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IRT Eurocard

Types

ADT-3180

Alarm Transmitter

&

ADR-3180

Alarm Receiver

Designed and manufactured in Australia

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

IRT Eurocard
Types
ADT-3180 Alarm Transmitter
&
ADR-3180 Alarm Receiver

Instruction Book

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This instruction book applies to units later than S/N 9500000.

General Description

The ADT-3180 and ADR-3180 provide a means of transferring data from one location to another using frequencies in the normal audio range. In this sense the pair function in a similar way to computer modems operating over telephone lines.

However the ADT/R-3180 system provides several advantages over conventional modems for applications in the broadcast industry. The system is provided with isolated parallel inputs and outputs making it especially suited to the transmission of alarms, control information and tally's, and the additional provision of serial mode operation allows a wider range of applications.

In addition, the ADT-3180 may be used as a parallel to serial converter and the ADR-3180 as a serial to parallel converter. This configuration may be used for the transfer of GPI alarm contact closures over RS232 modems or CODECS with corresponding contact closures provided at the receive end.

The ADT-3180 may be set to either serial or parallel input mode. Both FSK and RS232 outputs are present regardless of which input is selected. The ADR-3180 may be set to either serial or FSK input mode and provides simultaneous serial and parallel relay contact closure outputs. These settings are independent allowing serial input data to be output in parallel form for control purposes or parallel data inputs from alarms or tally's to be output in serial format for interpretation by a computer.

When the ADR-3180 serial output is used, and the parallel output is not required, the relays of the parallel output may be disabled to eliminate any noise from their operation and preserve their working life.

Applications:

- Remote site alarms.
- Remote tally's.
- Remote control of switchers.
- Data transfer of cueing information or statistics.
- GPIB transfer over MPEG links.

Features:

- May be used on existing audio links.
- Optimised performance on balanced audio lines.
- Choice of 8 way parallel input or 1200 Baud RS232 serial input.
- Parallel and serial outputs.
- Opto isolated parallel inputs.
- Changeover relay contacts on parallel outputs.
- Optional disabling of relays when using serial mode output.

Equipment provided:

Standard:

ADT-3180 Alarm transmitter.
ADT-3180 Rear assembly

ADR-3180 Alarm receiver.
ADR-3180 Rear assembly

Accessories available:-

FR-700 Eurocard module mounting frame:-

Provides mounting for up to 12 IRT Eurocards and one PT-700 dual AC power supply side by side in 134 mm of standard rack space (3 Rack Units).

FRU-1030 1 RU chassis /PSU

The FRU-1030 can be fitted with either one or two Eurocards in a horizontal side by side format. A single AC power supply is included to power the cards.

TME-6 Eurocard extender board.
Instruction Book.

Technical Specifications

IRT Eurocard modules

Type ADT-3180 and ADR-3180

ADT-3180: (Transmitter)

Parallel input:

Type	Opto isolated with switchable pullup resistors for grounding contact operation.
Maximum input current	10 mA.
Maximum input voltage	+30 V.
Number	8.

Serial input:

Type	RS232.
Data rate	1200 Baud.
Signals connected	RXD & RTS.
Nominal input level	±9 V minimum.

Audio output:

Type	AC coupled. Transformerless, balanced.
Impedance	300 Ω.
Nominal output level	0 dBu into >10 KΩ.
FSK frequency:	Low 1300 Hz.
High	2100 Hz.

ADR-3180: (Receiver)

Audio input:

Type	AC coupled. Transformerless, balanced.
Impedance	>10KΩ.
Nominal input level	+0 dBu.
Carrier input alarm level	-20 dBu between 1 KHz & 2.5 KHz.
FSK frequency:	Low >1000 Hz.
High	<2500 Hz.
Input CMR	>55 dB.

Parallel output:

Type	Relay isolated with changeover contacts.
Number	8.
Contact rating	30 Vdc @ 1 A.
	120 Vac @ 500 mA.

Serial output:

Type	RS232.
Data rate	1200 Baud.
Signals connected	TXD & CTS.
Nominal output level	±9 V minimum.

Connectors:	Audio	Plugable screw block connectors.
	Matching plug	Phoenix type MC1.5/3-ST-3.81 3 pin plug (2 x supplied with module.)
	RS232	9 pin 'D' female. (1 x supplied with module.)
	Parallel	25 pin 'D' female. (1 x supplied with module.)

Power Requirements:	28 Vac CT (14-0-14) or $\pm$ 16V DC
Power consumption	<5 VA

Other:

Temperature range	0 - 50° C ambient
Mechanical	Suitable for mounting in IRT 19" rack chassis with input output and power connections on the rear panel
Finish:	Front panel Rear assembly
	Grey enamel, silk-screened black lettering & red IRT logo
	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	RB-3180 Rear connector assembly. Matching connectors for audio and data inputs & outputs supplied.
Optional accessories	Instruction manual TME-6 module extender card

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

Technical Description

The ADT-3180 & ADR-3180 operate on the principle of Frequency Shift Keying (FSK).

Both transmitter and receiver are based on the TCM3105L FSK modem IC (U 3 in both ADT-3180 & ADR-3180). This IC contains all the circuitry required for both transmit and receive functions of a basic FSK system. The remainder of the circuit provides the necessary analogue and digital interfaces.

System timing is derived from a clock on board the TCM3105L. The clock frequency CLK (pin 2 - U 3) of 19.11 KHz (16 times the maximum Baud rate of 1200) is derived by frequency division from the oscillator frequency of 4.43 MHz set by crystal XL 1.

ADT-3180:

The transmitter is a programmable frequency synthesiser that provides two output frequencies (on TXA - pin 11 of U 3), representing the 'marks' and 'spaces' of the digital signal present on the TXD input (pin 14 - U 3).

Control of the module is handled by the Programmable Logic Array (PLA) U 2. This selects either the serial or parallel inputs and provides the necessary signals for the parallel to serial converter U 1 and RS232 interface U 4.

For connection of the serial and parallel interfaces; see *Configuration* section.

The FSK output is AC coupled to the audio output drivers U 5 & U 6 which provide a balanced output signal of 0 dBu set by RV 1. This is AC coupled to the output via source impedance setting resistors R 14 & 15.

ADR-3180:

The audio input is AC coupled to a high impedance differential input stage (U 5a) and buffered (U 5b) before being AC coupled to the FSK demodulator IC U 3.

The receive section of the TCM3105L (U 3) is responsible for the demodulation of the analogue signal appearing at the RXA (pin 4 - U 3) and is based on the principle of frequency to voltage conversion. This section contains a group delay equaliser (to correct phase distortion), automatic gain control, carrier detect level adjustment and bias distortion adjustment, thereby optimising performance and giving the lowest possible bit error rate.

Carrier detect information is given to the system by means of the carrier detect circuits, which set a flag on the CDT output (pin 3 - U 3) if the level of received in-band energy falls below the value set on the CDL input (pin 10 - U 3) for a specified minimum duration.

Control of the module is handled by PLA U 2. This provides a constant serial output to the RS232 interface U 4 and may de-select the parallel output (if not required) and provides the necessary signals for the serial to parallel converter U 1 which in turn drives the relays for the parallel output.

For connection of the serial and parallel interfaces; see *Configuration* section.

Power supply: (ADT-3180 & ADR-3180)

Each module is provided with redundant power supply inputs for use with IRT frames providing redundant power supplies of either 14 - 0 - 14 Vac or ± 16 Vdc or one of each. The independent power supply inputs are passed through resistors F 1 - F 4, which act as fuses to protect the power supply rails from module failure.

Diodes D 1 - D 4 and D5 - D 8 isolate the two supplies and provide rectification of AC inputs.

Series resistors (R 19 & 20 - ADT-3180 and R 22 & 23 - ADR-3180) and zener diode ZD 1 limit the input voltage to the DC-DC converter to a maximum of 32 Vdc under the most adverse input conditions. The DC-DC converter provides a +5 Vdc output, which is used by both digital and analogue sections of the circuit.

A number of power supply bypass capacitors are placed strategically in the circuit to eliminate power supply noise induced by digital switching.

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.

Internal Adjustments

The following adjustable resistors are factory set and should not be adjusted unless a component has been changed. They are not 'operational' controls. Before adjusting any of these controls allow time for the modules to reach temperature stability.

ADT-3180:

RV 1 Output gain. Set for 0 dBu into high impedance.

ADR-3180:

RV 2 Receive bias adjustment. Sets the decision threshold of the final comparator to minimise bias distortion.

Do not adjust. Factory set for 0 dBu input. If input level is low adjust audio level to input **not** this control.

RV 4 Input common mode rejection. This has been factory pre-set to provide the best performance and should not require adjustment.

Configuration

ADT-3180:

Serial / parallel mode selection:

The ADT-3180 may be operated with either a serial or parallel input, but not both. Selection of the input mode is made by a switch SW 3 - 1 on the module PCB.

Regardless of which input is selected; the RS232 output remains active.

SW3.	Function	OFF	ON
1	Input select	Parallel	RS232.
2	Parity	Even	None
3	Not used.		
4	Not used.		



For connection details for the serial and parallel inputs see *Installation* section.

Parallel inputs:

The parallel inputs on the ADT-3180 may be operated either by a contact closure or an external voltage source.

For brevity the contact closure mode is referred to in this handbook as “pullup” in reference to the resistor, which holds the input at a logical high level and the external voltage source method is referred to as “isolated” as in this mode there is no direct connection to the ground reference of the module.

See diagram 803896 sheet 2 for recommended external connections for each mode.

Note that the external contact closure method shown in the diagram ensures that the relays are normally in their rest position and therefore only draw current when required to operate. This ensures the minimum power consumption and heat dissipation at the receiver and is thus the preferred mode. To reflect the contact closure at the transmitter the normally open (N/O) contacts at the receiver should be used.

The method shown operates by the external contact closure bypassing the current supply to the LED in the opto isolator and the open circuit voltage at the N/O contact of the transmitter will therefore be equal to the forward voltage of the opto isolator LED (approximately 1.6 Volts).

For reliable operation it is important that the external circuit be of low impedance to ensure that the full LED current of approximately 2 mA is bypassed.

When using the external voltage method it is important to note that a current limiting resistor should be included in series with the voltage source to limit the current to a maximum of 10 mA. In practice a current of 5 mA is more than sufficient for reliable operation. Under no circumstances should the external voltage exceed 30 V and correct polarity must be observed or destruction of the isolator may result.

Each of the parallel inputs may be switched to either pullup or isolated mode by switches SW 1 - 1 to 8 as follows:

SW 1

1	Parallel input 1	pullup (ON)	isolated (OFF).
2	Parallel input 2	pullup (ON)	isolated (OFF).
3	Parallel input 3	pullup (ON)	isolated (OFF).
4	Parallel input 4	pullup (ON)	isolated (OFF).
5	Parallel input 5	pullup (ON)	isolated (OFF).
6	Parallel input 6	pullup (ON)	isolated (OFF).
7	Parallel input 7	pullup (ON)	isolated (OFF).
8	Parallel input 8	pullup (ON)	isolated (OFF).

ADR-3180:

The serial data output on the ADR-3180 is always operative.

When the serial data output is being used, and the relay outputs are not required, the parallel output should be switched off. This will prevent the relays from chattering, reduce current consumption at the receiver and preserve the working life of the relays.

Switch SW 3-1 may be used to disable the parallel relay output by switching the input select to the unused input. This will only disable the parallel output; the RS232 output remains active all the time.

SW3. Function	OFF	ON
1 Input select	RS232	FSK.
2 Parity	Even	None.
3 Not used.		
4 Not used.		



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.

Installation in frame or chassis:

See details in separate manual for selected frame type.

Audio Connections:

The audio connector SK 4 is located on the rear assembly and is marked Gnd, +ve and -ve for connection to a balanced audio line.

Once connected the signal level at the input to the ADR-3180 should be checked to be within the range of -10 to +3 dBu. If not the signal level should be adjusted in the audio path **NOT** at the ADT-3180 or ADR-3180 which have been factory aligned for optimum performance.

When receiving data the DATA LED on the front panel will light indicating a received signal between 1000 Hz and 2500 Hz with a level greater than -20 dBu.

It should be noted that the phasing of the audio signal is not critical for this application as the FSK method detects only the frequency changes of the signal.

If the audio signal is monitored on a loudspeaker a rapidly shifting tone will be heard similar to that produced by a fax machine whilst data is being transmitted.

Data Connections:

ADT-3180:

Serial input: SK 2 9 pin female 'D' connector on rear assembly.

This input is designed to be compatible with a standard serial port on a PC used to output data to the ADT-3180. The linking cable between the PC and the ADT-3180 should be wired pin to pin.

Pin	Name	Use
1	CD	Connected to pins 4, 6 & 9.
2	DSR	Connected to pins 1, 4 & 9
3	TXD	Not connected
4	RTS	Not connected
5	RXD	Serial data input from PC.
6	CTS	Clear to send output to PC.
7	DTR	Connected to pins 1, 6 & 9
8	RI	Connected to pins 1, 4 & 6.
9	SG	Signal Gnd.

Parallel inputs: SK 3 25 pin female 'D' connector on rear assembly.

See *Configuration* section for details of external connection to these inputs.

Pin	Input #	Pullup mode	Isolated mode
1	8	N/O	Opto +ve
2	8	Gnd	Gnd
3	7	Connect to pin 3	Opto -ve
4	7	Gnd	Gnd
5	6	N/O	Opto +ve
6	6	Connect to pin 17	Opto -ve
7	5	N/O	Opto +ve
8	5	Connect to pin 6	Opto -ve
9	4	Gnd	Gnd
10	4	N/O	Opto +ve
11	3	Connect to pin 9	Opto -ve
12	3	Gnd	Gnd
13	2	N/O	Opto +ve
14	2	Connect to pin 23	Opto -ve
15	1	N/O	Opto +ve
16	1	Connect to pin 12	Opto -ve
17	1	Gnd	Gnd
18	1	N/O	Opto +ve
19		No connection.	

ADR-3180:

Serial output: SK 2 9 pin female 'D' connector on rear assembly.

This output is designed to be compatible with a standard serial port on a PC used to input data from the ADR-3180. The linking cable between the PC and the ADR-3180 should be wired pin to pin.

Pin	Name	Use
1	CD	Connected to pins 4, 6 & 9.
2	6 DSR	Connected to pins 1, 4 & 9
3	TXD	Serial data input from PC.
4	7 RTS	Not connected.
5	3 RXD	Not connected.
6	8 CTS	Clear to send output to PC.
7	4 DTR	Connected to pins 1, 6 & 9
8	9 RI	Connected to pins 1, 4 & 6.
9	5 SG	Signal Gnd.

Parallel outputs: SK 3 25 pin female 'D' connector on rear assembly.
See *Configuration* section for details of external connection to these inputs.

Each parallel output is connected to a relay with a set of changeover contacts allowing connection to either normally open (N/O) or normally closed (N/C) contacts.

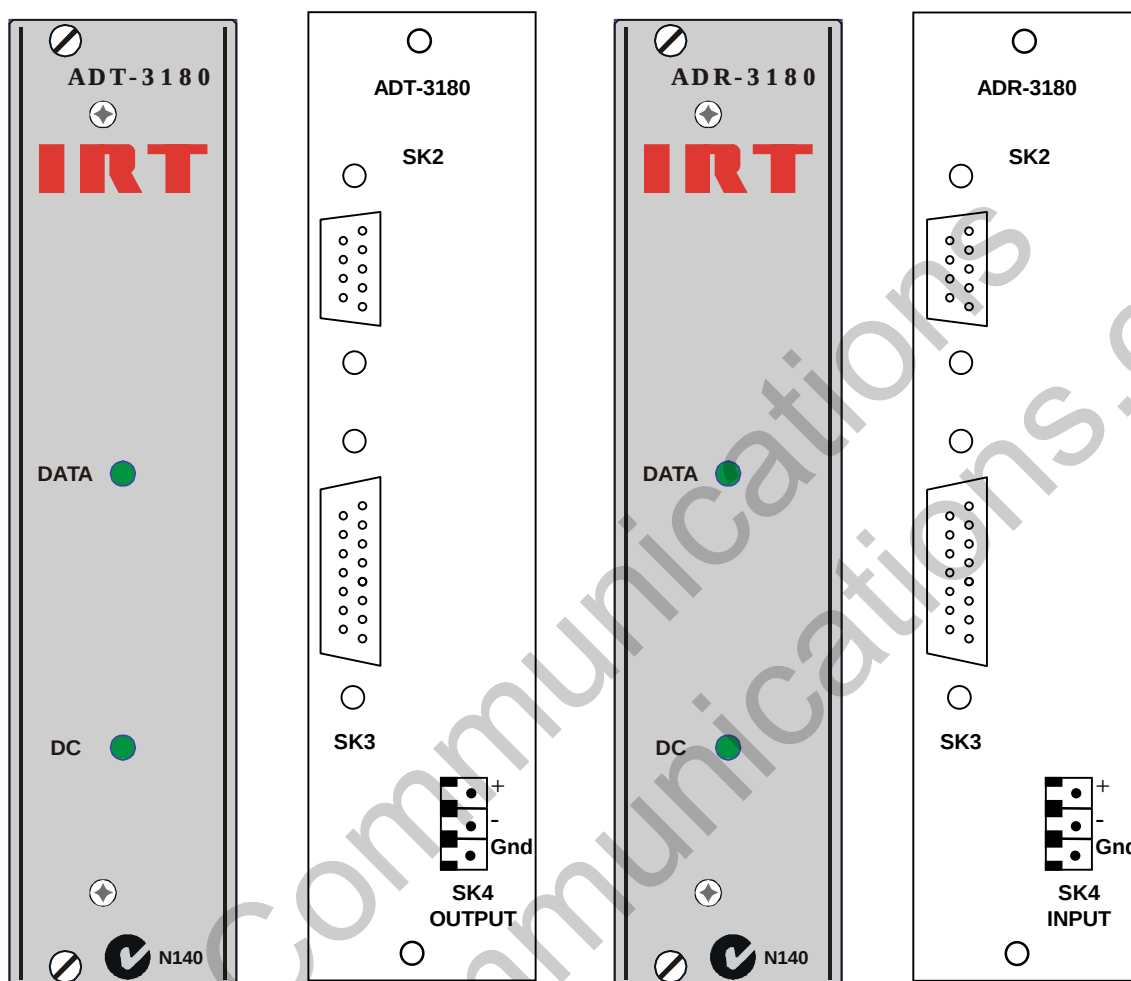
These contacts are intended for low powered signalling purposes only and care should be taken not to exceed the relay contact ratings of 30 Vdc @ 1 A. / 120 Vac @ 500 mA. If it is desired to operate devices using mains power these should be controlled via a suitable power relay housed separately and operated by the ADR-3180 outputs using low voltage.

Connector configuration is as follows:

Pin	Input #	Relay contact
1	8	N/O
2	14 8	Common
3	8	N/C
4	15 7	N/C
5	7	Common
6	16 7	N/O
7	6	N/O
8	17 6	Common
9	6	N/C
10	18 5	N/C
11	5	Common
12	19 5	N/O
13	7	N/O
14	20 4	Common
15	4	N/C
16	21 3	N/C
17	3	Common
18	22 3	N/O
19	2	N/O
20	23 2	Common
21	2	N/C
22	24 1	N/C
23	1	Common
24	25 1	N/O
25		No connection.

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
Email: service@irteletronics.com

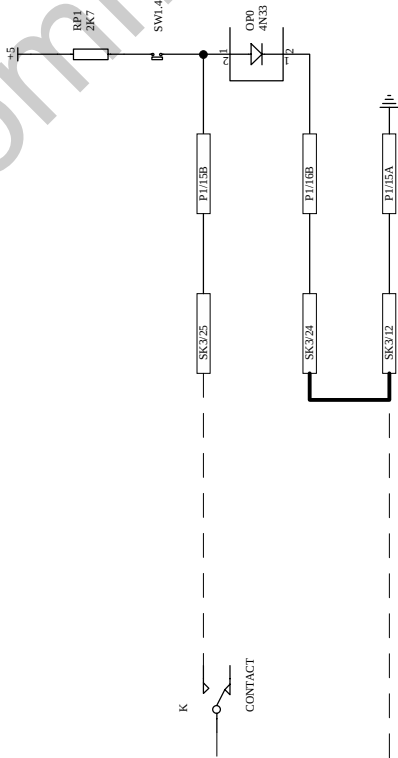
Fax: 61 2 9439 7439

Drawing Index

Drawing #	Sheet #	Description
803896	1	ADT-3180 main circuit schematic
803896	2	ADT-3180 external connections for parallel input
803900	1	ADR-3180 main circuit schematic

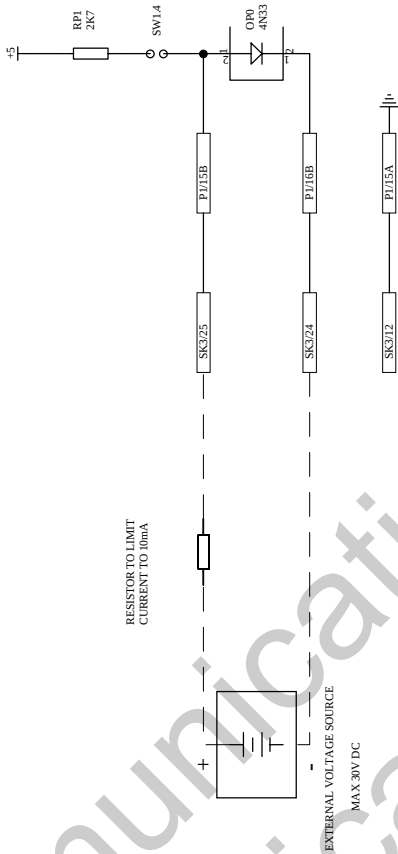
IRT Communications
www.irtcommunications.com

EXTERNAL CONTACT CLOSURE - SHOWN FOR INPUT 0
(VOLTAGE FREE)
SW1.4 CLOSED
LINK SK3/12 & 24
APPLY CONTACT CLOSURE BETWEEN SK3/25 & 12



CONTACT CLOSURE WILL OPERATE RELAYS AT RECEIVER.

EXTERNAL VOLTAGE - SHOWN FOR INPUT 0
SW1.4 OPEN

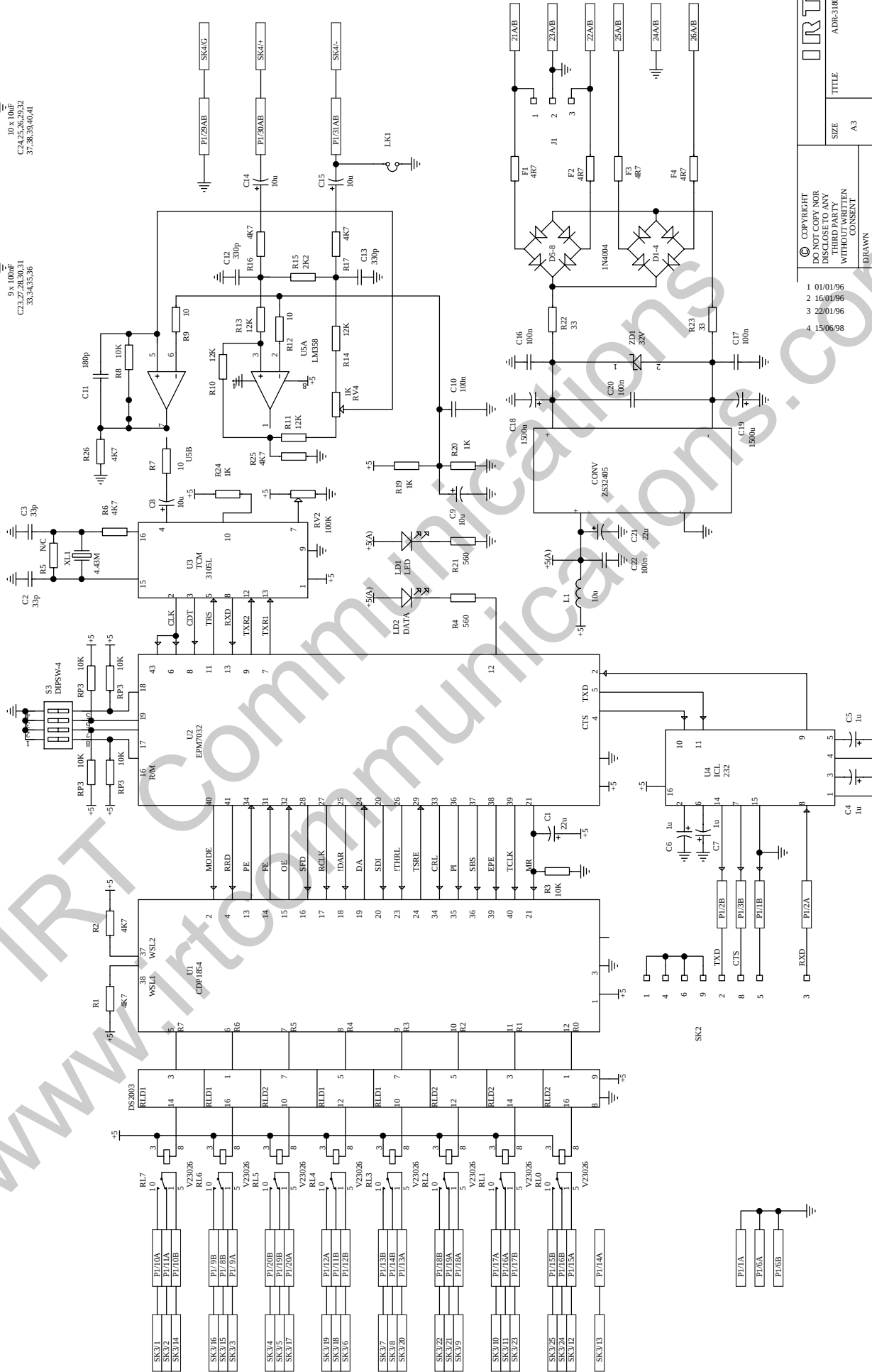


VOLTAGE APPLICATION WILL RELEASE RELAYS AT RECEIVER

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IRT Electronics Pty. Ltd. ACTARMON NSW AUSTRALIA 2064			

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9 x 100nF
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33,34,35,36



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- 1 01/01/96
- 2 16/01/96
- 3 22/01/96
- 4 15/06/98