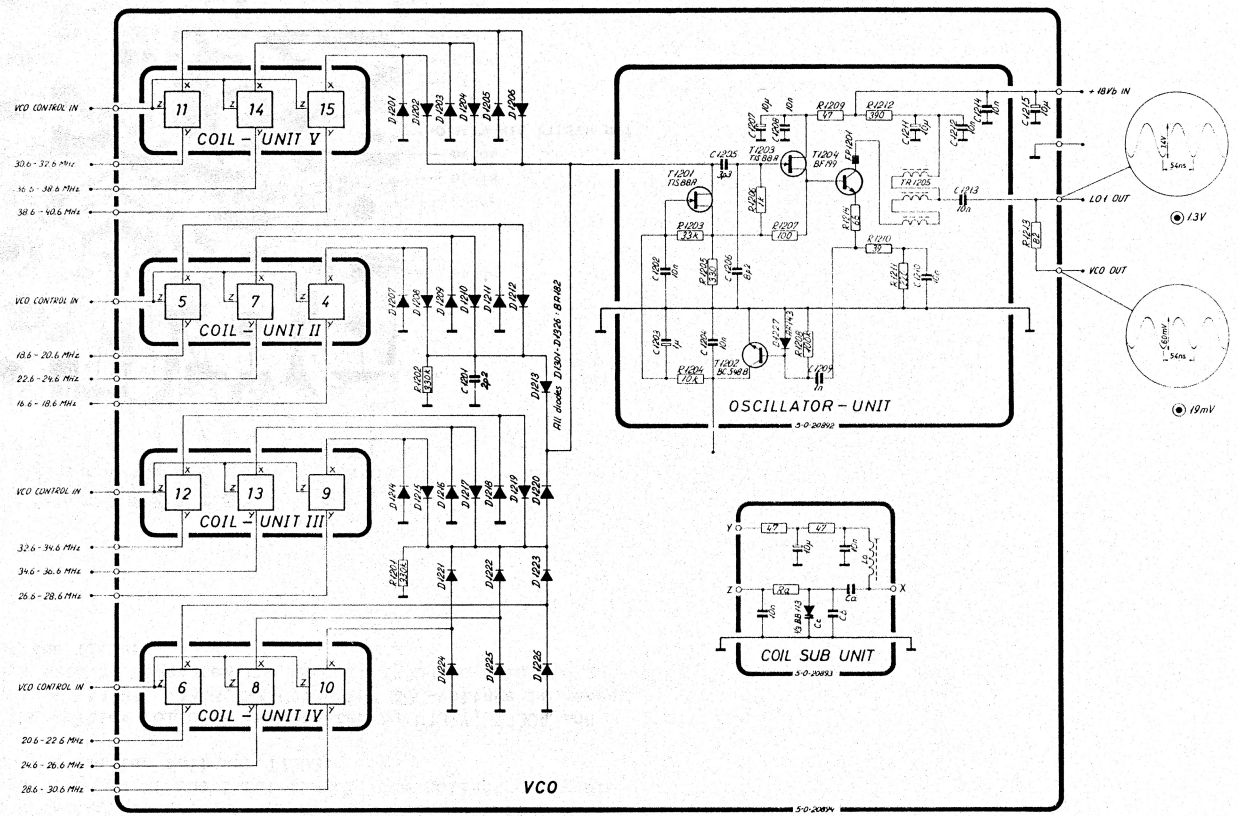
This unit contains in principle twelve VCO's constructed in such a way that it contains one single oscillator unit and twelve coil units switched in and out by the diodes D1201 to D1226. The oscillator circuit is made up of T1201 and T1203, the output signal is fed through the buffer amplifier T1204. The signal current in T1204 is measured by the level detector C1209, R1208 and D1227 and T1202 it regulates the oscillator amplitude to maintain a constant output voltage.

The oscillator unit is factory adjusted and sealed and cannot be repaired in the field, it must be replaced and can be repaired at the factory.



TEST CONDITIONS

Frequency setting : 2.0005 MHz
Oscilloscope input : Passive probe 10:1
DC voltmeter input : 10 Mohm
⊙: Diode probe measurement
TP: Testpoint
All voltage statements are typical

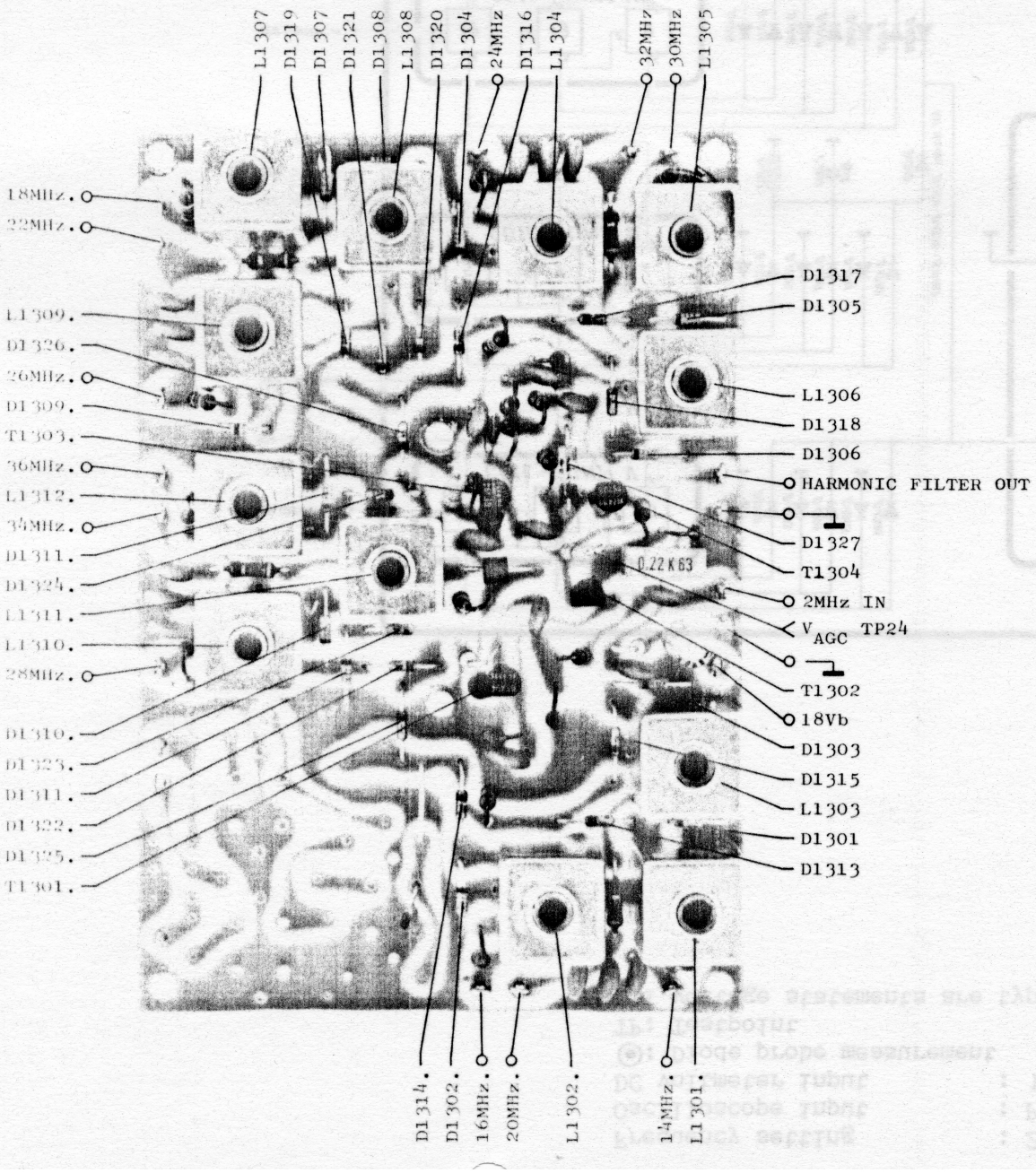


CIRCUIT DESCRIPTION HARMONIC FILTERS R1119 & R1120

This unit consists of twelve tuned LC-circuits which are switched in and out by the diodes D1313 - D1326 and an automatic gain controlled amplifier.

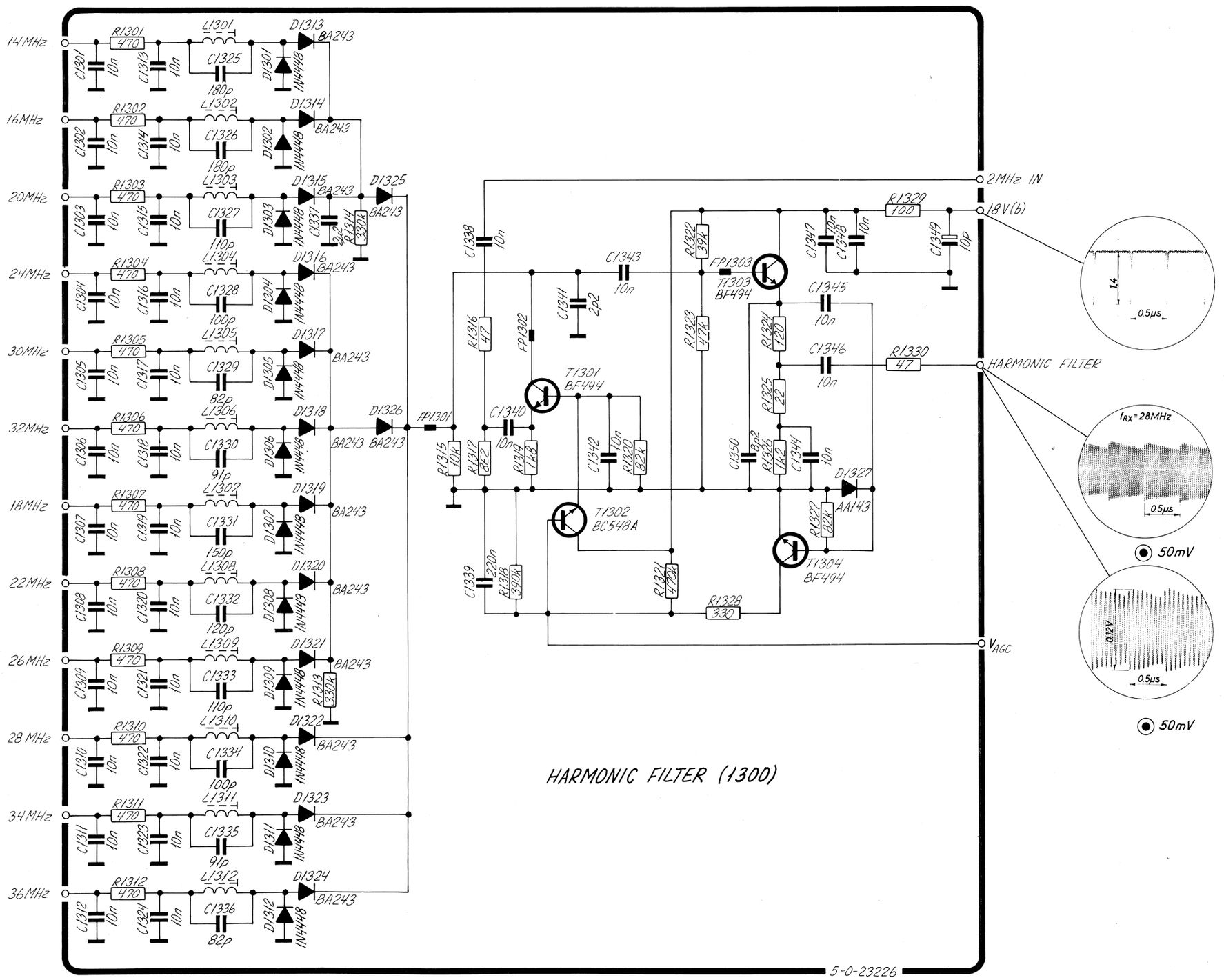
The circuit receives signal from the 2 MHz spectrum generator located on the divider board, and the selected LC-circuit together with T1301 filters out and amplifies the wanted harmonic of the input signal. The collector signal of T1301 is then fed to the emitter follower T1303.

The output voltage of the emitter follower is detected by D1327, T1304 and C1345. Through T1304, R1328, R1321, R1318,and C1339 the AGC-voltage is generated and via T1302 this voltage regulates the gain in T1301 to maintain constant output voltage of the filter.



TEST CONDITIONS

Frequency setting : 2.0005 MHz
Oscilloscope input : Passive probe 10:1
DC voltmeter input : 10 Mohm
⊙: Diode probe measurement
TP: Testpoint
All voltage statements are typical



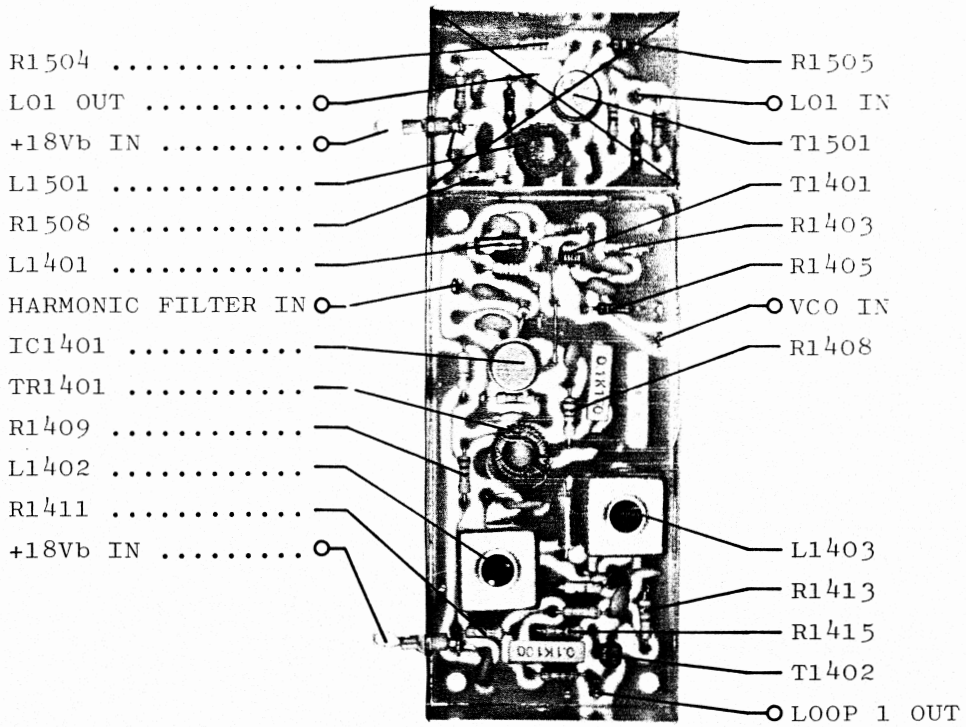
CIRCUIT DESCRIPTION LOOP 1 MIXER R1119 & R1120

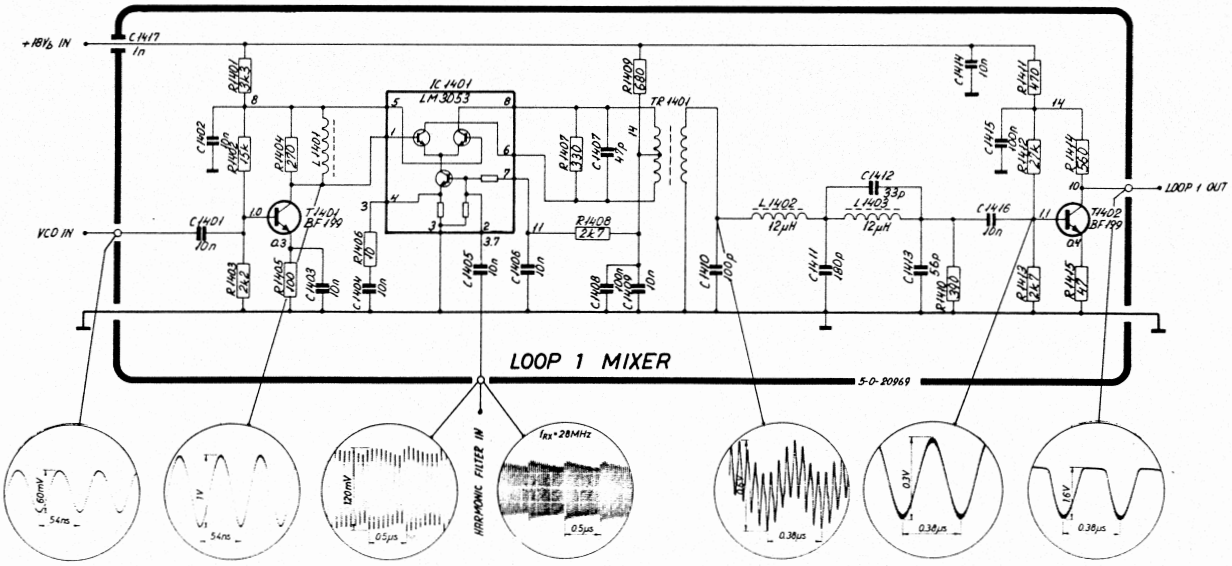
This unit mixes together the VCO signal and the signal from the harmonic filter and filters out the difference frequency to supply the variable divider.

The VCO signal is fed via C1401 to the buffer amplifier T1401 and after that to the integrated balanced mixer IC1401. To this the harmonic filter signal is applied via C1405. Output from the mixer is fed into the combiner transformer TR1401 feeding into the low pass filter containing L1402, L1403, C1410, C1411, C1412 and C1413. This low pass filter filters out the wanted mixing product and prevents the two local-oscillator signals from reaching the variable divider. The filtered signal is amplified in the output amplifier.T1402.

TEST CONDITIONS

Frequency setting : 2.0005 MHz
Oscilloscope input : Passive probe 10:1
DC voltmeter input : 10 Mohm
⊙: Diode probe measurement
TP: Testpoint
All voltage statements are typical


R1504 .....
LO1 OUT .....
+18Vb IN .....
L1501 .....
R1508 .....
L1401 .....
HARMONIC FILTER IN
IC1401 .....
TR1401 .....
R1409 .....
L1402 .....
R1411 .....
+18Vb IN .....
R1505
LO1 IN
T1501
T1401
R1403
R1405
VCO IN
R1408
L1403
R1413
R1415
T1402
LOOP 1 OUT


+18Vb IN
VCO IN
LOOP 1 OUT
IC1401 LM3053
TR1401
T1401 BF199
T1402 BF199
L1402 12µH
L1403 12µH
LOOP 1 MIXER
5-0-20969
HARMONIC FILTER IN

CIRCUIT DESCRIPTION VCO-BUFFER R1119 & R1120

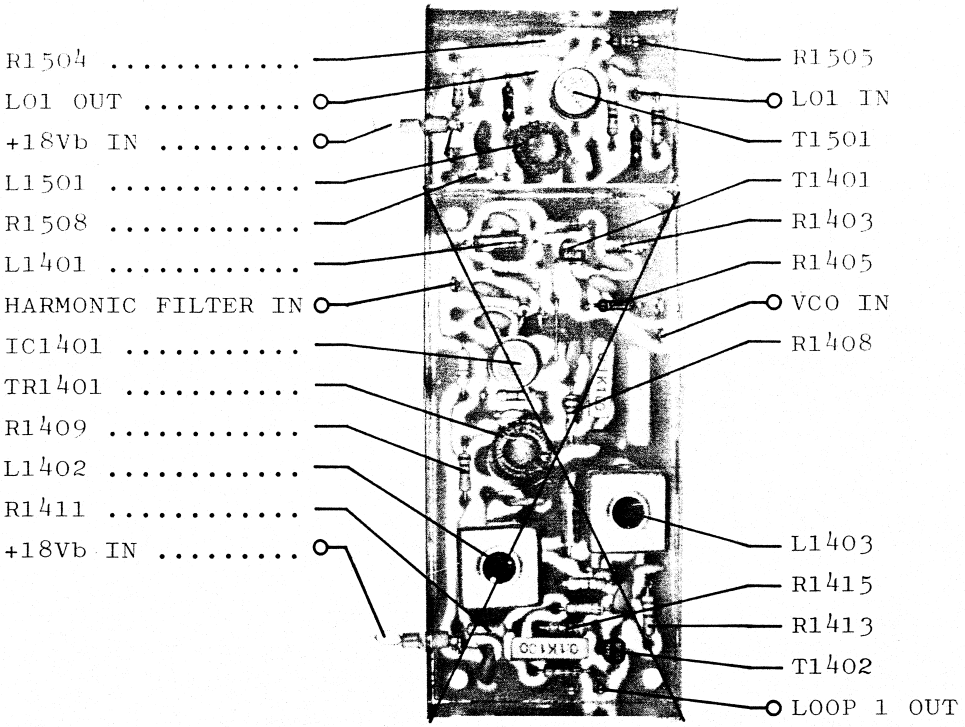
This unit contains the VCO buffer amplifier.

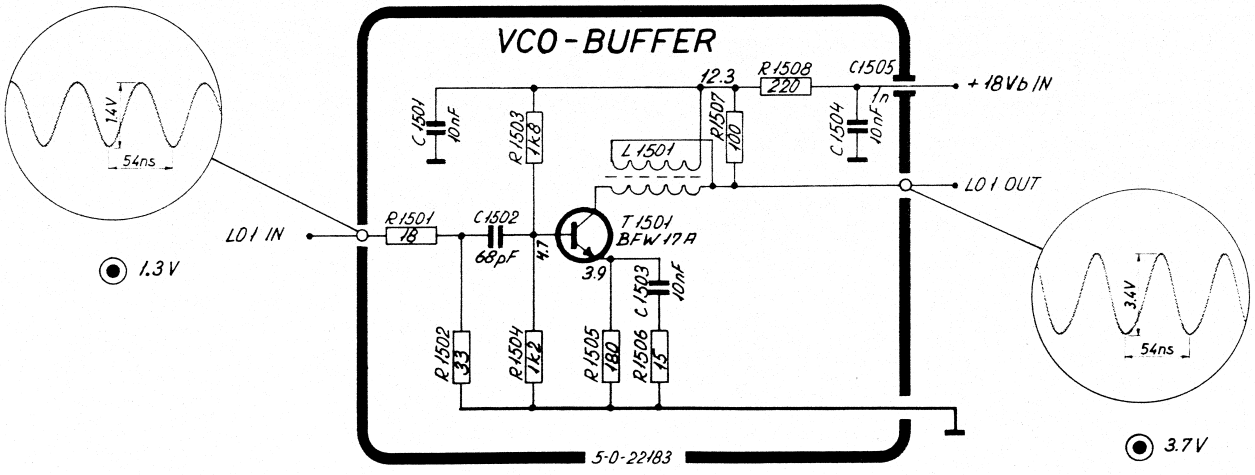
The signal from the VCO-UNIT enters the base of T1501 via the frequency compensating capacitor C1502. Capacitor C1503 and resistor R1506 are part of the frequency compensating circuit.

From the collector of T1501 the signal is fed to the 1st & 2nd MIXER circuit board via the impedance step down transformer L1501.

TEST CONDITIONS

Frequency setting : 2.0005 MHz
Oscilloscope input : Passive probe 10:1
DC voltmeter input : 10 Mohm
⊙: Diode probe measurement
TP: Testpoint
All voltage statements are typical


R1504 .....
LO1 OUT .....
+18Vb IN .....
L1501 .....
R1508 .....
L1401 .....
HARMONIC FILTER IN
IC1401 .....
TR1401 .....
R1409 .....
L1402 .....
R1411 .....
+18Vb IN .....
R1505
LO1 IN
T1501
T1401
R1403
R1405
VCO IN
R1408
L1403
R1415
R1413
T1402
LOOP 1 OUT


VCO-BUFFER
14V
54ns
1.3V
LO1 IN
R1501 18
C1502 68pF
T1501 BFW17A
4.1
3.9
C1501 10nF
R1503 1K8
L1501
12.3
R1507 100
R1508 220
C1505 1n
C1504 10nF
+18Vb IN
LO1 OUT
C1503 10nF
R1502 33
R1504 1K2
R1505 180
R1506 15
3.4V
54ns
3.7V
5-0-22183

CIRCUIT DESCRIPTION VCXO 1ST LOOP 2 MIXER & LOOP 2 FILTER R1119 & R1120

This unit contains the LOOP 2 integrator, the summing amplifier, the voltage controlled crystal oscillators (VCXO's) and the first LOOP 2 MIXER.

LOOP 2 INTEGRATOR

The integrator is built-up around IC1601a, the integration capacitor is C1609. R1628 feeds current into the diode coupled Darlington pair in the phase comperator IC1013 on the divider board in order to perform the 1.5V reference voltage. The output from the integrator pin 1 feeds into pin 5 of the summing amplifier.

SUMMING AMPLIFIER

The IC1601b sums up two signals namely the output from the integrator and the informations from the 100 Hz setting. This information is weighed by means of the resistors R1617, R1618, R1619, R1620 and R1621. This summing is done to speed up the LOOP 2 system in the continuous tuning mode.

The output, pin 7 of IC1601b, is fed to the VCXO's via a ripple filter consisting of R1616 and C1614.

VCXO's

The VCXO's are crystal controlled Pierce Collpits oscillators, the frequency of which are tuned of varicap's, D1601, D1605 and D1606.

For receiver frequencies below 14 MHz the 16 MHz oscillator is working and for frequencies above 14 MHz the 10 MHz one is working.

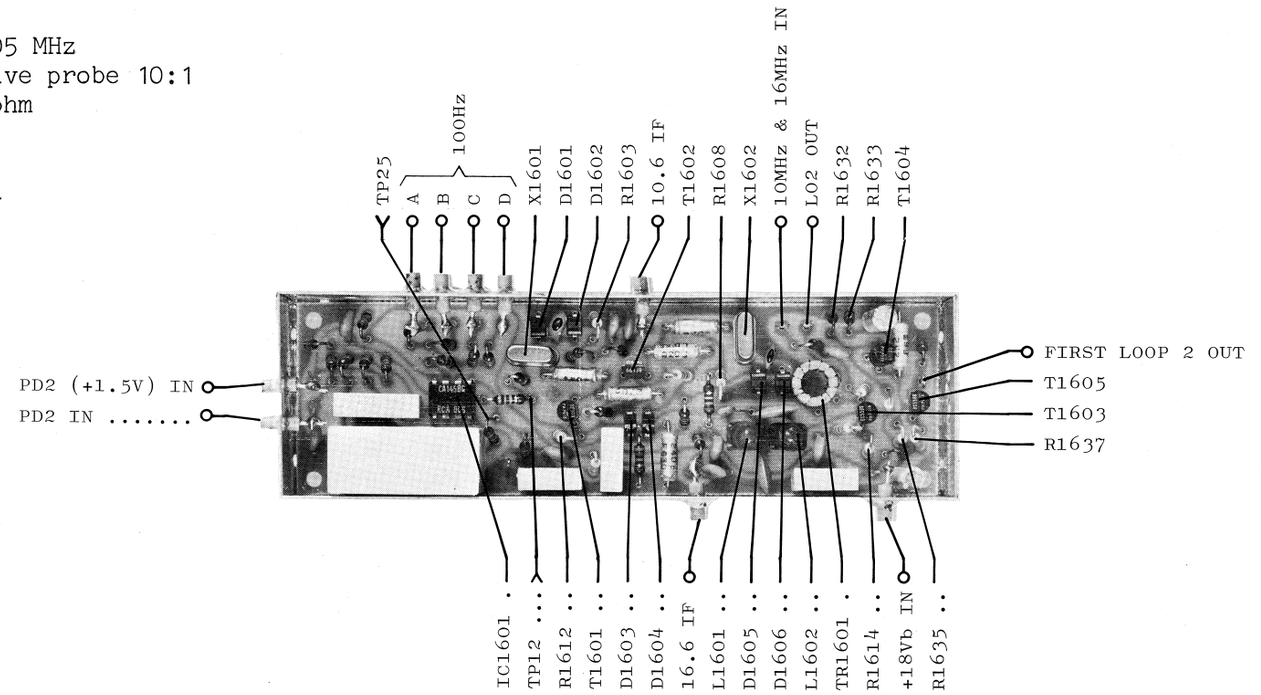
The outputs from the VCXO's are fed to the low pass filter consisting of L1609, L1610, C1612, C1613 and C1616, and then to the buffer amplifier T1603 and out via the impedance step down transformer TR1601 to the 2nd mixer located at the 1st AND 2nd MIXER circuit board. A portion of the oscillator signal is fed to the first loop 2 mixer via R1624.

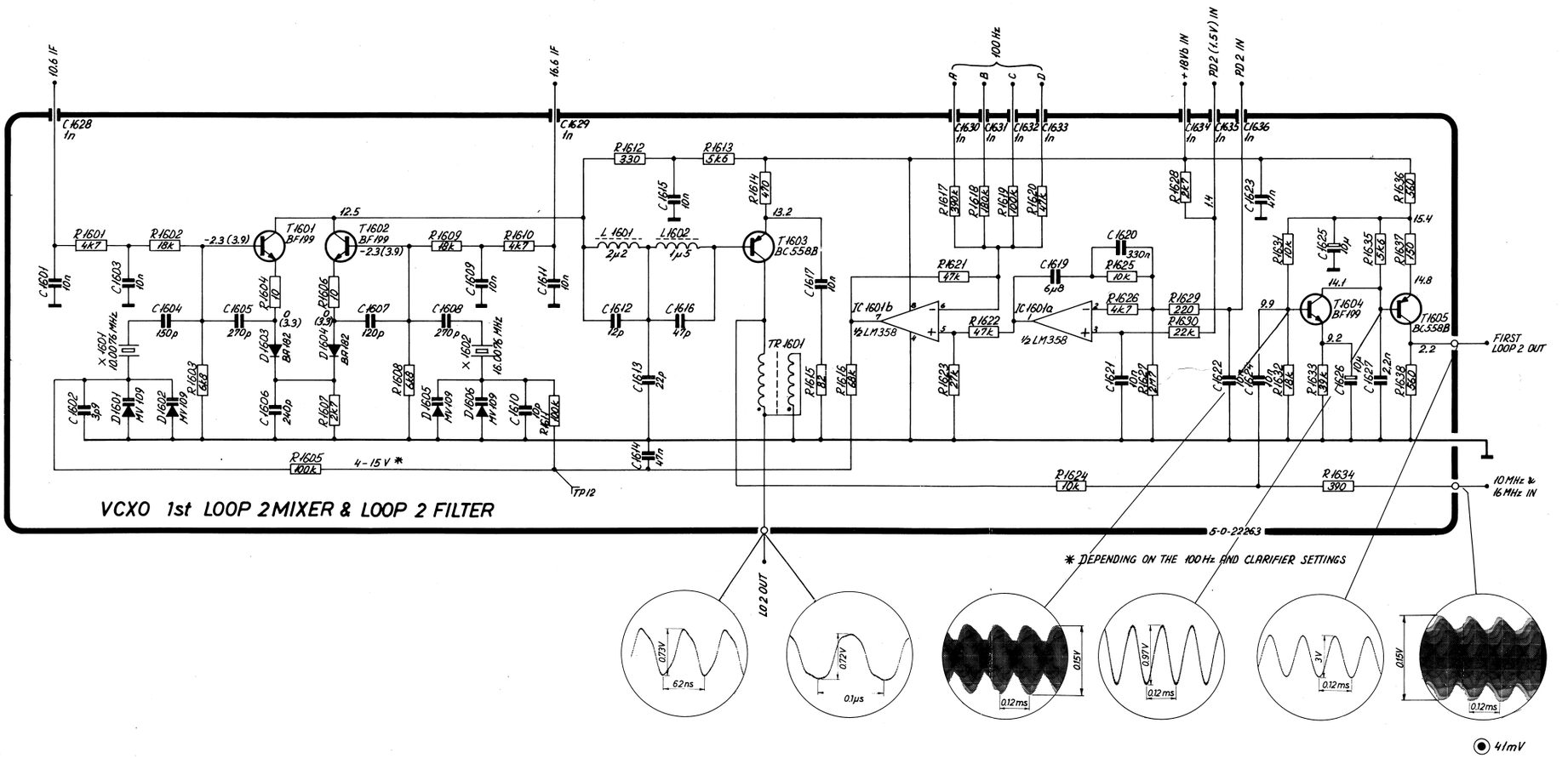
FIRST LOOP 2 MIXER

As mentioned above the VCXO signal is fed into the base of mixer transistor T1604, together with the 10 MHz and 16 MHz signals from the DIVIDER UNIT. Because of the big difference between the mixer frequencies and the output frequency the only filtering needed to filter out the wanted mixing product is R1635 and C1627. The mixer transistor is feeding into the output amplifier T1605.

TEST CONDITIONS

Frequency setting : 2.0005 MHz
Oscilloscope input : Passive probe 10:1
DC voltmeter input : 10 Mohm
⊙: Diode probe measurement
TP: Testpoint
All voltage statements are typical





CIRCUIT DESCRIPTION CLARIFIER AND 2ND LOOP 2 MIXER R1119 & R1120

This unit contains the clarifier AF oscillator, 2nd LOOP 2 MIXER and a low pass filter.

AF OSCILLATOR

The AF oscillator consists of the transistor T1701 and the tuned circuit L1701, C1702, C1703 and the clarifier control capacitors C2601, C2602 and C2603. The nominal frequency is 7 kHz (clarifier to center pos.).

2nd LOOP 2 MIXER

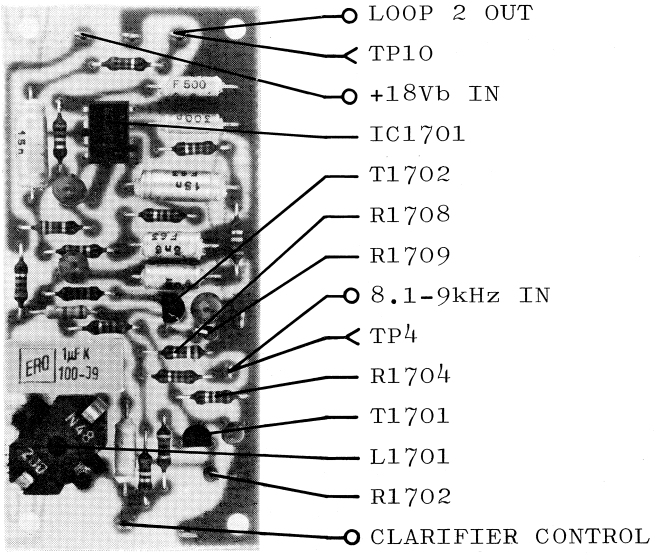
From the collector of T1701 the signal is fed to the base of the 2nd LOOP 2 MIXER T1702, where it is subtracted from the other injection signal, having a nominal frequency range from 8.1 kHz to 9.0 kHz (clarifier to center pos.).

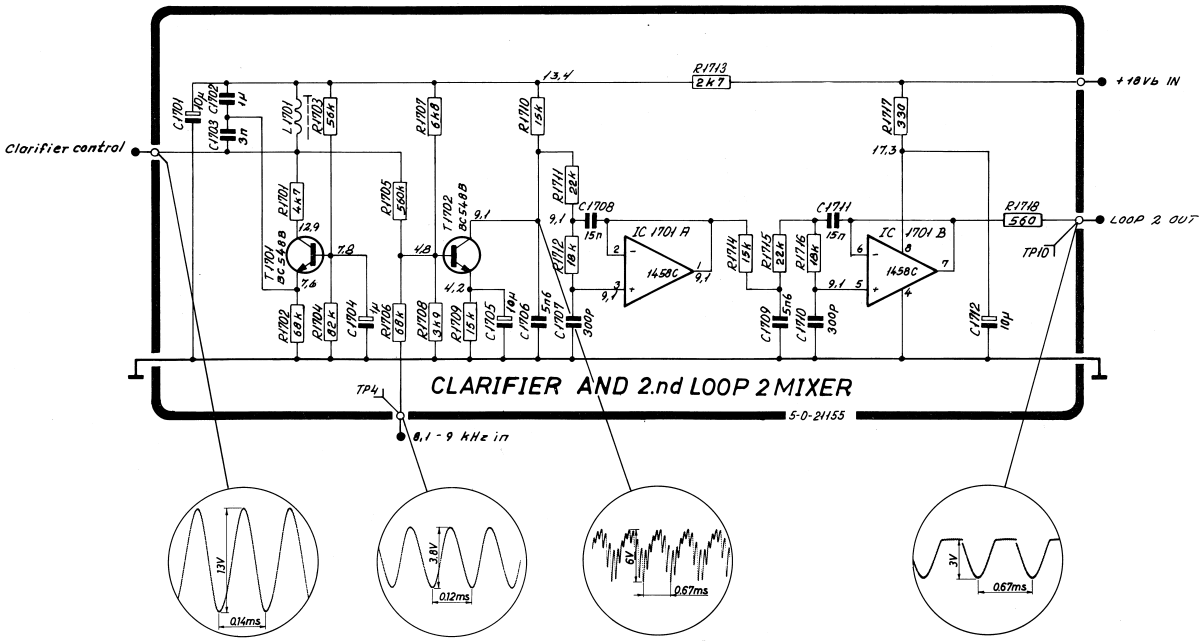
LOW PASS FILTER

The mixed signal on the collector of T1702 is fed to a sixth order active low pass filter with a cut-off frequency of 3.5 kHz, and thus allows the difference frequency to pass through. The nominal output frequency range is 1.1 kHz - 2.0 kHz. The filter is built-up around IC1701A and IC1701B. The output frequency is fed to the programmable divider on the DIVIDER-UNIT.

TEST CONDITIONS

Frequency setting : 2.0005 MHz
Oscilloscope input : Passive probe 10:1
DC voltmeter input : 10 Mohm
⊙: Diode probe measurement
TP: Testpoint
All voltage statements are typical


LOOP 2 OUT
TP10
+18Vb IN
IC1701
T1702
R1708
R1709
8.1-9kHz IN
TP4
R1704
T1701
L1701
R1702
CLARIFIER CONTROL


Clarifier control
+18Vb IN
LOOP 2 OUT
TP101
TP4
8,1 - 9 kHz in
CLARIFIER AND 2.nd LOOP 2 MIXER
5-0-21155
IC 1701 A
IC 1701 B
14.58C
T1701 BC548B
T1702 BC548B
0,14ms
0,12ms
0,67ms
0,67ms

CIRCUIT DESCRIPTION BFO R1120

This unit contains the BFO oscillator, BFO mixer and the strapping terminals for the A1 and A2 modes.

BFO

The 9.4 MHz oscillator is a crystal controlled variocap. tuned Pierce Collpits oscillator.

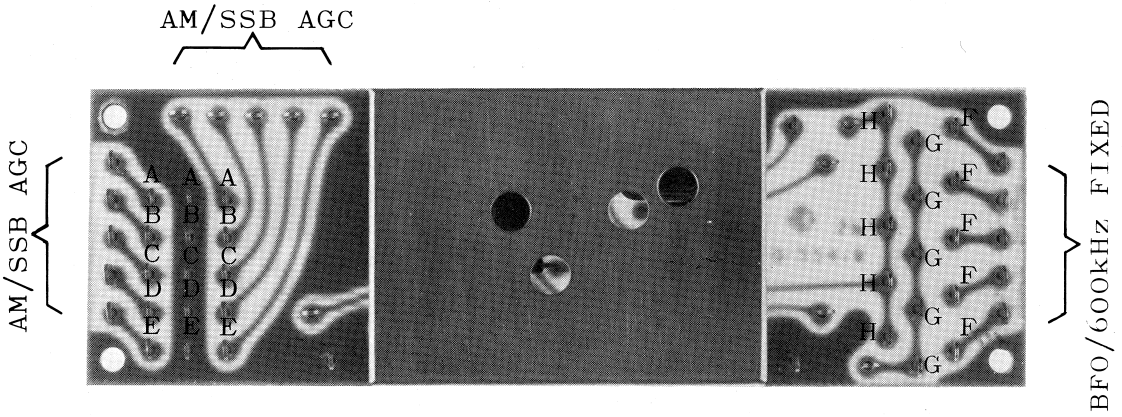
The control voltage for the variocap. is taken from the BFO control R2602.

From the collector of the oscillator transistor T1801 the signal is fed to the mixer T1802.

BFO MIXER

The 9.4 MHz signal from the oscillator T1801 and the 10 MHz signal from the DIVIDER UNIT are mixed in T1802, and the difference is filtered out in the low pass filter consisting of L1801, C1807 and C1809 and fed to the IF AMPLIFIER DETECTOR AND AGC CIRCUIT BOARD.

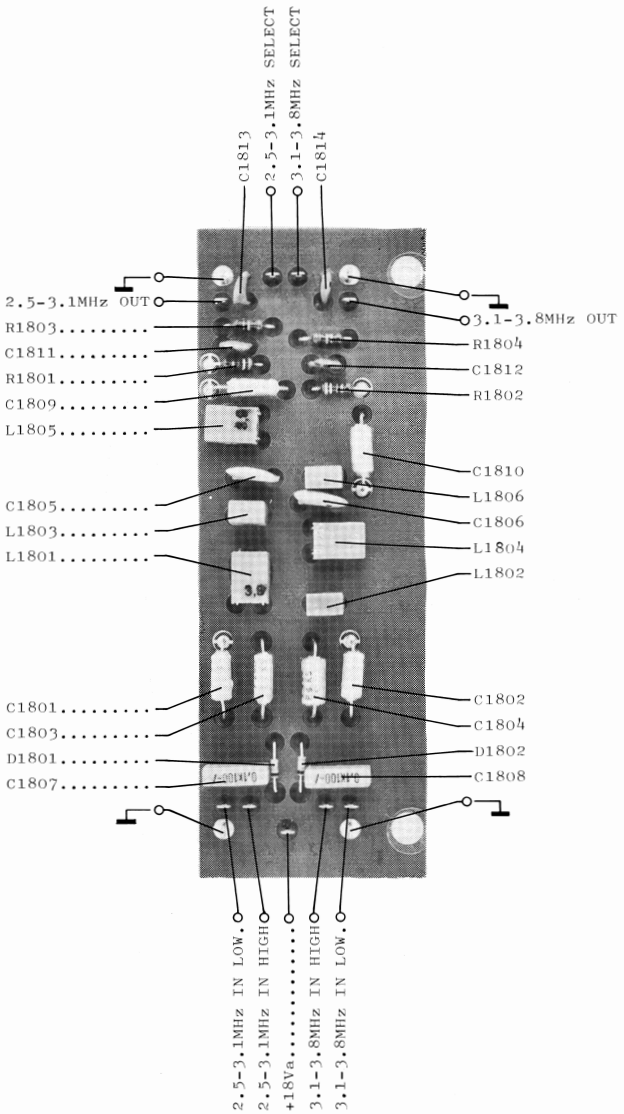
STRAPPING TERMINALS

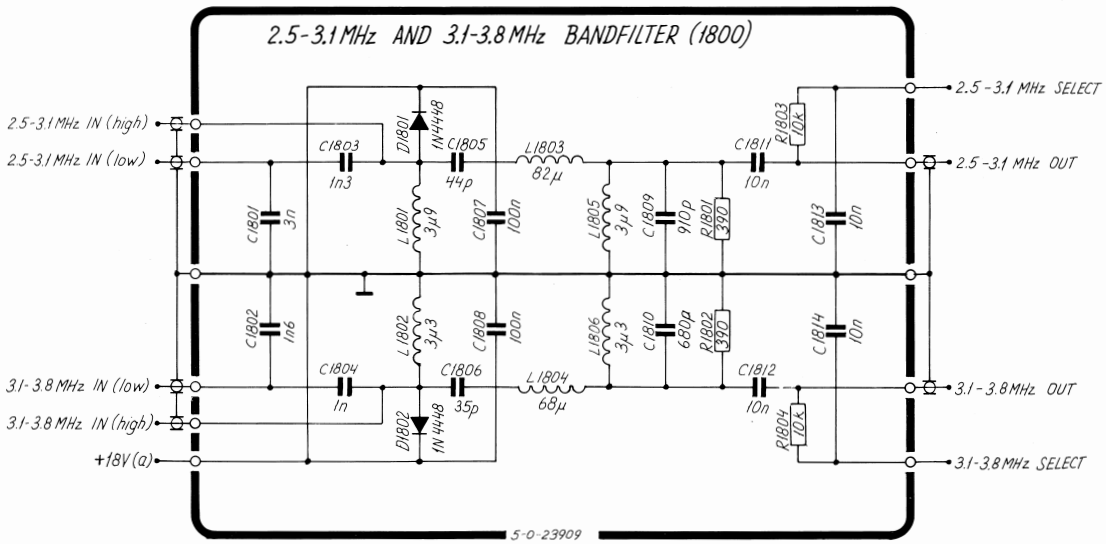


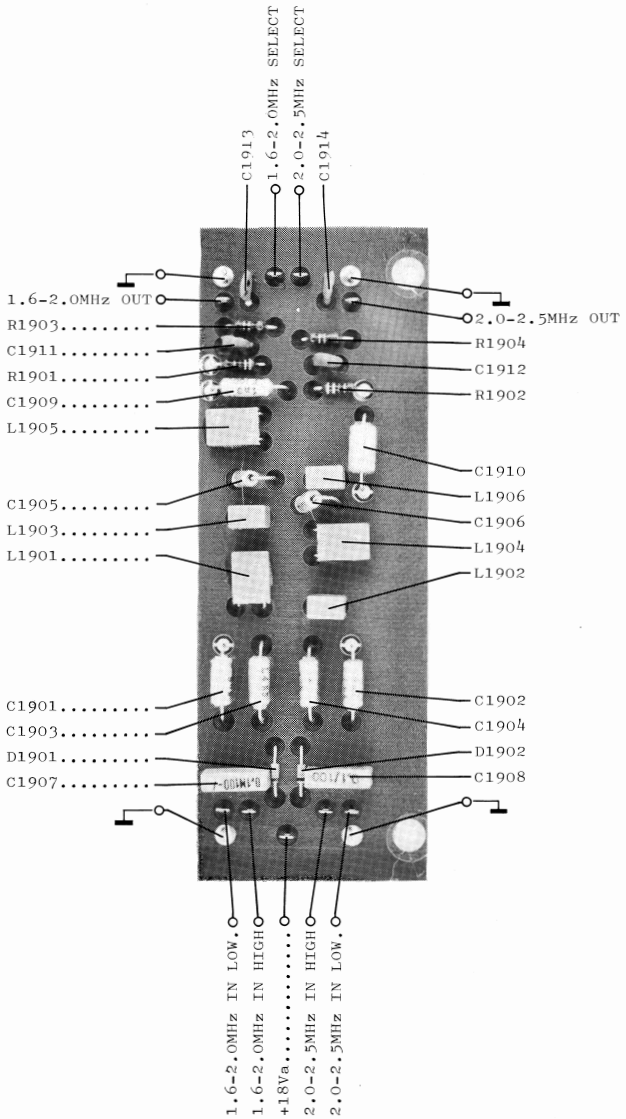
AM/SSB AGC: Are the three identical letters connected, AM AGC is chosen, if no connection, SSB AGC is chosen.

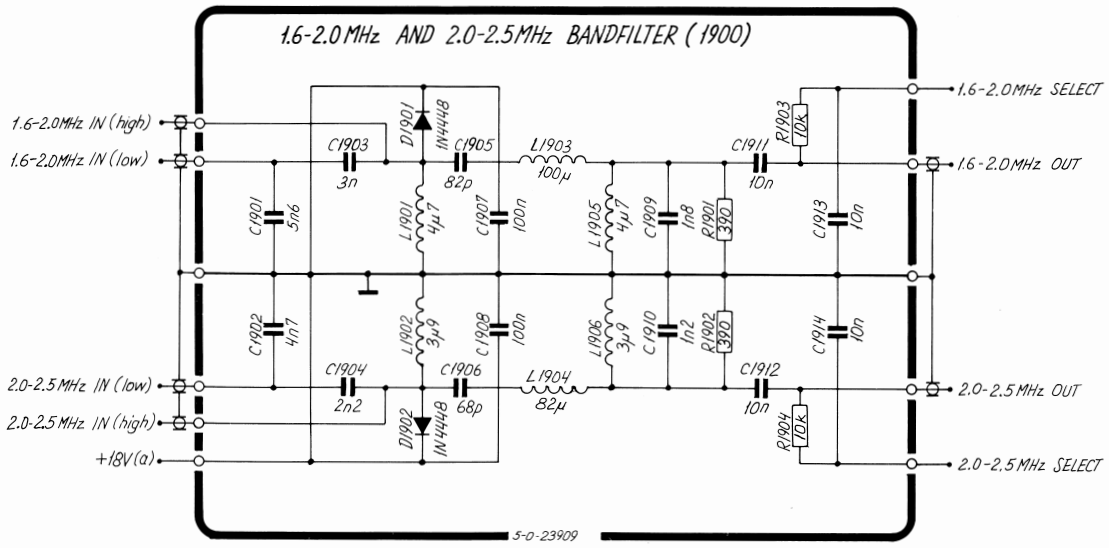
BFO/600 kHz fix: Is F connected to G, 600 kHz fix is chosen, is F connected to H, BFO is chosen.

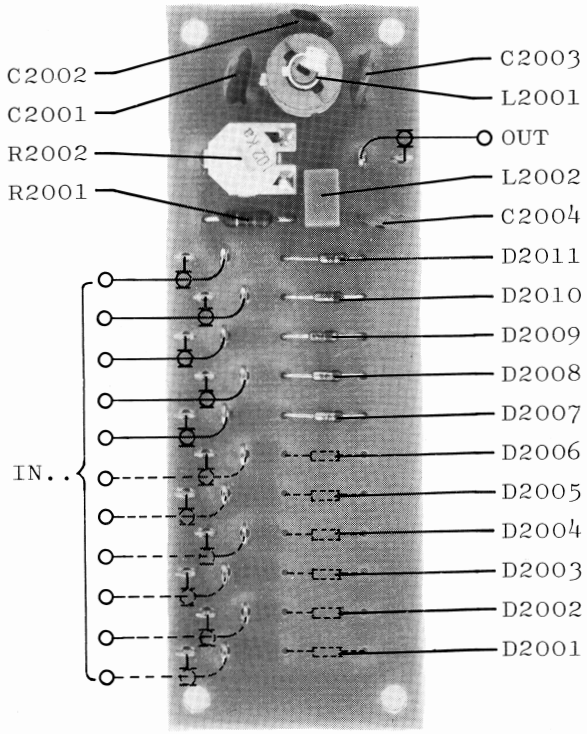
R 1121

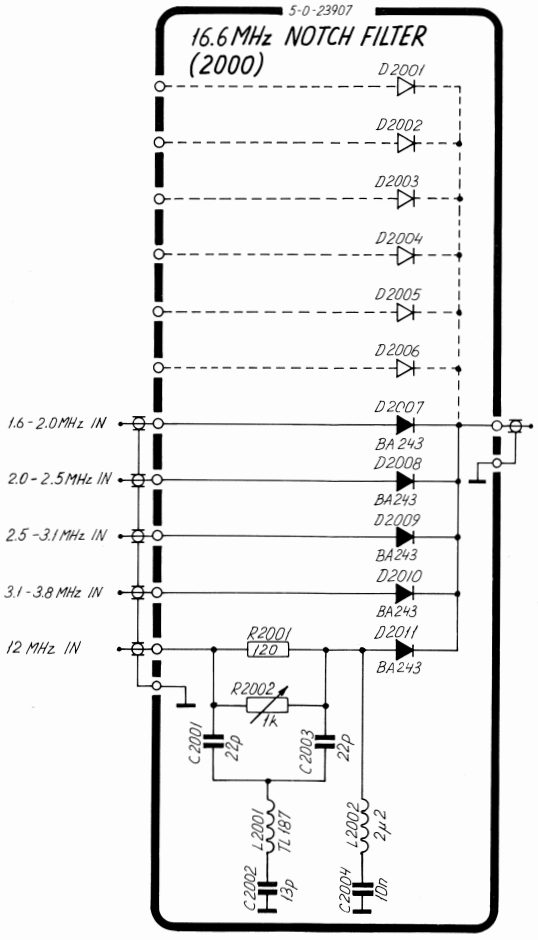

C1813
2.5-3.1MHz SELECT
3.1-3.8MHz SELECT
C1814
2.5-3.1MHz OUT
R1803.....
C1811.....
R1801.....
C1809.....
L1805.....
C1805.....
L1803.....
L1801.....
C1801.....
C1803.....
D1801.....
C1807.....
3.1-3.8MHz OUT
R1804
C1812
R1802
C1810
L1806
C1806
L1804
L1802
C1802
C1804
D1802
C1808
2.5-3.1MHz IN LOW
2.5-3.1MHz IN HIGH
+18Va.....
3.1-3.8MHz IN HIGH
3.1-3.8MHz IN LOW

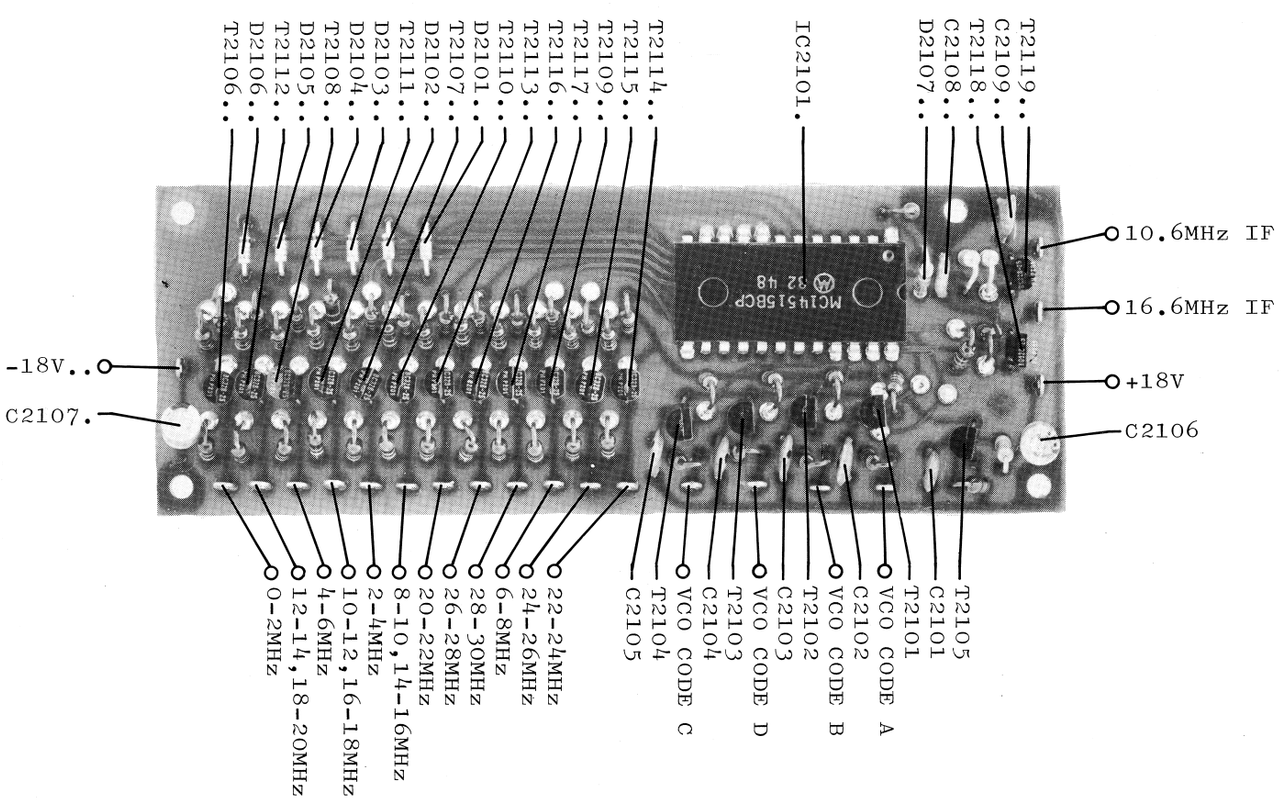

2.5-3.1 MHz AND 3.1-3.8 MHz BANDFILTER (1800)
2.5-3.1 MHz IN (high)
2.5-3.1 MHz IN (low)
3.1-3.8 MHz IN (low)
3.1-3.8 MHz IN (high)
+18V (a)
C1803 1n3
D1801 1N4448
C1805 44p
L1803 82µ
C1811 10n
R1803 10k
C1801 3n
L1801 3µ9
C1807 100n
L1805 3µ9
C1809 910p
R1801 390
C1813 10n
C1802 1n6
L1802 3µ3
C1808 100n
L1806 3µ3
C1810 680p
R1802 390
C1814 10n
C1804 1n
C1806 35p
L1804 68µ
C1812 10n
D1802 1N4448
R1804 10k
2.5-3.1 MHz SELECT
2.5-3.1 MHz OUT
3.1-3.8 MHz OUT
3.1-3.8 MHz SELECT
5-0-23909

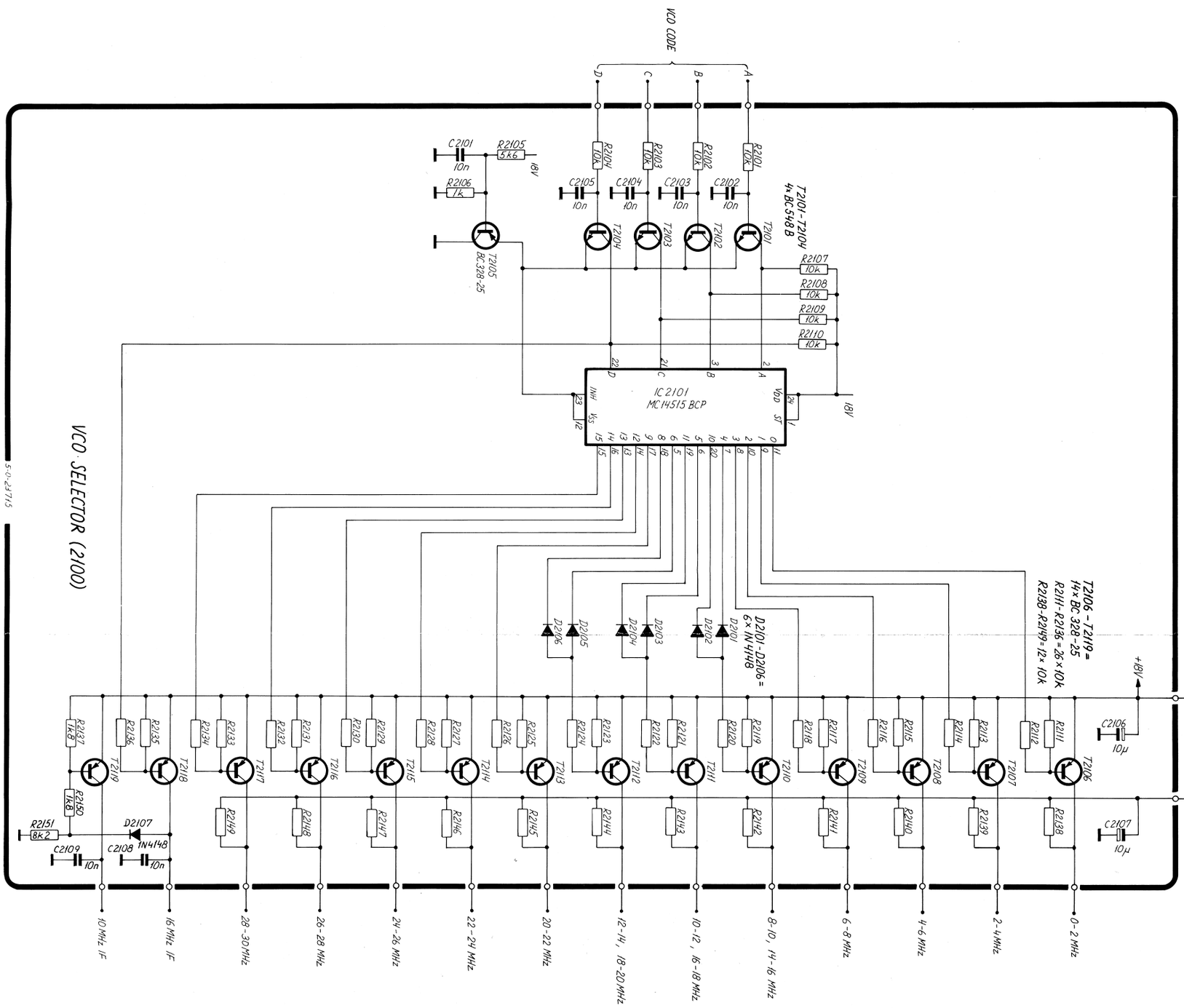

C1913
1.6-2.0MHz SELECT
2.0-2.5MHz SELECT
C1914
1.6-2.0MHz OUT
R1903.....
C1911.....
R1901.....
C1909.....
L1905.....
C1905.....
L1903.....
L1901.....
C1901.....
C1903.....
D1901.....
C1907.....
2.0-2.5MHz OUT
R1904
C1912
R1902
C1910
L1906
C1906
L1904
L1902
C1902
C1904
D1902
C1908
1.6-2.0MHz IN LOW.
1.6-2.0MHz IN HIGH
+18Va.....
2.0-2.5MHz IN HIGH
2.0-2.5MHz IN LOW.


1.6-2.0MHz AND 2.0-2.5MHz BANDFILTER (1900)
1.6-2.0MHz IN (high)
1.6-2.0MHz IN (low)
2.0-2.5MHz IN (low)
2.0-2.5MHz IN (high)
+18V(a)
C1901 5n6
C1902 4n7
C1903 3n
C1904 2n2
C1905 82p
C1906 68p
C1907 100n
C1908 100n
L1901 4µ7
L1902 3µ9
L1903 100µ
L1904 82µ
L1905 4µ7
L1906 3µ9
C1909 1n8
C1910 1n2
C1911 10n
C1912 10n
C1913 10n
C1914 10n
R1901 390
R1902 390
R1903 10k
R1904 10k
D1901 1N4148
D1902 1N4148
1.6-2.0MHz SELECT
1.6-2.0MHz OUT
2.0-2.5MHz OUT
2.0-2.5MHz SELECT
5-0-23909

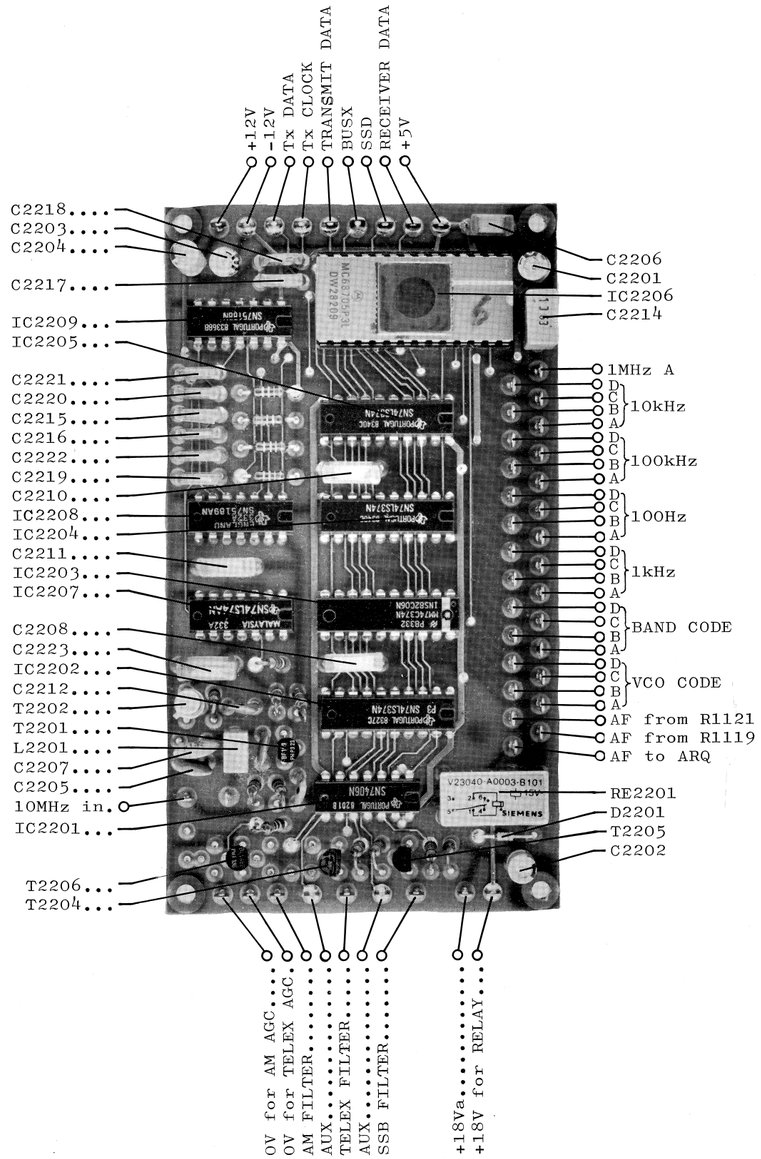

C2002
C2001
R2002
R2001
IN..
C2003
L2001
OUT
L2002
C2004
D2011
D2010
D2009
D2008
D2007
D2006
D2005
D2004
D2003
D2002
D2001

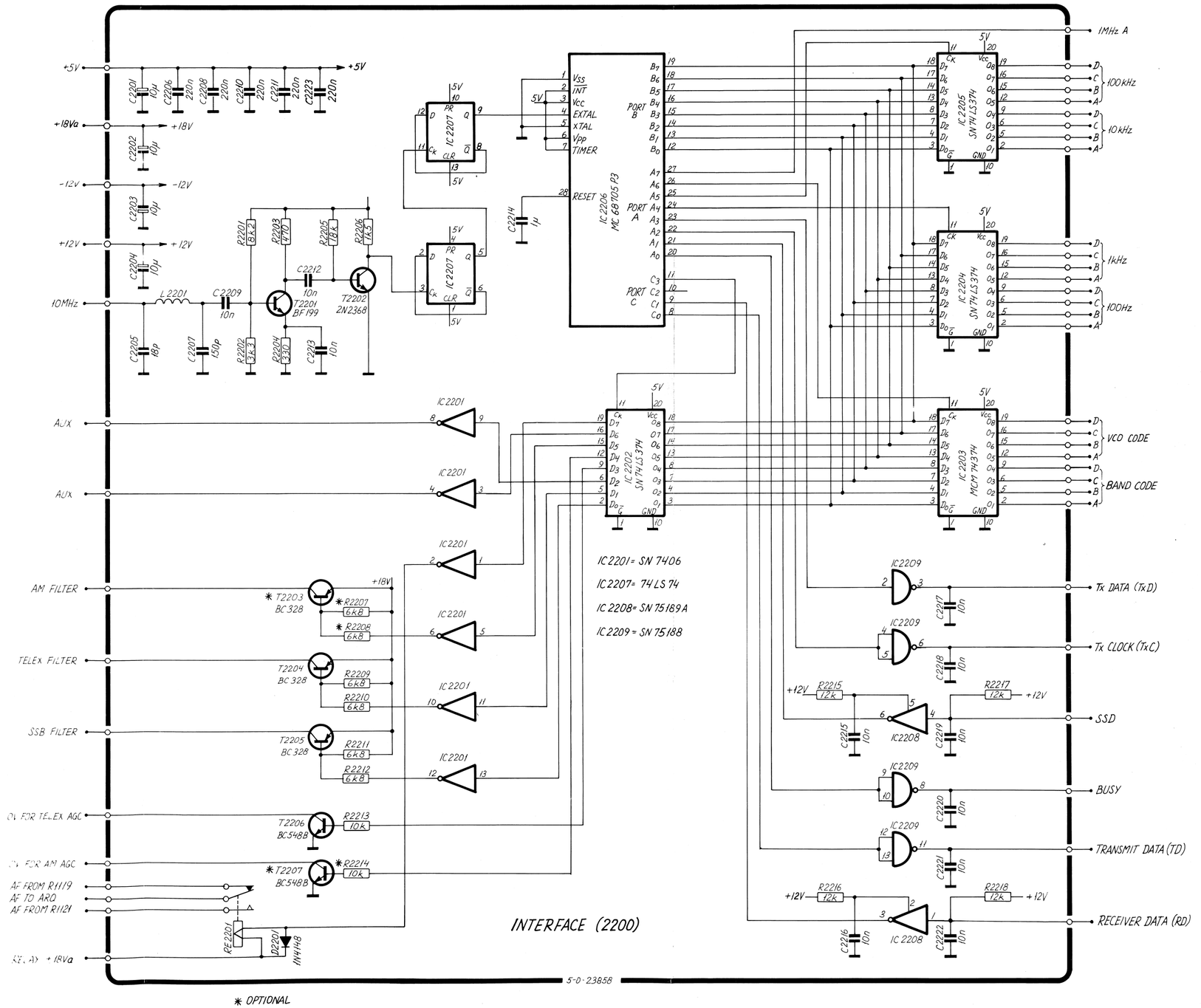

5-0-23907
16.6 MHz NOTCH FILTER
(2000)
D2001
D2002
D2003
D2004
D2005
D2006
D2007
BA 243
D2008
BA243
D2009
BA243
D2010
BA243
D2011
BA243
1.6 - 2.0 MHz IN
2.0 - 2.5 MHz IN
2.5 - 3.1 MHz IN
3.1 - 3.8 MHz IN
12 MHz IN
R2001
120
R2002
1k
C2001
22p
C2003
22p
L2001
TL 187
L2002
2µ2
C2002
13p
C2004
10n

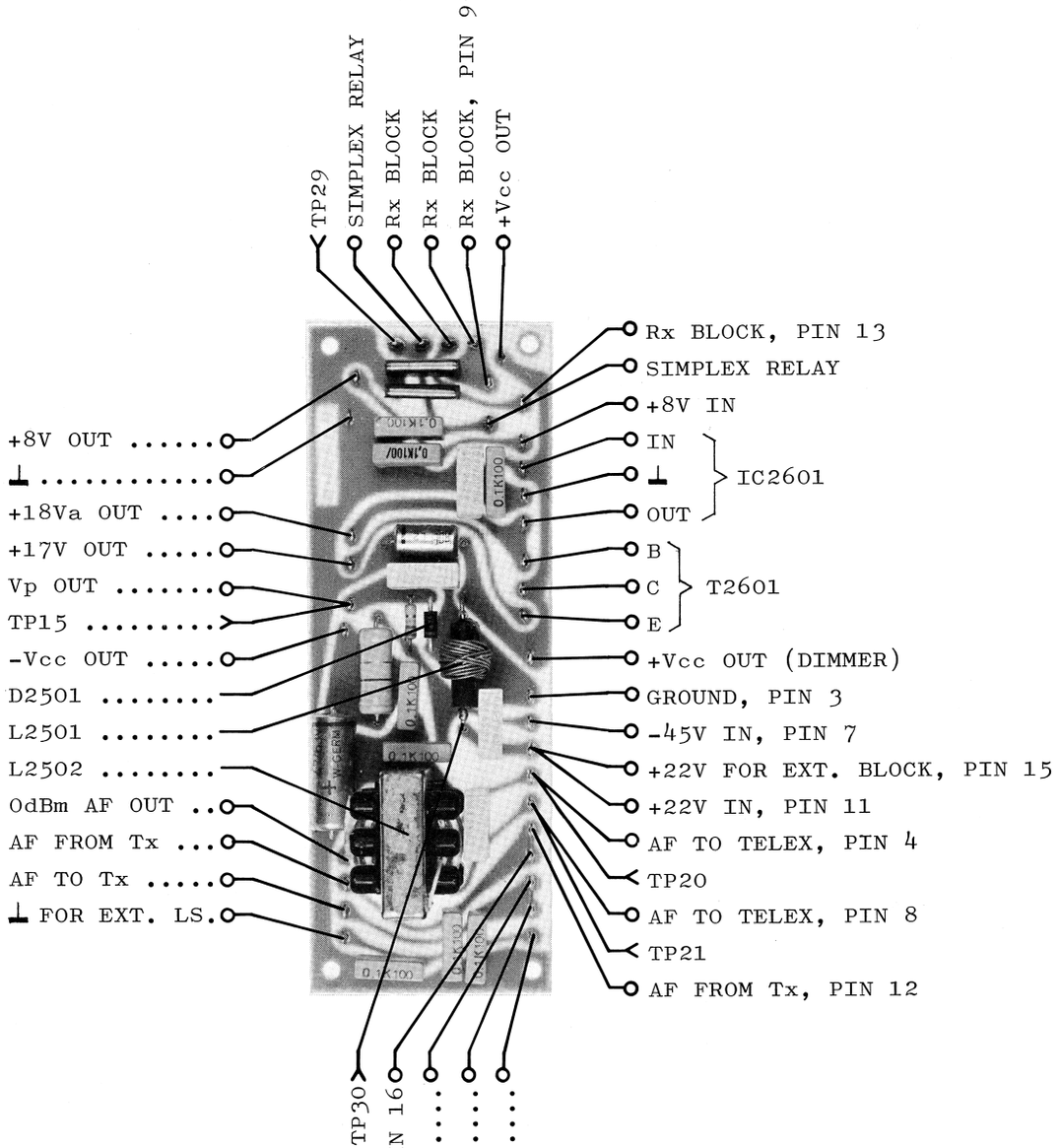

T2106..
D2106..
T2112..
D2105..
T2108..
D2104..
D2103..
T2111..
D2102..
T2107..
D2101..
T2110..
T2113..
T2116..
T2117..
T2109..
T2115..
T2114..
IC2101.
T2119..
C2109..
T2118..
C2108..
D2107..
MC14515BCP
10.6MHz IF
16.6MHz IF
+18V
C2106
-18V..
C2107.
0-2MHz
12-14, 18-20MHz
4-6MHz
10-12, 16-18MHz
2-4MHz
8-10, 14-16MHz
20-22MHz
26-28MHz
28-30MHz
6-8MHz
24-26MHz
22-24MHz
C2105
T2104
VCO CODE C
C2104
T2103
VCO CODE D
C2103
T2102
VCO CODE B
C2102
VCO CODE A
T2101
C2101
T2105

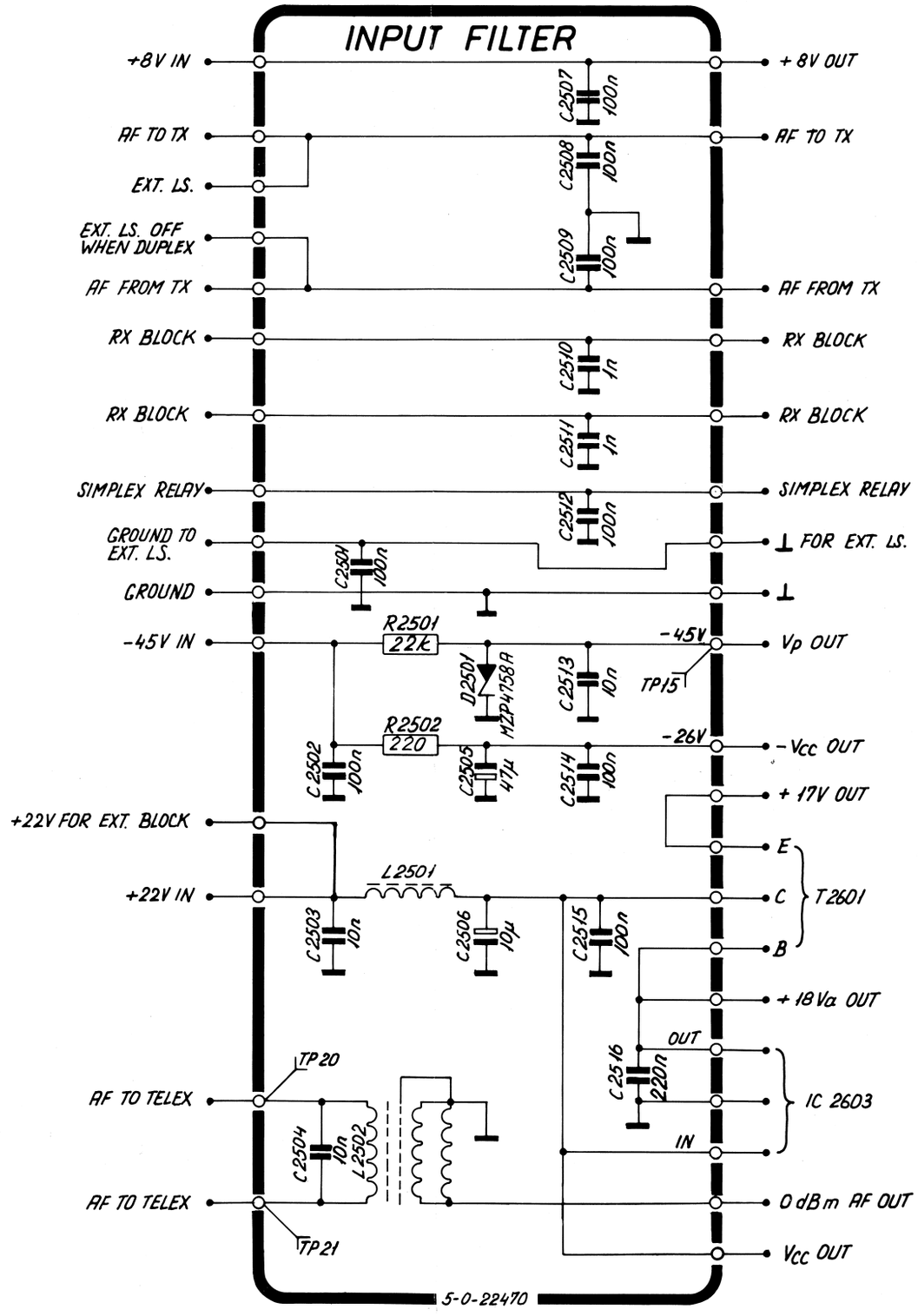

VCO SELECTOR (2100)
VCO CODE
IC 2101
MC14515 BCP
T2101-T2104
4× BC548B
T2105
BC328-25
T2106-T2119=
14× BC 328-25
R2111-R2136=26×10k
R2138-R2149=12×10k
D2101-D2106=
6× IN4148
+18V
-18V
10 MHz IF
16 MHz IF
28-30 MHz
26-28 MHz
24-26 MHz
22-24 MHz
20-22 MHz
12-14, 18-20 MHz
10-12, 16-18 MHz
8-10, 14-16 MHz
6-8 MHz
4-6 MHz
2-4 MHz
0-2 MHz

R 1121


+12V
-12V
Tx DATA
Tx CLOCK
TRANSMIT DATA
BUSX
SSD
RECEIVER DATA
+5V
C2218....
C2203....
C2204....
C2217....
IC2209...
IC2205...
C2221....
C2220....
C2215....
C2216....
C2222....
C2219....
C2210....
IC2208...
IC2204...
C2211....
IC2203...
IC2207...
C2208....
C2223....
IC2202...
C2212....
T2202....
T2201....
L2201....
C2207....
C2205....
10MHz in.
IC2201...
T2206...
T2204...
C2206
C2201
IC2206
C2214
1MHz A
10kHz
100kHz
100Hz
1kHz
BAND CODE
VCO CODE
AF from R1121
AF from R1119
AF to ARQ
RE2201
D2201
T2205
C2202
0V for AM AGC....
0V for TELEX AGC.
AM FILTER.....
AUX.....
TELEX FILTER....
AUX.....
SSB FILTER....
+18Va.....
+18V for RELAY...


+5V
+18Va
+18V
-12V
+12V
10MHz
L2201
C2209 10n
C2205 18p
C2207 150p
T2201 BF199
T2202 2N2368
IC2207 SN74LS74
IC2206 MC 6870S F3
IC2214 1µ
1MHz A
100kHz
10kHz
1kHz
100Hz
VCO CODE
BAND CODE
IC2205 SN74LS374
IC2204 SN74LS374
IC2202 SN74LS374
IC2203 MCM74374
AUX
AUX
AM FILTER
TELEX FILTER
SSB FILTER
0V FOR TELEX AGC
0V FOR AM AGC
AF FROM R1119
AF TO ARQ
AF FROM R1121
RE 2201
D2201 1N4148
IC2201 = SN 7406
IC2207 = 74 LS 74
IC 2208 = SN 75189A
IC 2209 = SN 75188
Tx DATA (TxD)
Tx CLOCK (TxC)
SSD
BUSY
TRANSMIT DATA (TD)
RECEIVER DATA (RD)
INTERFACE (2200)
5-0-23858
* OPTIONAL

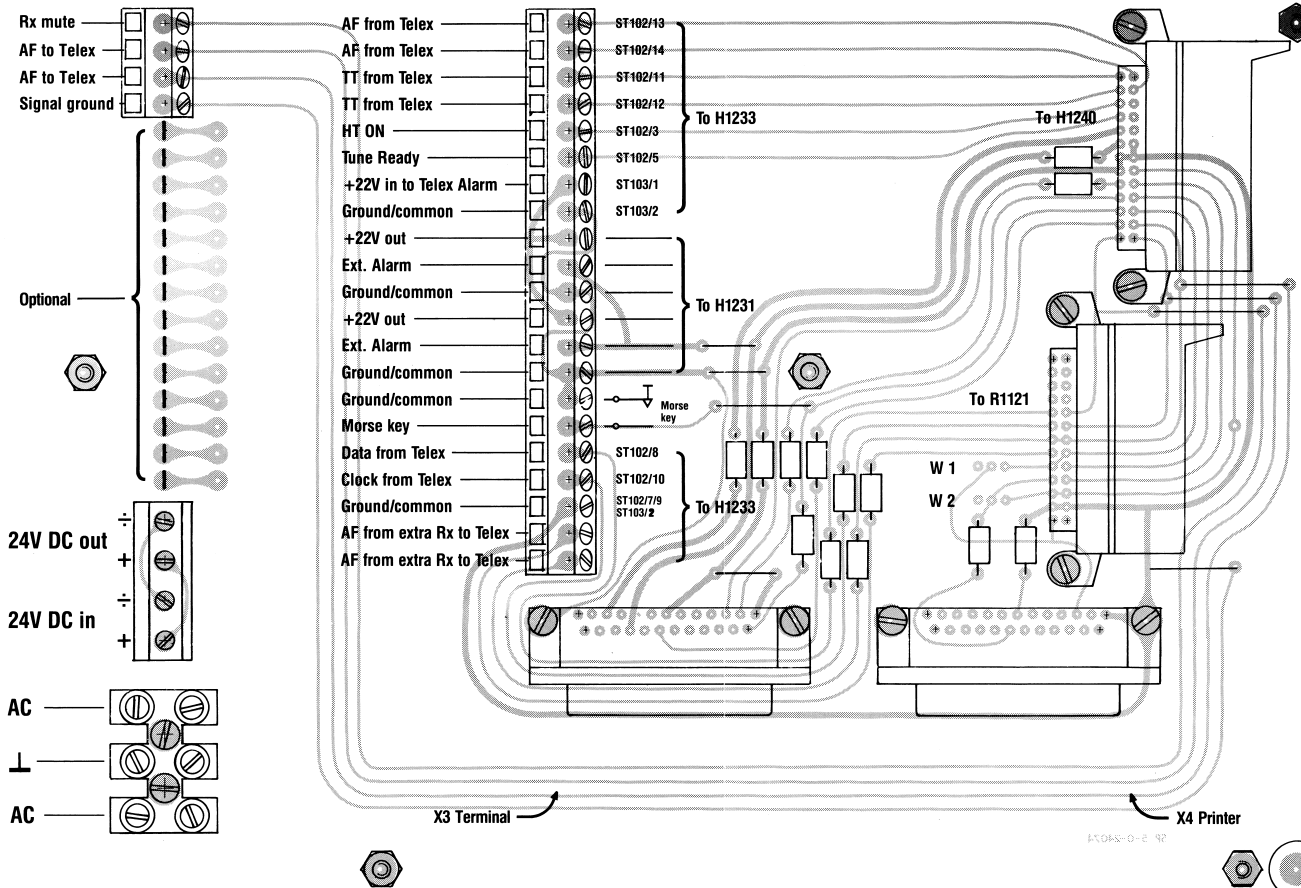

TP29
SIMPLEX RELAY
Rx BLOCK
Rx BLOCK
Rx BLOCK, PIN 9
+Vcc OUT
Rx BLOCK, PIN 13
SIMPLEX RELAY
+8V IN
IN
⊥
OUT
IC2601
B
C
E
T2601
+Vcc OUT (DIMMER)
GROUND, PIN 3
-45V IN, PIN 7
+22V FOR EXT. BLOCK, PIN 15
+22V IN, PIN 11
AF TO TELEX, PIN 4
TP20
AF TO TELEX, PIN 8
TP21
AF FROM Tx, PIN 12
+8V OUT .....
⊥ .....
+18Va OUT ....
+17V OUT .....
Vp OUT .....
TP15 .....
-Vcc OUT .....
D2501 .....
L2501 .....
L2502 .....
0dBm AF OUT ..
AF FROM Tx ...
AF TO Tx .....
⊥ FOR EXT. LS.
TP30
EXT. LS. OFF WHEN DUPLEX, PIN 16
AF TO Tx, PIN 20 .....
EXT. LS., PIN 24 .....
⊥ FOR EXT. LS., PIN 28 .....


INPUT FILTER
+8V IN
+ 8V OUT
C2507 100n
RF TO TX
RF TO TX
C2508 100n
EXT. LS.
EXT. LS. OFF WHEN DUPLEX
C2509 100n
RF FROM TX
RF FROM TX
RX BLOCK
RX BLOCK
C2510 1n
RX BLOCK
RX BLOCK
C2511 1n
SIMPLEX RELAY
SIMPLEX RELAY
C2512 100n
GROUND TO EXT. LS.
⊥ FOR EXT. LS.
C2501 100n
GROUND
⊥
R2501 22Ł
-45V IN
-45V
Vp OUT
D2501 HZP4758A
C2513 10n
TP15
R2502 220
-26V
-Vcc OUT
C2502 100n
C2505 47µ
C2514 100n
+ 17V OUT
+22V FOR EXT. BLOCK
E
L2501
+22V IN
C
T2601
C2503 10n
C2506 10µ
C2515 100n
B
+ 18Va OUT
OUT
TP20
C2516 220n
AF TO TELEX
IC 2603
IN
C2504 10n
L2502
AF TO TELEX
0 dBm AF OUT
TP21
Vcc OUT
5-0-22470

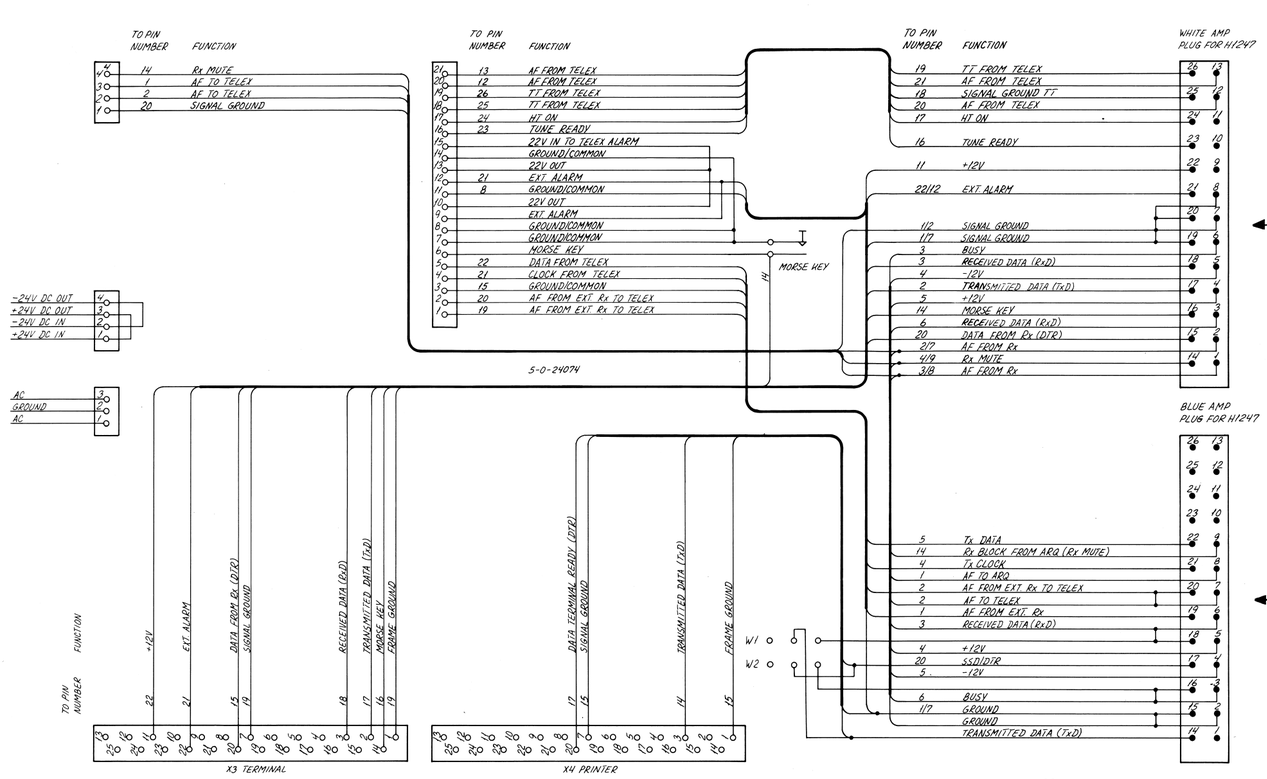
MAIN SCHEMATIC-DIAGRAM R1121 Ⓐ

AERIAL SWITCH (100)
OPTIONAL BANDFILTER
4MHz AND 22MHz BANDFILTER (200)
6MHz AND 16MHz BANDFILTER (300)
8MHz AND 12MHz BANDFILTER (400)
NOTCHFILTER (2000)
1.6-2.0MHz AND 2.0-2.5MHz BANDFILTER (1900)
2.5-3.1MHz AND 3.1-3.8MHz BANDFILTER (1800)
1st & 2nd MIXER (500)
IF FILTER (700)
IF AMPLIFIER DETECTOR AND AGC (800)
INPUT FILTER (2500)
AF AMPLIFIER (900)
INTERFACE (2200)
VCO BUFFER (1500)
VCO UNIT (1200) MARKED WHITE
VCO SELECTOR (2100)
HARMONIC FILTER (1300) MARKED BLACK
LOOP 1 FILTER AND ±18V SUPPLY (1100)
LOOP 1 MIXER (1400)
VCXO, 1st LOOP 2 MIXER AND LOOP 2 FILTER (1600)
CLARIFIER AND 2nd LOOP 2 MIXER (1700)
DIVIDER UNIT (1000)

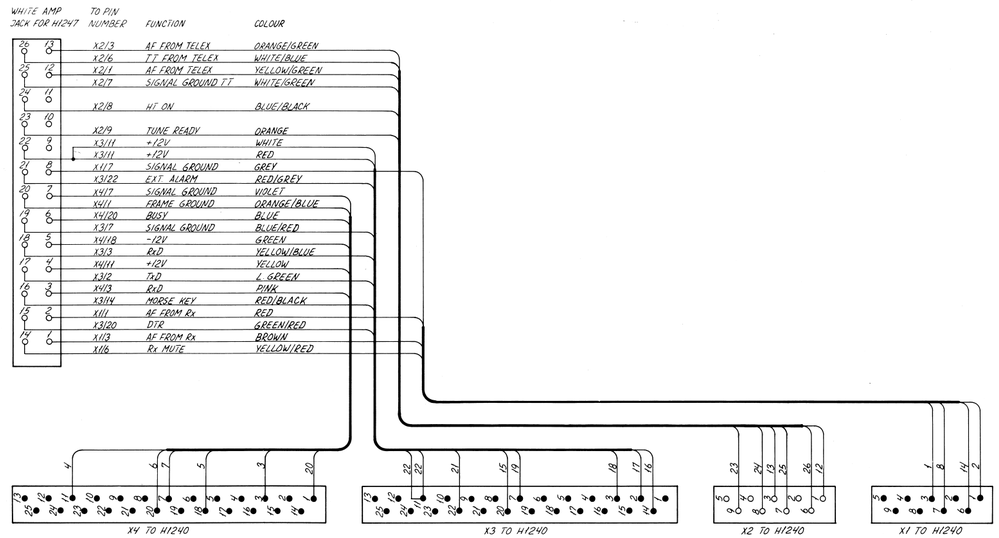
CONNECTION BOARD H1247



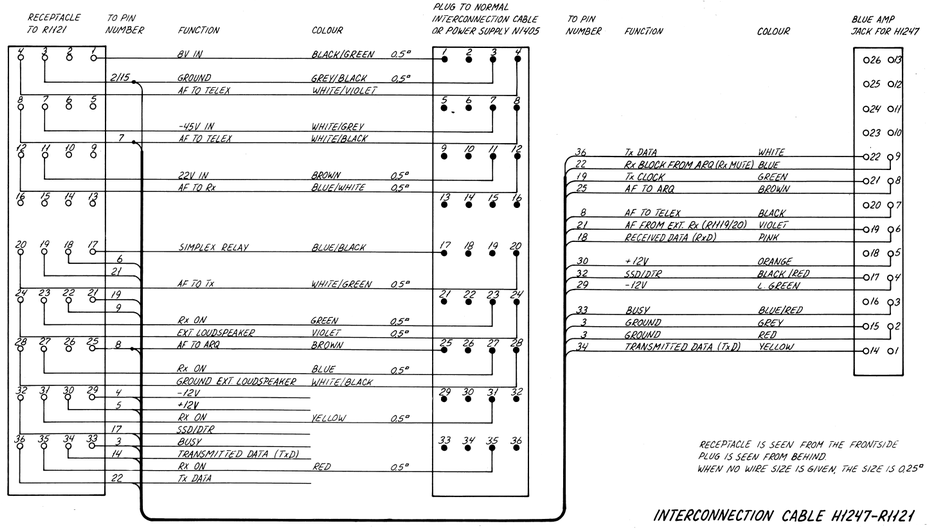
A



Ⓐ MAIN SCHEMATIC DIAGRAM FOR CONNECTION BOX HI247



INTERCONNECTION CABLE HI247-HI240



RECEPTACLE IS SEEN FROM THE FRONTSIDE
PLUG IS SEEN FROM BEHIND.
WHEN NO WIRE SIZE IS GIVEN, THE SIZE IS 0.25²

INTERCONNECTION CABLE HI247-RII2I

Symbol	Description	Manufact.	
C101	Capacitor polyester 220nF ±10% 100V	Siemens	B32510-D1224-K
C102	Capacitor polyester 220nF ±10% 100V	Siemens	B32510-D1224-K
C103	Capacitor polyester 220nF ±10% 100V	Siemens	B32510-D1224-K
C104	Capacitor polyester 220nF ±10% 100V	Siemens	B32510-D1224-K
C105	Capacitor polyester 220nF ±10% 100V	Siemens	B32510-D1224-K
C106	Capacitor polyester 220nF ±10% 100V	Siemens	B32510-D1224-K
C107	Capacitor polyester 220nF ±10% 100V	Siemens	B32510-D1224-K
C108	Capacitor polyester 220nF ±10% 100V	Siemens	B32510-D1224-K
C109	Capacitor polyester 220nF ±10% 100V	Siemens	B32510-D1224-K
C110	Capacitor polyester 220nF ±10% 100V	Siemens	B32510-D1224-K
C111	Capacitor polyester 220nF ±10% 100V	Siemens	B32510-D1224-K
C112	Capacitor polyester 220nF ±10% 100V	Siemens	B32510-D1224-K
C113	Capacitor polyester 220nF ±10% 100V	Siemens	B32510-D1224-K
C114	Capacitor polyester 220nF ±10% 100V	Siemens	B32510-D1224-K
C115	Capacitor polyester 220nF ±10% 100V	Siemens	B32510-D1224-K
C116	Capacitor polyester 220nF ±10% 100V	Siemens	B32510-D1224-K
C117	Capacitor ceramic 10nF -20/+80% 50V	KCK	HE70SJYF103Z
C118	Capacitor ceramic 10nF -20/+80% 50V	KCK	HE70SJYF103Z
C119	Capacitor ceramic 10nF -20/+80% 50V	KCK	HE70SJYF103Z
C120	Capacitor polyester 220nF ±10% 100V	Siemens	B32510-D1224-K
C121	Capacitor polyester 220nF ±10% 100V	Siemens	B32510-D1224-K
C122	Capacitor polyester 220nF ±10% 100V	Siemens	B32510-D1224-K
C123	Capacitor polyester 220nF ±10% 100V	Siemens	B32510-D1224-K
C124	Capacitor ceramic 10nF -20/+80% 50V	KCK	HE70SJYF103Z
C125	Capacitor polyester 100nF ±10% 100V	Siemens	B32510-D1104-K
C126	Capacitor electrolyt 10uF ±20% 35V	ERO	EKI 00 AA 210F
C127	Capacitor polyester 220nF ±10% 100V	Siemens	B32510-D1224-K
C128	Capacitor polyester 220nF ±10% 100V	Siemens	B32510-D1224-K
D101	Diode silicon	Philips	1N4148
D102	Diode silicon	Philips	1N4148
IC101	Integrated circuit	Motorola	MC14515BCP

Symbol	Description	Manufact.	
R101	Resistor 27 ohm ±5% 4W	Philips	2322 330 22279
R102	Resistor 6,8 Kohm ±5% 0.33W	Philips	2322 181 33682
R103	Resistor 6,8 Kohm ±5% 0.33W	Philips	2322 181 33682
R104	Resistor 6,8 Kohm ±5% 0.33W	Philips	2322 181 33682
R105	Resistor 6,8 Kohm ±5% 0.33W	Philips	2322 181 33682
R106	Resistor 6,8 Kohm ±5% 0.33W	Philips	2322 181 33682
R107	Resistor 6,8 Kohm ±5% 0.33W	Philips	2322 181 33682
R108	Resistor 6,8 Kohm ±5% 0.33W	Philips	2322 181 33682
R109	Resistor 6,8 Kohm ±5% 0.33W	Philips	2322 181 33682
R110	Resistor 6,8 Kohm ±5% 0.33W	Philips	2322 181 33682
R111	Resistor 6,8 Kohm ±5% 0.33W	Philips	2322 181 33682
R112	Resistor 6,8 Kohm ±5% 0.33W	Philips	2322 181 33682
R113	Resistor 6,8 Kohm ±5% 0.33W	Philips	2322 181 33682
R114	Resistor 6,8 Kohm ±5% 0.33W	Philips	2322 181 33682
R115	Resistor 6,8 Kohm ±5% 0.33W	Philips	2322 181 33682
R116	Resistor 6,8 Kohm ±5% 0.33W	Philips	2322 181 33682
R117	Resistor 6,8 Kohm ±5% 0.33W	Philips	2322 181 33682
R118	Resistor 6,8 Kohm ±5% 0.33W	Philips	2322 181 33682
R119	Resistor 6,8 Kohm ±5% 0.33W	Philips	2322 181 33682
R120	Resistor 6,8 Kohm ±5% 0.33W	Philips	2322 181 33682
R121	Resistor 6,8 Kohm ±5% 0.33W	Philips	2322 181 33682
R122	Resistor 6,8 Kohm ±5% 0.33W	Philips	2322 181 33682
R123	Resistor 6,8 Kohm ±5% 0.33W	Philips	2322 181 33682
R124	Resistor 6,8 Kohm ±5% 0.33W	Philips	2322 181 33682
R125	Resistor 6,8 Kohm ±5% 0.33W	Philips	2322 181 33682
R126	Resistor 6,8 Kohm ±5% 0.33W	Philips	2322 181 33682
R127	Resistor 6,8 Kohm ±5% 0.33W	Philips	2322 181 33682
R128	Resistor 6,8 Kohm ±5% 0.33W	Philips	2322 181 33682
R129	Resistor 6,8 Kohm ±5% 0.33W	Philips	2322 181 33682
R130	Resistor 6,8 Kohm ±5% 0.33W	Philips	2322 181 33682
R131	Resistor 6,8 Kohm ±5% 0.33W	Philips	2322 181 33682
R132	Resistor 6,8 Kohm ±5% 0.33W	Philips	2322 181 33682
R133	Resistor 6,8 Kohm ±5% 0.33W	Philips	2322 181 33682
R134	Resistor 4,7 Kohm ±5% 0.33W	Philips	2322 181 13472
R135	Resistor 390 ohm ±5% 0.33W	Philips	2322 181 33391
R136	Resistor 8,2 Kohm ±5% 0.33W	Philips	2322 181 33822
R137	Resistor 8,2 Kohm ±5% 0.33W	Philips	2322 181 33822
R138	Resistor 100 Kohm ±5% 0.33W	Philips	2322 181 13104
R139	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 33103
R140	Resistor 390 ohm ±5% 0.33W	Philips	2322 181 13391

Symbol	Description	Manufact.	
R141	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 33103
R142	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 33103
R143	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 33103
R144	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 33103
R145	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 33103
R146	Resistor 4,7 Kohm ±5% 0.33W	Philips	2322 181 33472
R147	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 33103
R148	Resistor 220 ohm ±5% 0.33W	Philips	2322 181 33221
R149	Resistor 1 Kohm ±5% 0.33W	Philips	2322 181 33102
R150	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 33103
R151	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 33103
R152	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 33103
R153	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 33103
R154	Resistor 5,6 Kohm ±5% 0.33W	Philips	2322 181 33562
RE101	Relay 15V DC	Siemens	V23040-A0003-B101
RE102	Relay 15V DC	Siemens	V23040-A0003-B101
RE103	Relay 15V DC	Siemens	V23040-A0003-B101
RE104	Relay 15V DC	Siemens	V23040-A0003-B101
RE105	Relay 15V DC	Siemens	V23040-A0003-B101
RE106	Relay 15V DC	Siemens	V23040-A0003-B101
RE107	Relay 15V DC	Siemens	V23040-A0003-B101
RE108	Relay 15V DC	Siemens	V23040-A0003-B101
RE109	Relay 15V DC	Siemens	V23040-A0003-B101
RE110	Relay 15V DC	Siemens	V23040-A0003-B101
RE111	Relay 15V DC	Siemens	V23040-A0003-B101
RE112	Relay 15V DC	Siemens	V23040-A0003-B101
RE113	Relay 15V DC	Siemens	V23040-A0003-B101
RE114	Relay 15V DC	Siemens	V23040-A0003-B101
RE115	Relay 15V DC	Siemens	V23040-A0003-B101
RE116	Relay 15V DC	Siemens	V23040-A0003-B101
RE117	Relay 15V DC	Siemens	V23040-A0003-B101
RE118	Relay 24V	TAKAMISAWA	LZ24H-24V
RE119	Relay 24V	ELFEIN	880-111-24V
T101	Transistor	Philips	BC328-25
T102	Transistor	Philips	BC328-25
T103	Transistor	Philips	BC328-25

Symbol	*Description*	*Manufact.*	
T104	Transistor	Philips	BC328-25
T105	Transistor	Philips	BC328-25
T106	Transistor	Philips	BC328-25
T107	Transistor	Philips	BC328-25
T108	Transistor	Philips	BC328-25
T109	Transistor	Philips	BC328-25
T110	Transistor	Philips	BC328-25
T111	Transistor	Philips	BC328-25
T112	Transistor	Philips	BC328-25
T113	Transistor	Philips	BC328-25
T114	Transistor	Philips	BC328-25
T115	Transistor	Philips	BC328-25
T116	Transistor	Philips	BC328-25
T117	Transistor	Philips	BC328-25
T118	Transistor	Philips	BC548B
T119	Transistor	Philips	BC548B
T120	Transistor	Philips	BC548B
T121	Transistor	Philips	BC328-25
T122	Transistor	Philips	BC328-25
T123	Transistor	Philips	BC328-25
T124	Transistor	Philips	BC328-25
T125	Transistor	Philips	BC328-25
T126	Transistor	Philips	BC328-25

Symbol	Description				Manufact.	
C201	Capacitor polyester	10nF	±5%	250V	ERO	MKT1818
C202	Capacitor polystyrene	2,2nF	±1%	63V	Philips	2222 424 42202
C203	Capacitor polystyrene	91pF	±1%	630V	Philips	2222 427 49109
C204	Capacitor ceramic	2,7pF		250V	Ferroperm	9/0112.9
C205	Capacitor polystyrene	82pF	±1%	630V	Philips	2222 427 48209
C206	Capacitor ceramic	3,3pF		400V	Ferroperm	9/0112.9
C207	Capacitor polystyrene	91pF	±1%	630V	Philips	2222 427 49109
C208	Capacitor polystyrene	470pF	±1%	630V	Philips	2222 427 44701
C209	Capacitor ceramic	10nF	-20/+80%	50V	KCK	HE70SJYF103Z
C210	Capacitor ceramic	10nF	-20/+80%	50V	KCK	HE70SJYF103Z
C211	Capacitor ceramic	10nF	-20/+80%	50V	KCK	HE70SJYF103Z
C212	Capacitor ceramic	10nF	-20/+80%	50V	KCK	HE70SJYF103Z
C213	Capacitor polystyrene	100pF	±1%	630V	Philips	2222 427 41001
C214	Capacitor polystyrene	82pF	±1%	630V	Philips	2222 427 48209
C215	Capacitor ceramic	2,2pF		250V	Ferroperm	9/0112.9
C216	Capacitor polystyrene	51pF	±1%	630V	Philips	2222 427 45109
C217	Capacitor ceramic	2,2pF		400V	Ferroperm	9/0112.9
C218	Capacitor polystyrene	51pF	±1%	630V	Philips	2222 427 45109
C219	Capacitor polystyrene	680pF	±1%	630V	Philips	2222 427 46801
C220	Capacitor polyester	10nF	±5%	250V	ERO	MKT1818
D201	Diode silicon				ITT	1N4148
D202	Diode silicon				ITT	1N4148
D203	Diode silicon				ITT	1N4148
D204	Diode silicon				ITT	1N4148
L201	Coil				S.P.	TL 186
L202	Coil				S.P.	TL 186
L203	Coil				S.P.	TL 186
L204	Coil				S.P.	TL 191
L205	Coil				S.P.	TL 191
L206	Coil				S.P.	TL 191
R201	Resistor	10 Kohm	±5%	0.33W	Philips	2322 181 13103
R202	Resistor	10 Kohm	±5%	0.33W	Philips	2322 181 13103

Symbol	Description	Manufact.	
C301	Capacitor polyester 10nF ±5% 250V	ERO	MKT1818
C302	Capacitor polystyrene 1,5nF ±1% 250V	Philips	2222 426 41502
C303	Capacitor polystyrene 91pF ±1% 630V	Philips	2222 427 49109
C304	Capacitor ceramic 2,7pF ±1% 250V	Ferroperm	9/0112.9
C305	Capacitor polystyrene 82pF ±1% 630V	Philips	2222 427 48209
C306	Capacitor ceramic 3,3pF 400V	Ferroperm	9/0112.9
C307	Capacitor polystyrene 91pF ±1% 630V	Philips	2222 427 49109
C308	Capacitor polystyrene 360pF ±1% 630V	Philips	2222 427 43301
C309	Capacitor ceramic 10nF -20/+80% 50V	KCK	HE70SJYF103Z
C310	Capacitor ceramic 10nF -20/+80% 50V	KCK	HE70SJYF103Z
C311	Capacitor ceramic 10nF -20/+80% 50V	KCK	HE70SJYF103Z
C312	Capacitor ceramic 10nF -20/+80% 50V	KCK	HE70SJYF103Z
C313	Capacitor polystyrene 130pF ±1% 630V	Philips	2222 427 41301
C314	Capacitor polystyrene 62pF ±1% 630V	Philips	2222 427 46209
C315	Capacitor ceramic 2,2pF 250V	Ferroperm	9/0112.9
C316	Capacitor polystyrene 51pF ±1% 630V	Philips	2222 427 45109
C317	Capacitor polystyrene 1,8pF ±1% 160V	Philips	2222 425 41802
C318	Capacitor polystyrene 51pF ±1% 630V	Philips	2222 427 45109
C319	Capacitor polystyrene 750pF ±1% 250V	Philips	2222 426 47501
C320	Capacitor ceramic 10nF -20/+80% 50V	KCK	HE70SJYF103Z
D301	Diode silicon	ITT	1N4148
D302	Diode silicon	ITT	1N4148
D303	Diode silicon	ITT	1N4148
D304	Diode silicon	ITT	1N4148
L301	Coil	S.P.	TL 187
L302	Coil	S.P.	TL 187
L303	Coil	S.P.	TL 187
L304	Coil	S.P.	TL 190
L305	Coil	S.P.	TL 190
L306	Coil	S.P.	TL 190
R301	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 13103
R302	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 13103

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Symbol	*Description*	*Manufact.*	
C401	Capacitor ceramic 10nF-20/+80% 50V	KCK	HE70SJYF103Z
C402	Capacitor polystyrene 1,5nF ±1% 250V	Philips	2222 426 41502
C403	Capacitor polystyrene 120pF ±1% 630V	Philips	2222 427 41201
C404	Capacitor ceramic 2,7pF 250V	Ferroperm	9/0112.9
C405	Capacitor polystyrene 120pF ±1% 630V	Philips	2222 427 41201
C406	Capacitor ceramic 2,7pF 250V	Ferroperm	9/0112.9
C407	Capacitor polystyrene 130pF ±1% 630V	Philips	2222 427 41301
C408	Capacitor polystyrene 360pF ±1% 630V	Philips	2222 427 43601
C409	Capacitor ceramic 10nF -20/+80% 50V	KCK	HE70SJYF103Z
C410	Capacitor ceramic 10nF -20/+80% 50V	KCK	HE70SJYF103Z
C411	Capacitor ceramic 10nF -20/+80% 50V	KCK	HE70SJYF103Z
C412	Capacitor ceramic 10nF -20/+80% 50V	KCK	HE70SJYF103Z
C413	Capacitor polystyrene 220pF ±1% 630V	Philips	2222 427 42201
C414	Capacitor polystyrene 75pF ±1% 630V	Philips	2222 427 47509
C415	Capacitor ceramic 2,7pF 250V	Ferroperm	9/0112.9
C416	Capacitor polystyrene 51pF ±1% 630V	Philips	2222 427 45109
C417	Capacitor ceramic 2,2pF 250V	Ferroperm	9/0112.9
C418	Capacitor polystyrene 56pF ±1% 630V	Philips	2222 427 45609
C419	Capacitor polystyrene 820pF ±1% 250V	Philips	2222 426 48201
C420	Capacitor ceramic 10nF -20/+80% 50V	KCK	HE70SJYF103Z
D401	Diode silicon	ITT	1N4148
D402	Diode silicon	ITT	1N4148
D403	Diode silicon	ITT	1N4148
D404	Diode silicon	ITT	1N4148
L401	Coil	S.P.	TL 188
L402	Coil	S.P.	TL 188
L403	Coil	S.P.	TL 188
L404	Coil	S.P.	TL 189
L405	Coil	S.P.	TL 189
L406	Coil	S.P.	TL 189
R401	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 13103
R402	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 13103

Symbol	*Description*			*Manufact.*	
C501	Capacitor ceramic	0.82pF ± 0.25pF	250V	Ferroperm	9/0110.9
C502	Capacitor ceramic	0.82pF ± 0.25pF	250V	Ferroperm	9/0110.9
C503	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C504	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C505	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C506	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C507	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C508	Capacitor polystyrene	56pF ± 2%	630V	Philips	2222 427 35609
C509	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C510	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C511	Capacitor trimmer	6/45 Teflon	100V	DAU	107.5901.045
C512	Capacitor trimmer	6/45 Teflon	100V	DAU	107.5901.045
C513	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C514	Capacitor ceramic	4p7 ± 0.25pF	400V	Ferroperm	9/0112.9
C515	Capacitor ceramic	6p8 ± 0.25pF	400V	Ferroperm	9/0112.9
C516	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C517	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C518	Capacitor ceramic	56pF ± 5%N150	1000V	Ferroperm	9/0116.9
C519	Capacitor ceramic	39pF ± 5%	400V	Ferroperm	9/0116.9
C520	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C521	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C522	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C523	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C524	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C525	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C526	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C527	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C528	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C529	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C530	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C531	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C532	Capacitor ceramic	39pF ± 5%	400V	Ferroperm	9/0116.9
D501	Diode switch			Philips	BA182
D502	Diode switch			Philips	BA182
D503	Diode switch			Philips	BA182
D504	Diode switch			Philips	BA182
D505	Diode switch			Philips	BA182
D506	Diode switch			Philips	BA182
D507	Diode switch			Philips	BA182

Symbol	*Description*			*Manufact.*	
D508	Diode silicon			Philips	1N4148
D509	Diode silicon			Philips	1N4148
D510	Diode switch			Philips	BA182
D511	Diode switch			Philips	BA182
D512	Diode switch			Philips	BA182
D513	Diode switch			Philips	BA182
D514	Diode switch			Philips	BA182
D515	Diode switch			Philips	BA182
D516	Diode switch			Philips	BA182
D517	Diode switch			Philips	BA182
D518	Diode silicon			Philips	1N4148
FL501	Crystal filter 10.6085 MHz			S.P.	C1008
FL502	Crystal filter 16.6085 MHz			S.P.	C1014
FP501	Ferrite bead 4B1			Philips	4322 020 34420
FP502	Ferrite bead 4B1			Philips	4322 020 34420
L501	Coil 33uH ±5%			Kaschke	type 200
L502	Coil			S.P.	TL290
L503	Coil			S.P.	TL273
M501	Mixer			S.P.	C1021
R501	Resistor	100 ohm ± 5%	0.33W	Philips	2322 211 13101
R502	Resistor	100 ohm ± 5%	0.33W	Philips	2322 211 13101
R503	Resistor	4K7 ohm ± 5%	0.33W	Philips	2322 211 13472
R504	Resistor	4K7 ohm ± 5%	0.33W	Philips	2322 211 13472
R505	Resistor	4K7 ohm ± 5%	0.33W	Philips	2322 211 13472
R506	Preset potmeter	4K7 ohm ±20%	0.3 W	Noble	IM8KV2-1S
R507	Resistor	100 ohm ± 5%	0.33W	Philips	2322 211 13101
R508	Resistor	100 ohm ± 5%	0.33W	Philips	2322 211 13101
R509	Resistor	12kohm ± 5%	0.33W	Philips	2322 211 13123
R510	Resistor	22kohm ± 5%	0.33W	Philisp	2322 211 13223
R511	Resistor	10kohm ± 5%	0.33W	Philips	2322 211 13103
R512	Resistor	8K2 ohm ± 5%	0.33W	Philips	2322 211 13822
R513	Resistor	2K2 ohm ± 5%	0.33W	Philips	2322 211 13222
R514	Resistor	2K2 ohm ± 5%	0.33W	Philips	2322 211 13222
R515	Resistor	4K7 ohm ± 5%	0.33W	Philips	2322 211 13472
R516	Resistor	1K2 ohm ± 5%	0.33W	Philips	2322 211 13122
R516	Resistor	4K7 ohm ± 5%	0.33W	Philips	2322 211 13472

Symbol	*Description*			*Manufact.*	
R518	Resistor	1K2 ohm ± 5%	0.33W	Philips	2322 211 13122
R519	Resistor	3K3 ohm ± 5%	0.33W	Philips	2322 211 13332
R520	Resistor	4K7 ohm ± 5%	0.33W	Philips	2322 211 13472
R521	Resistor	4K7 ohm ± 5%	0.33W	Philips	2322 211 13472
R522	Resistor	1Kohm ± 5%	0.33W	Philips	2322 211 13102
R523	Resistor	3K3 ohm ± 5%	0.33W	Philips	2322 211 13332
R524	Resistor	470 ohm ± 5%	0.33W	Philips	2322 211 13471
R525	Resistor	4K7 ohm ± 5%	0.33W	Philips	2322 211 13472
R526	Resistor	5K6 ohm ± 5%	0.33W	Philips	2322 211 13562
R527	Resistor	2K7 ohm ± 5%	0.33W	Philips	2322 211 13272
R528	Resistor	1Kohm ± 5%	0.33W	Philips	2322 211 13102
R529	Resistor	3K3 ohm ± 5%	0.33W	Philips	2322 211 13332
R530	Resistor	18Kohm ± 5%	0.33W	Philips	2322 211 13183
R531	Resistor	3K3 ohm ± 5%	0.33W	Philips	2322 211 13332
R532	Resistor	220 ohm ± 5%	0.33W	Philips	2322 211 13221
R533	Resistor	12Kohm ± 5%	0.33W	Philips	2322 211 13123
T501	Transistor			Philips	BF256B
T502	Transistor			Philips	BF256B
T503	Transistor			Philips	BF199
TR501	Transformer			S.P.	TL272
TR502	Transformer			S.P.	TL269

Symbol	Description	Manufact.	
C701			
C702	Capacitor electrolytic 10uF 35V	ERO	EKI 00 AA 210F
C703	Capacitor polystyrene 3,9nF ±1% 160V	Philips	2222 425 43902
C704	Capacitor polystyrene 3,3nF ±1% 160V	Philips	2222 425 43302
C705			
C706			
C707			
C708			
C709			
C710			
C711			
C712			
C713			
C714			
C715			
C716			
C717			
C718			
C719			
C720	Capacitor polyester 0,1uF ±10% 100V	ERO	MKT1822
C721	Capacitor electrolytic 10uF 40V	ERO	EB 00 CA 210G
C722			
C723	Capacitor polyester 0,1uF ±10% 100V	ERO	MKT1822
C724	Capacitor electrolytic 10uF 35V	ERO	EKI 00 AA 210F
C725	Capacitor polystyrene 3,9nF ±1% 160V	Philips	2222 425 43902
C726	Capacitor polystyrene 3,3nF ±1% 160V	Philips	2222 425 43302
C727	Capacitor ceramic 10nF -20/+80% 50V	KCK	HE70SJYF103Z
C728	Capacitor polyester 0,1uF ±10% 100V	ERO	MKT1822
C729	Capacitor ceramic 10nF -20/+80% 50V	KCK	HE70SJYF103Z
D701	Diode switch	Philips	BA182
D702	Diode switch	Philips	BA182
FL701			
FL702	Crystal filter 598,3KHz	NDK	C1025A

Symbol	Description			Manufact.	
L701					
L702	Coil			S.P.	TL 194
L703					
L704					
L705					
L706					
L707	Coil			S.P.	TL 194
R701					
R702	Resistor	390 ohm ±5%	0.33W	Philips	2322 181 13391
R703	Resistor	3,9 Kohm ±5%	0.33W	Philips	2322 181 13392
R704	Resistor	56 Kohm ±5%	0.33W	Philips	2322 181 13563
R705	Resistor	120 Kohm ±5%	0.33W	Philips	2322 181 13124
R706					
R707					
R708					
R709	Resistor	120 ohm ±5%	0.33W	Philips	2322 181 13121
R710					
R711	Resistor	1,5 Kohm ±5%	0.33W	Philips	2322 181 13152
R712	Resistor	270 ohm ±5%	0.33W	Philips	2322 181 13271
R713	Resistor	390 ohm ±5%	0.33W	Philips	2322 181 13391
R714	Resistor	3,9 Kohm ±5%	0.33W	Philips	2322 181 13392
R715	Resistor	56 Kohm ±5%	0.33W	Philips	2322 181 13563
R716	Resistor	120 Kohm ±5%	0.33W	Philips	2322 181 13124
R717	Resistor	120 ohm ±5%	0.33W	Philips	2322 181 13121
T701	Transistor			Motorola	TIS88A
T702	Transistor			Motorola	TIS88A
T703	Transistor			Motorola	TIS88A

Symbol	Description			Manufact.	
L704	Coil			S.P.	TL003
L705	Coil			S.P.	TL003
L706	Coil			S.P.	TL277
L707	Coil			S.P.	TL194
R701	Resistor	390 ohm ±5%	0.33W	Philips	2322 211 13391
R702	Resistor	390 ohm ±5%	0.33W	Philips	2322 211 13391
R703	Resistor	3k9 ohm ±5%	0.33W	Philips	2322 211 13392
R704	Resistor	56kohm ±5%	0.33W	Philips	2322 211 13563
R705	Resistor	120kohm ±5%	0.33W	Philips	2322 211 13124
R706	Resistor	10kohm ±5%	0.33W	Philips	2322 211 13103
R707	Resistor	56kohm ±5%	0.33W	Philips	2322 211 13563
R708	Resistor	120kohm ±5%	0.33W	Philips	2322 211 13124
R709	Resistor	120 ohm ±5%	0.33W	Philips	2322 211 13121
R710	Resistor	120 ohm ±5%	0.33W	Philips	2322 211 13121
R711	Resistor	1k5 ohm ±5%	0.33W	Philips	2322 211 13152
R712	Resistor	270 ohm ±5%	0.33W	Philips	2322 211 13271
R713	Resistor	390 ohm ±5%	0.33W	Philips	2322 211 13391
R714	Resistor	3k9 ohm ±5%	0.33W	Philips	2322 211 13392
R715	Resistor	56kohm ±5%	0.33W	Philips	2322 211 13563
R716	Resistor	120kohm ±5%	0.33W	Philips	2322 211 13124
R717	Resistor	120 ohm ±5%	0.33W	Philips	2322 211 13121
T701	Transistor			Philips	BF256A
R702	Transistor			Philips	BF256A
T703	Transistor			Philips	BF256A

Symbol	*Description*			*Manufact.*	
C801	Capacitor electrolytic	10uF ±20%	35V	ERO	EKI00AA210F
C802	Capacitor polystyrene	3n3 ± 5%	160V	Philips	2222 425 23302
C803	Capacitor polystyrene	360pF ± 2%	630V	Philips	2222 427 33601
C804	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C805	Capacitor electrolytic	10uF ±20%	35V	ERO	EKI00AA210F
C806	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C807	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C808	Capacitor electrolytic	10uF ±20%	35V	ERO	EKI00AA210F
C809	Capacitor electrolytic	1uF ±20%	50V	ERO	EKI00AA110H
C810	Capacitor polystyrene	1nF ± 5%	250V	Philips	2222 426 21002
C811	Capacitor polystyrene	120pF ± 2%	630V	Philips	2222 427 31201
C812	Capacitor electrolytic	10uF-10/+100%	25V	Siemens	B41313 A5106-V
C813	Capacitor tantalum	68uF ±20%	16V	Siemens	ETQ - 5
C814	Capacitor ceramic	10uF-20/+80%	50V	KCK	HE70SJYF103Z
C815	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C816	Capacitor polyester	100nF ±20%	100V	Philips	2222 344 24104
C817	Capacitor electrolytic	10uF ±20%	35V	ERO	EKI00AA210F
C818	Capacitor polystyrene	1nF ± 5%	250V	Philips	2222 426 21002
C819	Capacitor polystyrene	120pF ± 2%	630V	Philips	2222 427 31201
C820	Capacitor polystyrene	270pF ±10%	400V	Ferroperm	9/0129.9
C821	Capacitor electrolytic	10uF ±20%	35V	ERO	EKI00AA210F
C822	Capacitor ceramic	270pF ± 5%	630V	Philips	2222 427 22701
C823	Capacitor ceramic	1nF-20/+80%	400V	Ferroperm	9/0138.9
C824	Capacitor tantalum	220nF ±20%	35V	ERO	ETP1A
C825	Capacitor ceramic	270pF ±10%	400V	Ferroperm	9/0129.9
C826	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C827	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C828	Capacitor electrolytic	10uF ±20%	35V	ERO	EKI00AA210F
C829	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103J
C830	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103J
C831	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103J
C832	Capacitor electrolytic	10uF ±20%	35V	ERO	EKI00AA210F
C833	Capacitor electrolytic	10uF-20/+80%	35V	ERO	EKI00AA210F
C834	Capacitor polystyrene	1nF ± 5%	250V	Philips	2222 426 21502
C835	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
C836	Capacitor polyester	22nF ±20%	250V	Philips	2222 344 40223
C837	Capacitor polystyrene	1n5 ±5%	250V	Philips	2222 426 21502
C838	Capacitor ceramic	10nF-20/+80%	50V	KCK	HE70SJYF103Z
D801	Diode silicon			Philips	1N4148
D802	Diode silicon			Philips	1N4148

Symbol	Description		Manufact.	
D803	Diode silicon		Philips	1N4148
D804	Diode zener	4.7V ± 5% 0.4W	Philips	BZX79C4V7
D805	Diode silicon		Philips	1N4148
D806	Diode silicon		Philips	1N4148
D807	Diode silicon		Philips	1N4148
D808	Diode silicon		Philips	1N4148
D809	Diode silicon		Philips	1N4148
D810	Diode silicon		Philips	1N4148
D811	Diode switch		Philips	BA182
D812	Diode switch		Philips	BA182
D813	Diode switch		Philips	BA182
D814	Diode stabistor		Philips	BZV 46 2V0
D815	Diode stabistor		Philips	BZV 46 2V0
L801	Coil		S.P.	TL195
L802	Coil	470uH ± 5%	Kaschke	Type 200/5
L803	Coil	390uH ± 5%	Kaschke	Type 200/5
L804	Coil	330uH ± 5%	Kaschke	Type 200/5
L805	Coil		S.P.	TL196
R801	Resistor	12Kohm ±5% 0.33W	Philips	2322 106 33123
R802	Resistor	12Kohm ±5% 0.33W	Philips	2322 106 33123
R803	Resistor	3k9 ohm ±5% 0.33W	Philips	2322 211 13392
R804	Resistor	2k2 ohm ±5% 0.33W	Philips	2322 211 13222
R805	Resistor	5E1 Ohm ±5% 0.33W	Philips	2322 211 13518
R806	Resistor	5k6 ohm ±5% 0.33W	Philips	2322 211 13562
R807	Resistor	4K7 ohm ±5% 0.33W	Philips	2322 106 33472
R808	Resistor	6k8 ohm ±5% 0.33W	Philips	2322 211 13682
R809	Resistor	12Kohm ±5% 0.33W	Philips	2322 211 13123
R810	Resistor	15 ohm ±5% 0.33W	Philips	2322 106 33159
R811	Resistor	2K2 ohm ±5% 0.33W	Philips	2322 106 33222
R812	Resistor	2K2 ohm ±5% 0.33W	Philips	2322 106 33222
R813	Resistor	2k7 ohm ±5% 0.33W	Philips	2322 106 33272
R814	Resistor	1k2 ohm ±5% 0.33W	Philips	2322 211 13122
R815	Resistor	47Kohm ±5% 0.33W	Philips	2322 106 33473
R816	Resistor	390 ohm ±5% 0.33W	Philips	2322 211 13391
R817	Resistor	5E1 ohm ±5% 0.33W	Philips	2322 211 13518
R818	Resistor	2M7 ohm ±5% 0.33W	Philips	2322 106 33275
R819	Resistor	8k2 ohm ±5% 0.33W	Philips	2322 211 13822
R820	Resistor	3k9 ohm ±5% 0.33W	Philips	2322 211 13392
R821	Resistor	12Kohm ±5% 0.33W	Philips	2322 211 13123

Symbol	Description			Manufact.	
R822	Resistor	12Kohm ±5%	0.33W	Philips	2322 211 13123
R823	Resistor	1Mohm ±5%	0.33W	Philips	2322 211 13105
R824	Resistor	39Kohm ±5%	0.33W	Philips	2322 106 33393
R825	Resistor	12Kohm ±5%	0.33W	Philips	2322 211 13123
R826	Resistor	15Kohm ±5%	0.33W	Philips	2322 211 13153
R827	Resistor	4k7 ohm ±5%	0.33W	Philips	2322 211 13472
R828	Resistor	1Kohm ±5%	0.33W	Philips	2322 106 33102
R829	Resistor	390 ohm ±5%	0.33W	Philips	2322 211 13391
R830	Resistor	5E1 ohm ±5%	0.33W	Philips	2322 211 13518
R831	Resistor	1Mohm ±5%	0.33W	Philips	2322 106 33105
R832	Resistor	12Kohm ±5%	0.33W	Philips	2322 211 13123
R833	Resistor	18k ohm ±5%	0.33W	Philips	2322 211 13183
R834	Resistor	12Kohm ±5%	0.33W	Philips	2322 211 13123
R835	Resistor	3k9 ohm ±5%	0.33W	Philips	2322 211 13392
R836	Resistor	15Kohm ±5%	0.33W	Philips	2322 211 13153
R837	Resistor	470 ohm ±5%	0.33W	Philips	2322 106 33471
R838	Resistor	10Kohm ±5%	0.33W	Philips	2322 106 33103
R839	Resistor	47Kohm ±5%	0.33W	Philips	2322 211 13473
R840	Resistor	100Kohm ±5%	0.33W	Philips	2322 211 13104
R841	Resistor	2k2 ohm ±5%	0.33W	Philips	2322 106 33222
R842	Resistor	22Kohm ±5%	0.33W	Philips	2322 211 13223
R843	Resistor	100 ohm ±5%	0.33W	Philips	2322 211 13101
R844	Resistor	390 ohm ±5%	0.33W	Philips	2322 211 13391
R845	Resistor	1Kohm ±5%	0.33W	Philips	2322 106 33102
R846	Resistor	120Kohm ±5%	0.33W	Philips	2322 211 13124
R847	Resistor	18Kohm ±5%	0.33W	Philips	2322 211 13183
R848	Resistor	22Kohm ±5%	0.33W	Philips	2322 211 13223
R849	Resistor	5k6 ohm ±5%	0.33W	Philips	2322 211 13562
R850	Resistor	1Kohm ±5%	0.33W	Philips	2322 211 13102
R851	Resistor	220 ohm ±5%	0.33W	Philips	2322 211 13221
R852	Resistor	47Kohm ±5%	0.33W	Philips	2322 211 13473
R853	Resistor	1Kohm ±5%	0.33W	Philips	2322 211 13102
R854	Resistor	10Kohm ±5%	0.33W	Philips	2322 106 33103
R855	Resistor	27Kohm ±5%	0.33W	Philips	2322 211 13273
R856	Resistor	10Kohm ±5%	0.33W	Philips	2322 211 13103
R857	Resistor	2k2 ohm ±5%	0.33W	Philips	2322 211 13222
R858	Resistor	5k6 ohm ±5%	0.33W	Philips	2322 211 13562
R859	Resistor	1Kohm ±5%	0.33W	Philips	2322 211 13102
R860	Resistor	10Kohm ±5%	0.33W	Philips	2322 106 33103
R861	Resistor	560 ohm ±5%	0.33W	Philips	2322 211 13561

Symbol	*Description*		*Manufact.*	
R862	Resistor	1k5 ohm ±5% 0.33W	Philips	2322 211 13152
R863	Resistor	47 ohm ±5% 0.33W	Philips	2322 106 33479
R864	Resistor	1Mohm ±5% 0.33W	Philips	2322 106 33105
R865	Resistor	100Kohm ±5% 0.33W	Philips	2322 211 13104
R866	Resistor	12Kohm ±5% 0.33W	Philips	2322 211 13123
R867	Resistor	100 ohm ±5% 0.33W	Philips	2322 211 13101
R868	Resistor	100Kohm ±5% 0.33W	Philips	2322 211 13104
R869	Resistor	47Kohm ±5% 0.33W	Philips	2322 211 13473
R870	Resistor	3k9 ohm ±5% 0.33W	Philips	2322 211 13392
R871	Resistor	1Kohm ±5% 0.33W	Philips	2322 211 13102
R872	Resistor	100Kohm ±5% 0.33W	Philips	2322 211 13104
R873	Resistor	47 ohm ±5% 0.33W	Philips	2322 106 33479
T801	Transistor		Philips	BC548B
T802	Transistor		Philips	BC548B
T803	Transistor		Philips	BC558B
T804	Transistor		Philips	BF256A
T805	Transistor		Philips	BC548B
T806	Transistor		Philips	BC548B
T807	Transistor		Philips	BC558B
T808	Transistor		Philips	BF256A
T809	Transistor		Philips	BC548B
T810	Transistor		Philips	BC548B
T811	Transistor		Philips	BC548B
T812	Transistor		Philips	BC558B
T813	Transistor		Philips	BC548B
T814	Transistor		Philips	BC548B
T815	Transistor		Philips	BC548B
T816	Transistor		Philips	BC548B
T817	A - E Transistor array		National	LM3086N

Symbol	Description			Manufact.	
C901	Capacitor polyester	220nF ±20%	100V	ERO	MKT1822-422/0
C902	Capacitor ceramic	1n8-20/+80%	400V	Ferroperm	9/0141.9
C903	Capacitor electrolytic	10uF ±20%	35V	ERO	EKI00AA210F
C904	Capacitor electrolytic	4u7 ±20%	50V	ERO	EKI00AA147H
C905	Capacitor polystyrene	15nF ± 2%	63V	Philips	2222 424 31503
C906	Capacitor polystyrene	30nF ± 2%	63V	Philips	2222 424 33003
C907	Capacitor polystyrene	1n3 ± 2%	160V	Philips	2222 425 31302
C908	Capacitor polystyrene	39nF ± 2%	63V	Philips	2222 424 33903
C909	Capacitor polystyrene	470pF ± 2%	250V	Philips	2222 426 44701
C910	Capacitor ceramic	1n8-20/+80%	400V	Ferroperm	9/0141.9
C911	Capacitor polyester	220nF ±20%	100V	ERO	MKT1822-422/0
C912	Capacitor electrolytic	4u7 ±20%	50V	ERO	EKI00AA147H
C913	Capacitor electrolytic	4u7 ±20%	50V	ERO	EKI00AA147H
C914	Capacitor polyester	100nF ±20%	100V	ERO	MKT1822-410/0
C915	Capacitor electrolytic	100uF-10/+50	25V	Siemens	B41283-B5107-T
C916	Capacitor electrolytic	22uF ±20%	35V	ERO	EKI00BB222F
C917	Capacitor polystyrene	4n7 ± 2%	63V	Philips	2222 424 34702
C918	Capacitor polystyrene	1nF ± 2%	250V	Philips	2222 426 31002
C919	Capacitor electrolytic	22uF ±20%	35V	ERO	EKI00BB222F
C920	Capacitor polyester	100nF ±20%	100V	ERO	MKT1822-410/0
C921	Capacitor electrolytic	470uF-10/+50%	16V	Siemens	B41283-A4477-T
C922	Capacitor electrolytic	100uF-10/+50%	25V	Siemens	B41283-B5107-T
C923	Capacitor polyester	100nF ±20%	100V	ERO	MKT1822-410/0
IC901	Integrated circuit			National	LM324
IC902	Integrated circuit			SGS/ATES	TCA940
R901	Resistor	82Kohm ±5%	0.33W	Philips	2322 211 13823
R902	Resistor	27Kohm ±5%	0.33W	Philips	2322 211 13273
R903	Resistor	6k8 ohm ±5%	0.33W	Philips	2322 106 33682
R904	Resistor	56Kohm ±5%	0.33W	Philips	2222 211 13563
R905	Resistor	68Kohm ±5%	0.33W	Philips	2222 106 33683
R906	Resistor	3k3 ohm ±5%	0.33W	Philips	2222 211 13332
R907	Resistor	100Kohm ±5%	0.33W	Philips	2222 211 13104
R908	Resistor	3k3 ohm ±5%	0.33W	Philips	2222 106 33332
R909	Resistor	12Kohm ±5%	0.33W	Philips	2222 211 13123
R910	Resistor	12Kohm ±5%	0.33W	Philips	2222 211 13123
R911	Resistor	12Kohm ±5%	0.33W	Philips	2222 211 13123
R912	Resistor	3k3 ohm ±5%	0.33W	Philips	2222 211 13332
R913	Resistor	18Kohm ±5%	0.33W	Philips	2222 211 13183

Symbol	Description			Manufact.	
R914	Resistor	56Kohm ±5%	0.33W	Philips	2222 211 13563
R915	Resistor	15Kohm ±5%	0.33W	Philips	2222 211 13153
R916	Resistor	68Kohm ±5%	0.33W	Philips	2222 211 13683
R917	Resistor	3k3 ohm ±5%	0.33W	Philips	2322 211 13332
R918	Resistor	4k7 ohm ±5%	0.33W	Philips	2222 211 13472
R919	Resistor	22Kohm ±5%	0.33W	Philips	2222 211 13223
R920	Resistor	56Kohm ±5%	0.33W	Philips	2222 106 33563
R921	Resistor	120 ohm ±5%	0.33W	Philips	2222 211 13121
R922	Resistor	100 ohm ±5%	0.5W	Philips	2222 212 13101
R923	Resistor	56 ohm ±5%	0.33W	Philips	2222 211 13569
R924	Resistor	1 ohm ±5%	0.33W	Philips	2222 211 13108
R925	Resistor	39 ohm ±5%	0.33W	Philips	2222 211 13399
R926	Resistor	10 ohm ±5%	0.33W	Philips	2222 211 13109
R927	Resistor	8E2 ohm ±5%	4.2W	Philips	2222 330 22828
R928	Resistor	1K2 ohm ±5%	0.33W	Philips	2222 211 13122

Symbol	*Description*			*Manufact.*	
C1001	Capacitor	10 nF ±20%	400V	Philips	2222 344 54103
C1002	Capacitor electrolytic	10 uF ±20%	35V	ERO	EKI 00AA 210F
C1003	Capacitor ceramic	12 pF ±5% NP0	400V	Ferroperm	9/0112.9
C1004	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE70SJYF103Z
C1005	Capacitor ceramic	68 pF ±2% N150	100V	KCK	SDPU-6E/N150/68/G/100V
C1006	Capacitor polyester	22 nF ±20%	400V	Philips	2222 344 54223
C1007	Capacitor polyester	10 nF -20/+80%	50V	KCK	HE70SJYF103Z
C1008	Capacitor polyester	220 nF ±20%	100V	Philips	2222 344 24224
C1009	Capacitor polyester	15 nF ±20%	400V	Philips	2222 344 54153
C1010	Capacitor polyester	47 nF ±20%	250V	Philips	2222 344 40473
C1011	Capacitor polyester	220 nF ±20%	100V	Philips	2222 344 24224
C1012	Capacitor electrolytic	10 uF -10/+100%	40V	Siemens	B41313-A7106-V
C1013	Capacitor electrolytic	10 uF -10/+100%	40V	Siemens	B41313-A7106-V
C1014	Capacitor polyester	220 nF ±20%	100V	Philips	2222 344 24224
C1015	Capacitor polyester	47 nF ±20%	250V	Philips	2222 344 40473
C1016	Capacitor polyester	220 nF ±20%	100V	Philips	2222 344 24224
C1017	Capacitor polyester	220 nF ±20%	100V	Philips	2222 344 24224
C1018	Capacitor polyester	220 nF ±20%	100V	Philips	2222 344 24224
C1019	Capacitor polyester	220 nF ±20%	100V	Philips	2222 344 24224
C1020	Capacitor polyester	220 nF ±20%	100V	Philips	2222 344 24224
C1021	Capacitor polystyrene	1n2F ±5%	63V	Philips	2222 424 21202
C1022	Capacitor polystyrene	6n8F ±5%	63V	Philips	2222 424 26802
D1001	Diode zener	12V ±5%	0.4W	Philips	BZX79C12
D1002	Diode silicon			Philips	BAW62
FP1001	Ferrite bead	4B1		Philips	4322 020 34420
IC1001	Integrated circuit			Texas	SN74LS192N
IC1002	Integrated circuit			Texas	SN74LS192N
IC1003	Integrated circuit			Texas	SN74LS192N
IC1004	Integrated circuit			Texas	SN74LS192N
IC1005	Integrated circuit			Texas	SN74LS192N
IC1006	Integrated circuit			Motorola	MC4044P
IC1007	Integrated circuit			Texas	SN74LS390N
IC1008	Integrated circuit			Texas	SN74LS20N
IC1009	Integrated circuit			Texas	SN74LS27N
IC1010	Integrated circuit			Texas	SN74LS109N
IC1011	Integrated circuit			Texas	SN74LS390N
IC1012	Integrated circuit			Texas	SN74LS390N

Symbol	Description			Manufact.	
IC1013	Integrated circuit			Motorola	MC4044P
IC1014	Integrated circuit			Texas	SN7410N
IC1015	Integrated circuit			Texas	SN74LS290N
L1001	Coil			S.P.	TL255
L1002	Coil			S.P.	TL235
R1001	Resistor	15 Kohm ±5%	0.33W	Philips	2322 211 13153
R1002	Resistor	15 Kohm ±5%	0.33W	Philips	2322 211 13153
R1003	Resistor	560 ohm ±5%	0.33W	Philips	2322 211 13561
R1004	Resistor	15 Kohm ±5%	0.33W	Philips	2322 211 13153
R1005	Resistor	560 ohm ±5%	0.33W	Philips	2322 211 13561
R1006	Resistor	5K6 ohm ±5%	0.33W	Philips	2322 211 13562
R1007	Resistor	1K8 ohm ±5%	0.33W	Philips	2322 211 13182
R1008	not used				
R1009	Resistor	1K8 ohm ±5%	0.33W	Philips	2322 211 13182
R1010	Resistor	820 ohm ±5%	0.33W	Philips	2322 211 13821
R1011	Resistor	390 ohm ±5%	0.33W	Philips	2322 211 13391
R1012	Resistor	220 ohm ±5%	0.33W	Philips	2322 211 13221
R1013	Preset potmeter	2K ohm ±10%	0.5W	Bourns	3299W-1-202
R1014	Resistor	1K2 ohm ±5%	0.33W	Philips	2322 106 33122
R1015	Resistor	10K ohm ±5%	0.33W	Philips	2322 211 13103
R1016	Resistor	820 ohm ±5%	0.33W	Philips	2322 211 13821
R1017	Resistor	470 ohm ±5%	0.33W	Philips	2322 211 13471
R1018	Resistor	10 Kohm ±5%	0.33W	Philips	2322 211 13103
R1019	Resistor	1K2 ohm ±5%	0.33W	Philips	2322 211 13122
R1020	Resistor	2K2 ohm ±5%	0.33W	Philips	2322 211 13222
R1021	Resistor	560 ohm ±5%	0.33W	Philips	2322 211 13561
R1022	Resistor	22 Kohm ±5%	0.33W	Philips	2322 211 13223
R1023	Resistor	270 ohm ±5%	0.33W	Philips	2322 106 33271
R1024	Resistor	1K8 ohm ±5%	0.33W	Philips	2322 211 13182
R1025	Resistor	10 Kohm ±5%	0.33W	Philips	2322 211 13103
R1026	Resistor	220 ohm ±5%	0.33W	Philips	2322 106 33221
R1027	Resistor	2K2 ohm ±5%	0.33W	Philips	2322 211 13222
R1028	Resistor	47 Kohm ±5%	0.33W	Philips	2322 106 33473
R1029	Resistor	2K2 ohm ±5%	0.33W	Philips	2322 211 13222
R1030	Resistor	1 Kohm ±5%	0.33W	Philips	2322 211 13102
R1031	Resistor	220 ohm ±5%	0.33W	Philips	2322 211 13221
R1032	Resistor	680 ohm ±5%	0.33W	Philips	2322 211 13681
R1033	Resistor	12 Kohm ±5%	0.33W	Philips	2322 211 13123

Symbol	*Description*		*Manufact.*	
R1034	Resistor	6K8 ohm ±5% 0.33W	Philips	2322 211 13682
R1035	Resistor	1 Kohm ±5% 0.33W	Philips	2322 211 13102
T1001	Transistor		Philips	2N2368
T1002	Transistor		Philips	2N2368
T1003	Transistor		Philips	BF494
T1004	Transistor		Philips	BF199
T1005	Transistor		Philips	2N2368
T1006	Transistor		Philips	BF199

Symbol	Description			Manufact.	
C1101	Capacitor polyester	220 nF ±20%	100V	Philips	2222 344 24224
C1102	Capacitor polyester	220 nF ±20%	100V	Philips	2222 344 24224
C1103	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE70SJYF103Z
C1104	Capacitor electrolytic	10 uF ±20%	35V	ERO	EKI 00AA 210F
C1105	Capacitor electrolytic	10 nF ±20%	35V	ERO	EKI 00AA 210F
C1106	Capacitor electrolytic	10 uF ±20%	35V	ERO	EKI 00AA 210F
C1107	Capacitor polyester	220 nF ±20%	100V	Philips	2222 344 24224
C1108	Capacitor electrolytic	10 uF -10/+100%	40V	Siemens	B41313-A7106-V
C1109	Capacitor electrolytic	10 uF ±20%	35V	ERO	EKI 00AA 210F
C1110	Capacitor polycarbonate	470 nF ±10%	100V	Philips	2222 344 21474
C1111	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE70SJYF103Z
C1112	Capacitor polystyrene	39 nF ±1%	63V	Philips	2222 424 43903
C1113	Capacitor polyester	6u8F ±10%	100V	Philips	2222 344 25685
C1114	Capacitor electrolytic	10 uF ±20%	35V	ERO	EKI 00AA 210F
C1115	Capacitor ceramic	220 pF ±20%	400V	Ferroperm	9/0129.9
C1116	Capacitor polyester	220 uF ±10%	100V	Philips	2222 344 25224
C1117	Capacitor ceramic	220 pF ±20%	400V	Ferroperm	9/0129.9
C1118	Capacitor polyester	150 nF ±10%	100V	Philips	2222 344 25154
D1101	Diode silicon			Philips	BAW62
D1102	Diode silicon			Philips	BAW62
D1103	Diode zener	4.7V ±5%	0.4W	Philips	BZX79C4V7
D1104	Diode zener	4.7V ±5%	0.4W	Philips	BZX79C4V7
D1105	Diode silicon			Philips	BAW62
D1106	Diode silicon			Philips	BAV21
IC1101	Integrated circuit			National	LM308
R1101	Resistor	1 Kohm ±5%	0.33W	Philips	2322 211 13102
R1102	Resistor	82 ohm ±5%	0.33W	Philips	2322 211 13829
R1103	Resistor	820 ohm ±5%	0.33W	Philips	2322 211 13821
R1104	Resistor	150 Kohm ±5%	0.33W	Philips	2322 211 13154
R1105	Resistor	2K2 ohm ±5%	0.33W	Philips	2322 211 13222
R1106	Resistor	1K2 ohm ±5%	0.33W	Philips	2322 211 13122
R1107	Resistor	12 Kohm ±5%	0.33W	Philips	2322 211 13123
R1108	Resistor	12 ohm ±5%	0.33W	Philips	2322 211 13129
R1109	Resistor	10 Kohm ±5%	0.33W	Philips	2322 211 13103
R1110	Preset potmeter	2K2 ohm ±20%	0.5W	Philips	2322 482 20222
R1111	Resistor	3K3 ohm ±5%	0.33W	Philips	2322 211 13332
R1112	Resistor	10 Kohm ±5%	0.33W	Philips	2322 211 13103

Symbol	*Description*			*Manufact.*	
R1113	Resistor	3K3 ohm ±5%	0.33W	Philips	2322 211 13332
R1114	Preset potmeter	2K2 ohm ±20%	0.5W	Philips	2322 482 20222
R1115	Resistor	10 Kohm ±5%	0.33W	Philips	2322 211 13103
R1116	Resistor	1K5 ohm ±5%	0.33W	Philips	2322 211 13152
R1117	Resistor	2K7 ohm ±5%	0.33W	Philips	2322 106 33272
R1118	Resistor	3K3 ohm ±5%	0.33W	Philips	2322 211 13332
R1119	Resistor	10 Kohm ±5%	0.33W	Philips	2322 211 13103
R1120	Resistor	560 ohm ±5%	0.33W	Philips	2322 211 13561
R1121	Resistor	3K92 ohm ±1%	0.25W	VITROHM	471-0
R1122	Resistor	150 ohm ±5%	0.33W	Philips	2322 211 13151
R1123	Resistor	22 Kohm ±5%	0.33W	Philips	2322 211 13223
R1124	Resistor	2M7 ohm ±5%	0.33W	Philips	2322 211 12275
R1125	Resistor	4K7 ohm ±5%	0.33W	Philips	2322 211 13472
R1126	Resistor	2K2 ohm ±5%	0.33W	Philips	2322 211 13222
R1127	Resistor	3K92 ohm ±1%	0.25W	VITROHM	471-0
R1128	Resistor	36K5 ohm ±1%	0.25W	VITROHM	471-0
R1129	Resistor	3K92 ohm ±1%	0.25W	VITROHM	471-0
T1101	Transistor			Philips	BD138
T1102	Transistor			Philips	BC548A
T1103	Transistor			Philips	BD139
T1104	Transistor			Philips	BC558
T1105	Transistor			Philips	BC556A
T1106	Transistor			Philips	BC548

HARMONIC FILTER UNIT R1119 & R1120

Symbol	*Description*			*Manufact.*	
C1301	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE 70 SJ YF 103Z
C1302	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE 70 SJ YF 103Z
C1303	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE 70 SJ YF 103Z
C1304	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE 70 SJ YF 103Z
C1305	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE 70 SJ YF 103Z
C1306	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE 70 SJ YF 103Z
C1307	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE 70 SJ YF 103Z
C1308	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE 70 SJ YF 103Z
C1309	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE 70 SJ YF 103Z
C1310	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE 70 SJ YF 103Z
C1311	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE 70 SJ YF 103Z
C1312	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE 70 SJ YF 103Z
C1313	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE 70 SJ YF 103Z
C1314	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE 70 SJ YF 103Z
C1315	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE 70 SJ YF 103Z
C1316	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE 70 SJ YF 103Z
C1317	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE 70 SJ YF 103Z
C1318	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE 70 SJ YF 103Z
C1319	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE 70 SJ YF 103Z
C1320	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE 70 SJ YF 103Z
C1321	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE 70 SJ YF 103Z
C1322	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE 70 SJ YF 103Z
C1323	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE 70 SJ YF 103Z
C1324	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE 70 SJ YF 103Z
C1325	Capacitor polystyrene	180 pF ±2%	630V	Philips	2222 427 31801
C1326	Capacitor polystyrene	180 pF ±2%	630V	Philips	2222 427 31801
C1327	Capacitor polystyrene	110 pF ±2%	630V	Philips	2222 427 31101
C1328	Capacitor polystyrene	100 pF ±2%	630V	Philips	2222 427 31001
C1329	Capacitor polystyrene	82 pF ±2%	630V	Philips	2222 427 38209
C1330	Capacitor polystyrene	91 pF ±2%	630V	Philips	2222 427 39109
C1331	Capacitor polystyrene	150 pF ±2%	630V	Philips	2222 427 31501
C1332	Capacitor polystyrene	120 pF ±2%	630V	Philips	2222 427 31201
C1333	Capacitor polystyrene	110 pF ±2%	630V	Philips	2222 427 31101
C1334	Capacitor polystyrene	100 pF ±2%	630V	Philips	2222 427 31001
C1335	Capacitor polystyrene	91 pF ±2%	630V	Philips	2222 427 39109
C1336	Capacitor polystyrene	82 pF ±2%	630V	Philips	2222 427 38209
C1337	Capacitor ceramic	2.2 pF ±0.25 pF	250V	Ferroperm	9/0112.9
C1338	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE 70 SJ YF 103Z
C1339	Capacitor polyester	0.22 uF ±10%	63V	ERO	MKT 1818 42206
C1340	Capacitor ceramic	10 nF -20/+80%	50V	KCK	HE 70 SJ YF 103Z

HARMONIC FILTER UNIT R1119 & R1120

Symbol	*Description*			*Manufact.*	
C1341	Capacitor ceramic	2.2 pF ±0.25 pF	250V	Ferroperm	9/0112.9
C1342	Capacitor ceramic	10 nF -20/+80%	50V	Ferroperm	HE 70 SJ YF 103Z
C1343	Capacitor ceramic	10 nF -20/+80%	50V	Ferroperm	HE 70 SJ YF 103Z
C1344	Capacitor ceramic	10 nF -20/+80%	50V	Ferroperm	HE 70 SJ YF 103Z
C1345	Capacitor ceramic	10 nF -20/+80%	50V	Ferroperm	HE 70 SJ YF 103Z
C1346	Capacitor ceramic	10 nF -20/+80%	50V	Ferroperm	HE 70 SJ YF 103Z
C1347	Capacitor ceramic	10 nF -20/+80%	50V	Ferroperm	HE 70 SJ YF 103Z
C1348	Capacitor ceramic	10 nF -20/+80%	50V	Ferroperm	HE 70 SJ YF 103Z
C1349	Capacitor electrolytic	10 uF ±20%	35V	Roederstein	EKI 00 AA 210F
C1350	Capacitor ceramic	8.2 pF ±0.25 pF	400V	Ferroperm	9/0112.9
D1301	Diode silicon			Philips	IN4448
D1302	Diode silicon			Philips	IN4448
D1303	Diode silicon			Philips	IN4448
D1304	Diode silicon			Philips	IN4448
D1305	Diode silicon			Philips	IN4448
D1306	Diode silicon			Philips	IN4448
D1307	Diode silicon			Philips	IN4448
D1308	Diode silicon			Philips	IN4448
D1309	Diode silicon			Philips	IN4448
D1310	Diode silicon			Philips	IN4448
D1311	Diode silicon			Philips	IN4448
D1312	Diode silicon			Philips	IN4448
D1313	Diode switch			Telefunken	BA243
D1314	Diode switch			Telefunken	BA243
D1315	Diode switch			Telefunken	BA243
D1316	Diode switch			Telefunken	BA243
D1317	Diode switch			Telefunken	BA243
D1318	Diode switch			Telefunken	BA243
D1319	Diode switch			Telefunken	BA243
D1320	Diode switch			Telefunken	BA243
D1321	Diode switch			Telefunken	BA243
D1322	Diode switch			Telefunken	BA243
D1323	Diode switch			Telefunken	BA243

HARMONIC FILTER R1119 & R1120

Symbol	*Description*	*Manufact.*	
D1324	Diode switch	Telefunken	BA243
D1325	Diode switch	Telefunken	BA243
D1326	Diode switch	Telefunken	BA243
D1327	Diode germanium	Philips	AA143
FP1301	Ferrite Bead 4B1	Philips	4322 020 34420
FP1302	Ferrite Bead 4B1	Philips	4322 020 34420
FP1303	Ferrite Bead 4B1	Philips	4322 020 34420
L1301	Coil	S.P.	TL350
L1302	Coil	S.P.	TL347
L1303	Coil	S.P.	TL336
L1304	Coil	S.P.	TL338
L1305	Coil	S.P.	TL340
L1306	Coil	S.P.	TL352
L1307	Coil	S.P.	TL337
L1308	Coil	S.P.	TL349
L1309	Coil	S.P.	TL348
L1310	Coil	S.P.	TL339
L1311	Coil	S.P.	TL351
L1312	Coil	S.P.	TL341
R1301	Resistor 470 ohm ±5% 0.33W	Philips	2322 106 33471
R1302	Resistor 470 ohm ±5% 0.33W	Philips	2322 106 33471
R1303	Resistor 470 ohm ±5% 0.33W	Philips	2322 211 13471
R1304	Resistor 470 ohm ±5% 0.33W	Philips	2322 106 33471
R1305	Resistor 470 ohm ±5% 0.33W	Philips	2322 106 33471
R1306	Resistor 470 ohm ±5% 0.33W	Philips	2322 211 13471
R1307	Resistor 470 ohm ±5% 0.33W	Philips	2322 106 33471
R1308	Resistor 470 ohm ±5% 0.33W	Philips	2322 211 13471

HARMONIC FILTER R1119 & R1120

Symbol	*Description*			*Manufact.*	
R1309	Resistor	470 ohm ±5%	0.33W	Philips	2322 106 33471
R1310	Resistor	470 ohm ±5%	0.33W	Philips	2322 106 33471
R1311	Resistor	470 ohm ±5%	0.33W	Philips	2322 211 13471
R1312	Resistor	470 ohm ±5%	0.33W	Philips	2322 106 33471
R1313	Resistor	330 kohm +5%	0.33W	Philips	2322 106 33334
R1314	Resistor	330 kohm ±5%	0.33W	Philips	2322 106 33334
R1315	Resistor	10 kohm ±5%	0.33W	Philips	2322 106 33103
R1316	Resistor	47 ohm ±5%	0.33W	Philips	2322 106 33479
R1317	Resistor	8.2 ohm ±5%	0.33W	Philips	2322 106 33828
R1318	Resistor	390 kohm ±5%	0.33W	Philips	2322 106 33394
R1319	Resistor	1.8 kohm ±5%	0.33W	Philips	2322 106 33182
R1320	Resistor	82 kohm ±5%	0.33W	Philips	2322 106 33823
R1321	Resistor	470 kohm ±5%	0.33W	Philips	2322 211 13474
R1322	Resistor	39 kohm ±5%	0.33W	Philips	2322 106 33393
R1323	Resistor	47 kohm ±5%	0.33W	Philips	2322 106 33473
R1324	Resistor	120 ohm ±5%	0.33W	Philips	2322 106 33121
R1325	Resistor	22 ohm ±5%	0.33W	Philips	2322 106 33229
R1326	Resistor	1.2 kohm ±5%	0.33W	Philips	2322 106 33122
R1327	Resistor	82 kohm ±5%	0.33W	Philips	2322 106 33823
R1328	Resistor	330 ohm ±5%	0.33W	Philips	2322 106 33331
R1329	Resistor	100 ohm ±5%	0.33W	Philips	2322 106 33101
R1330	Resistor	47 ohm ±5%	0.33W	Philips	2322 106 33479
T1301	Transistor			Philips	BF494
T1302	Transistor			Philips	BC548A
T1303	Transistor			Philips	BF494
T1304	Transistor			Philips	BF494

Symbol	*Description*	*Manufact.*	
	The units are factory adjusted and sealed and can only be repaired at the factory.		
	Module No. 1200	S.P.	VCO UNIT
	Module No. 1300	S.P.	HARMONIC FILTER UNIT

Symbol	*Description*		*Manufact.*	
C1401	Capacitor ceramic	10 nF -20/+80% 50V	KCK	HE70SJYF103Z
C1402	Capacitor ceramic	10 nF -20/+80% 50V	KCK	HE70SJYF103Z
C1403	Capacitor ceramic	10 nF -20/+80% 50V	KCK	HE70SJYF103Z
C1404	Capacitor ceramic	10 nF -20/+80% 50V	KCK	HE70SJYF103Z
C1405	Capacitor ceramic	10 nF -20/+80% 50V	KCK	HE70SJYF103Z
C1406	Capacitor ceramic	10 nF -20/+80% 50V	KCK	HE70SJYF103Z
C1407	Capacitor ceramic	47 pF ±2% N150 100V	Philips	2222 638 34479
C1408	Capacitor polyester	100 nF ±20% 100V	Philips	2222 344 24104
C1409	Capacitor ceramic	10 nF -20/+80% 50V	KCK	HE70SJYF103Z
C1410	Capacitor ceramic	100 pF ±2% N150 100V	Philips	2222 628 34101
C1411	Capacitor polystyrene	180 pF ±1% 630V	Philips	2222 427 41801
C1412	Capacitor ceramic	33 pF ±2% 100V	Philips	2222 628 34339
C1413	Capacitor ceramic	56 pF ±2% 100V	Philips	2222 628 34569
C1414	Capacitor ceramic	10 nF -20/+80% 50V	KCK	HE70SJYF103Z
C1415	Capacitor polyester	100 nF ±20% 100V	Philips	2222 344 24104
C1416	Capacitor ceramic	10 nF -20/+80% 50V	KCK	HE70SJYF103Z
C1417	Capacitor feed through	1 nF -20/+80% 250V	Ferroperm	9/0138.58
IC1401	Integrated circuit		National	LM3053
L1401	Coil		S.P.	TL059
L1402	Coil	12 uH ±5%	Kaschke	220/5
L1403	Coil	12 uH ±5%	Kaschke	220/5
R1401	Resistor	3K3 ohm ±5% 0.33W	Philips	2322 211 13332
R1402	Resistor	15 Kohm ±5% 0.33W	Philips	2322 211 13153
R1403	Resistor	2K2 ohm ±5% 0.33W	Philips	2322 211 13222
R1404	Resistor	270 ohm ±5% 0.33W	Philips	2322 211 13271
R1405	Resistor	100 ohm ±5% 0.33W	Philips	2322 211 13101
R1406	Resistor	10 ohm ±5% 0.33W	Philips	2322 106 33109
R1407	Resistor	330 ohm ±5% 0.33W	Philips	2322 211 13331
R1408	Resistor	2K7 ohm ±5% 0.33W	Philips	2322 211 13272
R1409	Resistor	680 ohm ±5% 0.33W	Philips	2322 211 13681
R1410	Resistor	390 ohm ±5% 0.33W	Philips	2322 211 13391
R1411	Resistor	470 ohm ±5% 0.33W	Philips	2322 211 13471
R1412	Resistor	27 Kohm ±5% 0.33W	Philips	2322 211 13273
R1413	Resistor	2K7 ohm ±5% 0.33W	Philips	2322 211 13272
R1414	Resistor	560 ohm ±5% 0.33W	Philips	2322 211 13561
R1415	Resistor	47 ohm ±5% 0.33W	Philips	2322 211 13479

Symbol	Description		Manufact.	
C1601	Capacitor ceramic	10 nF -20/+80% 50V	KCK	HE70SJYF 103Z
C1602	Capacitor ceramic	3p9F ±0.25 pF NPO 400V	Ferroperm	9/0112.9
C1603	Capacitor ceramic	10 nF -20/+80% 50V	KCK	HE70SJYF 103Z
C1604	Capacitor polystyrene	150 pF ±5% 630V	Philips	2222 427 21501
C1605	Capacitor polystyrene	270 pF ±5% 630V	Philips	2222 427 22701
C1606	Capacitor polystyrene	240 pF ±5% 630V	Philips	2222 427 22401
C1607	Capacitor polystyrene	120 pF ±5% 630V	Philips	2222 427 21201
C1608	Capacitor polystyrene	270 pF ±5% 630V	Philips	2222 427 22701
C1609	Capacitor ceramic	10 nF -20/+80% 50V	KCK	HE70SJYF 103Z
C1610	Capacitor ceramic	10 pF ±10% NPO 400V	Ferroperm	9/0112.9
C1611	Capacitor ceramic	10 nF -20/+80% 50V	KCK	HE70SJYF 103Z
C1612	Capacitor ceramic	12 pF ±5% N150 100V	KCK	SDRU-6B
C1613	Capacitor ceramic	22 pF ±5% N150 100V	KCK	SDRU-6B
C1614	Capacitor polyester	47 nF ±10% 250V	Philips	2222 344 25473
C1615	Capacitor ceramic	10 nF -20/+80% 50V	KCK	HE70SJYF 103Z
C1616	Capacitor ceramic	47 pF ±5% N150 100V	KCK	SDRU-6B
C1617	Capacitor ceramic	10 nF -20/+80% 50V	KCK	HE70SJYF 103Z
C1618	Not used			
C1619	Capacitor polyester	6u8F ±10% 100V	Philips	2222 344 25685
C1620	Capacitor polyester	330 nF ±10% 100V	Philips	2222 344 25334
C1621	Capacitor ceramic	10 nF -20/+80% 50V	KCK	HE70SJYF 103Z
C1622	Capacitor ceramic	10 nF -20/+80% 50V	KCK	HE70SJYF 103Z
C1623	Capacitor polyester	47 nF ±20% 100V	Philips	2222 344 24473
C1624	Capacitor ceramic	10 nF -20/+80% 50V	KCK	HE70SJYF 103Z
C1625	Capacitor electrolytic	10 uF ±20% 35V	ERO	EKI 00AA210F
C1626	Capacitor electrolytic	10 uF ±20% 35V	ERO	EKI 00AA210F
C1627	Capacitor polystyrene	2n2F ±5% 100V	Philips	2222 424 22202
C1628	Capacitor feed through	1 nF -20/+80% 250V	Ferroperm	9/0138.58
C1629	Capacitor feed through	1 nF -20/+80% 250V	Ferroperm	9/0138.58
C1630	Capacitor feed through	1 nF -20/+80% 250V	Ferroperm	9/0138.58
C1631	Capacitor feed through	1 nF -20/+80% 250V	Ferroperm	9/0138.58
C1632	Capacitor feed through	1 nF -20/+80% 250V	Ferroperm	9/0138.58
C1633	Capacitor feed through	1 nF -20/+80% 250V	Ferroperm	9/0138.58
C1634	Capacitor feed through	1 nF -20/+80% 250V	Ferroperm	9/0138.58
C1635	Capacitor feed through	1 nF -20/+80% 250V	Ferroperm	9/0138.58
C1636	Capacitor feed through	1 nF -20/+80% 250V	Ferroperm	9/0138.58
D1601	Diode varicap.		Motorola	MV109
D1602	Diode varicap.		Motorola	MV109

Symbol	Description			Manufact.	
D1603	Diode switch			Telefunken	BA243
D1604	Diode switch			Telefunken	BA243
D1605	Diode varicap.			Motorola	MV109
D1606	Diode varicap.			Motorola	MV109
IC1601	Integrated circuit			National	LM358N
L1601	Coil	2u2H ±10%		Kaschke	220
L1602	Coil	1u5H ±10%		Kaschke	220
R1601	Resistor	4k7 ohm ±5%	0.33W	Philips	2322 106 33472
R1602	Resistor	18 kohm ±5%	0.33W	Philips	2322 211 13183
R1603	Resistor	6k8 ohm ±5%	0.33W	Philips	2322 106 33682
R1604	Resistor	10 ohm ±5%	0.33W	Philips	2322 106 33109
R1605	Resistor	100 kohm ±5%	0.33W	Philips	2322 106 33104
R1606	Resistor	10 ohm ±5%	0.33W	Philips	2322 106 33109
R1607	Resistor	2k7 ohm ±5%	0.33W	Philips	2322 211 13272
R1608	Resistor	6k8 ohm ±5%	0.33W	Philips	2322 106 33682
R1609	Resistor	18 kohm ±5%	0.33W	Philips	2322 106 33183
R1610	Resistor	4k7 ohm ±5%	0.33W	Philips	2322 106 33472
R1611	Resistor	100 kohm ±5%	0.33W	Philips	2322 106 33104
R1612	Resistor	330 ohm ±5%	0.33W	Philips	2322 106 33331
R1613	Resistor	5k6 ohm ±5%	0.33W	Philips	2322 106 33562
R1614	Resistor	470 ohm ±5%	0.33W	Philips	2322 106 33471
R1615	Resistor	82 ohm ±5%	0.33W	Philips	2322 106 33829
R1616	Resistor	68 kohm ±5%	0.33W	Philips	2322 211 13683
R1617	Resistor	390 kohm ±5%	0.33W	Philips	2322 106 33394
R1618	Resistor	180 kohm ±5%	0.33W	Philips	2322 106 33184
R1619	Resistor	100 kohm ±5%	0.33W	Philips	2322 106 33104
R1620	Resistor	47 kohm ±5%	0.33W	Philips	2322 106 33473
R1621	Resistor	47 kohm ±5%	0.33W	Philips	2322 106 33473
R1622	Resistor	47 kohm ±5%	0.33W	Philips	2322 106 33473
R1623	Resistor	27 kohm ±5%	0.33W	Philips	2322 106 33273
R1624	Resistor	10 kohm ±5%	0.33W	Philips	2322 106 33103
R1625	Resistor	10 kohm ±5%	0.33W	Philips	2322 106 33103
R1626	Resistor	4k7 ohm ±5%	0.33W	Philips	2322 106 33472
R1627	Resistor	2M7 ohm ±5%	0.33W	Philips	2322 106 32275
R1628	Resistor	2k7 ohm ±5%	0.33W	Philips	2322 106 33272
R1629	Resistor	220 ohm ±5%	0.33W	Philips	2322 106 33221
R1630	Resistor	22 kohm ±5%	0.33W	Philips	2322 106 33223
R1631	Resistor	10 kohm ±5%	0.33W	Philips	2322 106 33103

Symbol	Description			Manufact.	
R1632	Resistor	18 kohm ±5%	0.33W	Philips	2322 106 33183
R1633	Resistor	39 kohm ±5%	0.33W	Philips	2322 106 33393
R1634	Resistor	390 ohm ±5%	0.33W	Philips	2322 106 33391
R1635	Resistor	5k6 ohm ±5%	0.33W	Philips	2322 106 33562
R1636	Resistor	560 ohm ±5%	0.33W	Philips	2322 106 33561
R1637	Resistor	150 ohm ±5%	0.33W	Philips	2322 106 33151
R1638	Resistor	560 ohm ±5%	0.33W	Philips	2322 106 33561
T1601	Transistor			Philips	BF199
T1602	Transistor			Philips	BF199
T1603	Transistor			Philips	BC558B
T1604	Transistor			Philips	BF199
T1605	Transistor			Philips	BC558B
TR1601	Coil			S.P.	TL234
X1601	Crystal	10.0076 MHz		S.P.	C1018
X1602	Crystal	16.0076 MHz		S.P.	C1019

Symbol	*Description*			*Manufact.*	
C1701	Capacitor electrolytic	10 uF ±20%	35V	ERO	EKI 00AA210F
C1702	Capacitor polyester	1 uF ±20%	100V	ERO	MKT 1822 - 510/0
C1703	Capacitor polystyrene	3 nF ±2%	100V	Philips	2222 424 33002
C1704	Capacitor electrolytic	1 uF ±20%	50V	ERO	EKI 00AA110H
C1705	Capacitor electrolytic	10 uF ±20%	35V	ERO	EKI 00AA210F
C1706	Capacitor polystyrene	5n6F ±2%	100V	Philips	2222 424 35602
C1707	Capacitor polystyrene	300 pF ±2%	630V	Philips	2222 427 33001
C1708	Capacitor polystyrene	15 nF ±5%	100V	Philips	2222 424 21503
C1709	Capacitor polystyrene	5n6F ±2%	100V	Philips	2222 424 35602
C1710	Capacitor polystyrene	300 pF ±2%	630V	Philips	2222 427 33001
C1711	Capacitor polystyrene	15 nF ±5%	100V	Philips	2322 424 21503
C1712	Capacitor electrolytic	10 uF ±20%	35V	ERO	EKI 00AA210F
IC1701	Integrated circuit			Motorola	MC1458CP
L1701	Coil			S.P.	TL223
R1701	Resistor	4k7 ohm ±5%	0.33W	Philips	2322 211 13472
R1702	Resistor	68 kohm ±5%	0.33W	Philips	2322 106 33683
R1703	Resistor	56 kohm ±5%	0.33W	Philips	2322 211 13563
R1704	Resistor	82 kohm ±5%	0.33W	Philips	2322 211 13823
R1705	Resistor	560 kohm ±5%	0.33W	Philips	2322 211 13564
R1706	Resistor	68 kohm ±5%	0.33W	Philips	2322 211 13683
R1707	Resistor	6k8 ohm ±5%	0.33W	Philips	2322 211 13682
R1708	Resistor	3k9 ohm ±5%	0.33W	Philips	2322 211 13392
R1709	Resistor	15 kohm ±5%	0.33W	Philips	2322 106 33153
R1710	Resistor	15 kohm ±5%	0.33W	Philips	2322 211 13153
R1711	Resistor	22 kohm ±5%	0.33W	Philips	2322 211 13223
R1712	Resistor	18 kohm ±5%	0.33W	Philips	2322 211 13183
R1713	Resistor	2k7 ohm ±5%	0.33W	Philips	2322 211 13272
R1714	Resistor	15 kohm ±5%	0.33W	Philips	2322 211 13153
R1715	Resistor	22 kohm ±5%	0.33W	Philips	2322 211 13223
R1716	Resistor	18 kohm ±5%	0.33W	Philips	2322 211 13183
R1717	Resistor	330 ohm ±5%	0.33W	Philips	2322 211 13331
R1718	Resistor	560 ohm ±5%	0.33W	Philips	2322 211 13561
T1701	Transistor			Philips	BC548B
T1702	Transistor			Philips	BC548B

BANDFILTER R1121 2,5-3,1 AND 3,1-3,8MHz

Symbol	Description	Manufact.	
C1801	Capacitor polystyrene 3,0nF ±1% 160V	Philips	2222 425 43002
C1802	Capacitor polystyrene 1,6nF ±1% 630V	Philips	2222 427 41602
C1803	Capacitor polystyrene 1,3nF ±1% 250V	Philips	2222 426 41302
C1804	Capacitor polystyrene 1nF ±1% 630V	Philips	2222 427 41002
C1805	Capacitor ceramic 44pF ±5% 400V	Ferroperm	9/0116.9
C1806	Capacitor ceramic 35pF ±5% 400V	Ferroperm	9/0116.9
C1807	Capacitor polyester 0,1uF ±10% 100V	ERO	MKT1822
C1808	Capacitor polyester 0,1uF ±10% 100V	ERO	MKT1822
C1809	Capacitor polystyrene 910pF ±1% 250V	Philips	2222 426 49101
C1810	Capacitor polystyrene 680pF ±1% 630V	Philips	2222 427 46801
C1811	Capacitor ceramic 10nF -20/+80% 50V	KCK	HE70SJYF103Z
C1812	Capacitor ceramic 10nF -20/+80% 50V	KCK	HE70SJYF103Z
C1813	Capacitor ceramic 10nF -20/+80% 50V	KCK	HE70SJYF103Z
C1814	Capacitor ceramic 10nF -20/+80% 50V	KCK	HE70SJYF103Z
D1801	Diode silicon	Philips	1N4448
D1802	Diode silicon	Philips	1N4448
L1801	Coil 3,9uH ±5%	NEOSID	006122 81
L1802	Coil 3,3uH ±5%	NEOSID	006122 80
L1803	Coil 82uH ±5%	NEOSID	006122 11
L1804	Coil 68uH ±5%	NEOSID	006122 10
L1805	Coil 3,9uH ±5%	NEOSID	006122 81
L1806	Coil 3,3uH ±5%	NEOSID	006122 80
R1801	Resistor 390 ohm ±5% 0.33W	Philips	2322 181 13391
R1802	Resistor 390 ohm ±5% 0.33W	Philips	2322 181 13391
R1803	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 13103
R1804	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 13103

Symbol	Description	Manufact.	
C1901	Capacitor polystyrene 5,6nF ±1% 63V	Philips	2222 424 45602
C1902	Capacitor polystyrene 4,7nF ±1% 63V	Philips	2222 424 44702
C1903	Capacitor polystyrene 3,0nF ±1% 160V	Philips	2222 425 43002
C1904	Capacitor polystyrene 2,2nF ±1% 250V	Philips	2222 426 42202
C1905	Capacitor polystyrene 82pF ±1% 630V	Philips	2222 427 48209
C1906	Capacitor polystyrene 68pF ±1% 630V	Philips	2222 427 46809
C1907	Capacitor polyester 0,1uF ±10% 100V	ERO	MKT1822
C1908	Capacitor polyester 0,1uF ±10% 100V	ERO	MKT1822
C1909	Capacitor polystyrene 1,8nF ±1% 160V	Philips	2222 425 41802
C1910	Capacitor polystyrene 1,2nF ±1% 630V	Philips	2222 427 41202
C1911	Capacitor ceramic 10nF -20/+80% 50V	KCK	HE70SJYF103Z
C1912	Capacitor ceramic 10nF -20/+80% 50V	KCK	HE70SJYF103Z
C1913	Capacitor ceramic 10nF -20/+80% 50V	KCK	HE70SJYF103Z
C1914	Capacitor ceramic 10nF -20/+80% 50V	KCK	HE70SJYF103Z
D1901	Diode silicon	Philips	1N4448
D1902	Diode silicon	Philips	1N4448
L1901	Coil 4,7uH ±5%	NEOSID	006122 82
L1902	Coil 3,9uH ±5%	NEOSID	006122 81
L1903	Coil 100uH ±5%	NEOSID	006122 12
L1904	Coil 82uH ±5%	NEOSID	006122 11
L1905	Coil 4,7uH ±5%	NEOSID	006122 82
L1906	Coil 3,9uH ±5%	NEOSID	006122 81
R1901	Resistor 390 ohm ±5% 0.33W	Philips	2322 181 13391
R1902	Resistor 390 ohm ±5% 0.33W	Philips	2322 181 13391
R1903	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 13103
R1904	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 13103

Symbol	Description	Manufact.	
C2001	Capacitor ceramic 22pF ±5% 400V	Ferroperm	9/0116.9
C2002	Capacitor ceramic 13pF ±5% 400V	Ferroperm	9/0112.9
C2003	Capacitor ceramic 22pF ±5% 400V	Ferroperm	9/0116.9
C2004	Capacitor ceramic 10nF -20/+80% 50V	KCK	HE70SJYF103Z
D2001	Diode switch	Philips	BA243
D2002	Diode switch	Philips	BA243
D2003	Diode switch	Philips	BA243
D2004	Diode switch	Philips	BA243
D2005	Diode switch	Philips	BA243
D2006	Diode switch	Philips	BA243
D2007	Diode switch	Philips	BA243
D2008	Diode switch	Philips	BA243
D2009	Diode switch	Philips	BA243
D2010	Diode switch	Philips	BA243
D2011	Diode switch	Philips	BA243
L2001	Coil	S.P.	TL 187
L2002	Coil 2,2uH ±5%	NEOSID	006122 78
R2001	Resistor 120 ohm ±5% 0.33W	Philips	2322 181 13121
R2002	Preset potmeter 1 Kohm ±20% 0.3W	NOBLE	TM8-KV2-1S

Symbol	Description	Manufact.	
C2101	Capacitor ceramic 10nF -20/+80% 50V	KCK	HE70SJYF103Z
C2102	Capacitor ceramic 10nF -20/+80% 50V	KCK	HE70SJYF103Z
C2103	Capacitor ceramic 10nF -20/+80% 50V	KCK	HE70SJYF103Z
C2104	Capacitor ceramic 10nF -20/+80% 50V	KCK	HE70SJYF103Z
C2105	Capacitor ceramic 10nF -20/+80% 50V	KCK	HE70SJYF103Z
C2106	Capacitor electrolytic 10uF 35V	ERO	EKI 00 AA 210F
C2107	Capacitor electrolytic 10uF 35V	ERO	EKI 00 AA 210F
C2108	Capacitor ceramic 10nF -20/+80% 50V	KCK	HE70SJYF103Z
C2109	Capacitor ceramic 10nF -20/+80% 50V	KCK	HE70SJYF103Z
D2101	Diode silicon	Philips	1N4148
D2102	Diode silicon	Philips	1N4148
D2103	Diode silicon	Philips	1N4148
D2104	Diode silicon	Philips	1N4148
D2105	Diode silicon	Philips	1N4148
D2106	Diode silicon	Philips	1N4148
D2107	Diode silicon	Philips	1N4448
IC2101	Integrated circuit	Motorola	MC14514BCP
R2101	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 33103
R2102	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 33103
R2103	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 33103
R2104	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 33103
R2105	Resistor 5,6 Kohm ±5% 0.33W	Philips	2322 181 33562
R2106	Resistor 1 Kohm ±5% 0.33W	Philips	2322 181 33102
R2107	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 33103
R2108	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 33103
R2109	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 33103
R2110	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 33103
R2111	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 33103
R2112	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 33103
R2113	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 33103
R2114	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 33103
R2115	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 33103
R2116	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 33103

Symbol	Description	Manufact.	
R2117	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 33103
R2118	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 33103
R2119	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 33103
R2120	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 33103
R2121	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 33103
R2122	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 33103
R2123	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 33103
R2124	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 33103
R2125	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 33103
R2126	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 33103
R2127	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 33103
R2128	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 33103
R2129	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 33103
R2130	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 33103
R2131	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 33103
R2132	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 33103
R2133	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 33103
R2134	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 33103
R2135	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 33103
R2136	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 33103
R2137	Resistor 1,8 Kohm ±5% 0.33W	Philips	2322 181 33182
R2138	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 33103
R2139	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 33103
R2140	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 33103
R2141	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 33103
R2142	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 33103
R2143	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 33103
R2144	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 33103
R2145	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 33103
R2146	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 33103
R2147	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 33103
R2148	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 33103
R2149	Resistor 10 Kohm ±5% 0.33W	Philips	2322 181 33103
R2150	Resistor 1,8 Kohm ±5% 0.33W	Philips	2322 181 33182
R2151	Resistor 8,2 Kohm ±5% 0.33W	Philips	2322 181 33822
T2101	Transistor	Philips	BC548B
T2102	Transistor	Philips	BC548B
T2103	Transistor	Philips	BC548B

Symbol	*Description*	*Manufact.*	
T2104	Transistor	Philips	BC548B
T2105	Transistor	Philips	BC328-25
T2106	Transistor	Philips	BC328-25
T2107	Transistor	Philips	BC328-25
T2108	Transistor	Philips	BC328-25
T2109	Transistor	Philips	BC328-25
T2110	Transistor	Philips	BC328-25
T2111	Transistor	Philips	BC328-25
T2112	Transistor	Philips	BC328-25
T2113	Transistor	Philips	BC328-25
T2114	Transistor	Philips	BC328-25
T2115	Transistor	Philips	BC328-25
T2116	Transistor	Philips	BC328-25
T2117	Transistor	Philips	BC328-25
T2118	Transistor	Philips	BC328-25
T2119	Transistor	Philips	BC328-25

Symbol	Description			Manufact.	
C2201	Capacitor electrolytic	10uF	35V	ERO	EKI 00 AA 210F
C2202	Capacitor electrolytic	10uF	35V	ERO	EKI 00 AA 210F
C2203	Capacitor electrolytic	10uF	35V	ERO	EKI 00 AA 210F
C2204	Capacitor electrolytic	10uF	35V	ERO	EKI 00 AA 210F
C2205	Capacitor ceramic	18pF ±5%	50V	KCK	HE40SJPH180J
C2206	Capacitor MKT	220nF ±10%	100V	Siemens	B32510-D1224-K
C2207	Capacitor ceramic	150pF ±5%	50V	KCK	HE90SJPH151J
C2208	Capacitor MKT	220nF ±10%	100V	Siemens	B32511-D1224-K
C2209	Capacitor ceramic	10nF -20/+80%	50V	KCK	HE70SJYF103Z
C2210	Capacitor MKT	220nF ±10%	100V	Siemens	B32511-D1224-K
C2211	Capacitor MKT	220nF ±10%	100V	Siemens	B32511-D1224-K
C2212	Capacitor ceramic	10nF -20/+80%	50V	KCK	HE70SJYF103Z
C2213	Capacitor ceramic	10nF -20/+80%	50V	KCK	HE70SJYF103Z
C2214	Capacitor polyester	1uF ±10%	63V	ERO	MKT1818
C2215	Capacitor MKT	10nF ±10%	250V	Siemens	B32510-D3103-K
C2216	Capacitor MKT	10nF ±10%	250V	Siemens	B32510-D3103-K
C2217	Capacitor MKT	10nF ±10%	250V	Siemens	B32510-D3103-K
C2218	Capacitor MKT	10nF ±10%	250V	Siemens	B32510-D3103-K
C2219	Capacitor MKT	10nF ±10%	250V	Siemens	B32510-D3103-K
C2220	Capacitor MKT	10nF ±10%	250V	Siemens	B32510-D3103-K
C2221	Capacitor MKT	10nF ±10%	250V	Siemens	B32510-D3103-K
C2222	Capacitor MKT	10nF ±10%	250V	Siemens	B32510-D3103-K
C2223	Capacitor MKT	220nF ±10%	100V	Siemens	B32511-D1224-K
D2201	Diode silicon			ITT	1N4148
IC2201	Integrated circuit			Texas	7406N
IC2202	Integrated circuit			Texas	SN74LS374N
IC2203	Integrated circuit			National	MM74C374N
IC2204	Integrated circuit			Texas	SN74LS374N
IC2205	Integrated circuit			Texas	SN74LS374N
IC2206	Integrated circuit			Motorola	MC68705P3L
IC2207	Integrated circuit			Texas	SN74LS74AN
IC2208	Integrated circuit			Texas	SN75189AN
IC2209	Integrated circuit			Texas	SN75188N

Symbol	Description	Manufact.	
L2201	Coil 6,8uH ±5%	NEOSID	006122 84
R2201	Resistor 8,2 Kohm ±5% 0.33W	Philips	2322 181 33822
R2202	Resistor 3,3 Kohm ±5% 0.33W	Philips	2322 181 33332
R2203	Resistor 470 ohm ±5% 0.33W	Philips	2322 181 33471
R2204	Resistor 330 ohm ±5% 0.33W	Philips	2322 181 33331
R2205	Resistor 18 Kohm ±5% 0.33W	Philips	2322 181 33183
R2206	Resistor 1,5 Kohm ±5% 0.33W	Philips	2322 181 33152
R2207	Resistor 6,8 Kohm ±5% 0.33W	Philips	2322 181 33682
R2208	Resistor 6,8 Kohm ±5% 0.33W	Philips	2322 181 33682
R2209	Resistor 6,8 Kohm ±5% 0.33W	Philips	2322 181 33682
R2210	Resistor 6,8 Kohm ±5% 0.33W	Philips	2322 181 33682
R2211	Resistor 6,8 Kohm ±5% 0.33W	Philips	2322 181 33682
R2212	Resistor 6,8 Kohm ±5% 0.33W	Philips	2322 181 33682
R2213	Resistor 12 Kohm ±5% 0.33W	Philips	2322 181 33123
R2214	Resistor 12 Kohm ±5% 0.33W	Philips	2322 181 33123
R2215	Resistor 12 Kohm ±5% 0.33W	Philips	2322 181 13123
R2216	Resistor 12 Kohm ±5% 0.33W	Philips	2322 181 13123
R2217	Resistor 12 Kohm ±5% 0.33W	Philips	2322 181 13123
R2218	Resistor 12 Kohm ±5% 0.33W	Philips	2322 181 13123
RE2201	Relay 15V DC	Siemens	V23040-A0003-B101
T2201	Transistor	Philips	BF199
T2202	Transistor	Motorola	2N2368
T2203	Transistor	Philips	BC328-25
T2204	Transistor	Philips	BC328-25
T2205	Transistor	Philips	BC328-25
T2206	Transistor	Philips	BC548B
T2207	Transistor	Philips	BC548B

Symbol	*Description*			*Manufact.*	
C2501	Capacitor polyester	100 nF ±20%	100V	Philips	2222 344 24104
C2502	Capacitor polyester	100 nF ±20%	100V	Philips	2222 344 24104
C2503	Capacitor polyester	10 nF ±20%	400V	Philips	2222 344 54103
C2504	Capacitor polyester	10 nF ±20%	400V	Philips	2222 344 54103
C2505	Capacitor electrolytic	47 uF -10/+50%	63V	ERO	EB 00FC 247J
C2506	Capacitor electrolytic	10 uF -10/+100%	40V	ERO	EB 00CA 210G
C2507	Capacitor polyester	100 nF ±20%	100V	Philips	2222 344 24104
C2508	Capacitor polyester	100 nF ±20%	100V	Philips	2222 344 24104
C2509	Capacitor polyester	100 nF ±20%	100V	Philips	2222 344 24104
C2510	Capacitor polycarbonate	1 uF ±20%	630V	ERO	KC1849 210/6
C2511	Capacitor polycarbonate	1 uF ±20%	630V	ERO	KC1849 210/6
C2512	Capacitor polyester	100 nF ±20%	100V	Philips	2222 344 24104
C2513	Capacitor polyester	10 nF ±20%	400V	Philips	2222 344 54103
C2514	Capacitor polyester	100 nF ±20%	100V	Philips	2222 344 24104
C2515	Capacitor polyester	100 nF ±20%	100V	Philips	2222 344 24104
C2516	Capacitor polyester	220 nF ±20%	100V	Philips	2222 344 24224
D2501	Diode zener	56V ±5%	1W	Motorola	MZP 4758A
L2501	Coil			S.P.	TL079
L2502	AF transformer			Tradania	2296
R2501	Resistor	22 kohm ±5%	0.33W	Philips	2322 211 13223
R2502	Resistor	220 ohm ±5%	1.15W	Philips	2322 214 13221