



OPERATION, INSTALLATION & MAINTENANCE HANDBOOK
Suitable for all AC&E versions built after Jan, 2003

ALARM and POWER DISTRIBUTION PANEL

Mounting options for Type 84, 92 & 19" Racks

(E844)

ISSUE: 2

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APDP 24V & 48V VERSIONS

ALARM and POWER DISTRIBUTION PANEL

| | | |
|----------|--------|------------------------|
| APDP007 | 48Volt | 1A + 84/92 & 19" Racks |
| APDP2407 | 24Volt | 1A + 19 Inch Mount |

Description

- Protected supply of power to Sub-Racks in two separate Feed Circuits of 8 (eg. total 2 x 8 x 6A), both 48Volt and 24Volt version (positive ground). Max. of 48A per feed circuit.
- Monitors status of individual Feed Circuits.
- Collection of other Alarms Circuits within Rack for Exchange Alarm Scheme & Alarm Systems.
- Fits Type 92, Type 84 and 19" Instrumentation Rack Standard.
- Selectable circuit feeds from 0Amp to 10Amp (special circumstances 16A feeds).
- Monitor alarms for under voltage or over voltage feed (nominally 20% range).
- Heavy duty components adopted for extended life and high reliability.
- Height 125mm.
- Pluggable Circuit Breakers: ETA from 50 milli-Amps to 16 Amp.

Features

1. Two electrically isolated feed circuits are available (for dual source feeding - power redundancy).
2. Monitoring of voltage status on both power feeds.
3. Collection and distribution of individual feed circuit alarm status connection.
4. Protection for individual sub-rack equipment by Circuit Breakers (pairing for dual power feeds can be arranged). Eight + Eight Circuit Breakers maximum.
5. Electro-Magnetic Compatibility compliant.
6. Front access for all power inputs and alarm wiring with improved cable management.

Electrical Parameters

1. Tripping of power feed by thermal/magnetic Circuit Breakers 0.05A to 10Amp for each rack feed. (Max current 48A per rack feed – eg: 8 x 6A can be accommodated—96A per Panel).
2. Levels of Alarm with Circuit Breakers:-
 - Tripped shows Urgent Alarm (Red LED) [can be down graded to Non-Urgent Alarm (Orange LED)].
 - Tripped but intermediate attention is indicated (Alarm Receiving Attention) (Green bar LED).
 - Set breakers show normal condition (Green LED display).
3. Monitors Supply Voltage.

| | 48Volt Version | 24Volt Version |
|--------------------------|------------------|----------------------|
| Under Voltage Alarm | Less than 38.5V | Less than 19.2V |
| Over Voltage Alarm | Greater than 65V | Greater than 32.5V |
| Normal Operation Voltage | (± 10%) 53 to 43 | (± 10%) 26.5V to 22V |
| Max Feed Voltage | 70V short period | 35V short period |

4. Individual tripped Circuit Breaker make contacts to ground are brought out to an Alarm Field.
5. Collection and display of sub-rack alarms (grounding contacts for individual sub-racks).
6. Patching Alarm Field available with standard IDC (connection).
7. External alarm contacts for power fail.

Application: (Network provider Type Rack Power Feeds and Alarm Systems)

1. Broadband Radio Systems and MUX equipment etc.
2. Monitored Exchange Rack feeds to sub-rack equipment.
3. Integration of Alarms for central management systems.
4. Rack Exchange Alarm Systems. Collection and Display.

| BREAKERS | | | | | | | | | |
|-------------|------|------|------|------|------|------|------|------|------|
| Rating /Amp | 1 | 2 | 3 | 4 | 5 | 6 | 8 | 10 | 16 |
| Part No | E312 | E373 | E372 | E355 | E311 | E370 | E313 | E391 | E609 |

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1. GENERAL

1.1 SCOPE:

The scope of this manual embraces, in general terms, the features of the product including a detailed description of the key elements of the panels and sub-panels, and how they function. Also included are procedures for installation, testing, commissioning and maintenance.

The purpose of this manual is to give the inquirer a simple subject by subject reference to the product's features. In short this manual purports to highlight all you need to know to ensure reliable service from the panel and gives easy to find information.

The product reflects the requirement of Telstra's Specification 1582 and manifests requirements of that specification.

1.2 GLOSSARY OF TERMS:

Many of the terms used in this manual are extracted from the Telstra specification. Other terms which are employed are recognised standards in the electronic industry or in Australian Standard AS 1852

1.3 MANUFACTURER'S LABEL:

A manufacturer's label is located on the main chassis under the Alarm PCA.

This label contains:-

- the manufacturer's name
- equipment part number
- Issue No
- unique sequential manufacturing number
- date of manufacture

1.4 SYMBOLS:

The symbols used in the drawing are either to AS1102 or those standards used by "Protel" Schematic capture computer program which again refer to AS 1102.

1.5 STATIC SENSITIVE DEVICES - HANDLING PROCEDURES:

During manufacture and handling of components prior to assembly the manufacturer recognizes ESD procedures/standards and are upheld in this stage of the life of the product. After assembly into the respective PCA's and final assembly into product, accepted industry standards are employed. After final assembly, components are less vulnerable however normal ESD care should be exercised once the product is removed from the packing.

During the life of the product normal ESD care should be exercised when the unit or sub-units are removed from the rack and maintenance is performed.

Recognised ESD maintenance bench tops, together with a technician wrist strap should be used, and a warning sign indicating potentially ESD sensitive components should be displayed in the region where the equipment is handled or repaired.

1.5.1 Explanation:

The more vulnerable components in the product are present on the Alarm PCA. Components such as U1 and U2, which are CMOS elements, are the most vulnerable; next would be all transistors. Since each of these elements have their respective electrodes tied to a common "ground" they are less likely to be exposed to high electro-static potentials.

The Power PCA has no elements, which are effectively sensitive to ESD.

1.5.2 Labelling:

The unit is labelled with an ESD sticker to indicate the recognised precautions which should be applied during installation, commissioning and maintenance.

1.5.3 Packaging:

The original packaging provided with this unit should be retained and reused in case the unit needs to be relocated or re-transported.

1.5.4 Precaution:

Standard practices of an ESD bench mat, wrist straps and floor a mat should be used when possible during maintenance procedures on the bench.

1.6 WARRANTY and REPAIR INFORMATION:

1.6.1 A standard warranty of 12 months from date of invoice is offered for this item, provided it can be demonstrated that each of the sub-assemblies have been subjected to normal operating conditions.

1.6.2 Procedure for Handling Malfunctioning Equipment:

Each component or sub-assembly requires individual attention. The recommended approach is listed below.

After sub-assembly is identified as being faulty refer to Section 4 for the procedure to identify faulty elements.

- a) Alarm Panel (PCA): it is recommended that a test of this assembly be done by either the manufacturer or a competent technician in a circuit configuration which simulates its working environment.
- b) Power Panel (PCA): similarly it is recommended the same treatment be applied as for the Alarm Panel, ie being assembled and tested with a known performance Alarm Panel..
- c) Circuit Breakers: these element should be checked first to the sequence of contact closures as shown in diagram B8693 sheet 1 of 1 in Section 7 and then subjected to a load trip test specified by the Manufacturer (ETA - Germany)
- d) Panel Frame Work: replacement spares are recommended for these items and other items (see Section 6). Please contact AC&E Pty Limited for details of kits of frame spares.

2. EQUIPMENT DESCRIPTION AND SPECIFICATIONS.....

2.1 EQUIPMENT DESCRIPTION:

2.1.1 Equipment Mounting:

This equipment has two sets of mounting brackets enabling the panel to be mounted in a variety of racks. One set of brackets only suits 19 inch racks, the other set is reversible and suits both Type 84 and Type 92 racks. Each bracket is fixed to the panel using the three countersunk M4 screws supplied.

2.1.2 Supply Inputs:

Two independent -48Volt input circuits are provided which give bus feeds of 48Amp maximum (this will ensure that less than 20 degree C surface temperature rise over ambient occurs on any of the track feeds of copper inlay on the main power PCB). These are nominated by RF1 and RF2 on the circuit diagram B10701 sheet 1 of 4 in Section 7 (RF = Rack Feeds). Each of these inputs breaks down to 8 separate feeds maximum. For example, eight 6A feeds or any combination to total 48Amps, which are protected by circuit breakers CB1 to CB8 for RF1 and CB9 to CB16 for RF2. In some circumstances it is possible to have at least one feed, able to carry 16Amp per each RF1 or RF2; however the total current per rack feed should not exceed a total of 48A max as a rating.

2.1.3 Supply Inputs Monitoring:

Both RF1 and RF2 inputs circuits are monitored for under voltages and over voltages. Under voltage input conditions are monitored independently, and over voltage conditions are combined by the sensing circuits.

For under voltage sensing two Schmidt trigger circuits are employed (U2:A and U2:B IC's) which in turn feed relays to signal further via the Alarm PCA and LEDs to indicate under voltage tripping. "RF1 LED" and "RF2 LED" monitor the RF1 and RF2 inputs respectively. Outputs at terminal 'UVA'. Resistors R1, R2, R3, R4, R67 and R68 achieve the setting of the trip voltage. In addition these two outputs from the Schmidt triggers are "orred" through diodes D1 and D2. Inversion of this signal is via U1:A and thence to TR1 amplifier which drives RL1 Relay and the Normal (green) LED. RL1, which is normally closed (no power), allows a ground signal to an external monitoring circuit in the event of a total power failure {at terminals STAU and RCA(U)}.

In the case of overvoltage, a circuit consisting of a zener diode ZD3 and two "or" diodes D11 and D12 feed an amplifier (TR7, TR8) to drive a relay RS3. This relay provides a ground to external circuits giving the required overvoltage indication. It also provides logic function for the Alarm Circuit via RS3/1.

2.1.4 Subrack Feeds:

There is provision for 2 lots of 8 separate feed circuits overload protected by electromagnetic and thermal trip mechanisms within each circuit breaker (CB1 to CB16).

Each of these feed circuits can independently feed up to 16 Amps. However because of the limitation of the input terminal block rating of 65Amp maximum, each Rack Feed Circuit RF1 and RF2 has the recommended capacity to feed 48Amps. This means that any combinations of 4 x 12Amps breakers or 6 x 8Amp breakers can be installed for example.

Circuit Breaker CB1 to CB8 are fed from RF1 source input and similarly CB9 to CB16 are fed from RF2 source input.

These two circuits can be linked together to form one -48V battery feed or fed from different -48V Supply circuits (eg: different circuits from a High Ohmic Distribution supply).

A separate breaker circuit of 1Amp (CB17) is devoted to controlling the -48V feed to the alarm and monitoring circuit (schematic B10701 sheet 2 of 4 in Section 7).

If either of the feed circuits RF1 or RF2 should fail (not both) then the alarm circuit is maintained by diodes D67 or D68 and via breaker CB17.

A Solid link is provided between "RF1+" and "RF2+" to ensure the alarm circuit is maintained if the positive terminal (or earth) should become disconnected. (refer schematic B10701 sheet 1 of 4 and "Light Gauge Link", in Section 7)

2.1.5 APDP Alarm Field:

Connection to the terminals on the Alarm field is via a 4 Pole IDC type connections. The gauge of wire suitable for IDC is Ø0.4 to Ø0.65mm single or multi-strand conductors. Refer to Section 7, for Alarm Field Termination Layout.

Arrays 4U, 5U, 6U & 7U respectively are input diode "or" connected to the Urgent Alarm monitoring circuit and similarly CB1 to CB16 and diode "orred" to this Urgent Alarm monitoring circuit. External outputs for Urgent Alarm is via SW1-1 to terminals RCA(U) and STAU via diode D17.

Similarly 4NU, 5NU, 6NU & 7NU inputs are diode "orred" to the Non-Urgent monitoring circuit. CB1 to CB16 are diode "orred" to the Non-Urgent monitoring circuit as well. Each Circuit Breaker can be elected to be either an urgent or non-urgent category by the position of DIL switch SWA and SWB1.

Again Non-Urgent Alarm outputs are isolated by SW1 - 2 and output to terminals RCA(NU) and STA(NU) via diode D18.

Arrays 4ARA, 5ARA, 6ARA & 7ARA are diode "orred" for inputs to the ARA alarm monitor circuit. Circuit Breakers CB1 to CB16 are wired "orred" to the ARA sensing and monitoring circuits.

External feed of the ARA alarm circuit is via SW 1-3 for isolation to terminals RCA(ARA) and STA(ARA) via diode D19.

Direct output of individual circuit breakers CB1 to CB16 for alarm circuit purposes is via terminals CB1, -----CB16 respectively.

The under-voltage alarm circuit is fed from the alarm PCA to isolation switch SW3-2 and D85 diode to UVA terminal on the IDC array.

The over-voltage alarm circuit is derived from the Alarm PCA over-voltage sensing circuit through to SW3-1 isolation switch and diode D86 to the OVA output.

An Alarm Power Fail from CB17 is provided via diode D87 to the CB17 output.

A spare diode is provided from diode (I/P) to diode (O/P).

Provision for Earth terminals (positive batt.) is available at terminals Rack Earth (Cage clamp terminal -yellow/green) via link LK1, which provides solid link to +ve's. Further optional links LK2 and LK3 provide Frame Ground and/or optional Rack Shield Earths respectively.

Live -48V batt. is available at S-A,S-B,S-C,S-D. These are fed via CB17 for current protection.

Spare isolated linking terminals are provided at Distributed ZaA1, ----ZaLE4.

2.1.6 Alarm Circuit:

The power for the Alarm Circuit PCA is provided via two diodes, each connected to RF1 negative and RF2 negative and then through a circuit breaker CB17 which is rated at 1Amp. The positive return is via RF1 positive and RF2 positive which are connected on the PCB. This is to ensure power is provide to the Alarm circuit should one of the input RF1 or RF2 fail. Light current (<1Amp) feeds are distributed to S(1) to S(4) when line feeds are required for negative 48V in the Alarm Field (S-1,S-2,S-3,S-4).

2.1.7 Subrack Power Supply:

Depending on the sub-rack current feed requirements, a circuit breaker of fractions of an Amp to 16Amp can be inserted in the plug-in facility of the Power Distribution PCA. Common circuit breaker ratings are 1Amp, 4Amp, 5Amp, 6Amp, 8Amp, 10Amp & 16Amp.

Two fields of 8 power outputs are available on the Power Distribution PCA. The blue connectors are reserved for negative 48V and the adjacent grey connectors are for the respective positive returns. These two independent power bus feeds are protected by individual circuit breakers, which can be removed or installed as necessary.

A strip of 1 x orange and 3 x green connectors are arranged to be linked together, and are for the "dirty" earths ie: shielding of sub rack feeds for noise reduction purposes (orange connectors). This orange connector is connected to the array of 16 orange connectors beside each of the output connector's blue and grey and can be "earthed" to chassis earth or battery positive as required. The combination of links LK2 and LK3 provide this connection. See wiring diagram. Each of these connectors uses the cage-clamp method of connection. They can take cable sizes from 1 to 2.5mm².

2.1.8 Circuit Breakers:

The Alarm and Power Distribution Panel can be equipped to take up to sixteen ETA Series 3600 Thermal Magnetic circuit breakers, depending on the customers requirements, in positions CB1 to CB16.

Circuit breakers with a current rating up to 16 amps each can be fitted in these positions, to a maximum of 48 amps per rack feed. However CB17, the alarm circuit breaker, must only be fitted with a 1 amp circuit breaker.

2.1.9 Circuit Breaker Operations:

With the breaker set, when large current overloads occur, the magnetic trip circuit is fast acting. For example, for equal or greater than 6 to 8 times the rated current capacity of the breaker the trip times are in the order of 0.001sec to 1sec. For

current less than 6x to 1x the rated current a slower trip rate of 2 to 40 minutes is applicable. (Refer to Figure 1 in Section 7).

2.1.10 Circuit Breaker Alarms:

With the breaker tripped contacts 4 and 7 are closed. These contacts give rise to alarms "NU" or "U" depending on the alarm rating condition setting (refer SWA and SWB).

In the intermediate position, ARA contacts 6 and 7 are made, which signals the Alarm Receiving Attention (ARA) LED. This position is determined by the service technician. Refer B8343 sheet 1 of 1.

2.1.11 Sub-Rack U, NU Alarms:

Urgent and Non-Urgent Alarm inputs from the sub-racks (indicated by a ground on the alarm line) are fed into the APDP which accommodates up to 16 inputs of each type 4U, 5U,6U,7U, and 4NU,5NU,6NU,7NU. These are isolated by diodes (D101 to D116 and D117 to D132).

Because the APDP is also considered a sub-rack, the inputs to the U alarm logic (refer to drawing B10701, sheet 3 of 4 in Section 7) are detected by inputs to inverter IC (UI:C) to drive the U alarm LED. These inputs are "orred" with D13 and D3 (from the under voltage driver).

Overriding these urgent alarm inputs is an input via contact RL1 which serves two functions. One, to provide alarm if the normal LED is not glowing and two, to provide an external urgent alarm in the form of a ground to an external alarm circuit (if SW1-1 is closed). This is labelled Rack Common Output Alarm at Terminal RCA(u) or isolated by diode D17 to STAU terminal.

Inputs to the U and NU sense circuits are isolated by diodes D69 to D84, and are nominated by the installer for each of the 16 total output circuit breakers, as to whether inputs can be fed to external urgent alarm circuits as described above or Non-urgent alarm circuits via SW1-2 to output RCA(NU) or isolated by diode D18 to output STANU.

2.1.12 Alarm Receiving Attention (ARA) Indication:

Like the other alarm inputs an array of diodes is provided for sub-rack inputs nominated as ARA, via D133 to D148 and terminal inputs 4ARA, 5ARA, 6ARA & 7ARA to RCA(ARA) and D19 to STA(ARA).

A wired-or circuit, connected to each of the circuit breakers CB1 to CB16 provides the input from within the APDP. Pin 7 of each of the breakers is connected to positive (earth) and pin 6 of any one of the 16 breakers provides the necessary earth connection.

2.1.13 Outputs to Remote Station Alarms:

Outputs to Station Alarms are provided for Urgent and Non-urgent alarms as described in 2.1.11 above. In addition ARA outputs are provided by SW1-3 switch (when it is closed) to RCA(ARA) or isolated D80 to STA(ARA).

Under-voltage output alarm is provided by RS1/1 or RS2/1 contacts via SW3-2, diode D85 to Terminal UVA.

Over-voltage alarm is provided by RS3/2 contact SW3-1 diode D86 and Terminal OVA.

Each of the output alarm contacts for circuit breakers CB1 to CB16 are provided individually if a separate alarm feature is required (internally to the APDP a diode isolation array for nominated urgent or non-urgent is provided).

2.1.14 Front Panel Alarm Display:

Apart from the Urgent LED U alarms, NU yellow LED showing Non-Urgent alarm, NML Green LED showing normal operation and Light Green Bar LED showing Alarm Receiving Attention, each of the Circuit Breaker positions show the status of the power feeding of each 16 plus 1 breakers.

In the fully on position the black round button (which has a number on that indicates the current rating of the individual breaker) is depressed. In the tripped position the button is proud of the panel indicating power to the respective subrack is off. By partially depressing the button to an intermediate position of ARA the appropriate alarm status is displayed ie: ARA Bar LED will glow. (this is shown on diagram B8343 in Section 7 and is also provided on the back of the front panel).

2.1.15 Front Panel Assembly:

Access to the subrack power cable terminals, alarm field, switches and circuit breakers is via the front panel. The front panel can be removed from the assembly by rotating the two quarter turn fasteners at each end of the front panel.

A designation label to record the rack number and the subrack associated with each circuit breaker is located in a pocket in the decal on the front cover. Labels on the inside of the front cover describe the terminations, the function of the switches and the operation of the circuit breakers as well as providing space for the recording of rack and station cabling to panel and the alarm fields.

2.1.16 "Earthing" Arrangement:

A floating "Rack Shield Earth" array of 16 cage-clamp type terminal blocks is provided for sub-rack power feeding if required. These orange coloured terminals are connected together with heavy PCB tracking to give low RF impedance. An external link L2 is provided to connect rack earth to Shield Rack Earth

A Rack Earth input terminal, which is floating, provides a means to input from the Rack Equipment a high integrity earth point ie: wired to this terminal (2 x 2.5mm² input).

"RF1+" positive rack feed number 1 and "RF2+" positive rack feed number 2 can be connected to Rack Earth Input terminal via link which is a solid 3 pronged metal link supplied with the Wago set of terminals for ground to the positive terminals.

A Frame earth terminal is provided to connect to the rack earth via L2.

2.2 SPECIFICATION:

2.2.1 Electrical:

Maximum input to each RF1 and RF2: 48Amp each

Maximum output to each sub-rack is 16Amp, a maximum of two 16A rating per RF is recommended.

Maximum alarm signalling current is: 1Amp at 48 volts DC.
Maximum continuous operating voltage is 65V, with short term operation to 70volts.
Normal operating range of voltage: 38.5V to 65V
Circuit Breaker trip times (dependent on rating of circuit breaker chosen) refer to ETA's manufacturing data sheets (see figure 1 in Section 7).

Operating Temperature Range:

+10°C to 55°C with RH up to 90%.

2.2.3 Mechanical

The physical dimensions of the Alarm and Power Distribution Panel are :-

| | |
|--|--------|
| Height..... | 125mm |
| Panel Width (without mounting brackets) | 450mm |
| Depth (without mounting brackets)..... | 197mm |
| Weight (fully loaded with brackets and circuit breakers) | 4.19kg |

3. **INSTALLATION and TESTING**

Prior to factory packaging each unit is given a functional test exercising each of the combinations of the switch settings and alarm tripping conditions. Therefore it is not necessary to retest the panel prior to assembly into the rack. (However if there are signs that the panel has been damaged during transit, a report should be made directly to the store authority claiming details of the damage. In turn the Store person shall report to AC&E the extent of the damage as early as possible).

3.1 SAFETY PRECAUTIONS:

Care should be exercised in handling when removing the panel from the packaging to mount in the rack. For the particular rack standards a determination of which configuration of the mounting bracket attachments to be installed should be made. Refer to section 3.2 to show how each is assembled. This should be done on the bench prior to mounting in the rack.

It is best to remove all circuit breakers and disconnect the alarm panel before any wiring is made.

Wiring is best performed by attention to the alarm field first ie: wiring of the alarm circuits should be performed first. Refer to Section below for detail.

Earthing connection should next be made.
Battery negative terminals should next be applied.
Progressive installation of circuit breakers for each wired circuit, then followed by the Alarm PCA connection.

A series of tests should then be applied to determine if each circuit is functional - refer to commissioning procedure in Section 4.

3.2 RACK MOUNTING

The Alarm and Power Distribution Panel should be located at the top of the rack. For 19 Inch and Type 92 racks, fit the appropriate mounting brackets to the front position on the side panels. For Type 84 racks, reverse the Type 92 mounting brackets and fit them to the rear fixing position on the side panels.

3.3 CABLES and TERMINATION:

Cable sizes for input, output and alarm circuits are listed below:-

Input Power Cables: 6 to 16 mm²
Input Alarm Cables:..... 0.125 to 0.33 mm²
Output Power Cables: 1 to 2.5 mm²
Output Alarm Cables:..... 0.125 to 0.33 mm²

Stripping lengths for both input and output cables are detailed on the inside front panel labels. For termination of 2.5mm² output cable, use insulated bootlace ferrules mounted into the input terminal as shown on the inside front cover label and drawing B8699 Section 7.

To install cable into the power input and each terminals (the larger size cage clamp connector) it is recommended that a 3 mm flat screw driver be used to release the connector for acceptance of the cable see diagrams on the inside of the APDP cover.

To install cable into the smaller Cage clamp connectors (Wago connectors) it is recommended that a straight 3mm bladed screwdriver be inserted into the cup lever and downward force applied to open cage. Release force after cable is inserted.

Input alarm and output alarm cables identification for IDC termination is provided. A Krone termination tool is recommended for the operation of termination.

Management of cable is provided. Use of combs and cable ties as recommended; these are provided on the frame top side for output and alarm cabling while the input cables a tray is provided.

3.4 SWITCH SETTINGS:

SW1: Switch to the left to invoke all external output alarms.
SW2: Switch to the left to invoke all Urgent alarms
(or to the right for Non-Urgent alarms).
Note: there are two groups for SW2
SW3: Switch to left to invoke under and overvoltage alarms.
CB1 to CB8: Controls output from RF1
CB9 to CB16: Controls output from RF2
CB17: Controls output to alarm sensing circuit and display.

3.5 RECORDING ON LABELS

Record the rack number, the subrack number associated with each circuit breaker and the alarm status (urgent/non-urgent) of each subrack, on the designation label kept in a pocket in the decal on the outside of the front cover.

Record the details of the rack and station cabling to the panel and the alarm fields in the space provided on the label on the inside of the front cover.

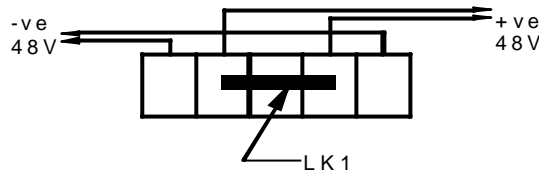
4. FUNCTIONAL TESTING AND COMMISSIONING.....

Section 4.1 details a bench test, which can identify problems with the panel prior to installation or after decommissioning. Sections 4.2 to 4.5 discuss methods of test insitu in the rack environment.

4.1 BENCH TESTING OF APDP:

A) ALARM INDICATION SECTION

- a) Connect the power supply (PS) Terminals "RF1-" and "RF2-" to -48V and "RF2+" and "RF1+" to Earth (zero).



Test probe: LED in series with 1k5 resistor connected to -ve 48V on power supply.

Set the power supply current limiting to nominally 1 amp to provide protection for overloads on the Power Supply. Also connect the Alarm PCA to the power PCB via the ribbon cable assembly provided.

- b) With no circuit breaker (CB) inserted - no current is to register on the PS current meter for a 48Volt setting; switch to Amps.
..... Pass.
Position all switches to the left position.
- c) Insert a 1Amp CB into the CB17 position, and set the CB on.
Red "U" LED - OFF and GREEN "NML" LED - ON.
..... Pass
- d) Take the voltage upward slowly to 70 Volts -
Red "U" LED should come ON (Green Off) at between 65V to 70V.
Do not hold for long periods at 70V - (eg: no greater than 15 minutes).
..... Pass
- e) Take voltage downwards slowly to note the trip point of Green (NML) to Red (U) between 40V to 30V Pass
- f) Continue to take voltage down to note RF1 and RF2 LED glowing somewhere between 36V and 10V (during a phase of 36V to 40V there may be a period of instability - ignore)
..... Pass
- g) Take -48V feed from say "RF1-" Input terminal. The "U" Red Urgent Alarm and the "RF1" LED should glow. Ensure that SW3 is in the left position Pass
- h) Take -48V feed from "RF2-" Input terminal. The "U" Red Urgent Alarm and the "RF2" LED should glow.. Pass

B. ALARM GATHERING & MONITORING SECTION (ALARM INPUTS)

- a) URGENT

- i) Starting with the A1 position, and working down to D16, check the "U" alarm field by using a grounding wire (connected to "RF1+") and touching on the respective terminals. Note that the "U" LED glows for each position touched.
- ii) Using a tripped circuit breaker, plug into the CB1 to CB16 positions in turn, and note that the "U" LED glows for each position. SW2 must be in correct position (left position).
..... Pass

b) NON-URGENT
Similar to a) using A17 to D32 positions.
SW2 must now be in right position (RHS)..... Pass

c) ARA
Again similar to a) using the A33 to D48 positions, this time using a partially reset Circuit Breaker..... Pass

C. ALARM OUTPUTS -(Alarm Field)

These are to be checked with a test probe (eg: LED in series with 1.5kΩ resistor connected to -48Volts of PS).

- a) With no power to the Alarm Panel (disconnected -48V from the Alarm Panel) a ground should be available by a contact (thru the RL1 relay) Test Probe glows when connected to RCA(U) and STA(U).
.....Pass
- b) With power to the Alarm Panel (connecting -48V back to Alarm panel) and with CB16 tripped:-
"Urgent Alarms" are available thru connecting probe to RCA(U) and then STA(U), the LED on probe glows. Pass
Move tripped breaker to CB15 then successively through to CB1 position for a similar result.
- c) With power to Alarm Panel and Circuit Breaker CB16 in partial reset position.
"Alarm Receiving Attention" alarms are available thru connecting probe to RCA(ARA) and STA(ARA), the LED on probe glows..... Pass
- d) With power to Alarm Panel - tripped CB16, SW2 to the right position (RHS).
"Non Urgent Alarms" are available thru connecting probe to RCA(NU) and STA(NU), the LED on probe glows. Pass
Move tripped breaker to CB15 then successively through to CB1 position for a similar result.
- e) Set power feed to 30Volts (under voltage):-
The LED on probe glows by connecting to UVA (ground)..... Pass
- f) Set power feed to 68Volts (over voltage):-
The LED on probe glows by connecting to OVA (ground)..... Pass

- g) Return voltage to 48V. (Check loose diode)
Connecting +ve probe to Diode(O/Pp) and test probe (with 1k5Ω + LED) to Diode (I/P). The LED on probe should glow. Pass
Check live output of -48Volts on terminals S-(A,B,C,D) by connecting voltmeter to "RF2+" and those points. The reading on voltmeter should be -48V. Pass
Check ground to S+(A, B, C, D) by using the test probe to contact to those points.

4.2 CIRCUIT BREAKERS AND ALARM PRIORITY SWITCHING TEST

With the panel in the rack, no circuit breakers in positions CB1 to CB16, and no load on output feed RF1-1, a tripped breaker can be inserted in CB1 position to show the nomination of Urgent or Non-Urgent status. SW2-1 left to show Urgent (red glow) and right to show Non-Urgent (yellow glows).

4.3 ALARM INPUT TEST - (Panel in rack)

By short circuiting termination 4U to 7U (16 terminals) to RF2+, individually, Urgent alarm indicator shows.

By short circuiting termination 4NU to 7NU (16 terminals) to RF2+ individually, Non-Urgent alarm indicator shows.

By short circuiting termination 4ARA to 7ARA (16 terminals) to RF2+ individually, ARA alarm green bar shows.

4.4 REMOTE STATION ALARM - (Panel in rack)

Each of these can be checked by enabling or disabling Urgent, Non-Urgent, and ARA by switching SW1-1, SW1-2 and SW1-3 open or closed respectively.

Likewise the over-voltage and under-voltage external (remote) alarm can be enabled or disabled by SW3-1 and SW3-2.

Should CB17 breaker be tripped at any time then the common station alarm would occur at the CB17 Terminal.

4.5 EQUIPMENT FEEDS

Each of the sub-rack equipment feeds are via terminals CB1 to CB8 and CB9 to CB16.

Each of these feeds are controlled by the respective circuit breaker installed.

5. REPAIR UNDER WARRANTY

If this equipment malfunctions during the warranty period, it should be re-packed in its original packing materials and returned to the manufacturer for the evaluation and repairs. The equipment should be returned with a report detailing the description of the fault to the QUALITY MANAGER at :

A C & E Pty Limited
5-11 Mellor Street,
West Ryde N.S.W 2114,
Australia

6. SPARE PARTS LIST.....

| <u>Component Description</u> | <u>A.C.&E. Part No.</u> | <u>Qty.</u> |
|---|-----------------------------|-------------|
| 1. Alarm-LED Printed Circuit Assembly (refer following parts list) | AALPCA1 | 1 |
| 2. Power Printed Circuit Assembly (refer following parts list) | E852 | 1 |
| 3. Ribbon Cable Assembly | E350 | 1 |
| 4. Circuit Breaker 1 amp (Optional) | E312 | 1 |
| 5. Circuit Breaker 2 amp (Optional) | E373 | 1 |
| 6. Circuit Breaker 3 amp (Optional) | E372 | 1 |
| 7. Circuit Breaker 4 amp (Optional) | E355 | 1 |
| 8. Circuit Breaker 5 amp (Optional) | E311 | 1 |
| 9. Circuit Breaker 6 amp (Optional) | E370 | 1 |
| 10. Circuit Breaker 8 amp (Optional) | E313 | 1 |
| 11. Circuit Breaker 10 amp (Optional) | E391 | 1 |
| 12. Circuit Breaker 16 amp (Optional) | E609 | 1 |
| 13. Mounting Bracket Kit 19 inch (Optional) | E245 | 1 |
| 14. Mounting Bracket Kit Type 84 & 92 (Optional) | E246 | 1 |
| 15. Designation Label | E855 | 1 |

ALARM & POWER DISTRIBUTION PANEL



ISSUE: 1

| COMPONENT DESCRIPTION | CIRCUIT REFERENCE | AC&E PART No | QTY |
|--------------------------------|--|------------------|-----|
| ARA Green bar (light) | H36 Mounted on solder side | E324 | 1 |
| 2. POWER PCA | | | |
| PCB DSPT | Power PCB | E852 | 1 |
| CCT Breaker Sockets ETA 19-02 | CB1 to CB17 | | 17 |
| Input Bat.Terminals Wago | | | |
| 10 mm Green/Yellow | Rack Earth | | 1 |
| 15 mm Blue | RF1- | | 1 |
| 10 mm Grey | RF1+ and RF2+ | | 2 |
| 10 mm Blue | RF2- | | 1 |
| End plate | | | 1 |
| 3 Teriminal Bridge Link | LK1 | | 1 |
| Bat Output Terminals Wago | | | |
| Orange | CB1 to CB16,RST | | 17 |
| Blue | CB1 to CB16 | | 16 |
| Grey | CB1 to CB16 | | 16 |
| Green | RST,RE2,RE1 | | 3 |
| Grey end plates | | | 3 |
| Resistors 1K8, 5% PMF (PRO2) | R68, R67 | | 2 |
| DIODE (PRL 4002) | D67 – D84, D101 – D148, D16 – D19, D87, D86, D85 , D66, | E317 | 73 |
| Dual Line Switch (2pos) 16 way | SW2 | E319 | 2 |
| Dual Line Switch (2pos) 4 way | SW1,SW3 | E320 | 2 |
| Shrouded Header | PL2 | E318 | 1 |
| Krone 4 way | S-,S+,CB1 to CB16,4U to 7U,4NU to 7NU, 4ARA to 7ARA,LE Dist, OVA, UVA, Diode, STA, RCA etc | KR-6048-1-001-04 | 24 |
| | | | |

SECTION: 7

DRAWINGS:

| | |
|---|----------------------|
| Typical ETA Breaker Time/Current Characteristic | Fig. 1 |
| APDP General Assembly..... | B6357 - sheet 1 of 1 |
| APDP Power Board Schematic..... | B8690 - sheet 1 of 4 |
| APDP Alarm Board Schematic..... | B8690 - sheet 2 of 4 |
| APDP Alarm PCA Logic Diagram..... | B8690 - sheet 3 of 4 |
| APDP Functional Block Diagram..... | B8690 - sheet 4 of 4 |
| Internal Labels | B8693 - sheet 1 of 1 |

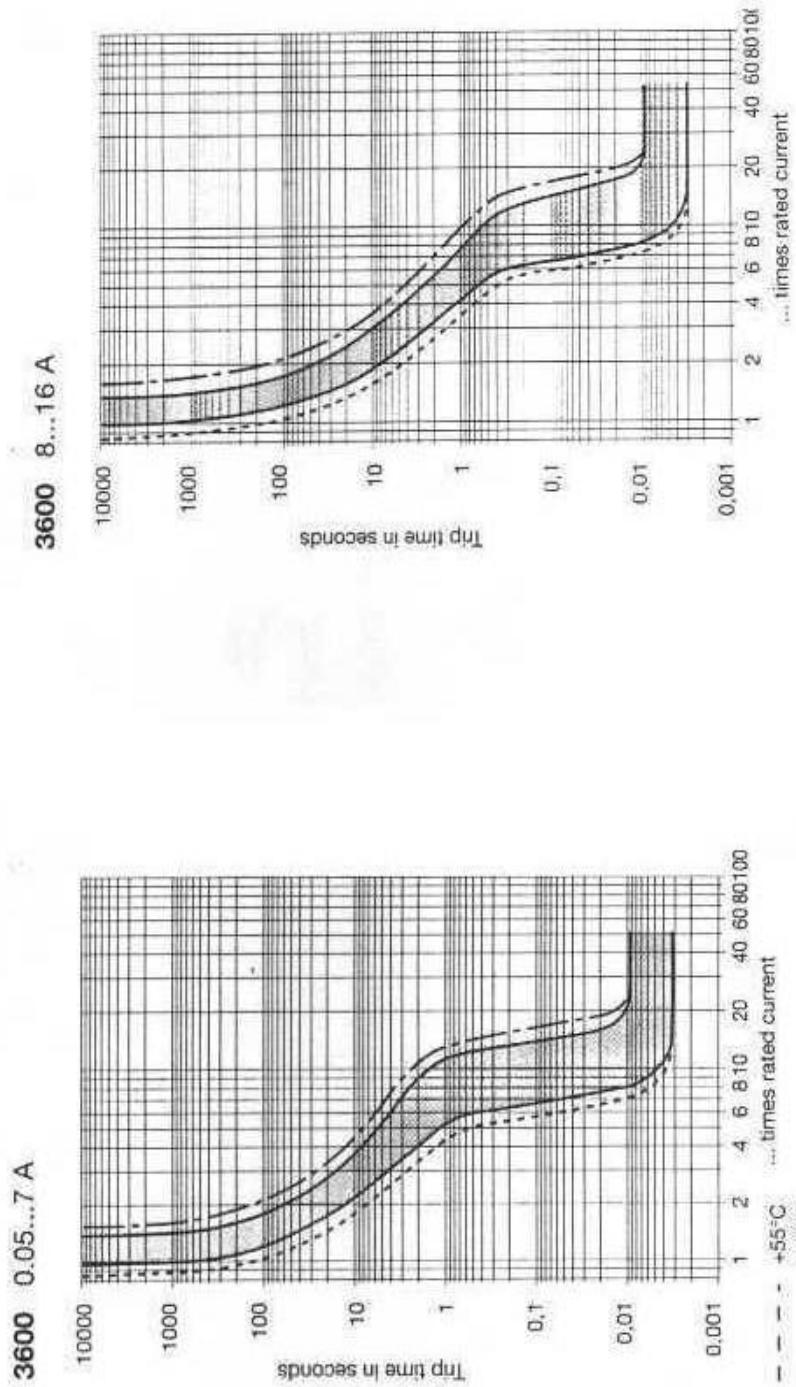
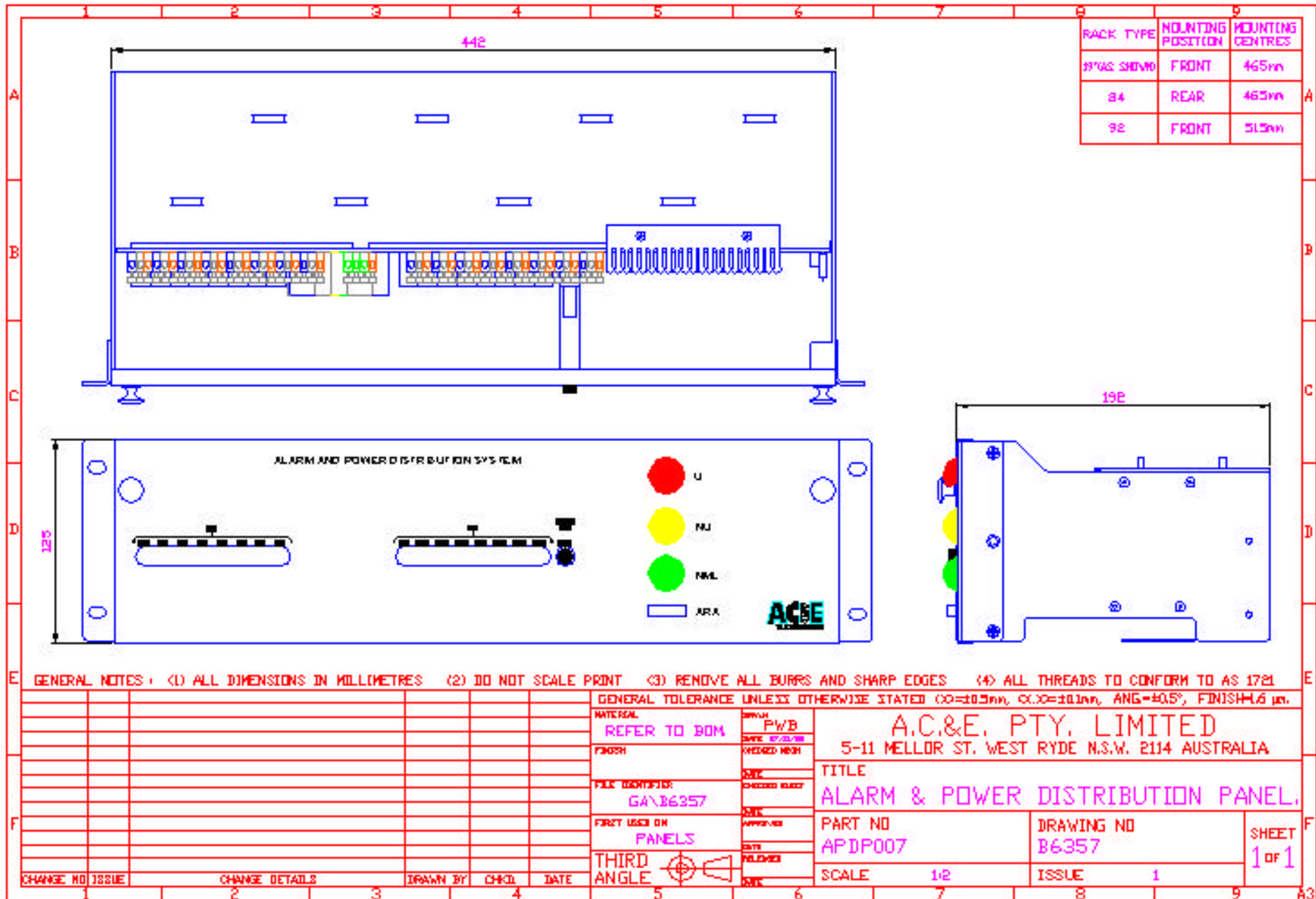
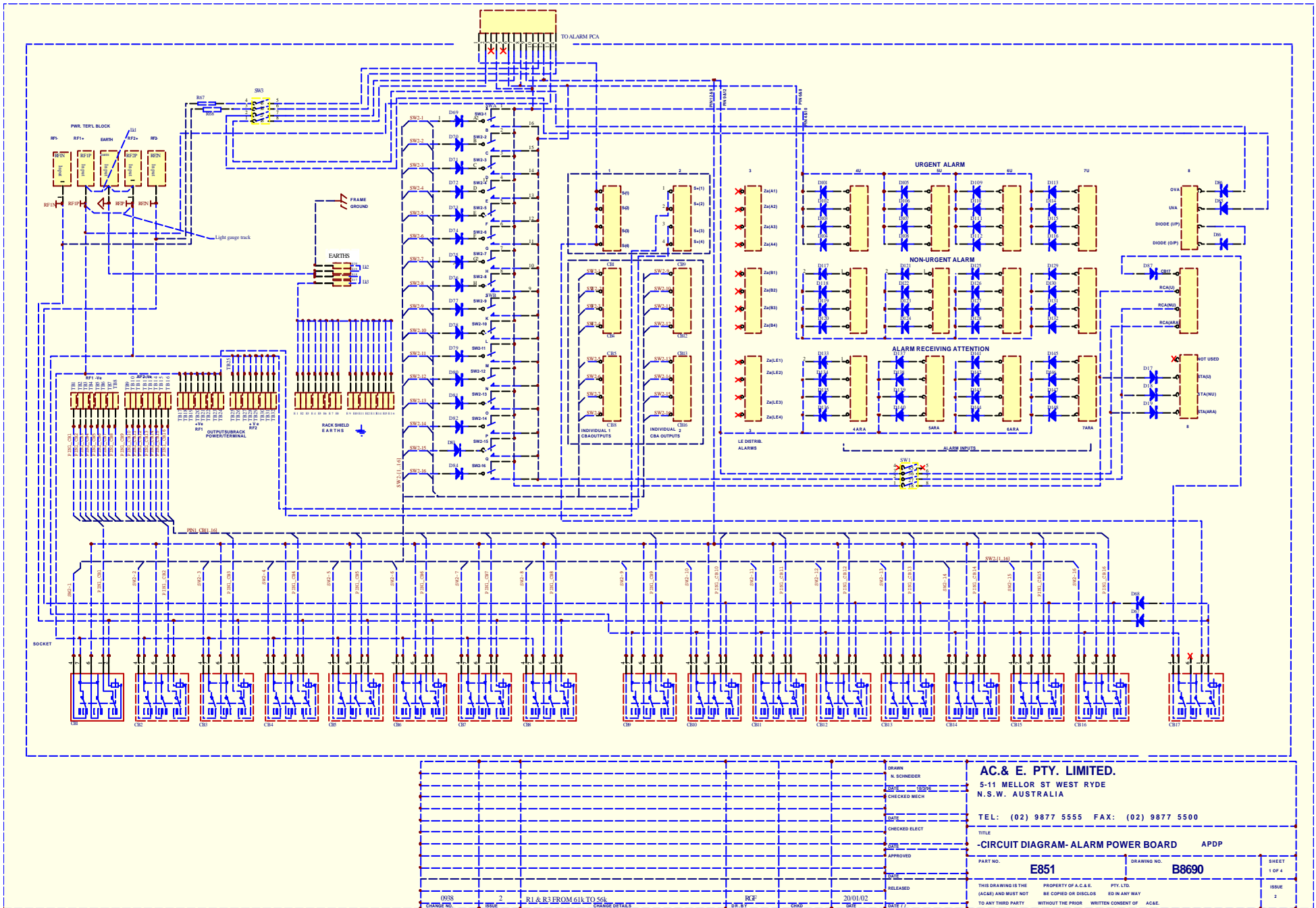


FIGURE 1 - ETA BREAKERS

ISSUE: 1



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| | | | | | |
|------------|---|-------------------------|-----|----------|--------|
| 0938 | 2 | R1 & R3 FROM 61K TO 56K | RCF | 20/01/02 | DR |
| CHANGE NO. | | CHANGE OR DATE | BY | DATE | REASON |

AC. & E. PTY. LIMITED.
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 N.S.W. AUSTRALIA

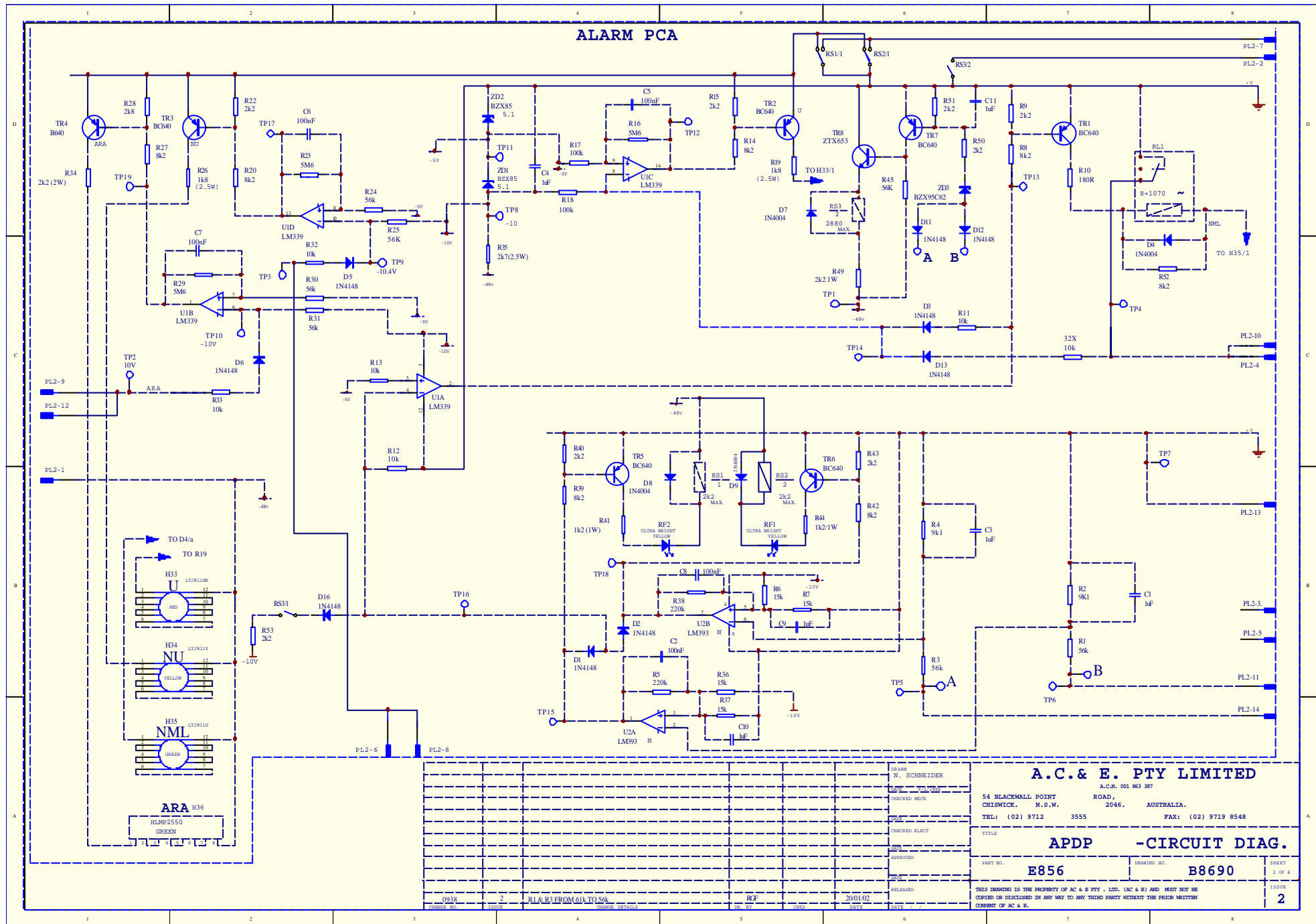
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TITLE: **CIRCUIT DIAGRAM- ALARM POWER BOARD** APDP

PART NO. **E851** DRAWING NO. **B8690** SHEET 1 OF 4

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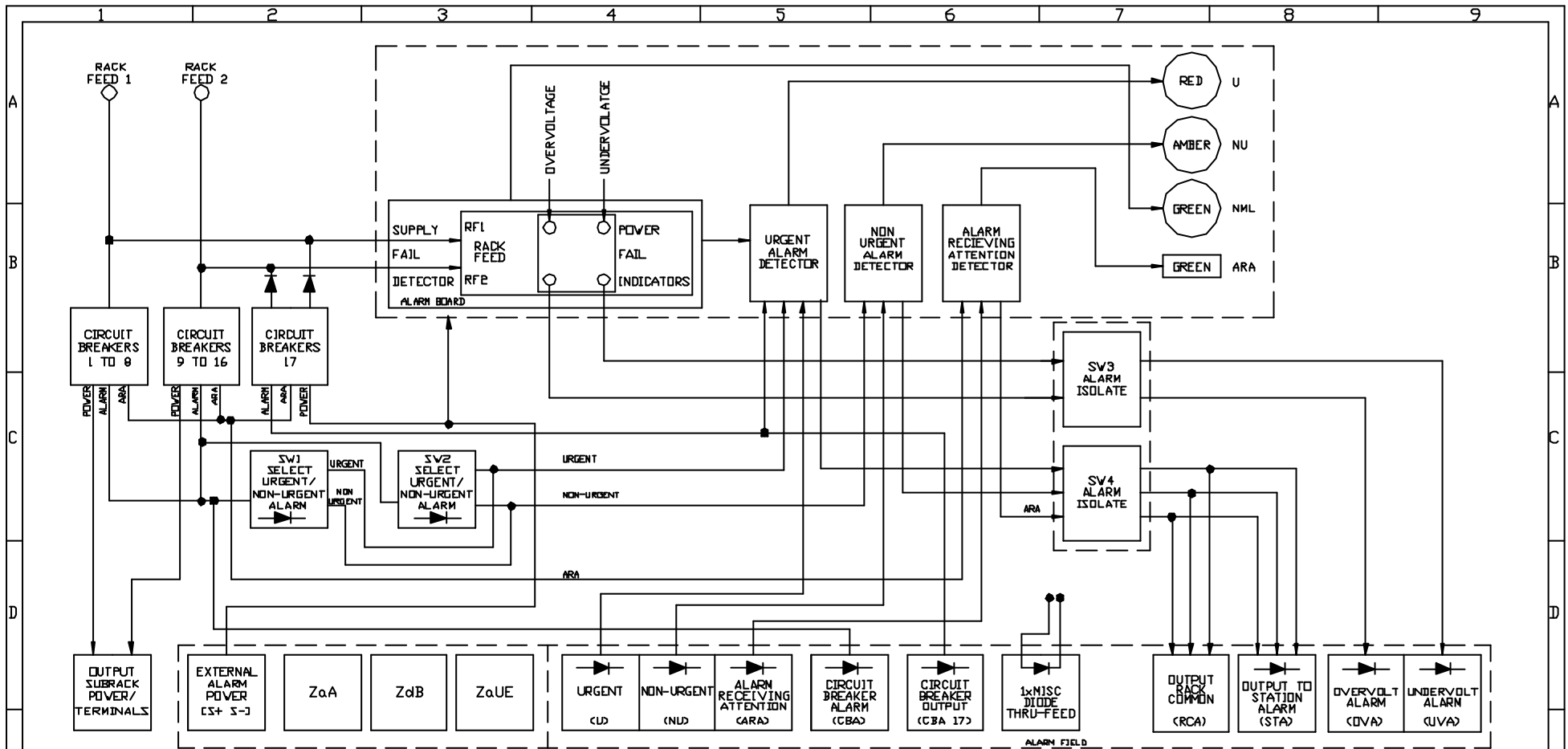
ALARM PCA



ARA H36
HIMP2550
GREEN

| | | | | |
|------------|-------|-------------------------|------|----------|
| 0938 | 2 | R1 & R3 FROM 61K TO 56K | RF | 20/01/02 |
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| APDP -CIRCUIT DIAG. | |
| PART NO. E856 | DRAWING NO. B8690 |
| APPROVED | ISSUED |
| RELEASED | 2 |



GENERAL NOTES : (1) ALL DIMENSIONS IN MILLIMETRES (2) DO NOT SCALE PRINT (3) MUST BE FREE OF BURRS AND SWarf (4) THREADS TO CONFORM TO AS1721

(X)=±0.5 mm, (X.X)=±0.1 mm, ANG.=±5°

| | | | | | | | | | | | | | |
|-----------|-------|----------------|--|---|------|---------------|--|--|--|---------|--|--------------|--|
| | | | | GENERAL TOLERANCE UNLESS OTHERWISE STATED | | | | | | | | | |
| | | | | MATERIAL | | DRAWN | | A.C.&E. PTY. LIMITED | | | | | |
| | | | | REFER TO B.O.M | | RGF | | | | | | | |
| | | | | FINISH | | DATE 18/01/96 | | TITLE BLOCK, LAYOUT, ALARM & POWER DISTRIBUTION PANEL | | | | | |
| | | | | | | CHECKED MEDH | | | | | | | |
| | | | | FILE IDENTIFIER | | DATE | | PART NO APDP007 | | | | | |
| | | | | PCB\E851\E851-4 | | CHECKED ELECT | | | | | | | |
| | | | | FIRST USED ON | | DATE | | DRAWING NO B8690 | | | | | |
| | | | | TELECOMMUNICATIONS | | APPROVED | | | | | | | |
| | | | | THIRD ANGLE | | DATE | | SCALE NTS | | | | | |
| | | | | | | RELEASED | | | | | | | |
| 0938 | | 2 | | CHANGE TO SHT 2 | | RGF | | 20/01/03 | | ISSUE 2 | | SHEET 4 of 4 | |
| CHANGE NO | ISSUE | CHANGE DETAILS | | DR. BY | CHKD | DATE | | | | | | | |

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