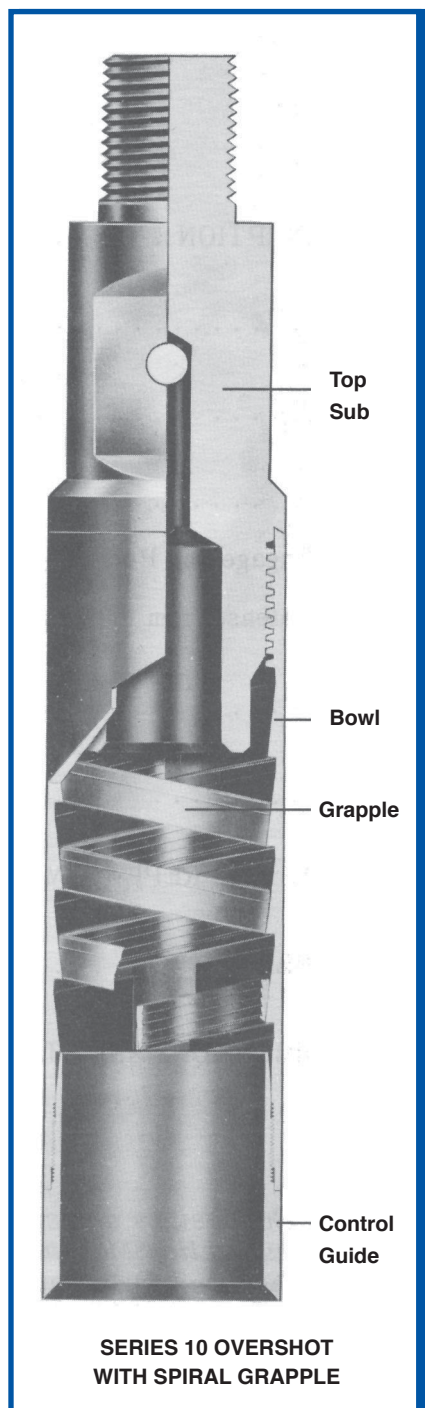


## *Classic Sucker Rod Overshots - Series 10 & 20*



### **GENERAL DESCRIPTION**

Classic Sucker Rod Overshots are sturdy, compact units designed to engage sucker rods or other items used inside of tubing. Designed and developed upon the same principle as other Classic Overshots, they are the most effective means for the recovery of sucker rods.

### **USES**

Classic Series 10 Overshots are designed to recover non-hardened Sucker Rod Boxes up to 2" O.D. inside of 2 7/8" tubing and up to 1 5/8" O.D. inside of 2 3/8" tubing. Basket Grapples are recommended for fishing for hardened and ground boxes.

Classic Series 20 Overshots are short-catch sucker rod overshots, which provide a means for engaging the exposed portion of a fish too short to be engaged with conventional catch overshoot.

Classic Sucker Rod Overshots, fitted with tubing thread Top Subs and Oversize Guides, are ideally suited for engaging the fishing neck of wire line rope sockets and retrieving wire line tools such as gun perforators lost inside of casing.

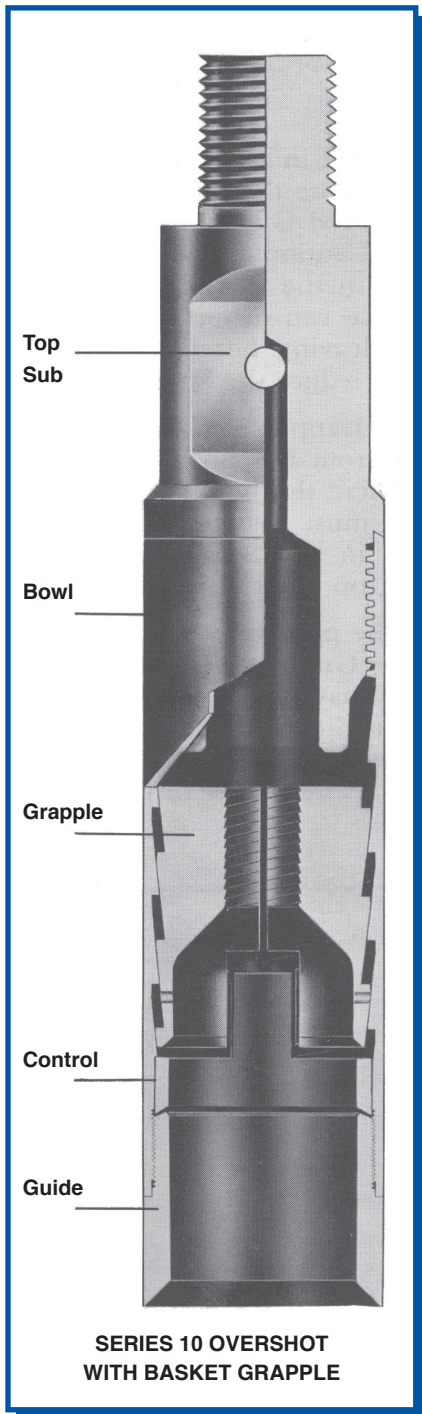
### **CONSTRUCTION**

A Classic Sucker Rod Overshot - Series 10 consists of a Top Sub, a Bowl, a Spiral Grapple and a Control Guide. When a Basket Grapple is used in a Series 10 assembly, a Basket Grapple Control and a Plain Guide are required.

A Classic Sucker Rod Overshot - Series 20 consists of a Top Sub, a Bowl, a Grapple Control and a Basket Grapple. It differs from a Series 10 in that the Grapple Control is at the top of the Bowl above the Basket Grapple placing the Grapple at the lowermost position in the Bowl.

### **OPERATION**

First determine that the Overshot is properly assembled, is dressed with the proper size grapple and that all of its parts are in good working order. Refer to Specification Table for list of parts.



Make up the Overshot on the fishing string and run into the well.

#### **TO ENGAGE AND PULL THE FISH**

As the top of the fish is reached, slowly rotate the fishing string to the right and gradually lower the Overshot over the fish; combined rotating and lowering is important.

When wire line is used for a fishing string, sinker bars should be used for weight to force the Overshot down on the fish. Using wire line eliminates releasing effect because the Overshot cannot be rotated.

Allow the right-hand torque to slack out the fishing string and then pull on the fish by elevating the fishing string.

#### **TO RELEASE FROM THE FISH**

Bump down; then simultaneously rotate to the right and slowly elevate the fishing string until the Overshot is clear of the fish. Combined rotating and elevating is important.

To release from a recovered fish, follow the same procedure while holding the fish below the Overshot.

#### **PRECAUTIONS**

Unless an upward strain is maintained, never rotate the fishing string to the right while the Overshot is engaged with the fish.

Always bump down the full weight of the fishing string before starting releasing operations.

#### **EXPLANATION OF MECHANISM**

After the Overshot has reached the top of the fish, combined rotation and lowering results in the following:

1. The Guide will direct the fish into the Overshot.
2. The Grapple will expand and the fish will pass into it to be halted by the pin section of the Top Sub or by the stop of a Basket Grapple.
3. The fish is now properly located in the Overshot and thereafter, when upward pull is exerted, the Grapple is contracted by the tapers of the Bowl and the hold is secure.

When releasing the sharp downward bump places the largest portion of the Bowl tapers opposite the Grapple and breaks the hold. Right-hand rotation expands the Grapple and by maintaining right-hand rotation, the Overshot may be withdrawn from the fish.



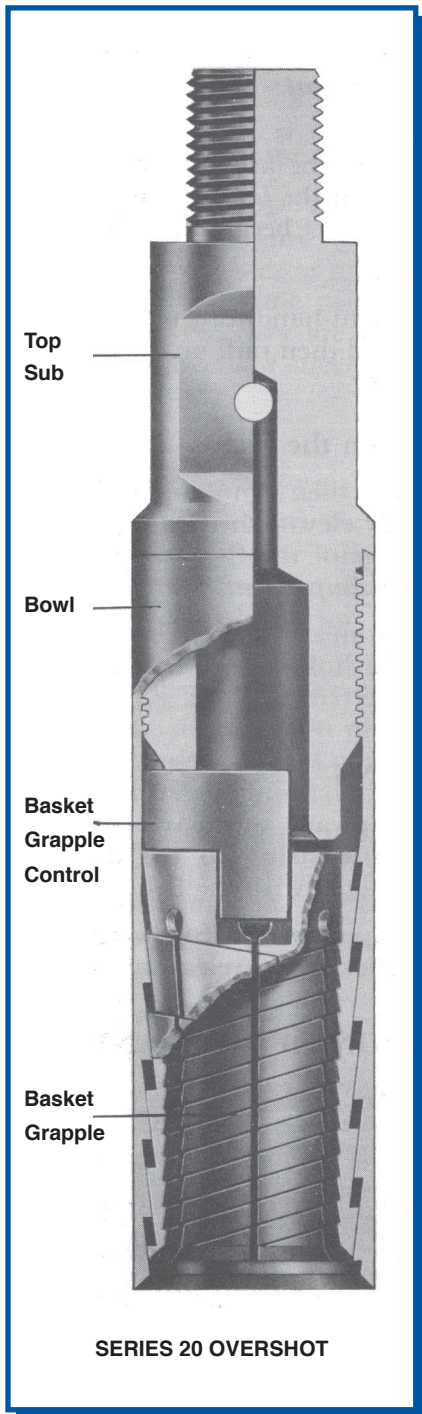
## MAINTENANCE

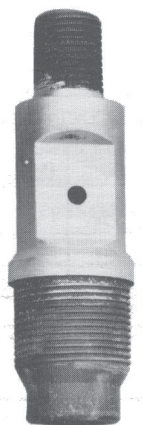
Maintenance of Classic Sucker Rod Overshots is simple, but important. After each use, the tool should be disassembled, inspected, repaired as required and re-assembled.

## DISASSEMBLY

1. Clamp the Bowl in a vise between the threaded ends. Break loose the threaded connections of the Top Sub and Guide; remove the Top Sub and Guide. Caution: Use only sufficient gripping action in the vise to break connections; excessive force can distort or crack the Bowl. Also, avoid leaving heavy tool marks on the Bowl, which reduce the longevity of the Bowl.
2. Remove the Grapple. This may be done by unscrewing it from the Bowl, using right-hand rotation. Where the Grapple is a Basket type, the Control must first be lifted out; through the bottom in the Series 10 Assembly, and through the top in the Series 20.

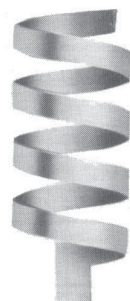
Inspect all the parts before reassembling them; particularly the Grapple. Check the wickers to assure that they have not been damaged or worn too much for additional safe operation. Grease the parts as they are re-assembled. To prevent rust or deterioration, either grease or paint the exterior.



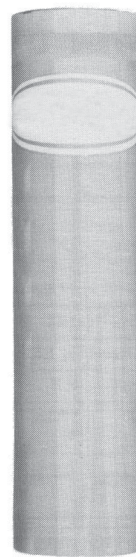


**Top Sub**

**Spiral  
Grapple**



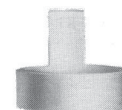
**Control  
Guide**



**Bowl**



**Basket  
Grapple**

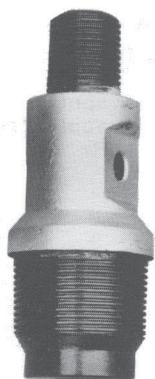


**Basket  
Grapple  
Control**



**Plain  
Guide**

**SERIES 10 - DISASSEMBLED**

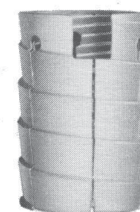


**Top Sub**



**Bowl**

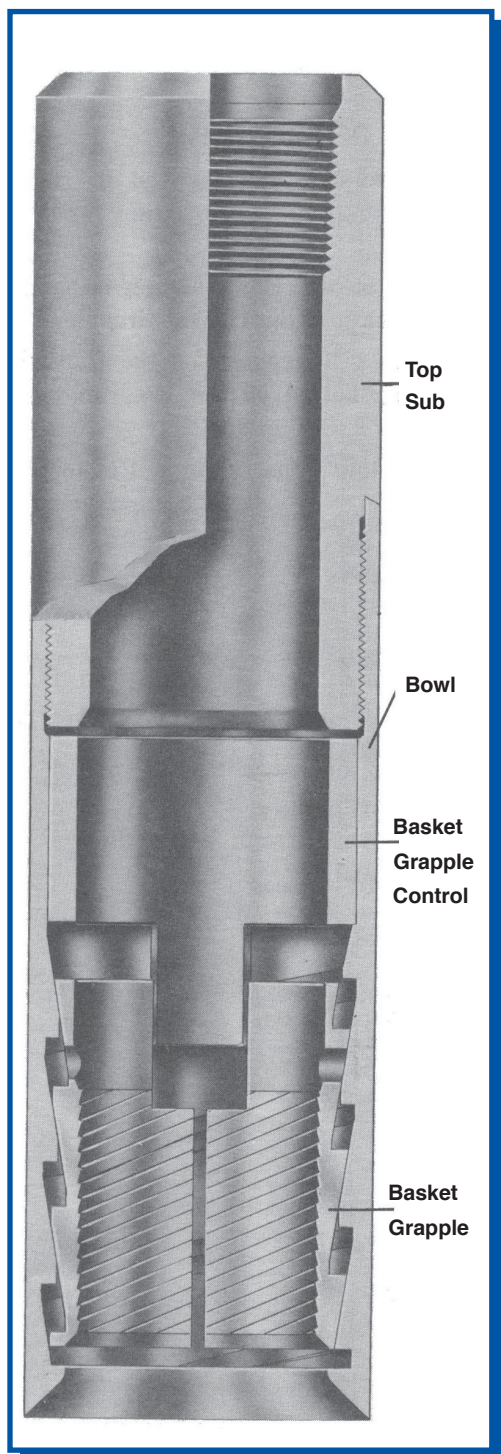
**Basket  
Grapple  
Control**



**Basket  
Grapple**

**SERIES 20 - DISASSEMBLED**

## *Series 70 Classic Short Catch Overshots*



Series 70 Classic Short Catch Overshots are especially designed to engage the exposed portion of a fish too short to be engaged with conventional catch overshots. Designed and developed upon the same principle as other Classic Overshots, they are the most effective means for the recovery of a fish whose exposed upper end is very short.

### **USE**

Each Series 70 Classic Short Catch Overshot is designed to engage a specific maximum Outside diameter. Each Overshot can be dressed to engage any smaller diameter by installing the desired size of Basket Grapple.

### **CONSTRUCTION**

A Series 70 Classic Short Catch Overshot consists of a Top Sub, a Bowl, a Basket Grapple Control and a Basket Grapple. In this Overshot, the Basket Grapple is inserted into the Bowl from the top and the finger of the Basket Grapple Control fits into the top of the Basket Grapple. The Bowl is designed to allow the Basket Grapple to be located at its extreme lower end.

### **OPERATION**

First determine that the Overshot is properly assembled, it is dressed with the proper size Grapple and that all of its parts are in good working order.

Make up the Overshot on the fishing string and run into the well.

#### **To Engage and Pull the Fish**

As the top of the fish is reached, slowly rotate the fishing string to the right and gradually lower the Overshot over the fish; combined rotating and lowering is important.

Allow the right-hand torque to slack out of the fishing string and then pull on the fish by elevating the fishing string.

#### **To Release from the Fish**

Bump down, then simultaneously rotate to the right and slowly elevate the fishing string until the Overshot is clear of the fish; combined rotating and elevating is important.

To release from a recovered fish, follow the same procedure while holding the fish below the Overshot.

### PRECAUTIONS

Unless an upward strain is maintained, never rotate the fishing string to the left while the overshot is engaged with the fish.

Always bump down the full weight of the fishing string before starting releasing operations.

### EXPLANATION OF MECHANISM

After the Overshot has reached the top of the fish, combined rotation and lowering results in the following:

1. The bottom of the Bowl serves as a guide to direct the fish into the Basket Grapple.
2. The Grapple will expand and the fish will pass into it to be halted by the lower end of the top sub.
3. The fish is now properly located in the Overshot and thereafter, when upward pull is exerted, the Grapple is contracted by the tapers of the Bowl and the hold is secure.

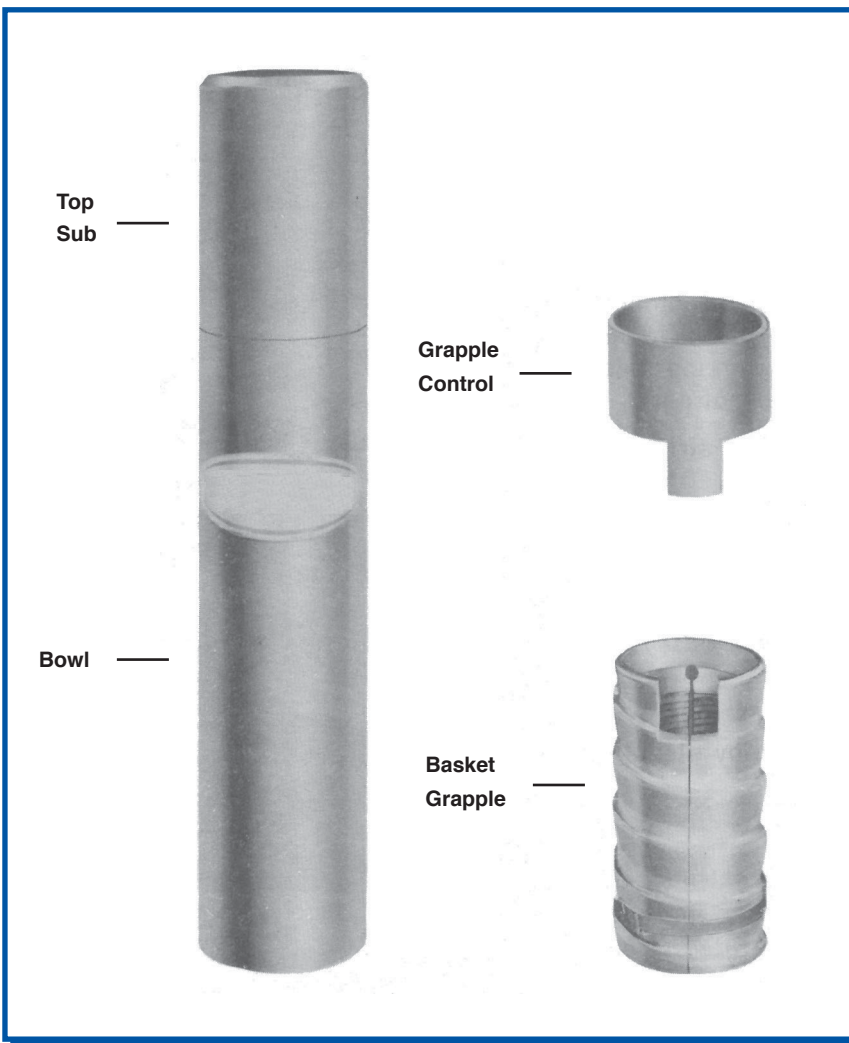
When releasing, the sharp downward bump breaks the freeze between Bowl and Grapple, and places the largest portion of the Bowl tapers opposite the largest portion of the Grapple Spirals. Elevation of the Fishing String and right-hand rotation of the overshot causes the left hand wickers in the Grapple to feed the overshot (Grapple) off the fish.

### MAINTENANCE

To guard against misruns and to prolong the life of the tool, the Overshot should be disassembled after use, cleaned and all parts oiled or lubricated before reassembling. Grapple wickers should be checked for dullness, and replaced if necessary.

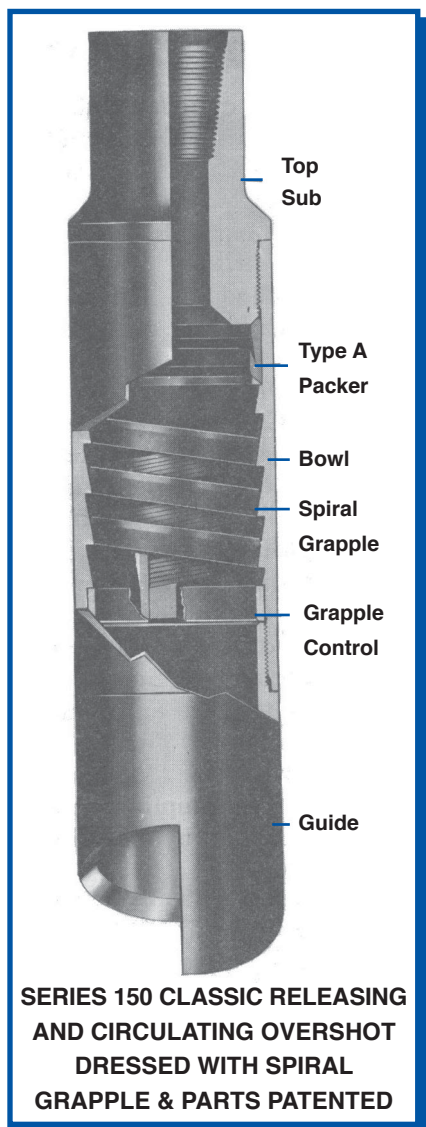
Reference to the illustrations will indicate that little instruction is needed to dismantle or assemble this tool.

To prevent rust or deterioration, either paint or grease the exterior of the Overshot.





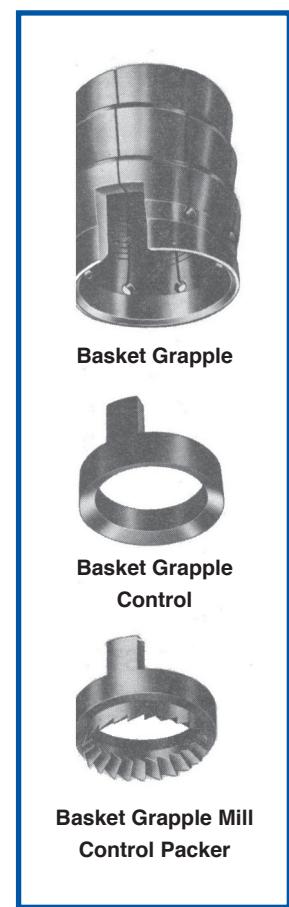
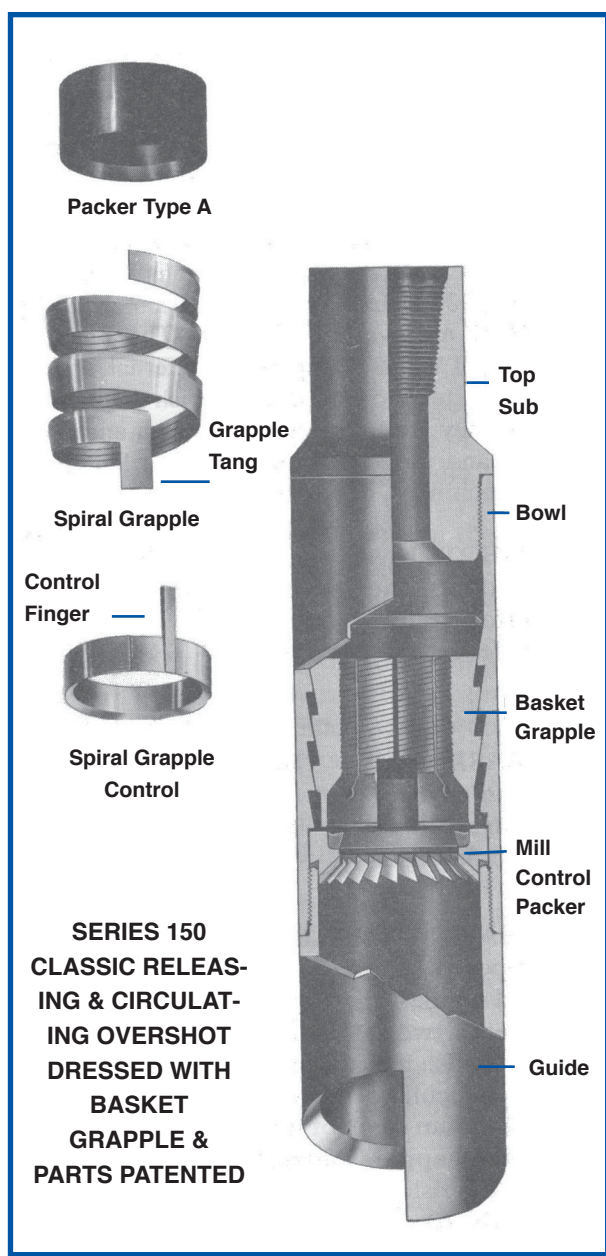
## Classic Series 150 Releasing & Circulating Overshot



### GENERAL DESCRIPTION

The Classic Series 150 Releasing & Circulating Overshot provides the strongest tool available to externally engage, pack-off and pull a fish. The basic simplicity and rugged construction with which it is designed have made it the standard of all external catch fishing tools.

The Classic Overshot has gained world-wide acceptance for fishing by means of external engagement of a fish. Each Classic Overshot is a carefully engineered unit. In service, it takes a positive grip over a large area of fish and is therefore capable of withstanding extremely heavy pulling, torsional and jarring strains without damage or distortion to either the tool or the fish.



Classic Overshots are continually developed to new standards of strength and efficiency and are expertly constructed of the highest quality material.

Each Classic Series 150 Releasing and Circulating Overshot is a compact unit designed to engage, pack-off and pull a specific size of tubing, pipe, coupling, tool joint, drill collar or smooth O.D. tool. Through the installation of proper undersize parts, they may be adapted to engage and pack-off any smaller size.

Classic course thread Overshots are designed for easier assembly and maintenance. The Classic "CT" Overshot has a course ACME thread on the upper end of the Bowl where the Top Sub is attached and at lower end where the Guide is attached.

The course thread allows much easier field assembly and will stand more abuse than the fine series currently offered.

The internal parts are completely interchangeable with existing Classic Overshots.

Cross-over bushings can be provided from fine thread series to coarse thread series, allowing full use of Bowls, Top Subs and Guides currently in stock.

All sizes Classic Series 150 Releasing and Circulating Overshot are available in full strength or slim hole types. Despite the extremely small outside diameters of Full Strength Type Overshots, they are engineered to withstand the pulling, torsional and jarring strains which must be exerted by modern machinery, to release and retrieve a lost fish.

The Slim Hole Type Overshots have reduced outside diameters, as compared to the Full Strength. They are used to perform pulling jobs in tight holes where no other outside catch, releasing fishing tool can be run.

### **USE**

A Classic Series 150 Releasing and Circulating Overshot is used to engage, pack-off and retrieve twisted-off or lost tubing, drill pipe, coupling, tool joint, casing or other similar fish.

### **CONSTRUCTION**

The Classic Series 150 Releasing and Circulating Overshot is composed of three outside parts; the Top Sub, Bowl, and Guide. The Basic Overshot may be dressed with either of two sets of internal parts, depending on whether the fish to be caught is near maximum in catch size for the particular overshot.

If the fish diameter is near the maximum catch of the Overshot, a Spiral Grapple, Spiral Grapple Control and Type "A" Packer are used. If the fish is a tubing collar, a Type "D" Collar Pack-off Assembly will replace the Type "A" Packer.

If the fish diameter is considerably below maximum catch size (usually 1/2") a Basket Grapple and a Mill Control Packer is used.

### **GRIPPING AND RELEASING MECHANISM**

The Bowl of the Overshot is designed with helically tapered spiral section in its inside diameter. The gripping member (Spiral Grapple or Basket Grapple) is fitted into this section. When an upward pull is exerted against a fish, an expansion strain is spread evenly over a long section of the fish. No damage or distortion results to either the fish or the Overshot. This design permits a far stronger tool with a smaller outside diameter than is possible with an overshot that employs a single tapered section which supports slips.

A Spiral Grapple is formed as a left-hand helix with a tapered exterior to conform with the helically tapered section in the Bowl. Its interior is wickered for engagement with the fish.

A Basket Grapple is an expansible cylinder with a tapered exterior to conform to the helically tapered section on the Bowl. Its interior is wickered for engagement with the fish.

Three types of Basket Grapple are available to meet the need for catching various types of fish:

The Plain Basket Grapple is standard, and will always be furnished unless another type is specified. It is wickered for its entire interior length. It is used to catch any plain single diameter fish.

The Basket Grapple with Long Catch Stop has an internal shoulder located at the upper end, to stop the fish in best catch position. It is designed to stop and catch an upset, or box section of a tool joint, with sufficient length left below the Grapple to allow the joint or upset to be packed off with a Basket Mill Control Packer.

The Basket Grapple with Short Catch Stop has a double set of wickers, of two different internal diameters. It is used to stop and catch a coupling with a ruptured piece of pipe engaged in its upper end. The upper set of wickers will catch the ruptured pipe, and act as a stop against the coupling, while the lower set of wickers will catch the coupling. The coupling will be stopped in best position to be packed off by the Mill Control Packer.

Grapple Controls are of two types: Spiral Grapple Controls are used with Spiral Grapples; Mill Control Packers are used with Basket Grapples.

Grapple Controls are used as a special key to allow the Grapple to move up and down during operation while simultaneously transmitting full torque from the Grapple to the Bowl.

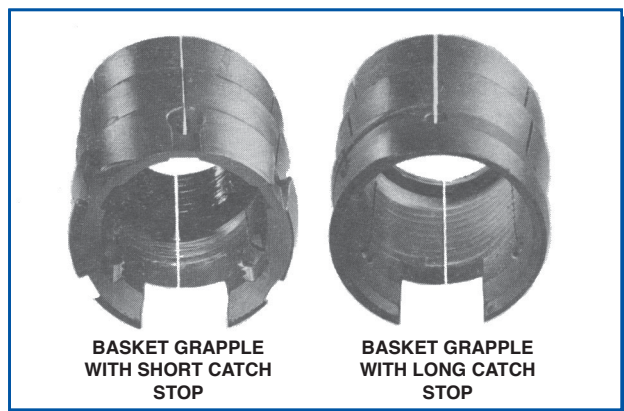
Spiral Grapple Controls and Basket Grapple Controls are plain. Mill Control Packers include a pack-off. See Pack-off Mechanism below for a complete explanation.

In operation, the Overshot functions in the same manner, whether dressed with Spiral Grapple parts or Basket Grapple parts.

During the engaging operation, as the Overshot is rotated to the right and lowered, the Grapple will expand when the fish is engaged, allowing the fish to enter the Grapple. Thereafter with rotation ceased and upward pull exerted, The Grapple is contracted by the tapers in the Bowl and its deep wickers grip the fish firmly.

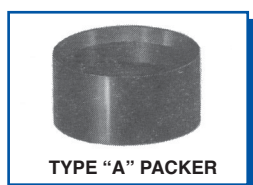
During the releasing operation, a sharp downward bump places the larger portion of the Bowl tapers opposite the Grapple smaller tapered portion, breaking the hold. Thereafter, when the Overshot is rotated to the right, and slowly elevated, the wickers will screw the Grapple off the fish, effecting release.

The fact that Classic Releasing and Circulating Overshots require right hand rotation only, both during engaging and releasing operation, is extremely important. This feature eliminates the dangers that are present when it is necessary to rotate the string to the left.



### PACK-OFF MECHANISM

The type of Pack-off used depends on how the Overshot is dressed, and the operator's choice.

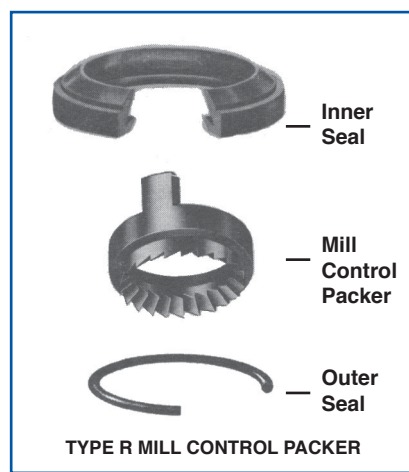


When the Overshot is dressed with a Spiral Grapple, a Type "A" Packer is used. The Type "A" Packer is a sleeve type. It seats at its O.D. against the inside of the bowl. It has an internal lip which seals around the fish.

Each Type "A" Packer is designed to pack-off a specific size. A type "A" Packer should be ordered for each catch size Spiral Grapple.

A Mill control Packer is used when the Overshot is dressed with a Basket Grapple. The Type "R" Mill Control Packer is used when a pack-off is required. The unique double lip seal of the Mill Control Packer provides a positive seal of the fish. The Packer is self-energized and is retained within the Mill Control by a lower second sealing lip and requires no adhesive for retaining the Packer. The Type "R" is most commonly used. It has a replaceable inner seal and a replaceable outer seal. The inner seal and the outer seal may both be replaced in the field when required. The Type "R" Mill Control (with mill teeth) is available. Mill Control Packers are designed to remove small burrs and rough breaks only.

All Mill Control Packers are manufactured to pack-off



a specific size. One should be ordered to match each size Basket Grapple. Mill Control Packers when used, replace a Plain Basket Control. The Plain Basket Control is used with a Basket Grapple when no pack-off of the fish is required.

Type "D" Packer assemblies are available to pack-off tubing collars in tubing size Series 150 Overshots. The Type "D" Packer assembly consists of a Packer, a Spring and an "O" Ring. It is assembled in the Bowl above the Grapple. Its upper end is sealed in a counter-bore in the Top Sub, by the "O" Ring. In operation, its lower end stops the collar in proper catch position, while the integral molded seal enters and packs-off the collar threads at the top of the collar.

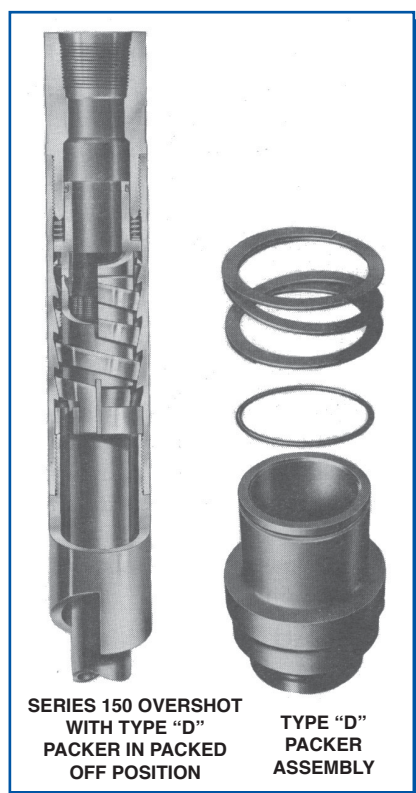
The Type "D" Collar Packer is designed to be used with a Spiral Grapple, in place of a Type "A" Packer, where the collar being fished is too short to allow effective catch and pack-off length.

### OPERATION

First determine that the Overshot is properly assembled, is dressed with the proper size Grapple and that all its parts are in good working condition.

Obviously, if the fish is smaller than the maximum outside diameter that the Overshot was designed to engage, install undersize parts.





If the hole size is so much greater than the fish size that it is possible for the Overshot to pass alongside the fish, install either a Wallhook Guide or an Oversize Guide in place of the Standard Guide.

If the top of the fish is a heavily burred tool joint, replace the Standard Guide with the proper Milling Guide, Type A or C.

If the fish has an unengageable upper end, install an extension between the Top Sub and the Bowl.

Using the Top Sub, connect the Overshot to the fishing string and run it in the hole.

### TO ENGAGE & PULL THE FISH

As the top of the fish is reached, slowly rotate the fishing string to the right and gradually lower the overshot over the fish; combined rotating and lowering is important.

Allow the right-hand twist to slack out of the fishing string and then pull on the fish by elevating the fishing string.

If the fish does not come, turn on the circulating pumps and maintain an upward strain while circulation is forced through the fish.

### To Release from the Fish

Bump Down; then simultaneously rotate to the right and slowly elevate the fishing string until the Overshot is clear of the fish; combined rotating and elevating is important.

To release from a recovered fish, follow the same procedure while holding the fish below the Overshot.

### PRECAUTIONS

Unless an upward strain is maintained, never rotate the fishing string to the left while the Overshot is engaged with the fish.

Always bump the full weight of the fishing string before starting releasing operations.

Always shut off the circulating pumps before lowering the Overshot over the fish.

### Function of the Overshot in Engaging the Fish

After the Overshot has reached the top of the fish, combined rotation and lowering results in the following:

1. The guide will direct the fish into the Overshot.
2. The Grapple will expand and the fish will pass through it.
3. The fish will pass through the Pack-off Rubber and will be halted when it contacts the pin end of the Top Sub. In the case where an external upset section is being engaged by a Basket Grapple, the fish will be halted by the solid steel stop in the upper end of the Basket Grapple.
4. The fish is now properly located in the Overstop and thereafter when upward pull is exerted, the Grapple is contracted by the tapers in the Bowl and the hold will be secure.

5. Likewise, once the fish is in this position, the circulation will seal the Pack-off Rubber around the fish and prevent fluid passage down the outside. Thus, by building up pressure with the pumps, the fluid can be forced down through the fish.

### Function of the Overshot When Releasing

The sharp downward bump places the largest portion of the Bowl tapers opposite the Grapple and breaks the hold. Right-hand rotation expands the Grapple and by maintaining right-hand rotation, the Overshot may be withdrawn from the fish.

### Function of the Grapple

The mechanical conditions which caused the Grapple to expand and contract are:

1. The Grapple is a left-hand helix.
2. The lower end of the Grapple is anchored in the Overshot Bowl.
3. The inside diameter of the Grapple is smaller than the outside diameter of the fish.

As the Overshot is rotated to the right and lowered over the fish, the drag of the fish against the grapple causes the Grapple to unwind and expand sufficiently to allow the fish to enter.



As the Overshot is rotated to the right and withdrawn from the fish, the drag of the fish against the Grapple causes the Grapple to unwind and expand sufficiently to allow the Overshot to be withdrawn.

### UNDERSIZE PARTS

Undersize parts are used when the fish to be caught is smaller than the maximum catch size of the Overshot.

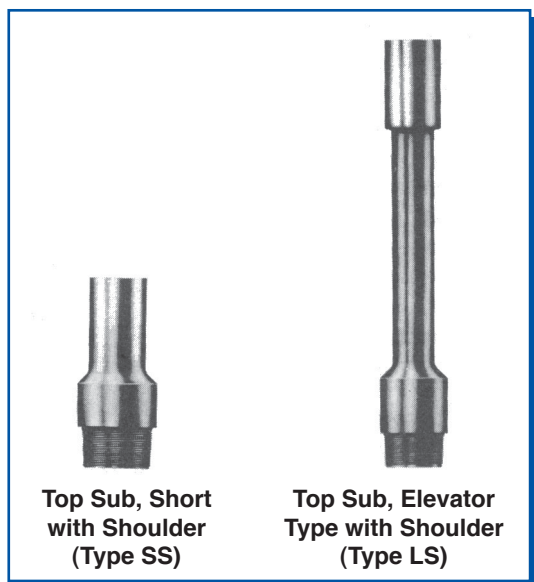
### SPIRAL PARTS

Undersize Spiral parts: Spiral Grapple and Type "A" Packer are used to catch sizes from "Maximum Catch-Spiral Grapple", down to "Maximum Catch-Basket Grapple".

These Spiral Grapples and Type "A" Packer should be changed for each different size fish. They will effectively catch and pack off worn fish as much as  $3/32$ " maximum undersize. The overrange of each grapple is approximately  $1/32$ ".

There are exceptions, particularly in the Slim Hole type Overshots. Some of these will effectively catch undersize or oversize fish by no more than  $1/16$ " maximum.

### CLASSIC OVERSHOT ACCESSORIES TOP SUBS



Top Subs are available for Classic Overshots in two types: SS, Short Sub with shoulder; and LS, Elevator Sub with shoulder. Type SS Top Subs are furnished as part of the assembly, unless otherwise specified.

### BASKET PARTS

Undersize Basket parts are used to catch sizes from "Maximum Catch-Basket Grapple" as specified in the specification tables, down to any smaller size.

Basket Grapples should be changed for each size fish to be caught.

Mill Control Packers should be changed for each size fish.

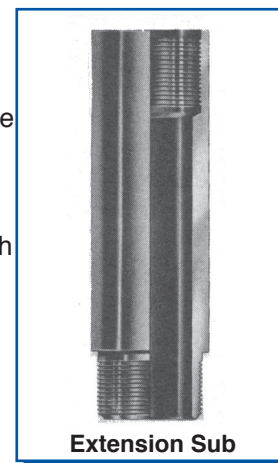
Where a Plain Basket Control is used in place of a Mill Control Packer, it need not be changed for use with undersize Basket Grapples.

Basket Grapples will effectively catch fish worn as much as  $3/32$ " maximum undersize. The overrange of each grapple is approximately  $1/32$ ".

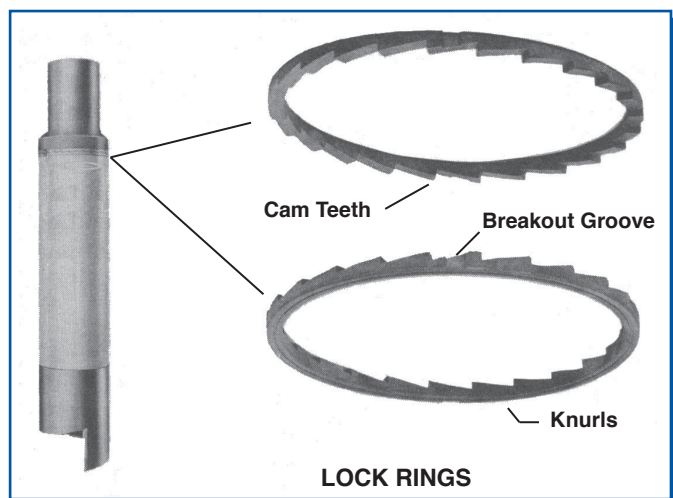
There are exceptions, particularly in the Slim Hole Type Overshots. Some of these will effectively catch undersize fish by more than  $1/16$ " maximum.

### EXTENSION SUBS

If a twist-off has left a fish whose upper end is unengageable, an Extension Sub should be installed between the Top Sub and the Bowl of the Overshot. This will permit lowering of the Overshot over the fish far enough to insure engagement and a perfect pack-off in the fishing operation.



### LOCK RINGS



Classic Lock Rings are available as optional equipment to prevent the Top Sub and Bowl of Classic Series 150 Releasing and Circulating Overshots from unthreading during backing-off operations. Use of Classic Lock Rings eliminates the weakening practice of drilling and tapping the Bowl to install a set screw for securing the Bowl to the Top Sub. The Rings also eliminate the weakening and hazardous practice of welding a steel strap across the Classic and Sub joint to hold them in place. Using excessive torque when making up these joints is also no longer necessary if the rings are used.

Classic Lock Rings provide a positive and releasable means for locking straight-threaded shouldered joints so they will not backoff.

### CONSTRUCTION

Classic Lock Rings are used in pairs consisting of two identical rings. The rings have cam-teeth on one face, knurls on the other, and two breakout grooves on the edges. They are precision made from alloy steel, stress relieved, and heat treated.

### ASSEMBLY

One Lock Ring is inverted and placed on the other so the cam-teeth intermesh and the breakout grooves are aligned, and then they are placed on the Top Sub. The Bowl is threaded on, and as the joint is made-up, the

knurled faces opposite to the cam-teeth dig in and grip the shoulders. The pitch on the cam-teeth is greater than the thread pitch, so if reverse rotation is applied, the cam-teeth begin to ride up on each other. This produces a wedging action which effectively locks the Top Sub to the Bowl.

The joints are properly made up when reverse torque has been applied and a slight separation in the cam-teeth shoulders is observed. Heavy make-up torque is not required.

When the Overshot is dressed with a spiral grapple and type "A" Packer, a Spacer is required between the Packer and Top Sub. The purpose of the Spacer is to fill the space produced by the extra standoff of the Top Sub when used with the Lock Rings. No Spacer is required when "A" Packer is not used.

### DISASSEMBLY

When unthreading is desired, a special Classic Lock Ring Breakout Clamp is required. Slight right hand torque may have to be applied for lining up the Ring breakout grooves to receive the Clamp.

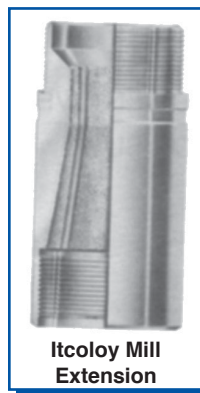
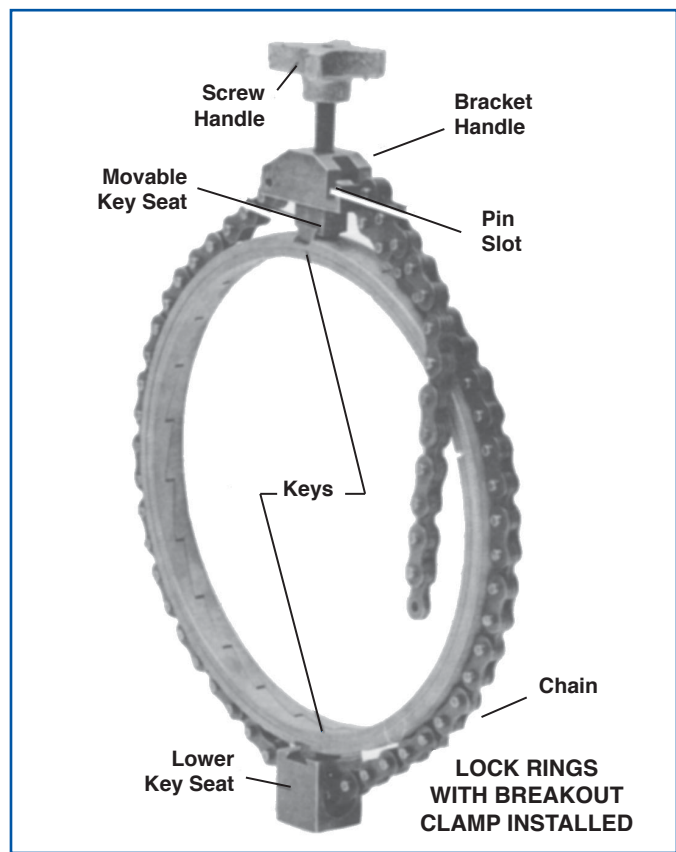
The Breakout Clamp consists of two keys that fit into the Lock Ring grooves, a lower key seat, and an extended pin flat link chain attached at one end to a bracket which has a guide for another (movable) key seat attached to a screw handle.

To position the Breakout Clamp, the screw handle is backed-up as far as it will go, the other end of the chain is put through a hole in the lower key seat, and the keys are placed in the ring grooves opposite each other. The chain is then pulled around the rings so that all slack is removed and the nearest pin is slipped into the pin slot on the bracket. The screw handle is then tightened which forces the slightly tapered keys into the lock ring breakout grooves, holds the cam-teeth together, and permits the shoulders to back away from the knurled faces when the joint is broken.

### ITCOLOY MILL EXTENSION

Itcoloy Mill Extensions are used to mill away flared or jagged metal from the top of the fish so that the fish will pass easily into the Overshot Bowl. For ordinary work, they are installed between the Bowl and the standard, over size or wall hook guides.

The Itcoloy Mill Extension is also used in the Classic Subsea Sheared Pipe Retrieval Method. In this case it is installed between the Overshot Bowl and the special



guides. They may be ordered by giving the Overshot number and specifying, "Itcoloy Mill Extension Type", and fish size. Prices available on request.

### GUIDES

**Oversize Guide and Wallhook Guides:**  
If the hole size is so much greater than the fish size that it is possible for the Overshot to pass alongside the fish, an Oversize Guide or a Wallhook Guide must be installed in place of the Standard Guide to insure alignment of the fish with the Overshot.

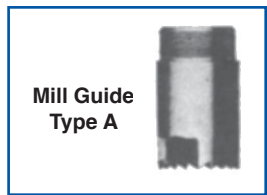
**Milling Guides, Types A and Itcoloy:**  
Twist-offs in tool joints are not always immediately revealed at the surface and as a result drilling is not halted at once. In such cases, the top of the fish is usually a badly burred tool joint, or drill pipe, and a Type A Milling Guide must be installed on the Overshot to trim the burr off the fish so that it can enter the Overshot. Itcoloy Milling Guides perform the same service on undersize tool joints and are also used when the top of the fish is an unusually jagged section of pipe.



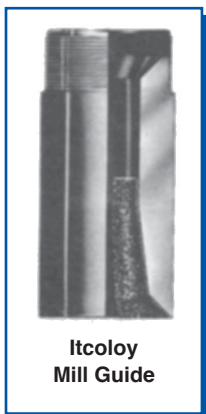
Oversize Guide  
Cut Lipped



Wall Hook  
Guide



Mill Guide  
Type A



Itcoloy  
Mill Guide

### ITCOLOY MILL GUIDE

Itcoloy Mill Guides are used to mill away jagged metal from the top of the fish so that the fish will pass easily into the Overshot Bowl.

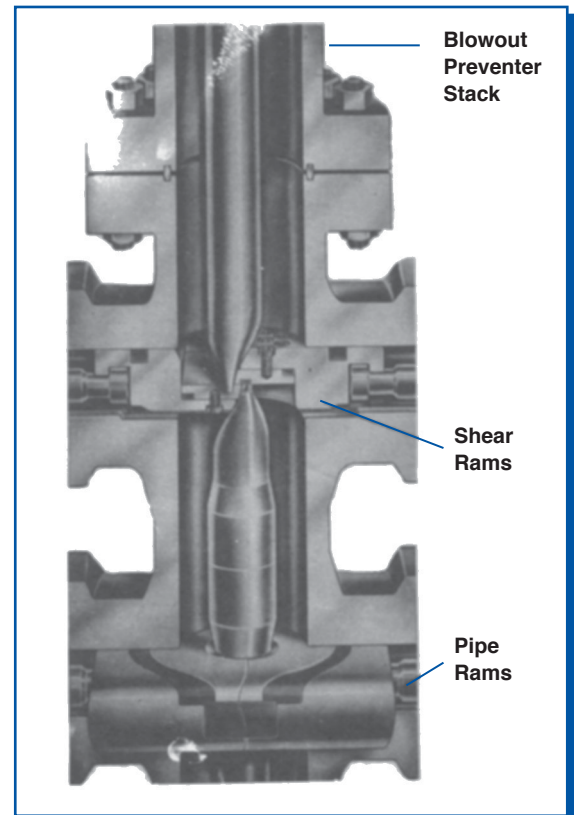
They may be ordered, using the standard guide number and specifying, "Itcoloy Mill Guide Type" and fish size.

### SUBSEA SHEARED PIPE RETRIEVAL

During operations from a floating rig, there is often many hundred feet of drilling string extending from the rig to the sea floor, through the wellhead blowout preventer (BOP) stack, and down into the well. If

occurrences like a blowout, a loss of anchor and the rig drifts, a dangerous storm is approaching, etc., it is sometimes necessary for the rig to hurriedly move from the wellsite. This is done by temporarily severing the drill string inside the BOP and only tripping out the upper end.

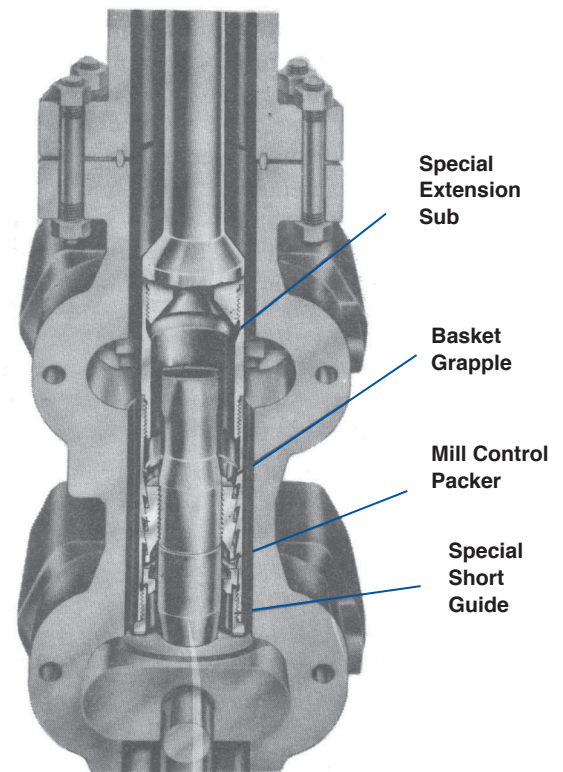
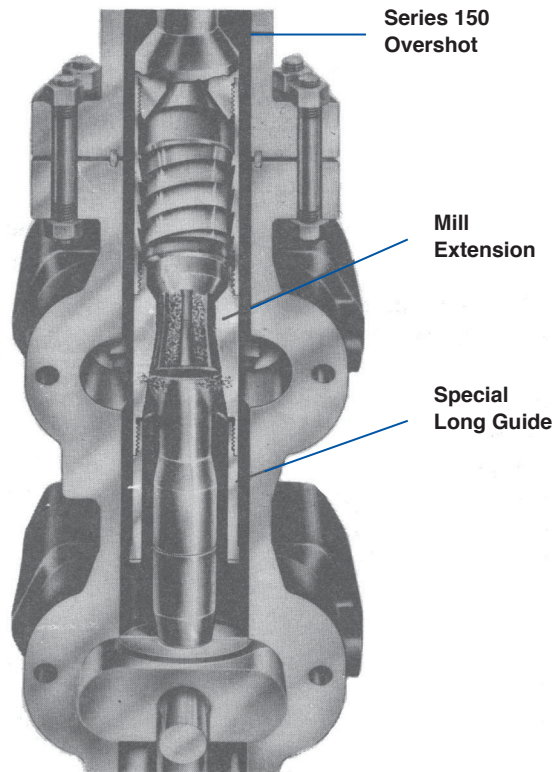
The BOP being used must have at least two sets of rams; lower pipe rams and shear rams above them. Before shearing, it is necessary to land the nearest tool joint on the pipe rams and close them to suspend and pack off the string. The shearing then produces flattened flare-ends with protruding ears.



When the rig returns, the string must be retrieved, the end brought to the surface and the sheared piece removed. In the past, sheared pipe retrieval has been difficult, costly and time-consuming. Often large parts of the BOP stack must be brought to the surface to effect retrieval.

The Classic method of sheared pipe retrieval can be achieved in a simple, time-saving and economical manner. It requires only two easy steps using the Series "150" Circulating and Releasing Overshot Equipped with a few special accessories.





### STEP 1: FLARE MILL-DOWN

The standard guide, grapple and packer have been removed from a Classic Overshot and it is then dressed with a Mill Extension and special flat-bottom Long Guide, and installed on the drill string. The Mill Extension has tapered milling ribs of Classic Itcoloy (sintered tungsten carbide) facing on its I.D. The Overshot is lowered into the BOP and over the end of the drill pipe, and then rotation takes place to mill down the flared ears of the sheared pipe. The end of the Long Guide is faced with soft metal so that if inadvertently it contacts the BOP pipe rams, it does not damage them. The Guide is also a length which prevents the Mill Extension from contacting and damaging the tool joint in the BOP. This is important because this joint O.D. is where engagement of the string will take place.

### STEP 2: ENGAGE AND PULL

After the milling step is completed, the Classic Overshot is brought back to the surface, dressed with a special flat-bottom Short Guide, Extension Sub and a

Basket Grapple and Mill Control packer sized to engage the joint. (The Short Guide also has a soft metal end to prevent ram damage). The Overshot is lowered again and as it enters the BOP, the milled-down flare-end passes through the Grapple and Mill Control Packer, and is housed in the Extension Sub while the Grapple engages and packs off the tool joint. A pull is exerted on the Overshot to make certain of engagement and then the BOP pipe rams are retracted, and the string is raised to the rig floor where the severed joint is removed and replaced, allowing normal operations to resume.

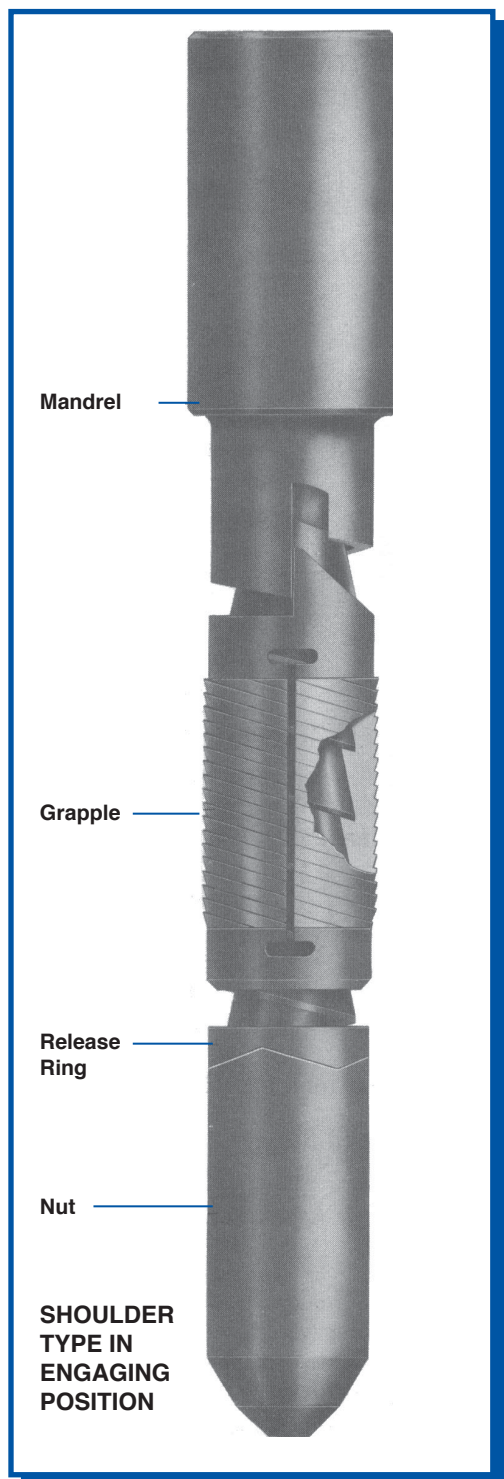
Classic Sheared Pipe Retrieval Overshot assemblies are available for all sizes of Drill Pipe and BOP's. Prices will be quoted on request.

### HOW TO ORDER

1. Give BOP make and working bore size.
2. Give the distance between the counter lines of the BOP pipe rams and shear rams.
3. Give drill pipe body O.D. and tool joint O.D. and length.



## *ITCO Type Classic Releasing Spears*



### **GENERAL DESCRIPTION**

The ITCO Type Classic Releasing Spear is a superior fishing spear which is designed to assure positive internal engagement with the fish. It is ruggedly built to withstand severe jarring and pulling strains. It engages the fish over a large area without damage to, or distortion of the fish. The simple design eliminates any small parts which could become lost or damaged in the hole. If the fish cannot be pulled, the spear may easily be released and disengaged.

### **USE**

The ITCO Type Classic Releasing Spear is used to internally engage and to retrieve all sizes of tubing, drill pipe and casing. It may be used in conjunction with cutters, spear pack-offs and other tools, where this is desirable.

### **CONSTRUCTION**

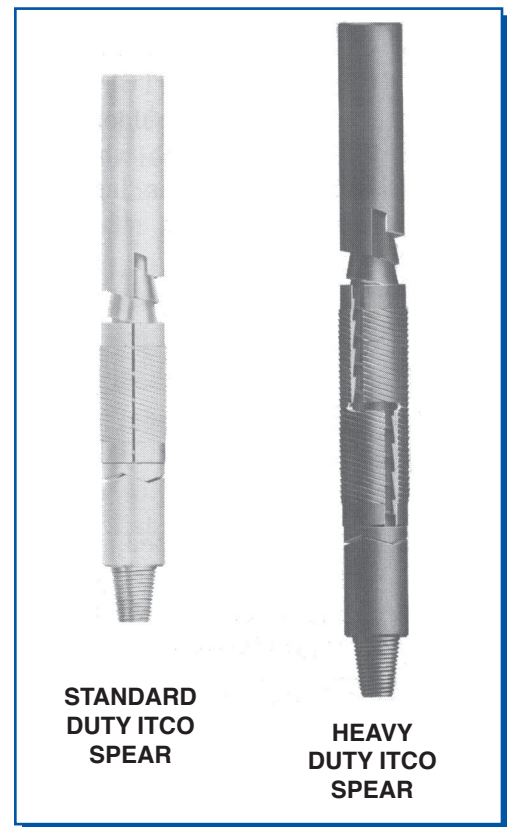
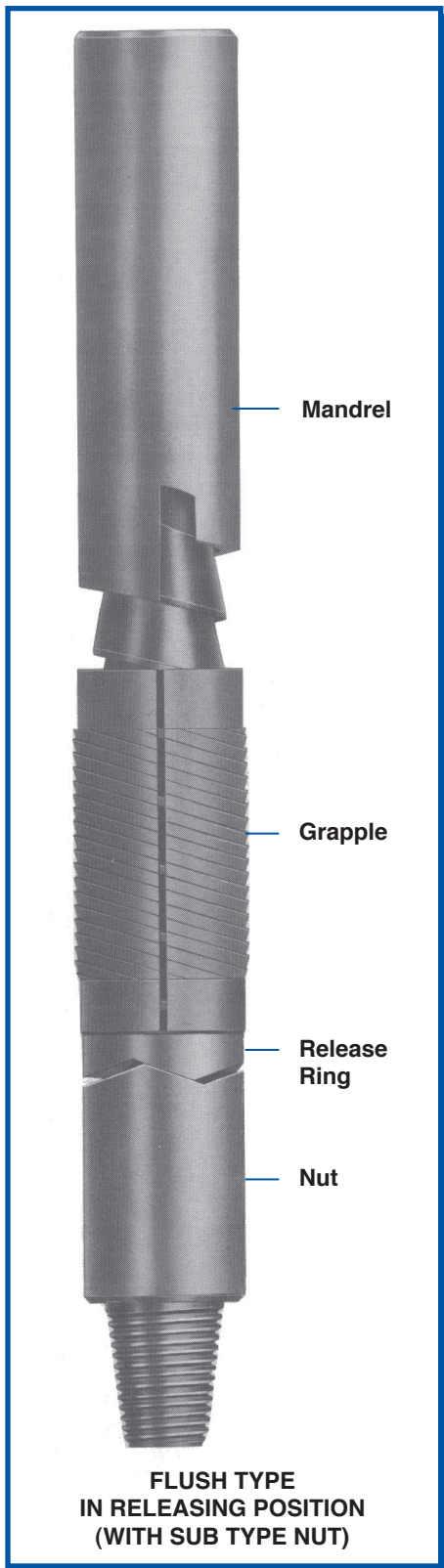
The UTCI Type Classic Releasing Spear consists of a Mandrel, Grapple, Release Ring and Nut. The Mandrel may be ordered in either a Flush Type or a Shoulder Type. Mandrel top connections are furnished to order.

The flexible one-piece Grapple has an internal helix matching the Mandrel helix. The tang of the Grapple rests against a stop on the Mandrel when the Spear is in the engaged position. The large engaging surface of the Grapple permits heavy jarring and pulling strains without distorting the fish.

The helix of the Mandrel ends at the point where the Release Ring is mounted. The cam of the Release Ring matches the cam on the face of the Nut. The matching cams of the Release Ring and the Nut are a safety device which resists locking, freezing or jamming of the Spear, assuring an easy release.

The standard plain bull-nose nut is furnished on the tool when ordered unless an alternate type is specified. Also available as accessory items at extra cost are Mill Type, Sub Type and Sidehill Type Nuts.

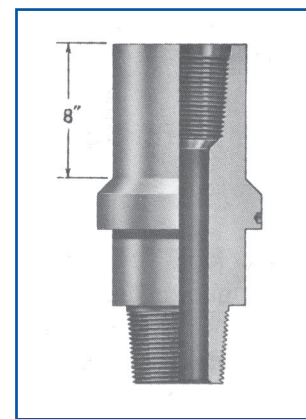
"Heavy Duty" Spears have a relatively longer Mandrel and Grapple than the Standard Spear resulting in twice as much supported wickered area in engagement with the fish.



## ACCESSORIES

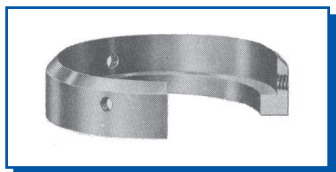
### Type F Stop Subs

The Type F Stop Sub is designed to be used with the Flush Mandrel Type Classic Releasing Spear when use of a stop is desirable. It is installed in the box connection at the top of the Mandrel.



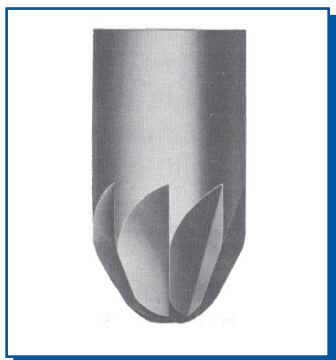
### Type S Oversize Stop Rings

The Type S Oversize Stop Ring is designed to be used with the Shoulder Mandrel Type Classic Releasing Spear when use of a larger stop is desirable. It is installed on the Spear Shoulder with set screws.



### Mill Type Nut

The Mill Type Nut is used in place of the standard bull-nose nut to mill away the distorted end of a fish to insure entrance of the Spear into the fish. It is also effective for drilling out a sand-plugged fish.



### Sidehill Type Nut

The Sidehill Type Nut is used in place of the standard bull-nose nut to align the Spear with the fish that is imbedded in the side wall of the hole.



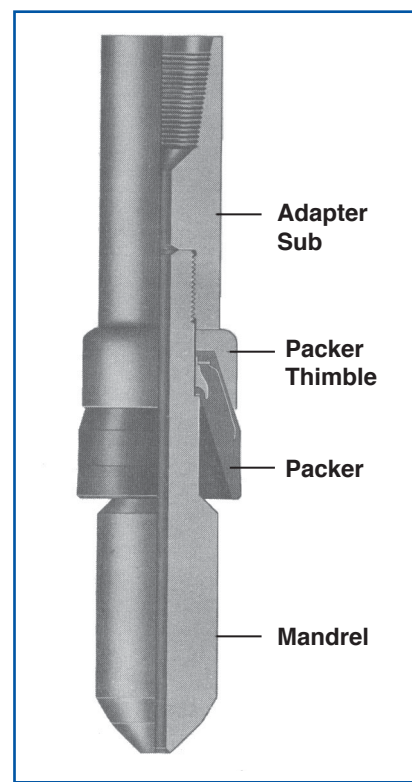
### Sub Type Nut

The Sub Type Nut is used in place of the standard bull-nose nut to provide the connection required to utilize other tools below the Spear, such as the Spear Pack-off or Internal Cutters.



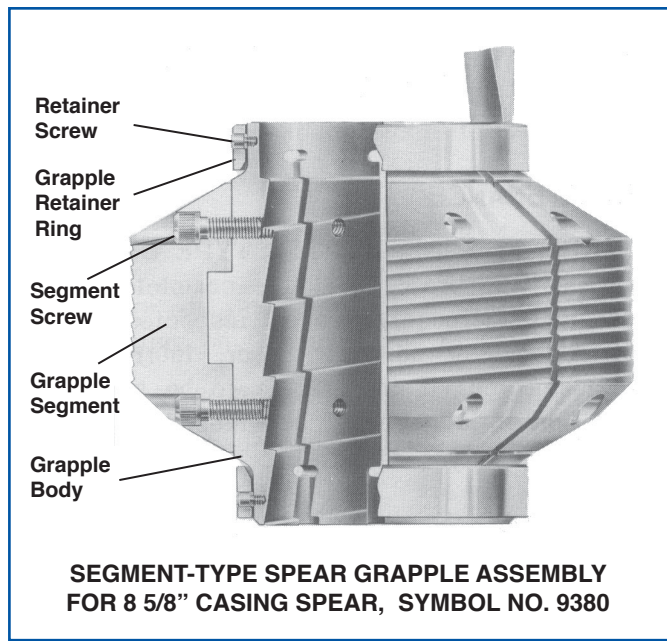
### Spear Pack-Off Assembly

The Spear Pack-Off Assembly is attached to the Sub Type Nut below the Spear to pack-off the fish in order to circulate through the fish. The Spear Pack-Off Assembly consists of an Adapter Sub, Packer Thimble, Packer and Mandrel. The Adapter Sub of the Spear Pack-off will be furnished with a box connection to match the pin connection of the Sub Type Nut on which it is to be used, or as otherwise ordered. The Mandrel of the Spear Pack-off may be ordered plain bull-nosed or with a pin connection for attachment of other tools, as specified.



### Segment Type Spear Grapple Assembly

The Segment Type Spear Grapple is used in place of the standard one-piece Grapple on the 8 5/8" and 9 5/8" size Spears to convert them to Spears capable of engaging up to 20" casing. The Segment Type Spear Grapple consists of a Grapple Body, eight grapple segments and 16 Grapple Segment Screws. The helix of the Grapple Body matches the helix of the Spear Mandrel making the action of the Spear the same as with the standard Grapple.



### CLASSIC INTERNAL CUTTER FOR USE IN "CUT & PULL" OPERATION

Classic Internal Cutters may be run below the Classic Releasing Spear and are spaced as desired, depending upon the length of the fish and the length of the cut to be made. The Spear should be spaced far enough above the cutter so that the Spear is clear of the fish during cutting operations. After cutting is completed, the Spear can be lowered to retrieve the cut-off section.

#### OPERATION

Examine and assure that the Classic Releasing Spear is the correct size for the pipe to be caught and is properly assembled.

Connect the Spear to the fishing string. Set the Spear in released position by screwing the Grapple down the helix against the Release Ring as far as it will go by hand. In this position the Grapple is caused to contract inward and will not engage the pipe as it is run in.

#### To Engage and Pull the Fish

Lower the fishing string slowly until the Spear has entered the fish to the desired depth. Rotate one full turn to the left, then pull the fish by elevating the fishing string.

As the fishing string is rotated to the left, it turns the Mandrel down through the Grapple, putting the Grapple in engaging position.

As straight pull will then wedge the Grapple into positive engagement with the fish.

#### To Release from the Fish

Bump down with the weight of the fishing string to break the engagement; rotate two to three turns to the right, then elevate the string until the Spear is clear of the fish.

This moves the Mandrel upward through the Grapple, forcing the Grapple down against the Release Ring and putting the Spear in the released position. If the Spear does not release, bump down; then simultaneously rotate to the right while slowly elevating the fishing string until the Spear is clear of the fish.

### OPERATION WITH ACCESSORIES

The ITCO Type Classic Releasing Spear, when being run alone, is assembled with a standard bull-nose Nut. If a positive stop is desired, use either a Shoulder Type Spear Mandrel, a Type F Stop Sub with the Flush Type Mandrel, or a Type S Oversize Stop Ring (on either the Type F Stop Sub or Shoulder Type Mandrel).

#### Mill Type Nut

If the top of the fish is distorted or plugged in any manner that would prevent easy entry of the Spear into the fish, install a Mill Type Nut in place of the Bull-Nose Nut.

When the top of the fish is reached, rotate slowly to the right and slowly lower the Spear into the fish until mill has cleaned burrs from top of fish and then lower into the fish to the desired depth.



### **Sidehill Type Nut**

If the top of the fish is out of line with the well bore or is imbedded in the sidewall, install a Sidehill Type Nut in place of the Bull-Nose Nut.

When the top of the fish is reached, the fishing string must be lowered, elevated, rotated a portion of a turn and lowered repeatedly until the leading edge of the Sidehill Type Nut encounters the section of the top of the fish that overlaps the wellbore, and directs the Spear into the fish.

### **Sub Type Nut**

If it is desired to run a Spear Pack-Off Assembly or an Internal Cutter below the Spear, install a Sub Type Nut in place of the Bull-Nose Nut.

### **Spear Pack-Off Assembly**

In order to circulate through the fish, install the proper size Spear Pack-Off Assembly on the Sub Type Nut of the Spear.

After the Spear has entered and engaged the fish, begin flow with the circulation pumps while maintaining a heavy upward strain on the fish. The fluid passing through the Adapter Sub and Mandrel backs up against the Packer, causing a positive seal on the inside of the fish. This will add lifting power to the pulling force applied to the fishing string, while at the same time begin a breakdown of the sediment or formation between the fish and the walls of the wellbore, freeing the fish.

### **Internal Cutter**

When it is desired to run an Internal Cutter below the Spear, a Sub Type Nut is installed in place of the Bull-Nose Nut. Sufficient pipe is made up between the Internal Cutter and the Spear to enable the Spear to remain above the fish during the cutting operation. After the cut has been completed, the Spear is lowered into the cut-off section to retrieve it.

### **Precautions**

In deep or crooked holes, it may be necessary to rotate the fishing string more than one full turn, to set or release the Spear. Moderate additional rotation is not harmful to the operation, or to the Spear.

During operation, always maintain a moderate upward strain on the fishing string when rotating either right-hand or left-hand.

Always bump down with the full weight of the fishing string before the releasing operation.

## **MAINTENANCE**

After each use, the ITCO Type Classic Releasing Spear should be completely disassembled, thoroughly cleaned, inspected for signs of damage or advanced wear, lubricated and re-assembled. If the tool is to be stored, the exterior surface should be greased or painted, after assembly.

### **Disassembly**

1. Secure the Spear in a suitable vise, clamping on the (upper) tool joint end.
2. Loosen and remove the Nut (or Spear Pack-Off Assembly).
3. Slide the release ring off the Mandrel.
4. Remove the Grapple by screwing it down the helix. Use right-hand rotation.
5. Clean all the parts thoroughly. Examine and replace any damaged or badly worn parts.

### **Reassembly**

1. Secure the Mandrel in a vise, clamping it near the upper end.
2. Apply a heavy coat of grease to the helix of the Mandrel.
3. If the Grapple is large, grease the interior, and install it on the Mandrel. Screw it on, using left-hand rotation.
4. Install the Release Ring with the cammed face downward (facing the Nut).
5. Apply thread dope or lubricant to the threads and assemble the nut on the Mandrel lower end. Buck it up tight.
6. Screw the Grapple Down the helix until it rests against the Release Ring (and Nut).
7. Paint or lubricate the exterior surfaces to prevent rust or deterioration.

### **Spear Pack-Off**

The Spear Pack-Off Assembly should be disassembled, cleaned and reassembled after each use. Disassembly should proceed as follows:

### **Disassembly**

1. Secure the assembly in a suitable vise, clamping on the lower end of the Mandrel.
2. Loosen and remove the Adapter Sub.
3. Slide off the Packer Thimble.
4. Remove the Packer.
5. Thoroughly clean all the parts. Examine the Packer carefully. If it is worn or damaged, replace it with a new packer.

### **Reassembly**

1. Secure the Mandrel in a vise, clamping it on the lower end.
2. Slide the Packer onto the Mandrel. Make sure that it seats properly on the shoulder of the Mandrel, and that the large open end faces downward (toward the fish).
3. Slide the Packer Thimble over the Mandrel and onto the Packer. Force it down tightly around the upper end of the Packer.
4. Apply thread dope or grease to the threads and assemble the Adaptor Sub onto the Mandrel. Buck the Sub up tight.
5. Paint or lubricate the exterior metal parts of the assembly. Do NOT paint or lubricate the rubber Packer. Paint, solvents, sunlight and most lubricants are harmful to rubber products when the rubber is exposed to them for long periods of time.

## Classic Full Flow Type Reverse Circulation Junk Baskets

### GENERAL DESCRIPTION

The Classic Full Flow Type Reverse Circulation Junk Baskets are designed to effectively catch junk by utilizing the reverse circulation principle. Small junk objects may be successfully deflected into this Junk Basket and retrieved, which would not be fished out by other junk baskets.

The tool's unique reverse circulation feature insures very complete recovery of junk, and eliminates misruns. Its design also retains a drain through the tool that eliminates the possibility of pulling a wet string even though the inner barrel is plugged by the core. This tool may also be converted into an effective Fishing Magnet which still retains the reverse circulation feature.

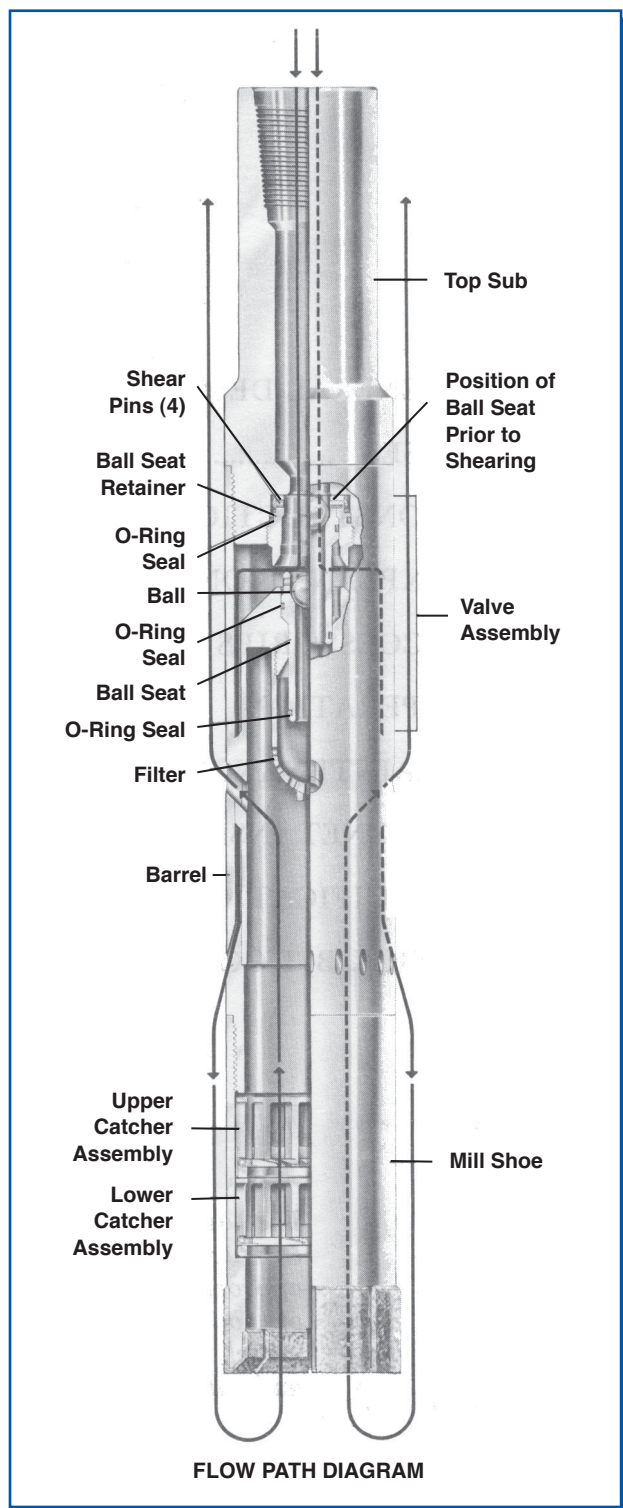
### USE

The Classic Full Flow Type Reverse Circulation Junk Baskets are used to retrieve all types of junk that accumulates at the bottom of a well. This junk may be such objects as rock bit cones and bearings, broken slips, bits of wireline, various hand tools, slivers and debris from twisted-off drill strings, milling cuttings, etc.

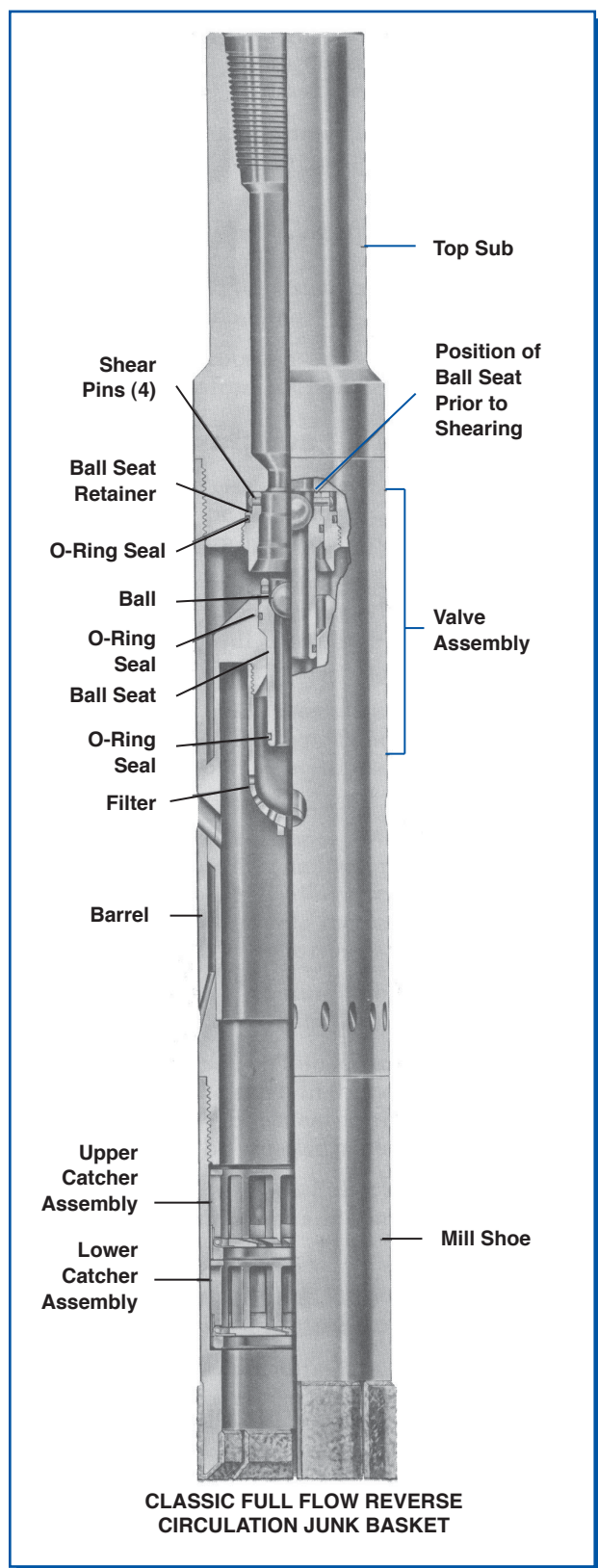
In operation the circulating fluid is jetted outwardly and downwardly against the full circumference of the hole, where it is deflected in a manner that directs all objects into the long hollow barrel of the basket.

### CONSTRUCTION

Classic Full Flow Type Reverse Circulation Junk Baskets consist basically of a Barrel, a Top Sub, Junk Catcher(s), a Shoe, a Filter, a Valve Assembly and a Pick-up Sub. The Valve Assembly consists of a Ball, a Ball Seat, a Ball Seat Retainer, four Shear Pins and Seals.







The Junk Baskets are available with one (1) Junk Catcher Assembly or they can be provided with two (2) on request.

### EXPLANATION OF MECHANISM

The Classic Full Flow Type Reverse Circulation Junk Baskets are designed to retrieve all types of small objects such as bit cones, tong pins, hammers, mill cuttings and similar junk. Its unique principle of reverse fluid circulation insures more complete recovery of junk in the hole and eliminates misruns.

#### Full Flow Type Valve Assembly

The Full Flow Type reverse circulation is obtained the same way as the Standard Type. The unique feature of the Full Flow Type is in the Valve Assembly. Sometimes when the Standard Type is being lowered into the well toward a fish, pieces of shale, shell, etc., break away from the walls, sift up through the catchers, and clog the valve which starts the reverse flow action prematurely when it is not desirable. The Full Flow is designed to seal off the cavity used in the reverse circulation until it is needed. When dressed for running in the hole, the Ball Seat of the Full Flow type is fastened to the Ball Seat Retainer with Shear Pins. This blocks off the reverse circulation ports and provides a "washpipe" between the Top Sub and Barrel so that flow will be directed through the I.D. to keep the Barrel washed clean while going in the hole. When the Basket is over the fish, the ball is dropped and seated, pump pressure causes the pins to shear, the Ball Seat drops down to a matching beveled shoulder of the Valve Assembly part of the barrel which opens the cavity, and reverse circulation starts (see illustration).

### ACCESSORIES

#### Mill Shoes

The Classic Full Flow Type Circulation Junk Baskets are furnished with a standard Type "A" Mill Shoe. This is a mill type with side wings. It is recommended that Itcoloy-faced Mill Shoes be considered.

The Type "B" Mill Shoe is similar in design to the Type "A" but is hard-faced with Classic Itcoloy. Itcoloy is a material composed of sintered tungsten carbide in an extremely tough matrix which will effectively and rapidly mill up junk during the fishing operations.

The Type “C” Mill Shoe is a Flat-bottomed Shoe which is hard-faced with ITCOLOY on the Bottom, on the inner face and on the outer face. It will effectively mill up junk and **is especially effective for cutting cores.**

### Finger Shoes

When junk is lying loose on the bottom of the well or when junk is too large to pass through the Catchers, A Finger Shoe may be installed on the bottom of the Barrel in place of the Mill Shoe. When the Junk Basket engages the fish, combined rotating and lowering cause the long fingers to close in beneath the fish and retain it in the Barrel. Finger Replacements are easy and inexpensive to replace on the Shoe Body.

### Magnet Inserts

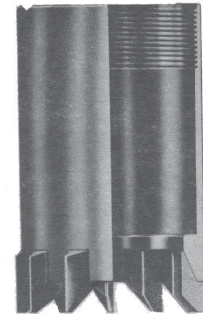
Magnet Inserts are available to convert Classic Full Flow Type Reverse Circulation Junk Baskets into effective fishing magnets. The Magnet Insert is machined to fit into the recess normally occupied by the catcher. The Magnet Insert is used especially when in hard-to-drill formations and to thoroughly clean the hole prior to diamond drilling. This arrangement provides a magnet that incorporates the advantages of reverse circulation.

### OPERATION

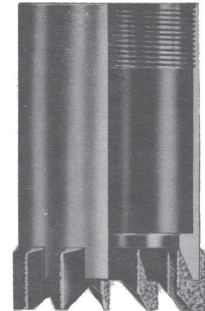
First, determine that the Junk Basket is properly assembled and that all its parts are in good working condition.

Examine the tool and make sure it is properly assembled and in good working condition. Look inside the Top Sub to see if the Ball Seat is positioned properly in the Ball Seat Retainer with the Shear Pins in place. For Shoe selection and operation, follow the same instructions described under “Selection of Shoes”.

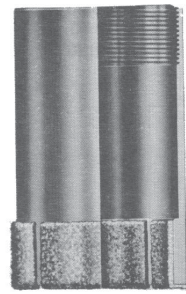
1. Make up the Junk Basket to the fishing string, lower into well, and turn on the circulation pumps. When the tool is a few feet off bottom, stop lowering and turn off the pumps.
2. Unscrew the Kelly from the string. Drop the Steel Ball down the drill pipe. Reconnect the Kelly. (Where a Window Sub is available, remove the plug from the sub and drop the Steel Ball down the drill pipe. Replace the plug in the Window Sub).
3. Turn the circulation pumps back on and watch the mud pressure gauge. When the Ball reaches the Ball Seat, a slight pressure build-up will occur. When the Pins shear a sudden drop in pressure



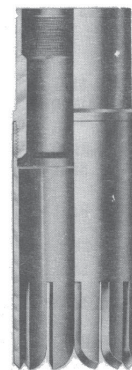
TYPE A  
MILL SHOE



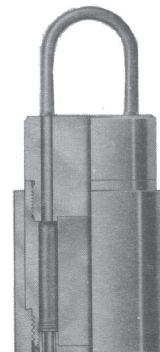
TYPE B  
MILL SHOE



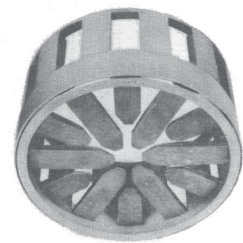
TYPE C  
MILL SHOE



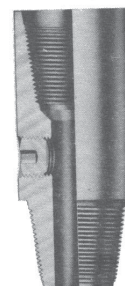
FINGER SHOE



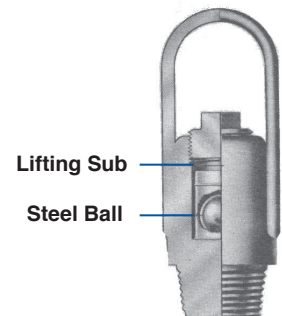
MAGNET INSERT



STANDARD CATCHER



WINDOW SUB



Lifting Sub

Steel Ball

LIFTING SUB

will be noticed on the gauge and this will indicate that reverse circulation is taking place.

4. Maintain high pressure circulation, rotate the string slowly to the right and lower the Junk Basket to the bottom of the hole.

When coring, continue right-hand rotation and lowering until a core at least ten inches long has been cut.

NOTE: When using the Itcoloy-faced Shoes, maintain one ton of weight on the shoe and rotate the basket to give a surface speed of 250 ft./min. to insure proper milling.

5. Stop rotation and circulation and pull the Junk Basket from the hole.

### **Selection of Shoe**

If the fish is embedded in a hard formation and a core must be cut, the Junk Basket must be equipped with the proper Mill Type Shoe.

If the fish is laying loosely on the bottom of the hole, the Junk Basket may be equipped with either the proper Mill Type Shoe or the proper Finger Type Shoe.

Finger Type Shoes will normally retrieve larger objects than Mill Type Shoes, provided the junk is lying loose on the bottom and a core need not be taken.

Itcoloy-faced Shoes, with their hard, rugged and long-lasting qualities, make possible the cutting away of protruding excess metal to allow free entry of the junk into the basket and the retention of the junk on the one run.

Remove the Lifting Sub and retain it and the Steel Ball at the derrick floor.

Using the Top Sub, connect the Junk Basket to the string and run it in the hole. If small junk particles are very prevalent in the hole, a Top Bucket Sub should be installed in place of the Top Sub.

Where a Window Sub is available, install on the top joint of drill pipe and connect the Kelly.

### **Operation of junk basket in Recovering Fish with the Mill Type Shoe**

1. Turn on the circulation pumps and force circulation through the Junk Basket for a few minutes before dropping the Steel Ball. This flushes out any mud that may have gathered in the Barrel during the run in.
2. After the Steel Ball has been dropped down the drilling pipe, its downward progress will not be halted until it encounters the Valve Seat in the Junk Basket.

Thereafter, when circulation is resumed, the fluid is forced through the inner passages of the Barrel and jetted outwardly and downwardly against the full circumference of the hole, where it is deflected in a manner that flushes all objects toward center. The fluid then flows in a continuous stream to the center of the Junk Basket and up through it and out the return ports in the upper end of the Barrel, thus giving a reverse circulation action.

3. Cut a length of core so that the fish rides past the Junk Catcher. The fingers on the Junk Catcher fold back while the core and fish are entering.
4. Pull up the Junk Basket so that the fingers in the Junk Catcher dig in and cut off a section of core. This holds the fish and core securely in the Junk Basket Barrel.

### **To Recover Fish when Basket is Equipped with Finger Type Shoe**

When the Junk Basket is approximately ten feet off bottom, turn on the circulating pumps and maintain circulation for a few minutes to condition the mud. Turn off the circulating pumps.

Unscrew the Kelly from the string. Drop the Steel Ball down the drill pipe. Reconnect the Kelly. (Where a Window Sub is available, remove the plug from the sub and drop the Steel Ball down the drill pipe. Replace the plug in the Window Sub).

Turn on the circulating pumps and while maintaining high pressure circulation, rotate the string slowly to the right and lower it until approximately two tons of weight rest against the bottom of the hole.

Stop rotation and circulation and pull the Junk Basket from the hole.

### **To Remove the Fish or Core**

Unscrew the Mill Type Shoe or the Finger Type Shoe from the Junk Basket and wash out the Barrel.

**NOTE:** The Junk Basket should be washed as soon as possible after being used. Pay particular attention to the space between the inner and outer barrels.

### **Precautions**

Make sure that the inside diameters of the tool joints in the string are large enough to pass the Steel Ball.

Be sure to retain the Steel Ball at the surface while the Junk Basket is being lowered into the hole.

## **MAINTENANCE**

To guard against misruns and to prolong the life of the tool, dismantle and thoroughly cleanse the Junk Basket after each job.

### **Disassembly**

1. Unscrew the Top Sub.
2. Using pipe wrench on diameter of Ball Seat Retainer protruding from bottom of Top Sub, unscrew and remove the Retainer. Knock out old pieces of Shear Pins from top of Retainer.
3. Remove the Steel Ball and Ball Seat.
4. (a) Unscrew the Mill Type Shoe.  
(b) Remove the Junk Catcher from the Shoe.
5. Finger Type Shoe:  
(a) Unscrew the Finger Type Shoe from the Barrel.  
(b) Unscrew the Finger Type Shoe Replacement from the Finger Type Shoe Body.
6. Using T-wrench provided, reach inside bottom of Barrel and unscrew Filter. Remove the Filter and clean out any debris which may be lodged in the holes of the Filter.
7. Wash out both the inside and the inner passages in the Barrel.
8. Check all parts carefully. Replace damaged parts with new ones.

9. Reassemble in the reverse order.
10. Before installing Ball Seat Retainer in Top Sub, replace O-Ring Seals on Retainer and Ball Seat with new ones. Insert Ball Seat into and against matching beveled shoulder of Ball Seat Retainer and install new Shear Pins. Screw this assembly into the Top Sub until snug. Heavy torque is not required.
11. Store the Steel Ball in the Lifting Sub.
12. To prevent rust, apply either paint or grease.

## **MAGNET INSERT ASSEMBLY**

### **Installation**

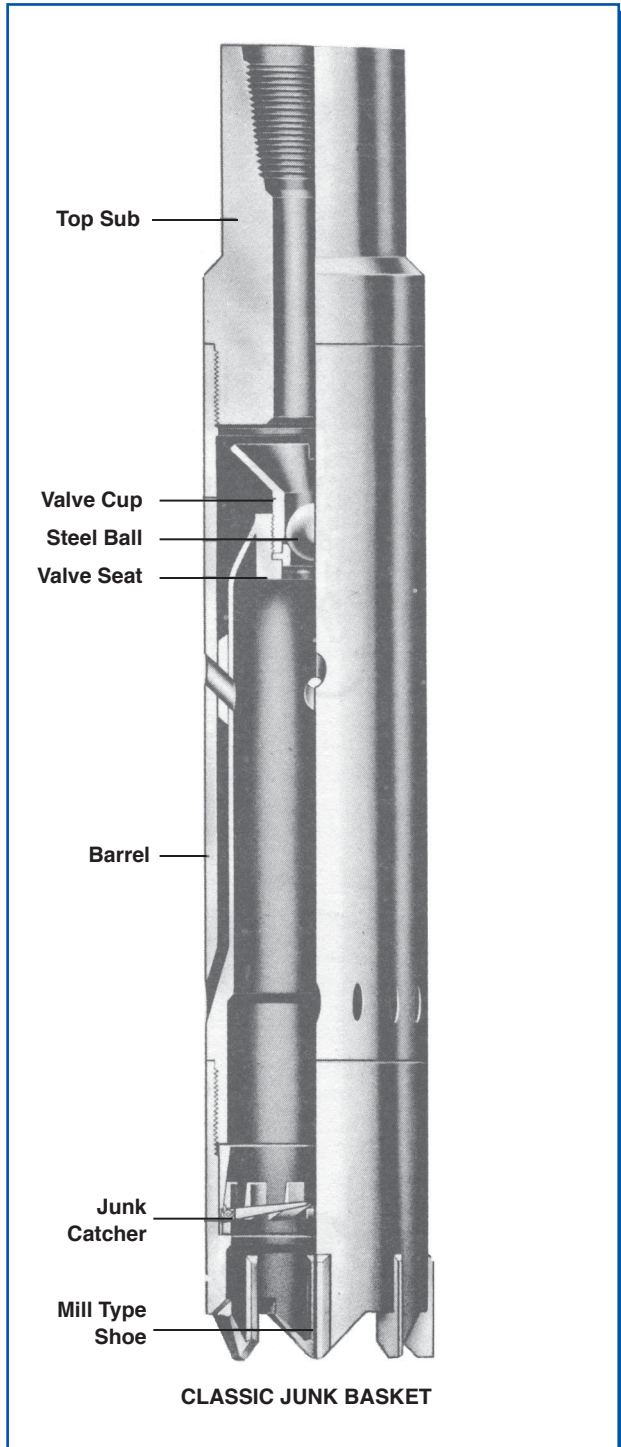
1. Remove Shoe from Barrel of the Junk Basket.
2. Remove Catcher from Shoe.
3. Install Magnetic Insert in Catcher recess.
4. Reassemble Junk Basket.

### **Maintenance**

1. Thoroughly clean after use; make sure circulation hole is clean.
2. Store with Keeper in place to preserve magnetism.



## *Classic Reverse Circulation Junk Baskets*



### GENERAL DESCRIPTION

The Classic Reverse Circulation Junk Baskets are designed to effectively catch junk by utilizing the reverse circulation principle. Small junk objects may be successfully deflected into this Junk Basket and retrieved, which would not be fished out by other junk baskets.

The tool's unique reverse circulation feature insures very complete recovery of junk, and eliminates misruns. Its design also retains a drain through the tool that eliminates the possibility of pulling a wet string even though the inner barrel is plugged by the core. This tool may also be converted into an effective Fishing Magnet which still retains the reverse circulation feature.

### USE

The Classic Reverse Circulation Junk Baskets are used to retrieve all types of junk that accumulates at the bottom of a well. This junk may be such objects as rock bit cones and bearings, broken slips, bits of wire line, various hand tools, slivers and debris from twisted-off drill strings, milling cuttings, etc.

In operation the circulating fluid is jetted outwardly and downwardly against the full circumference of the hole, where it is deflected in a manner that directs all objects into the long hollow barrel of the basket.

### CONSTRUCTION

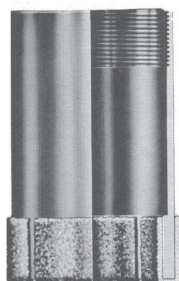
The Classic Reverse Circulation Junk Baskets consist basically of a Barrel, a Top Sub, a Junk Catcher, a Shoe and a Valve Assembly. A Lifting Sub is provided for ease of handling the Junk Basket and provides a storage place for the Steel Ball.



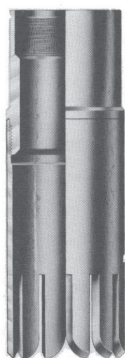
**TYPE A  
MILL SHOE**



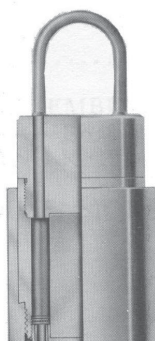
**TYPE B  
MILL SHOE**



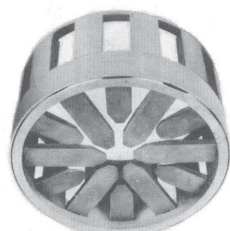
**TYPE C  
MILL SHOE**



**FINGER SHOE**



**MAGNET INSERT**



**STANDARD CATCHER**

The reverse circulation is obtained by the unique construction of the Barrel, which is in effect, a two-bowl assembly. With the Steel Ball in place in the Valve Seat, circulation fluid is directed around the Valve through the inner passages of the Barrel, is jetted outwardly and downwardly against the full circumference of the hole, flows in a continuous stream into the Barrel, up through the Barrel, then out the return ports at the upper end of the Barrel.

Classic Reverse Circulation Junk Baskets are available in two types - Standard and W7R. Standard type Baskets are designed to retrieve the more popular sizes of bit cones. The W7R type Baskets are designed to retrieve W7R and other oversize bit cones.

## **ACCESSORIES**

### **Mill Shoes**

The Classic Reverse Circulation Junk Baskets are furnished with a standard Type "A" Mill Shoe. This is a mill type with the side wings. It is recommended that Itcoloy-faced Mill Shoes be considered.

The Type "B" Mill Shoe is similar in design to the Type "A" but is hard-faced with Itcoloy. Itcoloy is a material composed of sintered tungsten carbide in an extremely tough matrix which will effectively and rapidly mill up junk during the fishing operation.

The Type "C" Mill Shoe is a flat-bottomed shoe which is hard-faced with Itcoloy on the bottom, on the inner face and on the outer face. It will effectively mill up junk and is especially effective for cutting cores.

### **Finger Shoes**

When junk is lying loose on the bottom of the well or when junk is too large to pass through the Catchers, a Finger Shoe may be installed on the bottom of the Barrel in place of the Mill Shoe. When the Junk Basket engages the fish, combined rotating and lowering cause the long fingers to close in beneath the fish and retain it in the Barrel. Finger Replacements are easy and inexpensive to replace on the Shoe Body.

## Magnet Inserts

Magnet Inserts are available to convert Classic Junk Baskets into effective fishing magnets. The Magnet Insert is machined to fit into the recess normally occupied by the Catcher. The Magnet Insert is used especially when in hard-to-drill formations and to thoroughly clean the hole prior to diamond drilling. This arrangement provides a magnet that incorporates the advantages of reverse circulation.

## OPERATION

First, determine that the Junk Basket is properly assembled and that all its parts are in good working condition.

Standard Style Baskets will retrieve all popular types of bit cones used to drill hole sizes within their ranges.

W7R Style Baskets are required to retrieve W7R and other oversize types of bit cones.

## Selection of Shoe

If the fish is embedded in a hard formation and a core must be cut, the Junk Basket must be equipped with the proper Mill Type Shoe.

If the fish is laying loosely on the bottom of the hole, the Junk Basket may be equipped with either the proper Mill Type Shoe or the proper Finger Type Shoe.

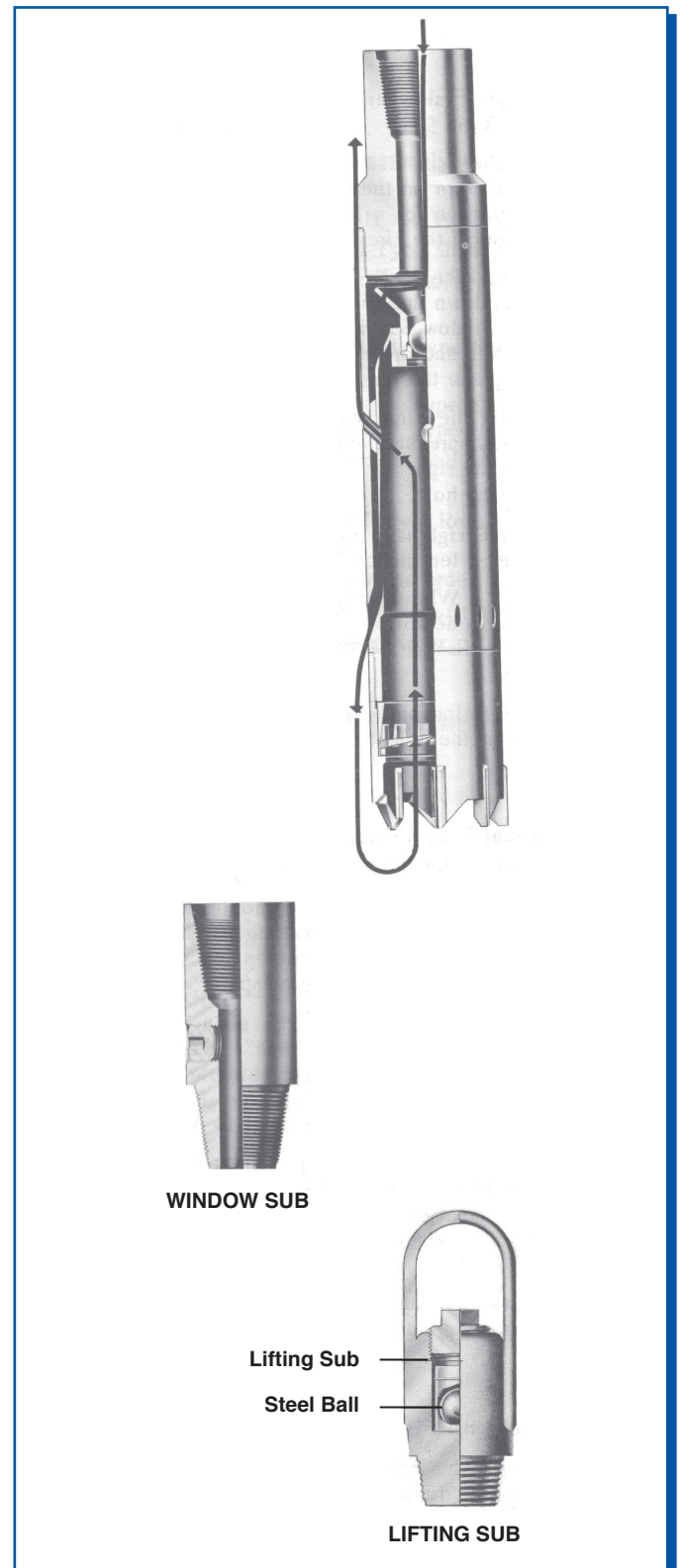
Finger Type Shoes will normally retrieve larger objects than Mill Type Shoes, provided the junk is lying loose on the bottom and a core need not be taken.

Itcoloy-faced Shoes, with their hard, rugged and long-lasting qualities, make possible the cutting away of protruding excess metal to allow free entry of the junk into the basket and the retention of the junk on the one run.

Remove the Lifting Sub and retain it and the Steel Ball at the derrick floor.

Using the Top Sub - connect the Junk Basket to the string and run it in the hole. If small junk particles are very prevalent in the hole, a Junk Sub should be installed in place of the Top Sub.

Where a Window Sub is Available, install on the top joint of drill pipe and connect the Kelly.



### **To Recover Fish when Basket is Equipped with Mill Type Shoe**

When the Junk Basket is approximately ten feet off bottom, turn on the circulating pumps and maintain circulation for a few minutes to condition the mud. Turn off the circulating pumps.

Unscrew the Kelly from the string. Drop the Steel Ball down the drill pipe. Reconnect the Kelly. (Where a Window Sub is available, remove the plug from the sub and drop the Steel Ball down the drill pipe. Replace the plug in the Window Sub).

Turn on the circulating pumps and while maintaining high pressure circulation, rotate the string slowly to the right and lower the Junk Basket to the bottom of the hole.

Continue right-hand rotation and lowering until a core at least ten inches long has been cut.

*NOTE:* When using the Itcoloy-faced Shoes, maintain one ton of weight on the shoe and rotate the basket 50 - 150 RPM to insure proper milling.

Stop rotation and circulation and pull the Junk Basket from the hole.

### **To Recover Fish When Basket is Equipped with Finger Type Shoe**

When the Junk Basket is approximately ten feet off bottom, turn on the circulating pumps and maintain circulation for a few minutes to condition the mud. Turn off the circulating pumps.

Unscrew the Kelly from the string. Drop the Steel Ball down the drill pipe. Reconnect the Kelly. (Where a Window Sub is available, remove the plug from the sub and drop the Steel Ball down the drill pipe. Replace the plug in the Window Sub).

Turn on the circulating pumps and while maintaining high pressure circulation, rotate the string slowly to the right and lower it until approximately two tons of weight rest against the bottom of the hole.

Stop rotation and circulation and pull the Junk Basket from the hole.

### **To Remove the Fish or Core**

Unscrew the Mill Type Shoe or the Finer Type Shoe from the Junk Basket and wash out the Barrel.

*NOTE:* The Junk Basket should be washed as soon as possible after being used. Pay particular attention to the space between the inner and outer barrels.

### **Precautions**

Make sure that the inside diameters of the tool joints in the string are large enough to pass the Steel Ball.

Be sure to retain the Steel Ball at the surface while the Junk Basket is being lowered into the hole.

### **EXPLANATION OF MECHANISM**

The Classic Reverse Circulation Type Junk Baskets are designed to retrieve all types of small objects such as bit cones, tong pins, hammers, mill cuttings and similar junk. Its unique principle of reverse fluid circulation insures more complete recovery of junk in the hole and eliminates misruns.

### **Function of Junk Basket in Recovering Fish with Mill Type Shoe**

1. Turning on the circulation pumps and forcing circulation through the Junk Basket for a few minutes before dropping the Steel Ball flushes out any mud that may have gathered in the Barrel during the run in.
2. After the Steel Ball has been dropped down the drilling pipe, its downward progress will not be halted until it encounters the Valve Seat in the Junk Basket. Thereafter, when circulation is resumed, the fluid is forced through the inner passages of the Barrel and jetted outwardly and downwardly against the full circumference of the hole, where it is deflected in a manner that flushes all objects toward center. The fluid then flows in a continuous stream to the center of the Junk Basket and up through it and out the return ports in the upper end of the Barrel, thus giving a reverse circulation action.
3. Cutting a length of core allows the fish to ride past the Junk Catcher. The fingers on the Junk Catcher fold back while the core and fish are entering.
4. Pulling up the Junk Basket causes the fingers in the Junk Cather to dig in and cut off a section of core, thus holding the fish and core securely in the Junk Basket Barrel.



### **Function of Junk Basket in Recovering Fish with Finger Type Shoe**

1. Turning on the circulating pump and forcing circulation through the Junk Basket for a few minutes before dropping the Steel Ball flushes out any mud that may have gathered in the Barrel during the run in.
2. After the Steel Ball has been dropped down the drill pipe, its downward progress will not be halted until it encounters the Valve Seat in the Junk Basket. Thereafter, when circulation is resumed, the fluid is forced through the inner passages of the Barrel and jetted outwardly and downwardly against the full circumference of the hole where it is deflected in a manner that flushes all objects toward center. The fluid then flows in a continuous stream to the center of the Junk Basket and up through it and out the return ports in the upper end of the Barrel, thus giving a reverse circulation action.
3. Rotating to the right and lowering the Junk Basket to the bottom causes the fingers of the Finger Type Shoe to close in beneath the fish.

#### **MAINTENANCE**

To guard against misruns and to prolong the life of the tool, dismantle and thoroughly cleanse the Junk Basket after each job.

### **Disassembly**

1. Unscrew the Top Sub.
2. Unscrew the Valve Assembly with the wrench provided.
3. Remove the Steel Ball and Valve Seat.
4. (a) Unscrew the Mill Type Shoe.  
(b) Remove the Junk Catcher from the Shoe.
5. Finger Type Shoe:  
(a) Unscrew the Finger Type Shoe from the Barrel.  
(b) Unscrew the Finger Type Shoe Replacement from the Finger Type Shoe Body.
6. Wash out both the inside and the inner passages in the Barrel.
7. Check all parts carefully. Replace damaged parts with new ones.
8. Reassemble in the reverse order.
9. Store the Steel Ball in the Lifting Sub.
10. To prevent rust, apply either paint or grease.

### **MAGNET INSERT ASSEMBLY**

#### **INSTALLATION**

1. Remove Shoe from Barrel of the Junk Basket.
2. Remove Catcher from Shoe.
3. Install Magnetic Insert in Catcher recess.
4. Reassemble Junk Basket.

#### **MAINTENANCE**

1. Thoroughly clean after use; make sure circulation hole is clean.
2. Store with Keeper in place to preserve magnetism.

## ITCO Type Classic Junk Baskets

### GENERAL DESCRIPTION

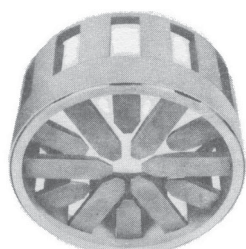
The Classic Junk Basket - Itco Type is an uncomplicated yet dependable fishing tool for retrieving all kinds of loose junk. Its simplicity of design, construction, operation and maintenance is such that any drilling crew can use it successfully. With free revolving double catchers, magnet inserts and accessory shoes, the Classic Junk Basket is indispensable equipment on a rotary drilling rig.

### USE

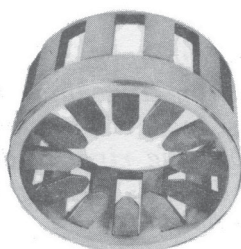
The Classic Junk Basket is used to retrieve all sorts of junk that may accumulate at the bottom of a well and which may impede drilling progress. This junk may be such objects as rock bit cones, bearings, broken slips, bits of wireline, various hand tools, slivers and debris from twisted off drill string, milling cuttings, etc. It may also be used to take a core sample, drill a full gauge hole or to ream the hole.

### CONSTRUCTION

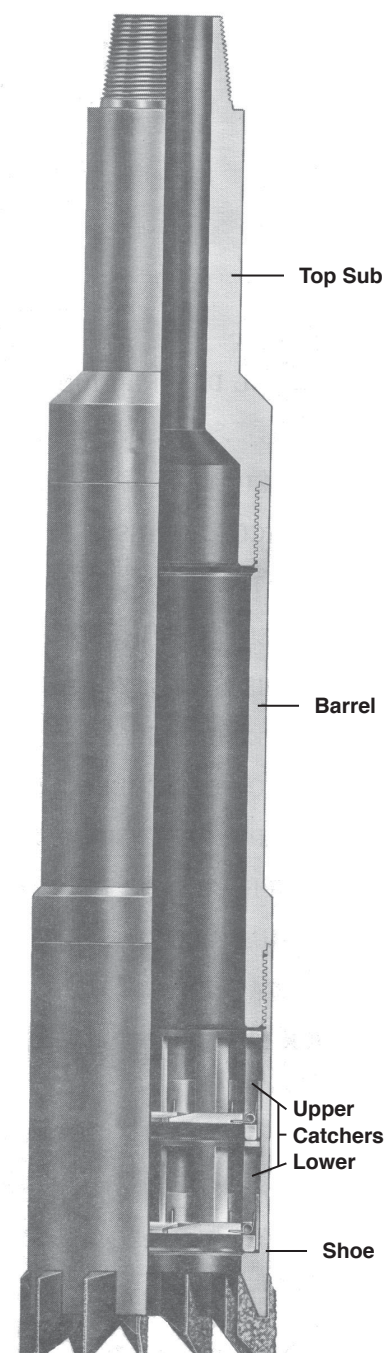
The Classic Junk Basket - Itco Type consists basically of a Barrel, A Top Sub, an Upper Catcher, a Lower Catcher, and a Type "A" Mill Shoe. This type shoe is faced with conventional hard metal on the cutting surfaces. Accessories include Magnet Inserts, Mill Shoes dressed with Itcoloy and Finger Shoes. The two catchers employ rivet-free construction, easily redressed on location. Catcher Fingers are cast from strong, long wearing manganese bronze. The Fingers in the Upper Catcher extend only half way to the center, its function being to break the core when an upward strain is taken on the string. The Lower Catcher has alternately long and short fingers which extend almost to the center, forming a close fitting basket which will retain the core or small pieces of junk. Both Catchers are free to revolve within the Shoe, eliminating Finger breakage.



**JUNK BASKET  
LOWER CATCHER**



**JUNK BASKET  
UPPER CATCHER**

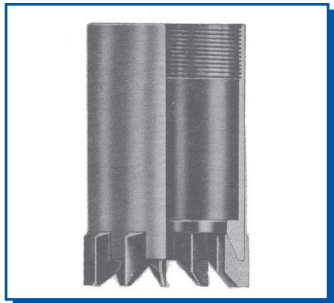


**ITCO TYPE CLASSIC JUNK BASKET  
DRESSED WITH TYPE A MILL SHOE**

## ACCESSORIES

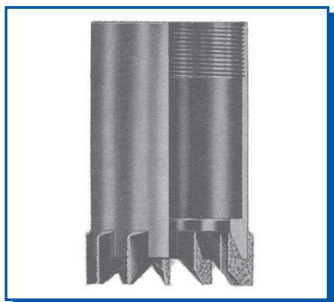
### Mill Shoes

The Classic Junk Basket - Itco Type is furnished with a standard Type "A" Mill Shoe. This is a mill type shoe with side wings and is ideal when used in softer formations. It is recommended the Itcoloy faced Mill Shoes be considered when harder formations are encountered.



**TYPE A  
MILL SHOE**

The Type "B" Mill Shoe is similar in design to the Type "A" but is hard faced with Itcoloy. Itcoloy is a material composed of sintered tungsten carbide, an extremely tough matrix which will effectively and rapidly mill up junk during the fishing operation. It is ideal when the cutting of hard formations is required.



**TYPE B  
MILL SHOE**

The Type "C" Mill Shoe is a flat bottomed shoe which is hard faced with Itcoloy on the bottom, on the inner face and on the outer face. It will effectively mill up junk and is especially effective for cutting cores. This is a burning type shoe for cutting metal.



**TYPE C  
MILL SHOE**

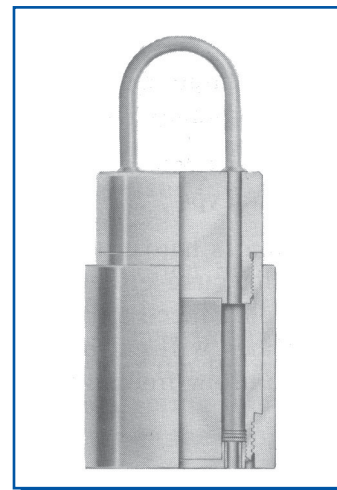
### Finger Shoes

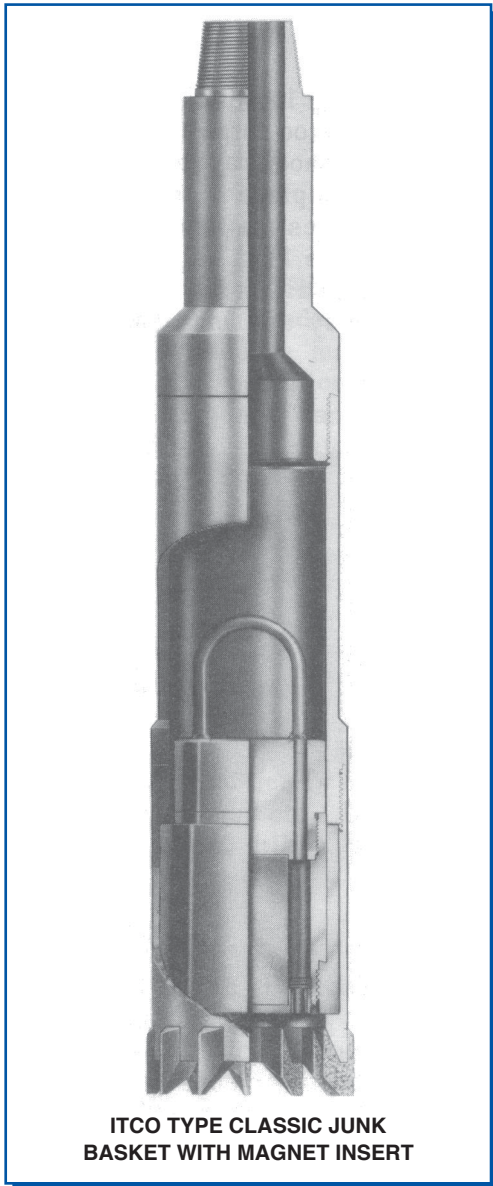
When junk is lying loose on the bottom of the well or when junk is too large to pass through the Catchers, a Finger Shoe may be installed on the bottom of the Barrel in place of the Mill Shoe. When the Junk Basket engages the fish, combined rotating and lowering cause the long fingers to close in beneath the fish and retain it in the Barrel. Finger replacements are easy and inexpensive to replace on the Shoe Body.



### Magnet Inserts

Magnet Inserts are available to convert Classic Junk Baskets into effective fishing magnets. The Magnet Insert is machined to fit into the recess normally occupied by the two Catchers. The Magnet Insert is used especially when in hard-to-drill formations and to thoroughly clean the hole prior to diamond drilling.





**ITCO TYPE CLASSIC JUNK  
BASKET WITH MAGNET INSERT**

### **OPERATION**

First determine that the Classic Junk Basket-Itco Type is properly assembled and that all parts are in good working order. (see "Reassembly")

Select the proper shoe:

- \* If the junk is large and lying loose on the bottom, use the Finger Shoe.
- \* If the formation is relatively soft and the Fish is loose, use a Type "A" Mill Shoe.
- \* If the formation is hard or the fish is imbedded in the formation, use either the Type "B" or Type "C"

Itcoloy-faced Mill Shoe. Also, these hard-faced shoes will cut away protruding excess metal to allow free entry of the junk into the basket.

Connect the assembly to the drill string and run it into the hole. Just before reaching bottom, start circulation at reduced pressure, begin rotation and slowly lower to contact the fish and bottom. Continue to rotate as weight is increased, permitting the Shoe to penetrate the formation. Penetrating the formation forces the junk completely into the barrel and cuts a short core.

After the core is cut, stop rotation and circulation, release the torque from the string, then take an upward strain to break the core. A Classic Hydraulic Jar made up in the string above the Classic Junk Basket will aid in quickly breaking the core.

As soon as the core is broken, the string and Basket may be removed from the well.

At the surface, break the joint between the Shoe and the Barrel, remove the Shoe and empty the Basket.

NOTES: When using Mill Shoes, maintain a ton of weight and rotate the Basket at a mill cutting rate of 50 to 150 rpm.

When using Finger Shoes, rotate and lower slowly until approximately two tons of weight is against the bottom.

### **MAINTENANCE**

The Classic Junk Basket - Itco Type is a relatively simple tool to maintain. For best operation and long service life the following procedure should guide the operator:

1. After use, the Junk Basket should be completely Disassembled and cleaned (see "Disassembly").
2. Inspect and replace as may be required any small parts, such as springs and fingers, that may be damaged.
3. Reassemble, greasing each internal part as it is assembled.
4. Dry and dope threaded connections as they are assembled.
5. After complete assembly, the entire outside of the Junk Basket should be painted or thoroughly greased, to present deterioration.

### **DISASSEMBLY**

1. Break the threaded joints between the Top Sub and Barrel, and between the Barrel and Shoe. This may best be done at the rig as the Junk Basket is removed from the hole.



2. Remove the Shoe from the Barrel. If the assembly is a large one, it may be necessary to use a lifting sub and large pipe vise to facilitate handling. If the Junk Basket is disassembled in horizontal position in a vise, care should be taken that the Catchers do not fall out as the Shoe is removed.
3. Lift out the two Catchers (or Magnet Insert) with their retrieved junk.
4. Remove the Top Sub from the Barrel.
5. If the Junk Basket is to be used again, immediately inspect the Catchers to assure they are not damaged and that all the Fingers work properly. If any damage is found, disassemble and replace the damaged parts, or use a spare Catcher. (see "Redressing Catcher Assemblies")
6. Thoroughly clean and lubricate all internal parts, and the interior of all the outside parts.

#### **REASSEMBLY**

1. Clamp the Barrel in a pipe vise.
2. Make up the Top Sub to the Barrel.
3. Insert the Lower Catcher into the Shoe. The Lower shoe is the one with alternate long and short Fingers. Insert the Upper Catcher into the Shoe above the Lower Catcher.

**CAUTION:** The Fingers hinge upward in operation. Make sure that both Catchers are installed so that they deflect upward in service. Also make sure that both Catchers are well greased just before assembly, and that both rotate freely in the Shoe.

When the Magnet Insert is used, it is inserted into the same recess as both Catchers, with its bail uppermost.

4. Make up the Shoe and its inserted Catchers (or Magnet Insert) to the lower end of the Barrel.
5. Tighten the two joints.
6. Paint or thoroughly lubricate the entire outside of the Junk Basket to prevent deterioration.

#### **REDRESSING CATCHER ASSEMBLIES**

##### **To Disassemble the Catcher:**

Completely disassemble the Catcher. The only tools required are a suitable screwdriver (with a 1/4" blade) and a vise if the Catcher is large.

Referring to the illustrations on next pages, proceed as follows:

1. Place the Catcher assembly on a workbench or in a vise, with the Retainer Ring at the top. Do not

exert enough force against the Catcher with vise jaws to maul or distort it.

2. Remove the two Retainer Screws (5).
3. Remove the Retainer Ring (2). This should be done slowly and with care. The Retainer Ring holds the several Torsion Springs deflected so that when the Retainer Ring is partially disassembled, it will tend to spring off due to the spring load behind it. If it is allowed to spring off unrestricted, parts may be lost or damaged.
4. Remove the Fingers (3) and the Torsion Springs (4).
5. Remove the Torsion Springs (4) from the Fingers (3).
6. Remove the Pivot Pins where these are used.
7. Clean all parts thoroughly, and inspect them for damage or excessive wear. Replace any parts not in good service condition.

##### **To Reassemble the Catcher:**

All Catchers are assembled by the same method, but more care must be taken with the Lower Catcher than with the Upper Catcher to assure that alternate long and short fingers assembled are in the proper sequence.

1. Check the Catcher replacement parts list to assure that the proper Fingers in correct quantity are being used. Grease all parts thoroughly.
2. Assemble a Torsion Spring (4) in one of the Long Fingers (3), so that one leg of the Torsion Spring is inserted into the small hole at the upper end of the Finger, and the other leg of the Torsion Spring is protruding out toward the code letter on the Finger.

**NOTE:** Some Catcher assemblies do not have Fingers with integral lugs. These assemblies utilize separate Pivot Pins. Fingers used in these assemblies are assembled with the Torsion Spring maintained in position by the pivot pin.

3. Insert the Finger with its assembled Torsion Spring into any one of the open slots in the side of the Body (1). The two pivot lugs on the Finger will nest into the smaller cross-slots at the upper end of the Finger slot.

**CAUTION:** Be sure to insert the Finger with the code letter toward the outside of the Catcher. These Fingers must be free to revolve inward toward the center of the

Catcher when the Retainer Ring (2) is installed, and the Fingers must be free to deflect upward when in service after assembly.

4. Install the first short Finger next to the first long Finger, in the same manner.
5. Install the second long Finger.
6. Continue installation of long and short Fingers, alternately until all have been installed.

After all Fingers have been installed, each Finger will have one leg of the Torsion Spring extending outward approximately 1/4" to 1/2" depending on size. Do not trim off these Torsion Spring Legs. They are necessary to the function of the Catcher Fingers.

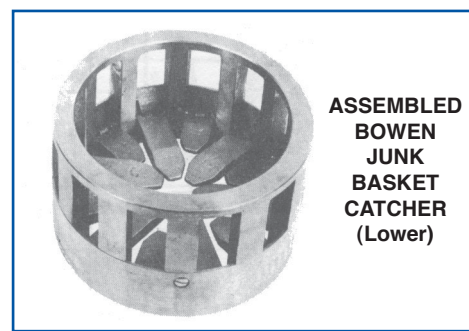
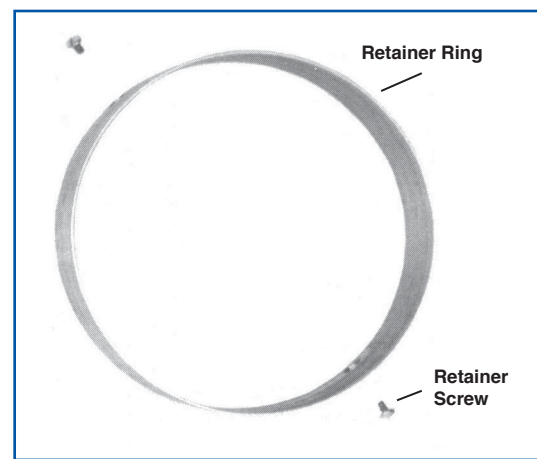
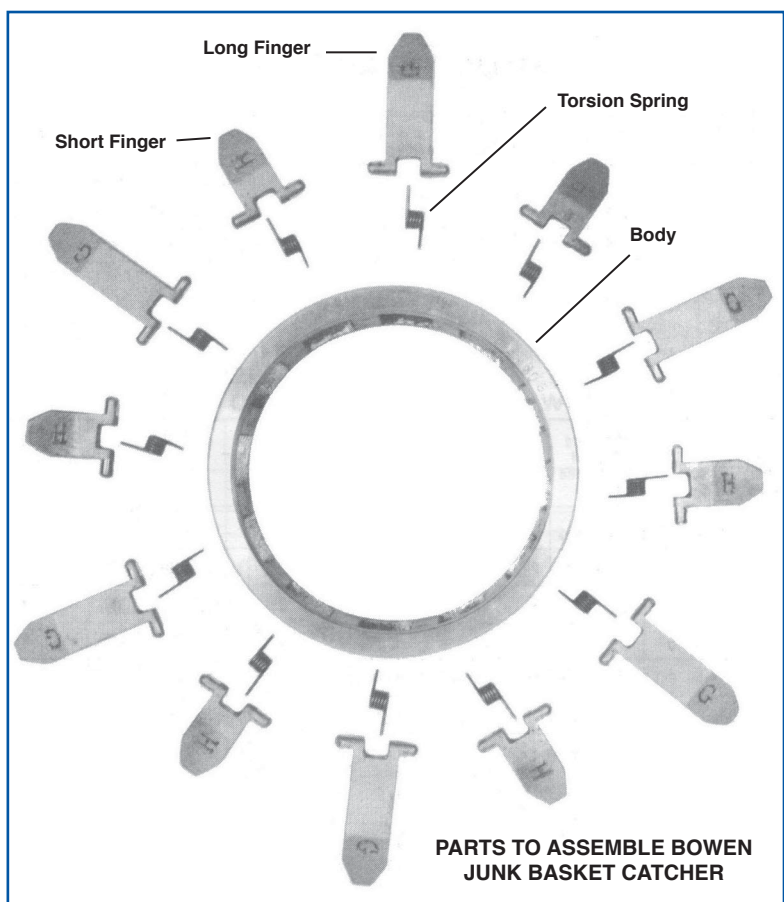
7. Slip the Retainer Ring (2) over the upper part of the Body (1), with the two holes at the bottom side. These two holes are 180° apart. They should be aligned with the two tapped holes in the Body.

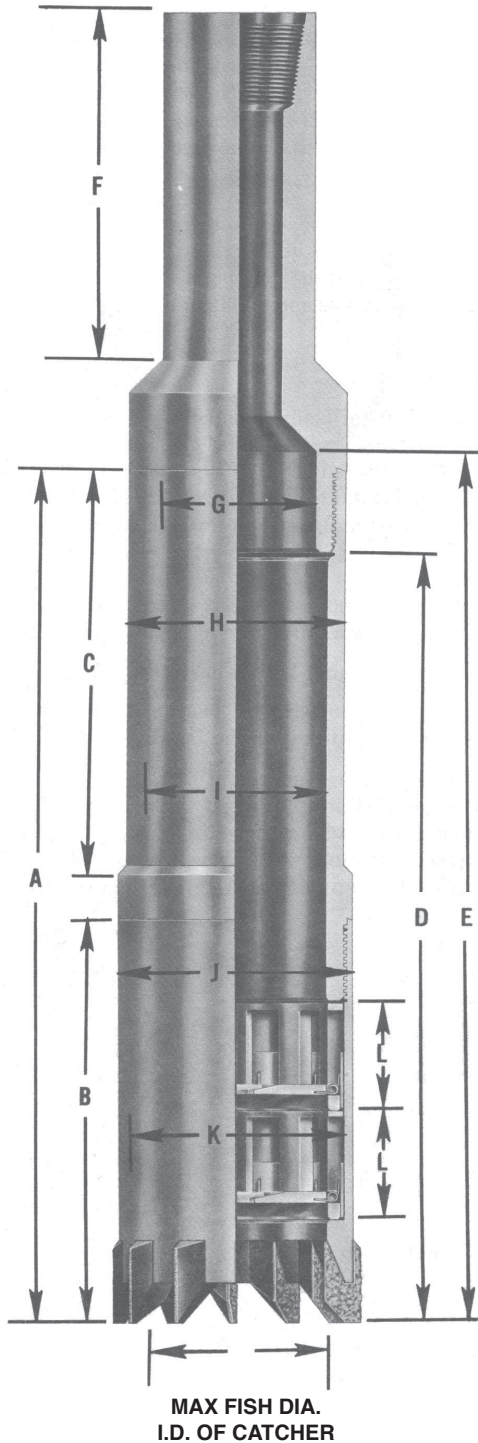
8. Shove the Retainer Ring down, deflecting the Torsion Spring legs until the bottom edge of the Retainer Ring rests on the series of shoulders near the center of the Body.

**NOTE:** If the Catcher is very large, two people may be required to assemble the retainer Ring; one maintaining the Fingers and Torsion Springs in place, while the second pushes the Retainer Ring down. The total force exerted by the Torsion Springs in large Catchers may be too great for one person to comfortably overcome.

9. Align the two holes in the Retainer Ring (2), with the two tapped holes in the Body (1).
10. Insert the two Retainer Screws, and tighten, making sure that the heads are completely centered in the Retainer Ring holes, and does not overlap the edge of the hole. Do not over-tighten these two screws.
11. Check the action of each of these assembled Fingers to assure proper deflection and retraction.

The Catcher is now ready for assembly in the Junk Basket.





### PRINCIPAL DIMENSIONS CLASSIC JUNK BASKET - ITCO TYPE

Hole Size	Standard O.D. of Hardfaced Shoe	Max. Fish Dia.	A	B	C	D	E	F	G	H	I	J	K	L
3 3/4 - 4 1/8	3 5/8 - 4 1/8	2 23/32	26 1/4	8 1/4	*	23	26 5/8	†	1 7/8	3 5/8	2 23/32	3 5/8	2 9/32	1 7/8
4 1/4 - 4 1/2	4 1/16 - 4 1/2	2 31/32	26 3/8	8 3/8	15 27/32	23 1/8	26 3/4	†	2 1/8	3 1/4	2 31/32	4 1/16	3 23/32	2 5/16
4 5/8 - 5	4 1/2 - 5	3 9/32	27 1/8	9 1/8	15 11/16	23 7/8	27 1/2	†	2 3/8	3 7/8	3 9/32	4 1/2	4 1/16	2 3/8
4 5/8 - 5	4 1/2 - 5	3 3/8	27	9	15 11/16	23 3/4	27 5/8	13	2 3/8	3 7/8	3 13/32	4 1/2	4 7/64	2 7/16
5 1/8 - 5 1/2	4 7/8 - 5 1/2	3 9/32	26 15/16	8 15/16	15 11/16	23 15/16	27 9/16	†	2 3/4	4 1/4	3 23/32	4 7/8	4 17/32	2 5/8
5 5/8 - 6	5 1/8 - 5 3/4	3 25/32	29 7/8	11 7/8	*	26 5/8	30 5/8	†	3 3/4	5 1/8	3 25/32	5 1/8	4 1/2	2 5/8
5 5/8 - 6	5 3/8 - 6	4 1/16	29 3/16	11 13/16	15 47/64	25 15/16	29 11/16	†	3	4 3/4	4 1/16	5 3/8	4 15/16	2 25/32
6 1/8 - 6 1/2	5 3/4 - 6 1/2	4 3/8	30 1/4	11 15/16	*	47 1/4	31 1/4	†	4	5 3/4	4 13/32	5 3/4	5 5/32	2 13/16
6 1/8 - 6 5/8	5 7/8 - 6 5/8	4 5/16	30 11/16	12 11/16	15 5/8	27 7/16	31	†	3 5/16	5 1/8	4 5/16	5 7/8	5 3/8	2 7/8
6 - 6 3/8	5 7/8 - 6 3/8	4 1/2	30 11/16	12 11/16	15 5/8	27 7/16	28	13	3 1/2	5 1/8	4 7/32	5 7/8	5 15/32	2 7/8
6 3/4 - 7 1/4	6 1/4 - 7 1/4	4 3/16	31 1/4	13 1/4	15 3/4	28	32 1/4	†	3 1/2	5 3/4	4 13/16	6 1/4	5 3/4	3 1/16
7 3/8 - 8 1/4	7 1/8 - 8 1/4	5 7/16	31 3/4	13 3/4	15 11/16	28 1/2	31 3/4	†	4 5/8	6 1/2	5 7/16	7 1/8	6 7/16	3 5/16
8 3/8 - 9 1/4	8 1/8 - 9 1/4	6 3/16	33 1/4	15 1/4	15 11/16	29 1/2	33 1/2	†	5 1/8	7 1/2	6 3/16	8 1/8	7 3/16	3 13/16
9 3/8 - 10 1/4	9 1/8 - 10 1/4	7 3/16	34 1/4	16 1/4	15 11/16	30 5/8	34 5/8	†	6 1/8	8 1/2	7 3/16	9 1/8	8 3/16	4 5/16
10 3/8 - 11 7/8	10 1/8 - 11 7/8	8 1/16	35 7/8	17 7/8	15 5/8	32 1/8	37 1/8	†	6 1/2	9 3/8	8 1/16	10 1/8	9 3/8	5
11 3/4 - 14 1/4	11 1/4 - 14 1/4	9 1/16	37 5/16	19 1/16	15 13/16	33 5/16	38 5/16	†	7 1/4	10 3/8	9 1/16	11 1/4	10 7/16	5 3/16
12 5/8 - 15	12 1/4 - 15	10 1/16	44 5/8	22 5/8	19 9/16	40 3/8	50 1/8	†	7 1/2	11 3/8	10 1/16	12 1/4	11 3/8	6
14 3/4 - 18	14 1/2 - 18	12 1/16	50 3/4	26 3/4	21	46	52 1/4	†	9 1/4	13 3/4	12 1/16	14 1/2	13 5/8	7

\* Flush from Shoe to Sub

† Length to order, specify box or pin connection.

## *Classic Fishing Magnets*

### GENERAL DESCRIPTION

Classic Fishing Magnets are the best special purpose Fishing tools available for retrieving undrillable objects having magnetic attraction. Small odd shaped items which cannot be caught by other conventional (inside or outside catch) fishing tools, are readily attracted and retrieved by Classic Fishing Magnets.

Magnets are available in sizes from 1" O.D. through 20" O.D., and with all popular threaded pin connections, for wireline or pipe operation. They are capable of exerting pulls from 5 pounds to 3,000 pounds, depending on size; and full circulation may be maintained through most of the magnets during service.

The Classic Magnet Charger is available as an optional accessory.

### USES

Tool failures, milling jobs, and accidents often cause objects such as bit cones, bearings, slips, mill cuttings, tong pins and hammers to collect at the bottom of the hole. In many instances, such objects can only be engaged and retrieved by magnetic attraction.

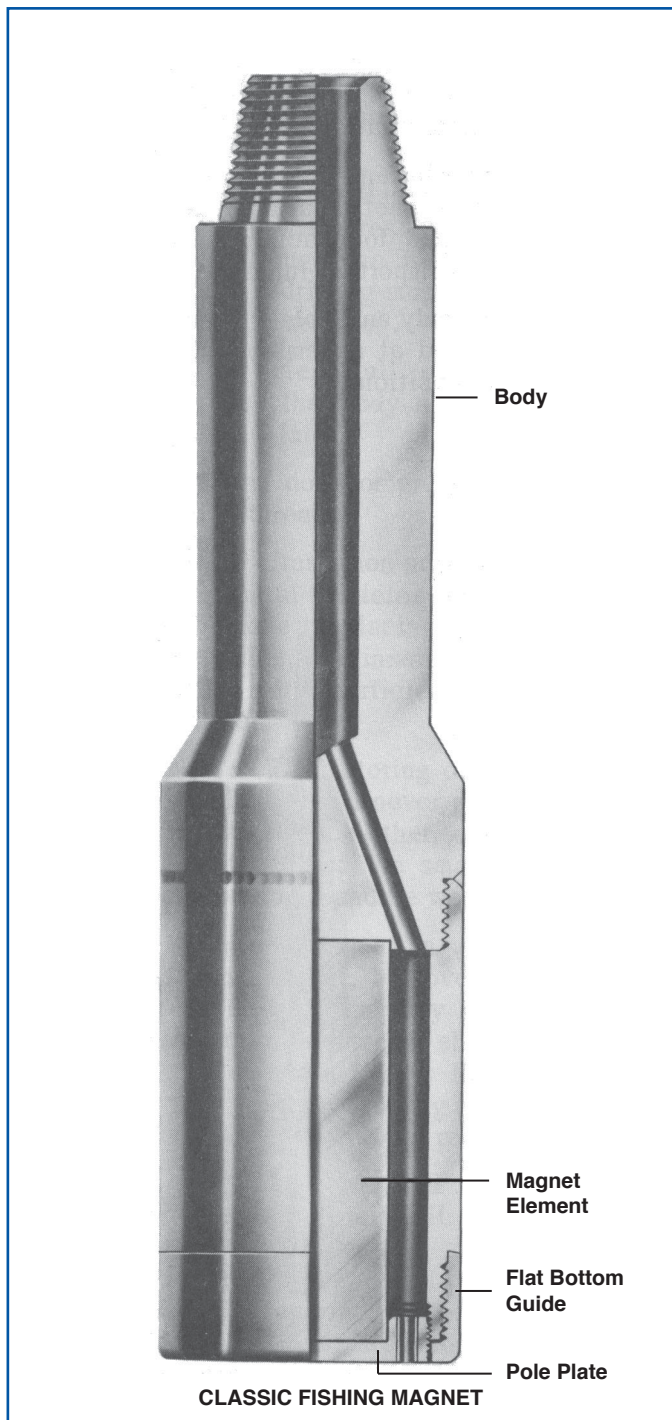
Classic Fishing Magnets are an indispensable accessory for all diamond coring operations. Particles such as chipped bit teeth and broken bearings can seriously damage or diminish the performance of a diamond core bit. Often, in a single run, Classic Fishing Magnets can completely cleanse the hole of all such particles, assuring the bit's safety and performance.

### CONSTRUCTION

The design of the Classic Fishing Magnet incorporates a patented construction using a special permanent magnet, in which the magnetic flux is concentrated in a controlled field around the Bottom Pole Plate. The Pole Plate is highly magnetic, and its field extends completely across the bottom end of the tool. Since no magnetism emanates to any other part of the tool, the outside case is not magnetized and the tool can be run inside cased holes without losing its effectiveness.

Generous circulation holes are provided through the body of the tool, and terminate in a series at the bottom of the tool inside the Fishing Guide. Circulation through these holes keeps the Pole Plate clean at all times.

The Classic Fishing Magnet consists of a Body, an





integral Housing, an integral Pole Plate, a Magnetic Element and a Bottom Guide.

The standard Guide is the Flush Guide type (having no extension below the Pole Plate). Optional guides available are the Lipped Guide, Mill Guide. The Body is manufactured from alloy steel. It has a suitable tool joint pin at its upper end, a thread at its lower end to engage the Housing, an ample circulation parts.

The Magnetic Element is the best, most efficient permanent magnet available. It is engineered and furnished to exacting specifications to best perform its important functions.

The Housing, Body and Pole Plate are screwed together and welded at assembly, with the Magnetic Element in position.

The Bottom Guide is removable to allow the Guide to be changed or repaired.

The Magnet assembly is magnetized after being completely assembled and is then given a final inspection.

## OPERATION

Classic Fishing Magnets are most often operated on tubing or drill pipe. However, where circumstances demand it, they may be operated on wireline.

Operation on wireline is achieved by utilizing Sucker Rod Adaptors, and Wireline Rope Sockets, which are also available from Classic. The Magnet, with a Flush Guide is lowered to the bottom of the hole and returned to the surface at a fairly slow speed. Operation on wireline is economical, but does not allow fluid circulation through the tool.

After the Magnet is assembled on the running string, lower it within 6" or 1 foot of the fish. Circulate the fluid long enough to wash out and remove heavy cuttings. Reduce circulation and lower the Magnet into contact with the fish. Rotate enough to assure good contact, and discontinue circulation.

The Flush Guide is used to catch objects such as sledge hammers, zublin cones, or flat objects too large to fit inside a Lipped or Mill Guide.

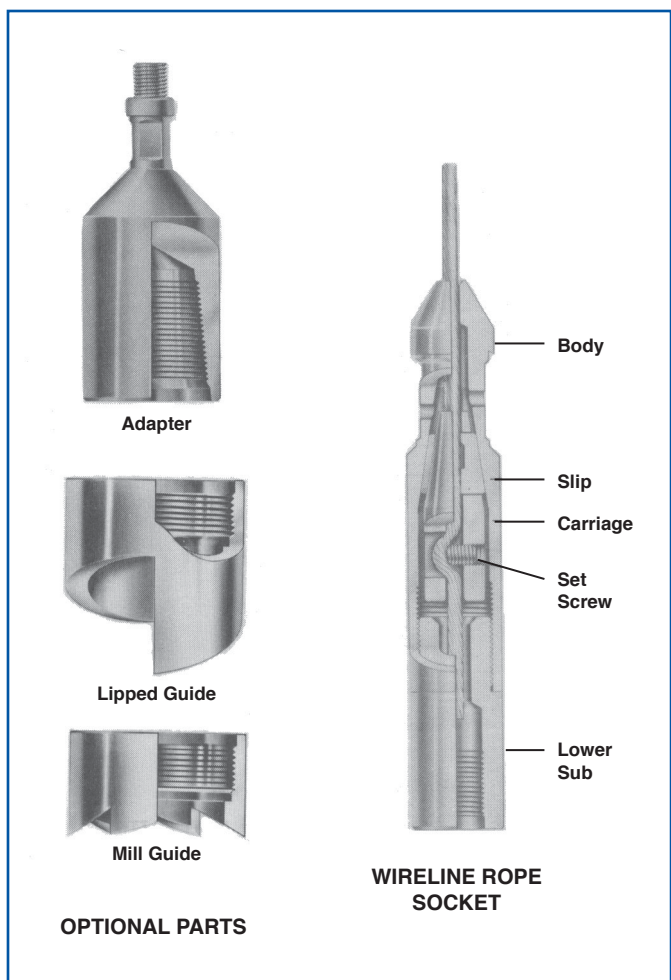
The Mill Guide is used when fishing for tong dies, one or two cones only, or during safety runs prior to diamond coring operations.

The Lipped Guide is used when three or more cones are lost in the hole. The purpose of using the Lipped Guide is to dig one of the cones out of the "nest"; roll it over one of the other cones and cause it to ride up to the Pole Plate.

After recovery of the first cone in this manner, it is good practice to replace the Lipped Guide with the Mill Guide for the second run.

The Lipped Guide should also be used for long objects which are lying to one side and need to be straightened up. For example: if an 18" pipe wrench is lost in the hole, it will usually lean to the side, therefore, the Lipped Guide should be used in order to "rake" it up straight, so that it may enter the Guide. Caution should be used in such cases, not to apply too much weight. Excessive weight will tend to push the object in to the formation, and may damage the Magnet Pole Plate.

Pull the Magnet to the surface and remove the fish. Before making a second run, assure that all circulation holes are clear and open. If necessary, remove any debris plugging these holes with a screwdriver or small rod probe. Repeat this procedure for any additional objects still in the hole.



### **Operational Examples: Fishing for One Cone**

Assemble the Classic Fishing Magnet with Mill Type Guide and run it in the hole.

Upon running the last stand or joint of the running string, make up the Kelly and start circulation immediately. Start the rotary at the same time. Rotate the tool down to within 6" or 1 foot of the fish. Leave the tool in this position for 3 or 4 minutes in order to wash the bottom of the hole clean. Observe the weight indicator closely for any sign of loss of weight. If loss of weight does appear, it is a positive indication that additional washing is required in order to reach true bottom. **DO NOT ROTATE YET.**

Lift the tool off bottom approximately 5 to 10 feet. Repeat the lowering and probing procedure, checking for the same depth and weight. Make sure there is not a subsequent weight loss.

After making sure that no more weight will be circulated off, engage the rotary. Using 3,000 pounds of weight, let the rotary turn 3 to 6 turns, observing whether there is torque resistance. Six turns should not give more than 1 or 2 turns of torque. If 5 or 6 turns of torque are returned with 5 or 6 rounds of rotary, take off about half the weight shown on the weight indicator and try rotating again. If the formation is hard or firm, this should be indicated by a jump of the rotary and subsequent smoothing out.

At this point, disengage the pump. Lift the tool 5 to 10 feet off bottom. Allow it to be idle for a couple of minutes. Slowly lower it back to bottom. **DO NOT USE THE PUMP AND DO NOT ROTATE.** Check the depth and weight on the fish. If the weight and depth check properly, turn the rotary 3 or 4 rounds. The same jump of the rotary and subsequent smoothing out will probably appear. It is good practice to repeat this last procedure, but it should be done without circulation.

It should be noted that this procedure will vary with hole conditions and with type and quantity of junk being fished.

Ample circulation and proper weight applications are the keys to success while running a Classic Fishing Magnet. In most cases, too much circulation is almost impossible, and the maximum weight that should be applied to any size Magnet during rotation is 5,000 pounds. Some jobs require no rotary. Maximum weight applied to any size magnet without rotation should, in most cases, be limited to 10,000 pounds.

Severe damage may be done to the Pole Plate and Magnetic Element by the application of excessive weight or rotation.

### **MAINTENANCE**

Maintenance of Classic Fishing Magnets is minimal, since the tools are never completely disassembled.

After each use the Magnet should be thoroughly washed out with fresh water. Circulate the fresh water through the tool from the pin until assured that all drilling mud, salt and other solutions have been removed. Allow the tool to dry.

Thoroughly clean all outside surfaces and paint or grease the Body and Housing - do not paint the Pole Plate.

Apply thread dope or grease to the tool joint pin and guide threads.

Inspect the circulation ports in the Pole Plate. Remove any metal particles found in these ports. This may be done by placing a screwdriver on the side of the Guide, and inserting the point into the holes, lifting metal particles out on the point of the screwdriver.

**CAUTION:** When storing or transporting more than one tool together, never place the bottom of two tools against each other, especially if one is larger than the other; the smaller tool will give up part of its charge and be weakened.

The Magnetic Element in a Classic Magnet is essentially permanent, but over a long period of time, or by mishandling may become weakened. When this occurs the magnet should be recharged. Unless the operator has a Classic Magnet Recharger, the tools requiring recharge must be returned to Classic for proper recharging.

Also, if through wear or damage, a magnet requires extensive repairs, it should be returned to Classic for such repairs. Classic's facilities allow the tool to be completely demagnetized, disassembled, repaired and reassembled under controlled conditions. Reassembly of these tools must be properly done if they are to function properly.

### CLASSIC'S MAGNET CHARGER

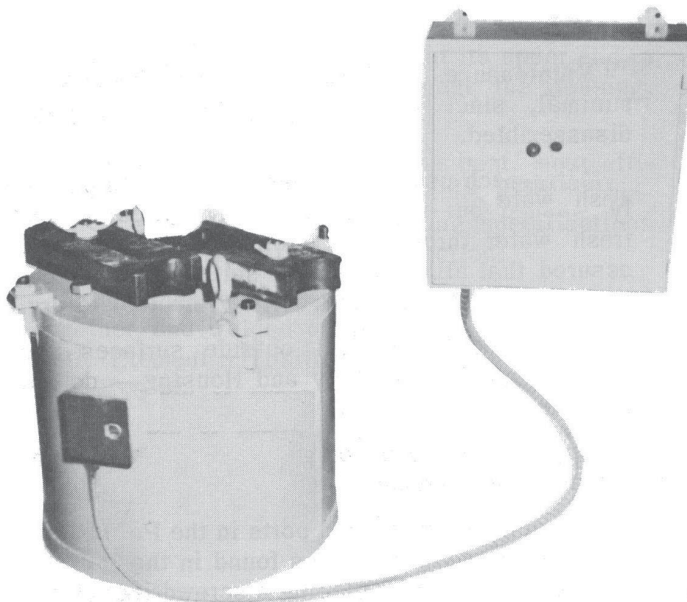
The Classic Magnet Charger is designed to induce a strong magnetic charge into bar type fishing magnets. It is able to do big charging jobs with small electrical service. The Classic Magnet Charger is a pulsed type unit and requires much less electrical power than ordinary continuous type chargers.

The Classic Magnet Charger includes a Power Supply Unit and Magnetizing Coil Unit. The solid state

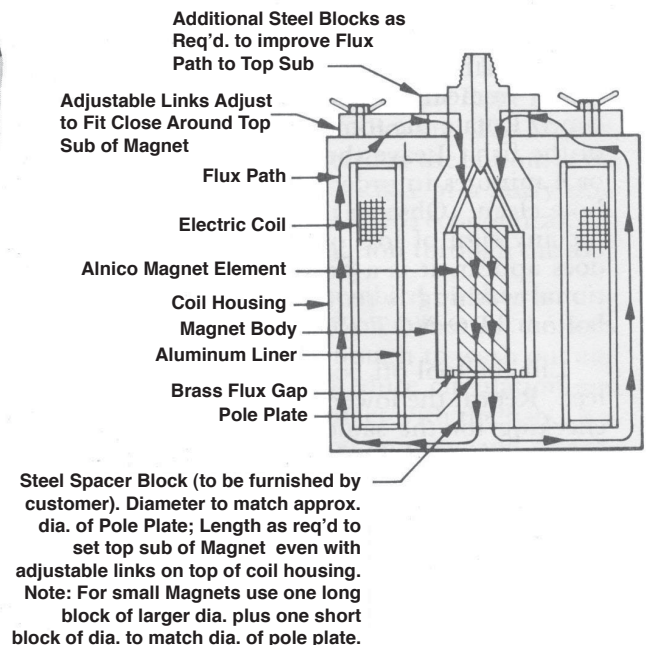
Power Supply Unit converts Alternating Current input into short-pulse, high-peak Direct Current output to the Magnetizing Coil.

The magnet is placed in the Magnetizing Coil and locked into place by means of adjustable arms which are a part of the magnetic circuit. A push of the button on the Power Supply Unit starts the magnetizing cycle, which automatically shuts off after the short interval of time required to reach peak magnetizing force.

CLASSIC'S MAGNET CHARGER



SCHEMATIC ARRANGEMENT  
FOR CHARGING FISHING MAGNETS  
IN CLASSIC'S MAGNET CHARGER COIL



### MAGNET CHARGER SET-UP PROCEDURE

#### A. To Adjust Power Supply

1. Disconnect magnetizing coil.
2. Remove fuses F1 and F2.
3. Set timing relay to maximum
4. Connect voltmeter "common" to PS-9 (zero volt bus).
5. Connect voltmeter (positive) to PS-8. Set meter on DC positive.
6. Turn on main switch.
7. Adjust R4 to obtain (+) 15 volts DC.
8. Connect voltmeter (positive) to PS-10. Set meter on DC negative.
9. Adjust R1 to obtain (-) 15 volts DC.

#### B. To Adjust Firing Module

1. Disconnect magnetizing coil.
2. Connect two 200-watt, 120-volt light bulbs in parallel across output terminals "positive" and "negative".
3. Remove fuse (F-2).
4. Place ohmmeter leads to read between output of diode "D1" and FM-10. Adjust R3 to read minimum (approx 10,000 ohms).
5. Connect voltmeter across load terminals "Pos" and "Neg".
6. Set timing relay "TR" to maximum.
7. Turn on main switch.
8. Depress pushbutton "PB".

9. Adjust R2 to obtain 60-65 volts DC across load.
10. Adjust R3 to reduce voltage back to 55 volts DC.
11. Turn main switch off.
12. Remove fuse F1 - install fuse F2.
13. Place ohmmeter leads to read between output of "D3" (on firing module circuit board) and FM-10. Adjust R-11 to read minimum (approximately 10,000 ohms).
14. Connect voltmeter leads across load terminals "Pos." and "Neg".
15. Set timing relay "TR" to maximum.
16. Turn on main switch.
17. Depress pushbutton "PB".
18. Adjust R10 to obtain 60 - 65 volts DC across load.
19. Adjust R11 to reduce voltage back to 55 volts DC.
20. Turn main switch off.
21. Replace fuse F2.
22. Remove light bulbs. Connect output terminals "Pos." and "Neg." to coil terminals "Pos." and "Neg.", respectively. Be sure to connect ground wire also.
23. Connect voltmeter across load terminals "Pos." and "Neg."
24. Turn main switch on.
25. Depress pushbutton PB.

26. Check terminal voltage - should read 110 - 120 volts DC.
27. Set timing relay "TR" on 2 seconds.  
The system is now ready to operate.

#### **C. Alternate Set-up with Oscilloscope**

Connect scope across output terminals "Pos." and "Neg."

1. Thru 8. Follow procedure as above.
9. Adjust R2 to cause SCR-1 to fire about 10° before peak.
10. Adjust R1 to cause SCR-1 to fire just before peak.
11. Thru 17. Follow procedure as above.
18. Adjust R10 to cause SCR-2 to fire about 10° before peak.
19. Adjust R11 to cause SCR-2 to fire just before peak.
20. Thru 27. Follow procedure as above.

#### **D. To Charge a Magnet**

1. Place iron spacers in bottom of coil as indicated. Spacers should be machined square and flat on ends.
2. Place magnet in coil as indicated. Adjust top links for best contact with top of magnet.
3. Depress pushbutton PB five times.



## *Classic Jar Intensifiers*

### GENERAL DESCRIPTION

The Classic Jar Intensifier is designed to be run in conjunction with the Type Z Classic Oil Jar. Its function is to supply acceleration to the collars and the upper portion of the Hydraulic Rotary Jar during its (jarring) free stroke.

Each Classic Jar Intensifier is designed to match a corresponding Type Z Classic Oil Jar. The Classic Jar Intensifier is essentially a hydraulic fluid spring which stores energy when a strain is pulled on the running string. When the strain is removed by the free stroke of the Jar, this stored energy is released, accelerating the drill collars and jar upward until a blow of high impact is struck.

### USE

During conventional jarring operations with either mechanical or hydraulic jars, the intensity of the blow struck is a function of, and proportional to the accelerated rapid movement of the entire running string above the jar. This accelerated movement will often be considerably diminished by friction of the running string against the wall of the hole. In such cases much of the energy will be lost. Also, at very shallow depth, the lack of available stretch in the running string causes a great loss in the effectiveness of expected acceleration, due to very small amount of stretch in the running string being available.

The Classic Jar Intensifier provides the means to store the required energy immediately above the jar and drill collars, to effectively offset the loss of stretch in, or drag on the running string.

An important secondary contribution of the Classic Jar intensifier is to utilize its contained hydraulic fluid to cushion the shock of the running string as it rebounds, after each jarring stroke. This reduces the inherent tendency to cause shock-damage to the tool and running string to a minimum.

Use of the Classic Jar Intensifier allows less drill collars to be used in a specific case than would otherwise be possible. This is particularly true at shallower operating depths, where excessive numbers of drill collars are sometimes used, to utilize mass in place of



CLASSIC JAR INTENSIFIER

available stretch. Use of too many drill collars with their great mass is often damaging to the tools and the running string, and should be avoided.

#### **OPERATION**

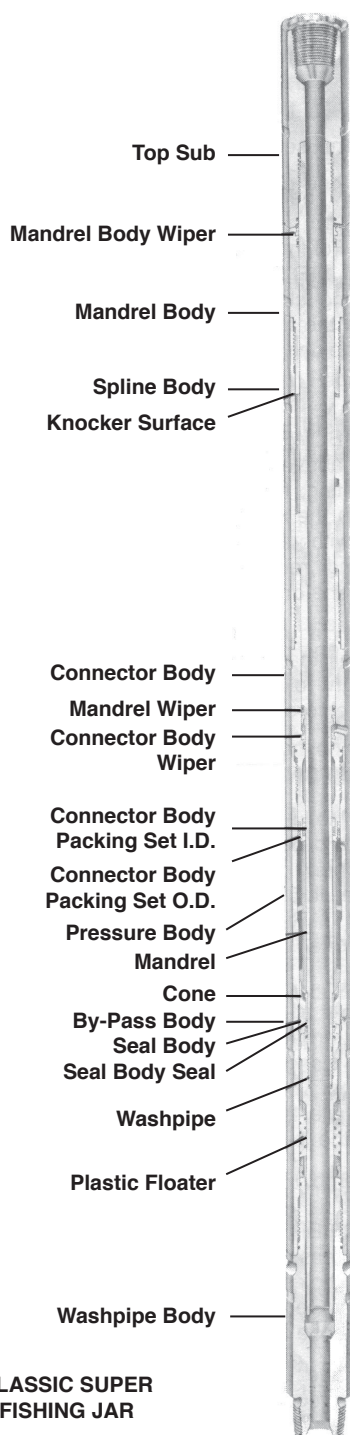
Prior to operation, the Classic Jar Intensifier should be examined to assure that it is completely assembled and in good working order.

The Jar Intensifier should be located in the running string immediately above the drill collars; just below the running string lower end. The jar should be located immediately below the drill collars and just above the fishing tools. The sequence from the fish upward should be: fishing tool, jar, drill collars, Jar Intensifier and running string.

The fishing operation should be run in conventional manner; the fish is engaged by the fishing tool, and a strain is pulled on the fishing string. This will cause the Jar Intensifier to stroke 6" to 13", depending on size, compressing the hydraulic fluid and storing energy at the Intensifier. This stored energy will cause the jar to operate. When the jar trips, the Intensifier imparts its stored energy to the drill collars and jar mandrel, in the form of acceleration, causing the jar to strike a blow of very high impact value.

This procedure is repeated as many times as is required to free the fish.

## Classic Super Fishing Jar



### GENERAL DESCRIPTION

The Classic Super Fishing Jar is a straight-pull operated jar which employs a patented combination of proven principles of hydraulics and mechanics. This jar is simple to assemble and its unique design allows for easy operation.

No setting or adjustment is required before going in the hole, or after the fish has been engaged. The Classic Super Fishing Jar is designed to permit the operator to easily and simply control the intensity of the jarring blow within a wide range, from a very light impact to a blow of very high impact. The unique impact control of the Classic Super Fishing Jar is made possible by the metering action of the patented cone assembly. As pull is applied to the jar, oil is forced from one side of the cone to the other through a metering slot. By being forced through a restricted passage, the fluid flow is retarded in such a manner that the stroke is delayed until the operator has ample time to take the necessary stretch in the running string (and Intensifier, when it is used) to strike a blow of given impact.

Another important feature of the Super Fishing Jar is the ease of closing or resetting. Only sufficient weight to overcome friction is required. Closing is free of any danger of causing damage to the tool, since the metering action does not take place during resetting. During resetting, large ports are opened in the cone assembly, allowing unimpeded flow of fluid from one cavity to the other.

Other important features are: The ability to transmit full torque at all times during operation, in either direction; the ability to deliver a rapid series of blows when desired, the only limitation being the time required to raise and lower the fishing string the short distance required to make each stroke; this tool does not interfere with the free operation of fishing tools, formation testers, safety joints, reversing tools, etc.

### USES

#### Fishing

When used in fishing operations, a Classic Super Fishing Jar should be installed immediately below a string of drill collars. For maximum effectiveness of jarring, a Classic Jar Intensifier should be installed in the fishing string. The intensifier should be located in the fishing string about four drill collars above the jar.

#### Coring

The Classic Super Fishing Jar is often run just above a diamond core barrel. As in drill stem testing, from three to fifteen drill collars are placed in the string, just above the Jar.

Breaking a core without a Jar in the string is often awkward and requires considerable pull load be taken in the drill pipe.

When a Jar is in the string, moderate pull load is all that is required to deliver a comparatively light blow which is usually sufficient to break the core.

### OPERATION

Prior to use, the Classic Super Fishing Jar should be carefully examined to assure that it is properly assembled and filled with Classic Jar Lube. The tool should be tested in a Classic Jar Tester (or equal testing equipment) if one is available, to assure proper performance.

Check all threaded connections to assure that they are made up as tight as the joints in the running string. Do not tong on the threaded connections; tong at least 4" from the joint.

Assemble the Jar in the string below the drill collars. It is recommended that a Classic Jar Intensifier be run with the Jar for maximum effectiveness; particularly in shallow, deep or crooked holes. When the Intensifier is run, it should be located in the string about four drill collars above the Jar.

NOTE: See Classic Instruction Manuals for recommended weights to be run with Classic Jar Intensifier.

To strike the initial blow, raise the string enough to take the stretch judged necessary to produce the required impact; set the brake, and wait for the jar to hit. The first blow may take from a few seconds to several minutes, depending on circumstances. The variables are depth of operation, amount of stretch in the string, whether an intensifier is used, down-hole temperature and mechanical condition of the hole.

For example, when a crooked hole prevents a uniform stretch over the entire string, it is impossible to exert as much pull at the Jar as would be exerted if the hole were straight.

The operator should use caution in applying pull load to the Jar. He should not exceed the safe working load for the particular Jar being used. Especially on the first pull, the tendency is to speed the action by applying additional load. Determine the maximum safe working load for the Jar, and never exceed this load during operation.

The velocity, and the relative impact load of the blow is controlled by the amount of stretch taken in the running string and the weight of the drill collars installed above the Jar.

After a stroke has been made, it is only necessary to

close the Jar and then to take the necessary stretch in the string to strike the next blow. Several blows per minute, at any desired intensity, may be struck, even in a crooked hole.

CAUTION: The Jar will usually be brought out of the hole in the open position. Perform Rig Floor Maintenance. It should be closed, taken from the string and laid on the derrick floor. Once closed, the Jar should not be left suspended from the elevators, especially with any appreciable weight suspended below it. In this position the Jar can open, dropping the length of its travel and may cause damage to the rig or injury to crewmen.

Listed below are difficulties and their corrective procedures sometimes encountered by operators:

1. If not able to hit the first blow:
  - A. Pull up to the desired stretch in the string and set the brake. Hold this position until the Jar strikes its blow.
  - B. Increase the tension in the running string if possible, but do not exceed the allowable working load on the Jar.
2. If unable to hit the second blow, lower the string farther, as the Jar is probably not closing sufficiently.
3. If the blows being struck are not as heavy as desired:
  - A. Be sure that the Jar is fully closed.
  - B. Pull the running string up faster.
  - C. Increase the number of drill collars installed above the jar.
  - D. Install a Jar Intensifier above the drill collar.

### RIG FLOOR MAINTENANCE

After moderate use on a short job, the Jar is usually kept at the rig site where it will require only minor maintenance which, in most cases, may be done on the rig floor.

Immediately after removal from the fishing string, flush all mud from the bore especially in the Washpipe Body and around the Washpipe. Also flush all mud from the Connector Body Pressure Balance Ports on the O.D. of the Connector Body. The Mandrel seal surface should be cleaned, well greased to prevent rust and then the Jar should be pushed into the closed position until its next use.

Before storing, coat box and pin threads with Classic Itcolube (anti-gall grease) to prevent corrosion and to aid make-up in next use. The Jar should be stored with the Mandrel end up or horizontally on a suitable rack.



## *Classic Drill Collars*



### **GENERAL DESCRIPTION**

Classic Drill Collars are manufactured from AISI Series 4145 H Fully Heat Treated, quenched and tempered, full length steel to insure maximum strength. A hardness range of 285 - 341 BHN and a minimum Izod impact strength of 40 foot pounds is guaranteed at one inch below the surface at room temperature.

Classic Drill Collars are designed to be used in drilling, fishing and coring operations where an extra weight is needed to enhance the effectiveness of the tool(s).

### **USES**

#### **Drilling**

Classic Drill Collars are used in drilling operations to add extra weight and stability to the drill string and drill bit. The additional weight puts more pressure on the drill bit therefore enhancing its performance. The rigidity of the collars allows stability and straightness in the drill string thus permitting more accuracy in the drilling operations.

#### **Fishing**

Classic Drill Collars greatly enhance the effectiveness of many types of Fishing Tools. Classic Drill Collars work in conjunction with spears, overshots, junk baskets, fishing jars, bumper subs, casing rollers, and repair and remedial tools.

#### **Coring**

Classic Drill Collars permit better stability and straightness during coring operations by applying needed pressure to the core cutterhead or core drill. This added weight also allows for truer formation samples to be taken in the core barrel.

### **NOTES ON DRILL COLLARS**

#### **Surface Finish: As Rolled**

This is the same finish on the bar when it is received from the mill. An "as rolled" bar meets API specifications on OD tolerances and all nominal drill collar requirements.

#### **Machined**

A machined finish drill collar has 1/8" to 1/4" of steel machined off the OD of the raw bar.

**Note:** "As rolled" collars are usually recommended because of the expense involved in obtaining a machined finish with no appreciable difference in drill collar quality.

## Length

API Range 2 drill collars are available in 30, 31 and 32 foot lengths and Range 3 drill collars in 42 or 43 1/2 foot lengths (See drill collar table).

## Connections

Classic drill collar connections are all machined to API specifications with these special features available on request.

1. API relief groove on pin or box.
2. Cold rolled thread roots.

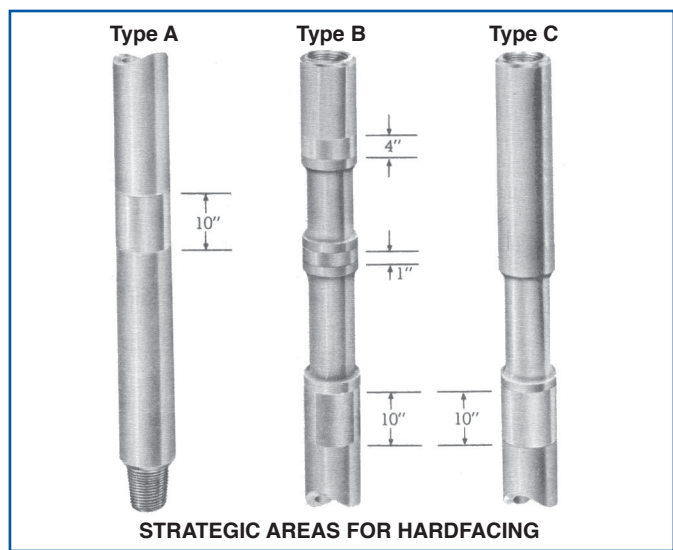
To minimize galling, all connections are immersed in a chemical solution to help hold drill collar lubricant. Thread protectors are furnished on most popular size drill collar joints.

When ordering or requesting quotation, please state:

1. O.D. - bore - length.
2. Size and type of connection (both ends) and special joint features.
3. Surface finish.
4. Additional features such as elevator and slip recesses.
5. Slick or Spiral Grooved.
6. Type of hard metal application A, B, or C (if desired).

## Hardfacing

Hardfacing, applied to strategic areas of the drill collar, helps increase drill collar life. Classic collars are hardfaced under closely controlled preheat and postheat conditions using an automatic, metal-arc, inert gas shielded, consumable electrode process.



Material used is granular tungsten carbide which automatically fed into a molten weld puddle to obtain uniform distribution of the particles. Hardfacing is applied flush to 1/32" above the OD of the collar.

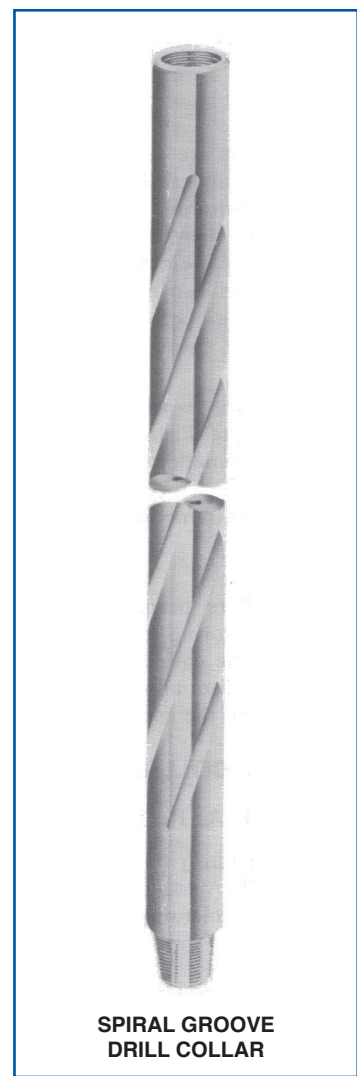
## Spiral Groove

Classic Tools utilizes the latest technology in machine tool design and controls. Many unique features were incorporated in the design making it the fastest and most accurate machine of its kind.

Classic Spiralled Drill Collars reduce the area of contact with the wall of the hole to reduce the chances of sticking.

When using Spiralled collars, the box end should be left uncut for at least 18" and no more than 24" below the shoulder. The pin end should be uncut for at least 12" and no more than 22" above the shoulder.

Using Spiralled Drill Collars reduces the weight of slick drill collars approximately 4 percent.



## SPECIAL FEATURES

### Slip and Elevator Recesses

Slip and elevator recesses eliminate the need for lift subs and safety clamps and therefore cut drill collar handling time. Careful machining produces smooth radii, free of tool marks. The radii are also cold rolled at the upper shoulders to help strengthen the machined areas.

### Stress Relief

The API Relief Groove Pin and the Bore Back Box remove unengaged threads in highly stressed areas of the drill collar joint. These features produce a more flexible joint, more resistant to fatigue cracking. Bending in the joint occurs in the smooth, stress relief areas.

### Cold Rolling

Cold rolling is the pre-stressing of the thread roots of the drill collar joint and results in a more durable connection. A hydraulic ram forces a roller into the thread root and follows the root down the thread spiral. The roller has the same contour as the thread root and the pressure between the roller and the root compresses the

metal in the thread root. This compression of the fibers in the thread root results in a stronger connection that can withstand bending stresses longer without fatigue damage.

### Lift Plugs

The thread section of all lift plugs is machined from AISI 4145H heat treated alloy steel. The center section is bored out for weight reduction.

When ordering or requesting quotation, please state:

1. Drill collar OD (A).
2. Drill collar connection size and type.

### Lift Subs

Lift subs are of one piece construction, machined from AISI 4145H heat treated, alloy steel.

1. Drill collar OD. (A)
2. Tool joint OD (B).
3. Tapered or square shoulder.
4. Drill pipe OD.
5. Drill collar connection size and type.

## RECOMMENDED SLIP AND ELEVATOR RECESS DIAMETERS

A COLLAR O.D.	B ELEVATOR RECESS DIAMETER	C SLIP RECESS DIAMETER	R ELEVATOR RECESS RADIUS	TOP ELEVATOR BORE	LOWER HALF ELEVATOR BORE
4 1/8	3 11/16	3 3/4	1/8	3 13/16	4 1/8
4 3/4	4 1/4	4 3/8	1/8	4 3/8	4 7/8
5 3/4	5 1/8	5 1/4	1/8	5 1/4	5 7/8
6	5 3/8	5 1/2	1/8	5 1/2	6 1/8
6 1/4	5 5/8	5 3/4	1/8	5 3/4	6 3/8
6 1/2	5 7/8	6	1/8	6	6 5/8
6 3/4	6	6 1/4	3/16	6 3/16	6 7/8
7	6 1/4	6 1/2	3/16	6 7/16	7 1/8
7 3/4	6 1/2	6 3/4	3/16	6 11/16	7 3/8
7 1/2	6 3/4	7	3/16	6 15/16	7 5/8
7 3/4	7	7 1/4	3/16	7 3/16	7 7/8
8	7 1/4	7 1/2	3/16	7 7/16	8 1/8
9	8 1/8	8 1/2	1/4	8 3/8	9 1/8
9 1/2	8 5/8	9	1/4	8 7/8	9 5/8
8 3/4	8 7/8	9 1/4	1/4	9 1/8	9 7/8
10	9 1/8	9 1/2	1/4	9 3/8	10 1/8

All dimensions are given in inches, unless otherwise stated.

## CLASSIC DRILL COLLARS

CONNECTION	1 1/4 'MT'	1 1/4 REG.	2 3/8 S.H.	2 3/8 REG.	NC23-31 238 PAC	NC23-31 278 PAC	NC26-35 2 3/8 IF	NC26-35 2 3/8 IF	NC26-35 2 3/8 IF	2 7/8 H-90	NC31-41 2 7/8 IF	NC31-45 2 7/8 IF	NC38-47 3 1/2 IF	NC38-47 3 1/2 IF	NC35-47	NC38-50 3 1/2 IF	NC44-60
O.D.	1 3/4"	2 1/4"	2 7/8"	3 1/8"	3 1/8"	3 1/8"	3 1/2"	3 1/2"	3 1/2"	3 3/4"	4 1/8"	4 1/2"	4 3/4"	4 3/4"	4 3/4"	5"	6"
I.D.	3/4"	5/8"	1 1/4"	1"	1 1/4"	1 1/4"	1 3/4"	1 1/2"	1 1/2"	2"	2"	2"	2 1/4"	2 3/8"	2"	2 1/4"	2 1/4"
BENDING STRENGTH RATIO	N/A	N/A	2.50:1	3.20:1	3.00:1	3.00:1	2.73:1	2.42:1		N/A	2.43:1	3.48:1	1.87:1	2.13:1	2.58:1	2.38:1	2.49:1
COMPLETE ASSEMBLY Approx. Wt (Lbs.)	200	374	537	702	659	659	736	801		806	1043	1302	1405	1356	1536	1652	2561

CONNECTION	NC44-60	NC44-62	NC46-62 4 IF	NC46-65 4 IF	NC46-65 4 IF	NC46-67 4 IF	NC50-70 4 1/2 IF	NC50-70 4 1/2 IF	NC50-72 4 1/2 IF	NC56-77	NC56-80	6 5/8" REG.	NC61-90	7 5/8" REG.	NC70-97	NC70- 100	NC77- 110
O.D.	6"	6 1/4"	6 1/4"	6 1/2"	6 1/2"	6 3/4"	7"	7"	7 1/4"	7 3/4"	8"	8 1/4"	9"	9 1/2"	9 3/4"	10"	11"
I.D.	2 13/16"	2 1/4"	2 13/16"	2 1/4"	2 13/16"	2 1/4"	2 1/4"	2 13/16"	2 13/16"	2 13/16"	2 13/16"	2 13/16"	2 13/16"	3"	3"	3"	3"
BENDING STRENGTH RATIO	2.84:1	2.91:1	2.63:1	2.76:1	3.05:1	3.18:1	2.54:1	2.73:1	3.12:1	2.70:1	3.02:1	2.93:1	3.17:1	2.81:1	2.57:1	2.81:1	2.78:1
COMPLETE ASSEMBLY Approx. Wt (Lbs.)	2353	2806	2598	3085	2877	3364	3643	3434	3714	4309	4675	5016	6050	6727	7130	7533	8970

\*NOTE: All optional equipment including Lift Bails, Zip Lift, Stress Relief Grooves, Hardfacing and Spiral Groove Collars are available upon request.

The Drill Collar Number consists of NC (Number Connection), a two digit number indicating the Pitch Diameter of the connection in units and tenths, a hyphen, a 2 or 3 digit number consisting of the Outside Diameter in units and tenths. The size and style indicate interchangeable connections.

All dimensions are given in inches unless otherwise specified.

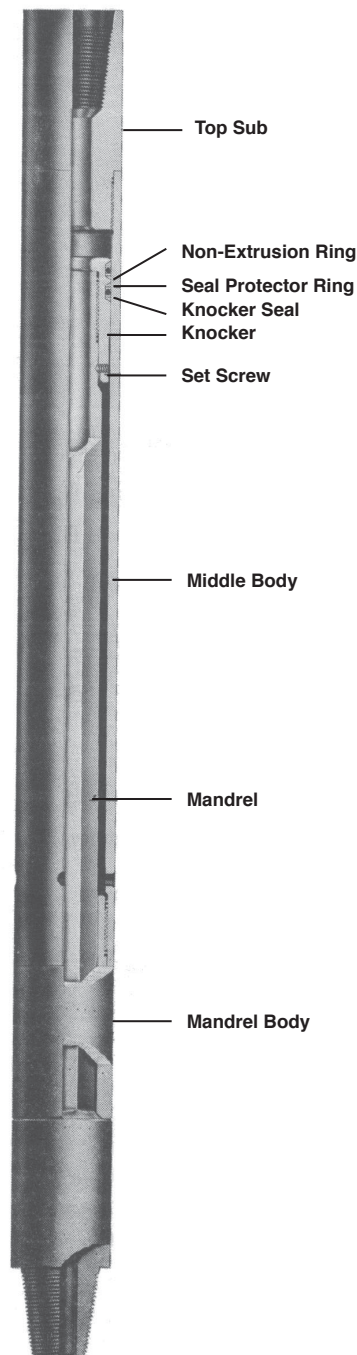
Classic Drill Collars are available in 30', 31' and 32' lengths. Please specify desired length when ordering.

When ordering please specify:

1. Part number, O.D., I.D. and length.
2. Size and type of connection (both ends) and special joint features.
3. Surface finish.
4. Additional features such as elevators and slip recess.
5. Slick or spiralled groove.
6. Tapered or square shoulder.



## Classic Fishing Bumper Subs



### GENERAL DESCRIPTION

The Classic Fishing Bumper Sub was designed to provide a relatively inexpensive yet durable bumper sub for use in all fishing operations. Made from high grade, heat-treated alloy steels, it has the strength to perform sustained bumping operations with a minimum of maintenance.

### OPERATION

Examine the Classic Fishing Bumper Sub to be sure that it is properly assembled, that all threaded connections are made up tightly and that it is the proper size for the hole diameter and the fishing string with which it is to be run.

#### In Fishing Operations

The Classic Fishing Bumper Sub is installed in the fishing string immediately above the fishing tool or safety joint. Its presence in the string enables the operator to release the fishing tool in the event it becomes impossible to pull the fish. The Classic Fishing Bumper Sub will deliver the sharp downward blow (and transmit the torque) that is required to break the fishing tool's engagement and to release it from the fish.

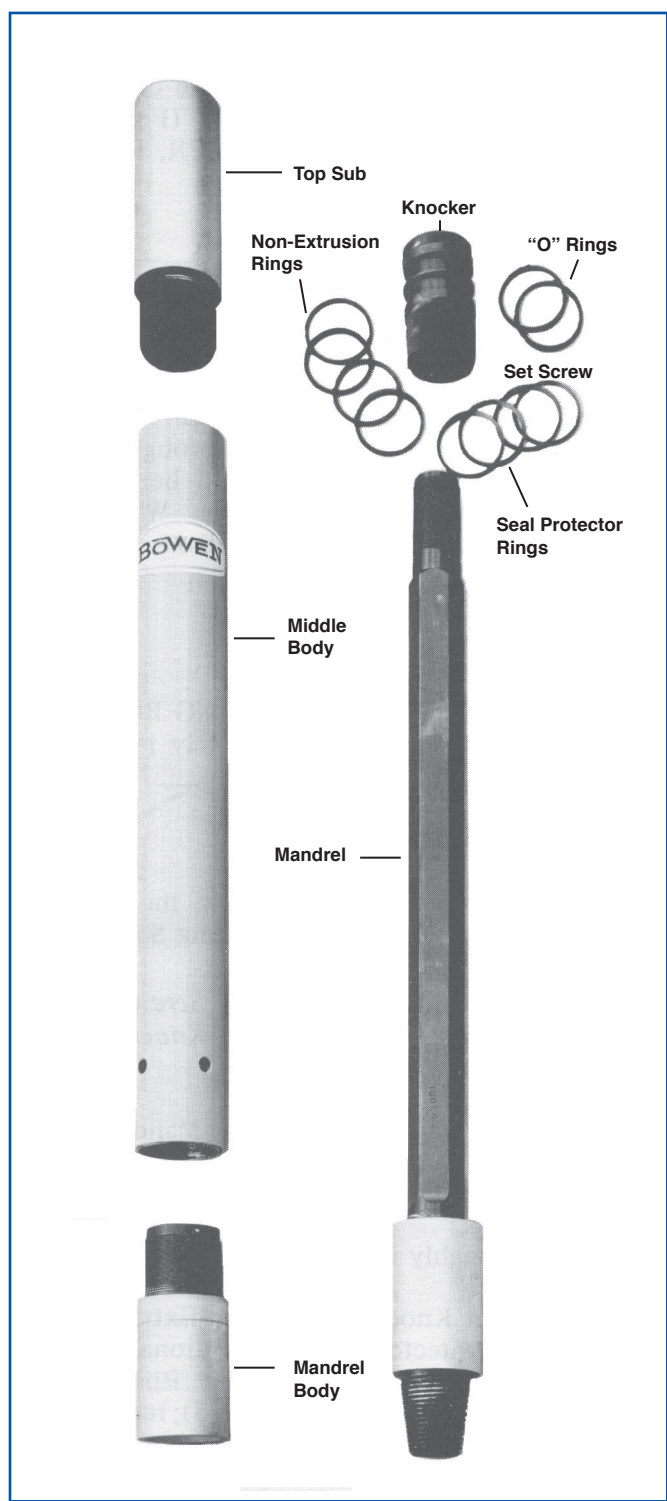
#### To "Bump Down" in the Hole

Elevate the fishing string to open the Classic Fishing Bumper Sub completely and take a strain or stretch in the string. This will be the length of the stroke plus the permissible stretch in the fishing string.

Drop the fishing string sharply (to within 6 inches of the closed position of the sub) and stop it abruptly with the brake. If sufficient stretch has been taken in the fishing string, this will cause the lower end of the fishing string to spring downward, closing the Classic Fishing Bumper Sub and due to the elasticity of the string, deliver a series of downward blows to the tool below the sub.

#### To Bump a Solid Downward Blow in the Hole

Elevate the fishing string to open the Classic Fishing Bumper sub completely plus a moderate strain or stretch in the string. This will be length of the stroke plus the permissible stretch of the string.



Drop the fishing string sharply this full length, without braking. This will cause the Classic Fishing Bumper Sub to close quickly! The lower end of the Mandrel Body will strike the shoulder on the lower end of the Mandrel, transmitting a single solid downward blow to the tool below.

#### **To Jar Up in the Hole**

Elevate the fishing string sufficiently to stretch it moderately. Then drop the fishing string a distance equal to the stretch taken only, and stop it abruptly with the brake. This will cause the lower end of the string to spring downward, causing the Classic Fishing Bumper Sub to close slightly, and then the string will rebound, causing the bumper sub to open quickly and the upper end of the Mandrel Body will strike the Knocker a solid upward blow.

#### **To Bump a Solid Blow at the Surface in Order to Disengage a Fishing Tool**

Leave a single or a drill collar above the Classic Fishing Bumper Sub. Open the Bumper Sub sufficiently to install the head of sledge hammer between the Mandrel Body and the shoulder on the Mandrel. Slack off the elevators. Pull the sledge from between the Mandrel Body and the Mandrel shoulder. This will cause the Classic Fishing Bumper Sub to close quickly and the lower end of the Mandrel Body will strike the shoulder of the Mandrel, delivering a solid, downward blow to the fishing tool and effecting a release of the fishing tool.

#### **As a "Feed-Off" Tool**

The Classic Fishing Bumper Sub may be employed as a "feed-off" tool. In this operation, the Classic Fishing Bumper Sub is installed in a cutting string a number of joints above a Classic Internal Cutter. Since the Bumper Sub has a 20" stroke, the cutting string is picked up only 10 inches after the cutter is set, thus only the predetermined weight of the pipe between the cutter and the Bumper Sub is applied to the cutter, assuring a smooth operation of the cutter.

## *Classic Lubricated Fishing Bumper Subs*

### **OPERATION**

#### **When Used in Drilling Operations**

The Classic Lubricated Fishing Bumper Sub is usually installed in the drilling string immediately above the drill collars. The Bumper Sub serves several purposes as mentioned in "USE". It is an excellent safety device, particularly when working in sticky formations, very deep holes or crooked holes, when drilling out cement in heavy mud, in coring jobs, and when running bits or reamers with restrictive bores.

#### **When Used in Fishing Operations**

The Classic Lubricated Fishing Bumper Sub is usually installed in the fishing string immediately above the fishing tool, safety joint or unlatching joint.

The Classic Lubricated Fishing Bumper Sub's primary purpose is to enable the operator to release the fishing tool in the event that it becomes impossible to pull the fish. It will deliver the necessary impact and impart the required torque that is required to release the tool from the fish.

There are a number of secondary uses for the Bumper Sub:

#### **To Release the Recovered Fish at the Top of the Hole**

This is accomplished by gripping the fish immediately below the fishing tool and, after opening the Classic Lubricated Fishing Bumper Sub, dropping a stand of drill pipe heavily down against the Bumper Sub. This will cause a sharp enough downward blow against the fishing tool to break the "freeze", after which the fish may readily be removed. In the event that insufficient impact may be produced by the stand of drill pipe, one or more drill collars may be inserted in place of the drill pipe, and the process repeated with more effect.

#### **To "Bump Down" in the Hole**

Elevate the fishing string sufficiently to open the Bumper Sub the full length of its stroke and take a strain on the pipe. This will require 10" to 18" to open the tool. Add enough pull to put a permissible amount of stretch in the drill or fishing string. The permissible stretch will

depend on the size of the pipe and its length above the Bumper Sub.

Drop the string sharply for a distance equal to the stretch in the string plus 9 1/2" to 12", depending on the size of the tool; and stop it abruptly with the brake. If sufficient stretch has been taken in the string, this will cause the lower end of the fishing string, i.e. immediately above the tool, to spring downward, closing the Bumper Sub. Due to the elasticity of the string, coupled with the natural rebound from the striking surfaces in the tool, a rapid series of resonant blows will be delivered to the tool below the Bumper Sub.

#### **To Bump a Solid Downward Blow in the Hole**

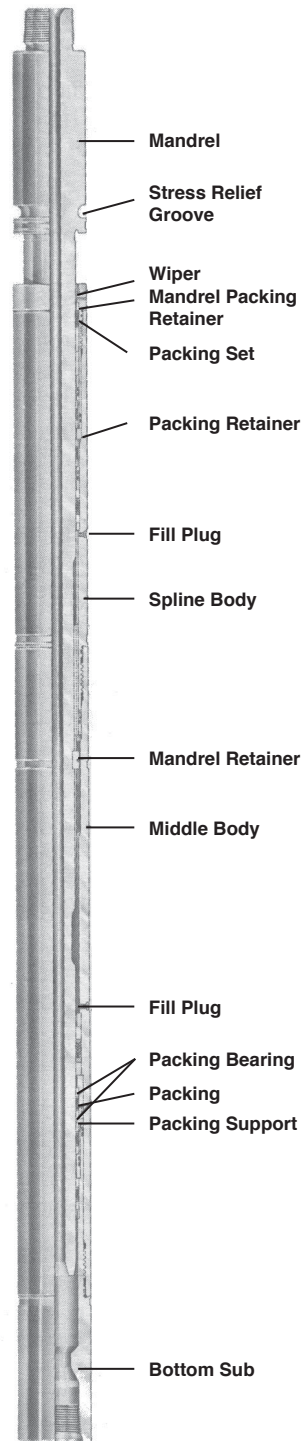
Elevate the string to open the Bumper Sub completely, and take a moderate strain or stretch in the string. This will require 15" to 20" at the tool plus stretch in the string.

Drop the running string sharply this full combined length without any braking action. This will cause the Bumper Sub to close quickly. The shoulder of the Mandrel will strike the Mandrel Body shoulder, transmitting a single, solid downward blow to the tool below the Bumper Sub.

#### **To Jar Up in the Hole**

Elevate the running string sufficiently to stretch it moderately. Then drop the string a distance equal to the stretch in the string and stop it sharply with the brake. This will cause the lower end of the string to spring downward, causing the Bumper Sub to partly close, after which the string will rebound. This will cause the Bumper Sub to re-open quickly and the Knocker will strike the lower end of the Mandrel Body a solid upward blow.

## Classic Cushion Sub



CLASSIC  
CUSHION SUB

### GENERAL DESCRIPTION

The Classic Cushion Sub provides for the highest drilling penetration rate by virtually eliminating the variable dynamic loading conditions on the bit.

The extremely long stroke, combined with a very low spring rate, provides a soft impact energy absorption system that greatly increases penetration and extends bit life.

As a bit rotates, it tends to generate a three-lobed cutting pattern on the bottom of the hole. Three times each revolution, the bit cones must ride up over the ridges thus formed and drop back into the pattern.

If the bit is directly connected, the large mass of the drill collars must be accelerated up and down in synchronism with the motions of the bit. This causes repetitive peak forces on the bit which may be several times the static bit weight, causing bit bounce. These cyclic forces also generate large stress waves in the drilling string, which shorten the life of the drill pipe and bit and can cause strong vibrations and damage to the rig equipment. These factors necessitate drilling at less than optimum bit weight and RPM.

### OPERATION

The Classic Cushion Sub should be located as close above the bit as possible, where it can function best to absorb these deflections with minimum variation in bit load, and minimum transmission of stress waves and vibrations up the drill string. Its function is similar to that of the spring and shock absorber on a wheel travelling over a rough road - it keeps the wheel on the ground while isolating the "bumps" from the vehicle. This is accomplished by means of a hydraulic spring.

As weight is lowered on the Cushion Sub, it will cause deflection of the hydraulic spring until the spring load balances the weight. Now, as the bit rotates and is deflected up over the ridges in the bottom hole pattern, it need not displace the massive drill collars above it; it need only deflect the spring slightly. As the bit drops back into the depressed portion of the bottom hole pattern, the hydraulic thrust follows it down, maintaining it on the bottom at all times and minimizing the variations in bit weight throughout the cycle.

The Cushion Sub adjusts automatically to any desired bit weight within its working range.

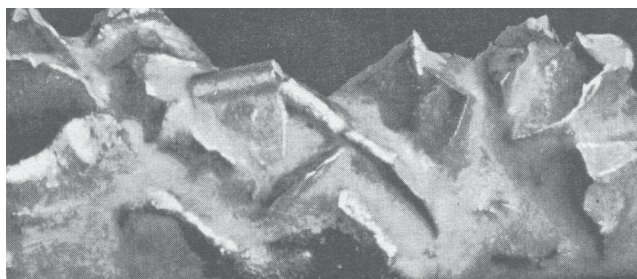


## Classic Carbide and Milling Tools

### GENERAL DESCRIPTION OF CARBIDE

Classic Carbide is a special hardfacing material made of crushed sintered tungsten carbide particles compounded with a resilient matrix of nickel-silver alloy. Classic Carbide is made in rod form for convenience of application wherever oxygen acetylene welding equipment is available.

In oilwell milling, when a Carbide hardfaced tool is rotated and lowered against an object (that is a fish, cement or formation, a multiplicity of small tungsten carbide particles imbed themselves into the object. Each tungsten carbide particle develops a small chip along the edge as it is moved across the object, cutting the object. As a particle's cutting edge becomes dulled, pressures and strains increase within the particle, causing a fracture to occur. Such fractures then create new cutting edges along the fracture plane. This process is repeated with each tungsten carbide particle, continuously renewing the cutting edges until the entire content of tungsten carbide particles is exhausted.



A macro-photograph of a portion of a Carbide Rod showing the concentration of tungsten carbide particles imbedded in the nickel-silver alloy matrix.

Tungsten carbide particles, with a hardness nearly that of diamonds, retain their hardness at high temperatures and are not affected by the heat generated from the cutting operation. The tough, resilient, nickel-silver alloy matrix securely holds the tungsten carbide particles in place and cushions the particles against severe impact.

### USES OF CARBIDE

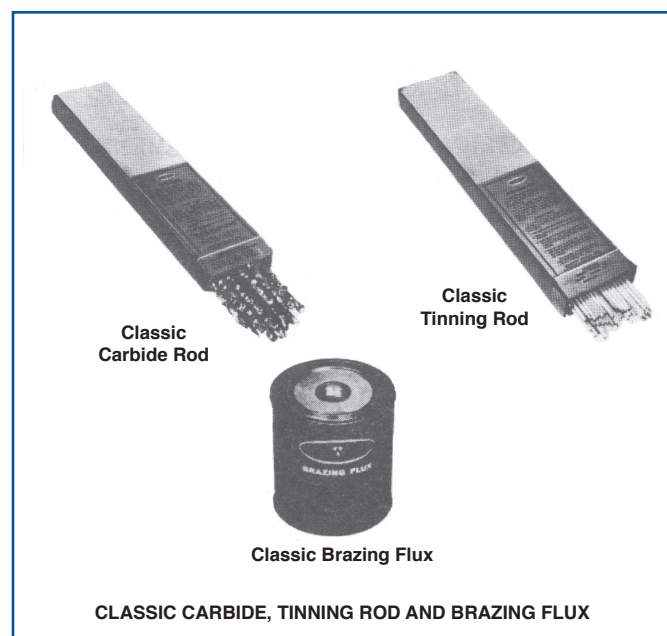
Classic Carbide is used to form the cutting or milling surfaces on milling shoes, rotary shoes, junk mills, section mills, milling stabilizers, piloted liner mills, or any tool that may be subjected to high abrasive wear and severe impact.

Tools dressed with Carbide are used to mill away all kinds of junk, including drill pipe, drill collars, bits, cones, casing, liners, and liner hangers. This advancement in metallurgy - which suspends fragmented tungsten carbide particles in a resilient matrix - provides milling tools requiring minimum torque, that have high-speed cutting ability, and that have increased life or wearing ability.

### CONSTRUCTION OF CARBIDE ROD

Classic Carbide consists of selected grades of crushed sintered tungsten carbide particles imbedded in a resilient nickel-silver alloy matrix.

Carbide uses only the hardest steel cutting sintered carbides. The sintered tungsten carbides are crushed, then sifted and graded to appropriate screen mesh sizes. After screening, each particle is hand selected to assure sharp, full-bodied particles and to eliminate all slivers and splinters that may have passed through the screen mesh.



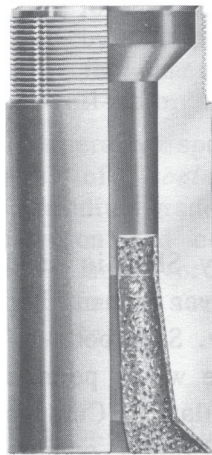
Classic Carbide is packed in cartons of approximately ten pounds each.

Classic Tinning Rod is packed in ten pound cartons. The rod size is 3/16" x 18".

Classic Brazing Flux is packed in one-pound metal cans.

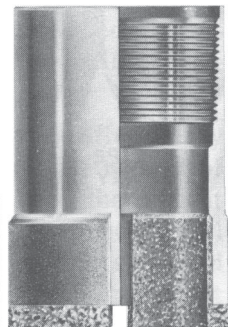
### Milling Shoes and Rotary Shoes Hardfaced with Carbide

Classic Milling Shoes or Classic Rotary Shoes are designed in various sizes and styles to meet the various conditions encountered in oil well fishing and washover operations. Illustrated herein are many of the styles with an explanation of their intended service.



**OVERSHOT  
MILLING GUIDE**

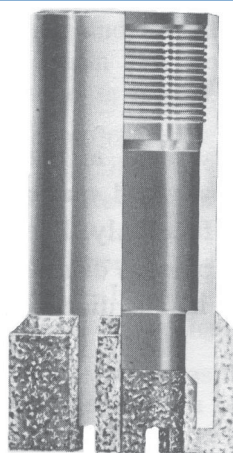
Overshot Milling Shoe is used to mill away jagged metal from the top of the fish so that the fish will pass easily into the Overshot Bowl.



**PACKER RETRIEVER  
MILLING SHOE**

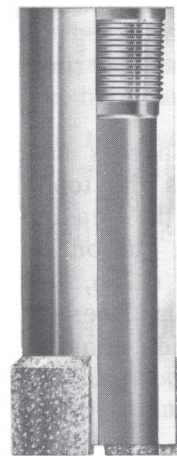
Packer Retriever Milling Shoe is used to mill away the slips of a production packer without damage to the casing so that the remainder of the packer can be retrieved.

Junk Basket Milling Shoe is used to mill away jagged edges from small junk or bit cones so that the junk will pass into the basket and be retrieved or for formation cutting to cut small cores.

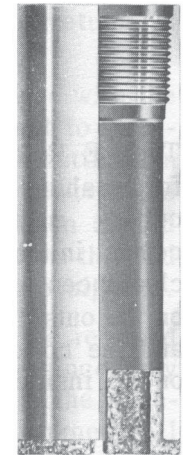


**JUNK BASKET  
MILLING SHOE**

Type A Rotary Shoe is used to cut metal on the fish without cutting the casing. Cuts on the inside diameter (I.D.) and the bottom. Does not cut on the outside diameter (O.D.)



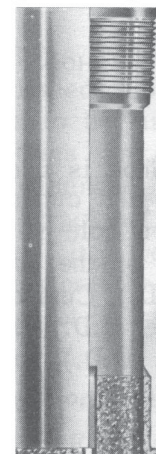
**TYPE B  
ROTARY SHOE**



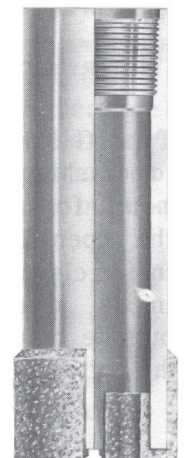
**TYPE A  
ROTARY SHOE**

Type B Rotary Shoe is used for washing over a fish and cutting metal or formation in the open hole. Cuts on the outside diameter (O.D.) and the bottom. Does not cut on the inside diameter (I.D.)

Type C Rotary Shoe is used for washing over and cutting metal, formation or cement. Cuts freely on the inside diameter (I.D.), the outside diameter (O.D.), and the bottom.



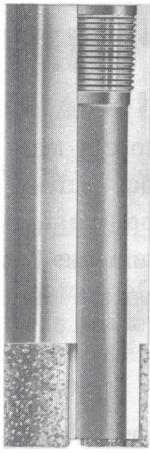
**TYPE D  
ROTARY SHOE**



**TYPE C  
ROTARY SHOE**

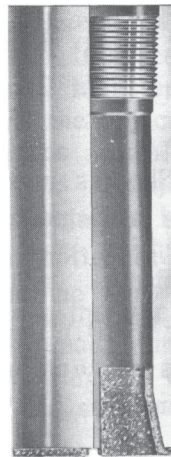
Type D Rotary Shoe is used to cut metal on the fish without cutting the casing where clearances are limited. Cuts on the inside diameter (I.D.), and the bottom. Does not cut on the outside diameter (O.D.).





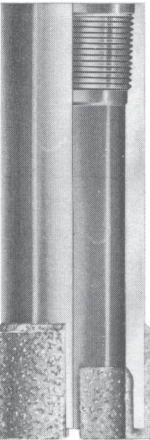
**TYPE E  
ROTARY SHOE**

Type E Rotary Shoe is used for washing over a fish and cutting metal, formation or cement in the open hole where clearances are limited. Cuts on the outside diameter (O.D.) and the bottom. Does not cut on the inside diameter (I.D.).



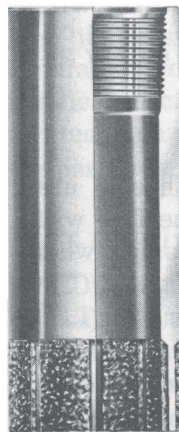
**TYPE F  
ROTARY SHOE**

Type F Rotary Shoe is used to size and dress the top of a fish inside the casing. Makes a tapered cut on the inside diameter (I.D.), and cuts on the bottom. Does not cut on the outside diameter (O.D.).



**TYPE G  
ROTARY SHOE**

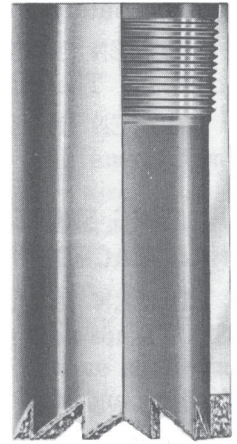
Type G Rotary Shoe is used for washing over and cutting metal, formation or cement in the open hole with limited inside clearances. Cuts on the inside diameter (I.D.), the outside diameter (O.D.), and the bottom.



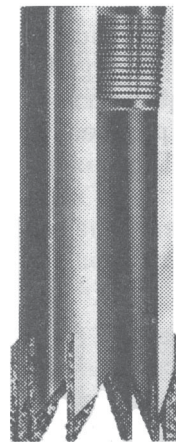
**TYPE H  
ROTARY SHOE**

Type H Rotary Shoe is used for washing over and cutting metal in the open hole with limited clearances on the outside diameter (O.D.). Cuts on the inside diameter (I.D.), the outside diameter (O.D.), and the bottom.

Type I Rotary Shoe is used for washing over and cutting formation only. Saw-tooth design permits maximum circulation. Cuts on the bottom only. Does not cut on the outside diameter (O.D.) or inside diameter (I.D.).



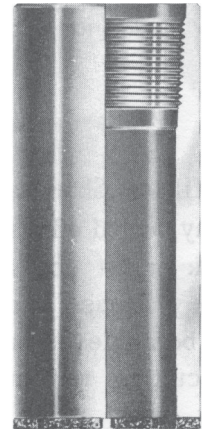
**TYPE I  
ROTARY SHOE**



**TYPE J  
ROTARY SHOE**

Type J Rotary Shoe is used for washing over and cutting formation only. Saw-tooth design with side wings permits maximum circulation. Cuts on the bottom and on the outside diameter (O.D.). Does not cut on the inside diameter (I.D.).

Type K Rotary Shoe is used for washing over and cutting on the bottom face only. Does not cut on the outside diameter (O.D.) or the inside diameter (I.D.).



**TYPE K  
ROTARY SHOE**

Classic Milling Shoes and Classic Rotary Shoes hardfaced with Classic Carbide are recommended for all types of washover operations. The increased speed of cutting and penetration makes a Carbide hardfaced shoe more economical to use than a conventional hard metal shoe.

Classic Milling Shoes are used to mill over and free stuck packers, spears, stabilizers, string reamers, rock bits or any metal objects which cannot be removed from the well bore with conventional fishing procedures and fishing tools.

Classic Rotary Shoes are excellent for washing over stuck pipe to cut away shales, clay, sand, salt, limestone, cement, anhydrite, red beds and other formations.

Graded particle size of Classic Carbide hardfacing for milling Shoes and Rotary Shoes is determined by the dimensional limitations of the shoe itself, the dimensional limitations of the fish and the well bore, and finally, the work to be done.

Generally speaking, coarse grades (3/8" to 3/16") of Carbide are utilized for metal cutting, and medium grades (3/16" to 1/16") are utilized for formation and cement cutting. The fine grades (10-18 mesh), or smaller, are used to prevent abrasive wear on such items as tool joints, stabilizers, subs, etc.

### **Operation of Milling Shoes and Rotary Shoes Hardfaced with Carbide**

Milling Shoes and Rotary Shoes are used primarily to dress a stuck fish so that a grappling or retrieving tool may engage the fish.

In operation, the penetration rate is affected by the hole condition, the rotary speed, the weight of the drill string upon the milling shoe, the weight and viscosity of the drilling fluid, the dimensional size of the milling shoe, and finally, the size and hardness of the material to be milled. It is apparent from all of these variables that a concise applied weight and revolutions per minute cannot be stated to obtain the most efficient penetration rate expressed in feet per hour.

Therefore, the optimum weight and rotary speed must be determined under actual operating conditions. Revolutions per minute (RPM) may vary from 60 RPM to 175 RPM. Washover or milling operations should begin with moderate speed and low weight. Increase both weight and speed until the desired, or optimum, penetration rate is attained.

Lower the washover string into the well until the milling shoe is a few feet above the top of the fish. Start the pumps and circulate the hole until the top of the fish

is clean. Either conventional or reverse circulation may be used. Reverse circulation is often recommended because the velocity of the returns is greater.

Normal pump pressures are recommended with the mud weight and viscosity being sufficient to circulate the cuttings out of the hole. If metal cuttings in great volume are anticipated, which is not usually the case in washover operations, consideration should be given to removing the metal cuttings from the mud stream to prevent damage to the pumping equipment.

The volume and characteristics of the returned cuttings should be checked frequently since they will provide a great deal of confirmation on the washover progress. Metal cuttings being returned will vary in shape and size due to the Carbide particle size being used and the material being milled. Chip size is primarily a function of the quality of the steel being milled.

In the event that the penetration rate declines, it is advisable to change the weight or the rotary speed and, in some cases, to spud lightly to re-establish the desired rate of progress.

### **Milling Tools Hardfaced with Carbide**

Milling tools are designed to mill away a stuck fish that cannot be retrieved by conventional fishing methods.

Since milling is usually a follow-up operation (after several fishing attempts), the fish to be milled away should be familiar to the operator and therefore the selection of the milling tool should be relatively easy to determine, since the dimensional restrictions of the well bore or casing, and the work to be accomplished are known.

The Milling Tool selected should provide maximum exposure of the milling edge to the material to be milled, maximum replacement of the milling edge as wear occurs, a maximum circulation to remove the cuttings. Examples of Milling Tools are described below.

NOTE: Conditions that might make a Carbide hardfaced pilot desirable are when the inside of the pipe to be milled is badly damaged, collapsed or contains junk, a Carbide hardfaced pilot is not recommended because of the danger of the pilot "sidetracking" through the damaged pipe. In these cases, it is recommended that a Taper Mill be run to restore the inside diameter of the pipe so that the pilot is free to align the pipe.

### **Operation of Milling Tools Hardfaced with Carbide**

Classic Milling Tools are simple to operate. For best results, relatively fast rotary speeds should be available as well as drill collars and drill pipe.



## *Classic Packer Type Casing Patches*



### **GENERAL DESCRIPTION**

The Classic Packer Type Casing Patch is an external catch tool, designed to engage a previously prepared fish, pack it off, and become a permanent part of the repaired casing, pipe or tubing.

The same dependable method of engagement and release which is utilized for Classic Overshots is employed in the Classic Packer Type Casing Patch. This method assures positive engagement and positive seal-off from either direction. The Patch provides a permanent connection which remains rigid and leak-proof for many years, yet is positively releasable if ever the need arises.

Classic Packer Type Casing Patches will not restrict the bore of the casing or tubing in any manner.

The Classic Packer Type Casing Patch is composed of three outside parts and five internal parts. This simplicity of design is matched by the simple positive operation.

### **USE**

The Classic Packer Type Casing Patch as indicated, is used to repair a damaged casing string by replacement of the damaged section, without having to remove the entire string of casing from the hole.

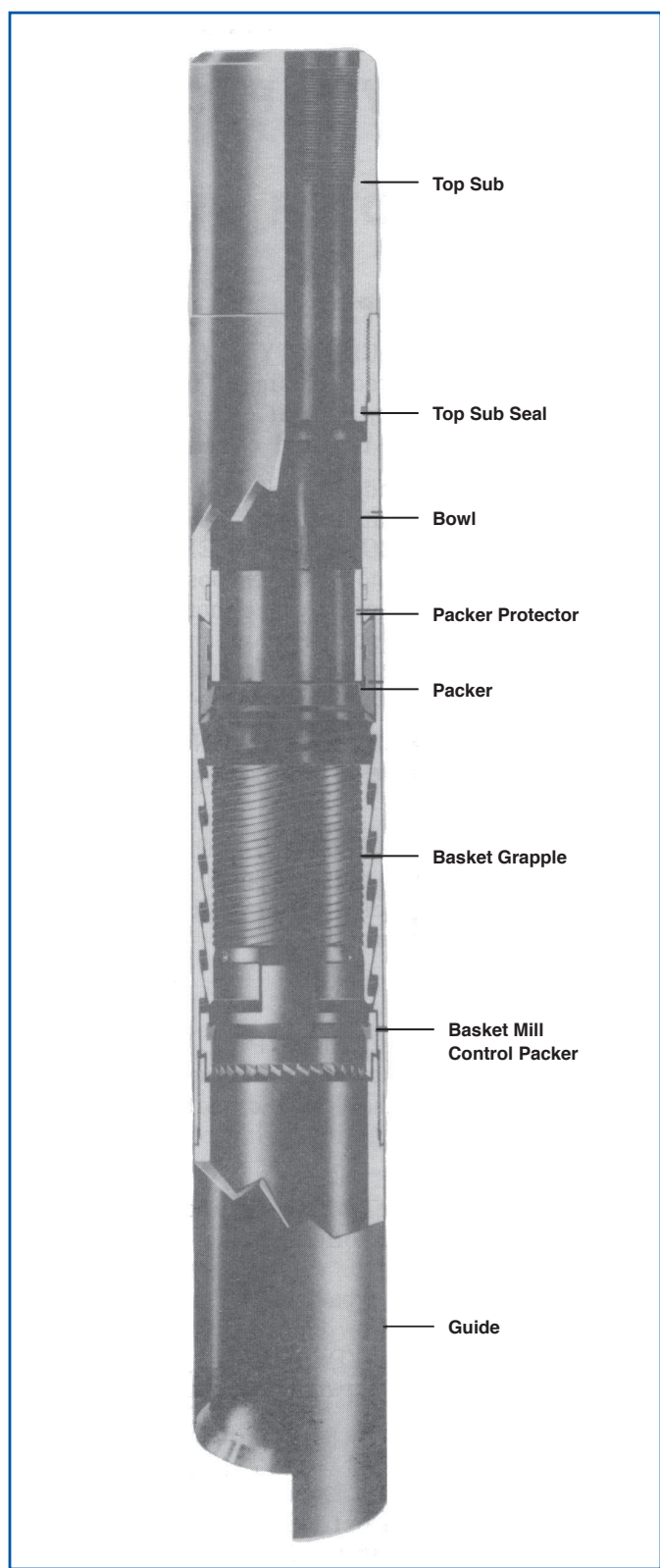
Where the upper portion of a casing string becomes ruptured or disoriented from the lower portion such as by faulting or caving of the formation, crushing, rupture, or backing off, the upper portion must be removed. New casing is then replaced, the Classic Packer Type Casing Patch forming the patching means between the old and new strings.

### **CONSTRUCTION**

The Classic Packer Type Casing Patch is constructed in the most basic manner to perform the functions of engaging the fish, sealing off the fish, or releasing, either during or after setting operations, should this become advisable.

The Top Sub, Bowl and Guide form the outer assembly.

The Top Sub has an upper connection to match the running string, and a lower connection to mate with the Bowl. A Top Sub Seal is located immediately below the lower thread of the Top Sub.



The Bowl has an upper connection for the Top Sub, an area of length into which the Packer Protector slides during operation, a spiraled section which contains the engaging Grapple, a space for the Mill Control Packer, and a lower connection to accept the Guide.

The Guide is usually flush with the outside diameter of the Casing Patch, and cut lipped. The primary purpose of the Guide is to assist smooth entry of the fish into the catch area of the patch. A secondary function is to maintain the inner working parts in position.

The inner working parts of the Classic Packer Type Casing Patch are the Grapple, Packer, Mill Control Packer and Packer Protector.

The Grapple is essentially a cylinder with wickers in its inside diameter for engaging the fish, and spirals on its outside diameter to mate with the spirals in the Bowl. Both the wickers and the spirals are made with a left-hand lead, which allow release by right-hand rotation. The Grapple has a series of longitudinal slots which allow the Grapple to flex diametrically during operation.

The Packer is a double lipped sleeve type packer, molded in one piece from synthetic rubber compound. The material is chosen to include the best combination of properties for general oil well service. It withstands most well fluids; has good resistance to gas invasion and abrasion.

In service, the outside of the Packer seals against the inside of the Bowl. The upper lip is protected from damage by the Packer Protector, until the entering fish pushes the Packer Protector up out of the way.

The Mill Control Packer serves the dual purpose of milling off burrs from the outside of the fish as it enters the assembly and serving as a special key to key the Grapple to the Bowl. The Grapple is free to move up and down sufficiently to engage or release the fish, but is prevented by the Control Finger from rotating. Thus, the torque required to release the assembly may be transmitted from the running string through the Top Sub, Bowl, Control Packer and on to the Grapple.

### OPERATION

Prior to running the Casing Patch, the fish should be prepared. This usually includes washing over and cleaning the upper end of the fish of splits and burrs, and "sizing" the fish.

The tool should be assembled in accordance with the "Complete Assembly" instructions, which follow.

Assemble the tool to the running string and buck it up tight.

**Caution:** Use tongs on Top Sub only. If undue pressure is exerted on the Bowl, crushing or distortion may result.

Lower the tool into the hole until the fish depth is reached. As the fish is reached, the running string should be slowly rotated to the right while lowering it slowly. This combined slow rotation and lowering is important to the operation of the tool

This should be continued until the fish has entered the tool and “bottomed” the Packer Protector against the lower end of the Top Sub. This can be determined by watching the rig weight indicator. Allow 15,000 to 20,000 pounds of weight to be supported by the Casing Patch, to assure good and complete engagement.

At this point, pick up the running string to remove the weight from the Casing Patch, while allowing the torque to slack from the running string.

**Caution:** Avoid any backlash.

The effectiveness of the Packer may be checked at this point, by application of mud pressure.

**Caution:** Care should be exercised during application of pressure to increase the pressure gradually, allowing the Packer to seat smoothly. In no case should the Casing Patch be “slugged” or shock loaded unnecessarily by the mud pumps.

Pick up the running string and apply sufficient pull to remove any slack from the string, and set the slips. No load is required to maintain engagement nor is any load required to effect or maintain a seal; any excessive pull should therefore be avoided, as excessive pull reduces the allowable hydrostatic pressure capacity of the assembly. See strength chart.

Once the fish enters the Casing Patch and dislodges the Packer Protector, and the tool is subsequently disengaged from the fish, no attempt should be made to re-engage the tool without first bringing it to the surface to reset the Packer Protector. If the Packer Protector is not in position, there is danger of rupturing the upper lip of the Packer, rendering it useless.

**Note:** The Classic Packer Type Casing Patch is relatively unaffected by ordinary corrosion, etc., so that it may be released years after initial setting. If the Casing Patch is cemented in place, however, so that the internal working parts are invaded by cement; the patch may not

release. In such cases, its removal may require milling it away or cutting the string below the patch and removing the patch with a portion of the milled over and retrieved string.

If for any reason it is desired to release and remove the Casing Patch from the tubing or casing string, proceed as follows:

#### **To Release the Classic Packer Type Casing Patch**

Bump Down firmly, until the top of the fish “bottoms” against the Top Sub. This will break the “freeze” between the Grapple and the fish. After bumping down, slowly elevate the running string, while simultaneously rotating slowly to the right. Continue this slow elevation and rotation until the Casing Patch is clear of the fish. This combined slow rotation and elevation is important to the proper function of the Casing Patch.

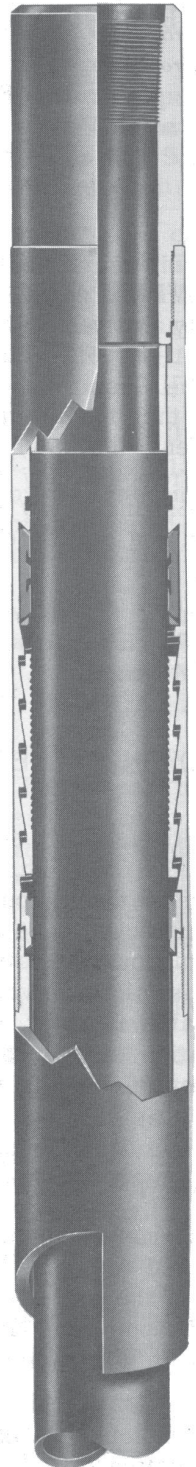
#### **COMPLETE ASSEMBLY**

Before actual assembly begins, the parts should be thoroughly checked to assure that they are in good condition and of the proper size for the operation. The Packer, Grapple and Mill Control Packer are all stenciled with the part number and catch size.

Clean all parts thoroughly, and lubricate them with grease or lubricating oil. If the tool is to be stored for any length of time, it is preferable to not grease the Packer or that portion of the body which houses the Packer. Petroleum products are detrimental to rubber products, particularly when stored in the open atmosphere.

Actual assembly should proceed as follows:

1. Clamp the Bowl in a suitable vise, horizontally.
2. Collapse the Packer by squeezing one side in toward the center. This will make the Packer small enough to be passed through the top end of the Bowl and be inserted into the space provided, immediately above the spiralled section. Note that both ends of the Packer are identical, so that either end may be assembled on top.
3. Assemble the Packer Protector in position in the Packer. This part should be slid into the too end of the Bowl and into the upper portion of the Packer, so that it comes to rest with its lower end immediately above the lower lip of the Packer. It is designed to keep the upper seal lip of the Packer deflected until the fish pushes the Packer Protector out of the Packer. This prevents the upper lip



CLASSIC PACKER TYPE CASING PATCH  
(Shown in Set Position)

of the Packer from being damaged during the setting operation. Once the fish is in proper catch position, the Packer will seal the fish in place.

**Caution:** Once the fish enters the Casing Patch and unseats the Packer Protector, the Casing Patch may be released as previously described. No attempt should be made to re-engage the fish however, once it is disengaged; a second engagement would very likely rupture the upper lip of the seal, rendering it useless. If a second engagement is necessary, the tool must be brought to the surface and the Seal Protector resealed as described in "Complete Assembly". A second run may then be made with safety.

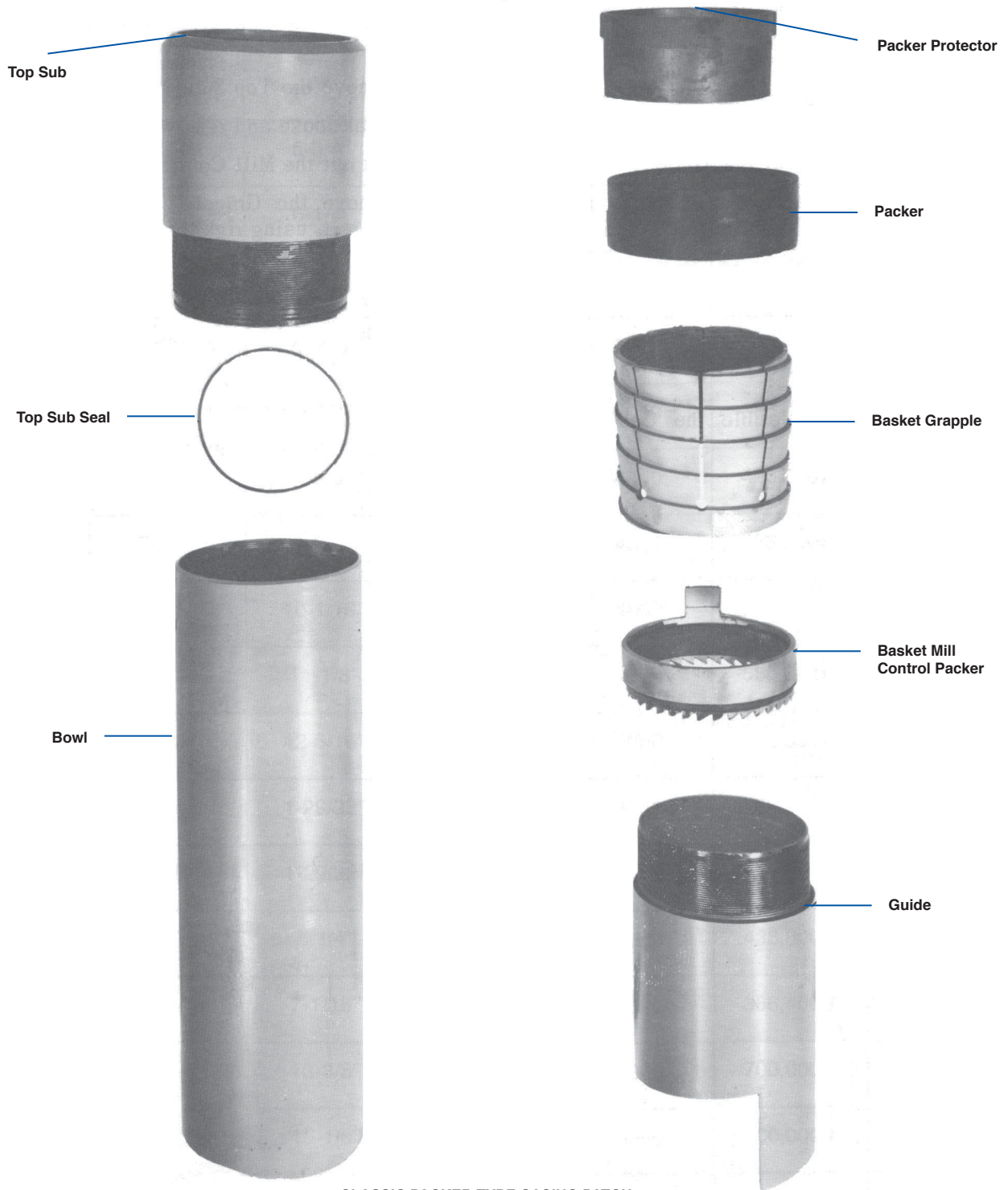
4. Assemble the Grapple in the Bowl. This may be done by grasping the Grapple by its lower end, and screwing it into the Bowl from the Bowl lower end. Left-hand rotation is required, as the spiralled outside diameter is a left-hand lead spiral. This design allows the tool to be released by right-hand rotation, when required. The lower end of the Grapple can be distinguished from the upper end by the single large slot in the lower end of the Grapple.

Insert the Grapple deep enough into the Bowl to allow the single large slot to line up with the similar slot in the bottom portion of the Bowl spiral. The bottom of the Grapple should be just above the lowest part of the spiral in the Bowl, when in proper position.

5. Insert the Mill Control Packer into the Bowl so that the protruding control finger rests in the slot in the lower end of the bowl spiral and simultaneously in the grapple slot.
6. Apply thread dope to the threads of the Guide and assemble the Guide to the Bowl, and tighten.
7. Assemble the Top Sub Seal in the groove provided in the lower end of the Top Sub.
8. Apply thread dope to the threads (and seal) on the Top Sub, and assemble the Top Sub in the Bowl, and tighten.

The assembly is now complete and ready for service.





CLASSIC PACKER TYPE CASING PATCH  
(Exploded View)

### Complete Disassembly

To completely disassemble the Casing Patch, proceed as follows:

1. Clamp the assembly in a suitable vise horizontally. Clamp immediately below the top connection, just below the threaded joint.
2. Break loose and remove the Top Sub.
3. Remove the Top Sub Seal.
4. Break loose and remove the Guide.
5. Lift out the Mill Control Packer.
6. Remove the Grapple. This may be done by unscrewing it, using right-hand rotation.
7. Remove the Packer Protector by sliding it out the upper end of the Bowl.
8. Remove the Packer. This may be done by slipping a bent screwdriver under one end of the Packer until the edge can be grasped. Collapse the Packer toward the center and remove it. This completes the disassembly of the tool.

### CALCULATED TENSILE AND BURST STRENGTHS CLASSIC PACKER TYPE CASING PATCHES

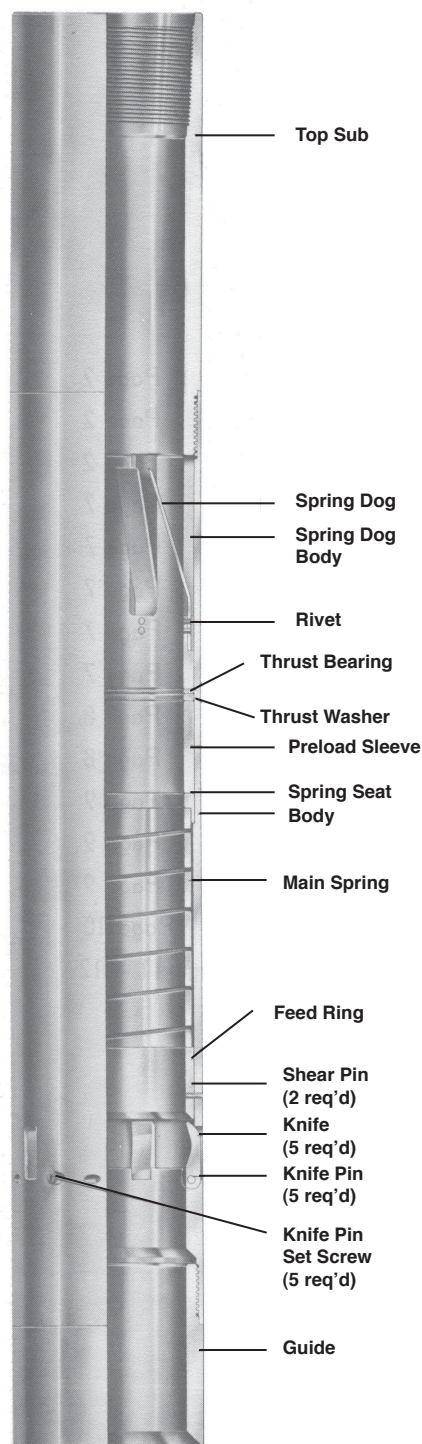
CASING O.D.	PATCH O.D.	MAXIMUM INTERNAL BURST (FLUID) PRESS - P.S.I.	MAXIMUM RECOMMENDED PRESSURE ACROSS PACKERS	TENSILE STRENGTH AT YIELD	MAXIMUM** RECOMMENDED PULL LOAD IN LBS.
4 1/2"	5 3/4"	11,426 PSI	5000	436,800#	288,000
5"	6 1/4"	10,512 PSI	5000	436,800#	288,000
5 1/2"	6 13/16"	11,009 PSI	5000	483,000#	318,500
6"	7 7/16"	9,067 PSI	5000	460,320#	304,000
6 5/8"	7 15/16"	7,558 PSI	4000	386,400#	254,000
7"	8 3/8"	8,052 PSI	4000	423,360#	279,500
7 5/8"	9"	7,493 PSI	4000	423,360#	279,500
8 5/8"	10 1/16"	7,450 PSI	4000	500,000#	330,000
9 5/8"	11 1/8"	7,399 PSI	4000	580,343#	385,500
10 3/4"	12 5/16"	7,309 PSI	3000	622,631#	412,000
1" Pipe	1 29/32"	7,870 PSI	4000	31,500#	20,800
3/4" Pipe	1 29/32"	7,870 PSI	4000	31,500#	20,800
4"	5 1/4"	12,514 PSI	5000	436,800#	288,000
5 3/4"	7 1/16"	8,496 PSI	4000	386,400#	254,000
11 3/4"	13 3/8"	7,000 PSI	3000	700,000#	462,000
13 3/8"	15 1/8"	6,500 PSI	3000	800,000#	528,000
13 5/8"	16"	10,500 PSI	3000	1,700,000#	1,122,000

\* Values shown are safe pressures assuming poor surface on O.D. of casing. Packers often hold considerably higher pressures.

\*\* Calculated figures, based on 66% of the yield strength of the material. These figures are intended to serve as a guide only, and are not guaranteed. In no case should the above figures be exceeded.

Note: The above burst figures apply to the bowl only. In no case should more than 5000 PSI be applied to the Packer.

## Classic External Cutters



### GENERAL DESCRIPTION

The Classic External Cutter is an automatic spring-fed pipe cutter that provides fast, efficient external cutting and recovery of long sections of pipe. Due to its automatic spring-fed feature it eliminates the inadvertent application of excessive strain being applied from the rig floor, preventing the knives from becoming burned or broken before the cut is made.

### RUNNING-IN PRECAUTIONS

1. Upon reaching the top of the fish, it is advisable to circulate to condition the mud and to flush all mud cake or debris from the tool.
2. Care should be exercised when going over the top of the fish and whenever possible the Classic External Cutter should be rotated to the right while going over. After the fish has entered the cutter, the cutter must not be raised more than absolutely necessary. When pulling the table slips on the rig the cutting string should be lifted only high enough to free the table slips. If one table slip segment is free and the others are tight, the table should be turned to free the tight ones. The cutting string must not be pulled higher than needed to release the table slips in order to ensure that upward movement will not shear the shear pins and force the Knives into contact with the fish. If this should happen, it will be necessary to cut the fish at this point as the cutter will not pass over the next lower tool joint or coupling without breaking the Knives.

### CUTTING PRECAUTIONS

1. When selecting the proper place to make the cut, it is recommended that the cut be made one joint above the lowest position to which the rotary washover shoe was run. This will leave, below the cutter, one joint of free pipe which will spring away from the wall and align itself in the cutter.
2. After the Kelly is made up in the string, and with circulation established at normal rate, the cutting string should be rotated to determine the amount of torque required to run the cutter, when the Knives are not in contact with the fish.

After the hole has been washed sufficiently and the cutter is rotating freely, the circulation and rotation must be stopped and the cutting string raised until the Dog Springs contact the next higher tool joint or coupling.

In cutters using the Slip Sub Assembly, the slips contact the pipe at all times. Raising the cutter will shear the brass pins between the Feed Ring and the Body above the Knives and force the Knives in against the fish.

3. Care should be exercised not to run the circulation pumps so that pulsations are transmitted to the cutting string, as this will cause the Knives to move up and down synchronous to the pulsations, resulting in an uneven cutting action.
4. When starting rotation, the operator is cautioned to apply only a small amount of torque. If free rotation is not established at this point, the cutter should be lowered slightly until the string can be turned with a minimum of torque. Allow the cutter to rotate freely for a few minutes. Then stop the rotation, pick up the cutting string about 1/4" and

again try rotation. If raising 1/4" does not change the amount of torque required, the raising and rotating should be repeated until increased torque is in evidence. This will tell the operator that the Knives are cutting the pipe. From this time until the cut is complete, it is well to take every precaution against excessive torque.

5. Sometimes, when the coupling or tool joint, under which the Dog Springs are engaged, is quite thin, the Dog Springs may rotate off the coupling shoulder before the cut is complete. Caution: If there is an indication that the Dog Springs have rotated off the coupling shoulder, stop rotation before continuing to prevent damage to the Knives. If the pipe is not raised carefully, the Knives may catch beneath the collar or tool joint and break. Should the Dog Springs rotate off the shoulder, the pipe must be backed down until the Dog Springs are again engaged under the coupling or tool joint, and cutting operations resumed. Be careful not to exceed the maximum load ratings to prevent damage to the Knives.



## Classic Internal Cutter

### GENERAL DESCRIPTION

Classic Internal Cutters are ruggedly built, efficient tools for cutting tubing, casing or drill pipe. Sizes ranging from 1.900" tubing up to 20 3/4" casing are available. Classic Internal Cutters are manufactured to exacting standards of interchangeability, permitting relative ease of maintenance after use and the redressing of a basic assembly to cut alternate sizes of pipe.

### OPERATING PRECAUTIONS

Careful measurements should be maintained while running in to assure that the cut or cuts are made at the desired depth or depths. All measurements should be taken with the Knives as the reference point.

If the pipe to be cut is a full string, see Nomograph to determine the lowest point at which it is loose.

If it is desired to locate a collar at the cutting depth, install a Classic Collar Finder on the bottom of the cutter.

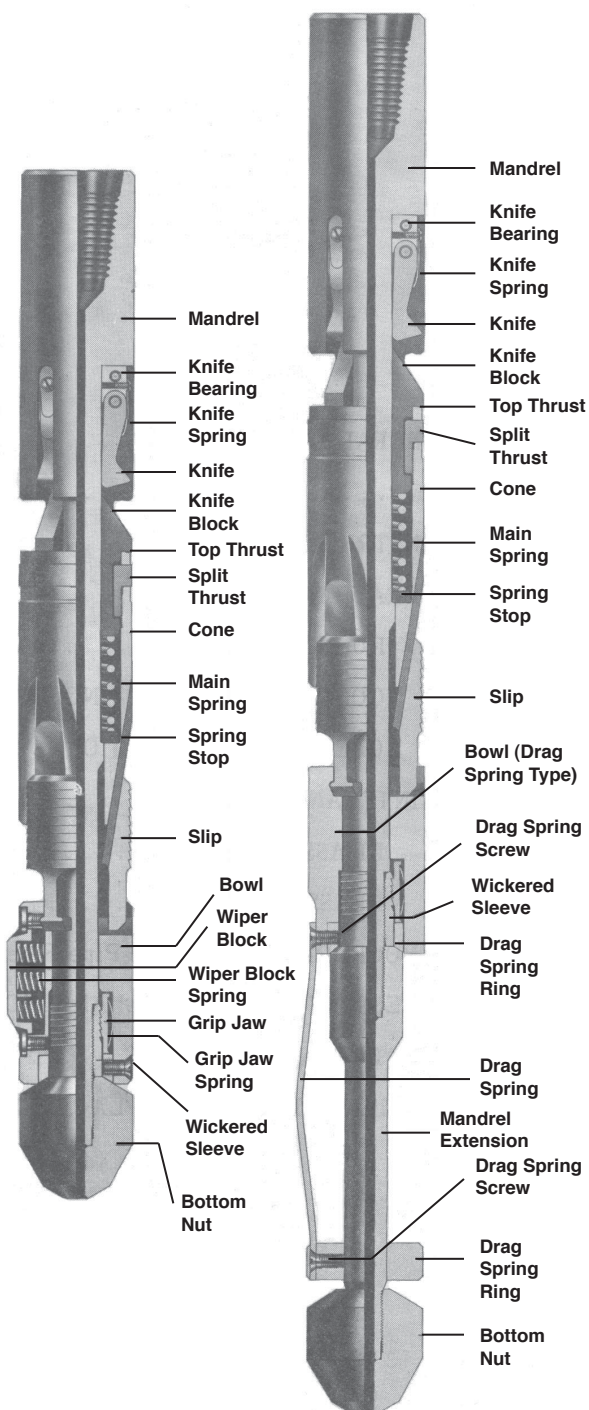
At great depths, in crooked holes and where existing rig equipment makes it very difficult to control the amount of weight applied to the Classic Internal Cutter, it is recommended that a Fishing Bumper Sub and stabilizer be made up above the cutter.

The stabilizer is usually made up one joint above the cutter. It tends to centralize and minimize any swaying action which might interfere with the smooth operation of the cutter.

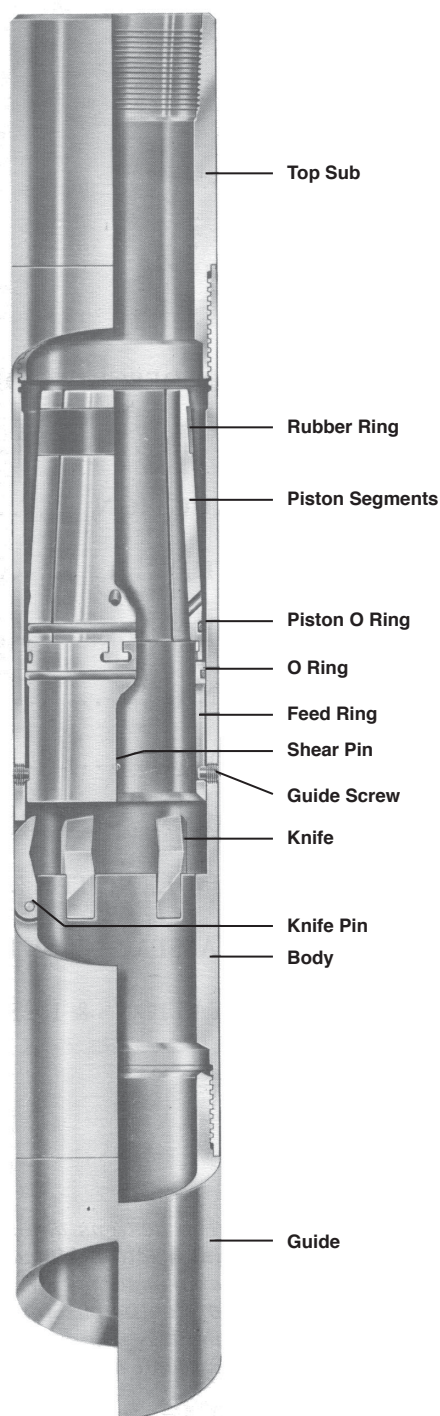
The Fishing Bumper Sub is run a number of joints above the cutter and stabilizer. This tool consists basically of two telescoping members, a Mandrel in a Body, free to slide with relation to each other, but provided with mating splines for transmitting torque.

In operation, the Classic Internal Cutter is set in the pipe as explained in "Operation". In this position the Fishing Bumper Sub is in the fully closed position. Since the tool is provided with a 20" stroke, the cutting string is then picked up 10" so that the only weight on the cutter is the predetermined weight of the pipe between the cutter and the Bumper Sub. In this manner, the variables of rig equipment and the inadvertent application of too much weight is eliminated and a smooth cut is made.

We recommend the following tools for this operation: Classic Fishing Bumper Sub and Classic Stabilizer.



## Classic Hydraulic External Cutter



### GENERAL DESCRIPTION

Classic Hydraulic External Cutters are hydraulically actuated mechanical tubing and drill pipe cutters. The cutters are fast, efficient, smooth cutting, and are capable of cutting and recovering strings of tubing or drill pipe. The cutter Knives are fed entirely by pump pressure, thus giving the operator sensitive control.

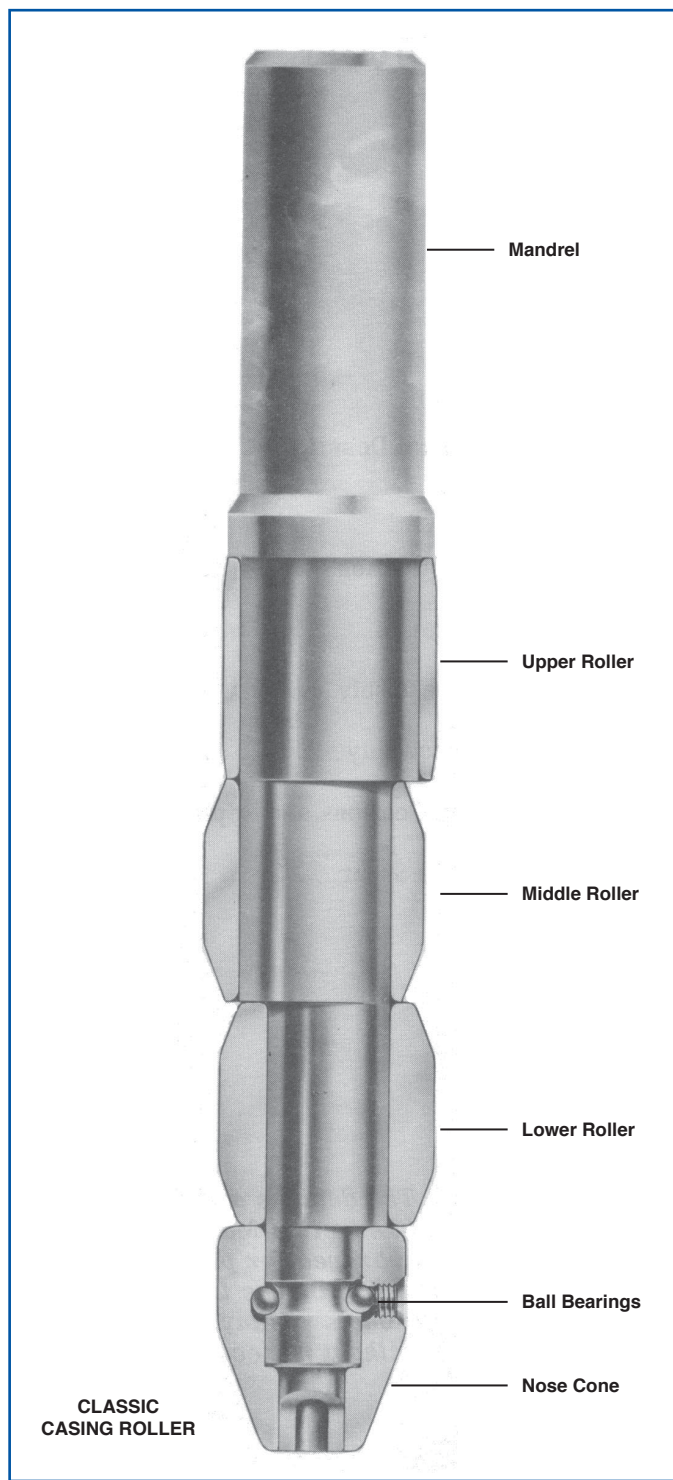
### RUNNING-IN PRECAUTIONS

1. Care should be exercised when going over the top of the fish. Whenever possible, rotate the Cutter to the right to feed the fish into the guide.
2. After the fish has entered the Cutter, the Cutter must not be raised more than absolutely necessary. When pulling the rotary slips on the rig, the cutting string should be lifted only high enough to free them. If the Cutter is lifted against a collar, the pins will be sheared. This will allow the feed ring to force the Knives against the pipe. **Should this occur, a cut should be made, then to avoid passing another collar and damaging the Knives.**

### CUTTING PRECAUTIONS

1. When selecting the proper place to make the cut, it is recommended that the cut be made one joint above the lowest position to which the rotary washover shoe was run. This will leave, below the Cutter, one joint of free pipe which will spring away from the wall and align itself in the cutter.
2. After the Kelly or Classic Power Sub or Classic Power Swivel, whichever is being used, is attached to the drill pipe, the cutting string is rotated to a free position. The pumps should then be turned on at a slow rate, allowing the pipe to be cut with minimum torque.

## Classic Tubing & Casing Rollers



### GENERAL DESCRIPTION

The Classic Tubing and Casing Roller is specifically designed for reconditioning casing and differs from any other tool intended for this use in that it does not contain any small parts to be worn, broken or lost in the well.

The Classic Tubing and Casing Roller is extremely rugged, yet simple in design. All moving parts are held in place on the Mandrel by large ball bearings running in deep grooves.

### OPERATION

Make up the Classic Tubing and Casing Roller to either the drill collars or to the drill pipe; experience has shown that it is preferable to connect direct to the drill pipe.

The drill pipe and the roller are rotated slowly and lowered gradually through the casing until the damaged area is located and contacted. Upon contact with the collapsed casing, increase the rotary speed to 40 - 75 RPM, start circulation and lower slowly.

The reduced portion of the tapered Nose Cone readily enters between the walls of the collapsed casing. As the Mandrel is rotated and lowered, the eccentrics force the Nose Cone and Rollers outwardly against the casing walls with great lateral pressure restoring the casing to its normal I.D. and roundness.

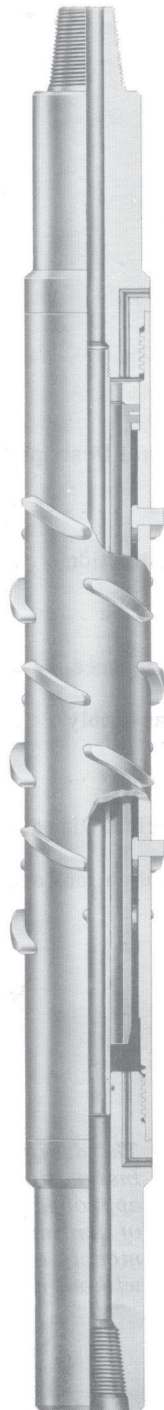
Moderate to heavy weight should be applied during the operation. The use of too little weight, with high rotational speeds should be avoided. Light weight with high speeds tends to wear the rollers without straightening the pipe. If insufficient weight is available in the running string, drill collars should be added. The best guide to the amount of weight and rotational speed to use is experience; as long as steady downward progress is made by the Casing Roller, the weight-speed ratio is giving the proper results.

Badly damaged casing will require the maximum amount of weight for the Roller to enter into and straighten the casing. The rugged construction of the Classic Tubing and Casing Roller allows the operator to apply the maximum amount of weight and torque without damage to the tool.

**CIRCULATION MUST BE MAINTAINED DURING THE OPERATION!**



## *Classic Casing Scrapers*



CLASSIC  
CASING SCRAPER

### USES

The Classic Casing Scraper is used to remove any deposits, irregularities or burrs from oilwell casing that might be the cause of trouble during later operation, such as running packers and other close tolerance equipment. Some of the main uses are:

1. Clean out cement, hardened mud, paraffin.
2. Remove burrs from perforations.
3. Remove bullets that become imbedded in the casing.
4. Remove burrs and nicks that might have resulted from the running of bits, or fishing tools.
5. Remove tight spots that might have been caused by dents in casing as a result of mishandling.

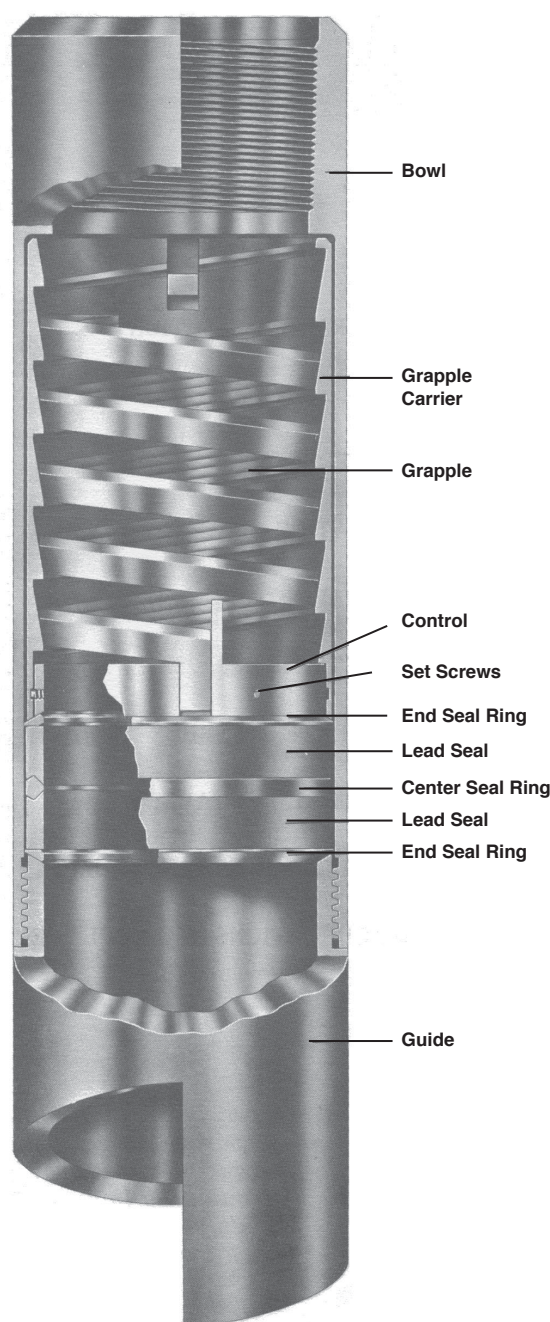
Removing obstructions from the inside of casing offers many advantages to the operator. Packers can be run easily and without damage to the sealing element. Packer seating and sealing is positive in clean, burr-free casing. If a casing swab is run, damage to the expensive swab rubbers is held to a minimum and rubber life is greatly increased.

The Classic Casing Scraper may be run either with the pin up or the pin down. It may be rotated or spudded. In all cases, full 360° interior casing scraping is assured due to the arrangement of the blades. Yet, this same arrangement and the contour of the blades permits passage through casing couplings and easy re-entry at the bottom, in the event the scraper passes out through the bottom of the casing.

Fluid may be circulated through the Washpipe at the convenience of the operator to wash out cement or excessive paraffin. Holes in the Top Sub and Bottom Sub effect pressure equalization between the inside and outside of the Support Sleeve. Therefore, hydrostatic pressure has no effect upon the scraping action of the scraper.



## Classic Lead Seal Casing Patches



CLASSIC LEAD SEAL CASING PATCH

### OPERATION

Prior to running the Lead Seal Casing Patch, the fish should be prepared. This usually includes washing over and cleaning the upper end of the fish of burrs and splits, and "sizing" the fish.

The tool should be assembled in accordance with the "Complete Assembly" instructions.

Assemble the tool to the running string and buck it up tight. Caution: Use tongs on upper portion of the Bowl, adjacent to the threaded connection, for backup. The main length of the Bowl is comparatively thin-walled; and if crushed or badly distorted, it will not function properly.

Lower the tool into the hole until fish depth is reached. As the fish is reached, the running string should be slowly rotated to the right while lowering it slowly. This combined slow rotation and lowering is important to the proper operation of the tool.

This should be continued until the fish has entered the Casing Patch, and "bottomed" against the upper shoulder of the Grapple Carrier provided for this purpose. This can be determined by watching the rig weight indicator. Allow 15,000 to 20,000 pounds of weight to be supported by the Casing Patch to assure good and complete engagement.

At this point pick up the running string to remove the weight from the Casing Patch while allowing torque to slack from the running string. Caution: Avoid any backlash.

Set the Lead Seal by elevating the running string. The load required to set the Casing Patch will depend on the size of the Casing Patch. This setting load will vary from 10,000 pounds to in excess of 100,000 pounds.

At this point the effectiveness of the Lead Seal may be checked by the application of pump pressure. Caution should be exercised, however, not to exceed a nominal 500 to 1,000 PSI. Before applying any appreciable pressure it is preferable to first reduce the setting load to a nominal 10,000 to 15,000 pounds load or approximately 1/4 the original setting load, whichever is smaller.

Once the Lead Seals are set, they will require only a minimum of load to maintain them in proper sealing position. Usually the tensile load required to set the slips to maintain the pipe is more than adequate. Any unnecessary pull load should be avoided.