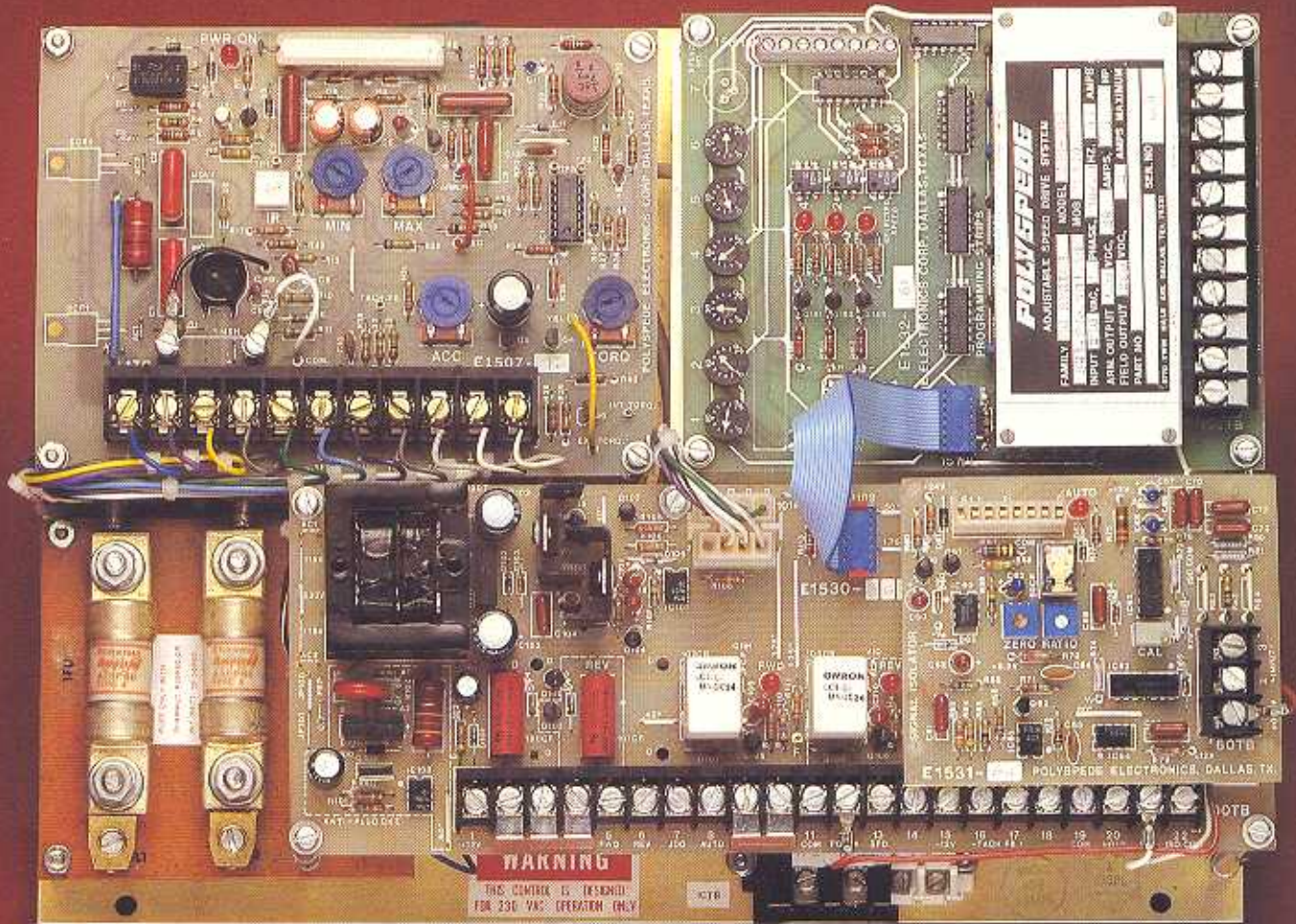


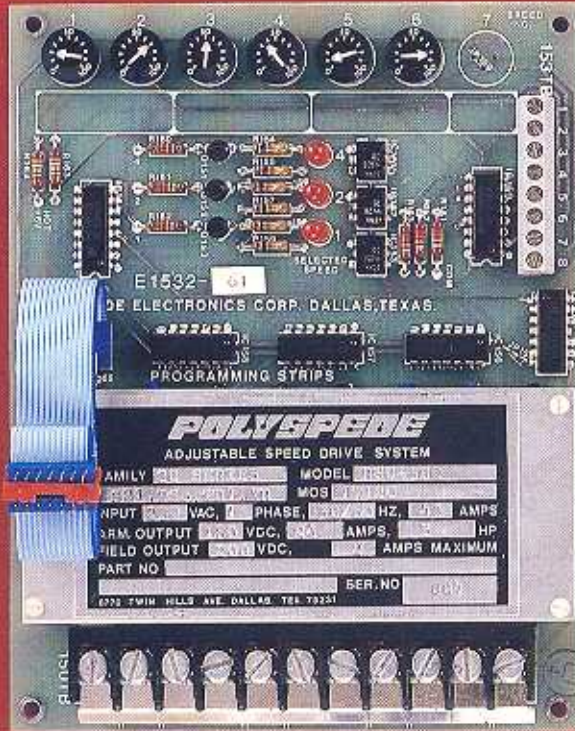
Systems Control

Pre-Engineered Motion Control Mini-Systems 1/8 thru 5 hp

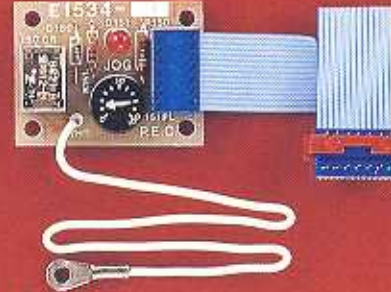


POLYSPED

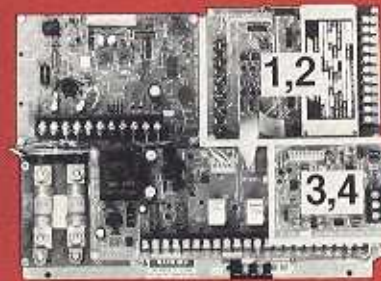
Systems Control offers a choice of standardized options



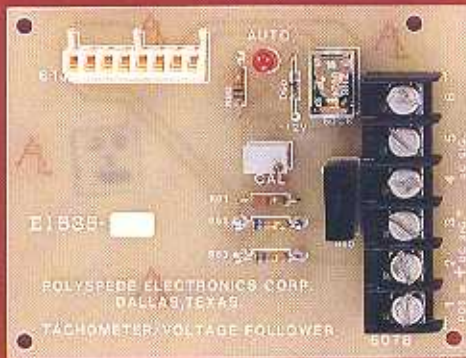
1. Preset speeds



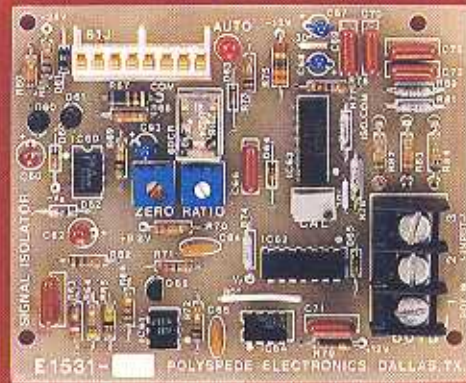
2. Jog



Outline of complete SC chassis



3. External signal control – tach follower



4. External signal control – signal isolator

Option circuit boards and their locations on the complete SC chassis. See the text, also the Selection Chart on pages 7 and 8, for available combinations.

Type SC Systems Control

Pre-Engineered Motion Control Mini-Systems

SCR, DC, Non-Regenerative, Open Chassis, 1/8-5hp

Polyspede Type SC Systems Control is the flexible, cost effective way to form compact mini-systems for manual or automatic motion control. It combines the popular OC-2 SCR DC drives with predesigned options and logic circuits. Three drive groups and four option groups insure fast, economical systems makeup.

Basic Optional Functions

Dynamic Braking
Adjustable Jog
Contactor Automatic Reversing

Tachometer Feedback Group

One Direction
Reversing

External Signal Control Group

Voltage Follower/Isolators
Tachometer Followers

Multiple Preset Speeds Group

Internal Potentiometers
External Signals

Design Features

- NEMA K (full wave with free-wheeling diode). Power conversion stage sized for continuous full load operation with any DC motor designated for Type K service.
- Short circuit protection by sub-cycle line fuses.
- Voltage transient protection: RC snubber across AC line. Movistor across power stage AC input and across motor field terminals on 230 volt models. Diode clipper on speed command input.
- Independent, simultaneously operating torque and speed loops with sharp, smooth transition provide optimum speed regulation and precise torque limit cut-in regardless of speed setting.
- External torque limit program terminals.
- Low level logic for options interfacing and low voltage operations.
- Screw type input-output connections.
- Moisture barrier on printed circuit paths. Conservatively rated components. 100% inspection and final testing.

Adjustments (Nominal Ranges)

Acceleration	Linear, 0.5 to 15 seconds
Torque (current) limit	50% to 150% of motor rating
Minimum speed	- 5% to + 10%
Maximum speed	70% to 110% *
IR	0 to 10% boost

*Normal maximum speed is 100%. Consult the factory for higher speeds.

Operating Conditions

Line voltage variation	± 10 volts (115 volt models) ± 20 volts (230 volt models)
Ambient temperature	0-40°C or 100°C max. power stage baseplate temperature
Altitude (standard)	1000 meters

Ratings

Horsepower range	Models for 1/8 thru 5 hp
Power source	115 or 230 VAC, single phase, 50 or 60 Hertz
Output voltage (115 VAC input, 1/8 thru 1 hp)	
Armature	0 to 90 VDC
Field	100 VDC
Output voltage (230 VAC input, 1/4 thru 5 hp)	
Armature	0 to 180 VDC
Field	200 VDC
Duty	Continuous
Overload capacity	150% for one minute

Performance Characteristics

Controlled speed range	30:1 with PM DC motors 20:1 with shunt motors
Speed regulation (percent of base speed)	1.0% (armature feedback) 0.1% (DC tachometer feedback)

Envelope Dimensions

1/8 thru 2 hp	14"W x 10 1/2"H x 5"D
3 hp	14"W x 10 1/2"H x 5 1/2"D
5 hp	14"W x 10 1/2"H x 6"D

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Drive Groups

BSC

For uni-directional, contactorless applications.

FSC

For uni-directional, DC loop contactor applications. Dynamic braking can be applied.

RSC

For reversing applications. Contactor dynamic braking and reversing are standard. Reversing includes anti-plug electronic lockout to prevent damage to the control or motor.

Options Groups

Basic Optional Functions

Dynamic Braking (D)

(Standard on RSC. Optional on FSC. Not available on BSC.) A factory installed option. An electronic lockout prevents re-start until the motor has stopped. The braking resistor is sized for one stop per minute from top speed at rated horsepower with an external load inertia not exceeding the armature inertia. Consult the factory if a more severe duty cycle is required.

Adjustable Jog (J2)

(Optional on BSC, FSC, RSC.) Jog is specified only when the Preset Speeds option is not specified. (The Preset Speeds option includes provision for jog operation.)

A factory or field installed option, consisting of a printed circuit board assembly with a JOG SPEED potentiometer, a relay and an LED indicator. The potentiometer adjusts jog speed from 0 to 100% of rated speed. The LED lights when the potentiometer is active. The relay disconnects any other speed input and feeds the JOG command to the SCR drive whenever the RUN-JOG switch is in the JOG position and the FORWARD (or REVERSE) switch is held activated.

Auto Reversing (AR)

(RSC only.) A factory or field modification of the standard reversing circuit. (See the RSC description and the SC block diagram.) The modification consists only of cutting a printed circuit board jumper. This causes reversing upon *momentary* switch activation, as opposed to the standard reversing which requires sustained activation until the motor stops. AR is especially useful in limit switch reversing applications.

Tachometer Feedback Group

Tachometer feedback improves speed regulation, extends the regulated speed range and reduces sensitivity to line voltage variations, ambient temperature changes and motor heating.

Tachometer feedback is a factory installed option/modification. It consists of disabling the armature voltage feedback circuit and providing the tachometer scaling network for a 50 V/1000 RPM motor-mounted tachometer. When used with reversing drives, (RSC), a printed circuit board mounted tachometer reversing relay is included.

Tachometer Feedback Group

For 50 V/1000 RPM DC Tachometers
Select one only

Option Code	Drive Group	Motor Base Speed*
T1	BSC, FSC	1150 RPM
T2	BSC, FSC	1750 RPM
T3	BSC, FSC	2400 RPM
TR1	RSC	1150 RPM
TR2	RSC	1750 RPM
TR3	RSC	2400 RPM

*Consult the factory for other base speeds or for tachometer voltage gradients other than 50 V/1000 rpm.

External Signal Control Group

External signal control provides the interface for automatic operation of the system in response to non-isolated signals from process instruments, motor armature voltages, line tachometers, tachometer followers— or other signals within the ranges listed. All external signal control options (except the tachometer followers) contain a built-in signal isolator. Note that Option S-21 isolates and conditions the standard Polyspede 0-6 VDC speed reference for all types of multiple drive systems.

A signal isolator eliminates the need for AC line isolation when a signal that is referenced to AC ground is connected to an SCR DC drive. It is smaller than an isolation transformer and it generates no heat,

but it does not provide any AC line surge or spike suppression.

Where the external signal from a tachometer or other source is already line isolated, the Tachometer Follower option, which contains no isolator, is used.

The external signal control is a field or factory installed printed circuit board assembly. It contains an optically coupled voltage/frequency — frequency/voltage signal isolator with a polarity insensitive, rectified and filtered input circuit. Scaling resistors, a MANUAL-AUTO relay and indicator light, a field-adjustable RATIO pot, plus factory-adjusted CAL and ZERO pots are also standard features.

In the AUTO mode, the MANUAL speed pot is by-passed by the

MANUAL-AUTO relay and the isolated and processed external signal is fed to the SCR DC drive. In the MANUAL mode, the relay selects the speed potentiometer for control. If a jog option is also selected, the external signal option is disabled during jogging and speed is controlled by the jog pot setting.

In all cases, the external signal control output is positive and increases as the input signal increases.

Example:

4 ma to 20 ma input = 0 to max output

0 VDC to 90 VDC input = 0 to max output

Maximum output is determined by the setting of the RATIO pot.

External Signal Control Group

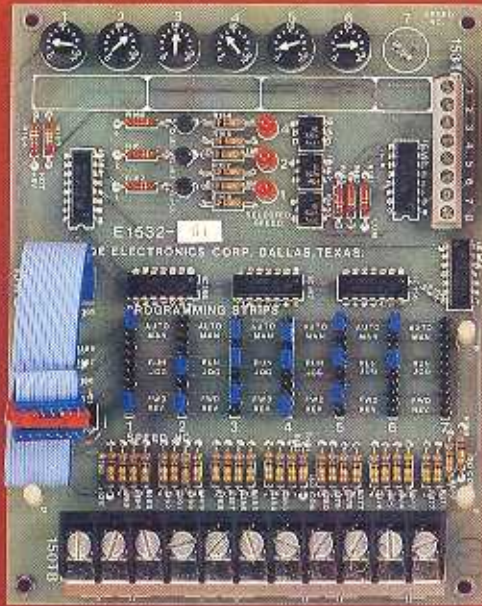
Use on BSC, FSC or RSC
Compatible with all options
Select one only

Option Code	Description	Typical Input Signal
S11	Current follower/isolator	Process instrument, 1-5 ma DC
S12	Current follower/isolator	Process instrument, 4-20 ma DC
S13	Current follower/isolator	Process instrument, 10-50 ma DC
S21*	Reference voltage follower/isolator	Reference voltage isolator, 0-6 VDC
S31	Voltage follower/isolator	DC armature voltage, 0-90 VDC
S32	Voltage follower/isolator	DC armature voltage, 0-180 VDC
S33	Voltage follower/isolator	DC armature voltage, 0-240 VDC
S34	Voltage follower/isolator	DC armature voltage, 0-500/550 VDC
S41	Voltage follower/isolator	Line tachometer, 10-20 VDC maximum
S42	Voltage follower/isolator	Line tachometer, 20-40 VDC maximum
S43	Voltage follower/isolator	Line tachometer, 40-80 VDC maximum
S44	Voltage follower/isolator	Line tachometer, 75-150 VDC maximum
TF1	Tachometer follower	Isolated tachometer, 6-20 VDC maximum
TF2	Tachometer follower	Isolated tachometer, 20-65 VDC maximum 25-75 VAC maximum
TF3	Tachometer follower	Isolated tachometer, 65-200 VDC maximum 75-230 VAC maximum

*S21, the Reference Voltage Follower Isolator, is used with Polyspede multi-motor drive systems (master/slave).

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Options Groups (Continued)



On the preset Speeds circuit board, each vertical programming strip represents a separate speed channel. Each channel is programmed by pushing the blue jumpers onto the appropriate pins.

Example: Channel 5 is programmed AUTO-RUN-FWD at a speed determined by Potentiometer Number 5.

Preset Speeds Group

The Preset Speeds option group provides a means to select and program multiple built-in preset speed pots and/or external signals, and to assign operational functions to the selections. A speed pot or speed input can be selected by three methods.

- Method 1. By maintained normally open remote switches.
- Method 2. By operator controlled switches in combination with program jumpers.
- Method 3. By a combination of Methods 1 and 2.

The preset speeds option is a factory or field installed printed circuit board assembly that can be set up or programmed in the field or in the factory. The option board contains lights to indicate which speed pot is active; also legends to assign names and identify functions of the program. See the programming strip in the photograph above.

Field setup in Method 1 consists of removing terminal block shorting straps as remote switches are connected.

Field setup in Method 2 consists of adding program jumpers to assign the name and function of each pot or speed input. These names (and appropriate combinations) can be assigned:

FWD	JOG
REV	MAN
RUN	AUTO

Field setup in Method 3 results in such pot names as

FWD SPD NO 1	FWD SPD NO 2 Etc.
-----------------	----------------------

with the FWD portion set up by Method 2 and SPD NO set up by remote switches.

Preset Speeds Group

Use on BSC, FSC or RSC

Compatible with all options except Jog (J2)
(Jog can be programmed in Preset Speeds)

Option Code

Description

PS7	Seven (7) printed circuit board mounted speed pots.
PS6	Seven (7) speeds—6 set by board mounted pots, and one controlled by an External Signal Control option.
PS4	Four (4) PCB mounted speed pots.
PS3	Four (4) speeds—3 set by board mounted pots, and one controlled by an External Signal Control option.
PS0	Seven (7) speeds set by remote speed pots or signals not included in this option. A terminal block for connection of the remote pot wipers or signals is provided.

With this selection chart you can select the drive and options, then s

Options Groups		Basic Optional Functions			Tachometer Feedback (Select One Only)						Process Instrument			
											1-5 MA DC	4-20 MA DC	10-50 MA DC	0-6 VDC In/0-6 VDC Out
Brief Options Description See Text for Details		Contactor Dynamic Braking	Adjustable Jog* 0-100% Base Speed	Contactor Auto Reversing	For 1150 RPM Motors With 50 VDC/1000 RPM Tachometers	Reversing. For 1150 RPM Motors With 50 VDC/1000 RPM Tachometers	For 1750 RPM Motors With 50 VDC/1000 RPM Tachometers	Reversing. For 1750 RPM Motors With 50 VDC/1000 RPM Tachometers	For 2400 RPM Motors With 50 VDC/1000 RPM Tachometers	Reversing. For 2400 RPM Motors With 50 VDC/1000 RPM Tachometers	S11	S12	S13	S21
		D	J2	AR	T1	TR1	T2	TR2	T3	TR3				
Options Codes														
SCR DC Drive Groups	BSC No Contactors	NA	A	NA	A	NA	A	NA	A	NA	A	A	A	A
	FSC DC Loop Contactor	A	A	NA	A	NA	A	NA	A	NA	A	A	A	A
	RSC Contactor Dynamic Braking and Reversing	S	A	A	NA	A	NA	A	NA	A	A	A	A	A

A = Available NA = Not available S = Standard feature *Preset speeds and adjustable jog cannot be selected concurrently as separate options

How to specify and order by catalog number

To assign a catalog number, select the appropriate Drive Group code, followed by the Line Voltage/Horsepower code from the table at the right. Add the required option codes, separating the items with commas, as in the example. Review the selection chart and options descriptions to be sure the combinations of options are compatible.

Example:

Catalog Number RSC-500, AR, TR2, S32, PS6

RSC = Contactor dynamic braking and reversing

500 = Rating of 230 VAC, 5 horsepower

AR = Adapted for automatic reversing

TR2 = Adapted for reversing feedback from a 50 VDC/1000 rpm tachometer mounted on the driven 1750 RPM base speed motor.

S32 = Adapted to isolate and follow a 0-180 VDC armature when in the "auto" mode.

PS6 = Programmable preset speeds. Six pots plus provision for one external signal from S32.

Line Voltage/HP Code

Horsepower	AC Line Input	Code
1/8	115V	-12
1/6	115V	-16
1/4	115V	-25
1/4	230V	-26
1/3	115V	-33
1/3	230V	-34
1/2	115V	-50
1/2	230V	-51
3/4	115V	-75
3/4	230V	-76
1	115V	-100
1	230V	-101
1 1/2	230V	-150
2	230V	-200
3	230V	-300
5	230V	-500

specify the Type SC Systems Control by catalog number.

External Signal Control
(Select One Only)

With Isolators				No Isolators		
Armature Voltage		Line Tachometer or Speed Reference		Tachometer Follower		

0-90 VDC	0-180 VDC	0-240 VDC	0-500/550 VDC	10-20 VDC Full Scale	20-40 VDC Full Scale	40-80 VDC Full Scale	75-150 VDC Full Scale	6-20 VDC Full Scale	Specify 20-65 VDC Full Scale or 20-65 VAC Full Scale	Specify 65-200 VDC Full Scale or 65-200 VAC Full Scale
S31	S32	S33	S34	S41	S42	S43	S44	TF1	TF2	TF3

A	A	A	A	A	A	A	A	A	A	A
A	A	A	A	A	A	A	A	A	A	A
A	A	A	A	A	A	A	A	A	A	A

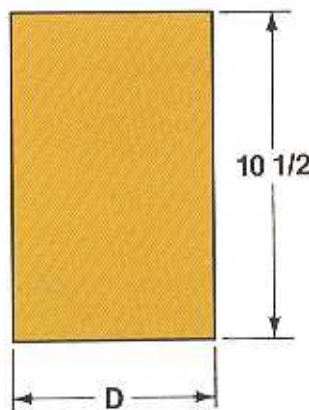
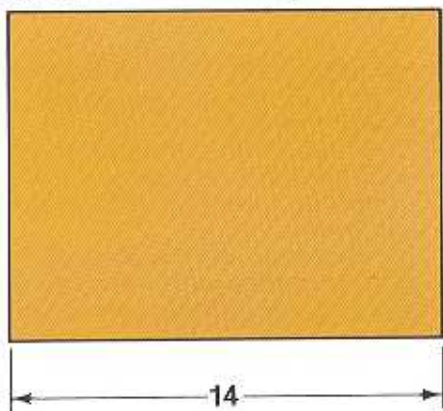
Preset Speeds*
See Text for Detailed Selection Information

7 Internal Pots	7 Internal Pots One Controlled by External Signal	4 Internal Pots	4 Internal Pots One Controlled by External Signal	7 External Pots or Other External Signals
PS7	PS6	PS4	PS3	PS0

A	A	A	A	A
A	A	A	A	A
A	A	A	A	A

separate options. Note: Preset Speeds option can be programmed for adjustable jog operation.

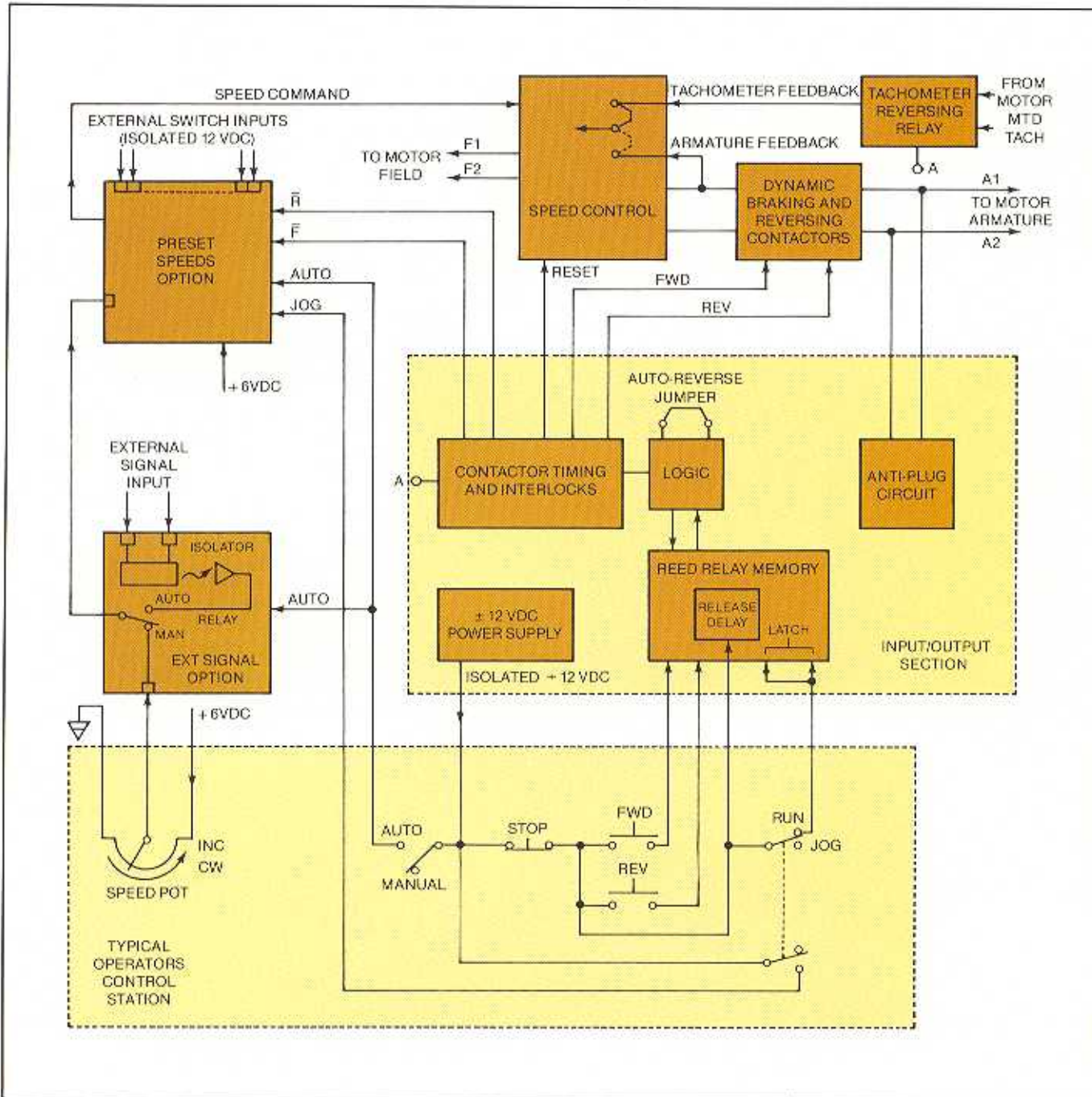
Minimum Envelope Dimensions



Horsepower	D
1/8-2	5
3	5 1/2
5	6



Type SC Systems Control Block Diagram



Details of Operation

Shown above is the block diagram for a typical Systems Control. The model in the diagram is an RSC with *Preset Speeds*, *External Signal* and *Reversing Tach Feedback* options. Also shown is contactor braking and reversing, a standard RSC feature.

The *Speed Control* section is the specially adapted Model OC-2 SCR DC drive described on page 3.

The *Input/Output* section interfaces between the speed control, the

drive control operators and the options. Its configuration varies depending on the basic SC drive group selected.

Features:

- CMOS logic is employed.
- Reed and DIP relays prevent electrical noise.
- Latching network allows use of simple momentary contact push-buttons for operator commands.

- Isolated 12 VDC power supplies serve *Input/Output* section and various options.
- POWER ON timer disables control for 200 milliseconds after turn-on to insure power supply stability before drive start.
- Contactor timing and interlocks insure zero current switching on contactor models. Extend contactor life.

POLYSPEDE

Polyspede is your complete source of electronic speed controls, 1/8 thru 400 hp



Spartan I

1/8 thru 1 1/2 hp, single phase AC input, DC output. Non-regenerative. Enclosed, low cost, compact, non-modifiable. $\pm 3\%$ speed regulation. Sub-cycle fusing.



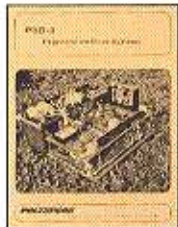
PRD-2

1/5 thru 2 hp, single phase AC input, DC output. Regenerative. Open chassis. Half wave operation for low cost. $\pm 1\%$ speed regulation, 6-12 Hz velocity loop response. Speed and torque are programmable in both forward and reverse rotation. Full line of options.



Spartan II

1/8 thru 2 hp, single phase AC input, DC output. Non-regenerative. Enclosed, compact, modifiable. $\pm 1\%$ speed regulation. Torque, IR, min/max speed and acceleration are all adjustable. Sub-cycle fusing.



PRD-8

1/2 thru 7 1/2 hp, single phase AC input, DC output. Regenerative. Open chassis. Full wave operation. $\pm 1\%$ speed regulation, 12 Hz velocity and torque loop response. Speed and torque are programmable in both forward and reverse rotation. Many standard features and options.



OC-1

1/8 thru 2 hp, single phase AC input, DC output. Non-regenerative. Open chassis, low cost, limited modifications. $\pm 1\%$ speed regulation. Torque, IR, min/max speed and acceleration are all adjustable. Sub-cycle fusing is available.



PRD-12

3 thru 400 hp, three phase AC input, DC output. Regenerative. Open chassis. Full wave operation. $\pm 1\%$ speed regulation, 7-10 Hz velocity loop response. Speed and torque are programmable in both forward and reverse rotation. Many standard features and options.



OC-2

1/8 thru 3 hp, single phase AC input, DC output. Non-regenerative. Open chassis, compact, modifiable. $\pm 1\%$ speed regulation. Field reconnectable for tach feedback. Speed or torque is programmable. Torque, IR, min/max speed and acceleration are all adjustable. Sub-cycle fusing.



SOS

7 1/2 thru 400 hp, three phase AC input, three phase variable frequency AC output. Inverter operation. Used with standard squirrel cage AC motors. $\pm 2\%$ voltage regulation, $\pm 0.5\%$ frequency regulation. Optional ± 0.05 , 0.001 or 0.0001% frequency regulation. NEMA 12 enclosure. Many features and options.



HP-3

1 thru 400 hp, three phase AC input, DC output. Non-regenerative. Open or enclosed chassis. $\pm 0.5\%$ speed regulation without tach feedback. Speed and torque are programmable. Remote operator station, fan cooled heat sinks, DC loop contactor, phase protection and sub-cycle fusing. Options.



Steadibus™

Solid state backup rectifier. Variable voltage, three phase AC input, constant voltage DC output. Protects DC powered production systems against short duration voltage dips or single phasing. Capacities to support DC buses supplying 100 to 1600 amps.

Other Polyspede Products

HP-6. 1 thru 400 hp. Three phase AC input, DC output. Six pulse SCR drive.

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Also: Motors, gear reducers and transformers.

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