

Ectron
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TECHNICAL NOTES

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GPIB REMOTE PROGRAMMING OPTION 02 ECTRON MODEL 1120 THERMOCOUPLE SIMULATOR/CALIBRATOR

IEEE Standard 488-1978

General Purpose Interface Bus (GPIB)—Overview

The GPIB is an interface specification for a common intercommunication mechanism allowing different manufacturers to build instruments and peripherals which will communicate in a standard method. The IEEE Standard 488-1978 "Digital Interface for Programmable Instrumentation", defines the mechanical, electrical, and functional specifications of the GPIB in device and system independent terms.

Communication over the GPIB is on a party-line bus structure. Sixteen signal lines comprise the complete bus structure, with eight lines for the data bus and eight lines for byte transfer and bus management. Data is transferred by a three line, interlocked handshake. This method allows devices with different data acceptance or response rates to co-exist on the same bus and participate in common data transfers.

There are ten interface functions specified by the IEEE 488 Standard. Not all devices need to have all functions, and some may only have partial subsets. The interface functions supported by the ECTRON GPIB interface are: SH1, AH1, T5, L3, SR1, RL1, PP1, DC1, and DT1. These functions allow the Model 1120 to be addressed and send data as a Talker, to be addressed and receive data as a Listener, to perform a Service Request, to be in Remote or Local state, to respond to a Parallel Poll, to be Cleared into an initialized state, and to be Triggered for concurrent execution. The ECTRON Talker and Listener address is selected by a five station DIP switch on the interface board.

The ECTRON GPIB interface allows full remote programming of the instrument, with support of all interface functions needed for convenient and flexible operation.

Remote Programming

GPIB Remote Programming of the ECTRON Model 1120 is accomplished by sending the 1120 a command string which represents keystrokes as would be entered through the front panel.

Table 1 shows the relationship between the keyboard key codes and the character used for the corresponding function in the remote mode. The +/-

key on the keyboard causes the sign of the numeric value in the display to toggle. In remote programming, the sign is sent along with the numeric information. The numeric sign remains in the previous state unless programmed different with the new command. Similarly, for CU/ALY, instead of a toggle function, a U or A is sent to denote CU or ALY. The CU/ALY state remains in the previous state unless programmed different with the new command. The front panel operation of depressing RCL and EXECUTE to display the output setting is not supported in the remote mode. For example:

To change the output to 4.5810 millivolts copper;

- (a) Unlisten Command
- (b) Address ECTRON 1120 as a Listener
- (c) Send, 4.581 MUZ.

To store the output state into register five;

- (a) Unlisten Command
- (b) Address ECTRON 1120 as a Listener
- (c) Send, YOX5

Serial Poll

When an error condition exists in the Model 1120, a Service Request will be generated and the 1120 will respond with a Request Service Message during a subsequent serial poll if enabled. Along with the Request Service Message the 1120 sends a status byte on the low order three data lines during a serial poll. The controller can thus determine the error state of the 1120 by conducting the serial poll. The Request Service Message and Error Status Byte are cleared after a serial poll. The 1120 will not be removed from the error state until a Clear Command, a "W", is sent over the interface. The Request Service Message and Error Status Byte are also cleared by a Clear Command in case a Parallel Poll is used.

Parallel Poll

The 1120 will respond to a Parallel Poll to request service if Configured and Enabled for a Parallel Poll by the System Controller. The Parallel Poll Enable (PPE) Message tells the 1120 which data line to respond with during the Parallel Poll. The S bit in the PPE Message must be a "1" in order for the 1120 to respond to a Parallel Poll. During an error condition (Parallel Poll Flag is a "1") the 1120 will pull the GPIB data line low indicated by the PPE Message provided

the S bit is a "1". The 1120 will respond with an error condition during a Parallel Poll until the Clear Command, a "W", is sent to the 1120 over the interface, clearing the Parallel Poll Flag.

Talker

When addressed as a Talker, the 1120 will respond with the current error condition. If no error condition is present the 1120 will send an "E0" over the interface. If an error condition does exist, the 1120 will send either E1, E2, E3, or E4, depending on the error condition. The conditions for these messages are listed in Table 2. The error response will be cleared to an "E0" when a Clear Command, "W", is sent to the 1120 over the interface. A Line Feed character with the EOI line pulled low terminates each talker response.

Remote/Local

The 1120 enters the Remote State when the REN line is pulled low and the 1120 is addressed as a

listener. In the Remote State the 1120 keyboard is locked out. Raising the REN line or sending the Go To Local addressed command when addressed as a Listener causes the 1120 to enter the Local State. (Unless the 1120 is in an error condition where a Clear Command, "W", must be sent first.) In the Local State the front panel keyboard is functional and the GPIB interface will receive messages from the bus but will not respond to them.

Device Clear

A power-on initialization sequence is performed when the 1120 receives the Device Clear universal GPIB command or the Selected Device Clear addressed GPIB command when addressed as a Listener.

Device Trigger

An execute command is performed when the 1120 receives the Group Execute Trigger addressed command when addressed as a Listener.

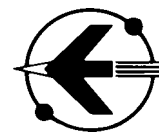
TABLE 1

KEYBOARD KEY CODE	REMOTE PROGRAMMING CHARACTER
0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
.	.
+	+
-	-
C	C
F	F
mV	M
V	V
CU	U
ALY	A
STO	X
RCL	Y
CLR	W
EXECUTE	Z
E	E
J	J
K	K
T	T
S	S
R	R
B	B
*	*

TABLE 2

ERROR CODE	CONDITION
E0	NO ERROR.
E1	ERROR 1 if the temperature selected is beyond the specification for the selected thermocouple type.
E2	ERROR 2 if the selected voltage is beyond the specified voltage range (± 11 volts).
E3	ERROR 3 if a thermocouple type has been selected and that thermocouple module is not present in the instrument.
E4	ERROR 4 if the reference junction temperature is beyond the range of the selected thermocouple type.

* Allocated for an additional thermocouple type. May be any type for which a full polynomial equation or emf vs temperature data is available. Currently available T/C types include:
 "C" Tungsten 5% Rhenium/Tungsten 26% Rhenium
 "N" Nicrosil/Nicil



Ectron[®]
CORPORATION

8159 ENGINEER ROAD
 SAN DIEGO, CA 92111
 (858) 278-0600