

Boyles VAG air-powered diamond drill

Drill rated to 950 ft. (290 m.) horizontal capacity and 510 ft. (155 m.) vertical capacity with AW rods and single rod puller. Utilizes model BVRG-94P (vane-type) 27 hp air motor. Boyles Model 12AG Swivel-head provides features to assure fast, efficient core drilling. Drill can be dismantled quickly and easily into lightweight components for transporting underground.

**12AG SCREWFEEED SWIVELHEAD** — • Will take AW and AWL drill rods, and AX equipment through the feedscrew. • "Safety"-type chuck balanced for high speeds. • Chuck jaws, chuck bolts and bushings are made of tough, heat-treated alloy steel for long life; easily replaceable. • Range of chuck jaw sizes from E to AW are available. • Four easily selected feeds to cover wide range of penetration rates. • Jacking wheel simplifies manual advancement or retraction of feedscrew. • Thrust indicator tells when bit makes contact with hole bottom. • Standard feed gears at 200 to 770 revolutions per inch (25 mm.) advance of feedscrew; other options and reverse feeds available.

**BVRG-94P AIR MOTOR** — 27 hp at 3600 rpm. • Smooth running, constant torque characteristics; 300 to 3600 rpm operating range. • Vane-type motor with spring-loaded plunger under each blade to insure blades contact liner at all times; high starting torque. • Combination throttle and directional control valve; gated handle for forward, stop and reverse positions. • Chrome-plated, precision ground liner. • O. D. and I. D. of liner and end plates concentric to facilitate regrinding and refacing. • Vane wear can be visually checked through exhaust port.

**ROD PULLER** — 6-inch (152 mm.) lightweight rod puller; provided with quick acting Puller Dogs up to BW rod size. Special dogs for larger rod sizes also available.

**BAR MOUNTING** — Rigid cast steel mounting to fit either 3½ in. (89 mm.) or 4½ in. (114 mm.) mine columns, horizontal or vertical. Loosening two nuts permits rotation of swivelhead to any drilling angle in the vertical plane parallel to the mine column.

**Boyles Operations**

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Boyles Vane Motors are lubricated entirely by oil mixed with the air supply.

An adequate supply of the proper oil is absolutely necessary. This is particularly important because when a good air supply is available the motors can be operated in excess of the recommended 4000 R.P.M.

Standard practice is to introduce the oil into the air through an "Air Line Lubricator" installed in the air line adjacent to the drill. The drill operator is normally responsible for the proper operation of the lubricator.

Boyles recommended practice is the use of two lubricators in parallel so that if one lubricator should run dry, become plugged or for any reason fail to operate properly the other will ensure at least partial lubrication of the motor.

Boyles Dual Air Line Lubricator (Part No. 1-328-005) has been specially designed for this purpose.

The "Dualfeed" Air Line Lubricator fills a long overdue need for a compact, rugged lubricator with a large oil capacity. In use, this lubricator eliminates the risk of running out of oil, reduces the number and frequency of refills, and lessens the possibility of contaminating the oil that can be caused by frequently adding oil in small quantities. Two rates of oil feed are available simply by uncoupling it and turning it end for end.

SPECIFICATIONS:

Normal Feed Rate    Fast (+) (#30 Jets), 30 to 40 ounces per average 8 hr. shift.  
                          Slow (-) (#20 Jests), 20 to 30 ounces per average 8 hr. shift.

Other jet sizes also available are #40, 35, 25 and 16.

Pipe connection size 2" NPT Pipe (max.) Oil capacity 4 Imperial or 4.8 U.S. quarts.

RECOMMENDED OILS ARE LISTED FOLLOWING:

<u>-Supplier-</u>	<u>-Brand Name-</u>
Imperial Oil Company	Arox EP 45, 56 or 80
Mobile Oil Company	Alma #5
Gulf Oil Company	Rock Drill Oil 66 or 59
Shell Oil Company	Tonna 'F'
Standard Oil Company	Chevron Febis K53
Texaco Oil Company	Rock Drill Lubricant 'EP'

NOTE: An ordinary engine oil is not recommended. Its rate of consumption will be very high and it will not lubricate properly, especially at higher temperatures.

The foregoing recommendations are for average operating conditions. Where extreme conditions of heat, moisture or severe dust exist Dresser/Boyles should be consulted.

**JKS BOYLES**

VANE MOTOR LUBRICATION

**BOYLES**  
DIAMOND DRILLING EQUIPMENT

REFERENCE NUMBERS SHOWN. ORDER BY PART NUMBERS SHOWN IN PARTS LIST.

PLATE #955A  
Page 1 of 1

When ordering replacement parts, always give the MODEL and SERIAL NUMBER of the drill which will be found stamped on the name plate.  
THIS IS IMPORTANT

When ordering motor replacement parts, ALWAYS give NAME and SERIAL NUMBER of the MOTOR in addition to the MODEL and SERIAL NUMBER of the DRILL.

When ordering swivelhead replacement parts, always give the MODEL and SERIAL NUMBER of the SWIVELHEAD in addition to the MODEL NUMBER of the DRILL.

NOTE

No swivelheads made prior to 1946 had the model and serial numbers stamped on them. The model and serial numbers are stamped on the back of the upper thrust pad and is only visible when the swivelhead is swung open on the hinge.

ALWAYS give PART NUMBER & DESCRIPTION OF PART and QUANTITY of the part required.

State definitely whether parts are to be shipped by express, freight or parcel post.

To ensure prompt and accurate service, your order must be clear and concise.

PARTS RETURNED FOR CREDIT:

Before returning any parts, write us a letter giving us an exact list and description of the parts, why you wish to return them whether for repairs, credit or replacement; also the number of the drill from which these parts were taken.

Transportation charges must be prepaid.

Mark sender's name on the outside of the box or package.

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INSTRUCTIONS FOR ORDERING PARTS

**BOYLES**  
DIAMOND DRILLING EQUIPMENT

REFERENCE NUMBERS SHOWN. ORDER BY PART NUMBERS SHOWN IN PARTS LIST.

**PLATE** #961-A

## SUGGESTED OPERATING PROCEDURES

The purpose of this article is to assist those who have not had previous experience in the operation of underground diamond drills. It covers particularly those machines equipped with a reversing motor and a righthand threaded feedscrew incorporating a waterswivel and drive coupling so short taper threaded rods can be added ahead of the feedscrew.

The procedure is basically similar for operating an underground drill with a chuck and feedscrew, through which the rods pass with a waterswivel attached. If this technique is preferred, the blast hole feedscrew assembly can be removed and replaced with a right hand feedscrew with an I.D. sufficiently large to allow the rods to pass through and with provision made on the front end to attach a chuck. This method, however, is slowed and more space consuming.

The first important item required to make an efficient setup for an underground drill is a suitable column. Columns are available in various sizes and designs. The two most commonly used are 3 1/2" and 4 1/2" diameter, the lengths being determined by the working conditions of the mine in which they are to be used.

Because the thrust developed by a diamond drill is much greater than that of a percussion drill, for which columns were originally developed it is recommended that the double jackscrew design be used in preference to the single jackscrew type, the former having much greater resistance to turning.

After all loose material has been barred down and the working area made safe, the first operation in preparing a drill setup is to install the column. The operator must first determine if the column is to be set vertically or horizontally, and if vertically, whether the column is to be set behind or ahead of the drill.

One important point to remember is that the drill should be set as close to the face as working conditions will permit. As mentioned above, a diamond drill develops a great deal of thrust, therefore, the closer it is to the face, the less chance there is that the unsupported rods and feedscrew will blow out of line when pressure is applied. This is a major cause of broken couplings and feedscrews.

The necessity of setting the drill as close to the face as working conditions will allow should be the major factor in determining whether the column is set behind or ahead of the drill. Both positions have their advantages and disadvantages, so the choice will be decided by the conditions that exist for locating the foot and head blocks of the column.

**JKS BOYLES**

UNDERGROUND DIAMOND DRILLS

**BOYLES**  
DIAMOND DRILLING EQUIPMENT

REFERENCE NUMBERS SHOWN. ORDER BY PART NUMBERS SHOWN IN PARTS LIST.

PLATE

#959A

Page 1 of 8

When the column is set behind the drill an eyebolt can be put into the rock about one foot to the right of the hole location and a turnbuckle used between it and the eye on the cap of the column drill mount. When tightened this will prevent the tendency of the machine to twist the column and drill off line.

When the column is set ahead of the drill the tendency to twist the column can best be counteracted by using an adjustable, tubular, steel sprag, positioned between the lug on the back of the swivel ring and the nearest rock surface that is close to being in line with the hole. If the rock being drilled is very hard it may be necessary to use more than one sprag or a combination of both sprag and turnbuckle.

Another important point to remember, when setting up a column, is to fully retract jacking screws and have the column lines up and held tight by driving wooden wedges. This should be done before the final tightening with the jacking screws. After the drill has been lined up and securely tightened to the column, it will be necessary to prepare the air and water hoses for connection to the drill.

Boyles Vane Motors are lubricated entirely by oil mixed with the air supply. An adequate supply of the proper oil is absolutely necessary.

This is particularly important because when a good air supply is available the motors can be operated in excess of the recommended R.P.M. Standard practice is to introduce the oil into the air through an "Airline Lubricator" installed in the air line adjacent to the drill.

To obtain the maximum performance from a BVRG-94P drill, two 1 1/4" hoses in parallel, or one 1 1/2" hose should be used between the main air line and the airline lubricator. Boyles recommend the use of two differently adjusted lubricators in parallel, so that if one should run dry or become plugged, the other will maintain partial lubrication until the fault is noticed and rectified. Boyles Dual Air Line Lubricator (Part No. 1-328-005) has been specially designed for this purpose.

The lubricator, or dual lubricators, as the case may be, should be located close to the drill in order to reduce the length of hose, subjected to the lubricating oil, to a minimum. The length of hose connecting the lubricator to the drill motor should be 1 1/2" I.D., and for normal conditions about 8 to 12 feet long.

Under average operating conditions a drill on coring work should consume 20 to 25 ounces (550 to 688 c.c.) per shift. Blast hole drills should consume 28 to 34 ounces (770 to 935 c.c.) per shift. Boyles Dual Air Line Lubricator should be set so that one lubricator delivers 2 ounces (55 c.c.) per operating hour and the other should deliver 4 ounces (110 c.c.) per operating hour.

**JKS BOYLES**

UNDERGROUND DIAMOND DRILLS

**BOYLES**  
DIAMOND DRILLING EQUIPMENT

REFERENCE NUMBERS SHOWN. ORDER BY PART NUMBERS SHOWN IN PARTS LIST.

PLATE #959A  
Page 2 of 8

As individual lubricators vary it is very important that their consumption be checked shortly after they have been adjusted or if the make or grade of oil is changed. Air line Lubricators should be checked and refilled twice per shift or often enough to ensure that the motor is never allowed to run dry.

An oil especially made for use in Air Line Lubricators should be used. The heavier grades having a viscosity of 55 S.S.U. @ 210° or higher are recommended. These are suitable for all temperatures above freezing.

Typical such oils are listed

- Supplier -	- Brand Name -
Imperial Oil Company	Arox EP 45, 56 or 80
Mobil Oil Company	Alma #5
Gulf Oil Company	Rock Drill Oil 66 or 59
Shell Oil Company	Tonna "F"
Standard Oil Company	Chevron Febris K53
Texaco Oil Company	Rock Drill Lubricant "EP"

An ordinary engine oil is not recommended. Its rate of consumption will be very high and it will not lubricate properly, especially at higher temperatures.

The foregoing recommendations are for average operating conditions. Where extreme conditions of heat, moisture or severe dust exist Boyles should be consulted.

Before connecting the air hose to the drill it is most important that it be blown out to remove any foreign matter, such as particles of rock, rust scale, from inside the air lines, water, etc. The period of blowing out should continue until all evidence of foreign matter has been removed. When coupling up a new motor or one that has stood for a long period of time, it is advisable to pour one or two ounces of oil into the air line before making the final connection.

Because the wear rate of vane motors is greatly accelerated by the presence of abrasive particles in the air. Boyles recommend the use of an auxiliary air screen which is much larger and finer than the standard screen supplied. This auxiliary air screen is located between the air hose and the inlet manifold of the motor.

The waterswivel hose should be 3/4" I.D. and have a working pressure rating of from 400 to 500 P.S.I. Like the air hose, it should be thoroughly flushed out before connecting it to the waterswivel, which is screwed into the end of the feedscrew. At this point it should be mentioned that optional waterswivels are available for use on either the back or front end of the feedscrew.

**JKS BOYLES**

UNDERGROUND DIAMOND DRILLS

**BOYLES**  
DIAMOND DRILLING EQUIPMENT

REFERENCE NUMBERS SHOWN. ORDER BY PART NUMBERS SHOWN IN PARTS LIST.

PLATE #959A  
Page 3 of 8

For short holes in the neighbourhood of 100 to 200 feet, mine water pressures of from 100-150 PSI are adequate, but for longer holes of steep up angle holes, high pressures will be required. These can be obtained by increasing the head of the mine supply system by introducing a pump for the purpose of increasing the existing pressure.

One of the outstanding features of the VEGR-94P drill is that it is fitted with a right hand threaded feedscrew. This feature necessitates the use of a reversing motor, as the feedscrew must be turned backwards during the process of retraction.

When using taper threaded, blast hole drill rods, it is advisable to use a starting barrel that is threaded in the back end with a box thread to receive the taper threaded rods direct, thereby, eliminating the need of a space consuming adapter bushing.

Before commencing to collar a hole, the area where it is to be started should be smoothed and squared by use of a moil and hammer. With the starting barrel assembly (consisting of starting barrel, reaming shell, corespring and bit) securely screwed directly to the feedscrew, rod adapter coupling, the drill is ready to collar the hole.

Place the feedshifter handle in a neutral feed position and jack or run the starting barrel ahead, until the bit is about 1/8" from making contact with the rock surface.

To jack the assembly ahead by hand, place the feedshifter in a neutral feed position, engage the drive sleeve lock, release the jacking wheel brake or lock (as the case may be) and turn the jacking wheel counterclockwise by hand.

To run the assembly ahead, place the feedshifter in a neutral feed position and start the drill turning forward (clockwise when looking at the swivelhead from the back or jacking wheel end.)

To start the drill turning forward, push the upper hinged part of the combination throttle and reversing valve handle backward or away from the operator with the left hand until the lock is released. The throttle is now free to be turned clockwise. The turning of the valve should be done deliberately and slowly to prevent the motor from starting too rapidly. With the drill turning slowly, use the right hand as a brake to stop or slow down the jacking wheel. When this is done the feedscrew will advance rapidly. After advancing the required distance, stop the drill by closing the throttle, then engage the feedshifter in the slowest feed position. This will be the feed designated by the largest number because feeds are described by the number of turns the bit makes to advance one inch.

**JKS BOYLES**

UNDERGROUND DIAMOND DRILLS

**BOYLES**  
DIAMOND DRILLING EQUIPMENT

REFERENCE NUMBERS SHOWN. ORDER BY PART NUMBERS SHOWN IN PARTS LIST.

PLATE

#959A

Page 4 of 8

Open the water control valve just enough to keep the face of the bit wet during the process of collaring. If the drill is not equipped with a collaring device to hold the bit on line, use a wooden pry that is notched for the purpose of holding the starting barrel in the required position. With the water on, as described above, and the bit forced slightly over to the left when facing the hole, start the drill turning slowly and let it feed forward until the bit begins to make contact with the rock. At this point the bit must be held securely as it will have a tendency to move or jump off line, until a full face contact is made with the rock. If the bit is allowed to jump during this operation, considerable damage to the diamonds may result. As soon as the face of the bit is fully in contact with rock, the drill should be stopped and bit withdrawn from the face to determine whether the hole is being started in the required position. If the hole is correctly positioned, jack the bit forward until it is again in contact with the rock. When drilling is resumed after this inspection, both the volume of water and speed of rotation can be increased.

During the process of collaring, the water will spray excessively due to the close fit of the bit, shell and starting barrel in the hole. This can be largely prevented by using a disc of soft rubber 6" to 8" in diameter, 1/4" to 3/8" thick, and having a hole in the centre to fit snugly over the starting barrel. This snug fit will cause the rubber disc to be held against the face of the rock during the drilling operation, thus acting as a deflector. Until such time as a volume of water equivalent to two or three gallons per minute can be passed through the bit, the rotation speed should be restricted to less than 500 RPM. After the bit has advanced an inch or two, it may be found more advantageous to use a faster feed.

The choice of feed is something that can best be determined by experience. However, as a guide, once the bit has been successfully started, as described above, the feed can be increased until the drill shows signs of labouring or building up pressure. Another indication of over feeding is a decreased or complete lack of water return caused by the bit mudding in soft, sticky formations. Any one of these conditions indicated that the rate of feed should be reduced.

If the drilling is being done without the aid of a corespring, it will be necessary to proceed until the bit blocks. Both the volume of water and the speed of rotation should be decreased when the starting barrel is within 1/2" to 1" of being filled and the drilling continued in this manner until a "kick" is indicated. The kick is caused by the core breaking off just back from the inside face of the bit. As soon as the kick is indicated, the drill should be stopped and the water shut off. If a corespring is used it is not necessary to proceed until a kick is indicated, but it can be done if considered advantageous. At this point the necessity of never removing a bit from bottom without first measuring the stick-up should be stressed. The stick-up in the case of a VEGR-94P Drill is the distance between the collar of the hole and the back end of the protruding rod.

**JKS BOYLES**

UNDERGROUND DIAMOND DRILLS

**BOYLES**  
DIAMOND DRILLING EQUIPMENT

REFERENCE NUMBERS SHOWN. ORDER BY PART NUMBERS SHOWN IN PARTS LIST.

PLATE #959A  
Page 5 of 8



Should any trouble such as a stuck bit, broken rod, loose core, etc., develop, which will necessitate reaming, fishing or chopping, it is most important to know the exact length of the hole. To obtain this the overall length of the corebarrel and the number of lengths or the rods in the hole should always be recorded before removing same from the hole. The actual length of the hole is the sum of these items less the stick-up.

The starting barrel is now ready to be removed from the hole. To remove the starting barrel, move the feedshifter handle into a neutral feed position. Should the handle not move freely due to the feed pressure that was developed to make the bit cut, place the jacking wrench on the rim of the jacking wheel and while applying pressure in the required direction on the feedshifter handle with the left hand, turn the jacking wheel very slightly backwards (counter-clockwise). During this operation the feedshifter handle will disengage freely. Should the feedscrew turn with the jacking wheel it will be necessary to engage the feedscrew lock to prevent it from doing so, but this operation should seldom be required.

With the feed in neutral, turn the jacking wheel forward about one half turn or until the bit is freed from the bottom of the hole. With the left hand, pull the hinged portion of the throttle valve towards the operator until the lock is freed, permitting it to be moved to the left. This will start the motor and drill turning left handed or backward. When the drill starts turning, use the right hand as a brake to slow or stop the jacking wheel. This will make the feedscrew retract or run back. The rubber bumper directly behind the feedscrew to rod adapter coupling assembly should not be allowed to come closer than 1" to the front of the swivelhead casting.

The starting barrel can now be completely withdrawn from the hole and taken off for the purpose of removing the core.

To remove the starting barrel, first prevent the feedscrew from turning by engaging the feedscrew lock; then with the aid of one pipe wrench remove the starting barrel from the adapter. Under no circumstances should a second pipe wrench be placed on the feedscrew to prevent it from turning.

To make the second run with the starting barrel, place it in the hole and, if space permits, add a 2 foot rod between it and the drill. If only a 1 foot starting barrel is being used it may require two runs before a 2 foot rod can be added. Drilling with the starting barrel will have to continue until the hole is sufficiently deep to receive the regular corebarrel and allow it and the adapter rod to be coupled to the drill.

**JKS BOYLES**

UNDERGROUND DIAMOND DRILLS

**BOYLES**  
DIAMOND DRILLING EQUIPMENT

REFERENCE NUMBERS SHOWN. ORDER BY PART NUMBERS SHOWN IN PARTS LIST.

PLATE #959A  
Page 6 of 8

The adapter rod is a 2 foot rod that has a standard, drill rod, pin thread on the front end and a tapered, Blast hole rod, box thread on the back end. It is used as the adapter between the drill rod, box thread of the standard core-barrel and the tapered pin thread of the blast hole rod.

Should it be necessary to collar the hole with casing, the hole must be reamed the required distance at this stage to receive the casing. This is done by attaching a reaming pilot, with casing bit attached, to the adapter rod. After inserting the horn of the reaming pilot in the drilled hole, connect the assembly to the feedscrew rod adapter and proceed to drill the required distance as described.

Assuming that a 5 foot corebarrel is being used and that a full five foot run can be made, the procedure will be as follows:-

Drill until the water hose connection that is attached to the back end water-swivel elbow comes to within not less than one inch from the outer ring of the jacking back wheel. At this point, move the feedshifter into a neutral position, slowly close the throttle valve and shut off the water. Next, withdraw the rods and corebarrel from the hole approximately 1/4" by turning the jacking wheel forward. Upon completion of this operation apply the jacking wheel brake or locking pin (as the case may be).

Depending upon which is most convenient, one of two methods can be used for loosening (breaking) the feedscrew rod adapter from the rod immediately ahead of it. If there is sufficient room ahead of the adapter assembly, or if it is not too high to be reached conveniently, engage the feedscrew lock and with the use of one pipe wrench, break the rod loose from the adapter, but do not turn it more than a quarter of a turn. This is to assure that the bit is not jacked back into bottom. The alternative method is to place the pipe wrench on the rod directly ahead of the adapter assembly, in a holding position, and with the aid of the feedscrew wrench, break the adapter thread loose.

After the thread has been loosened, the feedscrew lock (if it has been used), should be disengaged. The jacking wheel brake should then be applied or the locking pin engaged (as the case may be) and the feedshifter checked to make sure that it is still in a neutral position. The drill is now ready to be run backwards for the purpose of unscrewing it from the adapter rod and retracting the feedscrew. Again the rubber bumper should be brought to within no less than one inch from the swivelhead casting. It is most important during this operation to make certain that the jacking wheel does not turn, especially during the first four or five revolutions, for if it does the feedscrew will not retract as fast as the adapter is screwing out of the rod thread. Should this happen, the bit will be forced back on bottom and this will result in damaging the thread, bending the feedscrew or forcing the drill off line.

**JKS BOYLES**

UNDERGROUND DIAMOND DRILLS

**BOYLES**  
DIAMOND DRILLING EQUIPMENT

REFERENCE NUMBERS SHOWN. ORDER BY PART NUMBERS SHOWN IN PARTS LIST.

PLATE #959A  
Page 7 of 8

To add the next two foot rod, screw it partly into the rod protruding from the hole and hold the back end directly in line with the adapter. With the friction wheel still locked, start the drill turning very slowly forward and guide the box thread of the added rod onto the adapter as it advances. If, without holding the jacking wheel, the feedscrew advances sufficiently to allow the threads to be made up, this method can be used as an alternative at the discretion of the operator. With the feed in neutral, the jacking wheel freed and the water turned on, the drill is again ready to commence its next 2 foot run. As soon as the drill starts turning, the feedshifter should be engaged in the feed required. The addition of 2 foot rods in this manner should be continued until the corebarrel is filled or blocked.

To remove the rods and corebarrel from the hole, disconnect the adapter from the rods and run the feedscrew back as described above, then open the swivel-head. The rods and corebarrel are now free to be pulled from the hole by hand and, as this is done, the rods should be broken, with the use of two pipe wrenches, into their respective 2 foot lengths.

After the corebarrel has been emptied and placed back in the hole, one 5 foot standard drill rod should be added directly behind the corebarrel and followed by the 2 foot adapter rod. As the hole progresses it may be necessary to put one or two 2 foot rods in at the collar of the hole, after replacing the corebarrel and long rods, in order to adjust the length for connection to the feedscrew. When using a 10 foot corebarrel, and assuming that both 5 and 10 foot standard rods are being used, it will be necessary to have seven 2 foot blast hole rods in addition to the adapter rod, in order to make all the length combinations that may develop.

The foregoing instructions are primarily intended to explain the use of a diamond drill fitted with a right hand threaded feedscrew that has a water-swivel attached, either at the front or back end, and is powered by a reversing motor.

For those who are not familiar with underground drilling, a few general instructions have been included. These instructions are not complete and are not intended to cover the entire procedure of operating a diamond drill underground.

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UNDERGROUND DIAMOND DRILLS

**BOYLES**  
DIAMOND DRILLING EQUIPMENT

REFERENCE NUMBERS SHOWN. ORDER BY PART NUMBERS SHOWN IN PARTS LIST.

PLATE #959A  
Page 8 of 8

## OPERATING & SERVICING INSTRUCTIONS

**OPERATION:** Refer to Plate #450A for reference numbers shown in brackets. To obtain the maximum performance from these motors an adequate air supply must be provided. To ensure this, air supply hoses of the following minimum sizes should be used:

MODELS - 44P - 1"  
                  64P - 1 1/4"  
                  94P - 1 1/2"

Before connecting the air hose to the motor make sure all dirt, scale, water, etc., is blown from it. Check also the motor air inlet screen (450A-13) to make sure it is clean.

**CONTROL VALVE:** This valve controls both the direction of rotation and the speed of the motor. Its construction is such that it cannot be moved accidentally to an operating position nor can the direction of motor rotation be changed accidentally. To operate the motor in the forward or drilling direction, and assuming the operator is facing the motor, the valve lever should be pushed back and moved to the right. To reverse the motor, from the neutral position, pull the valve handle ahead and move it to the left. The distance the handle is moved from the neutral position determines the speed of the motor. As the operating load increases it may be necessary to advance the handle further to maintain speed.

**LUBRICATION:** All parts of the motor except the end bearings are lubricated by means of oil mixed with the air supply. The motor end bearings are lubricated through alemite fittings, on each end of the motor housing. These should be greased after each 8 hour shift.

**BLADES:** These should be checked for wear after each 400 hours operating period. To do this, first loosen the exhaust elbow retaining screw and remove the exhaust elbow. By looking into the motor through the exhaust outlet and through the exhaust ports the blades can be seen. Near the running edge of each blade there is a small hole. When the blade edge has worn down until only one half of this indicator hole remains, new blades should be installed. To replace the blades, first remove the rotor bevel gear and the rear motor cover. The rotor and rear end plate, can be withdrawn as an assembly. When installing new blades check each one in its respective rotor slot to see that it moves freely. Also check that the blade will go fully down into the slot. Lay a straight edge across the slot and if necessary file the back edge of the blade so the blade will set approximately 1/32 inch below the straight edge. Check also the end clearance of the blades in the rotor. They should be .010/.012 per inch of length shorter than the rotor. (e.g., 6" blade should be 5.940/5.928" long).

**JKS BOYLES**

REVERSIBLE VANE TYPE AIR MOTORS

**BOYLES**  
DIAMOND DRILLING EQUIPMENT

REFERENCE NUMBERS SHOWN. ORDER BY PART NUMBERS SHOWN IN PARTS LIST.

**PLATE**

#978A  
Page 1 of 4

BLADES - CONTINUED:

When replacing blades in the "P" Series Motors the springs and plungers should also be checked. Remove these and clean the plunger holes thoroughly. The springs should be replaced each time new blades are installed. Cracked or chipped plungers should be replaced. When the springs, plungers and blades are re-assembled, make certain that the blades are installed so the notches line-up with the plungers. Each pair of opposing blades should be checked for maximum blade protection from the rotor. When one blade of each pair is fully into its rotor slot the blade opposite it should project no more than 9/16" from the rotor. It may be necessary to file the "plunger notches" in the back of the blades slightly deeper to obtain this dimension.

BEARINGS: Each time the blades are changed the rear rotor bearing should be checked for end play. When the end play between the rotor end and the end plate exceeds .002" or if there are other indications of bearing wear this bearing should be replaced. To replace this bearing remove the bearing locknut from the rotor end and press rotor shaft out of the bearing. Remove the bearing retaining snap ring from the end plate and withdraw the bearing. The replacement bearing should be pressed, via the outer race, into the end plate until the outer race bottoms. Re-install the retaining ring, with the flat face of the ring against the bearing. Make sure this ring is expanded into and well seated in its groove. This is extremely important as this ring absorbs the end thrust of the rotor and locates it axially. A few light taps with a hammer and punch will assist in seating this ring. Replace the bearing spacer, on the rotor shaft and then re-install the end plate and bearing assembly onto the rotor. In doing this apply pressure only on the bearing inner race until it is firmly seated. Re-install bearing lockwasher and nut. At this point the clearance between the rotor end face and the rear end plate should be checked with a feeler gauge. This clearance should be between .004 and .006". Optional length bearing spacers are available in increments of .002". If the clearance is not within the above mentioned limits another suitable length bearing spacer should be installed. Before exchanging spacers re-check that the bearing is properly seated as it should be necessary to use a different spacer when the rear end plate has been replaced or re-faced because of wear. While the rotor is out of the motor, the front bearing should also be checked for wear. If it is necessary to replace this bearing, the outer race assembly can be removed and replaced easily after retaining ring (26) is removed. To remove the inner race from the rotor, heat the race, by means of a torch, to approximately 400°F. This heat will cause the bearing locking compound to break down and the inner race may be withdrawn easily. Without heat considerable force will be required to remove this race. Do not use excessive heat on the splined section of the shaft or it will be softened. Clean the shaft thoroughly and remove all oil and grease from the replacement inner race which can not be slid onto the shaft by hand. Cement this race to the shaft with the "Loctite" compound, and follow the instructions, supplied with the new bearing. When the motor has been re-assembled the bevel gear should be installed and secured with the pinion retaining screw assembly as per the following:

**JKS BOYLES**

REVERSIBLE VANE TYPE AIR MOTORS

**BOYLES**  
DIAMOND DRILLING EQUIPMENT

REFERENCE NUMBERS SHOWN. ORDER BY PART NUMBERS SHOWN IN PARTS LIST.

PLATE #978A  
Page 2 of 4

BEARINGS - CONTINUED:-

- (1) Mount the bevel gear.
- (2) Place the retaining washer (48) and the external tooth lockwasher (47) on the socket head capscrew (49), in that order.
- (3) When the socket head capscrew is screwed in tightly, there should be at least 0.005" clearance between the bevel gear and the retaining washer (48). If there is no clearance insert a shim between the retaining washer (48) and the lockwasher (47).  
If the clearance is greater than 0.005", it is all right.
- (4) Make doubly sure the socket head capscrew (49) is very tight. To do this properly, block the bevel gear to prevent the rotor from turning while tightening the capscrew (49).

LINER: To replace the liner (3) remove the rotor and rear end plate as previously described and also remove the front cover and front end plate (12 & 5). The liner can then be pressed out. If the housing and liner assembly are immersed in boiling water or can be placed in an oven at approximately 250°F., for a few minutes the aluminum housing will expand more than the liner and it will be quite easy to remove the liner. Similarly if, before installing a new liner, the housing is heated and the liner chilled it is quite easy to install the liner. Otherwise, it will be necessary to use a press for these operations. When replacing the liner observe the location identification marks on both the motor housing (stamped on each end face adjacent to the liner bore) and on the liner end faces. The marks on the liner should be lined up before assembly and should coincide after assembly with those on the housing. The liner should be installed with the two sets of elongated ports (main exhaust and reverse inlet) on the same side of the motor housing as the exhaust outlet. The liner is slightly longer (.010) than the bore into which it fits. When re-installed, the liner should project equally at each end. This allows the end plates to seat on the ground faces of the liner ends, assuring a proper air seal and alignment. When installing the motor end covers do not tighten the fastening capscrews excessively otherwise the covers can be warped.

VALVE ASSEMBLY: To dismantle the valve assembly, remove screws. The valve spool and handle assembly and retaining plates can then be withdrawn from the housing. Remove screw (38) to separate the handle assembly from the valve spool. To remove valve handle springs (36) drive out spring pin, from the valve handle. The springs may then be pushed out through the top of the handle. The hinge pin (16) can be removed.

To re-assemble the valve handle assembly, first check that the springs, (36) fits freely in the holes in the hinge pin (16) and the lever (11). Re-assemble the fixed handle (32) lever (11) and hinge pin (16) as illustrated on Plate #450A. Insert the springs through the holes in the top of the lever, into the handle (32) and through the holes in the hinge pin (16). Make sure the springs are driven right to the bottom of the holes in the handle (32). The spring retaining pin (39) may then be replaced in the lever (11).

**JKS BOYLES**

REVERSIBLE VANE TYPE AIR MOTOR

**BOYLES**  
DIAMOND DRILLING EQUIPMENT

REFERENCE NUMBERS SHOWN. ORDER BY PART NUMBERS SHOWN IN PARTS LIST.

PLATE #978A  
Page 3 of 4

VALVE ASSEMBLY - CONTINUED:-

To re-assemble the valve spool and operating handle assembly, first slide the thrust bearing (44) onto its spigot on the valve spool, followed by the end plate (10). The operating handle should be fastened to the spool such that the wider of the two ports in the valve spool is on the same side as the operating lever (11).

**JKS BOYLES**

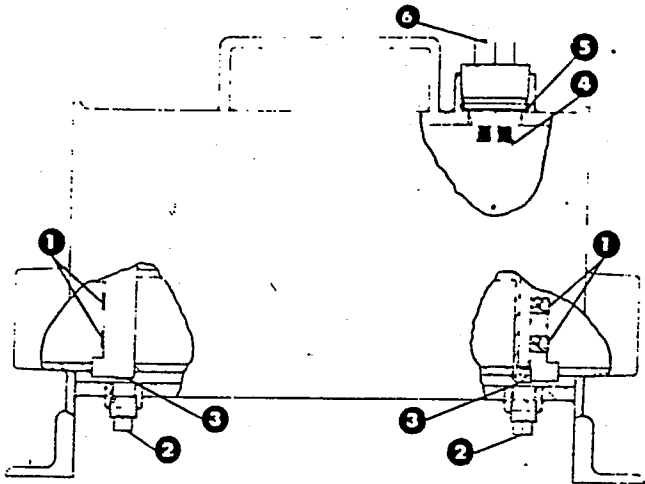
REVERSIBLE VANE TYPE AIR MOTORS

**BOYLES**  
DIAMOND DRILLING EQUIPMENT

REFERENCE NUMBERS SHOWN. ORDER BY PART NUMBERS SHOWN IN PARTS LIST.

PLATE #978A  
Page 4 of 4

OPERATING INSTRUCTIONS



PARTS LIST

ITEM NO.	JET NO.	PART NUMBER	ITEM NO.	DESCRIPTION & PART NUMBER	NO. REQ.
1	= 16	1-328-100	2	Drain Plug 5-200-078	2
	= 20	1-328-101*	3	Blowout Plug 5-200-125	2
	= 25	1-328-102	4	Screen 2-600-209	1
	= 30	1-328-103*	5	"O" Ring 5-030-725	1
	= 35	1-328-104	6	Filler Plug 1-328-007	1
	= 40	1-328-105			

\*STANDARD

Boyles "DUALFEED" LUBRICATOR should always be used resting on its feet in a horizontal position or as near to the horizontal position as possible. The "DUALFEED" LUBRICATOR is clearly marked with a PLUS sign at one end and a MINUS sign at the other. The PLUS end has the nozzle with LARGE "TWIN-JETS" and the MINUS end has the nozzle with SMALL "TWIN-JETS". The HOSE to the DRILL or PUMP is connected to the end of the "DUALFEED" LUBRICATOR having the jets that will give the required oil feed.

The STANDARD MODEL "DUALFEED" LUBRICATOR has #30 JETS in the PLUS end and #20 JETS in the MINUS end.

Other JET SIZES available: #16, #25, #35, and #40.

FOR WARM TEMPERATURE and/or LIGHT OILS, we recommend #25 JETS (two) for the PLUS END and #16 JETS (two) for the MINUS END.

FOR LOW TEMPERATURES and/or HEAVY OILS, we recommend #40 JETS (two) for the PLUS END and #30 JETS (two) for the MINUS END.

To Remove the Jets: The JETS (1) can be easily removed by first disconnecting the air hoses and then, by using a 3/16" hexagon socket head wrench, (3/16" across the Flats) the JETS can be screwed out for cleaning or replacing.

To Drain the OIL: Remove one of the two bottom pipe plugs (2).

To 'Blow-Out' the Nozzles: Remove both the drain plugs (2) and the nozzle drain plugs (3) (Use a 3/16" hexagon socket head wrench) then 'Blow-Out' with compressed air.

**JKS BOYLES**

DRESSER/BOYLES DUALFEED LUBRICATOR

**BOYLES**  
DIAMOND DRILLING EQUIPMENT

REFERENCE NUMBERS SHOWN. ORDER BY PART NUMBERS SHOWN IN PARTS LIST.

PLATE #956A  
Page 1 of 2



Filler Screen: Remove filler screen (4) periodically and clean. (The screen (4) is held in place by 'O' ring (5)).

Check Oil Frequently:

NOTE: Do not use two different sizes of JETS in ONE nozzle. Do not use only ONE JET in a nozzle. This practice nullifies the safety feature of the "TWIN-JETS".

**JKS BOYLES**

BOYLES DUALFEED LUBRICATOR

**BOYLES**  
DIAMOND DRILLING EQUIPMENT

REFERENCE NUMBERS SHOWN. ORDER BY PART NUMBERS SHOWN IN PARTS LIST.

PLATE #956A  
Page 2 of 2

OPERATING & SERVICING INSTRUCTIONS

REFER TO PLATES 34A, 58 & 59

This swivelhead is of the gear feed type incorporating four feeds any of which can be selected while the head is rotating. However, when drilling an UPPER HOLE, the changing of feeds must be done quickly because the feedscrew will feed backwards in neutral; this is liable to cause a block.

The standard range of feeds (revolutions per inch of penetration) is 200, 300, 400 and 770. Other feeds are available from 80 to 1360, as well as reverse feeds.

1) DIAGRAM OF FEED SHIFTER HANDLE POSITIONS:

Plate 58 shows the position of the feedshifter handle in relation to the feeds available.

2) LUBRICATION: Plate 59 shows the lubrication instructions.

3) TO DISMANTLE THE SWIVELHEAD:

TO REMOVE THE SWIVELHEAD COVER:

- (a) Remove the feedscrew (1) by jacking it out of the feednut (25) and then pulling it out through the drive sleeve (5).
- (b) Remove the jacking wheel locknuts (35) and pull the jacking wheel (33) off.
- (c) Remove the jacking wheel key (34).
- (d) Remove the two feed shifter handles (57).
- (e) Remove the two swivelhead dowel pins (75).
- (f) Remove the swivelhead cover, feed gear cover and countershaft bearing cover capscrews (72, 67, 68 and 70).
- (g) The swivelhead cover can now be removed leaving the feednut assembly, countershaft assembly, and drive sleeve assembly free to be lifted out.

TO REMOVE THE FEEDNUT (25):

- (a) Pull the feednut (25) out of the feednut bearing (30).
- (b) Pull the feednut (25) out of the feedgear cover leaving the thrust bearing collar (28), thrust bearing (29), thrust bearing oil seal retainer (32), and oil seals (31) in the feedgear cover (66).
- (c) Press the feedgears (26) off the feednut (25).
- (d) If for any reason the thrust bearing collar (28), thrust bearing (29), thrust bearing oil seal retainer (32) and oil seal (31) remain in the feednut (25) when it is pulled out, they can be pressed off with the feedgears (26).

**JKS BOYLES**

12AG SWIVELHEAD ASSEMBLY

**BOYLES**  
DIAMOND DRILLING EQUIPMENT

REFERENCE NUMBERS SHOWN. ORDER BY PART NUMBERS SHOWN IN PARTS LIST.

PLATE #979A  
Page 1 of 3

TO REMOVE THE COUNTERSHAFT (40):

- (a) Slip off feedgears (42), washers 48 & 49) and shifter key (50).
- (b) Remove countershaft locknut (46) and washer (47); push off drive gears (41), bearing (43), and spacer (45); remove shifter key (50).  
(NOTE: Be sure to line up shifter key with keyway in gear when pushing gears off.)
- (c) Push off upper countershaft bearing (44).
- (d) Drive out taper pins (52) which attach feed shifter rods (51) to collars (53) and remove shifter rods (51) and collars (53).

TO REMOVE THE DRIVE SLEEVE (5):

- (a) Remove the drive sleeve bearing cap (not shown) by removing the two capscrews (76). Now the drive sleeve assembly can be lifted out of the swivelhead casting.
- (b) Remove locking screw (8) (Only with low speed bevel gear) from bevel gear locknut (7) and remove locknut (7).
- (c) Push off bevel gear (6) and remove keys.
- (d) Push off upper Timken bearing (10 & 11), spacer (14) and drive gears (12 & 12A).
- (e) Release and remove drive sleeve locknut (17).
- (f) Push off lower Timken bearing (11) and oil seal (16).

4) TO REASSEMBLE SWIVELHEAD:

REPLACE THE DRIVE SLEEVE (5):

- (a) Replace drive gear keys (13), drive gears (12 & 12A), bearing spacer (14), bearing (10 & 11), bevel gear keys, and bevel gear (6). (Make sure the drive gears are mounted according to Feed Change Chart - Plate #58).
- (b) Replace bevel gear locknut (7) and tighten so that the whole assembly is clamped against drive sleeve shoulder. Secure with locking screw (8) (only with low speed-bevel gear).
- (c) Replace oil seal (16) and lower Timken Bearing (10 & 11).
- (d) Place the assembly in the swivelhead.
- (e) Clamp the drive sleeve assembly into the swivelhead casting with the drive sleeve cap (not shown) and the capscrews (76).
- (f) Mount the swivelhead casting with the drive sleeve assembly onto the drill to check the mesh of the bevel gears. When properly meshed the big ends of teeth in mesh of both gears must be flush. If the drive sleeve bevel gear is too high, remove the drive sleeve assembly, the bevel gear, and the bevel gear shims. If it is too low, add shims. It might be necessary to also adjust the mainshaft or crankshaft bevel gear by adding or removing its shims.
- (g) Replace drive sleeve locknut (17) and tighten to remove end play from bearings. Then slacken about 1/2" on circumference of thread and tighten locking screw (18).

**JKS BOYLES**

12AG SWIVELHEAD ASSEMBLY

**BOYLES**  
DIAMOND DRILLING EQUIPMENT

REFERENCE NUMBERS SHOWN. ORDER BY PART NUMBERS SHOWN IN PARTS LIST.

PLATE #979A  
Page 2 of 3

TO REASSEMBLE COUNTERSHAFT (40):

- (a) Replace shifter rods (51), shifter collars (53), and taper pins (52).
- (b) Replace drive gear shifter key (50); drive gears (41), bearing spacer (45), and lower bearing (43). (Make sure the drive gears are mounted according to Feed Change Chart - Plate #58).
- (c) Replace locknut (46) and washer (47); tighten to clamp the lower bearing (43) against countershaft shoulder.
- (d) Assemble upper bearing (44), washer (48) feedgear shifter key (50), feedgears (42) and washer (49). (Make sure the feedgears are mounted according to Feed Change Chart - Plate #58).
- (e) Place assembly in swivelhead and replace shifter yokes (54).

TO REASSEMBLE FEEDNUT (25):

- (a) Replace feedgear keys (27) and replace feedgears (26) on the feed nut (25) in the correct rotation as shown in the Feed Change Chart Plate #58).
- (b) Assuming the bearing (29), the bearing sleeve (28), and the oil seals (31 & 32) are assembled in the feednut housing (66), slip this assembly onto feednut (25).
- (c) Replace the jacking wheel key (31).
- (d) Replace the jacking wheel (34).
- (e) Screw one feednut locknut (35) onto the feednut (25) and tighten it until the jacking wheel (33) thrust bearing (24) and feedgears (26) are all clamped tightly between the locknut (35) and the collar in the feednut (25). The second locknut (35) should then be screwed on and securely locked.  
(NOTE: The thrust bearing (29) requires no end play and should be held tight by the locknuts.)

TO REPLACE THE FEEDNUT ASSEMBLY:

- (a) Check the feednut bearing (30) on the feednut (25) and make sure there is a running fit.
- (b) Try the feednut bearing (30) in the swivelhead casting (65) and make sure the hole in the bearing is a free fit over the dowel pin in the casting.
- (c) Try feednut (25) in the swivelhead casting (65) and check the feed gear mesh.
- (d) Put on swivelhead cover with one or two capscrews - do not tighten.
- (e) Mount the feedgear cover (66) to the lower half of the swivelhead casting (65) with four capscrews (67) and tighten lightly.
- (f) Replace all swivelhead cover capscrews (72) and tighten. Replace all thrust bearing cover capscrews (67 & 68) and tighten.
- (g) Replace countershaft bearing cover (69).
- (h) Replace feedshifter handles (57).

5) ADJUST THE MESH OF THE BEVEL GEARS.

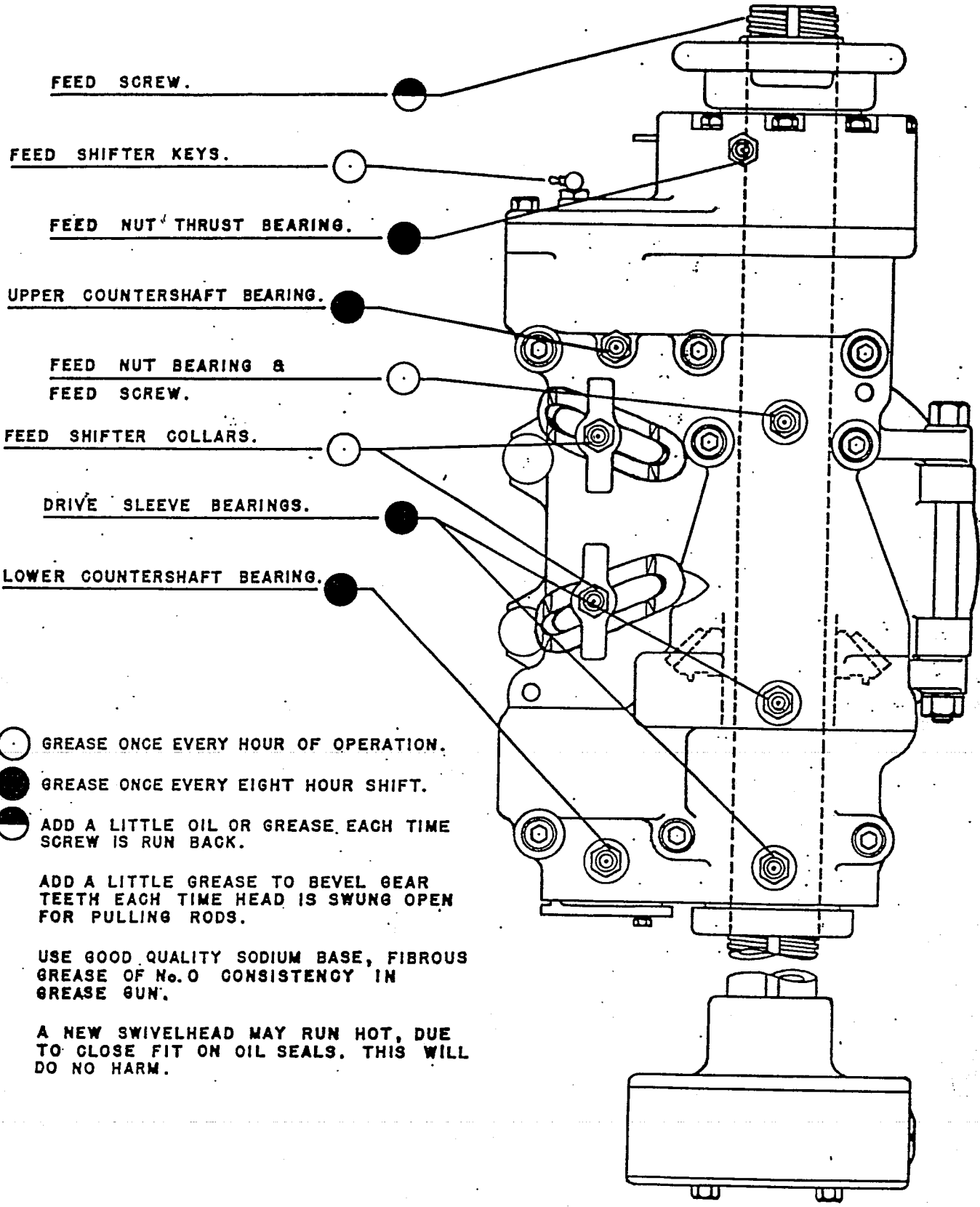
**JKS BOYLES**

12AG SWIVELHEAD ASSEMBLY

**BOYLES**  
DIAMOND DRILLING EQUIPMENT

REFERENCE NUMBERS SHOWN. ORDER BY PART NUMBERS SHOWN IN PARTS LIST.

#979A  
**PLATE** Page 3 of 3



**FEED SCREW.**

**FEED SHIFTER KEYS.**

**FEED NUT THRUST BEARING.**

**UPPER COUNTERSHAFT BEARING.**

**FEED NUT BEARING &  
FEED SCREW.**

**FEED SHIFTER COLLARS.**

**DRIVE SLEEVE BEARINGS.**

**LOWER COUNTERSHAFT BEARING.**

○ GREASE ONCE EVERY HOUR OF OPERATION.

● GREASE ONCE EVERY EIGHT HOUR SHIFT.

◐ ADD A LITTLE OIL OR GREASE EACH TIME SCREW IS RUN BACK.

ADD A LITTLE GREASE TO BEVEL GEAR TEETH EACH TIME HEAD IS SWUNG OPEN FOR PULLING RODS.

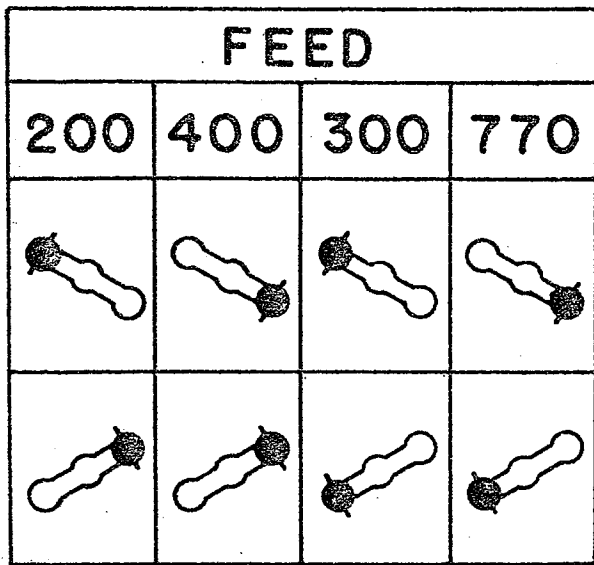
USE GOOD QUALITY SODIUM BASE, FIBROUS GREASE OF No.0 CONSISTENCY IN GREASE GUN.

A NEW SWIVELHEAD MAY RUN HOT, DUE TO CLOSE FIT ON OIL SEALS. THIS WILL DO NO HARM.

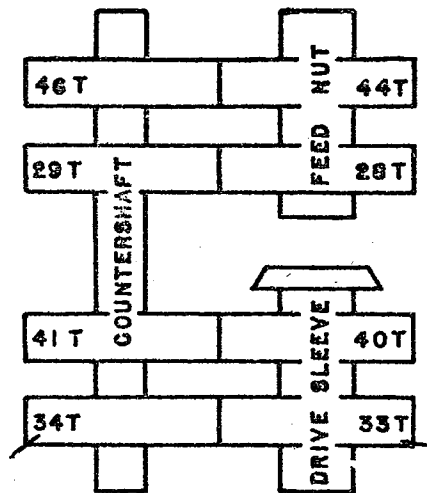
**MODEL BUS-12AG  
LUBRICATION CHART**

**JKS BOYLES**

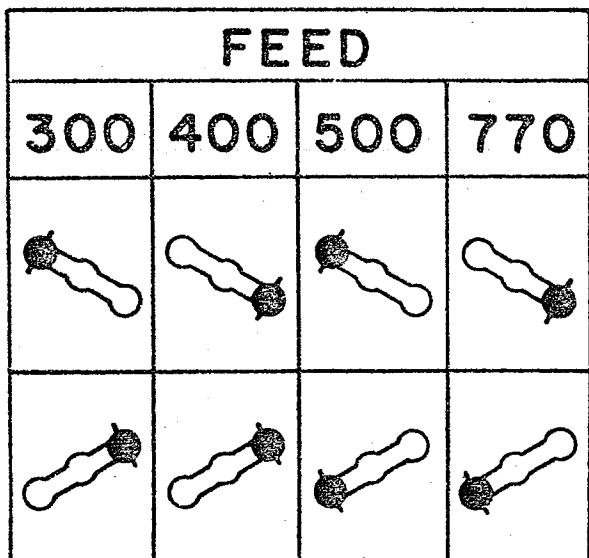
**PLATE No 58**



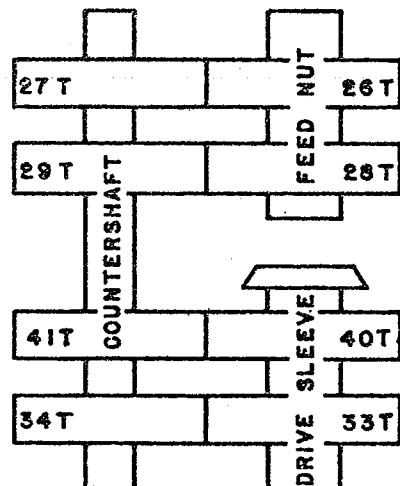
FEED SHIFTER POSITIONS  
STANDARD FEEDS



POSITION OF GEARS  
STANDARD FEEDS



FEED SHIFTER POSITIONS  
ALTERNATE FEEDS



POSITION OF GEARS  
ALTERNATE FEEDS

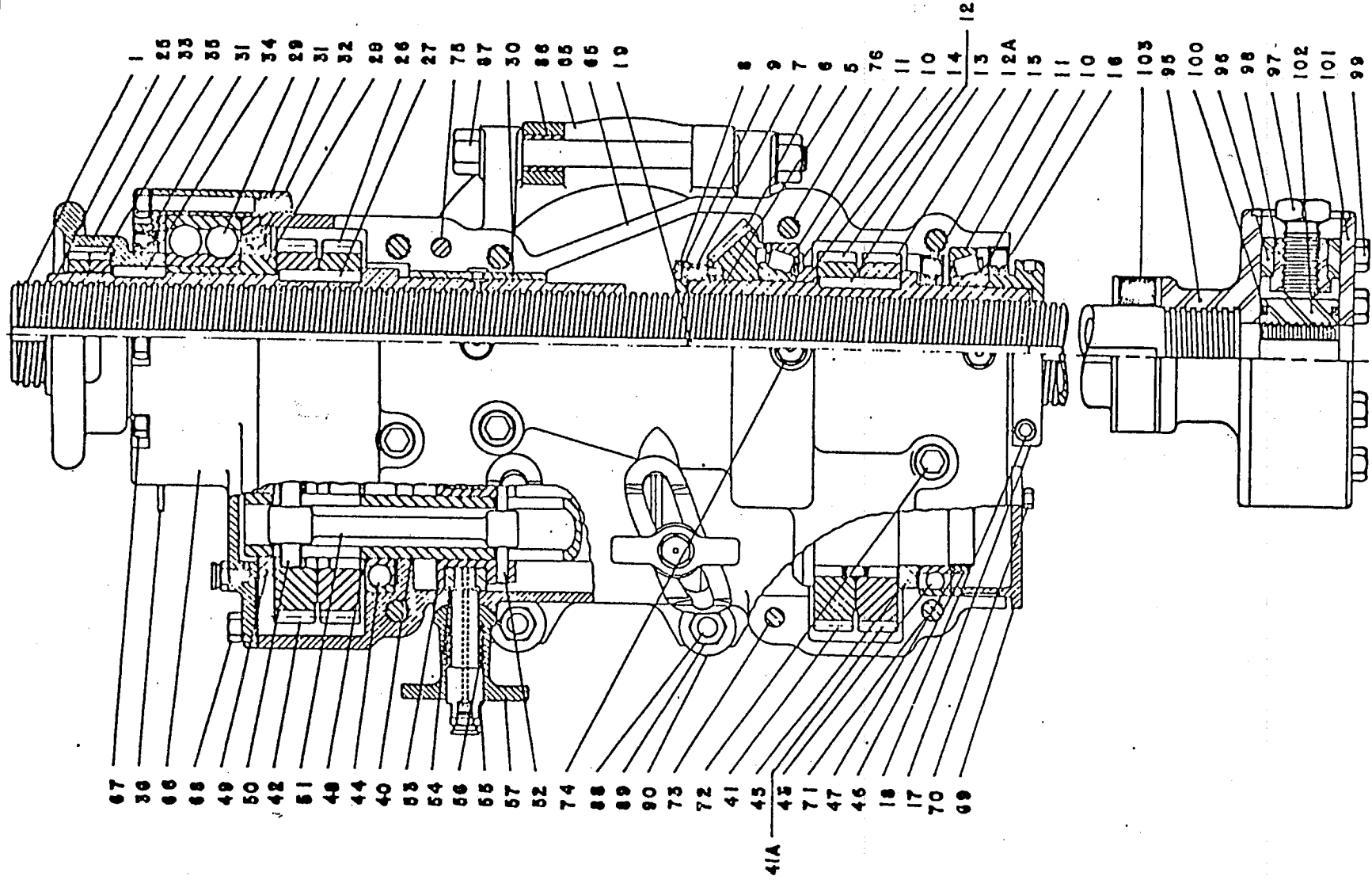
Mining  
Equipment

DRESSER

MODEL BUS-12AG  
FEED CHANGE CHART

BOYLES  
DIAMOND DRILLING EQUIPMENT

PLATE No 58



1  
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**JKS BOYLES**

MODEL BUS-12AG  
FEEDSCREW ASSEMBLY

**BOYLES**  
DIAMOND DRILLING EQUIPMENT

REFERENCE NUMBERS SHOWN ORDER BY PART NUMBERS SHOWN IN LIST OF PARTS

PLATE NO 34A

(3-004-597/598/599M)

2643A

8-7-75 Issue 3

REFER TO PLATE #34A

Rev. 19-1-76 Issue 3

Rev. 2-1-89

Ref. No.	Part No.	No. Req'd.	Description
<u>FEEDSCREW GROUP</u>			
1	3-004-068	One to	Feedscrew 1.81" I.D. (AW or AWL Rod)
1	3-004-173	Suit	Feedscrew 1.84" I.D. (EW Casing)
2	3-004-002	One	Feedscrew Bushing - 'E' Rod )
2	3-004-003	to	Feedscrew Bushing - 'EW' Rod ) For Feedscrew
2	3-004-001	Suit	Feedscrew Bushing - 'A' Rod ) 3-004-068
2	3-004-174	One	Feedscrew Bushing - 'E' Rod )
2	3-004-175	to	Feedscrew Bushing - 'EW' Rod ) For Feedscrew
2	3-004-176	Suit	Feedscrew Bushing - 'A' Rod ) 3-004-173
<u>DRIVE SLEEVE GROUP</u>			
5	3-004-148	1	Drive Sleeve
6	3-004-089	One	Drive Sleeve Bevel Gear 1:1 Ratio
6	3-004-090		Drive Sleeve Bevel Gear 1.38:1 Ratio
6	3-004-088	to	Drive Sleeve Bevel Gear 1:1.2 Ratio
6	3-004-198		Drive Sleeve Bevel Gear 2.65:1 Ratio
6	3-004-140	Suit	Drive Sleeve Bevel Gear 2.04:1 Ratio
	3-004-085		Bevel Gear Shim (.005)
	3-004-086		Bevel Gear Shim (.010)
	3-004-092	1	Bevel Gear Shim Set
	3-501-204	2	Bevel Gear Key
7	3-004-036	One	Drive Sleeve Bevel Gear Locknut (used with 3-004-089 and 3-004-088)
7	3-004-142	to Suit	Drive Sleeve Bevel Gear Locknut (used with 3-004-090, 3-004-198 & 3-004-140)
8	5-181-315	One	Lockwasher (used with 3-004-088 & 3-004-089)
8	3-004-143	to Suit	Drive Sleeve Bevel Gear Locknut Screw (used with 3-004-090, 3-004-198 & 3-004-140)
9	5-180-503	1	Lockscrew Washer (3/16 Reg. Lockwasher)
10	5-010-088	2	Drive Sleeve Bearing Cone
11	5-010-087	2	Drive Sleeve Bearing Cup
12	3-004-039	1	Drive Gear (40 Teeth)
12A	3-004-042	1	Drive Gear (33 Teeth)
13	3-004-144	1	Feednut Gear Key
14	3-004-145	1	Drive Sleeve Bearing Spacer
15	5-040-076	1	Drive Sleeve Bearing Oil Seal (Upper)
16	5-040-088	1	Drive Sleeve Bearing Oil Seal (Lower)

IMPORTANT - Always quote Serial Number when ordering Spare Parts



REFER TO PLATE #34A

Rev. 19-1-76 Iss.3  
Rev. 13-1-78

Ref. No.	Part No.	No. Req'd.	Description
<u>Drive Sleeve Group - (Continued)</u>			
17	3-004-146	1	Drive Sleeve Locknut
18	5-112-049	1	Drive Sleeve Locknut Capscrew (5/16 UNF x 1 1/2 Soc.)
19	3-004-147	3	Drive Sleeve Key
<u>Note: For Mating Driveshaft Bevel Gears refer to Page 5.</u>			
<u>FEEDNUT GROUP</u>			
25	3-004-137	1	Feednut (4 Thd.) Standard
27	3-004-144	1	Feednut Gear Key
28	3-004-149	1	Thrust Bearing Collar
29	5-000-095	1	Thrust Bearing
30	3-004-150	1	Feednut Bearing
	5-040-092	2	Feednut Thrust Bearing Oil Seal
	3-004-151	1	Thrust Bearing Oil Seal Retainer
	3-004-152	1	Feednut Jacking Back Wheel
34	3-004-153	1	Jacking Back Wheel Key
35	3-004-117	2	Feednut Locknut
36	3-004-154	1	Thrust Indicator
<u>COUNTERSHAFT GROUP</u>			
40	3-004-155	1	Countershaft
41	3-004-061	1	Countershaft Drive Gear (41 Teeth)
41A	3-004-071	1	Countershaft Drive Gear (34 Teeth)
43	5-000-050	1	Countershaft Bearing (Lower)
44	5-000-056	1	Countershaft Bearing (Upper)
45	3-004-156	1	Countershaft Bearing Spacer
46	5-176-307	1	Countershaft Locknut SKF N-07
47	5-181-307	1	Countershaft Lockwasher SKF W-07
48	3-004-157	1	Countershaft Geed Gear Washer (Lower)
49	3-004-158	1	Countershaft Feed Gear Washer (Upper)
50	3-004-132	2	Feed Shifter Key
51	3-004-159	2	Feed Shifter Rod
52	5-222-440	2	Roll Pin 1/4" x 2 1/2" Lg.
53	3-004-186	2	Feed Shifter Collar
54	3-004-161	2	Feed Shifter Brass Yoke
55	3-004-104	2	Feed Shifter Bolt with Alemite Fitting
	3-008-151	2	Feed Shifter Spring
	3-004-162	2	Feed Shifter Handle
	5-200-803	2	Alemite Fitting (90°)

IMPORTANT - Always quote Serial Number when ordering Spare Parts

2643A  
 8-7-75 Issue 3  
 Rev. 19-1-76 Iss.3  
 Rev. 13-1-78

REFER TO PLATE #34A

Ref. No.	Part No.	No. Req'd.	Description
<u>SWIVELHEAD HOUSING GROUP</u>			
65	3-004-095	One to Suit	Swivelhead Housing (for all drills except JVA & VAG)
	3-004-096		Swivelhead Housing (for JVA & VAG Drills)
66	3-004-163	1	Feed Gear Cover
	5-200-800	1	Alemite Fitting (Straight)
67	5-113-703	7	Feed Gear Cover Capscrew (3/8 UNC x 3 1/4" Lg.)
68	5-103-603	2	Feed Gear Cover Capscrew (3/8 UNC x 1" Lg.)
69	3-004-164	1	Countershaft Bearing Cover
70	5-101-403	2	Countershaft Bearing Cover Capscrew (1/4-20 UNC x 3/4" Lg. Hex.)
72	5-116-449	8	Swivelhead Capscrew (9/16-18 UNF x 2 1/2" Lg. Soc.)
	3-004-138	2	Swivelhead Handle
	5-102-436	4	5/16-24 UNF x 3/4" Lg. Hex. Hd. Capscrew
	5-180-805	4	5/16 External Tooth Lockwasher
74	5-200-800	6	1/8 Alemite Fitting (Straight)
74	5-310-036	1	Adapter
75	5-223-810	2	#8 x 2 1/2 Taper Pin
76	5-115-436	2	Drive Sleeve Bearing Capscrew (1/2 UNF x 2 1/2" Lg.)
	5-200-803	1	Alemite Fitting 90°
<u>SWIVEL RING GROUP</u>			
<p><u>Note:</u> Items 85-90 are not included with Swivel Ring Group - they must be ordered separately.</p>			
85	3-004-012	One to Suit	Swivel Ring (c/w Items 86-90) for -
	3-004-017		JVA Drills
	3-004-166		BBU-2 with Single or Dual Rod Puller
	3-004-014		VAG Drill
	3-004-015		BBS-15 & BBS-2 Drills
	3-004-013		BBS-15 with Swivel Ring Mast
	3-004-011		BBS-25, 37 & 56 Drills
	3-004-023		BBS-25, 37 & 56 with Dual Rod Puller
	3-004-023		BBS-25, 37 & 56 with Swivel Ring Mast
85A	3-501-198		6
85A	3-503-506	5	Swivel Ring Bolt (Long) for BBS-25, 37 & 56
85A	3-503-507	1	Swivel Ring Bolt (Short) for BBS-25, 37 & 56
85B	5-173-008	6	1/2-13 UNC Hex. Nut (Heavy Semi-Finished)
85C	5-181-508	6	1/2 SAE Flat Washer
86	5-020-012	2	Swivelhead Hinge Bolt Bushing (Incl. with Item 85)
87	3-004-131	1	Swivelhead Hinge Bolt (Incl. with Item 85)
87A	5-222-410	1	1/4 x 1" Roll Pin (Incl. with Item 87)
87B	5-221-042	1	1/8 x 1" Cotter Pin (Incl. with Item 85)

IMPORTANT - Always quote Serial Number when ordering Spare Parts

2643A

8-7-75 Issue 3

Rev. 19-1-76 Issue 3

Rev. 13-1-78

REFER TO PLATE #34A

Ref. No.	Part No.	No. Req'd.	Description
<u>Swivel Ring Group (Continued)</u>			
88	3-004-022	2	Swivelhead Eye Bolt (Incl. with 85)
88A	5-114-336	2	7/16-20 UNF x 2 1/4" Hex. Capscrew (Incl. with 85)
88B	5-171-307	2	7/16-20 UNF Self-Locking Nut (Incl. with 85)
89	5-176-510	2	Swivelhead Eye Bolt Nut (Incl. with 85)
90	5-180-032	2	Swivelhead Eye Bolt Washer (Incl. with 85)
<u>CHUCK GROUP</u>			
Chuck Assembly (c/w Items 95-102) for:			
	3-004-409	One	'E' Rod
	3-004-408		'EW' Rod
	3-004-407	to	'A' Rod
	3-004-406		'AW' & 'AWL' Rod
	3-004-404	Suit	'EW' Casing
	3-004-432C	1	Chuck Flange
	3-004-433C	1	Chuck Body (c/w Item 98)
97	3-501-493A	2	Chuck Bolt
98	3-501-492A	2	Chuck Bolt Bushing (Included with Item 96)
99	5-115-603	6	1/2-13 UNC x 3" Lg. Hex. Capscrew
100	3-501-478	2	Chuck Jaw Spring
101	3-004-428	One	Chuck Plate ('E' & 'EW' Rod)
101	3-004-430	to	Chuck Plate ('A', 'AW' & 'AWL' Rod)
101	3-004-431	Suit	Chuck Plate ('EW' Casing)
102	3-501-482	Two	Chuck Jaw ('E' Rod)
102	3-501-483		Chuck Jaw ('EW' Rod)
102	3-501-480	to	Chuck Jaw ('A' Rod)
102	3-501-481		Chuck Jaw ('AW' & 'AWL' Rod)
102	3-501-865	Suit	Chuck Jaw ('EW' Casing) *
103	3-004-029	1	Chuck Rubber Bumper
<u>TOOLS (Supplied with Swivelhead)</u>			
	3-501-494	1	Chuck Wrench
	3-002-179	1	Jacking Back Wheel & Gate Wrench
	5-202-146	1	Allen Wrench Set

IMPORTANT - Always quote Serial Number when ordering Spare Parts

DRIVE SLEEVE & MATING BEVEL GEARS

Drive Sleeve Bevel Gear

Mating Drive Gear

Part No.

Ratio

Part No.

Drive Gear Mounting Method

MODEL JV AIR MOTOR

3-004-089

1:1

2-700-274

Mounts on Flange 2-600-213  
Adjustment by Shims 2-700-285  
at Flange.

3-004-090

1.38:1

2-600-230

Mounts directly on Shaft.  
Adjustment by Shims 2-600-219  
at end of Hub.

MODEL "VAG" VANE MOTOR

3-004-198

2.65:1

2-503-388

Mounts directly on Vane Motor Shaft

3-004-140

2.04:1

2-503-350

Mounts directly on Vane Motor Shaft

VANE MOTOR MODELS 44P, 64P, & 94P

3-004-198

2.65:1

2-503-388

Mounts directly on Vane Motor Shaft.

3-004-140

2.04:1

2-503-350

Mounts directly on Vane Motor Shaft.

DRIVE SLEEVE & MATING BEVEL GEARS

Drive Sleeve Bevel Gears

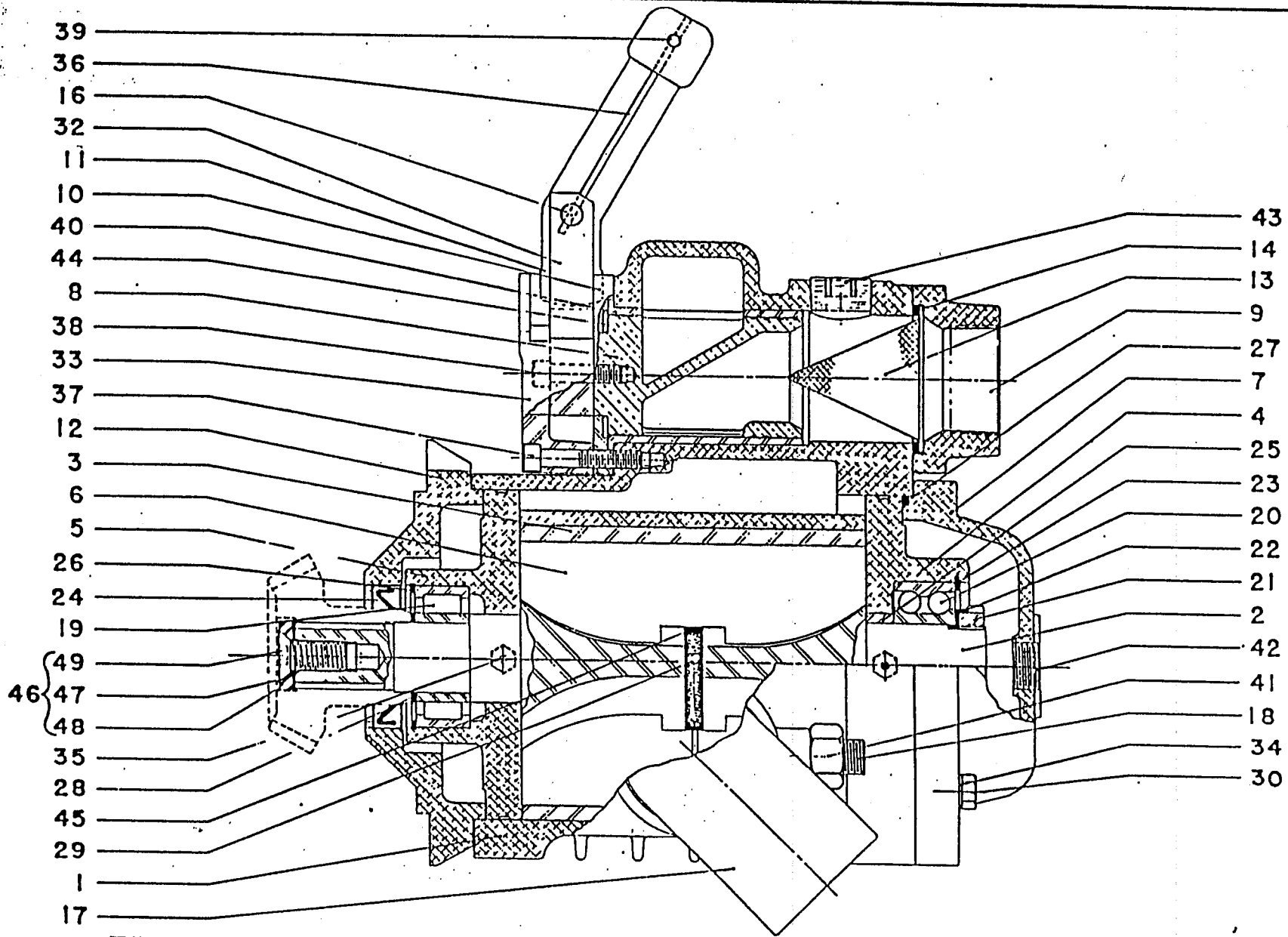
Mating Drive Gears

<u>Part No.</u>	<u>Ratio</u>	<u>Part No.</u>	<u>Drive Gear Mounting Method</u>
		<u>MODEL BBU-2</u>	
3-004-089	1:1	2-700-274	Mounts on Flange 2-700-138, Adjustment by Shims 2-600-313 at Flange.
3-004-090	1.38:1	2-700-143	Mounts directly on Shaft, Adjustment by Shims 2-120-103 behind end of Hub.
		<u>MODEL BBS-15</u>	
		<u>(For Serial #2-412-000/.. through 2-412-006/.. Only)</u>	
3-004-089	1:1	2-120-100	Mounts on Shaft. Adjustment by Shims 2-120-103 behind end of Hub.
3-004-090	1.38:1	2-120-102	Mounts directly on Shaft. Adjustment by Shims 2-120-103 behind end of Hub.
3-004-088	1:1.2	2-120-101	Mounts on Flange 2-120-104. Adjustment by Shims 2-600-313 at Flange.
		<u>MODEL BBS-15 with "SPLIT DRIVE" FRONT END</u>	
		<u>(For Serial #2-412-007/.. and Following)</u>	
3-004-089	1:1	2-117-171	Mounts on Shaft. Adjustment by Shims 2-120-103 behind end of Hub.
3-004-090	1.38:1	2-117-195	Mounts directly on Shaft. Adjustment by Shims 2-120-103 behind end of Hub.
3-004-088	1:1.2	2-120-101	Mounts on Flange 2-120-104. Adjustment by Shims 2-600-313 at Flange.
		<u>MODEL BBS-25, 37 &amp; 56</u>	
3-004-089	1:1	2-117-171	Mounts directly on Shaft
3-004-090	1.38:1	2-117-195	Mounts directly on Shaft
3-004-088	1:1.2	2-117-194	Mounts directly on Shaft

2643A  
8-7-75

AVAILABLE FEEDS

FEED	FEEDNUT FEED GEAR	COUNTERSHAFT FEED GEAR	COUNTERSHAFT DRIVE GEAR	DRIVE SLEEVE DRIVE GEAR
	<u>Part No.</u>	<u>Part No.</u>	<u>Part No.</u>	<u>Part No.</u>
80	3-004-304	3-004-354	3-004-061	3-004-039
100	3-004-304	3-004-354	3-004-071	3-004-042
150	3-004-305	3-004-355		
200	3-004-306	3-004-356	3-004-061 ←	3-004-039
	3-004-305	3-004-355		
300	3-004-306	3-004-356	3-004-071	3-004-042
	3-004-307	3-004-357		
340	3-004-308	3-004-358		
400	3-004-309	3-004-359	3-004-061	3-004-039
450	3-004-310	3-004-360	3-004-061	3-004-039
500	3-004-311	3-004-361	3-004-061	3-004-039
	3-004-307	3-004-357		
612	3-004-308	3-004-358		
770	3-004-309	3-004-359	3-004-071	3-004-042
1000	3-004-310	3-004-360	3-004-071	3-004-042
1360	3-004-311	3-004-361	3-004-071	3-004-042
 <u>REVERSE</u>				
350	3-004-321	3-004-371	3-004-071	3-004-042
630	3-004-321	3-004-371	3-004-061	3-004-039



**JKS BOYLES**

BVRG REVERSIBLE VANE MOTOR

**BOYLES**  
DIAMOND DRILLING EQUIPMENT

REFERENCE NUMBERS SHOWN. ORDER BY

NUMBERS SHOWN IN PARTS LIST.

2190A

Rev. 10-10-73

Rev. 10-2-76

Ref. No.	Part No.	No. Req'd.	Description
			<u>Refer to Plate #450A</u>
	2-503-005		BVRG-94P Vane Motor Assembly Includes Ref. Nos. 1 - 49 Inclusive)
1	2-503-330	1	Motor Housing
2	2-503-310	1	Rotor
3	2-503-337	1	Liner
4	2-503-333	1	Rear End Plate
5	2-501-104	1	Front End Plate
6	2-503-319	6	Rotor Blade
7	2-503-332	1	Housing Rear Cover
8	2-503-339	1	Valve Spool
9	2-501-108	1	Air Inlet Flange
10	2-503-341	1	Valve Spool End Plate
11	2-503-342	1	Reversing Valve Handle
12	2-501-111	1	Vane Motor Mounting Ring
13	2-503-123	1	Air Inlet Screen
14	5-030-805	1	'O' Ring 2 3/8 x 2 1/8 x 1/8
16	2-503-343	1	Valve Handle Pin
17	2-503-336	1	Air Outlet Elbow
18	2-502-124	1	Elbow Lockscrew & Nut
19	5-010-006	1	Front Bearing
20	5-000-147	1	Rear Bearing
21	5-176-307	1	Locknut SKF N-07
22	5-181-307	1	Lockwasher SKF W-07
23	5-052-315	1	Retaining Ring Beveled Internal
24	5-040-038	1	Oil Seal
25		1	Rear Bearing Spacer - Refer to Page 2
26	5-050-244	1	Retaining Ring
27	5-030-832	1	'O' Ring 5 3/4 x 5 1/2 x 1/8
28		1	Pinion Shim - Refer to Page 3
29	2-503-347	3	Spring
30	5-113-003	4	3/8-16 UNC x 1 1/2" Lg. Hex. Hd. Capscrew
31	5-103-616	4	3/8-16 UNC x 1" Lg. Soc. Hd. Capscrew
32	2-503-340	1	Valve Spool Handle (Fixed)
33	2-503-344	1	Valve Handle Retaining Plate
34	5-180-506	4	3/8 Standard Lockwasher
35	5-200-800	2	1/8 Alemite Fitting (Straight)
36	2-503-345	2	Valve Handle Spring
37	5-112-116	3	5/16-18 UNC x 1 3/4" Lg. Soc. Hd. Capscrew
38	5-102-823	1	5/16-18 UNC x 1 1/4" Lg. Soc. Hd. Capscrew
39	5-222-420	1	1/4 Dia. x 1 1/4 Lg. Sel-Lok Pin

IMPORTANT - Always quote Serial Number when ordering Spare Parts



Part No.	No. Req'd.	Description
		<u>Refer to Plate #450A</u>
2-501-113	1	Valve Sleeve
5-171-410	2	5/8 UNC Jam Nut
5-200-134	3	3/4 NPT Pipe Plug
5-010-108	1	Thrust Bearing
2-503-315	6	Rotor Plunger
2-503-370	1	Bevel Gear Retaining Screw Assembly Consists of Ref. Nos. 47, 48 & 49.
5-180-808	1	1/2" External Tooth Lockwasher
2-503-371	1	Pinion Retaining Washer
5-105-863	1	1/2-20 UNF x 1 1/4" Lg. Flat Hd. Capscrew
 <u>Note:</u>		
Rear Bearing Spacers and Pinion Shims are available in various lengths to compensate for variations in parts and should be selected from the following tables.		
<u>Rear Bearing Spacer - Ref. No. 25</u>		
<u>Part No.</u>	<u>Variation from Nominal Size</u>	
2-501-365	+ .010	
2-501-364	+ .008	
2-501-351	+ .006	
2-501-348	+ .004 Std.	
2-501-346	+ .002	
2-501-343	.000	
2-501-340	- .002	
2-501-338	- .004	
2-501-336	- .006	

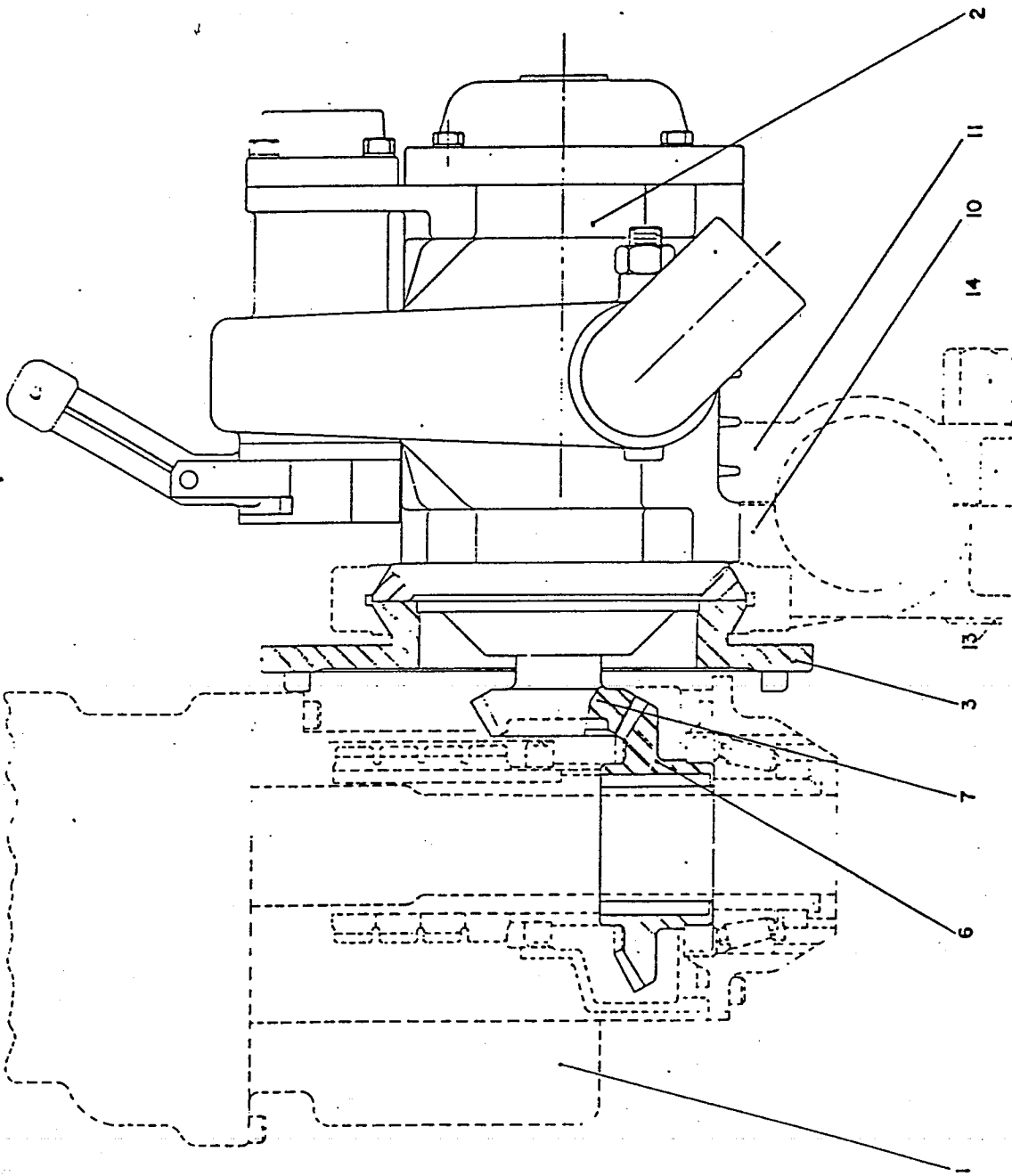
IMPORTANT - Always quote Serial Number when ordering Spare Parts

Ref. No.	Part No.	No. Req'd.	Description
			<p><u>Pinion Shim - Ref. No. 28</u></p> <p><u>Part No.</u>    <u>Variation from Nominal Size</u></p> <p>2-502-136        / .045</p> <p>2-502-135        / .030</p> <p>2-502-134        / .015</p> <p>2-502-133        Standard</p> <p>2-502-132        - .015</p> <p>2-502-131        - .030</p>

IMPORTANT - Always quote Serial Number when ordering Spare Parts

MATING MOTOR AND DRIVE SLEEVE BEVEL GEARS FOR USE WITH VANE MOTORS

<u>SWIVELHEAD MODEL</u>	<u>MOTOR BEVEL GEAR PART NO.</u>	<u>DRIVE SLEEVE BEVEL GEAR PART NO.</u>	<u>RATIO</u>	<u>MOTOR BEVEL GEAR MOUNTING METHOD</u>
VEG	2-503-316	3-002-161	1.29:1	MOUNTS DIRECTLY
VEG	2-503-314	3-002-162	1.8:1	ON
VEG	2-503-311	3-002-163	2.33:1	MOTOR SHAFT.
VEG	2-503-312	3-002-160	3.06:1	ADJUSTMENT BY
VAG	2-503-388	3-004-198	2.65:1	SHIM
VAG	2-503-350	3-004-140	2.04:1	SEE PAGE 3



MODELS VAG & VEG UNDERGROUND DRILLS

**JKS BOYLES**

REFERENCE NUMBERS SHOWN.

ORDER BY PART NUMBERS SHOWN IN LIST OF PARTS.

PLATE N<sup>o</sup> 503

REFER TO PLATE #503

Ref. No.	Part No.	No. Req'd.	Description
1		1	Model BUS-12AG Swivelhead Assembly (Refer to Plate #34A & Parts List)
2		One to Suit	Model BVRG-64P Vane Motor Assembly (Refer to Plate #450 & Parts List) Model BVRG-94P Vane Motor Assembly (Refer to Plate #450 & Parts List)
3	3-004-166	1	Swivel Ring  <u>BEVEL GEAR GROUP</u>
6	3-004-141 3-004-140	One to Suit	Drive Sleeve Bevel Gear (Ratio 2.65:1) Drive Sleeve Bevel Gear (Ratio 2.04:1)
7	2-503-318 2-503-350	One to Suit	Motor Bevel Gear (Ratio 2.65:1) Motor Bevel Gear (Ratio 2.04:1)  <u>3 1/2" RIGID BAR MOUNTING GROUP</u>
10	2-600-002	1	Rigid Bar Mounting c/w Items below - (For use with 3 1/2" Dia. Bar) - Standard
11	2-600-302	2	Rigid Bar Mounting Cap
13	5-129-203	4	3/4-10 UNC x 5" Lg. Hex. Hd. Bolt
14	2-600-305	4	Rigid Bar Mounting Cap Nut
	2-600-304	2	Rigid Bar Mounting Stud Nut
	2-600-303	2	Rigid Bar Mounting Stud
	5-222-320	2	Roll Pin 3/16 x 1 1/4" (For Locking Stud)  <u>4 1/2" RIGID BAR MOUNTING GROUP</u>
10	2-600-003	1	Rigid Bar Mounting c/w Items below - (For use with 4 1/2" Dia. Bar)
11	2-600-307	2	Rigid Bar Mounting Cap
13	5-152-403	4	1 1/8-7 UNC x 6" Lg. Hex. Hd. Bolt
14	2-600-268	4	Rigid Bar Mounting Cap Nut
	2-600-304	2	Rigid Bar Mounting Nut
	2-600-303	2	Rigid Bar Mounting Stud
	5-222-320	2	Roll Pin 3/16 x 1 1/4 (For Locking Stud)

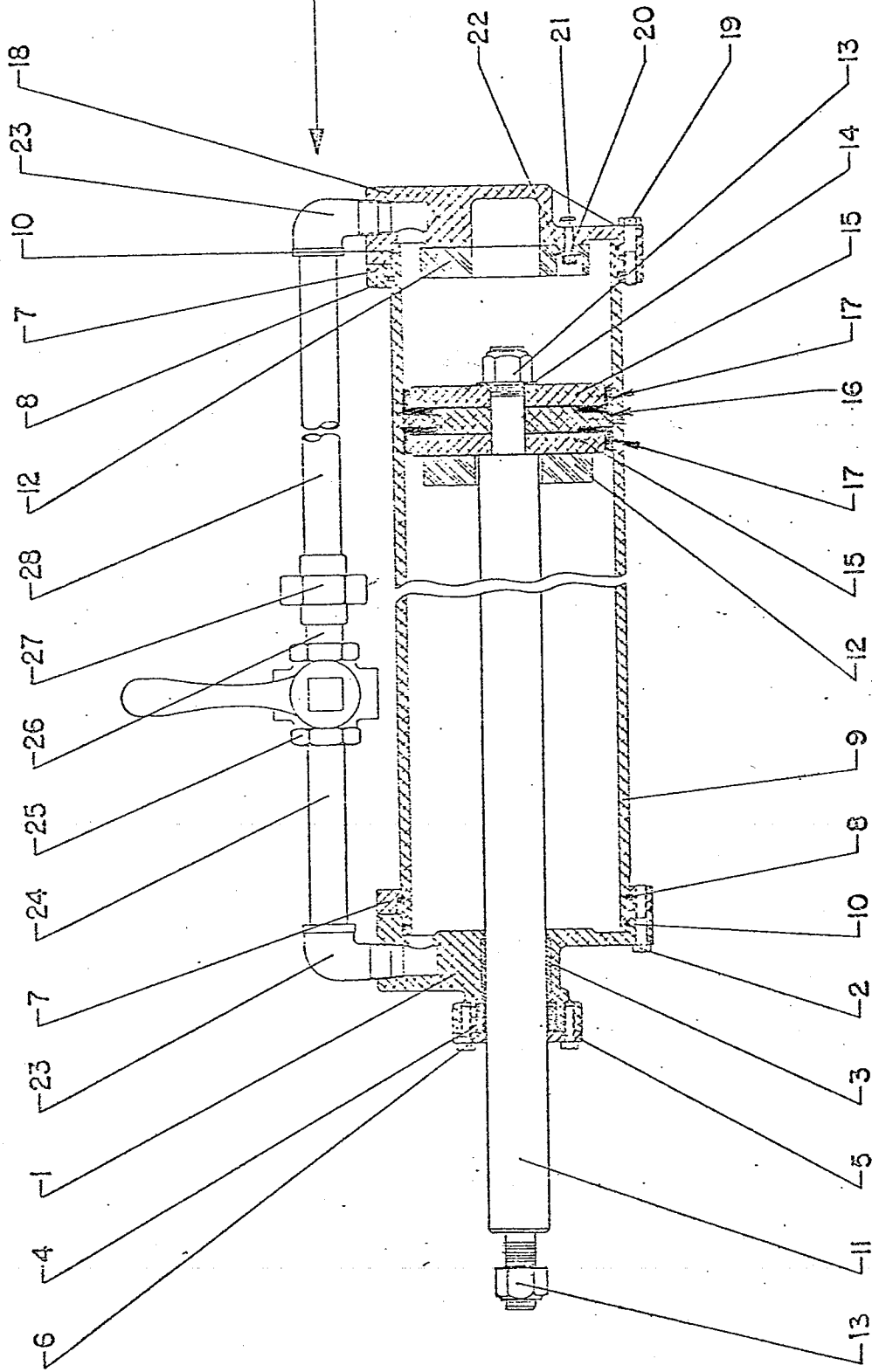
IMPORTANT - Always quote Serial Number when ordering Spare Parts

2445A  
Rev. 15-3-78.

Ref. No.	Part No.	No. Req'd.	Description
			<u>TOOLS</u>
	3-002-179	1	Jacking Back Wheel Wrench
	3-504-494	1	Chuck Wrench
	5-202-146	1	Allen Wrench Set
			<u>OPTIONAL EQUIPMENT</u>
	1-328-005	1	Boyles "Dualfeed" Lubricator
	2-503-008	1	Auxiliary Air Screen

IMPORTANT - Always quote Serial Number when ordering Spare Parts

NOTE: Piping as shown (Items 23-28)  
applies only to single rod puller.



Mining  
Equipment

**DRESSER**

CYLINDER ASSEMBLY  
For  
6" SINGLE & DUAL ROD PULLER

**BOYLES**  
DIAMOND DRILLING EQUIPMENT

REFERENCE NUMBERS SHOWN. ORDER BY PART NUMBERS SHOWN IN PARTS LIST.

PLATE #501B

2489A

Rev. 9-12-76

Rev. 12-7-77

REFER TO PLATE # 501B

Ref. No.	Part No.	No. Req'd.	Description
	2-802-045M		<u>Cylinder Assembly</u> (c/w Piping) - Includes Ref. 1-28
	2-802-021M		<u>Cylinder Assembly</u> (Less Piping) - Includes Ref. 1-22
1	2-802-101	1	Cylinder Bottom Cap (c/w Item 3)
2	5-113-103	8	3/8-16 UNC x 1 3/4" Lg. Hex. Capscrew
3	2-802-112	1	Cylinder Bottom Cap Bushing (Incl. with Item 1)
4	5-042-004	1	'V' Packing Set
5	2-802-104	1	Packing Retainer
6	5-103-603	3	3/8-16 UNC x 1" Lg. Hex. Capscrew
7	2-802-109	2	Clamp Ring
8	2-504-240	2	Split Lock Ring
9	2-802-105	1	Cylinder
10	5-030-837	2	'O' Ring (1/8 x 6 1/4 x 6 1/2)
11	2-802-116	1	Piston Rod
12	2-802-107	2	Piston Rod Bumper
13	5-172-120	2	1 1/4 UNF Self-Locking Jam Nut
14	2-802-111	1	Piston Washer
15	2-802-108	2	Piston Disc
16	2-802-106	1	Piston
17	5-041-008A	2	Piston Cup
18	2-802-102	1	Cylinder Top Cap
19	5-113-103	8	3/8-16 UNC x 1 3/4" Lg. Hex. Capscrew
20	5-101-816	2	1/4-20 UNC x 1 1/4" Lg. Soc. Hd. Capscrew
21	5-170-904	2	1/4-20 UNC Self-Locking Nut
22	5-180-204	2	1/4" Plain Washer
23	5-215-006	2	3/4 Male to 1" Female 90° Reducing Street Elbow
24	5-210-512	1	1" x 6" Lg. Nipple
25	2-802-122	1	1" 4-Way Valve c/w Handle
26	5-210-503	1	1" Close Nipple
27	5-201-130	1	1" Dart Union
28	5-210-550	1	1" Pipe x 25" Lg.

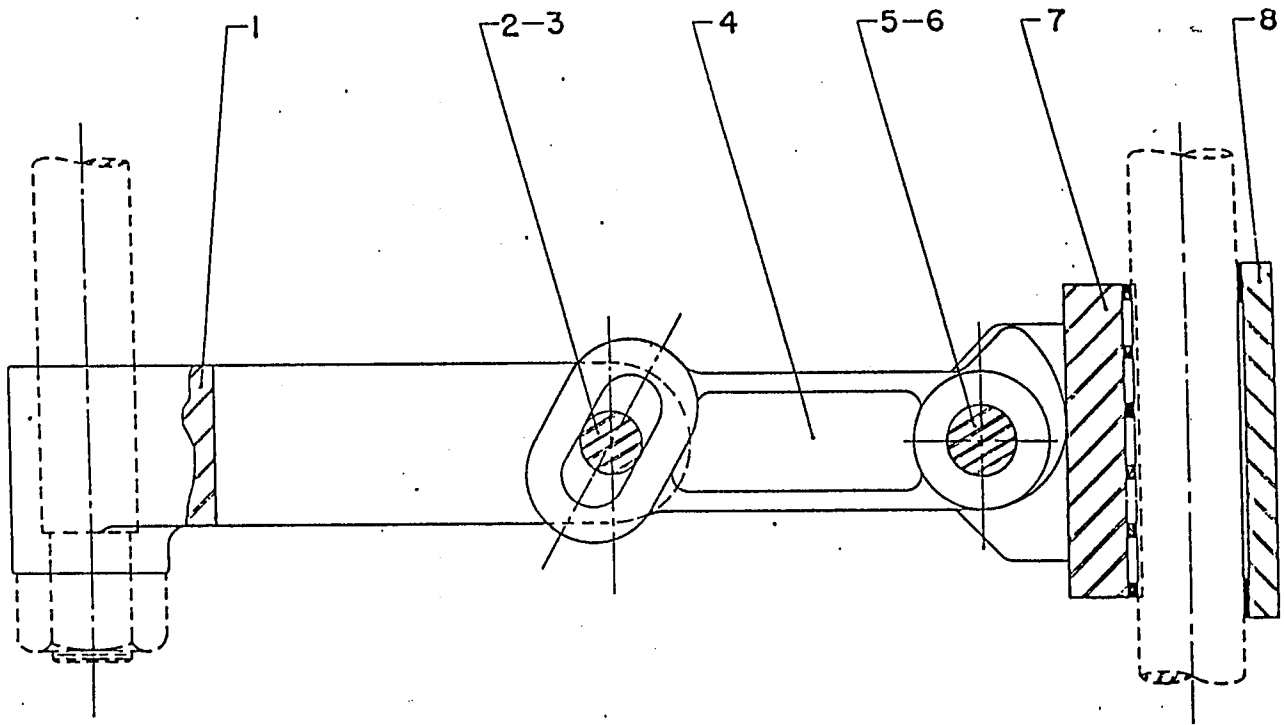
IMPORTANT - Always quote Serial Number when ordering Spare Parts



FOR USE ON 12AG OR 12BH SWIVELHEAD

Ref. No.	Part No.	No. Req'd.	Description
	2-802-046		6" Single Rod Puller Assembly less Dog Assembly - Consisting of: Cylinder Assembly 2-802-045 & Items 1 to 9 below.
	2-802-090		<u>6" Single Rod Puller Assembly*</u> - For: 'E' Drill Rod 'A' Drill Rod 'AW' & 'AWY' Drill Rod & 'AWY' B.H. Drill Rod 'BW' & 'BWL' Drill Rod & 'AW' Casing 'NW' Drill Rod  *Note: Each Assembly consists of: Cylinder Assembly 2-802-045. Dog Assembly (Refer to Page 3) & Items 1-9 below
	2-802-083		
	2-802-074		
	2-802-069		
	2-802-086		
1	2-802-113	1	Rod Puller Clamp (Upper) c/w Items 3-5
2	2-802-114	1	Rod Puller Clamp (Lower) c/w Items 3-5
3	5-125-103	2	1/2-13 UNC x 4 1/2" Lg. Hex. Capscrew
4	5-125-403	2	1/2-13 UNC x 6" Lg. Hex. Capscrew
5	5-180-508	4	1/2-13 UNC Hex. Nut
6	5-115-136	4	1/2-20 UNF x 1 3/4" Lg. Hex. Capscrew ) To Mount
7	5-171-008	4	1/2-20 UNF Hex. Nut ) Clamps to
8	5-180-508	4	1/2 Regular Lockwasher ) Swivel Ring
9	2-802-123	1	Rod Puller Air Hose 72" Lg.

IMPORTANT - Always quote Serial Number when ordering Spare Parts



ORDER BY PART NUMBERS SHOWN IN LIST OF PARTS.  
REFERENCE NUMBERS SHOWN.

PLATE N°507

ROD PULLER DOG ASSEMBLY  
STANDARD



FOR USE ON 12AG OR 12BH SWIVELHEAD

Ref. No.	Part No.	No. Req'd.	Description
			<p><u>Note:</u> Items 10-14 &amp; 15-17 are not included with Rod Puller Assembly.</p> <p>Parts Required for connecting rod puller air supply hose to 'JV' or 'BBU-2' Air Motor:-</p>
0	5-210-600	1	1 1/4 Close Nipple (150#)
11	5-201-578	1	1 1/4 x 1 1/4 x 1" Tee (150#)
12	5-210-503	2	1" Close Nipple (150#)
3	5-201-604	1	1" Shut-off Valve
4	5-201-130	1	1" Union (150#)
			<p>Parts Required for connecting rod puller air supply hose to Vane type Air Motors:-</p>
15	5-210-503	2	1" Close Nipple (150#)
6	5-201-604	1	1" Shut-off Valve
7	5-201-130	1	1" Union (150#)

IMPORTANT - Always quote Serial Number when ordering Spare Parts

FOR USE ON  
12AG OR 12BH SWIVELHEAD WITH 6" SINGLE ROD PULLER

Ref. No.	Part No.	No. Req'd.	Description
			<u>Refer to Plate #507</u>
			Dog Assembly (c/w Ref. 1-8) for:
	2-802-089		'E' Drill Rod
	2-802-084		'A' Drill Rod
	2-802-078		'AW' & 'AWY' Drill Rod & 'AWY' B.H. Drill Rod
	2-802-067		'BW', 'BWY' & 'BWL' Drill Rod & 'AW' Casing & 'BWY' B.H. Rod
	2-802-088		'N' Drill Rod
	2-802-087		'NW' Drill Rod
1	2-802-138	1	Dog Attachment
2	5-118-603	1	3/4-10 x 3" Lg. Hex. Hd. Bolt
3	5-170-612	1	3/4-10 UNC Hex. Nut
			Rod Puller Dog for:
4	2-800-150	One	'E' & 'EW' Drill Rod & 'EX' B.H. Drill Rod
4	2-800-151		'A', 'AW' & 'AWY' Drill Rod & 'AA' & 'AWY' B.H. Drill Rod
4	2-800-152	to	'B', 'BW', 'BWY' & 'BWL' Drill Rod & 'B' & 'BWY' B.H. Drill Rod & 'AX' Casing
4	2-800-185	Suit	'N' & 'NW' Drill Rod
5	5-150-003	One	7/8-9 UNC x 4" Lg. Hex. Hd. Bolt for -
5	5-150-103	to	'E' & 'EW' Drill Rod & 'EX' B.H. Drill Rod
5	5-150-203	Suit	7/8-9 UNC x 4 1/2" Lg. Hex. Hd. Bolt for -
			'A', 'AW' & 'AWY' Drill Rod & 'AA' & 'AWY' B.H. Drill Rod
			7/8-9 UNC x 5" Lg. Hex. Hd. Bolt for -
			'B', 'BW' & 'BWY' Drill Rod & 'B' & 'BWY' B.H. Drill Rod & 'N' & 'NW' Drill Rod
6	5-170-614	1	7/8-9 UNC Hex. Nut

IMPORTANT - Always quote Serial Number when ordering Spare Parts

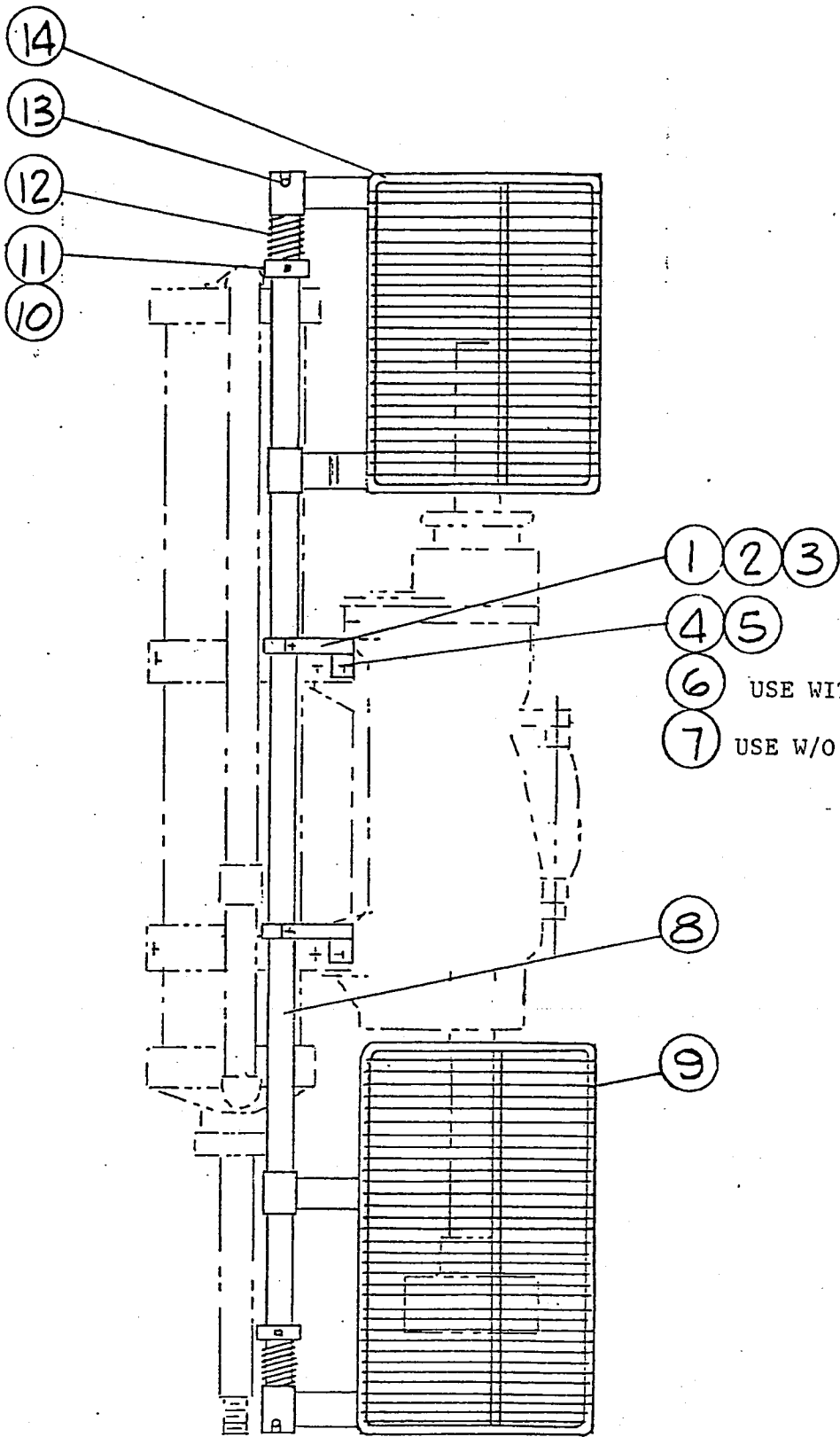
3126A

Rev. 26-1-77

FOR USE ON  
12AG OR 12BH SWIVELHEAD WITH 6" SINGLE ROD PULLER

Ref. No.	Part No.	No. Req'd.	Description
			<u>Refer to Plate #507</u>
	2-800-155 2-800-160 2-800-156 2-800-157 2-800-158 2-800-159	One  to	Jaw for:- 'E' Drill Rod 'EW' Drill Rod & 'EX' B.H. Drill Rod 'A' Drill Rod & 'AA' B.H. Drill Rod 'AW', 'AWY' Drill Rod & 'AWY' B.H. Drill Rod 'B' Drill Rod & 'B' B.H. Drill Rod 'BW', 'BWY' & 'BWL' Drill Rod & 'BWY' B.H. Drill Rod & 'AW' Casing
	2-801-250B 2-801-249B	Suit	'N' Drill Rod 'NW' Drill Rod
	2-800-162 2-800-163 2-800-164	One  to	Jaw Frame for:- 'E' & 'EW' Drill Rod & 'EX' B.H. Drill Rod 'A', 'AW' & 'AWY' Drill Rod & 'AA' & 'AWY' B.H. Drill Rod 'B', 'BW', 'BWY' & 'BWL' Drill Rod & 'B' & 'BWY' B.H. Drill Rod & 'AW' Casing
	2-801-251B 2-800-184B	Suit	'N' Drill Rod 'NW' Drill Rod

IMPORTANT - Always quote Serial Number when ordering Spare Parts



(6) USE WITH ROD PULLER  
 (7) USE W/O ROD PULLER

**JKS BOYLES**  
INDUSTRIES INC.

SWIVELHEAD GUARD AG/EG

REFERENCE NUMBERS SHOWN. ORDER BY PART NUMBERS SHOWN IN PARTS LIST.

PLATE 1170-A

TITLE: SWIVELHEAD GUARD 12AG/22" FEED

ENG. INFO-- REF. ONLY	ITEM	PART NUMBER	DESCRIPTION	QTY
	1	3-004-211B	Support Bracket	2
With Rod Puller	6	5-115-403	1/2" - 13 UNC 2 1/2 HHCS	2
Without Road Puller	7	5-115-103	1/2" - 13 UNC x 1 3/4 HHCS	2
	4	5-170-608	1/2" - 13 UNC HEX. NUT	2
	5	5-180-508	1/2" Reg. Lockwasher	2
	2	5-113-003	3/8 - 16 UNC x 1 1/2 HHCS	2
	3	5-180-506	3/8 Reg. Lockwasher	2
	8	3-004-212A	Support Tube	1
	9	3-004-213B	Front Guard	1
	14	3-004-214B	Rear Guard	1
	10	3-004-215A	Stop Collar	2
	11	5-101-223	1/4 - 20 UNC x 1/2" Sq.Hd.Set Scr.	2
	12	5-200-527	Spring	2
	13	5-222-812	1/2" x 1 3/4 Roll Pin	2

JOB NUMBER	UNITS REQ'D	DRAWN BY
		WRC

REVISION A B C	DATE Sept/85	SHEET 1 OF 1
	ISSUE 1	PART NUMBER 3-004-603M