

COMPUTER CONVERSIONS CORPORATION

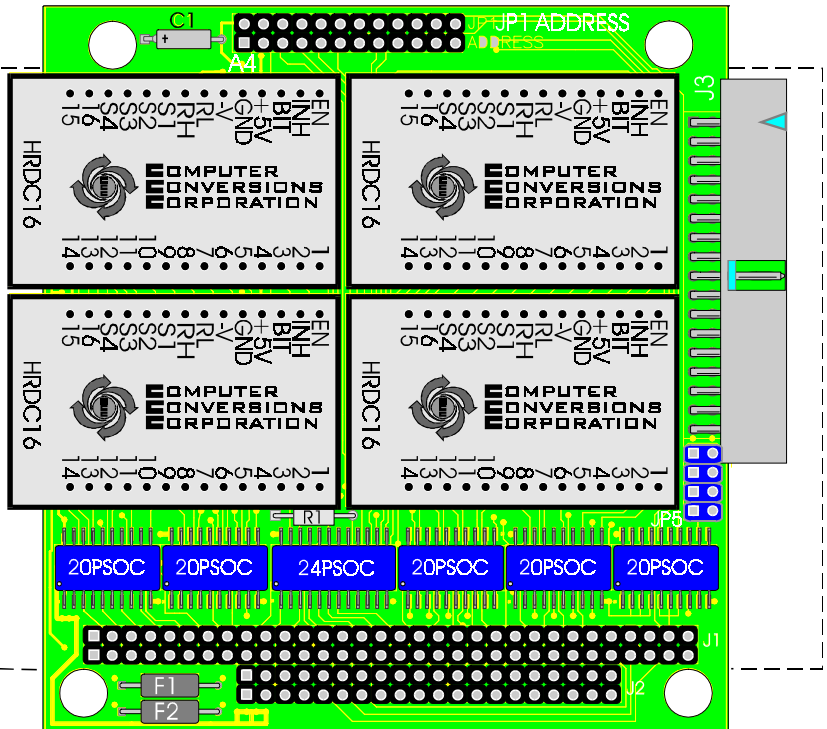
6 DUNTON COURT, EAST NORTHPORT, N.Y. 11731
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PC/104™ STACKABLE SYNCHRO/RESOLVER/LVDT TRACKING INPUT MODULES



~~~~ FEATURES ~~~~

- Direct** Synchro, Resolver and LVDT **Inputs**
- Quad Channel** Solid State Input Modules
- Transformer Isolated** Models,
- No external conditioning or components req'd.**
- Wide band** 47-1K hz. Reference Inputs, Model options to 10Khz.
- PC/104™ Form-Factor, Stack through
- True 16 Bit Address Decode
- True 16 Bit "Word Level" Data Bus
- Bus/Stack Powered Std.
- True card level accuracy and test data.
- Auto Handshake, no need to Inhibit Converters
- BIT/Fault Output Status, w/Loss detect
- Forced Angle Test Mode For Self Test



Actual Size, True 16 Bit Data Bus, ISOLATED TOO!

DESCRIPTION

The PC104 Series™ are 3 and 4 Channel PC/104 and compatible synchro, resolver, and LVDT/RVDT to digital converters, employing type 2 ratiometric tracking converters specifically suited for high performance embedded applications.

They will accept any group of upto 4 individual, 3-wire **Synchro**, or 4-wire **Resolver** inputs, or **2-4 wire LVDT/RVDT inputs**, over a frequency range of **50Hz to 10KHZ.**, and convert them into 10-16 bit words of virtually jitter-and lag free, natural binary data representing the input signals absolute physical position.

Data is addressable in a **single word 16 bit format** over the PC/104™ stack-bus. Data made available to the bus is continuously updated (tracking) without interruption; output **data is accurate, monotonic, and always fresh** up to the maximum tracking rate of the converter.

Forced Test Mode:

All modules include a force angle test mode for self-test to excersize the converters for module checks following

power-ups. 3 separate test-to angles are provided on 3 channel isolated models, and a single test-to 30 degree angle is provided on 4 channel units.

The forced test mode may be activated by setting bits SD0/SD1 in the control word, once activated the converters internally switch their inputs from the field I/O and instead insert fixed analog test angles for validation, when switching to or from the forced angle test mode, the user can either wait the specified settling time rated for those converters (20 to 300msec.), or monitor fault/BIT status bits as a ready indicator. Test within .15 degrees.

Built-In-Test/Loss/Fault Detect Status

Additionally, a single **Status Word** is provided to report the **BIT/Fault status** of each independent channel, indication include loss of signal, loss of reference, overspeed/accel and malfunction alert.

Direct Field Voltage Inputs

No external transformers, modules or signal conditioners are **required**. The synchro/resolver and LVDT converters used

feature **internal** solid-state or **Transformer Isolated** Scott T's that accept **direct field voltage inputs**.

Transformer Isolation is offered for **all** the reference and signal input lines, **This completely isolates the card and effectively the whole computer from all field wiring, eliminating concerns over; troublesome ground loops, ground induced noise, differing potentials, ground interjected spikes, and ghostly field noise that so frequently takes down, and/or corrupts the operation of, entire systems.**

Transformer isolated units, facilitate

~~~~ APPLICATIONS ~~~~

- Synchro/Resolver Test Sets
- Embedded Display and Inst. Sets
- OEM Mobile Antenna Gear
- Marine Gyro/GPS Systems
- Automated Guided Vehicles
- Drones, Radars, Weather Inst's.
- Surveying & Mapping Apparatus

densities upto 4 channels per card, and separate reference inputs are provided for each channel; allowing differing reference sources to be used with a single card, and channel to channel and channel to bus isolation exceeding 500VDC.

Solid State input units are for price-para-mount applications, offering densities upto 4 channels per module, with separate reference inputs for each channel, and common mode rejection exceeding 70 db.. Because only "whole complete converters" are used throughout; direct field input voltages are facilitated and neither external components, conditioning, or field component selections/changes, are required.

Accuracy, performance, and dynamic characteristics, are *specified and tested inclusive of the whole PC/104™ assembly*, and printed test data is provided, and maintained, on all units.

Maximum versatility has been employed on the PC104 Series' products to assure the universal compatibility in addressing, timing, system, and specific computer *hardware and software independence*.

The PC104 Series cards are configured with a full 16 bit range of jumper-plug selectable I/O addressing . The interface is a *solidly-reliable*, high-speed, true **16 bit "Word-Level"** register access. Simply address the I/O; and read the data.

Because *'auto-handshaking'* is provided on-board, *to prevent false reads, and* a true 16 bit data bus is used; there is *no need to employ any additional software* steps to inhibit the converters, or manipulating 8 bit bytes; and the user is assured only the most current, valid and "dynamic" data is presented to the bus.

Software code fragments that may be used as *drivers, are provided* in C, and simple inport/outport commands are used in assembly. In addition, a C written Demonstration program is provided for *Out-Of-The-Box testing*, scaling, and off-setting; *without* any user *programming* required, and includes source code .

PC104's are available in: commercial 0°C to +70°C, industrial -40°C to +85°C.

| SPECIFICATIONS | | | | | |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------|----------------|---------|-----------------------|----------|
| | 10 Bits | 12 Bits | 14 Bits | 16 Bits | |
| Accuracy (1) | | +/-30' | +/-8.5' | +/-4' | +/-4' |
| <i>-GA models</i> | | | | +/-4.5' | +/-4.5' |
| <i>-HA models</i> | | +/-21' | | +/-2.7' | *+/-2.6' |
| Tracking Rate | | 12.5 | 10 | 2.5 | 0.625 |
| <i>(RPS)</i> | 400Hz. | 40 | 40 | 10 | 2.5 |
| | 2,5KHz. | 100 | 80 | 30 | 5 |
| <i>-HS models</i> | 2.5KHz. | 200 | 200 | 50 | 10 |
| Acceleration | 60Hz. | 770 | 295 | 20 | |
| | 400Hz. | 12600 | 4500 | 610 | 124 |
| | 2,5KHz. | 2500 | 9000 | 1620 | |
| | 60Hz. | 1400 | 350 | 70 | |
| | 400Hz. | 22000 | 5500 | 1100 | |
| | 2,5KHz. | 160K | 40000 | 8100 | |
| Step Responce | 60Hz. | 200ms. | 360ms. | 800ms. | 1200ms. |
| | 2.5KHz. | 95ms. | 95ms. | 150ms. | 600ms. |
| Frequency Range | 60Hz.units | 47-1000Hz. | | 400Hz.units 360-2KHz. | |
| | 2.5KHz.units | 2000 - 4800Hz. | | Higher Freq. Avail. | |
| Reference Inputs | 26VRMS into 90K ohms | | | | |
| | 115VRMS into 360K ohms | | | | |
| Signal Inputs | 11.8VRMS L-L into 26K ohms Minimum L-L Balanced | | | | |
| | 26VRMS L-L into 26K ohms Minimum L-L Balanced | | | | |
| | 90VRMS L-L into 200K ohms Minimum L-L Balanced | | | | |
| Breakdown (volts) | 500 VDC Minimum to Ground on Transformer Units | | | | |
| Common Mode | 70 Db. Minimum on Solid State Units | | | | |
| Power | +5VDC @ .45 Amp. typ, + 50 ma./channel | | | | |
| | -12VDC @ 30 ma./c | | | | |
| Temperature | Operating: 0C to +70C (-1 units), -40C to +85C (-3 units) | | | | |
| | Storage: -55C to +125C | | | | |
| Notes: | 1) Accuracy applies for whole assy. +/- 1LSB, over temperature range, +/-10% amplitude and freq. variations, & +/-5% power variations, | | | | |
| | 2) Different input voltages, rates and frequencies available | | | | |

Environmental Specifications:

Temperature: see chart & model #

Humidity: 0 to 95%
(non-condensing)

Wheight: 4-8 ounces = 1-4 Channel

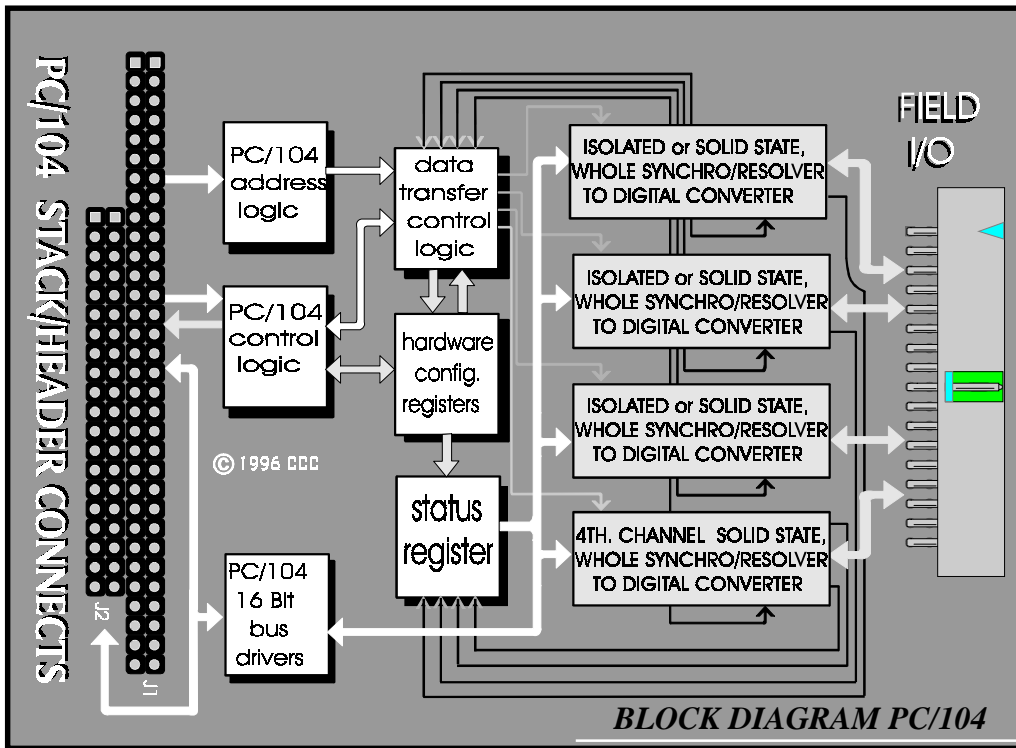
Vibration: 3.5 mm. 5-9Hz. :
1.0 G 9 - 150Hz.

Shock: 15 g's for 11 msec.



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SOFTWARE SUPPORT

All cards shipped with Software Packs having a Demo Program for Out-Of-The-Box Testing & Scaling, and Self-Test features etc. with Source Code provided for extraction. Code fragments for use as Drivers provided in C, Assembly uses inport/outport see below. NT Drivers are Extra.

Notes:

- 1) All shields to go direct to Earth Ground on the computer side only.
- 2) To reverse direction of rotation swap S1 with S3 or invert data in software.
- 3) S4 is not used on Synchro units.

SETTING BOARD BASE ADDRESS

Address Bits/Plugs 4-15 are used to set the boards base address. Example shown is as boards leave the factory; set to 300h (Hex). Removing Address Jumper-Plugs sets the address to a 1.

| | | | | | | | | | | | | | | | | |
|---------------------------|----|----|----|----|----|----|---|---|---|---|---|---|---|---|---|---|
| HEX format/Representation | 0 | 3 | 0 | 0 | | | | | | | | | | | | |
| Logic Set, Out = 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Address Bits | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | N |

PC104 SERIES ADDRESS MAP

| HEX Select | Address Bits | | | | Converter Function | Chan. Chn# |
|------------|--------------|----|----|----|------------------------|------------|
| | A4 | A3 | A2 | A1 | | |
| 00h | 0 | 0 | 0 | 0 | CHANNEL DATA READ ONLY | 0 |
| 02h | 0 | 0 | 0 | 1 | CHANNEL DATA READ ONLY | 1 |
| 04h | 0 | 0 | 1 | 0 | Read Status | ALL |
| 06h | 0 | 0 | 1 | 1 | Read Status | ALL |
| 08h | 0 | 1 | 0 | 0 | Write Test / Run mode | ALL |

Note: On 4 channel units 06h is chan. 3, 08h = read status, 0Ah = write test mode/angle .

Control Word

| | | |
|-----------------------------------------------|-----|------|
| Write test mode verses run mode Bit SD0 = LSB | | |
| SD1 | SD0 | Mode |
| 0 | 0 | RUN |
| 0 | 1 | 90° |
| 1 | 0 | 0° |
| 1 | 1 | 30° |

STATUS WORD BIT MAP for PC104 SERIES

| MSB | I/O Status Data Bits | | | | | | | | | | | LSB | | | |
|--------------------------------------------|----------------------|----|----|----|----|---|---|---|---|---|---|-----|---|---|---|
| 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| Bits 4-15 =X= Not used, Mask | | | | | | | | | | | | | | | |
| 0 = Built-in-Test Channel 3 Fault/BIT/Loss | | | | | | | | | | | | | | | |
| 0 = Built-in-Test Channel 2 Fault/BIT/Loss | | | | | | | | | | | | | | | |
| 0 = Built-in-Test Channel 1 Fault/BIT/Loss | | | | | | | | | | | | | | | |
| 0 = Built-in-Test Channel 0 Fault/BIT/Loss | | | | | | | | | | | | | | | |

PIN TERMINATIONS:PC104 Series,

| PIN | Standard | | PIN | Standard | |
|-----|----------|-----------------------|-----|----------|-----------------------|
| 1 | RL | Reference Channel # 0 | 17 | RL | Reference Channel # 2 |
| 2 | RH | | 18 | RH | |
| 3 | S1 | Signals Channel # 0 | 19 | S1 | Signals Channel # 2 |
| 4 | S2 | | 20 | S2 | |
| 5 | S3 | | 21 | S3 | |
| 6 | S4 | | 22 | S4 | |
| 7 | V0 | DC Vel. (opt.) | 23 | V2 | DC Vel. (opt.) |
| 8 | Gnd | Ground | 24 | Gnd | Ground |
| 9 | RL | Reference Channel # 1 | 25 | RL | Reference Channel # 3 |
| 10 | RH | | 26 | RH | |
| 11 | S1 | Signals Channel # 1 | 27 | S1 | Signals Channel # 3 |
| 12 | S2 | | 28 | S2 | |
| 13 | S3 | | 29 | S3 | |
| 14 | S4 | | 30 | S4 | |
| 15 | V1 | DC Vel. (opt.) | 31 | V3 | DC Vel. (opt.) |
| 16 | Gnd. | Ground | 32 | Gnd | Ground |

NOTES: 1) J3 Connector ANSLEY # 609-3407

2) J3 MATE: Wire: Housing: AMP # 102387-8

Pins: AMP # 102348-2 or 102348-3, (Don't use ribbon)

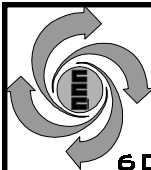
3) Velocity output not used on solid state input units.

4) 3 Channel Isolated Units use this, 4 Channels Isol. Differ

ASSEMBLY CODE FOR READING REGISTERS

```
MOV DX,Port_address in Hex ; place address of port
                               ; in DX register
INW AX,DX                     ; place value in AX register
```





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PC104™ SERIES SYNCHRO/RESOLVER Inputs MODEL SELECTION GUIDE



MODEL SELECTION GUIDE FOR PC104 UNITS

Model: PC104 - B 4 B 4 B 5 0 - X V - 1

a : see table a a b a b a b a b

b : see table b CH.0 CH.1 CH.2 CH.3

Temp.
Comm. -1
Extended -3

Insert -X for Transformer Isolated units

Insert -V for DC Velocity outputs option for Transformer Isolated Units only.

a) SELECT CONVERTER TYPE AND RESOLUTION CODE

BITS 16 14 12 10

SYNCHRO TO DIGITAL

Code A B C D

RESOLVER TO DIGITAL

Code E F G H

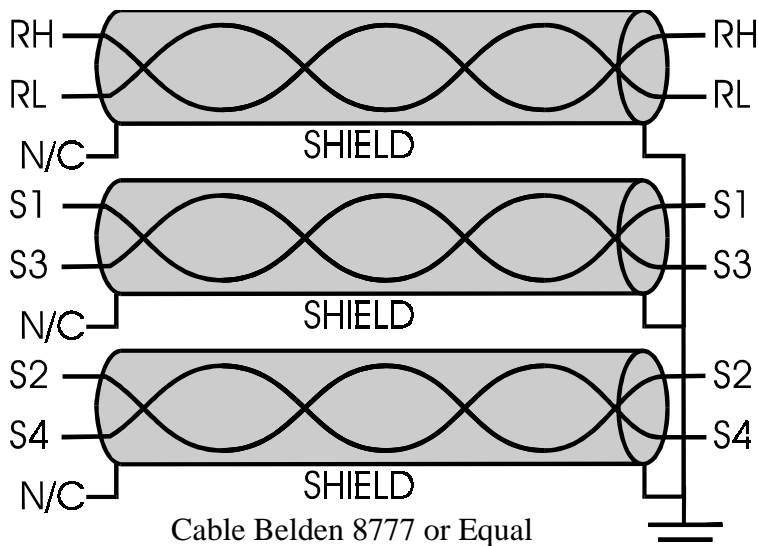
ALL OTHERS REQUEST EXT. MODEL GUIDE

b) SELECT SIGNALS (INSERT CODE #)

| REFERENCE VOLTAGE | SIGNAL LEVELS | FREQUENCY IN HERTZ | INSERT THIS CODE |
|-------------------|---------------|--------------------|------------------|
| 26VAC | 11.8V. L-L | 400 Hz. | 1 |
| 26VAC | 11.8V. L-L | 2.6KHz. | 2 |
| 26VAC | 26V. L-L | 400 Hz. | 3 |
| 115VAC | 90V. L-L | 400 Hz. | 4 |
| 115VAC | 90V. L-L | 60 Hz. | 5 |

ALL OTHERS REQUEST EXT'D. MODEL GUIDE

CABLE DRAWING



Example:

Model; PC104-B4B4B5-X-1

Includes:

- 1 PC104 Card, Populated with:
- 2 - 14 Bit S-D Converters 115/90V. @ 400Hz.
- 1- 14 Bit S-D Converter 115/90V. @ 60 Hz.

All Reference and Signal inputs are Transformer Isolated, 0°C to 70 °C oper. temp.

Your Local CCC Representative is:



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