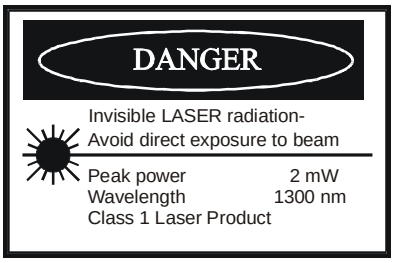
I R T Electronics Pty Ltd A.B.N. 35 000 832 575
26 Hotham Parade, ARTARMON N.S.W. 2064 AUSTRALIA
National: Phone: (02) 9439 3744 Fax: (02) 9439 7439
International: +61 2 9439 3744 +61 2 9439 7439
Email: sales@irtelectronics.com
Web: www.irtelectronics.com

IRT Eurocard

70 / 140 MHz IF FIBRE OPTIC LINK

Type RWT-3086 / RWR-3086



Designed and manufactured in Australia

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

RWT-3086/RWR-3086

WIDE BAND
RF FIBRE OPTIC LINK

Instruction Manual

Table of Contents

This instruction book applies to units later than S/N 0109001.

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 RWT-3086 / RWR-3086
WIDE BAND RF FIBRE OPTIC LINK

GENERAL DESCRIPTION

The IRT RWT-3086 / RWR-3086 70 / 140 MHz IF fibre optic link is a modular system for transmitting a broadband RF signal ranging from 20 MHz to 200 MHz along a single mode optical fibre, the system is optimised for operation over 10 dB to 25 dB optical path attenuation. A system consists of two IRT Eurocard modules, the RWT-3086 LASER transmitter module and the RWR-3086 photo-diode receiver module.

RWT-3086 Laser transmitter.

As shown on diagram 804218 the RWT-3086 Laser Transmitter module consists of a 1300 nm wide bandwidth laser diode, whose operating current is set by a driver circuit controlled by feedback from the monitoring diode in the laser package. Wide band amplifiers are used to drive the laser with the RF signal applied to the module input.

The monitoring diode output is also connected to comparator circuits, which are used to provide an indication of the optical power levels. The low power alarm drives a LED indicator on the front panel, and after passing through a relay, is also available as an external connection. The adjustment and connection data for this circuit is given in the installation section of the manual.

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 outputs are regulated by three-terminal regulators. The DC indicator LED on the front panel is wired in series with a zener diode and a resistor between +12 and -12 Volts. The zener is to ensure that the LED extinguishes if either of the power supplies fails.

RWR-3086 Photo-diode receiver.

As shown on diagram 804295 the RWR-3086 Photo-diode Receiver module consists of an optical detector diode circuit and pre- amplifier followed by an attenuator circuit and signal output amplifier.

The optical detector circuit consists of an avalanche photo-diode, biased from an adjustable positive supply, followed by a transimpedance amplifier operating from +5V. The output of the amplifier is connected to a FET amplifier whose gain is controlled by its bias supply. Further amplifiers are used to bring the output level up to the level applied to the input of the RWT-3086 Laser Transmitter. The bias of the gain control amplifier Q1, is set by RV1 a front panel control, or by the control voltage from an AGC circuit derived from the RF signal level at the output of the RWR-3086 RF amplifiers.

With the AGC option enabled by setting LK2 to 2-3 and the adjustment of RV2 (the AGC control), a comparator circuit U6 monitors the bias voltage to Q1 and enables a low signal alarm when the AGC voltage range is exceeded. The low signal alarm circuit drives an LED indicator on the front panel, and after passing through a relay, is also available as an external connection. The adjustment and connection data for this circuit is given in the installation section of the manual.

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). Three-terminal regulators regulate the rectified DC outputs. The DC indicator LED on the front panel is wired in series with a zener diode and a resistor between +12 and –12 Volts. The zener is to ensure that the LED extinguishes if either of the power supplies fails.

TECHNICAL SPECIFICATIONS

IRT Eurocard modules
Types RWT-3086 / RWR-3086

RF signal connections		BNC on rear assembly
Input / output impedance		75 Ω.
RF input level		0 to -20 dB.
Overall system gain		Adjustable for unity gain with 25 ±1 dB optical path loss.
System 3rd order intercept (IP3)		> +10 dBm
System frequency response		±1 dB 20 MHz - 200 MHz.
System group delay		±2 ns 20 MHz - 200 MHz.
System noise		-100 dBm/Hz typical at 25 dB optical path loss.
System noise floor		-40 dBm max.
Optical signal connections		SC/PC (at rear of the module) for use with single mode (9/125 μm) fibre cable.
Optical output power		-2 dBm nominal.
Maximum system optical loss		25 ±1 dB maximum.
Minimum recommended system optical loss		10 dB. *
Power requirements		28 Vac CT (14-0-14) or ± 16 Vdc.
Power consumption		<4.5 VA.
Temperature range		0 - 50° C ambient.
Mechanical		Suitable for mounting in IRT 19" rack chassis with fibre & RF connections and alarms at rear.
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		Matching control connectors are supplied with each module.
Optional accessories		TME-6 module extender card. Optical attenuator. Part No: ATT-Blue 10dB Operation manual. ZWR-3085RH double width rear assembly for changeover pairs of RWR-3086's.
	*	Where optical path loss is less than 10 dB an optical attenuator must be employed.
NOTE :		All the parameters specified are only applicable when using single mode (9/125 μm) fibre cable.

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

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:

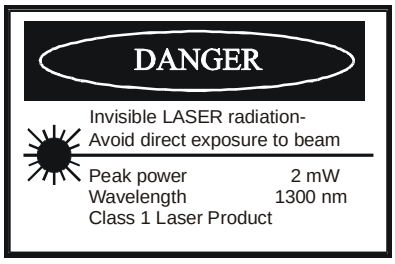
The earth path is dependent on the type of frame selected. In every case particular care should be taken to ensure that the frame is connected to earth for safety reasons. See frame manual for details.

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.

RWT-3086 LASER transmitter module



The RWT-3086 is factory aligned for an optical output level of -2 dBm ±2 dB and an optimum RF input level of -10 dBm into 75 Ohms.

Installation requires the unit to be plugged into the front of the mounting frame and the rear assembly to be secured to the rear panel of the mounting frame, to install a module in the frame please see instructions under selected frame type in the relevant manual describing the frames.

RF signal connection is made to the BNC connector on the rear panel of the RWT-3086.

Optical signal connection is made to the optical connector on the rear of the RWT-3086 module. **Extreme care must be taken to ensure the cleanliness and consequently the best return loss of the optical connections.**

The RWT-3086 will operate with input signal levels up to 0 dBm, however further increase in level will bring up inter-modulation components in the signal structure.

Alarm Circuit.

The external connections for the alarm circuit are available on pins 3 and 4 of SK1 on the rear panel. Pin 3 is the ground connection and pin 4 is the active connection from the alarm circuit. **The alarm circuit output is a relay contact set, which is linked to provide a contact closure or a contact open when a fault occurs.** To select the contact closure on fault with link LK6 near RL1 in the NC (2-3) position. Note a fault condition then will be either low laser output or loss of dc power.

RWR-3086 photo-diode receiver module

Installation requires the unit to be plugged into the front of the mounting frame and the rear assembly to be secured to the rear panel of the mounting frame, to install a module in the frame please see instructions under selected frame type in the relevant sections describing the frames.

RF signal connection is made to the BNC connector on the rear panel of the RWR-3086.

Optical signal connection is made to the optical connector on the rear of the RWR-3086. **Extreme care must be taken to ensure the cleanliness and consequently the best return loss of the optical connections.**

The RWR-3086 is factory pre-set to give unity gain in the RF signal path with 25 dB attenuation in the optical path and LK2 set for **manual gain** adjustment, using RV1 on the front panel.

With the RWR-3086 set for manual gain operation the unit will hold the output signal relatively constant due to the APD bias operation for optical path attenuation from 10 dB to 25 dB.

Alternatively link LK2 can be set in the AGC position and the AGC loop will then hold the output level constant to the RF level set by RV2 (the factory setting is –10 dBm). The RF output level will now be held constant to this setting for optical path attenuation from 10 dB to 25 dB, **when there is RF signal on the link.**

Alarm Circuit.

Note the alarm circuit is active **only** when the RWR-3086 gain control circuit is operating in the AGC condition. To enable AGC of the output RF signal level, change LK2 to the AGC position and set RV2 to give the correct RF level at the output of the RWR-3086. The default factory setting for RV2 is a RF level of –10 dBm into 75 Ω from SK2 on the rear panel.

The external connections for the alarm circuit are available on pins 1 and 2 of SK1 on the rear panel. Pin 1 is the ground connection and pin 2 is the active connection from the alarm circuit. **The alarm circuit output is a relay contact set, which is linked to provide a contact closure or a contact open when a fault occurs.** The default setting is for contact closure on fault set LK6 near RL1 in the NC (2-3) position. Note a fault condition then will be either bias voltage to Q1 out of range indicating low or no signal, or loss of dc power.

RWT-3086 Pre-set adjustments.

RV2 sets the bias current to the laser diode and thus the optical output from the RWT-3086. Adjustment of RV2 without monitoring the optical output power and the laser operating linearity will cause misalignment of the RWT-3086 and may cause the system to fail. RV2 has been factory set for correct operation and should not be adjusted without consulting the manufacturer.
RV3 sets the output low indicator LD2 on the front panel and the state of the alarm relay RL1.
RV4 sets the laser on indicator LD1 and is adjusted to come on when the laser low indicator extinguishes.

RWR-3086 Pre-set adjustments.

RV2 sets the RF signal level at the output when the RWR-3086 is operated in AGC mode (LK2 2-3).
RV3 sets the signal **LOW** signal alarm indicator circuit as indicated by LD1 on the front panel, when the RWR-3086 is operated in AGC mode.
RV4 sets the bias voltage for the APD diode in the optical detector, a factory adjustment for optimum gain in the receiver at low optical signal level.
RV6 is set to minimise the noise from the APD at low optical signal level, a factory adjustment only.

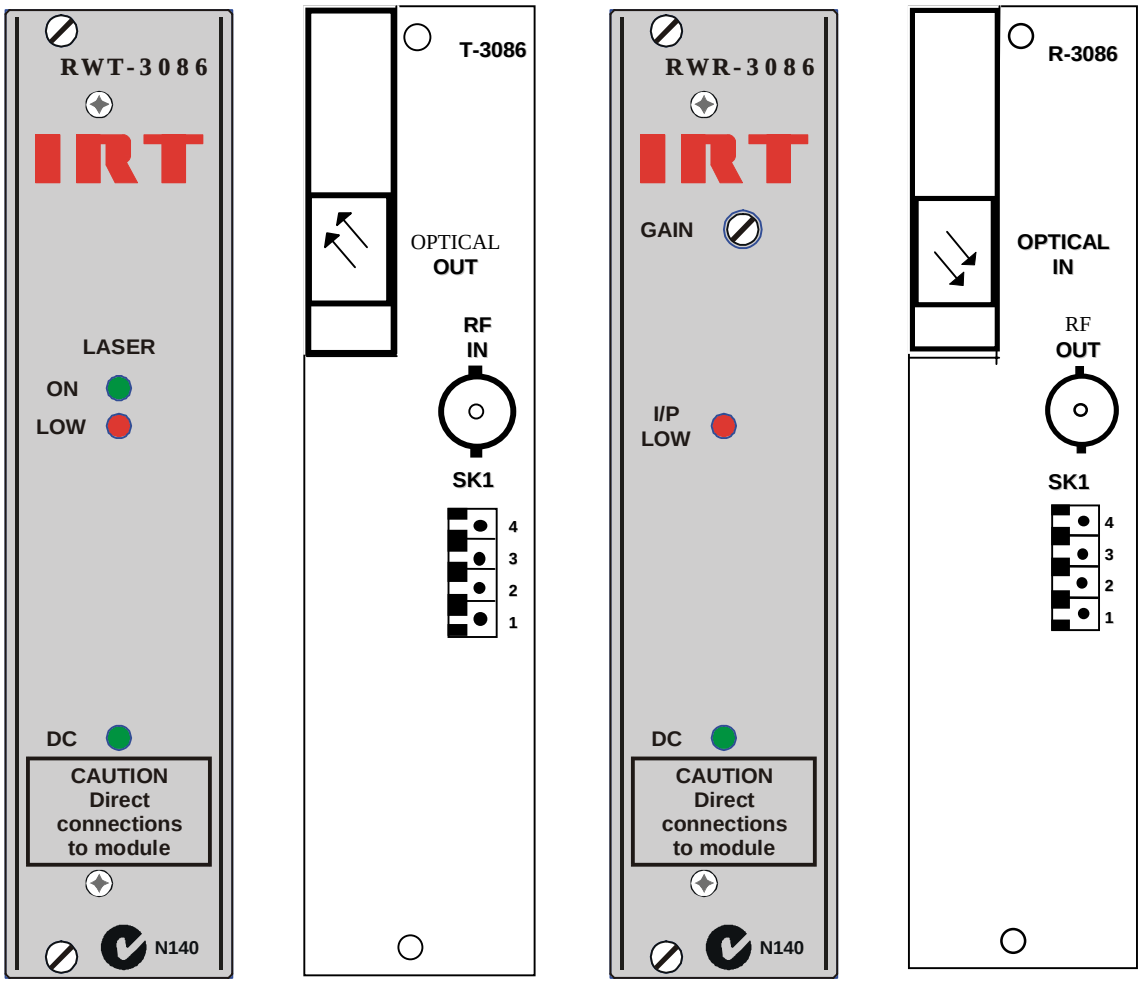
Diagrams are provided giving details of the circuits of the RWT-3086 and the RWR-3086. The optical and RF signal sections are housed in sealed shielded sections containing no user serviceable parts. Should service be required on these circuits, please return the unit to the supplier for repair and alignment.

Optical Attenuation Requirements.

To keep the intermodulation distortion low the maximum recommended optical input level to an RWR-3086 is –10 dBm. Therefore where the optical path loss is less than 10 dB an optical attenuator should be used at the receiver input. Such a pad is available from IRT as an accessory. For the more critical applications such as the transport of QPSK signals, best results will be achieved if the input optical level does not exceed –15 dBm.

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.



ZWR-3086RH Change-over Rear Panel

Two RWR-3086 receivers can be operated in a Main/Standby change-over situation for failure of a path using the change-over rear assembly, ZWR-3086RH. This is a double width rear assembly, which takes two RWR-3086 receiver modules side by side. One acts as the Main receiver and the other as the Standby receiver. Should the Main receiver circuit lose its input signal, a relay on the ZWR-3086RH board swaps the output connection with the Standby receiver module.

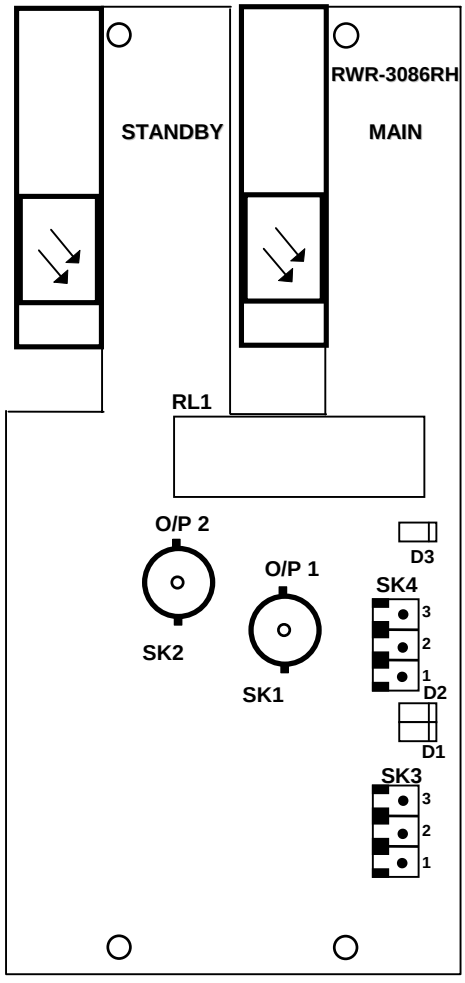
For operation of two receivers in the Main/Standby mode the following connections must be made:
(Refer drawings 804295 and 804298)

1. In the RWR-3086 modules, LK6 must be placed in position 1-2. This will provide a closure to ground at SK4 on the ZWR-3086RH rear connector when signal is present.

2. In the RWR-3086 modules LK1 must be closed. This will provide the +ve voltage for the relay on the rear assembly.

3. The relay on the rear assembly connects the output of the Main module to the O/P 1 connector, SK1, in the energised condition. At the same time the output of the Standby receiver will be connected to the O/P 2 connector, SK 2. On change-over these signal connections will swap. Wiring SK3 PIN 2 to SK4 PIN 3 will complete the circuit so that O/P 1 is the main output and on failure the relay will release and switch to the output from the Standby module.

4. An alarm can only be obtained from the RWR-3086 when LK2 is in the "AGC" position, pin 2 - pin 3. Thus an RWR-3086 will give an alarm on loss of "RF Signal" at the receiver and the required "RF Signal Level" must be set by RV2. The factory preset is for an "RF Signal Level" at the output of -10 dBm when the RWR-3086 is operated in the "AGC" mode.



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.

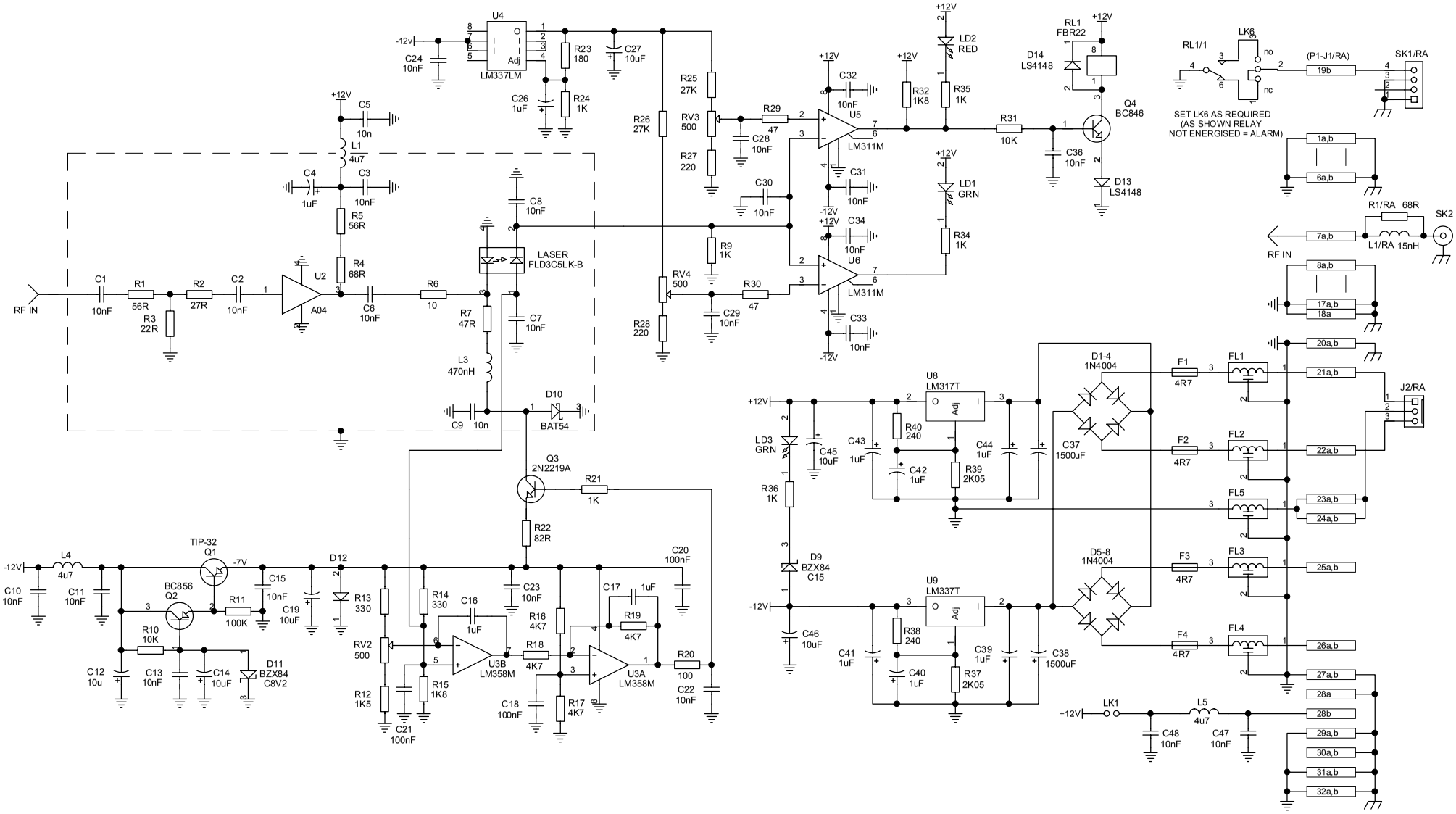
The equipment should be returned **to the agent who originally supplied the equipment** or, where this is not possible, to IRT direct as follows.

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 List Index

Drawing #	Sheet #	Description
804218	1	RWT-3086 optical transmitter schematic diagram
804295	1	RWR-3086B optical receiver schematic diagram
804295	2	RWR-3086B optical receiver schematic diagram
804295	3	RWR-3086B optical receiver schematic diagram
804298	1	ZWR-3085/6RH C/O Rear Panel for RWR3085/6



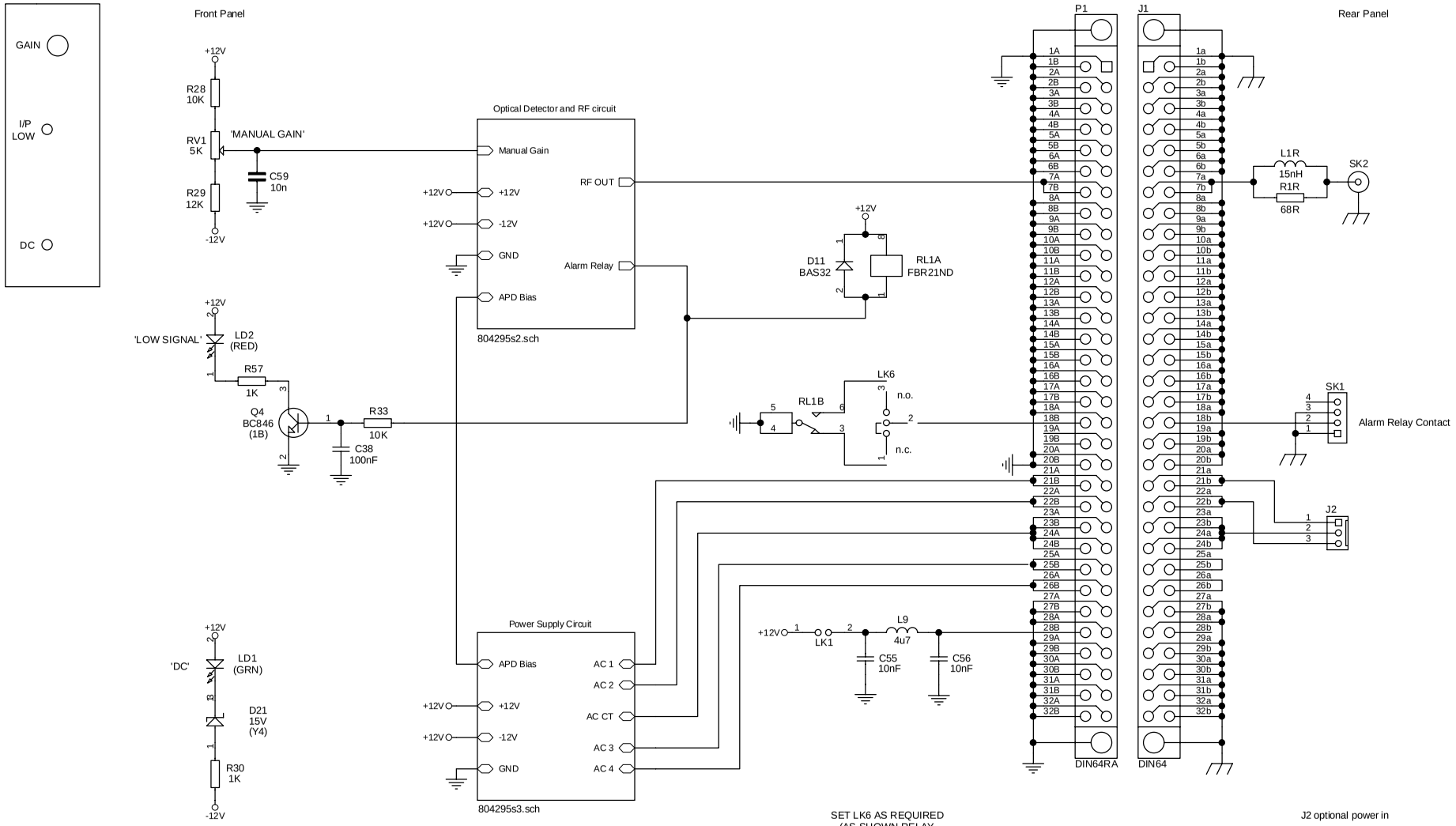
NOTE: UNLESS OTHERWISE MARKED DIODES ARE LS4148

PCB 804544

1 8-10-98
2 6-03-01 ECR1183
3 20-03-01 ECR1190

IRT

SIZE A3	Title RWT-3086		
DRAWN K.N.			
CHECKED	SCALE N.T.S.	Drawing No. 804218	Sheet 1 of 3
ENG. APP.			
Revision: 3	IRT Electronics Pty. Ltd.		
Date: 13-Sep-2001	ARTARMON NSW AUSTRALIA 2064		

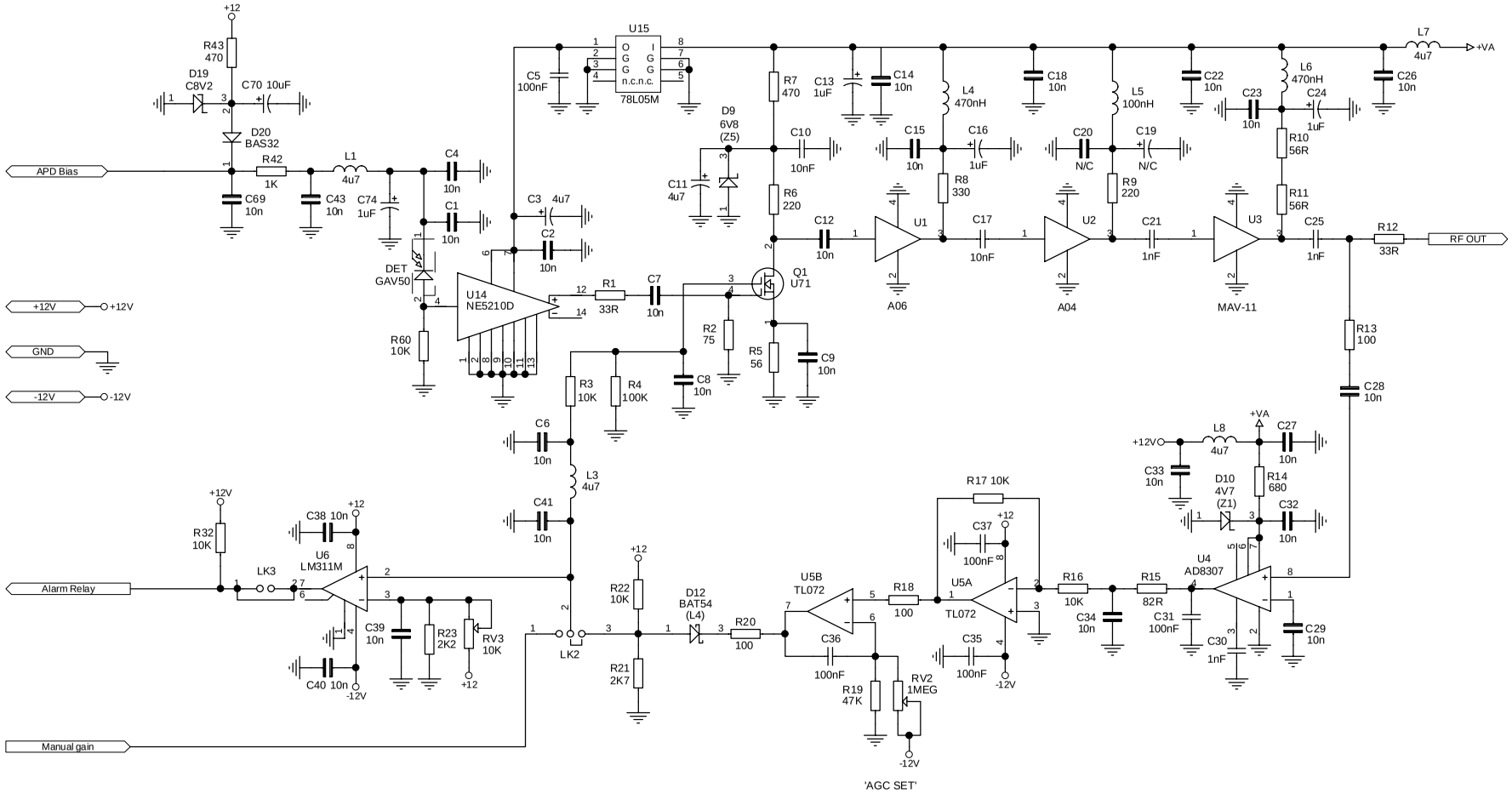


1 17-03-1999	
2 20-03-02 ECR1320	
DRAWN K.N.	
CHECKED	
ENG. APP.	
Revision: 2	
Date: 4-Apr-2002	

IRT

SIZE A3	Title RWR-3086 70MHz I.F. Fibre Optic RX.	
SCALE N.T.S.	Drawing No. 804295	Sheet 1 of 3

IRT Electronics Pty. Ltd.
ARTARMON NSW AUSTRALIA 2064



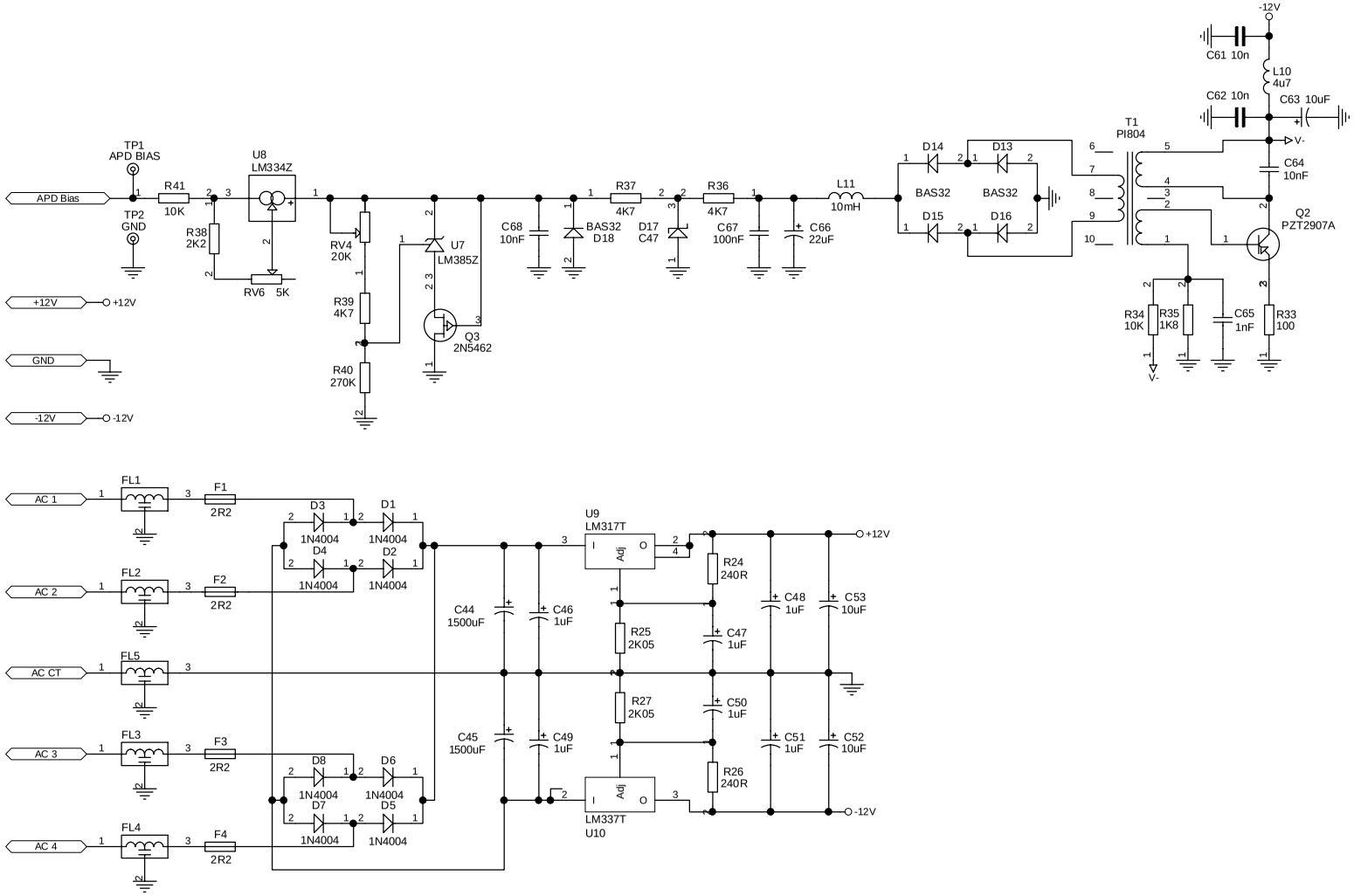
1 17-03-1999
2 20-03-02 ECR1320

DRAWN K.N.
CHECKED
ENG. APP.
Revision: 2
Date: 4-Apr-2002

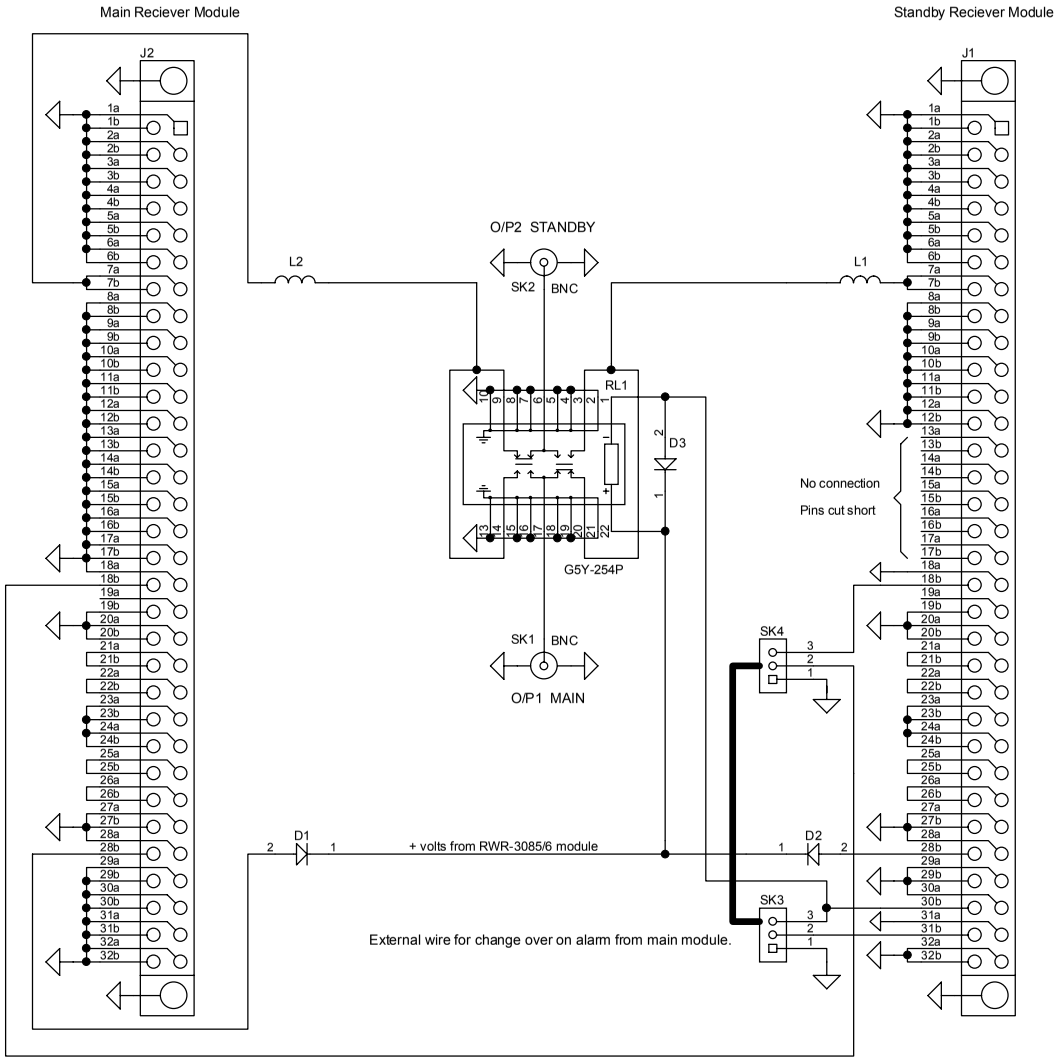
IRT

SIZE A3
Title RWR-3086B
Optical Detector and RF circuit
SCALE N.T.S.
Drawing No. 804295
Sheet 2 of 3

IRT Electronics Pty. Ltd.
ARTARMON NSW AUSTRALIA 2064



1 17-03-1999	© COPYRIGHT DO NOT COPY NOR DISCLOSE TO ANY THIRD PARTY WITHOUT WRITTEN CONSENT	IRT
2 20-03-02 ECR1320	DRAWN K.N.	SIZE A3 — Title: RWR-3086B Power Supply Circuit
	CHECKED	SCALE N.T.S. — Drawing No. 804295 — Sheet 3 of 3
	ENG. APP.	
	Revision: 2	IRT Electronics Pty. Ltd. ARTARMON NSW AUSTRALIA 2064
	Date: 4-Apr-2002	



LINK SETTINGS FOR RECIEVER MODULES
WHEN USED WITH ZWR-3085/6RH CHANGE-OVER REAR PANEL.

LINK SETTINGS IN BOTH RWR-3085 MODULES.

LK1	CLOSED	
LK6	1-2	
MANUAL GAIN	LK2	1-2
	LK4	CLOSED (LK3 OPEN)
AGC OPERATION	LK2	2-3
	LK3	CLOSED (LK4 OPEN)

LINK SETTINGS IN BOTH RWR-3086 MODULES.

LK1	CLOSED	
LK6	1-2	
AGC OPERATION	LK2	2-3
	LK3	CLOSED (SHOULD BE CLOSED WITH WIRE LINK).
	LK4	SHOULD BE OPEN

Note: For operation of two recievers in a Main - Standby mode the following connections must be made.

In the RWR-3085 and RWR-3086 modules LK6 must be placed in position 1-2. This will provide a contact closure to ground at SK4 when signal is present.

In the RWR-3085 and RWR-3086 modules LK1 must be closed. This will provide +ve voltage for the relay on the rear assembly.

The relay on the rear assembly connects the output of the Main module to O/P1 connector SK1 in the energised condition.
At the same time the output of the Standby reciever will be connected to O/P2 connector SK2. On change over these signal connections will swap.
Wiring SK3 PIN 2 to SK4 PIN 3 will complete the circuit, so that O/P1 is the main output and on failure the relay will release and switch to the output from the standby module.

When using the RWR-3085 with LK2 in the "MAN" position pin 1-pin 2, and LK4 closed an alarm will occur on loss of optical signal level.
When operating the RWR-3085 in "AGC" LK2 pin2 - pin 3, and LK3 closed an alarm will occur on loss of "RF SIGNAL".

NOTE: THIS IS IMPORTANT 'AN ALARM CAN ONLY BE OBTAINED FROM THE RWR-3086 WHEN LK2 IS IN THE "AGC" POSITION pin 2 - pin 3.
Thus a RWR-3086 will give an alarm on loss of "RF SIGNAL" at the reciever and the required "RF SIGNAL LEVEL" must be set by RV2.
The factory preset is for a "RF SIGNAL LEVEL" at the output of -10dBm when the RWR-3086 is operated in the "AGC" mode.

1 10-07-2000
2 24-07-2000

IRT

SIZE A3	Title ZWR-3085/6RH C/O Rear Panel for RWR-3085/6	
DRAWN K.N.		
CHECKED	SCALE N.T.S.	Drawing No. 804298 — Sheet 1 of 2
ENG. APP.		
Revision: 2	IRT Electronics Pty. Ltd. ARTARMON NSW AUSTRALIA 2064	
Date: 17-Sep-2001		