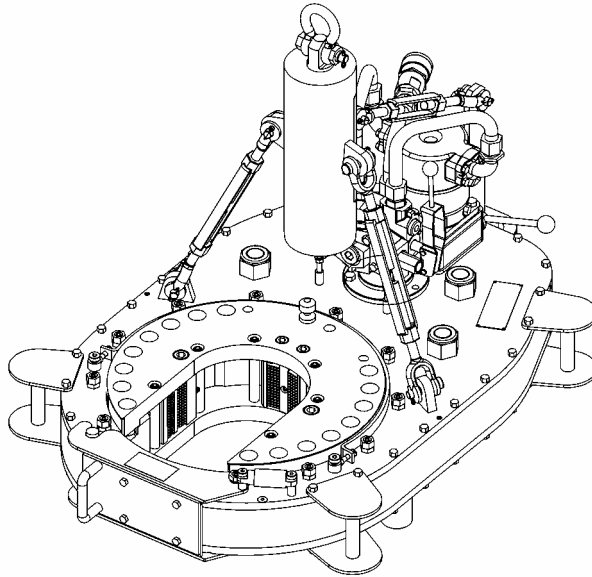


UNIVERSE

9.63 POWER TONG

MODEL # 01C09D

MANUAL



UNIVERSE MACHINE CORPORATION
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INTRODUCTION

The Universe Power Tong uses a unique three jaw biting system that ensures minimal damage to the pipe.

The Universe Power Tong is carefully designed and built to be sturdy and reliable. The tong design ensures years of trouble free performance. Like any fine mechanical device, regular maintenance and safety procedures covered in this manual will help extend the life and performance of this power tong as well as provide for safe and efficient operation.

It is therefore very important to read this manual **carefully** before using this power tong.

This manual also covers the major components that make up the Universe tong. Although this machine is built to meet rigorous and tough working conditions, some parts over time may wear out and need replacing. If any replacement parts are required, or if you experience problems that this manual does not cover and need assistance, please contact any of the Universe Power Tong dealers.

SPECIFICATIONS

Maximum Torque	See power tong engineering data sheet
Maximum Speed	See power tong engineering data sheet
Maximum Power Requirements	See power tong engineering data sheet

Major Dimensions

Length	42 inch (1.07 m)
Overall Width	28.5 inch (0.7 m)
Centre of pipe to centre of handle (Torque Arm)	30 inch (0.76 m)

Weight (approximately).....1100 lbs. (498 kg)

Jaws Available: 9.63 inch (244.5 mm), 8.63 inch (219.1 mm), 7.63 inch (193.7 mm),
7.0 inch (177.8 mm), 6.63 inch (168.3 mm), 5.5 inch (139.7 mm),
4.5 inch (114.3 mm), 3.5 inch (88.9 mm)

Other size jaws or dies can be made to order.

ABBREVIATIONS

inch (in)	kilopascal (kPa)
foot (ft)	meter (m)
pound (lb)	millimeter (mm)
gallon (gal)	kilogram (kg)
pound per square inch (psi)	Newton Meter (Nm)

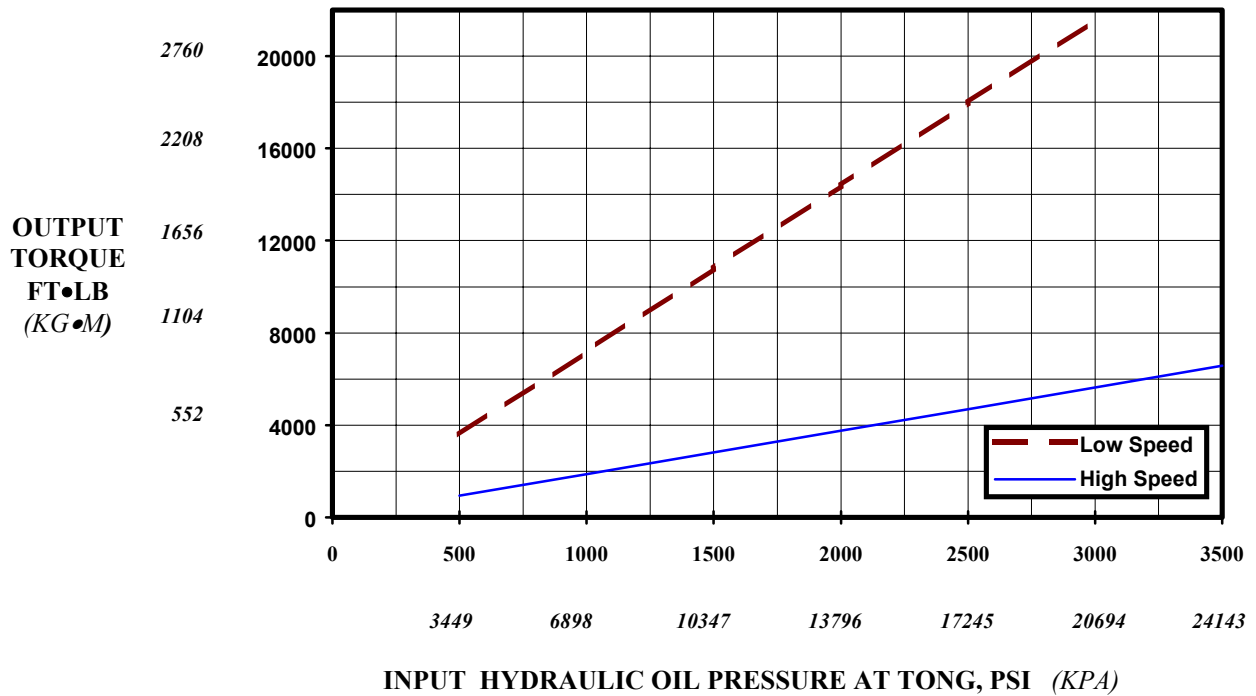
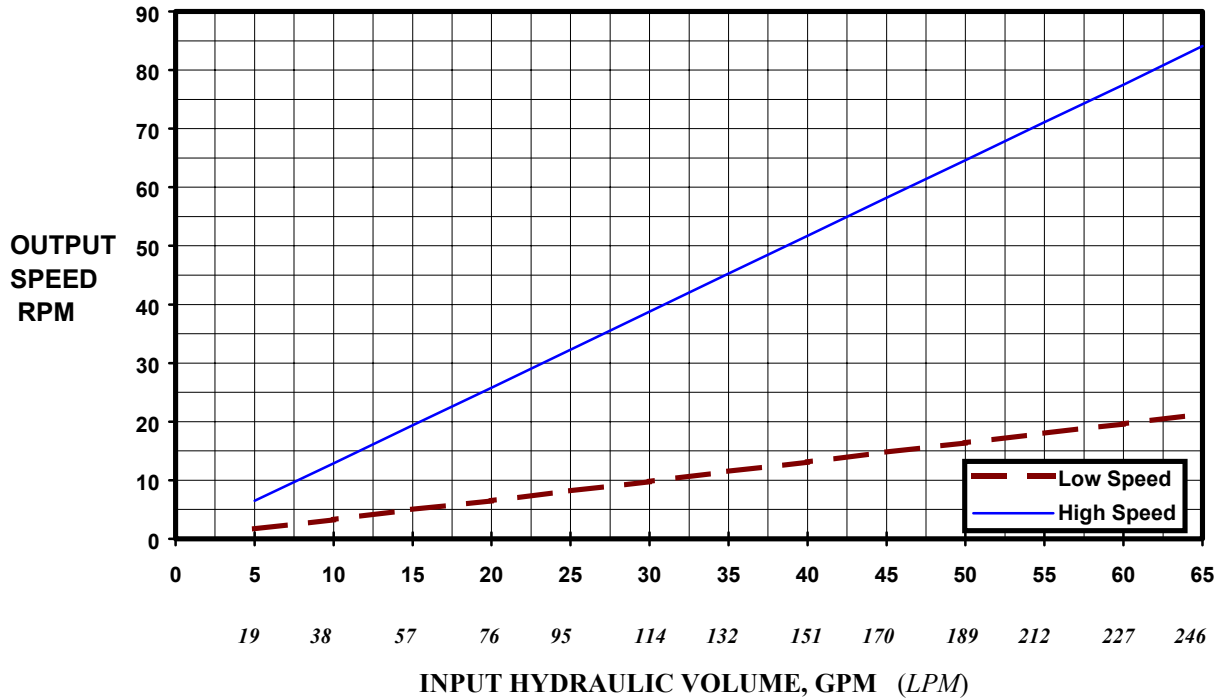
UNIT CONVERSIONS

1 ft.lb = 0.138 kg.m = 1.356 N.m	1 lb = 0.453 kg
1 ft = 0.305 m	1 US gal = 3.785 LPM
1 inch = 25.4 mm = 0.0254 m	1 psi = 0.070 kg/cm ³ = 6.895 kPa

POWER TONG ENGINEERING DATA SHEET
MOTOR: 015 61 015

GEAR RATIO: 47

POWER TONG: 9.63

MODEL: 01C09D


NOTE : THE ABOVE VALUES ARE DERIVED FROM CALCULATION AND ARE ONLY APPROXIMATE

TONG OPERATION

JAW DIES

Three jaws are required in the Universe Power Tong, consisting of two front pivot jaws and one rear jaw (refer to Figure A). Before installing dies, make sure jaw pin and rollers are greased and in place. Both front pivot jaws are the same, and can be installed onto the left side or the right side. Before installing the rear jaw, ensure it is properly lubricated. Make sure that the bolts holding the dies on the jaws are tight. The bolts holding the pivot jaws should only be hand tightened. Use a wire brush to keep jaw dies clean and free of debris.

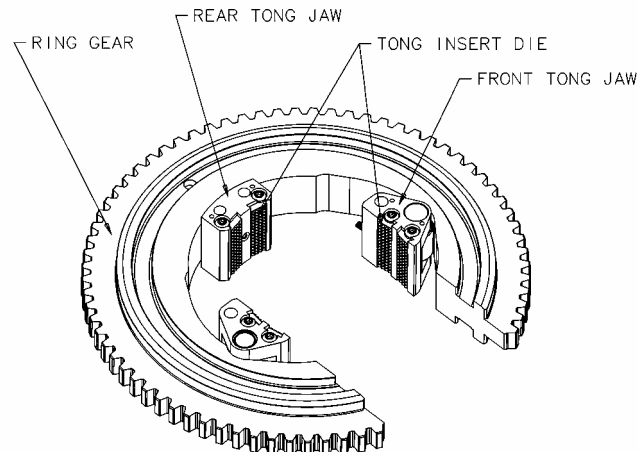


FIGURE A : Jaw Assembly

JAW AND DIE SELECTION CHART

JAW / DIE SELECTION CHART		
JAW SIZE	3.88 X 1.25 X DIE (98.6mm x 31.8mm) THICKNESS	BITING DIAMETER ± 0.06 INCHES (1.5mm)
9.63 (244.5)	0.44 (11.1)	9.75 (222.3)
	0.50 (12.7)	9.63 (219.1)
	0.56 (14.3)	9.50 (215.9)
	0.63 (15.9)	9.38 (212.7)
	0.69 (17.5)	9.25 (209.6)
	0.75 (19.1)	9.12 (206.4)
	0.81 (20.6)	9.00 (203.2)
	0.88 (22.2)	8.88 (200.0)
	0.94 (23.8)	8.75 (196.9)
	1.00 (25.4)	8.63 (193.7)
	1.06 (26.9)	8.50 (190.5)
8.63 (219.1)	0.44 (11.1)	8.75 (222.3)
	0.50 (12.7)	8.63 (219.1)
	0.56 (14.3)	8.50 (215.9)
	0.63 (15.9)	8.38 (212.7)
	0.69 (17.5)	8.25 (209.6)
	0.75 (19.1)	8.12 (206.4)
	0.81 (20.6)	8.00 (203.2)
	0.88 (22.2)	7.88 (200.0)

JAW / DIE SELECTION CHART (CONT.)		
JAW SIZE	3.88 X 1.25 X DIE (98.6mm x 31.8mm) THICKNESS	BITING DIAMETER ± 0.06 INCHES (1.5mm)
8.63 (219.1) cont.	0.94 (23.8)	7.75 (196.9)
	1.00 (25.4)	7.63 (193.7)
	1.06 (26.9)	7.50 (190.5)
7.63 (193.7)	0.44 (11.1)	7.75 (196.9)
	0.50 (12.7)	7.63 (193.7)
	0.56 (14.3)	7.50 (190.5)
	0.63 (15.9)	7.38 (187.3)
	0.69 (17.5)	7.25 (184.2)
	0.75 (19.1)	7.12 (181.0)
	0.81 (20.6)	7.00 (177.8)
	0.88 (22.2)	6.88 (174.6)
	0.94 (23.8)	6.75 (171.5)
	1.00 (25.4)	6.63 (168.3)
	1.06 (26.9)	6.50 (165.1)
	6.63 (168.3)	0.44 (11.1)
0.50 (12.7)		6.63 (168.3)
0.56 (14.3)		6.50 (165.1)
0.63 (15.9)		6.38 (161.9)
0.69 (17.5)		6.25 (158.8)
0.75 (19.1)		6.13 (155.6)
0.81 (20.6)		6.00 (152.4)
0.88 (22.2)		5.88 (149.2)
0.94 (23.8)		5.75 (146.1)
1.00 (25.4)		5.63 (142.9)
1.06 (26.9)		5.50 (139.7)
5.50 (139.7)		0.44 (11.1)
	0.50 (12.7)	5.50 (139.7)
	0.56 (14.3)	5.38 (136.5)
	0.63 (15.9)	5.25 (133.4)
	0.69 (17.5)	5.13 (130.2)
	0.75 (19.1)	5.00 (127.0)
	0.81 (20.6)	4.88 (123.8)
	0.88 (22.2)	4.75 (120.7)
	0.94 (23.8)	4.63 (117.5)
	1.00 (25.4)	4.50 (114.3)
	1.06 (26.9)	4.38 (111.1)
	4.50 (114.3)	0.44 (11.1)
0.50 (12.7)		4.50 (114.3)
0.56 (14.3)		4.38 (111.1)
0.63 (15.9)		4.25 (108.0)
0.69 (17.5)		4.13 (104.9)
0.75 (19.1)		4.00 (101.6)
0.81 (20.6)		3.88 (98.6)
0.88 (22.2)		3.75 (95.3)
0.94 (23.8)		3.63 (92.2)
1.00 (25.4)		3.50 (88.9)
1.06 (26.9)		3.38 (85.9)

JAW / DIE SELECTION CHART (CONT.)		
JAW SIZE	3.88 X 1.25 X DIE (98.6mm x 31.8mm) THICKNESS	BITING DIAMETER ± 0.06 INCHES (1.5mm)
3.50 (88.9)	0.44 (11.1)	3.63 (92.2)
	0.50 (12.7)	3.50 (88.9)
	0.56 (14.3)	3.38 (85.9)
	0.63 (15.9)	3.25 (82.55)
	0.69 (17.5)	3.13 (79.5)
	0.75 (19.1)	3.00 (76.2)
	0.81 (20.6)	2.88 (73.2)
	0.88 (22.2)	2.75 (69.9)
	0.94 (23.8)	2.63 (66.8)
	1.00 (25.4)	2.50 (63.5)
	1.06 (26.9)	2.38 (60.5)

NOTE:

1. The above chart is based on flat dies which are within $\pm 0.015''$ ($\pm 0.038\text{mm}$) in thickness.
2. Contoured dies are measured on the outside edge and the center is slightly thinner than the size listed above. This will cause the biting diameter listed above to increase slightly.

TONG SUPPORT ASSEMBLY

Make sure before each job that the hanger supporting the tong is secure and correctly assembled. To obtain the best bite possible, ensure that the tong is level and perpendicular to the tubing. This can be accomplished by adjusting the three turnbuckles.

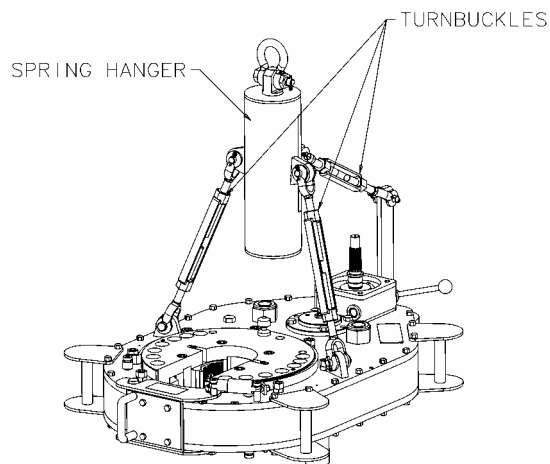


FIGURE B : Hanger Assembly

The Universe Power Tong has a built in spring hanger. This device compensates for downward movement of the tong and reduces cable strain. When a load cell is used, ensure that it is properly connected to the backup line at 90 degrees to the power tong in the horizontal plane.

TONG OPERATION (CONT.)

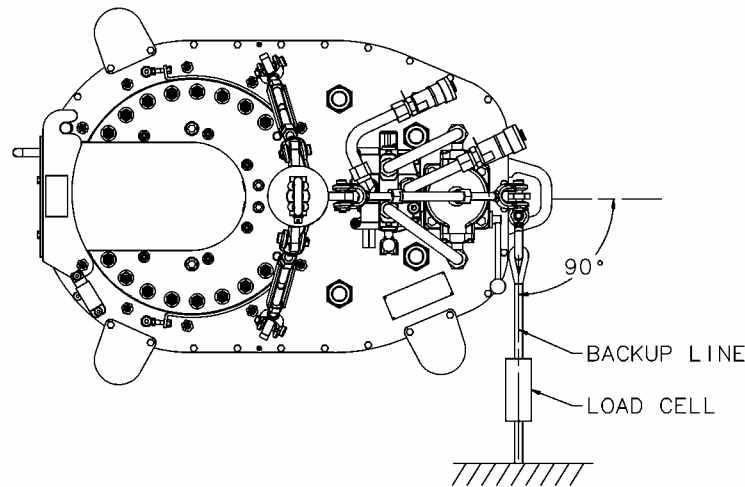


FIGURE C : Backup Line Assembly

OPERATING THE TONG

In order to prevent injury to personnel and/or damage to the tong unit, it is recommended that these steps be followed:

- 1) Make sure the power tong is properly leveled.
- 2) Make sure the hanger assembly and backup lines are secure and properly connected.
- 3) Ensure that all tong hydraulic hoses are correctly connected and free of any obstacles.
- 4) It is very important for the safety of the operating personnel to make sure that the door is closed and properly secured before starting and running the tong!
- 5) Since this device works with large forces, everyone except the operator should stand clear of the power tong to ensure safety and reduce the risk of accident.
- 6) Make sure the brake bands are adjusted and secured properly.
- 7) When operating, do not open the door and keep hands away from any moving parts.
- 8) When the tong is operating above 15,000 ft-lbs (20,340 Nm), ensure that both idler drive gears are engaged with the main gear.

CONTROLS

The power tong has two main controls. The first is the large handle control located on the top next to the hydraulic piping as illustrated below. This control operates the direction of rotation of the tong. When this handle is in its neutral position, the tong will not rotate and the oil will freely flow through the valve. Pulling the handle towards the operator will turn the tong counterclockwise while pushing the handle will turn the tong clockwise.

TONG OPERATION (CONT.)

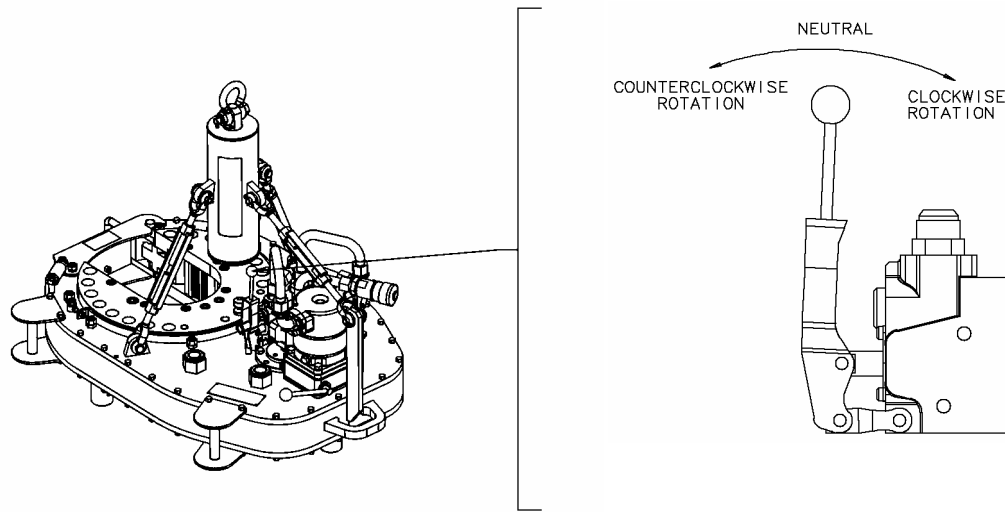


FIGURE D : Direction Control Lever (Closest one to the motor on units with multiple levers)

The second control lever, located on the gear box the motor sits on, controls the speed of the tong. When the lever is in the up position, the tong will run at high speed and in the lower position the tong will run at low speed.

NOTE: *To extend the shift gear life, shift gears while tong is not running. Slight throttling may be required.*

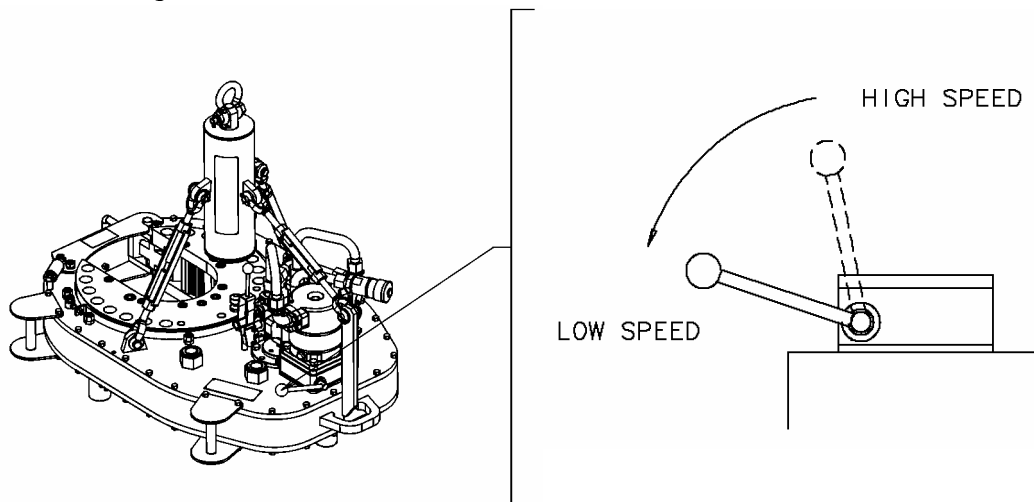


FIGURE E : High & Low Gear Control

BACKING PIN FOR ALIGNING JAWS WITH OPENING

When rotating the tong in a clockwise direction (make up), put the backing pin into the hole on the right side. When rotating counterclockwise (breaking out), the backing pin should be placed into the hole on the left side. This can be seen in the illustration below:

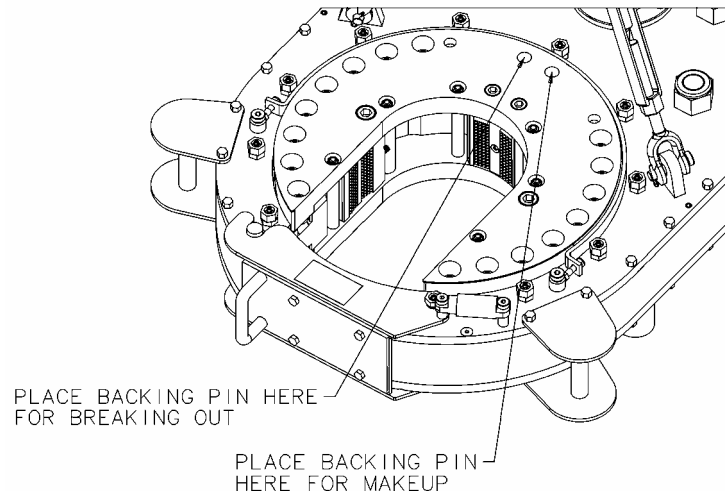


FIGURE G : Backing Pin Locations

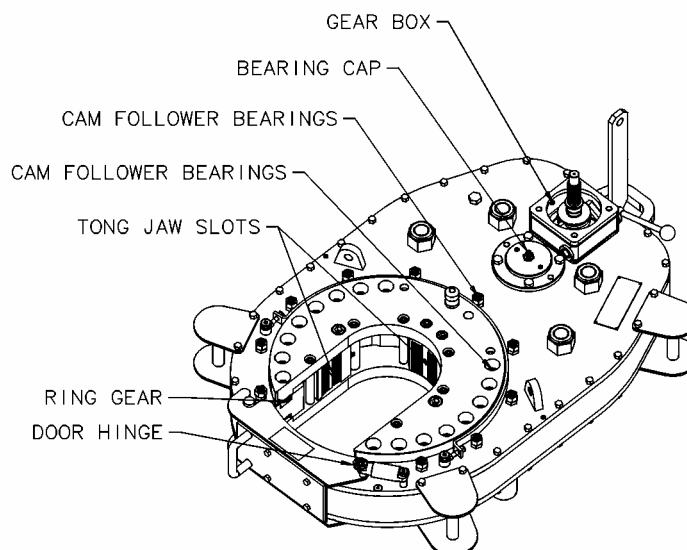
NOTE : When disengaging jaws from pipe, make sure to rotate tong until main gear aligns with opening.

MAINTENANCE AND STORAGE

LUBRICATION

By lubricating the tong, its life can be greatly extended. The following diagram serves as a simple guide that should be followed on a regular basis:

RECOMMENDED GREASE GUIDE :



**FIGURE G : GREASE POINTS
MAINTENANCE AND STORAGE (CONT.)**

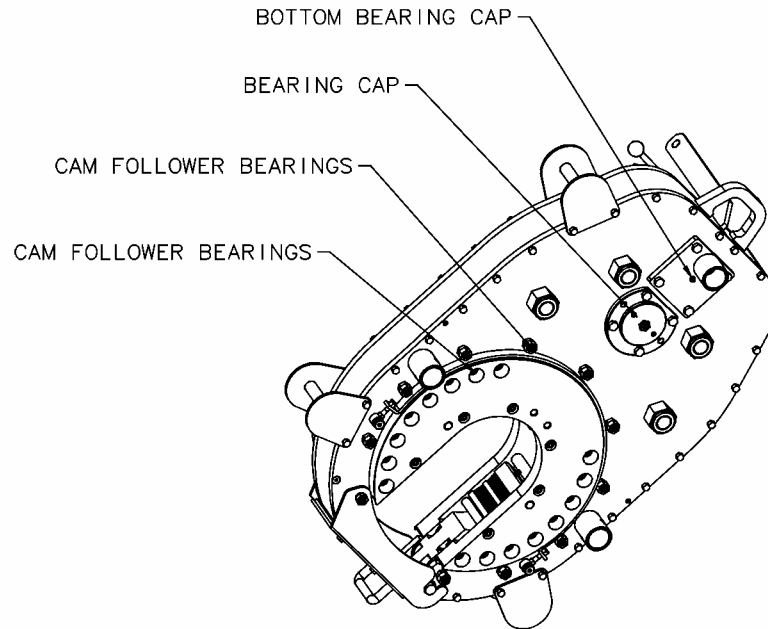


FIGURE G : GREASE POINTS (CONT.)

GREASE APPLICATION TABLE (REFER TO FIGURE G)			
LOCATION	APPLICATION	USAGE	Recommended Grease
Cam Follower Bearings	Grease Gun (1 Pump)	Daily	ESSO Unirex EP2 or equivalent
Bearing Cap	Grease Gun (2 Pumps)		
Bottom Bearing Cap			
Door Hinge			
Gear Box			
Tong Jaw Slots	Manually Brush On	As Required	ESSO Dynagear Extra or equivalent
Ring Gear	Manually Brush On		
Internal Gears	Manually Brush On		
Inside Body	Manually Brush On	As Required	ESSO Unirex EP2 or equivalent

NOTE : The Above grease guide covers working operations from -40 C to +40 C.

ADJUSTMENTS & CHECKS

Inspecting the brake band regularly for tightness and wear is recommended. A brake band with the braking material worn considerably should be replaced with a new one. Check and tighten all hydraulic connections.

MAINTENANCE AND STORAGE (CONT.)

STORAGE

After a job and before storage, the tong should be properly cleaned with a petroleum based cleaning agent. The tong should then be drained of any fluids and lubricated as specified in the lubrication chart. Be sure to store tong in a dry environment.

NOTE : If using tong on an offshore platform or in any corrosive environments, steam clean tong with regular water, drain, lubricate, and store in a dry climate.

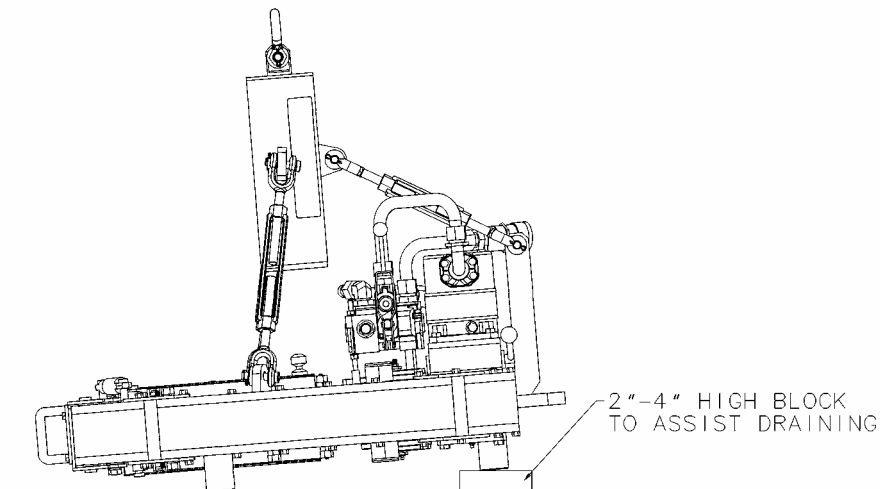


FIGURE H : Storage Configuration to Ensure Moisture Run Out

TROUBLESHOOTING GUIDE

The following serve as a simple guide to some of the problems that may be encountered while using the power tong unit. If the problem persists or is not listed here, please contact any authorized Universe Power Tong service centres.

1. **Jaws are slipping or not biting the pipe properly.**
 - a) Check the pipe diameter and look at the die selection chart to ensure proper size of dies are being used. The jaw rollers should be about 1/3 to 1/2 way up the cam. If this is not the case, it may be necessary to go to the next die size.
 - b) Check to ensure that the rollers in the front jaws are greased and rolling freely.
 - c) Ensure the back of the rear jaw and the area it contacts on the ring gear is properly greased.
 - d) Check the brake bands and, if necessary, tighten them. If the braking material is worn out, then it should be replaced. Also check the dies and if they're worn out, replace them.

TROUBLESHOOTING GUIDE (CONT.)

- e) If all the above have been done and the dies still slip, try to get an initial bite, then increase the torque incrementally until the desired torque is reached. This will cause the dies to dig into the pipe thus allowing higher torquing.

2. The jaw locks onto the pipe after make up or breaking out a joint.

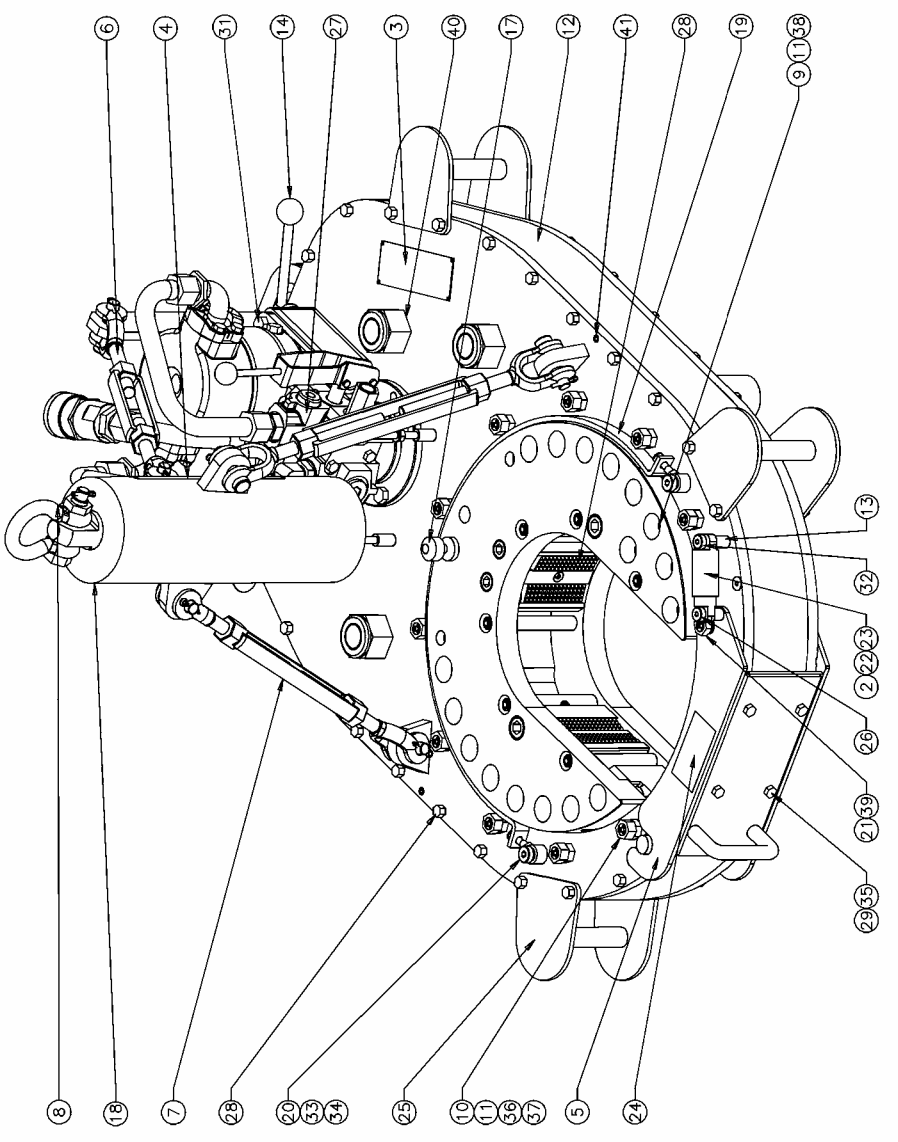
- a) To unlock the tong, try to slightly jerk the ring gear in the opposite direction. If this does not work, rotate the tong so that the ring gear opening is in line with the tong opening. Open the door and put a piece of lumber into the opening and rotate the ring gear until it hits the wood. This should then release the jaws from the pipe.
- b) Check to ensure the brake bands are snug.
- c) Check to ensure that all dies are of equal thickness.
- d) Check and ensure that the jaws are all greased and pivot in and out freely.
- e) Loosen the brake bands and try to rotate the cage plates by hand. If they do not move freely or are sticky, take them apart and check all rollers. Replace any rollers that are broken. Also check all sliding or rolling surfaces. If any burs are found, file them off.

3. The motor runs in reverse, or the bottom motor oil seal keeps blowing out.

- a) Check to ensure that the pressure line is connected to the “PRESSURE IN” port on the tong, and return line is connected to the “PRESSURE OUT” port on the tong. Refer to 706F00020 Tong Hydraulic Unit Assembly for port identification.
- b) Ensure the return line is free from any obstructions and oil is allowed to flow freely back to the tank.

UNIVERSE MACHINE CORPORATION EDMONTON ALBERTA		SCALE: NTS	DWG. No. 01C09D
SUPERSEDES: _____ DATE: _____ SUPERSEDED BY: _____ DATE: _____		DESCRIPTION: 9.63 POWER TONG	
BY: _____ DATE: _____ DESCRIPTION OF CHANGE: _____ MGB JUNE 16, 2004 ORIGINAL DRAWING			
APP'D _____ VSP _____			

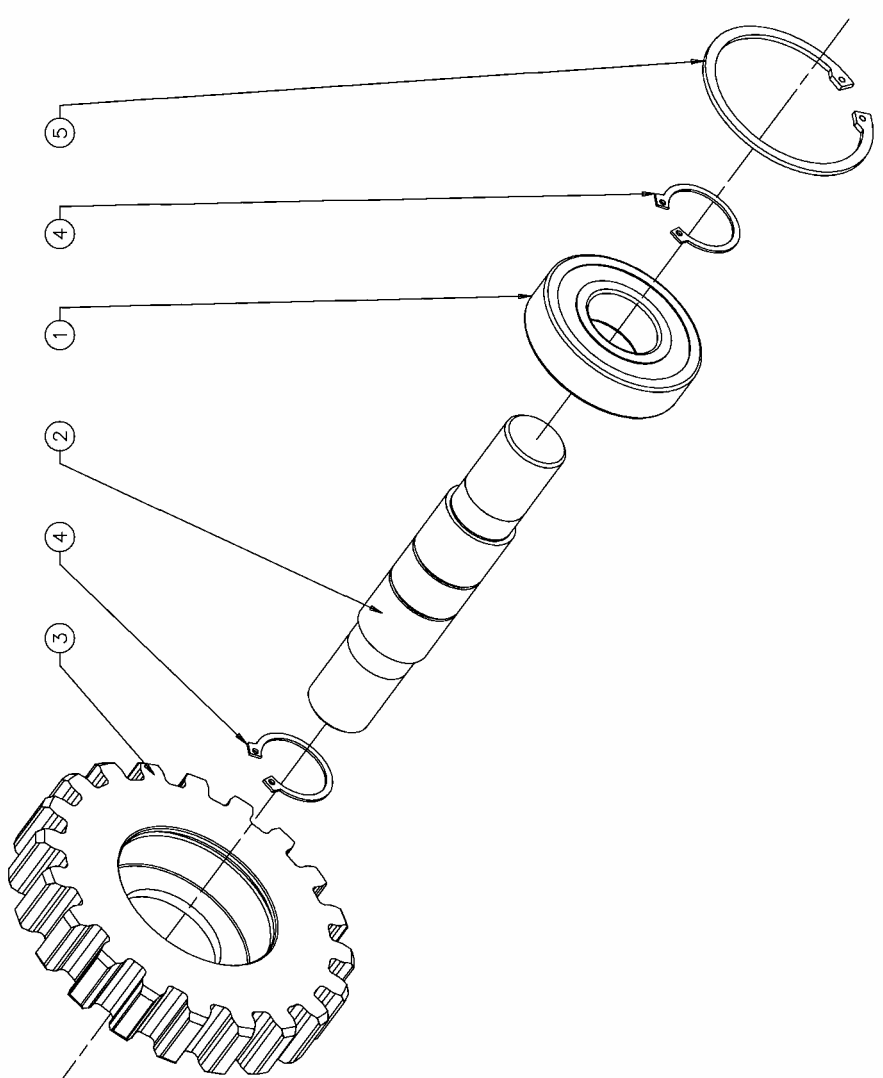
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2	1	SPRING	015 81701
3	1	PLATE - UNIVERSE ID	049 00523
4	1	DECAL - UNIVERSE SMALL	049 00524
5	1	LABEL - TONG DOOR WARNING	049 00527
6	1	TURNBUCKLE	067 12065
7	2	TURNBUCKLE	067 12094
8	1	ANCHOR SHACKLE	068 12013
9	32	CAM FOLLOWER	085 11633
10	22	FLANGED BEARING UNIT	085F01452-3
11	54	GREASE ZERT	094 00201
12	1	BODY UNIT	701F09001
13	1	CYLINDER SUPPORT	701S13002
14	1	HANDLE	702 00001
15	2	SPRING HOLDING PIN	702 05012
16	2	SPRING BUSHING	702 05013
17	1	BACKING PIN	702 13001
18	1	SPRING HANGER ASSEMBLY	703F00001
19	2	BRAKE BAND UNIT - 9.63	703F09001
20	4	EYE BOLT UNIT	703F13010
21	2	DOOR BUSHING	705 13032
22	1	DOOR CYLINDER	705 13033
23	1	DOOR PISTON	705 13034
24	1	DOOR UNIT	705F09001
25	3	HANDLE ASSEMBLY	705F05030
26	1	DOOR CYLINDER SUPPORT	705S13007
27	1	TONG HYDRAULIC UNIT	706F00020
28	1	TONG JAW ASSEMBLY	01C09C-6
29	4	HEX BOLT	N20 08082
30	50	HEX BOLT	N20 08102
31	17	HEX BOLT	N40 08082
33	2	SHOULDER BOLT	N40 08043
34	4	SHOULDER BOLT	N40 10083
35	8	LOCKNUT	N66 06522
36	20	NUT	N66 10042
37	20	JAM NUT	N66 10142
38	32	LOCKNUT - THIN	N66 10552
39	2	LOCKNUT - CRIMPED	N66 10582
40	8	LOCKNUT	N66 22562
41	4	SPRING PIN	N68 06062



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UNIVERSE MACHINE CORPORATION		EMMONTON ALBERTA	SCALE NTS	DWG. No 01C09D - 3
SUPERSEDED BY:		FIN. WT	DESCRIPTION IDLER GEAR SHAFT #2	
BY	DATE	DATE:		
MB	JUNE 16, 2004	DESCRIPTION OF CHANGE	APP'D	
		ORIGINAL DRAWING	VP	

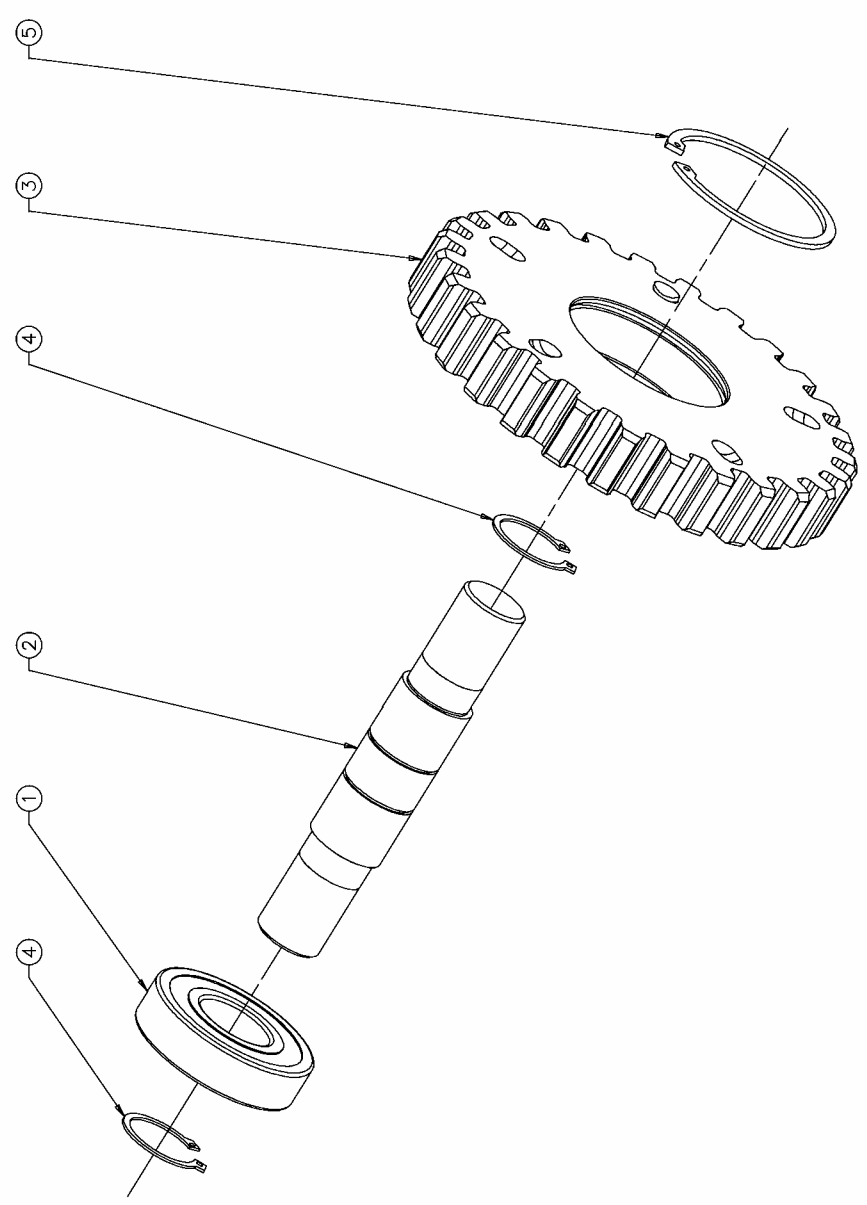
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2	1	IDLER SHAFT	702 05006
3	1	IDLER #2 GEAR	704 08004
4	2	EXTERNAL SNAP RING	N69 25061
5	1	INTERNAL SNAP RING	N69 57112



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UNIVERSE MACHINE CORPORATION		EDMONTON ALBERTA	SCALE	NTS	DWG. No.	01D05C-3
SUPERSEDES:		DATE:	DESCRIPTION			
SUPERSEDED BY:		DATE:	IDLER GEAR ASSEMBLY			
BY:	DATE:	DESCRIPTION OF CHANGE:	APP'D			
MMB	MAY 12, 2004	ORIGINAL DRAWING	VSP			

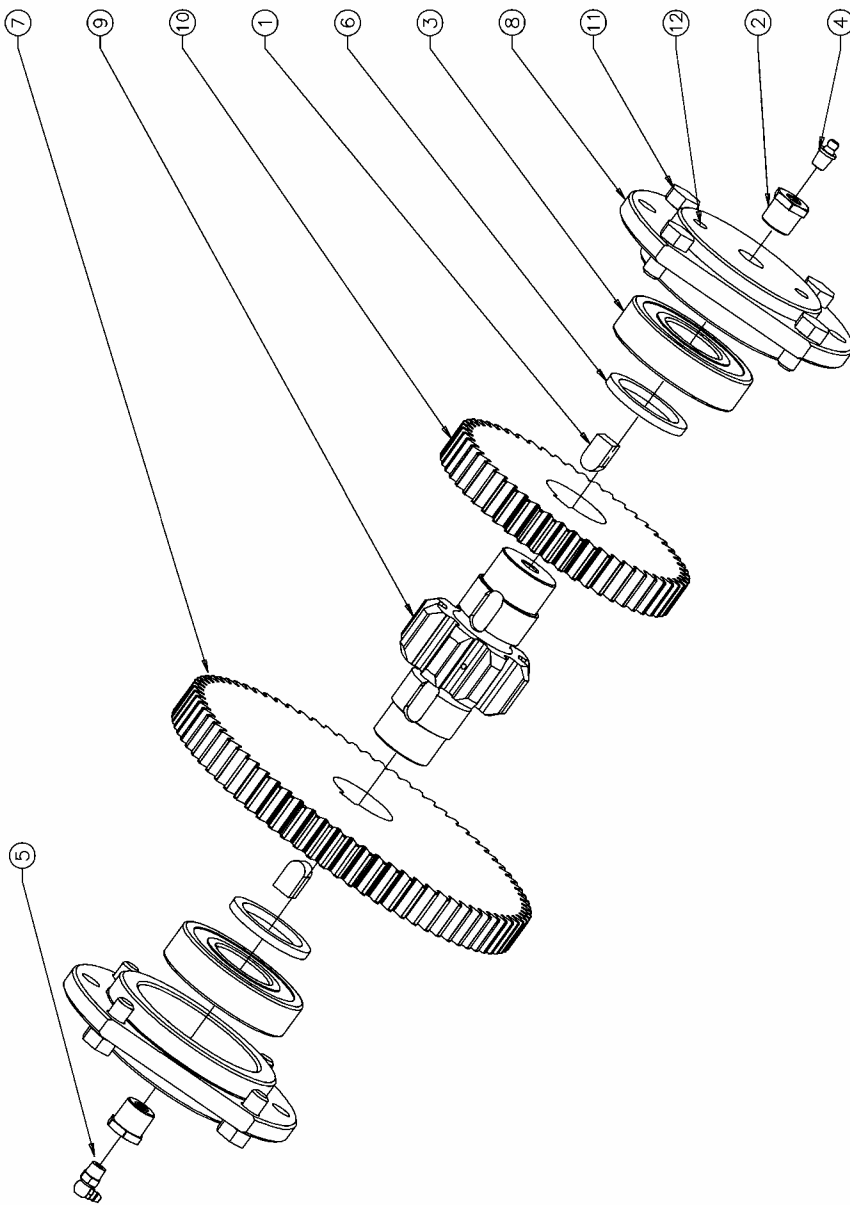
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3	1	IDLER GEAR	704 05004
4	2	EXTERNAL SNAP RING	N69 25061
5	1	INTERNAL SNAP RING	N69 57112



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UNIVERSE MACHINE CORPORATION		SCALE NTS	DWG. No 01D05C-4
DESCRIPTION PINION GEAR ASSEMBLY			
FIN. WT 48.3 LBS			
APP'D			
VP			
DATE MAY 12, 2004			
DESCRIPTION OF CHANGE ORIGINAL DRAWING			
DATE			
BY			
DATE			
DATE			
DATE			

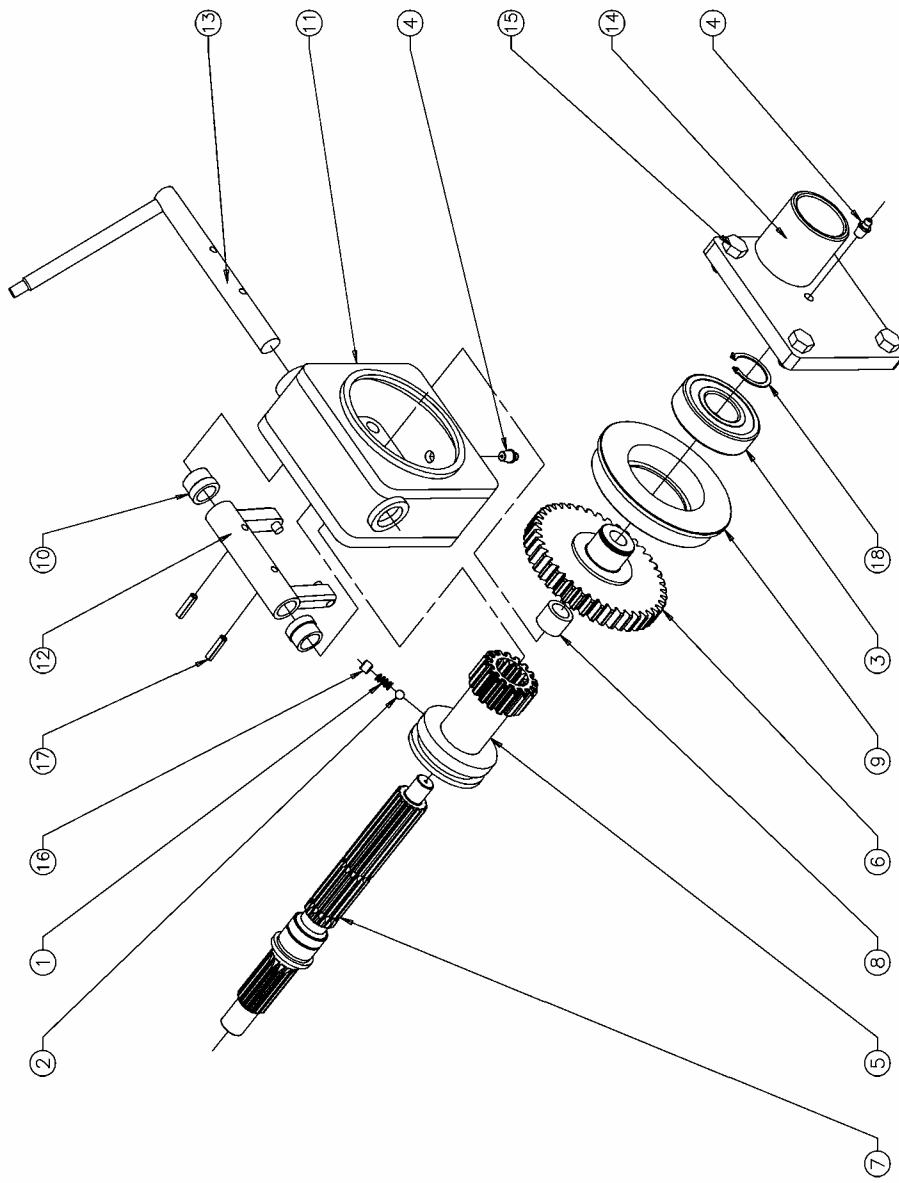
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1	2	KEY	006 14001
2	2	REDUCER BUSHING	036 08001
3	2	BEARING	085 35091
4	1	GREASE ZERT	094 00101
5	1	GREASE ZERT	094 00102
6	2	PINION GEAR SPACER	701 05004
7	1	TOP DRIVEN GEAR	704 05002
8	2	BEARING CAP	702 13003
9	1	PINION GEAR	704 05003
10	1	BOTTOM DRIVEN GEAR	704 05008
11	8	HEX BOLT	N20 08082
12	4	SET SCREW	NS3 06080



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UNIVERSE MACHINE CORPORATION		SCALE	NTS	DMG. No	01D05C-5
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BY					
DATE					
DESCRIPTION OF CHANGE					
APP'D					
DATE					
ORIGINAL DRAWING					
VP					
VP					
DATE					
DESCRIPTION					
DATE					
DESCRIPTION					
DATE					
DESCRIPTION					
DATE					

ITEM	QTY	DESCRIPTION	PART #
1	1	SPRING	015 20501
2	1	BALL	030 31001
3	1	BEARING	085 31081
4	1	GREASE ZERT	084 00102
5	1	SHIFT MOTOR GEAR	704 05001
6	1	BOTTOM MOTOR GEAR	705 05007
7	1	MOTOR SHAFT	704 05009
8	1	GEAR BUSHING	704 05012
9	1	SPACER BEARING HOUSING	706 05130
10	1	SHIFT SLEEVE	706 05132
11	1	ADAPTER BOX	706F05100
12	1	SHIFT FORK ASSEMBLY	706F05110
13	1	SHIFT HANDLE ASSEMBLY	706F05120
14	1	BOTTOM BEARING CAP ASSY	706F05135
15	4	HEX BOLT	N20 08082
16	1	SET SCREW	N53 06060
17	1	SPRING PIN	N68 04082
18	1	EXTERNAL SNAP RING	N69 22051

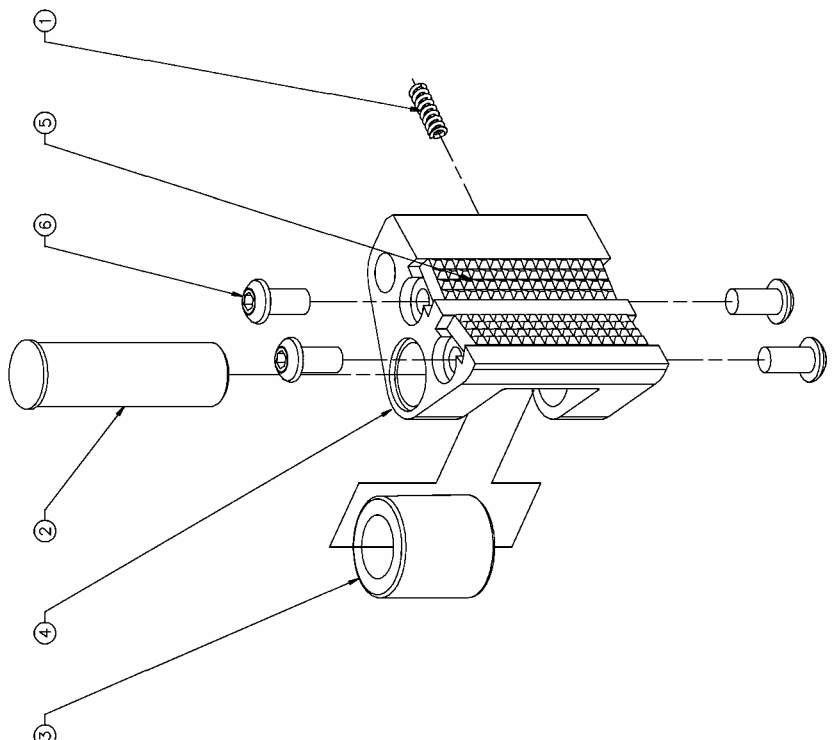


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UNIVERSE MACHINE CORPORATION		SCALE: NTS	Dwg. No. 01C09D-6
EDMONTON ALBERTA		DESCRIPTION: FRONT JAW ASSEMBLY	
FIN. WT			
SUPERSEDES:			
DATE:	DATE:		
DESCRIPTION OF CHANGE:			
BY:	DATE:		
MB	JUNE 18, 2004		
ORIGINAL DRAWING			
APP'D			
VGP			

ITEM	QTY	DESCRIPTION	PART #
1	1	SPRING	015 31201
2	1	JAW PIN	707 05001
3	1	JAW ROLLER	707 05002
*4	1	9.63 FRONT JAW (X.XX)	707 0900X
5	2	1/2 STD. INSERT DIE	707 08250-01
6	4	SOC BUTTON CAP SCREW	N47 08083

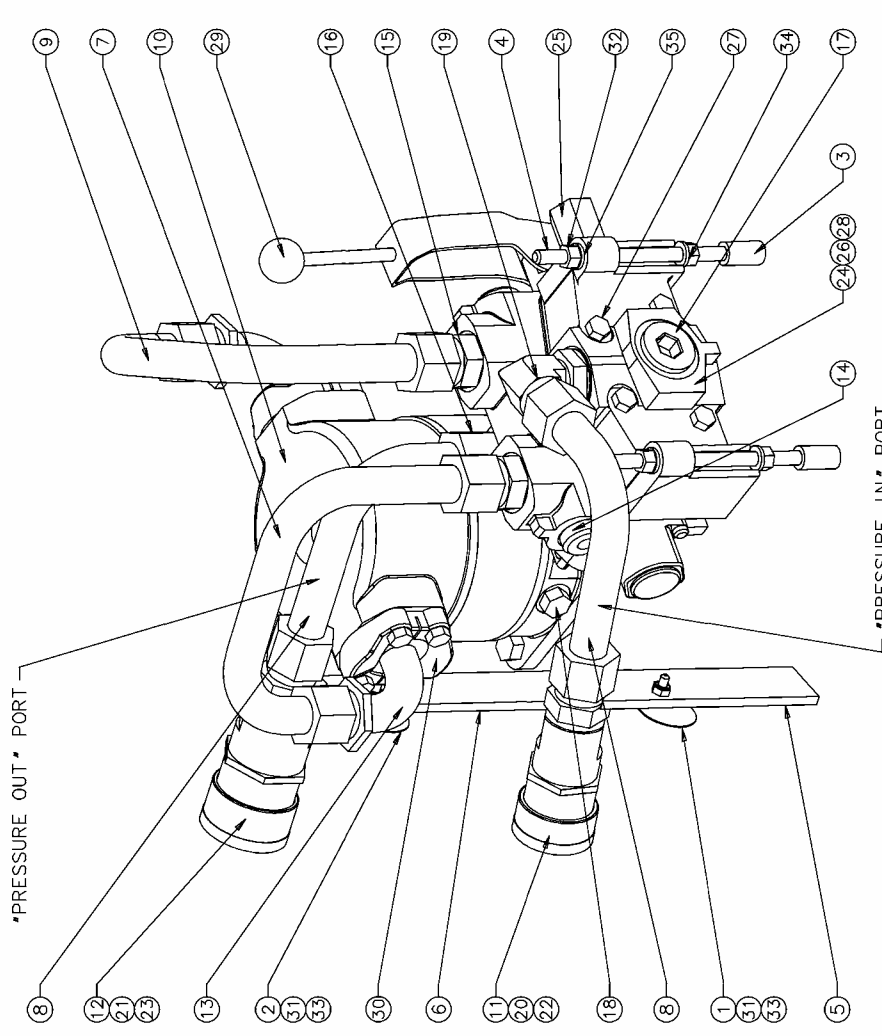
* FOR SELECTION AND PART NUMBERS OF JAWS REFER TO THE JAW/DIE SELECTION CHART



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UNIVERSE MACHINE CORPORATION		EDMONTON ALBERTA	SCALE: NTS	DWG. No. 706F00020
SUPERSEDES:		FIN. WT	DESCRIPTION: TONG HYDRAULIC UNIT	
BY:	DATE:	98 Lbs		
MB	MAY 12, 2004			
DESCRIPTION OF CHANGE		APP'D		
ORIGINAL DRAWING		VGP		

ITEM	QTY	DESCRIPTION	PART #
1	1	TAG - PRESSURE IN	049 00525
2	1	TAG - PRESSURE OUT	049 00526
3	2	CYLINDER SUPPORT	701S13002
4	2	VALVE SUPPORT ROD	701S13009
5	1	TUBE SUPPORT BAR - PRESSURE	701S13027
6	1	TUBE SUPPORT BAR - RETURN	701S13028
7	1	TUBING - 16 JICF X 16 JICF MTR	706F00002
8	2	TUBING - 16 JICF X 16 JICF LIN	706F00004
9	1	TUBING - 16 JICF X 16 JICF MTR	706F00006
10	1	HYDRAULIC MOTOR - 15 CU	H015-61-015-30
11	1	FITTING - 16 JICM X 16 NPTM	H2404-16-16
12	1	FITTING - 16 JICM X 20 NPTM	H2404-16-20
13	2	TUBING - 16 JICM X 20 FLANGE X 90	H20FL-16MJ
14	2	PORT PLUG - HIGH BOY SECTION	H391-1873-011
15	2	FITTING - 16 JICM X 12 ORBM	H6400-16-12
16	1	FITTING - 16 JICM X 16 ORBM	H6400-16-16
17	2	PLUG 16 ORBM SHALLOW	H16NBP-SOC-HD
18	2	PLUG 6 ORBM	H6408-6
19	1	FITTING - 16 JICM X 16 ORBM X 90	H6801-16-16
20	1	DUST COVER - 1 IN. MALE	H78-DC-16
21	1	DUST COVER - 1.25 IN. MALE	H78-DC-20
22	1	Q-COUPLER - 1 IN. MALE WING	H878N16-16F
23	1	Q-COUPLER - 1.25 IN. MALE WING	H878N20-20F
24	1	VALVE - SAE INLET	H0VA20-A880
25	1	VALVE - RELIEF - DVG20 MAIN	H0V620-HRV
26	1	VALVE - MOTOR WORK SECT. - HIBOY	H0VA20-LA755
27	1	VALVE - STUD KIT	H0VA20-SK-1
28	1	VALVE - SAE OUTLET	H0VA20-TR88
29	1	VALVE - HANDLE KIT	H0VA20-H-8
30	2	FLANGE - 20 SAE	HFK20FA
31	2	HEX BOLT	N20 04062
32	4	NUT	N66 06032
33	2	LOCKNUT	N66 04522
34	2	WASHER	N67 06012
35	2	LOCKWASHER	N67 06022



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Item	Part No.	Description	Qty
1	0150111	Seal Plate Snap Ring	1
2	0150112	Seal Plate Outer Seal	1
3	0150113	Seal Plate O-ring	1
4	0150110	Seal Plate	1
5	0150114	Seal Plate O-ring	1
6	0150730	Bearing Snap Ring	1
7	0150710	Ball Bearing	1
8	0150701	Keyed Shaft	1
9	0150702	Splined Shaft	1
10	0150901	Bolt	4
11	0150102	Front Housing - Internal	1
12	0150478	Dowel Pin - Front	2
13	0150610	O-Ring	4
14	0150620	Plate Screw	4
15	0150604	Plate	2
16	0150400	Synor GA 11.5	1
17	0150401	Synor GA 15	1
18	0150402	Synor GA 13	1
19	0150403	Synor GA 9.5	1
20	0150404	Synor GA 8.0	1
21	0150406	Synor GA 7.0	1
22	0150407	Synor GA 6	1
23	0150409	Synor GA 3.0	1
24	0150420	Synor Valve Spring	8
25	0150410	Synor Valve	4
26	0150300	Rotor	1
27	0150311	Rotor Valve	10
28	0150320	Rotor Valve Spring Outer	20
29	0150321	Rotor Valve Spring Inner	20
30	0150902	Bolt Checks	4
31	0150770	Headle Bearing	1
32	0150800	Rear Housing	1
33	0150429	Dowel Pin - Rear	2

