

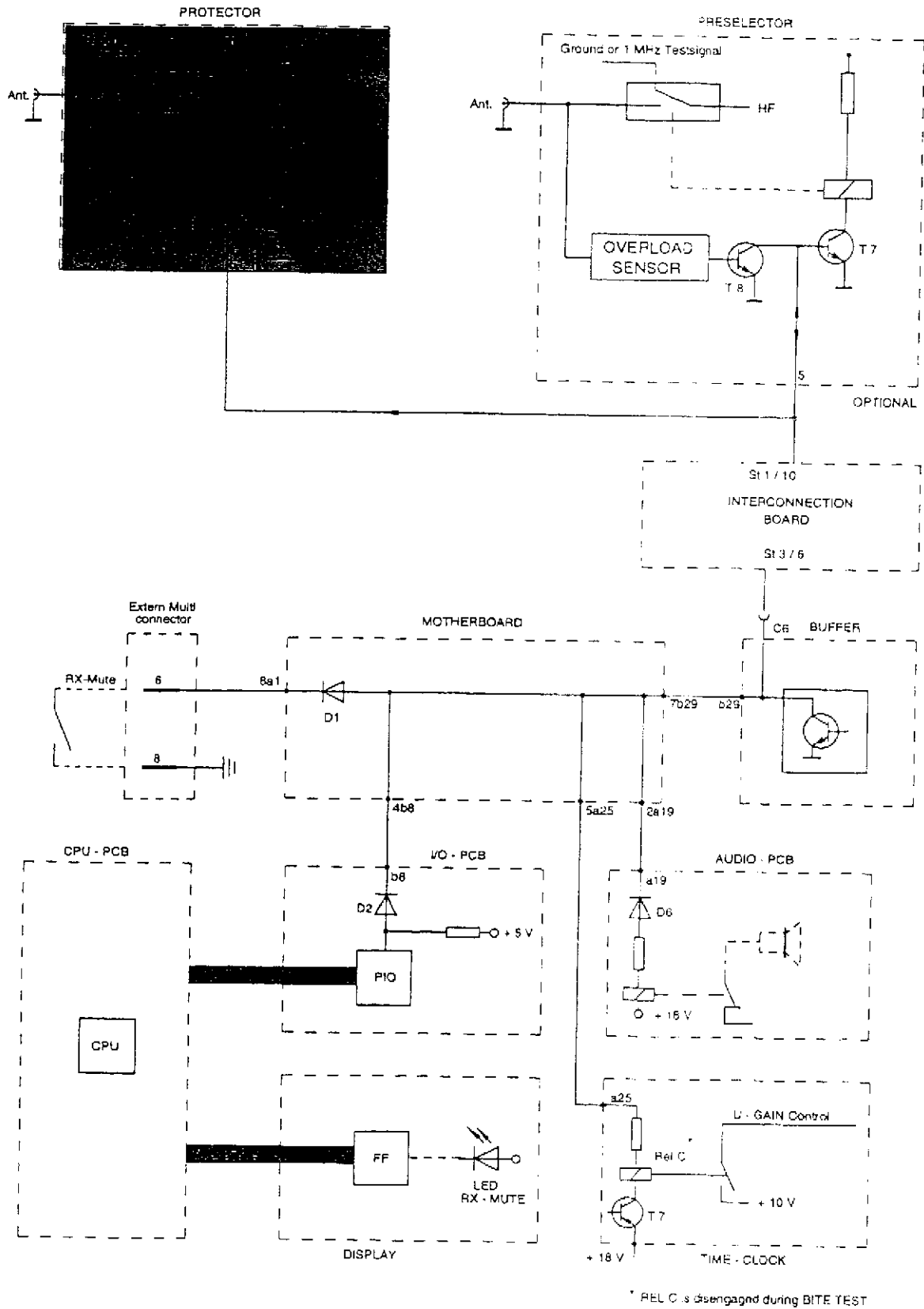
**-Protector-****Technical description**

The PROTECTOR module includes a low-pass filter (roll off 33 MHz) and an attenuator (20 dB). When the receiver is switched off, the antenna input is automatically disconnected. A gas discharge lamp and a 1 M ohms resistor are connected in parallel to the antenna input. Voltages > 90 V and static electricity are shunted providing an overvoltage protection. At the output of the low-pass filter, a sample of the RF voltage is generated by C44/C43, amplified with T3, rectified by D 1 and fed to the operational amplifier IC - A. This IC acts as a comparator, the reference voltage (= 1 V) is generated by the divider resistors R12/R18. If the level at the antenna input exceeds about 6 dBm (117 ... 123 dB $\mu$ V), the 20 dB attenuator is automatically switched on.

The attenuator cannot be constructed as a normal  $\pi$ - or T circuit, because of the high antenna input voltage and the possible high power dissipation in the first resistor. For this reason a series resistor R 17 ( 820 ohms; 1.5 watts) is switched in series with the low-pass filter output only. The characteristic passband and stopband of the low-pass filter is not severely affected due to this mismatching. When the 20 dB attenuator is switched on, the signal 20 dB ATT. is applied to the control unit; the LED ANT. ATTENUATION 20 dB (31) \* indicates this situation. If the 20 dB attenuator is to be switched on permanently, enter code 31 \* on the front panel of the receiver. To mute the receiver, switch socket Bu 1 pin 5 (MUTE) to 0 V; relay Rel B drops out and breaks the circuit to the antenna input. For the self-test, the 1 MHz test signal is fed in via St 1. The level is >+22 dBm for testing the RF Level Sensor and - 54 dBm for testing the gain of the cassettes 1<sup>st</sup> MIXER, 2<sup>nd</sup> MIXER, FILTERBOARD and DEMODULATOR. The antenna signal is fed from the PROTECTOR cassette through the RF OUT socket to the 1<sup>st</sup> MIXER. If the "PRESELECTOR" option is used, the circuitry of the PROTECTOR is integrated in the PRESELECTOR, the cassette PROTECTOR must therefore be omitted.

- \* Code 31 for RX 1001 M / RX 5001
- Code 21 for RX 1001 M / L 11

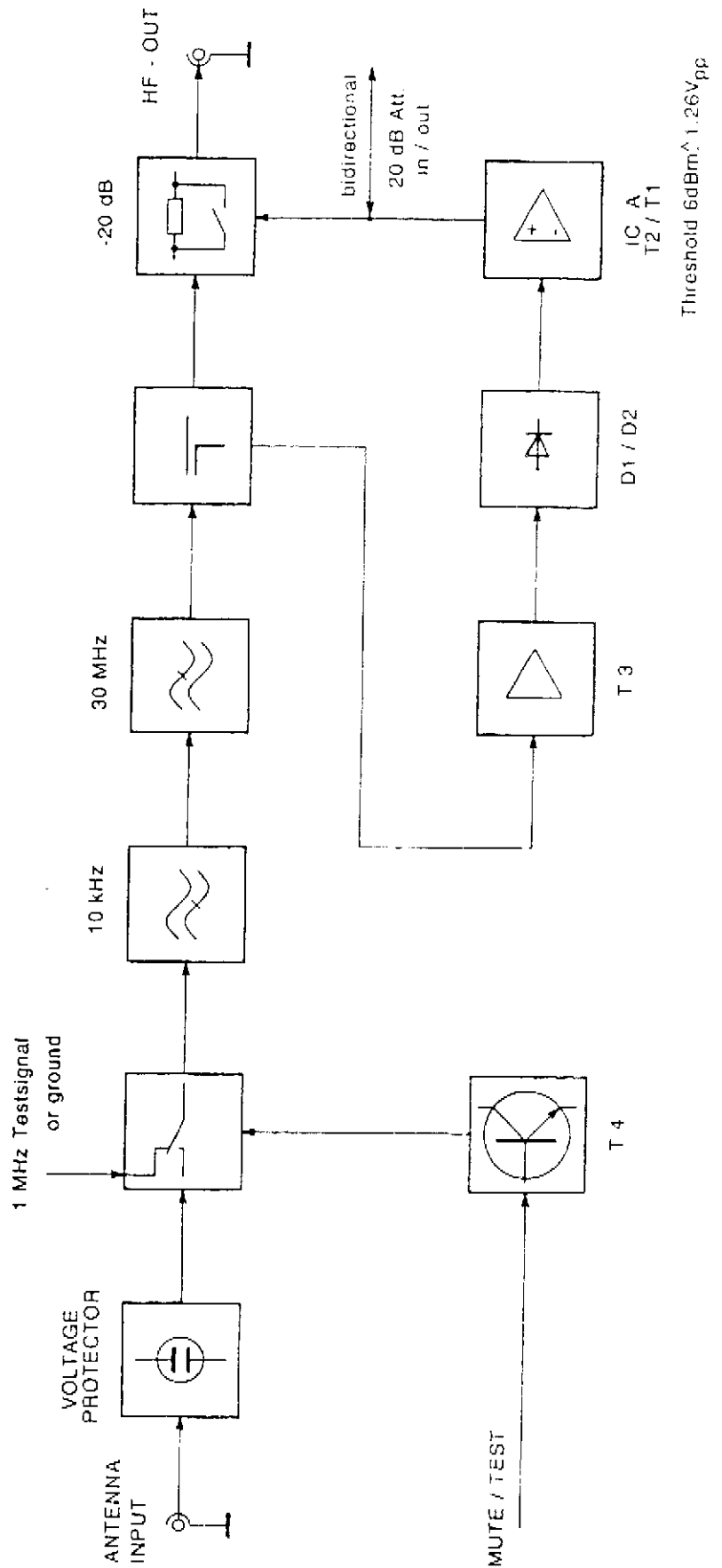
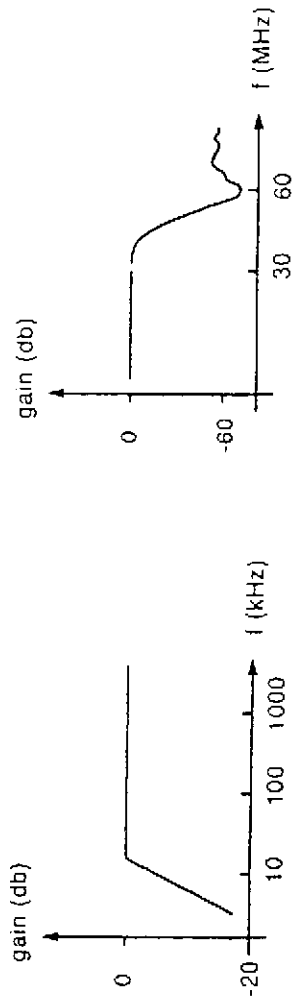
-Protector-



\* REL C is disengaged during BITE TEST

Mute Interconnection

-Protector-



Blockdiagram Protector

**-Protector-****Test and alignment instructions**

Required:           Circuit diagram PROTECTOR -Hagenuk Drawing  
No. 97 Sa 2.155.95  
tracking generator, spectrum analyser.

Test configuration: The PROTECTOR is not removed. The plugs/sockets at the connections ST 1, Bu 2 (ANT.INPUT) and Bu 3 (RF OUT) are pulled off.

Spectrum analyser:           to Bu 3 (RF OUT)  
Tracking generator:         to Bu 2 (ANT. INPUT)  
(level 0 dBm)

Checking the passband and stopband curve of the low-pass filter  
Switch on receiver - the LEDs PRESELECTOR ON, ANT ATT. 20 dB and RX MUTE must not be illuminated.

Spectrum analyser settings: Centre frequency 50 MHz  
Span                            100 MHz  
Time/Div.                    5 ms

**Test values:**

Up to 30 MHz passband attenuation < 1 dB, ripple < 2 dB  
From 50 MHz stopband attenuation > 60 dB

Increase the tracking generator output level to +10 dBm.

**Test values:**

up to 30 MHz ripple < 3 dB, level -10 dB (when the 20 dB ATT. is switched on!)

Reduce tracking generator output level to -20 dBm and activate RX MUTE:

**Test values:**

Signal attenuation should be > 35 dB. (i. e. output level < -55 dBm in the passband)

Cancel RX MUTE; activate ATTENUATOR ON.

**Test values:**

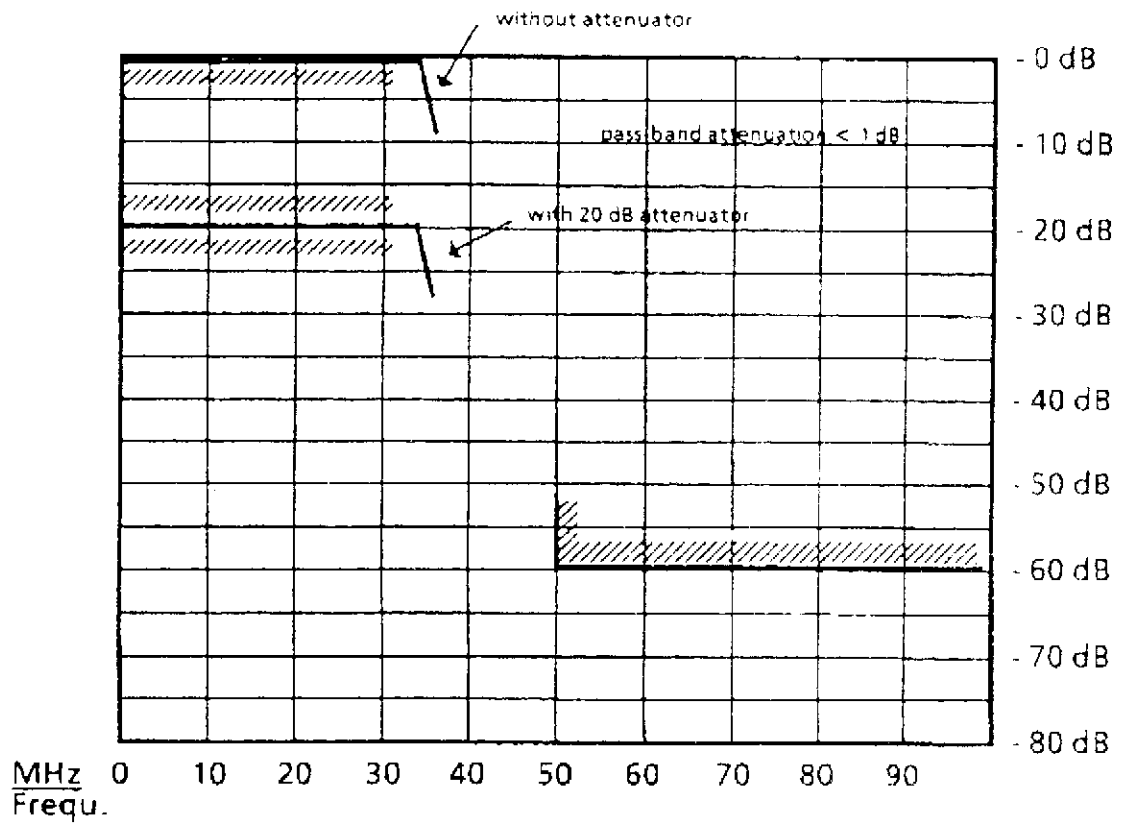
Attenuation in the passband should be 20 dB (tolerance +3 dB to -2 dB).  
(output level -40 dBm +3; -2 dBm)

Cancel ATTENUATOR ON and connect tracking generator to plug ST 1 (level 0 dBm).

**Test values:**

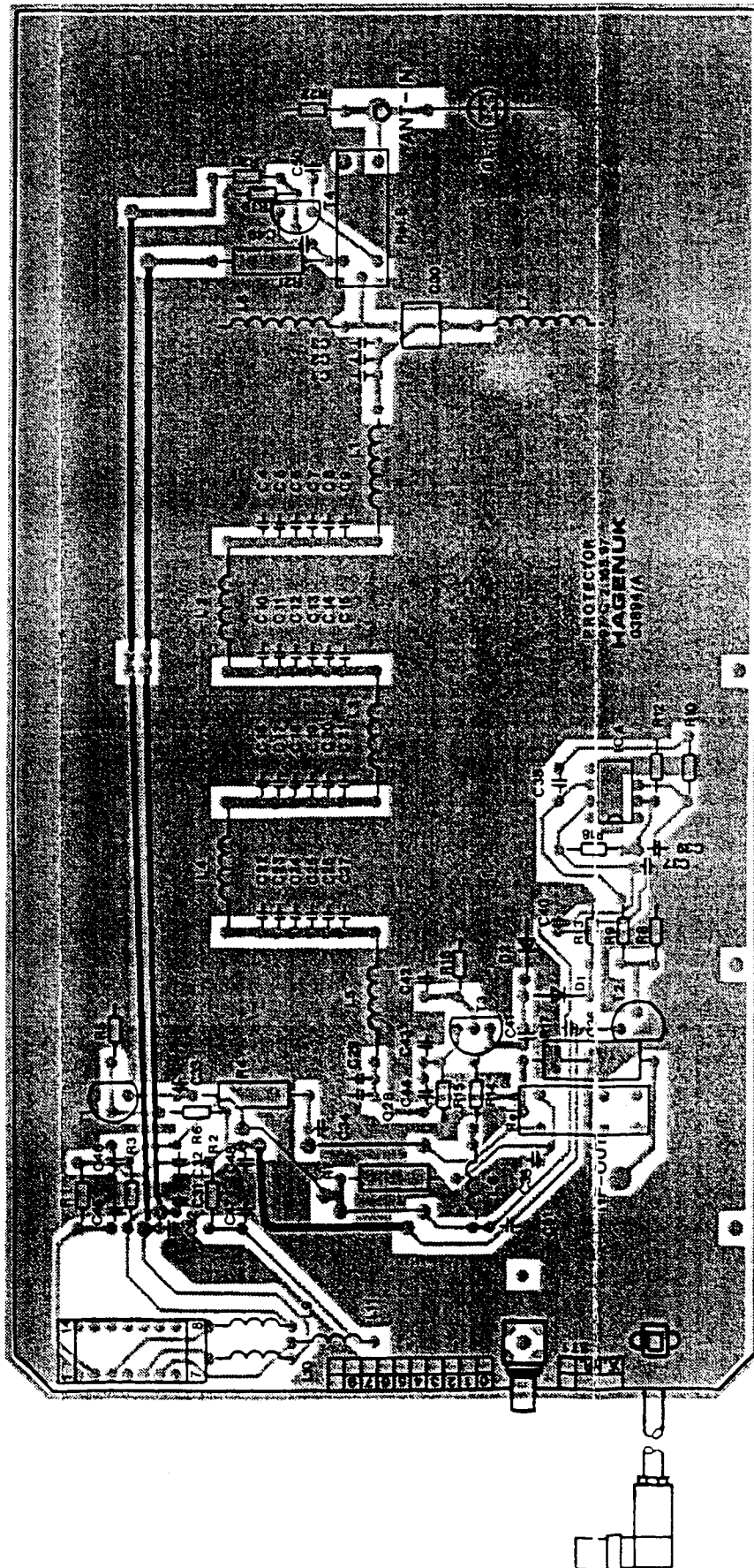
Attenuation in the passband should be < 1 dB and ripple < 2 dB.

-Protector-

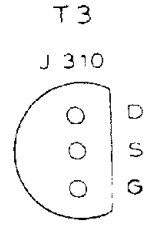
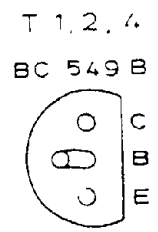
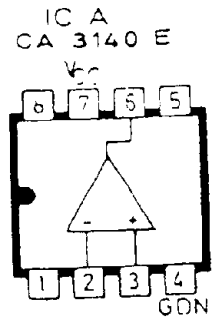
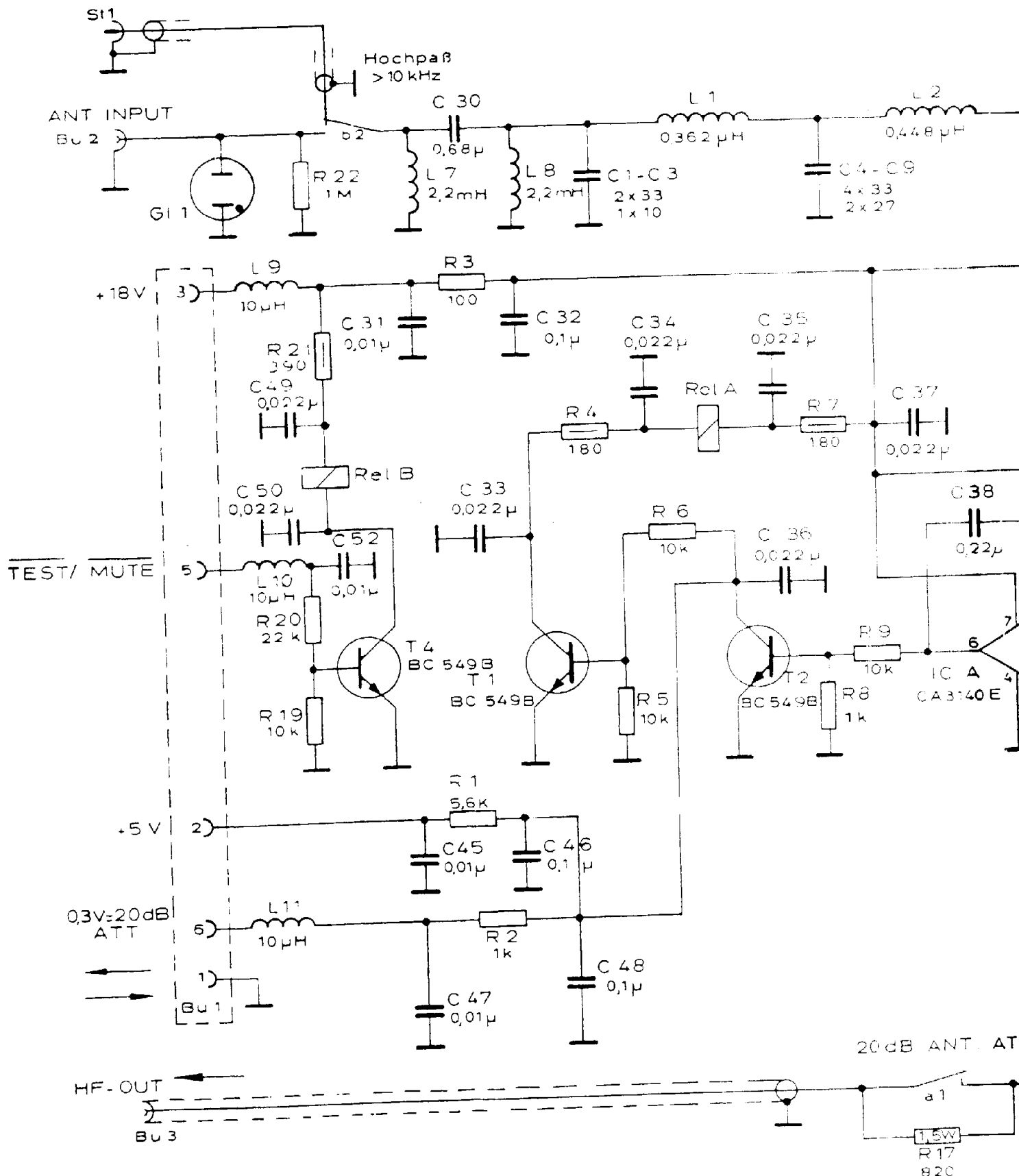


Passband and stopband characteristics of the PROTECTOR with tolerance lines.

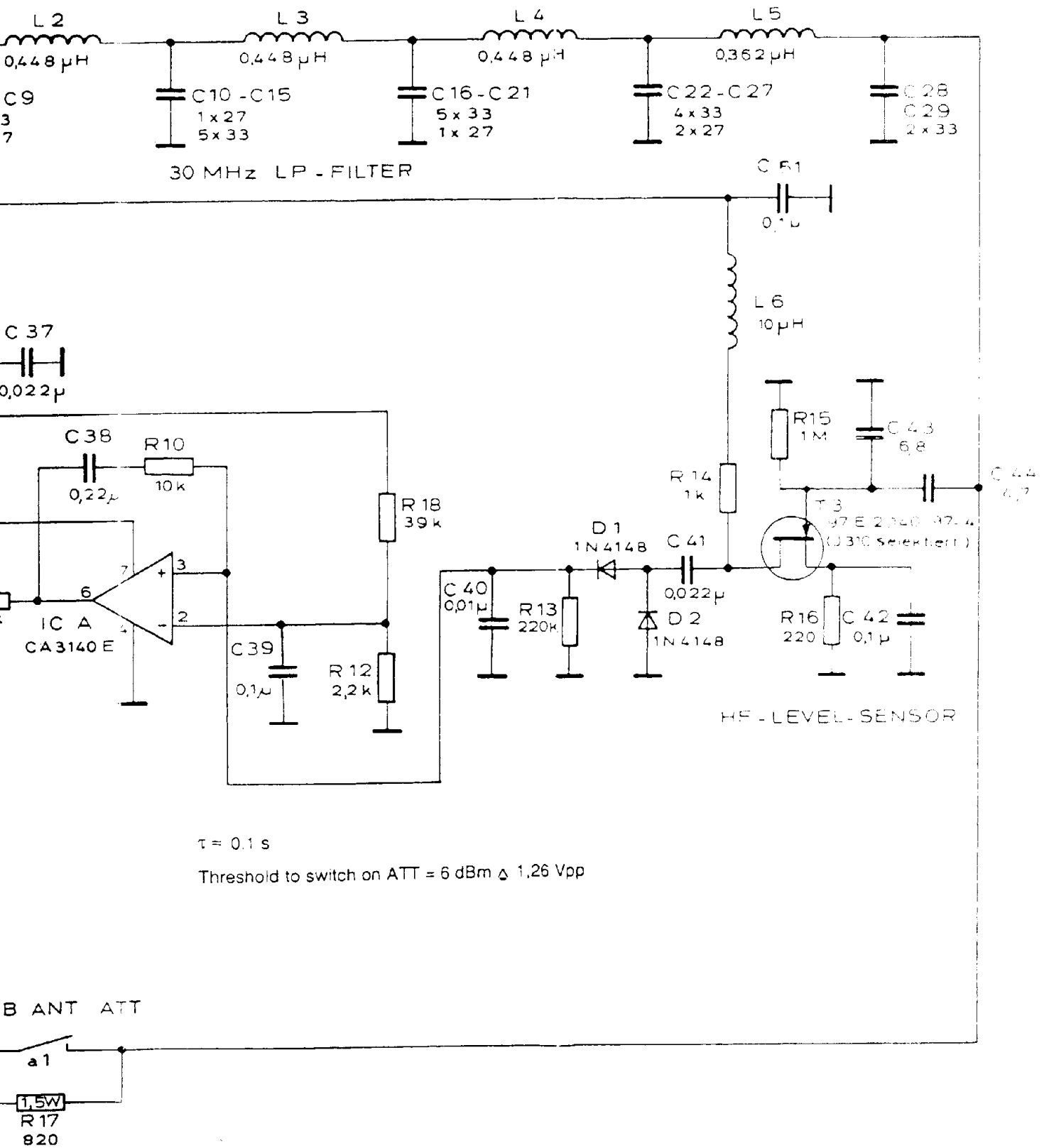
see circuit diagram - PROTECTOR 97 Sa D 2.155.95



Printed Circuit Board  
Protector  
97 C 2.155.97



BOTTOM VIEW



$\tau = 0.1 \text{ s}$

Threshold to switch on ATT = 6 dBm  $\Delta$  1.26 Vpp

PROTECTOR  
Circuit Diagram  
97 Sa D 2.155 95



**-Protector-**

Ident-No.	Mark	Electr. value	Identity	Manufacturer
<b>Capacitors:</b>				
1425.145	C1	33 pF/500 V 2 %	EDPU 222265010339	VALVO
1425.145	C2	33 pF/500 V 2 %	EDPU 222265010339	VALVO
1425.153	C3	10 pF/500 V 2 %	EDPU 222265010109	VALVO
1425.145	C4	33 pF/500 V 2 %	EDPU 222265010339	VALVO
1425.145	C5	33 pF/500 V 2 %	EDPU 222265010339	VALVO
1425.145	C6	33 pF/500 V 2 %	EDPU 222265010339	VALVO
1425.145	C7	33 pF/500 V 2 %	EDPU 222265010339	VALVO
1425.161	C8	27 pF/500 V 2 %	ENPU 222265010279	VALVO
1425.161	C9	27 pF/500 V 2 %	EDPU 222265010279	VALVO
1425.161	C10	27 pF/500 V 2 %	EDPU 222265010279	VALVO
1425.145	C11	33 pF/500 V 2 %	EDPU 222265010279	VALVO
1425.145	C12	33 pF/500 V 2 %	EDPU 222265010279	VALVO
1425.145	C13	33 pF/500 V 2 %	EDPU 222265010279	VALVO
1425.145	C14	33 pF/500 V 2 %	EDPU 222265010279	VALVO
1425.145	C15	33 pF/500 V 2 %	EDPU 222265010279	VALVO
1425.145	C16	33 pF/500 V 2 %	EDPU 222265010279	VALVO
1425.145	C17	33 pF/500 V 2 %	EDPU 222265010279	VALVO
1425.145	C18	33 pF/500 V 2 %	EDPU 222265010279	VALVO
1425.145	C19	33 pF/500 V 2 %	EDPU 222265010279	VALVO
1425.145	C20	33 pF/500 V 2 %	EDPU 222265010279	VALVO
1425.161	C21	27 pF/500 V 2 %	EDPU 222265010279	VALVO
1425.145	C22	33 pF/500 V 2 %	EDPU 222265010279	VALVO
1425.145	C23	33 pF/500 V 2 %	EDPU 222265010279	VALVO
1425.145	C24	33 pF/500 V 2 %	EDPU 222265010279	VALVO
1425.145	C25	33 pF/500 V 2 %	EDPU 222265010279	VALVO
1425.161	C26	27 pF/500 V 2 %	EDPU 222265010279	VALVO
1425.161	C27	27 pF/500 V 2 %	EDPU 222265010279	VALVO
1425.145	C28	33 pF/500 V 2 %	EDPU 222265010279	VALVO
1425.145	C29	33 pF/500 V 2 %	EDPU 222265010279	VALVO
1179.225	C30	0,68 $\mu$ F/100 V	B32540 A1684-J	SIEMENS
0904.988	C31	0,01 $\mu$ F/40 V	EDPU/0,6 K10000	VALVO
1423.037	C32	0,1 $\mu$ F/63 V	MKS 2	WIMA
1116.207	C33	0,022 $\mu$ F/40 V	EDPU/0,6	VALVO
1116.207	C34	0,022 $\mu$ F/40 V	EDPU/0,6	VALVO
1116.207	C35	0,022 $\mu$ F/40 V	EDPU/0,6	VALVO
1116.207	C36	0,022 $\mu$ F/40 V	EDPU/0,6	VALVO
1116.207	C37	0,022 $\mu$ F/40 V	EDPU/0,6	VALVO
1400.568	C38	0,22 $\mu$ F/63 V	MKS 2	WIMA
1423.037	C39	0,1 $\mu$ F/63 V	MKS 2	WIMA
0904.988	C40	0,01 $\mu$ F/40 V	EDPU/10000	VALVO
1116.207	C41	0,022 $\mu$ F/40 V	EDPU/0,6 K10000	VALVO
1423.037	C42	0,1 $\mu$ F/63 V	MKS 2	WIMA

**-Protector-**Parts lists No.  
97 Sa 2.155.95

Ident-No.	Mark	Electr. value	Identity	Manufacturer
0945.137	C43	6,8 pF/63 V	NPO/1B EDPU/0,6	VALVO
1425.188	C44	4,7 pF/500 V 2 %	EDPU 222265010478	VALVO
1425.196	C45	0,01 $\mu$ F/63 V	MKS 2	WIMA
1423.037	C46	0,1 $\mu$ F/63 V	MKS 2	WIMA
1425.196	C47	0,01 $\mu$ F/63 V	MKS 2	WIMA
1423.037	C48	0,1 $\mu$ F/63 V	MKS 2	WIMA
1116.207	C49	0,022 $\mu$ F/40 V	FDPU/0,6 K10000	VALVO
1116.207	C50	0,022 $\mu$ F/40 V	EDPU/0,6 K10000	VALVO
1423.037	C51	0,1 $\mu$ F/63 V	MKS 2	WIMA
0904.988	C52	0,01 $\mu$ F/40 V	EDPU/0,6 K10000	VALVO

**Diodes:**

0745.677	D1		1 N 4148	ITT
0745.677	D2		1 N 4148	ITT

**Resistors:**

0744.840	R1	5,6 K 5 % 1/8 W	DIN 44052
0179.698	R2	1 K 5 % 1/8 W	DIN 44052
0179.639	R3	100 5 % 1/8 W	DIN 44052
0181.005	R4	180 5 % 1/2 W	DIN 44052
0179.701	R5	10 K 5 % 1/8 W	DIN 44052
0179.701	R6	10 K 5 % 1/8 W	DIN 44052
0181.005	R7	180 5 % 1/2 W	DIN 44052
0179.698	R8	1 K 5 % 1/8 W	DIN 44052
0179.701	R9	10 K 5 % 1/8 W	DIN 44052
0179.701	R10	10 K 5 % 1/8 W	DIN 44052
0744.808	R12	2,2 K 5 % 1/8	DIN 44052
0799.416	R13	220 K 5 % 1/8 W	DIN 44052
0179.698	R14	1 K 5 % 1/8 W	DIN 44052
0542.946	R15	1 M 5 % 1/8 W	DIN 44052
0542.983	R16	220 5 % 1/8 W	DIN 44052
1425.226	R17	820 5 % 1,5 W	DIN 44063
0799.300	R18	39 K 5 % 1/8 W	DIN 44052
0179.701	R19	10 K 5 % 1/8 W	DIN 44052
0767.204	R20	22 K 5 % 1/8 W	DIN 44052
0243.647	R21	390 5 % 1/8 W	DIN 44052
0542.946	R22	1 M 5 % 1/8 W	DIN 44052

Parts lists No.  
97 Sa 2.155.95

-Protector-

Ident-No.	Mark	Electr. value	Identity	Manufactuter
<b>Coils:</b>				
1425.110	L1	0,362 $\mu$ H	97 E 2.140.97-2	HAGENUK
1425.129	L2	0,448 $\mu$ H	97 E 2.140.97-3	HAGENUK
1425.129	L3	0,448 $\mu$ H	97 E 2.140.97-3	HAGENUK
1425.129	L4	0,448 $\mu$ H	97 E 2.140.97-3	HAGENUK
1425.110	L5	0,362 $\mu$ H	97 E 2.140.97-2	HAGENUK
1076.140	L6	10 $\mu$ H/10 %	72.0	JAHRE
1116.312	L7	2.2 mH	2500-44	AMPHENOL
1116.312	L8	2.2 mH	2500-44	AMPHENOL
1076.140	L9	10 $\mu$ H/10 %	72.0	JAHRE
1076.140	L10	10 $\mu$ H/10 %	72.0	JAHRE
1076.140	L11	10 $\mu$ H/10 %	72.0	JAHRE

**Integrated circuits:**

1300.326	IC A	CA 3140 E
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**Transistors:**

1291.033	T1	BC 549 B	
1291.033	T2	BC 549 B	
	T3	97 E 2.140.97-4	HAGENUK
1291.033	T4	BC 549 B	

**Connectors:**

1189.735	Bu 1	14 pins	DIL B14-P108	BURNDY
	Bu 2	UG 58 A/U	R 161 404	RADIALL
1427.337	Bu 3		97 E 2.140.98	HAGENUK
1422.693	ST 1		R 114 665	RADIALL

**Supplements:**

GL 1	SIC90/Q69-814	SIEMENS
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**Relays:**

1186.574	Rel 1	5 V	RH 5 V	NATIONAL
1186.574	Rel 2	5 V	RH 5 V	NATIONAL