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IRT Eurocard

Types DDA-3301
G.703 Data Distribution Amplifiers
&
ZDA-3301RH
Handshake changeover assembly

Designed and manufactured in Australia

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

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Instruction Book

Table of Contents

This instruction book applies to units later than S/N 0309251.

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General description

The DDA-3000 series of data distribution amplifiers are intended for use with data signals conforming to the ITU Rec. G.703. Due to the fixed rates of the G.703 specification it is necessary to specify the G.703 data rate when ordering so that the appropriate timing components, coding and levels are set in accordance with the standard.
For ease of reference the different amplifiers are called by the same designation with a suffix to indicate the rate. This does not indicate that a product at one data rate can be readily changed to a different rate, but rather that that they perform similar functions.
Some of the Data Distribution Amplifiers (DDA's) in the series are primarily designed to work as stand alone DDA's whilst others are intended primarily for use in redundant path switching applications.

The DDA-3301 is currently available in 8, 34 and 45 Mb/s G.703 rates and is primarily intended for use in pairs with a double width rear assembly (ZDA-3301RH) for automatic path protection applications.

Three outputs are provided at the rear of the module with an additional output for monitoring purposes on the front panel. The primary output is controlled by relays to provide a bypass signal from the input in the event of a power failure.

Indicators are provided on the front panel for: Data loss
AIS detect (Alarm Indication Signal)
Module in service
Module in standby.

External alarm signals are also available on the rear of the module.

Changeover inhibit and changeover request switches are provided on the front panel for use where modules are linked in pairs for redundancy. For this configuration a special handshake connector is provided on the rear panel to link the logic sections of two modules.

When used as a line equaliser or distribution amplifier the DDA may be housed in any of IRT's standard Eurocard frames. When used in pairs for handshake operation only 3 RU chassis types may be used so that the two modules are as close together as possible. The double width rear assemblies are designed specifically for this purpose and provide the best return loss characteristics. Cables should not be used to link two modules.
Details of frame types are available separately.

Applications:

- Stand alone cable equaliser or distribution amplifier
- Paired for redundant path protection switching

Standard features:

- Adaptive cable input equalisation
- Data regeneration & re-clocking
- Monitor facility
- Power fail bypass facility
- External alarms and bypass
- Redundancy handshake facility
- IRT Eurocard construction compatible with other IRT Eurocard modules and frames
- Dual power supply operation

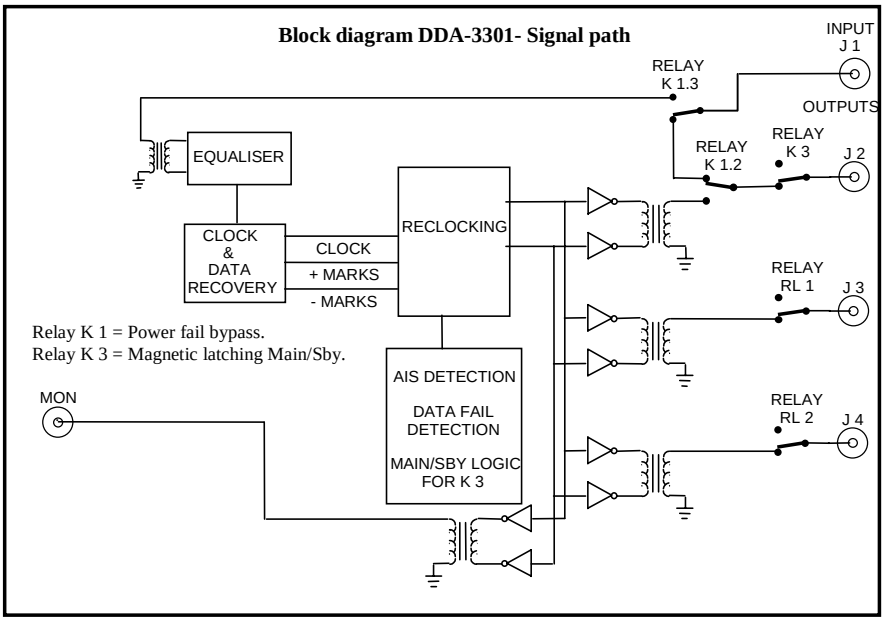
Equipment provided:

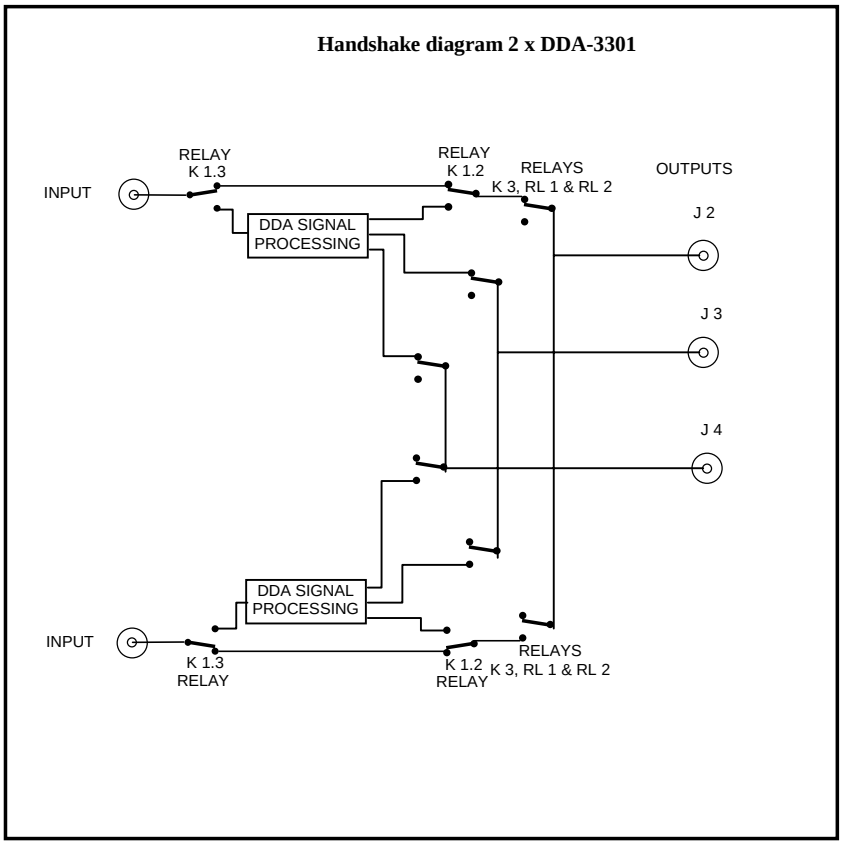
Standard: DDA-3301/XX Data distribution amplifier module.
(Where XX is the G.703 data rate)
ZDA-3301 Rear assembly for stand alone DDA-3301.

Accessories available:

ZDA-3301RH Double rear assembly for handshake:	Connects two adjacent DDA-3301's for automatic changeover of all three outputs in the event of a fault being detected. Note that the ZDA-3301RH supersedes the earlier ZDA-3101RH.

Functional diagrams





Technical specifications

DDA-3301/8:

Conforms to CCITT G.703 8448 Kb/s – see *Electrical characteristics of G.703 signals***.**

Input:

Type	Transformer coupled.
Impedance	75 Ω terminated.
Cable equalisation	Automatic. 0 - 6 dB at 4,224 KHz. Components set for Beldin YR23769 cable.

Outputs:

Type	Transformer coupled.
Number	3 switched, regenerated, reclocked outputs located on rear connection assembly and one located on front panel.
Impedance	75 Ω source terminated.

DDA-3301/34:

Conforms to CCITT G.703 34368 Kb/s – see *Electrical characteristics of G.703 signals***.**

Input:

Type	Transformer coupled.
Impedance	75 Ω terminated.
Cable equalisation	Automatic. 0 - 12 dB at 17,184 KHz. Components set for Beldin YR23769 cable.

Outputs:

Type	Transformer coupled.
Number	3 switched, regenerated, reclocked outputs located on rear connection assembly and one located on front panel.
Impedance	75 Ω source terminated.

DDA-3301/45:

Generally in accord with CCITT G.703 44736 Kb/s – see *Electrical characteristics of G.703 signals***.**

Input:

Type	Transformer coupled.
Impedance	75 Ω terminated.
Equalisation	Automatic for up to 400 m of Belden 8281 equivalent.

Outputs:

Type	Transformer coupled.
Number	3 switched, regenerated, reclocked unshaped outputs located on rear connection assembly and one located on front panel.
Impedance	75 Ω source terminated.

Electrical Characteristics:

Cable Type	Coaxial
Impedance	75 Ω
Signal level	1.0 V
Pulse Shape	Unshaped, scaled from fig. 17/G.703
Nominal pulse width	14.55 ns
Code conversion	B3ZS
Jitter at input port	§ 3 of recommendation G.823
Jitter at output port	§ 2 of recommendation G.823
Return loss at input ports:	
860 KHz to 1720 KHz	12 dB
1720 KHz to 34368 KHz	18 dB
34368 KHz to 51550 KHz	14 dB

Common data:
(Applies to all versions)

Controls & alarms:

Input:

External changeover request	A ground applied to this input will emulate the operation of the front panel switch "Change Request"

Outputs:

Bypass	Contact closure to ground if power has failed
General alarm	Contact closure to ground if a. Data Loss is detected OR b. AIS is detected AND the AIS disable link (LK 1) is not installed AIS detection is defined as at least 2048 consecutive data "1"s Data Loss is defined as less than 120 data "1"s in 512 G.703 data rate clock periods

Connectors:

	Data:	BNC
	Alarm:	Krone LSA plus

Indicators:

DC power
Data loss
AIS detect
Module in service
Module in standby

Power requirements		28 Vac CT (14-0-14) or ± 16 Vdc
Power consumption		170 mA. (5.5 VA)
Temperature range		0 - 50° C ambient
Mechanical		Suitable for mounting in IRT 19" rack chassis types with input output and power connections on the rear panel
Finish:	Front panel:	Grey background, black lettering & red IRT logo
	Rear assembly:	Detachable silk-screened PCB with direct mount connectors to Eurocard and external signals
Dimensions		6 HP x 3 U x 220 mm IRT Eurocard
Standard accessories		Rear connector assembly

ZDA-3301RH Technical specifications

Controls & alarms:

Input:

External changeover request	A ground applied to this input will emulate the operation of the front panel switch "Change Request".

Outputs:

Bypass	Contact closure to ground if power has failed.
General Alarm	Contact closure to ground if a. Data Loss is detected OR b. AIS is detected AND the AIS disable link (LK 1) is not installed. AIS detection is defined as at least 2048 consecutive data "1"s. Data Loss is defined as less than 120 data "1"s in 512 G.703 data rate clock periods.
In Service (Main) Path Indication:	Transistor switch to ground if card is *Main* (if DA version is equipped).

Connectors:

Data:	BNC.
Alarm:	Krone LSA plus.
In Service (Main) Path:	Krone LSA plus.

Changeover logic:

A changeover to the companion module will occur under any of the following conditions:

Loss of input signal
AIS detection alarm (provided AIS is not disabled by link LK 1)
Loss of power

In all of the above cases switching will only occur if

companion module is able to provide an output free of the same defects and
changeover inhibit switch is not activated on either module.

Priority logic:

The priority switching in normal mode follows non-reverting logic, which dictates:

In the event of failure of main then standby DDA will assume control and become *Main* causing the failed path DDA to become *Standby*.

This implies that when the failed path is restored that it will remain as *Standby* and not become *Main* unless either a failure of *Main* occurs or a manual changeover is requested.

Power on reset.

When power is applied to the pair, the *power on reset* signal will set the module which was last enabled as *Main* as *Main* and the other module will be forced to act as *Reserve*.

When power is applied to a pair for the first time it may be necessary to force the desired module to become main by pressing the *Change Request* button on the front panel of the desired module. The *Main* module will be indicated by the *In Service* LED lighting on the front panel.

Electrical characteristics of G.703 signals:

Electrical characteristics CCITT G.703 2048 Kb/s:

Pair each direction	One coaxial pair.
Test load impedance	75 Ω resistive.
Signal level	2.37 V.
Nominal pulse width	244 ns.
Code conversion	HDB3.
Pulse shape	Fig. 15/G.703.
Jitter at input port	§ 3 of recommendation G.823.
Jitter at output port	§ 2 of recommendation G.823.
Return loss at input ports:	
51 KHz to 102 KHz	12 dB.
102 KHz to 2048 KHz	18 dB.
2048 KHz to 3072 KHz	14 dB.

Electrical characteristics CCITT G.703 8448 Kb/s:

Pair each direction	One coaxial pair
Test load impedance	75 Ω resistive
Signal level	2.37 V
Nominal pulse width	59 ns
Code conversion	HDB3
Pulse shape	Fig. 16/G.703
Jitter at input port	§ 3 of recommendation G.823
Jitter at output port	§ 2 of recommendation G.823
Return loss at input ports:	
211 KHz to 422 KHz	12 dB
422 KHz to 8448 KHz	18 dB
8448 KHz to 12672 KHz	14 dB

Electrical characteristics CCITT G.703 34368 Kb/s:

Cable Type	Coaxial
Impedance	75 Ω
Signal level	1.0 V
Nominal pulse width	14.55 ns
Code conversion	HDB3
Pulse shape	Fig. 17/G.703
Jitter at input port	§ 3 of recommendation G.823
Jitter at output port	§ 2 of recommendation G.823
Return loss at input ports:	
860 KHz to 1720 KHz	12 dB
1720 KHz to 34368 KHz	18 dB
34368 KHz to 51550 KHz	14 dB

Electrical characteristics CCITT G.703 Shaped 44736 Kb/s:

Cable Type	Coaxial
Impedance	75 Ω
Signal level	
Power at 22368 KHz	+1.8 dBm to +5.7 dBm.
Power at 44736 KHz	>20 dBm below power at 22368 KHz.
Code conversion	B3ZS
Pulse shape	Fig. 14/G.703

Electrical characteristics CCITT G.703 Unshaped 44736 Kb/s:

Cable Type	Coaxial
Impedance	75 Ω
Signal level	1.0 V
Pulse Shape	Unshaped, scaled from fig. 17/G.703
Nominal pulse width	14.55 ns
Code conversion	B3ZS
Jitter at input port	§ 3 of recommendation G.823
Jitter at output port	§ 2 of recommendation G.823
Return loss at input ports:	
860 KHz to 1720 KHz	12 dB
1720 KHz to 34368 KHz	18 dB
34368 KHz to 51550 KHz	14 dB

Characteristics of signal types

Coding characteristics - G.703:

The **HDB3** (High Density Bi-polar of order 3) code as defined in G.703 for 34,368 Kb/s is as follows:

Binary 1 bits are represented by alternate positive and negative pulses and binary 0 bits by spaces. Exceptions are made when strings of successive 0 bits occur in the binary signal.

Each block of 4 successive zeros is replaced by 000V or B00V where B is an inserted pulse of the correct polarity and V is an inserted pulse violating the polarity rule. The choice of 000V or B00V is made so that the number of B pulses between consecutive V pulses is odd so that successive V pulses are of alternate polarity and so no DC component is introduced.

The **B3ZS** (Bipolar with Three Zero Substitution) (Also designated **HDB2** - High Density Bi-polar of order 2) code as defined in G.703 for 44,736 Kb/s is as follows:

Binary 1 bits are represented by alternate positive and negative pulses and binary 0 bits by spaces. Exceptions are made when strings of successive 0 bits occur in the binary signal.

Each block of 3 successive zeros is replaced by 00V or B0V. The choice of 00V or B0V is made so that the number of B pulses between consecutive V pulses is odd, so that successive V pulses are of alternate polarity and so no DC component is introduced.

G.703 data signal format.

The following waveforms are intended to give some idea of the type of signal at various points in the DDA when in operation. They are not intended as accurate portrayals of either voltage levels or timing.

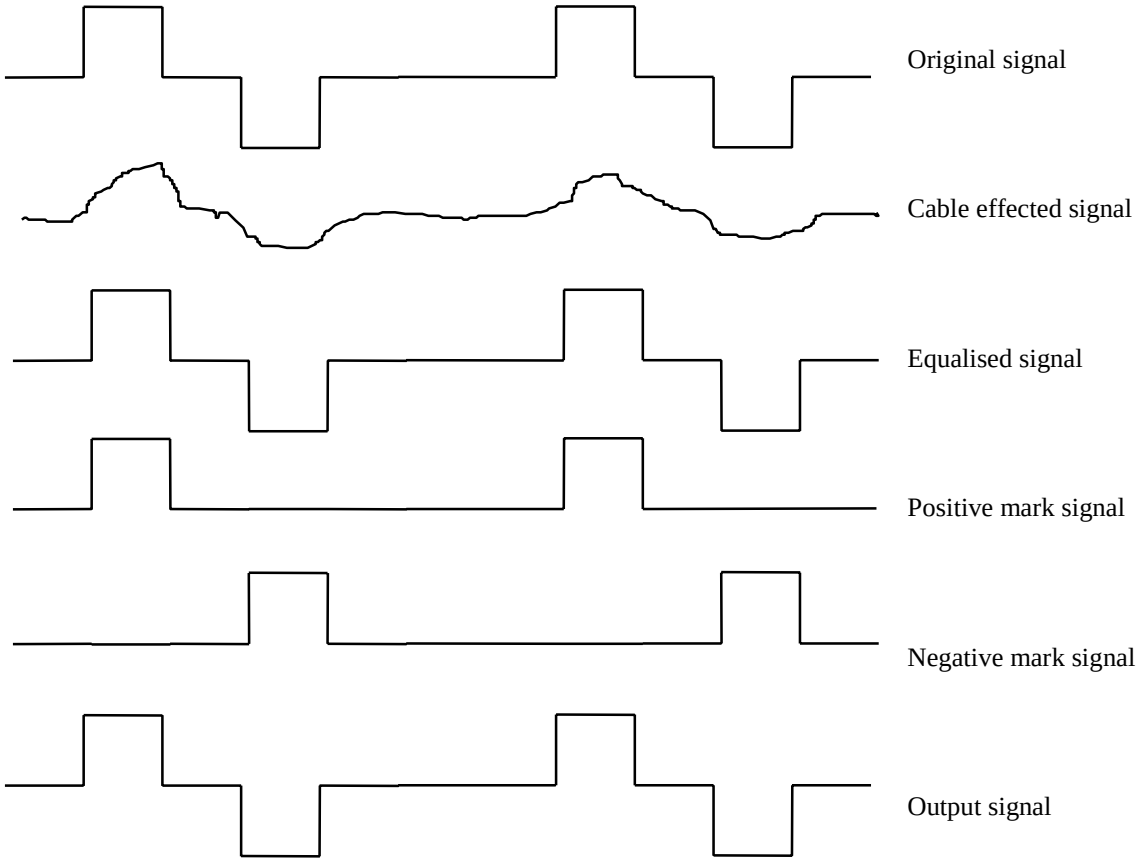
It can be seen that the original signal has both positive and negative going pulses. This format is used so that the signal does not rely on DC levels. To preserve the AC nature of the signal a coding system is used to ensure that a succession of either ‘1’s or ‘0’s in the original data does not produce a DC output. The coding system varies according to the type of G.703 signal (See specifications for each module and *Coding characteristics* above.)

It can be seen that the cable effected signal bears little resemblance to the original signal and due to the high frequency attenuation looks more like a noisy analogue signal than a digital signal. The input equaliser circuit in the DDA enhances the high frequency response and detects the rate of change of the signal to produce a squared up signal with fast rise and fall times suitable for processing and re-clocking.

The signal is separated into +ve and -ve mark signals as shown. The relative timing of these signals must be closely maintained or the final re-clocked output signal will not be accurate.

The re-clocking circuit acts on each of the +ve and -ve mark signals by detecting the data rate with a phase locked loop which has a sufficiently long flywheel time to maintain the clock frequency in the presence of the maximum length ‘0’ data signal.

The re-clocked +ve and -ve mark signals are fed to separate output drivers for each output where they are recombined in the output transformers resulting in an output signal as shown which is the same as the original signal.


Original signal
Cable effected signal
Equalised signal
Positive mark signal
Negative mark signal
Output signal

Description of operation

See block diagrams commencing on page 5 and schematic diagrams at rear of this manual.
Unless specified, the following description applies to all G.703 data rates.

Input:

The G.703 input signal is connected to the input circuit of the amplifier.

If no power is present, and the amplifier was active before the power was removed, then the signal will be directed to the output connector via K 1 and K 3. When power is applied the K 1 relays operate and switch the signal via the amplifier to the K 3 relay and thence the output connectors.
In this power fail mode, the connection from input to output is passive and so only one output can be connected.

The K 3 relay is of the bi-stable magnetic latching type and so will only change state when an imbalance of drive occurs between the *set* and *reset* coils. The K 3 relay is operated under the control of the logic processor *main select* via transistor driver Q 8 to the *set* coil and released by any external signal present on the pin 9 *status* input of the handshake connector to the *reset* coil.
When power is applied to the DDA, the logic circuit will cause the K 3 relay to be *set*. If two DDA's are connected in handshake configuration, one of the two will take control first and become the *main* amplifier causing the other to become the *standby*.
Either module can be made *main* by pressing the change request button on the front panel of the required module provided that no alarms are present. An external changeover request may also be made via pin 3 of SK 2 alarm/control connector on the rear panel provided that the changeover inhibit switch on the front panel is not in the inhibit position.
When the K 3 relay is in the *reset* position the input path from the input connector and the K 1 relay is terminated in 75 Ω to preserve the loading on the input.

Active path:

Input switching & equaliser:
The signal from the K 1a relay connects to the input transformer and automatic line equalisation circuit consisting of transistors Q 1 to Q 6. The purpose of this equaliser is to restore both the signal level and the leading and trailing edges of the digital signal so that signal jitter is not introduced when the clock signal is derived in the subsequent stage.

+ve & -ve mark signals and clock generator:
The equalised signal is coupled to the following stages by transformer T 2. This has two secondary windings to translate the positive and negative going components of the signal to a positive format for processing by standard single supply logic circuits in the following stages. The two signals are identified as the +ve and -ve mark signals and remain separate until the final output driver stage.

Both the logic and reclocking circuits require a synchronous clock signal. The clock is an oscillator formed by U 3 a, b & c and is re-triggered to keep time by a signal extracted from both the +ve or -ve mark signals (OR gate U 3 d).
The clock signal is retarded by delay line DLY prior to being used in the main processing logic and reclocking circuit in order to provide the optimum timing at the reclocking point.

Logic processing, reclocking and AIS detection:
The main logic processing, reclocking, error detection and operational interfacing are all performed by logic circuits within U 4, which is a custom-programmed large scale logic array. The internal logic and functions of this IC are too complex to describe in detail and the following is intended as a guide to function only.

Data loss detection:
Valid data is deemed to be present at the module input when 120 or more data pulses have been received in 512 nominal clock periods at the G.703 data bit rate specified for the DDA. In order for the data pulse to be counted, more than 60% of the minimum anticipated data pulse must be present.

If less than 120 data pulses are counted over a period of 512 clock pulses then the data signal is deemed to be invalid and the data loss flag is set.

If the area of a given pulse is less than 60% of the minimum anticipated (or acceptable) data pulse, after line equalisation and shaping, then that pulse is not considered as a valid input to the count.

In any of these cases the *Data Loss* LED on the front panel of the module will light and the general alarm relay output will be activated connecting the general alarm output contact to ground.

AIS detection:
The data processor will detect an incoming AIS (Alarm Indication Signal) (a series of >2048 1's) and will set the AIS flag and the general alarm relay output will be activated connecting the general alarm output contact to ground.

Note however that when data errors or no data is detected that the DDA-3301 does not generate an outgoing AIS data stream to the data outputs.

The AIS alarm system may be disabled by a link on the main board LK 1. This prevents the AIS detection from operating the automatic changeover function when used in handshake configuration and prevents AIS from setting the general alarm output. The AIS detection circuit will, however, still provide AIS indication, on the front panel LED, if AIS is detected.

The AIS disable link does not effect the general alarm being activated by data or signal loss as described above.

Power on reset:
When power is applied to the unit, U 6 generates a *power on reset* signal. This signal causes the processing circuit to examine its current status and connections and restore operation to its state prior to power failure.

If the DDA is connected for stand-alone operation all alarms will be reset and normal operation will resume. If an AIS signal is present on the data input or data is outside the prescribed limits outlined above then the general alarm will be activated after the normal detection period has elapsed from the P.O.R. signal being initiated.

For operation in handshake mode see *Handshake* operation description.

ARA in & urgent alarm out.
These facilities are not enabled at this time.

Data signal output drivers.
The reclocked +ve and -ve mark signals are bussed to output drivers U 7 to 10.
Each output driver consists of three inverters operating in parallel in order to obtain a high current output capability for driving the output transformer without stressing any individual amplifier.

Diodes are connected across the transformer primary to ground and the inverter output to +5V to prevent any back EMF from causing damage to the drivers. The resistors between the output drivers and the output transformer set the correct output operating pulse amplitude to ±1 V measured at the output connectors.

Note that the *Mon. Output* on the front panel of the module is obtained in the same manner as the outputs on the rear of the module.

Handshake operation:

Purpose:
Handshake interconnection is required when two circuits are to be operated in 1:1 protection switching mode to provide a continuous signal output in the event of failure of the primary signal path.

Priority logic:
For this mode to be employed it is necessary to provide two programme feeds which are designated as the *Main* and *Standby* paths.
The priority switching in normal mode follows non-reverting logic, which dictates:

> In the event of failure of main then standby DDA will assume control and become *Main* causing the failed path DDA to become *Standby*.

This implies that when the failed path is restored that it will remain as *Standby* and not become *Main* unless either a failure of *Main* occurs or a manual changeover is requested.

Changeover logic:
A changeover to the companion module will occur under any of the following conditions:

> Loss of input signal
> AIS detection alarm (provided AIS is not disabled by link LK 1)
> Loss of power

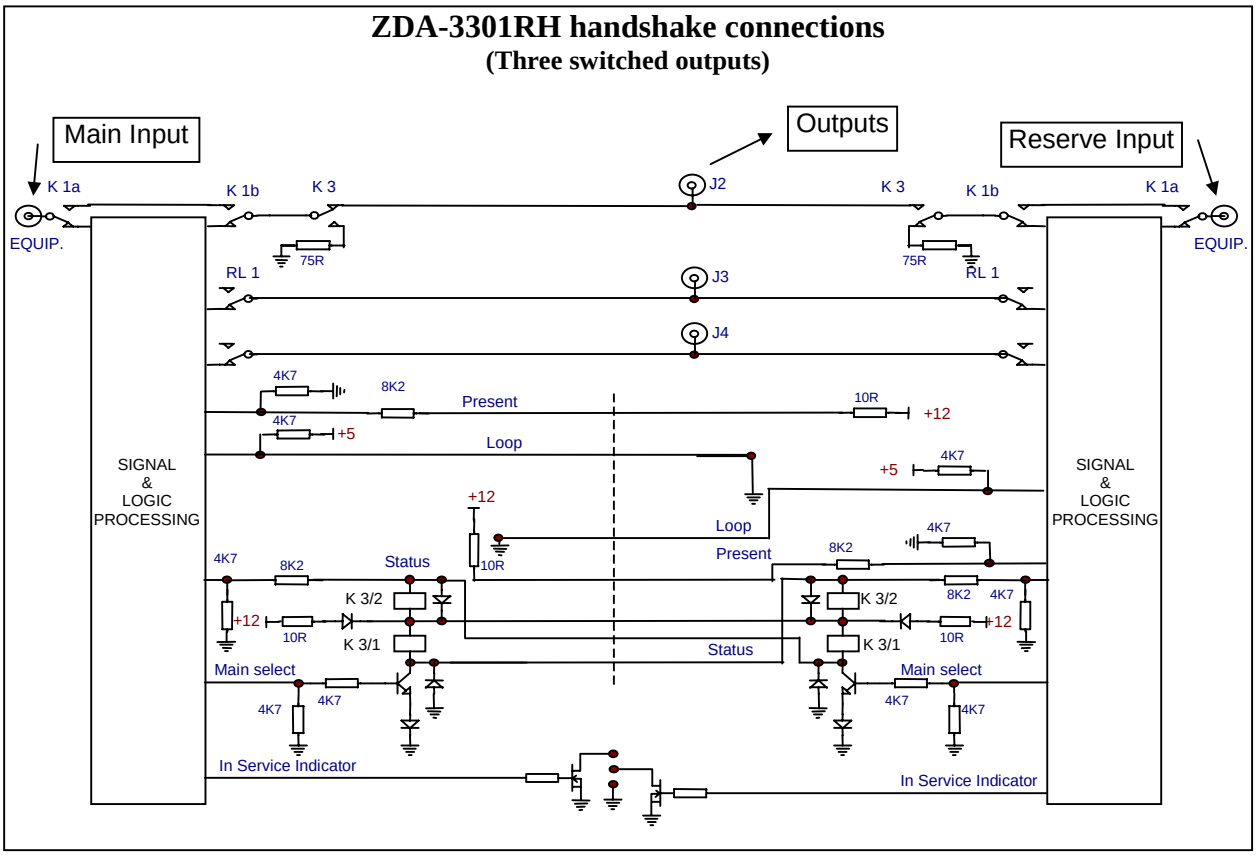
In all of the above cases switching will only occur if:

> the companion module is able to provide an output free of the same defects AND
> the changeover inhibit switch is not activated on either module.

Connections:
Handshake interconnection should only be made using either the ZDA-3301RH or the earlier ZDA-3101RH handshake double rear assembly.
This rear assembly makes all the necessary connections for both logic and data signals when two DDA's are inserted side by side in a 3 RU frame.
Individual alarm outputs are provided for each module.

Detailed operational description:

Connections for handshake (paired) operation of two DDA-3301's are shown in the following diagram.



Inputs & outputs:
The two modules are supplied with signals from separate paths to their input connectors on the rear of the module. For the purposes of description these are designated as the main and reserve inputs although they may be of equal standing.

Logic connections:
All required logic connections are made by tracks on the double width PCB. Automatic operation is immediately initiated when two modules are plugged into this type of rear assembly.
No external connections are required, but external alarm connections are available from each module for use if desired. Additionally, each module has a connection for an external *Make Main* control for remote DA selection.

Handshake mode detection:
Two data lines are present on the handshake connector to indicate to each module that it is to operate in handshake mode.
The *Loop* signal on pin 16a is connected to ground when another module is connected and the *Present* signal on pin 16b detects the presence of power on the alternate module.
If the *Loop* signal is not connected to ground then all handshake operations are inhibited.

If the loop signal is at ground indicating the presence of an alternate module and if power is present on both modules then normal handshake operation is permitted. If the *Present* signal indicates that power is lost on the alternate module then the module with power will take control and become *Main*.

Power on reset.
When power is applied to the pair the *power on reset* signal will attempt to reset both modules. However, as only one module can be *Main*, the logic processor checks for handshake operation and if detected then the module which was last enabled as *Main* will take control as *Main* and the other module will be forced to act as *Reserve*.
This memory capability is due to the latching nature of the K 3 relay, which will cause the *Main* and *Reserve* paths to be maintained even in the absence of power.

The only exception to this rule is when power is applied to a pair for the first time that they are coupled in handshake mode. In this special case both modules will initially have their K 3 relays in the active path condition and so both will attempt to become *Main*. As the P.O.R. signal for each module will be slightly different for any two modules, one will reach its operating mode first and will force the other module to immediately change to become *Reserve*.
As the selection of which module becomes *Main* is cannot be determined before installation it may be necessary to force the desired module to become main by pressing the *Change Request* button on the front panel of the desired module. The *Main* module will be indicated by the *In Service* LED, on the front panel, lighting.

Automatic changeover:
An automatic changeover is initiated whenever the power fails on *Main* and not on *Reserve* or when a general alarm is initiated on *Main* (indicating either loss of input signal or AIS indication if the AIS is enabled) and the *Change Inhibit* switch is not active on either module.

In either case, the *Main Status* line will go from LO to HI. The companion module, on detecting this change, will switch its *Main Select* line to HI. The K 3/1 relay driver then activates the relay (hence becoming *Main*) and sends the *Status* line to the first module LO confirming the change and preventing that module from attempting to become *Main* again.

Manual changeover:
A manual changeover is initiated by pressing the *Change Request* button on the front of the module that is required to become *Main*.
The mechanism of the change is similar to the automatic changeover described above except that it is initiated by the module requesting that it become *Main*. This forces the *Status* line to the other module to LO and it immediately responds to become *Reserve*.

Alarm and external changeover connections:
Two Krone type connectors are provided on the rear panel providing the following for each of the modules:

Pin	1	K 1 relay status - connection to ground indicates module is in bypass mode (loss of power).
	2	K 2 relay status - connection to ground indicates a general signal alarm.
	3	External changeover request - connection to ground will make this module *Main* in handshake mode.
	4	Ground.

A third Krone type connector (SK3) provides remote status of which unit is *In Service (Main)*:

Pin	1	Connection to ground indicates that module 1 is the *In Service (Main)* module.
	2	Connection to ground indicates that module 2 is the *In Service (Main)* module.
	3	Ground.

Note that SK3 is not provided on the earlier ZDA-3101RH rear assembly.

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.

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.

Internal adjustments

The only internal adjustment that may be made by the user is link LK 1, which may be set to disable AIS detection if required.

This module uses a programmable logic device as the main processing circuit. This device must be correctly programmed is only obtainable through IRT. No attempt should be made to substitute other devices or to programme a similar device as this could cause extensive damage to the module.

Installation

Installation in frame or chassis:

See details in separate manual for selected frame type.

G.703 data connections - stand alone operation:

Connect the input and as many output connections as required.
Only good quality 75 Ohm connectors and cable should be used. The use of 50 Ohm BNC connectors may cause serious reflection problems with G.703 signals, causing data errors.
In general cable runs should be kept as short as possible and should not exceed 200 metres for reliable error free operation.

G.703 data connections - handshake operation:

See separate section on handshake operation.

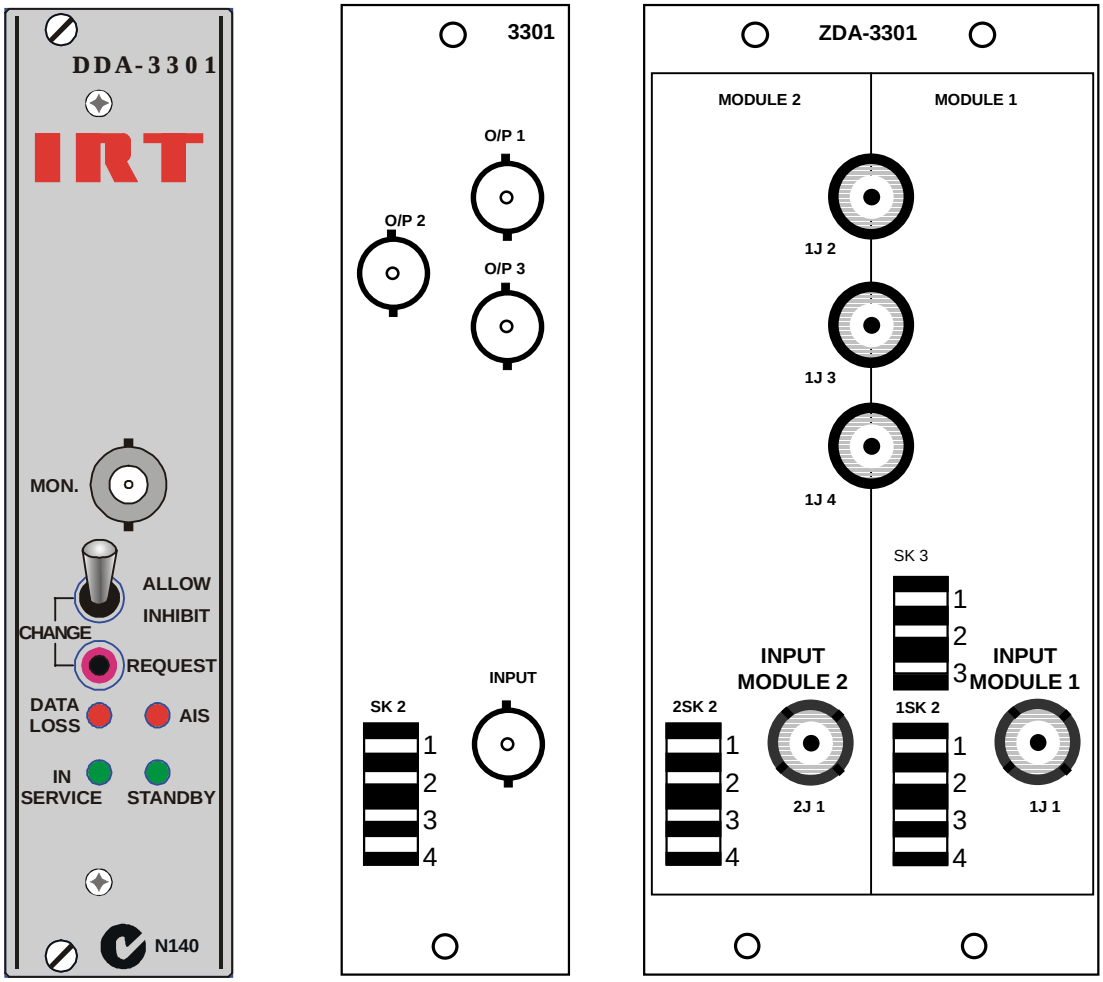
Alarm and external changeover connections:

A Krone type connector is provided on the rear panel of the module providing the following:

Pin	1	K 1 relay status - connection to ground indicates module is in bypass mode (loss of power).
	2	K 2 relay status - connection to ground indicates a general signal alarm.
	3	External changeover request - connection to ground will make this module *Main* in handshake mode.
	4	Ground.

Front & rear panel 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.



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.

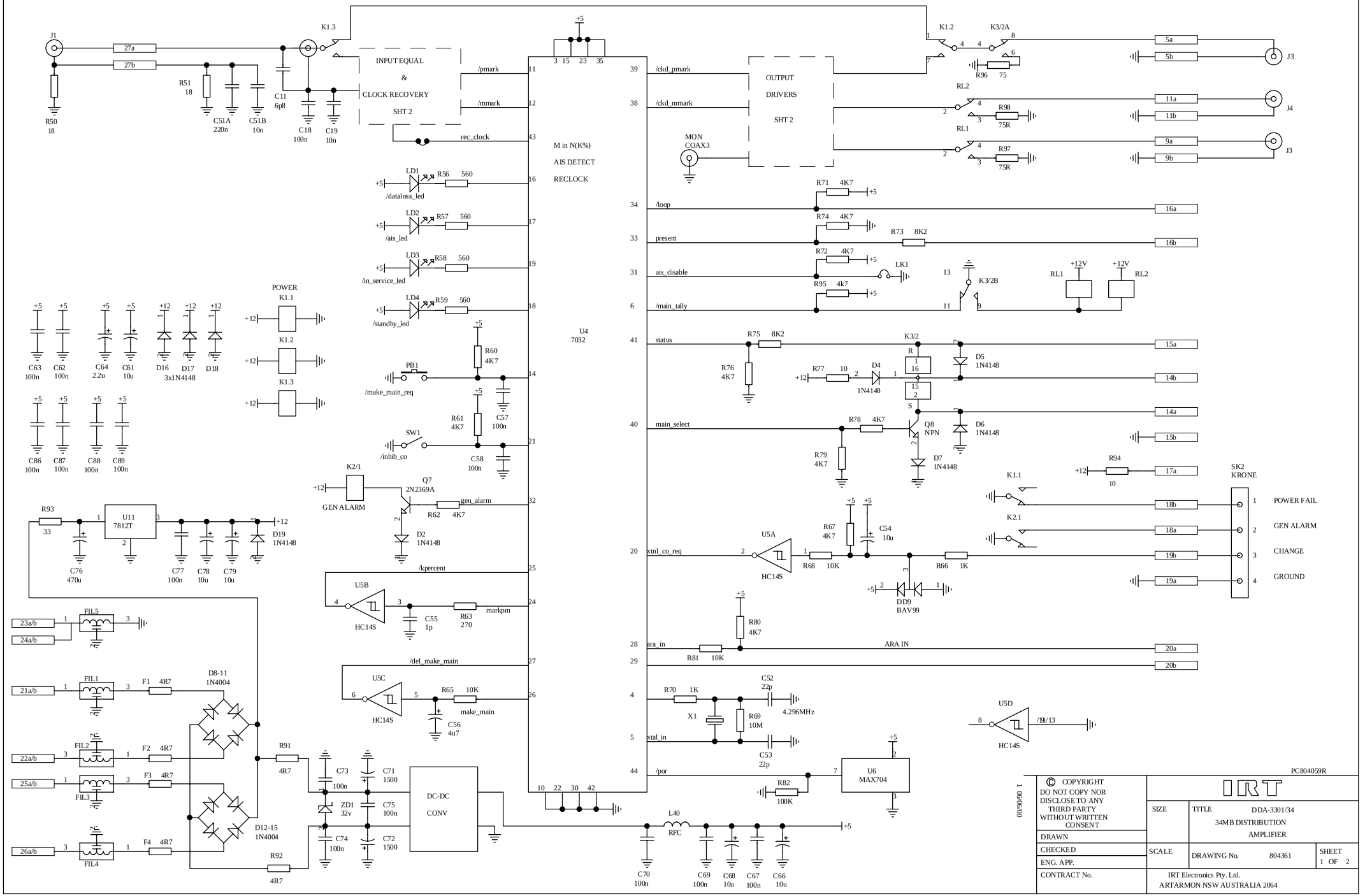
The equipment should be returned **to the agent who originally supplied the equipment or, where this is not possible**, to IRT direct as follows.

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
804361	1	DDA-3301/34 34 Mb DA schematic part 1.
804361	2	DDA-3301/34 34 Mb DA schematic part 2.
804362		DDA-3301/45 45 Mb distn amplifier parts list
804807		ZDA-3301RH handshake rear assembly schematic


J1
27a
27b
R50
18
R51
18
C51A
220n
C51B
10n
C11
6p8
C18
100n
C19
10n
K1.3
INPUT EQUAL
&
CLOCK RECOVERY
SHT 2
/pmark
/mmark
rec_clock
M in N(K%)
AIS DETECT
RECLOCK
U4
7032
+5
3 15 23 35
10 22 30 42
LD1
R56 560
/dataloss_led
LD2
R57 560
/ais_led
LD3
R58 560
/in_service_led
LD4
R59 560
/standby_led
PB1
/make_main_req
R60
4K7
R61
4K7
C57
100n
SW1
/inhib_co
C58
100n
K2/1
GEN ALARM
Q7
2N2369A
gen_alarm
R62 4K7
D2
1N4148
/kpercent
U5B
HC14S
C55
1p
R63
270
markpm
/del_make_main
U5C
HC14S
R65 10K
C56
4u7
make_main
POWER
K1.1
K1.2
K1.3
+12
C63
100n
C62
100n
C64
2.2u
C61
10u
D16
D17
D18
3x1N4148
C86
100n
C87
100n
C88
100n
C89
100n
R93
33
U11
7812T
C76
470u
C77
100n
C78
10u
C79
10u
D19
1N4148
FIL5
23a/b
24a/b
FIL1
21a/b
FIL2
22a/b
FIL3
25a/b
FIL4
26a/b
F1 4R7
F2 4R7
F3 4R7
F4 4R7
D8-11
1N4004
D12-15
1N4004
R91
4R7
R92
4R7
C73
100n
C74
100n
ZD1
32v
C71
1500
C75
100n
C72
1500
DC-DC
CONV
L40
RFC
C70
100n
C69
100n
C68
10u
C67
100n
C66
10u
/ckd_pmark
/ckd_mmark
OUTPUT
DRIVERS
SHT 2
MON
COAX3
K1.2
K3/2A
R96 75
RL2
R98
75R
RL1
R97
75R
5a
5b
J3
11a
11b
J4
9a
9b
J3
/loop
present
ais_disable
/main_tally
R71 4K7
R74 4K7
R73 8K2
R72 4K7
LK1
R95 4k7
K3/2B
+12V
+12V
RL1
RL2
16a
16b
status
main_select
R75 8K2
R76
4K7
K3/2
R77 10
D4
1N4148
D5
1N4148
R78 4K7
Q8
NPN
D6
1N4148
D7
1N4148
R79
4K7
14a
14b
15a
15b
R94
10
17a
SK2
KRONE
POWER FAIL
GEN ALARM
CHANGE
GROUND
18b
18a
19b
19a
K1.1
K2.1
xtnl_co_req
U5A
HC14S
R67
4K7
C54
10u
R68 10K
R66 1K
DD9
BAV99
R80
4K7
ara_in
R81 10K
ARA IN
20a
20b
R70 1K
X1
C52
22p
R69
10M
4.296MHz
xtal_in
C53
22p
/por
R82
100K
U6
MAX704
U5D
HC14S
/EN/13
PC804059R
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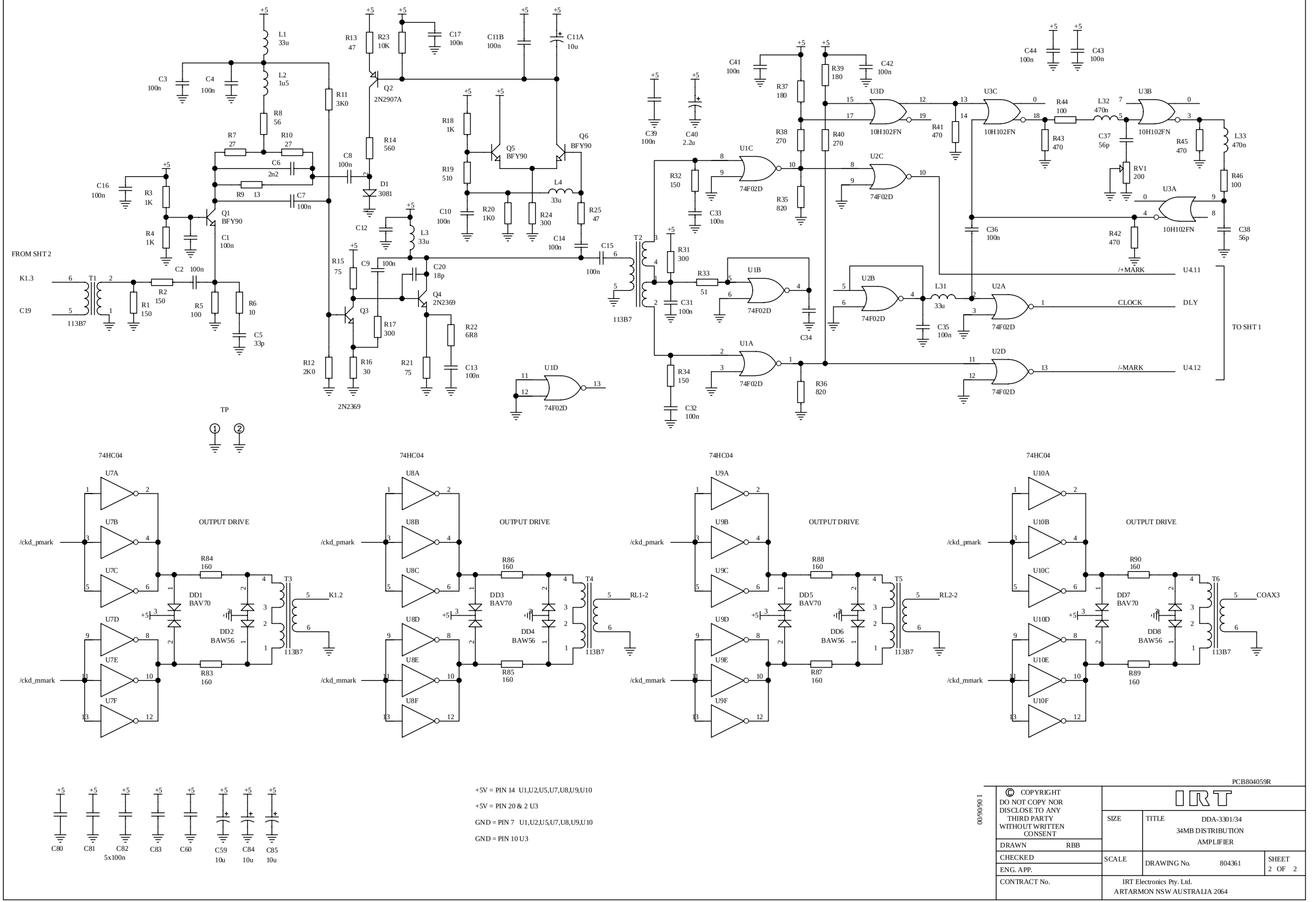
FROM SHT 2
K1.3
C19
113B7
TP
2N2369
74HC04
OUTPUT DRIVE
/ckd_pmark
/ckd_mmark
DD1 BAV70
DD2 BAW56
DD3 BAV70
DD4 BAW56
DD5 BAV70
DD6 BAW56
DD7 BAV70
DD8 BAW56
K1.2
RL1-2
RL2-2
COAX3
74F02D
10H102FN
/+MARK
/-MARK
CLOCK
DLY
U4.11
U4.12
TO SHT 1
5x100n
+5V = PIN 14 U1,U2,U5,U7,U8,U9,U10
+5V = PIN 20 & 2 U3
GND = PIN 7 U1,U2,U5,U7,U8,U9,U10
GND = PIN 10 U3
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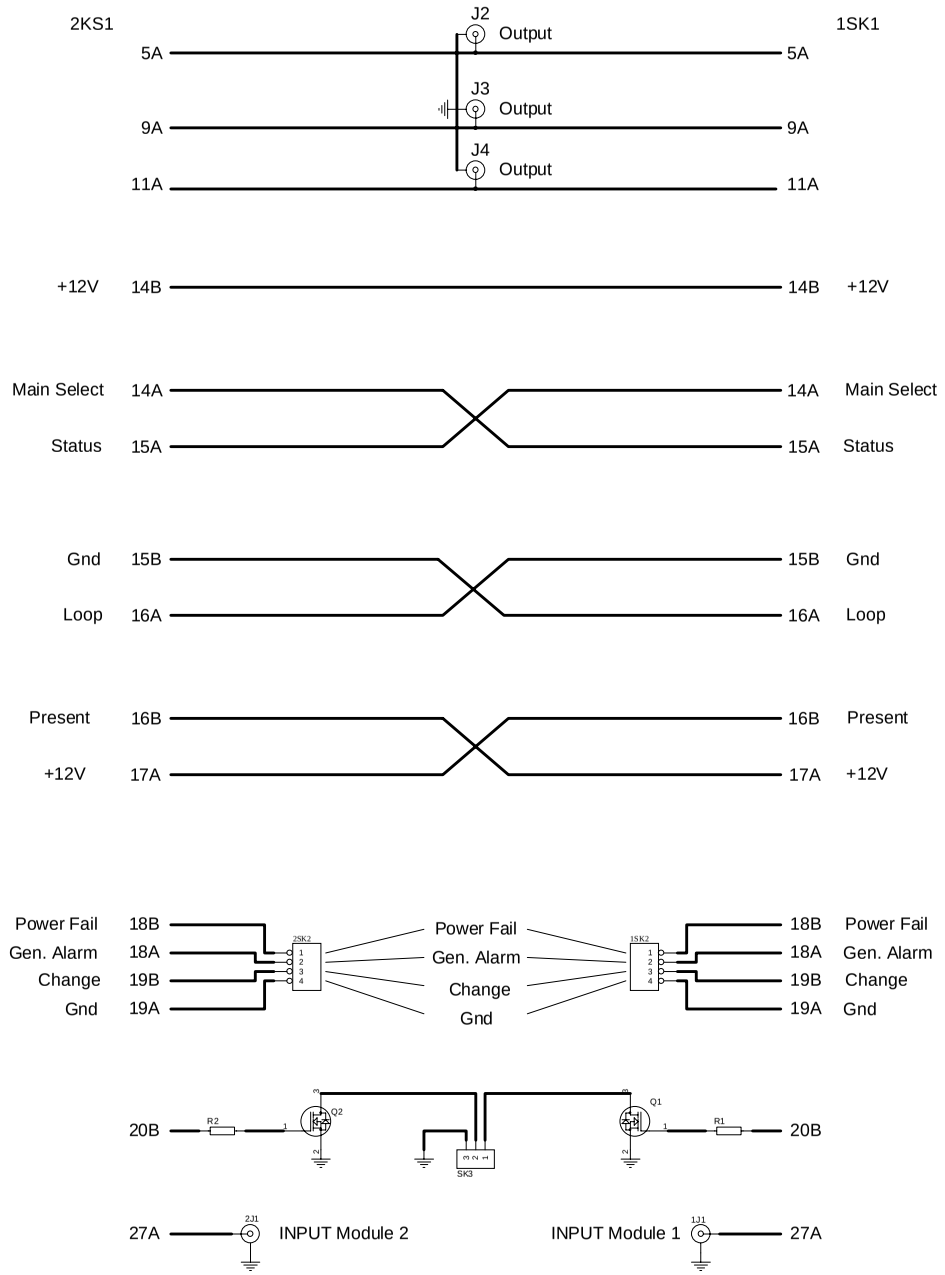

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	DRAWN SAH	SIZE A4	Title ZDA-3301RH Handshake Connection
	ENG.APR.	SCALE N.T.S.	Drawing No. 804807 — Sheet 1 of 1
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	Revision: 1	IRT Electronics Pty. Ltd. ARTARMON NSW AUSTRALIA 2064	
	Date: 5-Jan-2004		