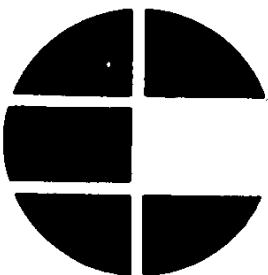


**LQT SERIES**

**Instruction Manual**



**Coutant Electronics Ltd.**

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## Introduction

The LQT Series Power Supplies provide continuously variable, highly stable, twin outputs. Operating in both constant voltage and constant current modes. These units, by front panel switch selection, can be operated in series or parallel, as well as in the master/slave configuration.

## Specification

|                          |   |
|--------------------------|---|
| Input voltage:           | 105, 115, 125, 220, 230 or 240 volts<br>$\pm 10\%$ . By transformer tap changes.                        |
| Input frequency:         | 45 to 60 Hz.  |
| Input termination:       | 3 core flying lead.   |
| Output termination:      | Via 4mm terminals.  |
| Output Polarity:         | Both outputs are fully floating, either terminal may be grounded.                                       |
| Temperature range:       | + 10°C to + 45°C.   |
| Temperature coefficient: | Less than 0.02% per °C.   |
| Transient response:      | Less than 10u sec. for recovery to within 10mV of steady state voltage, after application of full load. |
| Output impedance:        | Less than 200m ohms at 100K Hz.<br>Less than 500m ohms at 500K Hz.                                      |
| Meter Accuracy           | $\pm 3\%$   |

### Constant voltage mode

|                  |  |
|------------------|--|
| Line regulation: | $\pm 0.01\% + 1\text{mV}$ for $\pm 10\%$ mains change. |
| Load regulation: | 0.03% + 3mV zero to full load.                         |
| Ripple voltage:  | 0.005% + 0.5mV peak to peak.                           |

### Constant current mode

|                  |  |
|------------------|--|
| Line regulation: | $\pm 0.01\% + 1\text{mA}$ for $\pm 10\%$ mains change. |
| Load regulation: | 0.03% + 3mA full load to short circuit.                |
| Ripple current:  | 0.01% + 1mA peak to peak.                              |

## Available outputs

| Unit Type | Output Voltage                             | Output Current                           |
|-----------|--|--|
| LQT 100   | 0 to 30 volts twice                        | 0 to 1 Amp twice                         |
|           | 0 to 60 volts                              | 0 to 1 Amp                               |
|           | 0 to 30 volts                              | 0 to 2 Amp                               |
|           | Variable – 30V to +30V tracked about zero. | Variable – 1A to +1A tracked about zero. |
| LQT 200   | 0 to 15 volts twice                        | 0 to 2 Amp twice                         |
|           | 0 to 30 volts                              | 0 to 2 Amp                               |
|           | 0 to 15 volts                              | 0 to 4 Amp                               |
|           | Variable – 15V to +15V tracked about zero. | Variable – 2A to +2A tracked about zero. |

## Mechanical details

| Unit Type | Dimensions |        |       |        |       |        | Weight |     |
|-----------|------------|--------|-------|--------|-------|--------|--------|-----|
|           | Height     |        | Width |        | Depth |        | Approx |     |
|           | mm         | inches | mm    | inches | mm    | inches | Kg     | lbs |
| LQT 100   | 165        | 6½     | 230   | 9      | 185   | 7¼     | 6.8    | 15  |
| LQT 200   |            |        |       |        |       |        |        |     |

## Operating instructions

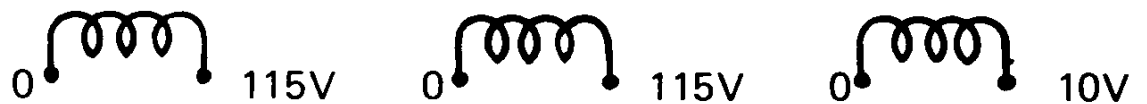
### General

Before switching A.C. input to the unit, check that:—

1. The A.C. Fuse is a 1 Amp (if I/P voltage is between 200 to 240 volts), or a 2 Amp (if I/P voltage is between 105 to 125 volts), and is an anti-surge device.
2. The transformer primary taps are set to within  $\pm 10\%$  of the nominal mains voltage. Setting is indicated by dial on the rear panel. Units supplied to the British Isles are set to 240 volts, Europe 220 volts, Canada and U.S.A. 115 volts unless otherwise specified by the customer.
3. Connect the flying input lead to a suitable 3 pin plug, using the colour code; Green/Yellow – earth; Brown – live; Blue – neutral.

Fig. 1. Transformer primary tap connections

The primary is arranged as three windings:—



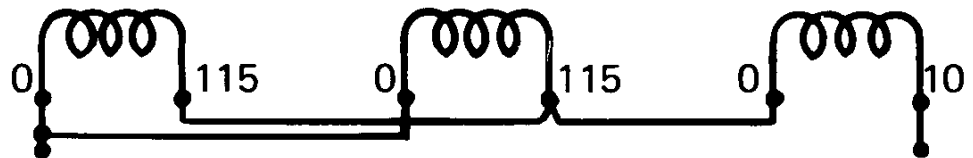
The 115V windings are connected in series for an input of 230 volts and in parallel for an input of 115 volts. The 10 volt winding is connected in series, in phase to add 10 volts (for 125V or 240V) and in anti-phase to subtract 10 volts (for 105V or 220V).

Examples:

240V A.C.  
input



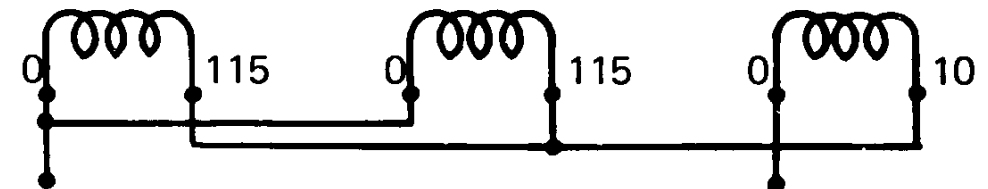
125V A.C.  
input



220V A.C.  
input



105V A.C.  
input



### Controls

- On-Off Switch:** This controls the mains input supply to the unit and is indicated when on, by a neon light.
- V – A Switch:** These two switches enable either voltage (V) or current (A) to be monitored on the appropriate meter.
- Tracking/Non Tracking Switch:** This enables the unit to work in the master/slave mode of operation.
- Series/isolated parallel Switch:** This enables the two outputs to be connected in series or parallel.
- Voltage:** Two single turn potentiometers, per output, provide fine and course control to set the output voltage level.
- Current:** One single turn potentiometer, per output, sets the output current level.

## Operating instructions

### 1. Two independent outputs:—

- a) Select 'isolated' position on the series/parallel switch.
- b) Select 'non-tracking' position on the tracking/non-tracking switch.

### Constant voltage mode

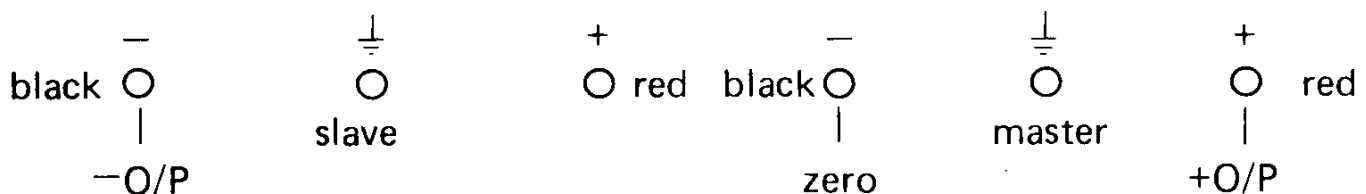
- c) Select 'V' position on volts-amps switches.
- d) Turn all voltage controls to minimum (fully anti-clockwise) and the current control to maximum (fully clockwise).
- e) Connect the load/loads to the output terminals and adjust the voltage until the required level is indicated on the meter. The unit will remain in constant voltage unless the load resistance is so reduced that the current demand exceeds the level set by the current control (capacity of the unit if fully clockwise), the output will then enter into the constant current mode and the voltage will fall to maintain a constant current output.

### Constant current mode

- f) Select 'A' position on volts/amps switches.
- g) Turn voltage controls to maximum (fully clockwise) and the current controls to minimum (fully anti-clockwise).
- h) Connect the load/loads to the output terminals and adjust the current controls until the required current level is indicated on the meter. The unit will remain in the constant current mode until the load resistance is so increased that the current demand is less than the level set by the current control, the unit will then change to the constant voltage output.

### 2. Master/slave operation:—

Connect loads to output terminals as follows:—



### Constant voltage mode

See table for Control Settings.

Adjust the master unit voltage until the required level is indicated on the master unit meter. The – O/P will remain at the corresponding level (with respect to zero) as the +O/P. The unit will remain in constant voltage unless the load resistance is so reduced that the current demand exceeds the level set by the current control (capacity of the unit if fully clockwise) the unit will then enter the constant current mode and the voltage will fall to maintain a constant current output.

### 3. **Series operation:—**

Connect load to the extreme outside terminals.

#### **Constant voltage mode**

See table for Control Settings.

Adjust the master unit voltage until half the required level is indicated on the master unit meter. (The voltage level will always be twice that shown on the master unit meter.)

The unit will remain in constant voltage unless the load resistance is so reduced that the current demand exceeds the level set by the current control (the capacity of unit if fully clockwise), the unit will then enter the constant current mode and the voltage will fall to maintain a constant current output.

#### **Constant current mode**

See table for Control Settings.

Adjust the master current control until the required level is indicated on the master unit meter.

The unit will remain in constant current mode unless the load resistance is so increased that the current demand is less than the level set by the current control, the unit will then change to constant voltage operation.

### 4. **Parallel operation:—**

Connect load to one set of terminals (i.e. to master unit O/P terminals *or* to slave unit terminals).

**Note:** In non-tracking mode, individual adjustments to slave and master controls will be necessary.

#### **Constant voltage mode**

See table for Control Settings.

Adjust master unit voltage controls until the required voltage level is indicated on both meters.

The unit will remain in constant voltage unless the load resistance is so reduced that the current demand exceeds twice the level set by the current control (twice the capacity of the unit if fully clockwise). The unit will then enter the constant current mode and the voltage will fall to maintain a constant current output.

### **Constant current mode**

See table for Control Settings.

Adjust master current control until the required level is indicated on both meters.

The unit will remain in constant current mode unless the load resistance is so increased that the current demand is less than the level set by the current control, the unit will then change into constant voltage operation.



## MASTER/SLAVE OPERATION

| Mode of Operation                                 | SLAVE  |            |            | MASTER |            |            | Tracking<br>Non Tracking | Series/Parallel<br>Isolated |
|---|--------|------------|------------|--------|------------|------------|--------------------------|-----------------------------|
|   | Meter  | Current    | Voltage    | Meter  | Current    | Voltage    |                          |                             |
| General:<br>Constant Voltage                      | V      | MAX        | -          | V      | MAX        | MIN        | T                        | S                           |
| Series:<br>Constant Voltage<br>Constant Current   | V<br>A | MAX<br>MAX | -<br>MAX   | V<br>A | MAX<br>MIN | MIN<br>MAX | T<br>T                   | S<br>S                      |
| Parallel:<br>Constant Voltage<br>Constant Current | V<br>A | MAX<br>MAX | MIN<br>MAX | V<br>A | MAX<br>MIN | MIN<br>MAX | T<br>T                   | P<br>P                      |

## Circuit Description

Input power is supplied to the primaries of the transformer via mains switch S50 and antisurge fuse FS50. The split winding is connected in series for voltages of 220 – 240 and in parallel for voltages of 105 – 125.

Diodes MR1 and MR2 rectifies the output from the 22 volt secondary winding and the resulting D.C. passes to transistor VT1 which provides a constant current output fed to MR10, MR9 and MR13. This network provides the stabilised auxiliary rail.

The output of the main secondary winding is rectified via MR6 and MR7 and the resulting D.C. output passes to the output terminals via VT50a and VT50b. R50a and R50b compensate for any base emitter voltage variations in the series elements.

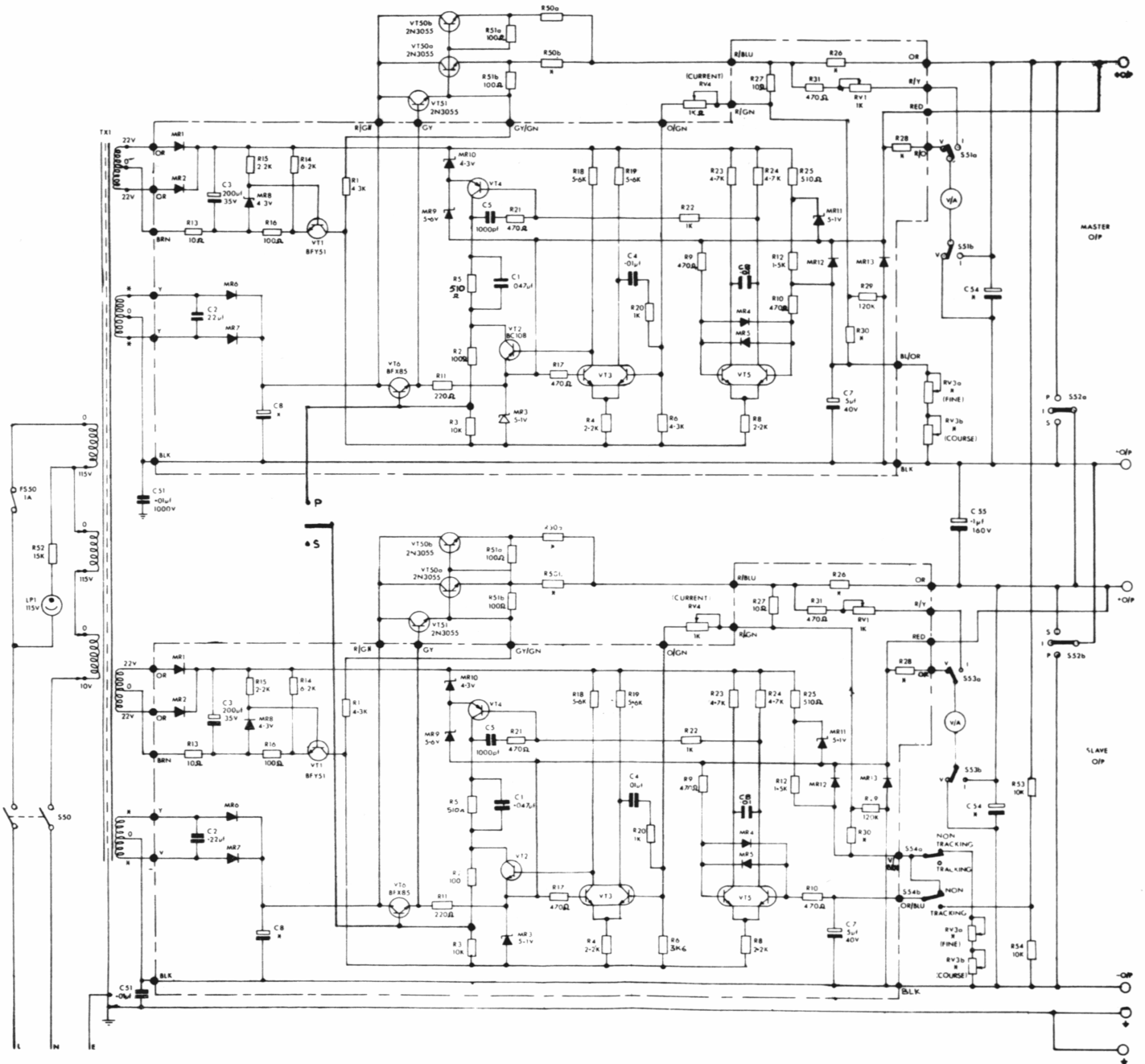
Voltage regulation and control is provided via the comparator VT5 to the series elements VT50a and VT50b via VT51 and VT6. Zener diode MR11 is connected via R25 to the positive auxiliary rail to provide a reference voltage from which a reference current is derived by R12. This current is compared by VT5 with the current obtained from the output voltage by RV3a and RV3b (output voltage controls). Since the current in RV3a and RV3b is proportional to the output voltage, the resistance of the output voltage controls determine the output voltage of the unit. The output voltage is monitored by the meter via S51a, S51b and voltage dropper R28.

Current regulation and control is provided via VT3, one side of which is connected to R26 via resistor chain R6, RV4 and R27. The other side is connected to the other side of R26 via R17. If the load current is increased, the voltage drop across R26 increases and VT3 will change state depending on the setting of current control RV4. VT2 will then conduct removing drive from VT6 which in turn will control VT51, VT50a and VT50b. Stabilised current limit adjustment is therefore provided by RV4 and it is monitored by the meter via shunt circuit R26, R31 and RV1 through S51a and S51b.

Tracking/non-tracking switch S54 connects comparator VT5 of the slave section to the output of both sections via R53 and R54 when in the tracking position. Thus when the master output voltage is adjusted, the slave section comparator becomes unbalanced and will adjust the slave section voltage to become the same voltage. Voltage controls on the slave section are switched out of circuit in the tracking mode.

Series/isolated/parallel switch operation is self explanatory except that in the parallel position, drivers VT6 of both sections are paralleled which means that

either the section with the highest output voltage will take control or the master will automatically take control if switch S54 is in tracking position.



| UNIT    | TX1 SEC TAP'S | C8             | C54          | R50a & b | R26    | R28   | R30    | RV3a  | RV3b  |
|---------|---------------|----------------|--------------|----------|--------|-------|--------|-------|-------|
| LQT 100 | 32V-0-32V     | 2,200µf<br>63V | 200µf<br>35V | 1Ω, 3W   | 1Ω 3W  | 30K Ω | 1M Ω   | 1K Ω  | 10K Ω |
| LQT 200 | 20V-0-20V     | 4,700µf<br>40V | 470µf<br>35V | .5Ω, 3W  | .5Ω 3W | 15K Ω | 470K Ω | 500 Ω | 5K Ω  |

BOTH UNITS  
 LPT1 REPLACED 5/12/99  
 R52 INCREASED TO 62K

LQT SERIES CIRCUIT DIAGRAM

## **WARNING**

When the mains supply is connected to the mains connector block on a power supply dangerous voltage will be present on some components within the unit.

## **HEALTH AND SAFETY AT WORK ACT 1974**

We have reasonable grounds to believe that we have ensured, so far as is practicable, that our product has been so designed and constructed as to be safe and without risks to health, when properly installed and used in its intended environment by appropriate and trained personnel, and in accordance with our published instructions.

## **SPARES AND SERVICE**

1. A full stock of tested spare parts is held at our Ilfracombe factory for customers who require to repair units themselves.
2. When returning units to our Service Department, please ensure they are adequately packed for the journey. The units must also be accompanied by information as to their origin and nature of defect. This information will greatly assist us in giving a speedy turn round, please supply too much information rather than too little.
3. Coutant Electronics Ltd., reserve the right to make design and component changes without notice. Equivalent components may be used in place of those listed.

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