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IRT Eurocard

Type DSA-3280

2048 kHz Clock Distribution Amplifier

Designed and manufactured in Australia

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

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2048 kHz Clock Distribution Amplifier

Instruction Book

Table of Contents

This instruction book applies to units later than S/N 9905001.

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.

IRT Eurocard
Type DSA-3280
2048 kHz Clock Distribution Amplifier

General Description

The DSA-3280 is a distribution amplifier that operates in accordance with G.703 2048 kHz synchronisation clock recommendation. It incorporates a protection switching facility for the switching in of signals from a standby module when a fault is detected.

The front panel of the DSA-3280 provides break access facility for the incoming signal in the form of a 1.6/5.6 connector link.

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 during a power failure.

Power or clock loss generates a changeover request for a companion unit. In addition, the module may be forced into bypass mode by an external signal.

Indicators are provided on the front panel for:

- DC power
- Clock loss
- Module in service
- Module in standby

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

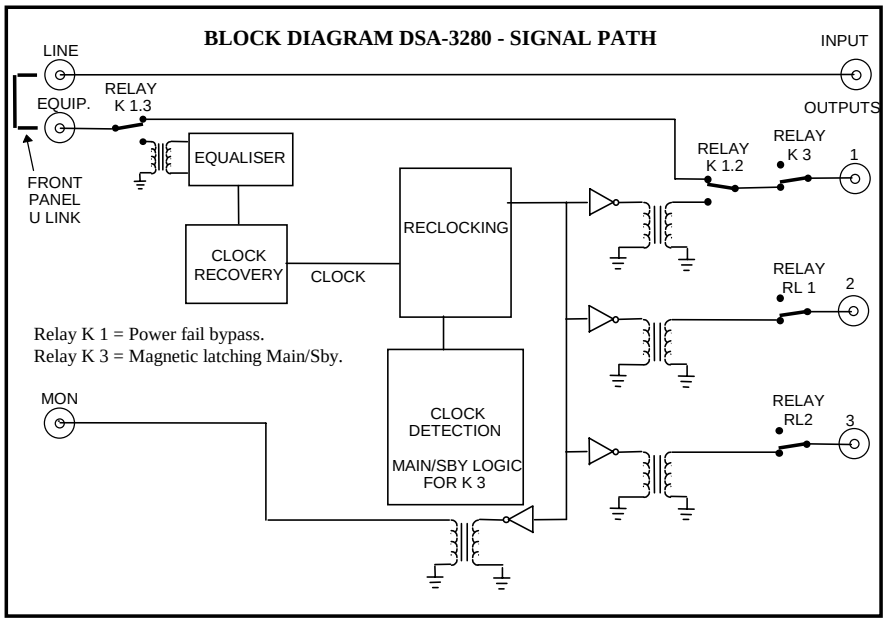
Changeover-inhibit and changeover-request switches are provided on the front panel for use where modules are linked in pairs for redundancy.

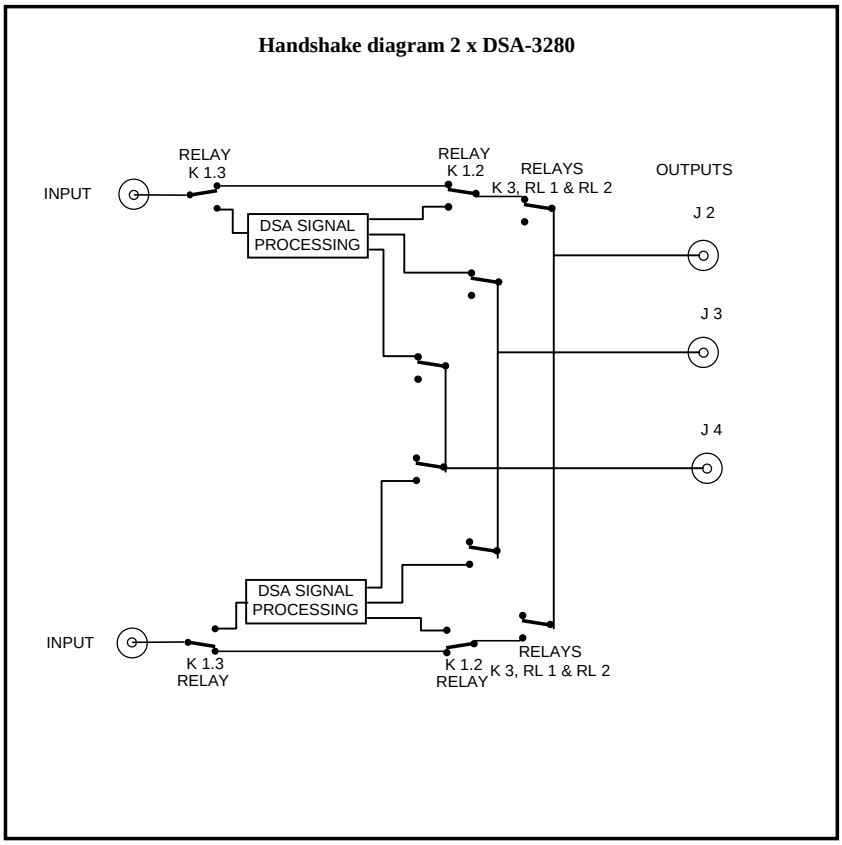
For this configuration, a special double width rear assembly (type ZAA-3101RH) is available to link the signal and logic sections of two modules.

Standard features:

- **G.703 compliant.**
- **Adaptive cable input equalisation.**
- **Clock regeneration.**
- **Monitor & break access facility.**
- **Protection switching facility.**
- **External alarms and bypass.**
- **Redundant pair operation capability.**
- **Compatible with other IRT Euro card modules and frames.**

Functional Diagram





Technical Specifications

2048 kHz signal data:

Conforms to electrical characteristics CCITT G.703 2048 kHz synchronisation interface – see below.

Input:

Type	Transformer coupled.
Impedance	75 Ω terminated.

Outputs:

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

Controls & alarms:

DC power
Clock loss
Module in service
Module in standby
Bypass
General alarm
Changeover request.

Connectors:

	Data:	BNC or 1.6/5.6 coaxial.
	Alarm:	Krone LSA plus.

Other:

Power requirements		28 Vac CT (14-0-14) or ± 16 Vdc.
Temperature range		0 - 50° C ambient.
Mechanical		Suitable for mounting in IRT 19" Eurocard rack chassis with input output connections on the rear panel.
Finish:	Front panel	Grey enamel, silk-screened black lettering & red IRT logo.
	Rear assembly	Detachable silk-screened PCB with direct mount connectors to Eurocard and external signals.
Dimensions		31 mm x 3 U x 220 mm IRT Eurocard.
Standard accessories		DSA-3280 rear connector assembly.
Optional accessories		Instruction manual.
		ZDA-3101RH double rear assembly, for handshake connection of two DSA-3280's.

Electrical characteristics CCITT G.703 2048 kb/s:

Pair each direction	One coaxial pair.
Test load impedance	75 Ω resistive.
Signal level	0.75 to 1.5 Vp.
Frequency	2048 kHz ± 50 ppm.
Pulse shape	Fig. 21/G.703.
Jitter at output port	0.05 UIp-p (20 Hz to 100 kHz).
Return loss at input ports @ 2048 kHz:	>15 dB.

Due to our policy of continuing development, these specifications are subject to change without notice.

Description of Operation

See block diagrams commencing on page 4 and schematic diagrams at rear of this manual.

Input:

The G.703 input synchronization 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 DSA-3280, the logic circuit will cause the K 3 relay to be *set*. If two DSA-3280'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 clock level and the leading and trailing edges of the digital signal so that signal jitter is not introduced when the clock signal is regenerated in the subsequent stage.

Clock regenerator:
The equalised signal is coupled to the following stages by transformer T 2. The secondary winding drives an oscillator circuit formed by U3 ,the resulting clock then passes to U4 that provides the logic drive for output drive circuits

Logic processing:
The main logic processing, and 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 clock is deemed to be present at the module input when 120 or more clock pulses have been received in a nominal period. In order for the clock pulses to be counted, more than 60% of the minimum anticipated clock pulses must be present.

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

If the area of a given clock pulse is less than 60% of the minimum anticipated (or acceptable), 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.

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 DSA-3280 is connected for stand-alone operation all alarms will be reset and normal operation will resume. If the clock 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.

Clock signal output drivers.
The reprocessed clock signal is bussed to output drivers U 7 to 10 for driving the output transformers.

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 clock amplitude to a nominal 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 DSA-3280 will assume control and become *Main* causing the failed path DSA-3280 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 clock
> Loss of power

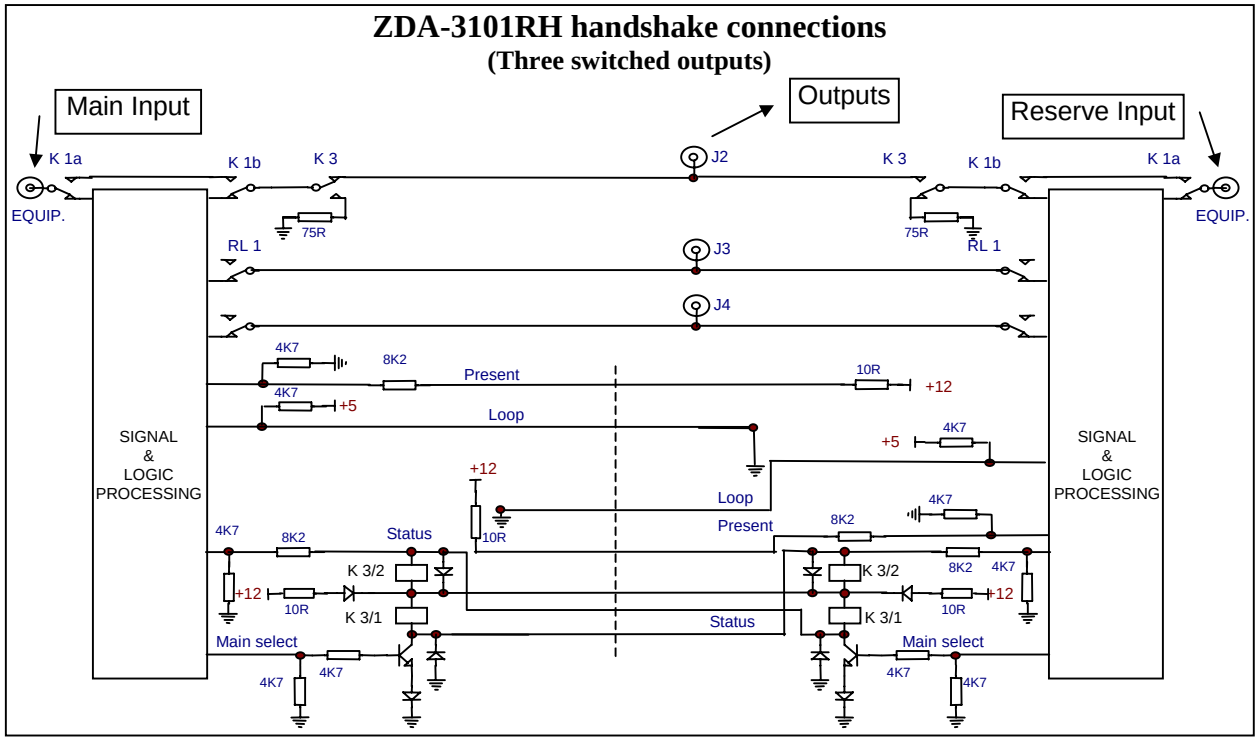
In all of the above cases switching will only occur if:

> 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 the handshake double rear assembly ZDA-3101RH.
This rear assembly makes all the necessary connections for both logic and data signals when two DSA-3280'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 DSA-3280'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.

Operation:

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 6 is connected to ground when another module is connected and the *Present* signal on pin 7 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 a loss of input signal) 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*.

Internal adjustments

No internal adjustment can be made by the user.

This module uses a programmable logic device as the main processing circuit. This device must be correctly programmed and 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

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.

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 output cable runs should be kept as short as possible.

G.703 data connections - handshake operation:

See separate section on handshake operation.

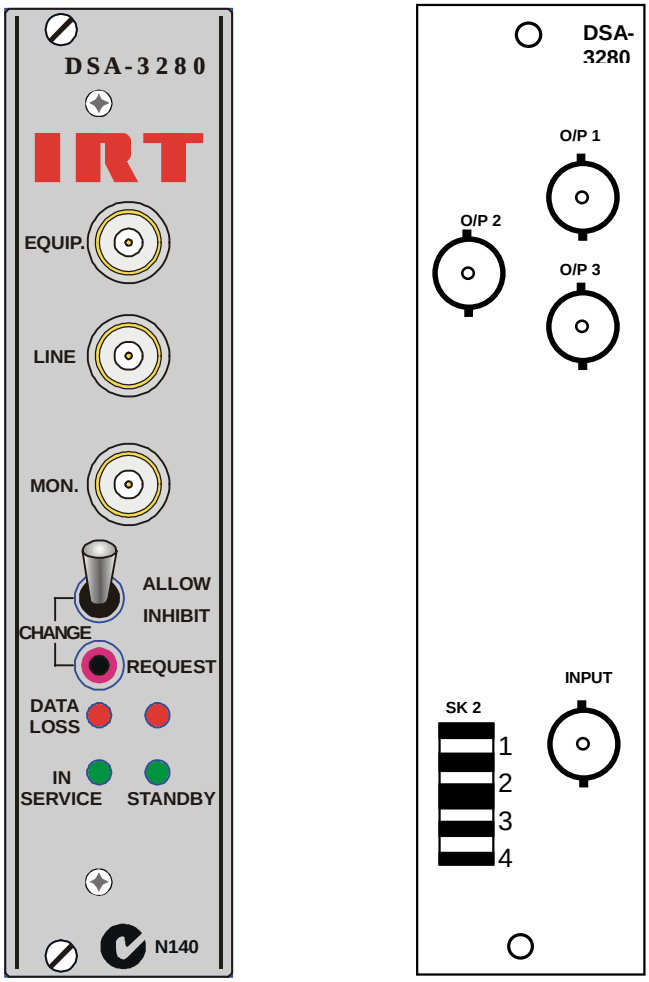
Alarm and external changeover connections:

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.
	2	K 2 relay status - connection to ground indicates module is *Main* in handshake mode.
	3	External changeover request - connection to ground will make this module *Main* in handshake mode.
	4	Ground.

Front & rear panel connector diagrams

The following front panel and rear assembly drawings are not to scale and are intended to show connection order and approximate layout 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.

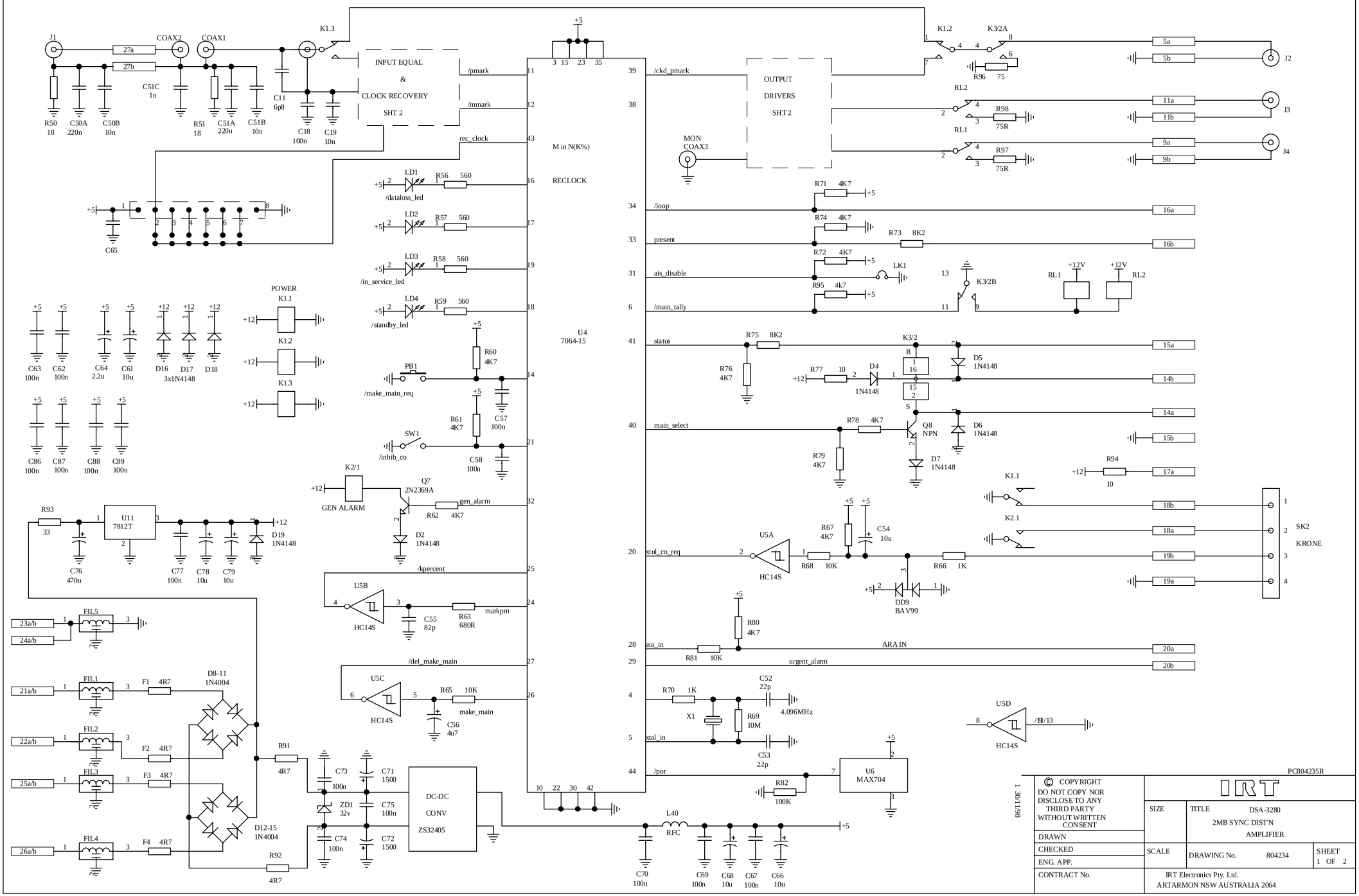
The equipment should be returned **to the agent who originally supplied the equipment or, where this is not possible**, to IRT direct as follows.

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 List Index

Drawing #	Sheet #	Description
804234	1	DSA-3280 2Mbit/s Clock Distribution Amplifier schematic.
804234	2	DSA-3280 2Mbit/s Clock Distribution Amplifier schematic.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COAX2
COAX1
K1.3
27a
27b
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SHT 2
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/mmark
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RECLOCK
U4
7064-15
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/in_service_led
/standby_led
/make_main_req
/inhib_co
/loop
present
ais_disable
/main_tally
status
main_select
xtnl_co_req
/ckd_pmark
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MON
COAX3
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K3/2A
RL2
RL1
K3/2B
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K1.2
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D5
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D6
1N4148
DD9
BAV99
K2.1
SK2
KRONE
FIL1
FIL2
FIL3
FIL4
FIL5
D8-11
1N4004
D12-15
1N4004
DC-DC
CONV
ZS32405
ZD1
32v
L40
RFC
X1
4.096MHz
U6
MAX704
R50
C50A
C50B
C51C
R51
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AMPLIFIER
SCALE
DRAWING No.
804234
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ARTARMON NSW AUSTRALIA 2064
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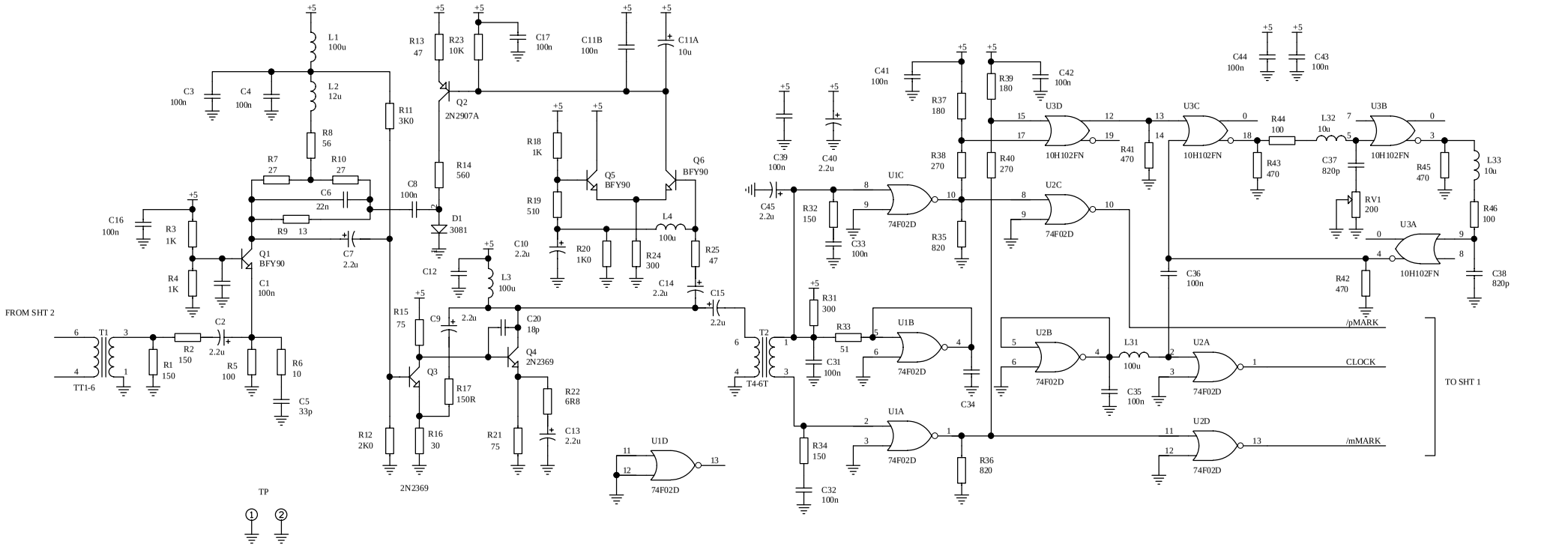

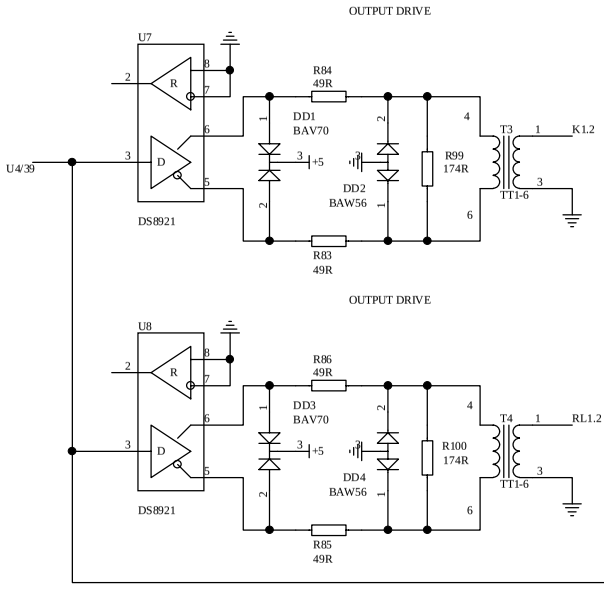

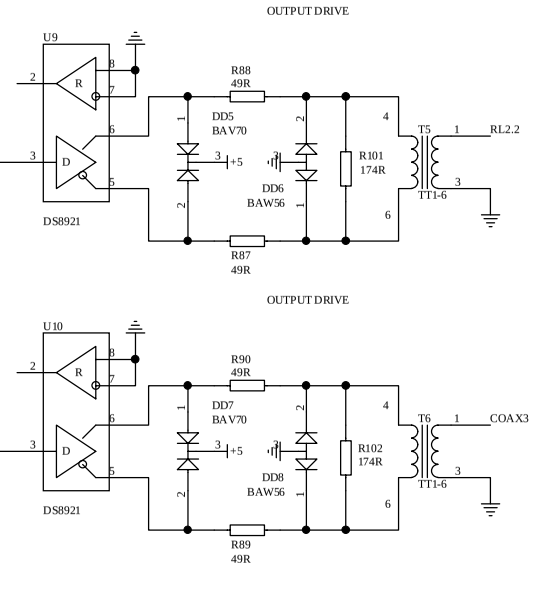

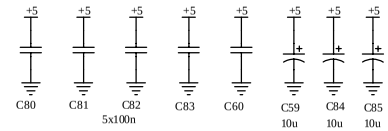

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CHECKED	SCALE	DRAWING No. 804234
ENG. APP.		SHEET 2 OF 2
CONTRACT No.	IRT Electronics Pty. Ltd. ARTARMON NSW AUSTRALIA 2064	