
Autotech Controls

M8251 LBus PLS Module

Instruction & Operation Manual

CAUTION: The M8251 LBus PLS (P/N ASY-M8251-010) is not interchangeable with ASY-M8251-PLS, ASY-M8251-FPLS or ASY-M8251-PLS/S applications. There are wiring differences. Read this manual in its entirety before installation.

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1. Introduction

Autotech's PLS and Mini-PLS families have continually set the standard for speed, precision, reliability, and product features in the Programmable Limit Switch marketplace. While retaining the key features and high standards of other Autotech products, the M8251 LBus PLS combines 16 outputs, fault detection and indication, eight user-defined PLS setups, and simple, easy-to-learn programming in one compact unit.

In addition, if you program the setpoints for each channel through the front panel keys, each of the eight PLS setups supports up to 160 ON/OFF setpoint pairs (that may be used in any combination of 80 each of the low and high 8 channels.) There are only 112 ON/OFF setpoint pairs (that may be used in any combination of 56 each on the low and high 8 channels) when programmed through the backplane. Included are a fault output and a motion detector that energize when the resolver is rotating between motion limits.

Figure 1, System Overview, depicts one physical slot in the I/O rack to which one cradle has been installed. The cradle, which carries a PLS and an Output module, is specific to the programmable controller type, and may require more than one slot in an I/O rack.

Powerful, Easy to Learn, Man - Machine Interface

Autotech's human factors engineering has made it possible to program all PLS functions from either the backplane via a specific PLC or by using the five front-panel keys and a smart front-panel display. With the five self-explanatory programming keys, programming the M8251 LBus PLS is extremely simple. There are no long complex key sequences to remember.

Simultaneous display of related parameters for easy understanding

In the normal operating mode, the display indicates the selected PLS setup number, the current resolver RPM, and the shaft position. When programming PLS setpoints, the display shows the selected channel number and the selected ON and OFF setpoints.

Individual Speed Compensation for all 16 PLS Outputs

The M8251 LBus PLS features a rate offset to compensate for speed variations. This rate offset represents a positive number that varies linearly with RPM. The rate offset is added to the resolver position and is used to advance the PLS settings as a function of the machine speed. In the M8251 LBus PLS, the rate offset can be programmed in scale factor units per 100 rpm up to full scale factor value.

Patented "↑" and "↓" Keys for fine tuning in motion

Most programmed values can be adjusted with the machine running, making fine tuning of job parameters easy. However, when the Program Enable input is FALSE setpoint and setup changes are disabled, avoiding accidental or unauthorized setup changes can be difficult.

Multiple Setup Storage Makes Job Changeover Easy

The M8251 LBus PLS can store up to eight independent, user-defined PLS setups for different machine setups. The M8251 can accept either a front-panel, a PLC command, or a serial link command to select a setup.

Optically Isolated Inputs and Outputs

All M8251 inputs and outputs are fully isolated to provide outstanding electrical noise immunity in harsh industrial environments.

Built-In Fault Detector

The Fault Output is normally energized when the M8251 LBus PLS is operating normally and the resolver wiring is intact. If an internal M8251 fault is detected, the power fails, one or more of the resolver wires is broken or disconnected, the Fault output, the PLS outputs, and the motion output will de-energize.

Built-In Tachometer and Motion Detector

The built-in tachometer and motion detector are updated over 68 times per second to provide fast, accurate indication and detection of rotary motion. The motion detector is programmed to energize an output when the machine's RPM is between the motion low and high limits.

Inputs and Outputs

The M8251 Module uses a separate output module for output functions that allow the user to select either sourcing or sinking drivers. Consult Autotech Controls' M8250 Sourcing or M8250 Sinking Output Module Manual (manual part numbers MAN-M8250-POUT and MAN-8250-NOUT, respectively).

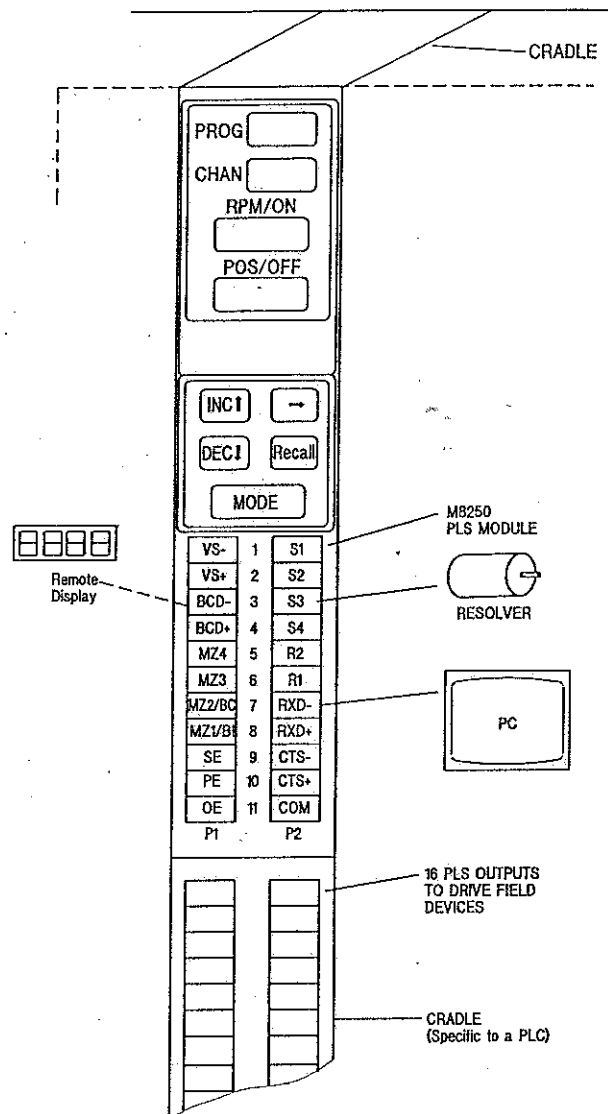


Figure 1. M8251 LBus PLS System Overview

Decimal Address: 132

I/O Status (16 Bit)

MSD¹LSD¹

X	X	X	X	DNGR	CTN	MOT	BW	MZ4	MZ3	MZ2/BC	MZ1/BI	FO	OE	SE	PE
---	---	---	---	------	-----	-----	----	-----	-----	--------	--------	----	----	----	----

X = Not Used

0 = No input

1 = Input present

DNGR = Danger Output; fail safe

0 = Stopping time exceeds the danger limit

1 = Stopping time is within the danger limit

CTN = Caution Output

0 = Stopping time is within the caution limit

1 = Stopping time exceeds the caution limit

MOT = Motion Output

0 = RPM exceeds the Motion Hi/Low Limit

1 = RPM within the Motion Hi/Low Limit

BW = Broken Wire

0 = Broken wire fault

1 = No broken wire fault

MZ1/BI = Mod Z Input 1 (Modification to zero)
or Brake Input*Mod Z Input 1:*

0 = No input

1 = Input present

Brake Input:

0 = Brake input present (Brake Mode)

1 = Brake input not present (Run Mode)

MZ2/BC = Mod Z Input 2 (Modification to zero)
or Brake Clear

MZ3 = Mod Z Input 3 (Modification to zero)

0 = No input

1 = Input present

MZ4 = Mod Z Input 4 (Modification to zero)

0 = No input

1 = Input present

FO = Fault Output (diagnostic); fail safe

0 = Fault

1 = No fault

OE = Output Enable

0 = No input

1 = Input present

SE = Supervisor Enable

0 = No input

1 = Input present

PE = Program Enable

0 = No input

1 = Input present

*(Either hard wired input or MZ1 in ModZ and
Brake inputs)*

Decimal Address: 160

ModZ (Modification to Zero) & Brake Inputs (16 Bit)

MSD

LSD

X	X	X	X	X	X	X	X	X	X	X	X	X	MZ4	MZ3	MZ2/BC	MZ1/BI
---	---	---	---	---	---	---	---	---	---	---	---	---	-----	-----	--------	--------

X = Not Used

(ModZ and brake cannot be used together)

MZ1/BI = Mod Z/Brake Input

Brake: 0 = input present (Brake Mode),

1 = not present (Run Mode)

MZ2/BC = Mod Z/ Brake Clear

MZ3 = Mod Z

MZ4 = Mod Z

¹ MSD = Most significant digit
LSD = Least significant digit

Decimal Address: 256

Read/Write Error and Address (14 Bit)

MSD										LSD			
EADD	EADD	EADD	EADD	EADD	EADD	EADD	EADD	EADD	EADD	ENUM	ENUM	ENUM	ENUM

EADD = Error Address

06 Program enable input not active

ENUM = Error Number

07 Attempting fine tuning on bad address

01 Attempt to fine tune nonexisting dwell

08 Access to fine tuning control word not available

02 New dwell is out of range

03 Programming a parameter during motion

09 Attempt to program higher than first dwell when in time-off mode.

04 Value out of range

05 Function module busy

Decimal Address: 272

Group Types (14 Bit)

MSD										LSD			
X	X	X	X	X	X	X	X	X	X	GN4	GN3	GN2	GN1

X = Not used**GN1- GN4** = Group Number 1, 2, 3, or 4

0 = PLS

1 = MODZ

Decimal Address²

Group# + 256* Channel Type (14 Bit)

MSD										LSD			
X	X	X	X	X	ALCH	X	X	X	X	GRP	GRP	GRP	

X = Not used**ALCH**= All Channels

0 = ANGLE On/Off

1 = ANGLE On/Time Off

GRP = Group

000 = 0

001 = 1

010 = 2

011 = 3

100 = 4

Group # + 256* Chan Type's decimal address depends upon channel number (e.g., Decimal Address for Channel 1 is 324)

2. Specifications

Power Requirements:

Rack : 5 VDC @ 650 mA

Customer: 24 VDC @ 100 mA

Operating Temperature:

-10 to 130° F (-23 to 55° C)

PROGRAMMING

Number of PLS Setups: 8

PLS Setpoints: 160 per PLS setup (80 per group of 8 outputs)—Front Panel. 112 per PLS Setup (56 per group of 8 outputs) — Backplane

Scale Factor:

Programmable from 16 to 999, common to all PLS setups (resolution 17 to 1000 counts/turn)

Offset:

Programmable from 0 to Scale Factor Value, common to all PLS setups

Speed Compensation:

Programmable in scale factor units per 100 rpm, up to full scale factor value. Each PLS channel has its own speed compensation.

Motion Detector:

Low and High Motion Limits, common to all PLS setups. Programmable from 0 to 1999 RPM

Update Time:

1.6 msec. for ASY-M8251-010
Maximum Speed with 1° Resolution
100 RPM for ASY-M8251-010
0.8 msec. for ASY-M8251-F10
200 RPM for ASY-M8251-F10

RESOLVER INTERFACE

Position transducer: Resolver, Autotech Series RL100, RL101, RL500, E1R, E7R, E8R, E9R or equivalent

Cable Length between Resolver and M8251:
2500 feet max, shielded

Resolver Cable: Overall foil shielded, twisted pair, such as Autotech's cable CBL-10T22-XXXX

Maximum Resolver Shaft Speed: 2000 RPM

Resolver Decoder: Ratiometric

CONTROL INPUTS

Electrical specifications: (All Inputs)

Optical Isolation: 2500 V

Input impedance: 7500 Ohms

Logic Levels (See wiring section for typical schematic)

TRUE: 20 VDC to 30 VDC; 3 mA @ 24 VDC

FALSE: 0 to 2 VDC or open circuit

Program Enable (PE):

When TRUE, enables setpoint programming

Supervisor Enable (SE):

When TRUE, enables setpoint and setup (scale factor, offset, program # etc.)

— continued

2. Specifications — continued

Output Enable (OE):

When TRUE, PLS Channel outputs enabled, (both Fault and Motion always enabled)

ModZ and Brake Inputs (MZ1/BI = ModZ input 1 or Brake Input; MZ2/BC = ModZ input 1 or Brake Clear; MZ3 = ModZ Input 3; MZ4 = ModZ Input 4):

ModZ inputs when TRUE enables Modification to Zero
Brake Input when TRUE enables Run Mode, when FALSE enables Brake Mode
Brake Clear when TRUE clears Stopping Time and returns to Caution Condition

OUTPUTS

An output module is required for connection to field devices. Consult Autotech Controls' M8250 Sourcing or M8250 Sinking Output Module Manual (manual part numbers MAN-M8250-POUT and MAN-8250-NOUT, respectively).

Fault Output:

Normally energized; de-energizes if broken resolver wire or M8251 internal fault is detected.

Motion Output:

Output energized whenever resolver RPM is between programmed motion limits.

PLS Outputs:

Number of PLS Outputs: 16

3. Installation and Wiring

Refer to figure 2 and the following installation and wiring tables 1 through 4 for connections to Autotech's M8251 LBus PLS Module, Part Number ASY-M8251-010.

Table 1. P1 Terminal Block

Terminal #	Designator	Function/Description
1	VS-	24 VDC external power source
2	VS+	
3	BCD-	Do not connect
4	BCD+	
5	MZ4	ModZ trigger input for Group 4
6	MZ3	ModZ trigger input for Group 3
7	MZ2/BC	ModZ trigger input for Group 2/Brake Clear
8	MZ1/BI	ModZ trigger input for Group 1/Brake Wear Input (see wiring note below)
9	SE	Supervisor Enable Input
10	PE	Program Enable Input
11	OE	Output Enable Input

Input BI (Terminal 8) must be wired as follows:

- Input BI must be TRUE when brake is applied (clutch is disengaged)
- Input BI must be FALSE when brake is disengaged (clutch is applied)

Table 2. P2 Terminal Block

Terminal #	Designator	Function/Description
1	S1	Resolver (Stator)
2	S2	
3	S3	
4	S4	
5	R2	Resolver (Rotor)
6	R1	
7	RXD-	Receive/Transmit data line for RS485 Serial Port
8	RXD+	
9	CTS-	CTS/RTS Handshake line for RS485 Serial Port
10	CTS+	
11	COM	Serial Common

3. Installation and Wiring — continued

**Table 3. CBL-09S22-DAxxxx Cable
Serial Port Wiring**

Wire Color (twisted pairs)	M8251 Terminal		DB9 Connector Pin
	Term. #	Function	
Yellow-Black	P2-7	RXD-	3
White-Black	P2-8	RXD+	4
Red-Black Yellow	P2-9 P2-9	CTS-	7 5
Blue-Black White	P2-10 P2-10	CTS+	8 6
Red	P2-11	COM	9

**Table 4. CBL-10T22-xxx Cable
Resolver Wiring**

Wire Color (twisted pairs)	Terminal #	Resolver Terminal #	Connector Pin on MS Connector
Yellow-Black Yellow	P2-1 P2-3	S1 S3	D C
Blue-Black Blue	P2-2 P2-4	S2 S4	B A
Green-Black Green	P2-6 P2-5	R1 R2	F E
Shield		Gm Gnd	G

To change the resolver ascending count direction, reverse the S1 and S3 connections.

3. Installation and Wiring — continued

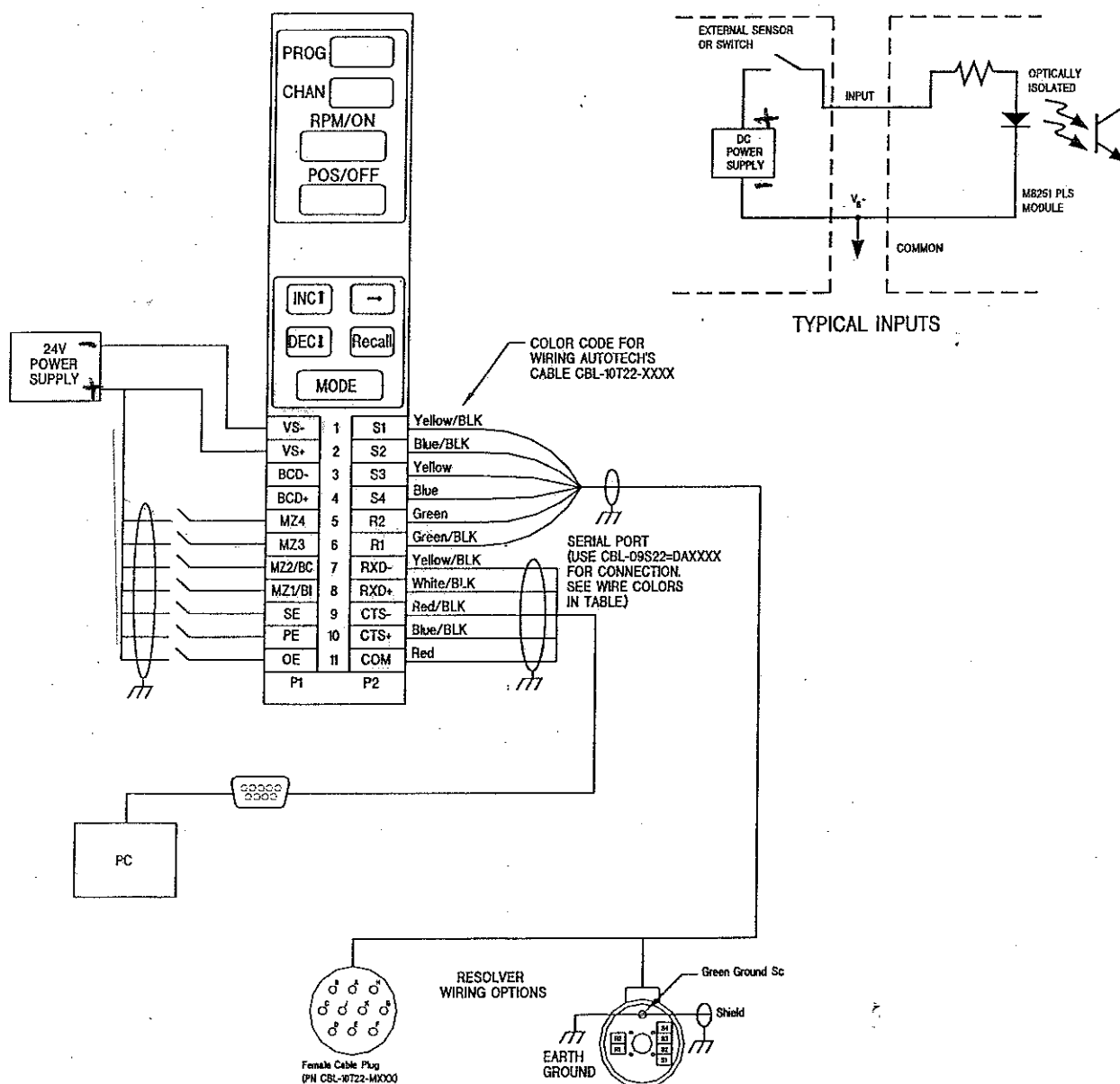


Figure 2. M8251 LBus PLS Module Wiring

4. Programming the M8251 LBus PLS Module

4.1 Overview

The M8251 LBus PLS Module can be programmed using one or more of the following:

- Keypad on the module
- IBM PC or a compatible computer
- PLC

Programming of the module using the Keypad is covered in this section. Programming through an IBM PC is covered in Autotech's Graphic PLS Interface Manual, Part Number PPC-M1051-00B. Programming through a PLC is described in the specific PLC manual.

On the M8251 LBus PLS, the different modes are accessed by repeatedly pressing the MODE key until the desired mode is displayed. The M8251 will automatically return to the Default Display Mode if left in some other mode for more than one minute without any key presses.

4.2 Definitions

This section defines nine commonly used terms associated with the M8251 LBus PLS Module programming instructions. These terms include:

- Program
- Keypad & Displays
 - INC/DEC Keys
 - Right Arrow Key
 - Recall Key
 - Default Display
 - Cable Fault Display
- Groups
- ModZ Inhibit Zone
- Channel

Program

There are eight distinct setups that may be preprogrammed into the M8251 LBus PLS. The setups are identified by a Program Number from 1 to 8.

Keypad & Displays

Figure 3 shows the front view of the PLS module. The programming key sequences are fairly similar for all modes. Key Functions are described below.

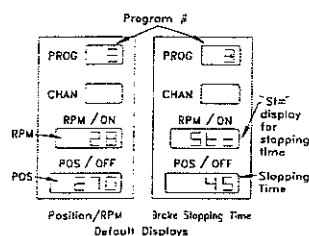
INC/DEC Keys — Blinking digits in a window indicate that the window's contents may be changed; numbers will be incremented or decremented, non-numerical selections will scroll to other selections. Channel and Group Numbers in the second window can always be increased and decreased to display the information about those items. However, programming must be enabled (PE input TRUE), to edit the values in the other windows below.

Right Arrow Key — If programming is enabled, use the Right Arrow Key to move from one window to the other. Editing may occur in the window with the blinking digits. Also, from the Default Mode, the Right Arrow Key will cause either the RPM and Position, or the Brake Stop Time to be displayed.

Recall Key — The Recall Key is used to recall setpoints in Channel Setpoint Mode. Also, from the Default Mode, the Recall Key jumps directly to the Setpoint Programming Mode.

Default Display — On power up, the PLS module displays one of the following two displays:

- 1) Program Number, Tachometer RPM, Base Position, or;
- 2) Program Number, Brake Stop Time in seconds (St=x.xx).



— continued

4. Programming — continued

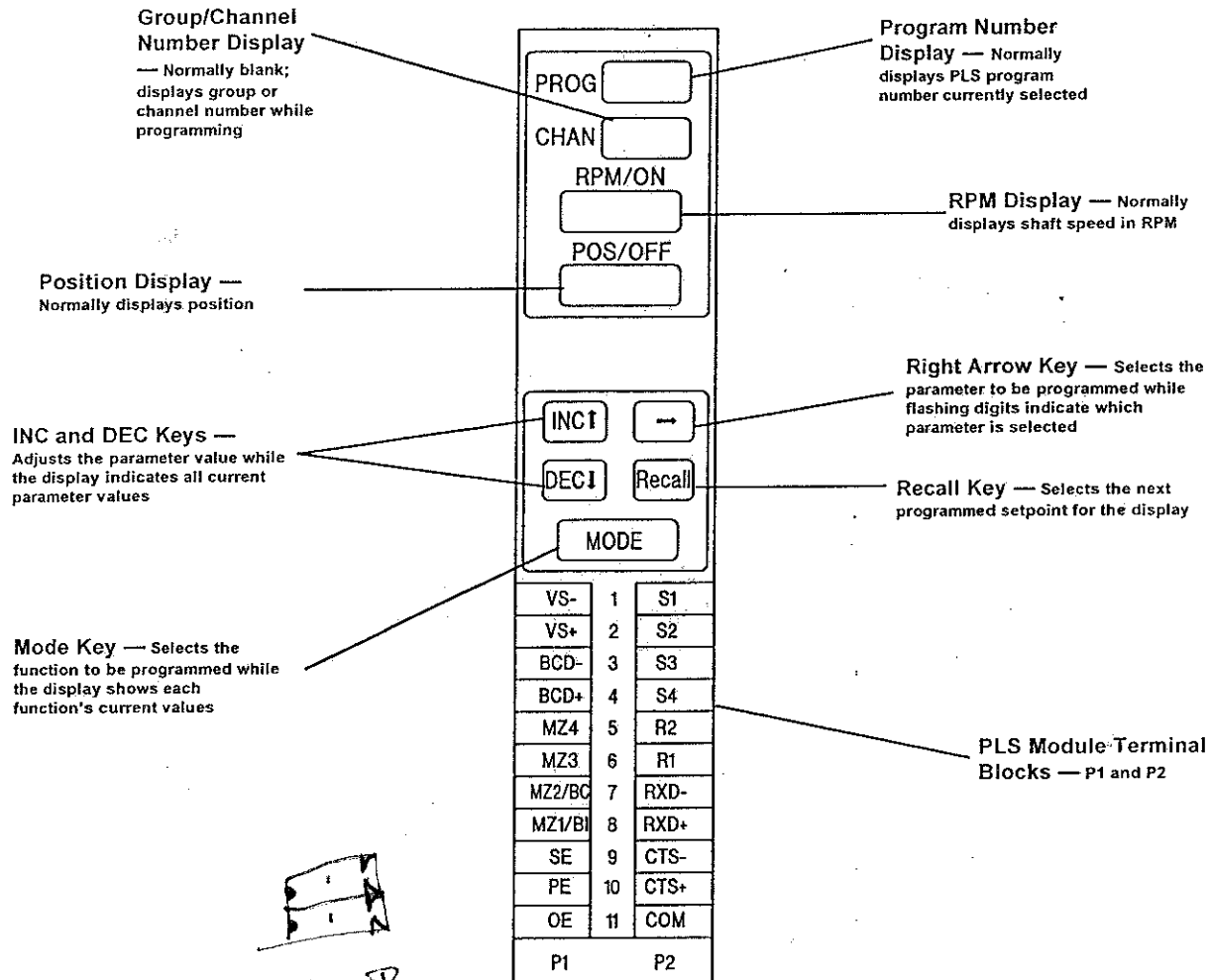
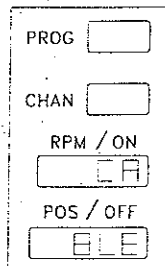


Figure 3. M8251 LBus PLS Module Keypad and PLS Terminal Blocks (P1 and P2)

4. Programming — continued

Cable Fault Display — In the event of a resolver cable fault, the message “CABLE” will be flashing in the RPM and Position windows:



Groups

Output channels may be “associated” or grouped together into one of four extra, independent groups. The base group is always PLS (Normal Programmable Limit Switch) type, while groups 1–4 may be defined as PLS or ModZ type. Each PLS group has its own group offset while each ModZ group has its own ModZ input and a ModZ inhibit zone. This creates the effect of having 5 independent M8251’s running from the same resolver. This can be a very powerful and useful feature when it is desirable to control several different types of processes that are all driven by the same shaft.

ModZ Inhibit Zone

If the Group Type is ModZ, the Group Offset is not used. Instead, there is a parameter called the Inhibit Zone. The ModZ Inhibit Zone is an angular zone where the ModZ cycle may not be retriggered. The Inhibit Zone begins when the ModZ cycle is originally triggered (angle = 0), and continues up to the preprogrammed angle. Once the ModZ cycle has progressed beyond this Inhibit Zone, the ModZ cycle may be restarted by retriggering the ModZ input. A group may not be selected as a ModZ group if the Brake Wear Monitor is in use (i.e., the Brake Wear Limits are nonzero — see paragraph 4.4, *Programmable Options, ModZ*, this manual).

Channel

There are 16 independent output channels, each of which contains its own setpoint program to turn the output on or off at different shaft angles. Each channel also contains its own speed compensation factor so that propagation delays from output to process may be compensated for. Each channel is associated with one of the five groups; the default is the base group. Figure 4 shows the relationship between groups and channels.

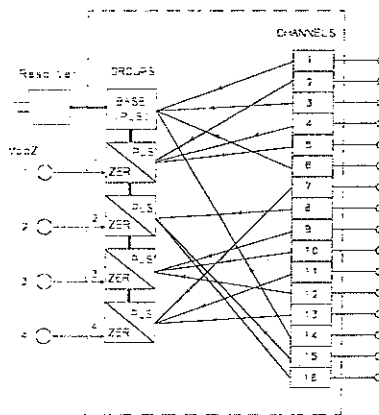


Figure 4. Groups and Channels Relationships

4.3 What needs to be programmed?

The module has many programmable parameters. Some of the parameters are program independent (i.e., they are common to all programs in the unit), while others are program specific. *Note that the M8251 LBus PLS can store 8 different setups (programs).* The current program is selected using the keypad, by a PLC command, or from the serial link.

Program Independent or Global Parameters

Table 5 summarizes program independent or global parameters. There are 16 independent output channels, each of which contains its own

Setpoint program to turn the output on or off at different resolver angles. Each channel also contains its own speed compensation factor so that device response time may be compensated for. Inputs PE and SE control independent programming and viewing of the parameters. Both inputs must be TRUE to allow programming of all the parameters. *Programming Reference*, Section 5.0, provides complete key sequences for programming a parameter.

Program Dependent Parameters

Table 6 summarizes program dependent parameters.

Table 5. Program Independent Parameters		
Parameters are common to all programs in the M8251 LBus PLS Module		
Parameter	Definition	Range
Scale Factor (Prog. Mode 1)	Maximum number of counts per revolution; minus 1 (i.e., 999 Scale Factor gives 1000 counts/revolutions)	16-999 Default: 359 to work in degrees
Base Offset (Prog. Mode 2)	Counts to be added to resolver position. It is used to align resolver zero to machine zero.	0 to Scale Factor Default: 0
Motion Limits, High & Low (Prog. Mode 8)	Motion output energizes if resolver moves within these limits.	0 to 1999
Program Number (Prog. Mode 9)	Setup or Program number.	Range: 1-8 Default: 1
Station Number (Prog. Mode 10)	Unique node number for serial communication	0 to 255 Default: 16
Baud Rate (Prog. Mode 11)	Serial communication baud rate	110, 300, 600, 1200, 2400, 4800, 9600 Default: 9600

Table 6. Program Dependent Parameters		
Parameters specific to a program		
Parameter	Definition	Range
Speed Compensation (Prog. Mode 6)	A constant number in scale factor units to advance setpoints (dwells) based on resolver speed. Programmed in counts per 100 RPM.	0 to Scale Factor Default: 0 Programmed for each channel separately.
Brake Wear Monitor, Danger & Caution Limits (Prog. Mode 7)	Caution and danger limits for brake wear monitoring control outputs 7 and 8. If limits are 0, the outputs function as normal PLS outputs.	Range: 0 to 9.99 sec. Default: 0 Caution limit is less than Danger limit
Setpoints, ON & OFF for as many channels as required (Prog. Mode 12)	The associated output is energized at ON setpoint, and de-energized at OFF setpoint or Time-Off	Range: 0 to Scale Factor Multiple dwells possible in a channel. Maximum number of dwells = 80 per 8 channels Default: 0

4.4 Programmable Options

Speed Compensation

Speed compensation is used to advance/retard a programmed dwell dynamically based on resolver speed. This feature is useful to compensate for field device's response time. For example, consider an output driving a solenoid with a turn ON time of 10 ms. The application requires that the solenoid turns ON at 120 degrees, regardless of machine speed (i.e., turn ON the output 10 ms before machine reaches 120 degrees). That is, if the machine is running at 60 RPM, output needs to be turned ON at approx. 117 degrees. At 120 RPM, the same output needs to be turned ON at 114 degrees. See *Mode 6, Programming Reference*, Section 5.0, for programming instructions on Speed Compensation.

Brake Wear Monitor

The M8251 LBus PLS has a programmable option to monitor wear on the machine brakes. To use this feature, the user needs to program two time limits, called Caution and Danger. A nonzero caution/danger limit indicates that the brake wear monitor feature is in use. With brake wear monitor, outputs 7 & 8 act as caution and danger outputs instead of normal PLS outputs. See *Mode 7, Programming Reference*, Section 5.0, for programming instructions for Brake Wear.

ModZ

Modification to zero (ModZ) is mutually exclusive with Brake Wear Monitor. ModZ works in the following way:

- a. If a group is defined as ModZ, all the channels belonging to it are ModZ channels.
- b. ModZ group is controlled by the corresponding ModZ input on the PLS terminal block P1.
- c. When a false-to-true transition is detected on the ModZ input, the current angle becomes the new reference of "0" point. All the

setpoints on the ModZ channels will be referenced to this point. ModZ channels will be referenced to this point. ModZ cycle terminates when one full resolver revolution is made.

CAUTION

Setpoints crossing "0" may give undesirable results when programmed into a ModZ output channel because the M8251 LBus PLS will react as if two setpoints were programmed: one beginning at zero, the other ending at zero.

Care should also be taken when programming ModZ setpoints and Speed Compensation into a PLS channel because too much Speed Compensation could cause a similar setpoint split or even cause a beginning of cycle setpoint to occur at the end of the cycle.

- d. To start a new ModZ cycle, ModZ input must make a new false-to-true transition.

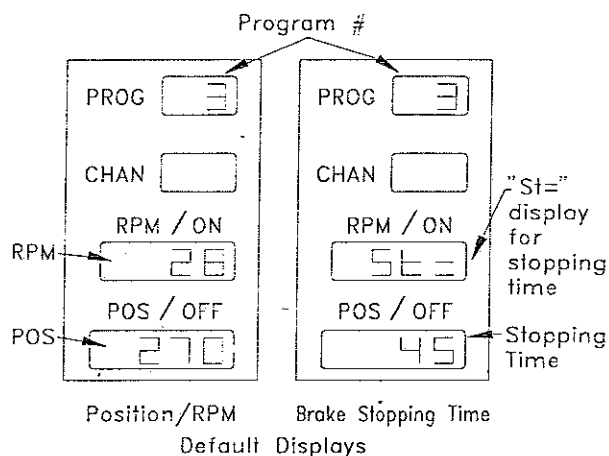
See *Mode 3, Group Type Definition, Programming Reference*, Section 5.0 for ModZ programming instructions.

5. Programming Reference

Mode: Default Displays

The module has two possible default display modes: (1) Position/RPM or (2) Brake Stopping time display. The right arrow key toggles the default display between these two display modes. On power up, or time out, the display returns to the current default display. The following table shows action in response to different key presses:

Key Pressed	Response
MODE	Switch to Mode 1 if SE TRUE or Mode 12 if SE FALSE
INC/DEC	Shows GR1-4 position + RPM If Group is undefined, POS=NULL
Right Arrow	Toggle between POS/RPM and Brake Stopping Time
Recall	Calls up setpoints

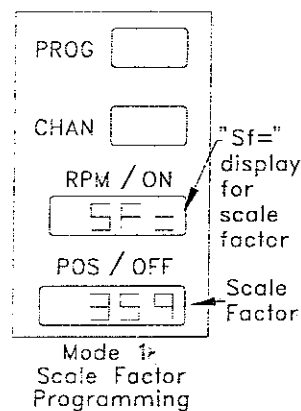


Mode 1: Scale Factor

Control Inputs: SE must be TRUE; PE must be TRUE for programming

Previous Mode: Default Mode

The Scale Factor is the desired counts per turn minus one. For example, to work in degrees, program the Scale Factor to 359. The allowed range of values is 16 to 999. The Scale Factor is common to all Setups. The following table shows action in response to different key presses:



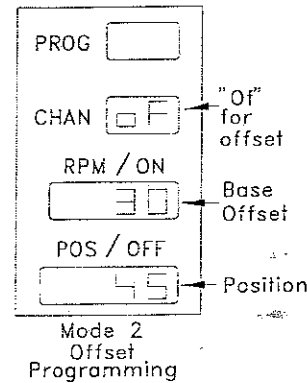
Key Pressed	Response
MODE	Switch to Mode 2 if SE TRUE
INC/DEC	If PE is TRUE, Increment/Decrement blinking scale factor.
Others	No response
None	Display times out and returns to current default display

Mode 2: Base Offset

Control Inputs: SE must be TRUE; PE must be TRUE for programming

Previous Mode: Mode 1 (Scale Factor)

The Offset value is used to electronically align the resolver zero to machine zero. This feature allows mounting of resolver without regard to realignment. The allowed range for the offset is 0 to Scale Factor. The Offset is common to all setups. The current Offset is displayed in RPM/ON window, while the POS/OFF window shows position (which includes offset, i.e., Displayed Position = Resolver Position + Offset).



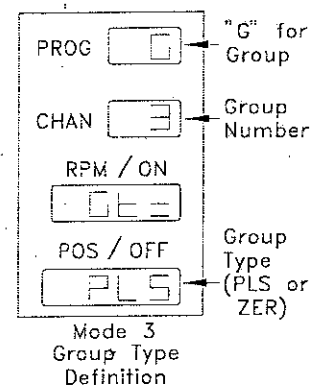
Key Pressed	Response
MODE	Switch to Mode 3 if SE TRUE
INC/DEC	If PE is TRUE, Increment/Decrement blinking Offset (in RPM/ON window)
Others	No response to Recall & Right Arrow Keys
None	Display times out and returns to current default display

Mode 3: Group Type Definition

Control Inputs: SE must be TRUE; PE must be TRUE for programming

Previous Mode: Mode 2 (Offset)

The M8251 LBus PLS has a feature to associate outputs with up to 5 groups. These groups are called Groups 1 through 4 and Base. Base Group is the default group for all outputs (no ModZ feature associated with it). Groups 1 through 4 can individually be defined as PLS or ModZ ("Zer") groups. ModZ means Modified Zero.



A PLS Group can have an additional offset (in addition to base offset) called Group Offset — common to all associated outputs.

In a ModZ Group ("Zer"), all associated outputs share the same ModZ input (Group 1 will be controlled by ModZ1 input and so on). Any

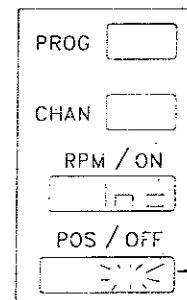
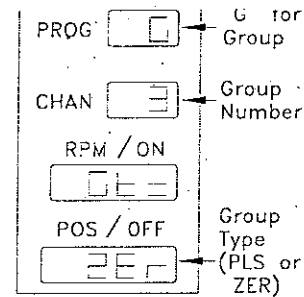
— continued

output not associated with groups 1–4 is considered in Base Group, which is always a normal PLS type group (i.e., ModZ).

If the Group Type is ModZ, the Group Offset is not used. Instead, there is a parameter called the Inhibit Zone. The ModZ Inhibit Zone is an angular zone in which the ModZ cycle may not be retriggered. The Inhibit Zone begins when the ModZ cycle is originally triggered (angle = 0), and

continues up to the preprogrammed angle. Once the ModZ cycle has progressed beyond this Inhibit Zone, the ModZ cycle may be restarted by retriggering the ModZ input.

Key Pressed	Response
MODE	Switch to Mode 4 if SE TRUE
INC/DEC	PE must be TRUE If cursor on group number (CHAN window), Increment/Decrement group number, decrementing below 1, displays "non" RPM/WON window. Leaving this mode with "Cr non" on display will mean no groups are defined. If cursor on group type window (POS/OFF window), toggle display between PLS (to define PLS type group) and ZER (to define ModZ type group).
Right arrow	If PE is TRUE, moves cursor between group number and group type windows. Pressing the Right Arrow Key again allows changing: - the Group Offset, if the group is a PLS, or - the MODZ Inhibit Zone, if the Group is ModZ ("Zer" on display)
None	Display times out and returns to current default display



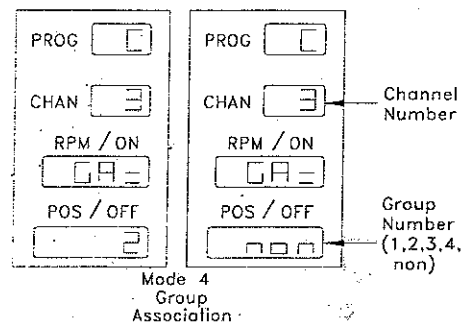
Mode 4: Group Association

Control Inputs: SE must be TRUE; PE must be TRUE for programming.

Previous Mode: Mode 3 (Group Type)

This mode is used to associate channels (outputs) selectively to groups defined in Mode 3. "non" in the group number display means that the channel is not associated with Groups 1–4, and that it is in the Base Group.

Key Pressed	Response
MODE	Switch to Mode 5 if SE TRUE
INC/DEC	If cursor on Channel Number, increment/decrement channel number. If cursor on Group Number, increment/decrement group number.
Right Arrow	If PE is TRUE, moves cursor between channel window having channel number and POS/OFF window displaying group number.
Recall	No response
None	Display times out and returns to default display



Mode 5: Channel Type Definition

Control Inputs: SE must be TRUE; PE must be TRUE for programming

Previous Mode: Mode 4 (Group Association)

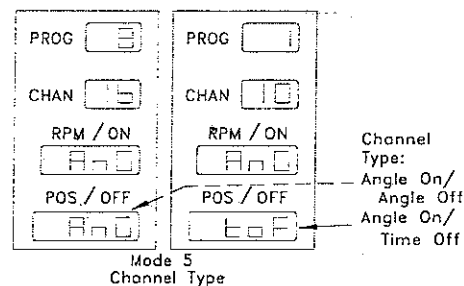
The outputs in M8251 LBus PLS are of two types:

Angle On – Angle Off: Outputs energized at an angle (on setpoint), and de-energized at another angle (off setpoint).

Angle On – Time Off: Outputs energized at an angle (on setpoint), and de-energized after programmed elapsed time.

This mode is used to program the type of output for each channel.

Key Pressed	Response
MODE	Switch to Mode 6 if SE TRUE
INC/DEC	If cursor on Channel Number, increment/decrement channel number. If cursor on Channel Type, increment/decrement Angle or Time Off.
Right Arrow	If PE is TRUE, moves cursor between channel window having channel number and POS/OFF window displaying channel type.
Recall	No response
None	Display times out and returns to default display

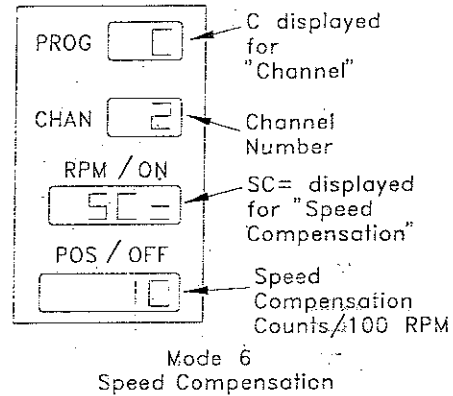


Mode 6: Speed Compensation

Control Inputs: SE must be TRUE; PE must be TRUE for programming

Previous Mode: Mode 5 (Channel Type Definition)

The M8251 LBus PLS requires speed compensation to be programmed in counts-to-be-advanced/retarded per 100 RPM. The speed compensation at other speeds is linearly calculated by the unit automatically. Most users program this value by trial and error. If you know the response time of the device to be compensated, a good starting value can be computed by the Speed Compensation formula as a function of response time: Delay (ms) (0.6 degrees/100 RPM). Each Channel 1 to 16 has its own programmable speed compensation, unless Channels 7 and 8 are used for Brake Wear Monitor (see Mode 7).



Key Pressed	Response
MODE	Switch to Mode 7 if SE TRUE
INC/DEC	If cursor on Channel Number, increment/decrement channel number. If cursor on Speed Compensation, increment/decrement speed compensation for the displayed channel number.
Right Arrow	If PE is TRUE, moves cursor between channel window having channel number and POS/OFF window shows speed compensation for displayed channel.
Recall	No response
None	Display times out and returns to default display

Mode 7: Brake Wear Monitor — Caution & Danger Time Limits

Control Inputs: SE must be TRUE; PE must be TRUE for programming

Previous Mode: Mode 6 (Speed Compensation)

Other Condition: ModZ groups not used

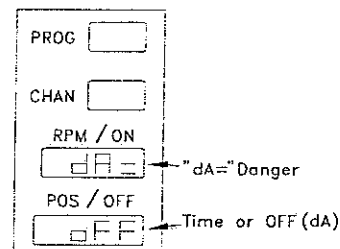
The Brake Wear Monitor is a programmable option. For brake wear monitoring, the user is required to program Caution and Danger Limits. If Danger Limit is OFF, the outputs function as normal PLS outputs. The Caution Limit is less than the Danger Limit. Maximum programmable limit is 9.99 sec. The Danger Limit will need to be entered first to allow room for the Caution Limit. *To turn off the Brake Wear function and use the output as a normal PLS output, set both limits to zero.*

A FALSE to TRUE transition on input BI (Terminal 8) starts a timer in the unit to measure machine stopping time — the internal brake input must be in brake mode before this statement is true. Likewise, the external brake input must be in brake mode when the internal brake input transitions from Run Mode to Brake Mode. The measured stopping time can be viewed by selecting it as default mode (see Default Displays). The stopping time is compared with programmed limits and outputs (Terminals 7 and 8) are controlled according to table 7 below.

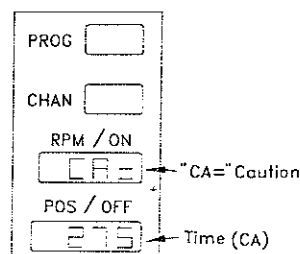
A TRUE on BC input (Terminal P1-7) resets stopping time to zero, and also resets outputs to the Caution state. (Caution Output 7 ON, and Fail-safe Danger Output 8 ON).

Table 7. Brake Output Conditions on Terminals P1-7 and P1-8

Condition	Output 7 (Caution)	Output 8 (Danger)
Safe (Stopping time less than caution limit)	Off	On
Caution (Stopping time between caution & danger limits)	On	On
Danger (Stopping time more than danger limits)	On	Off
OFF: Deenergized ON: Energized		



Key Pressed	Response
MODE	Switch to Mode 8 if SE TRUE
INC/DEC	If RPM/ON window blinking - switch between Caution (CA=) & Danger (dA=) limits If POS/OFF window blinking (PE must be TRUE) - increment/decrement blinking number (limits)
Right Arrow	If PE is TRUE, moves cursor between Caution/Danger (RPM/ON) and Time Limit (POS/OFF) windows
Recall	No response
None	Display times out and returns to default display



Mode 7
Brake Wear Monitor
Caution & Danger Time Limits

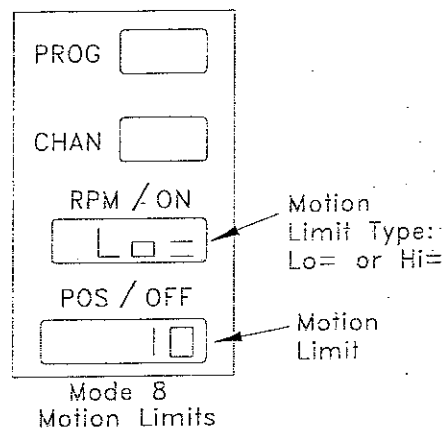
Mode 8: Motion Limits

Control Inputs: SE must be TRUE; PE must be TRUE for programming

Previous Mode: Mode 7 (Brake Wear Monitor)

The Motion Output is controlled by the Low and High Motion Limits. If the resolver RPM is between the Motion Limits inclusively, the Motion Output will be energized. Motion Limits are common for all eight programs.

Key Pressed	Response
MODE	Switch to Mode 9 if PE and SE are TRUE
INC/DEC	If cursor on motion limit type (in RPM/ON window), toggle between "Hi=" (High Motion Limit) and "Lo=" (Low Motion Limit) If cursor in POS/OFF window, increment/decrement displayed limit
Right Arrow	If PE is TRUE, moves cursor between motion limit type and the limit
Recall	No response
None	Display times out and returns to default display



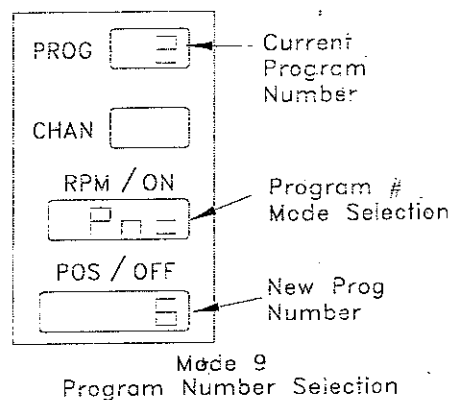
Mode 9: Program Number Selection

Control Inputs: SE must be TRUE; PE must be TRUE for programming.

Previous Mode: Mode 8 (Motion Limit)

Other Conditions: The resolver must not be moving (RPM<4)

Key Pressed	Response
MODE	Switch to Mode 10 if PE and SE are TRUE
INC/DEC	If PE is TRUE, increments/decrements Program Number
Right Arrow	No response
Recall	No response
None	Display times out and returns to default display

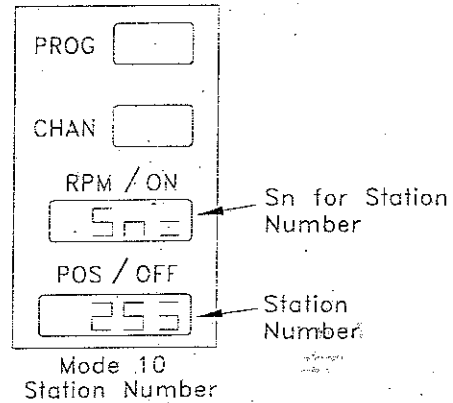


Mode 10: Station Number Selection

Control Inputs: SE must be TRUE; PE must be TRUE for programming.

Previous Mode: Mode 9 (Program Number)

The Station Number for serial communications must be unique for each communicating device on the communications link. The number may be from Station #1 to #255. If serial communications should be disabled, select "off" (where #0 would be).



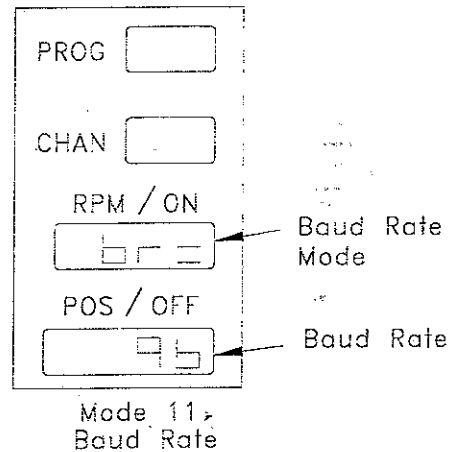
Key Pressed	Response
MODE	Switch to Mode 11 if PE and SE are TRUE
INC/DEC	If PE is TRUE, increments/decrement displayed Station Number
Right Arrow	No response
Recall	No response
None	Display times out and returns to default display

Mode 11: Baud Rate Selection

Control Inputs: SE must be TRUE; PE must be TRUE for programming

Previous Mode: Mode 10 (Station Number Selection)

The M8251 LBus PLS supports the following baud rates for serial communication.



Key Pressed	Response
MODE	Switch to Mode 12 if PE and SE are TRUE
INC/DEC	If PE is TRUE, increments/decrement baud rate
Right Arrow	No response
Recall	No response
None	Display times out and returns to default display

Mode 12: Setpoint Programming

Control Inputs: PE must be TRUE for programming

Previous Mode: Mode 11 (Baud Rate) if SE is TRUE (Default Mode) if SE is FALSE

When the shaft is moving in the forward direction, Angle-On/Angle-Off setpoints are defined as: On = Angle at which the output will turn on, Off = Angle at which the output will turn off. These angles are programmed by using the Right Arrow key to select the number to edit, then Incrementing or Decrementing the number. Pressing the Right Arrow Key moves you from Channel Number to:

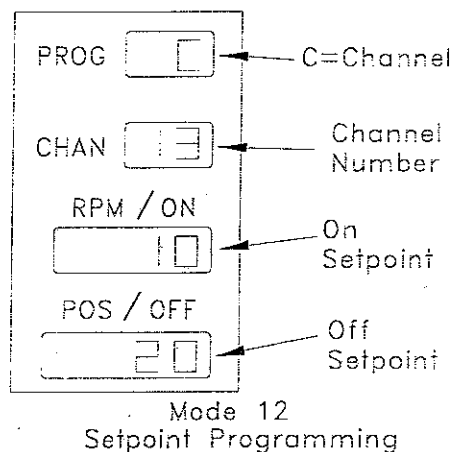
1. On Setpoint
2. Off Setpoint or Time Off Value.
3. Set or Program both On and Off setpoints

Key Pressed	Response
MODE	Switch to Default Mode
INC/DEC	Increment/Decrement
Right Arrow	Each press moves cursor from Channel Number to On to Off Setpoint Windows - First press: Channel Window to On Setpoint - Second press: On Setpoint Window to Off Setpoint - Third press: Off Setpoint Window to On and Off Setpoint (Channel Window) - Fourth press: On and Off Setpoint Windows to Channel Window (for retaining current dwell span)
Recall	Recall new setpoint pair if exists, or null setpoint
None	Display times out and returns to default display

(INC or DEC) together (for retaining current dwell span), back to Channel Number.

Pressing the Recall Key will reveal any additional Setpoints in the selected channel and will provide the "Null Setpoint" symbol [o] [o] so that additional setpoints may be added to that channel.

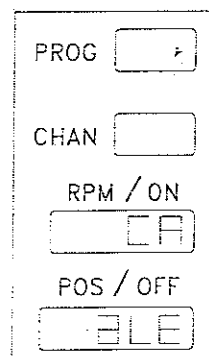
The blinking decimal point in the channel window serves as an acknowledgment that new setpoint pair is being stored. Each Channel 1 to 16 may contain any number of setpoints (on/off pairs) up to the following limits: the low 8 channels (1 to 8) are limited to a total of 80 setpoints; the high 8 channels (9 to 16) are limited to a total of 80 setpoints.

**Mode: Cable Fault Display**

Control Inputs: N/A

Previous Mode: Default

The M8251 LBus PLS internal self-check circuit continuously monitors the microprocessor, DC power, and resolver cable. If any fault is detected by the M8251 LBus PLS, the "cable" fault detection display will appear. During this mode, the fail-safe fault output will turn OFF and all outputs are disabled automatically. When corrected, the display will return to the Default Display.



6. Memory Map for PLS Module

Decm	Hex	Type	Description	Decm	Hex	Type	Description
128	0080	Read Only	RPM	320	0140	Read/Write	LE Spd Comp Chan 1
130	0082	Read Only	Position	322	0142	Read/Write	TE Spd Comp Chan 1
132	0084	Read Only	I/O Status (16Bits)	324	0144	Read/Write	Group # +256*Chan Type
134	0086	Read Only	Outputs (1-16)	326	0146	Read/Write	Ch 1 SP 1 ON
136	0088	Read Only	Stopping Time	328	0148	Read/Write	Ch 1 SP 1 OFF
138	008A	Read Only	Outputs (9-16)	330	014A	Read/Write	Ch 1 SP 2 ON
160	00A0	Write Only	ModZ & Brake Inputs	332	014C	Read/Write	Ch 1 SP 2 OFF
188	00BC	Read/Write	Fine Tuning Address	334	014E	Read/Write	Ch 1 SP 3 ON
190	00BE	Read/Write	Fine Tuning Address	336	0150	Read/Write	Ch 1 SP 3 OFF
256	0100	Read/Write	Error (addr+1024*Err)	338	0152	Read/Write	Ch 1 SP 4 ON
258	0102	Read/Write	Scale Factor	340	0154	Read/Write	Ch 1 SP 4 OFF
260	0104	Read/Write	Offset	342	0156	Read/Write	Ch 1 SP 5 ON
262	0106	Read/Write	High Motion Limit	344	0158	Read/Write	Ch 1 SP 5 OFF
264	0108	Read/Write	Low Motion Limit	346	015A	Read/Write	Ch 1 SP 6 ON
266	010A	Read/Write	Program Number	348	015C	Read/Write	Ch 1 SP 6 OFF
268	010C	Read/Write	Danger Limit	350	015E	Read/Write	Ch 1 SP 7 ON
270	010E	Read/Write	Caution Limit	352	0160	Read/Write	Ch 1 SP 7 OFF
272	0110	Read/Write	Group Types	354	0162	Read/Write	LE Spd Comp
274	0112	Read/Write	Group 1 Offset	356	0164	Read/Write	TE Spd Comp Chan 2
276	0114	Read/Write	Group 2 Offset	358	0166	Read/Write	Group # + 256* ChanType
278	0116	Read/Write	Group 3 Offset	360	0168	Read/Write	Ch 2 SP 1 ON
280	0118	Read/Write	Group 4 Offset	362	016A	Read/Write	Ch 2 SP 1 OFF
282	011A	Read/Write	ModZ 1 Inhibit Zone	364	016C	Read/Write	Ch 2 SP 2 ON
284	011C	Read/Write	ModZ 2 Inhibit Zone	366	016E	Read/Write	Ch 2 SP 2 OFF
286	011E	Read/Write	ModZ 3 Inhibit Zone	368	0170	Read/Write	Ch 2 SP 3 ON
288	0120	Read/Write	ModZ 4 Inhibit Zone	370	0172	Read/Write	Ch 2 SP 3 OFF
290	0122	Read/Write	Baud rate	372	0174	Read/Write	Ch 2 SP 4 ON
292	0124	Read/Write	Station Number				

6. Memory Map for PLS Module

Decm	Hex	Type	Description	Decm	Hex	Type	Description
374	0176	Read/Write	Ch 2 SP 4 OFF	430	01AE	Read/Write	Ch 4 SP 1 OFF
376	0178	Read/Write	Ch 2 SP 5 ON	432	01B0	Read/Write	Ch 4 SP 2 ON
378	017A	Read/Write	Ch 2 SP 5 OFF	434	01B2	Read/Write	Ch 4 SP 2 OFF
380	017C	Read/Write	Ch 2 SP 6 ON	436	01B4	Read/Write	Ch 4 SP 3 ON
382	017E	Read/Write	Ch 2 SP 6 OFF	438	01B6	Read/Write	Ch 4 SP 3 OFF
384	0180	Read/Write	Ch 2 SP 7 ON	440	01B8	Read/Write	Ch 4 SP 4 ON
386	0182	Read/Write	Ch 2 SP 7 OFF	442	01BA	Read/Write	Ch 4 SP 4 OFF
388	0184	Read/Write	LE Spd Comp Chan 3	444	01BC	Read/Write	Ch 4 SP 5 ON
390	0186	Read/Write	TE Spd Comp Chan 3	446	01BE	Read/Write	Ch 4 SP 5 OFF
392	0188	Read/Write	Group # + 256* Chan Type	448	01C0	Read/Write	Ch 4 SP 6 ON
394	018A	Read/Write	Ch 3 SP 1 ON	450	01C2	Read/Write	Ch 4 SP 6 OFF
396	018C	Read/Write	Ch 3 SP 1 OFF	452	01C4	Read/Write	Ch 4 SP 7 ON
398	018E	Read/Write	Ch 3 SP 2 ON	454	01C6	Read/Write	Ch 4 SP7 OFF Chan 2
400	0190	Read/Write	Ch 3 SP 2 OFF	456	01C8	Read/Write	LE Spd Comp Chan 5
402	0192	Read/Write	Ch 3 SP 3 ON	458	01CA	Read/Write	TE Spd Comp Chan 5
404	0194	Read/Write	Ch 3 SP 3 OFF	460	01CC	Read/Write	Group # + 256*Chan Type
406	0196	Read/Write	Ch 3 SP 4 ON	462	01CE	Read/Write	Ch 5 SP 1 ON
408	0198	Read/Write	Ch 3 SP 4 OFF	464	01D0	Read/Write	Ch 5 SP 1 OFF
410	019A	Read/Write	Ch 3 SP 5 ON	466	01D2	Read/Write	Ch 5 SP 2 ON
412	019C	Read/Write	Ch 3 SP 5 OFF	468	01D4	Read/Write	Ch 5 SP 2 OFF
414	019E	Read/Write	Ch 3 SP 6 ON	470	01D6	Read/Write	Ch 5 SP 3 ON
416	01A0	Read/Write	Ch 3 SP 6 OFF	472	01D8	Read/Write	Ch 5 SP 3 OFF
418	01A2	Read/Write	Ch 3 SP 7 ON	474	01DA	Read/Write	Ch 5 SP 4 ON
420	01A4	Read/Write	Ch 3 SP 7 OFF	476	01DC	Read/Write	Ch 5 SP 4 OFF
422	01A6	Read/Write	LE Spd Comp Chan 4	478	01DE	Read/Write	Ch 5 SP 5 ON
424	01A8	Read/Write	TE Spd Comp Chan 4	480	01E0	Read/Write	Ch 5 SP 5 OFF
426	01AA	Read/Write	Group # +256* Chan Type	482	01E2	Read/Write	Ch 5 SP 6 ON
428	01AC	Read/Write	Ch 4 SP 1 ON	484	01E4	Read/Write	Ch 5 SP 6 OFF

6. Memory Map for PLS Module

Decm	Hex	Type	Description	Decm	Hex	Type	Description
486	01E6	Read/Write	Ch 5 SP 7 ON	544	0220	Read/Write	Ch 7 SP 4 OFF
488	01E8	Read/Write	Ch 5 SP 7 OFF	546	0222	Read/Write	Ch 7 SP 5 ON
490	01EA	Read/Write	LE Spd Com Chan 6	548	0224	Read/Write	Ch 7 SP 5 OFF
492	01EC	Read/Write	TE Spd Comp Chan 6	550	0226	Read/Write	Ch 7 SP 6 ON
494	01EE	Read/Write	Group # + 256*Chan Type	552	0228	Read/Write	Ch 7 SP 6 OFF
496	01F0	Read/Write	Ch 6 SP 1 ON	554	022A	Read/Write	Ch 7 SP 7 ON
498	01F2	Read/Write	Ch 6 SP 1 OFF	556	022C	Read/Write	Ch 7 SP 7 OFF
500	01F4	Read/Write	Ch 6 SP 2 ON	558	022E	Read/Write	LE Spd Comp Chan 8
502	01F6	Read/Write	Ch 6 SP 2 OFF	560	0230	Read/Write	TE Spd Comp Chan 8
506	01FA	Read/Write	Ch 6 SP 3 OFF	562	0232	Read/Write	Group # +256*Chan Type
508	01FC	Read/Write	Ch 6 SP 4 ON	564	0234	Read/Write	Ch 8 SP 1 ON
510	01FE	Read/Write	Ch 6 SP 4 OFF	566	0236	Read/Write	Ch 8 SP 1 OFF
512	0200	Read/Write	Ch 6 SP 5 ON	568	0238	Read/Write	Ch 8 SP 2 ON
514	0202	Read/Write	Ch 6 SP 5 OFF	570	023A	Read/Write	Ch 8 SP 2 OFF
516	0204	Read/Write	Ch 6 SP 6 ON	572	023C	Read/Write	Ch 8 SP 3 ON
518	0206	Read/Write	Ch 6 SP 6 OFF	574	023E	Read/Write	Ch 8 SP 3 OFF
520	0208	Read/Write	Ch 6 SP 7 ON	576	0240	Read/Write	Ch 8 SP 4 ON
522	020A	Read/Write	Ch 6 SP 7 OFF	578	0242	Read/Write	Ch 8 SP 4 OFF
524	020C	Read/Write	LE Spd Comp Chan 7	580	0244	Read/Write	Ch 8 SP 5 ON
526	020E	Read/Write	TE Spd Comp Chan 7	582	0246	Read/Write	Ch 8 SP 5 OFF
528	0210	Read/Write	Group # + 256*Chan Type	584	0248	Read/Write	Ch 8 SP 6 ON
530	0212	Read/Write	Ch 7 SP 1 ON	586	024A	Read/Write	Ch 8 SP 6 OFF
532	0214	Read/Write	Ch 7 SP 1 OFF	588	024C	Read/Write	Ch 8 SP 7 ON
534	0216	Read/Write	Ch 7 SP 2 ON	590	024E	Read/Write	Ch 8 SP 7 OFF
536	0218	Read/Write	Ch 7 SP 2 OFF	592	0250	Read/Write	LE Spd Comp Chan 9
538	021A	Read/Write	Ch 7 SP 3 ON	594	0252	Read/Write	TE Spd Comp Chan 9
540	021C	Read/Write	Ch 7 SP 3 OFF	596	0254	Read/Write	Group # +256*Chan Type
542	021E	Read/Write	Ch 7 SP 4 ON	598	0256	Read/Write	Ch 9 SP 1 ON

6. Memory Map for PLS Module

Decm	Hex	Type	Description	Decm	Hex	Type	Description
600	0258	Read/Write	Ch 9 SP 1 OFF	658	0292	Read/Write	Ch 10 SP 7 OFF
602	025A	Read/Write	Ch 9 SP 2 ON	660	0294	Read/Write	LE SpdCompChan11
604	025C	Read/Write	Ch 9 SP 2 OFF	662	0296	Read/Write	TE SpdCompChan11
606	025E	Read/Write	Ch 9 SP 3 ON	664	0298	Read/Write	Group # +256*Chan Type
608	0260	Read/Write	Ch 9 SP 3 OFF	666	029A	Read/Write	Ch 11 SP 1 ON
610	0262	Read/Write	Ch 9 SP 4 ON	668	029C	Read/Write	Ch 11 SP 1 OFF
612	0264	Read/Write	Ch 9 SP 4 OFF	670	029E	Read/Write	Ch 11 SP 2 ON
614	0266	Read/Write	Ch 9 SP 5 ON	672	02A0	Read/Write	Ch 11 SP 2 OFF
616	0268	Read/Write	Ch 9 SP 5 OFF	674	02A2	Read/Write	Ch 11 SP 3 ON
618	026A	Read/Write	Ch 9 SP 6 ON	676	02A4	Read/Write	Ch 11 SP 3 OFF
620	026C	Read/Write	Ch 9 SP 6 OFF	678	02A6	Read/Write	Ch 11 SP 4 ON
622	026E	Read/Write	Ch 9 SP 7 ON	680	02A8	Read/Write	Ch 11 SP 4 OFF
624	0270	Read/Write	Ch 9 SP 7 OFF	682	02AA	Read/Write	Ch 11 SP 5 ON
626	0272	Read/Write	LE SpdCompChan10	684	02AC	Read/Write	Ch 11 SP 5 OFF
628	0274	Read/Write	TE SpdCompChan10	686	02AE	Read/Write	Ch 11 SP 6 ON
630	0276	Read/Write	Group # + 256*Chan Type	688	02B0	Read/Write	Ch 11 SP 6 OFF
632	0278	Read/Write	Ch 10 SP 1 ON	690	02B2	Read/Write	Ch 11 SP 7 ON
634	027A	Read/Write	Ch 10 SP 1 OFF	692	02B4	Read/Write	Ch 11 SP 7 OFF
636	027C	Read/Write	Ch 10 SP 2 ON	694	02B6	Read/Write	LE SpdCompChan12
638	027E	Read/Write	Ch 10 SP 2 OFF	696	02B8	Read/Write	TE SpdCompChan12
640	0280	Read/Write	Ch 10 SP 3 ON	698	02BA	Read/Write	Group # +256*Chan Type
642	0282	Read/Write	Ch 10 SP 3 OFF	700	02BC	Read/Write	Ch 12 SP 1 ON
644	0284	Read/Write	Ch 10 SP 4 ON	702	02BE	Read/Write	Ch 12 SP 1 OFF
646	0286	Read/Write	Ch 10 SP 4 OFF	704	02C0	Read/Write	Ch 12 SP 2 ON
648	0288	Read/Write	Ch 10 SP 5 ON	706	02C2	Read/Write	Ch 12 SP 2 OFF
650	028A	Read/Write	Ch 10 SP 5 OFF	708	02C4	Read/Write	Ch 12 SP 3 ON
652	028C	Read/Write	Ch 10 SP 6 ON	710	02C6	Read/Write	Ch 12 SP 3 OFF
654	028E	Read/Write	Ch 10 SP 6 OFF	712	02C8	Read/Write	Ch 12 SP 4 ON
656	0290	Read/Write	Ch 10 SP 7 ON				

6. Memory Map for PLS Module

Decm	Hex	Type	Description	Decm	Hex	Type	Description
714	02CA	Read/Write	Ch 12 SP 4 OFF	770	0302	Read/Write	Ch 14 SP 1 OFF
716	02CC	Read/Write	Ch 12 SP 5 ON	772	0304	Read/Write	Ch 14 SP 2 ON
718	02CE	Read/Write	Ch 12 SP 5 OFF	774	0306	Read/Write	Ch 14 SP 2 OFF
720	02D0	Read/Write	Ch 12 SP 6 ON	776	0308	Read/Write	Ch 14 SP 3 ON
722	02D2	Read/Write	Ch 12 SP 6 OFF	778	030A	Read/Write	Ch 14 SP 3 OFF
724	02D4	Read/Write	Ch 12 SP 7 ON	780	030C	Read/Write	Ch 14 SP 4 ON
726	02D6	Read/Write	Ch 12 SP 7 OFF	782	030E	Read/Write	Ch 14 SP 4 OFF
728	02D8	Read/Write	LE SpdCompChan 13	784	0310	Read/Write	Ch 14 SP 5 ON
730	02DA	Read/Write	TE SpdCompChan 13	786	0312	Read/Write	Ch 14 SP 5 OFF
732	02DC	Read/Write	Group # +256*Chan Type	788	0314	Read/Write	Ch 14 SP 6 ON
734	02DE	Read/Write	Ch 13 SP 1 ON	790	0316	Read/Write	Ch 14 SP 6 OFF
736	02E0	Read/Write	Ch 13 SP 1 OFF	792	0318	Read/Write	Ch 14 SP 7 ON
738	02E2	Read/Write	Ch 13 SP 2 ON	794	031A	Read/Write	Ch 14 SP 7 OFF
740	02E4	Read/Write	Ch 13 SP 2 OFF	796	031C	Read/Write	LE Spd CompChan15
742	02E6	Read/Write	Ch 13 SP 3 ON	798	031E	Read/Write	TE Spd CompChan15
744	02E8	Read/Write	Ch 13 SP 3 OFF	800	0320	Read/Write	Group # +256*Chan Type
746	02EA	Read/Write	Ch 13 SP 4 ON	802	0322	Read/Write	Ch 15 SP 1 ON
748	02EC	Read/Write	Ch 13 SP 4 OFF	804	0324	Read/Write	Ch 15 SP 1 OFF
750	02EE	Read/Write	Ch 13 SP 5 ON	806	0326	Read/Write	Ch 15 SP 2 ON
752	02F0	Read/Write	Ch 13 SP 5 OFF	808	0328	Read/Write	Ch 15 SP 2 OFF
754	02F2	Read/Write	Ch 13 SP 6 ON	810	032A	Read/Write	Ch 15 SP 3 ON
756	02F4	Read/Write	Ch 13 SP 6 OFF	812	032C	Read/Write	Ch 15 SP 3 OFF
758	02F6	Read/Write	Ch 13 SP 7 ON	814	032E	Read/Write	Ch 15 SP 4 ON
760	02F8	Read/Write	Ch 13 SP 7 OFF	816	0330	Read/Write	Ch 15 SP 4 OFF
762	02FA	Read/Write	LE Spd CompChan14	818	0332	Read/Write	Ch 15 SP 5 ON
764	02FC	Read/Write	TE Spd CompChan14	820	0334	Read/Write	Ch 15 SP 5 OFF
766	02FE	Read/Write	Group # +256*Chan Type	822	0336	Read/Write	Ch 15 SP 6 ON
768	0300	Read/Write	Ch 14 SP 1 ON	824	0338	Read/Write	Ch 15 SP 6 OFF

6. Memory Map for PLS Module

Decm	Hex	Type	Description	Decm	Hex	Type	Description
826	033A	Read/Write	Ch 15 SP 7 ON				
828	033C	Read/Write	Ch 15 SP 7 OFF				
830	033E	Read/Write	LE SpdCompChan 16				
832	0340	Read/Write	TE SpdCompChan 16				
834	0342	Read/Write	Group # +256*Chan Type				
836	0344	Read/Write	Ch 16 SP 1 ON				
838	0346	Read/Write	Ch 16 SP 1 OFF				
840	0348	Read/Write	Ch 16 SP 2 ON				
842	034A	Read/Write	Ch 16 SP 2 OFF				
844	034C	Read/Write	Ch 16 SP 3 ON				
846	034E	Read/Write	Ch 16 SP 3 OFF				
848	0350	Read/Write	Ch 16 SP 4 ON				
850	0352	Read/Write	Ch 16 SP 4 OFF				
852	0354	Read/Write	Ch 16 SP 5 ON				
854	0356	Read/Write	Ch 16 SP 5 OFF				
856	0358	Read/Write	Ch 16 SP 6 ON				
858	035A	Read/Write	Ch 16 SP 6 OFF				
860	035C	Read/Write	Ch 16 SP 7 ON				
862	035E	Read/Write	Ch 16 SP 7 OFF				

7. M8251 LBus PLS Troubleshooting Table

Symptoms	Possible Causes
Unable to program unit parameters (Scale Factor, Offset, etc.)	1) Is the program Enable Input (PE) false? (i.e., the voltage level at the customer VS+/VS- input is incorrect) 2) Is the machine moving? – programming of several parameters (Scale Factor, Program Number) is disabled if the resolver is turning faster than 3 RPM. 3) If unable to program setpoints, the PLS program group may already have 80 setpoints.
Program memory is changing by itself.	1) Has the program number been changed to a different number? 2) Have proper grounding and shielding practices been applied? 3) Is the Program Enable input TRUE? While this will not cause the program to change itself, keeping it FALSE when not actually programming the unit, ensures that the memory cannot be programmed
Position and RPM readings are incorrect.	1) Is the resolver correctly wired? Follow these steps for a quick check: a. Turn power off to M8251 LBus PLS unit. b. With terminal block P2 removed from unit, measure with ohm meter the following: Term. 6 to Term. 5 (R1 to R2) = 15 to 50 ohms; Term. 1 to Term. 3 (S1 to S3) = 50 to 150 ohms; Term. 4 to Term. 2 (S4 to S2) = 50 to 150 ohms. 2) Is the resolver cable properly grounded and shielded?
"CABLE" is displayed in display.	1) Supply (VS+, VS-) less than 20 VDC 2) Is resolver wiring correct? Follow instructions for ohming out resolver wiring in the steps above.
Mechanical Zero drifts.	1) Is the mechanical Resolver linkage loose? 2) Has the offset value been changed?
If all fails –	Call your local distributor or (630)668-3900 for service.

8. How to Order

1. Cradle

SAC-T0505-010 Cradle for Texas Instruments Series 505 I/O
 SAC-M8000-010 Cradle for Allen-Bradley 1771 Series I/O
 SAC-M0800-010 Cradle for Modicon Ourbus I/O

..... Cradle for GE 90-70 Series

2. M8251 LBus PLS Module

ASY-M8251-010 Large Bus (LBus) Programmable Limit Switch (PLS) Module
 ASY-M8251-F10 Fast LBus PLS Module

(change "M" in part number above to "S" to order a slave module)

3. Output Module

ASY-M8250-NOUT Standard 16 plus two Output Module (N-Channel, sinking output)
 ASY-M8250-POUT Standard 16 plus two Output Module (P-Channel, sourcing output)

4. Resolvers

The M8251 LBus PLS requires a single turn resolver as an input device, such as Autotech's RL100, RL101, RL500, RL501, E1R, E7R, E8R or E9R series of resolvers. Please see appropriate Position Transducer Manual for complete ordering information on resolvers, cables, and appropriate accessories.

5. Cable

CBL-10T22-Cxxx 22 AWG, 10 conductor (5 twisted pairs) overall foil shielded cable, without connector. "xxx" length must be ordered as 010, 020, 050 feet and increments of 50 feet (i.e., 100, 150, etc.).

CBL-10T22-Mxxx 22 AWG, 10 conductor (5 twisted pairs) overall foil shielded cable, with 10 pin MS connector (ECM-10REC-ITT) on one end. "xxx" length must be ordered as 010, 020, 050 feet and increments of 50 feet (i.e., 100, 150, etc.).

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Autotech Controls warrant their products to be free from defects in materials or workmanship for a period of one year from the date of shipment, provided the products have been installed and used under proper conditions. The defective products must be returned to the factory freight prepaid and must be accompanied by a Return Material Authorization (RMA) number. The Company's liability under this limited warranty shall extend only to the repair or replacement of a defective product, at The Company's option. The Company disclaims all liability for any affirmation, promise or representation with respect to the products.

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