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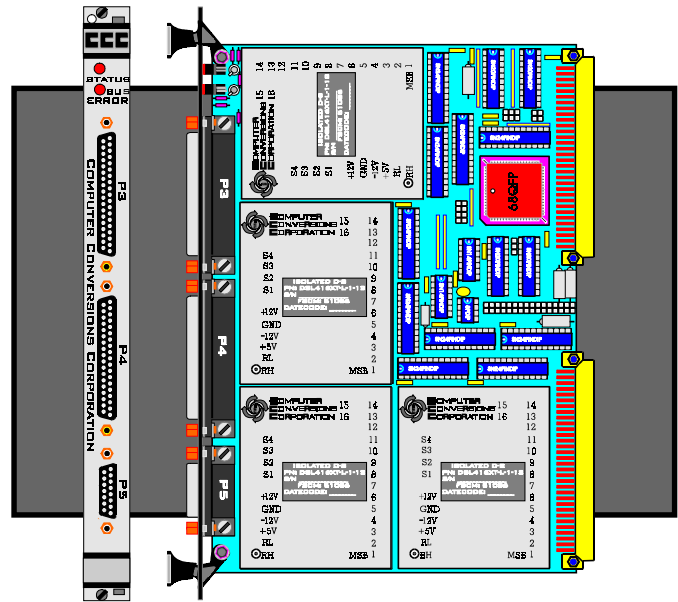
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VB SERIES SYNCHRO-RESOLVER-ENCODER VME CARD OVERVIEW

VBR, VBW, VBE, VBB, VBT, VBDT Series Introduction

FEATURES

- Up to 8 Isolated Input Channels/Card
- Synchro, Resolver and LVDT I/O
- Independent Tracking Converters
- Mix-Match upto 8 Converters/Card
- 100% Transformer Isolated I/O units
- Loop-Back Testing Cards Available
- Self-Test Models w/Continuous Flt.
- Proven "Industry Std. Converters"
- Reliable Register Based "LSI" Logic
- Quadrature Incremental Encoder
- Outputs for Motion Controllers' Input
- On-Board Reference Supplies
- Absolute Multi-Speed/Multiturn I/O



Overview

The "VB Series" products line contains VME compatible synchro/resolver converters and absolute encoder systems. These particular cards are ideal for any rotary motion and related process, control, or simulator type application with any VME compatible system.

The **VB Series** provide up to **eight channels** of resolver or synchro conversion on a single-width, standard 6U height VME card.

The **VBE Series** Resolver/Encoder systems feature up to 6 axis of shaft angle position encoding with a choice of single or multiturn resolvers used as the sensor inputs.

CCC's full line of "Industry Standard" Synchro/Resolver converters, and Absolute Encoder products, are used to populate standard multi-function VME decoder cards. Differing converters may be mixed to minimize real estate for a particular application.

Both **industrial and military grade** (extended) temperature range versions are available, with forced air or conduction cooled models having thermal layers and expansion wedge style card locks. Accuracy applies over the operating temperature range, and 883 level B/38510 parts/processing is available on all units.

Transformer isolation is offered for all inputs and outputs, eliminating concerns for ground loops, differing potentials and high voltage field transients affecting the card itself and the VME Bus backplane.

All input cards feature Built-In Fault Detect, Self-Test command angle is optional, and models with True Wrap Around Test (VBT's).

Maximum versatility has been employed on all "VB" products to assure universal compatibility in addressing, timing, system, and microcomputer independence.

All VB Series converter cards are configured as **A24:D16 DTB Slaves**. They will respond to address modifier codes "3D" or 39 for standard addressing, and "2D" or "29" when selected for short I/O type addressing.

The VME interface is a very straight-forward register based design; simply address the channel and read or write the data.

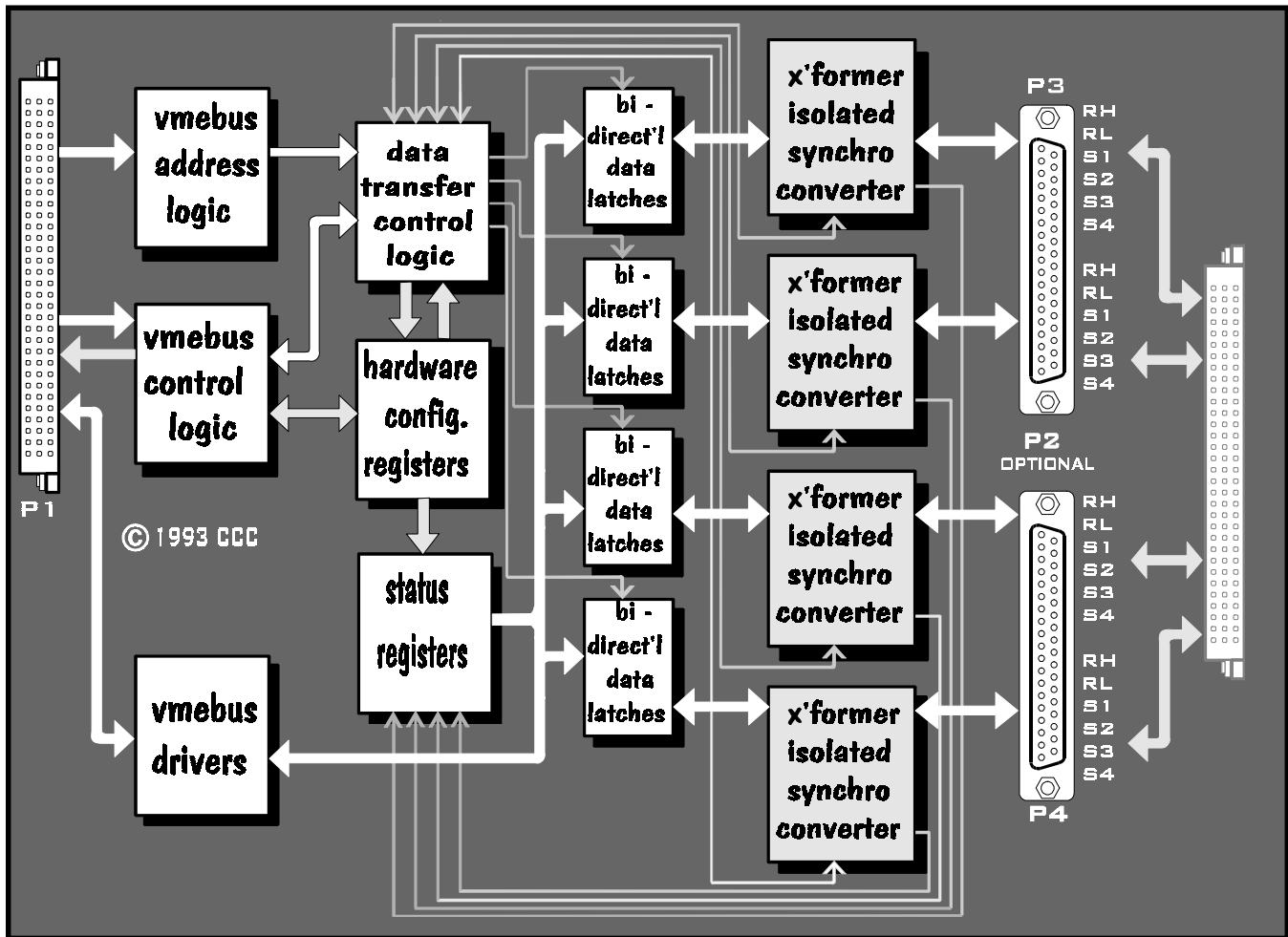
Status registers are used to provide card configuration data, and on a per channel basis, to provide channel config. and fault status.

The high speed register based interface allows these cards to operate reliably in any software environment, with uninhibited **Real-Time** performance.

Buffered latches are provided on all data lines to assure stable read and write cycles as commanded by the host. Address and control lines feature single point terminations to minimize any loading of the backplane. All signal output converters are provided with **inherent read-back** ability.

BUS CONVERTER SELECTIONS:

- Synchro/Resolver to Digital
- Absolute Encoder/Resolver Systems
- Digital to Synchro/Resolver
- Multispeed & Multiturn Converters
- Multifunction Dynamic Rotators
- DC Sine/Cos. Vector Generators
- 2 & 3 Wire LVDT/RVDT to Digital
- Digital to LVDT/RVDT Simulators
- Active CDX Control Differentials
- Active CT Control Transformers
- Active Incremental Outputs & Ref.
- Isolated D-A,s and Tracking A-D's
- Built-In Fault Detect, Forced-Test and True Isolated Wrap-Around Test.
- Programmable Reference Supplies



No external Power Supplies are required, every card is available as powered with standard ± 12 and $+5V$ VME Bus standard supplies.

Power source jumpers are provided to select the $\pm 12VDC$ power input source, via the external connector port, or the VME BUS P1 backplane.

CCC's VB cards include two 25 pin polarized "D" style subminiature connectors on the **front panel** for all external I/O, **and/or the P2** connector I/O is available as an option.

The availability of Self-Test Command Angle options (-WS), and True Wrap-Around loop back-test boards (VBT and VBTD Series), allow the user to configure automatic self test and simulation type programs at any level.

Because the VB Series uses **proven, and reliable "whole" converter products**, coupled with the use of leading edge LSI interface technology, the VB Series cards offer quick availability, **competitive pricing and the best density** verses performance ratio available in the marketplace.

VBR,VBW,VBE, & VBB SERIES ADDRESS MAP

HEX Select	Address Bits				Converter Function	Chan
	A4	A3	A2	A1		
00h	0	0	0	0	Read/Write Chan.	0
02h	0	0	0	1		1
04h	0	0	1	0		2
06h	0	0	1	1		3
08h	0	1	0	0	Read-Back Chan.	0
0Ah	0	1	0	1		1
0Ch	0	1	1	0		2
0Eh	0	1	1	1		3
10h	1	0	0	0	*Read Status Chan.	0
12h	1	0	0	1		1
14h	1	0	1	0		2
16h	1	0	1	1		3

*-WS Units, Write Command Self-Test Angle



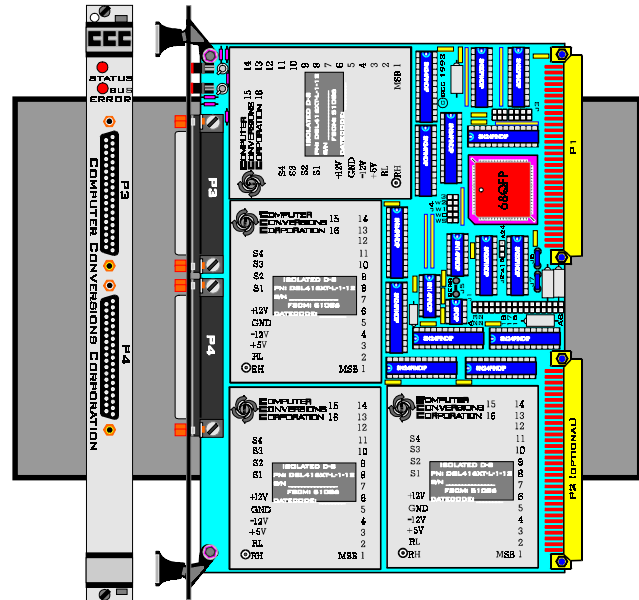
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VBW SERIES VME BUS TO SYNCHRO, RESOLVER OR DC SIN/COS OUTPUT CARDS

FEATURES

- Simulates Synchros and Resolvers
- DC Sine Cosine Models Available
- Transformer Isolated I/O
- Choice of 12 to 18 Bit Resolution
- Up to 4 Channels Per VME Card
- No External Power Supplies Required
- Mil Temp. and 883ER/38510 Available
- Fast 5 USec. Throughout (With Settling)
- Inherent Readback Access



DESCRIPTION

The **VBW Series** are complete VME Bus to Synchro and Resolver output converters used for *self-test, simulation and control*, in military and industrial applications.

The VBW card is populated with digital to: synchro, resolver, or DC sine/cosine converters mixed as specified for the application.

The converters are *continuously updating*, allowing the speed response to be dictated by the software, clock and the CPU.

All of these synchro and resolver converters feature virtually *indestructible short-circuit proof outputs*, over-voltage and transient protection, *internal heat sinks*, current limiting, and *automatic thermal cutoff*.

Complete *transformer isolation* is offered for all reference inputs and signal outputs to *eliminate ground loops*, differing potentials, and to *keep any high voltage transients from affecting the VME bus backplane*.

Both *low cost* "DSL/DRL Series", and "DSP Series" *reference powered converters* are offered to *drive on-board loads of up to 5VA*, and external "booster amplifiers" are available to drive *loads up to 300VA*.

VME BUS

The VBW series consists of up to **4 channels** digital of synchro or resolver converters in a *single slot width*, 6U size, standard VME Bus module. Only the DSP Converters require a double width slot because of their .82" height modules.

Configured as a **A24:D16 DTB Slave**, these cards will respond to address modifier codes "3D or 39" for standard addressing, and "2D or 29" when selected for short I/O type addressing. The D00 through D15 data lines are used for the command input, whereby D15 represents the most significant bit.

FUNCTIONS

- Digital to Synchro/Resolver Converters
- Digital Vector Generators (DC Sine/Cos)
- Solid State Control Transformers
- Dual Channel Synchro Amplifiers
- Isolated Digital to Analog
- Mix/Match w/ S-D & R-D's On-Board
- Control Differential Transformers
- Reference Powered D-S Converters

Applications

- Fire Control Systems
- Aircraft Simulators & Trainers
- Naval Trainers
- Navigational Tools & GPS Systems
- Gyro & Wind Speed Simulation
- Test Stands & Instrumentation
- Automated Test Equipment

VBW cards are provided with *inherent Read-Back* functionality, and *Loop-Back/Wrap-around testing* features can be provided as an option (see VBT Series, data sheet).

Because the DSL/DRL series converters are offered with **VME Bus standard +12V and +5VDC supplies**, and the DSP series are completely **"Reference Powered" units**, *No external power supplies are required*.

These features make the VBW VDSL Series the *highest performance*, easiest to use and *most accurate complete units available* in the marketplace.

DSL/DRL TYPE

The DSL/DRL converters are **highly reliable**, **very low cost**, digital to synchro/resolver converters that are powered from $\pm 15\text{VDC}$ or **Bus-powered $\pm 12\text{volt}$ supplies**. The DC supply source may be field **selected as sourced by an external input or, powered from the VME Bus backplane**.

Frequencies of 400Hz and higher require **no external components**, and two different types of output transformers are offered for the 60Hz units.

The internal; reference and signal transformers, rugged power amplifiers, and **large internal heat sinks**, provide complete output drive with the best density verses heat dissipation per square inch, available for DC powered converters in the marketplace.

DSP TYPE

The DSP converters **derive the output power from the reference (RH, RL) input**, and require **No ± 15 or $\pm 12\text{VDC}$ supplies**. This series features a **very efficient, internal pulsating power supply**, that converts the reference input into a high-power, angle-weighted synchro output format.

Because these units convert the AC reference input directly into AC modified outputs; they are more like a translator than amplifier, they effectively **transfer the AC power rather than amplify** DC sources. This allows the DSP series converters the inherent ability to provide

superior efficiency and 2-3 times better thermal heat dissipation over DC powered units, in addition to the ability to provide high voltage 60 Hz. signals direct, without any external transformers. 400Hz DSP units **drive up to a full 4.5VA load**, and **60Hz units** drive a full 1.5VA load **direct without requiring external output transformers**.

Synchro/Resolver **active Control Transformers**, active Control **Differentials**, units with **Isolated D-A** (Digital to Analog), or **LVDT/RVDT**, Multispeed Conversion, **Demods' active Vector Generators** etc. can be configured by requesting: "VBW Series Extended Model Selection guide".

DSL/DRL Units; Model Type, Drive/Load Verses Power Supply Load												
DC Power Supplies	+/-15VDC SUPPLIES .External +/-18VMax.						+/-12VDC SUPPLIES .Bus-Powered or Ext.					
	60 Hz. Units			400 Hz. Units			60 Hz. Units			400 Hz. Units		
Model Type	**N	Std.	-3L	Std.	-3L	*-5	**N	Std.	-3L	Std.	-3L	*-5
Drive (VA)	0.02	1.5	2.2	1.5	2.9	5	0.02	1.2	1.7	1.2	2	3.4
90V. Synchro in Kohms		4	2.7	4	2	1.2	5	3.5	5	3	1.78	
11.8V. Syn in ohms				70	36					87	52	
11.8V. Res in ohms				93	48					116	70	
Avg. DC Current (ma.)	120	150		150			150	220		200		
Avg. Peak Current(ma.)	120	330		330			150	485		440		
Foldback (ma.)	120	600		600		2000	180	600		600		2000

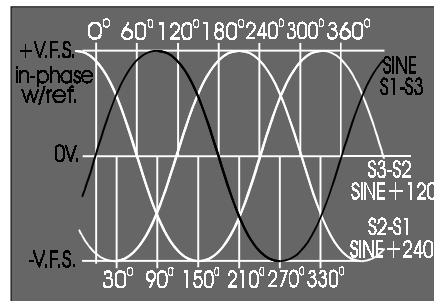
Notes 1)** These units used to power external power amplifiers to upto 300VA., +/-15V units are 7V , +/-12V. units are 6 V.L-L.
 2)* These units require a double slot assembly for module height and Thermal considerations,
 3) All units should have sufficient forced air cooling. Internal Thermal cut-off is at 125C and is automatically restored.
 4) 60 Hz. units require an external transformer shown below, P/N DSC60-15 for +/-15V units, P/N DSC60-12 for +/- 12V. units
 5) The +/- 12 or +/-15VDC Power supplies should feature foldback/current limiting to enable supplies to gradually increase the voltage with the load surge caused during power-on (turn-on short circuit current).Most reasonable supplies (including switchers) feature this.
 6) Both the + and - supplies should power-up simultaneously to minimize turn-on surges (typical of all Class B amp's.) Tracking supplies should be considered where practical.

Standard Synchro Loads		
MIL-STD Class MIL-S-20708	IMPEDENC ZSO	Load VA
26V 08 CT 4c	100 + j490	0.2784
26V 11 CT 4d	21.0 + j132	1.0417
11 CT 4e	838 + j4955	1.6118
15 CT 4b, & c	1600 + j9300	0.8584
15 CT 6b, & c	1170 + j6780	1.1773
18 CT 4b, & c	1420 + j13260	0.6074
18 CT 6b, & d	1730 + j510	4.491
23 CT 4, & a	1460 + j11050	0.7267
23 CT 4b, & c	1950 + j14000	0.573
23 CT 6, & a	1250 + j3980	1.9417
23 CT 6c & d	1350 + j4300	1.7972

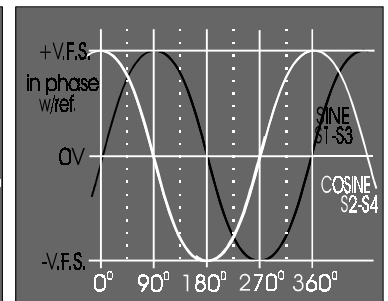
Notes: 1) 6 = 60 Hz., 4 = 400 Hz. units
 2) 26V = 26Vsystem, 11.8V L-L signals else; 115Vsystem, 90V L-L signals typ

Accuracy:

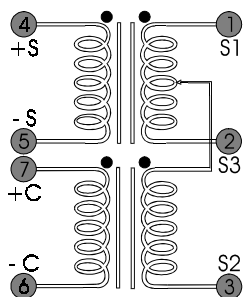
12 bit Units ± 15 arc minutes
 14 bit Units ± 4 arc minutes



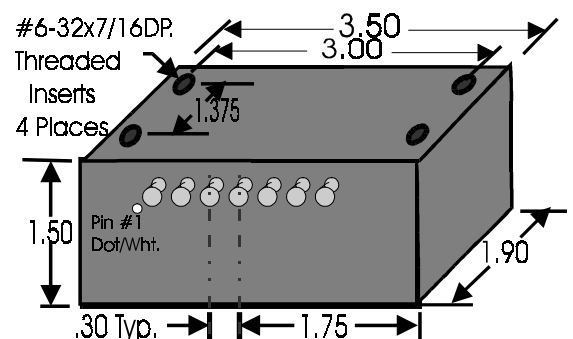
Synchro Format



Resolver Sin/Cos Format

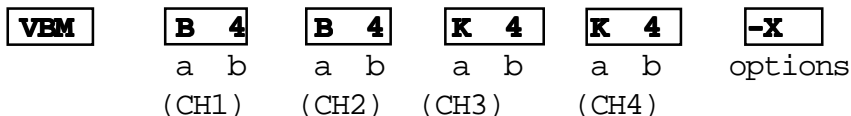


DSC60N, 60 Hz. Transformer
 For DSL 50/60 Hz. units only



MODEL SELECTION GUIDE

ex.



SELECT STYLE CARD

VBW = OUTPUT CARD

VBR = INPUT CARD

VBM = BOTH

VBT = INCLUDES LOOP-BACK TEST BUS

VBD = HIGH DENSITY CARD

VBDT = HD CARD W/LOOP-BACK TEST BUS

-WS models include forced angle self-test

SELECT ONE CONVERTER FOR EACH CHANNEL OR INSERT A #0 (EMPTY SPOT).

- NOTES: 1) VBT CARDS ONLY USE 3 CHANNELS, VBDT CARDS USE ONLY 6 CHANNELS.
2) VBD CARDS SELECT CONVERTER STYLE FOR EACH PAIR OF "INPUT" CONVERTERS.

a) **SELECT CONVERTER RESOLUTION:** b) **SELECT SIGNALS** (INSERT CODE #):

SYNCHRO TO DIGITAL	REFERENCE	SIGNALS	FREQUENCY	CODE
16 = A , 14 = B , 12 = C , 10 = D	26VAC	11.8V.L-L	400Hz.	1
RESOLVER TO DIGITAL	26VAC	11.8V.L-L	2.6KHz.	2
16 = E , 14 = F , 12 = G , 10 = H	26VAC	26V.L-L	400Hz.	3
DIGITAL TO SYNCHRO (DSL)	115VAC	90V.L-L	400Hz.	4
16 = J , 14 = K , 12 = M , 10 = N	115VAC	90V.L-L	60Hz.	5
DIGITAL TO SYNCHRO (DSP)	*115VAC	7V. L-L	400Hz.	6
14 BITS = P	*115VAC	7V. L-L	60Hz.	7
DIGITAL TO RESOLVER	*26VAC	7V. L-L	400Hz.	8
16 = R , 14 = S , 12 = T , 10 = U				

*These converters typically used to drive power amplifiers 6 V.L-L with +/- 12VDC Bus Power.

ALL OTHER CONVERTERS REQUEST EXTENDED SELECTION GUIDE

OPTIONS

- ADD: **X** FOR TRANSFORMER ISOLATED SIGNAL & REFERENCE LINES
3 FOR EXT'D. OPERATING TEMP. -40 to 75 degrees C convection/air cooled
3C FOR EXT'D. OPERATING TEMP. -40 to 75 degrees C conduction cooled
V FOR VELOCITY OUTPUTS
12 FOR ±12V INSTEAD OF ±15V SUPPLIES.
M FOR MULTISPEED UNITS.
P2 FOR P2 I/O VERSES FRONT PANEL, OR B FOR BOTH
883 FOR HIGH RELIABILITY 38510/883 LEVEL B PARTS/PROCESSING
-8 FOR INDEPENDENCE REFERENCES/NOT PAIRED ON VBD MODELS
Q FOR QUADRATURE INCREMENTAL ENCODER OUTPUTS, add Z for marker.
-WS FOR UNITS WITH ON-BOARD SELF-TEST (Input Channels)
-RS FOR WITH REFERENCE SUPPLY, Upto 5VA
-SR FOR WITH MULTIPLE REFERENCE SUPPLIES
 Note: multiple reference supplies avail. 4 channel units can have upto 1 reference supply/channel,
 8 Channel VBD type units can have upto 4 paired reference supply outputs/card, 1VA ea.
-F FOR WITH EXTERNAL FREEZE INPUT CONTROL LINES.

QUALITY NOTE: CCC quality assurance program conforms to MIL-I-45208.

All CCC products manufactured in U.S.A..

All Units Shipped with Printed Test Data, and Certificate of Compliance.

*LVDT/RVDT I/O, SCDX
Differentials, SCT's,
Dynamic Rotators, and
100's of other converter
options avail.*