Technical Manual

BOOM ANGLE INDICATOR

The Boom Angle Indicator mounted on the right side of the boom foot is a simple device for indicating the angle the boom makes with the true horizontal. A plate, showing angle in degrees, is bolted to the right side of the boom. A pendulum pointer suspended from one end hangs free. When the boom is parallel with level ground the pendulum would indicate zero degrees. As the boom is raised the angle indicated by the pendulum increases.

CONSULT MACHINE SPECIFICATIONS FOR CORRECT OPERATING RADIUS.

For successful operation of machines with dragline type booms it is necessary to operate well within the stability of the machine. The machine specifications, included with these instructions, tabulate permissible bucket size or maximum suspended load (bucket and contents) for all lengths of booms at various operating radius. The operating radius means the distance of the suspended load from the center of rotation when the machine is on firm level ground.

SET BOOM ANGLE WITH MACHINE ON FIRM, LEVEL GROUND.

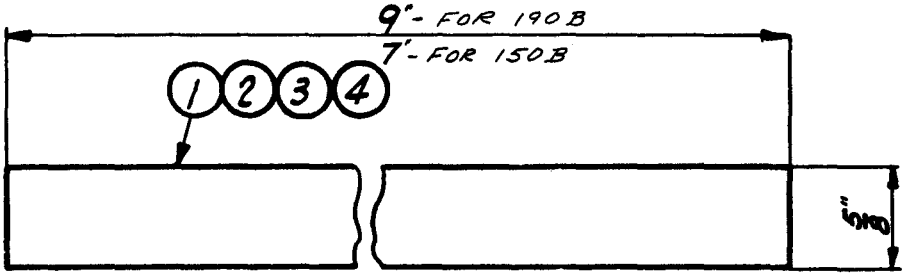
When the machine first goes into operation the correct operating radius should be determined, taking into consideration the weight and size of the bucket used and the weight and condition of the material being handled. Wet material weighs more than the same material dry. With the machine on firm, level ground, measure off the radius determined and raise the boom until the load is suspended at the correct radius. The boom angle indicator will then show the true angle of the boom with the horizontal.

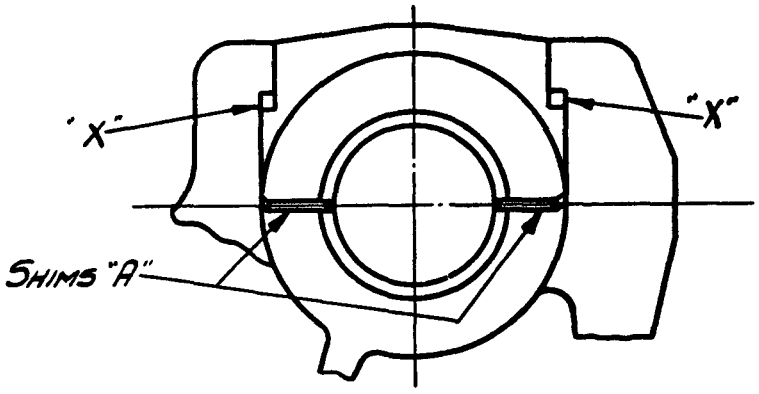
WATCH BOOM ANGLE INDICATOR AT ALL TIMES.

While the machine is working, watch the boom angle indicator and if, at any time, due to working on a grade or soft footing, the indicator shows an angle less than that determined when the machine was on level ground, raise the boom until the indicator shows an angle equal to, or greater than, that shown when on level ground. Failure to do this means that the machine is being operated in excess of its ratings and damage may result.

CHANGE BOOM ANGLE IF BOOM LENGTH OR LOAD IS CHANGED.

If the length of boom is changed or a different bucket is used, or if the nature of the material handled is such as to change the weight of the loaded bucket, a new operating radius must be determined and a new setting for the boom angle indicator determined.





INSTRUCTIONS FOR TAKING UP BEARING WEAR

1. DECREASE THICKNESS OF SHIMS "A" TO OBTAIN $\frac{1}{64}$" RUNNING CLEARANCE.
2. ADD SHIMS (1-2-3-4) UNDER KEYS AT "X" EQUAL TO THICKNESS REMOVED FROM SHIM "A".

NOTE: SHIMS (1-2-3-4) ARE FURNISHED WITH TOOLS AND SUPPLIES UNIT.

HOIST BEARING CAP SHIMS

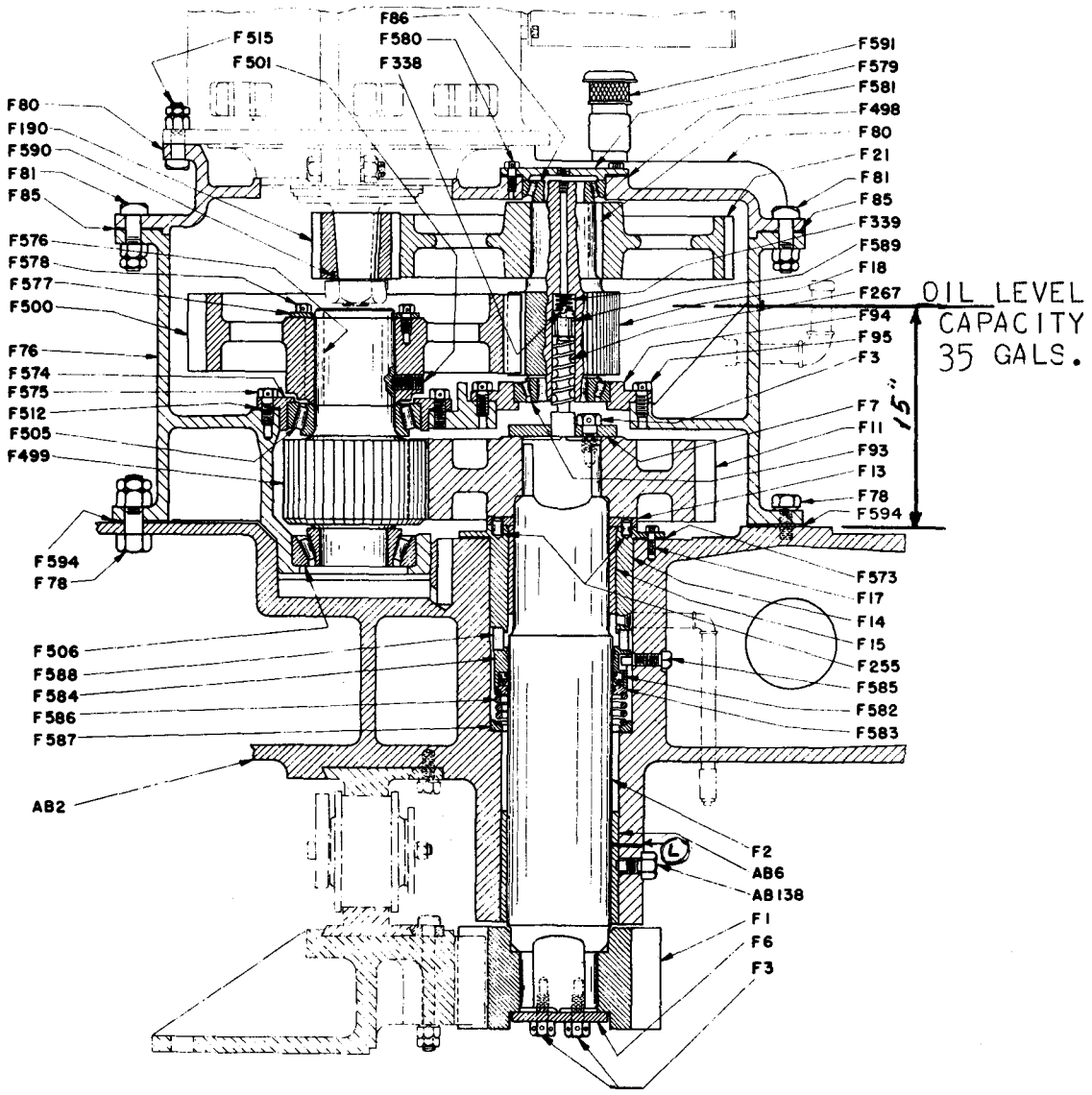
Revised July, 1964
Ref. Drawing 403782

NOTE: BEARING INSTRUCTION
PROCEDURE FOR: ASSEMBLY
1ST.INT.SHAFT BRGS.(PC.MK. 93-86)
2ND.INT.SHAFT BRGS.(505-506)
TYPICAL PROCEDURE:

1. ROTATE SHAFT ASSEMBLY (499) WHILE TAKING UP ON OUTER RACE RETAINER (574) BY TIGHTENING CAPSCREW (575) WITHOUT SHIM PACK IN PLACE.
2. CONTINUE TIGHTENING CAPSCREWS UNTIL BEARING BIND SLIGHTLY.
3. MEASURE GAP AT BEARING RETAINER (574).
4. INSTALL A NOMINAL SHIM PACK THICKNESS WHICH WILL EQUAL THE THE MEASURED GAP PLUS .003" (ALLOWABLE SHIM PACK TOLERANCE +.000 -.002)

SWING MACHINERY
REF.856286 10-70

110-B 150-B 190-B



Collector rings of wound-rotor and synchronous motors must be kept clean and polished. Ordinarily the rings will require only occasional wiping with a piece of canvas or non-linting cloth. If the rings become worn or pitted so that excessivc sparking occurs, grind or turn them to restore a smooth and true surface. Be sure all dust and dirt is blown out of the spaces between the collector rings.

Collector ring brushes must move freely in the holders and make firm contact with the rings. Check the brushes frequently to see that they are not stuck in the holders. New brushes should be ground to perfect fit with fine sandpaper. Maintain the brush spring tension at a pressure of from 2 to 3 pounds per square inch for carbon or graphite brushes. When replacing worn brushes, use the correct grade as furnished by Bucyrus-Erie Company.

Induction motors of small and medium size are usually furnished with ball or roller bearings. Induction or synchronous motors of the larger sizes may have oil-lubricated sleeve bearings.

Actual lubrication requirements of any particular motor or generator vary to a great extent on the details of construction, therefore it is impossible to give detailed lubrication instructions which will apply to all motors and generators. Manufacturers bulletins covering the electrical equipment are included with the instructions furnished for the machine. Read the bulletin applying to the particular piece of equipment for detailed maintenance instructions.

Couplings

The couplings used for connecting separate units of the motor generator set may be either of two general types, depending upon the construction of the motor generator set. Flexible couplings are usually used where both units to be connected have shafts supported at both ends. Solid (or rigid) couplings are used where one or both shafts are supported at one end only.

Solid couplings are of the flanged type and consist of two steel members rigidly bolted together. One half has a projecting ring on the face of the flange and the other half has a corresponding recess in the face of the flange. The fitted bolts holding the coupling halves together permit no flexibility, therefore the coupling halves must be very accurately aligned when assembling the coupling. The coupling was correctly installed at the factory but because of possible distortion in the supporting base, resulting from handling or from settling of the machine framework, it is well to check the alignment after the machine first goes into service and at increasingly greater intervals thereafter until it is definitely established that the alignment has not changed.

The first step in checking alignment of a motor-generator set consisting of two or more units all coupled with solid, flanged couplings, is to loosen all bolts and remove all but two diametrically opposite bolts in each coupling. Next, use jacking bolts to force the coupling halves far enough apart to permit inserting feelers between the coupling faces. Always open up the couplings next to the two-bearing unit (usually the driving motor) first, and do not open up the couplings too far, because the total end play must be divided between the couplings. After opening all couplings, remove the jacking bolts from all couplings and check alignment starting with one of the couplings next to the two-bearing unit.

Check the coupling halves for parallel faces by measuring the gap between halves with feeler gauges. Measure the gap at four points spaced 90 degrees apart around the coupling, then turn both shafts ¼ revolution and again take the four gauge measurements. Repeat this procedure two more times, turning the shafts ¼ revolution each time, taking care to turn both shafts the same amount, so that the relative position of the coupling halves is not disturbed.

The measurements on the sides of the coupling should check within 0.002 in. for all positions but the top and bottom readings may show a constant difference due to the tendency for the shafts to drop slightly at the open coupling.

Correction of vertical misalignment is obtained by adding or removing shims under the frame feet. Correction sidewise is obtained by removing the dowels, loosening the foot bolts and tapping the feet until the desired movement is obtained. Tighten the foot bolts before rechecking the alignment. After correct alignment is obtained drill new dowel holes and insert the dowels.

The flexible couplings used may be any of several different types depending upon the manufacturer of the motor generator set.

The "Fasts" flexible coupling, used on some sets, is not a universal joint and the same care must be taken in alignment of the coupling as for the solid coupling. In addition to checking the gap between coupling halves, check the hubs for concentricity by placing a straightedge on the rims of the hubs. Insert shims, if necessary, so that

Keep the motor clean and free of dirt and oil by following the general instructions given for alternating current motors.

If the compressor does not pump the required amount of air without running excessively, check the air piping for possible leaks. If the cylinders lack compression, examine the condition of the valves and clean, if necessary, as described in the manufacturer's bulletin. CAUTION: DO NOT ATTEMPT TO REMOVE THE DISCHARGE VALVE CAPS UNTIL THE AIR HAS BEEN BLED FROM THE SYSTEM.

The motor starting switch is provided with thermal overload relays to protect the motor against overheating. If the overload relays continually open the magnetic switch, examine the compressor for hot bearings or stuck valves. DO NOT REPLACE THE RELAY HEATERS WITH HEATERS OF LARGER SIZE.

Short circuit protection is obtained by the use of a circuit breaker or fuses in the supply line. Other motors may be connected to the same circuit breaker; therefore, in case the breaker opens, investigate all circuits to determine the cause of the trouble before resetting the circuit breaker or replacing the fuses.

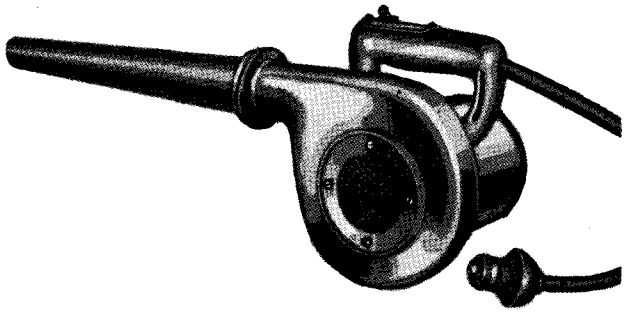
The Care of Motor and Generator Insulation

The following instructions regarding the care and maintenance of motor and generator insulation are of the utmost importance and should be followed very carefully in order to obtain the best results and continuous service from your machine. In the care of electric motors and generators, the feature having the greatest influence on operation, life and general well-being is the care given insulation.

Motors and generators that have been long in transit in moist atmosphere, or have been idle for an extended period without heat to prevent the accumulation of moisture, should be thoroughly dried out before being placed in service. Machines may also become wet by accident, or they may "sweat" as a result of a difference in their temperature and that of the surrounding air, just as cold water pipes "sweat" in warm, humid atmosphere. This condition is very injurious and should be prevented, particularly in the case of large and important motors and generators, by keeping them slightly warm at all times. Current at a low voltage can be passed through the windings or electric heaters can be used with tarpaulins stretched over the motor or generator to maintain the proper temperature.

A systematic and periodic inspection of motors and generators is necessary to ensure best operation. Some machines are installed where conditions are ideal, where dust, dirt and moisture are not present to an appreciable degree; but most motors are located where some sort of dirt accumulates in the windings, lowering the insulation resistance and cutting down creepage distances. Stone or coal dusts are highly abrasive and actually cut the insulation in being carried through by the ventilating air. If conditions are extremely severe, open motors and generators may require a certain amount of cleaning each day. For less severe conditions weekly inspection and partial cleaning is sufficient. Most machines require a complete overhauling and thorough cleaning about once a year.

The best method for cleaning the insulation is air at low pressure. The Bucyrus-Erie Company offers a portable blower delivering a good volume of air at the correct pressure which is very convenient for the periodic cleaning of insulation.



Once each week, or oftener if required by extremely dusty conditions, blow out the accumulated dust and dirt in the windings. Oil or grease is extremely detrimental to the insulation and must not be allowed to remain on the windings. Wipe off any accumulation of grease and clean with carbon tetrachloride. Be sure there is good ventilation, because the fumes are dangerous.

If small cracks appear in the insulation, apply a coat of insulating varnish after thoroughly cleaning the winding. Suitable varnish for this purpose may be obtained from the nearest dealer or the electrical equipment manufacturer. On most motors and generators, windings are accessible, and the air can be properly directed to prevent damage to them.

mineral grease of about #1-1/2 to #2 consistency should be used. The grease should be free of abrasive fillers and highly resistant to oxidation. When fans are operating at elevated temperature (166 F or higher), silicone or lithium soap base grease should be used. This high temperature grease should have a breakdown point above 350 F.

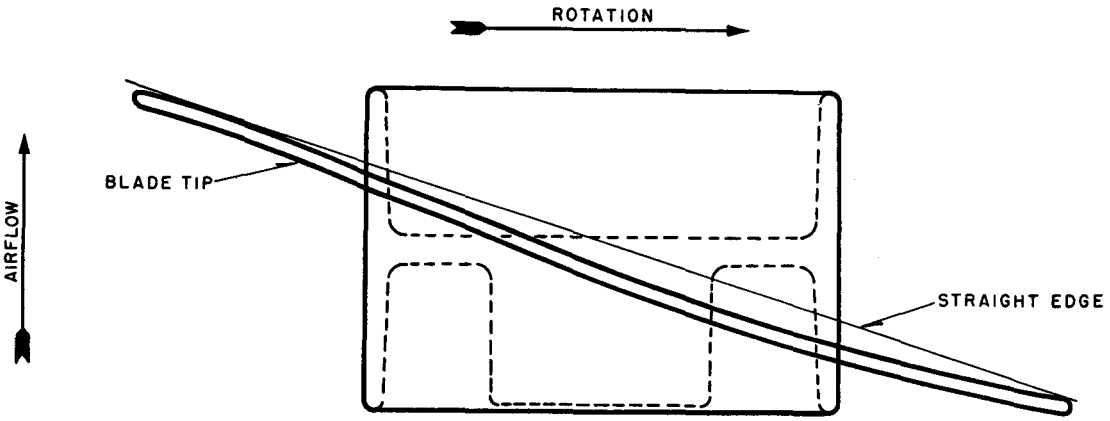
DRIVES

Sheaves should be firmly locked in position and the key should fit tightly. Alignment is correct when the fan and motor shafts are parallel and belts are perpendicular to the shaft. A straight edge or taut cord may be used to line up the sheaves. Belts should be under light tension and should feel "live" when thumped. Belts should deflect slightly under light pressure. To remove belts, loosen belt adjustment.

WHEEL ROTATION

Wheel rotation is shown by direction arrow on the wheel. Should this arrow become obscured, direction of rotation and air flow may be determined as indicated by the diagram.

METHOD OF DETERMINING AIR FLOW AND ROTATION



CAUTION: If it should become necessary to remove the fan wheel from shaft, the wheel should be carefully marked, so that the air flow face of the wheel blades are replaced on the shaft, in the correct direction of the air flow.

TEMPERATURE LIMITS

TYPE FAN	ARR.	TYPE WHEEL	CONSTRUCTION	TEMP. LIMITS (DEG.F) Min.	Max.
Tubeaxial	9	Aluminum	Standard	—20	+150
Tubeaxial	9	Steel	Standard	—20	+165
Tubeaxial	9	Steel	350 F	—20	+350
Tubeaxial	9	Steel	600 F	—20	+600
Tubeaxial	9	Steel	Corrosive Protective Coating	—20	+165
Tubeaxial	3	Stl or Alum	Standard	—20	+150
Vane or Tubeaxial	4	Stl or Alum	Standard	—20	+100
Vaneaxial	9	Stl or Alum	Standard	—20	+150
Spraybooth	9	Aluminum	Standard	—20	+150
Spraybooth	9	Steel	Standard	—20	+165

RENEWAL PARTS

When continuous fan operation is vital it is recommended that spare parts such as bearings, V-belts and, in some cases, wheels be kept on hand for emergencies.

PRE-OPERATING CHECK

Before putting the fan into operation, remove the shipping wire holding the wheel and turn the wheel by hand to be sure it is not rubbing against the casing. Check for tightness of wheel on shaft. Factory mounted motors on Arr. 9 fans may shift during shipment. Therefore, V-belt alignment should be checked. Be sure that belts are not rubbing against the internal belt guard. Check belt tension and, if required, adjust by means of the four adjusting bolts on the motor base plate. If, during operation, the belts should stretch beyond the limits of the adjustment bolts, the assembly may be raised by repositioning the holding bolts in the next higher hole.

Check wheel rotation when starting the unit to be sure it conforms to the direction arrow on the wheel. Make sure air flow conforms with direction arrow on casing.

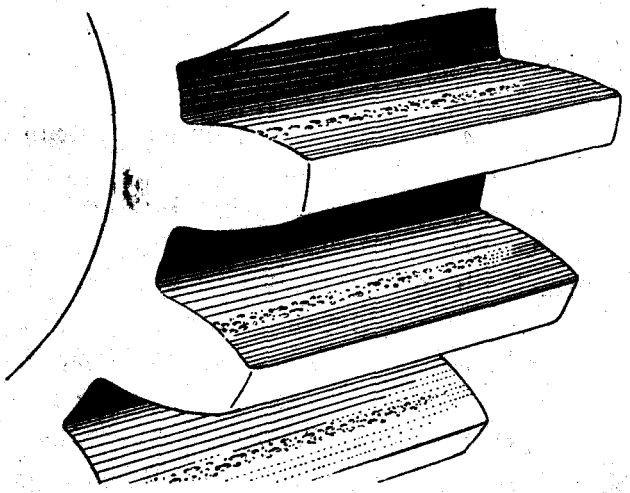


Fig. 1 . . . *Incipient Pitting.* Repeated stresses on the high or hard spots of gear teeth cause local fatigue failure of the metal. Small pieces or particles of metal break out at or slightly below the pitch line, leaving small craters or pits. After the high spots have broken out, further pitting may cease and normal wear may eventually polish out the pits.

occurs. As a result, minute particles break away and leave small pits where high points or hard spots have been (Fig. 1).

The type of pitting described ordinarily occurs only where there is a low ratio of slide to roll. Therefore, in spur or helical gears, the action occurs *at or near the pitch line,* where sliding is at a minimum. On other areas of the tooth surface the sliding action wears away the high spots before pitting can occur. With worm and most hypoid gears, side slide predominates in all contact areas, and true pitting of the gear teeth does not occur.

Although pitting is not a lubrication failure, there is some experimental evidence that oil plays a part in the following manner: As a result of fatigue, microscopic surface fatigue cracks start. These become filled with oil, and under the contact loads existing between the teeth, hydraulic pressure is developed. The pressure tends to extend the cracks and eventually to push out small particles of metal. This hydraulic action would occur with any fluid.

With spur and bevel gears, as each tooth passes through the center of mesh, the entire load is momentarily concentrated on the pitch line. If the area along the pitch line has already started to pit, the load is further concentrated on the remaining undamaged metal, and pitting is likely to increase progressively until the tooth surfaces are destroyed or severely damaged.

On the other hand, with helical, herringbone and spiral bevel gears, there is less likelihood of destructive pitting. This is because each tooth during mesh makes contact along a slanted line extending from root to tip. This line cuts across the pitch line, and although pitting may have roughened the area along the pitch line, the line of contact always extends beyond this roughened surface, and thus the load is carried on undamaged root and tip areas. Under such circumstances, pitting may cease as soon as the few, isolated high spots along the pitch line have been removed.

Pitting is more likely to occur on wide- than narrow-faced gears because of the greater difficulty in obtaining true and uniform contact across the entire width of the wide teeth. After high points and hard spots break away, the load may be distributed sufficiently well over the rest of the tooth surfaces so that the gears may then operate without further damage. With Correct Lubrication, normal wear may ultimately polish the surfaces to a smooth, unbroken finish. This sort of pitting is called *corrective* or *incipient* pitting and is not serious.

When pitting becomes progressively worse (Fig. 2), a reduction of load on the gears will

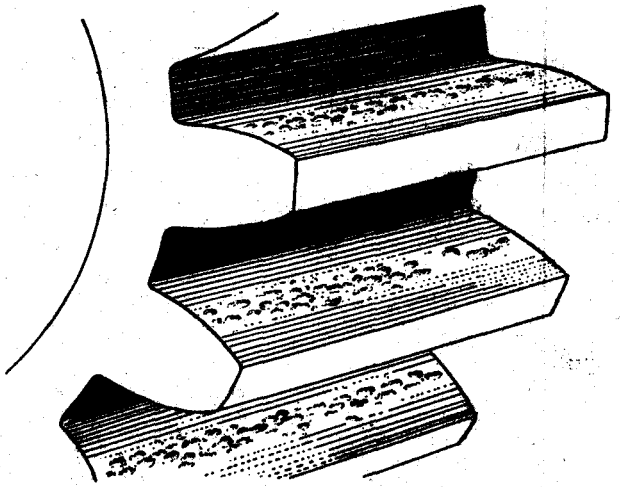


Fig. 2 . . . *Destructive Pitting.* Rough tooth surfaces may have many high spots or hard spots and may pit so badly that too much of the load-carrying surface is rendered ineffective. When this occurs, the increased loading of the remaining surface causes further pitting until the working areas are destroyed.

X-2622

Twice a year, or when temperature changes make it necessary, drain the propel gear case and cat drive gear cases immediately after propelling, and fill with gear lubricant of correct grade. Refer to Lubrication Manufacturers' Charts.

Note 6. Swing Roller Path and Swing Rack - Keep the roller path and swing rack thinly coated with gear compound. Check daily. If dirt accumulates, wash off the old lubricant and apply a fresh coat.

Note 7. Keep the steering clutches free of dirt, clay, etc. These clutches must be kept clean as their return into the engaged position is by spring action.

UPPER WORKS LUBRICATION

Most of the bearings for the upper works have grease fittings tapped directly into the bearing. Location of these fittings as well as other points requiring lubrication are shown on the Upper Works Lubrication Chart.

Reference Notes -- Upper Works

Note 1. Shovel Hoist or Dragline Drag - The first reduction gears are enclosed in oil tight cases. The gear case may be either oil or compound lubricated. Refer to Upper Works Lubrication Diagram.
The gear case is provided with a slight level gauge, a drain plug and an opening for filling the case. If gear compound is used the excess can be removed through a special opening provided.

The open gears should be checked twice a shift and compound applied as required.

Note 2. Swing - An air filter on the breather pipe prevents dirt entering the oil, however, the gear case should be drained and refilled after approximately one month's operation. Thereafter, drain and refill as indicated on chart.

In order to insure proper lubrication fo the upper first intermediate shaft bearing an impellor oil pump is placed in the shaft. If necessary to disassemble shaft be sure that ball check and spring are assembled correctly. The vertical swing shaft upper bearing is oil lubricated and the lower bearing is lubricated through a standard grease fitting brought out to a convenient location on the revolving frame deck.

Note 3. Crowd - Before placing machine in operation check to be sure that the clutch grease guard is in place. This guard protects the crowd clutch from lubricant accidentally getting on the clutch lining.

Note 4. Electric Controls - The master switches, levers, and chains in electrical control box located in operator's cab should be serviced once a week.

All the levers have grease fittings and normally only one or two shots of grease will suffice.

Occasionally a few drops of light oil should be placed on the roller chains to insure smooth operation.

SCOPE:

Lubricant performance requirements for Chain Drives.

APPLICATION:

Lubrication of enclosed and open chain drives.

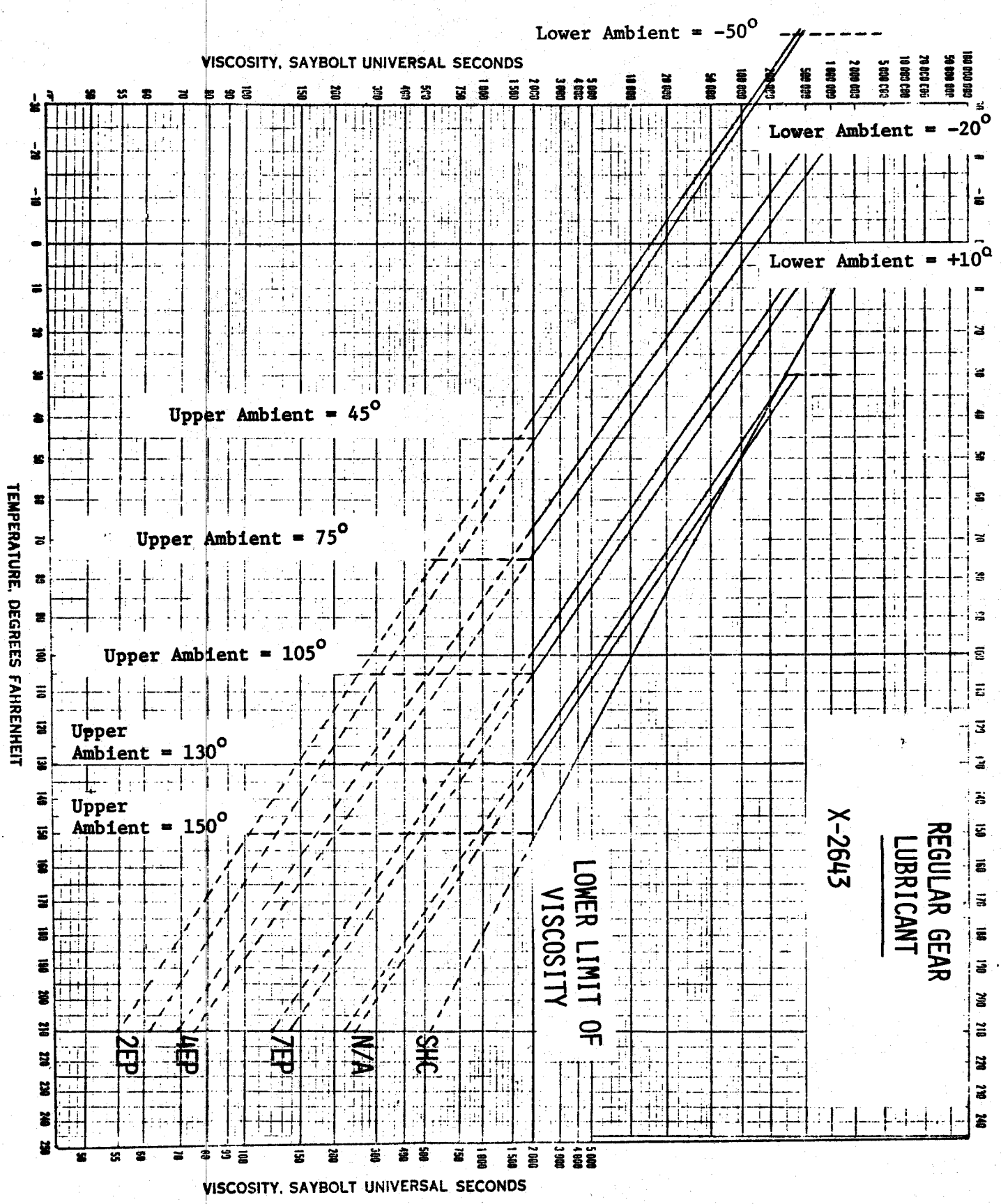
GENERAL REQUIREMENTS:

1. Viscosity must be low enough to insure penetration between the closely fitted pins and bushings. Viscosity selection is also influenced by start up and operating temperatures. Low viscosity is needed for silent chain to permit low shear when the chain plates go over the sprocket teeth.
2. Film Strength will enable the oil to maintain more effective protection against wear when the unit pressures are high due to heavy or shock loads. E.P. additives which produce film strength are desirable.
3. Should contain rust inhibitor
4. Should contain oxidation inhibitor when used in enclosed cases
5. Should contain anti-foam agent when used in enclosed cases

BASIC LUBRICATION CHART

TYPES OF CHAIN	METHOD	MIN. AMBIENT to MAX. OPERATING	BASIC REQUIREMENTS
Roller, silent (in oil tight cases)	Force-feed, dip mist, slinger, ring	-20 to 20°F 20 to 40°F 40 to 100 100 to 120 120 to 140 over 140	SAE 5W 10W 30 40 50 } Motor Oil 140 250 } Gear Oil
Roller, silent (in non-oil-tight housings, all-loss)	Drip, wick brush, mist, pour-can		
Cast, forged pintle, fabricated (open or in non-oil-tight cases; all-loss)	Dip pour-can, brush		

These performance requirements are benchmarks and not a specification. Therefore, meeting these limits as described above does not relieve the supplier of the responsibility associated with brand name products.


Lower Ambient = -50°
VISCOSITY, SAYBOLT UNIVERSAL SECONDS
Lower Ambient = -20°
Lower Ambient = +10°
Upper Ambient = 45°
Upper Ambient = 75°
Upper Ambient = 105°
Upper Ambient = 130°
Upper Ambient = 150°
TEMPERATURE, DEGREES FAHRENHEIT
LOWER LIMIT OF VISCOSITY
2EP
4EP
7EP
N/A
SHC
REGULAR GEAR LUBRICANT
X-2643
VISCOSITY, SAYBOLT UNIVERSAL SECONDS

ROPES - GENERAL

In designing a machine, Bucyrus-Erie makes careful studies of the size and operating speeds of all sheaves and drums and then selects the correct wire rope for each service. Constant contact with many machines in the field and repeated consultation with many rope makers helps us in selecting rope that is most satisfactory for each of our machines. To maintain this part of machine at its highest efficiency, purchase new ropes directly from Bucyrus-Erie Company and obtain the rope which we have found to be most suitable for that particular application.

OPERATION AND MAINTENANCE OF WIRE ROPE

A. OPERATION

To obtain maximum service from any wire rope, it is important that equipment be well maintained in good working order and reeved with the correct rope that has been properly installed. Another major point sometimes overlooked, the operator must have the necessary skills and exercise reasonable care.

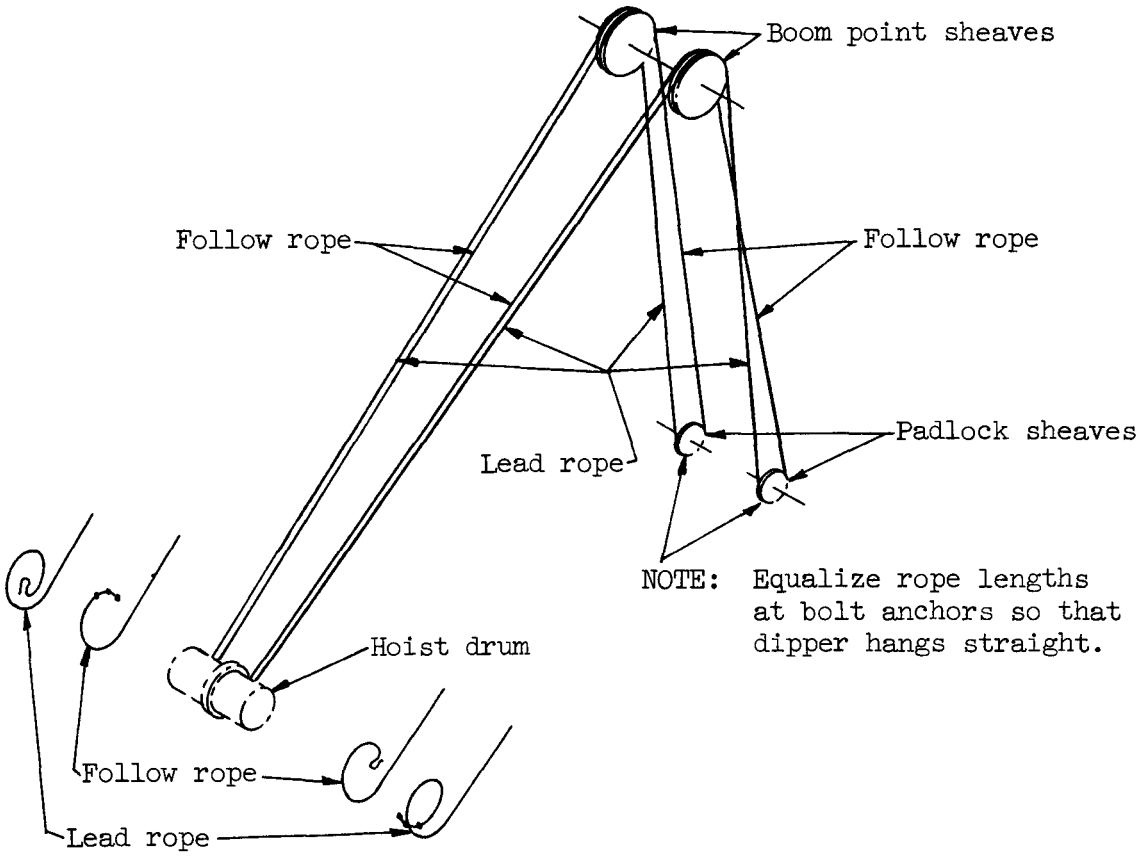
Modern designs of many types of equipment have incorporated electronic refinements into controls governing the speeds and loads imposed upon wire rope. Even with these refinements, final adjustments must be made by skilled technicians responsible for maintaining the equipment in proper working order. Rope life can be dependent, to a great extent, upon their knowledge and ability to adjust the controls so as to couple maximum production with good, safe rope life.

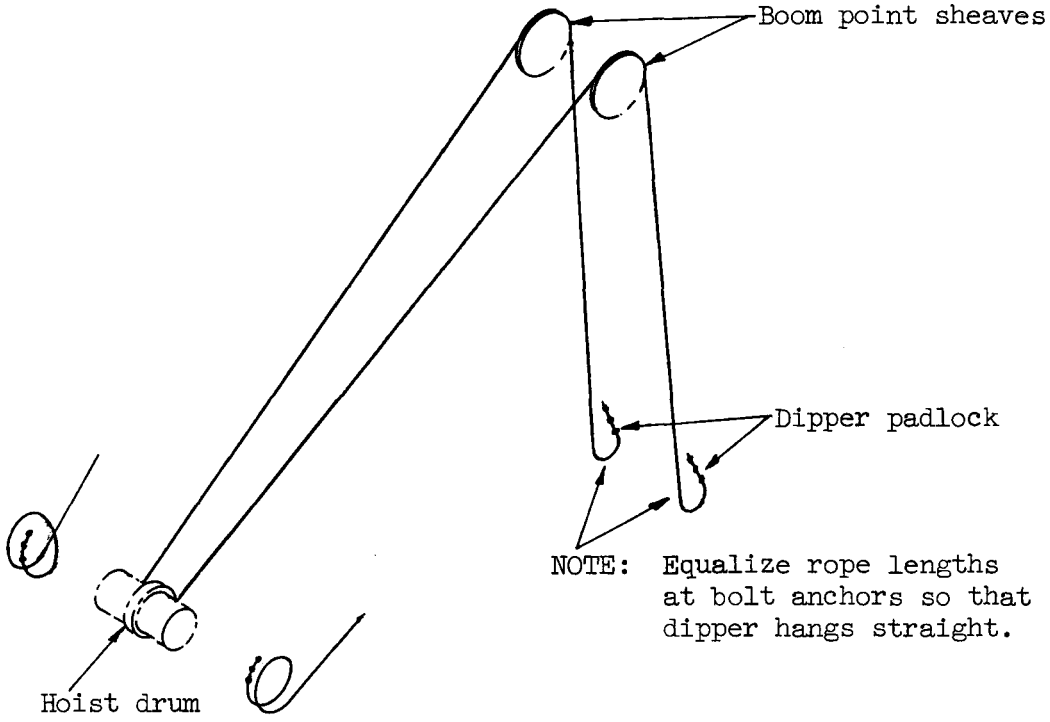
In many cases operation of the rope is still controlled directly by the operator. Experience and sense of touch, gained through his ability and close association with the equipment, can determine whether or not the rope service will be satisfactory.

The amount of service provided by a wire rope is influenced by the care afforded that rope. A rope subjected to high impact stresses, excessive vibrarion, continual overloads, abrasion or any other damaging conditions cannot be expected to last as long as one used properly by skilled operators.

LUBRICATION

Wire ropes are lubricated during fabrication, the amount and grade of lubricant used in general is dependent upon the size and type of rope. As this initial lubricant is not sufficient to last the entire useful life of the rope, subsequent applications of the following types of lubricants should be made periodically.





HOIST ROPE REEVING

June, 1964
Ref. Drawing 234935

valve as shown on schematic drawing. If the machine is again converted to shovel the dragline hoist machinery may be left in place.

13. Change electrical wiring to conform to the cable diagram and D.C. wiring diagram as shown for dragline operation. Also install the boom lights.

14. Reeve the boom hoist, drag and hoist cables in accordance with diagrams in the Reeving Section.

Reverse the above procedure to convert the machine from a dragline to shovel. The dragline hoist machinery is left in place but is not used when using the machine as a shovel.

LUBRICATION INSTRUCTIONS

A lubrication chart which shows the points to be lubricated on the dragline front end and boom hoist is included in the lubrication section of this book. Refer to the lubrication instructions given in that section for points to be lubricated and frequency of lubrication for dragline front end and other parts of the machine.

OPERATING INSTRUCTIONS

Refer to operation section for general operating suggestions and instructions in regard to steering, swinging, etc.

DRAGLINE OPERATING HINTS

Actual digging operations with the dragline require coordination between the hoist and drag motions which may be a little difficult to attain. Attention to the following suggestions and a little practice will soon give the operator the knack of filling the dragline bucket smoothly and quickly and permit accurate dumping.

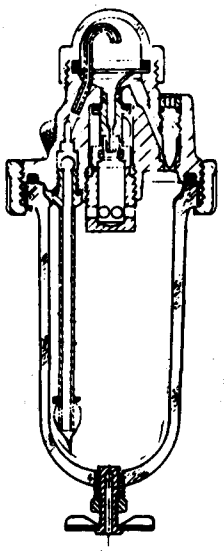
1. Keep the boom angle as high as conditions will permit so as to provide maximum stability. Do not exceed figures given in the machine specifications.

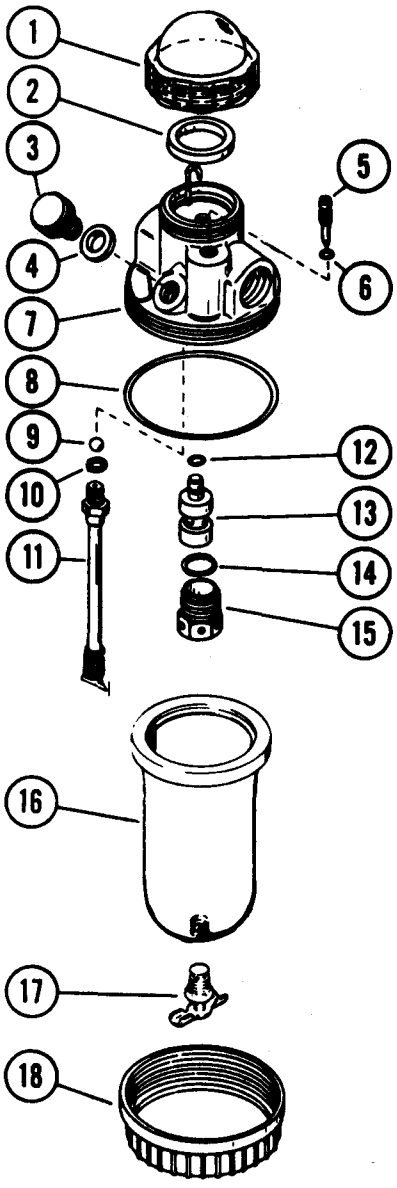
2. Regulate the depth of cut by taking in or paying out hoist line.

3. Hoist the bucket out of the pit as soon as it is full and before dirt is pushed up against the machine.

4. Start and stop the swing motion slowly so as not to place unnecessary strain on the boom.

5. When dropping back into the pit be careful to check the hoist and drag drums with the controllers so that the cables do not run off the drums.





INSTRUCTIONS and PARTS LIST
MICRO-FOG LUBRICATOR
Type 10-014

INSTALLATION

Install the lubricator near the machine it is to serve, downstream from the air filter and regulator. Note the arrow on the body which indicates the direction of air flow. Do not use this lubricator on air systems using synthetic, fire-resistant lubricants in the compressor.

OPERATION

Maximum temperature and pressure is 100° F. at 250 psig, 160° F. at 200 psig or 200° F. at 100 psig.

The only adjustment is the oil feed adjustment screw (5) which controls the rate of oil feed through the drip tube. The adjustment screw can be turned with a $\frac{3}{32}$" Allen wrench. Counter-clockwise rotation will increase the rate of oil feed, and clockwise rotation will decrease the rate of oil feed.

Approximately 10% of the oil dropping from the drip tube will enter the air line. Adjust the lubricator accordingly. The 10% rate is based upon use of a light oil of approximately 60 seconds S.U.V. at 100° F. The rate of oil delivery is decreased when a heavier oil is used.

At normal temperatures the Micro-Fog lubricator will operate satisfactorily with any high quality oil having a viscosity range up to 1000 seconds S.U.V. at 100° F. (S.A.E. 40). For best performance use the lightest weight oil which will give satisfactory lubrication. Do not use oils containing graphites, soaps, fillers, etc.

To fill the reservoir, shut off the air pressure and remove the filler cap (3). Tighten the cap firmly after filling.

MAINTENANCE

To service or to clean the lubricator, it must be disassembled. To do so shut off the air pressure and drain the oil from the reservoir.

Remove the bowl (16) by unscrewing the clamp ring (18). Then remove the sight-feed dome (1) and the filler plug (3).

Unscrew the diffusion plug (15) and push the venturi plug (13) out downward. Unscrew the siphon tube (11) taking care not to lose the ball (9) which rests on top of it.

Inspect and clean each part carefully before reassembly. Clean the bowl in kerosene or a petroleum solvent. DO NOT USE acetone, ethyl, acetate, ethylene dichloride, toulene, etc., as these solvents may deteriorate and damage the bowl.

For Repair Kit and Replacement Parts, see reverse side.