VARIABLE EQUALISER EQ5/509

Introduction

The EQ5/509 is a switched variable equaliser which provides attenuation correction for coaxial cables over the frequency band 10 kHz to 5·5 MHz. It is electrically similar to the EQ5/501 but includes a mains-operated transistor amplifier which ensures an accurate 75-ohm input impedance.

The EQ5/509 is constructed on a CH1/12D chassis with index peg positions 1 and 11.

General Specification

Input Level (low-frequency components)	1 volt p-p (nominal)
Insertion Loss (low-frequency components)	
1-dB correction	29·3 dB
20-dB correction	26·7 dB
	Insertion loss can be varied by ±1 dB
Input Impedance	75 ohms ±3 per cent
Output Impedance (dependent on equaliser setting)	25 to 75 ohms
Line-time Non-linearity Distortion	
At normal level	less than 1 per cent
At +5 dB	less than 2 per cent
Differential-gain Distortion 4·43 MHz	
At normal level	less than 1 per cent
At +5 dB	less than 2 per cent
Differential-phase Distortion 4·43 MHz	
At normal level	less than 0·10 degrees
At +5 dB	less than 0·25 degrees
Noise Figure	
1-dB correction	less than 40 dB
20-dB correction	less than 30 dB
Picture to Hum Ratio	greater than 50 dB
Low-frequency Bump	No overshoot for d.c.-step at input
50-Hz Square Wave Response	1 per cent tilt on symmetrical signal
Sync-pulse Crushing Input level +5 dB, black to white transition with 30% overshoot	less than 1 per cent
Operating temperature	10 to 40 degrees C
Mains Supply	200 to 250 volts r.m.s., 50 Hz
Power Consumption	25 mA at 240 volts
Size	Constructed on an 8½ in CH12/D chassis
Weight	5 lbs

Circuit Description

The circuit of the EQ5/509 is shown in Fig. 1 on page 3. The equaliser provides five sections of attenuation correction of which four are non-resonant sections and one can be made either resonant or non-resonant. Eleven switched positions of equalisation are provided including one straight-through position. The basic (low frequency) loss can be switched in ten steps from 1 dB to 20 dB.

An unequalised signal is applied to pin 14 of the input connector. The signal passes through a switched constant-resistance attenuator and a 6-dB pad to an *Input Att* control RV1. The basic loss of the equaliser is governed by a switched constant-resistance attenuator following the amplifier. The two switched attenuators are ganged and controlled by a *Max Corr* switch SA. The switching of both attenuators at the same time ensures that the overall loss is maintained at a reasonably constant value.

The transistor amplifier comprises an emitter follower, a common base stage and a second emitter follower. It has a high input impedance and a low output impedance. The input signal can be varied, by means of RV1, over the range ±1 dB. A negative feedback loop is provided between the output and the base of TR2. The overall voltage gain between the base of TR1 and the emitter of TR3 is 6·5 dB. A stabilised 13-volt supply is provided by a conventional bridge rectifier and zener diode arrangement. One fuse and an indicator lamp are mounted on the front panel.

The equaliser network is similar to that used in the EQ5/509 except that switched elements instead of continuously variable elements are used.

Maintenance

Table 1 gives typical circuit potentials measured with a high input impedance oscilloscope. The test conditions are:

(a) 1 volt p-p signal applied to the input of the EQ5/509.
(b) *Input Att* control set to *1 dB*.
(c) All other controls turned fully counter-clockwise.
(d) Output terminated in 75 ohms.

Reference should be made to Designs Department Specification 6.96(64) for further maintenance information. This Specification includes tables showing the variation of insertion loss and of pulse/bar ratio for all settings of the equaliser controls.

TABLE 1

Measured at	*Signal Level* (volts p-p)	
	Max Corr 1 dB	*Max Corr 20 dB*
Input	1·00	1·00
Junction R30-R31	0·25	1·00
Junction R31-R32	0·13	1·45
C1	0·11	0·42
Emitter TR3	0·24	0·92
C3	0·20	0·90
Output	0·035	0·047
Junction R42-C5	50-Hz ripple 5 mV p-p	
	+ 13 volts	

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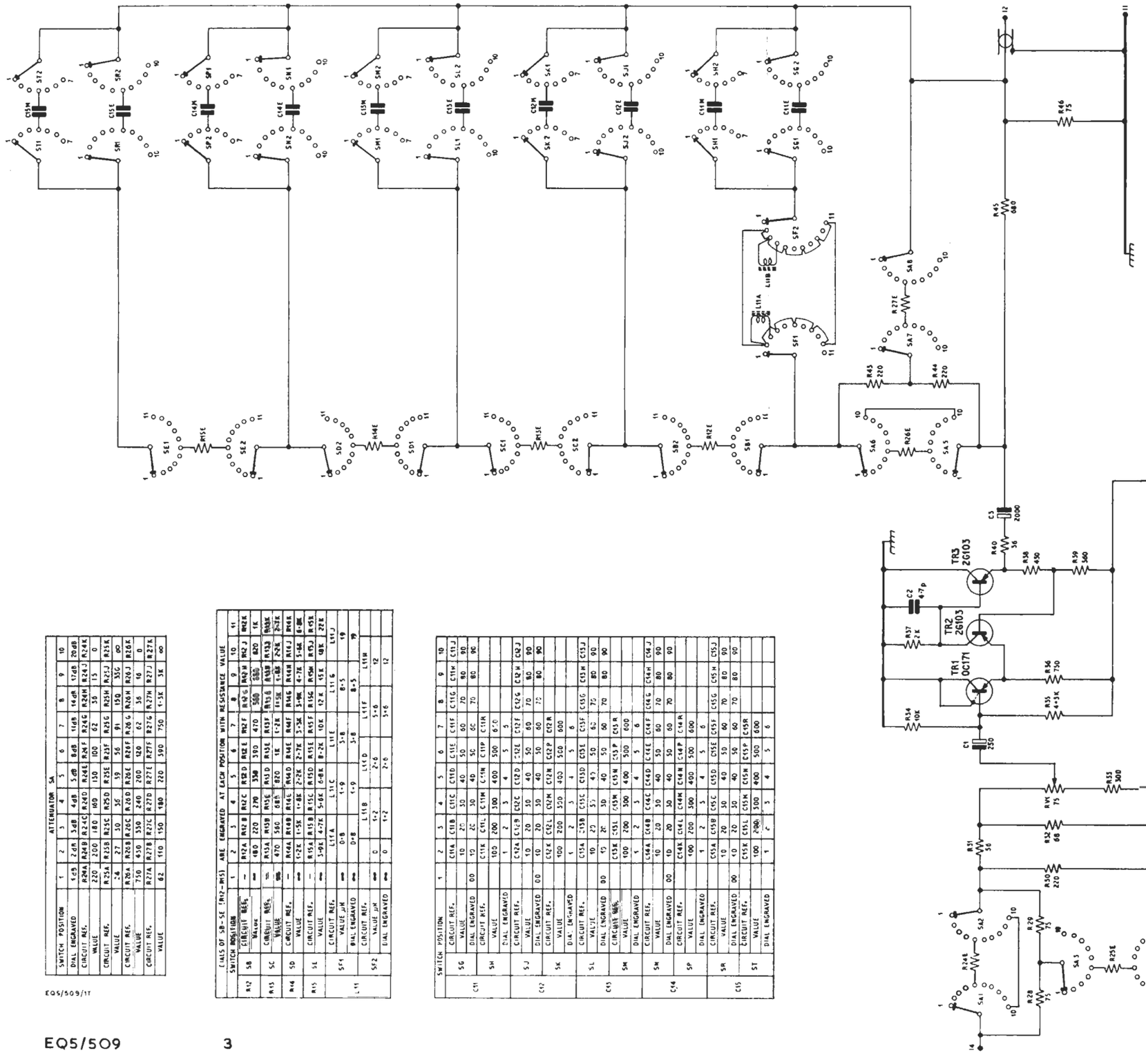

Fig.1. Circuit of the Variable Equaliser EQ5/509

ATTENUATOR SA

SWITCH POSITION	1	2	3	4	5	6	7	8	9	10
DIAL ENGRAVED	1dB	2dB	3dB	4dB	5dB	8dB	11dB	14dB	17dB	20dB
CIRCUIT REF.	R24A	R24B	R24C	R24D	R24E	R24F	R24G	R24H	R24J	R24K
VALUE	220	180	160	150	130	100	62	36	15	0
CIRCUIT REF.	R25A	R25B	R25C	R25D	R25E	R25F	R25G	R25H	R25J	R25K
VALUE	2·4	27	30	36	39	56	91	150	330	∞
CIRCUIT REF.	R26A	R26B	R26C	R26D	R26E	R26F	R26G	R26H	R26J	R26K
VALUE	750	430	330	240	200	120	62	36	16	0
CIRCUIT REF.	R27A	R27B	R27C	R27D	R27E	R27F	R27G	R27H	R27J	R27K
VALUE	62	110	150	180	220	390	750	1·5K	3K	∞

EQ5/509/1T

CALLS OF SB-SE (RK2-RK5) ARE ENGRAVED AT EACH POSITION WITH RESISTANCE VALUE

SWITCH POSITION		1	2	3	4	5	6	7	8	9	10	11
RK2	SB	CIRCUIT REF.	—	R12A	R12B	R12C	R12D	R12E	R12F	R12G	R12H	R12J	R12K
		Value	—	180	220	270	330	390	470	560	680	820	1K
RK3	SC	CIRCUIT REF.	—	R13A	R13B	R13C	R13D	R13E	R13F	R13G	R13H	R13J	R13K
		VALUE	—	470	560	680	820	1K	1·2K	1·5K	1·8K	2·2K	2·7K
RK4	SD	CIRCUIT REF.	—	R14A	R14B	R14C	R14D	R14E	R14F	R14G	R14H	R14J	R14K
		VALUE	—	1·2K	1·5K	1·8K	2·2K	2·7K	3·3K	3·9K	4·7K	5·6K	6·8K
RK5	SE	CIRCUIT REF.	—	R15A	R15B	R15C	R15D	R15E	R15F	R15G	R15H	R15J	R15K
		VALUE	—	3·9K	4·7K	5·6K	6·8K	8·2K	10K	12K	15K	18K	22K
SF1		CIRCUIT REF.		L11A		L11C		L11E		L11G		L11J	
		VALUE μH	—	0·8		1·9		3·8		8·5		19	
		DIAL ENGRAVED	—	0·8		1·9		3·8		8·5		19	
L11		CIRCUIT REF.		L11B		L11D		L11F		L11H			
		VALUE μH	—	0		1·2		2·6		5·6		12	
SF2		DIAL ENGRAVED	—	0		1·2		2·6		5·6		12	

SWITCH POSITION		1	2	3	4	5	6	7	8	9	10
SG	C11	CIRCUIT REF.		C14A	C11B	C11C	C11D	C11E	C11F	C11G	C11H	C11J
		VALUE	00	10	25	30	40	50	60	70	80	90
		DIAL ENGRAVED	00	10	25	30	40	50	60	70	80	90
SH		CIRCUIT REF.		C11K	C11L	C11M	C11N	C11P	C11R				
		VALUE		100	200	300	400	500	670				
		DIAL ENGRAVED		1	2	3	4	5	6				
SJ	C12	CIRCUIT REF.		C12A	C12B	C12C	C12D	C12E	C12F	C12G	C12H	C12J	
		VALUE	00	10	20	30	40	50	60	70	80	90	
		DIAL ENGRAVED	00	10	20	30	40	50	60	70	80	90	
SK		CIRCUIT REF.		C12K	C12L	C12M	C12N	C12P	C12R				
		VALUE		100	200	300	400	500	600				
		DIA. ENGRAVED		1	2	3	4	5	6				
SL	C15	CIRCUIT REF.		C15A	C15B	C15C	C15D	C15E	C15F	C15G	C15H	C15J	
		VALUE		10	20	30	40	50	60	70	80	90	
		DIAL ENGRAVED	00	10	20	30	40	50	60	70	80	90	
SM		CIRCUIT REF.		C15K	C15L	C15M	C15N	C15P	C15R				
		VALUE		100	200	300	400	500	600				
		DIAL ENGRAVED		1	2	3	4	5	6				
SN	C14	CIRCUIT REF.		C14A	C14B	C14C	C14D	C14E	C14F	C14G	C14H	C14J	
		VALUE		10	20	30	40	50	60	70	80	90	
		DIAL ENGRAVED	00	10	20	30	40	50	60	70	80	90	
SP		CIRCUIT REF.		C14K	C14L	C14M	C14N	C14P	C14R				
		VALUE		100	200	300	400	500	600				
		DIAL ENGRAVED		1	2	3	4	5	6				
SR	C15	CIRCUIT REF.		C15A	C15B	C15C	C15D	C15E	C15F	C15G	C15H	C15J	
		VALUE		10	20	30	40	50	60	70	80	90	
		DIAL ENGRAVED	00	10	20	30	40	50	60	70	80	90	
ST		CIRCUIT REF.		C15K	C15L	C15M	C15N	C15P	C15R				
		VALUE		100	200	300	400	500	600				
		DIAL ENGRAVED		1	2	3	4	5	6				