



REFERENCE
DOCUMENT

AEROTECH
LATCHED M FUNCTION AND ISOLATOR CARD
C 690-1103
ADDENDUM TO
SMART
INSTRUCTION MANUAL

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1.0 GENERAL INFORMATION

The Latched M Function and Isolator Card (LMI) option provides the user with six latched M function outputs, an unlatched output, and an input. These I/O are all isolated by relays or opto-isolators. The standard version (-1) has relay outputs and an optocoupler input. The -2 version has optically coupled outputs instead of relays.

1.1 Specifications

-1 Version

Outputs	Relay Contacts Form A (normally open)
Contact Ratings	0.5 amp MAX 115 VAC
Input	5-28 VDC* (9 to 60 m.a.)

-2 Version

Outputs	Phototransistor (4N 33)
Maximum Voltage, DC	30 volts
Maximum Current	20 ma
Recommended Load	2 K ohm
Input	5-28 VDC*

* Other voltages can be accomodated by changing R12.

2.0 INSTALLATION INSTRUCTIONS

All customer connections to the I/O Card are through the Buchanan Screw-Terminal Block mounted on the rear panel. The terminal block accepts wire sizes #22 to 12 AWG. The connections are:

Outputs	Terminals
M11/21	1, 2
M12/22	3, 4
M13/23	5, 6
M14/24	9, 10
M15/25	13, 14
M16/26 or MO	15, 16
IN PSN	17, 18
Input*	
CONTINUE	
+DC	17
-DC	18

* For input voltages other than 5 to 28 VDC, change R12 to $R12 = \frac{V}{.02}$, where V is the nominal DC input voltage.

3.0 OPERATION (Refer to C690-1103)

The LMI and as shown on Schematic C690-1103 consists of six latches and associated drivers. Operation of the M11/21 latch will be explained. When M11 is decoded, M10 at J1-12 and M1 at J1-2 go high and gate 13-3 goes low causing 13-4 to latch high. 13-4 high causes 10-10 to go low and energizes relay K1, closing contacts 1 and 2. This condition will remain until M21 is decoded, whereby 13-11 will go low and cause 13-4 to go low and deenergize the relay.

3.1 Power-On Reset

A power-on Reset can be implemented by inserting C1. This will cause all relay contacts to be open when power is initially applied.

3.2 CONTINUE Input

The application of a DC voltage (+ on 7) to terminals 7 and 8 will cause the infrared-emitting diode to conduct and turn ON the phototransistor M19, causing the CONTINUE (OV DC or low) signal.

3.3 Additional M Functions

When additional M functions are required, similar cards are daisy-chained at the J1 input and the M10 and M20 inputs are replaced (by jumpers on the card) to M30-M40, M50-M60, etc; so that outputs 1 and 2 are controlled by M31/M41, M51/61, etc. respectively.

3.4 MO - M16/M26

Optional jumpers on the card replace the latched M function M16/M26 with MO. The MO output, when programmed, notifies the user that this is a programmed stop which requires the application of the CONTINUE signal at TB1-17 & 18 to continue the program from where it stopped when MO was encountered.

4.0 PROGRAMMING

Programming the LMI Card is similar to programming the standard M function. The specified command is initiated when read.

Example:

```
      N104      M11      M12      D1000      M21      EOB
```

When SMART reads block 104, M11 will cause contacts TB1-1 and 2 to close. A few microseconds later, M12 will be read and contacts TB1-3 and 4 will close. Then D1000 will be read which will cause a 1 second delay. After the one second delay, M21 is read and causes TB1-1 and 2 contacts to open. Then EOB is read and N104 displayed.

Example:

```
      N110      X 1000      EOB  
      N111      MO      X-2000      EOB
```

When Block N110 is read and the X axis is commanded to move 1000 steps, N110 is displayed. When X gets into position, TB1-17 and 18 contacts close and block N111 is read. Nothing occurs when N111 is read but when MO is read contacts TB1-15 and 16 close to signal the user the system has read a program stop. Nothing further will happen until the user applies the CONTINUE command to TB1-7 and 8. When SMART recognizes that a transition from no voltage to voltage occurs at TB-7 and 8, it will continue the program by executing X-2000 steps and displaying N111.

5.0 TROUBLESHOOTING AND MAINTENANCE

5.1 Troubleshooting

Troubleshooting the LMI card is relatively simple because of the CMOS circuitry and dwell capability of SMART.

To verify the operation of a function (M11/M21), program M11 followed by a 10 second or larger delay (M11 D10000 EOB). Execute this program and observe that 13-3 goes lo, causing 13-4 to go high and 10-10 to go low, energizing the relay and closing contacts TB1-1 and 2.

5.2 Maintenance

The relays may require replacement after 3 million operations at rated voltage and current.