synchro/resolver to digital converter
VMEbus 16 bit
series VME1683

FEATURES

- **Single or 2-speed inputs**
- **Up to 3 channels**
- **Tracking to 5 RPS**
- **High accuracy**
- **50Hz to 5KHz excitation**
- **Continuous self-test**
- **Reference/signal loss alert**
- **Front panel status LEDs**
- **6U single card slot**
- **VME P1 bus slave**
- **VME backplane powered**

GENERAL DATA

The series VME1683 is a single-slot VMEbus card that incorporates up to three single-speed or two-speed synchro or resolver to digital tracking converters. Two-speed converters can be specified as 1:36 or binary speed ratios of 1:8 to 1:64. The converters employ ratiometric conversion with a Type II servo loop necessary for high-noise immunity and high-speed performance. Single-speed converters feature a “reference synthesizer” required to maintain high accuracies even with large rotor to stator phase shifts or high rotational rates. The two-speed converters automatically compensate for angular displacement between coarse and fine inputs of up to 2.5˚. The coarse and fine inputs are combined into a single unambiguous 16-bit word.

Each converter contains its own diagnostic circuitry. Diagnostics include a loss of reference, loss of coarse signal and loss of fine signal indicators. A built-in-test feature is also incorporated that continuously monitors converter performance. A memory location indicates the status of each reference and stator input plus the performance status of each converter.

ON-BOARD I/O DEVICES AND FUNCTIONS

The VMEbus card contains the following devices and functions:

- — Up to 3 Synchro or Resolver to Digital Converters
- — Fault/Status Register
- — Clear BIT Fault Control
- — Test Register

Synchro or Resolver to Digital Converters

Converters can be specified to accept either single or two-speed synchro or resolver input signals. The converters output a 16-bit word representing the angular position of the synchro or resolver shaft. This word may be read out via the VMEbus at the offset specified in conjunction with the base address of the VME card.

All converter channels continuously monitor the status of reference and stator input signals. Each converter also continuously monitors itself for fault conditions, i.e., excessive error or malfunction. A built-in-test (BIT) output indicates converter fault conditions.

Fault/Status Register

The Fault/Status Register provides a means to obtain access to the fault and status outputs of all three converter channels via a single read operation. This is a word-wide (16-bit) read-only device that is accessed via the VMEbus at the address offset specified in conjunction with the base address of the VME card.

Clear Bit Fault Control

This is a control function, not an I/O device. Due to the transient nature of the BIT outputs of the S-R/D converters, the fault state of each BIT signal is latched on the board. During power-up, the BIT outputs are latched to logic 1. This fault indication should be cleared via the VMEbus by reading or writing at the Clear BIT Fault address offset.

SPECIFICATIONS

Parameter	Value
Resolution	16 bits (0.0055˚)
Accuracy[1]	
Single speed	±1.3 arc minutes (0.022˚)
Two speed	
1:8	±40 arc seconds (0.011˚)
1:16	±32 arc seconds (0.009˚)
1:32, 1:36, 1:64	±24 arc seconds (0.007˚)
Power Supplies[2]	
+12V ±5%	65mA max.
–12V ±5%	45mA max.
+5V ±5%	850mA max.
Reference Inputs[2] [3]	
Voltage	2.5Vrms to 130Vrms
Frequency	47Hz to 5KHz
Impedance	400KΩ single ended 800KΩ differential
Stator Inputs[2] [3]	
Type	Solid state differential Synchro or resolver
Voltage	2.5Vrms to 115rms (L-L)
Impedance	(Voltage x 4.5)KΩ
Dynamic Characteristics	See converter specification
Temperature Ranges	
Operating	0˚ to +70˚C (std) –40˚ to +85˚C (IT)
Storage	–55˚ to +105˚C

NOTES:

1. Accuracy applies for:
   a) +10%, -20% stator amplitude variation.
   b) over specified reference voltage and frequency range.
   c) 10% reference and stator harmonic distortion.
   d) over specified power supply ranges.
   e) over operating temperature ranges.
   f) ±45˚ reference to stator phase shift, single-speed converters.
   g) ±15˚ reference to stator phase shift, two-speed converters.
2. Reference and stator inputs are accessed via a front panel DC37P connector. DC power is provided via VME P1 connector.
3. See ordering Information for specific voltage and frequency ranges.

Test Register

This is a byte addressable word-wide port built from two octal read-back latches. It may be accessed via the VMEbus by reading or writing to the Test Register address offset.

The Test Register is provided as a dual purpose feature. The primary role is as a diagnostic aid used to verify the functionality of the board's VMEbus interface circuitry and local data bus integrity. As a secondary role, the read-back latch capability of the board can be used at power-up to establish a level of confidence in the system's VMEbus.

I/O CONFIGURATION

The VMEbus interface is configured as an A24:D16 slave. All data transfers to and from the board are via the VMEbus P1. The board monitors all Address Modifiers (AM5-AM0) and may be accessed via any of the following standard (A24) addressing modes:

- Standard supervisory program access (3E)
- Standard supervisory data access (3D)
- Standard non-privileged program access (3A)
- Standard non-privileged data access (39)

The interface does not implement interrupt functions but will only transfer data if IACK* is HIGH. The interrupt daisy chain is jumpered on board. After DSO* or DS1* goes low, DTACK* will be driven LOW within 6 cycles of SYSCLK unless the converter is busy. Once the converter busy interval is complete, the DTACK* will be driven LOW.

Base Address Selection

The VMEbus board base address is derived by partially decoding the VMEbus A24 address bus. Only the upper eight lines (A23-A16) are monitored during VMEbus cycles. The board may be configured to respond to any one of 256 possible base addresses using the on board 8-position base address dip switch. This corresponds to the following VMEbus standard mode address range:

00xxxx hex to FFxxxx hex

Note: x = Don't care

Each of the eight address select switches on the board corresponds to each of the eight monitored address lines as follows:

VMEbus Address	CSI VMEbus Board Base Address Switch
A23	S1-8
A22	S1-7
A21	S1-6
A20	S1-5
A19	S1-4
A18	S1-3
A17	S1-2
A16	S1-1

The base address of the board may be set by placing each switch in the ON or OFF position to specify a particular address. The state of each switch corresponds as follows:

Switch State	Binary Value	Boolean State
ON	0	FALSE
OFF	1	TRUE

Offset Address Selection

Each I/O device on the board may be accessed via a unique VMEbus address. The address for each I/O device is derived from the base address of the board and an address offset value that is unique to each I/O device. The address offset value is combined with the board's base address to generate the VMEbus address used to access a particular I/O device. The typical method used in the combination process begins by setting all "Don't Care" bits in the base address to zero. Next the desired offset value is simply added to the base address. This address is then used to access the I/O device via the VMEbus. The address offset value and access mode for each I/O device located on the CSI VMEbus board is summarized in the Address Offset Table.

ADDRESS OFFSET TABLE

I/O Device or Function	Offset Hex	Data Width	Port Size	Access Type
S-R/D Chan 1	00	16 bit	word	read
S-R/D Chan 2	02	16 bit	word	read
S-R/D Chan 3	04	16 bit	word	read
Clear BIT Fault	06	n/a	word	read
Clear BIT Fault	06	n/a	word	write
Fault/Status	08	16 bit	word	read
Test Register	0A	16 bit	word/	read
	0A	16 bit	byte	write

DATA LINES

The CSI VMEbus card provides 16 data lines configured as a D16 slave. The table below shows the format of the devices on board the VMEbus card.

DATA LINE FORMAT TABLE

Data Line	S-R/D Data	Fault/Status Register
D15	180.000°	Chan 1 LOC
D14	90.000°	Chan 1 LOF
D13	45.000°	Chan 2 LOC
D12	22.500°	Chan 2 LOF
D11	11.250°	Chan 3 LOC
D10	5.625°	Chan 3 LOF
D9	2.813°	Chan 1 LOR
D8	1.406°	Chan 2 LOR
D7	0.703°	Chan 3 LOR
D6	0.352°	Chan 3 BIT
D5	0.176°	Chan 2 BIT
D4	0.088°	Chan 1 BIT
D3	0.044°	not used
D2	0.022°	Chan 1 CB
D1	0.011°	Chan 2 CB
D0	0.006°	Chan 3 CB

NOTE: CB = Converter Busy
BIT = Built-In-Test
LOR = Loss of Reference Input
LOF = Loss of Fine Stator Input
LOC = Loss of Coarse Stator Input

CB "0" = data valid
"1" = converter busy
BIT "0" = normal operation
"1" = excessive error or malfunction
LOR "0" = reference ON
"1" = reference OFF
LOF "0" = fine stator input connected
"1" = fine stator input disconnected
LOC "0" = coarse stator input connected
"1" = coarse stator input disconnected

SYNCHRO/RESOLVER INPUT CONNECTOR — J1

Pin #	Ident
1	Chan 3 Ref Lo
2	Chan 3 Coarse S4
3	Chan 3 Coarse S2
4	Chan 3 Fine S4
5	Chan 3 Fine S2
6	n/c
7	n/c
8	Chan 2 Ref Lo
9	Chan 2 Coarse S4
10	Chan 2 Coarse S2
11	Chan 2 Fine S4
12	Chan 2 Fine S2
13	n/c
14	n/c
15	Chan 1 Ref Hi
16	Chan 1 Coarse S3
17	Chan 1 Coarse S1
18	Chan 1 Fine S3
19	Chan 1 Fine S1
20	Chan 3 Ref Hi
21	Chan 3 Coarse S3
22	Chan 3 Coarse S1
23	Chan 3 Fine S3
24	Chan 3 Fine S1
25	n/c
26	n/c
27	Chan 2 Ref Hi
28	Chan 2 Coarse S3
29	Chan 2 Coarse S1
30	Chan 2 Fine S3
31	Chan 2 Fine S1
32	n/c
33	Chan 1 Ref Lo
34	Chan 1 Coarse S4
35	Chan 1 Coarse S2
36	Chan 1 Fine S4
37	Chan 1 Fine S2

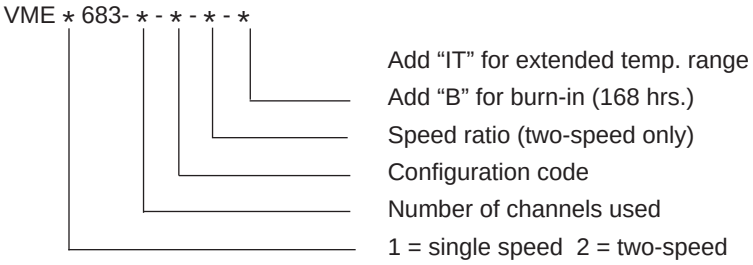
ORDERING INFORMATION

CONFIGURATION TABLE				
Code	Input Type	Reference Input	Frequency Range	Stator Input
01	Synchro	26V	360-3000Hz	11.8V
02	Synchro	115V	360-3000Hz	90.0V
03	Synchro	115V	47-3000Hz	90.0V
04	Resolver	26V	360-3000Hz	11.8V

NOTES:

1. This is only a partial listing of configurations available.
2. Models may be supplied with a mix of converters, i.e., synchro and resolver, single and two-speed, various speed ratios and various frequency ranges.
3. The CSI VME1683 uses the 168H300 single-speed converter and the CSI VME2683 uses the 168T600 two-speed converter. Refer to those data sheets for additional specific information.
4. Part numbering designation system shown below may be used only when all converters on a board are identical.
5. Consult factory for non-standard or special requirements.

PART NUMBER DESIGNATION



WARRANTY

All units warranted against defects in materials and workmanship for 1 year from date of shipment. Liability is expressly limited to servicing, adjusting, or replacing any CSI product returned to our factory with delivery charges prepaid. In no case shall our liability exceed the original purchase price.