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IRT Eurocard

Types VG-741T & VG-741R

Vertical Interval Serial Data Transmission System

Designed and manufactured in Australia

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

IRT Eurocard

Type VG-741T & VG-741R

Vertical Interval Serial Data Transmission System

Instruction Book

Table of Contents

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

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 modules
Types VG-741T & VG-741R
General Description

The VG-741T & VG-741R provide a means of transmitting data over an existing video link. The data is encoded in serial form, using one user selectable line in the vertical interval for transmission. Data may be input to the transmitter module in either serial or parallel form and is available at the receiver in both serial and parallel form. In addition, the receiver provides relay-isolated outputs for three of the parallel lines, for direct control of switching or alarm functions.

Several systems may be used on one video signal using different lines. In addition, the encoded data contains addressing information and several receivers may be set to the same line, but with different addresses and activated individually.

Typical uses include:

Station identification
Countdown and warning for station breaks
Remote operation of equipment in transmission chain
Remote indication of alarm or equipment status
Remote control of video recorders for selected program recording
PC to PC data transfer for news text or electronic mail

The system is compatible with the obsolete VG-341 system used for station identification and countdown.
In this mode, the VG-741T encodes identification data in the vertical interval signal on network relay circuits. This enables identification of the originating station's program and provides cueing information relative to that circuit. For operation of the countdown function, an additional plug in integrated circuit option OP-10 is required in the transmitter only.

Serial/parallel inputs and outputs allow connection to a PC at either or both ends or direct control of up to 8 simultaneous functions or, by external decoding, 255 non simultaneous functions.

Eight data bits plus start and parity bits are encoded and transmitted in the vertical blanking period on the selected line. This allows the full ASCII set (256 codes) plus parity and start bits to be transmitted.

VG-741T:
The VG-741T is a transmitter only with a choice of parallel or serial data input or optional countdown.
A pre-set code indicating the identification number of the transmitting station may be continually transmitted.
A contact closure to the rear connector initiates transmission of a 10 to 0 countdown sequence (OP-10 option fitted).

VG-741R:
The VG-741R is a receiver / decoder only with data and relay isolated outputs. A separate piece of equipment must be used for display of data in the desired form.
The full output is available as both serial and parallel data with code confirmation before output.
Three relay outputs are available. These may be set to indicate countdown at 7, countdown at 5 and countdown at 0 when used with the OP-10 countdown option in the VG-741T.
Relay output addressing is available.

Standard features:

- Vertical interval line is user selectable
- Serial & parallel connections
- Optional code confirmation
- Programmable relay outputs
- Auto countdown send with warning
- PC compatible
- Compatible with other IRT Eurocards including failure detectors & switchers.

Equipment provided:

Standard: VG-741T Vertical interval serial data transmitter
or
VG-741R Vertical interval serial data receiver.
RB-741 Rear Assembly

Optional: OP-10 Countdown sequence generator for VG-741T

Accessories available:

FR-700 Eurocard module mounting frame:	Provides mounting for up to 12 Eurocard modules and one PT-700 Dual AC power supply side by side in 134 mm of standard Rack space (3 Rack Units).
FR-722 1 RU chassis conversion/PSU	The FR-722 provides a means of converting Eurocards to a 1 rack unit format. The FR-722 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
Types VG-741T & VG-741R

(All specifications apply to both VG-741T & VG-741R unless otherwise noted.)

Video input / output:

Input connectors	BNC
Number	2
Input impedance	Loop through
Input signal	Composite 1 Volt p-p sync negative

Data:

Serial data input/outputs:

Data system	RS-232 format
Connector	1 x DB-9
Clock rate	1200 BAUD
Data transfer rate	50 cps (1 /field) 25 cps (1 /frame) 25 cps (1 /field + check) 12.5 cps (1 /frame + check)

Parallel data input/outputs:

Connector	1100-8-110-01 IDC 10 pin header strip.
Inputs (VG-741T only)	8 bit gnd contact with 10 KΩ (pull-up resistor to +5 Vdc.
Outputs (VG-741R only)	8 bit HCMOS data levels.

Control data input/outputs:

Connector	Z5.598.4353 (x 2) 6 pin polarised plugable screw connector supplied with matching plug.
Input (VG-741T only)	1 x Opto isolated input (See manual for details).
Output (VG-741R only)	3 x Contact closure (Max. 100 mA, 24 V. Space for optional series resistor on PCB)

Data encoded video:

Data line	During vertical blanking period on selectable lines.
Data format	One start, eight data bits (LSB first) & one parity bit, one stop.
Start of data	15 µs ± 2 µs after leading edge of sync of selected line.
Bit width	4.47 µs ± 3%
Amplitude	0.28 to 0.42 Vp-p

Other:

Power requirements		28 Vac CT (14-0-14) or (±16 Vdc).
Power consumption		140 mA.
Temperature range		0 - 50° C ambient.
Mechanical		Suitable for mounting in IRT 19" rack chassis types FR-700 & FR-722 with input output and power 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		6 HP x 3 U x 220 mm IRT Eurocard.
Supplied accessories		RB-741 Rear connector assembly. Matching connectors for parallel inputs / outputs supplied and relay outputs VG-741R only.
Optional accessories		Instruction manual. TME-6 module extender card.

Circuit Description

Please refer to the block and circuit diagrams at the end of this manual, when reading the following explanation.

General note on DIP Switch settings:

In the following descriptions ON = CLOSED = Logic 0.
OFF = OPEN = Logic 1.

Line Selection:

Line selection is made on SW 1.1-4 on both the VG-741R & T.
A chart showing the code for each usable line is on the PCB overlay. If SW 1.8 is OFF then signal will be sent in both fields.
If SW 1.8 is ON and SW 1.7 is ON then only the odd field will contain data, whereas if SW 1.7 is OFF only the even field will contain data.

The VG-741R will only respond to data on its selected line.

Any line from line 7 to 22 in the first field of the vertical interval (and the corresponding line in the second field) may be selected by means of positions 4, 3, 2 & 1 of this binary coded DIP switch. A legend is marked on the PCB indicating the code for each line.

Naturally, both units must be set to the same line number.

Care must be taken when choosing which line is used. The data is **added** to the existing line and so a line must be chosen which contains no other information.
Some video processing equipment may blank some or all lines in the vertical interval. For this reason, a higher line number will normally be safer. On the other hand, some monitors will underscan slightly and as a result, high line numbers will be visible.
Therefore, if no other vertical interval signals are in use line 15 makes a good compromise.

VG-741T Transmitter / Encoder.

The VG-741T encodes an eleven bit code onto a selected line of either or both fields of a video signal applied to its input/output connectors SK 3 and SK 4. These two BNC connectors are part of a passive loop-through.

The code signal is added to, not keyed into, the video. This has been done so that a failure of the VG-741T will not interrupt the video. Therefore, it is the recommended method of operation that the input video signal to the VG-741T has blanking level clamped to zero volts.

If the VG-741T must be used with a video signal which is not clamped then the added data amplitude may vary with average picture level. This can be alleviated to some degree by adding a 10 µF capacitor in series with the input and R7, and a 10 KΩ pulldown resistor from the capacitor and R7 junction and ground.

For best operation the video leads to and from the VG-741T should be kept as short as practical (less than 1 metre).

Modes of operation:

Serial [SW 1.6 ON]

In this mode, the VG-741T receives a serial RS232 8 bit word via SK 2 and transmits it on the selected video line.

The asynchronous receiver works at 1200 BAUD and expects 8 bits per word, an even parity bit and 1 stop bit.

The VG-741T encoder can only send one 8 bit word each field (i.e. one per vertical block in the "BOTH" fields mode). Therefore, the maximum byte transfer rate is 50 bytes per second or approximately 550 BAUD.

As the asynchronous receiver is working at 1200 BAUD or 109 bytes per second it is necessary to control the sending device (PC?) so that there is no more than one byte sent to the VG-741T each field. This can be achieved by using the 'CTS' (Clear To Send) signal on Pin 8 of SK 2 to signal the sending device to send one byte. The CTS goes to +9V (Mark) for approximately 1.6 ms each field.

In normal operating modes of IBM compatible PC's the CTS is not always checked between each byte. Appendix A is the source code of a program, written in C, which will check the CTS each byte. An alternative solution is to ensure that the sending device only sends 49 bytes per second.

If you opt to transmit in one field only (i.e. ODD or EVEN, in lieu of BOTH) then the byte transfer rate will only be 25 per second or 225 B.

Parallel [SW 1.6 OFF]

Parallel data inputs on transmitter are normally held high by 10 K ohm pull-up resistors in resistor array RP 2.
This results in a code of 1's being transmitted by default and the three relays in the receiver unit being energised (contacts closed) when a signal is received.

When pins 1, 2 or 3 on J 1 on the transmitter is grounded the corresponding bit changes to a '0' and the corresponding relay RL 1, RL 2 or RL 3 in the receiver is de-energised (contacts open).

The receiver will not change the state of any output unless valid data is received.

So, if the transmitted signal is lost the relays will retain their status until either power is turned off at the receiver or the transmitted signal is restored and a new and different valid data code is received.

In this mode the VG-741T continuously transmits the 8 TTL level bits presented in parallel at J1.

For instance, the inputs of J 1 could be connected to eight external switches for some remote control application. It is also possible to connect some encoding device that would then give a possibility of 255 discrete codes. For further information, see the section on the VG-741R for 'Address Mode' and 'Double Word Check' features.

SW 2 is provided for the FACTS (Federation of Australian Television Stations) OP-10 Program Source Identification mode where a unique byte identifying the source station is transmitted continuously. This code can be set on SW 2. A list of the FACTS approved codes is in Appendix B.

SW 2 is in parallel with the J1 input connections, so make sure they are all OFF before using external inputs.

Countdown Generator.

The optional Countdown Generator generates a 10 second countdown sequence starting a 10 and finishing at 0 - in one second steps. The ASCII code for each second is transmitted for four fields only.
To start the countdown (provided LK 1 is installed) you must connect pins 2 and 3 of PL 1 for longer than 20 ms and less than 10 seconds.
The Countdown option only works in the PARALLEL mode.

VG-741R Receiver / Decoder.

The VG-741R decodes a signal on the selected line in either or both fields of a video signal that has been encoded by a VG- 741T or VG-341. The input video input of the VG-741R is high impedance looping and will require a termination if the loop connection is not utilised.

The VG-741R has three types of output:

1. An RS232 type serial output at 1200 BAUD with a start bit, 8 data bits, an even parity bit and one stop bit.
2. A parallel TTL output of the 8 data bits.
3. Contact closures from three relays.

There are four decoding options viz. Transparent, OP-11, Double Word Check and Address Mode.

Decode Options.

Transparent. [SW 2.8, SW 2.7, SW 2.6 all ON]

In this mode, the data is available on both the serial and parallel outputs as it is decoded.

Relay 1 will operate if bit 0 is a 1.
Relay 2 will operate if bit 1 is a 1.
Relay 3 will operate if bit 2 is a 1.
The relays will remain latched until a data byte is received with their associated bits changed.

OP-11. [SW 2.6 OFF]

The serial and parallel outputs are as in Transparent above.

Relay 1 will operate if the data byte = hex 30 (ASCII 0).
Relay 2 will operate if the data byte = hex 35 (ASCII 5).
Relay 3 will operate if the data byte = hex 37 (ASCII 7).

Double Word Check [SW 2.8 OFF]

In this mode, there will be:

- no output from the serial output.
- no change in the output of the parallel output.
- no change in the status of the relays.

Unless, the newly received data byte exactly equals the last received data byte.

Address Mode [SW 2.7 OFF]

This mode may operate in conjunction with the DWC but not in conjunction with OP-11.
In this mode the bits 7 through 4 of the received data word must match the data set on SW 2 4 through 1 for

* an output from the serial output
* a change in the output of the parallel output
* a change in the status of a relay.

When the system is being used for data transfer and the relays are not required, they may be stopped from uselessly operating by removing LK 1 on the VG-741R.

Internal Adjustments

No internal adjustments or alignment is required to either module.
User settings are confined to those required for setting the desired mode of operation and line number as detailed in the following configuration section of this manual.

The data slice adjustment on the VG-741R should not require adjustment by the user. If it is considered that adjustment is necessary, please consult the factory for required equipment and procedure. Incorrect adjustment will result in erratic performance of the receiver.

Configuration

Rear assembly:

This is physically the same for both the transmitter and receiver, but the signals present on each have different purposes. Care should therefore be taken to ensure that where transmitters and receivers are located side by side that the correct connections are made according to which module is which.

Video input/output:

Two connectors are provided at both the transmitter and receiver for the video signal. These are connected together allowing loop through connection of the video signal. If only one connector is used on either module a 75 Ohm terminating plug should be fitted to the other connector so as to maintain the correct impedance.

Vertical interval line selection:

SW 1 on both transmitter and receiver PCB's.

VG-741 Line Selection Chart		
Normal chipset		
PAL	NTSC	Code
8	10	0001
9	11	0010
10	12	0011
11	13	0100
12	14	0101
13	15	0110
14	16	0111
15	17	1000
16	18	1001
17	19	1010
18	20	1011
19	21	1100
20	22	1101
21	23	1110
22	24	1111

VG-741 Line Selection Chart		
OM prefix chipset		
PAL	NTSC	Code
12	14	0001
13	15	0010
14	16	0011
15	17	0100
16	18	0101
17	19	0110
18	20	0111
19	21	1000
20	22	1001
21	23	1010
22	24	1011
23	25	1100
24	26	1101
25	27	1110
26	28	1111

Any line from line 7 to 22 in the first field of the vertical interval (and the corresponding line in the second field) may be selected by means of positions 4, 3, 2 & 1 of this binary coded DIP switch. A legend is marked on the PCB indicating the code for each line.

Naturally, both units must be set to the same line number.

Care must be taken when choosing which line is used. The data is **added** to the existing line and so a line must be chosen which contains no other information.

Some video processing equipment may blank some or all lines in the vertical interval. For this reason a higher line number will normally be safer.

On the other hand, some monitors will underscan slightly resulting in high line numbers being visible.

Therefore, if no other vertical interval signals are in use line 15 makes a good compromise.

Station identification codes, according to FACTS OP 11, are normally sent on line 12.

For special applications, a replacement PLA chip is available which extends the upper limit of the line setting by four lines. This chip carries an OM prefix in both the transmitter and receiver. Note however, that this allows use of lines which are in the active picture area and whilst this will overcome problems with equipment which reconstitutes the vertical interval, their use may be frowned upon by some broadcasting authorities.

Serial input/output:

SK 2 9 pin 'D' connector on rear assembly.

VG-741T transmitter & VG-741R receiver.

Pin 1 - DCD
Pin 2 - RXD - no connection on VG-741T.
Pin 3 - TXD - no connection on VG-741R.
Pin 4 - DTR
Pin 5 - GND
Pin 6 - DSR
Pin 7 - no connection
Pin 8 - CTS
Pin 9 - RI

Parallel input output:

J 1 10 pin in line connector on rear assembly.

VG-741T transmitter.

Pin 10 - No connection
Pin 9 - Common input signal ground
Pin 8 - Connect to Pin 9 for bit 0 or to operate relay 1 on receiver.
Pin 7 - Connect to Pin 9 for bit 1 or to operate relay 2 on receiver.
Pin 6 - Connect to Pin 9 for bit 2 or to operate relay 3 on receiver.
Pin 5 - Connect to Pin 9 for bit 3.
Pin 4 - Connect to Pin 9 for bit 4.
Pin 3 - Connect to Pin 9 for bit 5.
Pin 2 - Connect to Pin 9 for bit 6.
Pin 1 - Connect to Pin 9 for bit 7.

VG-741R receiver.

Pin 10 - No connection
Pin 9 - Common output signal ground
Pin 8 - bit 7 out normally high.
Pin 7 - bit 6 out normally high.
Pin 6 - bit 5 out normally high.
Pin 5 - bit 4 out normally high.
Pin 4 - bit 3 out normally high.
Pin 3 - bit 2 out normally high.
Pin 2 - bit 1 out normally high.
Pin 1 - bit 0 out normally high.

Isolated external signal connector:

PL 1 6 pin plugable screw block connector on rear assembly.

VG-741T transmitter - initiates countdown sequence when OP-10 option is fitted.

VG-741R receiver - Relay output.

Pin 1 & 2 relay 1 contacts
Pin 3 & 4 relay 2 contacts
Pin 5 & 6 relay 3 contacts

Note that on the VG-741R receiver rear assembly pads have been provided for fitting three resistors R 1, R 2 & R 3. This allows the relays to provide a set resistance in series with each relay for direct operation of devices, such as video recorders, which have voltage programmable remote control inputs.
These resistors are normally shorted out by a fine track on the PCB. If you wish to use this facility, these tracks must be cut before fitting the appropriate value resistor.
If these tracks have previously been cut and this facility is not required a zero Ohm resistor or link should be fitted in place of resistors R 1, R 2 & R 3.
This facility is duplicated by R 15, R 16 & R 17 on the main module PCB. Note that R1 is in series with R 15 and so on. This allows the user to choose which location is more appropriate to the particular installation. It is strongly recommended that resistors only be fitted in one of these locations, not both.

Data input selection:

VG-741T transmitter only.

Select your input for either serial or parallel operation. Note the receiver provides both serial and parallel output at all times and thus does not require selection.

SW 1/6 set to "OFF" for parallel input.

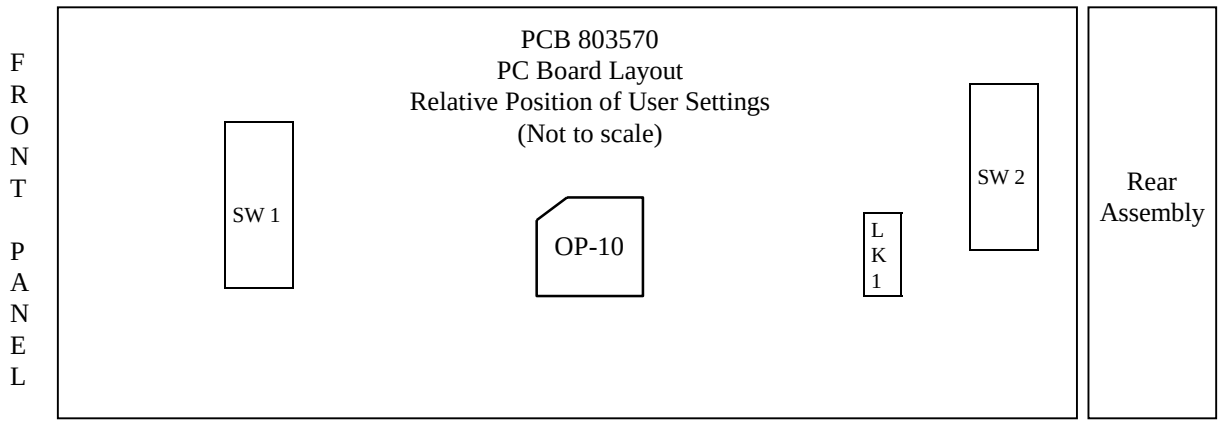
SW 1/6 set to "ON" for serial input.

Field selection / Double word check / Address mode / FACTS OP- 11 mode:

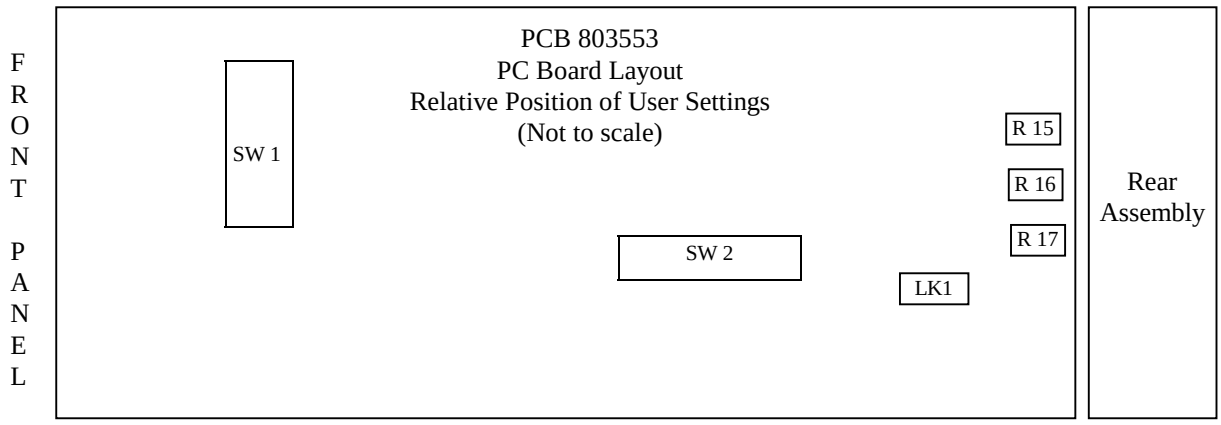
A full explanation of these functions is contained in the *Circuit Description* section.

User settings, location diagrams:

VG-741T transmitter



VG-741R receiver



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.

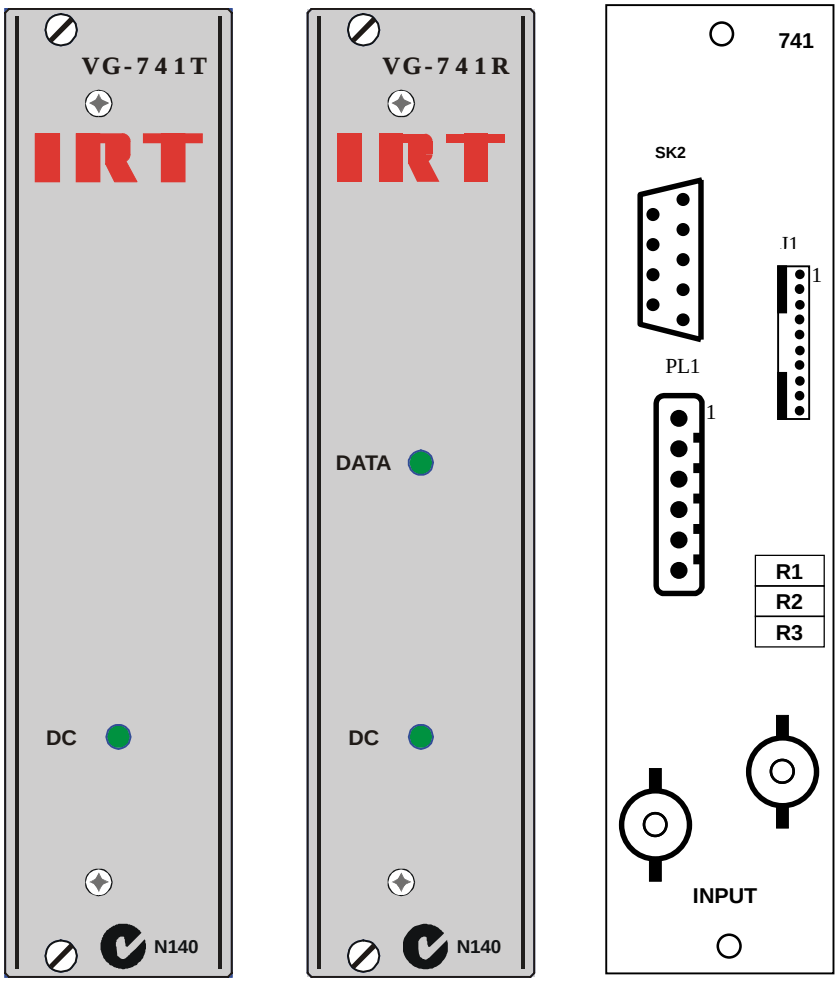
Signal earth: For safety reasons a connection is made between signal earth and chassis earth. No attempt should be made to break this connection.

Installation in frame or chassis:

See details in separate manual for selected frame type.

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

Appendix A.

To run program type "VG741 filename com_number"
where filename is the name of a file to be sent,
and com_number is 1 for COM1: or 2 for COM2:
While program is running hit any key to abort.

```
/* VG741.c - program for vg-741t */
#include "stdio.h"
void main(int argc, char *argv[])
{
int to_741;
int stat;
int com1;
FILE *text;

            clrscr();
            if(argc<2)
            { printf(" You forgot the file name !");
              exit(0);
            }
            if((text=fopen(argv[1],"r"))==NULL)
            {       printf("Cannot find %s \n",argv[1]);
      exit(1);
            }
            com1=(argv[2][0]=='2')? 1:0;
            printf("Sending %s to COM%d \n",argv[1],(com1+1));
            bioscom(0,0x9f,com1);  /* 1200 BAUD 8 BITS even PARITY */
      while(!kbhit())
             { stat=(bioscom(3,0,com1)&0x4010);
               if (stat == 0x4010)   /* tsr empty & cts */
                     {  to_741=getc(text);
                           bioscom(1,to_741,com1);
                           if (to_741==EOF) exit(0);
                           putchar(to_741);
                     }
            }
      exit(0);
}
```

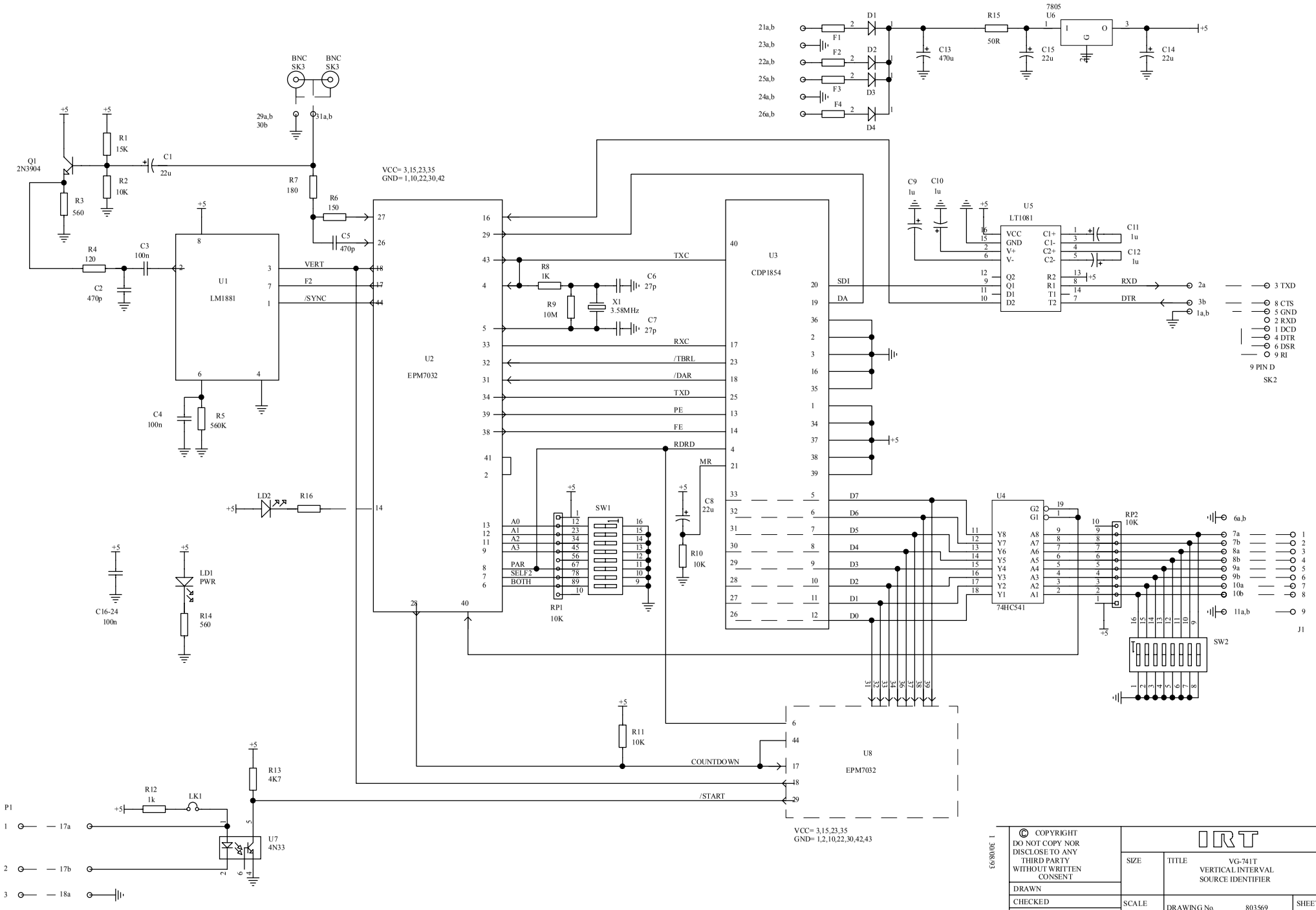
Appendix B
FACTS OP-11
IDENTIFICATION CODES

Note Values are in hexadecimal.

00		20	BTQ	40	ADS	60	TVT	
01	AMV	21	DDQ	41	GTS	61	TNT	
02	ATV	22	FNQ	42	NWS	62		
03	BCV	23	ITQ	43	RTS	63		
04	BTV	24	MVQ	44	SAS	64		
05	GLV	25	QTQ	45	SES	65		
06	GMV	26	RTQ	46	NTD	66		
07	GTV	27	SDQ	47	IMP	67		
08	HSV	28	SEQ	48		68		
09	STV	29	TNQ	49		69		
0A		2A	TVQ	4A		6A		
0B		2B		4B		6B		
0C		2C		4C		6C		**A**
0D		2D		4D		6D		**L**
0E		2E		4E		6E		**L**
0F		2F		4F		6F		
10	ATN	30	0	50	BTW	70	LA9	**E**
11	CBN	31	1	51	GSW	71	OLY	**V**
12	CTC	32	2	52	GTW	72	AUS	**E**
13	CWN	33	3	53	STW	73	XPH	**N**
14	ECN	34	4	54	TVW	74	TVB	
15	MTN	35	5	55	VEW	75		**P**
16	NBN	36	6	56	NEW	76		**A**
17	NEN	37	7	57		77		**R**
18	NRN	38	8	58		78		**I**
19	RTN	39	9	59		79		**T**
1A	RVN	3A	10	5A		7A		**Y**
1B	TCN	3B	WNG	5B		7B		
1C	TEN	3C		5C		7C		
1D	WIN	3D		5D		7D		
1E	SBS	3E		5E		7E		
1F		3F		5F		7F	IRT	

Drawing index

Drawing #	Sheet #	Description
803569	1	VG-741T Schematic
803569	2	VG-741T Functional diagram
803552	1	VG-741R Schematic
803552	2	VG-741R Functional diagram
803559	1	RB-741 Rear assembly schematic


21a,b
23a,b
22a,b
25a,b
24a,b
26a,b
F1
F2
F3
F4
D1
D2
D3
D4
R15
50R
7805
U6
C13
470u
C15
22u
C14
22u
BNC
SK3
BNC
SK3
29a,b
30b
31a,b
Q1
2N3904
R1
15K
R2
10K
R3
560
C1
22u
R7
180
R6
150
C5
470p
VCC= 3,15,23,35
GND= 1,10,22,30,42
R4
120
C3
100n
C2
470p
U1
LM1881
VERT
F2
/SYNC
C4
100n
R5
560K
U2
EPM7032
TXC
RXC
/TBRL
/DAR
TXD
PE
FE
RDRD
MR
R8
1K
C6
27p
R9
10M
X1
3.58MHz
C7
27p
U3
CDP1854
SD1
DA
C9
1u
C10
1u
U5
LT1081
VCC
GND
V+
V-
C1+
C1-
C2+
C2-
C11
1u
C12
1u
Q2
Q1
D1
D2
R2
R1
T1
T2
RXD
DTR
2a
3b
1a,b
3 TXD
8 CTS
5 GND
2 RXD
1 DCD
4 DTR
6 DSR
9 RI
9 PIN D
SK2
LD2
R16
SW1
A0
A1
A2
A3
PAR
SELF2
BOTH
RP1
10K
C8
22u
R10
10K
D7
D6
D5
D4
D3
D2
D1
D0
U4
74HC541
RP2
10K
6a,b
7a
7b
8a
8b
9a
9b
10a
10b
11a,b
J1
SW2
C16-24
100n
LD1
PWR
R14
560
R11
10K
COUNTDOWN
/START
U8
EPM7032
VCC= 3,15,23,35
GND= 1,2,10,22,30,42,43
P1
17a
17b
18a
R12
1k
LK1
R13
4K7
U7
4N33
PCB 803570
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VG-741T
VERTICAL INTERVAL
SOURCE IDENTIFIER
SCALE
DRAWING No. 803569
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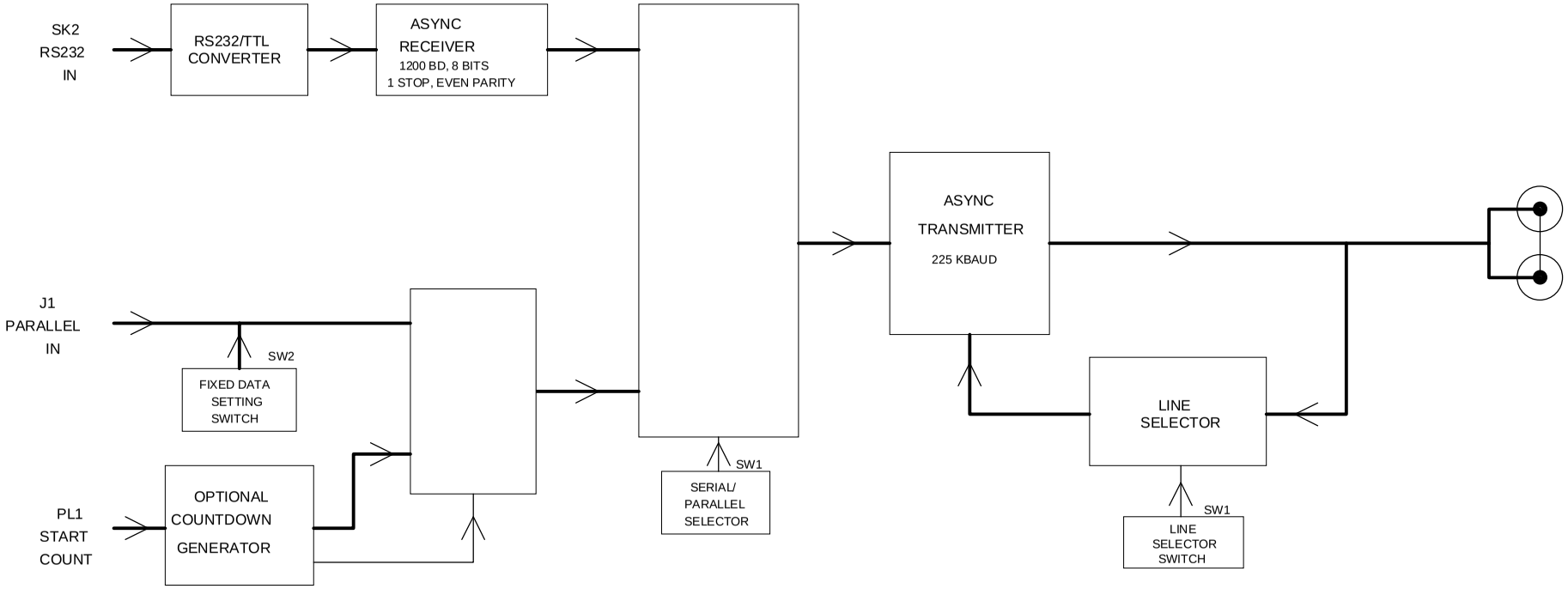

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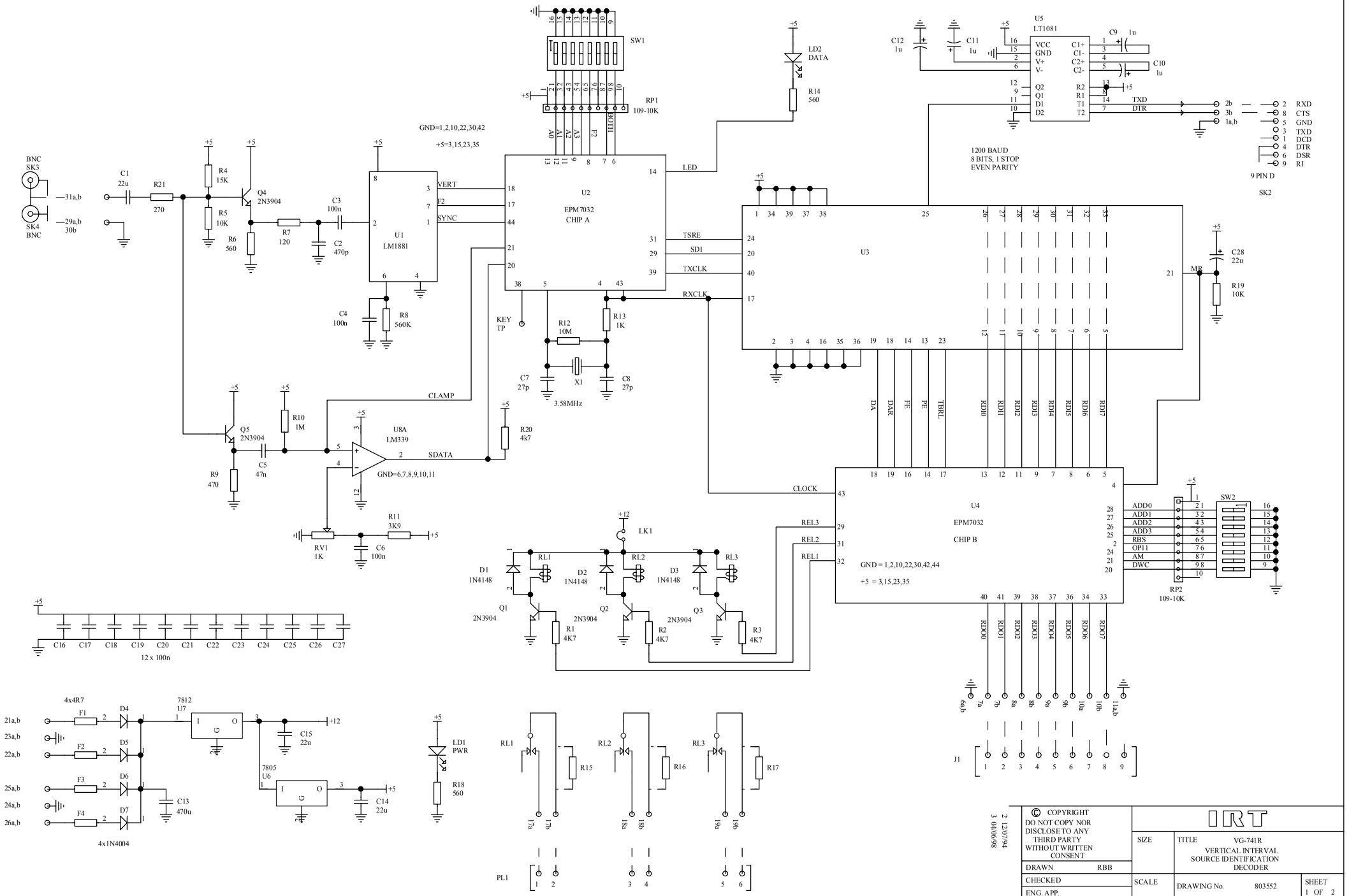

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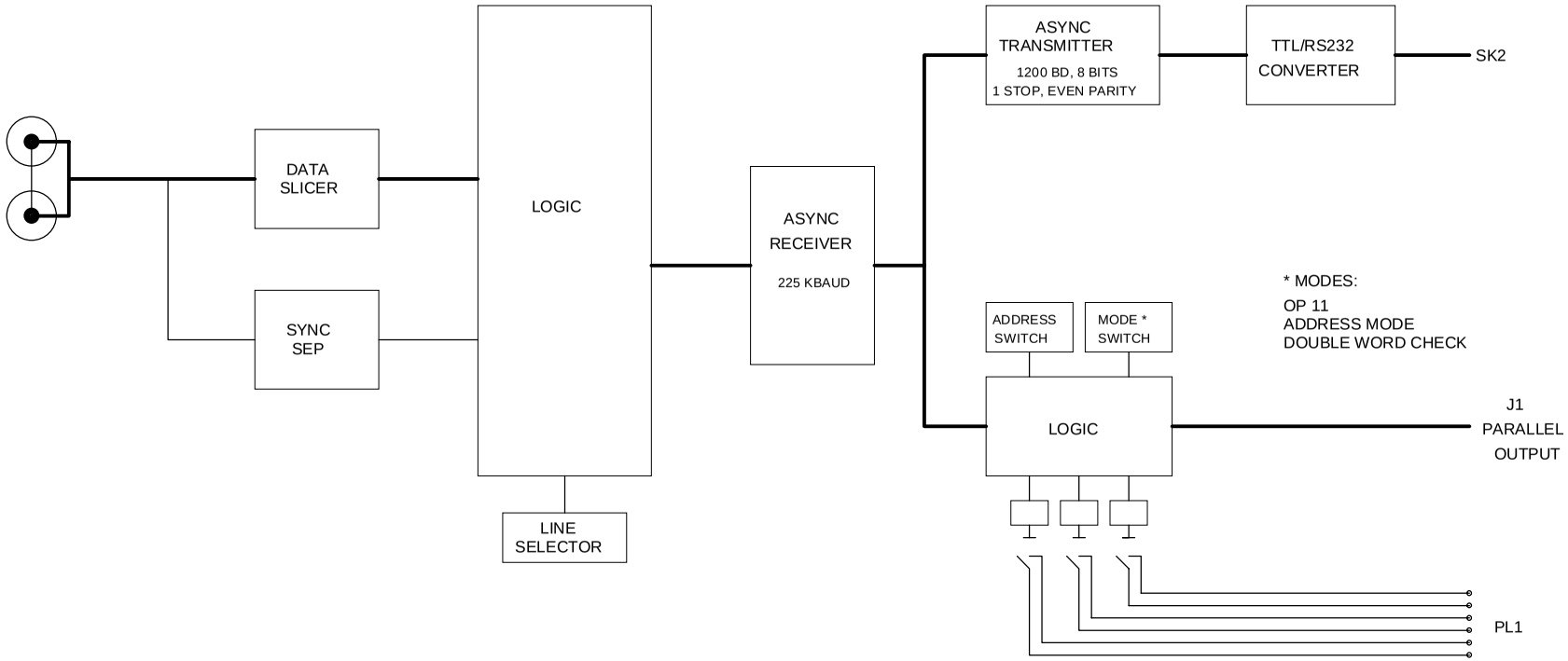

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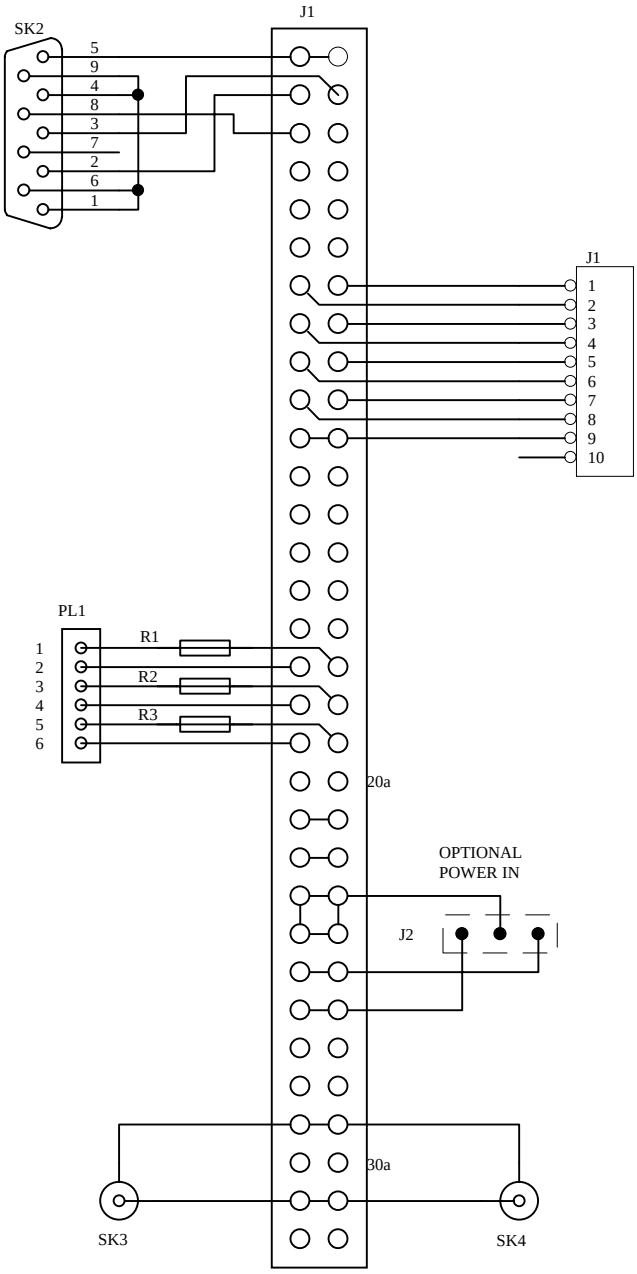

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