

QL Series II

**Precision Power
Supplies**

Service Manual



Table of Contents

Specification	2
Safety	5
General	6
Circuit Descriptions	7
Calibration	10
Parts List	12
Interconnection Diagram	32
Component Layouts	33
Circuit Diagrams	39

Specification

General specifications apply for the temperature range 5°C to 40°C. Accuracy specifications apply for the temperature range 18°C to 28°C after 1 hour warm-up with no load and calibration at 23°C. Typical specifications are determined by design and are not guaranteed.

MAIN OUTPUTS

Voltage/Current Ranges:	QL355	QL564				
	0V to 35V/0.001A to 3A 0V to 35V/0.1mA to 500mA 0V to 15V/0.001A to 5A	0V to 56V/0.001A to 2A 0V to 56V/0.1mA to 500mA 0V to 25V/0.001A to 4A				
Voltage Setting:	Resolution 1mV Accuracy $\pm (0.03\% + 5mV)$					
Current Setting:	Resolution 1mA; 0.1mA on 500mA range Accuracy $\pm (0.2\% + 5mA)$; $\pm (0.2\% + 0.5mA)$ on 500mA range.					
Output Mode:	Constant voltage or constant current with automatic cross-over. CI indicator lit in constant current mode.					
Output Switch:	Electronic, non isolating. Switch illuminated when Output on. Preset voltage and current limit displayed when Output off.					
Output Terminals:	Universal 4mm safety binding posts on 19mm (0.75") pitch for Output; screwless terminals for Sense. Duplicate rear panel Output and Sense screw terminals on P models.					
Transient Response:	<50 μ s to within 15mV of set level for a change in load current from full load to half load or vice versa.					
Voltage Programming Speed:	Maximum time required for output to settle within 1% of its total excursion (for resistive load). Excludes command processing time.					
	QL355	QL564				
	<i>Full Load</i>	<i>No Load</i>				
	<i>Full Load</i>	<i>No Load</i>				
<i>Up</i>	15V 5A	6ms	6ms	25V/4A	10ms	6ms
<i>Up</i>	35V 3A	20ms	7ms	56V/2A	40ms	15ms
<i>Up</i>	35V 500mA	200ms	40ms	56V/500mA	300ms	60ms
<i>Down</i>	15V 5A	6ms	250ms	25V/4A	10ms	400ms
<i>Down</i>	35V 3A	25ms	600ms	56V/2A	50ms	800ms
<i>Down</i>	35V 500mA	120ms	600ms	56V/500mA	200ms	800ms
Ripple and Noise (20MHz bandwidth):	Normal mode voltage: <0.35mVrms and 2mVp-p Normal mode current: <0.2Arms; <20 μ Arms on 500mA range.					
Load Regulation:	For any load change, measured at the output terminals, using remote sense. Voltage <0.01% + 2mV. Current <0.01% + 250 μ A; <0.01% + 50 μ A on 500mA range. Add typically 2.5mV for a 0.5V drop in the positive output lead. Specification applies for sense lead resistance <0.5 Ω .					
Line Regulation:	Voltage <0.01% + 2mV for 10% line change. Current <0.01% + 250 μ A; <0.01% + 50 μ A on 500mA range.					
Temperature Coefficient:	Voltage: typically <(50ppm + 0.5mV)/°C Current: typically <(100ppm + 1mA)/°C; typically <(100ppm + 0.1mA)/°C on 500mA range.					
Output Protection:	Output will withstand forward voltages of up to 20V above rated output voltage. Reverse protection by diode clamp for currents up to 3A.					

Over-voltage Protection: (OVP)	Range 1V to 40V (QL355), 1V to 60V (QL564) Resolution 0.1V; accuracy $\pm (2\% + 0.5V)$ Response time typically 100 μ s
Over-current Protection: (OCP)	Range 0.01A to 5.5A (QL355), 0.01A to 4.4A (QL564) Resolution 0.01A; accuracy $\pm (0.2\% + 0.01A)$ Response time typically 35ms
Protection Functions:	Output trips off for OVP, OCP, over-temperature and Sense miswiring

METER SPECIFICATIONS (Main Outputs)

Display Type:	5-digit (Volts), 4-digit (Amps), 14mm (0.56") LED.
Voltage (CI mode):	Resolution 10mV Accuracy $\pm (0.1\% \text{ of reading} + 10\text{mV})$
Current (CV mode):	Resolution 0.001A; 0.1mA on 500mA range Accuracy $\pm (0.2\% + 0.005A)$; $\pm (0.2\% + 0.5\text{mA})$ on 500mA range
V x A:	Resolution 0.01W; 0.001W on 500mA range Accuracy $\pm (0.3\% + 0.05W)$; $\pm (0.3\% + 0.005W)$ on 500mA range

AUXILIARY OUTPUT (T models only)

Voltage Range:	1V to 6V
Voltage Setting:	Resolution: 10mV Accuracy: $\pm 0.5\% \pm 10\text{mV}$
Current Limit:	3A minimum
Output Switch:	Electronic, non isolating. Switch illuminated when Output on.
Output Terminals:	Universal 4mm safety binding posts on 19mm (0.75") pitch. Duplicate screwless terminals on rear panel.
Output Protection:	Output will withstand up to 16V forward voltage. Diode clamp reverse protection for currents up to 1A. Over-current trip.
Ripple & Noise: (20MHz bandwidth)	<2mV rms, 10mVp-p
Load & Line Regulation:	<1.0% for a 90% load change; 0.1% for a 10% line change.
Status Indication:	Current limit lamp. Current overload trip indication.
Meter Specifications: (use SET/VIEW button)	Voltage Meter: Resolution 10mV, accuracy $\pm 0.5\% \pm 10\text{mV}$ Current Meter: Resolution 10mA, accuracy $\pm 0.5\% \pm 10\text{mA}$
Voltage Programming Speed:	Maximum time required for output to settle within 1% of its total excursion (for resistive load). Excludes command processing time. 1V to 6V: 10ms, no load and full load 6V to 1V: 10ms, no load and full load

KEYBOARD & ROTARY CONTROL

All functions, including the selection and set-up of the remote control interfaces, can be set from the keyboard. The rotary jog control can be used to adjust output voltage and current settings in a quasi-analogue mode.

ALARM OUTPUT

Isolated rear-panel open-collector output signal. User can select output to be activated for either OVP, OCP, Overtemperature or Sense miswiring, or for any of those four faults.

DIGITAL INTERFACES (P models only)

Full digital remote control facilities are available through the RS232, USB, LAN and GPIB interfaces.

General

RS232:	Standard 9-pin D-connector. Variable Baud rate (600 to 19200).
GPIB:	Conforming with IEEE488.1 and IEEE488.2
USB:	Standard USB 2.0 hardware connection. Operates as a virtual COM port.
LAN:	Ethernet 100/10base-T hardware connection. Auto speed detect, auto MDIX. LXI V1.2, Class C compliant.
Remote Command Processing Time:	Typically <25ms between receiving the command terminator for a step voltage change at the instrument and the output voltage beginning to change.
Status Indication:	Remote mode and LAN status indicators

Main Outputs

Voltage Setting:	16-bit; Resolution 1mV, accuracy $\pm (0.03\% + 5\text{mV})$
Current Setting:	16-bit; Resolution 0.1mA, accuracy $\pm (0.2\% + 5\text{mA})$ Resolution 0.01mA, Accuracy $\pm (0.2\% + 0.5\text{mA})$ on 500mA range.
Readback V & I	See meter specifications.

Auxiliary Output (T models only)

Voltage Setting:	Resolution 10mV, accuracy $\pm 0.5\% \pm 10\text{mV}$
Current Setting:	Resolution 10mA, accuracy $\pm 0.5\% \pm 10\text{mA}$
Readback V & I	See meter specifications

GENERAL

AC Input:	230V AC or 115V AC $\pm 10\%$, 50/60Hz Installation Category II
Power Consumption:	Single output: 250VA max; Triple output: 500VA max.
Operating Range:	+5°C to +40°C, 20% to 80% RH
Storage Range:	-40°C to +70°C
Environmental:	Indoor use at altitudes up to 2000m, Pollution Degree 2.
Cooling:	Intelligent variable-speed fan. Over-temperature trip shuts down output if internal temperatures exceed predetermined thresholds.
Store/Recall:	Up to 50 set-ups each main output, 50 linked set-ups, and 10 auxiliary output settings can be saved and recalled via the keyboard or remote interfaces.
Safety:	Complies with EN61010-1
EMC:	Complies with EN61326
Size:	Single output: 140 x 160 x 290mm (WxHxD), excl. feet & terminals. Triple output: 280 x 160 x 290mm (WxHxD), excl. feet & terminals
Weight:	Single: 5.5kg; Triple: 10.5kg

This power supply is a Safety Class I instrument according to IEC classification and has been designed to meet the requirements of EN61010-1 (Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use). It is an Installation Category II instrument intended for operation from a normal single phase supply.

This instrument has been tested in accordance with EN61010-1 and has been supplied in a safe condition. This instruction manual contains some information and warnings which have to be followed by the user to ensure safe operation and to retain the instrument in a safe condition.

This instrument has been designed for indoor use in a Pollution Degree 2 environment in the temperature range 5°C to 40°C, 20% - 80% RH (non-condensing). It may occasionally be subjected to temperatures between +5°C and -10°C without degradation of its safety. Do not operate while condensation is present.

Use of this instrument in a manner not specified by these instructions may impair the safety protection provided. Do not operate the instrument outside its rated supply voltages or environmental range.

WARNING! THIS INSTRUMENT MUST BE EARTHED

Any interruption of the mains earth conductor inside or outside the instrument will make the instrument dangerous. Intentional interruption is prohibited. The protective action must not be negated by the use of an extension cord without a protective conductor.

When the instrument is connected to its supply, terminals may be live and opening the covers or removal of parts (except those to which access can be gained by hand) is likely to expose live parts. The apparatus shall be disconnected from all voltage sources before it is opened for any adjustment, replacement, maintenance or repair.

Capacitors inside the power supply may still be charged even if the power supply has been disconnected from all voltage sources but will be safely discharged about 10 minutes after switching off power.






Any adjustment, maintenance and repair of the opened instrument under voltage shall be avoided as far as possible and, if inevitable, shall be carried out only by a skilled person who is aware of the hazard involved.

If the instrument is clearly defective, has been subject to mechanical damage, excessive moisture or chemical corrosion the safety protection may be impaired and the apparatus should be withdrawn from use and returned for checking and repair.

Make sure that only fuses with the required rated current and of the specified type are used for replacement. The use of makeshift fuses and the short-circuiting of fuse holders is prohibited.

Do not wet the instrument when cleaning it.

The following symbols are used on the instrument and in this manual:-

	Earth (ground) terminal.
	mains supply OFF.
	mains supply ON.
	alternating current (ac)
	direct current (dc)

Service Handling Precautions

Service work or calibration should only be carried out by skilled engineers using high quality test equipment. If the user is in any doubt as to his competence to carry out the work, the instrument should be returned to the manufacturer or their agent overseas for the work to be carried out.

Please note the following points before commencing work.

The tracks on the printed circuit boards are very fine and may lift if subjected to excessive heat. Most of the integrated circuits are static sensitive and great care should be taken when handling them to avoid damage due to static discharge. Also, most devices on the Control board are surface mounted components with very fine leads on small pitches. These components must be removed and replaced with great care to avoid damage to the PCB. It is essential that only the proper tools and soldering equipment as recommended for surface mount components are used.

Dismantling the instrument

WARNING!

Disconnect the instrument from all voltage sources before it is opened for adjustment or repair. If any adjustment or repair of the opened instrument is inevitable it shall be carried out only by a skilled person who is aware of the hazards involved.

1. Remove the six screws retaining the top cover and lift clear.
2. To remove the pcbs, first improve access by unscrewing the front panel: remove the screw(s) securing the front panel bracket(s) to the spacer in the centre of the Power pcb(s) and remove the screws that fix the bottom edge of the front panel to the chassis. The front panel can be tipped forward to give access to the latching connectors connecting the Keyboard to the Power pcb; disconnect these, noting orientation.
3. To remove the Power and Control pcbs remove the two screws securing the Power pcb to the central fan bracket and the two screws fixing the Power pcb bracket to the rear panel. Unplug the two transformer connectors, the fan connector and any inter-pcb connections (Power to Power on a triple output supply, and/or Power to Interface on programmable versions) noting their positions carefully; a diagram is provided at the end of this manual showing how these connections are made. The Control pcb is plugged into the Power pcb and both can now be lifted clear together.
4. The Display/Keyboard pcb can be removed from the front moulding after pulling off the jog wheel and removing the fixing screws, two of which also secure the front panel bracket (four on the triple).
5. To remove the Interface pcb from the rear panel, undo the jackscrews of the GPIB and RS232 sockets and the self-tap screw in the chassis which retains the inner support bracket.
6. When re-assembling the instrument ensure that all fixings use the correct fasteners. Replace cut cable ties. Do not over tighten the display/keyboard fixing screws in the moulding. Check that the fan operates.

Circuit Descriptions

The Power board contains the main power supply and the auxiliary supplies used internally, the output series regulator transistors, the microcontroller, display drivers and some control logic.

The Control board contains voltage and current control, ADC and DAC and some control logic.

The linear regulator is in series with the positive output but, because of the way in which the control circuit is referenced to the +ve output, it is convenient to consider the regulated output as the negative side.

To help reading the circuit diagrams the two connectors between the power and control pcbs join as follows. PJ14 to PJ18 and PJ20 to PJ19.

Power Pcb

The main windings are connected either in series (for the high voltage range) or in parallel (for the low voltage range) by the range relays and an electronic tap change at approximately half range is used to reduce dissipation. Bridge rectifier BR1 feeds C4 the reservoir capacitor when tap change is low. When tap change is high, two of the diodes in BR1 are bypassed by SCR1 and SCR2. Voltages are listed below at nominal mains (230V).

QL355	35V/3A	15V/5A
Secondary – high tap, no-load	39.8VAC	19.9VAC
Secondary – high tap, full-load	37VAC	18.9VAC
C4 – high tap, no-load	51.5VDC	24.5VDC
C4 – high tap, full-load	44.7VDC	21.9VDC

QL564	56V/2A	25V/4A
Secondary – high tap, no-load	60VAC	30.1VAC
Secondary – high tap, full-load	56VAC	28.6VAC
C4 – high tap, no-load	79.5VDC	38.4VDC
C4 – high tap, full-load	69.5VDC	35.2VDC

A 30Vrms centre tapped winding and full wave rectification provide the auxiliary supplies. IC1 generates +10V and IC2 –5V. A 10.4Vrms winding and full wave rectification power the relays and fan and IC3 provides the +5V for the microcontroller, display and control logic.

Comparator IC6A provides the system reset signal and comparator IC6B provides the power fail signal to the microcontroller to store the instrument settings at power down.

The fan speed is regulated by a pulse width modulator in the microcontroller; if the heatsink exceeds a certain temperature measured by Q22, comparator IC50A switches the fan to full speed. If the heatsink temperature continues to rise IC50B will pull the over-temperature line low which will turn the output off.

Q15 and Q16 are the series regulator transistors; long-tailed pair Q17 and Q21 ensure current sharing. The +10V supply to emitter follower Q14 is via switch Q13 which is turned on after a delay to prevent output glitches when power is turned on.

Microcontroller IC9, which is factory programmed, writes the calibration values and instrument settings to non-volatile memory IC31, reads the keyboard, spin-wheel and status of the instrument via shift registers (4021s), reads the ADC, outputs data via shift registers (4094s) and display drivers IC32, IC33 and IC38, and writes to the DAC.

Jumpers are fitted to SEL1 to 7 to inform the microcontroller of the model type and to LK1 and LK2 to power the opto-couplers, see table below.

	SEL1	SEL2	SEL3	SEL4	SEL5	SEL6	SEL7	LK1	LK2
QL355				Yes					
QL355P				Yes					
QL355T output 1								Yes	Yes
QL355T output 2			Yes						
QL355TP output 1									
QL355TP output 2			Yes						
QL564						Yes			
QL564P						Yes			
QL564T output 1						Yes		Yes	Yes
QL564T output 2			Yes			Yes			
QL564TP output 1						Yes			
QL564TP output 2			Yes			Yes			

The transformer windings are in series for the high voltage range and in parallel for the low voltage range. D4, R14,C16 and D7,R15,C17 ensure the correct switching sequence of the range relays.

IC8C and IC8D form an oscillator to drive the buzzer.

TP2 carries a synchronising pulse output which makes it possible to view the DAC sample and hold outputs and the ADC input selector signals.

TP3 provides an output that toggles at each stage of the range change switching sequence.

Control Pcb

IC2 is a 16-bit DAC and the reference to it is supplied via IC19B which allows fine adjustment for voltage and current settings. The DAC output is multiplexed into 7 sample and holds. IC14A is for the voltage control (VC); when the output is off IC42B grounds its input via VR2. IC28B drives the guard track (GV) round the VC sample and hold. An identical circuit is used for the current control (IC). IC20B is the voltage control error amplifier and IC21A is a differential amplifier. With the output at 35.0V VM will be -1.74V and VC will be 1.47V. Comparator IC26B is for over voltage protection (OVP). A relay selects local or remote voltage sensing; if the voltage between an output and its sense reaches $2 \times V_{be}$ either Q19 or Q20 will turn on turning the output off.

IC20A is the current control error amplifier and IC22 is a differential amplifier with a gain of 10. R50 is used for the high current range and R51 is used for the 500mA range selected by IC23. Q3 shorts out R51 when the high current range is selected. If the current limit is set to 2.0A IC will be approximately 846mV. With a 2Amp load on the high range IM will be -1V. Over current protection (OCP) is realised in software. When the power supply is in constant current mode IC20A has control and comparator IC17B drives the CI line high.

IC37 is a 12-bit ADC; ADREF is adjusted for voltage and current measurements and is approximately 4V. IC27B has a gain of -2 ; therefore if, for example, VM was -2 V then the output of IC27B would be $+4$ V. Offsets are trimmed by ADOFST. To achieve 13-bit resolution two measurements are taken with and without the 13th bit subtracted from the input selected by IC24C.

Any trip condition is latched by IC29 and IC30 and cleared by the microcontroller by pressing escape. IC18 is used for synchronising the switching of the outputs on triple units.

Auxiliary Output

Each transformer has a 5Vrms winding and these are connected in series at the Auxiliary Power pcb. Regulator IC5 provides 5V. IC1 is a step down switching regulator (buck). Microcontroller IC11 sets the output voltage with a PWM signal via low pass filter IC4B. IC4D is the voltage error amplifier and IC4A signals if the loop comes out of regulation. Using an internal ADC IC11 measures the output voltage and current. The opto-couplers provide isolated communication with the processor on Output 1.

Interface Pcb

The interface board allows the unit to communicate externally via USB, RS232, LAN or GPIB. IC2 is an ARM7 processor which is programmed in-circuit using the standard JTAG port accessed at PJ5. IC3 is the Ethernet transceiver. IC1 is the RS232 transceiver it has a charge pump to generate -5 V. IC31, IC32 and IC33 form the GPIB interface. IC33 is a GPIB controller IC and performs all the GPIB hardware handshaking and status reporting. IC31 and IC32 are GPIB specific buffers.

Servicing Note

If IC31 the memory IC located on the power pcb is replaced it is very likely the check sums do not match resulting in "error 999" being displayed. Pressing OK will get out of this condition and initialise the EEPROM. This will only work on a single power supply or on output 2 on a triple power supply. If IC31 has to be replaced on output 1 side of a triple power supply, output 1 and output 2 power boards will have to be interchanged, also links will have to be changed (see table under Power Pcb description) so that the power supply can initialise.

Calibration

Refer to the General section for dismantling instructions and safety precautions. Normal calibration is done without opening the instrument.

Allow 10 minute warm-up before commencing calibration.

Refer to the User Manual for detailed operation of these power supplies.

Equipment Required

A 5.5 digit multimeter with better than 0.02% accuracy on dc volts and better than 0.12% accuracy on dc current (to 5A); alternatively use a precision shunt for current measurement. An electronic load set to approximately 2.7A or a 1.8Ω 15W resistor.

Calibration

To enter calibration press SHIFT, #, 99. If the instrument is a long way out of calibration or has been repaired, the default calibration values should be loaded first by pressing SHIFT #, 91. Pressing ESCAPE at anytime will abort the calibration procedure and revert to the stored calibration values.

Having entered calibration mode, follow the table below. To increment to the next step press OK. The calibration **must** be done in sequence. At the end of calibration press OK to store the calibration. The instrument automatically sets the range and settings at each step.

Use the spin-wheel to adjust calibration; holding down the JOG SET OFF key will give x100 increments to speed up calibration. Pressing SHIFT will show the calibration value.

On triple units calibrate both output 1 and output 2.

There are two internal adjustments which are factory set and will normally only require adjustment if a component has been changed in the associated area. If this is so proceed as follows. VR1 and VR2 are both located near the top of the control pcb. They are accessible from both sides of the board. Turn them both fully clockwise as viewed from the component side, fully anti-clockwise as viewed from the solderside. Adjustment is done with the output set to off. Connect an ammeter across the output terminals and adjust VR1 for +1mA. Remove ammeter and connect voltmeter and adjust for VR2 –10mV. (minus or negative 10mV).

Calibration steps 17 to 22 on output 1 are for the Auxiliary output.

QL355

Step/Range	Settings	Adjust for:-	Load	Detail
1, 35V 3A	0.01V 3A	10mV ± 0.5mV	DVM	o/p 0V
2, 35V 3A	0.01V 3A	0.010V on display	DVM	V readback zero
3, 35V 3A	35V 3A	35V ± 0.5mV	DVM	o/p V span
4, 35V 3A	35V 3A	35.000 on display	DVM	V readback span
5, 35V 3A	0.01V 3A	10mV ± 0.5mV	DVM	o/p 0V
6, 35V 3A	35V 3A	35V ± 0.5mV	DVM	o/p V span
7, 35V 3A	2V 0.001A	1mA ± 0.5mA	milli-ammeter	o/p A offset
8, 35V 3A	2V 0.001A	0.001 on display	milli-ammeter	A readback zero
9, 35V 500mA	2V 0.1mA	0.1mA ± 0.05mA	milli-ammeter	o/p mA offset
10, 35V 500mA	2V 0.1mA	flashing 0.0/0.1 on display	milli-ammeter	mA readback zero
			change load	
11, 15V 5A	2V 4A	4A ± 0.5mA	ammeter	o/p A span
12, 15V 5A	2V 4A	4.000 on display	ammeter	A readback span
13, 15V 5A	2V 4.1A	4.100 on display	ammeter	A readback 13bit

Continued....

14, 35V 500mA	2V 400mA	400mA \pm 0.05mA	ammeter	o/p mA span
15, 35V 500mA	2V 400mA	400.0 on display	ammeter	mA readback span
16, 35V 500mA	2V 410mA	410.0 on display	ammeter	mA readback 13bit
17, Aux o/p	5V	5.00V \pm 10mV	DVM	o/p V span
18, Aux o/p	5V	5.00V on display	DVM	V readback
19, Aux o/p	1V	1.00V on display	DVM	V readback
20, Aux o/p	5V	5.00V \pm 0.5mV	DVM	V readback
21, Aux o/p	off	0.000 flashing 0.001		A readback zero
22, Aux o/p	5V	Display equals ammeter	Electronic load or 1.8 Ω load in series with ammeter	A readback

QL564

Step/Range	Settings	Adjust for:-	Load	Detail
1, 56V 2A	0.01V 2A	10mV \pm 0.5mV	DVM	o/p 0V
2, 56V 2A	0.01V 2A	0.010V on display	DVM	V readback zero
3, 56V 2A	35V 2A	35V \pm 0.5mV	DVM	o/p V span
4, 56V 2A	35V 2A	35.000 on display	DVM	V readback span
5, 56V 2A	41V 2A	41.000 on display	DVM	V readback 13bit
6, 56V 2A	0.01V 2A	10mV \pm 0.5mV	DVM	o/p 0V
7, 56V 2A	35V 2A	35V \pm 0.5mV	DVM	o/p V span
8, 56V 2A	2V 0.001A	1mA \pm 0.5mA	milli-ammeter	o/p A offset
9, 56V 2A	2V 0.001A	0.001 on display	milli-ammeter	A readback zero
10, 56V 500mA	2V 0.1mA	0.1mA \pm 0.05mA	milli-ammeter	o/p mA offset
11, 56V 500mA	2V 0.1mA	flashing 0.0/0.1 on display	milli-ammeter	mA readback zero
			change load	
12, 25V 4A	2V 4A	4A \pm 0.5mA	ammeter	o/p A span
13, 25V 4A	2V 4A	4.000 on display	ammeter	A readback span
14, 56V 500mA	2V 400mA	400mA \pm 0.05mA	ammeter	o/p mA span
15, 56V 500mA	2V 400mA	400.0 on display	ammeter	mA readback span
16, 56V 500mA	2V 410mA	410.0 on display	ammeter	mA readback 13bit
17, Aux o/p	5V	5.00V \pm 10mV	DVM	o/p V span
18, Aux o/p	5V	5.00V on display	DVM	V readback
19, Aux o/p	1V	1.00V on display	DVM	V readback
20, Aux o/p	5V	5.00V \pm 0.5mV	DVM	V readback
21, Aux o/p	off	0.000 flashing 0.001		A readback zero
22, Aux o/p	5V	Display equals ammeter	Electronic load or 1.8 Ω load in series with ammeter	A readback

Parts List

PCB ASSEMBLY – POWER – QL355

Part No.	Description	Position
20073-9801	SCREW No.4x1/4in. Plastite	HEATSINKS
20613-0026	SIL-PAD 900S 100MM X 25MM	FOR HS1, HS2
20670-0366	HEATSINK LS01000 100MM PLAIN	SK1-2
20670-0367	CLIP 1 FOR TO220/TO247 H/S	FOR IC1-3,Q22,SCR1-2,BR1,Q15,Q16
22240-0150	RELAY 12V DPDT 8A	RL1-2
22312-0242	FUSE CLIPS PCB MTG	FS1
22315-0310	FUSE 10A ANTISURGE(T) HBC UL	FS1
22315-0451	FUSE 750mAT SUBMIN PCB MNT UL	FS4 ,FS6
22315-0452	FUSE 1.0AT SUBMIN PCB MTG UL	FS5
22573-0041	HEADER 2WAY STR SIL STD/GOLD	LK1-3, TP1, TP5, TP2-4 (1 PIN EACH)
22573-0071	HEADER 5 WAY STR SIL STD	PJ8
22573-0150	HEADER 20 WAY STR LATCHING	PJ10-11
22573-0225	HEADER 5 WAY STR F/LOCK .156	PJ1
22573-0226	HEADER 6 WAY STR F/LOCK .156	PJ2
22573-0247	HEADER 2 WAY STR .1P F/LOCK	PJ6 (Rear Mount), PJ7 (REAR MOUNTED), PJ9
22573-0251	HEADER 6 WAY STR .1P F/LOCK	PJ5/PJ13 (R/MOUNTED)
22573-0262	HEADER 2 WAY RT ANG F/LOCK .1P	PJ4
22573-0410	HEADER 10W (2x5) BOXED	PJ15 (REVERSE MOUNTED)
22575-0038	HEADER 6 WAY STR SIL STD	PJ3
22575-0068	HEADER 14 WAY (2X7) STR SKEL	PJ12
22575-0103	HEADER 16 WAY (2X8) STR SKEL	PJ14 ,PJ20
23202-3100	RES 10K0F W60 MF 50PPM	R3 ,R96
23274-0104	RES 0R22J 3W WW	R26-27
23424-0443	CAP 10NZ 1KV CER D10 P5	C12-13
23557-0660	CAP 2200U 16V ELEC RE2 P5	C3
23557-0664	CAP 1000U 35V ELEC RE2 P5	C1-2
23557-0770	CAP 10000U 63V ELEC LP5 P10	C4-5
23620-0247	CAP 220NK 63V P/E P5	C16-17
23620-0257	CAP 2U2K 100V P/E P22.5	C9-10
23620-0263	CAP 220NK250VP/E 368 SER P15	C11 ,C23
23620-9007	CAP 10NK 100V P/E P5	C87
25115-0907	DIO 1N4002 B/R	D20-22
25210-0060	THYRISTOR 2N6507 TO-220	SCR1-2
25211-0303	RECTIFIER BRIDGE 8A 200V SIL	BR1

PCB ASSEMBLY – POWER – QL355 continued/...

Part No.	Description	Position
25211-9302	RECTIFIER BRIDGE W02G	BR2-3
25386-9300	TRAN NPN TIP31A	Q22
25601-0590	TRAN MOSFET NCHAN HUF75639G3	Q15-16
27001-0020	OPTO-COUPLER CNY17-3 0.3 UL	IC44 ,IC52
27001-0050	OPTO-COUPLER 6N136	IC48-49
27001-0110	OPTO-COUPLED TRIAC 3011	IC4-5
27160-0009	IC V/REG 7805 TO220	IC3
27160-0014	IC V/REG 7905 TO220	IC2
27160-0200	IC V/REG LM317 TO220	IC1
28151-0010	BUZZER - 41.T70P015H	BUZZ1
28500-1190	XTAL 18.432MHZ MICROPROCSR	XTL1
44117-0181	PCB ASSY SM POWER nQL355 S	

PCB ASSEMBLY – SM POWER – QL355 and QL564

Part No.	Description	Position
23105-0100	RES SM0805 10R0F W1	R93
23105-0330	RES SM0805 33R0F W1	R133
23105-0560	RES SM0805 56R0F W1	R124-125, R128, R131 ,R138-139 ,R145-154
23105-1100	RES SM0805 100RF W1	R12 ,R23-24
23105-1180	RES SM0805 180RF W1	R1-2
23105-1220	RES SM0805 220RF W1	R28
23105-1270	RES SM0805 270RF W1	R110, R127 ,R142
23105-1330	RES SM0805 330RF W1	R144
23105-1360	RES SM0805 360RF W1	R60 ,R134
23105-1390	RES SM0805 390RF W1	R40-41
23105-2100	RES SM0805 1K00F W1	R4, R19, R111 ,R117, R122-123 ,R130,
23105-2120	RES SM0805 1K20F W1	R20
23105-2150	RES SM0805 1K50F W1	R29
23105-2220	RES SM0805 2K20F W1	R109
23105-2470	RES SM0805 4K70F W1	R16-18, R112 ,R121
23105-2510	RES SM0805 5K10F W1	R21-22 ,R132
23105-2560	RES SM0805 5K60F W1	R52
23105-3100	RES SM0805 10K0F W1	R5 ,R7-9, R13, R30, R120, R126 ,R136-137,
23105-3200	RES SM0805 20K0F W1	R6 ,R98-99
23105-3220	RES SM0805 22K0F W1	R32-39, R116 ,R155-172
23105-3330	RES SM0805 33K0F W1	R25, R75, R92, R129 ,R140
23105-4100	RES SM0805 100KF W1	R11 ,R43

PCB ASSEMBLY – SM POWER – QL355 and QL564 continued/...

Part No.	Description	Position
23105-4220	RES SM0805 220KF W1	R14-15 ,R143
23105-5100	RES SM0805 1M00F W1	R10, R31, R115 ,R135
23407-0100	CAP SM0805 10PG CER NPO	C56-57
23407-0101	CAP SM0805 100PG CER NPO	C21-22
23461-0020	CAP SM0805 100NZ 50V CER Y5V	C15 ,C18-20, C55, C58, C59, C61, C64
23461-0040	CAP SM0805 1N0K 50V CER X7R	C30-37 ,C47-54
23559-3471	CAP SM 470U 16V AL ELEC	C71
23559-5100	CAP SM 10U 35V AL ELEC	C6-8 ,C43
23559-5220	CAP SM 22U 35V AL ELEC	C14
23559-6010	CAP SM 1U 50V AL ELEC	C86 ,C88-90
25021-1010	DIO SM BAS21 200V/200mA SOT23	D1-7 ,D24
25340-1000	TRAN SM PNP BC859C SOT23	Q5-9 ,Q26
25340-1010	TRAN SM PNP PMBT3906	Q13-14
25377-1000	TRAN SM NPN BC849C SOT23	Q1-2 ,Q10-12, Q18 ,Q24
25381-1000	TRAN SM NPN SMBT3904	Q17 ,Q21
25381-1010	TRAN SM NPN BC817	Q23
27103-1040	IC SM LM393	IC6 ,IC50
27164-1070	IC SM ULN2003AD SOIC16	IC38
27227-0210	IC SM 4021	IC34-35 ,IC41
27227-0940	IC SM 4094 SO16	IC28
27239-0000	IC SM 74HC00 SO14	IC8
27239-0140	IC SM 74HC14 SO14	IC7
27239-5740	IC SM 74HC574 SO20	IC32-33
27250-2290	IC SM PIC16F887-I/PT 44TQFP	IC9
27403-0130	IC SM 24LC16B/SN SOIC8	IC31
35555-5130	PCB - POWER - nQL355/564	

PCB ASSEMBLY – POWER – QL564

Part No.	Description	Position
20073-9801	SCREW No.4x1/4in. Plastite	HEATSINKS
20613-0026	SIL-PAD 900S 100MM X 25MM	FOR HS1, HS2
20670-0366	HEATSINK LS01000 100MM PLAIN	SK1-2
20670-0367	CLIP 1 FOR TO220/TO247 H/S	FOR IC1-3,Q22,SCR1-2,BR1,Q15,Q16
22240-0150	RELAY 12V DPDT 8A	RL1-2
22312-0242	FUSE CLIPS PCB MTG	FS1
22315-0310	FUSE 10A ANTISURGE(T) HBC UL	FS1
22315-0451	FUSE 750mAT SUBMIN PCB MNT UL	FS4 ,FS6

PCB ASSEMBLY – POWER – QL564 continued/...

Part No.	Description	Position
22315-0452	FUSE 1.0AT SUBMIN PCB MTG UL	FS5
22573-0041	HEADER 2WAY STR SIL STD/GOLD	LK1-3, TP1, TP5, TP2-4 (1 PIN EACH)
22573-0071	HEADER 5 WAY STR SIL STD	PJ8
22573-0150	HEADER 20 WAY STR LATCHING	PJ10-11
22573-0225	HEADER 5 WAY STR F/LOCK .156	PJ1
22573-0226	HEADER 6 WAY STR F/LOCK .156	PJ2
22573-0247	HEADER 2 WAY STR .1P F/LOCK	PJ6 (rear mounted), PJ7 (REAR MOUNTED), PJ9
22573-0251	HEADER 6 WAY STR .1P F/LOCK	PJ5/PJ13 (R/MOUNTED)
22573-0262	HEADER 2 WAY RT ANG F/LOCK .1P	PJ4
22573-0410	HEADER 10W (2x5) BOXED	PJ15 (REVERSE MOUNTED)
22575-0038	HEADER 6 WAY STR SIL STD	PJ3
22575-0068	HEADER 14 WAY (2X7) STR SKEL	PJ12
22575-0103	HEADER 16 WAY (2X8) STR SKEL	PJ14 ,PJ20
23202-3220	RES 22K0F W60 MF 50PPM	R3,R96
23274-0105	RES 0R33J 3W WW	R26,R27
23424-0443	CAP 10NZ 1KV CER D10 P5	C12-13
23557-0660	CAP 2200U 16V ELEC RE2 P5	C3
23557-0664	CAP 1000U 35V ELEC RE2 P5	C1-2
23557-0775	CAP 4700U 100V ELEC LP5 P10	C4,C5
23620-0247	CAP 220NK 63V P/E P5	C16-17
23620-0257	CAP 2U2K 100V P/E P22.5	C9-10
23620-0263	CAP 220NK250VP/E 368 SER P15	C11 ,C23
23620-9007	CAP 10NK 100V P/E P5	C87
25115-0907	DIO 1N4002 B/R	D20-22
25210-0060	THYRISTOR 2N6507 TO-220	SCR1-2
25211-0303	RECTIFIER BRIDGE 8A 200V SIL	BR1
25211-9302	RECTIFIER BRIDGE W02G	BR2-3
25386-9300	TRAN NPN TIP31A	Q22
25601-0790	TRAN MOSFET N FQA70N10 TO-3P	Q15,Q16
27001-0020	OPTO-COUPLER CNY17-3 0.3 UL	IC44 ,IC52
27001-0050	OPTO-COUPLER 6N136	IC48-49
27001-0110	OPTO-COUPLED TRIAC 3011	IC4-5
27160-0009	IC V/REG 7805 TO220	IC3
27160-0014	IC V/REG 7905 TO220	IC2
27160-0200	IC V/REG LM317 TO220	IC1
28151-0010	BUZZER - 41.T70P015H	BUZZ1

PCB ASSEMBLY – POWER – QL564 continued/...

Part No.	Description	Position
28500-1190	XTAL 18.432MHZ MICROPROCSR	XTL1
44117-0181	PCB ASSY SM POWER nQL355	

PCB ASSEMBLY – CONTROL

Part No.	Description	Position
10300-0313	PAD P/E S/AD 12 X 15MM	FOR R50
22240-0070	RELAY TYPE 47 (12VDC)	RL3
22455-0040	TAB 4.8MAX 0.8MM STR PCB MTG	FAS1, 2
22573-0251	HEADER 6 WAY STR .1P F/LOCK	PJ3
22574-0316	SKT 16 WAY (2x8)	PJ18,19
23105-1100	RES SM0805 100RF W1	R109
23105-1330	RES SM0805 330RF W1	R44-49,122
23105-2100	RES SM0805 1K00F W1	R38, 56, 78-81, 95,106,107,114
23105-2470	RES SM0805 4K70F W1	R28,91
23105-3100	RES SM0805 10K0F W1	R29,31,32,43,52,53,72,73,118,123,124,128
23105-3200	RES SM0805 20K0F W1	R67, 68,102,105
23105-3205	RES SM0805 20K5F W1	R35
23105-3470	RES SM0805 47K0F W1	R76
23105-4100	RES SM0805 100KF W1	R97, 98,108
23105-4220	RES SM0805 220KF W1	R77,103,104,113,131
23105-4270	RES SM0805 270KF W1	R66, 69
23105-4330	RES SM0805 330KF W1	R55, 62, 94
23106-2200	RES SM0805 2K00D W1 25PPM	R83, 84
23106-3100	RES SM0805 10K0D W1 25PPM	R99,100,120,121
23106-3110	RES SM0805 11K0D W1 25PPM	R87
23106-3130	RES SM0805 13K0D W1 25PPM	R88
23106-3200	RES SM0805 20K0D W1 25PPM	R39, 82, 85,101
23202-1150	RES 150RF W60 MF 50PPM	R54,125
23215-2845	RES 8K45B W25 MF 15PPM	R63, 74
23215-3110	RES 11K0B W25 MF 15PPM	R57
23215-3130	RES 13K0B W25 MF 15PPM	R61
23215-4150	RES 150KB W25 MF 15PPM	R64, 65
23284-0110	RES 0R51J 2W5 WW	R51
23286-0040	RES 0R05J 15W WW ALUM HSD	R50
23385-2220	RES PS/H 2K2 CF 6MM	VR1, 2
23427-0388	CAP 220PK 100V CER P2.5	C81
23427-0388	CAP 220PK 100V CER P2.5	C49

PCB ASSEMBLY – CONTROL continued/...

Part No.	Description	Position
23427-9205	CAP 47PJ 100V CER NPO P2.5	C44-48, 62, 72, 74-78
23428-0100	CAP 10PG 100V CER NPO P2.5T	C37
23557-0500	CAP 1U0 50V ELEC P1.5	C42
23557-0647	CAP 10U 35V ELEC P2	C24, 25, 27, 53, 58, 60
23557-0694	CAP 220U 100V ELEC P5	C40,41
23620-0246	CAP 100NK 63V P/E P5	C22, 23, 26, 28, 30, 33, 35, 36, 39, 54, 59, 65, 66, 79, 80, 82
23620-0247	CAP 220NK 63V P/E P5	C63
23620-0249	CAP 330NK 63V P/E P5	C31, 32, 34
23620-0252	CAP 2N2K 63V P/E P5	C50, 56, 61
23620-0286	CAP 470NF 100V P/E P5	C92, 93
23620-9007	CAP 10NK 100V P/E P5	C51, 52, 55, 57, 84
25021-0901	DIO 1N4148 B/R	D9, 10, 15-19
25031-0040	DIO BAX16	D13, 14
25334-0011	TRAN PNP TIP30	Q18
25336-5590	TRAN PNP BC559C	Q9
25341-0218	TRAN PNP 2N3906	Q25
25377-5490	TRAN NPN BC549C	Q4, 5
25383-0610	TRAN NPN ZTX653	Q19, 20
25601-0620	TRAN MOSFET N CHAN LL	Q3
27103-1040	IC SM LM393	IC17, 26
27106-0644	IC SM TL074CD BI-FET OP AMP	IC15
27106-0645	IC SM TO072CD DUAL BIFET OP AMP	IC31, 32
27106-1080	IC SM OP07CS	IC22
27106-1240	IC SM MCP602	IC28
27106-1250	IC SM MCP602 OP AMP	IC28
27153-1120	IC SM MCP3201B 12 BIT ADC	IC37
27161-0061	IC V/REF AD680 T092	IC16
27162-1030	IC SM MAX5441 ACUA 16 BIT DAC	IC1
27226-0510	IC 4051B 16 PIN	IC13
27227-0210	IC SM 4021	IC36
27227-0510	IC SM 4051	IC25
27227-0750	IC SM 4075	IC18
27227-0940	IC SM 4094	IC11,IC43
27236-0530	IC SM 74HC4053	IC23-24, IC42, IC44
27239-1320	IC SM 74HC132	IC29-30
35555-3300	PCB - CONTROL	

PCB ASSEMBLY - INTERFACE

Part No.	Description	Position
20010-0205	RIVET ALUM 2.4W X 6L	PCB fixing(1)
20010-0208	RIVET ALUM 2.4W X 8L	FOR PJ10(2)
20040-9501	NUT No.4 Angle	PCB fixing
20210-0112	NUT M3 BARB	FOR IC15
20234-0011	SCREW M3 X 10 PNHDPZ ZPST	FOR IC15
20613-0006	SIL-PAD TO220 LARGE HOLE	FOR SK6
20670-0066	HEATSINK - BMH/220/9007	SK6 (LAY FLAT)
22315-0450	FUSE 500mAT SUBMIN PCB MNT UL	FS1
22573-0070	HEADER 4 WAY STR SIL STD	TP1
22573-0222	HEADER 2 WAY STR F/LOCK .156	PJ18
22573-0248	HEADER 3 WAY STR .1P F/LOCK	PJ3
22574-0430	SKT 24W RA IEEE RC10-24R-LNA	PJ10
22574-0450	SKT 9W R/A D-TYPE (CLIP IN)	PJ2
22574-0495	SKT - USB TYPE B - PCB MTG	PJ1
22574-0900	SKT RJ45 - SI-60005-F	PJ6
22575-0065	HEADER 20 WAY 2X10 STR SKELN	PJ5
23557-0688	CAP 1000U 16V ELEC P5	C98
25211-9302	RECTIFIER BRIDGE W02G	BR1
27160-0460	IC V/REG L4941BV	IC15
27163-1600	IC 75160 20 PIN	IC32
27163-1610	IC 75161 20 PIN/0.3	IC31
27250-0410	IC UPD7210C GPIB CONT 40 PIN	IC33
35358-0580	EARTHING SPRING USB	SP1
44117-0201	PCBASS SM I/F LAN/USB/RS QL S	

PCB ASSEMBLY – SM - I/F – LAN/USB/RS

Part No.	Description	Position
22225-1000	SWITCH SM PUSH 'NB'	SW1
23101-0330	RES SM0603 33R0F	R58-60
23105-0000	RES SM0805 ZERO OHM	R1
23105-0330	RES SM0805 33R0F W1	R7,R9
23105-0470	RES SM0805 47R0F W1	R15,R22
23105-1100	RES SM0805 100RF W1	R23,R25-27,R32,R34,R44-45
23105-1110	RES SM0805 110RF W1	R3,R5
23105-1470	RES SM0805 470RF W1	R12,R14
23105-1680	RES SM0805 680RF W1	R42
23105-2100	RES SM0805 1K00F W1	R11,R19,R40

PCB ASSEMBLY – SM - I/F – LAN/USB/RS continued/...

Part Number	Description	Position
23105-2150	RES SM0805 1K50F W1	R20,R63
23105-2220	RES SM0805 2K20F W1	R4,R6,R33,R38-39,R43,R54,R62
23105-2487	RES SM0805 4K87F W1	R46
23105-3100	RES SM0805 10K0F W1	R2,R8,R13,R16-18,R24,R29-30,R35-36,R41,R48-49
23105-3470	RES SM0805 47K0F W1	R37,R47
23105-4100	RES SM0805 100KF W1	R10,R21
23407-0101	CAP SM0805 100PG CER NPO	C1-3,C6
23407-0180	CAP SM0805 18PG CER NPO	C14-15
23407-0220	CAP SM0805 22PG CER NPO	C21,C32
23409-0113	CAP SM1206 10NK 500V X7R	C100
23411-0475	CAP SM1206 4U7K 16V CER X7R	C5
23461-0020	CAP SM0805 100NZ 50V CER Y5V	C4,C7-8,C16-20,C22-29,C33-36,C40,C42,C52-54,C
23461-0500	CAP SM0805 4U7 6V3 CER X5R	C38-39
23559-0010	CAP SM 100UF 6.3V AL ELEC	C99
23559-2221	CAP SM 220U 10V AL ELEC	C37
23559-3470	CAP SM 47U 16V AL ELEC	C9,C12-13
23595-0010	CAP SM-A 1U0M 16V TANT	C10-11,C31
23595-0110	CAP SM-B 10UM 10V TANT	C30,C107
25021-1010	DIO SM BAS21 200V/200mA SOT23	D1
25061-0304	LED SM0805 RED	LED1-2
25340-1000	TRAN SM PNP BC859C SOT23	Q1
25377-1000	TRAN SM NPN BC849C SOT23	Q3
27160-1030	IC SM V/REG LM1117-3V3 SOT223	IC4
27163-1232	IC SM 232A RS232 DRIVER	IC1
27246-0140	IC SM 74LCX14 SO14	IC5
27250-2260	IC SM DP83848C PHYTER LQFP48	IC3
27250-2340	IC SM MCU LPC2368 TFBGA100	IC2
28500-2040	XTAL SM 12MHZ 30/50PPM 16PF	XTL1
28515-1000	OSC MODULE SM 50MHz ACT9300	OCS1
35594-0290	PCB I/F LAN/USB/RS232 QL	

PCB ASSEMBLY – KEYBOARD SINGLE

Part Number	Description	Position
20612-0012	WASHER FIBRE 15.88MM OD	FIT BETWEEN REAR OF PCB AND ENC1. ENC1 TO HAVE TAB BENT FLAT.
22224-0020	ENCODER ROT 24 POSITION	ENC1

PCB ASSEMBLY – KEYBOARD SINGLE continued/...

Part Number	Description	Position
25061-0300	LED - SM - RED 3.2 X 2.8MM	LED1, LED3-8, LED11, LED15,LED20, LED24
25061-0301	LED - SM - YELLOW 3.2 X 2.8MM	LK17,18,19, 21, 22, 23
25061-0302	LED - SM - GREEN 3.2 X 2.8MM	LED2
25061-1000	DISPLAY SET QL .56 LED 9MM LEG	
35555-3350	PCB - KEYBOARD	
43171-1310	CONN ASSY 20 WAY - 135MM	

PCB ASSY – KEYBOARD – DUAL

Part Number	Description	Position
20612-0012	WASHER FIBRE 15.88MM OD	
22224-0020	ENCODER ROT 24 POSITION	ENC1
25061-0300	LED - SM - RED 3.2 X 2.8MM	LED1-11, 13-15, 20, 24, 25, 27-30
25061-0301	LED - SM - YELLOW 3.2 X 2.8MM	LED17-19, LED21-23, LED31-33, LED35-37
25061-0302	LED - SM - GREEN 3.2 X 2.8MM	LED12, 34
25061-1000	DISPLAY SET QL .56 LED 9MM LEG	DISP1-6
35555-3520	PCB - KEYBOARD	
43171-1310	CONN ASSY 20 WAY - 135MM	PJ12-15

PCB ASSEMBLY – TERMINAL

Part Number	Description	Position
22467-0120	TERMINAL BLOCK 2W - LIGHT GREY	TB1
22575-0081	SKT 6 WAY IDT .1P	W1-6
23424-0443	CAP 10NZ 1KV CER D10 P5	C2
23557-0695	CAP 10U 100V ELEC P2.5	C93
23620-9007	CAP 10NK 100V P/E P5	C1
25061-0200	LED – T1 ROUND (3mm) - RED	LED25
25117-0020	DIO 1N5401	D22
35515-1960	PCB - TERMINAL	

PCB ASSY – IEC INLET

Part Number	Description	Position
23424-0459	CAP 4N7 250V AC CER	C85,C88
23684-0008	CAP 100NM 250VAC X2 P/E P15	C89
35555-3860	PCB - IEC SKT	

PCB ASSY - AUX TERM/POWER

Part Number	Description	Position
22040-0030	FERRITE SLEEVE APPX 9/16/17L	L2, 2 WIRES / 2 PASSES (USING 43187-2010)

PCB ASSY - AUX TERM/POWER continued/...

Part Number	Description	Position
22219-0500	SWITCH 2 POLE MOMENTARY	SW1
22315-0457	FUSE 3.0AT SUBMIN PCB MTG UL	FS1
22467-0130	TERMINAL BLOCK 2W R/A	TB1
22573-0071	HEADER 5 WAY STR SIL STD	PJ5
22573-0206	HEADER 6 WAY STRAIGHT .156P	PJ4 (REVERSE MOUNTED)
22573-0224	HEADER 4 WAY STR F/LOCK .156	PJ1, PJ3
22575-0206	SKT 6W .156 20AWG Yellow IDT	fit wires from 43187-2010 & solder to pcb
23271-0005	RES 0R01J 4W MR VTM 350-8	R18
23557-0699	CAP 10000U 16V ELEC P7.5	C4
23557-0838	CAP 220U25VELEC LOW/PRF P3.5	C35,C37
23620-0267	CAP 100NK 100V P/E P5	C5
23620-0268	CAP 220NK400VP/E 468 SER P15	C31
25061-0201	LED - T1 R'ND(3mm) RED L/LEG	LED1
25115-0700	DIO 11DQ03	D1
25117-0020	DIO 1N5401	D2-6
27160-0011	IC V/REG 78L05 TO92	IC5
43171-2700	CONN ASSY 10W 400 ST QL-T	PJ2
43187-2010	WIRE SET CUT nQL AUX UL	2 PASSES OF EACH WIRE THROUGH L2
44117-0211	PCB ASS SM AUX TERM/POWER nQLT	

PCB ASSEMBLY – SM AUX TERM/POWER

Part No.	Description	Position
22041-0100	BEAD FERRITE SM0603	FB1-2
22156-0070	CHOKE SM 33uH 4.2A SHIELDED	L1
23105-1100	RES SM0805 100RF W1	R42
23105-1330	RES SM0805 330RF W1	R40
23105-1360	RES SM0805 360RF W1	R17,R20
23105-1390	RES SM0805 390RF W1	R9, R29-30
23105-1470	RES SM0805 470RF W1	R37
23105-1560	RES SM0805 560RF W1	R22
23105-2100	RES SM0805 1K00F W1	R7, R12, R14, R26, R32
23105-2180	RES SM0805 1K80F W1	R15
23105-2330	RES SM0805 3K30F W1	R2
23105-3100	RES SM0805 10K0F W1	R5-6, R8, R23, R27-28, R31, R35
23105-3150	RES SM0805 15K0F W1	R36,R38
23105-3180	RES SM0805 18K0F W1	R3,R4,R10-11,R39
23105-3200	RES SM0805 20K0F W1	R16, R24-25

PCB ASSEMBLY – SM AUX TERM/POWER continued/...

Part No.	Description	Position
23105-3430	RES SM0805 43K0F W1	R19, R21
23105-4100	RES SM0805 100KF W1	R1, R13, R33-34, R41

PCB ASSEMBLY – SM AUX TERM/POWER

Part No.	Description	Position
23407-0470	CAP SM0805 47PG CER NPO	C11, C14, C16
23414-3226	CAP SM1210 22UK 16V CER	C1-3
23461-0015	CAP SM0805 10NK 50V CER X7R	C6, C15, C22
23461-0020	CAP SM0805 100NZ 50V CER Y5V	C10, C17-21, C23-25, C28-30, C33,C34
23461-0040	CAP SM0805 1N0K 50V CER X7R	C8
23461-0050	CAP SM0805 22NJ 50V CER X7R	C26
23461-0070	CAP SM0805 4N7J 50V CER X7R	C7,C36
23461-0080	CAP SM0805 47NK 50V CER X7R	C27
23461-0200	CAP SM0805 2N2J 50V CER X7R	C9
23461-0310	CAP SM1206 1UK 25V CER X7R	C32
23559-5220	CAP SM 22U 35V AL ELEC	C13
25377-1000	TRAN SM NPN BC849C SOT23	Q1
27002-0020	OPTO-COUPLR SM IL206AT SOIC8	IC6-10
27106-1160	IC SM LM324M OP AMP SO14	IC4
27106-1250	IC SM MCP602 OP AMP	IC3
27168-1100	IC SM MP2307 SO8	IC1
27239-0140	IC SM 74HC14 SO14	IC2
27250-2300	IC SM PIC16F785-I/SO 20SOIC	IC11
35555-5110	PCB - AUX TERM/POWER - nQLT	

MECHANICAL ITEMS - QL355 & QL355P - UNPACKED PARTS LIST

Part No.	Description	Position
10232-0360	TUBING PVC CLEAR 9.5ID UL	Mains wire to mains switch sleeving (70mm)
20620-0010	CLIP - ENCODER KNOB	
20661-0290	SPACER Clr No. 4 x 22.2 Nylon	POWER TOP
20662-0570	FOOT SELF ADHESIVE GREY	FEET FRONT
20662-9101	INSTRUMENT FOOT	FEET BACK
22040-0030	FERRITE SLEEVE APPX 9/16/17L	QTY 1 FOR OUTPUT LEADS (2 PASSES), QTY 1 FOR 6 SENSE WIRES (2 PASSES)
22115-0870	TRANSFORMER-nQL355 ULSP	
22219-0090	SWITCH ROCKER DPST GREY UL SP	
22315-0316	FUSE 1.6A ANTISURGE(T)HBC UL	
22520-0200	ACRECEP 10AMPFUSE SNAP I ULSP	
22571-1101	WASHER ALUMINIUM SAFETY TERM	

MECHANICAL ITEMS - QL355 & QL355P - UNPACKED PARTS LIST continued/...

Part No.	Description	Position
22571-1150	TERM PSU SAFETY:REAR INS YEL	
22571-1210	TERM PSU SFTY2 28L SPINDLE GRY	
22571-1220	TERM PSU SAFETY2:TOP INS RED	
22571-1230	TERM PSU SAFETY2:TOP INS BLK	
22571-1240	TERM PSU SAFETY2:TOP INS GREY	
22575-0009	SHORTING BLOCK	FIT TO SEL 4
22575-0077	SKT 2 WAY IDT .1P	FAN
22575-0078	SKT 3 WAY IDT .1P	LAN to Power
22575-0202	SKT 2W .156 20AWG Yellow IDT	
22575-0205	SKT 5W .156 20AWG Yellow IDT	TX TO PWR PCB
22575-0206	SKT 6W .156 20AWG Yellow IDT	TX TO PWR PCB
23557-0506	CAP 10u 63V ELEC P2	Rear terminals
28522-0050	FAN 80MM 12VDC (QL) UL SP	
31512-0830	BRACKET R/PANEL TO PCB QL	
31512-0880	BRACKET F/PANEL TO CHASS QLS	
31512-1070	BRACKET - FAN SUPPORT - QL S	
33111-0280	BRACKET HANDLE - PSU UNIVERSAL	
33143-0293	FOOT - TILT - HOUSING GREY3	FEET FRONT
33143-0303	FOOT - TILT - SUPPORT - GREY3	FEET FRONT
33147-0293	FRONT MOULDING QLS PRTD GY3 UL	
33331-1650	OVERLAYTERM/NAM/LOGnQL355P	
33331-9720	OVERLAYTERM/NAM/LOGnQL355	
33533-0430	LENS - DISPLAY - QL	
33533-0440	WINDOW - DISPLAY - QL	
33536-4323	COVER PAINTED QL SINGLE GREY3	
33536-4350	CHASSIS - PRINTED - QL SINGLE	
33536-4830	CHASSIS - PRINTED - QL-P SINGLE	
37151-0533	KNOB 32MM (QL) D-SHAFT GREY3	
37541-1230	LABEL SAFETY EARTH GRN/WHITE	
43187-2030	WIRE SET CUT BASIC QL UL	
43187-2050	WIRE SET CUT QL-P UL	
43187-2060	WIRE SET CUT QL-P R/TERMS UL	
44117-0020	PCB ASSY - CONTROL - QL355	
44117-0060	PCB ASSY - KEYBOARD - QL355 U	
44117-0070	PCB ASSY - TERMINAL - QL355 U	
44117-0150	PCB ASSY - IEC INLET - QL S	
44117-0180	PCB ASSY - POWER - nQL355	

MECHANICAL ITEMS - QL355 & QL355P - UNPACKED PARTS LIST continued/...

Part No.	Description	Position
44117-0220	PCB ASSY LAN/USB/232/GPIB	
44117-0230	PCB ASSY - KEYBOARD - QL355-P U	
46117-0010	FIXINGS & FASTEN QL355/564	
47511-0020	KEYPAD - QL SINGLE	

FIXINGS AND FASTENERS PARTS LIST QL355/355P QL564/564P

Part No.	Description	Position
20010-0254	RIVET SNAP-LOCK 4.1D X 5.5T	Fan
20010-0264	RIVET SNAPLOCK 3.6Dx2.2-3TGREY	Fan bracket/Chassis
20010-0266	RIVET SNAP-LOCK 3.6Dx2-3H F/HD	Power pcb/Fan(2)
20030-0271	WASHER M4x12x1 ZPST	Output terminals
20037-0304	WASHER M4 SHK/PROOF I/T ZPST	Front feet (2), Terminals(3)
20037-0310	WASHER WIDE RIM 4.3IDx12.6OD	Earth terminal
20062-9301	SCREW No.4x3/8in. Pozi. Pan	GPIB bracket
20063-0010	SCREW NO6 X 3/8 NIBHDPZ ST/AB	Case
20063-0020	SCREW NO6 X 1/2 NIBHDPZ ST/AB	TX
20065-0070	SCREW M2.5 X 6 PLAS PNHDPZ	K/B/FP(4), Handle bracket(2)
20210-0110	NUT M4 BARB	Terminals
20210-0112	NUT M3 BARB	Barrier block(2), Remote sense pcb (2)
20213-0010	CAPTIVE NUT SNU-1219-17-00	TX
20213-0040	CAPTIVE NUT SPIRE NO.6	Chassis
20234-0016	SCREW M4 X 16 PNHDPZ ZPST	Feet
20234-0025	SCREW M3 X 12 PNHDPZ ZPST	Barrier block
20234-0028	SCREW M4 X 10 PNHDPZ ZPST	Front feet
20234-0100	SCREW M3x6PNHDPZ C/W EXT SH/P	Bracket/Chassis(2), Power
20234-0101	SCREW M3x16PNHDPZ C/W SH/P	Remote sense post
20236-0010	SCREW M4 X 12 TAMPERPROOF	Earth
20651-0016	CLIP CABLE RICHCO MWSEA2-2-01	Fan bracket mtg
20653-0204	CABLE TIE 100 X 2.5MM	
20661-0222	SPACER Hex M3 x 10 NPBR	FP Support bracket
20661-0295	SPACER HEX M4 X 8 NPBR	Terminals
20661-9111	SPACER Hex M3 x 6 NPBR	Remote sense pcb
22571-1101	WASHER ALUM. SAFETY TERM	Earth

MECHANICAL ITEMS - QL355T & QL355TP UNPACKED PARTS LIST

Part No.	Description	Position
10232-0360	TUBING PVC CLEAR 9.5ID UL	Mains wire to mains switch sleeving (70mm)
20010-0262	RIVET SNAP-LOCK 4.1D X 3.5T	AUX PCB SPACERS

MECHANICAL ITEMS - QL355T & QL355TP UNPACKED PARTS LIST continued/...

Part No.	Description	Position
20620-0010	CLIP - ENCODER KNOB	
20651-0018	CLAMP CABLE 11.1 X 4.8	AUX RIBBON CABLE FIXING (REAR MOUNT)
20661-0290	SPACER Clr No.4 X 22.2mm Nylon	POWER TOP
20661-0610	SPACER PCB SUPPRT 1/2 INCH NY	AUX PCB
20662-0570	FOOT SELF ADHESIVE GREY	FEET FRONT
20662-9101	INSTRUMENT FOOT	FEET BACK
22040-0030	FERRITE SLEEVE APPX 9/16/17L	QTY 2 FOR OUTPUT LEADS (2 PASSES), QTY 2 FOR 6 SENSE WIRES (2 PASSES)
22115-0870	TRANSFORMER-nQL355 ULSP	
22219-0090	SWITCH ROCKER DPST GREY UL SP	
22315-0304	FUSE 4.0A A/SURGE (T) HBC UL	
22315-0316	FUSE 1.6A ANTISURGE(T)HBC UL	FS1,FS1 fitted to IEC PCB assy
22520-0200	ACRECEP 10AMPFUSE SNAPI ULSP	
22571-1101	WASHER ALUMINIUM SAFETY TERM	Earth
22571-1150	TERM PSU SAFETY:REAR INS YEL	
22571-1210	TERM PSU SFTY2 28L SPINDLE GRY	
22571-1220	TERM PSU SAFETY2:TOP INS RED	
22571-1230	TERM PSU SAFETY2:TOP INS BLK	
22571-1240	TERM PSU SAFETY2:TOP INS GREY	
22575-0009	SHORTING BLOCK	MASTER SEL3 (1), SLAVE LK1 (1), SLAVE LK2 (1)
22575-0077	SKT 2 WAY IDT .1P	FAN (2) POWER TO POWER (2)
22575-0078	SKT 3 WAY IDT .1P	POWER to POWER
22575-0202	SKT 2W .156 20AWG YELLOW IDT	
22575-0205	SKT 5W .156 20AWG Yellow IDT	TX TO PWR PCB
22575-0206	SKT 6W .156 20AWG Yellow IDT	TX TO PWR PCB
28522-0050	FAN 80MM 12VDC (QL) UL SP	
31512-0820	BRACKET F.PNL/CHASS QLTRIPLE	
31512-0830	BRACKET R/PANEL TO PCB QL	
31512-1080	BRACKET - FAN SUPPORT - QL T	
33111-0280	BRACKET HANDLE - PSU UNIVERSAL	
33143-0293	FOOT - TILT - HOUSING GREY3	FEET FRONT
33143-0303	FOOT - TILT - SUPPORT - GREY3	FEET FRONT
33147-0273	FRONT MOULDING QLT PRTD GY3 UL	
33331-2030	OVERLAY TERM/NAM/LOGnQL355TP	
33331-9700	OVERLAY TERM/NAM/LOGnQL355T	

MECHANICAL ITEMS - QL355T & QL355TP UNPACKED PARTS LIST continued/...

Part No.	Description	Position
33533-0430	LENS - DISPLAY - QL	
33533-0440	WINDOW - DISPLAY - QL	
33536-4303	COVER PAINTED QL TRIPLE GREY3	
33536-4360	CHASSIS - PRINTED QL TRIPLE	
33536-4840	CHASSIS - PRINTED QL TRIPLE P	
37113-2113	BUTTON 6.5D X 9.4L GREY3	FRONT PANEL
37151-0533	KNOB 32MM (QL) D-SHAFT GREY3	
37541-1230	LABEL SAFETY EARTH GRN/WHITE	
43187-2030	WIRE SET CUT BASIC nQL UL	
43187-2040	WIRE SET CUT QL-T UL	
43187-2050	WIRE SET CUT QL-P UL	
43187-2060	WIRE SET CUT QL-T r/TERMS UL	
44117-0020	PCB ASSY - CONTROL - QL355	
44117-0070	PCB ASSY - TERMINAL - QL355 U	
44117-0090	PCB ASSY - KEYBOARD -QL355T U	
44117-0130	PCB ASSY IEC 230V QL355T/TP	
44117-0180	PCB ASSY - POWER - nQL355	
44117-0210	PCB ASSY AUX TERM/POWER nQLT	
44117-0220	PCB ASSY LAN/USB/232/GPIB	
47511-0010-L	KEYPAD - QLT LEFT	
47511-0010-R	KEYPAD - QLT RIGHT	

FIXINGS AND FASTENERS QL355T/TP QL564T/TP

Part No.	Description	Position
20010-0254	RIVET SNAP-LOCK 4.1D X 5.5T	Fan
20010-0264	RIVET SNAPLOK 3.6Dx2.2-3TGREY	Chassis/Fan bracket
20010-0266	RIVET SNAP-LOCK 3.6Dx2-3H F/HD	Power pcb/Fan bracket
20030-0266	WASHER M4 ZPST	Earth terminals
20030-0271	WASHER M4x12x1 ZPST	Output terminals
20037-0304	WASHER M4 SHK/PROOF I/T ZPST	Front feet(2), Terminals(8)
20037-0310	WASHER WIDE RIM 4.3IDx12.6OD	Earth terminals
20062-9301	SCREW No.4x3/8in. Pozi. Pan	GPIB bracket
20063-0010	SCREW NO6 X 3/8 NIBHDPZ ST/AB	Case
20063-0020	SCREW NO6 X 1/2 NIBHDPZ ST/AB	TX
20065-0070	SCREW M2.5 X 6 PLAS PNHDPZ	K/B/FP(6), Handle bracket(4)
20210-0110	NUT M4 BARB	Terminals
20210-0111	NUT M4 SERRATED FLANGE	Earth

FIXINGS AND FASTENERS QL355T/TP QL564T/TP continued/...

Part No.	Description	Position
20210-0112	NUT M3 BARB	Barrier block(4), Remote sense
20213-0010	CAPTIVE NUT SNU-1219-17-00	TX
20213-0040	CAPTIVE NUT SPIRE NO.6	Chassis
20234-0016	SCREW M4 X 16 PNHDPZ ZPST	Feet
20234-0025	SCREW M3 X 12 PNHDPZ ZPST	Barrier block
20234-0028	SCREW M4 X 10 PNHDPZ ZPST	Front feet
20234-0100	SCREW M3x6PNHDPZ C/W EXT SH/P	Bracket/Chassis(4),Power pcb/Fan bracket(4),
20234-0101	SCREW M3x16PNHDPZ C/W SH/P	Remote sense pcb/Aux.
20236-0010	SCREW M4 X 12 TAMPERPROOF	Earth
20653-0204	CABLE TIE 100 X 2.5MM	
20661-0238	SPACER HEX M3 x 8 NPBR	FP Support bracket
20661-0295	SPACER HEX M4 X 8 NPBR	Terminals
20661-9111	SPACER Hex M3 x 6 NPBR	Remote sense pcb

MECHANICAL ITEMS – QL564T & QL564TP UNPACKED PARTS LIST

Part No.	Description	Position
10232-0360	TUBING PVC CLEAR 9.5ID UL	Mains wire to mains switch sleeving (70mm)
20010-0262	RIVET SNAP-LOCK 4.1D X 3.5T	AUX PCB SPACERS
20620-0010	CLIP - ENCODER KNOB	
20651-0016	CLIP CABLE RICHCO	MTG TO FAN BRKT
20651-0018	CLAMP CABLE 11.1 X 4.8	AUX RIBBON CABLE FIXING (REAR MOUNT)
20661-0290	SPACER Clr No.4 X 22.2mm Nylon	POWER TOP
20661-0610	SPACER PCB SUPPRT 1/2 INCH NY	AUX PCB
20662-0570	FOOT SELF ADHESIVE GREY	FEET FRONT
20662-9101	INSTRUMENT FOOT	FEET BACK
22040-0030	FERRITE SLEEVE APPX 9/16/17L	QTY 2 FOR OUTPUT LEADS (2 PASSES), QTY 2 FOR
22115-0880	TRANSFORMER-nQL564 ULSP	
22219-0090	SWITCH ROCKER DPST GREY UL SP	
22315-0304	FUSE 4.0A A/SURGE (T) HBC UL	
22315-0316	FUSE 1.6A ANTISURGE(T)HBC UL	FS1,FS1 fitted to IEC PCB assy
22467-0040	TERMINAL BARRIER BLOCK 4W 10A	
22520-0200	ACRECEP 10AMPFUSE SNAPI ULSP	
22571-1101	WASHER ALUMINIUM SAFETY TERM	Earth

MECHANICAL ITEMS – QL564T & QL564TP UNPACKED PARTS LIST continued/...

Part No.	Description	Position
22571-1150	TERM PSU SAFETY:REAR INS YEL	
22571-1210	TERM PSU SFTY2 28L SPINDLE GRY	
22571-1220	TERM PSU SAFETY2:TOP INS RED	
22571-1230	TERM PSU SAFETY2:TOP INS BLK	
22571-1240	TERM PSU SAFETY2:TOP INS GREY	
22575-0009	SHORTING BLOCK	MASTER SEL3 (1), SLAVE LK1 (1), SLAVE LK2 (1)
22575-0077	SKT 2 WAY IDT .1P	FAN (2) POWER TO POWER (2)
22575-0078	SKT 3 WAY IDT .1P	POWER to POWER
22575-0202	SKT 2W .156 20AWG YELLOW IDT	
22575-0205	SKT 5W .156 20AWG Yellow IDT	TX TO PWR PCB
22575-0206	SKT 6W .156 20AWG Yellow IDT	TX TO PWR PCB
23557--0506	CAP 10U 63V ELEC P2	
28522-0050	FAN 80MM 12VDC (QL) UL SP	
31512-0820	BRACKET F.PNL/CHASS QLTRIPLE	
31512-0830	BRACKET R/PANEL TO PCB QL	
31512-1080	BRACKET - FAN SUPPORT - QL T	
33111-0280	BRACKET HANDLE - PSU UNIVERSAL	
33143-0293	FOOT - TILT - HOUSING GREY3	FEET FRONT
33143-0303	FOOT - TILT - SUPPORT - GREY3	FEET FRONT
33147-0273	FRONT MOULDING QLT PRTD GY3 UL	
33331-9710	OVERLAY TERM/NAM/LOGQL564T	
33331-2040	OVERLAY TERM/NAM/LOGQL564TP	
33533-0430	LENS - DISPLAY - QL	
33533-0440	WINDOW - DISPLAY - QL	
33536-4303	COVER PAINTED QL TRIPLE GREY3	
33536-4360	CHASSIS - PRINTED QL TRIPLE	
33536-4840	CHASSIS - PRINTED QL TRIPLE P	
37113-2113	BUTTON 6.5D X 9.4L GREY3	FRONT PANEL
37151-0533	KNOB 32MM (QL) D-SHAFT GREY3	
37541-1230	LABEL SAFETY EARTH GRN/WHITE	
43187-2030	WIRE SET CUT BASIC nQL UL	
43187-2040	WIRE SET CUT nQL-T UL	
43187-2050	WIRE SET CUT QL-P UL	

MECHANICAL ITEMS – QL564T & QL564TP UNPACKED PARTS LIST continued/...

Part No.	Description	Position
43187-2060	WIRE SET CUT QL-T r/TERMS UL	
44117-0020	PCB ASSY - CONTROL - QL355	
44117-0070	PCB ASSY - TERMINAL - QL355 U	
44117-0090	PCB ASSY - KEYBOARD -QL355T U	
44117-0130	PCB ASSY IEC 230V QL355T/TP	
44117-0190	PCB ASSY - POWER - nQL564	
44117-0210	PCB ASSY AUX TERM/POWER nQLT	
44117-0220	PCB ASSY LAN/USB/232/GPIB	
47511-0010-L	KEYPAD - QLT LEFT	
47511-0010-R	KEYPAD - QLT RIGHT	

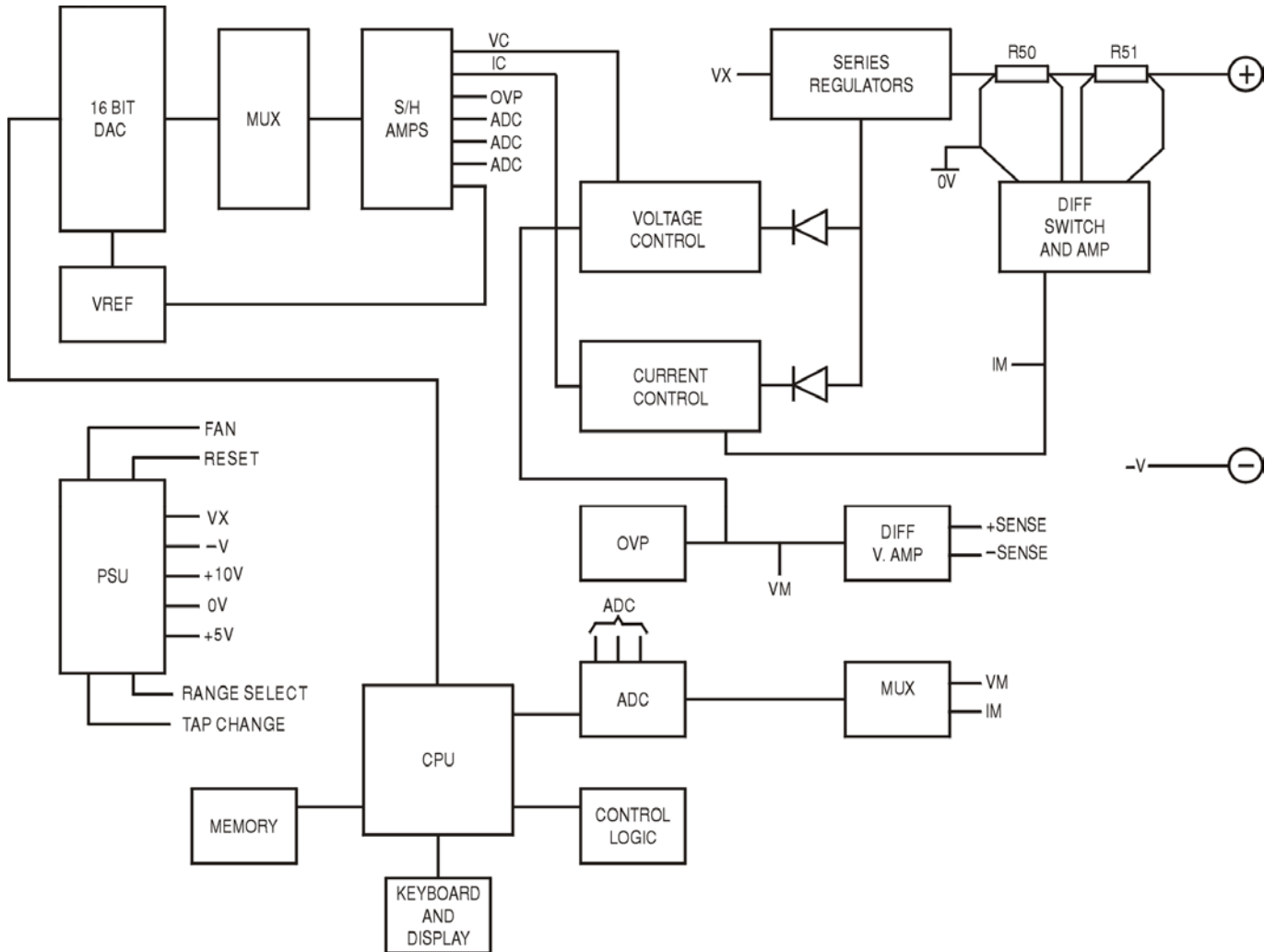
MECHANICAL ITEMS - QL564/564P UNPACKED PARTS LIST

Part No.	Description	Position
10232-0360	TUBING PVC CLEAR 9.5ID UL	Mains wire to mains switch sleeving (70mm)
20620-0010	CLIP - ENCODER KNOB	
20662-0570	FOOT SELF ADHESIVE GREY	FEET FRONT
20662-9101	INSTRUMENT FOOT	FEET BACK
22040-0030	FERRITE SLEEVE APPX 9/16/17L	QTY 1 FOR OUTPUT LEADS (2 PASSES), QTY 1 FOR
22115-0880	TRANSFORMER-nQL564 ULSP	
22219-0090	SWITCH ROCKER DPST GREY UL SP	
22315-0316	FUSE 1.6A ANTISURGE(T)HBC UL	
22467-0040	TERMINAL BARRIER BLOCK 4W 10A	
22520-0200	ACRECEP 10AMPFUSE SNAPI ULSP	
22571-1101	WASHER ALUMINIUM SAFETY TERM	
22571-1150	TERM PSU SAFETY:REAR INS YEL	
22571-1210	TERM PSU SFTY2 28L SPINDLE GRY	
22571-1220	TERM PSU SAFETY2:TOP INS RED	
22571-1230	TERM PSU SAFETY2:TOP INS BLK	
22571-1240	TERM PSU SAFETY2:TOP INS GREY	
22575-0009	SHORTING BLOCK	FIT TO SEL 4 & 6
22575-0077	SKT 2 WAY IDT .1P	FAN
22575-0202	SKT 2W .156 20AWG YELLOW IDT	
22575-0205	SKT 5W .156 20AWG Yellow IDT	TX TO PWR PCB
22575-0206	SKT 6W .156 20AWG Yellow IDT	TX TO PWR PCB
23557--0506	CAP 10U 63V ELEC P2	

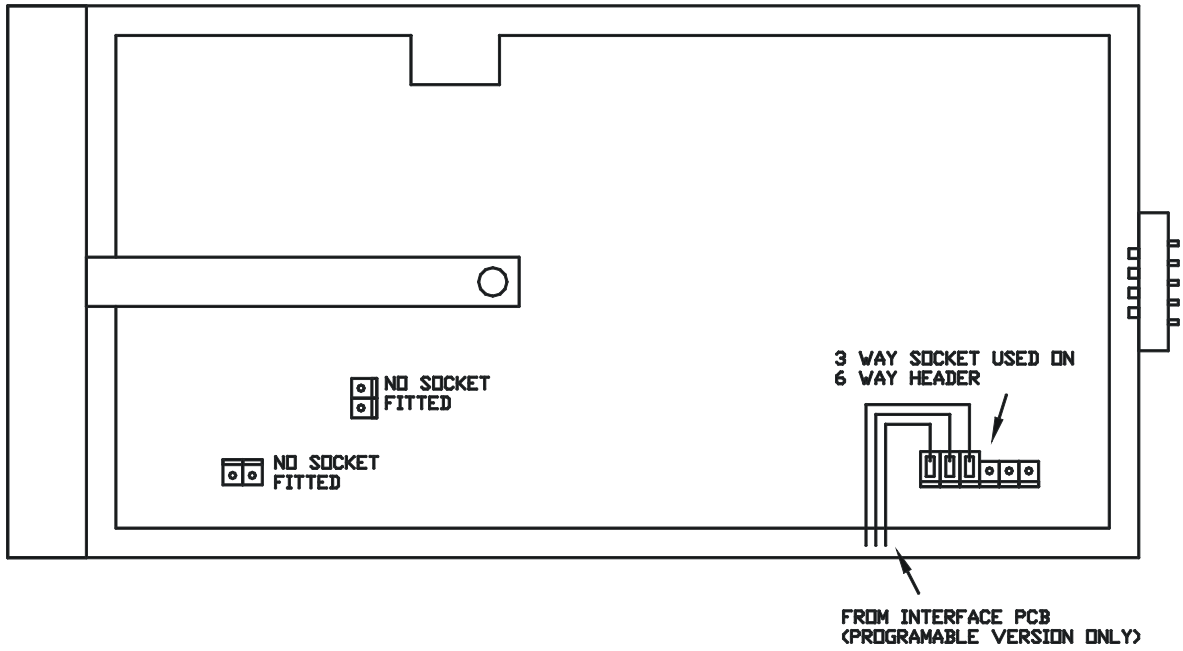
MECHANICAL ITEMS - QL564/564P UNPACKED PARTS LIST continued/...

Part No.	Description	Position
28522-0050	FAN 80MM 12VDC (QL) UL SP	
31512-0830	BRACKET R/PANEL TO PCB QL	
31512-0880	BRACKET F/PANEL TO CHASS QLS	
31512-1070	BRACKET - FAN SUPPORT - QL S	
33111-0280	BRACKET HANDLE - PSU UNIVERSAL	
33143-0293	FOOT - TILT - HOUSING GREY3	FEET FRONT
33143-0303	FOOT - TILT - SUPPORT - GREY3	FEET FRONT
33147-0293	FRONT MOULDING QLS PRTD GY3 UL	
33331-1660	OVERLAYTERM/NAM/LOGnQL564 P	
33331-9730	OVERLAYTERM/NAM/LOGnQL564	
33533-0430	LENS - DISPLAY - QL	
33533-0440	WINDOW - DISPLAY - QL	
33536-4323	COVER PAINTED QL SINGLE GREY3	
33536-4350	CHASSIS - PRINTED - QL SINGLE	
33536-4830	CHASSIS - PRINTED - QL-P SINGLE	
37151-0533	KNOB 32MM (QL) D-SHAFT GREY3	
37541-1230	LABEL SAFETY EARTH GRN/WHITE	
43187-2030	WIRE SET CUT BASIC nQL UL	
43187-2050	WIRE SET CUT QL-P UL	
43187-2060	WIRE SET CUT QL-T r/TERMS UL	
44117-0020	PCB ASSY - CONTROL - QL355	
44117-0060	PCB ASSY - KEYBOARD - QL355 U	
44117-0070	PCB ASSY - TERMINAL - QL355 U	
44117-0150	PCB ASSY - IEC INLET - QL S	
44117-0190	PCB ASSY - POWER - nQL564	
44117-0220	PCB ASSY LAN/USB/232/GPIB	
44117-0230	PCB ASSY - KEYBOARD - QL355-P U	
47511-0020	KEYPAD - QL SINGLE	

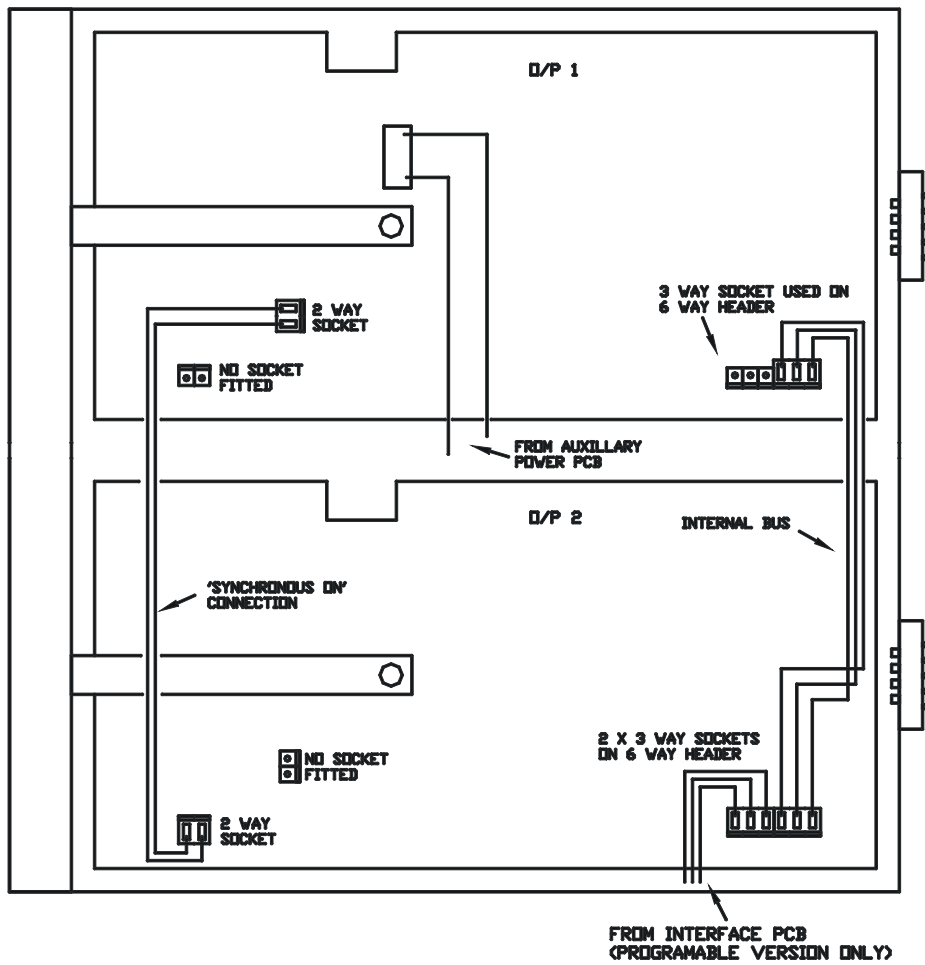
Block Diagram



Interconnection Diagram

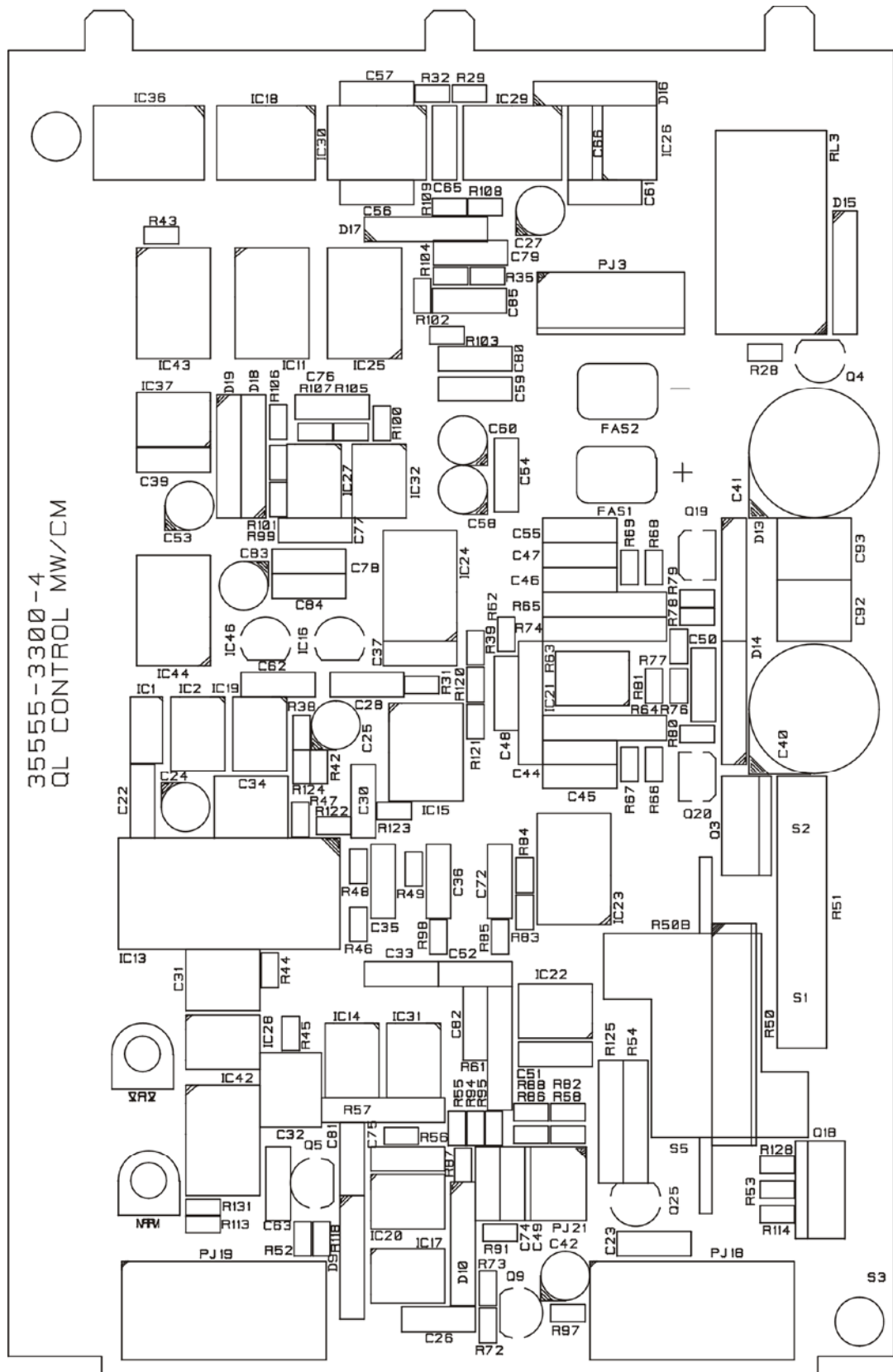


SINGLE PSU

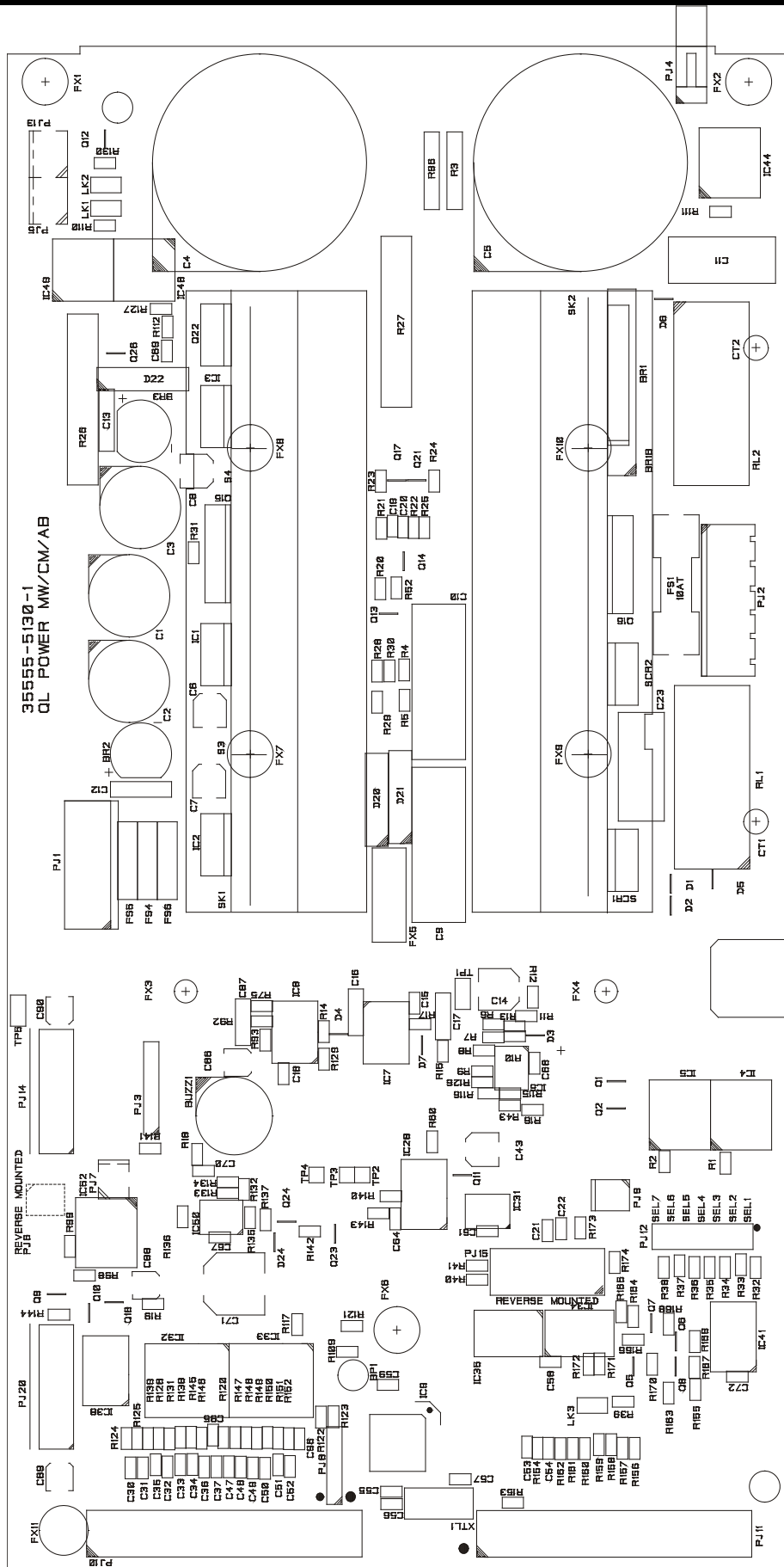


TRIPLE PSU

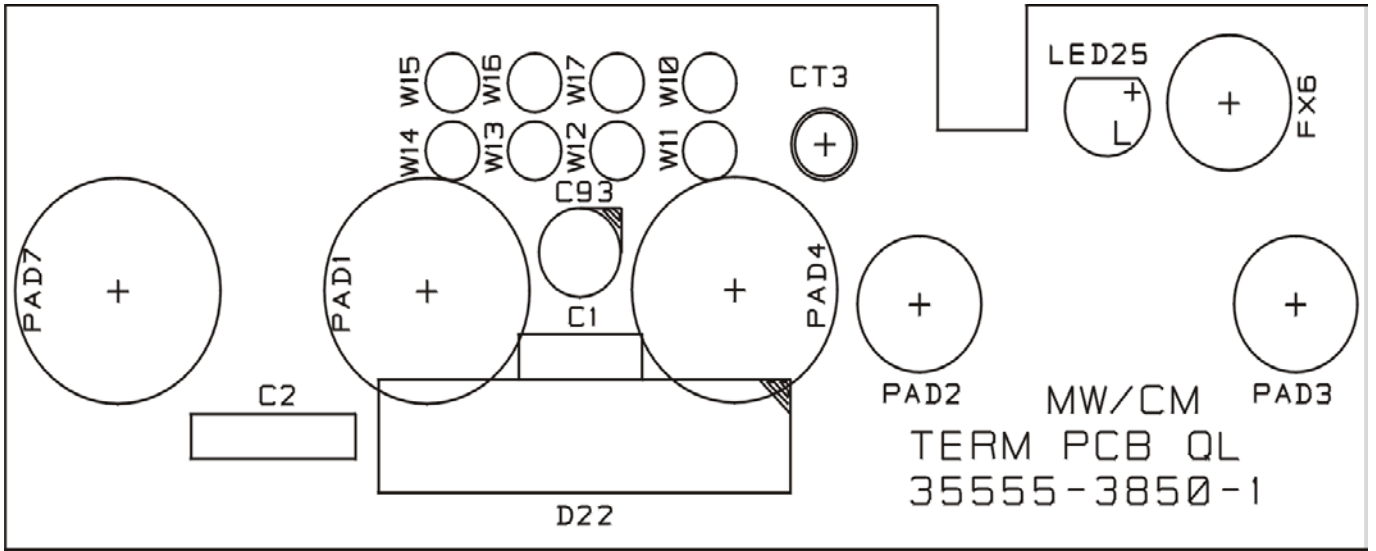
Component Layouts



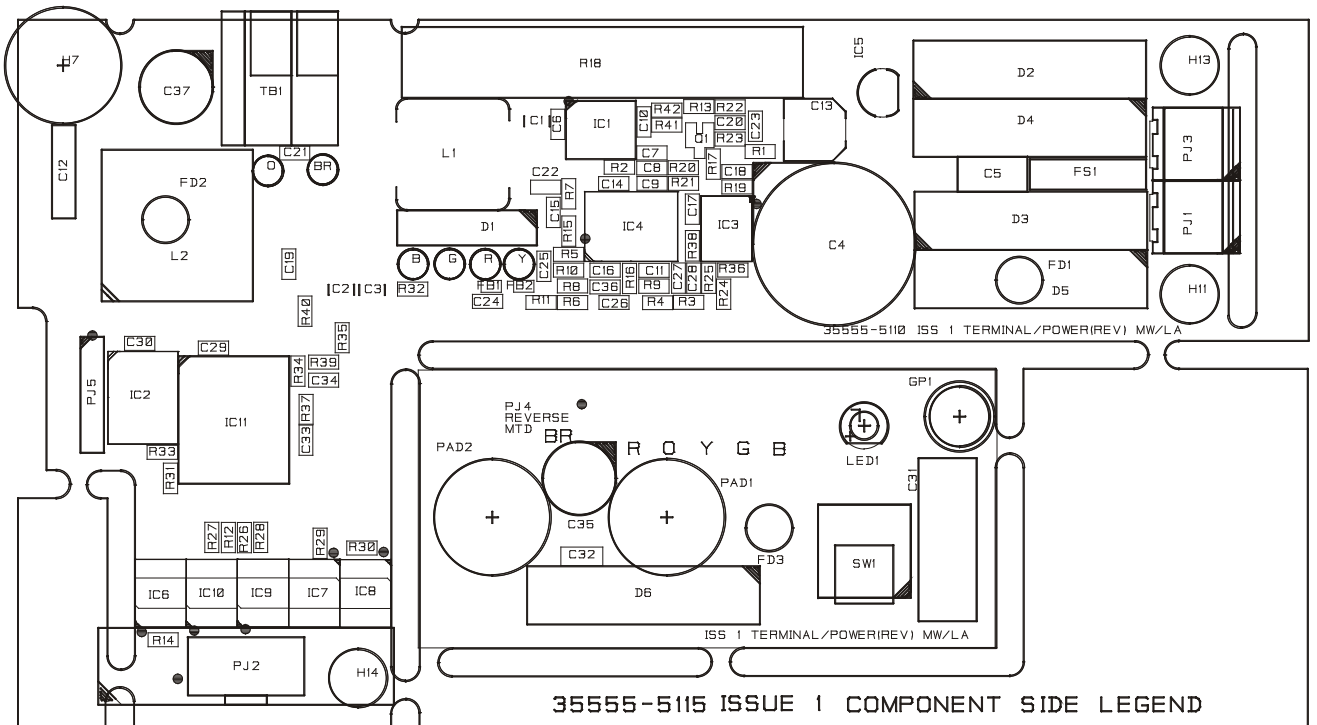
CONTROL PCB



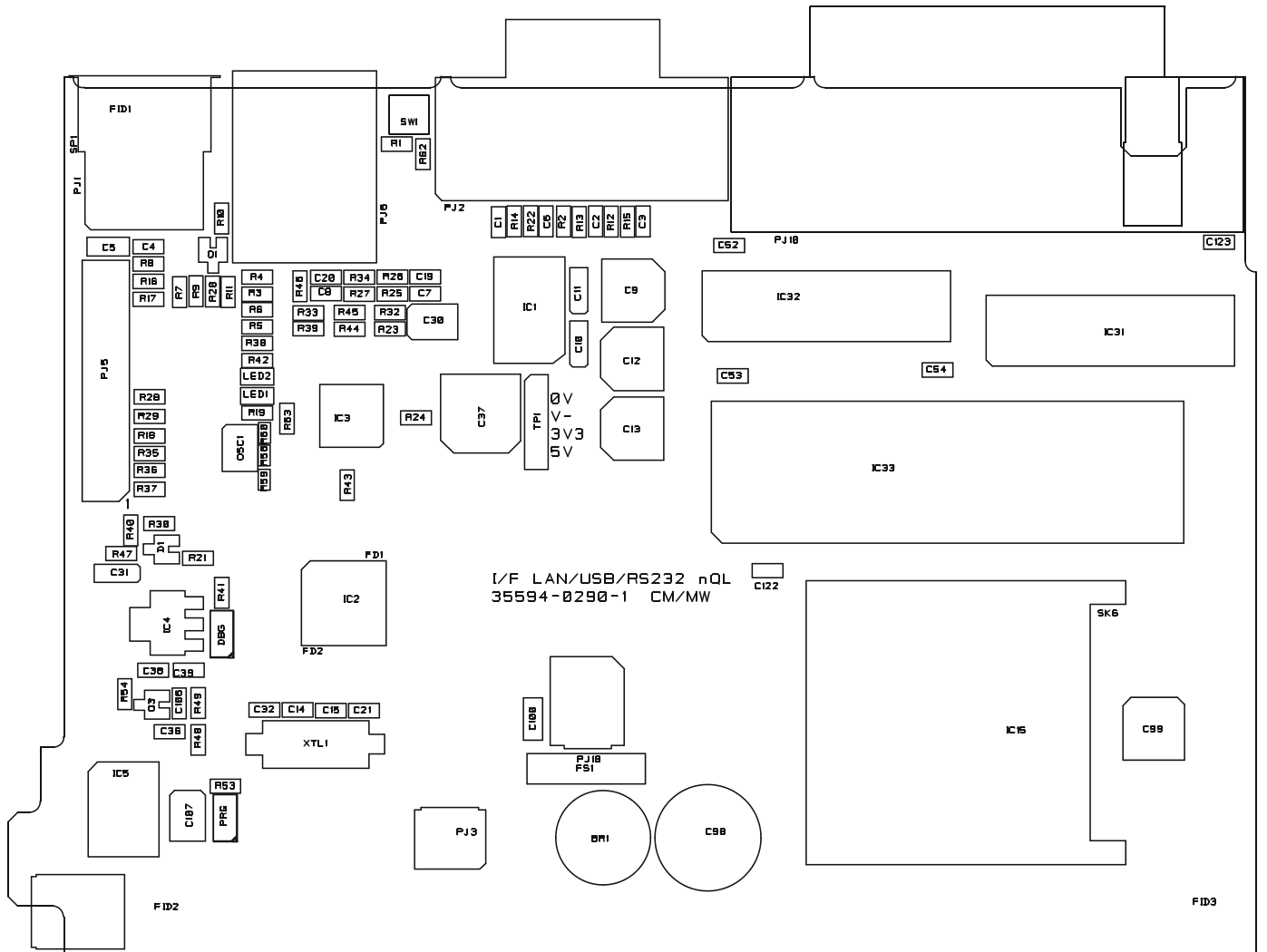
POWER PCB



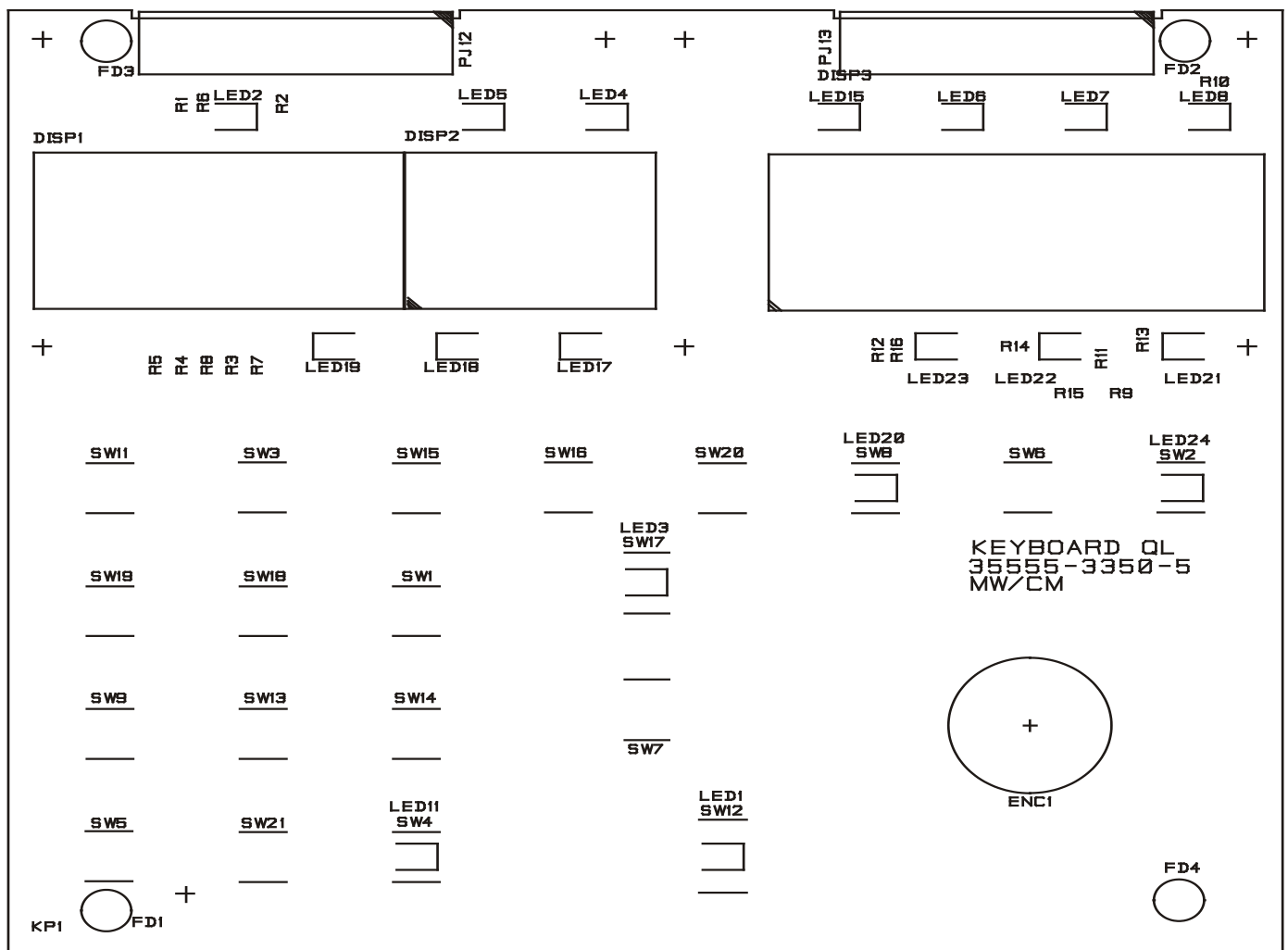
MAIN TERMINAL PCB



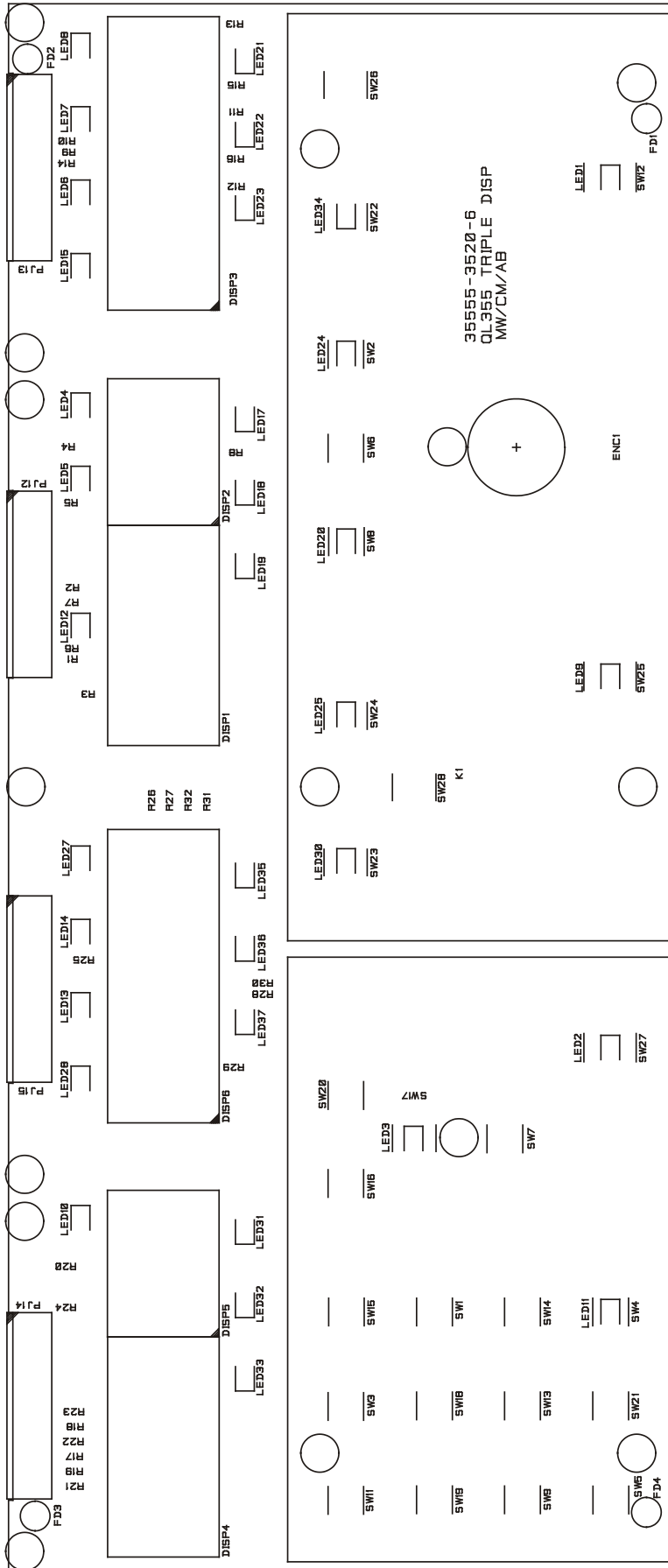
AUXILIARY POWER PCB (TRIPLE ONLY)



INTERFACE PCB

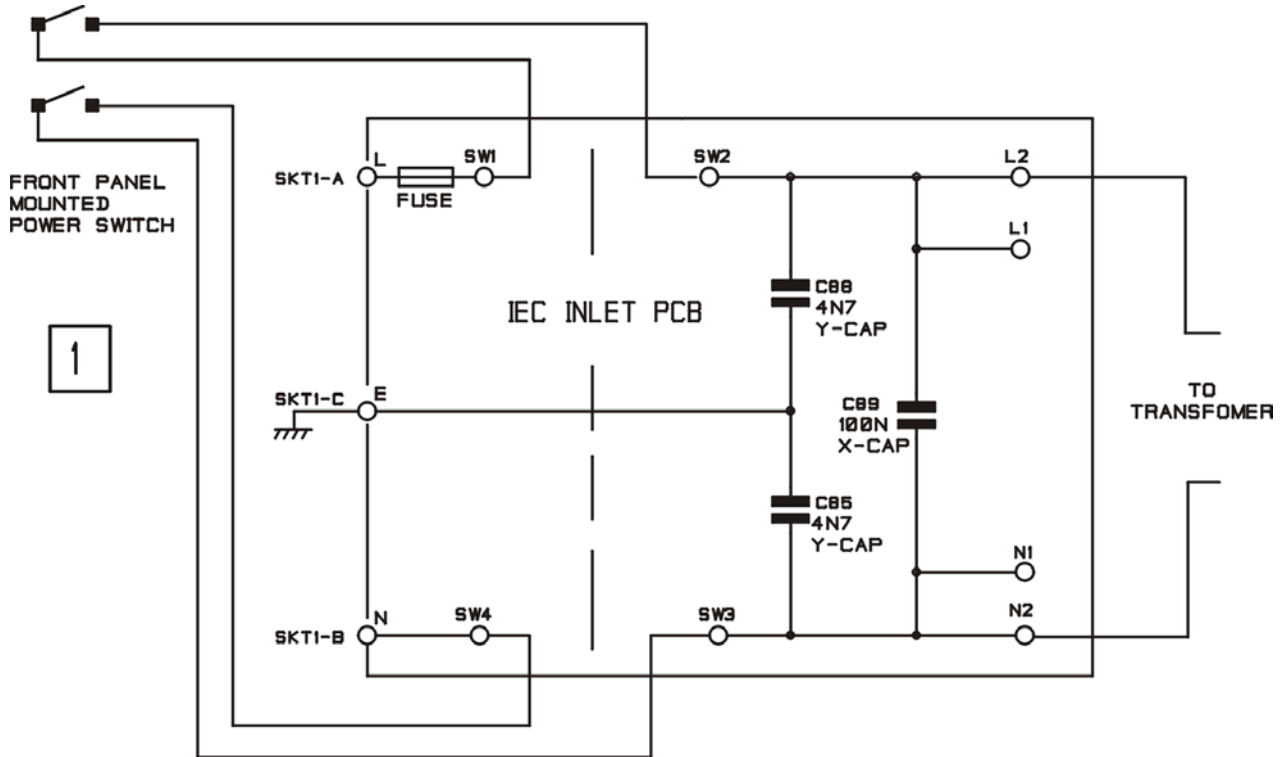


KEYBOARD/DISPLAY PCB (SINGLE)

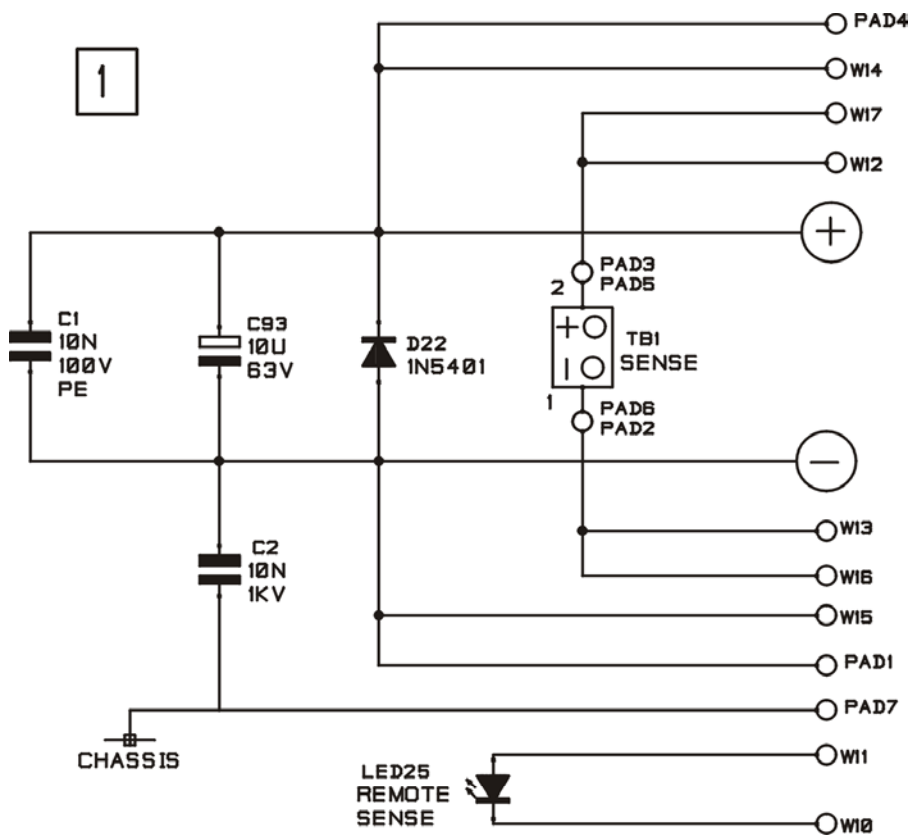


KEYBOARD/DISPLAY PCB (TRIPLE)

Circuit Diagrams

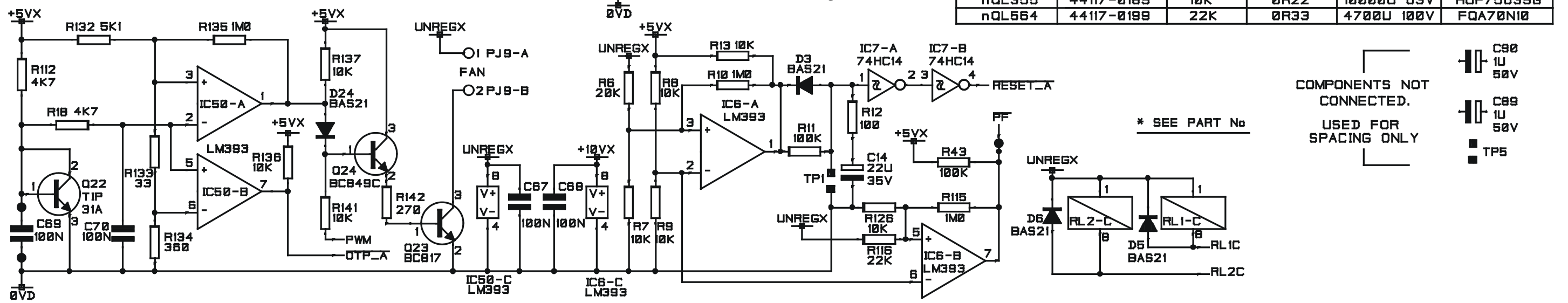
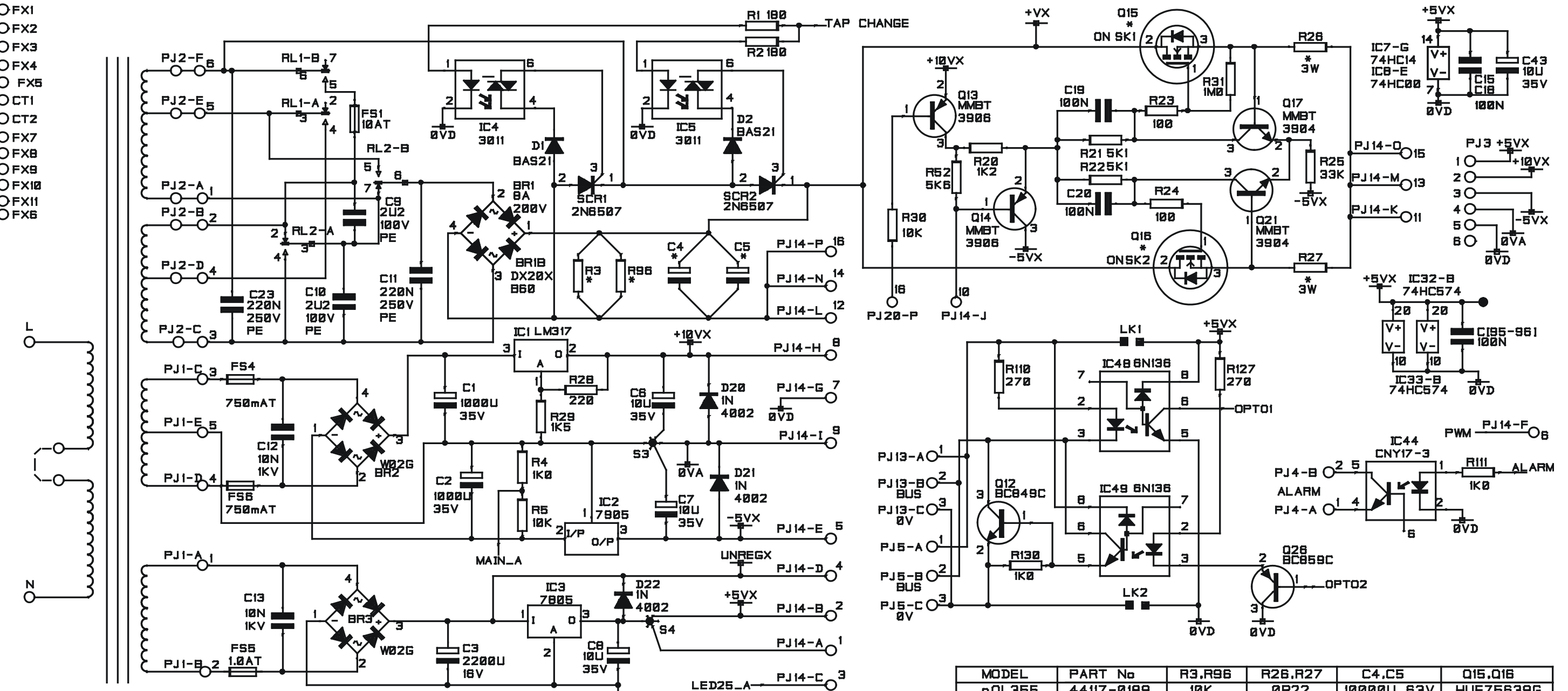


AC SUPPLY CONNECTION PCB



MAIN OUTPUT FRONT PANEL TERMINAL PCB

- FX1
- FX2
- FX3
- FX4
- FX5
- CT1
- CT2
- FX7
- FX8
- FX9
- FX10
- FX11
- FX6

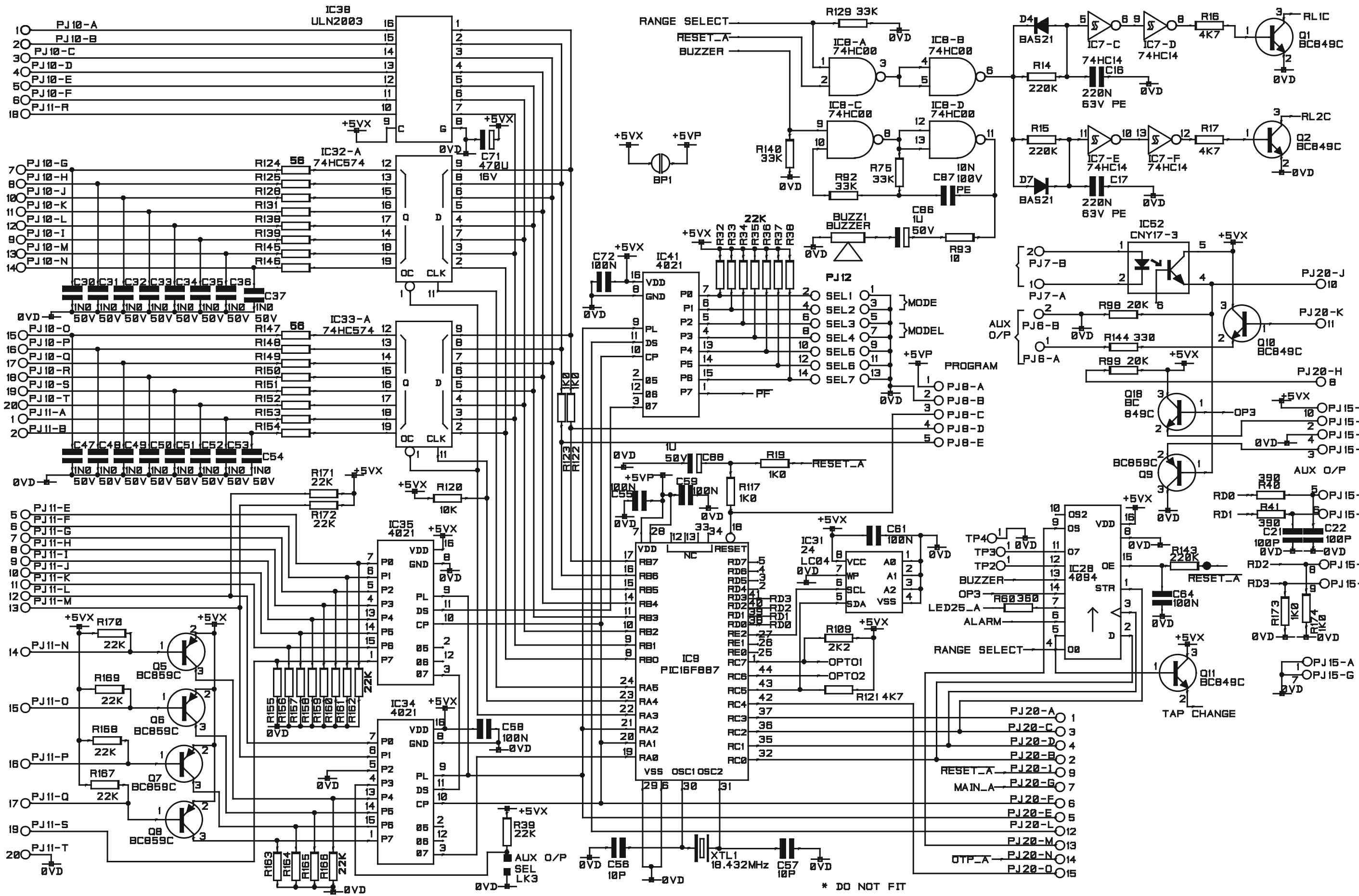


MODEL	PART No	R3,R96	R26,R27	C4,C5	Q15,Q16
nQL355	44117-0199	10K	0R22	10000U 63V	HUF75639G
nQL564	44117-0199	22K	0R33	4700U 100V	FQA70N10

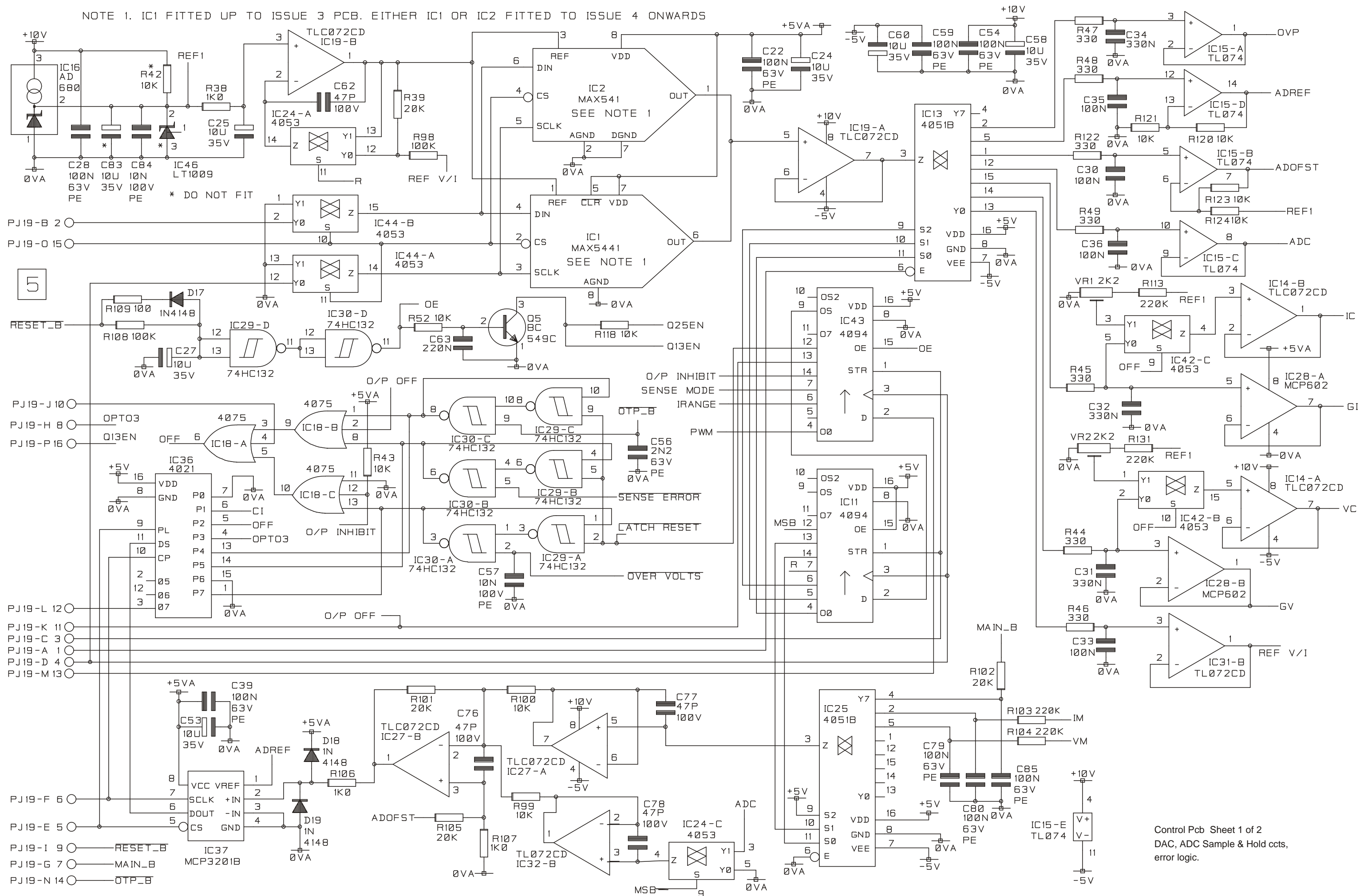
COMPONENTS NOT CONNECTED.
USED FOR SPACING ONLY

* SEE PART No

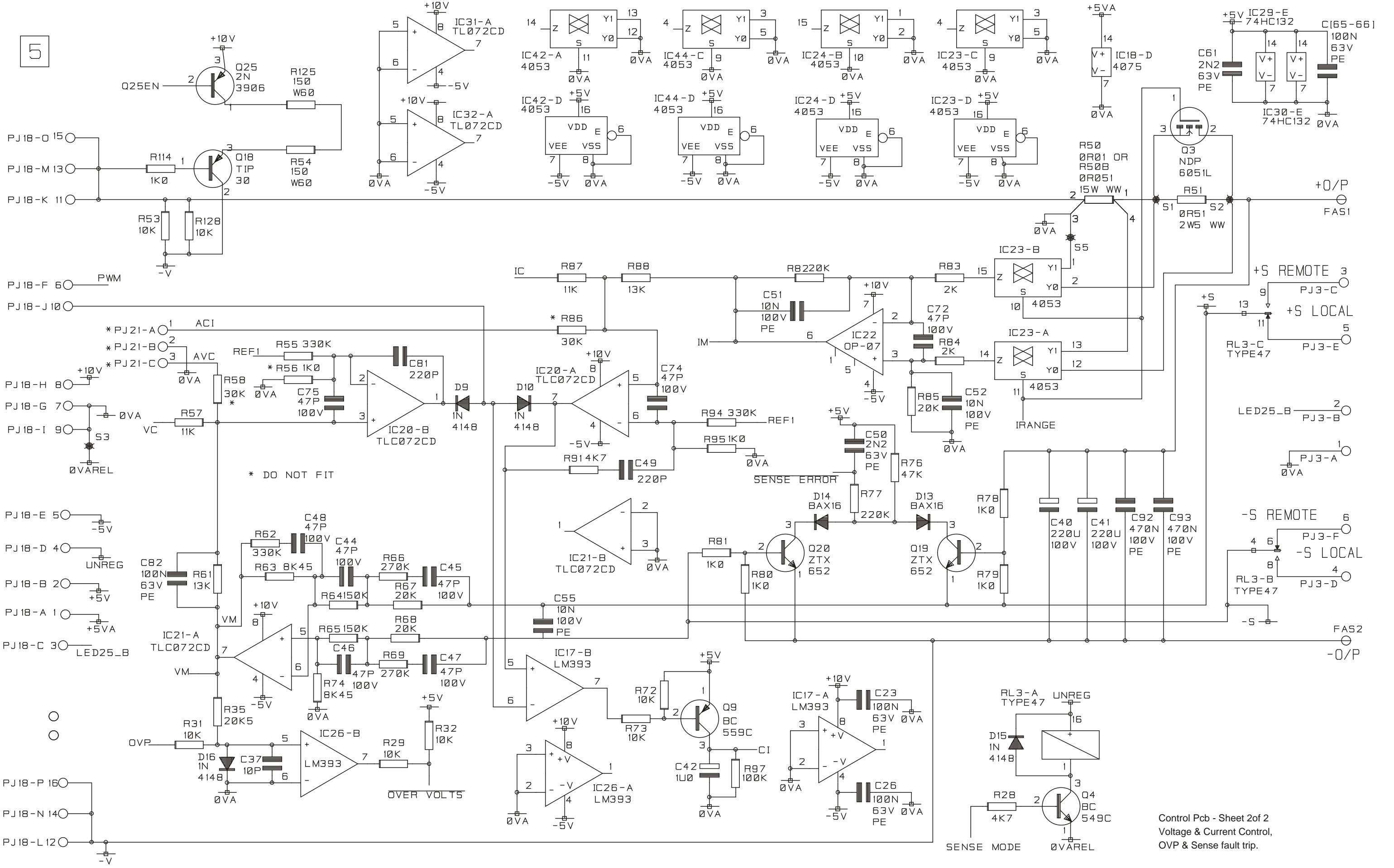
C80 1U 50V
 C89 1U 50V
 TP5



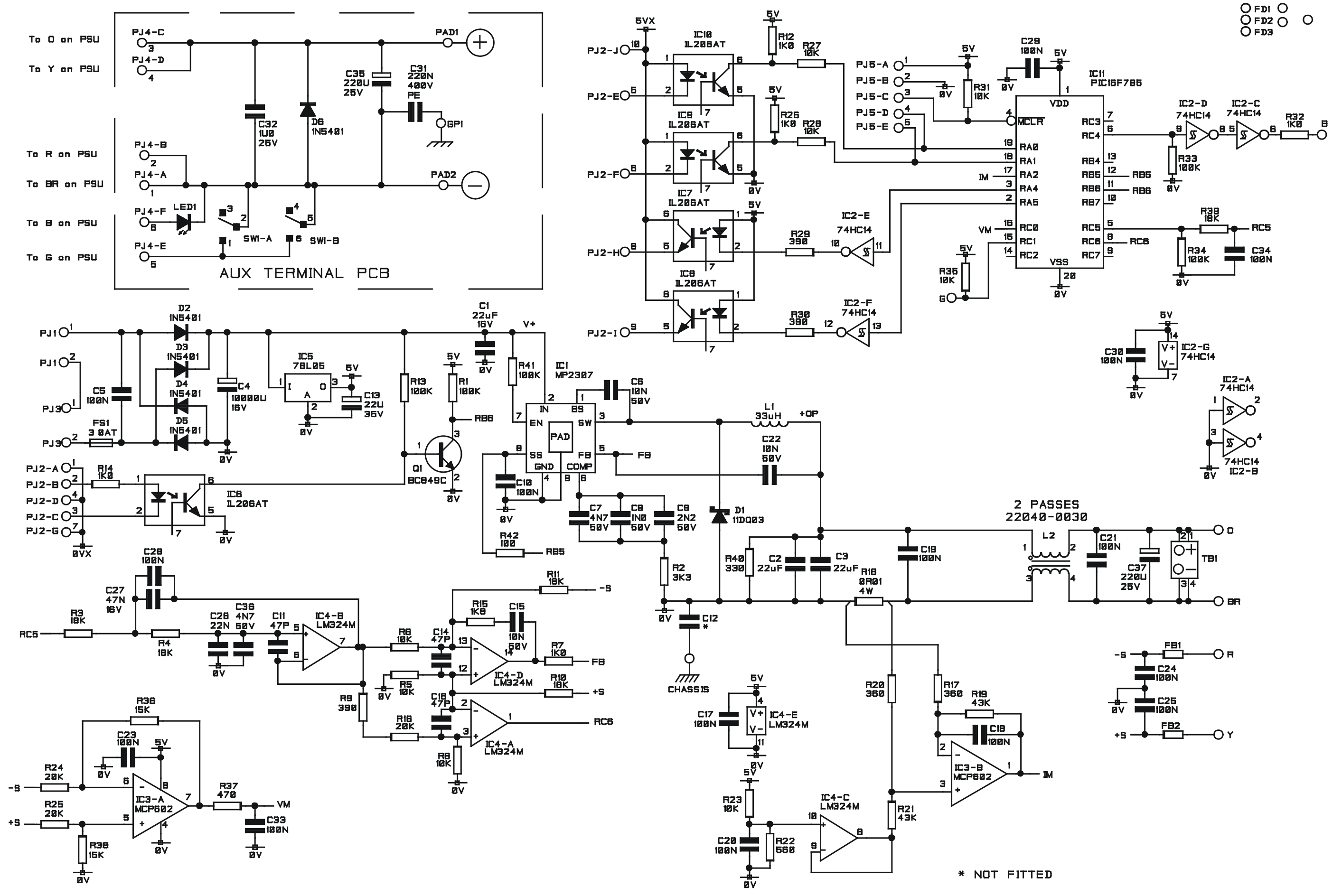
NOTE 1. IC1 FITTED UP TO ISSUE 3 PCB. EITHER IC1 OR IC2 FITTED TO ISSUE 4 ONWARDS



5



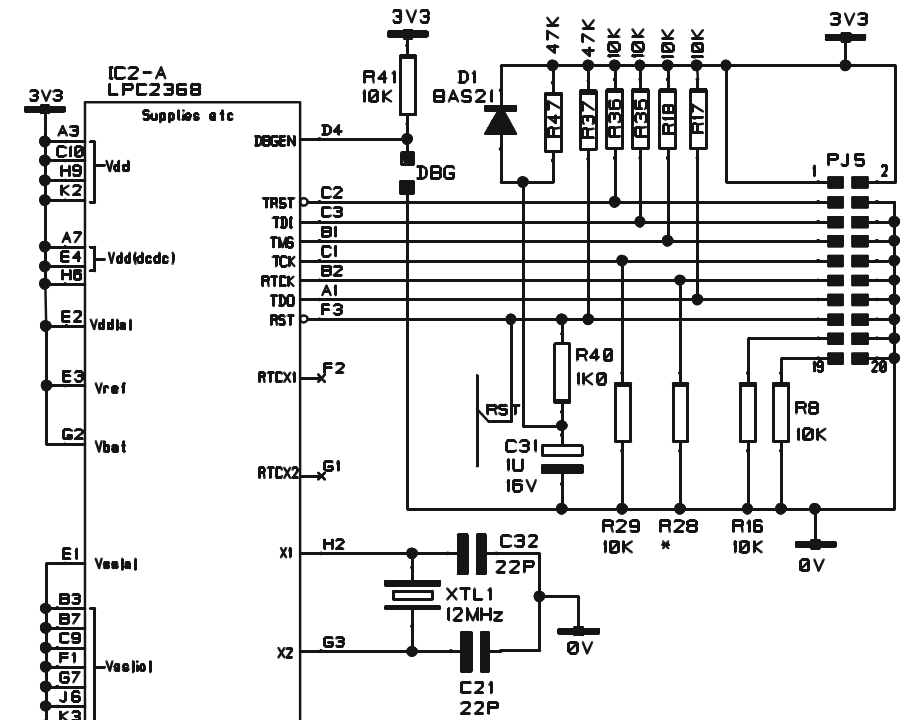
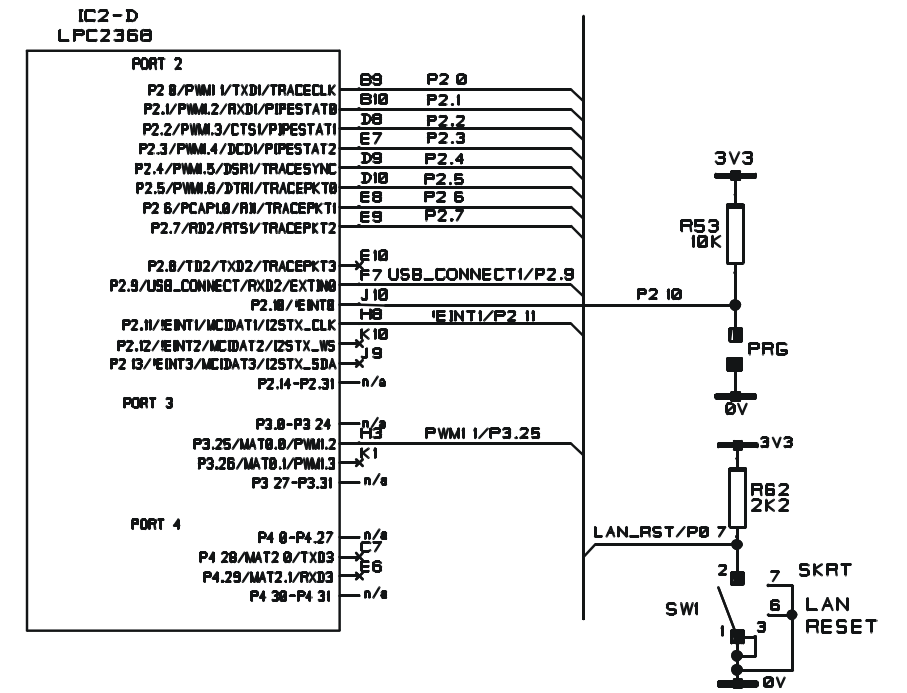
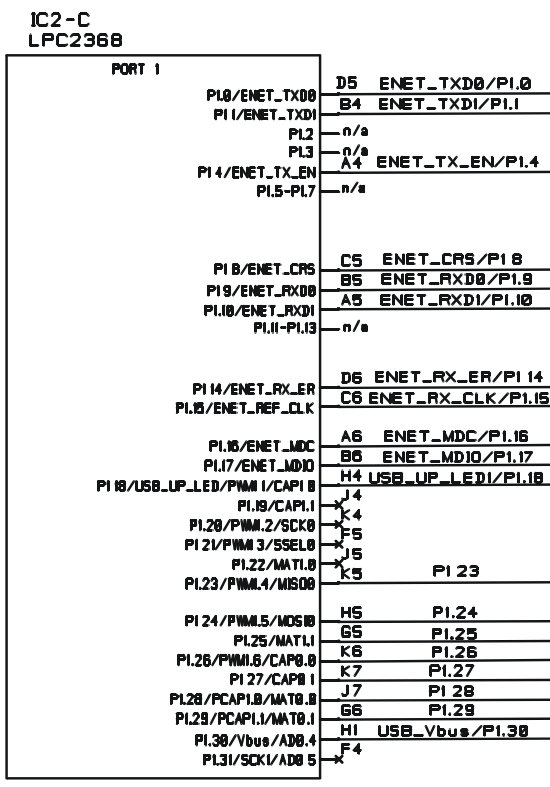
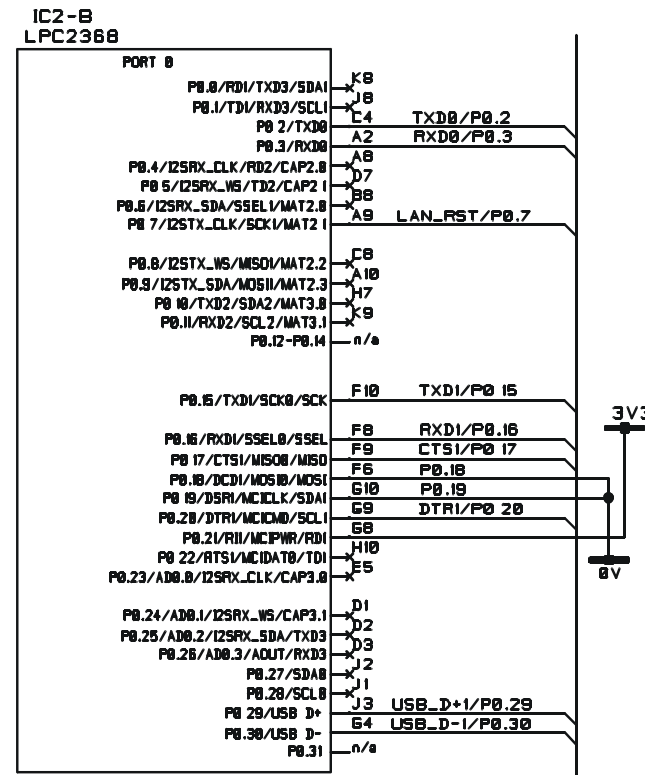
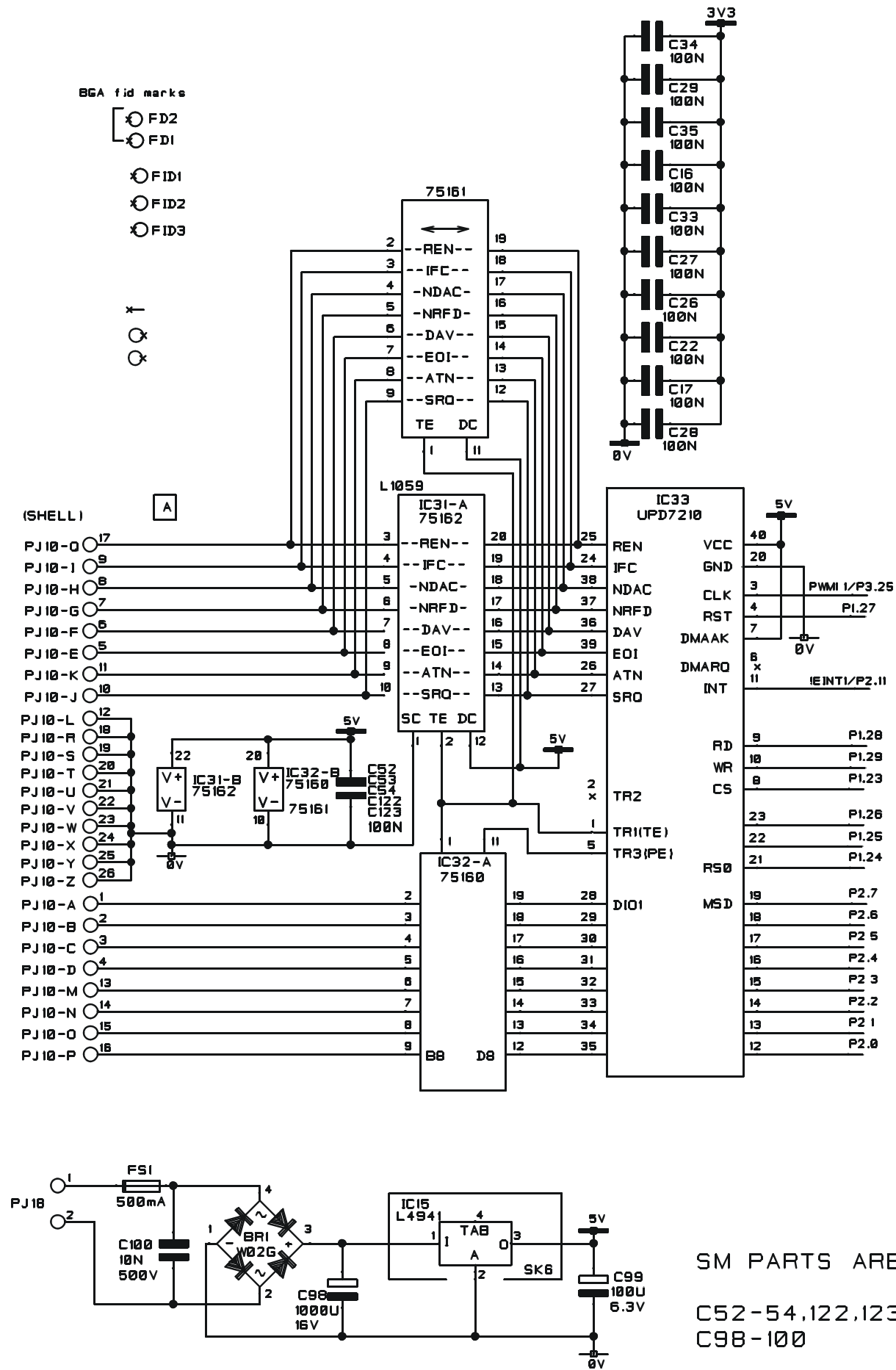
Control Pcb - Sheet 2of 2
 Voltage & Current Control,
 OVP & Sense fault trip.



- FD1 ○
- FD2 ○
- FD3 ○

QL SERIES II - AUXILIARY PCB

* NOT FITTED



SM PARTS ARE:

C52-54,122,123

C98-100

