



# Mechanical Spear

B&W Spear  
GS Spear  
GS Spear with Prong

MAN-TTT-200 (R01)

## Thru-Tubing Technology

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# Mechanical Spear

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## Description

The Mechanical Spear is used to retrieve a tool string or downhole control device that has an internal fishing neck on top, and is stuck or has been left in the hole. The spear is designed to withstand high side and tensional loads during a jarring operation.

## Operation

Tag the fish and set down approximately 20-30 lbs, the collets will then retract and latch when entering the internal fish neck profile. Begin pulling and/or jarring to retrieve the fish. If retrieval is not possible, jar down to shear the brass shear screws. This causes the collets to retract and disengage from the fishing neck. The fishing string can now be retrieved from the hole.

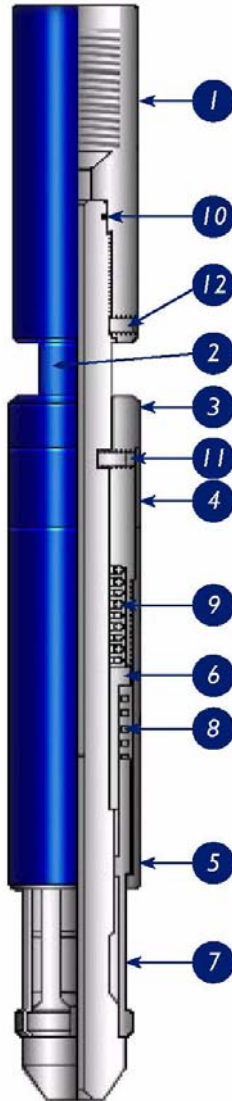


*Note: Unless otherwise indicated, all the strength figures given in this manual, are the result of calculations based on the yield strength of the material used in the manufacture of this product. These strength calculations are considered accurate within plus or minus 20% and are to be used only as a guide. They do not constitute a guarantee, actual or implied. In use, appropriate allowance should be made as a safety factor.*

# Mechanical Spear

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## TT0200-168B BOM, Schematic and Specs



ITEM	QTY	TOOL PARTS DESCRIPTION	PART NUMBER
1	1	Top Sub	TT0200-168B-001
2	1	Mandrel	TT0200-168B-002
3	1	Shear Screw Housing	TT0200-168B-003
4	1	Cover Sleeve	TT0200-168B-004
5	1	Collet Housing	TT0200-168B-005
6	1	Spring Stop	TT0200-168B-006
7	1	B & W Collet	TT0200-168B-007
8	1	2" GS Collet Spring	PUR-TCS0091-096
9	1	Mandrel Spring 3 1/2" x 1.225 x .968	PUR-TCS0080-224
10	1	O-Ring 13/16" x 15/16" x 1/16" 2-017	PUR-TORV000-017
11	2	Brass Slotted Shear Screws 1/4-20 x 5/16"	PUR-TBSS160-020
12	1	Steel Allen Set Screw 1/4-20 x 5/16"	PUR-TSAS160-020

**Tool Name:** 1.688 in. OD Mechanical 2 in. B & W Spear

**Product Code:** TT0200-168B    **Tool OD:** 1.688 in.    **Tool ID:** 0.188 in.

**Material:** AISI 4140 HT    **Tool Length:** 16.5 in.

**Minimum Yield:** 100,000 psi

**Strength Properties of Tool:**

**Minimum Yield Point and Load to Yield:** The thread recess of the pin connection of the Mandrel, 27,100 lbs; the Collet stop on the Mandrel, 27,700 lbs.

**Burst Point and Burst Pressure:** The O-ring bore of the Top Sub, 57,000 psi.

**Torsional Weak Point and Ft-Lbs to Yield:** 180 ft-lbs as a function of O-ring groove collapse of the Mandrel, **without** the 1/4-20 Steel Allen set screw tightened to 77.9 in-lbs; 220 ft-lbs as a function of O-ring groove collapse of the Mandrel, **with** the 1/4-20 Steel Allen set screw tightened to 77.9 in-lbs; 250 ft-lbs as a function of torsional yield of the pin end of the Mandrel, **without** the 1/4-20 Steel Allen set screw tightened to 77.9 in-lbs; 290 ft-lbs as a function of torsional yield of the pin end of the Mandrel, **with** the 1/4-20 Steel Allen set screw tightened to 77.9 in-lbs; 710 ft-lbs as a function of torsional yield of the Mandrel at the thread recess of the pin connection.

**Recommended Make Up Torque:**

**1st Connection:** The Top Sub - Mandrel connection - 45 ft-lbs.

**2nd Connection:** The 1/4-20 Steel Allen set screw - 77.9 in-lbs.

**Shear Screw Value:**

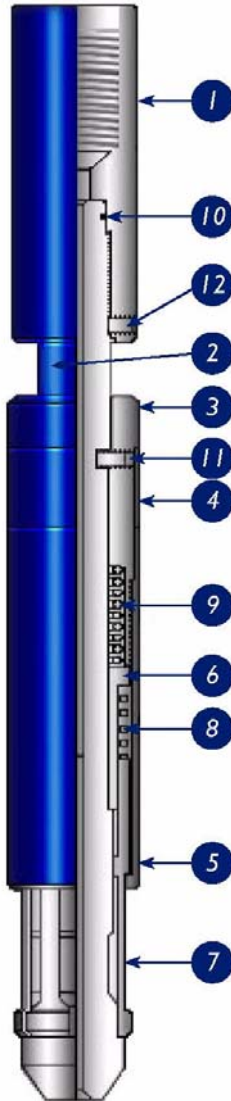
1/4-20 NC Brass, 1,415 lbs (plus or minus 15%) per screw.

**Fishing Profile Information:**

The tool catches a 2 in. B&W (1.313 in. ID) internal fishing neck/JAF Disconnect

# Mechanical Spear

## TT0200-168BGS BOM, Schematic and Specs



ITEM	QTY	TOOL PARTS DESCRIPTION	PART NUMBER
1	1	Top Sub	TT0200-168B-001
2	1	Mandrel "GS"	TT0200-181A-002
3	1	Shear Screw Housing	TT0200-168B-003
4	1	Cover Sleeve	TT0200-168B-004
5	1	Collet Housing	TT0200-168B-005
6	1	Spring Stop	TT0200-168B-006
7	1	"GS" Collet	TT0200-181A-010
8	1	2" GS Collet Spring	PUR-TCS0091-096
9	1	Mandrel Spring 3 1/2" x 1.225 x .968	PUR-TCS0080-224
10	1	O-Ring 13/16" x 15/16" x 1/16" 2-017	PUR-TORV000-017
11	2	Brass Slotted Shear Screws 1/4-20 x 5/16"	PUR-TBSS160-020
12	1	Steel Allen Set Screw 1/4-20 x 5/16"	PUR-TSAS160-020

**Tool Name:** 1.688 in. OD Mechanical 2 in. GS Spear

**Product Code:** TT0200-168BGS **Tool OD:** 1.688 in. **Tool ID:** 0.188 in.

**Material:** AISI 4140 HT

**Tool Length:** 16.0 in.

**Minimum Yield:** 100,000 psi

**Strength Properties of Tool:**

**Minimum Yield Point and Load to Yield:** The thread recess of the pin connection of the Mandrel, 27,100 lbs; the Collet stop on the Mandrel, 27,700 lbs.

**Burst Point and Burst Pressure:** The O-ring bore of the Top Sub, 57,000 psi.

**Torsional Weak Point and Ft-Lbs to Yield:** 180 ft-lbs as a function of O-ring groove collapse of the Mandrel, **without** the 1/4-20 Steel Allen set screw tightened to 77.9 in-lbs; 220 ft-lbs as a function of O-ring groove collapse of the Mandrel, **with** the 1/4-20 Steel Allen set screw tightened to 77.9 in-lbs; 250 ft-lbs as a function of torsional yield of the pin end of the Mandrel, **without** the 1/4-20 Steel Allen set screw tightened to 77.9 in-lbs; 290 ft-lbs as a function of torsional yield of the pin end of the Mandrel, **with** the 1/4-20 Steel Allen set screw tightened to 77.9 in-lbs; 710 ft-lbs as a function of torsional yield of the Mandrel at the thread recess of the pin connection.

**Recommended Make Up Torque:**

**1st Connection:** The Top Sub - Mandrel connection - 45 ft-lbs.

**2nd Connection:** The 1/4-20 Steel Allen set screw - 77.9 in-lbs.

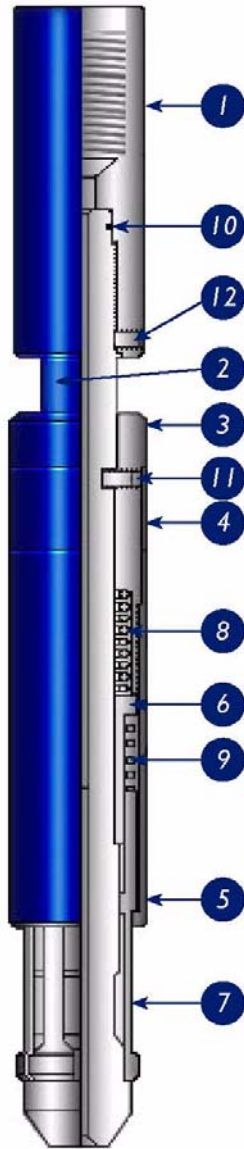
**Shear Screw Value:**

1/4-20 NC Brass, 1,415 lbs (plus or minus 15%) per screw.

**Fishing Profile Information:**

The tool catches a 2" nominal (1.375" ID) internal fishing neck.

## TT0200-213B BOM, Schematic and Specs



ITEM	QTY	TOOL PARTS DESCRIPTION	PART NUMBER
1	1	Top Sub	TT0200-225B-001
2	1	Mandrel	TT0200-225B-002
3	1	Shear Screw Housing	TT0200-225B-003
4	1	Cover Sleeve	TT0200-225B-004
5	1	Collet Housing	TT0200-213B-005
6	1	Spring Stop	TT0200-225B-006
7	1	Collet	TT0200-225B-007
8	1	Mandrel Spring 4" x 1.687 x 1.417	PUR-TCS0112-256
9	1	2 1/2" GS Collet Spring	PUR-TCS0122-304
10	1	O-Ring 1 1/16" x 1 1/4" x 3/32" 20121	PUR-TORV000-121
11	6	Brass Slotted Shear Screws 1/4 - 20 x 3/8"	PUR-TBSS160-024
12	1	Steel Allen Set Screw 1/4 - 20 x 3/8"	PUR-TSAS160-024

**Tool Name:** 2.125 in. OD Mechanical 2.500 in. GS Spear

**Product Code:** TT0200-213B **Tool OD:** 2.125 in. **Tool ID:** 0.313 in.

**Material:** AISI 4140 HT **Tool Length:** 21.6 in.

**Minimum Yield:** 100,000 psi

**Strength Properties of Tool**

**Minimum Yield Point and Load to Yield:** The Collet stop on the Mandrel, 49,000 lbs; the 0.281 in. diameter holes of the Mandrel, 50,000 lbs.

**Burst Point and Burst Pressure:** The O-ring bore of the Top Sub, 48,000 psi.

**Torsional Weak Point and Ft-Lbs to Yield:** 700 ft-lbs as a function of O-ring groove collapse of the Mandrel, **without** the 1/4-20 Steel Allen set screw tightened to 77.9 in-lbs; 750 ft-lbs as a function of O-ring groove collapse of the Mandrel, **with** the 1/4-20 Steel Allen set screw tightened to 77.9 in-lbs; 950 ft-lbs as a function of torsional yield of the pin end of the Mandrel, **without** the 1/4-20 Steel Allen set screw tightened to 77.9 in-lbs; 1,000 ft-lbs as a function of torsional yield of the pin end of the Mandrel, **with** the 1/4-20 Steel Allen set screw tightened to 77.9 in-lbs; 2,200 ft-lbs as a function of torsional yield of the Mandrel at the thread recess of the pin connection.

**Recommended Make Up Torque:**

**1st Connection:** The Top Sub - Mandrel Stub Acme connection - 210 ft-lbs.

**2nd Connection:** The Screw Housing - Collet Housing Stub Acme connection - 100 ft-lbs.

**3rd Connection:** The 1/4-20 Steel Allen set screw - 77.9 in-lbs.

**Miscellaneous Information:**

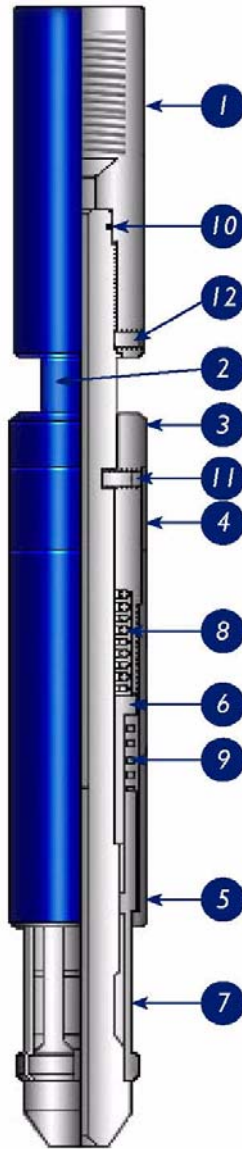
**Shear Screw Size and Values:** 1/4-20 X 3/8 in. Long Brass Slotted Head Shear Screws, 1,415 lbs per screw (plus or minus 20%)

**Fishing Profile Information:**

The tool catches a 2-1/2 in. nominal (1.813 in. ID) internal fishing neck.

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## TT0200-225B BOM, Schematic and Specs



ITEM	QTY	TOOL PARTS DESCRIPTION	PART NUMBER
1	1	Top Sub	TT0200-225B-001
2	1	Mandrel	TT0200-225B-002
3	1	Shear Screw Housing	TT0200-225B-003
4	1	Cover Sleeve	TT0200-225B-004
5	1	Collet Housing	TT0200-225B-005
6	1	Spring Stop	TT0200-225B-006
7	1	Collet	TT0200-225B-007
8	1	Mandrel Spring 4" x 1.687 x 1.417	PUR-TCS0112-256
9	1	2 1/2" GS Collet Spring	PUR-TCS0122-304
10	1	O-Ring 1 1/16" x 1 1/4" x 3/32" 20121	PUR-TORV000-121
11	6	Brass Slotted Shear Screws 1/4 - 20 x 3/8"	PUR-TBSS160-024
12	1	Steel Allen Set Screw 1/4 - 20 x 3/8"	PUR-TSAS160-024

**Tool Name:** 2.250 in. OD Mechanical 2.500 in. GS Spear

**Product Code:** TT0200-225B **Tool OD:** 2.250 in. **Tool ID:** 0.313 in.

**Material:** AISI 4140 HT

**Tool Length:** 21.6 in.

**Minimum Yield:** 100,000 psi

**Strength Properties of Tool:**

**Minimum Yield Point and Load to Yield:** The Collet stop on the Mandrel, 49,000 lbs; the 0.281 in. diameter holes of the Mandrel, 50,000 lbs.

**Burst Point and Burst Pressure:** The O-ring bore of the Top Sub, 48,000 psi.

**Torsional Weak Point and Ft-Lbs to Yield:** 700 ft-lbs as a function of O-ring groove collapse of the Mandrel, **without** the 1/4-20 Steel Allen set screw tightened to 77.9 in-lbs; 750 ft-lbs as a function of O-ring groove collapse of the Mandrel, **with** the 1/4-20 Steel Allen set screw tightened to 77.9 in-lbs; 950 ft-lbs as a function of torsional yield of the pin end of the Mandrel, **without** the 1/4-20 Steel Allen set screw tightened to 77.9 in-lbs; 1,000 ft-lbs as a function of torsional yield of the pin end of the Mandrel, **with** the 1/4-20 Steel Allen set screw tightened to 77.9 in-lbs; 2,200 ft-lbs as a function of torsional yield of the Mandrel at the thread recess of the pin connection.

**Recommended Make Up Torque:**

**1st Connection:** The Top Sub - Mandrel Stub Acme connection - 210 ft-lbs.

**2nd Connection:** The Screw Housing - Collet Housing Stub Acme connection - 100 ft-lbs.

**3rd Connection:** The 1/4-20 Steel Allen set screw - 77.9 in-lbs.

**Miscellaneous Information:**

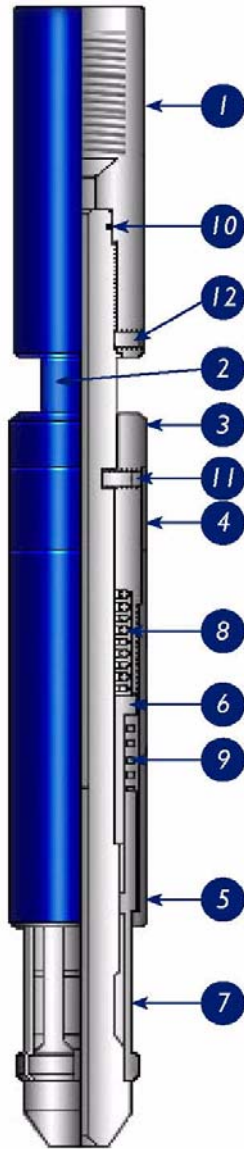
**Shear Screw Size and Values:** 1/4-20 X 3/8 in. Long Brass Slotted Head Shear Screws, 1,415 lbs per screw (plus or minus 20%)

**Fishing Profile Information:**

The tool catches a 2-1/2 in. nominal (1.813 in. ID) internal fishing neck.



## TT0200-288A BOM, Schematic and Specs



ITEM	QTY	TOOL PARTS DESCRIPTION	PART NUMBER
1	1	Top Sub	TT0200-288A-001
2	1	Mandrel f/2 7/8" "FDL" Disconnect Bottom Sub	TT0200-288A-002
3	1	Screw Housing	TT0200-288A-003
4	1	Cover Sleeve	TT0200-288A-004
5	1	Collet Housing	TT0200-288A-005
6	1	Spring Stop	TT0200-288A-006
7	1	Collet f/2 7/8" "FDL" Disconnect Bottom Sub	TT0200-288A-007
8	1	Mandrel Spring	PUR-TCS0132-320
9	1	Collet Spring 3" "GS" Dog Spring	PUR-TCS0152-275
10	1	O-Ring 1 5/16" x 1 1/2" x 3/32" 2-125	PUR-TORV000-125
11	9	Brass Slotted Shear Screws 1/4-20 x 7/16"	PUR-TBSS160-028
12	1	Steel Allen Set Screw 5/16-18 x 1/2"	PUR-TSAS200-032

**Tool Name:** 2.875 in. OD Mechanical 3 in. GS Spear

**Product Code:** TT0200-288A    **Tool OD:** 2.875 in.    **Tool ID:** 0.500 in.

**Material:** AISI 4140 HT

**Tool Length:** 24.8 in.

**Minimum Yield:** 100,000 psi

**Strength Properties of Tool:**

**Minimum Yield Point and Load to Yield:** The thread recess of the pin connection of the Mandrel, 76,000 lbs; the shear screw holes of the Mandrel, 80,000 lbs.

**Burst Point and Burst Pressure:** The O-ring bore of the Top Sub, 56,000 psi.

**Torsional Weak Point and Ft-Lbs to Yield:** 1,200 ft-lbs as a function of O-ring groove collapse of the Mandrel, **without** the 5/16-18 Steel Allen set screw tightened to 156 in-lbs; 1,300 ft-lbs as a function of O-ring groove collapse of the Mandrel, **with** the 5/16-18 Steel Allen set screw tightened to 156 in-lbs; 1,570 ft-lbs as a function of torsional yield of the pin end of the Mandrel, **without** the 5/16-18 Steel Allen set screw tightened to 156 in-lbs; 1,670 ft-lbs as a function of torsional yield of the pin end of the Mandrel, **with** the 5/16-18 Steel Allen set screw tightened to 156 in-lbs; 3,500 ft-lbs as a function of torsional yield of the Mandrel at the thread recess of the pin connection.

**Recommended Make Up Torque:**

**1st Connection:** The Top Sub - Mandrel Stub Acme connection - 360 ft-lbs.

**2nd Connection:** The Screw Housing - Collet Housing Stub Acme connection - 480 ft-lbs.

**3rd Connection:** The 5/16-18 Steel Allen set screw - 156 in-lbs.

**Miscellaneous Information:**

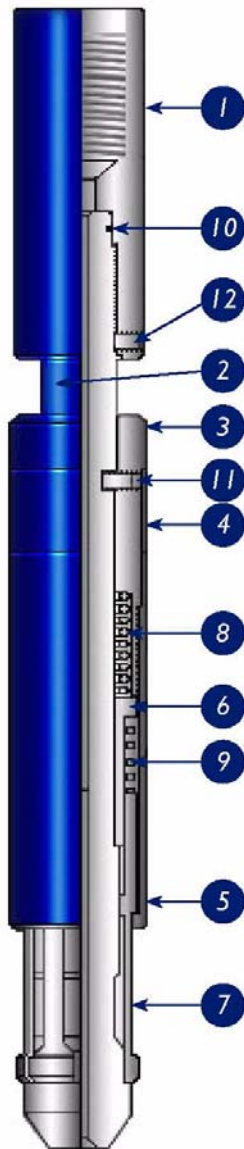
**Shear Pin Size & Values:** 1/4-20 X 7/16 in. Long Brass Slotted Head Shear Screws, 1,415 lbs per screw (plus or minus 20%)

**Fishing Profile Information:**

The tool catches a 3 in. nominal (2.312 in. ID) internal fishing neck.

# Mechanical Spear

## TT0200-288E BOM, Schematic and Specs



ITEM	QTY	TOOL PARTS DESCRIPTION	PART NUMBER
1	1	Top Sub	TT0200-288A-001
2	1	Mandrel f/3 1/8" "FDL" Disconnect Bottom Sub	TT0200-288A-008
3	1	Screw Housing	TT0200-288A-003
4	1	Cover Sleeve	TT0200-288A-004
5	1	Collet Housing	TT0200-288A-005
6	1	Spring Stop	TT0200-288A-006
7	1	Collet f/3 1/8" "FDL" Disconnect Bottom Sub	TT0200-288A-009
8	1	Mandrel Spring	PUR-TCS0132-320
9	1	Collet Spring 3" "GS" Dog Spring	PUR-TCS0152-275
10	1	O-Ring 1 5/16" x 1 1/2" x 3/32" 2-125	PUR-TORV000-125
11	9	Brass Slotted Shear Screws 1/4-20 x 7/16"	PUR-TBSS160-028
12	1	Steel Allen Set Screw 5/16-18 x 1/2"	PUR-TSAS200-032

**Tool Name:** 2.875 in. OD Mechanical 3 in. GS FA Spear

**Product Code:** TT0200-288E **Tool OD:** 2.875 in. **Tool ID:** 0.500 in.

**Material:** AISI 4140 HT

**Tool Length:** 26.3 in.

**Minimum Yield:** 100,000 psi

**Strength Properties of Tool:**

**Minimum Yield Point and Load to Yield:** The thread recess of the pin connection of the Mandrel, 76,000 lbs; the shear screw holes of the Mandrel, 80,000 lbs.

**Burst Point and Burst Pressure:** The o-ring bore of the Top Sub, 56,000 psi.

**Torsional Weak Point and Ft-Lbs to Yield:** 1,200 ft-lbs as a function of O-ring groove collapse of the Mandrel, **without** the 5/16-18 Steel Allen set screw tightened to 156 in-lbs; 1,300 ft-lbs as a function of O-ring groove collapse of the Mandrel, **with** the 5/16-18 Steel Allen set screw tightened to 156 in-lbs; 1,570 ft-lbs as a function of torsional yield of the pin end of the Mandrel, **without** the 5/16-18 Steel Allen set screw tightened to 156 in-lbs; 1,670 ft-lbs as a function of torsional yield of the pin end of the Mandrel, **with** the 5/16-18 Steel Allen set screw tightened to 156 in-lbs; 3,500 ft-lbs as a function of torsional yield of the Mandrel at the thread recess of the pin connection.

**Recommended Make Up Torque:**

**1st Connection:** The Top Sub - Mandrel Stub Acme connection - 360 ft-lbs.

**2nd Connection:** The Screw Housing - Collet Housing Stub Acme connection - 480 ft-lbs.

**3rd Connection:** The 5/16-18 Steel Allen set screw - 156 in-lbs.

**Miscellaneous Information:**

**Shear Pin Size and Values:** 1/4-20 X 7/16 in. Long Brass Slotted Head Shear Screws, 1,415 lbs per screw (plus or minus 20%)

**Fishing Profile Information:**

The tool catches a 3 in. GS FA (2.312 in. ID) internal fishing neck (longer reach than standard).

## 1.0 Pre-Assembly



**Warning:** *Make sure all tool parts and components have been thoroughly cleaned or serious damage and/or injury could occur!*



**Note:** *Verify that the correct O-ring redress kit and quantities are used as specified on the Bill Of Materials (for example, 5 each etc....). Lay out all redress kit components on a clean surface.*



**Note:** *Make sure to lubricate all O-rings and threaded surfaces.*



**Note:** *Visually inspect all parts for damage or wear. Thread parts together without the O-rings to check fit. Repair or replace damaged parts.*



**Caution:** *Always file wrench marks or burrs and clean off debris!*



**Caution:** *This tool should always be disassembled, cleaned thoroughly, inspected and reassembled after each job!*

## 2.0 Assembly

**2.1** Grease the entire ID of the Collet Housing (item #5), then insert the Collet (item #7), fingers first, into the threaded end of the housing.

**2.2** Put the O-ring (item #10) onto the Mandrel (item #2), then insert it into the Collet.

**2.3** Place the assembly in a vise on the Collet Housing.

**2.4** Grease the shaft of the Mandrel, then slide the Spring (item #9) onto the end of the Mandrel and into the Collet Housing.

**2.5** Grease the ID of the Spring Stop (item #6) slide it shoulder down onto the Mandrel and push it against the Spring (item #9).

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**2.6** Now slide the Mandrel Spring (item #8) onto the Mandrel and against the Spring Stop.

**2.7** Grease the ID of the Cover Sleeve (item #4) and put it on the Shear Screw Housing (item #3). Screw the sleeve/housing into the Collet housing just enough so that all of the shear screw holes are still visible.

**2.8** Thread the Top Sub (item #1) onto the Mandrel about half way. Now pull back on the Top Sub to align the holes in the Mandrel with those in the Shear Screw Housing.

**2.9** According to your desired shear values, install the required number of Shear Screws (item #11).

**2.10** Finish screwing in the Shear Screw Housing (item #3) and make wrench tight.



*Note: Use two wrenches when making up the Shear Screw Housing to the Collet Housing. Do not use the Shear Screws when torquing.*

**2.11** Continue to screw on the Top Sub by hand until it stops. Now put the assembly in the vise on the Top Sub, with the set screw hole facing up. Make the Top Sub connection wrench tight by placing a wrench on the head-end of the Mandrel and turning. Be sure to file off any burrs on the Mandrel head.



*Note: This step ensures that the Shear Screw(s) do not shear.*

**2.12** Finally, insert the Set Screw (item #12) into the Top Sub and tighten.



*Note: If you are using Mechanical Spear with Prong, insert the Prong into the end of the Mandrel head and make wrench tight.*

## 3.0 Disassembly

**3.1** Put the assembly into a vise on the Top Sub (item #1), with the set screw hole facing up.

**3.2** Remove the Set Screw (item #12) from the Top Sub.



*Note: If you are using Mechanical Spear with Prong, remove the Prong from the end of the Mandrel head.*

**3.3** Remove the Top Sub by placing a wrench on the head-end of the Mandrel (item #2). File off any burrs from the Mandrel head.

**3.4** Put the assembly in the vise on the Collet Housing (item #5).

**3.5** Unscrew the Shear Screw Housing (item #3) about half way.

**3.6** Remove the Shear Screw(s) (item #11).



*Note: You might have to use the Top Sub as in step 2.8.*

**3.7** Remove the Shear Screw Housing and Cover Sleeve (item #4).

**3.8** Remove the Spring (item #8), the Spring Stop (item #6) and the other Spring (item #9).

**3.9** Remove the assembly from the vise and pull the Mandrel (item #2) out of the Collet (item #7).

**3.10** Finally, remove the Collet from the Collet Housing.



*Note: Remove and discard all O-rings. Replace O-rings after each use. Thoroughly clean tool parts in a cleaner approved by state and/or local laws.*



*Note: Visually inspect tool for swelling after each use. Damaged or swelled components must be replaced.*



*Note: It is recommended that a Magnetic Particle Inspection (MPI) be completed on all components after each job.*

# Mechanical Spear

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