

description

installation

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maintenance

and parts

for Warner

electric

motor brakes

SERVICE MANUAL



ELECTRIC MOTOR BRAKES

APPLIES TO MODELS

825, 1000, 1225

installation

When a complete spline drive armature assembly is purchased, it will be shipped with armature, splined armature adapter, and autogap spring already assembled. The splined hub, retainer ring, and bushing will be shipped as separate parts.

assembly

step 1 Place the armature-splined adapter assembly on a flat surface, segments up. Take the splined hub, retainer ring groove first, and press it through the autogap spring and splined armature adapter. (A) The splined hub can be inserted from the other side if assembly requires it.

step 2 Insert the retainer ring in the groove. (B)

step 3 Slide the armature-adapter assembly up against the retainer ring.

step 4 Insert the bushing in the retainer ring side of the splined hub. (C) The clearance holes in the bushing flange should line up with the tapped holes in the splined hub.

step 5 Slide the complete assembly on the shaft and place in contact with the magnet. (D)

step 6 Tighten the bushing capscrews, taking a few turns at a time on each capscrew. (E) As the capscrews are tightened, the armature will back away slightly from the magnet. After the capscrews are completely tight, there should be a clearance of about $\frac{1}{16}$ " between armature and magnet.

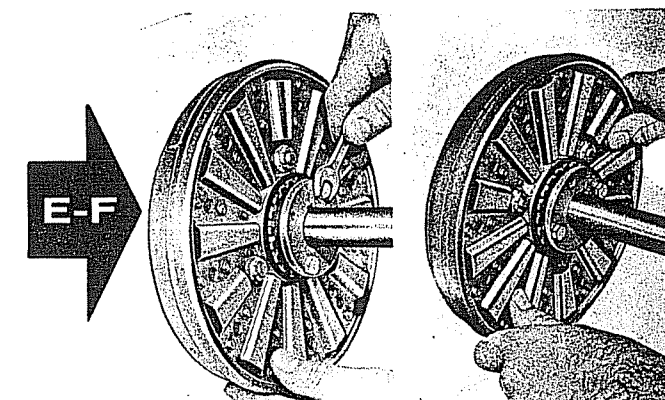
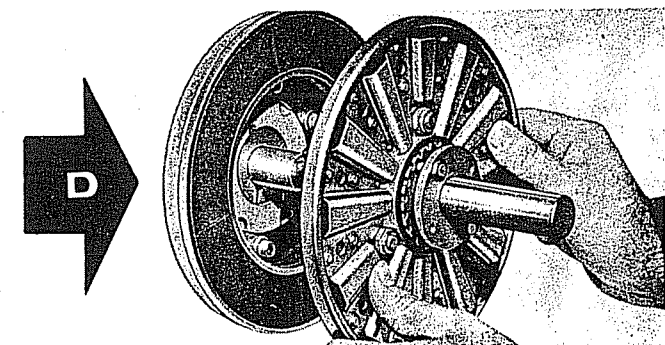
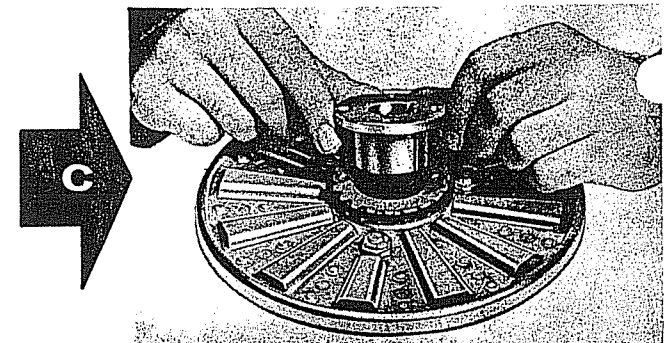
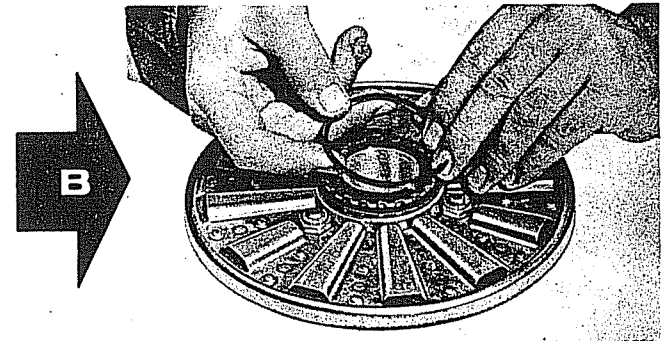
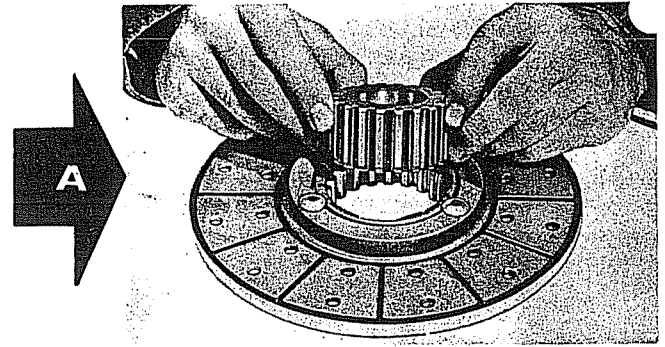
step 7 After the bushing is secure on the shaft, push the armature against the magnet face. (F) Then release the armature and a $\frac{1}{32}$ " gap will be automatically attained.

disassembly

step 1 Remove the bushing capscrews and insert them in the tapped holes in the bushing flange.

step 2 Tighten the capscrews. This will force the removal of the bushing.

step 3 Once the bushing is loose, the entire assembly is free to be removed from the shaft.



installation

After mounting to hub, the 670154-A1 (item #5) retainer washers and armature should be pulled against the 670720 (item #4) retainer ring so that the 670156 follow-up springs (item #2) are completely compressed.

With the armature assembled to the hub for reversed assembly, assemble the hub on the shaft allowing 1/16" clearance between the magnet face and armature. On the first actuation of the unit, the detent rings will be moved approximately 1/64" toward the magnet and will automatically assume their correct position.

Failure to provide this original clearance will result in the armature constantly bearing on the magnet until there is sufficient wear for the unit to adjust itself.

Installation of the autogap accessory on existing brake installations will result in longer stopping times as compared to the standard installation. This is most apparent where very fast stops are being made. This is due to the time increment required for the magnet to build up flux density sufficient to attract the armature across the 3/64" air gap maintained by the Autogap assembly. This delay, if critical, can be overcome by decreasing line resistance to the magnet if full current is not being used, or earlier application of current to the unit.

Each Autogap accessory group is packed in a plastic bag and includes the required number of armature drive pins, detent rings, retainer washers, armature release springs, follow-up springs, and instruction drawing I-25099. Autogap accessory groups are available for vertically mounted units with armature mounted above magnet or magnet mounted above the armature.

MAINTENANCE

When a Warner Electric Motor Brake is properly assembled and installed, no further service, lubrication or maintenance should be required throughout the life of the unit. As with any friction-type device, however, some initial care should be given to the wear rate, as minor adjustments in speed of operation may sometimes greatly extend the life of the brake.

Slight changes in torque, made with the control rheostat, may greatly and simply extend the life of your unit by decreasing the braking speed. Best wear life will be obtained when the input voltage to the magnet is maintained at the minimum required for desired stop. Once the proper speed has been established, precautions should be taken to prevent personnel not familiar with wear characteristics from changing the rheostat setting. A good rule to remember is the quicker the stop, the shorter the service life.

WEAR PATTERN

Wear grooves appear on the armature and magnet surfaces after extended service, Fig. 12. This is a normal wear condition and will not impair functioning of the unit or cause it to lose torque. In fact, a new brake may require burnishing, or running-in, before maximum rated torque may be developed. Never machine the armature or magnet contact surfaces to remove grooving or scoring.

Remachining the face of a worn armature is never recommended.

MAINTENANCE

But a worn magnet face should always be machined if it is to be used with a replacement armature. In refacing a worn magnet: (1) machine only enough material to clean up the entire face of the magnet; (2) hold face within .005" of parallel with the mounting plate; and (3) undercut the molded facing material .002" to .004" below the pole faces.

Automatic wear adjustment, or armature follow-ups, is provided by allowing the armature to slide freely axially on the drive pins. This provides maximum armature life with a minimum amount of care and attention. As the friction surfaces "wear-in" the armature advances on the pins so full contact with magnet is maintained at all times. By observing the amount of clearance between the armature back plate and the shoulder of the drive pin bushings, a quick estimate may be made of the approximate life remaining in the wear surfaces. Table IV gives the proper "initial" clearance, the

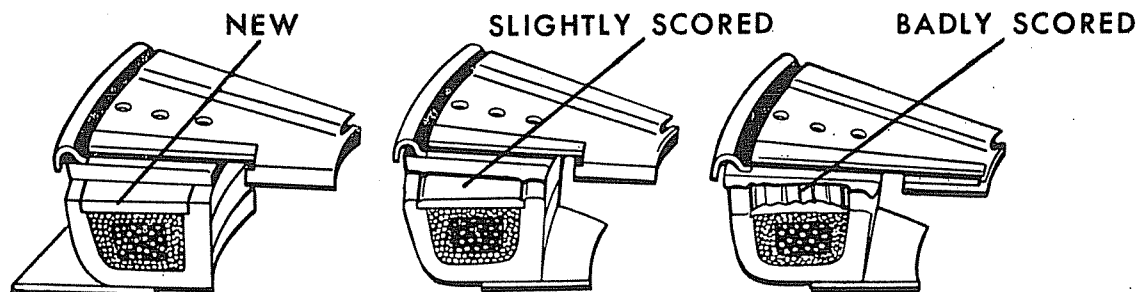


FIGURE 12 TYPICAL WEAR PATTERNS OF MAGNET AND ARMATURE DISC

operation

OPERATION

Warner Electric Motor Brakes operate on approximately 90 volts of direct current at .35 amperes. As the coil in the magnet is energized, the doughnut-shaped iron shell becomes a powerful magnet and attracts the armature, completing the magnetic circuit.

Brake magnets are so designed that the normal voltage, as specified in the rating, brings the magnetic flux to a value that saturates the steel in the magnet poles. At saturation, the armature is held against the magnet with sufficient force to transmit rated torque.

If the applied voltage is lower than rated, the flux will not rise to the saturation point and torque output is lowered---stopping time is lengthened, thus performance ranging from relatively slow, cushioned stops to rapid operation measured in milliseconds, may be achieved by raising or lowering the rheostat setting to suit desired changes in the torque load, cycle, etc.

When extremely rapid brake operation is desired, flux build-up may be speeded by over-excitation of the magnet coil. This is done by applying initially higher than rated voltage to the magnet coil and then shifting over to constant rated voltage for "holding" to avoid overheating of the coil.

ARMATURE

The armature disc consists of a series of magnetic metal segments riveted and brazed to a steel back plate, Figure 2. Flutes in the backplate behind the metal segments provide an outlet for rapid dissipation of heat generated by friction between the armature segments and friction surface of the magnet. The armature is equipped with bushings for mounting pins, and is free to move axially on these drive pins, providing automatic adjustment for wear.

THE MAGNET

The magnet consists of a coil imbedded in a shell of magnetic material, Figure 3. It is faced with a molded friction material. Magnetic flux path is through the pole faces and the metal segments of the armature disc. Current is supplied through wire connections to magnet terminals.

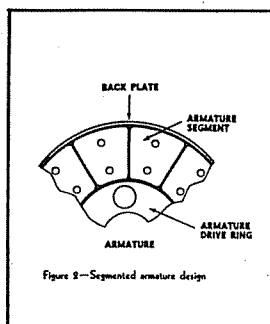


Figure 2—Segmented armature design

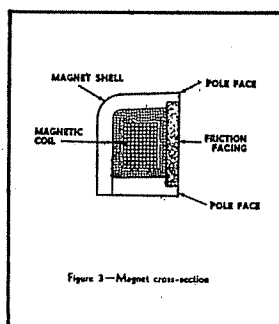


Figure 3—Magnet cross-section

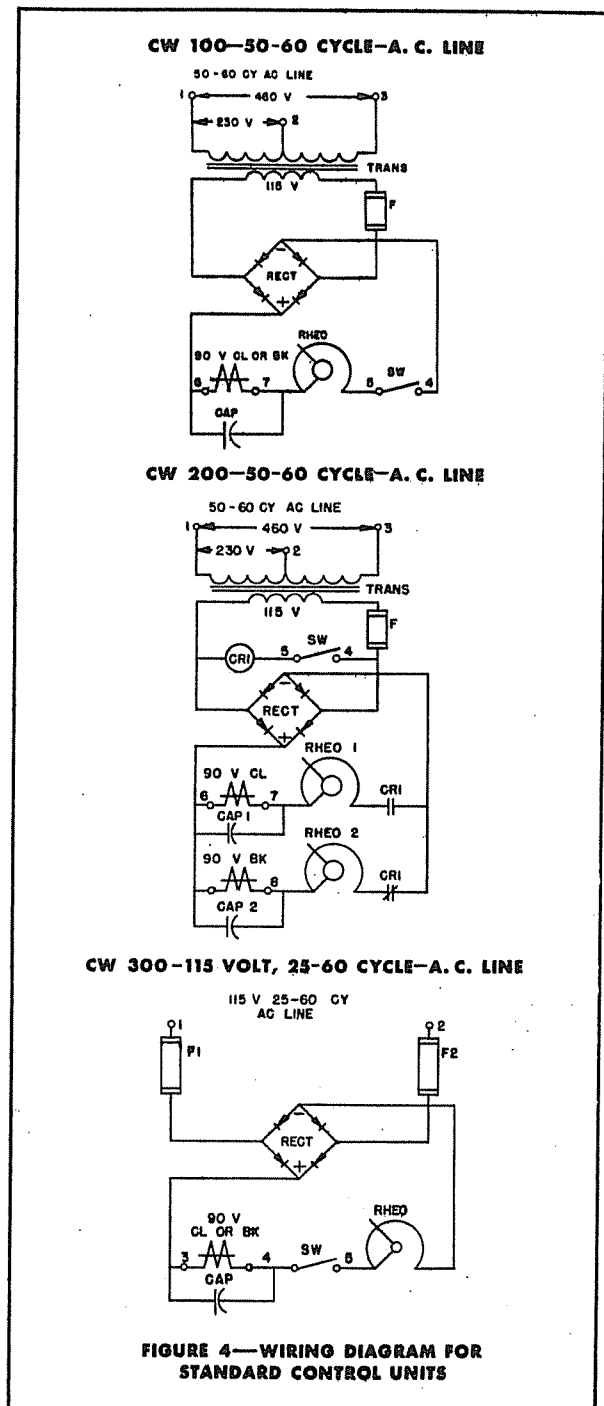


FIGURE 4—WIRING DIAGRAM FOR STANDARD CONTROL UNITS

ELECTRICAL COMPONENTS

Warner controls are used to provide the necessary d-c power requirements for the motor brake units from an a-c source. Standard controls are available for 90 volt units operating from a 115-230-460 or 550 volt a-c source.

Standard Warner controls are available with a built-in relay to control switching between a clutch and brake, and have rheostats for individual d-c voltage regulation for each brake. They also have built-in fuses to protect the rectifiers.

maintenance

"caution" clearance after which wear should be observed carefully and the "worn out" clearance, indicating need for replacement.

TABLE IV—WEAR CLEARANCE

Brake Unit	Clearance		
	Initial	Caution	Worn Out
825	$\frac{1}{16}$ "	$\frac{3}{16}$ "	$\frac{1}{2}$ "
1000	$\frac{1}{16}$ "	$\frac{3}{16}$ "	$\frac{1}{2}$ "
1225	$\frac{1}{16}$ "	$\frac{3}{8}$ "	$\frac{3}{4}$ "
1525	$\frac{1}{16}$ "	$\frac{3}{8}$ "	$\frac{3}{4}$ "

HEAT

Excessive heat and high operating temperatures are causes of rapid wear. Hence, units should be ventilated as efficiently as possible, especially if operation requires fast, repetitive braking. Overheating of the magnet coil results if greater than rated voltages are used. Where high voltages are used for obtaining unusually fast actuation, means must be provided in the electrical circuit to reduce the input voltage to the magnet after the brake is fully engaged.

FOREIGN MATERIALS

If units are used on motors where abrasive dust, chips or grit are dispelled into the atmosphere, enclosure or shielding of brake may be necessary if maximum life is to be obtained. Oil and grease accidentally reaching friction surfaces may be removed readily by wiping with a rag dampened with carbon tetrachloride. In performing this operation, do not drench friction material.

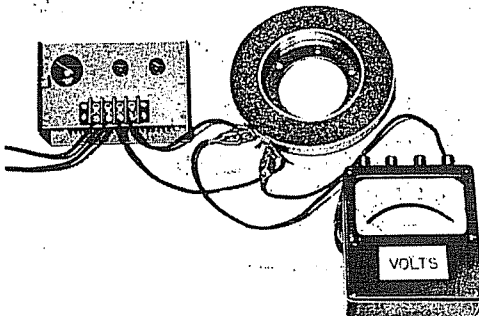


Figure 13 - Check voltage across terminals

TORQUE LOSS

If a brake slips or loses torque completely, the initial check should be the input voltage to the magnet as follows:

90 VOLT SERIES -- Connect a dc voltmeter with a range of 0-100 volts or more, directly across magnet terminals. With power on and rheostat turned up, a normal reading is 90 volts, although 85 to 95 is satisfactory. Reading should drop as rheostat control is adjusted counter-clockwise.

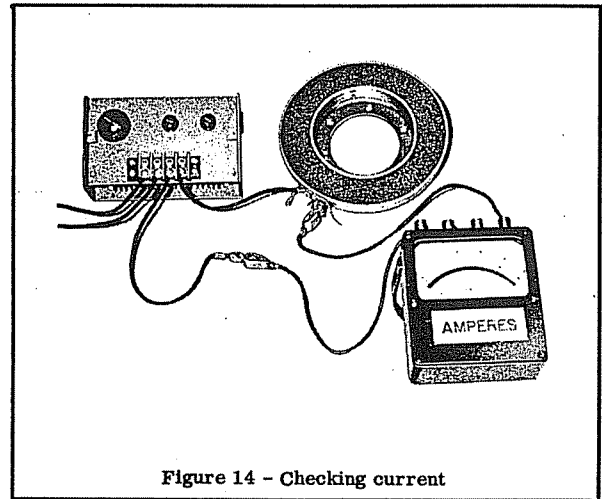


Figure 14 - Checking current

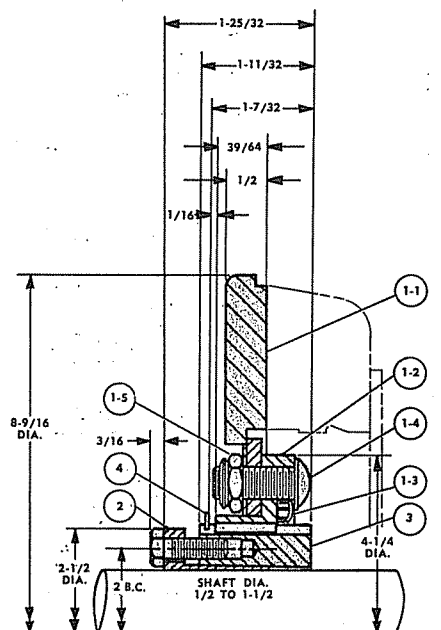
OPERATION

Operation of the spline drive armature assembly is simple. The splined hub (3) and bushing (2) are firmly attached to the shaft. The armature (1-1), splined armature adapter (1-2) and autogap spring (1-3) comprise an integral assembly that fits over the splined hub.

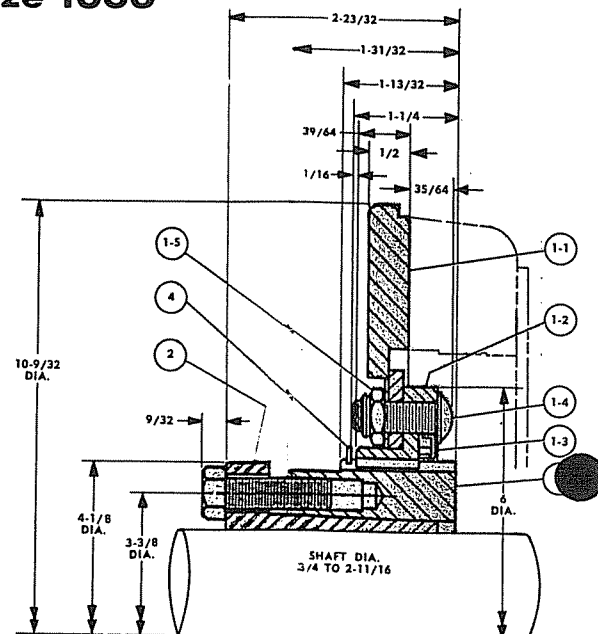
The armature is free to move on the spline toward the magnet. The autogap spring maintains a running clearance of $1/32$ " when armature and magnet are disengaged, and also makes the unit self-adjusting for wear.

DIMENSIONS

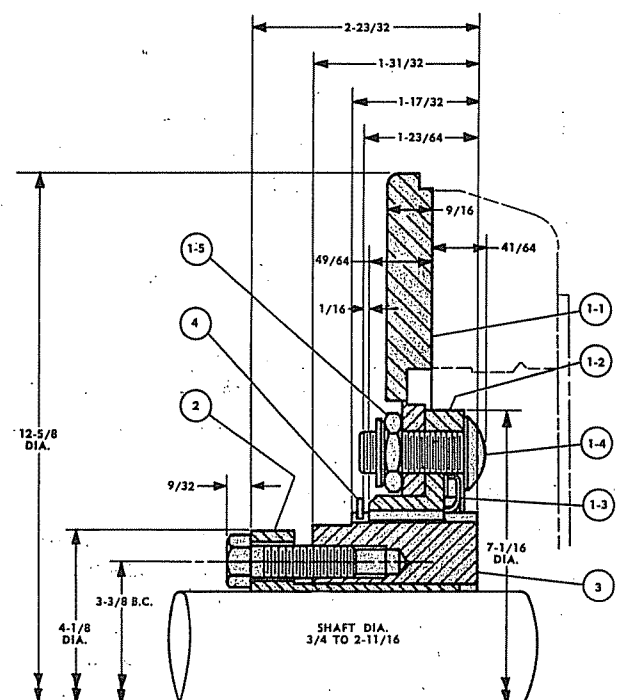
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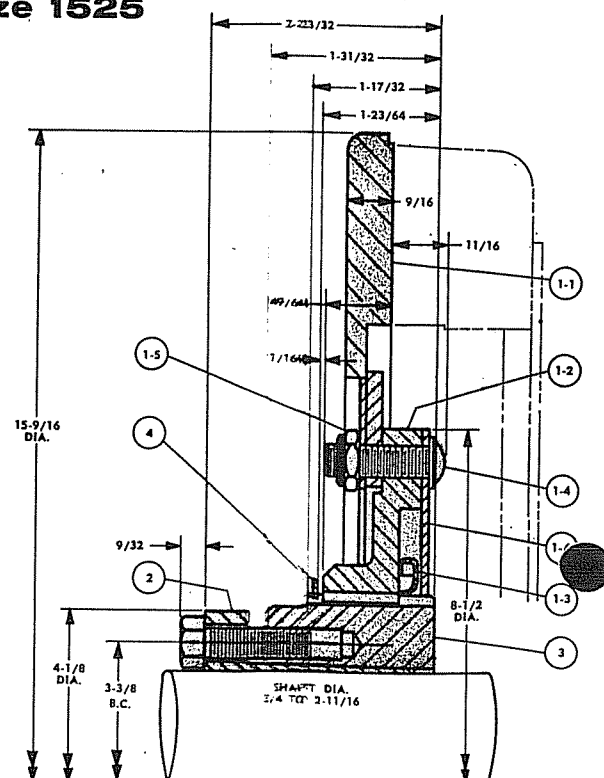
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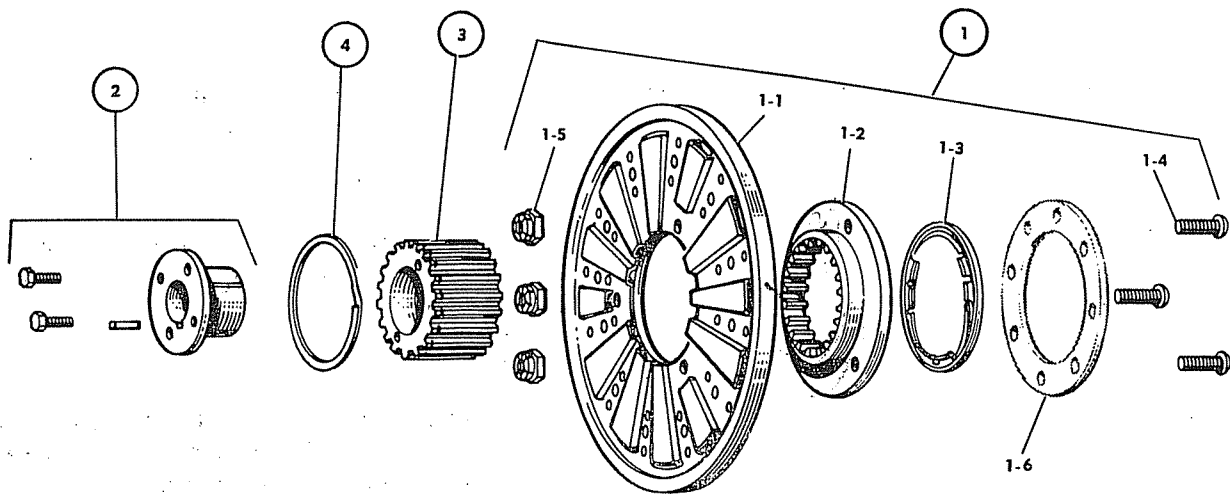
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size 1525



REPLACEMENT PARTS



Item No.	Description	Size 825 Part No.	No. Req.	Size 1000 Part No.	No. Req.	Size 1225 Part No.	No. Req.	Size 1525 Part No.	No. Req.
Complete Assembly	Spline Drive Armature Assembly	5321-111-002		5322-111-003		5323-111-002		5324-111-002	
1	Armature and Splined Adapter Assembly	5321-111-001	1	5322-111-002	1	5323-111-001	1	5324-111-001	1
1-1	armature	67921	1	5322-111-001	1	67931	1	67932	1
1-2	splined armature adapter	104-0008	1	104-0009	1	104-0010	1	104-0011	1
1-3	autogap spring	808-0005	1	808-0006	1	808-0007	1	808-0007	1
1-4	button head screw	797-0271	3	797-0271	3	797-0281	4	797-0272	8
1-5	locknut	661-0004	3	661-0004	3	661-0005	4	661-0004	8
1-6	retainer plate	—	Not Req.	—	Not Req.	—	Not Req.	686-0003	1
2	Bushing, Browning	180-0001*	1	180-0025*	1	180-0025*	1	180-0025*	1
3	Splined Hub	540-0057	1	540-0062	1	540-0054	1	540-0064	1
4	Retainer Ring	748-0006	1	748-0007	1	748-0005	1	748-0005	1

BUSHING SPECIFICATIONS

Part No.	Shaft Sizes Available from Warner	Shaft Sizes Available from Browning	BROWNING SPECIFICATIONS			
			½" to 1⅜"	1⅞" and 1½"	¾" to 2⅞"	2⅞" to 2½"
180-0001	¾" to 1½" in ⅛" Increments	½" to 1½" in ⅛" Increments	Size "H" Type 1	Size "H" Type 2	—	—
180-0025	1¼" to 2" in ⅛" Increments Also 2¼" & 2½"	¾" to 2⅞" in ⅛" Increments	—	—	Size "Q1" Type 1	Size "Q1" Type 2

SPLINE DATA

Size	825	1000	1225	1525
Number Teeth	20	33	36	36
Pitch	8/16	8/16	8/16	8/16
Pressure Angle	30°	30°	30°	30°
Surface Finish on Male Spline (Micro-Inches)	63	63	63	63

trouble shooting

TROUBLE	PROBABLE CAUSE	REMEDY
Loss of torque	Power loss	<p>Check input voltage to magnet. Readings should be in proportion to control rheostat setting. Refer page 9.</p> <p>Check current. Ammeter should read approx. 0.4 amperes on a 90 volt system—3.5 amperes on a 6 volt system. Refer page 9.</p> <p>Check for break in wiring and repair.</p>
	Slipping	Check for oil or grease on armature and magnet friction surfaces. Clean with carbon tetrachloride. Enclose or shield unit. Refer page 9.
	Brake is worn out	Replace worn parts.
	Smooth friction surfaces on new brake	Burnish friction surfaces— <i>run-in</i> .
	Poor alignment of armature and magnet	Mount magnet back plate to rigid machine member, such as a casting, motor frame, etc. Refer page 5.
Rapid wear	Braking too fast for load and size of unit	Adjust rheostat to slow braking. Refer page 3.
	Excessive heat	<p>Ventilate unit if located in tight enclosure. Check speed of operation.</p> <p>Check torque and heat specifications for possible larger brake requirements.</p>