MYCRO 352
Single-Loop Digital Controller

CONFIGURATION HANDBOOK

MOORE PRODUCTS CO., Spring House, PA 19477
INTRODUCTION

This handbook serves as a reference for configuration procedures and function block parameters of the Model 352 Single Loop Digital Controller (SLDC). Additional information can be found in the User's Manual AD352 10.

Information in this handbook applies to "A", "B" and "C" level software. "B" level software is an enhanced version, included in stations shipped after July 1985, which added new function blocks as well as enhancements to some existing blocks. These are identified with a -B next to the FB description for new blocks or next to the parameter description for enhancements to existing blocks.

"C" level software is an enhanced version, included in stations shipped after June 1991, which added new function blocks as well as enhancements to some existing blocks. These are identified with a -C next to the FB description for new blocks or next to the parameter description for enhancements to existing blocks.
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3 Dedicated Bargraphs
Dedicated bargraphs for the process and setpoint values which are continuously displayed, and are configurable to flash thereby designating an important status in the loop.

4 Valve Bargraph
Used to indicate valve variable.

5 C/L (Console/Local) Pushbutton
Used to select Console or Local operating mode. This is operational only when the controller contains a Local Instrument Link Option Board and when the Local Instrument Link Function Block (FB16) is configured. A backlit light indicates which mode is active (Green = Console, Red = Local).

6 E/I (External/Internal) Pushbutton
Active only when the E/I Transfer function block (FB11) is configured. A backlit light indicates which mode is active (Green = External, Red = Internal).

7 A/M (Auto/Manual) Pushbutton
Active only when the A/M Transfer function block (FB14) is configured. A backlit light indicates which mode is active (Green = Auto, Red = Manual).

8 Pulser Knob
Used to change setpoint and valve variables on-line, and select configuration parameters.

9 4-Character Alphanumeric Display
During configuration mode, displays configuration data. While not in configuration mode, displays status, error code or tag information.

10 D (Display) Pushbutton
Used to select displayed variable on the 4-1/2 digit display. A backlit letter will turn on to indicate the P, S, V, X or Y variable.

11 ACK (Acknowledge) Pushbutton
Pushbutton used to acknowledge flashing bargraph display.

12 Configuration Controls
Pushbuttons used to select and define Function Blocks. NOTE: during operation the EXIT pushbutton lights all LEDs to ensure their proper operation.

13 Quick Access Pushbuttons
Used to provide quick access to certain values in the S (Soft) configuration mode for the selected loop.

Station Identification (not shown)
Removable label on front of flip-down access door allows tagged, individual stations to be identified.
GENERAL CONFIGURATION PROCEDURE

The first step in any configuration is to draw a diagram of the blocks and how they are to be interconnected. The diagram should include the inputs and outputs that will be used on each block along with the identifying letters and numbers. Individual diagrams can include more or less detail as required.

The main function of the diagram is to provide information on the operation of the controller and assist in filling out the Configuration Documentation Booklet AD352-30.

The documentation booklet should then be completed – some soft configuration (S) data (e.g., controller tuning) may not be known and can be added at a later time. Each function block that is to be used must be assigned an execution sequence number (ESN). The ESN is usually not critical, but inputs to a block should normally be executed before the block is executed. It is a good idea to skip ESN numbers to allow for future additions. Number 00 to 99 can be used with 00 indicating that the block is not being used.

In hard (H) configuration, each block can be assigned specific functions as well as inputs from other blocks. These block inputs can be assigned numbers from 00 to 99 with 00 representing no input and 01 to 99 being specific output identifications from other blocks.

Soft (S) configuration allows for setting of gain, time constants, etc., within each block.

Generally, controllers are shipped from the factory calibrated for 1-5 Vdc inputs and 4-20 mA dc outputs and should not require recalibration. Calibration data is stored in EEPROM along with other configuration data.

NOTES: [ ] X An X in the alphanumeric display indicates the menu selection is locked out. The pulser and store button will not function at the value level.

Only blocks selected in the T mode will be displayed in the S and H modes.

After the store button is pushed within a specific menu selection you cannot re-enter the menu level (exit and then re-enter configuration).

CONFIGURATION INFORMATION

A. General

In order to establish an operating system to perform a specific control function, the MYCRO 352 must be configured. The user has three paths to select from in order to establish the proper configuration (operating system):

1. Use a factory configured option (FCO) already stored in the station memory.
2. Use a factory configured option (FCO) with modification.
3. Develop a completely new configuration based on the specific needs of a particular application.

If the required operating system is reasonably similar to an FCO, it is generally quicker to take path #2.

In any event, the best method can be selected by following the procedure listed below. This procedure will allow a systematic and logical approach to both developing the configuration and documenting it for future reference.

In configuring a MYCRO 352, there are several modes of configuration, described below:

V – VIEW

The V mode is used to view the output value for each of the block outputs in the SLDC. This mode allows for inspection of intermediate block outputs for checking configuration parameters.

S – Soft Configuration

A configuration mode that allows you to adjust a gain, bias, tuning constant or other similar parameter of a function block.

C – Calibration

A configuration mode that allows you to zero and span input and output function blocks.

T – Table of Function Blocks

This configuration mode is a listing of all available blocks that can be used in an operating system. In order to “call up” a particular function block into the operating system, an execution sequence number (ESN) is assigned. The assignment of an ESN puts the function block into the configuration of the station. (Note the ESN also assigns the sequential order in which the function block operations are performed.

H – Hard Configuration

A configuration mode that allows the interconnection of function blocks to execute a specific function and to select a specific function for a block to perform, where a choice exists. Hard configuration can be looked on as the interconnection (“software wiring”) of the function blocks in the operating system.

F – Factory Configured Option

A configuration mode that allows you to select a permanently stored configuration for your operating system.

M – Smart Transmitter

This mode is used only when a smart transmitter board has been installed in the SLDC. FB97 is configured and a smart transmitter is online. It allows viewing and/or changing of certain transmitter parameters such as range or damping.

B. Configuration Development Procedure

It is recommended that the procedure listed below be followed.

Step 1. Draw a block diagram showing the function blocks to be used in the operating system (configuration). It is a good idea to lay out the diagram as you would P & ID drawings with inputs at the top and outputs at the bottom and the intermediate function blocks arranged in a logic flow path in the middle.

* Available only with C Level software.
Step 2. On the diagram, assign an execution sequence number to each block appearing in the diagram. The ESN is not critical, but inputs to a block should normally be executed before the function block operation is executed. It is a good idea to skip ESN's to allow for future additions to the configuration. Numbers 00 to 99 can be used with 00 indicating a particular block is not being used. Enter the ESN's on the Configuration Documentation.

Step 3. On the diagram identify the source for each of the inputs to each function block. Normally the source for an input will be either the rear mounted terminal strip or an output of another function block. Identification for these sources (01 to 99) can be found in the book. Also note the input identification label. Then enter this hard configuration data in the documentation sheets.

Step 4. Review each function block which is being used in the configuration in order to establish the need for additional hard configuration data (i.e. selection of square root extractor on an analog input). This can be most easily done by looking under the "H" column of the configuration documentation sheet.

Step 5. Complete the soft configuration "S" column of the configuration documentation sheet for the function blocks used. It may be useful to note this information on the block diagram. Some soft configuration data (i.e. controller tuning) may not be known and will have to be added later.

Step 6. Establish calibration values for all inputs and outputs. Enter this information on both the block diagram and the configuration documentation sheet. Generally, controllers are shipped from the factory calibrated for 1-5 Vdc inputs and 4-20 mAcons outputs and should not require recalibration. Calibration data is stored in EEPROM along with other configuration data.

Step 7. Review the completed configuration documentation sheet. At this point all the function blocks to be used in the operating system should be completely filled out under the T, H, S & C columns and you are now ready to configure the station.

C. Actual Configuration
1. Compare configuration developed above with available FCO's. If they are identical or similar, enter the appropriate FCO and make modification (if required).
2. If there are no similar FCO's, erase any previous configuration by setting all ESN's to 00. This can be accomplished by calling up FCO 00 or FCO 10. Then reconfigure the station by storing all data from configuration documentation sheet. Enter all "T" mode information, then "H" mode, the "S" mode and the "C" mode directly from the columns in the configuration sheets.

CONFIGURATION CONTROLS

ENTER CONF

Push to enter the configuration mode. Enters at the menu level. Step buttons will move you to a new level.

MENU LEVEL

S [ALPHANUMERIC DISPLAY]

Push to change menu selection.

FUNCTION BLOCK LEVEL

S 0 1 [TURN PULSER TO SELECT BLOCK NO.]

Push to select block no. (If more than one exists within the block)

PARAMETER LEVEL

S F B 1

Push to select parameter (4-1/2 digit display)

VALUE LEVEL

S F B 1

Push to change value.

STORE

PUSH TO STORE VALUE IN THE DISPLAY (ONLY ACTIVE AT THE VALUE LEVEL)

EXIT

PUSH TO EXIT CONFIGURATION (ACTIVE AT ANY LEVEL)

* Available only with "C" Level software.
OPERATING CONTROLS
PULSER KNOB

Used for operating changes such as setpoints and valve adjustments, and quick access changes.

PUSHBUTTONS

Active only when the SLDC contains a link interface (FB96). The pushbutton selects operational control of the SLDC. A green light on the front panel indicates operation from a console/computer through the link interface and a red light indicates the SLDC can be operated locally from the operator’s display panel.

Active only when function block FB11 has been selected in the T configuration mode. It functions as a 2 position switch with a green light indicating the E position and a red light the F position and is monitored by FB11 (see description for FB11 in AD552-10).

Active only when function block FB14 has been selected in the T configuration mode. It functions as a 2 position switch with a green light indicating the A position and a red light the M position (see description for FB14 in AD552-10).

Used to change the variable displayed on the 4-1/2 digit meter. A backlit letter will turn on to indicate the variable (P, S, V, X, or Y). Only variables whose inputs have been configured will be selected. Variables P, S, and V will also be displayed on analog indicators.

Used to acknowledge a flashing F/S bargraph display. When more than one status is active it can also be used to change the status being displayed in the 4-digit alphanumeric.

When the Model 352 is not in the configuration mode, these pushbuttons are used to scroll the Tag Name 1 (TN1), Tag Name 2 (TN2), Engineering Units 1 (EU1), Engineering Units EU2, Link Station Address (LSA), Data Base Revision Number (DBRN), Station Identification (SIC), Configuration Filename (CNF). The 12-character Tag Names 1 and 2, 4-character Engineering Units 1 and 2 and 12-character Station Identification may be configured in the Operator’s Display function block (FB15) using the arrow keys and pulser knob. Refer to the “Character Identification” table for a list of available characters. The link station address may be configured in FB98. The data base revision number is automatically incremented when the Model 352’s configuration is changed. The configuration filename is the name of the configuration as stored by the Model 352 configuration software. The tag data is scrolled in the alphanumeric display for a configured amount of time set by the Tag Scroll Time (STST).

QUICK ACCESS BUTTONS

- Four pushbuttons will provide quick access to the S (Soft) configuration mode at the value level for selected function blocks.

- Provides access to the tuning parameters of controller #1 (FB13).

- You can advance to the next parameter by pushing the tune 1 button again.

- The controller action A1 can be viewed but not changed in this mode.

- Moves the cursor to adjacent left positions in the alphanumeric display enabling 12-character station ID, 4-character engineering units, and 12-character tag names to be entered during configuration of the operator’s display (FB15)*

- Provides access to the tuning parameters of controller #2 (FB45) (applies only when the SLDC includes an expander board – Model 352E).

- You can advance to the next parameter by pushing the tune 2 button again.

- The controller action A2 can be viewed but not changed in this mode.

- Moves the cursor to adjacent right positions in the alphanumeric display enabling 12-character station ID, 4-character engineering units, and 12-character tag names to be entered during configuration of the operator’s display (FB15)*

- Provides access to the alarm parameters associated with function block FB12.

- You can advance to the next parameter by pushing the alarm button again.

- Provides access to either the ratio parameter associated with function block FB07 or bias parameter associated with function block FB08.

- When the store button is pushed the controller will store the parameter value and then exit the configuration mode.

* Available only with C-Level software.
FUNCTION BLOCKS

FB01
ANALOG INPUT #1

<table>
<thead>
<tr>
<th>FILTER BREAKPOINT FREQ</th>
<th>0.001 to 10.00 Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZERO INPUT</td>
<td>0.0 to 1.0 Vdc</td>
</tr>
<tr>
<td>FULL SCALE INPUT</td>
<td>4.0 to 5.0 Vdc</td>
</tr>
<tr>
<td>VERIFY INPUT = B</td>
<td>-3.3 to 103.3%</td>
</tr>
<tr>
<td>SQUARE ROOT EXTRACTOR</td>
<td>NO/YES</td>
</tr>
</tbody>
</table>

FB02
ANALOG INPUT #2

<table>
<thead>
<tr>
<th>FILTER BREAKPOINT FREQ</th>
<th>0.001 to 10.00 Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZERO INPUT</td>
<td>0.0 to 1.0 Vdc</td>
</tr>
<tr>
<td>FULL SCALE INPUT</td>
<td>4.0 to 5.0 Vdc</td>
</tr>
<tr>
<td>VERIFY INPUT = B</td>
<td>-3.3 to 103.3%</td>
</tr>
<tr>
<td>SQUARE ROOT EXTRACTOR</td>
<td>NO/YES</td>
</tr>
</tbody>
</table>

FB03
ANALOG OUTPUT #1

<table>
<thead>
<tr>
<th>SIGNAL</th>
<th>A O01+ (A7)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A O01- (A8)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ZERO OUTPUT</th>
<th>4.0 mAcd</th>
</tr>
</thead>
<tbody>
<tr>
<td>FULL SCALE OUTPUT</td>
<td>20.0 mAcd</td>
</tr>
<tr>
<td>VERIFY OUTPUT = B</td>
<td>-3.3 to 103.3%</td>
</tr>
<tr>
<td>INPUT A (SIGNAL)</td>
<td>00 to 99</td>
</tr>
<tr>
<td>INPUT B (ON/OFF)</td>
<td>00 to 99</td>
</tr>
</tbody>
</table>

FB04
DIGITAL OUTPUT #1

| INPUT A (ON/OFF) | 00 to 99 |

FB05
DIGITAL OUTPUT #2

| OUTPUT A (ON/OFF) | 00 to 99 |

FB06
DIGITAL INPUT #1

| INPUT A (ON/OFF) | 00 to 99 |

FB07
RATIO = A - B

<table>
<thead>
<tr>
<th>RATIO</th>
<th>0.00 to 30.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>INPUT A</td>
<td>00 to 99</td>
</tr>
<tr>
<td>INPUT B</td>
<td>00 to 99</td>
</tr>
</tbody>
</table>
**FB12**

**ALARM AS - A, B**

- **INPUT A**
  - **ALARM #1 (A1)**
  - **STATUS AS1**
- **INPUT B**
  - **ALARM #2 (A2)**
  - **STATUS AS2**
- **INPUT C**
  - **DEVIATION (AD) IC-DI**
  - **STATUS DS**
- **INPUT D**

**FB12 (cont'd.)**

- **S A 3**
  - **ENABLE/DISABLE ALARM 3**
  - **EN/DIS**
- **S A 4**
  - **ENABLE/DISABLE ALARM 4**
  - **EN/DIS**
- **H A 1 T**
  - **ALARM 1 TYPE**
  - **NONE/HILO/HDEV/DEV/DEV/D**
- **H A 2 T**
  - **ALARM 2 TYPE**
  - **NONE/HILO/HDEV/DEV/DEV/D**
- **H A 3 T**
  - **ALARM 3 TYPE**
  - **NONE/HILO/HDEV/DEV/DEV/D**
- **H A 4 T**
  - **ALARM 4 TYPE**
  - **NONE/HILO/HDEV/DEV/DEV/D**
- **H I N A**
  - **INPUT A**
  - **00 to 99**
- **H I N B**
  - **INPUT B**
  - **00 to 99**
- **H I N C**
  - **INPUT C**
  - **00 to 99**
- **H I N D**
  - **INPUT D**
  - **00 to 99**
- **H A 1 I**
  - **ALARM 1 DELAY IN TIME**
  - **0.00:4:1:2:5:15:30:60 SEC**
- **H A 2 I**
  - **ALARM 2 DELAY IN TIME**
  - **0.00:4:1:2:5:15:30:60 SEC**
- **H A 3 I**
  - **ALARM 3 DELAY IN TIME**
  - **0.00:4:1:2:5:15:30:60 SEC**
- **H A 4 I**
  - **ALARM 4 DELAY IN TIME**
  - **0.00:4:1:2:5:15:30:60 SEC**
- **H A 1 O**
  - **ALARM 1 DELAY OUT TIME**
  - **0.00:4:1:2:5:15:30:60 SEC**
- **H A 2 O**
  - **ALARM 2 DELAY OUT TIME**
  - **0.00:4:1:2:5:15:30:60 SEC**
- **H A 3 O**
  - **ALARM 3 DELAY OUT TIME**
  - **0.00:4:1:2:5:15:30:60 SEC**
- **H A 4 O**
  - **ALARM 4 DELAY OUT TIME**
  - **0.00:4:1:2:5:15:30:60 SEC**
- **H A 1 R**
  - **ALARM 1 RINGBACK**
  - **NO/YES**
- **H A 2 R**
  - **ALARM 2 RINGBACK**
  - **NO/YES**
- **H A 3 R**
  - **ALARM 3 RINGBACK**
  - **NO/YES**
- **H A 4 R**
  - **ALARM 4 RINGBACK**
  - **NO/YES**
- **H A 3 S**
  - **ALARM 3 ALPHANUMERIC STATUS**
  - **A3/AD**

**FB12 (cont'd.)**

- **S A 1**
  - **ENABLE/DISABLE ALARM 1**
  - **EN/DIS**
- **S A 2**
  - **ENABLE/DISABLE ALARM 2**
  - **EN/DIS**

**FB13**

**CONTROLLER #1**

- **PROCESS**
  - **PID**
  - **PID**
  - **PID**
- **FB13**
  - **INPUT**
  - **OUTPUT**

**FB13**

- **S A 1**
  - **ACTION-REV(-)/DIR(+)**
  - **-4**
- **S A 1**
  - **ACTION-C**
  - **REV/DIR**
- **S P G 1**
  - **PROPORTIONAL GAIN**
  - **0.01 to 100.0**
- **S T I 1**
  - **TIME INTEGRAL**
  - **0.01 to 1000 M/R**

(continued on page 17)
**FB13 (cont'd.)**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>STD01</td>
<td>TIME DERIVATIVE</td>
</tr>
<tr>
<td>SDG1</td>
<td>DERIVATIVE GAIN</td>
</tr>
<tr>
<td>SMR1</td>
<td>MANUAL RESET**</td>
</tr>
<tr>
<td>HC1T</td>
<td>TYPE</td>
</tr>
<tr>
<td>HC1T</td>
<td>TYPE-C</td>
</tr>
<tr>
<td>HMRT</td>
<td>MANUAL RESET TRACKING**</td>
</tr>
<tr>
<td>HINP</td>
<td>INPUT P (PROCESS)</td>
</tr>
<tr>
<td>HINS</td>
<td>INPUT S (SETPOINT)</td>
</tr>
<tr>
<td>HINF</td>
<td>INPUT F (FEEDBACK)</td>
</tr>
<tr>
<td>HINA</td>
<td>INPUT A (ADAPTIVE GAIN)**</td>
</tr>
<tr>
<td>HINC</td>
<td>INPUT C (TRACK COMMAND)**</td>
</tr>
</tbody>
</table>

*Does not apply to Type 3 (CD)  ** Type 2 only (FD)  *** Type 4 only (PIDA)

**FB14 A/M TRANSFER -C**

- **Auto Input**: A
- **Emergency Manual**: E
- **Standby Sync**: S
- **Track Input**: T

**FB15 OPERATOR'S DISPLAY -A,-B**

- **Input P**: P
- **Input S**: S
- **Input V**: V
- **Input X**: X
- **Input Y**: Y

**User Status**: 1

**User Status**: 2

**Operator's Display Panel**

**Error**

**ACKNOWLEDGE**

**Pulse-Off**

**Pulse-On**

**Decimal Point Process**: 0.0000

**Process LO**: 0 to ±18750

**Process HI**: 0 to ±18750

**Decimal Point X -B**: 0.0000

(continued on page 20)
<table>
<thead>
<tr>
<th>FB15 - CONT'D</th>
</tr>
</thead>
<tbody>
<tr>
<td>SXL</td>
</tr>
<tr>
<td>SXH</td>
</tr>
<tr>
<td>SDP</td>
</tr>
<tr>
<td>SYL</td>
</tr>
<tr>
<td>SYH</td>
</tr>
<tr>
<td>HNP</td>
</tr>
<tr>
<td>HNS</td>
</tr>
<tr>
<td>HNV</td>
</tr>
<tr>
<td>HNA</td>
</tr>
<tr>
<td>HNX</td>
</tr>
<tr>
<td>HNY</td>
</tr>
<tr>
<td>HFL1</td>
</tr>
<tr>
<td>HFL2</td>
</tr>
<tr>
<td>HFL3</td>
</tr>
<tr>
<td>HSCF</td>
</tr>
<tr>
<td>HIN1</td>
</tr>
<tr>
<td>HIN2</td>
</tr>
<tr>
<td>HVBD</td>
</tr>
</tbody>
</table>

(*) Any one of the following status conditions can be selected to flash the P/S bar graphs.

- 00 (NOT USED)
- 01 ABSOLUTE ALARM #1 (A1)
- 02 ABSOLUTE ALARM #2 (A2)
- 03 DEVIATION ALARM (AD)
- 04 HIGH LIMIT #1 (H1)
- 05 LOW LIMIT #1 (L1)
- 06 HIGH LIMIT #2 (H2)
- 07 LOW LIMIT #2 (L2)
- 08 OVERRIDE (OR)
- 09 STANDBY SYNC (SS)
- 10 EMERGENCY MANUAL (EM)
- 11 USER DEFINED STATUS (U1)
- 12 USER DEFINED STATUS (U2)
- 13 ERROR (E)
- 14 EMERGENCY INTERNAL (EI) -B
- 15 EMERGENCY LOCAL (EL) -B
- 16 NON UPDATING INPUT (NU) -B
- 17 DECIMAL POINT X
- 18 DECIMAL POINT Y
- 19 ST TONE
- 20 TAG SCROLL TIME | 7 to 70 SECONDS |
- 21 TAG NAME 1 | 12 CHAR. (ASCII) |
- 22 TAG NAME 2 | 12 CHAR. (ASCII) |
- 23 ENG UNITS 1 | 4 CHAR. (ASCII) |
- 24 ENG UNITS 2 | 4 CHAR. (ASCII) |
- 25 ID | STATION ID | 12 CHAR. (ASCII) |
- 26 INPUT P (PROCESS) | 00 to 99 |
- 27 INPUT S (SETPOINT) | 00 to 99 |
- 28 INPUT V (VALVE) | 00 to 99 |
- 29 INPUT A (ACKNOWLEDGE) | 00 to 99 |
- 30 INPUT R (RANGE) | 00 to 99 |
- 31 PROCESS DISPLAY RANGE | 1/256 |

(continued on page 20)
FB15 (cont'd.)

<table>
<thead>
<tr>
<th>H</th>
<th>S</th>
<th>D</th>
<th>R</th>
<th>SETPOINT DISPLAY RANGE</th>
<th>1/2S</th>
</tr>
</thead>
<tbody>
<tr>
<td>H</td>
<td>I</td>
<td>N</td>
<td>X</td>
<td>INPUT X</td>
<td>00 to 99</td>
</tr>
<tr>
<td>H</td>
<td>I</td>
<td>N</td>
<td>Y</td>
<td>INPUT Y</td>
<td>00 to 99</td>
</tr>
<tr>
<td>H</td>
<td>F</td>
<td>L</td>
<td>1</td>
<td>Flasher 1</td>
<td>00 to 17(1)</td>
</tr>
<tr>
<td>H</td>
<td>F</td>
<td>L</td>
<td>2</td>
<td>Flasher 2</td>
<td>00 to 17(1)</td>
</tr>
<tr>
<td>H</td>
<td>F</td>
<td>L</td>
<td>3</td>
<td>Flasher 3</td>
<td>00 to 17(1)</td>
</tr>
<tr>
<td>H</td>
<td>F</td>
<td>L</td>
<td>4</td>
<td>Flasher 4</td>
<td>00 to 17(1)</td>
</tr>
<tr>
<td>H</td>
<td>F</td>
<td>L</td>
<td>5</td>
<td>Flasher 5</td>
<td>00 to 17(1)</td>
</tr>
<tr>
<td>H</td>
<td>S</td>
<td>C</td>
<td>F</td>
<td>SELF CLEARING FLASHER</td>
<td>NO/YES</td>
</tr>
<tr>
<td>H</td>
<td>I</td>
<td>N</td>
<td>2</td>
<td>INPUT 2 (USER 2 STATUS)</td>
<td>00 to 99</td>
</tr>
<tr>
<td>H</td>
<td>U</td>
<td>2</td>
<td>S</td>
<td>USER 2 STATUS</td>
<td>**</td>
</tr>
<tr>
<td>H</td>
<td>V</td>
<td>B</td>
<td>D</td>
<td>VALVE BAR DIRECT</td>
<td>NO/YES</td>
</tr>
</tbody>
</table>

** Refer to Character Identification Table

(1) Any one of the following status conditions can be selected to flash the P/S bargraph:

| 00 (NOT USED) |
| 01 ALARM #1 (A1) |
| 02 ALARM #2 (A2) |
| 03 ALARM #3 (A3 OR AD) |
| 04 HIGH LIMIT #1 (HL) |
| 05 LOW LIMIT #1 (LL) |
| 06 HIGH LIMIT #2 (HL2) |
| 07 LOW LIMIT #2 (LL2) |
| 08 OVERRIDE (OR) |

09 STANDBY SYNC (SS)
10 EMERGENCY MANUAL (EM)
11 USER DEFINED STATUS 1 (**)
12 USER DEFINED STATUS 2 (**)
13 ERROR (E)
14 EMERGENCY INTERNAL (EI)
15 EMERGENCY LOCAL (EL)
16 NON-UPDATING INPUT (NU)
17 ALARM #4 (A4)

Character Identification

<table>
<thead>
<tr>
<th>Character</th>
<th>Character Name</th>
<th>Character Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>!</td>
<td>blank</td>
<td>0</td>
</tr>
<tr>
<td>.</td>
<td>exclamation mark</td>
<td>1</td>
</tr>
<tr>
<td>&quot;</td>
<td>quotation mark</td>
<td>2</td>
</tr>
<tr>
<td>#</td>
<td>number sign</td>
<td>3</td>
</tr>
<tr>
<td>$</td>
<td>dollar sign</td>
<td>4</td>
</tr>
<tr>
<td>%</td>
<td>percent sign</td>
<td>5</td>
</tr>
<tr>
<td>&amp;</td>
<td>ampersand sign</td>
<td>6</td>
</tr>
<tr>
<td>(</td>
<td>left parenthesis</td>
<td>7</td>
</tr>
<tr>
<td>)</td>
<td>right parenthesis</td>
<td>8</td>
</tr>
<tr>
<td>*</td>
<td>apostrophe</td>
<td>9</td>
</tr>
<tr>
<td>-</td>
<td>dash</td>
<td>:</td>
</tr>
<tr>
<td>+</td>
<td>plus</td>
<td>:</td>
</tr>
<tr>
<td>,</td>
<td>comma</td>
<td>&lt;</td>
</tr>
<tr>
<td>/</td>
<td>minus</td>
<td>=</td>
</tr>
<tr>
<td>.</td>
<td>period</td>
<td>&gt;</td>
</tr>
<tr>
<td>/</td>
<td>slash right</td>
<td>?</td>
</tr>
</tbody>
</table>

(continued on Page 26)
FB16 (cont'd.)

<table>
<thead>
<tr>
<th>SF</th>
<th>PH</th>
<th>FULL SCALE PULSES/HOUR</th>
<th>1 to 18,000 PPH</th>
</tr>
</thead>
<tbody>
<tr>
<td>SZ</td>
<td>DO</td>
<td>ZERO DROP OUT</td>
<td>0.0 to 30.0%</td>
</tr>
<tr>
<td>SH</td>
<td>CA</td>
<td>HIGH-COUNT TOTALIZER A</td>
<td>000 to 999</td>
</tr>
<tr>
<td>SH</td>
<td>CB</td>
<td>HIGH-COUNT TOTALIZER B</td>
<td>0 to 4000</td>
</tr>
<tr>
<td>H1</td>
<td>NA</td>
<td>INPUT A</td>
<td>0 to 91</td>
</tr>
<tr>
<td>H1</td>
<td>NR</td>
<td>INPUT R (RESET)</td>
<td>0 to 91</td>
</tr>
<tr>
<td>HB</td>
<td>YP</td>
<td>BYPASS TOTALIZER A</td>
<td>NO/YES</td>
</tr>
</tbody>
</table>

FB17

SETPOINT TRACK & HOLD #1 - A, -B

<table>
<thead>
<tr>
<th>Track Input</th>
<th>C</th>
<th>Track Command</th>
<th>C</th>
<th>Output</th>
<th>22</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>INT</td>
<td>INPUT T (TRACK VARIABLE)</td>
<td>00 to 99</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H1</td>
<td>INC</td>
<td>INPUT C (TRACK COMMAND)</td>
<td>00 to 99</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For additional Setpoint Track & Hold see FB46.

FB18

GEN. PURPOSE TRACK & HOLD #1

<table>
<thead>
<tr>
<th>Track Input</th>
<th>C</th>
<th>Track Command</th>
<th>C</th>
<th>Output</th>
<th>22</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>INT</td>
<td>INPUT T (TRACK VARIABLE)</td>
<td>00 to 99</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H1</td>
<td>INC</td>
<td>INPUT C (TRACK COMMAND)</td>
<td>00 to 99</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H1</td>
<td>HE</td>
<td>ADJUSTMENT INDEPENDENT OF E1</td>
<td>NO/YES</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For additional Gen. Purpose Track & Hold see FB46.

FB19

GEN PURPOSE HOLD #1

<table>
<thead>
<tr>
<th>Track Input</th>
<th>C</th>
<th>Output</th>
<th>24</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>H</td>
<td>2</td>
<td>HOLD VALUE</td>
</tr>
</tbody>
</table>

For additional Gen. Purpose Hold see FB69.

FB20

AND/NAND LOGIC #1 - A, -B

<table>
<thead>
<tr>
<th>Track Input</th>
<th>A</th>
<th>Output</th>
<th>20</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>INT</td>
<td>INPUT A</td>
<td>00 to 99</td>
</tr>
<tr>
<td>H1</td>
<td>B</td>
<td>INPUT B</td>
<td>00 to 99</td>
</tr>
</tbody>
</table>

For additional And-Nand Logic see FB48, 56 & 66.

FB21

OR/NOR LOGIC #1 - A, -B

<table>
<thead>
<tr>
<th>Track Input</th>
<th>A</th>
<th>Output</th>
<th>21</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>INT</td>
<td>INPUT A</td>
<td>00 to 99</td>
</tr>
<tr>
<td>H1</td>
<td>B</td>
<td>INPUT B</td>
<td>00 to 99</td>
</tr>
</tbody>
</table>

For additional Or-Nor Logic see FB30, 54 & 70.
FB26
ANALOG INPUT #5

A15+ (D5)  1.5 Vdc  XTR
A1C- (D5)  OUTPUT

SF B 5  FILTER BREAKPOINT FREQ. 0.001 to 10.00 Hz
C Z I 5  ZERO INPUT 0.0 to 1.0 Vdc
C F I 5  FULL SCALE INPUT 4.0 to 5.0 Vdc
C V I 5  VERIFY INPUT -B -3.3 to 103.3%
H S R E  SQUARE ROOT EXTRACTOR -C NO/YES

For additional Analog Input see FB01-02, 25 & 27.

FB27
ANALOG INPUT #6

A16+ (D7)  1.5 Vdc  XTR
A1C- (D8)  OUTPUT

SF B 6  FILTER BREAKPOINT FREQ. 0.001 to 10.00 Hz
C Z I 6  ZERO INPUT 0.0 to 1.0 Vdc
C F I 6  FULL SCALE INPUT 4.0 to 5.0 Vdc
C V I 6  VERIFY INPUT -B -3.3 to 103.3%
H S R E  SQUARE ROOT EXTRACTOR -C NO/YES

For additional Analog Input see FB01-02, 25 & 26.

FB29
ANALOG OUTPUT #2

AO2+ (D9)  ANALOG OUTPUT #2 4.20 mAdc
AOC- (D10)  SIGNAL

C Z O 2  ZERO OUTPUT 4.0 mAdc
C F O 2  FULL SCALE OUTPUT 20.0 mAdc
C V O 2  VERIFY OUTPUT -B -3.3 to 103.3%
H I N A  INPUT A (SIGNAL) 00 to 99
H I N B  INPUT B (ON-OFF) 00 to 99

For additional Analog Output see FB03 & 51.

FB30
DIGITAL INPUT #2

DI2+ (C7)  OUTPUT
DI2- (C8)  ON-OFF

DIGITAL INPUT #2

For additional Digital Input see FB06 & 31.

FB31
DIGITAL INPUT #3

DI3+ (C9)  OUTPUT
DI3- (C10)  ON-OFF

DIGITAL INPUT #3

For additional Digital Input see FB06 & 30.

FB32
RELAY OUTPUT #1

R1NO (C1)  RELAY OUTPUT #1 ON-OFF
R1C (C2)  RELAY OUTPUT #1 RELAY OUTPUT #1
R1NC (C3)  RELAY OUTPUT #1 REV/DIR

H I N A  INPUT A 00 to 99
H R 1 A  RELAY ACTION REV/DIR (+) -C

For additional Relay Output see FB33 & 32.

FB33
RELAY OUTPUT #2

R2NO (D1)  RELAY OUTPUT #2 ON-OFF
R2C (D2)  RELAY OUTPUT #2 RELAY OUTPUT #2
R2NC (D3)  RELAY OUTPUT #2 REV/DIR

H I N A  INPUT A 00 to 99
H R 2 A  RELAY ACTION REV/DIR (+) -C

For additional Relay Output see FB33 & 32.
FB34
MULTIPLIER/DIVIDER #1 - A, -B

INPUT A
INPUT B
INPUT C

OUTPUT

Signal Equation
\[ S_0 = \frac{G_0 \left[ G_a \cdot S_a + B_a \right] - G_b \cdot S_b + B_b}{G_c \cdot S_c + B_c} + B_0 \]

SGO1 GAIN-OUTPUT 0.030 to 3.000
SGA1 GAIN A INPUT 0.030 to 3.000
SGB1 GAIN B INPUT 0.030 to 3.000
SGC1 GAIN C INPUT 0.030 to 3.000
SBO1 BIAS-OUTPUT -3.000 to +3.000
SBA1 BIAS A INPUT -3.000 to +3.000
SBB1 BIAS-B INPUT -3.000 to +3.000
SBC1 BIAS-C INPUT -3.000 to +3.000
HINA INPUT A 00 to 99
HINB INPUT B 00 to 99
HINC INPUT C 00 to 99

For additional Multiplier/Divider see FB35.

FB34 (cont’d.)

INPUT A
INPUT B
INPUT C

OUTPUT

Signal Equation
\[ S_0 = \frac{G_0 \left[ G_a \cdot S_a + B_a \right] - G_b \cdot S_b + B_b}{G_c \cdot S_c + B_c} + B_0 \]

SGC2 GAIN-OUTPUT 0.030 to 3.000
SGA2 GAIN A INPUT 0.030 to 3.000
SGB2 GAIN B INPUT 0.030 to 3.000
SGC2 GAIN C INPUT 0.030 to 3.000
SBO2 BIAS-OUTPUT -3.000 to +3.000
SBA2 BIAS A INPUT -3.000 to +3.000
SBB2 BIAS B INPUT -3.000 to +3.000
SBC2 BIAS C INPUT -3.000 to +3.000
HINA INPUT A 00 to 99
HINB INPUT B 00 to 99
HINC INPUT C 00 to 99

For additional Multiplier/Divider see FB35.

FB35
MULTIPLIER/DIVIDER #2 - A, -B

MATH BLOCK #1 - C

INPUT A
INPUT B
INPUT C

OUTPUT

Signal Equation
\[ S_0 = \frac{G_0 \left[ G_a \cdot S_a + B_a \right] - G_b \cdot S_b + B_b}{G_c \cdot S_c + B_c} + B_0 \]

SGO1 GAIN-OUTPUT 0.030 to 3.000
SGA1 GAIN A INPUT 0.030 to 3.000
SGB1 GAIN B INPUT 0.030 to 3.000
SGC1 GAIN C INPUT 0.030 to 3.000
SBO1 BIAS-OUTPUT -3.000 to +3.000
SBA1 BIAS A INPUT -3.000 to +3.000
SBB1 BIAS-B INPUT -3.000 to +3.000

(continued on Page 27)
**FB35**

**MATH BLOCK #2 - C**

**Signal Equation**

\[ S_0 = G_0 \left[ (G_0 \cdot S_A + B_A) \right. \left. \oplus (G_0 \cdot S_B + B_B) \right] \oplus (S_0 \cdot S_C + B_C) \oplus B_0 \]

\[ (-X/Y+) \]

**Gain Table**

<table>
<thead>
<tr>
<th>Gain</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>SG</td>
<td>GAIN-OUTPUT</td>
<td>0.030 to 3.000</td>
</tr>
<tr>
<td>SA</td>
<td>GAIN-A INPUT</td>
<td>0.030 to 3.000</td>
</tr>
<tr>
<td>SB</td>
<td>GAIN-B INPUT</td>
<td>0.030 to 3.000</td>
</tr>
<tr>
<td>SC</td>
<td>GAIN-C INPUT</td>
<td>0.030 to 3.000</td>
</tr>
<tr>
<td>S0</td>
<td>BIAS-OUTPUT</td>
<td>-3.000 to -3.000</td>
</tr>
</tbody>
</table>

For additional Math Block see FB34, 36 & 37.

---

**FB36**

**MATH BLOCK #3 - C**

**Signal Equation**

\[ S_3 = G_3 \left[ (G_3 \cdot S_A + B_A) \right. \left. \oplus (G_3 \cdot S_B + B_B) \right] \oplus (S_3 \cdot S_C + B_C) \oplus B_0 \]

\[ (-X/Y+) \]

**Gain Table**

<table>
<thead>
<tr>
<th>Gain</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>SG</td>
<td>GAIN-OUTPUT</td>
<td>0.030 to 3.000</td>
</tr>
<tr>
<td>SA</td>
<td>GAIN-A INPUT</td>
<td>0.030 to 3.000</td>
</tr>
<tr>
<td>SB</td>
<td>GAIN-B INPUT</td>
<td>0.030 to 3.000</td>
</tr>
<tr>
<td>SC</td>
<td>GAIN-C INPUT</td>
<td>0.030 to 3.000</td>
</tr>
<tr>
<td>S0</td>
<td>BIAS-OUTPUT</td>
<td>-3.000 to -3.000</td>
</tr>
</tbody>
</table>

For additional Math Block see FB34, 36 & 37.
**FB37**

**ADDER/SUBTRACTER #2 – A, B**

**INPUT A**

**INPUT B**

**INPUT C**

**OUTPUT**

**Signal Equation**

\[ S_0 = A_0 \left( (A_0 \cdot S_0) + B_0 \right) + (A_0 \cdot S_0 + B_0) = (A_0 \cdot S_0 + B_0) + B_0 \]

\[ \text{A} \quad \text{B} \quad \text{C} \]

<table>
<thead>
<tr>
<th>S</th>
<th>G</th>
<th>O</th>
<th>4</th>
<th>GAIN-OUTPUT</th>
<th>0.030 to 3.000</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>G</td>
<td>A</td>
<td>4</td>
<td>GAIN-A INPUT</td>
<td>0.030 to 3.000</td>
</tr>
<tr>
<td>S</td>
<td>G</td>
<td>B</td>
<td>4</td>
<td>GAIN-B INPUT</td>
<td>0.030 to 3.000</td>
</tr>
<tr>
<td>S</td>
<td>G</td>
<td>C</td>
<td>4</td>
<td>GAIN-C INPUT</td>
<td>0.030 to 3.000</td>
</tr>
<tr>
<td>S</td>
<td>B</td>
<td>O</td>
<td>4</td>
<td>BIAS OUTPUT</td>
<td>-3.000 to +3.000</td>
</tr>
<tr>
<td>S</td>
<td>B</td>
<td>A</td>
<td>4</td>
<td>BIAS-A INPUT</td>
<td>-3.000 to +3.000</td>
</tr>
<tr>
<td>S</td>
<td>B</td>
<td>B</td>
<td>4</td>
<td>BIAS-B INPUT</td>
<td>-3.000 to +3.000</td>
</tr>
<tr>
<td>S</td>
<td>B</td>
<td>C</td>
<td>4</td>
<td>BIAS-C INPUT</td>
<td>-3.000 to +3.000</td>
</tr>
<tr>
<td>S</td>
<td>S</td>
<td>4</td>
<td>A</td>
<td>SIGN A</td>
<td>+/−</td>
</tr>
<tr>
<td>S</td>
<td>S</td>
<td>4</td>
<td>B</td>
<td>SIGN B</td>
<td>+/−</td>
</tr>
<tr>
<td>H</td>
<td>I</td>
<td>N</td>
<td>A</td>
<td>INPUT A</td>
<td>0.0 to 99</td>
</tr>
<tr>
<td>H</td>
<td>I</td>
<td>N</td>
<td>B</td>
<td>INPUT B</td>
<td>0.0 to 99</td>
</tr>
<tr>
<td>H</td>
<td>I</td>
<td>N</td>
<td>C</td>
<td>INPUT C</td>
<td>0.0 to 99</td>
</tr>
</tbody>
</table>

For additional Adder/Subtractor see FB38.

**FB37**

**MATH BLOCK #4 – C**

**INPUT A**

**INPUT B**

**INPUT C**

**OUTPUT**

**Signal Equation**

\[ S_0 = A_0 \left( (A_0 \cdot S_0 + B_0) \text{Operation A} (A_0 \cdot S_0 + B_0) \text{Operation B} (A_0 \cdot S_0 + B_0) + B_0 \right) \]

\[ \text{A} \quad \text{B} \quad \text{C} \]

<table>
<thead>
<tr>
<th>S</th>
<th>G</th>
<th>O</th>
<th>4</th>
<th>GAIN-OUTPUT</th>
<th>0.030 to 3.000</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>G</td>
<td>A</td>
<td>4</td>
<td>GAIN-A INPUT</td>
<td>0.030 to 3.000</td>
</tr>
<tr>
<td>S</td>
<td>G</td>
<td>B</td>
<td>4</td>
<td>GAIN-B INPUT</td>
<td>0.030 to 3.000</td>
</tr>
<tr>
<td>S</td>
<td>G</td>
<td>C</td>
<td>4</td>
<td>GAIN-C INPUT</td>
<td>0.030 to 3.000</td>
</tr>
<tr>
<td>S</td>
<td>B</td>
<td>O</td>
<td>4</td>
<td>BIAS OUTPUT</td>
<td>-3.000 to +3.000</td>
</tr>
</tbody>
</table>
| (continued on Page 31)
### FB44 5-SEGMENT CHARACTERIZER - A, -B

**Input A**

| S X 0 | INPUT CO-ORDINATE X0 | 0.0 to 100.0% |
| S X 1 | INPUT CO-ORDINATE X1 | 0.0 to 100.0% |
| S X 2 | INPUT CO-ORDINATE X2 | 0.0 to 100.0% |
| S X 3 | INPUT CO-ORDINATE X3 | 0.0 to 100.0% |
| S X 4 | INPUT CO-ORDINATE X4 | 0.0 to 100.0% |
| S X 5 | INPUT CO-ORDINATE X5 | 0.0 to 100.0% |
| S Y 0 | OUTPUT CO-ORDINATE Y0 | 0.0 to 100.0% |
| S Y 1 | OUTPUT CO-ORDINATE Y1 | 0.0 to 100.0% |
| S Y 2 | OUTPUT CO-ORDINATE Y2 | 0.0 to 100.0% |
| S Y 3 | OUTPUT CO-ORDINATE Y3 | 0.0 to 100.0% |
| S Y 4 | OUTPUT CO-ORDINATE Y4 | 0.0 to 100.0% |
| S Y 5 | OUTPUT CO-ORDINATE Y5 | 0.0 to 100.0% |
| H I N A | INPUT A | 0.0 to 99 |

### FB44 10-SEGMENT CHARACTERIZER - C

**Input A**

| S X 0 | INPUT CO-ORDINATE X0 | 0.0 to 100.0% |
| S X 1 | INPUT CO-ORDINATE X1 | 0.0 to 100.0% |
| S X 2 | INPUT CO-ORDINATE X2 | 0.0 to 100.0% |
| S X 3 | INPUT CO-ORDINATE X3 | 0.0 to 100.0% |
| S X 4 | INPUT CO-ORDINATE X4 | 0.0 to 100.0% |
| S X 5 | INPUT CO-ORDINATE X5 | 0.0 to 100.0% |
| S X 6 | INPUT CO-ORDINATE X6 | 0.0 to 100.0% |
| S X 7 | INPUT CO-ORDINATE X7 | 0.0 to 100.0% |
| S X 8 | INPUT CO-ORDINATE X8 | 0.0 to 100.0% |
| S X 9 | INPUT CO-ORDINATE X9 | 0.0 to 100.0% |
| S X 10 | INPUT CO-ORDINATE X10 | 0.0 to 100.0% |
| S Y 0 | OUTPUT CO-ORDINATE Y0 | 0.0 to 100.0% |

(continued on page 36)

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### FB45 CONTROLLER #2

**Process**

- S A 2 | ACTION REV(-)/DIR(+)
- S A 3 | ACTION -C
- S P G 2 | PROPORTIONAL GAIN* 0.01 to 100.0
- S T I 2 | TIME INTEGRAL 0.01 to 1000 MIA
- S T D 2 | TIME-DERIVATIVE 0.00 to 100.0
- S D G 2 | DERIVATIVE GAIN 0.00 to 100.0
- S M R 2 | MANUAL RESET** 0.0 to 100.0
- H C T 2 | TYPE -C PID/PID/PID
- H M R T | MANUAL RESET TRACKING** NO/YES

**Feedback**

- H I N P | INPUT P (PROCESS) 00 to 99
- H I N S | INPUT S (SETPOINT) 00 to 99
- H I N F | INPUT F (FEEDBACK) 00 to 99
- H I N A | INPUT A (ADAPTIVE-GAIN)** 00 to 99
- H I N C | INPUT C (TRACK COMMAND) 00 to 99

For additional controller see FB13.

* Does not apply to Type 3 (3C)  ** Type 2 only (PD)  *** Type 4 only (PIDA)
FB61
ANALOG OUTPUT #3 - B

AO3+ (C5)
AO3- (G6)

4-20 mADC

SIGNAL
ON/OFF

A
B

CZO3
ZERO OUTPUT

CF03
FULL SCALE OUTPUT

CV03
VERIFY OUTPUT

HINA
INPUT A (SIGNAL)

HINB
INPUT B (ON/OFF)

4-20 mADC

3.3 to 103.3%

00 to 99

00 to 99

For additional Analog Output see FB60 & 29.

FB62
GENERAL PURPOSE HOLD #2 - B

FB62
GEN. PURPOSE
HOLD #2

51
OUTPUT

SH4
HOLD VALUE

-3.3 to 103.3%

For additional General Purpose Hold see FB19.

FB63
GEN. PURPOSE TRACK & HOLD #2 - B

FB63
TRACK INPUT

68
OUTPUT

GEN PURPOSE
TRACK & HOLD
#2

TC
TRACK COMMAND

HINA
INPUT A

HINB
INPUT B

HINC
INPUT C

HIND
INPUT D

-3.3 to 103.3%

00 to 99

00 to 99

00 to 99

For additional General Purpose Track & Hold see FB18.
FB64 QUAD COMPARATOR -C

INPUT A E COMPARATOR 1
INPUT B F COMPARATOR 2
INPUT C G COMPARATOR 3
INPUT D H COMPARATOR 4

S T C 1 TRIP POINT - COMP 1 3.3 to 103.3%
S T C 2 TRIP POINT - COMP 2 3.3 to 103.3%
S T C 3 TRIP POINT - COMP 3 3.3 to 103.3%
S T C 4 TRIP POINT - COMP 4 3.3 to 103.3%
S D C 1 DEADBAND - COMP 1 0.1 to 100.0%
S D C 2 DEADBAND - COMP 2 0.1 to 100.0%
S D C 3 DEADBAND - COMP 3 0.1 to 100.0%
S D C 4 DEADBAND - COMP 4 0.1 to 100.0%
H C 1 A COMP 1 - ACTION REV/DIR
H C 2 A COMP 2 - ACTION REV/DIR
H C 3 A COMP 3 - ACTION REV/DIR
H C 4 A COMP 4 - ACTION REV/DIR
H I N A INPUT A 00 to 99
H I N B INPUT B 00 to 99
H I N C INPUT C 00 to 99
H I N D INPUT D 00 to 99
H I N E INPUT E 00 to 99
H I N F INPUT F 00 to 99
H I N G INPUT G 00 to 99
H I N H INPUT H 00 to 99

FB65 DELAY TIMER -B

INPUT A 89 OUTPUT

S D T DELAY TIME 0.0 to 300.0 SEC.
H I N A INPUT A 00 to 99
H D T T DELAY TIMER TYPE OFF/ON
H O P U POWER UP 100% NO/YES

FB65 DELAY TIMER -C

INPUT A 89 OUTPUT

S D T DELAY TIME 0.0 to 10000 SEC.
H I N A INPUT A 00 to 99
H D T T DELAY TIMER TYPE OFF/ON
H O P U POWER UP 100% NO/YES

FB66 BINARY COUNTER -B

INPUT A 88 OUTPUT

H I N A INPUT A 00 to 99

FB66 DIVIDE-BY 1 COUNTER -C

INPUT A 88 OUTPUT

S N COUNTER DIVISOR BIN. 2 to 128
H I N A INPUT (A) 00 to 99
H I N R RESET INPUT (R) 00 to 99
SMART TRANSMITTER INPUT OPTION -C

X-MTR "A"

X-MTR "B"

X-MTR "C"

SMART TRANSMITTER INPUT OPTION

FB97

CODE UNITS CONSOLE ABBREVIATION
0 Undefined
1 inches H2O at 68 Deg. F
2 inches Hg at 0 Deg. F
3 feet H2O at 68 Deg. F
4 millimeters H2O at 68 Deg. F
5 millimeters Hg at 0 Deg. F
6 pounds/square inch
7 bars
8 millibars
9 grams/square centimeter
10 kilograms/square centimeter
11 pascals
12 kilopascals
13 tons @ 0 degrees Celsius
14 atmospheres
15 cubic feet/minute
16 gallons/minute
17 liters/minute
18 imperial gallons/minute
19 cubic meters/hour
20 feet/second
21 meters/second
22 gallons/second
23 million gallons/day
24 liters/second
25 million liters/day
26 cubic feet/second
27 cubic feet/day
28 cubic meters/second
29 cubic meters/day
30 imperial gallons/hour
31 imperial gallons/day
32 degrees Celsius
33 degrees Fahrenheit
34 degrees Rankine
35 Kelvin
36 millivolts
37 ohms
38 hertz
39 milliamperes
40 milliamps
41 milliamps
42 millierms
43 millivolts
44 cubic meters
45 feet
46 meters
47 millimeters
48 centimeters
49 millimeters
50 miles
51 miles
52 hours
53 minutes
54 seconds
55 centipoise
56 micropoise
57 percent
58 volts
59 millivols
60 milligrams
61 kilograms

Myro XTC TRANSMITTER TYPE

1 PRESS/2 PRESS PID/3 TEMP/4 TEMP PID

+ Myro XTC TRANSMITTER ONLY

* Refers to input A, B or C. Replace with appropriate letter

(1) Transmitter Dependent
(2) -19999 to 19999

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<th>CODE</th>
<th>UNITS</th>
<th>ABBREVIATION</th>
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<th>UNITS</th>
<th>ABBREVIATION</th>
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<td>metric tons</td>
<td>MetTon</td>
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</tr>
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<td>lb</td>
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<td></td>
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<td></td>
<td>140</td>
<td>Undefined</td>
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<td>Mton/min</td>
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<td>Mton/h</td>
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<td>Reserved</td>
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<td>Mton/day</td>
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<td>&quot;Not Used&quot;</td>
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<td>pounds/second</td>
<td>lbs</td>
<td>151</td>
<td>percent steam quality</td>
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<td>81</td>
<td>pounds/minute</td>
<td>lb/min</td>
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<td>feet-in-sixteenths</td>
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<td>cubic feet/pound</td>
<td>CuFt/lb</td>
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<td>lb/day</td>
<td>154</td>
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<td>short tons (2000 pounds)/minute</td>
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<td>pound/inch</td>
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<td>g/Cm</td>
<td>162</td>
<td>% Plato</td>
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<td>kg/Cm</td>
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<td>% Plato</td>
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<td>Legal</td>
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<td>% Plato</td>
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<td>lb/CFt</td>
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<td>g/ml</td>
<td>166</td>
<td>% Plato</td>
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<tr>
<td>96</td>
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<td>kg/ml</td>
<td>167</td>
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<td>% Plato</td>
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<td>lb/CuI</td>
<td>169</td>
<td>% Plato</td>
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<td>ShTon/CuYd</td>
<td>170</td>
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<td>100</td>
<td>degrees true/80°Brix</td>
<td>deg°80B</td>
<td>171</td>
<td>% Plato</td>
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<td>173</td>
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<td>% Sol w</td>
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<td>183</td>
<td>% Plato</td>
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<td>184</td>
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<td>m/hr</td>
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<td>CuFt/h</td>
<td>190</td>
<td>% Plato</td>
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<td>barrels/second</td>
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<td>133</td>
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<td>bbl/minute</td>
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<td>% Plato</td>
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<td>barrels/hour</td>
<td>bbl/hr</td>
<td>194</td>
<td>% Plato</td>
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FB98
LINK INTERFACE OPTION -B

INPUTS

TO LINK

FROM LINK

OUTPUTS

RECEIVED DATA

FROM LINK

TRANSMITTED RECEIVED DATA

REC. TRANSMITTED RECEIVED DATA

INH

IN

IN

IN

IN

IN

INCL

LK + (B1)

LK - (B2)

LK + (B1)

LK - (B2)

EMERG L

H L S A LINK STATION ADDRESS 0 to 64
H L 1 P LOOP 1 PROCESS 00 to 99
H L 1 L LOOP 1 LIMITS (SETPOINT) NO/YES
H L 1 S LOOP 1 SETPOINT 00 to 99
H L 1 V LOOP 1 VALVE 00 to 99
H L 2 P LOOP 2 PROCESS 00 to 99
H L 2 L LOOP 2 LIMITS (SETPOINT) NO/YES
H L 2 S LOOP 2 SETPOINT 00 to 99

H L 2 V LOOP 2 VALVE 00 to 99
H L I N A INPUT A 00 to 107
H L I N B INPUT B 00 to 107
H L I N C INPUT C 00 to 107
H L I N D INPUT D 00 to 107
H L I N E INPUT E 00 to 107
H L I N F INPUT F 00 to 107
H L I N G INPUT G 00 to 107
H L I N H INPUT H 00 to 107
H L I N I INPUT L (EMERG. LOCAL) 00 to 99
H A 7 0 SOURCE ADDRESS, OUTPUT 70 0 to 64
H C 7 0 SOURCE CHANNEL, OUTPUT 70 0 to 256
H N 7 0 NUI STATUS TRIGGERED ON 70 NO/YES
H A 7 1 SOURCE ADDRESS, OUTPUT 71 0 to 64
H C 7 1 SOURCE CHANNEL, OUTPUT 71 0 to 256
H N 7 1 NUI STATUS TRIGGERED ON 71 NO/YES
H A 7 2 SOURCE ADDRESS, OUTPUT 72 0 to 64
H C 7 2 SOURCE CHANNEL, OUTPUT 72 0 to 256
H N 7 2 NUI STATUS TRIGGERED ON 72 NO/YES
H A 7 3 SOURCE ADDRESS, OUTPUT 73 0 to 64
H C 7 3 SOURCE CHANNEL, OUTPUT 73 0 to 256
H N 7 3 NUI STATUS TRIGGERED ON 73 NO/YES
H A 7 4 SOURCE ADDRESS, OUTPUT 74 0 to 64
H C 7 4 SOURCE CHANNEL, OUTPUT 74 0 to 256
H N 7 4 NUI STATUS TRIGGERED ON 74 NO/YES
H A 7 5 SOURCE ADDRESS, OUTPUT 75 0 to 64
H C 7 5 SOURCE CHANNEL, OUTPUT 75 0 to 256
H N 7 5 NUI STATUS TRIGGERED ON 75 NO/YES
H A 7 6 SOURCE ADDRESS, OUTPUT 76 0 to 64
H C 7 6 SOURCE CHANNEL, OUTPUT 76 0 to 256
H N 7 6 NUI STATUS TRIGGERED ON 76 NO/YES
H A 7 7 SOURCE ADDRESS, OUTPUT 77 0 to 64
H C 7 7 SOURCE CHANNEL, OUTPUT 77 0 to 256
H N 7 7 NUI STATUS TRIGGERED ON 77 NO/YES
H R L 0 RECORD TRANSFER LOCKOUT -C NO/YES
H P L 0 PARAMETER COMMAND LOCKOUT -C NO/YES

(continued on page 52)
LOCAL INSTRUMENT LINK PARAMETERS (EXTERNAL) - B

The following Model 352 information are configuration parameters for external devices of a Local Instrument Link (e.g. computers, control consoles, etc.). These parameters cannot be configured at the faceplate of the Model 352.

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<td>LOOP ALARMS MIMIC FB12</td>
<td>YES/NO</td>
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<td>L A 1 L</td>
<td>LOOP ALARM #1 LIMIT</td>
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<td>0.0 TO 100.0%</td>
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<td>L A 4 L</td>
<td>LOOP ALARM #4 LIMIT</td>
<td>0.0 TO 100.0%</td>
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<tr>
<td>A A 1 L</td>
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<td>0.0 TO 100.0%</td>
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<tr>
<td>A A 2 L</td>
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<td>0.0 TO 100.0%</td>
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<td>B A 1 L</td>
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<td></td>
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<td>B A 2 L</td>
<td>CHANNEL B ALARM #2 LIMIT</td>
<td>0.0 TO 100.0%</td>
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<td>C A 1 L</td>
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<td>0.0 TO 100.0%</td>
<td></td>
</tr>
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<td>C A 2 L</td>
<td>CHANNEL C ALARM #2 LIMIT</td>
<td>0.0 TO 100.0%</td>
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<tr>
<td>D A 1 L</td>
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<td>CHANNEL B ALARM #1 TYPE WORD</td>
<td>ATW</td>
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</tr>
<tr>
<td>B A 2 T</td>
<td>CHANNEL B ALARM #2 TYPE WORD</td>
<td>ATW</td>
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<tr>
<td>C A 1 T</td>
<td>CHANNEL C ALARM #1 TYPE WORD</td>
<td>ATW</td>
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</tr>
<tr>
<td>C A 2 T</td>
<td>CHANNEL C ALARM #2 TYPE WORD</td>
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<tr>
<td>D A 1 T</td>
<td>CHANNEL D ALARM #1 TYPE WORD</td>
<td>ATW</td>
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<tr>
<td>D A 2 T</td>
<td>CHANNEL D ALARM #2 TYPE WORD</td>
<td>ATW</td>
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</tr>
</tbody>
</table>

ATW – Alarm Type Word is a 12-bit word that defines the alarm type. Details on each type word can be found in the Model 352 Link Communications User’s Manual AD352-40.

LOCAL INSTRUMENT LINK PARAMETERS (EXTERNAL) - C

The following Model 352 information are configuration parameters for external devices of a Local Instrument Link (e.g. computers, control consoles, etc.). These parameters cannot be configured at the faceplate of the Model 352.

<p>| | | | |</p>
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<thead>
<tr>
<th></th>
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</tr>
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<td>CHANNEL A ALARM #2 LIMIT</td>
<td>-3.3 TO 103.3%</td>
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</tr>
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<td>CHANNEL A ALARM #3 LIMIT</td>
<td>-3.3 TO 103.3%</td>
<td></td>
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<td>B A 3 L</td>
<td>CHANNEL B ALARM #3 LIMIT</td>
<td>-3.3 TO 103.3%</td>
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<tr>
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<tr>
<td>B A 4 T</td>
<td>CHANNEL B ALARM #4 TYPE WORD</td>
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</tr>
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<td>C A 1 T</td>
<td>CHANNEL C ALARM #1 TYPE WORD</td>
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</tr>
<tr>
<td>C A 3 T</td>
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<td>ATW</td>
<td></td>
</tr>
<tr>
<td>C A 4 T</td>
<td>CHANNEL C ALARM #4 TYPE WORD</td>
<td>ATW</td>
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<td>CHANNEL D ALARM #1 TYPE WORD</td>
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<tr>
<td>D A 2 T</td>
<td>CHANNEL D ALARM #2 TYPE WORD</td>
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<td>CHANNEL D ALARM #3 TYPE WORD</td>
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<td>D A 4 T</td>
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</tr>
</tbody>
</table>

ATW – Alarm Type Word is a 12-bit word that defines the alarm type. Details on each type word can be found in the Model 352 Link Communications User’s Manual AD352-40.
**FB99**

**NO. 3 ANALOG INPUT OPTIONS**

- **V - OPTIONAL INPUT VOLTAGE**
  - A3+ (A10)
  - A3- (A9)
  - FB99
    - TRACK INPUT 1
    - TRACK COMMAND 1
    - OUTPUT
  - SFB 3: FILTER BREAKPOINT FREQ: 0.001 to 10.00 Hz
  - CZI 3: ZERO INPUT: 0.0 to 1.0 Vdc
  - CFI 3: FULL SCALE INPUT: 4.0 to 5.0 Vdc
  - CVI 3: VERIFY INPUT - B: 3.3 to 103.3%
  - HINT: INPUT T: 00 to 99
  - HINC: INPUT C: 00 to 99
  - HSRE: SQUARE ROOT EXTRACTOR: NO/YES

  * Used only with Computer Pulse input.

- **C - OPTIONAL INPUT COMPUTER PULSE**
  - A3+ (A10)
  - A3- (B10)
  - A3e (A9)
  - FB99
    - TRACK INPUT
    - TRACK COMMAND
    - OUTPUT
  - SFSP: FULL SCALE PULSES: 1.00 to 4.00 thousand
  - HINT: INPUT T: 00 to 99
  - HINC: INPUT C: 00 to 99

**OPTIONAL INPUT, MILLIVOLT OR THERMOCOUPLE**

- **A3+ (A10)**
- **A3- (B10)**
  - SENSOR BOARD (A8)
    - TRACK INPUT 1
    - TRACK COMMAND 1
    - OUTPUT
  - SFB 3: FILTER BREAKPOINT: 0.001 to 10.00 Hz
  - SRU: RANGE UNITS 1: MV, °F, °C: 1:2:3
  - SRL: RANGE LOW
  - SRH: RANGE HIGH
  - CZI 3: ZERO INPUT
  - CF1 3: FULL SCALE INPUT
  - CVI 3: VERIFY INPUT - B: 3.3 to 103.3%
  - C1ST: INPUT TYPE
    - HINT: INPUT T: 00 to 99
    - HINC: INPUT C: 00 to 99

**RANGE TABLE**

<table>
<thead>
<tr>
<th>COT</th>
<th>C79</th>
<th>CF8</th>
<th>L7</th>
<th>D7A</th>
<th>OPM</th>
<th>D7R</th>
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<td>0.00 MV</td>
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<td>1.00 MV</td>
<td>1.00 MV</td>
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<td>1000</td>
<td>10.00 MV</td>
<td>10.00 MV</td>
<td>10.00 MV</td>
<td>10.00 MV</td>
</tr>
</tbody>
</table>

* Range table: 300 to 750°F (185 to 400°C) for all software releases prior to release BR9.
DIGITAL CONTROLLER TUNING

These are general guidelines taken from Moore Products Co. Application Document AM-35. Tuning should only be attempted by a qualified person who has read AM-35 and is familiar with the process to be tuned, and understands how to prevent the process from entering unsafe conditions during tuning procedures.

Ziegler-Nichols Closed Loop Method

1. Bring the process to desired setpoint on manual control.
2. Eliminate integral and derivative action by adjustment – maximum integral time and minimum derivative time.
3. Adjust the proportional gain to the lowest setting and switch the control system to automatic.
4. Simulate a process upset by making a small, momentary change in the setpoint. Look for a sustained cycle in the measurement or controller output. If no cycle results, increase the proportional gain and try again. Repeat until a sustained cycle of continuous amplitude appears.
5. Note the lowest proportional gain at which cycling is sustained. This is the ultimate proportional gain PGU.
6. Time the cycle from peak to peak in minutes. This is the ultimate period Tu.
7. Determine controller adjustments from the table on side 2.

### OPTIONAL INPUT, FREQUENCY –B

<table>
<thead>
<tr>
<th>Setting</th>
<th>Description</th>
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<tbody>
<tr>
<td>SMXN</td>
<td>FREQ. RANGE – MIN.</td>
</tr>
<tr>
<td>SMAX</td>
<td>FREQ. RANGE – MAX.</td>
</tr>
<tr>
<td>SZDO</td>
<td>ZERO DROP OUT (% OF RANGE)</td>
</tr>
<tr>
<td>CIPV</td>
<td>INPUT PEAK VOLTAGE</td>
</tr>
<tr>
<td>CIVV</td>
<td>INPUT VALLEY VOLTAGE</td>
</tr>
<tr>
<td>CIL</td>
<td>INPUT VOLTAGE LEARN</td>
</tr>
<tr>
<td>HINT</td>
<td>INPUT T</td>
</tr>
<tr>
<td>HINC</td>
<td>INPUT C</td>
</tr>
</tbody>
</table>

* Used only with Computer Pulse Input.
Ziegler-Nichols Open Loop Method

1. Bring the process to the desired setpoint on manual control.
2. Change the valve position a small amount $\Delta V(\%)$. The change should be large enough to produce a measurable response in the process, but not large enough to drive the process beyond normal operating range. A 5% valve change is a good starting point.
4. Calculate $P_G u = \frac{2(\Delta V)}{\Delta C}$, $T_u = 4L$.

5. Determine controller settings from the table below.

<table>
<thead>
<tr>
<th>TYPE OF CONTROLLER</th>
<th>P</th>
<th>PI</th>
<th>PD*</th>
<th>PID</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proportional Gain (PG)</td>
<td>0.5 $P_G u$</td>
<td>0.45 $P_G u$</td>
<td>0.71 $P_G u$</td>
<td>0.6 $P_G u$</td>
</tr>
<tr>
<td>Integral (TI - min.)</td>
<td></td>
<td>0.83 $T_u$</td>
<td></td>
<td>0.5 $T_u$</td>
</tr>
<tr>
<td>Derivative (TD - min.)</td>
<td></td>
<td></td>
<td>0.15 $T_u$</td>
<td>0.125 $T_u$</td>
</tr>
</tbody>
</table>

* Not from original 2 ft paper

REAR TERMINAL ASSIGNMENTS

COLUMN "A"

A10 - AC SUPPLY, HOT, OR DC (+)
A11 - AC SUPPLY, NEUTRAL, OR DC (-)
A12 - CASE (SAFETY) GROUND
A13 - ANALOG INPUT 1 (+) (FB04)
A14 - ANALOG INPUT COMM (-) (FB04)
A15 - ANALOG INPUT 2 (+) (FB02)
A16 - ANALOG OUTPUT 1 (+) (FB03)
A17 - ANALOG OUTPUT COMM (-) (FB03)
A18 - OPTIONAL NO. 3 INPUT (FB99)
A19 - INPUT (ANALOG INPUT NO. 3 (+)

COLUMN "B"

B1 - LINK (+) (FB98)
B2 - LINK (-) (FB98)
B3 - NO CONNECTION
B4 - DIGITAL OUTPUT 1 (+) (FB04)
B5 - +26 VDC TRANSMITTER SUPPLY (FB05)
B6 - DIGITAL OUTPUT 2 (+) (FB05)
B7 - DIGITAL OUTPUT COMM (-) (FB06)
B8 - DIGITAL INPUT 1 (+) (FB06)
B9 - DIGITAL INPUT 1 (-) (FB06)
B10 - OPTIONAL NO. 3 INPUT (FB99)

COLUMN "C"

C1 - RELAY 1 OUTPUT NORMALLY OPEN (FB32)
C2 - RELAY 1 COMM (FB32)
C3 - RELAY 1 OUTPUT (FB32)
C4 - NO CONNECTION
C5 - ANALOG OUTPUT 3 (+)
C6 - ANALOG OUTPUT 3 COMM (-)
C7 - DIGITAL INPUT 2 (+) (FB30)
C8 - DIGITAL INPUT 2 (-) (FB30)
C9 - DIGITAL INPUT 3 (+) (FB31)
C10 - DIGITAL INPUT 3 (-) (FB31)

COLUMN "D"

D1 - RELAY 2 OUTPUT NORMALLY OPEN (FB33)
D2 - RELAY 2 COMM (FB33)
D3 - RELAY 2 OUTPUT (FB33)
D4 - ANALOG INPUT 4 (+) (FB25)
D5 - ANALOG INPUT 4 COMM (-)
D6 - ANALOG INPUT 5 (+) (FB26)
D7 - ANALOG INPUT 5 (-) (FB27)
D8 - ANALOG INPUT 6 (+) (FB28)
D9 - ANALOG OUTPUT 2 (+) (FB29)
D10 - ANALOG OUTPUT 2 (-) (FB29)

* All analog input, analog output and digital output commons are connected within the controller.
FACTORY CONFIGURED OPTIONS

These are configurations stored in permanent memory (EPROM) that can be transferred to the configuration memory (EEPROM) with a single keystroke. A complete listing of all the factory configured options is given below. As an example, the complete documentation for FCO-01 is listed on the following pages. Complete documentation for other factory configured options can be found in the MYCRO 352 User's Manual AD352-10.

FCO 00......................... ESN Reset (ESN = 00)
FCO 01......................... Single-Loop PID Controller (TSP)
FCO 02......................... Single-Loop PID Controller (NTSP) – B
FCO 03......................... External-Set PID Controller (TSP) – B
FCO 04......................... External-Set PID Controller (NTSP) – B
FCO 05......................... Ratio-Set PID Controller (TSP) – B
FCO 06......................... Loading Station – B
FCO 07......................... A/M Station – B
FCO 08......................... A/M Station w/Bias – B
FCO 09......................... Indicator – B
FCO 10......................... Default Configuration – B
FCO 11......................... Single-Loop PID Controller (TSP) – C/L Operation – B
FCO 12......................... Single-Loop PID Controller (NTSP) – C/L Operation – B
FCO 13......................... External-Set PID Controller (TSP) – C/L Operation – B
FCO 14......................... External-Set PID Controller (NTSP) – C/L Operation – B
FCO 15......................... Ratio-Set PID Controller (TSP) – C/L Operation – B
FCO 16......................... Loading Station – C/L Operation – B
FCO 17......................... A/M Station – C/L Operation – B
FCO 18......................... A/M Station w/Bias – C/L Operation – B
FCO 19......................... Indicator – C/L Operation – B
FCO 20......................... Single Station Cascade
FCO 21......................... Single-Loop Controller w/Feedforward
FCO 40......................... ** Computer-Set A/M Transfer
FCO 41......................... ** DDC Control
FCO 42......................... ** Computer-Set Supervisory Control – B

FCO 11 to 19 – Only available when link interface installed
FCO 20 to 21 – Only available when expander board installed
FCO 40 to 42 – Only available when computer push board installed

** Not available with "C" level software.

FACTORY CONFIGURED OPTION – 01

SINGLE-LOOP PID CONTROLLER
WITH
- HI/LO PROCESS ALARMS
- TRACKING SETPOINT

LOOP DIAGRAM

PROCESS

FB13

FB12

FB17

FB83

HI ALARM

LO ALARM

FB15 DISPLAY INPUTS

A01 (A1)
A0C (AB)

VALVE

FB83 OUT

FB14

A/M

A

V

A

C

S

S

F

B

P

A

B

C

D

E

F

G

H

I

J

K

L

M

N

O

P

Q

R

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V

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