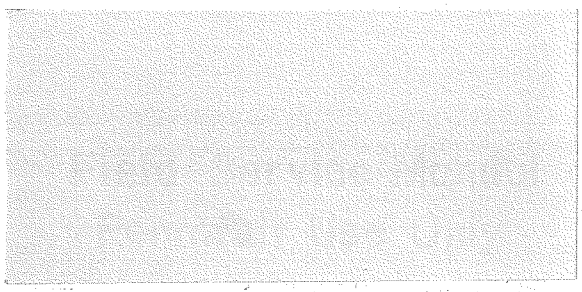


Model 900-306
900-310 VACUUM BOOSTER

Ser. No. **Lot No.**

INSTRUCTIONS

7. STOKES SUPPLEMENTARY DATA

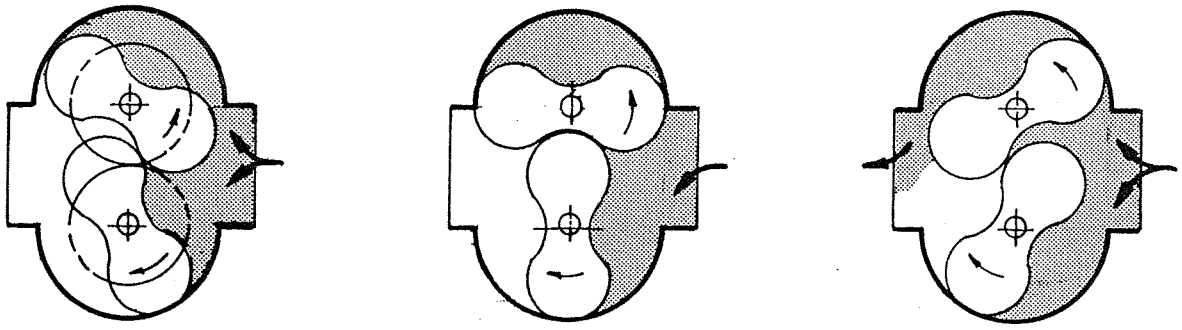
Parts Ordering Information
Stokes Microvac 2-Year Warranty
Warranty and Field Service Policy
Pumping Hazardous Gases Sheet
Technical Bulletin No. 305-1
Schedule of Field Service Charges
Prices of Lubricants, Greases, and Pumping Fluids

8. REFERENCE DRAWINGS

B-0-306	Exploded View of Vacuum Booster
B-0-307	Sectional View of Vacuum Booster
D-425-291-1 (306) D-425-561-1 (310)	Arrangement of Vertical Inlet Vacuum Booster
D-425-779-1 (306) D-425-780-1 (310	Arrangement of Horizontal Inlet Vacuum Booster
D-425-551-1 (306-401)	Direct Drive Vacuum Booster
D-425-552-1 (310-401)	Direct Drive Vacuum Booster
C-402-285(306-310)	Gear Puller
C-402-373-1	Gear Assembly Pressing Tool

1.1 Principle of Operation

Stokes Models 306 and 310 blowers are single stage positive displacement vacuum booster machines. The blower consists of two double lobe impellers that are mounted in parallel, and rotate in synchronous mesh in a one-piece cylinder. As gas enters the inlet port it fills a cavity exposed by rotation of the impellers, Fig. 1, position 1. The impellers continue to turn and trap a quantity of gas between the rotating impeller and blower casing, Fig. 1, position 2. Further rotation pushes the trapped volume around the cylinder and out the discharge port, Fig. 1, position 3.



FLOW THROUGH A STOKES VACUUM BOOSTER

Fig.-1

1.1.1 CFM Capacity

306 @ 1800 RPM = 125 CFM
306 @ 3600 RPM = 245 CFM
306 @ 4300 RPM = 310 CFM
310 @ 3600 RPM = 400 CFM

1.2 MAXIMUM ALLOWABLE OPERATING CONDITIONS

For satisfactory performance Stokes blowers must be operated under approved operating conditions. The Stokes warranty is valid only when these conditions are fully met.

MODEL	SPEED RPM	PRESSURE DIFFERENTIAL ACROSS BLOWER	DISCHARGE GAS TEMP.	TEMP. RISE ACROSS BLOWER
306 310	* 3600 RPM	380 TORR	375°F (191°C)	275°F (135°C)

* The 306 blower can be run at 4300 RPM for special applications. --- Consult factory.

NOTE: For any specific application, pressure differential and maximum discharge temperature do not always occur simultaneously. Whichever limit is reached first is the controlling factor.

1.3 Lubricant

Lubricating oil is shipped in a separate container. Refer to Section 2 (pages 2-4 to 2-6) for proper amount and filling procedure.

1.4 Booster Arrangements

Vacuum boosters are available (factory arranged) for belt or direct drive and for vertical or horizontal inlet and discharge.

1.5 Safety precautions

For equipment covered specifically or indirectly in this instruction book, it is important that all personnel observe safety precautions to mimimize the chances of injury. Among many considerations, the following should particularly be noted:

1.5.1 Pump casing and associated piping or accessories may become hot enough to cause major skin burns on contact.

1.5.2 Internal and external rotating parts of the booster and driving equipment can produce serious physical injuries. Do not reach into any opening in the booster while it is operating, or while subject to accidental starting. Cover external moving parts with adequate guards.

1.5.3 Disconnect power before doing any work, and avoid bypassing or rendering inoperative any safety or protective devices.

1.5.4 If booster is operated with piping disconnected, place a strong coarse screen over the inlet.

1.5.5 Stay clear of open inlet piping (suction area) and the open discharge blast.

1.5.6 Stay clear of blast from pressure relief valves and the suction area of vacuum relief valves.

1.5.7 Use proper care and good procedures in handling, lifting, installing, operating and maintaining the equipment.

1.5.8 Casing pressure must not exceed 25 psi (172 kpa) gauge. Do not pressurize vented cavities from an external source, nor restrict the vents.

2.1 GENERAL

On receipt of the unit, check for any damage that may have occurred during transit. Report any damage or missing parts as soon as possible.

2.1.1 During installation protective coverings should be left in place to reduce the chances of intrusion of foreign material and rusting. Protection against chemical or salt water atmosphere is not provided. The interior is protected against normal atmospheric corrosion by small bags of an absorbent material fastened to the flange covers.

2.1.2 Before operating, put the required amount of oil into the three oil reservoirs per instructions under Lubrication.

2.1.3 The vacuum booster should be mounted on a smooth, flat, level surface. The degree of variation in level should not exceed 1/32" per horizontal foot (.7937 mm per horizontal 30.48 cm) in any direction. The surface must be flat within .0C2" or shims must be used to avoid twisting the housing more than .002".

2.1.4 Before starting, turn drive shaft over manually clockwise and counter-clockwise to ensure that no foreign material is present in the impeller cavity.

2.1.5 Rotation may be either clockwise or counter-clockwise depending on desired direction of flow.

2.1.6 Inlet and outlet piping should have a proper flexible coupling in the line to prevent rigid piping from distorting the booster housing.

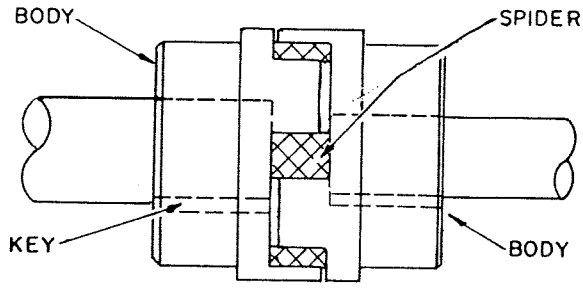
2.1.7 It is important to maintain all pipes and fittings free of debris. If this requirement is not adhered to, jamming and internal damage to the vacuum booster may occur. A Stokes inlet vacuum filter is recommended to provide protection for the booster.

2.2 BELT DRIVE

2.2.1 The sheave should be located as close as practical to the booster or back belt guard and should not overhang the shaft. The motor sheave must be in alignment with the booster sheave and belts tightened according to V-belt manufacturers instructions. Minimum recommended sheave P.D. for vacuum booster is 4.2 inches.

2.3 DIRECT DRIVE

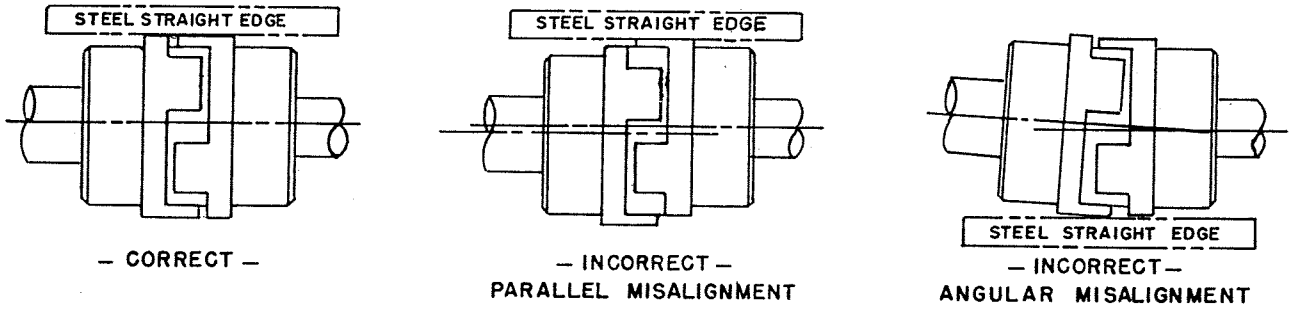
2.3.1 The Stokes direct drive attachment consists of a resilient cushion type flexible coupling (Fig. 2), motor adapter with cover, oil seals and flange mounted motor. The coupling does not require lubrication. If the Stokes direct drive attachment is not used, follow Section 2.3.2 and the selected coupling manufacturer's instructions for shaft alignment.



COUPLING

Fig.-2

2.3.2 Misalignment can be either parallel or angular. Maximum allowable deviation in offset is .002 (.0508 mm) total indicator reading. The two inside faces of the coupling should not vary more than .001 (.0254 mm) from parallel. See Fig. 3.



COUPLING ALIGNMENT

Fig. –3

2.4 OXYGEN SERVICE

2.4.1 Vacuum boosters intended for oxygen service receive special preparation for shipment. In addition to required cleaning, vacuum boosters are back filled with zero gas air to prevent inleakage of contaminating atmosphere. (Zero gas air is air which has been certified to have a total hydrocarbon content of 2.00 PPM as CH4).

2.4.2 Oxygen Service boosters require Fomblin Y-25 as lubricant. Substitutes cannot be used. Use of other oils or contamination with hydrocarbons can result in an explosion.

NOTE: IT IS RECOMMENDED THAT ANY MAJOR REPAIRS NEEDED FOR THE OXYGEN SERVICE BOOSTER SHOULD BE DONE IN OUR PLANT.

2.4.3 Clean vacuum piping lines (internally) and flanges so they are completely free of hydrocarbon contamination. Use Isotron 113 or equal. Clean a minimum of three (3) times and allow the surfaces to air dry before assembly.

Oil can be procured from:

Montedison USA, Inc.
1114 Avenue of the Americas
New York, N.Y. 10036

2.4.4 For handling of vacuum boosters for Oxygen Service refer to Section 5.1.

2.5 CLEANING (Standard Vacuum Booster)

2.5.1 A clean rag dampened with toluene can be used to clean the booster impeller section and flanges if they have accumulated dirt during installation or storage.

2.6 LUBRICATION (See Figs. 4 and 5)

2.6.1 The Stokes vacuum booster has three oil reservoirs:

(A) Lip Seal Reservoir
(B) Bearing Housing (drive end) Reservoir
(C) Gear Housing Reservoir

2.6.2 (A) - The lip seal oil reservoir is vented to atmospheric pressure. The volume of oil that fills the reservoir between the seals is used to lubricate the seal rubbing surfaces and prevent leakage of atmospheric air into the vacuum booster.

2.6.3 (B) - The bearings in the bearing housing (drive end) reservoir are lubricated by splash from an oil slinger that dips into the oil sump.

2.6.4 (C) - In the gear housing reservoir the gears are lubricated by partial immersion in the oil sump. Splash from the gears and oil slinger lubricates both gear end bearings.

2.6.5 To fill bearing housing (drive end) and gear housing reservoirs, STOP UNIT AND BREAK VACUUM. LUBRICATING OIL MAY NOT BE ADDED WHILE VACUUM BOOSTER IS IN OPERATION. Note that bearing housing (drive end) and gear housing reservoir may be under vacuum. The following table shows the normal oil capacities of the oil reservoirs. The oil may be added to the lip seal reservoir during operation.

Approximate Oil Capacity in Pints. (Milliliters)

Use Stokes V-Lube "H" for other than oxygen service.

	Pints		(Milliliters)	
Piping Connection	Horizontal	Vertical	Horizontal	Vertical
Seal Reservoir	.50	.50	229	220
Drive End Bearing Housing	.25	.50	111	230
Gear Housing	.50	.75	244	370

2.6.6 Fill the three reservoirs with the recommended lubricant to the middle point of the sight glasses. Wait for a period of three minutes to allow oil level to equalize.

NOTE: DO NOT OVERFILL OR PERMIT OIL LEVEL TO FALL BELOW THE BOTTOM OF THE SIGHT GLASSES.

When the unit is operating the oil level may fluctuate slightly. All fill and drain plugs should be sealed. If the seal reservoir is over-filled, excess oil may flow from the vent hole in the filler plug when the oil is heated. No harm will be done to the booster if this leakage occurs and the leakage will stop as soon as all excess oil has been expelled. If the drive end bearing or gear end reservoirs are overfilled, oil may spill over into the cylinder.

NOTE: FOR OXYGEN SERVICE BOOSTERS SEE SECTION 2.4 FOR SPECIAL LUBRICANT INSTRUCTIONS.

2.7 LUBRICATION SCHEDULE

NOTE: OPERATING CONDITIONS DETERMINE FREQUENCY OF OIL CHANGES.

2.7.1 For normal operating conditions, during the first week, the oil levels on each end of the vacuum booster should be checked every 24 hours of operation. Bearing and gear oil should be changed every 2000 operating hours. Oil in the seal reservoir does not require changing. Add oil to maintain proper level as necessary.

NOTE: BOTH BEARING OIL RESERVOIRS ARE TO BE FILLED WITH OIL ONLY WHEN THE BLOWER IS MOUNTED IN ITS OPERATING LOCATION.

2.7.2 Under severe operating conditions such as contamination within the vacuum system or excessively high operating temperatures within the vacuum booster more frequent oil changes are recommended.

2.8 LUBRICATION DIAGRAM - Vertical Flow

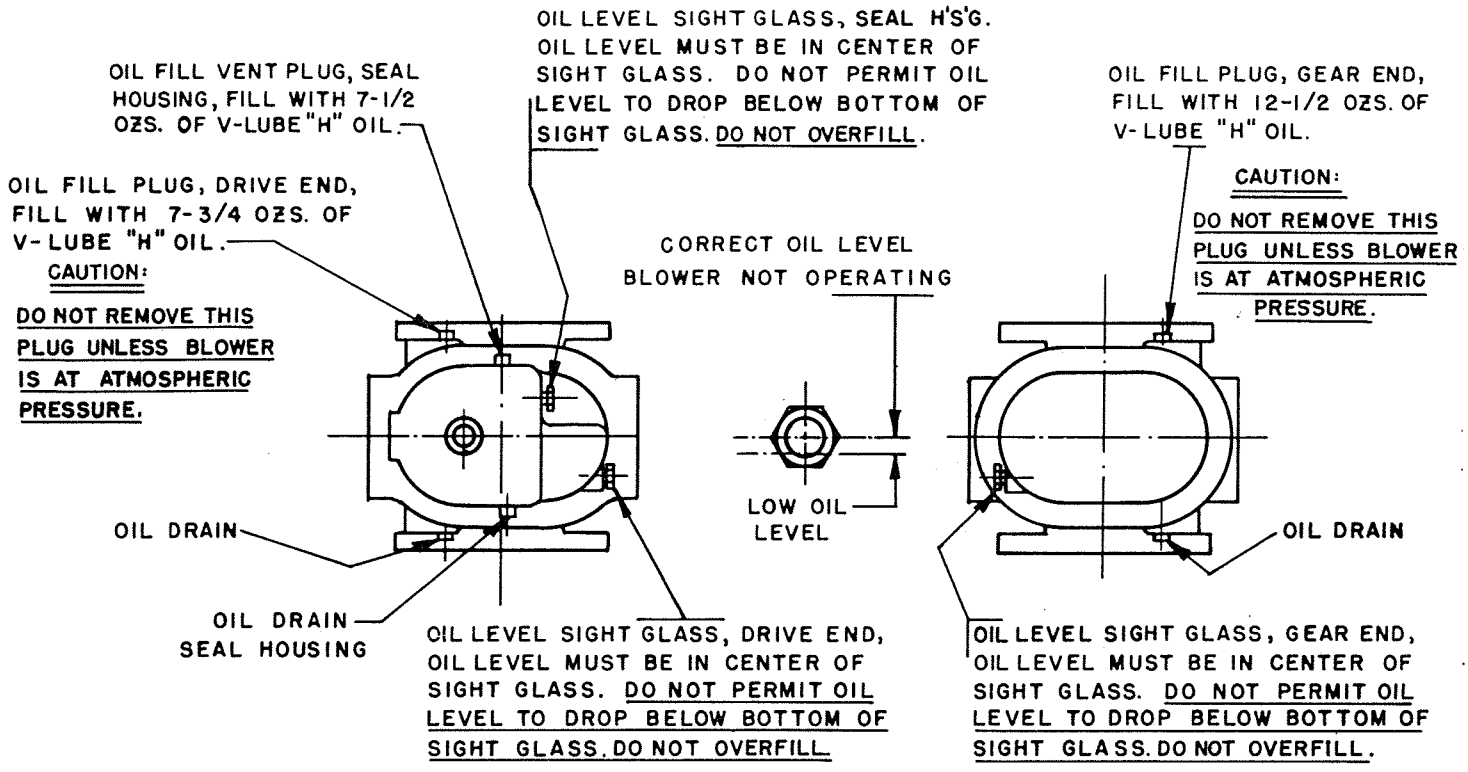


Fig.-4

NOTE: *(1) THERE ARE THREE (3) OIL RESERVOIRS AND THREE (3) OIL FILL PLUGS.*
(2) FOR STANDARD APPLICATIONS USE V-LUBE "H" OIL AS LUBRICANT. COAT THREADED PLUGS WITH TEFLON PASTE SEALANT.
(3) FOR OXYGEN SERVICE USE FOMBLIN Y-25 OIL AS LUBRICANT. COAT THREADED PLUGS WITH OXY-8 PASTE SEALANT. OXY-8 CAN BE PROCURED FROM:

Fluoramics, Incorporated
103 Pleasant Avenue
Uppler Saddle River
New Jersey, 07458, USA

2.9 LUBRICATION DIAGRAM - Horizontal Flow

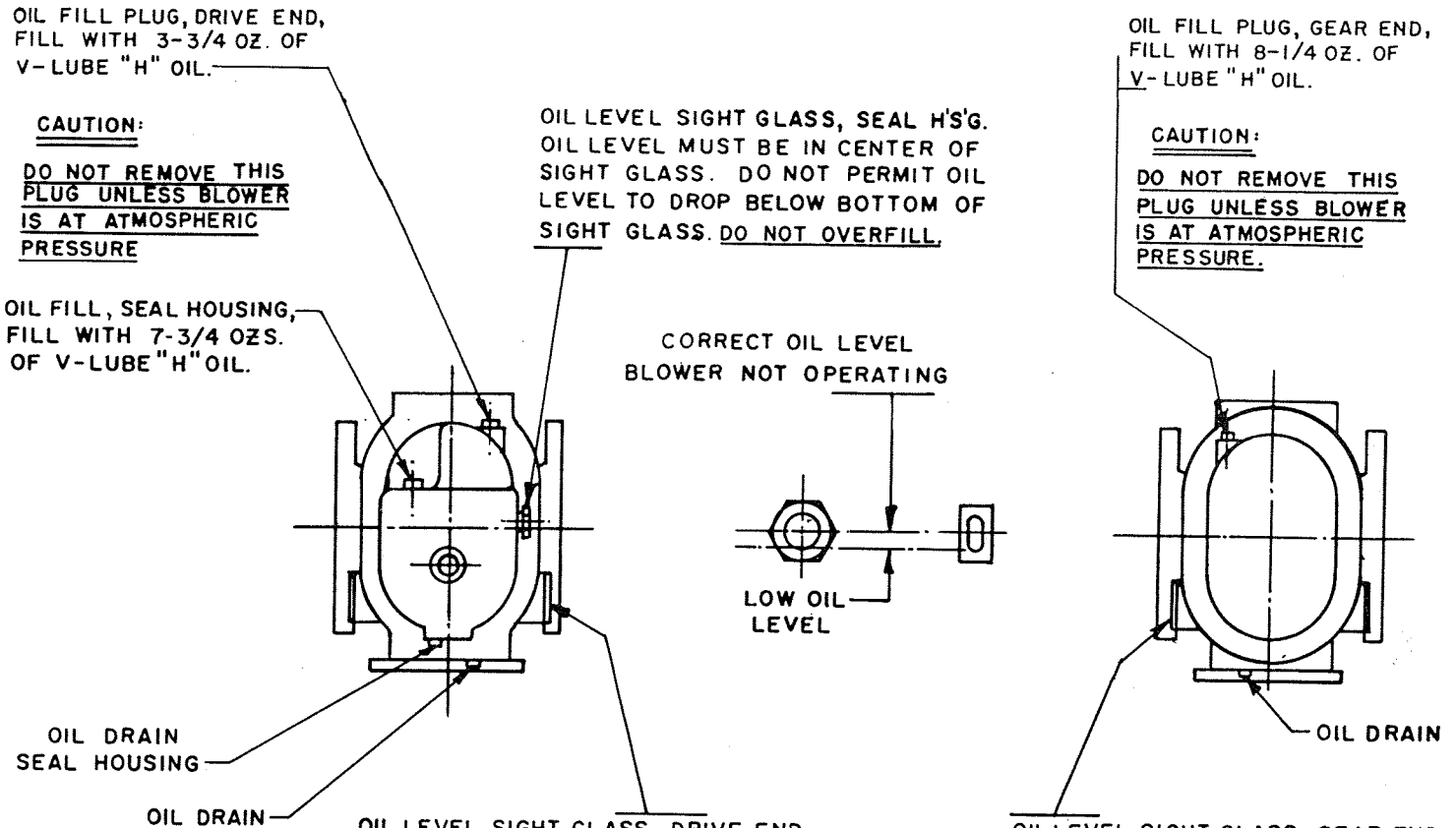


Fig.-5

NOTE (1) *THERE ARE THREE (3) OIL RESERVOIRS AND THREE (3) OIL FILL PLUGS.*
(2) *FOR STANDARD APPLICATIONS USE V-LUBE "H" OIL AS LUBRICANT. COAT THREADED PLUGS WITH TEFLON PASTE SEALANT.*
(3) *FOR OXYGEN SERVICE USE FOMBLIN Y-25 OIL AS LUBRICANT. COAT THREADED PLUGS WITH OXY-8 PASTE SEALANT. OXY-8 CAN BE PROCURED FROM:*

Fluoramics, Incorporated
103 Pleasant Avenue
Upper Saddle River
New Jersey, 07458, USA

3.1 OPERATION

NOTE: *DO NOT ATTEMPT TO OPERATE THE UNIT UNTIL CHECKED PER THE INSTALLATION INSTRUCTIONS.*

3.1.1 If the unit rotates freely and direction of rotation is correct, the unit may be started. A preliminary run-in period of five minutes at no-load should reveal any inherent problems. If required, corrections should be made immediately.

3.1.2 A one hour run at blank-off should be made to check for loud noises, excessive vibration, seal leakage in the vacuum booster.

3.1.3 After steps (1) and (2) have been completed a run at normal pressure conditions for about fifteen minutes should be initiated. Observe the behavior of the vacuum booster for noise and vibration.

3.1.4 During initial operation for the first week, observation of oil levels should be on a daily basis to determine if any losses occur. Oil levels should not drop below the bottom of the sight glasses.

3.1.5 Periodically check drive belt tension and the booster for unusual noises and increase in vibration.

NOTE: Reference Drawings B-0-306 and B-0-307

4.1 In general, major repairs are to be considered beyond the scope of maintenance work and should be performed at the factory, after arrangement through the nearest sales office. Warranty failures should not be repaired at all, unless specific written authorization has been obtained through a sales office before starting work. Unauthorized disassembly during the warranty period may void the warranty.

4.1.1 A consistent program of inspection and maintenance servicing is the most effective method of minimizing booster repairs or operating problems. A record of services and dates is recommended to help keep this work on a regular schedule.

4.1.2 Correct lubrication is probably the most important requirement, other than operating the booster within its specified rating limits. In a new and properly installed unit there are no moving contacts between the two impellers, or between the impellers and cylinder or headplates. Wear is confined to the timing gears, the bearings which support and locate the shafts, and the drive shaft seals. All are lubricated and wear should be nominal if clean oil of the proper grade is always supplied.

4.1.3 The bearings and gears supplied with Stokes boosters are generously sized and should give years of trouble-free service under normal operating conditions. The drive shaft seals should be considered as expendable and may be replaced in the field as outlined in Section 4.2.

4.1.4 Design of the booster is basically simple, minor repair operations are straight forward, but the work should be done by personnel with good mechanical experience. No attempt is made in this manual to outline procedures for replacing bearings and gears. If this work is attempted, it will be necessary to rely on assembly drawings B-0-306 and B-0-307. Best results will be obtained by having such repairs done at the factory.

4.2 DRIVE SHAFT SEAL MAINTENANCE

The drive shaft seal assembly consists of two individual pressure type seals submerged in oil and located in the seal housing. Two different types of seals are used as noted on Drawing B-0-306, B-0-307, Fig. 7. Care must be taken to assure that the seals are not interchanged. Seals should be replaced as a set. An inner seal leak may be evidenced by a loss of vacuum or a rise in oil level in the drive end bearing housing. When replacing seals, polish out any nicks or cuts. Adjust the seal axial location $\pm$ 1/16" to avoid a shaft defect is permissible.

4.3 OIL SEAL REMOVAL

NOTE: DRAIN ALL LUBRICANT FROM THE SEAL HOUSING AND BEARING HOUSING DRIVE END RESERVOIRS.

4.3.1 Seal Housing disassembly.

4.3.2 Belt drive - remove reservoir cover (29) and gasket (30).

4.3.3 Direct drive - remove motor and its coupling half. Booster coupling hub is to be removed before the motor support and '0' rings are removed.

4.3.4 Remove all bolts securing seal housing to bearing housing. Using two of the seal housing attachment bolts, jack seal housing (3) from bearing housing drive end.

4.3.5 Tighten jack bolts evenly to prevent dowel pins from binding. See Fig. 6.

NOTE: CARE MUST BE TAKEN NOT TO SCORE THE SHAFT.

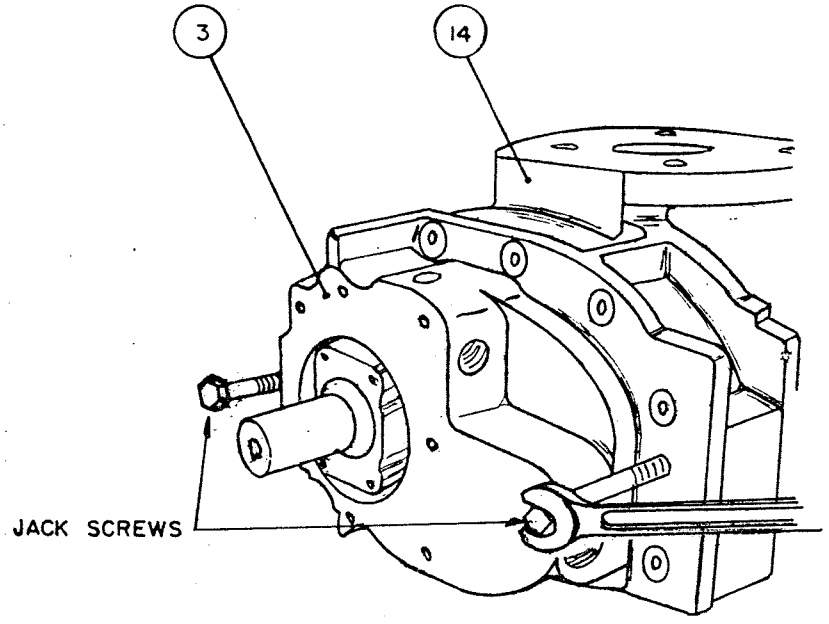


Fig. 6

4.3.6 Removal of seals is accomplished by pressing both out simultaneously through the seal bore. Seals removed from the seal housing are not re-usable.

4.3.7 Pressing out of seals may be done from either side. Care must be exercised to prevent the pressing tool from scratching the seal bore. Carefully clean and inspect seal bore and clean out any dirt or debris from seal oil reservoir.

4.3.8 Clean mating faces of bearing and seal housing with Toluene or with Oakite Stripper #157 to remove all traces of old sealant.

4.4 INSTALLATION OF NEW OIL SEALS

4.4.1 Carefully inspect new lip seals for cuts or nicks on the sealing lip and for any burrs on the outer metal rim. Dischard seal if any lip defects are apparent.

4.4.2 Place new seal on pilot of tool (A-425-594-1) with lip of seal facing out and metal case against tool shoulder, Fig. 7. Lightly oil inner diameter of lip seal to ease installation.

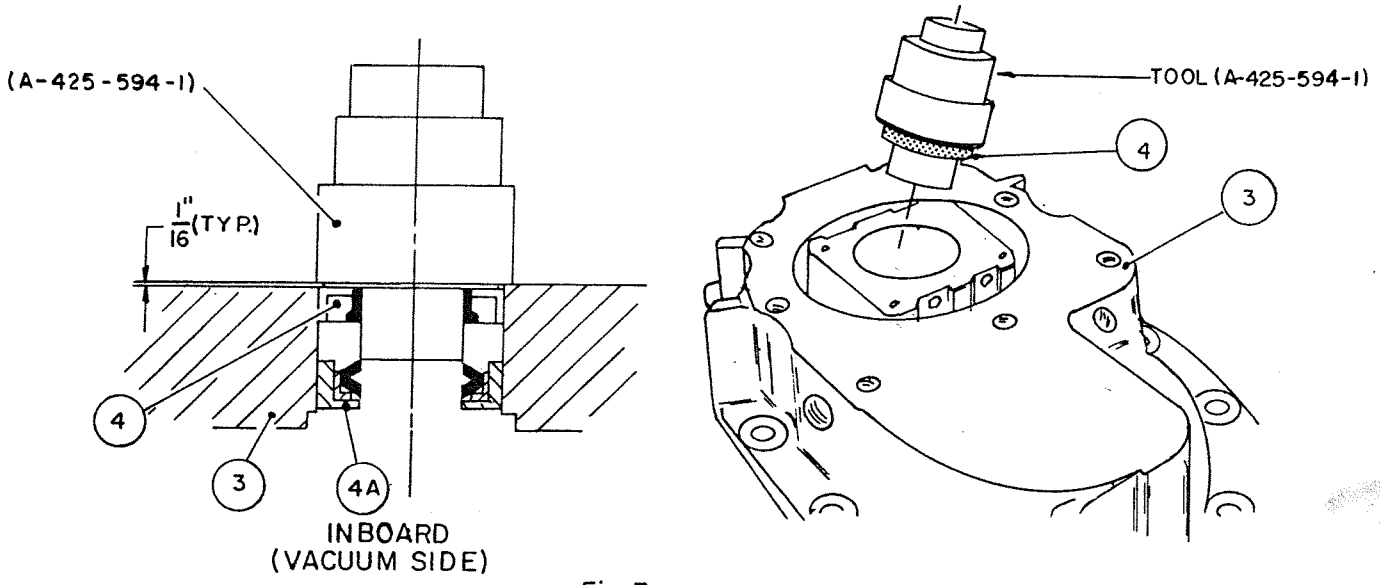


Fig.-7

4.4.3 Press lip seal Part 4 into bore of seal housing. Press tool until solid contact is made. This procedure is to insure that the seal is square in the bore and provide a 1/16" seal offset below the face of the seal bore.

Install inboard seal Part 4A from opposite side using same procedure.

CAUTION: SEALS MUST BE LOCATED AND ORIENTED AS SHOWN IN DRAWINGS B-0-306 and B-0-307.

4.4.4 Clean mating surfaces of seal housing and bearing housing with Loctite Safety Solvent.

Apply a thin bead (1/16 dia.) of Loctite gasket eliminator #515 to bearing housing seal area. (Garlock #101S thinned with Toluene to a consistency of heavy grease is an acceptable substitute for the gasket eliminator.)

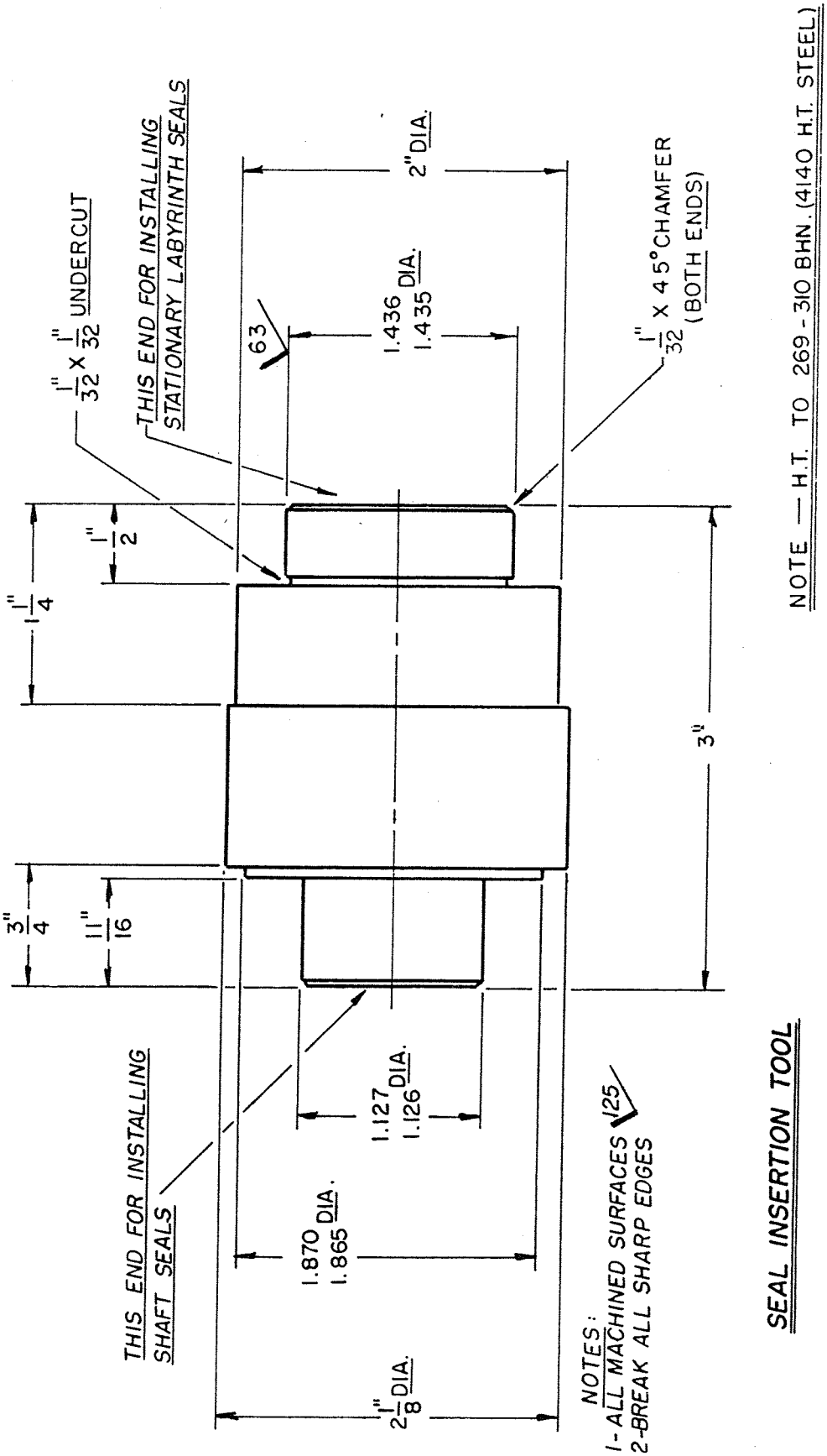
4.4.5 Apply tape over keyway slot. Slide seal housing over drive shaft. Hold housing square with shaft to prevent damage to seals. Engage dowel pins in bearing housing and tap seal housing firmly in place.

4.4.6 Secure seal housing to pump body flange with hex head cap screws. Torque all bolts to 13 ft. lbs.

4.5 PAINTING

4.5.1 If blower is repainted, care must be taken not to paint over the porous vent hole in vent plug. (Item 28).

4.6 SEAL INSERTION TOOL



4.7 Standard Internal Clearances - Clearances are in inches with unit cold. See Figures 1, 2 and 3. Check clearances in standard rotation and oppposite rotation.

	900-306-401	900-310-401
Drive End	.006 - .015	.010 - .019
Gear End	.004 - .009	.004 - .009
Cylinder to Impeller (a thru f)	.0055 - .0075	.0055 - .0075
Between Impeller (pos. 1 thru pos. 3)	.012 - .019	.012 - .019

End Clearance

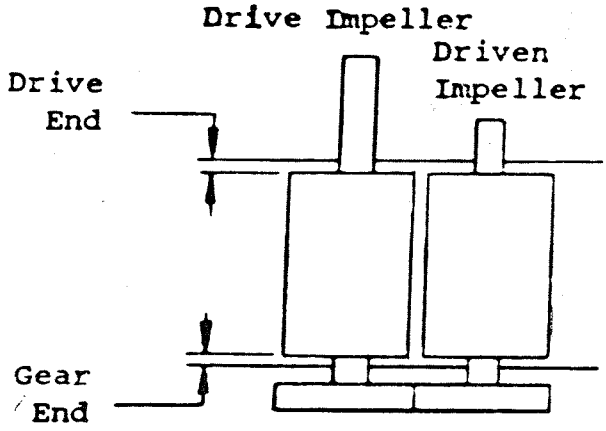


FIGURE 1

Cylinder to Impellers

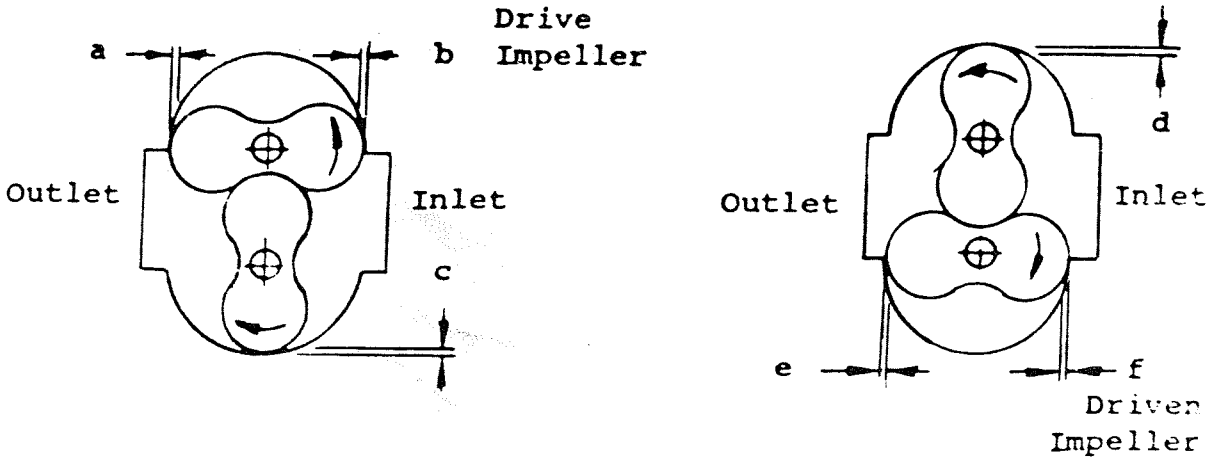


FIGURE 2

BETWEEN IMPELLERS

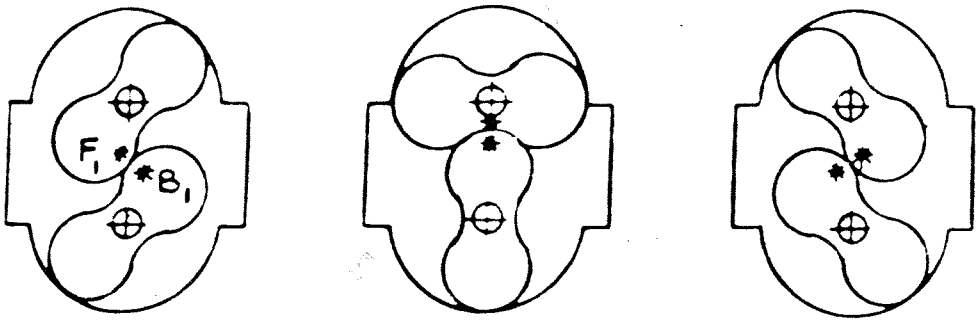


FIGURE 3

4.8 Timing of Impellers

4.8.1 The key stock should fit tightly in the keyway of the gear and shaft. Looseness of the key in the keyway is not permitted. The key stock is to be tapped in the keyways with a soft-face hammer. If the key is loose, inspect keyways and key stock and reject parts not to size.

4.8.2 Assemble shaft spacer, gear oil slinger, arbor shim and gear key on drive shaft. The gear key is to fit tightly in the keyway. Mount right hand drive gear on the drive shaft with gear installation tool (C-402-373-1) and locate the gear firmly against the gear end oil slinger. Spray screw threads and tapped hole with Loctite solvent cleaner and apply Loctite #271 (Stud Lock) to bolt threads. Torque bolt to 24 ft. lbs. Gear end slinger must not wobble after it is secured.

NOTE: Use gear puller tool C-402-285 with shaft protector plug to remove a gear from the impeller shaft if required.

4.8.3 Assemble shaft spacer, arbor shim with .060" standard shim pack and key on driven shaft. The gear key is to fit tightly in the keyway. The arbor shim pack is to be assembled with shim stock that is stacked in the largest increments of thickness to reduce compression in the stack up. Position impellers and keyways as in Figure 4. Mount left hand gear on driven shaft with gear installation tool C-402-373-1.

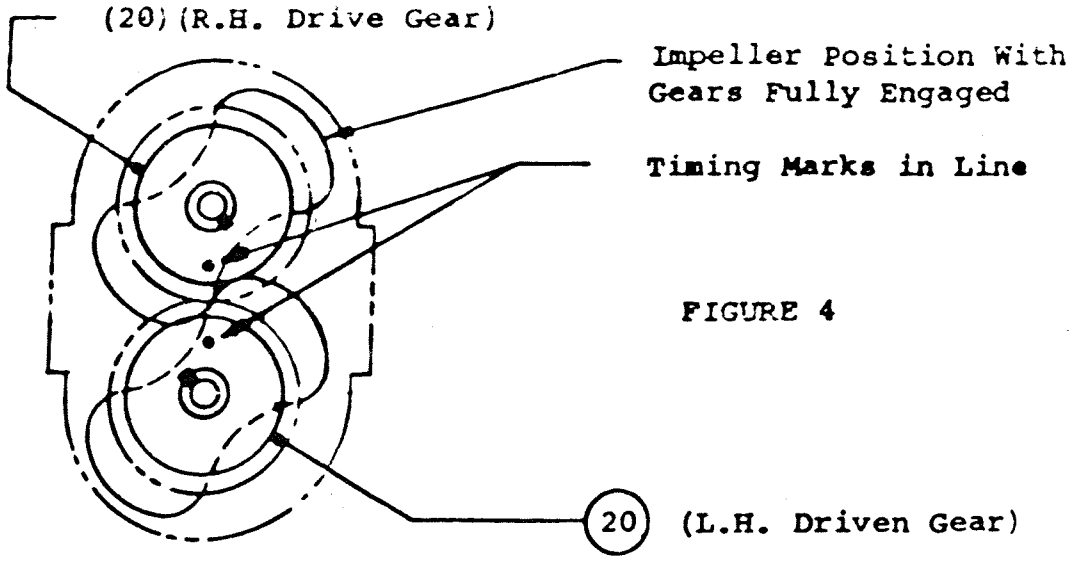


FIGURE 4

4.8.4 Align the left hand driven gear on the shaft so that the center punch marks (timing marks) engage in line with the tooth space similarly marked on the drive gear, Figure 4. Spray screw threads and tapped hole with Loctite solvent cleaner and apply Loctite #271 (Stud Lock) to bolt threads. Torque bolt to 24 ft. lbs.

4.8.5 Rotate both impellers 360° while passing through plastic shim strips to check desired working clearance of .012 - .019. If impellers knock during rotation or bind on a minimum of .012 plastic shim, timing marks are not in alignment or gear shim pack is not sized correctly.

4.8.6 For adjustment in timing, rotate impellers to 45° at position 1, Figure 5. If $F_1 - B_1$ clearance is smaller than .012, an addition of shim at the driven gear is required. If $F_1 - B_1$ clearance is larger than .019 a reduction of shim at the driven gear is required. Check the clearance between the impellers at the 45° position in four orientations for a minimum clearance of .012. If impellers continue to knock, check the amount of backlash in the assembled gear set for a maximum permitted amount .004 of an inch.

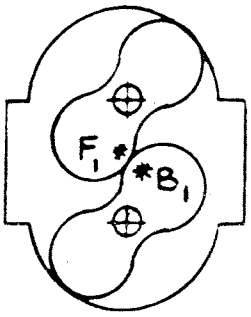


FIGURE 5

Pos. 1

4.8.7 Rotate both impellers rapidly in standard rotation while holding plastic shim strips of .012 thickness between impellers from the discharge and inlet end. Shim should not bind or pull when moved along the full length of impellers. Check clearance in standard rotation and opposite rotation.

4.8.8 Inspect blower for any foreign matter or rust in its interior. Clean if necessary. Turn blower over by hand while checking for any internal interferences. Assembled blower should turn easily without drag or tight spots.

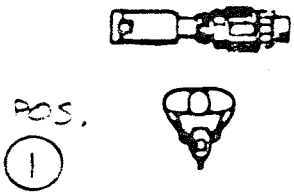
4.9 Sound level Measurements (Using general radio GR 1565-B meter or similar device)

Blower Shaft Speed	Acceptable dB Level @ Blankoff
4300 RPM	78 dBA or less at 3 feet
3600 RPM	76 dBA or less at 3 feet
1800 RPM	74 dBA or less at 3 feet

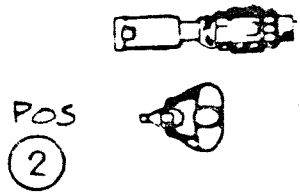
4.9.1 Calibrate sound meter and set weighing scale of sound level meter on "A" network. At a distance of 36 inches from the surface of the blower locate the area that has the highest level reading by holding the meter perpendicular (90^{o}) to the blower.

NOTE: Do not record sound reading in back of the drive motor. The motor fan will influence the overall noise level.

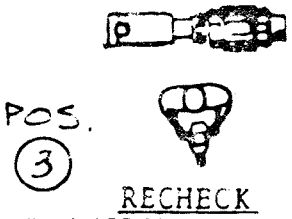
4.9.2 The following procedure is used in the measurement of sound levels.



BACKGROUND LEVEL
FIG-6



TOTAL LEVEL
FIG-7



RECHECK
BACKGROUND LEVEL
FIG-8

a. Figure 6, turn your back to the blower pointing the meter away from the blower. The meter will now register the background noise level. Record this number.

b. Figure 7, return to the original position, 90° to the blower and record the level registered on the meter. This number is the total noise level.

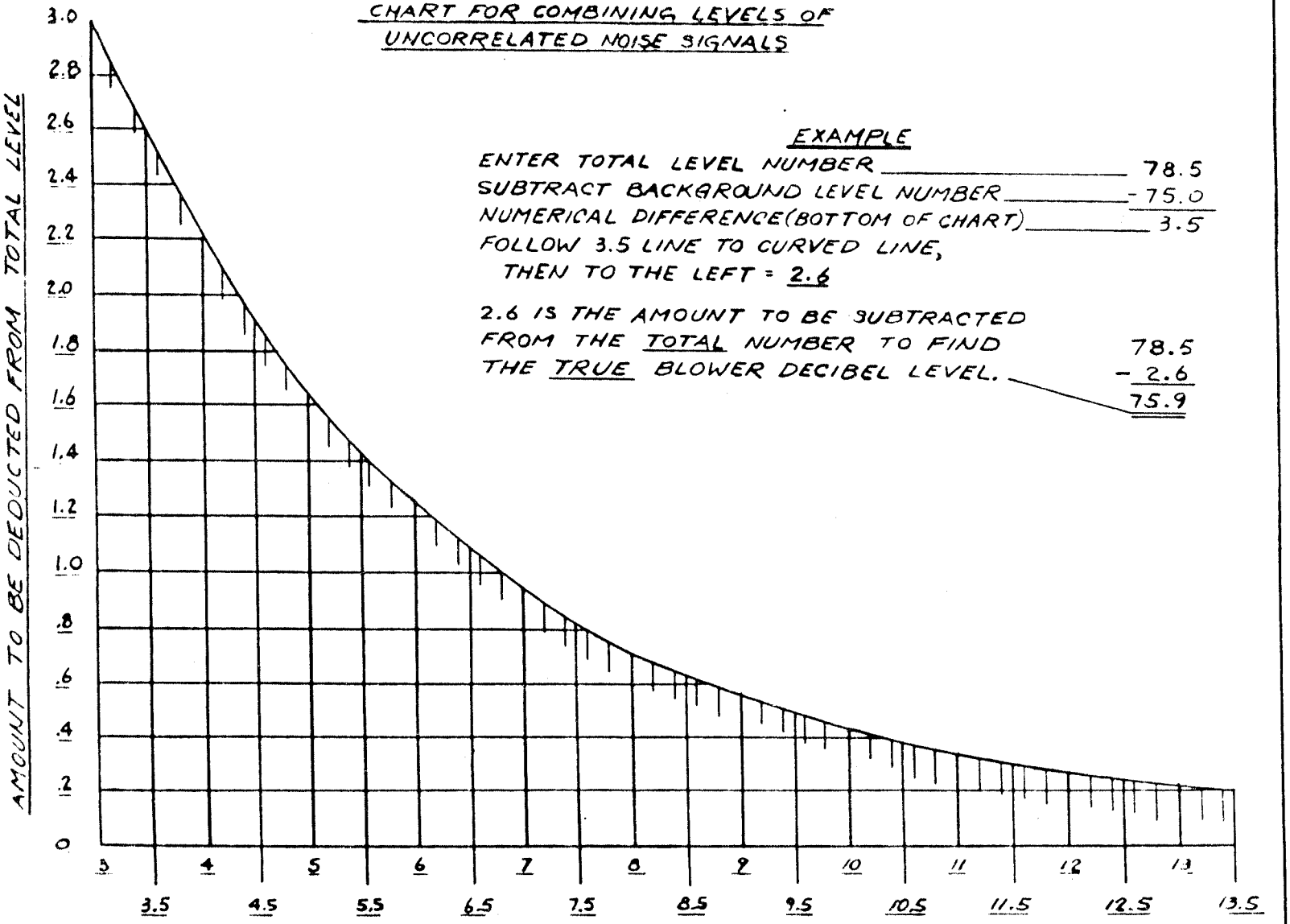
c. Figure 8, return to position (1) back towards the blower and recheck the background level to be sure it has not changed.

4.9.3 If the total noise level does not exceed the maximum permitted, the following chart No. B-402-288, need not be used.

4.9.4 If the total noise level exceeds the maximum permitted, subtract the background level number (position 1) from the total number (position 2). Find the resulting number at the bottom of the chart. Follow the line above the resulting number to its intersection with the curved line, then to the left to find the amount to be deducted from the total noise level to determine the true blower noise level. See example on chart. This final number is to be used to determine acceptance or rejection.

4.9.5 Any irregular or unusual noises within the acceptance limit are to be investigated.

CHART FOR COMBINING LEVELS OF UNCORRELATED NOISE SIGNALS



EXAMPLE

ENTER TOTAL LEVEL NUMBER _____ 78.5
SUBTRACT BACKGROUND LEVEL NUMBER _____ - 75.0
NUMERICAL DIFFERENCE (BOTTOM OF CHART) _____ 3.5
FOLLOW 3.5 LINE TO CURVED LINE,
THEN TO THE LEFT = 2.6

2.6 IS THE AMOUNT TO BE SUBTRACTED
FROM THE TOTAL NUMBER TO FIND
THE TRUE BLOWER DECIBEL LEVEL.

78.5
- 2.6
75.9

5.1 OXYGEN SERVICE

5.1.1 It is recommended that any major repairs needed for the oxygen service booster should be done in out plant.

5.1.2 Minor repairs such as replacement of lip seals can be made in the field. Because of the possibility of a dangerous reaction to dirt and chemical compositions in an oxygen rich environment, absolute cleanliness of parts, tools, wipers and even assemblers' hands and clothes is a positive must.

5.1.3 General guidelines for oxygen service booster.

1. All parts should be inspected for burrs before cleaning.
2. All stored, cleaned parts must be covered with plastic to maintain cleanliness.
3. Work area, tools and fixtures should be free of grease and oils - clean in Isotron 113 or equal. Minimum of three (3) times.
4. Use clean "paper wipers" only (no cloth).
*5. Use Oxy-8 paste on all threaded pipe and fittings. (Do not use Permatex, Loctite or Teflon paste.)
6. Hands and assembly tools should be lightly coated with Fomblin Y-25 oil to prevent contamination of parts during assembly.
7. Ball bearings and lip seals should be cleaned and free of grease and oil - clean in Isotron 113 or equal. Apply light film of halocarbon oil in bearings after cleaning.
8. No rust preventive oils should be used on any oxygen service booster parts.

* Oxy-8 can be procured from:

Fluoramics, Incorporated
103 Pleasant Avenue
Upper Saddle River
New Jersey, 07458, USA

Model 900-306-401 DIRECT DRIVE VACUUM BOOSTER

Lot no. SC-78162 **to**

Sym.	Qty.	Part no.	Description
1	1	D-423-898-1	Motor Support
1A	1*+	085-38≡990	"O" Ring
1B	1*+	022-2-240	"O" Ring
2	1	A-424-663-3	Port Cover
3	1	F-424-697-1	Seal Housing
4	1*+	085-37-861	Oil Seal
4A	1*+	A-426-390-1	Seal Assembly
5	1	A-424-667-1	Clamp Collar
6	1	A-425-256-2	Drive End Slinger
8	3	A-425-019-1	Shaft Spacer
9	3*+	085-37-646	Ball Bearing, Double Row
10	4+	085-37-653	Wave Washer
11	4+	A-425-037-1	Rotating Labyrinth Seal
12	4+	A-425-016-1	Stationary Labyrinth Seal
13	2	F-424-694-1	Bearing Housing
14	1	F-424-695-1	Pump Body
15	1+	D-423-872-1	Drive Impeller
16	3	A-425-011-2	Split Bearing Retainer
17	1	A-425-257-1	Gear End Slinger
18	2+	085-38-843	Arbor Shim (.062 Thk.)
19	2	A-424-651-6	Shaft Key
19A	2	A-424-680-3	Shaft Key
20	1+	085-38-257	Gear Set (1 R.H. and 1 L.H.) (Always change gears as sets)
21	3	A-423-894-1	Washer
22	1	D-424-698-1	Gear Cover
24	---	Arbor Shim Pack	Consists of the Following:
	1	085-38-844	Arbor Shim (.015 Thk.)
	1	085-38-845	Arbor Shim (.010 Thk.)
	4	085-38-846	Arbor Shim (.005 Thk.)
	5	085-38-847	Arbor Shim (.003 Thk.)
	1	085-39-031	Arbor Shim (.032 Thk.)
25	1+	D-424-874-4	Driven Impeller
26	1*+	085-37-645	Ball Bearing, Single Row

*Recommended spare part (wear items) + Parts normally stocked

Model 900-306-401 DIRECT DRIVE VACUUM BOOSTER

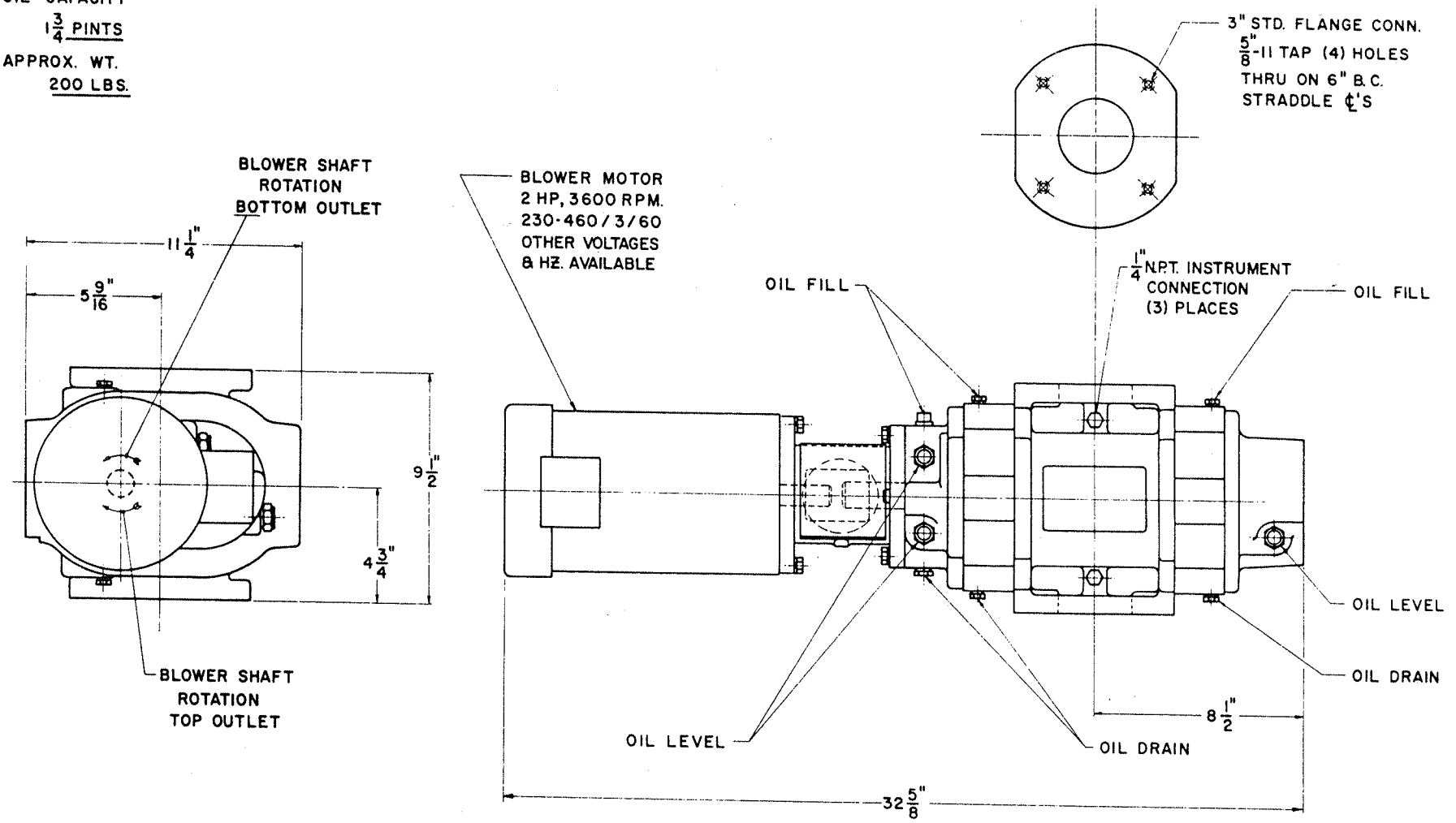
Lot no. SC-78162 **to**

Sym.	Qty.	Part no.	Description
27	3+	085-38-008	Sight Glass
28	1+	085-38-007	Breather Vent Plug
	1+	085-37-849	Shaft Coupling, 7/8" bore
	1*+	A-425-594-1	Seal Insertion Tool
			REFERENCE DRAWINGS
		B-0-306	Stokes Vacuum Booster Assembly
		B-0-307	Sectional View of Booster

*Recommended spare part (wear items)

+ Parts normally stocked

OIL CAPACITY
1 3/4 PINTS
APPROX. WT.
200 LBS.



DIRECT DRIVE VACUUM BOOSTER

PRODUCT CODE 900-306-401
125 C.F.M. at 1800 R.P.M.
245 C.F.M. at 3600 R.P.M.

STOKES PENNWALT
DWG. NO. D-425-551-1

Model 900-310-401 DIRECT DRIVE VACUUM BOOSTER

Lot no. SC-78162 **to**

Sym.	Qty.	Part no.	Description
1	1	D-423-898-1	Motor Support
1A	1*+	085-38-990	"O" Ring — 156 √1 Tow
1B	1*+	022-2-240	"O" Ring — 228 √1 Tow
2	1	A-424-663-3	Port Cover
3	1	F-424-697-1	Seal Housing
4	1*+	085-37-861	Oil Seal
4A	1*+	A-426-390-1	Seal Assembly
5	1	A-424-667-1	Clamp Collar
6	1	A-425-256-2	Drive End Slinger
8	3	A-425-019-1	Shaft Spacer
9	3*+	085-37-646	Ball Bearing, Double Row
10	4+	085-37-653	Wave Washer
11	4+	A-425-037-1	Rotating Labyrinth Seal
12	4+	A-425-016-2	Stationary Labyrinth Seal
13	2	F-424-694-1	Bearing Housing
14	1	F-424-696-1	Pump Body
15	1+	D-423-871-5	Drive Impeller
16	3	A-425-011-2	Split Bearing Retainer
17	1	A-425-257-1	Gear End Slinger
18	2+	085-38-843	Arbor Shim (.062 Thk.)
19	2	A-424-651-6	Shaft Key
19A	2	A-424-680-3	Shaft Key
20	1+	085-38-257	Gear Set (1 R.H. and 1 L.H.) (Always change gears as sets)
21	3	A-423-894-1	Washer
22	1	D-424-698-1	Gear Cover
24	---	Arbor Shim Pack	Consists of the Following:
	1	085-38-844	Arbor Shim (.015 Thk.)
	1	085-38-845	Arbor Shim (.010 Thk.)
	4	085-38-846	Arbor Shim (.005 Thk.)
	5	085-38-847	Arbor Shim (.003 Thk.)
	1	085-39-031	Arbor Shim (.032 Thk.)
25	1+	D-423-873-4	Driven Impeller
26	1*+	085-37-645	Ball Bearing, Single Row

*Recommended spare part (wear items) + Parts normally stocked

Model 900-310-401 DIRECT DRIVE VACUUM BOOSTER

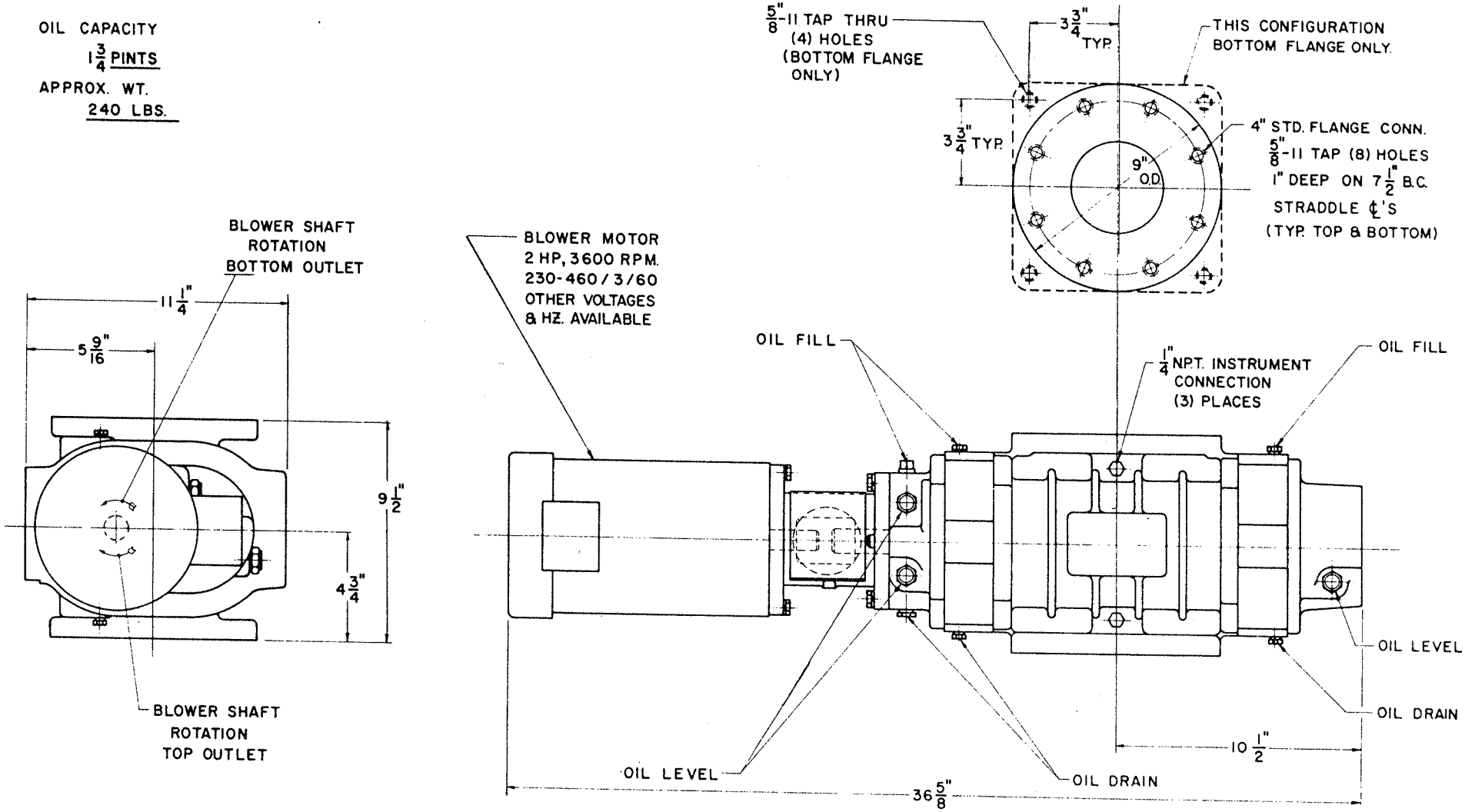
Lot no. SC-78162 **to**

Sym.	Qty.	Part no.	Description
27	3+	085-38-008	Sight Glass
28	1+	085-38-007	Breather Vent Plug
	1+	085-37-849	Shaft Coupling, 7/8" bore
	1*+	A-425-594-1	Seal Insertion Tool
			REFERENCE DRAWINGS
		B-0-306	Stokes Vacuum Booster Assembly
		B-0-307	Sectional View of Booster

*Recommended spare part (wear items)

+ Parts normally stocked

OIL CAPACITY
1 3/4 PINTS
APPROX. WT.
240 LBS.



DIRECT DRIVE VACUUM BOOSTER (400 CFM)

PRODUCT CODE 900-310-401

STOKES PENNWALT

DWG. NO. D-425-552-1

Model 900-306-1 BELT DRIVE VACUUM BOOSTER

Lot no. CD-81296 **to**

Sym.	Qty.	Part no.	Description
3	1	F-424-697-1	Seal Housing
4	1*+	085-37-861	Oil Seal
4A	1*+	A-426-390-1	Seal Assembly
5	1	A-424-667-1	Clamp Collar
6	1	A-425-256-2	Drive End Slinger
8	3	A-425-019-1	Shaft Spacer
9	3*+	085-37-646	Ball Bearing, Double Row
10	4+	085-37-653	Wave Washer
11	4+	A-425-037-1	Rotating Labyrinth Seal
12	4+	A-425-016-2	Stationary Labyrinth Seal
13	2	F-424-694-1	Bearing Housing
14	1	F-424-695-1	Pump Body
15	1+	D-423-872-4	Drive Impeller
16	3	A-425-011-2	Split Bearing Retainer
17	1	A-425-257-1	Gear End Slinger
18	2+	085-38-843	Arbor Shim (.062 thk.)
19	2	A-424-651-6	Shaft Key
19A	1	A-424-680-3	Shaft Key
20	1+	085-38-257	Gear Set (1 R.H. and 1 L.H.) (Always change gears as sets)
21	3	A-423-894-1	Washer
22	1	D-424-698-1	Gear Cover
24	---	Arbor Shim Pack	Consists of the Following:
	1	085-38-844	Arbor Shim (.015 Thk.)
	1	085-38-845	Arbor Shim (.010 Thk.)
	4	085-38-846	Arbor Shim (.005 Thk.)
	5	085-38-847	Arbor Shim (.003 Thk.)
	1	085-39-031	Arbor Shim (.032 Thk.)
25	1+	D-423-874-4	Driven Impeller
26	1*+	085-37-645	Ball Bearing, Single Row
27	3+	085-38-008	Sight Glass
28	1+	085-38-007	Breather Vent Plug
29	1	B-423-882-1	Reservoir Cover
30	1*+	B-423-883-1	Reservoir Cover Gasket

*Recommended spare part (wear items) + Parts normally stocked

Model 900-306-1 BELT DRIVE VACUUM BOOSTER

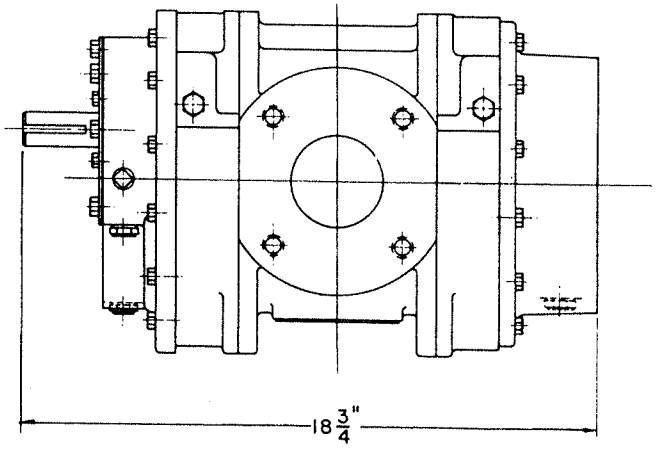
Lot no. CD-81296 **to**

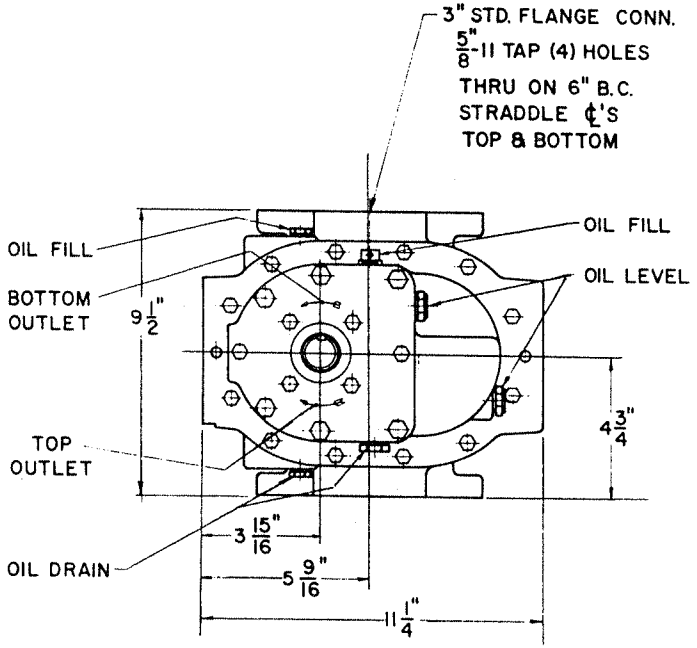
Sym.	Qty.	Part no.	Description
	1*+	A-425-594-1	Seal Insertion Tool
			REFERENCE DRAWINGS
		B-0-306	Stokes Vacuum Booster Assembly
		B-0-307	Sectional View of Booster

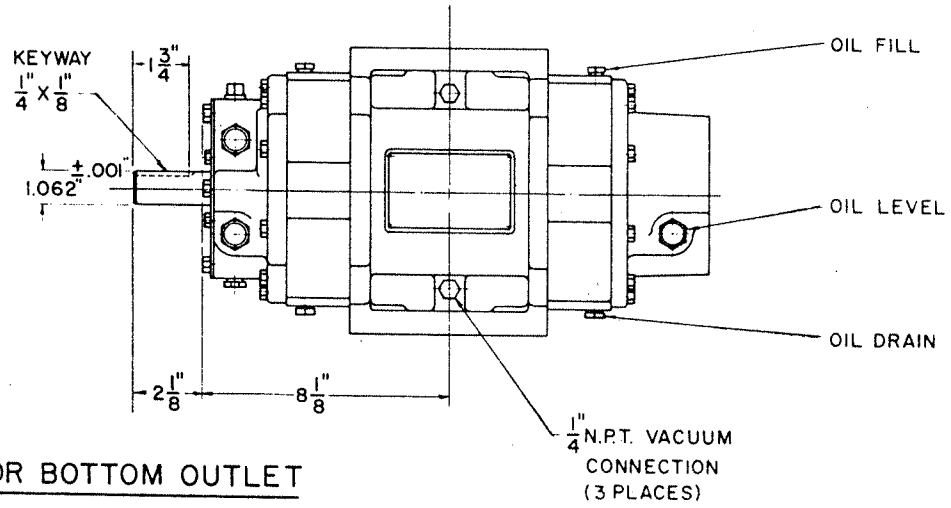
*Recommended spare part (wear items)

+ Parts normally stocked

OIL CAPACITY
1 3/4 PINTS
APPROX. WT.
150 LBS.







TOP OR BOTTOM OUTLET

PRODUCT CODE 900-306-1

125 C.F.M. at 1800 R.P.M.
245 C.F.M. at 3600 R.P.M.

BELT DRIVE VACUUM BOOSTER

STOKES
PENNWALT
DWG NO. D-425-291-1

Model 900-310-1 BELT DRIVE VACUUM BOOSTER

Lot no. CD-81296 **to**

Sym.	Qty.	Part no.	Description
3	1	F-424-697-1	Seal Housing
4	1*+	085-37-861	Oil Seal
4A	1*+	A-426-390-1	Seal Assembly
5	1	A-424-667-1	Clamp Collar
6	1	A-425-256-2	Drive End Slinger
8	3	A-425-019-1	Shaft Spacer
9	3*+	085-37-646	Ball Bearing, Double Row
10	4+	085-37-653	Wave Washer
11	4+	A-425-037-1	Rotating Labyrinth Seal
12	4+	A-425-016-2	Stationary Labyrinth Seal
13	2	F-424-694-1	Bearing Housing
14	1	F-424-695-1	Pump Body
15	1+	D-423-871-5	Drive Impeller
16	3	A-425-011-2	Split Bearing Retainer
17	1	A-425-257-1	Gear End Slinger
18	2+	085-38-843	Arbor Shim (.062 thk.)
19	2	A-424-651-6	Shaft Key
19A	1	A-424-680-3	Shaft Key
20	1+	085-38-257	Gear Set (1 R.H. and 1 L.H.) (Always change gears as sets)
21	3	A-423-894-1	Washer
22	1	D-424-698-1	Gear Cover
24	---	Arbor Shim Pack	Consists of the Following:
	1	085-38-844	Arbor Shim (.015 Thk.)
	1	085-38-845	Arbor Shim (.010 Thk.)
	4	085-38-846	Arbor Shim (.005 Thk.)
	5	085-38-847	Arbor Shim (.003 Thk.)
	1	085-39-031	Arbor Shim (.032 Thk.)
25	1+	D-423-873-4	Driven Impeller
26	1*+	085-37-645	Ball Bearing, Single Row
27	3+	085-38-008	Sight Glass
28	1+	085-38-007	Breather Vent Plug
29	1	B-423-882-1	Reservoir Cover
30	1*+	B-423-883-1	Reservoir Cover Gasket

*Recommended spare part (wear items) + Parts normally stocked

Model 900-310-1 BELT DRIVE VACUUM BOOSTER

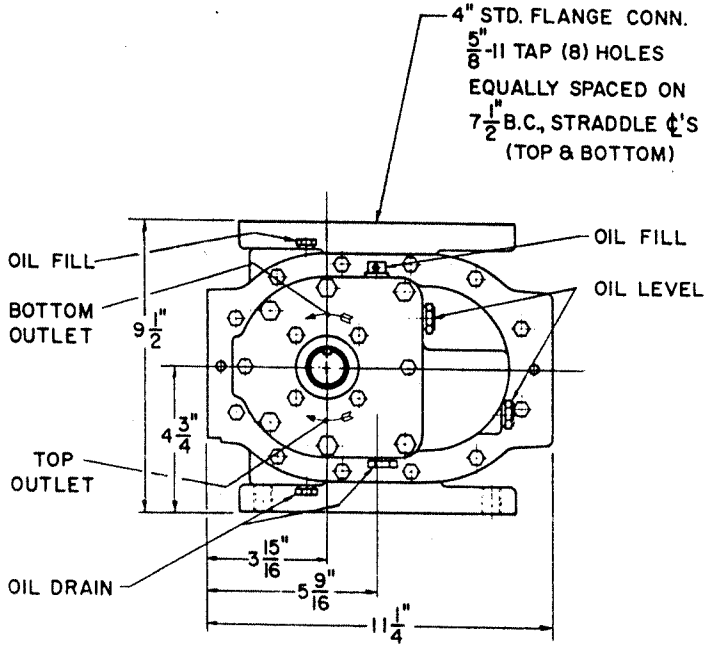
Lot no. CD-81296 **to**

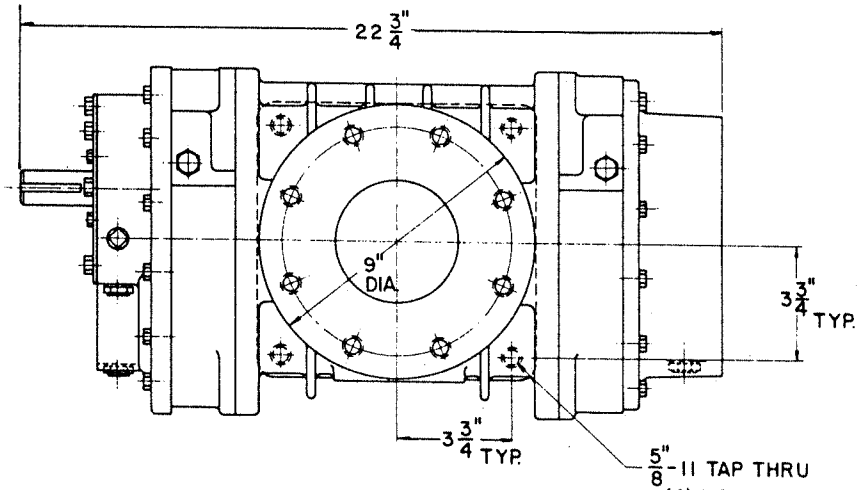
Sym.	Qty.	Part no.	Description
	1*+	A-425-594-1	Seal Insertion Tool
			REFERENCE DRAWINGS
		B-O-306	Stokes Vacuum Booster Assembly
		B-O-307	Sectional View of Booster

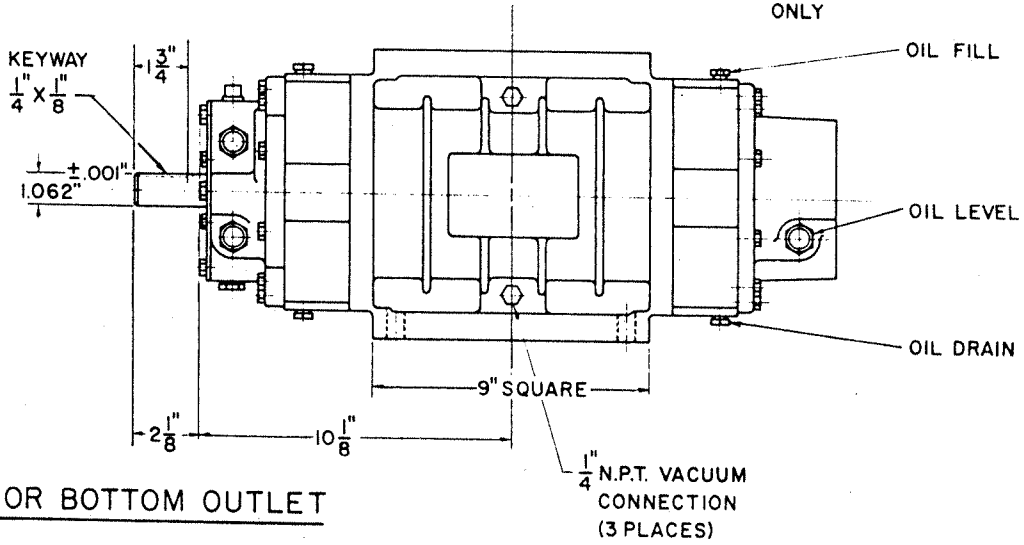
* Recommended spare part (wear items)

+ Parts normally stocked

OIL CAPACITY
1 3/4 PINTS
APPROX. WT.
190 LBS.







TOP OR BOTTOM OUTLET

PRODUCT CODE 900-310-1

400 C.F.M. at 3600 R.P.M.

BELT DRIVE VACUUM BOOSTER

STOKES
PENNWALT
DWG. NO. D-425-561-1

Model 900-306-402 HORIZONTAL FLOW BLOWER FOOT MOUNTING

Lot no. **to**

Sym.	Qty.	Part no.	Description
1	1	D-423-898-1	Motor Support
1A	1*+	085-38-990	"O" Ring
1B	1*+	022-2-240	"O" Ring
2	1	A-424-663-3	Port Cover
3	1	F-424-697-2	Seal Housing
4	1*+	085-37-861	Oil Seal
4A	1*+	A-426-390-1	Seal Assembly
5	1	A-424-667-1	Clamp Collar
6	1	A-425-256-2	Drive End Slinger
8	3	A-425-019-1	Shaft Spacer
9	3*+	085-37-646	Ball Bearing, Double Row
10	4+	085-37-653	Wave Washer
11	4+	A-425-037-1	Rotating Labyrinth Seal
12	4+	A-425-016-1	Stationary Labyrinth Seal
13	1	F-424-694-2	Bearing Housing (Gear End)
13A	1	F-424-694-3	Bearing Housing (Drive End)
14	1	F-424-695-3	Pump Body
15	1+	D-423-872-1	Drive Impeller
16	3	A-425-011-2	Split Bearing Retainer
17	1	A-425-257-1	Gear End Slinger
18	2+	085-38-843	Arbor Shim (.062 Thk.)
19	2	A-424-651-6	Shaft Key
19A	2	A-424-680-3	Shaft Key
20	1+	085-38-257	Gear Set (1 R.H. and 1 L.H.)(Always change gears as sets)
21	3	A-423-894-1	Washer
22	1	D-424-698-1	Gear Cover
24	---	Arbor Shim Pack	Consists of the Following:
	1	085-38-844	Arbor Shim (.015 Thk.)
	1	085-38-845	Arbor Shim (.010 Thk.)
	4	085-38-846	Arbor Shim (.005 Thk.)
	5	085-38-847	Arbor Shim (.003 Thk.)
	1	085-39-031	Arbor Shim (.032 Thk.)
25	1+	D-424-874-4	Driven Impeller
26	1*+	085-37-645	Ball Bearing, Single Row

*Recommended spare part (wear items) + Parts normally stocked

Model 900-306-402 HORIZONTAL FLOW BLOWER FOOT MOUNTING

Lot no. **to**

Sym.	Qty.	Part no.	Description
27	2*	A-426-108-1	Sight Glass
27A	2*	A-426-373-1	Sight Glass Plate
27B	2*	A-426-109-1	Sight Glass Gasket
28	1+	085-38-007	Breather Vent Plug
29	2	A-426-114-1	Mounting Foot
	1+	085-37-849	Shaft Coupling
	1*+	A-425-594-1	Seal Insertion Tool
			Reference Drawing
		B-0-306	Stokes Vacuum Booster Assembly

*Recommended spare part (wear items)

+ Parts normally stocked

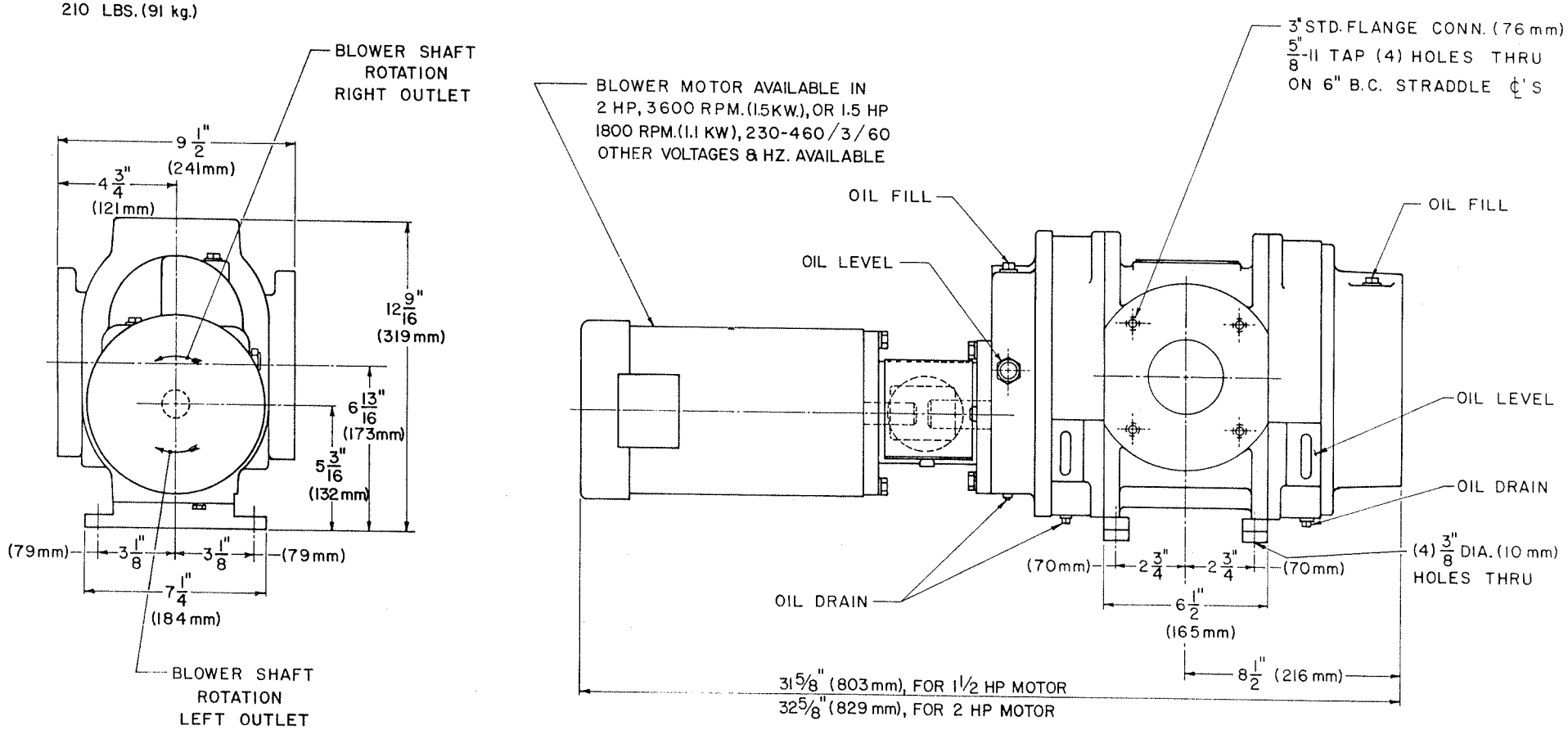
See Special Discount Offer Enclosed

OIL CAPACITY:

$1\frac{3}{4}$ PINTS (0.8 LITER)

APPROX. WT.:

210 LBS. (91 kg.)



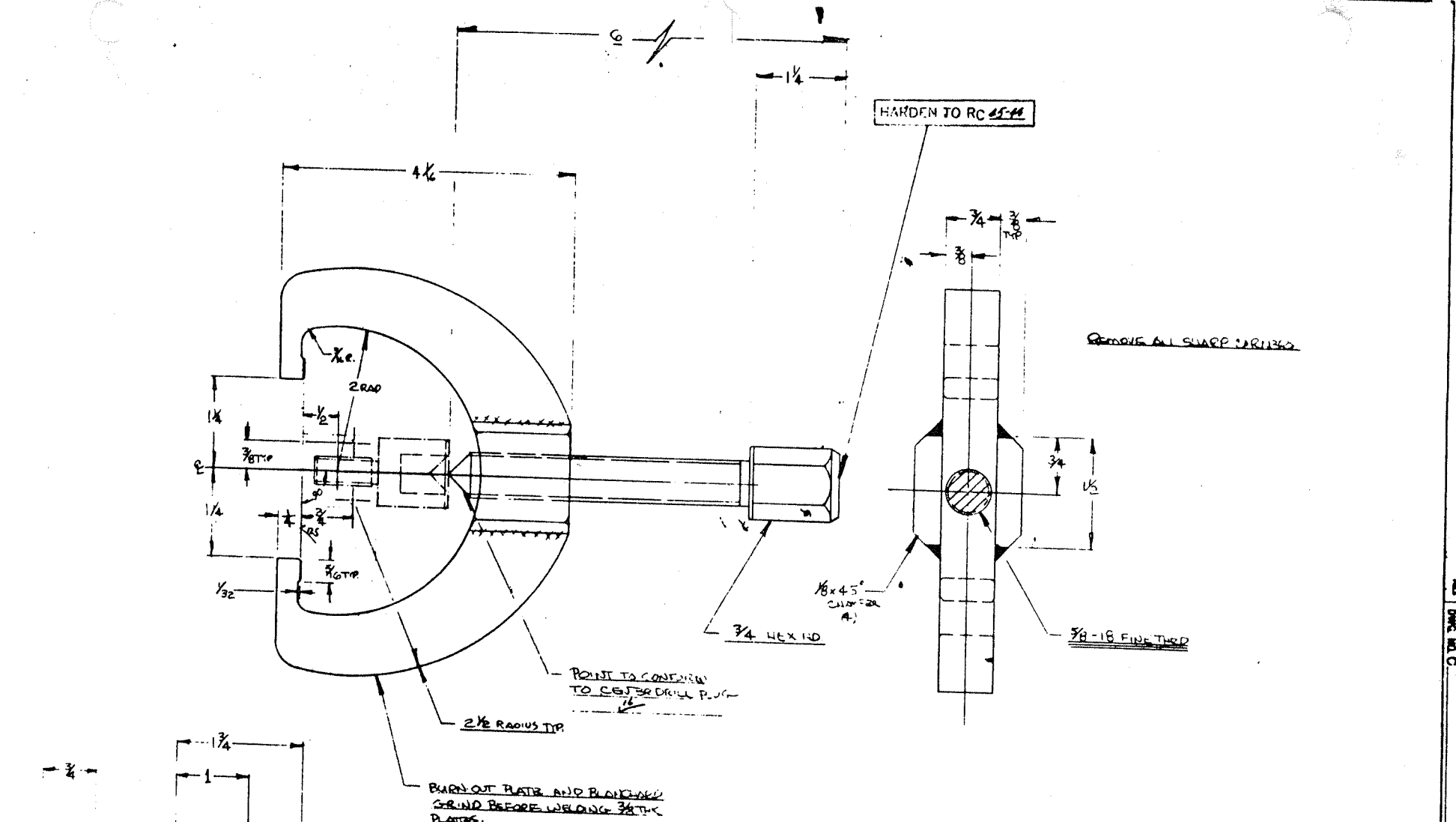
DIRECT DRIVE BLOWER

PRODUCT CODE 900-306-404	125 C.F.M. (212 M^3/HR.) at 1800 R.P.M.
PRODUCT CODE 900-306-402	245 C.F.M. (415 M^3/HR.) at 3600 R.P.M.

STOKES PENNWALT

DWG. NO. D-425-551-3

B.K. 12-22-81



	11				
	10				
	9				
	8				
	7				
	6				
	5				
1	4	PLUG	4140	1 DIA x 1 3/4 LG	
1	3	SCREW	4140	1 DIA x 6 LG	
2	2	BLR	HRS	3/8 x 1 1/2 x 1 1/4	
1	1	PLATE	HRS	3/4 x 4 5/16 x 5 3/4 BURN OUT	
QTY		ITEM	MATERIAL	DESCRIPTION	NOTE

STAMP:
TOOL NO. C-402-285
PRODUCT CODE: 900-302-310
ORDER NO.
PRODUCTION DWGS C-425-725-16
C-425-777-11

THIS PLUG MADE TO PROTECT 306-310 IMPELLER THREAD

HARDEN TO RC 25

REVISED TOLERANCE BLOCK 1-1-72

TOLERANCES (UNLESS OTHERWISE NOTED)
WELDING DIMENSIONS ± 1/8" UP TO 60" ± 1/4" OVER 60"
MACHINING DIMENSIONS FRACTIONAL ± 1/64 DECIMAL ± .005 ANGULAR ± 1/2°
THREADS CLASS 2
FINISHES unless otherwise noted
63 = 125 MICROINCHES
125 MICROINCHES
63 MICROINCHES

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DESCRIPTIVE TITLE: GEAR PULLER 306-310 AMP
DRAWN BY: MW. DATE: 9/14/81 SCALE:
CHECKED BY: DATE:
APPROVED BY: DATE:
APPROVED BY: DATE: S. G.

		B
		A
QUAN	APP	REVISIONS

PENNWALT STORES
DEPARTMENT OF CHEMICALS & HEALTH PRODUCTS
3000 TABOR ROAD, PHILADELPHIA, PA. 19120

C-402-285

Model 900-310-402 HORIZONTAL FLOW BLOWER FOOT MOUNTING

Lot no. **to**

Sym.	Qty.	Part no.	Description
27	2*	A-426-108-1	Sight Glass
27A	2*	A-426-373-1	Sight Glass Plate
27B	2*	A-426-109-1	Sight Glass Gasket
28	1+	085-38-007	Breather Vent Plug
29	2	A-426-114-1	Mounting Foot
	1+	085-37-849	Shaft Coupling
	1*+	A-425-594-1	Seal Insertion Tool
			Reference Drawing
		B-0-306	Stokes Vacuum Booster Assembly

*Recommended spare part (wear items)

+ Parts normally stocked

See Special Discount Offer Enclosed

Model 900-310-402 HORIZONTAL FLOW BLOWER FOOT MOUNTING

Lot no. to

Sym.	Qty.	Part no.	Description
1	1	D-423-898-1	Motor Support
1A	1*+	085-38-990	"O" Ring
1B	1*+	022-2-240	"O" Ring
2	1	A-424-663-3	Port Cover
3	1	F-424-697-2	Seal Housing
4	1*+	085-37-861	Oil Seal
4A	1*+	A-426-390-1	Seal Assembly
5	1	A-424-667-1	Clamp Collar
6	1	A-425-256-2	Drive End Slinger
8	3	A-425-019-1	Shaft Spacer
9	3*+	085-37-646	Ball Bearing, Double Row
10	4+	085-37-653	Wave Washer
11	4+	A-425-037-1	Rotating Labyrinth Seal
12	4+	A-425-016-2	Stationary Labyrinth Seal
13	1	F-424-694-2	Bearing Housing (Gear End)
13A	1	F-424-694-3	Bearing Housing (Drive End)
14	1	F-424-696-2	Pump Body
15	1+	D-423-872-4	Drive Impeller
16	3	A-425-011-2	Split Bearing Retainer
17	1	A-425-257-1	Gear End Slinger
18	2+	085-38-843	Arbor Shim (.062 Thk.)
19	2	A-424-651-6	Shaft Key
19A	2	A-424-680-3	Shaft Key
20	1+	085-38-257	Gear Set (1 R.H. and 1 L.H.)(Always change gears as sets)
21	3	A-423-894-1	Washer
22	1	D-424-698-1	Gear Cover
24	---	Arbor Shim Pack	Consists of the Following:
	1	085-38-844	Arbor Shim (.015 Thk.)
	1	085-38-845	Arbor Shim (.010 Thk.)
	4	085-38-846	Arbor Shim (.005 Thk.)
	5	085-38-847	Arbor Shim (.003 Thk.)
	1	085-39-031	Arbor Shim (.032 Thk.)
25	1+	D-424-873-4	Driven Impeller
26	1*+	085-37-645	Ball Bearing, Single Row

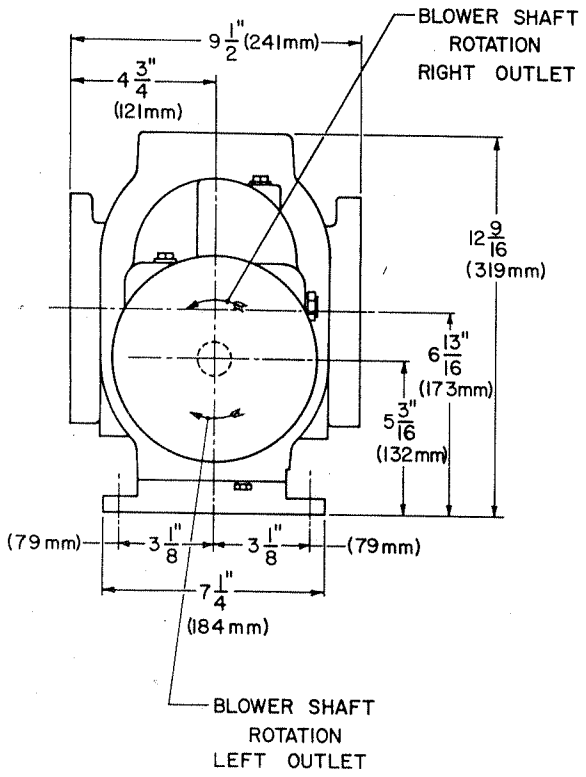
*Recommended spare part (wear items) + Parts normally stocked

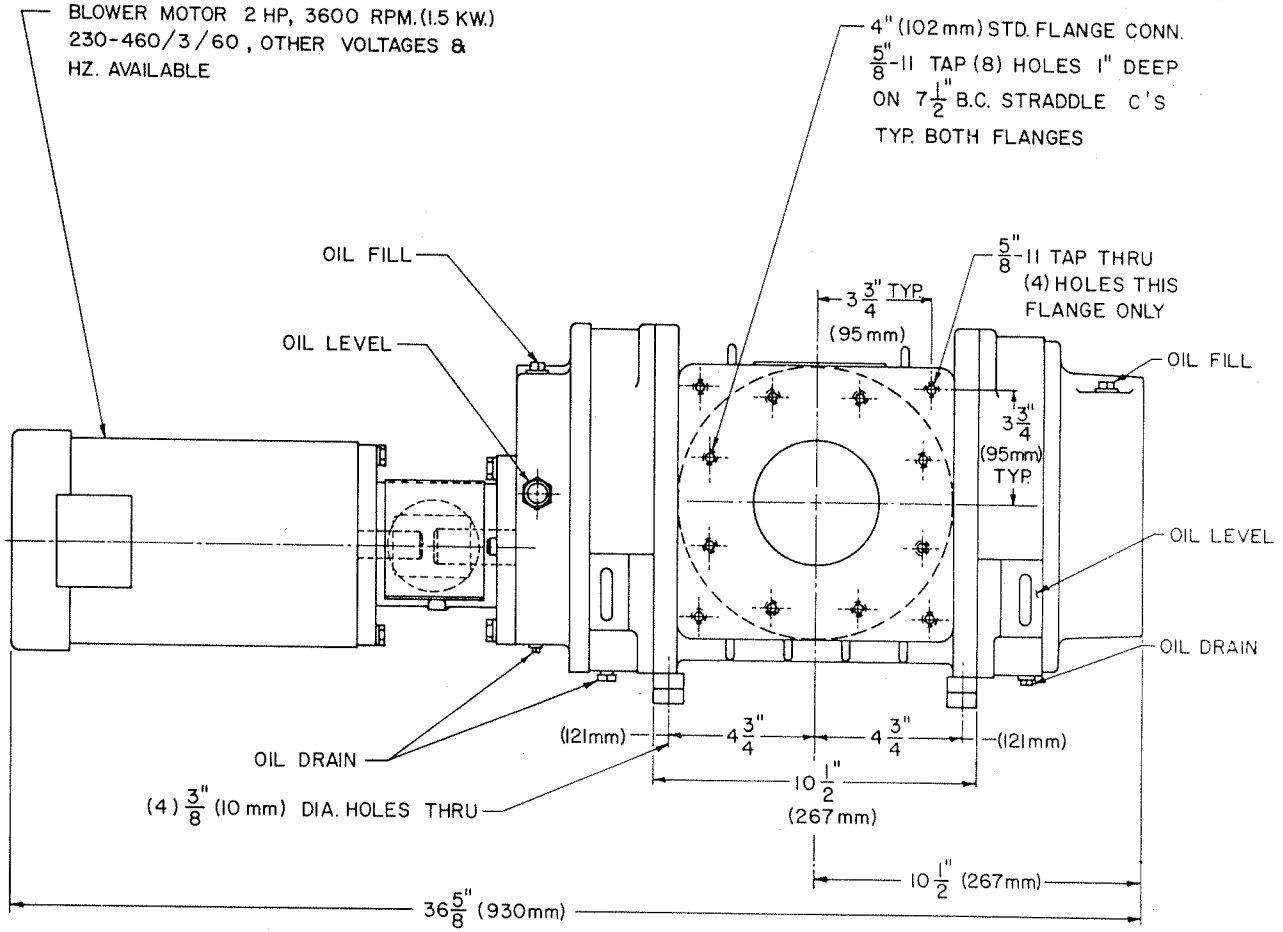
OIL CAPACITY:

$1\frac{3}{4}$ PINTS (0.8 LITER)

APPROX. WT.:

250 LBS. (109 kg)





DIRECT DRIVE BLOWER (400 C.F.M.)(680 M^3/HR)

PRODUCT CODE 900-310-402

STOKES PENNWALT

DWG. NO. D-425-552-2

B.K. 1-6-82