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IRT Eurocard

Type DVC-3112

270 Mb/s Serial Digital VDA with Reclocked & composite outputs

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 0200001.

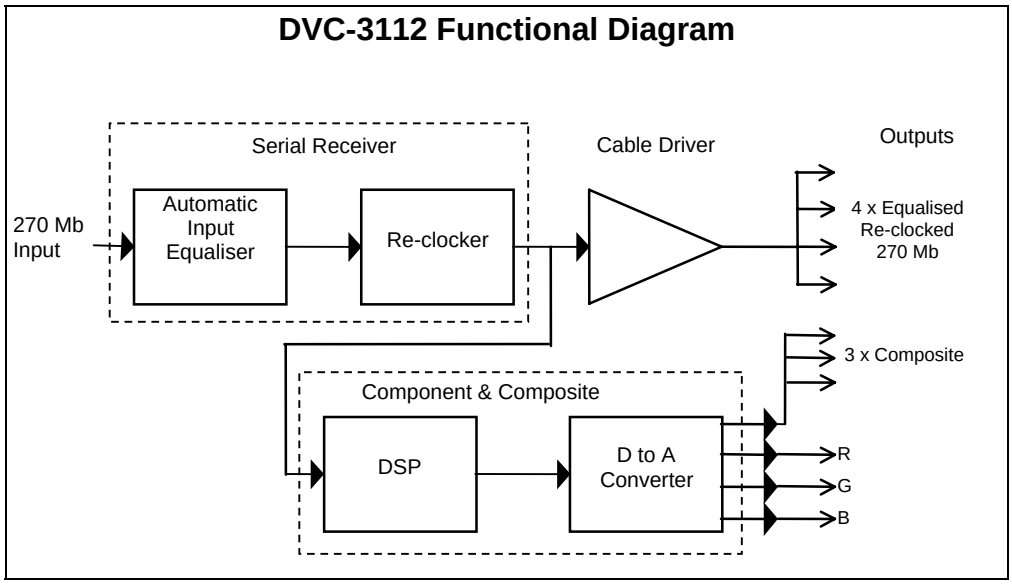
Operational Safety:

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.

270 Mb/s Serial Digital VDA
with
Reclocked & composite outputs
Type DVC-3112



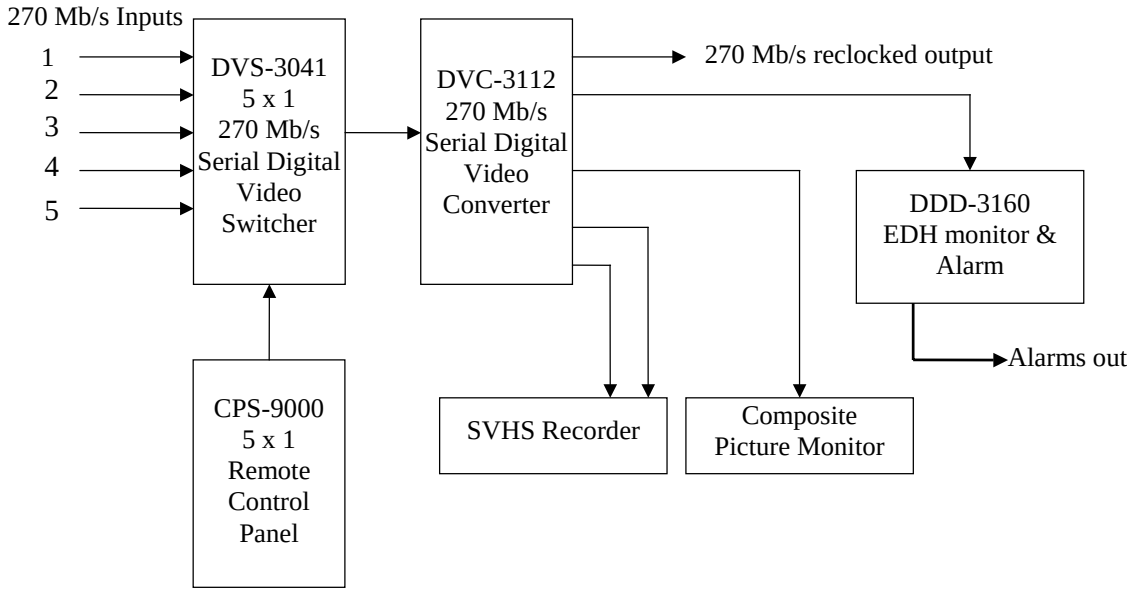
Features:

- **Broadcast quality, full 10-bit video conversion.**
- **4 Equalised, regenerated and reclocked repeater outputs.**
- **3 Composite analogue colour outputs with high quality 10 bit D to A.**
- **Component output.**
- **PAL or NTSC operation with auto or manual switching.**
- **SDI input loss and decoded video indicators on front panel.**
- **Standard IRT Eurocard format may be mixed with other IRT Eurocards in same frame.**

Applications

- **Monitoring 270 Mb/s serial digital signals using composite analogue monitors.**
- **Converting 270 Mb/s serial digital to composite for analogue recording.**
- **Converting 270 Mb/s serial digital to SVHS format for off line editing or previewing.**

Example: 5 way 270 Mb/s switch with reclocked output, recording and monitoring facilities.



General Description

The DVC-3112 is a high performance 270 Mbit/s serial digital video to analogue composite converter and distribution amplifier.

The DVC-3112 is designed to regenerate a link and provide a broadcast quality analogue composite signal for monitoring purposes.

The serial receiver section, shown in the block diagram above, automatically equalises and re-clocks the input serial video signal and the cable driver section retransmits the regenerated serial video.

This configuration allows both an extension of the link and a jitter performance advantage over non re-clocking regenerators.
The DVC-3112 is primarily intended to operate in mixed (digital and analogue) environments allowing existing analogue monitoring equipment to be utilised without the need to purchase more expensive digital equipment.

The DVC-3112 provides three composite outputs and an RGB component output.

Full 10 bit video processing and 10-bit digital to analogue converters are used in order to assure a high quality analogue signal suitable for broadcast and production monitoring applications.

Many features of the DVC-3112 are automatic, which minimises set-up and operational costs. Indicators show the type of input standard present as well as an alarm that indicates the absence of a carrier. This provides the operator with a simple visual indication of the condition of the link.

Some additional functionality has been integrated to allow more advanced users to customise their system. Links on the board are can be used to enable some signal processing, test signal generation and choice of output configurations. The operation of these functions is described in the *Configuration* section.

DVC-3112 Technical specifications

Input:

Connector	BNC.
Format	270 Mbit/s (Serial CCIR601, 4:2:2).
Impedance	75Ω
Equalisation	Automatic up to < 22 dB.

Outputs - Digital:

Number	4.
Connectors	BNC.
Format	Reclocked 270 Mbit/s (Serial CCIR601, 4:2:2).
Signal Level	800 mV ±10%.

Outputs - Analogue:

Number	3 x composite plus 1 x RGB component.
Connectors	BNC.

Performance:

Differential gain	<0.5%
Differential phase	<0.5°
Luminance non linearity	<1% p-p.
2T pulse K factor	K-2T <0.5% KF
Noise level (10 KHz - 5 MHz unified)	<-80 dBrms
Hsync jitter in a frame	<3 ns p-p
Frame period jitter	<5 ns p-p
Power requirements	28 Vac CT (14-0-14) or ± 16V DC.
Power consumption	<240 mA.

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	Grey background, black lettering & red IRT logo
	Rear assembly	Detachable silk-screened PCB with direct mount connectors to Eurocard and external signals
Dimensions		32 mm x 3 U x 220 mm IRT Eurocard
Standard accessories (supplied with module)		Rear connector assembly including matching connector for switcher control.
Links		Component output selection (LK3 & LK4) RGB sync insertion (LK5) NTSC Pedestal insertion (LK6) Pass Vertical Blanking information (LK9)
Options		SDI output 4 can be modified as a field pulse input to control the composite field sequence (PAL mode only).

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

Technical Description

The **DVC-3112** consists of four major sections:

- Serial Receiver
- Cable Driver (Serial Transmitter)
- Composite Encoder
- Video output

Serial Receiver:

The **serial receiver** section is responsible for cable equalisation, detecting the type and presence of the serial video and serial to parallel conversion. Four regenerated serial outputs are connected to the cable driver section allowing "loop through" equivalent applications.

Cable equalisation is automatically performed by the receiver. Cable lengths up to 300 m (depending on cable) can be accommodated. If loss of serial video is detected, an alarm indicating "loss of carrier" is shown on the front panel.

The receiver automatically adjusts to the input serial rate and is capable of regenerating serial data rates from 143 to 360 Mbit/s. The serial receiver supports SMPTE-259M (270 Mbit/s), 360 Mbit/s, 4Fsc-PAL (177 Mbit/s) and 4Fsc-NTSC (143 Mbit/s). Currently the composite encoder is however only capable of decoding SMPTE-259 (270 Mbit/s, serial CCIR-601).

The serial receiver also performs the standard descrambling process ($G(x) = X^9 + X^4 + 1$) as well as sync word (3FF,000,000) detection.

Composite Video Encoder:

Composite video encoding is a complicated process and is performed entirely in the digital domain using dedicated digital signal processors. The extensive use of digital processing reduces thermal and supply dependencies, minimises set-up requirements, eliminates calibration and provides consistent performance.

The **Timing Extraction and Control** section is responsible for extracting the video timing signals from the parallel video stream. The sync words (SAV, EAV) are located and used to generate all the video timing used in the DVC-3112. Consequently, the DVC-3112 becomes dormant when no serial video is present. This section is also responsible for the extraction and demultiplexing of the luminance and chrominance information.

Video format converter:

The video format converter converts the Chroma and Luminance samples into composite (PAL or NTSC) and component (Y/C) format. Optional filtering, NTSC pedestal level and output format is user selectable.

The video format converter is programmed during power-up based on the settings of the links (LK 4, 6, 8, 12, 13 & 15).

Video output

The video output section contains passive filtering for the composite and component signal outputs of the video format converter. The filters remove aliasing components and are equipped with SinX/X correction. This correction is designed to remove the Zero Order Hold distortion incurred by using sample and holds in the A->D. The ZOH distortion manifests itself as a significant attenuation of the higher frequency spectral replicates as well as non uniform spectral gain in the desired baseband.

A triple buffering amplifier is used to correct for filter losses, DC offsets and provide a 75 Ohm output impedance.

Configuration

Recommended operating conditions:

The maximum useable input cable length is primarily determined by the attenuation characteristic of the cable. Below is a list of different types of cables and recommended maximum lengths for 270 Mbit/s.

Cable	Recommended Maximum Lengths
RG 59/U	110m (360 ft)
PSF 1/3	150m (500 ft)
Belden 8281	200m (650 ft)
Gepco VPM2000	220m (720 ft)
Belden 1694A	275m (900 ft)

The maximum lengths given were calculated from tests using a Faraday Technology Cable Clone (model SC 75A 510B-A) which emulates Belden 8281 cable. The Belden 8281 attenuation characteristic was then compared with other cable types to derive an equivalent cable length for that cable.

Front Panel Controls & Indicators:

NTSC - AUTO -PAL select

270 Mbit PAL
270 Mbit NTSC
Loss of input video
Power on

Links & Options:

Some additional functionality has been integrated to allow more advanced users to customise their system.

Links on the board are can be used to enable some signal processing, test signal generation and choice of output configurations. The operation of these functions is described below.

The DVC-3112 cannot be damaged by changing these settings. However, a strong knowledge of serial video is desirable as changing some of these settings can generate output distortions under certain circumstances.

Chrominance (IQ/UV) filters: - (default enabled)

The optional chrominance low pass filter (SW 1-3) is provided to reduce interference between chroma and luminance components.
The FIR filter is symmetrical to ensure a linear phase response.

FILTER SELECTION

Y filter spec

Format	LK 6	LK 4	Passband Cut-off	Stopband Ripple	Stopband Cut-off	Stopband atten.	F 3 dB
	IN	OUT	MHz	dB	MHz	dB	MHz
PAL	0	0	3.4	0.098	8.0	>51.3	5.0
PAL	0	1	1.4	0.107	4.4	>29.3	2.7
PAL	1	0	4.0	0.150	8.0	>40.0	5.65
PAL	1	1	3.4	0.106	8.0	>50.3	5.0
NTSC	0	0	2.3	0.026	7.5	>50.0	4.2
NTSC	1	1	1.0	0.085	3.6	>27.6	2.1
NTSC	0	0	4.0	0.150	8.0	>40.0	5.65
NTSC	1	1	2.3	0.106	8.0	>50.3	5.0

UV filter spec

Format	Passband Cut-off	Stopband Ripple	Stopband Cut-off	Stopband atten.	F 3dB
	MHz	dB	MHz	dB	MHz
PAL	1.3	0.040	4.0	>40.0	2.45
NTSC	1.0	0.085	3.6	>40.0	2.05

Component or composite auxiliary outputs: - (default 3 x composite plus 1 x RGB)
The DVC-3112 has three dedicated composite outputs. In addition, three analogue outputs are available which are assignable as Y & C (S-Video) and one extra composite or as RGB or YC_RC_B.

The Y & C outputs allow monitors with S-Video inputs or SVHS recorders to be used to best advantage.

Initial set-up:

SW1 PAL, NTSC or Auto configuration version

Up	NTSC
Centre	Auto configuration
Down	PAL

Output Select
Composite or Component selection

Output	LK 13	LK 12
Comp, Y, C	IN	IN
Comp, Y, C	IN	OUT
YC_UC_V	OUT	IN
RGB	OUT	OUT

Output connector assignments:

LK 13	IN	SK 6	Chroma
		SK 1	Luminance
		SK 3	Composite
LK 13	OUT		
LK 12	OUT	SK 6	R
		SK 1	G
		SK 3	B
LK 13	OUT		
LK 12	IN	SK 6	C_R
		SK 1	Y
		SK 3	C_B

RGB / YC_RC_B Sync

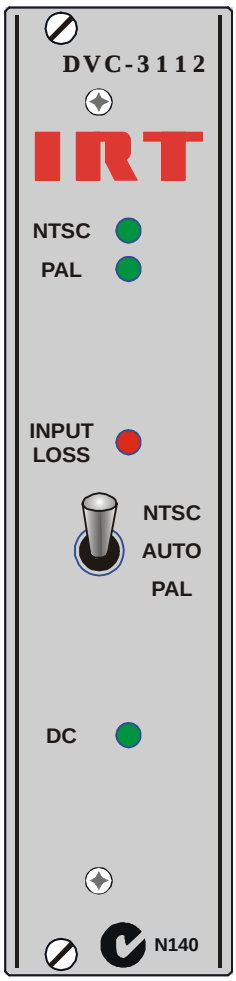
LK 8	OUT	Sync added to ALL component outputs (R, G, B or YC_RC_B)
LK 8	IN	No sync on ANY component outputs (R, G, B or YC_RC_B)

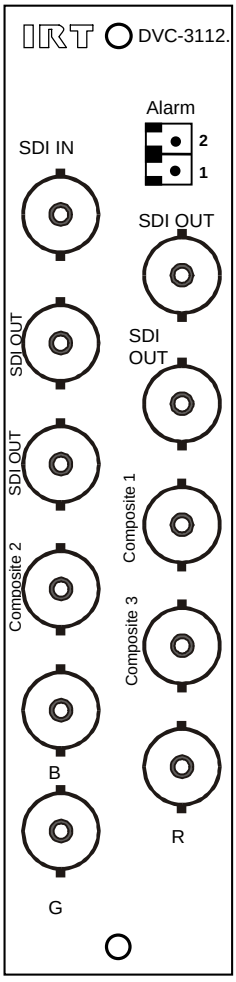
NTSC Pedestal
If NTSC format is selected

LK 15	IN	no pedestal
LK 15	OUT	pedestal

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.

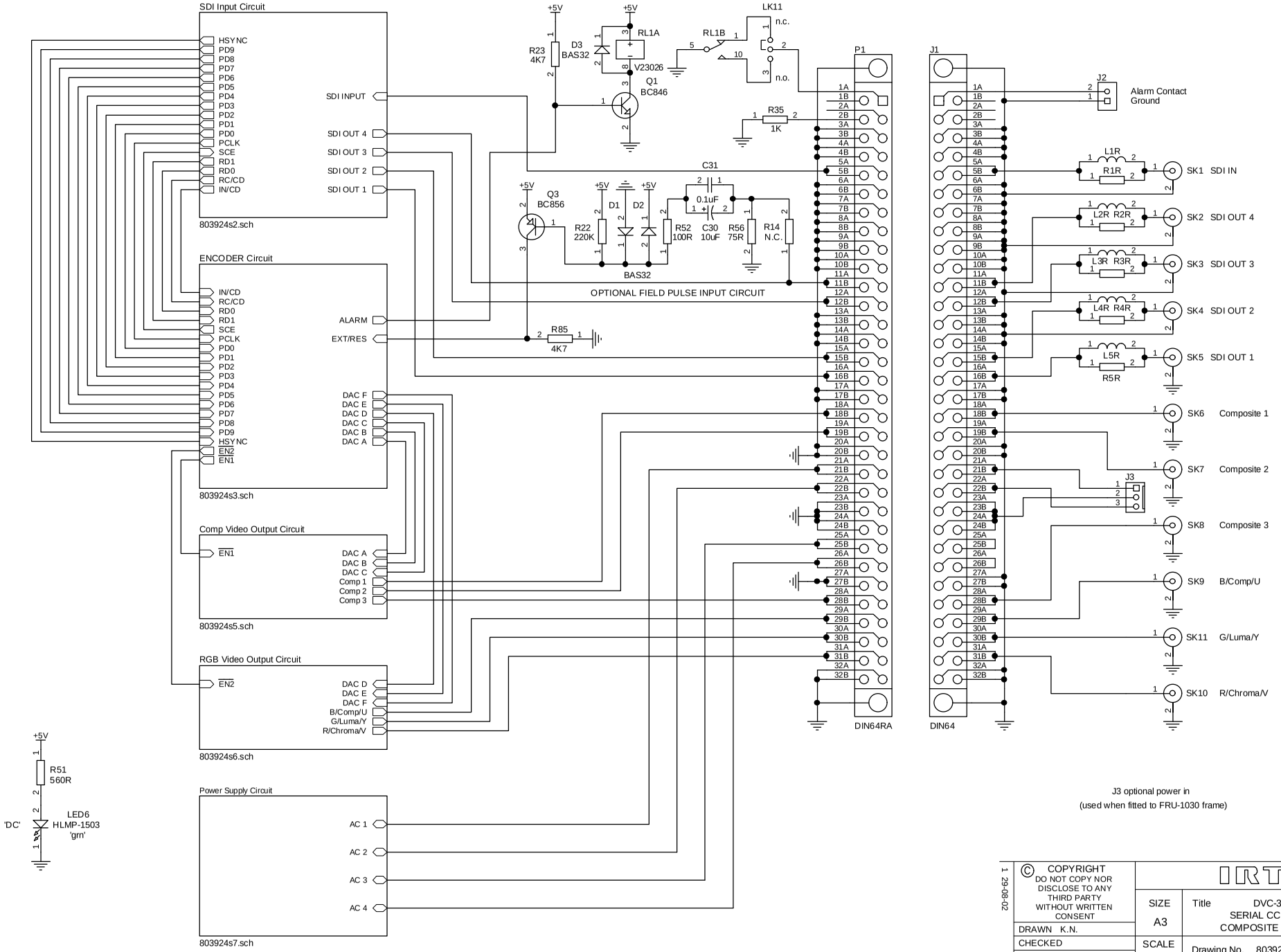
The equipment should be returned **to the agent who originally supplied the equipment or, where this is not possible**, to IRT direct as follows.

Equipment Service
IRT Electronics Pty Ltd
26 Hotham Parade
ARTARMON
N.S.W. 2064
AUSTRALIA

Phone: 61 2 9439 3744 Fax: 61 2 9439 7439
Email: service@irtelectronics.com

Drawing Index

Drawing #	Sheet #	Description
803924	1	DVC-3112 block diagram.



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DRAWN K.N.	SIZE A3	Title DVC-3112 SERIAL CCIR601 to COMPOSITE ENCODER	
CHECKED	SCALE N.T.S.	Drawing No. 803924	Sheet 1 of 7
ENG. APP.			
Revision: 1		IRT Electronics Pty. Ltd. ARTARMON NSW AUSTRALIA 2064	
Date: 9-Oct-2002			