

SECTION I
INTRODUCTION

1.1 PURPOSE OF MANUAL

The purpose of this manual is to present information required for understanding the functions, the electrical and mechanical characteristics, and the basic principles of operation of the Model 60A Dual Channel Input Register.

1.2 APPLICATION

The Model 60A is a general purpose TTL level input register which may be used in applications requiring outputs from a digital data source to be entered into a Camac system.

1.3 GENERAL DESCRIPTION

The Model 60A is a single width Camac Module which conforms with IEEE standard 583-1975. The module accepts up to 48 bits of data in two independent 24 bit channels via its two front panel connectors. Also included in the connectors are a Data Strobe input and a Data Received output for each channel. These signals permit the module to engage in a handshake method of data entry. The module has LAM generation capability which may be used to initiate an interrupt on entry of data. Four data entry modes are provided which can be selected by Dataway Command to a two bit control register, common to both channels. These modes are as follows:

- A. Load data from the external source continuously. An external Data Strobe may be used, however, data entry is not controlled by the Strobe; the module's storage registers continuously follow the input data. The Data Received output is set by the leading edge of the external Data Strobe signal (if used) and remains set until cleared. No LAM is generated in this mode.
- B. Load data from the external source under control of the external Data Strobe. Data is latched in the module's storage registers on receipt of the strobe and the Data Received output is set. No LAM is generated in this mode.
- C. Same as Mode A, except that the LAM status register is set on receipt of a Data Strobe signal. Dataway L will be asserted if the LAM is enabled.
- D. Same as Mode B, except that the LAM status register is set on receipt of a Data Strobe signal. Additional data cannot be entered until the LAM status register is cleared. Dataway L will be asserted if the LAM is enabled.

An additional data entry mode is provided in which a Dataway command for each channel generates an internal data strobe. Data from the external source is latched in the module's storage registers on execution of the command. The Data Received output is not set in response to the internally generated data strobe but the LAM status register is activated.

Separate Read, and Read and Clear commands for each channel are provided to transfer data from the module's storage registers to the Dataway Read lines. These commands also clear the Data Received signal and the LAM status register (if applicable to the mode used). During the time data is being read by the module, the storage registers are staticized to assure reading of stable data in the event that input data should change during a read operation while in the continuous load mode. The Data Strobe is inhibited when the module is addressed on its N line, preventing the Data Received output from being set during Read operations when the storage registers are staticized and thus not able to accept data. Additionally, Dataway Inhibit (I) when asserted inhibits the external Data Strobe.

The LAM structure, in addition to a LAM status register for each channel, includes an Enable/Disable LAM register which can be set by appropriate Dataway commands. A Test LAM command generates a Q response if a LAM status register is set and enabled. A Clear Lam command resets both the LAM status register and the Data Received signal.

The two bit control register, loaded from Write lines W1 and W2 by an overwrite command, selects the desired data entry mode. The state of the control register can be read back on command.

Dataway X is asserted by all properly executed commands. An X interlock feature is provided in each input connector to prevent operation if the cable connector is not installed in the module. In this case the operation will not produce an X response, thus alerting the system to the missing connector. The X interlock does not apply to commands to write into or read from the Control Register. Dataway Q=1 is generated for all Read and Write commands and conditionally on the result of a Test LAM command.

SECTION II
SPECIFICATIONS

2.1 GENERAL

2.1.1 NUMBER OF CHANNELS 2

2.1.2 NUMBER OF DATA BITS (per channel) 24

2.2 SIGNAL LEVELS

2.2.1 INPUTS (Data and Data Strobe)
Logic 0 +2.0 to +5.5V
Logic 1 0 to +0.8V

2.2.2 OUTPUTS (Data Received)
Logic 0 +2.0 to +5.5V
Logic 1 0 to +0.8V

2.3 FRONT PANEL

2.3.1 INDICATORS
N Illuminated when module is addressed. Indicator is "stretched" so that short duration activation is visible.

2.3.2 CONNECTORS
Channel 0 and Channel 1 Cannon 2BA31P

2.4 DATAWAY COMMANDS AND COMMON CONTROLS

2.4.1 COMMANDS

N·F(0) A(0)	Read channel 0 data register. Generate Q=1
N·F(0) A(3)	Read control register state, Generate Q=1
N·F(2) A(0)	Read and clear channel 0 data register. Generate Q=1
N·F(8) A(0)	Test channel 0 LAM request. Generate Q=1 if request is asserted.
N·F(10) A(0)	Clear channel 0 LAM status register.
N·F(16) A(0)	Overwrite Control Register with states of W1 and W2.
N·F(24) A(0)	Disable channel 0 LAM request.
N·F(26) A(0)	Enable channel 0 LAM request.
N·F(28) A(0)	Enter data into channel 0 data register Set channel 0 LAM status.

All above commands have equivalents for channel 1 with A(1) substituted for A(0) except those applying to Control Register which is common to both channels

All commands generate X=1

2.4.2 COMMON CONTROLS
Z·S2

I

Clear data, LAM status, and Data Received registers. Set Control Register to Mode A.
Inhibit external Data Strobe.

2.5 CONTROL REGISTER

2.5.1 OVERWRITE-N·F(16) A(0)

W2	W1
0	0
0	1
1	0
1	1

MODE
A
B
C
D

2.5.2 READ-N·F(0) A(3)

R2	R1
0	0
0	1
1	0
1	1

MODE
A
B
C
D

2.6 POWER

+6V, 940 ma

2.7 TEMPERATURE RANGE

0 to +60 degrees C

2.8 MECHANICAL

Single width module with protective side covers.

SECTION III

OPERATING INSTRUCTIONS

3.1 INSTALLATION

3.1.1 DATAWAY CONNECTIONS

The Model 60A may be installed in any normal station of the crate. The following installation procedure is recommended:

Preferably with the power off, insert the Model 60A into the crate guiders. The module should slide freely, and easily engage the Dataway connector. DO NOT USE THE JACKSCREW TO FORCE THE MODULE INTO THE CONNECTOR. Take up on the jackscrew until resistance is felt, then press on the front panel to engage the module as far as it will go. Repeat this procedure until the module is fully seated in the connector. CAUTION: If the module does not easily engage with the Dataway connector, check the appropriate crate dimensions against the Camac specifications. All Jorway modules are aligned in a jig to assure proper dimensions before they are shipped. UNDER NO CIRCUMSTANCES SHOULD THE MODULE'S FINGER AREA BE FILED IN AN ATTEMPT TO ENGAGE THE MODULE WITH THE DATAWAY.

3.1.2 INPUT CONNECTIONS

Connect an appropriate cable between each of the front panel input connectors and the device generating the data (see Table 3-1 for connector pin assignments). If either channel is not being used, it can be left unconnected since all inputs are biased to the logic 0 (high level) state. When wiring the cable, attention must be given to the X interlock control-pin 30 in each connector. This pin must be connected to ground, otherwise commands to the module will not produce an X response (except commands to the Control Register). Pin 30 may be connected to pin 31 at the module end of the cable, or it can be wired through the cable and connected to ground at the data source. Pin 31 should also be wired to ground at the source since it serves as the signal return path. If it is desired to operate without the X interlock feature, it can be defeated by the addition of two jumper wires on the module. This necessitates removal of the module's side covers to gain access to the printed circuit board. The covers may be removed by removing the six (6) flat lead screws from the right hand side of the module (as viewed from the front of the module). This will free both covers. It is not necessary to remove the screws from the left side cover; this cover will come off retaining the six (6) standoffs on its inside surface. To defeat the X interlock, add jumper wires marked "C" (Channel 0) and "D" (Channel 1) to the component side of the board using component layout drawing 60A-D-350 as a reference. Solder the wires on the reverse side of the board. Replace the side covers and install the module in the crate.

3.2 CRATE POWER UP

Crate power may now be applied. The Model 60 requires +6V only from the Dataway.

3.3 INITIALIZATION

Dataway Initialize (Z) should be applied to the module before other commands are utilized since the module, when powered up, will have its various registers randomly set. On receipt of Dataway Z (with S2) the control register will be set to Mode A (see paragraph 1.3), both LAM status registers will be cleared, the LAM Enable/Disable will be set to the Disable state, and both Data Received outputs will be cleared.

In addition, both data registers will be cleared. However, since the control register is set to the continuous load state, the data registers will assume the same states as their respective inputs.

When Dataway Z is generated, Dataway Inhibit (I) is set and maintained until cleared (according to Camac specification). Thus, the Data Strobe in the Model 60A will be inhibited. If the Data Strobe is to be used, it is necessary to clear the Dataway Inhibit by appropriate command to the crate controller. If desired, the Model 60's response to Dataway I can be deleted by a simple jumper change within the module. This may be done as follows:

Remove covers from the Model 60A (see paragraph 3.1.2). Locate the jumper wire marked "A" using component layout drawing 60A-D-350 as a reference. Remove this jumper. Locate position of jumper "B" and install wire in the holes provided. Solder the wires on the reverse side of the board. Note that this change affects both channels; it is not possible to delete the action of I for an individual channel.

3.4 CONTROL REGISTER

To select the desired data entry mode (if other than Mode A) the command, N.F(16) A(0) is used with the states of Dataway Write Lines W1 and W2 determining the written data. The following table shows the modes selected with the states of the W1 and W2 lines.

W2	W1	MODE
0	0	A
0	1	B
1	0	C
1	1	D

3.5 LAM

If mode B or D is selected, which includes the generation of a LAM on entry of data, the LAM status register can be enabled using command N.F(26) A(0) for channel 0 and N.F(26) A(1) for channel 1. Either channel's LAM may be masked by using Disable LAM Command, N.F(24) A(0) or N.F(24) A(1), which inhibits that channel's LAM status register from producing an L request (and Dataway L). Other commands to test or clear the LAM may be used as required.

3.6 READ COMMANDS

An F(0) Read Command, subaddressed to channel 0 or 1, reads the data from the channel's input register onto the Dataway Read (R) lines, and at S2 time resets its LAM status and Data Received registers (if applicable to the mode in use). An F(2) Read and Clear command is similar except that the storage registers are also cleared at S2 time.

It should be recognized that data entry via the external strobe will not occur during a Read Data operation to the module due to the required staticizing of the storage registers. The Data Received output will, however, signify whether data was entered or not (see section 1.3).

3.7 COMMAND DATA ENTRY

An F(28) command will strobe data into the storage registers on its execution. The control register should be set to either mode B or D when using this method of data entry.

TABLE 3-1

MODEL 60A CONNECTOR PIN ASSIGNMENTS

SIGNAL	PIN NUMBER
Input bit 1	1
" " 2	2
" " 3	3
" " 4	4
" " 5	5
" " 6	6
" " 7	7
" " 8	8
" " 9	9
" " 10	10
" " 11	11
" " 12	12
" " 13	13
" " 14	14
" " 15	15
" " 16	16
" " 17	17
" " 18	18
" " 19	19
" " 20	20
" " 21	21
" " 22	22
" " 23	23
" " 24	24
	25
Data Strobe In	26
Data Received Out	27
	28
	29
X Interlock	30
Ground	31

SECTION V

SERVICE

5.1 GENERAL

Jorway instruments are conservatively designed using quality components with high reliability as a prime objective. In addition, all units are manufactured to rigid quality control standards and are thoroughly tested and run in before shipment. As a result, long life and trouble-free operation can be expected. Nevertheless, occasional malfunctions may occur, necessitating service of the unit.

Most Jorway products are covered by our standard one year warranty. Instruments requiring service within the warranty period should be returned to the factory for repair under its terms (see warranty printed elsewhere in this manual). We also strongly recommend that instruments which are out of warranty be returned to the factory when service is necessary. Jorway personnel, being intimately familiar with our products, are able to efficiently isolate any problem and restore the unit to proper operating condition.

If, for any reason, the user decides to repair an instrument it should be done by qualified personnel, experienced in working with this type of equipment. The information contained in this manual should be read and understood before attempting to troubleshoot the unit, since familiarity with the principles of operation and circuitry are essential. Utilizing the schematic diagrams and other material in the manual, it should be possible for a skilled technician to determine the cause of a malfunction and effect its repair.

5.2 DISASSEMBLY

The only disassembly usually required to service the module is removal of the side shields. These can be removed by removing the six flat head screws securing the right hand shield (viewed from front of module). This will allow the two shields to be lifted off with the six standoffs remaining attached to the left hand shield. Do not loosen the screws securing the circuit board to the rails as this affects the module to crate alignment which has been set at the factory. Follow reverse procedure for reassembly of the unit.

5.3 COMPONENT REPLACEMENT

If it is necessary to replace a component on the circuit boards, extreme care should be exercised so that the board is not damaged. Most important is that excessive heat is not applied to the printed circuitry. Use the minimum amount of heat necessary to melt the solder. Multilead components, such as dual in-line integrated circuits are difficult to remove and it is usually better to cut the leads of suspected components and remove the remaining pieces one by one from the component holes. The use of a suitable solder extracting device will greatly aid in the removal of such components. The holes should be thoroughly cleaned out before the new component is inserted. Do not use force in either removal or insertion of components as damage to the plated through holes may result. Component or IC leads should be free and not attached to the side of a plated through hole before an attempt is made to extract the component or pin.

5.4 COMPONENT IDENTIFICATION

A component layout drawing is provided to aid in the location of components on the circuit board. The layout drawing should be used in conjunction with the schematic diagram as it identifies components using the same reference designations as shown on the schematic.

The component layout drawing will be found adjacent to the schematics in Section VIII of this manual.