

**CAVINS MODEL "F" SPIDER
AIR OPERATED
CE CERTIFIED**

**OPERATING, SERVICE AND REPLACEMENT
PARTS MANUAL**



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INTRODUCTION TO CAVINS SPIDERS

The "Advance" Spider developed by Cavins Oil Well Tools is considered to be the pioneer in power slips. Through years of experience and testing, many improvements have been made, which make the "Advance" Spider the leader in safe, economical and trouble free handling of tubular goods. Heat treated alloy steel is used throughout for the greatest possible strength and longest wearing life with a minimum of weight. The shafts are hardened alloy steel for longer life. Replaceable steel bushings are fitted into the journal bearings. All bearings and journals are equipped with grease fittings for lubrication. Air cylinders and foot valves are mist lubricated through the air stream. All spiders are equipped with a manually operated safety latch, which should be used to positively lock the slips in their set position. Because of the low operating pressure, the slips cannot release from the tubing until it has been raised by the elevators, thus, guarding against a lost string in the event that the foot valve is tripped accidentally. The slips, shafts and the air/hydraulic cylinders are protected by guards to prevent damage caused by the elevators or other outside forces. Through research and field testing, our engineers are constantly on the lookout for additional improvements which assure the user in the field of receiving the safest and most maintenance free equipment available.

A. APPLICATION

The CAVINS "Advance" Spider is available in 5 models. The model "B" Spider is designed for use with all API tubing sizes from 1.315" OD through 3-1/2" OD. The Model "C" and "C-HD" Spiders are designed for use with API tubing and drill pipe sizes from 1.315" OD through 5-1/2" OD. The Model "F" Spider is capable of handling all API tubing, casing and drill pipe sizes from 2-3/8" OD through 8-5/8" OD. And finally, the Model "G" Spider can handle all API tubing, casing and drill pipe sizes from 2-3/8" OD through 13-3/8" OD. All models may be used on a rotary table with an adapter plate which fits into the master bushing drive square, thus centering the Spider on the rotary table. All Spider Models can be modified to pass parallel strings of tubing or electric cable.

B. COMPRESSED AIR OPERATED SPIDER

All Spider Models are available for compressed air operation. The relatively low operating pressure required by the Spiders makes it easily adaptable to air supply on any rig or to a portable compressor if the rig is not so equipped.

Each compressed air operated Spider requires the following equipment:

1. One Air Spider Assembly complete.
2. One Slip Assembly complete with inserts for each size tubing/casing/pipe to be run.
3. One Air Filter, Pressure Regulator with gage and Lubricator assembly.
4. One Foot operated Air control Valve assembly.
5. Three lengths of Air Hose Assemblies. One hose to connect from the air supply to the inlet of the foot valve via the Lubricator assembly and the other two to connect the valve to the two ports on the air cylinder attached to the Spider.

C. SLIPS

A slip assembly consists of four individual segments, which are machined together as a unit to form a matched set. Each matched set must fit into a master gage which is identical to the bowl in a spider body, thereby assuring that all slip assemblies will fit in all spiders of the same model. However, slip segments from one set of slips will NOT interchange with slip segments from another set as they will not be matched sets. It is very important, that these sets are kept together to ensure proper gripping action. It is also important that adjacent segments within an assembly which are tied together with arm and tie bolts always be assembled together when replacing arm bolts and tie bolts. A segment from one set of slips should never be substituted for a missing segment in another set of slips.



SPECIFICATIONS FOR CAVINS SPIDERS

SPECIFICATIONS	MODEL "B"	MODEL "C"	MODEL "CHD"	MODEL "F"	MODEL "G"
MATERIAL	Alloy Steel	Alloy Steel	Alloy Steel	Alloy Steel	Alloy Steel
WEIGHT – LESS SLIPS	210 LBS 95 KGS	328 LBS 149 KGS	365 LBS 165 KGS	1175 LBS 532 KGS	2900 LBS 1315 KGS
OVERALL HEIGHT	15-1/2 IN 39 CM	16-1/2 IN 42 CM	16-1/2 IN 42 CM	28 IN/71 CM A) 17 IN/43 CM to top of bowl w/o guard. B) 22-1/2 IN/57 CM To highest pt w/o guard.	35 IN/89 CM A) 17 IN/43 CM to top of bowl w/o guard. B) 22-1/2 IN/57 CM To highest pt w/o guard
BASE DIMENSIONS	16 X 19-1/2 IN 41 X 50 CM	18-1/2 X 18-1/2 IN 47 X 47 CM	20 X 19 IN 51 X 48 CM	28 X 28 IN 71 X 71 CM	41 X 41-5/8 IN 104 X 106 CM
BOLT CENTERS	11-1/8 – 16-1/2 IN 28 – 42 CM	12-3/4 – 14-1/2 IN 32 – 37 CM	12-3/4 – 14-1/2 IN 32 – 37 CM	18-3/4 – 24-1/2 IN 48 – 62 CM	31 – 37 IN 78 – 94 CM
GATE OPENING	4-1/4 IN 10.8 CM	5-3/4 IN 14.60 CM	5-3/4 IN 14.60 CM	8.75 IN 22.22 CM	13-3/4 IN 34.92 CM
BOWL OPENING	4-5/8 IN 11.75 CM	6-1/2 IN 16.50 CM	6-1/2 IN 16.50 CM	10-1/8 IN 25.72 CM	15-1/2 IN 39.37 CM
OPERATING AIR PRESSURE	35 – 45 PSI	40 – 50 PSI	40 – 50 PSI	60 – 80 PSI	150 PSI
OPERATING HYDRAULIC PRESSURE	250-275 PSI 1723 – 1896 KPA	250-275 PSI 1723 – 1896 KPA	250-275 PSI 1723 – 1896 KPA	275-300 PSI 1896 – 2068 KPA	300-350 PSI 2068 – 2413 KPA
TUBULAR GOODS RANGE	1.315 IN – 3-1/2 IN	1.315 IN – 5-1/2 IN	1.315 IN – 5-1/2 IN	2-3/8 IN – 8-5/8 IN	2-3/8 IN–13-3/8 IN
HOOK LOAD CAPACITY	110,000 LBS 49.89 TONNES	165,000 LBS 74.84 TONNES	250,000 LBS 113.40 TONNES	400,000 LBS 181.44 TONNES	700,000 LBS 317.52 TONNES

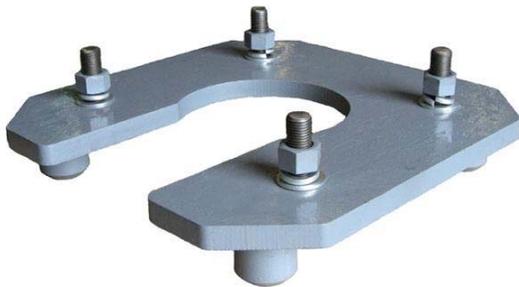
NOTES:

- To calculate maximum setting depth of string, divide the maximum load capacity by the weight per foot of the threaded and coupled tubular goods to be handled.
- For slips with Circular Button inserts and Strip inserts, reduce calculated setting depth by 40%.
- For slips with Chevron Inserts, reduce calculated setting depth by 25%.
- For slips with Integral teeth, no reduction of the calculated setting is necessary.
- For slips with Full circle inserts, no reduction of the calculated setting is necessary.
- For slips with Horizontal teeth inserts (applies to Model "F" Spider only), reduce calculated setting depth by 25% for drill pipe only.



MODEL "F" SPIDER ASSEMBLY AND ACCESSORIES

PART NUMBER	PART DESCRIPTION	NET WT LBS/KGS
TF100-S	CAVINS 'ADVANCE' MODEL "F" AIR OPERATED SPIDER FOR 2-3/8" TO 8-5/8" OD CSG FOR SINGLE STRING OPERATION (400,000# HOOK LOAD CAP.)	1175/533
TB200	FOOT OPER. RATCHET TYPE AIR CONTROL VALVE WITH QUICK CHANGE COUPLINGS & COVER GUARD	26/11.8
TB220	COMBINATION AIR CONTROL UNIT COMPLETE WITH RATCHET FOOT VALVE, AIR FILTER, PRESSURE REGULATOR, GAGE, LUBRICATOR & ALL FITTINGS MOUNTED IN SAFETY COVER GUARD.	56/25/4
TB220-P	COMBINATION AIR CONTROL UNIT COMPLETE WITH PISTON FOOT VALVE, AIR FILTER, PRESSURE REGULATOR, GAGE, LUBRICATOR & ALL FITTINGS MTD. IN SAFETY COVER GUARD.	56/25.4
TB230	FOOT OPERATED PISTON TYPE AIR CONTROL VALVE WITH QUICK CHANGE COUPLINGS & COVER GUARD.	15/6.8
TB295	HAND OPERATED AIR CONTROL VALVE	1.7/1.77
TB300-XX	AIR HOSE ASSEMBLY-COMplete WITH Q/C COUPLINGS. 'XX' REPRESENTS LENGTH OF HOSE DESIRED. 15 WOULD BE 15 FT.	
TB400	AIR FILTER/PRESSURE REGULATOR WITH GAGE & LUBRICATOR UNIT COMPLETE WITH MOUNTING BRACKET	5.5/2.5
TF170-P-20.500	PIN DRIVE ROTARY TABLE ADAPTER PLATE TO ADAPT MODEL "F" SPIDER TO API 20-1/2" PIN DRIVE MASTER BUSHING.	200/90.7
TF170-P-27.500	PIN DRIVE ROTARY TABLE ADAPTER PLATE TO ADAPT MODEL "F" SPIDER TO API 27-1/2" OR 37-1/2" PIN DRIVE MASTER BUSHING.	185/83.9
TF170-S	ROTARY TABLE ADAPTER PLATE TO ADAPT MODEL "F" SPIDER TO ANY ROTARY TABLE SQUARE DRIVE MASTER BUSHING WITH A STANDARD A.P.I. 13-9/16" ID.	120/54.4



TF170-P-27.500 PIN DRIVE ADAPTER PLATE

TB230 AIR CONTROL VALVE ASSY



SLIPS FOR MODEL "F" SPIDER



MASTER SLIP BODY FOR MAX OD PIPE	API PIPE SIZES IT ACCOMODATES OD	TYPE "TD" SLIPS COMPLETE WITH INSERTS		NO. OF TYPE "HTI" INSERTS PER SET
		PART NUMBER	NET WT. LBS/KGS	
3-1/2"	2-3/8"	TF150-D-3.500X2.375	149/68	16
	2-7/8"	TF150-D-3.500X2.875	145/66	16
	3-1/2"	TF150-D-3.500	141/64	16
4-1/2"	3-1/2"	TF150-D-4.500X3.500	136/62	32
	4"	TF150-D-4.500X4.000	127/58	32
	4-1/2"	TF150-D-4.500	121/55	32
5-1/2"	4-1/2"	TF150-D-5.500X4.500	169/77	32
	5"	TF150-D-5.500X5.000	161/73	32
	5-1/2"	TF150-D-5.500	154/70	32
7-5/8"	6-5/8"	TF150-D-7.625X6.625	200/91	48
	7"	TF150-D-7.625X7.000	205/93	48
	7-5/8"	TF150-D-7.625	192/87	48
8-5/8"	8-5/8"	TF150-R-8.625 INTEGRAL TEETH NO INSERTS REQD	143/65	-



CAVINS MODEL "F" SPIDER

MASTER SLIP BODY FOR MAX OD PIPE	API PIPE SIZES IT ACCOMODATES OD	TYPE "TD" SLIPS LESS INSERTS		NO. OF TYPE "HTI" INSERTS PER SET
		PART NUMBER	NET WT. LBS/KGS	
3-1/2"	2-3/8" TO 3-1/2"	TF151-D-3.500	135/61	16
4-1/2"	3-1/2" TO 4-1/2"	TF151-D-4.500	108/49	32
5-1/2"	4-1/2" TO 5-1/2"	TF151-D-5.500	141/64	32
7-5/8"	6-5/8" TO 7-5/8"	TF151-D-7.625	174/79	48

SLIP SIZES		NO. OF TYPE "HTI" INSERTS PER SET		
FOR MASTER SLIP BODY SIZE	TO HANDLE TUBULAR GOODS SIZE	PER SET		
OD	OD	NO REQD	PART NUMBER	NET WT LBS/KGS
3-1/2"	2-3/8"	16	TF1571-3.500X2.375	14/6
	2-7/8"	16	TF1571-3.500X2.875	10.5/4.8
	3-1/2"	16	TF1570-3.500	6.5/3
4-1/2"	3-1/2"	32	TF1571-4.500X3.500	28/13
	4"	32	TF1571-4.500X4.000	19.5/8.8
	4-1/2"	32	TF1570-4.500	13.3/6
5-1/2"	4-1/2"	32	TF1571-5.500X4.500	28/13
	5"	32	TF1571-5.500X5.000	19.5/8.8
	5-1/2"	32	TF1570-5.500	12.5/5.7
7-5/8"	6-5/8"	48	TF1571-7.625X6.625	26/11.8
	7"	48	TF1571-7.625X7.000	31/14
	7-5/8"	48	TF1570-7.625	18/8

SLIP SIZES		INSERTS – TYPE "HTI" FOR "TD" SLIPS	
FOR MASTER SLIP BODY SIZE	TO HANDLE TUBULAR GOODS SIZE	EACH	
OD	OD	PART NUMBER	NET WT LBS/KGS
3-1/2"	2-3/8"	TF157-3.500X2.375	.88/.39
	2-7/8"	TF157-3.500X2.875	.66/.30
	3-1/2"	TF157-3.500	.41/.19
4-1/2"	3-1/2"	TF157-4.500X3.500	.88/.39
	4"	TF157-4.500X4.000	.61/.28
	4-1/2"	TF157-4.500	.42/.19
5-1/2"	4-1/2"	TF157-5.500X4.500	.88/.39
	5"	TF157-5.500X5.000	.61/.28
	5-1/2"	TF157-5.500	.39/.18
7-5/8"	6-5/8"	TF157-7.625X6.625	.54/.24
	7"	TF157-7.625X7.000	.65/.29
	7-5/8"	TF157-7.625	.37/.17



MASTER SLIP BODY FOR MAX OD PIPE	PIPE SIZES IT ACCOMODATES OD	TYPE "FCR" SLIPS COMPLETE WITH INSERTS		NO. OF "FCI" INSERTS PER SET
		PART NUMBER	NET WT. LBS/KGS	
3-1/2"	2-3/8"	TF620-FCR-3.500X2.375	156/71	4
	2-7/8"	TF620-FCR-3.500X2.875	151/68	4
	3-1/8"	TF620-FCR-3.500X3.125	146/66	4
	3-1/2"	TF610-FCR-3.500	142/64	4
5-1/2"	3-3/4"	TF620-FCR-5.500X3.750	194/88	4
	4"	TF620-FCR-5.500X4.000	189/86	4
	4-1/8"	TF620-FCR-5.500X4.125	185/84	4
	4-3/8"	TF620-FCR-5.500X4.375	181/82	4
	4-1/2"	TF620-FCR-5.500X4.500	178/81	4
	4-3/4"	TF620-FCR-5.500X4.750	175/79	4
	5"	TF620-FCR-5.500X5.000	166/75	4
	5-1/2"	TF610-FCR-5.500	155/70	4
7-5/8"	5-3/4"	TF620-FCR-7.625X5.750	244/111	4
	6"	TF620-FCR-7.625X6.000	237/108	4
	6-1/4"	TF620-FCR-7.625X6.250	230/104	4
	6-1/2"	TF620-FCR-7.625X6.500	223/101	4
	6-5/8"	TF620-FCR-7.625X6.625	220/100	4
	7"	TF620-FCR-7.625X7.000	209/95	4
	7-1/4"	TF620-FCR-7.625X7.250	199/90	4
	7-5/8"	TF610-FCR-7.625	186/84	4



CAVINS MODEL "F" SPIDER

MASTER SLIP BODY FOR MAX OD PIPE	PIPE SIZES IT ACCOMODATES OD	TYPE "FCR" SLIPS LESS INSERTS WITH RET PINS		NO. OF TYPE "FCI" INSERTS PER SET
		PART NUMBER	NET WT. LBS/KGS	
3-1/2"	2-3/8" TO 3-1/2"	TF600-FCR-3.500	116/53	4
5-1/2"	3-3/4" TO 5-1/2"	TF600-FCR-5.500	115/53	4
7-5/8"	5-3/4" TO 7-5/8"	TF600-FCR-7.625	133/60	4

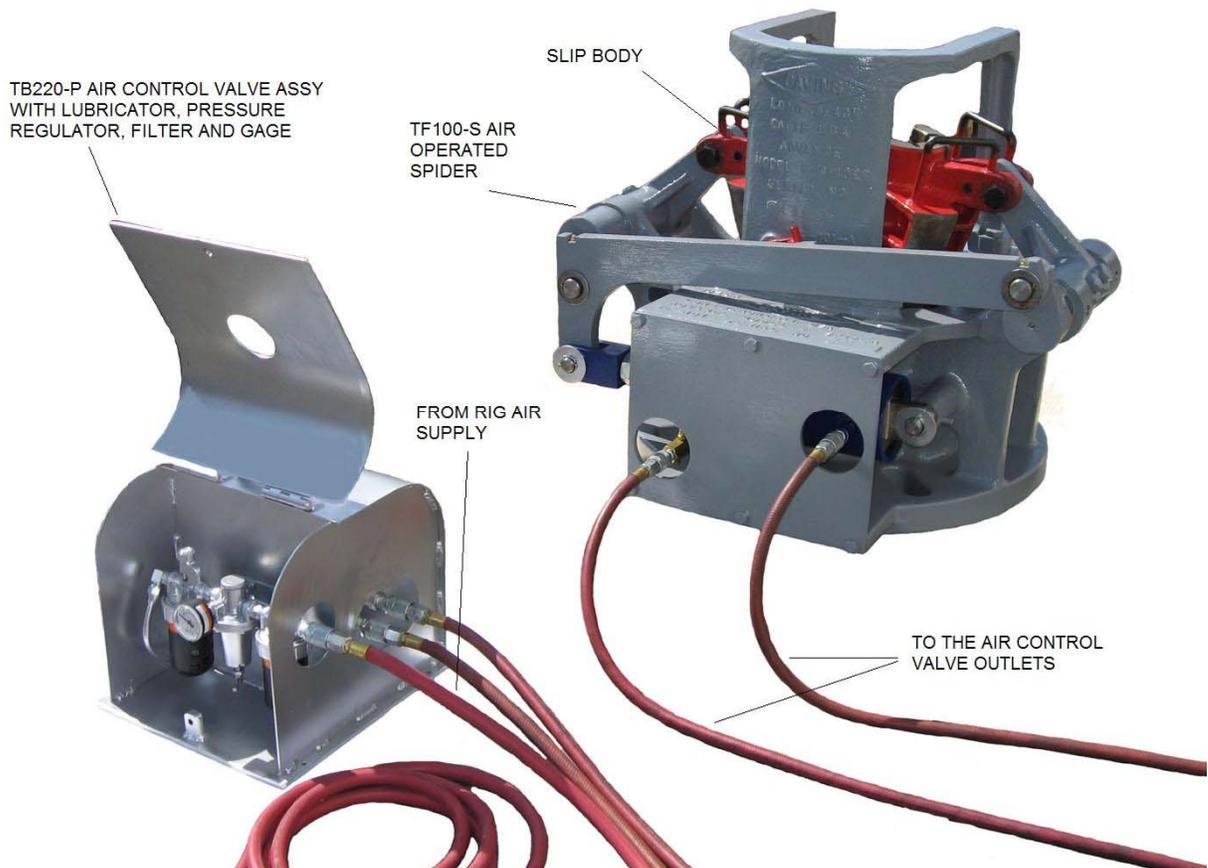
Note: * A set of cotter pins is supplied with each set of the "FCI" inserts.
Some FCI inserts may require a minimum order of 2 sets.

SLIP SIZES		* INSERTS – TYPE "FCI" FOR TYPE "FCR" SLIPS FOR SINGLE STRINGS		
FOR MASTER SLIP BODY SIZE	TO HANDLE TUBULAR GOODS SIZE	PER SET		
OD	OD	NO REQD	PART NUMBER	NET WT LBS/KGS
3-1/2"	2-3/8"	4	TF651-3.500X2.375	40/18
	2-7/8"	4	TF651-3.500X2.875	35/16
	3-1/8"	4	TF651-3.500X3.125	30/14
	3-1/2"	4	TF650-3.500	26/12
5-1/2"	3-3/4"	4	TF651-5.500X3.750	79/36
	4"	4	TF651-5.500X4.000	74/34
	4-1/8"	4	TF651-5.500X4.125	70/32
	4-3/8"	4	TF651-5.500X4.375	66/30
	4-1/2"	4	TF651-5.500X4.500	63/29
	4-3/4"	4	TF651-5.500X4.750	60/27
	5"	4	TF651-5.500X5.000	51/23
5-1/2"	4	TF650-5.500	40/18	
7-5/8"	5-3/4"	4	TF651-7.625X5.750	111/50
	6"	4	TF651-7.625X6.000	104/47
	6-1/4"	4	TF651-7.625X6.250	97/44
	6-1/2"	4	TF651-7.625X6.500	90/41
	6-5/8"	4	TF651-7.625X6.625	87/39
	7"	4	TF651-7.625X7.000	76/34
	7-1/4"	4	TF651-7.625X7.250	66/30
	7-5/8"	4	TF650-7.625	53/24

SLIP ASSEMBLY HARDWARE/SPARE PARTS			
DESCRIPTION	NO PER SET REQD	PART NUMBER	NET WT LBS/KGS
ARM BOLT	2	TF154	.93/.42
NUT FOR ARM BOLT	2	TF155	.25/.11
TIE BOLT FOR SLIP	2	TF152	.31/.14
LOCK NUT FOR TIE BOLT	2	TB112	.04/.02
RETAINING PIN	4	TF601	.34/.15
COTTER PIN *	4	TC602-S	.01/.01
BOLT (3-1/2" TD SLIPS)	4	TF156-L	
BOLT (4-1/2–7-5/8 TD SLIPS)	8 OR 12	TF156-S	
LOCK NUT	4,8 OR 12	TF158	

INSTALLATION

- The spider can be installed directly over the wellhead utilizing the slots in the base or on a rotary table using an adapter plate. Adapter plates are available for both API square and pin drives.
- The proper size slips along with inserts can then be installed on the spider with the bolts and nuts provided. It should be verified that the slip set used is a matched set and the inserts installed are a combination of left and right segments if using type "FCR" slip body.
- Air hoses fitted with quick disconnects allow the cylinder on the spider to be connected to the air control valve assembly (refer to figure below). Before connecting the quick disconnects, they should be inspected for any debris and cleaned. The air control valve assembly is connected to the air supply via a pressure regulator, lubricator and filter combination unit. The air supply can be either the rig air supply or a portable compressor unit.





OPERATION AND SAFETY PRECAUTIONS

- **Read and understand all operating and service instructions before using the Spider Assembly. All operating personnel should be thoroughly trained and knowledgeable of the equipment operation and safe use.**
- **Never place hand or feet in or around the operating parts of the Spider Assembly when in use.**
- **Always lower the Slips into the bowl and disconnect the power source before moving, installing or performing maintenance on the equipment. The air supply to the cylinder is between 60 to 80 psi and hydraulic fluid is supplied at between 275 and 300psi to a hydraulic cylinder.**
- **Spider furnished with pinch point guards should not be used without the guard properly installed.**
- **Safety latch should be checked for proper function on a daily basis and replaced when broken or damaged. Never use the equipment without a safety latch installed.**
- **The Spider assembly should only be lifted or hoisted by the body guard properly secured to the spider body. Never lift or hoist the equipment by attaching to any moveable component, the cylinder guard or the pinch point guard.**
- **Never use the Spider without the gate and gate bolt installed. Gate should only be removed using the lifting eye provided.**
- **Do not overload the Spider – never exceed the rated capacity.**

The following steps need to be taken before changing out slips or replacing inserts when the spider is positioned over the well bore:

- Cycle the foot control valve or other designated rig console control valve until the slips and the slip lifting arms are in the fully open/retracted position. Engage the safety latch to prevent the lift arms from closing and disconnect the hoses to the operating cylinder to prevent accidental operation of the spider.
- Remove and install another set of slips or replace inserts in the slip segments already installed. Please reference maintenance and troubleshooting section drawings for slip and insert information. Rig personnel should take precautions during this activity to avoid dropping parts and tools down the hole.



- The slip sets consist of four segments and each segment is marked to ensure a matched set is installed in the spider. Two segments bolted together makes up one half of a set and is installed on the lift arm by running a bolt through the outside hole on the lugs of the slip segments and the slot in the lifting arm and installing the lock nut. Stroke the slips and check to make sure that the individual slip segments do not bind.

Insert Replacement procedure for Cavins Full Circle (Type "FCR") Slips with replaceable "FCI" inserts:

- Place the Safety Latch in the locked position and remove the Slips from the Spider body by removing the Lifting Arm Bolts and Nuts
- Remove the Cotter Pins from each Slip segment
- Remove the Insert Retaining Pins (insert a dowel rod or punch from the lower end of the slip and tap them out if necessary)
- Remove the old "FCI" Inserts from each Slip segment (gently tap them out with a hammer if necessary)
- Clean and lubricate the slips as needed prior to installing the new "FCI" Inserts and check for excessive wear
- Each set of (4) "FCI" Inserts comes with 2 right and 2 left hand segments. Install the new "FCI" Inserts in each slip segment and check the fit. Inserts should fit snugly. If the fit appears to be too loose, then the Slips may need to be replaced.
- Re-Install the Insert Retaining Pins in each Slip Segment.
- Re-Install the new Cotter Pins (included with the "FCI" Insert set) in each Slip Segment.
- Make sure the Safety Latch is in the locked position and Re-Install the Slips in the Spider Body by securing them to the Lifting Arms with the proper Slip Bolt and Self-locking Nut

Operational performance of the spider should be continuously monitored while in use.

- Check the function of the slips, and if necessary, adjust the cylinder pressure to control the rate of speed for raising and lowering the slips in the spider bowl. This may also require adjustment of the travel stop screw and or the cylinder yoke if changing out to a different slip size. This may also require adjustment of the cylinder pressure to compensate for the different weight of the new slip installed.
- Make appropriate adjustments to ensure that the slips will not damage the pipe or the inserts by setting too hard (slamming down) on the pipe. Always remember to load the hook or top drive before opening the slips and to fully open on the slips before allowing pipe travel to prevent damage to pipe as well as inserts.



MAINTENANCE & TROUBLESHOOTING

The Cavins F spider design has been proven to be a safe, durable and trouble free design for both manual and power operated slips. Since the F spider and slip sets were first introduced in 1962, the tool has been used routinely for drilling, completions, well servicing and snubbing operations around the world. The 200 ton rating of the F spider and the capability of running tubulars from 2 3/8 to 8 5/8 diameters makes it a versatile tool and when properly used and maintained, will provide years of trouble free service.

Cavins F spiders and slip segment sets are manufactured from alloy steel castings, heat treated to achieve specified tensile and impact properties. The operating shafts lift arms and cross-over links are also manufactured from alloy steel to ensure strength and durability. The Cavins model "F" spider design allows for both air and hydraulic operation without changes in the spider features.

Slip sets are available in both the Type "FCR" (full circle insert) and Type "TD" (dovetail slotted) design. Both have replaceable inserts.

Spiders are subject to normal wear in use which will lead to the gradual deterioration of the slip bowl, slips and operating component parts, and will eventually affect the performance of the tool. To assure reliable and trouble free operation it is recommended that both routine and periodic inspections be performed to identify potential problems and eliminate equipment failure or performance problems from occurring. The following guidelines should be incorporated into routine rig equipment maintenance, inspection and personnel awareness.

Never do the following:

Use the wrong size slips or inserts for the pipe diameter being run.

Use mismatched slip segments. All Cavins slips are match marked sets (Figs. 1,3 & 5).

Use mismatched size inserts for pipe diameter being run.

Run pipe without the gate installed in the spider.

Set slips on tool joints, upsets or couplings.

Use the tool as a back-up for torque wrenches or power tongs.

Use as a rotating piece of equipment.

Hammer on the spider operating parts or the slip segments.

Standard Maintenance (routine-daily while in service)

1. Keep the spider clean.
2. Lubricate the bowl.
3. Grease the operating arms and cross-over link.
4. Check and secure all bolting hardware.
5. Weather protect as required.

Function Check (routine-daily)

1. Air or hydraulic operated spiders require pressure regulation to avoid hard setting (slamming) on the pipe which can cause damage to the pipe and to the tool. Adjust the pressure regulator and or flow control valve (TF130) for air operated Spider or pressure reducer valve for hydraulically operated Spider to lower the slips at a controlled rate.
2. Slamming the slips can also create an uneven load on the slip segments when set on the pipe, and this load is then transferred to the spider's top end mechanical parts (lift arms, operating shafts, and cross-over link).



3. The uneven loading on the operating parts will eventually lead to accelerated wear on the bushings and shafts, the bending or deformation of the shafts and lift arms, out-of-time condition on the lift arm/shaft assembly, or the breaking of a shaft or lift arm.
4. The withdrawal of the slips from the bowl should also be controlled to avoid the same type of potential damage to the top end operating parts as described above. This is adjusted by the use of an air pressure regulator valve on the air pressure feed for an air operated spider, or for hydraulic function by the operator's pressure control system on the rig.
5. Check the stroke on the piston rod and make sure the travel is sufficient for slip function. The slips should not hang up on the top of the spider. The cylinder rod yoke can be adjusted to place the slips at the bowl opening. The adjustment of the cylinder rod yoke requires removal of the yoke from the operating shaft and no pressure source should be connected to the cylinder when this is performed. Personnel performing the yoke adjustment must not put their hands into pinch points, and should use the hole in the shaft (TF105) with a round bar for manual function while replacing the yoke on the operating shaft after adjustment.

Visual Check (routine-daily)

1. Without removing the slips from the lift arms, with the slips fully out of the bowl and with the safety latch engaged, clean and visually check the individual slip segments. Gouges or scoring of the back taper on the slip segments is an indicator of problems with debris or improper setting of the slips in the bowl which could also indicate damage to the bowl surface where the slips set (Fig 4). Using a slip set with damaged back taper surfaces will affect the proper setting of the slips on the pipe and will continue to cause potential damage to the tapered bowl surface in the spider. Slip sets found in this condition should be removed from service until they can be checked thoroughly and either reconditioned (refer to Inspection section) or replaced.
2. Clean and visually check the condition of the inserts in the individual slip segments. Damaged or broken inserts (dies) should be replaced. When the inserts are worn where they will no longer grip the pipe, then the inserts need to be replaced.
3. Without removing the slips from the lift arms, with the slips fully out of the bowl and with the safety latch engaged, clean and visually check the spider bowl for any signs of damage to the tapered surfaces. Gouges or scoring in the bowl will affect slip segment setting, and should be noted for a more comprehensive inspection between jobs when the tool can be put in safe condition by removing the slips (refer to Inspection section).

Precaution: Personnel should not be allowed at any time to place their hands or arms in the spider bowl area when the slips are installed either open or closed.

Inspection Guidelines

Mechanical Function/Operation (periodic-every 90 to 120 day intervals)

1. Remove the slip set from the spider and thoroughly clean both the spider and the slip segments.
2. Check for any broken or missing bolts, set screws, taper pins or retaining rings and replace with new ones.
3. Check the bushing fit in the journals for the shafts, and the bushings in the cross-over operating link. The bushings should not be loose, working out or able to be moved by hand. If this be found, the bushing or bushings need to be replaced. Shaft fit in the bushings should be tight, without any play.
4. Check the function of the safety latch on the operating link and make sure it works properly. Should the safety latch be bent or broken, or the safety latch screw be broken, replace with a new one.
5. Install a set of slips that are in good condition with new inserts in the spider, and set the slips on the appropriate pipe diameter to check the bowl for uniform fit of the slips and proper timing/even setting of the left and right slip segments. A good uniform fit of the slips will be tight and free of



lateral side to side, front to back movement. A fairly even setting of the slips, within 3/16 inch of vertical alignment, is evidence of acceptable timing. A non-uniform fit of the slips in the bowl that allows the slips to rock back and forth is an indication of wear in the bowl.

6. While performing Number 5 above, verify that the slips are not setting too low in the bowl of the spider. The bottom of the slips should never extend below the base of the spider body.

Visual Inspection for Damage and Wear

1. Visually examine the spider bowl for any mechanical cuts or gouges that would create an irregular surface and interfere with the slips setting properly in the tapered bowl (Fig 6). Depending on the size and/or extent, these areas may be polished out to remove any high spots that would prevent the slips from setting properly. Verify correction by setting the slips as described above in number five.
2. Evenly spaced and eroded areas in the bowl are due to the contact area of the individual slip segments wearing/foot printing into the bowl over a long or aggressive period of service. The performance of the tool is degraded when this is not corrected by re-machining the bowl to recover the proper taper. This service is provided by Cavins or by our authorized repair representatives. This condition will, if not corrected, affect proper gripping of the pipe and accelerate wear on new slip sets that may be used.
3. Slip sets that have been in service should be routinely checked to ensure that the inserts may be removed without having to use a hammer to drive the inserts out. Striking case hardened inserts with a steel hammer is dangerous, since the inserts may fracture and create shrapnel. Use a brass hammer or a brass rod with a hammer to drift out inserts that will not slip out by hand.
4. Visually examine the tapered backs of each slip segment for gouges, cuts and deformation. The segment taper has to be smooth, with no raised metal, or the bowl in the spider will be damaged. Raised metal can be filed or power sanded (not ground) to the proper contour if done carefully.

Magnetic Particle Inspection (annual examination)

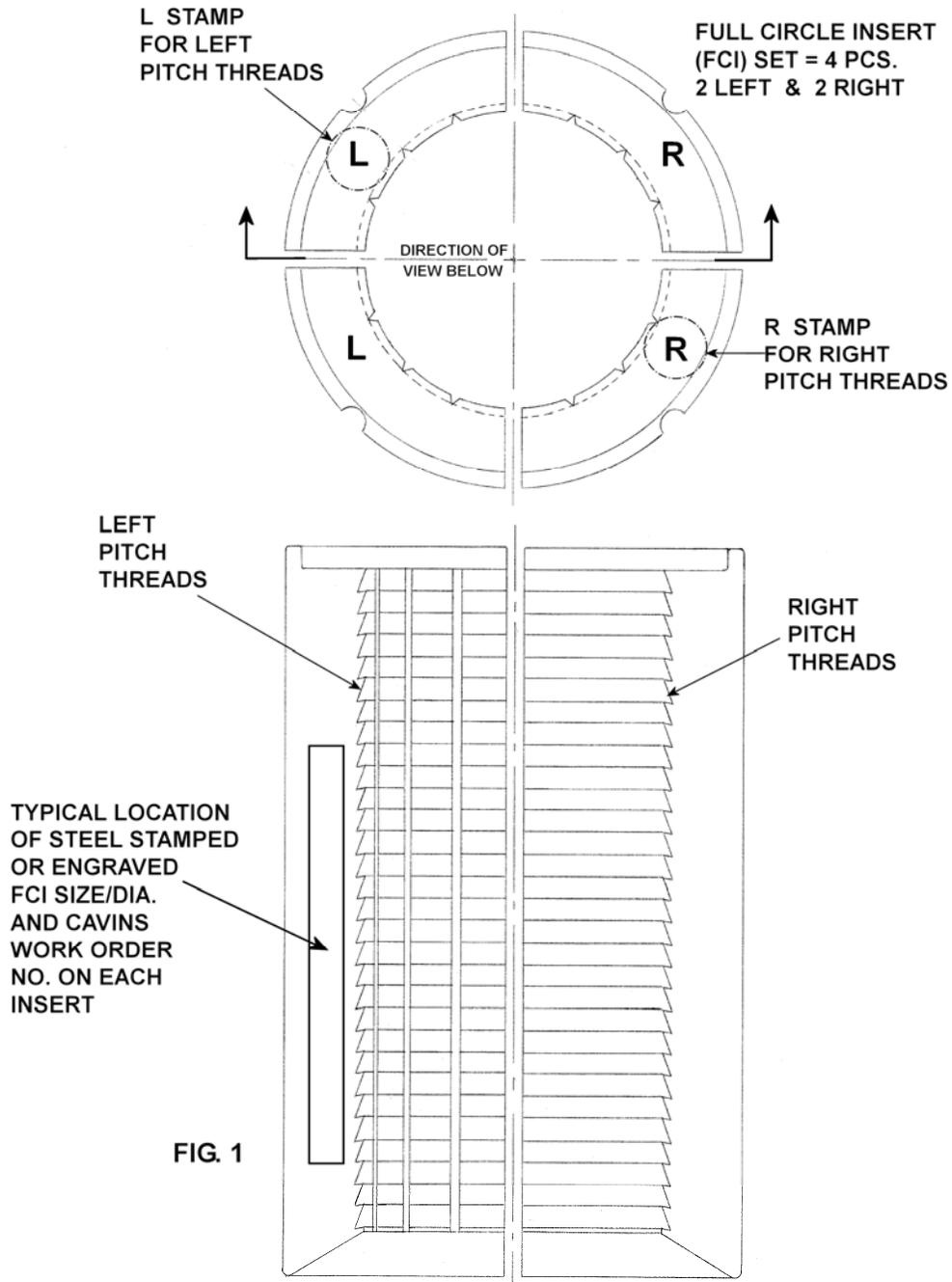
1. To allow access for pre-cleaning and performing Magnetic Particle Inspection (MPI), the spider should be partially disassembled. The slips, cross over link, cylinder guard plate, operating cylinder and gate are removed.
2. The spider body bowl and the dovetail slots for the gate are the areas most affected by service induced stress and are considered critical areas. These areas are machined surfaces, and unless there has been prolonged service with poor maintenance in a highly corrosive environment, these surfaces may only require scrubbing and thorough solvent cleaning in preparation for MPI. Should these surfaces be corroded, they will require sand blasting to thoroughly clean the surface for MPI. Sand blast of these surfaces should be to a white metal finish using fine grain particles, in order to avoid excessive scouring of the surfaces. The same cleaning treatment should be performed on the gate to prepare for MPI of the machined surfaces and the areas adjacent to the machined surfaces.
3. The preferred method for MPI is Wet Fluorescent due to the sensitivity of the suspended and fluorescing particles. Either a residual or continuous (active) field may be used provided the field is capable of being directed to reveal both longitudinal and transverse orientated indications.
4. Any indication with a length that is three (3) times greater than its width is considered a relevant linear indication and requires defect determination. When indications are determined to be defects they shall be removed. Defects that do not exceed 3/32" (2.4 mm) in depth may be blended out to the adjacent surface. Excavations to remove defects in excess of 3/32" (2.4 mm) should be weld repaired. Cavins Oil Well Tools will provide technical guidance for weld repair to equipment operators who, due to location, are unable to return the spider to Cavins Oil Well Tools for repair.
5. All weld repair areas which include the deposited weldment, the heat affected zone (HAZ), and the surrounding base material shall be re-examined by MPI. The acceptance criteria for the weld repair is as follows:
 - No cracks allowed

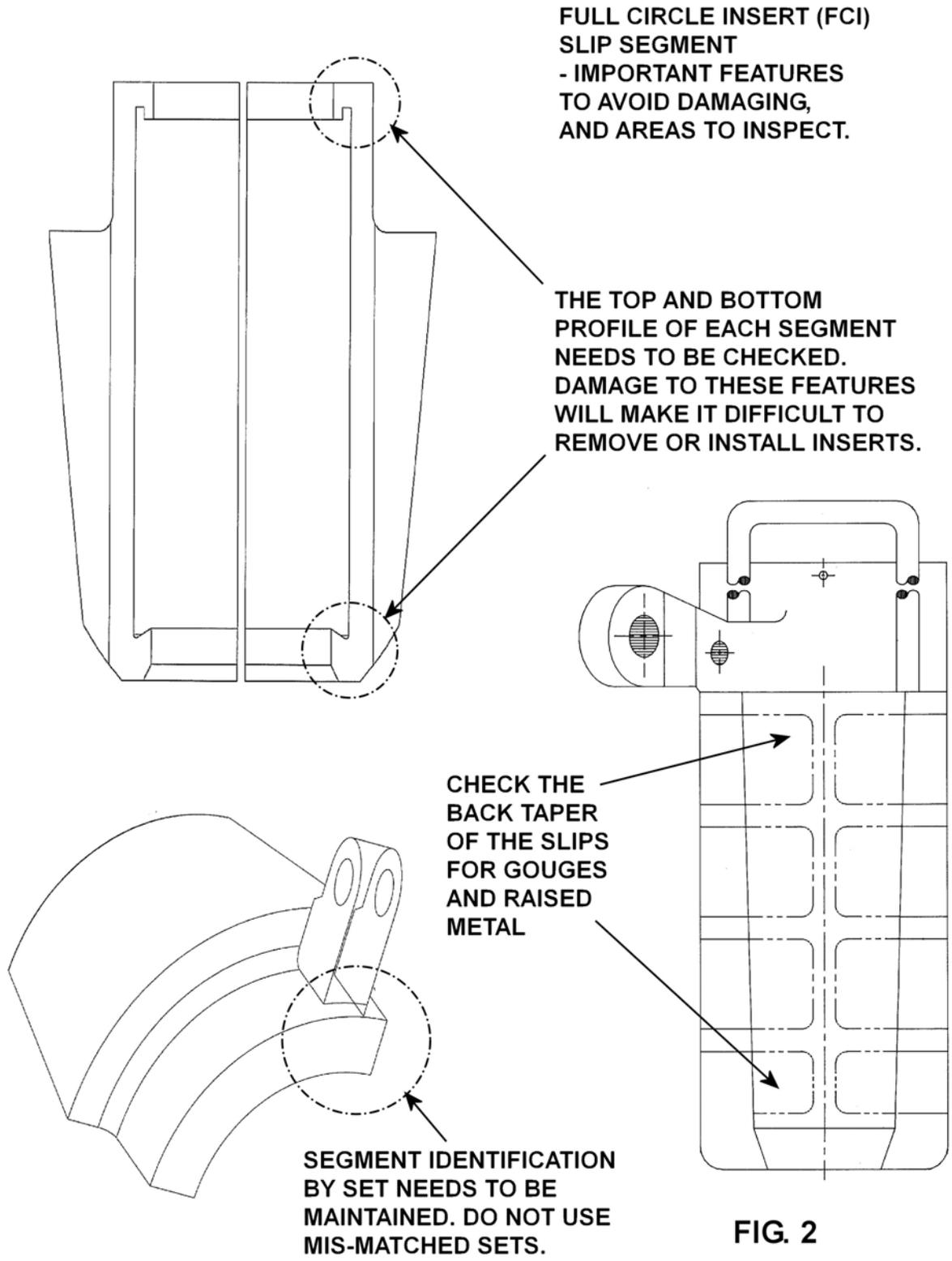


CAVINS MODEL "F" SPIDER

- No undercut allowed
- No rounded indications greater than 1/8" (3.175 mm.)

See the attached drawings, (Figs 2,4 & 6), for the use of a straight edge in checking the wear on both the bowl taper and the tapered backs of the slip segments





CAVINS SLIP SET
SEGMENT MARKING
FOR MATCH SET
IDENTIFICATION
AND SIZE.
TYPICAL LOCATION
OF STAMPING

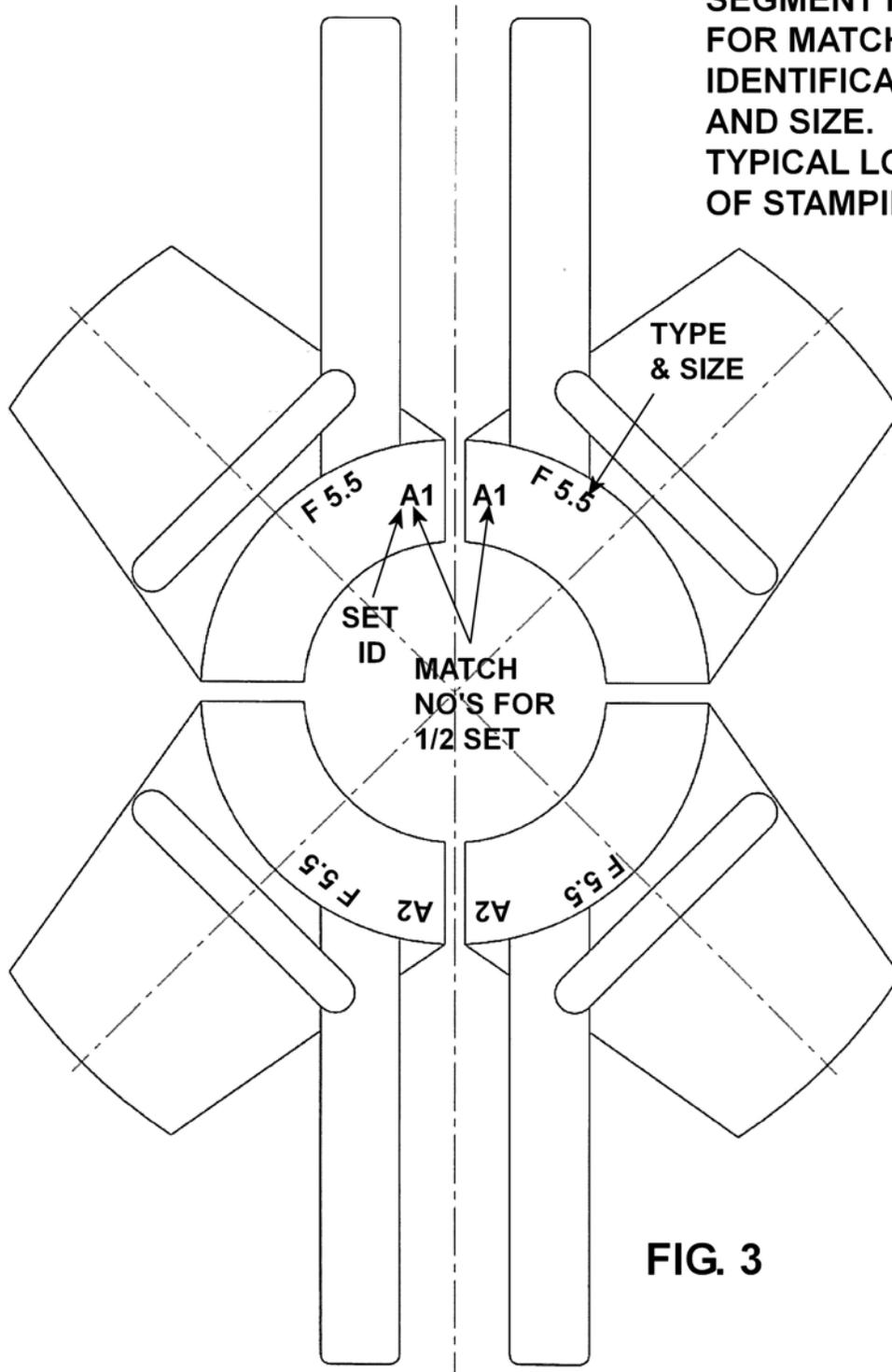


FIG. 3

**SLIP SEGMENT INSPECTION
USE OF A STRAIGHT EDGE
TO CHECK FOR RAISED METAL
OR OFF FLAT AREAS ON THE
TAPER.**

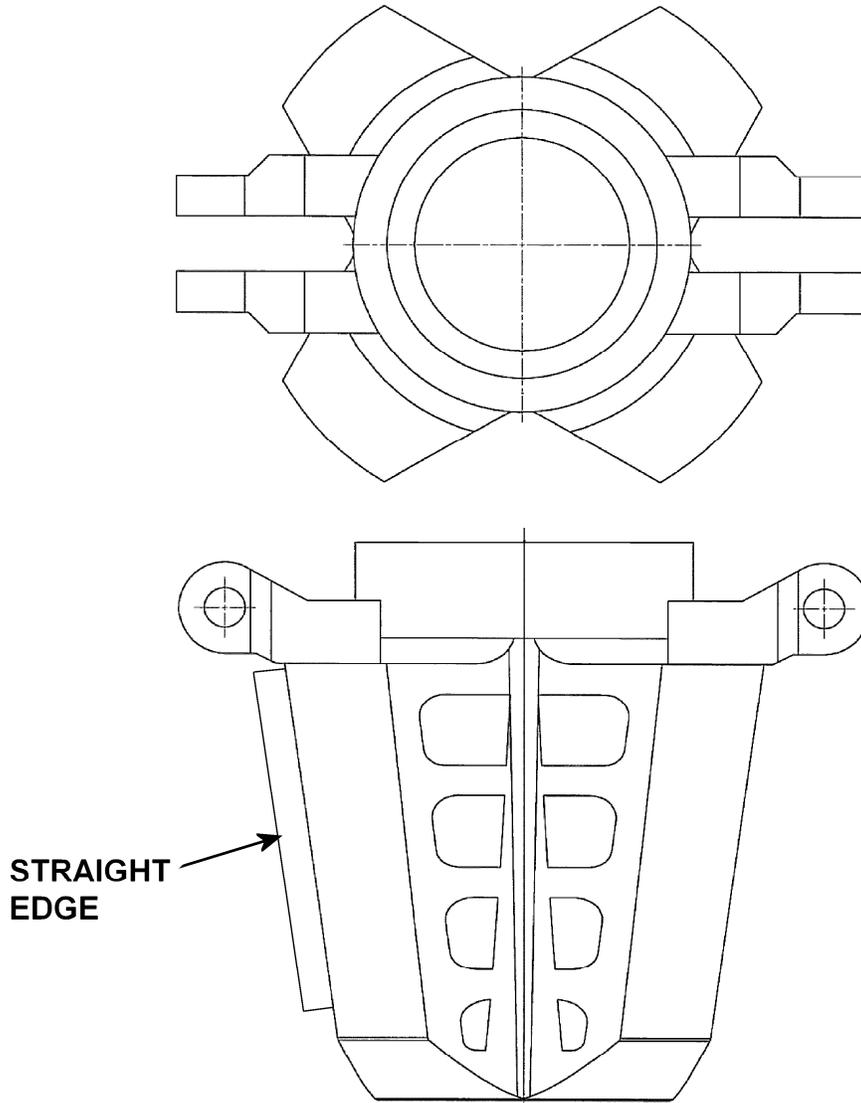


FIG. 4

CAVINS SLIP SET
FULL CIRCLE INSERT
INSTALLATION BY
THREAD PITCH
MARKING - L & R

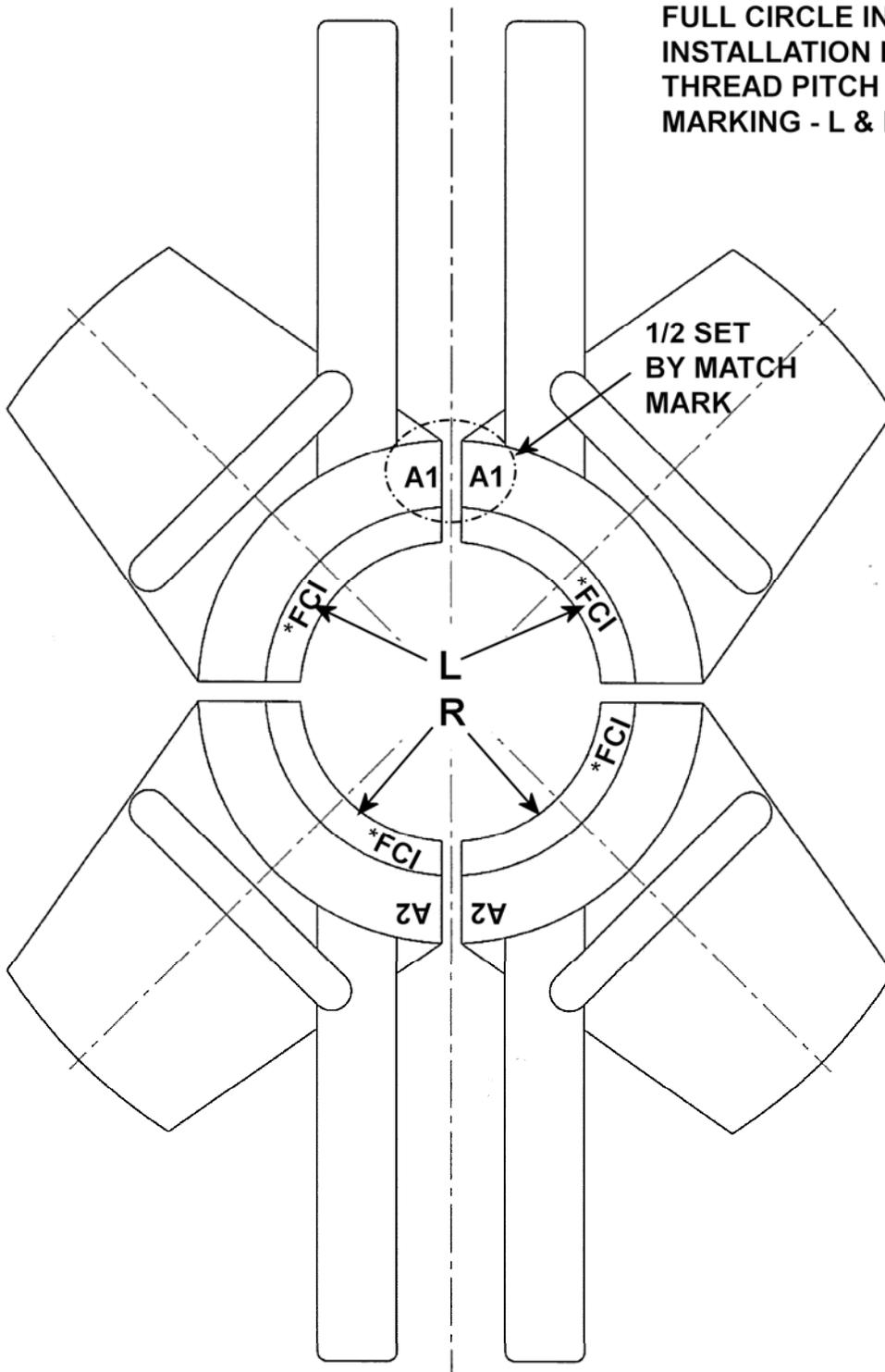


FIG. 5

USE OF STRAIGHT EDGE TO CHECK FOR GOUGES OR WEAR IN THE BOWL.

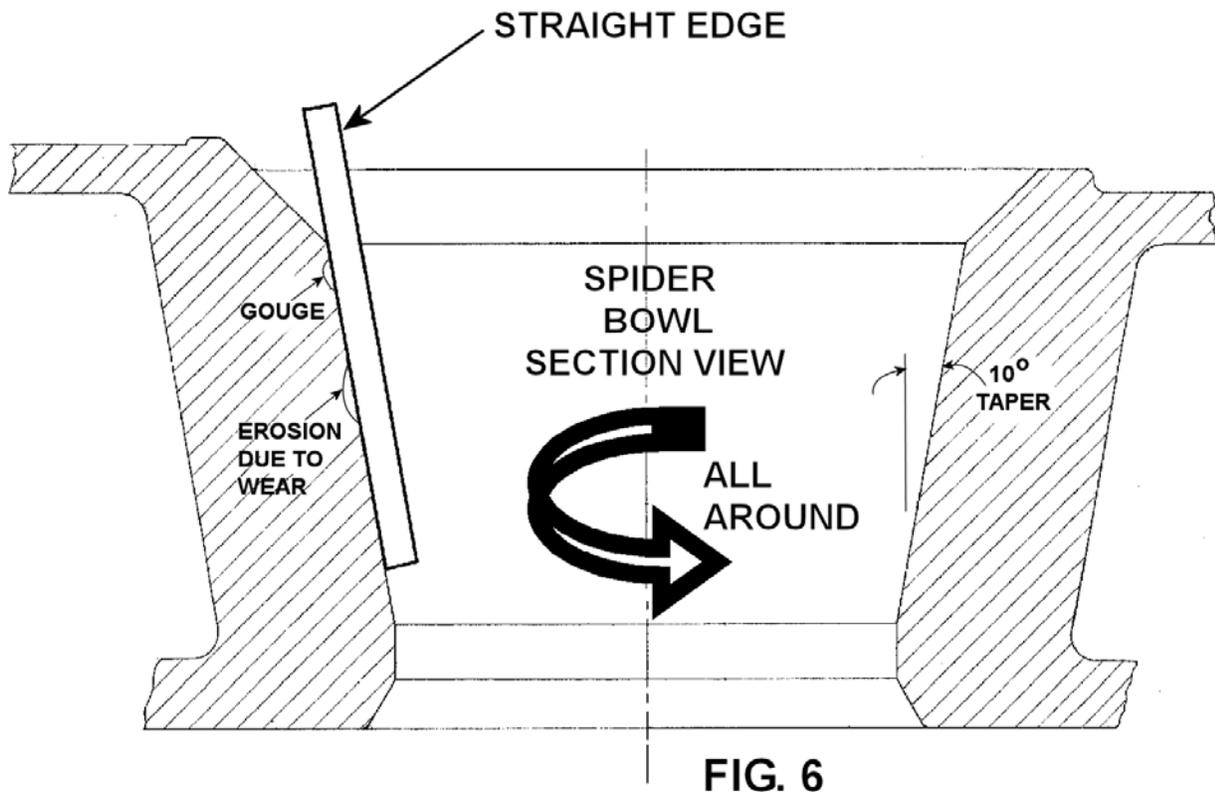


FIG. 6



TROUBLESHOOTING

If properly operated and maintained, the Model "F" Spider should continue to provide trouble-free service for a long period of time. Occasionally, however, problems will arise that require corrective action. The table below lists some of them and describes how to identify and correct them.

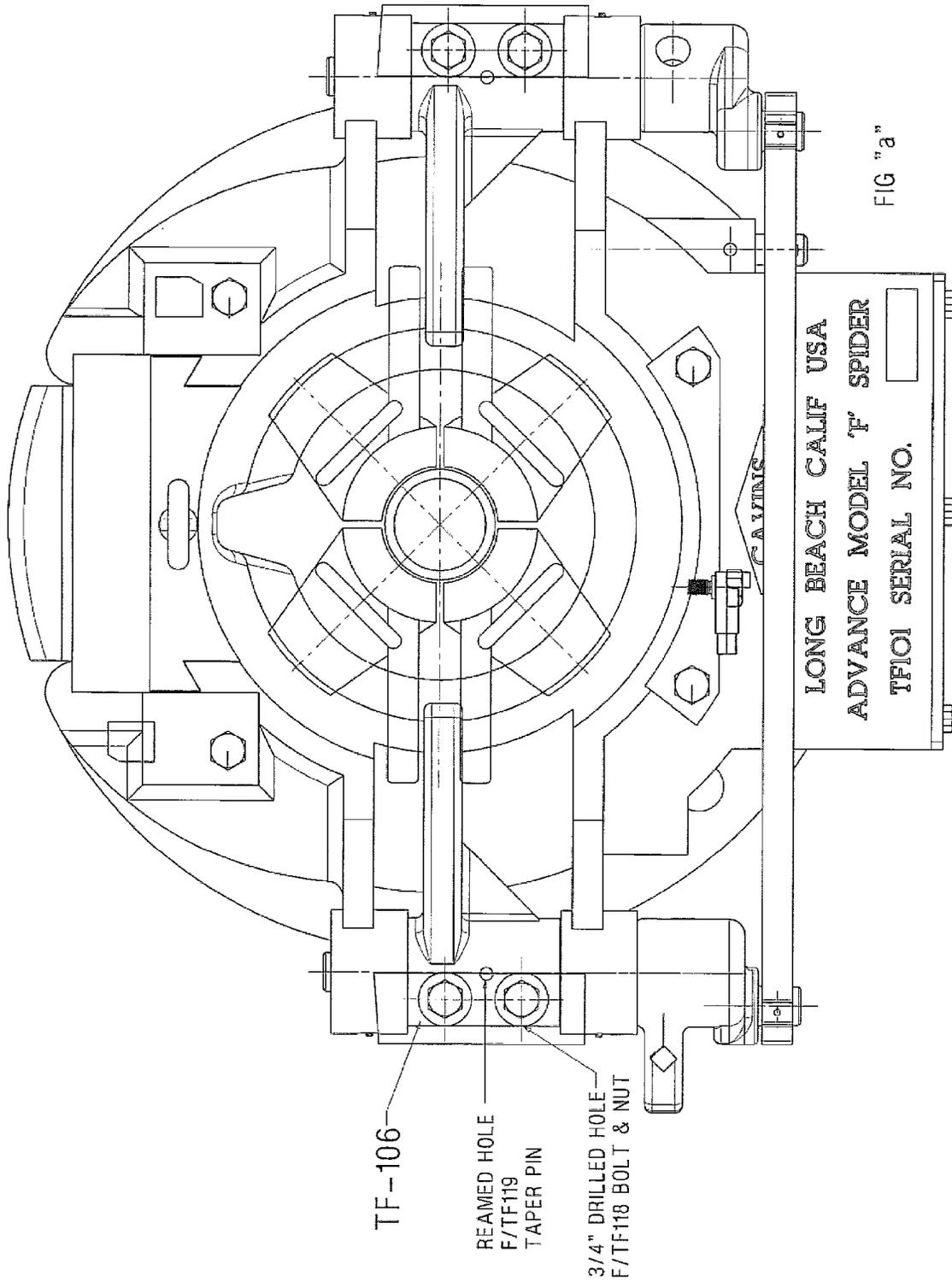
Symptom	Possible cause and corrective action
Cylinder performs poorly – Irregular stoke affects the raising & lowering of slips	<p>Air pressure loss due to a cut hose, broken fitting or leaking connector. Locate the problem in the air lines and replace the damaged component.</p> <p>Foot control pressure regulator not properly adjusted.</p> <p>Flow control valve on air cylinder needs adjustment.</p> <p>O-Ring seals are damaged on the front or rear head of the cylinder or the piston itself. Repair the cylinder using an air cylinder repair kit</p>
Mechanical Operation – Irregular slip set on pipe	<p>Debris in the spider bowl. Inspect and clean the bowl.</p> <p>Damage to the tapered back of the slip segments. Repair or replace slip body.</p> <p>Damage to the spider bowl. Inspect and repair. Gate bolt missing causing the gate to be not in its normal position. Inspect and bolt the gate in place so that the gate is placed in its 'normal' position.</p> <p>Travel stop screw broken off or not adjusted properly. Replace or adjust the travel stop screw. Slip segment handles are bent and interfere with the lift arm function.</p> <p>All insert segments are not the same size. Inspect to make sure all insert segments are the same size.</p> <p>The shafts, lifting arms, link assemblies or the bushings are worn or loose affecting the timing of the slips. Repair the spider as necessary</p>
Spider does not grip the pipe securely and there is slippage	<p>Excessive debris built up on the insert segment faces. Inspect and clean</p> <p>Broken or worn out insert segments. Replace inserts.</p> <p>All insert segments are not the same size. Inspect to make sure all insert segments are the same size. Worn out or damaged Spider bowl. Inspect and repair.</p>

SHOP REPAIRS – ASSEMBLY WITH REPLACEMENT PARTS

After all worn parts have been removed from the Spider and it has been cleaned of all gunk and debris and a thorough visual inspection of the bowl to check for condition, follow the steps below to install new components and complete the assembly.

1. Place the Spider on a Radial Drill Press table. Place a set of new or like new slips with inserts holding an approximately 2 feet long piece of tubing/casing inside the Spider Bowl.
2. Locate the lifting arms (TF106) between the Slip Body ears and install the Slip Lifting Arm Bolts (TF154) and Nuts (TF155) through the Slip Body ears and Spider arms.
3. Position the shafts (TF104) & (TF105) and link (TF103) as shown in Fig "B". Positioning of the 3 parts should be such that the dimension "A" (Fig "B") is 1-5/16".
4. Place a wedge on the shelf underneath the link and hold the link against the wedge using a "C" Clamp. With the link securely positioned, drill (2) 3/4" holes in each lifting arm locating them approximately in the center of the Lifting arm bosses.
5. Using a center punch, punch (1) mark on each lifting arm 2-1/2" from the end and on centerline of the shafts.
6. Using a 27/64" drill, position the drill on the punched mark and drill through the lifting arm and the shaft.
7. Remove the 27/64" drill and install a #8 tapered reamer on the drill press. Ream the drilled hole such that the top of the taper pin (TF119) is approximately 1/2" above the lifting arm when inserted hand tight.
8. After the above operations, remove the lifting arms (TF106) and saw cut them 1/4" wide as shown in Fig "C"
9. After the saw cut, install the shafts and arms back on the Spider, tighten the bolts, install the link and complete by installing the retaining rings (TF122).





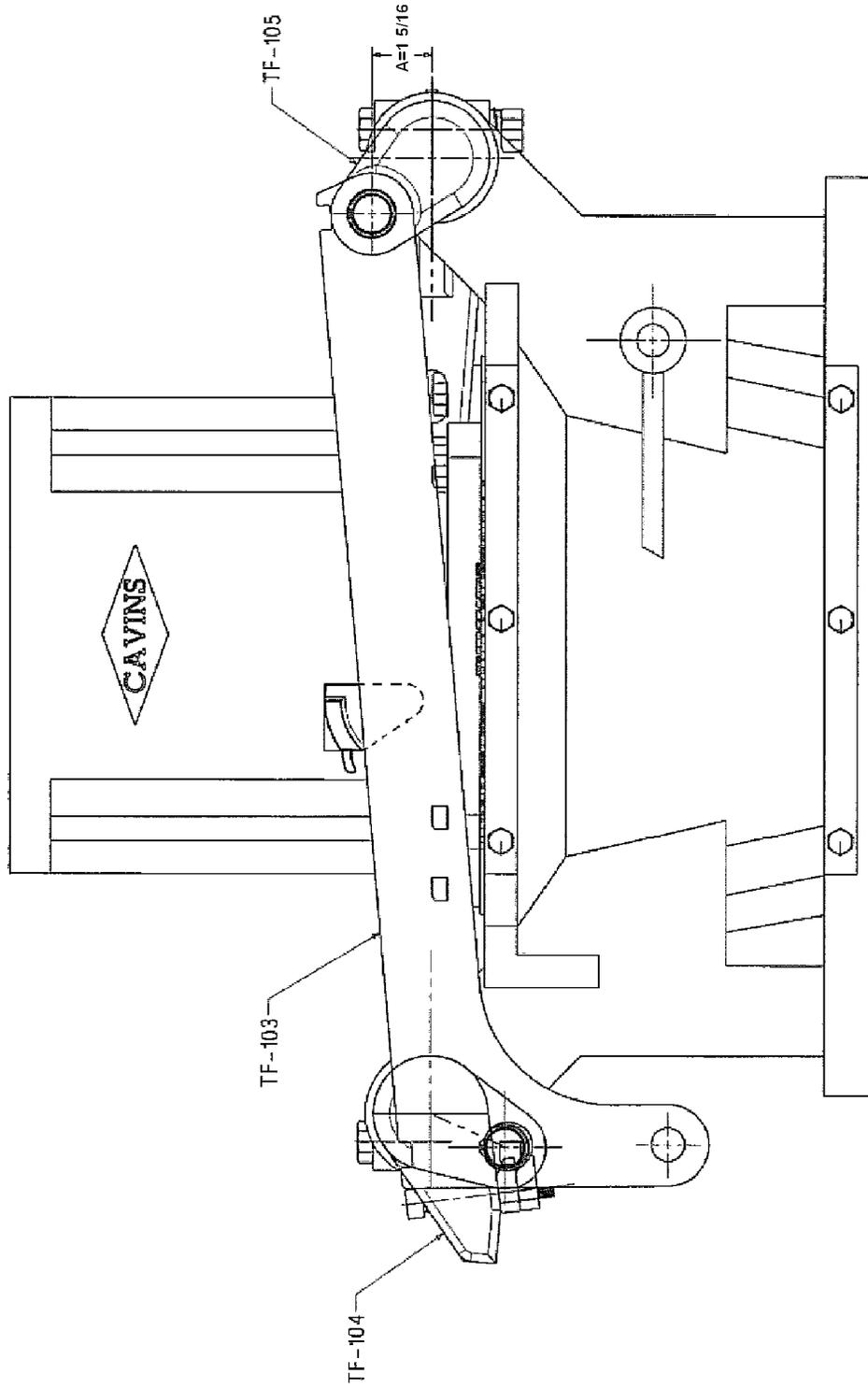
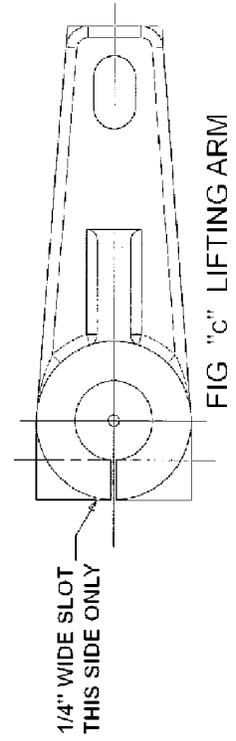
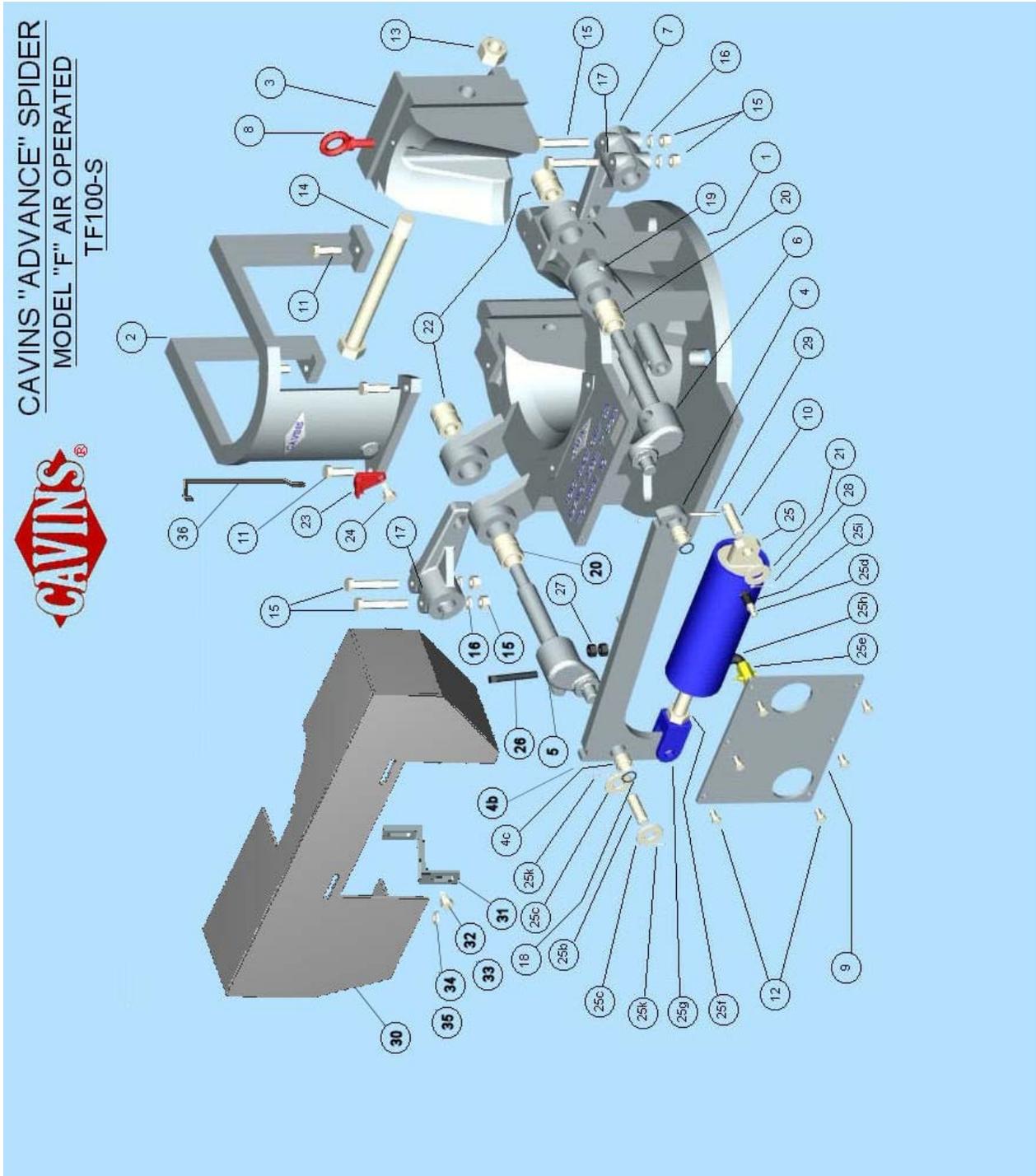


FIG "b" MODEL "F" SPIDER





REPLACEMENT PARTS





CAVINS MODEL "F" SPIDER

ITEM #	PART NUMBER	PART DESCRIPTION	NET WT LBS/KGS
	TF100-R-LC	REPAIR KIT, LESS CYLINDER CONSISTING OF: (1) TF104 LEFT HAND SHAFT (1) TF105 RIGHT HND SHAFT (2) TF106 LIFTING ARM (1) TF114 NUT F/GATE BOLT (1) TF115 BOLT F/GATE (4) TF116 BOLT,NUT F/ARM (4) TF117 LCKWSHR F/TF116 (2) TF119 TAPER PIN F/ARM (2) TF122 RETAINING RING (6) TB123 GREASE FITTING (2) TF124 SHAFT BUSHING (2) TF125 LINK BUSHING (2) TF127 SHAFT BUSHING	95/43
2	TF101-A	BODY GUARD FOR MODEL "F" SPIDER SUPPLIED WITH INSTRUCTIONS TO MACHINE FOR FIELD INSTALLATION.	88/40
3	TF102-SF	GATE/SEMI-MACHINED MODEL "F" SUPPLIED WITH INSTRUCTIONS TO FINISH MACHINE FOR FIELD INSTALLATION	186/84
4	TF103	LINK ASSEMBLY	30/14
5	TF104	SHAFT - LEFT HAND	21/9.5
6	TF105	SHAFT - RIGHT HAND	18/8
7	TF106	LIFTING ARM - MODEL "F" (SUPPLIED W/INSTRUCTIONS F/ASSY)	18/8
8	TF107	EYE BOLT FOR GATE	1/.45
9	TF108	CYLINDER GUARD	18/8
10	TF109	SUPPORT PIN FOR CYLINDER	1/.45
11	TF112	CAP SCREW FOR TF101-A	.5/.22
12	TF113	CAP SCREW FOR TF108	.08/.01
13	TF114	NUT FOR TF115	1/.45
14	TF115	GATE BOLT	9/4
15	TF116-1	NUT FOR LIFT ARM	.2/.09
15	TF116-2	BOLT FOR LIFT ARM	.4/.18
16	TF117	LOCKWASHER FOR TF116-2	.04/.02
17	TF119	TAPER PIN FOR TF106	.19/.09
18	TF122	RETAINING RING FOR SHAFTS	.03/.01
19	TB123	GREASE FITTING	.01/.01
20	TF124	SHAFT BUSHING - LARGE ID	1/.45
4C	TF125	LINK BUSHING	.19/.09
21	TF126	WASHER FOR TF109	.19/.09
22	TF127	SHAFT BUSHING - SMALL ID	2/.9
36	TC138	SAFETY LATCH HANDLE	.2/.1
23	TC139	SAFETY LATCH ASSEMBLY	.75/.34
24	TB136	SAFETY LATCH BOLT	.25/.11
30	TF137	PINCH POINT GUARD	32/15
31	TF138	BRACKET FOR TF137	.6/.27
32	939097-24	HEX HEAD CAP SCREW FOR TF137	
34	939370-11	WASHER FOR TF137	

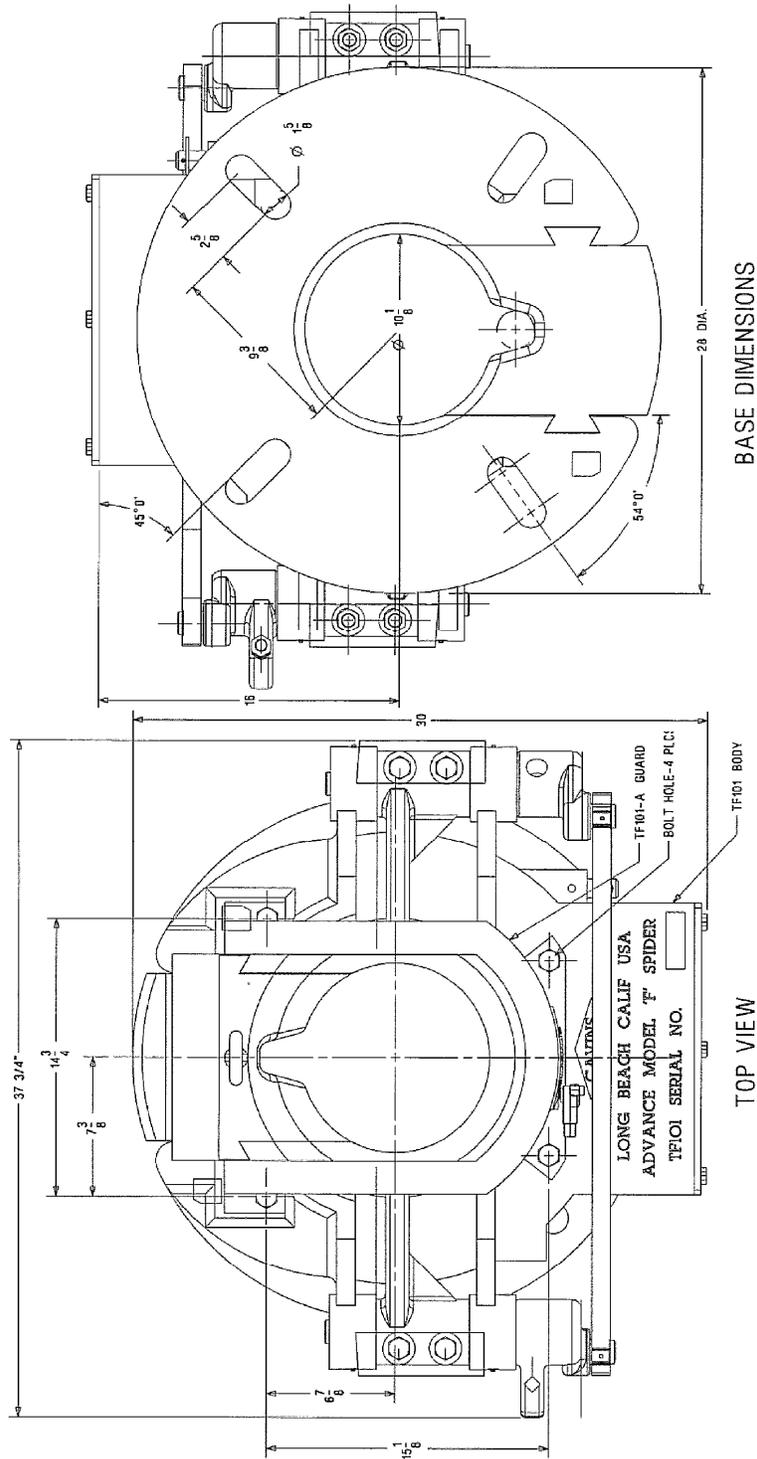


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35	939643-9	STAR WASHER FOR TF137	
33	941442-5	LOCKNUT FOR TF137	
25	TF140-N	AIR CYLINDER	60/27
-	TF140-R	AIR CYLINDER REPAIR KIT	.87/.4
26	TF176	TRAVEL STOP SCREW	.02/.01
27	PB208	NUT	.13/.06
28	TC602-S	COTTER PIN	.01/.01
29	TB119	TAPER PIN	.13/.06



OVERALL DIMENSIONS



CAVINS MODEL "F" TUBING SPIDER DIMENSIONS