TECHNICAL MANUAL

OPERATOR'S, ORGANIZATIONAL, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL INCLUDING REPAIR PARTS LIST FOR BLAST CLEANING MACHINE WITH DUST COLLECTOR MODEL NO. 70AC (WHEELABRATOR-FRYE INC.) (NSN 4940-00-300-1314)

HEADQUARTERS, DEPARTMENT OF THE ARMY

NOVEMBER 1981

Technical Manual

NO. 9-4940444.14&P

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC, *19 November 1981*

Operator's, Organizational, Direct Support and General Support Maintenance Manual Including Repair Parts List BLAST CLEANING MACHINE WITH DUST COLLECTOR MODEL 70AC (NSN 4940-00-300-1314)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2, located In the back of this manual direct to: Commander, US Army Armament Material Readiness Command, ATTN: DRSAR.MAS, Rock Island, IL 61299. A reply will be furnished directly to you.

NOTE

This manual Is published for the purpose of Identifying an authorized commercial manual for the use of the personnel to whom this blast cleaning machine is issued.

Manufactured by: Wheelabrator- Frye Inc.
Materials Cleaing Division
400 S. Byrkit Ave.
Mishawaka, IN 46544

Procured under Contract No. DAAA09-76-C6656

This technical manual is an authentication of the manufacturers' commercial literature and does not conform with the format and content specified in AR 310-3, Military Publications. This technical manual does, however, contain available information that is essential to the operation and maintenance of the equipment.

INSTRUCTIONS FOR REQUISITIONING PARTS

NOT IDENTIFIED RY NSN

When requisitioning parts not identified by National Stock Number, it is mandatory that the following information be furnished the supply officer.

1 - Manufacturer's Federal Supply Code Number - 70490

2 - Manufacturer's Part Number exactly as listed herein.

3 - Nomenclature exactly as listed herein, including dimensions, if necessary.

4 - Manufacturer's Model Number - Model 70AC

5 - Manufacturer's Serial Number (End Item)

6 - Any other information such as Type, Frame Number, and Electrical Characteristics, if applicable.

7 - If DD Form 1348 is used, fill in all blocks except 4, 5, 6, and Remarks field in accordance with AR 725-50.

Complete Form as Follows:

(a) In blocks 4, 5, 6, list manufacturer's Federal Supply Code Number - 70490 followed by a colon and manufacturer's Part Number for the repair part.

(b) Complete Remarks field as follows:

Noun: (nomenclature of repair part)
For: NSN: 4940-00-300-1314
Manufacturer: Wheelabrator - Frye Inc.
Materials Cleaning Division
400 S.Byrkit Ave.
Model: 70AC Mishawaka, IN 46544
Serial: (of end item)

Any other pertinent information such as Frame Number, Type, Dimensions, etc.

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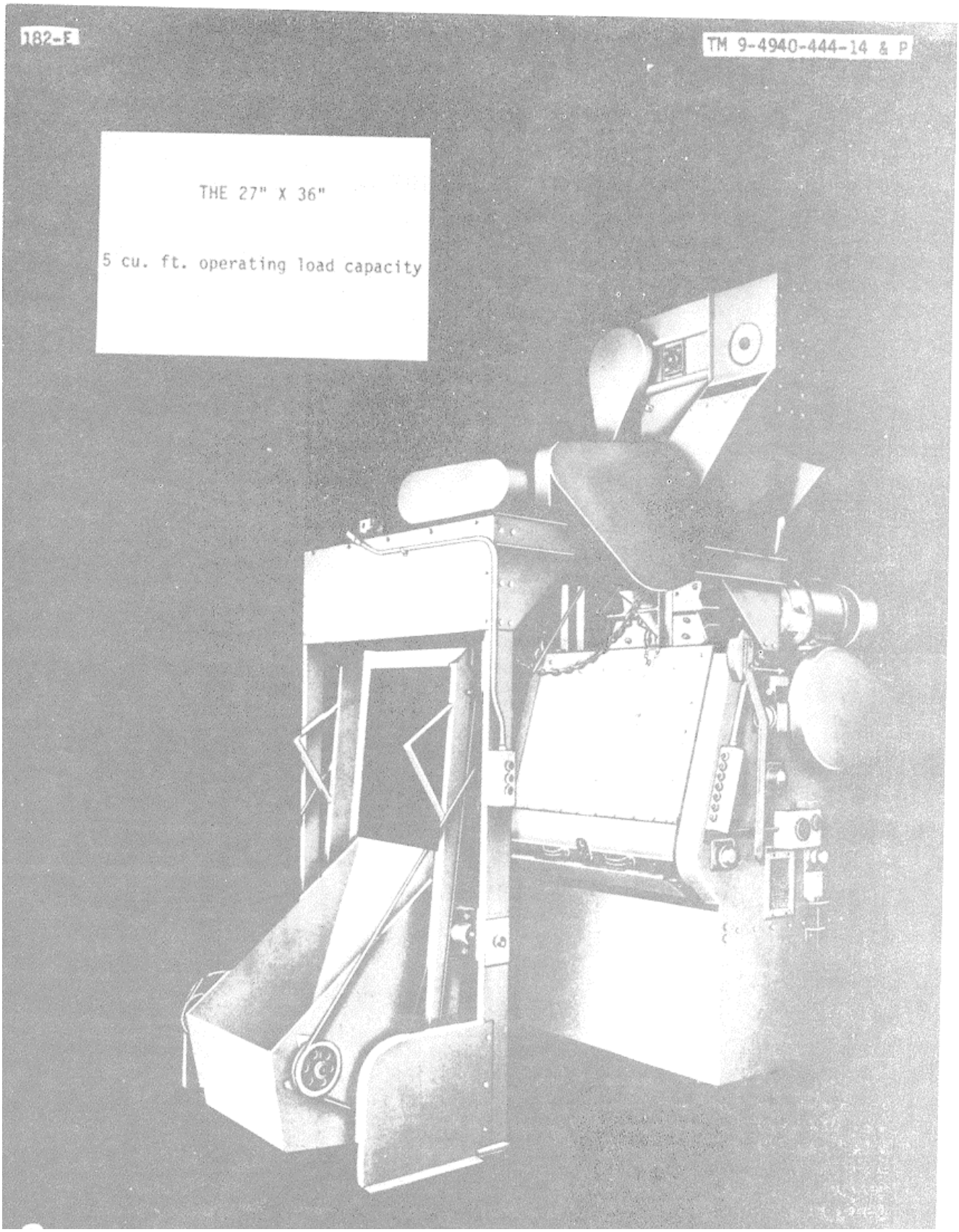
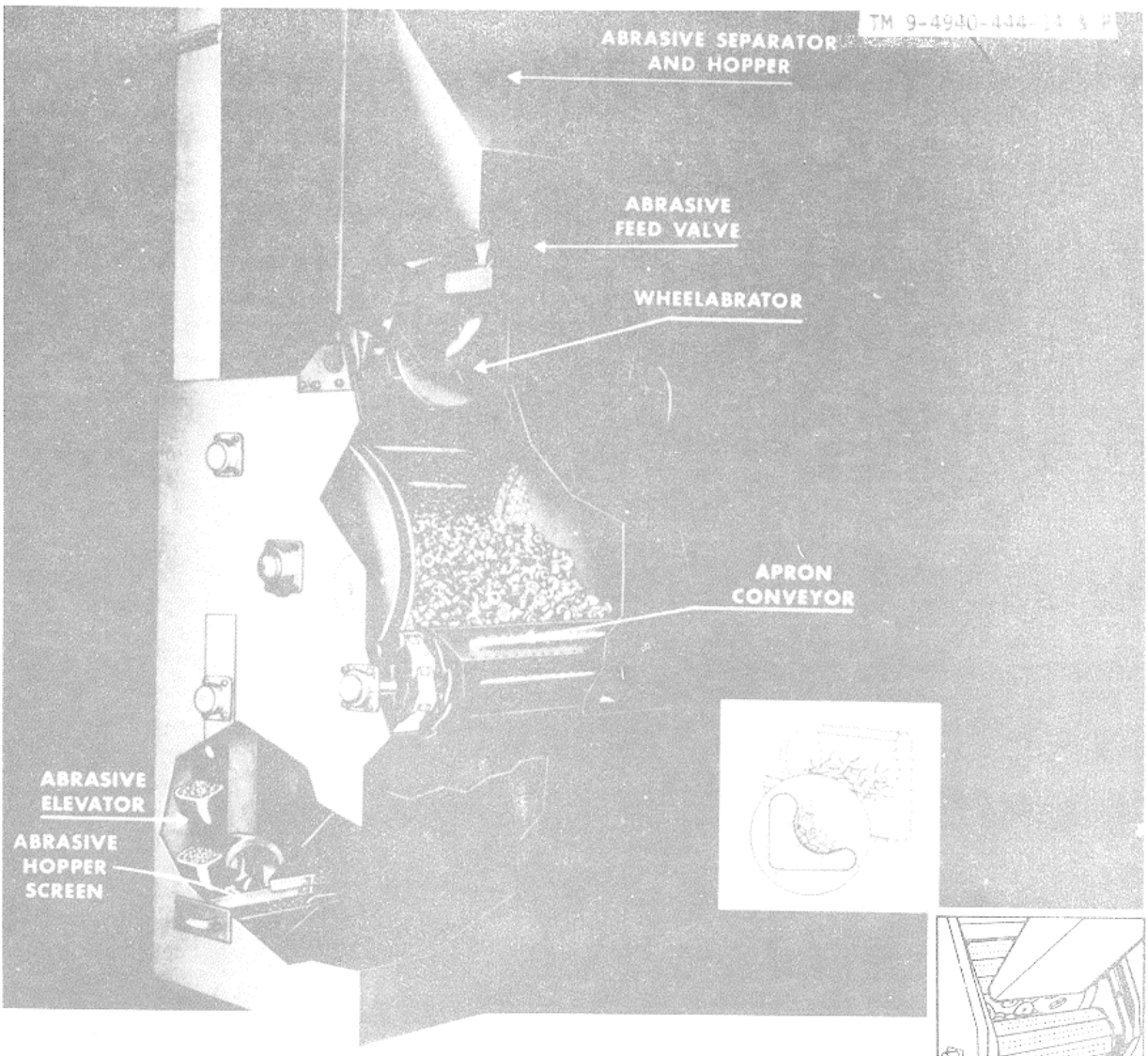

182-E
TM 9-4940-444-14 & P
THE 27" X 36"
5 cu. ft. operating load capacity

TUMBLAST DESCRIPTION

The 27" x 36" Tumblast is a heavy duty airless blast machine with a 5 cu ft operating load capacity. It is used for cleaning small castings, forgings, auto parts, heat treated work, weldments, and other metal parts.

The Tumblast features are as follows:
(a) The airless blast unit with directional control; and (b) the Tumblast endless apron conveyor method of exposing the work to the abrasive blast.

The standard 27" x 36" Tumblast is supplied with a steel slat type conveyor. If desired: a heavy endless rubber conveyor belt may be used.



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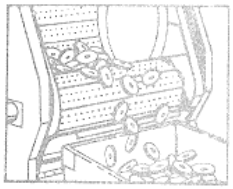
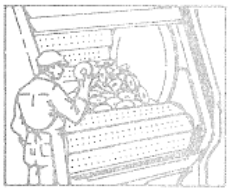


Unloading



Ease of Inspection

Mechanical Loading

The Tumblast Loader (either pit type or floor level) greatly reduces loading time and permits the Tumblast to be recharged almost instantly after unloading. The operator touches a push button causing the bucket to rise and discharge its load into the apron conveyor.

Filling the Loader

Charging the Tumblast

5

The Tumblast uses the endless conveyor method of tumbling - which completely exposes all surfaces of every piece to the full effect of the abrasive blast.

Spent abrasive falls through holes in the conveyor and passes into a bucket elevator to be carried to an overhead abrasive separator and storage hopper from which it is fed by gravity to the unit.

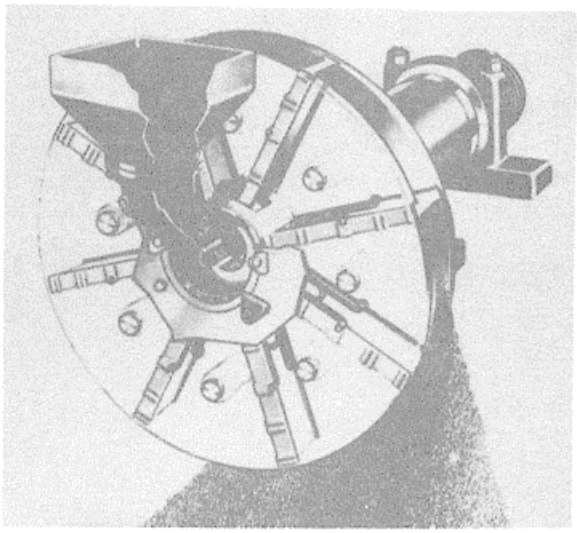
The speed and ease o loading and unloading are important features of the Tumblast. Unloading is accomplished by reversing the apron conveyor which carries work up and out of the cleaning chamber. The quick-opening door permits easy inspection of the load, eliminating under and over blasting, and enables the operator to set an accurate cleaning time for products varying in size, shape, and weight

THE AIRLESS TUMBLAST

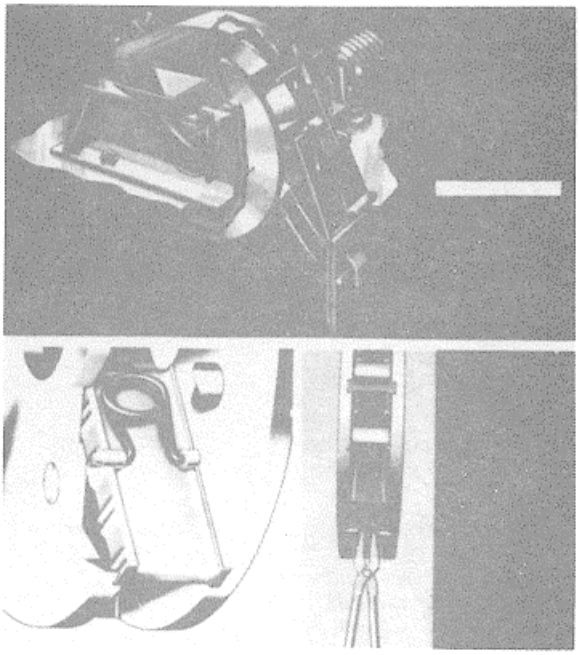
The efficient blast cleaning device

The heart of any airless blast cleaning equipment is the abrasive throwing unit. The 27” x 36” Tumblast uses the type "Q" wheel (15” diameter x 2 1/2" wide) that hurls abrasive by controlled centrifugal force upon the work to be blasted.

This wheel features blades held in position with a spring clip holding device.



The Type “Q” Unit



HOW THE WHEEL WORKS

Gravity-fed abrasive is picked up by the rapidly rotating impeller and discharged through openings. It is then forced through the opening in the stationary (but adjustable) control cage and immediately picked up by the rotating blades. Blades repeat this operation approximately 300 times a second. The abrasive slides along the blades until it leaves the wheel in a controlled barrage of high capacity cleaning power.

ENDLESS APRON CONVEYOR BELT PROVIDES COMPLETE WORK EXPOSURE —
The endless apron conveyor can be provided either as a series of perforated flights made of special abrasion-resisting steel or as a molded rubber endless belt. Supporting rolls mounted under the rubber belt permit handling heavier loads without belt deflection (not required for Plastic Deflashers). Easily accessible conveyor takeups permit ready and simple adjustment of the belt.

LINK ASSEMBLY IS COMPLETELY PROTECTED — A series of malleable links, with hardened steel bushings, pins and rollers, hold together the steel conveyor apron flights. This assembly is protected from the abrasive blast by the barrel heads.

CONVEYOR MAIN DRIVE WITH OVERLOAD PROTECTION — The conveyor drive consists of an electrical motor with "V" belt drive to a worm gear reducer, and a chain drive from the reducer to the upper, rear conveyor shaft. The mill and drive are protected from excessive overloads by means of a positive limit switch on the mill drive. The low conveyor speed provides a gentle yet complete tumbling action without danger to the work or machine parts.

HEADS AND BEARINGS PROTECTED BY REMOVABLE WEAR PLATES — Barrel heads are made of heavy steel protected by removable wearing plates. They are supported by heavy-duty roller and ball bearings mounted in dust-tight housings.

CONVEYOR SHAFTS AND SPROCKETS — DESIGNED FOR HEAVY LOADS — The conveyor sprockets are mounted on heavy-duty shafting. The pulleys which support and guide the conveyor on the rubber belt machines are grooved to prevent abrasive buildup between the pulley and conveyor.

RUGGED CABINET FOR DURABILITY AND ECONOMY — Side frames are reinforced heavy steel plate. Anti-friction bearings, securely sealed against abrasive and dust, are used on all load-carrying shafts. In- section doors provide access to all interior working parts.

ABRASIVE-TIGHT, RIGID DOOR — The easily operated counterbalanced door is of rigid construction to prevent damage and excessive maintenance from tumbling work hitting the door. Lined with rubber to protect it from abrasive wear. An automatic lock sets when the door is closed and must be unlocked manually before the door can be raised. A limit switch, operated from a cam on the door operating shaft, prevents running the wheel when the door is open or reversing the mill when the door is closed.

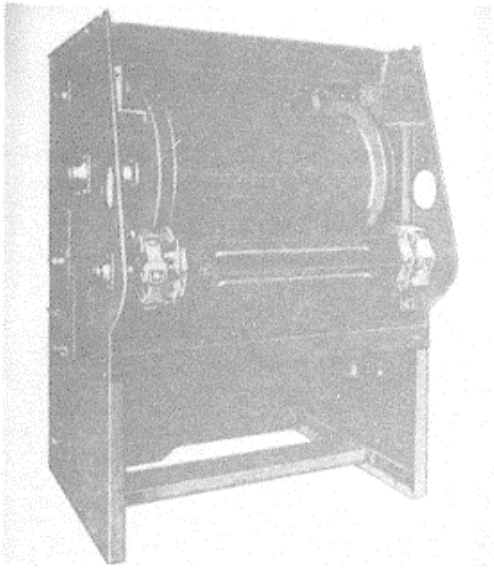
ABRASIVE SEPARATOR—
The 18"abrasive separator employs the natural angle of abrasive repose to provide positive flow control-insuring an even flow across the entire separator lip, irrespective of the degree of abrasive contamination. The uniform, low velocity curtain permits a thorough "air washing" of the abrasive. Wear is negligible because abrasive moves on abrasive — not the separator parts.

ABRASIVE ELEVATOR HAS ADJUSTABLE TENSION — The bucket type abrasive elevator is mounted between the conveyor and the rear wall of the Tumblast. Tension on the belt is adjusted with a single screw which assures both bearings being adjusted equally. This screw can be swiveled to correct for misalinement.

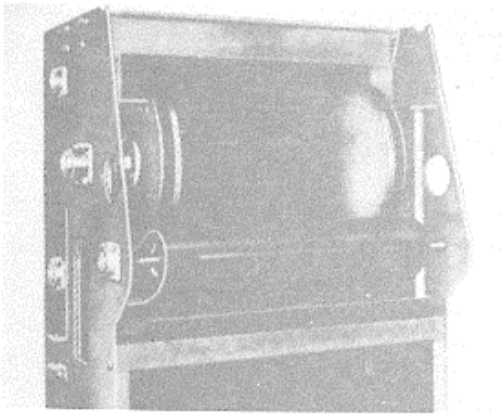
ABRASIVE SCREEN REMOVES COARSE MATERIAL — Spent abrasive from the apron conveyor drops into the hopper through a stationary, removable wire screen pan which retains refuse, large pieces of scale, and other foreign material. The hopper serves as the boot of the bucket elevator.

AIR OPERATED ABRASIVE CONTROLS — Abrasive controls are power-operated by an air cylinder. In addition to insuring proper abrasive feed to the wheel, this improvement makes possible a semi-automation option.

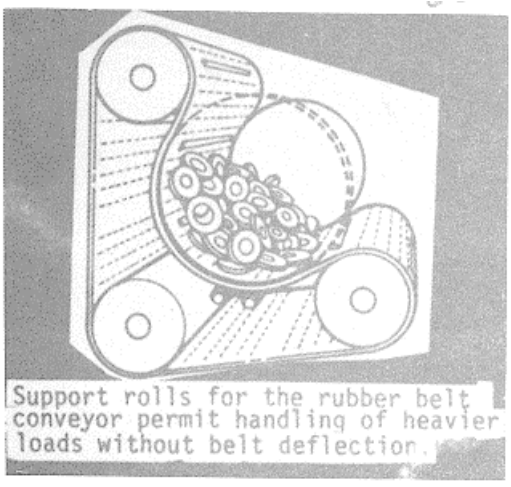
NEVERLUBE (SEALED FOR LIFE) BEARINGS ARE INSTALLED WHERE PRACTICAL — Eliminates the risk of short life due to lack of lubrication or over-lubrication —- also eliminates pushout seals and messy accumulations of grease and dust.

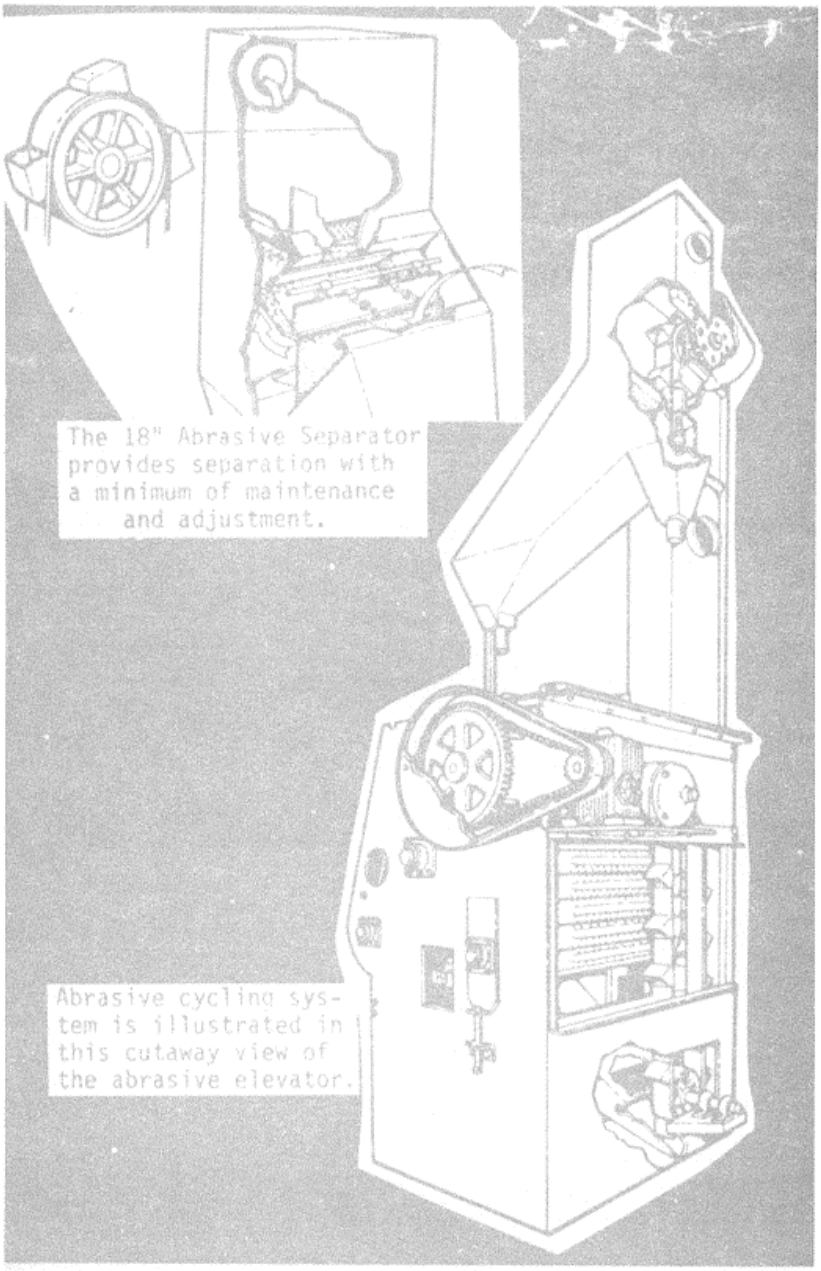


The endless chain apron conveyor consists of a series of abrasion-resisting steal perforated flights.

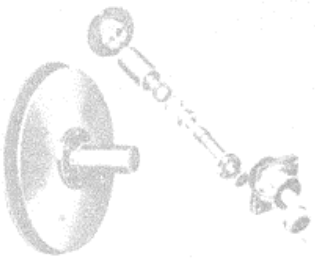


The rubber belt conveyor is recommended for handling products requiring an extremely gentle tumbling action.





A series of malleable links, with hardened steel bushings, pins, and rollers, hold together the apron conveyor flights.



Barrel heads are made of heavy steel protected by removable wearing plates.

MECHANICAL SPECIFICATIONS

Operating Load Capacity (cu. ft.)	5
Shipping Weight of Tumblast (lbs.)	8840
Shipping Weight of Loader (lbs.)	2150
Weight of heaviest piece (lbs.)	6410
Size of largest piece — width	7' 2"
depth	5' 8"
height	5' 2"
(as machine is normally shipped)	
Floor Space without Loader — width	7' 1¼"
depth	5' 6"
Floor Space with Loader — width	7' 1¼"
depth	12' 0"
Clearance (minimum) — front	4' 0"
back	2' 0"
side R. H.	2' 0"
side L. H.	3' 0"
Height	13' 8"

Total H. P.	Conveyor Steel	Conveyor Rubber
Without Loader	17	11¾
With Loader	19	13¾

Ventilation Requirements (depending upon job) C.F.M.	1300-1750
Apron Conveyor Speed (F.P.M.) Steel	15
Rubber	Approximately 17.8
Apron Conveyor Material	Steel . . Standard
	Rubber . Optional
Units (15" diameter x 2½" wide)	1

ELECTRICAL SPECIFICATIONS

MOTORS

The following ball bearing, totally enclosed, horizontal, squirrel cage, induction motors are required for the 27" x 36" Tumblast:

Unit		
Steel Conveyor	15 H.P.	1800 R.P.M.
Rubber Belt Conveyor	10 H.P.	1800 R.P.M.
Conveyor Drive	1 H.P.	1800 R.P.M.
Elevator		
Steel Conveyor	1 H.P.	1800 R.P.M.
Rubber Conveyor	¾ H.P.	1800 R.P.M.
Loader	2 H.P.	1800 R.P.M.

CONTROLS AND PANEL BOX

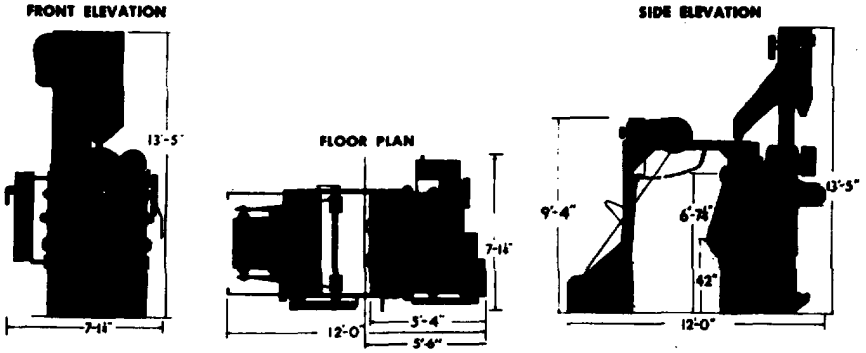
Magnetic starters which control the operation of the various motors are housed in a single 12 enclosure. The control panel is fitted with an externally operated disconnect switch and such other features as color-coded insulated wire, front connected wiring, fuse protection for all motor wires, low voltage fused control circuit, thermal overload relays, separate load and control terminal blocks, and electrical interlocks for various starters.

Push button controls for the Tumblast are mounted in a 1 gasketed enclosure. When the loader is furnished a separate push button station is mounted on the loader frame.

An ammeter and wheel hour meter are provided.

A plugging relay brings the Tumblast to a quick stop when the power is cut so that the mill door can be opened quickly without danger from flying abrasive.

OVERALL DIMENSIONS



FOUNDATION

This machine uses a floor level foundation with no pit required. It may be satisfactorily mounted on any solid, level floor.

ACCESSORIES

Various accessories are available for special operating conditions. These include: intermittent mill drive, time clock, abrasive level indicator, abrasive adding device and automatic sequencing.

INSTALLATION REMIDERS

Proper operation of equipment is largely dependent upon proper installation procedures. Pay particular attention to the following installation procedures:

1) Foundations, pits (if used) and anchor bolt LAYOUTS SHOULD BE CHECKED WITH CERTIFIED FOUNDATION DRAWINGS before proceeding with the actual installation.

2) REMOVE ALL DEBRIS from pits, foundations and general installation area.

3) Install lower abrasive cycling parts in pit first, if used - these may include hoppers, shaker conveyors, worm screws, etc. Level and shim components if necessary.

4) PLACE FELT OR TAR PAPER STRIP AND MASTIC CEMENT BETWEEN EDGES OF ALL PARTS THAT ARE TO BE BOLTED TOGETHER. Tightly sealed joints are important to proper installation. Cement and felt or tar paper strip are included with shipment of all equipment.

5) Erect main cabinet section, drifting or reaming matching bolt holes as may be necessary. If main cabinet section is composed of separate wall and roof panels, use mastic cement and felt or tar paper strip between all joints.

6) LEVEL CABINET AND SHIM ACCORDINGLY.

7) When erecting the abrasive elevator, give particular attention to the following:

   a) Make certain that all connecting joints are properly sealed with mastic cement and felt or tar paper.
   b) PLUMB ELEVATOR CASING, shim if necessary.
   c) Drop the head pulley to the lowest point of the elevator belt takeup device. Install rubber elevator belt making certain that buckets are headed toward the proper discharge direction. If bucket belt needs to be shortened, MAKE A STRAIGHT BELT CUT AND SPLICE BELT SQUARELY.
   d) Tighten belt by raising the head pulley. Belt will stretch excessively for a period of approximately two weeks. RECHECK BELT TENSION OF A NEW BELT EVERY COUPLE OF DAYS AND RETIGHTEN BY RAISING TAKEUP. Check alinement of belt, DO NOT ALLOW BELT TO RUB AGAINST THE CASING. Belt should ride on center of crowned head pulley. Belt will invariably ride toward low side of pulley, raise that side of the pulley in small increments to center the belt.

8) While completing the erection of the upper abrasive cycling components, make certain that mastic cement and felt or tar paper strip is used between all connecting parts. These components may include screw conveyor, rotary screen, abrasive separator, storage hopper, etc.

9) It is important that the upper worm screw conveyor and rotary screen together with the screw trough and housing BE INSTALLED SQUARE AD LEVEL. The abrasive separator must also be installed square and level, and particular attention should be given to all abrasive distribution points within the separator to make certain that ALL ELEMENTS ARE LEVEL, SQUARE AND TRUE. Any parts that may have been sprung or bent in shipment should be corrected.

10) MAKE CERTAIN THAT ALL DRIVES ARE IN PROPER ALINEMENT. Check for correct belt and chain tension. All drives must be free of mechanical binds. Tighten all set screws on sprockets, sheaves, pulleys, bearing collars, etc.

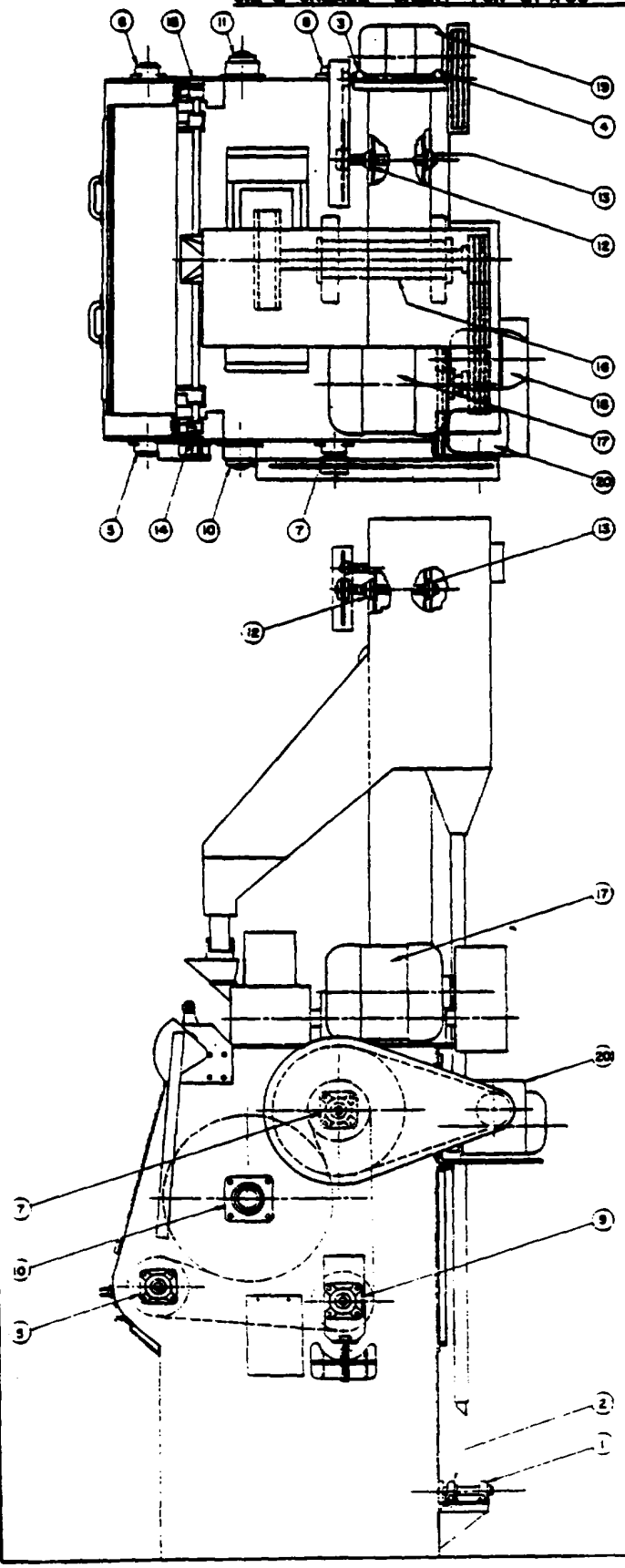
11) Check lubrication of all gear reducers. REDUCERS ARE SHIPPED DRY AND SHOULD BE FILLED to the proper oil level with the recommended lubricant as designated on reducer housing name plate or lubrication instruction plate. Do not lubricate open chain drives. BEARINGS ARE PRE-LUBRICATED, DO NOT OVER-GREASE. Check oil level in unit bearing, if an oil type bearing is used.

12) Clear machine internally and externally of all debris, nuts, bolts, welding rod butts, shavings, etc. including cleanout of all hoppers, troughs, housings, screens, grates, etc. MAKE CERTAIN THAT WHEEL IS CLEARED AND ROTATES FREELY.

An individual Parts Book has been prepared for your particular machine. The Parts Book was made up immediately after shipment of the machine in order that it may include all last minute changes. The book will carry the serial number of the shipped equipment.

The Parts Book will also contain a section entitled, "A, B, C's of Operation". Please refer to this section for suggestions regarding proper operation and maintenance procedures.

OIL & GREASE CHART FOR 27 X 36 TUMBLAST



1-2-3-4-5-6-7-8-9-12-13 LUBRICATED FOR LIFE-SEE NOTE

10-11 GREASE EVERY SIX (6) MONTHS. USE SUPERLA NO. 4R OR AN EQUIVALENT.

14-15 GREASE AFTER EVERY 16 HOURS OPERATION USE SUPERLA NO.4R OR AN EQUIVALENT

16-FILL BEARINGS THRU OIL HOLE ON TOP OF HOUSING FILL UNTIL LEVEL OF OIL REGISTER BETWEEN THE TWO LINES INDICATED ON OIL GAGE AT THE BOTTOM OF HOUSING. DO NOT OVER GREASE. USE A HIGH GRADE MOTOR OIL S.A.E. NO 10 OR 20

17-18-19 (FOR MOTORS WITH GREASE PLUGS)-GREASE AFTER ONE YEAR'S OPERATION & EVERY 6 MONTHS THERE-AFTER.

(FOR MOTORS WITHOUT GREASE PLUGS) GREASE EVERY ONE TO TWO YEARS REMOVE BEARINGS FROM HOUSING & SEALS FROM BEARINGS. PACK BEARING 2/3 FULL & HOUSING COMPLETELY FULL.

20-KEEP REDUCER FILLED TO TOP OIL LEVEL PIPE. USE S.A.E. NO. 140 GEAR LUBRICANT WITH EXTREME PRESSURE CHARACTERISTICS REFILL AFTER EACH 1000 HRS OPERATION

SPECIFICATIONS FOR SUPERLA NO.4R

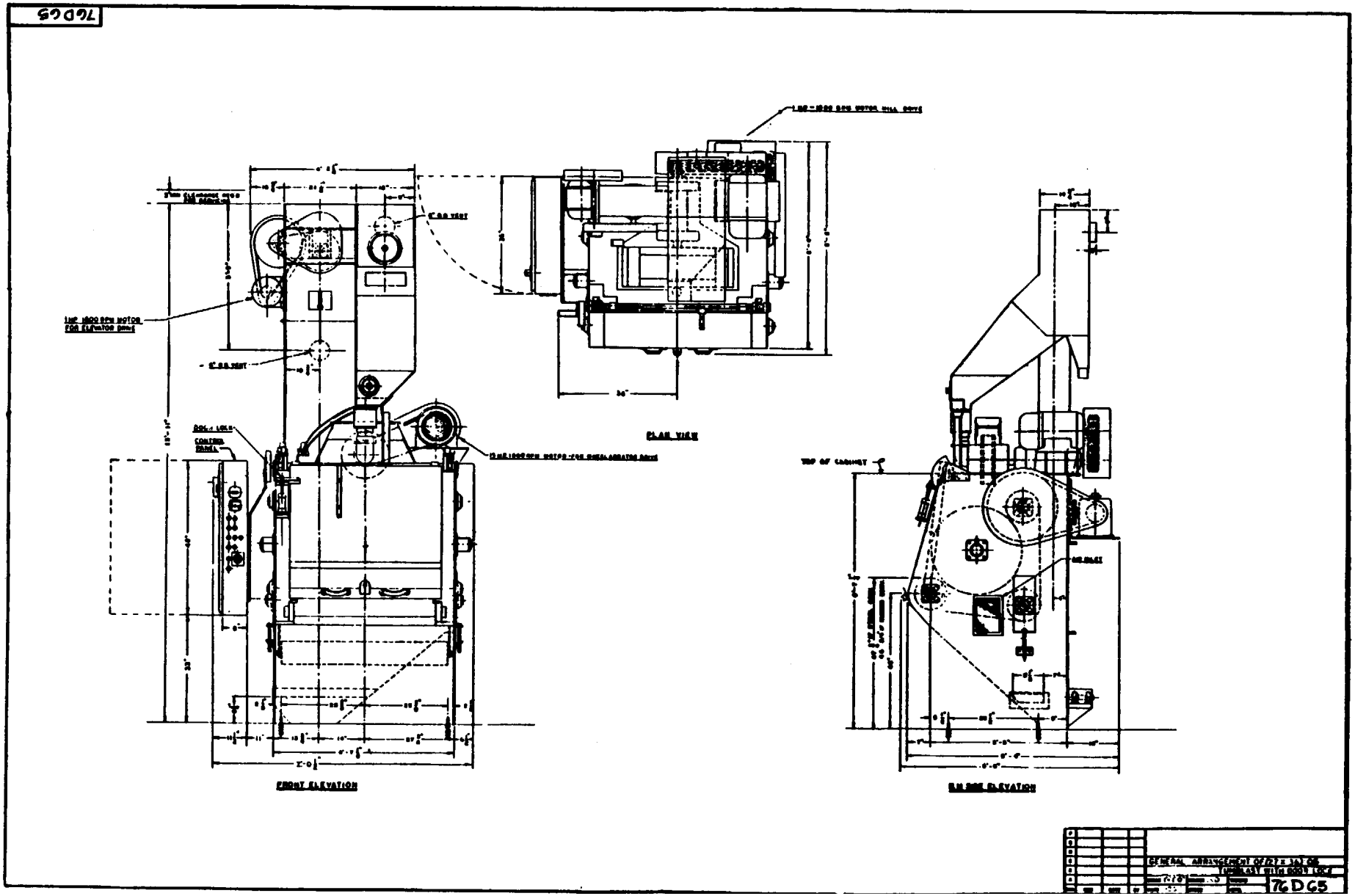
NO.1 CUP GREASE, LOW SOAP RANGE WITH OIL OF APPROXIMATELY 350 SECONDS S.U.V. PENETRATION OF APPROXIMATELY 300.

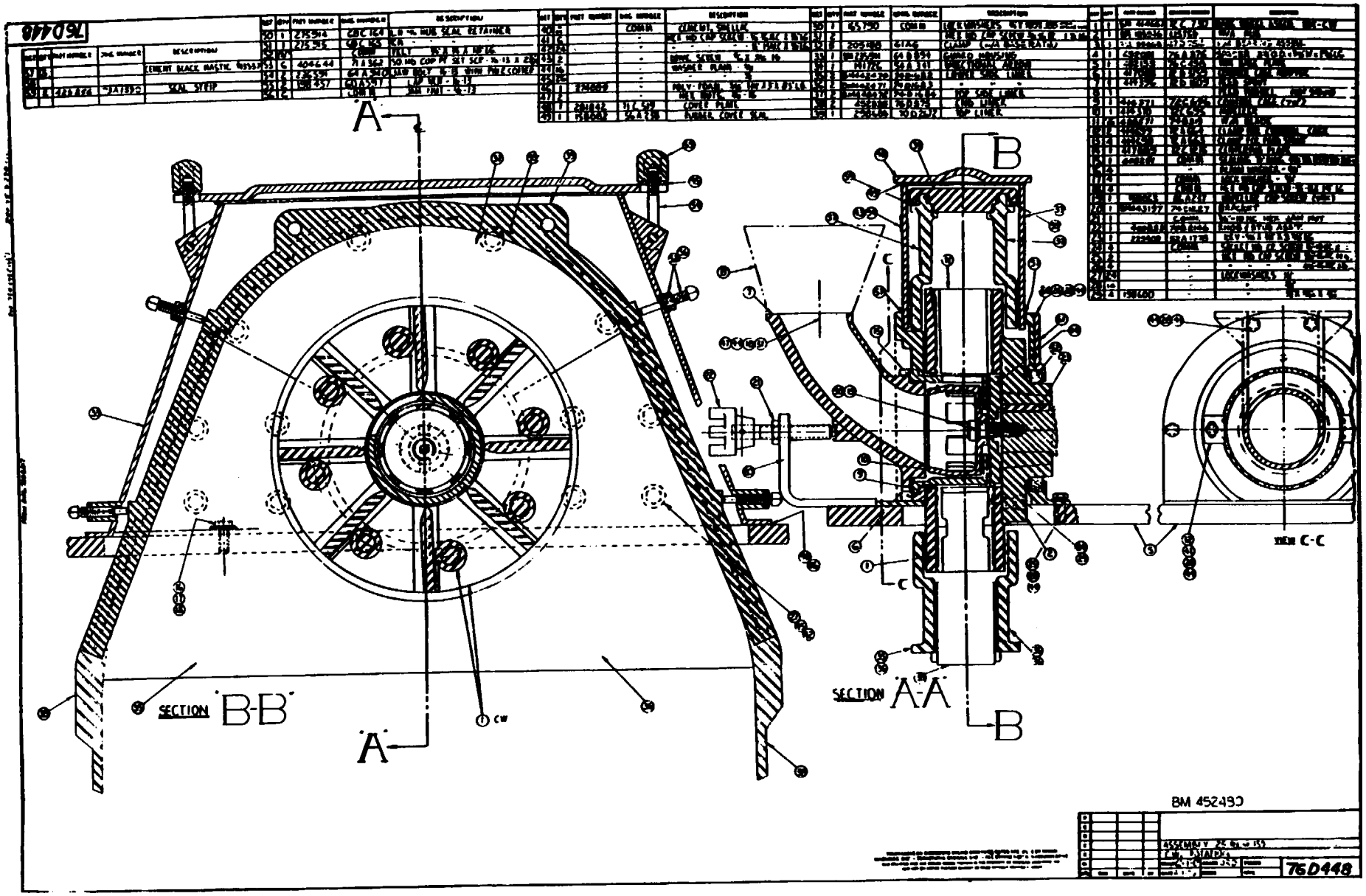
NOTE.

ANY TYPE SC BALL BEARING PILLOW BLOCK OR FLANGE BEARING WITHOUT GREASE FITTING IS LUBRICATED FOR THE LIFE OF THE BEARING. NO FURTHER GREASING IS REQUIRED. THESE BEARINGS WILL HAVE A PLUG INSTEAD OF A GREASE FITTING.

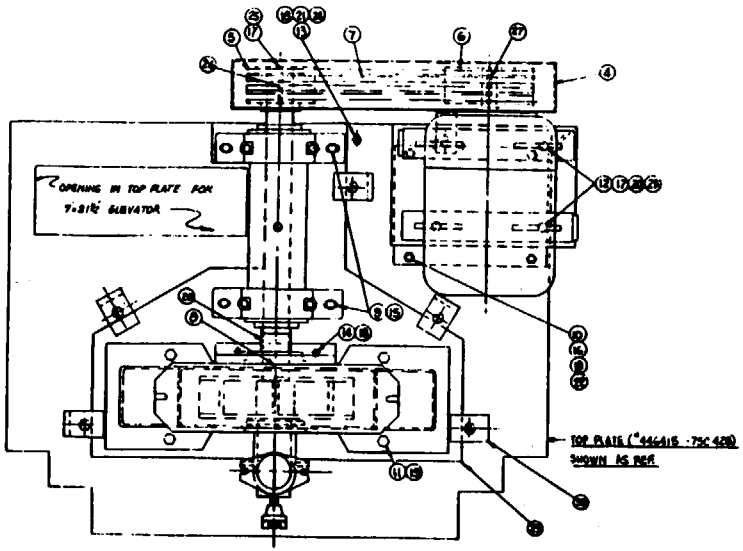
DO NOT LUBRICATE ROLLER CHAIN. THIS ATTRACTS DIRT & SHORTENS LIFE OF THE CHAIN

DWG. SD 2937


76DC5
PLAN VIEW
FRONT ELEVATION
76DC5

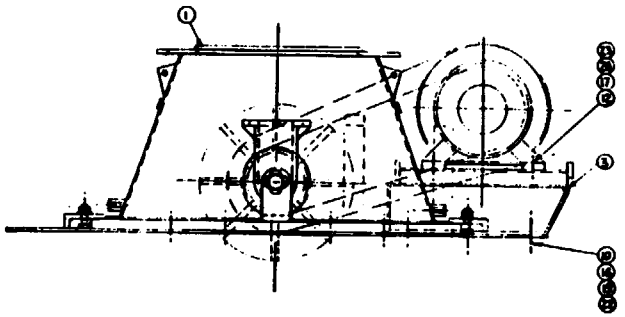

SECTION B-B
SECTION A-A
VIEW C-C
BM 452480
76D448

76D 785



	SET	QTY	PART NUMBER	DRAWING NUMBER	DESCRIPTION
*	1	1	BM 452460	76D 448	W/A ASSEMBLY (RUN WHEEL) C.L. EST.
*	2	1	BM 455[illegible]	47D 754	BEARING ASS'Y W/A
*	3	1	B.V. 27993	88C 984	BASE, W/A MOTOR FOR 215-T FR 1.1/2.
*	4	1	BM 457421	76C 489	GUARD, W/A DRIVE (TOP, ENC.)
	5	1	94572	43B 2441	SHEAVE, "B" C.I., 6.6" PD, 4GR., 2 7/8" B. "KWY & Z 55290", 3" HUB LENGTH
	6	1	151820	COMM.	SHEAVE, "B" C.I., 6.6" PD, 4GR, [illegible] "KWY & Z 55290"
	7	4	65135	"	V-BELTS
*	8	1	229409	52A 1778	KEY, HUB 5/8 x 5/8 x 3 5/8" LG KEYSTOCK
*	9	4		COMM.	5/16"-18 x 2½" LG. HEX HD CAPSCREW
	10	4		"	5/16"-11 x 1½" LG " " "
*	11	4		"	3/4"-10 x 3/4" LG " " "
	12	4		"	1/2"-13 x 1½" LG " " "
*	13	2		"	5/8"-11 x 1" LG " " "
*	14	2		"	5/8"-11 x 3/8" LG " " "
A	15	4		"	3/4" LOCKWASHER
	16	4		"	5/8" "
	17	5		"	1/2" "
	18	4		"	3/8" "
*	19	8		"	5/8" FLATWASHER
*	20	4		"	1/2" "
*	21	2		"	5/8" "
*	22	4		"	5/8"-11 HEX NUTS
	23	4		"	1/2"-13 " "
*	24	2		"	5/8"-11 " "
	25	1		"	1/2" x 1 3/4" LG SOCKET HD. CAPSCREW
*	26	1		"	KEY 1/2" x 1/2" x 1 1/2" LG KEYSTOCK
*	27	1		"	" 3/8" x 3/8" x 2.75 LG "
*	28	1	452091	76A 576	SPACER 3.50 O.D. x 3/8" W. x 1 7/8" LG. C.D.S.
*	29	1	452133	76C 436	BASE PLATE, W/ELABRATOR
*	30	5	205186	61A6	CLAMP

* ITEMS NOT INCLUDED ON THIS B/M. BUT ARE SHOWN FOR REF.



BM-452571

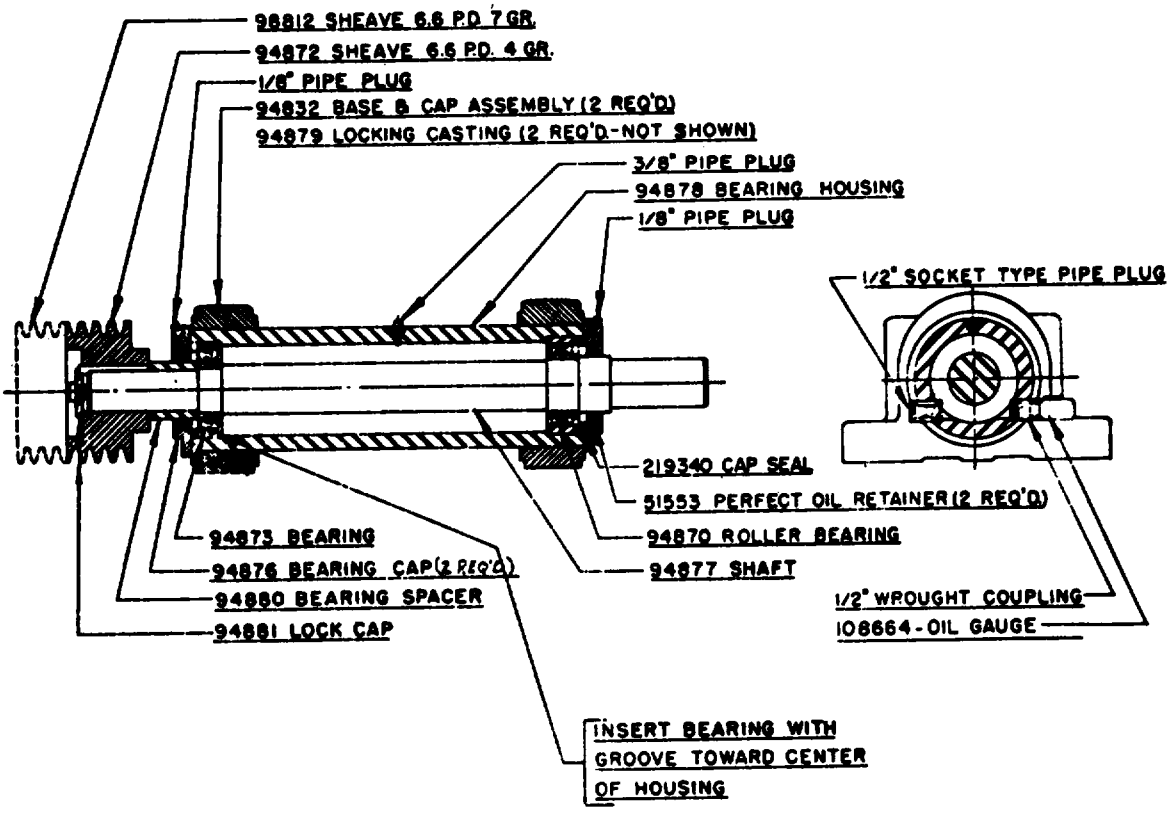
W/A MOTOR ASSY. FOR

76 D 785

BEARING ASSEMBLY

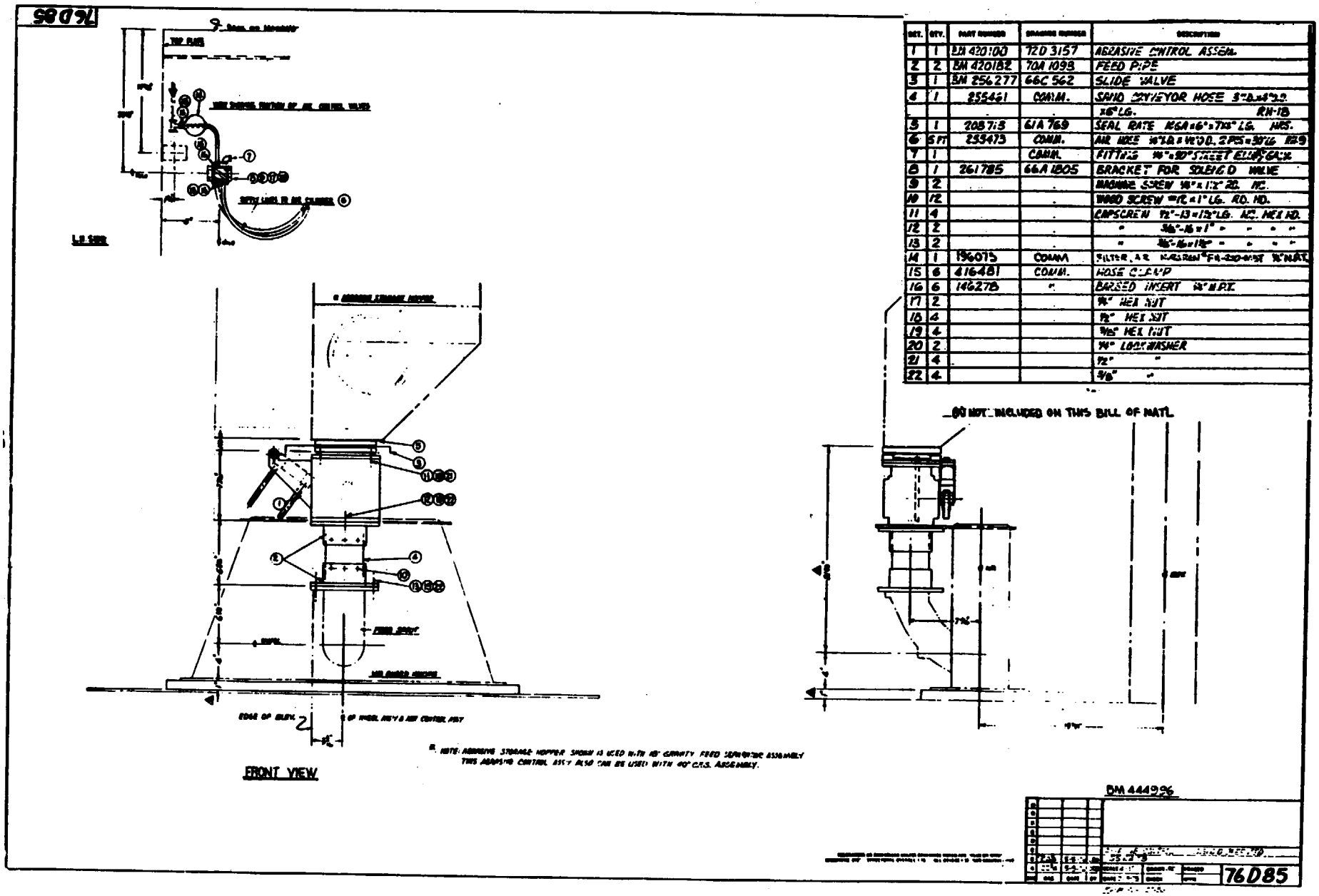
OIL & GREASE SPECIFICATIONS

FILL BEARING THRU OIL HOLE ON TOP OF HOUSING. FILL UNTIL LEVEL OF OIL REGISTERS EVEN WITH THE TOP OF OIL GAUGE GLASS. IF THERE IS ANY QUESTION AS TO THE LEVEL, UNSCREW PLUG ON TOP SIDE OF GAUGE. OIL LEVEL SHOULD BE APPROXIMATELY 1/8" BELOW THE GAUGE TOP. USE A HIGH GRADE MOTOR OIL S.A.E. NO 10 OR 20. CHANGE OIL AFTER EVERY 6 MONTHS OR 3000 HOURS OF OPERATION.



NOTE

95868 COMPLETE BEARING ASSEMBLY WITHOUT SHEAVE



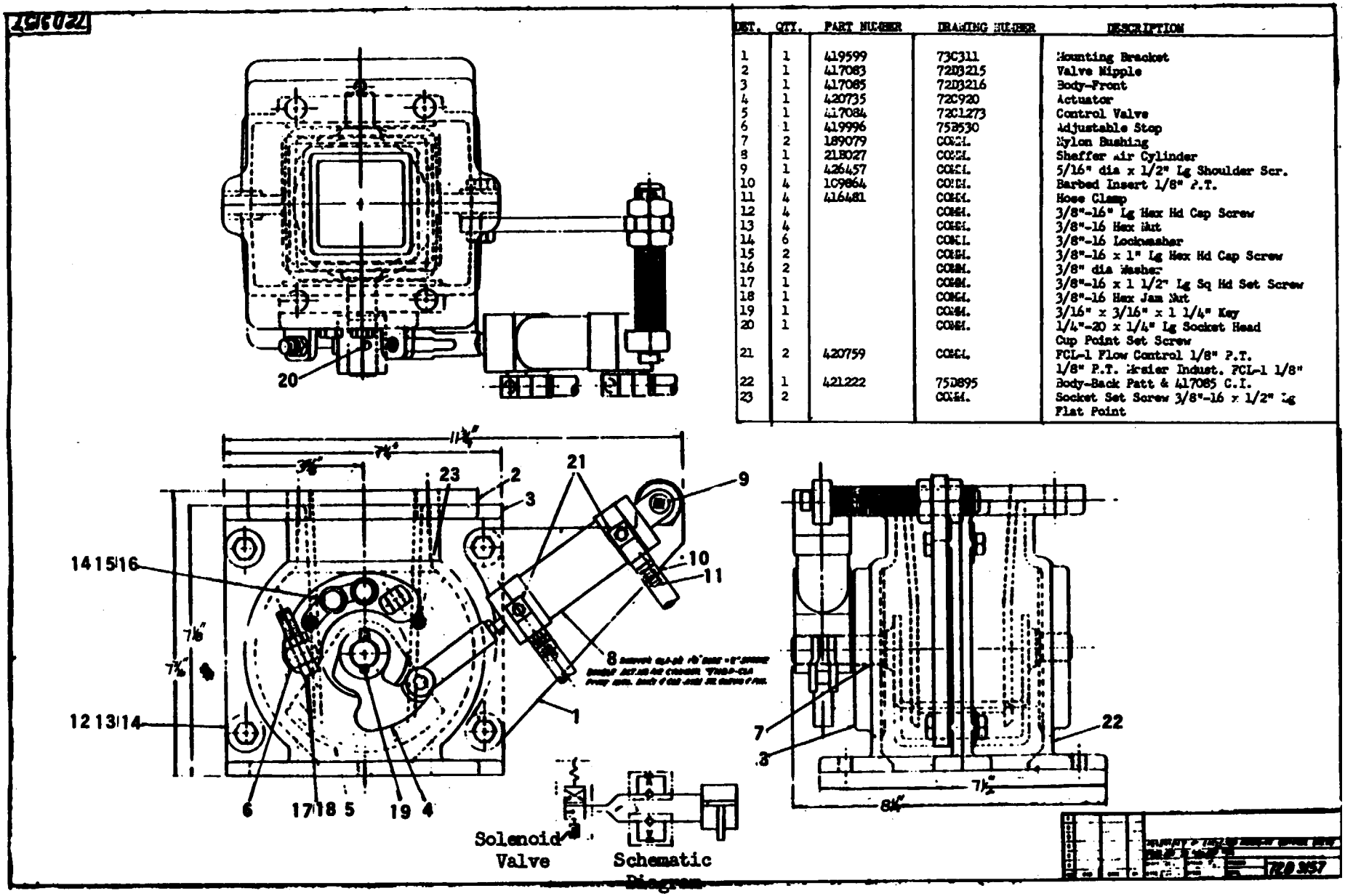
DET.	QTY.	PART NUMBER	DRAWING NUMBER	DESCRIPTION
1	1	BM 420100	72D 3157	ABRASIVE CONTROL ASSEM.
2	2	BM 420182	70A 1098	FEED PIPE
3	1	BM 256277	66C 562	SLIDE VALVE
4	1	255461	COMM.	SAND CONVEYOR HOSE 3"I.D.x4"O.D. x6" LG. RH-1B
5	1	208718	61A 769	SEAL RATE NSA x6"x7¾" LG. NRS.
6	5 FT	253475	COMM.	AIR HOSE ½"I.D.x ½"O.D. 2 PLY x 300 LB
7	1		COMM.	FITTING ½"x90° STREET ELBOW GALV.
8	1	261785	66A 1805	BRACKET FOR SOLENOID VALVE
9	2			MACHINE SCREW ¼"x1¼" RD. HD.
10	12			WOOD SCREW #12 x 1" LG. RD. HD.
11	4			CAPSCREW ½"-13 x 1½" LG. NC. HEX HD.
12	2			" ⅜"-16 x 1" " " " "
13	2			" ⅜"-16 x 1½" " " " "
14	1	196015	COMM	FILTER, AIR MURPHY FR-250-01ST ½" NPT
15	6	416481	COMM.	HOSE CLAMP
16	6	146278	"	BARBED INSERT ½" M.P.T.
17	2			½" HEX NUT
18	4			½" HEX NUT
19	4			⅜" HEX NUT
20	2			½" LOCK WASHER
21	4			½" "
22	4			⅜" "

(9) NOT INCLUDED ON THIS BILL OF MATL

FRONT VIEW

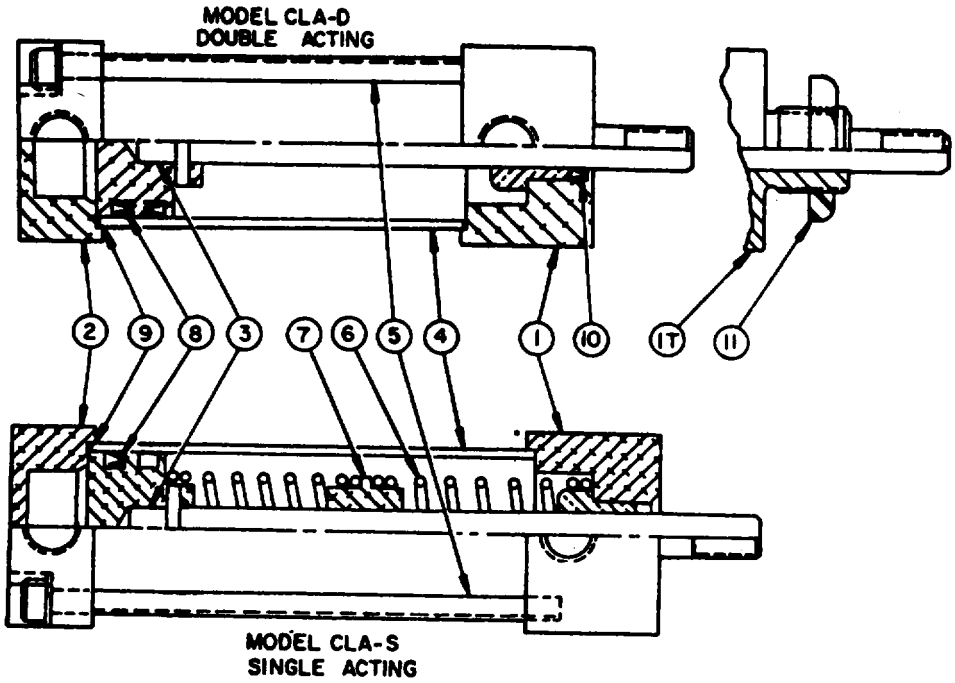
BM 444996

76D85



DET.	QTY.	PART NUMBER	DRAWING NUMBER	DESCRIPTION
1	1	419599	73C311	Mounting Bracket
2	1	417083	72D3215	Valve Nipple
3	1	417085	72D3216	Body-Front
4	1	420735	72C920	Actuator
5	1	417084	72C1273	Control Valve
6	1	419996	75B530	Adjustable Stop
7	2	189079	COM.	Nylon Bushing
8	1	218027	COM.	Sheffer Air Cylinder
9	1	426457	COM.	5/16" dia x 1/2" Lg Shoulder Scr.
10	4	109864	COM.	Barbed Insert 1/8" P.T.
11	4	416481	COM.	Hose Clamp
12	4		COM.	3/8"-16" Lg Hex Hd Cap Screw
13	4		COM.	3/8"-16 Hex Nut
14	6		COM.	3/8"-16 Lockwasher
15	2		COM.	3/8"-16 x 1" Lg Hex Hd Cap Screw
16	2		COM.	3/8" dia Washer
17	1		COM.	3/8"-16 x 1 1/2" Lg Sq Hd Set Screw
18	1		COM.	3/8"-16 Hex Jam Nut
19	1		COM.	3/16" x 3/16" x 1 1/4" Key
20	1		COM.	1/4"-20 x 1/4" Lg Socket Head Cup Point Set Screw
21	2	420759	COM.	FCL-1 Flow Control 1/8" P.T. 1/8" P.T. Mosier Indust. FCL-1 1/8"
22	1	421222	75D895	Body-Back Patt & 417085 C.I.
23	2		COM.	Socket Set Screw 3/8"-16 x 1/2" Lg Flat Point

INSTALLATION AND MAINTENANCE INSTRUCTIONS CLA SERIES CYLINDERS 1 1/8" BORE



INSTALLATION

1. Install cylinders so that a minimum, if any, side thrust will be applied to the piston rod. Make sure that the piston rod lines up exactly with the part to which it is to be attached.

2. When attaching fittings, use sealing compound sparingly. To make sure compound does not get into cylinder, apply only to male threads with none on thread closest to open end. Tighten fittings only enough to seal properly. Over- tightening may distort threads on fittings, in heads or both

3. It is recommended that a good air line filter and lubricator be installed on, or as close as possible to each cylinder.

MAINTINANCE

1. The cylinder must be disassembled to replace packings and inspect and/or replace other parts. To disassemble, remove tie rods (5). Do not attempt to separate piston and piston rod. These parts are available for replacement as a piston and rod assembly (3) only.

2. Carefully inspect piston rod OD and ID of tube (4) for nicks, scratches, or other damage. Parts showing such surface defects should be replaced, or short packing and rod bushing life will result

3. All packing and gaskets should be replaced each time it is necessary to disassemble the cylinder for maintenance.

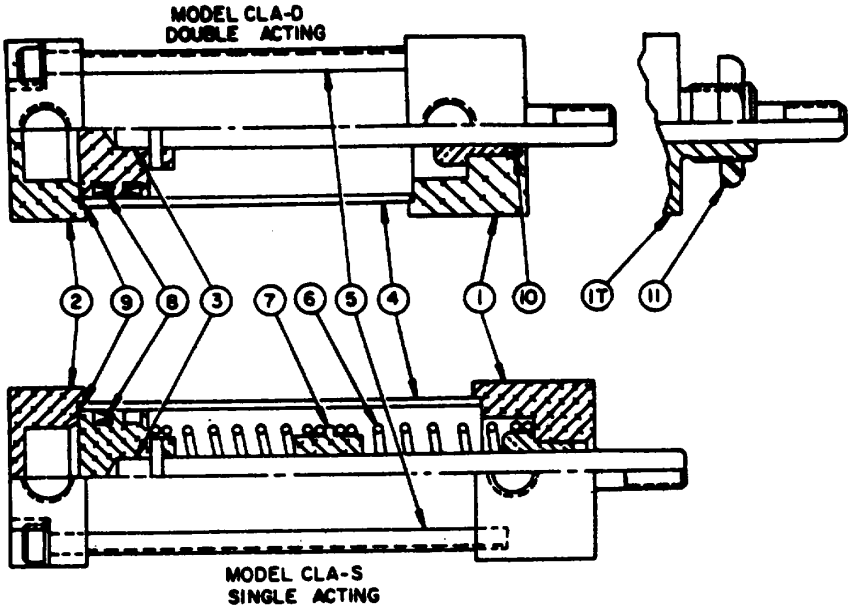
4. Make sure all cylinder parts are clean before reassembly. Lubricate tube ID and packing with a light film of oil prior to reassembly. Install packings with lips pointing in the direction shown on the sectional view. Make sure packings are not twisted.

5. When reassembling double acting cylinders, Install rod packing (10) in front head (1 or 1T). Lubricate rod threads, position piston and rod assembly (3) in front head and thread through rod packing, using care not to damage packing lips.

6. Use care when installing piston packings on piston, and when slipping tube over piston assembly, not to damage packing lips.

7. Tighten tie rods securely, and uniformly putting them under slight tension.

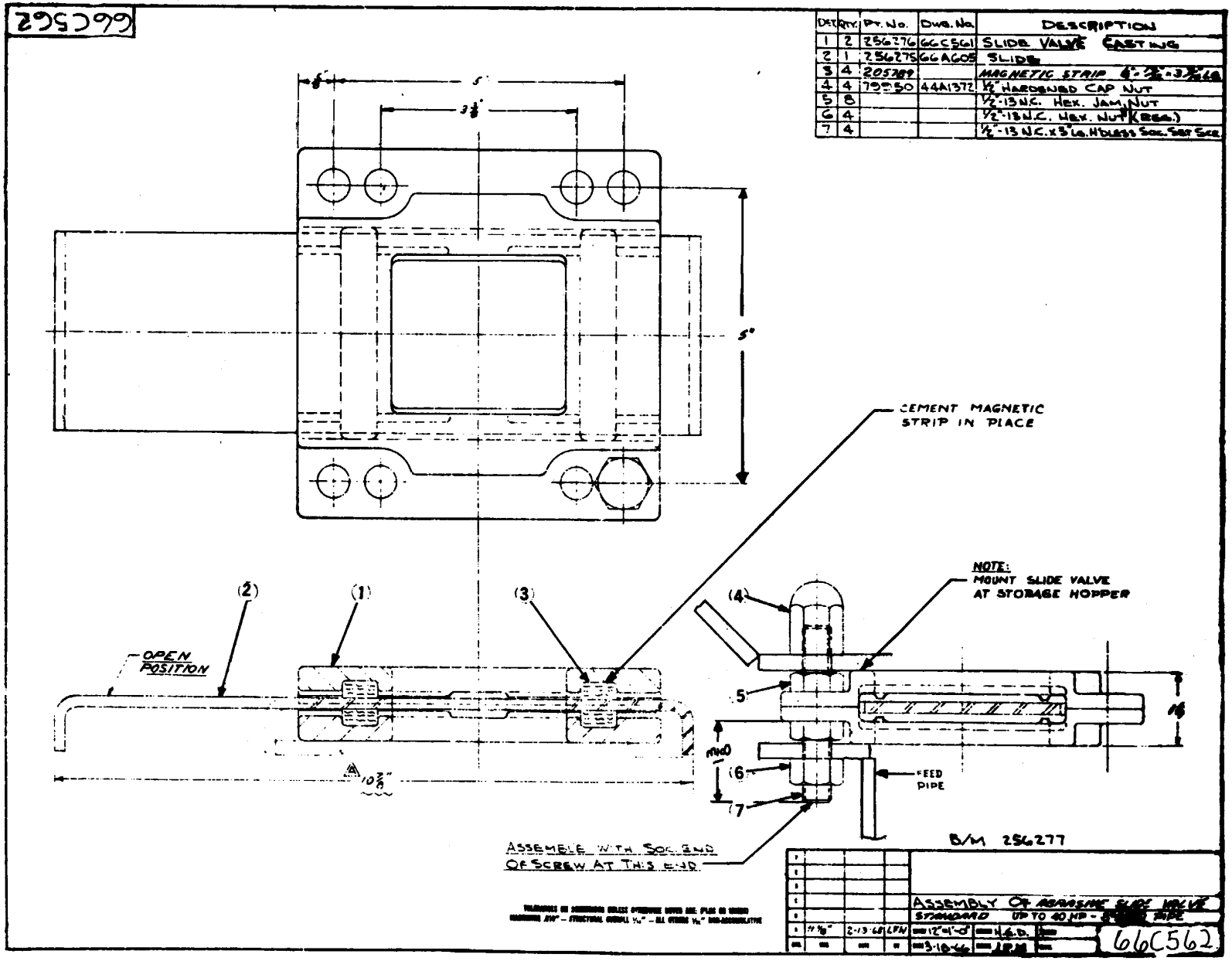
PARTS LIST
CLA SERIES
CYLINDERS
1 1/8" BORE

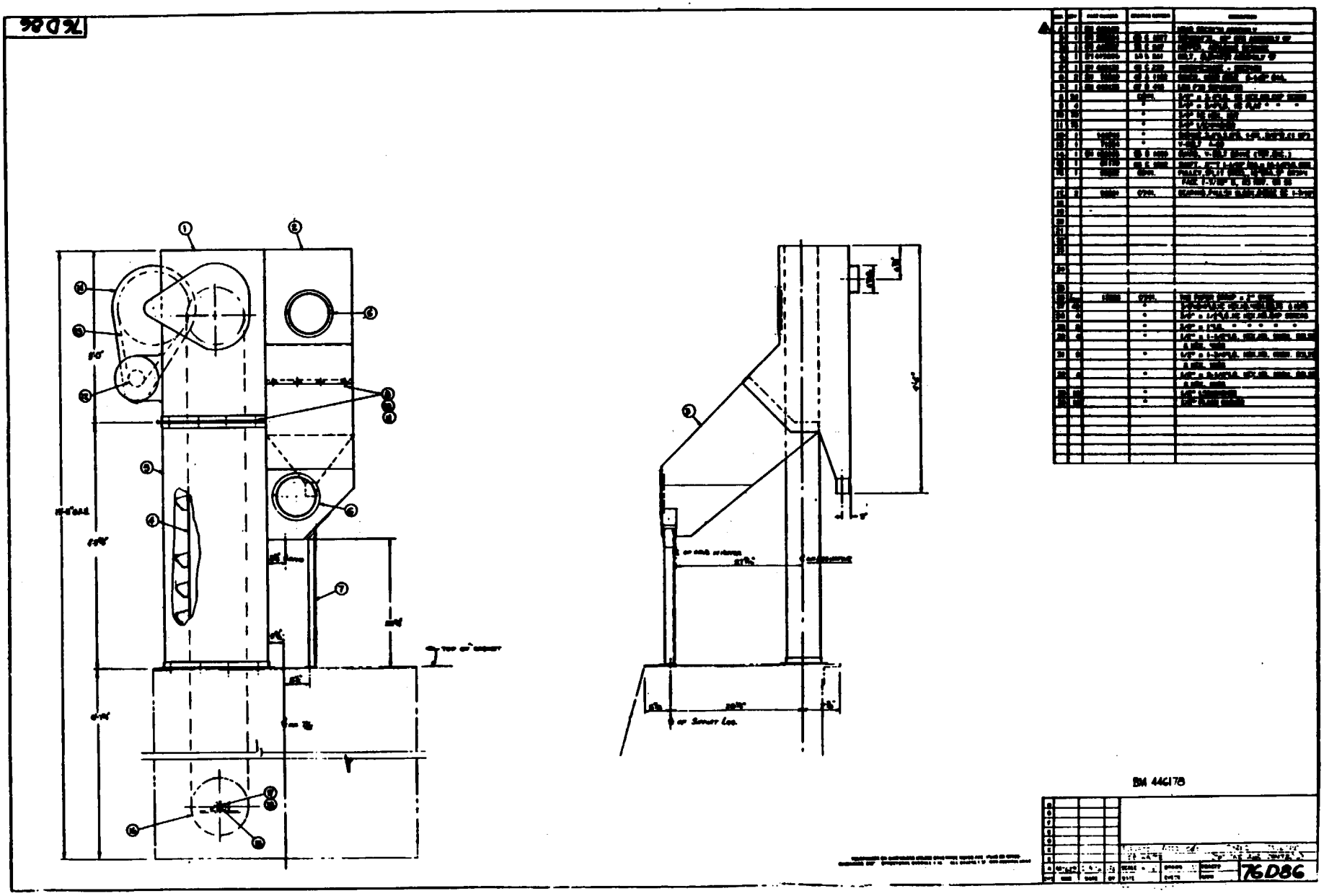


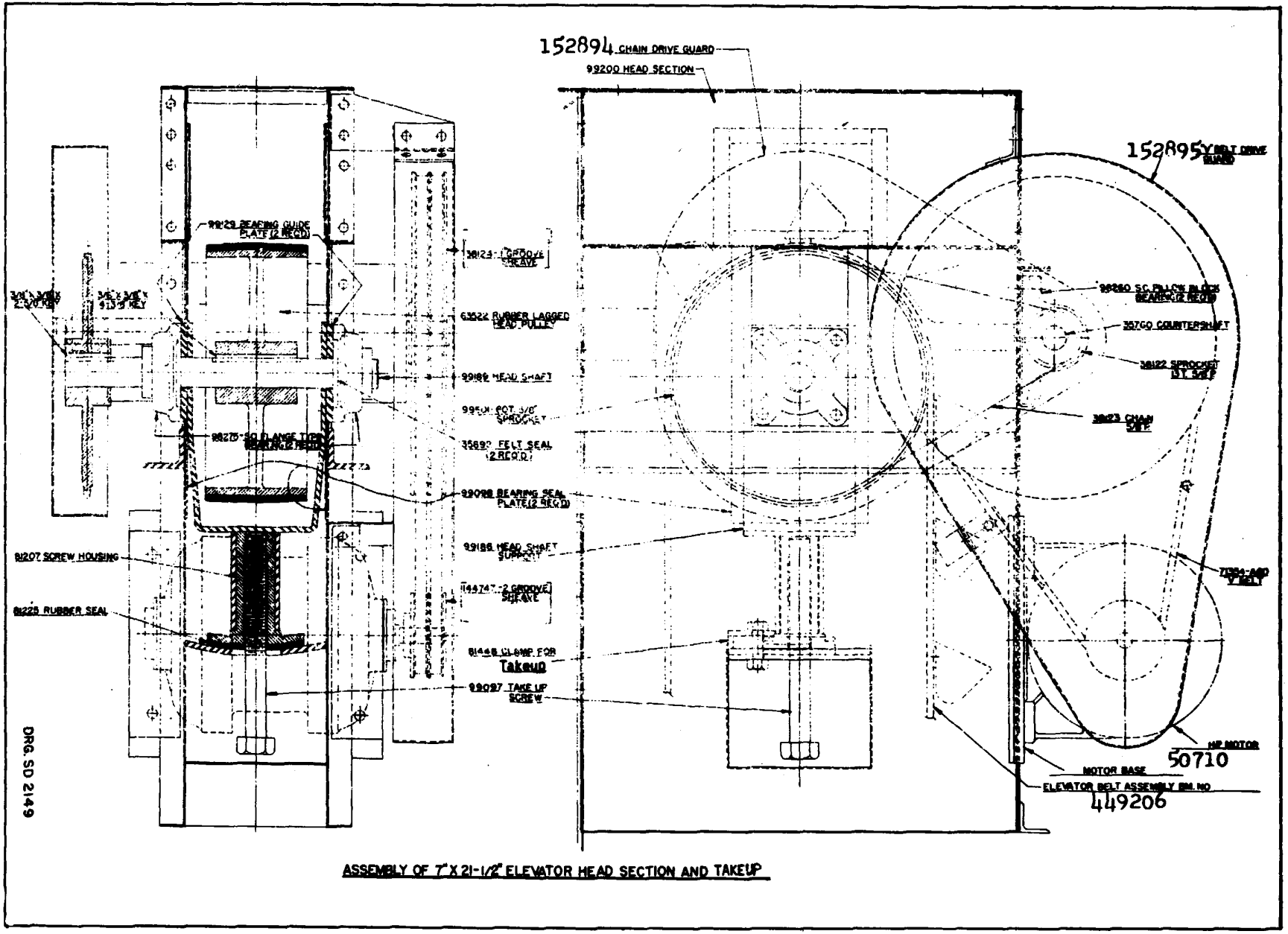
PARTS LIST

ITEM NO	DESCRIPTION	PART NO.	QUANTITY REQUIRED	
			CLA-S	CLA-D
KIT	CONSISTING OF ITEMS .8, 9, & 10		KIT NO. 725-0033	KIT NO. 725-0032
1	FRONT HEAD AND BUSHING, Plain	625-0030	1	1
1 T	FRONT HEAD AND BUSHING, Stud Mount	625-0031	1*	1*
2	REAR HEAD	625-5063	1	1
3	PISTON AND ROD ASSEMBLY	- -	1	1
4	TUBE	- -	1	1
5	TIE ROD AND LOCKWASHER	- -	2	2
6	SPRING	625-3001	†	
7	SPRING SPACER	625-5064	‡	
8	PISTON PACKING	150-0112-0087	1	2
9	GASKET	190-0125-0112	1	2
10	ROD PACKING	150-0050-0031		1
11	JAM NUT	426-06218	1*	1*

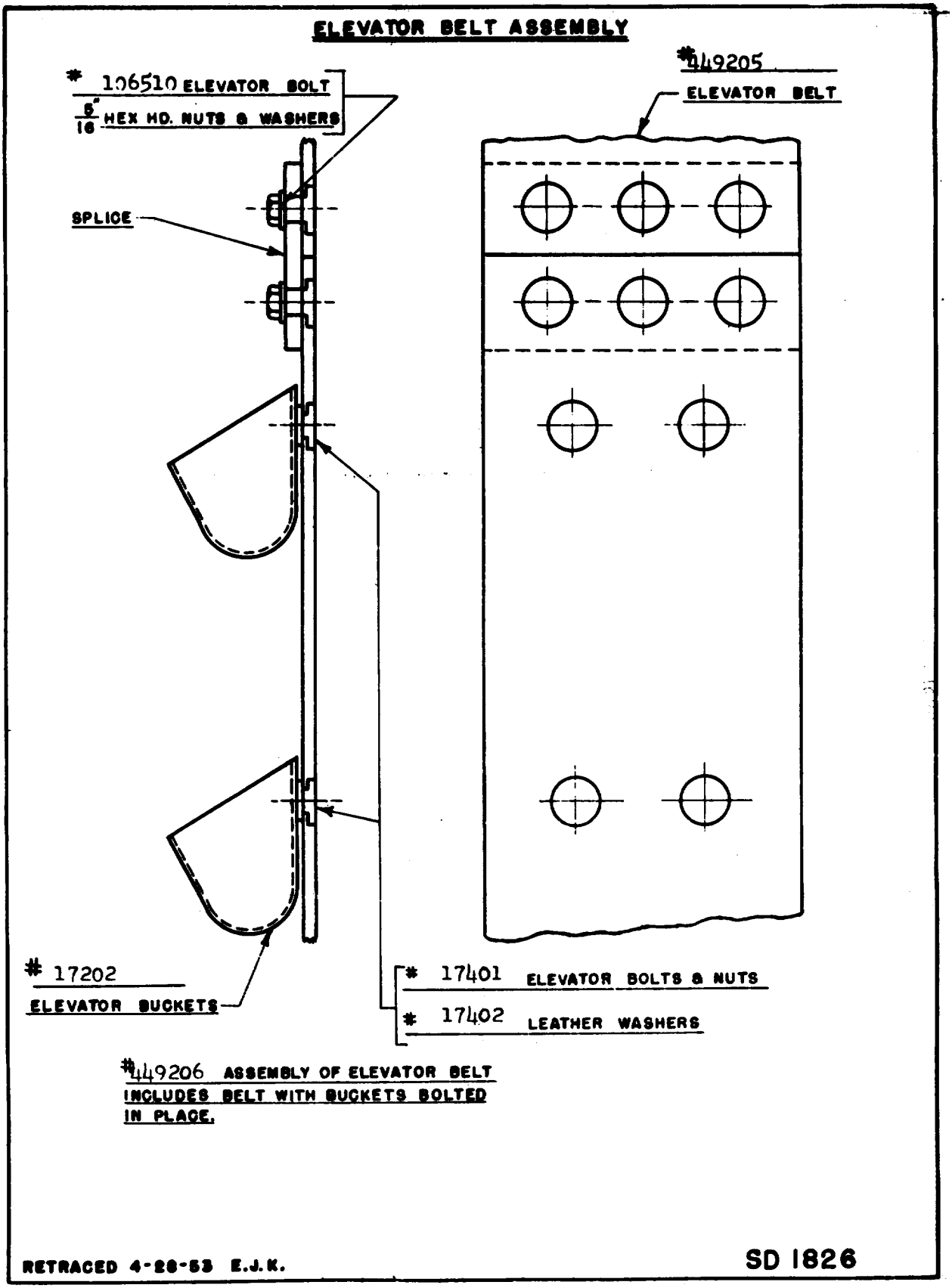
† One spring required for each inch of stroke (or each additional fraction thereof).
‡ Number of spacers required equals number of springs minus one.
* Used with stud mount front head only.

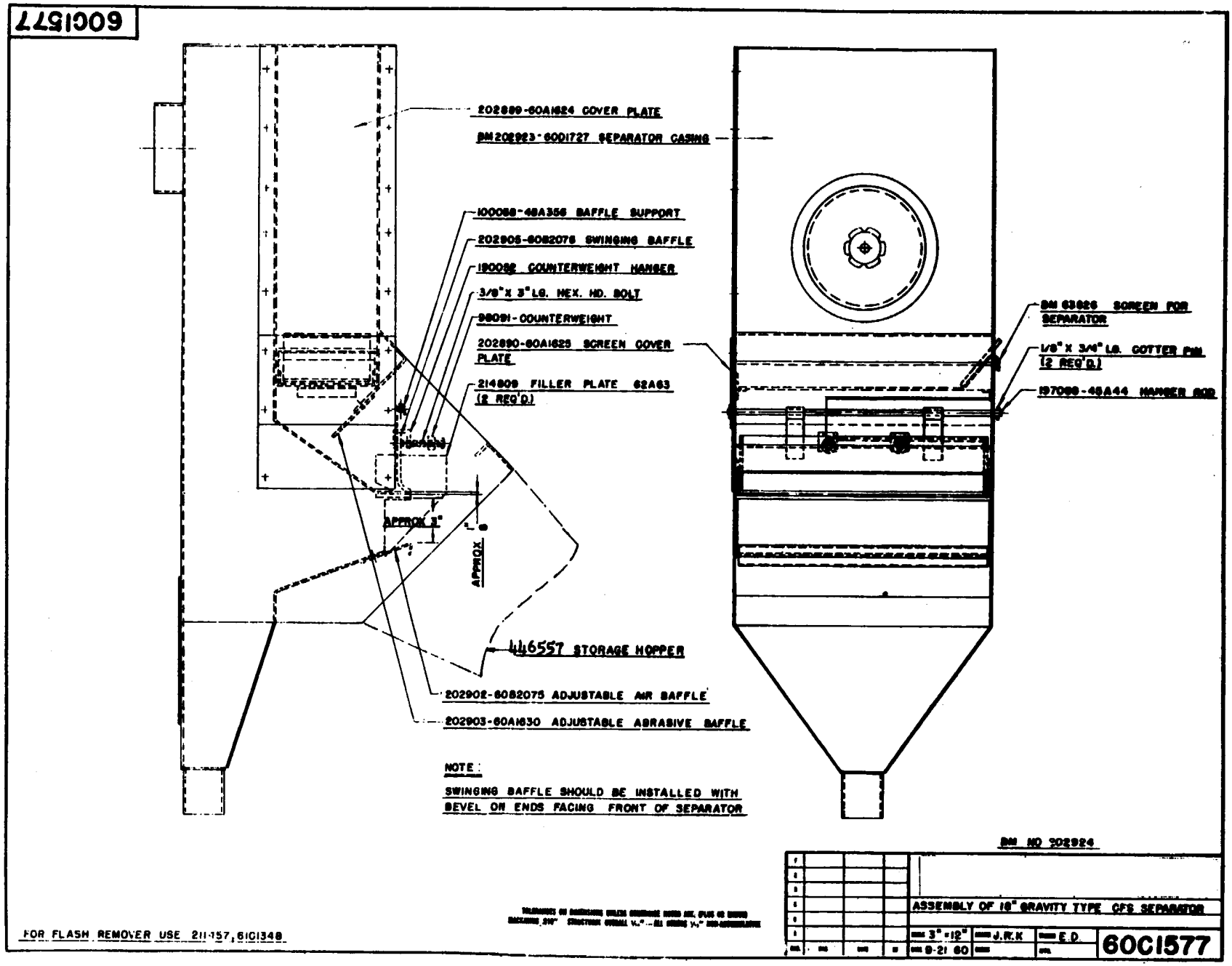

66C562
DET. QTY. PT. NO. DWG. NO. DESCRIPTION
1 2 256276 66C561 SLIDE VALVE CASTING
2 1 256275 66A605 SLIDE
3 4 205389 MAGNETIC STRIP 4" - 2 1/2" - 3/32" Lg.
4 4 79950 44A1372 1/2" HARDENED CAP NUT
5 8 1/2"-13 N.C. HEX. JAM NUT
6 4 1/2"-13 N.C. HEX. NUT (REG.)
7 4 1/2"-13 N.C. x 3" Lg. H'DLESS SOC. SET SCR.
5"
3 1/2"
CEMENT MAGNETIC STRIP IN PLACE
NOTE: MOUNT SLIDE VALVE AT STORAGE HOPPER
(1)
(2)
(3)
(4)
(5)
(6)
(7)
OPEN POSITION
10 7/8"
FEED PIPE
ASSEMBLE WITH SOC. END OF SCREW AT THIS END
B/M 256277
ASSEMBLY OF ADJUSTABLE SLIDE VALVE
STANDARD UP TO 40 HP - 3
66C562

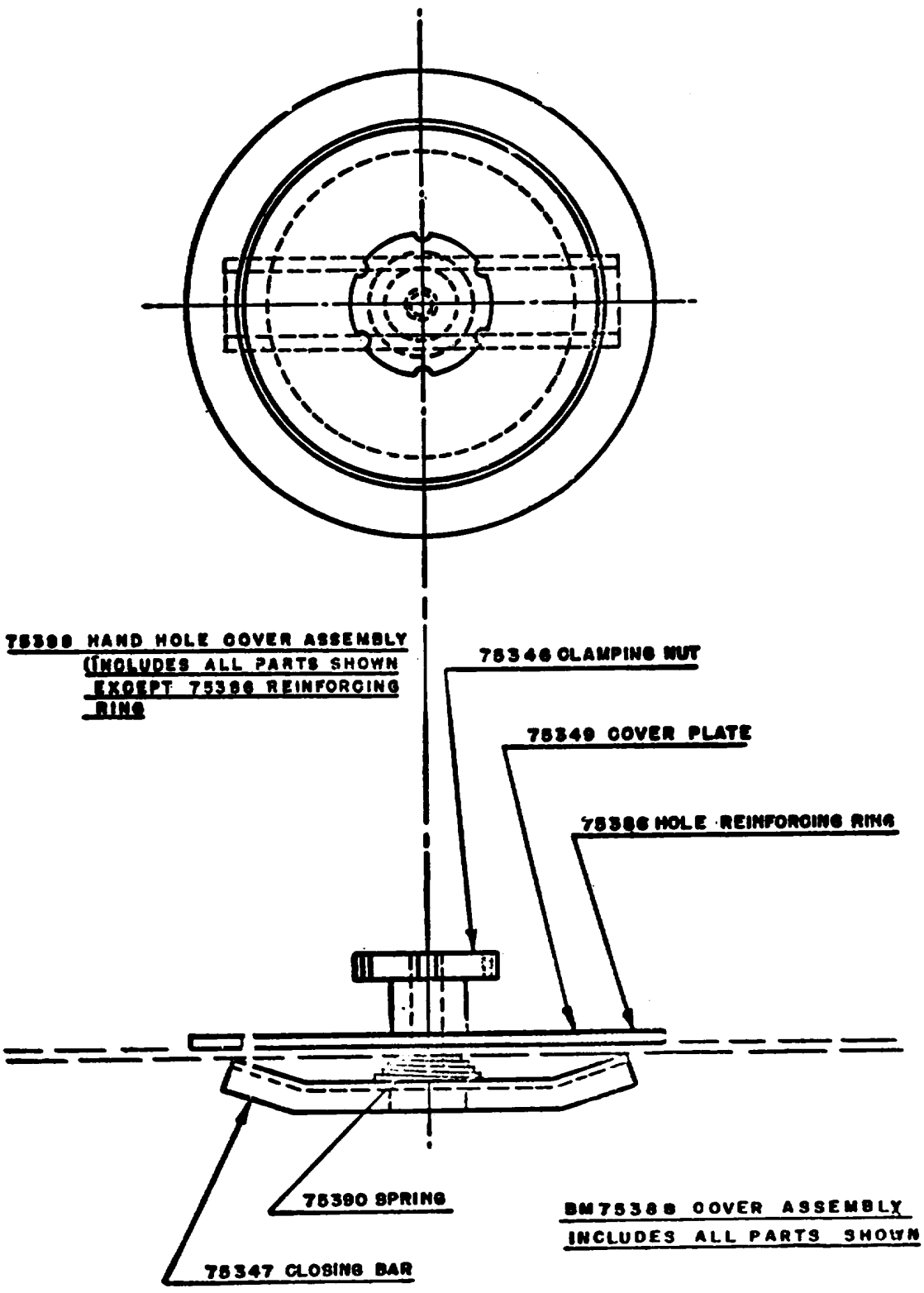




ASSEMBLY OF 7" X 21-1/2" ELEVATOR HEAD SECTION AND TAKEUP

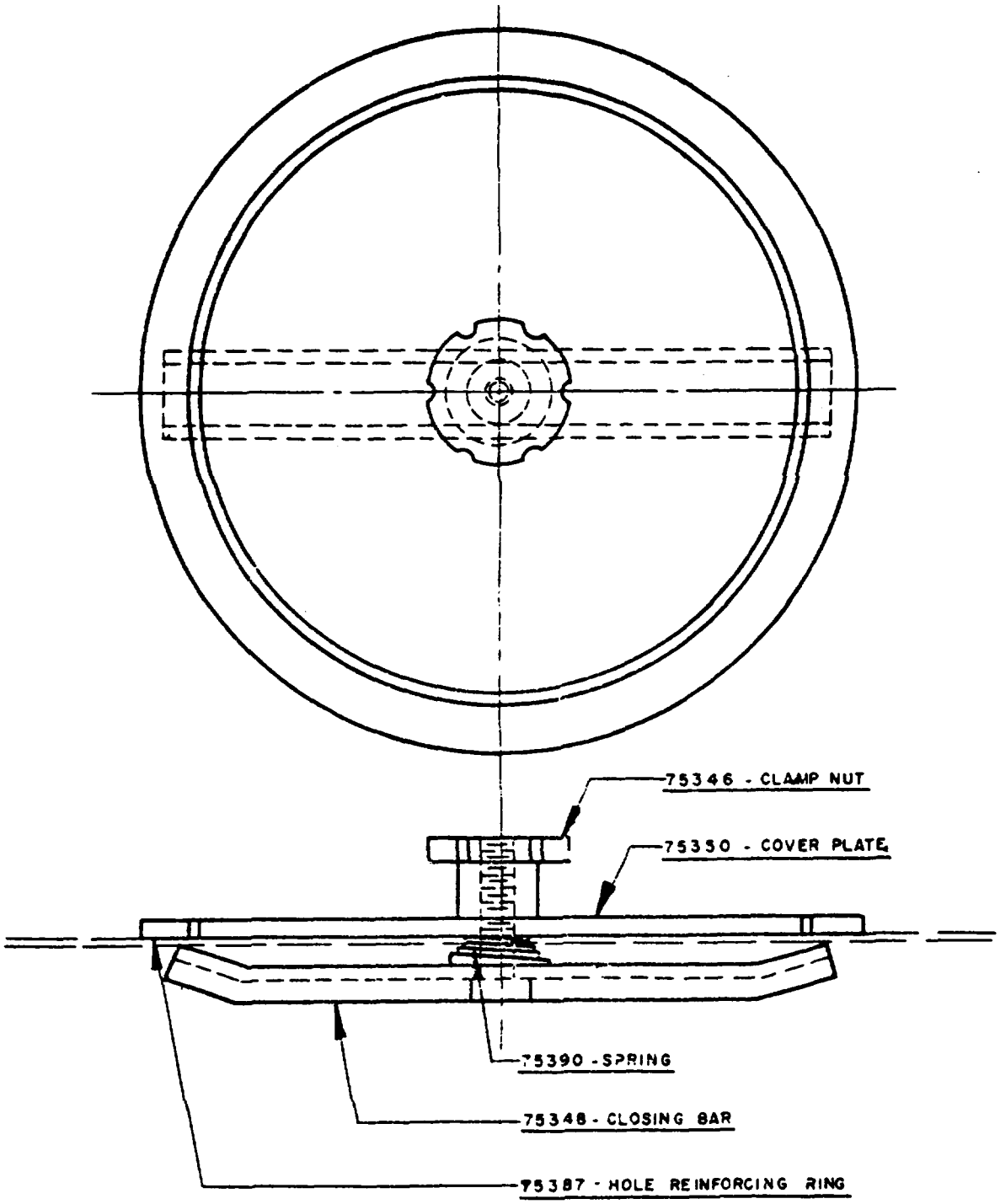

ELEVATOR BELT ASSEMBLY
* 106510 ELEVATOR BOLT
5/16" HEX HD. NUTS & WASHERS
#449205
ELEVATOR BELT
SPLICE
17202
ELEVATOR BUCKETS
* 17401 ELEVATOR BOLTS & NUTS
* 17402 LEATHER WASHERS
#449206 ASSEMBLY OF ELEVATOR BELT INCLUDES BELT WITH BUCKETS BOLTED IN PLACE.
RETRACED 4-28-53 E.J.K.
SD 1826


6001577
202899-60A1624 COVER PLATE
BM 202923-60D1727 SEPARATOR CASING
100088-48A356 BAFFLE SUPPORT
202905-6082076 SWINGING BAFFLE
190088 COUNTERWEIGHT HANGER
3/8"X 3" LG. HEX. HD. BOLT
98091-COUNTERWEIGHT
202890-60A1625 SCREEN COVER PLATE
214809 FILLER PLATE 62A63 (2 REQ'D.)
APPROX 3"
APPROX
446557 STORAGE HOPPER
202902-6082075 ADJUSTABLE AIR BAFFLE
202903-60A1630 ADJUSTABLE ABRASIVE BAFFLE
BM 63826 SCREEN FOR SEPARATOR
1/8" X 3/4" LG. COTTER PIN (2 REQ'D.)
197099-48A44 HANGER ROD
NOTE:
SWINGING BAFFLE SHOULD BE INSTALLED WITH BEVEL ON ENDS FACING FRONT OF SEPARATOR
FOR FLASH REMOVER USE 211-157, 61G1348
BM NO 202924
ASSEMBLY OF 18" GRAVITY TYPE CFS SEPARATOR
3"=12"
J.R.K
E.D.
9-21-60
60C1577


5" DIAM HOLE COVER
75388 HAND HOLE COVER ASSEMBLY (INCLUDES ALL PARTS SHOWN EXCEPT 75386 REINFORCING RING
75346 CLAMPING NUT
75349 COVER PLATE
75386 HOLE REINFORCING RING
75390 SPRING
75347 CLOSING BAR
BM75388 COVER ASSEMBLY INCLUDES ALL PARTS SHOWN

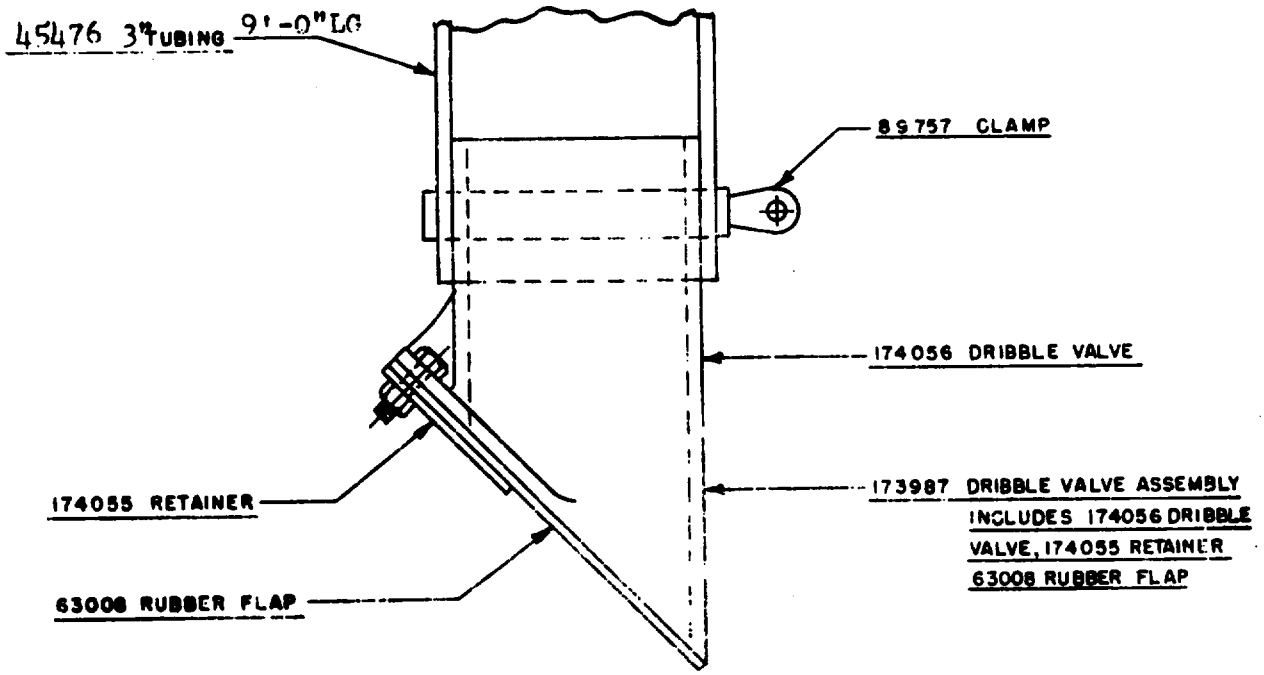
DWG SD1904

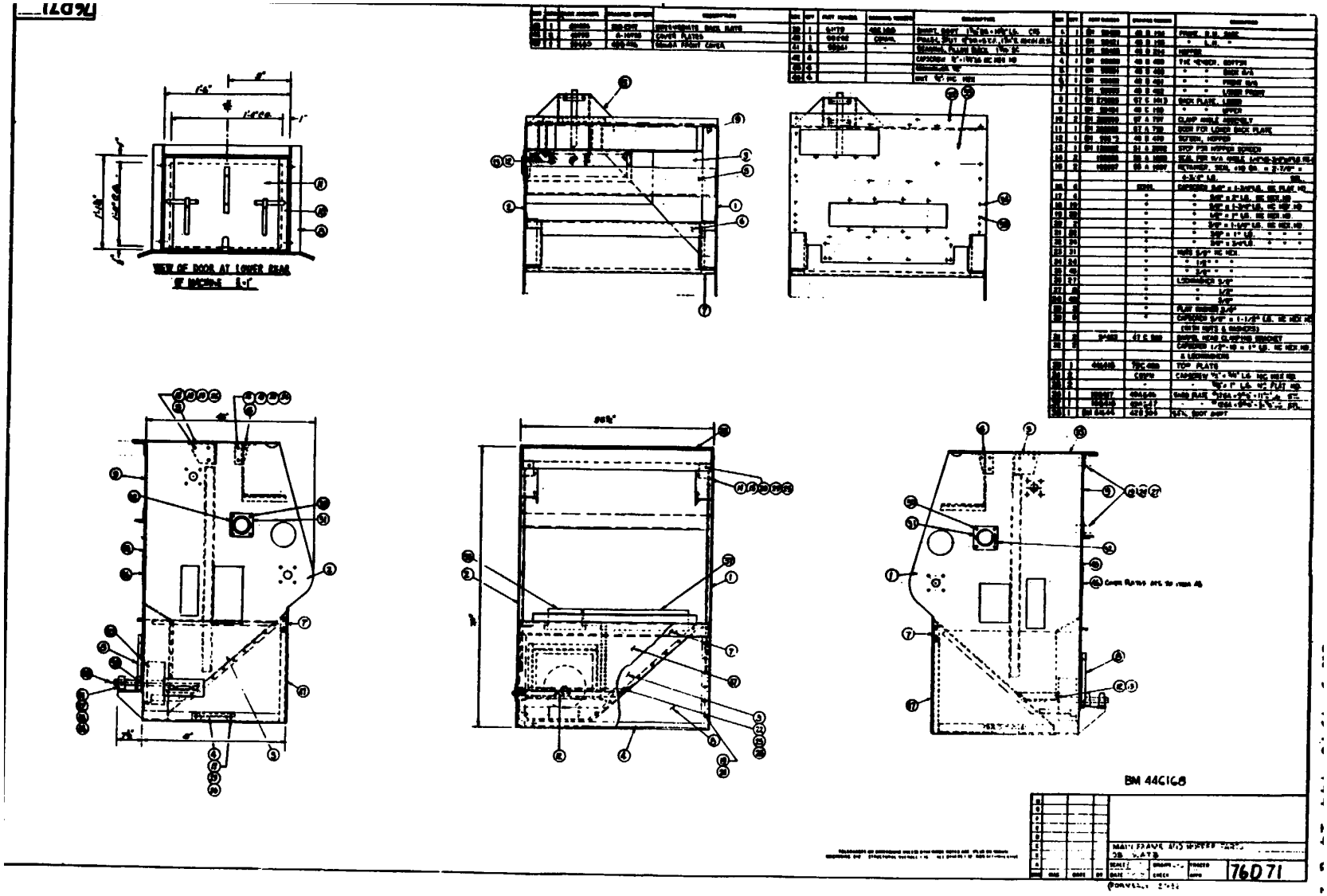
8 1/2" DIAM HOLE COVER ASSEMBLY

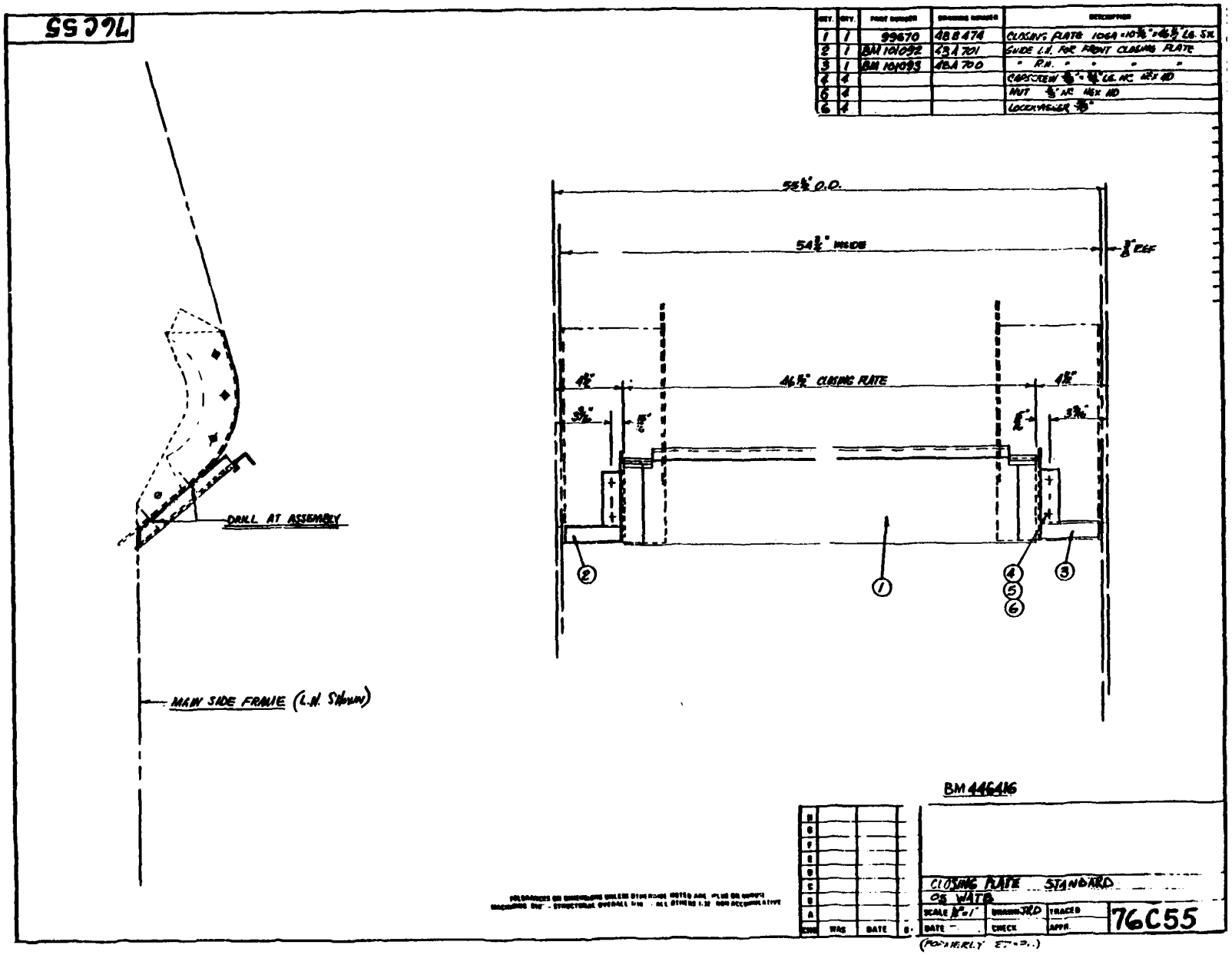


BM 75389 Hand Hole Cover Assembly (Includes All Parts Shown Except 75387 Reinforcing Ring)

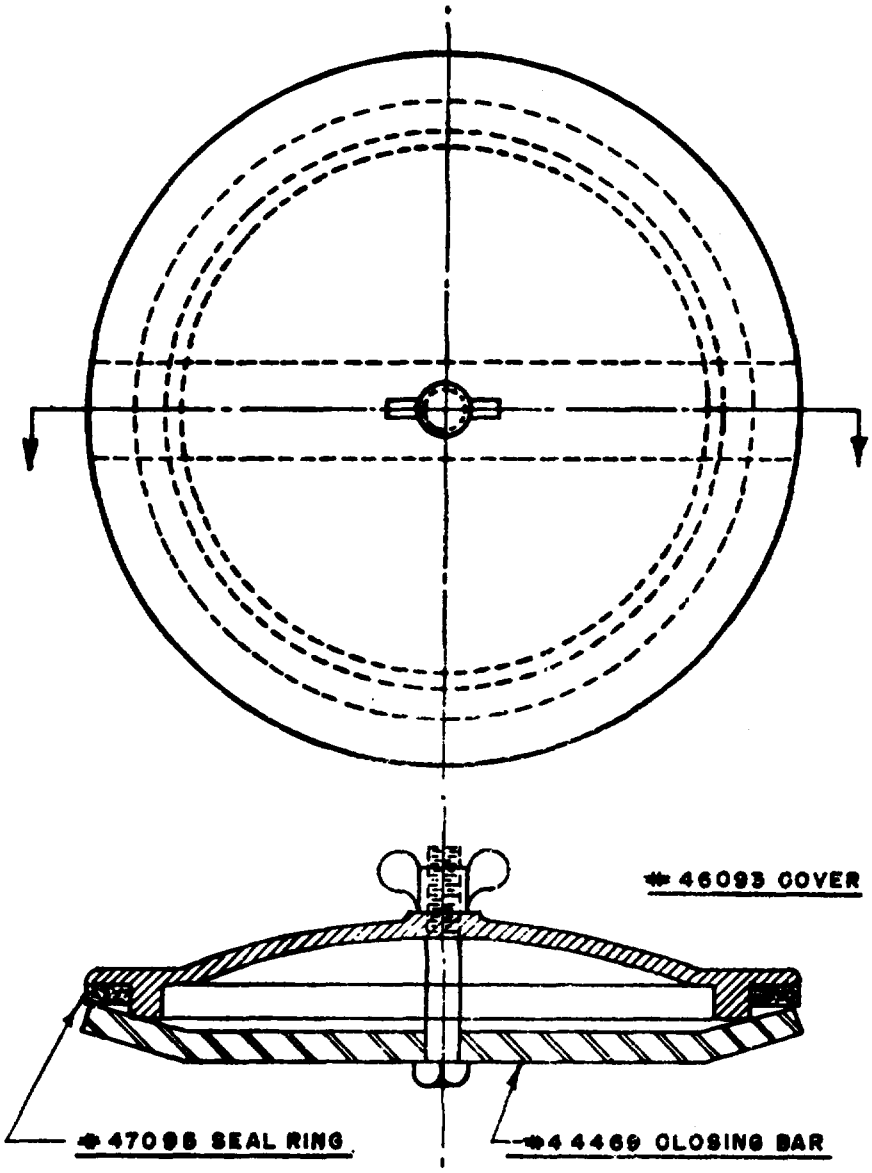
DRIVE VALVE ASSEMBLY



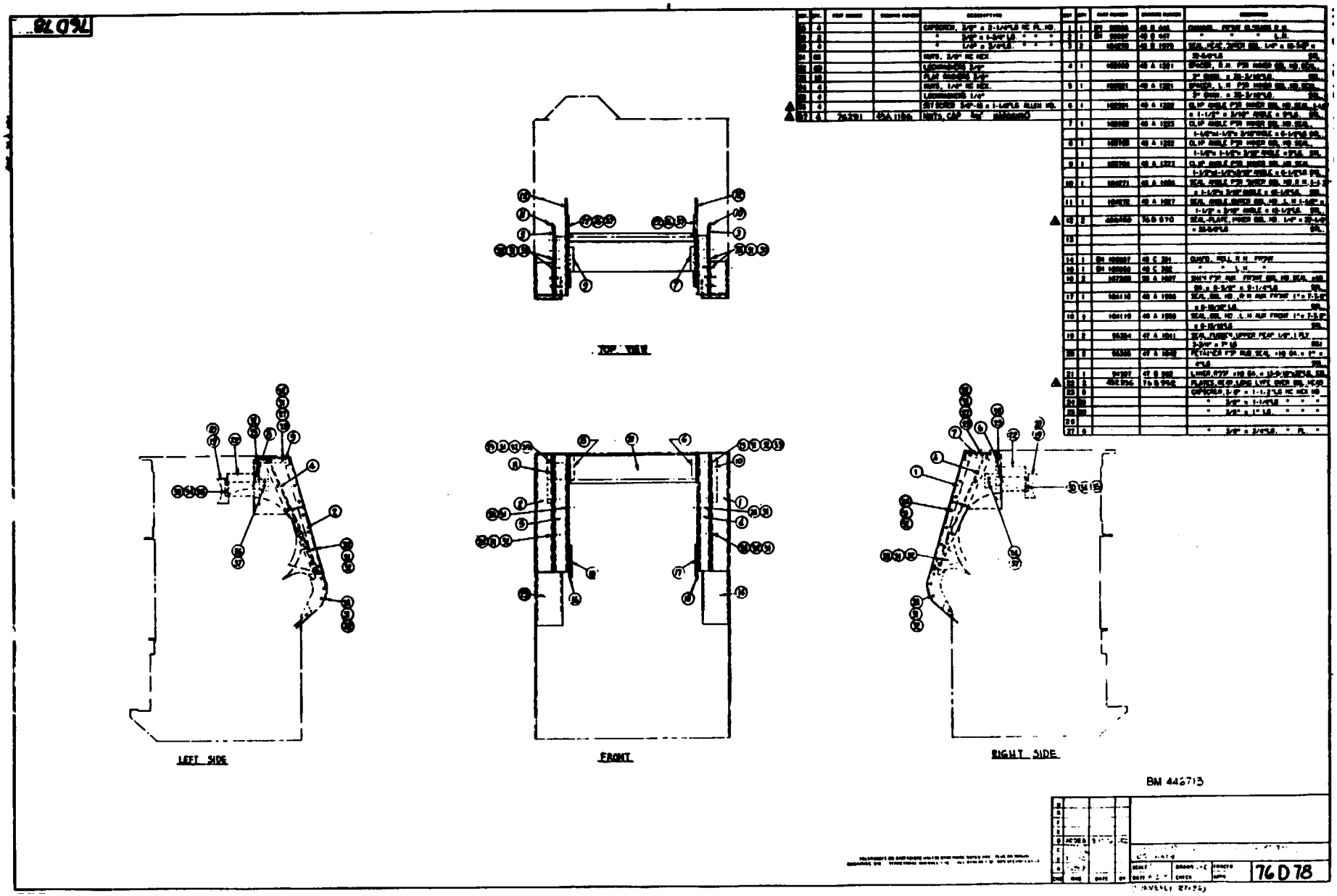

BM 44C168
76D71

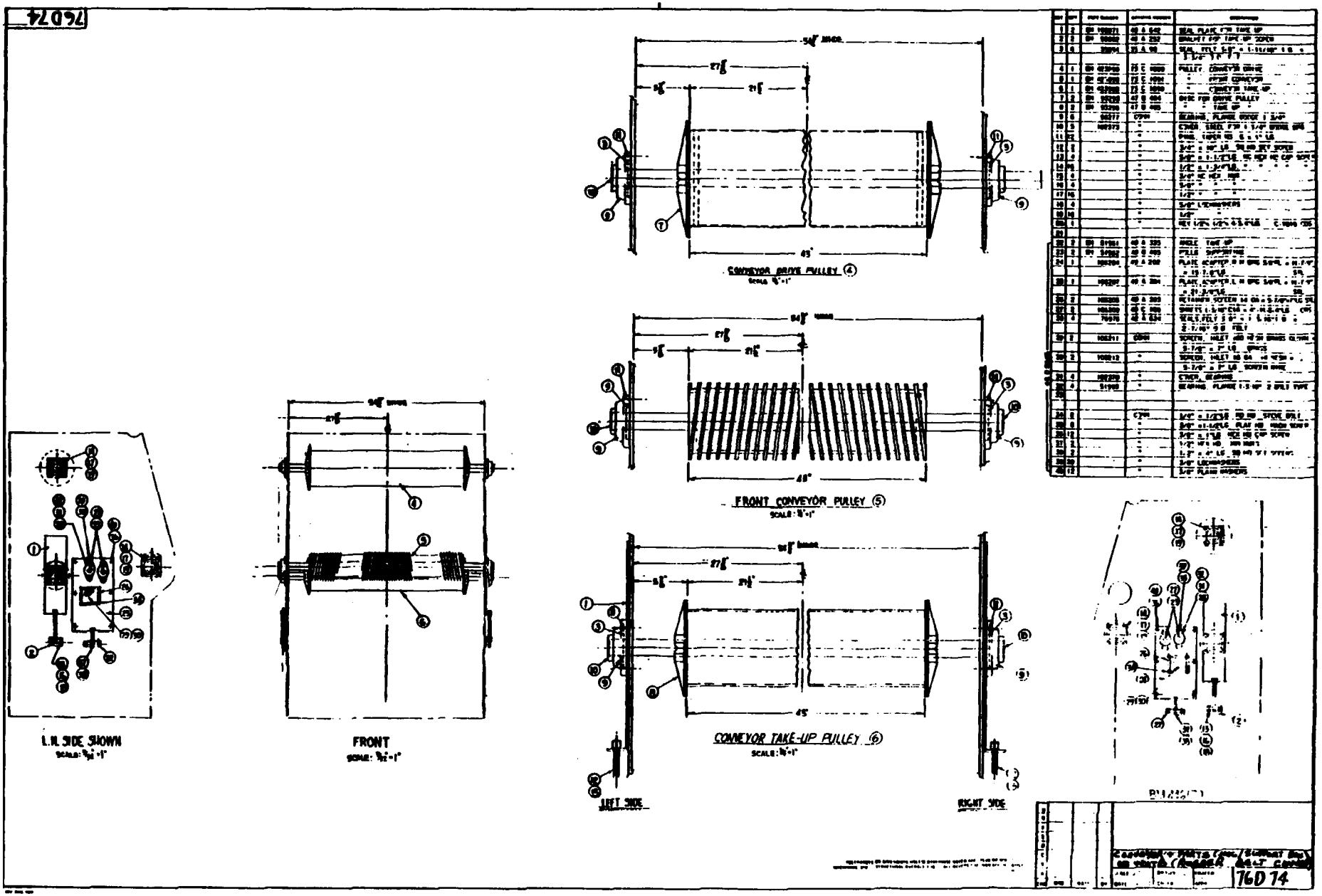

76C55
55½" O.D.
54½" INSIDE
⅜" REF
4½"
46½" CLOSING PLATE
4½"
DRILL AT ASSEMBLY
MAIN SIDE FRAME (L.H. Shown)
BM 446416
CLOSING PLATE STANDARD
OS WATB
76C55

HOPPER HOLE COVER

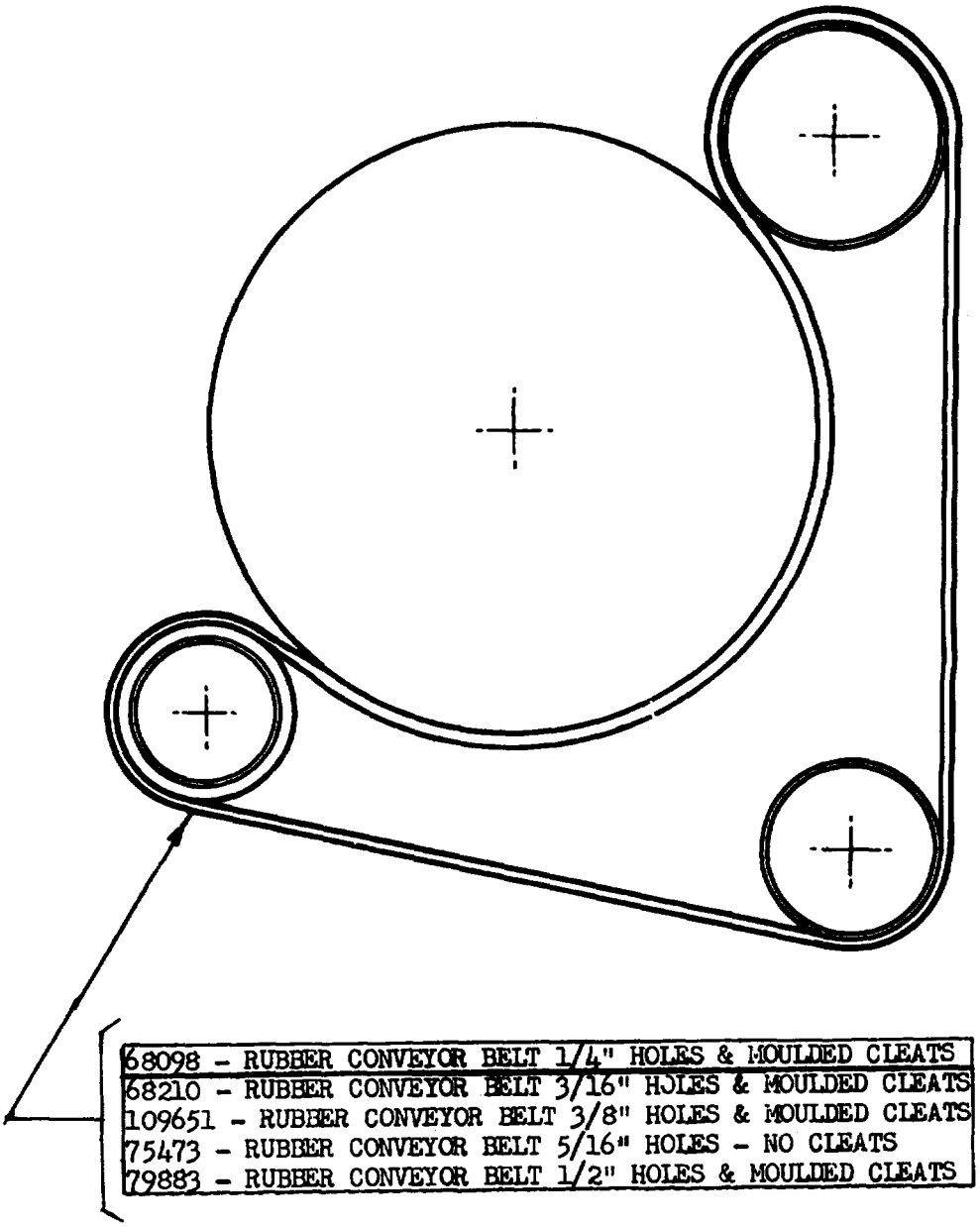


SD 1754.


TOP VIEW
LEFT SIDE
FRONT
RIGHT SIDE
BM 446713
76D78

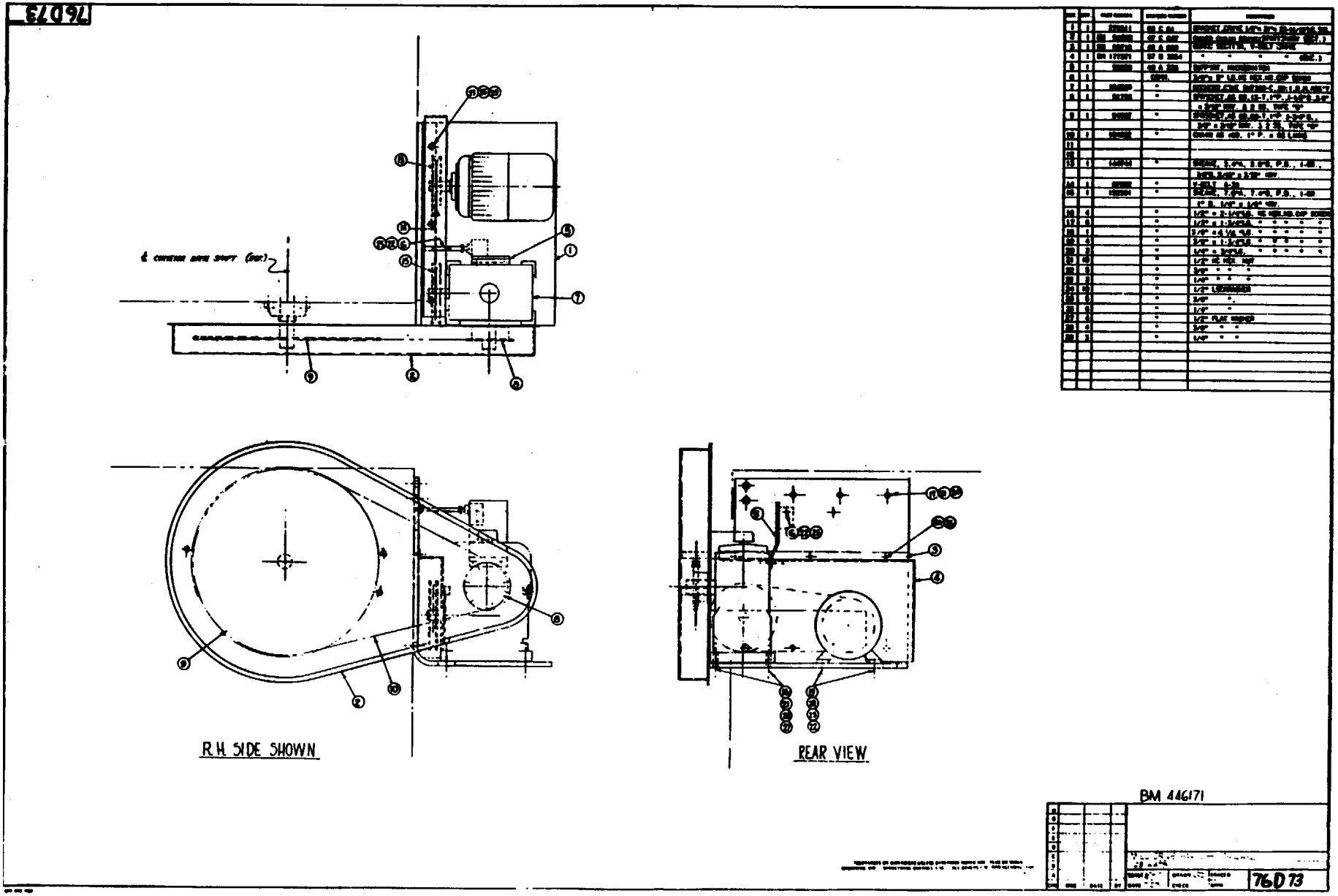

76D74
CONVEYOR DRIVE PULLEY ④
FRONT CONVEYOR PULLEY ⑤
CONVEYOR TAKE-UP PULLEY ⑥
L.H. SIDE SHOWN
FRONT
LEFT SIDE
RIGHT SIDE
76D 74

RUBBER BELT FOR 27X36 TUMBLAST



68098 - RUBBER CONVEYOR BELT 1/4" HOLES & MOULDED CLEATS
68210 - RUBBER CONVEYOR BELT 3/16" HOLES & MOULDED CLEATS
109651 - RUBBER CONVEYOR BELT 3/8" HOLES & MOULDED CLEATS
75473 - RUBBER CONVEYOR BELT 5/16" HOLES - NO CLEATS
79883 - RUBBER CONVEYOR BELT 1/2" HOLES & MOULDED CLEATS

DWG. SD 2208


76D73
R.H. SIDE SHOWN
REAR VIEW
BM 446171
76D73

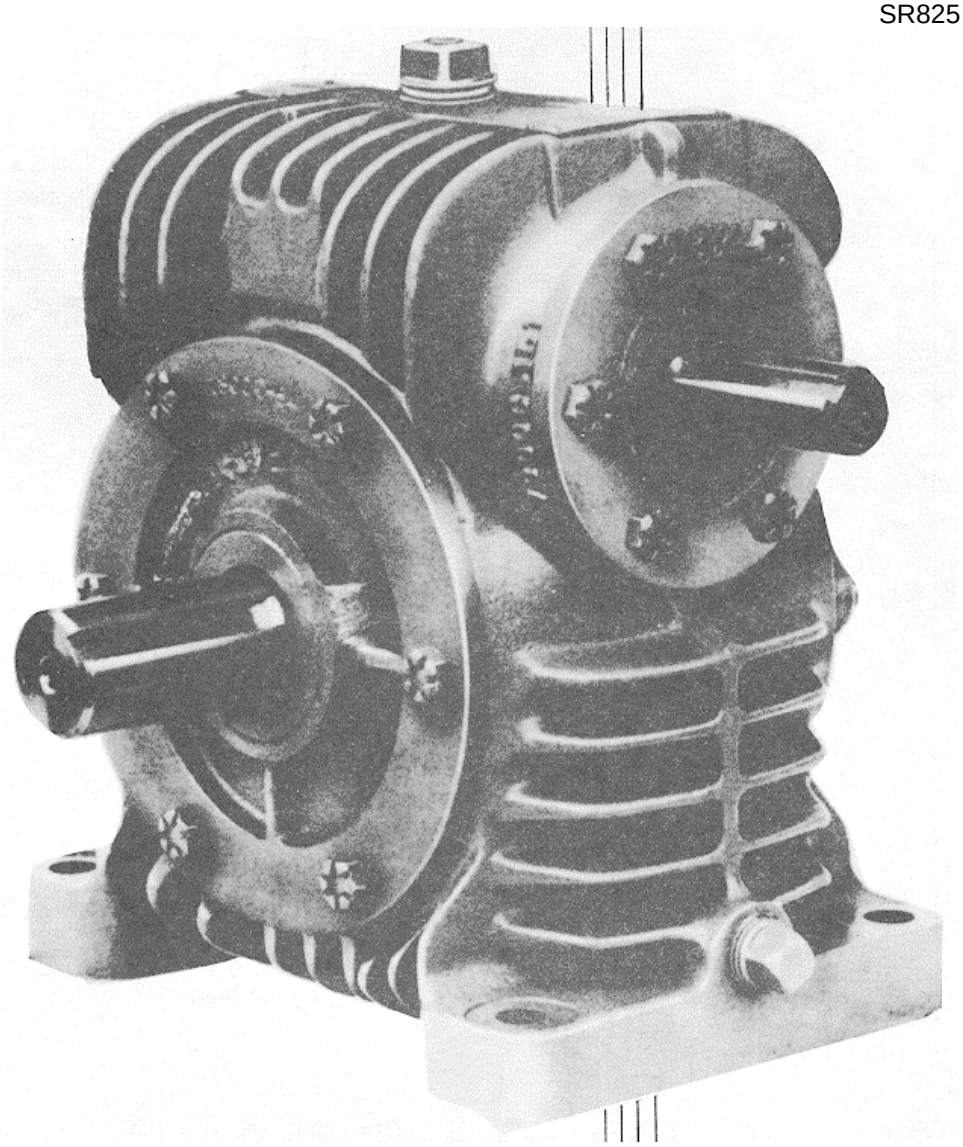
Parts and Servicing

SPEED REDUCERS

SOLID AND HOLLOW GEARSHAFT

MODELS
SO, SU, SV
SSO, SSU, SSV

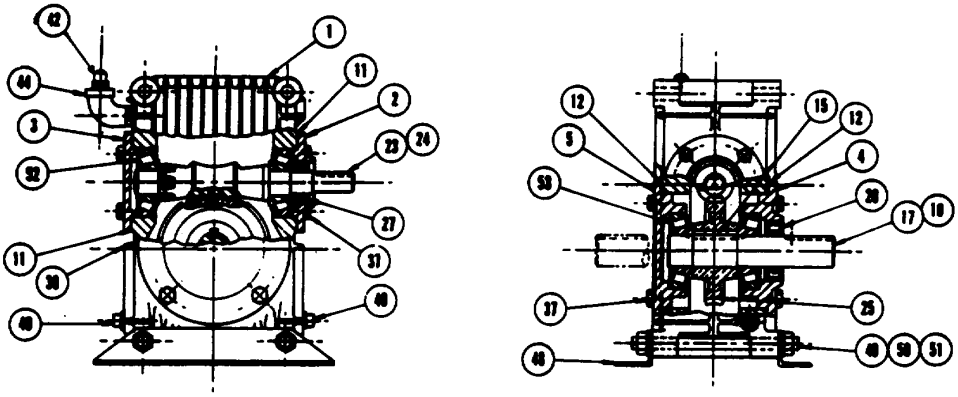
SIZES
7200C, 72500C
7300C, 73600C



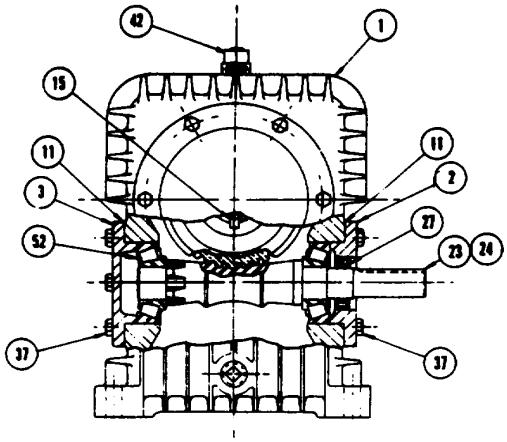
REDUCER PARTS LIST

		PART NUMBERS			
CODE	**DESCRIPTION**	**7200C**	**72500C**	**7300C**	**73500C**
1	Housing-Overslung	7200C-51	72500C-51	7300C-151	73500C-151
1	Housing-Underslung	7200C-51	72500C-51	7300C-51	73500C-51
1	Housing-Vertical	7200C-51	72500C-51	7300C-651	73500c-651
2	Cap-Worm Brg. (Open)	7200C-52	72500C-52	7300C-52	73500C-52
3	Cap-Worm Brg. (Closed)	7200C-53	72500C-53	7300C-53	73500C-53
4	Carrier-Gear Brg. (Open)	7200C-54	72500-54	7300C-54	73500-54
5	Carrier-Gear Brg. (Closed)	7200-55	72500-55	7300-55	73500-55
6	Carrier-Gear Brg. (Open, Type 'V' Gearshaft Up	7200C-54	72500C-54	7300C-154	73500-154
7	Carrier-Gear Brg. (Closed) Type 'V' Gearshaft Down	7200-55	72500-55	7300-155	73500-155
8	Carrier-Gear Brg.	S200-54	S2500-54	S300-54	S3500-54
9	Top Carrier-Gear Brg.-Type 'V'	S200-54	S2500-54	S300-154	S3500-154
10	Steeple Brg. Carrier	---	M2500-54	M300-54	M3500-54
11	Shims-Worm Brg. Caps	7200C-58	72500C-58	7300-58	73500C-58
12	Shims-Gear Brg. Carrier	7200-60	72500-60	7300-57	73500-57
13	Spacer-Gear	---	---	---	73500-16
14	Spacer-Used With Detail 196 Only	---	M2500-16	M300-16	M3500-16
15	Key- Gear	025K171	025K171	037K256	050K306
16	Key- Gear	025K181	025K181	037K331	037K387
17	Gearshaft-Single Extended	7200-56	72500-56	7300-56	73500-56
18	Gearshaft-Double Extended	7200-156	72500-156	73500-156	73500-156
19	Gearshaft-Sgl. Ext. Steeple Brg.	---	M2500-56	M300-56	M3500-56
20	Gearshaft-Dbl. Ext. Steeple Brg. One End	---	M2500-156	M300-156	M350-156
21	Gearshaft--Dbl. Ext. Steeple Brg. Both Ends	---	M2500-196	M300-196	M3500-196
22	Hollow Gearshaft	S200-156	S2500-156	S300-156	S3500-156
23	Worm-Single Extended	7200C-200	72500C-200	7300C-210	73500C-200
24	Worm-Double Extended	7200C-250	72500C-250	7300C-250	73500C-250
25	Gear—Solid Shaft	7200-300	72500C-300	7300-310	73500-300
26	Gear-Hollow Shaft	S200-300	S2500-300	S300-310	S3500-300
27	Oil Seal-Worm	075W150	087W168	106W212	125W225
28	Oil Seal-Gearshaft-Lip Type	112W212	125W225	150W250	200W325
30	Oil Seal-Hollow Shaft	193W268	262W350	325W425	363W475
31	Grease Retainer-Upper Brg. Gearshaft Vertical	---	---	7300-657	73500-657
32	Grease Retainer-Upper Brg. Gearshaft Vertical	---	---	S300-657	S3500-657
33	Grease Identification Plate	---	---	7300-92	7300-92
34	Grease Fitting	---	---	185070	185070
35	Grease Fitting-Hollow Shaft Vertical	---	---	185055	185070
36	Grease Fitting-Steeple Brg. Carrier Up	---	---	185009	185009
37	Place Bolts	116330	116330	116352	116352
38	Oil Level 'Plug	120029	120029	120002	120002
39	Oil Level Gauge-Type 'V'	---	---	163002	163002
40	Drain Plug	120003	120003	120005	120005
41	Pipe Plug--Steeple Brg. Carrier	120002	120002	120002	120002
42	Breather Plug	170002	170002	170004	170004
44	Elbow for Breather	125022	125022	---	---
46*	Guard Cover	S200-160	S2500-160	S300-160	S3500-160
47*	Guard Cover-Grease Fitting Hole	---	---	S300-160-1	S3500-160-1
48*	Foot Bracket	7200-61	72500-61	---	---
49*	Foot Bracket Studs	7200-62	72500-62	---	---
50*	Foot Bracket Washers	113710	113711	---	---
51*	Foot Bracket Nuts	112003	112004	---	---
52	Worm Bearings	321075/212	323092/256	341126/218	343132/312
53	Gear Bearings-Solid Shaft	317118/244	302820/875	326822/881	333821/180
54	Gear Bearings-Hollow Shaft	300362A/388	30399A/93AS	327620/889	342368/584

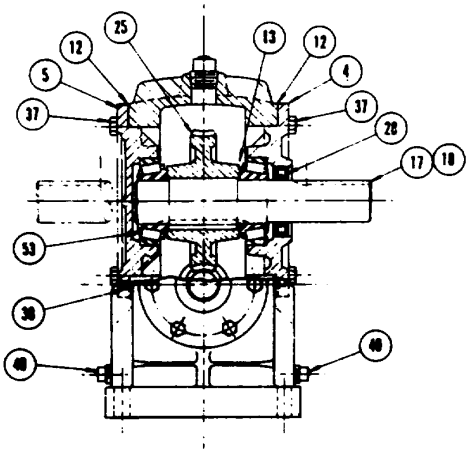
*Optional on Hollow Shaft Reducers

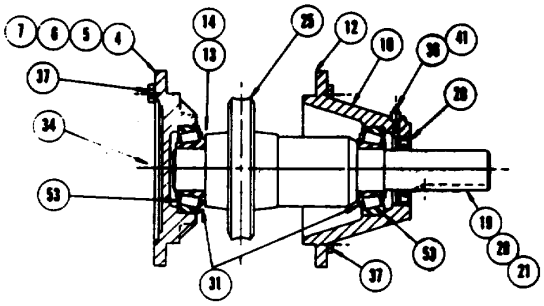


WORM AND GEAR MOUNTINGS
SIZES 7200C, 72500C
MODEL 'SO' UNIT SHOWN

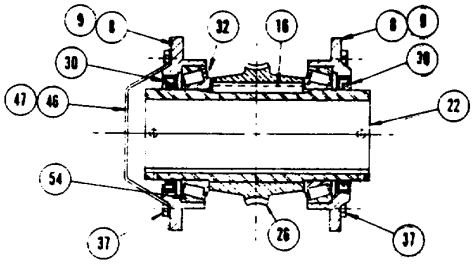


WORM AND GEAR MOUNTINGS
SIZE 7300C, 73500C
MODEL 'SU' UNIT SHOWN

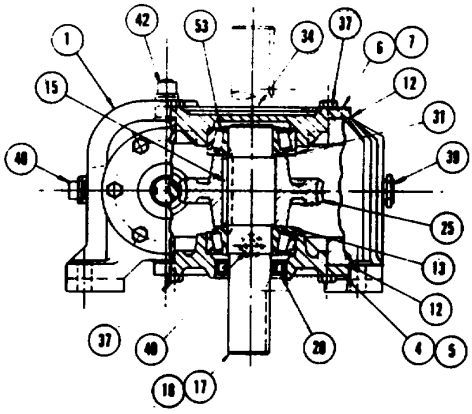




GEAR MOUNTINGS FOR STEEPLE BEARING



HOLLOW SHAFT GEAR MOUNTING



Vertical Gear Mounting And
Housing Details Sizes 7300C, 73500C

APPROVED LIST OF LUBRICANTS for DOUBLE-ENVELOPING WORMGEAR UNITS & GEARSETS

CENTER DISTANCE	WORM SPEED UP TO RPM	Ambient Temp. Degrees Fahrenheit † 15-60° F	Ambient Temp. Degrees Fahrenheit 50-125° F	†† WORM SPEED ABOVE RPM	Ambient Temp. Degrees Fahrenheit † 15-60° F	Ambient Temp. Degrees Fahrenheit 50-125° F
Up to 6" inclusive	700	8 Comp.	8A Comp.	700	8 Comp.	8 Comp.
Over 6" to 12"	450	8 Comp.	8A Comp.	450	8 Comp.	8 Comp.
Over 12" to 18"	300	8 Comp.	8A Comp.	300	8 Comp.	8 Comp.
Over 18" to 24"	250	8 Comp.	8A Comp.	250	8 Comp.	8 Comp.
Over 24"	200	8 Comp.	8A Comp.	200	8 Comp.	8 Comp.

Extracted from AGMA Standard 250.02 "Lubrication"

VISCOSITY RANGE FOR VARIOUS AGMA LUBRICANTS	
AGMA LUBRICANT NO.	VIS. RANGE SSU SECONDS @ 210° F
7 Comp.	125 to 150 SSU
8 Comp.	150 to 190 SSU
8A Comp.	190 to 250 SSU
ABOVE OILS ARE COMPOUNDED WITH 3 TO 10 PERCENT OF ACIDLESS TALLOW OR OTHER SUITABLE ANIMAL FATS.	

† Pour Point of the oil used should be less than the minimum ambient temperature expected.

†† Wormgears operating at speeds above 2400 rpm or 2000 feet per minute rubbing speed may require force feed lubrication. In general, a lubricant of lower viscosity than recommended in the above table may be used with a force feed system.

AGMA #7 COMPOUND			AGMA #8 COMPOUND			AGMA #8A COMPOUND			
BRAND NAME	P.P. °F	SSU @ 210° F	BRAND NAME	P.P. °F	SSU @ 210° F	BRAND NAME	P.P. °F	SSU @ 210° F	MANUFACTURER
Cyl. Oil 460X	35°	142	Cyl. Oil 680X	30	156	Cyl. Oil 1000X	40	196	Chevron Oil Co.
Inca Oil	20°	142	Zuni Oil	15	177	Special Worm Oil 225	30	225	Continental Oil Co.
						"B" Cyl. Oil	25°	190	Fiske Brothers Refining Co.
• Veedol Atwater 83	60	145	• Veedol Atwater 87	50°	165	• Veedol Atwater 93	60°	195	Getty Oil Co.
•• Senate 145D	10	141	•• Senate 155	5°	152	•• Senate 186	15	190	Gulf Oil Co.
			• Vim Cyl. Oil 600	15°	153	• Cyl. - Tal - 81	55°	238	Houghton, E. F. & Co.
Hulbert 17	15	140	Hulbert 19	30°	160				Hulbert Oil & Grease Co.
•• Cylesstic TK-140	20°	138	•• Cylesstic TK-180	30	179	•• Cylesstic TK-210	30°	210	Exxon Co.
•• Kendco 131 Comp.	30°	131	•• Kendco 155 Comp.	30	155	•• Kendco 206 Comp.	30°	206	Kendall Refining Co.
• Keystone K-600	45°	150	• Keystone K-610	45°	165	• • Keystone K-620	50	220	Keystone Div., Pennwalt Corp.
Conedroil B	15	142	Conedroil A	25°	190	Conedroil A	25	190	Machinery Distributors Inc.
•• 600W Cyl. Oil	40	140	•• 600W Super Cyl. Oil	40	155	•• Extra Hecla Super Cyl. Oil	40°	200	Mobil Oil Co.
Bustrux L-1039	15	130	Bustrux L-1040	25	170	Bustrux L-1041	35°	220	Parr Inc.
•• Steam Cyl. Oil 2	40	145	•• Steam Cyl. Oil 5	45	190	•• Steam Cyl. Oil 5	45°	190	Penzoil United Inc.
Hector 2000S Steam Cyl. Oil	20	145	Hector 3000S Steam Cyl. Oil	20	178				Phillips Petroleum Co.
•• 63150 Valvata J-78	15	142	•• 63155 Valvata J-82	25	190	•• 63155 Valvata J-82	25	190	Shell Oil Co.
Skelly 135-36	0	136	Skelcyl No. 1	25°	155				Skelly Oil Co.
American Worm Gear Oil	20	148	American Cyl. Oil 196-L	35	187				Standard Oil Div. - American Oil Co.
Vanguard Cyl. Oil	10	129	Honor Cyl. Oil	15°	175	650T Cyl. Oil	25	214	Texaco Inc.

NOTE: MAJOR oil companies, not on the above list, have indicated that they do not have products which meet the requirements of AGMA 250.03

NOTE: E. P. lubricants or cylinder oils with E. P. additives do not meet AGMA 250.03 and should not be used in speed reducers

GENERAL INSTRUCTIONS
LUBRICATION

Lubricant must be selected In accordance with AGMA Standards. All oils must have a minimum viscosity Index of 90 and be compounded with 3 to 10 percent acidless tallow or other suitable animal fats.

RECOMMENDED AGMA COMPOUNDS

Gear Reducer Size	Worm Speed Up to RPM	Ambient Temperature (1)		Worm Speed(2) Above RPM	Ambient Temperature	
		15°-60°F	50°-125°F		15°-60°F	50°-125°F
7200C Thru 73500C	700	#08 Compound	#8A Compound	700	#8 Compound	#8 Compound

(1) Pour-point of oil used should be less than the minimum ambient temperature expected.
(2) Worm speeds in excess of 2400 R P M or 2000 feet per minute rubbing speed may require force feed lubrication. Before starting a new gear reducer, fill it to the oil level sight gage or plug.

OIL CHANGE:

The oil in a new unit should be drained at the end of two weeks operation and the gear case thoroughly flushed with a light flushing oil. Subsequently, change oil every 2500 hours of operation or every six months, whichever occurs first. Where operating conditions are severe, It may be necessary to change oil at intervals of one to three months.

APPROXIMATE OIL CAPACITY - IN GALLONS

Reducer	Model		
Size	SU,SSU	SO,SSO	SV,SVV
7200C	1/8	1/8	3/16
72500C	3/16	3/16	3/16
7300C	3/8	5/16	1/4
73500C	3/4	5/8	1/2

The oil level should be maintained within the oil sight gage or plug when the reducer is not operating. Due to the effect of oil agitation, it is not possible to obtain a correct oil level reading while the reducer is in operation.

It is necessary that the oil be clean and free of sludge at all times to obtain long life from a gear reducer.

Every precaution should be taken to prevent water and foreign particles from entering the gear case.

INSTALLATION:

The unit must have the output shaft carefully lined up within the tolerances recommended by the manufacturer of the universal joints or couplings used. The base or mounting plate for the unit must be fiat In order to provide a uniform support for the mounting pads of the reducer. Mounting bolts must be tightened uniformly. When properly lined up and bolted In place, the unit should turn freely, except for slight friction caused by oil seals. Shim feet to aline.

SERVICING:

If it should become necessary to disassemble a reducer, either to replace bearings or worn or damaged parts, proceed as outlined below.

1. Disconnect couplings on the Input and output shafts and remove coupling halves from shafts. Drain oil from reducer.

Note: Care should be taken to prevent misplacing or damaging any of the shims or gaskets. It is important that the shims be kept with their respective caps and noted from which end of the housing the cap was removed.

2. Remove the worm bearing caps, oil seal, shims and bearing cups from the housing. (These cups are a slip-fit and may be freed by lightly tapping the worm shaft.) The worm may now be disengaged from the gear and removed from the housing.
3. Remove the gear bearing carrier, oil seal and shims. Remove the complete gear assembly.

Note: All damaged parts must be replaced. Reassemble in reverse order using the original or same size spacers and shims.

If either the worm or gear has been damaged, replace with a new complete gearset. Check the set number and use only matched sets for best results. All standard gearsets are furnished in matched sets and are Interchangeable In the reducer as such, regardless of the gear ratio. In manufacture, unless the gearset is otherwise marked, each set is matched with the worm on top ,t the gear. Looking from the input or motor end of the worm, the gear markings are to the left. This relationship must be maintained In assembly whether the gearset is operated In a horizontal, vertical or other position.

If either member of the original gearset appears to be salvageable, it may be returned to our plant for Inspection, and if found usable, be rematched with a new worm or gear to secure a new gearset.

REPLACEMENT OF BEARINGS:

When tapered roller bearings are replaced, proceed as follows: Measure the width of the original bearing being replaced. Measure he width of new bearing being installed. If the new bearing Is narrower than the old one, remove part of the shims amounting o the difference. If new bearing is thicker, add shims In the same manner. All single row bearings should be assembled with the following looseness.

RECOMMENDED BEARING LOOSENESS

C.D.	Worm Bearing	Gear Bearing
2.000	.004	.001
2.500	.004	.001
3.000	.004	.001
3.500	.005	.001

Note 1: Looseness to be divided equally between each side of the unit for both worm and gear.

Note 2: Plus or minus .001 tolerance allowed.

End play on the worm shaft and gear shaft, due to wear or differences In width of new bearings, may be eliminated by removing Pr adding shims under the bearing caps. Care should be taken o maintain the original alignment of the gear set; bearing running tolerance must be maintained.

CHECKING:

The thickness of shims can be determined simply from their color is follows

.003" thick shims are green
.005" thick shims are blue
.010" thick shims are red
.020" thick shims are steel

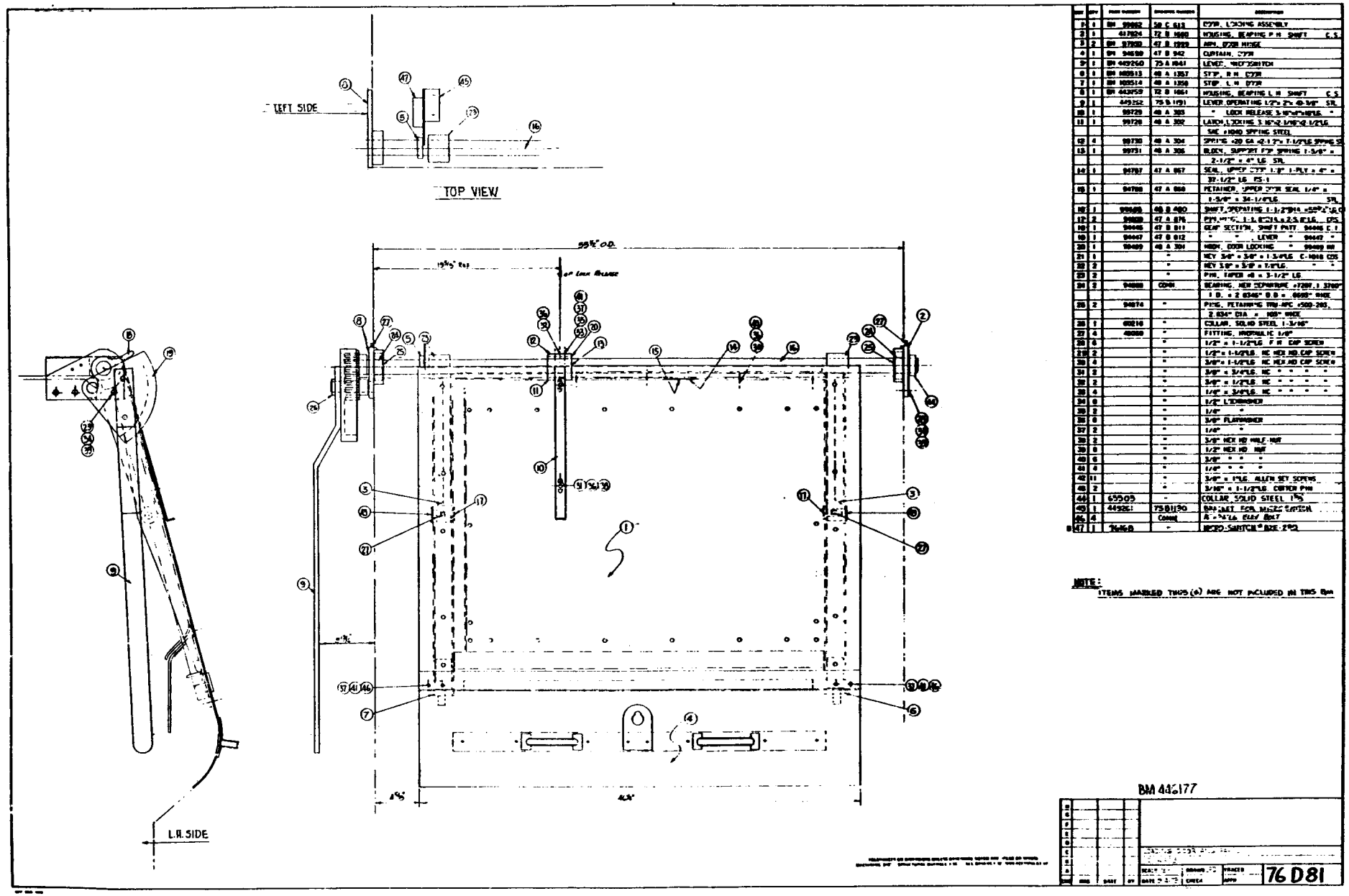
CHANGING HAND OF ASSEMBLY

The worm gear set and reducer will operate equally well in either direction and changing to the opposite side gear shaft extension is a simple operation.

To reverse the gear shaft extension, it is necessary to remove the gear caps and proceed as follows: Press one bearing and the gear off the shaft. Reverse the gear on the shaft and reassemble bearing. (Note: On 73500C, a spacer is used between the gear and the bearings.) After removing the caps, look for the stamping on the housing flange face against which the shims are placed, such as +2. This indicates the amount(O.002") which the housing flange is off from being central. Housing may be plus or minus.

If this is not more than plus or minus 0.003", the gear assembly may be reversed leaving the original shims on the caps.

If, in exceptional cases, the total difference in flanges are off more than 0.003", take the necessary amount of shims from the cap on the shortest side and leave them on the housing so as to centralize the housing flanges. For instance if one side is -2 and the other +3 leave a 0.005" shim on the -2 flange side of the housing. Then reassemble gear shaft and bearings in housing. The shims determine the positioning of the gear set and also provide required bearing running clearances. Damaged shims may develop oil leaks. Replaced shims must be same thickness as original shims. This procedure is to maintain the original alinement the gear with the housing flanges. A similar procedure is followed if it is desired to reverse the worm shaft extension. (**NOTE: If the worm shaft is** reversed**, the gear must also be reversed.)**

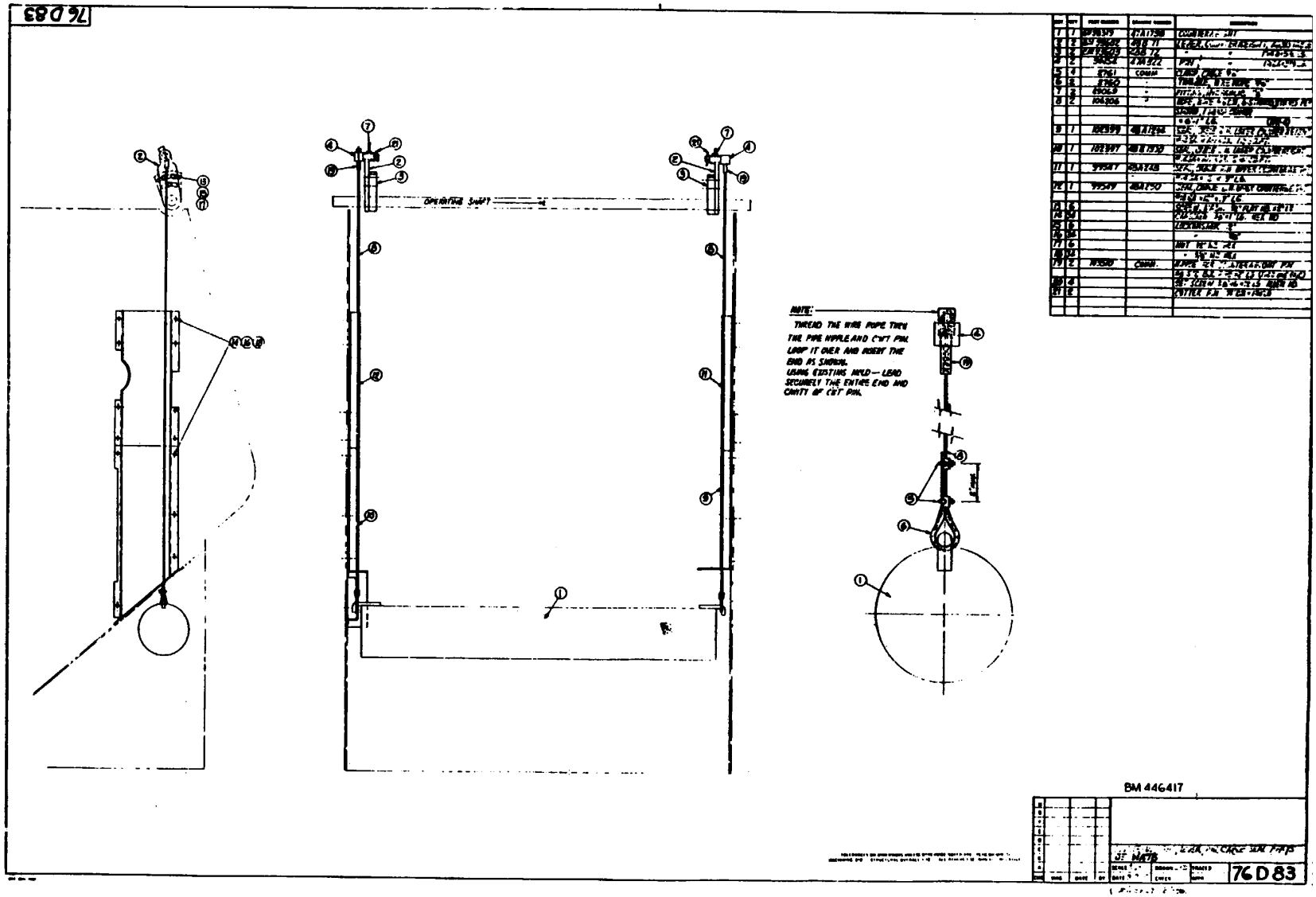


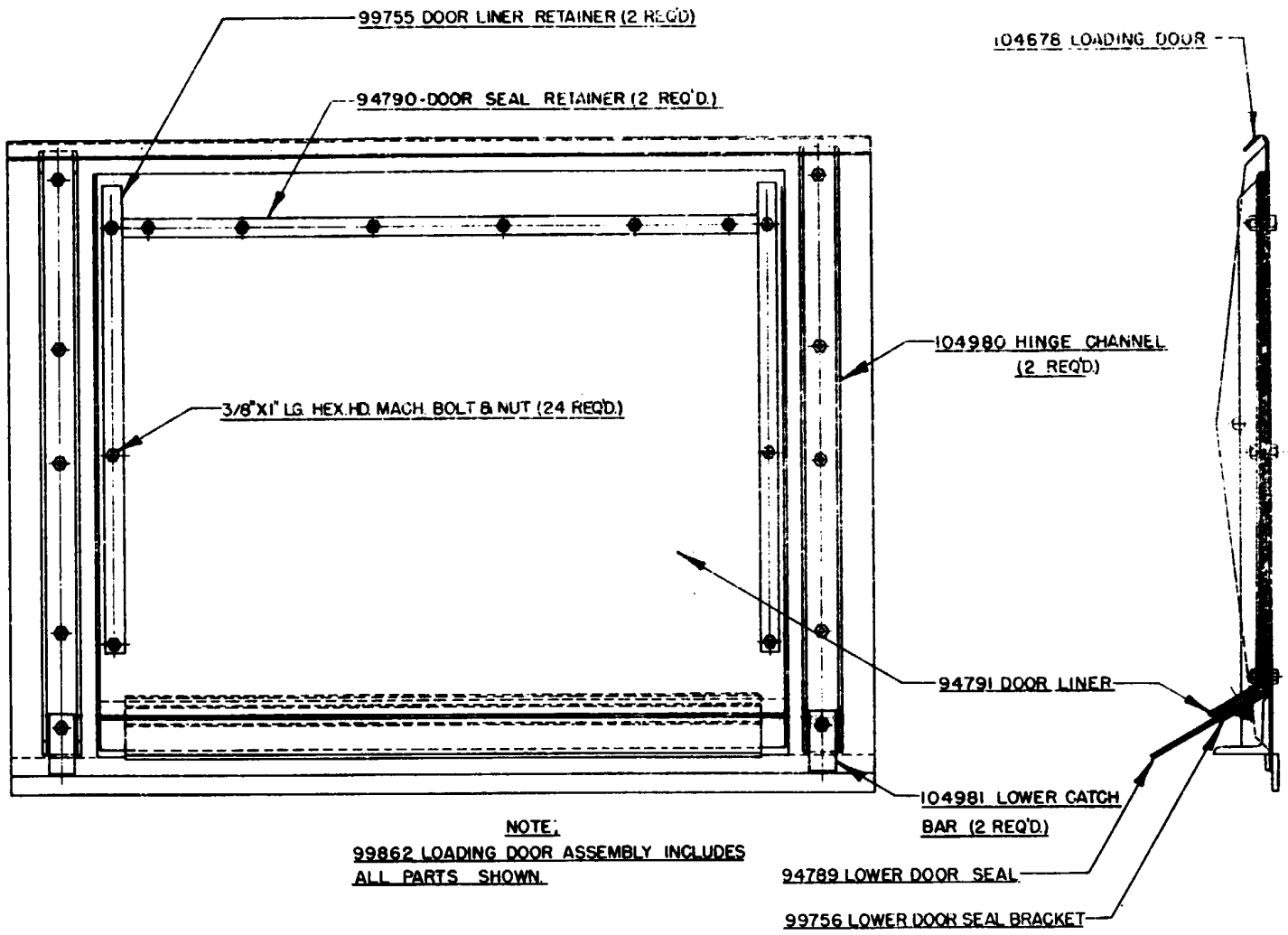
1	1	BM 99952	50 C 613	CYLR. LOCKING ASSEMBLY
2	1	437824	72 B 1660	HOUSING, BEARING R.H. SHAFT C.S.
3	2	BM 97930	47 B 1289	ARM, DOOR HINGE
4	1	BM 94699	47 B 942	CURTAIN, CYLR
5	1	BM 449260	75 A 1641	LEVER, MICROSWITCH
6	1	BM 100513	48 A 1357	STOP, R.H. CYLR
7	1	BM 100514	48 A 1358	STOP, L.H. CYLR
8	1	BM 443959	72 B 1664	HOUSING, BEARING L.H. SHAFT C.S.
9	1	449252	75 B 1191	LEVER, OPERATING 1-1/2" x 2" x 49-3/8" STL
10	1	99729	48 A 303	" LOCK RELEASE 3-15/16" x 34-1/4" LG. "
11	1	99728	48 A 302	LATCH, LOCKING 3-15/16" x 1-1/16" x 1-1/2" LG. SAE 4140 SPRING STEEL
12	6	99730	48 A 304	SPRING .120 GA. x 2-1/2" x 7-1/2" LG. SPRING STL
13	1	99731	48 A 305	BLOCK, SUPPORT FOR SPRING 1-5/8" x 2-1/2" x 4" LG. STL
14	1	94787	47 A 867	SEAL, UPPER CYLR 1.8" 1-PLY x 4" x 39-1/2" LG. FS-1
15	1	94788	47 A 868	RETAINER, UPPER CYLR SEAL 1/4" x 1-5/8" x 34-1/4" LG. STL
16	1	99698	48 B 480	SHAFT, OPERATING 1-1/2"DIA. x 55"LG.
17	2	99699	47 A 876	PIN, HINGE 1-1.8"DIA. x 2.5" LG. CRS
18	1	94446	47 B 811	GEAR SECTION, SHAFT PART 94446 C.S.
19	1	94447	47 B 812	" " LEVER " 94447 "
20	1	99699	48 A 301	HINGE, DOOR LOCKING " 99699 HR
21	1		"	KEY 3/8" x 3/8" x 1-3/4"LG. C-1018 CRS
22	2		"	KEY 3/8" x 3/8" x 1"LG. " "
23	2		"	PIN, TAPER #8 x 3-1/2" LG.
24	2	94888	CONN	BEARING, NEW CONVERSE #7208 1.3780" I.D. x 2.0346" O.D. x .6693" WIDE
25	2	94874	"	RING, RETAINING TRU-ARC #5100-205, 2.034" DIA. x .109" WIDE
26	1	99210	"	COLLAR, SOLID STEEL 1-3/16"
27	4	48000	"	FITTING, HYDRAULIC 1/8"
28	6		"	1/2" x 1-1/2"LG. F.H. CAP SCREW
28A	2		"	1/2" x 1-1/2"LG. HC HEX HD. CAP SCREW
30	4		"	3/8" x 1-1/2"LG. HC HEX HD CAP SCREW
31	2		"	3/8" x 3/4"LG. HC " " " "
32	2		"	3/8" x 1-1/2"LG. HC " " " "
33	4		"	1/2" x 3/4"LG. HC " " " "
34	8		"	1/2" LOCKWASHER
35	2		"	1/8" "
36	8		"	3/8" FLATWASHER
37	2		"	1/8" "
38	2		"	3/8" HEX HD HOLE NUT
39	8		"	1/2" HEX HD NUT
40	6		"	3/8" " "
41	8		"	1/8" " "
42	11		"	3/8" x 1"LG. ALLEN SET SCREWS
43	2		"	3/16" x 1-1/2"LG. COTTER PIN
44	1	69505	-	COLLAR, SOLID STEEL 1"
45	1	44926	75 B 1190	BRACKET FOR MICRO SWITCH
46	4		CONN	A - 7/16 ELEV BOLT
47	1	76A6-8	-	MICRO SWITCH SIZE 2"

NOTE:
ITEMS MARKED THUS (a) ARE NOT INCLUDED IN THIS Gpn

BM 445177

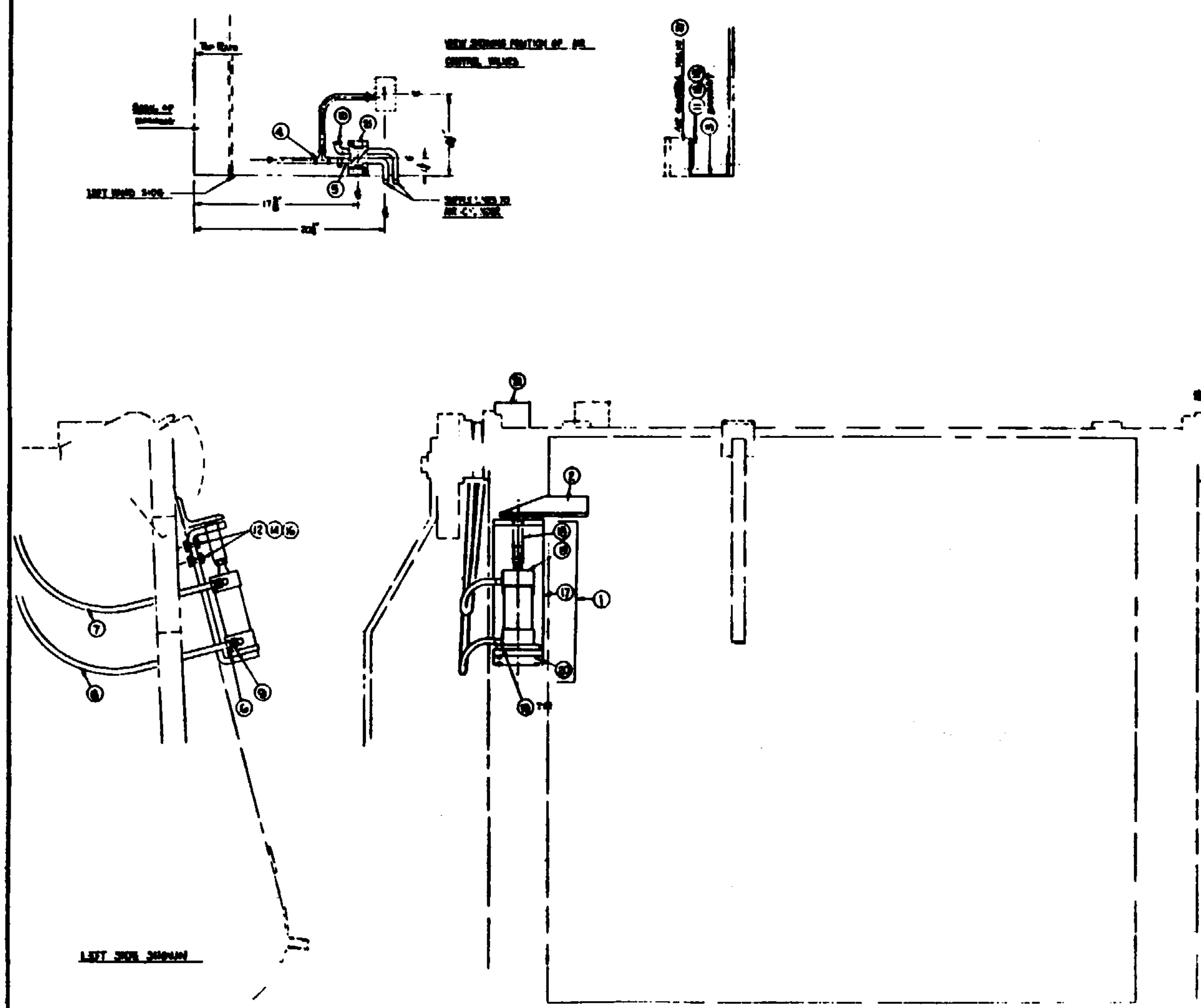
76 D81


76D83
NOTE:
THREAD THE WIRE ROPE THRU THE PIPE NIPPLE AND CUT PIN. LOOP IT OVER AND RIVET THE END AS SHOWN.
USING EXISTING HOLD — LEAD SOLDER THE ENTIRE END AND CAVITY OF CUT PIN.
BM 446417
76D83



LOADING DOOR ASSEMBLY 27X36 TUMBLAST

76D84



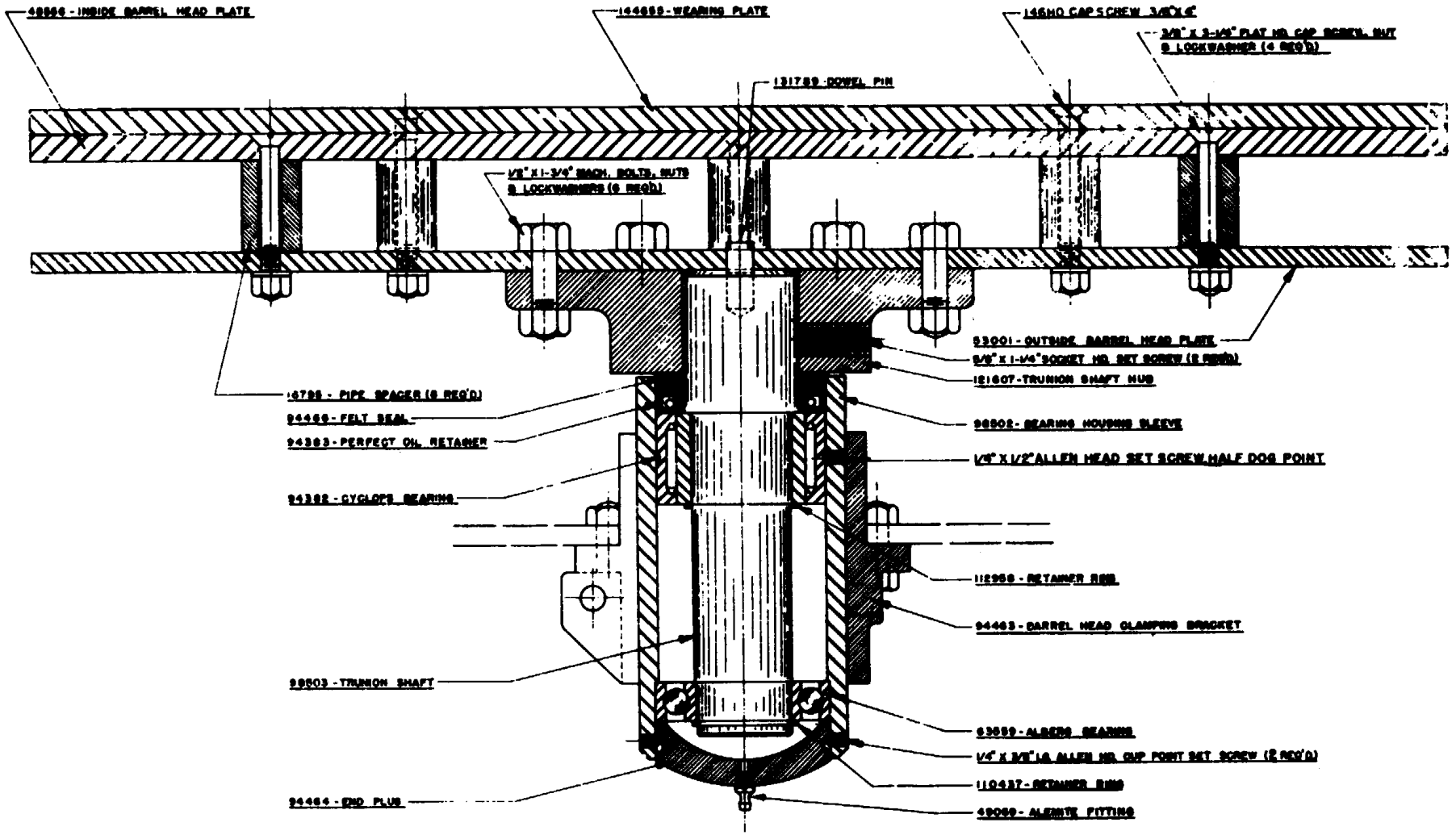
ITEM	QTY.	PART NUMBER	DRAWING NUMBER	DESCRIPTION
1	1	BM 450995		LOCK, DOOR, ASS'Y
2	1	421728	73A 829	STOP, DOOR
3	1	261785	66A 1805	BRACKET FOR SOLENOID VALVE
4	1	446049	COMM.	TEE, PIPE, STD. 1/4"x1/4"x1/4" (GALVANIZED)
5	1	446050	"	NIPPLE, PIPE, STD. 1/4"x1 1/2" LG (")
6	4	416481	"	CLAMPS, HOSE
7	2 1/2 FT		"	HOSE, AIR 1/4" I.D. x 1/2" O.D. x 30" LG.
8	3 FT		"	" " 1/4" I.D. x 1/2" O.D. x 36" LG.
9	4	146278	"	INSERT, BARBED, 1/4" N.P.T.
10	5		"	ELL, STREET, STD. 1/4"x90° (GALVANIZED)
11	2			SCREW, MACHINE 1/4"x1 1/2" LG RD HD.
12	4			CAPSCREW 1/2"x1 1/2" LG. NC HEX HD.
13	2			NUT HEX 1/4"
14	4			NUT, HEX 1/2"
15	2			LOCKWASHER 1/4"
16	4			LOCKWASHER 1/2"
17	1	421727	73B 947	BRACKET, SUPPORT, AIR CYLINDER
18	1	416943	72A 1160	PIN, LOCKING-DOOR
19	1	416970	COMM	CYLINDER, AIR - ALKON MODEL #24
20	4			CAPSCREW 1/4"x 5/8" LG HEX HD W/NUT & L.WASHER
21	1	269782		VALVE, AIR CONTROL P.N. #66-200-25

ITEMS 17 THRU 20 ARE ON BM 450995 & ARE NOT INC/ON BM 446800

ITEMS MARKED THUS ** ARE NOT INC/ON BM 446800

BM 446800

76D84

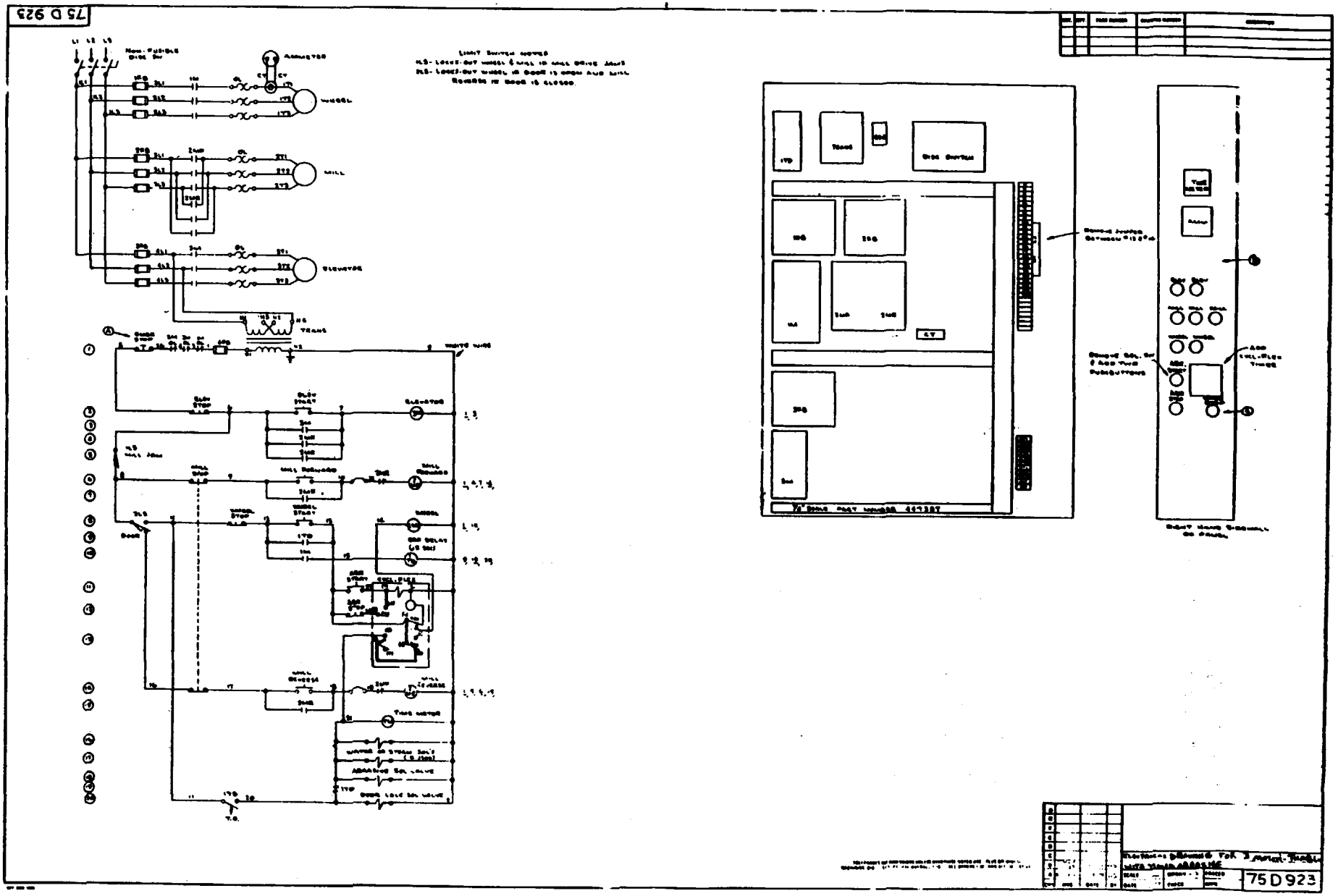


NOTE

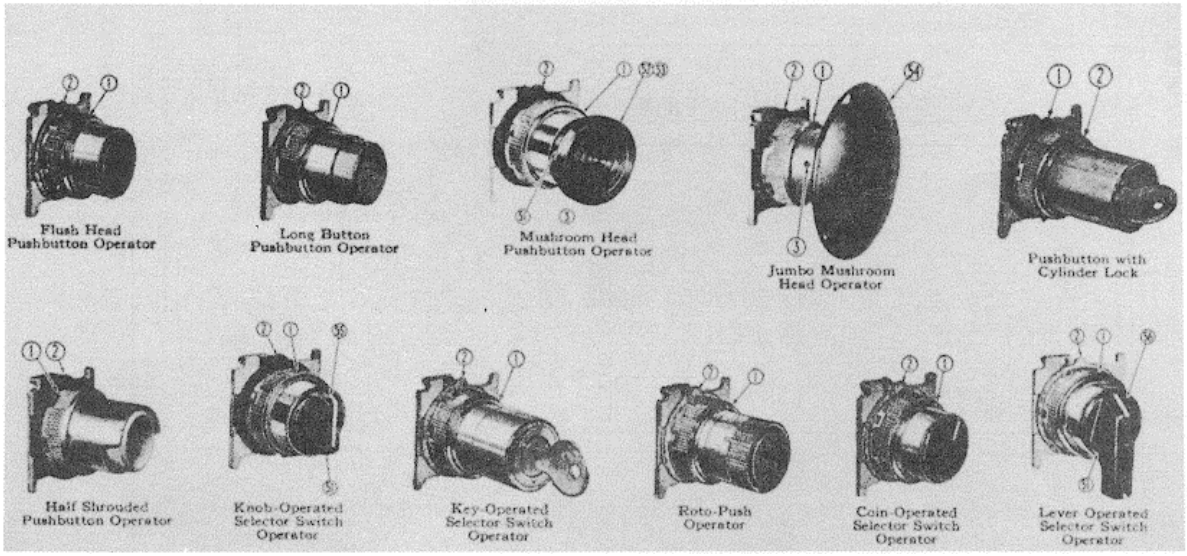
157975 BARREL HEAD ASSEMBLY INCLUDES ALL PARTS SHOWN EXCEPT 94463 BARREL HEAD CLAMPING BRACKET

BARREL HEAD ASSEMBLY FOR RUBBER BELT 27 X 36 TUMBLAST

(LONG LYFE LINERS)


75 D 923
75D923

INSTRUCTION SHEET
Bulletin 10250 Heavy Duty Oil Tight Control Units
RENEWAL PARTS-Information Required

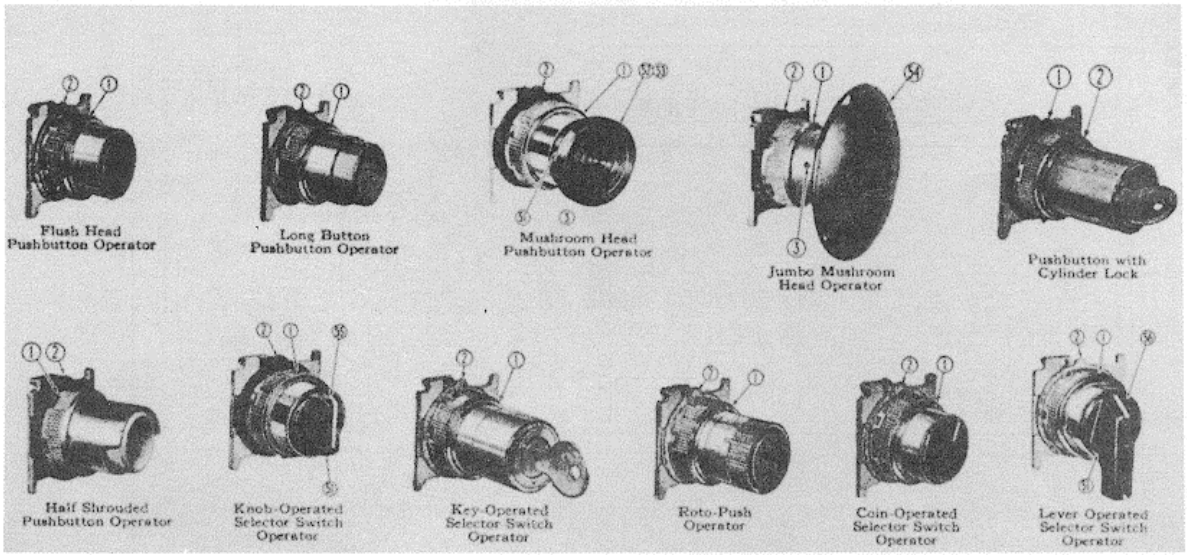


Item No.	Description	No Req	Part Number	Item No.	Description	No Req	Part Number
1	Retaining Nut (13/8 x "15/32" High)	1	15-676	16	Retaining Nut (13/8"x11 1/16 High)	1	15-678
2	Gasket	1	16-1548	17	Lamp (#259)	1	28-949
3	Set Screw (No. 10-32 x1/4" Long) Hollow Hex.	1	11-544	18	Lens(Glass) includes gasket	1	As req. below
5	Terminal Lug (furnished with item 6 only)	AS			Red		1020TC13
6	Terminal Screw and Lug (Captive)	Req.	80-2926		Green		10250TC14
7	Mounting Screw (#6-32 x .710' long)	2	11-3118		Amber		10250TC15
8	Retaining Nut (13/8" x 23/64" High)	1	15-701		Blue		10250TC16
9	Retaining Nut (13/8" x 3/4" High)	1	15-702		Clear		10250TC17
10	Spring Washer	1	16-1609		White		10250TC18
11	Handle	1	53-937	19	Mounting Screw (No. 6-32 x 19/16" Long)	2	11-1685
12	Resistor		20		Retaining Nut (5/8" High)	1	15-715
	110 Volt (1000 Ohms)	1	57-1715	21	Mounting Screw	2	11-1632
	220 Volt (3000 Ohms)	1	57-1715-2	22	Switch for Resistor Type PresTest	1	86-1684-2
13	Mounting Screw		24		Lamp (#44)	1	28-672
	For Base Mounting	2	11-1612	25	Terminal Lug (Furnished with item 26)	As	
	For One Hole Mounting	2	11-1632	26	Terminal Screw & Lug	Req.	80-2926
14	Lamp		27		Mounting Screw (6-32 x .710" Long)	2	11-3118
	110 Volt Type S-6 (6 Watt, 110 Volt)	1	28-81		Washer	2	16-2038
	220 Volt Type 10S6 (10 Watt, 250 Volt)	1	28-552	28	Illuminated Lens	1	As req. below
15	Lenses (Plastic)	1	As req. below		Red		10250TC47
	Red		10250TC1		Green		10250TC48
	Green		10250TC2		Blue		10250TC49
	Yellow		10250TC3		Amber		10250TC50
	Blue		10250TC4		White		10250TC51
	Clear		10250TC5		Clear		10250TC52
	White		10250TC6	29	Non-illuminated Buttons	1	As req. below
	Lenses (Glass)	1	As req. below		Black		10250TB60
	Red		10250TC7		Green		10250T861
	Green		10250TC8		Red		10250TB62
	Yellow		10250TC9	30	Coupling	1	29-3749-2
	Blue		10250TC10	31	Set Screw (6-32 x .125 Long)	1	11--1199
	Clear		10250TC11	33	Gasket (Supplied with Basic Unit)	1	32--803
	White		10250TC12	34	Socket Head Screw(4-40 x .375' Long) (Supplied with Item 29)	2	11--2684

24-5046, 41-1089, 41-1090, 86-1440, 86-1512, 86-1517, 86-1535, 86-1706, 86-1752, 886-1843, 86-1946, 86-2098, 86-2135, 86-2136, 86-2153, 86-2177, 86-2193, 86-2334, 86-2683, 86-3049, 86-3082, 86-3362, 86-3342, 86-3738, 86-3856, 86-3857, 86-3858, 86-3859, 86-3860, 86-3861.

Made in U.S.A.

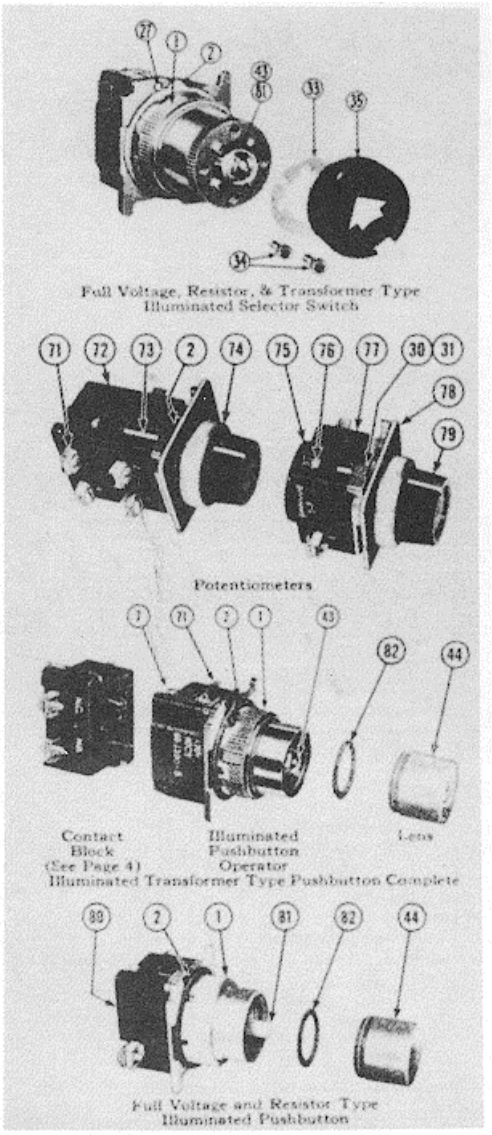
INSTRUCTION SHEET



Item No.	Description	No Req	Part Number	Item No.	Description	No Req	Part Number
35	Cap (Lens)	1	As req. below		Lens (Extra Heavy Duty Glass)	1	As req. below
	Red		10250TER		Red		10250TC41
	Green		10250TEG		Green		10250TC42
	Amber		10250TEA		Amber		10250TC43
	Blue		10250TEL		Blue		10250TC44
	Clear		10250TEC		Clear		10250TC45
	White		10250TEW		White		10250TC46
37	Terminal plate	1	80-1901	45	Lamp Type S-6: 6 Watt	1	As req. below
38	Resistor and capacitor combination:				Volts (Volt Lamp)		
	440 volts A-c	1	25-1912-3		4-6 6		28-760
	550 volts A-c	1	25-1912-4		8-12 12		28-516
	Resistor combination:				14-17 18		28-761
	100 volts A-c	1	25-912		18-23 24		28762
	220 volts A-c	1	25-1912-2		24-29 30		28-399
	Resistor:				32-39 40		28-763
	440 volts A-c	1	25-1912-5		48-59 60		28-764
	550 volts D-c	1	25-1912-6		60--74 75		28-380
39	Lamp (#B7A)	1	28-520	51	Set Screw (16-32 x /4' Long Hollow Hex.)	1	11-2014
43	Lamp (112) (Trans Type)	1	28-769	52	Mushroom Head Button (Melamine - Includes		
44	Lens (Plastic):	1	As req. below		item 51)	1	As req. below
	Red		10250TC21		Black		53-892
	Green		10250TC22		Red		53-892-2
	Yellow		10250TC23		Yellow		53-92-3
	Blue		10250TC24		Green		53-5892-4
	Clear		10250TC25		Blue		53-892-5
	White		10250TC26				

Made in U.S.A.

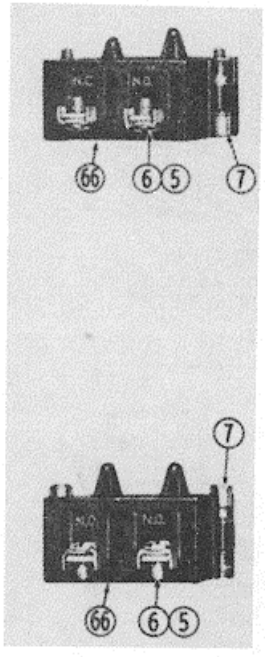
INSTRUCTION SHEET



Item No.	Part Description	Req	Number
53	Mushroom Head Button (Aluminum - Includes item 3)	1	As req. below
	Black		53-1162
	Red		53-1162-2
	Yellow		53-1162-3
	Green		53-11624
	Aluminum Shrouded (Includes item 3)		
	Black		53-1395
	Red		53-1395-2
	Yellow		53-1395-3
	Green		53-1395-4
54	Jumbo Mushroom Head Button (Aluminum - Includes item 3)	1	As req. below
	Red		53-977
	Black		53-977-2
	Yellow		53-977-3
	Green		53-977-4
55	Knob (Melamine - Includes item 51)	1	As req. below
	Black		10250TKB
	Red		10250TKR
	Green		10250TKG
	Yellow		10250TKY
	Gray		10250TKA
	Brown		10250TKN
	White		10250TKW
	Blue		10250TKL
	Orange		10250TKO
56	Lever (Melamine -Includes item 51)	1	As req. below
	Black		10250TLB
	Red		10250TLR
	Green		10250TLG
	Yellow		10250TLY
	Gray		10250TLA
	Brown		10250TLN
	White		10250TLW
	Blue		10250TLL
	Orange		10250TLO
66	Contact Block (Select from Table page 4)		Give the Catalog Ordering No. for each Block Ordered.
71	Screw with lug	As Req.	80 2926
72	Dual potentiometer (encapsulated) (does not include items 71 or 73)	1	As req. bow
	1,000 ohms		41-1096-2
	2,500 ohms		41-1096-3
	10,000 ohms		41-1096-4
	25,000 ohms		41-1096-5
	50,000 ohms		41-1096-6
73	Mounting screw	2	11-3123
74	Retaining nut	1	15-708-2
75	Resistor (used with single potentiometer) (connect to terminals No. 1 and No. 3) not shown	1	57-1443-10
76	Mounting screw (#6-32 x .750" long)	2	11-1612
77	Single potentiometer (encapsulated) (does not include items 71 or 76)	1	As req. below
	1,000 ohms		41-1095-2
	2,500 ohms		41-1095-3
	10,000 ohms		41-1095-4
	25,000 ohms		41-1095-5
	50,000 ohms		41-1095-6
78	Indicating plate:		
	Without legend	1	30-4460
	Specify legend	1	30-4460-2
79	Knob	1	53-1314
	Socket set screw (#6-32 x .250' long)	1	11-2014

Item No.	Description	No Req	Part Number	Item No.	Description	No Req	Part Number
80	Resistor (not shown)			82	Lens sealing washer	1	16-1876-2
	120 volts	2	57-1791	83	Knob	1	53-1645
	240 volts	2	57-1791-2	84	Handle	1	25-5045
81	Lamps- Type #PSB (resistor & full voltage type)	1	As req. below	85	Common gate (supplied with item 87)	1	
	Volts No.			86	Position gate:		
	6 6SB		28-1022		2 position	1	54-7278
	12 12PSB		28-1025		3 position	1	54-7173
	24 24PSB		28-1026		4 position	1	54-7178
	32 28PSB		28-1027		8 position	1	54-7175
	48 48PSB		28-1028	87	Mechanism (includes item 85)	1	83-1513
	120 120PSB		281029				
	240 120PSB		28-1079				

10250T Contact Blocks



Contact Block (One Hole Mounting Type)

Contact Block (Base Mounting Type)

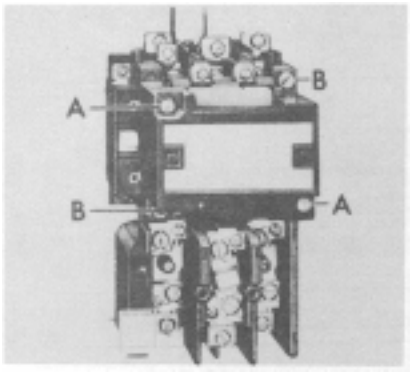
Select A Contact Block That Agrees With The Block Being Renewed.

Circuit Symbol	Circuit	Mounting	Feature	Catalog Ordering No. 10250T
	1 NC-1 NO	One Hole	.....	1
	2 NO	One Hole	.....	2
	2 NC	One Hole	.....	3
	1 NO	One Hole	.....	53
	1 NC	One Hole	.....	51
	1 NC-1 NO	Base	.....	6
	2 NO	Base	.....	7
	2 NC	Base	.....	8
	1 NO	Base	.....	54
	1 NC	Base	.....	52
	1 NC-1 NO	One Hole	*Overlap	55
	2 NO	One Hole	▲	57
	1 NC-1 NO	Base	*Overlap	56
	2 NO	Base	▲	58

*The NO Contacts Close 1/16" Nominal Before the NC Contacts Open.

▲One NO Contacts Closes 1/16" Nominal Before the other NO makes

RENEWAL PARTS AND INSTRUCTION PUBLICATION FOR NEMA SIZE "1" 3 POLE STARTER WITH STANDARD TRIP EUTECTIC OVERLOAD RELAY



Typical Starter Three Pole with Two Circuit Electrical Interlock

INTRODUCTION

This publication is designed to simplify inspection and maintenance. It features...

1. A publication number keyed to the ordering number of the device...to simplify filing and fact finding.
2. A nameplate inscription keyed to the specific renewal parts publication...to eliminate cross referencing.
3. An exploded view for easy, positive identification of parts with illustrated steps on "how to assemble and disassemble"...to conserve time and eliminate guesswork.
4. Comprehensive maintenance information to provide maximum performance. This information should be read carefully.

DESCRIPTION

These are three pole, three phase, non-reversing A-c magnetic starters for across the line applications within the ratings shown on the nameplate of the equipment.

CARE

These starters require no mechanical maintenance. Any maintenance required can be performed with an electricians screwdriver. For continued uninterrupted performance, renew all of the power contacts and springs at the same time before the contact tip material has worn away. When renewing the contacts check all terminal screws to insure they are tight and secure. Suggestion refer to publication 14183 for helpful information on inspecting and determining when to replace contacts.

RENEWAL OF OPERATING COIL

The operating coil is epoxy encapsulated and so constructed to provide long service life. Should the coil require changing, the entire operation can be performed in a few minutes.

1. Unfasten the two pan head cover screws "A" and remove the cover item 16.
2. Tilt the top of the armature item 11 away from the coil.
3. Slide the armature up and out.
4. Remove the spring plate item 12.
5. Pull the coil straight out.
6. Install the new coil with the coil terminal blades engaging the coil terminal clips.
7. Install and seat the spring plate.
8. Slide the armature (narrow end to the right) into its seated operating position.
9. Install the cover.

RENEWAL OF POWER UNIT

NOTE • The power unit item 1 consists of a factory assembly of all the magnetic parts, movable contacts, and their carrier assembly. This unit usually permits immediate restoration to service of a device which may have become Inoperative.

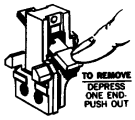
Unfasten the two gold colored Hex. Head screws "B", pull out the power unit, plug-in the new and retighten the screws "B". A set of stationary contacts is included with the power unit, It is advisable to install these stationary contacts at the same time, particularly if visual inspection indicates that both the movable and stationary contacts need replacement. Specify coil by suffix letter selected from coil table on page 55.

RENEWAL OF POWER CONTACTS

The power contacts when used within their rating will provide long trouble free life. They should not be filed or dressed.

1. Remove the power unit assembly by loosening the two gold colored slotted hex head screws "B" and pull the power unit straight out.

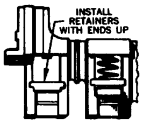
MOVABLE CONTACTS



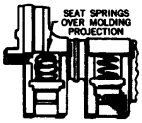
SKETCH "A"

SKETCH "B"

2. Depress one end of the movable contact and push the contact out (see sketch "A").
3. Remove the springs item 10.
4. Remove the retainers item 9.



SKETCH "C"



SKETCH "B"

5. Install the new retainers item 9. (see sketch "C") Note -the retainer must be installed so the springs will seat over the extruded hole, with the retainer ends extending away from the contacts.
6. Install the spring item 10 (see sketch "D").
7. Install the contact (see sketch "B"). Insert contact, raise end slightly and push in to seat.

STATIONARY CONTACTS

NOTE - It is not necessary to disconnect any wiring.

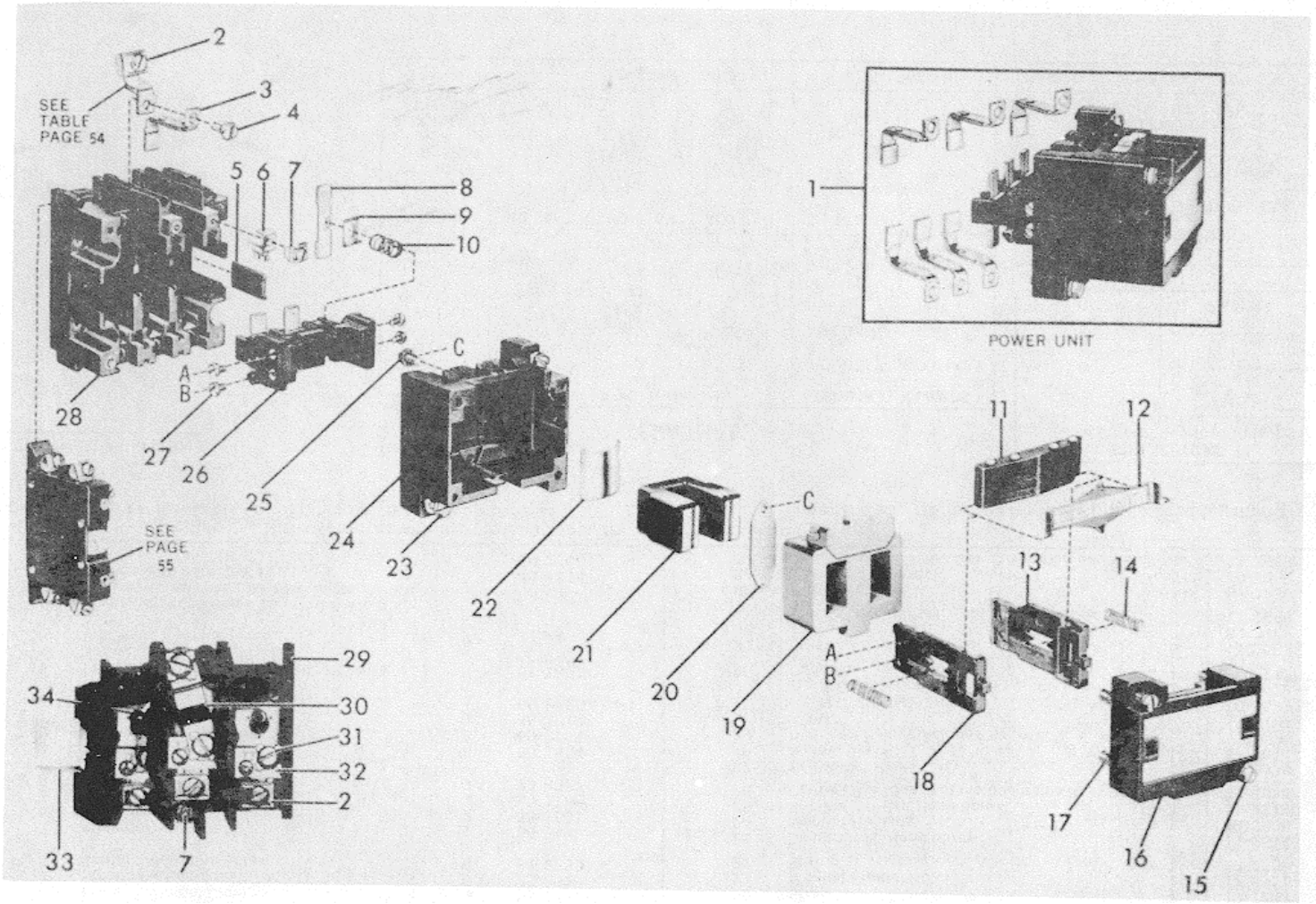
8. Remove the screws securing the stationary contacts.
9. Slide the contact out of the groove in the molding. A hole in the contact plate is provided for convenient removal with a screwdriver.
10. Install the new contacts.

CAUTION - The stationary contacts must be installed so they seat on top of the terminal plates. (See typical assembly top of page 53) ELECTRICAL INTERLOCKS The electrical interlocks are renewable as a complete assembly. See page 15 for the various electrical interlocks.

LUBRICATION

Do not lubricate any part of this equipment.

Continued on page 55



OVERLOAD RELAY
The parts listed and illustrated are available for repairs. Should other parts be required order a complete overload relay.

Made in U.S.A.

PARTS LIST

▲Recommended Spare Parts.
A Renewal Set of Contacts for 3 Poles, Part No. 6-23-2 (includes items 3, 4, 8, 9 and 10).

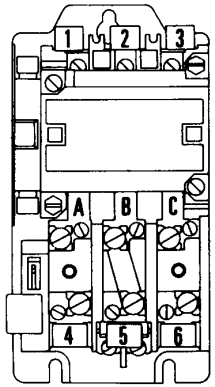
Item No.	Description of Part	No. Req.	Part No.
• 1	Power unit (includes items 3, 4, 8 thru 27) (see coil table p 55)	1	C10CX 55-1763
2	Power Terminal Clamp	*	23-3528
▲ 3	Stationary Contact	6	11-2280
4	Contact Mounting Screw	6	56-3493
5	Insulator	1	55-1681
6	Coil Terminal Clip	2	55-1743
7	Auxiliary Terminal Clamp	*	23-3527
▲ 8	Movable Contact	3	
9	Retainer	3	55-1954
10	Spring	3	69-2535
★11	Armature	1	48-1019
12	Spring Plate	1	69-2765
13	Push Bars (includes items 14, 18 and 27)	1	61-1857
14	Spring	2	69-2507
15	Pan Head Sems Screw	2	11-2517
16	Cover (includes items 15 and 17 w/o nameplate) (give complete nameplate data for cover with nameplate)	1	49-4114
17	Spring	4	69-2508
18	Push Bar (see item 13)	1	.....
19	Coil (see table on page 55)	1	.....
20	Strap	1	19-1723
★21	Magnet Frame	1	17-8911
22	Spring	1	69-2766
23	Slotted Hex Head Screw	2	11-2518
24	Magnet Housing	1	49-3606
25	8—32 x .50 Pan Head Screw	2	11-2515
26	Contact Bar (does not include items 8, 9, 10)	1	23-3522
27	6—32 Pan Head Screw	4	11-2378
28	Molded Base	1	17-9014
29	Overload Relay (includes items 2, 7, 31 thru 34)		10-3523-5
	N.C. Control Circuit	1	10-3523-9
	N.C.-N.O. Control Circuit	1	25-2217
30	Connector	1	11-2582
31	Screw	6	80-2749
32	Terminal Plate	3	11-2669
	6—20 x .438 P. H. Thd Cutting Screw	3	53-1236
33	Button (White)	1	10-4057
34	Thermal Element	3	11-2669.
	6—20 x .438 P. H. Thd Cutting Screw	3	

•Coil must be specified by suffix letter selected from coil table on page 55. The power units are supplied only with 3 power poles

*As Required.

★It is Recommended that items 11 and 21 be replaced together.

TERMINAL POSITIONS



TERMINALS

Selection and arrangement see adjacent table.

	POSITION 1	POSITION 2	POSITION 3	TERMINAL CLAMPS POWER	TERMINAL CLAMPS AUXILIARY
WITH PROVISION FOR AUXILIARY TERMINAL				 #10-32 Item 2 in Parts List	 #6-32 Item 7 in Parts List
PART NO.	80-3167	80-3168	.....	55-1763	55-1743
WITHOUT PROVISION FOR AUXILIARY TERMINAL				POWER  #10-32	
PART NO.	.....	80-2786	80-2788-3	55-1763	

CONNECTORS (Contactor to Overload Relay)

POSITION	PART NO.
A	25-2212
B	25-2213
C	25-2214

TERMINALS (On Overload Relay)

POSITION	 Item 32 in Parts List	TERM. CLAMP  Item 2 in Parts List
4, 5, 6		
PART NO.	80-2749	55-1763

Made in U.S. A.

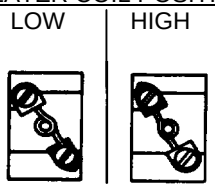
Continued from p 52

EUTECTIC OVERLOAD RELAY

This overload relay has two steps of adjustment (low or high) obtained by POSITIONING THE HEATER COILS as shown in the adjacent illustrations. Note the location of the pointed terminal on the heater coil.

The heater coil selection table furnished with the starter illustrates the proper mounting position. All coils must be mounted in the same position for a given overload relay.

HEATER COIL POSITION



Reset and tripped indication -

A transparent rectangular window above the reset button provides visual indication.

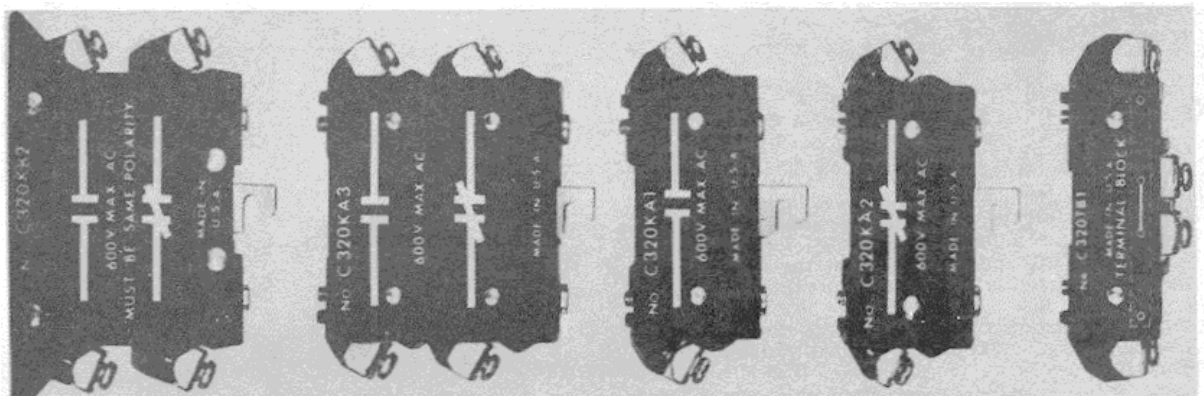
Relay Reset - Dark Window.

Relay Tripped - Light (silver) Window.

Do not disassemble this relay.

The parts called out on page 53 are available for repairs. If parts are required other than those listed replaced the complete relay.

ELECTRICAL INTERLOCKS, TERMINAL BLOCK AND COIL TABLE



ADD ON TYPE

BASE MOUNTED

Circuit	Catalog No.
None (Dummy)	10-3640-3
1 N.O.	C320KB1
1 N.O.-1 N.C.	C320KB2

FOR MOUNTING ABOVE BASE MOUNTED INTERLOCK

Circuit	Catalog Number
1 N.O.	C320KA1
1 N.C.	C320KA2
1 N.O.-1 N.C.	C320KA3

TERMINAL BLOCK

Cat. No.
C320TB1

Operating Coils Selection Table

Volts	Cycles	Part Number	* Suffix Letter	Volts	Cycles	Part Number	* Suffix Letter
120 110	60 50	9-1887-1	A	600 550	60 50	9-1887-4	D
240 220	60 50	9-1887-2	B	208	60	9-1887-5	E
480 440	60 50	9-1887-3	C	380	50	9-1887-8	L

*Suffix letter required only when power unit is ordered.

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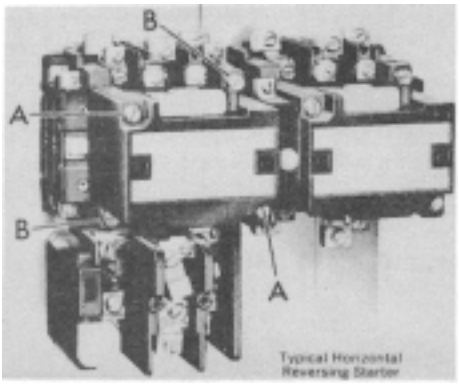
RENEWAL PARTS AND INSTRUCTION PUBLICATION FOR NEMA SIZE "1" 3 POLE THREE PHASE REVERSING STARTER WITH STANDARD TRIP EUTECTIC OVERLOAD RELAY



INTRODUCTION

This publication Is designed to simplify Inspection and maintenance. It features...

1. A publication number keyed to the ordering number of the device...to simplify filing and fact finding.
2. A nameplate inscription keyed to the specific renewal parts publication...to eliminate cross referencing.
3. An exploded view for easy, positive identification of parts with illustrated step on '"how to assemble and disassemble"...to conserve time and eliminate guesswork.
4. Comprehensive maintenance information to provide maximum performance. This information should be read carefully.

DESCRIPTION

These are three pole, three phase, reversing A-c magnetic starters for across the line applications within the ratings shown on the nameplate of the equipment.

CARE

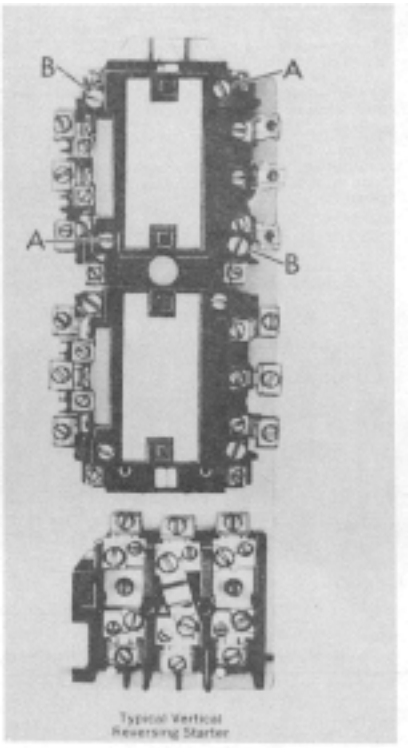
These starters require no mechanical maintenance. Any maintenance required can be performed with an electricians screwdriver. For continued uninterrupted performance, renew all of the power contacts and springs at the same time before the contact tip material has worn away.

When renewing the contacts check all terminal screws to ensure they are tight and secure.

RENEWAL OF OPERATING COIL

The operating coil is epoxy encapsulated and so constructed to provide long service life. Should the coil require changing, the entire operation can be performed in a few minutes.

1. Unfasten the two pan head cover screws "A" and remove the cover item 16.
2. Tilt the top of the armature item 11 away from the coil.
3. Slide the armature up and out.
4. Remove the spring plate item 12.
5. Pull the coil straight out.



6. Install the new coil with the coil terminal blades engaging the coil terminal clips.
7. Install and seat the spring plate.
8. Slide the armature (narrow end to the right) into Its seated operating position.
9. Install the cover.

RENEWAL OF POWER UNIT NOTE

The power unit item 1 consists of a factory assembly of all the magnetic parts, movable contacts, and their carrier assembly. This unit usually permits immediate restoration to service of a device which may have become inoperative.

Unfasten the two gold colored Hex. Head screws "B", pull out the power unit, plug-in the new and retighten the screws 'B". A set of stationary contacts is included with the power unit. It is advisable to install these stationary contacts at the same time, particularly if visual inspection indicates that both the movable and stationary contacts need replacement. Specify coil by suffix letter selected from coil table on page 59.

Continued on page 59

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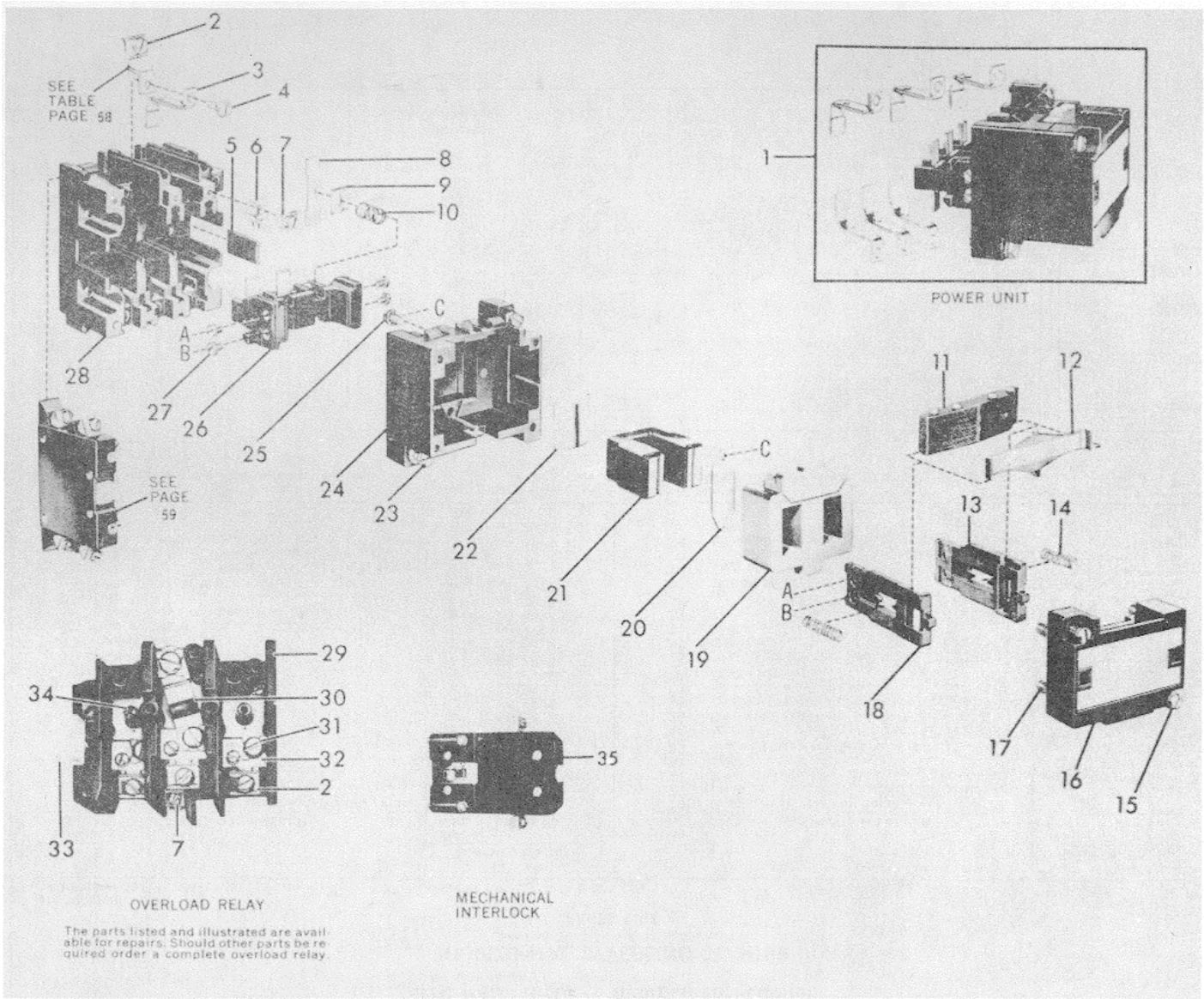
969


2
SEE TABLE PAGE 58
3
4
5
6
7
8
9
10
1
POWER UNIT
C
A
B
28
27
26
25
24
23
22
SEE PAGE 59
11
12
13
14
21
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19
18
17
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31
32
2
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7
35
OVERLOAD RELAY
The parts listed and illustrated are available for repairs. Should other parts be required order a complete overload relay.
MECHANICAL INTERLOCK

969

HORIZONTAL REVERSING STARTER

(See Page 60 for Vertical Rev. Starter.)

PARTS LIST

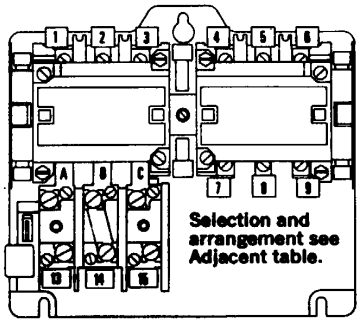
▲Recommended Spare Parts:
A Renewal Set of Contacts for 3 Poles, Part No. 6-23-2 (includes items 3, 4, 8, 9 and 10).

Item No.	Description of Part	3 Pole Reversing Starter No. Req.	3 Pole Reversing Starter Part No.
• 1	Power unit (includes items 3, 4, 8 thru 27) (see coil table p.59.)	2	C10CX
2	Power Terminal Clamp	*	55-1763
▲ 3	Stationary Contact	12	23-3528
4	Contact Mounting Screw	12	11-2280
5	Insulator	2	56-3493
6	Coil Terminal Clip	4	55-1681
7	Auxiliary Terminal Clamp	*	55-1743
▲ 8	Movable Contact	6	23-3527
9	Retainer	6	69-2535
10	Spring	6	48-1019
★11	Armature	2	69-2765
12	Spring Plate	2	61-1857
13	Push Bars (includes items 14, 18 and 27)	2	11-2517
14	Spring	4	
15	Pan Head Sems Screw	4	
16	Cover (includes items 15 and 17 w/o nameplate) (give complete nameplate data for cover with nameplate)	2	49-4114 69-2508
17	Spring	8	
18	Push Bar (see item 13)	2	.....
19	Coil (see coil table on page 59.)	2	
20	Strap	2	19-1723
★21	Magnet Frame	2	17-8911
22	Spring	2	69-2766
23	Slotted Hex. Head Screw	4	11-2518
24	Magnet Housing	2	49-3606
25	8-32 x .50 Pan Head Screw	4	11-2515
26	Contact Bar (does not include items 8, 9, 10)	2	23-3522
27	6-32 Pan Head Screw	8	11-2378
28	Molded Base	2	17-9014
29	Overload Relay (includes items 2, 7, 31 thru 34)	1	10-3523-5
30	Connector	*	25-2217
31	Screw	*	11-2582
32	Terminal Plate 6—20 x .438 P. H. Thd. Cutting Screw	3	80-2749
33	Button (White)	3	11-2669
34	Thermal Element 6—20 x .438 P. H. Thd. Cutting Screw	1	53-1236
35	Mechanical Interlock	1	10-4057 11-2669 C321KM1

•Coil must be specified by suffix letter selected from coil table on page 59.
The power units are supplied only with 3 power poles.

*As required.
★It is recommended that items 11 and 21 be replaced together.

TERMINAL POSITIONS



TERMINALS

	POSITION 1, 4	2, 5	3, 6	7	8	9	POWER	AUXILIARY
WITH PROVISION FOR AUXILIARY TERMINAL							#10-32 Item 2 in Parts List	#6-32 Item 7 in Parts List
PART NO.	80-3167	80-3168	.....	.....	.....	.....	55-1763	55-1743
WITHOUT PROVISION FOR AUXILIARY TERMINAL							POWER #10-32	
PART NO.	80-2788-2	80-2786	80-2788-3	80-2788-3	80-2786-3	80-2788-	55-11763	

TERMINALS (On Overload Relay)	POSITION	Item 32 in Parts List	TERM. CLAMP Item 2 in Parts List
	13, 14, 15		
	PART NO.	80-2749	55-1763

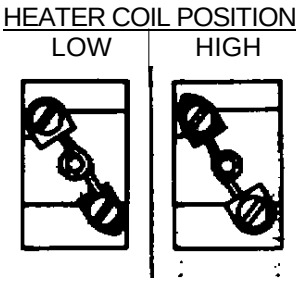
CONNECTORS (Contactor to Overload Relay)	
POSITION	PART NO.
A	25-2212
B	25-2213
C	25-2214

Made In U.S.A.

Continued from page 56.

EUTECTIC OVERLOAD RELAY

This overload relay has two steps of adjustment (low or high) obtained by POSITIONING THE HEATER COILS as shown in the adjacent illustrations. Note the location of the pointed terminal on the heater coil.



The heater coil selection table furnished with the starter illustrates the proper mounting position. All coils must be mounted in the same position for a given overload relay.

Reset and tripped indication -

A transparent rectangular window above the reset button provides visual indication.

Relay Reset - Dark Window

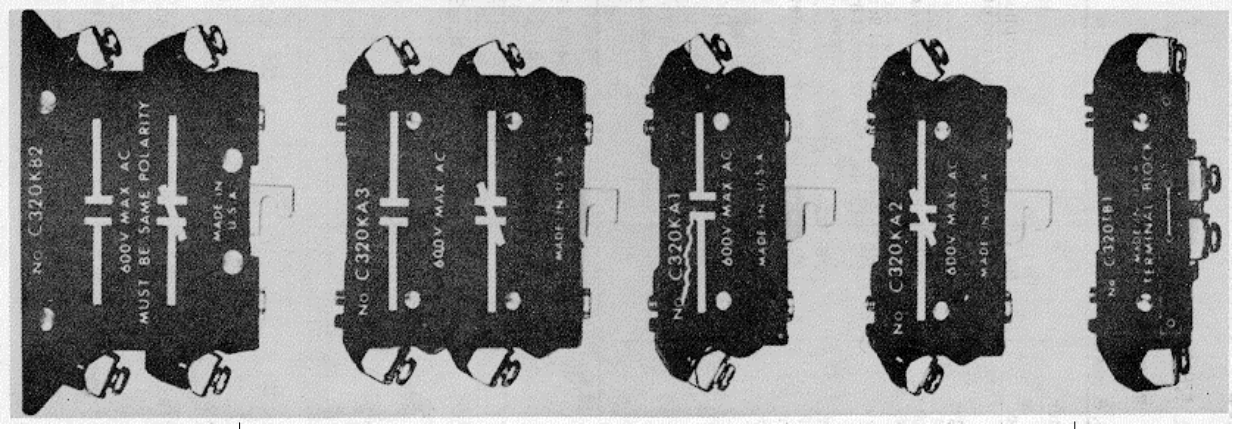
Relay Tripped - Light (silver) Window

Do not disassemble this relay.

The parts called out on page 57 and list on page 58 are available for repairs. If parts are required other than those listed replace the complete relay.

Continued on page 61

ELECTRICAL INTERLOCKS, TERMINAL BLOCK AND COIL TABLE



ADD ON TYPE

BASE MOUNTED

Circuit	Catalog No.
None (Dummy)	10-3640-3
1 N.O.	C320KB1
1 N/O. - 1 N.C.	C320KB2

FOR MOUNTING ABOVE BASE MOUNTED INTERLOCK

Circuit	Catalog Number
1 N.O.	C320KA1
1 N.C.	C320KA2
1 N.O. - 1 N.C.	C320KA3

TERMINAL BLOCK

Cat. No.
C320TB2

Operating Coils Selection Table

Volts	Cycles	Part Number	* Suffix Letter	Volts	Cycles	Part Number	* Suffix Letter
120 110	60 50	9-1887-1	A	600 550	60 50	9-1887-4	D
240 220	60 50	9-1887-2	B	208	60	9-1887-5	E
480 440	60 50	9-1887-3	C	380	50	9-1887-8	L

*Suffix letter required only when power unit is ordered.

RENEWAL PARTS - Information Required
VERTICAL REVERSING STARTER
PARTS LIST

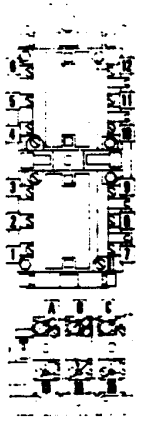
▲Recommended Spare Parts:
A Renewal Set of Contacts for 3 Poles, Part No. 6-22-2 (includes items 3, 4, 8, 9 and 10).

Item No.	Description of Part	3 Pole Reversing Starter No. Req.	3 Pole Reversing Starter Part No.
• 1	Power unit (includes items 3, 4, 8 thru 27) (see coil table p. 59)	2	C10CX
2	Power Terminal Clamp	*	55-1763
▲ 3	Stationary Contact	12	23-3528
4	Contact Mounting Screw	12	11-2280
5	Insulator	2	56-3493
6	Coil Terminal Clip	4	55-1681
7	Auxiliary Terminal Clamp	*	55-1743
▲ 8	Movable Contact	6	23-3527
9	Retainer	6	55-1954
10	Spring	6	69-2535
★11	Armature	2	48-1019
12	Spring Plate	2	69-2765
13	Push Bars (includes items 14, 18 and 27)	2	61-1857
14	Spring	4	69-2507
15	Pan Head Sems Screw	4	11-2517
16	Cover (includes items 15 and 17 w/o nameplate) (give complete nameplate data for cover with nameplate)	2	49-4114
17	Spring	8	69-2508
18	Push Bar (see item 13)	2	.....
19	Coil (see coil table on page 59)	2	• .....
20	Strap	2	19-1723
★21	Magnet Frame	2	17-8911
22	Spring	2	69-2766
23	Slotted Hex Head Screw	4	11-2518
24	Magnet Housing	2	49-3606
25	8-32 x .50 Pan Head Screw	4	11-2515
26	Contact Bar (does not include items 8, 9, 10)	2	23-3522
27	6-32 Pan Head Screw	8	11-2378
28	Molded Base	2	17-9014
29	Overload Relay (includes items 2, 7, 31 thru 34)	1	10-3523-5 ★
30	Connector	*	25-2217
31	Screw	*	11-2582
32	Terminal Plate 6—20 x .438 P. H. Thd Cutting Screw	3	80-2749
		3	11-2669
33	Button (White)	1	53-1236
34	Thermal Element 6—20 x .438 P. H. Thd Cutting Screw	3	10-4057
		1	11-2669
35	Mechanical Interlock	1	C321KM1

•Coil must be specified by suffix letter selected from coil table on page 59.
The power units are supplied only with 3 power poles.

*As required.
★It is recommended that items 11 and 21 be replaced together.

TERMINAL POSITIONS



Selection and arrangement see adjacent table

TERMINALS

	POSITION 1,4	2,5	3,6	7, 10	8, 11	9, 12	POWER	AUXILIARY
WITH PROVISION FOR AUXILIARY TERMINAL							∮10-32 Item 2 in Parts List	∮6-32 Item 7 in Parts List
PART NO.	80-3167	80-3168	.....	.....	.....	.....	55-1763	55-1743
WITHOUT PROVISION FOR AUXILIARY TERMINAL							POWER  ∮10-32	
PART NO.	80-2788-2	80-2786	80-7899-3	80-2788-3	80-2786-3	80-2788-2	55-1763	

TERMINALS (On Overload Relay)	POSITION A, B, C, 13, 14, 15	Item 32 in Parts List 	TERM. CLAMP Item 2 in Parts List 
	PART NO.	80-2749	55-1763

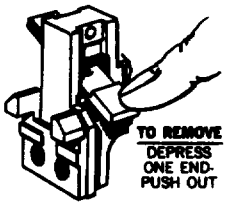
Continued from page 59.

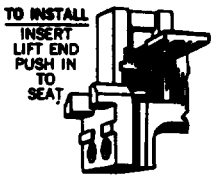
RENEWAL OF POWER CONTACTS

The power contacts when used within their rating will provide long trouble free life. They should not be filed or dressed.

1. Remove the power unit assembly by loosening the two gold colored slotted hex. head screws "B" and pull the power unit straight out. (See photos on page 56.)

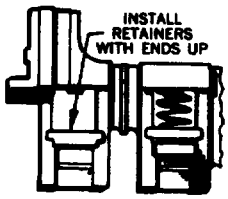
MOVABLE CONTACTS

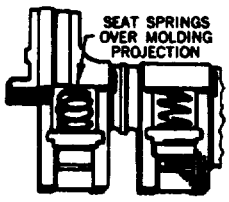




SKETCH "A" **SKETCH "B"**

2. Depress one end of the movable contact and push the contact out (see sketch "A").
3. Remove the springs item 10.
4. Remove the retainers item 9.





SKETCH "C" **SKETCH "D"**

5. Install the new retainers Item 9. (see sketch "C") Note-the retainer must be installed so the springs will seat over the extruded hole, with the retainer ends extending away from the contacts.
6. Install the spring Item 10. (see sketch "D").
7. Install the contact (see sketch "B"). Insert contact, raise end slightly and push in to seat.

STATIONARY CONTACTS

NOTE-It is not necessary to disconnect any wiring.

8. Remove the screws securing the stationary contacts.
9. Slide the contact out of the groove In the molding. A hole In the contact plate is provided for convenient removal with a screwdriver.
10. Install the new contacts.

CAUTION - The stationary contacts must be installed so they seat on top of the terminal plates. (See typical assembly page 7.)

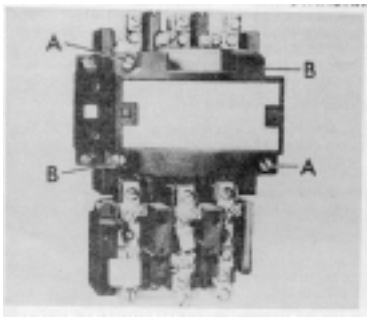
ELECTRICAL INTERLOCKS

The electrical Interlocks are renewable as a complete assembly. See page 59 for the various electrical interlocks.

LUBRICATION

Do not lubricate any part of this equipment.

RENEWAL PARTS AND INSTRUCTION PUBLICATION FOR NEMA SIZE "2" 3 POLE STARTER WITH STANDARD TRIP EUTECTIC OVERLOAD RELAY



Typical Starter Three Pole with Two Circuit Electrical Interlock

INTRODUCTION

This publication is designed to simplify inspection and maintenance. It features ...

1. A publication number keyed to the ordering number of the device ... to simplify filing and fact finding.
2. A nameplate inscription keyed to the specific renewal parts publication ... to eliminate cross referencing.
3. An exploded view for easy, positive identification of parts with illustrated steps on "how to assemble and disassemble" ... to conserve time and eliminate guesswork.
4. Comprehensive maintenance information to provide maximum performance. This information should be read carefully.

DESCRIPTION

These are three pole, three phase, non-reversing A-c magnetic starters for across the line applications within the ratings shown on the nameplate of the equipment.

CARE

These starters require no mechanical maintenance. Any maintenance required can be performed with an electrician's screwdriver. For continued uninterrupted performance, renew all of the power contacts and springs at the same time before the contact tip material has worn away.

When renewing the contacts check all terminal screws to insure they are tight and secure.

Suggestion - refer to publication 14183 for helpful information on inspecting and determining when to replace contacts.

RENEWAL OF OPERATING COIL

The operating coil is epoxy encapsulated and so constructed to provide long service life. Should the coil require changing, the entire operation can be performed in a few minutes.

1. Unfasten the two pan head cover screws "A" and remove the cover item 26 page 63.
2. Unfasten the four pan head screws item 25 securing the clamp item 24 and the armature item 22. Remove the clamp and the armature.
3. Pull the coil straight out.
4. Install the new coil with the coil terminal blades engaging the coil terminal clips.
5. Install the armature (narrow end to the right) into its seated operating position.
6. Install the clamp and secure the screws.
7. Install the cover.

RENEWAL OF POWER UNIT

(Continued on Page 65.)

NOTE • The power unit item 1 consists of a factory assembly of all the magnetic parts, movable contacts, and their carrier assembly. This unit usually permits immediate restoration to service of a device which may have become inoperative.

Unfasten the two gold colored Hex. Head screws "B", pull out the power unit, plug-in the new and retighten the screws "B". A set of stationary contacts is included with the power unit. It is advisable to install these stationary contacts at the same time, particularly if visual inspection indicates that both the movable and stationary contacts need replacement. Specify coil by suffix letter selected from the coil table on page 65.

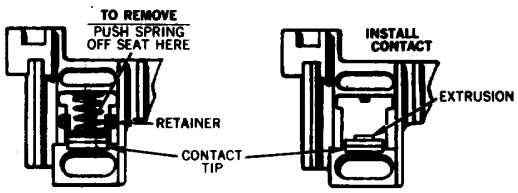
RENEWAL OF POWER CONTACTS

The power contacts when used within their rating will provide long trouble free life. They should not be filed or dressed.

1. Remove the power unit assembly by loosening the two gold colored slotted hex. head screws "B" and pull the power unit straight out.

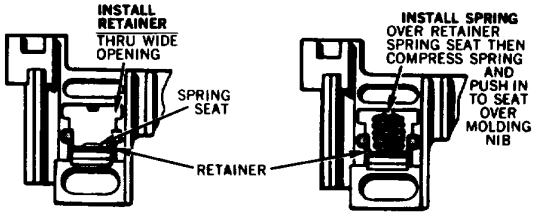
MOVABLE CONTACTS

2. Remove the contact bar item 30 by removing the two screws item 31.
3. Push the springs item 10 off their seat on the retainer item 9 and push out. (See sketch "A".)
4. Remove the retainers thru the wide opening in the molding. The contacts item 8 will be free to come out.



SKETCH "A" SKETCH "B"

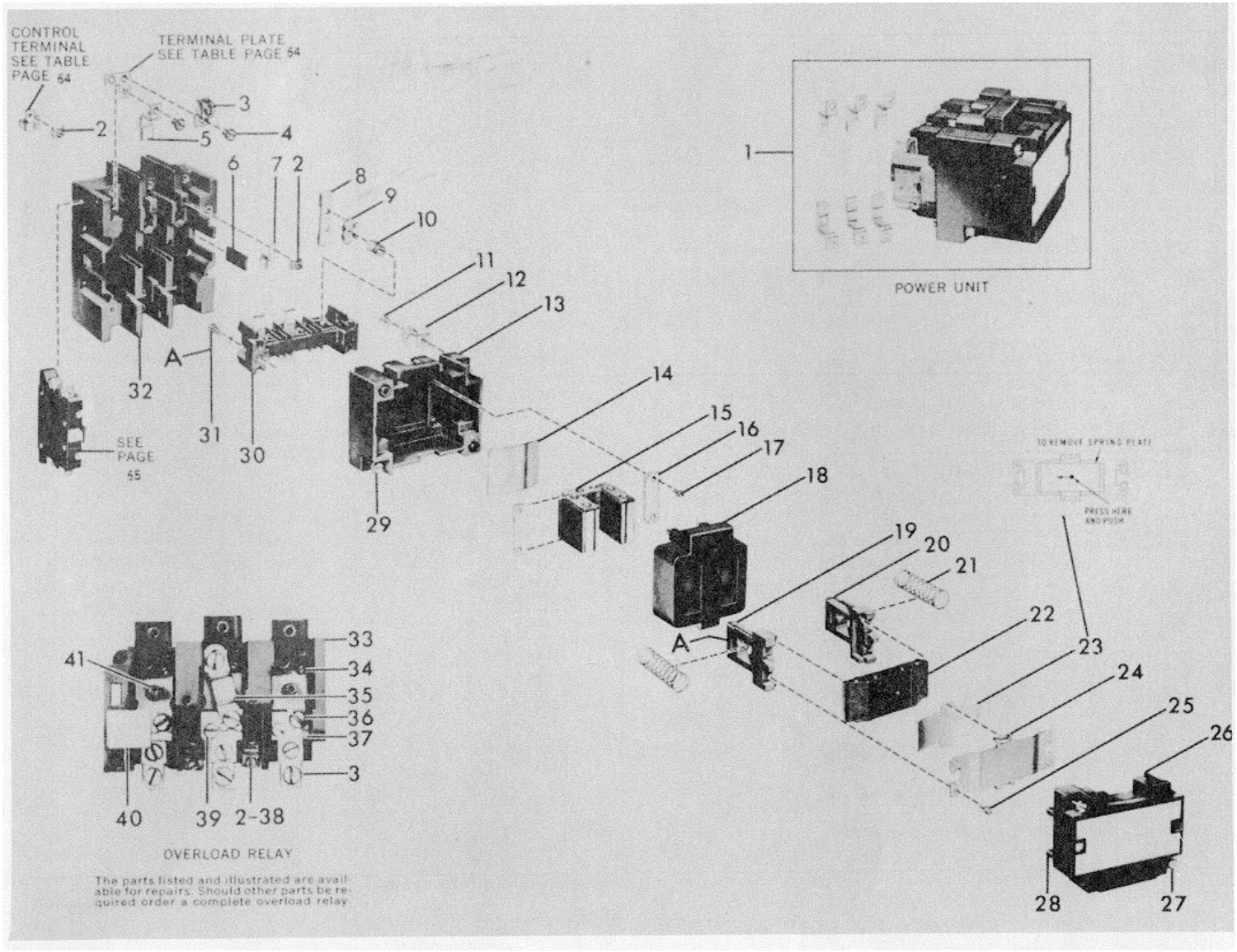
5. Install the new contacts. (See sketch "B".)
6. Install the new retainers, (See sketch "C".) The square openings must be keyed with the extrusions on the contacts.
7. Install the springs, insert one end over the seat on the retainer, compress springs and push in to seat over the molding nib. (See sketch "D".)



SKETCH "C" SKETCH "D"

8. Install the contact bar to the push bars items 19 and 20 with screws item 31.

NOTE: The contact bar is keyed with projections on the push bars. Match the keys to insure correct fit and assembly.


CONTROL TERMINAL SEE TABLE PAGE 64
TERMINAL PLATE SEE TABLE PAGE 64
POWER UNIT
SEE PAGE 65
TO REMOVE SPRING PLATE
PRESS HERE AND PUSH
OVERLOAD RELAY
The parts listed and illustrated are available for repairs. Should other parts be required order a complete overload relay

RENEWAL PARTS - Information Required

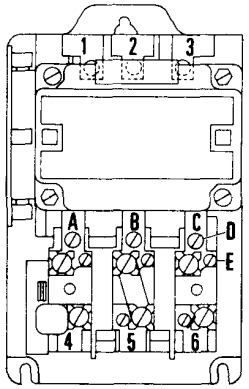
PARTS LIST

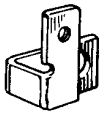
▲Recommended Spare Parts
A Renewal Set of Contacts for 3 Poles, Part No. 6-24-2 (includes items 4, 5, 8, 9 and 10).

Item No.	Description of Part	3 Pole Starter No. Req.	3 Pole Starter Part No.
● 1	Power unit (includes items 4, 5, 8 thru 32) (see coil table page 65 .)	1	C10DX
2	Auxiliary Terminal Clamp	*	55-1743
3	Lug	*	
	Copper		80-2819
	Aluminum		80-2798
4	10-32 x .437 Pan Head Sems Screw	*	11-2425
▲ 5	Stationary Contacts	6	23-3470
6	Insulator	1	56-3494
7	Coil Terminal Clip	2	80-2871
▲ 8	Movable Contact	3	23-3706
9	Retainer	3	55-1950
10	Spring	3	69-2598
11	8-32 x .50 Flat Head Thread Cutting Screw	6	11-2251
12	Blowout	6	65-529
13	Magnet Housing (see item 29)	1	49-3664
14	Spring	1	69-2604
★15	Magnet Frame	1	17-8955
16	Clamp	2	55-1877
17	6-32 x .312 Pan Head Sems Screw	4	11-2538-4
18	Coil (see coil table on page 65 .)	1	.....
19	Push Bar (Left Hand)	1	61-1629
20	Push Bar (Right Hand)	1	61-1628
21	Spring	2	69-2692
★22	Armature	1	48-1020
23	Spring Plate	1	69-2515
24	Clamp Plate	1	55-1878
25	6-32 x .50 Pan Head Sems Screw	4	11-2668
26	Cover (includes items 27 and 28) (without nameplate) (give complete nameplate data for cover with nameplate)	1	49-4151
27	10-32 x 1.88 Pan Head Sems Screw	2	11-2310
28	Spring	4	69-2310
29	10-32 x 1.88 Slotted Hex. Head Sems Screw	2	11-2525
30	Contact Bar	1	23-3619-3
31	8-32 x .688 Round Head Sems Screw with Washers.	2	11-2524
32	Molded Base	1	17-9255
33	Overload Relay (includes items 2, 3, 34, 36 thru 41)		
	With Copper Lugs		10-3535-5
	N.C. Control Circuit	1	10-3535-7
	N.C.-N.O. Control Circuit	1	
	With Aluminum Lugs		10-3535-9
	N.C. Control Circuit	1	10-3535-11
	N.C.-N.O. Control Circuit	1	
34	6-32 x .312 Round Head	3	11-1525
35	Connector	1	25-2217-2
36	Screw	*	11-2582
37	Terminal Plate	3	80-2771
38	Auxiliary Terminal Clamp (Gold)	*	
39	8-32 x .50 Pan Head Sems Screw	6	11-2280
40	Button (White)	1	53-1236
41	Thermal Element	3	10-4057

TERMINAL PLATE POSITIONS

Selection and arrangement see adjacent table.



	TERMINAL PLATES			CONTROL TERMINALS	
POSITION	1	2	3	1	2 or 3
PICTURE					
PART NO.	80-2879	80-2740	80-3433	80-3392	80-2805
MOUNTING SCREW	10-32 ITEM 4 IN PARTS LIST			TERMINAL CLAMP	6-32 ITEM 2 IN PARTS LIST
PART NO.	11-2425			PART NO.	55-1743

TERMINAL PLATE OVERLOAD RELAY	
POSITION	
4, 5, 6	ITEM 37 IN PARTS LIST
PART NO.	80-2771

CONNECTORS CONTACTOR TO OVERLOAD RELAY	
POSITION	PART NO.
A	25-2545
B	25-2544
C	25-2543
MOUNTING SCREWS	
D ITEM 4 IN PARTS LIST	11-2425
E ITEM 39 IN PARTS LIST	11-2280

(Continued from Page 62)

STATIONARY CONTACTS

Note: It is not necessary to disconnect any wiring.

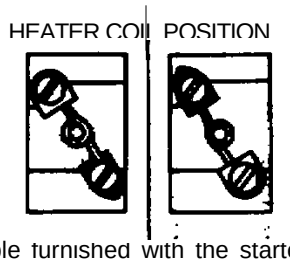
9. Remove the screws securing the stationary contacts
10. Install the new contacts and screws.

Caution: The stationary contacts must be installed so the seat on top of the terminal plates.

A control terminal, when used, (see table page 64) must be mounted on top of the stationary contacts.

EUTECTIC OVERLOAD RELAY

This overload relay has two steps of adjustment (low or high) obtained by POSITIONING THE HEATER COILS as shown In the adjacent illustrations. Note the location of the pointed terminal on the heater coil.



The heater coil selection table furnished with the starter illustrates the proper mounting position. All coils must be mounted in the same position for a giver overload relay.

ELECTRICAL INTERLOCKS

The electrical interlocks are renewable as a complete assembly. See Illustrations and tables below for the various electrical Interlocks.

LUBRICATION

Do not lubricate any pert of this equipment.

Reset and tripped indication

A transparent rectangular window above the reset button provides visual indication.

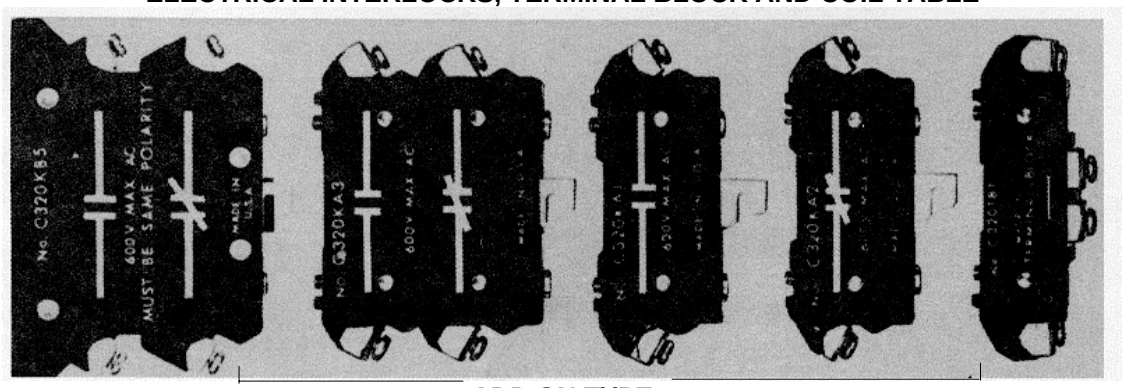
Relay Reset - Dark Window.

Relay Tripped - Light (silver) Window.

Do not disassemble this relay.

The parts called out on page 63 and listed on page 64 are available for repairs. If parts are required other than those listed replace the complete relay.

ELECTRICAL INTERLOCKS, TERMINAL BLOCK AND COIL TABLE



ADD ON TYPE

BASE MOUNTED

Circuit	Catalog No.
1 N.O.	C320KB4
1 N.O. - 1 N.C.	C320KB5

FOR MOUNTING ABOVE BASE MOUNTED INTERLOCK

Circuit	Catalog Number
1 N.O.	C320KA1
1 N.C.	C320KA2
1 N.O. - 1 N.C.	C320KA3

TERMINAL BLOCK

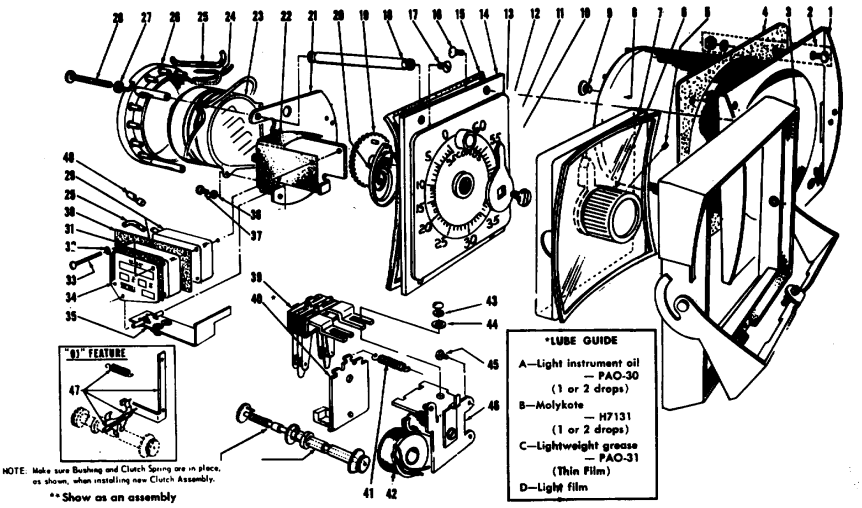
Cat. No.
C320TB1

Operating Coils Selection Table

Volts	Cycles	Part Number	* Suffix Letter	Volts	Cycles	Part Number	* Suffix Letter
120	60	9-1889-1	A	600	60	9-1889-4	D
110	50			550	50		
240	60	9-1889-2	B	208	60	9-1889-13	E
220	50						
480	60	9-1889-3	C	380	50	9-1889-14	L
440	50						

*Suffix letter required only when power unit is ordered.

TIMER
PARTS LIST & LUBE GUIDE



*	REF NO.	PART NO.	DESCRIPTION	NO. REQ'D
	1	HP50-75	Plug-in Case (Black)	1
		HP50-30	Plug-in Case (Gray)	1
	2	0196403	Pkg. (contains 4 ea. Screws, lockwashers, nuts)	1
	3	HP50-74	Bezel (Black) and handle assembly	1
		HP50-18	Bezel (Gray) and handle assembly	1
		HP50-90	Bezel (Squared off Gray) and handle assbly. (model 5)	
	4	PBG-58	Neoprene Gasket for Mtg HP50-30	1
	5	0134520	5-40 x 5/16" Set Screw	1
	6	H-7867	(Black) Knob w/0135420 set screw	1
		PBK-37	(Gray) Knob w/0135420 set screw	1
		PBK-69	Straight sided knob w/spun alum. Cap (model 5)	1
	7	HP50-66	(Gray) Window, knob and pointer assembly	1
		HP50-94	Window, knob and pointer assembly (model 5)	1
		PDM-440	Window Only	
	8	PBG-83	Gasket for Window	1
	9	0123214	Terminal Screw (6-32 x ¼ BHMS)	12
	10	0123210	6-32 x 1/8" BHMS	1
	11	H-8869	Progress Pointer (used with HP50-66)	1
		H-10441	(Progress Pointer (used with HP50-94) (model 5)	1
	12	PFP-50	Neon lamp 120V (enclosed)	1
		PFP-53	Neon lamp 240V (enclosed	1
	13		Dial (see dial chart, page 67.)	
	14	HP50-17	Front Plate Assembly	1
	15	PBG-84	Gasket for bezel	1
	16	0133409	6-32 x 3/8 FHTT	4
	17	0118817	6-32 x 3/16" FHMS (undercut)	4
	18	H-7621	POST	3
A	19	HP50-15	Pointer shaft and gear assembly	1
A	20	PES-28	Reset Spring	1
D				
	21	H-7635	Motor and switch mounting plate	1

*	REF NO.	PART NO.	DESCRIPTION	NO REQ'D
		H-10437	Motor and switch mounting plate (model 5)	1
	22	PZA-79	Switch insulator	1
	23		Motor (see motor chart, page 67.)	
	24	PBW-170	Wire, No. 17 gauge (order per foot)	AR
	25	PET-170	Vinyl Tubing (order per foot)	AR
	26	PHB-7	Plug-in terminal ring	1
	27	0158118	No. 6 lockwasher	6
	28	0116715	6-32 x 1¼ " RHMS	3
	29	PAS-266	Delayed Switch SPDT (enclosed) For Replacement Use HP50-104	2
	30	PZA-80	Switch insulator	1
	31	PZA-81	Switch insulator	1
	32	0157001	No. 2 Shakeproof lockwasher	2
	33	0116021	2-56 x ¾" RHMS	2
	34	PAN-410	Switch Plate	1
B	35	HP50-16	Switch actuator lever assembly w/ two adjusting screws	1
		HP50-89	Switch actuator lever assembly w/ two adjusting screws (model 5)	1
	36	0158110	No. 4 lockwasher	2
	37	0116319	4-40 x ¼" RHMS	2
B	38	HP50-47	Instantaneous Switch Assembly (two SPDT open switches)	1
B	39	HP50-62	Armature Assembly	1
B	40	HP50-46	Clutch Assembly	1
	41	PES-166	Armature return spring (used for "on delay" only)	1
	42	HP50-4	Clutch Coil 120V 50/60 Hz	1
		HP50-22	Clutch Coil 240V 60 Hz	1
		HP50-86	Clutch Coil 240V 50 Hz	1
		HP50-23	Clutch Coil 120V 25 Hz	1
		HP50-24	Clutch Coil 240V 25 Hz	1
		HP50-25	Clutch Coil 24V 50/60 Hz	1
	43	014510	6-32 x ¼" RH Sems	3
	44	0155723	No. 6 Flat Washer	2
	45	0132709	6-32 x 3/8" PHTT	3
	46	HP50-45	Coil Core & Magnet Frame	1
B	47	HP50-352	Parts Kit for Reverse Clutch "01" feature "Off Delay"	1
	48	PAT-146	Terminals	1

TIMER
PARTS LIST

MOTOR CHART (REF. 23)

CODE SYM-BOL	TIME RANGE	120 VOLTS						240 VOLTS						24 VOLTS	
		25 Hz.		50 Hz.		60 Hz.		25 Hz.		50 Hz.		60 Hz.		50-60 Hz.	
17	0-5 sec			PML-30		PML-19				PML-26		PML-20		PML-21	
16	0-7.5 sec					PML-5				N.A.		PML-6		PML-14	
15	0-10 sec			PML-31		PML-7				PML-27		PML-8		PML-15	
14	0-15 sec					PML-9				PML-28		PML-10		PML-16	
0	0-30 sec			PML-32		PML-11				PML-29		PML-12		PML-17	
1	0-60 sec			PMH-63		PMH-63				PMH-64		PMH-64		PMH-65	
2	0-150 sec			PMH-66		PMH-66				PMH-67		PMH-67			
3	0-5 min	PMH-69		PMH-70		PMH-70				PMH-72		PMH-72		PMH-74	
4	0-10 min	PMH-77		PMH-79		PMH-79				PMH-82		PMH-82			
18	0-15 min			PMH-76		PMH-76				PMH-75		PMH-75			
5	0-30 min	PMH-89		PMH-91		PMH-91		PMH-92		PMH-94		PMH-94			
6	0-60 min	PMH-95		PMH-97		PMH-97				PMH-100		PMH-100			
7	0-150 min	PMH-113		PMH-115		PMH-115				PMH-118		PMH-118			
8	0-5 hr	PMH-125		PMH-127		PMH-127				PMH-130		PMH-130			
9	0-10 hr	PMH-131		PMH-133		PMH-133		PMH-134		PMH-136		PMH-136			
10	0-30 hr	PMH-237		PMF-126		PMF-126		PMH-238		PMF-129		PMF-129			
11	0-60 hr			PMF-132		PMF-132				PMF-135		PMF-135			

DIAL CHART (REF. 13)

CODE SYM-BOL	TIME RANGE	MODEL 4 DIALS USED ON GRAY TIMERS				MODEL 5 DIALS	
		25-60 Hz.		50 Hz.		25-60 Hz.	50 Hz.
17	0-5 sec	PAN-488		PAN-489		PAN-719	PAN-745
16	0-7.5 sec						
15	0-10 sec	PAN-492		PAN-493		PAN-728	PAN-742
14	0-15 sec	PAN-494		PAN-495		PAN-723	PAN-740
0	0-30 sec	PAN-496		PAN-497		PAN-731	PAN-737
1	0-60 sec	PAN-498		PAN-499		PAN-725	PAN-734
2	0-150 sec	PAN-500		PAN-501		PAN-748	PAN-710
3	0-5 min	PAN-502		PAN-503		PAN-720	PAN-746
4	0-10 min	PAN-504		PAN-505		PAN-729	PAN-743
18	0-15 min	PAN-506		PAN-507		PAN-724	PAN-741
5	0-30 min	PAN-508		PAN-509		PAN-732	PAN-738
6	0-60 min	PAN-510		PAN-511		PAN-726	PAN-735
7	0-150 min	PAN-512		PAN-513		PAN-749	PAN-722
8	0-5 hr	PAN-514		PAN-515		PAN-721	PAN-747
9	0-10 hr	PAN-516		PAN-517		PAN-730	PAN-744
10	0-30 hr	PAN-518		PAN-519		PAN-733	PAN-739
11	0-60 hr	PAN-520		PAN-521		PAN-727	PAN-736

50 Hz timers use different dial with 1/5 longer range.

NOTE-
RECOMMENDED SPARE PARTS-
1-Motor 1-Clutch coil 1-PAS-266 Switch (Ref. No. 29) (HP50-104 as Replacement)
In ordering list the part number. Also give the complete timer name plate data such as type, voltage frequency, time scale and serial number. This will help us identify parts used on special units. Write to factory for prices on special items not listed.

AC AMMETERS, CURRENT TRANSFORMERS, & ACCESSORIES

AMMETERS:

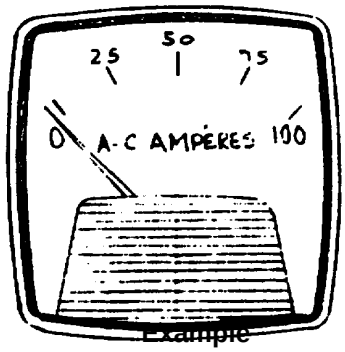
Part No. 183256 - 15 amp scale

Part No. 183257 - 30 amp scale

Part No. 183258 - 100 amp scale

Part No. 183259 - 200 amp scale

NOTE: All ammeters require use of a current transformer; see below.

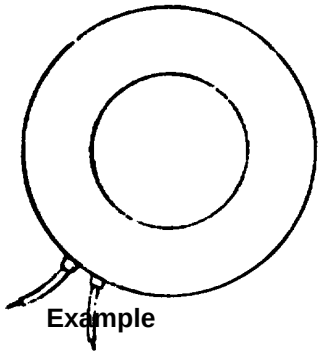


Example

CURRENT TRANSFORMERS:

Part No. 183260 - Ring Type Current Transformer, 30 to 5 amp ratio (used with 183256 & 183257 ammeter)

Part No. 183261 - Ring Type Current Transformer, 200 to 5 amp ratio(used with 183258 & 183259 ammeter)


Example

ACCESSORIES:

Part No. 54189 - Ammeter Housing

Part No. 183966 - Ammeter Cover

Part No. 150371 - Ammeter Nameplate

Four (4) - 1/4 x 1/2" Rd. ad. Machine Screws

Item No.	Qty.	Description	Part No.
1	1	Spool Return Spring	
2	1	Spool	
3	1	Up Seal	
4	1	Gasket, End Cover	
5	2	Mtg. Screws, End Cover (Not Shown)	
6	1	Combo-Gasket, Body	P46184
10	2	Mtg. Screws, Conduit Adapter To Body (Not Shown)	P20074-0100
11	1	Gasket, Solenoid Cover	
15	1	Solenoid Cover Assy	PL3387
19	1	Compression Gasket	
20*	1	Top Seat Assy	
27	1	0 Ring, Coil	
28	1	Plunger Spring	
29*	1	Plunger	
30**	1	Solenoid Coil	See coil spec. list
49	1	Spring Guide Pin	
50	1	Plug-In Receptacle/Leads	P75029
51	1	Side Port Body Assy O	PS5391
52	1	Side & Bottom Port Assy. "2" (Includes 4 pipe plugs, 4 o-ring seals)	PS5392
55	2	Screws, Pilot Head Plate (GG100B) (Not Shown)	P200380040
56	1	Rubber Ball (GG00100B)	P20041-0012
58	1	Solenoid Cover & Lens Assy (GL2008)	PL3692
61**	1	Solenoid Coil with Indicator Lamp (GL200B Specify Voltage)	PL98382

NOTE: Body assy. PS5391 or PS5392 permit easy conversion of original "A" Series GG Valves to current "B" Series GG Valves.

*Item No. 20 and 29 are related wear parts. Both parts should be replaced when servicing valve. Order solenoid service kit PS5387.

**If solenoid coil voltage is not specified, 120 Vac, 60 Hz will be furnished.

MOUNTING:

These 4-way, 2 position ¼" ported valves will operate mounted in any position. Models GG100B and GG200B have tapped side ports, ONLY. They may be in-line mounted and supported by the connecting piping. Or, they may be bolted down to any reasonably flat surface by means of two (2) 3/32" diameter mounting holes provided. Models GG1028 and GG202 are furnished with the tapped side ports plugged and the valve body drilled through to provide o-ring gasketed, bottom porting. Any combination of tapped side and gasketed bottom ports may be used.

Supply line to the Inlet port must be adequate to maintain a *minimum* of 35 PSI in the IN port chamber at all times. If several valves are being operated from a common supply line, this line must be adequately sized to handle the total air flow requirement.

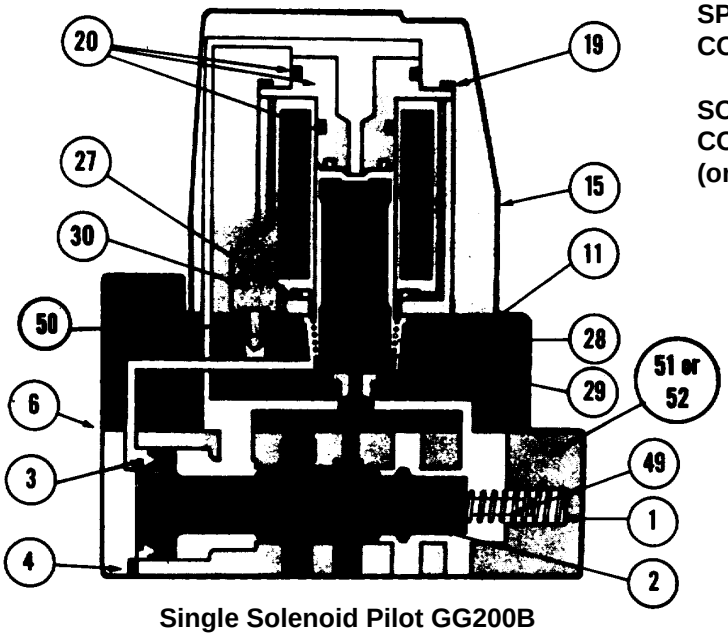
Electrical CAUTION: Coils should be operated within +10/-15% of their nominal rated voltage (7.7 watts, 0.24 amps inrush, 0.12 amps holding on 120 volt/60 cycle). Check voltage rating on each valve body before electrical hookup. Check coil specification list for optional voltages.

AIR LEAKAGE THROUGH VALVE EXH PORT: First be sure leak is in the valve and not across the piston of the cylinder being operated by the valve. This may be checked by disconnecting first one, then the other of the cylinder lines. If leakage is isolated to the valve, Install spool service kit PS5386 and/or solenoid service kit PS5387.

NOTE: Seals on the spool assembly are NOT replaceable. If they are worn or damaged, replace the complete spool assembly (PS5388). Also check condition of molded seats in both ends of solenoid plunger and their mating orifices in the conduit adapter and top seat assemblies; order PS5387 for replacements.

SOLENOID COIL IDENTIFICATION AND SPECIFICATION LIST

PART NO.	60HZAC	50HZAC	DC
P4615401	120V	110V	30V
P4615402	240V	220V	60V
P4615403	480V	440V	120V
P4615404	24V	22V	6V
P4615421	48V	44V	12V
P4615422	96V	88V	24V

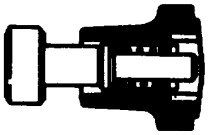


Single Solenoid Pilot GG200B

SPOOL ASSEMBLY SERVICE KIT PS5386
CONSISTS OF ITEMS 1, 2, 3, 4, 5 & 49

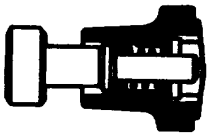
SOLENOID SERVICE KIT PS5387
CONSISTS OF ITEMS I1, 19, 20, 27, 28, 29
(order solenoid coil separately)

PL78668
NON-LOCKING MANUAL
OVERRIDE, FLUSH TYPE

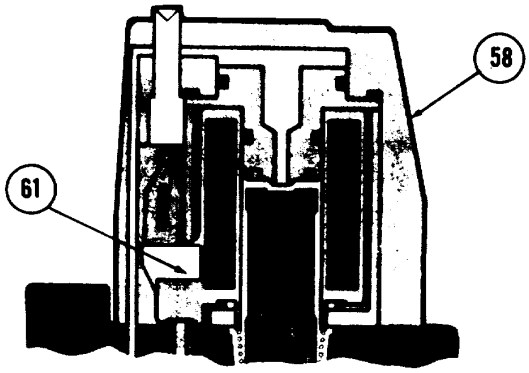


PL78670
NON-LOCKING MANUAL
OVERRIDE, KNOB TYPE

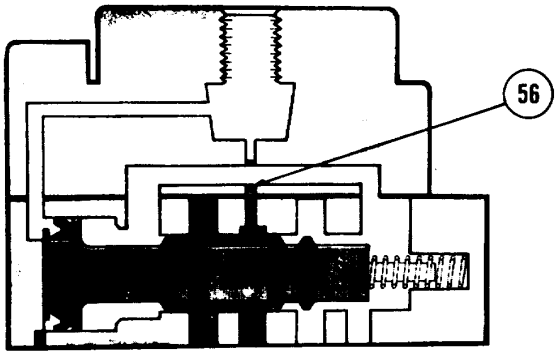
PL78669
LOCKING, MANUAL
OVERRIDE, FLUSH TYPE



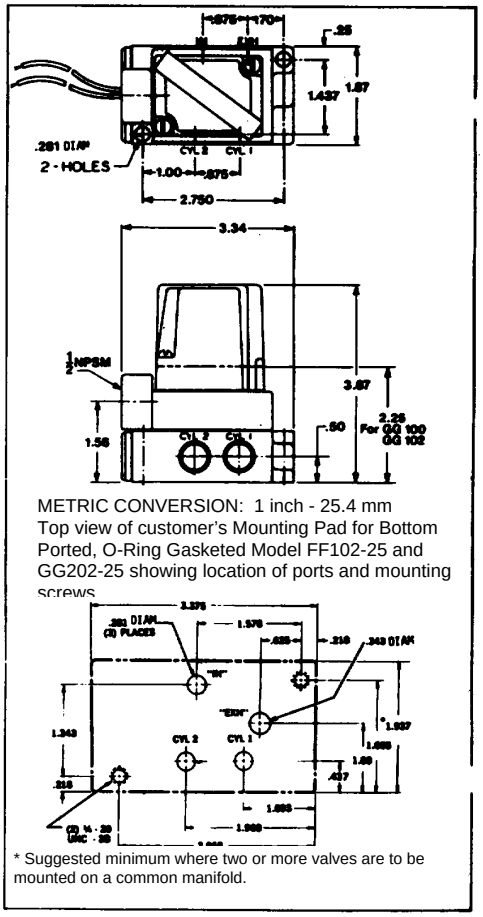
PL78671
LOCKING, MANUAL
OVERRIDE, KNOB TYPE



Solenoid Indicator Light Model GL200B



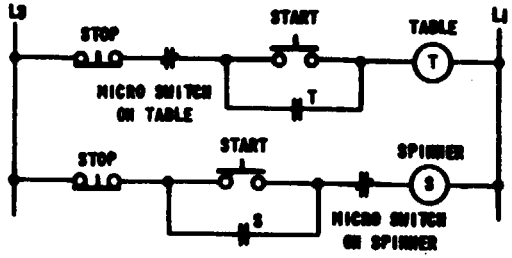
Single Air Operated GG100B



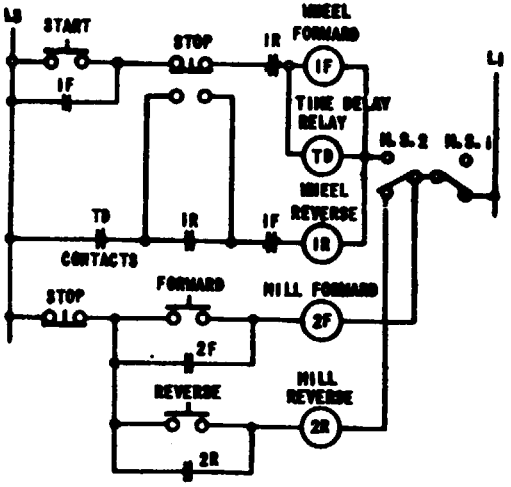
METRIC CONVERSION: 1 inch - 25.4 mm
Top view of customer's Mounting Pad for Bottom Ported, O-Ring Gasketed Model FF102-25 and GG202-25 showing location of ports and mounting screws.

* Suggested minimum where two or more valves are to be mounted on a common manifold.

TYPICAL SIMPLIFIED DIAGRAMS
TABLE AND SPINNER CONTROL CIRCUIT ON TABLAST

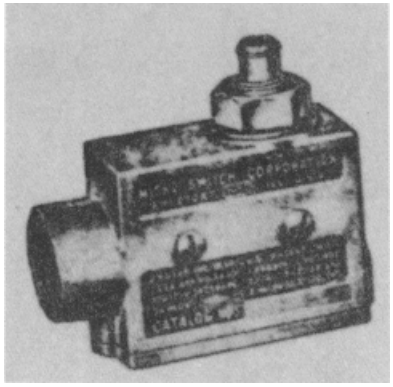


MILL & WHEEL CONTROL CIRCUIT ON TUMBLAST



M.S. 1 - MILL MICRO SWITCH
M.S.2 - DOOR MICRO SWITCH

MICRO SWITCH



Operating Force ..... 9 to 13 oz.
Release Force..... 4 oz., min.
Pretravel..... 0.020 in., max.
Overtravel..... 7/32 in., min.
Movement Differential ..... 0.002 in., max.
Net Weight .....0.52 lbs., max.

Application

1. #2 Multi-Table
2. #3 Multi-Table
3. Tumblasts
4. Special Applications

DESCRIPTION

The Micro-Switch is a precision snap action switch. The particular style which we use is a side mounting design, enclosing in a die cast housing for protection of the switch mechanism. Further protection to the mechanism is provided by the “Q” type plunger which permits an overtravel of 7/32” on the plunger without damage. Further overtraveling of the plunger is prevented by a stop ring on the plunger.

HOW USED

The Micro-Switch is used to protect the motor and driven equipment from damage due to jamming of the Table Drive, on the #2 Table, and of the Table and Spinner Drive on the #3 Table, and of the Mill Drive on Tumblasts. The Micro-Switch is also used as a door safety switch on Tumblasts to prevent operation of the wheel when door is open and to further prevent the mill running in reverse when door is closed. The Switch is factory mounted on a suitable bracket so that the actuator plunger is 1/16” from the bearing pedestals (in case of the #3 Table) and 1/16” from the Table speed reducer, in the case of the #2 Table. A similar distance is held between the actuator plunger and the mill reducer base plate on Tumblasts. When used as a door safety switch on Tumblasts, the switch is operated by a suitable cam on door shaft. A closer setting than approximately 1/16” will result in undue tripping of the drive and over a 1/16” setting fails to provide the proper protection.

Jamming of the drive mechanism usually results in excessive pull which causes deflection of the drive components. It is this deflection which causes the micro-switch to trip, thus removing the equipment from service.

See typical diagrams for more information.

HOW TO SPECIFY

AWECo. Part 76168 - Micro Switch: Metal clad, with normally open and normally closed (three point) contacts, catalog BZE-2RQ.

SD1942

EXHAUST PIPING INSTRUCTIONS

A. General.

An exhaust system shall be constructed with materials recommended and shall be installed in a permanent manner. The interiors of the pipes and fittings shall be smooth and free of any obstructions to minimize the resistance to air flow. The system shall be as free as possible from air leakage either into or out of the system except at points where air is taken into or discharged from the system.

B. Materials.

Galvanized sheet steel shall be used except where corrosive fumes, vapors, high temperature and other elements which will attack galvanized sheet steel are handled. (Where these conditions are encountered, special instructions are necessary.)

The material for various round and rectangular pipes and ducts shall not be less than the following thicknesses:

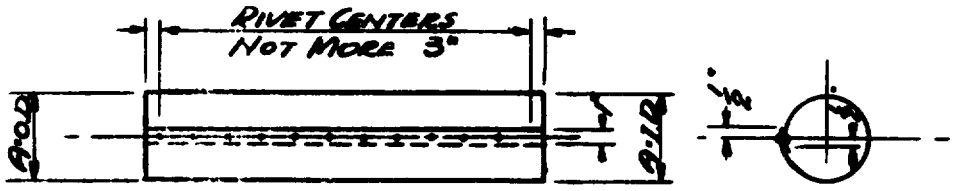
RECOMMENDED GAGE FOR PIPE & ELBOWS

Diameter of Round Pipe Or Greatest Dimension of Rectangular Pipe	Standard Pipe	Elbows
Up to 8" inclusive	20 ga	18 ga
Over 8" to 18" inclusive	18 ga	16 ga
Over 18"t to 30" inclusive	16 ga	14 ga
Over 30"	14 ga	12 ga

C. Pipe Joints.

1. Longitudinal Joints:
   All longitudinal sheet metal pipe Joints or seams shall be lapped and riveted, the rivet centers shall not be more than three inches and the amount of lap and size of rivets shall correspond to the following table:

U. S. Gage No. Sheet Metal	Width of Lap Joint - Inches	Size of Tinner Rivets to be Used
#20 ga	1"	3 lb
#18 ga	1"	5 lb
#16 ga	1"	6 lb
#14 ga	1"	8 lb

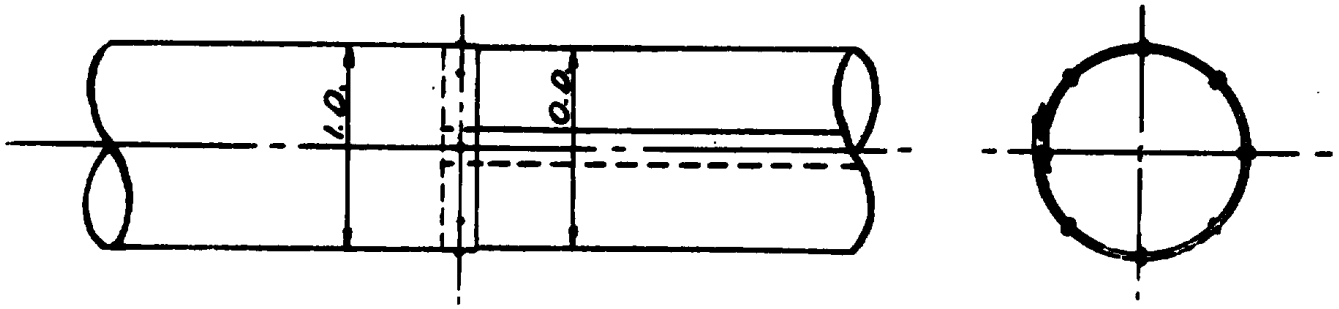


EXHAUST PIPING INSTRUCTIONS - continued

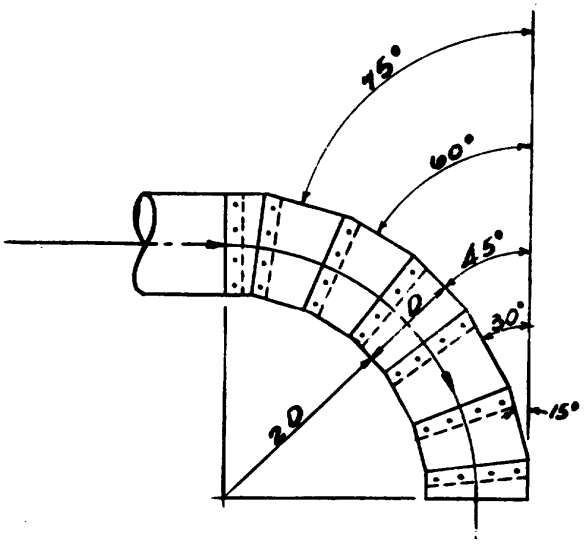
2. Girth Joints:
   All girth Joints of pipe shall be made so the outlet end of one length fits into the inlet end of the next length in the direction of airflow. The minimum lap size of rivets and spacing shall be as per the following table:

Diameter of Pipe	Length of Lap in Girth Joint - Inches	No. of Rivets per Joint
Up to 7" Inclusive	1"	4
Over 7" to 13" inclusive	1"	8
Over 13" to 19" inclusive	1"	12
Over 19" to 25" inclusive	1¼"	16
Over 25" to 32" inclusive	1¼"	20
Over 32" to 37"	1¼"	24
Over 37" to 42"	1¼"	28
Over 42"	1¼"	approx. 4½" centers

U. S. Gage No. Sheet Metal	Size of Tinners Rivets to be Used
20 ga	4 lb
18 ga	6 lb
16 ga	8 lb
14 ga	10 lb



3. Riveted Elbows:
   Elbows of riveted construction shall be constructed with at least the minimum number and size of rivets as required for the corresponding pipe diameter and thickness of sheet steel used. Elbows of seven piece construction or equivalent should be used as shown.

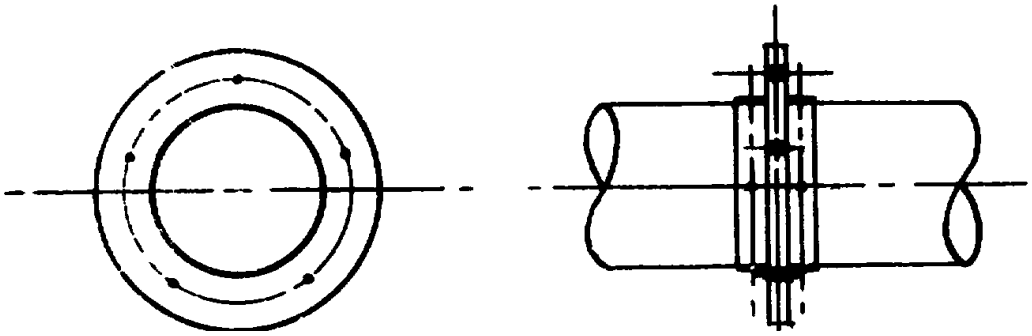


7 PIECE ELBOW

EXAUST PIPING INSTRUCTIONS - cont

4. Flanged Joints. It is permissible to use flanged girth joints for the purpose of removing sections of the piping for cleaning and inspection. Heavy iron or steel ring flanges are used. The joints are securely bolted together against suitable gasket material. The minimum number and size of bolts used in flanges are as follows:

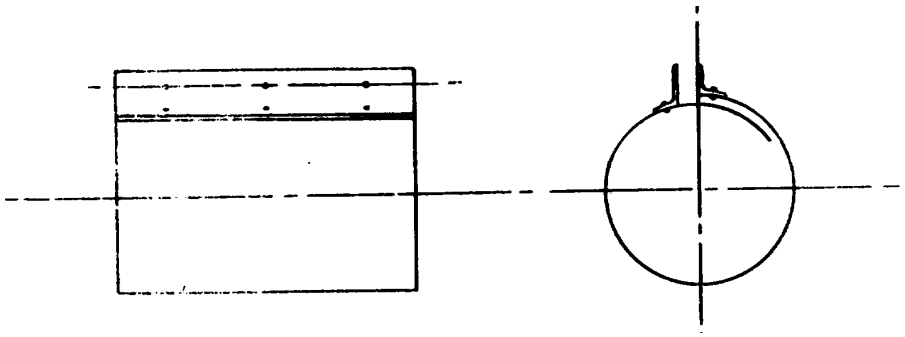
Diameter of Pipe	No. of Bolts in Flange	Size of Bolts
Up to 4" inclusive	4	3/8
Over 4" to 6" inclusive	5	3/8
Over 6" to 8" inclusive	8	3/8
Over 8" to 10" inclusive	8	3/8
Over 10" to 16" inclusive	8	1/2
Over 16" to 26" inclusive	12	1/2
Over 26" to 30" inclusive	16	1/2



5. Fan or Draw Band.

The joint connecting the piping to the dust collection equipment or the airflow producing equipment is a draw band. The band shall be made of similar material and thickness used in pipe. The band shall be securely fitted to prevent air leakage. The joint laps and bolts used shall conform to the following table:

Diameter of Pipe	Girth Lap	Longitudinal Lap	Size of Bolts and Maximum Bolt Centers
Up to 8" inclusive	4"	2"	1/4" bolts 4" centers
Over 8'" to 18" incl	4"	3"	3/8" bolts 5" centers
Over 18"	4"	3"	1/2" bolts 5" centers



6. Soldering:

All galvanized steel piping for exhaust systems operating at a temperature less than 400°F shall have all pipe joints soldered, except it is permissible to use joint cement to prevent air leakage in field joints or connections.

EXHAUST PIPING INSTRUCTIONS - cont

7. Welding:

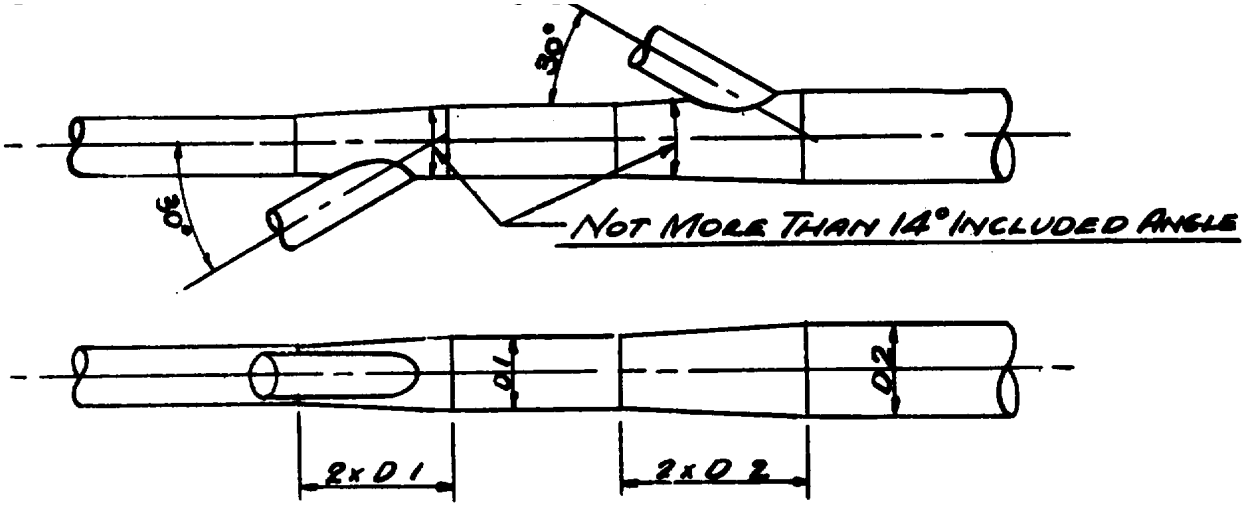
It is permissible to spot weld longitudinal and girth joints of galvanized or black sheet piping providing the welds produce fusion of steel to steel and the number of weld spots correspond to the number of rivets required.

NOTE: Butt welding may be used for pipe joints but is seldom satisfactory for gages of metal less than #16 U.S. gage.

D. Pipe Size.

1. Branch Pipe:
Branch pipe shall not be less in diameter than specified for the particular purpose by the various codes of the American Foundrymen's Association and shall not be less than is required by law.

2. Header Pipe:
The diameter of the header nine at any point shall be as specified.



3. Branch Pipe Entries to the Header Pipe:

Branch pipe shall enter the header pipe at an angle not greater than 45 , measured on the centerlines of the pipes and this angle should be as near 300 or less as practical. Entries shall be made on the sides or top of header pipe and never on the under side, unless the connection can drain by gravity. Not more than one branch pipe shall enter the header at the same point of intersection.

Branch pipe entries shall be made into a transformation piece unless for specific reasons where the branch pipe may enter the header without change of size for means of balancing the system.

4. Transformation Pieces:

Wherever a section of piping of given diameter Joins another larger section, it shall be accomplished by means of a transformation piece, the tapered sides of which are not greater than 140 included angle These pieces shall be made from material not less in thickness than used in the largest straight pipe section adjoining.

EXHAUST PIPING INSTRUCTIONS - cont

5. Fan Inlet Size:

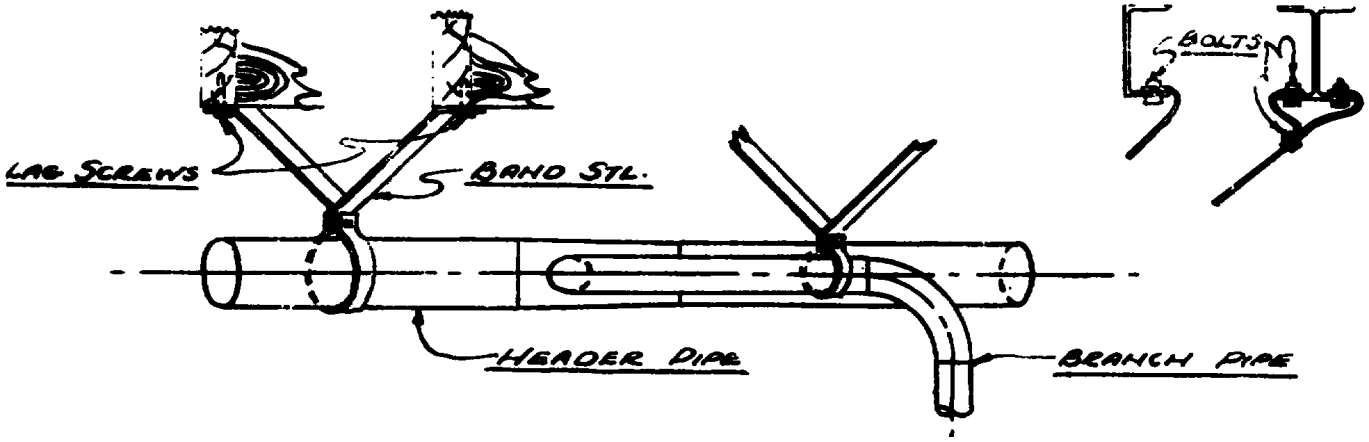
   The size of inlet to the airflow. producing equipment should be approximately the same inside diameter as the inside diameter of the header pipe. However, the inlet to the air flow producing equipment shall as a general rule never be less than the header pipe.

E. Supports for Piping Systems.

1. Horizontal Runs:
   All headers and horizontal runs of piping shell be supported on not over 22 ft centers and fastened securely to some substantial portion of the building structure or other permanent support. The supports should be of V construction and made from band steel not less in size than the band steel surrounding the piping. The size of the band steel clamped to the piping shall be as follows:

Diameter or greatest Dimension of Rectangular Pipe	Size of Band Steel	Size of Connecting Bolts in Pipe Band
Up to 12" inclusive	1 1/4" x 1/8"	1/4"
Over 12" to 20" inclusive	1 1/2" x 3/16"	3/8"
Over 20" to "	2" x 3/16"	1/2"

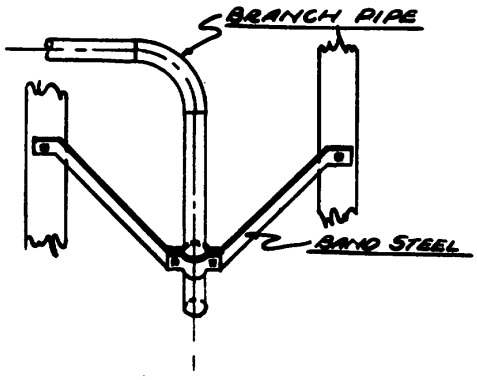
   Each horizontal run of branch pipe extending more than three ft horizontally from the header pipe shall be supported by means of 1" x 3/16" band steel support, preferably of "V" construction and bolted to a 1" x 3/16" band steel around the branch pipe.



2. Branch pipe:

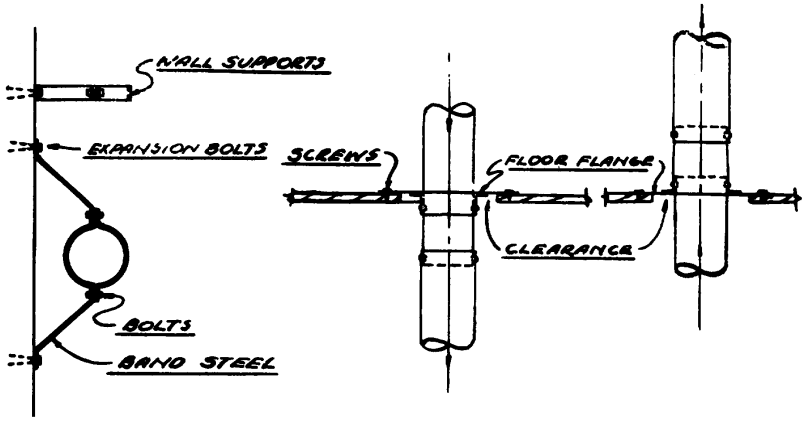
   Branch pipe subject to vibration and movement on account of the equipment being exhausted shall be supported laterally by band steel or rods to prevent displacement.

EXHAUST PIPING INSTRUCTIONS - cont

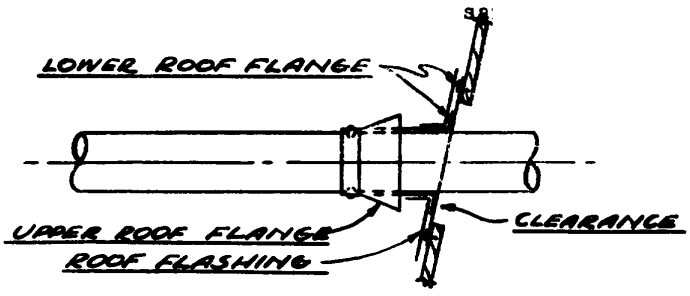


3. Vertical Runs:

   Vertical runs of piping through floors shall be set in flange tips at each floor level. Flange tips shall be securely fastened to floor. The flange tip shall be made from the same kind of material and two gages heavier than the connecting pipes. High vertical runs of piping shall be supported laterally to prevent vibration and displacement.

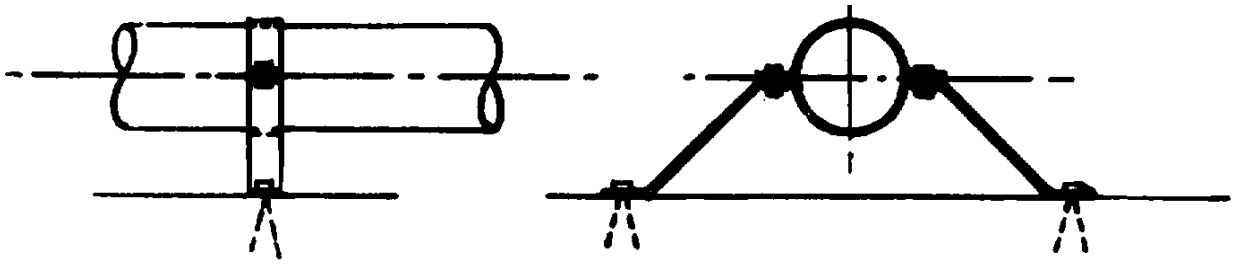


4. Discharge stacks: Discharge stacks from dust collection equipment and exhaust fans shall be securely fastened to the building structure. Flange tips shall be used in the same manner as provided for vertical runs of piping if the discharge stack passes through the floors. Upper and lower roof flanges of the same material and thickness as the stack shall be used at the roof line if the stack passes through the roof.

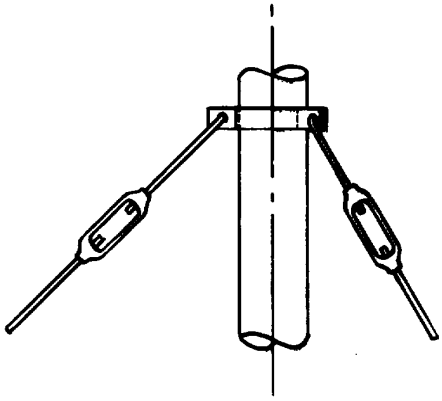


EXHAUST PIPING INSTRUCTIONS - cont

If the stack is located on the outside wall of the structure, it shall be securely strapped to the structure with heavy band steel not less than 2" x 3/16" in size.



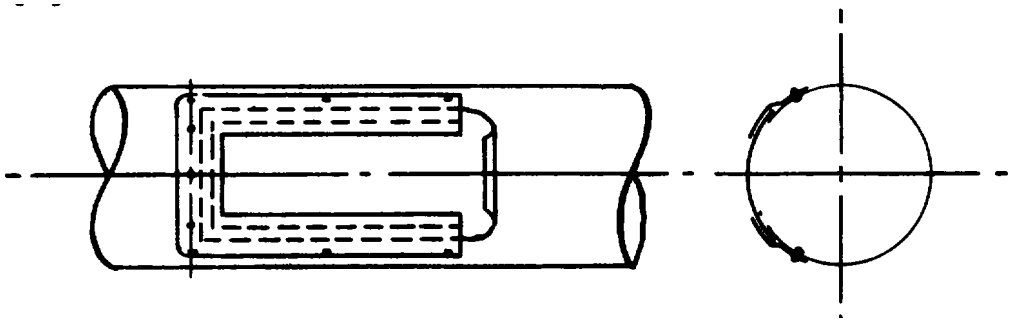
Discharge stacks, located where it is impossible to fasten them to the building structure, shall be guyed to resist wind pressure with heavy galvanized wire or cable provided with galvanized iron turn buckles for adjusting slack. Connect to permanent points of anchor or heavy angle iron braces, made to substitute for the guy wires or cables, providing the braces are permanently attached to a substantial anchorage. The band around the stack for attaching the guy wires or cable braces shall not be less than 2" x 3/16" band steel.



F. <u>Piping Cleanout Facilities.</u>

1. <u>Cleanout Holes:</u>

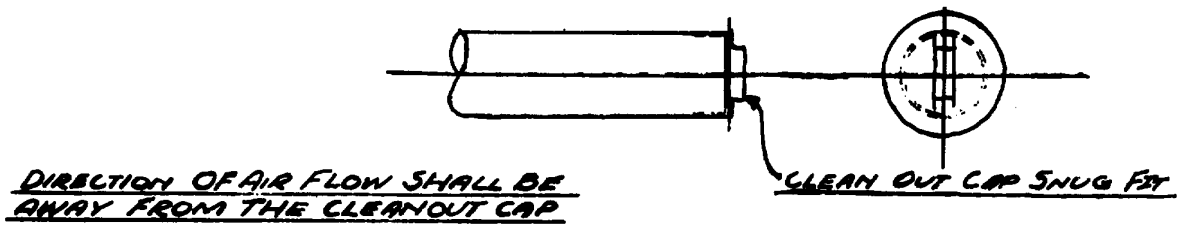
All horizontal runs of piping shall be provided with cleanout and inspection hand holes at approximately every 20 ft. They shall be of a size that will permit ready access to the interior of the pipe. They shall always be located before an elbow going into a vertical run and after an elbow in the horizontal run. Hand holes shall be on the under side of the pipes wherever possible. The holes shall be tightly covered with heavy gage material of the kind used in the pipes, and should be of the sliding type and shall be close fitting. They must not offer any obstruction on the inside of the pipe.



EXHAUST PIPING INSTRUCTIONS - cont

2. Header Caps.

   The ends of header pipe shall terminate in a cleanout and inspection hole. The cap shall fit tightly into the pipe to prevent air leakage.



G. Damper and Gates.

1. Damper or gates shall never be permitted in an exhaust system unless provided for the specific purpose of balancing the system and then permanently fastened against further manipulation. However, they (the gates or dampers) may be used for the specific purpose of Switching the air from one branch system to another, where branches are not intended to be operated simultaneously.
   NOTE: When dampers are used in an exhaust system and one or more dampers are shut off, the system is deprived of the volume of air for which it was designed, resulting in much lower velocities in the headers, causing the dust and dirt to settle in the pipes and plug up the system.

H. Pipe Reinforcements.

Pipe and duct work shall not be reinforced for any reason internally. If reinforcement is necessary, it shall be located on the outside of the piping either longitudinally or about the girth.

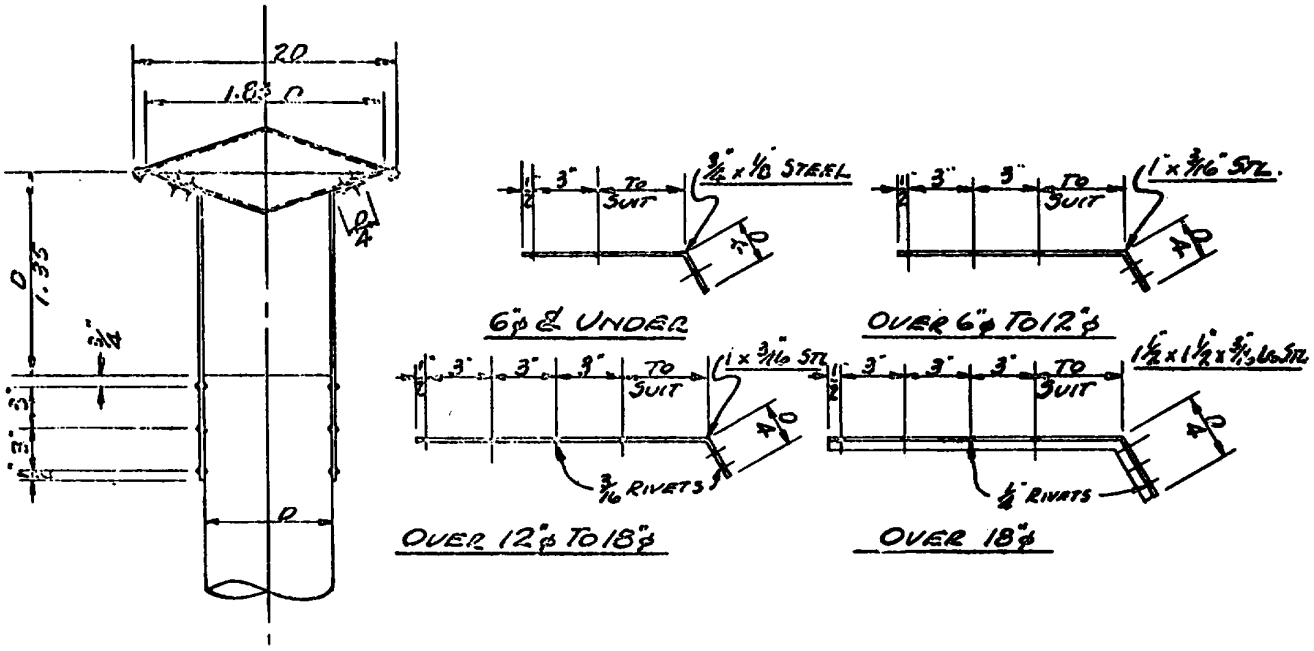
I. Location of Discharge.

All types of exhaust systems discharging out-of-doors shall have the outlet stack at least ten feet above the roof line of any adjacent buildings.

J. Weather Cap.

Stack and vents shall discharge upwards vertically. Weather caps shall be used only on such outlets where it is necessary to protect equipment below from the weather. A resistance pressure of 20% of the velocity pressure shall be added to the total pressure of system when weather caps are used.
Weather caps shall not be used on stacks connected directly to wet collectors or other equipment that will not be damaged from moisture. Where there is a possibility of rain or snow entering the system through the stack outlet, a drain pipe shall be located in the bottom of the fan housing to drain the accumulation of moisture, or a drain may be put in the under side of an elbow. Drain pipes so installed may be water sealed to obtain automatic functioning.

EXHAUST PIPING INSTRUCTIONS - cont 'd.



WEATHER CAP SPECIFICATIONS				
DIA. D.	NO BRACKETS REQ'D	SIZE STEEL REQD.	DIA. OF RIVETS	THICKNESS OF GALV STL. FOR WEATHER CARD U.S. GAUGE NO.
6" & UNDER	3	¾" x 1/8"	3/16" 0	22 GA.
OVER 6" 0				
TO 12" 0	3	1 x 3/16"	3/16" 0	22 GA.
OVER 12" 0 TO 10" 0	4	1 x 3/16"	3/16" 0	20 GA.
OVER 18"	NOT LESS THAN 4 WITH MAX SPACING NOT TO EXCEED 19" AROUND CIRCUM OF STACK.	1½" X 1½" X 3/16" <	¼" 0	18 GA.

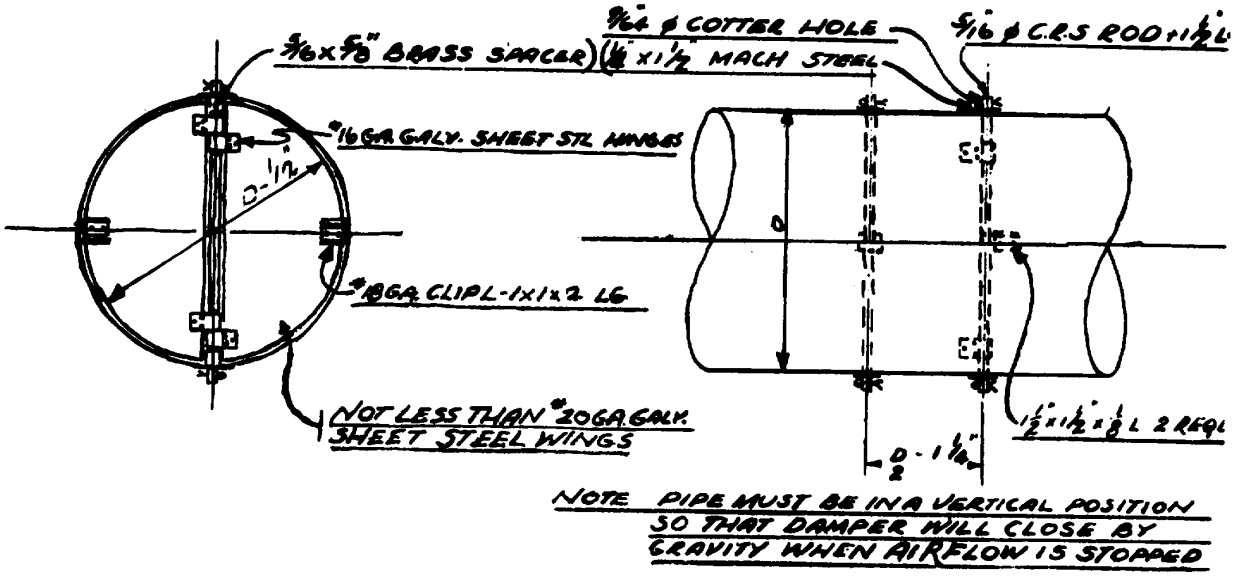
K. <u>Automatic Discharge Stack Dampers.</u>

Automatic dampers may be used in the discharge stack of an exhaust system if it is necessary to prevent cold air from entering the building during the time the system is not in operation. Installation of such dampers should be limited to the larger size stacks.

The dampers shall be automatic in operation so the air or gas created by the air flow producing equipment shall hold the damper open while in operation and they will close of their own weight when there is no air flow.

- continued -

EXHAUST PIPING INSTRUCTIONS - cont.



L. Location of Piping.

1. Location:
   Header pipe should be located above the equipment exhausted whenever possible and supported from ceiling or roof above.

2. Clearance:
   All piping shall be kept at least 6" away from combustible parts of the building structure.

3. Fire Walls:
   Pipe systems should not extend through fire walls unless necessary and in such cases, fusible link pipe shutters shall be provided on each side of the fire wall - preferably of the verticle type described in the code of the National Fire Protection Association on blower systems.

M. Fire and Explosion Hazards.

1. Electrical Ground:
   Any exhaust system handling matter of an explosive nature shall have the piping and other equipment permanently grounded through electrical conductors.

2. Non-Ferrous Construction:
   Exhaust systems handling highly flammable or explosive matter shall have such parts of the system, that are exposed to being hit be metallic objects, made from non-ferrous materials to prevent the possibility of sparks.
   Fan impellers in such installations shall be made entirely of non-ferrous material and in extremely hazardous operation the fan housing shall be constructed of non-ferrous material. in all other respects, the system shall meet the minimum requirements of the code on blower systems prepared by the National Fire Protection assoc.

EXHAUST PIPING INSTRUCTIONS - cont

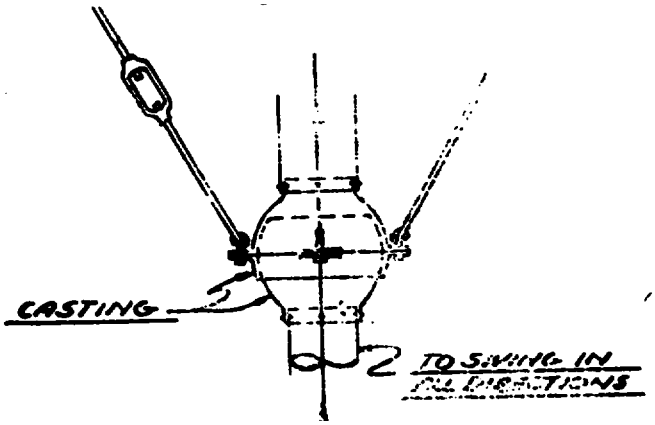
N. Hoods and Enclosures.

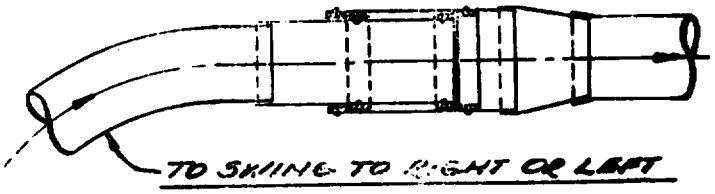
Whenever hoods and enclosures are constructed of sheet metal, the materials used should generally conform to the kind of material specified for the piping. Because the hoods and enclosures will vary in size, shape and construction due to the particular application, no specific rules can be given covering all of the elements of design, but the hoods and enclosures shall be constructed and provided with sufficient reinforcement to make them structurally permanent and all joints shall be tight to prevent air leakage.

O. Flexible Piping and Joints.

1. Flexible Piping:
   If flexible piping connections are required because of adjustable hoods, such as on stationary pedestal grinders, or hoods adjusted to suit operating conditions, such as surface and cutter grinders and certain swing frame grinder applications and the like, the hoods shall be connected to the branch pipes by means of flexible piping of the same internal diameter as the hood outlet and branch of one of the following specifications:
   Rubber tubing with a smooth interior and reinforced with a spiral wire built in as an integral part of the tubing. The wire reinforcement is necessary to prevent the walls of the tubing from collapsing under suction and to retain full inside diameter when the tubing is bent or kinked.
   Electro-galvanized steel flexible metal tubing square locked with heavy asbestos packing for the elimination of air leakage into the exhaust system.
   For handling exhaust gases under pressure as from an engine exhaust or where there is danger of leakage outward around the flexible piping, piping shall be electro-galvanized steel.

2. Flexible Joints:
   a. Swing Joints - if some flexibility is required in a pipe joint to permit the swinging of the hood about the branch pipe, such swinging or roller Joints shall be constructed as per swinging Joint construction shown below. Such joints shall be made as air tight as possible to eliminate excessive leakage.





EXHAUST PIPING INSTRUCTIONS - cont

b. Telescopic Joints - when it is necessary to use a telescopic joint in order to raise the hood out of the way or for vertical adjustment, the pipe connected to the hood shall have an inside diameter equivalent to the hood outlet, and such pipe shall be able to slide inside the connecting pipe, which shall be just large enough for a close, sliding fit. The inside pipe shall extend into the outside pipe at least one pipe diameter but never less than 61 when extended to maximum position.

P. Painting.

All exposed or unprotected sheet metal equipment and structural members shall be painted with paints suitable to prevent rust or corrosion.

NOTE

In the event of conflict between these general instructions and design shown on the certified prints for a specific Job, follow the prints.

EXHAUST PIPING INSTRUCTIONS - cont

Q. Vent Stack.

Piping from blast chamber to baffle type abrasive trap in horizontal line shall be of a heavier gage sheet metal than is used in the standard piping. The gage of metal for the vent stack is as follows:

Diam of Pipe	Vent Stack By AWECO
Up to 8" inclusive	14 ga
8" to 18" inclusive	12 ga
18" to 30" inclusive	10 ga

Pipe directly from blast chamber vent stack to baffle trap shall be:

Diam of Pipe	Pipe	Elbows
Up to 8" incl.	16	14
8" to 18" incl.	14	12
18" to 30" incl.	12	10

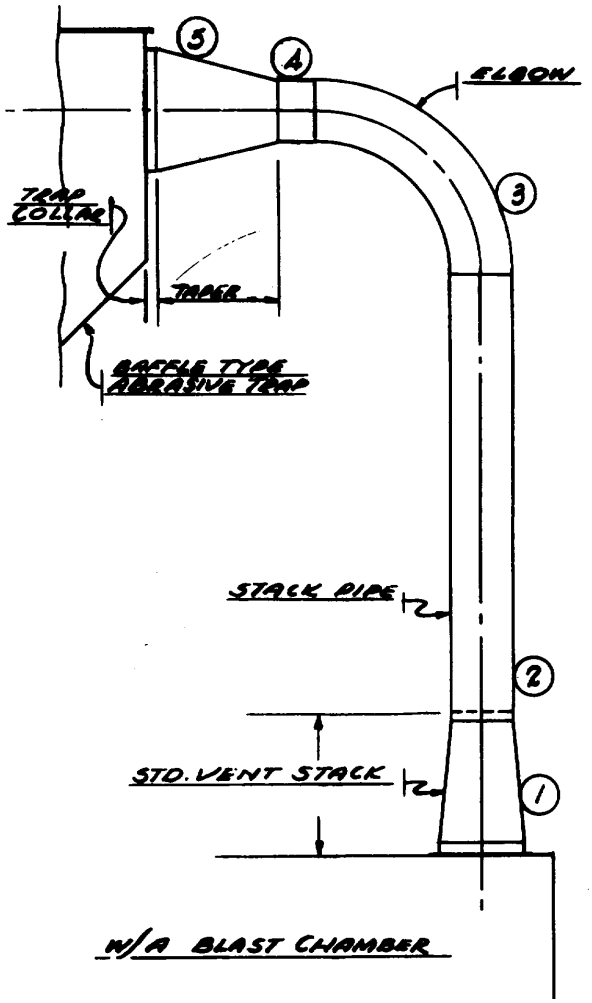
1. Vent stack shall be two times the outlet pipe diameter in height and tapered so the inlet end is equal to two times the pipe area at the outlet end. There shall be a circular opening into blast chamber of machine vented.

2. The pipe from vent stack is standard construction and as noted, is of a heavier gage metal than standard pipe.

3. The elbow from pipe is standard construction and, as noted, is of a heavier gage metal than standard elbow.

4. The pipe from elbow to diverging section of pipe shall be the same as "2".

5. The diverging section of pipe shall be standard construction and the same gage as for the vent stack. It shall also be two times the inlet pipe diameter in length and shall be two times the inlet pipe diameter at the outlet end.

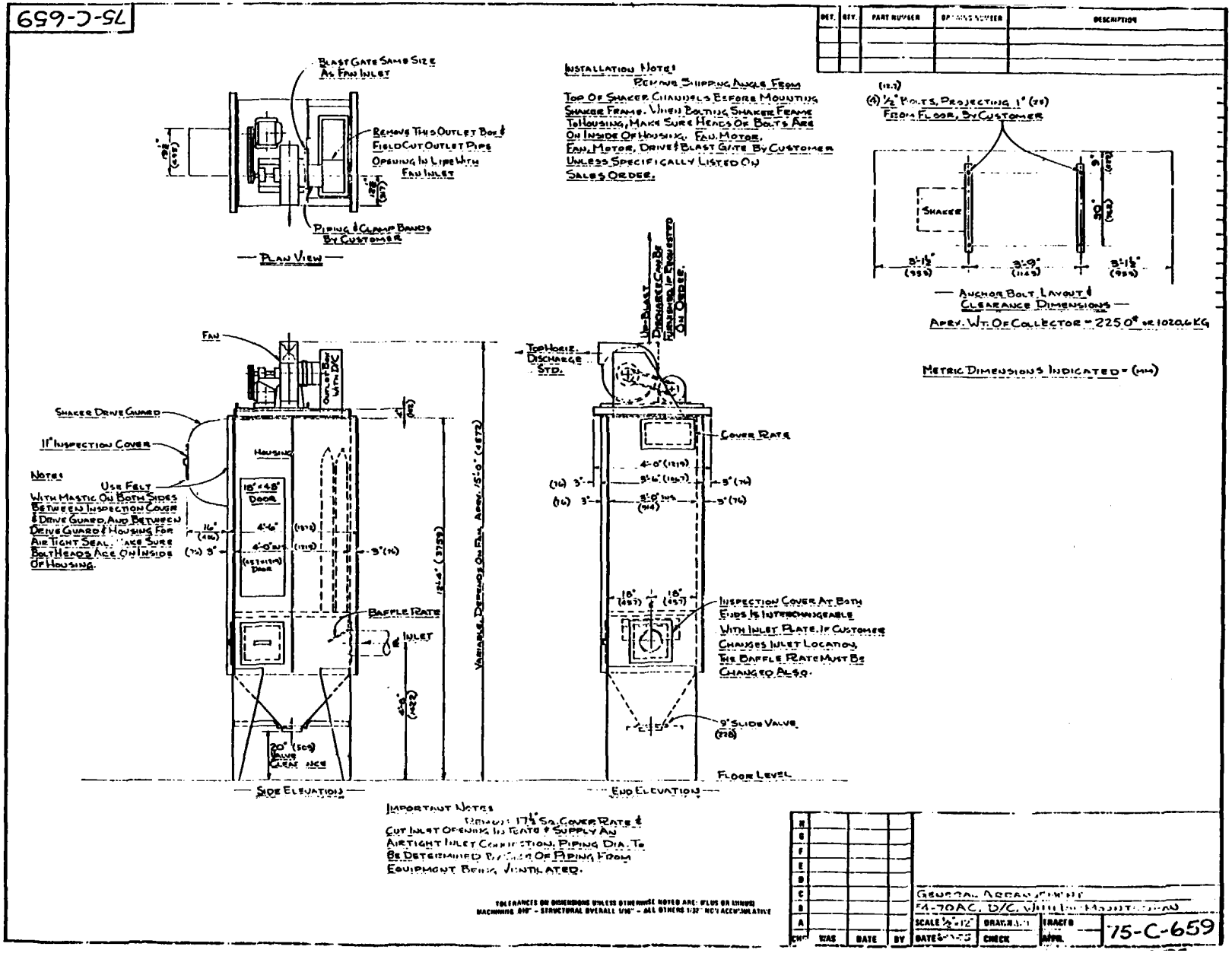


6. The size of the baffle type line trap shall be twice the diameter of the stack pipe.

RECOMMENDED SPARE PARTS LIST

QUANTITY	PART NUMBER	DESCRIPTION
25	**********	DUSTUBES
25	**********	TUBE HOOK
1	**********	SHAKER BAR
1	120343	ECCENTRIC SHAFT ASSEMBLY
4	94894	CHANNEL BEARING
4	95188	CHANNEL BRACKET
2	100073	CHANNEL SPACER
2	94811	SHOULDER BOLTS
2	123663	3/8" - 16" SLOTTED HEX NUTS
4		1/8" x 1" COTTER PIN
25		5/16" - 18" N.C.C.P. HEX NUTS
25		5/16" - 18" SELF-LOCKING NUTS

********** REFER TO SHAKER DRAWINGS FOR THIS PART NUMBER


75-C-659
Blast Gate Same Size As Fan Inlet
Remove This Outlet Box & Field Cut Outlet Pipe Opening In Line With Fan Inlet
Piping & Clamp Bands By Customer
Plan View
Installation Note:
Remove Shipping Angle From Top Of Shaker Channels Before Mounting Shaker Frame. When Bolting Shaker Frame To Housing, Make Sure Heads Of Bolts Are On Inside Of Housing. Fan, Motor, Fan Motor Drive & Blast Gate By Customer Unless Specifically Listed On Sales Order.
(4) ½" Bolts, Projecting 1" (25) From Floor, By Customer
Shaker
Anchor Bolt Layout & Clearance Dimensions
Approx. Wt. Of Collector = 225.0# or 1020.6 KG
Metric Dimensions Indicated = (mm)
Fan
Outlet Box With DC
Shaker Drive Guard
11" Inspection Cover
Notes:
Use Felt With Mastic On Both Sides Between Inspection Cover & Drive Guard, And Between Drive Guard & Housing For Air Tight Seal. Make Sure Bolt Heads Are On Inside Of Housing.
Housing
16" x 48" Door
Baffle Plate
Inlet
20" (508) Drive Guard Here
Variable Depends On Fan Approx. 15'-0" (4572)
Side Elevation
Up-Blast Discharge Can Be Furnished If Requested On Order.
Top Horiz. Discharge Std.
Cover Plate
Inspection Cover At Both Ends Is Interchangeable With Inlet Plate. If Customer Changes Inlet Location The Baffle Plate Must Be Changed Also.
9" Slide Valve (228)
Floor Level
End Elevation
Important Notes
Provide 17½" Sq. Cover Plate & Cut Inlet Opening In Plate & Supply An Airtight Inlet Connection. Piping Dia. To Be Determined By Size Of Piping From Equipment Being Ventilated.
Tolerances On Dimensions Unless Otherwise Noted Are: Plus Or Minus Machining .010" - Structural Overall 1/16" - All Others 1/32" Non Accumulative
General Arrangement
FA-70AC, D/C, Welded Construction
Scale ½" = 1'-0"
Drawn
Check
Date
Approved
Tracing
15-C-659

INSTALLATION & MAINTENANCE INSTRUCTIONS FOR SERIES "A" ASSEMBLED DUSTUBE DUST COLLECTOR

GENERAL:

This dust collector must be properly installed and receive proper attention in order to maintain its highest efficiency. The following instructions and drawings are issued to aid in doing this as well as to provide a reference for ordering repair parts when needed.

FOUNDATION:

The foundation is to be provided by the customer in accordance with the anchor bolt layout as shown on the General Arrangement drawing. If the exhaust fan and motor are installed out of doors, a weather-proof enclosure should be provided for them.

PIPING CONNECTIONS:

Remove the cover plate on the lower portion of the dust collector and cut out the required inlet size in the plate. DO NOT DO ANY CUTTING DIRECTLY ON THE COLLECTOR WITH THE DUSTUBES INSTALLED. The inspection covers at this level are interchangeable with the cover plate, and the inlet may be made at any of these positions. If the inlet is changed, the baffle plate must be moved so that it is centered behind the inlet.

On standard dust collectors there is an outlet cut on the end for clean air piping. If an overmount is furnished, the customer must cut an outlet opening either in the cover plate on the collector roof or in the outlet hood. When an end mount is purchased, customer must remove the cover plate from the transition on the end and cut the outlet.

SHAKER MECHANISM:

The shaker channels are held in place during shipping with a hold-down angle that runs the length of the collector or with steel strapping that runs over the channels and through the cell plates. These parts are to be removed after the collector is in an upright position. If steel strapping is used, it will be necessary to install the bottoms of the Dustubes that have been removed, in the cell plate floor.

In order to facilitate shipment, the eccentric shaft, shaker frame, connecting rod, shaker bar arm, and shaker drive have been assembled to each other, but removed from the dust collector housing. Bolt the shaker frame to the housing using felt with cement on both sides between the connection. Use button head cap screws with the heads inside the collector. Bolt the shaker bar arm to the shaker bar, making sure the connecting rod is adjusted so the shaker channels are level when the eccentric is on dead center. Be sure to tighten both lock nuts on the eccentric bearing. Bolt the shaker drive guard in place, again using felt with cement on both sides in the connection. Inspection and maintenance can be done through the cover plate in the shaker guard, but be sure to replace the plate before operating the collector.

DUSTUBES:

For installation of Dustubes, consult the attached instructions.

WIRING:

Refer to the wiring drawing and bulletins in this manual. Shaker and exhauster motor controls should be wired separately, but an interlock should be provided so that the two motors cannot operate at the same time. Conduit for the shaker motor should be run through the hole in the bottom of the shaker frame, fastening to both sides of the frame with lock nuts.

MANOMETER:

Tap two holes for 1/8" standard pipe on the front or either end of the collector, one just above the cell plate level (clean air side), and the other just below the cell plate level (dirty air side). Screw fittings, #4340, through the wall sheets into 1/8" pipe elbows, with the elbows pointing downward. Run tubing from these connections to the manometer, which is to be fastened to the wall sheet flange with bracket #138874. The manometer may be mounted elsewhere, but additional tubing may be necessary. Fill the manometer according to instructions furnished with it.

INSPECTION & MAINTENANCE

PRELIMINARY INSTRUCTIONS BEFORE OPERATION:

1. Check all Dustubes from the bottom to see that they seal properly.
2. Roll the shaker device over by hand, seeing that no parts are binding and that all bolts are tight.
3. See that all pipes are tightly fastened to the housing and that any pipes or conduits entering the housing are sealed airtight at their entrance.
4. Coat the ends of the shaker pins with #40 motor oil.

INSPECTION AT START OF OPERATION:

1. Check the direction of the fan to be sure it is pulling air through the collector.
2. Watch operation of shaker device for a final check on alinement and adjustment.
3. After the first day's operation, inspect the cell plate floor for dust accumulation. If dust is found, check the Dustubes and cell plate joints in the area.

DAILY INSPECTION:

1. Hoppers should be emptied at least once a day when exhaust fan is not running. Make sure hopper valves are closed after emptying.

2. Shaker device should be operated once or twice daily for about two minutes when exhaust fan is not running. As a general rule, the shaker device should be operated when the manometer shows 1½" to 2" difference in the level of liquid columns.

3. Visually check the rotating equipment and drives for signs of jamming, leakage, broken parts, wear, etc.

GENERAL ATTENTION:

An inspection of the Dustubes takes very little time and will prevent a worn tube from cutting out those adjacent. An accumulation of dust surrounding a tube is evidence of a leak. A leaky tube may be unhooked and rolled down to the cell plate until a new one can be installed, but do not forget to put in a new one.

Inspect the baffle plate behind the-inlet pipe every three months. If neglected, a hole in the plate will allow abrasive dust particles to cut into the Dustubes.

The dust collector housing and ductwork must be protected from physical damage and corrosion. Any sections damaged sufficiently to interfere with air flow or cause air leakage should be repaired or replaced. Protection against corrosion can be provided by periodic painting.

The bearings of the shaker device require no further lubrication. The fan and shaker motors should be lubricated in accordance with plant standards.

NOTE:

If it is necessary to order repair parts, reference to the specific part number will expediate delivery of the correct item.

INSTRUCTIONS FOR INSTALLING DUSTUBES

INSTALLING DUSTUBES ON TUBE HOOKS:

To install a loop-top tube:

Suspend tube from tube hook as illustrated in figure 1. Seams should all be turned one way, and seams hanging straight. Do not install in cell plate before suspending from hook.

To install a strap-type tube:

1. Insert end of strap between horizontal members of tube hook. See figure 2.

2. Fold end of strap over main member of tube hook. See figure 3.

3. Holding strap end with one hand, fold balance of strap (and bag attached) up and over both members of the tube hook as shown in figure 4.
4. After lifting the bag off the hook with one hand, as in figure 4, to approximately the proper height, the bag cuff can be installed in the cell plate. See instructions on page 3.

Fig. 1.
Slip the opening at the top of the tube onto the overhead tube hook.

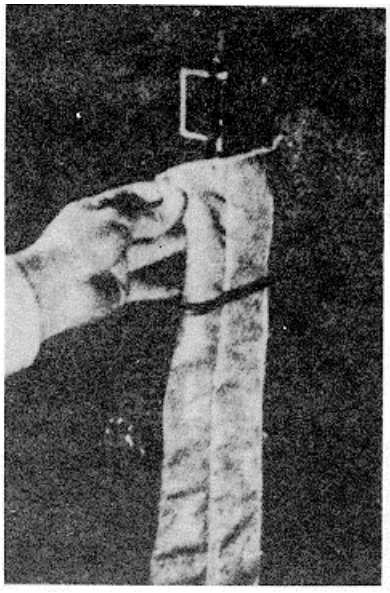


Fig. 2.
Slip strap through horizontal members of tube hook.

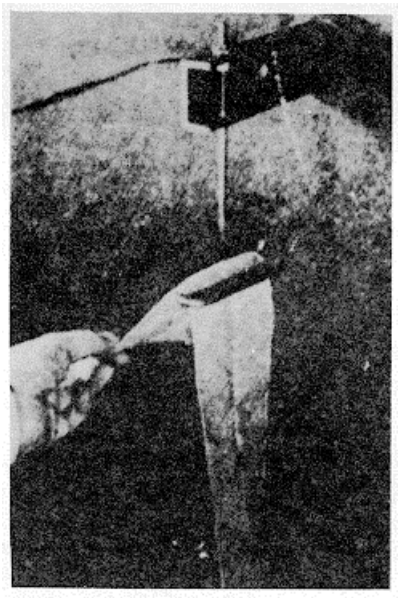


Fig. 3.
Fold strap over bar directly under threaded spindle.

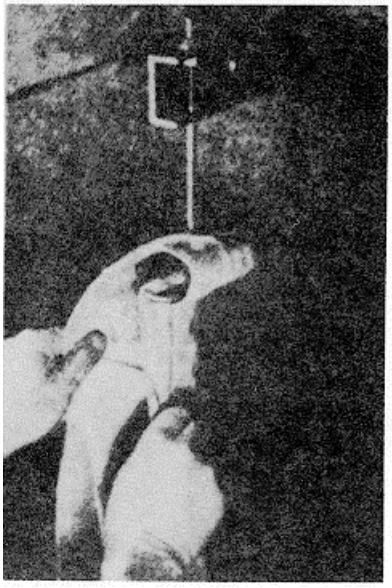


Fig. 4.
Bring bag over both horizontal members of tube hook.

5. Wrap the strap end around the shank of the tube hook and secure with a bag tie.* See figures 5, 6 and 7. Bag tie should be just above upper horizontal member of bag hook. Twist the bag tie tight enough to pinch strap end and shank of hook together.

* This is not to be done until bag has been properly seated in the cell plate and proper slack setting has been made.

Bag ties are not supplied with cotton sateen tubes, and are not normally required.

Fig. 5.
Wrap strap around tube hook and secure with bag tie.

Fig. 6.
Strap secured with bag tie. Note strap below tube hook.

Fig. 7.
Fold strap over and secure as shown if strap is drawn up to hook.

INCORRECT Procedure:

1. Strap end folded over wrong hook member as in figure 8. See correct wrap in figure 9.

2. Excess strap not fastened with bag tie. Bag is apt to slip or fall down.

3. Bag tie not twisted enough to pinch strap and hook together. Bag is apt to slit (or even fall down) especially if bag tie is placed far above horizontal member of hook.

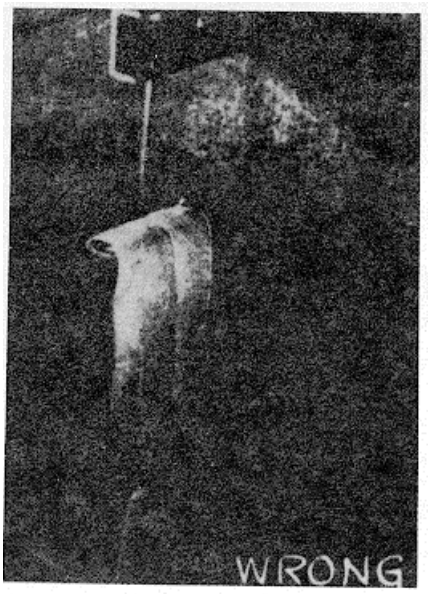


Fig. 8.
Bag hanging from offset horizontal bar of hook.

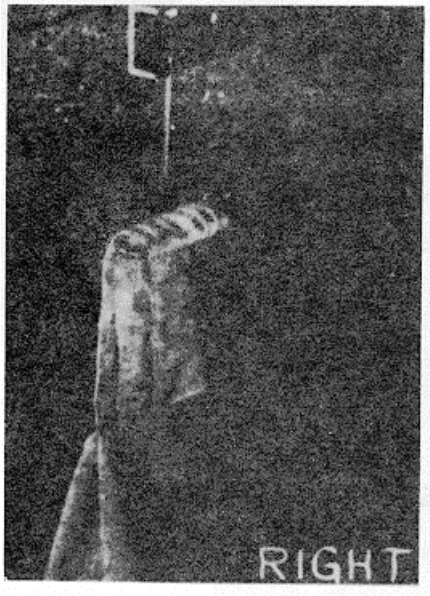


Fig. 9.
Bag hanging correctly from horizontal bar directly under threaded spindle.

4. Bag tie twisted too tight. Bag tie is likely to twist in two, or it is possible to 'cut" into certain fabrics by improper handling of the bag tie.

INSTALLING DUSTUBES IN CELL PLATE:

1. Collapse the bottom spring into a 'U' shape, as illustrated in figure 10.

2. Insert the spring through the top of the cell plate hole as in figure 11.
3. With one hand see that the bottom of the spring is flush with the bottom of the flange. Release the spring slowly, and allow it to snap into place. See figure 12. Spring may require a finger pressure to snap into place for proper seating. In most cases there is an audible snap when spring is properly seated.

Fig. 10.
Grasp spring at bottom of tube, folding together the two sides.

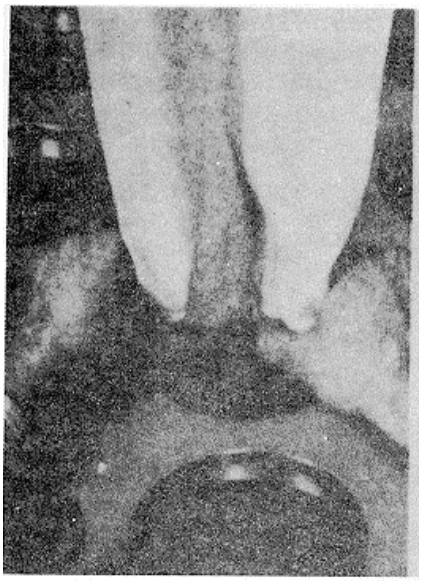


Fig. 11.
Insert folded tube into cell plate opening.

Fig. 12.
Spring will snap open when guided into position making a tight seal.

Fig. 13.
Tube spring must not project beyond the flange.

4. Check to see that the spring does not project beyond the bottom of the flange in figures 13, 14 and 15.

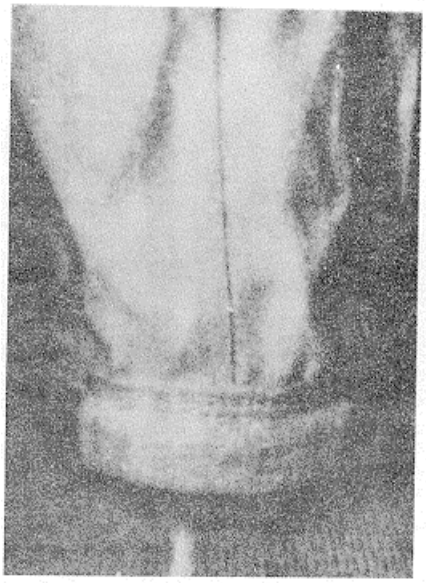


Fig. 14.
Side View of Dustube properly installed in cell plate.

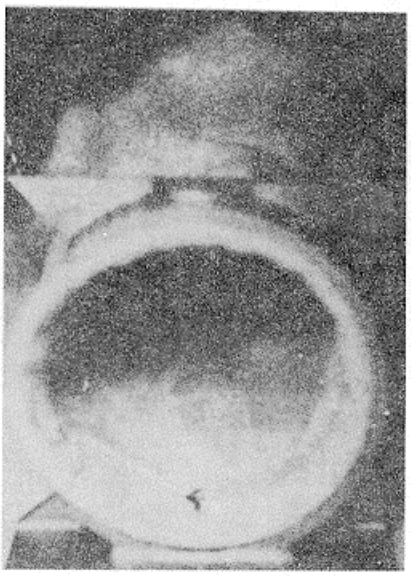


Fig. 15.
Bottom View of Dustube properly installed in cell plate.

5. Check for proper dustube suspension. The recommended dustube setting at installation is indicated in the following chart. Measure along the seam side.

Length of Tube	5" Dustubes Tension	Slack Allowed
70"	2-3 lb.	*Zero slack
90"	3	Zero slack
112"	4	Zero slack
126"	5	Zero slack
168"	7	Zero slack
	8" Dustubes	
210"	10 lb.	Zero slack

*Zero Slack is a subjective specification. It is a condition reached when a bag (with cuff already installed in the cell plate) is lifted by the top without undue force or stretch until the upright and the portion of the bag within 6" of the cell plate is fairly free from folds or wrinkles.

An objective specification is the use of a Spring Scale to "lift" a few bags to the prescribed tension in order to judge the desired condition. The recommended tensions are for clean dustubes, any fabric.

If tube is accidentally too taut, see figure 16, which illustrates how it is possible to lower bag. The thumb and forefinger can be used to pull the other end of the strap backward through the assembly, and when released, a tug on the bag will take out the slack in the strap.

To adjust tension of a loop-top tube, loosen both nuts on the tube hook and raise or lower the hook position on the shaker channel to get the desired slack, and tighten the nuts again. Do not use too much force when tightening the nuts.

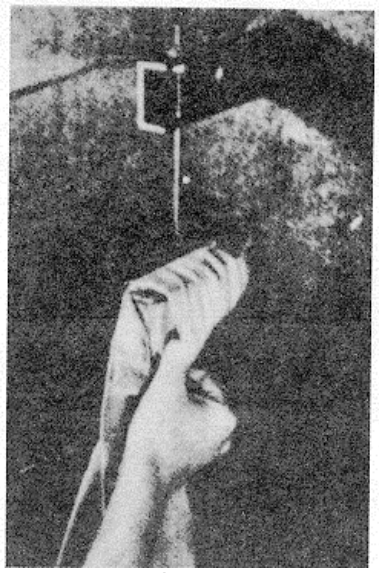


Fig. 16.
Pulling strap backward to lower bag.

INCORRECT: Any of the following conditions indicate improper installation.

1. Bag tops suspended with seams turned every which way. Bags hung on crooked or bent hooks. Bags hanging in a twist.

Fig. 17.
Improperly installed Dustube. Note “rolled” cuff.

Fig. 18.
Note "rolled" cuff and the restriction it causes.

2. "Rolled" cuffs (see figures 17 and 18). Restricts bag opening.

Fig. 19.
Dustube not flush with cell plate flange.

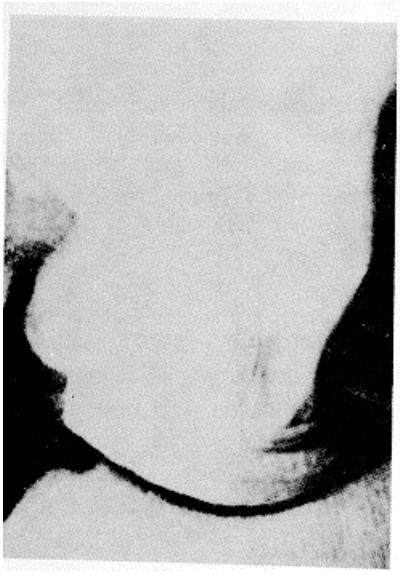


Fig. 20.
Dustube “cocked” in cell plate.

3. Protruding cuff, either above or below cell plate (see figure 19). Bag apt to pop out, or leak dust.

4. Bag cuff "cocked" at an angle (see figure 20). Bag is likely to pop out, or leak dust.

Fig. 21.
Dustube ring not fully expanded.

Fig. 22.
Dustube with too much slack.

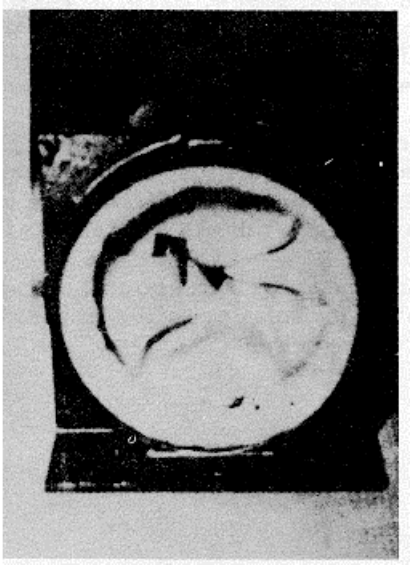


Fig. 23.
Dustube too slack. Note restriction. Dustube may fill completely.

5. Snap ring not fully expanded (see figure 21). Bag will leak dust, and may come out of cell plate. Some tight rings may he forced to fit by pounding, but chances are the ring will be bent beyond repair.

6. Bag too slack (see figure 22 and 23). Bag will not shake out properly. Bag may fill up completely with dust.

7. Bag too tight (taut, without recommended slack). Extreme loads on fabric, hook, and shaker mechanism. May cause early mechanical failures.

8. On strap-top bags only, strap improperly threaded (bag hanging from wrong bar of hook) or loose end of strap not properly secured. May result in fallen bag or cloth wear.

GENERAL INFORMATION ON DUSTUBES

INSTALLATION AND REMOVAL:

When an inside shaker device is used, the tubes next to the shaker device should be turned at a 45° angle to secure proper operative clearance. Care should be used to keep the vertical seams of the tubes straight and not twisted.

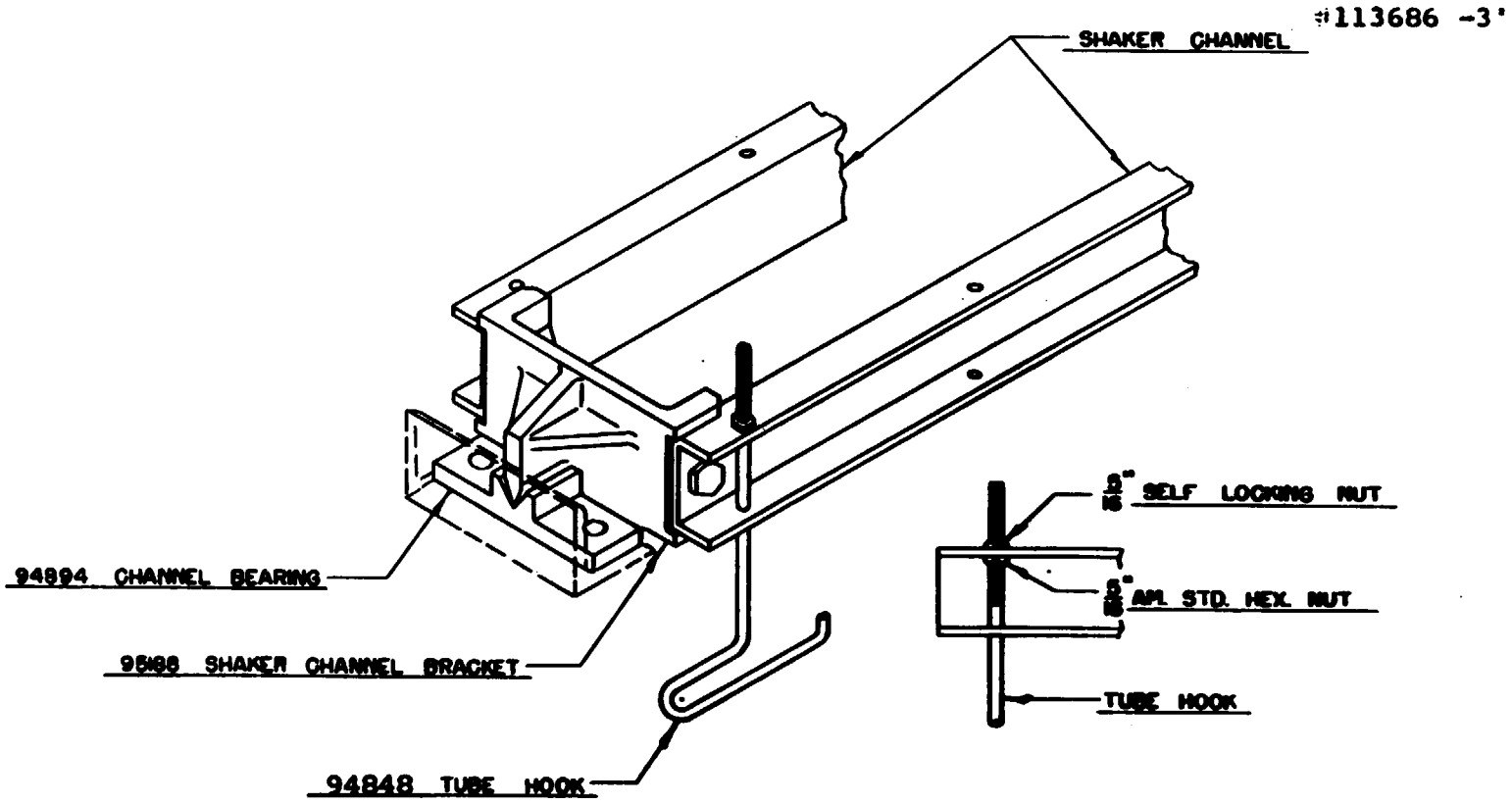
A tube improperly installed makes the entire installation ineffective; defeats the purpose of the collector. It is not enough to "stuff" the tube into a cell hole in a haphazard manner, or try to pull the expanded spring upward into a cell hole. (This is permissible only to straighten a tube after being installed).

To remove bound tubes, carefully slip a small screw driver between the cell hole and the spring from the bottom of tube and pry in on the spring. A properly installed DUSTUBE will be seated perfectly in the cell hole as described, with the vertical seam straight, and not twisted between tube hook and cell hole.

When removing and installing DUSTUBES, use extreme caution to avoid damage to the tubes and spring rings. Any leakage at the bottom, caused by improper installation, will affect both DUSTUBE life and collector efficiency. An accumulation of dust surrounding a tube is evidence of a leak.

No paint or other coating should be applied to the sides of the cell plate holes, and any accumulation of deposited material should be removed when new DUSTUBES are installed.

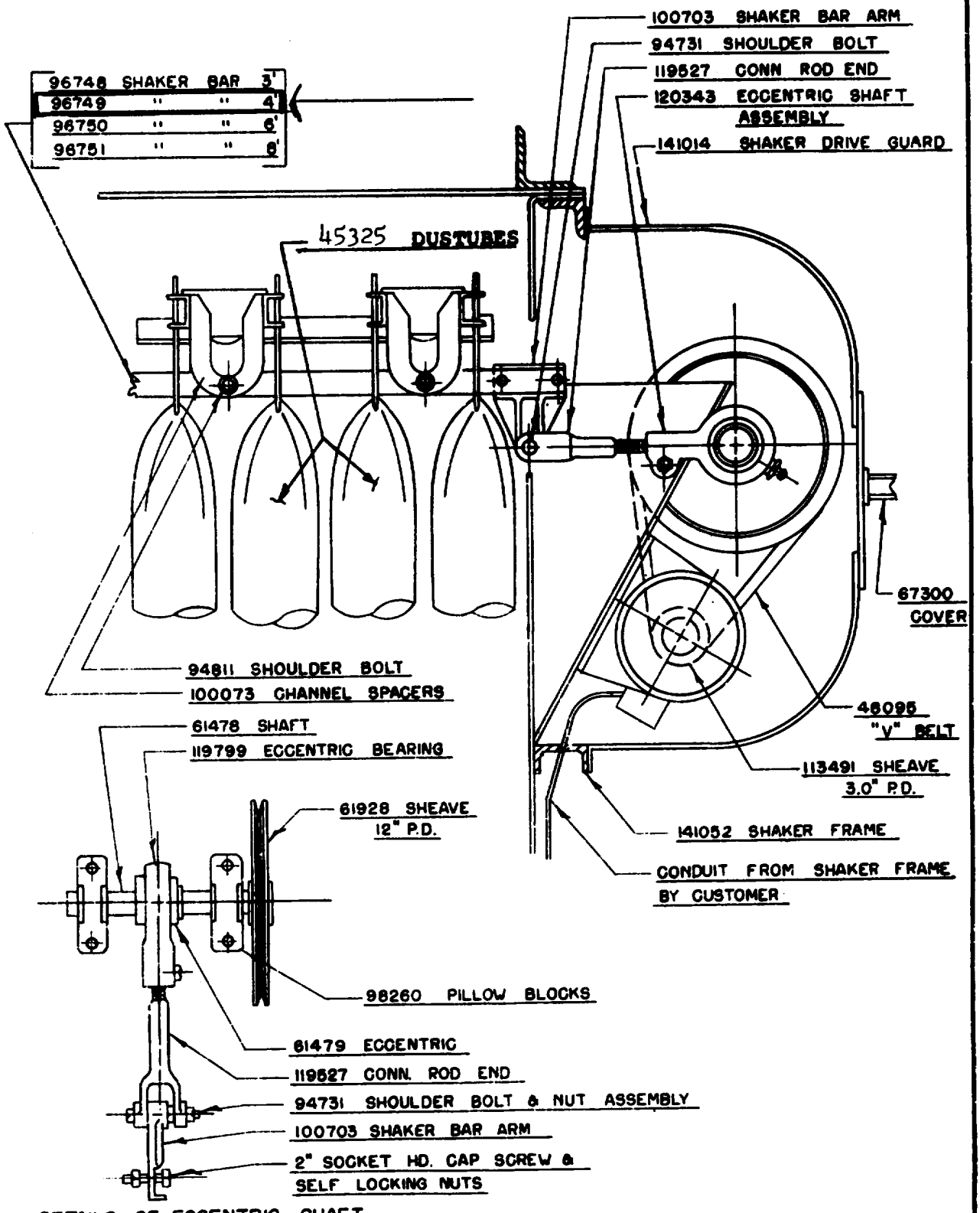
DUSTUBE COLLEOTOR DETAIL OF SHAKER CHANNEL



R.D.M. 4-20-54

S.D. 2591

NO 4 MODEL 70-AC ASSEM DUST COLLECTOR

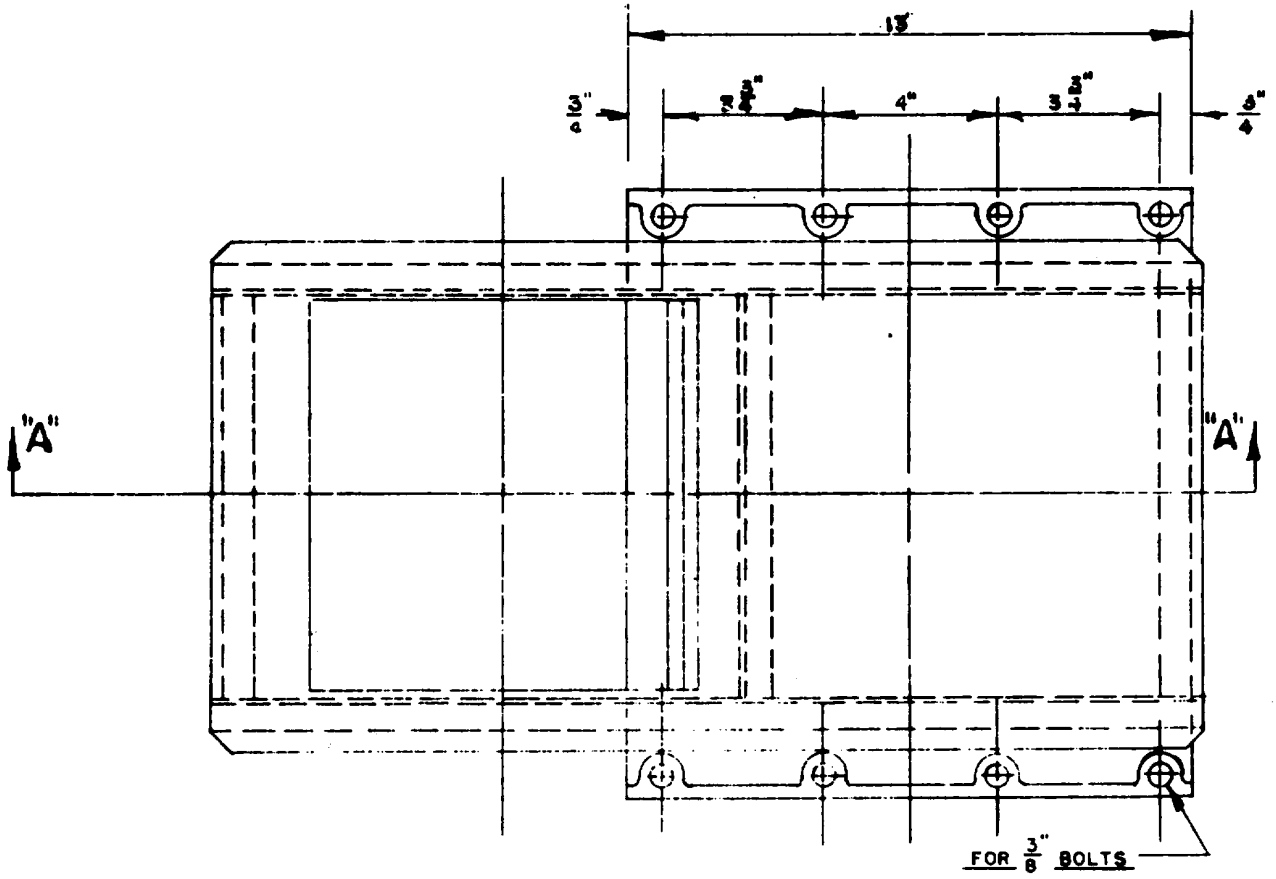


DETAILS OF ECCENTRIC SHAFT ASSEMBLY

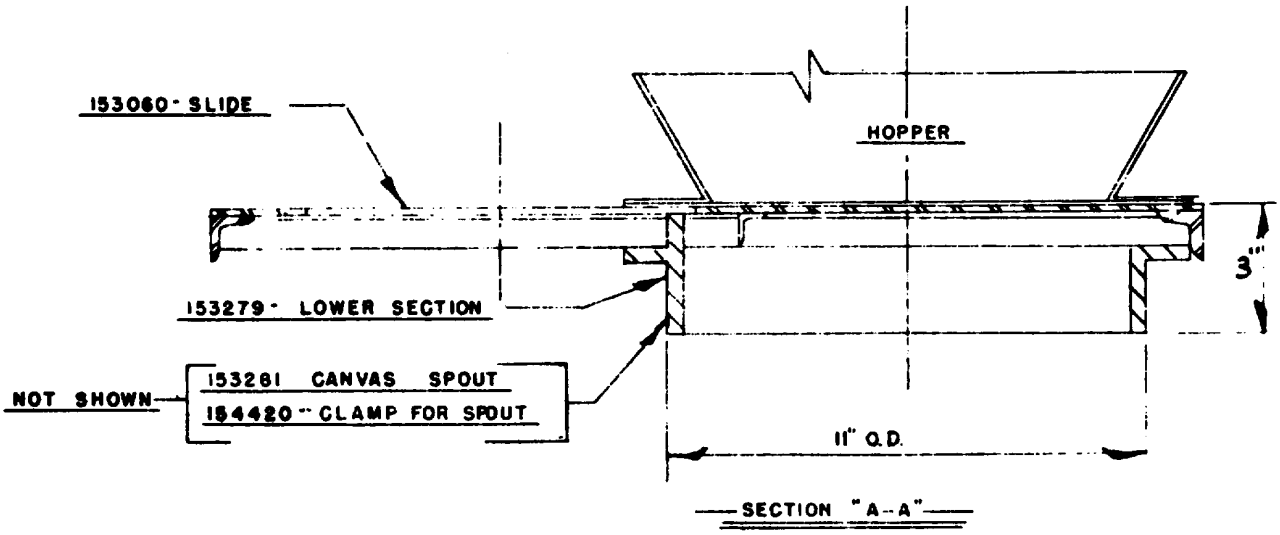
R.C.M. 4-21-54

S.D. 2594

HOPPER SLIDE VALVE FOR DUST COLLECTOR



PLAN OF HOPPER VALVE

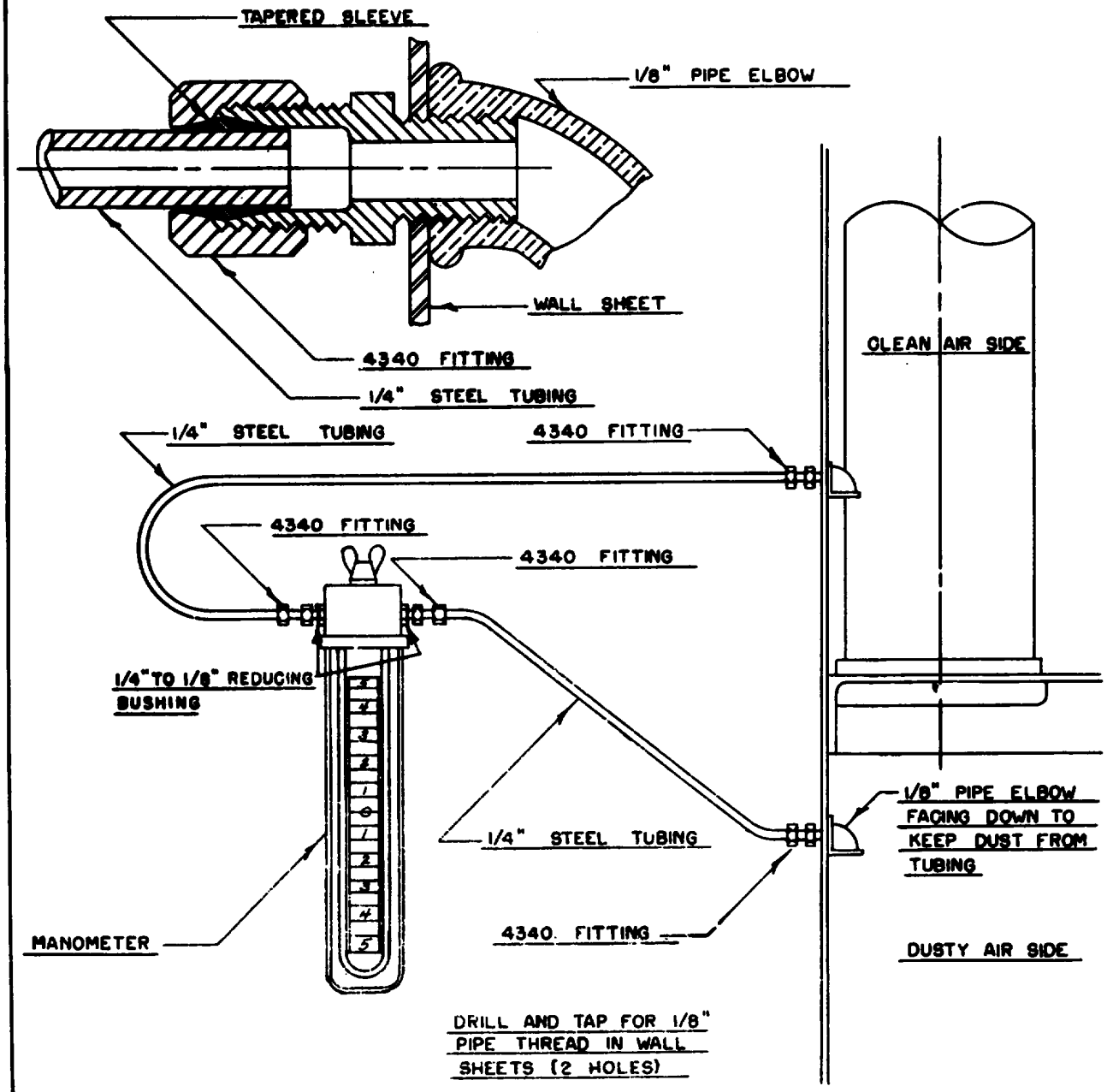


SECTION "A-A"

1-9-58 D.A.H.

SD 2864

INSTALLATION OF MANOMETER & FITTINGS FOR DUSTUBE COLLECTOR



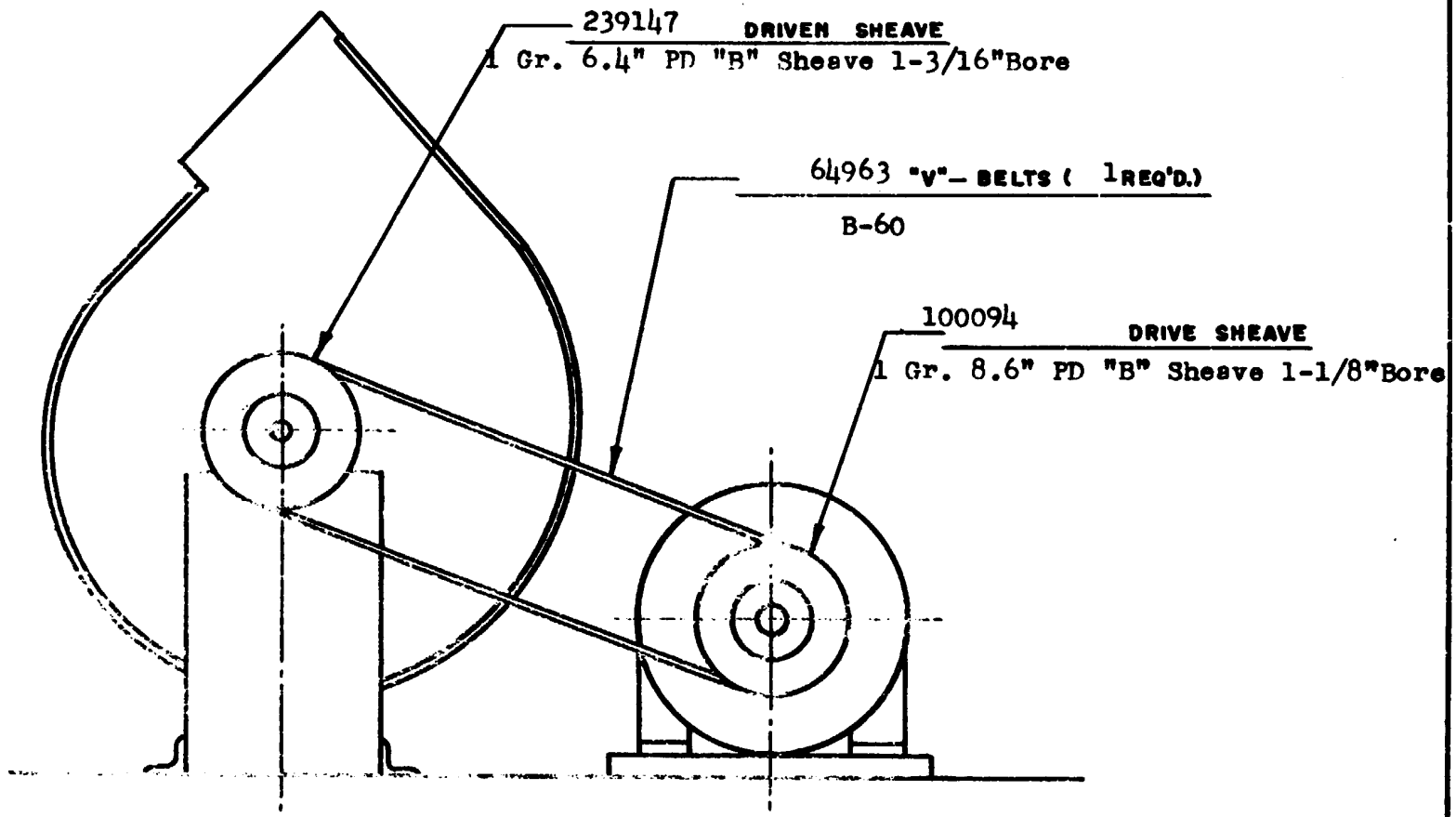
NOTE:
FOR ASSEMBLED COLLECTORS FASTEN MANOMETER TO WALL SHEET FLANGE WITH BRACKET NO. 138674

FOR K.D. COLLECTOR MANOMETER MAY BE MOUNTED ON COLLECTOR SUPPORT POST OR MAY BE MOUNTED ON COLLECTOR ELECTRICAL EQUIPMENT PANEL.

R.D.M. 4-22-54

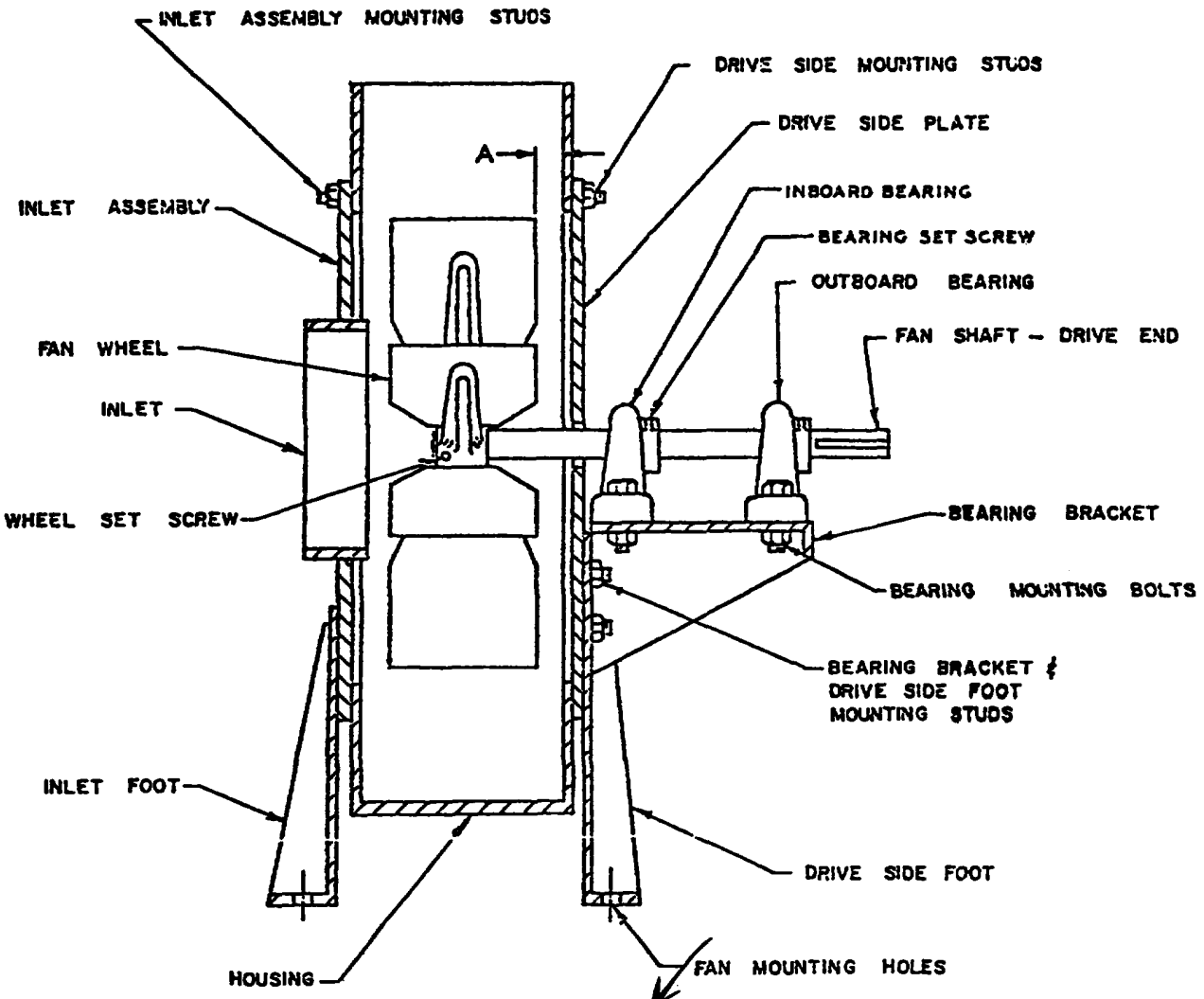
S.D. 2593

NOTE
THIS DRAWING IS FOR "V" BELT DRIVE ONLY.
DO NOT USE FOR FAN ARRANGEMENT.



DRG. SO 2074

EXHAUST FAN DRIVE PARTS



FAN SIZE	8	9	11	13	15
WHEEL CLEARANCE "A"	1/4	1/4	1/4	5/16	5/16

(1) WHEN ORDERING PART FOR FAN, PLEASE GIVE NAME OF PART, SERIAL NUMBER OF FAN, SIZE, TYPE AND ROTATION

(2) SERIAL NUMBER IS STAMPED ON END OF SHAFT, HUB OF WHEEL, AND NAME PLATE

(3) ROTATION OF WHEEL IS DESIGNATED AS CLOCKWISE OR COUNTERCLOCKWISE WHEN VIEWING FAN FROM DRIVE END OF SHAFT

DATE | FORM NO. 281

FAN ROTATION SHEET

SERIAL # A-130876

D/C SIZE 4-70 A/C

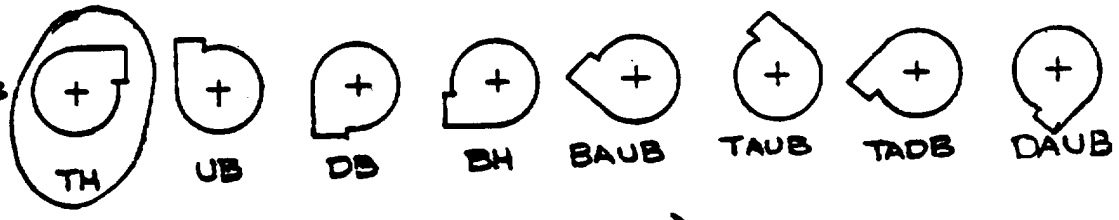
FAN SERIAL # 100795

SIZE 9

ROTATION IS CLOCKWISE (CIRCLE ONE, VIEWED FROM SHAFT END)

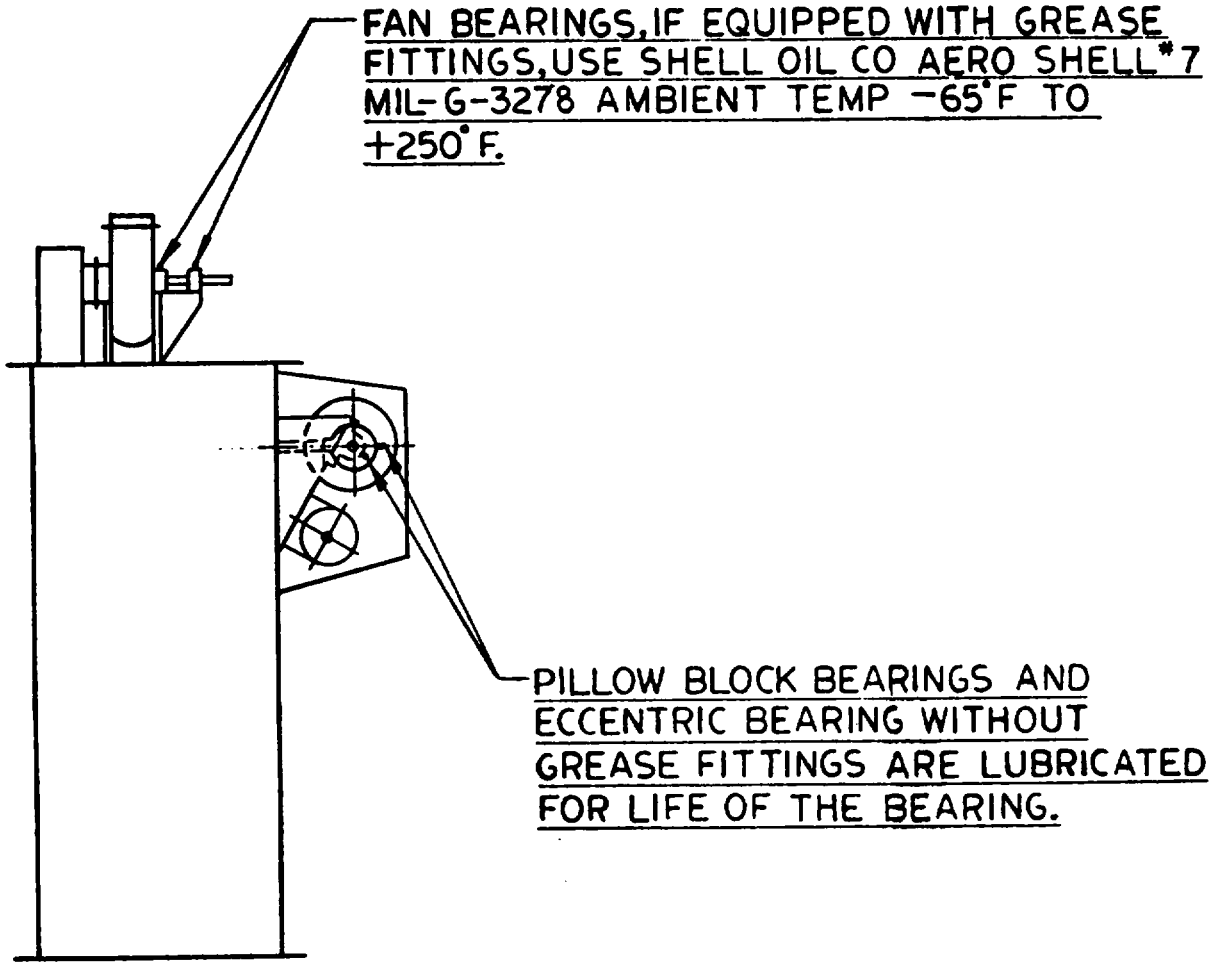
COUNTERCLOCKWISE

DISCHARGE



(CIRCLE ONE)

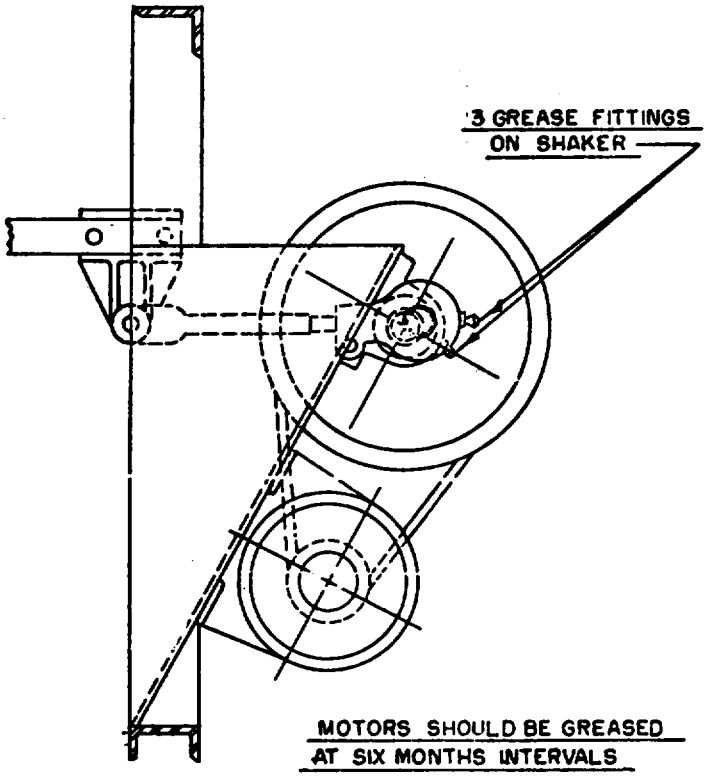
GREASING INSTRUCTIONS FOR ASSEM.DUSTUBE COLLECTOR

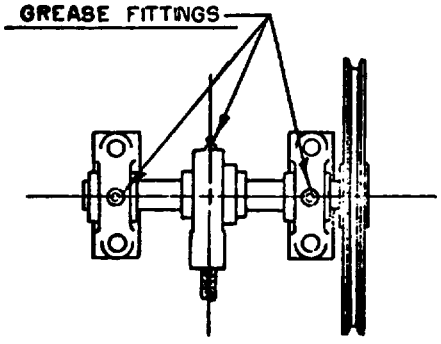


NOTE: MOTORS SHOULD BE GREASED AT SIX MONTHS INTERVALS, USE SAME GREASE AS FAN BEARINGS.

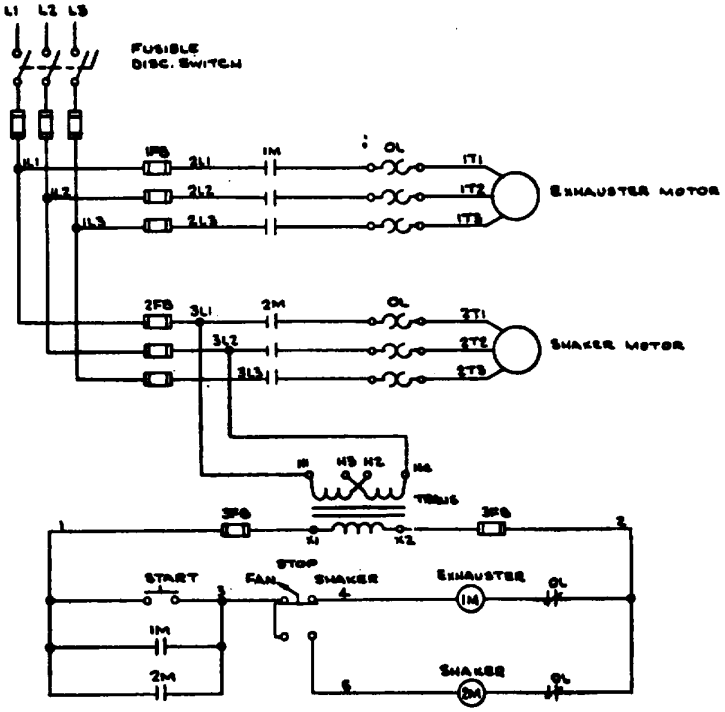
GREASING INSTRUCTIONS FOR ASSEM. DUSTUBE COLLECTOR

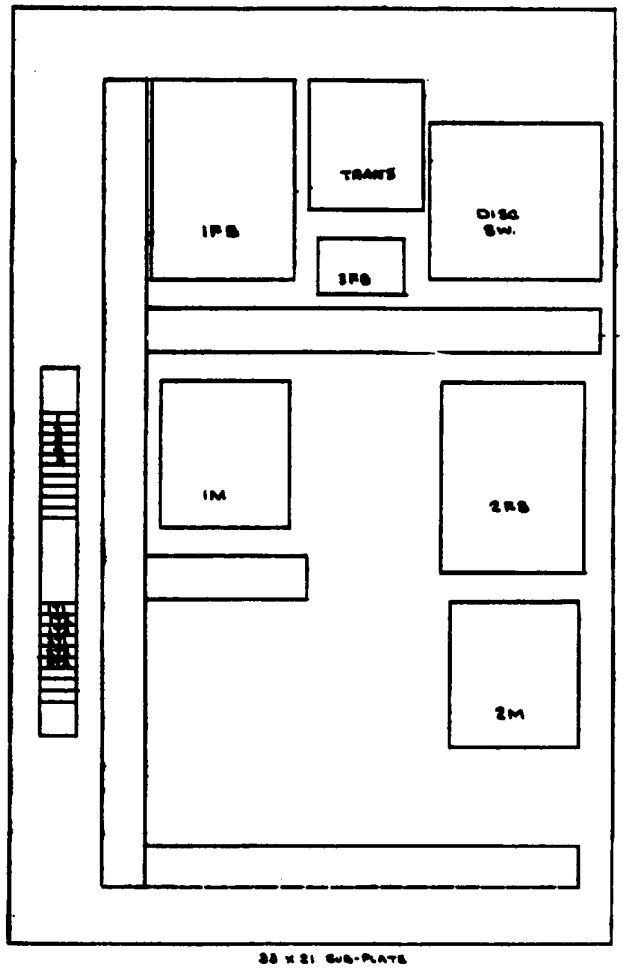
SHAKING DEVICE SHOULD BE LUBRICATED ONCE A MONTH, UNDER NORMAL SERVICE WITH A GOOD GRADE OF BALL BEARING GREASE.





73 D 954


L1 L2 L3
FUSIBLE DISC. SWITCH
1FB
1L1
1L2
1L3
1M
OL
1T1
1T2
1T3
EXHAUSTER MOTOR
2FB
3L1
3L2
3L3
2M
2T1
2T2
2T3
SHAKER MOTOR
H1 H3 H2 H4
TRANS
3FB
X1
X2
2FB
START
STOP
FAN
SHAKER
EXHAUSTER
1M
2M
SHAKER
2M



38 x 21 SUB-PLATE

73 D 954

By Order of the Secretary of the Army:

E. C. MEYER
General, United States Army
Chief of Staff

Official:

ROBERT M. JOYCE
Brigadier General, United States Army
The Adjutant General

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BLAST CLEANING MACHINE WITH DUST COLLECTOR, MODEL 70AC-1981

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