AVG

ac *AUTOTECH CONTROLS* **Automation** **UTICOR**

M1056 Programmable
Limit Switch (PLS)

Instruction & Operation Manual

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M1056 PLS

Instruction Manual

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 M1056 combines 16 power outputs, fault detection and indication, eight user-defined PLS programs, and simple, easy-to-learn programming in one compact unit with a NEMA 12 front panel. In addition, each of the eight PLS programs supports up to 160 ON/OFF setpoint pairs that may be used in any combination of 80 each on the low and high 8 channels. Also included are a fault output that indicates on the display the source of the fault for fast, easy troubleshooting and a no motion indicator that energizes when the engage/start time of the press reaches a low limit during a programmable time period.

Powerful, Easy to Learn, Man-Machine Interface

Autotech's human factors engineering has made it possible to program all PLS functions with only five front-panel keys and a smart front-panel display. With these five self-explanatory programming keys, programming the M1056 is extremely simple — no long complex key sequences to remember.

Simultaneous Display of Related Parameters for Easy Understanding

In the normal operating mode, the large, .56" numerical display indicates the selected PLS program number, the current resolver RPM and shaft position. When programming PLS setpoints, the display shows the selected channel number and the selected ON and OFF setpoints.

In all modes, bright, easy-to-read bar graph displays show the true output status of all eight PLS outputs as well as the fault relay status, the motion output status, and the external program select enable input status.

Individual Speed Compensation for all 16 PLS Outputs

The M1056 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 M1056, the rate offset can be programmed in scale factor units per 100 rpm up to full scale factor value.

Anti-Repeat Feature

- Programmable maximum backlash angle
- Programmable Tach/Position Output

A user installable module provides either tach or position output in either binary or BCD format, with a constant update rate or a PC-Sync update rate.

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. Two fully isolated supervisory inputs prevent accidental or unauthorized program changes.

Multiple Program Storage Makes Job Changeover Easy

The M1056 PLS can store up to eight independent, user-defined PLS programs for different machine setups. The M1056 is easily configured to accept either front-panel or external programmable controller compatible input to select a program.

Fully Isolated Inputs and Outputs

All M1056 inputs and outputs are fully isolated from user power sources to provide outstanding electrical noise immunity in harsh industrial environments.

Built-in Fault Detector

The Fault Output is normally energized when the M1056 PLS is operating normally and the resolver wiring is intact. If an internal M1056 fault is detected, or the power fails, or one or more of the resolver wires is broken or disconnected, the Fault output will de-energize. Under fault conditions all PLS outputs and the motion output will de-energize.

Built-in Tachometer and Motion Detector

The built-in tachometer and motion detector are accurate to 1 RPM and are updated over 68 times per second to provide fast, accurate indication and detection of rotary motion. The motion detector is programmed to energize a power relay output when the machine's RPM is between the motion low and high limits. The motion detector output status is indicated on the front panel.

Specifications

Power Requirements:
105–135 VAC, 50/60 Hz, 20 W or
220–260 VAC, 50/60 Hz, 20 W (option)
Operating Temperature:
−10 to +130 °F (−23 to +55 °C)

PROGRAMMING
Number of PLS Programs:
8 selectable from keyboard or externally via 3 program selected inputs (PS0 – PS2)
PLS Setpoints:
160 per PLS Program, 1280 total
Scale Factor:
Programmable from 16 to 999, common to all PLS programs (resolution 17 to 1000 counts/turn)
Offset:
Programmable from 0 to Scale Factor Value, common to all PLS programs
Speed Compensation:
Programmable in scale factor units per 100 RPM, up to full scale factor value. Each PLS channel has its own speed compensation. Channels 1–4 have 16 speed compensation zones.
Motion Detector:
Low and High Motion Limit. Common to all PLS programs. Programmable from 0 to 999 RPM

RESOLVER INTERFACE
Position transducer:
Resolver, Autotech Series RL100, E6R, E7R, E8R, RL101 or equivalent
Cable Length between Resolver and M1056:
2500 feet max, shielded
Resolver Cable:
Autotech CBL-10T22-XXXX
Maximum Resolver Shaft Speed: 3600 RPM
Resolver Decoder: Ratiometric

CONTROL INPUTS
Electrical specifications: (All Inputs)
Optical Isolation: 1500 V
Input impedance:1800 Ohms
Logic Levels
True: 1 to 28VDC sourcing; FALSE: 0 to 0.8VDC
Program Enable (PE):
When True, enables programming, and (if EP input is also True) External Program Number Select
Output Enable (OE):
When True, PLS Channel outputs enabled, (both Fault and Motion always enabled)
Fault Check Enable (FCE):
When True, disables PLS and Motion Detector Outputs whenever Resolver Broken Wire Fault or M1056 internal fault occurs.
PC Sync:
False to True or True to False transition will synchronize the Tach/Position output. This option is disabled/enabled through programming

External Program Number Select (EP) and Program Select inputs (PS0 – PS2):
When External Program Number Select input (EP) and Program Enable are both True, the PLS program is instantaneously selected by Program Select inputs PS0, PS1, and PS2, according to table given below:

Program Select Inputs			PLS Program
PS0	PS1	PS2	Selected
F	F	F	1
T	F	F	2
F	T	F	3
T	T	F	4
F	F	T	5
T	F	T	6
F	T	T	7
T	T	T	8

T: True   F: False

OUTPUTS
Unregulated Voltage Out (VO):
Current Limited, unregulated 12 VDC for use with M1056 inputs ONLY. *Not* for external sensor power.
Fault Output:
Detects resolver broken wire and M1056 internal faults; EM relay (Form C) output; 10 Amp resistive max @ 120 VAC;
Without Fault: Relay remains energized
With Fault: Relay de-energized (fail safe)
Motion Output:
EM relay (Form C) output; 10 Amp resistive max @ 120 VAC;
Relay de-energized whenever resolver RPM is between programmed motion limits.
PLS outputs:
Number of PLS Outputs: 16
Number of PLS Setpoints:
160 PLS setpoints per program; 1280 total for 8 programs. 80 for Ch 1–8, 80 for Ch 9–16
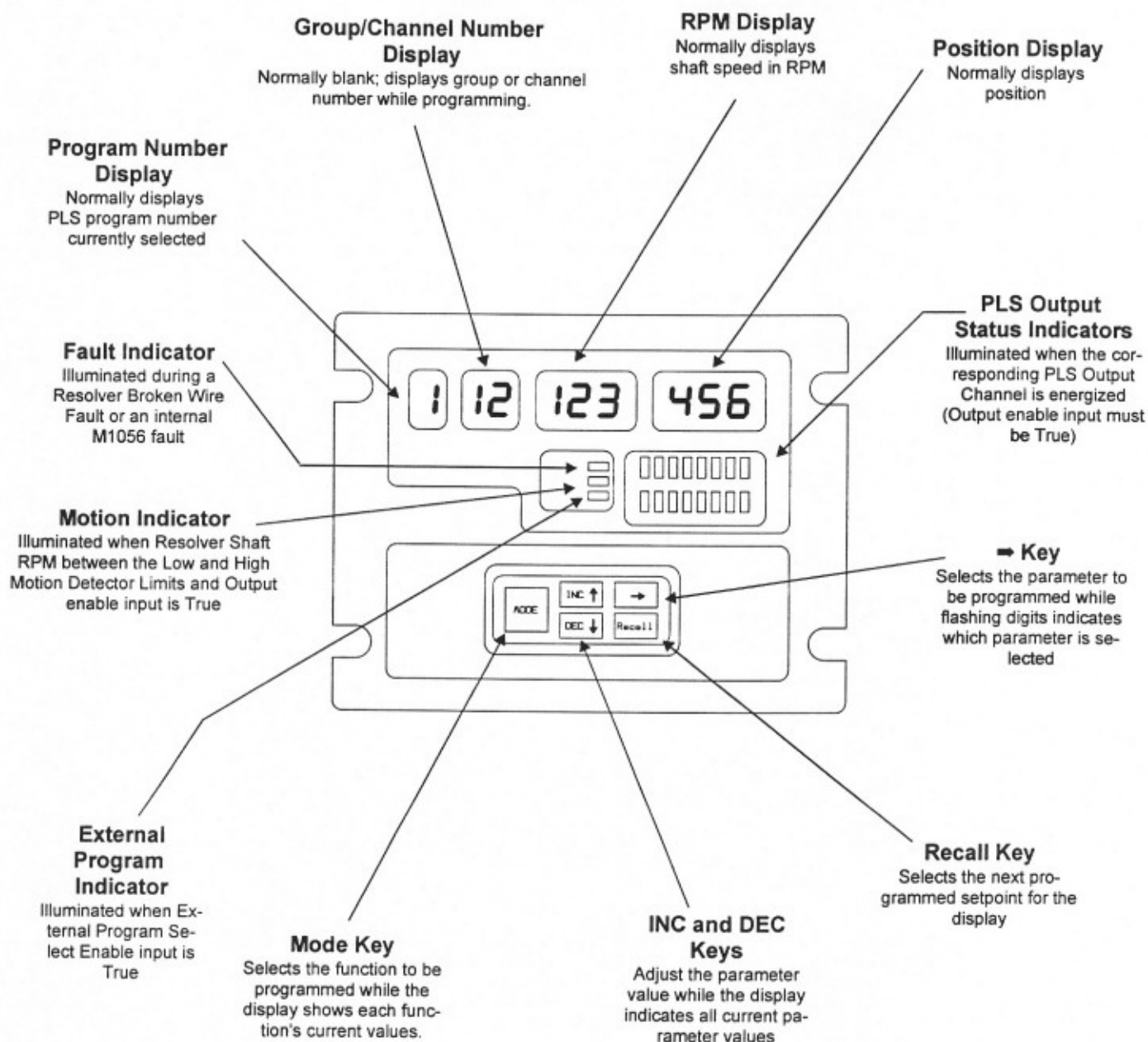### Types of Outputs:
A. Electromechanical SPDT Relay
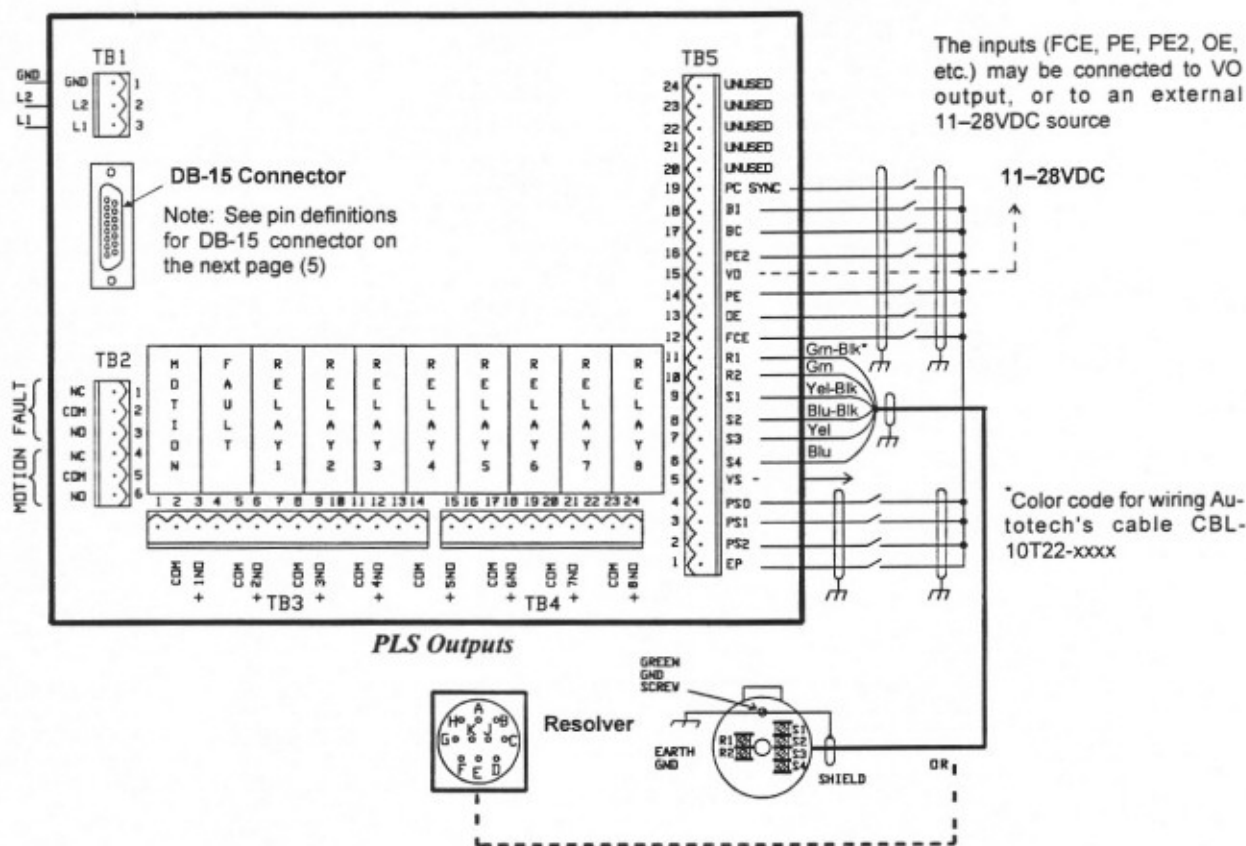10 Amp resistive continuous @ 120 VAC
B. Solid – State Relay
1. AC output: 120 VAC @ 3 A; ON time: <3 ms after zero cross; OFF time: At zero cross; Leakage: 2.1 mA @ 120 VAC
2. DC output: up to 60 VDC @ 3 A; ON time: 5 µs; OFF time: 35µs; Leakage: 0.29 mA @ 15 VDC
3. DC output: up to 200 VDC @ 1 A; ON time: 15 µs; OFF time: 100 µs; Leakage: < 0.01 mA @ 30 VDC

Installation and Operation

1. M1056 Front Panel

Group/Channel Number Display
Normally blank; displays group or channel number while programming.

RPM Display
Normally displays shaft speed in RPM

Position Display
Normally displays position

Program Number Display
Normally displays PLS program number currently selected

PLS Output Status Indicators
Illuminated when the corresponding PLS Output Channel is energized (Output enable input must be True)

Fault Indicator
Illuminated during a Resolver Broken Wire Fault or an internal M1056 fault

Motion Indicator
Illuminated when Resolver Shaft RPM between the Low and High Motion Detector Limits and Output enable input is True

```
|  1  |  12  |  123  |  456  |

      ==       00000000
      ==       00000000

      MODE   INC↑   →
             DEC↓   Recall
```

➡ Key
Selects the parameter to be programmed while flashing digits indicates which parameter is selected

External Program Indicator
Illuminated when External Program Select Enable input is True

Mode Key
Selects the function to be programmed while the display shows each function's current values.

INC and DEC Keys
Adjust the parameter value while the display indicates all current parameter values

Recall Key
Selects the next programmed setpoint for the display

2. M1056 Rear View (Terminals, Connectors, Plug-in Modules and Wiring)

The inputs (FCE, PE, PE2, OE, etc.) may be connected to VO output, or to an external 11–28VDC source

*Color code for wiring Autotech's cable CBL-10T22-xxxx

PLS Outputs

Logic I/O	Function/Description
BC	Brake monitor reset
BI	Brake wear input (option)
PC Sync	False to True or True to False transition synchronizes the tach/position output, when disabled/enabled by software
VO	Unregulated, Current Limited 12VDC output (For use with M1056 inputs only)
PE	Program Enable Input
PE2	Master Program Enable
OE	Output Enable Input
FCE	Fault Check Enable
R1-R2,S1-S4	Resolver input
VS-	Common terminal for Customers 11–28 VDC source
PS0–PS2	Program select inputs
EP	External PLS Program select enable Input
NO	Normally Open (Positive side for solid-state relays)
COM	Common

Resolver Wiring CBL-10T22-xxxx Cable

Wire Color		Resolver Terminal	Conn. Pin
Green-Black		R1	F
Green	Twisted pair	R2	E
Yellow-Black		S1	D
Yellow	Twisted pair	S3	C
Blue-Black		S2	B
Blue	Twisted pair	S4	A
Shield		Grn Gnd	G

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

Notes:

- Output wiring to other electronic devices such as programmable controllers must use uninterrupted runs of shielded cable with the shield connected to earth ground at both ends.
- No special tools are required to wire the M1056 PLS.
- Only NO output is available with solid-state relays. For solid-state relays, the NO terminal must be at a higher positive voltage than COM terminal.
- Use Autotech's overall foil shielded cables for wiring resolver. Above table gives wire colors of cable CBL-10T22-xxxx used to wire resolver.

Pin Definitions for DB-15 Connector

The table below provides pin numbers, wire color and functions for the DB-15 Connector.

Pin Definitions for DB-15 Connector on Cam Modules (Cable: CBL-15S22-DAxxx)		
Pin #	**Cable Color**	**Function**
1	Black	NC
2	White	Vs– (SigRef or Com)
3	Red	Vs+ (50VDC max for P&N; 5VDC max for T)
4	Green	NC
5	Orange	Channel 15
6	Blue	Channel 13
7	White/Black	Channel 11
8	Red/Black	Channel 9
9	Green/Black	Vs–
10	Orange/Black	Vs+
11	Blue/Black	NC
12	Black/White	Channel 16
13	Red/White	Channel 14
14	Green/White	Channel 12
15	Blue/White	Channel 10

NC : Not Connected
White/Black : White wire with Black stripes

Output Description (ASY-M1056-12P)	
Pin #	**Function**
1	Customer Power Supply (11–28 VDC)
2	Bit 11
3	Bit 10
4	Bit 9
5	Bit 8
6	Bit 7
7	Bit 6
8	Bit 5
9	Bit 4
10	Bit 3
11	Bit 2
12	Bit 1
13	Bit 0
14	Common (Return for 11–28 VDC customer power supply)

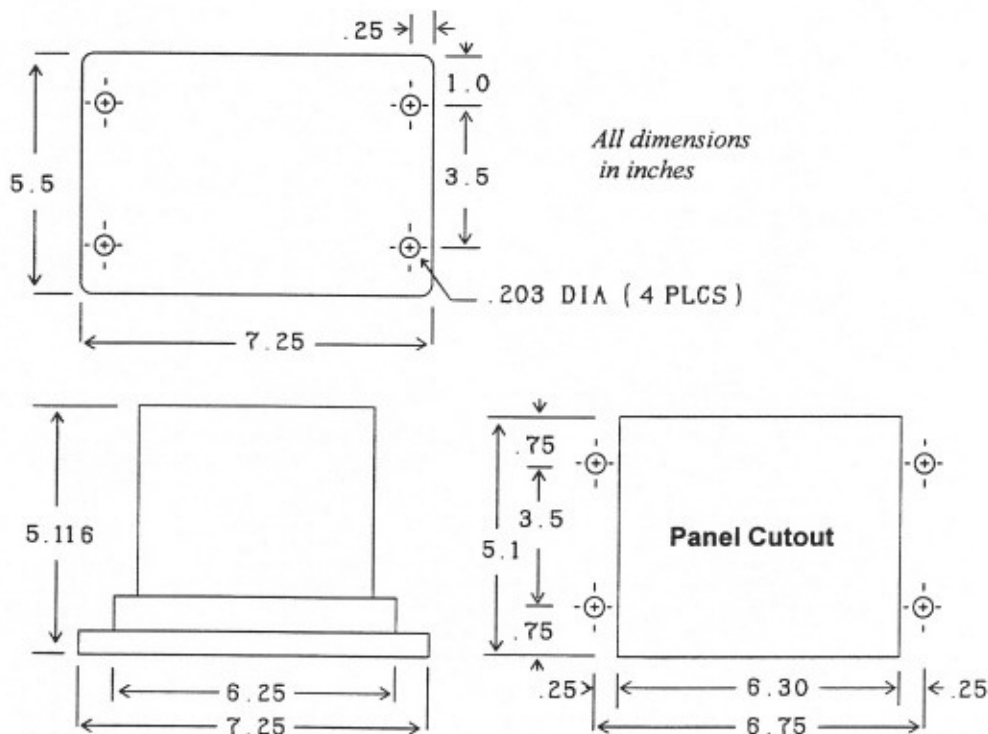PNP sourcing outputs. 100 mA continuous for each output, short circuit protected.

Note: The short circuit indicator (LED) flashes when a short is detected.

Plug-in Module for M1056 PLC (ASY-M1056-12P)

Module ASY-M1056-12P is used in conjunction with the M1056 PLS. This module plugs into the M1056 DP-15 Connector. It provides 12 short circuit protected, optically isolated PNP sourcing outputs. Short circuit on any output(s) is indicated by a flashing LED on the module. The output parameters of the module are programmable from the M1056 keypad. See the table (above, right) for pin definitions. Follow the steps below to install the module (reference figure to the right):

1. Remove two screws from the back cover of the M1056. These two screws are on the left side when looking at the back of the unit.
2. Insert the desired module into the DB-15 connector on the side of the unit.
3. Replace the two screws, securing the module to the back of the M1056.

3. Mounting

The M1056 PLS mounts in a 6.3" x 5.1" panel cutout and requires four mounting holes as shown in the Panel Cutout drawing below. The M1056 will fit in a 6 inches deep panel. Slide the M1056 through the panel opening with gasket and tighten the four #8 mounting screws. Attach the pre-wired removable terminal blocks to complete the installation.

M1056 Programmable Limit Switch Dimensions

.25

1.0

5.5

3.5

All dimensions
in inches

.203 DIA (4 PLCS)

7.25

5.116

6.25

7.25

.75

3.5

5.1

.75

Panel Cutout

.25

6.30

.25

6.75

Programming the M1056
16 Channel PLS

The following is an overview of the programming modes on the M1056 - 16 Channel PLS. The different modes are accessed by repeatedly pressing the MODE key until the desired mode is displayed. The M1056 will automatically return to the Default Display mode if left in some other mode for more than one minute without any key presses. (See Programming Flow Chart on the next page.)

- Default Display — Program Number, Tachometer, Position or Brake Stop Time
- Scale Factor
- Base Offset
- Channel Types
- Speed Compensation
- Brake Limits
- Motion Limits
- Motion Output Options —
  8 PLS outputs plus tach or motion
  16 PLS outputs
- Output Format — Tach/Motion output in Binary or BCD format
- PC Sync Option
- Anti-Repeat Feature
- Motion Output Delay
- Program Number Selection From Keyboard
- Setpoint Programming (direct access by pressing "Recall" or "Mode" Key from Default Mode) back to the Default Display.

> **Note:**
> Both program enable inputs, PE + PE2, must be true to allow viewing or programming of any modes except the default mode and the setpoint mode.

Definitions

Program

There are eight distinct setups that may be preprogrammed into the M1056. These setups are identified by a Program Number from 1 to 8. The current Program Number may be selected in two ways:

1. External Program Selection. If enabled, the following is disabled.
2. Keyboard Program Number Selection.

The following parameters are independent of Program Number:
- Scale Factor
- Base Offset
- Motion Limits High and Low

The remainder may have different values from program to program.

Channel

There are 16 independent output channels, and each 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.

Key Functions

The programming key sequences are fairly general for all modes. The keys function as follows:

MODE Key:
Press to sequence through the different programming modes. Pressing the MODE Key will save programming changes to the nonvolatile memory.

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 change to other selections. Channel Number 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 to the right.

Right Arrow Key:
If programming is enabled, use the Right Arrow Key to change the window that may be edited. Editing may occur in the window with the blinking digits. Also, from the Default Mode, the Right Arrow Key will cause either the Tach and Position, or the Brake Stop Time to be displayed.
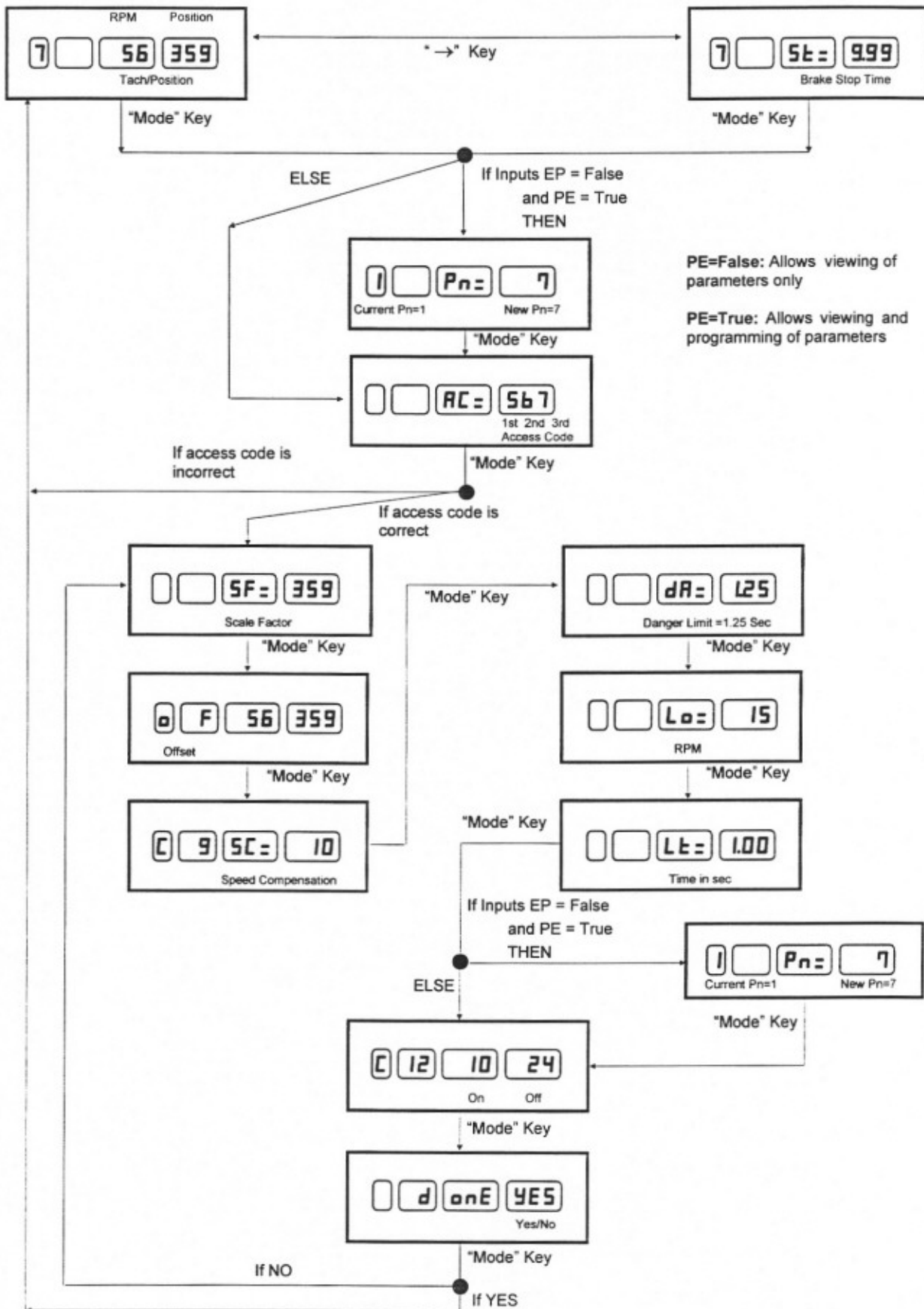
Recall Key:
The Recall Key is used to recall setpoints in Channel Setpoint Mode. Also, from the Default Mode, the Recall Key jumps directly to the Setpoint Programming Mode.

> **Note:**
> See page 12 for Symbols used in programming displays.
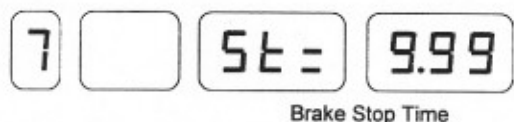
Programming Flow Chart

1. Default Display

Program Number, Tachometer RPM, Base Position.

RPM   Position

```
[ 7 ]  [    ]  [ 56 ] [ 359 ]
```
Tach/Position

OR

Program Number, Brake Stop Time in seconds (St=9.99)

```
[ 7 ]  [ St = ] [ 9.99 ]
```
Brake Stop Time

In the event of a resolver cable fault:
Program Number, and the message "CABLE" instead of Tach and Position.

```
[ 7 ]  [    ]  [ CA ] [ BLE ]
```
Broken Resolver Cable

The Base Position for the M1056 is composed of the absolute resolver position plus the machine offset value which is common to all eight programs.

2. Scale Factor

*PE and PE2 inputs must be **True** for viewing and programming.*

```
[    ]  [ SF = ] [ 359 ]
```
Scale Factor
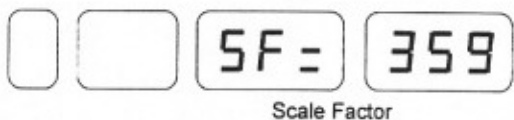
The Scale Factor is the desired counts per turn minus one. For example, to work in degrees, program the Scale Factor to 359. The allowed range of values is 16 to 999. The Scale Factor is common to all Programs 1 to 8. The Base Offset does not affect channels assigned to groups 1–4.

3. Base Offset

*PE and PE2 inputs must be **True** for viewing and programming.*

Offset   Position

```
[ o ] [ F ]  [ 56 ] [ 359 ]
```
Offset

The Offset value is the angle which when added to the absolute resolver postion, yields the desired machine position. The allowed range for the offset is 0 to Scale Factor. The Base Offset is common to all Programs 1 to 8.

4. Channel Type

*PE and PE2 inputs must be **True** for viewing and programming.*

The setpoints for a given channel may be designated as angle-on/Angle-off (default) or as Angle-on/Time-off.

```
[ C ] [ 1 1 ] [ Ang ] [ Ang ]
```
Angle ON/Angle OFF

```
[ C ] [ 12 ] [ Ang ] [ toF ]
```
Angle ON/Time OFF

Angle-on/Time-off setpoints function by turning the output on at the selected on-angle. The output will turn off again after the programmed time has elapsed (0.01 to 9.99 seconds). Only one setpoint may be programmed in a channel used as Angle-on/Time-off.

5. Speed Compensation

*PE and PE2 inputs must be **True** for viewing and programming.*

```
[ C ] [ 9 ] [ SC = ] [ 10 ]
```
Channel 9   Speed Comp = 10° /100 RPM

Each Channel 1 to 16 has its own programmable speed compensation. The value entered is the angle of offset to be added per each 100 RPM. The equation is:

Speed Compensated Position = Base or Group Position + Tach RPM's x Speed Comp value

Channels 5 through 16 have a single speed comp value to be programmed in. Channels 1 through 4 are special in that they have Speed Comp Zones. Each of the four channels has 16 zones into which individual speed comps may be entered for 16 different RPM ranges.

$$C \quad 1 \quad r \quad 1 \quad 10$$
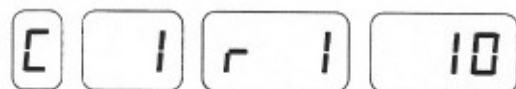
The rate limit for zone 1 = 10 RPM

The first number to enter is the rate limit ("r##, RPM") for the selected zone. The rate limit is the RPM value at which the speedcomp zone becomes active. The rate limits for each zone should increase with zone number. When a zone becomes active, the zones with lower rate limits become inactive. When a zone's rate limit shows "off", no further speedcomp zones are evaluated. If the "off" zone is zone 1, the channel will not have any speed comp.

$$C \quad 1 \quad c \quad 1 \quad 47$$

The comp value for zone 1 = 47° /100RPM

The second number to enter is the compensation value ("c##, Comp") for the selected zone. As with normal Speed Comps, this is the angular offset added to the actual position for each 100 RPM of speed. When a certain zone is selected by having the shaft RPM above the zone's rate limit, the selected compensation value is used to calculate the speed comp for that channel.

6. Brake Wear Monitor Time Limits

*PE and PE2 inputs must be **True** for viewing and programming.*

The amount of time it takes for a shaft to stop turning after the brakes are applied may be measured and compared to Caution and Danger Time Limits. This measurement can warn of brakes that are wearing out and may need to be replaced for safety reasons. If the shaft is turning and the brakes are applied, the "stop" signal may be wired into the "BI" brake input on the unit. Upon receiving this "stop" signal, the Brake Stop Timer begins counting, and if the shaft stops turning before the Caution Limit is exceeded, Outputs 7 and 8 will reflect a "Safe" condition. If the Stopping Time is between the Caution and Danger Limits, the "Caution" condition will appear on the outputs. If the Shaft fails to stop before reaching the Danger Limit, the "Danger" output condition will appear. When stopped, the brake timer may be cleared to the Caution condition by asserting the Brake Clear Input (otherwise used as the ModZ 1 Input).

Brake Output Conditions on Outputs 7 and 8:

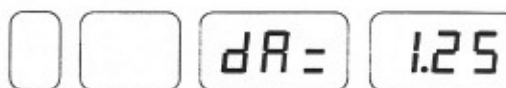| Condition	Output 7 (Caution)	Output 8 (Danger)
Safe	Off	On
Caution	On	On
Danger	Off	Off

OFF : Deenergized
ON   : Energized

$$CA = 1.00$$

The caution limit = 1.00 Seconds

The Danger Limit will probably need to be entered first to allow room for the Caution Limit to be changed. The relationship between Caution and Danger Limits is as follows:

$0.00 \leq$ Caution $\leq$ Danger ≤ 9.99 seconds.

$$dA = 1.25$$

Danger Limit = 1.25 Seconds

Turn off the Brake Wear function by setting both limits to zero. Setpoints on channels 7 and 8 will not be executed so that the outputs can be use by the Brake Wear Monitor. This mode will be skipped if any ModZ groups are in use.

7. Motion Limits

*PE and PE2 inputs must be **True** for viewing and programming.*

The Motion Output is controlled by the Low and High Motion Limits.

$$Lo = 15$$

$$Hi = 999$$
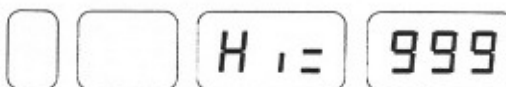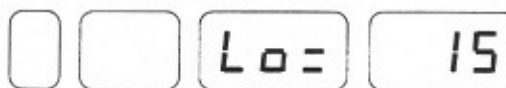
If the shaft RPM is between the Motion Limits inclusively, the Motion output will be energized. Motion Limits are common for all eight programs.

8. Program Number Selection

*PE and PE2 inputs must be **True** for viewing and programming.*

Program Number Selection is allowed only if the following conditions are met:
- The shaft is not turning (RPM < 4),
- The Program Enable is on.

I		Pn=		7

Current Pn = 1   New Pn = 7
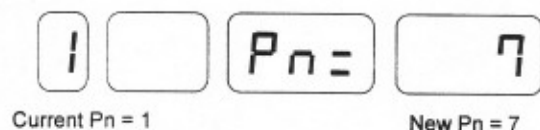
The Program Number may be selected from the keyboard only if the External Program Select input is off. If the External Program Select input is on, then the states of the Program Select inputs will determine which Program is selected.

9. Option 1: Output Option

*PE and PE2 inputs must be **True** for viewing and programming.*

		oP 1		tAC

OR   Tach Out

		oP 1		16

OR   16 PLS channels

		oP 1		POS
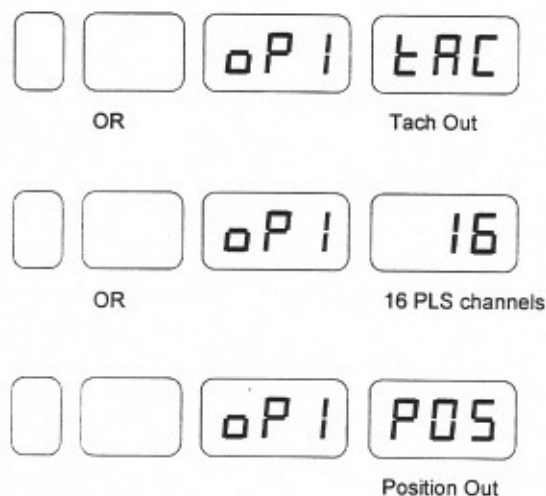
Position Out

Displays the current output option. "INC" and "DEC" keys toggle between the three selections:

- Tach output plus PLS channels 1–8
- PLS channels 1–16
- Position output plus PLS channels 1–8

10. Option 2: Binary or BCD Format

*PE and PE2 inputs must be **True** for viewing and programming.*

		oP2		bin

OR   Binary

		oP2		bcd

BCD

The current output format is only displayed if tach or position was selected for option 1. Pressing "INC" or "DEC" Key toggles between the two formats.

11. Option 3: PC-Sync

*PE and PE2 inputs must be **True** for viewing and programming.*

		oP3		YES

OR   Yes

		oP3		no

No
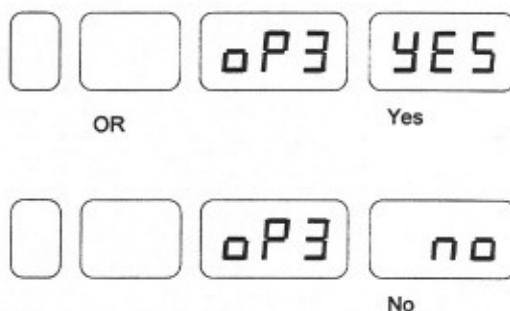
When PC-Sync is enabled (Yes), the tach/position output is updated within 500 μsec of the low to high transition of the PC-Sync input.

When PC-Sync is disabled (No), the tach/position output is updated every 500 μsec.

12. Anti-Repeat Feature

*PE and PE2 inputs must be **True** for viewing and programming.*

	A	rEP		50

The resolver is only allowed to reverse direction and turn backward motion is greater than this programmable angle, the PLS output channels 1 to 16 are disabled. The channels will be re-enabled when the resolver reaches the original position where the direction was reversed.

13. Motion Output Delay

PE and PE2 inputs must be True for viewing and programming.

$$\boxed{}\ \boxed{}\ \boxed{dL\,y}\ \boxed{3.74}$$

Station Number 16

The motion relay output and LED indicator will be delayed by this programmable value. The value is programmable in hundreds of seconds.

14. Setpoint Programming

PE input must be True for programming.

Both Angle-on/Angle-off and Angle-on/Time-off setpoints are programmed in this mode. The type of setpoints is determined by the Channel Type parameter programmed above.

		ON	OFF

$$\boxed{C}\ \boxed{I2}\ \boxed{I0}\ \boxed{24}$$

ON at 10°　　OFF at 24°
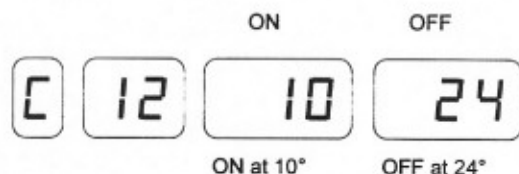
Angle-on/Angle-off

When the Shaft is moving in the forward direction (CCW), Angle-on/Angle-off setpoints are defined as: Angle-on = Angle at which the output will turn on. Angle-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 On Setpoint to Off Setpoint to both On and Off setpoints together, and 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. 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.

$$\boxed{C}\ \boxed{4}\ \boxed{I00}\ \boxed{2.45}$$

ON at 100°　　OFF after 2.45 Seconds

Angle-on/Time-off

Angle-on/Time-off setpoints function by turning the output on at the selected on-angle. The output will turn off again after the programmed time has elapsed (0.01 to 9.99 seconds). Edit the Angle-on/Time-off setpoint in a manner similar to the Angle-on/Angle-off setpoint except that only one Angle-on/Time-off setpoint is allowed per channel.

Pressing the Mode Key again will return the unit to the default display.

Symbols Used in Programming Displays

Symbol	English	Function/Description
Ang	Ang	Angle
br	br	Baud rate
C	C	Channel
c	c	Compensation value for zone
CA	CA	Caution
CABLE	CABLE	Cable
dA	dA	Danger limit
G	G	Letter G
GA	GA	Assign channel # to group #
Gr	Gr	Groups
Hi	Hi	High
In	In	Inhibit zone
Lo	Lo	Low
oF	oF	Base offset
Pn	Pn	Program number
r	r	Rate limit for zone
SC	SC	Speed compensation
SF	SF	Scale factor
Sn	Sn	Station number
St	St	Stop time
toF	toF	Time off

Symbol	English	Function/Description
oP 1	oP1	Output option tach/pos/16 Channel
oP 2	oP2	Output format option binary/BCD
oP 3	oP3	PC-Sync option Yes/No
rEP	rEP	Anti-Repeat feature
dLy	dLy	Motion output delay

M1056 Troubleshooting Guide

Symptoms	Possible causes
Unable to program unit parameters (Scale Factor, Offset, etc.)	• Is the Program Enable Input (PE) false? (i.e. the voltage level at the input is less than 11V) • Is the machine moving? — programming of several parameters (Scale Factor, Program Number) is disabled if the resolver is turning faster than 3 RPM. • If unable to program setpoints, the PLS program may already have 80 setpoints.
Program memory is changing by itself.	• Has the program number been changed to a different number (P1-P8)? • Have proper grounding and shielding practices been applied? • 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.	• Is the resolver correctly wired? Follow the steps below for a quick check. 1. Turn power off to M1056 unit 2. With main terminal block removed from unit, measure with ohm meter the followings: A. Term. 5 to Term. 6 (R1 to R2) = about 30 ohms B. Term. 1 to Term. 3 (S1 to S3) = about 55 ohms C. Term. 2 to Term. 4 (S2 to S4) = about 55 ohms • Is the resolver cable properly grounded and shielded?
Mechanical Zero drifts.	• Is the mechanical Resolver linkage loose? • Has the offset value been changed?
If all fails	• Call AVG Technical Support at 1 (800) TEC-ENGR (832-3647)

How to Order

1. M1056 PLS

SAC- M1056-010	Basic unit combines 16 power outputs, fault detection and indication; with Anti-Repeat feature: Programmable Maximum Backlash Angle, Programmable Tach/Position Output, User Installable Module for either Tach or Position output in either binary or BCD output format.
SSC-M1056-010	Slave unit

2. Relay Output Chassis

*ASY-RLYCH-08RL	Chassis for 8 EM-relay outputs with motion detector output and built-in power supply.
*ASY-RLYCH-08SS	Above chassis for 8 solid-state relay outputs.

2.1. Power Output Relays

Select the number and type of relays required.

KSD-012DC-10A	EM relay, SPDT, 120VAC @ 10 Amps resistive
KSS-120AC-3AMP	Solid state relay, 120VAC @ 3Amps
KSS-60VDC-3AMP	Solid state relay, 60VDC @ 3 Amps
KSS-200DC-1AMP	Solid state relay, 200VDC @ 1 Amp

2.2 Cable connecting M1053 to relay chassis:

CBL-RLYCH-DA4	15 conductor cable with overall shield 4 ft length and sub "D" connector on both ends for interconnection of relay chassis to PLS
CBL-RLYCH-DAxxx	Sames as above but with extended cable length
CBL-15S22-DAxxx	15 conductor cable,with overall foil shield, sub "D" connector on one end xxx= length in feet (10, 25, 50, and in 50 feet increments)

3. Plug-in-Modules

ASY-M1052-8P	Optically isolated PNP sourcing output module
ASY-M1052-8PTA	Above with the addition of 4-20mA analog velocity output
ASY-M1056-12P	Optically isolated 12 Bit PNP sourching output module

4. Position Transducers

The M1053PLS requires a single turn resolver as an input device, such as Autotech's RL100, RL101, RL500, RL501, E1R, E6R, E7R, E8R series of resolvers. Please see rotary position transducer manual for How to Order information on these transducers and appropriate accessories.

WARRANTY

CAUTION