-2.Mixer-

Technical description

The 2nd mixer module converts the IF signal from the 1st mixer (63.078 MHz) to 5 MHz. At the same time the output level can be controlled with a dynamic range of 80 db by varying the AGC voltage U_{AGC} (2.0 V min. attenuation to 3.2 V max. attenuation). By using two switchable crystal filters the bandwidths 6 kHz and 3 kHz can be selected. Narrower bandwidths are selected on the Filterboard but either of the two filters in the 2. mixer has to be active. The bandwidth selection is controlled by the processor. The 2nd mixer has two 5 MHz IF outputs decoupled from each other; during the bite test the level is monitored only at output ST 2 (5 MHz IF OUT to filterbank) as only this output has a defined 50 ohm termination. The output ST3 (5 MHz IF OUT to ISB Demodulator) can remain open. The signal from the 1st mixer socket BU2, 63.078 MHz FROM 1st IF is fed to the mixer module via a 60 MHz high pass filter. The mixer module contains 3 low pass filters, a ringmixer and a diplexer. Due to the modular construction of the unit (MIXER MODULE) it suppresses intermodulation products in the IF output of the 2nd mixer caused by spurious emissions. If these emissions were to penetrate the mixer module they could cause mixing products with VCO's harmonics in the vicinity of the 5 MHz IF signal. The filters in the signal path to the ring mixer M 1 strongly attenuate signals above 200 MHz; the cut off frequency for the LO and RF signals is around 66 MHz. An attenuation of < 40 dB from 160 MHz to 1.6 GHz is achieved by the screened construction and the use of air core coils and SMD capacitors. The passband attenuation is in contrast, only 0.3 dB. The mixer output always sees a 50 ohm termination made up of the filter network consisting of L 7, L 8, C 54 and C 55. This minimizes intermodulation from the ring mixer. The sum frequency is separated from the output filter by a parallel tuned resonant circuit, and terminated to 50 ohm by a series tuned resonant circuit. The difference frequency (5 MHz) passes via the Chebyshev filter (0.4 dB passband attenuation; 40 dB stopband attenuation from 27 MHz to 1.6 GHz) to the output of the mixer module. The signal then passes to the two filter branches T 1, D 10, F 8, D 3 and T 2, D 11, F 7, D 4. The DATA and STROBE control signals from the processor are stored in IC-A, which control the comparators IC-B and thus the diodes of the respective quartz filter.

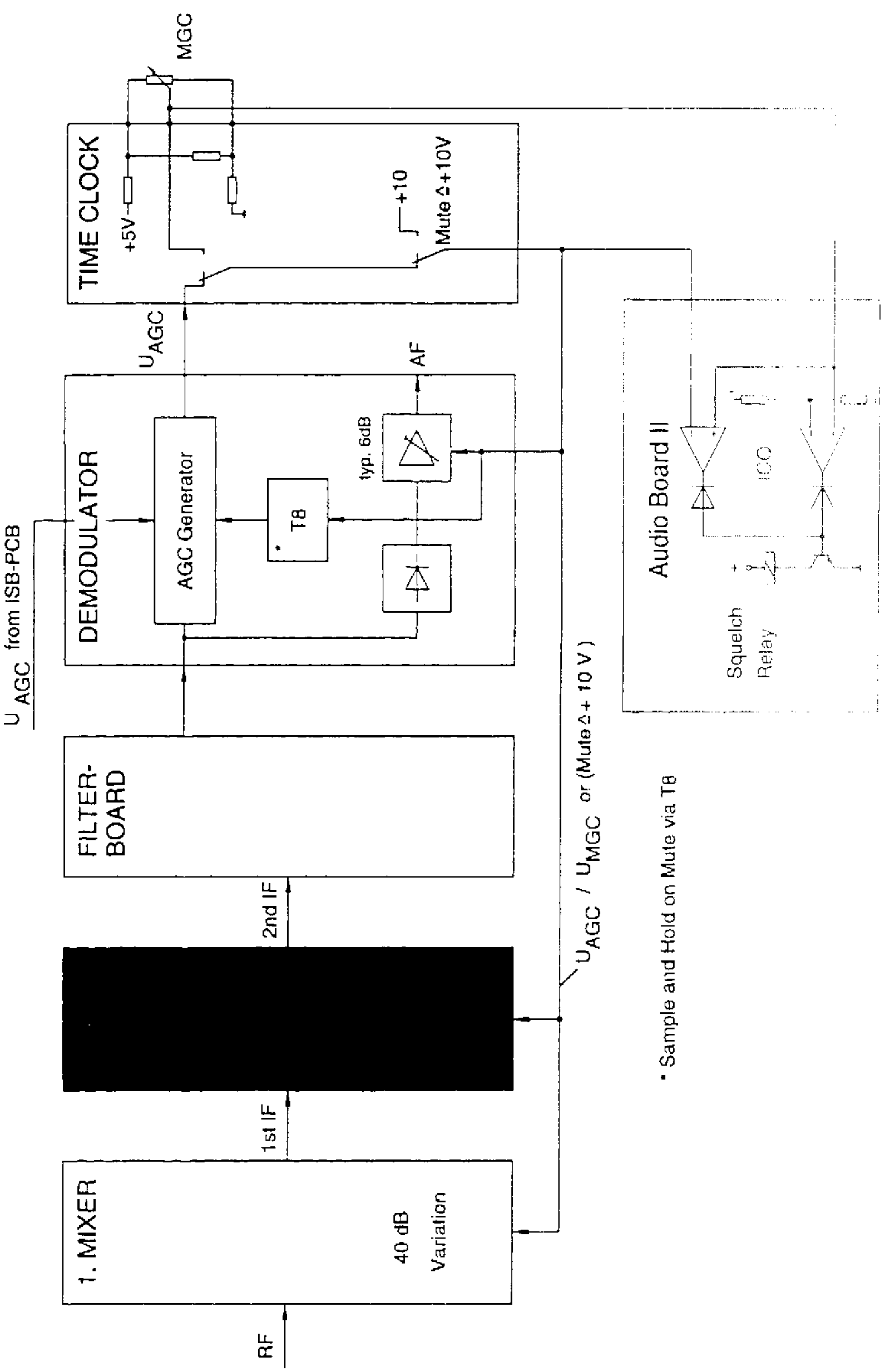
A DATA H signal switches the 6 kHz path (± 3 kHz) on the negative edge of the STROBE signal. A voltage of 15 V is then present on MP 2. D 10 thus conducts; MP 3 is at the same time about 2.5 V, so that D 3 also conducts and the filter F 8 becomes operational. Filter F 7 is at the same time blocked. A DATA L signal is required for the opening the 3 kHz path.

-2.Mixer-

The following two-stage amplifier (T 3 and T 4) has dual-gate MOSFETS, each stage having a dynamic range of 40 dB. The IF signal is fed to gate 1. The amount of amplification is controlled by the DC voltage on G 2. The voltage on gate 2 causes the drain current to change and therefore the gain of the transistor to change; high current-high gain; low current-low gain. Low gain is achieved by making the gate 2 voltage with reference to source negative which causes low current to flow. Due to the fact that the bias of the transistor also depends on the value of the gate 1- source voltage, a source resistor would therefore cause an unwanted change in the bias. This problem is minimized by using the zener diode D 6. This holds the source voltage at a temperature compensated level between 5.6 min. to 6.2 V max.. The AGC range for gate 2 is between 5.2 to 7.0 V. IC-F is used to increase the U_{AGC} from 2.0 - 3.2 to 5.2 - 7.0 V.
The difference voltage U_{AGC} min - U_{AGC} max is controlled by R 25, R 24, and the voltage range by R 20, R 21 and R 22. Potentiometer R 22 is used to compensate for transistor differences.

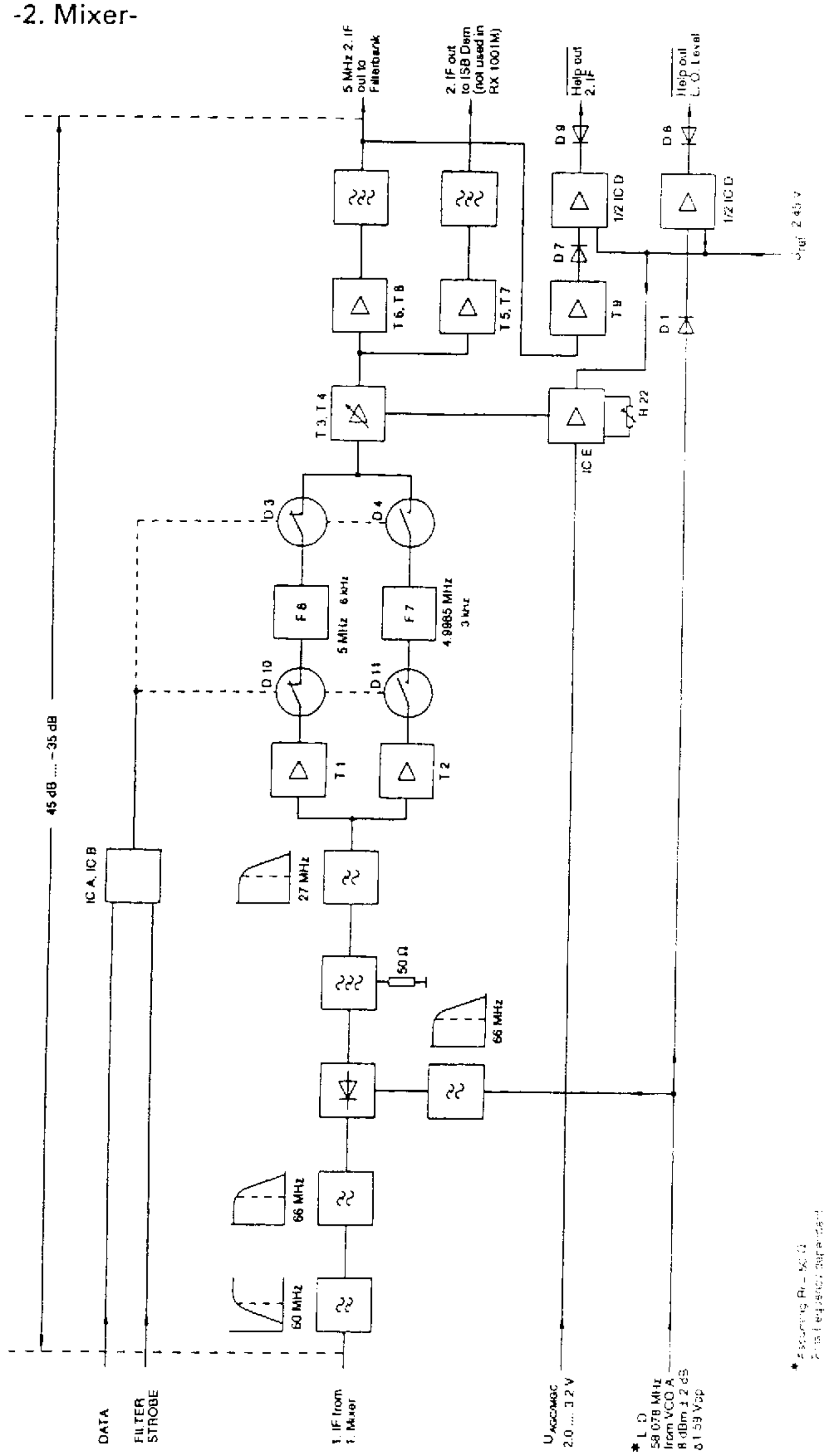
The voltage regulator IC-C and the four diodes D 14-17 regulate the voltage. The diodes are used for temperature compensation.
The output signal is split between 2 buffer stages. Each buffer stage is followed by a transistor amplifier (T 7, T 8). A transformer bandpass filter is connected to the outputs of the transistor amplifiers to attenute harmonics and provide the required 50 ohm termination. The signal level 5 MHz IF OUT TO FILTERBANK output is monitored by the 5 MHz IF level sensor. The signal is amplified by T 9 rectified by D 7 and compared by IC-D with the reference voltage from R 6, R 60 and D 2. The level sensor is required only during BITE TEST. Using the LO LEVEL sensor the incoming signal from VCO A f = 58.078 MHz (+7 dBm) using rectifier D 1 and comparator IC-D is monitored. If the input signal level is too low then the LO LEVEL output is low. If the level is correct then the LO output is HIGH.

-2. Mixer-



Gain control principle

-2. Mixer-



Blockdiagram 2. Mixer

-2. Mixer-

Test and alignment instructions

Required: Circuit diagram - 2nd MIXER - Hagenuk Drawing No. 97 Sa BX 2.155.90
spectrum analyser, signal generator

Test configuration: The 2nd mixer module is removed and the cassette is opened. Then reconnect all cablos to the receiver.

Testing of basic gain

Unplug St (plug) 2 (63.078 MHz FROM 1st IF) and connect the tracking generator into place (f = 63.078 MHz P_{OUT} -46 dBm).
Connect the spectrum analyser to ST 3 (5 MHz IF OUT TO ISB DEMODULATOR) with the following settings:

Centre frequency	5	MHz
Span	20	kHz
Reference level	0	dBm

Switch on receiver and check output level at:
1st bandwidth 3.00 kHz code 87
2nd bandwidth 6.00 kHz code 88
Test values:
Reconnect the filter with the lower output level. Disconnect the AGC voltage (ST 1 pin 4) and feed in an external AGC voltage U_{AGC} of 2.00 V ± 5 mV.
Test values:
Output level at plug ST 3 should be: -1 dBm ± 0.5 dB (can be adjusted with R 22).

Testing the IF and LO level monitoring circuit

Disconnect ST 2 and terminate connection ST 2 on the circuit board with 50 ohm. Connect DVM to ST 1 pin 8.
Test values:
Reduce signal level from signal generator; at -40 to -44 dBm, LOW level should be on ST 1 pin 8.
Connect socket Bu 2 to receiver, disconnecting at socket Bu 3 and connecting the signal generator to socket Bu 3, 58.078 MHz from VCO.
Connect DVM to ST 1 pin 9. Set signal generator to f = 58.078 MHz P_{out} +7 dBm.
Test values:
Reduce signal from signal generator; at +3 dBm to 1 dBm, LOW level should be on ST 1 pin 9.

-2. Mixer-

Testing the dynamic characteristic
Preparations as in item 1 above.

NOTE
Fit case cover.

Test values:

Signal generator 63.078 MHz	U_{AGC}	P_{OUT} on plug ST 2
-46 dBm	2.00 V	-1 dBm ± 0.5 dB
-46 dBm	2.20 V	-11 dBm ± 3 dB
-46 dBm	2.40 V	-22 dBm ± 3 dB
-46 dBm	2.60 V	-33 dBm ± 4 dB
-46 dBm	2.80 V	-46 dBm ± 5 dB
-46 dBm	3.00 V	-61 dBm ± 5 dB
-26 dBm	3.20 V	-61 dBm ± 5 dB

If the maximum attenuation is exceeded, R 76 (if not enough, R 66) must be fitted in parallel with R 25; then start again with item 1.

Testing the crystal filters
Select 3.00 kHz bandwidth on receiver.
Test values:
Measure the output level on plug ST 2 with a spectrum analyser. Vary the frequency of the signal generator in accordance with the following table and measure the level.

Signal generator frequency	Output level
63.078 MHz ± 3 kHz	U/out -12 dBm
63.078 MHz ± 5.0 kHz	U/out -40 dBm
63.078 MHz ± 7.8 kHz	U/out -70 dBm
63.078 MHz ± 100... 200 kHz	U/out -70 dBm

Select 6.00 kHz bandwidth on receiver.
Test values:
Measure the output level on plug St 2 with a spectrum analyser. Vary the frequency of the signal generator in accordance with the following table and measure the level:

Signal generator frequency	Output level
63.078 MHz ± 6 kHz	U/out -12 dBm
63.078 MHz ± 10 kHz	U/out -40 dBm
63.078 MHz ± 15.6 kHz	U/out -70 dBm
63.078 MHz ± 100...200 kHz	U/out -70 dBm

-2.Mixer-

Test and alignment instructions (mixer module)

Required:	Circuit diagram - 2nd MIXER Hagenuk Drawing No. 97 Sa Bx 2.155.90 spectrum analyser, RF generators, VSWR bridge
Test configuration:	The 2nd MIXER module is removed and the cassette is opened; all subsequent operations are illustrated in the diagrams given below.

Testing the LO filter

Disconnect the module inputs and outputs from the circuit board. Solder a coax cable to the left-hand filter in the central section and connect to the input of the spectrum analyser. Connect the RF generator to the input (see fig. 4-1).

Spectrum analyser settings:			
	Centre frequency	100	MHz
	Span	200	MHz
	Tracking generator-level	-10	dBm

Test values:
The filter curves should reach the levels stated at the frequencies given.

Frequency	Level
60 MHz	-10 dBm ± 0.5 dB
105 MHz	-30 dBm ± 0.7 dB
200 MHz	<60 dBm

Testing the RF filter

Solder a coax cable to the right-hand filter in the central section and connect to the input of the spectrum analyser. Connect the RF generator to the input (see fig. 4-2).

Spectrum analyser settings:			
	Centre frequency	100	MHz
	Span	200	MHz
	Tracking generator-level	-10	dBm

Test values:
The filter curves should reach the levels stated at the frequencies given.

Frequency	Level
60 MHz	-10 dBm
105 MHz	-30 dBm ± 0.7 dB
200 MHz	<60 dBm

-2. Mixer-

Testing the IF filter
Solder a coax cable to the filter board in the central section and connect to the spectrum analyser input. Connect the RF generator as illustrated in fig. 4-3.
Spectrum analyser settings: same as in item 2.
Test values:

Frequency	Level
5 MHz	-10 dBm ± 0.4 dB
30 MHz	< -50 dBm
50 MHz	< -70 dBm

Testing the input matching of the filter board
Terminate the IF filter with 50 Ohm (fig. 4-3). Connect the spectrum analyser and tracking generator to a VSWR bridge (impedance bridge). The bridge input to the circuit being measured is open.

Spectrum analyser settings:		
	Centre frequency	5 MHz/ 121.2 MHz
	Span	2 MHz
	Tracking generator-level	0 dBm

bring the measuring curve on to the 0 dBm reference line. Measure the return loss.

Test values:

Frequency	Return loss	VSWR
5 MHz	>19 dB	<1.25
121.2 MHz	>16 dB	<1.35

NOTE
If the return loss is less than the specified limit for 121.2 MHz, it may be improved by compressing or expanding L 7.

-2. Mixer-

Overall testing of module
Resolder the ring mixer M 1 (IE 500) to the filter sections already measured and then fit cover on to module: Connect measuring instruments as shown in fig. 4-4.

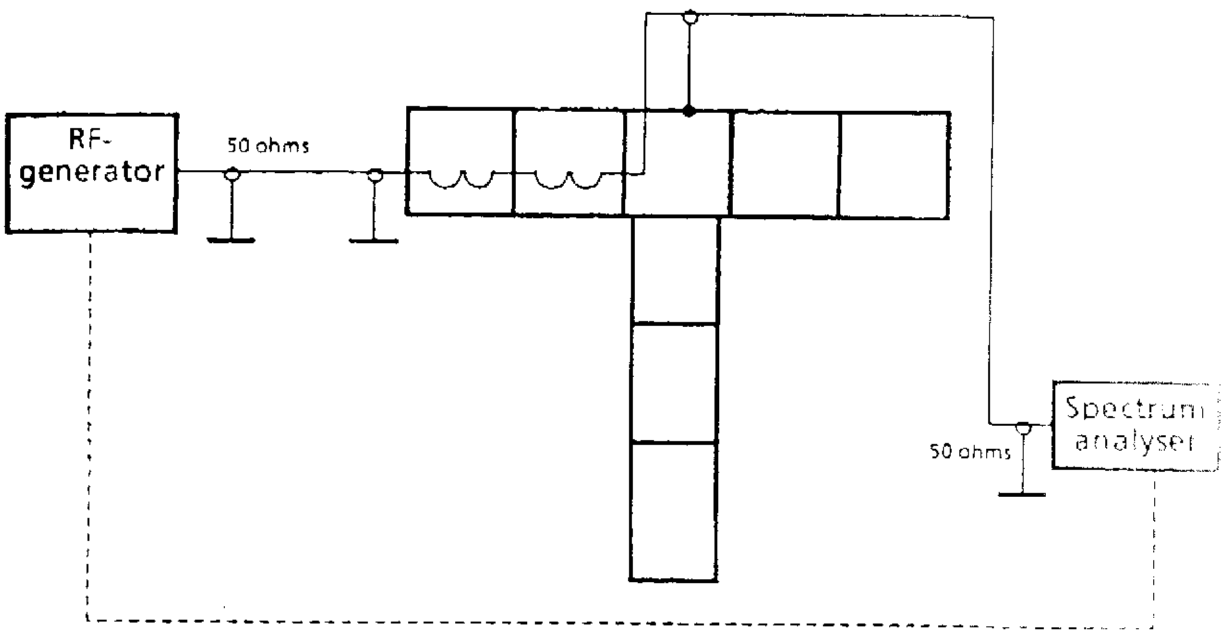
RF generator f = 63.078 MHz; -20 dBm
RF generator f = 58.078 MHz; +7 dBm

Spectrum analyser settings:	Centre frequency	5 MHz
		58.078 MHz
		63.078 MHz
		121.156 MHz
	Span	[illegible]00 kHz
	Reference level	10 dBm

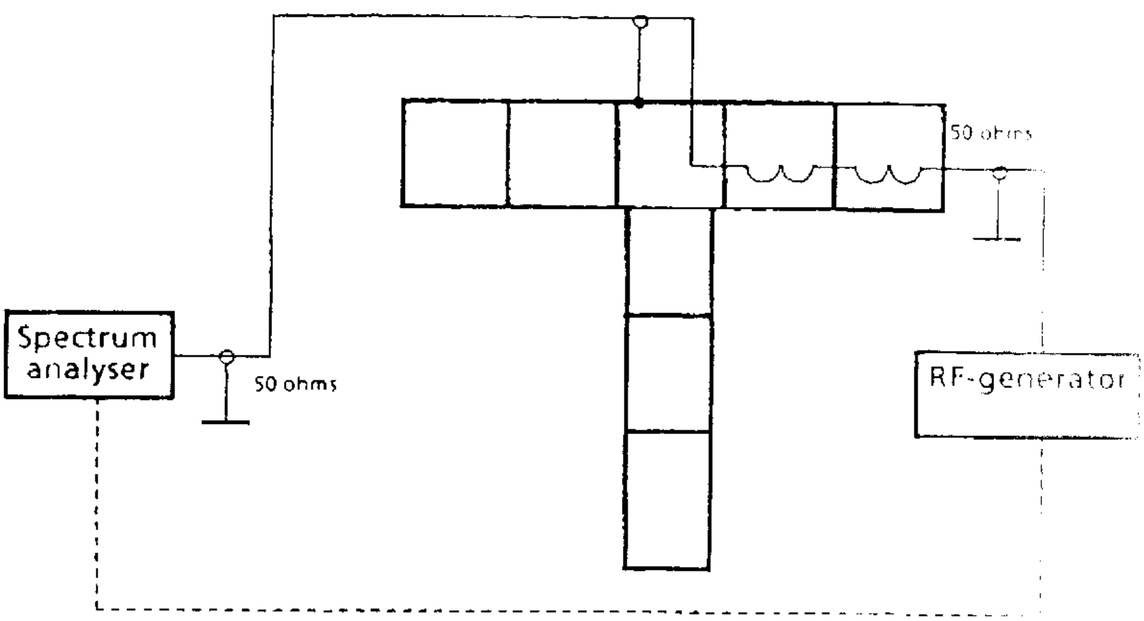
Test values:

Frequency	Output level
5 MHz	> -28.5 dBm
58.078 MHz	< -70 dBm
63.078 MHz	< -90 dBm
121.156 MHz	< -90 dBm

-2. Mixer-

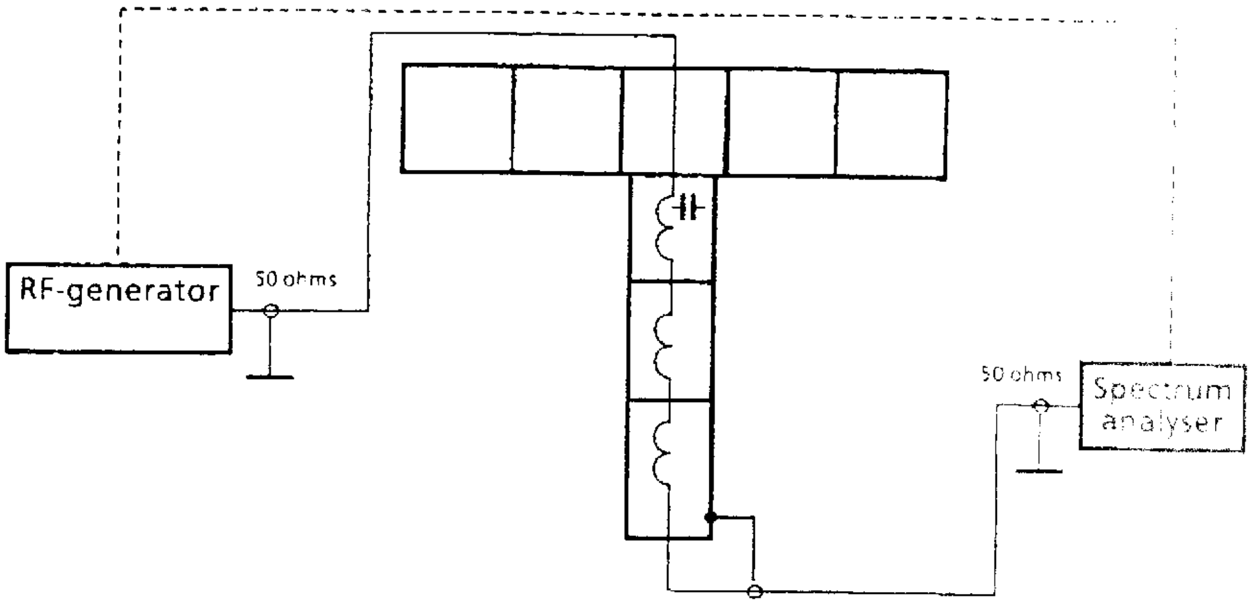


Testing LO-FILTER

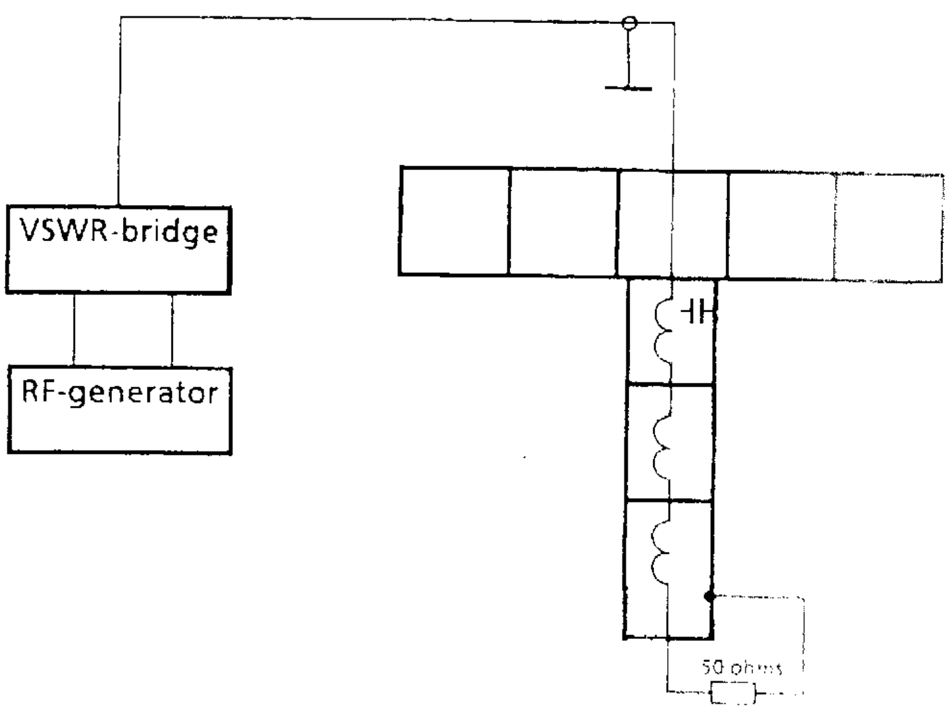


RF-FILTER

-2. Mixer-

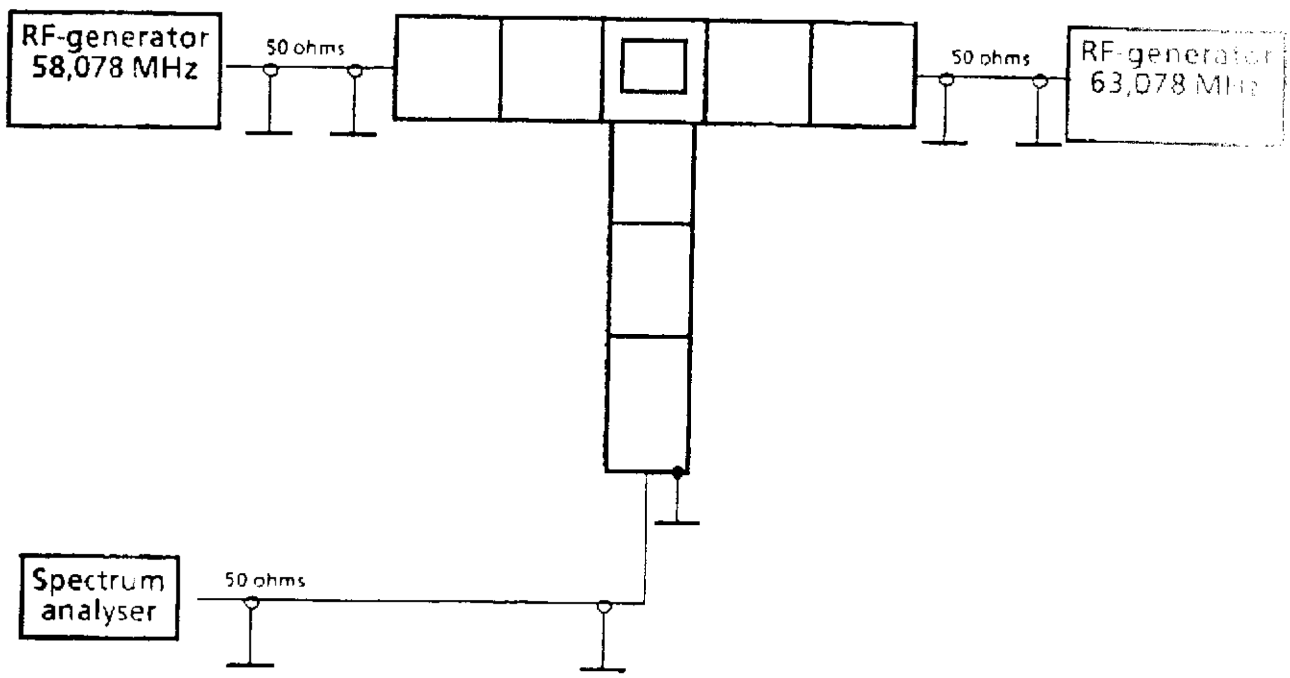


Testing IF-FILTER and input matching



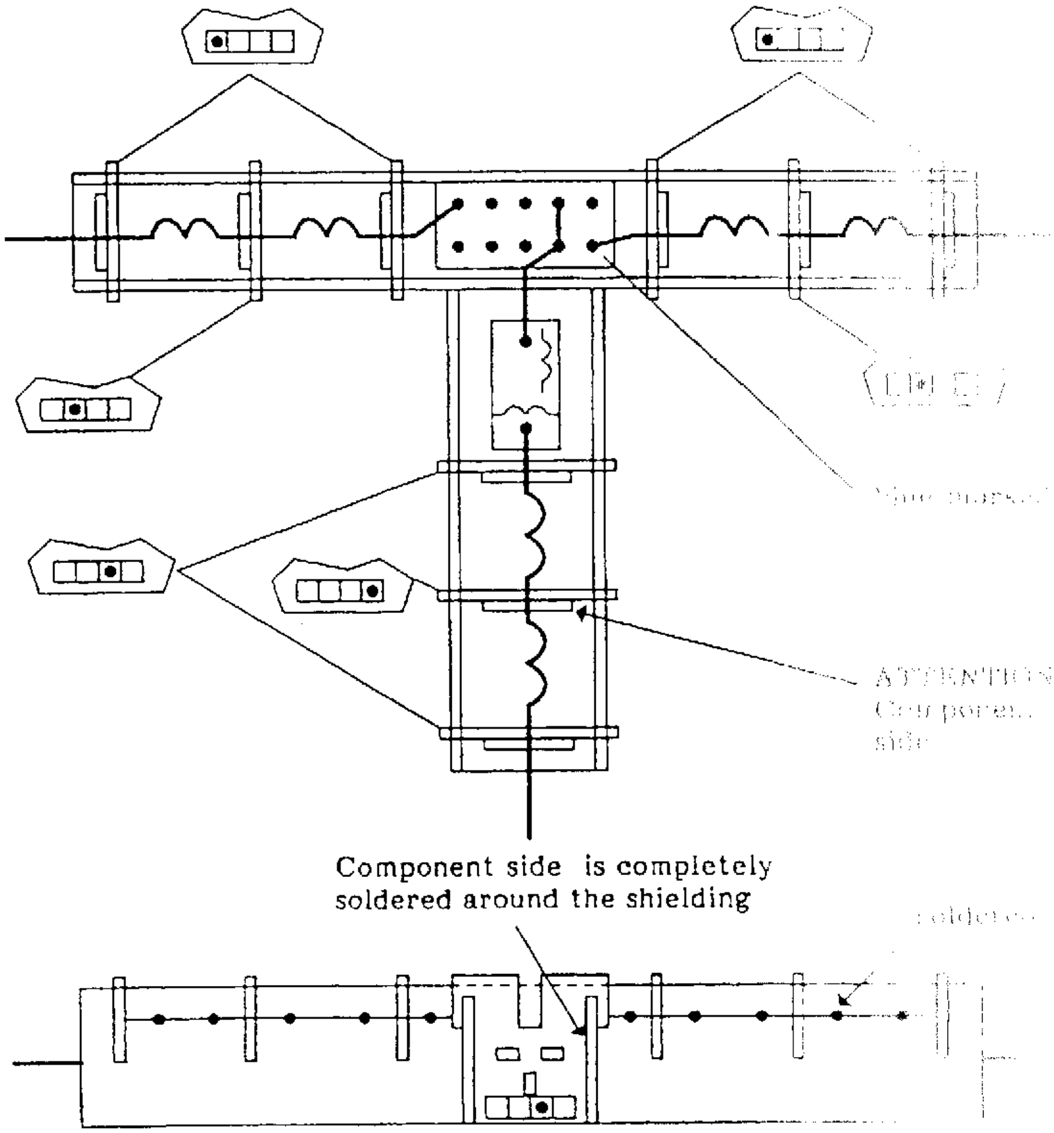
Testing the impedance of the input matching

-2. Mixer-



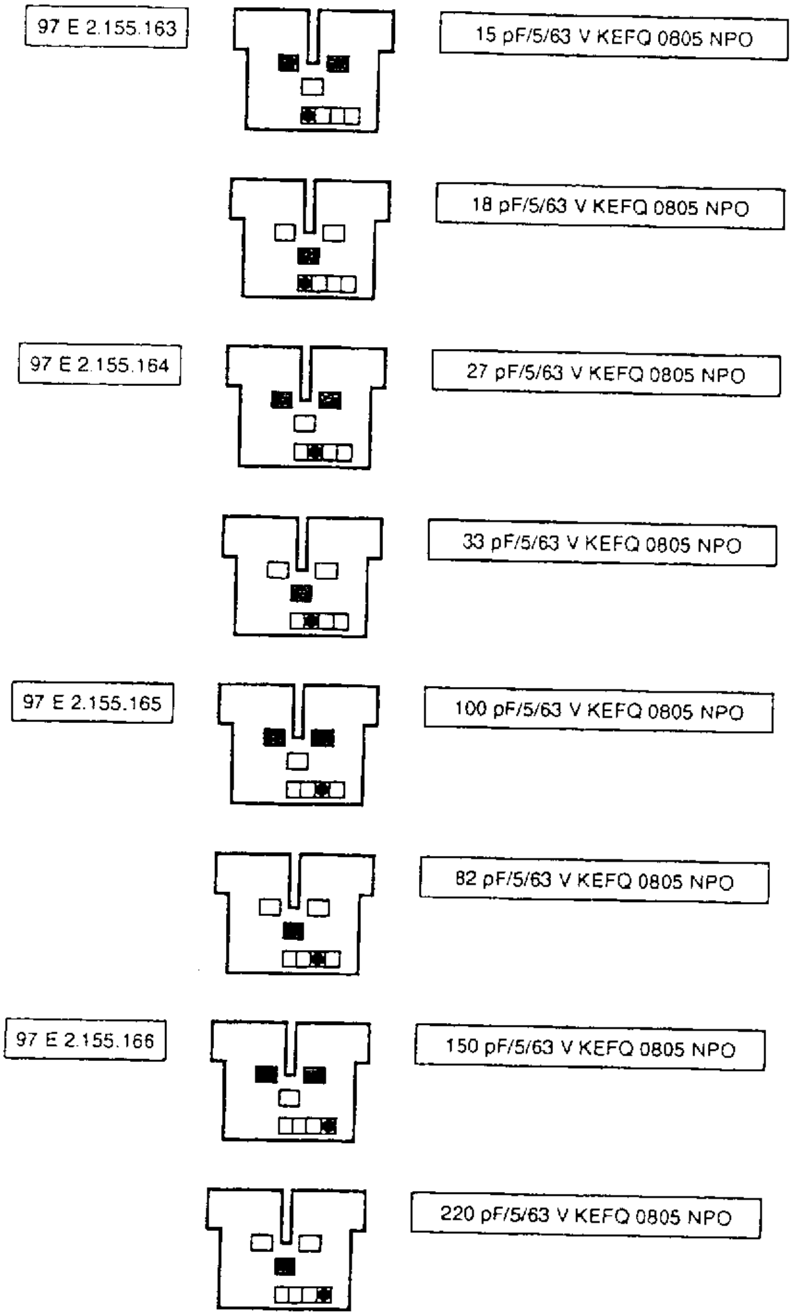
Overall testing of the module

-2. Mixer-



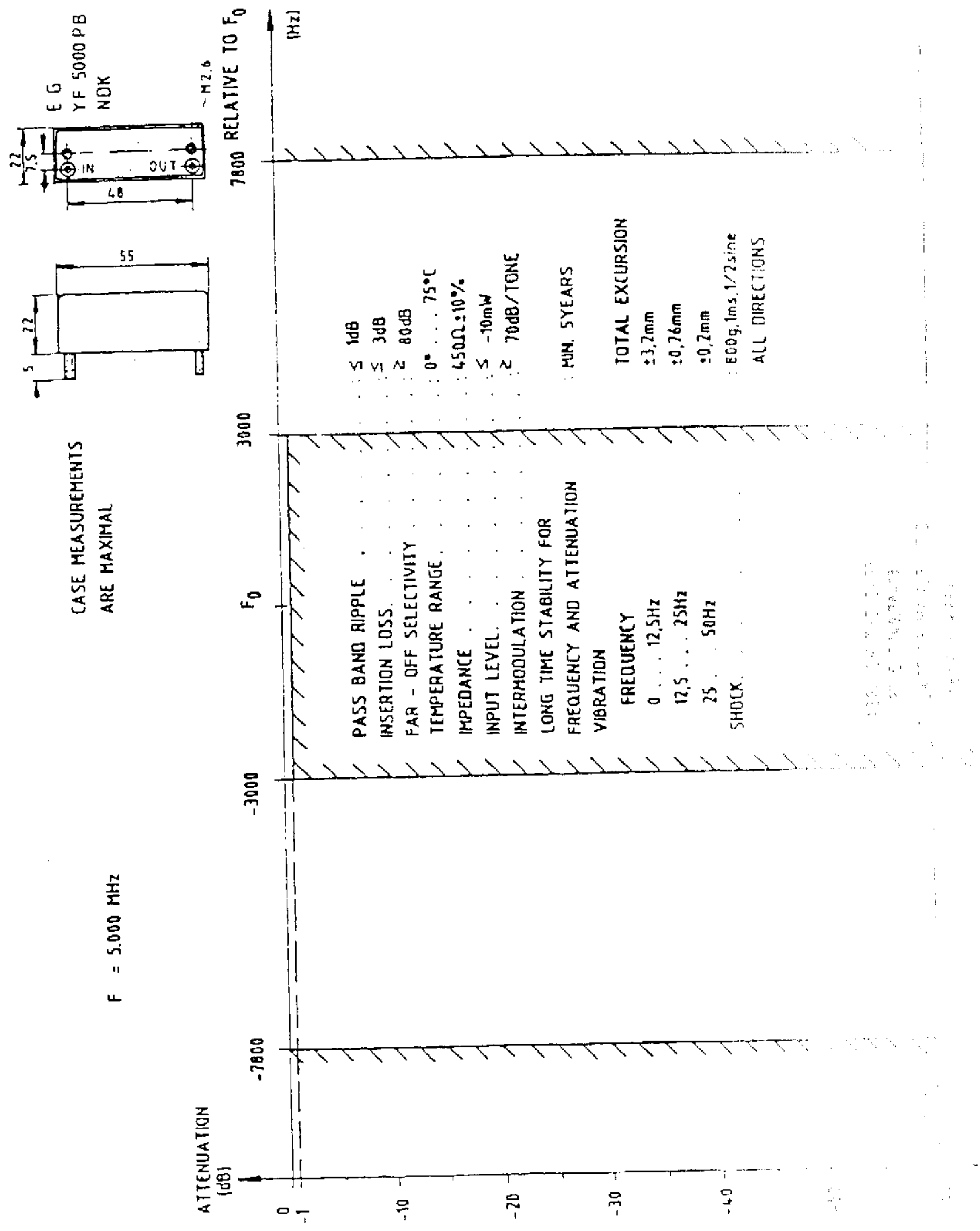
Arrangement of 2. Mixer LP-Filters

-2. Mixer-



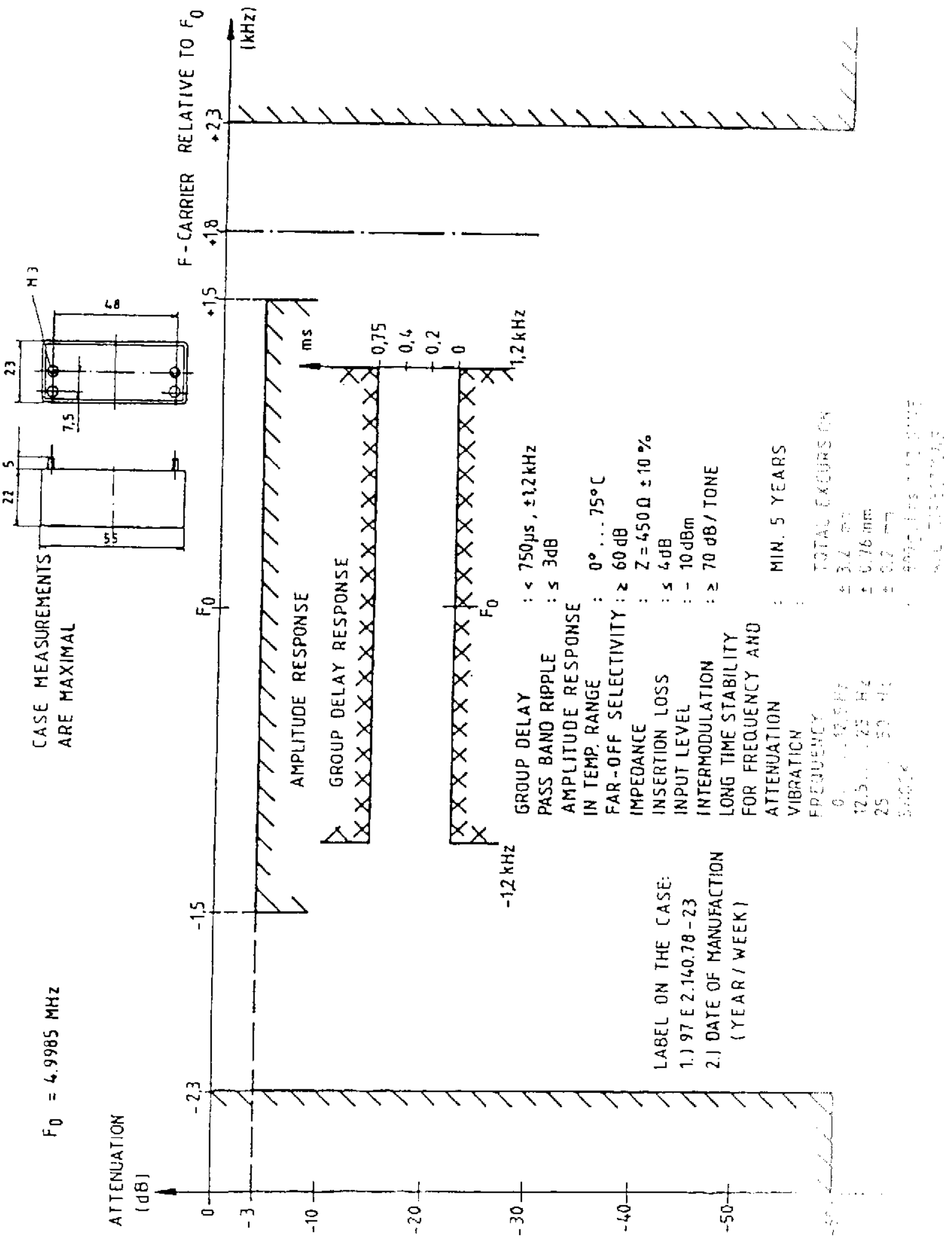
2. Mixer Capacitor PCBs

-2. Mixer-



Quartz Filter 2. Mixer drawing No. 97 E 2.140.78-18

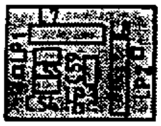
-2. Mixer-



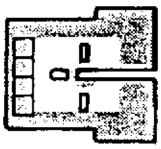
Quartz Filter B=3kHz drawing No. 97 E 2.140.78-23

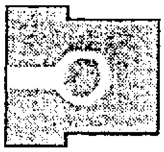
-2. Mixer-

see circuit diagram - 2. MIXER 97 Sa BX 2.155.90

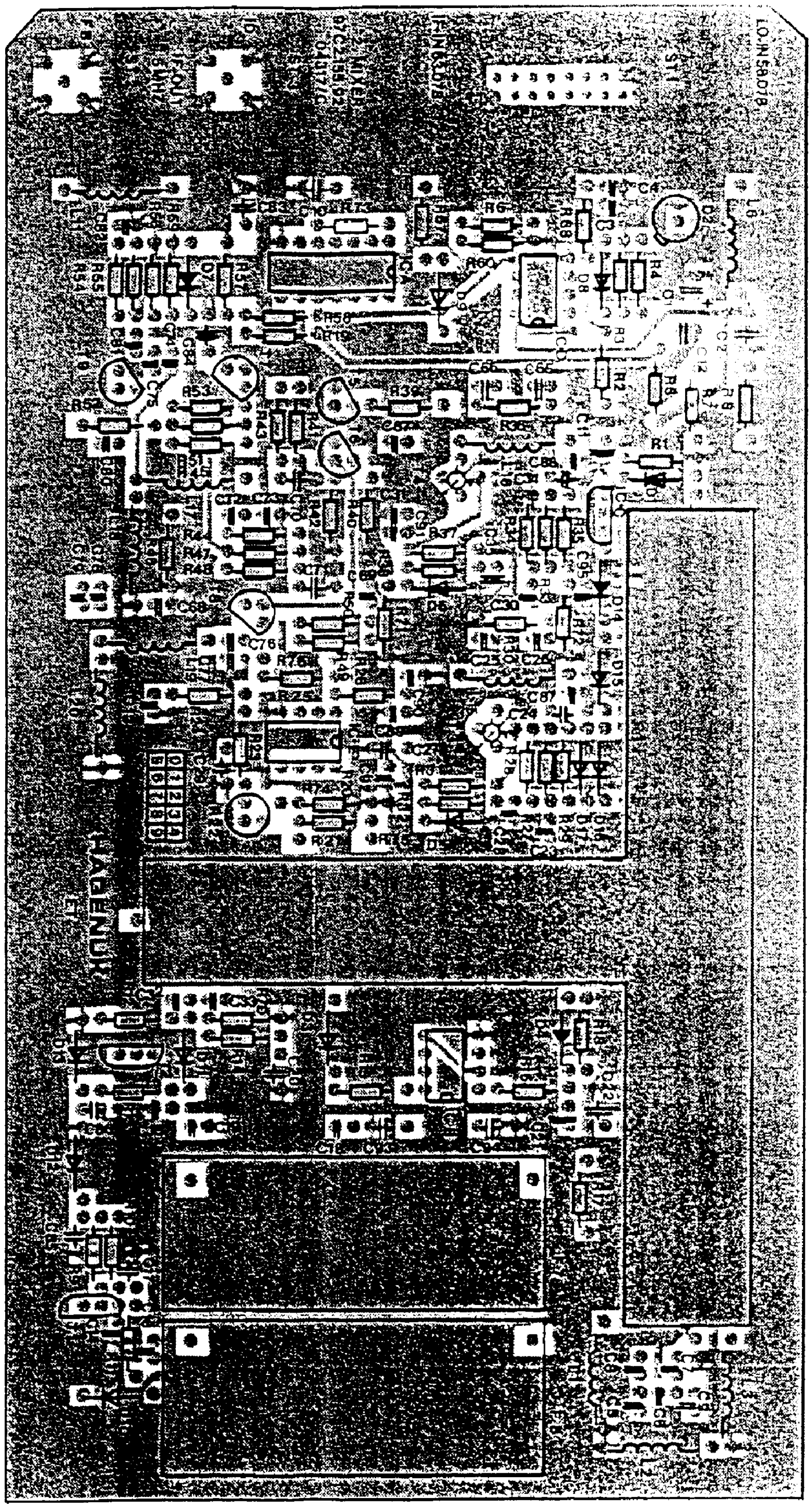


Diplexer PCB - 97 E 2.155.170

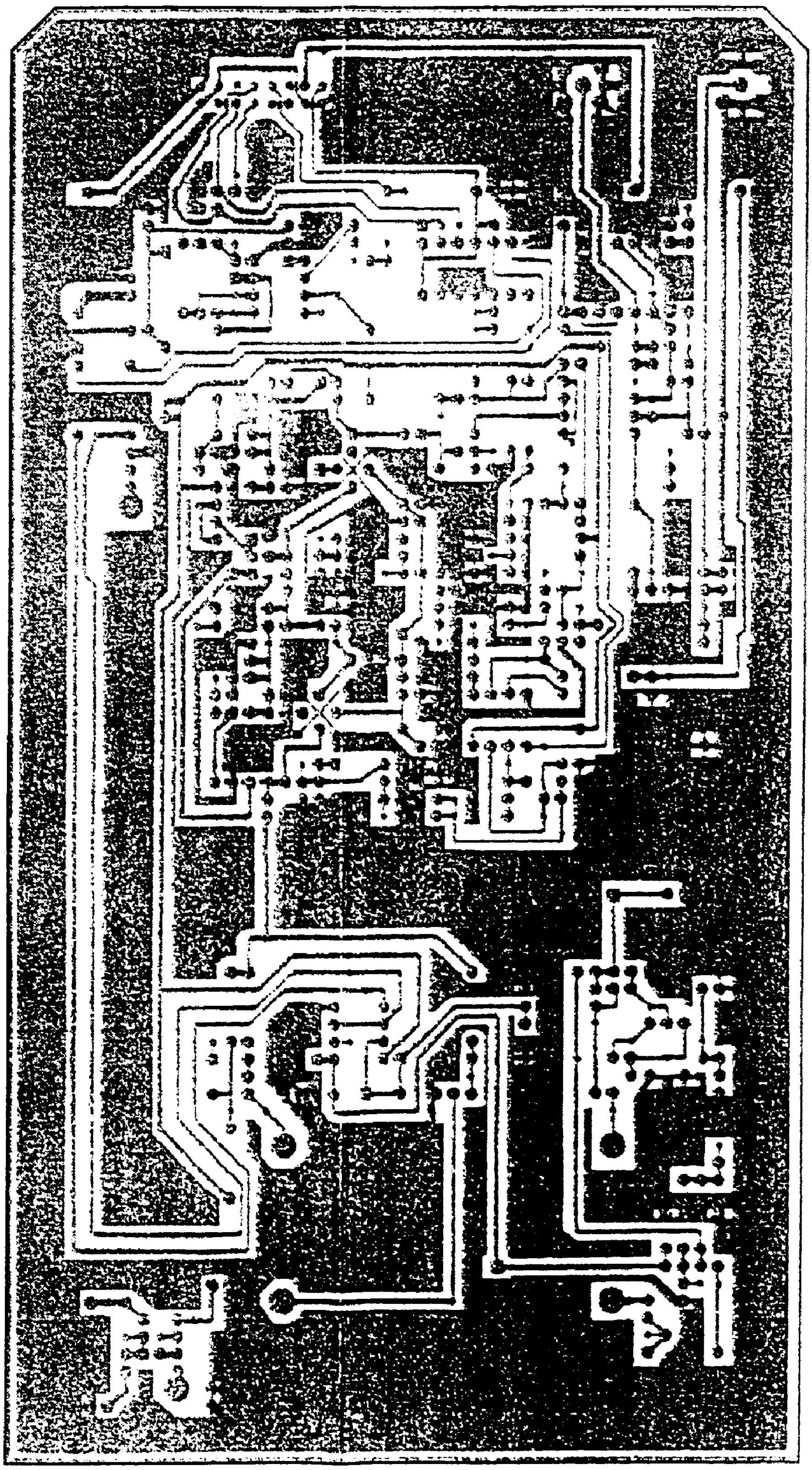




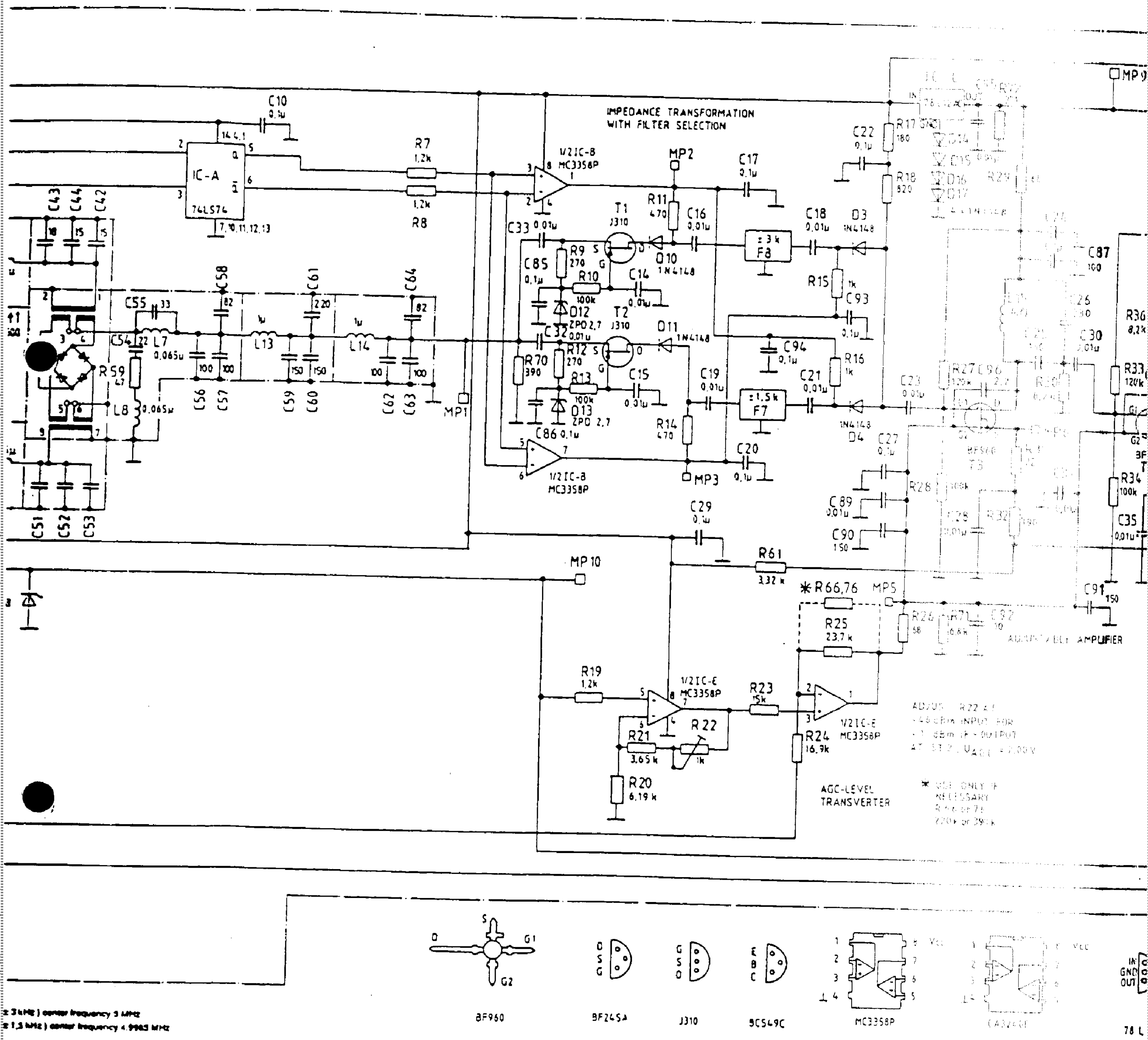
Capacitor PCB - 97 E 2.155.163-166



see circuit diagram - 2. MIXER 97 Sa BX 2.155.90



Printed Circuit Board
2. Mixer
97 C 2.155.92



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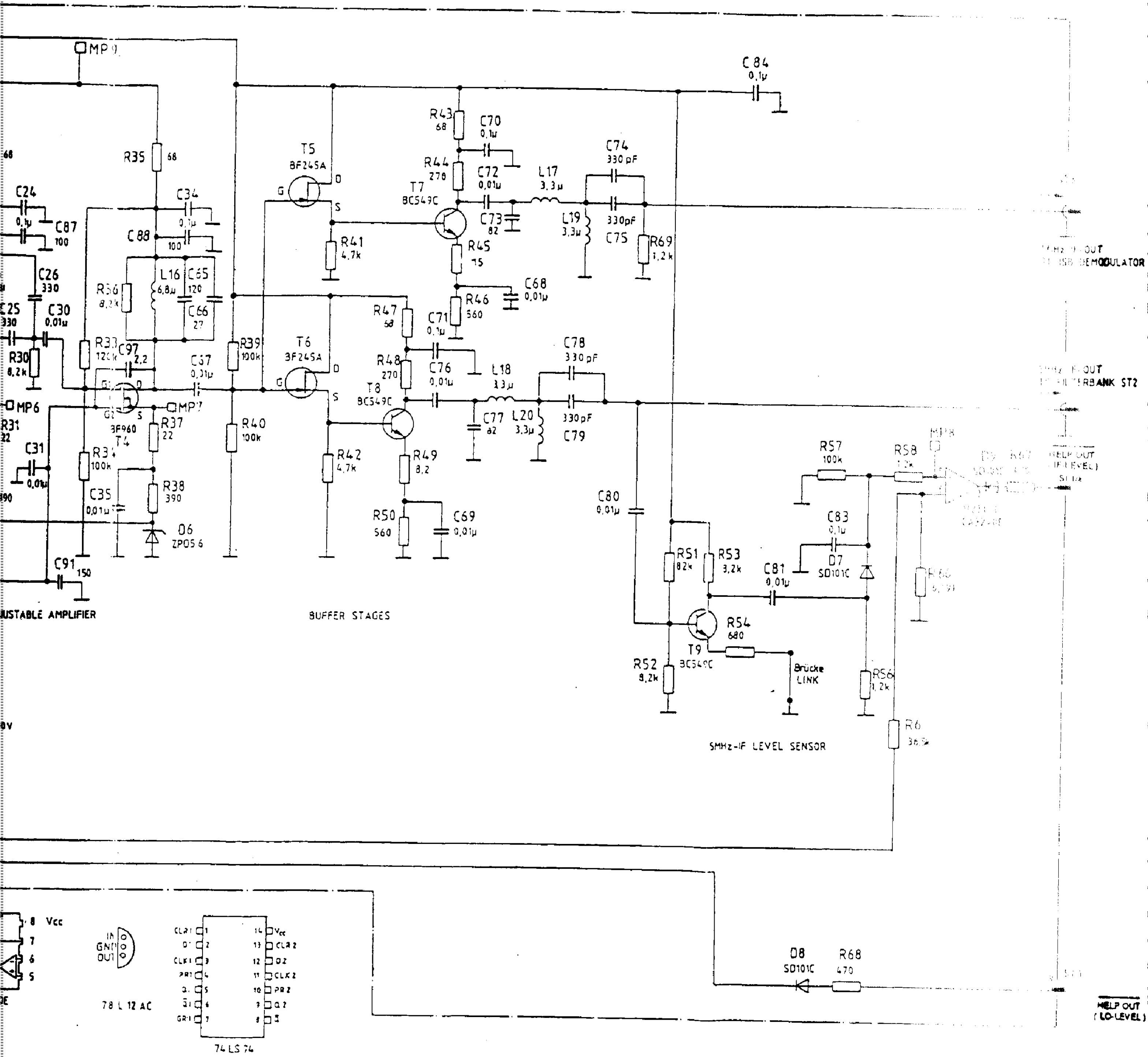

2. MIXER
Circuit Diagram
97 Sa BX 2.155.90

Parts lists No.
97 Sa 2.155.98

-2. Mixer-

Ident-No.	Mark	Electr. value	Identity	Manufacturer
Capacitors:				
1643.819	C1	47/20/35 V	RSP RM 2,5	VALVO
1423.037	C2	0,1/20/63 V	MKS 2	WIMA
1739.840	C3	1000pF/10/100 V	EGRU RM 2,5	VALVO
1739.840	G4	1000pF/10/100 V	EGRU RM 2,5	VALVO
1732.633	C5	82pF/2/100 V	EGRU RM 2,5 NPO	VALVO
1732.617	C6	47pF/2/100 V	EGRU RM 2,5 NPO	VALVO
1115.774	C7	56pF/2/63 V	DIN 41923 NPO	
1478.389	C8	150pF/2/63 V	N150 EDPU 0,6	VALVO
0945.048	C9	100pF/2/63V	NPO 1B DIN 41923	
1423.037	C10	0,1/20/63 V	MKS 2	WIMA
1739.859	C11	0,01/+80/-20/40 V	EGRU RM 2,5	VALVO
1739.859	C12	0,01/+80/-20/40 V	EGRU RM 2,5	VALVO
1739.859	C13	0,01/+80/-20/40 V	EGRU RM 2,5	VALVO
1739.859	C14	0,01/+80/-20/40 V	EGRU RM 2,5	VALVO
1739.859	C15	0,01/+80/-20/40 V	EGRU RM 2,5	VALVO
1739.859	C16	0,01/+80/-20/40 V	EGRU RM 2,5	VALVO
1423.037	C17	0,1/20/63 V	MKS 2	WIMA
1739.859	C18	0,01/+80/-20/40 V	EGRU RM 2,5	VALVO
1739.859	C19	0,01/+80/-20/40 V	EGRU RM 2,5	VALVO
1423.037	C20	0,1/20/63 V	MKS 2	WIMA
1739.859	C21	0,01/+80/-20/40 V	EGRU RM 2,5	VALVO
1423.037	C22	0,1/20/63 V	MKS 2	WIMA
1739.859	C23	0,01/+80/-20/40 V	EGRU RM 2,5	VALVO
1423.037	C24	0,1/20/63 V	MKS 2	WIMA
1420.844	C25	330pF/2/2/63 V	DIN 41923	
1420.844	C26	330pF/2/2/63 V	DIN 41923	
1423.037	C27	0,1/20/63 V	MKS 2	WIMA
1739.859	C28	0,01/+80/-20/40 V	EGRU RM 2,5	VALVO
1423.037	C29	0,1/20/63 V	MKS 2	WIMA
1739.859	C30	0,01/+80/-20/40 V	EGRU RM 2,5	VALVO
1739.859	C31	0,01/+80/-20/40 V	EGRU RM 2,5	VALVO
1739.859	C32	0,01/+80/-20/40 V	EGRU RM 2,5	VALVO
1739.859	C33	0,01/+80/-20/40 V	EGRU RM 2,5	VALVO
1423.037	C34	0,1/20/63 V	MKS 2	WIMA
1739.859	C35	0,01/+80/-20/40 V	EGRU RM 2,5	VALVO
1647.032	C36	15pF/5/63 V	KEFQ 0805	VALVO
1647.032	C37	15pF/5/63 V	KEFQ 0805	VALVO
1650.157	C38	18pF/5/63 V	KEFQ 0805	VALVO
1646.966	C39	27pF/5/63 V	KEFQ 0805	VALVO
1646.966	C40	27pF/5/63 V	KEFQ 0805	VALVO
1650.181	C41	33pF/5/63 V	KEFQ 0805	VALVO
1647.032	C42	15pF/5/63 V	KEFQ 0805	VALVO
1647.032	C43	15PF/5/63 V	KEFQ 0805	VALVO

Parts lists No.
97 Sa 2.155.90

-2. Mixer-

Ident-No.	Mark	Electr. value	Identity	Manufacturer
1650.157	C44	18pF/5/63 V	KEFQ 0805	VALVO
1647.032	C45	15pF/5/63 V	KEFQ 0805	VALVO
1647.032	C46	15pF/5/63 V	KEFQ 0805	VALVO
1650.157	C47	18pF/5/63 V	KEFQ 0805	VALVO
1646.966	C48	27pF/5/62 V	KEFQ 0805	VALVO
1646.966	C49	27pF/5/62 V	KEFQ 0805	VALVO
1650.181	C50	33pF/5/63 V	KEFQ 0805	VALVO
1647.032	C51	15pF/5/63 V	KEFQ 0805	VALVO
1647.032	C52	15pF/5/63 V	KEFQ 0805	VALVO
1650.157	C53	18pF/5/63 V	KEFQ 0805	VALVO
1647.172	C54	22pF/5/63 V	KEFQ 0805	VALVO
1650.181	C55	33pF/5/63 V	KEFQ 0805	VALVO
1646.958	C56	100pF/5/63 V	KEFQ 0805	VALVO
1646.958	C57	100pF/5/63 V	KEFQ 0805	VALVO
1646.915	C58	82pF/5/63 V	KEFQ 0805	VALVO
1646.842	C59	150pF/5/63 V	KEFQ 0805	VALVO
1646.842	C60	150pF75/63 V	KEFQ 0805	VALVO
1647.008	C61	220pF/5/63 V	KEFQ 0805	VALVO
1646.958	C62	100pf/5/63 V	KEFQ 0805	VALVO
1646.958	C63	100pf/5/63 V	KEFQ 0805	VALVO
1646.915	C64	82pF/5/63 V	KEFQ 0805	VALVO
1304.291	C65	120pF/2/2/63 V	DIN 41923	
1186.078	C66	27pF/2/63 V	DIN 41923	
1739.859	C67	0,01/+80/-20/40 V	EGRU RM 2,5	VALVO
1739.859	C68	0,01/+80/-20/40 V	EGRU RM 2,5	VALVO
1739.859	C69	0,01/+80/-20/40 V	EGRU RM 2,5	VALVO
1423.037	C70	0,1/20/63 V	MKS 2	WIMA
1423.037	C71	0,1/20/63 V	MKS 2	WIMA
1739.859	C72	0,01/+80/-20/40 V	EGRU RM 2,5	VALVO
1116.231	C73	82pF/2/63 V	DIN 41923	
1420.844	C74	330pF/2/63 V	DIN 41923	
1420.844	C75	330pF/2/63 V	DIN 41923	
1739.859	C76	0,01/+80/-20/40 V	EGRU RM 2,5	VALVO
1116.231	C77	82pF/2/63 V	DIN 41923	
1420.844	C78	330pF/2/63 V	DIN 41923	
1420.844	C79	330pF/2/63 V	DIN 41923	
1739.859	C80	0,01/+80/-20/40 V	EGRU RM 2,5	VALVO
1739.859	C81	0,01/+80/-20/40 V	EGRU RM 2,5	VALVO
1423.037	C83	0,1/20/63 V	MKS 2	WIMA
1423.037	C84	0,1/20/63 V	MKS 2	WIMA
1423.037	C85	0,1/20/63 V	MKS 2	WIMA
1423.037	C86	0,1/20/63 V	MKS 2	WIMA
0945.048	C87	100pF/2/63 V	DIN 41923	
0945,048	C88	100pF/2/63 V	DIN 41923	
1739.859	C89	0,01/+80/-20/40 V	EGRU RM 2,5	VALVO

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Parts lists No.
97 Sa 2.155.90

-2. Mixer-

Ident-No.	Mark	Electr. value	Identity	Manufacturer
1478.389	C90	150pF/2/63 V	N150 EDPU 0,6	VALVO
1478.389	C91	150pF/2/63 V	N150 EDPU 0,6	VALVO
0945.145	C92	10pF/2/63 V	DIN 41923	
1423.037	C93	0,1/20/63 V	MKS 2	WIMA
1423.037	C94	0,1/20/63 V	MKS 2	WIMA
1739.859	C95	0,01/+80/-20/40 V	EGRU RM 2,5	VALVO
0945.102	C96	2,2pF/0,25/63 V	NPO/IB DIN 41923	
0945.102	C97	2,2pF/0,25/63 V	NPO/IB DIN 41923	

Diodes:

1464.740	D1		SD 101 C	ITT
1865.668	D2		ZN 458	FERRANTI
0745.677	D3		1 N 4148	
0745.677	D4		1 N 4148	
1562.592	D6		ZPD 5,6 SB 14327	ITT
1464.740	D7		SD 101 C	ITT
1464.740	D8		SD 101 C	ITT
1464.740	D9		SD 101 C	ITT
0745.677	D10		1 N 4148	
0745.677	D11		1 N 4148	
0694.959	D12		ZPD 2,7	ITT
0694.959	D13		ZPD 2,7	ITT
0745.677	D14		1 N 4148	
0745.677	D15		1 N 4148	
0745.677	D16		1 N 4148	
0745.677	D17		1 N 4148	

Resistores:

0767.190	R1	100k-5-0,6-0207	DIN 44052-G	
0744.794	R2	1,2k-5-0,6-0207	DIN 44052-G	
1285.602	R3	6,19k-1-50-0207	DIN 44061-G	
1296.000	R4	90,9k-1-50-0207	DIN 44061-G	
0530.352	R5	3,3k-5-0,6-0207	DIN 44052-G	
1405.381	R6	36,5k-1-50-0,6-0207	DIN 44061-G	
0744.794	R7	1,2k-5-0,6-0207	DIN 44052-G	
0744.794	R8	1,2k-5-0,6-0207	DIN 44052-G	
0179.663	R9	270-5-0,6-0207	DIN 44052-G	
0767.190	R10	100k-5-0,6-0207	DIN 44052-G	
0554.898	R11	470-5-0,6-0207	DIN 44052-G	
0179.663	R12	270-5-0,6-0207	DIN 44052-G	
0767.190	R13	100k-5-0,6-0207	DIN 44052-G	

Parts lists No.
97 Sa 2.155.90

-2. Mixer-

Ident-No.	Mark	Electr. value	Identity	Manufacturer
0554.898	R14	470-5-0,6-0207	DIN 44052-G	
0179.698	R15	lk-5-0,6-0207	DIN 44052-G	
0179.698	R16	lk-5-0,6-0207	DIN 44052-G	
0744.883	R17	180-5-0,6-0207	DIN 44052-G	
0744.921	R18	820-5-0,6-0207	DIN 44052-G	
0744.794	R19	1,2k-5-0,6-0207	DIN 44052-G	
1285.602	R20	6,19k-1-50-0207	DIN 44061-G	
1414.909	R21	3,65k-1-50-0207	DIN 44061-G	
1930.893	R22	lk/20 Trimmpotiom.	170/6 MOL.	SIEMENS
0791.733	R23	15k-5-0,6-0207	DIN 44052-G	
1293.028	R24	16,9k-1-50-0207	DIN 44061-G	
1286.935	R25	23,7k-1-50-0,6-0207	DIN 44061-G	
0653.853	R26	68-5-0,6-0207	DIN 4405-G	
0921.580	R27	120k-5-0,6-0207	DIN 44052-G	
0767.190	R28	100k-5-0,6-0207	DIN 44052-G	
0653.853	R29	68-5-0,6-0207	DIN 44052-G	
0542.814	R30	8,2k-5-0,6-0207	DIN 44052-G	
0744.735	R31	22-5-0,6-0207	DIN 44052-G	
0744.751	R32	390-5-0,6-0207	DIN 44052-G	
0921.580	R33	120k-5-0,6-0207	DIN 44052-G	
0767.190	R34	100k-5-0,6-0207	DIN 44052-G	
0653.853	R35	68-5-0,6-0207	DIN 44052-G	
0542.814	E36	8,2k-5-0,6-0207	DIN 44052-G	
0744.735	R37	22-5-0,6-0207	DIN 44052-G	
0744.751	R38	390-5-0,6-0207	DIN 44052-G	
0767.190	R39	100k-5-0,6-0207	DIN 44052-G	
0767.190	R40	100k-5-0,6-0207	DIN 44052-G	
0767.212	R41	4,7-5-0,6-0207	DIN 44052-G	
0767.212	R42	4,7-5-0,6-0207	DIN 44052-G	
0653.853	R43	68-5-0,6-0207	DIN 44052-G	
0179.663	R44	270-5-0,6-0207	DIN 44052-G	
0626.716	R45	15-5-0,6-0207	DIN 44052-G	
0542.857	R46	560-5-0,6-0207	DIN 44052-G	
0653.853	R47	68-5-0,6-0207	DIN 44052-G	
0179.663	R48	270-5-0,6-0207	DIN 44052-G	
1004.719	R49	8,2-5-0,6-0207	DIN 44052-G	
0542.857	R50	560-5-0,6-0207	DIN 44052-G	
0744.875	R51	82k-5-0,6-0207	DIN 44052-G	
0542.814	R52	8,2k-5-0,6-0207	DIN 44052-G	
0542.814	R53	8,2k-5-0,6-0207	DIN 44052-G	
0698.172	R54	680-5-0,6-0207	DIN 44052-G	
0744.794	R56	1,2k-5-0,6-0207	DIN 44052-G	
0767.190	R57	100k-5-0,6-0207	DIN 44052-G	
0744.794	R58	1,2k-5-0,6-0207	DIN 44052-G	
1768.751	R59	47-5-0,06 W 2x1,25x0,5/0,7		

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-2. Mixer-

Ident-No.	Mark	Electr. value	Identity	Manufacturer
1285.602	R60	6,19k-1-50-0207	DIN 44061-G	
1683.888	R61	3,32k-1-100-05-0204	DIN 44061-G	
0799.416	R66	220k-5-0,6-027	DIN 44052-G Abgleichwid.	
0554.898	R67	470-5-0,6-0207	DIN 44052-G	
0554.898	R68	470-5-0,6-0207	DIN 44052-G	
0744.794	R69	1,2k-5-0,6-0207	DIN 44052-G	
0744.751	R70	390-5-0,6-0207	DIN 44052-G	
0767.220	R71	6,8k-5-0,6-0207	DIN 44052-G	
0542.830	R72	27k-5-0,6-0207	DIN 44052-G	
0744.840	R73	5,6k-5-0,6-0207	DIN 44052-G	
0799.416	R76	390k-5-0,6-207	DIN 44052-G Abgleichwid.	

Coils:

1068.105	L1	0,15uH/10 PCT	Typ 72.00	JAHRE
1068.105	L2	0,15uH/10 PCT	Typ 72.00	JAHRE
1068.105	L3	0,15uH/10 PCT	Typ 72.00	JAHRE
1902.229	L4	0,165uH	97 E 2.155.160-5	
1902.229	L5	0,165uH	97 E 2.155.160-5	
1427.105	L6	82uH/10 PCT	Typ 72.00	JAHRE
1917.455	L7	0,065uH	97 E 2.155.170-2	
1917.455	L8	0,065uH	97 E 2.155.170-2	
1902.229	L9	0,165uH	97 E 2.155.160-5	
1902.229	L10	0,165uH	97 E 2.155.160-5	
1076.140	L11	10µH/10 PCZ	Typ 72.00	JAHRE
1902.350	L13	1uH B 78108-T1102-K		SIEMENS
1902.350	L14	1uH B 78108-T1102-K		SIEMENS
0845.213	L15	6,8uH/10	PCT/Typ 72.00	JAHRE
0845.213	L16	6,8uH/10	PCT/Typ 72.00	JAHRE
1865.684	L17	3,3uH B 78108-T1332-K		SIEMENS
1865.684	L18	3,3uH B 78108-T1332-K		SIEMENS
1865.684	L19	3,3uH B 78108-T1332-K		SIEMENS
1865.684	L20	3,3uH B 78108-T1332-K		SIEMENS

Integrated circuis:

1653.172	IC A		74 LS 74 N	
1422.715	IC B		MS 3358 P 1	MOTOROLA
1865.676	IC C	LM 78 L12	ACT/NAT.MC 78 L 12	MOTOROLA/ACP
			UA 78 L 12	AC/TEXAS
1427.156	IC D		CA 3240 E	OP.-Verst.
1422.715	IC E		MC 3358 P1	MOTOROLA

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-2. Mixer-

Ident-No.	Mark	Electr. value	Identity	Manufacturer
Transistors:				
1425.137	T1		J 310	NATIONAL
1425.137	T2		J 310	NATIONAL
1865.706	T3		BF 960	SIEMENS, VALVO TELEFUNKEN
1865.706	T4		BF 960	SIEMENS, VALVO TELEFUNKEN
1562.606	T5		BF 245 A	VALVO
1562.606	T6		BF 245 A	VALVO
1291.106	T7		BC 549 C	ROE, ITT
1291.106	T8		BC 549 C	ROE, ITT
1291.106	T9		BC 549 C	ROE, ITT
Connectors:				
1826.514	ST1	16-pins	609-1604E	T&B
1705.504	ST2		Nr. 11.1520.001	TELEGÄRTNER
1705.504	ST3		Nr. 11.1520.001	TELEGÄRTNER
Supplements:				
1078.577	M1	ring mixer IE 500		
1934.244	F7	quartz filter	97 E 2.140.78-23	
1865.633	F8	quartz filter	97 E 2.140.78-18	