# AES 4000 GRAVITY STRAINER

## INSTALLATION -- OPERATION -- MAINTENANCE

## INTRODUCTION

Inspection:

The AES 4000 Series Gravity Strainer is supplied in a ready-to-install condition. However, prior to installation, the vessel assembly should be inspected for visible signs of shipping damage. IMPORTANT: If there is any evidence of damage to either the equipment or the wood packing, contact the carrier's claim agent and notify Albany International.

Vessel Design:

The standard 4000 series vessel design incorporates a fiberglass tank with inlet, accept, reject and shower connections.

Units are designed to direct the accept flow to a properly sized holding tank. IMPORTANT: The 4000 series vessel assembly is generally not large enough to act as a holding tank or provide suction head for process pumps. OUTLET PIPING SHOULD BE LARGE ENOUGH TO ALLOW UNRESTRICTED FLOW FROM THE UNIT. Should the outlet flow be restricted, the strainer vessel will quickly fill up and overflow into the reject header (See Figure 1 and 1A).

## INSTALLATION

1. Handle the strainer vessels with care. Lifting lugs are provided on the side of the fiberglass vessel. A spreader bar should be used.

2. The filter must be installed in a horizontal position and leveled (See Figure 2).

   Prior to making any flange connections (and with inlet blind flange still in place and the drain valve closed) fill the inflow chamber with water (using hose, etc.). With the chamber filled completely full, but not overflowing, the unit may be leveled quite easily. NOTE: This must be done prior to making flange connections to prevent undue stress on the unit.

3. Piping should be assembled toward the vessel (instead of from the vessel) and final fit-up should not induce any stress.

   Weight of piping and valves must be supported independently. Stress due to thermal movement must be relieved by expansion joints.

   Full face neoprene gaskets of 40 to 50 durometer are preferred for the fiberglass flanges (ASA 150 lb. flanges). A

lubricant, grease, or soap on full face gaskets will improve the sealing. Bolt torque of 25 to 40 foot-pounds is recommended.

4. Connect the feed line and inlet control valve (by customer) to the upper large diameter flanged inlet pipe. See Figures 4, 5, 6, 7, 8 and 9 for typical inlet piping arrangements.

5. Connect the accepts and rejects line to the appropriate ports on the bottom of the unit. The pipe runs should be the same size as the ports, with minimum possible restriction to flow. Horizontal runs should be sloped downwards in accordance with normal gravity drain line standards.

   The reject line is sized for system failure protection. If the screen should happen to plug up (for example, if power was accidentally interrupted to shower drive motor) all of the flow will be directed to the reject line. If the reject line is restricted, the unfiltered water will back up and overflow into the filtered water system.

6. Connect the line for the rotating shower to its water supply. If the media in use is 60 mesh or finer, the accepts from the strainer may be used to supply the shower.

   Water pressure required to keep the screen open varies with each application. A pressure regulator followed by a pressure gauge should be installed in the shower supply line to regulate the proper water pressure and to limit the water pressure to a maximum of 20 psi. The following table gives shower flow requirements.

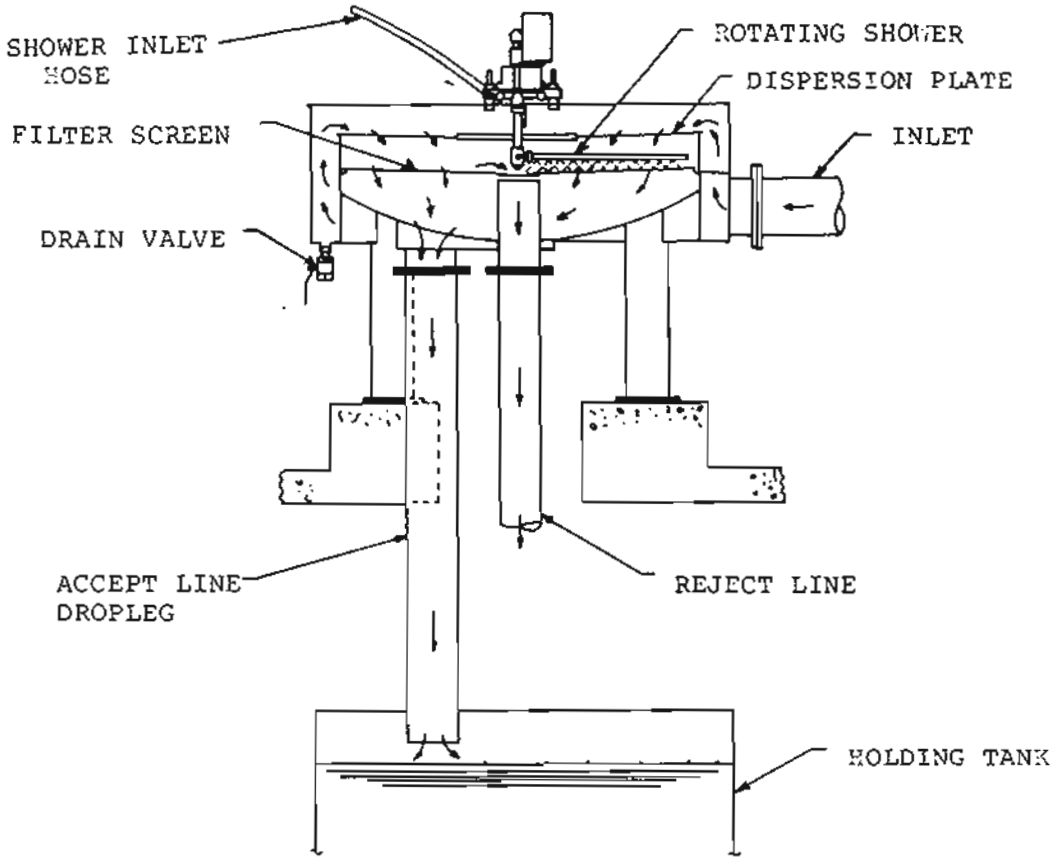
| MODEL | APPROXIMATE GPM AT 20 PSI* |
|---|---|
| 4005 | 31 gpm |
| 4015 | 45 gpm |
| 4025 | 53 gpm |
| 4035 | 66 gpm |
| 4045 | 80 gpm |

* These gallonage figures are for shower use alone. If use of the 1/8" pipe size minimum velocity bleed ports are expected, an additional 20 gpm will be required regardless of the unit size. (See Troubleshooting Section -- Problem II).

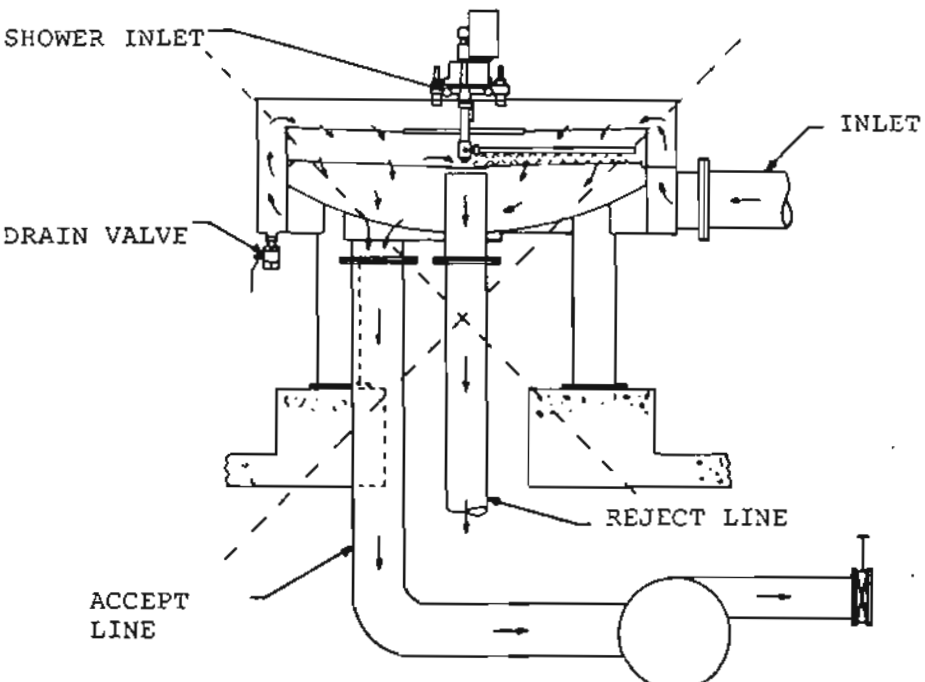
7. The standard motor supplied on 4000 Gravity Strainers is 1/2 hp, 230/460 volt, 3 phase, 60 cycle TENV. Motor speed is 1800 rpm and the motor starter is not supplied with the unit.

8. After connecting electrical supply, check the rotation of the shower arm. It should be turning at about 9 rpm clockwise.

9. The drain valve should be piped to the nearest "U" drain or sewer or to the reject line, for proper gravity flow.




RECOMMENDED INSTALLATION
FIGURE 1




NOT RECOMMENDED SINCE RESTRICTION OF FLOW MAY RESULT IN FLOODING OF VESSEL
FIGURE 1A

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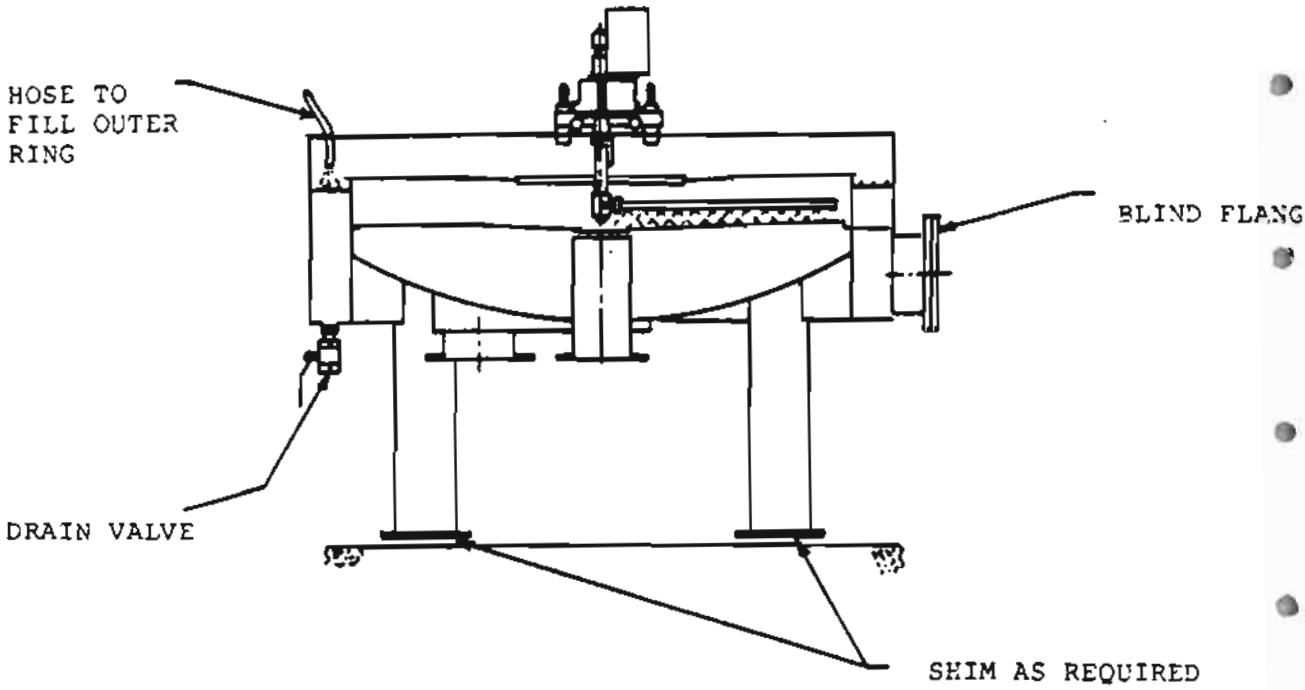
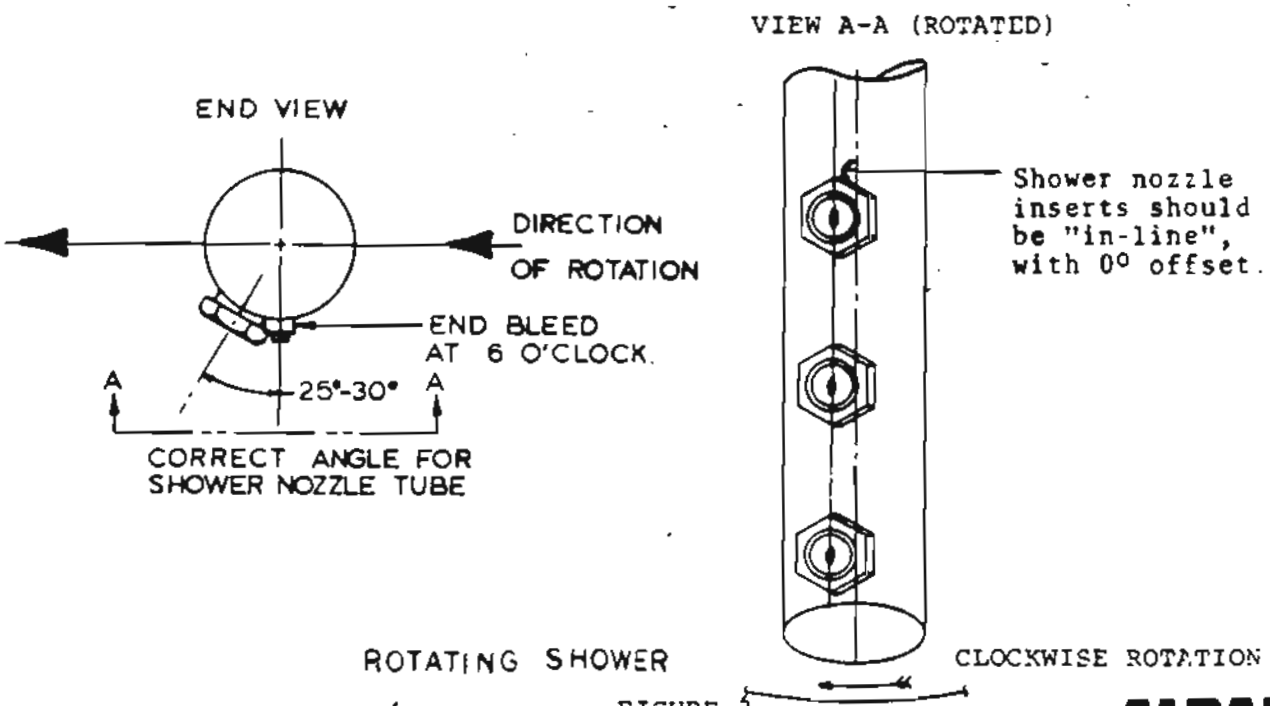



LEVELING STRAINER
FIGURE 2




ROTATING SHOWER
FIGURE 3

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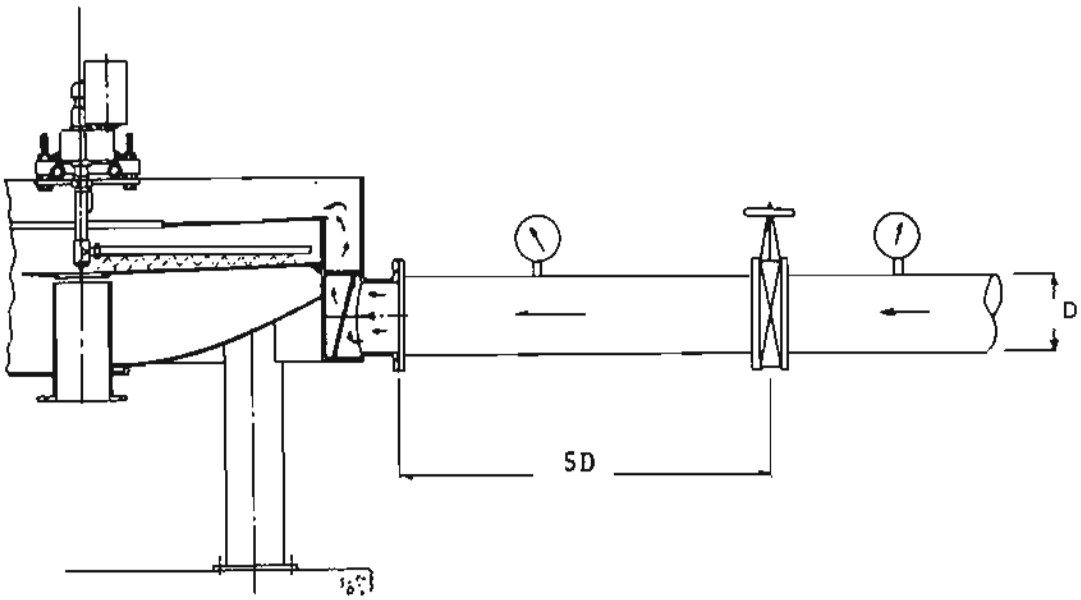
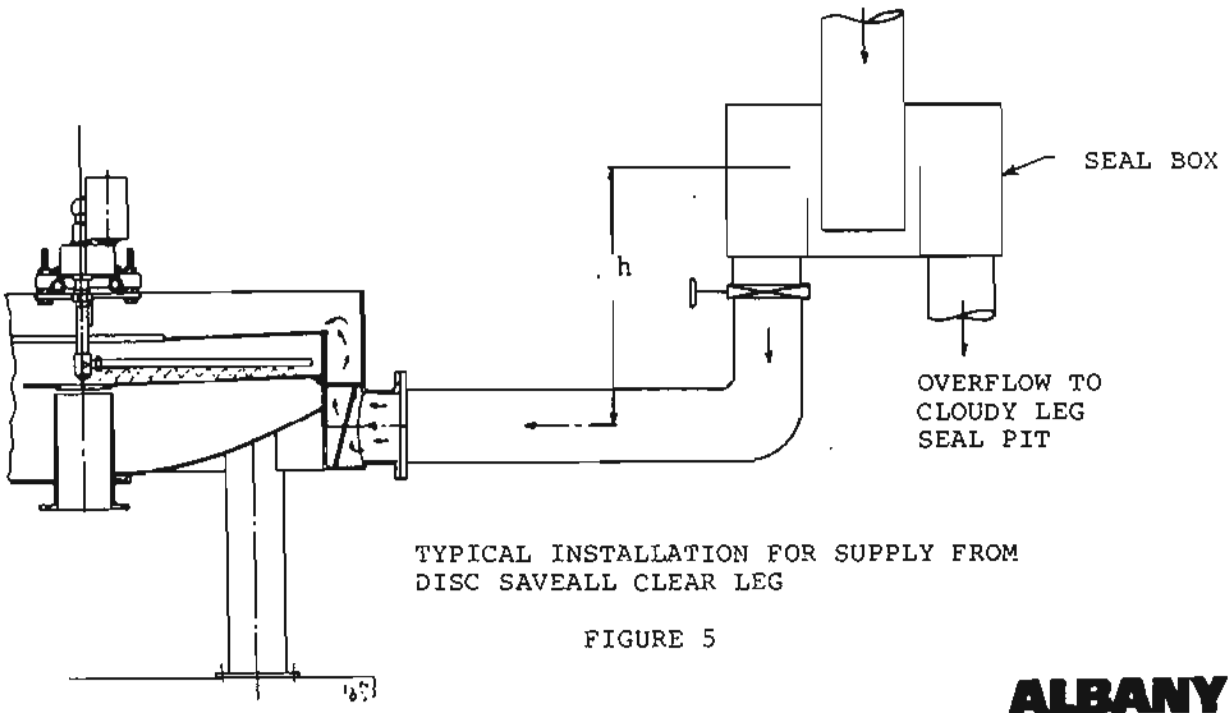
INLET VALVE




INLET VALVE LOCATION
FIGURE 4

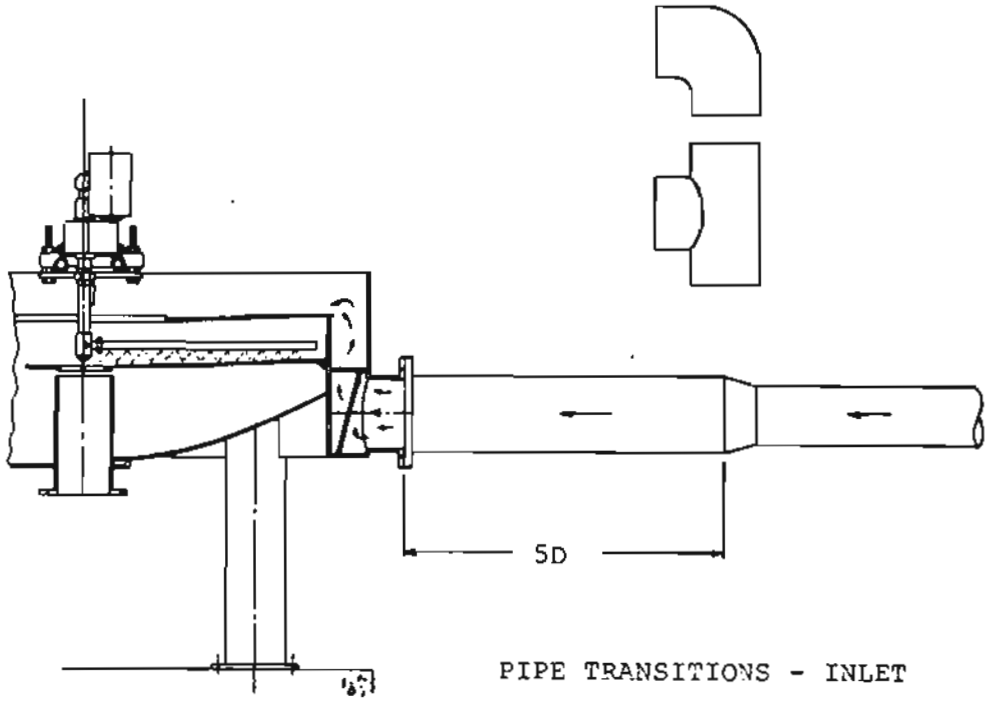
CLEAR LEG




TYPICAL INSTALLATION FOR SUPPLY FROM
DISC SAVEALL CLEAR LEG

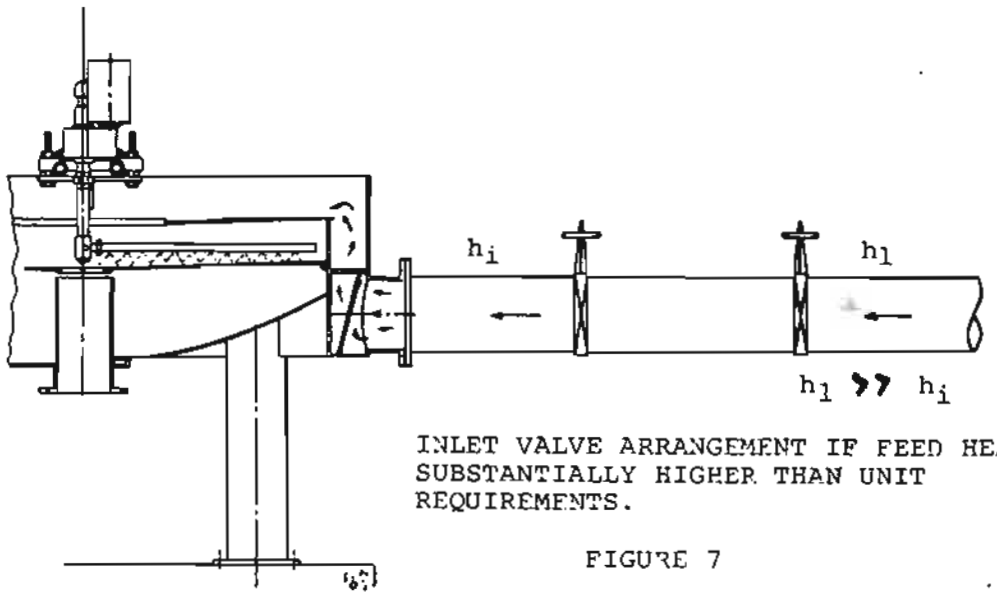
FIGURE 5

PIPE TRANSITIONS



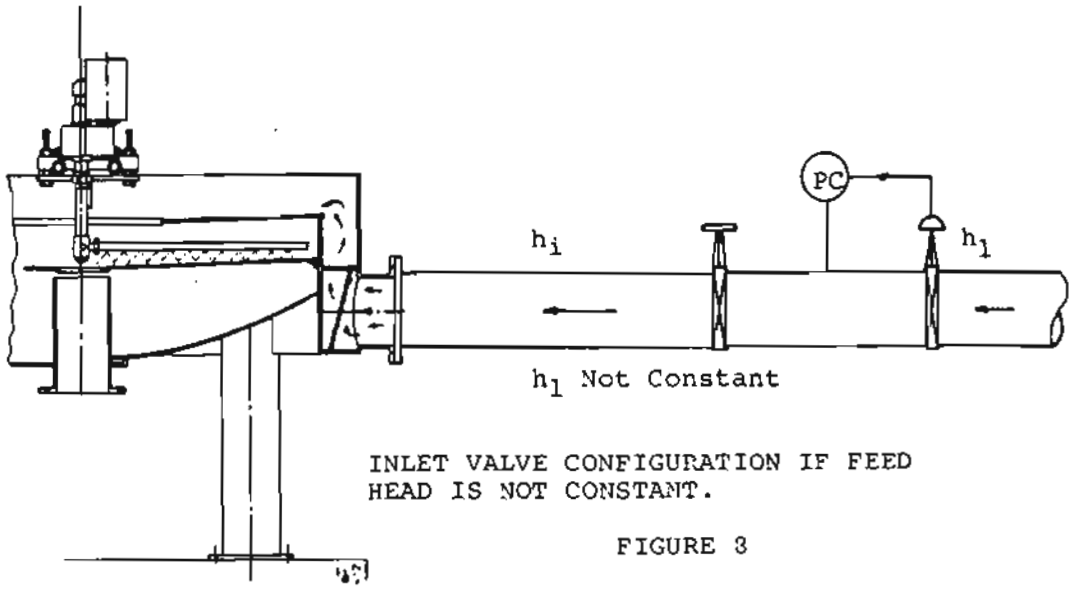

PIPE TRANSITIONS - INLET

FIGURE 6



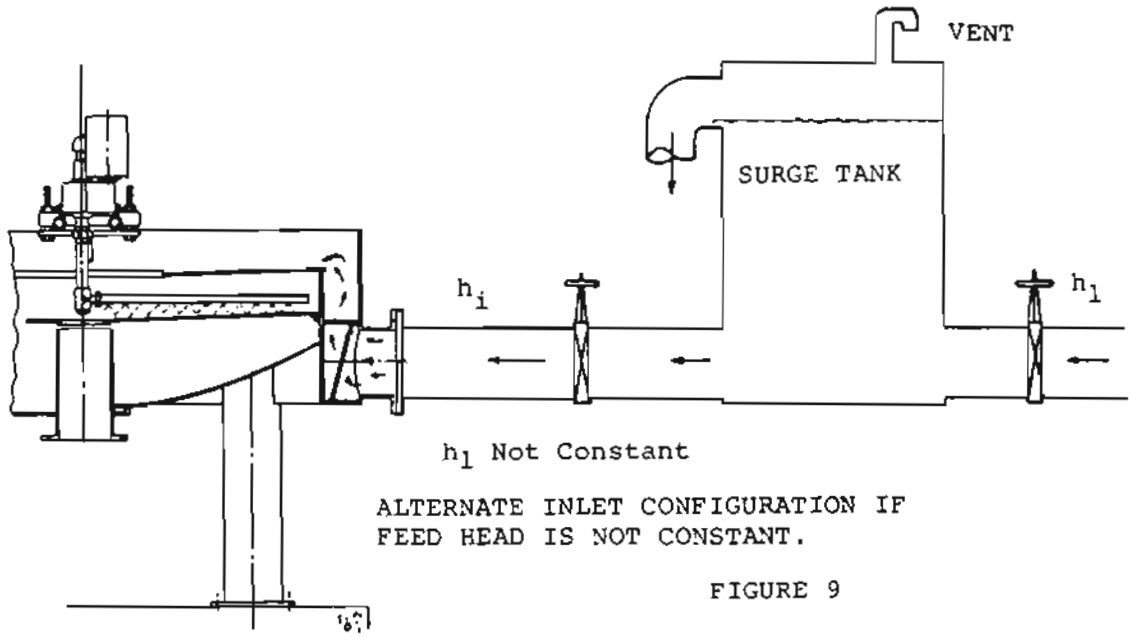

INLET VALVE ARRANGEMENT IF FEED HEAD SUBSTANTIALLY HIGHER THAN UNIT REQUIREMENTS.

FIGURE 7




INLET VALVE CONFIGURATION IF FEED HEAD IS NOT CONSTANT.

FIGURE 8




ALTERNATE INLET CONFIGURATION IF FEED HEAD IS NOT CONSTANT.

FIGURE 9

# OPERATION

## General Description:

The fluid to be filtered enters the Gravity Strainer and is directed around the circumference of the vessel. The dispersion plate (if supplied) distributes the flow uniformly over the surface of the screen.

The filtered fluid (accepts) falls directly through the media. The oversized solids which collect on the screen are continuously washed to the center reject port by the angled fan sprays of the three rotating shower arms

## Start-Up Procedure:

1. Turn on shower drive motor.

   CAUTION: Ensure that shower arms are turning before turning on shower water supply.

2. Turn on the shower water. Start with the shower pressure at approximately 10 psi.

3. Open inlet valve slightly.

   If the unit is level, the water will rise evenly and flow onto the dispersion plate uniformly about its entire circumference.

   If the unit is not level, stop the flow and drain the unit using the drain valve. Next, disconnect all flange connections and level the unit as described in Installation Instructions.

4. If the unit is level, increase flow to the unit while monitoring the volume of reject flow.

## Capacity:

The capacity of a unit depends upon the volume of solids being removed from the fluid and the speed at which these solids are washed from the screen by the rotating shower.

If too much (contaminated or heavily loaded) flow enters the unit, the screen will begin to blind off causing a greater and greater flow to the reject header.

A reject flow of approximately 30 gpm would indicate that the unit is operating at or near its design capacity.

Increasing shower pressure will increase capacity. However, increasing to pressures greater than 20 psi will have little additional effect, and can have an adverse effect by "stapling" fiber through the screening media.

NOTE: Due to the large screen area, effects of changes in flow rate and/or shower pressure may not show up for 15 to 20 minutes.

5. If the unit can handle all the inflow available, reducing the shower water pressure will cause a slight reduction in the reject flow volume.

6. When shutting the 4000 strainer down, run the shower for at least 5 minutes after inflow to the unit has stopped. Changing the shower supply to fresh water during this period is recommended.

## TROUBLESHOOTING

I. Problem: Sudden increase in reject flow.

Probable Cause/Solution:

Check rotating shower for plugged nozzles. Also check inlet flow for possible increase in solids loading.

II. Problem: Shower nozzle plugging.

Probable Cause/Solution:

Disassemble and clean plugged nozzles. Accept water from the strainer may be used in the shower if the screen media is 60 mesh or finer. However, low flow velocity in the shower tubes may result in settling out of suspended solids, which will in time result in nozzle plugging. When this is the case, the nozzles will most often plug in succession; the outside nozzles first, etc.

To combat this problem, remove the 1/8" pipe plugs located near the end of the shower arms. Removing these plugs will increase shower consumption by approximately 20 gpm resulting in a higher flow velocity in the showers. The higher velocity will help prevent nozzle plugging.

III. Problem: Solids collecting on the dispersion plate.

Probable Cause/Solution:

The dispersion plate should be hosed down at least once per day. If build-up is a constant problem, the strainer may be operated without the dispersion plate. It should be noted that operating without the plate may result in decreased filtration efficiency or screen fatigue. Consult Albany International.

## MAINTENANCE

The 4000 series strainer is designed for continuous service. In order to ensure uniform, reliable service, some preventative maintenance must be performed.

1. The dispersion plate should be hosed down on a regular basis (daily if demanded by operating experience).

2. The entire unit should be inspected and washed down on a routine basis. The dispersion plate should be removed and the screen checked for holes.

3. Lubrication of the right angle speed reducer is extremely important. Proper oil level must be maintained. The correct level is indicated by the level plug.

   Lubicant should be drained and the gear case refilled after the first 250 hours of operation; then every 1500 hours or six months thereafter.

   There are grease fittings on the rotary elbow and on the top bearing of the hollow shaft gear reducer. Both of these fittings should be greased every 1500 hours of operation or every six months, whichever comes first. Any general purpose waterproof grease for low speed bearings is acceptable. Recommended greases are shown on the attached Browning Gear Reducer instructions.

   Further instructions and lubrication information may be found on the manufacturer's tag attached to the gear reducer.

4. Check shower on a regular basis for nozzle plugging and correct nozzle orientation (See Figure 3).

## DISTRIBUTOR PLATE AND FILTER MEDIA REMOVAL

Should it become necessary to remove the distributor plate (if supplied) or the filter media for either maintenance or replacement, then the following procedure should be used.

1. Span the top surface of the vessel with a plank or suitable support to provide access for service personnel.
2. Disconnect the three shower arms at their unions on the hub assembly and remove them.
3. Disconnect the shower feed pipe at the union located below the drive reducer and remove.
4. Lift the distributor plate and slide it out from under the drive support beam and over the side of the vessel.
5. Lift the filter media and slide it out from under the drive support beam and over the side of the vessel.
6. To replace the filter media and distributor plate reverse the procedure outlined above.
7. Shower arms and nozzles should be set as shown in Figure 3.

FILTER MEDIA REPLACEMENT -- See Form 253B.

Browning WORM GEAR SHAFT MOUNT REDUCERS

# IMPORTANT INSTRUCTIONS

(File for Future Reference)

## WARNING - DRIVE MUST BE FILLED WITH OIL BEFORE OPERATION

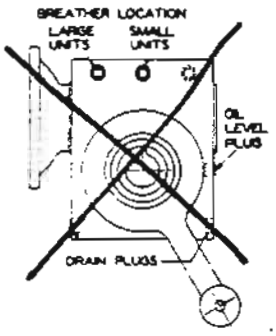
### INSTALLATION INSTRUCTIONS

1. POSITIONING

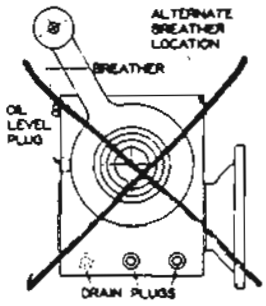
The Browning Worm Gear Shaft Mount Reducer is designed to operate in four positions: Hollow Output Shaft Bottom, Hollow Output Shaft Top, Hollow Output Shaft Vertical and Input Shaft Vertical with MOTOR UP. Every Reducer is supplied with a plain square head breather plug, drain plug and oil level plug. The breather is designed to release air pressure caused by heat generated in the gear reducer.

For 375, 450 and 516 Reducers operating with Hollow Output Shaft BOTTOM at input speed less than 690 RPM, contact the Factory.

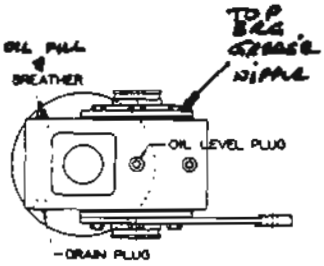
POSITIONING THE BREATHER AT THE TOP OF THE GEAR REDUCER IS VERY IMPORTANT. If not in the top when the reducer is mounted, interchange the breather with the socket head pipe plug so that the breather is at the top. See Sketches No. 1, 2, 3 and 4 for proper location of the breather plug in all four mounting positions.



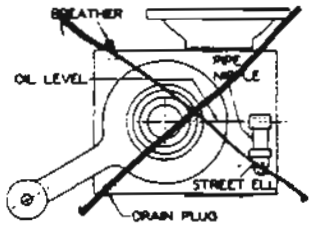

Sketch No. 1
Output Shaft Bottom




Sketch No. 2
Output Shaft Top




Sketch No. 3
Output Shaft Vertical




Sketch No. 4
Input Shaft Vertical

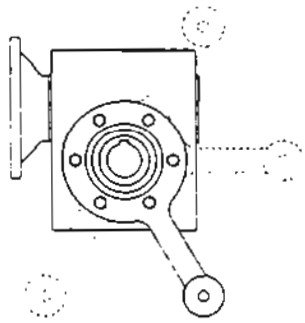
Oil level for input vertical must be at the centerline of the low speed hollow shaft and can be checked by the plug on the side of the housing in small units. In the larger units a street ell and pipe nipple can be used, see Sketch No. 4. For Input Vertical, MOTOR DOWN, contact the Factory.

2. TO ATTACH THE TORQUE ARM (Furnished)

Remove and discard the capscrews in the Gear Cover on the side of the reducer which will be next to the machine on which the reducer is to be mounted. DO NOT REMOVE OR DISTURB THE GEAR COVER. Attach the Torque Arm in the desired position (see Sketch No. 5) over the gear cover using the longer capscrews provided.

3. TO MOUNT THE REDUCER

The shaft on which the reducer is to be mounted should be straight and free of burrs. Lubricate the shaft and slide the reducer into place WITH THE TORQUE ARM NEXT TO THE MACHINE.



Sketch No. 5

DO NOT HAMMER ON THE REDUCER WHEN MOUNTING. NEVER LIFT A REDUCER BY ITS SHAFTS. Tighten ALL setscrews onto the driven shaft. Fasten the torque arm to a rigid support.

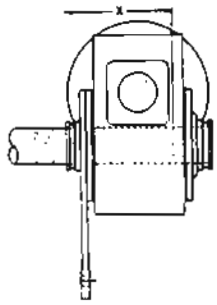
Form No. 8083 BROWNING MFG. DIVISION—EMERSON ELECTRIC CO.—MAYSVILLE, KY.

ATTACH TO ESD FORM # 381, AND 368.

4. The driven shaft should extend all the way through the Hollow Output Shaft of the Reducer. If this is not possible, it must extend at least as far as the recommended minimum shown in Table No. 1 and Sketch No. 6.

Table No. 1

| Reducer No. | Dimension "X" | |
|---|---|---|
| | No Bushing | With Bushing |
| SM133 | 3 1/8 | -- |
| SM154 | 3 7/8 | -- |
| SM175 | 3 7/8 | -- |
| SM206 | 3 3/4 | 5 |
| SM237 | 4 1/8 | 5 1/4 |
| SM262 | 4 1/2 | 5 1/2 |
| SM300 | 5 3/8 | 7 1/8 |
| SM325 | 5 3/8 | 7 1/8 |
| SM375 | 7 | 7 7/8 |
| SM450 | 8 | 9 1/8 |
| SM516 | 7 3/4 | 9 |




Sketch No. 6

5. BUSHINGS (Available in SM206 Reducers and Larger)

Bushings are used to adapt the hollow output shaft to a smaller driven shaft. ALWAYS CHECK THE SHAFT STRESS WHEN USING BUSHINGS. Insert the bushings into the hollow output shaft and retain in place by threading the longer setscrews, provided with the bushings, into the holes in the bushings. The keyed bushing should be mounted at the power take-off end of the driven shaft. If a solid keyed bushing is used, install the key at this time. Mount the reducer on the shaft and tighten ALL setscrews.

It is preferred that the shaft extend completely through the reducer bore and MUST extend into it by at least "X" as shown in Table No. 1 for Bushings.

BUSHINGS WHERE THE KEYWAY IS CUT COMPLETELY THROUGH THE WALL may appear to be too small for the shaft or too large for the reducer bore. In either case, when the bushing is forced onto the shaft or into the bore it returns to its original shape and is very functional.

* NOTE →

## LUBRICATION INSTRUCTIONS

Using the correct amount of oil is important. Too little or too much oil can cause overheating and rapid wear of gears, bearings and seals. The approximate amount of oil is given on the lubrication name plate attached to the reducer housing and in the following table. To fill the gear reducer:

1. Place it in the desired operating position, and with the unit NOT RUNNING remove the breather plug and the oil level plug (see Sketches 1, 2, 3 and 4 on page 1 for location of these plugs).
2. Fill slowly through the breather hole until oil begins to drain from the oil level hole. See Table No. 3 for recommended lubricant. If lubricant cannot be pumped into the unit, a street ell in the breather hole will be helpful in pouring in the oil.
3. Allow oil to settle for a few minutes, check again and replace oil level plug, remove street ell, if used, and replace breather plug.

Table No. 2 APPROXIMATE AMOUNT OF LUBRICANT REQUIRED IN OUNCES

| Reducer No. | Output Shaft Top | Output Shaft Bottom | Output Shaft Vertical | Input Shaft Vertical |
|---|---|---|---|---|
| SM133 | 9 | 5 1/2 | 7 | 7 |
| SM154 | 14 | 9 1/2 | 12 | |
| SM175 | 21 | 12 | 16 | |
| SM206 | 22 | 13 | 18 | |
| SM237 | 28 | 14 | 23 | |
| SM262 | 39 | 30 | 33 | |
| SM300 | 60 | 34 | 45 | |
| SM325 | 61 | 41 | 57 | 61 |
| SM375 | | | | |
| SM450 | | | | |
| SM516 | | | | |

Browning

# REDUCERS

The low speed (hollow output shaft) bearings have been grease packed at the factory and no additional lubrication is necessary except when the reducer is operated with OUTPUT SHAFT VERTICAL. In this case, remove the hex. head pipe plug in the top low speed end cover and replace with a grease fitting and use General Purpose Anti-Friction Grease per the table below. If the reducer has no pipe plug in the low speed gear cover, contact the Factory.

## RECOMMENDED LUBRICANTS AND OPERATING TEMPERATURES

When worm gears are operated, heat is generated. A maximum gear case temperature of 200°F. is not uncommon for units operating in normal ambient temperature. No damage will result from this temperature if the gear reducer is operated at rated capacity and the proper oil is used. Below is a table showing some recommended oils:

| COMPANY | RECOMMENDED OILS FOR AMBIENT TEMPERATURES | |
|---|---|---|
| | 15 - 60°F (AGMA Comp #7)* | 60 - 125°F (AGMA Comp #8)* |
| **BROWNING** | GL32LT and GL12SLT | GL32HT and GL12SHT |
| American | Amolite Worm Gear Comp #4 | Amolite Worm Gear Comp #6 |
| Gulf | Acorn Cyl Oil "B" | Sentee Cyl Oil "C" |
| Humble | Cylesso TX-140 | Cylesso TX-160 |
| Shell | Valvata J78 | Valvata J82 |
| Socony | Mobile Cyl 600W | Mobile Super Cyl 600W |
| Standard of California | Chevron Gear Compound #140 | Chevron Gear Compound #160 |
| Standard of Indiana | Standard Worm Gear Oil | Calumet SH Cyl Oil |
| Standard of Kentucky | Chevron Gear Compound #140 | Chevron Gear Compound #160 |
| Standard of Ohio | Sohicyl C150 | Sohicyl 650 |
| Texaco, Inc. | Honor Cyl Oil | 650T Cyl Oil |

*For ambient temperatures lower than 15°F. and higher than 125°F., contact the factory.

Pouring point of the oil should not be less than the minimum ambient temperature in which it is used.

**Recommended General Purpose Greases for Low Speed Bearings**

| | |
|---|---|
| Alvania #2 | Sinclair Litholine Multi-Purpose |
| Texaco Multifak #2 | Sun Prestigo #42 |
| Humble Multi-Purpose Grease "H" | |

## RELUBRICATION

Service life and gear efficiency are affected by oxidation or contamination of the lubricating oil. Improved performance is obtained by periodic relubrication. After initial two week operating period, drain the oil while warm. Flush the gear case with a light weight (5 or 10W) mineral oil and refill to proper level with fresh recommended oil.

For normal operating conditions, relubricate again after one month and thereafter at four month intervals. If unit is operated in abnormally high ambient temperature or unusual contaminating atmosphere, or longer than eight hours per day, relubricate more frequently.

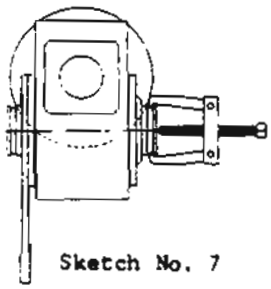
In vertical shaft operation, relubricate the top low speed bearing with each oil change. Clean fitting before greasing. Do not over lubricate. Use a general purpose grease recommended above or an equivalent.

## MAINTENANCE

Browning Gear Reducers are accurately adjusted and tested at the factory. They will need no maintenance other than proper lubrication for good service life.

## REMOVAL OF REDUCER

Shaft Mount Worm Gear Reducers may be easily removed from the driven shaft by using a conventional external wheel puller, see Sketch No. 7. Be sure to loosen ALL setscrews first.



Sketch No. 7

## STORAGE

The inside of all Browning reducers have been completely coated with a rust preventive oil. If this housing is not going into service for some appreciable time, it should be filled completely with the recommended oil. Before operating, drain excess oil to the correct operating level. Reducers should be stored in a heated room which has a relatively even temperature and humidity.

# REPLACEMENT OF MEDIA IN 3600 & 4000 SERIES GRAVITY STRAINERS

## GENERAL INFORMATION:

Operating experience indicates that accidental mechanical damage is the primary cause of media failure. For this reason it is extremely important that care be taken when handling the screens and that spare screens be stored in a safe location.

Two styles of screens are currently being supplied with the gravity strainer; single layer construction and two layer construction.

## SINGLE LAYER SCREENS

Single layer construction (Figure 1) is used for 100 mesh, 60 mesh and coarser screens.

> NOTE: The nominal 60 and 100 mesh stainless steel media is a specially woven screen material (standard 60 or 100 mesh square weave media is not recommended for this service).

Since normal media life (excepting mechanical damage) is several years, and since a certain amount of skill is involved to properly mount replacement media, Albany recommends that damaged screens be returned to Glens Falls for media replacement.

If on-site replacement is required, the following procedure is recommended:

1. Remove damaged media. Grind or sand screen rings to remove all residual solder.

2. Prepare a working table about one foot greater in width than the screen diameter. A 15" diameter hole should be cut in the center of the table for the screen drip edge (Figure 3).

3. Locate inner ring on table (with drip edge protruding through hole). Hold in place with small 1/4" plywood blocks tacked to table.

4. Locate outside ring so that it is concentric to inside ring. Hold in place with 1/4" plywood blocks tacked to table.

5. The mesh should then be laid on the table. Extreme care should be taken to prevent creasing of the media. Double staple one corner and stretch tight - corner to corner and cross corners and staple all sides (Figure 4).

6. Recheck surface of screen for wrinkles and tightness. Stretch and restaple as required.

7. Apply acid flux and solder outside ring. A soft silver solder (Chemtron #430 or equivalent) is recommended. A large electric soldering iron should be used. Solder should be applied in 6" arcs spaced 4-5" apart. This "skip soldering" is done to distribute heat and help eliminate wrinkles.

8. Start around assembly again, filling in areas not soldered first pass.

9. Place a weight (i.e., blind flange) on center of screen for added tension. Apply flux and solder inside ring (Figure 5).

10. Reclean and solder any void spots.

11. Trim edge of screen with sharp knife and examine for voids in solder.

12. Trim center of screen. Be careful to maintain a smooth edge.

13. Rinse screen with water to remove all excess acid flux.

14. Radius inside edge with file to smooth sharp edges which may catch fiber.

DOUBLE LAYER SCREENS:

Double layer construction (Figure 2) is used for some 100 mesh and all 150 mesh and finer screens.

The double layer construction consists of a 10 mesh stainless steel back-up wire soldered to a bottom set of rings. A set of top rings is used to clamp the fine polyester media in place.

Replacement of the polyester media is quite easy since soldering is not required and since the polyester fabric is less prone to wrinkle or crease than stainless media.

The folloiwng procedure is recommended:

1. Prepare a working table asbout one foot greater in width than the screen diameter. A 15" diameter hole should be cut in the center of the table for the screen drip edge (Figure 3).

2. Place screen assembly on table. Note marks on top and bottom rings which indicate proper ring alignment. If marks are not visible, use file to mark rings for proper alignment upon reassembly.

3. Remove top rings and strip off old polyester.

4. Inspect 10 mesh screen for damage. Check solder joints. Clean and repair if required. If repair is made, rinse away acid flux before continuing.

5. The fine mesh should then be laid on the table. Double staple one corner and stretch tight -- corner to corner and cross corners. Staple all sides.

6. Recheck for wrinkles and tightness. Stretch and restaple as required. The fabric should be quite tight. There should be no bagginess or wrinkles.

7. Apply a small bead of silicone sealant (1/4" wide) on the poly media above the outer ring.

8. Place top outside ring in position (check alignment marks).

9. Use sissors to cut away the media after clamping the top ring to the bottom using every other socket head screw (leave approximately 1" of media protruding outside clamp rings).

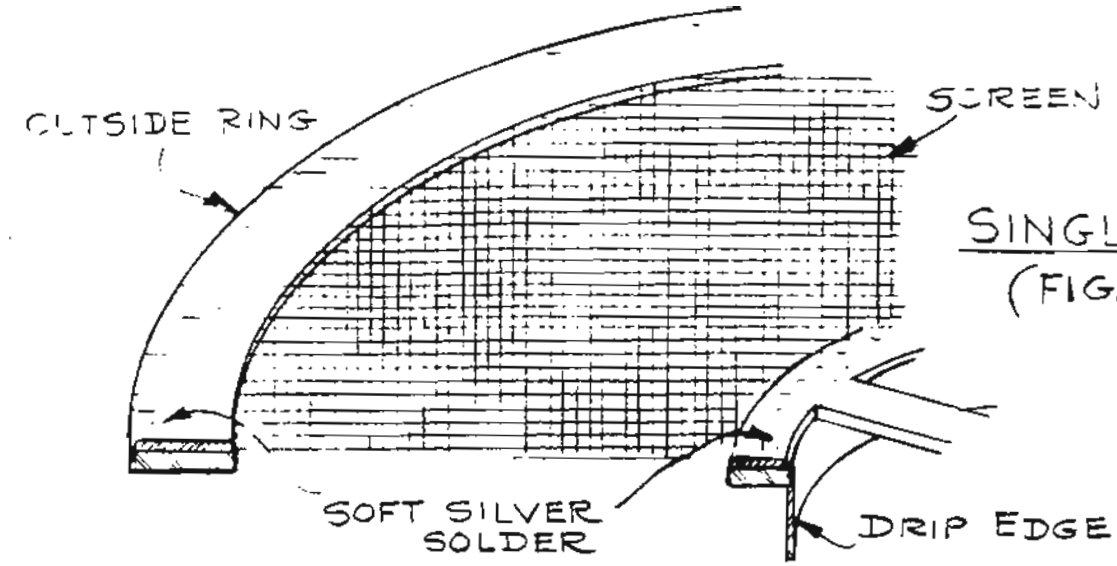
10. Check for excess bagginess. Loosen screws and tighten media as required.

11. Replace remaining socket head screws.

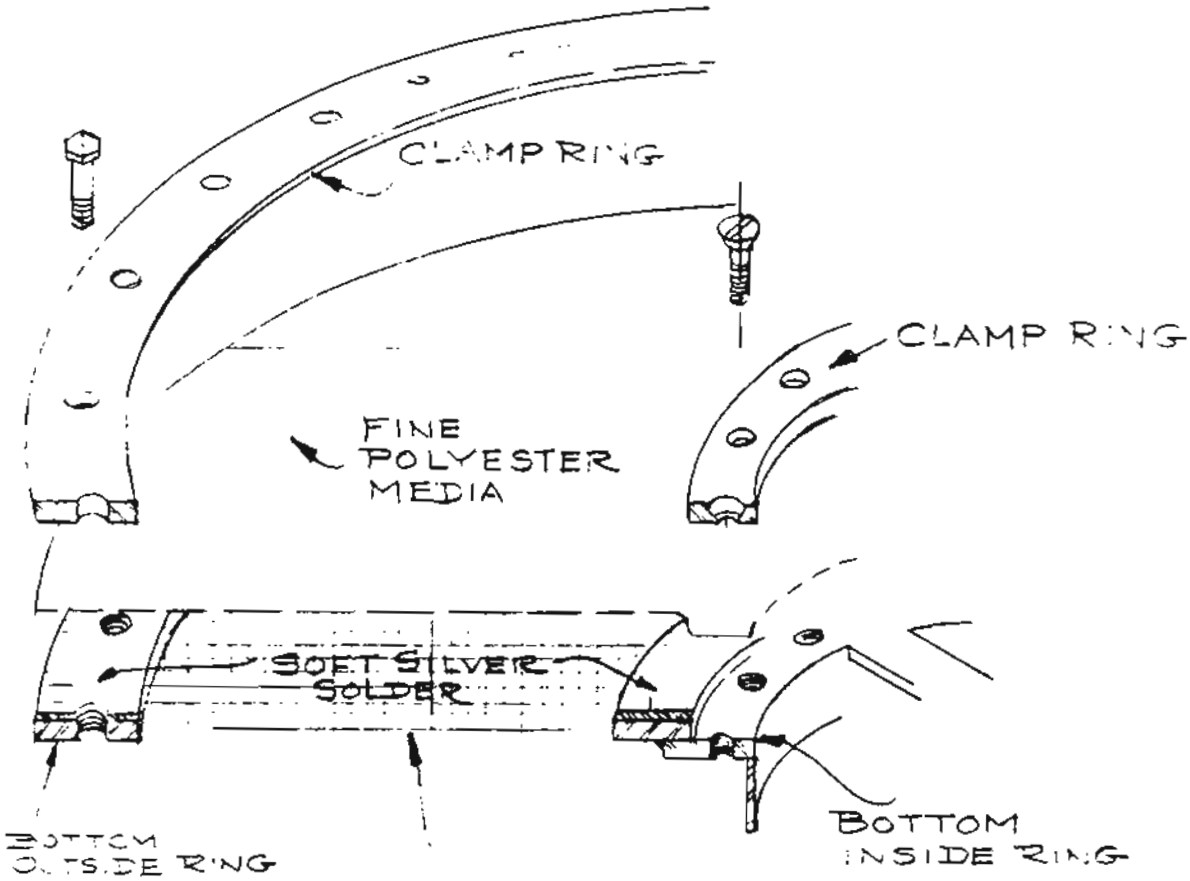
12. Place bead of silicone sealant (1/4" wide) on the bottom side of the inside top ring. Replace ring, noting proper alignment marks. Attachment of this ring will help increase media tension.

13. Leave screen on table for at least one hour to allow sealant time to cure.

14. Trim excess material and cut out center reject hole, with a sharp knife or razor blade.




SINGLE LAYER
(FIG. 1)




'O MESH
BACK UP
(STAINLESS STEEL)

TWO LAYER (FIG 2)

FORM #253B
4/19/77
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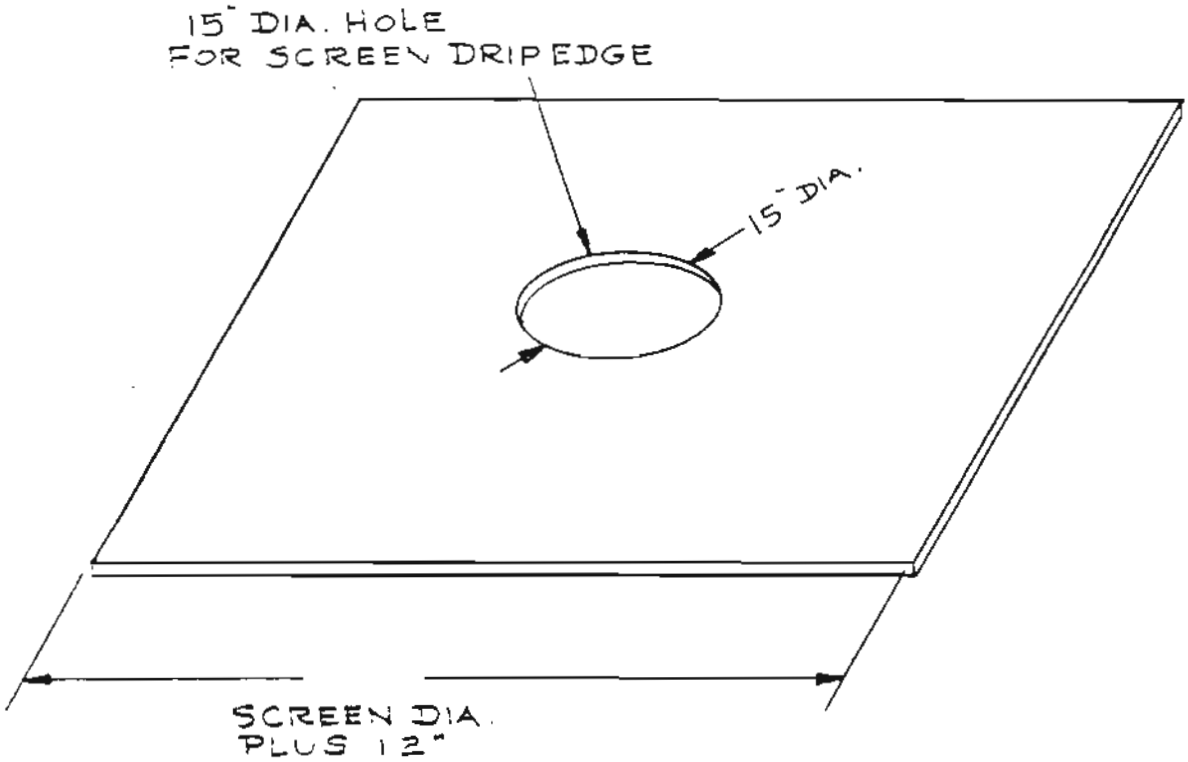
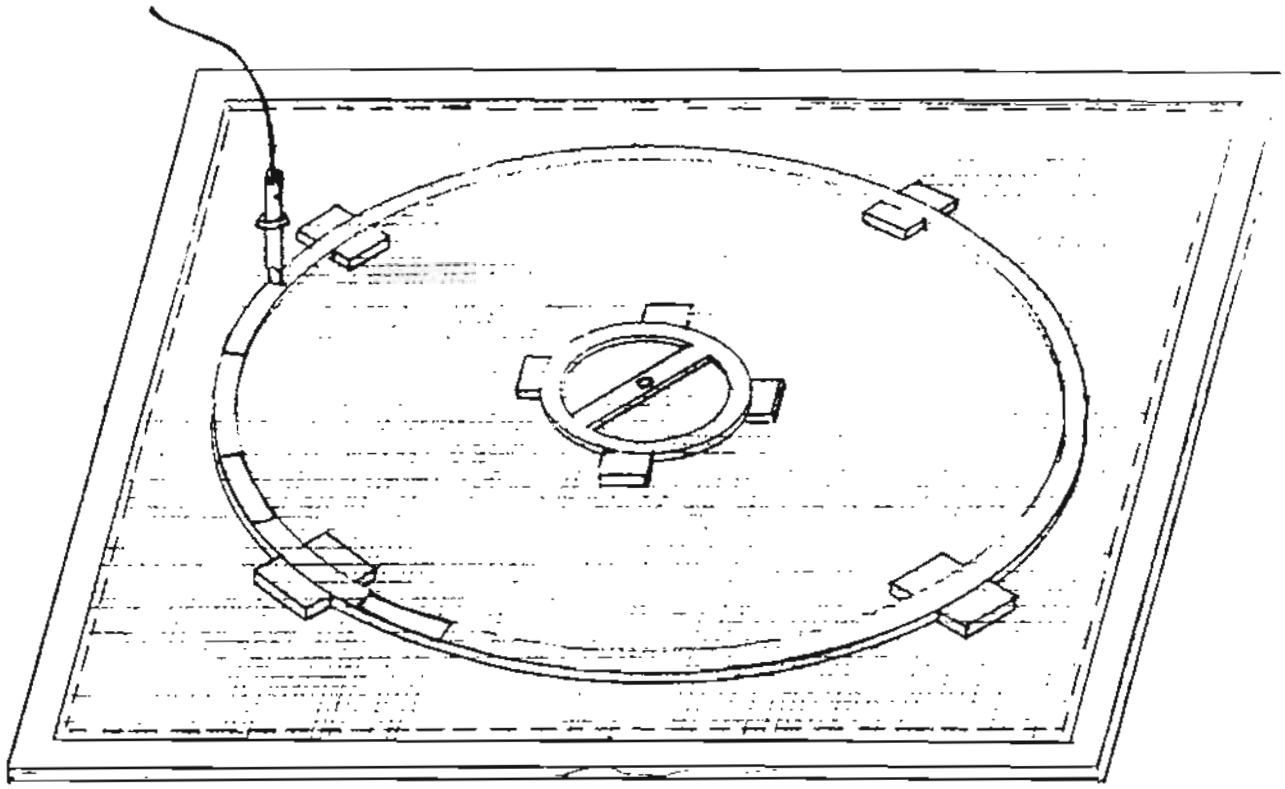
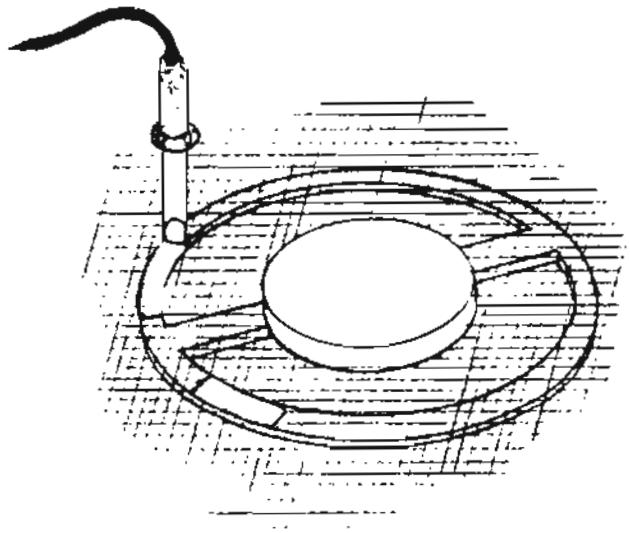



MOUNTING TABLE
(FIG. 3)



STRECHING THE MEDIA (FIG. 4)
AND SKIP SOLDERING OUTSIDE RING



PLACE WEIGHT IN CENTER (FIG 5)