

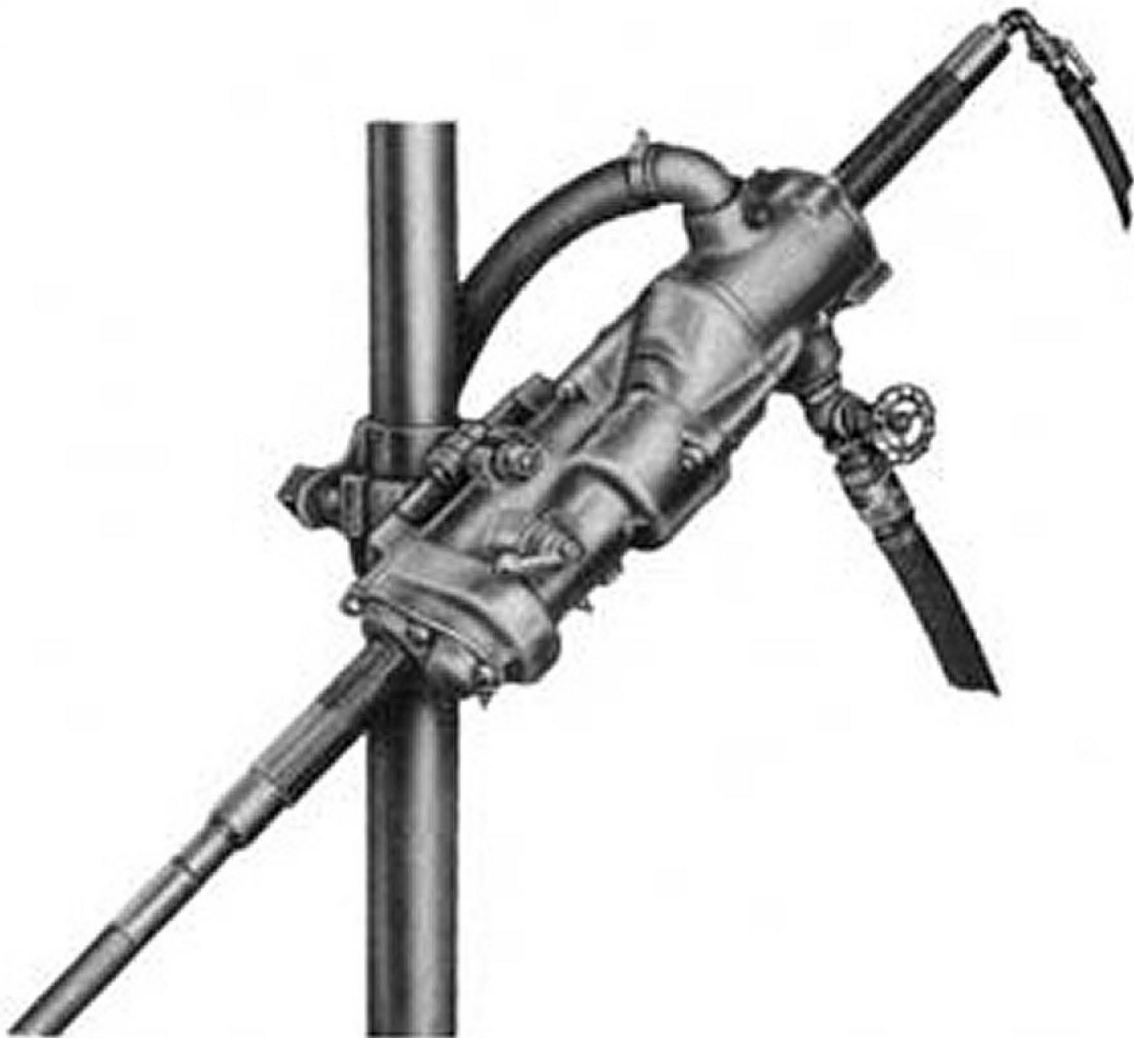
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65 Diamond Core Drill

OPERATOR/SERVICE MANUAL



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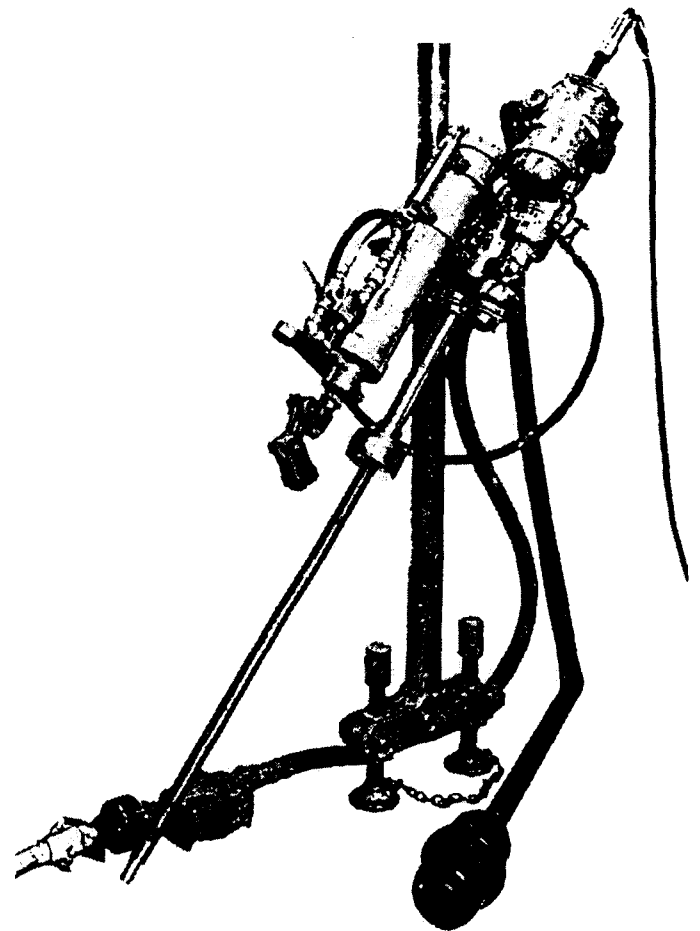
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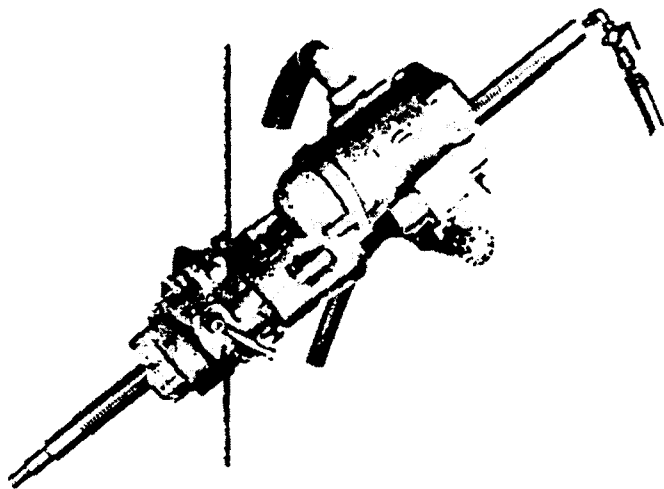
Northwest 65 Diamond Drill

The 65 is a fully enclosed, dust proof, oil tight unit in a sturdy, rugged steel housing. Ball bearings, used throughout the drill, and an efficient spur gear drive running grease, reduce friction losses to a minimum.

A standard rock drill saddle is used to mouth the drill on a column, arm or crossbar from which it can work in any position. The complete drill with built-in screw feed swivel head is 42-1/2 inches long, weighs 200 pounds and handles with the facility of a drifter.



Principal Features



*65 Diamond Drill
with Blast Hole Coupling and
High Speed Water Swivel*

Coring

1. Capacity – 600 feet with EW rods and EX fittings.
2. Self aligning, two position rod puller is available when required for deeper drilling.
3. Delicacy of bit control gives low bit cost and high core recovery.
4. Wide selection of feeds and speed available to cover special drilling conditions.

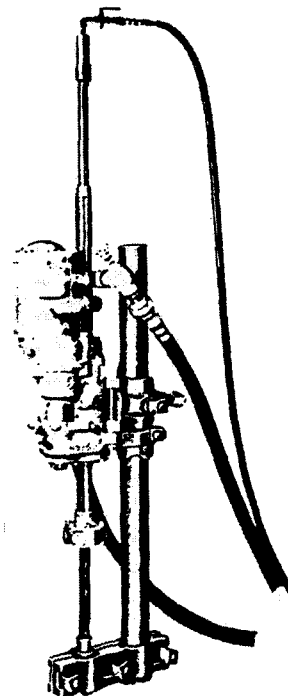
Non- Coring

1. The reversible air motor greatly speeds blast hole drilling by allowing rapid unscrewing of rod joints, after breaking joint with a wrench, and allowing for rapidly moving the chuck or blast hole coupling into drilling position.
2. High bit speeds available where drilling conditions admit their use.
3. Adequate torque to maintain higher bit speeds results in increased footage.
4. A heavy feed screw, blast hole coupling and high- speed water swivel available for use when drilling with two foot rods in front of machine.

Motor

The 65 motor is a reversible, six blade, 20 HP air motor which packs plenty of extra power for the most severe operating conditions. This motor has its highest torque at "stall", so it will start heavy loads and run smoothly at any speed. Air consumption is low, the 65 motor actually delivering more horsepower on the same amount of air as motors of lesser horsepower rating, which means that the use of a compressor for maximum capacity is not mandatory. The average air consumption of the motor is approximately 250 CFM, and maximum consumption about 400 CFM.

This unusually trouble free motor runs without vibration and has very few wearing parts.



*65 Grout Pipe Clamp Assembly with 65 Diamond Drill
Assembly includes column pipe, saddle clamp, safety collar and
bushing. For use on 1-1/2" or 2" grout pipe.
(Special: may be bored for 3" pipe if needed)*

Rated Capacity

The Northwest 65 has a rated capacity of 600 feet with EW rods and EX core barrel.

General

The 65 is designed for coring work where a light fast drilling machine is required. It is also ideal as a blast hole or grout hole drill because of its compact design, powerful motor, and reversible features.

Swivel Head

A swivel head with four sets of feed gears is built into the drill to maintain absolute alignment. Any feed gear may be thrown into action without stopping the drill. Ball bearings take the thrust of drilling and the weight of drill rods. Length of feed is 24 in., bit rotation speeds are available as listed in the table of specifications.

"Safety" Chuck

The chuck is accurately machined to assure perfect alignment. The jaws are held by two large, Allen set screws with countersunk heads in chuck body to make it impossible for them to catch the operator's clothing while rotating. Successive pairs of holes in the chuck body may be used as threads become worn which lengthens the effective life of the chuck.

Blast Hole Coupling

Where it is desired to use 24 in. rods in front of machine, use the heavy Feed Screw and (EW) Blast Hole Coupling with the High Speed Water Swivel screwed directly to the back of the feed screw.

Principal Features, continued

Table of Specifications Northwest 65 Diamond Drill

Rated Capacity (Feet)	
EW-EX	600
AW-AX	500
BW-BX	350
NW-NX	300
Rotary Motor – HP	20 (reversible)
Dimensions (Inches)	
Width	15-1/2
Height	12
Length	42-1/2
Net Weight (Lbs.)	
Drill with Chuck	200
Drill with Blast Hole Coupling	195
Drill with Rod Puller	290
Bit Rotating Speeds	
Standard	0-1500
Optional	0-1000
Optional	0-3000
"Built In" Screw Feed	
Length of Feed	24 in.
I.D. of Coring Feed Screw (Inches)*	1-1/2 in.
Feed Gears (4) Revolutions/ Inch Advance	
Standard	100, 200, 300, 500
Optional	50, 75, 800, 1100
Special	0, 101, 170

*See page 10 for heavy walled, non-coring blast hole feed screw.

65 Rod Puller

The 65 Rod Puller with a 4-1/2 in. diameter piston and 21 in. of travel has been designed to match the short overall length of the 65. Its capacity is from 400 ft. of EW rods up, depending on the inclination of the drill hole. Its use is recommended for holes over 60 ft. in depth. Rod Puller may also be used on A W Rod.

Rod Pullers have a short mounting bracket which bolts to the drill saddle plate in either of two positions. In the lower position, this allows for mounting the cylinder assembly farther back, past the motor when space is at a minimum. This also eliminates the necessity of removing the saddle plate from the drill when mounting or removing the Rod Puller.

Rod Puller Specifications

Capacity – EW Rods, Vertical	400 ft.
Length of Stroke	21 in.
Length Overall, Extended	54-1/2 in.
Cylinder I.D.	4-1/2 in.
Weight (Pounds)	100

Care and Operation

Capacity of the 65 is 600 feet of EW rod with EX fittings. The feed screw easily accommodates the EX core barrel for starting holes. Rods may be pulled by hand to a depth of 60 ft.; for any depth over this the Rod Puller is recommended since considerable time is saved which can be used on actual drilling.

Lubrication

The motor is lubricated by a Line Oiler with a short air inlet hose, which is supplied as standard equipment with each machine. The Line Oiler must be adjusted according to local conditions such as the temperature and the grade of oil being used. With oiler properly adjusted, one filling should be enough for four hours normal operation.. Use SAE #10 to #30, depending on temperature and local conditions. Be sure the motor is getting oil at all times.

For the drill itself, use a lithium base, high viscosity grease as recommended below. Once each eight hours, inject grease into the eight grease fittings on the drill, two of which are located on the housing front cover, four on the housing and two on the rear cover. Special attention should be given to the upper fitting on the rear cover. The feed screw is greased by a small hole in the drive sleeve and cleaned and oiled by the auxiliary exhaust.

The piston rod of the Rod Puller should be oiled occasionally. No other oiling is necessary as the Line Oiler lubricates the disc type valve and the two piston cup leathers.

Remove two chuck set screws from chuck occasionally, clean them and coat with light oil to make adjustment quicker and easier.

Recommended Grease

Standard Oil Co. of Indiana, Stanolith No. 57
Union Oil Co. of California, Unoba EP No. 1
Shell Oil A lithium based grease having high temperature stability for a wide temperature range is required in the swivel head of the 65. The following greases, or their equivalents, meet the requirements for this application.
Keystone Lubricating Co., 84H Medium or Light
Sinclair Oil Co., Litholene
Texas Co., Multi-Fak No. 2
Swan Finch Oil Co., 70-169S
Fisk Bros., Lubriplate No. 630AA
Dow Corning, No. DC-44

Operation

For efficient operation of the Northwest 65 Diamond Core and Blast Hole Drill, at least 80 psi OPERATING pressure should be maintained at the drill. Use 1-1/4 in. hose up to 25 feet and 1-1/2 in. hose for longer lengths.

Blow out air hose before attaching to inlet. Remove and clean air screen at frequent intervals, being careful not to damage or distort screen and allow grit or scale to get into motor.

If the motor freezes from excess moisture in the air line, remove hose from the drill and blow out hose until the line is clear. If this does not remove water, the use of an air receiver is recommended. After blowing out line, inspect and clean air screen, since quantities of water moving through the line generally carry scale and grit which may plug screen and seriously impede air flow.

CAUTION: Do not over speed motor on light loads. This may cause the blades to burn and delaminate.

Gear Changes

There are four feed gear changes on the 65, the rating figure representing the number of revolutions of the bit per inch of advance. The Specification Table lists feeds available, the drill being supplied with 100, 200, 300 and 500 feed gears unless otherwise specified.

The drill is assembled with fast feeds toward the front and slower feeds toward the rear. These may be reversed at operator's discretion, since it makes no difference in actual operation. Gears are engaged by turning the shifter handle until the longer part of the handle is midway between the letters "N" stamped on the housing or as far as it will go in either direction. As assembled, turn the shifter handle **CLOCKWISE** for a fast feed or **COUNTER-CLOCKWISE** for a slow feed. Three neutral positions, one between each feed, are marked by the letter "N" on the housing. To return feed screw when run out, close throttle, move shifter lever to **NEUTRAL** position, hold down feed nut stop pin and open throttle slowly. When chuck or coupling is about one inch from front of housing cover, release stop pin and close throttle. To re-engage gears, move shifter handle toward gear to be used, open throttle slightly and the feed gear key should slip into position. If the gear key does not immediately slip into slot in gear, do not attempt to force it, but hold shifter handle against gear until correct position is reached and key slips into place.

CAUTION: Be careful not to jam chuck against front housing when returning the feed screw.

If jamming occurs, **CLOSE THROTTLE VALVE**, leave shifter handle in **NEUTRAL** position, hold down feed nut stop pin and turn chuck or feed screw backward to loosen it.

With shifter handle in neutral, feed screw may be returned rapidly (taking care not to jam chuck against housing) or may be run forward into position just as rapidly by reversing motor. If desired, the screw may be run completely out of the feed nut.

Feed screw may be run normally a full 24" without difficulty. A full 26" run is obtained without running feed screw down into feed nut by using the Blasthole Feed Screw and EW Blasthole Coupling with High Speed Water Swivel attached directly to the feed screw.

Speeds

As normally assembled, unless another speed range has been specified, the motor pinion and drive gear set for the 65 gives a nominal spindle speed of 1500 RPM with a gear reduction of two to one. This gives the drill enough torque for holes up to 600 feet deep and plenty of speed for coring.

Other gear combinations are available for the most difficult conditions, such as deeper NX holes where the 1000 RPM gear set will give extremely high torque, or for blasthole drilling where the 3000 RPM set will give a high rotating speed for drilling up to 24 in. a minute.

Speed of rotation is not to be confused with feed, which is a definite ratio of revolutions per inch of feed screw advance. For example, when drilling in the 200 feed gear, the feed screw will be advancing one inch for every 200 revolutions of the screw. High rotational speeds will drill faster, but the ratio of revolutions of the screw to each inch the screw advances remains constant.

Maintenance

Motor

The motor consists of a cylinder in which a rotor is mounted eccentrically, six slots in the rotor hold six laminated, phenolic blades which move in and out against the cylinder wall as the rotor revolves. These blades and the rotor are the only rotating parts. Ball bearings, end plates, rotor housing liner and blades are the only wearing parts. It is recommended that an extra set be kept on hand. Adequate lubrication is important in maintaining rotor blades, as running a relatively short time without lubrication will cause them to wear rapidly and unevenly, burn or delaminate.

The rotor blades may be removed and the wearing faces dressed down with sandpaper or a file in case of uneven wear. Care must be taken to keep the wearing faces square with the sides.

To remove or change blades, remove eight Cap Screws holding the Rotor Housing Cover to the Rotor Housing and remove cover. Remove the Rotor Locking Nut and, with two Allen wrenches tighten the Set Screws to jack the End Plate out of the housing. The rotor blades may then be removed for inspection or replacement. Before replacing end plate, retract Set Screws to avoid interference during assembly.

To remove the Rotor Housing Liner or to change Ball Bearings, the motor must be removed from drill and, after the Rotor Housing Cover has been removed, the assembly of rotor, liner and end plates may be pushed out the rear end of the motor housing for inspection or replacement.

Maintenance, continued

J-1455 MOTOR

Exploded view showing method of jacking rear end plate out of motor housing for changing rotor blades →

Drill

To disassemble, first move shifter level to neutral, hold down feed nut stop pin, reverse motor and run screw out of feed nut. The drill may now be disconnected from the air line and the motor removed from the drill. Next remove Drive Gear Screw and remove drive shaft drive gear from Rear Housing Cover, and remove rear housing cover from Housing. Next, remove Shifter Sleeve Detent Spring Plug and Detent Spring and remove Front Housing Cover.

After removing Castle Nut from end of Drive Shaft, drive shaft with feed gears and feed nut assembly may be pulled out together. Remove Drive Sleeve.

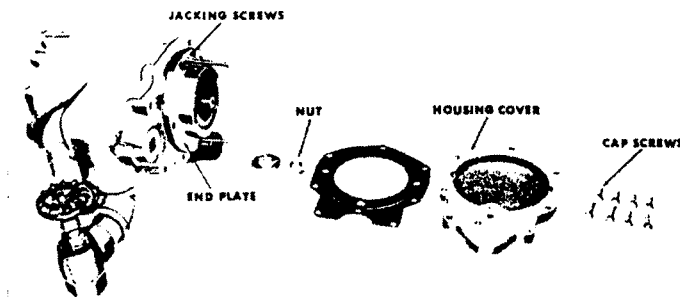
Do not disassemble drive shaft or feed nut assembly unless replacement of parts is required. If feed nut is disassembled, remove Lock Nuts with two spanners, **LEFT HAND THREAD!**

To reassemble, if feed nut has been disassembled, first drive Key into slot in nut and place feed gears on feed nut with the gears in sequence from the lowest to the highest or the reverse, according to operator's preference. Place Ball Bearing on gears and tighten Lock Nuts in place, using two spanners. **LEFT HAND THREAD!** After tightening nuts, stake in at least four places with center punch.

If drive shaft has been disassembled, first place Steel Ball and Spring in Shifter Rod and tighten Plug in end of rod. Insert rod in drive shaft and drive Feed Gear Key into rod under steel ball. Pack feed gears with recommended grease and place on drive shaft to mate with those on the feed nut. Remember that the two assemblies are put together from opposite ends and that the sequence of assembly must be the reverse of that used on the feed nut in order to pair feed gears on final assembly.

Next, place Thrust Washer and Ball Bearing on drive shaft. Place one Washer and Shifter Collar in Shifter Sleeve, invert sleeve, place second Washer on shifter collar and screw Shifter Collar Nut on shifter collar. Place Pin Retainer on drive shaft, insert Shifter Pin through hole in shifter rod and place assembled shifter sleeve on drive shaft, entering pin in slot in shifter collar nut. Place Pin Retainer in groove in shifter collar nut.

Before reassembling drill, remove the shifter handle assembly and the drive Shaft Front Bearing. If two Ball Bearings located in the drive sleeve chamber of the housing require replacement, drive the first down tightly against should in housing, add Spacer and drive second bearing against spacer.



During assembly all parts should be coated liberally with recommended grease.

Mesh gears of drive shaft and feed nut assemblies and insert in housing together. Hold Drive Shaft Gear in housing and assemble with drive shaft using Key. Place Ball Bearing in housing and tighten Castle Nut on drive shaft against Drive Shaft Washer. Place Drive Sleeve assembled with one Call Bearing in housing. Fasten Front Housing Cover assembled with Grease Seal on housing.

Rotate drive shaft until shifter handle assembly may be inserted in housing, rotate shifter handle as far as it will go **CLOCKWISE** to engage shifter key with last feed gear, remove assembly and place in its proper position, with handle to left of 'N' toward chuck end of housing.

Fasten Rear Housing Cover assembled with Grease Seal and Roller Bearing to housing, place drive shaft drive gear and two Keys on drive shaft and tighten Drive Gear Screw into drive shaft against Washer.

Assemble motor with swivel head, attach air line, thread drive screw into feed nut, depress stop pin and, with motor on forward rotation, open throttle and run screw into nut. **DO NOT** jam chuck against front housing cover.

Rod Puller

To replace worn piston cup leathers, unscrew back cylinder head and pull out piston and piston rod.

Water Circulation

Good drilling practice requires a dependable water supply used at the lowest pressure conducive to good sludge removal, which results in saving of the pump, power and diamond bits. Local conditions will dictate the correct pressure and volume required, for instance, sticky ground will require high pressure and deep drilling, because of leaky rod joints and the necessity to keep sludge in suspension for long periods of time will require larger volumes of water. Large holes drilled with small rods will need a large volume of water to maintain normal circulation velocity.

Suggestions for Core Drilling With the Northwest 65

Setting Up

When installing drill on column, column are, or cross bar, be sure setup is rigid. Misalignment resulting from loose column or arm may break rods or feed screw. The use of a double screw column instead of the single screw type is recommended for this reason. Column should be set up about 42 inches back from where the hole is to be collared to allow for the full run of the feed screw and the stroke of the rod puller.

If sludge samples are to be taken, as is done where core recovery is poor, it is advisable to use a piece of casing in the collar of the hole. In this case, the column should be set back sufficiently so that there is still approximately 42 inches between the column and the end of the casing.

When drilling down holes, where there is danger of muck or other foreign material falling into the hole, it is advisable to use casing in the collar of the hole as a safety precaution. In drilling up holes more than 30 degrees above horizontal, the hole should be started with a casing bit so that a stuffing box may be used to prevent water and muck from pouring out of the hole and onto the drill and operator.

When starting holes in fractured or faulty ground where there is danger of small pieces of rock caving into the hole, case sufficiently long to bottom in solid ground should be inserted. If this is not done, the small pieces of rock, especially if hard, may materially increase the diamond bit cost per foot of hole drilled by becoming wedged between the diamonds in the bit and breaking them when pulling out of the hole. The same holds true when going to the bottom of the hole, as the pieces may be forced to the bottom and it will be necessary to run over them with the probability that some of the diamonds will be broken. Even if the sharpness of the bit is not materially impaired, each of the diamonds in the bit represents a portion of its value, and a correspondingly lower footage and salvage may be had.

Drilling

Diamond bits required for core drilling are the casing bit, double tube reaming shell and bevel wall coring bit.

In starting to drill (where casing will be used) a five foot rod is put through the chuck and feed screw, the starting barrel is tightened to the rod in front of the chuck and the water swivel is screwed on the back end of the five foot rod. Next, tighten the casing bit in place, using care not to contact the diamonds with the wrench.

Move up to rock face and inspect to make sure it is square with the bit. If it is not, pick or moil the surface until it is square. The chick screws may now be tightened and adjusted to center the rod in the chuck. If the ground is soft, the hole may be started immediately by holding the starting barrel against the face by hand. If the ground is hard, a 'vee' should be cut in the edge of a plank or lagging and the plank secured under the starting barrel.

Then, holding the starting barrel down into the 'vee' with another plank or lagging, turn on the water, place drill in lowest feed gear and open the throttle slowly.

Always start the drill slowly and collar the hole carefully. More damage may be done to the bit in collaring the hole than in the next 20 feet of drilling. When a portion of the bit is in the rock, remove the plank and open the throttle.

Casing should be run into the solid rock far enough so that when the diamond casing bit is removed and the hole cased, approximately four inches of casing is outside the collar. The starting barrel is simply a short piece of casing with a rod-to-casing bushing and on which a diamond set casing bit may be used.

If casing is to be run deeper, longer pieces may be added as required. After hole is cased to solid bottom, hole should be washed out, using cross chipping bit on the end of rods to chop out any small pieces of core that may be left in the hole. This will ensure a clean hole for the start.

If the casing is only into the rock a couple feet, it will be necessary to put the double tube core barrel through the feed screw after removing the Feed Screw Bushing. **LEFT HAND THREAD!**

The inner tube of the core barrel is quite thin in section and is designed to receive the core cut by the bit. Water coming from the rod into the back end connection of the core barrel flows between the inner and outer tubes toward the bit. Most of this water passes out around the bit to keep it cool and carry away the sludge. A small amount of the water passes back up the inner tube to float pieces of core back away from the bit and to keep them from wedging in the tube or bit and causing the bit to choke or block prematurely and grind up the core; this feature is the reason that double tube core barrels are usually recommended instead of single tube barrels. After passing through the inner tube, the water runs out two small holes in the side of the back end connection of the core barrel. When starting a hole with part of the core barrel outside the collar of the hole, remove bit and push cork, rubber plug or wad of paper to the back of the core barrel to keep water from spraying on the drill and operator while drilling. After core barrel is well into hole, remove the plug the next time the core barrel is emptied.

When the hole has been drilled to approximately five feet, the core barrel and rods should be kept greased. Different ground conditions call for different greases, but usually a cup or fibre grease of No. 3 government specification is suitable. After greasing, it will be necessary to cut burlap into six or eight inch squares and use it to grip the rods when pulling them.

The practice of greasing is necessary to cut friction and vibration to a minimum. Vibration is very hard on diamond bits, at times shattering the diamonds if allowed to continue for any length of time. When vibration occurs it may not show on the surface, but it slows down the drill at once; the best practice is to shut off the motor completely, and then reopen the throttle valve slowly, changing speeds until a spot is found where vibration is not so intense.

When the feed screw has been run down its full length, shut off the circulating water BEFORE loosening chuck screws. If this is not done, the water pressure may push the rods and core barrel off the bottom of the hole and allow some of the core to drop out of the bit. When drilling with a short string of rods, always hold them down with a wrench while running the feed screw back to prevent the string being raised and the core lost if the chuck jaws should catch on the rods while returning.

If pieces of core should drop out of the bit and lie sideways in the hole, damage to the diamond bit will result in running over them.

When the feed screw has been returned, tighten the chuck screws, turn on the water and wait for it to start running out of the hole before drilling is resumed.

In normal ground the machine will run smoothly while drilling, but as soon as the bit is blocked or the core barrel gets full the motor will act erratically, alternately slowing down, speeding up, or even stopping momentarily and shutting off the water when core breaks tightly.

When this happens, core barrel must be pulled and emptied. As soon as the core barrel is out of the hole, remove the bit and reaming shell, then remove the back end connection and empty the inner tube. If some of the core sticks in the inner tube, tap tube lightly with the flat of a wooden paddle, taking care not to bend or dent tube.

It is a good plan to have a trough made up that is long enough to take the core as it is emptied from the tube so that it does not get mixed up with cores pulled previously. It is important also that the core be marked as to depth every time the barrel is emptied, using wooden blocks in boxes made up for preserving the core.

Normally, very little trouble will be encountered in diamond drilling. Make sure before starting the drill that water circulation is established. If water shuts off while drilling, stop immediately until the cause is found. If the bit is blocked or mudded, at which time the bit will slow down or stop, rods must be pulled and the core barrel emptied and cleaned. If it is found that rods turn easily and water is still circulating after chuck screws have been loosened and still no water shows at the collar, it is probable that the bit has run into a seam or small cavity which is taking up the water and drilling may be safely resumed. Since a new face is then being cut, start drilling for an inch or so. If drill operates smoothly, it is safe to open the throttle again.

Generally the drill should be run in the fastest feed gear possible as long as it operates smoothly and without too much effort. With a sharp bit, after the hole is collared, the drill may be run in the 100 feed gear. When the motor begins to labor or slow down, because of a dull bit or harder ground, gear should be shifted to a slower rate of feed.

Diamond bits should not be run too far for economic reasons. In very hard ground, bits should be changed as soon as the motor labors too hard in slowest feed gear. In abrasive formations, or where the bits have run to the point where metal is worn away from the diamonds and there is danger of their being torn out,

the bit should be taken out of service because loose stones may break up the entire bit.

Drill Rod Recommendations

It should be recognized that size of chuck, chuck jaws and drill rod do not necessarily govern the size of hole what is to be drilled. For example, the largest size NW casing may be drilled into the rock using EW drill rod. The EW rod is run through the chuck jaws and an EW to NW rod-to-casing sub is used to connect to the NW casing or starting barrel equipped with a diamond casing bit.

The foregoing is not recommended as a desirable combination but frequently it is necessary to improvise in order to expedite the work. Obviously it is impractical to have every desirable piece of equipment on all jobs, many of which are isolated from sources of supply.

With the exception of short holes in easy drilling conditions, do not use EW rods for drilling AX or larger holes EXCEPT THROUGH FEED SCREW AND CHUCK!

AW rods have the necessary strength for drilling to any depth up to 3500 feet; however, when drilling with AW rods and BX or NX core barrels, be sure to insert one or two rods of complementary size (BW or NW) immediately behind the core barrel; otherwise, serious rod vibration or wobble may develop.

Blast Hole and Grout Hole Drilling

When drilling blast or grout holes, where recovery of core is unnecessary, the use of a short, hard metal protected blast hole barrel, is recommended. The use of a diamond set reaming shell is dispensed with and the bit screwed directly into the barrel. The advantage of using these barrels lies in their greater wearing qualities as compared to the ordinary core barrel.

Where space is at a premium in blast hole drilling, the use of two foot rods ahead of the drill is recommended. This is the most rapid method of drilling with the 65. Using the water swivel screwed directly to the back end of the blast hole feed screw, and with blast hole coupling in the front end, drilling is simply a matter of adding rods instead of chucking and changing water swivel in the ordinary manner. The reversible feature of the 65 motor is a time-saver in this type of drilling since the rods, after the joint has been broken, may be unscrewed and screwed up using the motor.

When drilling in soft ground, it is recommended that the spindle and gear which gives a spindle speed of 3000 RPM be used. In harder ground the 1500 RPM set may be used to advantage, but the highest practical spindle speed is recommended to cut drilling time to the minimum.

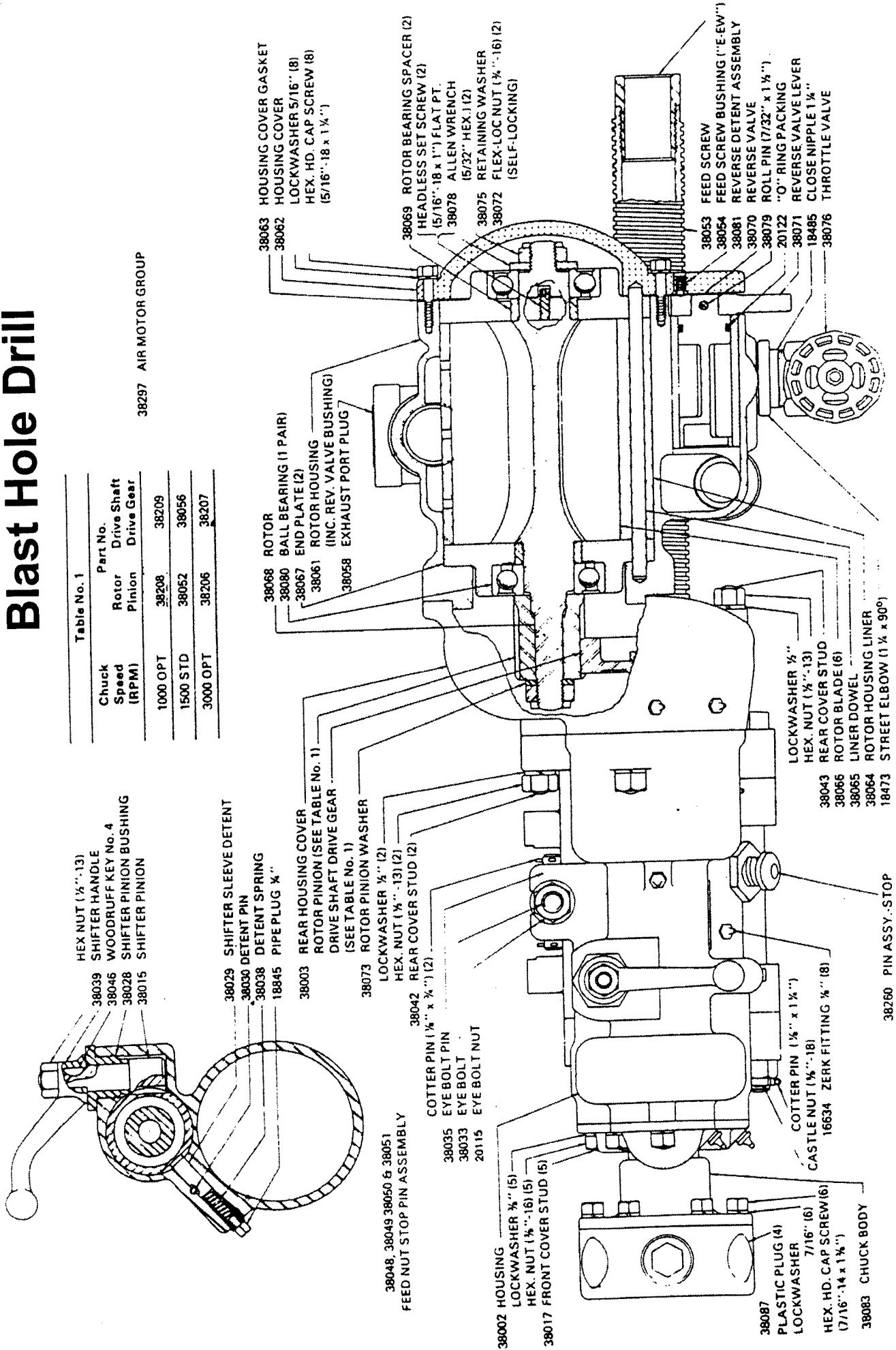
The Grout Pipe Clamp setup is indispensable for grout hole drilling as the drill is always in alignment when moving on and off grout pipes.

Northwest 65 Diamond Core and Blast Hole Drill

38297 AIR MOTOR GROUP

Table No. 1

Chuck Speed (RPM)	Part No.	Rotor Pinion Drive Shaft
1000 OPT	38208	38209
1500 STD	38052	38056
3000 OPT	38206	38207



- 38039 HEX NUT (1/2" x 13)
- 38046 SHIFTER HANDLE
- 38028 WOODRUFF KEY No. 4
- 38015 SHIFTER PINION BUSHING
- 38015 SHIFTER PINION

- 38029 SHIFTER SLEEVE DETENT
- 38030 DETENT PIN
- 38038 DETENT SPRING
- 18845 PIPE PLUG 1/2"

- 38003 REAR HOUSING COVER
- ROTOR PINION (SEE TABLE No. 1)
- DRIVE SHAFT DRIVE GEAR (SEE TABLE No. 1)
- 38073 ROTOR PINION WASHER

- 38048, 38049, 38050 & 38051 FEED NUT STOP PIN ASSEMBLY
- 38035 EYE BOLT PIN
- 38033 EYE BOLT
- 20115 EYE BOLT NUT

- 38002 HOUSING
- LOCKWASHER 3/8" (5)
- HEX NUT (1/2" x 16) (5)
- 38017 FRONT COVER STUD (5)

- 38043 LOCKWASHER 1/2"
- HEX NUT (1/2" x 13)
- 38066 REAR COVER STUD
- 38065 ROTOR BLADE (6)
- 38064 LINER DOWEL
- 18473 ROTOR HOUSING LINER
- 18473 STREET ELBOW (1 1/2" x 90°)

- 38043 LOCKWASHER 1/2"
- HEX NUT (1/2" x 13)
- 38066 REAR COVER STUD
- 38065 ROTOR BLADE (6)
- 38064 LINER DOWEL
- 18473 ROTOR HOUSING LINER
- 18473 STREET ELBOW (1 1/2" x 90°)

- 38087 PLASTIC PLUG (4)
- LOCKWASHER 7/16" (6)
- HEX. HD. CAP SCREW (6) (7/16" x 1 1/2")
- 38083 CHUCK BODY

- 38068 ROTOR
- 38080 BALL BEARING (1 PAIR)
- 38067 END PLATE (2)
- 38061 ROTOR HOUSING (INC. REV. VALVE BUSHING)
- 38058 EXHAUST PORT PLUG

- 38063 HOUSING COVER GASKET
- 38062 HOUSING COVER
- LOCKWASHER 5/16" (8)
- HEX. HD. CAP SCREW (8) (5/16" x 1 1/2")

- 38069 ROTOR BEARING SPACER (2)
- HEADLESS SET SCREW (2) (5/16" x 1") FLAT PT.
- 38078 ALLEN WRENCH (5/32" HEX.) (2)
- 38075 RETAINING WASHER
- 38072 FLEX-LOC NUT (1/2" x 16) (2) (SELF-LOCKING)

- 38053 FEED SCREW
- 38054 FEED SCREW BUSHING ("E-EW")
- 38081 REVERSE DETENT ASSEMBLY
- 38070 REVERSE VALVE
- 20122 ROLL PIN (7/32" x 1 1/2")
- 38071 "O" RING PACKING
- 18485 REVERSE VALVE LEVER
- 38076 CLOSE NIPPLE 1/4"
- THROTTLE VALVE

- 38043 LOCKWASHER 1/2"
- HEX NUT (1/2" x 13)
- 38066 REAR COVER STUD
- 38065 ROTOR BLADE (6)
- 38064 LINER DOWEL
- 18473 ROTOR HOUSING LINER
- 18473 STREET ELBOW (1 1/2" x 90°)

- 38043 LOCKWASHER 1/2"
- HEX NUT (1/2" x 13)
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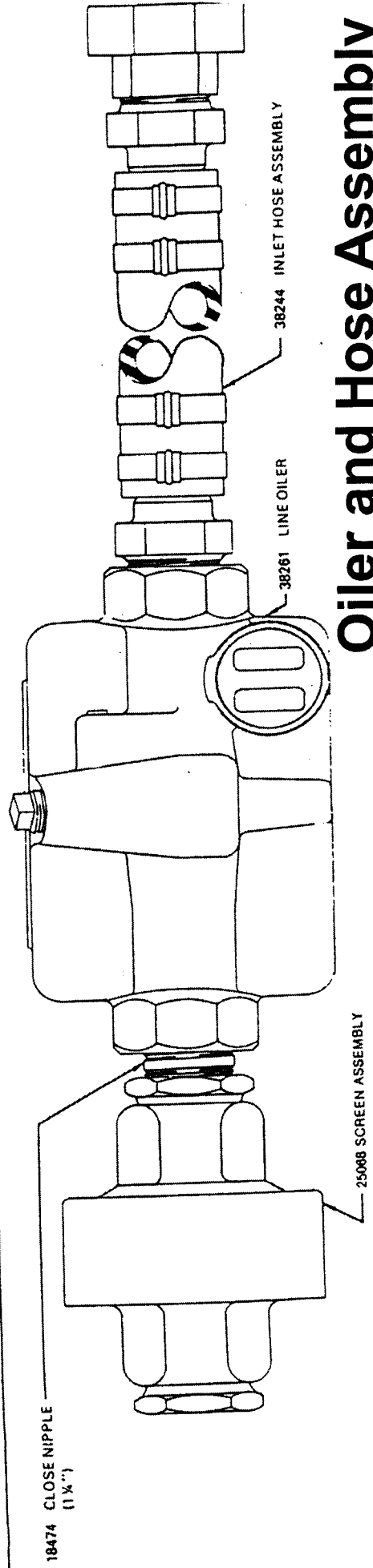
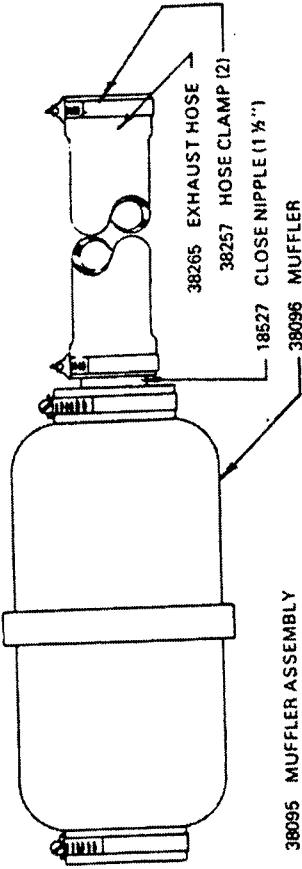
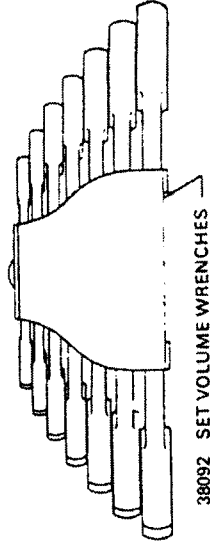
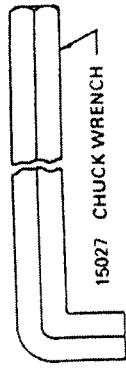
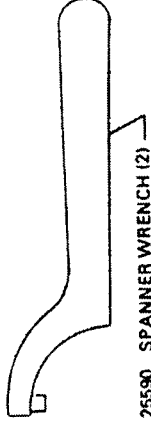
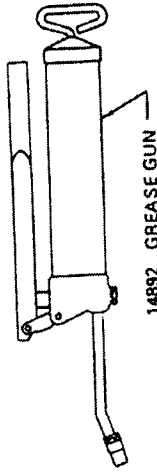
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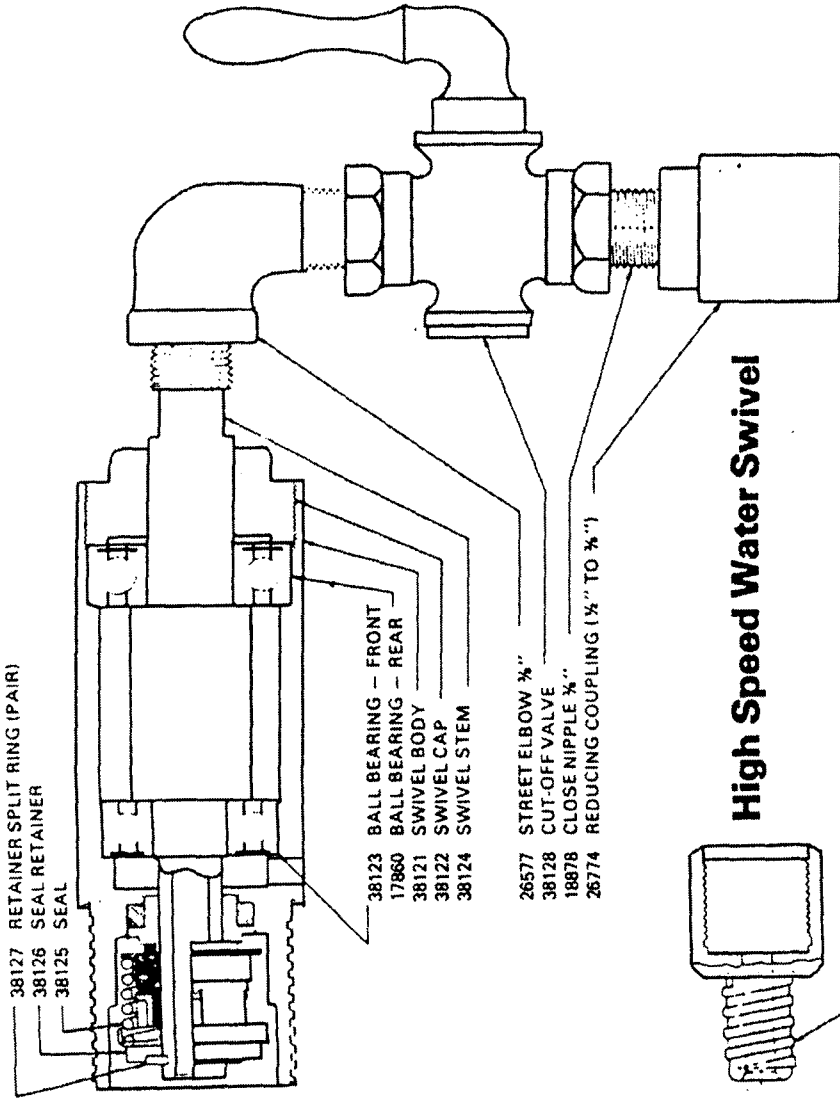
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- 38064 LINER DOWEL
- 18473 ROTOR HOUSING LINER
- 18473 STREET ELBOW (1 1/2" x 90°)

Standard Equipment for Northwest 65



Oiler and Hose Assembly

38120 H. S. WATER SWIVEL
(WITH FEED SCREW CONNECTION — SHOWN)



38127 RETAINER SPLIT RING (PAIR)
38126 SEAL RETAINER
38125 SEAL

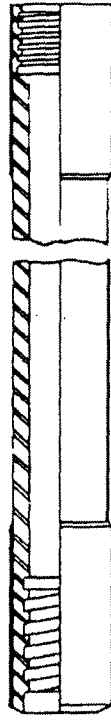
38123 BALL BEARING — FRONT
17860 BALL BEARING — REAR
38121 SWIVEL BODY
38122 SWIVEL CAP
38124 SWIVEL STEM

26577 STREET ELBOW $\frac{3}{4}$ "
38128 CUT-OFF VALVE
18878 CLOSE NIPPLE $\frac{3}{4}$ "
26774 REDUCING COUPLING ($\frac{1}{2}$ " TO $\frac{3}{4}$ ")

High Speed Water Swivel

38129 ADAPTOR (FOR "EW" ROD)

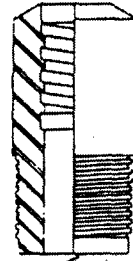
Special Equipment



BLASTHOLE BARREL FOR NON-CORING WORK
38190 EW ROD CONNECTION — "EX"
38191 AW ROD CONNECTION "AX"

Blast Hole Barrel

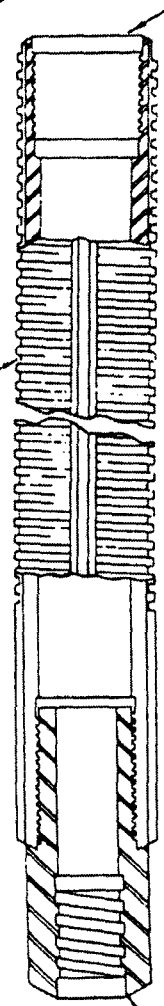
38194 WATER SWIVEL BLAST HOLE COUPLING (EW THREAD)
TO BE SCREWED DIRECTLY INTO
FEED SCREW.



TO RECEIVE THREADED 38120
HIGH SPEED WATER SWIVEL DI-
RECTLY OR 38194 WATER SWIVEL
BLAST HOLE COUPLING.

Blast Hole Feed Screw

38204 BLAST HOLE FEED SCREW



38193 BLAST HOLE FEED SCREW COUPLING (EW THREAD)

38192 BLAST HOLE FEED SCREW COUPLING (AW THREAD)

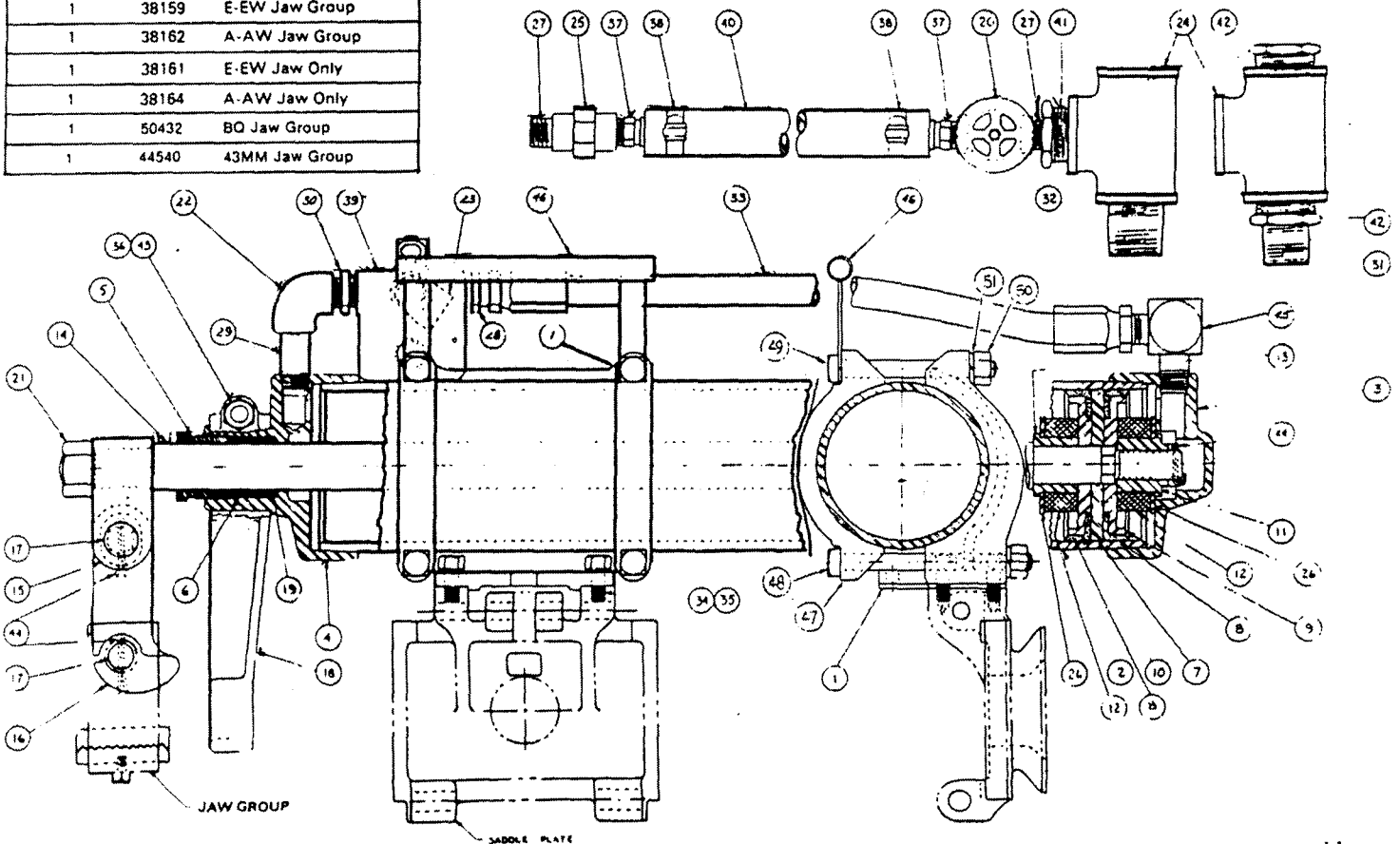
38130 65 Rod Puller

Item	Req'd.	Part No.	Description
1	1	38131	Clamp, Cyl. Holding
2	1	38132	Cylinder
3	1	38133	Head, Cyl. (Plain)
4	1	38134	Head, Cyl. (Packed)
5	1	38135	Nut, Gland
6	1	38136	Gland, Packing
7	1	38137	Piston
8	2	38138	Leather, Piston Cup
9	1	38139	Spacer, Piston (Outside)
10	1	38140	Spacer, Piston (Inside)
11	1	38141	Nut, Piston
12	2	38142	Buffer, Piston
13	1	38143	Sleeve, Buffer
14	1	38144	Rod, Piston
15	1	38145	Arm, Rod Grip
16	1	38146	Cam, Rod Grip
17	2	38147	Pin, Cam
18	1	38148	Guide, Rod
19	1	38149	Packing, Cyl. Head
20	1	26741	Valve, Globe - 1/2"
21	1	Com'l	Nut, Hex. 7/8"-14 UNF H44262
22	1	19034	Elbow, H.D. 1/2" x 90
23	1	18882	Elbow, St. 1/2" x 90°

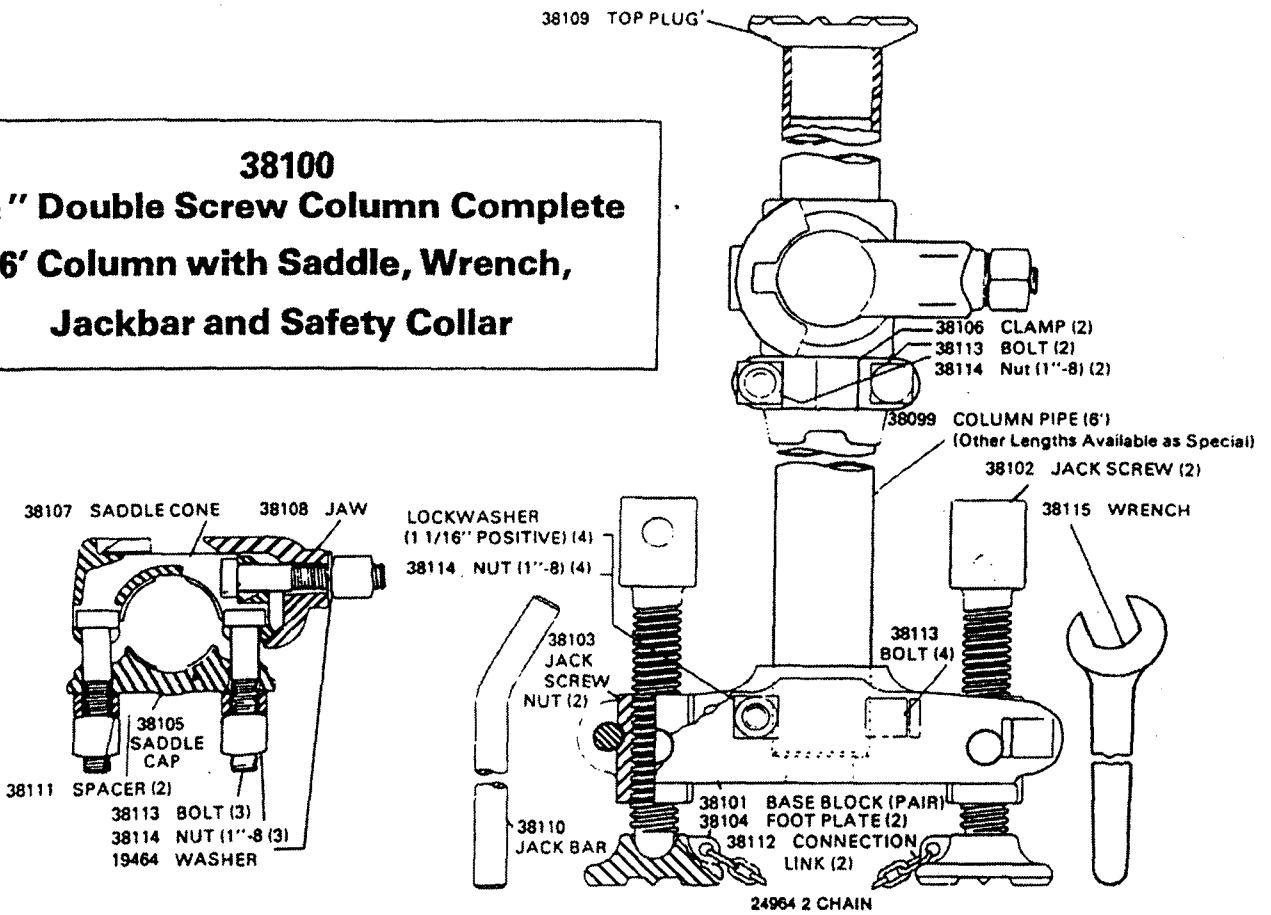
Item	Req'd.	Part No.	Description
24	1	18178	Tee, Pipe - 1 1/2"
25	1	38150	Union, 1/2" Pipe
26	2	38158	Washer, Buffer
27	2	20823	Nipple, Close - 1/2"
28	1	18891	Adapter, Straight
29	1	17358	Nipple, H.D. - 1/2" x 2"
30	1	38254	Adapter, Straight
32	1	18474	Nipple, Pipe - 1 1/2" x 2"
33	1	38266	Hose Assy
34	4	Com'l	Capscrew, 3/8"-16 NC x 1"
35	4	Com'l	Lockwasher - 3/8"
36	1	Com'l	Bolt, Sq. Hd. - 1/2"-13 NC x 3"
39	1	38299	Valve, 4 Way - 1/2"
40	6.25'	38267	Hose, Air - 1/2"
41	1	18922	Bushing, Pipe - 1 1/2" - 1/2"
43	1	Com'l	Nut, Hex. 1/2"-13 NC
44	3	Com'l	Pin, Cotter - 1/4" x 1 1/2"
45	1	22523	Adapter - 90
46	1	38151	Handle, Rod Puller
47	2	38152	Clamp, Cyl.
48	2	38153	Bolt, 1/2" x 5 1/2"
49	2	38154	Bolt, 1/2" x 4 1/2"
50	4	Com'l	Nut 1/2" Hex
51	4	Com'l	Lock Washer 1/2"

Jaw Groups & Jaws

Req'd.	Part No.	Description
1	38159	E-EW Jaw Group
1	38162	A-AW Jaw Group
1	38161	E-EW Jaw Only
1	38164	A-AW Jaw Only
1	50432	BO Jaw Group
1	44540	43MM Jaw Group

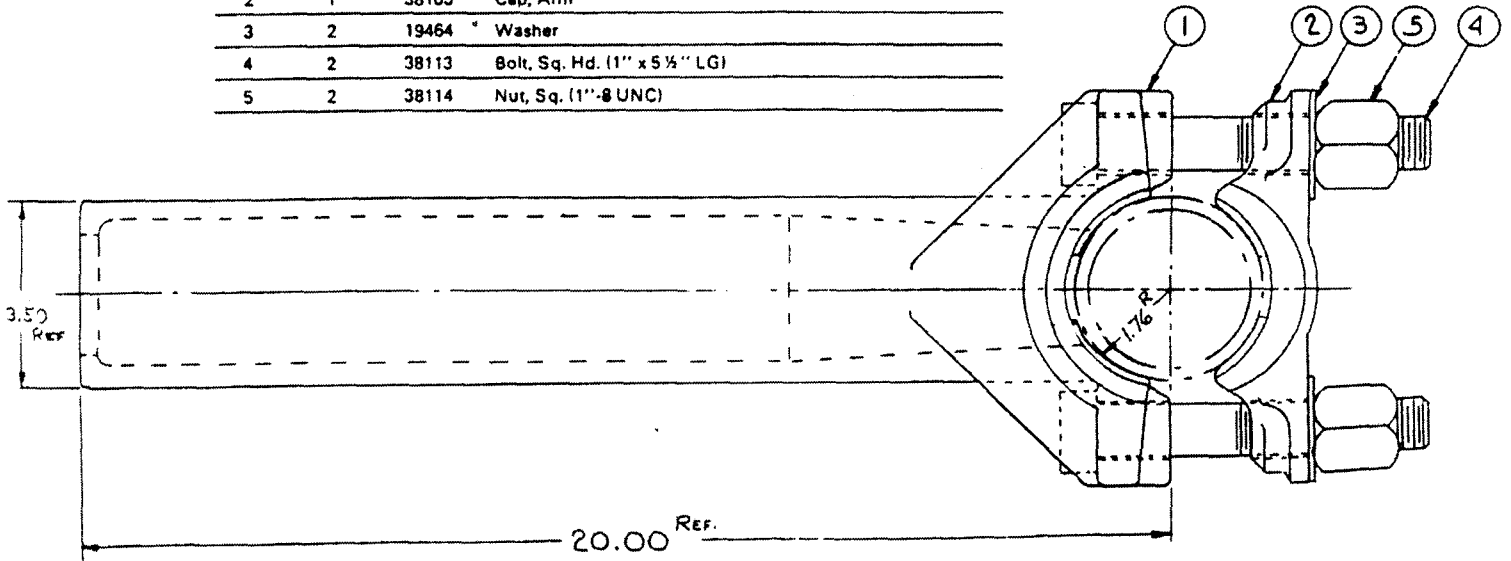


38100
3½" Double Screw Column Complete
6' Column with Saddle, Wrench,
Jackbar and Safety Collar



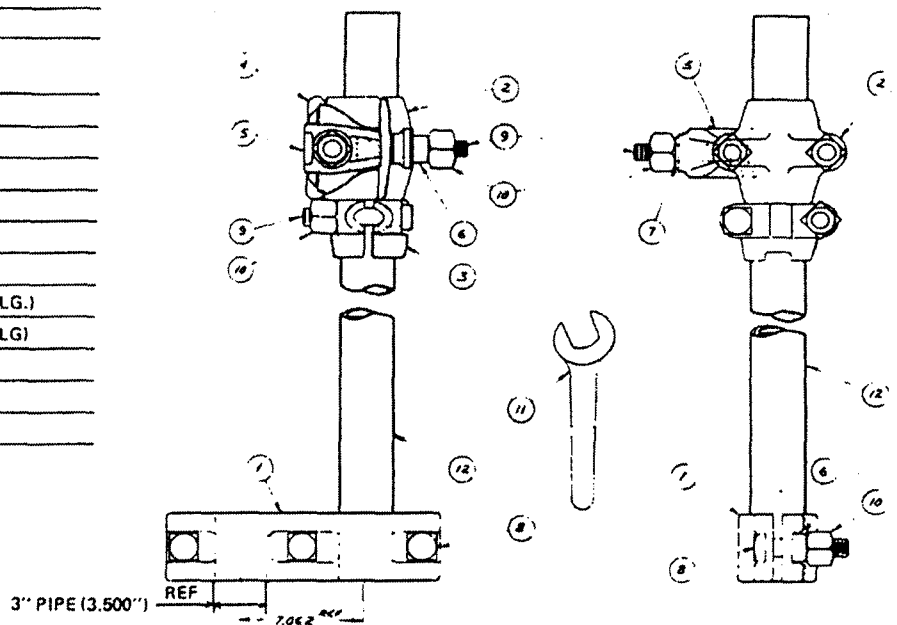
38097
Side Arm Assy.
Consisting of

Item	Req'd.	Part No.	Description
1	1	38098	Arm (20" LG)
2	1	38105	Cap, Arm
3	2	19464	Washer
4	2	38113	Bolt, Sq. Hd. (1" x 5 ½" LG)
5	2	38114	Nut, Sq. (1"-8 UNC)



38157 Grout Pipe Clamp Assy (For 3" Pipe)

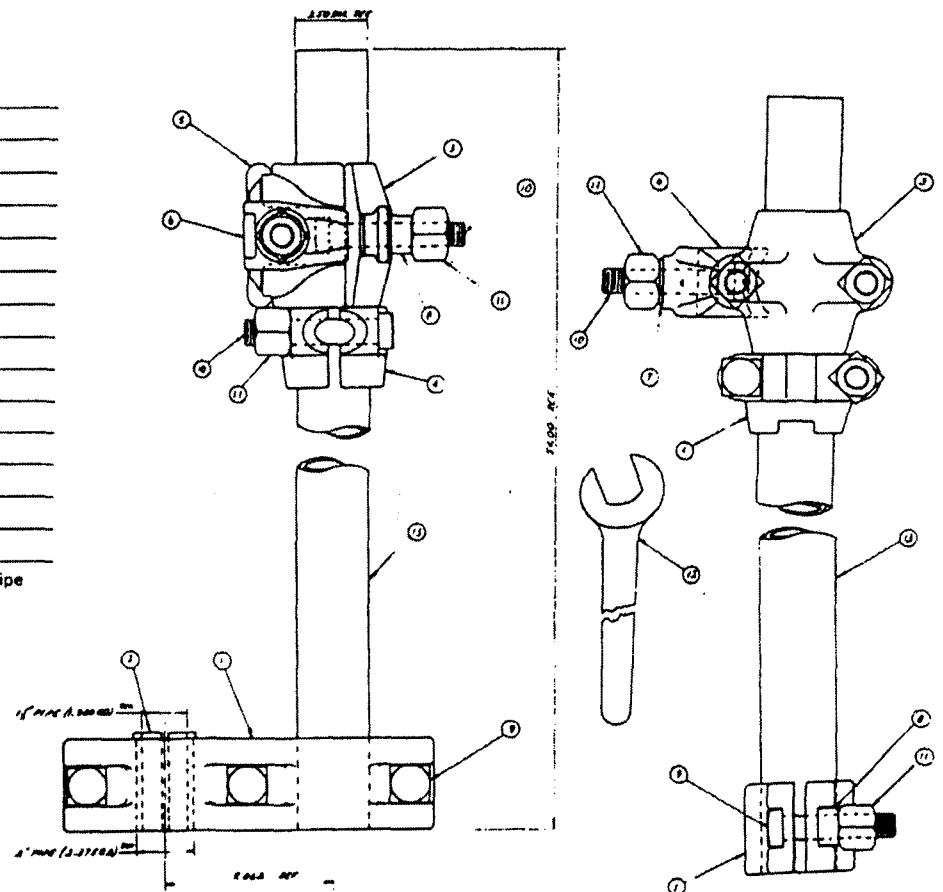
Item	Req'd.	Part No.	Description
1	2	38165	Clamp, Grout Pipe 3 1/2" dia. for 3" Pipe
2	1	38105	Cap, Arm
3	2	38106	Clamp
4	1	38107	Saddle
5	1	38108	Jaw
6	5	38111	Washer
7	1	19464	Washer
8	3	38119	Bolt, Sq. Hd. (1"-8 NC x 4 1/2" LG.)
9	5	38113	Bolt, Sq. Hd. (1"-8 NC x 5 1/2" LG)
10	8	38114	Nut, Sq. (1"-8 NC)
11	1	38115	Wrench, Open End
12	1	Com'l	Pipe (3" x 54.00 LG)



38116 Grout Pipe Clamp Assy. (For 1 1/2" / 2" Pipe)

Item	Req'd.	Part No.	Description
1	2	38117	Clamp, Grout Pipe
2	1	38118	Bushing, Split
3	1	38105	Cap, Arm
4	2	38106	Clamp
5	1	38107	Saddle
6	1	38108	Jaw
7	1	19464	Washer
8	5	38111	Washer
9	3	38119	Bolt, Sq. Hd. (1"-8 x 4 1/2" LG)
10	5	38113	Bolt, Sq. Hd. (1"-8 x 5 1/2" LG)
11	8	38114	Nut, Sq. (1"-8)
12	1	38115	Wrench, Open End
13	1	Com'l	Pipe (3" x 54" LG)

NOTE: For mounting on 1 1/2" pipe with the use of item 2 or for 2" pipe without item 2.



Recommended Spare Parts

Northwest 65 Diamond Drill Kit Number 38295

Part No.	Description	Min. Quan.	Quantity 2500 Hrs. Operation
16634	Alemite Fitting	6	6
25044	Drive Gear Key	2	2
38064	Rotor Housing Liner		1
38066	Rotor Blade	12	24
38067	End Plate		2
38072	Lock Nut	1	2
38052	Rotor Pinion		1
38056	Drive Gear		1
38004	Drive Shaft		1
38005	Ball Bearing	1	1
38007	Roller Bearing	1	1
38010	Shifter Collar Washer	2	
38012	Shifter Pin	1	2
38014	Feed Gear Key	1	2
38170 & 38178	Set Feed Gears — 100		1
38171 & 38179	Set Feed Gears — 200		1
38172 & 38180	Set Feed Gears — 300		1
38173 & 38181	Set Feed Gears — 500		1
38018	Front Grease Seal	1	1
20638	Rear Grease Seal	1	1
38053	Feed Screw	1	1
38020	Ball Bearing	1	1
38025	Ball Bearing	1	
19680	Feed Nut Bearing	1	1
38088	Set Chuck Jaws "E"-"EW"	2	4
38086	Chuck Screw	2	2
38040	Feed Nut	1	2
38041	Feed Nut Key	1	2
38080	Rotor Bearing (Pair)		1

65 Air Rod Puller Kit Number 38296

Part No.	Description	Quantity 2500 Hrs. Operation
38135	Gland Nut	1
38138	Piston Cup Leather	2
38146	Cam	1
38147	Cam Pin	2
38149	Cylinder Head Packing	2

Rod Puller Jaws Only

Part No.	Description	Quantity 2500 Hrs. Operation
38161	E-EW Jaw Only	2
38164	A-AW Jaw Only	2