TECHNICAL MANUAL

350 Ton Umbilical Spider

Operation Manual

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Revision History

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A	12/15/15	Issued for Use

Description of Change

Rev	Change
B	

TABLE OF CONTENTS

GENERAL

The purpose of this 350 ton spider is to grip and lift API sized pipe vertically with a piggy backed umbilical. Mounted on the rig floor or rotary table with a custom ‘winged’ top guide to aid centering the tubular string and an adapter plate used to secure the tool onto a rotary table.

Figure 1: Spider for umbilical

Specially modified slip assemblies and interchangeable inserts allow each spider to handle different size API pipe. The 350 ton accommodates 4 1/2” to 13 5/8”. Inserts enable pipe handling with an OD up to 1” smaller than nominal slip size.

When the slip assembly is in the open/up position, the pipe and couplings may move freely vertically. When slips are in the set/down position, the pipe is held without inflicting damage. A locking mechanism prevents accidental actuation of the slips. The tool is pneumatically operated.

Insert hinge pin before applying load. If door is open or not secured by pin, the spider will be damaged under load

CONVENTIONS

IMPORTANT SYMBOL IDENTIFICATION	
	WARNING to Operators / Users
	CAUTION to Operators / Users
NOTE	**NOTIFICATION** to Operators / Users

Table 1

SAFETY

Texas International's equipment is used and installed in controlled rig environments involving hazardous operations and situations.

All personnel performing installation, operations, repair or maintenance on this spider must have knowledge of rig procedure. All crew in the vicinity of operations should be trained on rig safety and tool operation. Crew must be instructed for safe use of this spider.

SPECIFICATIONS

Capacity Short Tons	Pipe Range Inches	Operating Pressure PSI
350	4-1/2 To 13-5/8	85 - 125

Table 2

INSTALLATION

- Ensure the spider's top guard plate and top guides are properly fastened and correspond to the tubular size
- Verify the inserts correspond to both the slip and tubular size. Make sure they are secured by the insert retaining plate
- The 5-1/2" slips have two (2) types of inserts. The beveled (ending in GB) go on the top and bottom
- The 5-7/8" slips have three (3) types of inserts. The top bevel (ending in TB) go on the top. The bottom bevel (ending in BB) go on the bottom.

<u>Spider</u>

- Place adapter plate on the rotary table inserting the pins on the bottom of the spider adapter plate into the kelly drive bushing pin holes of the master bushing. Ensure there is no interference between the spider adapter plate and the master bushing
- Secure by placing the tool on the opening of the plate

Pneumatic

- Connect the air supply to the quick connect coupling at the rear of the tool WHEN IN USE
- Make sure the air supply range is within 85-125 PSI

OPERATION

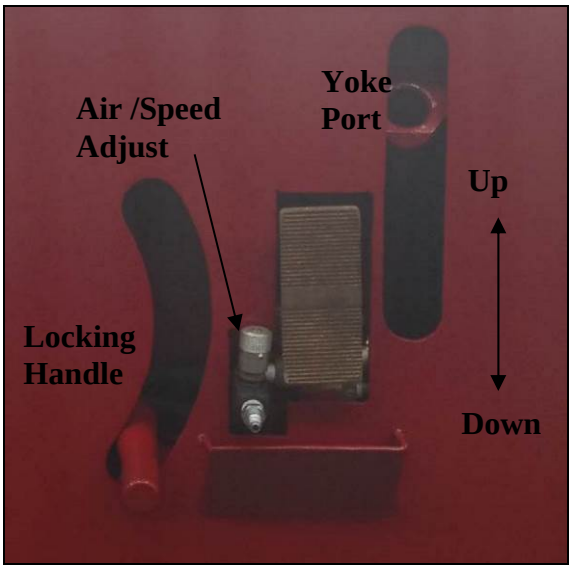


Figure 2: 350 Ton E/S

Releasing the Pipe

- Move the locking handle to the bottom position to raise slips
- Press the top of the pedal/treadle to release the slip's grip on the pipe

Gripping the Pipe

- Move the lock handle to the upper position to lower slips
- Depress the pedal/treadle at the bottom to bring the slips down to grip the pipe

The following can create an unsafe working condition:

1) operating the spider without the locking mechanism
2) using an improperly maintained locking mechanism, or
3) not locking the spider correctly
4) for safety, disconnect air when the slips are down/locked

This spider has a custom top guide and door (see Figure 3). When the wings on the top guide are closed, the pipe and the umbilical clamp are kept in position, preventing them from contacting and possibly damaging the inserts as well as protecting the umbilical. The roller directs the cable/umbilical.

Figure 3: Top guide with wings and door with roller

Figure 4: Wings closed

With the slips up, slowly lower the tubular string. When the clamp has cleared the top guide, close the wings by turning the levers to the left and pushing the handles toward the center.

Ensure the wings are locked in position by trying to move handles

When the clamp has cleared the spider, the slips can be set.

Figure 5: Unlocked

Figure 6: Locked and closed

The Air/Speed Adjust needle valve (p/n 060016) comes preset and controls the speed the slips set/lock. TIOT recommends the setting of one and a half (1-1/2) turns from close with only the green showing as indicated in Figure 8.

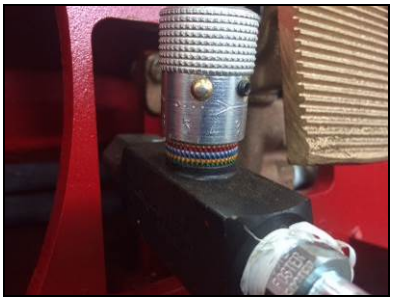


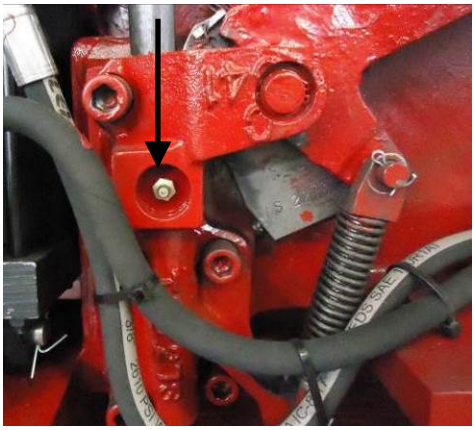
Figure 7: Open

Figure 8: Set

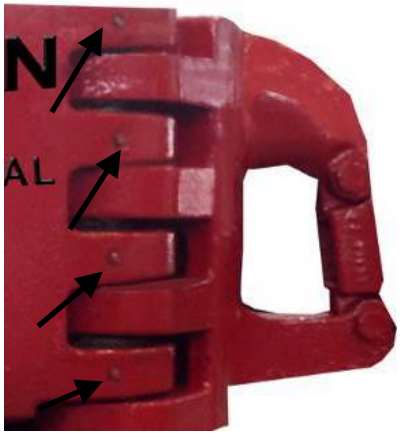
MAINTENANCE

Lubrication

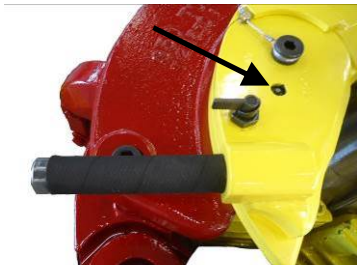
Recommend the use of Extreme Pressure (EP) Grease as indicated below:



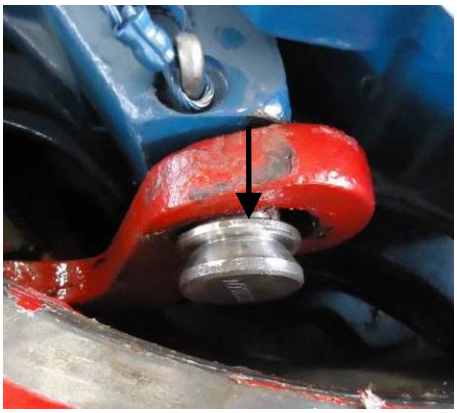
Locking mechanism: grease fitting (as seen on manual E/S) & spring



Hinge pin: grease fittings & ear contact surface (350 ton shown)



Grease fitting on both sides



Yoke eye contact surface

Fill grease dispensers to lubricate the inside bore. The lighted areas indicate slip contact

Figure 9: Key lubrication points

- Make sure the air supply is disconnected before any maintenance is performed
- Use light machine oil on the inserts and its slot - do not apply grease or pipe dope as it could result in slip damage
- Lubricate all moving parts

Changing Slips

- Raise or release the slips by moving the locking handle in the bottom position
- Suspend the slips using a line and pull safety cotter pins (2) and retainer pins (2) from the yoke
- Lift slip assembly from the tool's cone
- Replace with the properly sized set of slips – verify inserts are correct. *See warning on page 5*
- Suspend replacement slips from a line
- Ensure the yoke eyes are in the up position
- Insert slips into the cone and reinstall retainer pins and safety cotter pins

Figure 10: Slip Change – removing retainer pin

This spider requires special slips

Changing Inserts

- Remove slips per instructions above and place on a flat surface
- Unfasten and pull out the insert retaining screws
- Pull the inserts out of the slip slots - using a small pry bar and hammer, if needed

Make sure the insert slots are not damaged during insert removal process

- Remove all debris from the slots and add a thin layer of light machine oil
- Place new inserts into the slots with the teeth pointing up – see warning on page 5
- Fasten insert retaining screws

Assessment and PM schedule

The end user is responsible to establish an inspection schedule and criteria subject to tool usage, wear and environmental conditions. TIOT recommends daily, semiannual and annual inspections as follows:

- Daily / Shift / Job Start Up
    1. Assess lubrication and replenish as needed

Apply grease to interior edges of top guide to reduce contact with the cable clamp

    2. Check fasteners - make sure there are no loose or missing components
    3. Verify ancillary equipment matches tubular size
    4. Actuate slips and locking mechanism several times to check performance
    5. Visually check hoses for wear and tear- replace if leaks are found
    6. Inspect inserts and replace as needed
    7. Check slip retaining bottom sections (toes) for twisting and cracks

- Semiannual
    1. Verify lubrication - make sure all grease fittings are in place
    2. Inspect slip grip - review witness marks on the mandrel/pipe made by inserts. Apply paint on the mandrel/pipe and paper, if needed
    3. Remove coating and debris from critical areas
    4. Complete Magnetic Particle Inspection (MPI) - repair as needed

- Annual
    1. Performance Load Test according to API RP 8B
    2. Perform MPI twenty four (24) hours after load test according to ASTM E709 and use API 8C as criteria
    3. Repair cast as needed – recommend repairs be done by TIOT

Proof of load test and MPI are required after remanufacture or a major weld repair in a critical area

WEAR DATA

Model	350 Ton
Total Clearance (in inches)	
Hinge Pin "A"	0.036
Min. Dia.	2.485
Ears (in inches)	
Radius "R"	2.50
"E"	20.50
"D" Min.	5.50

Table 3

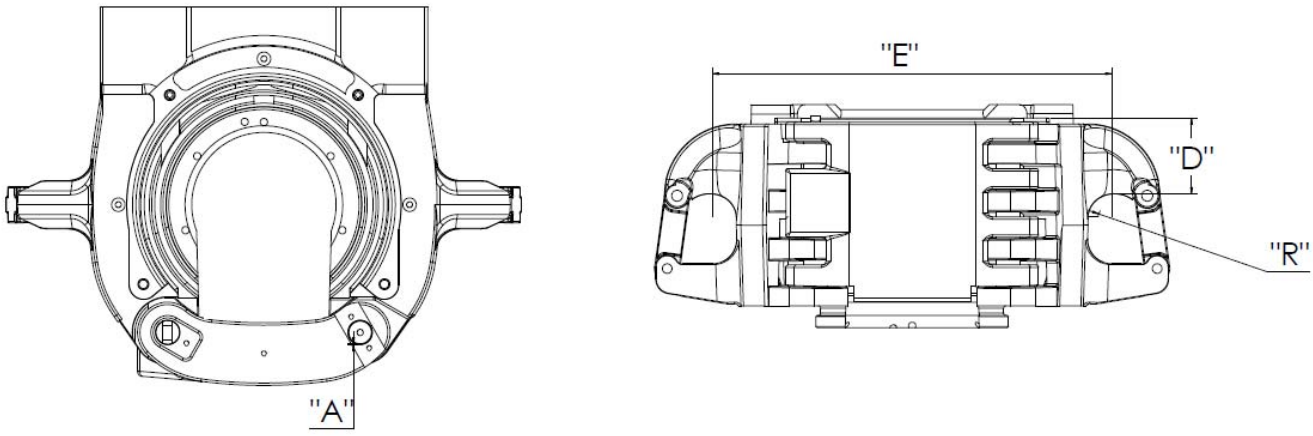


Figure 11

CRITICAL AREA MAP

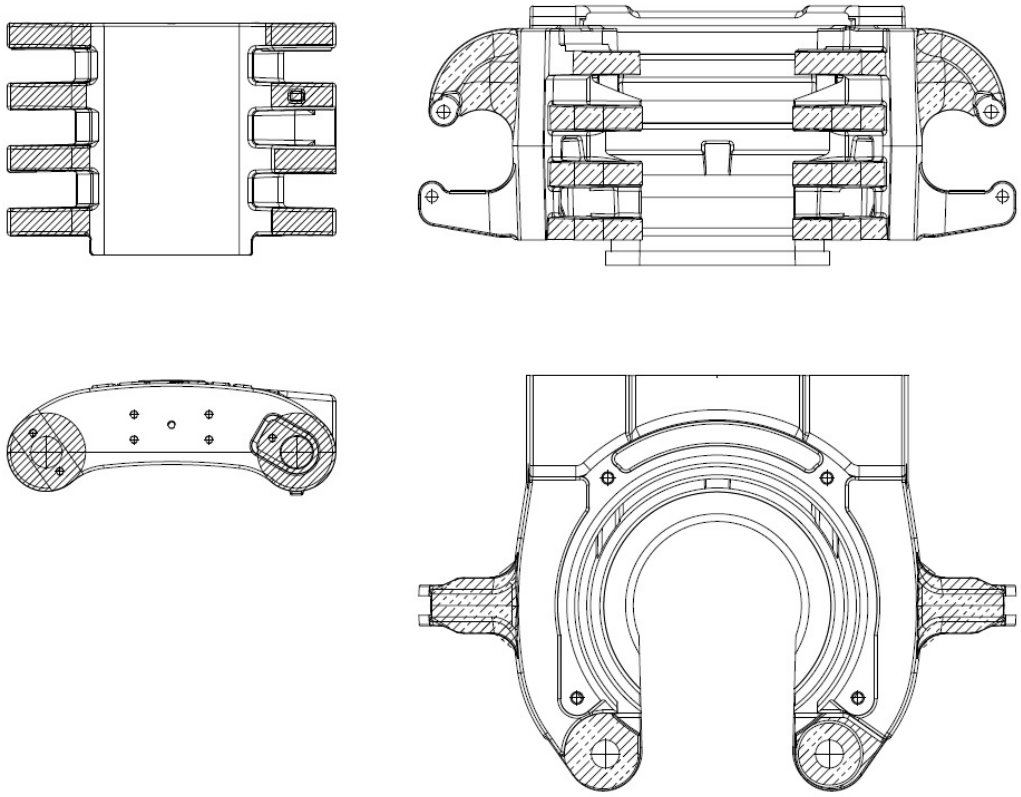


Figure 12

Hatched areas are load bearing and critical

STORAGE AND TRANSPORTATION

The spider assembled with the slips should never be thumped down against the floor. It may jam the locking mechanism

During warehouse storage

- Unpainted surfaces should be coated with rust preventing agent
- Prevent excessive exposure to water and moisture
- Clean the tool and its air couplings after use - steam cleaning as needed; remove mud, debris and any other substances
- Transport the unit in a suitable container or on a pallet

TROUBLESHOOTING

Area	Issue	Failure Mode	Probable Solution
Slips	Not locking in the set (down) or release position (up)	Locking mechanism needs adjustment	Remove the yoke retainer pin and adjust the yoke eyebolt by turning it to a suitable location
		Worn locking mechanism components	Replace the overload plunger, spring cam lock or cam rod if worn
	Does not unlock at the set position (down)	Locking mechanism is stuck	Use a small pry bar and hammer to move up the bottom of the lock rod to release the locking mechanism. Remove the locking mechanism for evaluation and repair
	When released, slips do not swing wide open	Hinge pin and/or spring may be damaged or worn	Inspect and replace if necessary
	They are uneven when placed at the release pipe position	Bent yoke	Remove and straighten yoke if possible or replace
	Slips move slow in either direction (Pneumatic)	Insufficient air supply	Verify air source and adjust pressure as needed
		Air Leak	Replace worn/damaged hoses
		Air/Speed Adjust valve leak	Replace
		Cylinder Seal leak	Replace
	Slips sticking	Insufficient lubrication	Remove slips. Clean the cone and slip backs. Apply light machine oil and reinstall
	Pipe slides through the slips when in the down position or pipe surface is damaged or distorted	Incorrect slip / insert combination. Slip set up is not correct size for the tubular used	Pull slips and make changes to match the tubular
Yoke	Bent	Guide plates do not match the tubular size.	Remove and straighten yoke if possible or replace as needed

Table 4

PARTS

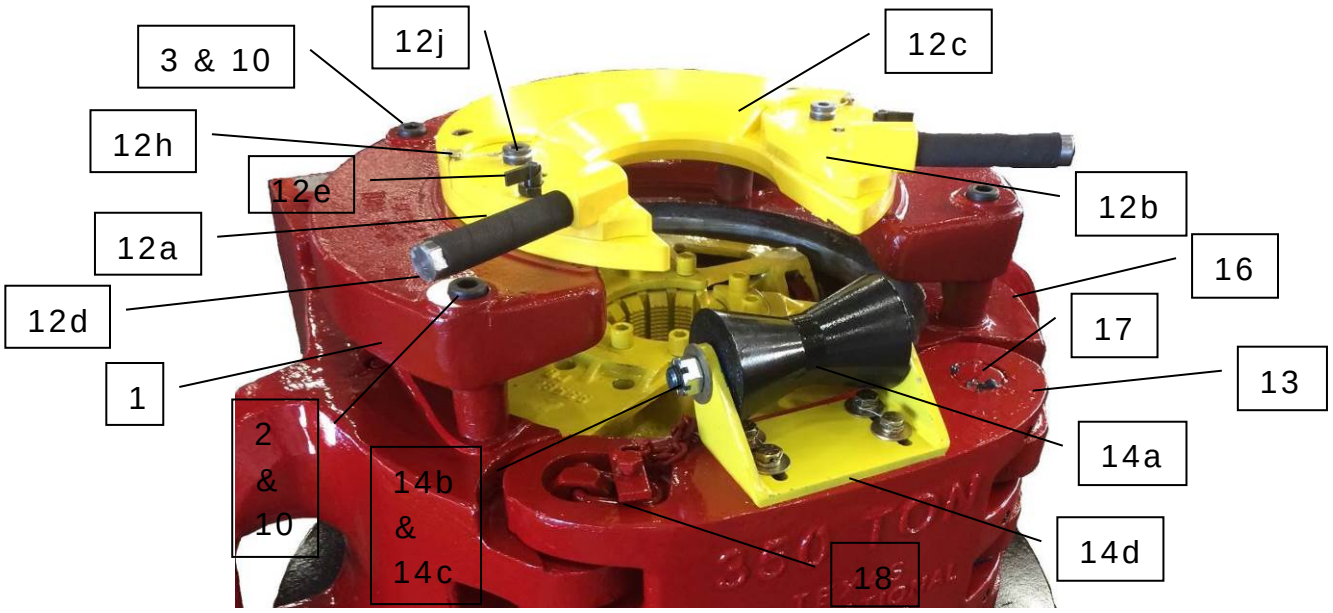


Figure 13; 350 ton for umbilical with 5-7/8 inserts

Item #	Part No	Description	Qty
1	T28570-1-UMB	Upper Guard	1
2	040031	Screws for Upper Guard	2
3	040034	Screws for Upper Guard	2
4	T33494-UMB	350 Ton Yoke - Modified	1
5*	T28514-1-UMB	Yoke Clevis - modified	2
6*	T28513-UMB	Yoke Eye Bolt - modified	2
7*	T28551Y512-UMB	Slips, 7" x 5-1/2" - modified	1
	T28551Y578-UMB	Slips, 7" x 5-7/8" - modified	1
8*	060050-UMB	Knuckle (Female Rod End)	2
9	T50006260Y-1	Treadle Valve	2
10	040054	Washer	4
11	060049	Cylinder, Pneumatic	2
12	T51951-A-UMB	5 7/8" Top Guide Assembly	1
	T51950-A-UMB	5 1/2" Top Guide Assembly	1
12a	T51950-1L-UMB	Top Guide Left Wing	1
12b	T51950-1R-UMB	Top Guide Right Wing	1
12c	T51951-UMB	5 7/8" Top Guide	1
	T51950-UMB	5 1/2" Top Guide	1
12d	T51950-0-UMB	Handle Assembly	2
12e	080109	Plunger	2
12f*	040181	Set Screw	2
12g*	02-0005	Grease Fitting	2
12h	040097	Hex Head Screw	2
12j	T51950-5-UMB	Shoulder Screw	4

*not shown

Table 5

Item #	Part No	Description	Qty
13	T28502-UMB	Door Modified	1
14	T28502-0-UMB	Roller Assembly	1
14a	T28502-2-UMB	Roller For Umbilical	2
14b	T28502-3-UMB	Hex Head Screw	2
14c	040224	Hex Slotted Nut	2
14d	T28502-1-UMB	Bracket	1
15*	T33492-AIR-KIT	350T Air Kit	1
16	T28501-1	350T Body	1
17	T28504	Hinge Pin, Stationary	1
18	T28505	Hinge Pin, Removable	1
19	T27000-UMB	Spider Adapter Plate	1
19a*	T27002-UMB	Spider Adapter Plate Pins	4

*not shown

Table 5 continued

Figure 14; Rear 350 ton for umbilical without cover

250 / 350 Locking Mechanism - P/N T28510-UMB			
Item	**Part No**	**Qty**	**Description**
1	T26273	1	SLIP LOCK BRACKET
2	T26275-1	1	LOCKING CAM OR PORKCHOP
3	T26277	1	BRACKET PIN
4	T26278	1	LOCK SPRING
5	T26279	1	SPRING PLUNGER
6	T26280-1	1	SPRING PLUNGER GUIDE
7	T27458	1	OVERLOAD PLUNGER
8	T28511	1	LOCK ROD
9	T28512	1	SLIP LOCK HANDLE
10	T28513-UMB	1	YOKE EYE BOLT
11	T28514-1-UMB	1	YOKE CLEVIS
12	040025	1	NUT, NYLOC
13	T945039-75	1	TI CAM EXTENSION SPRING
14	T945040-2	1	SLIP LOCK OVERLOAD SPRING
15	040022	1	FLAT HEAD SOCKET HEAD
16	040014	2	WASHER, FLAT, 1/2"
17	040020	1	SCREW, SET, STEEL, CUP POINT
18	080011	2	CAM SPRING COTTER PIN
19	080012	2	COTTER PIN
20	080013	1	GREASE FITTING
21	080014	2	RETAINING RING
22	080015	1	PIN, CLEVIS, STEEL, ZINC PLATED,

Table 6

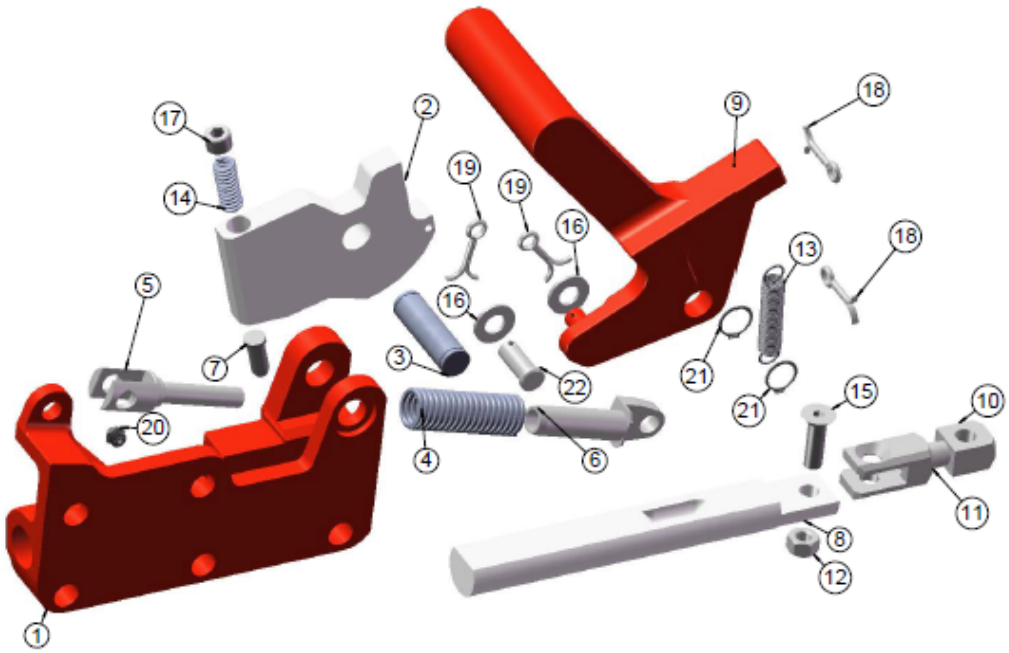


Figure 15: Locking mechanism

350 PNEUMATIC SPARES		
Part No	**Description**	**Qty**
060049	CYLINDER	2
060050-UMB	KNUCKLE, MODIFIED	2
T50006260Y-1	TREADLE VALVE	1
030022	PIPE COUPLING	1
030184	MALE QUICK DISCONNECT COUPLING	1
030044	TEE, RUN	2
030160	90 DEGREES ELBOW	2
030195	ELBOW, 90 DEGREE	4
030326	M-NPT / F-NPT 90 DEG	1
060016	NEEDLE VALVE	1
030169	NIPPLE, PIPE,BLACK STEEL	1
050108	HOSE	3
050109	HOSE	1
030134	NIPPLE, PIPE, HEX, STEEL	1
060061	SINGLE DIRECTION FLOW CONTROL VALVE-BRASS	1

Table 7

When replacing the flow control valve (internal), p/n 060061, connect as shown below.

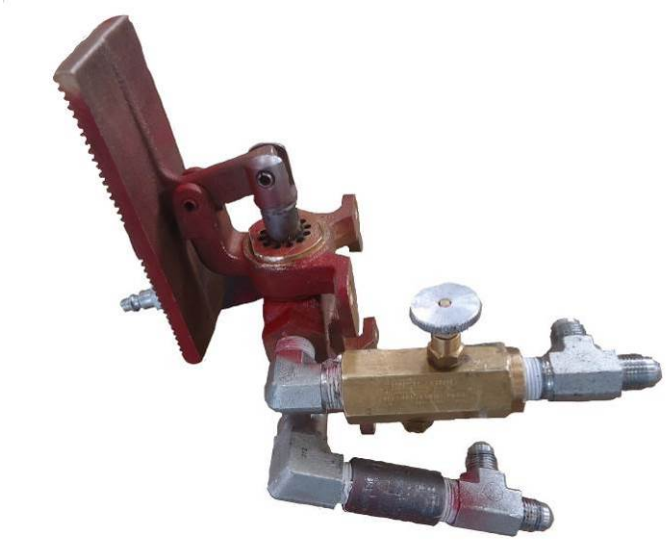


Figure 16: Treadle assembly

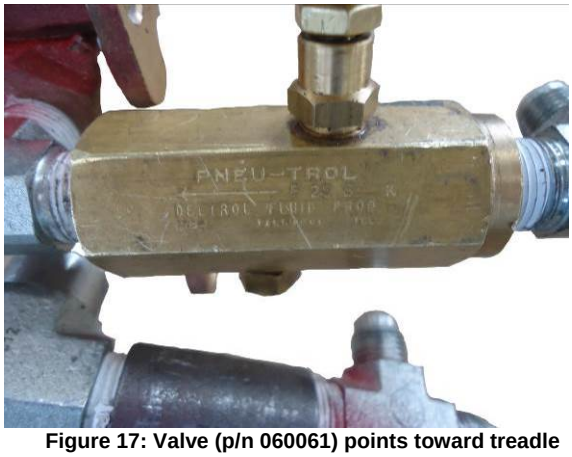


Figure 17: Valve (p/n 060061) points toward treadle

TIOT recommends the valve be set three and one half (3-1/2) turns from close.

ANCILLARY COMPONENT LIST

Slip Size	PIPE SIZE	INSERT	INSERT QTY	INSERT RETAINER	UPPER GUARD
350 Ton Elevator/Spider					
7"	5 1/2"	JJ-0700-0508-G	24	T26324	T28570-1-UMB
		JJ-0700-0508-GB	24		
	5 7/8"	JJ-0700-0514-0	24		
		JJ-0700-0514-BB	12		
		JJ-0700-0514-TB	12		

Table 8

Every Company has to have a Toolbox.

At Texas International Oilfield Tools

we provide the tools to fuel the world!