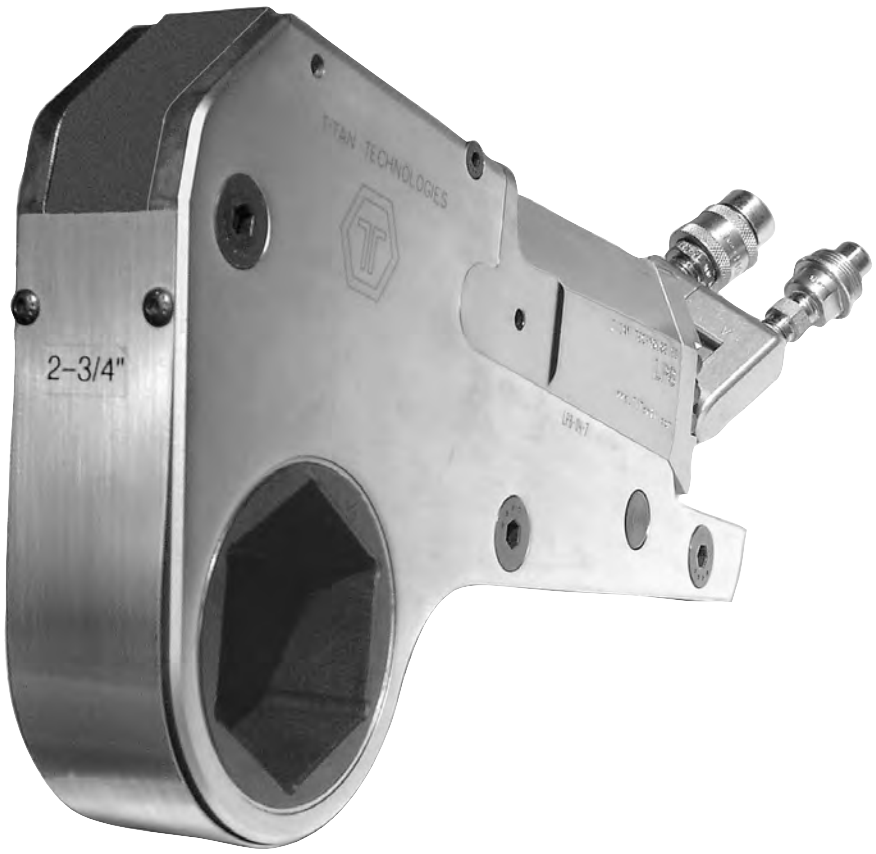
TITAN
TECHNOLOGIES INTERNATIONAL, INC

SUPERIOR BOLTING SOLUTIONS

LP Series

Low Profile Hydraulic Torque Wrench System



OP_LP_V3 June 14, 2006

TITAN
TECHNOLOGIES INTERNATIONAL, INC

Subject: Welcome to Titan Technologies

Dear Valued Customer

Thank you for your recent purchase. You have just acquired the best Hydraulic Torque Wrench on the market. We thank you for joining the ever expanding list of satisfied customers who have made Titan the fastest growing company in our industry.

Your new Titan Technologies LP Series Hydraulic Torque Wrench is engineered for superior strength and tool life. With proper care your Titan LP Series tool will provide years of unsurpassed accuracy, performance and reliability.

We use only the best high strength aircraft alloy available. Extreme care has been taken at all steps of production and quality assurance to ensure that each part adheres to our exacting engineering and manufacturing standards. Unique Patented and Patent Pending features result in a superior Low Profile Hydraulic Torque Wrench that delivers superior performance and longer tool life.

All Titan Technologies Pumps and Accessories undergo a rigorous quality assurance program to ensure you the quality and reliability you deserve. The goal is to make your bolting task go as quickly and smoothly as possible.

In addition, Titan, its employees and our worldwide network of dealers and representatives stand ready to assist you in any way we can to make your bolting job easier.

Titan offers an unparalleled selection of specialized bolting equipment to offer you “Superior Bolting Solutions”

We offer direct customer service which is second to none. Your critiques, comments and suggestions are welcome. And we stand ready to act to serve you better. With that philosophy in mind if you feel your situation merits our direct attention, feel free to contact us at any time. We stand ready to serve you and again, thank you for your business.

Yours truly,

Peter A. Rosa
President & CEO

Important Safety Precautions
Please read and understand before use.
If there are any questions, please contact Titan Technologies or your authorized Titan Technologies Representative.

Important: Your Titan Technologies Hydraulic Torque Wrench is a State-Of-The-Art Power Tool capable of generating tremendous forces. All power tools should be treated with respect and all safety precautions should be observed to avoid accidents or injury. Please observe the following precautions and observe all safety rules at your facility. Remember, common sense is your best safety precaution.

Read and understand all instructions, prior to use. If there are any questions, please contact Titan or an authorized Titan Representative for instructions, prior to use. All personnel and their supervisors should be required to read and understand the operation of the Titan Technologies equipment as outlined in the manual.

Use the proper equipment for the Job: For environments where sparks and fire is a hazard, you must use the Titan P+ Pneumatic Power packs. **Warning: Electric Power Packs should not be used** in any atmosphere, which can be considered potentially volatile. Sparks can also be generated by friction or any metal-to-metal contact. Precautions should be taken to avoid any danger of explosion or fire, **prior** to use.

Safety precautions and procedures:

- To reduce the chance of accident, the operator of the tool is the person who operates the remote control.
- Stay clear during operation. If the tool must be steadied during operation, take precaution to stay clear of pinch points (reaction area).
- Make sure the reaction point is safe. Keep clear, ensure reaction forces are safe and the tool is not reacting in such a way as to force the reaction arm off the tool. Keep reaction forces "in line with the nut you are turning.
- Wear proper safety attire. Use Safety Goggles, Hard Hats, proper work gloves and other applicable clothing.
- Use the correct Titan Tool for the job. A good rule of thumb is to use the largest tool that fits. This will result in longer tool life and increased safety.
- Observe all in plant safety rules
- Make sure the pump and tool are properly grounded to avoid electrical shock.

Some "common sense" precautions:
Please find below some simple and common sense safety precautions. These and all other plant, municipality, state and federal safety checks for power equipment must be adhered to.

• Check all Electrical or Air connections, prior to use. Any frayed or cut air lines or electrical wiring should be replaced prior to use. Only an authorized electrician should do any electric repair work.

• Check all Hydraulic Hoses, quick connects and connections prior to use. Titan Hydraulic Torque Wrenches work under high pressure. Any kinked hoses must be replaced and are not to be used. **Caution**: Kinked Hydraulic Hoses pose an immediate safety hazard. If Safety hose burst guards are compromised. They must be replaced prior to use.

• **DO NOT** use Hydraulic Hoses, Quick Connects or other Coupling Systems, Power Cords, Air Hoses, or Remote Cords as a means of moving equipment.
• Always inspect Tools, Pumps, Impact Sockets, and Accessories for visible damage, prior to use.

• Always follow proper maintenance schedules and procedures. Refer to the operations manual and always ask questions if you do not fully understand safety rules, precautions or tool operation.

• Always be alert. Use common sense. Do not use this or any other power equipment under the influence of drugs, alcohol, or other substances that may affect reaction time or your judgment.

• Check ALL sockets. Use only the proper top quality and proper size impact sockets and accessories with Titan Hydraulic Torque Wrenches. Due to the high forces generated by the Titan Hydraulic torque Wrenches, the use of Titan Technologies quality impact sockets and accessories is highly recommended.

• Inspect all sockets and accessories for damage or flaws **prior to use**. If there is any question, do not use the socket. Remember, your Titan Tool develops a tremendous amount of power. You must be aware that any socket may have hidden flaws, which may cause breakage to the socket. Stay clear during operation of the tools.

Preparation for use

General: All Titan Technologies Hydraulic torque Wrenches come completely assembled and are ready for use. The Titan Power Packs provide the pressure and adequate flow to efficiently operate the tool.

- Titan Power Packs are configured so as to not exceed the capacity of the Titan tools. Please note that if you use the Titan Power Packs for any other purpose, please take precautions to not exceed the limits of the ancillary equipment powered by the Titan pump. You must limit the pumps pressure by presetting the pressure prior to use, to within the limits of the non-Titan equipment.

Basic System Assembly: The Titan LP-Series Hydraulic Torque Wrenches are connected to the Power Pack via a 10, 000-psi Twin-Line Hydraulic Hose Assembly. The hoses have a 4: 1 Safety Factor. Caution: Use only Titan Technologies hoses and connections to assure quality and safety of hoses and connections.

Extremely Important: The sequencing of your hydraulic connections is imperative and **must not** be switched. The hydraulic connections are provided from the factory in the following configuration and must not be changed.

1. High pressure (Advance) at the pump and tool is supplied with a Male Nipple Quick Connect.
2. Low Pressure (Return side) at the tool and pump are supplied with a Female Quick Connect.
3. Twin-Line Hoses are Male Connect to Male Connect and Female Connect to Female Connect.
4. Your system will not work properly unless set up this way.
    - When changing Quick Connects, you MUST replace a male connection with a male connection and a female connection with a female connection

Changing Links and engaging Link to Hydraulic Power Head:
The Titan LP Series uses interchangeable Hex Links which attach to the Hydraulic Head via a Link Retention Pin.

1. Remove Link Mating pin from housing
2. Choose proper link size for the task at hand
3. Mate link with housing via link mating pin which is retained via a spring & ball mechanism .
4. If using a link reaction Arm or ALCO Arm attach the accessory via the appropriate extended link retention pin at this time. If loosening place the reaction arm to extend off the left side of the link. If tightening position the Reaction on the right side of the link. Always react on the same side you engage the nut.
5. Connect Hydraulic Power Head to pump via hose assembly
6. Cycle tool **off load** until piston engages with the Link via the TL Link Retractor Clip. The function of the Link retractor clip is to return the mechanism so the tool can

continuously ratchet. Note: it may be necessary to manually position the drive mechanism to a position where it is possible for the piston rod end to engage the clip. If you have difficulty free-wheeling the mechanism into position, depress the Reaction Pawl Assembly.

7. Ensure the mechanical and the hydraulic are properly engaged and functioning by cycling the tool on the floor for a couple of cycles. Be sure that the piston has engaged the link properly and has completely and fully mated with the link retractor clip. Cycle until the link makes a full stroke and returns properly into position for the subsequent stroke. If functioning properly proceed to next step (setting the hydraulic Pressure). If not functioning, check quickl disconnects and trouble shooting guide.

Changing the tool from Loosen to tightening and visa versa:

When using a Titan LP-Series tool, stand the tool with the Link facing you and the swivel assembly in the back of the tool . To tighten the link, engage from the right side. To loosen, the link must engage from the left side. If using a Link Reaction Arm it must always in used only on the same side from which the nut is engaged with the tool. If using the reaction fragment pad of the LP Link (preferred). Abut firmly against an adjacent nut or other suitable reaction point.

Setting your required torque.

1. Connect the tools, pump and hoses.
2. Find the proper power supply.
3. MAKE SURE YOU HAVE THE PROPER PRESSURE/TORQUE CONVERSION CHART FOR THE TOOL YOU ARE USING!
4. Cycle the tools (free standing) to assure all quick connects are properly seated and that the power supply is adequate.
5. Loosen the Lock Nut on the High Pressure Regulator assembly.
6. Consult the Pressure /Torque Conversion chart for the proper pressure for the torque you desire. See example on the next page.

Sample Pressure /Torque Conversion Chart

(Consult Pressure /Torque Conversion Chart supplied with your tool for proper settings)

PSI	FT./LBS.	BAR	KGM	NM
1500	544	104	75	738
1600	582	110	80	789
1800	658	124	91	892
2000	734	138	101	995
2200	810	152	112	1098
2400	886	166	122	1201
2600	962	179	133	1304
2800	1038	193	143	1408
3000	1114	207	154	1511
3200	1192	221	164	1616
3400	1271	235	175	1723
3600	1350	248	186	1831
3800	1429	262	197	1938
4000	1508	276	208	2045
4200	1589	290	219	2155
4400	1669	304	230	2263
4600	1749	317	241	2372
4800	1830	331	253	2481
5000	1910	345	264	2590
5200	1988	359	274	2696
5400	2066	373	285	2801
5600	2144	386	296	2907
5800	2222	400	307	3013
6000	2300	414	317	3119
6200	2377	428	328	3223
6400	2454	442	339	3328
6600	2532	455	349	3433
6800	2609	469	360	3538
7000	2686	483	371	3642
7200	2771	497	382	3757
7400	2856	511	394	3873
7600	2942	524	406	3989
7800	3026	538	418	4103
8000	3112	552	429	4220
8200	3196	566	441	4334
8400	3281	580	453	4449
8600	3366	593	465	4564
8800	3451	607	476	4680
9000	3536	621	488	4795
9200	3590	635	495	4868
9400	3670	649	506	4977
9600	3740	662	516	5071
9800	3825	676	528	5187
10000	3902	690	538	5291

7. **Turn the Thumbscrew counterclockwise until you are below the pressure you require. (Depress the remote control button to advance and check the gauge pressure to make sure you are. Once there release the button on the remote. Let Oil return to pump and then shut pump off from the remote.)**
8. **Turn the pump on, depress and hold button on remote and while holding the button in the advance position, turn the thumbscrew on the HP Regulator CLOCKWISE to build pressure. Once the pressure has been seen at the gauge, turn the locknut (firmly hand-tight). Lock pressure in at desired pressure.**
9. **Release button and then re-pressurize to double check that the pressure has been set properly. If you are still below where you want to be, loosen the lock nut and continue to build pressure to the proper setting. If you want to be over the pressure point, let go the advance button, back off the pressure a bit and then depress the button until the proper pressure is achieved. BE SURE TO TIGHTEN THE LOCK NUT.**

You are now ready to proceed to the next step.

Setting the pressure for Loosening:

1. Follow the same procedure as for Torque setting. While your Titan Technologies Hydraulic Torque Wrench is engineered to work at full pressure, it is a good rule of thumb to set the torque to 80%-90% of the tools capacity. By using the largest Titan Technologies Tool that fits the job, you will get much longer tool life. If you can not develop enough torque to loosen the nut at 80%-90% of the tools capacity, chances are you need the next size Titan Technologies tool. Consult your Titan Technologies representative.

LP-Series Hydraulic Torque Wrench "set up" on the application:

1. Use only the proper size LP Hex Link or, high quality Stacking Socket for the nut. Using a socket or a Link that is too large is dangerous. Use the proper size socket or link. If you do not have the proper link or socket, STOP and get the correct one before proceeding.
2. Use the proper Link Mating Pin to properly retain the Link to the Power Head of your Titan Technologies Tool.
3. Place the Titan Technologies Tool and Link on the nut. Make sure the reaction Arm Safely abuts against a stationary object (adjacent seated nut the best). Make sure the Drive is fully engaged in the tool, and that the Link is fully engaged on the nut. You want to **react in plane** with the nut your turning.
4. Make sure hoses, Tru-Swivel™, Quick connects, etc. are clear from any obstruction. They are not meant to be your reaction point.
5. Apply momentary pressure to the tool to ensure proper placement.
6. **DANGER! Never place your hand on the reaction arm or reaction pad, while the tool is in operation.**

Operating the Titan Technologies Hydraulic Torque Wrench

- Depress the button to advance.
- Make sure you have a safe reaction.
- The Titan Technologies Pump delivers Hydraulic Pressure to the tool.
- The Pumps have a 4-Way Directional Control Valve. It is set up so that the operator needs to depress the 3-Way Remote to advance the cylinder.
- The act of "letting go" of the button automatically switches the valve on the pump to the retract mode. Therefore **you must depress the advance button and keep it depressed until you have reached the end of your stroke.**
- The piston is attached to a Ratchet Pawl System (link), which drives the nut.
- The piston will use whatever pressure it takes to reach the end of its stroke.
- Once you reach the end of your stroke, let go of the advance and wait for the oil to return to the pump.
- Continue this process until the process is complete. (For Torque up, that is when the tool stalls after successive strokes and you have reached your preset pressure. For Loosening, after the nut is loosened).
- Shut Pump motor off from the Remote Control Pendant and proceed to set up on the next nut to be turned.

Basic Preventative and Corrective Tool Maintenance:

Preventative LP-Series Tool Maintenance:
Dirt and grit will reduce the life of the tool and the resulting friction will affect tool performance.

- You should periodically clean all parts and lubricate with Dow Corning GN Metal Assembly paste.
- Period of this maintenance will vary and will depend on the amount of use the tools see and the environment the tools are used in. Use common sense to determine your tool preventative maintenance period.
- Re-lubrication and cleaning of the tool is recommended to be done to each tool at least once a year for tools exposed to normal use. If you use the tool in extreme conditions such as multiple shift use and/or at consistent use at or near tool capacity, it is recommended that preventative maintenance be performed on a 3-6 month cycle
- If your work environment is subject to excessive dirt and grit, or is a corrosive environment, it is recommended that you put the tools on a shorter preventative maintenance cycle.
- You may order the proper moly-paste lubricant from Titan Technologies. (#TAP1204K33).
- All Tools should be recalibrated after re-lubrication. Note: Do not substitute lubricant. If you do lubricate with a different lubricant than the one we specify, you should definitely have the tool re-calibrated. Different lubricants will result in different torque output. Torque output of the tool is a function of area, pressure and friction. Lubricants of a greater or lesser coefficient of friction will result in greater or lesser torque output. Your Titan Technologies Torque Charts are based on the coefficient of friction when using Dow Corning Metal Assembly paste in its tools.

- Recommended Calibration Cycle: We recommend a recalibration cycle of one year for the Titan Hydraulic Torque Wrenches and Hydraulic Gauges. Your calibration period may vary due to the amount and conditions of use, or to adhere to your own calibration procedure. To have your tools re-certified please contact your Titan Technologies authorized representative or you may contact Titan Technologies.

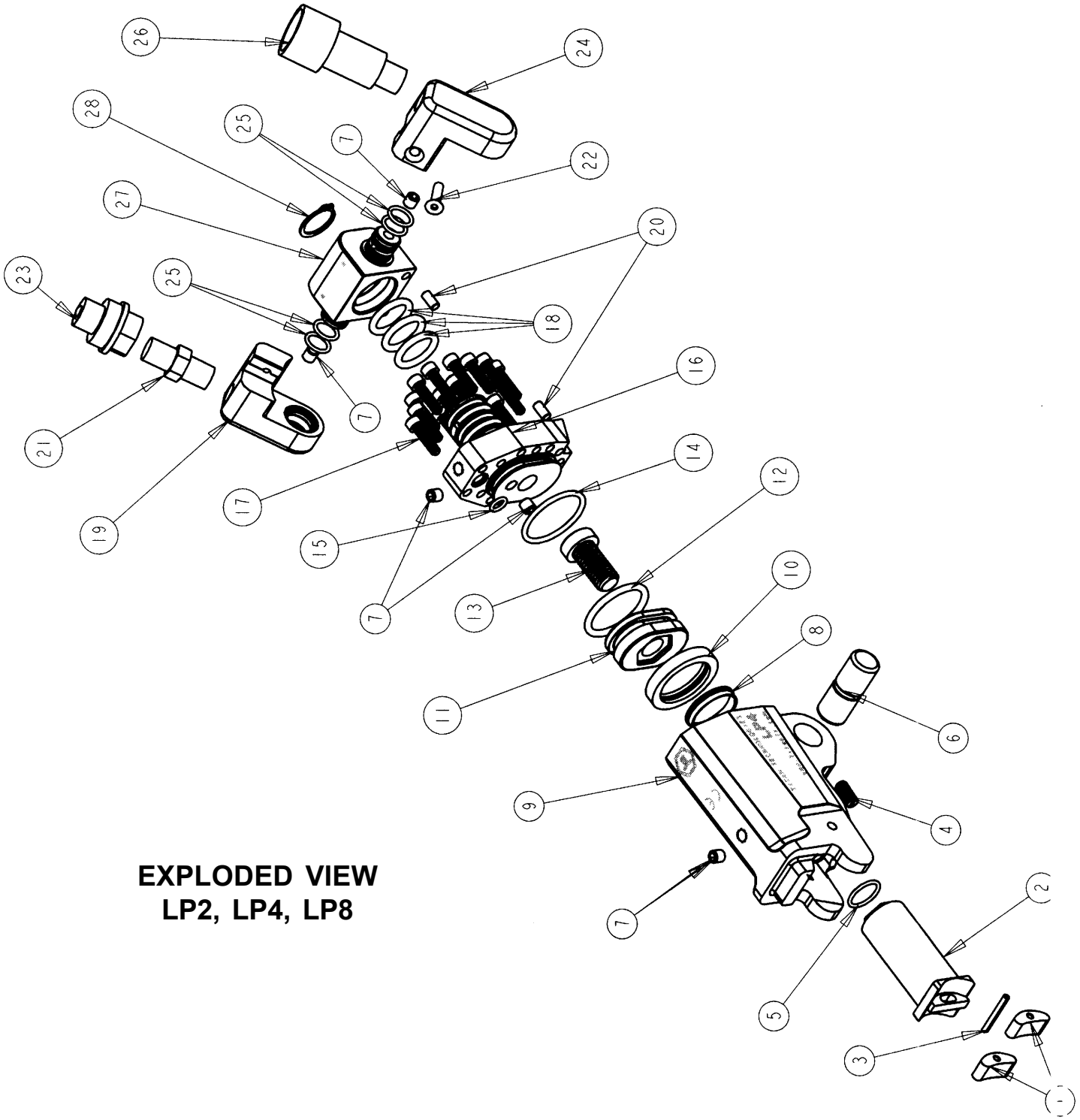
Diagnosing a problem:

#1. Check all quick connects. Make sure all connections are properly and fully seated.

- Check to see that the quick connects are configured as described in the Preparation for Use subheading of this manual (see page 6). Any change in the configuration will cause the tool to malfunction or not function at all.

#2. Check power supply. Inadequate or incorrect voltage, amperage or in the use of the Titan Air/ Hydraulic Power Unit, inadequate or dirty Air Supply will cause your most common problems. MAKE SURE YOU USE THE Filter Lubricator Regulator with your Titan Technologies Air Pump.

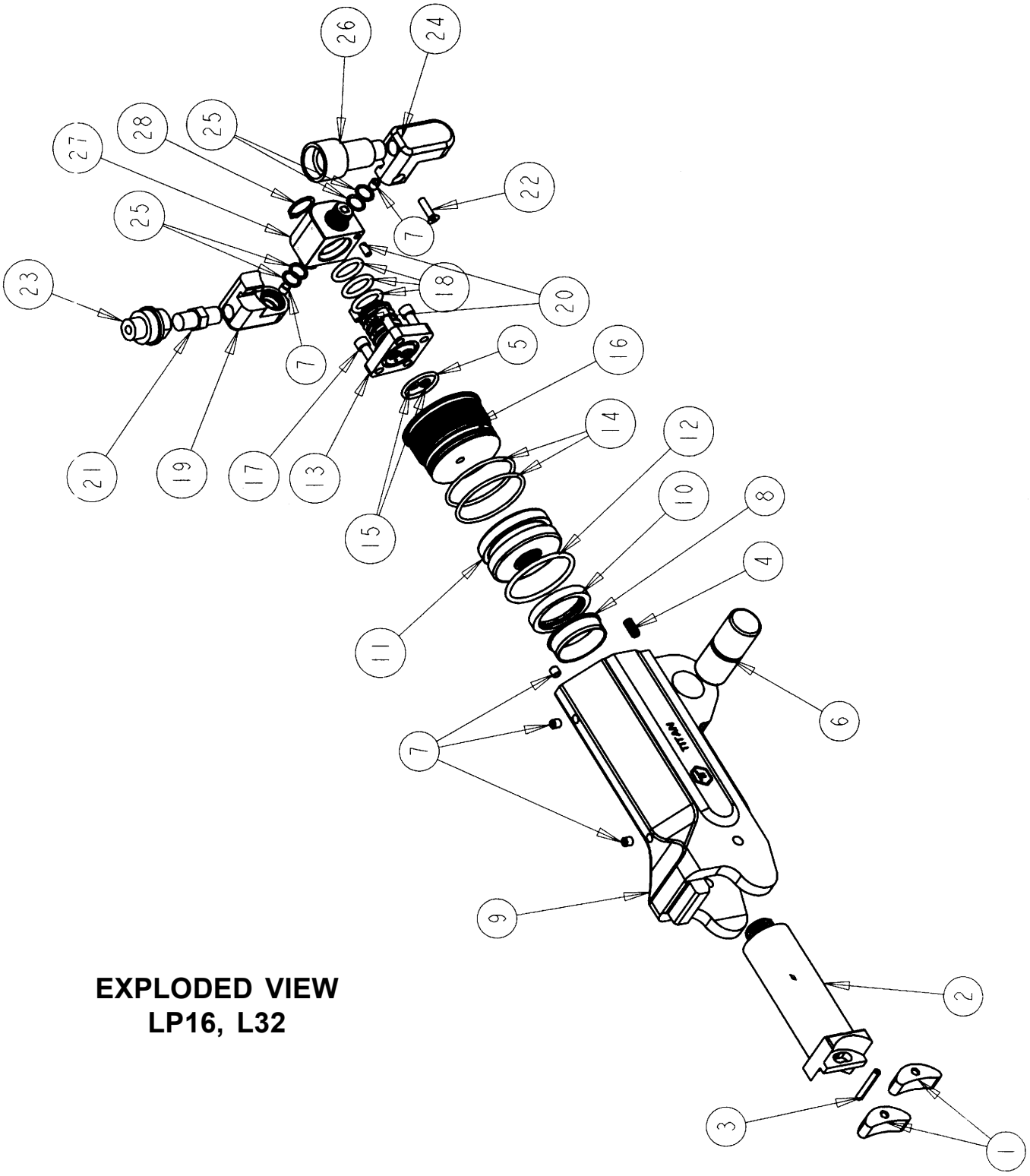
#3. When applicable, segregate the systems parts to determine if the problem is a tool malfunction or a pump malfunction. (For Example, if the pump does not build pressure with the tool disconnected, you know the problem is a pump problem and not the tools. Conversely, if the Pump builds pressure with the tool disconnected from the system, but does not with the tool attached, the problem is with the tool). This simple procedure will save valuable time in diagnosing the cause of the problem.



EXPLODED VIEW
LP2, LP4, LP8

PARTS LIST
Cylinder, Housing & Swivel Assembly
LP-2 / LP-4 / LP-8

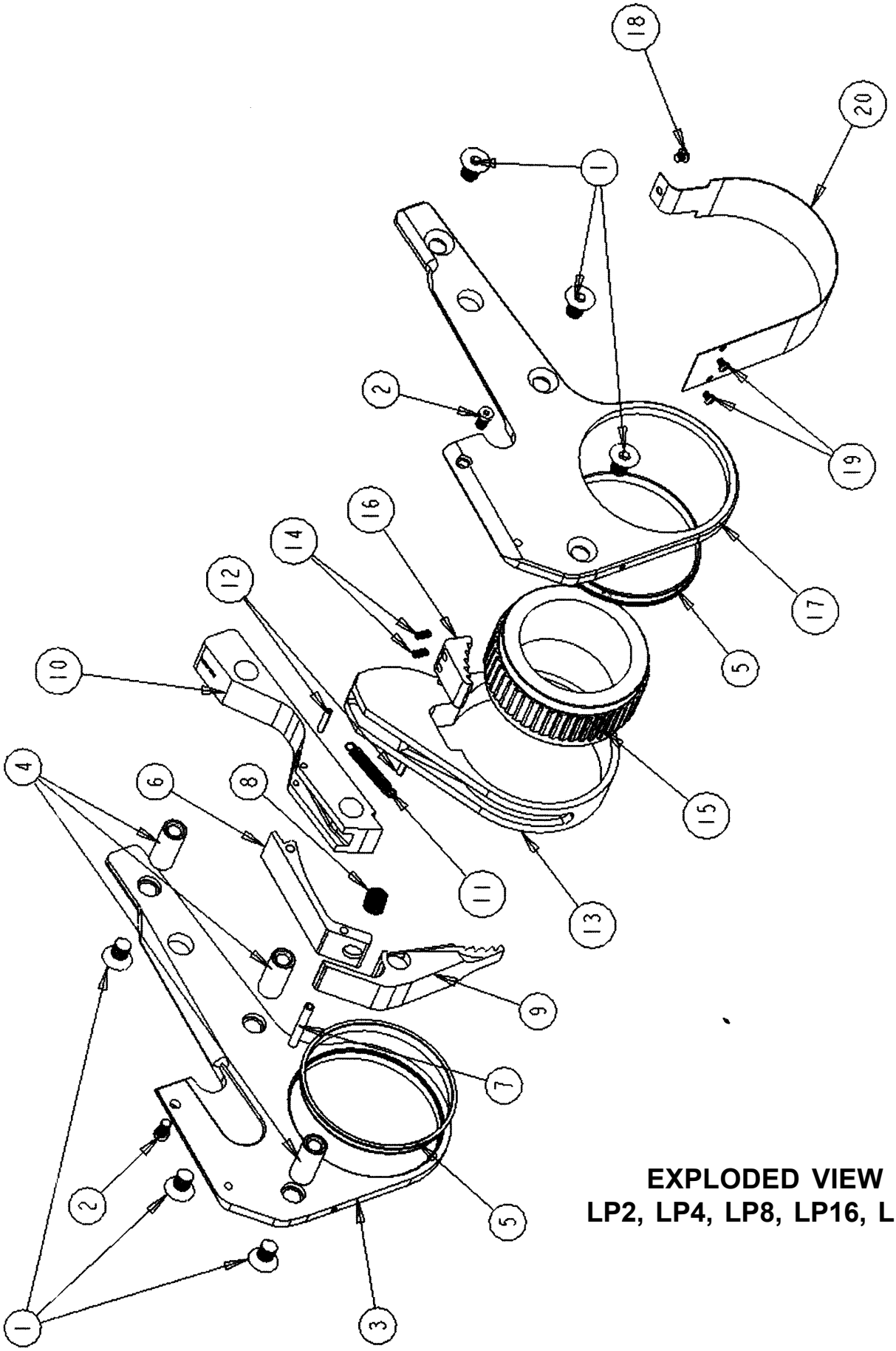
ITEM	DESCRIPTION	QTY	PART NUMBER		
			LP2	LP4	LP8
1	MOON BUSHING	2	TL2C-04	TL4C-04	TL8C-04
2	ROD	1	TL2C-07	TL4C-07	TL8C-07
3	ROLL PIN *	1	TL2C-21	TL4C-21	T10-40-41-42
4	BALL PLUNGER *	1	TL2C-22	TL4/16C-22	TL4/16C-22
5	O-RING; ROD TO PISTON	1	T1/25-71-013	TL4/8C-07-016	TL4/8C-07-016
6	MATING PIN	1	TL2C-05	TL4C-05	TL8C-05
7	SET SCREW	5	T1/25-80	T1/25-80	T1/25-80
8	GLAND	1	TL2C-08	TL4C-08	TL8C-08
9	HOUSING	1	TL2C-01	TL4C-01	TL8C-01
10	LIP SEAL	1	T1-01-N	T3-01-N	T5-01-N
11	PISTON	1	TL2C-06	TL4C-06	TL8C-06
12	O-RING; PISTON	1	T3/25-70-120	TL4C-02-218	T5-25-223
13	SOCKET HEAD CAP SCREW *	1	TL2C-25	TL4C-25	TL8C-25
14	O-RING; END CAP	1	T3/25-70-120	TL4C-03-125	T5-25-223
15	O-RING; RETURN PORT	1	TL2C-03-007	T3/25-70-010	T3/25-70-010
16	END CAP/ SWIVEL POST	1	TL2C-03	TL4C-03	TL8C-03
17	END CAP SCREW *	14	TL2C-20	TL4C-20	TL8C-20 (16)
18	O-RING; SWIVEL POST	3	T1-70-014	T3/25-70-210	T3/25-70-210
19	ADVANCE MANIFOLD	1	T1-72	T3/25-72	T3/25-72
20	SWIVEL DOWEL PIN	2	T1-81	T3/25-81	T3/25-81
21	HEX NIPPLE ADAPTER *	1	T1-77	T3/25-77	T3/25-77
22	SWIVEL ARM SCREW	1	T1-76	T3/25-76	T3/25-76
23	MALE QUICK CONNECT *	1	T1/25-79	T1/25-79	T1/25-79
24	RETRACT MANIFOLD	1	T1-73	T3/25-73	T3/25-73
25	O-RING; SWIVEL HOUSING	4	T1/25-71-013	T1/25-71-013	T1/25-71-013
26	FEMALE QUICK CONNECT*	1	T1-78	T3/25-78	T3/25-78
27	SWIVEL HOUSING	1	T1-71	T3/25-71	T3/25-71
28	SNAP RING *	1	T1-74	T3/25-74	T3/25-74
29	MAINTENANCE KIT *		MK-LP2	MK-LP4	MK-LP8
30	HOUSING SEAL KIT		LP2-62	LP4-62	LP8-62
31	SWIVEL SEAL KIT		LP2-00	LP4/8-00	LP4/8-00
32	LOCKTITE (RED)				
33	LOCKTE (BLUE)				
34	MOLY PASTE		#TAP1204K33	#TAP1204K33	#TAP1204K33



EXPLODED VIEW
LP16, L32

PARTS LIST
LP-16 & LP-32 Cylinder, Housing & Swivel Assembly

ITEM	DESCRPTION	QTY	PART NUMBER	
			LP16	LP32
1	MOON BUSHING	2	TL16C-04	TL32C-04
2	ROD	1	TL16C-07	TL32C-01
3	ROLL PIN *	1	TL16C-21	TL32C-21
4	BALL PLUNGER *	1	TL4/16C-22	TL32C-22
5	POST LARGE 0-RING	1	T3/25-70-120	T3/25-70-120
6	MATING PIN	1	TL16C-05	TL32C-05
7	SET SCREW	5	T1/25-80	T1/25-80
8	GLAND	1	TL16C-08	TL16C-08
9	HOUSING	1	TL16C-01	TL32C-01
10	LIP SEAL	1	T10-01-N	TL32C-01-N
11	PISTON	1	TL16C-06	TL32C-06
12	0-RING; PISTON	1	TL16C-06-328	TL32C-06-328
13	SWIVEL POST	1	T3/25-70	T3/25-70
14	0-RING; END CAP	2	TL16C-03-137	TL32C-03-137
15	POST SMALL 0-RING	2	T3/25-10-010	T3/25-10-070
16	END CAP	1	TL16C-03	TL32C-03
17	SWIVEL POST SCREW	4	T3/25-75	T3/25-75
18	0-RING; SWIVEL POST	3	T3/25-70-210	T3/25-70-210
19	ADVANCE MANIFOLD	1	T3/25-72	T3/25-72
20	SWIVEL DOWEL PIN	2	T3/25-81	T3/25-81
21	HEX NIPPLE ADAPTER*	1	T3/25-77	T3/25-77
22	SWIVEL ARM SCREW	1	T3/25-76	T3/25-76
23	MALE QUICK CONNECT *	1	T1 /25-79	T1/25-79
24	RETRACT MANIFOLD	1	T3/25-73	T3/25-73
25	0-RING; SWIVEL HOUSING	4	T1/25-71-013	T1/25-71-013
26	FEMALE QUICK CONNECT *	1	T3/25-78	T3/25-78
27	SWIVEL HOUSING	1	T3/25-71	T3/25-71
28	SNAP RING *	1	T3/25-74	T3/25-74
	MAINTENANCE KIT *		MK-LP16	MK-LP32
	SWIVEL SEAL KIT		T325-00	T325-00
	HOUSING SEAL KIT		LP16-62	LP32-62
	LOCKTITE (RED)			
	LOCKTE (BLUE)			
	MOLY PASTE		#TAP1204K33	#TAP1204K33



EXPLODED VIEW
LP2, LP4, LP8, LP16, LP32

LP LINK PARTS LIST

ITEM	DESCRIPTION	QTY	PART NUMBER				
			LP2	LP4	LP8	LP16	LP32
1	LINK LOCATOR SCREW *	6	TL2L-20	TL4L-20	TL8L-20	TL16L-20	TL32L-20
2	TOP SPACER SCREW *	2	TL2L-22	TL4/8L-22	TL4/8L-22	TL16L-22	TL32L-22
3	RIGHT LINK PLATE	1	TL2L-04-XX-1	TL4L-04-XX-1	TL8L-04-XX-1	TL16L-04-XX-1	TL32L-04-XX-1
4	LINK LOCATOR	3	TL2L-08	TL4L-08	TL8L-08	TL16L-08	TL32L-08
5	DRIVE BUSHING	2	TL2L-07-XX	TL4L-07-XX	TL8L-07-XX	TL16L-07-XX	TL32L-07-XX
6	TOP SPACER	1	TL2L-06	TL4L-06	TL8L-06	TL16L-06	TL32L-06
7	TOP SPACER ROLL PIN *	1	TL2L-21	TL4L-21	TL8L-21	TL16L-21	TL32L-21
8	REACTION PAWL SPRING *	1	TL2L-26	TL4L-26	TL8L-26	TL16L-26	TL32L-26
9	REACTION PAWL	1	TL2L-05-XX	TL4L-05-XX	TL8L-05-XX	TL16L-05-XX	TL32L-05-XX
10	REACTION SPACER	1	TL2L-10	TL4L-10	TL8L-10	TL16L-10	TL32L-10
11	RETRACT SPRING *	1	TL2L-12	TL4L-12	TL8L-12	TL16L-12	TL32L-12
12	RETRACT SPRING ROLL PIN *	2	TL2C-21	TL4C-21	T10-40-41-42	TL16L-21	TL32L-21
13	DRIVE BLOCK	1	TL2L-03-XX	TL4L-03-XX	TL8L-03-XX	TL16L-03-XX	TL32L-03-XX
14	DRIVE PAWL SPRING *	2	TL2L-25	TL4/8L-25	TL4/8L-25	TL16L-25	TL32L-25
15	RATCHET	1	TL2L-01-XX-YYY	TL4L-01-XX-YYY	TL8L-01-XX-YYY	TL16L-01-XX-YYY	TL32L-01-XX-YYY
16	DRIVE PAWL	1	TL2L-02-XX	TL4L-02-XX	TL8L-02-XX	TL16L-02-XX	TL32L-02-XX
17	LEFT LINK PLATE	1	TL2L-04-XX-2	TL4L-04-XX-2	TL8L-04-XX-2	TL16L-04-XX-2	TL32L-04-XX-2
18	LARGE SHROUD SCREW *	1	TL2/16L-23	TL2/16L-23	TL2/16L-23	TL2/16L-23	TL32L-23
19	SMALL SHROUD SCREW *	2	TL2L-24	TL4L-24	TL8/16L-24	TL8/16L-24	TL32L-24
20	SHROUD	1	TL2L- 11-XX	TL4L- 11-XX	TL8L- 11 -XX	TL16L- 11 -XX	TL32L- 11 -XX
	MAINTENANCE KIT*		MK-LP2-LK	MK-LP4-LK	MK-LP8-LK	MK-LP16-LK	MK-LP32-LK
	LOCKTITE (RED)						
	LOCKTE (BLUE)						
	MOLY PASTE		#TAP1204K33	#TAP1204K33	#TAP1204K33	#TAP1204K33	#TAP1204K33

XX = Link Plate #
YYY = Hex size
* ITEMS IN MAINTENANCE KIT

Titan Technologies LP-Series Corrective Maintenance:

QUICK REFERENCE
Trouble Shooting Guide

For your Titan Technologies Hydraulic Torque Wrench System

Problem	Probable Cause	Solution
Tool will not advance	1. Quick Connect not mated properly. 2. Damaged Connect. 3. Foreign material in directional-control valve at pump.	1. Tighten Connection until fully secure. 2. Replace. 3. Disassemble & clean.
Tool will not retract	1. Same as above. 2. Broken or Missing Link Retract Spring.	1. Same as above. 2. Replace retract spring
Tool cannot be removed	1. Holding (2nd) Pawl is engaged. 2. Cylinder did not retract	1. Pressurize the tool and while keeping the button depressed on the remote control, GENTLY pull back the Pawl Release Lever on the side of the tool. Release the button on the remote & let the piston retracts. 2. Check Quick Connects. as described above.
Tool will not build Pressure	1. Quick Connect on Gauge is Loose. 2. Motor Coupling on Pump is damaged. 3. Seal Damage in Cylinder 4. Seal Damage in Tru-Swivel	1. Fully secure Loose Quick Connect. 2. Replace 3. Replace seals. 4. Replace seals.
Tool leaks oil	1. Damaged "O" Rings.	1. Replace Seals.
Tool advances in "Retract" Mode or "Reverse" Mode	1. Quick Connects installed in improper sequence.	1. Make sure Connects are set up as described on page 6& 7 of this Manual.
Ratchet returns on retract Stroke.	1. Missing or broken Holding (2 nd) Pawl 2. Missing or defective Holding Pawl	1. Replace 2. Replace (2 nd) Pawl Spring.
Tool will not take successive Strokes	1. Loose or defective Quick Connect. 2. Operator is depressing Advance before Oil has a chance to return to reservoir, thus preventing the piston	1. Fully Tighten or replace Connects on retract side. 2. Wait for Oil to return to reservoir and for the cylinder to fully retract before taking the next

Problem	Probable Cause	Solution
	3. Defective Drive Pawl Spring.	3. Replace the Spring.
	4. Broken Drive Pawl.	4. Replace the Pawl.
No pressure reading on Gauge	1. Defective Gauge.	1. Replace Gauge.
	2. Loose Connect.	2. Tighten Connect.
	3. Defective Seals.	3. Inspect all seals and replace any defective seals.
	4. Defective Motor coupling.	4. Replace Motor Coupling.
Erratic Pressure Readings	1. Improper or Defective Gauge.	1. Replace with properly Dampened Titan gauge.
	2. Defective High Pressure Regulator.	2. Replace High Pressure Regulator.
	3. Foreign Material in 4-way Valve.	3. Clean. Note: Do not use Teflon Tape, Use Pipe dope.
Electric Pump builds Pressure but will not switch to retract.	1. Voltage Drop..	1. Use heaver extension cord or plug directly toproper power source.
Air Pump builds Pressure but will not switch to retract.	1. Pump starved for air.	1. Use minimum 1" dia. air hose. Need 50 cfm. 100 psi. air source.
Pump will not build pressure.	1. Inadequate power supply.	1. Use proper power Source.
	2. Pump starved for air.	2. Use minimum 1" dia. air hose. Need 50 cfm.100 psi. air source.
	3. Defective High Pressure Regulator.	3. Replace.
	4. Defective internal HP Regulator.	4. Adjust or replace.
	5. Defective Gauge.	5. Replace.
	6. Dirty Oil.	6. Clean Reservoir and replace oil.
	7. Clogged Oil Filter.	7. Replace Filter.
	8. Clogged FLR.	8. Replace FLR.
Air Pump Sluggish	1. Pump starved for air.	1. Use minimum 1" dia. air hose. Need 50 cfm.100 psi. air source
	2. Dirt in Air Motor.	2. Flush Motor with solvent, clean, dry and lubricate.
	3. Dirty Oil Filter .	3. Clean or replace.
Air Motor Frozen	1. FLR missing or broken	1. Replace FLR.
	2. Rotor Bearings frozen.	2. Inspect & Replace
	3. Obstruction in Air Valve.	3. Inspect, Clean.
	4. Improperly installed Remote -Control hoses.	4. Ensure 3-hose system is Connected properly. (color coded).
	5. Defective Remote-Control Hoses.	5. Replace.
	6. Defective Remote Button.	6. Replace spring.
The tool pops off the nut.	1. Improper Reaction.	1. Always React in plane with the nut you are turning. Consult your Titan Representative to see if a custom reaction or another Titan Technologies Tool is better suited for the particular application.

Titan Technologies LP-Series Preventative Maintenance:

Basic Pump Maintenance:

- Dirt and grit will reduce the life of the pump.
- Change oil after every 40 hours of use. Oil Filter should be changed; dirt and grit must be cleaned from the reservoir.
- All Quick Connects must be cleaned or changed prior to use.
- Inspect all Brushes for wear and replace periodically to prevent damage to the motor.
- Use Only Grade 46 Hydraulic Oil. Proper Hydraulic Oil is available from Titan Technologies.

Titan Technologies Pump Test Procedure

- You will need two 10, 000-psi liquid filled gauges to test the pump. One for the high pressure (Advance) Port and one for the return (Low Pressure) port.
- Remove all hoses from the Titan Pump.
- Make sure all Quick Connects are clean and free of dirt and grit.
- Attach Gauges to ports.
- Check Oil Level on Pump Reservoir. Ensure Oil is filled to proper levels.
- Remove the screws that hold the pump to the Pump Reservoir.
- Set Toggle switch to "On Position".
- Using the Remote Control, advance the 3-Way Rocker Switch all the way forward. Holding the button down turn the High Pressure Regulator Assemblies Thumbscrew clockwise and build pressure. See if advance side achieves 10,000 psi. While Remote control button is in Advance Mode, check the pressure on the return side. It should read Zero.
- Release button on Remote pendant to the middle position (Retract). Check the gauge. It should read 1,500- 2,000 psi.
- Shut the pump off from the Remote Control Switch.

1. If the pump shows pressure on the return side while the pump is in the advance position, your problem is probably a sub plate assembly.
2. If the pump does not start, see:
    - Electric Control Assembly.
    - Universal Motor Assembly.
3. If Pump does not switch from Retract side.
    - First check voltage.
    - Check Electric Control Assembly.
    - Check Solenoid Assembly.
4. If Pump does not does not build pressure or builds pressure too slowly, see:
    - Valve Assembly.
    - Pressure Regulator Assembly.
    - Basic Pump Assembly.

To Remove and repair the Titan Tru-Swivel™

1. Remove the Snap Ring on the top of the Swivel Post.
2. Using a puller, pull the Swivel Assembly Off the post.
3. Remove Allen Screws
4. Inspect Post and Swivel Assembly for damage.
5. Inspect Quick Connects and Couplers for damage.
6. Replace any damaged Parts or Connections.
7. Check "O" Rings for wear or Damage.
8. Replace any damaged or worn "O" Rings. "White Lithium Grease will prove helpful in the installation process and provide needed lubrication to the "O" Rings.
9. Secure Post to Housing by torquing the Allen Screws
10. Using a Rubber or Sand Hammer Gently tap the Tru-Swivel™ into Position.
11. Lock Snap Ring in Place.

PREVENTATIVE MAINTENCE for
Titan Express/ Titan P+ / Titan Electric Series Pumps

WARNING : THE ELECTRICAL POWER CORD MUST BE DISCONNECTED FROM ELECTRICAL OUTLETS BEFORE PERFORMING MAINTENANCE OR REPAIR PROCEDURES.

TITAN Express Series pumps are precision-built hydraulic units and, as such, do require a certain amount of care and maintenance.

1. **Hydraulic Oil :** oil should be completely changed after every 40 hours of operation, or at least twice a year. Always make sure the reservoir is filled with fluid. If additional oil is required, use only high-grade hydraulic, such as Titan grade 32 or grade 46.

2. **Quick-Disconnects :** Fittings should be checked periodically for leaks. Dirt and foreign materials should be kept away from fittings. Clean before use.

3. **Gauge :** TITAN gauges are liquid filled. Should this liquid level drop, it indicates external leakage, and replacement is necessary. Should the gauge fill with hydraulic oil, it indicates internal failure and should be discarded.

4. **Motor :** The motor shaft and bearings should be flushed and lubricated once a year.

5. **Filter :** The filter should be replaced twice a year for a normal use, and more often if pump is in daily use.
6. **Remote control :** The electric cord or air line to the remote control should be checked for kinks or obstructions periodically. If there is a bend or break in the line, it must be replaced. The spring-loaded buttons on the remote handle should be checked in the event of operating difficulties.

7. **Oil tank :** Should be checked in prevention of leakage.

8. **Pumping unit :** The pump should be overhauled every 2 years. This can be done by TITAN or by a qualified hydraulic service center.

Consult your Titan Pump Operations Manual

Please contact Titan Technologies or your local Titan Representative or Dealer:

Titan Technologies International, Inc.
9001 Jameel Road, Suite 180
Houston, TX. 77040
Tel:+1 (281) 449-9994
Fax: +1 (281) 449-9996
E-mail: sales@TitanTi.com
www.TitanTi.com
Sales: Extension 104
Engineering: Extension 108
Service: Operator

TITAN
TECHNOLOGIES INTERNATIONAL, INC

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