MANUFACTURER DOCUMENT PACKAGE

Manufacturer's Manual

Reference package for procurement and maintenance review

GENERAL ELECTRIC

IS200TBTCH1CBB

THERMOCOUPLE INPUT TERMINAL BOARD

Used with the applicable Mark VIe TBTC Thermocouples configuration.

REFERENCE PACKAGE

OFFICIAL DOCUMENT

Selected official manufacturer pages follow this cover.

Source: Original GEH-6721G TBTC thermocouple section, H1C simplex variant

Fault	Fault Description	Possible Cause
317	Controller pid [ ], exch [ ] minor sig mismatch, IONet [ ]	I/O pack outputs exchange received with minor signature different than expected
318	Controller pid [ ], exch [ ] cfg timestamp mismatch, IO-Net [ ]	I/O pack outputs exchange received with configuration timestamp different than expected
335	Code Segment CRC mismatch	Process Code Segment CRC mismatch
338	I/O pack Mapper SSI signals are not being updated	I/O pack SSI data is not being updated
339	I/O pack App SSO signals are not being received	I/O pack SSO data is not being updated
340	I/O pack Mapper static data structure CRC mismatch	Mapper static data CRC does not match
341	I/O pack Mapper I/O compatibility code mismatch	I/O pack mapper I/O Compat does not match firmware
342	I/O pack App compatibility code mismatch	I/O pack App I/O Compat does not match firmware
343	I/O pack App BOPLIB static data CRC mismatch	I/O pack application data structure CRC changed
344	I/O pack process code segment CRC mismatch	I/O pack process - code seg CRC bad
345	I/O pack App static config data CRC mismatch	I/O pack application data structure CRC changed
351	I/O pack App Periodic thread [ ] timing overrun	An I/O pack application thread over/under run
353	Sys Config Shmem CRC mismatch	Config Shmem CRC changed

TBTC Thermocouple Input

Functional Description

The Thermocouple Input (TBTC) terminal board accepts 24-type E, J, K, S, or T thermocouple inputs. It accepts additional B, N and R types of thermocouple inputs only when used with PTCCH2 in Mark VIe. These inputs are wired to two barrier-type blocks on the terminal board. TBTC communicates with the I/O processor through DC-type connectors. Two types of the TBTC are available, as follows:

- TBTCH1C for simplex applications has two DC-type connectors.
- TBTCH1B for TMR applications has six DC-type connectors.

Mark VI Systems

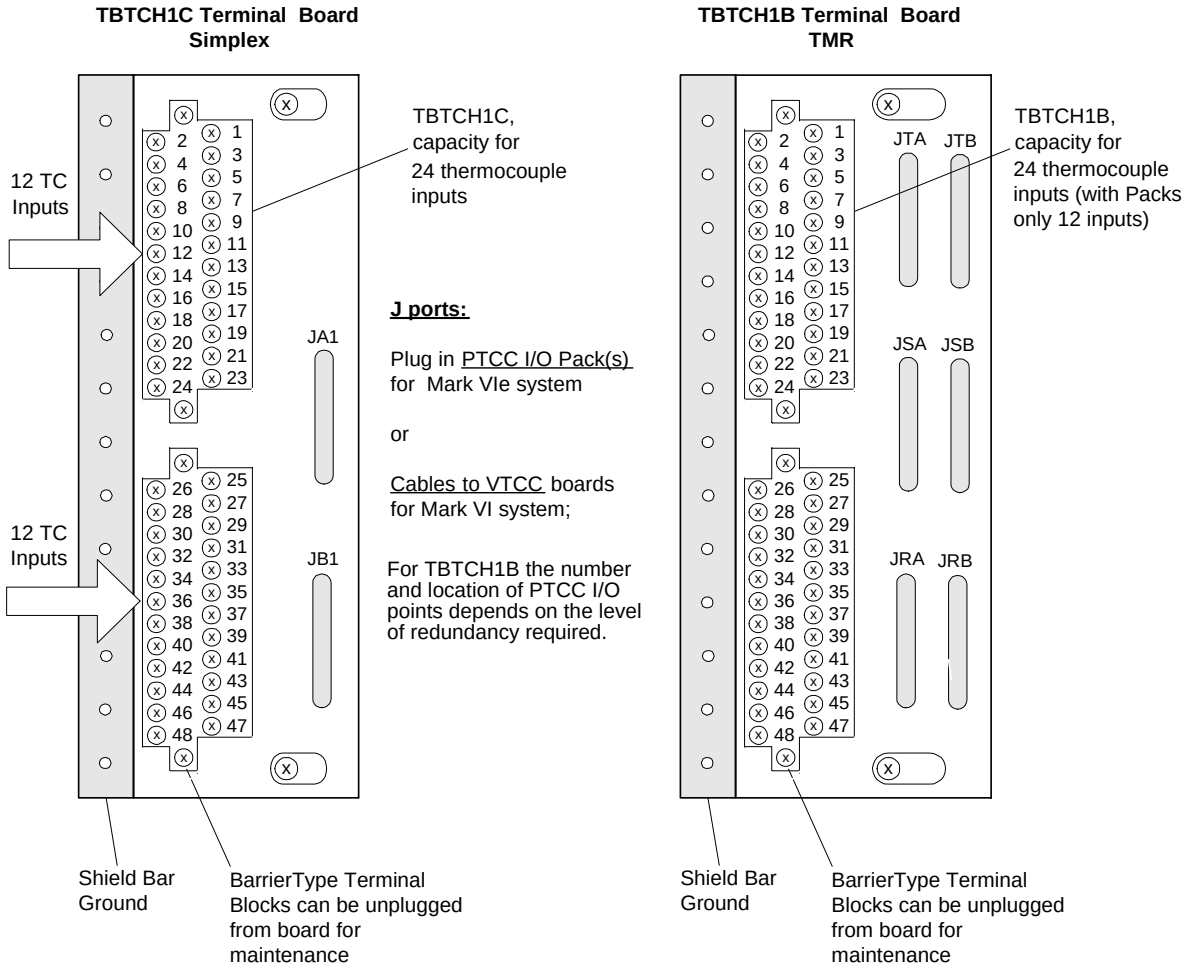
In the Mark VI system, TBTC works with the VTCC processor and supports simplex and TMR applications. One TBTCH1C connects to the VTCC with two cables. In TMR systems, TBTCH1B connects to three VTCC boards with six cables.

Mark VIe Systems

In the Mark VIe system, TBTC works with the PTCC I/O pack and supports simplex, dual, and TMR applications. In simplex systems, two PTCC packs plug into the TBTCH1C for a total of 24 inputs. With the TBTCH1B, one, two, or three PTCC packs can be connected, supporting a variety of system configurations.

- Simplex pack – 12 inputs
- Simplex packs – 24 inputs
- TMR packs – 12 inputs

The Thermocouple Input (TBTC) terminal board accepts 24-type E, J, K, S, or T thermocouple inputs for PTCCH1 pack and 24-type E, J, K, S,T,B,N or R thermocouple inputs for PTCCH2 pack.



Thermocouple Terminal Board, I/O Processor, and Cabling

Installation

Connect the thermocouple wires directly to the two I/O terminal blocks. These removable blocks are mounted on the terminal board and held down with two screws. Each block has 24 terminals accepting up to #12 AWG wires. A shield terminal strip attached to chassis ground is located on the left side of each terminal block.

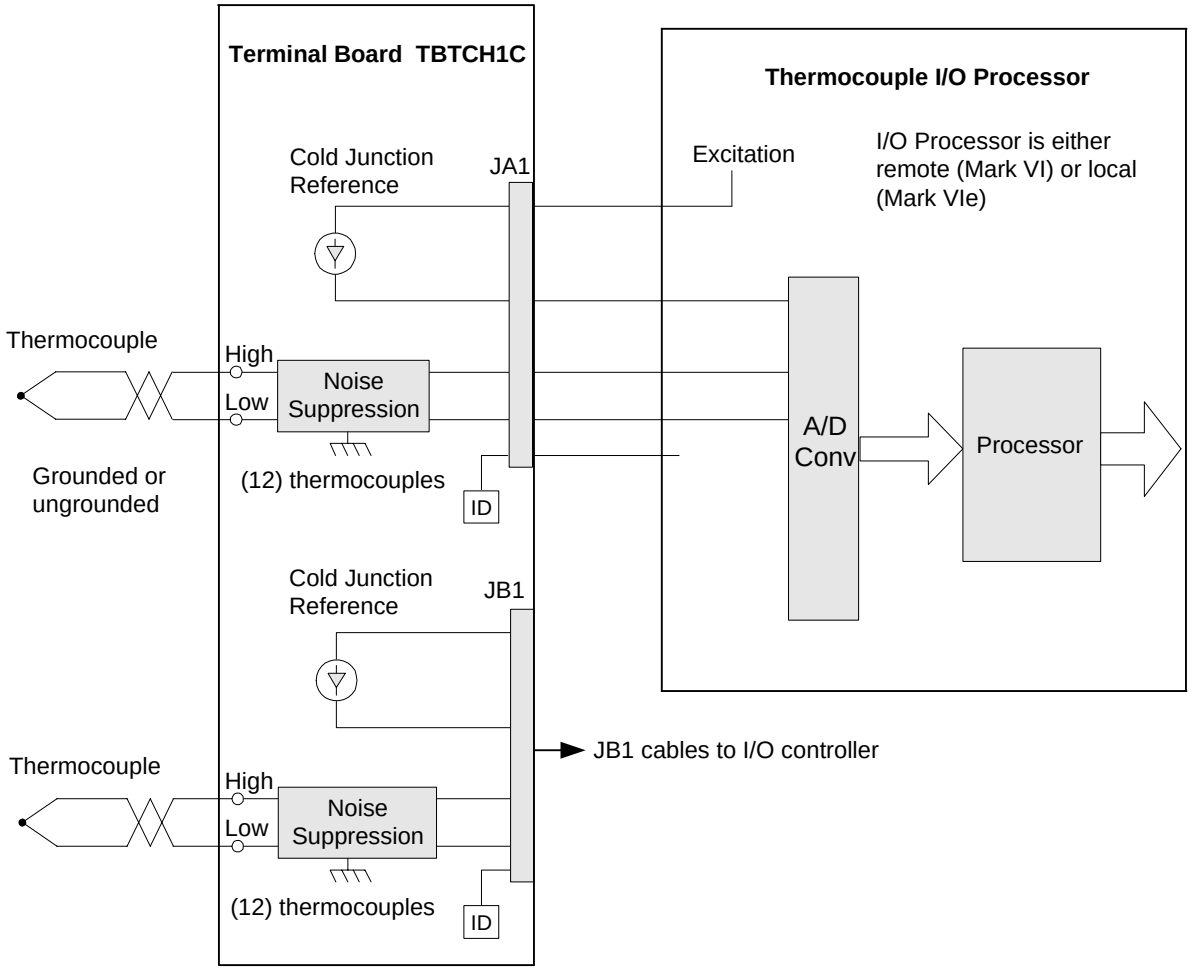
In Mark VI systems, cable the TBTC J-type connectors to the I/O processors in the VME rack.

In Mark VIe systems, plug the I/O packs directly into the TBTC J-type connectors. The number of cables or I/O packs depends on the level of redundancy required.

Operation

The 24 thermocouple inputs can be grounded or ungrounded. They can be located up to 300 m (984 ft) from the turbine control panel with a maximum two-way cable resistance of 450 Ω. TBTC features high-frequency noise suppression and two CJ reference devices, as shown in following figure. The I/O processor performs the analog-to-digital conversion and the linearization for individual thermocouple types.

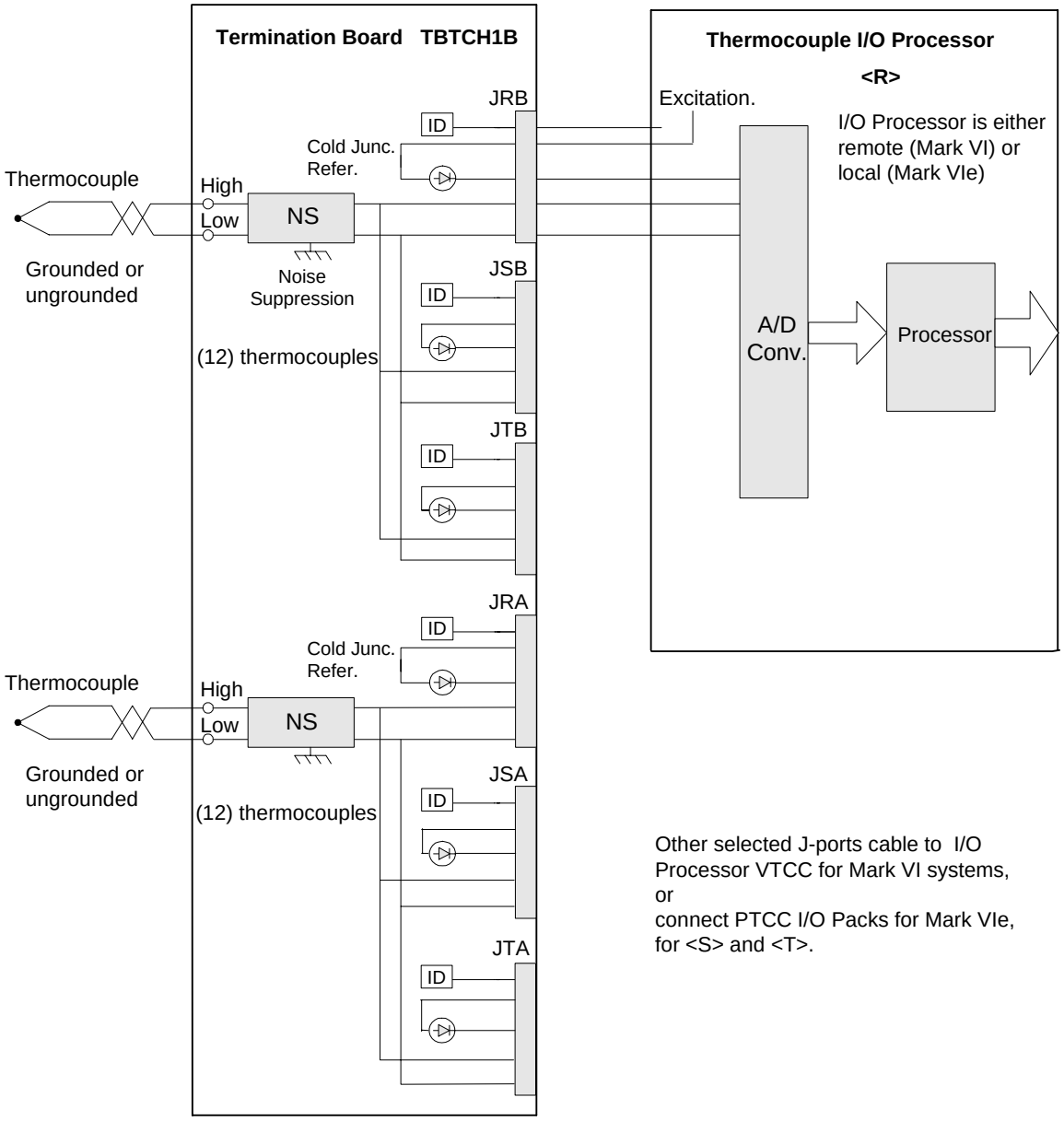
In Mark VI simplex systems using TBTCH1C, one VTCC is used. In Mark VIe simplex systems, two PTCC packs plug into TBTC, obtaining 24 thermocouple inputs.



Thermocouple Inputs and I/O Processor, Simplex

For TMR systems using TBTCH1B, the thermocouple signals fan out to three J-connectors. The Mark VI system accommodates 24 inputs and the Mark VIe system accommodates 12 inputs.

The TBTC terminal board supports all thermocouple spans documented for the associated thermocouple I/O processor.



Thermocouple Inputs and I/O Processor, TMR systems

Thermocouple Limits

TBTC with PTCCH1 or VTCC

Thermocouple inputs support a full-scale input range of -8.0 mV to + 45.0 mV. The following table shows typical input voltages for different thermocouple types versus the minimum and maximum temperature range. The CJ temperature is assumed to range from -30 to 65°C (-22 to +149 °F).

Thermocouple Type PTCCH1	E	J	K	S	T
Low range, °F	-60	-60	-60	0	-60
°C	-51	-51	-51	-17.78	-51
mV at low range with reference at 70°C (158 °F)	-7.174	-6.132	-4.779	-0.524	-4.764
High range, °F	1100	1400	2000	3200	750
°C	593	760	1093	1760	399
mV at high range with reference at 0°C (32 °F)	44.547	42.922	44.856	18.612	20.801

TBTC with PTCCH2

Thermocouple inputs support a full-scale input range of -20.0 mV to + 95.0 mV. The following table shows typical input voltages for different thermocouple types versus the minimum and maximum temperature range. The CJ temperature is assumed to range from -30 to 65°C (-22 to +149 °F).

Thermocouple Type PTCCH2	E	J	K	S	T
Low range, °F	-60	-60	-60	0	-60
°C	-51	-51	-51	-17.78	-51
mV at low range with reference at 70°C (158 °F)	-7.174	-6.132	-4.779	-0.524	-4.764
High range, °F	1832	2192	2372	3200	752
°C	1000	1200	1300	1760	400
mV at high range with reference at 0°C (32 °F)	76.373	69.553	52.41	18.612	20.869

Thermocouple Type PTCCH2	B	N	R
Low range, °F	32	-60	0
°C	0	-51	-17.78
mV at low range with reference at 70°C (158 °F)	-0.0114	-3.195	-0.512
High range, °F	3272	2282	3092
°C	1800	1250	1700
mV at high range with reference at 0°C (32 °F)	13.593	45.694	20.220