



## Series 1989 Quik-Set™ III Multiturn PLS

### QUIK-SET™ III HIGH RESOLUTION SINGLE TURN & MULTITURN PLS

- Up to 48 Circuits
- Scan Time as Low as 17 Micro-seconds
- EEPROM Memory
- Multiple Program Capability
- Single or Dual Axis Input
- Choice of Transducers:
  - Resolver-Single or Multiturn
  - Linear Displacement Transducer
  - Optical Encoder
  - 4-20 mA or 0-10V Analog
- Fault Check Circuitry and Brake Monitor for Press Controls
- Resolution to 1 Part in 4,194,304
- Key Locked Program Security
- Programmable Decimal Point
- Programmable Scale Factor
- Special Software Available
- Portable Keypad
- RS-232 or RS-422 Serial Communication
- Speed Offset
- Remote Reset
- BCD, Binary, or Gray Code Output of Position or RPM
- Industrial Duty Transducers
- Mill Duty Enclosures
- Linear Actuators
- Cable Drives
- Combination Mechanical Cam Transducer Packages
- Custom Sensor Assemblies



**AMETEK**  
AUTOMATION & PROCESS TECHNOLOGIES

# Quik-Set™ III

## Multiturn PLS

### DESCRIPTION

The *QUIK-SET III* is a fully integrated microcomputer-based Programmable Limit Switch (PLS) with a convenient keypad for programming each independent output circuit to open or close at the desired settings. The system allows precise position control of either rotary or linear motion through the keypad or by a remote programmable controller, computer, or via any remote serial data link using RS-232 or RS-422.

The Programmable Limit Switch receives a signal from the transducer and converts the signal to the appropriate binary code.

As the transducer passes through the preprogrammed dwell settings, the programmer outputs can energize solenoids, relays, or solid state circuitry to control external circuits providing accurate repetitive and sequential operations.

Standard programmers are available with 16, 32, and 48 circuits all operating from a single transducer.

The dual axis programmer, with 16 or 32 outputs, can control two independent axes and provide substantial economy for multiple axis equipment.

The *QUIK-SET III* PLS is available for inputs from single or multiturn resolvers, linear displacement transducers, optical encoders, or analog signal devices.

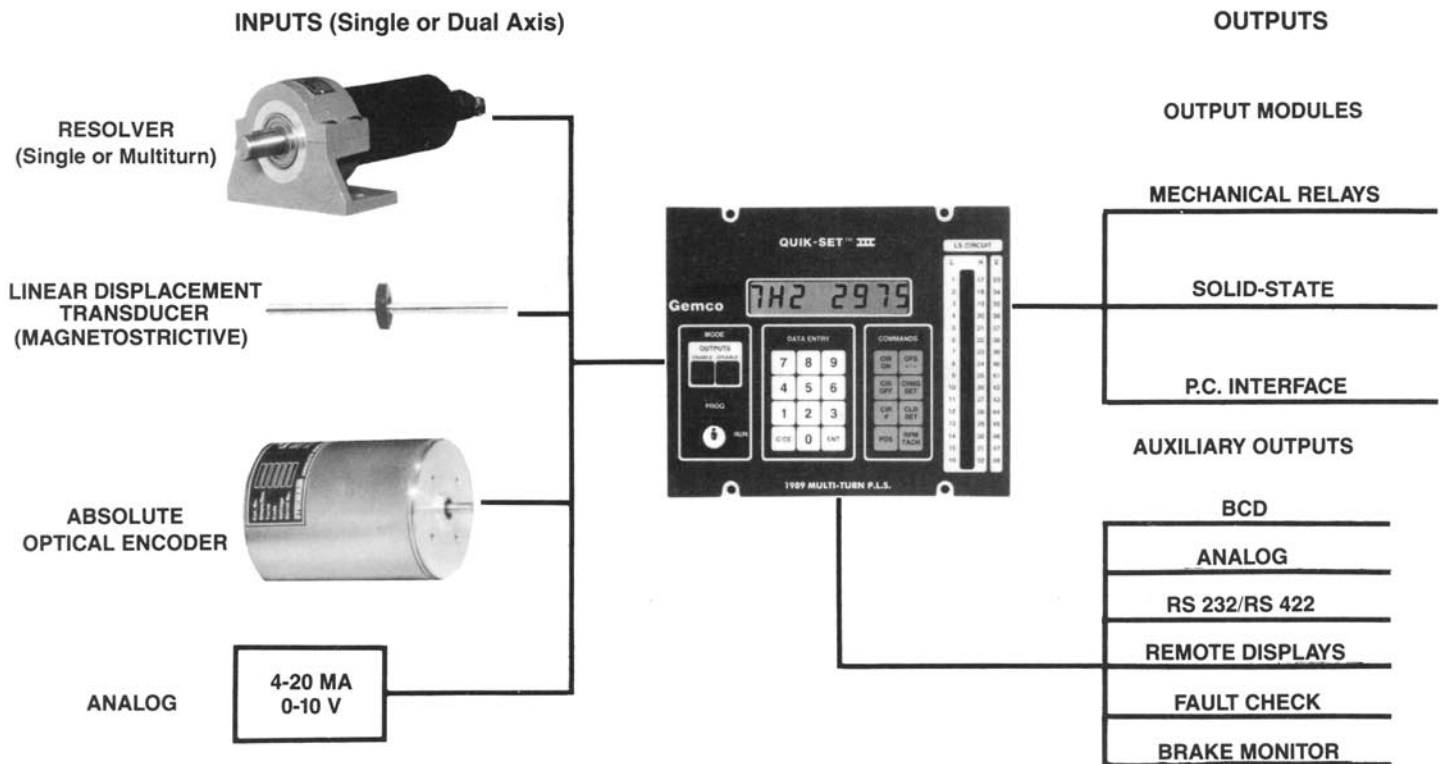
Optional features include a portable keypad for cost savings on multiple units, multiple programs which offer fast and easy production changes, and dual channel inputs for dual axis or differential outputs. A fault check and a brake monitor circuit are available to provide safe reliable operation for overall press control and feed operation.

### APPLICATION

Gemco's *QUIK-SET III* Programmable Limit Switch is a pilot device used for industrial applications such as material handling, assembly machines, mechanical presses, packaging machines, steel mills, and many other applications where accurate repetitive and sequential operations are required in control circuitry.

The Microcomputer Programmable Limit Switch makes it possible to program the opening or closing of independent circuits at a desired position of the transducer, even while the machine is in motion. When a resolver transducer input is used, the programmer can be located as far as 3000 feet from the machine.

### QUIK-SET III P.L.S.



# Quik-Set™ III Multiturn PLS

## INPUT TYPES

### RESOLVER TRANSDUCER

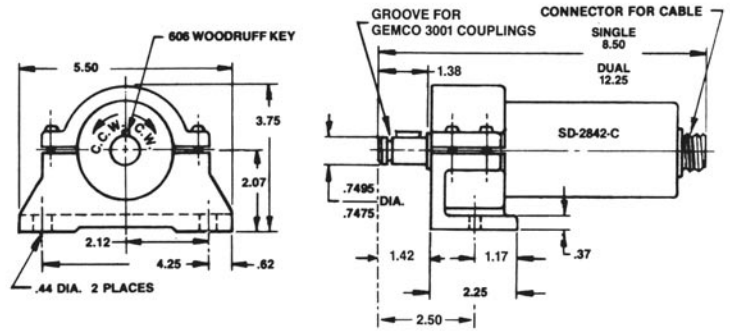
The highly accurate, reliable, brushless resolver provides an absolute analog signal which varies as a function of the angular rotation of the input shaft. The two phase stator and single phase rotor of the resolver provide a ratiometric output that does not vary with changes in rotor voltage, frequency or temperature.

The brushless resolver is available in a rugged duty NEMA 4 enclosure with a plug-in connector. The 3/4-inch input shaft in sealed ball bearings results in the most rugged duty transducer available for industrial applications.

The single turn resolver is accurate to within six minutes of arc. A multiturn dual resolver is available in a 64 or 128 turn unit. The PLS offers 14-bit resolution (16,384) for the single turn unit, and 14 bits per turn for the multiturn units (i.e., 20 bits total for the 64-turn unit and 21 bits total for the 128-turn unit).

Single turn resolvers are also available with integral gear boxes as shown on page 24. These standard gear boxes do have some backlash and are only recommended for unidirectional operation. Consult the factory for precision gear boxes for reciprocating applications.

### SINGLE TURN RESOLVER OR MULTITURN DUAL RESOLVER TRANSDUCER



### LINEAR DISPLACEMENT TRANSDUCER (LDT)

A strain pulse is transmitted in a magnetostrictive wire inside a protective tube by the interaction of a current pulse and a magnetic field from a movable magnet. The strain pulse travels at a given speed and precise linear positioning can be determined by measuring the time interval for the pulse to travel to a fixed reference point.

The LDTs provide absolute positioning up to 14-bit resolution (16,384) with excellent linearity (.05%).



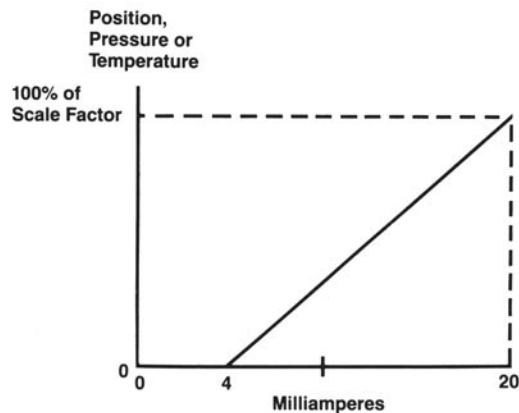
### BINARY

The binary input allows resolution up to 24 bits (16,777,216) with any binary input. Typical binary inputs include single turn and multiturn absolute optical encoders.

### ANALOG

Analog inputs for 4 to 20 mA or 0-10 volts will offer resolution up to 12 bits (4096).

The scale factor is keypad programmable over the range of the specified input. The highest scale reading will correspond to the highest analog voltage or current input value. Consult the factory for special requirements.



# Quik-Set™ III Multiturn PLS

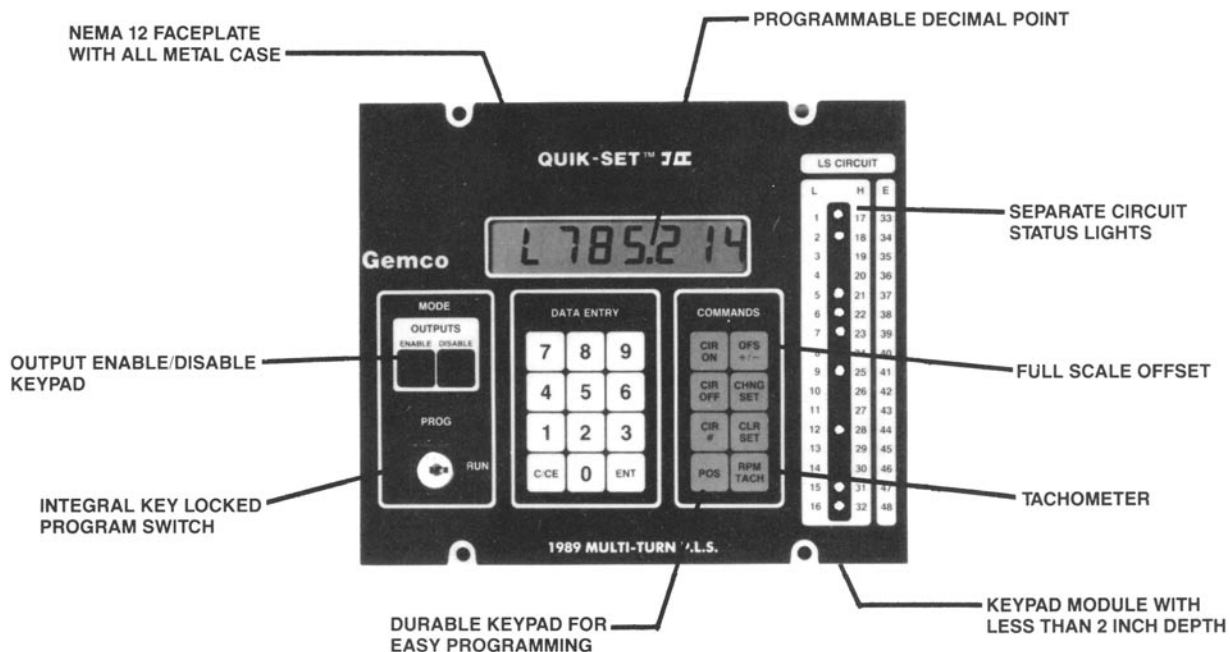
## THE PROGRAMMER

The 1989A Programmable Limit Switch includes the following basic features: 16 circuits each of which will accept multiple setpoints, non-battery backed memory (EEPROM), easy keypad programming, key locked program switch, programmable decimal point, programmable scale factor, full scale offset, position or RPM display, convertible enclosure, choice of rotary or linear input transducers, NEMA 12 faceplate, motion detector, enable-disable switch, programming through zero, choice of output types, and 12-bit resolution.

Commonly used options include up to 48 output circuits,

portable keypad, multiturn operation, 14-bit resolution, RS-232 serial transceiver, remote displays, remote reset, multiprogram feature, selectable speed offset, analog outputs, fault check output, brake monitor, and choice of enclosure types.

A standard option package K is now available which combines several unique features at no additional cost. Included in this package are the following features: remote reset, selectable speed offset, multiprogram, fault check and all the basic features above.



**No Battery Backup.** No battery backup required for all *QUIK-SET III* Programmers. Memory is retained in E<sup>2</sup> PROM chips which require no battery backup for retention of memory.

**Clockwise/Counterclockwise Rotation.** If the resolver-to-programmer cable assembly SD3342-B is connected as shown on the rear of the programmer, the readout will increase as the transducer rotates in a clockwise direction. By reversing the "green" and "black of green" terminals, the readout will increase as the transducer rotates in a counterclockwise direction.

**The Enable/Disable** switch on the programmer activates the Gemco output module by taking the enable circuit on each output module to ground and allows the outputs to turn on and off as they are **called for**. The "Run-Prog" selector switch, wired in parallel with the enable/disable switch, will also take the enable circuit to ground in the "run" position. Therefore, the disable keypad (in the "Prog" mode) will only disable Gemco output modules, not other programmer outputs. When the programmer is interfaced to a P.C., the P.C. can be programmed to enable circuits when the ground occurs on the enable terminal on the back of the *QUIK-SET III*.

# Quik-Set™ III

## Multiturn PLS

### DESCRIPTION

The standard 1989A Programmable Limit Switch is convertible from a one piece package to two separate pieces consisting of a keypad module (1-1/2" deep) and a CPU module which can be subpanel mounted or assembled to the rear of the keypad. High power output modules are used when the programmer outputs do not have enough load capacity. Since the power supply for the complete PLS is included in the output module, a separate Gemco power supply is needed when no output module is required.

When more than one PLS is used, a complete 1989A PLS can be supplied for each station, or a single 1989 **PKP Portable Keypad** can be used for programming and initial setup of several 1989PA CPU Modules. The 1989 PKP Keypad can be easily plugged into each 1989PA CPU Module for quick and simple programming or interrogation of programmed parameters.

The 1989CA CPU Module can be used without a keypad when all programming is to be done via RS-232 from a programmable controller. The 1989CA CPU Module can also be used as a spare or replacement module for the Standard Programmable Limit Switch.

Three versions of the 1989 Programmable Limit Switch catalog numbering system will be described.

The first version includes all commonly used **special options**. Consult your local representative for additional special requirements.

The second variation includes a **standard option package K** which reduces system cost by including many commonly used options in a standard unit. This variation is limited to 16 circuits and does not include all the possible PLS options.

The third version is a 1989D **Dual Axis PLS**, which may be considered two independent single-axis programmable limit switches that share a common keypad, display and CPU module. Programming and operation are similar to the single axis unit, but with many additional features.

Sixteen and 32-circuit PLSs are available in the Dual Axis PLS with half the circuits operating from one axis and the other half from the other axis. The display will monitor the position or RPM of either axis or automatically switch between axes while also displaying the axis number. Positional data is limited to four digits. Different scale factors for each axis can be used, and many of the single axis options are available as is shown in the catalog numbering system.

The 1989D Dual Axis PLS is also available with a differential option which provides monitoring and control based on the difference in position or RPM between two axes. See programmer Option D for details.

Transducer(s) and their associated cable assemblies must be ordered separately for either the single or dual axis PLS.



Portable Keypad Assembly with  
CPU Module and Single Resolver  
Transducer



# Quik-Set™ III

## Multiturn PLS

### PROGRAMMER OPTIONS

#### Option A — Analog Output

The analog output option is available in either 1) 0-10 VDC, 2) -10 to +10 VDC, or 3) 4 to 20 mA. This option is keypad selectable to provide either position or RPM (velocity) data and analog gain. This output is available from terminals of an auxiliary board on the CPU module.

This option is not available with option package K and cannot be used when options H and R are both specified.

Typical applications include variable speed drives, feedback and control systems, valve positioning or data recording.

#### Option B — BCD Output – Position or RPM

The BCD output option is keypad selectable to provide either position or RPM information. The parallel BCD output is available at the terminal strip of the CPU module. The type of output used (i.e., current sinking, sourcing, TTL) is the same as the programmer output unless otherwise specified. This option is not available on systems having more than 32 circuits. The BCD output is typically fed into a programmable controller in systems where high speed switching is performed by the PLS while slower speed functions are controlled by the P.C.

A Latch input is provided to freeze the output data, thus allowing sufficient time for the P.C. to reliably read the signal. However, if the fault check option is ordered, the Latch input is not available.

Binary and Gray Code outputs are also available.

#### Option C — Fault Check

The fault check option provides an automatic, in process, verification that all major Programmable Limit Switch functions are operating properly. The output of the fault check circuit can be used to control an optional fault check relay on the output module (i.e. always relay 16 on output module) or a customer supplied device. The fault check relay is energized during normal operation and de-energizes during a fault condition. The fault check relay should be wired to immediately stop operation of the equipment when a fault is sensed.

A customer supplied contact provides a fault reset input which can test the circuit and also resets the relay in case of a fault.

The fault check relay will detect the following problems:

- 1) Disconnected or severed resolver cable.
- 2) Resolver excitation failure.
- 3) Microprocessor system malfunctions.
- 4) Resolver to digital converter or associated electronics failure.
- 5) Loss of main 120V AC power, 24V DC power or 15V or 5V regulators within the PLS.

#### Option D — Differential Operation (Dual Axis Only)

The Differential option allows the display to monitor the difference in position or RPM between two axes in addition to the normal dual axis operation. Three outputs are also provided to indicate: 1) if axis 2 is greater than axis 1; 2) if axis 2 is less than axis 1; 3) if the two axes are in sync (user programmable window).

This option offers keypad programming for linear or rotary differential position, as well as a differential dimension mode which subtracts the two axes' readings from a fixed overall dimension to measure overall width, such as slab width in a steel mill.

The analog output, when used with this option, can be keypad selected to monitor axis 1, axis 2, or differential in either position or RPM. The differential analog output can be used as a servo feedback device to synchronize the two axes.

Analog output voltage range will be 0 to +10 Volts when monitoring individual axis position or RPM, and -10 to +10 Volts when monitoring differential position or RPM. Voltage gain and offset are keypad programmable.

#### OPTION H — RS-232 Transceiver

The RS-232 Transceiver option is available from terminals on an auxiliary board of the CPU module. This transmitter/receiver allows programmer interrogation and remote programming of all keypad functions via a programmable controller or any ASCII CRT terminal via an RS-232 four-wire serial data link. This option is not available when Options A & R are both specified.

#### OPTION M — Multiple Program

The multiple program option makes it possible to store eight separate operating programs with single or multiple dwells on up to 48 circuits simultaneously. This allows for rapid changeover from one set of manufacturing parameters to another without slowing production. Program selection can be made by either a remote binary coded signal or through keypad commands. An initial keypad selection will determine which of these two modes of program selection are used.

In the first mode of program selection, a remote binary signal input is received from a programmable controller, personal computer, selector switch or other control device. This binary coded input (0 to 7) is applied to four terminals on the CPU module of the PLS and selects the required operating program. This Binary Coded input mode of program selection is **not** available with a dual resolver input.

# Quik-Set™ III

## Multiturn PLS

The second mode of program selection uses a few simple keypad commands to change the program. This mode of operation is recommended when key lockable programming security is desirable such as in press applications.

When the multiple program option is selected, the digit on the far left side of the programmer screen displays the operating program number.

### OPTION O — Remote Reset to a Preset Number

This option allows a remote contact closure to automatically reset the *QUIK-SET III* to zero or any other preprogrammed value. Typical applications include synchronizing machine outputs with the presence of parts flowing thru a machine, measure and cut applications and compensation for slippage in the machine to resolver drive linkage. Following loss and reapplication of programmer power, position data will revert to actual transducer position plus any programmed offset.

Output module option R provides a solid state relay in the output module which converts the initial application of a 110 volt 50/60 Hz signal to a contact closure which will reset the *QUIK-SET III*.

### OPTION R — Remote Serial Display – RS-422 Transmitter

This programmer option provides an RS-422 serial output to operate a remotely mounted serial display. Remote serial displays should be ordered separately. Twenty-five feet of interconnecting cable is included with each display. These displays are available with either four or eight-digit readouts and can be mounted up to 600 feet from the programmer. This option is not available when Options A & H are both ordered.

### OPTION S — Brake Monitor

This option offers an on-line monitor which checks the stopping time against a customer selected preset stopping time in seconds and can be used to check the stopping distance at any point during the stroke.

With simple keypad commands, the digital readout will display the stopping time or the stopping distance (degrees) of each cycle. If the time from de-energization of the press clutch voltage to stopping the ram exceeds a preset value, an output will be generated which can be used to stop further press operation.

The BCD output (Option B) and the remote reset (Option O) are not available with the Brake Monitor Option.

### OPTION T — Timed Dwell

This option allows the user to select up to sixteen outputs which can be programmed to turn on by position and turn off based on time. Each output's timed dwell can be programmed from 0.00 to 99.99 seconds. Only one position/time function can be programmed for each output operating in this mode. The output will cycle when the programmed position is reached from either direction. This option increases the standard output update time from 125 to 500 microseconds.

### OPTION U — Selectable Speed Offset – 4 Step

This option provides an automatic offset by speed to compensate for timing changes in a machine function over wide speed ranges. The outputs can be offset by a user programmed value in four user programmed RPM steps. In addition, the outputs can be disabled if the RPM falls below a user programmed motion detection value.

Typical applications include offsetting glue guns and pneumatic actuators to compensate for mechanical lag as machine speeds increase. This option can also be used to operate electric brake circuits sooner to compensate for increases in machine velocity.





# Quik-Set™ III

## Multiturn PLS

### LOG NUMBERING SYSTEM

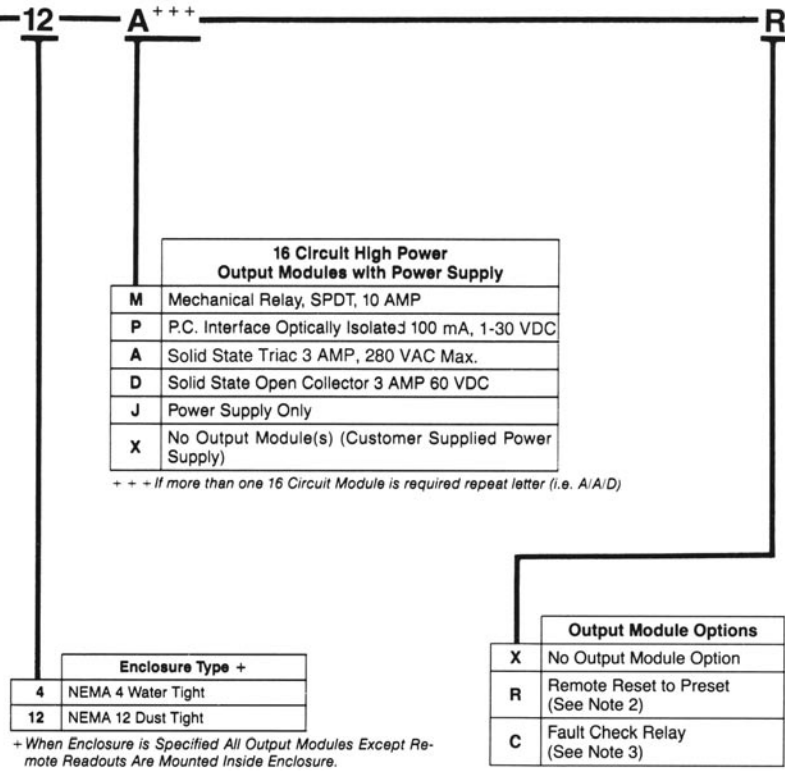
CONTINUE SEQUENCE ONLY IF OUTPUT MODULES TO BE FACTORY ASSEMBLED INSIDE OF ENCLOSURE. IF NOT, ORDER OUTPUT MODULES ON BOTTOM OF PAGE 8.

**NOTE 1:** Insert number to specify type of analog output.

- 1 0 to 10V DC
- 2 -10 to +10V DC
- 3 4 to 20 mA

**NOTE 2:** If the remote reset feature is activated by a 110V AC input, an output module having the remote reset option should be ordered.

**NOTE 3:** Fault check output signal from CPU Module is designed for use with fault check relay on output module. Specify output module option C if ordering output module.



Cable Assemblies		
Part No.	Item	Length
SD0334200***	Single Resolver to Programmer	15 ft.
SD0334900***	Dual Resolver to Programmer	15 ft.
SD0336100	Programmer to Output Module (spares)	6 ft.
SD0336300	Programmer To Output Module w/Remote Reset (spares)	6 ft.
SD0300800	2 Conductor Shielded Remote Readout	25 ft.
SD0322900	Keypad To Programmer Ribbon Cable (spares)	18 in.

\*\*\*Transducer to programmer cable assemblies must be ordered separately.

Resolver Transducers	
Part No.	Item
SD0284200	Standard 3/4" Input Shaft NEMA 4
Consult Factory	Cable Driven-Spring Return Transducer-Specify Travel to 100"
SD0410900	Dual Resolver 64 Turns
SD0410901	Dual Resolver 128 Turns

Remote Serial Display (Programmer Option R)	
Part No.	Description
SD-3527-C*	4 Digit Display
SD-3435-C*	8 Digit Display

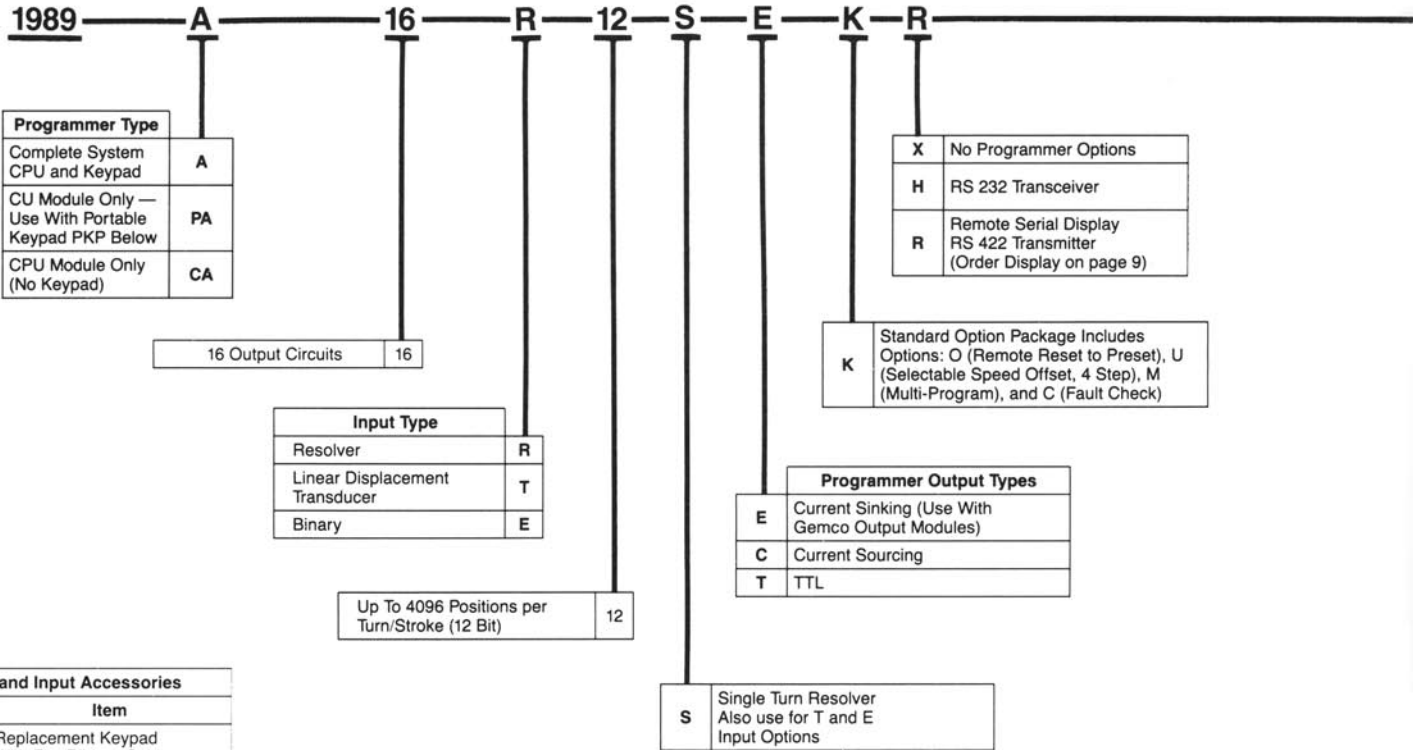
\*Includes 25 foot cable SD0300800

# Quik-Set™ III

## Multiturn PLS

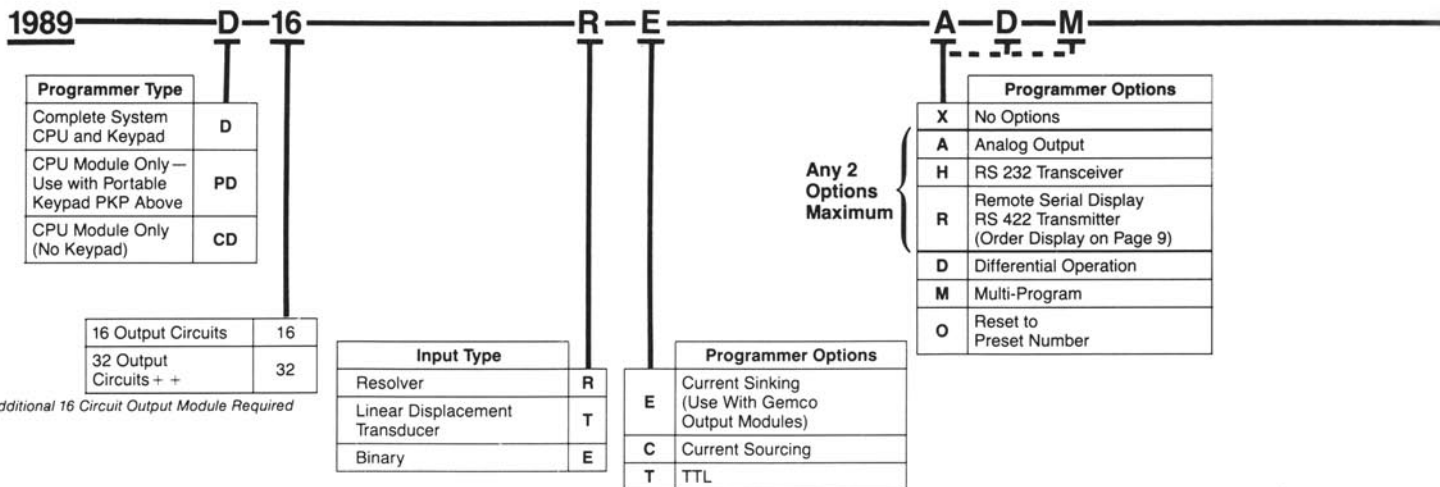
### EXPLANATION OF CATAL

#### 16 CIRCUIT QUIK-SET III WITH STANDARD OPTION PACKAGE



Keypads and Input Accessories	
Part No.	Item
1989 KP	Replacement Keypad With Flat Ribbon Cable 18 Inches Long
1989 PKP	Portable Keypad Assembly In Carrying Case With 6 Ft. Cable (With D-Type Connector)

#### DUAL AXIS QUIK-SET III



# Quik-Set™ III

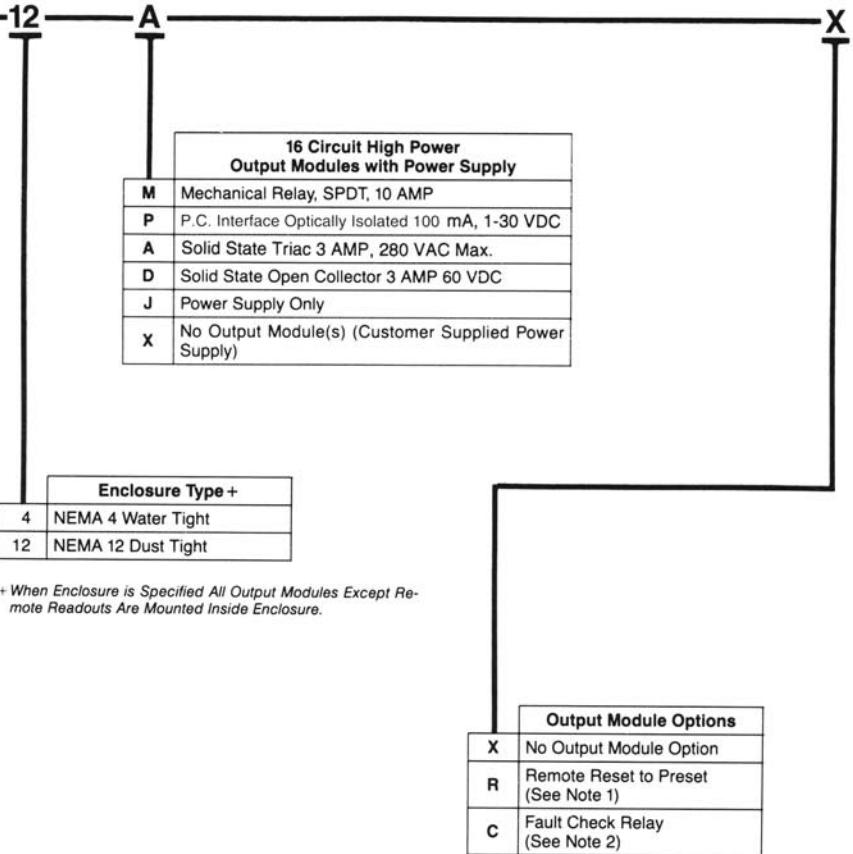
## Multiturn PLS

### LOG NUMBERING SYSTEM

CONTINUE SEQUENCE ONLY IF OUTPUT MODULES TO BE FACTORY ASSEMBLED INSIDE OF ENCLOSURE. IF NOT, ORDER OUTPUT MODULES ON BOTTOM OF PAGE 8.

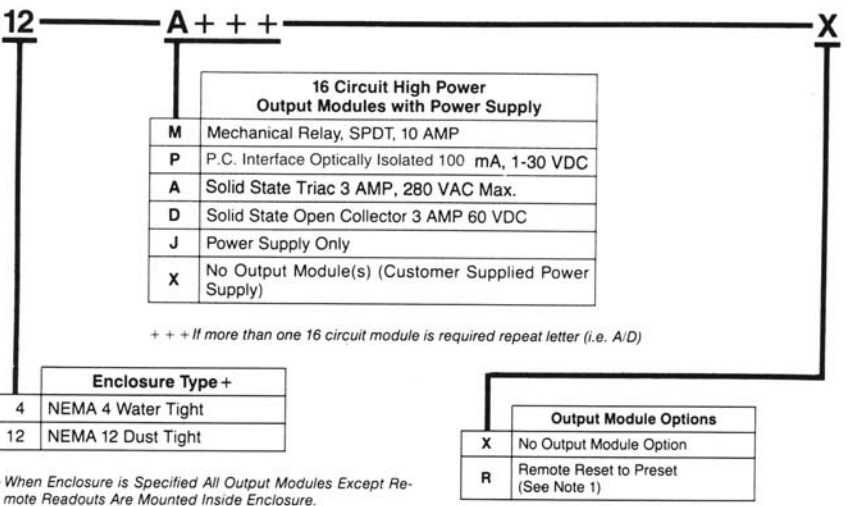
**NOTE 1:** If the remote reset feature is activated by a 110V AC input, an output module having the remote reset option should be ordered.

**NOTE 2:** Fault check output signal from CPU module is designed for use with fault check relay on output module. Specify output module option C if ordering output module.



CONTINUE SEQUENCE ONLY IF OUTPUT MODULES TO BE FACTORY ASSEMBLED INSIDE OF ENCLOSURE. IF NOT, ORDER OUTPUT MODULES ON BOTTOM OF PAGE 8.

**NOTE 1:** If the remote reset feature is activated by a 110V AC input, an output module having the remote reset option should be ordered.



# Quik-Set™ III

## Multiturn PLS

EXPLANATION OF CATALOG

### UP TO 48 CIRCUIT QUIK-SET III WITH ALL SPECIAL OPTIONS

1989 — L — 16 — L466 — E — A2 — M — O

Programmer Type	
Complete System CPU and Keypad	L
CPU Module Only - Use With Portable Keypad PKP Below	PL
CPU Module Only (No Keypad)	CL

16 Output Circuits	16
32 Output Circuits++	32
48 Output Circuits++	48

†† Additional 16 Circuit Output Module Required

STROKE IN INCHES	
0-17	L417
17.1-41	L441
41.1-66	L466
66.1-90	L490
90.1-136	L4136
136.1-189	L4189

Any 2 Options Maximum

Programmer Options	
X	No Options
A	Analog Output (See Note 1)
H	RS 232 Transceiver
R	Remote Serial Display RS 422 Transmitter (Order Display Below)
B	BCD Output Position or RPM
C	Fault Check Output
M	Multiprogram
O	Remote Reset to Preset Number
T	Timed Dwell

Keypads and Input Accessories	
Part No.	Item
1989 KP	Replacement Keypad With Flat Ribbon Cable 18 Inches long
1989 PKP	Portable Keypad Assembly in Carrying Case With 6 Ft. Cable (With D-Type Connector)

Programmer Output Types	
E	Current Sinking (Use With Gemco Output Modules)
C	Current Sourcing
T	TTL

### DUAL AXIS QUIK-SET III

1989 — DL — 16 — L290 — L241 — E — A — D — M

Programmer Type	
Complete System CPU and Keypad	DL
CPU Module Only - Use With Portable Keypad PKP Above	PDL
CPU Module Only (No Keypad)	CDL

16 Output Circuits	16
32 Output Circuits++	32

†† Additional 16 Circuit Output Module Required

AXIS 1 STROKE IN INCHES	
0-41	L241
41.1-66	L266
66.1-90	L290
90.1-136	L2136
136.1-189	L2189

AXIS 2 STROKE IN INCHES	
0-41	L241
41.1-66	L266
66.1-90	L290
90.1-136	L2136
136.1-189	L2189

Any 2 Options Maximum

Programmer Options	
X	No Options
A	Analog Output
H	RS 232 Transceiver
R	Remote Serial Display RS 422 Transmitter (Order Display on Page 9)
D	Differential Operation
M	Multi-Program
O	Reset to Preset Number

Programmer Options	
E	Current Sinking (Use With Gemco Output Modules)
C	Current Sourcing
T	TTL

# Quik-Set™ III

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### LOG NUMBERING SYSTEM

**CONTINUE SEQUENCE ONLY IF OUTPUT MODULES TO BE FACTORY ASSEMBLED INSIDE OF ENCLOSURE. IF NOT, ORDER OUTPUT MODULES ON BOTTOM OF PAGE 8.**

**NOTE 1:** Insert number to specify type of analog output.

- 1 0 to 10V DC
- 2 -10 to +10V DC
- 3 4 to 20 mA

**NOTE 2:** If the remote reset feature is activated by a 110V AC input, an output module having the remote reset option should be ordered.

**NOTE 3:** Fault check output signal from CPU Module is designed for use with fault check relay on output module. Specify output module option C if ordering output module.

**NOTE 4:** The 950 CP linear transducer requires a 24V DC 200 mA power supply. Order power supplies J and K if both are to be installed in the enclosure. Order PLS power supply from this price sheet and 950 CP linear transducer power supply from catalog Section 950 CP as separate items if system in enclosure is not specified.

12 — A<sup>+++</sup> — R

16 Circuit High Power Output Modules with Power Supply	
M	Mechanical Relay, SPDT, 10 AMP
P	P.C. Interface Optically Isolated 100 mA, 1-30 VDC
A	Solid State Triac 3 AMP, 280 VAC Max.
D	Solid State Open Collector 3 AMP 60 VDC
J	Power Supply Only for 1989 PLS
K	Power Supply Only for 950 LDT
X	No Output Module(s) (Customer Supplied Power Supply)

+++ If more than one 16 Circuit module is required repeat letter (i.e. A/A/D)  
See Note 4

Enclosure Type +	
4	NEMA 4 Water Tight
12	NEMA 12 Dust Tight

+ When Enclosure is Specified All Output Modules Except Remote Readouts Are Mounted Inside Enclosure.

Output Module Options	
X	No Output Module Option
R	Remote Reset to Preset (See Note 2)
C	Fault Check Relay (See Note 3)

**CONTINUE SEQUENCE ONLY IF OUTPUT MODULES TO BE FACTORY ASSEMBLED INSIDE OF ENCLOSURE. IF NOT, ORDER OUTPUT MODULES ON BOTTOM OF PAGE 8.**

**NOTE 1:** If the remote reset feature is activated by a 110V AC input, an output module having the remote reset option should be ordered.

**NOTE 2:** The 950 CP linear transducer requires a 24V DC 200 mA power supply. Order power supplies J and K if both are to be installed in the enclosure.

Order PLS power supply from this price sheet and the power supply for the 950 CP linear transducer from catalog section 950 CP as separate items if a system in an enclosure is not specified.

12 — A<sup>+++</sup> — X

16 Circuit High Power Output Modules with Power Supply	
M	Mechanical Relay, SPDT, 10 AMP
P	P.C. Interface Optically Isolated 100 mA, 1-30 VDC
A	Solid State Triac 3 AMP, 280 VAC Max.
D	Solid State Open Collector 3 AMP 60 VDC
J	Power Supply Only for Gemco PLS
K	Power Supply Only for 950 LDT
X	No Output Module(s) (Customer Supplied Power Supply)

+++ If more than one 16 Circuit module is required repeat letter (i.e. A/D)

Enclosure Type +	
4	NEMA 4 Water Tight
12	NEMA 12 Dust Tight

+ When Enclosure is Specified All Output Modules Except Remote Readouts Are Mounted Inside Enclosure.

Output Module Options	
X	No Output Module Option
R	Remote Reset to Preset (See Note 1)



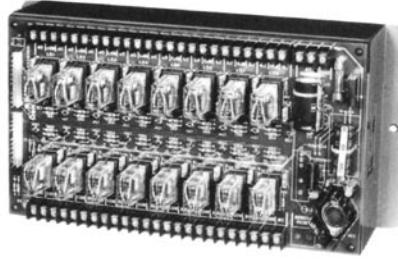
# Quik-Set™ III

## Multiturn PLS

### STANDARD HIGH POWER OUTPUT MODULES

**The mechanical relay** output has 16 SPDT circuits each of which is rated at 10 Amps. It also includes a 120 VAC to 5/15 VDC power supply which is used to power the *QUIK-SET III* programmer. Each circuit has an LED indicator which lights when the circuit is activated. An

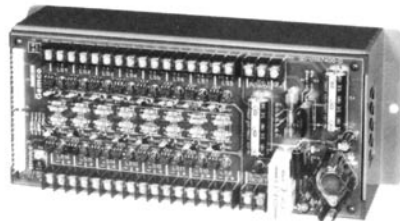
enable circuit on the module allows the person programming to enable or disable the outputs by push button command on the front of the *QUIK-SET III*. Multiple conductor cable which plugs into the output is included and is 6 feet long.



1989-O-115-M-S

**The P.C. Interface** output has 16 optically isolated circuits, each rated at 100 mA, 1-30 VDC, which may be wired sinking or sourcing. An external power supply must be used for the circuit outputs. An internal supply in the

module supplies 5/15 VDC to the *QUIK-SET III*. Each circuit has an LED indicator and the same enable circuit as used in the mechanical relay module. A multiple conductor cable plugs into the output module and is included.

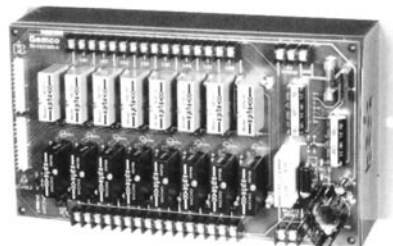


1989-O-115-P-S

**The solid state triac** output has 16 circuits which act like an SPST N.O. contact. They are rated at 3 Amps, 40V-280VAC. By supplying 120 VAC to the module, it will supply the *QUIK-SET III* with a 5/15 VDC through the 6 foot long multiple conductor cable supplied with the module. An LED indicator for each circuit shows when that circuit is activated and each triac module has a plug-in fuse in series with the output for protection. The en-

able circuit allows the outputs to be disabled when programming if necessary.

This same output can be supplied with DC open collector output modules rated at 3 Amps, 5V-60VDC. All the output modules are mounted on a ventilated enclosure which houses the transformer for the power supply.



1989-O-115-A-S

# Quik-Set™ III Multiturn PLS

## KEYBOARD FUNCTIONS

### RUN/PROG SELECTOR

The key selector in the lower left hand corner of the keypad prevents unauthorized changes to the programmed functions. With the key in the program ("PROG") mode, all functions of the controller can be programmed. With the key in the "RUN" mode, all setpoints, scale factor, decimal point, offset, motion detect, and other optional functions can be verified, but the programmed information cannot be changed.

### CIRCUIT ON/OFF COMMANDS

On a standard 16 circuit programmer the outputs of LS1-LS16 can be programmed to turn on or off by pressing the appropriate keypad. An LED lights when outputs are called for. All outputs are enabled when the key selector is turned to the "RUN" position. The enable/disable keypad does not function unless the key lock is in the "PROG" mode.

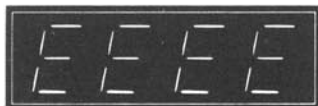
Each circuit LS1-LS16 is provided with an indicator LED which illuminates when the circuit is turned on. By depressing the disable key pad in the "PROG" position of the key, all outputs are disabled even though the LEDs on some circuits may still be lit. This allows the unit to be programmed without affecting the output relays or the equipment being controlled. Pressing the disable keypad in the "PROG" position of the run/prog selector switch disables the Gemco Output Modules only, not the programmer outputs.



### DISPLAY READOUT



The readout at the top of the keyboard panel displays all programmed information editing, programming, RPM, offset and also provides the following unique codes for programming:



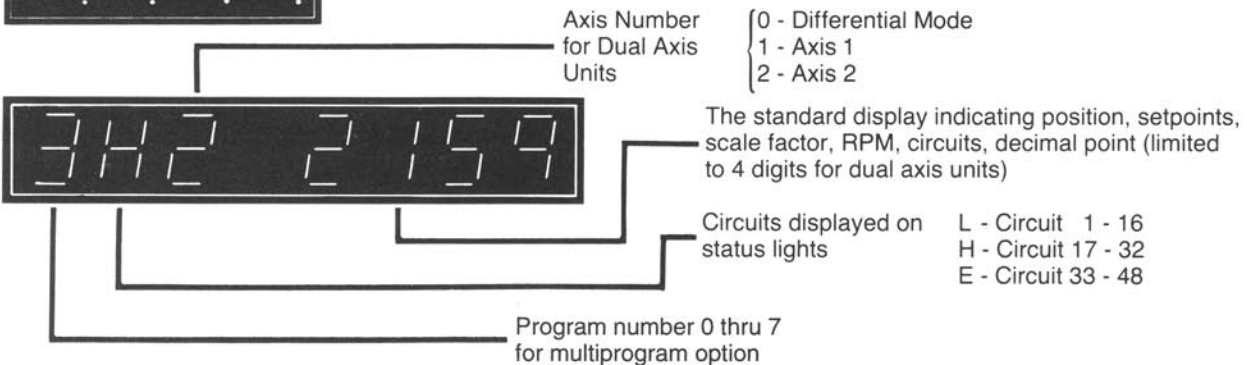
An improper entry was programmed. Example: with a scale factor of 360°, an entry greater than 359° was entered, EEEE will appear; also if transducer cable is severed, E's appear.



The circuit to be programmed has no previous setpoints in memory.



Decimal points flash when more than one setpoint is programmed per circuit.



# Quik-Set™ III

## Multiturn PLS

### KEYBOARD

**ENT** Enter

The Enter key must be depressed after keying in any numerical information.

**C/CE** Clear

Entry of the C/CE key will clear the current entry. A second entry will cause the display to be cleared.

**POS** Position

Entry of the POS key displays the transducer position.

**RPM  
TACH**

Entry of the RPM/TACH key displays the transducer revolutions per minute. It is updated approximately every second.

**NOTE:** When power is first applied, the display will normally read in position rather than RPM. If it is preferred that the display read in RPM when power is first applied, depress:



See the installation manual for further details.

### NUMBER ENTRY 0-9

Numbers may be entered by depressing the digit keys. During number entry, up to 7 digits may be entered depending on transducer resolution and other optional features.

### SCALE FACTOR

The controller is normally scaled to provide 4096 points per revolution. It is possible to enter a new scale factor which will provide a readout in any angular increment. If a scale factor of 360 is programmed, each increment would be 1°. If a scale factor of 3600 were programmed, each increment would be .1°.

The programmed scale factor is especially convenient when relating a linear dimension as a function of the transducer rotation. For example: if a rack drives the transducer one complete revolution in 9.98 inches, simply program the scale factor 998. This results in a direct readout and programming in inches. If the new scale factor is greater than the maximum input resolution of the programmer (i.e. 4096-12 Bit, or 16,384-14 Bit), then numbers will be skipped.

A new scale factor may be entered through the following sequence:

- 1) With display in the program mode, enter the number of points per revolution.

- 2) Depress the scale factor button. It is located on the bottom of the Display Module, not on the faceplate. The display will blank and then the current angle of the transducer will be displayed. The new scale will remain in effect until another scale factor is entered.

- 3) To check the existing scale factor, press the scale factor button only.

**NOTE:** The entry of the scale factor causes the offset value to be cleared. There should not be any setpoints entered when the scale factor is changed. If there are setpoints entered, they will be cleared.

If the display is monitoring RPM when the scale factor button is depressed, the display will then indicate motion detect data.

# Quik-Set™ III

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### PROGRAMMING

#### DECIMAL POINT

First determine if the decimal point is required. The programmer, upon initial power-up, displays whole numbers with no decimal. If the decimal point is required, ensure the programmer is in prog, then the following code will set the decimal point:

- 1) for tenths (decimal in second digit)

press

- 2) for hundredths press

- 3) for thousandths press

- 4) for ten thousandths press

- 5) if you wish to clear the decimal press

**OPTIONAL MULTIPLE PROGRAM SELECTION** – (See Programmer Options for additional description.)

If the M option is ordered, then either the Remote BCD input or keypad selection modes can be selected through the keypad. To determine which means of multiple program selection is used, enter one of the following codes:

- 1) For the remote BCD input selection mode (external binary inputs 0 to 7 to appropriate terminals on the CPU module) depress:

OR

- 2) For the keypad selection mode depress:

If the keypad selection mode is used, program selection is made by depressing the following keypads:

	Program Number	Program Code
<input type="text" value="CIR #"/>	0	770
<input type="text" value=""/>	1	771
<input type="text" value=""/>	2	772
<input type="text" value=""/>	3	773
<input type="text" value=""/>	4	774
<input type="text" value=""/>	5	775
<input type="text" value=""/>	6	776
<input type="text" value=""/>	7	777

PROGRAM CODE

The display will momentarily blank while the program is being selected. When digits reappear, the leftmost digit indicates which program is operating.

The following selection of circuit numbers and setpoints is the same for single or multiple program units.

#### SELECT CIRCUIT

The circuit to be modified must first be selected. Once a circuit is selected, all programming of setpoints will act on that circuit until a new circuit is selected.

- 1) Depress  key.

Dashes will appear in the display

- 2) Enter the circuit number to be modified. A number from 1 to 16, 1 to 32, or 1 to 48 should be entered based on the maximum number of circuits on your programmer.

- 3) Depress the  key.

The circuit entered in step 2 will be selected as the active circuit. The decimal point will be displayed after the entry is accepted. An erroneous entry (no number entered in step 2 or an illegal circuit number) will cause the error indicator to be displayed. In this case steps 1-3 must be repeated.

For 32 and 48 circuit programmers a letter L on the left side of the display will indicate that circuits 1 through 16 are shown by the circuit status lights.

For 32 and 48 circuit programmers a letter H will indicate circuits 17 to 32 are shown.

For 48 circuit programmers, a letter E will indicate circuits 33 to 48 are shown.

The 16 circuit status lights will show the group of 16 circuits in which the last circuit was called up on the programmer.

#### ENTER A NEW SETPOINT

A new setpoint for the currently selected circuit may be entered through the following steps. Each setpoint specifies the position at which the circuit is to be turned on or off. Each circuit may contain an arbitrary number of setpoints (multidwell) up to the maximum available (See specifications page 20).

- 1) Depress the  key to enter a position at which the circuit is to be turned on. Depress the  key to enter a position at which the circuit is to be turned off. Dashes will appear in the display. All the angles at which the circuit is to be turned on (or off) may be examined by repeatedly depressing the  or  key.

# Quik-Set™ III

## Multiturn PLS

- 2) Enter the angle at which the circuit is to be turned on (or off).
- 3) Depress the **ENT** key. The decimal point will be displayed after the **ENT** key is accepted. An error indication will be displayed if no number was entered in step 2 or if the number is too large. In this case steps 1 through 3 must be repeated.

If more than one "circuit on" or "circuit off" setpoint has been entered, the decimal points on the display will flash.

### DELETE AN EXISTING SETPOINT

An existing setpoint may be deleted through the following steps. An entire dwell may be cleared by deleting both the angle at which the circuit is turned on and the angle at which it is turned off.

- 1) Depress the **ON** key if an angle at which the circuit is turned on is to be deleted. Otherwise depress the **OFF** key to delete a setting at which the circuit is turned off. The angle of the first setting will be displayed. If dashes are displayed then there are no setpoints.
- 2) If the desired setting is not displayed then depress the **ON** or **OFF** key to step to the desired setting. Repeat this step until the desired angle is displayed.
- 3) Depress the **CLR SET** key. This causes the displayed setpoint to be deleted. The next setpoint will then be displayed. If dashes are displayed then no setpoints remain for the current circuit.

### MODIFY AN EXISTING SETPOINT

The angle at which the circuit is turned on or off may be modified through the following steps. This operation allows a previously entered setpoint to be changed to a different value. This is equivalent to deleting a setpoint and then entering a new setpoint.

- 1) Depress the **ON** key if an angle at which the circuit is turned on is to be modified. Otherwise depress the **OFF** key to modify a setting at which the circuit is turned off. The angle of the first setting will be displayed. If dashes are displayed then there are no setpoints entered.
- 2) If the desired setting is not displayed then depress the **ON** or **OFF** key to step to the desired setting. Repeat this step until the desired angle is displayed.
- 3) Enter the angle to which the setpoint is to be changed.

- 4) Depress the **CHNG SET** key. This causes the selected setpoint to be changed to the new value. The decimal point will be displayed after the **CHNG SET** key is accepted. An error indication will be displayed if no number was entered in step 2 or if the number is too large. If this is the case then steps 1 through 4 must be repeated.

### OFFSET

The angular displacement of the resolver from true zero can be compensated for by entry of the offset value. The offset value is a positive adjustment which is added to the raw angle read from the resolver. The offset is examined or modified by the following steps.

- 1) Depress the **OFS +/-** key. The current offset will be displayed.
- 2) Enter the required position.
- 3) Depress **ENT** key. The required position is now displayed and will follow the resolver rotation from the programmed position.

### MOTION DETECTION

The motion detector circuit is used when an output is desired to confirm rotation of the transducer. This output can be programmed at any speed between 5 and 1000 RPM. When using the motion detect circuit the LS16 output wire from the Micro-CPU module must be moved to the motion detect terminal, thereby using the LS16 output relay for motion detect. To program the motion detect circuit, use the following steps.

- 1) Depress the **RPM** key. The current RPM will be shown.
- 2) Enter the lowest RPM value at which an output signal is desired.
- 3) Depress the scale factor button located on the bottom of the keypad module.

To verify programmed value repeat above skipping step 2.

### OPTIONAL PROGRAMMING

Programming for the dual axis programmer and other options is covered in the installation manual provided with each 1989 Programmable Limit Switch.



# Quik-Set™ III

## Multiturn PLS

### PROGRAMMING EXAMPLES

- 1) Turn Key Selector to "PROG"
- 2) Select decimal point position
- 3) Enter scale factor to 360 increments per revolution  
Depress Scale Factor Button at the rear of the chassis.

- 4) Display position

- 5) Display RPM (Shaft must be rotating)

- 6) Display position (Rotate Transducer Shaft)

- 7) Enter offset to readout 0°

- 8) Select circuit 5

- 9) Turn circuit ON at 180 degrees

- 10) Turn circuit OFF at 250 degrees

- 11) Display current position

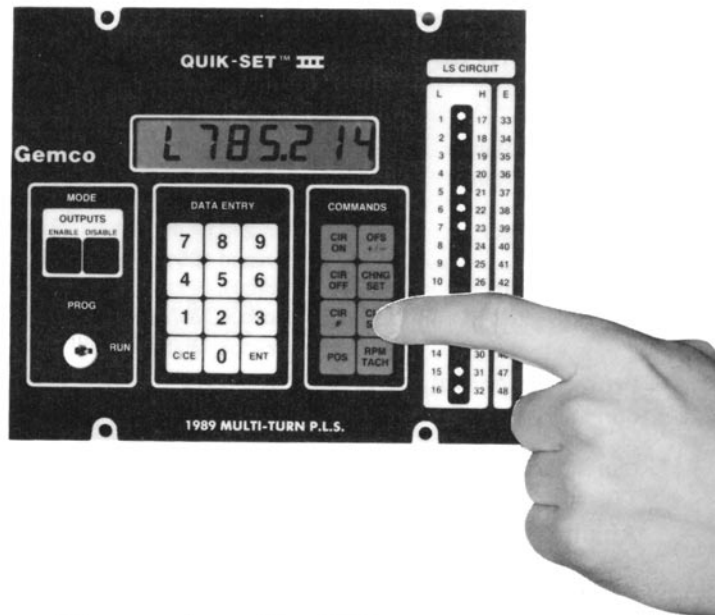
- 12) Rotate Transducer Shaft. Circuit No. 5 indicator should turn on at 180 and turn off at 250.



- 13) Change circuit ON angle from 180 degrees to 135 degrees

- 14) Delete circuit OFF setting at 250 degrees

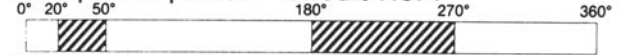
- 15) Note: When *only* a Cir. ON setting has been programmed, the output will stay ON from the Cir. ON setting to zero.



When *only* a Cir. OFF setting has been programmed, the output will go off from the Cir. OFF setting to zero.



- 16) Multiple Setpoints—Circuit No. 7



- 17) With the Key Selector in the "PROG" position, select Circuit 7

- 18) Turn circuit ON at 20 degrees

- 19) Turn circuit OFF at 50 degrees

- 20) Turn circuit ON at 180 degrees

- 21) Turn circuit OFF at 270 degrees

- 22) Display position

- 23) Rotate Transducer Shaft. Circuit No. 7 indicator light should turn on and off according to the timing chart in Step 16.

# Quik-Set™ III

## Multiturn PLS

### SPECIFICATIONS

#### QUIK-SET III Programmer (Display and CPU Module)

Resolution	—	Up to 24 Bit Binary Up to 21 Bit with dual resolver
Scale Factor Range	—	12 or 14 Bit 2-99999 (per turn)
Temperature Range	—	Operating 32°F to 125°F Storage 0°F to 150°F
Motion Detector	—	Standard response time 29 ms
Scan Time	—	Standard 125 microseconds (65 and 17 microsecond scan times available — consult factory for details)
Total Setpoints	—	16 circuit, Single Program, 100; 32 or 48 circuit, Single Program, 128 16 circuit, Multi-program, 65 Program; 32 circuit, Multi-program, 90/Program 48 circuit, Multi-program, 120/Program

#### Programmer Output Types:

Current Sinking	—	Sprague ULN 2803A, 5 to 50V, 0 to 200 mA, low true (on). Cannot be used to drive TTL circuit (use with High Power output modules).
Current Sourcing	—	Sprague UDN 2981A, 5 to 50V, 0 to 200 mA, high true (on). Cannot be used to drive TTL circuit.
TTL	—	Sinking current (74LS173) up to 20 mA, high true (on).

#### Auxiliary Outputs

**BCD, Binary, or Gray Code Outputs**— Current sinking, current sourcing or TTL same as above programmer outputs but with customer programmable active or inactive true.

<input type="checkbox"/> CIR #	<input type="checkbox"/> 7	<input type="checkbox"/> 5	<input type="checkbox"/> ENT	<input type="checkbox"/> X	<input type="checkbox"/> ENT	X = 0 Inactive True X = 1 Active True
--------------------------------	----------------------------	----------------------------	------------------------------	----------------------------	------------------------------	--

Analog Voltage	—	0 to 10V or -10 to +10V at 5 mA
Analog Current	—	4 to 20 mA 500 OHM load max.
Fault Check	—	Use high power output module with fault check option or retriggerable one-shot input device.
RS-232 or RS-422 Communications Transceiver	—	Use with any RS-232 or RS-422 compatible device
Remote Display Transmitter	—	Use with Gemco remote displays
Motion Detect	—	Same output type as selected programmer outputs

### HIGH POWER OUTPUT MODULES

#### Mechanical Relay Output Module

Input Voltage	—	115 VAC ± 10% (22 VA)
Output Voltage to Programmer	—	5/15 VDC
Output Type #16Q2C-D024	—	16 Mechanical SPDT 10 Amp isolated contacts relays. Pick-up 2 ms Drop Out 15 ms

#### P.C. Interface Output Module

Input Voltage	—	115 VAC ± 10% (15 VA)
Output Voltage to Programmer	—	5/15 VDC
Output Type — TIL 119	—	16 optically isolated, Darlington sink or source, 100 mA, 1-30 VDC open collector, .1 ms On .5 ms Off, Leakage .1 mA

#### Solid State Triac Output Module

Input Voltage	—	115 VAC ± 10% (15 VA)
Output to Programmer	—	5/15 VDC
Output Type — OAC-24	—	16 Triac, 3 Amp, 280 VAC Max. Zero, Crossing 0-8 ms ON, 0-8 ms OFF, Leakage 5 mA @ 280 VAC

#### Solid State Open Collector Output Module

Input Voltage	—	115 VAC ± 10% (15 VA)
Output to Programmer	—	5/15 VDC
Output Type — ODC-24	—	16 Optically Isolated. Sink or source, 3 Amp, 60 VDC mA, open collector, .1ms On .75 ms Off, Leakage 1 mA @ 60 VDC

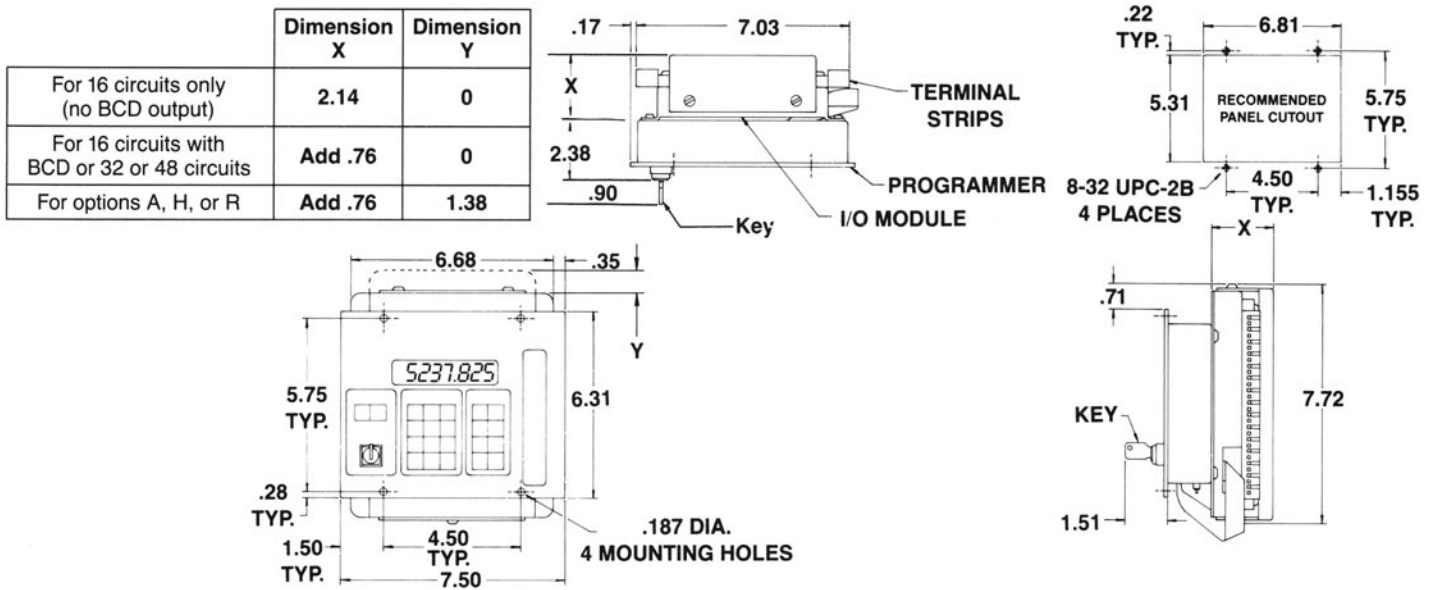
# Quik-Set™ III

## Multiturn PLS

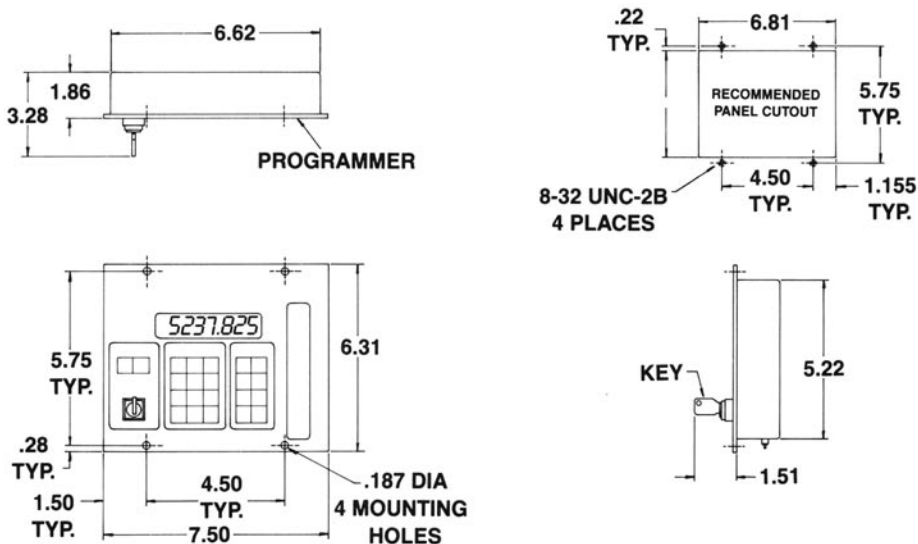
### QUIK-SET III

The *QUIK-SET III* can either have the Display Module and CPU Module mounted as a combined assembly, or have the Display Module mounted and the CPU Module mounted separately on the enclosure backplate. If enclosures are ordered from Gemco the units are mounted separately.

### DISPLAY MODULE AND CPU MODULE (COMBINED)



### DISPLAY MODULE (MOUNTED SEPARATELY)

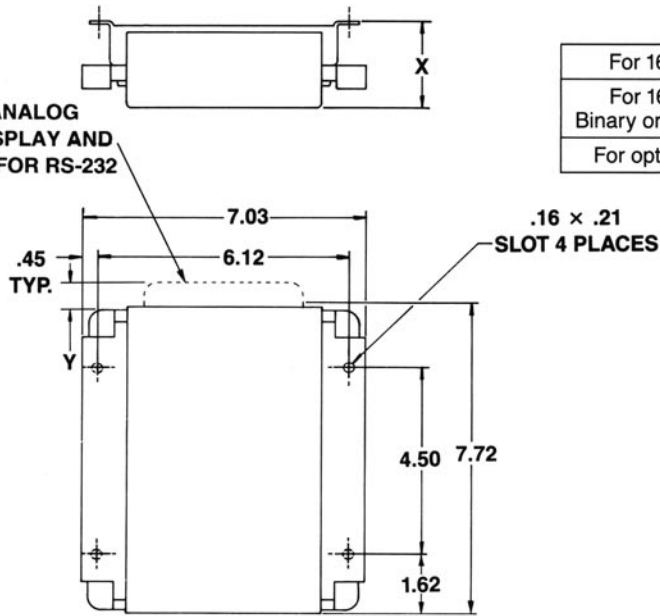


# Quik-Set™ III

## Multiturn PLS

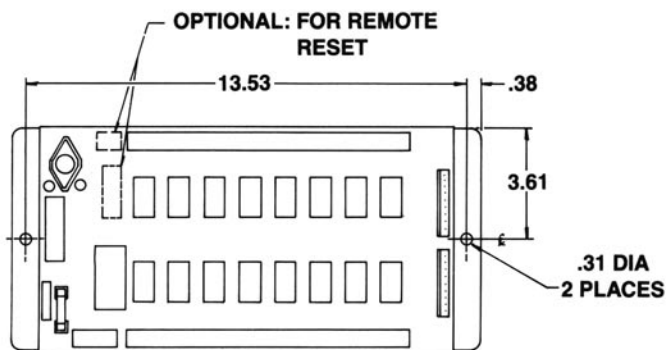
### CPU MODULE (MOUNTED SEPARATELY)

TERMINALS FOR ANALOG  
OUTPUT, REMOTE DISPLAY AND  
D-TYPE CONNECTOR FOR RS-232

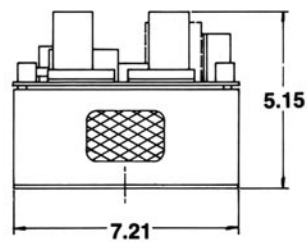
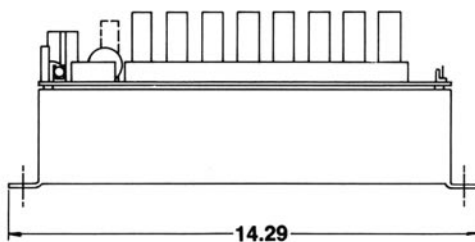


	Dimension X	Dimension Y
For 16 circuits only	2.14	0
For 16 circuits with Binary or 32 or 48 circuits	Add .76	0
For options A, H, or R	Add .76	1.38

### OUTPUT MODULE

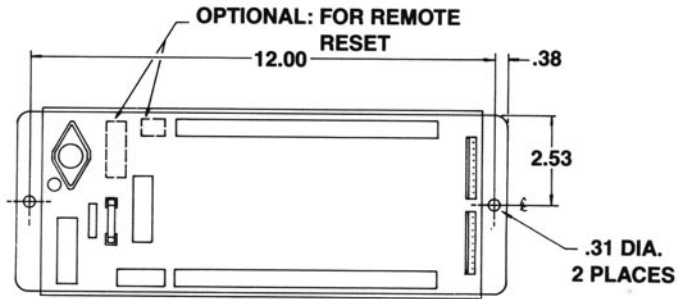


1989-0-115-M-S  
Mechanical  
Output Module  
(16 Circuits)

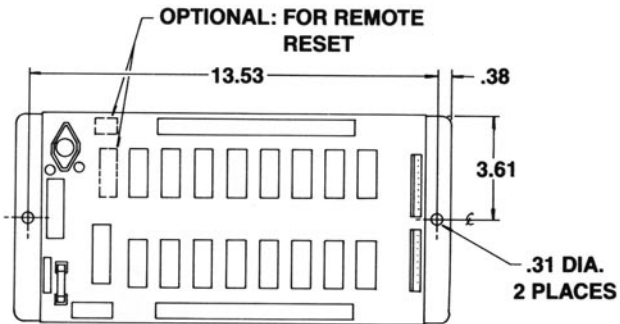
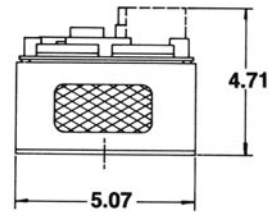
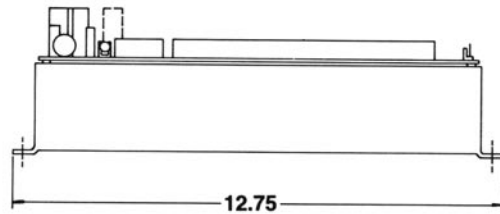


# Quik-Set™ III Multiturn PLS

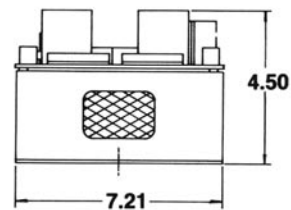
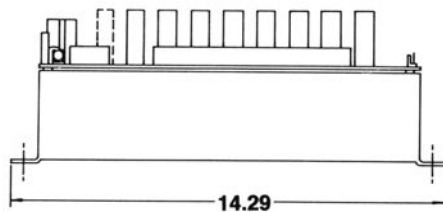
## OUTPUT MODULE



1989-0-115-P-S  
P.C. Interface  
Output Module  
(16 Circuits)



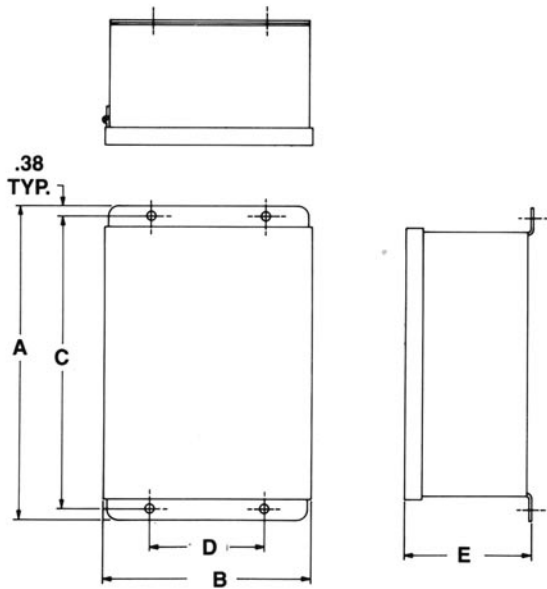
1989-0-115-A-S  
Triac Output Module  
(16 Circuits)





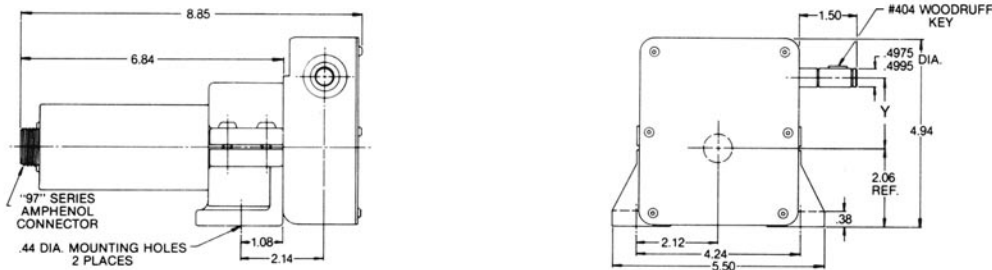
# Quik-Set™ III Multiturn PLS

## ENCLOSURE DIMENSIONS (NEMA 4 and NEMA 12)



Number of Circuits	A	B	C	D	E
16	22.34	17.10	21.58	15.00	8.00
32	34.34	17.10	33.58	15.00	9.30
48	31.50	30.38	30.75	28.00	9.30

## SINGLE TURN RESOLVER TRANSDUCER WITH GEAR BOX



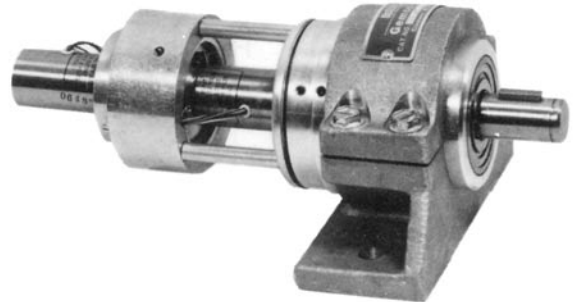
RATIO	Y ± .003	RATIO	Y ± .003	RATIO	Y ± .003	RATIO	Y ± .003
1:1	1.000	4.75:1	.906	15:1	1.250	36:1	1.437
1.2:1	1.375	5:1	.937	16:1	1.312	40:1	1.562
1.25:1	1.125	6:1	1.062	17:1	1.368	48:1	1.812
1.333:1	1.750	7:1	1.187	18:1	1.437	50:1	1.875
1.5:1	1.250	7.5:1	1.250	20:1	.937	60:1	1.156
1.6:1	1.625	8:1	1.312	24:1	1.062	64:1	1.218
2:1	1.500	10:1	.937	25:1	1.875	72:1	1.344
2.5:1	1.750	12:1	1.062	28:1	1.187	80:1	1.469
3:1	2.000	12.5:1	1.875	30:1	1.250	96:1	1.719
4:1	1.875	14:1	1.187	32:1	1.312	100:1	1.781

NOTE: Straight Drive Gear Box Available Up to 600:1 Ratio

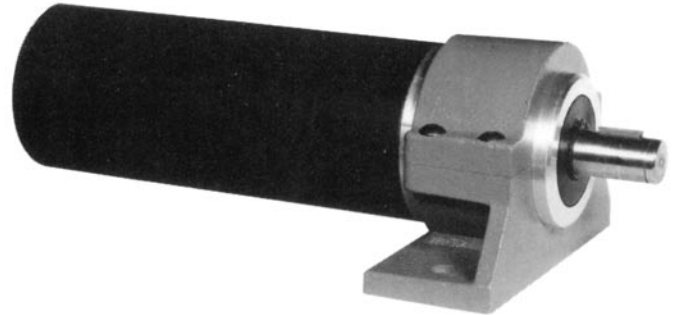
# Quik-Set™ III Multiturn PLS



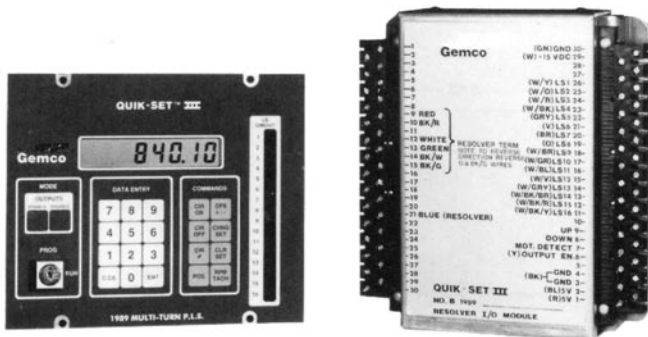
NEMA 12 Enclosure with Outer Door Open



Dual Resolver Transducer  
with Cover Removed



Dual Resolver Transducer



Display Module and CPU Module

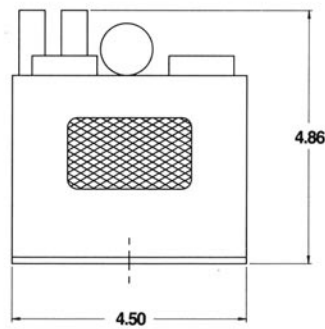
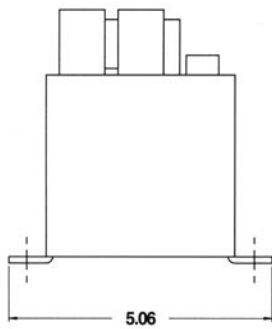
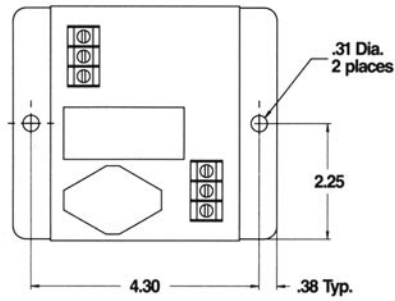


Combined Display CPU Module with Power Supply  
and Single Resolver Transducer

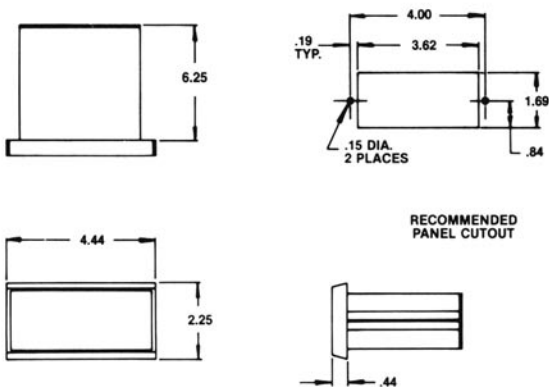
# Quik-Set™ III Multiturn PLS

## PANEL MOUNT POWER SUPPLY (1989-0-□-X-S)

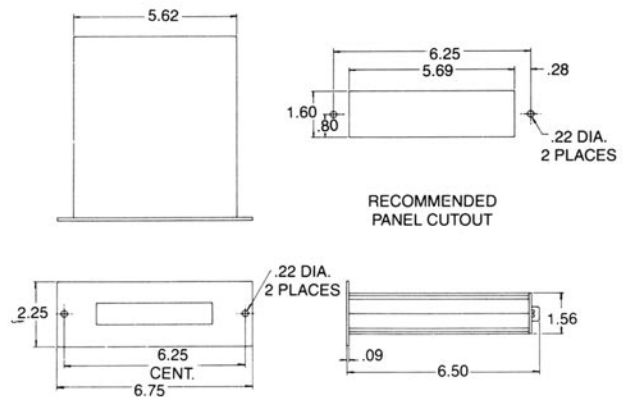
Required for 5/15 VDC When No Output Module Used



### Remote Serial 4 Digit Display (SD0352700)



### Remote Serial 8 Digit Display (SD0343500)



# **Quik-Set™ III**

## **Multiturn PLS**

### **Notes**

**Quik-Set™ III**  
**Multiturn PLS**



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