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IRT 1RU
Rack Alarm Gathering Unit (RAGU)
Type TPD-1120

Telstra Serial/Item 736/311

Designed and manufactured in Australia

IRT can be found on the Internet at:
http://www.irtelectronics.com

IRT 1RU
Rack Alarm Gathering Unit (RAGU)
Type TPD-1120
(Telstra Serial/Item 736/311)

Description

Instruction Book

Table of Contents

This instruction book applies to units later than S/N 9800000.

General description

In large installations, the number of alarms provided by equipment often becomes so great that they are difficult to manage, and so often are left unconnected.

The purpose of the TPD-1120 Rack Alarm Gathering Unit (RAGU) acts as a central unit that collects the various alarm signals generated by different types of equipment.

When an alarm is indicated on any input, the RAGU provides both an alarm output and a visual indication of the alarm input number allowing the alarm source to be located quickly.
Where a number of racks of equipment are co-located, it is best to locate one RAGU per rack. The alarm output of each RAGU (RAGU1) is sent to another RAGU (RAGU2) located at a central supervisory point. The RAGU2 will then indicate the rack in which the alarm is present and the RAGU1 will indicate the source.

The TPD-1130 Visual & Audio Alarm Panel (VAAP - pronounced varp) is intended to accompany and supplement the RAGU by providing large visual indicators and audio enunciators to attract attention to an alarm condition.

Both units provide facilities for operator response (Alarm Receiving Attention) and indications of whether the alarm has been acknowledged (New Alarm / Old Alarm).

Standard features:

- 24 alarm inputs.
- Alarm polarity selectable for each input.
- ARA output for each input.
- LED test for ALARM and ARA.
- History LED for each input.
- RS485 full function remote interface.

Accessories available:-

TPD-1130 Visual & Audio Alarm Panel (VAAP)	Provides visual and audible indications of RAGU alarms and their status. Adjustable volume and muting facilities are provided.
Instruction Book.	

Technical specifications
Rack Alarm Gathering Unit (RAGU)
Type TPD-1120

Alarm and ARA:

Inputs:

Internal 12 volt relay.

Must operate current	20 mA.
Must release current	1.5 mA.
Internal relay supply voltage	Selectable to either +12V ±1 V or -12V ±1V.

Damage will occur if a voltage of greater than ±12 volts is applied to any of these inputs.

Serial Communication:

Type	Conforming to RS485.
Connector	9 pin Female D.
Protocol	Duplex (4 wire) or Half Duplex (2 wire).
Speed	Selectable - 38400, 19200, 9600, 4800, 2400, 1200 baud.
Word length	One start, 8 data, one stop bits.

Connectors: Standard — Plugable screw block connectors (Phoenix).

Power requirements: 220 Vac RMS - 260 Vac RMS 45 - 60 Hz.
or -48 Vdc +15/-5 volts.

Power consumption

Power supply ‘drop out’ immunity — The normal operation of the unit will not be affected by power dropouts of up to 300 ms duration.

Other:

Temperature range	0 - 50° C ambient.
Finish	Grey enamel, silk-screened black lettering & red IRT logo.
Dimensions	44 x 483 x 236 mm
Supplied accessories	Matching connectors for alarm inputs and outputs.
Optional accessories	Instruction manual

Technical description

A full technical description is beyond the scope of this manual due to the overall operation being under the control of a microprocessor. The programming of this element is proprietary to IRT and general servicing of the unit outside of the factory is not recommended.

The sections of the circuit discussed below are those which may assist the user in locating simple faults which may be caused in the field by inadvertent misconnections or non-logic related problems.

Power supply:

(See Dwg: 804164 sheets 1 & 5.)
The TPD-1120 may be powered from either 240 Vac mains or -48 Vdc.
The AC mains supply connection is via an IEC320 connector with integral fuseholder. The specified 250 mA SLOW BLOW fuse will only fail under extreme circumstances and should never be replaced by a fuse of greater value. Continual failure of this fuse indicates either a mains power problem or failure of the internal power supply.
The AC mains is connected to a toroidal transformer that provides low voltage AC to the internal power supply.

The low voltage AC is rectified by diodes D 52 to D 55 and filtered by C 23 to provide approximately -50 Vdc.
Fusible resistor R50 provides secondary fuse protection to the rectifiers and transformer against catastrophic failure of the following DC-DC converter.

The -48 Vdc power input is made via a Klippon connector with polarities shown on the silk screening adjacent to the connector. The DC supply connect to the internal power supply via a separate fuse on the rear panel.
The same comments apply to this 2A fuse as to the AC fuse. However, in this case a SLOW BLOW type is not specified as there is no transformer inrush current in the DC path.

The -48 Vdc supply is connected to the filtered AC supply point via diode D 51 (to provide reverse polarity protection) and fusible resistor R 49.

The raw DC supply is connected to a DC-DC converter module DC 1, which provides the ±12 Vdc and +5 Vdc power supply rails. The input to this converter is protected by a 68 V zener diode ZD 1, in case of extreme input overload.
Should this occur, the relevant fusible resistor will either immediately blow or, in the case of long term mild overload, may increase in value. If this is suspected, the resistance should be measured and, if out of tolerance, should be replaced by a resistor of exactly the same type and value.

Alarm inputs:

(See Dwg: 804164 sheets 3 & 4.)
For additional details see *Configuration*.

You may select the polarity of the 12 V relay supply. On TB 9, if you link Vs to +12 then the relay supply is +12 Volts and the relay will operate when the input is shorted to ground by a contact or a saturated NPN transistor.
If, on TB 9, you link Vs to -12 then the relay supply is -12 Volts and the relay will operate when the input is shorted to ground by a contact or a saturated PNP transistor.

Never link Vs to both +12 and -12 at the same time. This one relay supply selection is applied to all 24 Alarm inputs and 24 ARA inputs. ***Do not apply a voltage greater than 12 volts to any input.***

The relay has the following nominal characteristics:

Coil resistance	480 Ω.
Nominal current	25 mA @ 12 Vdc.
Must operate voltage	9.6 Vdc.

Transistor drivers used to interface to these inputs should have ratings well in excess of the above characteristics. In addition, diode protection against back EMF from the relay should be employed.

Where long cable runs are required to interface to these inputs, the type of cable should be chosen so that the cable impedance and transistor saturation voltage are sufficiently low that the Must Operate Voltage specification is comfortably met.

Alarm outputs:

(See Dwg: 804164 sheet 1.)
The Enable Alarm Output switch on the front panel allows operation of the Alarm Relay when a new alarm is detected, and allows operation of the ARA Relay when there are any Alarms Receiving Attention.
This function is via the microprocessor, which then controls the relay outputs via U 21 relay drivers. A set of changeover contacts is made available on the rear assembly for the Alarm and ARA outputs (RL 50 & 49).

The maximum ON contact resistance is specified as 100 mΩ at 0.1 A and 6 Vdc.

The following relay contact values should not be exceeded:

Maximum switching current	500 mA
Maximum switching voltage	50 V
Maximum switching power	25 VA.

ARA (ACK) input:

(See Dwg: 804164 sheet 1.)
ARA - Operation converts any Alarm from “New” to “Alarm Receiving Attention” i.e. converts Alarm and Alarm Summary LED's from flashing to steady and releases Alarm Summary Relay if it was operated.

The front panel switch is connected to connector pin 10 of TB 7 on the rear panel and connects this terminal to ground when operated.

The Acknowledge input on pin 11 of TB 7 on the rear panel connects via D 57 protection diode to the acknowledge input relay, which signals a contact closure to ground to the microprocessor.

In stand-alone operation, the front panel switch is inoperative unless terminals 10 and 11 of TB7 are connected.
When used in conjunction with another RAGU or VAAP, the ACK switch output is connected from the master to the ACK input on the slave.

Remote control interface:

(See Dwg: 804164 sheet 1.)
Remote control is via an RS485 interface. For programming and protocol details of this interface, see *Configuration*.

The remote control connection is to a 9 pin 'D' connector on the rear panel. The interface to the microprocessor is via bi-directional bus transceivers U 22 & U 23.

The following links control the operation of the interface.

LK 5: Simplex / duplex selection
LK 4: 220 Ω termination for RS485.
LK 6: 220 Ω termination for RS485.

In accordance with RS485, the inclusion and value of cable termination is dependent on the specific environment in which the interface is employed.
For information on cable types, distances and impedances please consult the RS485 standard.

Internal adjustments

No user adjustments are required other than setting internal links as outlined under *Configuration*.

Link settings:
For an explanation of the use of each of these settings see *Configuration*.

LK 1: Mode select 2 - master.
LK 2: Mode select 3 - slave.
LK 3: Power supply ground to chassis.
LK 4: 220 Ω termination for RS485.
LK 5: Simplex / duplex selection
LK 6: 220 Ω termination for RS485.

TB 9 Relay supply polarity selection.

Configuration

Serial port modes:

The TPD-1120 has a serial communications port that can be used to report the state of the inputs. There are three link selectable options, each option providing a different method of reporting.

Mode 1; The TPD-1120 will respond to a correctly addressed message to report its status or to execute reset and acknowledge functions.
Mode 2; The TPD-1120 will send an addressed message containing some status information every 140 ms.
Mode 3; The TPD-1120 no longer responds to its alarm and ARA inputs, but displays information received from another TPD-1120 which itself is operating in Mode 2.

In all modes, the unit will only respond to messages specifically addressed to that unit.

To select Modes use LK 1 and 2.

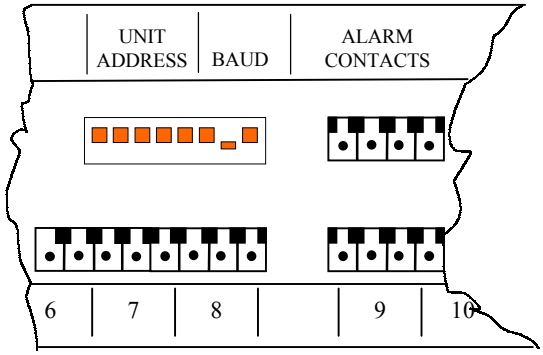
No links	Mode 1
Link 1 installed	Mode 2 (Master)
Link 2 installed	Mode 3 (Slave)

Address and baud rates:

SW4 on the rear of the unit is used to set the baud rate of the serial communications, and to set the unit address.

An 'ON' represents a 0.

SW 4.1 (LSB) to SW 4.5 (MSB) are the address and SW 4.6 (LSB) to SW 4.8 (MSB) is the baud rate.



SW4 1 - 5	Address
00000	0
10000	1
01000	2
11000	3
00100	4
10100	5
01100	6
11100	7

SW4 1 - 5	Address
00010	8
10010	9
01010	10
11010	11
00110	12
10110	13
01110	14
11110	15

SW4 1 - 5	Address
00001	16
10001	17
01001	18
11001	19
00101	20
10101	21
01101	22
11101	23

SW4 1 - 5	Address
00011	24
10011	25
01011	26
11011	27
00111	28
10111	29
01111	30
11111	31

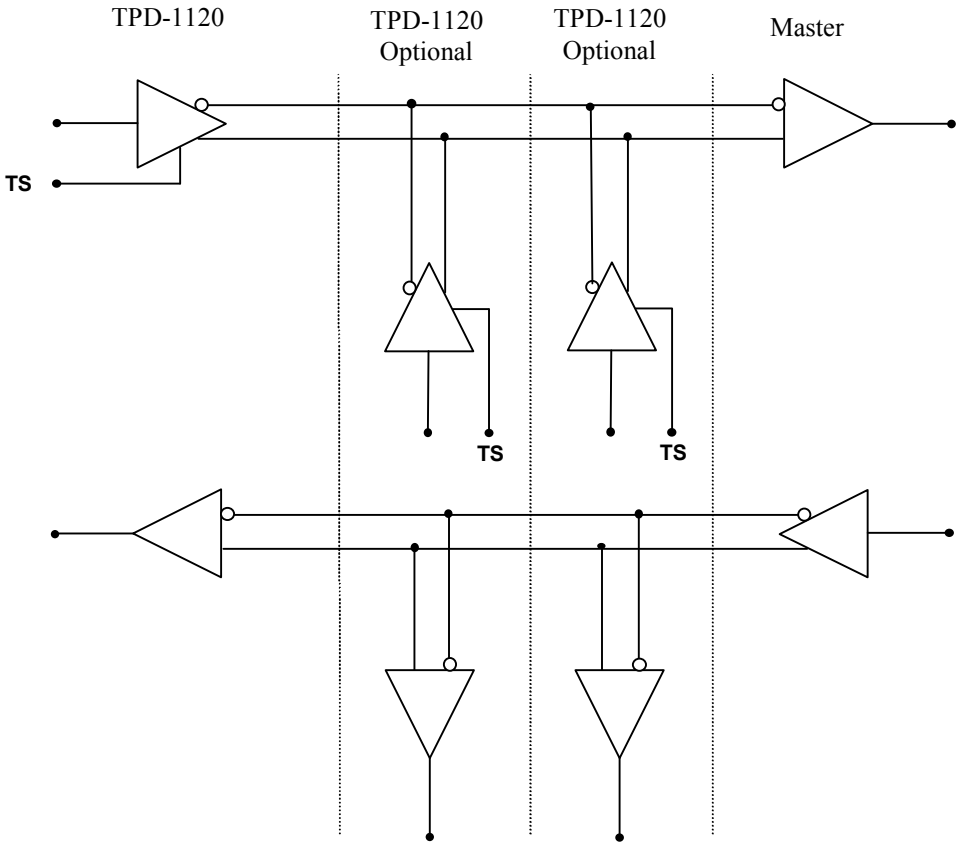
A TPD-1120 will only respond to messages that contain the correct unit address in the address field. When responding, a TPD-1120 will send its address in the address field.

SW4.6 - 8	Speed
000	38400
100	19200
010	9600
110	4800
001	2400
101	1200

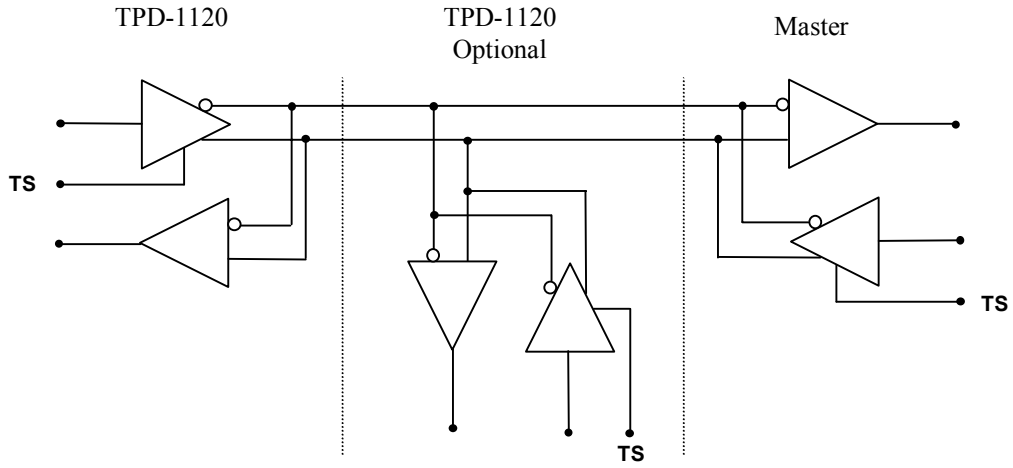
The speed and address are only set at 'power up'. If you change these settings, you must remove the power from the unit for at least 3 seconds.

Full & half duplex modes:
This port can be operated in full duplex or a half-duplex mode.

Full Duplex

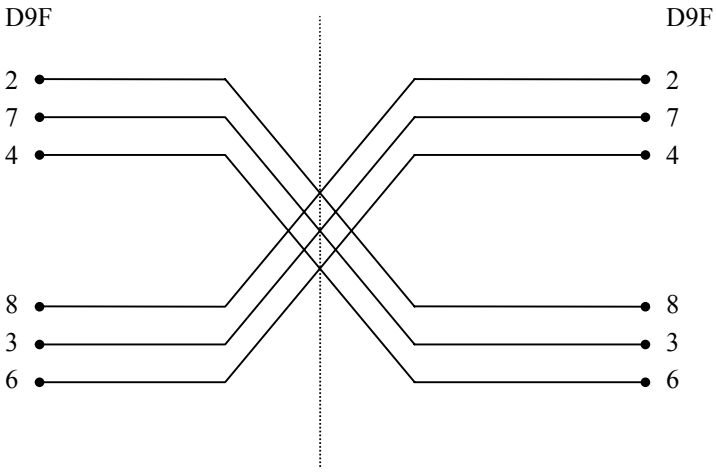


Half Duplex



For half duplex operation, install link LK 5.

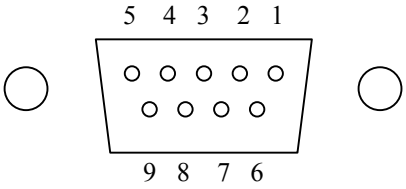
Cable connection for Full Duplex.



DB9 pin numbering:

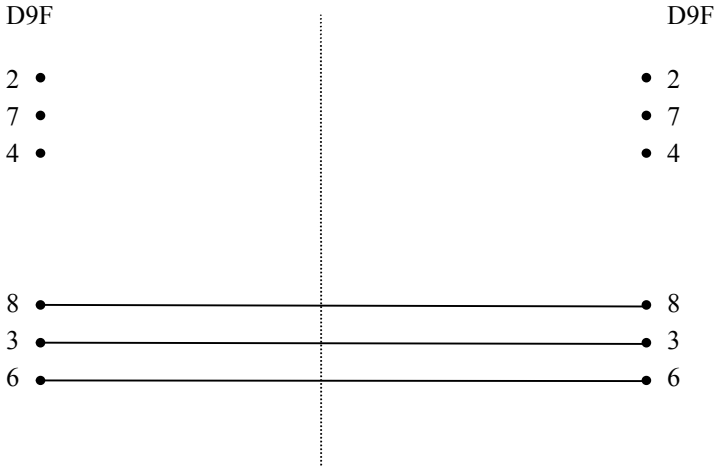
1. Gnd chassis
2. FD-
3. HD+
4. Gnd signal
5. N/C
6. Gnd signal
7. FD+
8. HD-
9. Gnd chassis

Remote control



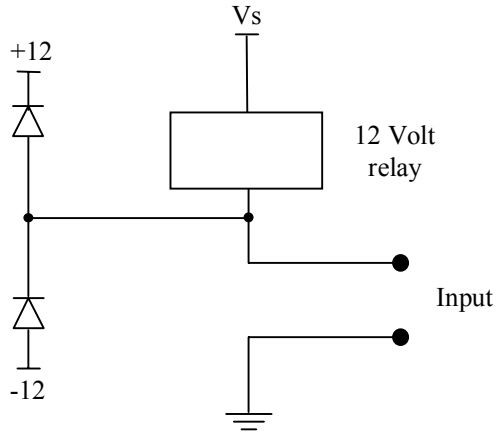
9 pin female ‘D’ connector as viewed at chassis rear

Cable Connection for Half Duplex.

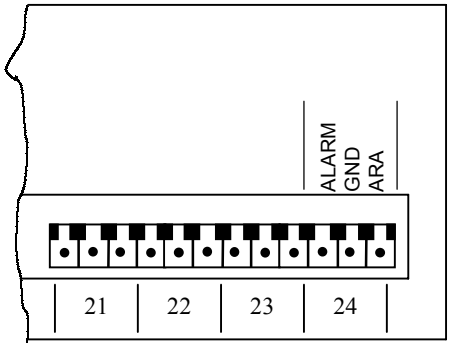


Alarm inputs:

The input circuitry of the 24 Alarm inputs and the 24 ARA inputs are thus:



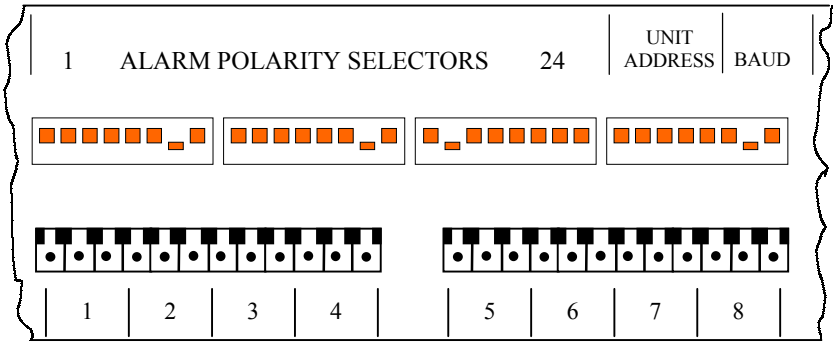
You may select the polarity of the 12 V relay supply. On TB 9, if you link Vs to +12 then the relay supply is +12 Volts and the relay will operate when the input is shorted to ground by a contact or a saturated NPN transistor.
If, on TB 9, you link Vs to -12 then the relay supply is -12 Volts and the relay will operate when the input is shorted to ground by a contact or a saturated PNP transistor.



Never link Vs to both +12 and -12 at the same time. This one relay supply selection is applied to all 24 Alarm inputs and 24 ARA inputs. ***Do not apply a voltage greater than 12 volts to any input.***

For each of the 24 Alarm inputs you may set the condition which generates an alarm. That is, you can configure the alarm to be active either if the relay is operated, or if the relay is not operated.

The 24 alarm polarity switches are accessible from the rear of the unit. An 'ON' switch (up) makes the alarm state to be when the relay is operated, and an off (down) makes the alarm state to be when the relay is not operated.



Command message formats:

When operating in Mode 1, the host must format its command messages as follows.

Word	Function
1	Break
2	Address
3	Word Count
4	Command
5	Check Sum

Break - At least 20 bit times of Space level.
Address - One byte containing the right justified 5 bit address of the target TPD-1120.
Word Count - One byte containing the number of bytes in the remainder of the message. (2)

Command - One byte indicating the function required.

Hex 80	Report state of Alarm inputs
Hex 81	Report Acknowledged alarms
Hex 82	Report History status
Hex 83	Report state of ARA inputs
Hex 84	Do Alarm Test function.
Hex 85	Do ARA Test function
Hex 86	Reset History
Hex 87	Acknowledge Alarms (operate ARA)

Check Sum - One byte of such a value that the hexadecimal sum of bytes 2, 3, 4, and 5 = 0 MOD 256.

In Mode 1, a TPD-1120 will respond to a valid command with a message in the following manner.

1. In response to commands Hex 80 to 83: -

Word	Function
1	Break
2	Address
3	Word Count
4	Function
5	Data 1
6	Data 2
7	Data 3
8	Check Sum

Break - At least 20 bit times of Space level.
Address - One byte containing the right justified 5 bit address of the TPD-1120.
Word Count - One byte containing the number of bytes in the remainder of the message. (5)
Function - One byte indicating the function being executed

Hex 40	Reporting state of Alarm inputs
Hex 41	Reporting Acknowledged alarms
Hex 42	Reporting History status
Hex 43	Reporting state of ARA inputs

Data 1 - One byte indicating the state of Input 1 (LSB) to Input 8 (MSB) [1 = active, 0 = idle]
Data 2 - One byte indicating the state of Input 9 (LSB) to Input 16 (MSB) [1 = active, 0 = idle]
Data 3 - One byte indicating the state of Input 17 (LSB) to Input 24 (MSB) [1 = active, 0 = idle]
Check Sum - One byte of such a value that the unsigned hexadecimal sum of bytes 2,3,4,5,6,7 and 8 = 0 MOD 256

1. In response to commands Hex 84 to 87: -

Word	Function
1	Break
2	Address
3	Byte Count
4	Function
5	Check Sum

Break - At least 20 bit times of Space level.
Address - One byte containing the right justified 5 bit address of the TPD-1120.
Word Count - One byte containing the number of bytes in the remainder of the message. (2)
Function - One byte indicating the function being executed

Hex 44	Doing Alarm Test function.
Hex 45	Doing ARA Test function.
Hex 46	Resetting History.
Hex 47	Acknowledging Alarms (operate ARA).

Check Sum - One byte of such a value that the unsigned hexadecimal sum of bytes 2,3,4 and 5 = 0 MOD 256.

Operation

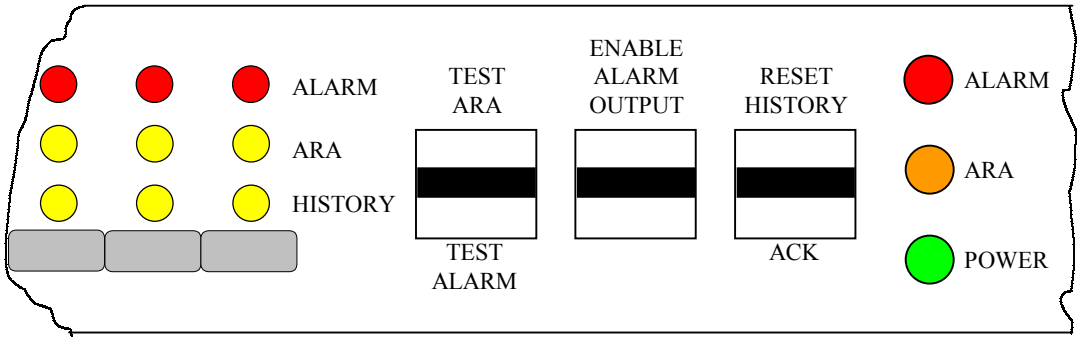
Front Panel Controls
ARA - Operation converts any Alarm from "New" to "Alarm Receiving Attention" i.e. converts Alarm and Alarm Summary LED's from flashing to steady and releases Alarm Summary Relay if it was operated. This switch is inoperative unless terminals 10 and 11 of TB7 are connected.

Reset History - Extinguishes any History LED's.

Test ARA - Lights all 24 ARA LED's, the ARA Summary LED. Operates the ARA Relay.

Test Alarm - Flashes all 24 Alarm LED's, the Alarm Summary LED and operates the Alarm Relay.

Enable Alarm Output - Allows operation of the Alarm Relay when a new alarm is detected, and allows operation of the ARA Relay when there are any Alarms Receiving Attention.



Front Panel Indicators.
Alarm - Flashes when there are any Alarms that have not been acknowledged. Becomes steady when all Alarms are Receiving Attention. Extinguishes when there are no Alarms.
When operating in Mode 3 and serial communications are lost all Alarm LED's are extinguished and the Alarm Summary LED flashes.

ARA - Indicates that there is at least one Alarm Receiving Attention or that there is at least one ARA input active.

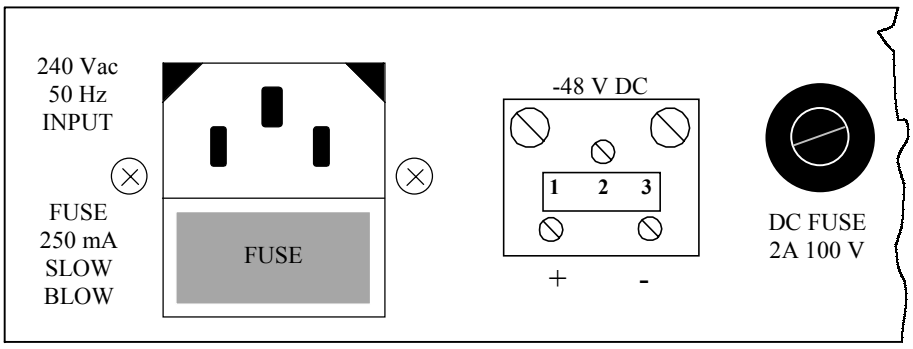
Power - Indicates that power is being supplied to the TPD-1120.

Power:

Either -48 Vdc or 240 Vac may be used to operate the TPD-1120.

It is not recommended that both supplies be present at the same time.

The fuse for the 240 V input is integral to the rear IEC 320 AC power input connector.



The fuse for the -48 Vdc input is on the rear panel.

Installation

Operational Safety:

WARNING

Operation of electronic equipment involves the use of voltages and currents that may be dangerous to human life. Note that under certain conditions dangerous potentials may exist in some circuits when power controls are in the **OFF** position.
Maintenance personnel should observe all safety regulations.

Do not make any adjustments inside equipment with power **ON** unless proper precautions are observed. All internal adjustments should only be made by suitably qualified personnel. All operational adjustments are available externally without the need for removing covers or use of extender cards.

Pre-installation:

Handling:

This equipment may contain or be connected to static sensitive devices and proper static free handling precautions should be observed.

Where individual circuit cards are stored, they should be placed in antistatic bags. Proper antistatic procedures should be followed when inserting or removing cards from these bags.

Power:

AC mains supply: Ensure that operating voltage of unit and local supply voltage match and that correct rating fuse is installed for local supply.

DC supply: Ensure that the correct polarity is observed and that DC supply voltage is maintained within the operating range specified.

Earthing:

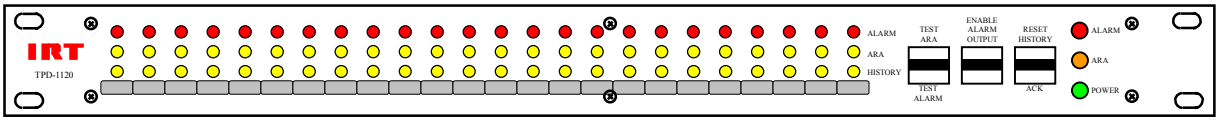
The earth path is dependent on the type of frame selected. In every case particular care should be taken to ensure that the frame is connected to earth for safety reasons. See frame manual for details.

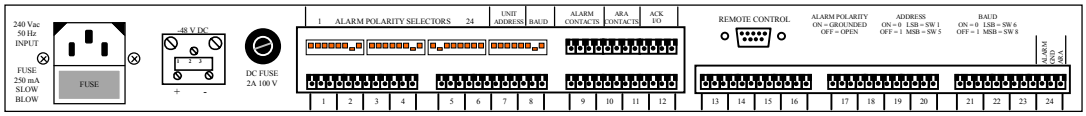
Signal earth: For safety reasons a connection is made between signal earth and chassis earth. No attempt should be made to break this connection.

Connections:

Front & rear panel connector diagrams

The following front panel and rear assembly drawings are not to scale and are intended to show relative positions of connectors, indicators and controls only.





Maintenance & storage

Maintenance:

No regular maintenance is required.

Care however should be taken to ensure that all connectors are kept clean and free from contamination of any kind. This is especially important in fibre optic equipment where cleanliness of optical connections is critical to performance.

Storage:

If the equipment is not to be used for an extended period, it is recommended the whole unit be placed in a sealed plastic bag to prevent dust contamination. In areas of high humidity a suitably sized bag of silica gel should be included to deter corrosion.

Where individual circuit cards are stored, they should be placed in antistatic bags. Proper antistatic procedures should be followed when inserting or removing cards from these bags.

Warranty & service

Equipment is covered by a limited warranty period of three years from date of first delivery unless contrary conditions apply under a particular contract of supply. For situations when "**No Fault Found**" for repairs, a minimum charge of $A100.00 will apply, whether the equipment is within the warranty period or not.

Equipment warranty is limited to faults attributable to defects in original design or manufacture. Warranty on components shall be extended by IRT only to the extent obtainable from the component supplier.

Equipment return:

Before arranging service ensure that the fault is in the unit to be serviced and not in associated equipment. If possible, confirm this by substitution.

Before returning equipment contact should be made with IRT or your local agent to determine whether the equipment can be serviced in the field or should be returned for repair.

The equipment should be properly packed for return observing antistatic procedures.

The following information should accompany the unit to be returned:

1. A fault report should be included indicating the nature of the fault
2. The operating conditions under which the fault initially occurred.
3. Any additional information which may be of assistance in fault location and remedy.
4. A contact name and telephone and fax numbers.
5. Details of payment method for items not covered by warranty.
6. Full return address.
7. For situations when "**No Fault Found**" for repairs, a minimum charge of $A100.00 will apply, whether the equipment is within the warranty period or not.

Please note that all freight charges are the responsibility of the customer.

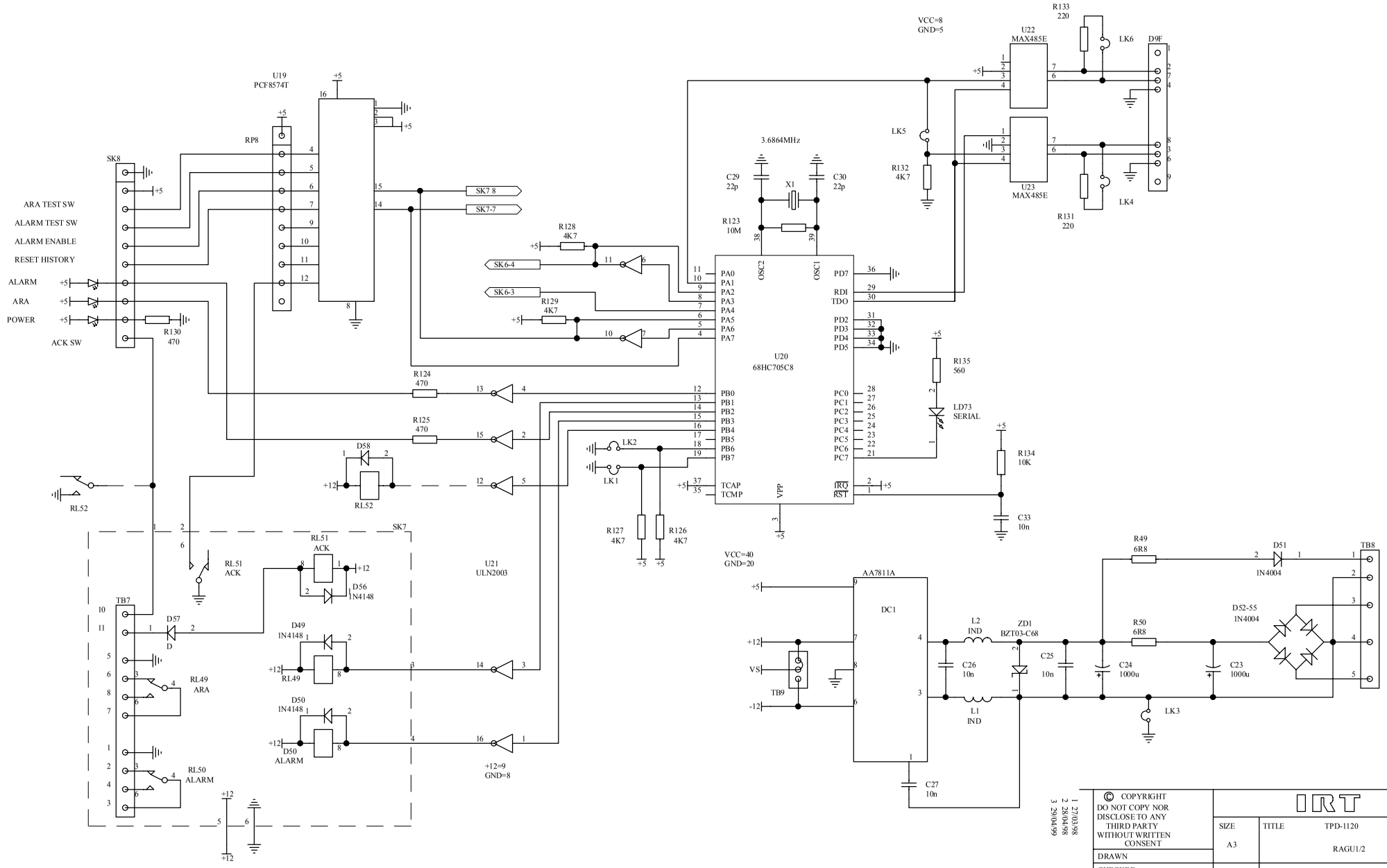
The equipment should be returned **to the agent who originally supplied the equipment or, where this is not possible**, to IRT direct as follows.

Equipment Service
IRT Electronics Pty Ltd
26 Hotham Parade
ARTARMON
N.S.W. 2064
AUSTRALIA

Phone: 61 2 9439 3744 Fax: 61 2 9439 7439
Email: service@irtelectronics.com

Drawing index

Drawing #	Sheet #	Description
804164	1	TPD-1120 Power supply and microprocessor circuit diagram.
804164	2	TPD-1120 LED drivers and DIP switch settings circuit diagram.
804164	2	TPD-1120 relay drivers 1 - 32 circuit diagram.
804164	2	TPD-1120 relay drivers 33 - 48 circuit diagram.
804164	5	TPD-1120 wiring diagram.



ISS 3 : CORRECTED D9F
ADDED RL52

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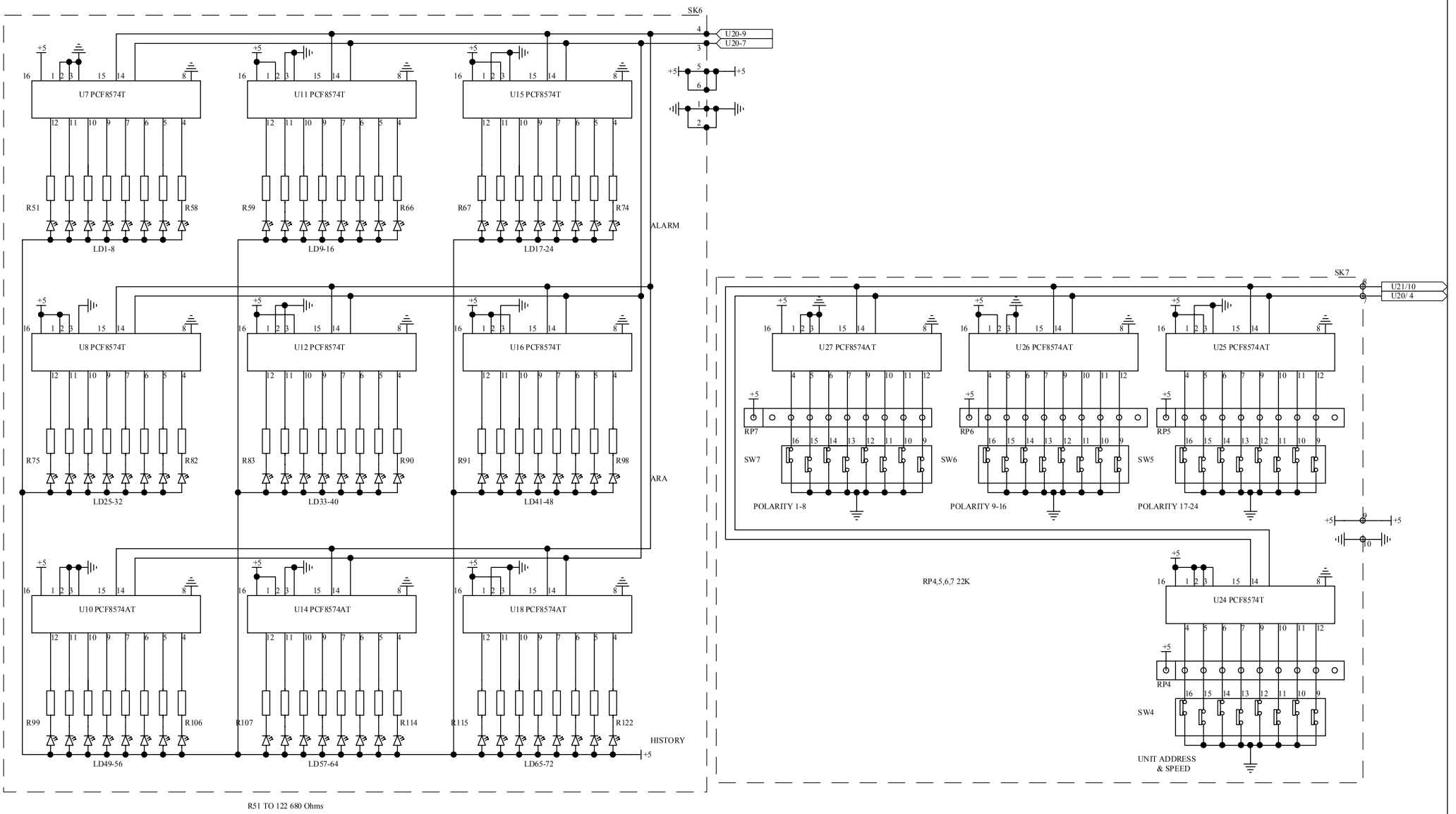
CHECKED	SCALE	DRAWING No. 804164	SHEET 1 OF 4
ENG. APP.			
CONTRACT No.	IRT Electronics Pty. Ltd. ARTARMON NSW AUSTRALIA 2064		

1 27/03/98
2 28/04/98
3 29/04/99



R51 TO 122 680 Ohms

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ENG. APP.			
CONTRACT No.		IRT Electronics Pty. Ltd. ARTARMON NSW AUSTRALIA 2064	

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SIZE A3

TITLE TPD-1120 RAGU1/2

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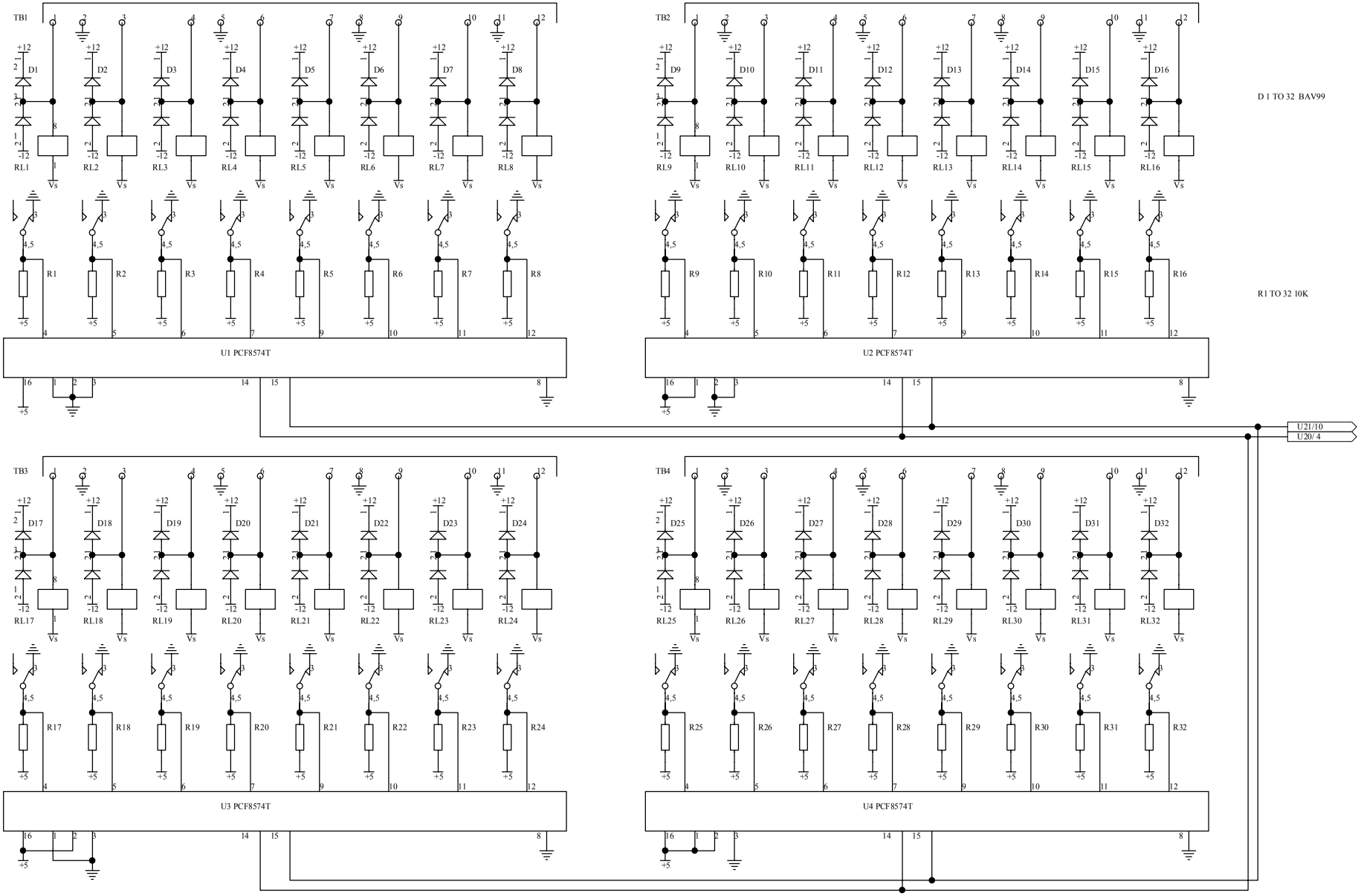

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CONTRACT No.

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SIZE A3

TITLE TPD-1120 RAGU1/2

SCALE

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SHEET 3 OF 4

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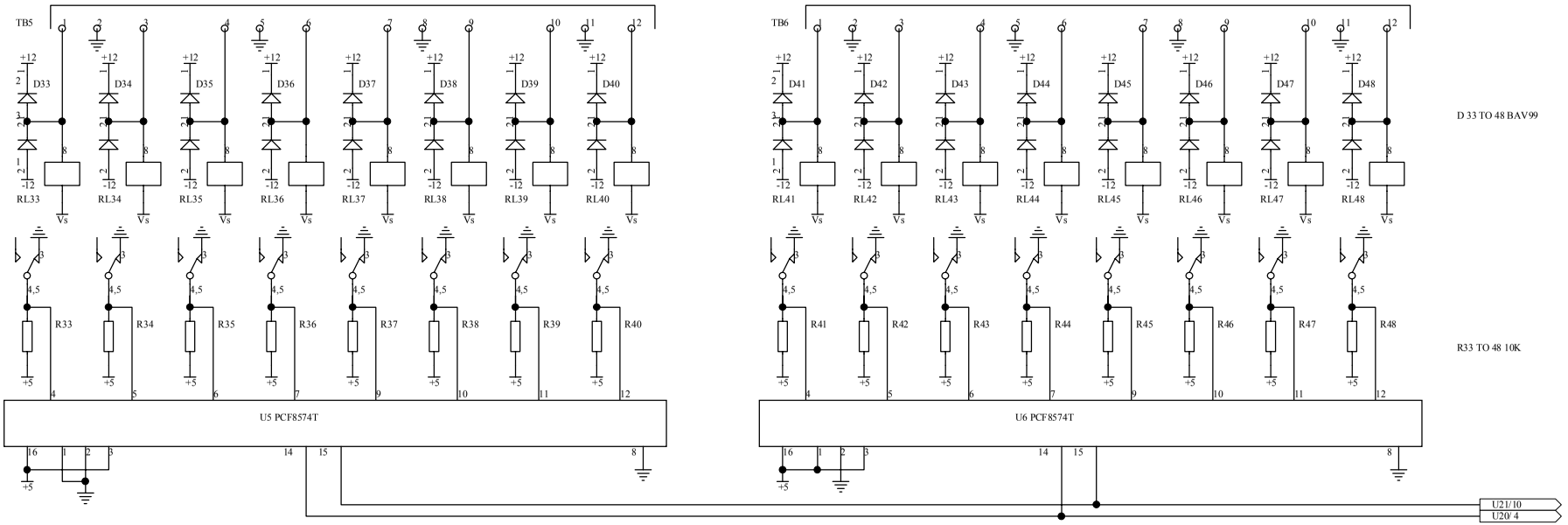

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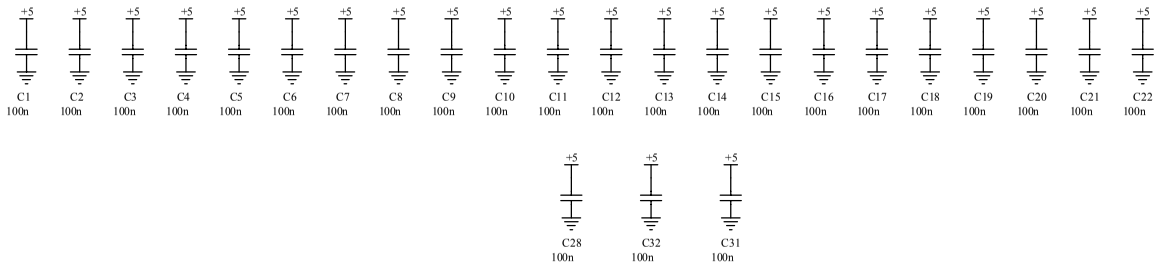

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CONTRACT No.	IRT Electronics Pty. Ltd. ARTARMON NSW AUSTRALIA 2064		

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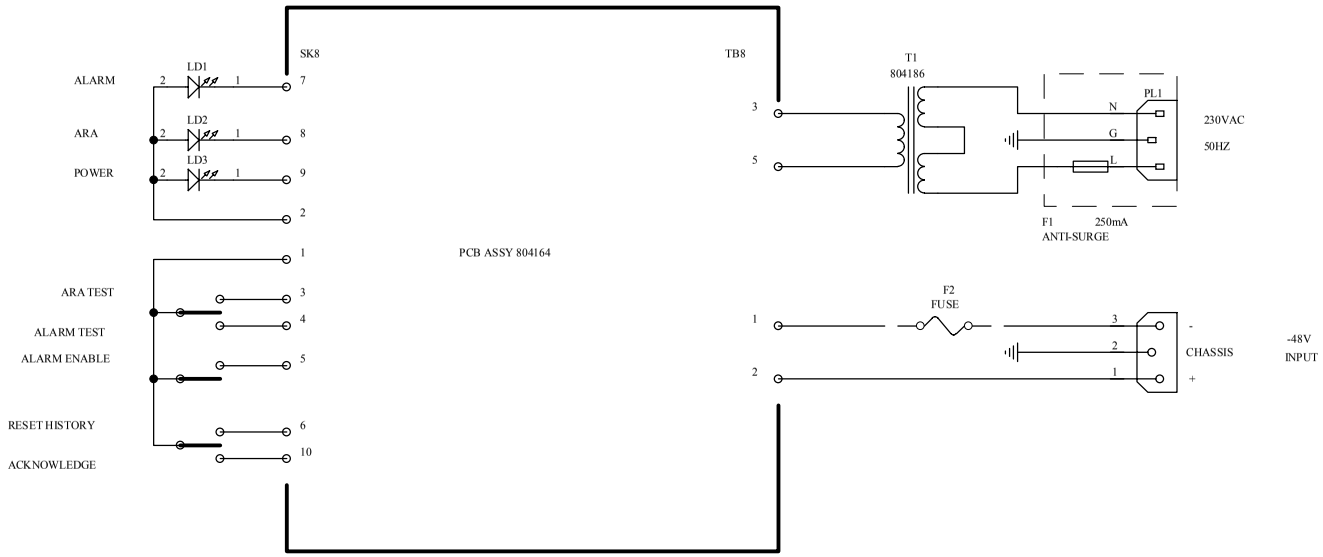

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