TID-15913

MASTER

Technical Manual

12-INCH SODIUM FLOW CONTROLLER

FOR

U. S. ATOMIC ENERGY COMMISSION
REACTOR ENGINEERING DIVISION

CONTRACT No. AT(11-1)-681

TECHNICAL MANUAL 20357

WESTINGHOUSE ELECTRIC CORPORATION
ATOMIC EQUIPMENT DEPARTMENT • CHESWICK, PA.

1a

DISCLAIMER

TABLE OF CONTENTS

TABLE OF CONTENTS (CONTINUED)

* California Service:

Philadelphia Gear Corporation
507 East Alondra Blvd.
Gardena, California
Mr. R. Burhoe
Mr. R. Dale, Mgr.

TABLE OF CONTENTS (CONTINUED)

DRAWINGS AND ILLUSTRATIONS

DRAWINGS AND ILLUSTRATIONS (CONTINUED)

SECTION I

INTRODUCTION

A. SAFETY NOTICE

Only experienced and authorized personnel should install and maintain the 12'' Sodium Flow Controller. The controller is designed for continuous operation at 1000°F and 100 psi with the thermal insulation placed as indicated on drawing 618J693, page 92.

B. COMPONENT LIST

The main components of the 12" Sodium Flow Controller are:

1. Flow Controller Body
2. Drive Screw Assembly and Disc
3. Thermal Barrier
4. Permanent Magnet Coupling
5. Operator with its Electrical Controls and Indicators

C. TABLE 1

EQUIPMENT DATA

1. Controller

Operating Temperature	1000°F
Maximum Operating Pressure	100 psig
Fluid Containment	Zero Leakage
Hydrostatic Test Pressure	225 psig
Operating Range	350 to 7000 gpm
Fluid	Liquid Metal
Body Drain	Provided
Can Vent	Provided
Disc Stroke	5-3/8 inches
Closing Revolutions	13
Closing Time Seconds	7.8
Closing Handwheel Revolutions	62.4

2. Thermal Barrier

Internal Thermal Insulation	
Vacuum Ring	Vacuum
Rotor Support	Cool Fluid for insulating.
	(Hot Fluid for additional heat source, if desired, for melting solidified sodium.)
Connections for additional cooling or heating fluid flow	Provided
Heaters	
Voltage	110 Volts
Wattage	
9-7/16 Dia.	1000 Watts
7-7/16 Dia.	750 Watts
5-7/16 Dia.	550 Watts
Total	2300 Watts
Thermocouples	
B & S Gauge	28
I.S.A. Calibration	Iron-Constantan (J)
Sheath Material	Inconel

3. Permanent Magnet Coupling

Revolutions	100 rpm max.
Maximum Torque Capacity @ Room Temperature	680 ft.lbs.
Operating Torque	300 ft.lbs. max.
Operating Temperature	450°F max.

4. Operator

Make	Philadelphia Gear Corp.
Model	SMA3
Motor	
Performance Curves	Fig. 1, Page 5
Make	Reliance Electric & Engineering Co.
Voltage	440 ± 10%
Phase	3
Frequency	60 cps
Current, at 440 Volts, Starting	59.4 Amps
Full Load	14 Amps
Locked Rotor	59.4 Amps
Torque, Starting	80 ft.lb.
Full Load	32 ft.lb.
Enclosure	Totally enclosed, weatherproof
Duty	Continuous
Ambient Temperature	130°F
Insulation throughout except Selsyn Transmitter	Type H
Temperature Rise	115°C
Control Voltage	110 Volts
Phase	1
Frequency	60 cps
Stearns Magnetic Brake	Model HT-72-A9 (70 Series)
Solenoid Gap	7/16"
Output Shaft Revolution	100 rpm
Output Shaft Full Load Torque	400 ft.lb.
Manual Override	Provided
Handwheel Ratio	4.8:1
Automatic Motor Override	Provided
Motor Ratio	18:1

RELIANCE Electric and Engineering Co.
Cleveland, Ohio, U.S.A.

Drawing Number
SK-51747

A.C. Motor Performance Curves

Specification Data:

E/S AD-5145
Rotor 403759-DT
Test S.O. Y-140609
Test Date 6-1-60
Res. On 440 V. Conn.
At 25 C 1.64 Ohms

Frame DB-254-UR3
Duty Cont.
Phase 3
Type/Form P/YR

Nameplate Data:

80 FT-LB Start
32 FT-LB Run
Volts 220/440
Amps 17.4/8.7

Cycles 60
Code K
Temp.Rise 55
Nema Design--
Enclosure TEFC

Volts	Amps		
	N.L.	F.L.	L.R.
484	7.59	15.4	---
480	---	---	67.4
440	5.75	14	59.4
400	---	---	53.6
396	4.34	14.1	---

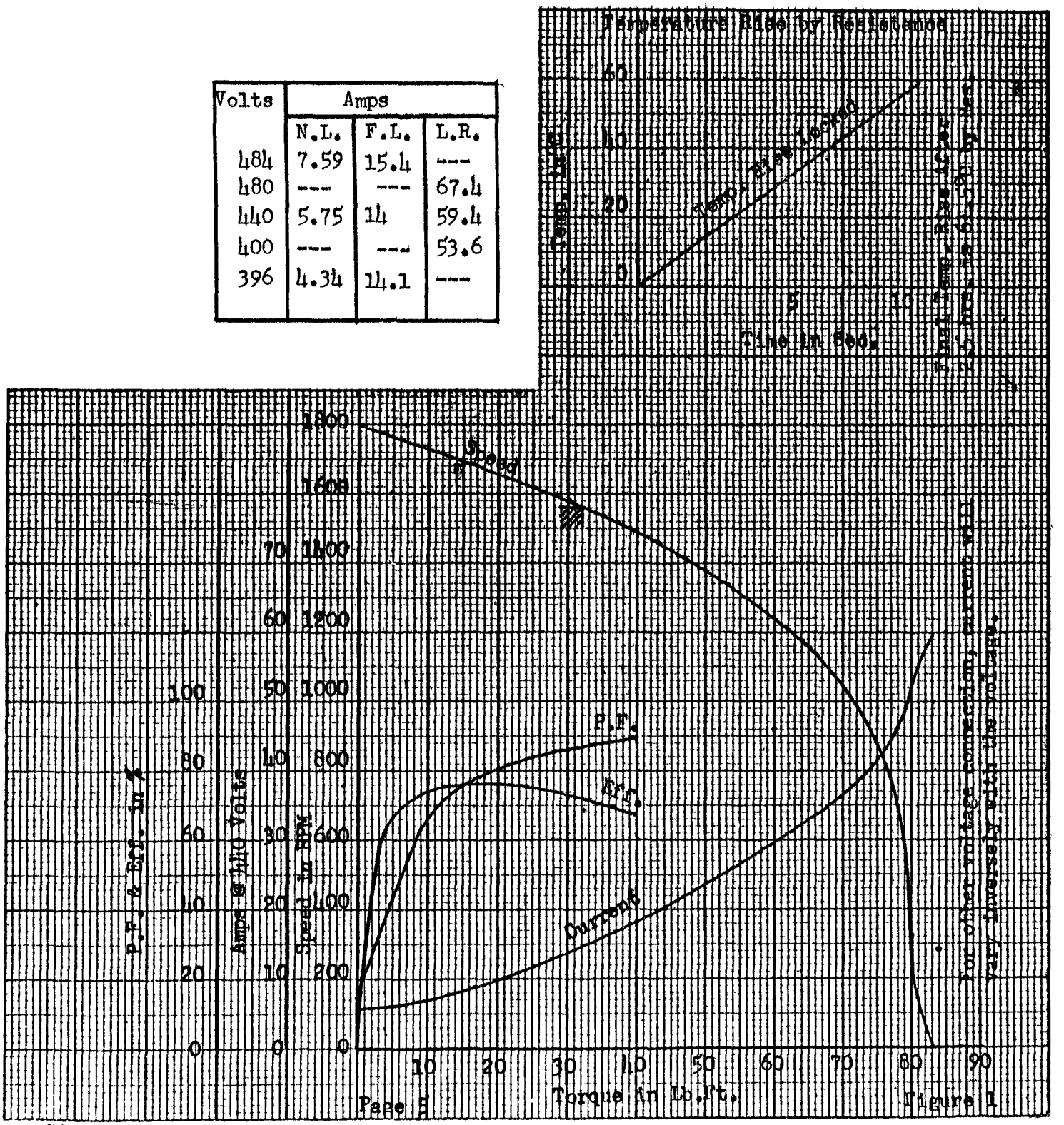


Figure 1

FORM 1/59

Remote Position Indicator	Selsyn Type
Torque Indicator	Provided and Calibrated
Position Limitswitches	Provided and Adjusted
Contact Rating	20 amp at 115 Volts 60 cps
Torque Overload Protection for both, "Open and "Close" direction	Provided and Adjusted

Motor Control

Reversing Controller (Page 82)

Make	Westinghouse
Size	1
Enclosure	Nema I
Mounting	Surface
Voltage	440/110
Phase	3/1
Style #	133A831G01
Catalog #	15-831 NS17
Shop Order	24-E-2142
Contactor Operating Coil	S-14702A1 3 PS-130
Voltage	110
Inrush	35 Amps
Holding	27 Amps
Heater Code #	BA9.6
Heater Style Number	966488
125% Overload Protection F.L. Motor Current @ 40°C	8.16 to 9.19 Amp
Current Rating @ 40°C	10.2 Amp

Pushbutton Station (Page 83)

Make	Clark
Type	AS
Mounting	Surface
Catalog #	BUL. 100 Type H
Case Cat. #	1 H5-SPL
Lamp No. 51	7V, 3W

5. Overall Dimensions

Height (Bottom of Controller Body to Top of Operator)	93-1/2
Length (℄ to Magnetic Brake)	42-1/2
Length (Port to Port)	47-5/8
Width (Flange Dim.)	28-9/16

6. Weights:

	Description	(Page 91) Expl.View #	Drawing	Lbs.
1.	Total		618J693, Gr. 1	4900
2.	Body	11	618J694, Gr. 1	1190
3.	Split Ring	5	366C319, Gr. 1	68
4.	Bolting Ring	2	366C320, It. 1	110
5.	Body Inlet	3	505D047, Gr. 1	435
6.	Control Cone	4	505D048, Gr. 1	75
7.	Drive Screw	30	510F033, Gr. 1	125
8.	Guide	12	258B219, It. 1	62
9.	1" 8 UNC-2Ax5½ Hex Bolt	9	12100-9	6
10.	Can Split Ring	10	366C324, Gr. 1	125
11.	Can Flange	56	366C326, It. 1	240
12.	Operator Support	83	505D057, Gr. 1	240
13.	Rotor Bearing	46	Ind.Tect.3166	6
14.	Bearing Retainer	47	258B221, It. 1	2.3
15.	Rotor	50	505D056, It. 1	560
16.	Bearing Retainer	45	366C332, It. 1	2.1
17.	Operator Mtg. Pl.	88	366C334, It. 1	180
18.	Motor Operator	90	D7441 1/2	1431
19.	Drive Hub	77	366C333, It. 1	53
20.	Drive Hub Brg.	74	KD 110 CP	2.1
21.	Bearing Retainer	58	366C327, It. 1	15

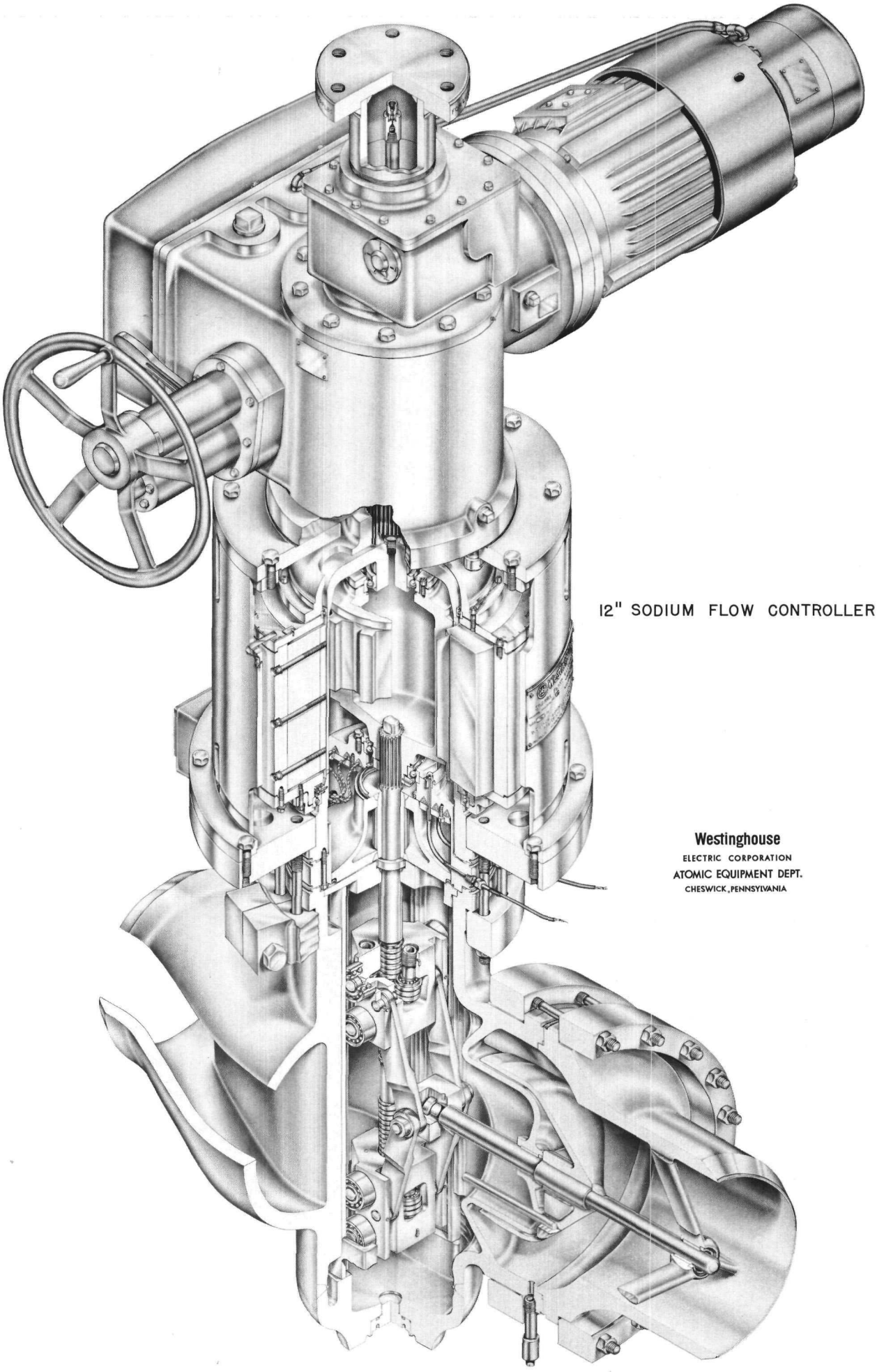

12" SODIUM FLOW CONTROLLER
Westinghouse
ELECTRIC CORPORATION
ATOMIC EQUIPMENT DEPT.
CHESWICK, PENNSYLVANIA

Fig. 2

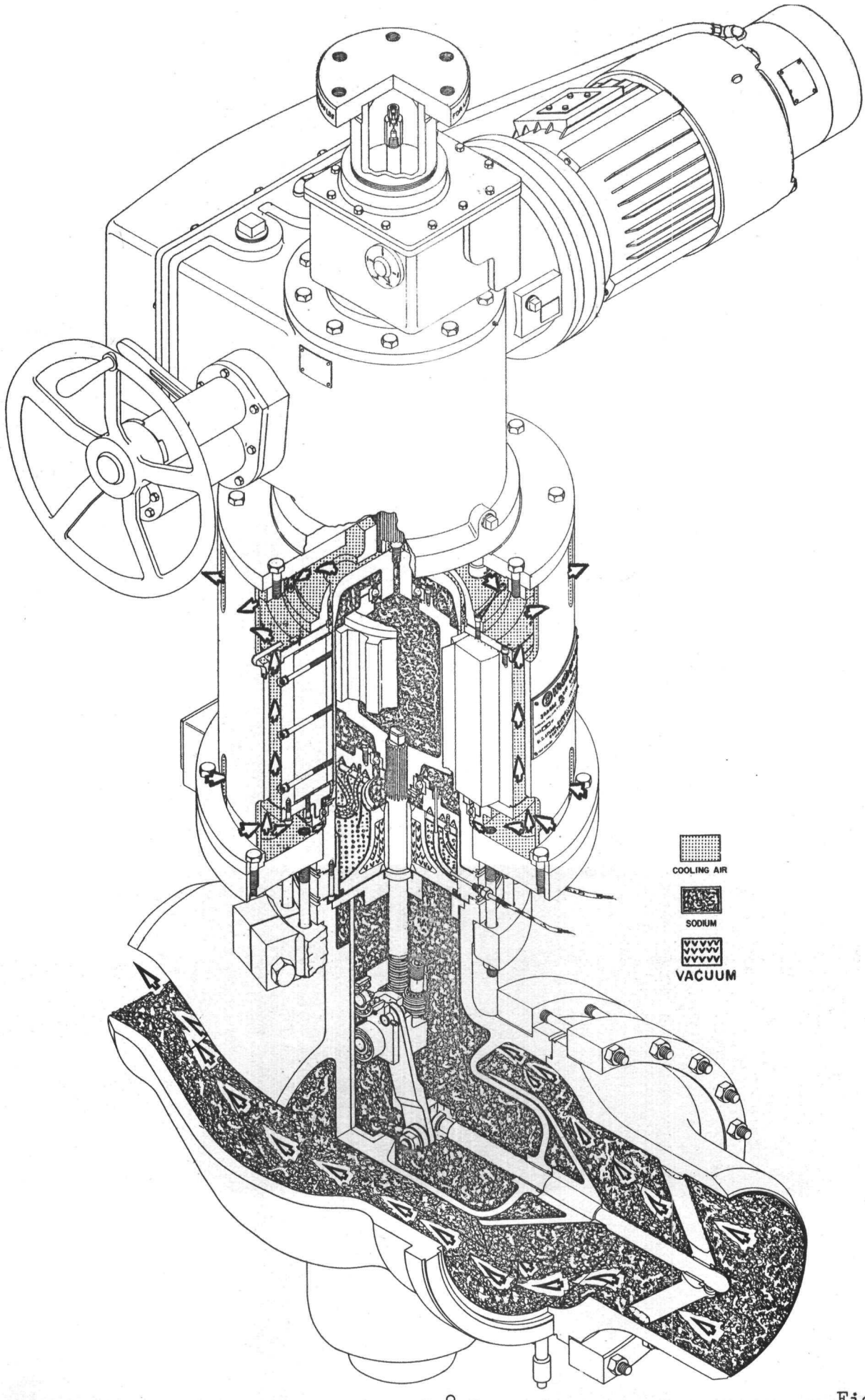


Fig. 3

BODY PHOTOGRAPH

Front View

Rear View

FIG. 4

Fig. 5

Fig. 6

SECTION II

DESCRIPTION OF SODIUM FLOW CONTROLLER

A. Hydraulic Characteristic (Fig. 2 - Page 8, Fig. 3 - Page 9, and 618J693, Page 92)

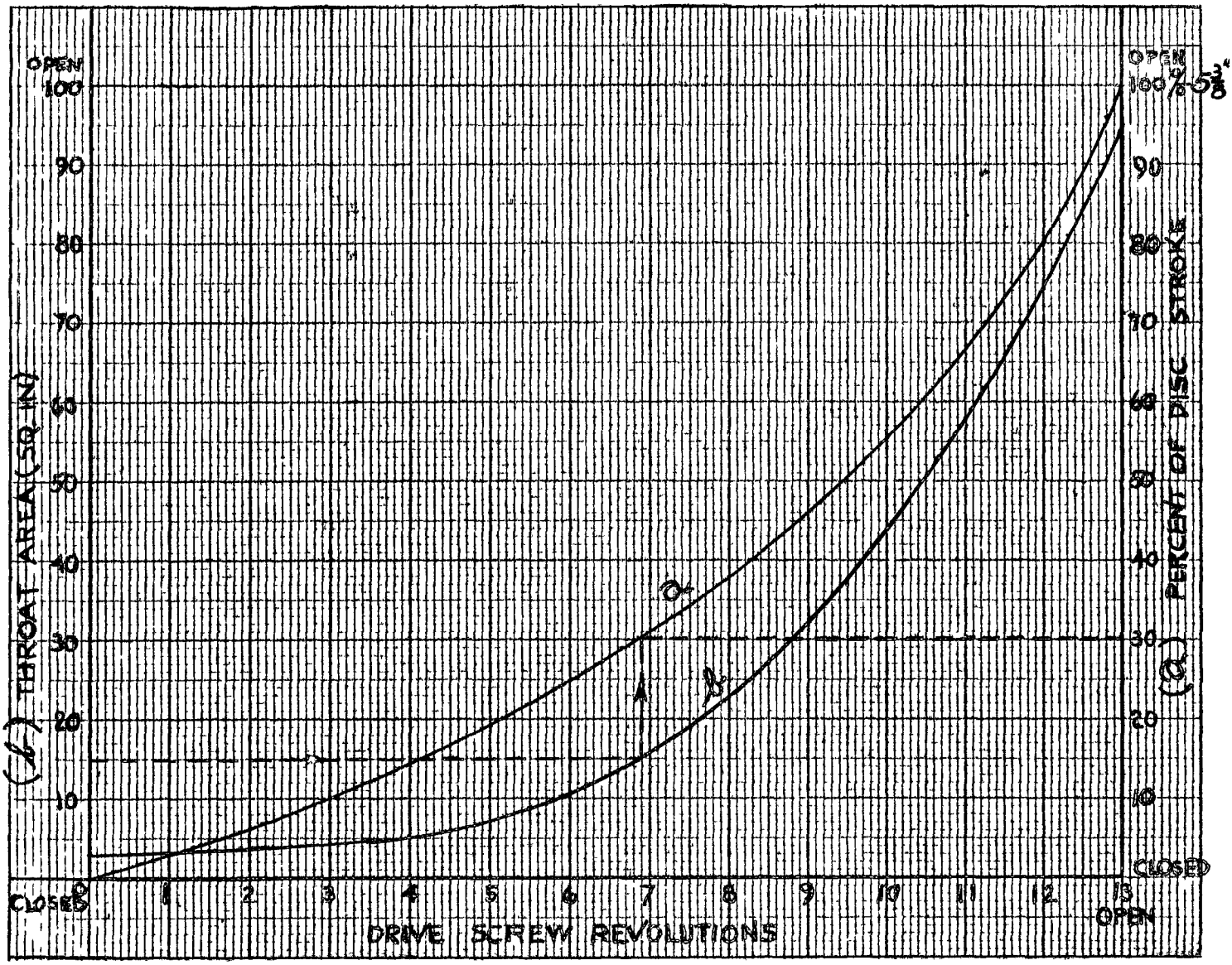
The Sodium Flow Controller is a flow controlling device for regulating the heat transfer in a liquid metal nuclear power plant. The controller consists of the body (Fig. 4, Page 10) with the separate inlet section, the control cone, drive screw assembly (Fig. 5, Page 11), the thermal barrier, the permanent magnet coupling, and the operator (Fig. 6, Page 12). The flow regulating control cone is located in the upstream part of the body and moves along the flow axis. The flow divides into two half sections, after passing the control cone, circumventing the center portion of the body which contains the control mechanism. After passing this center portion, the fluid converges near the downstream port of the body. The flow path is shaped carefully to guide the flow through its directional changes so that dissociation of the fluid on the low pressure diffusion side is kept to a minimum, especially at high velocities. Two drain plugs are provided which, in conjunction with the internal drain system, effect a clean drain of the sodium flow controller.

B. Control Cone Positioning Mechanism

The control cone is positioned by a screw type duplex toggle arm linkage (Fig. 5, Page 11). Its peculiar force-stroke characteristic, with its roller nuts running around the drive screw in opposite directions, compensates the axial force vectors within itself without requiring a bearing to take up reactional forces against the body. The symmetric

To determine percent of disc stroke for a given throat area (sq.in.), read horizontally from throat area scale to intersect curve "b", then vertically to intersect curve "a", and again horizontally to percent scale.

Example: Given 15 sq.in. throat area (6.9 drive screw revolutions) = 30.25% disc stroke.



a - Drive Screw Revolutions to Percent of Disc Stroke

b - Drive Screw Revolutions to Throat Area

FLOW CONTROL CHARACTERISTIC (THROAT AREA)
OF
12" SODIUM FLOW CONTROLLER

ED-SK 286961

design avoids side thrust to the control cone stem, thereby avoiding additional frictional loss. Each roller nut and toggle arm pair carries only half of the load.

Uniform revolutions of the drive screw are translated into higher force and slower travel in the direction of the closed position where higher dydraulic pressure drops require higher forces and where faster flow changes require finer regulation. (See ED-SK-286961A on Page 14 showing the flow control characteristic).

Roller nuts, equipped with stellite ball bearings transmit the rotary motion of the drive screw into linear motion. The toggle arms, then, convert the vertical linear motion into the horizontal control cone motion effecting the variable orifice. Rotation of the control cone is prevented by a pin which is guided in a bearing hole penetrating the front cup of the body. The static axial thrust of the control cone stem is transmitted over 8 double row ball bearings directly to the 2 channels in the controller body.

C. Thermal Barrier

On top of the body, the thermal barrier separates the 1000°F body from the permanent magnet coupling which should not exceed a temperature of 450°F. The barrier serves several functions. In addition to the insulating vacuum and air chambers, connections are provided for additional coolant flow through the thermal barrier, if so desired. Further, the thermal barrier is equipped with a total of 2300 watt heaters for melting solidified sodium in the can after a shutdown. On the other hand, additional heating could be effected by introducing heating fluid through the above

mentioned connections. Two thermocouples in the thermal barrier provide the control signal for the sodium temperature in the coupling as well as for the sheath temperature of the heaters.

D. Permanent Magnet Coupling

The permanent magnet coupling on top of the thermal barrier is driven by an electric motor operator. The coupling rotor runs on stellite ball bearings and is connected to the drive screw by a self-aligning spline. Magnetic flux links the permanent magnet stator assembly through the can with the soft magnetic rotor and thereby effects the seal-free coupling between the commercial operator and the hydraulic controller. Again, cooling openings are provided in the lower and upper part of the motor support, flange, and drive hub to assist in keeping the critical permanent magnets at a practical temperature by gravity air circulation. These holes could be closed partially or completely in case the thermal gradient is too great resulting in possible sodium solidification inside the can.

The position of the stator assembly can be observed through one of the upper cooling holes in the operator support, where an indicating hand is mounted pointing at the circular position scale. This ring scale has different graduations on either side. The percentage scale is used to identify the different control cone positions in connection with the different sodium flow capacity readings after installation of the sodium flow controller in the loop. The degree scale had been used at the factory for indicating the stator vs. rotor displacement through the entire torque range when the operator torque indicator had been calibrated.

E. Operator (Fig. 6- Page 12, Dwg. D-74411/2 - Page 74)

The operator with its male self-aligning splined shaft drives the stator assembly of the permanent magnet coupling directly on its center-line. The symmetrical concentric drive avoids additional gearing thereby avoiding separating forces, additional frictional losses, and need for lubrication. The operator drive shaft is hollow through its entire length to admit the stationary vent tube. When venting the system, the operator may stay in its place. An 1/8" NPT pipe tap is provided on the vent valve for conducting the vented fluid spillfree to a safe place. Only the operator lifting adaptor, which serves as a dust cover, has to be removed for access to the vent valve.

In addition to the positioning function of the operator, the following features are included:

1. Adjustable position limitswitches, which stop the operator automatically in the controller end positions. Three normally open and three normally close auxiliary contacts are available in the "OPEN" as well as in the "CLOSE" circuit.

2. Remote Position Indicator (Selsyn) calibrated in conjunction with the circular percent scale mounted on the stator.

3. Overload protecting adjustable torque switches for both control cone directions along the entire control cone stroke. Each switch has one normally close auxiliary contact in case it is desired to interlock another electrical circuit of the plant. The torque limitswitch is linked mechanically with

the axial motion of the operator worm shaft. The shaft is mounted so that it can slide against a helical "torque" spring in both directions whenever an hydraulic or frictional load has to be overcome. The amount of axial motion depends on the magnitude of the load met. The deflection of the worm shaft is linear proportional since an helical reaction spring is used which has a linear load-deflection characteristic. The torque switch can be adjusted for tripping the motor at any load within the capacity of the operator.

4. Torque indicator on operator calibrated in conjunction with the Permanent Magnet Coupling scale showing the torque produced by the operator.

5. Magnetic brake to ascertain positive positioning without any chance of drifting. The brake is adjustable for no shock stop.

6. Manual override engaged by depressing a lever and disengaged automatically by actuating the electric motor. Following general practice, the manual override closes by turning the handwheel clockwise and opens by rotating the handwheel counter clockwise as indicated on the handwheel rim.

NOTE

Since the electric motor is disengaged when the operator is in manual position, the magnetic brake

is disengaged as well. Therefore, it is advisable not to leave the manual lever in the override position.

The lever cannot be released manually, therefore, never attempt to force it upwards. The electric motor should be energized shortly to trip the manual lever whenever it was depressed, especially since this operator has non self-locking worm gearing due to the speed requirement. When tripping the manual lever, all persons should stay clear of the operator to avoid being hit.

The overload protection, being an electrical device, is not in action during manual operation. Therefore, in case of manual operation, precaution should be taken by watching the torque dial through the "Bijur" window in the control compartment cover if there is a possibility of manual overload. The applied torque shall not exceed 500 ft.lb. on the operator output shaft (110 ft.lb. on the handwheel), to avoid demagnetization of the permanent magnets. The impact device on the handwheel should only be used in emergency.

7. Indicating Lamps on Pushbutton Station

In accordance with the wiring diagram (Page 86), both lamps (green-open, red-closed) are on in any intermediate position. The red lamp goes out when open, while in the closed position the green lamp will be out. (See position limitswitch development on the wiring diagram.)

8. The Electrical Reversing Controller contains:

(a) A mechanical interlock which prevents the opening and closing contacts from being closed simultaneously. The only way to reverse the direction during operation, is to trip the current to the energized coil by depressing the "STOP" pushbutton and then depress the pushbutton of the desired direction.

(b) The current rating of the heaters provided with the controller is 10.2 amps @ 40°C. These heaters provide 125% Overload Protection at full load motor current of 8.16 to 9.19 amps @ 40°C.

9. Adaptability for Servo Control

Possibility is provided on the operator for exchanging the squirrel cage motor against a variable D.C. motor to follow the positioning signal of a servo system with computer and feedback control, free of hunting. The Selsyn type remote position indicator (Par. E.2) would furnish the necessary feedback signal. The control signal could originate from a single source like the power demand or secondary loop temperature or could include a combination of several signals compared in the computer to satisfy the economical performance in loop temperature, flow capacity, heat transfer capacity a.s.o. The adjustable D.C. control unit would be suitable for receiving a varying control signal. It would furnish a varying output signal

to vary the motor speed. Armature reversal feature would be included. A large differential signal would produce initial fast response. When approaching the desired control point, the motor speed would be slowed down to avoid overrunning and consequent hunting.

The servo control would contain a manual speed adjustment rheostat and manual/automatic selector switch.

For test purposes, an electric accumulative counter and predetermined electric counter can be used for full automatic cycling.

SECTION III

GENERAL INSTALLATION AND OPERATIONAL POINTERS

A. DON'T:

1. Don't dismantle the roller nuts without sufficient preparation against losing the stellite balls (Fig. 5, Page 11).

2. Don't try to bend the heater lead wires close to the ceramic terminals without counter holding them.

3. Don't permit the permanent magnet stator to exceed 450°F.

4. Don't force the operator declutch lever into motor operation position. Lever returns to this position automatically when motor is energized.

5. Don't try to move the declutch lever beyond 8° to 10° arc of travel from motor operation position to hand operation position.

6. Don't use abrasive cloth or paper to clean silver contacts of the geared position limit switches and torque switches.

7. Don't depress the declutch lever during motor operation to stop the controller travel, except in emergency.

8. Don't use torque increasing leverage on handwheel.

9. Don't use oversize motor overload heaters - instead look for cause of overloading.

10. Don't re-set torque switch heavier than 400 ft.lbs. without factory concurrence.

11. Don't attempt to remove either worm shaft plug or drive sleeve cover from limitorque while the sodium flow controller is torque seated. Always back the controller off the internal stop several handwheel turns before dismantling the operator.

12. Don't attempt to set the limit switches without first disconnecting control and power circuits.

13. Don't motor operate the sodium flow controller without first checking the limit switch settings.

14. Don't lubricate the electric motor. It was life time lubricated at the factory.

B. DO:

1. Do apply sparingly Molub Alloy XTO Light* to both stator ball bearings every six months. Before lubrication remove decayed residues.

2. Do torque the bolts of both main flanges to 75 ft.lbs.

3. Do adjust the permanent magnet coupling temperature, if necessary, so that it does not exceed 450°F. Use forced fluid circulation through the thermal barrier to regulate the temperature in accordance with the temperature information originating from the permanent magnet coupling thermocouple (Exploded View, Page 91, Item 43).

4. Do adjust the electromagnetic operator brake so that it stops the motion smoothly and avoids undesirable shocks to the permanent magnet coupling. See Magnetic Brake Instructions, Paragraph VI.J, Page 63.

5. Do cut power off before opening or replacing Limit Switch compartment cover.

6. Do check Limit Switch operation in conjunction with motor rotation. If motor is turning in wrong direction, interchange any pair of motor leads. (Close: Clockwise when observing the coupling scale)

7. Do install the sodium flow controller with the motor in horizontal plane, if possible. It is preferred to keep motor or Limit Switch compartment from hanging down. This prevents head of grease being against motor or switch seals.

---

* Imperial Oil & Grease Co., Inc., Los Angeles, 48, Calif.

8. Do connect space heater if unit is to be stored in a damp place prior to installation.

9. Do set up periodic operating schedule for Sodium Flow Controller if it is used infrequently.

10. Do lubricate operator drive sleeve top bearing every six months with a heavy duty, extreme pressure grease, such as Esso Neolube EP-1 or Esso Andoke B. Use grease gun on pressure fitting in housing cover.

11. Do keep geared position limit and torque switch contacts clean. Use carbon tetrachloride or other solvent on lint-free cloth.

12. Do keep Limit Switch compartment clean and dry.

13. Do be sure area is clean before dismantling the Sodium Flow Controller. Clean all parts before re-assembly (see Par. IV.A., Page 32).

14. Do apply fresh, clean lubricant to operator after re-assembly.

15. Do re-set geared limit switch before motor operation, if the limitorque has been either dismantled or removed from the Sodium Flow Controller.

16. Do replace whole limit switch gear box rather than attempt repairs in field.

17. Do replace any molded plastic conduit tap protectors (installed for shipping and storage only) with pipe plugs when installation wiring is completed.

18. Do check and replace damaged limit switch cover gasket before securing on operator.

19. Do refer to Parts List when ordering replacement or spare parts for the operator. Give operator nameplate data:

Unit Type SMA

Unit Size 3

Order No. 57-EO-79015/L-47087

Serial No. 87399

C. TROUBLE-SHOOTING:

IF GEAR LIMIT SWITCH FAILS TO STOP VALVE TRAVEL, CHECK THE FOLLOWING:

a. Control wiring

b. Geared position limit switch setting

c. Setting rod to see that it has been backed off after each side of switch has been set.

d. Remove limit switch gear box cover and inspect for damaged or broken gear teeth.

IF UNABLE TO OPERATE LIMITORQUE BY MOTOR:

a. Check both motor power and control circuits for supply and continuity.

b. Compare supply voltage with motor and controller nameplate rating. Then check motor amperage load.

c. If stalled motor is indicated, shut off power and operate the Sodium Flow Controller by handwheel.

EXCESSIVE HANDWHEEL EFFORT CAN INDICATE THE FOLLOWING:

a. Solidified sodium

b. Damaged parts

c. Misalignment

d. Thermal seizure

e. Faulty or damaged parts

ADDITIONAL TROUBLE SHOOTING HINTS:

When the Sodium Flow Controller is reported inoperative, or when the Sodium Flow Controller reportedly fails to complete its travel, or when the Sodium Flow Controller fails to cycle in the usual length of time, try to ascertain whether or not the difficulty is in the Sodium Flow Controller or operator mechanism.

1. Shift into handwheel operation and run the Sodium Flow Controller all the way from fully open to close and back to fully open. Without hydraulic load, the Sodium Flow Controller should move easily, since the drive sleeve is mounted on anti-friction roller bearings.

2. In the event that #1 does not disclose any useful information, remove the limit switch compartment cover. The limit switch arrangement and their function should be noted. Then step #1 should be repeated with the handwheel, taking note to see that the limit switches function according to the established plan. (Paragraph VI.F and H, pages 57 & 61)

3. If #2 and #1 fail to develop any peculiarity that might point to the trouble, then the Sodium Flow Controller should be operated electrically. If it is not possible to operate the Sodium Flow Controller, because of being in a sequence, then the magnetic contactor should be held in the "OPEN" position and then the "CLOSED" for sufficient time to move the Sodium Flow Controller completely through its cycle. If it is convenient, an ammeter should be in the circuit to see if the motor is properly loaded. (Fig. 1, Page 5).

4. If, after completion of step #1, #2, and #3, no operational difficulties occur, it can safely be assumed that the difficulty, if any, lies somewhere else than in the operator.

SPECIFIC TROUBLES that may have been noted during the examination carried out in #1, 2 and 3.

1. Limit Switches not operating according to plan.

   (a) Alter operation of the limit switches so that the travel limiting switch and auxiliary switches, if connected, work satisfactorily. (Section VI, Paragraph G, page 58)

2. Electric motor not staying on the line.

   (a) Since the torque switch is located in the holding coil circuit, it may be that the torque switch setting needs to be increased to cause the operator to develop more

torque before dropping off the line. Readjust per Section VI., Paragraph I., page 61.

(b) Investigate the size of the heater strips. They should not be sized too close to the motor name plate rating.

(c) (a) & (b) not being the case, the trouble lies in the circuits, not the operator.

3. Electric Motor Stalling

(a) Check direction of rotation to see that pushbutton holding coil operation and permanent magnet coupling direction agree with the plans, that is, that open pushbutton is energizing open side of reversing contactor and causes counter clockwise rotation of the permanent magnet coupling seen from the operator end.

(b) If (a) is O.K., then the electric motor gear train must be inspected.

(c) Before replacing motor, after inspecting helical reduction, check motor for operation while not connected to the load.

4. Electric Motor Running Too Slow.

(a) Put ammeter on the motor and check for overload, if appreciably more than name plate value, inspect gear train of the motor and have motor tested after being removed from operator.

5. Motor Running but No Rotation of the Drive Sleeve Occurs

(a) Lift up easily on declutch lever. If this corrects condition temporarily, it indicates weak or broken clutch spring or damage to lugs on gears.

(b) The trouble may be in the helical gear set driven by the motor shaft. Remove the motor and inspect.

6. Unusually Noisy Operation

(a) Pull grease plug and inspect condition of grease.

(b) Remove cover of the housing for further inspection if (a) warrants further checking.

(c) Remove motor and inspect helical gear reduction.

(d) If no source of noise can be discovered, attempt to feel in the grease for burrs that may be the result of one piece rubbing another.

7. Magnetic Brake

(a) Failure to Stop:

If brake does not stop properly:

(1) Check to see if brake is in need of adjustment for lining wear. (Page 63)

(2) Friction discs may be badly worn or broken and must be replaced. (Page 77)

(3) Check to see if hub has shifted on shaft.

(b) Excessive Humming

If excessive humming is heard from brake solenoid, the plunger isn't seating properly. This may cause coil failure. To correct:

(1) Clean solenoid of dirt or foreign matter between plunger and coil frame.

(2) The coil frame may have shifted from use and is not seating properly. Align coil frame, so plunger seats properly.

(c) Failure to Release

If brake does not release when solenoid is energized, check for the following:

(1) Broken lead.

(2) Low voltage. If voltage is too low for the solenoid, the plunger may make an effort to pull in, but may not pull in completely. This could cause coil failure.

(3) Coil failure. A coil may be burned-out due to low voltage, poor voltage regulation, too rapid cycling, over voltage or improper seating of plunger (humming). Before installing new coil, check for above causes and correct. (Page 77).

SECTION IV

INSTALLATION INSTRUCTIONS

A. Cleanliness During Assembly and Disassembly

The area in which the controller is to be assembled or disassembled must be clean and dust-free. The degree of cleanliness cannot be measured or defined. However, every effort should be made to keep it as clean as a normal business office or home. Areas in or near machine shops and areas where general construction is going on should not be considered clean enough. There should be no grinding, machining, welding, or any other dirt-producing operations close by. If repair work on the flow controller must be done where dirt-producing operations are being carried out, the dirt-producing operations may be stopped while the flow controller is repaired, or the repair area may be completely enclosed by a canvas tent. Normal atmospheric dust is not considered harmful to controller components if they are kept dry and are exposed for a short time only. Following the assembly of clean sub-assemblies into components, all openings should be sealed to prevent contamination. If the internal surfaces cannot be protected simply by sealing the openings, the part should be put into a tight container or covered with clean cloths or plastic sheets. Openings should be sealed with plastic or rubber covers or with plugs taped around the edges. Internal surfaces should never be exposed to the atmosphere longer than is necessary for working on the component.

Personnel working in the assembly area should wear clean, lint-free gloves and coveralls or similar outer clothing. (After cleaning, the con-

troller, internals should not be touched with bare hands.) Clothing should be free from dirt, grease, metal filings, and other foreign material.

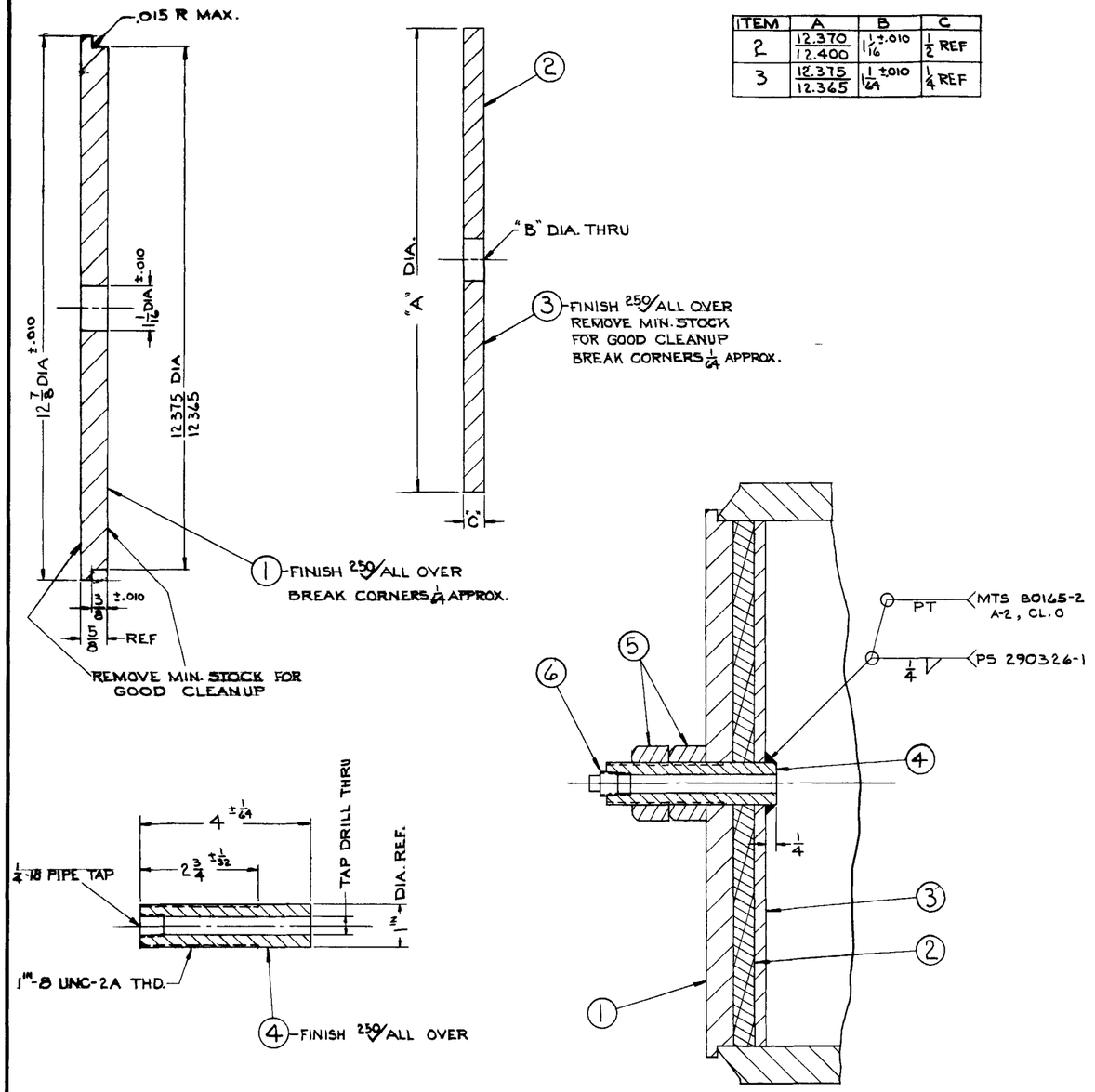
B. Installation Procedure

The Sodium Flow Controller is shipped completely assembled, seal welded, and calibrated. All limit switches are properly adjusted and the controller is ready for installation in the sodium test loop.

For contamination and corrosion protection during shipping and storage, both main ports are sealed with expansion plugs 366C376, Page 34 and 366C386, Page 35. The Sodium Flow Controller is filled with inert gas of 15 psi pressure. Before removal of the expansion plugs, equalize the pressure to the atmosphere by slowly removing one of the 1/4" square head steel pipe plugs, Item 6 of the subject drawings.

Install the flow controller with the flow entering the inlet section as shown on the perspective drawing, Figure 3, Page 9. The ports are prepared for welding into the loop, using the inert gas tungsten electrode welding process with fusible inserts of the EB type or equivalent for the first weld pass. For test purposes, two symmetric piezometer openings are provided to both split flow channels. The tubing and fittings for connecting the openings are furnished to facilitate connection to the pressure instrumentation.

The electrical control components (reversing controller and combined pushbutton station with indicating lights) as well as the remote position indicator receiver (Selsyn) can be installed at any desired remote location. Follow the wiring diagram B69025 on Page 86, Selsyn diagram A-1874 on Page 85, and Equipment Data on Page 2, for proper connections.



ITEM	A	B	C
2	12.370 / 12.400	1 1/16 ±.010	1/2 REF
3	12.375 / 12.365	1 1/64 ±.010	1/4 REF

APPARATUS SODIUM FLOW CONTROLLER — SHEET NO.

EXPANSION PLUG (BODY SECTION)

DWG. 366C376 SUB. 1Z3 — FINISH CHART

SYM.	ITEM	DESCRIPTION — MATERIAL DIMENSIONS IN INCHES	PATT No. OR REF DWG	FIN CH LINE No	STYLE No	SYM GR.	1	2	3	4	5
A	1	PLATE - FR. 13 1/8 DIA. OF 5/8 THK PLATE	2001-1				1				
	2	SEALER - FR. 12 1/2 DIA. OF 1/2 THK. NEOPRENE SHT.	12158-515				1				
B	3	PLATE - FR. 12 5/8 DIA OF 1/4 THK. PLATE	2001-1				1				
B	4	TUBE - FR. 4 1/4 OF 1" DIA. BAR	6130-1				1				
C	5	1"-8 HEX. STL. NUT	8190-5				2				
	6	1/4 SQ HD. STL. PIPE PLUG	4508				1				

A- CADMIUM PLATE ALL OVER PER FS 25AA05 EXCEPT THDS.
B- AFTER WELDING, CADMIUM PLATE ALL OVER PER FS 25AA02.
C- CADMIUM PLATE ALL OVER PER FS 25AA02.

~~ABOVE MATERIAL IS FOR ONE PLUG ASSEMBLY. TWO PLUG ASSEMBLIES REQUIRED PER SODIUM FLOW CONTROLLER.~~

S.O. 1-D-1082
D. 585153

ITR	CHANGE
1	
2	1-D-1082 WELD WAS 1/8 FILLET J. Hackman 9-21-60 R.C. Patton 9-21-60 J.G. Schmidt 9-23-60 M. Gordon 9-26-60
3	1-D-1082 NOTE 1 REMOVED NOTE A WAS CADMIUM PLATE ALL OVER J. Hackman 11-10-60 R.C. Patton 11-10-60 J.G. Schmidt 11-10-60

TOOL REQ'D DWG.
ENG. REF. DWG. L18J693

WESTINGHOUSE ELECTRIC CORPORATION

TITLE SODIUM FLOW CONTROLLER
EXPANSION PLUG (BODY SECTION)

DIMENSIONS IN INCHES—SCALE 1/2

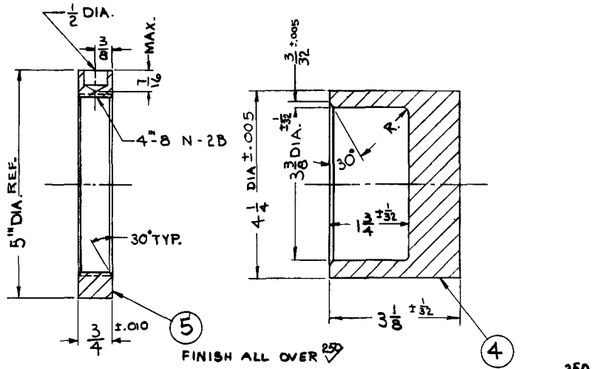
DFTM. HACKMAN	8-31-60	APPD.		9/1/60	366C376
CHKD. J. Hackman	9-1-60	MFG.		9-5-60	
ENGR. R.C. Patton	9-7-60	MATL.		9-7-60	

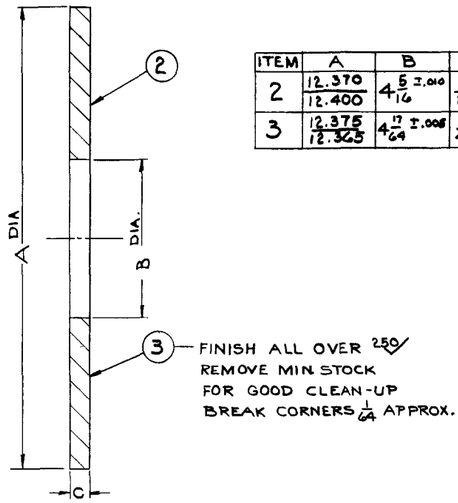
DIV. & PLANT LOCATION — ATOMIC EQUIPMENT DEPT.—CHESWICK, PA.

FORM AED-T8

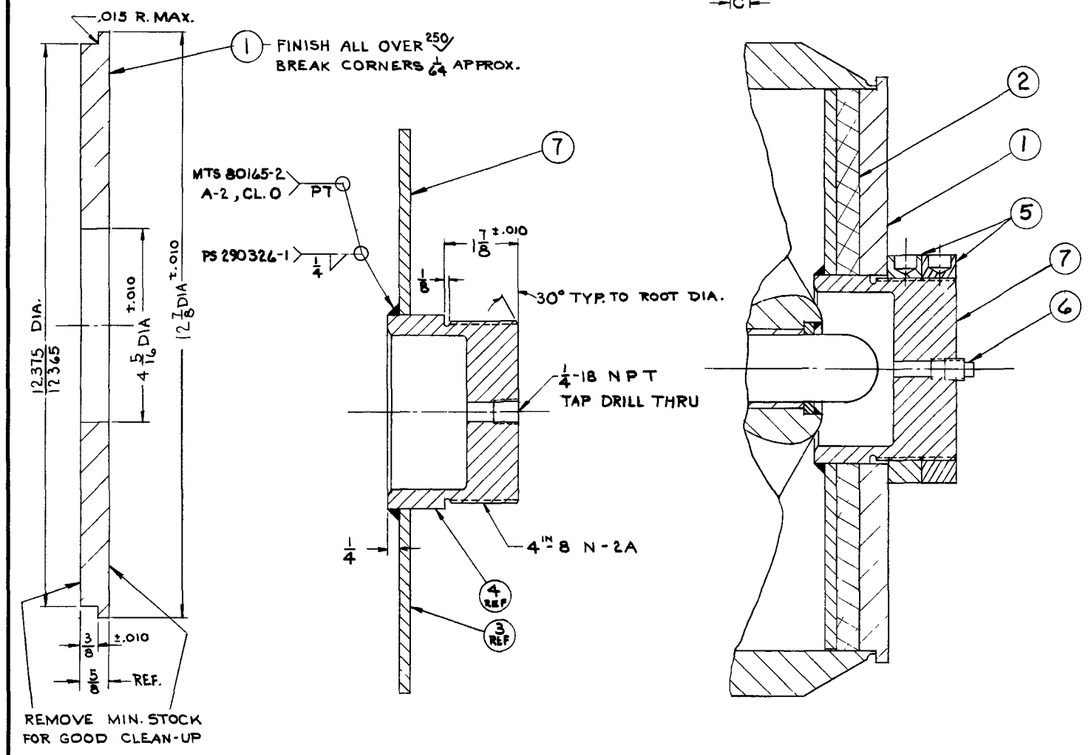
A. & B. SMITH CO. PGH. PA. PR 3148-686

FORM AED-9





ITEM	A	B	C
2	12.370 / 12.400	4 5/16 ±.010	1/2 REF
3	12.375 / 12.365	4 17/64 ±.005	1/4 REF



APPARATUS SODIUM FLOW CONTROLLER

EXPANSION PLUG (BODY INLET SECTION)

DWG. 366C386 SUB. 1 FINISH CHART

SYM.	ITEM	DESCRIPTION – MATERIAL DIMENSIONS IN INCHES	PATT NO. OR REF. DWG	FIN. CH. LINE NO.	STYLE NO.	SYM. GR.	1	2	3	4	5	NO. REQ
B	1	PLATE - FR. 13⅛ DIA. OF ⅝ THK. PLATE	2001-1				1					
	2	SEALER - FR. 12½ DIA. OF ⅛ THK. NEOPRENE SHT.	12158-516				1					
	3	PLATE - FR. 12 DIA. OF ¼ THK. PLATE	2001-1									1
	4	TUBE - FR. 3½ OF 4 ⅝ DIA. STL. BAR	6130-1									1
A	5	NUT - FR. 1" OF 5" DIA. STL. BAR	6130-1				2					
	6	¼ SQ. HD. STL. PIPE PLUG	4508				1					
C	7	PRESSURE PLATE - FR. IT'S. 344 THIS DWG.					1					

A - CADMIUM PLATE ALL OVER PER FS 25 AA02 EXCEPT THD'S.
B - CADMIUM PLATE ALL OVER PER FS 25 AA05.
C - AFTER WELDING & FINISH MACH. CADMIUM PLATE ALL OVER PER FS 25 AA02.

CONTINUED ON SHEET

SHEET 1 OF B/M MUST NOT EXTEND BELOW THIS SPACE. SEE DRAFTING MANUAL IF MORE SHEETS ARE NEEDED.

30-D-1082	1		
D	585153	CHANGE	

TOOL RECORD SPACE

TOOL REF. DWG.

ENG. REF. DWG. 366C376

WESTINGHOUSE ELECTRIC CORPORATION

TITLE SODIUM FLOW CONTROLLER
EXPANSION PLUG (BODY INLET SECTION)

DIMENSIONS IN INCHES – SCALE ½ = 1

DFTM. HACKMAN	11/8/60	APPD.	11/9/60	366C386
CHKD. HACKMAN	11/9/60	MFG.	11-10-60	
ENGR. H.C. Fluton	11-10-60	MATL.	11-10-60	
DIV. & PLANT LOCATION		ATOMIC EQUIP. DEPT. – PITTSBURGH, PA.		

A. O. SMITH CO., PGH., PA.

PR 1447-1188

SECTION V

DISMANTLING OF SODIUM FLOW CONTROLLER
(See Sectional Assembly Dwg. 618J793, Page 92)

Numbers in parenthesis refer to those illustrated in Exploded View, Page 91, except as noted.

A. Removal of Operator

1. Open the valve either electrically or manually.

2. Disconnect all power cables from the operator (88), remote position indicator, and thermal barrier (38). Disconnect the thermocouples (39 & 40) and the flow instrumentation.

3. Insert two 1" - 8 eyebolts into the operator lifting flange. Use the threaded holes closest to the motor for proper lifting balance.

4. Insert a bar through the eyebolts and check that the lifting flange is turned in tightly.

5. Attach a harness of 1 ton capacity to the eyebolts and an adjustable chain between the cranehook and the motor without applying any lifting force to the crane.

6. Remove the eight 5/8" x 11 bolts (87).

7. Insert four 5/8" x 11 jacking bolts in the threaded holes provided for this purpose in the operator mounting plate (86).

8. Turn the four jacking bolts simultaneously and uniformly in for lifting the operator in a concentric fashion. This is necessary for disengaging

the close fitting splined shaft without tilting the operator due to its off center gravity point.

9. After lifting the operator about 2 inches with the jacking bolts, remove the operator by crane avoiding carefully any tilting. If necessary, an adjustable chain should be attached between the crane hook and the magnetic brake to balance the operator.

B. Dismantling of Operator

To completely dismantle the operator, proceed as follows. Reference numbers in this paragraph only refer to drawings D-74411 and D-74412, Page 74.

1. After removal of the switch compartment cover (3) and all power and control cables, remove the torque switch and the geared position limit switch.

2. Remove the electric motor and the motor adapter plate. The motor pinion (44) is keyed to the motor shaft with key (82) and also attached with a set screw (67).

3. Remove the split ring (22) and the snap ring (122). Removal of these two pieces will allow the motor clutch gear (45) to be pulled from the wormshaft. The motor clutch gear can easily be removed since it is splined to the wormshaft. The tripper spring rods (41) should then be removed to prevent the loss of these small pieces. The tripper springs

(40) can then be removed either from inside the motor compartment or by removing the socket head set screws (69). These springs also should be removed to prevent their loss.

4. Remove the pipe plug (85). When the plug is removed, the declutch fork shaft (33) can be removed from the same hole. When the declutch fork shaft, which has a sliding fit in the declutch fork (32) is removed, the declutch fork will fall free, allowing for easy removal of this piece.

5. Remove tripper assembly by removing pin (79) and pulling trippers (37) and (38) from shaft #42. Care should be taken so that washers (78) and spacer (39) are not lost.

6. Remove clutch (26) and clutch spring (28) by sliding them from the worm-shaft toward the motor end.

7. To remove the handwheel, take off the socket head cap screw (62), the washer (46) and the handwheel clutch (47).

8. Remove the declutch lever (24) by loosening the set screw (68) and the key (81), then slide the lever from the shaft.

9. Remove the end cap (5) by removing the hex head cap screws (64) and the lock washers (72).

10. The removal of the spring cartridge (#16) is effected by removing the cap screws and washers (#80 & #63) first. Since the spring cartridge and worm (#15) are a separate sub-assembly, they must be removed together by threading out the worm from its engagement with the worm gear (#13). It is accomplished by manually rotating the worm shaft (#9) CCW from the motor end. This will expose the bearing cartridge (#19).

11. For further dismantling of this sub-assembly remove the bearing retaining ring (#123) and lock nut (#104). The torque spring (17) can be removed by taking off the lock nut (#117), washer (#91), and spacer (#90).

12. Remove housing cover (2).

13. Remove the handwheel shaft (10) by removing the elastic stop nut (116) and the washer (77). The handwheel gear (25) which is keyed to the handwheel shaft can be pulled free since it has a sliding fit. Tapping on the motor end of the handwheel shaft will free the bearings (97) and (98) from their respective positions and allow the handwheel shaft to be pulled free from the housing.

14. To remove worm shaft (#9), loosen cap screws (#70) from motor end. Now remove bearing cap (#18). By gently tapping on sides of worm shaft (#9) with soft hammer, it can be pulled from housing at motor end.

15. Loosen the set screw in the declutch link (29). This will allow the declutch link to be removed from the splined end of the declutch shaft (30) when the declutch shaft is pulled from the handwheel end of housing. Care

should be taken against loss of declutch link spacer (31) when shaft is pulled free.

16. Lift complete drive sleeve assembly from unit housing. The drive sleeve assembly consists of locking nut (11), jam nut (12), drive shaft (7), drive sleeve (6), top oil seal (112), top thrust bearing (94), worm gear (13) and (14), worm gear spacer (20), lower thrust bearing (96), oil seals (111). The two bottom oil seals will remain in place when the drive assembly is lifted from the housing. This complete drive assembly can be further dismantled if required.

C. Removal of Permanent Magnet Coupling (Exploded View, Page 91)

1. Attach three 5/8" x 11 eyebolts to the operator support (84) and attach a 3-chain harness to it.

2. Remove the eight 5/8" x 11 bolts (81) from the operator support (84).

3. Lift and remove the operator support. If desired, the jacking holes in the operator support flange can be used for assistance.

4. For removing the permanent magnet coupling stator assembly, the keeper removing tool 772D217 (page 87) is needed. Proceed in the following manner.

NOTE

The permanent magnets are made of Alnico V which is extremely brittle. Therefore, care should be taken to handle and move the stator assembly without any bumps and shocks.

In the installed position, the main flux passes through the small running gap between the magnet poles and the can generating the by far greatest and concentrated attraction of the entire assembly for any kind of steel particles. Special care should be taken, therefore, that no iron particles be present in the form of chips or especially iron powder within a 5 foot radius. This includes the tools, working clothes, gloves, shoes, etc. It is suggested to use a magnetic sweeper or any other suitable method to clear the area and working clothes painstakingly from any magnetic material. It is a very tedious job to remove iron particles piece by piece from the magnetized stator assembly, especially the pole faces if this care had been neglected.

It is suggested that the stator assembly be enclosed in a polyethylene bag whenever work on it is stopped for any length of time.

The circular graduation scale is made of aluminum and, therefore, considering its size, easily damaged. To avoid bending and scratching, have a clean carton of sufficient size ready for storage before removing the scale from the stator top end plate.

5. Withdraw the eight 5/16" x 18 bolts (73) and remove the stator top endplate (71) together with the drive hub (77) and the ball bearing (74).

6. Insert three 3/4" x 10 eyebolts into the stator top endplate (71) without touching the magnets (66) beneath.

7. Slide the top end plate with the drive hub and ball bearing straight up, carefully avoiding any side pull.

8. Separate the drive hub from the plate by using the two 5/16" x 18 threaded prying holes in the bottom of the plate.

9. Remove the ball bearing (74) from its seat in the top end plate.

10. Reinstall the top endplate with all eight 5/16" x 18 bolts using the two dowel bolts (75, 76) for lineup. Remove and store the dowel bolts in the keeper removing tool case (page 83).

11. Mount the keeper guide plate (Item 3 of 772D217, Page 87) using the twelve 5/16" x 18 bolts (Item 5 of 772D217).

12. Apply sufficient high temperature grease to all keepers, Item 2 of 772D217.

13. Insert all 12 keepers 3 inch deep in crosswise progressive order through the guide slots as shown on drawing 772D217.

14. Use the lift screw, Item 1 of 772D217, for incrementally driving the keepers down until they stop against the stator bottom end plate.

Here, too, proceed in crosswise progressive order, and further, take care not to exceed a 2-inch stroke for each set of crosswise progressive steps.

15. Remove the six 5/16" x 18 bolts (57) and lift the stator assembly straight up. No further dismantling of this assembly should be performed (except for the endplate), otherwise, the removal of the keepers outside its installed position would result in substantial demagnetization of the permanent magnets. See note of Paragraph 4.

16. Can

(a) Remove all flange bolts (1). For strength and thermal expansion reasons, these flange bolts are made of cold reduced 316 SST studs. The nuts are permanently mounted on the studs with an interference fit and are not to be removed from the studs. The stud and nut assembly should be treated as a one piece bolt.

(b) Remove split flange (10).

(c) Cut lower seal weld by grinding a minimum amount of fused metal.

(d) Insert three 5/8" x 11 eyebolts equally spaced into the outer bolt circle of the can flange (56) and lift the can assembly with the rotor and thermal barrier straight up. (The axial static thrust capacity of the bearing (59) is 8150 lbs.)

D. Removal of Thermal Barrier

1. For removing the thermal barrier and rotor, unscrew the bolts (40) and lower the can (55) on a flat clean surface.

2. Cut the upper seal weld and lift the can flange (with the can) straight up.

3. The rotor can be disconnected from the thermal barrier by removing the bolts (49).

4. For replacement of any heaters (37, 38, 39) both seal weld rings (31, 33) have to be opened. Only the butt welded side has to be cut on each seal weld ring.

5. In case of bearing (59) replacement;

   (a) Remove the lock pin (57). Be careful to lift the locking hook just out of engagement without overstraining the material.

   (b) Remove the ring nut (60).

   (c) Remove the lower stator bearing (59) by lifting the bearing retainer (58).

E. Removal & Dismantling of Drive Screw Subassembly (Drawing 510F033, Page 90)

1. Install two 3/4" x 10 eyebolts in the guide retainer (29).

2. With the control cone in the open position, lift the guide retainer with the attached drive screw assembly straight up. While doing so, observe carefully through the 2-1/2" diameter holes of the guide retainer that the toggle arm connector block (26) is sliding out smoothly. If necessary, insert a rod through one of the 2-1/2" diameter holes for guiding the block out of engagement with the control cone stem (4).

3. Roller Nuts (Drawing 510F033, Page 00)

   (a) Remove bearings (27).

   (b) Unlock and remove set screw pins (16) and toggle arm lock pins (15).

   (c) Remove toggle arm pins (20).

   (d) Remove toggle arms (25).

   (e) Remove spacers (21).

   (f) Unlock and remove nut locking pins (22).

   (g) Remove both nuts (23) from toggle arm connector block (26).

   (h) Remove all four toggle arms (25) and spacers (24) from the connector block.

   (j) Removal of Roller Assemblies (510F033, Page 00)

   When dismantling the roller assemblies, (17), care must be taken to keep the inner races constantly held together through all

handling until they are kept in their position by small aluminum strips or equivalent. Otherwise, loosening the grip on the roller subassembly at any time will cause the stellite balls to fall out resulting in their possible loss. It is suggested that this critical disassembly be performed in a box, open at the top only (Figure 5, Page 11). This box should not have any crevices or remote corners where small balls like these could withdraw from sight.

(k) Remove the roller assemblies, one after another, after withdrawing the set screw (13) and the roller pin (14). For removing the roller pins (14) of the upper carriage (28), insert a 1/4" stud into the pin (14). While removing the roller pins of the upper carriage (28), special care has to be taken to hold down the upper inner race preventing it from riding up and letting the balls escape. The roller assembly can now be taken out by sliding it out onto the roller assembly tool (606C909 H01, Page 56). See Photograph, Figure 5, Page 11.

F. Removal of Control Cone

The control cone can only be removed from the body by first removing the body inlet section from the loop. The necessary axial removal length is 16 inches.

SECTION VI

ASSEMBLY OF SODIUM FLOW CONTROLLER

(Assembly 618J693, Page 92)

Numbers in parenthesis refer to the Exploded View, Figure 11 of Page 91, except as noted.

A. Installation of Control Cone

1. Insert the control cone (4) with its stem into the body bushing until the cone is back seated.

2. Mount the split flange (8).

3. Mount the inlet section (3) without the test O-ring.

4. Insert and torque four equally spaced bolts (1) to 75 ft.lbs.

5. Perform the seal welding per welding instructions given on Page 59 and Assembly drawing 618J793, Page 92 and 15W008E, Page 65.

6. Insert and torque the remaining bolts (1).

B. Assembly and Installation of Drive Screw Subassembly (510F033, Page 90, Photograph, Figure 5, Page 11)

1. Care must be taken to keep the inner races of the roller assemblies (17) constantly held together through all handling until the shims are inserted and the set screws (6) tightened. Otherwise, the stellite balls could fall out, resulting in their possible loss. It is suggested

that this critical assembly be performed in a clean box with an uninterrupted flat bottom without any crevices where bearing balls could withdraw from sight. See Figure 5, Page 11.

2. Stack up the right (19) and left hand (28) carriages and the guide retainer (29) in this consecutive order. Lower the threaded part of the drive screw (30) into this stack. Block the guide retainer (29) up to the drive screw shoulder. Block the carriages (19 & 28) up to dimension "A" of drawing 510F033. The two carriages are to be in line as shown.

3. The roller assemblies (17) and shims (18) are marked with the numbers 1 thru 6. The pockets on the upper carriage (28) are marked correspondingly with the numbers 1, 2 & 3, and on the lower carriage (19) with 4, 5, & 6.

4. Place the shim with the roller assembly marked "1" in vertical position on the roller assembly tool 606C909H01 (page 56), with the marking "Top" on far side of ℄ A. Remove the aluminum straps carefully.

5. As shown on photograph Figure 5, Page 11, center the drive screw in the carriages. Lift the assembly tool with the roller assembly (17) and shim (18) adjacent to the pocket marked "1" and slide it into the pocket engaging the drive screw thread.

6. Attach a 1/4" stud to the roller pin (14) and insert it into the carriage and roller assembly.

7. Remove the stud from the pin and complete this assembly with the set screw wrenchtight.

8. Repeat this operation on both carriages except that no 1/4" stud is required for the lower carriage assembly. However, when installing the roller assemblies in the lower carriage, care has to be taken to hold the inner race firmly and continuously upwards until the roller pin (14) and set screw (13) are installed. In this position, the outer race is held upwards through its engagement with the drive screw thread. Any loosening of the lower inner race would open the lower bearing and consequently release the balls.

9. Recheck dimension "A" and make sure that the carriages are in line.

10. The toggle arm, spacer and pin in carriage (28) are marked with the number 7 on one side and 8 on the other. Carriage (19) is marked 9 & 10. The toggle arms, spacers, nuts and connector block (26) are identified with the number "11" on one side and "12" on the other.

11. Slide spacers (24) and toggle arms (25) on connector block (26) retaining with nut (23) which shall be wrench tight. Then back the nut off approximately 15° to 30° for free running clearance.

12. Fold the arms into the slots of the carriages, and insert the spacers (21). Slip the pins (20) through the spacers (21) and arms (25).

13. Turn the drive screw (30), using the flats on the top of the screw, to check for free running of the roller nuts.

14. After completion insert and weld pins (16) to lock the set screws (13). Insert and weld pin (15) to lock pin (20).

15. Separate the roller nuts 9.75" nominal by counter clockwise rotation of the drive screw.

16. Install the eight double row ball bearings (17).

17. Insert the guides (12).

18. With the control cone in the open position, lower the drive screw assembly into the body observing through the 2-1/2" diameter holes of the guide retainer (29) that the connector block slides into proper engagement with the control cone stem (4). If necessary, a suitable rod, inserted through one of the 2-1/2" diameter holes, may be used for assistance.

C. Installation of Can & Thermal Barrier

1. Install the split flange (10).

2. Place the thermal barrier (41) on a clean flat surface of a diameter somewhat less than 10-3/4".

3. Lower the rotor (50) with its bearings (46) and (51) installed, straight down, engaging the outer race seat of the lower bearing (46) into the thermal barrier.

4. Insert, tighten, and secure the retaining ring bolts (49) with the locking plates (48).

5. Insert three 5/8" - 11 eyebolts equally spaced into the outer bolt circle of the can flange (56).

6. Assemble the can flange (56), bearing retainer (58), lower bearing (59), ring nut (61), and self-locking pin (60) onto the can (55).

7. Attach a 3-chain harness to the three eyebolts and lower the can carefully over the rotor onto its seat on the thermal barrier flange. 1-5/16" before reaching the thermal barrier seat, the upper inner ball bearing race (51) will begin to engage the internal bearing seat of the can. Therefore, it is suggested to take special care in guiding the can properly into the ball bearing (51).

8. Insert and tighten the four 3/8" x 16 bolts (40) through the bottom of the thermal barrier.

9. Lower the can assembly over the drive screw spline. For engagement with the rotor, turn the can assembly while hanging on the crane and not while resting on the spline until the teeth line up.

10. Insert and torque four equally spaced bolts (1) to 75 ft.lbs.

11. Seal weld per welding instructions given on Page 65 and Assembly drawing 618J693, Page 92.

12. Insert and torque the remaining bolts (1).

D. Installation of Stator Assembly (505D061, Page 89)

1. The permanent magnets are made of Alnico V which is extremely brittle. Therefore, care should be taken to handle and move the stator assembly without any bumps and shocks.

In the installed position, the main flux passes through the small running gap between the magnet poles and the can generating the by far greatest and concentrated attraction of the entire assembly for any kind of steel particles. Special care should be taken, therefore, that no iron particles be present in the form of chips or especially iron powder within a 5-foot radius. This includes the tools, working clothes, gloves, shoes, etc. It is suggested to use a magnetic sweeper or any other suitable method to clear the area and working clothes painstakingly from any magnetic material. It is a very tedious job to remove iron particles piece by piece from the magnetized stator assembly, especially the pole faces, if this care had been neglected.

It is suggested that the stator assembly be enclosed in a polyethylene bag whenever work on it is stopped for any length of time.

2. Insert three 3/4"-10 eyebolts into the stator top endplate (71), without touching the magnets (66) beneath.

3. Lower the stator sub assembly and remove the eyebolts.

CAUTION

1-1/4" before reaching the final seat on the lower bearing (59), take care not to touch the self-locking pin (60).

4. Use the lift screw, Item 1 of 772D217 (Page 87), for incrementally removing the twelve keepers, Item 2 of 772D217. Proceed in crosswise progressive order. Take care not to exceed a 2-inch stroke for each set of steps.

5. Remove the keeper guide plate, Item 3 of 772D217, and store it together with the keepers in the keeper removing tool case drawing 772D225 (Page 88).

6. After removal of the keepers the magnetic flux is linked with the rotor exerting a radial excentric side load to the stator. Therefore, after placing the upper stator bearing (74) on top of the upper stator end plate (71), center the stator with the 3 centering jack screws 606C909H07 (Page 76). The bearing can now easily be installed. Remove the jack screws and store them in the keeper removing tool case 772D225 (Page 88).

7. Install the drive hub (77) with the twelve 5/16" x 18 bolts and the three dowel pins (78).

8. Install the circular graduation scale with the percent scale up. The circular graduation scale is made of aluminum and, therefore, considering its size, easily damaged. Avoid bending and scratching of the scale.

9. Attach three 5/8" x 11 eyebolts to the motor support (86) and attach a 3-chain harness to it.

10. Lower the motor support concentrically and straight down on its seat on the can flange (56), and insert and tighten the eight 5/8" x 11 bolts (83).

E. Mounting of Operator (Figure 6, Page 12 - [illegible], Page 74.

1. In case the operator had been dismantled per Section V. Paragraph B, proceed in reverse sequence for its reassembly.

2. Insert two 1" x 8 eyebolts into the operator lifting flange. Use the threaded holes closest to the motor for proper lifting balance.

3. Insert a bar through the eyebolts and check that the lifting flange is turned in tightly.

4. Attach a harness of 1 ton capacity to the eyebolts and an adjustable chain between the crane hook and the electric motor.

5. Lift the operator and tension the adjusting chain until the operator is hanging perfectly vertical.

6. Lift and lower the operator with the operator mounting plate (88) attached carefully in position by guiding the splined operator shaft smoothly into engagement with the splined drive hub (77).

7. The operator mounting plate (89) has no locating fit with the motor support (86) to facilitate proper centering of the operator spline with the drive hub (77). Shortly before letting the operator down on its seat on the motor support, center the operator splined shaft

in the drive hub. It is suggested to use two indicators for this purpose, placing them 90° apart on the O.D. of the operator mounting plate. The concentricity can then be established as the medium (.006") between the two end positions in the 90° apart planes.

8. Remove the switch compartment cover on the side of the operator and the position indicator cover on top.

9. Reconnect all power cables to the operator and the thermal barrier. Follow the wiring diagram B69025 on page 86, A1874 on page 85, and the equipment data table 1 (page 2). Connect the thermocouples and the flow instrumentation. Replace the covers.

WARNING

DO NOT TOUCH any part of the valve when power is turned on to the motor. Especially, keep away from the manual lever; it disengages automatically when the motor is energized. Its upward movement could do bodily harm if it hits someone.

10. After manually positioning the sodium flow controller in the middle of its travel, briefly jog the OPEN, STOP, CLOSE Pushbuttons to check for proper rotation of the motor. If the stator assembly (visible through the openings in the motor support (1) does not turn clockwise with the CLOSE button depressed, reverse any two of the motor cable connections and check the operation again. Remove any jumpers if formerly installed.

FORM AED-98

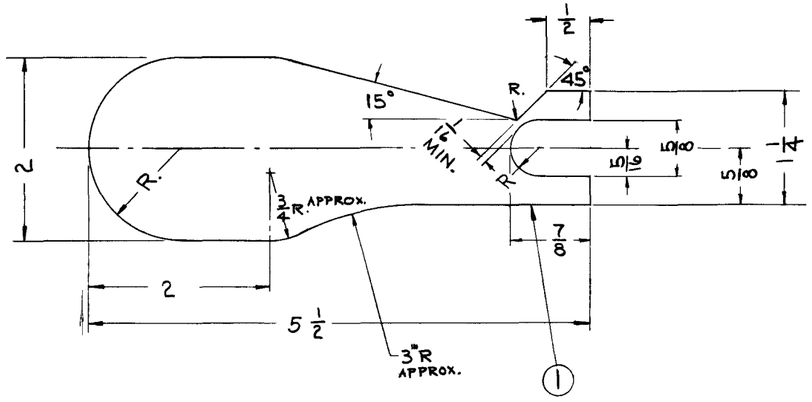
APPARATUS SODIUM FLOW CONTROLLER ASSEMBLY TOOLS

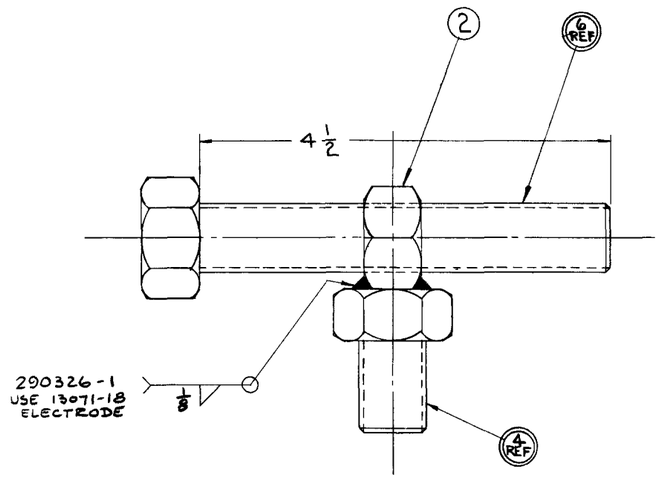
DWG. 606 C 909 SUB. 1

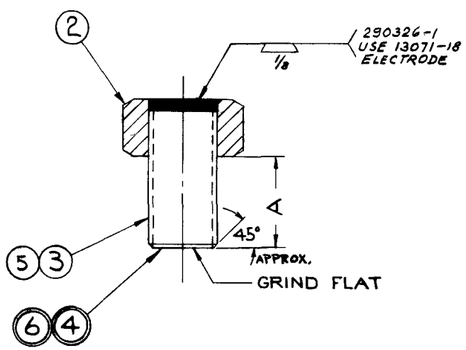
SYM.	ITEM	DESCRIPTION — MATERIAL DIMENSIONS IN INCHES	MATERIAL CODE NO.	STYLE OR PART No.	SYM GR.	1	2	3	4	5	6	NO REQ.
	1	ROLLER ASSY. TOOL-FR. 2" X 5 3/4 OF 1/16 THK. 304 SST. SHT.	12549-1									1
	2	3/4-10 HEX. STL. NUT	8190-5			1	1	1				
	3	STUD-FR. 1 1/2 OF 3/4-10 THREADED STL. BAR				1						
	4	NUT & STUD ASSY GR. 1 THIS DWG.						1				
	5	STUD-FR. 5" OF 3/4-10 THREADED STL. BAR					1					
	6	NUT & STUD ASSY. GR. 2 THIS DWG.						1				
A	7	STATOR CENTERING SCREW-GR. 3 THIS DWG.										1

A- GRIT BLAST, EXCEPT THREADS, AND ACID CLEAN PER W PS292600-3.

1-MACH & CLEAN PER W PS 292600-1 & 2.







ITEM	DIM. "A"	GROUP
4	1"	1 REF.
6	4 1/2	2 REF.

GROUP 3

S.O. 1-D-1082 1
D. 585153
CHANGE
BY

TOLERANCE & MACHINING CHART
TO BE USED UNLESS OTHERWISE SPECIFIED ON DWG

DIMENSIONS AS SPECIFIED	UNDER 6 IN.	6 IN TO 12 IN	12 IN TO 24 IN	OVER 24 IN
DECIMALS	±.005	±.008	±.010	±.015
FRACTIONS MACH	±.010	±.015	±.020	±.030
FRACTIONS UNMACH	±	±	±	±

WESTINGHOUSE ELECTRIC CORPORATION

TITLE SODIUM FLOW CONTROLLER ASSEMBLY TOOLS

DIMENSIONS IN INCHES—SCALE 1=1

DFTM. HACKMAN	3/17/61	APP.		4/11/61
CHKD.	3/20/61	MFG.		4-4-61
ENGR.	4/11/61	MATL.		4/11/61

606C909

ATOMIC EQUIP. DEPT.-CHESWICK, PA.

PR 8572-1280

A. G. B. SMITH CO., PGH. PA.

e-69

F. Checking Position Limit Switches (Figure 7, Page 59)

Numbers in parenthesis refer to Figure 7, Page 59.

All adjustments of the torque and position limit switches as well as of the percent scale on top of the permanent magnet coupling, the remote position indicator, and the torque indicator have been made at the factory. The following procedures are given for checking, changing, or correcting the limit switch settings.

NOTE

When working on the switch compartment, make sure that the incoming power switch is turned off.

1. Depress the "OPEN" Pushbutton.

2. After the "OPEN" Position Limit Switch has stopped the motor, observe the torque indicator. It should read
   The percent scale on top of the permanent magnet coupling and the remote position indicator should be on zero.

3. Depress the declutch lever (24) of drawing D-74411/2 Page 71 in the direction of the cast-on arrow until it remains latched in the depressed position. Slight rocking of the handwheel (8) of drawing D-72636 may be required to depress the declutch lever to the latched position. The lever will remain in the depressed position until motor operation is resumed at which time the handwheel will automatically be declutched.

4. Turn the handwheel in the "OPEN" direction, as marked on its rim. If the "OPEN" position limitswitch is set properly, the torque indicator should immediately show an increase in torque.

5. Depress the "CLOSE" pushbutton and repeat Paragraph 1 through 4 logically for the "CLOSE" position.

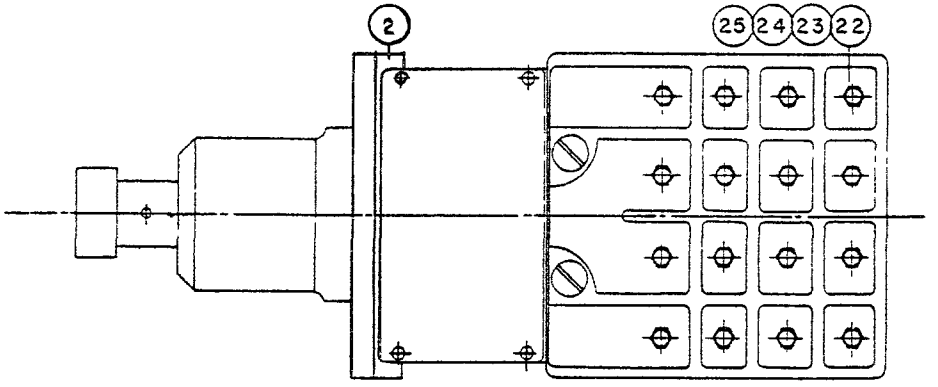
G. Readjustment of Position Limitswitches (Figure 7, Page 59)

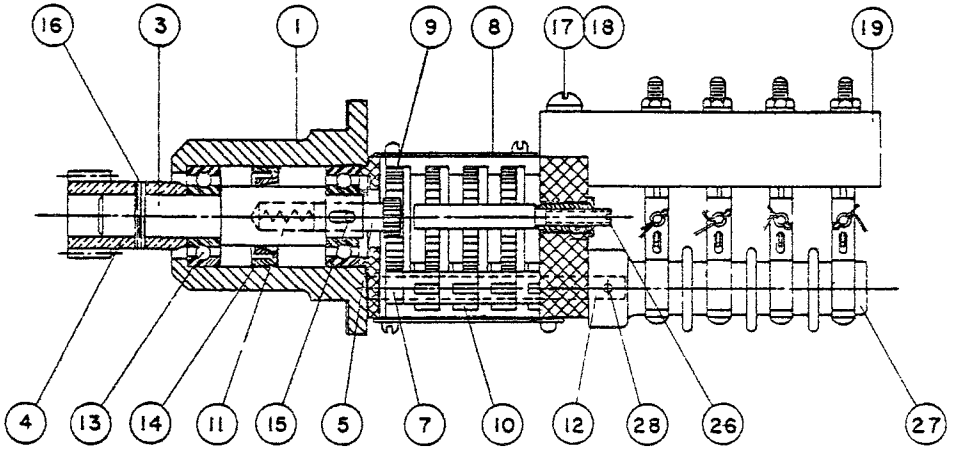
Numbers in parenthesis refer to Figure 7, Page 59.

1. If adjustment is required, close the controller for about 10 handwheel revolutions and then reopen it against the internal stop. The rotation of the handwheel for opening is counterclockwise as marked on the rim of the handwheel. Do not use excessive force. While opening the controller, observe the turning direction of the slotted gear shaft 6B of Figure 7, Page 59. This slotted shaft is extended through the gear case and can be seen just above the switch rotor marked "OPEN" which is connected to the "OPEN" contactor coil (terminals 3 & 43). After meeting the internal "OPEN" stop, observe the torque indicator and unload the operator to zero lbs. by reversing the handwheel rotation (clockwise).

2. At this position set the percent scale of the permanent magnet coupling, which is visible through the opening of the operator support, to zero beneath the pointer.

3. Set the remote position indicator to zero.





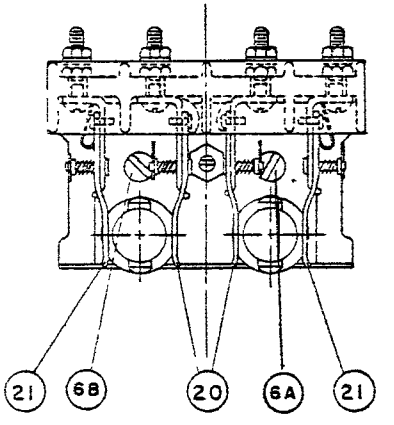


Fig. 7 Geared Position Limit Switch

PARTS LIST		PC NO	NAME	PC NO	NAME	PC NO	NAME
PC NO	NAME	7	INTERMITTENT PINION SHAFT	15	PIN	23	HEX NUTS
		8	G.L. FRAME COVER	16	TAPER PIN	24	LOCKWASHER
1	CARTRIDGE	9	INTERMITTENT GEAR	17	LOCKWASHER	25	SW'B'D WASHER
2	GEAR FRAME	10	INTERMITTENT PINION	18	SCREW	26	SETTING ROD ASSY.
3	DRIVE SLEEVE & SHAFT	11	DECLUTCH SPRING	19	SWITCH BASE	27	ROTOR
4	DRIVE PINION (MAIN)	12	STEM SPUR PINION	20	R.H FINGER ASSEMBLY	28	COTTER PIN
5	DRIVE PINION (SECONDARY)	13	BALL BEARING	21	L.H. FINGER ASSEMBLY		
6	INTERMITTENT GEAR SHAFT	14	OIL SEAL	22	RD.HD. SCREW		

4. Now declutch the drive pinion, Part 5 of Figure 7, by turning the setting rod Part 26 with a long screw driver clockwise until it is tight. Gear, Part #9, can now be turned for adjustment by inserting a screwdriver in the slot of the gear shaft (6B).

5. Turn gear shaft, Part 6B, in the same direction as noted when the controller was being opened until the contact No. 4 (terminals CL1 and 60) (red indicating light) on rotor, Part #27, opens.

6. In the event this contact is already open, turn the gear shaft, Part 6B, in the direction opposite to the direction as specified in step 5 until it closes; then back off the shaft until the contact opens again.

7. Engage the drive pinion Part #5 again by returning the setting rod, Part #26, to its original position. Turn it counterclockwise until a firm stop is reached, but do not jam. The "OPEN" position limitswitch gear train is now set.

8. Connect the electrical power and check the setting per steps F.1 through F.4 after having closed the controller for one complete coupling revolution.

9. The "OPEN" position switch adjusting procedure applies logically for the closed position limitswitch, contact #8, with its terminals CL 1 and 70, except that the percent scale on top of the permanent magnet coupling and the remote position indicator stay set based on the open position.

H. Checking of Double Torque Switch (Figure 8, Page 62)

1. Install jumper wires across the terminals CL 1-60 and CL 1-70 in the switch compartment.

2. Both the "OPEN" and "CLOSE" torque limitswitches have been set at the factory to 3.2 +1.1 corresponding to an overload cutout at 400 ft.lbs. torque.

3. After positioning the controller somewhere between its end positions, depress the "CLOSE" pushbutton being ready on the stop pushbutton to be able to interrupt the current immediately if the torque indicator shows a higher value than 400 ft.lbs.

I. Readjustment of Double Torque Limit Switch (Figure 8, Page 62)

Numbers in parenthesis refer to Figure 8, Page 62.

1. If the torque limit switch does not stop the motor at 400 ft.lbs., unlock the jam nut Part #25 of Figure 8, Page 62 and readjust the set screw, Part #27. Removing this set screw increases the torque cutout point. Turning the set screw in, decreases the torque value.

2. To avoid hunting for the proper control point, load the operator manually to a torque indicator reading of 400 ft.lbs. in the closed position.

3. Turn in the set screw of the corresponding torque switch (terminals 51 - 70 "CLOSE" and 41 - 60 "OPEN") so that the contacts close.

4. Withdraw the set screw until the contacts open.

NO	NAME
1	BRACKET
2	ACTUATING ARM R.S. & L.S.
3	DIAL HOLDER R.S.
4	DIAL HOLDER L S.
5	ACTUATING LINK
6	TRIPPER ARM
7	ACTUATING ARM SHAFT
8	ROLLER
9	ROLLER PIN
10	DIAL R.S.
11	DIAL L.S.
12	SPRING
13	STA. TERMINAL BLOCK
14	MOVABLE TERMINAL BLK
15	THREADED BUSHING
16	TERMINAL STUDS
17	CONTACT
18	CONTACTOR
19	HEX NUTS 10-32
20	WASHERS # 10
21	LOCKWASHERS #10
22	"O" RING
23	SOCK HD. CAP SCREW
24	HEADLESS SET SCREW
25	JAM NUT $\frac{1}{4}$-20
26	COTTER PIN & WASHER
27	SET SCW. $\frac{1}{4}$-20 x 1$\frac{1}{4}$ LG.
28	"O" RING
29	SOCK. CAP SCW. $\frac{1}{4}$-20 x $\frac{5}{8}$ LG.
30	T. SW. SPACER
31	GROOVE PIN $\frac{1}{8}$ x 1" LG.

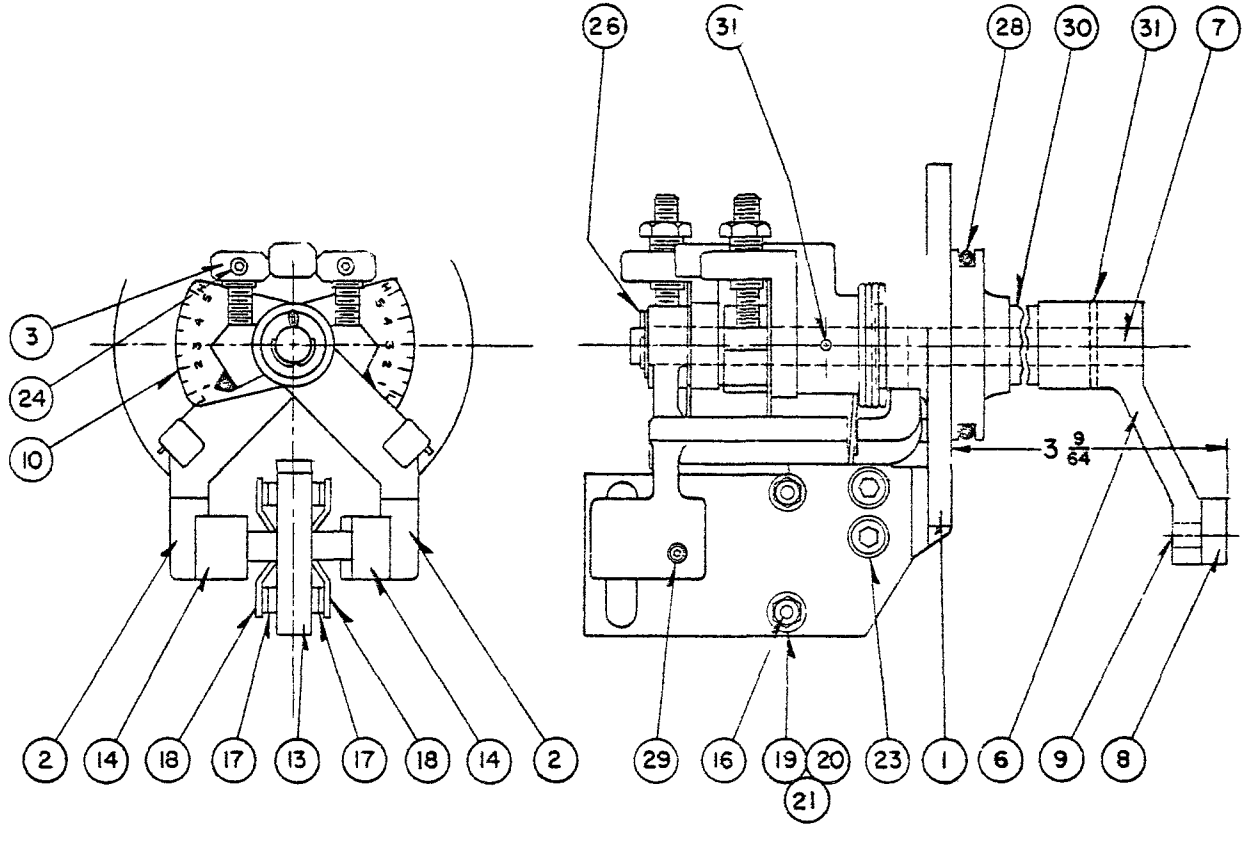


Fig. 8
Double Torque Switch

5. Tighten the jam nut.

6. Read the resulting red pointer position of the "CLOSE" actuating arm, Part #2, and adjust the "OPEN" actuating arm to the same dial position.

7. Do not touch the threaded bushing, Part #15, with its locking screw, Part No. 24. This bushing was set and locked at the factory in order to make sure that the torque switch will cut off the power within the capacity rating of the operator.

8. Check for proper operation per Step H.3.

9. Remove both jumper wires of Step H.1.

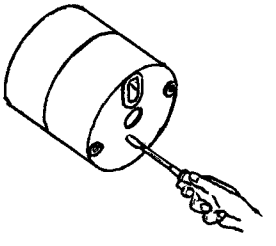
J. Adjustment for Friction Disc Wear of Magnetic Brake

How to Determine if Brake is in Need of Adjustment:

With current off, indicator at "NORMAL" or "ON" position indicates brake is in proper adjustment. When indicator is at the "ADJUST" position, or if marked increase in stopping time is noted, adjustment for wear is necessary.

1. Remove pipe plug in housing.

2. Insert screwdriver and turn adjusting stud in clockwise direction until indicator returns to the "ON" or "NORMAL" position.

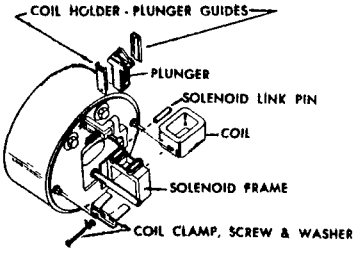


3. Replace pipe plug.

Alternate Procedure

1.a. Remove housing.

2.a. Insert screwdriver and turn adjusting stud in counter-clockwise direction until the proper solenoid gap of 7/16" is attained.



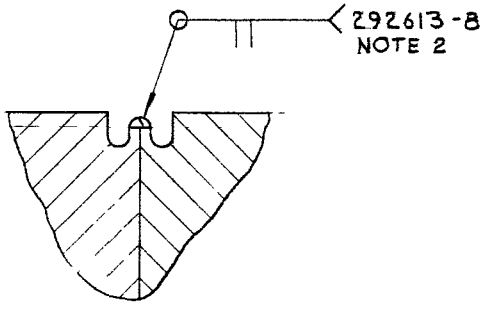
3.a. Replace housing.

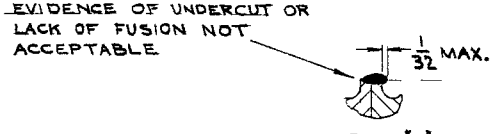
1

SPECIAL NOTES

1-THE WIDTH OF THE FINAL AS-WELDED NUGGET SHALL NOT EXTEND MORE THAN 1/32 INCH BEYOND THE VERTICAL BASE METAL SURFACE, AND THERE SHALL BE NO EVIDENCE OF UNDERCUT OR LACK OF FUSION AT THE OPPOSITE-SIDE WELD INTERFACE. (SEE VIEW X)

2. Select an electrode with 1.5 to 2.5% controlled ferrite content.





VIEW "X"
(SEE NOTE 1)

GENERAL NOTES

A – COMPONENTS TO BE IN POSITION SHOWN FOR ALL WELDING UNLESS NOTED.
B – WELDMENT COMPONENTS NOT TO BE TACK WELDED UNLESS NOTED.
C – SET ALL WELD CURRENT USING TONG OR RECORDING AMMETERS.
D – STAGGER ALL STARTS AND STOPS ON SUCCESSIVE PASSES. 15° TO 20°
E – GRIND OUT ALL CRATERS ON ROOT PASSES. AND GROVE FACES.
F – NUMBER OF BEADS ILLUSTRATED IS SYMBOLIC ONLY. TO INDICATE INDIVIDUAL DEPOSITION SEQUENCE. AMOUNT OF WELD METAL (SIZE OF BEAD) DEPOSITED SHALL NOT EXCEED THE APPROPRIATE SPECIFICATION LIMITS.
G – WELD DETAIL DRAWN FULL SIZE – TO MAXIMUM GAP TOLERANCE.

PASS NO.	AMPS	VOLTS	ELECTRODE DIA.	ELECTRODE LEAD ANGLE	ELECTRODE SIDE ANGLE	ELECTRODE EXT	FILLER WIRE DIA	FILLER WIRE ANGLE	FILLER WIRE FEED I. P. M	SURF SPEED I P M	ARC LGTH	CUP SIZE	GAS FLOW C. F. H
1	58-60	–	1/16	—	—	3/32 TO 1/4	1/16	—	—	3 +0 -1/8	3/32 TO 1/4	1/4	12-15

REMARKS

ENG REF DWG. 618J693

WESTINGHOUSE ELECTRIC CORPORATION

TITLE SEAL WELD

DFTM Hackman	5/3/61	APP		5/6/61	WELD SKETCH
CHKD	5/4/61	APP		5/4/61	15W008E
ENGR.	5/4/61	APP		5/4/61	
MFG APP			CODE IDENT No 04808		ATOMIC EQUIP. DEPT. – PITTSBURGH, PA.

ENG DEPT FORM A E D. 97

VII. LIST OF SPECIAL TOOLS & FIXTURES

A. TOOLS

Description	Qty.	Tool No.	Page	Referenced on Drawing	Page
Expansion Plug	1	366C376	34	618J693	92
Expansion Plug	1	366C386	35	618J693	92
Roller Assembly Tool	1	606C909	56	510F033	90
Stator Centering Screw	3	606C909	26	618J693	92
Keeper Removing Tool	1	772D217	87	505D061	89
Vacuum Tool	1	366C318		772D263	
Dowel Bolts (For Stator Endplates)	4	140199H04		505D061	89
Hex Nut (For Stator Endplates)	4	8190-5		505D061	89

B. FIXTURES

Torque Test Fixture	1	772D218		618J693	92
Hot Gas Test Assembly	1	772D240		618J693	92

VI. REPAIR PARTS LIST

A. SODIUM FLOW CONTROLLER

TABLE 2

Line No.	Name of Part	No.Req'd. Per SFC	Mfg.Dwg. & Ser.Part #	Corresponding Item No. Expl'd.View Page 91	Gen.Ass'y. Page 92
1	Body Assembly	1	618J694G01	11	1
2	Cap	1	505D046H01		
3	Backup Ring fr.34" of 5/32" dia. 316L Insert MC73432 CE	1	0		
4	Stem Bushing	2	366C322H04		
5	Lock Ring	2	366C322H05		
6	Split Ring	1	366C319G01	8	2
7	Lug fr. 4-3/4" x 4/3/4" x 2-1/2" 316 Plate	2	0		
8	Flange Stud	44	258B278G01	1	3
9	"O" Ring	1	160A975H21		4
10	Bolting Ring	1	366C320H01	2	5
11	Body Inlet	1	505D047G01	3	6
12	Control Cone & Stem	1	505D048G01	4	7
13	Drive Screw Assembly	1	510F033G01		8
14	Drive Screw	1	505D058G01	30	
15	Ring fr 3/4" of 2-3/8" dia. Haynes 25 Bar	1	0		
16	Upper Carriage	1	505D049H01	28	
17	Lower Carriage	1	505D050H01	19	
18	Roller Assembly	6	366C336G01	17	
19	Outer Race	6	366C335H01		
20	Inner Race	12	258B220H01		
21	Ball	156	160A413H01		

TABLE 2 (CONTINUED)

Line No.	Name of Part	No. Req'd. Per SFC	Mfg. Dwg. & Ser. Part #	Corresponding Item No. Expl'd. View Page 91	Corresponding Item No. Gen. Ass'y. Page 92
22	Roller Pin	6	258B218H01	14	
23	1"-14-NF-2A x 1" lg. Flat Pt. Soc. Set Screw	6	0	13	
24	Shim	6	160A409H01	18	
25	Roller Lock Pin	6	S#52D2030P15	16	
26	Toggle Arm Connector	1	366C321H01	26	
27	Connector Spacer	6	366C322H01	24	
28	Toggle Arm	4	258B217H01	25	
29	Toggle Arm Retainer	2	160A408H01	23	
30	Pin	2	S#52D2030P9	22	
31	Carriage Spacer	8	366C322H03	21	
32	Toggle Pivot Pin	4	366C321H02	20	
33	Pin	2	S#52D2031P8	15	
34	Bearing	8	#3373 Ind. Tectonics Inc.	27	
35	Guide Retainer	1	366C325H01	29	
36	Guide	2	258B219H01	12	9
37	1"-8 UNC-2A x 5-1/2" lg. 316 SST Hex Bolt	4	12100-9	9	10
38	1"-8 UNC-2B Hex Nut 316 SST	4	12100-9	5	11
39	Can Split Ring	1	366C324G01	10	12
40	Lug fr 4-3/4" x 3-3/4" x 2-1/2" thk burn of 316 SST Plate		0		
41	Can Flange	1	366C326H01	56	13
42	Operator Support	1	505D057G01	86	14
43	Support Shell	1	505D084H02		
44	Top Flange	1	505D084H04		

TABLE 2 (CONTINUED)

Line No.	Name of Part	No. Req'd. Per SFC	Mfg. Dwg. & Ser. Part #	Corresponding Item No. Expl'd. View Page 91	Corresponding Item No. Gen. Ass'y. Page 92
45	Bottom Flange	1	505D084H03		
46	5/8"-11 UNC-2A x 2" lg Hex Bolt 316 SST	8	12100-9	83	15
47	Rotor Lock Ring	1	366C332H02	45	16
48	Rotor Bearing	2	Ind. Tectonics Inc. Dwg. 3166	46, 51	17
49	Bearing Retainer	1	258B221H01	47	18
50	5/16"-18 UNC-2A x 3/4" lg Hex Bolt	6	12100-9	49	19
51	Rotor	1	505D056H01	50	20
52	Bearing Retainer	1	366C332H01	52	21
53	5/16"-18 UNC-2A x 3/4 lg. Soc. Cyl. SST Cap Screw	6	12100-9	54	22
54	Vent Tube 30-1/2" of 1/2" Sch 40 316 SST Pipe	1	12920-2		23
55	Operator Mtg. Plate	1	366C334H01	88	24
56	Motor Operator	1	Phila Gear SMA3-E-675000	90	25
57	5/8"-11 UNC-2A x 2" lg 316 SST Hex Bolt	8	12100-9	89	26
58	7/8"-9 UNC-2A x 2-1/4" lg Soc. Cyl. SST Cap Screw	8	52D020H03 316 SST	87	27
59	Drive Hub	1	366C333H01	77	28
60	Drive Hub Bearing	1	Kaydon KD-110CP	74	29
61	Stator Sub Assembly	1	505D061G01		30
62	Top End Plate	1	366C331H01	71	
63	5/16"-18 x 1-1/4" Soc. Cyl. SST Cap Screw	8	52D2015P7	62	
64	5/16" Stl. Lock Washer	52	0	63, 72	

TABLE 2 (CONTINUED)

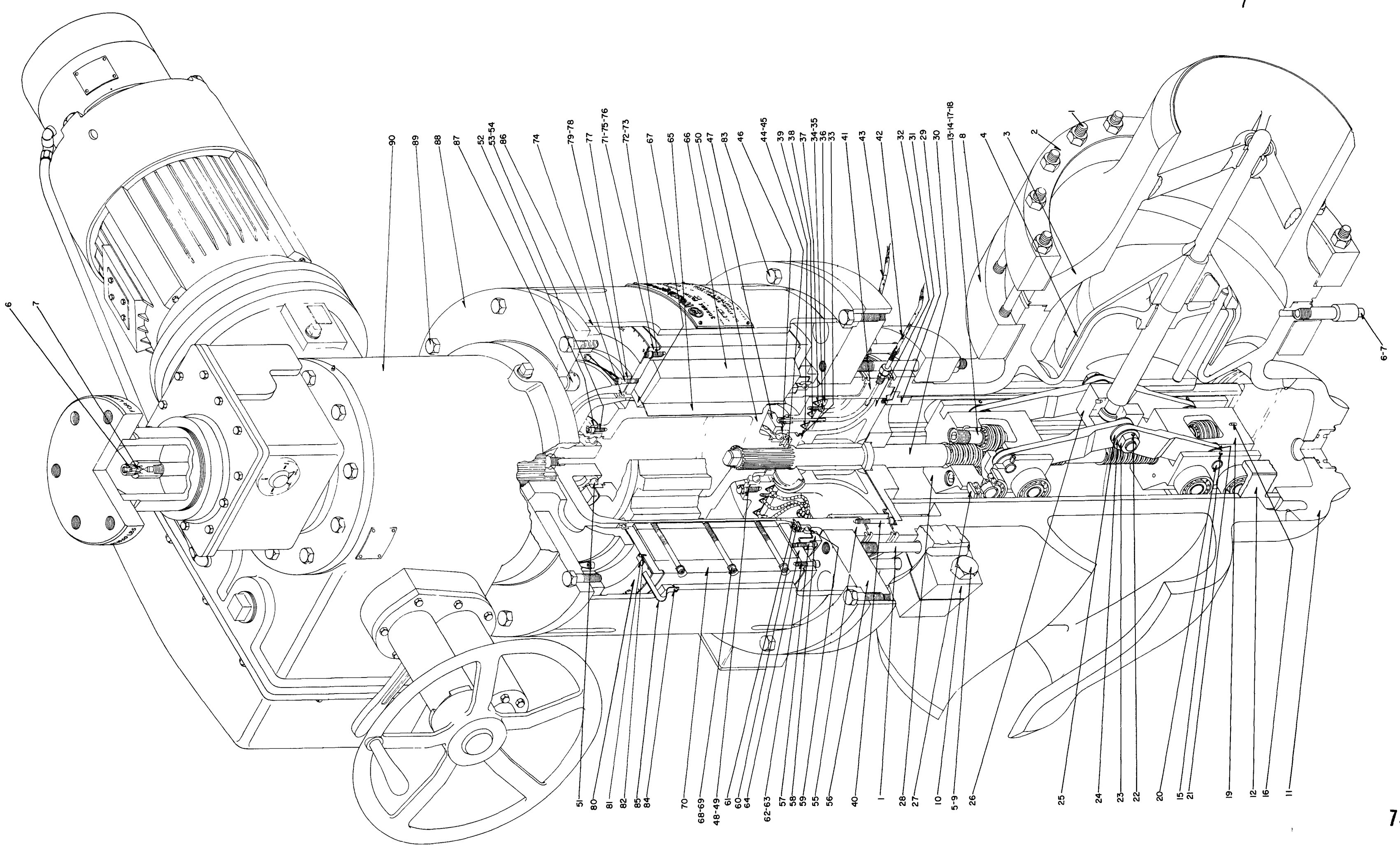
Line No.	Name of Part	No. Req'd. Per SFC	Mfg. Dwg. & Ser. Part #	Corresponding Item No. Expl'd. View Page 91	Corresponding Item No. Gen. Ass'y. Page 92
65	Stator Shell	1	505D055H01	70	
66	Magnet	12	366C330H01	66	
67	5/16"-18 x 4" lg Soc. Cyl. SST Cap Screw	36	6553-1	68	
68	Pole Piece	12	366C329H01	67	
69	Bottom End Plate	1	366C328H01	64	
70	Shield 11-1/4" x 1-1/8" of .016" Brass	12	2676-1	65	
71	5/16"-18 x 7/8" lg. Soc. Cyl. SST Cap Screw	8	52D2015P5	73	
72	Lock Ring	1	258B222H01	61	31
73	Bearing Retainer	1	366C327H01	58	32
74	Stator Bearing	1	Kaydon KF-120CP	59	33
75	Can	1	505D054H01	55	34
76	Thermal Barrier	1	505D098G01		35
77	Rotor Support	1	505D099G01	41	
78	Thermocouple Well fr 1-1/4 of 3/4 dia 316 SST Bar	1	12923-2		
79	Heater	1	366C348H01	37	
80	Heater	1	366C348H02	38	
81	Heater	1	366C348H03	39	
82	Heater Clamp	1	366C349G01	36	
83	T.C. Guide fr 6-1/4" of .248" OD x .048" Wall Inconel Tubing	2	8153-4		
84	Soc. Cyl. Cap Screw	21	52D2004H03	34	
85	Locking Cup 1/4"	21	160A943H01	35	

TABLE 2 (CONTINUED)

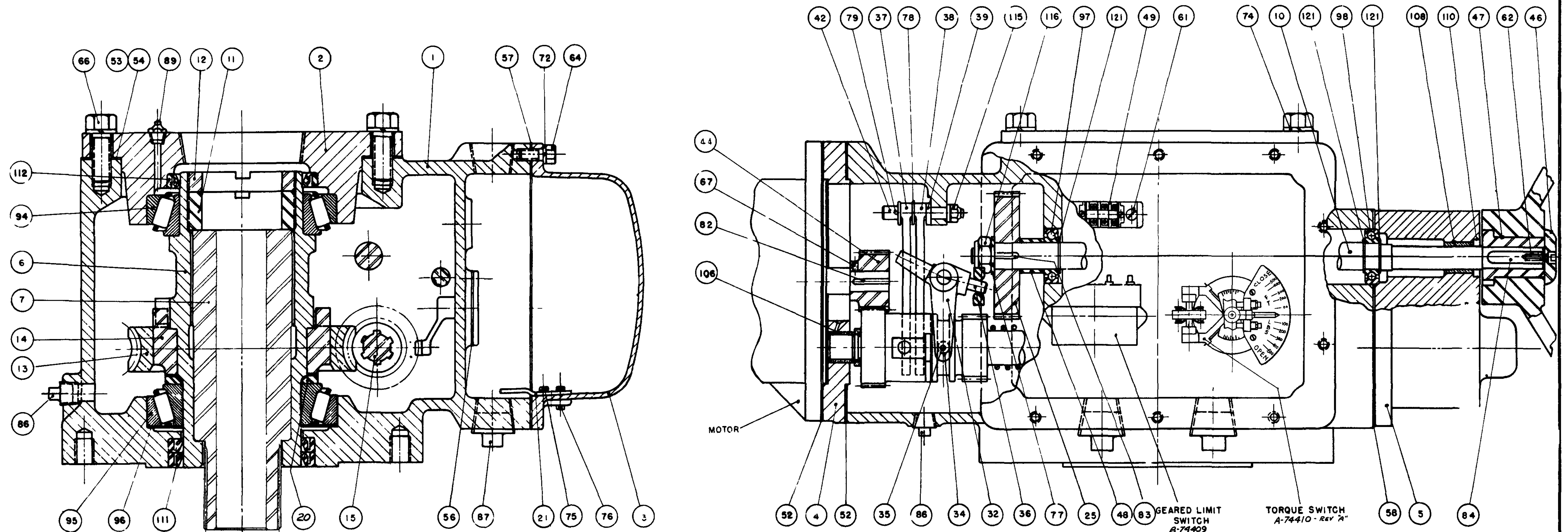
Line No.	Name of Part	No. Req'd. Per SFC	Mfg. Dwg. & Ser. Part #	Corresponding Item No. Expl'd. View Page 91	Corresponding Item No. Gen. Ass'y. Page 92
86	Ball & Socket Insulating Beads	1 Set	Star Porcelain Cat. #4c		
87	Insulating Tubing 5/32" ID, 1/4" OD, 9-3/8" lg	7	Ceramic for 1200°F		
88	3/4" Conduit Nipple Sch 40S	1	3/4" NPT both ends		
89	Conduit Locknut 3/4"	1	W Supply Cat. #142		
90	4-11/16" Sq. Box 2-1/8" Deep	1	W Supply Cat. #72171-1		
91	End Bushing	1	W Supply Cat. #71S		
92	Terminal Strip	2	Jones Type 3-142		
93	.164"-32 x 3/4" lg. Fil. Stl. Mach. Screw	8	0		
94	.164"-32 Hex. Stl. Mach. Screw Nut	8	0		
95	4-11/16" Square Cover	1	W Supply #72-C-2		
96	Vacuum Ring	1	772D200G01	32	
97	3/4"SST C'sunk Pipe Plug	2	0		
98	Thermocouple 7" lg	1	505D098H20	43	
99	Thermocouple 9" lg.	1	505D098H23	42	
100	Seal Weld Ring	1	366C351H04	31	
101	Seal Weld Ring	1	366C351H02	33	
102	"O" Ring	2	160A975H20		36
103	3/8"-16 x 2-1/4" Soc. Cyl. SST Cap Screw	4	12100-9	40	37
104	Vent Plug	2	160A407H01	7	56
105	Lifting Flange	1	366C344G01		57
106	Connector	2	Autoclave Eng. Cat. #30A40800 316 SST		58

TABLE 2 (CONTINUED)

Line No.	Name of Part	No. Req'd. Per SFC	Mfg. Dwg. & Ser. Part #	Corresponding Item No. Expl'd. View Page 91	Corresponding Item No. Gen. Ass'y. Page 92
107	Drain Plug	1	258B276H01		59
108	Gland	2	160A415H01	6	60
109	Locking Cup	6	160A943H02	53	61
110	Lockwire	40 ft.	.051" dia. 304 SST		62
111	Locking Plate	6	160A416H01	48	63
112	Washer	4	1-3/4" OD, 1-1/32" ID, 1/16" thk. 316 SST Bar		64
113	Pointer	1	366C350H02	85	65
114	.190-32" x 3/8" Pan Stl. Mach. Screw	5	9964-2	82	66
115	Circ. Graduation Scale	1	366C350H03	80	67
116	Clamps	4	366C350H01	81	68
117	5/16"-18 UNC-2Ax1-1/4" Soc. Cyl. SST Cap Scr. 316 SST	18	52D2015H07 316 SST	79	60
118	Lock Pin-1/8" dia. x 1-1/2 lg 316 SST	1	12923-2	44	71
119	"O" Ring	1	53C2613P30		72
120	Self Locking Pin	1	160A421H01	60	76
121	Tee Union 316 SST Ermeto	1	Weatherhead Cat. #8717 x 4		77
122	Male Connector	2	Weatherhead Cat. #8217 x 4		78
123	Tube-1/4"OD x .049" Wall x 40" lg 316 SST	2	12920-1		79
124	Nameplate	1	131P427H01		80
125	.190"-32 x 3/8"Fil. SST Mach. Screw	4	12100-1		81
126	Vent Tube 3" of 1/2"Sch 40 316 SST Pipe 1/2" NPT, Both Ends	1	12920-2		82
127	Temp-Plate	3	618J693H83		83
128	Dowel Pin	3	52D2036P13		84


90
89
88
87
52
53-54
86
74
79-78
77
71-75-76
72-73
67
65
66
50
47
83
46
44-45
39
38
37
34-35
36
33
41
43
42
32
31
29
30
13-14-17-18
8
4
3
2
1
6
7
6-7
51
80
81
82
85
84
70
68-69
48-49
61
60
64
62-63
57
58
59
55
56
40
1
28
27
10
5-9
26
25
24
23
22
20
15
21
19
12
16
11

ITEM NO.	QUAN	NAME	MAT'L	DRG NO
1	1	HOUSING	C IRON	D181223
2	1	HOUSING COVER	" "	B510384
3	1	L SW COMP COVER	C ALUM	B688099
4	1	MOTOR ADAPTER	C IRON	B537038
5	1	END CAP	" "	B544143
6	1	DRIVE SLEEVE	DUCTILE IRON	B649165
7	1	NUT	HYT BRZ.	B659917
8	1	HANDWHEEL 18"	CAST STL	C663113
9	1	WORM SHAFT	4140 STL	C497616
10	1	HANDWHEEL SHAFT	1040 STL	C497618
11	1	LOCKING NUT	M STL	A644024
12	1	JAM NUT	" "	A644025
13	1	WORM GEAR RIM	NO 65 BRZ	C305
14	1	WORM GEAR CENTER	DUCTILE IRON	C305
15	1	WORM-SPLINED	4620 STL	A209
16	1	SPRING CARTRIDGE	C. IRON	C522042
17	1	TORQUE SPRING	CR-VAN SPR. STL	A654
18	1	BEARING CAP	M ST'L	B543525
19	1	" CARTRIDGE	M. ST'L	B520466
20	1	WORM GEAR SPACER	HYT BRZ	A615024
21	1	COVER HOOK	M STL	A714212
22	1	WS END SPLIT RING	4140 STL	A607222
23	1	" " SPL. RING SPAC.	STL. TUB	A607223
24	1	DECLUTCH LEVER	MALLEABLE IRON	A661285
25	1	H W GEAR	4140 STL	A363126
26	1	CLUTCH	4140 STL	A363104
27	1	T. SPRING PULL ROD	M. STL	A675579
28	1	CLUTCH SPRING	CR-VAN SPR. STL	A654437
29	1	DECLUTCH LINK	DUCTILE IRON	A661304
30	1	" LEVER SHFT.	S. FIN STEEL	B497619
31	1	" LINK SPAC	STL TUB.	A615025
32	1	" FORK	C. STEEL	A670253
33	1	" " SHAFT	S. FIN STEEL	A675550
34	2	" " ROLLER	4140 STL	A651067
35	2	" " ROL. PIN	" "	A675474
36	1	" " PIN	DR. ROD	A675542
37	1	" TRIPPER #1	STL. FORG	A665089
38	1	" " #2	" "	A665090
39	1	" " SPAC.	M STL	A604852
40	2	TRIPPER SPRING	MUSIC WIRE	A654377
41	2	" " ROD	M. STL	A675552
42	1	" PIN	S. FIN STEEL	A675578
43	2	MTR CL GEAR CAM PIN	4140 STL	A675553
44	1	MOTOR PINION	" "	A250
45	1	" CLUTCH GEAR	" "	A343
46	1	H W WASHER	M STL	A605C34
47	1	H.W. CLUTCH	C. STEEL	B700769
48	1	H.W. SPACER	STL. TUB	A615353
49	1	TERMINAL STRIP	CLASS 9080-TA-5	
50	1	G.L. HELICAL PINION	[illegible]	A250774
51				
52	2	MOTOR GASKET 1/32		A667005
53	1	COVER " 1/32	ANCH.	A667889
54	1	" " 1/64	"	A667889
55	1	G L SWITCH " 1/32	"	A667012
56	1	T SWITCH " 1/32	"	A667822
57	1	G L " COMP. GASK.		
58	1	END CAP GASKET 1/64	ANCH	A668047
59	1	SPR. CART. GASKET	"	B667890
60	1	HANDLE		NO. 7QA
61	2	1/4-20X5/8 LG FIL. HD. CAP SCR.	STL.	
62	1	3/8-16X1" LG. SOC. HD. CAP SCR.	"	
63	8	3/8-16X1 1/4 LG " "	"	
64	15	1/2-13X1 1/2 LG HEX HD. CAP SCR.	"	
65	4	5/8-11X2 1/2 LG " "	"	
66	12	7/8-9X2 1/4 LG. " "	"	
67	1	1/4-20X5/8 LG SOC. HD. SET SCR.	"	
68	1	5/16-18X1/2 LG " "	"	
69	2	1/2-13X1/2 LG " "	"	
70	6	3/8-16X1" LG. " "	"	
71			STL.	
72	17	1/2 STD. LOCKWASHER	"	
73	4	5/8 STD. LOCKWASH.	STL.	
74	12	7/8 " "	"	
75	2	1/4-20X1" LG. HEX HD. CAP SCR.	"	
76	2	1/4-20 HEX. NUT	"	
77	1	3/4 SAE. STD. PLAIN WASHER	"	
78	2	17/32 I.D.X1 1/16 O.D. 3/32 WASH.	"	
79	1	3/32X1" LG. COTTER PIN	"	
80	8	3/8 STD. LOCKWASHER	"	
81	1	KEY 3/16 SQ. X 13/16 LG.	STL.	ROUND BOTH END
82	1	" 1/4 SQ. X 1 3/8 LG.	"	ROUND ONE END
83	1	" 1/4 SQ. X 1 1/8 LG.	"	"
84	1	" 1/4 SQ. X 2 5/8 LG.	"	"
85	1	1/2 STD. PIPE PLUG	M. I.	
86	5	3/4 " " "	"	
87	2	1 1/2 " " "	"	
88				
89	1	1/8 GREASE FITTING	STL	NO. 1610
90	2	TORQ. SPR. SPACER	"	A615027
91	1	" " RETAINER	"	A615026
92	1	WORM BUSHING	BRZ	A650422
93				
94	1	ROLLER BEARING	TIMKEN	[illegible]
95	1	" "	"	[illegible]
96	1	SHIM SET	"	NO. 29
97	1	BALL BEARING	S.K.F	NO. 6206
98	1	" "	"	" 6206NR
99	1	" "	"	" 6209NR
100	1	" "	"	6210
101				
102	1	STD LOCKNUT	S.K.F	NO. N09
103	1	" LOCKWASHER	"	" W-09
104	1	" LOCKNUT	"	" N-10
105				
106	1	OILITE BUSHING	OILITE	A1317
107	1	BUNTING "	BUNTING	A650387
108		" "	"	A1319
109	1	OIL SEAL	JOHNS MANVILLE	9240LPD
110	1	" "	"	9848LPD
111	2	" "	"	7112 LA
112	1	" "	"	6957 LA
113				
114				
115	1	ELASTIC STOP NUT	ESNA	29U066
116	1	" " "	"	49TU120
117	1	" " "	"	49TE-164
118				
119				
120	1	EXT. RET. RING	TRUARC	5100-75
121	3	EXT RET RING	TRUARC	5100-118
122	1	" " "	"	5100-112
123	1	INT. " "	"	5000-354
124	1	BIJUR WINDOW	BIJUR	B-5177
125				
126				
127				
128				
129				
130				
131				
132				
133				
134				
135				
136				
137				
138				
139				
140				
141				
142				
143				
144				



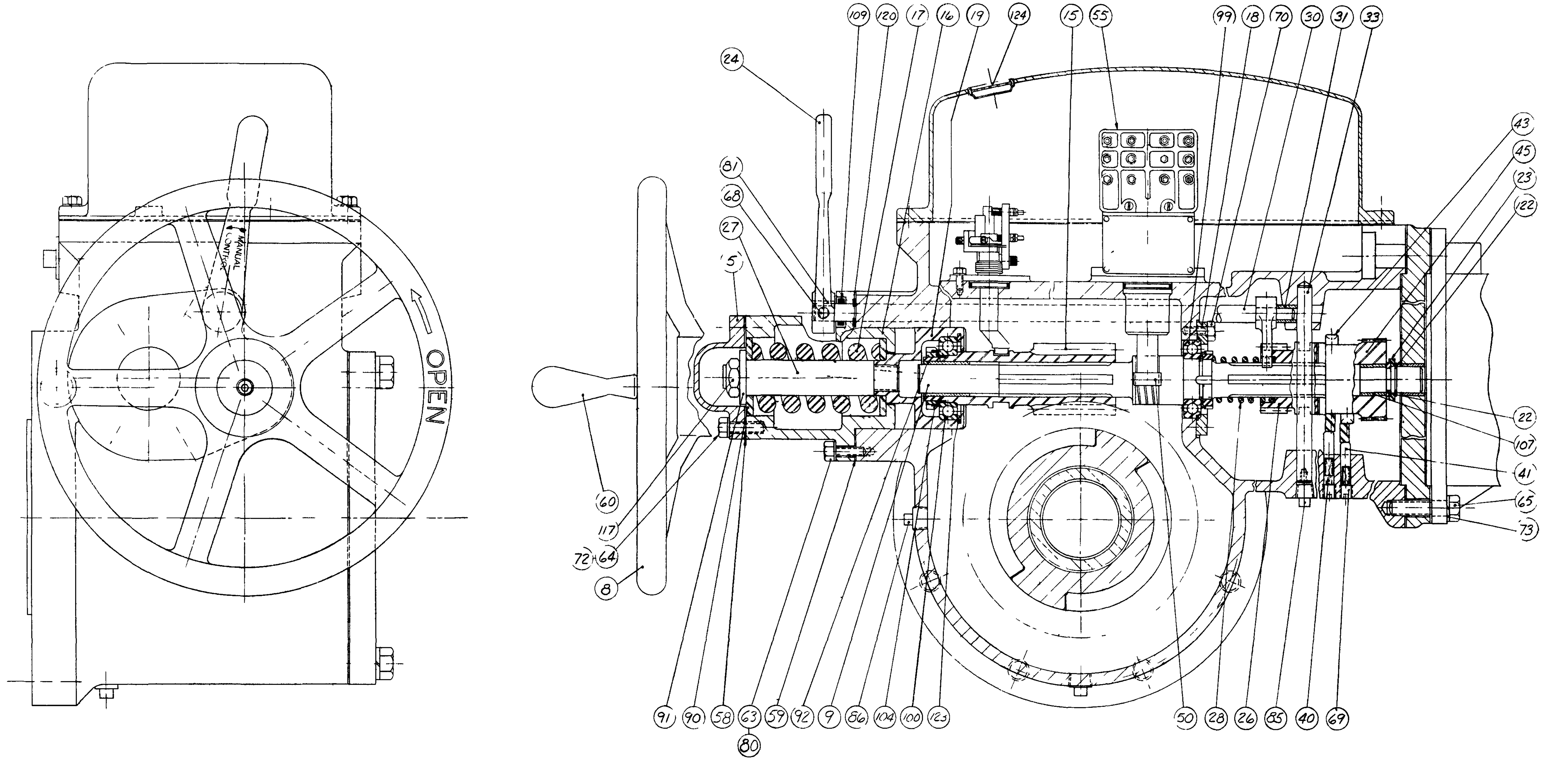
DOUBLE TORQUE

OLD PART NO.		PHILADELPHIA GEAR WORKS — PHILA., PA	
1ST ORDER NO	NO REQ PER UNIT	STOCK SIZE	ROUGH WT
LAST ORDER NO.	DRN	ALL MACHINED FRACTIONAL DIM'S ± .010 UNLESS NOTED	
SUPERSEDES	TR	NAME ASSEMBLY SHEET NO. 1	
SUPERSEDED BY	CHKD / APPVD.		
SCALE HALF	MAT	MACH SIZE SMA-3	DWG NO D-74411
DATE	HEAT TREAT		

REVISIONS: A — Revised — 13-30-61 ACM

ORDER NO.

NO. REQ'D ON THIS ORDER



OLD PART NO		PHILADELPHIA GEAR CORPORATION	
1st ORDER NO.	NO. REQ. PER UNIT	STOCK SIZE	ROUGH WT
LAST ORDER NO	DRN MWL	ALL MACHINED FRACTIONAL DIMENSIONS ± .010 UNLESS NOTED	
SUPERSEDES	TR.	NAME Double Torque Assembly Sheet No 2	
SUPERSEDED BY	CHKD / APPVD.		
SCALE HALF	MAT	MACH SIZE SMA-3	DWG. NO. D-74412
DATE	HEAT TREAT		

REVISIONS: A — Revised — 1-30-61 ACM

RELIANCE ELECTRIC AND ENGINEERING CO.

Renewal Parts and Repair Division

A-C Motor Parts List

Customer Phila. Gear				Customer P.O.			
Reliance S.O.				Motor Serial No. Y-140609			
Frame Size	HP	Type/Form		PH/CYC	RPM	Volts	Amps
DB-254UR3	80 #1 16 #1	P/YF		3/60	1705	220/440	15.4/ 7.7
Duty	Rise	Mech. Specs		Electrical Spec.		D/S No.	
Cont.	55°C	M/P Y-140609		507438		65601-359	
Qty.	Part Name	Part Number		Qty.	Part Name	Part Number	
1	Bearing F.E.	4841-6-W		1	Stator Frame	81640-1-A	
1	Bearing B.E.	4841-8-F		1	Stator Core	65484-R	
1	Bracket - F.E.	81657-50-A		1 Set	Stator Coil	E/S 507438	
1	Bracket - B.E.	81657-60A			Rotor	403759-DT	
1	Seal Brkt. B.E.	404832-3-B			Shaft	65499-50-R	
1	Fan Cover	75432-17-R					
1	Fan	75442-A					
1	Brake Shield	404466-A					
1	Brake Hub	400388-RC					
1	Stearns Brake size HT72A-9						

ORDERING INSTRUCTIONS: When ordering, please specify; Part Name, Part Number Nameplate Data (see above), Serial and/or Model Number

*Recommended For Stock

Get Production Insurance With Genuine Factory-Built Parts

Stearns electric

style H-70 series
magnetic disc brakes

REPAIR PARTS LIST

STYLE H-70 SERIES

STEARNS MAGNETIC DISC BRAKES

Fig. 1115

IMPORTANT

Use this multiplier to determine net price on brake parts.

Multiplier _____ Date _____

Company _____

If your multiplier is not shown in this space, please contact your local representative or the Milwaukee office for this information.

INFORMATION REQUIRED

When ordering repair parts, give the Stock Number of the part needed. This number will completely identify the part. The Item Number only may be used if the following Name Plate data is furnished:

Serial Number .....

Size ..... Voltage .....

HOW TO USE THIS LIST

This repair parts list covers all sizes and models of Style H-70 Series STEARNS magnetic Disc Brakes. After checking the exploded parts drawing, the proper Stock Number of the part needed may be found in the accompanying tables.

STEARNS ELECTRIC CORPORATION
Milwaukee 2, Wisconsin

H-70 SERIES BRAKE PARTS LIST

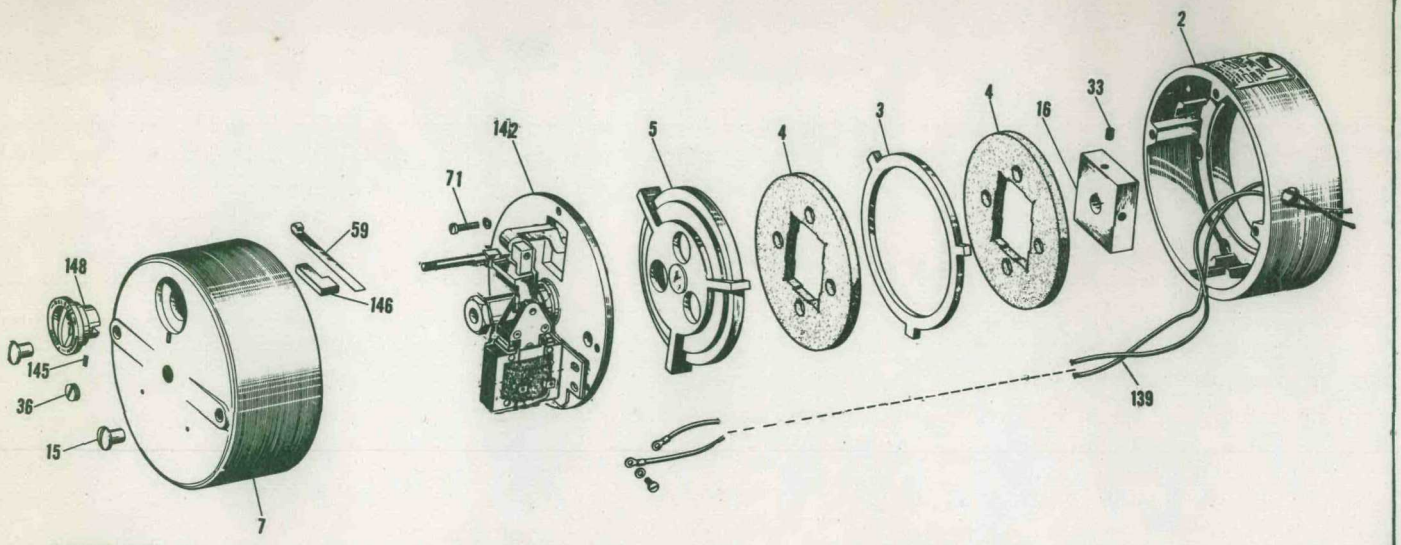
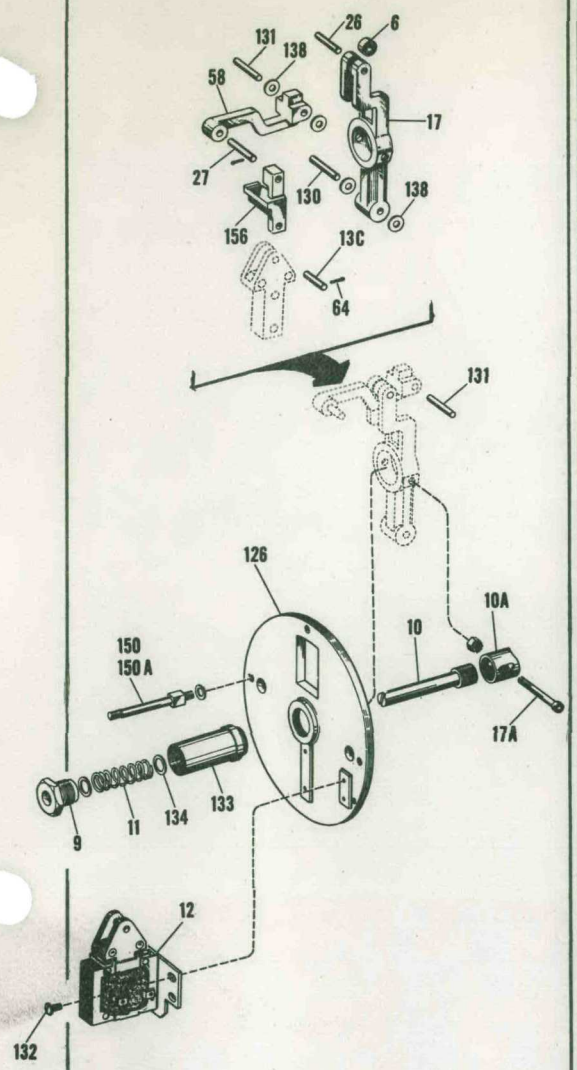


TABLE NO. 1

ITEM NO.	DESCRIPTION	OLD STOCK NO.	NEW STOCK NO.	LIST PRICE EACH	QTY.	WHERE USED: BRAKE SIZE 72	72A	72B	72C	74	74A	76	76A	REGISTER 9	11	CURRENT AC	DC	OPEN	ENCLOSED	MOUNTING POSITION HORIZ.	V.A.	V.B.	MISC. VARIABLES
2	END PLATE — 9 REGISTER — OPEN — HORIZ. MTG.	270H	8-002-701-1	$ 38.00	1	X	X	X	X					X		X	X	X		X		X	
	END PLATE — 9 REGISTER — OPEN — HORIZ. MTG.	271H	8-002-702-1	55.25	1					X	X			X		X	X	X		X		X	SPECIFY
	END PLATE — 9 REGISTER — OPEN — HORIZ. MTG.	274H	8-002-703-1	65.25	1							X	X	X		X	X	X		X		X	
	END PLATE — 11 REGISTER — OPEN — HORIZ. MTG.	275H	8-002-704-1	42.00	1	X	X	X	X						X	X	X	X		X		X	LEAD
	END PLATE — 11 REGISTER — OPEN — HORIZ. MTG.	272H	8-002-705-1	69.25	1					X	X				X	X	X	X		X		X	
	END PLATE — 11 REGISTER — OPEN — HORIZ. MTG.	273H	8-002-706-1	71.50	1							X	X		X	X	X	X		X		X	WIRE
	END PLATE — 9 REGISTER — OPEN — VERT. ABOVE MTG.		8-002-701-3	42.00	1	X	X	X	X					X		X	X	X			X		
	END PLATE — 9 REGISTER — OPEN — VERT. ABOVE MTG.		8-002-702-3	63.25	1					X	X			X		X	X	X			X		CONNEC-
	END PLATE — 9 REGISTER — OPEN — VERT. ABOVE MTG.		8-002-703-3	77.25	1							X	X	X		X	X	X			X		
	END PLATE — 11 REGISTER — OPEN — VERT. ABOVE MTG.		8-002-704-3	46.00	1	X	X	X	X						X	X	X	X			X		TION
	END PLATE — 11 REGISTER — OPEN — VERT. ABOVE MTG.		8-002-705-3	77.25	1					X	X				X	X	X	X			X		
	END PLATE — 11 REGISTER — OPEN — VERT. ABOVE MTG.		8-002-706-3	83.50	1							X	X		X	X	X	X			X		WHEN
2A	END PLATE — 9 REGISTER — ENC. — HORIZ. MTG.	2A70H	8-002-735-1	50.75	1	X	X	X	X					X		X	X		X	X		X	
	END PLATE — 9 REGISTER — ENC. — HORIZ. MTG.	2A71H	8-002-736-1	67.25	1					X	X			X		X	X		X	X		X	ORDERING
	END PLATE — 9 REGISTER — ENC. — HORIZ. MTG.	2A74H	8-002-737-1	77.25	1							X	X	X		X	X		X	X		X	
	END PLATE — 11 REGISTER — ENC. — HORIZ. MTG.	2A75H	8-002-738-1	54.75	1	X	X	X	X						X	X	X		X	X		X	END
	END PLATE — 11 REGISTER — ENC. — HORIZ. MTG.	2A72H	8-002-739-1	81.25	1					X	X				X	X	X		X	X		X	
	END PLATE — 11 REGISTER — ENC. — HORIZ. MTG.	2A73H	8-002-740-1	83.50	1							X	X		X	X	X		X	X		X	PLATES
	END PLATE — 9 REGISTER — ENC. — VERT. ABOVE MTG.		8-002-735-2	54.75	1	X	X	X	X					X		X	X		X		X		
	END PLATE — 9 REGISTER — ENC. — VERT. ABOVE MTG.		8-002-736-2	75.25	1					X	X			X		X	X		X		X		
	END PLATE — 9 REGISTER — ENC. — VERT. ABOVE MTG.		8-002-737-2	89.25	1							X	X	X		X	X		X		X		
	END PLATE — 11 REGISTER — ENC. — VERT. ABOVE MTG.		8-002-738-2	58.75	1	X	X	X	X						X	X	X		X		X		
	END PLATE — 11 REGISTER — ENC. — VERT. ABOVE MTG.		8-002-739-2	89.25	1					X	X				X	X	X		X		X		
	END PLATE — 11 REGISTER — ENC. — VERT. ABOVE MTG.		8-002-740-2	95.50	1							X	X		X	X	X		X		X		
3	STATIONARY DISC — HORIZ. MTG.	370H	8-003-701-1	18.00		0	0	0	0	1	1	2	2	X	X	X	X	X	X	X			
3V	STATIONARY DISC — VERTICAL MTG.	3V70H	8-003-701-2	18.25		0	0	0	0	1	1	2	2	X	X	X	X	X	X	X		X	X
4	FRICTION DISC	480	8-004-701	7.90		1	1	1	1	2	2	3	3	X	X	X	X	X	X	X	X	X	X
5	PRESSURE PLATE — HORIZ. ONLY MTG.	570H	8-005-701-1	14.25	1					X	X	X	X	X	X	X	X	X	X	X			
	PRESSURE PLATE — HORIZ. AND VERT. BELOW MTG.	570H	8-005-701-1	14.25	1	X	X	X	X					X	X	X	X	X	X	X			X
5B	PRESSURE PLATE — VERT. BELOW ONLY	5B70H	8-005-701-3	14.75	1					X	X	X	X	X	X	X	X	X	X				X
5T	PRESSURE PLATE — VERT. ABOVE	5T70H	8-005-701-2	14.75	1	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		
7	HOUSING — 9 REGISTER	770H	8-007-701-1	17.00	1	X	X	X		X		X		X		X	X	X	X	X	X	X	
	HOUSING — 9 REGISTER	772H	8-007-702-1	19.75	1				X		X		X	X		X	X	X	X	X	X	X	
	HOUSING — 11 REGISTER	771H	8-007-703-1	20.50	1	X	X	X		X		X			X	X	X	X	X	X	X	X	
	HOUSING — 11 REGISTER	773H	8-007-704-1	21.25	1				X		X		X		X	X	X	X	X	X	X	X	
15	HOUSING NUT	1570H	8-015-701	.75		X	X	X	X	X	X	X	X	2	4	X	X	X	X	X	X	X	SPECIFY
15B	*GASKET, HOUSING NUT*	15B70H	8-167-701	.10		X	X	X	X	X	X	X	X	2	4	X	X		X	X	X	X	SHAFT
16	HUB — OPEN	1680	8-016-701	12.00	1	X	X	X	X					X	X	X	X	X		X	X	X	DIAMETER
	HUB — OPEN	1681	8-016-702	14.75	1					X	X			X	X	X	X	X		X	X	X	(BORE) AND
	HUB — OPEN	1682	8-016-703	18.25	1							X	X	X	X	X	X	X		X	X	X	KEYWAY
16A	HUB — ENCLOSED	16A80	8-016-704	16.75	1	X	X	X	X					X	X	X	X		X	X	X	X	WHEN
	HUB — ENCLOSED	16A81	8-016-705	18.75	1					X	X			X	X	X	X		X	X	X	X	ORDERING
	HUB — ENCLOSED	16A82	8-016-706	21.00	1							X	X	X	X	X	X		X	X	X	X	HUBS
25	MOUNTING BOLTS FOR FLOOR MOUNTING	2570H	9-17-1412	.80	4	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	
33	(HUB) SET SCREW	3380	9-20-1108	.20	2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	FLOOR
34	FLOOR MOUNTING BRACKET	3470H	8-034-701-1	29.00	1	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	MTD. ONLY
36	WEAR ADJUSTMENT PIPE PLUG	3670H	8-136-701	.30	1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
59	RELEASE SPRING	5970H	8-059-701	.25		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
61A	VERTICAL MOUNTING PIN — ABOVE	61A70H	8-061-701	.50	3	X	X	X	X					X		X	X	X	X		X		
	VERTICAL MOUNTING PIN — ABOVE	61A71H	8-061-702	.50	3					X	X			X		X	X	X	X		X		
	VERTICAL MOUNTING PIN — ABOVE	61A72H	8-061-703	.50	3							X	X	X		X	X	X	X		X		
	VERTICAL MOUNTING PIN — ABOVE	61A73H	8-061-704	.50	3	X	X	X	X						X	X	X	X	X		X		
	VERTICAL MOUNTING PIN — ABOVE	61A74H	8-061-705	.50	3					X	X				X	X	X	X	X		X		
	VERTICAL MOUNTING PIN — ABOVE	61A75H	8-061-706	.50	3							X	X		X	X	X	X	X		X		
61	VERTICAL MOUNTING PIN — BELOW	6171H	9-29-4719	.50	3					X	X			X	X	X	X	X	X			X	
	VERTICAL MOUNTING PIN — BELOW	6172H	9-29-4727	.50	3							X	X	X	X	X	X	X	X			X	
62A	VERTICAL MOUNTING SPRING — RED	62A70H	8-062-701	.50	3	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		
	VERTICAL MOUNTING SPRING — RED	62A70H	8-062-701	.50	3							X	X	X	X	X	X	X	X			X	
62B	VERTICAL MOUNTING SPRING — WHITE	62B70H	8-062-702	.50	3					X	X	X	X	X	X	X	X	X	X		X		
62C	VERTICAL MOUNTING SPRING — BLUE	62C70H	8-062-703	.50	3							X	X	X	X	X	X	X	X		X		
62D	VERTICAL MOUNTING SPRING — GREEN	62D70H	8-062-704	.50	3					X	X	X	X	X	X	X	X	X	X			X	
69	GASKET, HOUSING TO END PLATE — 9 REG. — ENC.	6970H	8-069-701	2.00	1	X	X	X	X	X	X	X	X	X		X	X		X	X	X	X	
69A	GASKET, HOUSING TO END PLATE — 11 REG. — ENC.	6971H	8-069-702	2.30	1	X	X	X	X	X	X	X	X		X	X	X		X	X	X	X	
71	(SUPPORT PLATE) MACHINE SCREW	7170H	9-12-3014	.10	3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
71A	(SUPPORT PLATE) LOCKWASHER	71A70H	9-45-1310	.10	3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
78	NAME PLATE	7870H	8-078-001	.10	1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
78S	(NAME PLATE) DRIVE SCREW	7870H	9-25-1303	.05	4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
139	LEAD WIRE AND TERMINAL ASSEMBLY (SET OF 2)	13980	5-39-0124	1.65	1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
140	LEAD WIRE BUSHING — POSITION "D" — INT. CONN. ONLY	140A70H	8-140-017	.70																			INTERNAL
	LEAD WIRE BUSHING — POSITION "A" — INT. CONN. ONLY		8-140-005	.70	1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	CONNECTIONS
	LEAD WIRE BUSHING — ALL OTHER POS. — INT. CONN. ONLY	14070H	8-140-037	.70																			ONLY
142	SUPPORT PLATE ASSEMBLY, #5 SOL., AC (WITH STD. COIL)			129.25	1	X								X	X	X	X		X	X	X	X	Specify
	SUPPORT PLATE ASSEMBLY, #5 SOL., DC (WITH STD. COIL)		SEE	185.25	1	X								X	X		X	X	X	X	X	X	Coil Stock
	SUPPORT PLATE ASSEMBLY, #6 SOL., AC (WITH STD. COIL)		TABLE	146.50	1		X	X		X		X		X	X	X	X		X	X	X	X	No. (from
	SUPPORT PLATE ASSEMBLY, #6 SOL., DC (WITH STD. COIL)		NO. 2	203.25	1		X	X		X		X		X	X		X	X	X	X	X	X	table No. 3)
	SUPPORT PLATE ASSEMBLY, #8 SOL., AC (WITH STD. COIL)			172.25	1				X		X		X	X	X	X		X	X	X	X	X	When ordering
	SUPPORT PLATE ASSEMBLY, #8 SOL., DC (WITH STD. COIL)			250.25	1				X		X		X	X	X		X	X	X	X	X	X	Support Plate
																							Assembly
145	(RELEASE ARM) MACHINE SCREW	14570H	9-10-0710	.10	1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
	(RELEASE ARM) LOCKWASHER	14570H	9-45-0607	.05	1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
146	RELEASE ARM	14670H	8-146-701-1	1.90	1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
148	RELEASE KNOB	14870H	8-148-503-1	5.15	1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

76 A



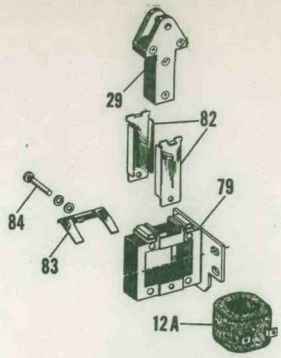


TABLE NO. 3 — SOLENOID COMPONENTS AND COILS

ITEM NO.	DESCRIPTION	#5 SOLENOID FOR H72 STOCK NO.	#5 SOLENOID FOR H72 PRICE EACH	#6 SOLENOID FOR H72A, 72B, 74 & 76 STOCK NO.	#6 SOLENOID FOR H72A, 72B, 74 & 76 PRICE EACH	#8 SOLENOID FOR H72C, 74A & 76A STOCK NO.	#8 SOLENOID FOR H72C, 74A & 76A PRICE EACH
12	SOLENOID ASSEMBLY LESS COIL	5-12-0051	45.75	5-12-0061	59.75	5-12-0081	73.50
	COMPONENTS FOR ABOVE ASSEMBLY						
29	PLUNGER	8-029-051	$31.00	8-029-061	39.50	8-029-081	$49.25
79	FRAME	8-079-051	31.00	8-079-061	39.50	8-079-081	49.25
82	COIL HOLDER — PLUNGER GUIDE (2)	8-082-051	4.90	8-082-061	4.90	8-082-081	6.25
83	COIL CLAMP	8-083-051	4.40	8-083-061	4.40	8-083-081	5.75
84	COIL CLAMP SCREW & WASHER	8-084-051	.40	8-084-061	.40	8-084-081	.50
12A	COIL — AC — 110 VOLTS, 60 CYCLES	6-1-51106	13.50	6-1-61106	14.50	6-1-81106	23.50
	COIL — AC — 208 VOLTS, 60 CYCLES	6-1-52086	13.50	6-1-62086	14.50	6-1-82086	23.50
	COIL — AC — 220 VOLTS, 60 CYCLES	6-1-52206	13.50	6-1-62206	14.50	6-1-82206	23.50
	COIL — AC — 440 VOLTS, 60 CYCLES	6-1-54406	13.50	6-1-64406	14.50	6-1-84406	23.50
	COIL — AC — 550 VOLTS, 60 CYCLES	6-1-55506	13.50	6-1-65506	14.50	6-1-85506	23.50
	COIL — AC — 110 VOLTS, 50 CYCLES	6-1-51105	13.50	6-1-61105	14.50	6-1-81105	23.50
	COIL — AC — 208 VOLTS, 50 CYCLES	6-1-52085	13.50	6-1-62085	14.50	6-1-82085	23.50
	COIL — AC — 220 VOLTS, 50 CYCLES	6-1-52205	13.50	6-1-62205	14.50	6-1-82205	23.50
	COIL — AC — 380 VOLTS, 50 CYCLES	6-1-53805	13.50	6-1-63805	14.50	6-1-83805	23.50
	COIL — AC — 440 VOLTS, 50 CYCLES	6-1-54405	13.50	6-1-64405	14.50	6-1-84405	23.50
	COIL — AC — 550 VOLTS, 50 CYCLES	6-1-55505	13.50	6-1-65505	14.50	6-1-85505	23.50
	COIL — AC — 110 VOLTS, 25 CYCLES	6-1-51102	13.50	6-1-61102	14.50	6-1-81102	23.50
	COIL — AC — 220 VOLTS, 25 CYCLES	6-1-52202	13.50	6-1-62202	14.50	6-1-82202	23.50
	COIL — AC — 440 VOLTS, 25 CYCLES	6-1-54402	13.50	6-1-64402	14.50	6-1-84402	23.50
	COIL — AC — 550 VOLTS, 25 CYCLES	6-1-55502	13.50	6-1-65502	14.50	6-1-85502	23.50
	COIL — AC — 110/220 VOLTS, 60 CYCLES	6-2-51106	29.50	6-2-61106	30.80	6-2-81106	38.50
	COIL — AC — 220/440 VOLTS, 60 CYCLES	6-2-52206	29.50	6-2-62206	30.80	6-2-82206	38.50
	COIL — DC — 115 VOLTS	6-1-51150	46.00	6-1-61150	47.75	6-1-81150	56.00
	COIL — DC — 230 VOLTS	6-1-52300	46.00	6-1-62300	47.75	6-1-82300	56.00

*Solenoid Assemblies complete with coil require, for identification, both the "Solenoid Assembly Less Coil" Stock Number and the Coil Stock Number. List prices for solenoid assemblies complete with coil are the sum of the list price for the coil and for the assembly less coil.

TABLE NO. 2 — SUPPORT PLATE (BRAKE MECHANISM) ASSEMBLY

ITEM NO.	DESCRIPTION	OLD STOCK NO.	NEW STOCK NO.	LIST PRICE EACH	NO. REQ'D	REGISTER	#9						#11					
						BRAKE SIZE	72		72A		72B 74 76	72C 74A 76A	72		72A		72B 74 76	72C 74A 76A
						CURRENT	AC	DC	AC	DC	AC	DC	AC	DC	AC	DC	AC	DC
						ASSEMBLY STOCK NUMBER	5-42-7001	5-42-7002	5-42-7003	5-42-7004	5-42-7005	5-42-7006	5-42-7007	5-42-7008	5-42-7011	5-42-7012	5-42-7013	5-42-7014	5-42-7015	5-42-7016	5-42-7017	5-42-7018
6	BALL BEARING	680	9-01-6801	$ 3.30	1		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
9	TORQUE ADJUSTMENT SCREW	970H	8-009-701	3.30	1		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10	WEAR ADJUSTMENT STUD — #5 AND #6 SOL.	1070H	8-010-701	3.30	1		X	X	X	X	X	X			X	X	X	X	X	X		
	WEAR ADJUSTMENT STUD — #8 SOL.	1071H	8-010-702	3.30	1								X	X							X	X
10A	WEAR ADJUSTMENT NUT	10A70H	8-110-701	3.30	1		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
11	PRESSURE SPRING	1181	8-011-701	2.45			X	X							X	X						
	PRESSURE SPRING	1182	8-011-702	2.45							X	X							X	X		
	PRESSURE SPRING	1183	8-011-703	2.45					X	X							X	X				
	PRESSURE SPRING	1184	8-011-704	2.45									X	X							X	X
12	SOLENOID ASSEMBLY — #5		SEE		1		X	X							X	X						
	SOLENOID ASSEMBLY — #6		TABLE		1				X	X	X	X					X	X	X	X		
	SOLENOID ASSEMBLY — #8		NO. 3		1								X	X							X	X
13C	SOLENOID LINK PIN — #5 SOL.	13C70H	8-012-701	.65	1		X	X							X	X						
	SOLENOID LINK PIN — #6 SOL.	13C71H	8-012-702	.65	1				X	X	X	X					X	X	X	X		
	SOLENOID LINK PIN — #8 SOL.	13C72H	8-012-703	.65	1								X	X							X	X
17	LEVER ARM — #5 AND #6 SOL.	1770H	8-017-701-1	7.00	1		X	X	X	X	X	X			X	X	X	X	X	X		
	LEVER ARM — #8 SOL.	1771H	8-017-701-2	7.00	1								X	X							X	X
17A	WEAR ADJUSTMENT CAP SCREW	17A70H	8-036-701	.80	1		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	(CAP SCREW) NUT		9-40-2810	.10	1		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
26	BEARING PIN	2680H	9-29-5022	.75	1		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
27	WEAR INDICATOR PIN	2780H	8-027-701	.65	1		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
58	SOLENOID LEVER — #5 AND #6 SOL.	5870H	8-008-701-1	5.10	1		X	X	X	X	X	X			X	X	X	X	X	X		
	SOLENOID LEVER — #8 SOL.	5871H	8-008-702-1	5.10	1								X	X							X	X
64	COTTER PIN	6470H	9-31-0308	.10	3		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
126	SUPPORT PLATE, AC	12670H	8-126-701-1	18.00	1		X		X		X		X		X		X		X		X	
	SUPPORT PLATE, DC		8-126-701-2	18.00	1			X		X		X		X		X		X		X		X
130	LEVER ARM PIVOT PIN	13070H	9-29-5036	.65	1		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
131	INDICATOR PIVOT PIN	13170H	9-29-5041	.40	1		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

76-B

(Continued on page 4)

TABLE NO. 2 — SUPPORT PLATE (BRAKE MECHANISM) ASSEMBLY (Continued)

ITEM NO.	DESCRIPTION	OLD STOCK NO.	NEW STOCK NO.	LIST PRICE EACH	NO. REQ'D	REGISTER	# 9						# 11						
						BRAKE SIZE	72		72A		72B 74 76		72C 74A 76A		72		72A		72B 74 76		72C 74A 76A	
						CURRENT	AC	DC	AC	DC	AC	DC	AC	DC	AC	DC	AC	DC	AC	DC	AC	DC
						ASSEMBLY STOCK NUMBER	5-42-7001	5-42-7002	5-42-7003	5-42-7004	5-42-7005	5-42-7006	5-42-7007	5-42-7008	5-42-7011	5-42-7012	5-42-7013	5-42-7014	5-42-7015	5-42-7016	5-42-7017	5-42-7018
132	SOLENOID MOUNTING SCREWS	13280	8-132-701	.10	3		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	(SOLENOID MOUNTING) LOCKWASHER		9-45-0828	.10	3		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
133	SUPPORT PLATE TUBE — #5 AND #6 SOL.	13370H	8-133-701	3.50	1		X	X	X	X	X	X			X	X	X	X	X	X		
	SUPPORT PLATE TUBE — #8 SOL.	13371H	8-133-702	4.70	1								X	X							X	X
134	PRESSURE SPRING WASHER	13480	8-134-701	.65	2		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
138	BEARING, WASHER TYPE	13880	8-138-101	.10	4		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
150	HOUSING STUD — #5 AND #6 SOL.	15070H	8-150-701	1.10			2	2	2	2	2	2			4	4	4	4	4	4		
150A	HOUSING STUD — #8 SOL.	150A70H	8-150-702	2.20									2	2							3	3
150B	HOUSING STUD BRACKET	150B70H	5-15-7001	4.40	1																X	X
	(HOUSING STUD) LOCKWASHER		9-45-0311	.05			2	2	2	2	2	2	2	2	4	4	4	4	4	4	4	4
156	RELEASE BAR — LINK — #5 AND #6 SOL.	15670H	8-156-701-1	1.75	1		X	X	X	X	X	X			X	X	X	X	X	X		
156A	RELEASE BAR — LINK — #8, SOL., AC	15671H	8-156-702-1	1.75	1								X								X	
	RELEASE BAR — LINK — #8 SOL., DC		8-156-702-2	1.75	1									X								X
157	DC SWITCH		5-57-0009	21.45				1		1		1		2		1		1		1		2
	(SWITCH MOUNTING) MACH. SCREW		9-10-2705	.10				2		2		2		4		2		2		2		4
	(SWITCH MOUNTING) LOCKWASHER		9-45-0307	.05				2		2		2		4		2		2		2		4
159	SWITCH MOUNTING BRACKET — #5 AND #6 SOL., DC		8-159-701	1.65	1			X		X		X				X		X		X		
	SWITCH MOUNTING BRACKET — #8 SOL., DC		8-159-702	1.65	1									X								X
	SWITCH BRACKET MACH. SCREW		8-132-701	.10	2			X		X		X		X		X		X		X		X
	(SWITCH BRACKET) LOCKWASHER		9-45-0828	.05	2			X		X		X		X		X		X		X		X
160	SWITCH TRIPPER — #8 SOL., DC		8-160-701	.65	1									X								X
	(SWITCH TRIPPER) MACH. SCREW, #8 SOL., DC		9-10-0506	.10	2									X								X
	(SWITCH TRIPPER) LOCKWASHER, #8 SOL., DC		9-45-0305	.05	2									X								X

VERTICAL MOUNTING COMPONENTS USED IN BRAKES MANUFACTURED AFTER JUNE, 1960 (STARTING WITH SERIAL NO. B-297697)

ITEM NO.	DESCRIPTION	STOCK NO.	LIST PRICE EACH	NO. REQ'D	WHERE USED												MOUNTING POSITION	
					H-70 BRAKE SIZES								REG-ISTER		OPEN	ENCLOSED		
					72	72A	72B	72C	74	74A	76	76A	9	11			V.A.	V.B.
2	END PLATE — 9 REG. — OPEN — HORIZ. AND VERT. BELOW	8-002-701-1	$ 38.00	1	X	X	X	X					X		X			X
	END PLATE — 9 REG. — OPEN — VERT. ABOVE	8-002-701-4	42.00	1	X	X	X	X					X		X		X	
	END PLATE — 9 REG. — OPEN — VERT. ABOVE AND BELOW	8-002-702-4	63.25	1					X	X			X		X		X	X
	END PLATE — 9 REG. — OPEN — VERT. ABOVE AND BELOW	8-002-703-4	77.25	1							X	X	X		X		X	X
	END PLATE — 11 REG. — OPEN — HORIZ. AND VERT. BELOW	8-002-704-1	42.00	1	X	X	X	X						X	X			X
	END PLATE — 11 REG. — OPEN — VERT. ABOVE	8-002-704-4	46.00	1	X	X	X	X						X	X		X	
	END PLATE — 11 REG. — OPEN — VERT. ABOVE AND BELOW	8-002-705-4	77.25	1					X	X				X	X		X	X
	END PLATE — 11 REG. — OPEN — VERT. ABOVE AND BELOW	8-002-706-4	83.50	1							X	X		X	X		X	X
2A	END PLATE — 9 REG. — ENC. — HORIZ. AND VERT. BELOW	8-002-735-1	50.75	1	X	X	X	X					X			X		X
	END PLATE — 9 REG. — ENC. — VERT. ABOVE	8-002-735-4	54.75	1	X	X	X	X					X			X	X	
	END PLATE — 9 REG. — ENC. — VERT. ABOVE AND BELOW	8-002-736-4	75.25	1					X	X			X			X	X	X
	END PLATE — 9 REG. — ENC. — VERT. ABOVE AND BELOW	8-002-737-4	89.25	1							X	X	X			X	X	X
	END PLATE — 11 REG. — ENC. — HORIZ. AND VERT. BELOW	8-002-738-1	54.75	1	X	X	X	X						X		X		X
	END PLATE — 11 REG. — ENC. — VERT. ABOVE	8-002-738-4	58.75	1	X	X	X	X						X		X	X	
	END PLATE — 11 REG. — ENC. — VERT. ABOVE AND BELOW	8-002-739-4	89.25	1					X	X				X		X	X	X
	END PLATE — 11 REG. — ENC. — VERT. ABOVE AND BELOW	8-002-740-4	95.50	1							X	X		X		X	X	X
3	STATIONARY DISC — VERT. MTG.	8-003-701-4	18.25		0	0	0	0	1	1	2	2	X	X	X	X	X	X
5	PRESSURE PLATE	8-005-701-4	14.75	1	X	X	X	X	X	X	X	X	X	X	X	X	X	X
61	VERTICAL MOUNTING PIN	8-061-711	.75	3	X	X	X	X					X	X	X	X	X	X
	VERTICAL MOUNTING PIN	8-061-712	.75	3					X	X			X	X	X	X	X	X
	VERTICAL MOUNTING PIN	8-061-713	.75	3							X	X	X	X	X	X	X	X
62	VERTICAL MOUNTING SPRING — BLUE (62C80)	8-062-803	.50		3	3	3	3	6	6	9	9	X	X	X	X	X	X
62S	SPRING SPACER	8-141-702	.15		0	0	0	0	3	3	9	9	X	X	X	X	X	X

REPRESENTATIVES AND/OR DISTRIBUTORS

ATLANTA, GEORGIA
BALTIMORE, MARYLAND
BEAUMONT, TEXAS
BUFFALO, NEW YORK
CAMBRIDGE, MASSACHUSETTS
CHARLOTTE, NORTH CAROLINA
CHATTANOOGA, TENNESSEE
CHICAGO, ILLINOIS
CINCINNATI, OHIO
CLEVELAND, OHIO
DALLAS, TEXAS
DENVER, COLORADO
DETROIT, MICHIGAN
EL PASO, TEXAS
GRAND RAPIDS, MICHIGAN
GREENSBORO, NORTH CAROLINA
GREENVILLE, SOUTH CAROLINA
HARRISBURG, PENNSYLVANIA
HOLYOKE, MASSACHUSETTS
HOUSTON, TEXAS
KALAMAZOO, MICHIGAN
KANSAS CITY, MISSOURI
LOS ANGELES, CALIFORNIA
LONG BEACH, CALIFORNIA
LUBBOCK, TEXAS
MEMPHIS, TENNESSEE
McALLEN, TEXAS
MILWAUKEE, WISCONSIN
MINNEAPOLIS, MINNESOTA
MUSKEGON HEIGHTS, MICHIGAN
NEW ORLEANS, LOUISIANA
NEW YORK, NEW YORK
OMAHA, NEBRASKA
PEORIA, ILLINOIS
PHILADELPHIA, PENNSYLVANIA
PHOENIX, ARIZONA
PITTSBURGH, PENNSYLVANIA
PORTLAND, OREGON
PROVIDENCE, RHODE ISLAND
READING, PENNSYLVANIA
RICHMOND, VIRGINIA
ROCKFORD, ILLINOIS
ROCK ISLAND, ILLINOIS
SALT LAKE CITY, UTAH
SAN FRANCISCO, CALIFORNIA
SAN LEANDRO, CALIFORNIA
SEATTLE, WASHINGTON
SOUTH BEND INDIANA
SPRINGFIELD, MASSACHUSETTS
ST. LOUIS, MISSOURI
YOUNGSTOWN, OHIO

CONSULT YOUR TELEPHONE DIRECTORY FOR LOCAL STEARNS REPRESENTATIVE OR BRAKE REPAIR PART DISTRIBUTOR

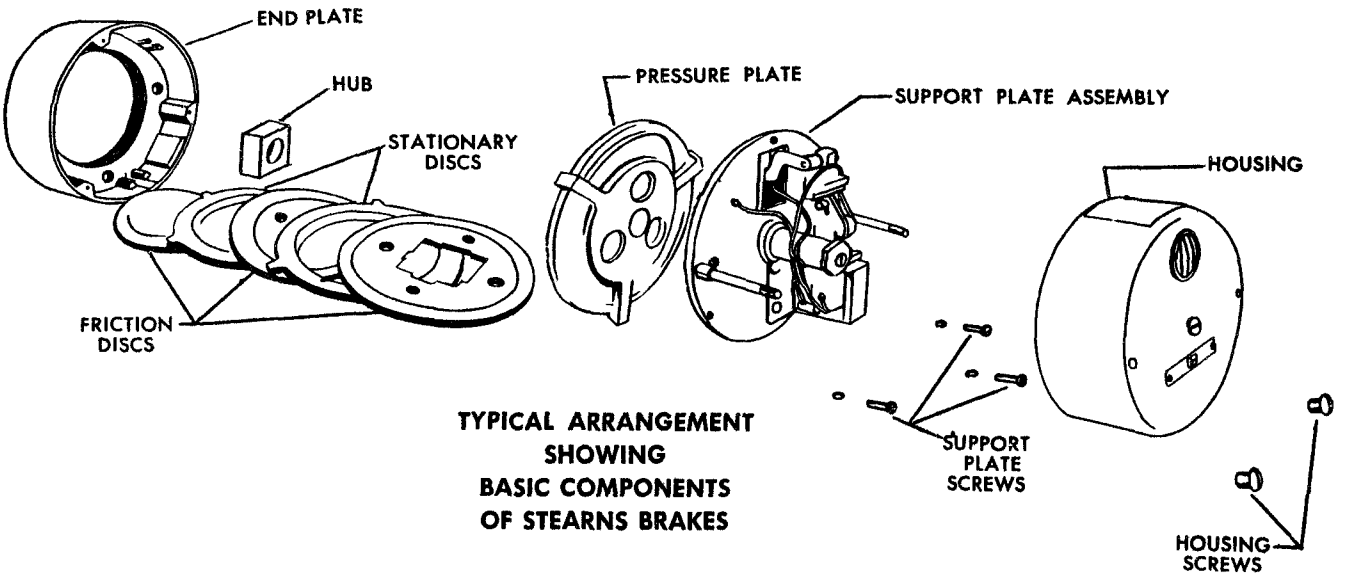
STEARNS ELECTRIC CORPORATION

120 N. Broadway, Milwaukee 2, Wis.

b. Magnetic Brake Coil Replacement

1. Disconnect solenoid from circuit.
2. Remove solenoid link pin.
3. Lift plunger from solenoid frame.
4. Remove coil clamp, screw and lockwasher.
5. Slide coil sideways from frame. To reassemble, follow preceding steps in reverse order.

c. Magnetic Brake, Renewal of Friction Discs



TYPICAL ARRANGEMENT SHOWING BASIC COMPONENTS OF STEARNS BRAKES

1. Dismantling: Remove housing screws, housing, support plate screws, support plate assembly, pressure plate, friction disc and stationary disc.

2. Reassemble friction discs and pressure plate. To insure proper brake operation, be sure that the friction disc moves freely, but not loosely, on hub. If snug, file internal edges lightly until free movement is attained.

3. Turn out (reverse direction than for adjusting) adjusting stud to compensate for adjustments that had been made to brake. For proper direction, see Paragraph J, Page 58, before assembling the support plate assembly to the endplate. If it becomes difficult to tighten the support plate screws, turn out the adjusting stud further.

4. Adjust brake as described in Paragraph J, Page 58.

5. Replace housing and housing screws.

Life-Line® starters and contactors

type N • size one

non-reversing and reversing two, three, four, and five pole

general

This data presents the most frequently used renewal parts for size 1 type N Life-Line starters and Life-Line contactors of current design.

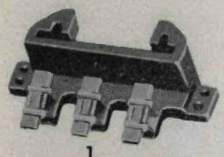
Information on parts not shown may be obtained at the nearest Westinghouse office. Please advise class and style number of complete starter when requesting this information.

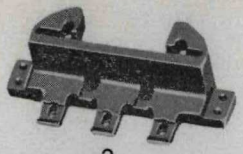
style numbers:

starters				contactors	
non-reversing style number			reversing style number	non-reversing style number	reversing style number
2-pole					
133A824G01 to 11 133A956G01 to 11 133A957G01 to 11 133A958G01 to 11 453D212G02 ▲				133A851G01 to11 133A852G01 to 11 △ 133A994G01 to 11 133A995G01 to 11 △ 453D212G01 △ ▲ 453D212G03 ▲	
3-pole					
133A247G01, 02+ 133A826G01 to 11 133A827G01 to 04 133A828G01 to 03 ◉ 133A830G01 to 03 133A960G01 to 07, 10 133A961G01 to 11 133A962G01 to 11 133A963G01 to 11 133A964G01 to 11+ 133A965G01 to 07 133A966G01 to 11 133A971G01 to 11 133A972G01 to 11 133A973G01 to 11 133A974G01 to 04 133A975G01 to 04 133A976G01 to 04 133A977G01 to 11 133A978G01 to 11 133A979G01 to 11 133A980G01 to 11 133A981G01 to 11 133A982G01 to 11+ 134A052G01 to 3 134A250G01 to 11 134A251G01 to 11 134A252G01 to 11 134A253G01 to 11 134A254G01 to 11 134A255G01 to 11 134A256G01 to 11 134A257G01 to 11 134A258G01 to 11 134A259G01, 02 134A260G01 134A261G01 134A262G01 to 13 134A263G01 to 13 134A264G01 to 13	134A265G01 134A266G01 to 13 134A267G01 to 13 134A268G01 to 13 134A269G01 134A270G01 to 13 134A271G01 to 13 134A272G01 to 13 134A302G01 to 11 134A303G01, 02 134A304G01 to 03 134A305G01 to 11 134A306G01 to 11 134A307G01 to 11 134A309G01 to 07 134A310G01 to 04 134A311G01 to 12 134A312G01 to 04 134A313G01 to 04 134A314G01 to 04 134A315G01 to 04+ 134A316G01 to 04 134A317G01 to 04+ 134A318G01 to 12 134A319G01 to 12 134A320G01 to 12 134A321G01 to 05 134A322G01 to 08 134A323G01 to 12 134A324G01, 02 134A325G01, 02 134A327G01 to 08 134A328G01 to 03 134A329G01 to 04 134A330G01 to 04 134A331G01 to 04+ 134A332G01 to 04 134A333G01 to 04 134A334G01 to 04	134A335G01 to 08 134A336G01 to 12 134A337G01 to 03 134A338G01, 02 134A340G01 to 08 134A341G01 to 12 134A342G01 to 08 134A343G01 to 12 134A344G01, 02 134A345G01 to 04 134A346G01 to 14 134A347G01 to 14 134A348G01 to 14 134A349G01 134A350G01 to 14 134A351G01 to 14 134A352G01 to 14 134A353G01 134A354G01 to 14 134A355G01 to 14 134A356G01 to 14 134A382G01, 02 134A833G01 to 04 134A851G01 to 04 134A853G01 to 04 135A041G01 to 05 135A175G01 to 05 135A176G01 to 06 135A182G01 to 05 135A639G01 to 11 135A712G01, 02 135A713G01, 02 135A714G01 to 04 135A715G01 to 04 64A3076G02 ▲ 64A3076G05 ▲ 313C282G02+ ▲ 453D213G04 ▲ 453D213G05 ▲ 453D213G12 ▲	133A831G01 to 11 133A832G01 to 04 133A835G01 to 03 133A837G01 133A839G01 133A841G01 to 11+ ◉ 133A918G01 to 14 133A986G01 to 11 133A987G01 to 06, 09, 10 133A989G01 to 11 133A990G01 to 11 133A992G01 to 11 134A053G01 to 03 134A124G01 to 03+ ◉ 134A357G01, 02 134A358G01 to 11 134A359G01 to 04 134A360G01 to 12 134A361G01, 02 134A362G01 to 12 134A363G01 to 08 134A364G01 to 08 134A365G01 to 08 134A366G01 to 12 134A367G01 134A368G01 134A369G01 to 03 134A370G01 to 03 134A854G01 to 04 134A855G01 to 04 134A856G01 to 04 134A857G01 to 04 64A3076G04 ▲ 64A3076G06 ▲ 453D179G02 ▲ 453D179G05 ▲ 453D179G08 ▲ 453D210G04 ▲	133A855G01 to 11 133A857G01 to 11 △ 133A996G01 to 11 133A998G01 to 11 453D213G01 △ ▲ 453D213G03 ▲	133A844G01 to 11 453D179G01
4-pole					
133A829G01 to 11 133A967G01 to 11 133A968G01 to 11 133A969G01 to 11 133A983G01 to 11 453D214G02 ▲			133A838G01 to 11 133A988G01 to 11 133A993G01 to 11 453D217G02 ▲	133A859G01 to 11 133A860G01 to 11 △ 133A997G01 to 11 453D214G01 △ 453D214G03 ▲	
5-pole					
				133A863G01 to 11 453D215G02 ▲	

▲ Mechanical parts, style number, not supplied without coils, specify number coil desired
+ Three overload relays
△ No interlock
◉ No overload relays
I See page 2 for style number of individual replacement parts

June, 1960
supersedes rpd 11-000B1 dated December, 1958; rpd 11-001B1 dated October, 1959 and rpd 15-825A dated July, 1959
mailed to: E/587, 591, 593, 595, 636; D61-6A, C, S; C301, 305, 307, 309, 451

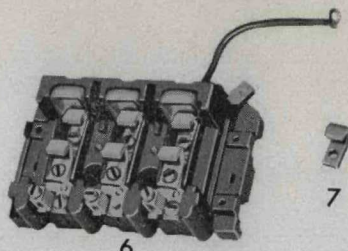

1


2


3

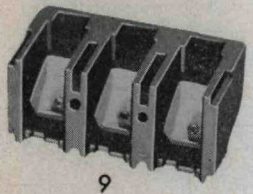

4

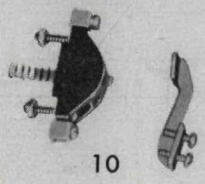

5

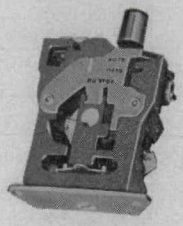

6

7


8


9


10


11


12

kits of normal wearing parts

Normal wearing parts for two and three pole Linestarters have been packaged in a single, easily identified contact kit. Each kit contains one moving contact, one moving contact spring and two stationary contacts for each pole. The contact kit for a two pole Linestarter is style number 1605 211 and for three pole is style number 1605 212. Two style number 1605 211 kits are used for a four pole Linestarter.

ordering information

- Name part and give its style number.
- State method of shipment desired.
- Send all orders or correspondence to nearest sales office of the Company.

reference number	description of part	style number of part				number used▲
		two pole	three pole	four pole	five pole	
1	cross bar complete	1774 346	1774 347	1605 215	1605 216	1
2	cross bar	1763 743	1763 743	1314 995	1314 996	1
3	moving contact	1314 985	1314 985	1314 985	1314 985	I1 per pole
4	contact spring	1314 961	1314 961	1314 961	1314 961	I1 per pole
5	moving contact support	1314 971	1314 971	1314 971	1314 971	I1 per pole
6	base complete	1605 217	1605 218	1605 219	1605 220	1
7	stationary contact	1314 986	1314 986	1314 986	1314 986	I2 per pole
8	kickout spring	1314 959	1314 959	1314 959	1314 959	1
9	arc box	1605 221	1605 221	1605 222	1605 223	1
10	interlock—normally open	453D976G05	453D976G05	453D976G05	453D976G05	1
	interlock—normally closed	453D976G06	453D976G06	453D976G06	453D976G06	▲used on reversing devices
11	overload relay	48A3454G03	48A3454G03	48A3454G03	48A3454G03	◉2
△	pushbutton unit (when used)	1400 797	1400 797	1400 797	1400 797	1
△	selector switch unit (when used)	1400 796	1400 796	1400 796	1400 796	1
12	operating coil	see table—order by voltage and frequency				
△	heater for relay	order by code number on heater or see price list 11-020				

Parts indented are included in the part under which they are indented.
△ Not illustrated
I Kits of normal wearing parts see copy above
◉ Not used on classes 11-205, 11-211 or contactors classes 15-815 and 15-825

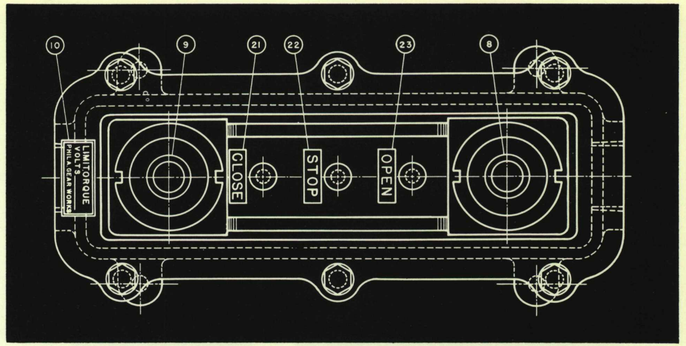
▲ Use double quantities for reversing devices except only two overload relays are used and they also use two normally closed interlocks.

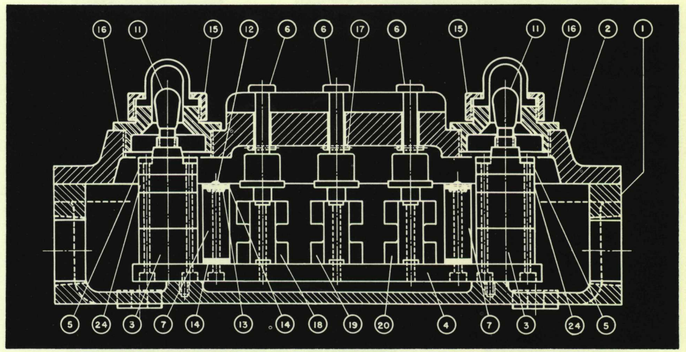
operating coils

number of poles	style number of operating coil											
	220v-60c 208v-60c 115v-60c	110 volt 60 cycle	220v-60c 208v-60c 110v-25c	440v-60c 380v-50c 220v-25c	550 volt 60 cycle	600 volt 60 cycle	110 volt 50 cycle	220 volt 50 cycle	440 volt 50 cycle	550 volt 50 cycle	440 volt 25 cycle	550 volt 25 cycle
two, three four	1605 513□	1470 241 1470 261	1470 242 1470 262	1470 243 1470 263	1470 244 1470 264	1470 245 1470 265	1470 246 1470 266	1470 247 1470 267	1470 248 1470 268	1470 249 1470 269	1470 250 1470 270	1470 251 1470 271

□ dual voltage coil.

PARTS LIST TYPE ALEX

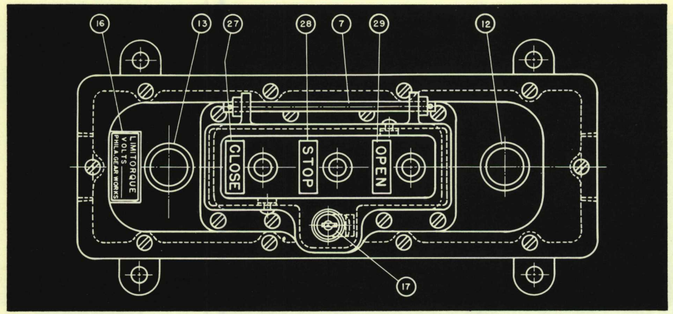


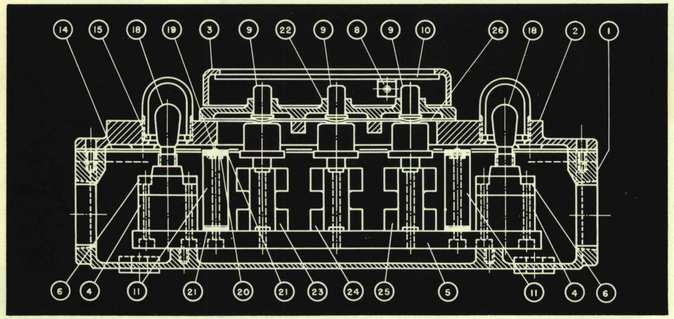


ITEM NO.	QUAN.	NAME	ITEM NO.	QUAN.	NAME
1	1	P.B. STATION BOX	13	2	RESISTOR—CUP-WASHER
2	1	P.B. STATION COVER	14	12	MICA WASHERS
3	4	RECEPTACLE SPACER	15	2	LENS—CLAMPING RING
4	1	SWITCH BASE	16	2	LENS—CL. RING ADAPTER
5	2	LAMP RECEPTACLE	17	3	STOP PIN
6	3	PUSH BUTTON PIN	18	1	CLOSE P.B. ELEMENT
7	2	IND. LAMP—RESISTOR	19	1	STOP P.B. ELEMENT
8	1	LENS—RED	20	1	OPEN P.B. ELEMENT
9	1	LENS—GREEN	21	1	CLOSE—NAMEPLATE
10	1	STATION—NAMEPLATE	22	1	STOP—NAMEPLATE
11	2	LAMP BULB	23	1	OPEN—NAMEPLATE
12	2	RESISTOR—SCREW	24	2	SHORT RECP. SPACER

80

PARTS LIST TYPE ALW





ITEM NO.	QUAN.	NAME	ITEM NO.	QUAN.	NAME
1	1	P.B. STATION BOX	16	1	STATION—NAMEPLATE
2	1	P.B. STATION COVER	17	1	YALE LOCK & KEYS
3	1	P.B. STATION DOOR	18	2	LAMP BULB
4	2	RECEPTACLE SPACER	19	2	RESISTOR—SCREW
5	1	SWITCH BASE	20	2	RESISTOR—CUP-WASHER
6	2	LAMP RECEPTACLE	21	12	MICA WASHERS
7	1	DOOR—HINGE PIN	22	1	P.B. STATION APRON
8	2	GLASS—RETAINER	23	1	CLOSE P.B. ELEMENT
9	3	PUSH BUTTON	24	1	STOP P.B. ELEMENT
10	1	P.B. DOOR—GLASS	25	1	OPEN P.B. ELEMENT
11	2	IND. LAMP—RESISTOR	26	1	APRON—GASKET
12	1	LENS—RED	27	1	CLOSE—NAMEPLATE
13	1	LENS—GREEN	28	1	STOP—NAMEPLATE
14	1	COVER—GASKET	29	1	OPEN—NAMEPLATE
15	2	LENS—GASKET			

LimiTorque® PHILADELPHIA GEAR CORPORATION
KING OF PRUSSIA (SUBURBAN PHILA.), PENNA.
Offices in all Principal Cities

INDUSTRIAL GEARS & SPEED REDUCERS • LIMITORQUE VALVE CONTROLS • FLUID MIXERS • FLEXIBLE COUPLINGS

Limitorque Corporation • Philadelphia

558-3M-BP

Printed in U.S.A.

80

BULLETIN NO. 11-55

PHILADELPHIA

LIMITORQUE

CONTROL STATIONS

TYPE ALW
opened

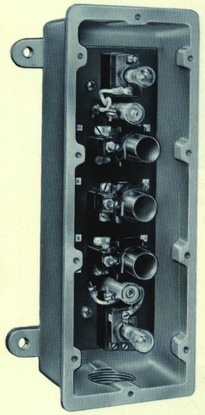


Fig. 1

LimiTorque Push Button Control Stations (Figs. 1 and 2) are designed for remote control of LimiTorque Valve Operators. They are easily mounted at any convenient location, either separately or in conjunction with a central plant control panel.

Operation of valves is completely automatic. "Open", "Stop", and "Close" buttons permit full control of LimiTorque-operated valves, wherever they are located. Red and green lights on the control station operate through limit switches, located in the LimiTorque unit, to indicate when valve is fully opened (red), fully closed (green) or at any intermediate position (red and green are both lighted). Push buttons are covered by break-glass door with Yale lock.

Voltage dropping resistors are mounted in Control Stations whenever control voltage exceeds 130 Volts. A.C. or D.C. Stations are available for either surface or flush mounting. A selector switch or additional indicator light is available where desired, except in type ALEX stations.

TYPE ALW
closed

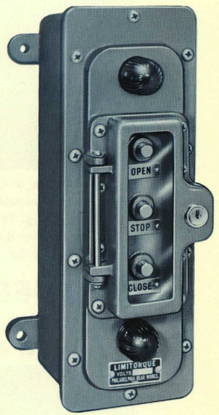


Fig. 2

TYPE	ENCLOSURE	BUTTONS	LIGHTS
AS	Sheet Steel NEMA I	3	2
AL	Cast Aluminum NEMA V	3	2
ALW	Cast Aluminum NEMA IV	3	2
ALEX	Cast Iron NEMA VII	3	2

All except "AS" and "ALEX" Stations have buttons covered by a break-glass door.

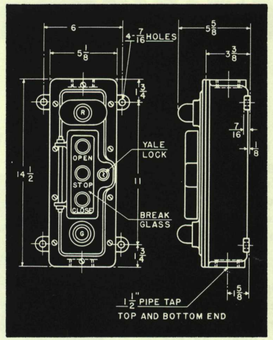
A PRODUCT OF PHILADELPHIA GEAR CORPORATION

80

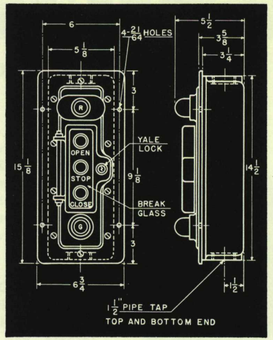
DUST TIGHT CONTROL STATION

TYPE AL

SURFACE MOUNTING



FLUSH MOUNTING

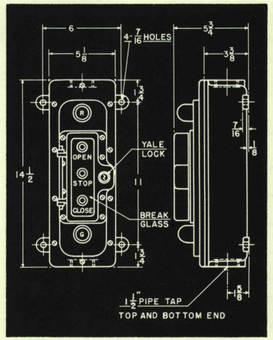


LimiTorque Push Button Control Station TYPE AL is enclosed in a heavy cast aluminum housing. This unit meets NEMA V requirements for dust tight construction. TYPE AL should be specified wherever atmospheric conditions require protection against dust infiltration. Please specify whether surface or flush mounting is desired.

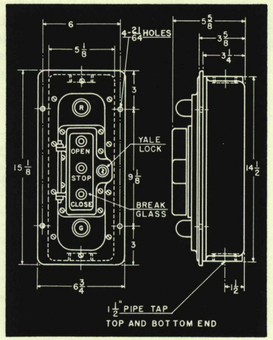
WEATHERPROOF CONTROL STATION

TYPE ALW

SURFACE MOUNTING



FLUSH MOUNTING

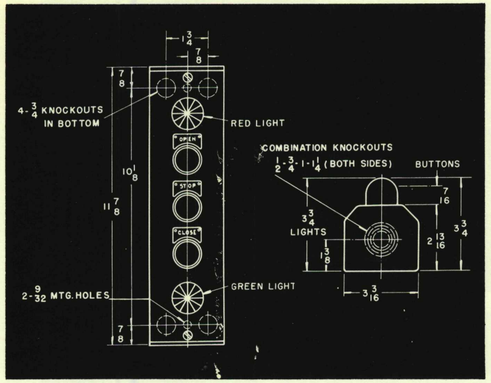


LimiTorque Push Button Control Station TYPE ALW is enclosed in a heavy cast aluminum housing. This unit meets NEMA IV requirements for weatherproof construction. TYPE ALW should be specified wherever mounting conditions require protection against weathering. Please specify whether surface or flush mounting is desired.

GENERAL PURPOSE CONTROL STATION

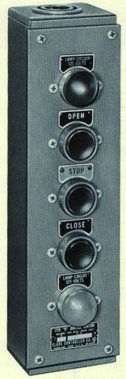
TYPE AS

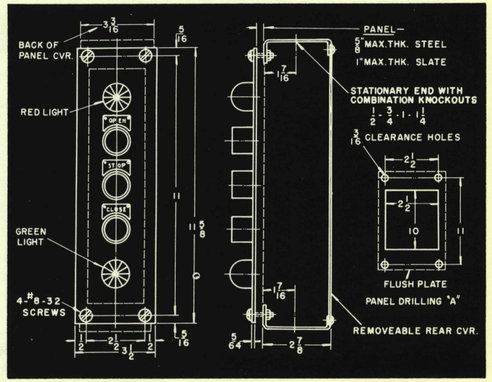
SURFACE MOUNTING



LimiTorque Push Button Control Station TYPE AS is enclosed in a sheet steel housing. This unit meets NEMA I requirements for general purpose electrical unit enclosures. TYPE AS should be specified for application indoors, where atmospheric conditions are normal. Please specify whether surface or flush mounting is desired.

FLUSH MOUNTING

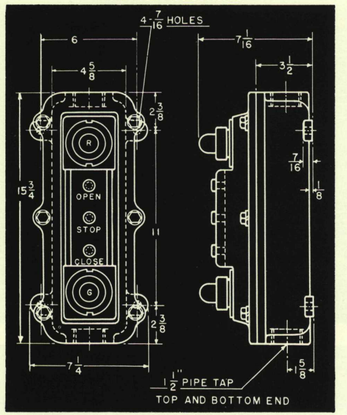


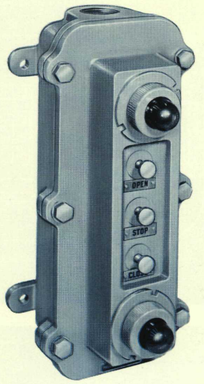


EXPLOSION PROOF CONTROL STATION

TYPE ALEX

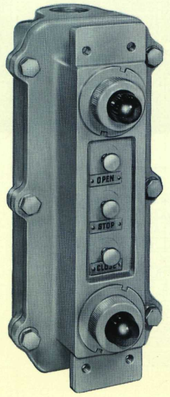
SURFACE MOUNTING

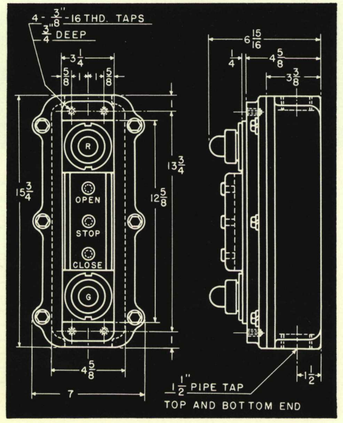


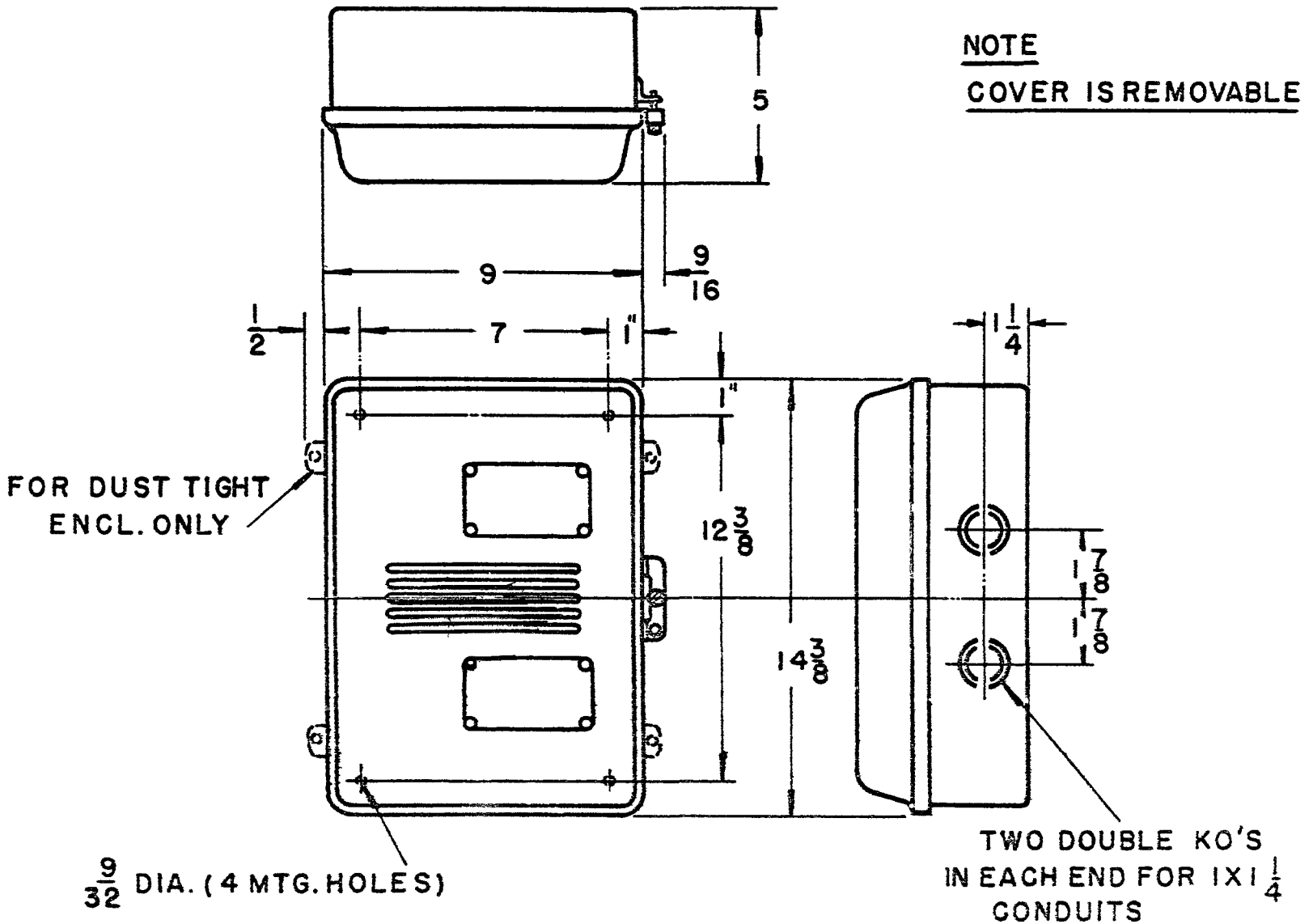


LimiTorque Push Button Control Station TYPE ALEX is enclosed in a cast iron housing. This unit meets NEMA VII requirements for Class 1, Group D hazardous locations. TYPE ALEX should be specified wherever atmospheric conditions necessitate adherence to these requirements. Please specify whether surface or flush mounting is desired.

FLUSH MOUNTING





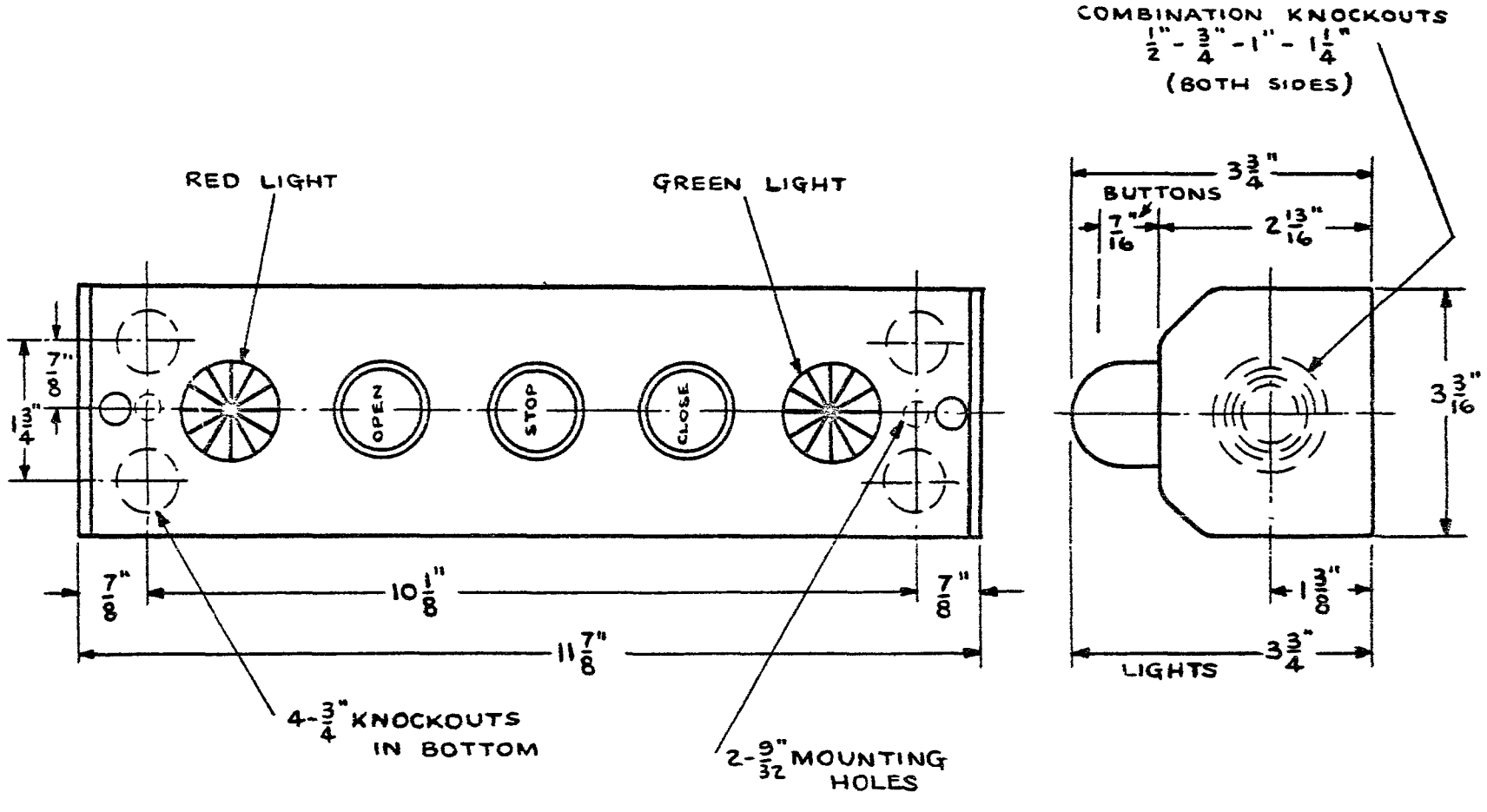


* DIMENSIONS IN INCHES

NEMA V DELETED IN TITLE
* REV. A NOTE ADDED 10-12-57

WESTINGHOUSE SIZE 081 NEMA 1 REVERSING CONTROLLER	PHILADELPHIA GEAR WORKS PHILADELPHIA, PENNA.	SUPERSEDES NO. L-41089	DRAWN R.J.G. C.J.S.	8-18-55 DATE
		SUPERSEDED BY NO.	SHEET NO. A-76993	

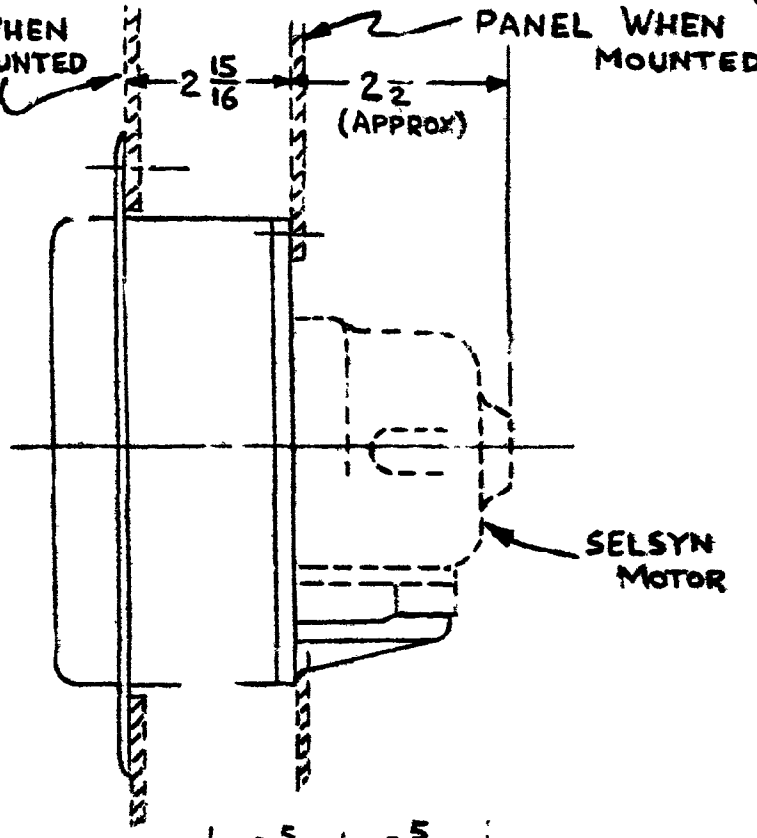
SH__. NO. _____

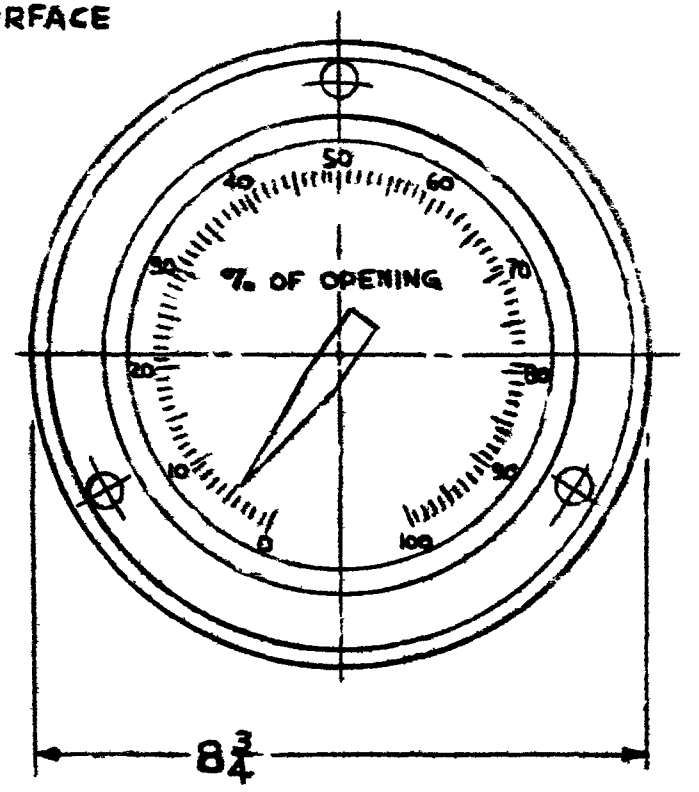


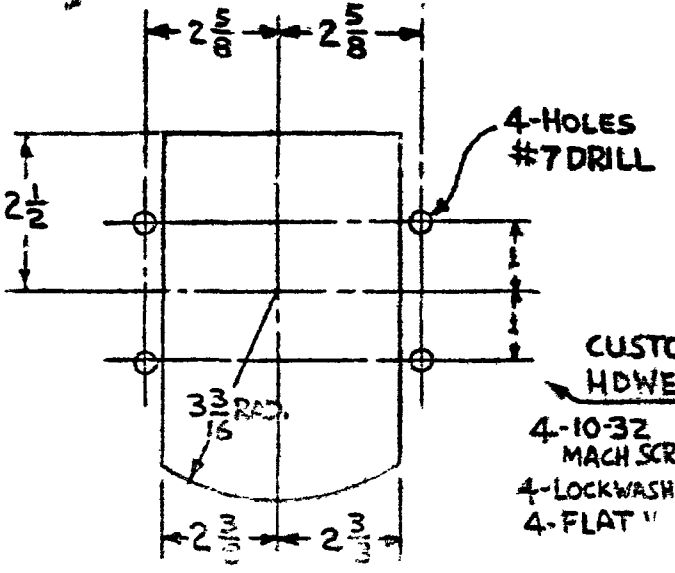
SURFACE MOUNTING

TYPE "AS"- 3B/2L P. B. STATION (NEMA I)	PHILADELPHIA GEAR WORKS PHILADELPHIA. PENNA.	SUPERSEDES NO.	DRAWN L.H. 10-25-49 DATE
		SUPERSEDED BY NO.	SHEET NO. A76088

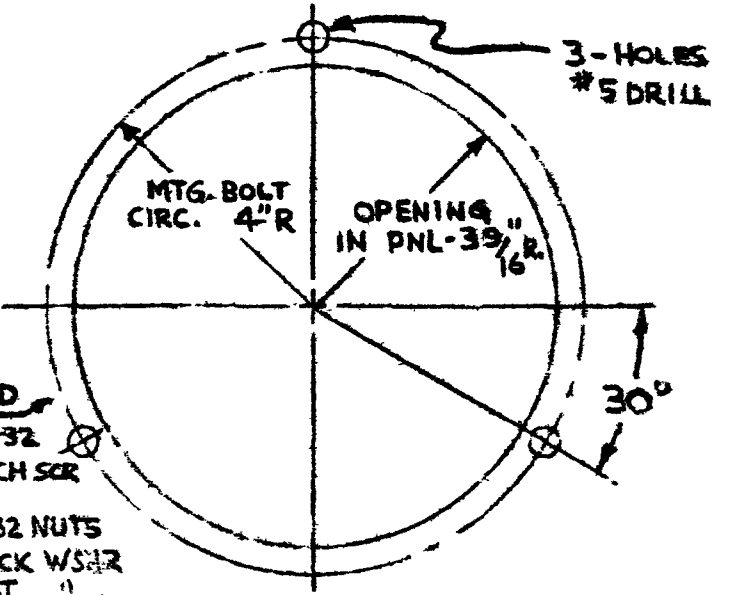
SHEET NO.







SURFACE MOUNTING



CUSTOMER HDWE. REQ'D

4-10-32 MACH SCR	3-10-32 MACH SCR
4-LOCKWASH	3-10-32 NUTS
4-FLAT "	3-LOCK WSHR
	3 FLAT "

FLUSH MOUNTING

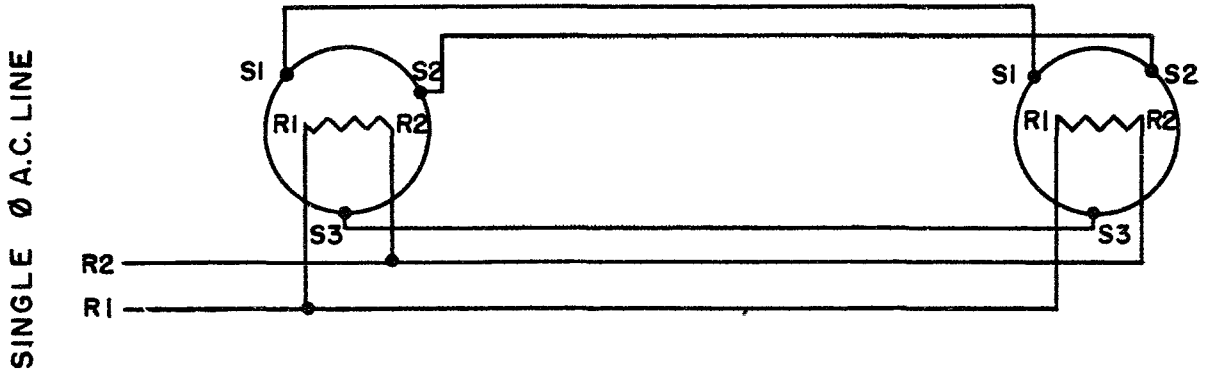
PHILA. GEAR WORKS REMOTE POSITION INDICATOR 6 1/2" DIAL

PHILADELPHIA GEAR WORKS
PHILADELPHIA PENNA.

SUPERSEDES No	DRAWN RJG 4-5-3 DATE
SUPERSEDED BY No.	SHEET No. A-76969

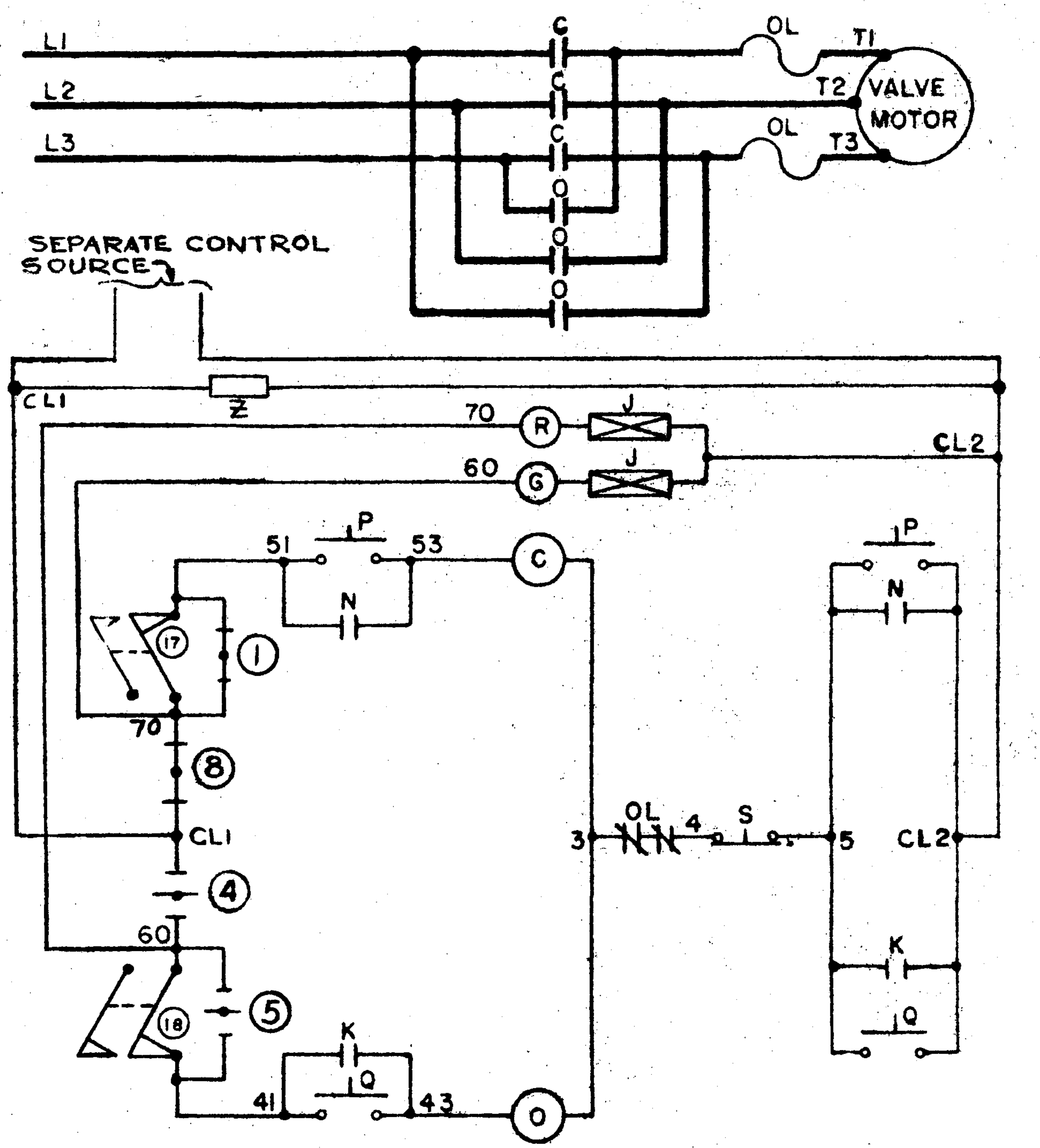
SHEET NO. A1874

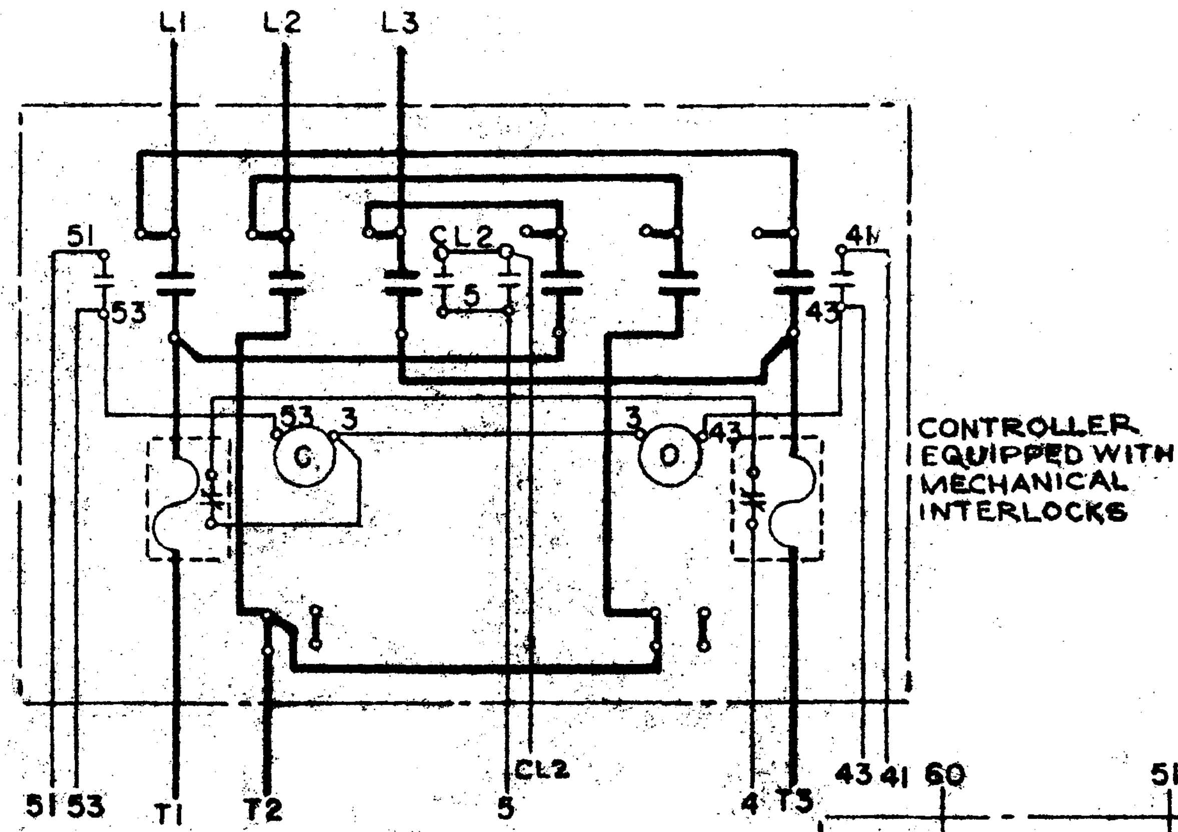
110 Volt 60 Cycle

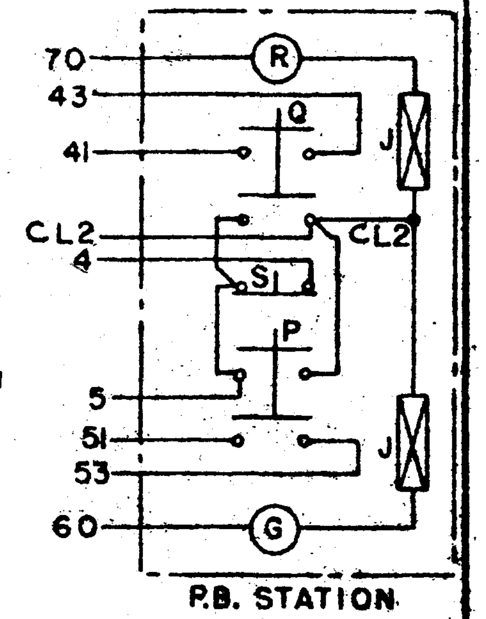


WIRING DIAGRAM-SELSYN TRANS— MITTER & RECIEVER	PHILADELPHIA GEAR WORKS PHILADELPHIA, PENNA.	SUPERSEDES NO.	DRAWN G.J.D. 11-5-40 DATE
		SUPERSEDED BY NO.	SHEET NO. A 1874

VALVE SHOWN IN THE FULL OPEN POSITION





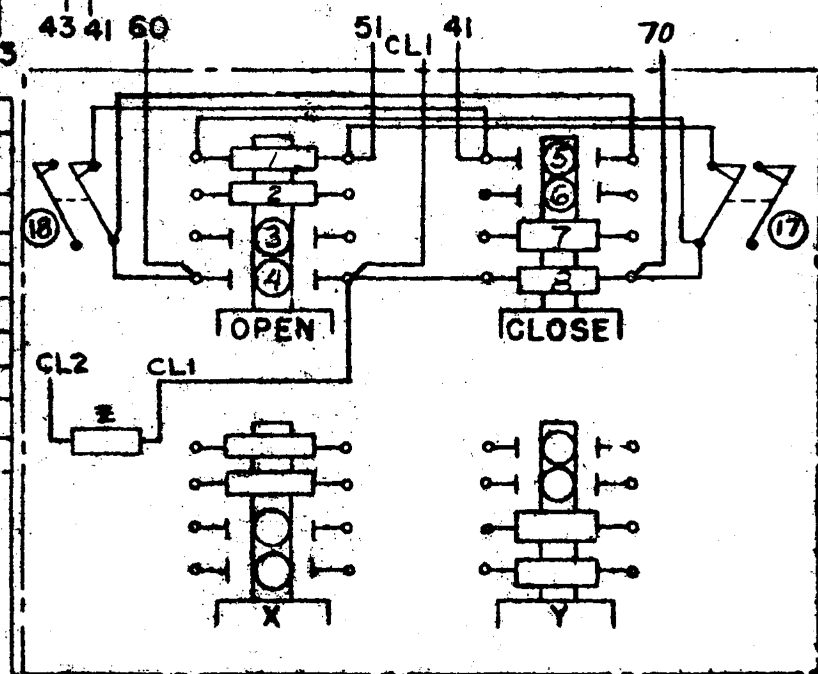


CONTACT	VALVE FULL OPEN	INTERMEDIATE VALVE POSITION	VALVE FULL CLOSED	CONTACT FUNCTION
1	CLOSED	OPEN	OPEN	BY PASS CIR.
2	CLOSED	OPEN	OPEN	SPARE
3	OPEN	CLOSED	CLOSED	SPARE
4	OPEN	CLOSED	CLOSED	OPEN LIMIT
5	OPEN	OPEN	CLOSED	BY PASS CIR.
6	OPEN	OPEN	CLOSED	SPARE
7	CLOSED	CLOSED	OPEN	SPARE
8	CLOSED	CLOSED	OPEN	CLOSE LIMIT

Table title: LIMIT SWITCH CONTACT DEVELOPMENT

X

Y



GEARED LIMIT SWITCHES

17-CLOSE TORQUE SWITCH INTERRUPTS CONTROL CIRCUIT IF MECHANICAL OVERLOAD OCCURS DURING CLOSING CYCLE
18-OPEN TORQUE SWITCH INTERRUPTS CONTROL CIRCUIT IF MECHANICAL OVERLOAD OCCURS DURING OPENING CYCLE
C-CLOSING CONTACTS & CONTACTOR
O-OPENING CONTACTS & CONTACTOR
R-RED INDICATOR LAMP
G-GREEN INDICATOR LAMP
J-LAMP RESISTOR
OL-OVERLOAD RELAY
S-STOP PUSHBUTTON
Q-OPEN PUSHBUTTON
P-CLOSE PUSHBUTTON
N-CLOSING CONTROL CIRCUIT HOLDING CONTACTS
K-OPENING CONTROL CIRCUIT HOLDING CONTACTS
Z-SPACE HEATER

X & Y-GEARED LIMIT SWITCHES MAY BE INDEPENDENTLY SET TO FUNCTION AT ANY DESIRED POINT OF VALVE TRAVEL

REVISIONS: A | MADE SEP. CONTROL SOURCE | 4-2-60

PHILADELPHIA GEAR WORKS — PHILA., PA.

OLD PART NO.
1ST ORDER NO. L-47087
LAST ORDER NO.
SUPERSEDES
SUPERSEDED BY
NO. REQ PER UNIT
DRN. J.G.A.
TR.
CHKD. JPG
APPD.
STOCK SIZE
ROUGH WT.
ALL MACHINED FRACTIONAL DIMENSIONS ± .010 UNLESS NOTED
NAME WIRING DIAGRAM
SCALE
MAT.
HEAT TREAT
DATE 5-9-60
Page 86
DWG. NO. B-69025

No. N13 W. B. & E. 100 6-55

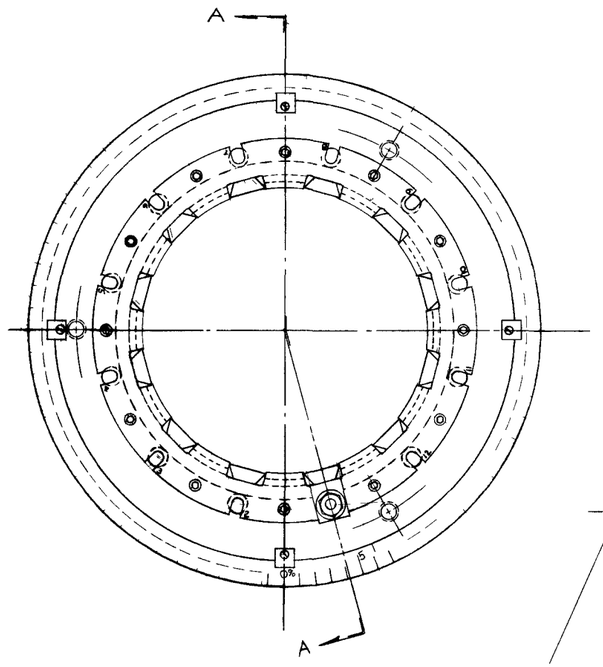
APPARATUS SODIUM FLOW CONTROLLER — SHEET NO.

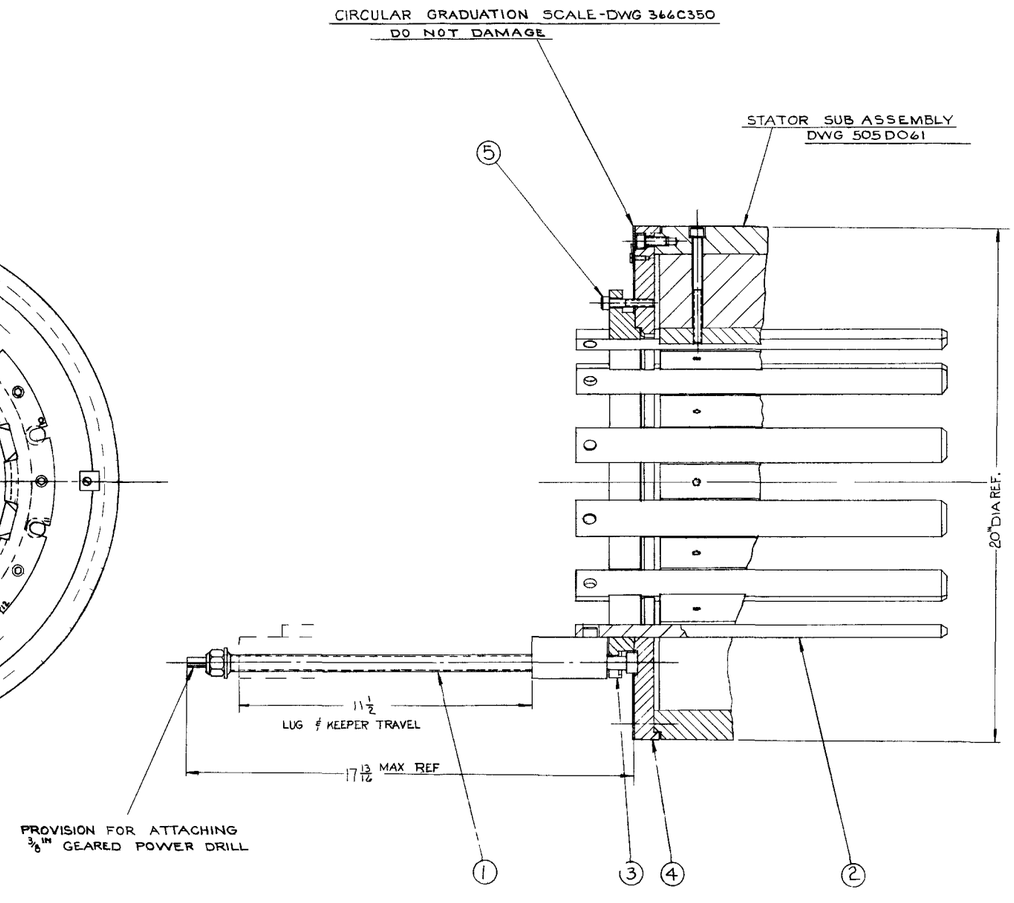
KEEPER REMOVING TOOL

DWG 772D217 SUB #3

SYM	ITEM	DESCRIPTION — MATERIAL DIMENSIONS IN INCHES	PATT No OR REF DWG.	FIN CH LINE No	STYLE No	SYM GR	FINISH CHART 1	2	3	4	5
	1	LIFT SCREW GR 1	366C360				1				
	2	KEEPER IT. 1	" 366C356				12				
	3	KEEPER GUIDE PLATE IT.1	" 366C359				1				
	4	TOP END PLATE IT.1	" 366C331				1				
	5	5/16 18×1 3/16 LG SOC. CYL. STL. CAP SCR	" 6553-13				REF 12				
	6	KEEPER REMOVING TOOL CASE									
		GR.1 772D225					1				

1- CLEAN ALL PARTS PRIOR TO ASSEMBLY PER PS 2.92600-1
2 LUBRICATE THREADS OF LIFT SCREW, ITEM 1. (MOBILE-FLEX EP#1 OR EQUAL)
3- WHEN INSERTING OR WITHDRAWING THE KEEPERS, ITEM 2, DO NOT EXCEED A MOVEMENT OF 1" FOR EACH KEEPER. PROCEED IN A CROSSWISE ORDER UNTIL ALL KEEPERS ARE REMOVED OR INSERTED COMPLETELY. (6,7,10,4,2,8,11,5,3,9,12,1)
4- STORE ALL PARTS OF TOOL IN A SPECIAL TOOL CASE WHEN NOT IN USE. KEEPERS MUST BE PROTECTED FROM DAMAGE OF ANY KIND. (DWG 772 D 225)
5- MAINTAIN THE LUBRICATION OF THE KEEPERS AT ALL TIMES. (MOBILE-FLEX EP#1 OR EQUAL)





SECTION A-A

NO	CHANGE	BY	DATE
1	1-D-1082		
2	1-D-1082 IT. 6 WAS NOT SHOWN	J. Hackman	8-3-60
		K.C. Fletcher	8-3-60
		Optional	6/1/60
3	1-D-1082 PICTURE BROUGHT UP TO DATE	J. Hackman	12-8-60
		K.C. Fletcher	12-8-60
		Optional	12-8-60

TOOL DWG. 505D061 REV. 6 DATE 12-8-60
STOCK 6183693

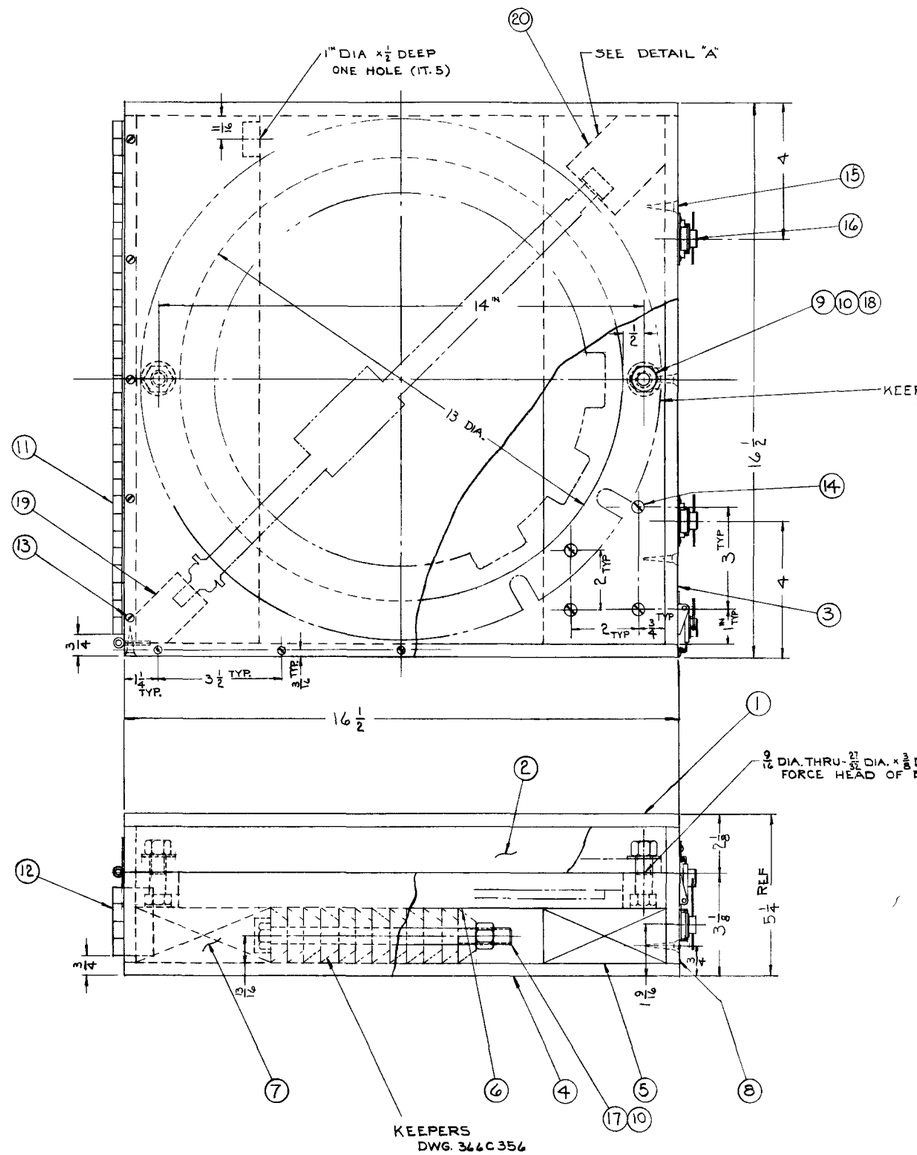
WESTINGHOUSE ELECTRIC CORPORATION

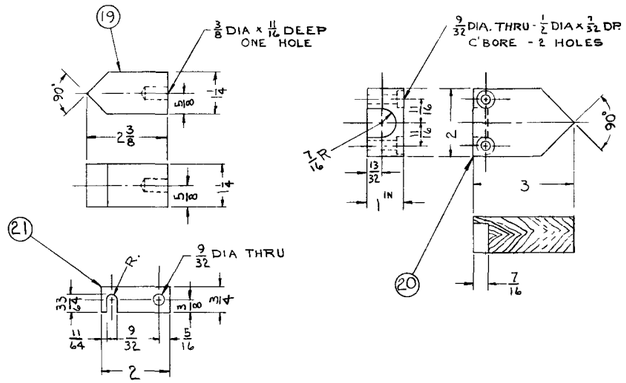
TITLE SODIUM FLOW CONTROLLER
KEEPER REMOVING TOOL

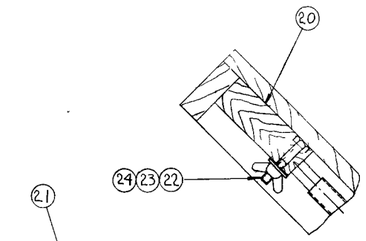
DIMENSIONS IN INCHES — SCALE 3/8 = 1

DFTM. HACKMAN	6-7-60	APPD.		772D217
CHKD.	6-7-60	MFG		
ENGR. K.C. Fletcher	6-8-60	MATL		

DIV. & PLANT LOCATION — ATOMIC EQUIPMENT DEPT.—CHESWICK, PA.







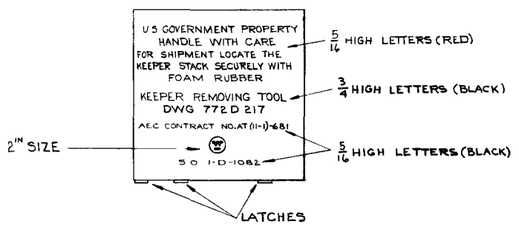
SYM.	ITEM	DESCRIPTION — MATERIAL DIMENSIONS IN INCHES	PATT. No. OR REF. DWG.	FI N. CH LI VE No	STYLE No.	SYM GR.	FINISH CHART 1 2 3 4 5
	1	TOP — 16 1/2 x 16 1/2 OF 1/2 THK PLYWOOD					1
	2	TOP SIDE - 1 3/8 x 16 1/2 OF 1/2 THK. PLYWOOD					2
	3	TOP END - 1 3/8 x 15 1/2 OF 1/2 THK. PLYWOOD					2
	4	BOTTOM - 16" x 16 1/2 OF 1/2 THK. PLYWOOD					1
	5	SPACER 15 1/2 OF 2 x 4 WHITE PINE					2
	6	PLATE - 15 1/2 x 15 1/2 OF 1" THK PLYWOOD					1
	7	BOTTOM SIDE - 3 1/8 x 16 1/2 OF 1/2 THK PLYWOOD					2
	8	BOTTOM END - 3 1/8 x 15 1/2 OF 1/2 THK. PLYWOOD					2
B	9	1/2-13 x 1 3/4 HEX STL. BOLT	9961-7				2
B	10	1/2-13 HEX. STL. NUT	8190-5				2
	11	HINGE - 15" LG x 2" WIDE (OPEN) - 3/8 DIA. PIN - .062 THK STL CONTINUOUS HINGE - PLAIN TYPE					1
	12	1 1/2 STL BUTT HINGE	6063-2				1
	13	#8 x 1 1/2 LG FLAT STL. WOOD SCR.	1662				48
	14	#10 x 1 3/4 LG FLAT STL WOOD SCR.	1662				16
	15	#10 x 1 1/4 LG. FLAT STL. WOOD SCR.	1662				12
A	16	LATCH — B. O.					3
B	17	1/2-13 x 7" LG HEX. STL. BOLT	9961-7				1
	18	1/2 STD STL WASHER					2
	19	BLOCK - 2 3/8 OF 1 1/4 x 1 1/4 WHITE PINE					1
	20	BLOCK 3 x 2 OF 1" THK PLYWOOD					1
B	21	CATCH - 2 OF 3/4 x 1/16 THK 304 SST SHEET	12549-1				1
B	22	1/4-20 x 1 1/2 HEX. STL BOLT	4408-1				2
	23	1/4 STD. STL. WASHER					2
B	24	1/4-20 STL WING NUT IT. 13	876431				2
A	25	ENGAGEMENT LATCH B.O.					1

A - B.O. SIMMONS FASTENER CORP., ALBANY 1, N.Y., SIMMONS #3 LINK LOCK - LIGHT DUTY LATCHES - 3 STD ENGAGEMENT LATCHES ~~AND ONE SPECIAL LATCH PER DETAIL (11-C)~~

B - W.A.E.D. TO FURNISH THESE MATL'S.

CONTINUED ON SHEET

1 - ALL JOINTS ARE TO BE GLUED AND SCREWED TOGETHER. DRILL 1/4 COUNTERSINK FOR ALL SCREWS.
2 - ATTACH THE HINGES & LATCHES WITH APPROPRIATE SIZE SCREWS.
3 - PAINT OUTSIDE SURFACES WITH LIGHT GRAY PAINT 9252-3 PAINT THE FOLLOWING INFORMATION ON THE TOP OF THE CASE, USING BLACK AND RED ENAMEL PAINT.



NO.	DATE	CHANGE	BY
1	1-D-1082		
2	1-D-1082	1/2 DIA x 1/16 C'BORE 3/8 DIA x 3/16 DP.	
3	1-D-1082	NOTE 2A REVISED	
4	1-D-1082	NOTE 4 CALLED FOR TWO STR. ENGAGEMENT LATCHES	

WESTINGHOUSE ELECTRIC CORPORATION

TITLE: SODIUM FLOW CONTROLLER
KEEPER REMOVING TOOL CASE

DIMENSIONS IN INCHES — SCALE 1/2 : 1

DFTM. HACKMAN	11/16/60	APPD.		
CHKD.	11/29/60	MFG.		12-2-60
ENGR.	12/1/60	MATL.		12-2-60

772D217 — TOOL REF. DWG. — ENGL. REP. DWG.

772D225

DIV. & PLANT LOCATION — ATOMIC EQUIPMENT DEPT. — CHESWICK, PA.

A.B. DUMONT CO. PHOTO PA. PR 2287-964 — Form AEE-14A

MANUFACTURING SEQUENCE CONTINUED:

5. CONNECT THE MAGNETIZING WINDINGS TO THE POWER SUPPLY AND THE SEARCH COILS TO MULTI RANGE FLUX METERS.(SENSITIVE RESEARCH INSTRUMENT CORP. MODEL FM.)

6. APPLY AT LEAST 2 SHOTS OF CURRENT TO THE ASSEMBLY.
   - 1ST. SHOT - 10,000 AMPS
   - 2ND SHOT - 12,500 AMPS

   THE FLUX METERS SHALL READ AT THE LAST SHOT;
   - YOKE - 13,200 GAUSS
   - POLE - 14,200 GAUSS

J - AFTER RECEIPT OF MAGNETIZED ASS'Y AT W AED REASSEMBLE ITEMS 1,2,3,8 AND 10. USE DOWEL BOLTS TO REALIGN ITEMS 1 & 8. AFTER TIGHTENING ITEMS 2 AND 10, REMOVE THE DOWEL BOLTS. (SEE TOOL RECORD COLUMN)

GENERAL NOTES

1 - MACH ℄ CLEAN PER PS 292600-1 ℄ 2.

2 - ISSUE ℄ ATTIATCH A CAUTION NOTE TO THE STATOR SUB-ASSY. TAG TO BE BLACK ON RED.

CAUTION: WHEN WORKING ON THE MAGNETIZED STATOR SUB-ASSY, CLEAN THE AREA WITHIN A 5 FT RADIUS WITH A STRONG ELECTROMAGNETIC SWEEPER OR OTHER SUITABLE METHOD. THIS INCLUDES CLOTHING, GLOVES, TOOLS, ETC. ALWAYS STORE AND HANDLE THE MAGNETIZED STATOR SUB-ASSY. ENCLOSED IN A POLYETHYLENE BAG.

MANUFACTURING SEQUENCE

A - ASSEMBLE GROUP 1.
   a - IF NECESSARY COMPRESS ITEMS 9 TOWARD THE CENTER UNTIL THEY FIT SNUG IN ITEMS 7.
   b - APPLY CEMENT (HYSOL #2527, HYSOL, INC., OLEAN, N.Y. OR EQUIV.) SPARLINGLY TO THE CONTACTING SURFACES OF THE MAGNETS, ITEM 5, BEFORE POSITIONING THEM INTO THE ASSEMBLY. (SEE HYSOL BULLETIN #2527)

B - DRILL ℄ REAM FOR DOWEL BOLTS. DOWEL BOLTS WILL BE IN PLACE DURING GRINDING OPERATION.

C - GRIND DIA 'C' USING DIAS 'A' & 'B' FOR SET UP

D - MARK POSITIONS OF ITEMS 1 & 8 RELATIVE TO ITEM 4 BEFORE DISASSEMBLY. MARK ONE END WITH THE LETTERS 'A' AND THE OTHER END WITH THE LETTERS 'B'.

E - REMOVE ITEMS 1, 2, 3, 8, 10 AND DOWEL BOLTS FROM THIS ASS'Y.

~~F - CHROME PLATE THE REMAINING ASS'Y. .0002 THK PER MIL 3171 & PS.~~

G - SHIP THE ~~CHROME PLATED~~ ASS'Y. (LESS ITEMS 1,2,3,8,10 AND DOWEL BOLTS) AND THE KEEPERS, DWG. 366C356, TO W BLAIRSVILLE (OR EQUIV.) WHERE THIS ASSEMBLY WILL BE MAGNETIZED PER PS 290768-3.

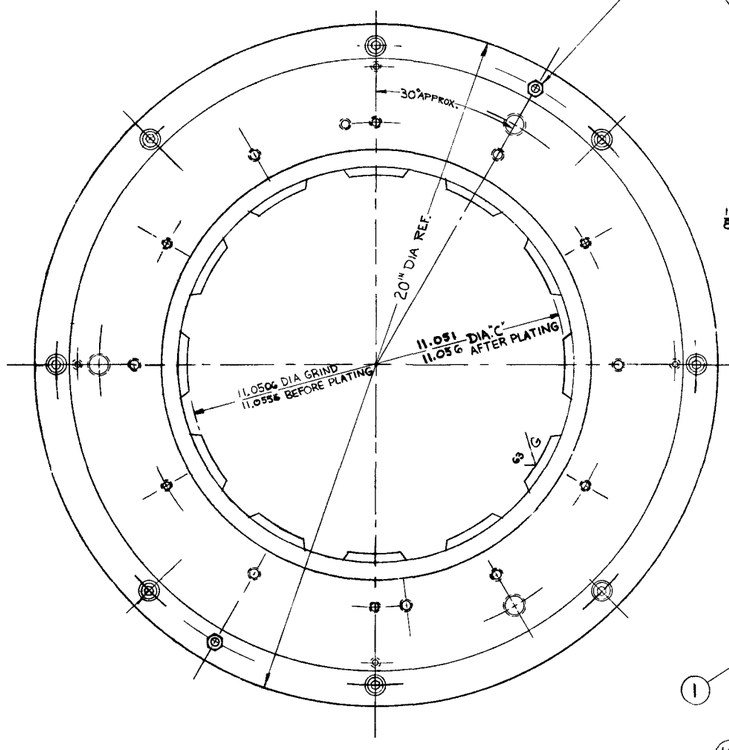
H - MAGNETIZATION PREPARATION AND PERFORMANCE.
   1. COVER THE AREAS WHERE MAGNETIZING COILS WILL PASS WITH GLASS TAPE.
   2. WIND .014 THK. X 14 WIDE SILICON IRON STRIPS AROUND THE INSIDE AND OUTSIDE DIA OF THE ASSY. (MIN THICKNESS ½"). APPLY SUFFICIENT HIGH TEMP GREASE TO ALL KEEPERS (DWG 366C356) AND INSERT THEM BETWEEN THE POLE TIPS.
   3. WIND 1½ TURNS OF 4/0 COPPER CABLE AROUND EACH MAGNET.
   4. WIND A ONE TURN SEARCH COIL AROUND THE POLE END AND YOKE END OF TWO MAGNETS (EACH COIL CONSISTS OF ONE TURN AROUND EACH MAGNET; HOWEVER, THE CIRCUIT ENCLOSES 2 MAGNETS.)

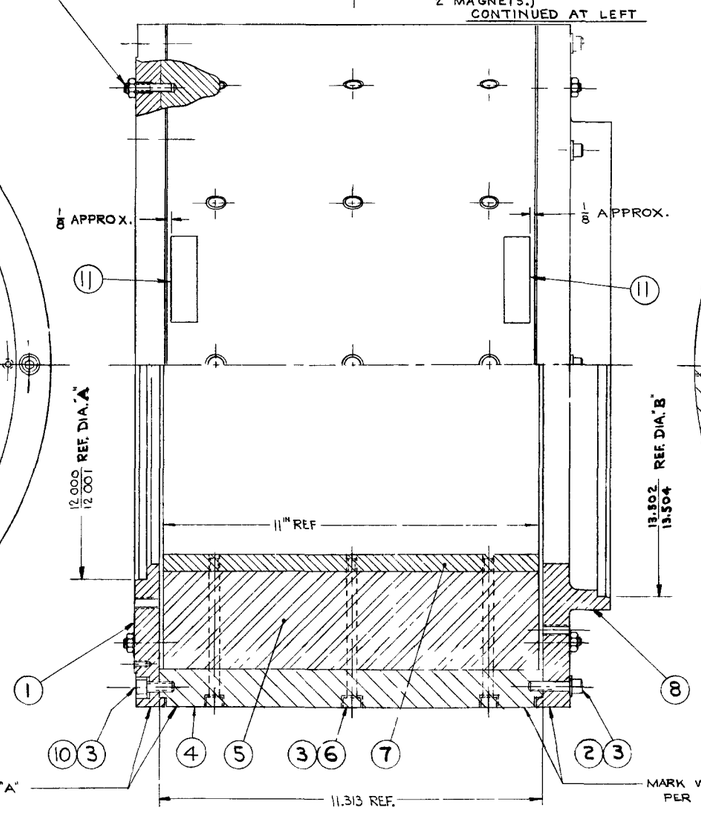
CONTINUED AT LEFT

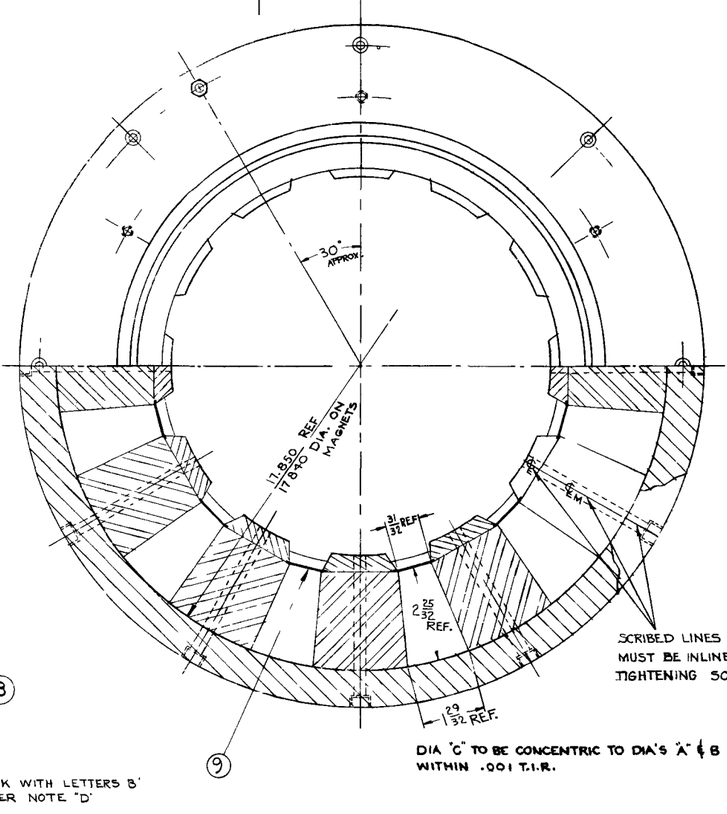
APPARATUS	SODIUM FLOW CONTROLLER									SHEET NO.
	STATOR SUB ASSEMBLY									
DWG.	505D061 SUBS TO 727856?									FINISH CHART.
SYM.	ITEM	DESCRIPTION — MATERIAL DIMENSIONS IN INCHES	PATT. No. OR REF. DWG.	FIN. CH. LINE NO	STYLE NO.	SYM GR.	1	2	3	4	5
	1	TOP END PLATE	IT. 1 366C331								
	2	5/16-18 X 1¼ SOC. CYL. SST. CAP SCR.			SED2015PT		8				
	3	5/16 STL. LOCK WASHER	2052-2				8				
	4	STATOR SHELL	IT. 1 505D055				1				
	5	MAGNET	IT. 1 366C330				12				
	6	5/16-18 X 7/16 SOC. CYL. STL. CAP SCR. 6553-1					36				
	7	POLE PIECE	IT. 1 366C329				12				
	8	BOTTOM END PLATE	IT. 1 366C328				1				
	9	SHIELD - 11¾ X 1⅛ OF .016 BRASS 2676-1 OR EQUIV.					12				
	10	5/16-18 X ⅞ LG SOC CYL SST. CAP SCR.			SED2015PS		8				
A	11	TEMP-PLATE					2 REQ.				

A - ORDER PER INFORMATION ON DWG 618J693

DRILL ℄ REAM FOR TIGHT FIT ON .2465 DIA. DOWEL X 1 1/16 DEEP MIN. 5/16 DIA X 7/16 DEEP C'BORE ITEMS 1 & 8. 2 HOLES BOTH ENDS, 180° APART ON 18 7/8 DIA. B. CIRCLE. (TOTAL 4 HOLES)







SCRIBED LINES ON ITS. 4, 5 & 7 MUST BE INLINE BEFORE TIGHTENING SCREWS IT. 6

DIA 'C' TO BE CONCENTRIC TO DIA'S 'A' & B WITHIN .001 T.I.R.

NO.	DATE	CHANGE	NAME OF PART WAS MAGNET CARRIER MFG STATOR SHELL	DRILL 7 REAM FOR DOWEL BOLTS ADDED. NOTES RE SEQUENCE NOTES RE WRITTEN NOTES WERE NUMBERED REF DIMENSIONS ADDED.	REF DIA WAS 17.766	PICTURE BROUGHT UP TO DATE	NOTE 'D' WAS NOT ON ITEM 11 WAS NOT ON	PPS W# 645343 NOTE 'F' RE CHROME	NOTE 'G' THE WORD 'CHROME PLATED' WERE REMOVED NOTE 'H' RE WRITTEN
1	1-9-1962								
2	1-D-1082								
3	1-D-1082								
4	1-D-1082								
5	1-D-1082								
6	1-D-1082								
7	1-D-1082								

TOOL DOWEL BOLT 4 REQD IT 4 - DWG 140199 DWG. REF. DWG. 5 - 10 HEX NUT 090-514 REQD

WESTINGHOUSE ELECTRIC CORPORATION

TITLE SODIUM FLOW CONTROLLER
STATOR SUB ASSEMBLY

DIMENSIONS IN INCHES — SCALE 4/1

DFTM. W. ELZER	9/1/60	APPD.		9/1/60	505D061
CHKD.	9-1-60	MFG.		9/1/60	
ENGR.	9/1/60	MATL.		9/1/60	

DIV. & PLANT LOCATION — ATOMIC EQUIPMENT DEPT. — CHESWICK, PA.

ROLLER ASSEMBLY & ADJUSTMENT

1. Care must be taken to keep the inner races, item 2 of the roller assembly, dwg. 366C336, constantly held together through all handling until the final spacers are inserted and the set screws (6) are tightened. Otherwise the stellite balls could fall out, resulting in their possible loss. It is suggested that this critical assembly be performed in a clean box with an uninterrupted flat bottom without any crevices where bearing balls could withdraw from sight.

2. Stack up the right (3) and left hand (2) carriages and the guide retainer (18) in this consecutive order. Lower the threaded part of the drive screw (1) into this stack. Block the guide retainer up to the drive screw shoulder. Block the carriages (2 & 3) up to dimension "A". The two carriages are to be in line as shown.

3. Mark the roller assemblies (4) and shims (7) with the numbers 1 thru 6. Mark the pockets on the upper carriage (2) with the numbers 1, 2 3, and on the lower carriage (3) with 1, 5 & 6. Use electric pencil for all marking.

4. Place the roller assembly marked "1" in vertical position on a small portable flat support, **with the marking "Top" on far side of S A.** Remove the aluminum straps carefully.

5. Lift the flat support with the roller assembly adjacent to the pocket marked "1" and slide it into the pocket under the drive screw thread. While doing so and until the final shim is installed, hold the lower inner race flushed upwards against the drive screw thread, carefully avoid any possible loss of balls.

6. Attach a 1/4" stud to the pin (5) and insert it at the carriage and roller assembly.

7. Measure Dimension "C" and cut shim marked "1" accordingly. Faces of shim to be parallel to each other and perpendicular to the bore within .001 T.I.R.

8. Block the pin up with a 1/4" nut, spacer & washer on the stud just far enough to insert the final shim.

9. Remove the stud from the pin and complete this assembly with the set screw.

10. Repeat this operation on both carriages except that no. 1/8" stud is required for the lower carriage assembly.

11. Recheck Dim. "A" and make sure that the carriages are in line.

    Mark toggle arm, spacer & pin in carriage (2) with the number 7 on one side and 8 on the other. Repeat markings on carriage 3 using numbers 9 & 10. Mark the toggle arms, spacers, nut and connector block with the number "11" on one side and "12" on the other.

12. Slide spacers (10) and toggle arms (11) on connector block (9) retaining with nut (12) which shall be wrench tight. Then back the nut off approximately 15° to 10° for free running clearance.

13. Fold the arms into the slots of the carriages, and insert the spacers. Slip the pins through the spacers and arms.

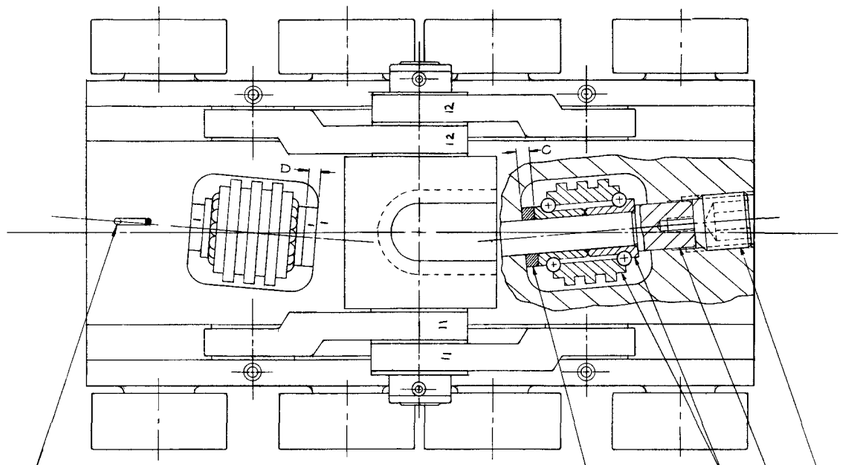
14. Add the bearings (17).

15. Turn the drive screw (1), using the flats on the top of the screw, to check for free running of the roller nuts.

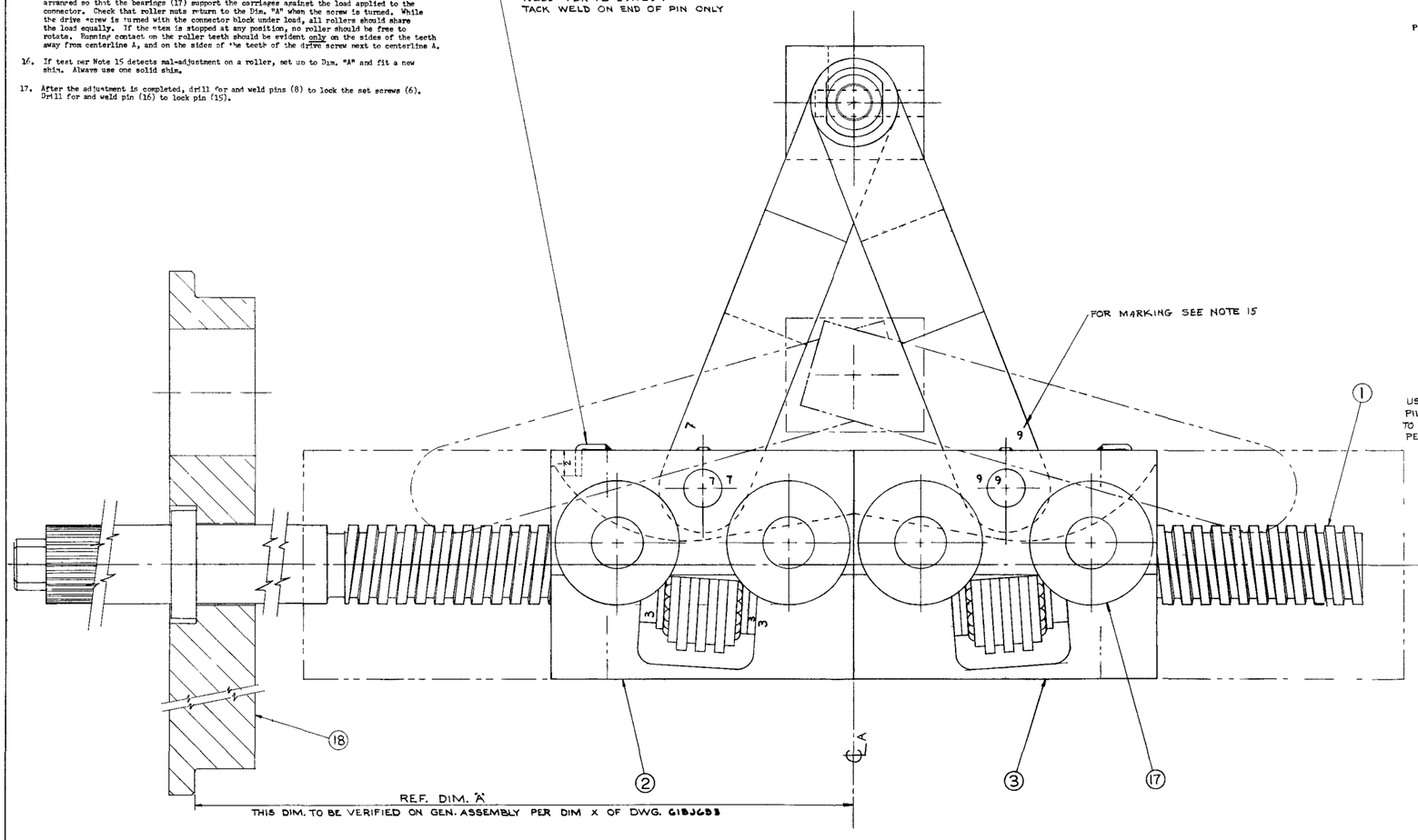
    Blue-in rollers and drive screw. Check for wear locations turning the drive screw with the flats provided, and applying a moderate load to the connector block toward the screw. This test should be conducted in the body with guides installed, or in an external set-up arranged so that the bearings (17) support the carriages against the load applied to the connector. Check that roller nuts return to the Dim. "A" when the screw is turned. While the drive screw is turned with the connector block under load, all rollers should share the load equally. If the item is stopped at any position, no roller should be free to rotate. Running contact on the roller teeth should be evident only on the sides of the teeth away from centerline A, and on the sides of the teeth of the drive screw next to centerline A.

16. If test per Note 15 detects mal-adjustment on a roller, set up to Dim. "A" and fit a new shim. Always use one solid shim.

17. After the adjustment is completed, drill for and weld pins (8) to lock the set screws (6). Drill for and weld pin (16) to lock pin (15).

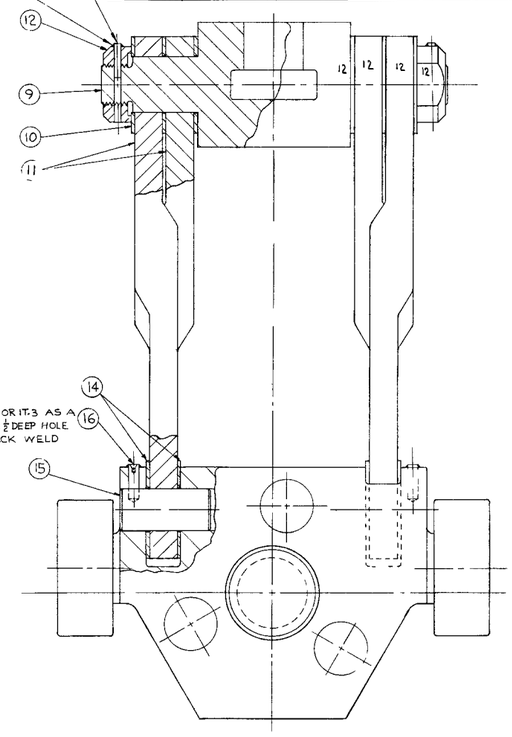


8 USING HOLE IN IT 2 (OR IT 3) AS A PILOT DRILL $\frac{9}{64}$ DIA HOLE INTO IT 6. INSERT IT 8. BEND PIN FLUSH AGAINST IT 2 (OR IT 3) AND TACK WELD PER PS 291129-1
TACK WELD ON END OF PIN ONLY



$\frac{9}{64}$ DRILL THRU TO RECIEVE 13

TACK WELD PER PS 291129-1



USING HOLE IN IT. 2 OR IT. 3 AS A PILOT DRILL $\frac{9}{64}$ DIA X $\frac{1}{2}$ DEEP HOLE TO RECIEVE IT. 16. TACK WELD PER PS 291129-1

APPARATUS SODIUM FLOW CONTROLLER — SHEET NO.

DRIVE SCREW SUB ASSEMBLY

DWG 510F033 SUB 1 578467B

FINISH CHART.

BYM B	ITEM	DESCRIPTION — MATERIAL DIMENSIONS IN INCHES	PATT No. REF DWG	FIN. CH LINE No.	STYLE No.	BYM GR	1	2	3	4	5
	1	DRIVE SCREW GR.1	505D058				1				
	2	UPPER CARRIAGE IT 1	505D049				1				
	3	LOWER CARRIAGE IT 1	505D050				1				
	4	ROLLER ASSEMBLY GR 1	366C336				6				
	5	ROLLER PIN IT 1	258B219				6				
	6	1"-14-NF-2A x 1/8" FLAT POINT LG SST SOC SET SCREW	12100-9				6				
	7	SHIM IT 1	160A409				6				
	8	ROLLER LOCK PIN S" 52	D2030P15				6				
	9	TOGGLE ARM CONNECTOR IT 1	366C321				1				
	10	CONNECTOR SPACERS IT 1	366C322				6				
	11	TOGGLE ARM IT. 1	258B217				4				
	12	TOGGLE ARM RETAINER IT 1	160A408				2				
	13	PIN S" 52	D2030P9				2				
	14	CARRIAGE SPACERS IT 3,	366C322				8				
	15	TOGGLE PIVOT PIN IT. 2,	366C321				4				
A	16	PIN S" 52	D2031P8				4				
B	17	BEARINGS					8				
	18	GUIDE RETAINER IT 1	366C325				1				

A #0 CENTER TO BE MACH IN ONE END ONLY BEFORE ASS'Y.
B B O INDUSTRIAL TECTONICS, INC DWG 3373

CONTINUED ON SHEET

S.O. 1-D-1082 — 1

D 585153

IT CHANGE

1-D-1082

1B ADDED TO PICTURE B/M, & NOTES. — 2
R.S. Hyman 3-17-60
H.G. Peterson 3-17-60
J.A. Pascale 3-17-60

1-D-1082

IND INDUSTRIAL TECTONICS INC DWG NO WAS 2155-1-2. — 3
J. Hackman 3-25-60
H.G. Peterson 3-25-60
J.A. Pascale 3-25-60

1-D-1082

ITT RH CALLED FOR IT 1-E05 D018 — 4

6 PDS WAS 12100-1
J. Hackman 4-22-60
H.G. Peterson 4-25-60
J.A. Pascale 4-26-60

1-D-1082

NORTHBROOKS BEARING B. DWG WAS 2155 2 — 5
H.G. Peterson 7-7-60
J.A. Pascale 7-7-60

1-D-1082

TOGGLE ARM AT TOGGLE ARM CONNECTOR HAD SQ END — 6
J. Hackman 9-29-60
H.G. Peterson 9-29-60
J.A. Pascale 9-29-60

1-D-1082

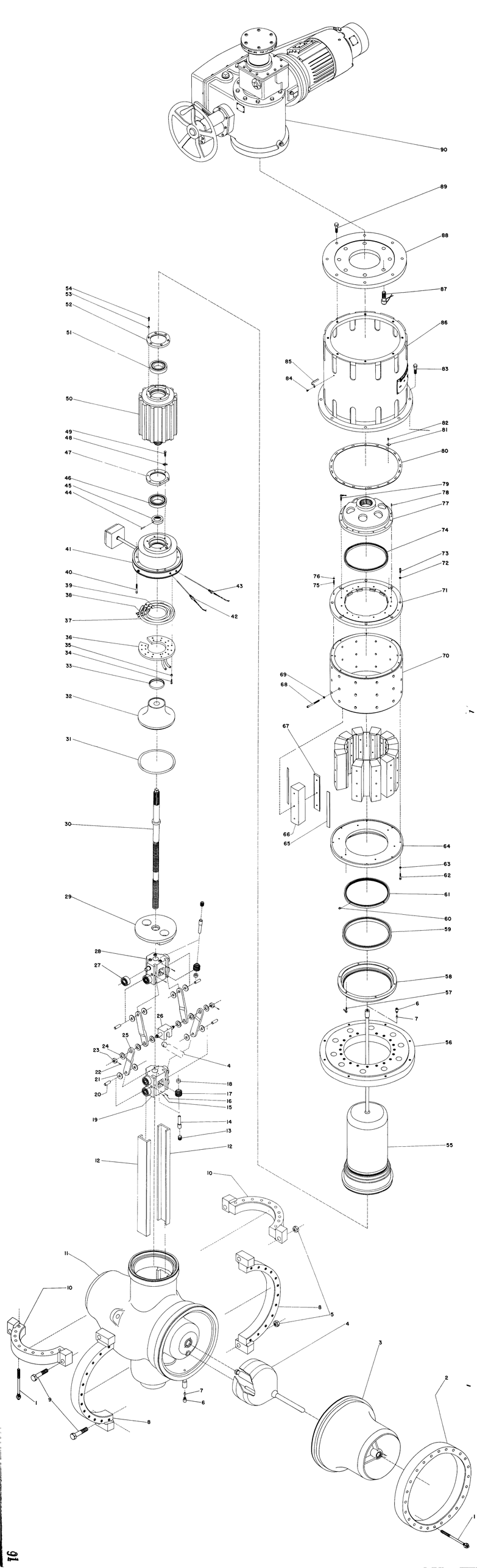
RECORD COPY OF SUB 1 ON FILE IN ENGR. VAULT — 7
ASSY NOTES RE-WRITTEN
J. Hackman 1-10-61
H.G. Peterson 1-10-61
J.A. Pascale 1-10-61

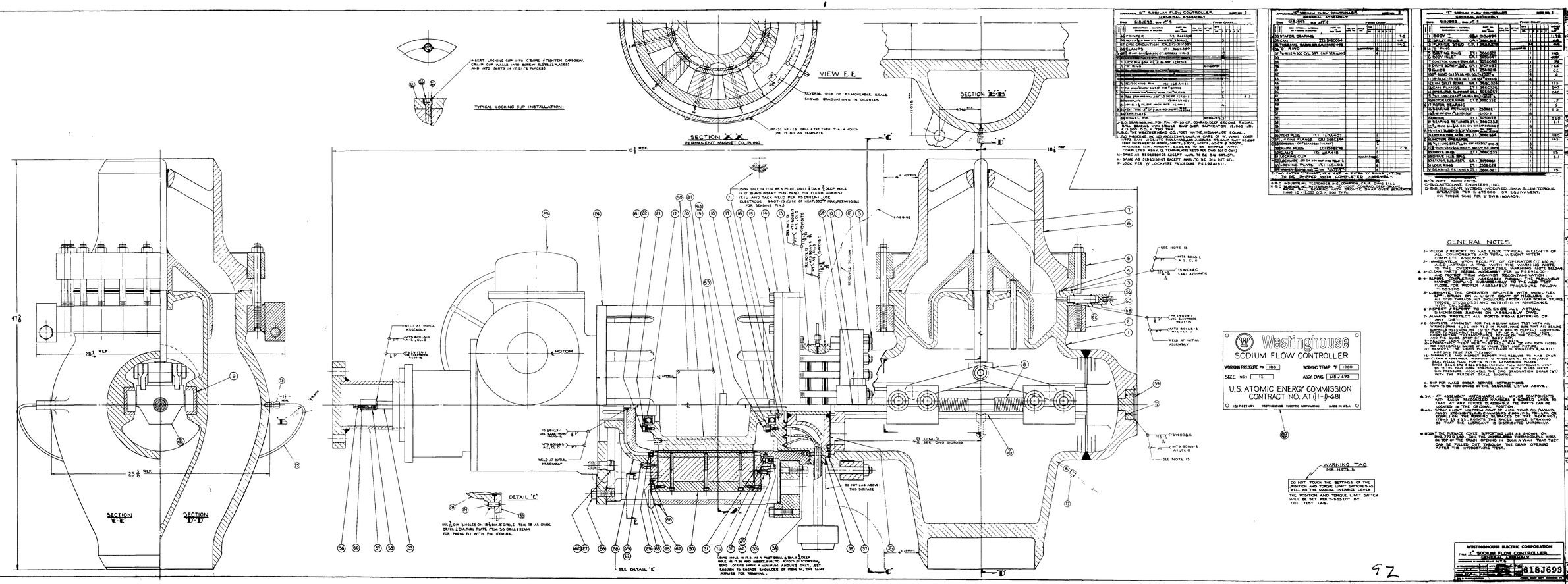
6 FUTURE — 8
FLAT POINT WAS NOT SPECIFIED
J. Hackman 1-12-61
H.G. Peterson 1-12-61
J.A. Pascale 1-12-61

WESTINGHOUSE ELECTRIC CORPORATION

TITLE SODIUM FLOW CONTROLLER
DRIVE SCREW SUB ASSEMBLY
DIMENSIONS IN INCHES SCALE 1:1

DFTM	3/14/60	APPD	3/14/60	510F033	TOOL RECORD COLUMN
CHKD	3/14/60	MFG.	3/14/60		TOOL SCOPE
ENGR.	3/14/60	MATL	3/14/60		TOOL TYPE
DIV & PLANT LOCATION		ATOMIC EQUIP DEPT CHESWICK PA			REF. DWG


90
89
88
87
86
85
84
83
82
81
80
79
78
77
74
73
72
76
75
71
70
69
68
67
66
65
64
63
62
61
60
59
58
57
6
7
56
55
54
53
52
51
50
49
48
47
46
45
44
41
40
39
38
43
42
37
36
35
34
33
32
31
30
29
28
27
26
25
24
23
22
21
20
4
18
17
16
15
19
14
13
12
12
10
11
10
8
5
4
3
2
1
9
7
6
8



Apparatus 11" SODIUM FLOW CONTROLLER SHEET NO 3
GENERAL ASSEMBLY
Dwg. 618J693 Sub Dwg. —

Item	Quantity	Description / Material	Part No.	Stock No.	Power Comp.
1	POINTER	(1) Steel			1.3
2		MS 90693-36 Nam 2½ JONES-BEE Steel			68
3		1/2 CIRC GRADUATION SCALE SS 303 Steel			140
4		SEE CLAMPS (2) Steel			
5		MS 21044-N4 (4) Steel			
6		MS 21044-N6 (4) Steel			
7		PLUG PIN 3/8 DIA x 1 1/2 LG DIA REF 1/2 x 3 Steel			
8		1/2" O RING	2-029		
9		1/2" O RING	2-029		
10		MS 16555-2 (2) Steel			
11		MS 16555-3 (2) Steel			
12		MS 16555-4 (2) Steel			
13		MS 16555-5 (2) Steel			
14		MS 16555-6 (2) Steel			
15		MS 16555-7 (2) Steel			
16		MS 16555-8 (2) Steel			
17		MS 16555-9 (2) Steel			
18		MS 16555-10 (2) Steel			
19		MS 16555-11 (2) Steel			
20		MS 16555-12 (2) Steel			
21		MS 16555-13 (2) Steel			
22		MS 16555-14 (2) Steel			
23		MS 16555-15 (2) Steel			
24		MS 16555-16 (2) Steel			
25		MS 16555-17 (2) Steel			
26		MS 16555-18 (2) Steel			
27		MS 16555-19 (2) Steel			
28		MS 16555-20 (2) Steel			
29		MS 16555-21 (2) Steel			
30		MS 16555-22 (2) Steel			
31		MS 16555-23 (2) Steel			
32		MS 16555-24 (2) Steel			
33		MS 16555-25 (2) Steel			
34		MS 16555-26 (2) Steel			
35		MS 16555-27 (2) Steel			
36		MS 16555-28 (2) Steel			
37		MS 16555-29 (2) Steel			
38		MS 16555-30 (2) Steel			
39		MS 16555-31 (2) Steel			
40		MS 16555-32 (2) Steel			
41		MS 16555-33 (2) Steel			
42		MS 16555-34 (2) Steel			
43		MS 16555-35 (2) Steel			
44		MS 16555-36 (2) Steel			
45		MS 16555-37 (2) Steel			
46		MS 16555-38 (2) Steel			
47		MS 16555-39 (2) Steel			
48		MS 16555-40 (2) Steel			
49		MS 16555-41 (2) Steel			
50		MS 16555-42 (2) Steel			
51		MS 16555-43 (2) Steel			
52		MS 16555-44 (2) Steel			
53		MS 16555-45 (2) Steel			
54		MS 16555-46 (2) Steel			
55		MS 16555-47 (2) Steel			
56		MS 16555-48 (2) Steel			
57		MS 16555-49 (2) Steel			
58		MS 16555-50 (2) Steel			
59		MS 16555-51 (2) Steel			
60		MS 16555-52 (2) Steel			
61		MS 16555-53 (2) Steel			
62		MS 16555-54 (2) Steel			
63		MS 16555-55 (2) Steel			
64		MS 16555-56 (2) Steel			
65		MS 16555-57 (2) Steel			
66		MS 16555-58 (2) Steel			
67		MS 16555-59 (2) Steel			
68		MS 16555-60 (2) Steel			
69		MS 16555-61 (2) Steel			
70		MS 16555-62 (2) Steel			
71		MS 16555-63 (2) Steel			
72		MS 16555-64 (2) Steel			
73		MS 16555-65 (2) Steel			
74		MS 16555-66 (2) Steel			
75		MS 16555-67 (2) Steel			
76		MS 16555-68 (2) Steel			
77		MS 16555-69 (2) Steel			
78		MS 16555-70 (2) Steel			
79		MS 16555-71 (2) Steel			
80		MS 16555-72 (2) Steel			
81		MS 16555-73 (2) Steel			
82		MS 16555-74 (2) Steel			
83		MS 16555-75 (2) Steel			
84		MS 16555-76 (2) Steel			
85		MS 16555-77 (2) Steel			
86		MS 16555-78 (2) Steel			
87		MS 16555-79 (2) Steel			
88		MS 16555-80 (2) Steel			
89		MS 16555-81 (2) Steel			
90		MS 16555-82 (2) Steel			
91		MS 16555-83 (2) Steel			
92		MS 16555-84 (2) Steel			
93		MS 16555-85 (2) Steel			
94		MS 16555-86 (2) Steel			
95		MS 16555-87 (2) Steel			
96		MS 16555-88 (2) Steel			
97		MS 16555-89 (2) Steel			
98		MS 16555-90 (2) Steel			
99		MS 16555-91 (2) Steel			
100		MS 16555-92 (2) Steel			

Apparatus 11" SODIUM FLOW CONTROLLER SHEET NO 4
GENERAL ASSEMBLY
Dwg. 618J693 Sub Dwg. —

Item	Quantity	Description / Material	Part No.	Stock No.	Power Comp.
1		BODY (2) SEE DRAWING			1.3
2		PISTON RINGS GR 1 3060054			68
3		PLUNGER STUD GR 1 3060098			140
4		O RING			
5		SCREW SOC SET CUP SEX 5/8"-11 x 5/8" LG			
6		BODY TOILET GR 1 3060060			
7		CONTROL COIL 4 REQ GR 1 3060067			
8		DRIVE SCREW ASS GR 1 3060033			
9		HOUSING GR 1 3060070			
10		SCREW SOC SET CUP SEX 5/8"-11 x 5/8" LG			
11		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
12		WASHER SPLIT RING GR 1 3060324			
13		SCREW SOC SET CUP SEX 5/8"-11 x 5/8" LG			
14		SCREW SOC SET CUP SEX 5/8"-11 x 5/8" LG			
15		SCREW SOC SET CUP SEX 5/8"-11 x 5/8" LG			
16		PISTON LOCK RING GR 1 3060077			
17		PISTON BEARING			
18		BEARING RETAINER (2) 3060081			
19		SCREW SOC SET CUP SEX 5/8"-11 x 5/8" LG			
20		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
21		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
22		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
23		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
24		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
25		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
26		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
27		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
28		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
29		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
30		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
31		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
32		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
33		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
34		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
35		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
36		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
37		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
38		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
39		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
40		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
41		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
42		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
43		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
44		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
45		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
46		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
47		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
48		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
49		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
50		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
51		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
52		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
53		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
54		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
55		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
56		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
57		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
58		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
59		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
60		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
61		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
62		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
63		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
64		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
65		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
66		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
67		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
68		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
69		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
70		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
71		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
72		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
73		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
74		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
75		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
76		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
77		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
78		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
79		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
80		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
81		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
82		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
83		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
84		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
85		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
86		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
87		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
88		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
89		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
90		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
91		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
92		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
93		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
94		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
95		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
96		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
97		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
98		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
99		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
100		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			

Apparatus 11" SODIUM FLOW CONTROLLER SHEET NO 5
GENERAL ASSEMBLY
Dwg. 618J693 Sub Dwg. —

Item	Quantity	Description / Material	Part No.	Stock No.	Power Comp.
1		BODY (2) SEE DRAWING			1.3
2		PISTON RINGS GR 1 3060054			68
3		PLUNGER STUD GR 1 3060098			140
4		O RING			
5		SCREW SOC SET CUP SEX 5/8"-11 x 5/8" LG			
6		BODY TOILET GR 1 3060060			
7		CONTROL COIL 4 REQ GR 1 3060067			
8		DRIVE SCREW ASS GR 1 3060033			
9		HOUSING GR 1 3060070			
10		SCREW SOC SET CUP SEX 5/8"-11 x 5/8" LG			
11		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
12		WASHER SPLIT RING GR 1 3060324			
13		SCREW SOC SET CUP SEX 5/8"-11 x 5/8" LG			
14		SCREW SOC SET CUP SEX 5/8"-11 x 5/8" LG			
15		SCREW SOC SET CUP SEX 5/8"-11 x 5/8" LG			
16		PISTON LOCK RING GR 1 3060077			
17		PISTON BEARING			
18		BEARING RETAINER (2) 3060081			
19		SCREW SOC SET CUP SEX 5/8"-11 x 5/8" LG			
20		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
21		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
22		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
23		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
24		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
25		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
26		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
27		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
28		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
29		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
30		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
31		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
32		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
33		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
34		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
35		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
36		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
37		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
38		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
39		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
40		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
41		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
42		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
43		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
44		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
45		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
46		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
47		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
48		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
49		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
50		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
51		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
52		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
53		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
54		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
55		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
56		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
57		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
58		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
59		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
60		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
61		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
62		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
63		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
64		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
65		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
66		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
67		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
68		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
69		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
70		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
71		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
72		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
73		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
74		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
75		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
76		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
77		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
78		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
79		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
80		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
81		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
82		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
83		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
84		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
85		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
86		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
87		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
88		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
89		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
90		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
91		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
92		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
93		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
94		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
95		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
96		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
97		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
98		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
99		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			
100		PLUG 1" SQ HD SET SCREW 5/8"-11 x 5/8" LG			

GENERAL NOTES

1- WEIGH & REPORT TO NAS ENGR TYPICAL WEIGHTS OF ALL COMPONENTS AND TOTAL WEIGHT AFTER COMPLETE ASSEMBLY.
2- INSPECT FOR CLEANLINESS OF OPERATOR CVT 630 AT A.E.D. ATTACH A TAG WITH THE WARNING NOTE AS SHOWN ON DWG. CVT5556, LEVER SEE WARNING NOTE BELOW.
▲ 3- CLEAN THE INTERIOR OF THE CONTROLLER AS SPECIFIED AND PROTECT THE INTERNAL RECIRCULATION PUMP.
● 4- BEFORE COMPLETING ASSEMBLY FURNISH THE PERMANENT MAGNET COUPLING SUBASSEMBLY TO THE A.E.D. TEST FLOOR FOR PROPER ASSEMBLY PROCEDURE FOLLOW NOTE 13.
5- LUBRICATE THE OPERATOR BUSHES WITH MOLY-FLEX EP#1 GREASE OR A LIGHT COAT OF HEAT-LUBE.
6- THE CONTROL COIL LEADS ARE TO BE TIED TO THE FRAME WITH TEFLON TAPE AND NOTE 17-11 IN ACCORDANCE WITH TM-30585.
6- THE CONTROL COIL LEADS TO NAS ENGR ALL ACTUAL MEASURED LENGTHS ON ASSEMBLY DWG.
7- ALWAYS PROTECT ALL PORTS FROM ENTERING OF ANY DIRT.
● 8- COMPLETE ASSEMBLY FOR THE HELIUM LEAK TEST WITH ALL PLUGS AND CAPS IN PLACE AND TIGHT. AFTER CLEANING PRIOR TO ASSEMBLY PACK THE TOP OF A 3 FT LONG 1/4 IN. DIA TUBE WITH GLASS WOOL AND INSERT INTO THE SIDE OUTLET(19) AND THE SIDE OUTLET(20).
9- HYDROSTATIC TEST PER T-555107 TO 2,000 PSIG WITH WATER AT 70°F MINIMUM. TEST PRESSURE TO BE HELD FOR 10 MINUTES. NO FAIL HOT OIL TEST PER T-555107.
10- CLEAN AND DRY THE CONTROLLER AND THE RESULTS TO NAS ENGR
11- CLEAN AND PACK WITH NON-FIBROUS LINT FREE MATERIAL AND SEAL FIELD PLUG PORTS WITH CAPANSION PLUGS.
12- CLEAN AND PACK WITH NON-FIBROUS LINT FREE MATERIAL AND SEAL ALL PORTS WITH CAPANSION PLUGS.
13- CLEAN AND PACK WITH NON-FIBROUS LINT FREE MATERIAL AND SEAL ALL PORTS WITH CAPANSION PLUGS. GAS PRESSURE 2000 PSIG THE DAY WITH 10 LBS LEAST (AT) WITH THE VALVE STILL CLOSED.

M- SHIP PER MILD ORDER SERVICE INSTRUCTIONS.
R- TS379 TO BE PERFORMED IN THE SEQUENCE LISTED ABOVE.

▲ 3-A- AT ASSEMBLY, WITH CAM IN "A" POSITION, CHECK WITH 0.005 GAUGE BETWEEN ROLLER AND CAM FOLLOWER AT POINT "B" SO THAT AT ANY POINT IS MINIMUM. BE PARTS CAN BE LOCATED IN THE ORIGINAL POSITION.
● 4-A- ASSEMBLY LUBRICATION: COAT ALL TEMP OIL (MOLUBDENUM DISULPHIDE) COMPOUND (MOL NO. MOLYKOTE) EQUAL TO THE BEARING SURFACES OF THE BEARINGS, LEVER EY #3 BEFORE THEY ARE INSTALLED, SPREADING SO THAT THE LUBRICANT IS DISTRIBUTED UNIFORMLY.

■ MOUNT FURNACE COVER ON MOUNTING USE HARDWARE ON HAND. THE FURNACE COVER TO THE MOUNTING STUDS SHALL BE ON TOP OF THE DRAIN OPENING IN SUCH A WAY THAT THEY CAN BE PULLED OUT THROUGH THE DRAIN OPENING AFTER THE HYDROSTATIC TEST.

B- ¾ NPT BOTH ENDS.
C- B.G. AUTROLAVE ENGINEERS, INC.
D- B.G. AUTROLAVE ENGINEERS, INC. MODEL 1" SMA ILLUMITORQUE OPERATOR PN 5-4-1000 OR EQUIVALENT. USE TORQUE SCALE PER W DWG. 160A539.

Westinghouse
SODIUM FLOW CONTROLLER
WORKING PRESSURE PSI 1000 | WORKING TEMP °F 1000
SIZE INCH 11 | ASSY. DWG. 618J693
U.S. ATOMIC ENERGY COMMISSION
CONTRACT NO. AT(11-1)-681
1SIP4STWH WESTINGHOUSE ELECTRIC CORPORATION MADE IN U.S.A.

WESTINGHOUSE ELECTRIC CORPORATION
TYPE 11" SODIUM FLOW CONTROLLER
GENERAL ASSEMBLY
SIZE A | DWG NO 618J693 | REV

92