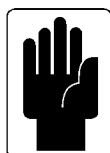


CPS 800

Console Power Supply

USER AND TECHNICAL MANUAL

For your own safety and to avoid invalidation of the warranty all text marked with these Symbols should be read carefully.



IMPORTANT: please read this manual carefully before connecting your Soundcraft console power supply to the mains for the first time.



This equipment complies
with the EMC Directive
89/336/EEC

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Part No. ZM0225
Issue I

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It is recommended that all maintenance and service on the product should be carried out by Soundcraft or its authorised agents. Soundcraft cannot accept any liability whatsoever for any loss or damage caused by service, maintenance or repair by unauthorised personnel.



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IMPORTANT SAFETY INSTRUCTIONS



AVIS: RISQUE DE CHOC ELECTRIQUE
- NE PAS OUVRIR

For your own safety and to avoid invalidation of the warranty please read this section carefully.

Read all of these instructions and save them for future reference. Follow all warnings and instructions marked on the unit.

- Do not place the unit on an unstable surface or near a radiator or heat source. Do not block or cover the openings of the unit. Do not insert objects through any apertures.
- Use only the type of power source indicated on the unit's rear panel.
- Connect all equipment to properly grounded power outlets. Avoid using outlets on the same circuit as air control systems or other equipment that regularly switches on and off.
- Do not use a damaged or frayed power cord. Protect the power cord from being walked on or pinched particularly at connectors and power outlets.
- Unplug the unit before cleaning. Clean with a damp cloth only. Do not spill liquid on the unit.
- Only use attachments/accessories specified by Soundcraft or authorised Soundcraft dealers.
- Unplug the unit during lightning storms or when unused for long periods of time.
- Unplug the unit and refer servicing to qualified service personnel under the following conditions:
If the power cord or plug is damaged; if liquid has entered the unit; if the unit has been dropped or the case damaged; if the unit does not operate normally or exhibits a distinct change in performance. Adjust only those controls that are covered by the operating instructions.
- **USA and Canada only:** Do not defeat the safety purpose of the polarised or grounding-type plug. A polarised plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wider blade or the third prong are provided for your safety. When the plug provided does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.

SAFETY INFORMATION

Warnings, Cautions and Notes



WARNINGS must be followed carefully to avoid bodily injury.



CAUTIONS must be observed to avoid damage to your equipment.

NOTES contain important information and useful tips on the operation of your PSU.

WARNING:
THIS UNIT MUST BE EARTHED
Under no circumstances should the mains earth be disconnected from the mains lead.

The wires in the mains lead are coloured in accordance with the following code:

Earth: Green and Yellow (Green/Yellow - US)

Neutral: Blue (White - US)

Live: Brown (Black - US)

As the colours of the wires in the mains lead may not correspond with the coloured markings identifying the terminals in your plug, proceed as follows:

- The wire which is coloured Green and Yellow must be connected to the terminal in the plug which is marked with the letter E or by the earth symbol.
- The wire which is coloured Blue must be connected to the terminal in the plug which is marked with the letter N.
- The wire which is coloured Brown must be connected to the terminal in the plug which is marked with the letter L.

Ensure that these colour codings are followed carefully in the event of the plug being changed.

This unit is capable of operating over a range of mains voltages as marked on the rear panel. It is important to ensure that the correct mains fuse is fitted before switching on the unit.



To avoid the risk of fire, replace the mains fuse only with the correct value fuse, as marked on the rear panel.



The unit contains no user serviceable parts. Refer all servicing to a qualified service engineer, through the appropriate Soundcraft dealer.

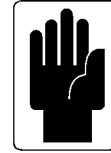
CPS 800

1

Introduction

Introduction

WARNING: THIS APPARATUS MUST BE EARTHED



The CPS800 is a linear power supply which, like other linear supplies, produce DC voltages by rectifying, smoothing and regulating AC voltages from the secondary windings of a mains transformer.

Soundcraft mixing consoles employ a number of dc voltage supply levels in their operation and these are all provided at the output of each supply unit.

The CPS800 also has the capability of being linked to a second CPS800 to provide automatic power backup in the event of one of the units failing.

In regulating these voltages there is considerable heat generated, the dissipation of which is achieved through a substantial internal heat sink. A fan is incorporated which draws air over the heatsinks to provide adequate heat dissipation for the regulators and reduce the outer case temperature.

The CPS800 is designed for installation in a 19" rack unit, occupying 3U of rack height. Refer to the section "RECOMMENDATIONS FOR INSTALLATION" on Page 2.2.

LED indication is provided on the front panel to show operation of the regulating circuits.

SHORT-CIRCUIT PROTECTION

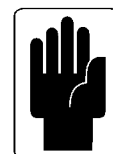
The +/-17V rails will current-limit when faced with a short to ground or each other for up to one second; if the short circuit remains for longer than one second then both of the 17V rails will be shut down. To reset them the supply must be switched off and then switched on again.

The +8V and +48V are current limited and will self recover when any short circuit is removed.

MAINS VOLTAGE SELECTION

Special attention should be paid to the following information:

Do not change the voltage setting without first turning the unit off and unplugging the mains lead.



This unit is capable of operating over a range of mains voltages by means of a 4-position mains input fuse carrier. It is important to ensure that the correct voltage setting is selected for the level of local mains voltage supply, for safe, uninterrupted operation of the unit.

Voltage selection is achieved by positioning the fuse carrier so that the required voltage appears next to the arrow which is moulded in the connector. In this way the unit is set up for operation at one of the following ranges of mains supply:

NOMINAL VOLTAGE

Vrms AC

230

115

100

85

OPERATING VOLTAGE RANGE

(+10/-15%)

Vrms AC

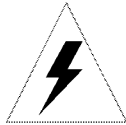
196 - 253

98 - 126

85 - 110

73 - 93

To remove the fuse use a small screwdriver to prise the fuse carrier from its location in the connector.



To avoid risk of fire use the correct value fuse, as indicated on the unit.

REPLACING MAINS FUSE

Switch the ON/OFF switch to the OFF position. Remove the mains lead from the connector. Use a small screwdriver to prise the fuse carrier from its location in the connector. Check the fuse and replace if necessary; also check that the voltage selection is correct for the mains supply level before switching the unit ON again.

If the mains fuse fails repeatedly this may be because an electrical safety hazard exists. The unit must be taken out of service and referred the Soundcraft dealer from the equipment was purchased.



This unit contains no user serviceable parts. Refer all servicing to a qualified service engineer, through the appropriate Soundcraft dealer.

Warranty



1 **Soundcraft** is a trading division of Harman International Industries Ltd .

End User means the person who first puts the equipment into regular operation.

Dealer means the person other than Soundcraft (if any) from whom the End User purchased the Equipment, provided such a person is authorised for this purpose by Soundcraft or its accredited Distributor.

Equipment means the equipment supplied with this manual.

- 2 If within the period of twelve months from the date of delivery of the Equipment to the End User it shall prove defective by reason only of faulty materials and/or workmanship to such an extent that the effectiveness and/or usability thereof is materially affected the Equipment or the defective component should be returned to the Dealer or to Soundcraft and subject to the following conditions the Dealer or Soundcraft will repair or replace the defective components. Any components replaced will become the property of Soundcraft.
- 3 Any Equipment or component returned will be at the risk of the End User whilst in transit (both to and from the Dealer or Soundcraft) and postage must be prepaid.
- 4 This warranty shall only be available if:
 - a) the Equipment has been properly installed in accordance with instructions contained in Soundcraft's manual; and
 - b) the End User has notified Soundcraft or the Dealer within 14 days of the defect appearing; and
 - c) no persons other than authorised representatives of Soundcraft or the Dealer have effected any replacement of parts maintenance adjustments or repairs to the Equipment; and
 - d) the End User has used the Equipment only for such purposes as Soundcraft recommends, with only such operating supplies as meet Soundcraft's specifications and otherwise in all respects in accordance Soundcraft's recommendations.
- 5 Defects arising as a result of the following are not covered by this Warranty: faulty or negligent handling, chemical or electro-chemical or electrical influences, accidental damage, Acts of God, neglect, deficiency in electrical power, air-conditioning or humidity control.
- 6 The benefit of this Warranty may not be assigned by the End User.
- 7 End Users who are consumers should note their rights under this Warranty are in addition to and do not affect any other rights to which they may be entitled against the seller of the Equipment.

CPS 800

2

Recommendations for Installation

Recommendations for Installation

The CPS800 power supply is provided with front panel fixing holes for 19" rack-mounting and will occupy 3U of rack space.

As with any power supply that contains a large mains-voltage transformer, it is preferable to provide a degree of physical isolation of the unit from other electronic equipment, particularly that which carries low level audio signals, to avoid any possible hum pick-up. For this reason the unit is used with a long (7 meters) output cable to enable it to be positioned away from the mixing console.

For the same reason, when rack-mounting it is preferable to avoid locating the unit adjacent to signal processing equipment.

It should be noted that if a complete rack containing a CPS800 unit is to be operated from a different mains supply level, then the unit should be withdrawn from the rack in order to reselect the mains voltage setting, at the same time as resetting any other equipment.

The other important consideration when rack-mounting the unit is the need for natural convection of air over the case and an unrestricted air flow through the unit. Note that air is drawn in at the front and back of the unit and expelled through the front panel.

Good ventilation BELOW the unit, in the floor or back of the rack, and similarly ABOVE the unit, at the top of the rack, will ensure a path for continuous air flow.

Other equipment in the rack which is known NOT to produce a significant amount of heat should be mounted BELOW the unit. Equipment that also relies on good air flow within the rack (ie. most power amplifiers and other power supplies) should be given due consideration and some space should be provided between such units and between these and the CPS800 unit. Forced convection, by means of a fan-tray, may be desirable in this situation.

The CPS800 will operate as a free-standing unit without requiring any special cooling arrangement, but should not be allowed to be accidentally or deliberately covered over in any way.



Do not operate the unit with the top cover removed.



The air intake and outflow holes must be inspected regularly and cleaned if necessary to maintain good airflow through the unit. This will be particularly important if the unit is used in a dusty environment.



System grounding. This is a complex subject and only brief guidance is given here. The CPS800 and the console it supplies must be grounded, and it is therefore usual to make the console the central grounding point for the whole audio system. This needs to be planned so that the ground loops are either avoided or rendered innocuous.

External processors are often double-insulated (ie their signal ground and the chassis need to be connected to mains ground for electrical safety) in which case no problem arises. Other external equipment may have to be grounded, and the balanced inputs and output on the console used to cancel out the hum generated by any ground -loops so created. Soundcraft console use special grounding techniques so that even severe ground-loops cannot cause noise or hum inside the console itself.

It should never be necessary to "lift the ground" on a properly installed system, and the user is strongly discouraged from doing so. Metalwork that is not grounded presents a safety hazard if a live mains connection comes into contact with it.



W A R N I N G : THIS APPARATUS MUST BE EARTHED.
**Under no circumstances should the mains earth be disconnected
from the CPS800 power supply unit.**

General

As with all electrical/electronic equipment care should be taken when handling this unit. Avoid general mishandling and do not drop. Avoid storage and operation in dusty locations and do not expose to corrosive atmospheres.



To avoid risk of fire do not expose this unit to rain or moisture.

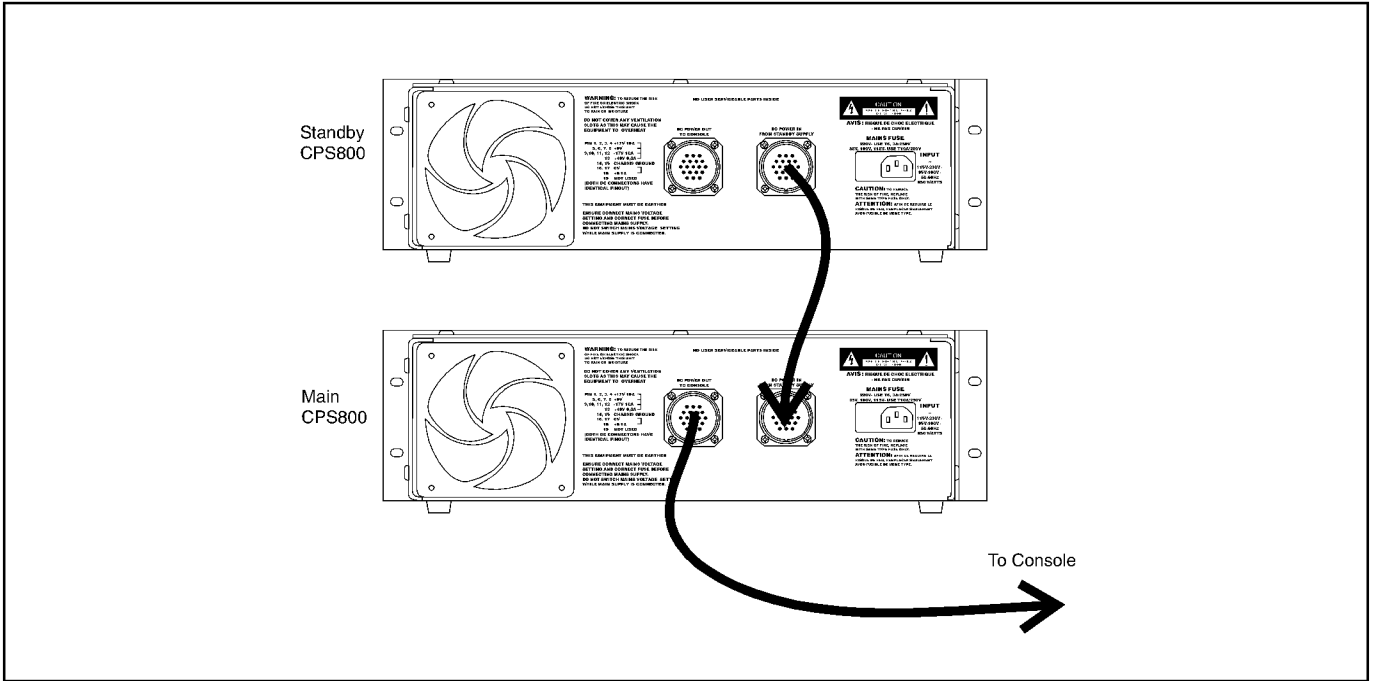
Retain all packaging for transportation in the event of the unit requiring servicing. Retain this manual safely, along with all other relevant documents.

For touring/mobile transportation it is advisable to install the CPS800 in a flight case to provide mechanical protection. Refer to your Soundcraft dealer for a suitable case. Where the CPS800 is enclosed in a touring case, provision must be made for adequate ventilation to the rear of the unit to ensure unrestricted supply of air for the cooling fan.

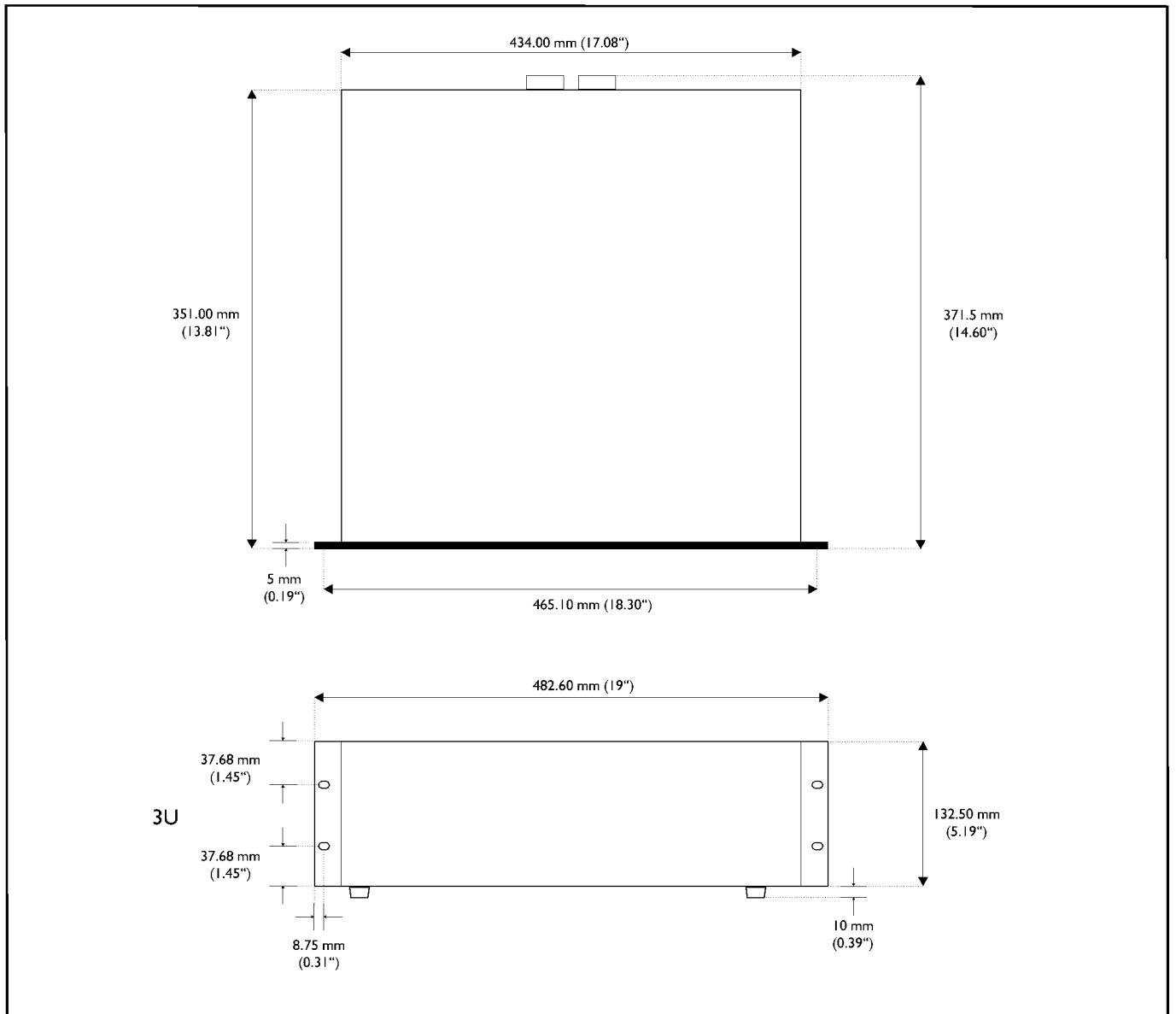


**Use only the high-current mains lead supplied, not the more
common 5A type supplied with other equipment.**

PSU Linking



Dimensions



CPS 800

3

Technical Specifications

Technical Specification

Outputs:

+/-17V	11 Amps.
+8V	1 Amp.
+48V	0.5 Amp.

Voltages are measured at console end of DC cable.

DC connectors: 2 Socapex on rear.

Noise and ripple:

+/-17V	Less than 1mV
+8V	Less than 1mV
+48V	Less than 1mV

Mains voltage taps (nominal)

85, 100, 115, 230V AC

Mains voltage range +10% to -15% of nominal at full load.

Mains-low LED (red) illuminates when mains voltage falls to within 3% of dropout point.

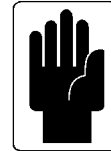
Input mains power:

650 Watts max.

Mains fuse: T6.3A/250 230VAP

T16A/250V 85,110, 115VAP

All voltage and current measurements are to be taken at the console-end of the power supply cable.



Protection:

All rails protected against indefinite short-circuit

Temperature

All rails protected against excess temperature. Thermal shutdown LED. (Red) Indicates +/-17V shutdown; stays on until PSU reset.

Operating temperature range:

-10 to +40 degC

Operating humidity range:

0 - 90% RH non-condensing.

Cooling: Forced-air with thermostatically controlled fan. Air enters cooling system via two 85mm filters on front and one 120mm filter at rear.

Case dimensions:

Standard 19-inch rack, 3U high.	
Height (excl feet)	132 mm (4.3ft)
Width	434 mm (14.2ft) (482 mm over mounting ears)
Depth	372 mm overall (12.2ft)

Weight (excl packing)

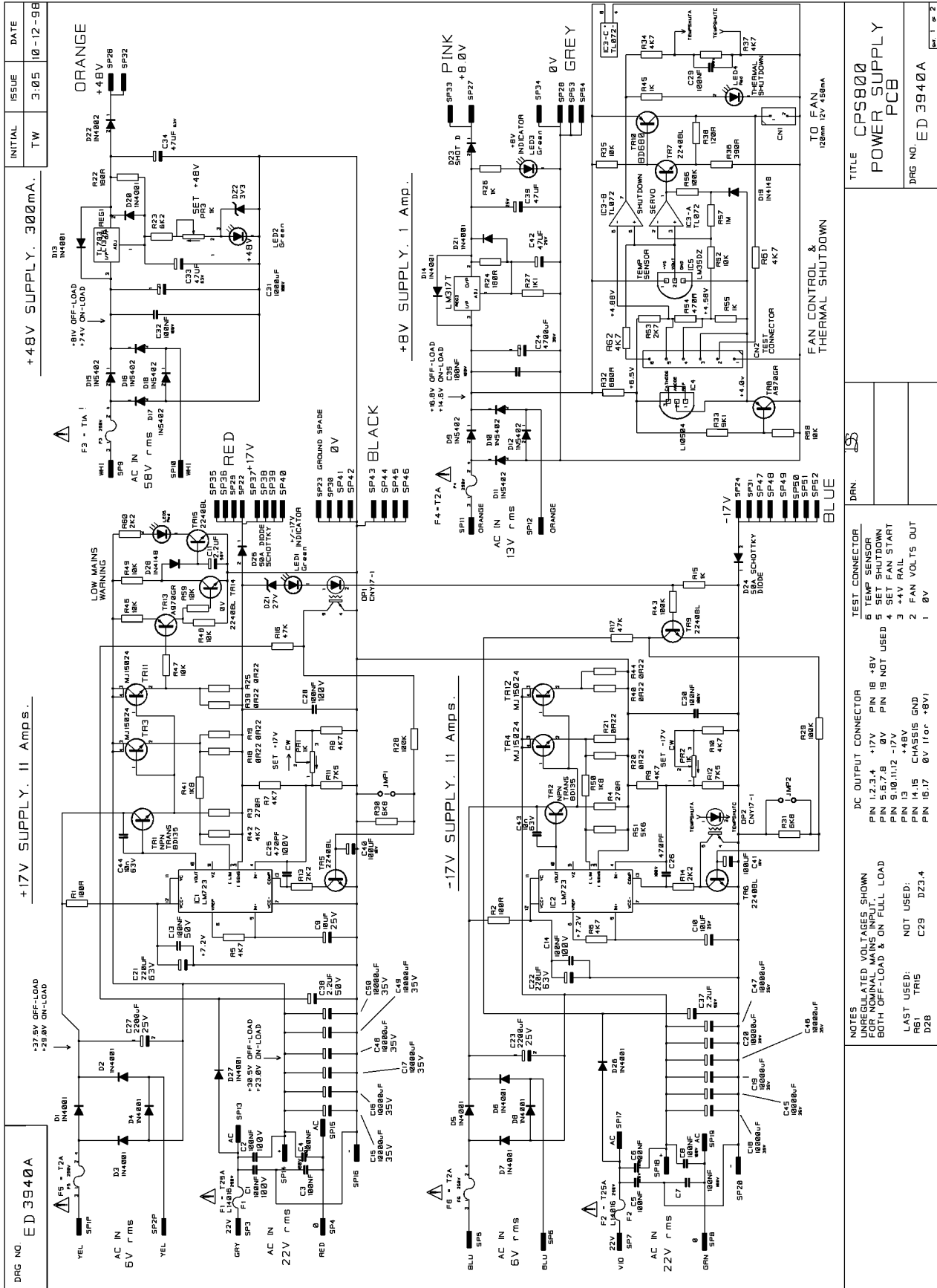
16 kgs approx.

CPS 800

4

Technical Description

Circuit Diagram



Circuit Description

THE +/- 17V RAILS.

This consists of two identical +17V supplies connected together to give +/-17V. The supply is described as “17V” because this is the voltage required at the end of the DC cable. Allowing for this and the load-dependant voltage-drop of the redundancy diodes means the actual supply voltage at the DC output socket is approx 17.8V. Each 17V supply is a linear regulator with conventional fullwave rectification and 60,000uF reservoir capacitors. This is combined with a second power supply that sits on top to power the driver transistors and the control IC; this reduces the minimum voltage drop across the series-pass device and so improves efficiency. The main series-pass elements for each rail are a pair of 250W discrete bipolar transistors mounted on a fan-cooled heatsink. The voltage reference and servo control amplifier are provided by a 723 regulator IC. The circuitry of the +17V regulator is described in detail below:

The +17V Supply.

The transformer secondary is fused by F1. Secondary fuses will normally only blow in the event of serious failure, such as a major short in the AC wiring or a failed bridge rectifier. The fullwave bridge rectifier is mounted on the heatsink, at the hottest end as it is the most heat-tolerant of the semiconductors. The unregulated DC voltage is approx +23 to +30V at nominal mains voltage, depending on the current drawn.

The 723 IC contains a 7.2V nominal Zener diode, defining the voltage that appears at Pin 6. R5 is in series with the positive input of the servo opamp (Pin 5) and is made roughly equal in resistance to the feedback divider R7,R11 etc to minimise bias-current offsets. C9 filters out Zener noise. The feedback divider R7,8,11, & PR1 derives a fraction of the output voltage and delivers it to the negative input of the servo opamp. (Pin 4) The negative feedback keeps this point also at 7.2V, so the actual output voltage is determined by the feedback divider ratio, which is trimmed over a narrow range by PR1. The output of the 723 servo opamp controls the output through TR1, an emitter follower driving the series-pass devices TR3,TR11. The power supply to TR1 is taken from the +12V supply developed across C27. This has its 0V side connected to the positive unregulated DC supply, which is 26 - 29V, (at nominal mains) giving a total voltage of approx 38 - 41V to power the driver; this also powers the 723 IC via R1. This subrail markedly reduces the minimum drop across the pass elements and therefore increases the efficiency. Output indicator LED1 is run at 7mA. The 50 Amp Schottky diode D25 on the output allows supplies to be paralleled for redundancy.

Overcurrent Protection.

The power supply is protected against short-circuits and overload by a dual-mode protection system; brief overloads are dealt with by constant-current protection, while prolonged overload causes both 17V rails to shut down. Reset is then by turning the mains power off briefly; one second is usually sufficient.

The constant-current protection system works in the standard way; when an attempt is made to draw excessive current, the output voltage is reduced so that no more than a fixed maximum can be drawn. However, the high current capability of this PSU means that long-term constant-current protection alone is not practical as the dissipation in the pass devices is too high for the cooling system to deal with, and in time they will overheat. The constant-current system measures the output current by sensing the voltage drop across parallel resistors R18,R19. When it reaches approx 0.60 V the internal protection transistor in IC1 is turned on via R41, and the output voltage on pin 10 is pulled down to limit the current supplied.

If this condition persists for longer than one second, then both rails of the +/-17V supply are shut down by the Mutual Shutdown System, described below.

The Mutual Shutdown System.

Equipment containing some kinds of op-amp is vulnerable to damage when only one of the +/-17V rails fails, as in this case excessive supply currents can be drawn, damaging fuse resistors on the modules.

When both 17V supplies are working normally, DZ1 is conducting, and LED1 is on. Opto-coupler OP1 has its photo-transistor conducting. Therefore TR5 does not conduct, and the +17V supply works normally. Similarly in the -17V supply, TR9 is conducting so TR6 remains off. If either of the 17V rails collapses, there is no longer enough voltage to keep DZ1 conducting, and OP1 and TR9 switch off. TR5 is now turned on by R16, with R28,30 and C40 providing a time-delay to prevent spurious operation on transients, or brief overloads which are dealt with by the constant-current protection system. TR5 now pulls down an internal node of IC1 via pin 13, and the +17V supply is shut down. When TR9 turns off, TR6 is turned on via R17,29,31, and pulls down an internal node of IC2 via pin 13, and the -17V supply is shut down. C41 provides the brief time-delay. The shutdown system generates its own supply rails using D27,C38, and D26,C37. The capacitors are proportioned so that these rails collapse very quickly (in less than a second) when mains power is removed. It is therefore only necessary to switch the supply off very briefly to reset it. There is no need to wait for the main reservoir capacitors to discharge.

Note that the LOW MAINS LED does not operate if the +/-17V supplies are shut down.

Low mains indicator.

The front panel carries a red LED which illuminates when mains voltage falls to within approx 3% of the dropout point. This works by measuring the voltage across the +17V pass transistors. When this falls below 600 mV (actual failure of regulation occurs at approx 300 mV) then TR13 turns off, turning TR14 off. This normally occurs in brief pulses, due to the 100 Hz ripple on TR11 collector. C11 then charges rapidly through R49 and D28, turning on TR15 and lighting LED5. C11 provides a fast-attack,slow-decay characteristic that holds TR15 on even for brief pulses. If the mains voltage does fall below the dropout point, the CPS800 does not allow the full ripple voltage through to the output. The +/-17V supplies fall in an orderly manner, showing approx 25mV rms of ripple.

If the mains voltage is well below the dropout point (more than 20% below nominal) when the supply is switched on, the +/-17V supplies will refuse to start.

The -17V Supply.

This is identical in operation to the +17V section described above.

The +48V Supply.

Max current rating is 0.5 Amps. The +48V phantom supply is based on the special high-voltage regulator TL783C. (REG1) The AC input is fused by F3 and fullwave rectified by D15-18; C31 is the reservoir capacitor. C32 ensures HF stability of REG1.

The TL783C maintains a fixed 1.27 V between its ADJ and OUT pins, so the adjustable voltage-divider R22-PR3-R23-LED2 gives an output of approx 48V. This can be adjusted by PR3. C33 minimises output ripple. Two protection diodes are included. D13 protects the regulator from reverse voltage if there is a charged capacitor across the output but the voltage on C31 has collapsed. Conventional diode D22 on the output allows supplies to be paralleled for redundancy.

Output indicator LED2 is run at 7mA, using the current drawn through the voltage adjustment divider to save power. The LED is in a vulnerable position on the edge of the PCB, and if one of its leads became broken, the +48v would rise uncontrollably. This is prevented by DZ2, which prevents the LED voltage drop of 2.0V from increasing beyond 3.3V. Output voltage will rise to approx +49.3V but this is of no significance.

The +8V Supply

Max current rating 1.0 Amps. This supply is primarily intended for powering console internal computers; the unregulated side also powers the PSU cooling fan.

The AC input is fused by F4 and fullwave rectified by D9-I2, with C24 as the reservoir capacitor. The LM317T regulator maintains 1.25V between OUTPUT and GND pins, so R24,27 give a fixed 8.7V which is 8.1V at the output after D23. C35 ensures regulator HF stability, while C42 reduces ripple output. Two protection diodes are included; D14 protects the regulator from reverse voltage if there is a charged capacitor across the output but the voltage on C24 has collapsed. D21 prevents the GND pin from rising above the OUT pin (due to the charge on C42) if the output is shorted. Output indicator LED3 is run at 7mA. Schottky diode D23 on the output allows supplies to be paralleled for redundancy.

Fan Control Servo.

The CPS800 is fitted with a fan control servo that adapts the fan speed to the power drawn. This gives a substantial reduction in fan noise under almost all circumstances. (The exception being 10% high mains and maximum current drawn, which naturally sets the fan to full speed)

The servo circuit consists of opamp IC3-A, temperature sensor IC5, shunt regulator IC4, and fan control devices TR7,TR10. IC4 maintains 2.50V between its "anode" and "cathode"; this is the precise voltage that drives the reference chain R53,54,55. TR8 also uses this voltage to set its emitter at 4.0V above ground; this keeps IC3's inputs within their common-mode range. Thus both ends of the voltage divider R53-R54-R55 are fixed at defined voltages.

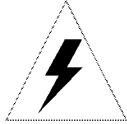
LM35DZ temperature sensor IC5 outputs 10mV per degreeC above freezing point (0 degC) and applies it to IC3-A non-inverting input. The desired heatsink temperature is set at the junction of R54,55, which sits at +4.58V approx. This is 580mV above the +4.0V rail, and so represents 58 degC. R52,57 set the servo loop gain. This is designed to be safely below the level at which slow thermal oscillations would occur. R56,D19 increase the open-loop gain when IC3-A output is below 4V. This prevents the fan sitting for long periods in a not-quite- running state where it consumes current but does not rotate. The voltage range 1-4V where this occurs is therefore skipped over quickly. The fan is driven through feedback amplifier TR7, I0, which has a voltage gain of 1.3 times. This allows the fan to be driven over its full operating voltage range despite the output saturation limits of IC3-A. This gives improved cooling at high temperatures and mains voltages.

Thermal shutdown is implemented by IC3-B. Its output is normally low, but when the output from IC5 exceeds the voltage set at the junction of R53,54, (+4.88V) it goes high, energising opto- coupler OP2 via R34. This shuts down the -17V LM723 IC2 by pulling down the internal node at pin 13, and the mutual shutdown system also closes down the +17V rail. The +4.88V sets a shutdown point at a heatsink flange temperature of 88 degC. High temperature is indicated by LED4. Note that this goes out when the power supply cools down to operating temperature, but the supply remains shutdown until the mains power is cycled off and on. Even if the PSU is at working temperature and the front air exit grille is completely blocked, the PSU may not shut-down, because of its large reserve of cooling capacity. Complete fan failure will cause shutdown approx 15 minutes later.

SAFETY



These safety notes are directed to those testing and repairing this power supply. This supply contains mains voltages on the mains I/P socket, the mains switch, etc, and the usual precautions must be taken. The main reservoir capacitors have a capacity of 60,000 uF, and are charged to +30V.



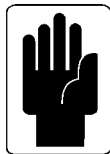
THIS CAN BE DANGEROUS.

The danger lies not in the voltage, but in the large currents that will flow if the capacitor terminals are shorted. A small screwdriver will simply disappear in a violent explosion. The main bodily danger is from metal watchstraps, etc. Serious burns are very likely if these contact the capacitor. The reservoir capacitors are not discharged by bleeder resistors on switchoff, as they would consume excessive power, so a charge may persist for some time.



A NON-GLOWING +17 LED DOES NOT MEAN THAT THESE CAPACITORS ARE DISCHARGED.

The unregulated supply to the +48V regulator can reach +90V on high mains, and should be treated with respect. These safety notes are directed to those testing and repairing this power supply.



Servicing should only be carried out by a competent service engineer.

Initial operational tests on the power supply can be carried out by switching the unit ON and checking the voltages present on the output connectors on the back of the unit. While the unit remains disconnected from the mixing console the +8V voltage floats with respect to the other 3 rails, which have a common 0V which is not connected to the mains ground until connection is made to console.

Any fault condition, with the exception of simple mains fuse failure due to underrating or an unusual mains input condition, will require removal of the top cover to enable fault correction. This is achieved using a cross-head screwdriver to remove the seven retaining screws and washers. Carefully lift the cover to avoid the earth connecting lead to the cover from snagging. Place the cover face down behind the unit.



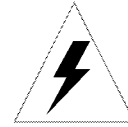
WARNING: At the front of the unit just behind the front panel is the MAINS SWITCH, which carries HIGH VOLTAGES directly from the mains input. Similarly on the rear panel is the MAINS INPUT SOCKET/MAINS VOLTAGE SELECTOR. Care MUST be taken when carrying out any servicing operation with the top cover removed.

FAULTFINDING NOTES.

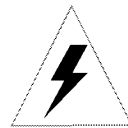
+/- 17V rail faultfinding.

If one side of the +/-17V supply is not working, the mutual shutdown system will close down both sides of the supply. This makes faultfinding difficult as it is often not obvious which side has failed. The mutual shutdown can be disabled by pushing jumpers onto JMP1, JMP2.

WHEN THESE JUMPERS ARE IN PLACE THE OVERLOAD SHUTDOWN SYSTEM IS DISABLED. CURRENT-LIMITING IS STILL WORKING, BUT THIS WILL NOT PREVENT OVERHEATING AND DAMAGE IN THE EVENT OF A SUSTAINED SHORT CIRCUIT.



IT IS ESSENTIAL THAT THESE TEMPORARY JUMPERS ARE REMOVED AFTER SERVICING IS COMPLETED! FAILURE TO DO THIS MAY CAUSE SEVERE CONSOLE DAMAGE IF ONLY ONE 17V RAIL SHUTS DOWN.



Thermal shutdown is operational on -17 V only, when these jumpers are present. If there is no power to the 723 IC (eg if R1 or R2 is open- circuit) the output will remain low, but no damage occurs.

+48V rail faultfinding.

The TL783 regulator sometimes fails so that it appears to be working, but with its reference voltage reduced to 0.6V. This gives an output voltage of approx +19V. Replace the regulator.

+8V rail faultfinding

This is a completely standard IC regulator circuit. The regulator REG3 is the only part that might fail.

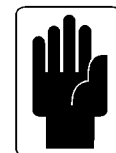
Fan Servo faultfinding

It is ESSENTIAL that the thermal sensor IC5 is pressed firmly up against the heatsink to get a proper measure of its temperature. If this is not so the fan will run too slowly for proper cooling, and thermal shutdown is also disabled.

The best way to test if the thermal sensor is working is simply to measure its output voltage. (between its pins 2 and 3) The LM35DZ gives +10mv for each degree C above zero, so at normal room temperatures the output is 200 - 250mV. At supply operating temperatures (heatsink hot to the touch) the output is 500 - 650mV.

Replacing Components

Replacement of any components should be undertaken only after switching the power supply unit OFF and disconnecting the mains supply lead from the power supply unit.



Replacement of any of the fuses in the power supply units is possible without the removal of the circuit board.

The fuses are held in open fuseholders on the top of the board. These can be carefully removed by hand. Ensure that the insulating fuse covers are replaced with the new fuses, in the case of F3, 4, 5 and 6.

Disassembly

The main power semiconductors are mounted on the heatsink extrusion, inside the fan tunnel. To access these the fibreglass tunnel wall must be removed by releasing the four black plastic rivets that secure it to the metal section of the fan tunnel. These are released by inserting a sharp knife under the mushroom head of the rivet and levering it outwards. Do this gently or the rivet head will be lost. To resecure the rivets the body must be pressed fully home into both holes before it is locked by pushing in the mushroom head.

The semiconductors can be removed by desoldering the pins, where appropriate, and unscrewing the fixing nuts or the fixing screws, taking care to retain the small insulating bush(es). Retain carefully the mounting pads and plastic insulating bushes where fitted.

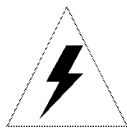


THESE MUST BE CORRECTLY REFITTED TO AVOID DAMAGE TO THE UNIT

T03 Devices

The correct high efficiency mounting pad must be used, and this should be replaced if it appears to be damaged (see the Parts Lists for the relevant Soundcraft Part Numbers). When refixing or replacing the device, it is important to screw the device down before resoldering the pins to avoid stressing the pads on the circuit board.

The high-efficiency thermal washers are relatively delicate, and must be handled with care. It is particularly important that they are clean and free from metal dust or swarf, as this is likely to cut through the washer when the bolts are tightened.



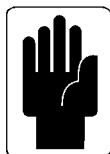
NOTE : The heatsink bracket is earthed through its mechanical contact with the rest of the chassis and so a faulty mounting pad may cause the output of its regulator to be connected to earth.

OUTPUT VOLTAGE ADJUSTMENTS

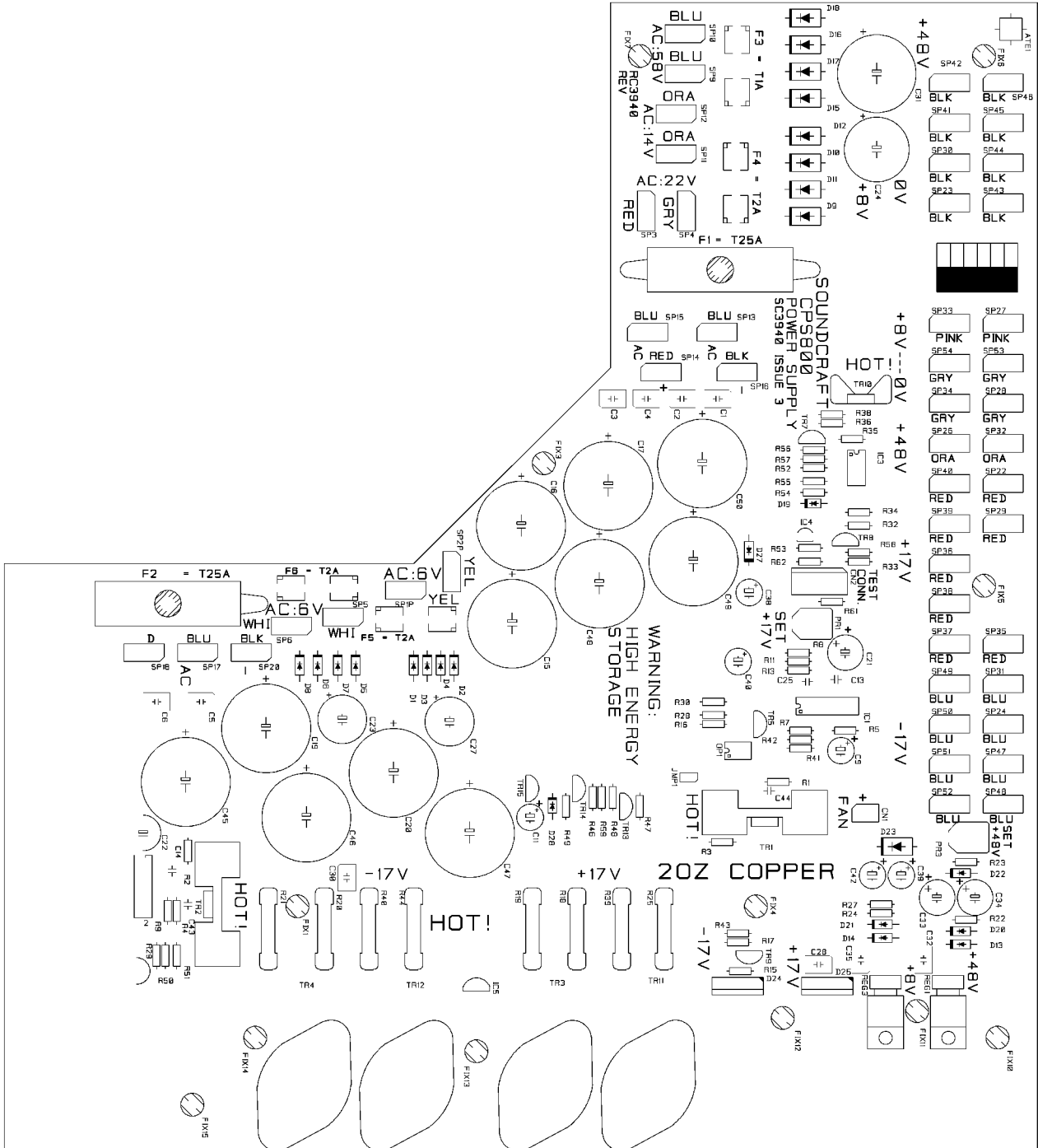
The +/-17V and +48V rails are adjustable via trim pots on the pcb. After any repair these should be checked on load and adjusted if necessary. Set the 17V rails to 17.5V +/- 0.1V, and the 48V rail to 48.3 +/- 0.1V at the PSU output. The 8V rail is not adjustable.

GENERAL

Before replacing the top cover on the unit, carefully remove any dust from surfaces within the unit.



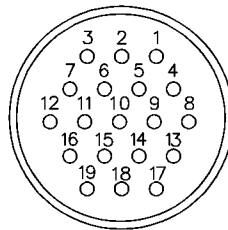
Carefully check all wiring connections and ensure that there are no loose parts lying around inside the unit



Outputs Pinouts

Wire List	
SRC	Voltage
PIN 1, 2, 3, 4	+17 V
PIN 5, 6, 7, 8	0V
PIN 9, 10, 11, 12	-17 V
PIN 13	+48V
PIN 14, 15	Chassis Ground
PIN 16, 17	0V
PIN 18	8V
PIN 19	Not Used

CONNECTOR
VIEWED FROM INSIDE PSU



CPS 800

5

Parts List

CPS800 POWER SUPPLY		
	!NON.IL RK SWT DPST(2600HMI IE)	DL8003
	!MNS LEAD USE FJ8007/8/11/12	FJ8009
	80MM FAN FILTER ASSY	HZ2211
	"CABLE TIE 4.3""	LF0501
	"NO.6X1/2""TYPE B CSK POZI BLACK"	NA0073
	M3 X 10MM PAN/POZI	NA0157
	M4X12 PAN POZI BLACK SCREW	NA0239
	M4X12MM CSK POZI SCRWB BLCK	NA0240
	M4X8MM PAN POZI SCRWB BLCK	NA0241
	NO8X3/8 PAN POZI B BLACK SCR	NA0372
	M3X6 PN PZI W/CAPT WASHER ZNC	NA0401
	M3 NYLON INSERT NUT	NB0113
	M4 NYLON INSERT NUT TYPE T	NB0127
	M8 NYLOC NUT	NB0151
	M4 PLAIN STEEL WASHER ZNC CLR	NC0249
	M4 BLACK PLASTIC WASHER	NC0250
	M8 PLAIN WASHER	NC0258
	SPACER M3X30 HEX BRASS NKL PLT	ND0464
	P-CLIP (9-14.3MM)	NZ2286
	DOME PLUG BLACK 11MM DIA HOLE	NZ2306
	CPS800 LID	PH1458-01
	CPS800 ANGLE SUPPORT	PH1459-01
	CPS800 CHASSIS	PJ1569-02
	CPS800 FRONT PNL	PJ1570-02

CPS800 HEATSINK ASSY			RS2084
D24	MBR5025L 50A 25V SCK DIODE	BA0023	
D25	MBR5025L 50A 25V SCK DIODE	BA0023	
	CPS2000 BRIDGE RECTIFIER	BC0220	
TR3	MJ15024 NPN POWER TRANS TO3 @	BD0373	
TR4	MJ15024 NPN POWER TRANS TO3 @	BD0373	
TRI1	MJ15024 NPN POWER TRANS TO3 @	BD0373	
TRI2	MJ15024 NPN POWER TRANS TO3 @	BD0373	
"REG1,"	VOLTAGE REG TL783CKC	BE0455	
IC5	LM35DZ THERMAL SENSOR	BE0477	
"REG3,"	LM317 V/RE6 TO-220 SGS/THOMSON	BE0508	
	M3X6MM CSK POZI BLK SCREW	NA0083	
	M5X30MM PAN POZI SCREW	NA0094	
IC5	M3 X 10MM PAN/POZI	NA0157	
REG1	M3 X 10MM PAN/POZI	NA0157	
	M4X8MM PAN POZI SCR ZINC	NA0225	
	NO8X3/8 PAN POZI B BLACK SCR	NA0372	
	M3.5 X 35 PAN POZ ZNC	NA0444	
	M5 NYLON INSERT NUT	NB0116	
	NYLOCK NUT ZINC 6-32 UNIFIED	NB0173	
	M4 PLAIN STEEL WASHER ZNC CLR	NC0249	
	M4X9 1MM THICK RUBBER WASHER	NC0293	
	M3.5 NYLON BUSH	ND0392	
	PLASTIC SNAP RIVET	NZ2332	
	CPS2000 TO3P MOUNTING CLIP	NZ2354	
	TO220 DOUBLE MOUNTING CLIP	NZ2368	
	CPS800 H/SINK SUPPORT	PF0667-01	
	CPS800 FAN DUCT	PF0668-02	
	CPS800 FAN DUCT SIDEWALL	PK2574-01	
	CPS800 PCB HEATSINK	PN1272-01	

CPS800 POWER SUPPLY			RC3940
R1	MF 0.25W RES 2% 100R	AD0425	
R10	MF 0.25W RES 2% 4K7	AD0465	
R11	MF 0.25W RES 2% 7K5	AD0470	
R12	MF 0.25W RES 2% 7K5	AD0470	

R13	MF 0.25W RES 2% 2K2	AD0457
R14	MF 0.25W RES 2% 2K2	AD0457
R15	MF 0.25W RES 2% 1K8	AD0455
R16	MF 0.25W RES 2% 47K	AD0489
R17	MF 0.25W RES 2% 47K	AD0489
R18	W/W RES 4W 10% OR22	AH0741
R19	W/W RES 4W 10% OR22	AH0741
R2	MF 0.25W RES 2% 100R	AD0425
R20	W/W RES 4W 10% OR22	AH0741
R21	W/W RES 4W 10% OR22	AH0741
R22	MF 0.25W RES 2% 180R	AD0431
R23	MF 0.25W RES 2% 6K2	AD0468
R24	MF 0.25W RES 2% 180R	AD0431
R25	W/W RES 4W 10% OR22	AH0741
R26	MF 0.25W RES 2% 1K	AD0449
R27	MF 0.25W RES 2% 1K1	AD0450
R28	MF 0.25W RES 2% 100K	AD0497
R29	MF 0.25W RES 2% 100K	AD0497
R3	MF 0.25W RES 2% 270R	AD0435
R30	MF 0.25W RES 2% 6K8	AD0469
R31	MF 0.25W RES 2% 6K8	AD0469
R32	MF 0.25W RES 2% 680R	AD0445
R33	MF 0.25W RES 2% 9K1	AD0472
R34	MF 0.25W RES 2% 4K7	AD0465
R35	MF 0.25W RES 2% 10K	AD0473
R36	MF 0.25W RES 2% 680R	AD0445
R37	MF 0.25W RES 2% 4K7	AD0465
R38	MF 0.25W RES 2% 220R	AD0433
R39	W/W RES 4W 10% OR22	AH0741
R4	MF 0.25W RES 2% 270R	AD0435
R40	W/W RES 4W 10% OR22	AH0741
R41	MF 0.25W RES 2% 1K8	AD0455
R42	MF 0.25W RES 2% 5K6	AD0467
R43	MF 0.25W RES 2% 100K	AD0497
R44	W/W RES 4W 10% OR22	AH0741
R45	MF 0.25W RES 2% 1K	AD0449
R46	MF 0.25W RES 2% 10K	AD0473
R47	MF 0.25W RES 2% 10K	AD0473
R48	MF 0.25W RES 2% 10K	AD0473
R49	MF 0.25W RES 2% 10K	AD0473
R5	MF 0.25W RES 2% 4K7	AD0465
R50	MF 0.25W RES 2% 1K8	AD0455
R51	MF 0.25W RES 2% 5K6	AD0467
R52	MF 0.25W RES 2% 10K	AD0473
R53	MF 0.25W RES 2% 2K7	AD0459
R54	MF 0.25W RES 2% 470R	AD0441
R55	MF 0.25W RES 2% 1K	AD0449
R56	MF 0.25W RES 2% 100K	AD0497
R57	MF 0.25W RES 2% 1M	AD0521
R58	MF 0.25W RES 2% 10K	AD0473
R59	MF 0.25W RES 2% 10K	AD0473
R6	MF 0.25W RES 2% 4K7	AD0465
R60	MF 0.25W RES 2% 2K2	AD0457
R61	MF 0.25W RES 2% 4K7	AD0465
R62	MF 0.25W RES 2% 4K7	AD0465
R7	MF 0.25W RES 2% 4K7	AD0465
R8	MF 0.25W RES 2% 4K7	AD0465
R9	MF 0.25W RES 2% 4K7	AD0465
D1	DIODE 1N4001	BA0005
D10	"DIODE 1N5402 200V 3A PRFMD .6""	BA0009
D11	"DIODE 1N5402 200V 3A PRFMD .6""	BA0009
D12	"DIODE 1N5402 200V 3A PRFMD .6""	BA0009
D13	DIODE 1N4001	BA0005
D14	DIODE 1N4001	BA0005
D15	"DIODE 1N5402 200V 3A PRFMD .6""	BA0009
D16	"DIODE 1N5402 200V 3A PRFMD .6""	BA0009
D17	"DIODE 1N5402 200V 3A PRFMD .6""	BA0009

D18	"DIODE 1N5402 200V 3A PRFMD .6""	BA0009	C4	MICRO-BOX 5MM 5% 100V 100N	CC0250
D19	DIODE 1N4148	BA0001	C40	"VERT ELEC 0.2"" TPD 100MF 10V"	CE0403
D2	DIODE 1N4001	BA0005	C41	"VERT ELEC 0.2"" TPD 100MF 10V"	CE0403
D20	DIODE 1N4001	BA0005	C42	"VERT ELEC 0.2"" TPD 47MF 25V"	CE0401
D21	DIODE 1N4001	BA0005	C43	MICRO-BOX 5MM 5% 63V 10N	CC0244
D22	DIODE 1N4002	BA0011	C44	MICRO-BOX 5MM 5% 63V 10N	CC0244
D23	DIODE SCHOTTKY 3A 20V IN5820	BA0028	C45	VERT ELEC 10000 UF 35V 25X45MM	CE0494
D26	DIODE 1N4001	BA0005	C46	VERT ELEC 10000 UF 35V 25X45MM	CE0494
D27	DIODE 1N4001	BA0005	C47	VERT ELEC 10000 UF 35V 25X45MM	CE0494
D28	DIODE 1N4148	BA0001	C48	VERT ELEC 10000 UF 35V 25X45MM	CE0494
D3	DIODE 1N4001	BA0005	C49	VERT ELEC 10000 UF 35V 25X45MM	CE0494
D4	DIODE 1N4001	BA0005	C5	MICRO-BOX 5MM 5% 100V 100N	CC0250
D5	DIODE 1N4001	BA0005	C50	VERT ELEC 10000 UF 35V 25X45MM	CE0494
D6	DIODE 1N4001	BA0005	C6	MICRO-BOX 5MM 5% 100V 100N	CC0250
D7	DIODE 1N4001	BA0005	C7	MICRO-BOX 5MM 5% 100V 100N	CC0250
D8	DIODE 1N4001	BA0005	C8	MICRO-BOX 5MM 5% 100V 100N	CC0250
D9	"DIODE 1N5402 200V 3A PRFMD .6""	BA0009	C9	"VERT ELEC 0.2"" TPD L-L 10MF 25V"	CE0417
DZ1	ZENER DIODE 27V 500MW	BB0128	PR1	CERMIT TRIMMER HORIZ 1K	DE0482
DZ2	ZENER DIODE 400MW 3.3V	BB0101	PR2	CERMIT TRIMMER HORIZ 1K	DE0482
OP1	CNY17-1 OPTO-COUPLER @	BD0348	PR3	CERMIT TRIMMER HORIZ 1K	DE0482
OP2	CNY17-1 OPTO-COUPLER @	BD0348	"JMP1,2,"	"HONDA .1"" 2WY SIL HDR (GOLD)"	FF0613
TR1	MJE340 NPN TRANS (T0225AA)	BD0375	CN1	"MTHD .1"" 2WY VERT LCKNG ML HDR"	FF0641
TR10	BD680 TRANS	BD0368	CN2	"MTHD .1"" 6WY VERT LCKG ML HDR"	FF0649
TR13	PNP TRANS 2SA970GR (TAPED)TOSH	BD0301	"SP3,4,5"	"1/4"" PC MNTNG BLADE VERT"	FF0676
TR14	NPN TRANS 2SC2240BL(TAPED)	BD0302	" +8, +48"	"MTHD .1"" 6WY R/A ML HDR"	FF0683
TR15	NPN TRANS 2SC2240BL(TAPED)	BD0302	"LED1,2,"	MV5453 5MM GREEN LED DIFF	JA0065
TR2	MJE340 NPN TRANS (T0225AA)	BD0375	"LED4,5,"	T 13/4 5MM LED HI EFF RED	JA0159
TR5	NPN TRANS 2SC2240BL(TAPED)	BD0302		16AWG TINNED COPPER WIRE SOLID	LF0593
TR6	NPN TRANS 2SC2240BL(TAPED)	BD0302		"6/32 UNCX10/16"" PCB STUD"	NZ2317
TR7	NPN TRANS 2SC2240BL(TAPED)	BD0302	TR10	TO126 CLIP-ON H/SNK RDPT PF730	PN1235
TR8	PNP TRANS 2SA970GR (TAPED)TOSH	BD0301	TR1	POWER STATION DRIVER HEATSINK	PN1241
TR9	NPN TRANS 2SC2240BL(TAPED)	BD0302	TR2	POWER STATION DRIVER HEATSINK	PN1241
IC1	V.REG LM723	BE0414		CPS800 PSU PCB	SC3940-03
IC2	V.REG LM723	BE0414	"LED1,2,"	HOLDER FOR 5MM LED PC MNT	ZC0222
IC3	JRC DUAL OP AMP 072BDE	BE0413	TR1	KOOL PAD LM317T/337T SLF-ADH	ZC0224
IC4	TL431 SHUNT REGULATOR	BE0503	TR2	KOOL PAD LM317T/337T SLF-ADH	ZC0224
C1	MICRO-BOX 5MM 5% 100V 100N	CC0250	TR1	DRIVER MOUNTING CLIP	ZC0231
C10	"VERT ELEC 0.2"" TPD L-L 10MF 25V"	CE0417	TR2	DRIVER MOUNTING CLIP	ZC0231
C11	"VERT ELEC 0.2"" TPD 2.2MF 50V"	CE0416	F1	"! FUSE HOLDER 1.25"" 30AMP"	ZD8631
C13	M/LAYER CRMC CAP 50V 100N	CA0018	F1	! 1/4X1/4 THBC25A FUSE	ZD8725
C14	MICRO-BOX 5MM 5% 100V 100N	CC0250	F2	"! FUSE HOLDER 1.25"" 30AMP"	ZD8631
C15	VERT ELEC 10000 UF 35V 25X45MM	CE0494	F2	! 1/4X1/4 THBC25A FUSE	ZD8725
C16	VERT ELEC 10000 UF 35V 25X45MM	CE0494	F3	!SCHURTER FUSE CLIP 10A/250V	ZD0317
C17	VERT ELEC 10000 UF 35V 25X45MM	CE0494	F3	!5X20MM T1AX250V FUSE	ZD8001
C18	VERT ELEC 10000 UF 35V 25X45MM	CE0494	F4	!SCHURTER FUSE CLIP 10A/250V	ZD0317
C19	VERT ELEC 10000 UF 35V 25X45MM	CE0494	F4	!5X20MM T2AX250V FUSE	ZD8002
C2	MICRO-BOX 5MM 5% 100V 100N	CC0250	F5	!SCHURTER FUSE CLIP 10A/250V	ZD0317
C20	VERT ELEC 10000 UF 35V 25X45MM	CE0494	F5	!5X20MM T2AX250V FUSE	ZD8002
C21	VERT ELEC 5MM 220MF/63V	CE0429	F6	!SCHURTER FUSE CLIP 10A/250V	ZD0317
C22	VERT ELEC 5MM 220MF/63V	CE0429	F6	!5X20MM T2AX250V FUSE	ZD8002
C23	VERT ELEC 2200/25V 26X12MM	CE0460		PKS OF DBL-SIDED ADHESIVE TAPE	ZZ2249
C24	VERT ELEC 4700UF 35V 18X42MM	CE0481		CPS800 RECTIFIER WFM-220MM	RV3903-220
C25	"C/C0.2"" TAPED 100V 470PF(N47)"	CA0008		"1/4"" CRIMP RCPTCLE CCT (BLUE)"	FG0645
C26	"C/C0.2"" TAPED 100V 470PF(N47)"	CA0008	1 x 220	14AWG TRI-RATED WIRE RED	LA0079
C27	VERT ELEC 2200/25V 26X12MM	CE0460	1 x 220	14AWG TRI-RATED WIRE BLACK	LA0080
C28	MICRO-BOX 5MM 5% 100V 100N	CC0250	2 x 220	14AWG TRI-RATED WIRE BLUE	LA0081
C29	MICRO-BOX 5MM 5% 100V 100N	CC0250		"CABLE TIE 4.3""	LF0501
C3	MICRO-BOX 5MM 5% 100V 100N	CC0250		CPS800 RECTIFIER WFM-350MM	RV3903-350
C30	MICRO-BOX 5MM 5% 100V 100N	CC0250		"1/4"" CRIMP RCPTCLE CCT (BLUE)"	FG0645
C31	VERT ELEC 10MM 1000MF/100V	CE0426	1 x 350	14AWG TRI-RATED WIRE RED	LA0079
C32	MICRO-BOX 5MM 5% 100V 100N	CC0250	1 x 350	14AWG TRI-RATED WIRE BLACK	LA0080
C33	"VERT ELEC 0.2"" 47UF 63V"	CE0402	2 x 350	14AWG TRI-RATED WIRE BLUE	LA0081
C34	"VERT ELEC 0.2"" 47UF 63V"	CE0402		"CABLE TIE 4.3""	LF0501
C35	MICRO-BOX 5MM 5% 100V 100N	CC0250		CPS800 FAN WFM	RV3958
C37	"VERT ELEC 0.2"" TPD 2.2MF 50V"	CE0416		"MTHD 2WY .1"" FML"	FF0585
C38	"VERT ELEC 0.2"" TPD 2.2MF 50V"	CE0416		FAN 120MM 12VDC 0.45A SANYO	HD0003
C39	"VERT ELEC 0.2"" TPD 47MF 25V"	CE0401	30mmx30	30CMX30CM THERMALLY CONDCTV SHT	ZC0223

	KOOL PAD LM317T/337T SLF-ADH	ZC0224
	KOOL PAD TO3P (HI-EFFICIENCY)	ZC0227
	KERATHERM 86/10 PAD	ZC0230
	1MM GROMMET STRIP	ZZ2261
	CPS800 MAINS WFM	RV3904
	!ARCO.33VF 20% 275V X CLASS LL	CC8001
	"1/4""CRIMP RCPTCLE CCT(CHAINED)"	FG0629
	PUSH ON TERMINAL	FG0659
	!IEC MAINS SKT 10A CPS250/275	FJ8029
	32/0.2 BLUE WIRE	LA0013
2 x 425	32/0.2 BROWN WIRE	LA0014
	32/0.2 YELLOW/GREEN WIRE	LA0023
	"CABLE TIE 4.3""	LF0501
	H20X20MM HELSYN SLEEVE BLUE	LF0512
	VIBRATION RESIST CRIMP TAG V5	NE0416
	CPS800 DC O/P WFM	RV3905
	"1/4""CRIMP RCPTCLE CCT(CHAINED)"	FG0629
	SOCAPEX 19WY PNL MNT FML	FJ0868
4 x 270	32/0.2 BLACK WIRE	LA0012
4 x 180	32/0.2 BLUE WIRE	LA0013
2 x 180	32/0.2 GREY WIRE	LA0016
1 x 180	32/0.2 ORANGE WIRE	LA0017
1 x 180	32/0.2 PINK WIRE	LA0018
4 x 180	32/0.2 RED WIRE	LA0019
2 x 180	32/0.2 YELLOW/GREEN WIRE	LA0023
	H20X20MM HELSYN SLEEVE BLUE	LF0512
	VIBRATION RESIST CRIMP TAG V5	NE0416
	CPS800 LID EARTH WFM	RV3929
	24/0.2 YELLOW/GREEN WIRE	LA0045
	VIBRATION RESIST CRIMP TAG V5	NE0416
	CPS800 TRANSFORMER WFM	RV3931
	"1/4"" CRIMP RCPTCLE CCT (BLUE)"	FG0645
	PUSH ON TERMINAL	FG0658
	!CPS800 TOROID TX ISS 5	HB8040
	VIBRATION RESIST CRIMP TAG V5	NE0416
	CPS900 PSU CARTON	TA0225
	CPS800 PSU CABLE TRAY	TA0451
	CPS800 L/R POLY KIT	TB0293
	"SLF SEAL BAGS+PNLS 31/2X41/2""	TZ2297
	"(CPS750)POLY BAG 26X31""500G"	TZ2316
	PSU EARTH SYMBOL SLF-ADH	ZA0078
	!5X20MM T1AX250V FUSE	ZD8001
	!5X20MM T2AX250V FUSE	ZD8002
	!FUSE COVER SCHURTER 853-9561	ZD8013
	!5X20MM T16A/250V AS FUSE	ZD8116
	CPS800 USER MANUAL/TECH GUIDE	ZM0225
	RICHO SCREW ON PLASTIC FEET	ZZ2541
	FAN FILTER & GUARD (120MM)	ZZ2833
CUT TO	PETP INSULATOR 530X110MM	ZZ2880

