Low Frequency Signal Generator SG8IA

instruction manual

COMPONENTS LIMITED

Advance

LOW FREQUENCY SIGNAL GENERATOR

TYPE SG81A

THE type SG81A is a wide range l.f. oscillator providing a maximum output of 1 watt into 600 ohms over a frequency range of 15 c/s to 200 kc/s.

The oscillator consists of a 12BH7 and an EF91 used in a capacitive-resistive Wien bridge network. The oscillator is stabilised by a thermistor in the anode circuit, and a second thermistor provides temperature compensation of the oscillatory output voltage. Thus a very constant output level is obtained.

The frequency is varied by means of a ganged variable capacitor and the frequency reading is calibrated on a drum scale of eight inches in length; a logging scale with fitted vernier is used in conjunction with the main scale.

The oscillatory voltage from the Wien bridge oscillator is fed via the SET LEVEL potentiometer to the control grid of a two stage buffer amplifier. The unit attentuator, tapped in one dB steps, is connected between the buffer amplifier and the output stage, and the output level meter, which consists of a moving coil meter and a rectifier bridge network, is connected across the whole of this attenuator. The amplified output of the buffer stage is resistance capacity coupled to the final output amplifier.

The application of negative feedback in the amplifier and output stages, together with stabilization in the oscillator, ensures a constant level with change of frequency. The output voltage is controlled by means of the unit and decade attenuators used together with the SET LEVEL control. The outstanding feature of this instrument is the excellent arrangement of the output terminations and the very convenient mode of attenuator switching. The decade attenuators are balanced pi networks providing full output either balanced or unbalanced, connected to or isolated from earth.

Specification

FREQUENCY RANGE:

15 c/s to 200 kc/s in 4 bands.

FREQUENCY CALIBRATION ACCURACY:

Ranges A, B and C ± (1%+1 c/s); range D±2 %, with logging scale and vernier.

FREQUENCY STABILITY:

Better than 0·1% at 1 kc/s after warm-up period. With mains voltage variation of ±10%, drift is less than 0·04% at 1 kc/s.

DISTORTION:

Total harmonic and hum content compared with fundamental above 100 c/s:

(1) better than 40 dB down (1%) with meter set at 1 mW reference level;

(2) better than 34 dB down (2%) with meter set at +5 dB (maximum output).

There is a slight increase in distortion below 100 c/s and when the output terminals feed into a high impedance on the +20 dB position of the decade attenuator.

HUM LEVEL:

Hum and noise content is less than 0·25% of maximum output.

OUTPUT:

Calibrated in volts and watts, balanced or unbalanced.

VOLTAGE:

20 mV to 25 V r.m.s. into 600 ohms in six ranges indicated by the calibrated meter scales and 10 dB attenuator.

POWER:

0 to 1 watt into 600 ohms, indicated with reference to 1 mW level by 1 dB and 10 dB step attenuators from −35 dB to +25 dB; plus 5 dB above reference level on the meter.

AMPLITUDE ACCURACY:

±1 dB over complete frequency range.

OUTPUT IMPEDANCE:

(1) 600 ohms centre tapped, balanced or unbalanced terminations with respect to earth.

(2) 300 ohms unbalanced.

There is a rise in output impedance on the ±20 dB position of the decade attenuator at the high frequency end of the 50-200 kc/s band.

ATTENUATOR ACCURACY (at normal "set" level):

Decade Attenuator: ±1·5% of attenuator reading.

Units Attenuator: ±1% of attenuator reading ±0·15 dB 20 c/s to 200 kc/s.

WEIGHT:

27½ lb (12·5 kg).

DIMENSIONS:

11¼ in. (28·5 cm) wide; 15 in. (37·2 cm) high; 8½ in. (21·6 cm) deep.

Controls and Connections

MAINS SWITCH:

Front panel, to the right. A red indicator on the left of the front panel indicates when power is on.

RANGE SWITCH:

Front panel, top right. Indicates which one of four ranges on the drum dial is effective.

SET LEVEL AND OUTPUT VOLTS:

Front panel, top left. Used as a set level control when output in dB relative to 1 mW is required, level indicated by 1 mW red line on meter scale. Used as a voltage output control when volts into 600 ohms is required.

UNITS ATTENUATOR:

Front panel, bottom left. Indicates ± 5 dB relative to any setting of the decade attenuator. When reading volts into 600 ohms this control should be set to READ VOLTS position.

DECADE ATTENUATOR:

Front panel, bottom right. Indicates in conjunction with units attenuator, dB relative to 1 mW into 600 ohms, or is used as a scale indicator and multiplier when reading volts into 600 ohms.

SET FREQUENCY CONTROL:

Control on front panel below drum dial.

POWER SUPPLIES:

The instrument is designed for operation at 105-125, 140-160 and 210-250 volts, at 40-100 c/s, a.c. only, the appropriate taps being provided on the transformer and made accessible by removing the cover plate mounted on the bottom of the instrument. Power consumption approximately 45 watts.

Operation

FREQUENCY:

A signal of any frequency between 15 c/s and 200 kc/s can be obtained by using the range switch in conjunction with the calibrated dial.

Continuous adjustment is possible by means of the slow-motion control situated centrally below the dial.

A logging scale with fitted vernier is incorporated to enable the dial to be reset accurately to any previously used frequency.

OUTPUT:

Output into a 600 ohms load is taken from the two red terminals.

The load can be balanced or unbalanced. If balanced, the neutral should be connected to the black terminal situated between the red terminals and slightly above them. The earth terminal, which is the lowest black terminal, CAN be connected to any part of the external circuit as desired, or the output may be left floating.

Output into a 300 ohm load can be taken from one of the red terminals and the upper black terminal. The output circuit is so arranged that it is unnecessary to load the unused terminals.

The output is set in two different ways:—

1. Volts into 600 ohms.

   All appropriate control lettering is engraved in BLACK. Set the units attenuator to the READ VOLTS position, i.e., +5 dB. The control marked READ VOLTS is then used as a fine control to set the output as indicated on one of the two scales of the meter. The appropriate scale to read is then indicated on the decade attenuator by the BLACK engraving.

2. Decibels up and down on 1 mW into 600 ohms.

   All appropriate lettering is engraved in RED. To set to 1 mW output, use SET LEVEL control to set meter pointer to the red line marked 1 mW. Switch both attenuators to

0 dB. Decibels up and down on this level are then set by switching the attenuator to the required figure, indicated by the red engraving. A further +5 dB can be obtained above ±25 dB by adjusting the meter pointer to the +5 dB red line. There is an increase in distortion at this setting, but the total distortion will not exceed 2%. It should be noted that there is an increase in distortion if the output is unterminated on the 0-25 V (+20 dB) setting of the decade attenuator. Also the output impedance rises towards the upper end of the 50 to 200 kc/s band on the 0-25 V (+20 dB) setting of the decade attenuator.

Maintenance Instructions

1. To remove instrument from its case, lay it face downwards on the guard handles and remove the two rear screws. Lay instrument with front panel upwards and remove 14 screws around edge of panel. Then, by means of the guard handles, lift the instrument vertically from the case.

2. Valve (tube) and pilot bulb replacements are straightforward when the instrument is removed from its case.

3. To set output volts correctly, connect a 600 ohm 1W close tolerance resistor (1%) between the two red terminals and monitor the output voltage. Set dial to 1 kc/s. Set decade attenuator and ADJUST VOLTS control to a convenient output voltage. (Note: The units attenuator must be set to the READ VOLTS position). Correct the voltage reading of the meter by means of RV2 situated on the upper chassis.

4. To adjust balance of output transformer. Set attenuator to −30 dB and frequency to 200 kc/s. Measure output volts on load with one end of the load earthed and centre tap not employed. Measure loaded output volts with earth transferred to other end of the load resistor. Adjust C29 until readings are identical. In all adjustments involving the use of a voltmeter or other device for monitoring the output volts, the input impedance of the measuring device must be high compared with 600 ohms, e.g., 100 kilohms.

Factory Service

Our factory Service Department is at your service should you wish to obtain further repair information by telephone or letter. The type and serial number of the instrument should always be quoted. We maintain an efficient Service facility, should you wish to return the instrument to our factory for repair.

The instrument is guaranteed for a period of one year from its delivery to the purchaser, for the replacement of defective parts other than valves (tubes) and fuses.

Valves (tubes) are subject to the manufacturer's guarantee.

Equipment returned to us for servicing must be adequately packed, preferably in the special box supplied, and shipped with transportation charges pre-paid. We can accept no responsibility for instruments arriving damaged.

Should the cause of failure during the guarantee period be due to misuse or abuse of the instrument, or if the guarantee has expired, the repair will be charged and put in hand without delay unless other instructions are received.

OUR SALES, SERVICE AND ENGINEERING DEPARTMENTS

ARE AT YOUR SERVICE AT ALL TIMES.

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CIRCUIT CODE

RESISTORS

REF	DESCRIPTION			
R.1	13M	H.S. WELWYN	1%	C25 2W
R.2	1M	H.S. WELWYN	1%	C23 ½W
R.3	70K	H.S. WELWYN	1%	C22 ½W
R.4	5·35K	H.S. WELWYN	1%	C22 ½W
R.5	13M	H.S. WELWYN	1%	C25 2W
R.6	1M	H.S. WELWYN	1%	C22 ½W
R.7	70K	H.S. WELWYN	1%	C22 ½W
R.8	5·35K	H.S. WELWYN	1%	C22 ½W
R.9	150K	H.S. WELWYN	1%	C21 ¼W
R.10	680	ERIE 9	10%	½W
R.11	270	ERIE 9	5%	½W
R.12	10K	ERIE 9	10%	1W
R.13	1M	ERIE 9	10%	½W
R.14	2·2K	ERIE 9	10%	½W
R.15	100K	ERIE 9	10%	½W
R.16	220K	ERIE 9	10%	½W
R.17	THERMISTOR S.T.C. TYPE A1522/100			
R.18	33 ERIE 9		10%	½W
R.19	22K ERIE		10%	½W
R.20	THERMISTOR S.T.C. TYPE A1451/100			
R.21	15K	ERIE 9	10%	½W
R.22	3·3K	ERIE 9	10%	½W
R.23	56K	ERIE 9	10%	½W
R.24	Not used			
R.25	22K	ERIE 9	10%	½W
R.26	1M	ERIE 9	10%	½W
R.27	15K	ERIE 9	10%	½W
R.28	3·3K	ERIE 9	10%	½W
R.29	2·72K	ERIE 109	1%	¼W
R.30	2·42K	ERIE 109	1%	¼W
R.31	2·16K	ERIE 109	1%	¼W
R.32	1·93K	ERIE 109	1%	¼W
R.33	1·72K	ERIE 109	1%	¼W
R.34	1·55K	ERIE 109	1%	¼W
R.35	1·34K	ERIE 109	1%	¼W
R.36	1·19K	ERIE 109	1%	¼W
R.37	1·09K	ERIE 109	1%	¼W
R.38	980	ERIE 109	1%	½W
R.39	47K	ERIE 9	10%	½W
R.40	100K	ERIE 9	10%	½W
R.41	7·9K	ERIE 109	1%	¼W
R.42	680K	ERIE 9	10%	½W
R.43	22K	ERIE 9	10%	½W
R.44	3·3K	ERIE 9	10%	½W
R.45	62K	ERIE 9	5%	½W
R.46	2·2K	ERIE 9	5%	½W
R.47	1K	ERIE 9	5%	½W
R.48	1M	ERIE 9	10%	½W
R.49	330	ERIE 9	10%	½W
R.50	150	ERIE 9	5%	½W
R.51	150	ERIE 9	5%	½W
R.52	577	ERIE 109	1%	¼W
R.53	427	ERIE 109	1%	¼W
R.54	577	ERIE 109	1%	¼W
R.55	367	ERIE 109	1%	¼W
R.56	1·485K	ERIE 109	1%	¼W
R.57	367	ERIE 109	1%	¼W
R.58	367	ERIE 108	1%	½W
R.59	1·485K	ERIE 109	1%	¼W
R.60	367	ERIE 109	1%	¼W
R.61	577	ERIE 109	1%	¼W
R.62	427	ERIE 109	1%	¼W
R.63	577	ERIE 109	1%	¼W
R.64	367	ERIE 109	1%	¼W
R.65	1·485K	ERIE 109	1%	¼W
R.66	367	ERIE 109	1%	¼W
R.67	367	ERIE 108	1%	½W
R.68	1·485K	ERIE 109	1%	¼W
R.69	367	ERIE 109	1%	¼W
R.70	22	ERIE 9	10%	½W
R.71	22	ERIE 9	10%	½W
R.72	500	BIRCH W/WOUND		2W
R.73	22K	ERIE 9	10%	½W

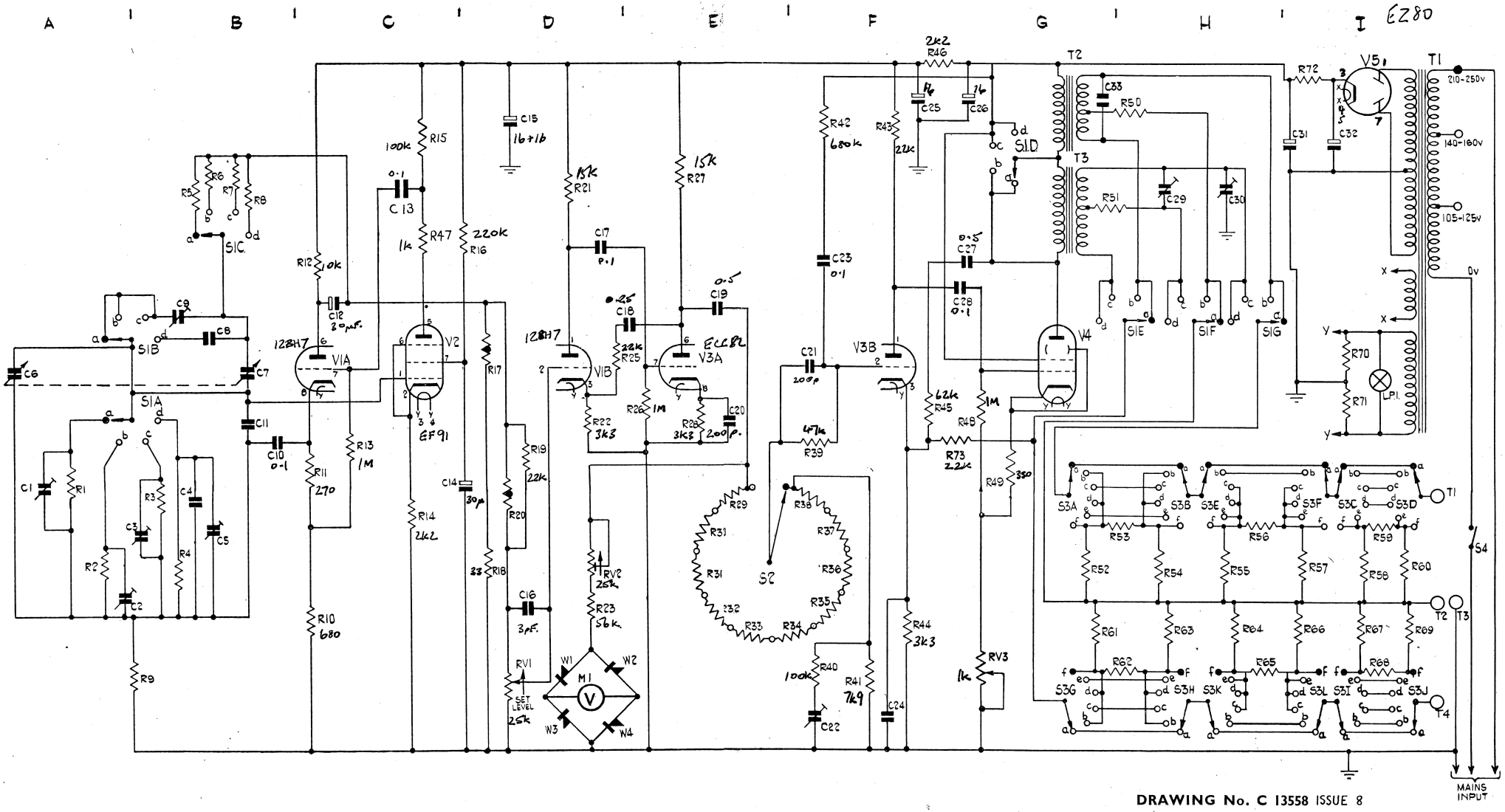
CIRC REF.	P. No.
A4	6700
A5	6701
B4	6702
B5	9080
B2	6700
B2	6701
B2	6702
B2	9080
B6	12183
C5	7497
C4	1843
C2	434
C4	1171
C4	867
C2	1270
D2	6703
D3	6719
D5	11979
D4	1271
D4	7811
D2	1177
D4	2736
D5	4406
D3	1271
E4	1171
E2	1177
E4	2736
E4	11901
E4	11902
E5	11903
E5	11904
E5	11905
F5	11906
F5	11907
F5	11908
F4	11909
F4	11910
F4	2933
F6	1270
F6	11911
F1	5024
F1	1271
F5	2736
F4	11758
F1	867
C3	1175
G4	1171
G4	7678
H1	11929
G2	11929
G5	11865
H4	11864
H5	11865
H5	11867
H4	11866
I5	11867
I5	11868
I4	11866
I5	11867
G5	11865
H6	11864
H5	11865
H5	11867
H6	11866
I5	11867
I5	11868
I6	11866
I5	11867
I3	4419
I3	4419
I1	11759
F4	1271

CAPACITORS

		CIRC. REF.	P. No.
C.1	WIRE TRIMMER	A4	10177
C.2	WIRE TRIMMER	A5	10177
C.3	WIRE TRIMMER	B4	10177
C.4	47pF SILVER MICA LEMCO 1106R 1%	B4	685
C.5	4-60pF CONCENTRIC TRIMMER—MULLARD	B5	353
C.6	532pF } 2 GANG POLAR E24 TYPE C16	A3	11859
C.7	532pF } —02/342	B3	
C.8	75pF SILVER MICA LEMCO 1510 1%	B3	12187
C.9	3-30pF CONCENTRIC TRIMMER—MULLARD	B3	1620
C.10	0·1μF PLESSEAL 20%	B4	11860
C.11	15pF ±1% SILVER MICA	B4	12911
C.12	30μF PLESSEY CE1619 WIRE ENDS 250v Wkg.	C3	12189
C.13	0·1μF PLESSEAL 20%	C3	11860
C.14	30μF PLESSEY CE1619 WIRE ENDS 250v. Wkg.	D4	12189
C.15	16+16μF HUNTS JE413 ELECT. 350v. D.C. Wkg.	D1	7014
C.16	3pF PEARL TYPE CERAMIC	D5	4843
C.17	0.1μF PLESSEAL 20% 350v. D.C. Wkg.	D2	11860
C.18	0·25 PLESSEAL 20% 350v. D.C. Wkg.	E3	11861
C.19	0·5 PLESSEAL 20% 350v. D.C. Wkg.	E3	12096
C.20	200pF LEMCO 1106 INSUL. 5% 350v. D.C. Wkg.	E4	11931
C.21	200 pF LEMCO 1106 INSUL. 5% 350v. D.C. Wkg.	F3	11931
C.22	3-30pF CONCENTRIC TRIMMER—MULLARD	F6	1620
C.23	0·1μF PLESSEAL 20% 350v. D.C. Wkg.	F2	11860
C.24	150pF LEMCO NO6 INSUL 1% 350V	F6	11572
C.25	16μF } PLESSEY CE6003	F1 }	
C.26	16μF } ELECT. 350v. Wkg.	G1 }	11863
C.27	0·5μF PLESSEAL 20% 350v. D.C. Wkg.	G2	12096
C.28	0·1μF PLESSEAL 20% 350v. D.C. Wkg.	G3	11860
C.29	450pF TRIMMER CYLDON 26	H2	12686
C.30	4-60pF CONCENTRIC TRIMMER—MULLARD	H2	353
C.31	16μF } PLESSEY CE6003	I1 }	
C.32	16μF } ELECT. 350v. Wkg.	I1 }	11863
C.33	0·04μF HUNTS W99 (ADJUST ON TEST)	G1	7485

MISCELLANEOUS

RV1	25K COLVERN CLR 3001/11 POT.	D6	11858
RV2	25K COLVERN CLR 901 POT.	D5	6814
S.1	FREQUENCY RANGE SELECTOR		A11694
S.2	ATTENUATOR UNITS		A11696
S.3	ATTENUATOR DECADE		A11695
S.4	MAINS-ARCO-ELECTRIC 8040/BT/13 On/Off		12180
RV3	1K COLVERN CLR901		7699
W1 W4	} CRYSTAL B.T.H.—CG6E		5871
V.1	12BH7		12802
V.2	EF91-6AM6		7312
V.3	12AU7 = ECC 82		11683
V.4	6BW6		8251
V.5	EZ80		11986
T.1	MAINS TRANSFORMER		MT.355
T.2	L.F. O/P TRANSFORMER		MT.354
T.3	H.F. O/P TRANSFORMER		MT.353
M.1	METER 100μA E.T.I 325		11937
LP.1	LAMP FLASHLIGHT 6·5v. ·3A		879
	INSTRUCTION MANUAL		319



DRAWING No. C 13558 ISSUE 8

EVERY EFFORT IS MADE TO KEEP THIS CIRCUIT UP-TO-DATE BUT THE RIGHT IS RESERVED TO ADJUST THE VALUES OR AMEND THE CIRCUIT WITHOUT NOTICE