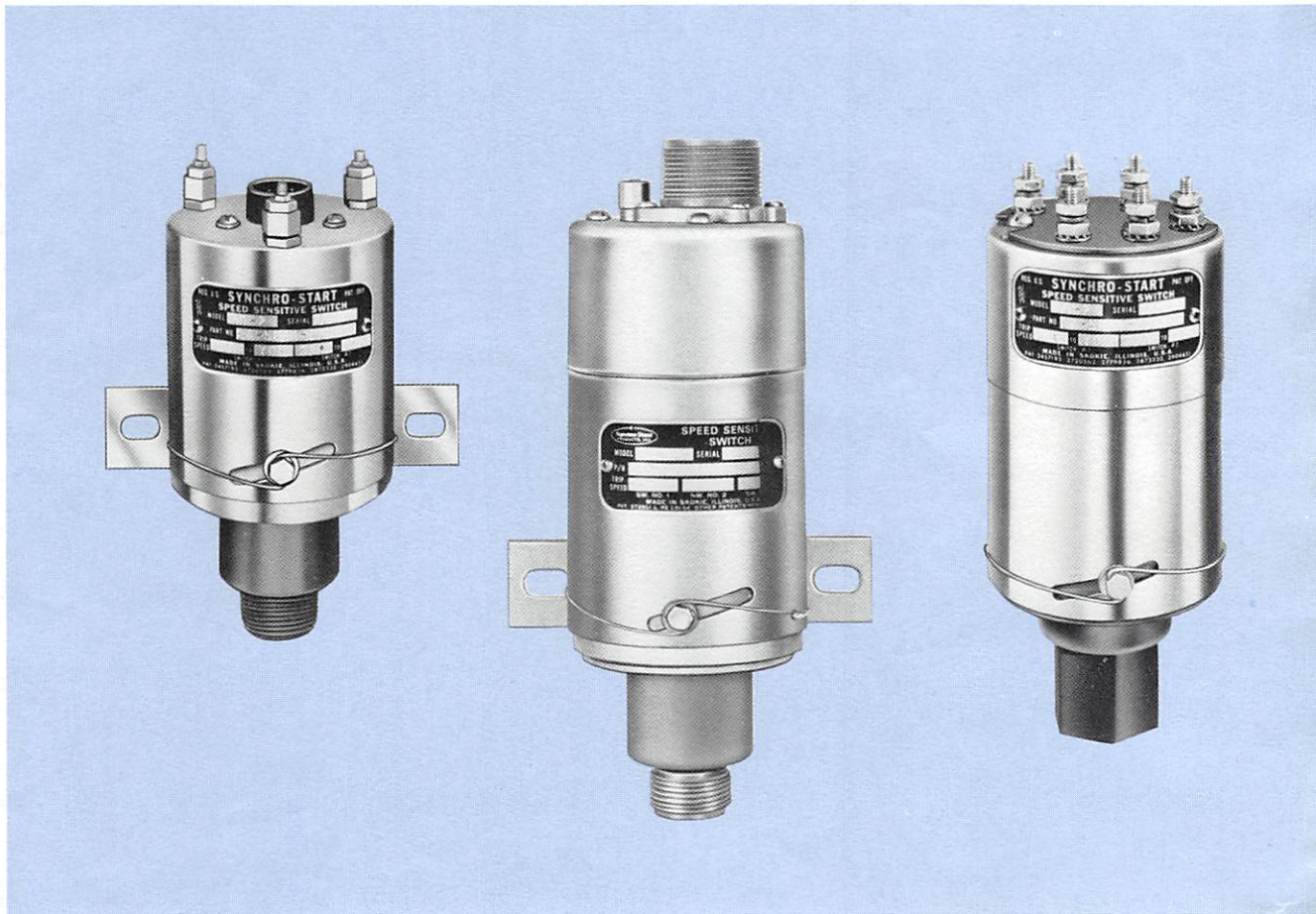


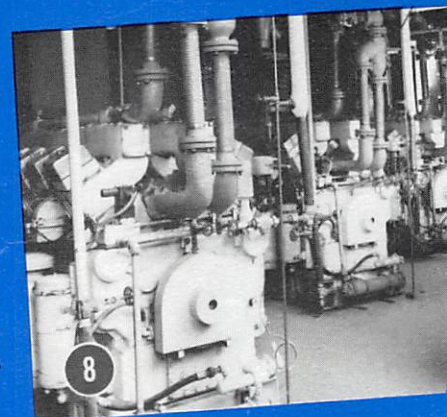
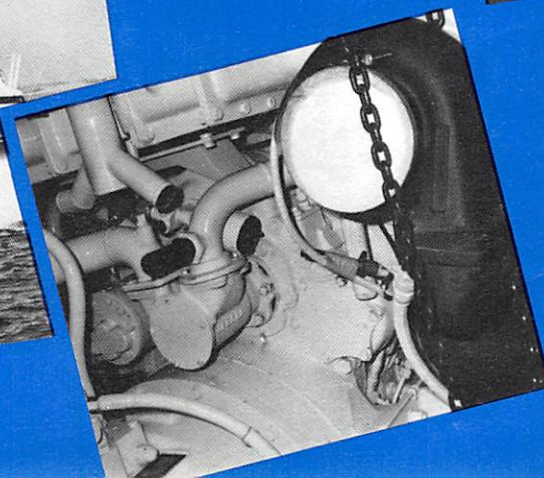
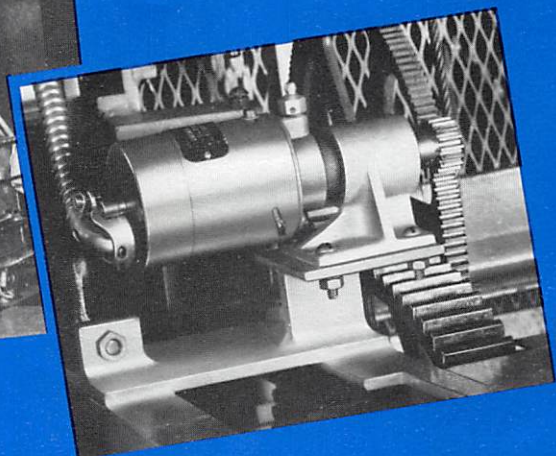
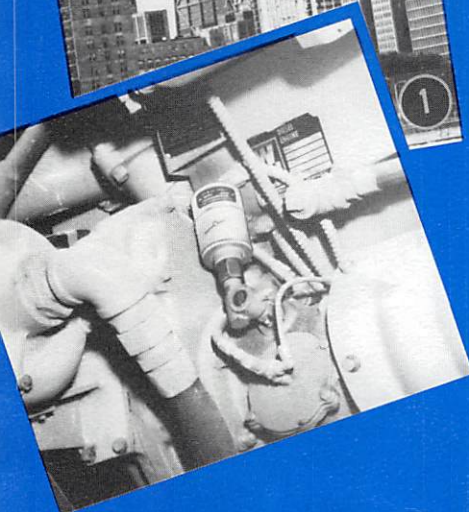
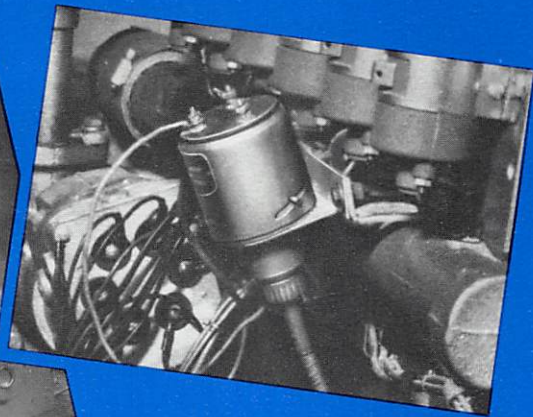
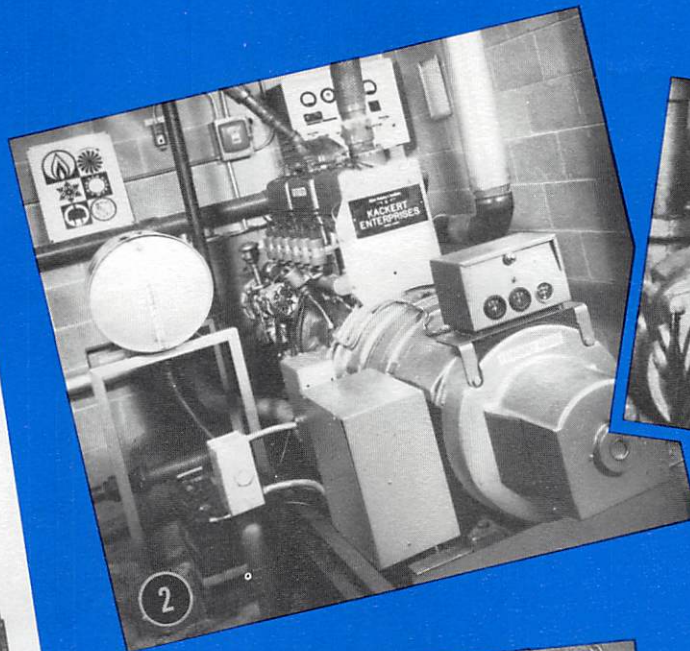
SYNCHRO-START MECHANICAL SPEED SWITCHES



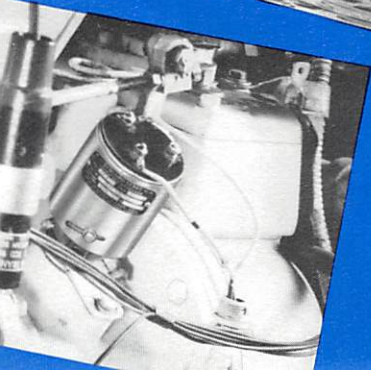
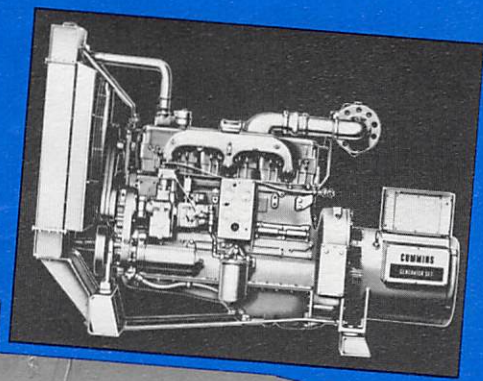
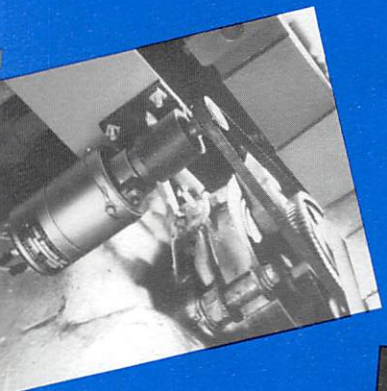
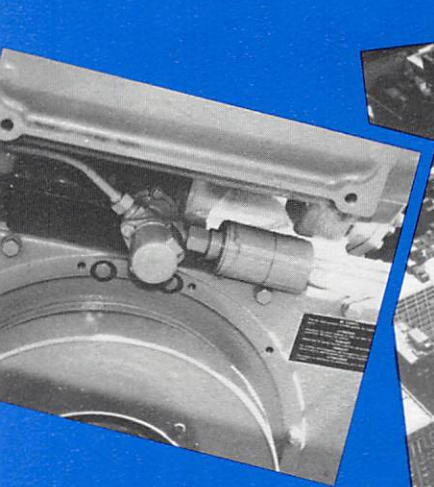
SUBSIDIARY OF KNOWLES ELECTRONICS, INC.

BULLETIN MS

APPLICATIONS OF SYNCHRO-ST



T MECHANICAL SPEED SWITCHES



INFORMATION

Contained in this Bulletin

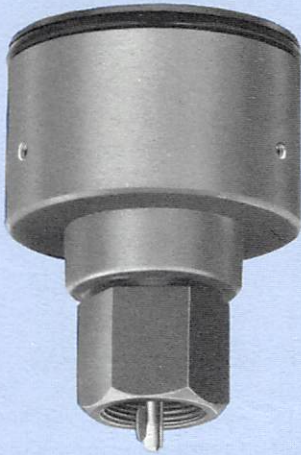
Mounting-Drive Styles	Pages 4 and 5
Internal Construction	Page 6
Electrical Terminations	Page 7
Features	Page 7
Specifications	Pages 8 to 11
Models	Pages 12 and 13
Ordering Information	Page 13
Accessories	Page 14

TYPICAL INSTALLATIONS

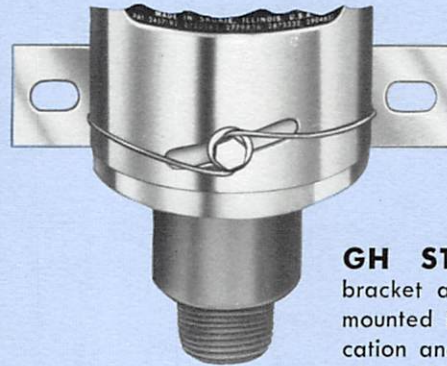
- 1 Standby power in the world's tallest apartment complex, the Hancock Center, Chicago, is provided by a Waukesha Diesel. The Synchro-Start Switch protects against overspeed.
- 2 Designed by Kackert Engineering, this total energy system, powered by a Minneapolis-Moline Diesel, in the plant of Quali-Tech, is protected by a Synchro-Start Switch.
- 3 Providing protection for the two Caterpillar Diesels which provide standby power for the First National Bank, Chicago is the job of the Synchro-Start Switches.
- 4 A Synchro-Start Switch automatically cuts off the electric motor at the maximum and minimum limits of travel on the Hi-Reach Platform made by Economy Engineering.
- 5 On the Vosper Hovermarine Surface Effect Ships a Synchro-Start Mechanical Speed Switch is used to protect the General Motors Diesels on the port and starboard sides.
- 6 The battery powered electric motor in the robot Prontow Tractor employs a Synchro-Start Switch to assure a steady speed regardless of grade variations.
- 7 The twin hull of the Ridgely Warfield research vessel of John Hopkins University is powered by a Cummins Marine Diesel which is protected by a Synchro-Start Switch.
- 8 A huge airport motel cannot tolerate engine failure. The Waukesha Diesels at the Sheraton O'Hare Inn, Chicago, are protected by Synchro-Start Switches.

MOUNTING-DRIVE STYLES

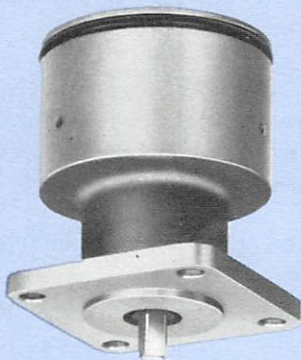
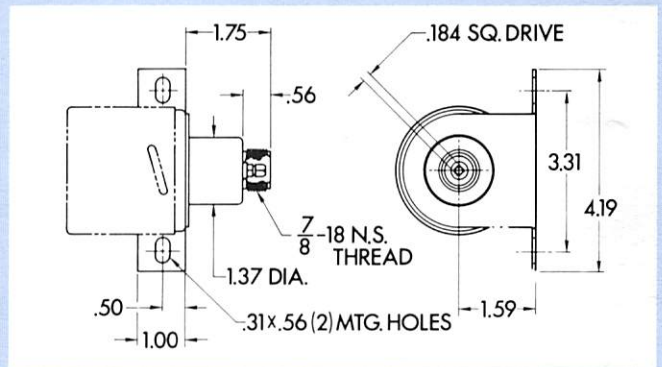
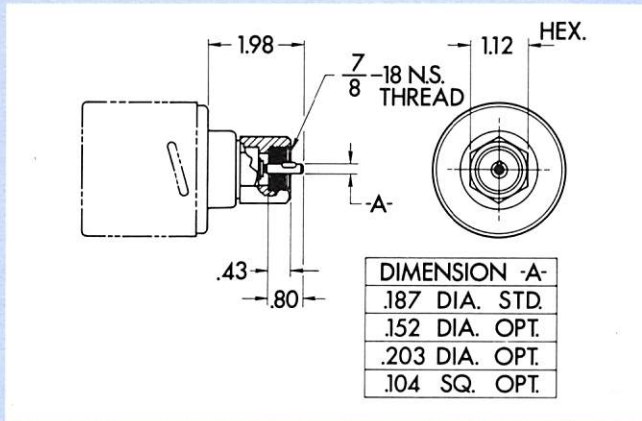
These eight basic Mounting-Drive Styles permit Synchro-Start Speed Switches to be used on practically any engine manufactured in the world.



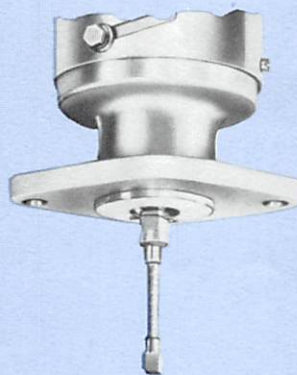
GO STYLE. Direct mounts on SAE tachometer accessory drive found on most engines manufactured in the USA. Four different DRIVE SHAFTS are available: .187 in. diam., .152 in. diam., .203 in. diam., and .104 in. square. The flexible drive shaft compensates for misalignment.



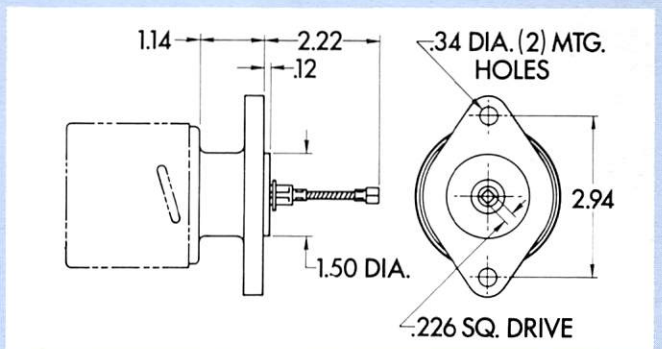
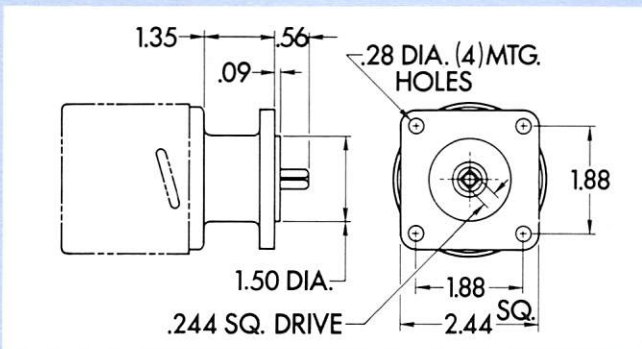
GH STYLE. Mounting bracket allows switch to be mounted in a convenient location and connected to engine drive by a variety of flexible cables.

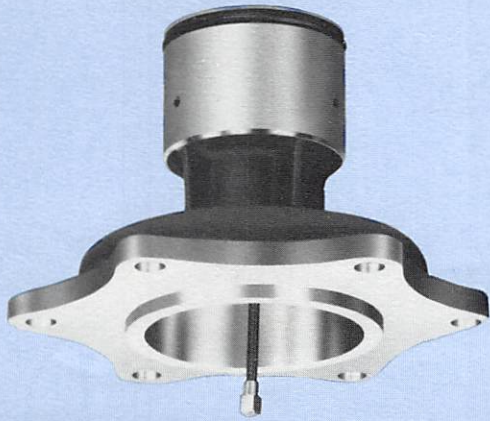


GB STYLE. Direct mounts on the AND 20005 Tachometer Pad.

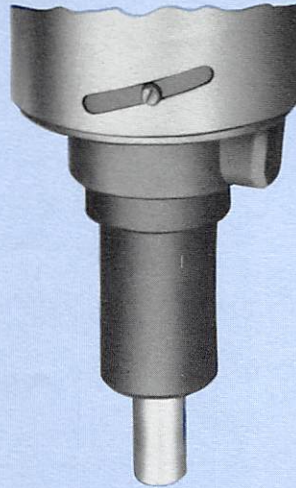


GY STYLE. Direct mounts on accessory drives found on many General Motors engines. Flexible drive shaft compensates for misalignment.

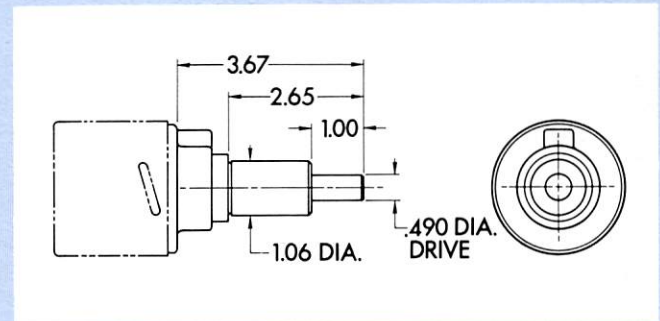
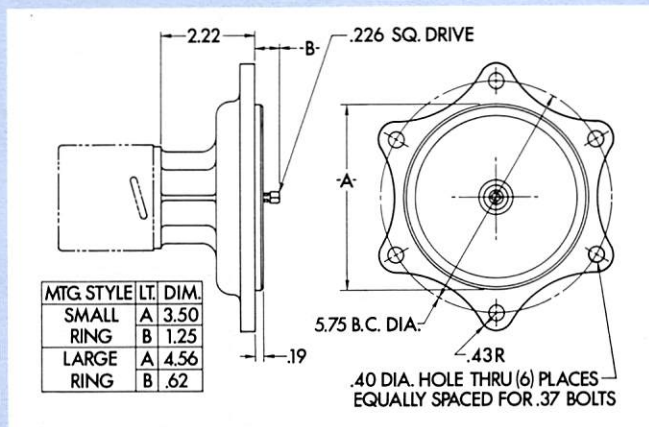




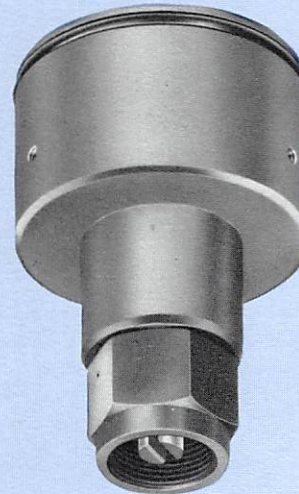
GW STYLE. Direct mounts on blower accessory drives found on General Motors engines. The SMALL RING is used on the IN LINE 71 series (except for the 2-71) and the LARGE RING is used on the V-71 and the V-92 series engines. The flexible shaft compensates for misalignment.



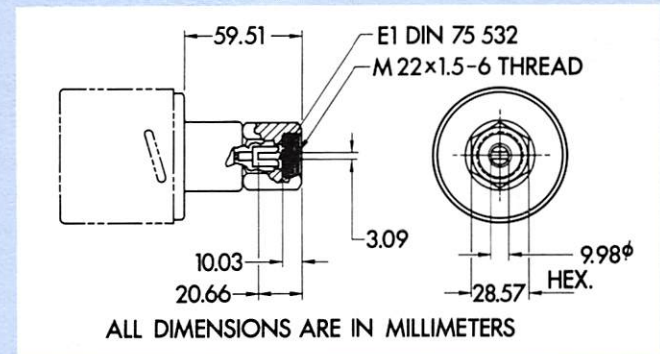
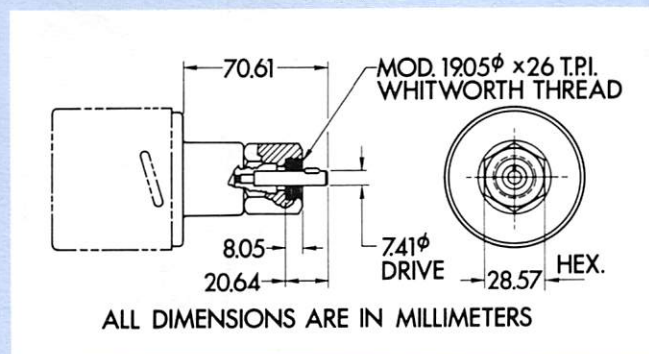
GS STYLE. Direct mounts on engine distributors or, by using a mounting bracket, may be used for belt, gear or direct coupling to any drive shaft.



GR STYLE. Direct mounts on engines equipped with WHITWORTH FORM thread common in the United Kingdom.



GJ STYLE. Direct mounts on engines equipped with E 1 DIN 75532 metric tachometer pad common in Europe.

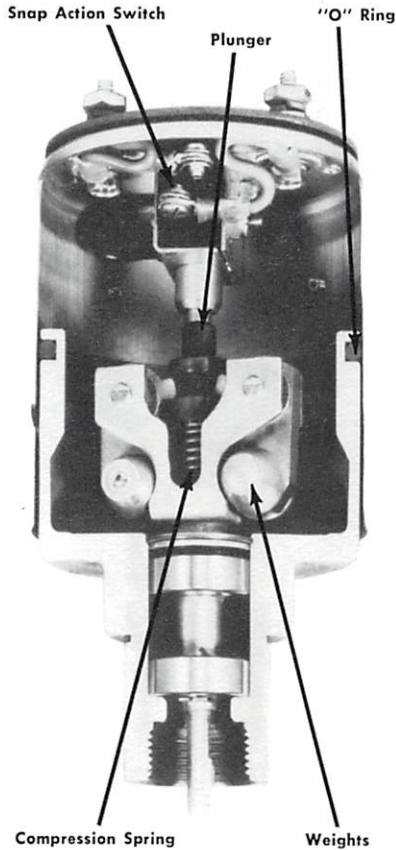


INTERNAL CONSTRUCTION

Below are cross section views of the four basic constructions of Synchro-Start Speed Switches. The "O" ring provides a seal against dust and moisture. Variety of springs and weights are available for all switch point speeds. To

adjust speed for both ONE ELEMENT models simply rotate the cap. On TWO and THREE ELEMENT models adjust individual element compression springs accessible through the top.

ONE ELEMENT Underspeed



UNDERSPEED ONE ELEMENT

Designed for switch points below normal operating speed. At zero speed plunger is in contact with the SPDT snap action switch. As speed increases two centrifugal weights extend causing plunger to lose contact with switch and switch contacts to change state. This unique design minimizes wear and allows equipment to operate for prolonged periods above switch point speed.

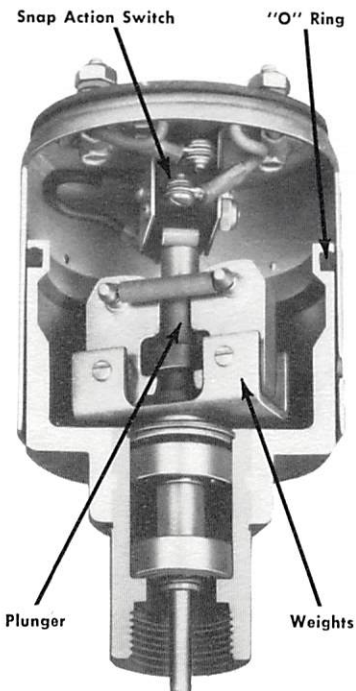
DECREASING SPEED. Switch contacts change when equipment slows down below a predetermined speed. Normally some external override must be used to allow equipment to reach operating speed.

INCREASING SPEED. A common application is crank disconnect. No override is necessary.

OVERSPEED ONE ELEMENT

Designed to shutdown equipment when operated at a speed in excess of normal operating speed. Patented construction minimizes wear of parts for speeds below switch point speed. As the speed approaches the switch speed point, two centrifugal weights extend causing the plunger to contact and actuate the SPDT snap action switch. Damage can occur if operated above switch point.

ONE ELEMENT Overspeed



TWO ELEMENT

Patented construction allows switch to operate safely at all speeds, and to have two separate switch points. As the speed increases, the centrifugal weights extend causing the plunger to contact the channel bar. The bearing on the plunger absorbs the thrust load and permits plunger to rotate without wear on the channel bar. The two switch actuating pins actuate the two snap action SPDT switches at the desired switch speed point.

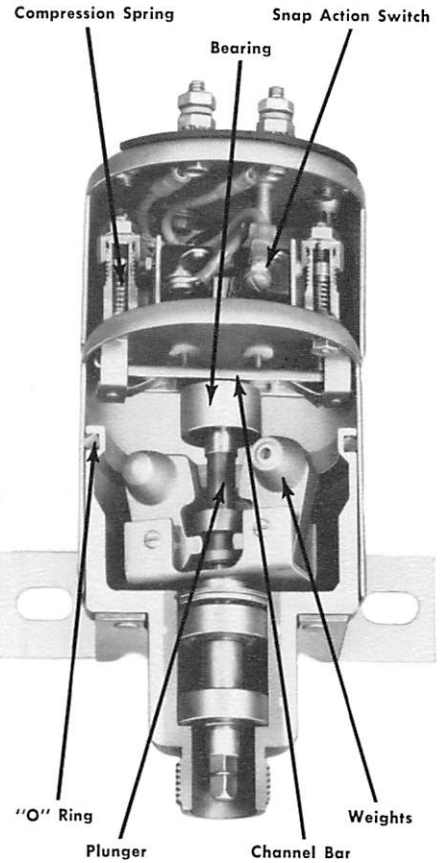
Common application is to use the lower speed switch point for crank disconnect and the higher speed point for overspeed shut down. This combines the function of an underspeed and overspeed switch.

THREE ELEMENT

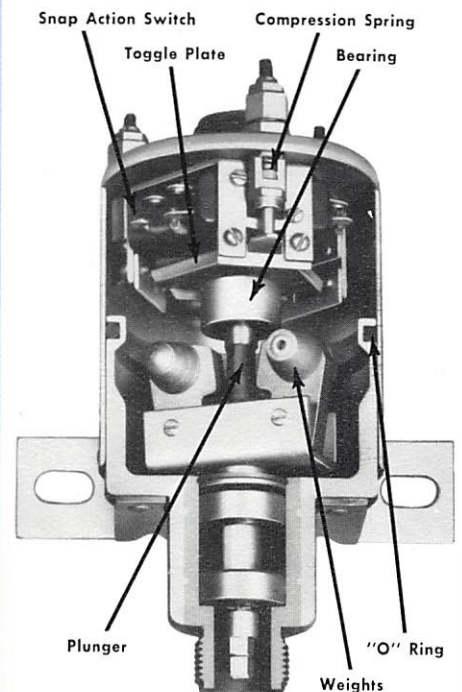
Patented construction allows switch to operate safely at all speeds. As speed increases two centrifugal weights extend causing the plunger to contact the toggle plate. The bearing on the end of the plunger absorbs the thrust load and permits plunger to rotate without wear on the toggle plate. Precision protrusion on the toggle plate actuate the three SPDT snap action switches.

Common application is for the lowest set point to provide crank disconnect, middle speed point, voltage regulator protection and the highest speed point overspeed shut down.

TWO ELEMENT SWITCH



THREE ELEMENT SWITCH



ELECTRICAL TERMINATION OPTIONS

Synchro-Start offers four basic ways of attaching connecting electrical wires to the speed switch.

SCREW TERMINALS



For most applications screw terminals are the most practical method of wiring the speed switch to the device that it controls. Three terminals (normally open, normally closed and common) are furnished with one element overspeed and underspeed switches. Two element switches are furnished with six screw terminals (normally open, normally closed and common for each element).

Three element switches are furnished with seven terminals; the wiring arrangement of these terminals must be specified as required by your application. There is no standard wiring arrangement for three element switches.

CONDUIT COVER

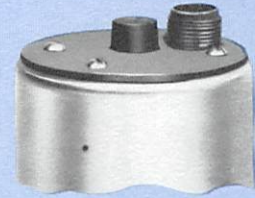


Conforms to the National Electric Code standards. It is provided with a $\frac{7}{8}$ inch hole for a half inch connector. For one element overspeed and underspeed switches this cover is placed over the screw terminals. For two element switches, six leads are brought out of the cover. No conduit cover is available for three element switches.

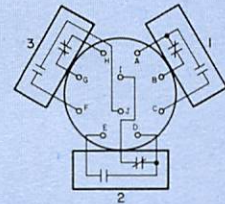
RUBBER GROMMET

When exposed screw terminals are not acceptable and conduit connectors are impractical, a rubber grommet is placed in the $\frac{7}{8}$ inch conduit cover hole. See Conduit Cover above.

MS CONNECTORS



Sometimes military specifications, contaminated atmosphere, or high voltage condition requires the speed switch to be fitted with a MS Connector. One element overspeed and underspeed switches are furnished with MS 3102R-10SL-3P, three (3) pin connector. Two element switches are furnished with MS 3102R-14S-6P, six (6) pin connector. Three element switches are furnished with MS 3102R-18-1P, ten (10) pin connector which is wired 3DDB as shown below. Other wiring arrangements must be specified.



FEATURES

SEALED CAP

All Mechanical Speed Switches are supplied with a sealed cap. This unique construction protects the rotor and snap action switches from dirt and moisture. If a conduit cover is furnished it is not moisture sealed to the cap.

SEALED BALL BEARINGS

Permanent lubricated Sealed Ball Bearings require no maintenance or lubrication and provide thousands of hours of operating life. Special lubricant permits operation in -40°F to $+250^{\circ}\text{F}$ environments.

INTERNAL ELASTOMERIC COUPLING

Optionally available for GO style only. The coupling effectively eliminates erratic operations by dampening engine torsional vibrations transmitted through the speed switch drive shaft.

EXPLOSION PROOF HOUSING

Explosion proof housing of cast aluminum provides protection in hazardous atmosphere. Designed for use with tachometer cable drive units on Model GH Switch and belt chain drive units on Model GS Switch. Enclosure meets the explosive atmosphere requirements of MIL-STD-810C, Method 511.1, Procedure II.

SNAP ACTION SWITCHES

Precision Snap Action Switches are custom designed for precise repeatability and vibration resistance. They are highly reliable and rated for $\frac{1}{2}$ million operations at 10 amps 12 volt D.C. or 120/220 Volt A.C. resistive. These SPDT switches are available for automatic or manual reset.

ALUMINUM CASTINGS

Rugged, light Aluminum Castings and heavy gauge Machine Parts withstand the severe vibrations encountered on diesel engines.

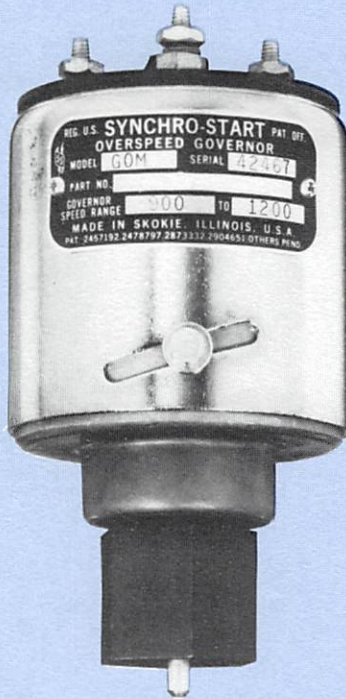
FLEXIBLE DRIVE SHAFT

Flexible Drive Shaft furnished with most DRIVE-MOUNTING styles compensates for eccentricity and misalignment and dampens vibration.

ROTATION

Operated in either clockwise or counter-clockwise direction.

SYNCHRO-START OVERSPEED SWITCHES



FEATURES

- One Switch Point.
- Operating Speed Must Be Below Switch Point.
- Sealed Permanently Lubricated Bearings.
- Rugged Construction.
- Field Adjustable.
- 10 Amp Switch Contacts.
- Available in All Mounting—Drive Styles.
- Patented design

OPTIONS

- Screw Terminals.
- Conduit Cover.
- MS Connector.
- Conduit Grommet.
- Sealed Construction.
- Manual or Automatic Reset.
- Explosion Proof Housing.

- 1 SCREW TERMINAL (3) #8-32 STUDS
- 2 MANUAL RESET
- 3 MANUAL RESET W/CONDUIT COVER
- 4 RECEPTACLE MS 3102R-14S-6P
- 5 CONDUIT COVER W/.875 DIAM. HOLE

ONE ELEMENT

SPECIFICATIONS

OVERSPEED CONSTRUCTION:

Operating speed must be below switch point.

SWITCH POINT ADJUSTMENT:

Rotor and springs available for speeds between 325 RPM and 5000 RPM increasing.

SWITCH POINT FIELD ADJUSTMENT RANGE:

Typically 20-25% total.

SWITCH POINT REPEATABILITY:

± 2% MAX

OPERATING TEMPERATURE:

-40°F to + 250°F.

SWITCH CONTACT RATING:

10 Amps resistive 12 volt D.C. or 110/220 volt A.C.

VIBRATION:

4 g's at 9 to 200 Hertz.

RESET TYPES:

Automatic or Manual.

AUTOMATIC RESET DIFFERENTIAL:

(Hysteresis) Typically 15% to 25%.

ENCLOSURE:

Dust Proof (Standard), Moisture Sealed (Optional).

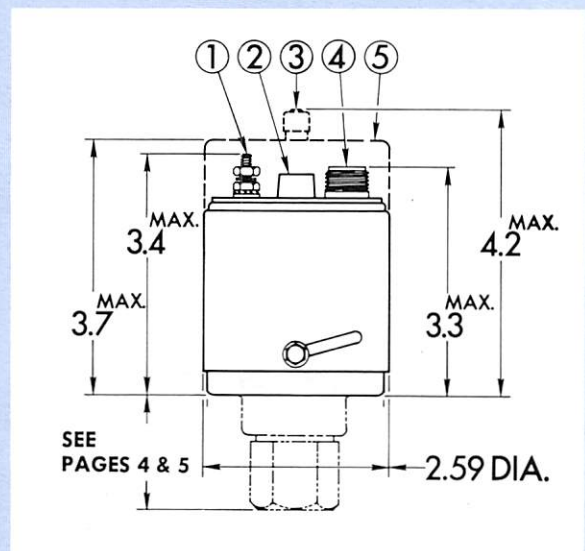
ELECTRICAL TERMINATIONS:

Screw #8-32, Conduit Cover, Rubber Grommet or MS Connector.

DRIVE—MOUNTING STYLES:

All (See Pages 4 and 5.)

DIMENSIONS



SYNCHRO-START UNDERSPEED SWITCHES

ONE ELEMENT

SPECIFICATIONS

UNDERSPEED CONSTRUCTION:

Operating speed must be above switch point.

SWITCH POINT ADJUSTMENT:

Rotor and Springs available for all speeds between 250 and 5000 RPM increasing or 200 and 5000 decreasing.

SWITCH POINT FIELD ADJUSTMENT RANGE:

Typically 20-25% total.

SWITCH POINT REPEATABILITY:

± 2% MAX

OPERATING TEMPERATURE:

-40°F to + 250°F.

SWITCH CONTACT RATING:

10 Amps resistive 12 volt D.C. or 110/220 volt A.C.

VIBRATION:

4 g's at 9-200 Hertz.

RESET TYPES:

Automatic.

AUTOMATIC RESET DIFFERENTIAL:

(Hysteresis) Typically 15% to 25%.

ENCLOSURE:

Dust Proof (Standard).

Moisture Sealed (Optional).

ELECTRICAL TERMINATIONS:

Screw #8-32, Conduit Cover, Rubber Grommet or MS Connector.

DRIVE—MOUNTING STYLES:

All (See Pages 4 and 5.)



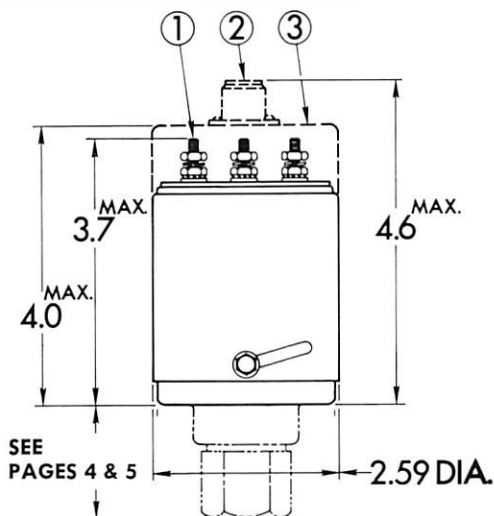
FEATURES

- One Switch Point.
- Operating Speed Must Be Above Switch Point.
- Sealed Permanently Lubricated Bearings.
- Rugged Construction.
- Field Adjustable.
- 10 AMP Switch Contacts.
- Available in All Mounting—Drive Styles.
- Automatic Reset.
- Patented design

OPTIONS

- Screw Terminals.
- Conduit Covers.
- MS Connector.
- Conduit Grommet.
- Sealed Construction.
- Explosion Proof Housing.

DIMENSIONS



- 1 SCREW TERMINALS (3) #8-32 STUDS
- 2 RECEPTACLE MS 3102R-10SL-3P
- 3 CONDUIT COVER W/.875 DIAM. HOLE

SYNCHRO-START SPEED SWITCH



FEATURES

- Two Switch Points.
- Operating Speed may be above or below Switch Points.
- Sealed Permanently Lubricated Bearings.
- Rugged Construction.
- Field Adjustable.
- 10 AMP Switch Contacts.
- Available in All Mounting—Drive Styles.
- Sealed Against Dust and Moisture.
- Automatic Reset on Low RPM Switch Point.
- Patented design

OPTIONS

- Screw Terminals.
- Conduit Cover.
- Conduit Grommet.
- MS Connector.
- Automatic or Manual Reset on High RPM Switch Point.
- Explosion Proof Housing.
- Fungus Proof.

- 1 SCREW TERMINAL (6) #8-32 STUDS
- 2 MANUAL RESET
- 3 MANUAL RESET W/MS RCPT. OR CONDUIT COVER
- 4 RECEPTACLE MS 3102R-14S-6P
- 5 CONDUIT COVER W/.875 DIA. HOLE

TWO ELEMENT

SPECIFICATIONS

SWITCH POINT ADJUSTABLE:

Rotors and Springs available for two switch points between 300 and 5000 RPM.

SWITCH POINT FIELD ADJUSTABLE RANGE:

Typically 15-20% total.

SWITCH POINT REPEATABILITY:

± 2% MAX

OPERATING TEMPERATURE:

-40°F to + 250°F.

SWITCH CONTACT RATING:

10 Amps resistive 12 volt D.C. or 110/220 volt A.C.

VIBRATION:

4 g's at 9 to 200 Hertz.

RESET TYPES:

Automatic for low RPM Switch Point.

Automatic or Manual for high RPM Switch Point.

AUTOMATIC RESET DIFFERENTIAL:

(Hysteresis) Typically 15-25%.

ENCLOSURE:

Dust and Moisture Sealed.

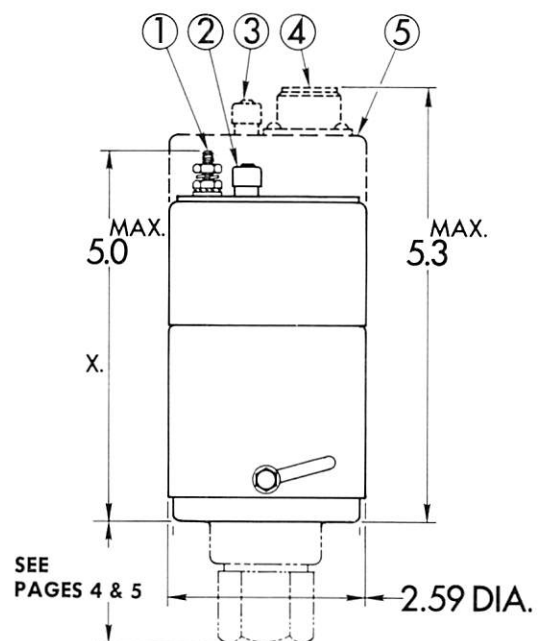
ELECTRICAL TERMINATIONS:

Screw #8-32, Conduit Cover, Rubber Grommet or MS Connector.

DRIVE—MOUNTING STYLES:

All (See Pages 4 and 5.)

DIMENSIONS



SYNCHRO-START SPEED SWITCH

THREE ELEMENT

SPECIFICATIONS

SWITCH POINT ADJUSTMENT:

Rotors and Springs available for three switch points between 325 and 5000 RPM.

SWITCH POINT FIELD ADJUSTMENT RANGE:

Typically 15-20% total.

SWITCH POINT REPEATABILITY:

± 2% MAX

OPERATING TEMPERATURE:

-40°F to + 250°F.

SWITCH CONTACT RATING:

10 Amps resistive 12 volt D.C. or 110/220 volt A.C.

VIBRATION:

4 g's at 9 to 200 Hertz.

RESET TYPES:

Automatic for low and middle RPM Switch Point.
Automatic or Manual for high RPM Switch Point.

AUTOMATIC RESET DIFFERENTIAL:

(Hysteresis) Typically 15-25%.

ENCLOSURE:

Dust and Moisture Sealed.

ELECTRICAL TERMINATIONS:

Screw #8-32.

MS Connector.

DRIVE—MOUNTING STYLES:

All (See Pages 4 and 5.)



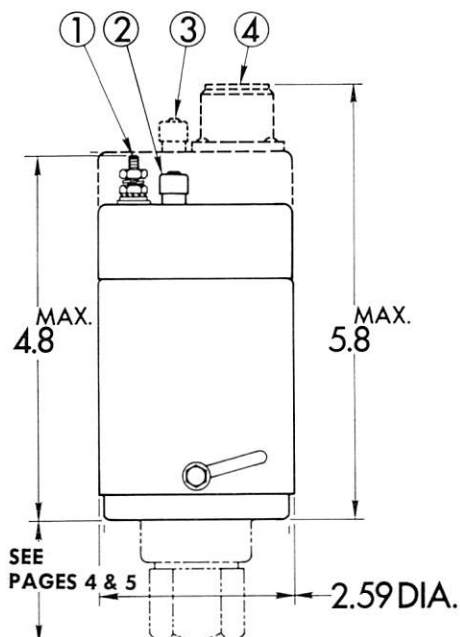
FEATURES

- Three Switch Points.
- Operating Speed may be above or below Switch Points.
- Sealed Permanently Lubricated Bearings.
- Rugged Construction.
- Field Adjustable.
- 10 Amp Switch Contacts.
- Available in all Mounting—Drive Styles.
- Sealed Against Dust and Moisture.
- Patented design

OPTIONS

- Screw Terminals.
- MS Connector.
- Automatic or Manual Reset on High RPM Switch Point.
- Explosion Proof Housing.

DIMENSIONS



- 1 SCREW TERMINAL (7) #8-32 STUDS
- 2 MANUAL RESET
- 3 MANUAL RESET W/MS RCPT.
- 4 RECEPTACLE MS 3102R-18-1P

SYNCHRO-START MODELS

One Element Overspeed Models

Mounting Drive	3 Screw Terminals*		Conduit Cover		3 Pin MS Connector		Explosion proof	
	Man. Reset	Aut. Reset	Man. Reset	Aut. Reset	Man. Reset	Aut. Reset	Man. Reset	Aut. Reset
SAE	GOM	GOA	GOMC	GOAC	GOMN	GOAN	—	—
CABLE	GHM	GHA	GHMC	GHAC	GHMN	GHAN	GHME	GHAE
DISTRIBUTOR	GSM	GSA	GSMC	GSAC	GSMN	GSAN	GSME	GSAE
GM	GWM	GWA	GWMC	GWAC	GWMN	GWAN	—	—
GM	GYM	GYA	GYMC	GYAC	GYMN	GYAN	—	—
AND 20005	GBM	GBA	GBMC	GBAC	GBMN	GBAN	—	—
WHITWORTH	GRM	GRA	GRMC	GRAC	GRMN	GRAN	—	—
METRIC	GJM	GJA	GJMC	GJAC	GJMN	GJAN		

* Add "S" at end of Screw Terminal Models to indicate sealed construction.

One Element Underspeed Models

Mounting Drive	3 Screw Terminals*	Conduit Cover	3 Pin MS Connector	Explosion Proof
SAE	GOU	GOUC	GOUN	—
CABLE	GHU	GHUC	GHUN	GHUE
DISTRIBUTOR	GSU	GSUC	GSUN	GSUE
GM	GWU	GWUC	GWUN	—
GM	GYU	GYUC	GYUN	—
AND 20005	GBU	GBUC	GBUN	—
WHITWORTH	GRU	GRUC	GRUN	—
METRIC	GJU	GJUC	GJUN	

* Add "S" at end of Screw Terminal Models to indicate sealed construction.

Two Element Models

Mounting Drive	6 Screw Terminals		Conduit Cover		6 Pin MS Connector		Explosion Proof	
	Man. Reset	Auto. Reset	Man. Reset	Auto. Reset	Man. Reset	Auto. Reset	Man. Reset	Auto. Reset
SAE	GO-2M	GO-2	GO-2MC	GO-2C	GO-2MN	GO-2N	—	—
CABLE	GH-2M	GH-2	GH-2MC	GH-2C	GH-2MN	GH-2N	GH-2ME	GH-2E
DISTRIBUTOR	GS-2M	GS-2	GS-2MC	GS-2C	GS-2MN	GS-2N	GS-2ME	GS-2E
GM	GW-2M	GW-2	GW-2MC	GW-2C	GW-2MN	GW-2N	—	—
GM	GY-2M	GY-2	GY-2MC	GY-2C	GY-2MN	GY-2N	—	—
AND 20005	GB-2M	GB-2	GB-2MC	GB-2C	GB-2MN	GB-2N	—	—
WHITWORTH	GR-2M	GR-2	GR-2MC	GR-2C	GR-2MN	GR-2N	—	—
METRIC	GJ-2M	GJ-2	GJ-2MC	GJ-2C	GJ-2MN	GJ-2N		

SYNCHRO-START MODELS

Three Element Models

Mounting Drive	6 Screw Terminals		10 Pin M5 Connector		Explosion Proof	
	Man. Reset is on high speed switch only	Man. Reset	Auto. Reset	Man. Reset	Auto. Reset	Aut. Reset
SAE		GO-3M	GO-3	GO-3MA	GO-3A	—
CABLE		GH-3M	GH-3	GH-3MA	GH-3A	GH-3E
GM		GW-3M	GW-3	GW-3MA	GW-3A	—
AND 20005		GB-3M	GB-3	GB-3MA	GB-3A	—
WHITWORTH		GR-3M	GR-3	GR-3MA	GR-3A	—

NOTE: Synchro-Start Models designate the mounting-drive style, manual or automatic reset, number of elements, overspeed or under-speed construction and sealed construction if one element; electrical termination, and explosion proof. The Model does not designate the speed settings, wiring arrangement, SAE drive shaft size and elastomeric coupling if GO style, large or small ring if GW style and fungus proofing.

HOW TO ORDER

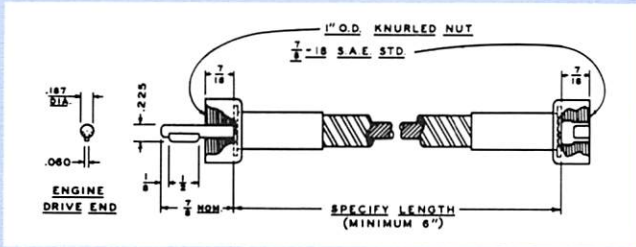
1. Specify the MODEL from above MODEL charts.
2. Specify the speed switch RPM for EACH element. Be sure to correct for the ENGINE-TO-TACH drive speed ratio.
CAUTION: The factory will assume that all speed switch points are approached in an increasing speed direction.
NOTE ON ORDER if decreasing speed direction.
3. If a GO style, note drive shaft size: .187, .152, or .203 inch diameter or .104 inch square.
4. If a GW style, specify SMALL RING or LARGE RING; otherwise specify the number of engine cylinders and the engine series (IN LINE 71, V-71 or V-92).
5. If a 3 ELEMENT speed switch is required be sure to specify the wiring arrangement required for your application.
6. Review the available options for the MODEL that you select and NOTE ON THE ORDER if required:
 - a) Internal Elastomeric Coupling (if GO style).
 - b) Grommet in 7/8 in. hole in conduit cover.
7. Review page 14 to determine if any accessories are required.
NOTE ON ORDER on a separate line item.

REPLACEMENT SPEED SWITCHES

Please give us ALL the information on the old speed switch nameplate. This will assure you of a useable replacement.

ACCESSORIES

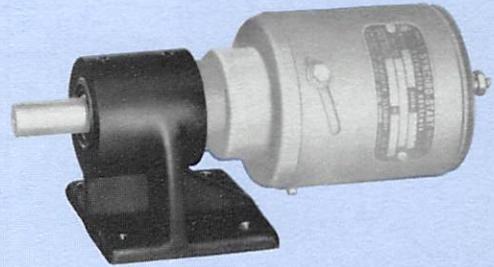
FLEXIBLE CABLES



SA 0075 Flexible Cable Assembly connects Model GH Switch to SAE tachometer drive.

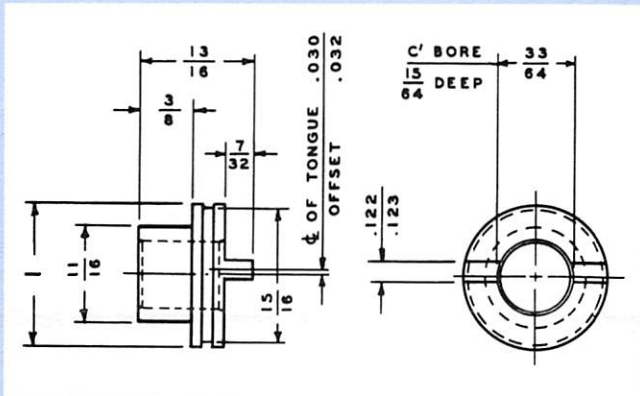
Cables should be as straight as possible and under three feet in length to prevent excessive wear and cable harmonics. Minimum length 6 inches. Specify length and shaft diameter.

MOUNTING BRACKET



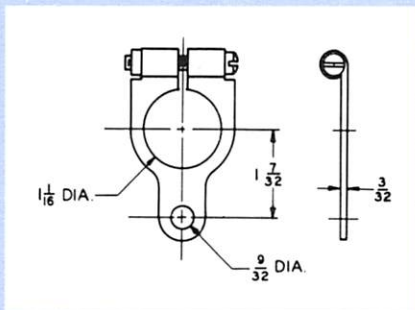
SA 2200 Mounting Bracket designed for mounting Model GS Switch. Made of cast aluminum. Anodized and dichromate sealing permits use in outdoor environment.

SAE DRIVE COUPLING



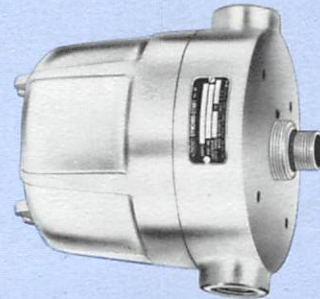
SA 2198 drive coupling, designed for use with Model GS Switch.

DISTRIBUTOR MOUNTING HOLD DOWN CLAMP

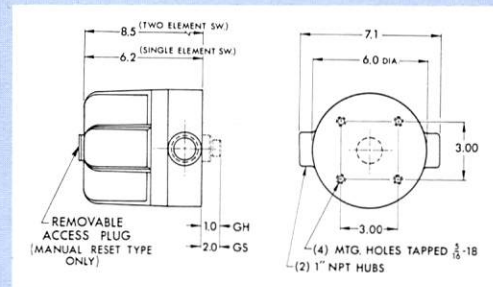


SA 2199 Die cast hold down clamp for Model GS Switch.

EXPLOSION PROOF HOUSING

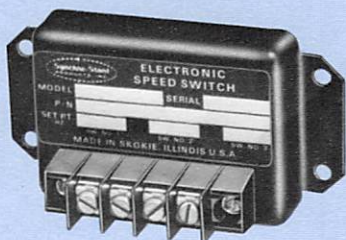


Explosion proof housing of cast aluminum provides protection in hazardous atmosphere. Designed for use with tachometer cable drive units on Model GH Switch and belt chain drive units on Model GS Switch. Enclosure meets the explosive atmosphere requirements of MIL-STD-810C, Method 511.1, Procedure II.



ELECTRONIC SPEED SWITCHES

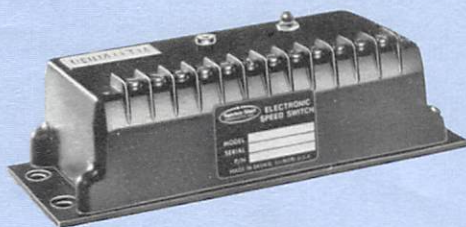
Synchro-Start is the only manufacturer offering a complete line of speed switches ranging from the ESSD so small you can hold it in the palm of your hand, to the ESSE, the last word in sophisticated advanced electronics. BULLETIN ESS SENT ON REQUEST.



MODEL ESSD

An amazingly compact switch only 2 x 4 inches that will provide over-speed or underspeed protection, crank disconnect, shift inhibiting on diesel engines and brake retarding on trucks. Ruggedly built to withstand hard service.

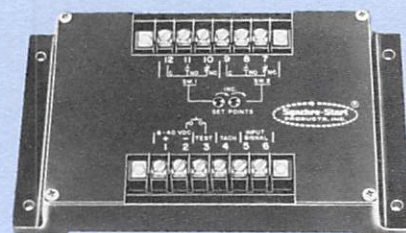
- Economical single channel speed switch.
- Light weight, rugged construction.
- Signal source, "Mini-Gen" Signal Generator or magnetic pickup.
- Potted, solid state components.
- Switching capability 1 amp DC max.
- Wide speed range from 20 rpm up.



MODEL ESSC

The Model ESSC is a compact speed switch designed to meet the needs of most engine control systems. It is modestly priced and will operate on 12 or 24 VDC batteries. Models available in 1, 2 or 3 switch points.

- Precise repetitive speed switch points.
- Reverse polarity and transient voltage protection.
- Adjustable switch points.
- 10 amp 28 VDC contacts.
- Sealed against moisture and dirt.
- NEMA 4 high impact molded enclosure.

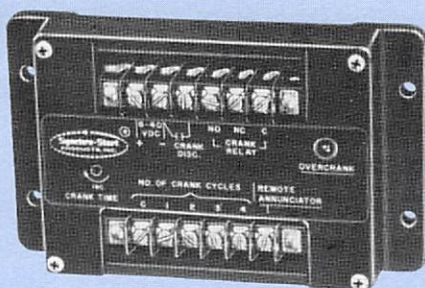


MODEL ESSE

The ESSE is compact with rugged environmental packaging, built-in mechanical relay, 8-40VDC power input and adjustable switch points. Models are available in 1 or 2 switch points.

- Potted for in-field reliability, exposed applications & hostile environments.
- High noise immunity.
- 10 amp 28 VDC contact.
- High vibration & transient protection.
- Cast aluminum case.
- Operating temperature range: -40° to 85°C

AUTO CRANK MODULE



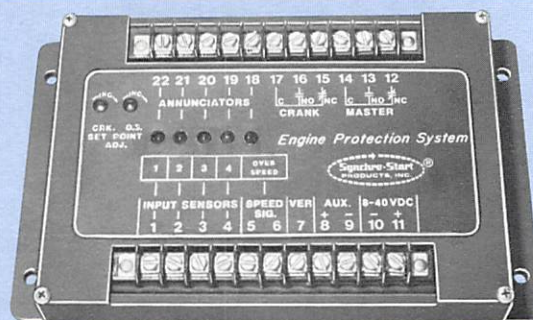
Compact, rugged, the Auto Crank Module is designed to provide automatic starting on stationary and portable engine driven generators, compressors, pumps, etc. Solid state • the Auto Crank Module will provide 1 to 5 crank cycles which are adjustable in terms of crank/rest time, if preset number of cycles is exceeded a built-in indicator light goes on and cranking is prevented until system is reset.

The Auto Crank Module will function with the Synchro-Start Engine Protective System or SSPI Speed Switch. When combined the two units provide a broad range of starting, monitoring, diagnostic and protective capabilities.

FEATURES

- Selectable cranking cycles.
- Adjustable crank/rest cycle time.
- Built-in LED overcrank indicator.
- High noise immunity.
- Suitable for panel or remote mounting.
- Provisions for remote overcrank annunciator.
- Compact, rugged, solid state design.
- Potted for in-field reliability and hostile environment.
- Reverse polarity protection.
- One unit for 12, 24 or 32 VDC battery operation.

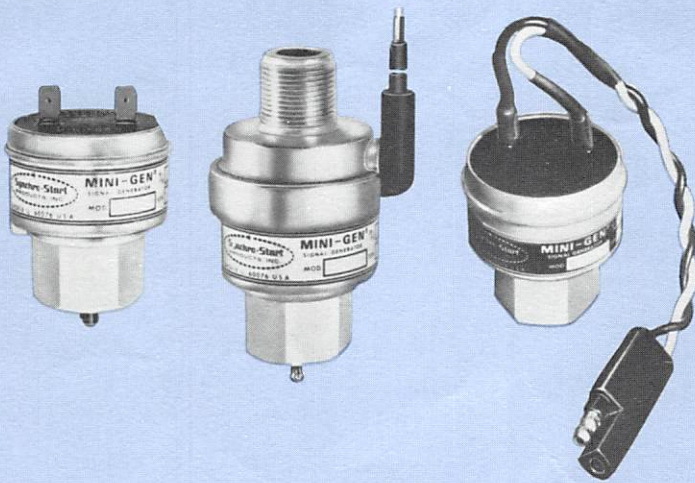
ESP ENGINE PROTECTION SYSTEM



The EPS Engine Protection System is designed to provide maximum protection for diesel engines from damage due to overspeeding. Diagnostic fault lights pinpoint engine failures reducing maintenance and repair costs and minimizing down-time.

FEATURES

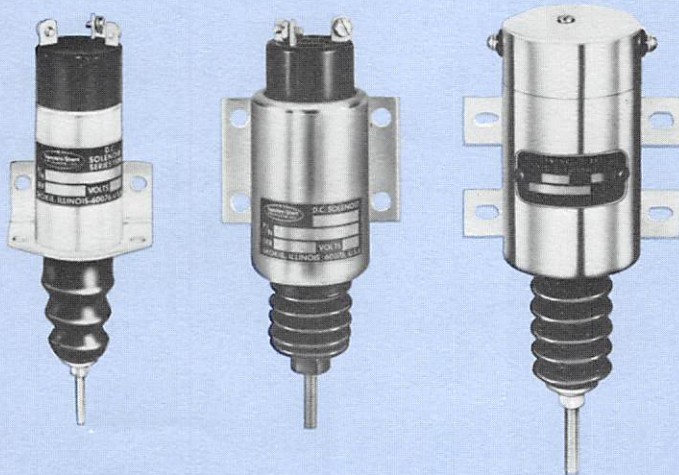
- Overspeed protection.
- Four switch points normally open grounding type sensors.
- Remote annunciator fault lights.
- Reverse polarity and transient voltage protection.
- Adjustable switch points.
- Overspeed verify circuit.
- Protected against vibration, shock, moisture, dirt.
- Diagnostic fault capability.
- Potted electronics.
- Automatic crank motor disconnect.



Mini-Gen® SIGNAL GENERATORS

The "Mini-Gen" Signal Generator provides a highly accurate and efficient signal for measuring road speed or engine rpm. The simple, rugged components are encased in a zinc die cast housing. Compact, it is designed to provide trouble-free service even under extreme conditions of heat, dirt, moisture and vibration. May be supplied with wire leads (optional). The generator is also available in a feed-thru model for installation on tachometer drives. It provides for easy method of installation and eliminates the need for costly adapters. The models will also give sufficient power for self-powered tachometers.

WRITE FOR BULLETIN ESS



SYNCHRO-START DC SOLENOIDS

Synchro-Start DC Solenoids are made in a wide range of sizes and capacities to meet practically any installation need. The simple, inexpensive Series 1502 gives a nine pound pull at one inch stroke with a hold force of 20 pounds. The Series 2001 and 2003 provide maximum pull power in small space measuring only 2 inches in diameter with a length of 6 inches. The Series 2001 has a pull force of 17 pounds at 1 inch stroke and the Series 2003 has a pull force of 21 pounds at 1 inch stroke. Both have a hold force of 40 pounds. The heavy duty Series D will provide a hold force of 16 pounds at a 1½ inch stroke.

WRITE FOR BULLETIN SOL

SERIES 1502 SERIES 2001-2003 SERIES D



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