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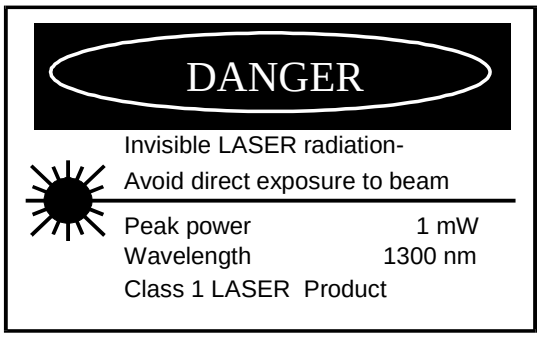
IRT Eurocard

Types RWT-3810 / RWR-3810

L Band RF Fibre Optic Link



Designed and manufactured in Australia

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

RWT-3810 / RWR-3810

L BAND RF FIBRE OPTIC LINK

Instruction Manual

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IRT Eurocard
RWT-3810 / RWR-3810

L BAND RF FIBRE OPTIC LINK

General description

The IRT RWT-3810 / RWR-3810 wide band RF fibre optic link is a modular system for transmitting a broadband RF signal ranging from 900 MHz to 2050 MHz along an optical fibre. A system consists of two IRT Eurocard modules, the RWT-3810 LASER transmitter module and the RWR-3810 photo-diode receiver module.

RWT-3810 Laser Transmitter.

The RWT-3810 LASER transmitter module consists of a wide bandwidth LASER diode, whose operating current is set by a driver circuit controlled by feedback from the monitoring diode in the laser package. A wide band RF amplifier is used to drive the LASER with the RF signal applied to the module input.

A RF gain control and RF monitor connector are provided on the front panel. The gain of the RF amplifier is adjusted by the front panel control (RV1), which varies the bias on the attenuator circuit in the RF gain stage.
The gain is adjusted for best signal to noise and inter-modulation performance by setting the RF level at the front panel RF monitor connector at –40dBm.

The laser internal monitoring diode output is connected to comparator circuits, which are used to provide optical power indications. The circuits drive LD3 on the front panel for laser power ON and FAIL indication (green for normal and red for failure), and after passing through a relay circuit, a LASER POWER ALARM is available as an external connection. The adjustment and connection data for this circuit is given in the installation section of the manual.

A 10.7 MHz pilot tone generator circuit is provided which with a detector circuit in the RWR-3810 receiver will verify the RF signal path of the system. The pilot tone level from the generator is monitored by a detector circuit whose output will be indicated by LD2 (green for normal and red for failure), and can, by closing LK2, operate the alarm relay circuit if a failure occurs.

LNB DC power can be applied to the RF cable connection to the RWT-3810 by closing LK4 on the board and applying the required DC voltage to SK3 on the rear panel.

SK3 pin 1 is the ground connection and pin 2 is the active connection. The circuit is not polarity sensitive.

The power supply comprises two bridge rectifiers whose rectified outputs are paralleled (positive and negative respectively) to provide redundancy. The inputs to these rectifiers are two independent feeds of 28 Vac (centre tap grounded). The rectified DC is regulated by three-terminal regulators. The DC indicator LED on the front panel is wired in series with a zener diode between +12 and -12 Volts. The zener is to ensure that the LED extinguishes if any one of the regulators fails.

RWR-3810 Photo-diode Receiver.

The RWR-3810 photo-diode receiver module consists of an optical detector diode circuit with integral pre-amplifier. Integrated attenuator and discrete amplifier circuits follows to set the output RF level of the system.

A RF gain control and RF monitor connector are provided on the front panel. The gain of the RF amplifier is adjusted by the front panel control (RV3), which varies the bias on the attenuator circuit in the RF gain stage. The RF level can be varied from –45dBm to –20dBm at the output RF connector for a correctly modulated RWR-3810 transmitter. The RF level at the front panel monitor connector is set at the same level as the rear panel RF output, this allows the RF level to be checked as the RF gain is adjusted. This output should be terminated with the 75 ohms termination provided when not in use.

The bias current of the optical detector diode is connected to a comparator circuit, which is used to provide received optical signal indication. The circuit will light indicator lamp LD3 on the front panel for OPTICAL SIGNAL indication (green for normal and red for failure), and with LK1 closed will operate a relay circuit, an ALARM contact set is available as an external connection. The adjustment and connection data for this circuit is given in the installation section of the manual.

A 10.7 MHz pilot tone detector circuit is provided which with the pilot generator circuit in the RWT-3810 transmitter will verify the RF signal path of the system. The pilot tone level is monitored by a detector circuit whose output will be indicated by LD2 (green for normal and red for failure), and can, by closing LK2, operate the alarm relay circuit if a failure occurs.

The power supply comprises two bridge rectifiers whose rectified outputs are paralleled (positive and negative respectively) to provide redundancy. The inputs to these rectifiers are two independent feeds of 28 Vac (centre tap grounded). The rectified DC are regulated by three-terminal regulators. The LED on the front panel is wired in series with a zener diode between +12 and -5.2 Volts. The zener is to ensure that the LED extinguishes if any one of the regulators fails.

NOTE: Direct connections are made to the rear of the RWT-3810 and RWR-3810 modules for the OPTICAL and RF cabling, these must be disconnected when a module is to be mounted or removed from the IRT Eurocard mounting frame.

RWT-3810 / RWR-3810 Technical specifications

RF signal connections		75 ohms SMC on rear connector panel. (BNC and F adapters provided.)
RF input level		Adjustable in the range -40 dBm to –20 dBm total power.
RF output level		Adjustable in the range -45 dBm to –20 dBm total power.
Input / output VSWR		<2:1 (75 Ω / 50 Ω).
System 3rd order intercept (IP3)		>+10 dBm.
System frequency response		900 MHz to 2050 MHz operation
500 MHz flatness 36 MHz flatness		± 1.5 dB ± 0.5 dB
System group delay		± 2 ns, 900 MHz - 2050 MHz
Carrier to noise		>26 dB for 36 MHz bandwidth
Inter-modulation products.		< 40 dBc.
Optical output power		-7 to -10 dBm.
System optical budget		> 4 dB.
Optical signal connections		SC angle faced (accessible from the rear of the module) for use with single mode (9/125μm) fibre cable.
LNB Power		13V or 18V input to RWT-3810 rear panel, SK3.
Power requirement		14V-0-14V AC /3.5 VA
Temperature range		0 - 45° C ambient
Mechanical		6 HP x 3 U x 220 mm IRT Eurocard Suitable for mounting in IRT 19" rack chassis. Fibre, RF & alarm connections at the rear.
Finish:	Front escutcheon	Grey with black lettering & red IRT logo
	Rear assembly	Detachable silk screened PCB with direct mount connectors to Eurocard and external signals
Standard accessories		Matching control connector is supplied with the TX module, and RF adapter connectors for conversion to BNC and F is supplied with both modules.
Optional accessories		TME-6 module extender card

NOTE: All the parameters specified are only applicable when using single mode (9/125μm) fibre cable with a return loss of >= 27 dB.

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

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.

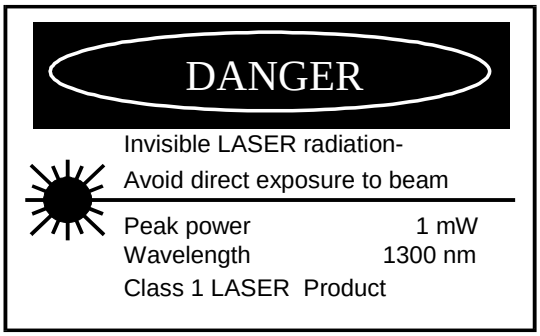
Signal earth: For safety reasons a connection is made between signal earth and chassis earth. No attempt should be made to break this connection.

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.



NOTE: Direct connections are made to the rear of the RWT-3810 and RWR-3810 modules for the **OPTICAL** and **RF** cabling, these must be disconnected when a module is to be mounted or removed from the IRT Eurocard mounting frame.

Installation in frame or chassis:

See details in separate manual for selected frame type.

RWT-3810 LASER transmitter module

The RWT-3810 is factory preset for a optical output of –7 dBm to –10 dBm and a RF input level of –40 dBm.

Installation requires the unit to be plugged into the front of the selected IRT frame and the rear assembly to be secured to the rear panel of the IRT frame. To install the module in a FRU-3000 or FRU-1030 frame please see the separate instruction manual "**Eurocard Frames & Power Supplies**".

RF signal connection is made to the 75 ohms SMC connector on the **rear panel** of the RWT-3810, adapters are supplied to allow connection to circuits using BNC or F series connectors.

A RF signal monitor connector is provided on the front panel. The RF level at this connector should be –40dBm as adjusted by the front panel RF gain control RV1. At this RF level the laser modulation is set for the best signal to noise and inter-modulation of the transmission system. For a input signal of –40dBm the RF gain control will be at the maximum (fully clock-wise) position, for higher input levels the gain will have to be backed up and adjusted to set the level at the RF monitor connector to –40dBm**. Note: the RF Monitor connector will need to be terminated with the 75 ohms termination provided when not in use.**

Optical signal connection is made to the SC/APC optical connector on the **rear** of the RWT-3810. **Extreme care must be taken to ensure the cleanliness and consequently the best return loss of the optical connections.**

The optical output power is monitored by comparator circuits, which are adjusted to change state if the output level varies by more than ± 3dB from the output level set during alignment. A led indicator on the front panel will light green when the laser is operating normally and change to red if the laser power deviates be ± 3dB from the pre-set level.

The RWT-3810 includes a pilot tone generator at 10.7 MHz. This allows for the verification of the RF signal path at the receiver. A led indicator on the front panel will light green when the pilot is operating normally and change to red if the pilot signal fails.

The alarm circuit accepts signals from the laser power low always, from the laser power high on LK1 closure and pilot fail circuit on LK2 closure to operate relay RL1. External connections from the alarm relay are available on pins 2 and 3 of SK4 on the rear panel. The alarm circuit is wired to give a relay contact closure when a fault condition such as power failure, low or high optical output, failure of the pilot tone generator occurs. A second alarm contact closure is available at J3.

LNB power can be applied to the RF in cable through J3 on the rear panel after closing LK5.

RWR-3810 photo-diode receiver module

The RWR-3810 is factory preset for use with the accompanying RWT-3810 transmitter and a optical path attenuation of 2 dB, to give unity gain in the RF signal path.

Installation requires the unit to be plugged into the front of the selected IRT frame and the rear assembly to be secured to the rear panel of the IRT frame. To install the module in a FRU-3000 or FRU-1030 frame please see the separate instruction manual "**Eurocard Frames & Power Supplies**".

RF signal connection is made to the SMC connector on the **rear** of the RWT-3810, adapters are supplied to allow connection to circuits using BNC or F series connectors

Optical signal connection is made to the optical connector on the **rear panel** of the RWR-3810. **Extreme care must be taken to ensure the cleanliness and consequently the best return loss of the optical connections.**

To overcome any optical path loss the RF signal level can be set using the front panel gain control (RV3), while at the same time monitoring the output level using the front panel RF monitor connector which outputs the same RF level as the rear output connector. **Note: the RF Monitor connector will need to be terminated with the 75 ohms termination provided when not in use.**

The optical input signal level is monitored by a current sense and comparator circuit, which is adjusted to change state if the optical path loss exceeds the maximum optical budget by 3 dB.

The alarm circuit accepts signals from the optical level on LK1 closure and pilot fail circuits on LK2 closure to operate relay RL1. The external connections for the alarm circuit are available on pins 2 and 3 of SK4 on the rear panel. The alarm circuit is wired to give a relay contact closure when a fault condition such as power failure or low optical input occurs. A second alarm contact closure is available at J3.

RWT-3810 adjustments.

RV1 sets the RF modulation level of the laser by applying a bias voltage to the RF attenuator circuit.

RWT-3810 Preset adjustments.

RV2 sets the output **LOW** indicator circuit as shown by LD3 on the front panel.
RV3 sets the output **HIGH** indicator circuit as shown by LD3 on the front panel.
RV4 sets the bias current to the laser diode and thus the optical output from the RWT-3810.

RWR-3810 adjustment.

RV3 sets the output RF level of the module by applying a bias voltage to the RF attenuator circuit.

RWR-3810 Preset adjustment.

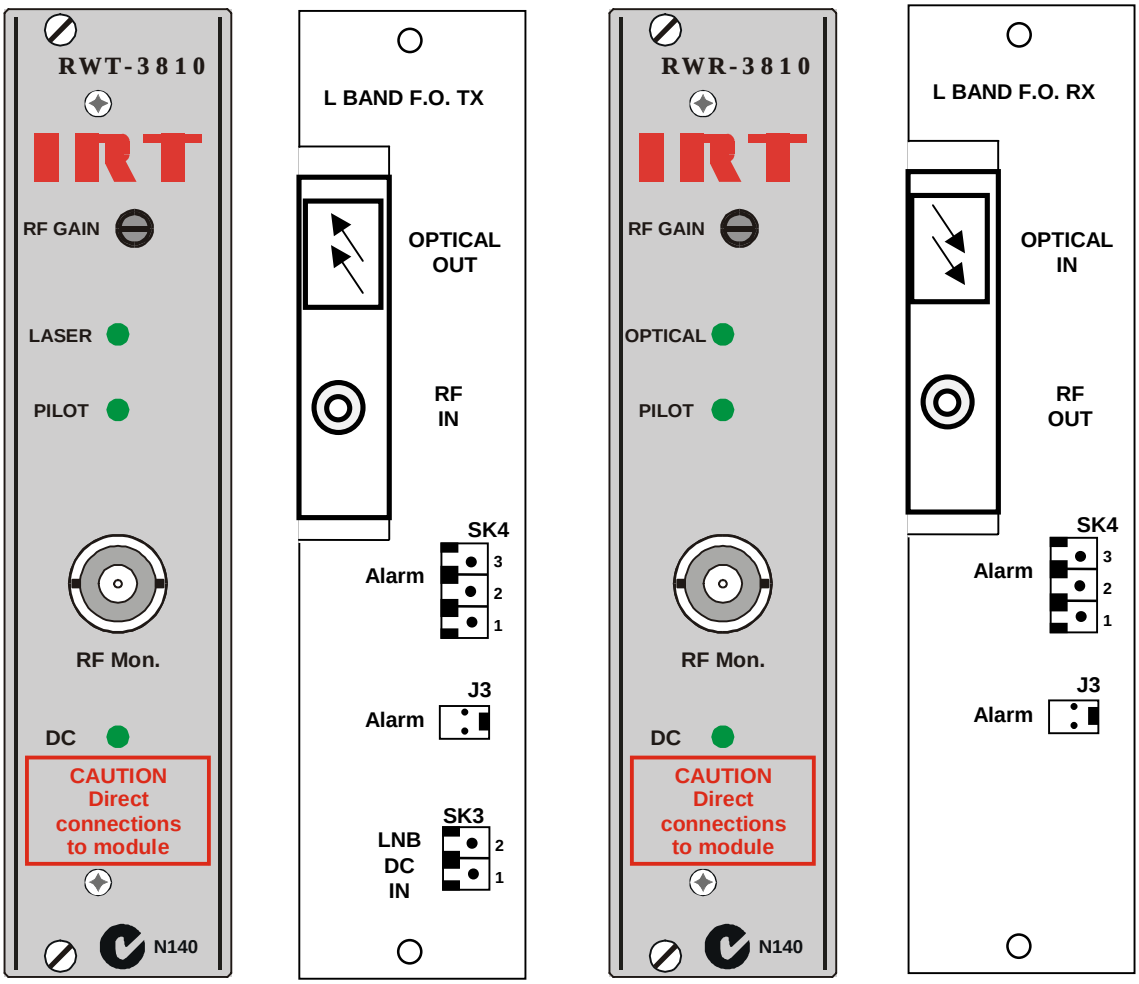
RV1 sets the pilot **SIGNAL LOW** alarm circuit threshold as shown by LD2 on the front panel.
RV2 sets the input **SIGNAL LOW** alarm circuit threshold as shown by LD3 on the front panel.

Diagrams are provided for the RWT-3810 and the RWR-3810. The optical and RF signal sections are housed in sealed shielded sections containing no user serviceable parts. Should service be required on these circuits, please return the unit to the supplier for repair and alignment.

NOTE: If it is necessary to remove a component from the circuit board during maintenance **IT IS ESSENTIAL TO ADD SOME SOLDER TO THE COMPONENT SOLDER JOINTS BEFORE REMOVAL IS ATTEMPTED**. This will add some solder flux to the joint and allow the heat from the iron to flow quickly into the joint and prevent localised overheating and damage to the circuit board.
Rear assemblies may be removed for maintenance. Make sure that extraction force is applied equally and steadily at the top and bottom of the rear assembly. SHOULD THIS NOT BE DONE THERE IS A GOOD CHANCE THAT YOU WILL BEND THE MODULE CONNECTOR PINS making it very difficult to re-install the rear assembly.

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 1 hour's labour, at IRT's current labour charge rate, 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 1 hour's labour will apply, whether the equipment is within the warranty period or not. Contact IRT for current hourly rate.

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
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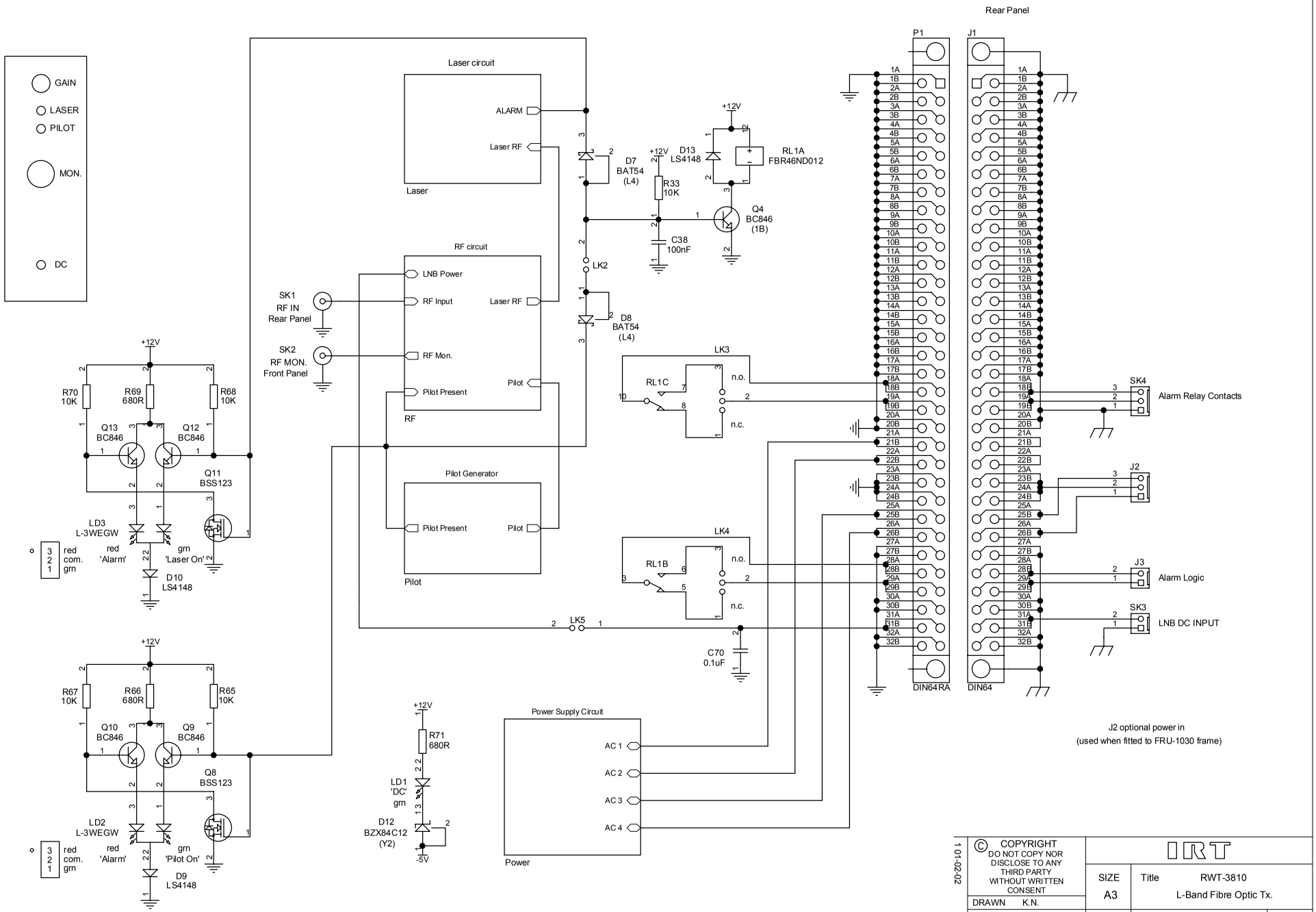
804421		RWR-3810 schematic block diagram



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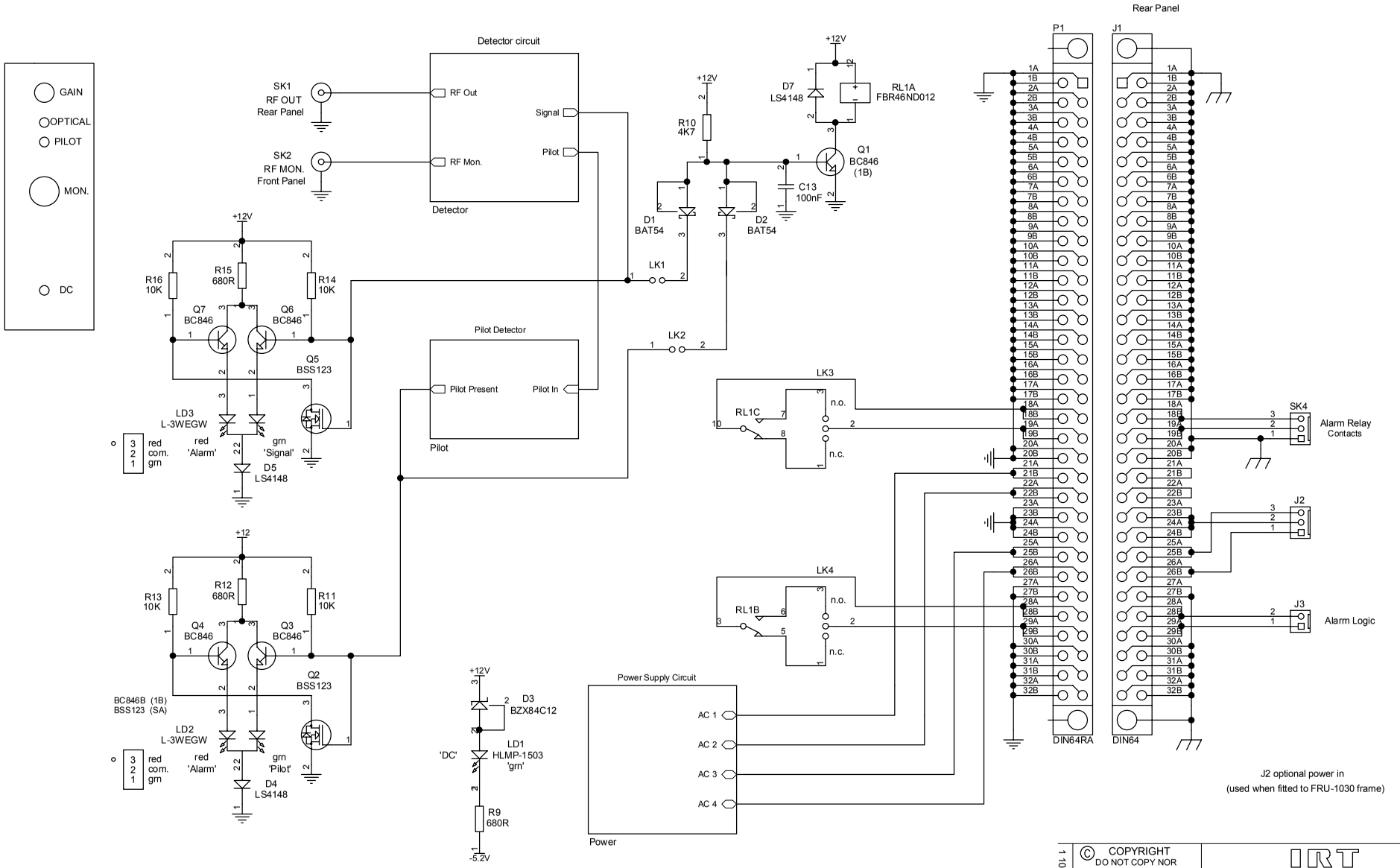
Date: 6-May-2002			



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	Date: 6-May-2002	