



CENTRIFUGAL FANS
Ventilating / Industrial

SERVICE MANUAL

SECTION II

FOUNDATIONS ASSEMBLY INSTALLATION

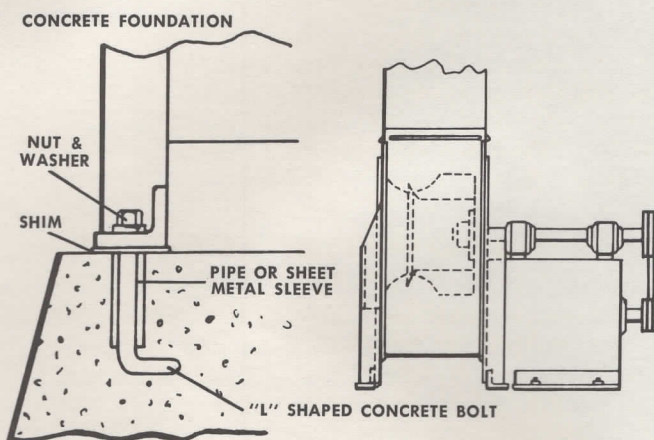
FOUNDATIONS

A rigid, level foundation is a must for every fan. It assures permanent alignment of fan and driving equipment and freedom from excessive vibration, minimizing maintenance costs. The sub-foundation (soil, stone, rock, etc.) should be firm enough to prevent uneven settlement of the structure. Foundation bolt locations are found on the assembly drawing.

POURED CONCRETE FOUNDATIONS RECOMMENDED

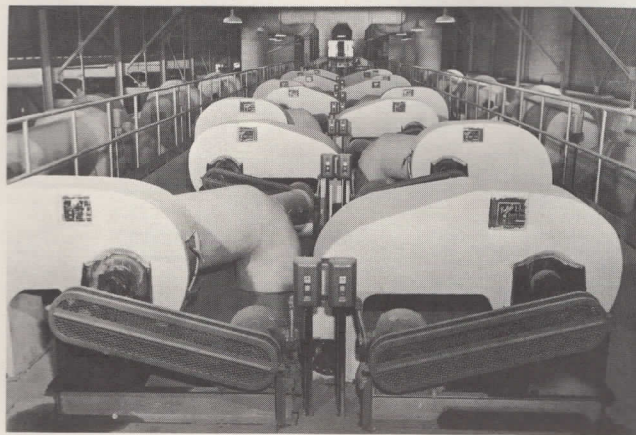
Poured concrete under the fan and all drive components is the best fan foundation. A generally accepted rule of thumb is that the weight of concrete foundation be at least three (3) times the total weight of the equipment it will support. This weight acts as an inertia block to stabilize the foundation. Where the ground is soft, the foundation should be flared or the footing course increased in size to resist settling. The top should extend at least 6 inches outside the outline of the fan base and should be beveled on the edges to prevent chipping.

Anchor bolts in concrete should be L or T-shaped. They should be placed in pipe or sheet metal sleeves approximately 2" larger in diameter than the anchor bolts to allow for adjustment in bolt location after the concrete has set. In estimating the length of bolts, allow for the thickness of nut and washers, thickness of fan base, extra threads for draw down and approximately 1" for grout and shims.



EQUIPMENT MOUNTED FANS

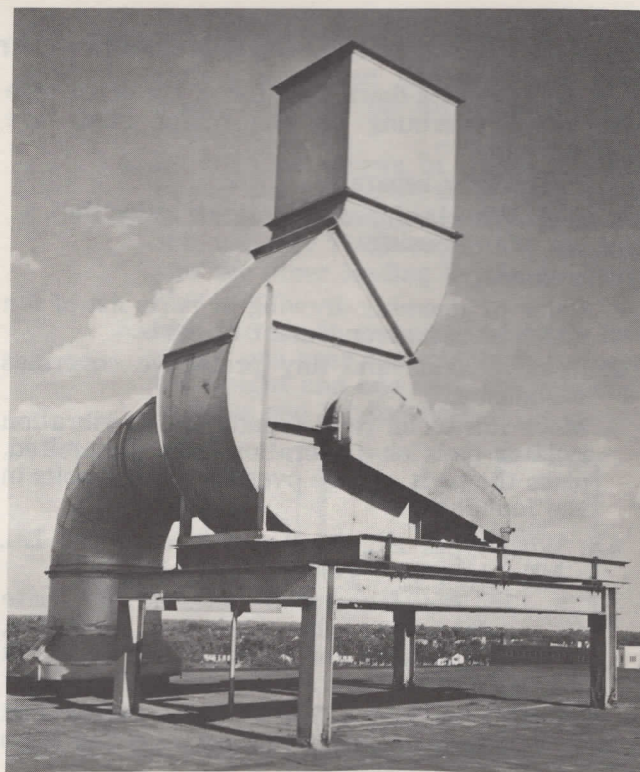
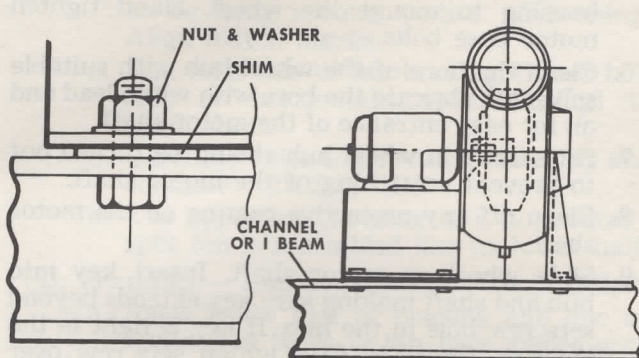
If the fan is mounted on equipment having parts which cause vibration, it is very important the fan support be rigid enough to prevent such vibration being carried to the fan. The resonant frequency of the support should avoid the fan running speed by at least 10%. It may be advisable to use vibration isolators under the fan.



STRUCTURAL STEEL FOUNDATION

When a structural steel foundation is necessary, it should be sufficiently rigid to assure permanent alignment. It must be designed to carry, with minimum deflection, the weight of the equipment plus the loads imposed by centrifugal forces set up by the rotating elements. We recommend welded, riveted, or suitably locked structural bolted construction to best resist vibration.

Fans installed above ground level should be located near to or above a rigid wall or heavy column. An overhead platform or support must be rigidly constructed, level and sturdily braced in all directions.



ASSEMBLY AND INSTALLATION

Fans and blowers are shipped:

1. Completely assembled
2. Partially knocked-down
3. Completely knocked-down.

Knocked-down fans are disassembled and the parts match-marked for easy field assembly. When installing units allow ample space for removal of wheel, lubrication of bearings, adjustment of motor base and inspection or servicing of complete unit.

UNITS SHIPPED COMPLETELY ASSEMBLED, Arr. 1, 2, 3, 4, 7, 8, 9, 10.

1. Remove skids and any protective coverings over bearings or housing.
2. Move fan to its rigid foundation. If vibration isolator pads or a vibration base is required, place the pads or base over the anchor bolts in the foundation. Line up foundation holes in fan base angles with anchor bolts and lower fan (be careful not to strip threads). Level unit with spirit level by shimming where necessary. Tighten nuts on all anchor bolts.
3. The fan is now ready to be connected into the system. See the OPERATION SECTION.

UNITS SHIPPED PARTIALLY KNOCKED-DOWN — Arr. 1, 2, 3, 7, 8, 9, 10.

Fans and blowers shipped partially knocked-down may have parts shipped as follows:

1. Fan section with housing, wheel, bearings and shaft assembled.
2. If split housing fan — top half removed.

3. Motor, coupling or V-belt drive separate.
4. Outlet damper, butterfly valve, screens, etc. separate.

To assemble:

1. Remove skids and any protective coverings over bearings or housing.
2. Move fan to its rigid foundation. If vibration isolator pads or a vibration base is required, place the pads or base over the anchor bolts in the foundation. Line up foundation holes in fan base angles with anchor bolts and lower fan, being careful not to strip threads. Level housing with spirit level by shimming where necessary. Tighten nuts on all anchor bolts.
3. If motor is not mounted, place motor in position on its base, align, shim where necessary and bolt down. See MOTOR SECTION.
4. If coupling has to be mounted, assemble half couplings on their shafts and align according to the COUPLING SECTION.
5. If fan is V-belt driven and drive is not mounted, assemble sheaves on their shafts and line up V-belts with proper tension. See V-BELT DRIVE SECTION.
6. If housing is split with top half removed, lower top half housing into position over bottom half housing being careful not to damage wheel or scratch shaft. Then bolt two halves together.
7. If outlet damper, butterfly valve, coupling guard or inlet screen is required, bolt these in position on the fan.
8. The fan is now ready to be connected into the system. See the OPERATION SECTION. If a belt guard is required, it can be mounted after system has been balanced.

ASSEMBLY AND INSTALLATION (Cont.)

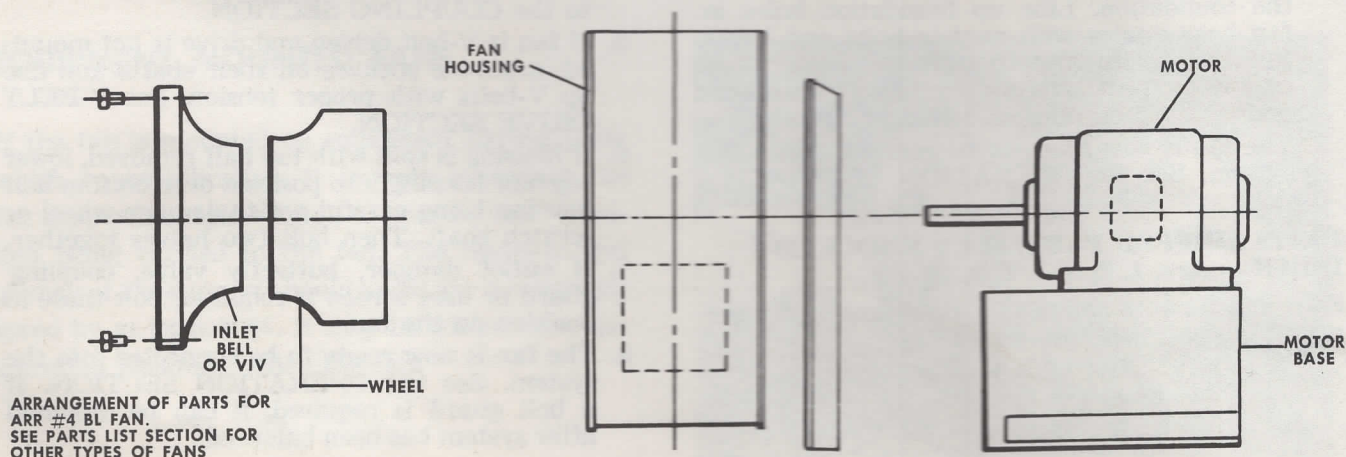
PARTIALLY KNOCKED-DOWN FANS — Arrangement 4

Partially knocked-down fans for direct drive with the wheel overhung on the motor shaft are shipped with:

1. Motor separate
2. Wheel shipped separate or inside the fan housing

To assemble:

1. Refer to assembly drawing or parts list of fan which shows arrangement of parts.
2. Remove skids and any protective coverings on housing.
3. Move fan to its rigid foundation. If vibration isolator pads or a vibration base is required, place the pads or base over the anchor bolts in the foundation.
- 4A. With types BL, BL-Aerofoil, cast iron LL, MW, AW, OW, Volume, R and CB fans:
 - a. Line up foundation holes in fan base angles with anchor bolts and lower fan, being careful not to strip threads. Hand tighten nuts on anchor bolts.
 - b. Remove inlet bell, inlet stand and/or inlet side plate by removing bolts holding them to the housing.
 - c. Remove wheel from housing or from its crate if shipped separately. Continue with Step 5.
- 4B. With types E and RE Fans:
 - a. Line up foundation holes in motor base angles with anchor bolts and lower fan, being careful not to strip threads. Hand tighten nuts on the anchor bolts.
 - b. Remove inlet side of housing (including inlet bell) by removing bolts holding it to drive side of housing.
 - c. Remove wheel from housing or from its crate if shipped separately. Continue with Step 5.
- 4C. With Baby Vent Sets:
 - a. Place housing with inlet collar on floor.
 - b. Remove motor base and drive side stand, if not already separate when received.
 - c. Place wheel into housing through drive side opening, keeping wheel hub toward you.
- d. Replace motor base and drive side stand and bolt to fan housing.
- e. Stand fan up, being careful not to damage loose wheel. Line up foundation holes in motor base angles with anchor bolts and lower fan being careful not to strip threads. Level unit with spirit level by shimming where necessary. Tighten nuts on all anchor bolts.
5. Now mount motor on its base so that the motor shaft is centered in the fan housing shaft hole and extends far enough into the housing to mount the wheel. Hand tighten motor base bolts.
6. Clean the bore of the wheel hub with suitable solvent. Lubricate the bore with white lead and oil for easy entrance of the motor shaft.
7. Set screws in wheel hub should be turned out to prevent scratching of the motor shaft.
8. Clean off any protective coating on the motor shaft.
9. Slide wheel on motor shaft. Insert key into hub and shaft making sure key extends beyond setscrew hole in the hub. If key is tight in the keyway, file it to fit. Tighten setscrew over keyway only. The second setscrew leading rotation will be tightened after final alignment.
10. Replace inlet bell, inlet stand, inlet sideplate or inlet side of fan housing. Use a sealer between the two mating surfaces on high pressure Type R, CB, E and RE fans.
11. Level fan housing on foundation with spirit level by shimming where necessary. Tighten nuts on all anchor bolts.
12. Adjust wheel on motor shaft to give proper fit between wheel and fan housing. Re-shim the motor if wheel is high or low in fan housing. See ALIGNMENT SECTION.
13. When alignment is achieved and wheel does not strike housing, tighten nuts on motor base bolts, second set screw leading the key in direction of rotation and set screw over keyway.
14. If outlet damper, inlet screen, shaft seal or butterfly valve (on Types R and CB fans) is required, bolt these in position on the fan.
15. The fan is now ready to be connected into the system. See the OPERATION SECTION.



COMPLETELY KNOCKED-DOWN FANS — Arrangement 1, 3, 7, 8, 9.

1. Remove all parts from their crates or skids. Refer to assembly drawing or parts list.
2. If vibration isolator pads or a vibration base is required, place the pads or base over the anchor bolts in the foundation.
- 3A. Housings — Bolted Scroll Construction.

- a. Lay suitable length of 4 x 6 timber on floor. Using holes in fan bracing for crane hooks, lay the **drive side** of the fan housing (lower half only on horizontally split housing) on the timber with inside housing facing up.
- b. Bolt scroll sheet to scroll angle on the inside of fan housing. The scroll sheet has to be bent around outline of housing. Align match marks.
- c. Bolt **inlet side** of fan housing (lower half only on horizontally split housing) to scroll sheet.
- d. Carefully raise this housing assembly and continue with Step 3B.
- e. The upper half housing of a horizontally split fan is assembled like its lower half.

3B. Housings — Horizontal and/or Vertical Split

- a. Raise lower half of housing and line up foundation holes in fan base angles with anchor bolts. Lower housing over anchor bolts being careful not to strip threads. Level with spirit level by shimming where necessary. Tighten nuts on all anchor bolts.
- b. Bolt vertically split sections together.

3C. Housings — Completely Assembled

- a. Raise housing into position and line up foundation holes in fan base angles with anchor bolts. Lower housing over anchor bolts being careful not to strip threads. Level housing with spirit level by shimming where necessary. Tighten nuts on all anchor bolts.
- 4A. If Arrangement 1, 7, 8 and 9 fans are shipped with bearing or motor base separate, move bases into position on the foundation. Shim where necessary to level and tighten nuts on anchor bolts.
- 4B. If Arrangement 1, 3, 7, 8 and 9 fans have separate bearing pedestals and soleplates, place them in position on the foundation. The "held" bearing pedestal should be set level at the correct elevation.
- 4C. Standard Arrangement 3 and 7 fans have bearing supports on the fan bracing or in the inlet collar.

5. Shaft and Wheel

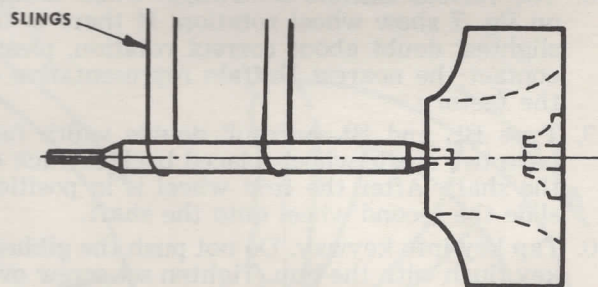
a. When received assembled:

1. Remove protective coating with solvent on bearing areas of shaft and coat with clean oil. **DO NOT TOUCH CLEAN BEARING AREAS OF SHAFT WITH BARE HAND** as perspiration can easily cause discoloration, oxidation and pitting.

b. When received disassembled:

1. Remove protective coating on shaft.

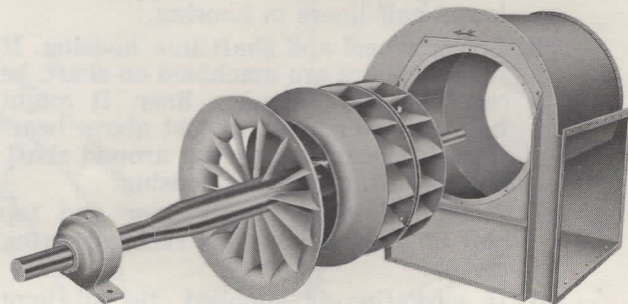
2. Remove key or keys from the shaft.
3. Carefully clean inside of wheel hub with solvent and lubricate bore with white lead and oil for ease of shaft entrance.
4. Be sure set screws in wheel hub are turned out to prevent scratching shaft. If three set screw holes appear in the hub, use only TWO — one over the key and the other leading key in direction of rotation.
5. Lift the shaft and support with two slings, one near the middle to support the weight and one near the coupling or drive end for balance.



6. The inlet bells or variable inlet vanes (VIV) are sometimes mounted with the wheel.

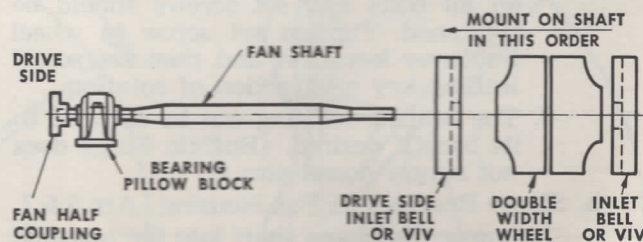
a. Fan Housing Not Split

Inlet bells or VIV should be mounted on the shaft **AFTER** wheel and shaft are placed in the fan housing.



b. Fan Housing Split. Coupling and Adjacent Bearing Shipped Mounted On Shaft. Double Inlet Only.

Before mounting wheel on shaft, the drive side inlet bell or VIV must be slipped over shaft into place. Use rags or paper on shaft for VIV to rest on. This will prevent scratches. Mount wheel or wheels as described in Step 7. Slip remaining VIV or inlet bell into place on the shaft.



c. Fan Housing Split, No Coupling or Bearings Mounted

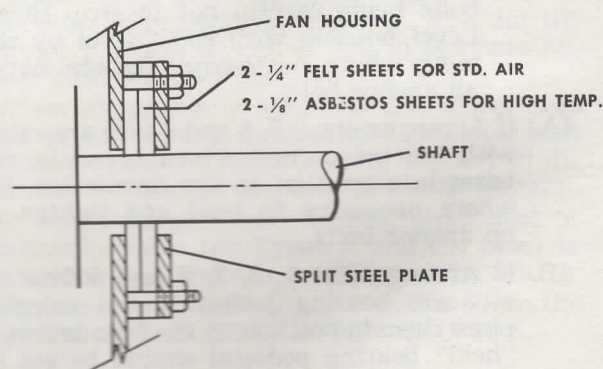
After wheel is mounted on the shaft as

ASSEMBLY AND INSTALLATION (Cont.)

- described in Step 7, the inlet bells or VIV's should be positioned on the shaft. Protect the shaft from scratches.
7. Slide the shaft into the wheel. **MAKE SURE ROTATION ARROW** painted, stamped or fastened on the fan housing **CORRESPONDS TO ARROW PAINTED ON WHEEL**. Slide inlet bells or VIV's into position as described in Step 6. The rotation arrow on the inlet bell or VIV must correspond with the mark on the fan housing and wheel. Motor overloading may result if the vanes in the inlet bell or VIV cause the air to whirl **against** wheel rotation.
 8. The various Buffalo centrifugal wheel designs on Pg. 7 show wheel rotation. If there is the slightest doubt about correct rotation, please contact the nearest Buffalo representative or the factory.
 9. Type BL and BL-Aerofoil double width fans have two single wheels placed back to back on the shaft. After the first wheel is in position, slide the second wheel onto the shaft.
 10. Tap key into keyway. Do not push the gibhead key flush with the hub. Tighten set screw over key with only enough pressure to hold wheel in position while placing shaft in bearings.
 11. Wheel and Shaft Into Split Fan Housing
 - a. Fan with Sleeve bearings — Arr. 1, 8, 9 and Arr. 3 & 7 with independent pedestals.
 1. Bolt and hand tighten lower halves of bearing housing on its support. Place lower half liners in housing.
 2. Lower wheel and shaft into housing. If thrust collars are machined on shaft, be careful not to damage liner. It might help to lower shaft to just above bearings, lift bearing liner up around shaft and lower into bearing housing.
 3. Install oil rings, upper liner and top half of bearing housings (keeps bearing clean).
 4. If gasketing is supplied, tie all joint gaskets in place on lower fan housing.
 5. Lower upper fan housing into place and bolt up. Bolt inlet bells or VIV's, which are loose on the shaft, to fan housing.
 6. Adjust wheels and inlet bells for correct alignment. Shim bearing housings, if necessary, and align sleeve bearings. (See ALIGNMENT SECTION and BEARING SECTION.)
 7. After final alignment is attained, nuts on all bolts and set screws should be tightened. Tighten set screw in wheel hub over key first and then set screw leading key in direction of rotation.
 8. The bearing housing can be doweled to its base if desired. (Buffalo Forge does not supply dowel pins.)
 - b. Sleeve Bearings on Fan Housing—Arr. 3 & 7.
 1. Lower wheel and shaft into fan housing. Bolt lower half of both inlet bells or VIV's to fan housing. Wood blocks can be placed under the shaft to help support it while bolting inlet bells or VIV's.
 2. Now bolt and hand tighten lower halves of bearing housing on its support. Place lower half liners in housing.
 3. Continue Steps 11a-2 - 11a-8.
 - c. Fan With Split Pillow Block Anti-Friction Bearings.

The procedure is similar to Step 11a except the balls and races or rollers and races are put on the shaft **BEFORE** lowering wheel and shaft into position.
 - d. Fan With Solid Pillow Block Anti-Friction Bearings.

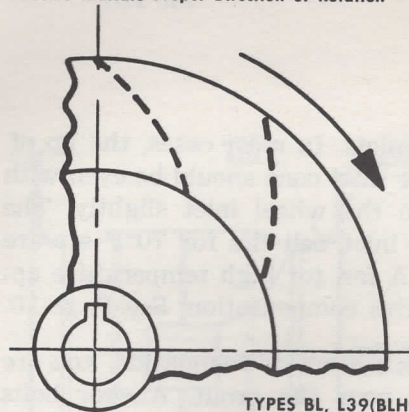
The procedure is similar to Step 11a except the complete pillow block is assembled on the shaft **BEFORE** lowering wheel and shaft into position.
 12. Wheel and Shaft Into Fan Housing — **NOT SPLIT**
 - a. Place wheel and shaft into fan housing through the fan inlet.
 - b. Place inlet bells or VIV's in position over the shaft and bolt to housing.
 - c. Mount bearings on their supports, align inlet bell or VIV with wheel, align bearings, shim pillow blocks where necessary and tighten nuts on all bolts. (SEE BEARING SECTION AND ALIGNMENT SECTION.)
 - d. Tighten set screw in wheel hub over key after final alignment and then tighten set screw leading key in direction of rotation.
 13. If a **shaft seal** is required, bolt assembly to fan housing. Make sure asbestos or felt seal seats itself around the shaft to prevent air leakage.



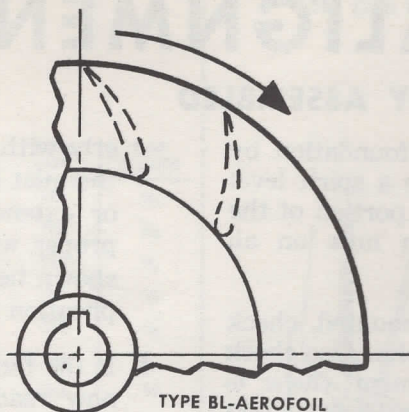
14. If fan has VIV's, assemble main control shaft and mechanism per assembly drawing. Check operating movement. (See VARIABLE INLET VANE SECTION.)
15. If outlet damper or inlet screens are required, bolt these in position to fan housing.
16. Mount motor on its base and connect to V-belt drive or couple to fan shaft. Mount coupling guard if required. (See MOTOR SECTION, V-BELT DRIVE SECTION and COUPLING SECTION.)
17. The fan is now ready to be connected into the system. (See the OPERATION SECTION.) If a belt guard is required, this can be fastened to fan after system has been balanced.

Arrows Indicate Proper Direction of Rotation

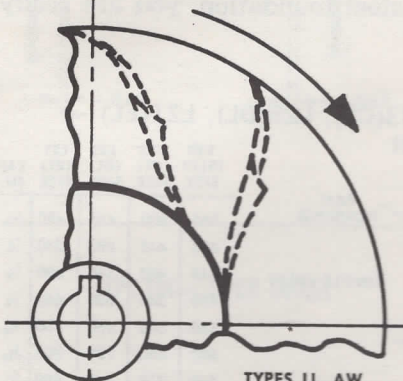
WHEEL DESIGNS AND ROTATIONS



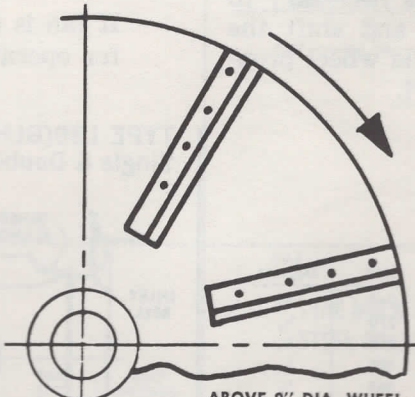
TYPES BL, L39(BLH),
L33(CL), L25(DL) & L21(EL)



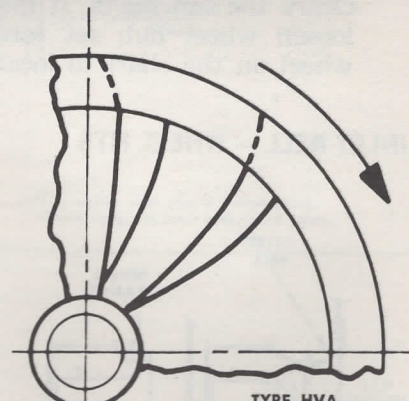
TYPE BL-AEROFOIL



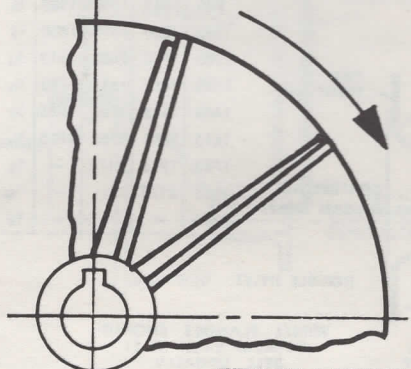
TYPES LL, AW
& BELTED VENT SET



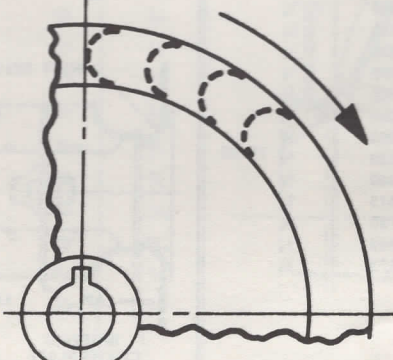
ABOVE 9" DIA. WHEEL -
TYPES 2E, 2EH,
3E & 4E
CONE WHEEL



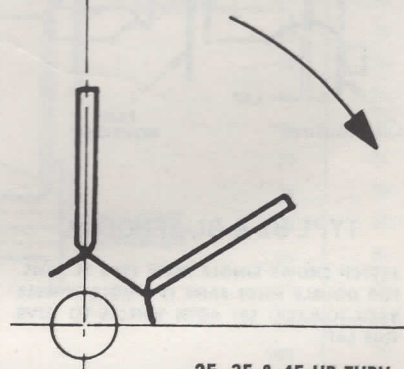
TYPE HVA



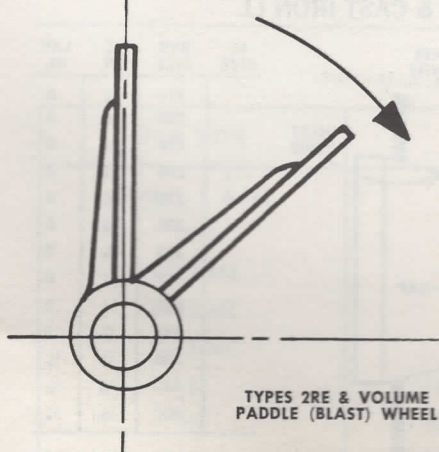
TYPES OW & VOLUME
OPEN & CONE WHEELS



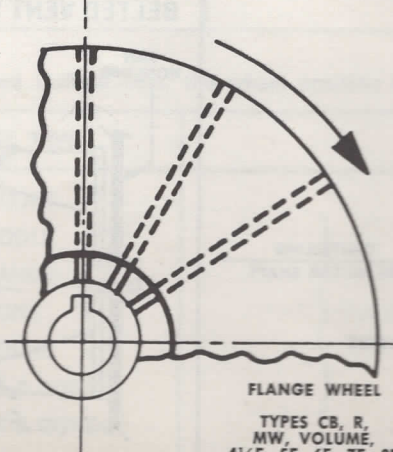
BABY VENT SET
& TYPE FC



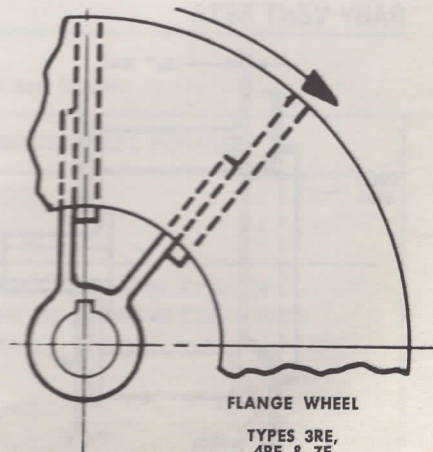
2E, 3E & 4E UP THRU
9" DIA.
PADDLE (BLAST) WHEEL



TYPES 2RE & VOLUME
PADDLE (BLAST) WHEEL



FLANGE WHEEL
TYPES CB, R,
MW, VOLUME,
4½E, 5E, 6E, 7E, 8E



FLANGE WHEEL
TYPES 3RE,
4RE & 7E

ALIGNMENT

UNITS SHIPPED COMPLETELY ASSEMBLED

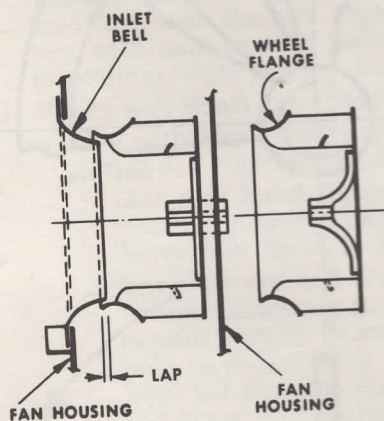
1. Level the fan housing on the foundation by shimming where necessary. Use a spirit level on the shaft or on a horizontal portion of the housing (base angle). Tighten nuts on all anchor bolts.
2. If fan is received with motor mounted, check tightness of motor hold down bolts. Also check coupling or V-belt drive alignment. (Refer to COUPLING SECTION or V-BELT DRIVE SECTION)
3. Spin wheel slowly by hand to see if fan wheel clears the fan inlets. It may be necessary to loosen wheel hub set screws and shift the wheel on the shaft to locate the wheel prop-

erly with the inlets. In most cases, the lip of the inlet bell or inlet cone should be even with or extend into the wheel inlet slightly. The proper wheel - inlet bell fits for 70°F air are shown below. A fan for high temperature application requires compensation. See Page 10.

4. If the fan is on a concrete foundation, you are now ready to pour the grout. Anchor bolts should be tight. After grout hardens, recheck for final level and alignment of all components.

If fan is on a steel foundation, you are ready for operation.

INLET BELL — WHEEL FITS

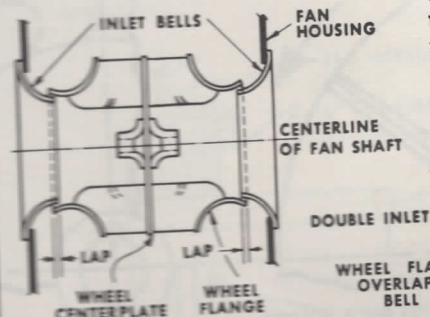
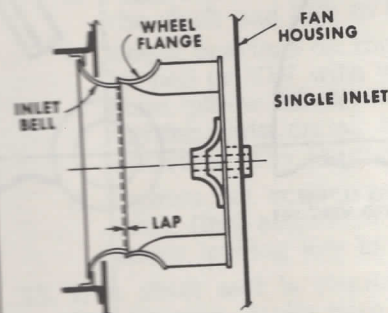


SIZE	LAP INCHES
245	3/8
270	3/8
300	3/8
330	3/8
365	3/8
400	3/8
445	3/8
490	3/8
540	3/8
600	3/8
660	3/8
730	3/8
805	3/8
890	3/8
980	3/8
1085	3/8
1200	3/8
1320	3/8
1460	3/8
1615	3/8
1780	3/8
1965	3/8
2175	3/8

TYPE BL & BL-AEROFOIL

SKETCH SHOWS SINGLE INLET TYPE BL FANS. FOR DOUBLE INLET FANS (2 SINGLE WHEELS BACK-TO-BACK) SET BOTH WHEELS TO GIVE THIS LAP.

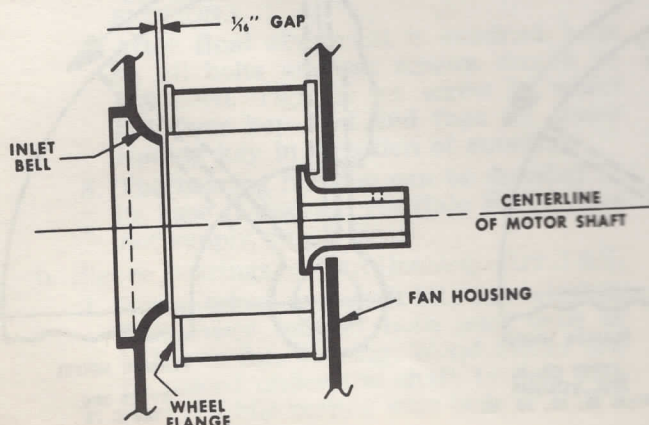
TYPE L39(BLH), L33(CL), L25(DL), L21(EL) — Single & Double Inlet



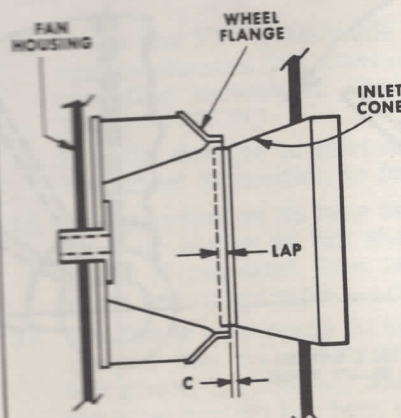
L39 (BLH) SIZE	L33 (CL) SIZE	L25 (DL) SIZE	L21 (EL) SIZE	LAP IN.
365	400	445	490	3/8
400	445	490	540	3/8
445	490	540	600	3/8
490	540	600	660	3/8
540	600	660	730	3/8
600	660	730	805	3/8
660	730	805	890	3/8
730	805	890	980	3/8
805	890	980	1085	3/8
890	980	1085	1200	3/8
980	1085	1200	1320	3/8
1085	1200	1320	1460	3/8
1200	1320	1460	1615	3/8
1320	1460	1615	1780	3/8
1460	1615	1780	1965	1/2
1615	1780	1965	2175	3/8
1780	1965	2175	—	5/8
1965	2175	—	—	1 1/8
2175	—	—	—	3/4

WHEEL FLANGES SHOULD OVERLAP EACH INLET BELL EQUALLY.

BABY VENT SETS

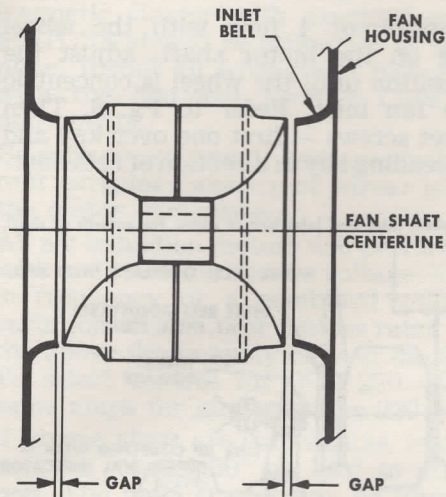


BELTED VENT SETS & CAST IRON LL



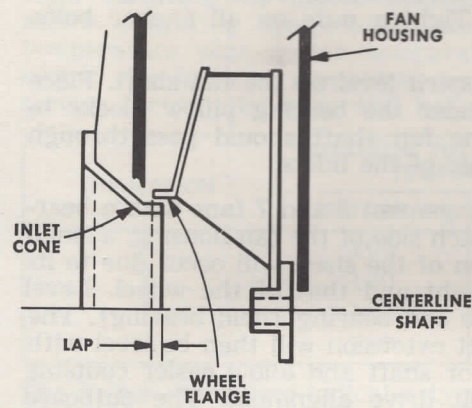
LL SIZE	BVS SIZE	C IN.	LAP IN.
175	3/8	0	0
200	3/8	0	0
225	3/8	0	0
250	3/8	0	0
275	3/8	0	0
300	1/4	0	0
325	1/2	0	0
375	1/2	0	0
400	1/2	0	0
450	1/2	0	0
500	1/4	1/4	1/4
550	3/2	3/2	3/2
600	1/4	1/4	1/4

TYPE HVA



HVA SIZE	GAP INCHES
121	$\frac{3}{16}$
122	$\frac{3}{16}$
123	$\frac{3}{16}$
151	$\frac{1}{4}$
152	$\frac{1}{4}$
153	$\frac{1}{4}$
181	$\frac{1}{4}$
182	$\frac{1}{4}$

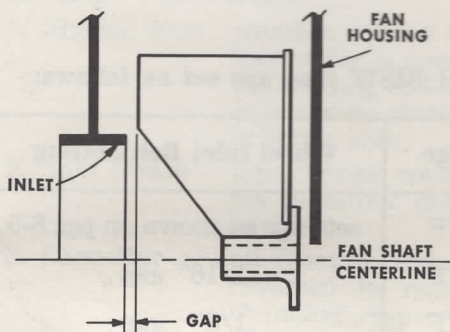
TYPE CB & R



CB DESIGN	LAP INCHES
1	*
2	*
3	*
4	*
4½	*
5	*

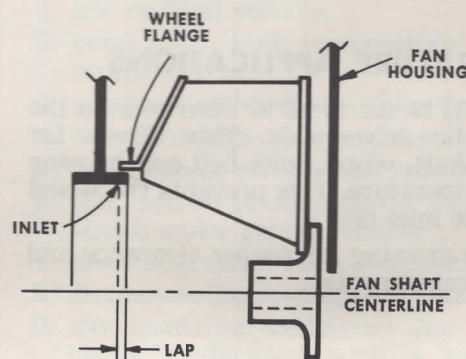
*Lap varies with size & temperature.
Check dwg. for each individual order.

TYPE OW - OPEN WHEEL



FAN SIZE	GAP INCHES
17	$\frac{3}{16}$
21	$\frac{5}{8}$
25	$\frac{3}{8}$
30	$\frac{7}{16}$
35	$\frac{3}{8}$
40	$\frac{5}{8}$
45	$\frac{5}{8}$
50	$\frac{9}{16}$
55	$\frac{3}{4}$
60	$1\frac{1}{16}$
70	$1\frac{1}{16}$
80	$\frac{3}{4}$
90	$1\frac{3}{8}$
100	1
110	$1\frac{1}{8}$
120	$1\frac{3}{8}$

TYPE MW & AW STEEL ONLY



FAN SIZE	LAP INCHES
17	$\frac{1}{8}$
21	$\frac{3}{16}$
25	$\frac{3}{16}$
30	$\frac{1}{4}$
35	$\frac{5}{16}$
40	$\frac{5}{16}$
45	$\frac{3}{8}$
50	$\frac{3}{8}$
55	$\frac{7}{16}$
60	$\frac{1}{2}$
70	$\frac{9}{16}$
80	$\frac{5}{8}$
90	$\frac{3}{4}$
100	$1\frac{3}{16}$
110	$1\frac{5}{16}$
120	1

For other standard Buffalo fans, the wheel position is indicated below:

FAN TYPE	WHEEL TYPE	CORRECT WHEEL POSITION
SMALL E & RE	PADDLE	
VEH	PADDLE	
VOLUME	FLANGE	
VOLUME	CONE	
VOLUME	PADDLE	
E	FLANGE & CONE	
RE	FLANGE & CONE	

ALIGNMENT (Cont.)

UNITS SHIPPED KNOCKED-DOWN

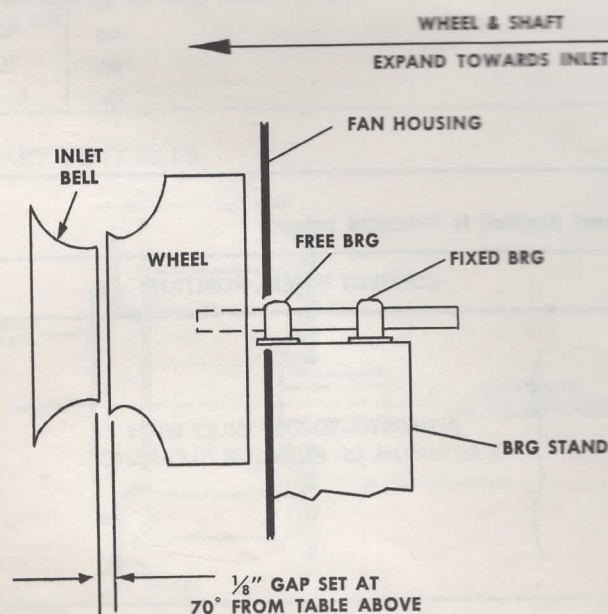
1. Level the fan housing, motor base or bearing base on the foundation by shimming where necessary. Tighten nuts on all anchor bolts.
2. a. Place a spirit level on the fan shaft. Place shims under the bearing pillow blocks to level. The fan shaft should pass through the center of the inlets.
b. On Arrangement 3 and 7 fans with a bearing on each side of the fan housing, a small deflection of the shaft will occur due to its own weight and that of the wheel. Level the drive end bearing (held bearing). The fan shaft extension will then be level with the motor shaft and allow easier coupling or V-belt drive alignment. The outboard bearing is set at a slight angle due to the shaft deflection. The bearing surface must lie properly against the shaft especially if a sleeve bearing is used.
3. a. Level the motor by shimming. On all direct connected fans the motor must be on the same horizontal center line as the fan shaft, except on high temperature applications, where an adjustment is made for expansion.

HIGH TEMPERATURE APPLICATIONS

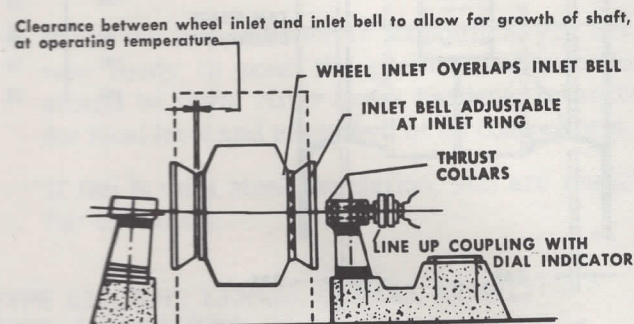
The wheel should be set to allow clearance on the side opposite the driver side. This allows for growth of the shaft, wheel, inlet bell and housing at operating temperature. This prevents the wheel from striking the inlet bell.

Check assembly drawing for proper clearance and lap on other Arrangements.

EXAMPLE: 730 BL ARR 1 SISW @ 600°F



- b. On Arrangement 4 fans with the wheel overhung on the motor shaft, adjust the motor position until the wheel is concentric with the fan inlet. Refer to Pg. 8. Then tighten set screws — first one over key and then one leading key in direction of rotation.



Shaft Deflection is exaggerated to show inboard bearing, pedestal and drive level. Outboard bearing and pedestal set at angle to line up with shaft deflection.

Shaft deflection is slight and amounts to .003" to .010" per foot of shaft measured between centers of bearing. Shaft deflection is same whether fan is idle or operating.

4. Follow steps 3-4 for "Units Shipped Complete Assembled", page 8.

Arrangement 1 SISW fans are set as follows:

Temp. Range	Wheel-Inlet Bell Setting
up to 200°F	settings as shown on pgs 8-9
210° - 350°F	1/16" gap
360° - 700°F	1/8" gap
710° - 800°F	3/16" gap

When fan is up to temperature and wheel has expanded towards inlet bell, the correct operating lap of 1/4" (from table for Type BL fans pg. 8) should be had.

MOTORS

After motor has been mounted, aligned and bolted down, wire to power supply through a disconnect switch, short-circuit protection and suitable magnetic starter with overload protection. ALL MOTORS should be connected as shown on nameplate. Install all wiring and fusing in accordance with the National Electric Code and local requirements.

Be sure power supply (voltage, frequency and current carrying capacity of wires) is in accord with the motor nameplate.

All a-c induction motors will perform satisfactorily with a 10% variation in voltage, a 5% variation in frequency or a combined voltage - frequency variation of 10%. For motors rated 208 - 220 volts, the above limits apply only to the 220 volt rating. To select control for 208 - 220 volt motors, use same amps for either 208 or 220 volts.

If grease plugs are inaccessible, motor end frames may be rotated 90° or 180° to afford better access. The main frame may be turned end-for-end to shift conduit box to the opposite side. The conduit box may be rotated to one of four 90° positions.

Most motors are received with bearings lubricated and require no relubrication for some time depending on operating conditions. **HOWEVER — ALWAYS CHECK TO BE SURE MOTOR BEARINGS ARE LUBRICATED BEFORE START-UP.**

(See Maintenance Section on Motor Bearings.)

TO REVERSE DIRECTION OF ROTATION

A. Single Phase Motors

1. Shaded Pole rotation cannot be reversed unless motor is constructed so that the shading coil on half of stator pole can be shifted to other half of stator pole.
2. Split Phase interchange connections to supply of either main or auxiliary winding.
3. Capacitor all types of capacitor motors are reversed in rotation by interchanging connections to supply of either main or auxiliary winding.
4. Repulsion remove plate on motor end bracket and turn bracket (holding brushes) in direction **opposite** to direction of existing rotation.

B. Two Phase Motors — interchange line leads.

C. Three Phase Motors — interchange any two line leads.

Normal operation of motors results in temperature rises according to motor insulation. The total motor operating temperature includes ambient temperature plus motor temperature rise. The motor rise includes nameplate temperature rise, service factor allowance and hot-spot allowance.

INSULATION CLASS	MAXIMUM TOTAL OPERATING TEMPERATURE	
	° CENTIGRADE	° FAHRENHEIT
A	105	221
B	130	266
F	155	311
H	180	356

The motor nameplate indicates type of insulation. As the hot-spot allowance is not measurable, the maximum total operating temperature must be reduced. Class A insulation is then suitable for total measurable temperature of 90°C (194°F) on open motors, 95°C (203°F) on enclosed motors. Class B insulation is suitable for total temperature of 110°C (230°F) on open motors, 115°C (239°F) on enclosed motors. If the motor feels hot, measure its temperature — thermometer against stator windings or by resistance measurement.

Various motor troubles can be caused by:

1. low or high voltage.
2. overload — high temperature — drawing too much current.
3. armature unbalance — vibration and noise.
4. worn bearings — armature rubs against stator.
5. too much or not enough lubricant in bearings.
6. commutator brushes on d-c motor worn or not seated under proper tension.
7. loose hold down bolts — vibration and noise.
8. dirt in windings — high temperature.
9. low insulation resistance due to moisture — check resistance with a megohm meter ("Megger") or similar instrument employing a 500 volt d-c potential. Resistance should read at least 1 megohm. If it is less, remove motor from service, clean and dry windings. A high grade insulation varnish should be applied to the windings before putting back in service.

USEFUL MOTOR FORMULAS

SINGLE PHASE A-C	THREE PHASE A-C	DIRECT CURRENT
$HP = \frac{WATTS}{746} = \frac{KW}{.746}$	$HP = \frac{WATTS}{746} = \frac{KW}{.746}$	$HP = \frac{WATTS}{746} = \frac{KW}{.746}$
$MOTOR HP INPUT = \frac{E \times I \times PF}{746}$	$MOTOR HP INPUT = \frac{E \times I \times PF \times 1.732}{746}$	$MOTOR HP INPUT = \frac{E \times I}{746}$
$MOTOR HP OUTPUT = \frac{E \times I \times PF \times ME}{746}$	$MOTOR HP OUTPUT = \frac{E \times I \times PF \times 1.732 \times ME}{746}$	$MOTOR HP OUTPUT = \frac{E \times I \times ME}{746}$
$FAN BHP INPUT = \frac{E \times I \times PF \times ME \times DE}{746}$	$FAN BHP INPUT = \frac{E \times I \times PF \times 1.732 \times ME \times DE}{746}$	$FAN BHP INPUT = \frac{E \times I \times ME \times DE}{746}$

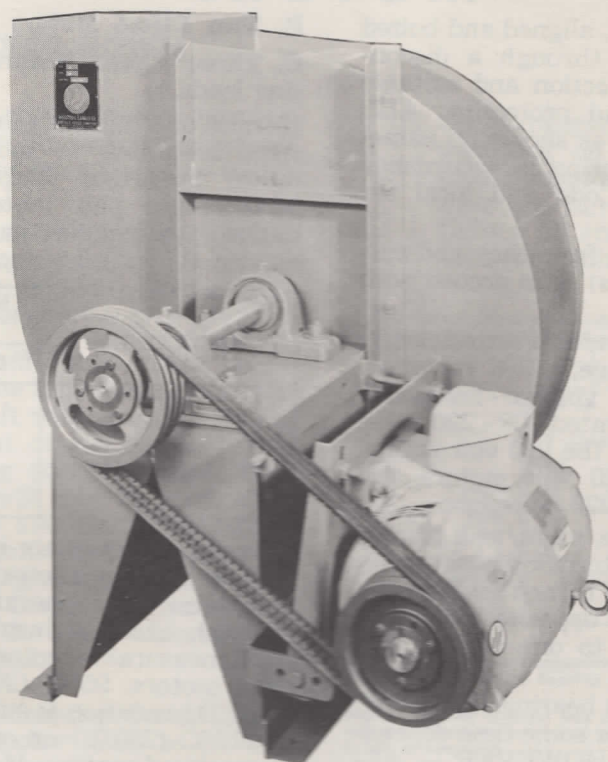
E = VOLTS • I = AMPS • PF = POWER FACTOR (80 - 85%)

ME = MECHANICAL EFFICIENCY (85 - 90%) • DE = DRIVE EFFICIENCY: DIRECT DRIVE - 100%; V-BELT DRIVE - 95%

FAN BRAKE HORSEPOWER CAN BE FIGURED BY A POWER READING OF FAN MOTOR WITH A VOLT-AMP METER. CALCULATE THE APPROXIMATE BRAKE HORSEPOWER, USING THESE EQUATIONS:

$$1. \text{ CORRECTED FULL-LOAD AMPS} = \frac{\text{NAMEPLATE FULL-LOAD AMPS} \times \text{NAMEPLATE VOLTS}}{\text{FIELD VOLTAGE RATING}}$$

$$2. \text{ APPROX. FAN BHP} = \text{NAMEPLATE HP} \times \frac{(\text{MOTOR-OPERATING AMPS} - \text{MOTOR NO-LOAD AMPS} \times 0.5)}{(\text{CORRECTED FULL-LOAD AMPS} - \text{MOTOR NO-LOAD AMPS} \times 0.5)}$$



V-BELT DRIVES

Fans shipped completely assembled have had V-belt drive aligned at Buffalo Forge. Alignment should be checked before operation.

1. Be sure sheaves are locked in position.
2. Key should be seated firmly in keyway.
3. Place straight edge or taut cord across faces of driving and driven sheaves to check alignment. The motor and fan shafts must be parallel; with V-belts at right angles to the shafts.
4. Start the fan. Check for proper rotation. Run fan at full speed. A slight bow should appear on slack side. Adjust belt tension by adjusting motor on its sliding base. All belts must have slack on one side.
5. If belts squeal at start-up, they are too loose and should be tightened.
6. When belts have had time to seat in the sheave grooves, then readjust belt tension.

V-belt drive assembly can be mounted as follows:

1. Clean motor and fan shafts. Be sure they are free from corrosive material. Clean bore of sheaves and coat with white lead or heavy oil for ease of shaft entry. Remove oil, grease, rust or burrs from sheaves.
2. Place fan sheave on fan shaft and motor sheave on its shaft. **DO NOT POUND SHEAVES ON** as this may damage bearings. Tighten sheaves in place.
3. Move motor on slide base so belts can be placed in grooves of both sheaves without

forcing. Do not roll belts or use a tool to force belts over the grooves.

4. Align fan and motor shafts so they are parallel. The belts should be at right angles to the shafts. A straight edge or taut cord placed across faces of sheaves will aid in alignment.
5. Tighten belts by sliding motor in its base. Correct tension gives the best drive efficiency. Excessive tension causes undue bearing pressure.
6. Start the fan and run it at full speed. Adjust belt tension until only a slight bow appears on the slack side of the belts. If slippage occurs, a squeal will be heard at start-up. Eliminate this squeal by tightening up the belts.
7. Give belts a few days running time to become seated in sheave grooves — then readjust belt tension.

If the shafts become scratched or marked, carefully remove sharp edges and high spots such as burrs with fine emery cloth or a honing stone. Avoid getting emery dust in the bearings.

Do not apply any belt dressing unless it is recommended by the drive manufacturer. V-belts are designed for frictional contact between the grooves and sides of the belts. Dressing will reduce this friction.

Minimum belt center distances are available on request.

Belt tension on an adjustable pitch drive is obtained by moving the motor — **not by changing the pitch diameter** of the adjustable sheave.

BEARINGS — Assembly Instructions

These general instructions cover standard types of anti-friction and sleeve bearings furnished with Buffalo Forge equipment. Detailed information on specific bearings supplied with the fan are found in the shipping envelope or can be obtained from the bearing manufacturer.

1. Bearings should be inspected and thoroughly cleaned if necessary. If a bearing is disassembled, mark its parts in relation to one another to avoid error in reassembly. Do not mix its parts with those of other bearings.

ANTI-FRICTION BEARINGS

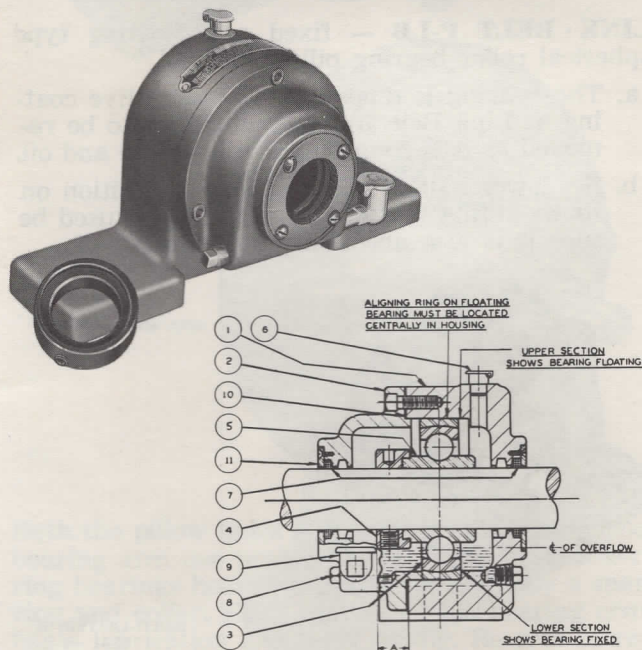
FAFNIR LAK, RAK, LAO, LSAO AND SAO — fixed type ball bearing pillow blocks.

- a. This type of bearing is always shipped assembled and ready for installation.
- b. Slip each bearing pillow block and locking collar into position on the shaft. The locking collars will face each other on Arr. 1, 8, 9 and 10 and face away from each other on Arr. 2, 3 and 7.
- c. Bolt pillow blocks in position on their mounting surfaces after shimming and aligning. They should be mounted so fan wheel and shaft clear the fan housing.
- d. Slide locking collar against end of inner ring. Turn collar in direction of shaft rotation until it grips shaft and inner ring. Tighten collar with a drift pin. Tighten set screw or screws in collar.
- e. Types LAK, RAK, LAO and LSAO are pre-lubricated and need no grease. Type SAO needs grease lubrication before startup. (See MAINTENANCE SECTION — LUBRICATION.)
- f. To dismantle, reverse this procedure. **Be sure** to remove burr on shaft caused by set screw **BEFORE** removing pillow block from shaft. A honing stone will remove burr.



2. Determine type of pillow block and location of fixed bearing.
3. Check all nameplates on fan for special instructions.
4. Mount bearings in position on the shaft in accordance with the particular type of bearing furnished. (See following paragraphs.)
5. The shaft should be clean and free from burrs and other irregularities. Be sure bearing is not to be seated on worn flat sections.

FAFNIR SAOL — fixed and floating type ball bearing pillow blocks.

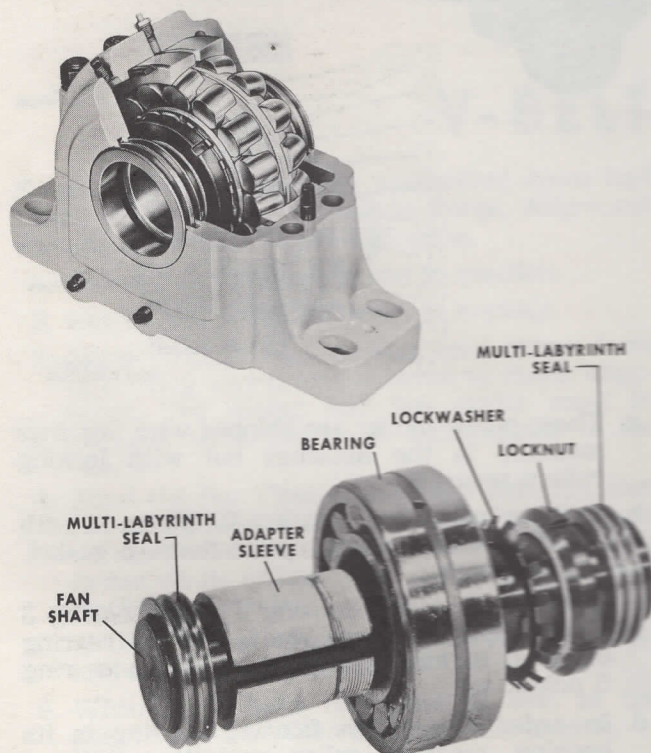


- a. These pillow blocks are shipped with bearings mounted in the housings but with locking collars separate.
- b. Remove end cover 2, gasket 10, plates 11 with packings 7. Be careful not to damage gasket and packings.
- c. Slide pillow block housing 1 with bearing 3 and one plate 11 onto shaft. Position bearing on shaft making sure cam end of inner ring 5 points out.
- d. In order to position floating bearing in its housing, measure collar projection "A" on fixed unit and duplicate it on floating unit. Since "A" is the same on both pillow blocks, the floating bearing will automatically be positioned in the center of the floating space.
- e. Bolt pillow blocks securely in position on their mounting surfaces after shimming and aligning. The outside diameter of shaft and housing bore should clear equally all around. Pillow blocks should be mounted so fan wheel and shaft does not strike any part of fan housing.
- f. Slide locking collar 4 into position against bearing inner ring 5. Turn collar in direction of shaft rotation until it grips shaft and inner

- ring. Tighten collar with a drift pin. Tighten set screw in collar.
- Replace gasket 10, end cover 2, packing 7 and plate 11 on end cover. Bolt on end cover.
 - Draw up screws holding plates just enough to hold packing rings snugly in place.
 - Then fill with oil in top cup 6 until overflow cup 9 is full. Fill only when fan is not running.
 - The SAOL type can be converted to grease lubrication. See Fafnir instructions when doing this.
 - To disassemble, reverse this procedure. **BE SURE** to remove burr on shaft caused by the set screw **BEFORE** removing pillow block from the shaft. A honing stone will remove the burr.

LINK-BELT P-LB — fixed and floating type spherical roller bearing pillow blocks.

- The bearing is dipped in a preservative coating at Link Belt and does not have to be removed as it is compatible with grease and oil.
- Set lower half of split housing in position on its mounting surface. If an oil cup is used be sure it is assembled in pillow block.



- Apply white lead, thinned with oil, on outside diameter and threads of tapered sleeve and face of locknut (helps in tightening adapter).
- Assemble multi-labyrinth seal ring (if used) adapter sleeve, roller bearing, lockwasher, locknut and second seal loosely and slip onto shaft.
- Hand tighten locknut onto adapter sleeve as tightly as possible.
- Insert feeler gauges between outer ring and the unloaded roller on both sides of bearing until snug fit is obtained. Record this figure.

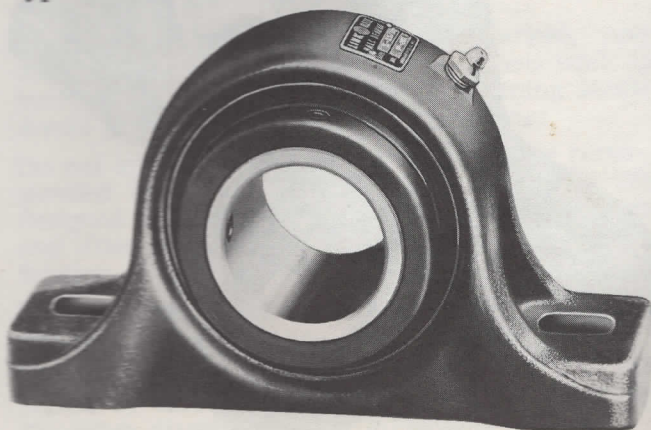
- Lower shaft with bearing and adapter assemblies into lower half of pillow block housings. Be sure multi-labyrinth seals are aligned with seal grooves. Bolt lower housing to bearing mounting surface after shimming and aligning. Pillow blocks should be mounted so fan wheel and shaft do not strike any part of fan housing.
- Position floating bearing centrally in lower housing. For a fixed bearing, position bearing for insertion of "C" spacer which is inserted on locknut side (keep bearing flush with opposite side of housing).
- Tighten locknut with a spanner wrench until snug. Place soft steel or brass bar against locknut and strike bar several times with a hammer. Distribute blows around locknut by rotating shaft. These blows drive inner ring farther up on adapter sleeve and release pressure on threads. Use spanner wrench to further tighten locknut. Repeat this procedure until desired amount of clearance has been removed from bearing.

BEARING CLEARANCE REDUCTION FROM READING STEP f.

BEARING CLEARANCE REDUCTION FROM REDUCED SIZE				
Pillow block series number	Bearing Number		Reduction of Clearance	
			Minimum	Maximum
			Inches	
6823 thru 6828	22209LBK	22210LBK	.0010	.0015
6829 thru 6844	22211LBK	22216LBK	.0010	.0020
6845 thru 6868	22217LBK	22224LBK	.0015	.0025
6869 thru 6892	22226LBK	22232LBK	.0020	.0030
6893 thru 68104	22234LBK	22236LBK	.0025	.0035
68105 thru 68116	22238LBK	22240LBK	.0025	.0040
68117 thru 66168	22244LBK	23056LBK	.0030	.0050
6923 thru 6928	22309LBK	22310LBK	.0010	.0015
6929 thru 6944	22311LBK	22316LBK	.0010	.0020
6945 thru 6968	22317LBK	22324LBK	.0015	.0025
6969 thru 6992	22326LBK	22332LBK	.0020	.0030

- Secure locknut by bending lockwasher tang into locknut slot.
- Insert "C" spacer in fixed bearing base on locknut side.
- Lubricate bearings with grease or oil. (See MAINTENANCE SECTION — LUBRICATION.)
- Replace top half of pillow block (cap). Make sure races are not cocked in housing before tightening cap bolts.

LINK-BELT—fixed type ball bearing pillow block. The mounting procedure is similar to FAFNIR type RAK and LSAO.

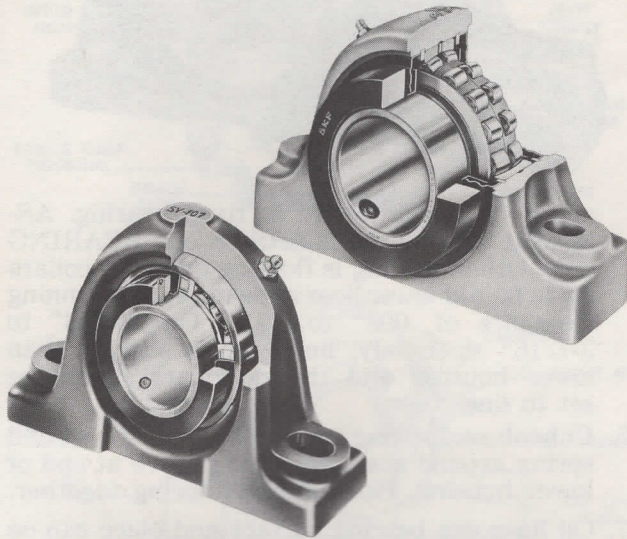


BEARINGS — Assembly Instructions

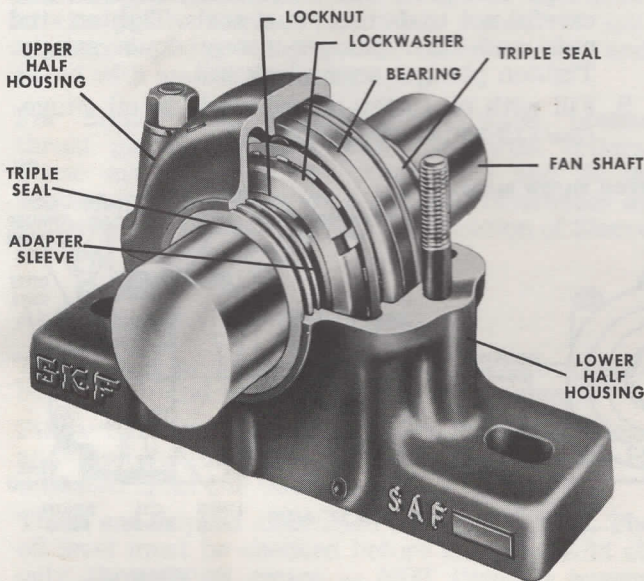
SKF SY — fixed type ball bearing pillow block.

SKF SYR — fixed type roller bearing pillow block.

The mounting procedure is similar to FAFNIR type RAK and LSAO.



SKF - SAF Series 22500 or 22600 — fixed and floating spherical roller bearing pillow blocks.



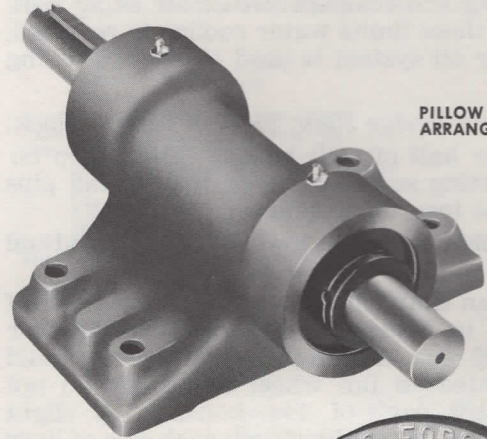
The adapter mounting procedure is similar to the LINK BELT roller bearing procedure.

BEARING CLEARANCE REDUCTION

FOR SHAFT DIAMETER OVER	INCLUDING	REDUCTION IN INTERNAL CLEARANCE
1 1/4"	2 1/4"	.001"
2 1/4"	3 1/2"	.0015"
3 1/2"	4 1/2"	.002"
4 1/4"	5"	.0025"
5"	6 1/2"	.003"
6 1/2"	7 1/4"	.0035"
7 3/8"	8 1/4"	.004"

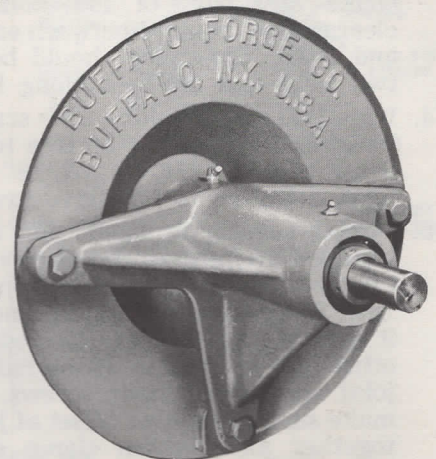
The above SKF pillow blocks are all of the adapter mounting type. Sometimes the cylindrical bore mounted bearing which does not use an adapter is furnished. In this case, threads are cut on the shaft to take the locknut. Refer to the specific mounting instructions of the manufacturer.

ARRANGEMENT 2 BEARINGS



PILLOW BLOCK
ARRANGEMENT

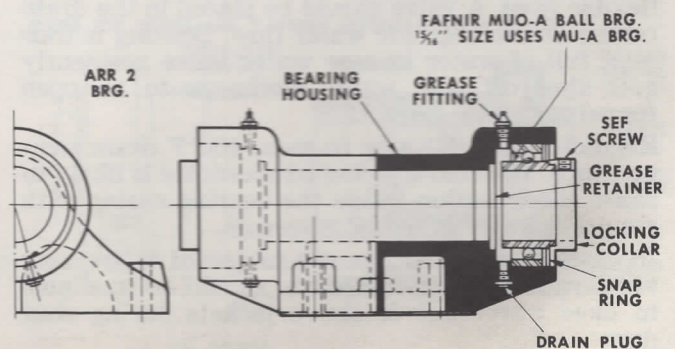
TRIPOD BRG ARM



Both the pillow block arrangement and the tripod bearing arm use prelubricated Fafnir wide inner ring bearings held in a Buffalo housing by a snap ring and collar. Each bearing in the bearing arm has a lubrication and relief fitting. Be sure to remove relief fitting plug before lubricating.

To disassemble:

1. Loosen set screw in collars.
2. Remove collar by rotating in direction opposite rotation. Remove burr caused by set screw. A honing stone will remove burr.
3. Remove snap ring with screw driver.
4. Take bearing assembly out of housing. This assembly was originally pressed into housing and removing it might require you to take the whole pillow block or tripod arm off the fan shaft.
5. Reverse this procedure to assemble.

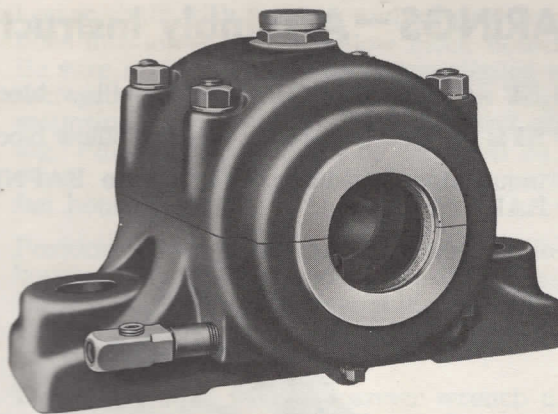


DODGE SLEEVE BEARINGS

Ring oil sleeve bearings may be ambient air cooled below certain restrictions of ambient conditions, speed, loading and temperature of air being handled. Above these limits water cooling is required. A circulating oil system is used above ring oiling speeds.

To Assemble a Dodge Plain Sleeveoil Pillow Block:

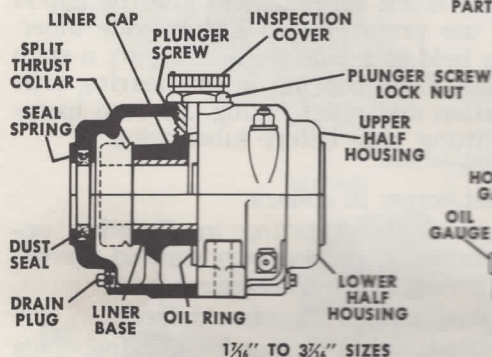
1. Set **lower half** of split housing in position on its mounting surface. The oil gauge and pipe should be inserted in housing.
2. Place **liner base** in lower housing and oil surface.
3. Lower fan shaft onto liner and bolt lower half housing to bearing mounting surface after shimming and aligning. Pillow blocks should be mounted so fan wheel and shaft do not strike any part of fan housing. A slight clearance is required between each side of liner and shaft. Clearance should be equal on the two sides and uniform along length of liner.
4. Install **oil rings** making sure screws are secure in joints. Rings must be free to rotate on fan shaft. Sizes 1-7/16" to 3-7/16" have one ring. Sizes 3-15/16" to 12" have two rings.
5. **Thrust collars**, in fixed unit, should now be installed. Remove clamp screws and make sure cracked joint is clean. Place one half on shaft with flinger groove next to liner base. Rotate it around shaft as far as possible and place other half in position. Bring halves together at joint and insert clamp screws. Check face to make sure there is no offset at joint, tap halves together and tighten clamp screws. Repeat



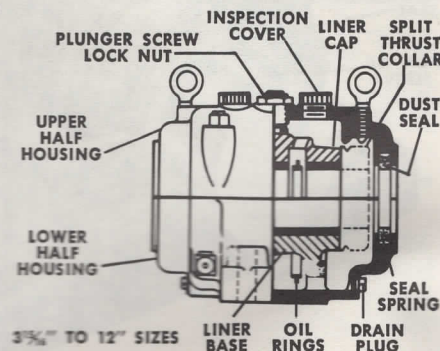
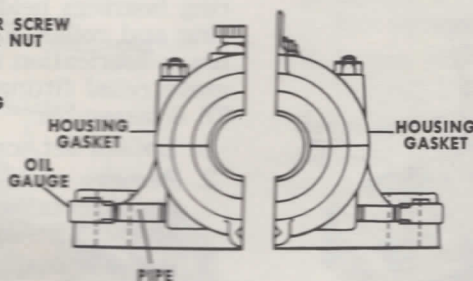
above for opposite end of fixed bearing. **ASSEMBLE TWO COLLARS** on one **BEARING** only. Other bearing is floating type. Tap collars up to face of lower liner allowing a total running clearance of .005" to .015". On 1-7/16" to 3-7/16" sizes only, liner cap is shorter than lower housing and thrust collars should be set to liner base.

6. **Unhook seal spring ends**. Thread dust seal and spring around shaft and into groove at end of lower housing. Hook ends of spring together.
7. **Oil liner cap** bearing surface and place cap on fan shaft. Oil rings must be free.
8. Loosen plunger screw on **upper half housing** (cap) and place cap on housing studs., being careful not to damage dust seals. Tighten stud nuts and turn plunger screw down snugly. Tighten plunger screw lock nut.
9. Fill with oil to top of red circle in oil gauge. (See LUBRICATION SECTION.)

PARTS FOR DODGE PLAIN SLEEVOIL PILLOW BLOCKS



1 1/4" TO 3 3/4" SIZES

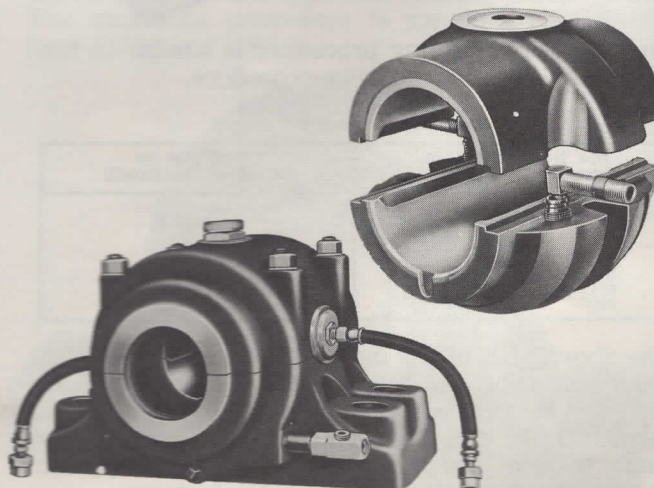


3 3/4" TO 12" SIZES

To assemble a **Dodge Water Cooled Sleeveoil Pillow Block**, follow the above steps and also install **grommet** and grommet washer. **ALWAYS USE FLEXIBLE HOSE CONNECTIONS** — keeps bearing self-aligning. Buffalo Forge **does not** supply flexible hose. A valve should be placed in the drain return line to regulate water flow. Bearing is thus kept full of water in case water valve accidentally gets shut off. Let water discharge to an open funnel for visual inspection.

Regulate flow of water to max. 100°F drain temperature. Too cold a jacket temperature is likely to cause condensation inside the bearing casing with resultant water in the oil reservoir.

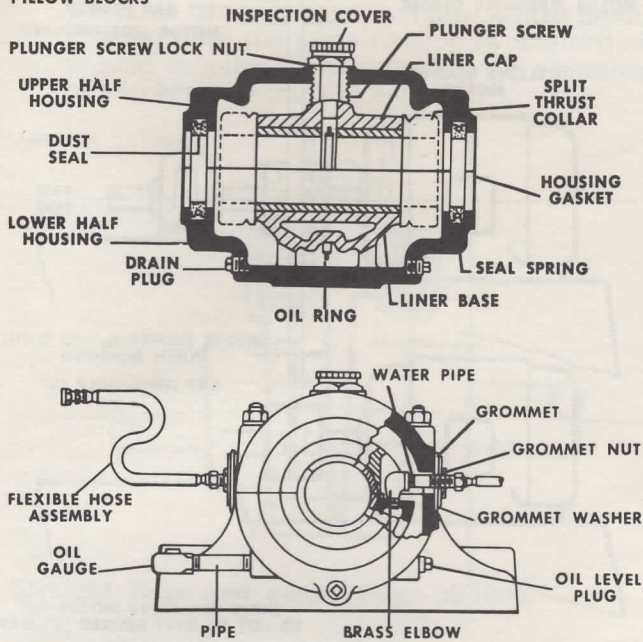
In cases where bearings are subjected to freezing temperatures, compressed air should be available to blow water out of sleeve jackets during shut down.



BEARINGS — Assembly Instructions

Dodge Water Cooled Pillow Block (Cont.)

PARTS FOR 1 $\frac{1}{4}$ " TO 3 $\frac{3}{8}$ " DODGE WATER COOLED SLEEVOIL PILLOW BLOCKS



Auxiliary seals can be fitted to one or both ends of the pillow block. These seals consist of split semi-steel plates bolted to the outer housing and fitted with an extra standard seal.

For higher than normal thrust loads, bronze thrust plates are used with the thrust collars. These are bolted to the liner ends and fit up against thrust collars with running clearances as indicated for thrust collars of Lubrication of Sleeve Bearing Section.

Arrangement 2 Sleeve Bearing:

These fan arrangements use a Dodge bronze bushed fan and blower pillow block as shown.

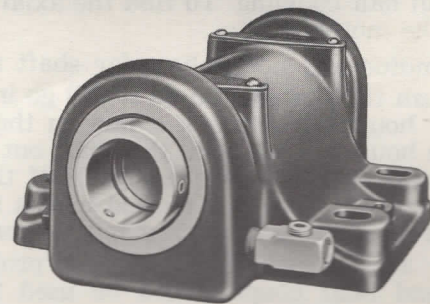
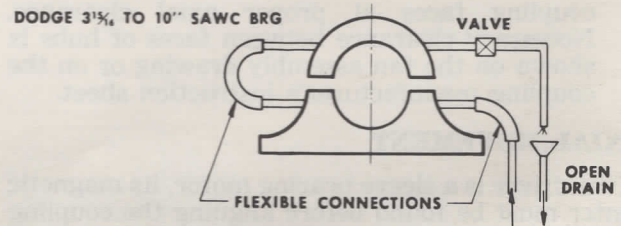
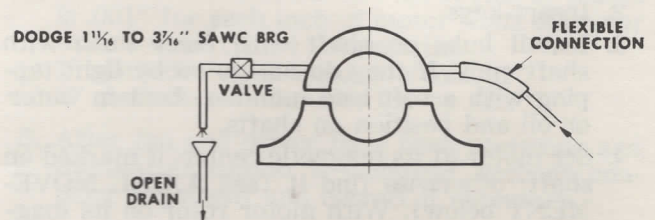
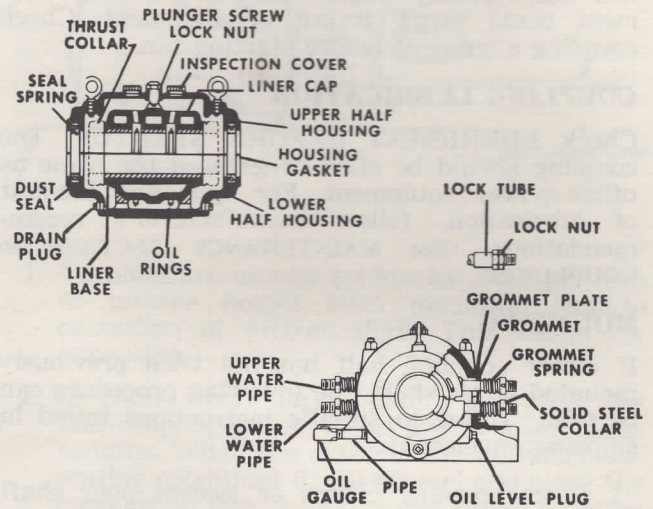
Pillow blocks are fitted with two bronze bushings and T section oil rings. Steel thrust collars can be adjusted from the outside.

These are shipped assembled with Arr. 2 fans. The oil level must be checked before start-up. Add oil only through oil gauge — NOT through inspection openings.

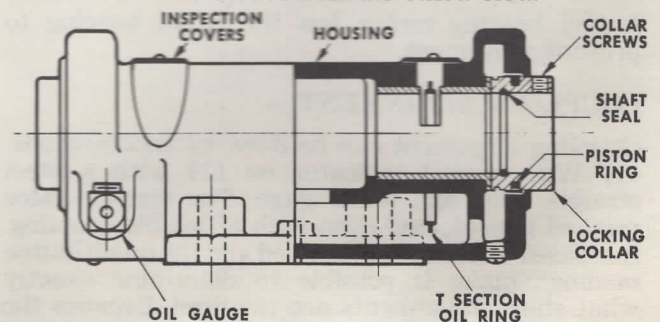
To disassemble an Arr. 2 sleeve bearing pillow block:

1. Loosen wheel hub set screws and remove set screw burrs on the fan shaft by honing. Put blocks under wheel.
2. Remove bolts holding pillow block to fan housing.
3. Remove shaft and pillow block from wheel.
4. Loosen set screws in pillow block locking collars and remove collars. Remove set screw burr on shaft by honing.
5. Slide complete pillow block off shaft.
6. The bronze bushing can then be pressed out of the pillow block.

PARTS FOR 3 $\frac{1}{2}$ " TO 10" DODGE WATER COOLED SLEEVOIL PILLOW BLOCKS



PARTS FOR DODGE ARR. 2 SLEEVE BEARING PILLOW BLOCK



FLEXIBLE COUPLINGS

A fan shipped assembled with coupling mounted has the coupling aligned. Handling during shipment could throw it out of alignment. Check coupling alignment before starting fan.

COUPLING LUBRICATION

Check LUBRICANT BEFORE STARTUP. The coupling should be oiled or greased the same as other power equipment. For type and amount of lubrication, follow manufacturer's recommendations. (See MAINTENANCE SECTION on COUPLINGS).

MOUNTING

If either coupling half has not been previously mounted on its shaft, the following procedure can be used: (refer to specific instructions found in shipping envelope):

1. Place coupling covers or sleeves over shaft ends.
2. Insert keys.
3. Install hubs on shaft with faces flush with shaft ends. If they do not go on by light tapping with a soft lead hammer, heat in water or oil and position on shafts.
4. Set motor at its magnetic center, if marked on shaft; otherwise find it (see AXIAL MOVEMENT below). With motor rotor on its magnetic center, locate motor on its base with coupling faces at proper axial clearance. Necessary clearance between faces of hubs is shown on the fan assembly drawing or on the coupling manufacturer's instruction sheet.

AXIAL MOVEMENT

If the driver is a sleeve bearing motor, its magnetic center must be found before aligning the coupling halves to prevent the motor half from moving up against fan half coupling. To find the axial movement of the motor shaft:

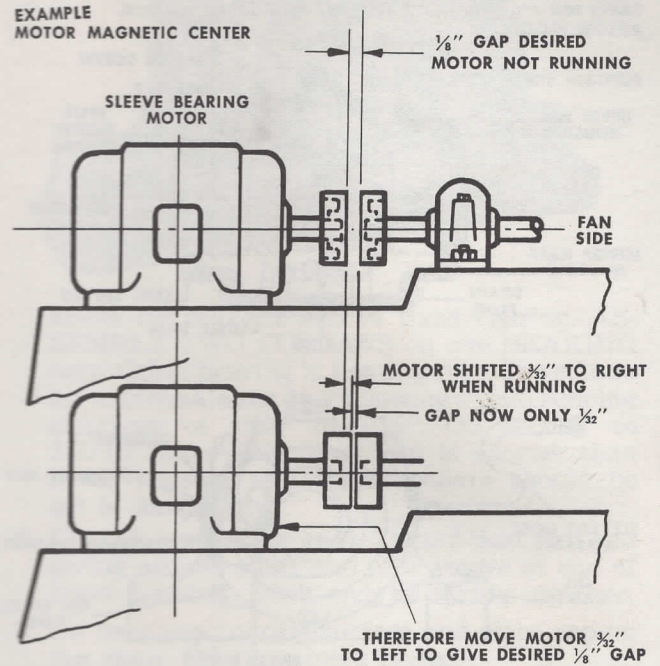
1. Run motor and notice how far shaft moves.
2. Or, push the shaft as far as it will go into the motor housing and mark a line on the shaft at the housing. Then pull the shaft out as far as it will go and scribe a line. Half the distance between the two scribed marks locates the sleeve bearing motor's magnetic center.

If motor axial movement becomes a problem, a limited end float coupling can be used to limit this movement and keep motor near its magnetic center.

A ball bearing motor has its thrust bearing to prevent movement.

COUPLING ALIGNMENT —

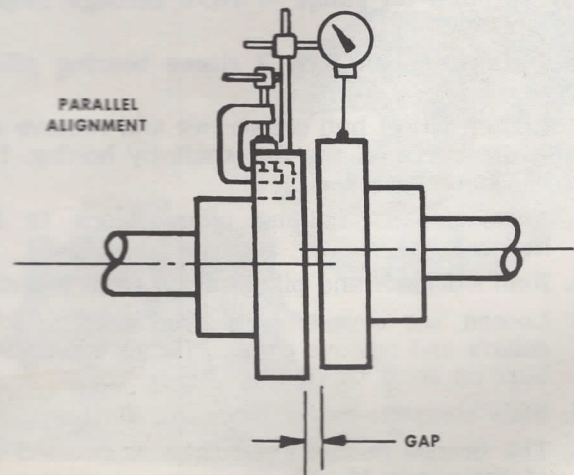
Coupling alignment can be done by two methods. (1) With a dial indicator or (2) with a steel straight edge and feeler gage. The dial indicator method is preferred even with a flexible coupling. Increased accuracy is obtained and the quantitative readings make it possible to determine exactly what shim adjustments are required. Because the



position of the fan half of the coupling is determined when the fan shaft and bearings are aligned, any necessary adjustment will usually have to be made by moving the driver. When in correct alignment the faces of the coupling should be parallel and hubs concentric.

Dial Indicator Method

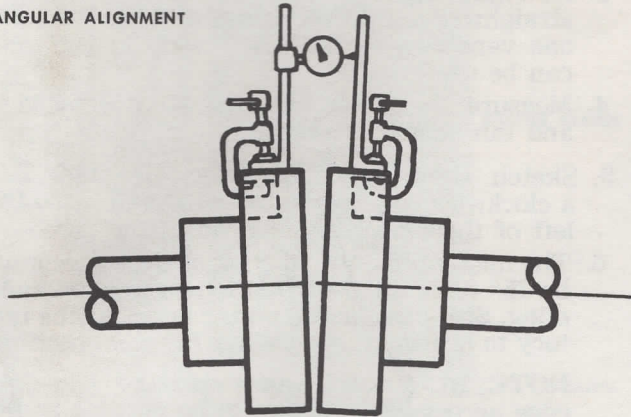
1. Parallel alignment. Fasten indicator bracket on one hub with dial button contacting alignment surface of opposite hub. Rotate shaft on which indicator is attached and take readings at four points: top, each side and bottom. Difference between the two side radial readings indicates motor must be shifted sideways. Difference between top and bottom readings indicates motor must be raised or lowered by adding or removing the same thickness of shims under all four feet. Amount of correction in each case is one half the difference between the two readings.



FLEXIBLE COUPLINGS

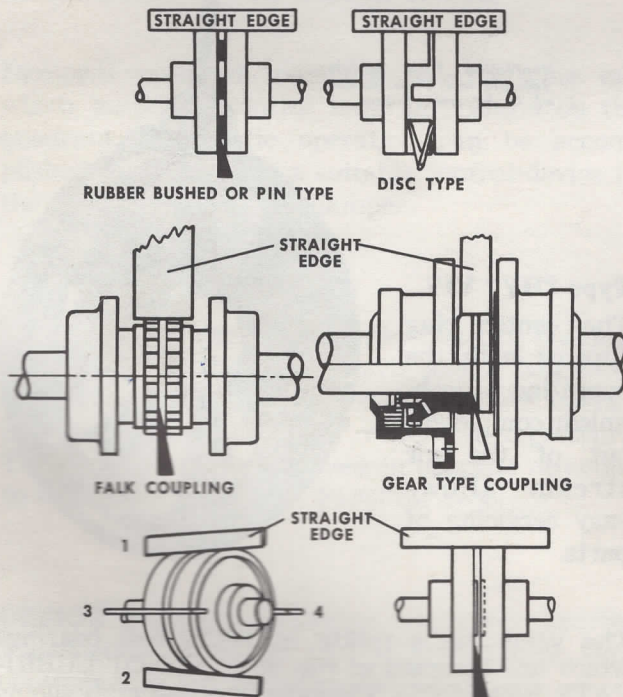
2. Angular alignment. Fasten the indicator brackets on the hubs. Rotate both shafts in unison so the four readings are taken between the same two points on the hubs. Adjust motor position until the same reading is obtained all around coupling. This equalizes the clearance or gap between the hub faces.

ANGULAR ALIGNMENT



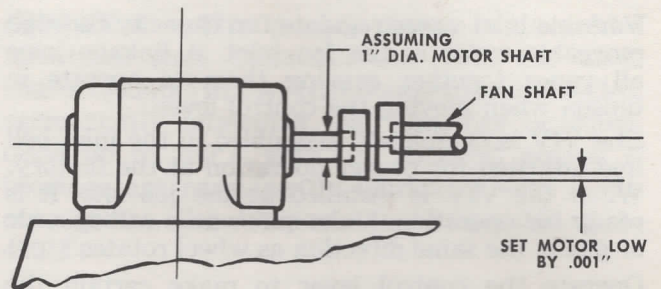
Straight Edge and Feeler Gage Method.

1. Parallel alignment. Place a straight edge across the coupling hubs. Raise or lower the motor by shimming until the straight edge lies true at top and bottom positions on the hubs. Placing the straight edge on each side of the hubs will align them in the horizontal position. Shift the motor sideways to adjust horizontally.
2. Angular alignment. The clearance between the hub faces can be equalized at four points with a steel wedge of feeler gage.



ALIGNING VARIOUS TYPES OF COUPLINGS
CHECK ALL TYPES AT FOUR POSITIONS 90° APART AS SHOWN

THERMAL EXPANSION



1. Turbines are usually set low by .001" per inch of turbine height from mounting feet to centerline of turbine shaft. This allows for expansion.
2. In cases where large motors are used, the half coupling should be set low by a few thousandths. When the driver heats up under operating conditions it will expand and bring the coupling in line. A reasonable figure must be assumed at the initial line up. A rule of thumb is .001" for each inch of motor shaft diameter and no more than 4 thousandths.
1" shaft dia. — set motor low by .001"
2" shaft dia. — set motor low by .002"
3. After fan and driver have been operating and thermal expansion is complete, recheck coupling alignment and correct if necessary.

VARIABLE INLET VANES—VIV's

Variable inlet vanes regulate fan capacity through moveable vanes in the fan inlet. A linkage joins all vanes together causing them to operate in unison when moving the control lever.

The VIV is completely assembled in the inlet bell and adjusted for proper operation at the factory. When the VIV is installed at the job site, it is ready for operation. Make sure vanes will spin air or gas in the same direction as wheel rotates.

Operate the control lever to make certain the vanes move easily from open to closed positions. This should be done BEFORE any inlet ductwork or inlet boxes are attached to the fan which will make the VIV inaccessible.

VIV's operated manually have a wing nut which locks the control lever in position on the quadrant. Automatic operation is accomplished by connecting a suitable control device to the VIV control lever. Double inlet fans include a connection shaft for operation of both inlets with one lever.

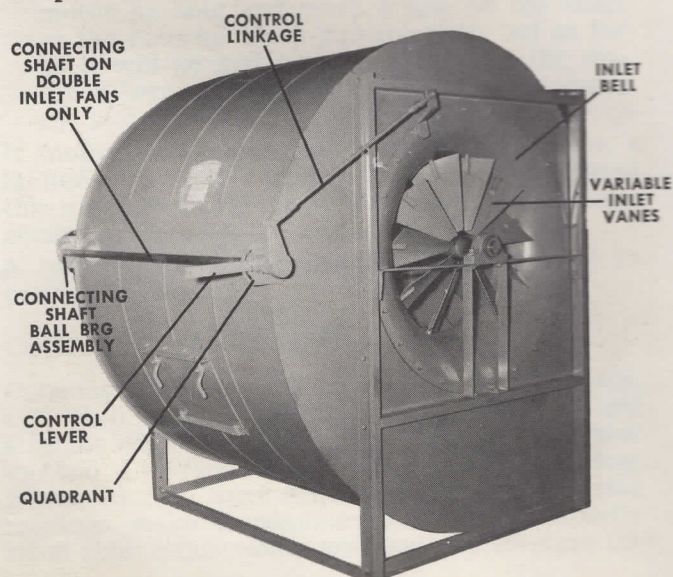
On some fans, in order to limit the horsepower, a stop is used to control the maximum open position. Do not remove this stop.

DESIGN 5 — Vanes are cantilevered with the operating mechanism inside the fan. They are easily serviced by removing the inlet bell which includes the VIV assembly. Each vane shaft is supported by two oilite bushings separated by a steel sleeve. The area between the steel sleeve and vane shaft is packed with graphite grease to prevent shaft from seizing. The vanes should be opened and closed frequently to give this grease a chance to function — especially in dusty atmospheres.

Units good up to 200°F operating temperature and 12" water gauge pressure.

DESIGN 6 & 6A — Same construction as Design 5 except they use prelubricated NICE ball bearings instead of the oilite bushings and steel sleeve. The Design 6A VIV has the operating mechanism inside the fan completely shrouded in a dust tight cover.

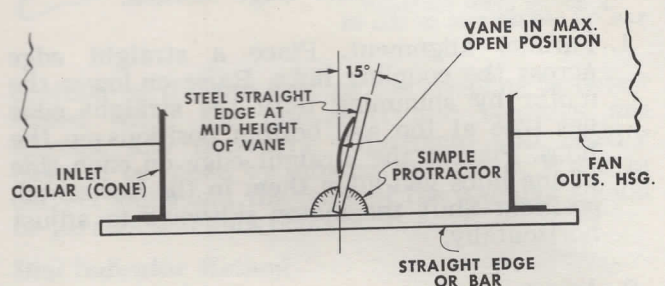
Bearings for Design 5, 6 & 6A variable inlet vanes are prelubricated prior to shipment.



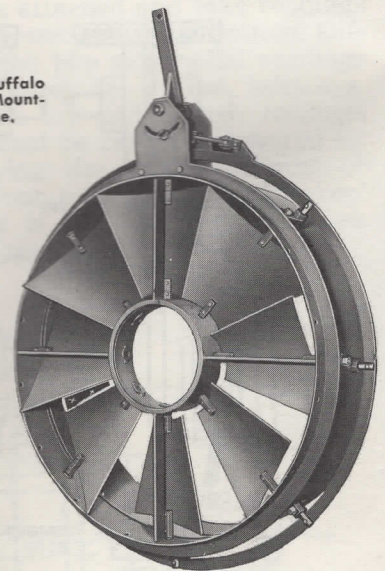
MEASURING MAX. VIV OPEN POSITION

1. Loosen wing nut locking control lever to quadrant.
2. Lay straight edge or long bar across inlet.
3. At right angles to this bar, extend another straight edge into the vanes and lay it across one vane's two edges. Any vane in the inlet can be used.
4. Measure angle between edge of straight edge and fan shaft center line.
5. Sketch shows a counter-clockwise fan. For a clockwise rotating fan the 15° will be to the left of the center line instead of the right.
6. The maximum open position of the vanes must be 75° from a closed position to prevent ramming. Stops are placed on the vanes at the factory to prevent more than a 75° open position.

NOTE: BL-Aerofoil vanes open 90° (Straight edge across vane edges will be parallel to fan shaft).



Ventilating Type Buffalo Variable Inlet Vane. Mounted in Separate Frame.

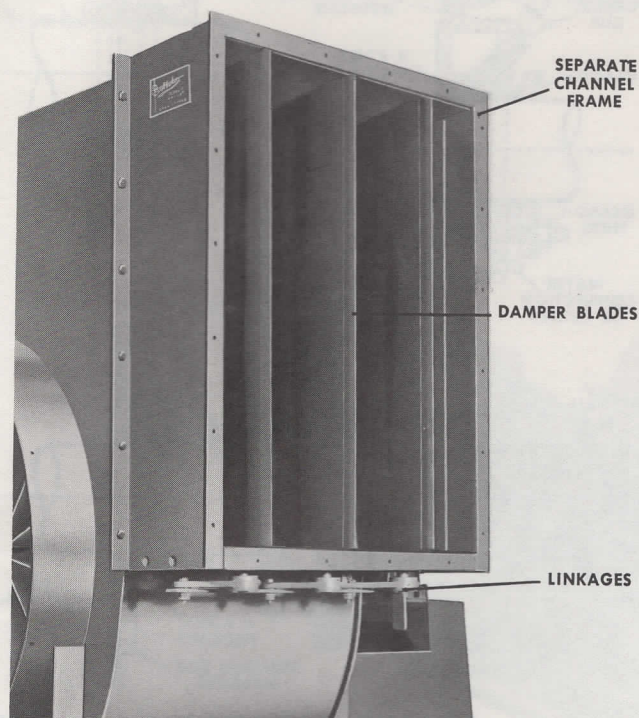


Type "HV" VIV

The center ring support with the operating mechanism completely out of the air stream allows easy servicing of parts.

The vane shafts rotate in NICE ball bearings which are designed to run dry. DO NOT LUBRICATE BEARINGS. The vane lever assembly should be greased occasionally through its Alemite grease fitting.

OUTLET DAMPERS



Dampers are furnished in separate channel section either structural or fabricated. It is best to close the damper when installing to prevent damage to the damper blades.

The damper blades and linkages are pre-set to give a tight fit between blades when the damper is closed. Check the damper operation to make sure all the blades operate without binding.

Dampers operated manually have a wing nut which locks the control lever in position on the quadrant. Automatic operation can be accomplished by connecting a suitable control device to the control lever of the damper.

DESIGN 4 — uses NICE series 500 ball bearings (or equal) on the blade shafts and a fabricated steel frame. This design good up to 200°F operating temperature and 6-3/4" water gauge pressure. The blades will open or close in opposite direction to the adjacent blade — Paraflow type.

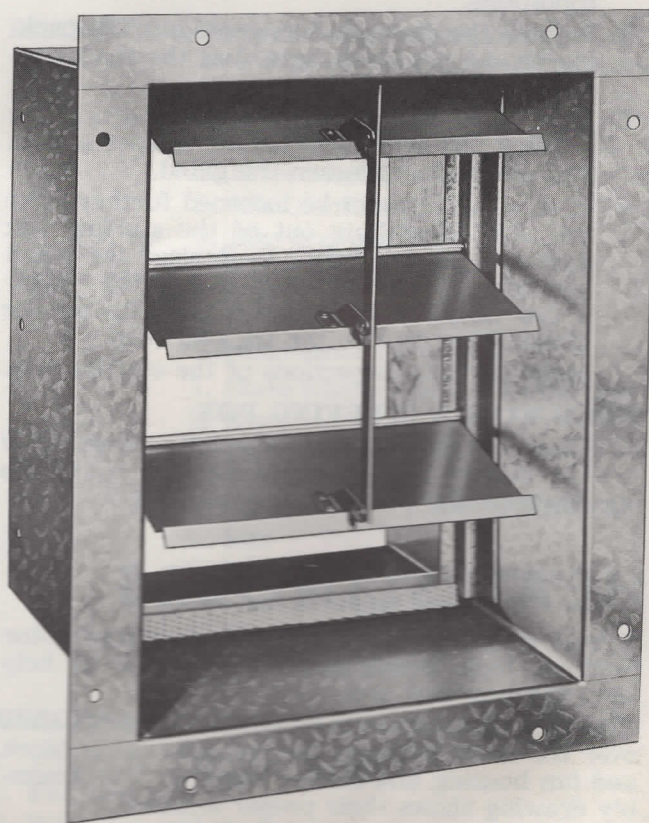
DESIGN 5 — same as Design 4 except in heavier construction. Good up to 200°F operating temperature and 12" water gauge pressure.

DESIGN 6 — This damper design has a welded structural steel channel frame with the blade shafts mounted in FAFNIR double grease shielded, permanently lubricated, ball bearings or equal. Good up to 250°F with the standard grease. If bearings are permanently lubricated with a silicone grease, the damper may be operable up to 450°F.

DESIGN 7 — This damper uses cast iron sleeve bearings set out from the welded structural channel frame by spacers containing two rings of braided asbestos packing. Good up to 600°F. Bearings for Design 4, 5, 6 & 7 dampers are pre-lubricated prior to shipment.

BELTED VENT SET DAMPERS

This back draft damper uses felt lined aluminum blades in an extruded aluminum frame. The blade shafts rotate in nylon bearings. Dampers are either gravity, motor or hand operated.



STUFFING BOX

A stuffing box prevents air or gas from leaking out through the fan housing shaft hole. It usually has 4 rows of packing or 3 rows of packing and one grease lubricated lantern ring. In either case, the box is packed before shipment and grease added in stuffing boxes supplied with a lantern ring.

The standard packing is either Johns Manville #250 graphitized braided asbestos square packing or Johns Manville #350 plaited square packing with lead ribbon and asbestos yarns. Both good up to 3600 RPM and temperatures to 500°F. A metallic packing is used above 500°F. Replacement packing material may be obtained from Buffalo Forge. **BULK PACKING SHOULD NOT BE USED.**

If the fan is to be shut down for a considerable time, the packing should be removed from the stuffing box and the shaft and box thoroughly cleaned and slushed with a protective coating. This eliminates any possibility of pitting action and shaft seizure; keeps the wearing surfaces in good condition.

PACKING BREAK-IN

It is essential that the packing be put through a break-in period.

1. Check clearance between housing stuffing box and fan shaft with a feeler gage. The shaft must be centered in the stuffing box.
2. Check grease in the grease cup when a grease ring is supplied. Use a good grade of soap type packing grease.
3. If stuffing box is water-cooled, connect flexible water line with valve in drain return line to regulate flow. Let the water discharge to an open funnel so visual inspection will show water flowing. Adjust water flow to suit conditions.
4. Tighten the gland nuts finger tight. The packing should not be so tight that the shaft cannot be turned by hand.
5. Start the fan and run for 15 minutes. If the stuffing box gets too warm or you see smoke, stop the fan and loosen the gland.
6. If the gland cannot be loosened further, take one row of packing out of the stuffing box and coat it with light oil. Replace the gland and bring to finger tightness. Run the fan for a few hours until you can take up on the gland. Then replace the packing ring.
7. Make periodic inspections of the stuffing box.

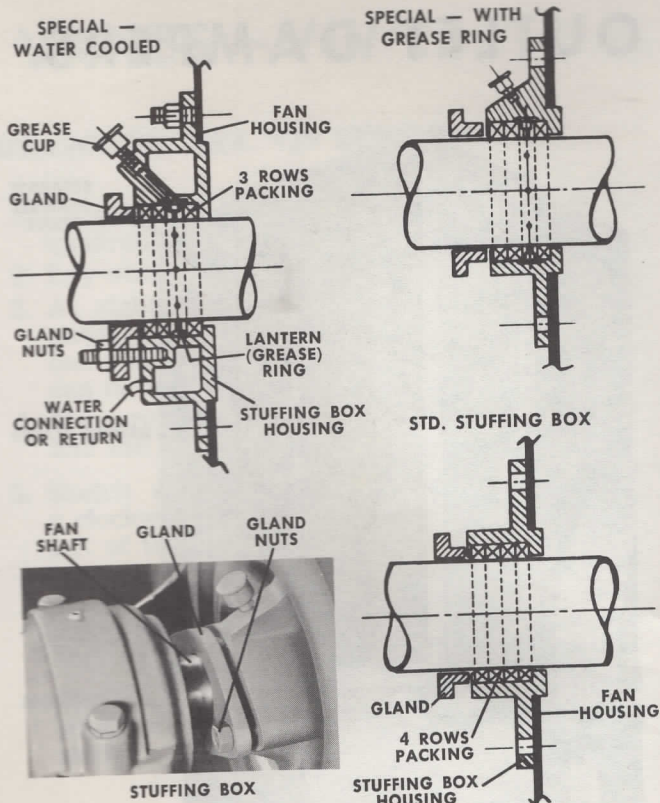
REPACKING A STUFFING BOX

1. Clean out the old packing including that below the lantern ring. Flexible packing hooks are available for removing the packing.

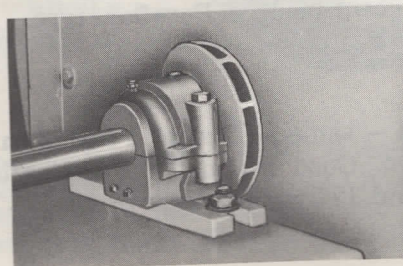
HEAT SLINGERS

A heat slinger is a split aluminum or steel rotor used on high temperature applications to help keep the bearings cool.

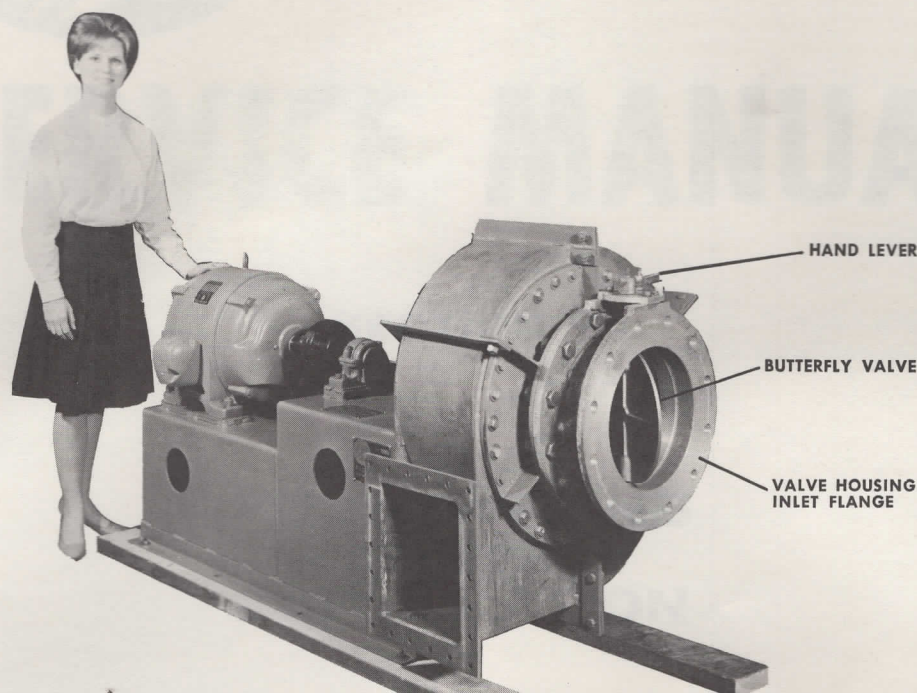
They are easily assembled by placing both halves over the shaft between the fan side pillow block and fan housing and bolting together. The assembly drawing shows their proper location.



2. Clean off any nicks or score marks found on the shaft.
3. Clean up the stuffing box housing.
4. Clean the channels and holes of the lantern ring.
5. The new packing rings should be cut to the proper length so ends come together but do not overlap.
6. Begin by installing the first ring. Grease or oil should be smeared on the I.D. of the ring to allow easy entry into the box. The entire ring could be immersed in oil before installing if desired. Start by installing one end of the ring and bring it around the shaft until it's completely inserted in the stuffing box.
7. With the aid of a split bushing, push the packing to the bottom of the box. Seat the ring firmly by replacing the gland and taking up on the bushing. Seat this bottom ring hard, because this first ring does most of the sealing.
8. Repeat this operation with each packing ring, making sure to stagger the joints 90° apart.
9. If a lantern ring is used, be sure it is properly positioned under the grease hole in the box.
10. After the last ring is installed, position the gland and take up bolts finger tight.
11. Now run the fan and follow Steps 1-7 in Packing Break-In above.



BUTTERFLY VALVES — These single vane devices control the flow of the air much the same way as the VIV. They can be controlled by a hand lever, hand wheel, chain wheel or chain lever. There are no points to lubricate on these valves. If used in a dusty atmosphere, it is advisable to open and close the valve disc once in awhile to keep shaft seals from binding.



ORDERING SPARE PARTS

Contact the local Buffalo Representative or the factory and supply the following information:

1. Fan shop order number stamped on nameplate.
2. Fan size and type stamped on nameplate.
3. Fan arrangement.
4. Description of part required.
5. Pattern number if part is a casting.
6. Special paints or coatings.

The particular fan parts lists attached to this manual will be useful in ordering.

HOUSING — does not include side plates if it is adjustable discharge. It does not include inlet cone, vanes or bearing supports if it is non-adjustable. Direction of discharge should be indicated if a non-adjustable discharge housing is ordered.

WHEEL — be sure to indicate direction of rotation of fan and type of wheel (flange, cone or paddle) and the operating speed. If the wheel is the back plate type, specify whether hub location is internal or external to the backplate. The bore and keyway dimensions are also required.

SHAFT — be sure to indicate type and make of bearings used. Length and location of shaft extensions are also required.

BEARINGS — the following information should be indicated when ordering various types of bearings:

Anti-Friction Bearings

1. State whether ball or roller
2. Manufacturer
3. Size and number
4. Fixed or floating
5. Parts required

Arrangement 2 Bearings

1. State whether ball or sleeve type
2. Size
3. Parts required

Dodge Ring Oiled Sleeve Bearings

1. Size
2. Babbitted or bronze sleeves
3. Plain or water jacketed
4. Whether fixed or floating
5. Parts required

RECOMMENDED SPARES

1. V-belts on V-belt driven fans
2. Fan bearings
3. Wheel(s) and shaft