

ERES104 2-channel PC/104 Syncro/Resolver interface User's Manual

Real Time Devices Finland Oy

Manual for 1.2 Hardware Revision

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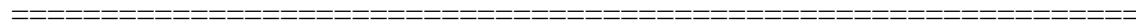
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INTRODUCTION

This user's manual describes the operation of the ERES104 2-channel PC/104 syncro/resolver subsystem.

Some of the key properties of the RES104 include:

- ◆ 2 Independent Differential Syncro/Resolver/LVDT channels
- ◆ Connection to 11.8V or 90V Syncros with onboard solid State Scott-T circuitry
- ◆ Programmable sine wave excitation from 400Hz to 1.6KHz, global for both channels
- ◆ Programmable resolution ranging from 10 to 16 bits
- ◆ Error 8/4/2 minutes
- ◆ Resolution 16-bits guaranteed with onboard reference source.
- ◆ Fully PC/104 compliant
- ◆ +5V only operation

The following paragraphs briefly describe the major features of the ERES104. A more detailed discussion is included in Chapter 3 (Hardware description) The board settings are described in Chapter 1 (Board settings).

Syncro/Resolver inputs

The ERES104 provides independently configurable input channels. Both channels support Syncro, Resolver or LVDT interface. The voltage of the Syncro inputs can be selected to either 11.8V or 90V standard devices. You may use the onboard excitation oscillator or you may wish to use an external reference source. The external reference signal is scalable with an onboard voltage divider. Reference phase shift can be adjusted with a resistor capacitor pair for each channel (not factory set). Special design procedures have been followed to ensure error free stable operation even up to 16-bit resolution. Both input channels have independent grounds for reference and sensors. Syncro signals are converted to sine/cosine resolver signals with a laser trimmed precision solid state Scott-T converter. The resolver signal is then digitized by the onboard resolver-to-digital converters.

Excitation circuitry

A programmable reference oscillator is available onboard to drive sensors. The frequency and amplitude of the sine wave are programmable. Digital potentiometers are used to give stable operation and flexible 32-step adjustment of excitation characteristics. The reference source is common to both channels. Independent output buffer amplifiers are used to drive the sensors. The onboard DC/DC converter can be used to drive total loads of 1,5W. If you connect the bus power to drive the excitation amplifier circuitry you may increase the drive to 2,5W. In this case make sure you provide adequate airflow around the excitation amplifier not to thermally overload the device. The excitation frequency is factory set to 400Hz to 1,6KHz range. This range can easily be increased to 2,6KHz to work with common resolver types with a small adjustment. Please consult the factory for more details.

Mechanical description

The ERES104 is designed on a PC/104 form factor. An easy mechanical interface to both PC/104 and EUROCARD systems can be achieved. Stack your ERES104 directly on a PC/104 compatible computer using the onboard mounting holes. Care must be taken to ensure good quality cabling to ensure high quality noise free operation .

Connector description

The connections are made by header type terminals. RTD Finland may deliver boards with or without headers. The PC/104 bus connector is 16-bit wide stackthrough type.

What comes with your board

You receive the following items in your ERES104 shipment:

- * ERES104 PC/104 resolver to digital converter board
- * User's manual

Note: DOS/WIN95/98/2000/NT 4.0 drivers and test software are available from our website at www.rtdfinland.fi.

If any item is missing or damaged, please call Real Time Devices Finland customer service department at (+358) 9 346 4538.

Scope of this manual

This manual expects the user to be familiar with syncros and resolvers. The theory and operation of these sensors is not within the scope of this manual.

Using this manual

This manual is intended to help you install your new ERES104 module and get it working quickly, while also providing enough detail about the board and its functions so that you can enjoy maximum use of its features even in the most demanding applications.

When you need help

This manual and all the example programs will provide you with enough information to fully utilize all the features on this board. If you have any problems installing or using this board, contact our Technical Support Department (+358) 9 346 4538 during European business hours, or send a FAX to (+358) 9 346 4539 or Email to sales@rtdscandinavia.fi. When sending a FAX or Email request, please include your company's name and address, your name, your telephone number, and a brief description of the problem.

CHAPTER 1 - BOARD SETTINGS

The ERES104 board has jumper settings to configure the operation of the board. Special care must be taken to make correct connections since high voltage input signals may be used.

Factory configured jumper settings

Figure 1-1 illustrates the general location of the onboard connectors and jumpers. Table 1-1 will show some general jumper settings preset by the factory. Refer to the following jumper specific information on usage of these jumpers.

<i>Jumper name</i>	<i>Function</i>	<i>Setting</i>
BASE	Base address	300h
IRQ1	Channel 1 IRQ	10
IRQ2	Channel 2 IRQ	11
SENSOR1	Sensor selection	Direct resolver
SENSOR2	Sensor selection	Direct resolver

Table 1-1 Factory preset jumpers



Fig. 1-1 Jumper and connector locations of the ERES104

BASE - Base Address Jumpers (Factory setting: 300h)

The most common cause of failure when you are first setting up your module is address contention. Some of your computers I/O space is already occupied by other internal I/O devices and expansion boards. When the ERES104 attempts to use its reserved I/O addresses already used by another peripheral device erratic performance may occur and data read from the board may be corrupted.

To avoid this problem make sure you set up the base address first using the five jumpers which let you choose from 32 different I/O addresses in your computers I/O map. Should the factory installed setting of 300h be unusable for your system configuration, you may change this setting to another using the options illustrated in Table 1-2. The table shows the switch settings and their corresponding values in hexadecimal values. Make sure you verify the correct location of the base address jumpers. When the jumper is removed it corresponds to a logical "0", connecting the jumper to a "1".

Base Address Jumper Settings ERES104

Hex / (Decimal)	Jumper Settings	Hex / (Decimal)	Jumper Settings
Addr	5 6 7 8	Addr	5 6 7 8
200 / (512)	0 0 0 0	300 / (768)	0 0 0 1
220 / (544)	1 0 0 0	320 / (800)	1 0 0 1
240 / (576)	0 1 0 0	340 / (832)	0 1 0 1
260 / (592)	1 1 0 0	360 / (848)	1 1 0 1
280 / (512)	0 0 1 0	380 / (768)	0 0 1 1
2A0 / (544)	1 0 1 0	3A0 / (800)	1 0 1 1
2C0 / (576)	0 1 1 0	3C0 / (832)	0 1 1 1
2E0 / (592)	1 1 1 0	3E0 / (848)	1 1 1 1

Table 1-2 Base address jumpers

Note: The top-most jumper is equivalent to address line A8, the bottom-most is A5.

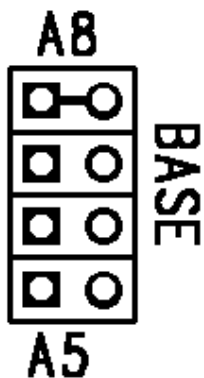


Fig. 1-2 Base address jumper showing base address 300H

IRQ1/IRQ2 - Host Interrupt selection jumper (Factory settings: IRQ10/11)

The ERES104 can assert a host interrupt using the hardware interrupts IRQ 2,5,7,10,11,15. The selection of these interrupts is performed by closing one position on the jumper header connector marks IRQ1 for channel 1 or alternatively IRQ2 for channel 2. The interrupt header is illustrated below in figure 1-3.

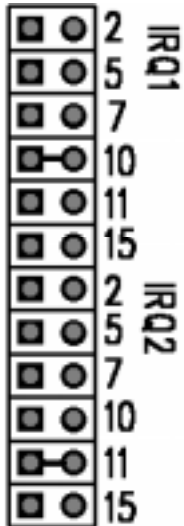


Fig. 1-3 Host interrupts set to factory defaults

SENSOR1/2 - Sensor type selection jumpers (Factory settings: straight resolver)

The sensor configuration jumper blocks consist of 3 parts A,B and C. The jumper blocks are identical for channels 1 and 2 and are located on top of each other on the board. Figure 1-4 illustrates the sensor input terminal block.

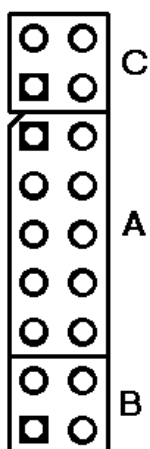


Fig. 1-4 Sensor configuration terminal block, C and B block pins are :
2 4
1 3

The configuration is the following for these terminal blocks:

		A	B	C
1)	Differential resolver	3-4	OFF	1-2
2)	Resolver/Inductosyn	5-6 1-2 7-8	OFF	1-2
3)	Syncro	5-6 1-2 7-8	1-2 3-4	3-4
4)	Differential syncro	5-6	1-2 3-4	3-4
5)	LVDT	1-2 7-8 9-10	OFF	OFF

CHAPTER 2 - BOARD INSTALLATION

=====

The ERES104 Syncro/Resolver interface board is very easy to connect to your industrial distributed control system. Direct interface to PC/104 systems is easily achieved. This chapter tells you step-by-step how to install your ERES104 into your system.

After completing the installation use the diagnostic and test software to fully verify that your board is working.

Board Installation

Keep your board in its antistatic bag until you are ready to install it to your system! When removing it from the bag, hold the board at the edges and do not touch the components or connectors. Please handle the board in an antistatic environment and use a **grounded** workbench for testing and handling of your hardware.

Before installing the board in your computer, check the jumper settings. Chapter 1 reviews the factory settings and how to change them. If you need to change any settings, refer to the appropriate instructions in Chapter 1. Note that incompatible jumper settings can result in unpredictable board operation and erratic response.

General installation guidelines:

1. Turn OFF the power to your computer
2. Touch the grounded metal housing of your computer to discharge any antistatic buildup and then remove the board from its antistatic bag.
3. Hold the board by its edges and install it in an enclosure or place it on the table on an antistatic surface.
4. Connect the board to the sensors using the sensor header connector.
Make sure the polarity of the cable is correct.

Installation integrated with a PC/104 module stack:

- * Secure the four PC/104 installation holes with standoffs.
- * Connect the board to the sensors and other peripherals using the interface header connectors.

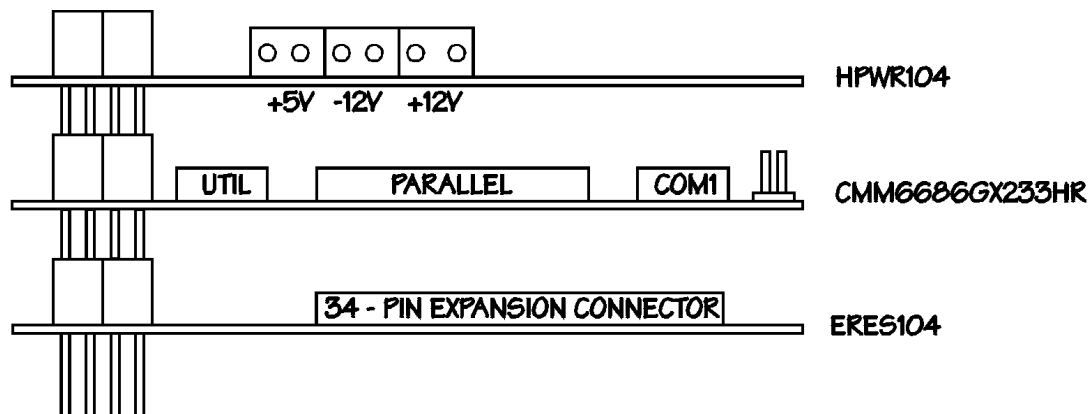


Fig. 2-1 ERES104 integrated in a PC/104 dataModule stack

Synchro/Resolver connector

The two sensor inputs are located in header connector J10 to the right side of the board. Signals are connected as described below:

Pin# J10	Function	Pin# J10	Function
1 ***	REF_OSC1	2	GND
3	SIN1	4	CH1_AGND
5	COS1	6	CH1_AGND
7	EXT_REF1	8	CH1_AGND
9	REF_OSC2	10	GND
11	SIN2	12	CH2_GND
13	COS2	14	CH2_GND
15	EXT_REF2	16	CH2_GND
17	GND	18	GND
19*	S1_1/S1_DR1	20	S3_1/S3_DR1
21	CH1_AGND	22**	S4_DR1
23	S2_DR1	24	S2_1
25***	REF_OSC1	26***	REF_OSC2
27	S1_2/S1_DR2	28	S3_2/S3_DR2
29	CH2_AGND	30	S4_DR2
31	S2_DR2	32	S2_2
33	GND	34	GND

Table 2-1 Sensor interface connector J10 pinout

- * S1 Channel 1 or differential resolver S1 channel 1
- ** Differential resolver S4
- *** REF_OSC1 and REF_OSC2 are derived from the same source, but buffered independently

/BIT led

A LED on the ERES104 indicated that either Channel #1 or Channel #2 Built-in-test error is active. If no error exists on either channel the LED is off. Note that if you have only one sensor connected the LED is always lit since the other channel indicated loss of signal error through it's built in test signal.

Power connector

The power connector field illustrated in Figure 2-2 brings power to the ERES104 or it can be used to take power from the PC/104 stack.

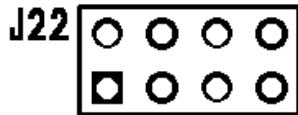


Figure 2-2. Power connector of the ERES104.

Pin # J22	Description
1	GND
2	+5V
3	N.C.
4	+12V_BUS
5	-5V
6	-12V_BUS
7	GND
8	+5V

Table 2-2. Power connector of the ERES104.

- Note 1. Pin #5 (-5V) is only connected to the PC/104 bus, it is not used by the ERES104 board.
- Note 2. -12V and +12V are connected to the PC/104 bus. These power inputs are only used if the excitation source is powered from the power connector. In this case the solder blobs on the solder side of the board next to the power connector must be closed. (This mode is usually set by the factory if the board setup requires this)
- Note 3. The board is usually powered through the PC/104 host bus when not in stand-alone mode. J22 can only used to power the module when power is not available from the PC/104 bus.

CHAPTER 3 – HARDWARE DESCRIPTION

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This section describes the functionality of the vital subsections of the ERES104 board. These include the Resolver-to-Digital converters, Solid state Scott-T converter and Sine wave excitation oscillator.

BELOW ARE LISTED THE EXTERNAL COMPONENT VALUES OF THE RDC-19220 RESOLVER-TO-DIGITAL CONVERTER. FOR MORE INFORMATION ON SELECTING THESE COMPONENTS, PLEASE REFER TO THE APPLICATION NOTE DOCUMENTATION ON THE WEBSITE WWW.DDC-WEB.COM.

RC 30K
RS 53K

REF+ INPUT RESISTANCE 2K

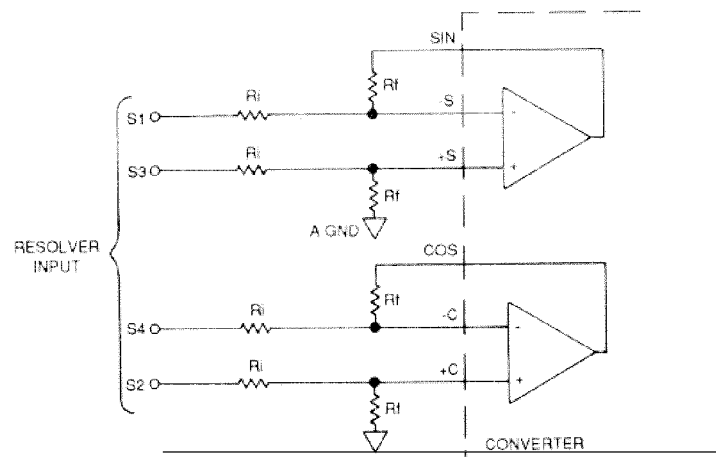
RV 39K WITH 20K TRIMPOT (CENTERED) , EQ. 49K
CBW 4,7nF
RB 100K
CBW/10 470pF

Resolver to Digital Converters

Two independent resolver-to-digital converters condition the sensor inputs. These versatile chips have programmable resolution and internal diagnostic functions. The control of these converters is performed by the host computer. These converters support a variety of operational modes provided by the circuitry onboard, these include Resolvers, Inductosyns, Syncros and LVDT's that can be conditioned with up to 16-bit resolution. The following passage will illustrate these connections.

Connecting Resolvers to ERES104

The figure 3-1a illustrates a generic resolver connection scheme to the converter. Figure 3-1b shows a real connection that is used on the ERES104. The dashed line describes the onboard precision resistor pack that is used to precondition the voltage range of the sensors to a suitable level. If non differentially connected resolvers are used they connect directly to the **sin** and **cos** inputs of the appropriate channels.

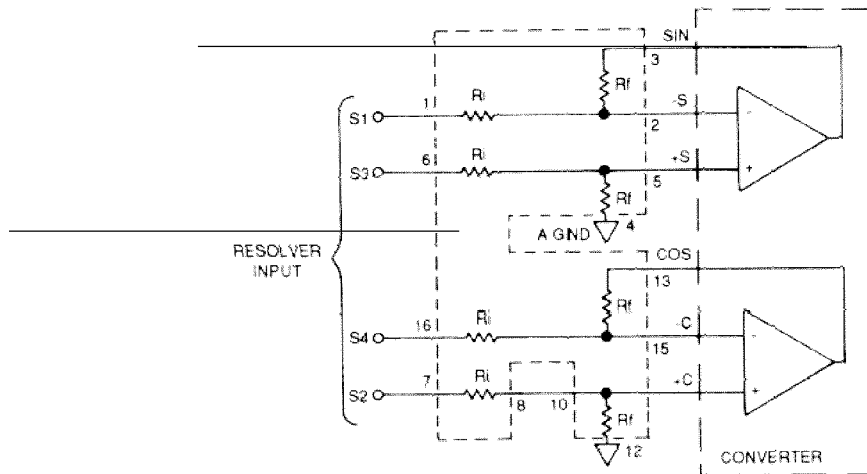


$$\frac{R_f}{R_i} \times 2 \text{ Vrms} = \text{Resolver L-L rms voltage}$$

$$R_f \geq 6 \text{ k}\Omega$$

S1 and S3, S2 and S4, and Rf and Rf should be ideally twisted shielded, with the shield tied to GND at the converter.

Figure 3-1a Differential resolver connection to a ERES104



S1 and S3, S2 and S4, and Ri and Rl should be ideally twisted shielded, with the shield tied to GND at the converter.
 For DDC-49530: Ri = 70.8 kΩ, 11.8 V input, synchro or resolver.
 For DDC-49590: Ri = 270 kΩ, 90 V input, synchro or resolver.
 Maximum addition error is 1 minute.

FIGURE 7B. DIFFERENTIAL RESOLVER INPUT, USING DDC-49530 (11.8 V) OR DDC-49590 (90 V)

Figure 3-1b Differential resolver connection to ERES104

S1 is in pin #19, S3 is in pin #20, S4 is in pin #21, S2 is in pin #22 of J10 as an example for channel #1
 S1 is in pin #27, S3 is in pin #28, S4 is in pin #30, S2 is in pin #31 of J10 as an example for channel #2

Connect A jumper 3-4; and C jumper 1-2

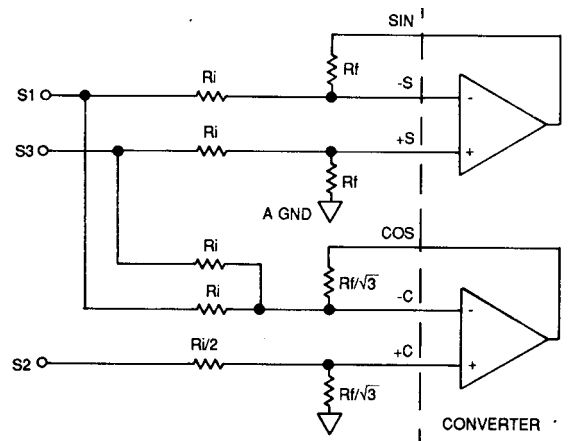
Connecting Inductosyns to ERES104

The ERES104 can also be used to interface to Inductosyn type scales. The Inductosyn scale output is very low, in the range of 2-10mV pp. The signal is identical to that of a resolver. From the point of view of the RD-converter the Inductosyn signal must be preamplified to the level of 2V rms that is required by the chips. This must be performed by an external balanced preamplifier pair external to the ERES104. Please consult the factory for hints on Inductosyn interfacing.

The onboard sine wave oscillator output current drive is limited. This means that it will not in many cases be sufficient to drive a low impedance Inductosyn slide that may have a resistance in the magnitude of Ohms. RTD can give hints on how to do this.

Connecting Syncros to ERES104

The figure 3-2a illustrates a generic resolver connection scheme to the converter. Figure 3-1b shows a real connection that is used on the ERES104. The dashed line describes the onboard precision resistor pack that is used to precondition the voltage range of the sensors to a suitable level of 2V.

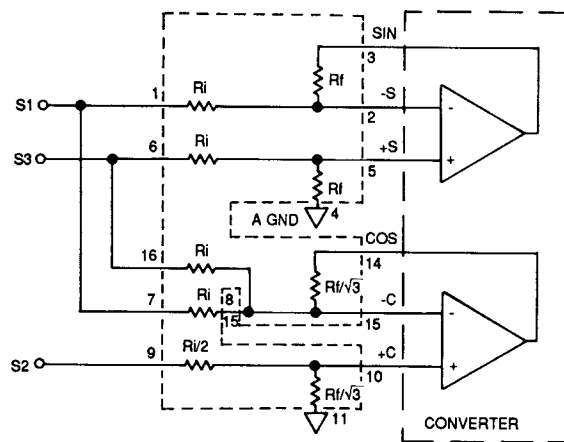


$$\frac{R_i}{R_f} \times 2 V_{rms} = \text{Synchro L-L rms voltage}$$

$$R_f \geq 6 \text{ k}\Omega$$

S1, S2, and S3 should be triple twisted shielded; RH and RL should be twisted shielded. In both cases the shield should be tied to GND at the converter.

Fig. 3-2a Generic Syncro connection to a Resolver-to-Digital converter



S1, S2, and S3 should be triple twisted shielded; RH and RL should be twisted shielded. In both cases the shield should be tied to GND at the converter.

90 V input = DDC-49590: $R_i = 270 \text{ k}\Omega$, 90 V input, synchro or resolver.
 11.8 V input = DDC-49530: $R_i = 70.8 \text{ k}\Omega$, 11.8 V input, synchro or resolver.
 Maximum addition error is 1 minute.

Fig. 3-2b Syncro connection to a ERES104

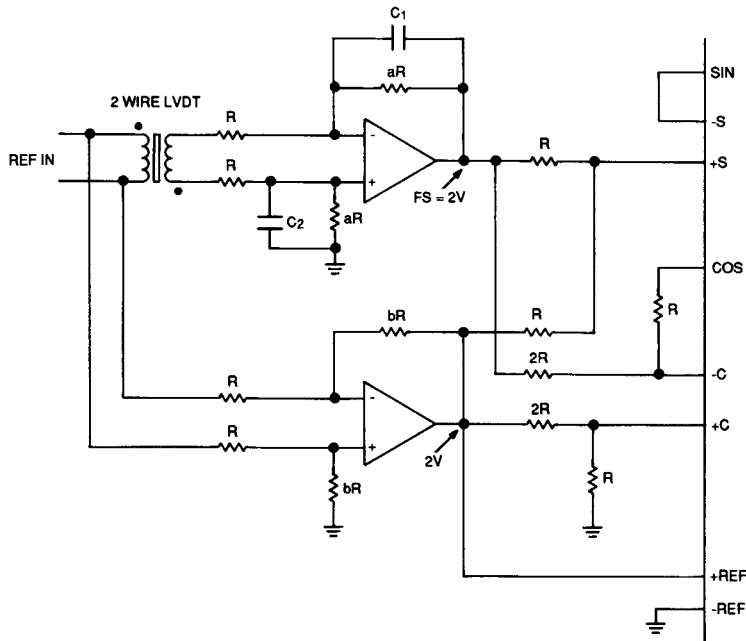
S1 is in pin #19, S3 is in pin #20, S2 is in pin #24 of J10
 as an example for channel #1

S1 is in pin #27, S3 is in pin #28, S2 is in pin #32 of J10
 as an example for channel #2

Connect B jumper 1-2,3-4 , A jumper 5-6; and C jumper 3-4

Connecting LVDT's to ERES104

Standard 2-wire LVDT's interface to the Resover-to-Digital converters as illustrated below. Please consult the factory in applications involving LVDT interfacing.



$C_1 = C_2$, set for phase lag = phase lead through the LVDT.

Fig. 3-3a Illustrates a generic 2-wire LVDT connection to a converter.

The precision amplifier circuitry presented above is external to the ERES104. Such LVDT preamplifier modules are available from RTD as standard products, or they may be designed by RTD to suit customer specific requirements. Please contact RTD for more information on different solutions for LVDT interfacing.

Solid State Scott-T converter

Syncro signals must be converted to SIN and COS resolver signals that can be directly interfaced by the Resolver-to-Digital converters. The classical transformer coupled connection is often too cumbersome to use. The ERES104 module uses the internal operational amplifiers of the Resolver-to-Digital converters and precision resistors to implement the Solid State Scott-T circuit seen below. The most important design criteria in this connection is the perfect matching of the resistors. Precision is maintained by using a special trimmed resistor network together with the internal Opamps. These resistor networks are available for the two standard voltage levels 11.8V and 90V syncros. The resistor network value ratios are pre-trimmed to produce the 2V rms input signal required by the converters. Jumper fields A, B and C as discussed previously will select the right resistor configuration for the circuit.

In your delivery you have received resistor networks for both standard voltages. They may be easily customized channel-by-channel by inserting the correct resistor network into the onboard sockets. The resistor networks are used as follows:

DDC - 49530 are used with 11.8V Syncro inputs

DDC - 49590 are used with 90V Syncro inputs

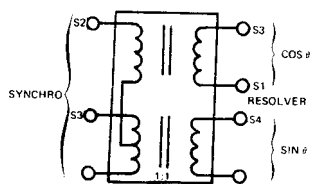
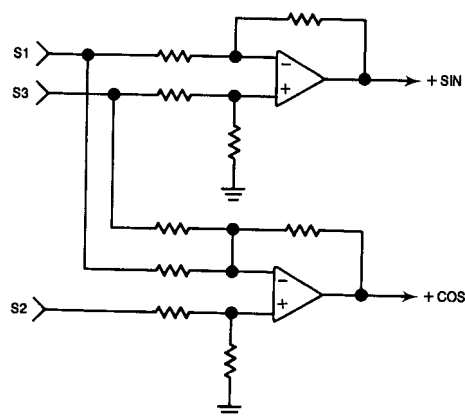


Figure 1.10f. Scott-T Transformer.



WHERE: $SIN = S3 - S1$

$$COS = \left[S2 - \left(\frac{S1 + S3}{2} \right) \right] \frac{2}{\sqrt{3}}$$

Figure 1.10g. Solid-State Scott-T.

Fig. 3-4 Solid State Scott-T converter circuitries.

Sine Wave Excitation

A special programmable AC excitation source is available on the ERES104. It can be used to drive different sensors directly. The amplitude and frequency are programmable from the host interface. The methods to do this are described in later passages of this manual.

The adjustment of the oscillator is performed with digital potentiometers providing a very stable non drifting performance. The digital adjustment potentiometers have 32 steps. The output adjustable frequency span is in the range of 400 Hz to 1,6KHz.

Amplitude adjustment ranges from 0 to 7,5Vrms. Adjustment of the gain can be performed in 32 steps also. Note that the settings of the frequency and gain are non-volatile and will be automatically stored in the EEPROM of the trim pots. In some cases when input power to the system rises slowly EEPROM configuration data may become incorrect and the excitation waveform is not correct. This can be corrected by rebooting the system with a faster power set-up time.

The output of the reference oscillator source is buffered with a power Op-amp. It derives its power from the onboard DC/DC converter or the PC/104 bus. In case the power consumption of the sensors exceed 1.5W, power must be derived from an external power supply fed through the PC/104 bus (or power header J22). A suitable power PC/104 supply is the EPWR104 or HPWR104 giving output +-500mA of +-12V.

There are two output buffer amplifiers in parallel. One for Sensor #1 and the other for Sensor #2. The reference frequency source is common to both of these buffer amplifiers. Separate DC return paths are available at the connector J10 for the excitation source. This scheme will remove noise from ground loops in sensor connections.

The onboard excitation source will work well with resolutions up to 16 bits. In case you desire to use 16-bit resolution you must make sure that cabling and shielding is performed carefully.

Reference connection

The reference feedback that is connected to the RD converter must fulfill two main criteria. Firstly the incoming signal must be 4Vpp and secondly it must be in phase with the incoming signal. In case the reference (excitation feedback) is too high in amplitude a series resistor may be added either externally, or by soldering one on the board. There are two locations reserved for voltage divider resistors R24 for channel #1 and R41 for channel #2. The input resistance is 2K, so installing a 2K in series will allow a 8Vpp reference signal.

In case of reference signal phase lag or lead you can correct it by installing an external capacitor. Phase-shift correction will improve accuracy and quadrature rejection. The size of the capacitor can be selected as follows:

$$X_c = 1 / (2 \times \pi \times F) \quad \text{where } F = \text{excitation frequency and } \tan(\Phi) = X_c/R$$

where Φ = desired phase shift

for more information, please consult the component specific datasheet of the RD converter chips.

On the solder side of the board are locations for an additional resistor/capacitor for phase correction for each channel. The components for channel #1 are labelled R8/R7; for channel #2 R9/R10. The factory default setting is R8 and R9 closed (no phase adjustment).

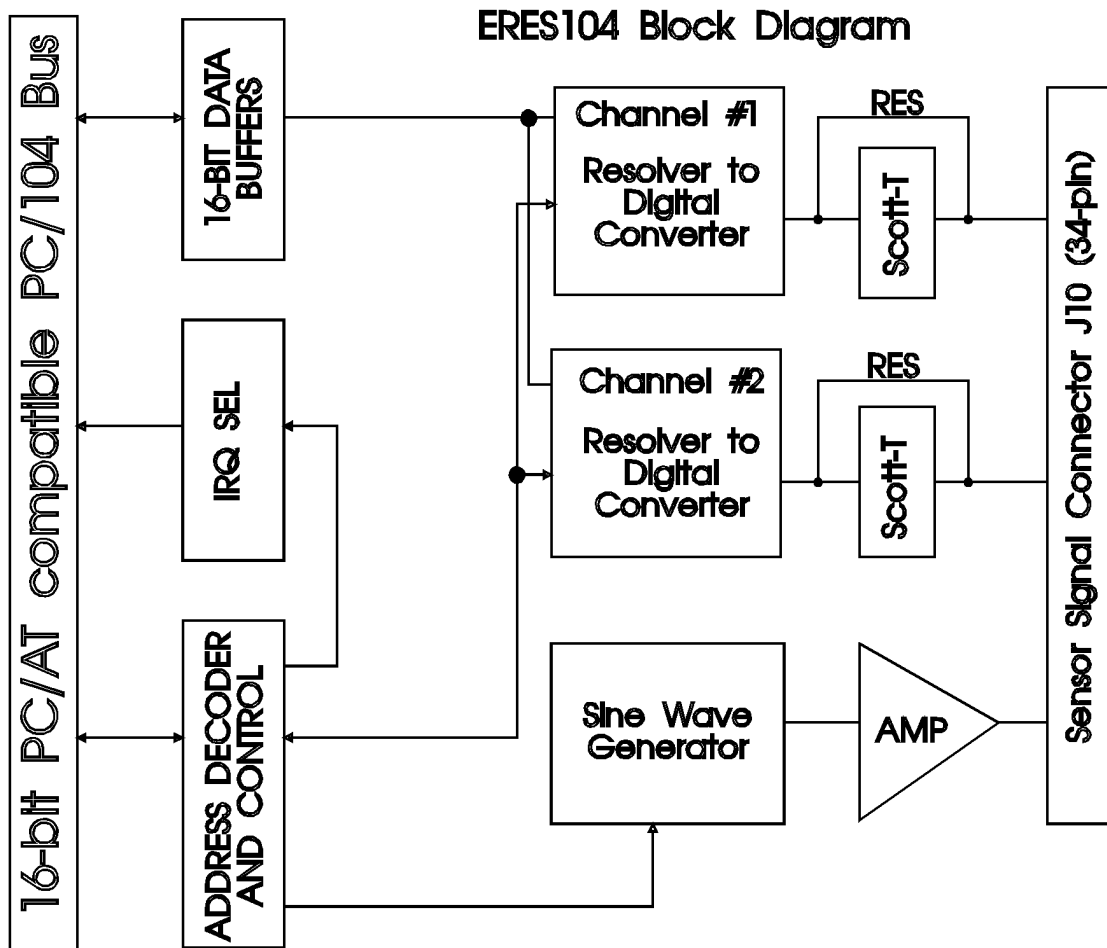


Fig. 3-5 Block diagram of ERES104 board

CHAPTER 4 - BOARD OPERATION AND PROGRAMMING

This section will describe how to program the ERES104 host interface from both directions as well as explain how the onboard Resolver-to-Digital converters and the programmable sine wave oscillators are programmed from the host computer.

Host Interface base address from PC/104 bus

Table 4-1 illustrates the I/O map from the host PC/104 computer to the ERES104.

Table 4-1 ERES104 I/O map from host computer		
ADDR	Function	Direction
BASE+0	INHIBIT CHANNEL #1	WR
BASE+2	INHIBIT CHANNEL #2	WR
BASE+4	IRQ_CONF	WR/RD
BASE+6	BOARD_CNTRL	WR/RD
BASE+8	RD_RESOLUTION	WR
BASE+A	INCREMENT	WR/RD
BASE+C	/ENABLE CHANNEL #1	RD
BASE+E	/ENABLE CHANNEL #2	RD
BASE+10	IRQ_CLEAR CHANNEL1	WR/RD
BASE+12	IRQ_CLEAR CHANNEL2	WR/RD

BASE+0 INHIBIT CHANNEL 1 (1 AFTER RESET)

The RD converter #1 Inhibit signal is controlled by this address. If this signal is driven low (0), the RD converter stored the current reading in the internal counter into a latch from where the angle data can then be read.

D0 = 1 conversion being updated continuously
 D1 = 0 freeze counter to latch for reading

BASE+2 INHIBIT CHANNEL 2 (1 AFTER RESET)

The RD converter #2 Inhibit signal is controlled by this address. If this signal is driven low (0), the RD converter stored the current reading in the internal counter into a latch from where the angle data can then be read.

D0 = 1 conversion being updated continuously
 D1 = 0 freeze counter to latch for reading

BASE+4 IRQ_CONF (0000 AFTER RESET)

This register controls the host interrupts. The source of the interrupt can be either /BIT (built i test error) or alternatively CB (Controller busy; code has changed 1 LSB)

D0 = IRQ enable bit , Channel 1 ; 0 disable, 1 enable
 D1 = IRQ enable bit , Channel 2 ; 0 disable, 1 enable
 D2 = IRQ source selection bit , Channel 1; 0 /BIT , 1 CB
 D3 = IRQ source selection bit , Channel 2; 0 /BIT , 1 CB

BASE+6 BOARD_CNTRL (1110 AFTER RESET)

This register controls some housekeeping bits used by the board such as reset control as well as control of the of the digital trimpots.

- D0 = /Chip select of frequency control trimpot , active when 0
 D1 = /Chip select of amplitude control trimpot , active when 0
 D2 = UP/DN control of digital trimpots, 1 = up, 0 = dn
 D3 = Enable reset , 0 enables host reset to reset resolution register
 1 disables host reset to reset resolution register

BASE+8 RD_RESOLUTION (00h AFTER RESET)

This register controls the resolution bits of the RD converters for channels #1 and #2.

The truth table for the resolution is as described below:

B	A	Resolution
0	0	10
0	1	12
1	0	14
1	1	16

- D0 = Channel #1 A
 D1 = Channel #1 B
 D2 = Channel #2 A
 D3 = Channel #2 B

Note that these signals are only used for LVDT mode:

- D4 = 1 Invert channel 1 A to -5V, bit must be set to 1 (D0)
 D5 = 1 Invert channel 1 B to -5V, bit must be set to 1 (D1)
 D6 = 1 Invert channel 2 A to -5V, bit must be set to 1 (D2)
 D7 = 1 Invert channel 2 B to -5V, bit must be set to 1 (D3)

B	A	Resolution
-5V	0	8
0	-5V	10
1	-5V	12
-5V	-5V	14

BASE+A INCREMENT

Reading or writing to this address will increment the counter of the selected digital trimpots that control the excitation frequency and amplitude. the direction of the increment is set by the UP/DN bit in address BASE+6 BOARD_CNTRL.

To increment the trimpots you must bring the increment signal low and return the signal high again under software control by writing to BASE+A 0 and 1. Please refer to the example programs on how to do this.

BASE+C /ENABLE CHANNEL #1
BASE+E /ENABLE CHANNEL #2

Reading from this address will output the RD converter data to the host. Note that the ERES104 is a true AT board, and it will output a 16 bit value from addresses BASE+C and BASE+D. *The ERES104 does not support a XT host!*

BASE+10 IRQ_CLEAR CHANNEL #1
BASE+12 IRQ_CLEAR CHANNEL #2

Reading or writing to these addresses will clear the pending interrupt condition. make sure you perform this clear operation before you exit from your ISR.

Setting up the ERES104 board for correct operation, steps to take:

- 1) Excitation selection, either onboard excitation or external excitation source. In case you need to interface to high voltage syncros or resolvers you must use an external reference source. If you use 12V resolvers or syncros you may use the onboard reference oscillator.
- 2) Program the frequency of the oscillator (recommended 400 to 1KHz) by programming Trimpot #1. The frequency output can easily be measured with an oscilloscope from the pin #9 of the 8038 signal generator chip. The sine wave output has the same frequency as the square wave output at pin #9.
- 3) Program the excitation gain to give a 2Vrms at the sensor outputs. Note that the power amplifier is AC coupled. Changing the frequency will also affect the amplitude of the excitation gain.
- 4) The reference feedback is by factory default set to a voltage division of 5K1 over 2K. Change the 5K1 series resistor to suit the correct level of Reference feedback in case it is too low. It should be in the range of 2-4V peak. You can measure the feedback reference signal of the RD converter after voltage scaling from pin #10 in header "A"

Closing solder blobs B1 and B2 on the board will automatically connect the onboard excitation source to the voltage divider for the reference feedback. B1 and B2 are located on the solder side of the board and are closed in the factory default condition. ***In cases that you use external sensor excitation blobs B1 and B2 must be left disconnected.***