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TONEOHM
550 and 580
SERVICE

550 and 580 SERVICE MANUAL CONTENTS

TONEOHM 550

TONEOHM 580

TONEOHM 550 SPECIFICATIONS

* 4 RANGES ..... 200 milliohms,2 ohms,20 ohms,200 ohms
* ACCURACY. ..... +/- 4% + 1 Digit
* MAXIMUM PROBE VOLTAGE..... 60mV (open circuit)
* PROBE PROTECTION ..... Automatic current limit to =/- 30V
* DISPLAY..... 3 1/2 digit liquid crystal display
* POWER..... 90.130V or 200.250V 50/60 Hz at 12VA (approx.)

CHANGE OF MAINS RANGE

A. To change from 115V to 230V nominal.

1. Remove the top cover by unscrewing the feet, and remove the 4 screws securing the pcb to the enclosure bottom.

2. Remove the 2 links AC and BD adjacent to the transformer.

3. Add the link BC.

4. Change the fuse as per ratings on the rear panel.

B. To change from 230V to 115V nominal.

1. Remove the top cover by unscrewing the feet, and remove the 4 screws securing the pcb to the enclosure bottom.

2. The link BC is made by track in the underside of the pcb unless A above has ben performed. This must be broken eg using a 3 or 4mm drill, or remove the link.

3. Add links AC and BD.

4. Change the fuse as per ratings on the rear panel.

CALIBRATION

1. Allow the instrument to warm up for 15 minutes.

2. Select the 200 ohms range and connect the basic probes to a 100 ohms 0.5% (or 1%) resistor.

3. Adjust the trim pot on the back of the DVM module for a reading of 100.0.

Note that the basic calibration accuracy is determined by the accuracy of the 100 ohms resistor.

4. The accuracy of the other three ranges is automatically set by internal 1% resistors. To check these use a 10 ohms resistor on the 20 ohms range and 100 ohms on the 200 ohms range.

Note that when checking the 200 milliohms range accuracy, the bulk resistance of the basic probes should be subtracted from the reading This can be found by pressing both probes down on to a thick copper track so that the probe tips are touching (typically 2 to 3 milliohms).

CIRCUIT DESCRIPTION

The instrument consists of 5 main blocks.

1. DC current generator.
2. DC amplifier.
3. DVM module.
4. Voltage controlled oscillator.
5. Power supply.

The DC current generator produces a constant current (set by the range switch) which is fed down the braid of the coaxial probe leads to the probe tip. This current causes a voltage drop across the resistance under test, which is fed to the dc amplifier by the inner conductors of the coaxial probe leads. The dc amplifier output is displayed by the digital voltmeter module, and is also used to control the frequency of a voltage controlled oscillator which drives a front panel loudspeaker.

VOLTAGE CONTROLLED OSCILLATOR

U3 is connected as an astable multivibrator, its frequency set by C3 and the conduction of Q4. The collector current of Q4 is controlled by the output of U2.

U3 output, which consists of narrow negative going pulses, is converted into a square wave by a divide of two flip flop U4.
The output of U4 is coupled via the volume control R38 to output amplifier U16 which drive the loudspeaker.

POWER SUPPLIES

These comprise of two fixed 5V regulators which are connected to provide plus and minus 5V supplies for use throughout the unit. The transformer primary windings are connected in series for 230V operation or parallel for 115V operation.

DC CURRENT GENERATOR

This comprises of Ula and Q2. Ula maintains a constant voltage across the emitter resistor of Q2, which is chosen by the RANGE switch. This current is fed via D1 to the positive probe coaxial braid. D1 protects Q2 if the positive probe is accidentally connected to a positive voltage. D9/Q1 turn Q2 off if the psitive probe is taken to a negative voltage.

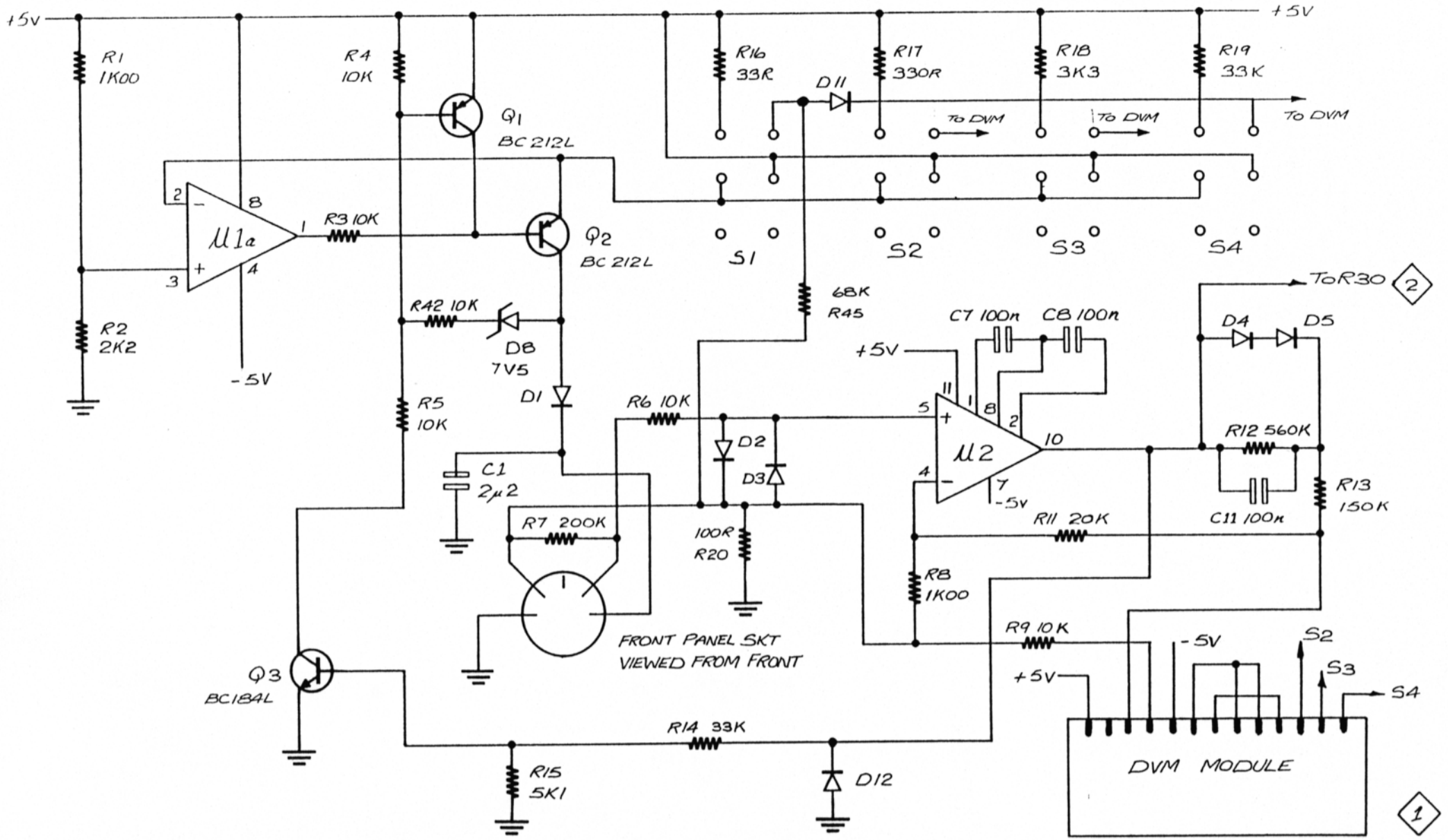
DC AMPLIFIER/DVM MODULE

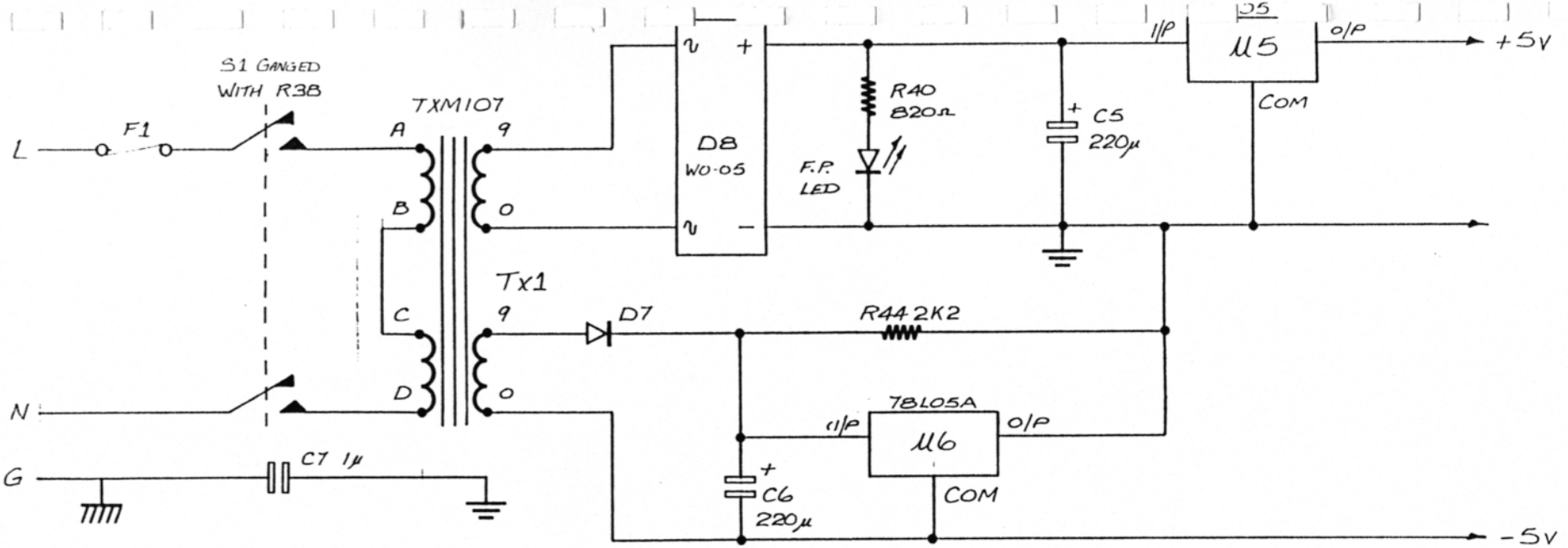
U2 amplifies the low level voltage signal appearing at the probe tips, R11 and R8 set the gain. The DVM module (200mV for maximum reading) is driven from U2.

R13/R12/D4/D5 form a non linear network whose output drives the voltage controlled oscillator.

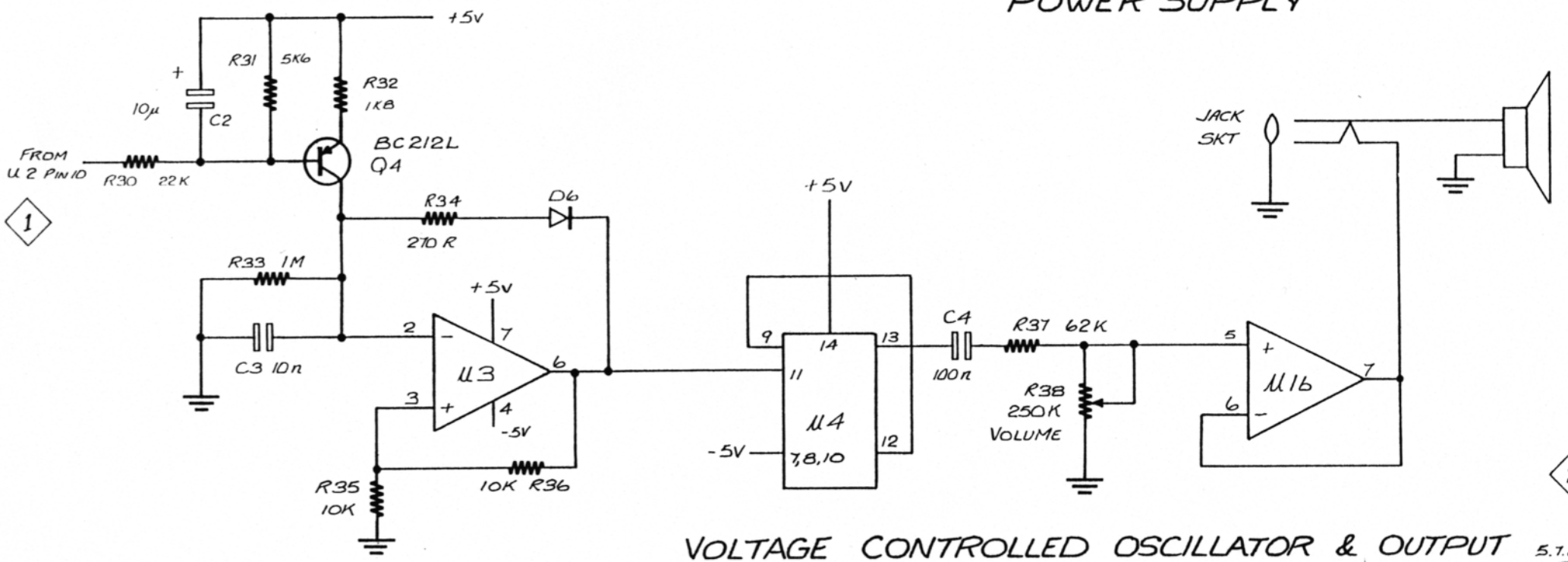
R6/D2/D3 protect U2 if the probes are connected across a voltage supply. Q3 feeds back a signal to the current generator via Q1 so that when the probes are open circuit, U2/Q3 and Q1 limit the conduction of Q2 which limits the open circuit probe tip voltage.
Q3 is off when a measurement is being made.

TONE OHM 550


+5V
R1 1K00
R2 2K2
-5V
R4 10K
Q1 BC 212L
Q2 BC 212L
U1a
R3 10K
R42 10K
D8 7V5
D1
R5 10K
R6 10K
D2
D3
C1 2µ2
R7 200K
100R R20
FRONT PANEL SKT VIEWED FROM FRONT
Q3 BC184L
R14 33K
R15 5K1
D12
R16 33R
D11
R17 330R
R18 3K3
R19 33K
To DVM
S1
S2
S3
S4
68K R45
C7 100n
C8 100n
U2
R11 20K
R8 1K00
R9 10K
R12 560K
C11 100n
R13 150K
D4
D5
To R30
DVM MODULE
CURRENT GENERATOR, AMPLIFIER, & DVM MODULE.
27.11.81. BG.



POWER SUPPLY



VOLTAGE CONTROLLED OSCILLATOR & OUTPUT 5.7.85 BG.

TONEOHM 580

CHANGE OF MAINS RANGE

A. To change from 115V to 230V nominal.

1. Remove the top cover by unscrewing the two screws in the bottom of the case.
2. Remove the 4 screws retaining the pcb to the lower cover.
3. Remove the two links AC and BD adjacent to the transformer.
4. Add the link BC.
5. Change the fuse as per rear panel ratings and reassemble unit.

B. To change from 230V to 115V.

1. Remove the top cover by unscrewing the 2 screws in the bottom of the case.
2. Remove the 4 screws retaining the pcb to the lower case.
3. The link BC is made by track on the underside of the pcb unless A above hAs been performed. This must be broken at X eg using a 3mm or 4mm drill bit, or remove the link BC if present.
4. Add links AC and BD.
5. Change the fuse as per the rear panel ratings and reassemble the unit.

CALIBRATION

1. Remove the top cover and apply power to the unit.

<u>CAUTION</u> LINE VOLTAGES ARE EXPOSED - TAKE CARE!

2. Connect the DRIVE SOURCE leas to a 10 ohm resistor.
3. Using an oscilloscope set to 20mV/div and 10uS/div, monitor the voltage appearing across C6 (the probe voltage).

Adjust R5 for maximum signal amplitude with the current probe placed next to one of the DRIVE SOURCE leads and aligned for maximum signal.

If no oscilloscope is available, connect the DRIVE SOURCE leads to a 200 ohm resistor. Place the current probe against one of the leads with the dots parallel to it (i.e. maximum sensitivity). Adjust R5 so that a tone is produced when the probe is in this position with the SENSITIVITY control fully clockwise.

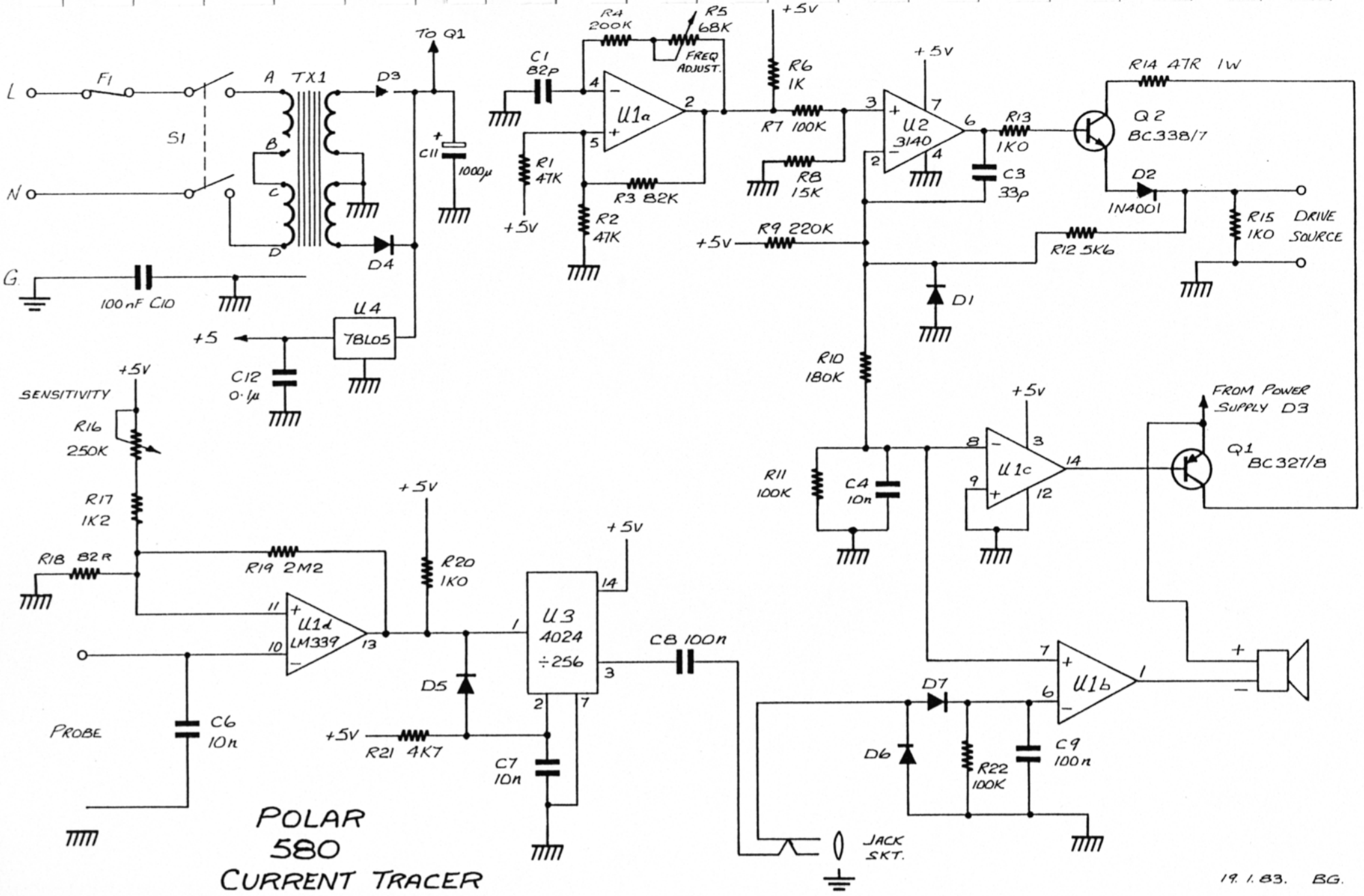
CIRCUIT DESCRIPTION

The DRIVE SOURCE voltage is a 550mV peak square wave at 50KHz. This is produced by astable multivibrator Ula whose frequency is adjusted by R5.

U2 and Q2 form the low impedance output with current limiting provided by R14.

Ulc and Q1 form a protection circuit which removes the output source by switching Q1 off, if the drive source leads are connected across a negative voltage source.

Uld is a comparator which produces a 50khz output if the probe voltage exceeds the SENSITIVITY voltage. This output frequency is divided by U3, and is available to power an ear-piece, or drive an internal piezo transducer via Ulb to produce a sound output when the probe detects sufficient signal.


L
N
G
F1
S1
A
B
C
D
TX1
D3
D4
To Q1
C11 1000µ
100nF C10
U4
78L05
+5
C12 0·1µ
R4 200K
R5 68K
FREQ ADJUST.
C1 82P
U1a
R1 47K
R2 47K
R3 82K
+5V
R6 1K
R7 100K
R8 15K
U2 3140
C3 33p
R13 1K0
R14 47R 1W
Q2 BC338/7
D2 1N4001
R15 1K0
DRIVE SOURCE
R12 5K6
R9 220K
D1
R10 180K
R11 100K
C4 10n
U1c
FROM POWER SUPPLY D3
Q1 BC327/8
SENSITIVITY
R16 250K
R17 1K2
R18 82R
R19 2M2
U1d LM339
R20 1K0
U3 4024 ÷256
C8 100n
D5
R21 4K7
C7 10n
PROBE
C6 10n
U1b
D7
D6
R22 100K
C9 100n
JACK SKT.
POLAR 580 CURRENT TRACER
19.1.83. BG.