Wayne Kerr
AP1kW Power Supplies
AP3080 AP6050 AP10030
User & Service Manual

Part Nº 9HAP1kW

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1. SAFETY

1.1 General

This equipment has been designed to meet the requirements of EN61010 “Safety requirements for electrical equipment for measurement, control & laboratory use”, and has left the factory in a safe condition.

This product is not intended for use in atmospheres which are explosive, corrosive or adversely polluted (e.g. containing conductive or excessive dust). It is not intended for use in safety critical or medical applications.

The remainder of this section on safety provides information and warnings which must be followed by the user to ensure safe operation and maintain the equipment in a safe condition otherwise protection provided by the equipment may be impaired.

OPERATOR - Person who uses this equipment for its intended purpose. This person should be suitably trained and aware of the hazards. Operators should be capable of fuse replacement providing the normal precautions are taken.

1.2 A.C. Power Supply

1) It is necessary to fit a suitable a.c. power plug to the power cable, the user must observe the following colour codes:

   LIVE terminal to BROWN lead

   NEUTRAL terminal to BLUE lead

   EARTH terminal to GREEN/YELLOW lead.

   The user must also ensure that the protective earth lead would be the last to break should the cable be subject to excessive strain.

2) If the power cable electrical connection to the a.c. power plug is through screw terminals then, to ensure reliable connections, any solder tinning of the cable wires must be removed before fitting the plug.

3) WARNING! Any interruption of the protective earth conductor inside or outside the equipment or disconnection of the protective earth terminal is likely to make the equipment dangerous. Intentional interruption is prohibited.

4) Before switching on the equipment, ensure that it is set to the voltage of the local a.c. power supply.

1.3 Adjustment, Replacement of Parts, Maintenance and Repair

1) When the equipment is connected to the local a.c. power supply internal terminals may be live and the opening of the covers or removal of parts - including fuse holders - (except those to which access can be gained by hand) is likely to expose live parts. **The equipment must be disconnected from all voltage sources before it is opened for any adjustments, replacement (e.g. fuses), maintenance or repair.**

2) Capacitors inside the equipment may still be charged even if the equipment has been disconnected from all voltage sources.

3) Any adjustment, maintenance and repair of the opened equipment powered up must be carried out by a skilled person who is aware of the hazards involved

4) Servicing personnel should be trained against unexpected hazards.

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

1.4 Static Electricity

The unit supplied may use static sensitive devices and service personnel should be alerted to components which require handling precautions to avoid damage by static electrical discharge.

Before handling circuit board assemblies containing these components, personnel should observe the following precautions:

1) The work surface should be a conductive grounded mat.

2) Soldering irons must be grounded and tools must be in contact with a conductive surface to ground when not in use.

3) Any person handling static sensitive parts must wear a wrist strap which provides a leaky path to ground, impedance not greater than 1 megaohm.

4) Components or circuit board assemblies must be stored in or on conductive foam or mat while work is in progress.

5) New components should be kept in the supplier's packaging until required for use.

1.5 Disposal Hazards

Service personnel should be aware that batteries should be disposed of intact and never incinerated.

1.6 Load Inductance

Low voltage D.C. power supply products connected to large inductive loads can store sufficient energy in the load to cause an electrical hazard. Extreme caution is recommended when switching such circuits as back EMFs can reach dangerous levels.

WARNING

This equipment is intended for use by suitably trained and competent persons.

Under some conditions this product is capable of having hazardous voltages (greater than 60V) on its terminals in normal use. Appropriate precautions should be taken for safety.

This product can cause hazards if it is not used in accordance with these instructions. Read them carefully and follow them in all respects. Double check connections to the unit before use.

DO NOT USE THIS EQUIPMENT IF IT IS DAMAGED.

2. SCHEDULE OF EQUIPMENT

The Power Supply has been carefully packed to prevent damage in transit.

The complete equipment comprises:-

Description	Part Nº	Qty
AP Power Supply	11AP3080 or 11AP6050 or 11AP10030	1
User & Service Manual	9HAP1kW	1
Spare Fuses 1A T Type	FT1A00123	1
Rack Mounting Kit	HB2529	1

Note: In the event of damage in transit or shortage in delivery, separate notices in writing should be given to both the carriers and Wayne Kerr Electronics Limited, within three days of receipt of the goods, followed by a complete claim within five days. All goods which are subject of any claim for damage in transit or shortage in delivery should be preserved intact as delivered for a period of seven days after making the claim, pending inspection or instructions from Wayne Kerr Electronics Ltd., or an agent of this company.

3. INTRODUCTION

Autoranging - The AP series of autoranging bench\rack power supplies utilise switching techniques to provide d.c. power up to 1kW over a wide range of voltage and current combinations, thus obviating the need to select alternative output power supplies.

Precision - The units include full digital metering of both voltage and current. The output of each power supply is adjustable from near zero to maximum volts and from near zero to maximum amps by the 10 turn front panel controls. Alternatively, the outputs can be controlled by the remote resistive or voltage programming facilities at the rear of the unit, or, when fitted, by the IEEE488 interface.

Enable & Preview - The power supply output is enabled by the front panel 'output enable' switch. When this switch is in the 'button out' position the front panel LED meters and bargraphs display preview the output voltage and output current. This is done without having to open circuit the load to set the voltage or short circuit the output to set the current.

Displays - When in the 'output enabled' state, the meters and bargraphs display the actual voltage and current being delivered to the load. The bargraph displays, in addition to providing 'trend' indication, also allow the user to see at a glance, the current or voltage availability.

Overvoltage Limit - To protect the load from the inadvertent application of an excessive voltage, the power supply incorporates an 'Overvoltage Limit' (OVL). this causes the supply to 'down programme' if the pre-set level has been exceeded. It can be adjusted by rotating the 'adjust OVL' control through the front panel. In the local mode, this voltage level can be monitored on the voltmeter by depressing the 'Display OVL' button.

Indicators - To enable the user to quickly assess the operating states, the power supply is provided with LED indication of 'output enabled' and 'CV' or 'CI' operation. LED indication is also provided of, an overtemperature condition (when any of the three heat-sink assemblies have exceeded a safe operating temperature), an overvoltage condition and of unregulated output (if the load demand exceeds 1kW d.c.).

Computer Control - An IEEE488 interface is available as a factory fitted option. When fitted, this allows control of voltage and current and, in addition, provides 'read back' to the controller of the actual voltage and current being delivered to the load. The IEEE488 option includes LEDs which indicate if the power supply is 'talking' or 'listening' or whether a 'service request' signal has been sent.

System or Bench Use - The power supply can be used on the bench or rack mounted using the brackets provided. All units are fan cooled.

Standards - The AP series is designed to meet generic emc standards. From 1st Jan 1997 this product will comply with Euro Norm safety standard EN61010-1.

4. SPECIFICATION

All parameters measured with a resistive load.

Models Available

Model №	P max	V range	I range
AP30-80	1kW	0-30V	0-80A
AP60-50	1kW	0-60V	0-50A
AP100-30	1kW	0-100V	0-30A

A.C Input

230V±14% (198 to 263V) or 115V±14% (99 to132V) 48 to 63Hz
Internal link and selector switch to change for 115V operation.

Input Current

9A max. r.m.s. for 240V a.c. (20A peak), 20A max. r.m.s. for 115V a.c.

Inrush Current

31A max. for 240V a.c. 16A for 115V a.c.

Efficiency

80% typical at max. output power

D.C. Output

See models available for voltage and current ranges.

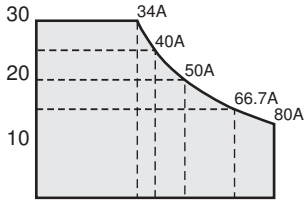

Fig. 4a. AP3080

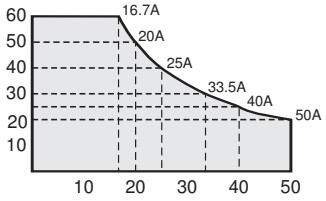

Fig. 4b AP 6050

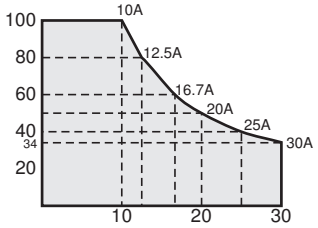

Fig. 4c. AP10030

Output Control

Three methods of control:
1. Front panel ten turn potentiometers.
2. Remote programming by resistance, voltage or current.
3. IEEE488 bus control

Resolution of Controls

0.07% typical of max. output voltage.
0.07% typical of max. output current.

Line Regulation
For a 10% change of a.c. input from nominal

Less than 0.01% +3mV in constant voltage (CV) mode.
Less than 0.01% +5mA in constant current (CI) mode.

Load Regulation
For a zero to full load change

Less than ±0.01% ±5mV in CV mode.
Less than ±0.01% ±5mA in CI mode.

Ripple and Noise
Δf = 20Hz to 20MHz

Typical 4mV r.m.s./40mV p-p
Max 7mV r.m.s./70mV p-p.(CV)
Typical 25mA r.m.s. Max 40mA r.m.s. (CI)

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Temperature Coefficient
Typical after 30 min. warm up

0.01% + 2mV per °C (CV)
0.01% + 4mA per °C (CI)

Stability

Typical drift in output over an 8 hour interval (assuming constant line, load and ambient temperature) after a 30 min. warm up
±0.03% of output ±5mV (CV)
±0.03% of output ±5mA (CI)

Output Impedance

0.2mΩ at d.c., typical.

Load Inductance

When using the power supply close to short circuit it is recommended that all possible precautions are taken to maintain a low load inductance. (Load leads should be short and where possible twisted together.)

Response Time to Transient Loads

Less than 2ms typical for output to recover within 100mV of nominal (CV mode) following a change in output current of from 90-100% or 100-90% of maximum current.

Programming Response Time

Maximum time for output voltage to change from 2 volts to maximum or from maximum to 2V and settle within 200mV band:

UP	Full load (3.4Ω)	120ms
	No load	120ms
DOWN	Full load (3.4Ω)	400ms
	No load	1.2s

Overvoltage Limit (OVL)

Front panel adjustable multiturn potentiometer. Trip level adjustable from approx. 2V to a level above rated output voltage. Accuracy of trip setting 1% approx. +1.5V.

Current Monitor

0-5V amplified current monitor output for zero to full output current. accuracy 1% +10mV. Output impedance 5kΩ nominal.

Remote Programming

Resistance 0 to 4k7Ω provides zero to full output voltage or current. Common terminal connected to negative sense terminal.
Accuracy at 23°C 0.2% +60mV (CV) 1.1% +50mA (CI).
Voltage 0 to 5V provides zero to full output voltage or current.
Accuracy at 23°C 0.1% +60mV (CV) 1% +50mA (CI).

Remote Inhibit

Input of a voltage between approx 2 and 60 volts to rear panel terminal will shut down output.

Remote Sensing

Maintains nominal voltage at load by correcting for up to 0.5V drop in each output lead.

E.M.C.

Complies with EN50081-1 & EN50082-1 generic emissions and immunity standards.
Note: This unit may exhibit deviance of up to 1% (CV mode) or 2% (CI mode) in a 3V/m field.

Safety Standards

Designed to comply with BS4743/IEC348.
After Jan 1st 1997 all units will be compliant with EN61010-1.

Metering And Status

Twin 3 digit panel meters on front panel

Indication

12.5mm character height. High efficiency, red LED, digital display of voltage and current output. Overvoltage limit (OVL trip point) can also be displayed.
Twin bargraphs of 20 segments each give approximate indication of voltage and current availability and will show trends.
Status flags give LED indication of CV and CI within panel meters.
Central status window indicates unregulated condition (UNREG), overtemperature trip (OT), overvoltage limit (OVL). In addition, if the IEEE488 bus option is fitted BUS indicates the unit is under bus control; LSN indicates receiving data from the bus; TLK indicates transmitting data on the bus; and SRQ indicates that a 'service request' has been initiated

Meter Accuracy Resolution & F.S.D

VOLTAGE
Accuracy at 23°C: ±0.2% rdg ±1 digit
Resolution: 100mV f.s.d 99.9V

CURRENT
Accuracy at 23°C: ±1% rdg ±1 digit
Resolution: 100mA f.s.d. 99.9A

IEEE (488) Interface
(When Fitted)

Refer to supplementary handbook (part no 9HAPHIBUS).

Float Voltage

These units are designed for either terminal to be floated up to 120V d.c. from earth, including the output voltage. **The float sources must be impulse free** (see IEC 664) i.e. do not float the output on an unisolated a.c. supply.

Environmental

Operating temperature 0-40°C
Storage temperature -20 to +60°C
Cooling: Fan cooled. Air intake on front panel.
Overtemperature trip protection is featured.
RH <80% Non-condensing
Altitude <2000m
Pollution degree 2 - Normally non-conductive pollution.
Non-corrosive, non-explosive atmosphere.
Installation category 2 - Connected via a plug and socket to the supply.
For indoor use only.

Mechanical

Height 145mm)
Width 435mm) approx overall dimensions
Depth 520mm)
Weight 16kg (20 kg shipping weight)

Rack Mounting

Easily fitted into a standard 19” rack using mounting ears provided (see Page 13 Section 5.4.). Support rear of unit in rack.

Panel Symbols Used


Refer to handbook.


Alternating current


Earth (ground) terminal


CAUTION - Risk of electric shock.

On


Off

ORDER CODES

AP30-80	11AP3080
	As above with IEEE488.2 interface
	11AP3080/H =11AP3080+11APHIBUS1
AP60-50	11AP6050
	As above with IEEE488.2 interface
	11AP6050/H =AP6050+11APHIBUS2
AP10030	11AP10030
	As above with IEEE488.2 interface
	11AP10030/H =11AP10030+11APHIBUS3

We reserve the right to amend specifications without notification.

5. INSTALLATION

5.1 Supply Voltage

Changing the supply voltage involves entering the unit and should be set by an agent or by the factory when purchased. **If the value specified on the rear panel is incorrect for the installation then this task should be carried out by a qualified person. It is very important that the unit is clearly marked subsequent to a change**.

To change the input voltage setting proceed as follows:

1. Disconnect mains lead from supply and wait 15 minutes to allow capacitors to discharge.
2. Remove the three fixing screws from each side trim.
3. Remove side trims.
4. Working from the front, and for each cover, slide backwards to clear recess in front handles. Hinge cover away from the unit to just clear front handles and then pull cover forwards.

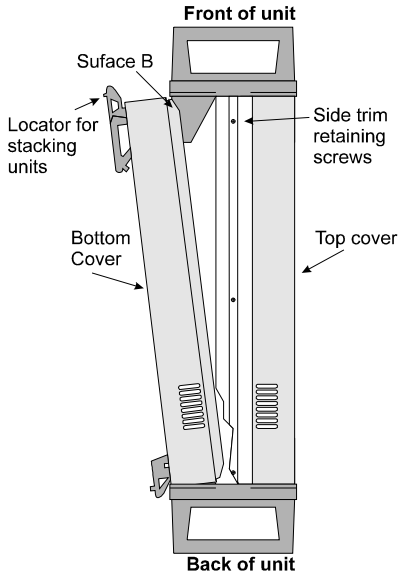


Fig. 5.1 Unit Assembly

5. Having gained access to the interior and working from the top of the unit, locate the voltage selector slide switch (accessible through the top plate) and adjust to the appropriate setting.
6. For 115V operation, reconnect the orange link from the input reservoir capacitor to the point marked 115V on the input filter board. Connect back to itself at the reservoir capacitors for 230V operation.

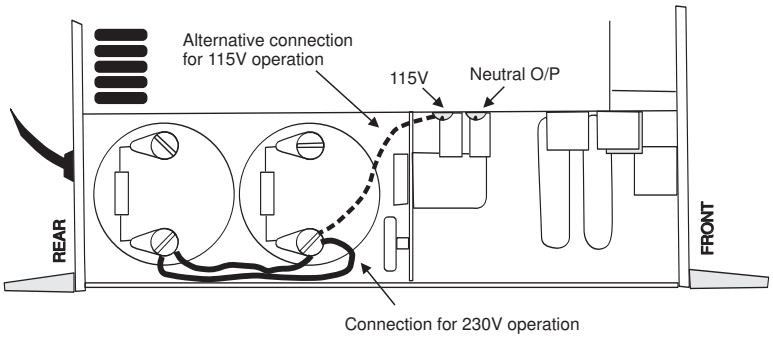


Fig. 5.2 Changing Input Voltage

7. Amend the legend on the back panel to indicate the new voltage setting.
8. Finally, replace the covers and items previously removed.

5.2 Mains Connection

The unit is provided with a mains lead capable of handling the input current for both 115V and 230V operation. The free end of the lead should be connected via a suitable plug (or, preferably, wired directly) to the local mains supply. The colour code employed is as follows: Brown to Live, Blue to Neutral, Green/Yellow to Ground Safety Earth.

AP series power supplies are classified as Safety Class 1 equipment and it is imperative that the mains earth lead (Green/Yellow) is connected to a known integrity earth otherwise the chassis may float to a dangerous potential.

Due to the power supply incorporating an RFI filter, some earth leakage current (3 to 4mA) will flow. This may cause ‘nuisance’ tripping of the more sensitive type of earth leakage circuit breakers.

The power supplies are intended for use with mains wiring capable of supplying the rated input current without undue voltage drop. (See specification for maximum input currents). The protective circuits (fuse or circuit breaker) must be capable of handling the peak ‘in rush’ current without blowing or tripping. Unsatisfactory operation of the unit may be due to low mains voltage caused by high a.c. line impedance. Check as stated in Section 6.5.

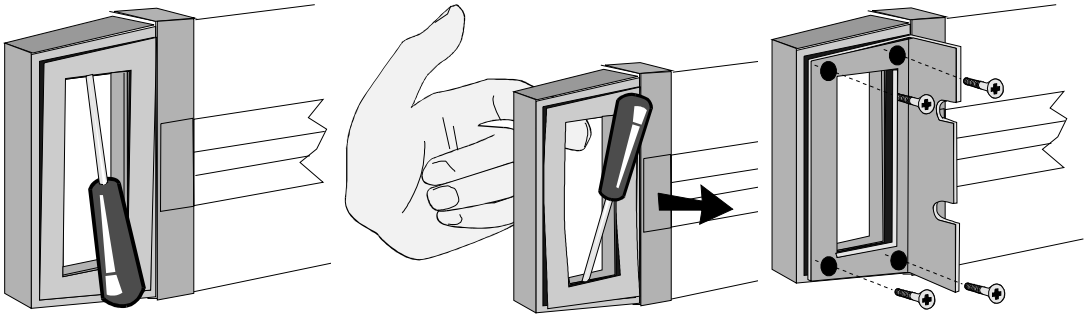
5.3 Location

AP power supplies are intended for use either on the bench or in a rack. The units are fan cooled and care must be taken not to restrict the air intake at the front or the exhausts at the rear, top and bottom of the unit. If the power supply is rack mounted the exhaust must not be subject to a static back pressure.

5.4 Rack Mounting

All models can be rack mounted in a standard 19” rack by using the two rack mounting ‘ears’ and the screws supplied. To fit these ‘ears’, carefully prise out the insert in the outer face of both front handles (see diagrams) and store for future use. Fit each ear into the recess formed by the removal of the insert and secure using the screws provided (M4 x 10 CSK). It is important that some provision be made to support the rear of the unit when using the rack mounting ears.

Procedure for attachment of rack mounting bracket



Insert small screwdriver into thin gap between insert and handle body. Prise away one end slightly and hold in position with finger.
Note orientation of insert with styling cut-out opposite cut out in handle

Insert screwdriver into other end and repeat procedure. This will relieve the small tapered pins of the insert from the threaded holes in the handle. Remove insert in the direction of arrow.

Insert rack mounting bracket into recess in handle in attitude shown and secure firmly with 4 M4 x 10LG C'SK HD screws supplied.

Fig 5.3 Rack Mounting Ears

6. OPERATING INSTRUCTIONS

6.1 First Time Operation

General

Before turning 'ON', confirm that the unit is set to the correct mains input voltage and that the mains earth lead is connected to ground. Remove the terminal cover and confirm that links are in place on the barrier strip viz.:

+ linked to +sense (13 and 12)

- linked to -sense (11 and 10)

Vprog terminals 6, 7 and 8 connected together

Iprog terminals 3, 4 and 5 connected together

That + (13) and - (11) are wired to +ve and -ve busbar respectively.

Ensure that no load is connected

Replace the terminal cover. (The output of the power supply is inhibited with this cover removed).

If the power supply is fitted with the IEEE488 option, ensure that the Bus connector is disconnected and the Bus/Local switch is in the Local position. (Both items are located on the back panel).

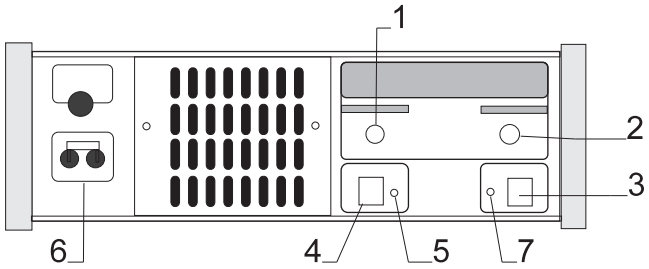


Fig 6.1 Front panel controls and indicators

Turn the voltage control ***1*** and the current control ***2***, fully anticlockwise and the OVL control ***5*** fully clockwise. Ensure that the output enable switch ***3*** is in the button out position.

Switch the power supply on by moving the circuit breaker ***6*** upwards to the 'ON' position. The LED voltmeter and ammeter are now illuminated.

Rotate the voltage control fully clockwise, noting that the voltmeter and bargraph show increased readings until at least the maximum output voltage of the unit is reached.

Repeat the above process using the current control and monitoring the ammeter and associated bargraph. Ensure the readings reach at least the maximum output current of the unit.

Reset the voltage and current controls of the unit fully anticlockwise. Depress the "output enable" switch ***3***. Note the adjacent green LED ***7*** is illuminated and that either the CV (Constant Voltage) or CI (Constant Current) legend is illuminated. Rotate the current control one turn clockwise and note that only the CV legend is illuminated.

Note: under these conditions of demanding zero output, the 'UNREG' legend may also be illuminated. This indicates that precisely zero output is not being achieved.

Whilst depressing the 'display OVL' button ***4***, rotate (with a suitable tool) the OVL adjust control ***5*** anticlockwise until a reading on the voltmeter of say 25V is reached. Release the button and rotate the voltage control clockwise at the same time monitoring the voltmeter. Confirm that when the voltage reaches the level of the pre-set OVL, the voltmeter reading falls to approximately zero and the OVL legend is illuminated.

Reset the OVL circuit by rotating the voltage control fully anticlockwise, the OVL adjust fully clockwise, releasing the 'output enable' switch and after 5 seconds, depress again to 'enable' the output.

Constant Current Check

Inhibit the output by releasing the 'output enable' switch, wait 30 seconds for the output capacitors to discharge and then remove the protective terminal cover held by 2 M3 screws.

Short circuit the +ve and -ve bus bars (use wire capable of carrying the maximum current that can flow i.e. for 50 amps use 10mm^2) and then replace terminal cover.

Rotate the voltage control approximately one turn clockwise (from its fully anticlockwise position) and rotate the current control fully anticlockwise.

Depress the 'output enable' switch and confirm that the CI legend is illuminated thus indicating that the power supply is in constant current mode. Rotate the current control clockwise. By reference to the front panel digital ammeter confirm that control of the output current is available over the power supply's output current range.

Release the 'output enable' switch and wait for 30 seconds. Remove the terminal cover and the short circuit from the output. Replace the terminal cover. Read the remainder of the operating instructions before connecting supply to actual load.

6.2 Connecting the Load

Load connections to the power supply are made to the busbars (marked +ve and -ve) at the rear of the instrument. Access to these terminals is gained by removing the protective cover. Load wires may be connected to any of the three pairs of connecting screws on the busbars (6 x M5 bolts). Standard wires should have the appropriate size of termination fitted. It is important that the wires to the load should be of sufficient gauge to avoid overheating when carrying the current (set by the current limit point) that would flow if the load were shorted. Generally, thicker wires than the minimum necessary to carry the current are needed to obtain good regulation at the load. If the load regulation is critical, then remote sensing should be used (see section 6.4.2.). To eliminate voltage spikes and noise pick up, which could affect the power supply performance, these leads should be twisted together, especially when operating with the load at a distance of greater than 1 metre. The leads should also be de-coupled by connecting a 1µF capacitor, adequately voltage rated, across the load and as close as possible to it.

Replace the protective terminal cover (it is held on by 2 x M3 screws) over the busbars and the barrier strip before enabling the output. load leads may pass through the gap in the bottom of the cover. N.B. The output is inhibited when this cover is removed.

Earthing the Load

Either the +ve or -ve busbar can be earthed to produce negative or positive voltages relative to ground. A M5 threaded insert on the back panel (which is connected to ground via the units mains lead) is provided to give a common earth point thus minimising earth loop problems.

If neither terminal is connected to earth, the output can be floated up to a maximum of 120V d.c. (including output volts), away from earth potential. When a second earth is added to the system a 200V float is permissable.

6.3 Protective Circuits

Circuits within the power supply will limit the output power or inhibit the system operation (i.e. reduce output to zero) under certain conditions. LED enunciators on the front panel indicate when one of the protection circuits is activated.

6.3.1 Overrange (UNREG)

An ‘over-range’ condition is indicated by the ‘UNREG’ (output unregulated) LED being illuminated and no other LEDs in the status area being lit. The green output enable LED will be illuminated.

The over-range condition occurs when the output power demanded from the supply exceeds 1000W. The output does not shut down but will be limited with a constant power output of just over 1000W. This condition will occur if the load connected is such that neither the set voltage nor current limit setting can be reached without the load taking more than 1000W.

Over-range may also occur if a current limit setting of greater than the maximum specified output current is demanded.

6.3.2 Overvoltage Limit (OVL)

This circuit will operate whenever the output voltage exceeds that set by the overvoltage adjust or when the output voltage exceeds a factory set overvoltage limit (approximately 10% greater than maximum output voltage).

The overvoltage trip is indicated by the ‘OVL’ LED being illuminated. The power supply output will shut down, the meters will read approximately zero and no other indicators (including the green output LED) will be illuminated.

Adjusting Overvoltage Trip

The trip point is adjustable by means of the multi-turn, screwdriver adjustable, ‘OVL adjust’ on the front panel.

The trip setting can be seen by pressing the ‘display OVL’ button on the front panel. This displays the overvoltage setting on the voltmeter. The setting can be viewed at any time whether the power supply output is enabled or not. It is recommended that the trip point

be set at least 2 volts above the output voltage normally required. This avoids the possibility of false tripping.

Resetting Overvoltage Trip

To reset the overvoltage trip, release the 'output enable' push button, wait 5 seconds, then depress the 'output enable' push button. If the power supply trips again, check the OVL setting is in excess of the set output voltage. This may be done by comparing the displayed OVL setting with the prospective output voltage (i.e. with output not 'enabled').

6.3.3 Overtemperature Protection

An overtemperature condition is indicated by 'OT' being illuminated in the status section. The power supply output will shut down. The meters and bargraphs will read approximately zero and no other LEDs will be lit.

This condition will occur if there has been overheating within the unit, e.g. due to fan filter blockage, air intake/outlet restrictions or a too high ambient temperature. Refer to instructions for filter cleaning (see section 9.1.).

Resetting Overtemperature Trip

When the unit has cooled sufficiently, the overtemperature trip can be reset in a similar manner to the overvoltage trips i.e. releasing and then resetting the 'output enable' button. The trips should only be reset when the cause of the overheating has been removed.

6.3.4 Low A.C. Mains Voltage Protection

If the a.c. mains input falls below approximately 70% of normal, the power supply will shut down until the normal mains supply is restored (operation at low mains could cause overheating and/or unreliable operation).

This condition is indicated by the 'UNREG' LED being illuminated. The green 'enabled' LED will remain lit, the output will be shut down and the meters will read approximately zero.

N.B. - If the unit is operating with a mains input voltage near to the minimum specified it is recommended that the mains impedance check be carried out (section 6.5.). If the impedance is high the power supply may not be receiving adequate supply volts and this may cause overheating.

Comment [PMA1]:

Front Panel Shows								Condition
CV LED	CI LED	Enable LED	UNREG LED	OT LED	OVL LED	ENABLE BUTTON	METER	
×	×	×	×	×	×	OUT	Set volts & Amps	Voltmeter & ammeter reading preview volts & amps set by the front panel
✓	×	✓	×	×	×	IN	Output V & I	Normal CV operation meters read O/P volts and current flowing.
×	✓	✓	×	×	×	IN	Output V & I	Normal CI operation meters read O/P volts and current flowing.
×	×	✓	✓	×	×	IN	Output V & I	Overrange condition.
×	×	×	×	✓	×	IN	Zero	Overtemperature trip shutdown.
×	×	×	×	×	✓	IN	Zero	Overvoltage trip output shutdown
✓	×	✓	Lit for short periods	×	×	IN	Output V & I	Occurs for short periods when reducing O/P volts with low load and indicates dynamic bleed circuit is in operation.
×	×	✓	✓	×	×	IN	Zero	Low mains or mains dropout.
×	×	×	×	×	×	IN	Zero	Terminal cover removed or “INHIB” in operation.

- Normal operation

6.4 Operating Modes

6.4.1 Normal Operating Mode

The unit is factory set for normal operation i.e. operation via front panel controls and front panel sensing.

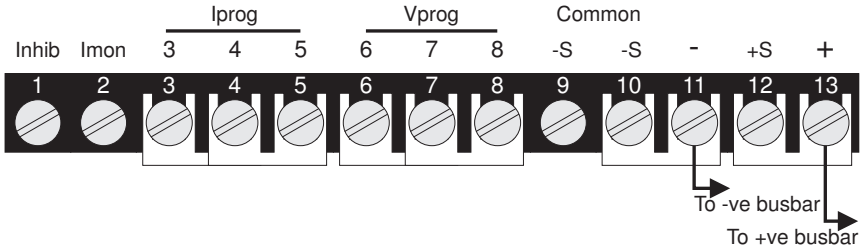


Fig. 6.2. Rear barrier strip linking for normal mode

Constant Voltage (CV)

Ensure that the 'output enable' switch is in the out position, wait 30 seconds and remove the rear terminal cover. Connect the load leads to the output busbars. Refer to section 6.2. "Connecting the Load". Connect the unit to a suitable supply and replace the rear cover. Switch on by moving the circuit breaker to the 'ON' position.

The front panel voltmeter and ammeter will illuminate and display the values at which the controls were set. Output voltage and current limit settings can now be set to the required values. The overvoltage trip point can also be set. The 'output enable' switch should now be depressed. Power will be applied to the load and the voltage and current delivered to the load will be indicated on the AP units by the meters.

Provided that the current limit point has been set higher than the actual current flowing into the load, then the 'CV' legend will be illuminated. Whenever the load current reaches the previously set current limit figure, the power supply will automatically change to constant current operation. This illuminates the CI legend and extinguishes the CV legend. If the product of the current taken and the output voltage exceed 1kW (before reaching the current limit setting) the output current will be limited by the internal power limit circuit.

To avoid unwanted CV/CI crossover, an allowance should be made6.44 for the peak currents taken by the load when setting the current limit level.

Constant Current (CI)

With the power supply switched on and the 'output enable' switch out, the ammeter will display the prospective current limit setting. This setting may be adjusted by the front panel control.

The output voltage should be set to a higher value than that which would be developed across the load with the required constant current flowing.

When the 'output enable' switch is pressed in, power is applied to the load and the meters indicate the voltage and current delivered to the load. If the voltage at the output busbars is less than the voltage setting, the 'CI' legend will be illuminated. If the load changes such that the voltage developed across it reaches the pre-set voltage level then

the supply will automatically change to constant voltage operation. The ‘CV’ legend will become illuminated and the ‘CI’ legend will be extinguished.

The voltage setting should be such that under normal load unwanted CI/CV crossovers do not occur.

If the product of the output current and output voltage reaches the power limit (approximately 1kW) before the pre-set voltage limit is reached, then the maximum voltage available will be limited by the power limit circuit.

Constant Power (UNREG)

The ‘UNREG’ legend will illuminate if the load power requirements needed to reach the voltage or current limit settings exceed the maximum power boundary of 1kW. In the constant power condition neither the CV nor the CI legend will be illuminated. The specification may not be valid in this over-range condition but no damage will occur to the unit. The supply can work continuously in this mode without damage, but it will not meet specifications. In particular, the output ripple increases substantially and the output has poor regulation (hence the legend ‘UNREG’).

The bargraph below the ammeter has a secondary scale marked ‘volts available’. The secondary scale of the bargraph below the voltmeter is marked ‘current available’. These secondary scales give an indication of the voltage that can be attained at a particular current setting and the current that can be drawn at a particular voltage setting (before reaching 1kW output) respectively. For example, at a 20V setting, the ‘current available’ scale shows 50A (Power 1kW = 20V x 50A) and similarly for the ‘volts available’ bargraph.

N.B. Under certain line and load conditions it may be possible to obtain more than 1kW output power and still be in regulation. However, any change in line or load could result in the unit going out of regulation. For this reason it is not advisable to use the unit beyond the 1kW power boundary for normal operation.

6.4.2 Remote Voltage Sensing

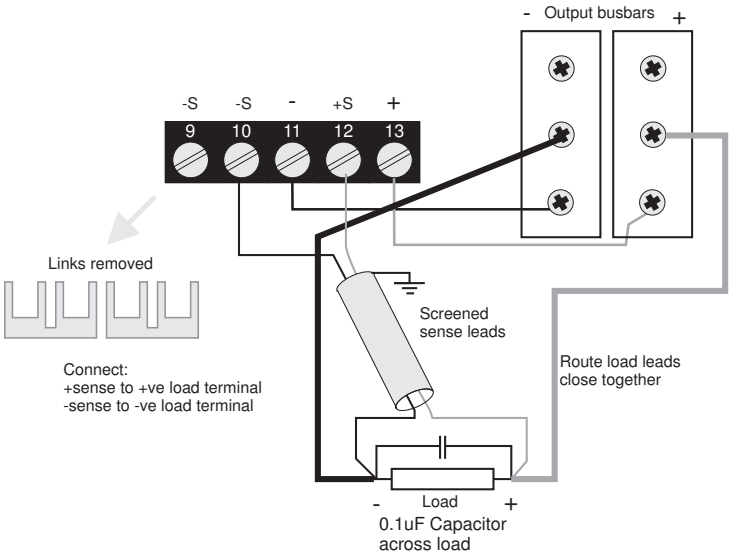


Fig 6.3. Connections for remote voltage sensing

Remote voltage sensing must be used where the load lead resistance is such that it causes the regulation at the load to be unacceptably poor. Connecting the sense terminals to the supply output at the load (rather than at the output busbars) will overcome this problem. This is because the control circuitry will now monitor the voltage across the load.

To connect for remote sensing proceed as follows:

a) Switch off a.c. power, wait 30 seconds, then remove rear terminal cover.

b) Remove the two links joining barrier strip terminals 10 and 11, and 12 and 13.

c) Connect the sense leads from the sense terminals to the load as shown in the diagram. *Fig. 6.3.*

d) Connect the load and replace the terminal cover.

e) Connect 0.1µF capacitor if necessary.

N.B. - The sense leads only carry a few milliamps of current and can be of a light gauge wire. To minimise pick up they should be a screened, twisted pair of leads, since any noise picked up will appear on the output. If the sense leads become disconnected the load voltage will tend to rise above the set value. This rise will be limited by internal circuitry to approximately 10-20% of the set value.

Load leads should be made of heavy gauge wire. As well as giving the necessary current carrying capability, this helps reduce the volt drop along the load lead between the output and sense terminals. Such a volt drop must not exceed 0.5V.

Leads should be kept as short as possible. If long leads are used an additional capacitor, connected across the load, may be required. See section 6.2.

6.4.3 Remote Programming

This section deals with the remote programming of the power supply output via the rear barrier strip terminals. The terminals are accessible when the terminal cover is removed.

Units fitted with the IEEE488 option (which allows remote programming via the IEEE bus) may also be controlled in this way when set for local operation. Programming with the IEEE interface is dealt with in a separate manual.

The connections available on the rear terminal strip allow the power supply voltage and current values to be remotely programmed using either voltage, resistive or current programming. The power supply is essentially voltage programmable but two constant current sources are provided which, for normal operation, are used in conjunction with the front panel controls to give, what is in effect, resistive programming. Current sources, front panel controls and the voltage programming inputs can be connected to external resistors, voltage sources and current sources to give various programming options. Examples of the more common options are given.

a) Remote Resistive Programming

Controlling The Output Voltage

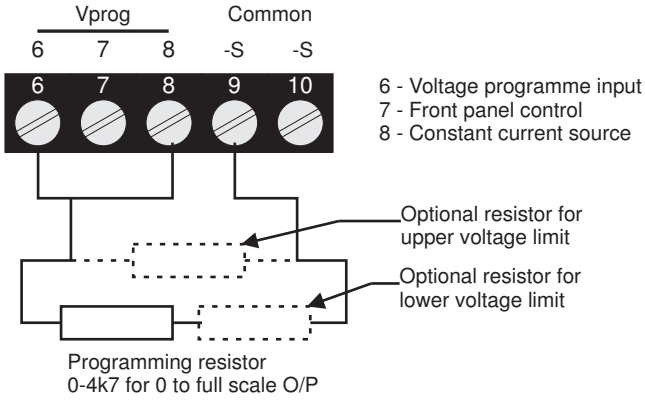


Fig. 6.4. Connections for resistive programming output voltage

Connections as shown in *Fig. 6.4* will give remote resistive programming of the output voltage. A resistor variable from 0 to 4.7kΩ will produce an output voltage of zero to full scale. Upper and lower limits can be set by connecting fixed resistors in parallel or series with the remote variable resistor. A fixed resistor in series will set a lower limit and one in parallel an upper limit. Upper and lower limits for the front panel potentiometers can also be set if required. The front panel potentiometer is connected as a variable resistor from terminal 7 to negative sense. Fixed resistors can be wired in series or parallel with the front panel potentiometer to limit the output as previously described. The front panel potentiometer is of nominal 5kΩ value ±5%.

N.B. If a resistor is added in series with the front panel potentiometer the maximum total resistance would be greater than 5kΩ. This would not damage the unit but some of the travel of the front panel control would be lost. An upper limiting resistor should be connected in parallel with the resistor combination.

Controlling The Output Current

The output current is controlled in the same way as the output voltage, except for the use of different barrier strip connections. These are shown below:

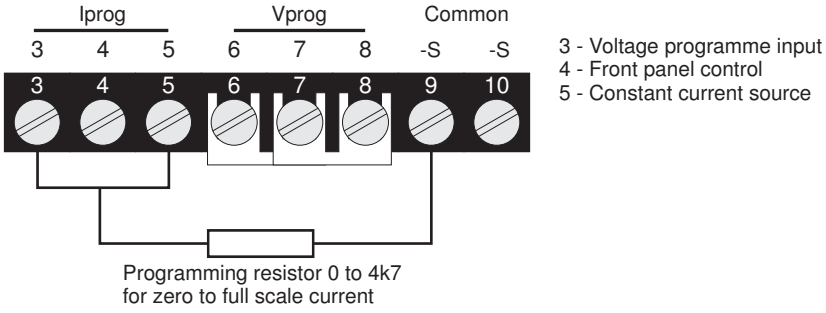


Fig 6.5.. Connections for resistive programming output current

To maintain the temperature coefficient and stability specifications of the power supply, any resistors used for resistive programming should be stable types with low temperature coefficients (60ppm per °C).

b) Remote Voltage Programming

Controlling The Output Voltage

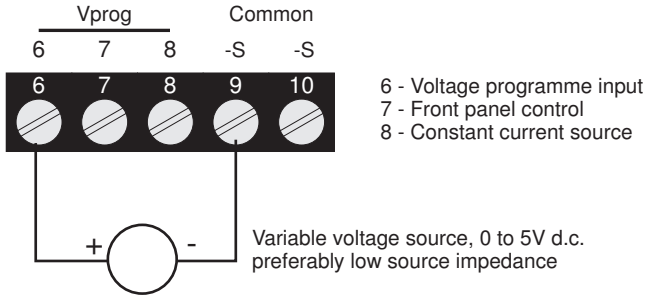


Fig. 6.6 Connections for voltage programming output voltage

Connecting up a variable voltage source as shown will programme the output voltage of the power supply from zero to full scale for a 0 to 5V programming voltage.

A higher programming voltage can be scaled down using a potential divider.

Notes On Voltage Programming: The voltage programming inputs, terminals 3 and 6, have an input impedance of 5MΩ and will not significantly load most voltage sources. The source impedance of the voltage programming source should be fairly low (in the order of a few kΩ to reduce noise pick up. Any noise voltage superimposed on the programming voltage will appear as noise on the power supply output. Similarly, if a resistor chain is used for scaling down a higher programming voltage, the resistor values should be as low as practicable. If long voltage programming leads are used it is advisable that they are twisted and screened.

Notes On Remote Programming: When using any of the methods of remote programming described, the remote programming source replaces the front panel

potentiometer. This means that when the 'output enable' switch is released, the value set by the remote programming source appears on the front panel meters.

Terminals 9 and 10 (negative sense and common for programming) on the rear barrier strip are internally linked. This means that either can be used for negative sense when connecting for remote programming. The extra terminal is provided for ease of wiring. The negative sense terminal is used as the common (0V) connection for programming both voltage and current settings of the power supply. This allows a common ground to be used when programming the voltage and current remotely.

If voltage programming is being used, an open-circuit input will, in most cases, result in the power supply output falling to zero. With resistive programming, the outputs could rise to maximum. To prevent this an 'upper limit' programming resistor should be connected close to the barrier strip terminals. The overvoltage limit may also be used to give protection against such occurrences.

6.4.4 Auto-Parallel Operation

The AP series of power supplies can be connected for auto parallel operation. This means that the units can be connected together to give a greater output current capability. Units are connected together in a 'master-slave' configuration. This gives parallel operation with good current sharing between units.

When in this mode the controls of the master can be operated as if it were a single unit, i.e. in CV or CI mode, etc. However, current flowing into the load will be current measured on the master unit multiplied by the number of parallel units in operation.

Notes:

a) Under no (or low) load conditions the down programming speed of the power supply combination will be considerably reduced. This is because only the master unit will be able to down programme the output voltage.

b) Not more than four units should be connected together in auto-parallel mode.

Connections for auto-parallel operation

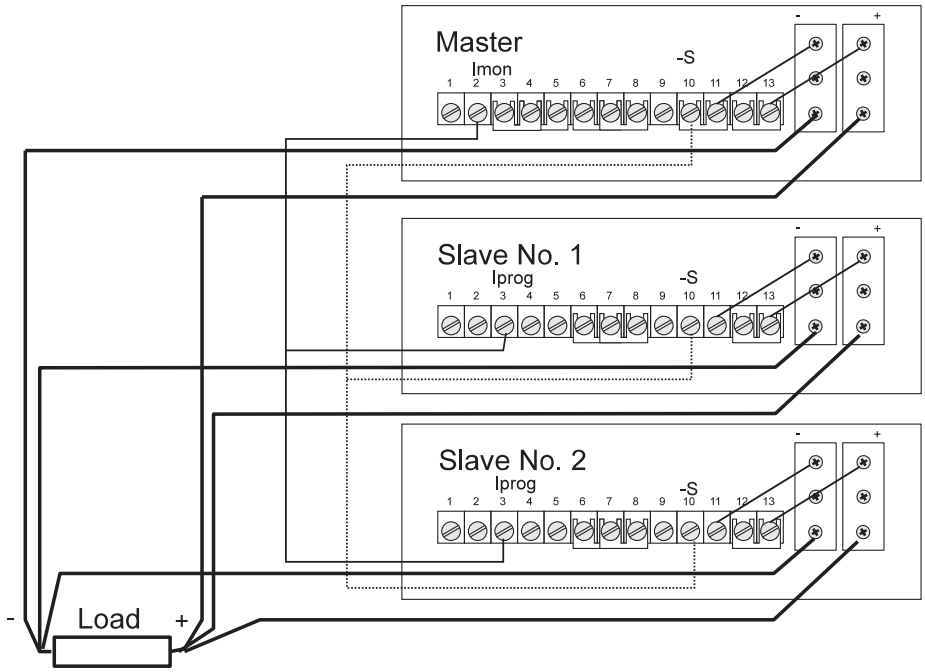


Fig. 6.7 Connections for auto-parallel operation

To connect in auto-parallel mode proceed as follows:

a) The link joining terminals 10 and 11 to be removed on all slave units.

b) The links joining terminals 3, 4 and 5 to be removed on all slave units.

c) Terminal 10 to be linked together between all units.

d) Terminal 2 of master to be linked to terminal 3 of all slaves.

e) Load leads should be run separately from each power supply to the load.

Setting The Voltage And Current Controls

The parallel combination behaves as if it were a single constant voltage/constant current supply controlled by the master. The current controls of the slaves are inoperative. The voltage limits of the slaves should be set above the highest output voltage that is required. This ensures that all the slaves work in the CI mode.

Overvoltage Protection

The overvoltage protection level is set by the master supply. Overvoltage trip levels on the slave units should be adjusted to their maximum level.

If the master unit trips, all the slave units will programme down to minimum output voltage. The individual trips on the slave units can also be set if required. In this case, only the unit on which the trip is operated would shut down.

Remote Sensing

Remote sensing leads should be connected to the master supply at terminal 10 (negative sense) and terminal 12 (positive sense) as described in section 6.4.2. The connections between the power supplies must remain intact (see *Fig. 6.8*).

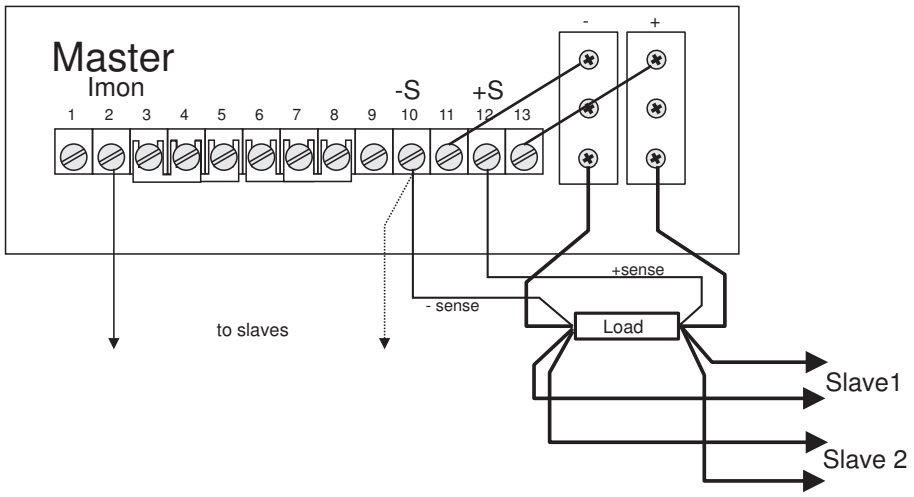


Fig. 6.8. Remote sensing with master/slave parallel operation.

Remote Programming

The master unit is programmed in the normal way to give remote control of the output voltage or current of the parallel combination. See section 6.4.3. on remote programming.

N.B. The current measured by the master will be that proportion of the load current supplied by the master. All units supply equal current and so the total current will be the master current multiplied by the number of parallel units. Alternatively, the current readings of the master and all the slaves can be summed (necessary if different models are placed in parallel). This should be taken into account when programming current limit settings or when working in constant current mode. The master output voltage will be the voltage seen by the load.

6.4.5 Master-Slave Series Operation

WARNING - Hazardous voltages will be present when operating in this mode and the appropriate precautions should be taken.

The power supplies can be connected in series for master-slave operation. When connected together in this way, a higher total output is available than the maximum output of each individual unit. In this mode the slave units follow the master, thus giving a total output voltage equal to the output voltage of the master multiplied by the number of units in series.

a) Limitations

The maximum voltage allowed between the output and earth is 200V d.c. This limits the number of units that can be connected in series. For the AP6050, up to 3 units can be operated over their full range, uni-polar with respect to ground, and 6 units for centre-tapped bipolar operation. For operation at a higher current with limited output voltage, more units can be connected together. However, care must be taken to limit the maximum voltage above ground to 200V d.c.

b) Connections For Master-Slave Operation

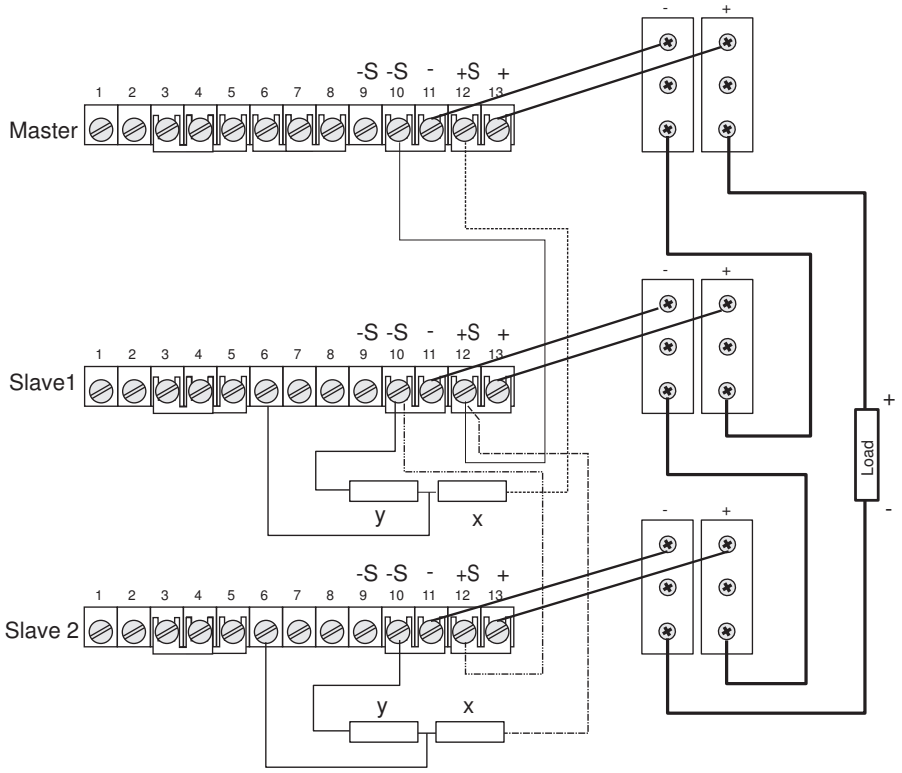


Fig. 6.9 Connections for master slave series operation

c) Calculation Of Resistor Divider Values For Series Master-Slave Operation

If the slaves are to deliver the same output voltage as the master then (where n = 6 for 30-80, 12 for 60-50 & 20 for 100-30)

$$R_X = (2n-1)\ R_Y$$

for each pair of X and Y. If the slaves are to give a different output voltage than that of the master where r = ratio of voltages V MASTER/V SLAVE. Then:

$$R_X = n(1+r)R_Y - R_Y.$$

Choosing standard resistor values may necessitate having some difference in output voltages. In this case, the load voltage is the sum of the reading of each power supply's voltmeter. Alternatively a separate voltmeter can be connected across the load.

To maintain the temperature coefficient and stability specifications of the supplies, the external resistors should be low noise and low temperature coefficient (50ppm per °C) types.

When choosing resistor values, a compromise has to be found between programming speed (which is impaired when the source impedance of the voltage programming sources is greater than a few kΩ) and resistor dissipation (which increases with lower values). If R_Y is kept below 5kΩ, this will have little effect on the programming speed.

d) Positive And Negative Tracking Supply

Positive and negative tracking outputs can be achieved by earthing the centre of the power supply chain. Alternatively, it can be earthed at any point if an unbalanced positive and negative supply is required. However, no power supply output must exceed 200V d.c. with respect to earth.

e) Overvoltage Trips

The overvoltage trip on the master unit can be used as an overall system trip. To do this the master level is set to just above the output voltage that the master should be delivering when the total load voltage is at the desired limit point. When the master trips, the slave units will programme down to minimum output voltage. The trips on the slave units can also be set if required. This gives maximum protection but leads to a greater likelihood of false tripping.

f) Remote Sensing

Remote sensing of the load voltage is achieved as follows:

i) Disconnect the link joining terminals +S and + on the master.

ii) Connect the +S terminal to the positive end of the load (positive sense lead).

iii) Disconnect the link joining -S and - on the most negative slave unit.

iv) Connect the -S terminal to the negative end of the load (negative sense lead).

See section 6.4.2. for further information on remote sensing.

g) Remote programming

The master power supply may be remotely controlled by any of the normal methods of remote programming. These are described in section 6.4.3.

When remotely programming master-slave series combinations, care should be taken to ensure that programming input voltages or resistors are referenced to the negative terminal of the master unit. The master unit is always the most positive unit of the combination. Therefore the reference terminal will be at a voltage between that of the combination output terminals and not necessarily at earth potential.

h) Setting The Output Voltage And Current Of Series Combination

The output voltage of this combination is set by controlling the master unit output voltage. This can be done by the front panel potentiometer or by remote programming. The total output voltage is a multiple of the master unit output voltage. The multiplying factor is determined by the choice of resistor dividers X and Y described previously. The current limit is determined by the master unit setting. The current limit settings of the slaves should be set above the maximum load current required. This avoids interference with the master.

6.5. Line Impedance Test

WARNING - This test necessitates operating the unit with covers removed and should only be performed by qualified personnel. Hazardous voltages are present within the unit and can remain for up to 15 minutes after removing the input power.

Low Mains Potential

This a.c. line impedance test should be performed if the unit is operating near to the minimum rated input voltage. With normal line impedances, the unit should work correctly down to the minimum a.c. input. If the a.c. line impedance is high the unit may be incapable of supplying full output power or may overheat when delivering full output power. High a.c. line impedance can be due to poor mains wiring, long extension leads or poor connections somewhere in the system. Measuring the a.c. line voltage is an insufficient test due to the peak-clipping effect of the power supply.

Procedure

WARNING - Hazardous voltages are involved in this test and all safety precautions should be taken.

To perform the a.c. line impedance test, proceed as follows:

a) Switch off instrument, disconnect from the mains and wait 15 minutes before removing top cover as described in section 5.1.

b) Connect a d.c. voltmeter, capable of reading up to 500V, across the two series connected large line capacitors (C401, red wire and C402, black wire) and monitor the voltage.

c) Connect a load capable of taking the maximum output current and power of the unit (i.e. on AP6050, say 50A at 20V).

d) Connect the unit to the mains and switch on.

e) Switch ‘output enable’ to the ‘ON’ position and adjust for the required output voltage (i.e. 20V on AP6050). Turn current limit fully clockwise.

f) Adjust the load to draw maximum specified output from the supply, checking the unit is still in CV mode.

g) Observe the reading on the voltmeter. The mean d.c. voltage across the line capacitors should be greater than 270V. Readings may fluctuate due to the presence of a 100Hz ripple of several volts magnitude across the capacitors. If the voltage measured is less than 270V either the mains supply is too low or the impedance is too high.

6.6. Current Monitor (I_{mon})

The current monitor (terminal 2) output provides a signal which is the amplified voltage developed across the current sense resistors. This signal is used for parallel operation but can also be used to monitor the output current. The signal varies from 0 to 5 volts for zero to full output current and is referenced to negative sense (terminals 9 or 10). The voltmeter should be connected between terminals I_{mon} and -S. The output impedance at terminal I_{mon} is 5kΩ.

6.7. Inhibit Terminal

The 'INHIB' terminal (output inhibit) is an extra facility which can be used to shut down the output of the power supply when remote programming. Unlike the front panel 'output enable' switch, this inhibit function cannot be used for resetting the overvoltage limit or overtemperature trip. A positive voltage, in the range of approximately 2 to 60V, applied to the 'inhib' terminal with respect to the -S terminal will shut down the output. The input impedance at the 'inhib' terminal (terminal 1) is 10kΩ.

7. CIRCUIT DESCRIPTION

General

Although specific to the AP6050, the following describes, in general, the AP3080 and AP10030 versions. Minor variations may occur between the different units. Reference is made to a number of diagrams. These are the schematic (giving major components and circuit function), the control board, the front panel board, the power conversion and a connection diagram.

Energy Conversion

The principle used is that of the 'flyback' converter. Energy is stored in the primary side of the inverter transformer (TX404, schematic and power conversion diagrams) by switching the d.c. voltage derived from the rectified mains input. Switching is accomplished by FETs TR1a, TR2a, TR3a and TR1b, TR2b, TR3b, (schematic and power conversion diagrams). When the primary is switched off, the polarity of the primary winding reverses. This causes the output diode(s) D401 (schematic and power conversion diagrams) to conduct and transfer the primary energy to the output capacitors C404, C405, C406 and C407 (schematic and power conversion diagrams). The energy stored in the leakage inductance of the transformer is returned to the d.c. supply via diodes D1a and D1b. The frequency of operation is approximately 25kHz. Output voltage/current or power is controlled by altering the 'on' time of the FETs.

Input Conditioning

The mains input passes through an R.F.I. filter to the auxiliary transformer, fan and mains rectifier diodes. The soft start relay, RL301 (schematic and power conversion diagrams), short circuits the soft start resistor, R301 (schematic and power conversion diagrams), when the auxiliary supplies have been established, but before the oscillator is gated to the switching FETs.

Switching

Two sections of three FETs (TR1a, TR1b, TR1c and TR2a, TR2B, TR2c) in parallel are used to switch the primary of the inverter transformer (TX404) across the d.c. supply. These FETs are switched on every cycle by means of the drive circuit TR6, 7, 8, 9, 10 and 11 (control board diagram) and power the drive transformer, TX402 (schematic and power conversion diagrams). The pulse width of this drive is controlled by a pulse width modulator circuit. The pulse width is obtained by producing a ramp from the linear rise of current in the primary of the inverter transformer, TX404.

A toroidal current transformer, TX403, monitors the current flowing in the conversion transformer primary. The output voltage from TX403 is generated across R46 by D21 (schematic and power conversion diagrams). The linear rise in current in the primary produces a voltage ramp output from the current transformer.

Transistor TR12 and associated circuitry C15, C18, etc. (control board diagram) are used to produce a secondary ramp with a non linear rate of rise. This ramp is switched on approximately 2µs before the FETs. The two ramps are now combined to form one with an initial fast rate of rise smoothly changing to that of the main ramp at pin 8 of IC2-C

(control board diagram). This allows for a more precise control of the width of the narrow pulses which are needed when a very low power output is demanded.

When this ramp reaches a value determined by the voltage on pin 9 of the comparator, IC2-C (control board diagram), the drive pulse is switched off. The voltage on pin 9 of the comparator is dependent on the output voltage of the unit (or output current if in current mode). To provide a maximum power limit, a second comparator (IC2-D) is 'OR'ed with the volts/current comparator. When the ramp (i.e. primary current) reaches a pre-set value the pulse to the FETs is switched off, no matter what is demanded from the load. At switch on, the power limit point rises exponentially to its normal value by means of C16, R55, etc. (control board diagram) and the switching off of TR13. This limits the power into the load immediately after switch on.

Dynamic Bleed

IC16, TR21, TR22 and TR20 etc. (control board diagram) comprise the dynamic bleed circuit. Under low load conditions, when the output is required to go to a lower value or off, the output of IC5-C goes low. This switches on the bleed circuit. This discharges the output capacitors at a rate of 100V per second. If the drive pulses are inhibited (e.g. overvoltage, off or overtemperature) the dynamic bleed circuit is activated to ensure that the output capacitors discharge. To allow the discharge to continue after the mains has been switched off, C57 provides power for a limited period.

Servo Control

a) Constant Voltage (CV)

In constant voltage mode operation, the output voltage is divided by R184, P10, R183 and R182 and fed to either the overvoltage trip comparator, IC22 (control board diagram), or the control amplifier, IC13 pin 2. The positive input of this amplifier (pin 3) has a voltage applied to it via IC24-D pin 12. This applied voltage can be varied depending on the output required. The output of IC13 is applied, via R57, to pin 9 of the ramp comparator, IC2-C and determines the peak ramp voltage and its duration.

Feedback is used to keep the output voltage constant. This is achieved by keeping the inputs to IC13 equal (the output of IC13 controls the pulse width of the FET 'on' time).

The voltage on pin 3 of IC13 is variable by the front panel voltage control potentiometer or, in external mode, by external resistors or a voltage. In local operation and in resistance programming, the control voltage is produced by passing a constant current through either the front panel potentiometer or the external programme resistors. The constant current source is formed from the circuits of IC19-C, TR23, TR24, etc. (control board diagram).

b) Constant Current (CI) & Automatic Changeover

In constant current mode operation, the output current is converted to a voltage by the current sense resistors R406/7/8 (power conversion diagram). This voltage is applied to the inputs of IC12 (control board diagram). IC12 and associated circuitry serves two functions, i.e. amplification and also rejection of any common mode voltage introduced by the finite resistance of the leads from the sense resistor to the sense terminal. The output from IC12 is taken to pin 2 of the current comparator IC15 and compared with the voltage on its pin 3. This voltage is set by the current limit required. When the voltage on

pin 2 of IC15 goes more positive than pin 3, the output of IC15 goes negative and takes command of the voltage controlling the ramp comparator. This results from the action of the OR gate formed by D30 and D31 which selects the lower of the output voltages from the voltage and the current comparators. The system is then controlled by the current into the load. IC14 and associated components provide an overriding upper current limiting circuit. This operates if the normal current limit is programmed above a safe value when in external operation.

Low Mains

IC17 (control board diagram) operates if the main voltage drops below the level required to maintain correct operation of the auxiliary supplies. IC2-B (control board diagram) operates if the mains 'drops out' for a small number of cycles. Under these conditions the circuits switch off the drive to the switching FETs.

Indicators

Mode state indication is controlled by IC1 (control board diagram). In the constant voltage mode, the current control amplifier, IC15 pin 6 is high and IC1-A output is low. TR4 will be off. The opposite is true of IC1-B, controlled by the voltage amplifier. Therefore TR5 will be on and constant voltage indicated. In the unregulated mode, both voltage and current amplifier outputs will be high and the anodes of D5, D6 and D7 will be low. The output of IC1-D will go high and switch on transistor TR2 which controls the unregulated indicator. If a trip, overvoltage, overtemperature, etc. is initiated, TR15 is turned on which turns off TR3 and TR1. TR1 turns off the power to the CV, CI and unregulated indicators. The overtemperature legend is driven by TR19 and the overvoltage limit legend by TR29.

Trip Circuits

Two over voltage trips are provided. The first, IC22 (control board diagram), is variable and is only controlled from the front panel. It can be inhibited by TR25 when the units are controlled by the IEEE488 bus. The second, IC27, is an absolute overvoltage trip and will operate whenever the output voltage exceeds approximately full scale by 10%. IC27 protects the power supply if the sense leads are disconnected or if on external operation excessive voltage is demanded. The temperature trips also operate the trip latching system, IC28 and IC29, directly by controlling pin 12 of IC29-D.

Displays & Metering

Current and voltage monitoring is by digital displays and bargraphs. Voltages proportional to output current and voltage are fed to the meter circuits via analogue switches IC18, IC20 and IC25 and buffer amplifiers IC19-B and IC24-C. The analogue switches switch the voltage derived from the output voltage and current (when the enable switch is on), or the output voltage and current settings (when the enable switch is off).

The voltmeter circuit consists of IC1 and display driver IC2 (front panel circuit diagram). The ammeter circuit uses IC5 and driver IC6 (front panel circuit diagram). The input to the common bargraph comparator array, IC8 and IC9 (front panel circuit diagram), is switched between the current and voltage inputs at 100Hz, as are the voltage and current bargraph displays. This is accomplished by the oscillator of IC7-3 (front panel circuit diagram) and the analogue switches of IC4.

8. RECALIBRATION

WARNING! This operation involves working on the unit with exposed hazardous voltages. It must only be undertaken by personnel who are fully aware of the hazards and who are trained to observe the necessary safety precautions. If in any doubt please return the unit to the Service Department at Wayne Kerr (see section 9.3.) or to any approved service depot operated by our agents overseas.

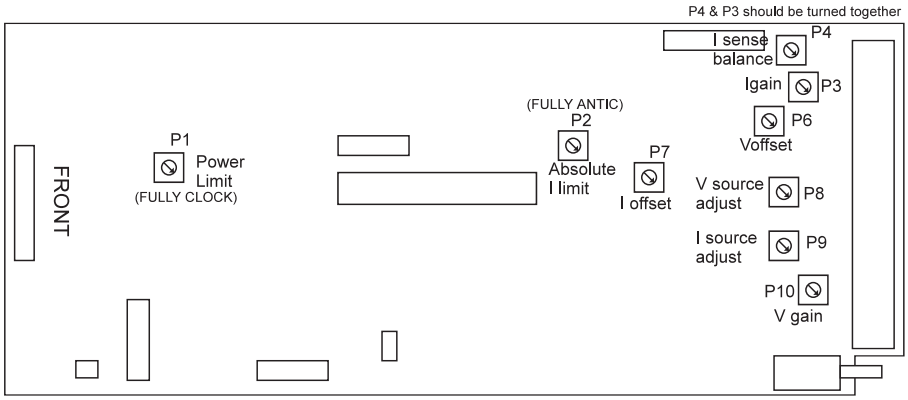


Fig 8.1 Control Board Pot Positions

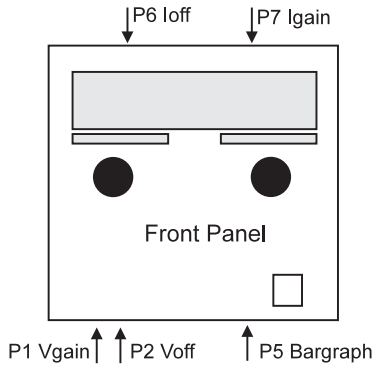


Fig 8.2 Display board pot positions

8.1 Equipment Needed For Recalibration

25A Earth bond tester (e.g. Megger PAT 2) & Insulation tester @ 500V D.C. (e.g. Megger BM 7)

Reference voltmeter

AP100-30	reading up to 150V >0.01% accuracy
AP60-50	reading up to 70V >0.01% accuracy
AP30-80	reading up to 40V >0.01% accuracy

Reference ammeter

AP100-30	reading up to 33A >0.01% accuracy
AP60-50	reading up to 55A >0.01% accuracy
AP30-80	reading up to 83A >0.01% accuracy

Resistance box	0 to 6kΩ	±0.02% accuracy
AC voltage source	Variable output 2kVA rating	
Loads	AP100-30	0.2-10Ω @ 33A
(variable	AP60-50	0.1-10Ω @ 55A
resistance)	AP30-80	0.1-2Ω @ 83A

8.2 Recalibration Procedure

8.2.1 Earth Bond

Use the PAT 2 tester to confirm the earth impedance to case is <0.1Ω.

8.2.2 Voltage

a) Ensure mains is switched off. Remove links from T1 (6), (7) and (8). Link T1 (8) to T1 (6). Connect reference DVM across T1 (6) and (9) (0 volts). Connect resistance box set to 4k7Ω across T1 (6) and (9).

b) Ensure output enable switch is off and switch mains input on. Adjust P8 on the control board to obtain 5.000V ±0.003V.

c) Disconnect DVM leads from T1 (6) and (9). Switch output enable 'ON' and with the DVM across the output terminals, adjust P10 on the control board to obtain 100V ±50mV for model AP100-30, 60V ±30mV for model AP60-50 and 30V ±25mV for model AP30-80.

d) Check front panel meter corresponds with the calibrating DVM (on AP100-30 a reading of EEE indicates 100V). Adjust P1 on the meter board if necessary.

e) Reduce resistance box to 470Ω and adjust P6 to obtain 0.500V ±0.003V between T1 (6) and (9). Transfer DVM to the output terminals and confirm a reading of 10.0V ±25mV for model AP100-30, 6.0V ±25mV for model AP60-50 and 3.0V ±25mV for model AP30-80.

f) Check front panel meter corresponds with the calibrating DVM. Adjust P2 on the meter board if necessary.

g) Repeat a) to e) until no adjustment required.

h) Disconnect resistance box and replace links to T1 (6), (7) and (8).

8.2.3 Current

a) Across the output terminals connect a load in series with a reference ammeter (alternatively use the DVM with a shunt)

b) Remove links from T1 (3), (4) and (5). Link T1 (5) to (3). Connect resistance box set to 4k7Ω between T1 (3) and (9).

c) Connect DVM between T1 (3) and (9) (0 volts). Ensure output enable switch is off. Switch mains input 'ON' and adjust P9 (I source adjust) to obtain 5.000V ±0.003V. Reduce resistance box to zero. Connect DVM between T1 (9) and (2) and adjust P5 for zero output ±0.003V.

d) Disconnect DVM leads and adjust resistance box to 4k7Ω ±0.02%. Adjust the load to maximum resistance and set the front panel voltage control to obtain 10V output. Switch the unit on and using the DVM to measure the current through the load, adjust the load and P3 (I sense gain) to obtain 30A ±0.1A for model AP100-30, 50A ±0.1A for model AP60-50 and 80A ±0.1A for model AP30-80 through the load whilst in current limit.

e) Check the front panel ammeter reads 30A ±0.1A for model AP100-30, 50A ±0.1A for model AP60-50 and 80A ±0.2A for model AP30-80.

f) Reduce the resistance box to 470Ω to obtain 0.500V ±0.003V between T1 (3) and (9) and adjust P7 to obtain 3A ±20mA for model AP100-30, 5A ±20mA for model AP60-50 and 8A ±20mA for model AP30-80.

g) Check the front panel ammeter reads 3A for model AP100-30, 5A for model AP60-50 and 8A for model AP30-80.

h) Repeat d) to f) until adjustments are not required.

i) With output enable off, adjust the front panel voltage control to obtain 97.5V for AP100-30, 58.5V for AP60-50 and 29.25 for AP30-80 on the front panel meter. Adjust P5 on the front panel board until the last segment of the voltage bargraph just lights.

Absolute Current Limit

j) With conditions as d) and output enable 'ON', adjust resistance box to 5.85kΩ and adjust the load to obtain:

32 ± 0.1A for AP100-30

54 ± 0.1A for AP60-50

82 ± 0.1A for AP30-80

k) Adjust P2 (absolute current limit) until unit just goes into current limit (shown by he UNREG indicator).

l) Disconnect resistance box and replace links T1 (3), (4) and (5).

8.2.4 Power Limit

a) Connect unit to an adjustable supply capable of delivering at least 2kVA.

b) Connect a resistive load in series with a reference ammeter across the output terminals. Connect a DVM (4 digits) to output terminals.

c) Switch mains 'ON' and enable 'OFF'. Adjust the front panel controls to the following settings:

35V 31A for AP100-30

21V 51A for AP60-50

13V 81A for AP30-80

d) Switch enable 'ON' and adjust the load to obtain in constant voltage mode:

30A ±0.05A at 35V ±0.05V for AP100-30

50A ±0.05A at 21V ±0.05V for AP60-50

80A ±0.08A at 13V ±0.05V for AP30-80

Reduce mains to 198V a.c.

e) Adjust P1 (power limit) for unit to just go into the unregulated state as indicated by 'UNREG' in the status window.

8.2.5 Sense Balance

a) Connect as in 7.2.3.b). Disconnect link from T1 (11) and (10), and connect T1 (10) to the junction of the load and ammeter.

b) Switch mains 'ON' and enable 'OFF'. Adjust the voltage control to 20V and current limit to:

31A for AP100-30

51A for AP60-50 and AP30-80

c) Switch enable 'ON' and adjust load to obtain:

30A ±0.05A for AP100-30

50A ±0.05A for AP60-50 and AP30-80

d) Adjust P4 (I sense balance) on control board until front panel meter reads:

30.0A ±0.1A for AP100-30

50.0A ±0.1A for AP60-50 and AP30-80

e) Switch unit 'OFF', and observing precautions as output capacitors may remain charged for some minutes, disconnect T1 (10) from the junction of the load and ammeter. Reconnect link between T1 (11) and (10).

f) Switch unit 'ON' and adjust the load, if necessary, to obtain:

30A ±0.05A for AP100-30

50A ±0.05A for AP60-50 and AP30-80

Check front panel meter reads

30.0A ± 0.5% ±1 digit

50.0A ± 0.5% ±1 digit

g) Repeat a) to f) if required.

8.2.6 Switch Unit Off

Observe precautions in case output capacitors have remained charged, disconnect load.

8.3.7 Reassembly and Inspection

Check that the earth conductor is secure and undamaged.

Replace the covers ensuring that there is not physical damage to the chassis or the covers themselves that could reduce safety gaps. Ensure all screws are properly tightened and trim replaced.

Perform an isulation check @ 500V: input to earth, output to earth and input to output (In all cases have output shorted and live/neutral shorted together).

8.3 Output Noise And Ripple Measurements

8.3.1 Low Frequency (Mains) Hum And Ripple On Output

This can be observed with an oscilloscope connected to the output in conventional single channel manner with the timebase locked to mains (line) frequency with a 5-10ms/div. timebase setting. The waveform will be fairly blurred due to high frequency spikes being picked up and superimposed on the low frequency ripple waveform. The peak-peak ripple figure is measured as the voltage between the peaks of the brightest part of the waveform:

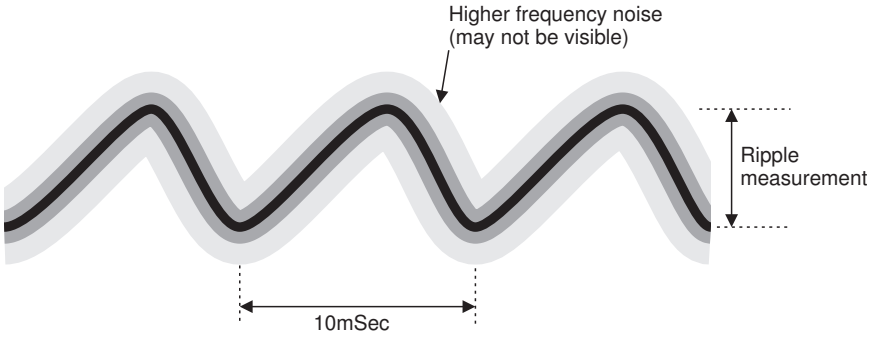


Fig.8.3. Ripple Measurement

8.3.2 Higher Frequency 'Spikes' Measurement

The higher frequency (up to 20MHz) spikes on the output are difficult to measure accurately with a high impedance single-ended measurement (e.g. standard oscilloscope probe and single channel). Additional signals are easily picked up and any common-mode signals (output with respect to ground) register as a differential signal due to the probe earth impedance at high frequencies.

The recommended measuring system is to use the oscilloscope in a differential mode, using two channels. This reduces common mode errors. The connections to the oscilloscope are made via 50Ω co-axial leads with a 50Ω termination to ground at each channel input. The connection to the power supply terminals must be capacitively coupled to prevent damage to the 50Ω terminations. See *Fig.8.4*.

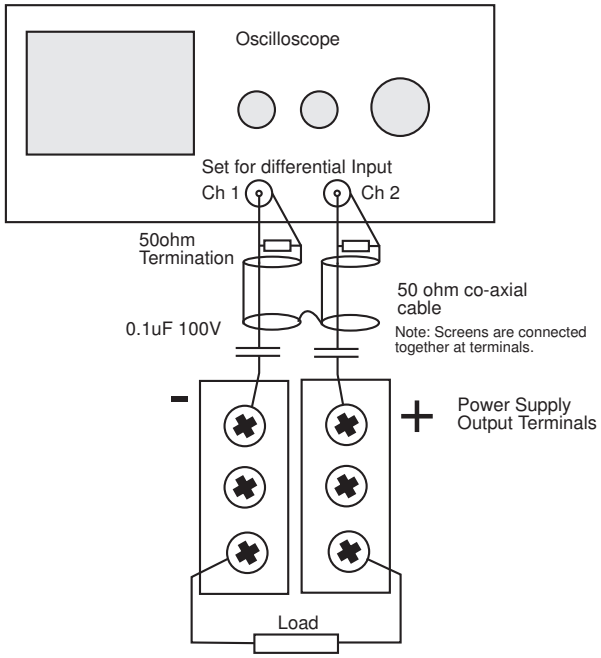


Fig.8.4 Differential measuring mode connections

The oscilloscope, of 20MHz bandwidth, should be set to 'ADD' the two channels with one channel inverted. Also ensure that both channels are set to the same attenuator levels. The two leads must be kept close together and the wiring to the terminals around the blocking capacitors should be as compact as possible to reduce pick up problems. The common-mode signal rejection capability of the oscilloscope must be checked before making a measurement. This is done by connecting the leads to the same power supply terminal whilst the unit is delivering the desired output and checking for any reading on the oscilloscope. Noise generated by the power supply will tend to be short spikes or bursts of high frequency noise with a period of approximately 40µs between them. Ideally the oscilloscope should display no reading at this point. Anything that does appear is due to insufficient common-mode rejection or noise pick up in the leads. It may be possible to reduce it by moving he leads or winding them around a ferrite toroid (a couple of turns) to form a common-mode choke. Otherwise this residual reading will have to be taken into account when measuring the actual output.

8.3.3 R.M.S. Noise On The Output

This gives a figure indicating the total r.m.s. value of noise on the output, i.e. mains hum and noise spikes without he ambiguity of an oscilloscope reading. A suitable measuring instrument is the Hewlett Packard True RMS Millivoltmeter type 3400A which can be connected directly to the output terminals.

9. MAINTENANCE

9.1 Cleaning

Fan Filter

The fan filter should be removed and cleaned every three months (more frequently in dusty environments). This prevents the filter becoming blocked which would cause the overtemperature trip to shut the power supply down. To clean the filter proceed as follows:

a) Switch the input to the power supply off.

b) Remove the fan grill by releasing the two quick release fasteners.

c) Remove the filter and shake off loose dust.

d) Wash the filter in a mild detergent solution.

e) Rinse and dry thoroughly before replacing.

f) Replace the fan grill before switching the power supply on.

Other Surfaces

The body of the power supply can be cleaned with a damp lint free cloth. Should it be required, weak detergents can be used. No water should enter the power supply. If the insides of the unit become clogged with dust a service will be required, do not attempt to wash down internal parts.

9.2 Safety Checks

Each year the unit should be given a simple safety check.

Equipment required:

25A Earth bond tester (e.g. Megger PAT 2)

Insulation tester @ 500V D.C. (e.g. Megger BM 7)

Tests

1. Inspect the unit for dents or missing parts which might pose a threat to the units safe operation. Look for any signs of overheating or evidence that foreign objects might have entered the unit. Check the condition of the mains cable.

2. Earth bond. Ensure that 25A D.C. can flow from exposed metal parts of the unit to earth with an impedance of less than 100mΩ.

3. Insulation test at 500V D.C. the input (LIVE & NEUTRAL) to earth and the output (Wired together) to earth and the input to output. Readings of greater than 1MΩ are acceptable.

9.3 Guarantee

The equipment supplied by Wayne Kerr Limited is guaranteed against defective material and faulty manufacture for a period of twelve months from the date of despatch. In the case of materials or components employed in the equipment but not manufactured by us, we allow the customer the period of any guarantee extended to us.

The equipment has been carefully inspected and submitted to comprehensive tests at the factory prior to despatch. If, within the guarantee period, any defect is discovered in the equipment in respect of material or workmanship and reasonably within our control, we undertake to make good the defect at our own expense subject to our standard conditions of sale. In exceptional circumstances and at the discretion of the Service Manager, a charge for labour and carriage costs incurred may be made.

Our responsibility is in all cases limited to the cost of making good the defect in the equipment itself. The guarantee does not extend to third parties, nor does it apply to defects caused by abnormal conditions of working, accident, misuse, neglect or wear and tear.

9.4 Service

In the event of difficulty, or apparent circuit malfunction, it is advisable to telephone (or telex) the Service Department or your local Sales Engineer or Agent (if overseas) for advice before attempting repairs.

For repairs and recalibration it is recommended that the complete instrument be returned to:

The Service Department,
Wayne Kerr Electronics Ltd
Durban Road
Bognor Regis
West Sussex
PO22 9RL

Tel: (01243) 825811 • Fax (01243) 824698

Please ensure adequate care is taken with packing and arrange insurance cover against transit damage or loss.

10. Component Schedules

Important explanation - Please read before ordering parts.

Due to limitations in the number of character spaces available the information in the circuit reference field has been abbreviated and the following notes are provided as a guide to its interpretation.

1. Where a component is used more than once on an assembly the alphabetic portion of the circuit reference for its second and subsequent locations has been omitted; e.g. the circuit reference information for a component located at R1 and R6 will appear as: R1 6
2. The circuit reference numbers are presented in ascending decade blocks delimited by colons; second and subsequent numbers within a decade block represent only the unit value of the location (the tens and hundreds values being implied); e.g. for a component located at R54, R57, R59, R82, R87, R102, R110 and R112 the circuit reference entry will be: R54 7 9:82 7 9:82 7:102:10 2.
3. Where components are used in a series of neighbouring circuit reference locations the circuit reference numbers are represented as inclusive blocks using a hyphen; e.g. for a component located at R16, R19, R21, R24, R25, R26, R31, R37, R38, R39, R40, R44, and R46 will be represented as R16 9:21 4-6: 31 37-40 4 6 (An exception to the rules occurs when a series crosses a decade block in which case the tens value is inserted.
4. Comments are preceded by a semicolon.

When ordering replacement parts please be sure to quote the part number provided.

Component Schedules

11AP3080

Part No	Description	Iss	Qty	Man	Man Part No	Reference
21AP3080	0-30V 0-80A AUTORANGE METERED.	D	1			
31AP3080	AP30/80 CASING	D	1			3
7NU0993531	BLANKING PLATE	B	1	00F	4BA0993531	
7SM5587	3U HANDLE BRACKET	A	2	00F	2SUDG5587	
HB2529	HANDLE BRACKET	C	1	32R	2SUOO2529	
7SU4611	FOOT RETAINER	A	2	00F	2SUDF4611	
7SU5514	TOP COVER	A	1	00F	1SUDE5514	
7SU5621	BOTTOM COVER	A	1	00F	1SUDE5621	
7SX5513	SIDE TRIM	A	2	00F	2SUDF5513	
FT1A00123	FUSE 1 AMP ANTI-SURGE 5 X 20MM		1	03B	S502	F401 (FOR TEST DEPT. USE)
HF0019	FOOT & FOLDING LEG ASSY DK GRY	A	2	14K	2SVOO0139+&+40	
HF0070	FOOT INSERT	A	6	14K	4SVOO0070	
HF0139	FOOT DARK ADMIRALTY GREY	A	2	14K	2SVOO0139	
JPSSG1000	SSG1000/AP60/50		1	51A	SJP0004	
4N3080C	CHASSIS ASSEMBLY	D	1			4
4N3080PC	POWER CONVERSION ASSEMBLY	B	1			4
4N3080H	HEATSINK ASSEMBLY	A	1			4
4N3080DH	DIODE HEATSINK ASSEMBLY	C	1			4
7SX2182	DIODE HEATSINK	C	1	00F	2SUBA2182	
CR44N70SM	4n70F 20% 400V A		2	03A	L1A-4N704A	C403:15
DG54V200	200V 2X50A 60NS ITOP		1	29S	BYV54V-200	D401 3
KP4M10	SCREW M4 X 10 PAN HD POZI		2	05T	KP4M10	
KP4M16	SCREW M4 X 16 PAN HD POZI		2	05T	KP4M16	
MB0029	INSULATING BUSH	J	2	72H	3SVOO0029(M10)	
RW233R0JJ	33R0 5% 2W50		2	04E	74ER	R403:10
SR090L06	T/TRIP STUD 90C N/C 300MM LDS		1	34T	L0609005300	THT401
TM60032	STANDOFF TERMINAL M2.5		2	01H	W6003/M2.5+(W2130)	
TS0B238	SOLDER TAG OBA/M6		1	05R	201020	
TS3B363	SOLDER TAG 3BA		1	05R	201017	
WF4M	FLAT WASHER M4		2	05T	WF4M	
WS4M	SPRING WASHER M4		4	05T	WS4M	
4N6050FH	FET HEATSINK ASSY	A	1			4
5N6050FH	FET CIRCUIT BOARD	B	1			5
BC1372	FET C.B.	B	1	01K	S1SAB13720	B
CL42N20WM1	2n20F 20% 1K0V		1	47L	106-362	C4
CRA1U00SM	1U00F 20% 400V A		3	03A	E1A10204A	C1-3
DAOMIT	DIODES OMITTED		2	00F	DAOMIT	D1 2
MC2	CERAMIC BEAD LARGE		4	57M	IPB2	R1 2 FIT X1 PER LEG
RM233R0FF	33R0 1% 0W60 50PPM 250V		6	18P	MRS25	R3-8
RW3200RNJ	200R 5% 9W00		2	04E	16ER	R1 2 (FIT X1 MC2 PER LEG)
TP15080	CIRCUIT BOARD PIN 8mm		8	02B	B1.5X0.20X8MST	X8 (X1-8 COMP SIDE)
VAOMIT	TRANSISTOR / IC OMITTED		6	00F	IN+HOUSE+REFERENCE	Q1-6
7SU4094	TRANSISTOR SUPPORT	A	6	00F	4SUDA4094	
7SX3922	HEATSINK	B	2	00F	3SUBA3922	
DG12PI600	600V 12A 50NS DO220I		2	29S	STTA1206DI	D1 2 (JIG 223) ENSURE COMP IS BYT12PI600
MF3888	CRAYOTHERM INSULATOR	B	6	72C	4SUOO3888	
SR090L06	T/TRIP STUD 90C N/C 300MM LDS		2	34T	L0609005300	THT1 2
VFP450IR	500V 13A 400MR TO3P STATIC		6	10I	IRFP450	Q1-6 (JIG 182)
7NU0993523	HEAT SINK SUPPORT	C	1	00F	3BA0993523	
7NU0993524	HEAT SINK COVER A	B	1	00F	2BA0993524	
4N3080M	MAIN ASSEMBLY	E	1			4
7NF0993530	INVERTER SPACER	A	1	00F	4OO0993530	
7NF0993537	INSULATOR PLATE	A	1	00F	4OO0993537	
7NR2626524	RES BAR	B	2	00F	4OO2626524	
7NU0993512	CAP BUS BAR B	A	2	00F	3CJ0993512	
7NU0993513	POSITIVE BUS BAR	D	1	00F	2CJ0993513	
7NU0993514	NEGATIVE BUS BAR	D	1	00F	2CJ0993514	
7NU0993515	CONNECTOR CLAMP	B	1	00F	4CJ0993515	
7NU0993516	RESISTOR CLAMP	C	1	00F	4CJ0993516	
7NU0993536	MAIN COVER PLATE	B	1	00F	3BA0993536	
BC239	POWER CONVERSION BOARD	B	1	01K	1BS23B2390	B
CB547N0SM	47n0F 20% 400V MKC 5X18 R15.0		2	159W	MKC10	C408 9
CED6M80KT	6800UF 50% 63V S 12.5		4	92B	ALS20B1022DF	C404-07
CRA3U30LJ	3U30F 5%0 100V MKT 12X27 A32.0		2	70S	MKT1813-533/0	C411 2
CX547N0PM	47NF 20% 250V R150		2	13R	PME+271M547M	C413 4
DTGN71	STUD DIODE		1	03W	SW02PCN075	D402
MC1	CERAMIC BEAD SMALL		2	57M	IPB/1	R405 X1/L
MM3055	TRANSISTOR MICA TO3		1	20B	TO3	
RAOMIT	RESISTORS OMITTED		1	00F	RAOMIT	R409
RW0R015RKT	0R015 10% 50W0		3	94M	HSA50-R1077	R406-408
RW0R100JJ	0R10 5% 2W50		1	04E	W21/74ER	R405 (MC1 X1/L)
RW3220RMJV	220R 5% 7W00		1	17V	210-0	R404
TBM2510PS	STRAIGHT PIN HEADER 10 WAY		1	23M	6410+22-27-2101	SK20
TP1510	CIRCUIT BOARD PIN 10mm		4	26P	B1.5X0.25X10MS	X4
VT3055	2N3055 TE1912		1	29S	2N3055(229B)	TR401
ZZ8D30033	INVERTER AP30/80	G	1	01B	ZZ8D30033	TX404
ZZ9E30051	OUTPUT CHOKE AP30/80	A	1	01B	ZZ9E30051	TX405
ZZ9H30015	CHOKE AP30/80	D	1	01B	ZZ9H30015	TX406
4N6050CD	CENTRE DIVIDER ASSEMBLY	B	1			4
GRM79H	GROMMET 11/2X1 M79H		1	60M	M/79/H	
KP3M10	SCREW M3 X 10 PAN HD POZI		2	05T	KP3M10	
KP3M8	SCREW M3 X 8 PAN HD POZI		2	05T	KP3M8	
NF3M	FULL NUT M3		4	05T	NF3M	
NV320D	POP RIVET 2.4MM DIA DOMED HD		2	08T	TAPD+33+BS	
WF3M	FLAT WASHER M3		2	05T	WF3M	
WS3M	SPRING WASHER M3		4	05T	WS3M	
5N6050D	DRIVE CB ASSY	D	1			5
BC240	DRIVE TRANSFORMER BOARD	C	1	01K	2BS12B2400	B
CLA1U00SJ	1U00F 5%0 400V MKP 13X31 R27.5		1	18P	378-52105	C410
DZ218V0H	18V 5% 1W30		4	01P	BZV85-C18V	Z1A 2A;1B 2B

Part No	Description	Iss	Qty	Man	Man Part No	Reference
GT23	CTY001/NT20 75C UL		2	28P	PLT1M-M	
KP3M6	SCREW M3 X 6 PAN HD POZI		6	05T	KP3M6	
TBA3902PS	2W PIN WAFER WITH STRGHT LOCK		5	07A	640388-2	SK14-18
TBM2506PS	STRAIGHT PIN HEADER 6 WAY 2.54		1	23M	6410+22-27-2061	SK19
TC41480	FASTON TWIN TAB U .25		7	07A	41480	
TP15080	CIRCUIT BOARD PIN 8mm		2	02B	B1.5X0.20X8MST	X2
WS3M	SPRING WASHER M3		6	05T	WS3M	
ZU4L20300	DRIVE TRANS AP60/50	E	1	01B	ZU4L20300	TX402
ZY4F20310	CURRENT TRANSFORMER AP60/50 5	B	1	01B	ZY4F20310	TX403
GT23	CTY001/NT20 75C UL		2	28P	PLT1M-M	
GT25	CTY010/RT675 75C UL		2	28P	PLT2S-M	
GT25UL	TYRAP PLT2S30 105C UL		1	28P	PLT+2S-30	TX406
KP3M8	SCREW M3 X 8 PAN HD POZI		16	05T	KP3M8	
KP4M10	SCREW M4 X 10 PAN HD POZI		1	05T	KP4M10	
KP4M16	SCREW M4 X 16 PAN HD POZI		1	05T	KP4M16	
KP5M10	SCREW M5 X 10 PAN HD POZI		5	05T	KP5M10	
NF3M	FULL NUT M3		16	05T	NF3M	
NF4M	FULL NUT M4		1	05T	NF4M	
NHUNF	HALF NUT 1/4-UNF		1	05T	NHUNF	
TS6B383	SOLDER TAG 6BA STC402297RM		4	05R	RC383/6BA	
WF3M	FLAT WASHER M3		6	05T	WF3M	
WS3M	SPRING WASHER M3		18	05T	WS3M	
WS4M	SPRING WASHER M4		2	05T	WS4M	
WS5M	SPRING WASHER M5		13	05T	WS5M	
WS6M	SPRING WASHER M6		1	05H	M6+SPRING+WASHER	
WW3M	WAVEY WASHER M3		6	24L	LS508/54	
4N6050IP	INPUT FILTER ASSEMBLY	A	1			4
4N6050CB	CAP ASSEMBLY	B	1			4
7NF0993507	CAP PLATE	A	1	00F	3OO0993507	
7SU6431	CAP CLIP	A	4	00F	3/6431	
CED5M60PM	5600UF 20% 250V		2	92B	ALS10A1174DC	C401 2
HW533	CAP INSULATOR AP6050	A	1	27P	3OO0993533	
KP4M12	SCREW M4 X 12 PAN HD POZI		8	05T	KP4M12	
MT4780BLK	TAPE 2M BLK 781/4780		.2	49B	781/4780+BLK	
RX536K0HJ	36K0 5% 2W00 200PPM 700V		2	53D	FP2-N8	R401 2
WF4M	FLAT WASHER M4		8	05T	WF4M	
WS4M	SPRING WASHER M4		8	05T	WS4M	
4N6050FD	FILTER DIVIDER ASSEMBLY	A	1			4
GR73M	GROMMET PV73M 20MM		1	09R	PV73M	
NF20MN	NYLON NUT M20 BLACK		1	06R	607-926	
NF3M	FULL NUT M3		3	05T	NF3M	
NR3M12TH	SPACER M3 X 12MM THR'D HEX		5	01H	R6334-02	
NV320D	POP RIVET 2.4MM DIA DOMED HD		2	08T	TAPD+33+BS	
WS3M	SPRING WASHER M3		3	05T	WS3M	
4N6050SS	SOFT START ASSEMBLY	C	1			4
7NU0993508	RELAY BRACKET	B	1	00F	3BA0993508	
DB36MB60A	35A 600V PLASTIC SQUARE TAG		1	10I	36MB60A	BR301
HR18102	RES MTNG CLIP		2	17V	18102	
KP3M8	SCREW M3 X 8 PAN HD POZI		2	05T	KP3M8	
KP4M10	SCREW M4 X 10 PAN HD POZI		2	05T	KP4M10	
KP4M20	SCREW M4 X 20 PAN HD POZI		1	05T	KP4M20	
RF16R02NJ	6R0 + 6R0 (DUAL) 5% 11W0		1	17V	226-216	R301
SR20016	HI V POWER 12VDC 16AAC DPNO		1	16J	REP200/12V+D.C.+4KV	RL301
WF3M	FLAT WASHER M3		2	05T	WF3M	
WF4M	FLAT WASHER M4		1	05T	WF4M	
WS3M	SPRING WASHER M3		2	05T	WS3M	
WS4M	SPRING WASHER M4		3	05T	WS4M	
YT18	T/C WIRE 18SWG		.062	55M	18SWG	
5N6050IP	I/P FILTER CB	A	1			5
BC238	FILTER 60/50'S	C	1	01K	2BS23B2380	B
CAOMIT	CAPACITORS OMITTED		2	00F	CAOMIT	C312 3
CX6470NPM	470NF 20% 250V R250		5	13R	PME+271M647	C303 5 6 9:10
CXA1U00PM	1.0UF 20% 250V R275		1	13R	PHE+830MF7100M	C304
CY42N20PM	2.2NF 20% 250V R100		2	13R	PME+271Y422M	C301 2
CY522N0PM	22NF 20% 250V R150		2	13R	PME+271Y522M	C307 8
GT25	CTY010/RT675 75C UL		3	28P	PLT2S-M	
MT9X3	FCAMPAD 90X38 771/4773		.5	49B	771/4773	
ZX4D11651	FILTER CHOKE AP60/50 5	B	2	01B	ZX4D11651	TX301 2
GCNX2	P CLIP 6.4MM I/D		2	04H	NX2	
KP3M6	SCREW M3 X 6 PAN HD POZI		4	05T	KP3M6	
KP4M10	SCREW M4 X 10 PAN HD POZI		5	05T	KP4M10	
NF3M	FULL NUT M3		3	05T	NF3M	
TS542	SOLDER TAG		4	02U	HGBV623/1000ET	
WS3M	SPRING WASHER M3		2	05T	WS3M	
WS4M	SPRING WASHER M4		5	05T	WS4M	
WW3M	WAVEY WASHER M3		5	24L	LS508/54	
5N3080C	AP30/80 CONTROL C.B.	P	1			5
5SAP1KWC	STANDARD 1KW CONTROL AP/MP	E	1			5
5SAPC	STANDARD CONTROL BOARD	K	1			5
5SAPC1	CONTROL STANDARD COMPONENTS	A	1			5
RM212R0FF	12R0 1% 0W60 50PPM 250V		12	18P	MRS25	R155 7 9:62 7 8:93 9:216-218:21
RM510K0FF	10K0 1% 0W60 50PPM 250V		14	18P	MRS25	R118:20;30 7 8;42 4;85;91 2 4 7 8;203
7SU3276	TRANSFORMER BRACKET	B	1	00F	4SUBA3276	
BC1096	CONTROL BOARD AP3KW	E	1	01K	C1RBT10960	BOARD TO BE ATE TESTED
CAOMIT	CAPACITORS OMITTED		7	00F	CAOMIT	C35 9:49:60 4:82 3
CC3100PLG	100PF 2% 100V N150 RP050		1	18P	683+34101	C98
CC3270PLG	270PF 2% 100V N750 RP050		1	18P	683+58271	C54
CC3330PLG	330PF 2% 100V N750 RP050		2	18P	683+58331	C15:47
CEA4U70LM	4.7UF 20% 100V R025		1	01W	WHT	C89
CEB15U0IT	15UF 50% 40V AXIAL		1	18P	030-37159	C34
CEB22U0JM1	22UF 20% 50V FC +5MM		1	01W	WHT	C100 (FIT WITH '+' TOWARDS R73)
CEC100UDT	100UF 50% 10V AXIAL		2	18P	030-34101	C23:36
CEC100UGM2	100UF 20% 25V 105 8x016 A20.0		1	01W	WTU-100-25	C31
CEC100UHM	100UF 20% 35V R050		3	01W	WHT	C24 6 7
CEC220UGM	220UF 20% 25V R050		2	01W	WHT	C20:97
CED1M00JQ	1000UF 20% 50V R 7.5		1	01W	WHT	C4
CED2M20BM	2200UF 20% 6.3V R 05.0		1	01W	RJ2	C57
CED2M20GM	2200UF 20% 25V R 07.5		1	01W	WHT	C1

Part No	Description	Iss	Qty	Man	Man Part No	Reference
CED2M20HM	2200UF 20% 35V 18X036R 07.5		2	01W	WHT	C5 6
CED4M70EM1	4700UF 20% 16V N 05.0		1	67P	TSU-ECES1CU472D	C3
CR42N20LM	2n20F 20% 100V KT 3X08 R05.0		2	159W	FKS2MIN	C44:52
CR510N0LJ	10n0F 5%0 100V KT 3X08 R05.0		24	159W	FKS2	C13 7 8:22:38:40 3 5 8:51 6 8;70-2 6-9;80 8;90-2
CR510N0LM	10n0F 20% 100V KT 3X08 R05.0		2	159W	FKS2MIN	C41:96:
CR6100NLM	100nF 20% 100V MKT 3X10 R07.5		14	159W	MKS3	C8:33 7:46:73-75:81 4 5 7:93 4 9
CR6220NKK	220nF 10% 63V MKT 4X08 R05.0		1	159W	MKS2	C25
CR6220NLM	220nF 20% 100V MKT 4X13 R10.0		5	159W	MKS4	C19:21 8 9:32
CR6470NLK	470nF 10% 100V MKT 7X13 R10.0		1	85S	MKT-32511-D1474K	C14
CRA1U00KM1	1U00F 20% 63V MKT 6X08 R05.0		1	159W	MKS2	C12
DAOMIT	DIODES OMITTED		3	00F	DAOMIT	Z8-10
DBP02	1.5A 200V PLASTIC IN LINE		1	11G	KBP02M	BR2
DBW02M	1.5A 200V PLASTIC ROUND		3	11G	W02G	BR1 3 4 (MC1 X1/L)
DG27150	DIODE		1	01P	BYV27-150	D21
DG28150	DIODE		1	01P	BYV28-150	D51
DG4003	DIODE		5	11G	1N4003	D1 2:26:34:41
DG4148	DIODE		34	23N	1N4148	D3 6-8:16-20 2 4 5 7 29-32 35-40 42-50 2 3
DGOA47	DIODE		2	01P	OA47	D4 9
DZ14V70E	4.7V 5% 0W50		1	31I	ZPD4.7	Z1
DZ16V20D1	6.2V 0W40		1	01P	1N823	Z5
DZ16V80E	6.8V 5% 0W50		1	31I	ZPD6.8	Z6
KP3M12	SCREW M3 X 12 PAN HD POZI		6	05T	KP3M12	
KP3M6	SCREW M3 X 6 PAN HD POZI		1	05T	KP3M6	
KP3M8	SCREW M3 X 8 PAN HD POZI		1	05T	KP3M8	
MB2840	M3 TOP HAT BUSH		6	14W	BQ2840	IC7 8 9:11;TR20 (IC10 IF FITTED)
MC1	CERAMIC BEAD SMALL		12	57M	IPB/1	BR1 3 4 X1/L
MM4170	ALUMINIUM OXIDE WASHER TO220		6	19R	4170	IC7 8 9:11;TR20 (IC10 IF FITTED)
NF3M	FULL NUT M3		8	05T	NF3M	
PM45K00KV	5K00 10% PRESET VERT STURN		1	02S	63P	P2
PM510K0KV	10K0 10% PRESET VERT STURN		3	02S	63P	P1 6 7
RAOMIT	RESISTORS OMITTED		5	00F	RAOMIT	R77-9:187:222
RG71M00BJ	1M00 5% 0W25 100PPM 1K1V		3	18P	VR25	R40 9:51
RG73M90BJ	3M90 5% 0W25 250PPM 1K1V		2	18P	VR25	R180 1
RM212R0FF	12R0 1% 0W60 50PPM 250V		18	18P	MRS25	R22 6:37:52:87:90 1 4:101 6 9:12 7:28:36:40 3 5
RM239R0FF	39R0 1% 0W60 50PPM 250V		1	18P	MRS25	R83
RM247R0FF	47R0 1% 0W60 50PPM 250V		1	18P	MRS25	R206
RM3100RDF	100R 1% 0W40 50PPM 200V		1	18P	MRS16T	R212
RM3100RFF	100R 1% 0W60 50PPM 250V		10	18P	MRS25	R53:160 1 3 9:70:208 9:11 3
RM3120RFF	120R 1% 0W60 50PPM 250V		2	18P	MRS25	R80 5
RM3220RFF	220R 1% 0W60 50PPM 250V		1	18P	MRS25	R215
RM3330RFF	330R 1% 0W60 50PPM 250V		1	18P	MRS25	R210
RM3470RFF	470R 1% 0W60 50PPM 250V		1	18P	MRS25	R19
RM3620RFF	620R 1% 0W60 50PPM 250V		1	18P	MRS25	R139
RM3910RFF	910R 1% 0W60 50PPM 250V		1	18P	MRS25	R84
RM41K00FF	1K00 1% 0W60 50PPM 250V		10	18P	MRS25	R150 8:73-75:88 9::90:200 1
RM41K20FF	1K20 1% 0W60 50PPM 250V		8	18P	MRS25	R5 6:10 2:61 8:71:195
RM41K50FF	1K50 1% 0W60 50PPM 250V		1	18P	MRS25	R223
RM41K80FF	1K80 1% 0W60 50PPM 250V		5	18P	MRS25	R45:152 3:77 8
RM42K20FF	2K20 1% 0W60 50PPM 250V		4	18P	MRS25	R63:96:129:220
RM42K70FF	2K70 1% 0W60 50PPM 250V		3	18P	MRS25	R111:32:56
RM43K30FF	3K30 1% 0W60 50PPM 250V		3	18P	MRS25	R9:11:36
RM43K90FF	3K90 1% 0W60 50PPM 250V		1	18P	MRS25	R88
RM44K70FF	4K70 1% 0W60 50PPM 250V		3	18P	MRS25	R31 8:44
RM45K10FF	5K10 1% 0W60 50PPM 250V		4	18P	MRS25	R57:60:133:207
RM46K80FF	6K80 1% 0W60 50PPM 250V		3	18P	MRS25	R2:86:131
RM48K20FF	8K20 1% 0W60 50PPM 250V		4	18P	MRS25	R151 4:76 9
RM49K10FF	9K10 1% 0W60 50PPM 250V		2	18P	MRS25	R28 9
RM510K0FF	10K0 1% 0W60 50PPM 250V		18	18P	MRS25	R1 3 7:16:39:41 3:50 8 9:64 9:70 3 5 6:81:108
RM512K0FF	12K0 1% 0W60 50PPM 250V		1	18P	MRS25	R55
RM515K0FF	15K0 1% 0W60 50PPM 250V		1	18P	MRS25	R17
RM516K0FF	16K0 1% 0W60 50PPM 250V		1	18P	MRS25	R146
RM518K0FF	18K0 1% 0W60 50PPM 250V		2	18P	MRS25	R82:148
RM522K0FF	22K0 1% 0W60 50PPM 250V		4	18P	MRS25	R13 5:27:147
RM527K0FF	27K0 1% 0W60 50PPM 250V		2	18P	MRS25	R42 8
RM533K0FF	33K0 1% 0W60 50PPM 250V		3	18P	MRS25	R4 8:14
RM539K0FF	39K0 1% 0W60 50PPM 250V		1	18P	MRS25	R47
RM547K0FF	47K0 1% 0W60 50PPM 250V		16	18P	MRS25	R18:32 3 5:56:62 7:72 4:89:119:41:64 5:86:96
RM551K0FF	51K0 1% 0W60 50PPM 250V		1	18P	MRS25	R149
RM568K0FF	68K0 1% 0W60 50PPM 250V		3	18P	MRS25	R65;93;202
RM6100KFF	100K 1% 0W60 50PPM 250V		1	18P	MRS25	R166
RM6200KFF	200K 1% 0W60 50PPM 250V		1	18P	MRS25	R66
RM6330KFF	330K 1% 0W60 50PPM 250V		1	18P	MRS25	R135
SB0059	AP60/50	B	1	31S	4STOO0059	SW1
TB72513C	TERMINAL BLOCK 13 WAY PCB MTG.		1	26V	TX72513-49-C	T1
TBA3902PS	2W PIN WAFER WITH STRGHT LOCK		1	07A	640388-2	SK6A
TBA3910PS	10W PIN WAF WITH STRGHT LOCK		1	07A	1-640388-0	SK3
TBM2506PS	STRAIGHT PIN HEADER 6 WAY 2.54		2	23M	6410+22-27-2061	SK5 7
TBM2510PS	STRAIGHT PIN HEADER 10 WAY		1	23M	6410+22-27-2101	SK9
TIH2516NT1L	16 WAY PIN HEADER		1	25V	M52-1216-662	SK4
TIH2534NT1L	34 WAY PIN HEADER		1	88M	ID101-H34-N-06-F1	SK8
VA311N	COMPARATOR SINGLE		2	23N	LM311N	IC22 7
VA3140E	OP AMP SINGLE STATIC		4	70H	CA3140E	IC13-16
VA339N	COMPARATOR QUAD LO PWR		3	23N	LM339N	IC1 2:17
VA347N	OP AMP QUAD		2	23N	LF347N	IC19:24
VA431AWC	REGULATOR SHUNT		2	23N	LM431ACZ	Z3 4 (DO NOT PREFORM FIT ON CONVERSION PAD)
VA7805CT	REGULATOR		2	02M	MCT7805CT	IC7 8(JIG 223)
VA78M12UC	REGULATOR		1	23N	LM341T12/LM78M12CT	IC9(JIG 223)
VA78M15CU	REGULATOR		1	23N	LM341T15/LM78M15CT	IC11(JIG 223)
VA7905CT	REGULATOR		1	23N	MC7905CT	IC6 (MOD REQ TO FIT TO ISSUE C C/B REF A
YARKER)						
VD4001BCN	BCMOS 4X 2-I/P NOR 14-D STATIC		3	23N	CD4001BCN	IC5:21 9
VD4011BE	BCMOS 4X 2-I/P NAND 14-D STATC		1	70H	CD4011BE	IC23
VD4013BE	BCMOS 2X D-TYP F/F 14-D STATIC		1	23N	CD4013BE	IC3
VD4066B	BCMOS 4X ANLOG SW 125R STATIC		3	23N	CD4066BCN	IC18:20 5
VD4069UBE	CMOS HEX INVERTR 14-DIP STATIC		1	23N	CD4069UBE	IC26
VD4093BCN	BCMOS 4X 2-I/P NAND 14-DP STAT		2	23N	CD4093BCN	IC4:28
VF540	IRF540 STATIC		1	10I	IRF540	TR33
VF9522	FET IRF9522 STATIC		1	10I	IRF9520	TR31

Part No	Description	Iss	Qty	Man	Man Part No	Reference
VP10218	TRANSISTOR PAD 10218		2	27K	EPX003	Z3 4
VS14L	IC SKT 14WAY		16	08R	ICO-143-S8A-T	
VS8P	IC SKT 8WAY		7	08R	ICO-083-S8A-T	
VT182PL	BC182PL T018 JOG		17	03Z	BC182PL	TR2-5 8:12-17 9:21 2 5 9:34
VT212PL	BC212PL TO18 JOG		8	03Z	BC212PL	TR1 7:23 4 26-28:30
VT337	BC337 TO18 PREFORM		1	01P	BC337	TR18
VTX650KCR	ZTX650 45V 2A N		1	03Z	ZTX650K35	TR32
VTX750K	ZTX750K		1	03Z	ZTX750K35+(4SC0174)	TR35
WF3M	FLAT WASHER M3		6	05T	WF3M	
WN3M	FLAT WASHER M3 NYLON 66		6	17N	M3+NYLON+WASHER	IC7 8 9:11;TR20 (IC10 IF FITTED)
WS3M	SPRING WASHER M3		9	05T	WS3M	
WW3M	WAVEY WASHER M3		3	24L	LS508/54	
7NU0993525	REGULATOR HEATSINK	B	1	00F	2BA0993525	
CAOMIT	CAPACITORS OMITTED		2	00F	CAOMIT	C102 3
CC3100PLG	100PF 2% 100V N150 RP050		1	18P	683+34101	C10
CC3270PLG	270PF 2% 100V N750 RP050		1	18P	683+58271	C55
CEB10U0GT1	10UF 50% 25V AXIAL		1	18P	030-36109	C16
CEC100UGM2	100UF 20% 25V 105 8x016 A20.0		1	01W	WTU-100-25	C30
CL3470PLJ	470pF 5%0 100V KP 5X08 R05.0		1	159W	FKP2	C11
CR41N00LM	1n00F 20% 100V KC 3X08 R05.0		1	159W	FKS2	C68
CR510N0LM	10n0F 20% 100V KT 3X08 R05.0		1	159W	FKS2MIN	C61
CR6100NLM1	100nF 20% 100V MKT 4X10 R10.0		1	159W	MKS4	C101
CRA1U00KM1	1U00F 20% 63V MKT 6X08 R05.0		1	159W	MKS2	C86
DG4003	DIODE		1	11G	1N4003	D28
DG4148	DIODE		1	23N	1N4148	D5
PAOMIT	POTENTIOMETERS OMITTED		1	00F	PAOMIT	P5
PM41K00KV	1K00 10% PRESET VERT STURN		2	02S	63P	P8 9
PM45K00KV	5K00 10% PRESET VERT STURN		2	02S	63P	P3 4
RAOMIT	RESISTORS OMITTED		1	00F	RAOMIT	R225
RM13R90FF	3R90 1% 0W60 100PPM 250V		1	18P	MRS25	R46
RM212R0FF	12R0 1% 0W60 50PPM 250V		1	18P	MRS25	R23
RM3180RFF	180R 1% 0W60 50PPM 250V		1	18P	MRS25	R219
RM3220RFF	220R 1% 0W60 50PPM 250V		1	18P	MRS25	R205
RM41K50FF	1K50 1% 0W60 50PPM 250V		1	18P	MRS25	R214
RM43K30FF	3K30 1% 0W60 50PPM 250V		1	18P	MRS25	R54
RM533K0FF	33K0 1% 0W60 50PPM 250V		2	18P	MRS25	R97:100
RM568K0FF	68K0 1% 0W60 50PPM 250V		1	18P	MRS25	R30
TAOMIT	SOCKETS PLUGS OMITTED		2	00F	TAOMIT	SK6B:11
VA78M12UC	REGULATOR		1	23N	LM341T12/LM78M12CT	IC10(JIG 223)
VAOP77	IC OP77GP STATIC		1	10B	OP-77GP	IC12
YL22105	LINK 10.5MM TC22SWG		1	00F	TC22SWG+10.5MM	R227
YT22	T/C WIRE 22SWG		.03	55M	22SWG	
CAOMIT	CAPACITORS OMITTED		3	00F	CAOMIT	C42:66 7
CC3330PLG	330PF 2% 100V N750 RP050		1	18P	683+58331	C50
CR42N20LM	2n20F 20% 100V KT 3X08 R05.0		2	159W	FKS2MIN	C63:95
CR44N70LJ	4n70F 5%0 100V KT 3X08 R05.0		1	159W	FKS2MIN	C62
CR533N0KM	33n0F 20% 63V MKT 3X08 R05.0		1	159W	MKS2	C53
CR6100NKM	100nF 20% 63V MKT 3X08 R05.0		1	159W	MKS2MIN	C65
CR6100NLM	100nF 20% 100V MKT 3X10 R07.5		1	159W	MKS3	C59
CR6220NKK	220nF 10% 63V MKT 4X08 R05.0		1	159W	MKS2	C69
DLINK22	22SWG TC LINK F		1	00F	DLINK22	D23
YT22	T/C WIRE 22SWG		.035	55M	22SWG	
DZ12V70E	2.7V 5% 0W50		1	31I	ZPD2.7	R121
PM3500RKV	500R 10% PRESET VERT STURN		1	02S	63P	P10
RAOMIT	RESISTORS OMITTED		3	00F	RAOMIT	R95:124 5
RM41K20FF	1K20 1% 0W60 50PPM 250V		1	18P	MRS25	R113
RM41K50FF	1K50 1% 0W60 50PPM 250V		1	18P	MRS25	R99
RM41K80FF	1K80 1% 0W60 50PPM 250V		2	18P	MRS25	R92:183
RM42K70FF	2K70 1% 0W60 50PPM 250V		2	18P	MRS25	R110:71
RM45K10FF	5K10 1% 0W60 50PPM 250V		2	18P	MRS25	R122:D33 POSITION
RM45K60FF	5K60 1% 0W60 50PPM 250V		2	18P	MRS25	R104 5
RM48K20FF	8K20 1% 0W60 50PPM 250V		1	18P	MRS25	R182
RM510K0FF	10K0 1% 0W60 50PPM 250V		3	18P	MRS25	R107:14:23
RM512K0FF	12K0 1% 0W60 50PPM 250V		2	18P	MRS25	R115:26
RM522K0FF	22K0 1% 0W60 50PPM 250V		1	18P	MRS25	R134
RM533K0FF	33K0 1% 0W60 50PPM 250V		1	18P	MRS25	R172
RM539K0FF	39K0 1% 0W60 50PPM 250V		1	18P	MRS25	R127
RM547K0FF	47K0 1% 0W60 50PPM 250V		1	18P	MRS25	R34
RM551K0FF	51K0 1% 0W60 50PPM 250V		1	18P	MRS25	R184
RM582K0FF	82K0 1% 0W60 50PPM 250V		2	18P	MRS25	R102 3
RM6100KFF	100K 1% 0W60 50PPM 250V		1	18P	MRS25	R98
RM6390KFF	390K 1% 0W60 50PPM 250V		1	18P	MRS25	R116
VT760	760A 1KV 4A R3478 N TO220		1	01T	TIPL760A	TR20(JIG 223)
7NU0993505	FILTER DIVIDER A	C	1	00F	1BA0993505	
7NU0993506	MAINS SCREEN	B	1	00F	2BA0993506	
7NU0993509	FAN SUPPORT BRACKET	A	2	00F	3DA0993509	
7NU0993517	CENTRE DIVIDER	F	1	00F	1BA0993517	
7NU0993522	CB BRACKET	B	1	00F	4DA0993522	
7SX5512	TOP & BOTTOM TRIM	A	4	00F	2SUDF5512	
GCNX1	P CLIP 5.0MM I/D		1	04H	NX1	
GR3G	GROMMET NYLON HN3G		4	21F	HN3G-33-1	
GR3P	GROMMET PLUNGER HN3P		4	21F	HN3P-33-4-1	
HA0135	3U HANDLE DARK ADMIRALTY GREY	B	4	14K	1SVOO0135	
HA0136	3U HANDLE INSERT DK AD'LTY GRY	B	4	14K	2SVOO0136	
KP3M10	SCREW M3 X 10 PAN HD POZI		4	05T	KP3M10	
KP3M12	SCREW M3 X 12 PAN HD POZI		1	05T	KP3M12	
KP3M6	SCREW M3 X 6 PAN HD POZI		10	05T	KP3M6	
KP4M16	SCREW M4 X 16 PAN HD POZI		4	05T	KP4M16	
KP5M10	SCREW M5 X 10 PAN HD POZI		1	05T	KP5M10	
NF3M	FULL NUT M3		1	05T	NF3M	
NF4M	FULL NUT M4		4	05T	NF4M	
TBA3902HS	2W HOUSING WITH STRAIGHT LOCK		5	07A	640250-2	
TBA3910HS	10W HOUSING WITH STRGHT LOCK		1	07A	1-640250-0	
WF3M	FLAT WASHER M3		2	05T	WF3M	
WF4M	FLAT WASHER M4		1	05T	WF4M	
WS3M	SPRING WASHER M3		11	05T	WS3M	
WS4M	SPRING WASHER M4		4	05T	WS4M	
WS5M	SPRING WASHER M5		1	05T	WS5M	

Part No	Description	Iss	Qty	Man	Man Part No	Reference
WW3M	WAVEY WASHER M3		4	24L	LS508/54	
4N3080F	FRONT PANEL ASSEMBLY	B	1			4
4N6050FF	FRONT PANEL ASSEMBLY	A	1			4
5N3080F1	FRONT PANEL DISPLAY C.B	G	1			
5NAPDISA	DISPLAY CB AXIAL ASSY	A	1			
BC235	FRONT PANEL DISPLAY BOARD	C	1	01K	CBP32B2350	BOARD TO BE ATE TESTED
RM15R10FF	5R10 1% 0W60 50PPM 250V		2	18P	MRS25	R15:23
RM41K00FF	1K00 1% 0W60 50PPM 250V		3	18P	MRS25	R21 8:41
RM41K10FF	1K10 1% 0W60 50PPM 250V		1	18P	MRS25	R37
RM42K20FF	2K20 1% 0W60 50PPM 250V		1	18P	MRS25	R36
RM42K70FF	2K70 1% 0W60 50PPM 250V		6	18P	MRS25	R6-8:22 6:35
RM510K0FF	10K0 1% 0W60 50PPM 250V		11	18P	MRS25	R2-5 9-11:20 4 5 7
RM512K0FF	12K0 1% 0W60 50PPM 250V		2	18P	MRS25	R12 8
RM520K0FF	20K0 1% 0W60 50PPM 250V		1	18P	MRS25	R34
RM522K0FF	22K0 1% 0W60 50PPM 250V		2	18P	MRS25	R16 7
RM547K0FF	47K0 1% 0W60 50PPM 250V		1	18P	MRS25	R33
RM6100KFF	100K 1% 0W60 50PPM 250V		3	18P	MRS25	R29-31
7NU0993526	TOP BRACKET	B	1	00F	3BA0993526	
7NU0993527	BOTTOM BRACKET	C	1	00F	3BA0993527	
7SF3293	PACKING PIECE A	A	2	00F	4SUOO3293	
7SF3294	PACKING PIECE B	A	2	00F	4SUOO3294	
CEA4U70KT	4.7UF 50% 63V AXIAL		1	18P	030-38478	C15
CEB10U0GT1	10UF 50% 25V AXIAL		4	18P	030-36109	C2 6 9:13
CEC100UDT	100UF 50% 10V AXIAL		1	18P	030-34101	C11
CR6100NKM	100nF 20% 63V MKT 3X08 R05.0		4	159W	MKS2MIN	C1 5 8:10
CR6100NLM1	100nF 20% 100V MKT 4X10 R10.0		1	159W	MKS4	C14
CR6220NLM	220nF 20% 100V MKT 4X13 R10.0		2	159W	MKS4	C3:12
CRA1U00KM1	1U00F 20% 63V MKT 6X08 R05.0		2	159W	MKS2	C4 7 (ALT 50V M13001)
CY42N20PM	2.2NF 20% 250V R100		1	13R	PME+271Y422M	C16
HC53160B	34W F/WIRE 4SC0039/C	C	1	25V	4SC0039	
HW1934	SPACER BOARD AP60/50	C	1	01K	3SUOO1934	
LD134G	LED GRN T1 3/4 MV64530		1	11Q	MV54530+/+LED+ONLY++	LED20
LD5501	LED HER 1 X 7 G OR H		6	02H	HDSP5501	LED1-3:15-17
LD57164	LED RED BAR GRAPH GORH		4	11Q	MV57164	LED5 6:18 9
LD600159	LED RED BLOCK LD001VR		9	24I	600159/UR	LED4 7-14
MC2	CERAMIC BEAD LARGE		2	57M	IPB2	LED20
PM45K00KH2	5K00 10% PRESET HORZ MTURN		1	02S	64Z	P5
PM45K00KV3	5K00 10% PRESET VERT MTURN		1	02S	64Y	P4
PM510K0KH1	10K0 10% PRESET HORZ MTURN		2	02S	64Z	P1 7
PM550K0KH1	50K0 10% PRESET HORZ MTURN		2	02S	64Z	P2 6
PW45K00JN	5K00 5% NPREST LIN		2	02S	534-5K	P3 8
RAOMIT	RESISTORS OMITTED		2	00F	RAOMIT	R39:40
RM3120RFF	120R 1% 0W60 50PPM 250V		2	18P	MRS25	R1:38
RM42K20FF	2K20 1% 0W60 50PPM 250V		1	18P	MRS25	R13
RM46K20FF	6K20 1% 0W60 50PPM 250V		1	18P	MRS25	R32
RM533K0FF	33K0 1% 0W60 50PPM 250V		2	18P	MRS25	R14 9
SA16700	SWITCH CAP GREY		2	24M	16-700	
SB15500	PUSH BUTTON SWITCH (BLK PB)		1	24M	15/501+(BLK+PB)	SW1
SB15550	PUSH/B SW 15-550 LATCH(RED PB)		1	24M	15-551-03	SW2
TIH2526NT1L	26 WAY PIN HEADER		1	25V	M52-1226-660	SK1
TK30513	PIN LINE SOCKET 3WAY		9	35R	3-0513-10	LED4 7-14
TP7401	12WAY STAKED MALE CONTACT		4	07A	1-163740-1	PL1 2
VA3914N	DRIVER BAR DISPLAY		2	23N	LM3914N	IC8 9
VD3161E	BCD-7SEG DECODER/DRIVER 16-DIP		2	70H	CA3161E	IC1 6
VD3162E	ADC 3-DIGIT BCD O/P 16-DIP		2	70H	CA3162E	IC2 5
VD4016B	BCMOS 4X ANL SWCH 280R STATIC		1	23N	CD4016BE	IC4
VD4050B	BCMOS HEX BUFFER 16-DIP STATIC		1	23N	CD4050BCN	IC3
VD4093BCN	BCMOS 4X 2-I/P NAND 14-DP STAT		1	23N	CD4093BCN	IC7
VS14L	IC SKT 14WAY		2	08R	ICO-143-S8A-T	IC4 7
VS16L	IC SKT 16WAY		3	08R	ICO-163-S8A-T	IC3 5 6
VS18L	IC SKT 18 WAY		2	08R	ICO-183-S8A-T	IC8 9
VS20L1	20 WAY LOW PROFILE SOCKET		4	28I	703-1320-01-04-10	LED5 6:18 9
VS32C	32W CARRIER 612-92-632		2	27F	612-92-632	LED1-3:15-17
VT328	BC328 TO18 PREFORM		8	01P	BC328	TR1-8
WN10M17	NYLON WASHER M10 X 17.45MM O/D		2	40P	041-3728	
YT22	T/C WIRE 22SWG		.112	55M	22SWG	L1 2;LK1
ZF1115	FERRITE BEAD L=5.6MM OD=4.15		2	15P	4313-020-15170	L1 2
7SU2430	FALSE FRONT PANEL KA	E	1	00F	1SUBA2430	
KC3M6	SCREW M3 X 6 CSK HD POZI		9	05T	KC3M6	
KC3M8	SCREW M3 X 8 CSK HD POZI		6	05T	KC3M8	
KP3M8	SCREW M3 X 8 PAN HD POZI		5	05T	KP3M8	
NF3M	FULL NUT M3		4	05T	NF3M	
WS3M	SPRING WASHER M3		4	05T	WS3M	
WW3M	WAVEY WASHER M3		5	24L	LS508/54	
4N6050B	BACK PANEL ASSEMBLY	B	1			4
6P10236	AP/MP RANGE WIRE PREP	J	1			6
TC2BARR	RING TERMINAL 2BA RED REEL		9	07A	2-342104-1	
TC39AMP	CRIMP TERMINAL		11	07A	640252-1	
TC3BARR	RING TERMINAL M4 RED 22-16AWG		8	07A	2-342103-1	
TC6BARR	RING TERMINAL 6BA RED REEL		2	07A	2-342101-1	
TCM25	CRIMP TERMINALS 2.5MM REEL		16	23M	4809-08-50-0031	
YM325	3 CORE MAINS CABLE 2.5MMX BLK		2	10P	2.5MM+HR325	
YP1602BKV	16/0.2 BLACK 105		.51	10P	VX350	
YP1602GYV	16/0.2 GREY 105		1.63	10P	16/0.2+VX	
YP1602PKV	16/0.2 PINK 105		.33	10P	16/0.2+VX	
YP1602VIV	16/0.2 VIOLET 105		.15	10P	16/0.2+VX	
YP1602WHV	16/0.2 WHITE 105		.33	10P	16/0.2+VX	
YP1602YLV	16/0.2 YELLOW 105		.3	10P	16/0.2+VX	
YP2402BNV	24/0.2 BROWN 105		.71	10P	24/0.2+VX	
YP2402RDV	24/0.2 RED 105		.25	10P	VX450	
YP2402VIV	24/0.2 VIOLET 105		.1	10P	24/0.2+VX	
YP30025BKV	48/0.2 BLACK 105		.46	08I	30/0.25+SOFLEX+TQ	
YP30025OR	16AWG ORANGE UL1015		.36	09A	30/0.25+UL1015	
YP30025RDV	48/0.2 RED 105		.28	08I	30/0.25+SOFLEX+TQ	
YP30025WHV	48/0.2 WHITE 105		.2	08I	30/0.25+SOFLEX+TQ	
YP30025YLV	48/0.2 YELLOW 105		.1	08I	30/0.25+SOFLEX+TQ	
YP3079BL	14AWG BLUE UL1015		.76	09A	14AWG+UL1015	
YP3079BLK	14AWG BLACK UL1015		.51	09A	14AWG+UL1015	

Part No	Description	Iss	Qty	Man	Man Part No	Reference
YP3079BN	14AWG BROWN UL1015		.44	09A	14AWG+UL1015	
YP3079RD	14AWG RED UL1015		.45	09A	14AWG+UL1015	
YP702GYV	7/0.2 GREY 105		.84	08I	30+X+0.1+SOFLEX+TQ	
YP702PKV	7/0.2 PINK 105		.175	08I	30+X+0.1+SOFLEX+TQ	
YP702VIV	7/0.2 VIOLET 105		.84	08I	30+X+0.1+SOFLEX+TQ	
YP702WHV	7/0.2 WHITE 105		.175	08I	30+X+0.1+SOFLEX+TQ	
YP702YLV	7/0.2 YELLOW 105		.84	08I	30+X+0.1+SOFLEX+TQ	
7NF0993528	BUS BAR SEPERATER	A	2	00F	4OO0993528	
7NF0993538	OUTPUT COVER INSULATOR	A	1	00F	4OO0993538	
7NU0993518	BACK PANEL A	D	1	00F	1BA0993518	
7NU0993519	OUTPUT COVER A	D	1	00F	2BA0993519	
7NU0993520	RH SIDE PANEL KA	C	1	00F	1CB0993520	
7NU0993521	LH SIDE PANEL A	C	1	00F	1CB0993521	
7SU2386	RIGHT HAND SIDE PANEL BRACKET	A	6	00F	4SUDA2386	
EF2A1	FAN 115V 119 X 38 MM		1	69P	4500N	
FH520TP	FUSE HOLDER 5 X 20MM P/MTG UL		1	12A	TO333UL	F401
FS9820	FUSE HOLDER SHROUD 5 X 20MM		1	28B	9820	F401
GC20M	CABLE BUSHING/CLAMP M20 THREAD		1	06R	607-904	
GR2156	GROMMET HV2156		1	53M	HV2156	
GR3A	HALF GROMMET ALUM GH3		2	37D	ALUM+GH3	
GR3G	GROMMET NYLON HN3G		3	21F	HN3G-33-1	
GR3P	GROMMET PLUNGER HN3P		3	21F	HN3P-33-4-1	
GR73	GROMMET M73H		1	60M	M73H	
HK150	KNOB CAP C150 SIF BLK		2	01S	C150	
HK15025	KNOB S150250 SIF BLK		2	01S	S150250	
HL9X30	BLANK 9X30 P120		1	51D	P120	
HMDEC10	FILTER FOAM DECLON 17mm THICK		.01	14D	10PPI+(17MM+THICK)	(125 X 115MM)
HR3	GUIDE RAIL RCG3		2	29R	RCG3	
HR335	OVAL STUD AJ3-35		2	37D	AJ3-35	
HRS3	SPRING S3		2	37D	S3-175	
HW0993501	CIRCUIT BREAKER PANEL	B	1	18G	300993501	
HW0993502	FAN PANEL	C	1	18G	3000993502	
HW10040100	DISPLAY PANEL 30/80	A	1	18G	2SC10010	
KC3M6	SCREW M3 X 6 CSK HD POZI		12	05T	KC3M6	
KC3M8	SCREW M3 X 8 CSK HD POZI		12	05T	KC3M8	
KP3M12	SCREW M3 X 12 PAN HD POZI		1	05T	KP3M12	
KP3M8	SCREW M3 X 8 PAN HD POZI		9	05T	KP3M8	
KP4M12	SCREW M4 X 12 PAN HD POZI		24	05T	KP4M12	
MT0858527	ADHESIVE PAD	B	3	49B	4SUOO0858527	
NF3M	FULL NUT M3		1	05T	NF3M	
NF4M	FULL NUT M4		1	05T	NF4M	
SS2225B	SLIDE SW T2225B MARKED 115-230		1	12A	T2225B	SW401
ST253A90	CCT BREAKER 25/33A 250V 2POLE		1	21C	BA2-B0-24-625-212-D	CB401
TL72332	JUMPER LINK		6	26V	7204-3502-A120	
WF3M	FLAT WASHER M3		2	05T	WF3M	
WN8B	FLAT WASHER 8BA/M2.5 NYLON 66		2	40P	011+0763	
WS3M	SPRING WASHER M3		4	05T	WS3M	
WS4M	SPRING WASHER M4		1	05T	WS4M	
WW3M	WAVEY WASHER M3		8	24L	LS508/54	
YM325	3 CORE MAINS CABLE 2.5MMX BLK		2	10P	2.5MM+HR325	
ZR0300	AUXILIARY TRANSFORMER Z1426	D	1	01B	3SR0300	TX401
7ZU0993532	CLAMPING STRIP	A	2	00F	4DA0993532	

11AP6050

21AP6050	0-60V 0-50A AUTORANGE METERED.	D	1			
31AP6050	AP60/50 CASING	D	1			3
7NU0993531	BLANKING PLATE	B	1	00F	4BA0993531	
7SM5587	3U HANDLE BRACKET	A	2	00F	2SUDG5587	
HB2529	HANDLE BRACKET	C	1	32R	2SUOO2529	
7SU4611	FOOT RETAINER	A	2	00F	2SUDF4611	
7SU5514	TOP COVER	A	1	00F	1SUDE5514	
7SU5621	BOTTOM COVER	A	1	00F	1SUDE5621	
7SX5513	SIDE TRIM	A	2	00F	2SUDF5513	
FT1A00123	FUSE 1 AMP ANTI-SURGE 5 X 20MM		1	03B	S502	F401 (FOR TEST DEPT. USE)
HF0019	FOOT & FOLDING LEG ASSY DK GRY	A	2	14K	2SVOO0139+&+40	
HF0070	FOOT INSERT	A	6	14K	4SVOO0070	
HF0139	FOOT DARK ADMIRALTY GREY	A	2	14K	2SVOO0139	
JPSSG1000	SSG1000/AP60/50		1	51A	SJP0004	
4N6050B	BACK PANEL ASSEMBLY	B	1			4
4N6050C	CHASSIS ASSEMBLY	D	1			4
4N6050IP	INPUT FILTER ASSEMBLY	A	1			4
4N6050CB	CAP ASSEMBLY	B	1			4
7NF0993507	CAP PLATE	A	1	00F	3OO0993507	
7SU6431	CAP CLIP	A	4	00F	3/6431	
CED5M60PM	5600UF 20% 250V		2	92B	ALS10A1174DC	C401 2
HW533	CAP INSULATOR AP6050	A	1	27P	3OO0993533	
KP4M12	SCREW M4 X 12 PAN HD POZI		8	05T	KP4M12	
MT4780BLK	TAPE 2M BLK 781/4780		.2	49B	781/4780+BLK	
RX536K0HJ	36K0 5% 2W00 200PPM 700V		2	53D	FP2-N8	R401 2
WF4M	FLAT WASHER M4		8	05T	WF4M	
WS4M	SPRING WASHER M4		8	05T	WS4M	
4N6050FD	FILTER DIVIDER ASSEMBLY	A	1			4
GR73M	GROMMET PV73M 20MM		1	09R	PV73M	
NF20MN	NYLON NUT M20 BLACK		1	06R	607-926	
NF3M	FULL NUT M3		3	05T	NF3M	
NR3M12TH	SPACER M3 X 12MM THR'D HEX		5	01H	R6334-02	
NV320D	POP RIVET 2.4MM DIA DOMED HD		2	08T	TAPD+33+BS	
WS3M	SPRING WASHER M3		3	05T	WS3M	
4N6050SS	SOFT START ASSEMBLY	C	1			4
7NU0993508	RELAY BRACKET	B	1	00F	3BA0993508	
DB36MB60A	35A 600V PLASTIC SQUARE TAG		1	10I	36MB60A	BR301
HR18102	RES MTNG CLIP		2	17V	18102	
KP3M8	SCREW M3 X 8 PAN HD POZI		2	05T	KP3M8	
KP4M10	SCREW M4 X 10 PAN HD POZI		2	05T	KP4M10	
KP4M20	SCREW M4 X 20 PAN HD POZI		1	05T	KP4M20	

Part No	Description	Iss	Qty	Man	Man Part No	Reference
RF16R02NJ	6R0 + 6R0 (DUAL) 5% 11W0		1	17V	226-216	R301
SR20016	HI V POWER 12VDC 16AAC DPNO		1	16J	REP200/12V+D.C.+4KV	RL301
WF3M	FLAT WASHER M3		2	05T	WF3M	
WF4M	FLAT WASHER M4		1	05T	WF4M	
WS3M	SPRING WASHER M3		2	05T	WS3M	
WS4M	SPRING WASHER M4		3	05T	WS4M	
YT18	T/C WIRE 18SWG		.062	55M	18SWG	
5N6050IP	I/P FILTER CB	A	1			5
BC238	FILTER 60/50'S	C	1	01K	2BS23B2380	B
CAOMIT	CAPACITORS OMITTED		2	00F	CAOMIT	C312 3
CX6470NPM	470NF 20% 250V R250		5	13R	PME+271M647	C303 5 6 9:10
CXA1U00PM	1.0UF 20% 250V R275		1	13R	PHE+830MF7100M	C304
CY42N20PM	2.2NF 20% 250V R100		2	13R	PME+271Y422M	C301 2
CY522N0PM	22NF 20% 250V R150		2	13R	PME+271Y522M	C307 8
GT25	CTY010/RT675 75C UL		3	28P	PLT2S-M	
MT9X3	FCAMPAD 90X38 771/4773		.5	49B	771/4773	
ZX4D11651	FILTER CHOKE AP60/50 5	B	2	01B	ZX4D11651	TX301 2
GCNX2	P CLIP 6.4MM I/D		2	04H	NX2	
KP3M6	SCREW M3 X 6 PAN HD POZI		4	05T	KP3M6	
KP4M10	SCREW M4 X 10 PAN HD POZI		5	05T	KP4M10	
NF3M	FULL NUT M3		3	05T	NF3M	
TS542	SOLDER TAG		4	02U	HGBV623/1000ET	
WS3M	SPRING WASHER M3		2	05T	WS3M	
WS4M	SPRING WASHER M4		5	05T	WS4M	
WW3M	WAVEY WASHER M3		5	24L	LS508/54	
4N6050PC	POWER CONVERSION ASSEMBLY	B	1			4
4N6050CD	CENTRE DIVIDER ASSEMBLY	B	1			4
GRM79H	GROMMET 11/2X1 M79H		1	60M	M/79/H	
KP3M10	SCREW M3 X 10 PAN HD POZI		2	05T	KP3M10	
KP3M8	SCREW M3 X 8 PAN HD POZI		2	05T	KP3M8	
NF3M	FULL NUT M3		4	05T	NF3M	
NV320D	POP RIVET 2.4MM DIA DOMED HD		2	08T	TAPD+33+BS	
WF3M	FLAT WASHER M3		2	05T	WF3M	
WS3M	SPRING WASHER M3		4	05T	WS3M	
4N6050H	HEATSINK ASSEMBLY	A	1			4
4N6050DH	DIODE HEATSINK ASSEMBLY	C	1			4
7SU3945	DIODE CROSS LINK A	B	1	00F	4SUCJ3945	THT401
7SX2182	DIODE HEATSINK	C	1	00F	2SUBA2182	
CR44N70SM	4n70F 20% 400V A		1	03A	L1A-4N704A	C403
DG54V200	200V 2X50A 60NS ITOP		1	29S	BYV54V-200	D401
KP4M10	SCREW M4 X 10 PAN HD POZI		2	05T	KP4M10	
KP4M16	SCREW M4 X 16 PAN HD POZI		2	05T	KP4M16	
RW233R0JJ	33R0 5% 2W50		1	04E	74ER	R403
TM60032	STANDOFF TERMINAL M2.5		1	01H	W6003/M2.5+(W2130)	
TS0B238	SOLDER TAG OBA/M6		1	05R	201020	
TS3B363	SOLDER TAG 3BA		1	05R	201017	
WF4M	FLAT WASHER M4		2	05T	WF4M	
WS4M	SPRING WASHER M4		4	05T	WS4M	
4N6050FH	FET HEATSINK ASSY	A	1			4
5N6050FH	FET CIRCUIT BOARD	B	1			5
BC1372	FET C.B.	B	1	01K	S1SAB13720	B
CL42N20WM1	2n20F 20% 1K0V		1	47L	106-362	C4
CRA1U00SM	1U00F 20% 400V A		3	03A	E1A10204A	C1-3
DAOMIT	DIODES OMITTED		2	00F	DAOMIT	D1 2
MC2	CERAMIC BEAD LARGE		4	57M	IPB2	R1 2 FIT X1 PER LEG
RM233R0FF	33R0 1% 0W60 50PPM 250V		6	18P	MRS25	R3-8
RW3200RNJ	200R 5% 9W00		2	04E	16ER	R1 2 (FIT X1 MC2 PER LEG)
TP15080	CIRCUIT BOARD PIN 8mm		8	02B	B1.5X0.20X8MST	X8 (X1-8 COMP SIDE)
VAOMIT	TRANSISTOR / IC OMITTED		6	00F	IN+HOUSE+REFERENCE	Q1-6
7SU4094	TRANSISTOR SUPPORT	A	6	00F	4SUDA4094	
7SX3922	HEATSINK	B	2	00F	3SUBA3922	
DG12PI600	600V 12A 50NS DO220I		2	29S	STTA1206DI	D1 2 (JIG 223) ENSURE COMP IS BYT12PI600
MF3888	CRAYOTHERM INSULATOR	B	6	72C	4SUOO3888	
SR090L06	T/TRIP STUD 90C N/C 300MM LDS		2	34T	L0609005300	THT1 2
VFP450IR	500V 13A 400MR TO3P STATIC		6	10I	IRFP450	Q1-6 (JIG 182)
7NU0993523	HEAT SINK SUPPORT	C	1	00F	3BA0993523	
7NU0993524	HEAT SINK COVER A	B	1	00F	2BA0993524	
4N6050M	MAIN ASSEMBLY	C	1			4
7NF0993530	INVERTER SPACER	A	1	00F	4OO0993530	
7NF0993537	INSULATOR PLATE	A	1	00F	4OO0993537	
7NR2626524	RES BAR	B	2	00F	4OO2626524	
7NU0993512	CAP BUS BAR B	A	2	00F	3CJ0993512	
7NU0993513	POSITIVE BUS BAR	D	1	00F	2CJ0993513	
7NU0993514	NEGATIVE BUS BAR	D	1	00F	2CJ0993514	
7NU0993515	CONNECTOR CLAMP	B	1	00F	4CJ0993515	
7NU0993516	RESISTOR CLAMP	C	1	00F	4CJ0993516	
7NU0993536	MAIN COVER PLATE	B	1	00F	3BA0993536	
BC239	POWER CONVERSION BOARD	B	1	01K	1BS23B2390	HAND SOLDER ONLY
CB547N0SM	47n0F 20% 400V MKC 5X18 R15.0		2	159W	MKC10	C408 9
CED2M30LM	2300UF 20% 75V R 12.5		4	92B	ALS20B-1021DF	C404-407(M13622)
CRA3U30LJ	3U30F 5%0 100V MKT 12X27 A32.0		2	70S	MKT1813-533/0	C411 2
CX547N0PM	47NF 20% 250V R150		2	13R	PME+271M547M	C413 4
DTGN71	STUD DIODE		1	03W	SW02PCN075	D402
MC1	CERAMIC BEAD SMALL		2	57M	IPB/1	R405 X1/L
RAOMIT	RESISTORS OMITTED		1	00F	RAOMIT	R409
RW0R030RKT	0R03 10% 50W0		3	94M	HSA50-R1077	R406-408
RW0R100JJ	0R10 5% 2W50		1	04E	W21/74ER	R405 (MC1 X1/L)
RW3680RMK	680R 10% 7W00		1	17V	210-9	R404
TBM2510PS	STRAIGHT PIN HEADER 10 WAY		1	23M	6410+22-27-2101	SK20
TP1510	CIRCUIT BOARD PIN 10mm		4	26P	B1.5X0.25X10MS	X4
VT3442	2N3442 140V 10A TO3 N		1	70H	2N3442	TR401
ZT4D20470	CHOKE AP60/50	E	1	01B	ZT4D20470	TX406
ZV8A20400	CHOKE OUTPUT AP60/50	B	1	01B	ZV8A20400	TX405
ZZ6F20460	INVERTER AP60/50	I	1	01B	ZZ6K20460	TX404
5N6050D	DRIVE CB ASSY	D	1			5
BC240	DRIVE TRANSFORMER BOARD	C	1	01K	2BS12B2400	B
CLA1U00SJ	1U00F 5%0 400V MKP 13X31 R27.5		1	18P	378-52105	C410
DZ218V0H	18V 5% 1W30		4	01P	BZV85-C18V	Z1A 2A;1B 2B

Part No	Description	Iss	Qty	Man	Man Part No	Reference
GT23	CTY001/NT20 75C UL		2	28P	PLT1M-M	
KP3M6	SCREW M3 X 6 PAN HD POZI		6	05T	KP3M6	
TBA3902PS	2W PIN WAFER WITH STRGHT LOCK		5	07A	640388-2	SK14-18
TBM2506PS	STRAIGHT PIN HEADER 6 WAY 2.54		1	23M	6410+22-27-2061	SK19
TC41480	FASTON TWIN TAB U .25		7	07A	41480	
TP15080	CIRCUIT BOARD PIN 8mm		2	02B	B1.5X0.20X8MST	X2
WS3M	SPRING WASHER M3		6	05T	WS3M	
ZU4L20300	DRIVE TRANS AP60/50	E	1	01B	ZU4L20300	TX402
ZY4F20310	CURRENT TRANSFORMER AP60/50 5	B	1	01B	ZY4F20310	TX403
GT25UL	TYRAP PLT2S30 105C UL		1	28P	PLT+2S-30	TX406
KP3M8	SCREW M3 X 8 PAN HD POZI		16	05T	KP3M8	
KP4M10	SCREW M4 X 10 PAN HD POZI		1	05T	KP4M10	
KP4M16	SCREW M4 X 16 PAN HD POZI		1	05T	KP4M16	
KP5M10	SCREW M5 X 10 PAN HD POZI		5	05T	KP5M10	
NF3M	FULL NUT M3		16	05T	NF3M	
NF4M	FULL NUT M4		1	05T	NF4M	
NHUNF	HALF NUT 1/4-UNF		1	05T	NHUNF	
TS6B383	SOLDER TAG 6BA STC402297RM		4	05R	RC383/6BA	
WF3M	FLAT WASHER M3		6	05T	WF3M	
WS3M	SPRING WASHER M3		18	05T	WS3M	
WS4M	SPRING WASHER M4		2	05T	WS4M	
WS5M	SPRING WASHER M5		13	05T	WS5M	
WS6M	SPRING WASHER M6		1	05H	M6+SPRING+WASHER	
WW3M	WAVEY WASHER M3		6	24L	LS508/54	
5N6050C	AP60/50 CONTROL BOARD	S	1			5
5SAP1KWC	STANDARD 1KW CONTROL AP/MP	E	1			5
5SAPC	STANDARD CONTROL BOARD	K	1			5
5SAPC1	CONTROL STANDARD COMPONENTS	A	1			5
RM212R0FF	12R0 1% 0W60 50PPM 250V		12	18P	MRS25	R155 7 9:62 7 8:93 9:216-218:21
RM510K0FF	10K0 1% 0W60 50PPM 250V		14	18P	MRS25	R118:20;30 7 8;42 4;85;91 2 4 7 8;203
7SU3276	TRANSFORMER BRACKET	B	1	00F	4SUBA3276	
BC1096	CONTROL BOARD AP3KW	E	1	01K	C1RBT10960	BOARD TO BE ATE TESTED
CAOMIT	CAPACITORS OMITTED		7	00F	CAOMIT	C35 9:49:60 4:82 3
CC3100PLG	100PF 2% 100V N150 RP050		1	18P	683+34101	C98
CC3270PLG	270PF 2% 100V N750 RP050		1	18P	683+58271	C54
CC3330PLG	330PF 2% 100V N750 RP050		2	18P	683+58331	C15:47
CEA4U70LM	4.7UF 20% 100V R025		1	01W	WHT	C89
CEB15U0IT	15UF 50% 40V AXIAL		1	18P	030-37159	C34
CEB22U0JM1	22UF 20% 50V FC +5MM		1	01W	WHT	C100 (FIT WITH '+' TOWARDS R73)
CEC100UDT	100UF 50% 10V AXIAL		2	18P	030-34101	C23:36
CEC100UGM2	100UF 20% 25V 105 8x016 A20.0		1	01W	WTU-100-25	C31
CEC100UHM	100UF 20% 35V R050		3	01W	WHT	C24 6 7
CEC220UGM	220UF 20% 25V R050		2	01W	WHT	C20:97
CED1M00JQ	1000UF 20% 50V R 7.5		1	01W	WHT	C4
CED2M20BM	2200UF 20% 6.3V R 05.0		1	01W	RJ2	C57
CED2M20GM	2200UF 20% 25V R 07.5		1	01W	WHT	C1
CED2M20HM	2200UF 20% 35V 18X036R 07.5		2	01W	WHT	C5 6
CED4M70EM1	4700UF 20% 16V N 05.0		1	67P	TSU-ECES1CU472D	C3
CR42N20LM	2n20F 20% 100V KT 3X08 R05.0		2	159W	FKS2MIN	C44:52
CR510N0LJ	10n0F 5%0 100V KT 3X08 R05.0		24	159W	FKS2	C13 7 8:22:38:40 3 5 8:51 6 8;70-2 6-9;80 8;90-2
CR510N0LM	10n0F 20% 100V KT 3X08 R05.0		2	159W	FKS2MIN	C41:96:
CR6100NLM	100nF 20% 100V MKT 3X10 R07.5		14	159W	MKS3	C8:33 7:46:73-75:81 4 5 7:93 4 9
CR6220NKK	220nF 10% 63V MKT 4X08 R05.0		1	159W	MKS2	C25
CR6220NLM	220nF 20% 100V MKT 4X13 R10.0		5	159W	MKS4	C19:21 8 9:32
CR6470NLK	470nF 10% 100V MKT 7X13 R10.0		1	85S	MKT-32511-D1474K	C14
CRA1U00KM1	1U00F 20% 63V MKT 6X08 R05.0		1	159W	MKS2	C12
DAOMIT	DIODES OMITTED		3	00F	DAOMIT	Z8-10
DBP02	1.5A 200V PLASTIC IN LINE		1	11G	KBP02M	BR2
DBW02M	1.5A 200V PLASTIC ROUND		3	11G	W02G	BR1 3 4 (MC1 X1/L)
DG27150	DIODE		1	01P	BYV27-150	D21
DG28150	DIODE		1	01P	BYV28-150	D51
DG4003	DIODE		5	11G	1N4003	D1 2:26:34:41
DG4148	DIODE		34	23N	1N4148	D3 6-8:16-20 2 4 5 7 29-32 35-40 42-50 2 3
DGOA47	DIODE		2	01P	OA47	D4 9
DZ14V70E	4.7V 5% 0W50		1	31I	ZPD4.7	Z1
DZ16V20D1	6.2V 0W40		1	01P	1N823	Z5
DZ16V80E	6.8V 5% 0W50		1	31I	ZPD6.8	Z6
KP3M12	SCREW M3 X 12 PAN HD POZI		6	05T	KP3M12	
KP3M6	SCREW M3 X 6 PAN HD POZI		1	05T	KP3M6	
KP3M8	SCREW M3 X 8 PAN HD POZI		1	05T	KP3M8	
MB2840	M3 TOP HAT BUSH		6	14W	BQ2840	IC7 8 9:11;TR20 (IC10 IF FITTED)
MC1	CERAMIC BEAD SMALL		12	57M	IPB/1	BR1 3 4 X1/L
MM4170	ALUMINIUM OXIDE WASHER TO220		6	19R	4170	IC7 8 9:11;TR20 (IC10 IF FITTED)
NF3M	FULL NUT M3		8	05T	NF3M	
PM45K00KV	5K00 10% PRESET VERT STURN		1	02S	63P	P2
PM510K0KV	10K0 10% PRESET VERT STURN		3	02S	63P	P1 6 7
RAOMIT	RESISTORS OMITTED		5	00F	RAOMIT	R77-9:187:222
RG71M00BJ	1M00 5% 0W25 100PPM 1K1V		3	18P	VR25	R40 9:51
RG73M90BJ	3M90 5% 0W25 250PPM 1K1V		2	18P	VR25	R180 1
RM212R0FF	12R0 1% 0W60 50PPM 250V		18	18P	MRS25	R22 6:37:52:87:90 1 4:101 6 9:12 7:28:36:40 3 5
RM239R0FF	39R0 1% 0W60 50PPM 250V		1	18P	MRS25	R83
RM247R0FF	47R0 1% 0W60 50PPM 250V		1	18P	MRS25	R206
RM3100RDF	100R 1% 0W40 50PPM 200V		1	18P	MRS16T	R212
RM3100RFF	100R 1% 0W60 50PPM 250V		10	18P	MRS25	R53:160 1 3 9:70:208 9:11 3
RM3120RFF	120R 1% 0W60 50PPM 250V		2	18P	MRS25	R80 5
RM3220RFF	220R 1% 0W60 50PPM 250V		1	18P	MRS25	R215
RM3330RFF	330R 1% 0W60 50PPM 250V		1	18P	MRS25	R210
RM3470RFF	470R 1% 0W60 50PPM 250V		1	18P	MRS25	R19
RM3620RFF	620R 1% 0W60 50PPM 250V		1	18P	MRS25	R139
RM3910RFF	910R 1% 0W60 50PPM 250V		1	18P	MRS25	R84
RM41K00FF	1K00 1% 0W60 50PPM 250V		10	18P	MRS25	R150 8:73-75:88 9::90:200 1
RM41K20FF	1K20 1% 0W60 50PPM 250V		8	18P	MRS25	R5 6:10 2:61 8:71:195
RM41K50FF	1K50 1% 0W60 50PPM 250V		1	18P	MRS25	R223
RM41K80FF	1K80 1% 0W60 50PPM 250V		5	18P	MRS25	R45:152 3:77 8
RM42K20FF	2K20 1% 0W60 50PPM 250V		4	18P	MRS25	R63:96:129:220
RM42K70FF	2K70 1% 0W60 50PPM 250V		3	18P	MRS25	R111:32:56
RM43K30FF	3K30 1% 0W60 50PPM 250V		3	18P	MRS25	R9:11:36
RM43K90FF	3K90 1% 0W60 50PPM 250V		1	18P	MRS25	R88

Part No	Description	Iss	Qty	Man	Man Part No	Reference
RM44K70FF	4K70 1% 0W60 50PPM 250V		3	18P	MRS25	R31 8:44
RM45K10FF	5K10 1% 0W60 50PPM 250V		4	18P	MRS25	R57:60:133:207
RM46K80FF	6K80 1% 0W60 50PPM 250V		3	18P	MRS25	R2:86:131
RM48K20FF	8K20 1% 0W60 50PPM 250V		4	18P	MRS25	R151 4:76 9
RM49K10FF	9K10 1% 0W60 50PPM 250V		2	18P	MRS25	R28 9
RM510K0FF	10K0 1% 0W60 50PPM 250V		18	18P	MRS25	R1 3 7:16:39:41 3:50 8 9:64 9:70 3 5 6:81:108
RM512K0FF	12K0 1% 0W60 50PPM 250V		1	18P	MRS25	R55
RM515K0FF	15K0 1% 0W60 50PPM 250V		1	18P	MRS25	R17
RM516K0FF	16K0 1% 0W60 50PPM 250V		1	18P	MRS25	R146
RM518K0FF	18K0 1% 0W60 50PPM 250V		2	18P	MRS25	R82:148
RM522K0FF	22K0 1% 0W60 50PPM 250V		4	18P	MRS25	R13 5:27:147
RM527K0FF	27K0 1% 0W60 50PPM 250V		2	18P	MRS25	R42 8
RM533K0FF	33K0 1% 0W60 50PPM 250V		3	18P	MRS25	R4 8:14
RM539K0FF	39K0 1% 0W60 50PPM 250V		1	18P	MRS25	R47
RM547K0FF	47K0 1% 0W60 50PPM 250V		16	18P	MRS25	R18:32 3 5:56:62 7:72 4:89:119:41:64 5:86:96
RM551K0FF	51K0 1% 0W60 50PPM 250V		1	18P	MRS25	R149
RM568K0FF	68K0 1% 0W60 50PPM 250V		3	18P	MRS25	R65;93;202
RM6100KFF	100K 1% 0W60 50PPM 250V		1	18P	MRS25	R166
RM6200KFF	200K 1% 0W60 50PPM 250V		1	18P	MRS25	R66
RM6330KFF	330K 1% 0W60 50PPM 250V		1	18P	MRS25	R135
SB0059	AP60/50	B	1	31S	4STOO0059	SW1
TB72513C	TERMINAL BLOCK 13 WAY PCB MTG.		1	26V	TX72513-49-C	T1
TBA3902PS	2W PIN WAFER WITH STRGHT LOCK		1	07A	640388-2	SK6A
TBA3910PS	10W PIN WAF WITH STRGHT LOCK		1	07A	1-640388-0	SK3
TBM2506PS	STRAIGHT PIN HEADER 6 WAY 2.54		2	23M	6410+22-27-2061	SK5 7
TBM2510PS	STRAIGHT PIN HEADER 10 WAY		1	23M	6410+22-27-2101	SK9
TIH2516NT1L	16 WAY PIN HEADER		1	25V	M52-1216-662	SK4
TIH2534NT1L	34 WAY PIN HEADER		1	88M	ID101-H34-N-06-F1	SK8
VA311N	COMPARATOR SINGLE		2	23N	LM311N	IC22 7
VA3140E	OP AMP SINGLE STATIC		4	70H	CA3140E	IC13-16
VA339N	COMPARATOR QUAD LO PWR		3	23N	LM339N	IC1 2:17
VA347N	OP AMP QUAD		2	23N	LF347N	IC19:24
VA431AWC	REGULATOR SHUNT		2	23N	LM431ACZ	Z3 4 (DO NOT PREFORM FIT ON CONVERSION PAD)
VA7805CT	REGULATOR		2	02M	MCT7805CT	IC7 8(JIG 223)
VA78M12UC	REGULATOR		1	23N	LM341T12/LM78M12CT	IC9(JIG 223)
VA78M15CU	REGULATOR		1	23N	LM341T15/LM78M15CT	IC11(JIG 223)
VA7905CT	REGULATOR		1	23N	MC7905CT	IC6 (MOD REQ TO FIT TO ISSUE C C/B REF A
YARKER)						
VD4001BCN	BCMOS 4X 2-I/P NOR 14-D STATIC		3	23N	CD4001BCN	IC5:21 9
VD4011BE	BCMOS 4X 2-I/P NAND 14-D STATC		1	70H	CD4011BE	IC23
VD4013BE	BCMOS 2X D-TYP F/F 14-D STATIC		1	23N	CD4013BE	IC3
VD4066B	BCMOS 4X ANLOG SW 125R STATIC		3	23N	CD4066BCN	IC18:20 5
VD4069UBE	CMOS HEX INVERTR 14-DIP STATIC		1	23N	CD4069UBE	IC26
VD4093BCN	BCMOS 4X 2-I/P NAND 14-DP STAT		2	23N	CD4093BCN	IC4:28
VF540	IRF540 STATIC		1	10I	IRF540	TR33
VF9522	FET IRF9522 STATIC		1	10I	IRF9520	TR31
VP10218	TRANSISTOR PAD 10218		2	27K	EPX003	Z3 4
VS14L	IC SKT 14WAY		16	08R	ICO-143-S8A-T	
VS8P	IC SKT 8WAY		7	08R	ICO-083-S8A-T	
VT182PL	BC182PL T018 JOG		17	03Z	BC182PL	TR2-5 8:12-17 9:21 2 5 9:34
VT212PL	BC212PL TO18 JOG		8	03Z	BC212PL	TR1 7:23 4 26-28:30
VT337	BC337 TO18 PREFORM		1	01P	BC337	TR18
VTX650KCR	ZTX650 45V 2A N		1	03Z	ZTX650K35	TR32
VTX750K	ZTX750K		1	03Z	ZTX750K35+(4SC0174)	TR35
WF3M	FLAT WASHER M3		6	05T	WF3M	
WN3M	FLAT WASHER M3 NYLON 66		6	17N	M3+NYLON+WASHER	IC7 8 9:11;TR20 (IC10 IF FITTED)
WS3M	SPRING WASHER M3		9	05T	WS3M	
WW3M	WAVEY WASHER M3		3	24L	LS508/54	
7NU0993525	REGULATOR HEATSINK	B	1	00F	2BA0993525	
CAOMIT	CAPACITORS OMITTED		2	00F	CAOMIT	C102 3
CC3100PLG	100PF 2% 100V N150 RP050		1	18P	683+34101	C10
CC3270PLG	270PF 2% 100V N750 RP050		1	18P	683+58271	C55
CEB10U0GT1	10UF 50% 25V AXIAL		1	18P	030-36109	C16
CEC100UGM2	100UF 20% 25V 105 8x016 A20.0		1	01W	WTU-100-25	C30
CL3470PLJ	470pF 5%0 100V KP 5X08 R05.0		1	159W	FKP2	C11
CR41N00LM	1n00F 20% 100V KC 3X08 R05.0		1	159W	FKS2	C68
CR510N0LM	10n0F 20% 100V KT 3X08 R05.0		1	159W	FKS2MIN	C61
CR6100NLM1	100nF 20% 100V MKT 4X10 R10.0		1	159W	MKS4	C101
CRA1U00KM1	1U00F 20% 63V MKT 6X08 R05.0		1	159W	MKS2	C86
DG4003	DIODE		1	11G	1N4003	D28
DG4148	DIODE		1	23N	1N4148	D5
PAOMIT	POTENTIOMETERS OMITTED		1	00F	PAOMIT	P5
PM41K00KV	1K00 10% PRESET VERT STURN		2	02S	63P	P8 9
PM45K00KV	5K00 10% PRESET VERT STURN		2	02S	63P	P3 4
RAOMIT	RESISTORS OMITTED		1	00F	RAOMIT	R225
RM13R90FF	3R90 1% 0W60 100PPM 250V		1	18P	MRS25	R46
RM212R0FF	12R0 1% 0W60 50PPM 250V		1	18P	MRS25	R23
RM3180RFF	180R 1% 0W60 50PPM 250V		1	18P	MRS25	R219
RM3220RFF	220R 1% 0W60 50PPM 250V		1	18P	MRS25	R205
RM41K50FF	1K50 1% 0W60 50PPM 250V		1	18P	MRS25	R214
RM43K30FF	3K30 1% 0W60 50PPM 250V		1	18P	MRS25	R54
RM533K0FF	33K0 1% 0W60 50PPM 250V		2	18P	MRS25	R97:100
RM568K0FF	68K0 1% 0W60 50PPM 250V		1	18P	MRS25	R30
TAOMIT	SOCKETS PLUGS OMITTED		2	00F	TAOMIT	SK6B:11
VA78M12UC	REGULATOR		1	23N	LM341T12/LM78M12CT	IC10(JIG 223)
VAOP77	IC OP77GP STATIC		1	10B	OP-77GP	IC12
YL22105	LINK 10.5MM TC22SWG		1	00F	TC22SWG+10.5MM	R227
YT22	T/C WIRE 22SWG		.03	55M	22SWG	
CAOMIT	CAPACITORS OMITTED		1	00F	CAOMIT	C42
CC3270PLG	270PF 2% 100V N750 RP050		1	18P	683+58271	C50
CR42N20LM	2n20F 20% 100V KT 3X08 R05.0		2	159W	FKS2MIN	C63;95
CR44N70LJ	4n70F 5%0 100V KT 3X08 R05.0		1	159W	FKS2MIN	C62
CR44N70LM	4n70F 20% 100V KT 3X08 R05.0		2	159W	FKS2	C53:67
CR510N0LM	10n0F 20% 100V KT 3X08 R05.0		1	159W	FKS2MIN	C65
CR522N0KM	22n0F 20% 63V MKT 3X08 R05.0		1	159W	MKS2MIN	C66
CR6100NLM	100nF 20% 100V MKT 3X10 R07.5		1	159W	MKS3	C59
CR6220NKK	220nF 10% 63V MKT 4X08 R05.0		1	159W	MKS2	C69
DG4148	DIODE		2	23N	1N4148	D23:33

Part No	Description	Iss	Qty	Man	Man Part No	Reference
PM3500RKV	500R 10% PRESET VERT STURN		1	02S	63P	P10
RAOMIT	RESISTORS OMITTED		1	00F	RAOMIT	R95
RG72M20BJ	2M20 5% 0W25 250PPM 1K1V		1	18P	VR25	R126
RM268R0FF	68R0 1% 0W60 50PPM 250V		1	18P	MRS25	R183
RM41K20FF	1K20 1% 0W60 50PPM 250V		2	18P	MRS25	R92:113
RM41K50FF	1K50 1% 0W60 50PPM 250V		1	18P	MRS25	R115
RM42K00FF	2K00 1% 0W60 50PPM 250V		1	18P	MRS25	R171
RM42K20FF	2K20 1% 0W60 50PPM 250V		1	18P	MRS25	R121
RM42K70FF	2K70 1% 0W60 50PPM 250V		1	18P	MRS25	R110
RM44K30FF	4K30 1% 0W60 50PPM 250V		1	18P	MRS25	R182
RM45K60FF	5K60 1% 0W60 50PPM 250V		1	18P	MRS25	R122
RM46K20FF	6K20 1% 0W60 50PPM 250V		2	18P	MRS25	R104 5
RM48K20FF	8K20 1% 0W60 50PPM 250V		1	18P	MRS25	R114
RM510K0FF	10K0 1% 0W60 50PPM 250V		3	18P	MRS25	R107:23 5
RM515K0FF	15K0 1% 0W60 50PPM 250V		1	18P	MRS25	R99
RM518K0FF	18K0 1% 0W60 50PPM 250V		1	18P	MRS25	R124
RM522K0FF	22K0 1% 0W60 50PPM 250V		1	18P	MRS25	R134
RM539K0FF	39K0 1% 0W60 50PPM 250V		1	18P	MRS25	R127
RM547K0FF	47K0 1% 0W60 50PPM 250V		1	18P	MRS25	R34
RM551K0FF	51K0 1% 0W60 50PPM 250V		2	18P	MRS25	R172:84
RM568K0FF	68K0 1% 0W60 50PPM 250V		1	18P	MRS25	R116
RM580K0BB	80K0 0.1% 0W25 50PPM 250V		2	94M	H8	R102 3
RM6330KFF	330K 1% 0W60 50PPM 250V		1	18P	MRS25	R98
VT760	760A 1KV 4A R3478 N TO220		1	01T	TIPL760A	TR20(JIG 223)
7NU0993505	FILTER DIVIDER A	C	1	00F	1BA0993505	
7NU0993506	MAINS SCREEN	B	1	00F	2BA0993506	
7NU0993509	FAN SUPPORT BRACKET	A	2	00F	3DA0993509	
7NU0993517	CENTRE DIVIDER	F	1	00F	1BA0993517	
7NU0993522	CB BRACKET	B	1	00F	4DA0993522	
7SX5512	TOP & BOTTOM TRIM	A	4	00F	2SUDF5512	
HA0135	3U HANDLE DARK ADMIRALTY GREY	B	4	14K	1SVOO0135	
HA0136	3U HANDLE INSERT DK AD'LTY GRY	B	4	14K	2SVOO0136	
KP3M10	SCREW M3 X 10 PAN HD POZI		4	05T	KP3M10	
KP3M12	SCREW M3 X 12 PAN HD POZI		1	05T	KP3M12	
KP3M6	SCREW M3 X 6 PAN HD POZI		10	05T	KP3M6	
KP4M16	SCREW M4 X 16 PAN HD POZI		4	05T	KP4M16	
KP5M10	SCREW M5 X 10 PAN HD POZI		1	05T	KP5M10	
NF3M	FULL NUT M3		1	05T	NF3M	
NF4M	FULL NUT M4		4	05T	NF4M	
TBA3902HS	2W HOUSING WITH STRAIGHT LOCK		6	07A	640250-2	
TBA3910HS	10W HOUSING WITH STRGHT LOCK		1	07A	1-640250-0	
WF3M	FLAT WASHER M3		2	05T	WF3M	
WF4M	FLAT WASHER M4		1	05T	WF4M	
WS3M	SPRING WASHER M3		11	05T	WS3M	
WS4M	SPRING WASHER M4		4	05T	WS4M	
WS5M	SPRING WASHER M5		1	05T	WS5M	
WW3M	WAVEY WASHER M3		4	24L	LS508/54	
4N6050F	FRONT PANEL ASSEMBLY	B	1			4
4N6050FF	FRONT PANEL ASSEMBLY	A	1			4
5N6050F1	FRONT PANEL DISPLAY C.B	G	1			
5NAPDISA	DISPLAY CB AXIAL ASSY	A	1			
BC235	FRONT PANEL DISPLAY BOARD	C	1	01K	CBP32B2350	BOARD TO BE ATE TESTED
RM15R10FF	5R10 1% 0W60 50PPM 250V		2	18P	MRS25	R15:23
RM41K00FF	1K00 1% 0W60 50PPM 250V		3	18P	MRS25	R21 8:41
RM41K10FF	1K10 1% 0W60 50PPM 250V		1	18P	MRS25	R37
RM42K20FF	2K20 1% 0W60 50PPM 250V		1	18P	MRS25	R36
RM42K70FF	2K70 1% 0W60 50PPM 250V		6	18P	MRS25	R6-8:22 6:35
RM510K0FF	10K0 1% 0W60 50PPM 250V		11	18P	MRS25	R2-5 9-11:20 4 5 7
RM512K0FF	12K0 1% 0W60 50PPM 250V		2	18P	MRS25	R12 8
RM520K0FF	20K0 1% 0W60 50PPM 250V		1	18P	MRS25	R34
RM522K0FF	22K0 1% 0W60 50PPM 250V		2	18P	MRS25	R16 7
RM547K0FF	47K0 1% 0W60 50PPM 250V		1	18P	MRS25	R33
RM6100KFF	100K 1% 0W60 50PPM 250V		3	18P	MRS25	R29-31
7NU0993526	TOP BRACKET	B	1	00F	3BA0993526	
7NU0993527	BOTTOM BRACKET	C	1	00F	3BA0993527	
7SF3293	PACKING PIECE A	A	2	00F	4SUOO3293	
7SF3294	PACKING PIECE B	A	2	00F	4SUOO3294	
CEA4U70KT	4.7UF 50% 63V AXIAL		1	18P	030-38478	C15
CEB10U0GT1	10UF 50% 25V AXIAL		4	18P	030-36109	C2 6 9:13
CEC100UDT	100UF 50% 10V AXIAL		1	18P	030-34101	C11
CR6100NKM	100nF 20% 63V MKT 3X08 R05.0		4	159W	MKS2MIN	C1 5 8:10
CR6100NLM1	100nF 20% 100V MKT 4X10 R10.0		1	159W	MKS4	C14
CR6220NLM	220nF 20% 100V MKT 4X13 R10.0		2	159W	MKS4	C3:12
CRA1U00KM1	1U00F 20% 63V MKT 6X08 R05.0		2	159W	MKS2	C4 7 (ALT 50V M13001)
CY42N20PM	2.2NF 20% 250V R100		1	13R	PME+271Y422M	C16
HC53160B	34W F/WIRE 4SC0039/C	C	1	25V	4SC0039	
HW1934	SPACER BOARD AP60/50	C	1	01K	3SUOO1934	
LD134G	LED GRN T1 3/4 MV64530		1	11Q	MV54530+/+LED+ONLY++	LED20
LD5501	LED HER 1 X 7 G OR H		6	02H	HDSP5501	LED1-3:15-17
LD57164	LED RED BAR GRAPH GORH		4	11Q	MV57164	LED5 6:18 9
LD600159	LED RED BLOCK LD001VR		9	24I	600159/UR	LED4 7-14
MC2	CERAMIC BEAD LARGE		2	57M	IPB2	LED20
PM45K00KH2	5K00 10% PRESET HORZ MTURN		1	02S	64Z	P5
PM45K00KV3	5K00 10% PRESET VERT MTURN		1	02S	64Y	P4
PM510K0KH1	10K0 10% PRESET HORZ MTURN		2	02S	64Z	P1 7
PM550K0KH1	50K0 10% PRESET HORZ MTURN		2	02S	64Z	P2 6
PW45K00JN	5K00 5% NPREST LIN		2	02S	534-5K	P3 8
RAOMIT	RESISTORS OMITTED		2	00F	RAOMIT	R39:40
RM3120RFF	120R 1% 0W60 50PPM 250V		2	18P	MRS25	R1:38
RM45K10FF	5K10 1% 0W60 50PPM 250V		1	18P	MRS25	R32
RM46K20FF	6K20 1% 0W60 50PPM 250V		1	18P	MRS25	R13
RM547K0FF	47K0 1% 0W60 50PPM 250V		2	18P	MRS25	R14 9
SA16700	SWITCH CAP GREY		2	24M	16-700	
SB15500	PUSH BUTTON SWITCH (BLK PB)		1	24M	15/501+(BLK+PB)	SW1
SB15550	PUSH/B SW 15-550 LATCH(RED PB)		1	24M	15-551-03	SW2
TIH2526NT1L	26 WAY PIN HEADER		1	25V	M52-1226-660	SK1
TK30513	PIN LINE SOCKET 3WAY		9	35R	3-0513-10	LED4 7-14
TP7401	12WAY STAKED MALE CONTACT		4	07A	1-163740-1	PL1 2

Part No	Description	Iss	Qty	Man	Man Part No	Reference
VA3914N	DRIVER BAR DISPLAY		2	23N	LM3914N	IC8 9
VD3161E	BCD-7SEG DECODER/DRIVER 16-DIP		2	70H	CA3161E	IC1 6
VD3162E	ADC 3-DIGIT BCD O/P 16-DIP		2	70H	CA3162E	IC2 5
VD4016B	BCMOS 4X ANL SWCH 280R STATIC		1	23N	CD4016BE	IC4
VD4050B	BCMOS HEX BUFFER 16-DIP STATIC		1	23N	CD4050BCN	IC3
VD4093BCN	BCMOS 4X 2-I/P NAND 14-DP STAT		1	23N	CD4093BCN	IC7
VS14L	IC SKT 14WAY		2	08R	ICO-143-S8A-T	IC4 7
VS16L	IC SKT 16WAY		3	08R	ICO-163-S8A-T	IC3 5 6
VS18L	IC SKT 18 WAY		2	08R	ICO-183-S8A-T	IC8 9
VS20L1	20 WAY LOW PROFILE SOCKET		4	28I	703-1320-01-04-10	LED5 6:18 9
VS32C	32W CARRIER 612-92-632		2	27F	612-92-632	LED1-3:15-17
VT328	BC328 TO18 PREFORM		8	01P	BC328	TR1-8
WN10M17	NYLON WASHER M10 X 17.45MM O/D		2	40P	041-3728	
YT22	T/C WIRE 22SWG		.1	55M	22SWG	L1 2;LK1
ZF1115	FERRITE BEAD L=5.6MM OD=4.15		2	15P	4313-020-15170	L1 2
7SU2430	FALSE FRONT PANEL KA	E	1	00F	1SUBA2430	
KC3M6	SCREW M3 X 6 CSK HD POZI		9	05T	KC3M6	
KC3M8	SCREW M3 X 8 CSK HD POZI		6	05T	KC3M8	
KP3M8	SCREW M3 X 8 PAN HD POZI		5	05T	KP3M8	
NF3M	FULL NUT M3		4	05T	NF3M	
WS3M	SPRING WASHER M3		4	05T	WS3M	
WW3M	WAVEY WASHER M3		5	24L	LS508/54	
6P10236	AP/MP RANGE WIRE PREP	J	1			6
TC2BARR	RING TERMINAL 2BA RED REEL		9	07A	2-342104-1	
TC39AMP	CRIMP TERMINAL		11	07A	640252-1	
TC3BARR	RING TERMINAL M4 RED 22-16AWG		8	07A	2-342103-1	
TC6BARR	RING TERMINAL 6BA RED REEL		2	07A	2-342101-1	
TCM25	CRIMP TERMINALS 2.5MM REEL		16	23M	4809-08-50-0031	
YM325	3 CORE MAINS CABLE 2.5MMX BLK		2	10P	2.5MM+HR325	
YP1602BKV	16/0.2 BLACK 105		.51	10P	VX350	
YP1602GYV	16/0.2 GREY 105		1.63	10P	16/0.2+VX	
YP1602PKV	16/0.2 PINK 105		.33	10P	16/0.2+VX	
YP1602VIV	16/0.2 VIOLET 105		.15	10P	16/0.2+VX	
YP1602WHV	16/0.2 WHITE 105		.33	10P	16/0.2+VX	
YP1602YLV	16/0.2 YELLOW 105		.3	10P	16/0.2+VX	
YP2402BNV	24/0.2 BROWN 105		.71	10P	24/0.2+VX	
YP2402RDV	24/0.2 RED 105		.25	10P	VX450	
YP2402VIV	24/0.2 VIOLET 105		.1	10P	24/0.2+VX	
YP30025BKV	48/0.2 BLACK 105		.46	08I	30/0.25+SOFLEX+TQ	
YP30025OR	16AWG ORANGE UL1015		.36	09A	30/0.25+UL1015	
YP30025RDV	48/0.2 RED 105		.28	08I	30/0.25+SOFLEX+TQ	
YP30025WHV	48/0.2 WHITE 105		.2	08I	30/0.25+SOFLEX+TQ	
YP30025YLV	48/0.2 YELLOW 105		.1	08I	30/0.25+SOFLEX+TQ	
YP3079BL	14AWG BLUE UL1015		.76	09A	14AWG+UL1015	
YP3079BLK	14AWG BLACK UL1015		.51	09A	14AWG+UL1015	
YP3079BN	14AWG BROWN UL1015		.44	09A	14AWG+UL1015	
YP3079RD	14AWG RED UL1015		.45	09A	14AWG+UL1015	
YP702GYV	7/0.2 GREY 105		.84	08I	30+X+0.1+SOFLEX+TQ	
YP702PKV	7/0.2 PINK 105		.175	08I	30+X+0.1+SOFLEX+TQ	
YP702VIV	7/0.2 VIOLET 105		.84	08I	30+X+0.1+SOFLEX+TQ	
YP702WHV	7/0.2 WHITE 105		.175	08I	30+X+0.1+SOFLEX+TQ	
YP702YLV	7/0.2 YELLOW 105		.84	08I	30+X+0.1+SOFLEX+TQ	
7NF0993528	BUS BAR SEPERATER	A	2	00F	4OO0993528	
7NF0993538	OUTPUT COVER INSULATOR	A	1	00F	4OO0993538	
7NU0993518	BACK PANEL A	D	1	00F	1BA0993518	
7NU0993519	OUTPUT COVER A	D	1	00F	2BA0993519	
7NU0993520	RH SIDE PANEL KA	C	1	00F	1CB0993520	
7NU0993521	LH SIDE PANEL A	C	1	00F	1CB0993521	
7SU2386	RIGHT HAND SIDE PANEL BRACKET	A	6	00F	4SUDA2386	
EF4800N	FAN 115V L NOISE 119 X 38 MM		1	69P	4800N	
FH520TP	FUSE HOLDER 5 X 20MM P/MTG UL		1	12A	TO333UL	F401
FS9820	FUSE HOLDER SHROUD 5 X 20MM		1	28B	9820	F401
GC20M	CABLE BUSHING/CLAMP M20 THREAD		1	06R	607-904	
GR2156	GROMMET HV2156		1	53M	HV2156	
GR3A	HALF GROMMET ALUM GH3		2	37D	ALUM+GH3	
GR3G	GROMMET NYLON HN3G		3	21F	HN3G-33-1	
GR3P	GROMMET PLUNGER HN3P		3	21F	HN3P-33-4-1	
GT25UL	TYRAP PLT2S30 105C UL		3	28P	PLT+2S-30	
HK150	KNOB CAP C150 SIF BLK		2	01S	C150	
HK15025	KNOB S150250 SIF BLK		2	01S	S150250	
HL9X30	BLANK 9X30 P120		1	51D	P120	
HMDEC10	FILTER FOAM DECLON 17mm THICK		.01	14D	10PPI+(17MM+THICK)	(125 X 115MM)
HR3	GUIDE RAIL RCG3		2	29R	RCG3	
HR335	OVAL STUD AJ3-35		2	37D	AJ3-35	
HRS3	SPRING S3		2	37D	S3-175	
HW0993501	CIRCUIT BREAKER PANEL	B	1	18G	300993501	
HW0993502	FAN PANEL	C	1	18G	3000993502	
HW0993503	DISPLAY PANEL AP60/50	A	1	18G	2SC10010	
KC3M6	SCREW M3 X 6 CSK HD POZI		12	05T	KC3M6	
KC3M8	SCREW M3 X 8 CSK HD POZI		12	05T	KC3M8	
KP3M12	SCREW M3 X 12 PAN HD POZI		1	05T	KP3M12	
KP3M8	SCREW M3 X 8 PAN HD POZI		9	05T	KP3M8	
KP4M12	SCREW M4 X 12 PAN HD POZI		24	05T	KP4M12	
NF3M	FULL NUT M3		1	05T	NF3M	
NF4M	FULL NUT M4		1	05T	NF4M	
SS2225B	SLIDE SW T2225B MARKED 115-230		1	12A	T2225B	SW401
ST253A90	CCT BREAKER 25/33A 250V 2POLE		1	21C	BA2-B0-24-625-212-D	CB401
TL72332	JUMPER LINK		6	26V	7204-3502-A120	
WF3M	FLAT WASHER M3		2	05T	WF3M	
WN8B	FLAT WASHER 8BA/M2.5 NYLON 66		2	40P	011+0763	
WS3M	SPRING WASHER M3		4	05T	WS3M	
WS4M	SPRING WASHER M4		1	05T	WS4M	
WW3M	WAVEY WASHER M3		8	24L	LS508/54	
WW4M	WAVEY WASHER M4		24	24L	LS508/56	
YM325	3 CORE MAINS CABLE 2.5MMX BLK		2	10P	2.5MM+HR325	
ZR0300	AUXILIARY TRANSFORMER Z1426	D	1	01B	3SR0300	TX401
7ZU0993532	CLAMPING STRIP	A	2	00F	4DA0993532	

Part No	Description	Iss	Qty	Man	Man Part No	Reference
11AP10030						
21AP10030	0-100V 0-30A AUTORANGE METERED	C	1			
31AP6050	AP60/50 CASING	D	1			3
7NU0993531	BLANKING PLATE	B	1	00F	4BA0993531	
7SM5587	3U HANDLE BRACKET	A	2	00F	2SUDG5587	
HB2529	HANDLE BRACKET	C	1	32R	2SUOO2529	
7SU4611	FOOT RETAINER	A	2	00F	2SUDF4611	
7SU5514	TOP COVER	A	1	00F	1SUDE5514	
7SU5621	BOTTOM COVER	A	1	00F	1SUDE5621	
7SX5513	SIDE TRIM	A	2	00F	2SUDF5513	
FT1A00123	FUSE 1 AMP ANTI-SURGE 5 X 20MM		1	03B	S502	F401 (FOR TEST DEPT. USE)
HF0019	FOOT & FOLDING LEG ASSY DK GRY	A	2	14K	2SVOO0139+&+40	
HF0070	FOOT INSERT	A	6	14K	4SVOO0070	
HF0139	FOOT DARK ADMIRALTY GREY	A	2	14K	2SVOO0139	
JPSSG1000	SSG1000/AP60/50		1	51A	SJP0004	
4N10030C	CHASSIS ASSEMBLY	D	1			4
4N10030PC	POWER CONVERSION ASSY	B	1			4
4N10030H	HEATSINK ASSY	A	1			4
4N10030DH	DIODE HEATSINK	C	1			4
7SU3945	DIODE CROSS LINK A	B	1	00F	4SUCJ3945	THT401
7SX2182	DIODE HEATSINK	C	1	00F	2SUBA2182	
CR42N20SM1	2n20F 20% 400V A		1	03A	L1A-2N204A	C403
DG230PI400	400V 2X30A 50NS ITOP		1	29S	BYT230PIV-400	D401
KP4M10	SCREW M4 X 10 PAN HD POZI		2	05T	KP4M10	
KP4M16	SCREW M4 X 16 PAN HD POZI		2	05T	KP4M16	
MB0029	INSULATING BUSH	J	2	72H	3SVOO0029(M10)	
RW222R0MJ	22R0 5% 6W00		1	04E	58ER	R403
TM60032	STANDOFF TERMINAL M2.5		1	01H	W6003/M2.5+(W2130)	
TS0B238	SOLDER TAG OBA/M6		1	05R	201020	
TS3B363	SOLDER TAG 3BA		1	05R	201017	
WF4M	FLAT WASHER M4		2	05T	WF4M	
WS4M	SPRING WASHER M4		4	05T	WS4M	
4N6050FH	FET HEATSINK ASSY	A	1			4
5N6050FH	FET CIRCUIT BOARD	B	1			5
BC1372	FET C.B.	B	1	01K	S1SAB13720	B
CL42N20WM1	2n20F 20% 1K0V		1	47L	106-362	C4
CRA1U00SM	1U00F 20% 400V A		3	03A	E1A10204A	C1-3
DAOMIT	DIODES OMITTED		2	00F	DAOMIT	D1 2
MC2	CERAMIC BEAD LARGE		4	57M	IPB2	R1 2 FIT X1 PER LEG
RM233R0FF	33R0 1% 0W60 50PPM 250V		6	18P	MRS25	R3-8
RW3200RNJ	200R 5% 9W00		2	04E	16ER	R1 2 (FIT X1 MC2 PER LEG)
TP15080	CIRCUIT BOARD PIN 8mm		8	02B	B1.5X0.20X8MST	X8 (X1-8 COMP SIDE)
VAOMIT	TRANSISTOR / IC OMITTED		6	00F	IN+HOUSE+REFERENCE	Q1-6
7SU4094	TRANSISTOR SUPPORT	A	6	00F	4SUDA4094	
7SX3922	HEATSINK	B	2	00F	3SUBA3922	
DG12PI600	600V 12A 50NS DO220I		2	29S	STTA1206DI	D1 2 (JIG 223) ENSURE COMP IS BYT12PI600
MF3888	CRAYOTHERM INSULATOR	B	6	72C	4SUOO3888	
SR090L06	T/TRIP STUD 90C N/C 300MM LDS		2	34T	L0609005300	THT1 2
VFP450IR	500V 13A 400MR TO3P STATIC		6	10I	IRFP450	Q1-6 (JIG 182)
7NU0993523	HEAT SINK SUPPORT	C	1	00F	3BA0993523	
7NU0993524	HEAT SINK COVER A	B	1	00F	2BA0993524	
4N10030M	MAIN ASSY	D	1			4
7NF0993530	INVERTER SPACER	A	1	00F	4OO0993530	
7NF0993537	INSULATOR PLATE	A	1	00F	4OO0993537	
7NR2626524	RES BAR	B	2	00F	4OO2626524	
7NU0993512	CAP BUS BAR B	A	2	00F	3CJ0993512	
7NU0993513	POSITIVE BUS BAR	D	1	00F	2CJ0993513	
7NU0993514	NEGATIVE BUS BAR	D	1	00F	2CJ0993514	
7NU0993515	CONNECTOR CLAMP	B	1	00F	4CJ0993515	
7NU0993516	RESISTOR CLAMP	C	1	00F	4CJ0993516	
7NU0993536	MAIN COVER PLATE	B	1	00F	3BA0993536	
BC239	POWER CONVERSION BOARD	B	1	01K	1BS23B2390	B
CAOMIT	CAPACITORS OMITTED		2	00F	CAOMIT	C404 6
CB547N0SM	47n0F 20% 400V MKC 5X18 R15.0		2	159W	MKC10	C408 9
CED2M30MM	2300UF 20% 115V		2	92B	ALS20B-1020DF	C405 7 (M13622)
CRA3U30LJ	3U30F 5%0 100V MKT 12X27 A32.0		2	70S	MKT1813-533/0	C411 2
CX547N0PM	47NF 20% 250V R150		2	13R	PME+271M547M	C413 4
DTGN71	STUD DIODE		1	03W	SW02PCN075	D402
MC1	CERAMIC BEAD SMALL		2	57M	IPB/1	R405 X1/L
RAOMIT	RESISTORS OMITTED		1	00F	RAOMIT	R408
RW0R030RKT	0R03 10% 50W0		2	94M	HSA50-R1077	R406 7
RW0R100JJ	0R10 5% 2W50		1	04E	W21/74ER	R405 (MC1 X1/L)
RW41K80MJ1	1K80 5% 7W00		1	17V	210-9	R404
TBM2510PS	STRAIGHT PIN HEADER 10 WAY		1	23M	6410+22-27-2101	SK20
TP1510	CIRCUIT BOARD PIN 10mm		4	26P	B1.5X0.25X10MS	X4
VT3442	2N3442 140V 10A TO3 N		1	70H	2N3442	TR401
ZT4D20470	CHOKE AP60/50	E	1	01B	ZT4D20470	TX406
ZZ8D30032	INVERTER AP100/30	G	1	01B	ZZ8D30032	TX404
ZZ9E30050	OUTPUT CHOKE AP10030	D	1	01B	ZZ9E30050	TX405
4N6050CD	CENTRE DIVIDER ASSEMBLY	B	1			4
GRM79H	GROMMET 11/2X1 M79H		1	60M	M/79/H	
KP3M10	SCREW M3 X 10 PAN HD POZI		2	05T	KP3M10	
KP3M8	SCREW M3 X 8 PAN HD POZI		2	05T	KP3M8	
NF3M	FULL NUT M3		4	05T	NF3M	
NV320D	POP RIVET 2.4MM DIA DOMED HD		2	08T	TAPD+33+BS	
WF3M	FLAT WASHER M3		2	05T	WF3M	
WS3M	SPRING WASHER M3		4	05T	WS3M	
5N6050D	DRIVE CB ASSY	D	1			5
BC240	DRIVE TRANSFORMER BOARD	C	1	01K	2BS12B2400	B
CLA1U00SJ	1U00F 5%0 400V MKP 13X31 R27.5		1	18P	378-52105	C410
DZ218V0H	18V 5% 1W30		4	01P	BZV85-C18V	Z1A 2A;1B 2B
GT23	CTY001/NT20 75C UL		2	28P	PLT1M-M	
KP3M6	SCREW M3 X 6 PAN HD POZI		6	05T	KP3M6	
TBA3902PS	2W PIN WAFER WITH STRGHT LOCK		5	07A	640388-2	SK14-18
TBM2506PS	STRAIGHT PIN HEADER 6 WAY 2.54		1	23M	6410+22-27-2061	SK19
TC41480	FASTON TWIN TAB U .25		7	07A	41480	
TP15080	CIRCUIT BOARD PIN 8mm		2	02B	B1.5X0.20X8MST	X2

Part No	Description	Iss	Qty	Man	Man Part No	Reference
WS3M	SPRING WASHER M3		6	05T	WS3M	
ZU4L20300	DRIVE TRANS AP60/50	E	1	01B	ZU4L20300	TX402
ZY4F20310	CURRENT TRANSFORMER AP60/50 5	B	1	01B	ZY4F20310	TX403
GT23	CTY001/NT20 75C UL		2	28P	PLT1M-M	
GT25	CTY010/RT675 75C UL		2	28P	PLT2S-M	
GT25UL	TYRAP PLT2S30 105C UL		1	28P	PLT+2S-30	TX406
KP3M8	SCREW M3 X 8 PAN HD POZI		16	05T	KP3M8	
KP4M10	SCREW M4 X 10 PAN HD POZI		1	05T	KP4M10	
KP4M16	SCREW M4 X 16 PAN HD POZI		1	05T	KP4M16	
KP5M10	SCREW M5 X 10 PAN HD POZI		5	05T	KP5M10	
NF3M	FULL NUT M3		16	05T	NF3M	
NF4M	FULL NUT M4		1	05T	NF4M	
NHUNF	HALF NUT 1/4-UNF		1	05T	NHUNF	
TS6B383	SOLDER TAG 6BA STC402297RM		4	05R	RC383/6BA	
WF3M	FLAT WASHER M3		6	05T	WF3M	
WS3M	SPRING WASHER M3		18	05T	WS3M	
WS4M	SPRING WASHER M4		2	05T	WS4M	
WS5M	SPRING WASHER M5		13	05T	WS5M	
WS6M	SPRING WASHER M6		1	05H	M6+SPRING+WASHER	
WW3M	WAVEY WASHER M3		6	24L	LS508/54	
4N6050IP	INPUT FILTER ASSEMBLY	A	1			4
4N6050CB	CAP ASSEMBLY	B	1			4
7NF0993507	CAP PLATE	A	1	00F	3OO0993507	
7SU6431	CAP CLIP	A	4	00F	3/6431	
CED5M60PM	5600UF 20% 250V		2	92B	ALS10A1174DC	C401 2
HW533	CAP INSULATOR AP6050	A	1	27P	3OO0993533	
KP4M12	SCREW M4 X 12 PAN HD POZI		8	05T	KP4M12	
MT4780BLK	TAPE 2M BLK 781/4780		.2	49B	781/4780+BLK	
RX536K0HJ	36K0 5% 2W00 200PPM 700V		2	53D	FP2-N8	R401 2
WF4M	FLAT WASHER M4		8	05T	WF4M	
WS4M	SPRING WASHER M4		8	05T	WS4M	
4N6050FD	FILTER DIVIDER ASSEMBLY	A	1			4
GR73M	GROMMET PV73M 20MM		1	09R	PV73M	
NF20MN	NYLON NUT M20 BLACK		1	06R	607-926	
NF3M	FULL NUT M3		3	05T	NF3M	
NR3M12TH	SPACER M3 X 12MM THR'D HEX		5	01H	R6334-02	
NV320D	POP RIVET 2.4MM DIA DOMED HD		2	08T	TAPD+33+BS	
WS3M	SPRING WASHER M3		3	05T	WS3M	
4N6050SS	SOFT START ASSEMBLY	C	1			4
7NU0993508	RELAY BRACKET	B	1	00F	3BA0993508	
DB36MB60A	35A 600V PLASTIC SQUARE TAG		1	10I	36MB60A	BR301
HR18102	RES MTNG CLIP		2	17V	18102	
KP3M8	SCREW M3 X 8 PAN HD POZI		2	05T	KP3M8	
KP4M10	SCREW M4 X 10 PAN HD POZI		2	05T	KP4M10	
KP4M20	SCREW M4 X 20 PAN HD POZI		1	05T	KP4M20	
RF16R02NJ	6R0 + 6R0 (DUAL) 5% 11W0		1	17V	226-216	R301
SR20016	HI V POWER 12VDC 16AAC DPNO		1	16J	REP200/12V+D.C.+4KV	RL301
WF3M	FLAT WASHER M3		2	05T	WF3M	
WF4M	FLAT WASHER M4		1	05T	WF4M	
WS3M	SPRING WASHER M3		2	05T	WS3M	
WS4M	SPRING WASHER M4		3	05T	WS4M	
YT18	T/C WIRE 18SWG		.062	55M	18SWG	
5N6050IP	I/P FILTER CB	A	1			5
BC238	FILTER 60/50'S	C	1	01K	2BS23B2380	B
CAOMIT	CAPACITORS OMITTED		2	00F	CAOMIT	C312 3
CX6470NPM	470NF 20% 250V R250		5	13R	PME+271M647	C303 5 6 9:10
CXA1U00PM	1.0UF 20% 250V R275		1	13R	PHE+830MF7100M	C304
CY42N20PM	2.2NF 20% 250V R100		2	13R	PME+271Y422M	C301 2
CY522N0PM	22NF 20% 250V R150		2	13R	PME+271Y522M	C307 8
GT25	CTY010/RT675 75C UL		3	28P	PLT2S-M	
MT9X3	FCAMPAD 90X38 771/4773		.5	49B	771/4773	
ZX4D11651	FILTER CHOKE AP60/50 5	B	2	01B	ZX4D11651	TX301 2
GCNX2	P CLIP 6.4MM I/D		2	04H	NX2	
KP3M6	SCREW M3 X 6 PAN HD POZI		4	05T	KP3M6	
KP4M10	SCREW M4 X 10 PAN HD POZI		5	05T	KP4M10	
NF3M	FULL NUT M3		3	05T	NF3M	
TS542	SOLDER TAG		4	02U	HGBV623/1000ET	
WS3M	SPRING WASHER M3		2	05T	WS3M	
WS4M	SPRING WASHER M4		5	05T	WS4M	
WW3M	WAVEY WASHER M3		5	24L	LS508/54	
5N10030C	AP10030 CONTROL C.B.	N	1			5
5SAP1KWC	STANDARD 1KW CONTROL AP/MP	E	1			5
5SAPC	STANDARD CONTROL BOARD	K	1			5
5SAPC1	CONTROL STANDARD COMPONENTS	A	1			5
RM212R0FF	12R0 1% 0W60 50PPM 250V		12	18P	MRS25	R155 7 9:62 7 8:93 9:216-218:21
RM510K0FF	10K0 1% 0W60 50PPM 250V		14	18P	MRS25	R118:20;30 7 8;42 4;85;91 2 4 7 8;203
7SU3276	TRANSFORMER BRACKET	B	1	00F	4SUBA3276	
BC1096	CONTROL BOARD AP3KW	E	1	01K	C1RBT10960	BOARD TO BE ATE TESTED
CAOMIT	CAPACITORS OMITTED		7	00F	CAOMIT	C35 9:49:60 4:82 3
CC3100PLG	100PF 2% 100V N150 RP050		1	18P	683+34101	C98
CC3270PLG	270PF 2% 100V N750 RP050		1	18P	683+58271	C54
CC3330PLG	330PF 2% 100V N750 RP050		2	18P	683+58331	C15:47
CEA4U70LM	4.7UF 20% 100V R025		1	01W	WHT	C89
CEB15U0IT	15UF 50% 40V AXIAL		1	18P	030-37159	C34
CEB22U0JM1	22UF 20% 50V FC +5MM		1	01W	WHT	C100 (FIT WITH '+' TOWARDS R73)
CEC100UDT	100UF 50% 10V AXIAL		2	18P	030-34101	C23:36
CEC100UGM2	100UF 20% 25V 105 8x016 A20.0		1	01W	WTU-100-25	C31
CEC100UHM	100UF 20% 35V R050		3	01W	WHT	C24 6 7
CEC220UGM	220UF 20% 25V R050		2	01W	WHT	C20:97
CED1M00JQ	1000UF 20% 50V R 7.5		1	01W	WHT	C4
CED2M20BM	2200UF 20% 6.3V R 05.0		1	01W	RJ2	C57
CED2M20GM	2200UF 20% 25V R 07.5		1	01W	WHT	C1
CED2M20HM	2200UF 20% 35V 18X036R 07.5		2	01W	WHT	C5 6
CED4M70EM1	4700UF 20% 16V N 05.0		1	67P	TSU-ECES1CU472D	C3
CR42N20LM	2n20F 20% 100V KT 3X08 R05.0		2	159W	FKS2MIN	C44:52
CR510N0LJ	10n0F 5%0 100V KT 3X08 R05.0		24	159W	FKS2	C13 7 8:22:38:40 3 5 8:51 6 8;70-2 6-9;80 8;90-2
CR510N0LM	10n0F 20% 100V KT 3X08 R05.0		2	159W	FKS2MIN	C41:96:
CR6100NLM	100nF 20% 100V MKT 3X10 R07.5		14	159W	MKS3	C8:33 7:46:73-75:81 4 5 7:93 4 9

Part No	Description	Iss	Qty	Man	Man Part No	Reference
CR6220NKK	220nF 10% 63V MKT 4X08 R05.0		1	159W	MKS2	C25
CR6220NLM	220nF 20% 100V MKT 4X13 R10.0		5	159W	MKS4	C19:21 8 9:32
CR6470NLK	470nF 10% 100V MKT 7X13 R10.0		1	85S	MKT-32511-D1474K	C14
CRA1U00KM1	1U00F 20% 63V MKT 6X08 R05.0		1	159W	MKS2	C12
DAOMIT	DIODES OMITTED		3	00F	DAOMIT	Z8-10
DBP02	1.5A 200V PLASTIC IN LINE		1	11G	KBP02M	BR2
DBW02M	1.5A 200V PLASTIC ROUND		3	11G	W02G	BR1 3 4 (MC1 X1/L)
DG27150	DIODE		1	01P	BYV27-150	D21
DG28150	DIODE		1	01P	BYV28-150	D51
DG4003	DIODE		5	11G	1N4003	D1 2:26:34:41
DG4148	DIODE		34	23N	1N4148	D3 6-8:16-20 2 4 5 7 29-32 35-40 42-50 2 3
DGOA47	DIODE		2	01P	OA47	D4 9
DZ14V70E	4.7V 5% 0W50		1	31I	ZPD4.7	Z1
DZ16V20D1	6.2V 0W40		1	01P	1N823	Z5
DZ16V80E	6.8V 5% 0W50		1	31I	ZPD6.8	Z6
KP3M12	SCREW M3 X 12 PAN HD POZI		6	05T	KP3M12	
KP3M6	SCREW M3 X 6 PAN HD POZI		1	05T	KP3M6	
KP3M8	SCREW M3 X 8 PAN HD POZI		1	05T	KP3M8	
MB2840	M3 TOP HAT BUSH		6	14W	BQ2840	IC7 8 9:11;TR20 (IC10 IF FITTED)
MC1	CERAMIC BEAD SMALL		12	57M	IPB/1	BR1 3 4 X1/L
MM4170	ALUMINIUM OXIDE WASHER TO220		6	19R	4170	IC7 8 9:11;TR20 (IC10 IF FITTED)
NF3M	FULL NUT M3		8	05T	NF3M	
PM45K00KV	5K00 10% PRESET VERT STURN		1	02S	63P	P2
PM510K0KV	10K0 10% PRESET VERT STURN		3	02S	63P	P1 6 7
RAOMIT	RESISTORS OMITTED		5	00F	RAOMIT	R77-9:187:222
RG71M00BJ	1M00 5% 0W25 100PPM 1K1V		3	18P	VR25	R40 9:51
RG73M90BJ	3M90 5% 0W25 250PPM 1K1V		2	18P	VR25	R180 1
RM212R0FF	12R0 1% 0W60 50PPM 250V		18	18P	MRS25	R22 6:37:52:87:90 1 4:101 6 9:12 7:28:36:40 3 5
RM239R0FF	39R0 1% 0W60 50PPM 250V		1	18P	MRS25	R83
RM247R0FF	47R0 1% 0W60 50PPM 250V		1	18P	MRS25	R206
RM3100RDF	100R 1% 0W40 50PPM 200V		1	18P	MRS16T	R212
RM3100RFF	100R 1% 0W60 50PPM 250V		10	18P	MRS25	R53:160 1 3 9:70:208 9:11 3
RM3120RFF	120R 1% 0W60 50PPM 250V		2	18P	MRS25	R80 5
RM3220RFF	220R 1% 0W60 50PPM 250V		1	18P	MRS25	R215
RM3330RFF	330R 1% 0W60 50PPM 250V		1	18P	MRS25	R210
RM3470RFF	470R 1% 0W60 50PPM 250V		1	18P	MRS25	R19
RM3620RFF	620R 1% 0W60 50PPM 250V		1	18P	MRS25	R139
RM3910RFF	910R 1% 0W60 50PPM 250V		1	18P	MRS25	R84
RM41K00FF	1K00 1% 0W60 50PPM 250V		10	18P	MRS25	R150 8:73-75:88 9::90:200 1
RM41K20FF	1K20 1% 0W60 50PPM 250V		8	18P	MRS25	R5 6:10 2:61 8:71:195
RM41K50FF	1K50 1% 0W60 50PPM 250V		1	18P	MRS25	R223
RM41K80FF	1K80 1% 0W60 50PPM 250V		5	18P	MRS25	R45:152 3:77 8
RM42K20FF	2K20 1% 0W60 50PPM 250V		4	18P	MRS25	R63:96:129:220
RM42K70FF	2K70 1% 0W60 50PPM 250V		3	18P	MRS25	R111:32:56
RM43K30FF	3K30 1% 0W60 50PPM 250V		3	18P	MRS25	R9:11:36
RM43K90FF	3K90 1% 0W60 50PPM 250V		1	18P	MRS25	R88
RM44K70FF	4K70 1% 0W60 50PPM 250V		3	18P	MRS25	R31 8:44
RM45K10FF	5K10 1% 0W60 50PPM 250V		4	18P	MRS25	R57:60:133:207
RM46K80FF	6K80 1% 0W60 50PPM 250V		3	18P	MRS25	R2:86:131
RM48K20FF	8K20 1% 0W60 50PPM 250V		4	18P	MRS25	R151 4:76 9
RM49K10FF	9K10 1% 0W60 50PPM 250V		2	18P	MRS25	R28 9
RM510K0FF	10K0 1% 0W60 50PPM 250V		18	18P	MRS25	R1 3 7:16:39:41 3:50 8 9:64 9:70 3 5 6:81:108
RM512K0FF	12K0 1% 0W60 50PPM 250V		1	18P	MRS25	R55
RM515K0FF	15K0 1% 0W60 50PPM 250V		1	18P	MRS25	R17
RM516K0FF	16K0 1% 0W60 50PPM 250V		1	18P	MRS25	R146
RM518K0FF	18K0 1% 0W60 50PPM 250V		2	18P	MRS25	R82:148
RM522K0FF	22K0 1% 0W60 50PPM 250V		4	18P	MRS25	R13 5:27:147
RM527K0FF	27K0 1% 0W60 50PPM 250V		2	18P	MRS25	R42 8
RM533K0FF	33K0 1% 0W60 50PPM 250V		3	18P	MRS25	R4 8:14
RM539K0FF	39K0 1% 0W60 50PPM 250V		1	18P	MRS25	R47
RM547K0FF	47K0 1% 0W60 50PPM 250V		16	18P	MRS25	R18:32 3 5:56:62 7:72 4:89:119:41:64 5:86:96
RM551K0FF	51K0 1% 0W60 50PPM 250V		1	18P	MRS25	R149
RM568K0FF	68K0 1% 0W60 50PPM 250V		3	18P	MRS25	R65;93;202
RM6100KFF	100K 1% 0W60 50PPM 250V		1	18P	MRS25	R166
RM6200KFF	200K 1% 0W60 50PPM 250V		1	18P	MRS25	R66
RM6330KFF	330K 1% 0W60 50PPM 250V		1	18P	MRS25	R135
SB0059	AP60/50	B	1	31S	4STOO0059	SW1
TB72513C	TERMINAL BLOCK 13 WAY PCB MTG.		1	26V	TX72513-49-C	T1
TBA3902PS	2W PIN WAFER WITH STRGHT LOCK		1	07A	640388-2	SK6A
TBA3910PS	10W PIN WAF WITH STRGHT LOCK		1	07A	1-640388-0	SK3
TBM2506PS	STRAIGHT PIN HEADER 6 WAY 2.54		2	23M	6410+22-27-2061	SK5 7
TBM2510PS	STRAIGHT PIN HEADER 10 WAY		1	23M	6410+22-27-2101	SK9
TIH2516NT1L	16 WAY PIN HEADER		1	25V	M52-1216-662	SK4
TIH2534NT1L	34 WAY PIN HEADER		1	88M	ID101-H34-N-06-F1	SK8
VA311N	COMPARATOR SINGLE		2	23N	LM311N	IC22 7
VA3140E	OP AMP SINGLE STATIC		4	70H	CA3140E	IC13-16
VA339N	COMPARATOR QUAD LO PWR		3	23N	LM339N	IC1 2:17
VA347N	OP AMP QUAD		2	23N	LF347N	IC19:24
VA431AWC	REGULATOR SHUNT		2	23N	LM431ACZ	Z3 4 (DO NOT PREFORM FIT ON CONVERSION PAD)
VA7805CT	REGULATOR		2	02M	MCT7805CT	IC7 8(JIG 223)
VA78M12UC	REGULATOR		1	23N	LM341T12/LM78M12CT	IC9(JIG 223)
VA78M15CU	REGULATOR		1	23N	LM341T15/LM78M15CT	IC11(JIG 223)
VA7905CT	REGULATOR		1	23N	MC7905CT	IC6 (MOD REQ TO FIT TO ISSUE C C/B REF A YARKER)
VD4001BCN	BCMOS 4X 2-I/P NOR 14-D STATIC		3	23N	CD4001BCN	IC5:21 9
VD4011BE	BCMOS 4X 2-I/P NAND 14-D STATC		1	70H	CD4011BE	IC23
VD4013BE	BCMOS 2X D-TYP F/F 14-D STATIC		1	23N	CD4013BE	IC3
VD4066B	BCMOS 4X ANLOG SW 125R STATIC		3	23N	CD4066BCN	IC18:20 5
VD4069UBE	CMOS HEX INVERTR 14-DIP STATIC		1	23N	CD4069UBE	IC26
VD4093BCN	BCMOS 4X 2-I/P NAND 14-DP STAT		2	23N	CD4093BCN	IC4:28
VF540	IRF540 STATIC		1	10I	IRF540	TR33
VF9522	FET IRF9522 STATIC		1	10I	IRF9520	TR31
VP10218	TRANSISTOR PAD 10218		2	27K	EPX003	Z3 4
VS14L	IC SKT 14WAY		16	08R	ICO-143-S8A-T	
VS8P	IC SKT 8WAY		7	08R	ICO-083-S8A-T	
VT182PL	BC182PL T018 JOG		17	03Z	BC182PL	TR2-5 8:12-17 9:21 2 5 9:34
VT212PL	BC212PL TO18 JOG		8	03Z	BC212PL	TR1 7:23 4 26-28:30
VT337	BC337 TO18 PREFORM		1	01P	BC337	TR18

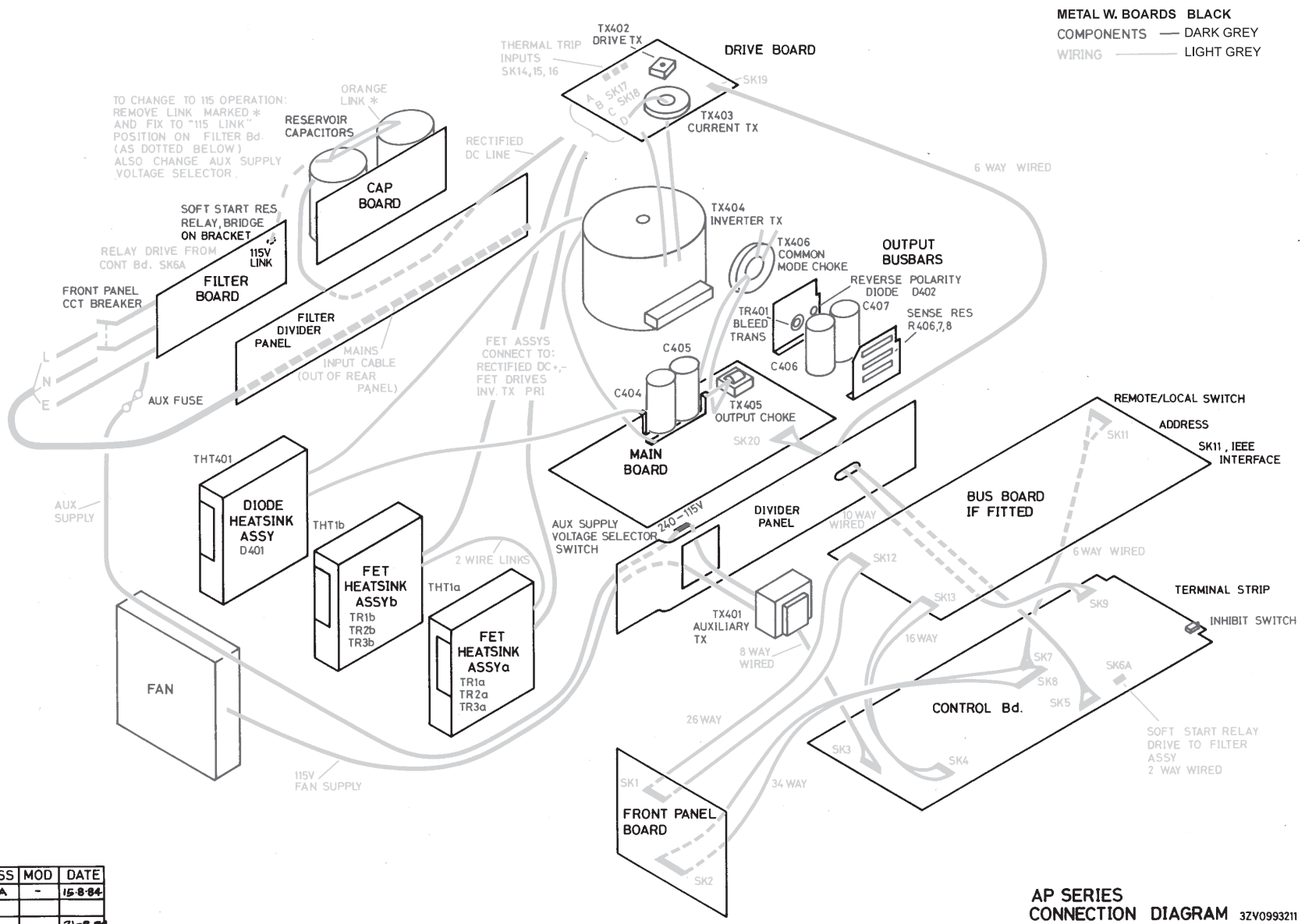
Part No	Description	Iss	Qty	Man	Man Part No	Reference
VTX650KCR	ZTX650 45V 2A N		1	03Z	ZTX650K35	TR32
VTX750K	ZTX750K		1	03Z	ZTX750K35+(4SC0174)	TR35
WF3M	FLAT WASHER M3		6	05T	WF3M	
WN3M	FLAT WASHER M3 NYLON 66		6	17N	M3+NYLON+WASHER	IC7 8 9:11;TR20 (IC10 IF FITTED)
WS3M	SPRING WASHER M3		9	05T	WS3M	
WW3M	WAVEY WASHER M3		3	24L	LS508/54	
7NU0993525	REGULATOR HEATSINK	B	1	00F	2BA0993525	
CAOMIT	CAPACITORS OMITTED		2	00F	CAOMIT	C102 3
CC3100PLG	100PF 2% 100V N150 RP050		1	18P	683+34101	C10
CC3270PLG	270PF 2% 100V N750 RP050		1	18P	683+58271	C55
CEB10U0GT1	10UF 50% 25V AXIAL		1	18P	030-36109	C16
CEC100UGM2	100UF 20% 25V 105 8x016 A20.0		1	01W	WTU-100-25	C30
CL3470PLJ	470pF 5%0 100V KP 5X08 R05.0		1	159W	FKP2	C11
CR41N00LM	1n00F 20% 100V KC 3X08 R05.0		1	159W	FKS2	C68
CR510N0LM	10n0F 20% 100V KT 3X08 R05.0		1	159W	FKS2MIN	C61
CR6100NLM1	100nF 20% 100V MKT 4X10 R10.0		1	159W	MKS4	C101
CRA1U00KM1	1U00F 20% 63V MKT 6X08 R05.0		1	159W	MKS2	C86
DG4003	DIODE		1	11G	1N4003	D28
DG4148	DIODE		1	23N	1N4148	D5
PAOMIT	POTENTIOMETERS OMITTED		1	00F	PAOMIT	P5
PM41K00KV	1K00 10% PRESET VERT STURN		2	02S	63P	P8 9
PM45K00KV	5K00 10% PRESET VERT STURN		2	02S	63P	P3 4
RAOMIT	RESISTORS OMITTED		1	00F	RAOMIT	R225
RM13R90FF	3R90 1% 0W60 100PPM 250V		1	18P	MRS25	R46
RM212R0FF	12R0 1% 0W60 50PPM 250V		1	18P	MRS25	R23
RM3180RFF	180R 1% 0W60 50PPM 250V		1	18P	MRS25	R219
RM3220RFF	220R 1% 0W60 50PPM 250V		1	18P	MRS25	R205
RM41K50FF	1K50 1% 0W60 50PPM 250V		1	18P	MRS25	R214
RM43K30FF	3K30 1% 0W60 50PPM 250V		1	18P	MRS25	R54
RM533K0FF	33K0 1% 0W60 50PPM 250V		2	18P	MRS25	R97:100
RM568K0FF	68K0 1% 0W60 50PPM 250V		1	18P	MRS25	R30
TAOMIT	SOCKETS PLUGS OMITTED		2	00F	TAOMIT	SK6B:11
VA78M12UC	REGULATOR		1	23N	LM341T12/LM78M12CT	IC10(JIG 223)
VAOP77	IC OP77GP STATIC		1	10B	OP-77GP	IC12
YL22105	LINK 10.5MM TC22SWG		1	00F	TC22SWG+10.5MM	R227
YT22	T/C WIRE 22SWG		.03	55M	22SWG	
CAOMIT	CAPACITORS OMITTED		4	00F	CAOMIT	C42:66 7 9
CB41N50MJ	1n50F 5%0 160V KC 3X10 R07.5		1	159W	FKC3	C59
CB43N30SK	3n30F 10% 400V KC 3X13 R10.0		1	159W	FKC3	C63
CC3270PLG	270PF 2% 100V N750 RP050		1	18P	683+58271	C50
CR41N50LM	1n50F 20% 100V KT 3X08 R05.0		1	159W	FKS2	C95
CR510N0LJ	10n0F 5%0 100V KT 3X08 R05.0		1	159W	FKS2	C53
CR510N0SK	10n0F 10% 400V MKT 4X13 R10.0		1	85S	MKT-32511-D6103K	C62
CR522N0PK	22n0F 10% 250V MKT 3X10 R07.5		1	85S	B32511-D3223K+10PCM	C65
DAOMIT	DIODES OMITTED		1	00F	DAOMIT	D33
DLINK22	22SWG TC LINK F		1	00F	DLINK22	D23
YT22	T/C WIRE 22SWG		.035	55M	22SWG	
PM3500RKV	500R 10% PRESET VERT STURN		1	02S	63P	P10
RAOMIT	RESISTORS OMITTED		4	00F	RAOMIT	R114:22 4 5
RLINK22	22 SWG TC LINK		2	00F	RLINK22	R99:123
RM247R0FF	47R0 1% 0W60 50PPM 250V		1	18P	MRS25	R183
RM3150RFF	15OR 1% 0W60 50PPM 250V		1	18P	MRS25	R110
RM3820RFF	820R 1% 0W60 50PPM 250V		1	18P	MRS25	R171
RM41K20FF	1K20 1% 0W60 50PPM 250V		1	18P	MRS25	R113
RM42K40FF	2K40 1% 0W60 50PPM 250V		2	18P	MRS25	R92:182
RM46K20FF	6K20 1% 0W60 50PPM 250V		2	18P	MRS25	R104 5
RM510K0FF	10K0 1% 0W60 50PPM 250V		2	18P	MRS25	R107:27
RM518K0FF	18K0 1% 0W60 50PPM 250V		1	18P	MRS25	R121
RM527K0FF	27K0 1% 0W60 50PPM 250V		1	18P	MRS25	R126
RM533K0FF	33K0 1% 0W60 50PPM 250V		1	18P	MRS25	R172
RM547K0FF	47K0 1% 0W60 50PPM 250V		1	18P	MRS25	R34
RM551K0FF	51K0 1% 0W60 50PPM 250V		1	18P	MRS25	R184
RM556K0FF	56K0 1% 0W60 50PPM 250V		1	18P	MRS25	R134
RM580K0BB	80K0 0.1% 0W25 50PPM 250V		2	94M	H8	R102 3
RM6100KFF	100K 1% 0W60 50PPM 250V		2	18P	MRS25	R95:115
RM6390KFF	390K 1% 0W60 50PPM 250V		1	18P	MRS25	R116
RM6470KFF	470K 1% 0W60 50PPM 250V		1	18P	MRS25	R98
VT760	760A 1KV 4A R3478 N TO220		1	01T	TIPL760A	TR20(JIG 223)
7NU0993505	FILTER DIVIDER A	C	1	00F	1BA0993505	
7NU0993506	MAINS SCREEN	B	1	00F	2BA0993506	
7NU0993509	FAN SUPPORT BRACKET	A	2	00F	3DA0993509	
7NU0993517	CENTRE DIVIDER	F	1	00F	1BA0993517	
7NU0993522	CB BRACKET	B	1	00F	4DA0993522	
7SX5512	TOP & BOTTOM TRIM	A	4	00F	2SUDF5512	
GCNX1	P CLIP 5.0MM I/D		1	04H	NX1	
GR3G	GROMMET NYLON HN3G		4	21F	HN3G-33-1	
GR3P	GROMMET PLUNGER HN3P		4	21F	HN3P-33-4-1	
HA0135	3U HANDLE DARK ADMIRALTY GREY	B	4	14K	1SVOO0135	
HA0136	3U HANDLE INSERT DK AD'LTY GRY	B	4	14K	2SVOO0136	
KP3M10	SCREW M3 X 10 PAN HD POZI		4	05T	KP3M10	
KP3M12	SCREW M3 X 12 PAN HD POZI		1	05T	KP3M12	
KP3M6	SCREW M3 X 6 PAN HD POZI		10	05T	KP3M6	
KP4M16	SCREW M4 X 16 PAN HD POZI		4	05T	KP4M16	
KP5M10	SCREW M5 X 10 PAN HD POZI		1	05T	KP5M10	
NF3M	FULL NUT M3		1	05T	NF3M	
NF4M	FULL NUT M4		4	05T	NF4M	
TBA3902HS	2W HOUSING WITH STRAIGHT LOCK		5	07A	640250-2	
TBA3910HS	10W HOUSING WITH STRGHT LOCK		1	07A	1-640250-0	
WF3M	FLAT WASHER M3		2	05T	WF3M	
WF4M	FLAT WASHER M4		1	05T	WF4M	
WS3M	SPRING WASHER M3		11	05T	WS3M	
WS4M	SPRING WASHER M4		4	05T	WS4M	
WS5M	SPRING WASHER M5		1	05T	WS5M	
WW3M	WAVEY WASHER M3		4	24L	LS508/54	
4N10030F	FRONT PANEL ASSEMBLY	B	1			4
4N6050FF	FRONT PANEL ASSEMBLY	A	1			4
5N10030F1	FRONT PANEL DISPLAY C.B	H	1			
5NAPDISA	DISPLAY CB AXIAL ASSY	A	1			

Part No	Description	Iss	Qty	Man	Man Part No	Reference
BC235	FRONT PANEL DISPLAY BOARD	C	1	01K	CBP32B2350	BOARD TO BE ATE TESTED
RM15R10FF	5R10 1% 0W60 50PPM 250V		2	18P	MRS25	R15:23
RM41K00FF	1K00 1% 0W60 50PPM 250V		3	18P	MRS25	R21 8:41
RM41K10FF	1K10 1% 0W60 50PPM 250V		1	18P	MRS25	R37
RM42K20FF	2K20 1% 0W60 50PPM 250V		1	18P	MRS25	R36
RM42K70FF	2K70 1% 0W60 50PPM 250V		6	18P	MRS25	R6-8:22 6:35
RM510K0FF	10K0 1% 0W60 50PPM 250V		11	18P	MRS25	R2-5 9-11:20 4 5 7
RM512K0FF	12K0 1% 0W60 50PPM 250V		2	18P	MRS25	R12 8
RM520K0FF	20K0 1% 0W60 50PPM 250V		1	18P	MRS25	R34
RM522K0FF	22K0 1% 0W60 50PPM 250V		2	18P	MRS25	R16 7
RM547K0FF	47K0 1% 0W60 50PPM 250V		1	18P	MRS25	R33
RM6100KFF	100K 1% 0W60 50PPM 250V		3	18P	MRS25	R29-31
7NU0993526	TOP BRACKET	B	1	00F	3BA0993526	
7NU0993527	BOTTOM BRACKET	C	1	00F	3BA0993527	
7SF3293	PACKING PIECE A	A	2	00F	4SUOO3293	
7SF3294	PACKING PIECE B	A	2	00F	4SUOO3294	
CEA4U70KT	4.7UF 50% 63V AXIAL		1	18P	030-38478	C15
CEB10U0GT1	10UF 50% 25V AXIAL		4	18P	030-36109	C2 6 9:13
CEC100UDT	100UF 50% 10V AXIAL		1	18P	030-34101	C11
CR6100NKM	100nF 20% 63V MKT 3X08 R05.0		4	159W	MKS2MIN	C1 5 8:10
CR6100NLM1	100nF 20% 100V MKT 4X10 R10.0		1	159W	MKS4	C14
CR6220NLM	220nF 20% 100V MKT 4X13 R10.0		2	159W	MKS4	C3:12
CRA1U00KM1	1U00F 20% 63V MKT 6X08 R05.0		2	159W	MKS2	C4 7 (ALT 50V M13001)
CY42N20PM	2.2NF 20% 250V R100		1	13R	PME+271Y422M	C16
HC53160B	34W F/WIRE 4SC0039/C	C	1	25V	4SC0039	
HW1934	SPACER BOARD AP60/50	C	1	01K	3SUOO1934	
LD134G	LED GRN T1 3/4 MV64530		1	11Q	MV54530+/+LED+ONLY++	LED20
LD5501	LED HER 1 X 7 G OR H		6	02H	HDSP5501	LED1-3:15-17
LD57164	LED RED BAR GRAPH GORH		4	11Q	MV57164	LED5 6:18 9
LD600159	LED RED BLOCK LD001VR		9	24I	600159/UR	LED4 7-14
MC2	CERAMIC BEAD LARGE		2	57M	IPB2	LED20
PM45K00KH2	5K00 10% PRESET HORZ MTURN		1	02S	64Z	P5
PM45K00KV3	5K00 10% PRESET VERT MTURN		1	02S	64Y	P4
PM510K0KH1	10K0 10% PRESET HORZ MTURN		2	02S	64Z	P1 7
PM550K0KH1	50K0 10% PRESET HORZ MTURN		2	02S	64Z	P2 6
PW45K00JN	5K00 5% NPREST LIN		2	02S	534-5K	P3 8
RM262R0FF	62R0 1% 0W60 50PPM 250V		1	18P	MRS25	R40
RM3120RFF	120R 1% 0W60 50PPM 250V		2	18P	MRS25	R1:38
RM41K00BB	1K00 0.1% 0W25 25PPM 250V		1	94M	H8	R39
RM43K00FF	3K00 1% 0W60 50PPM 250V		1	18P	MRS25	R32
RM512K0FF	12K0 1% 0W60 50PPM 250V		1	18P	MRS25	R13
RM547K0FF	47K0 1% 0W60 50PPM 250V		2	18P	MRS25	R14 9
SA16700	SWITCH CAP GREY		2	24M	16-700	
SB15500	PUSH BUTTON SWITCH (BLK PB)		1	24M	15/501+(BLK+PB)	SW1
SB15550	PUSH/B SW 15-550 LATCH(RED PB)		1	24M	15-551-03	SW2
TIH2526NT1L	26 WAY PIN HEADER		1	25V	M52-1226-660	SK1
TK30513	PIN LINE SOCKET 3WAY		9	35R	3-0513-10	LED4 7-14
TP7401	12WAY STAKED MALE CONTACT		4	07A	1-163740-1	PL1 2
VA3914N	DRIVER BAR DISPLAY		2	23N	LM3914N	IC8 9
VD3161E	BCD-7SEG DECODER/DRIVER 16-DIP		2	70H	CA3161E	IC1 6
VD3162E	ADC 3-DIGIT BCD O/P 16-DIP		2	70H	CA3162E	IC2 5
VD4016B	BCMOS 4X ANL SWCH 280R STATIC		1	23N	CD4016BE	IC4
VD4050B	BCMOS HEX BUFFER 16-DIP STATIC		1	23N	CD4050BCN	IC3
VD4093BCN	BCMOS 4X 2-I/P NAND 14-DP STAT		1	23N	CD4093BCN	IC7
VS14L	IC SKT 14WAY		2	08R	ICO-143-S8A-T	IC4 7
VS16L	IC SKT 16WAY		3	08R	ICO-163-S8A-T	IC3 5 6
VS18L	IC SKT 18 WAY		2	08R	ICO-183-S8A-T	IC8 9
VS20L1	20 WAY LOW PROFILE SOCKET		4	28I	703-1320-01-04-10	LED5 6:18 9
VS32C	32W CARRIER 612-92-632		2	27F	612-92-632	LED1-3:15-17
VT328	BC328 TO18 PREFORM		8	01P	BC328	TR1-8
WN10M17	NYLON WASHER M10 X 17.45MM O/D		2	40P	041-3728	
YAOMIT	LINKS OMITTED		1	00F	YAOMIT	LK1
YT22	T/C WIRE 22SWG		.1	55M	22SWG	L1 2
ZF1115	FERRITE BEAD L=5.6MM OD=4.15		2	15P	4313-020-15170	L1 2
7SU2430	FALSE FRONT PANEL KA	E	1	00F	1SUBA2430	
KC3M6	SCREW M3 X 6 CSK HD POZI		9	05T	KC3M6	
KC3M8	SCREW M3 X 8 CSK HD POZI		6	05T	KC3M8	
KP3M8	SCREW M3 X 8 PAN HD POZI		5	05T	KP3M8	
NF3M	FULL NUT M3		4	05T	NF3M	
WS3M	SPRING WASHER M3		4	05T	WS3M	
WW3M	WAVEY WASHER M3		5	24L	LS508/54	
4N6050B	BACK PANEL ASSEMBLY	B	1			4
6P10236	AP/MP RANGE WIRE PREP	J	1			6
TC2BARR	RING TERMINAL 2BA RED REEL		9	07A	2-342104-1	
TC39AMP	CRIMP TERMINAL		11	07A	640252-1	
TC3BARR	RING TERMINAL M4 RED 22-16AWG		8	07A	2-342103-1	
TC6BARR	RING TERMINAL 6BA RED REEL		2	07A	2-342101-1	
TCM25	CRIMP TERMINALS 2.5MM REEL		16	23M	4809-08-50-0031	
YM325	3 CORE MAINS CABLE 2.5MMX BLK		2	10P	2.5MM+HR325	
YP1602BKV	16/0.2 BLACK 105		.51	10P	VX350	
YP1602GYV	16/0.2 GREY 105		1.63	10P	16/0.2+VX	
YP1602PKV	16/0.2 PINK 105		.33	10P	16/0.2+VX	
YP1602VIV	16/0.2 VIOLET 105		.15	10P	16/0.2+VX	
YP1602WHV	16/0.2 WHITE 105		.33	10P	16/0.2+VX	
YP1602YLV	16/0.2 YELLOW 105		.3	10P	16/0.2+VX	
YP2402BNV	24/0.2 BROWN 105		.71	10P	24/0.2+VX	
YP2402RDV	24/0.2 RED 105		.25	10P	VX450	
YP2402VIV	24/0.2 VIOLET 105		.1	10P	24/0.2+VX	
YP30025BKV	48/0.2 BLACK 105		.46	08I	30/0.25+SOFLEX+TQ	
YP30025OR	16AWG ORANGE UL1015		.36	09A	30/0.25+UL1015	
YP30025RDV	48/0.2 RED 105		.28	08I	30/0.25+SOFLEX+TQ	
YP30025WHV	48/0.2 WHITE 105		.2	08I	30/0.25+SOFLEX+TQ	
YP30025YLV	48/0.2 YELLOW 105		.1	08I	30/0.25+SOFLEX+TQ	
YP3079BL	14AWG BLUE UL1015		.76	09A	14AWG+UL1015	
YP3079BLK	14AWG BLACK UL1015		.51	09A	14AWG+UL1015	
YP3079BN	14AWG BROWN UL1015		.44	09A	14AWG+UL1015	
YP3079RD	14AWG RED UL1015		.45	09A	14AWG+UL1015	
YP702GYV	7/0.2 GREY 105		.84	08I	30+X+0.1+SOFLEX+TQ	

Part No	Description	Iss	Qty	Man	Man Part No	Reference
YP702PKV	7/0.2 PINK 105		.175	08I	30+X+0.1+SOFLEX+TQ	
YP702VIV	7/0.2 VIOLET 105		.84	08I	30+X+0.1+SOFLEX+TQ	
YP702WHV	7/0.2 WHITE 105		.175	08I	30+X+0.1+SOFLEX+TQ	
YP702YLV	7/0.2 YELLOW 105		.84	08I	30+X+0.1+SOFLEX+TQ	
7NF0993528	BUS BAR SEPERATER	A	2	00F	4OO0993528	
7NF0993538	OUTPUT COVER INSULATOR	A	1	00F	4OO0993538	
7NU0993518	BACK PANEL A	D	1	00F	1BA0993518	
7NU0993519	OUTPUT COVER A	D	1	00F	2BA0993519	
7NU0993520	RH SIDE PANEL KA	C	1	00F	1CB0993520	
7NU0993521	LH SIDE PANEL A	C	1	00F	1CB0993521	
7SU2386	RIGHT HAND SIDE PANEL BRACKET	A	6	00F	4SUDA2386	
EF4800N	FAN 115V L NOISE 119 X 38 MM		1	69P	4800N	
FH520TP	FUSE HOLDER 5 X 20MM P/MTG UL		1	12A	TO333UL	F401
FS9820	FUSE HOLDER SHROUD 5 X 20MM		1	28B	9820	F401
GC20M	CABLE BUSHING/CLAMP M20 THREAD		1	06R	607-904	
GR2156	GROMMET HV2156		1	53M	HV2156	
GR3A	HALF GROMMET ALUM GH3		2	37D	ALUM+GH3	
GR3G	GROMMET NYLON HN3G		3	21F	HN3G-33-1	
GR3P	GROMMET PLUNGER HN3P		3	21F	HN3P-33-4-1	
GR73	GROMMET M73H		1	60M	M73H	
HK150	KNOB CAP C150 SIF BLK		2	01S	C150	
HK15025	KNOB S150250 SIF BLK		2	01S	S150250	
HL9X30	BLANK 9X30 P120		1	51D	P120	
HMDEC10	FILTER FOAM DECLON 17mm THICK		.01	14D	10PPI+(17MM+THICK)	(125 X 115MM)
HR3	GUIDE RAIL RCG3		2	29R	RCG3	
HR335	OVAL STUD AJ3-35		2	37D	AJ3-35	
HRS3	SPRING S3		2	37D	S3-175	
HW0993501	CIRCUIT BREAKER PANEL	B	1	18G	300993501	
HW0993502	FAN PANEL	C	1	18G	3000993502	
HW10041100	DISPLAY PANEL 100/30	A	1	18G	2SC10010	
KC3M6	SCREW M3 X 6 CSK HD POZI		12	05T	KC3M6	
KC3M8	SCREW M3 X 8 CSK HD POZI		12	05T	KC3M8	
KP3M12	SCREW M3 X 12 PAN HD POZI		1	05T	KP3M12	
KP3M8	SCREW M3 X 8 PAN HD POZI		9	05T	KP3M8	
KP4M12	SCREW M4 X 12 PAN HD POZI		24	05T	KP4M12	
MT0858527	ADHESIVE PAD	B	3	49B	4SUOO0858527	
NF3M	FULL NUT M3		1	05T	NF3M	
NF4M	FULL NUT M4		1	05T	NF4M	
SS2225B	SLIDE SW T2225B MARKED 115-230		1	12A	T2225B	SW401
ST253A90	CCT BREAKER 25/33A 250V 2POLE		1	21C	BA2-B0-24-625-212-D	CB401
TL72332	JUMPER LINK		6	26V	7204-3502-A120	
WF3M	FLAT WASHER M3		2	05T	WF3M	
WN8B	FLAT WASHER 8BA/M2.5 NYLON 66		2	40P	011+0763	
WS3M	SPRING WASHER M3		4	05T	WS3M	
WS4M	SPRING WASHER M4		1	05T	WS4M	
WW3M	WAVEY WASHER M3		8	24L	LS508/54	
YM325	3 CORE MAINS CABLE 2.5MMX BLK		2	10P	2.5MM+HR325	
ZR0300	AUXILIARY TRANSFORMER Z1426	D	1	01B	3SR0300	TX401
7ZU0993532	CLAMPING STRIP	A	2	00F	4DA0993532	

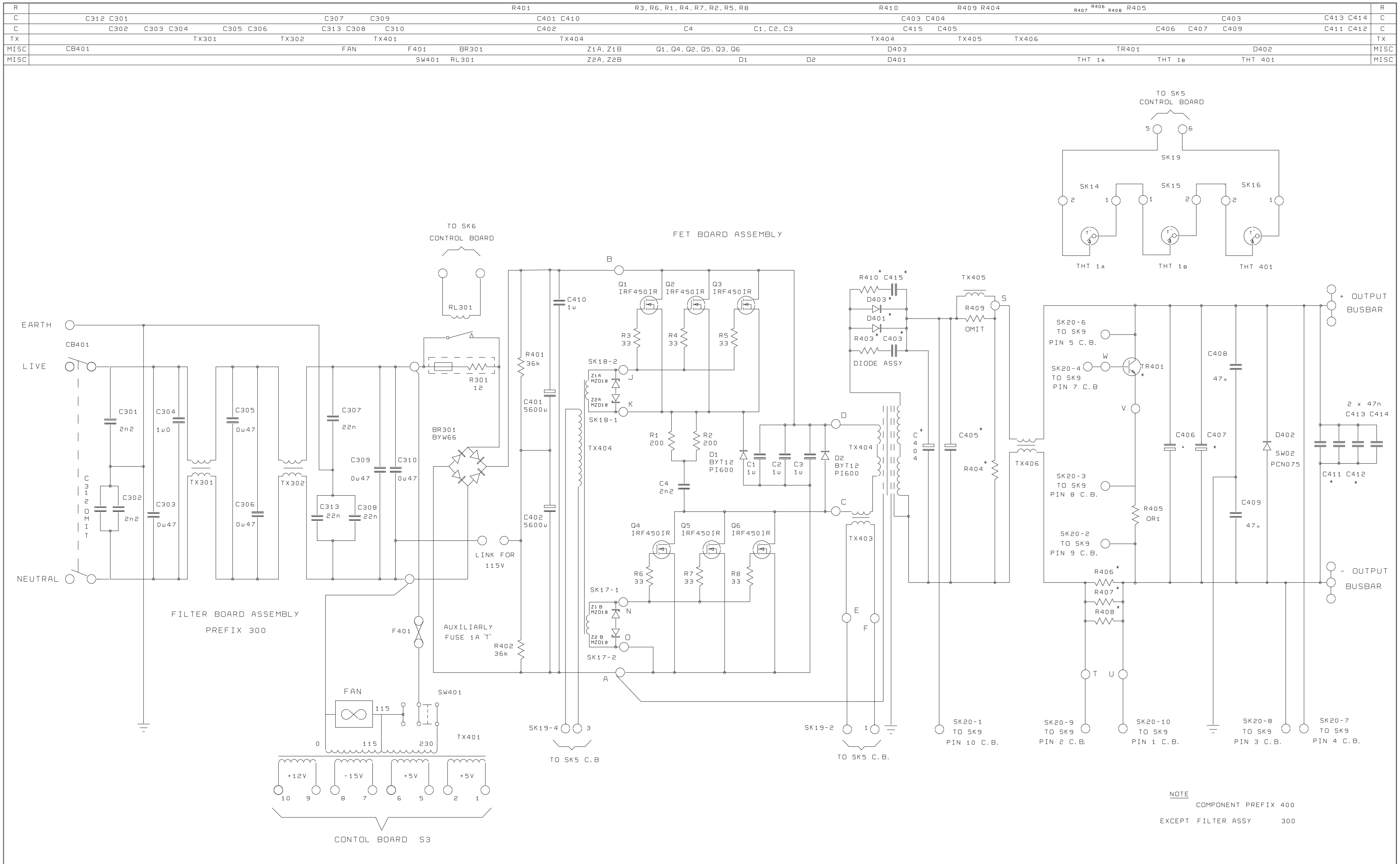
11. CIRCUIT DIAGRAMS

3ZV0993211	Connection
2ZX0993201	Power Conversion Section
1SZX0320 Sheet 1	Control Board
3SZX0320 Sheet 2	Control Board Component Variation Table
2ZW0993210	AP 1kW Schematic
CZX0993201	Front panel board.



DRN	ISS	MOD	DATE
HC	A	-	15-8-84
CKD			
BC			21-8-84

AP SERIES
CONNECTION DIAGRAM 3ZV0993211



ISS	C	D	E				R403	R404	R406/7	R408	R410	C403	C404/6	C405/7	C411/2	C415	D401	D403	TR401	
DATE	14.11.84	10.07.89	19.1.90				33	680	30m	30m	OMIT	4n7	2300	2300	3u3	OMIT	BYW08-200	OMIT	2N3442	AP60-50
MOD. NO.	10567	13672	14410				22	1k8	30m	OMIT	OMIT	2n2	OMIT	2300	OMIT	OMIT	BYT60-400	OMIT	2N3442	AP100-30
CHK'D	BC						33	220	15m	15m	33	4n7	6800	6800	3u3	4n7	BYW08-200	BYW08-200	2N3055	AP30-80
NAME		D. G. H	D. G. H																	

USED ON	FROM SERIAL NO.
AP60-50	465
AP30-80	281
AP100-30	221
MP30-80	145
MP60-50	145
MP100-30	151

NOTES:
ALL CAPACITOR VALUES IN F.
ALL RESISTOR VALUES IN OHMS.

* COMPONENT VALUE IN
AP VARIANT TABLE

UNLESS OTHERWISE STATED

Wayne Kerr Electronics Ltd.
DURBAN ROAD, BOGNOR REGIS, WEST SUSSEX PO22 9RL

TITLE POWER CONVERSION SECTION
CIRCUIT DIAGRAM

DRAWING NO. 2ZX0993203

1 SHEET OF 1 SHEETS

AP CONTROL BOARD VARIATION TABLE

AP/MP	R46	R92	R95	R98	R99	R102	R103	R104	R105	R110	R113	R114	R115	R116	R121	R122	R123	R124	R125	R126
30-80	3R9	1k8	OMIT	100k	1k5	82k	82k	5k6	5k6	2k7	1k2	10k	12k	390k	2V7	5k1	10k	OMIT	OMIT	12k
30-250	1R2	1k8	100k	100k	2V7	82k	82k	2k55	2k55	261	220	10k	12k	68k	2k2	56k	10k	18k	18k	2M2
100-30	3R9	2k4	100k	470k	LINK	80k	80k	6k2	6k2	150	1k2	OMIT	100k	390k	18k	OMIT	LINK	OMIT	OMIT	27k
100-90	1R2	2k4	100k	470k	LINK	80k	80k	6k2	6k2	150	1k2	OMIT	100k	390k	27k	8k2	39k	27k	18k	2M2
60-50	3R9	1k2	OMIT	330k	15k	80k	80k	6k2	6k2	2k7	1k2	8k2	1k5	68k	2k2	5k6	10k	18k	10k	2M2
60-150	1R2	1k2	2M2	100k	15k	80k	80k	6k2	6k2	150	1k2	8k2	1k5	100k	2k2	5k6	10k	18k	10k	2M2

AP/MP	R127	R134	R171	R172	R182	R183	D23	D33	C42	C53	C59	C62	C63	C65	C66	C67	C69	C95	C101	C102
30-80	39k	22k	2k7	33k	8k2	1k8	LINK	5k1	OMIT	33n	0u1	4n7	2n2	0u1	OMIT	OMIT	220n	2n2	0u1	OMIT
30-250	39k	22k	2k7	33k	8k2	1k8	LINK	1N 4148	OMIT	0u1	0u1	4n7	2n2	0u1	22n	4n7	OMIT	1n5	0u1	10n
100-30	10k	56k	820	33k	2k4	47	LINK	OMIT	OMIT	10n	1n5	10n	3n3	22n	OMIT	OMIT	OMIT	1n5	0u1	OMIT
100-90	39k	56k	820	33k	2k4	47	1N 4148	8k2	OMIT	10n	1n5	10n	2n2	22n	0u1	2n2	OMIT	1n5	0u1	10n
60-50	39k	22k	2k	51k	4k3	68	1N 4148	1N 4148	OMIT	4n7	0u1	4n7	2n2	10n	22n	4n7	0u22	2n2	0u1	OMIT
60-150	39k	8k2	2k	51k	4k3	68	1N 4148	1N 4148	2n2	22n	0u1	4n7	2n2	10n	22n	4n7	0u22	2n2	0u1	10n

ISS	C	D	E	F	G	H	I		
DATE	8.3.89	15.8.89	12.1.90	6.3.90	28.2.91	3.7.92	17/5/95		
MOD. NO.	13591	14211	14372	14325	14866	15423	18252		
CHK'D				B.C.	A.R.	A.R.			
NAME	AC	D.G.H	D.G.H	L.A.S	LDG	L.A.S	JEC		

USED ON: FROM SERIAL NUMBER

AP30- 80	261	MP30- 80	215
AP60- 50	415	MP60- 50	146
AP60-150	100	MP60-150	51
AP100- 30	221	MP100- 30	151
AP100- 90	100	MP100- 90	51
AP30-250			

NOTES:
ALL CAPACITOR VALUES IN F.
ALL RESISTOR VALUES IN OHMS.

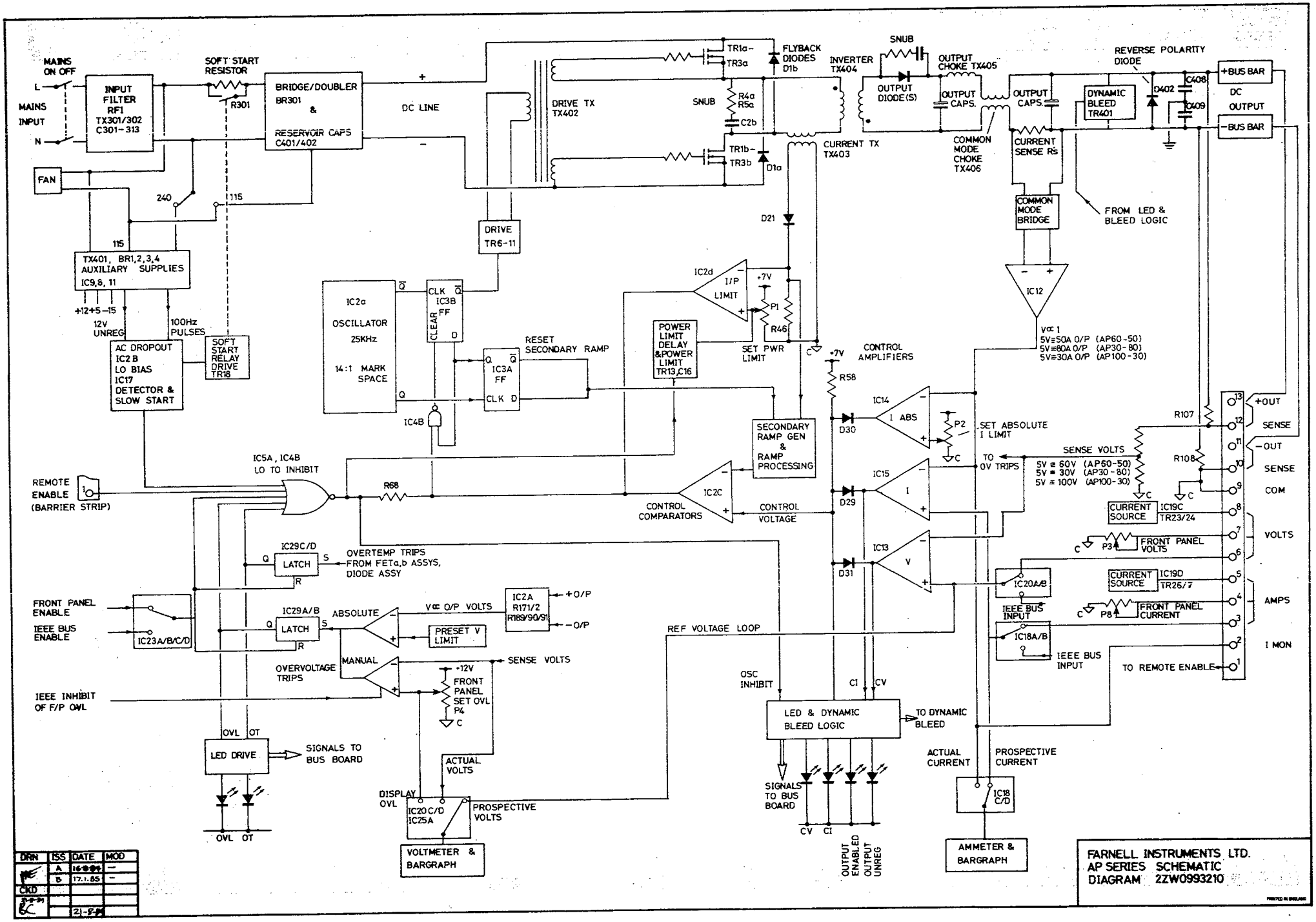
UNLESS OTHERWISE STATED

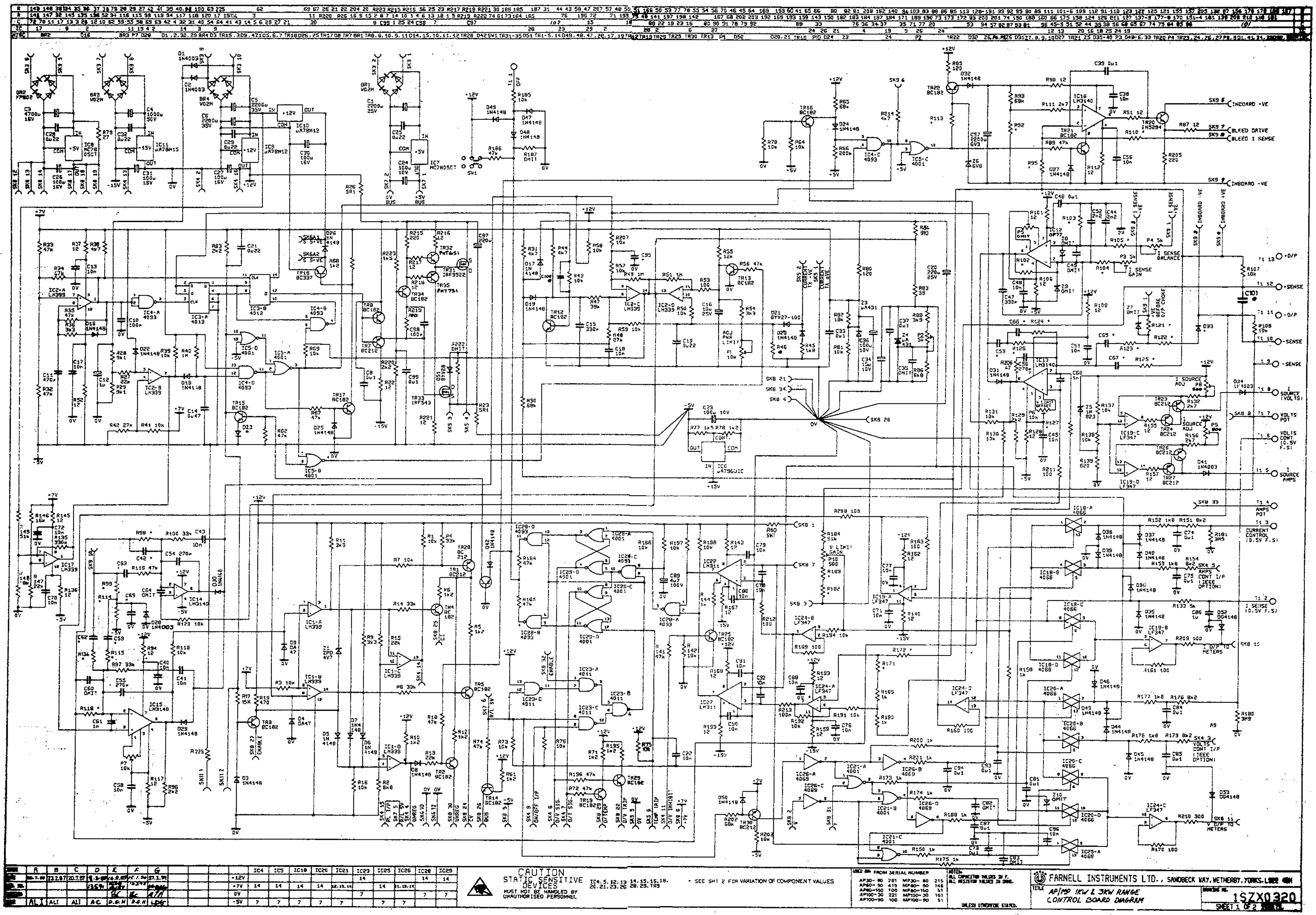
Wayne Kerr Electronics Ltd.
DURBAN ROAD, BOGNOR REGIS, WEST SUSSEX PO22 9RL

TITLE
AP/MP 1kW AND 3kW RANGE
CONTROL BOARD DIAGRAM

DRAWING NO.
3SZX0320

SHEET 2 OF 2 SHEETS


MAINS ON OFF
L
MAINS INPUT
N
INPUT FILTER RFI TX301/302 C301-313
SOFT START RESISTOR
R301
BRIDGE/DOUBLER BR301 & RESERVOIR CAPS C401/402
DC LINE
+
-
FAN
240
115
115
TX401, BR1,2,3,4 AUXILIARY SUPPLIES IC9,8, 11
+12+5-15
12V UNREG
100Hz PULSES
AC DROPOUT IC2 B LO BIAS IC17 DETECTOR & SLOW START
SOFT START RELAY DRIVE TR18
IC2a OSCILLATOR 25KHz 14:1 MARK SPACE
CLK IC3B FF CLEAR D
IC3A FF CLK D
RESET SECONDARY RAMP
IC4B
DRIVE TR6-11
DRIVE TX TX402
TR1a-
TR3a
TR1b-
TR3b
FLYBACK DIODES D1b
D1a
SNUB
R4a R5a C2b
INVERTER TX404
SNUB
OUTPUT DIODE(S)
OUTPUT CHOKE TX405
OUTPUT CAPS.
CURRENT TX TX403
COMMON MODE CHOKE TX406
OUTPUT CAPS.
CURRENT SENSE Rs
REVERSE POLARITY DIODE
DYNAMIC BLEED TR401
D402
C408
C409
+BUS BAR
DC OUTPUT
-BUS BAR
COMMON MODE BRIDGE
FROM LED & BLEED LOGIC
D21
IC2d I/P LIMIT
+7V
P1
R46
POWER LIMIT DELAY &POWER LIMIT TR13,C16
SET PWR LIMIT
IC12
Vα 1
5V≡50A O/P (AP60-50)
5V≡80A O/P (AP30-80)
5V≡30A O/P (AP100-30)
CONTROL AMPLIFIERS
+7V
R58
IC14 I ABS
P2
SET ABSOLUTE I LIMIT
D30
TO 0V TRIPS
SENSE VOLTS
5V ≡ 60V (AP60-50)
5V ≡ 30V (AP30-80)
5V ≡ 100V (AP100-30)
R107
R108
+OUT SENSE
-OUT SENSE
COM
IC15 I
D29
IC13 V
D31
SECONDARY RAMP GEN & RAMP PROCESSING
IC5A, IC4B LO TO INHIBIT
REMOTE ENABLE (BARRIER STRIP)
R68
IC2C
CONTROL COMPARATORS
CONTROL VOLTAGE
CURRENT SOURCE IC19C TR23/24
FRONT PANEL VOLTS
P3
VOLTS
IC29C/D LATCH
OVERTEMP TRIPS FROM FETa,b ASSYS, DIODE ASSY
CURRENT SOURCE IC19D TR25/7
FRONT PANEL CURRENT
P8
AMPS
IC20A/B
IEEE BUS INPUT
FRONT PANEL ENABLE
IEEE BUS ENABLE
IC23A/B/C/D
IC29A/B LATCH
ABSOLUTE
Vα O/P VOLTS
IC2A R171/2 R189/90/91
+O/P
-O/P
PRESET V LIMIT
REF VOLTAGE LOOP
IC18A/B
IEEE BUS INPUT
I MON
TO REMOTE ENABLE
OVERVOLTAGE TRIPS
MANUAL
+12V
SENSE VOLTS
FRONT PANEL SET OVL P4
IEEE INHIBIT OF F/P OVL
OSC INHIBIT
C1
CV
LED & DYNAMIC BLEED LOGIC
TO DYNAMIC BLEED
OVL OT
LED DRIVE
SIGNALS TO BUS BOARD
ACTUAL VOLTS
DISPLAY OVL
IC20 C/D IC25A
PROSPECTIVE VOLTS
VOLTMETER & BARGRAPH
SIGNALS TO BUS BOARD
CV C1
OUTPUT ENABLED
OUTPUT UNREG
ACTUAL CURRENT
PROSPECTIVE CURRENT
IC18 C/D
AMMETER & BARGRAPH
FARNELL INSTRUMENTS LTD.
AP SERIES SCHEMATIC
DIAGRAM 2ZW0993210
DRN
ISS
DATE
MOD
A
16-8-84
-
B
17.1.85
-
CKD
21-8-84


CAUTION
STATIC SENSITIVE DEVICES
MUST NOT BE HANDLED BY UNAUTHORISED PERSONNEL
IC4.5.12.13.14.15.16.18.20.21.23.26.28.29.TR9
* SEE SHT 2 FOR VARIATION OF COMPONENT VALUES
ALL CAPACITOR VALUES IN F.
ALL RESISTOR VALUES IN OHMS.
UNLESS OTHERWISE STATED.
FARNELL INSTRUMENTS LTD., SANDBECK WAY, WETHERBY, YORKS.
AP/MP 1KW & 3KW RANGE
CONTROL BOARD DIAGRAM
1SZX0320
SHEET 1 OF 2

AP CONTROL BOARD VARIATION TABLE

AP/MP	R46	R92	R95	R98	R99	R102	R103	R104	R105	R110	R113	R114	R115	R116	R121	R122	R123	R124	R125	R126
30-80	3R9	1k8	OMIT	100k	2V7	82k	82k	5k6	5k6	2k7	220	10k	12k	68k	2V7	5k1	10k	OMIT	OMIT	39k
30-300	1R2	1k8	OMIT	100k	2V7	82k	82k	5k6	5k6	2k7	220	10k	12k	68k	2V7	5k1	10k	OMIT	OMIT	39k
100-30	3R9	2k4	100k	470k	LINK	80k	80k	6k2	6k2	150	1k2	OMIT	100k	390k	100k	8k2	39k	27k	OMIT	2M2
100-90	1R2	2k4	100k	470k	LINK	80k	80k	6k2	6k2	150	1k2	OMIT	100k	390k	27k	8k2	39k	27k	18k	2M2
60-50	3R9	1k2	OMIT	330k	15k	80k	80k	6k2	6k2	2k7	1k2	8k2	1k5	68k	2k2	5k6	10k	18k	10k	2M2
60-150	1R2	1k2	2M2	100k	15k	80k	80k	6k2	6k2	150	1k2	8k2	1k5	68k	2k2	5k6	10k	18k	10k	2M2

AP/MP	R127	R134	R171	R172	R182	R183	D23	D33	C42	C53	C59	C62	C63	C65	C66	C67	C69	C95	C101	C102
30-80	39k	22k	2k7	33k	8k2	1k8	LINK	5k1	OMIT	33n	0u1	4n7	2n2	0u1	OMIT	OMIT	OMIT	1n5	OMIT	OMIT
30-300	39k	22k	2k7	33k	8k2	1k8	LINK	5k1	OMIT	33n	0u1	4n7	2n2	0u1	OMIT	OMIT	OMIT	1n5	OMIT	OMIT
100-30	200k	56k	820	33k	2k4	47	LINK	8k2	OMIT	4n7	1n5	10n	3n3	22n	0u1	OMIT	OMIT	1n5	OMIT	OMIT
100-90	39k	56k	820	33k	2k4	47	LINK	8k2	OMIT	10n	1n5	10n	3n3	22n	0u1	2n2	OMIT	1n5	u47	10n
60-50	39k	47k	2k	51k	4k3	68	1N 4148	D6 4148	OMIT	4n7	0u1	4n7	2n2	10n	22n	4n7	0u22	10n	OMIT	OMIT
60-150	39k	8k2	2k	51k	4k3	68	1N 4148	D6 4148	2n2	22n	0u1	4n7	2n2	10n	22n	4n7	0u22	2n2	0u1	10n

ISS	C	D	E	F	G				
DATE	8.3.89	15.8.89	12.1.90	5.3.90	28.2.91				
REQ. NO.	13591	14211	14372	14325	14866				
CHK'D									
NAME	AC	D.G.H	D.G.H	L.A.S	LDG				

USED ON: FROM SERIAL NUMBER

AP30- 80	261	MP30- 80	215
AP60- 50	415	MP60- 50	146
AP60-150	100	MP60-150	51
AP100- 30	221	MP100- 30	151
AP100- 90	100	MP100- 90	51

NOTES:
ALL CAPACITOR VALUES IN F.
ALL RESISTOR VALUES IN OHMS.

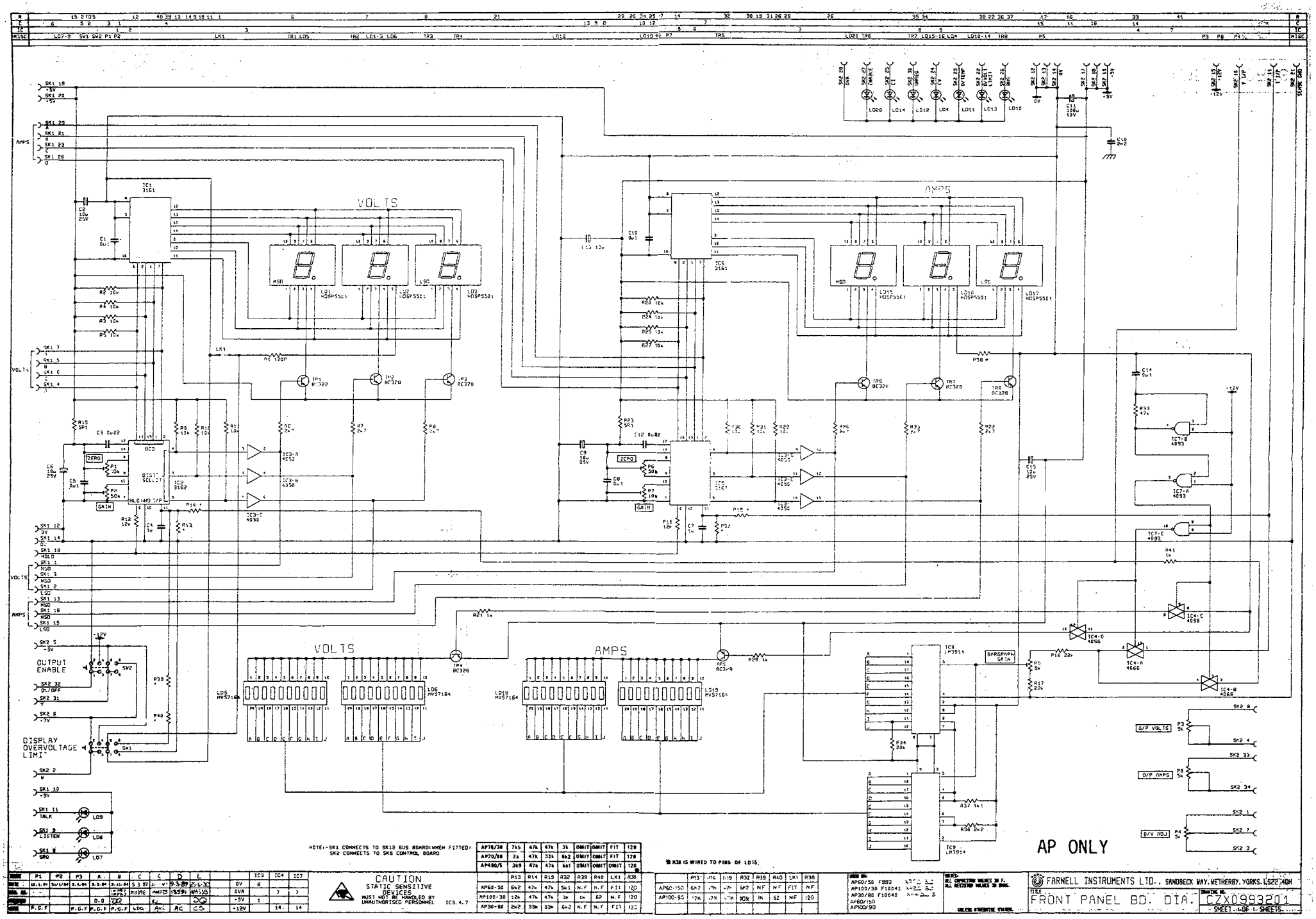
UNLESS OTHERWISE STATED

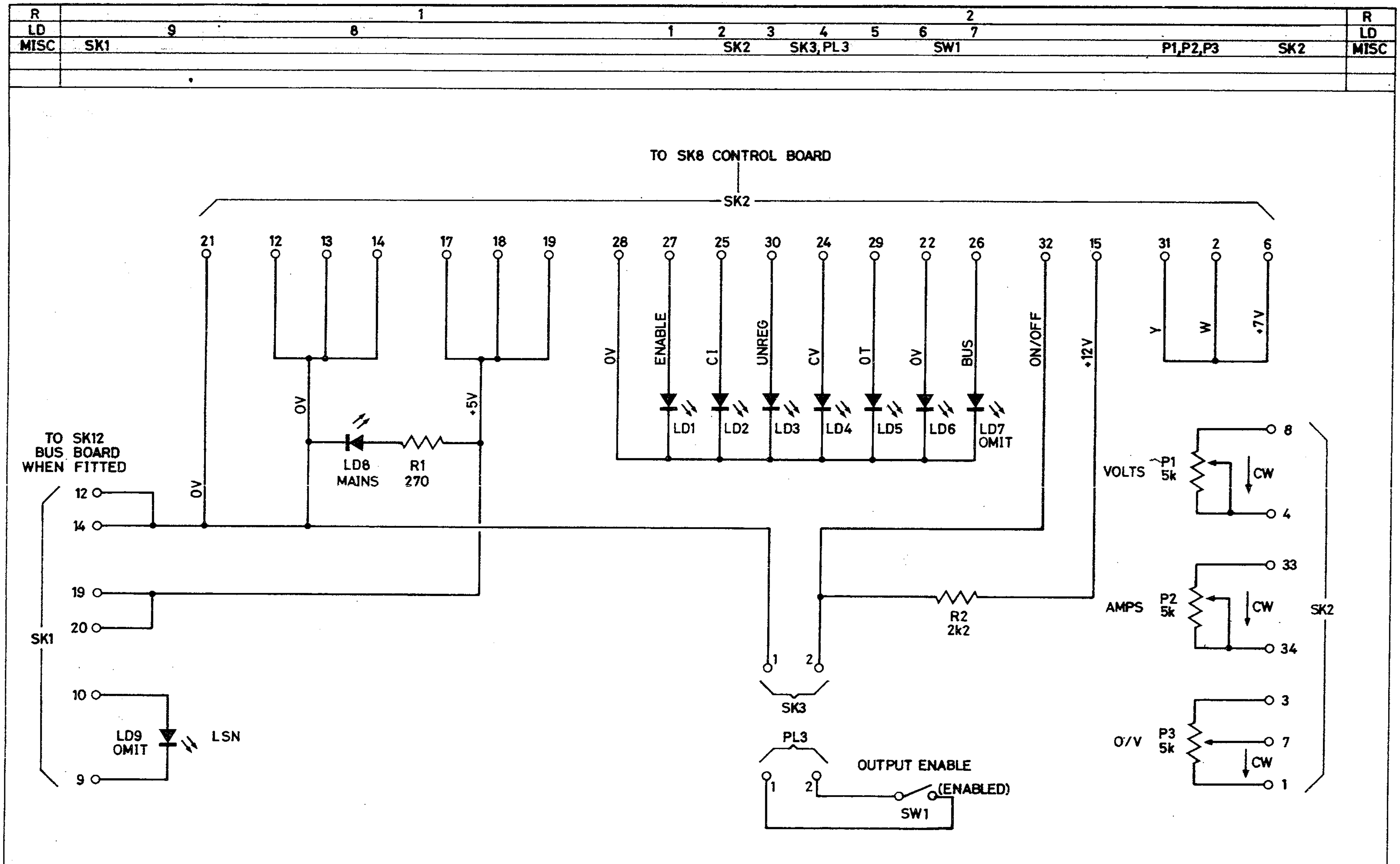
FARNELL INSTRUMENTS LTD., SANDBECK WAY, WETHERBY, YORKS. LS22 4DH

TITLE: AP/MP 1kW AND 3kW RANGE CONTROL BOARD DIAGRAM

DRAWING NO. 3SZX0320

SHEET 2OF 2 SHEETS


VOLTS
AMPS
OUTPUT ENABLE
DISPLAY OVERVOLTAGE LIMIT
AP ONLY
CAUTION
STATIC SENSITIVE DEVICES
MUST NOT BE HANDLED BY UNAUTHORISED PERSONNEL
FARNELL INSTRUMENTS LTD., SANDBECK WAY, WETHERBY, YORKS, LS22 4DH
FRONT PANEL BD. DIA.
CZX0993201



TRACED	ISS.	DATE	MOD. No.	ISS.	DATE	MOD. No.	USED ON:	NOTE:
	A	23/8/85	~				M.P. SERIES F1019/0	CAPACITOR VALUES GIVEN IN F.
CHECKED DR	B	25/11/85	~					RESISTOR VALUES IN Ω
DRAWN SEC.								UNLESS OTHERWISE STATED.

FARNELL INSTRUMENTS LTD. WETHERBY, YORKS.

TITLE **FRONT PANEL CIRCUIT DIAGRAM**

DRAWING No. 3ZX10190200

SHEET 1 OF 1 SHEETS

F1CD3

AARQUE 9256/84