

INSTRUCTION MANUAL
OSCILLATOR AND DETECTOR UNIT
TYPE OG1

OSCILLATOR AND DETECTOR UNIT TYPE OG1.

OPERATING INSTRUCTIONS.

Battery Mounting.

The instrument is supplied without batteries.

Two 4.5 volt flat-type batteries are employed, dimensions 21 x 61 x 66mm ($1\frac{3}{16}$ x $2\frac{15}{32}$ x $2\frac{23}{32}$ inch.), with brass strap contacts. Manufacturers Type numbers: Burgess 532, Hellesen 720, Berec 1189, Varta 201. IEC number is 3R12.

To install the batteries, remove righthand end cover. Connect batteries as follows: Righthand positive (short strap) to red/white lead, negative (long strap) to white lead, lefthand positive to red lead, negative to black lead. Fix batteries in clip with negative strap leftwards. Refit cover.

The righthand battery supplies the oscillator and d-c bridge voltage, and it may be checked in the "A" position of the function switch. The lefthand battery supplies the dc and ac galvo amplifiers and is checked in the "B" position. Generator output and galvo sensitivity depend on battery voltage, and batteries should be replaced at check readings of 30 to 35 μ A (3 to 3.5 volts from battery).

Operation, Dc measurements.

Connect "Gen." and "Det." terminals to the corresponding bridge terminals. Switch off bridge supply by switch or key on bridge. Set OG1 function switch to dc. After about 1 minute set meter to zero by zero knob.

Remove lead from lower "Det." terminal and check that meter reading is less than half-scale. This corresponds to an input error current less than 2nA which is insignificant for normal bridge work.

The instrument is now ready for use.

The dc power for the bridge is supplied from the A battery through a 10 Ω resistor, thus limiting the bridge power to max. 0.5 watt.

A small zero drift may occur due to ambient temperature variations, but this may be corrected by zero adjustment.

Operation. Ac measurements.

Connect "Gen." and "Det." terminals to bridge. To obtain the best accuracy when measuring high value impedances (low capacitance or high inductance values) always connect the lower "Det." terminal to the bridge terminal which is connected to the highest impedance branch, and the upper "Gen." terminal to the earthed bridge terminal.

When used in conjunction with the Danbridge Universal Bridge Type UB1, connect the "Det." and "Gen." terminals to the corresponding UB1 terminals in the same order and connect the upper UB1 "Gen." terminal to the box terminal.

Switch to "AC low" and adjust bridge balances for minimum meter reading. Note that on ac measurements only positive meter readings are obtained.

For loads at the "Gen." terminals above 100Ω , a higher output is obtained in the "AC high" position. Always start measurements on the "low" position as at low generator loads the oscillator may stop on "high", thus giving a faulty balance indication.

The ac detector is designed so that the maximum sensitivity is obtained at low input voltages, allowing discrimination of 10 to $20\mu\text{V}$ input. At high input voltages the sensitivity is decreased, so that for full scale reading about 100mV input is required. If the meter reads above full scale when starting measurements, reduce bridge input by switching in series resistance, until fine balancing is possible.

Miscellaneous uses.

The generator and detector are completely isolated mutually and may be employed separately for various purposes.

Overload.

Both dc and ac detector circuits are effectively protected against overloads up to 100 volts. On dc, due to internal heating zero drift may be caused at severe overload depending on the overload voltage and time. The instrument in this case will take some time to recover. For this reason it is advisable to avoid heavy overloads for longer periods.

Note. Always switch off instrument after use to obtain maximum battery life. This is especially important when working on ac, as this implies a constant drain on the A battery.

CIRCUIT DESCRIPTION.

Refer circuit diagram No. 88090.

The circuit consists of three functionally separate units: DC amplifier, AC amplifier and AC oscillator. These are all mounted on a common printed circuit board.

The DC and AC amplifiers are powered by dry battery B, and the AC oscillator employs a separate battery A. This battery also supplies power for the bridge at DC measurements with resistor R24 limiting the output current.

DC Amplifier.

This is designed as a two-stage differential amplifier to reduce voltage drift. T1 base current is compensated by current through R1 set by pre-set trimmer P2. P1 provides an input correction range of $\pm 8\text{mV}$ to set voltage zero. T1 and T4 are selected for a base-emitter voltage difference of less than 5mV.

The center-zero galvanometer M is switched between emitter-followers T2 - T3 on DC.

P1 is set for meter zero with detector terminals shorted. P2 is set with open terminals.

AC Amplifier.

This employs a high-gain direct coupled amplifier (T5 - T6 - T7). The output is rectified by D5 - D6 and switched to the meter in the AC positions. Negative feedback from R23 via D7 - D8 progressively reduces gain at increasing input levels to provide a wide amplitude range.

The step filter R18, C15 prevents high-frequency oscillation.

DC level (about 1.3V at T7 collector) is set by feedback via R20, R15, R16 decoupled by C4.

AC Oscillator.

Tr. is a ferrite-cored transformer. The primary winding is tuned by C10 to 1kc. T8 collector is connected to a tap on this winding. Feedback is taken via C12, R26 to T8 base.

Voltage divider R27, R28 in conjunction with emitter resistor R25 sets T8 emitter current to about 6 to 8mA. The output is taken from Tr. secondary winding to the output terminals via switch Sw.

LIST OF COMPONENTS

Capacitors

Circuit Ref.	Value	Rating	Manufacturer	Type	Part No.
C 1-	0,1 μ F	250V	Philips	Polyester	40729
C 2-	10 μ F	16V	Philips	Elektrolyt.	40837
C 3-	0,1 μ F	250V	Philips	Polyester	40729
C 4-	0,1 μ F	250V	Philips	Polyester	40729
C 5-	10nF	250V	Philips	Polyester	40655
C 6-	40 μ F	16V	Philips	Elektrolyt.	40854
C 7-	0,1 μ F	250V	Philips	Polyester	40729
C 8-	0,1 μ F	250V	Philips	Polyester	40729
C 9-	0,1 μ F	250V	Philips	Polyester	40729
C10-	1 μ F	250V	Philips	Polyester	40741
C11-	40 μ F	16V	Philips	Elektrolyt.	40854
C12-	10 μ F	16V	Philips	Elektrolyt.	40837

Diodes

Circuit Ref.	Type	Manufacturer	Part No.
D1-D2-D3-D4- D5-D6-D7-D8 }	1N914 or 1N4148 }	Philips, Mullard ITT	26151

Meter

Circuit Ref.	Type	Manufacturer	Part No.
M	Moving coil 50-0-50 μ A	SEW	42650

Potentiometers

Circuit Ref.	Value	Rating	Manufacturer	Type	Part No.
P1	10k Ω	2W	Vitrohm	Wirew.	51531
P2	47k Ω	0.2W	Vitrohm	Carbon	51824

RESISTORS

Circuit Ref.	Value Ω	Rating	Tol.	Manufacturer	Type	Part No.
R 1-	22M	1/3W	5%	Beyschlag	Dep. Carbon	43522
R 2-	150K	1/3W	5%	- " -	- " -	43415
R 3-	22K	1/3W	5%	- " -	- " -	43322
R 4-	47K	1/3W	5%	- " -	- " -	43347
R 5-	22K	1/3W	5%	- " -	- " -	43322
R 6-	150K	1/3W	5%	- " -	- " -	43415
R 7-	1K	1/3W	5%	- " -	- " -	43210
R 8-	1K	1/3W	5%	- " -	- " -	43210
R 9-	47K	1/3W	5%	- " -	- " -	43347
R10-	22K	1/3W	5%	- " -	- " -	43322
R11-	10K	1/3W	5%	- " -	- " -	43310
R12-	91K	1/3W	5%	- " -	- " -	43391
R13-	91K	1/3W	5%	- " -	- " -	43391
R14-	10K	1/3W	5%	- " -	- " -	43310
R15-	1M	1/3W	5%	- " -	- " -	43510
R16-	2.2M	1/3W	5%	- " -	- " -	43522
R17-	100K	1/3W	5%	- " -	- " -	43410
R18-	100	1/3W	5%	- " -	- " -	43110
R19-	100K	1/3W	5%	- " -	- " -	43410
R20-	1M	1/3W	5%	- " -	- " -	43510
R21-	10K	1/3W	5%	- " -	- " -	43310
R22-	10K	1/3W	5%	- " -	- " -	43310
R23-	3.3K	1/3W	5%	- " -	- " -	43233
R24-	10	1W	10%	Philips	Wirewound	46210
R25-	47	1/3W	5%	Beyschlag	Dep. Carbon	43047
R26-	4.7K	1/3W	5%	- " -	- " -	43247
R27-	27K	1/3W	5%	- " -	- " -	43327
R28-	10K	1/3W	5%	- " -	- " -	43310

Switch.

Circuit Ref.	Manufacturer	Part No.
Sw.	MEC	88240

Transformer.

Circuit Ref.	Type	Manufacturer	Part No.
Tr.	Tuned ferrite-core	Danbridge	92555

Transistors.

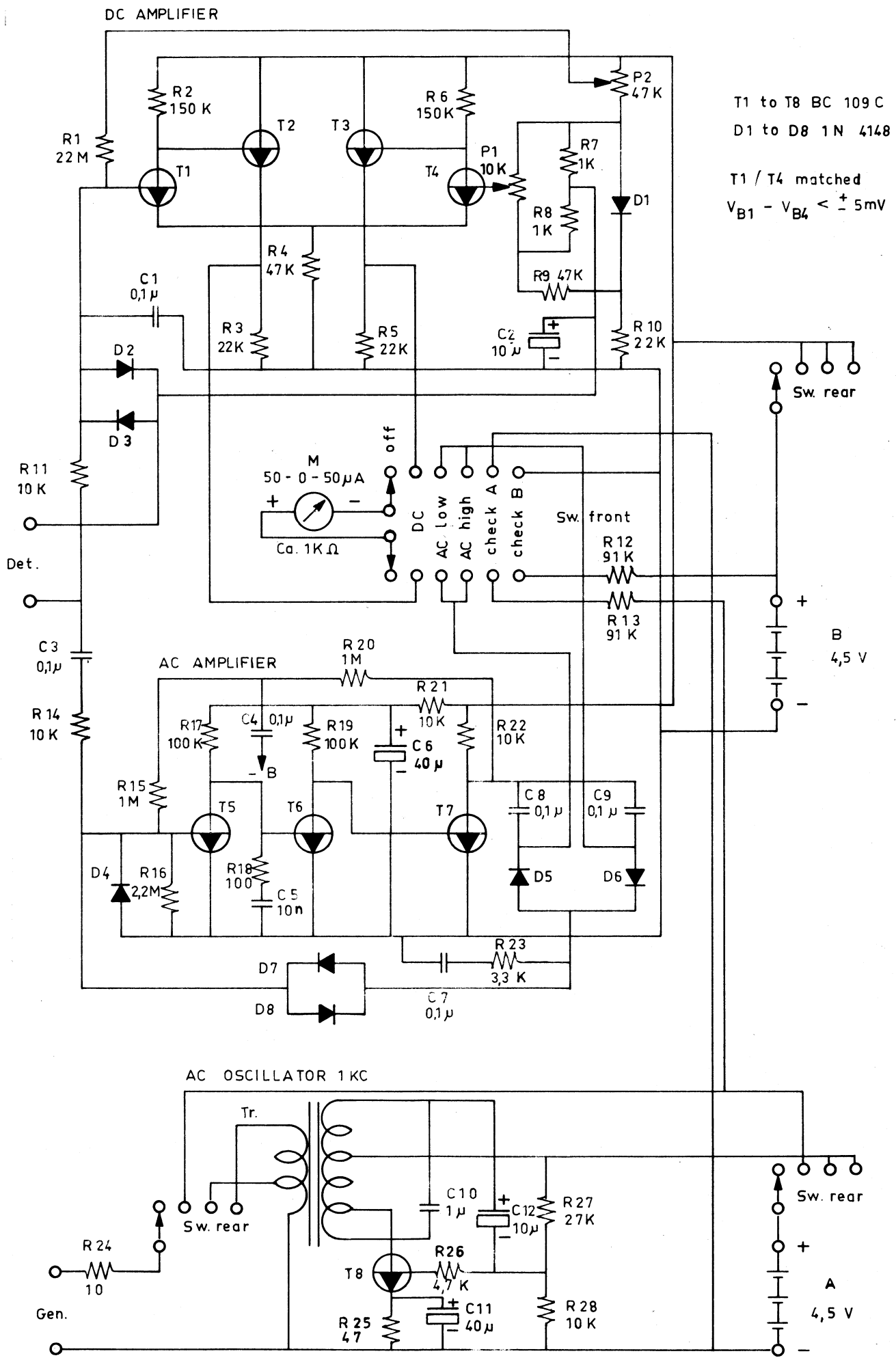
Circuit Ref.	Type	Manufacturer	Part No.
T1-T2-T3-T4)	BC109c	Philips, ITT	60303
-T5-T6-T7-T8)	Silicon	Mullard	

Note: T1 and T4 are matched.

$V_{B1} - V_{B4}$ less than $\pm 5mV$.

Miscellaneous components

Knob small	Manufacturer Elma	38109
Knob large	"- Elma	38110
Spade connector	Manufacture R.S.	25305



T1 to T8 BC 109 C
 D1 to D8 1N 4148
 T1 / T4 matched
 $V_{B1} - V_{B4} < \pm 5mV$

A/S DANBRIDGE

OSCILLATOR AND DETECTOR UNIT
 TYPE OG1
 CIRCUIT DIAGRAM