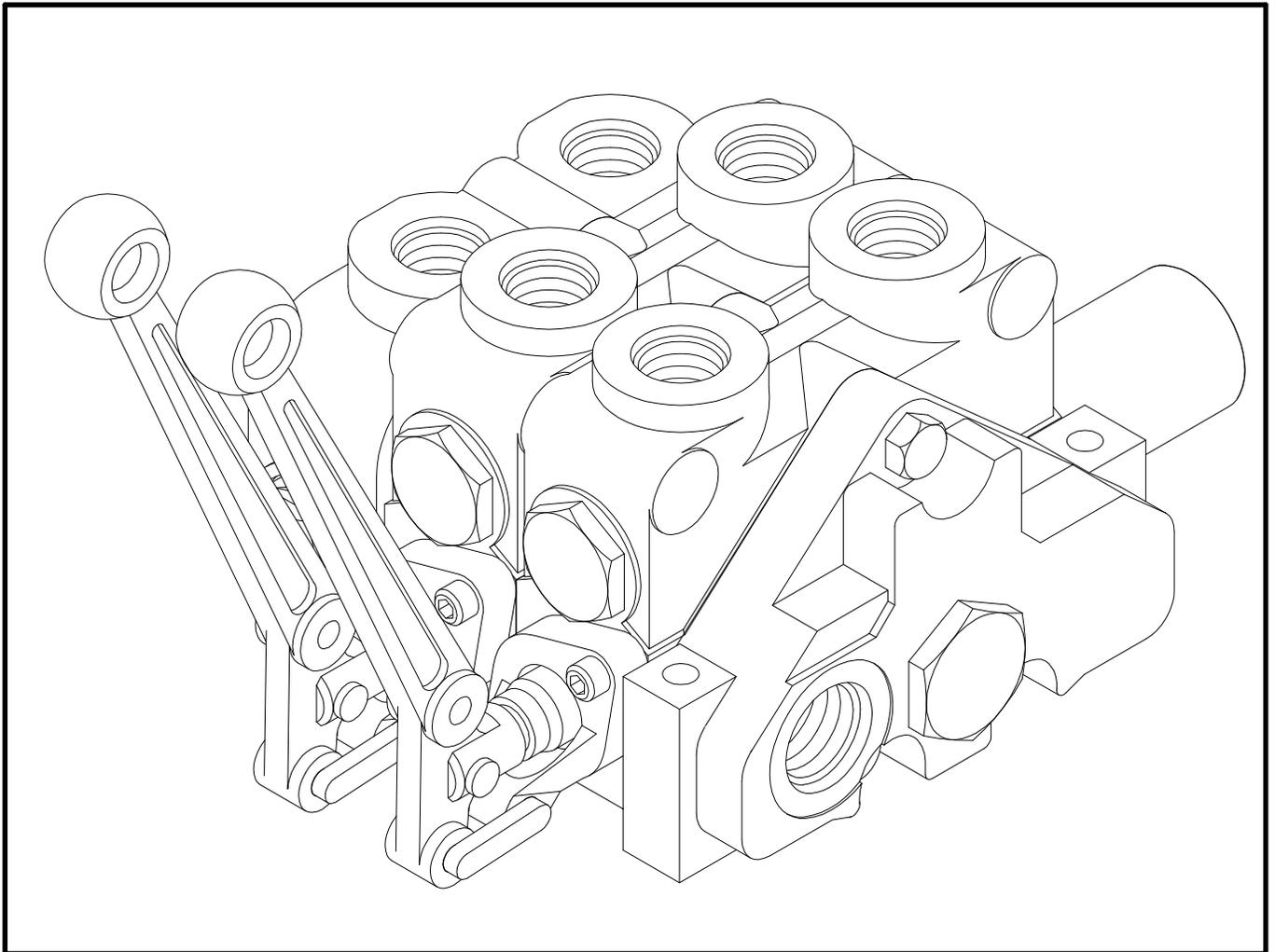


SERIES "20" SECTIONAL BODY DIRECTIONAL CONTROL VALVE PARTS MANUAL



PRINCE MANUFACTURING CORPORATION



Date: Jan. 2011

INDEX

PAGE:

2	SAFETY PRECAUTIONS
3	ASSEMBLY INSTRUCTIONS, PORT IDENTIFICATION, AND SPECIFICATIONS
4-6	WORK SECTIONS
7	SPOOL IDENTIFICATION CHART
8	PORT RELIEF CARTRIDGES
9-12	SPOOL ATTACHMENT OPTIONS
13-15	HANDLE & JOYSTICK OPTIONS
16-20	INLET, MID-INLET & OUTLET SECTIONS
21-23	UTILITY SECTIONS (SOLENOID)
24-26	SOLENOID OPERATORS
27	INSTALLATION EXAMPLE

GENERAL SAFETY PRECAUTIONS FOR HYDRAULIC VALVES

1) ALL HYDRAULIC VALVES MUST BE PROPERLY INSTALLED INTO THE HYDRAULIC SYSTEM TO PREVENT PERSONAL INJURY AND/OR PROPERTY DAMAGE. FURTHER, THE IMPROPER SERVICING OF A VALVE MAY RESULT IN PERSONAL INJURY AND/OR PROPERTY DAMAGE. PLEASE READ AND UNDERSTAND ALL CATALOG AND SERVICE INFORMATION BEFORE STARTING. AS WITH ALL MECHANICAL WORK THE PROPER TOOLS, KNOWLEDGE, AND SAFETY EQUIPMENT ARE REQUIRED. ALWAYS WEAR SAFETY GLASSES.

2) MAKE SURE ALL PRESSURE HAS BEEN RELIEVED IN THE HYDRAULIC LINES BEFORE INSTALLING OR SERVICING A HYDRAULIC VALVE.



WARNING: ESCAPING HYDRAULIC FLUID UNDER PRESSURE CAN HAVE SUFFICIENT FORCE TO PENETRATE SKIN, CAUSING SERIOUS PERSONAL INJURY. DO NOT USE YOUR HAND TO CHECK FOR HYDRAULIC LEAKS.

3) BEFORE INSTALLING OR SERVICING A HYDRAULIC COMPONENT MAKE SURE ALL WEIGHT HAS BEEN REMOVED FROM THE CYLINDERS OR MOTORS BEFORE DISCONNECTING HYDRAULIC LINES.

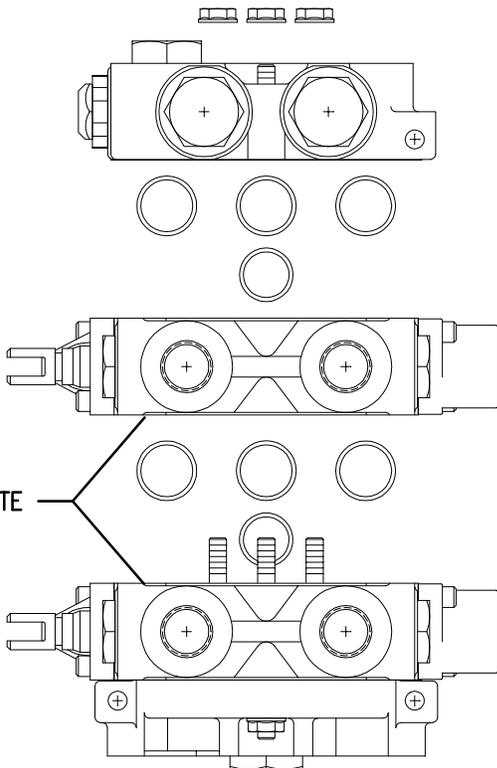


WARNING: DISCONNECTING THE HYDRAULIC LINES WHILE THE CYLINDER OR MOTOR IS UNDER LOAD MAY RESULT IN THE UNEXPECTED RAPID MOVEMENT OF MACHINE RESULTING IN SERIOUS PERSONAL INJURY.

4) DO NOT EXCEED THE OPERATING SPECIFICATIONS FOR PRESSURE, FLOW OR TEMPERATURE. ALL HYDRAULIC SYSTEMS REQUIRE A MEANS TO LIMIT THE MAXIMUM PRESSURE. THIS REQUIRES EITHER A PRESSURE RELIEF VALVE IN THE SYSTEM OR A PUMP THAT HAS PRESSURE COMPENSATION.



WARNING: OVERPRESSURE MAY CAUSE SUDDEN AND UNEXPECTED FAILURE OF A COMPONENT IN THE HYDRAULIC SYSTEM RESULTING IN SERIOUS PERSONAL INJURY. ALWAYS USE A GAUGE WHEN ADJUSTING A RELIEF VALVE.



ASSEMBLY INSTRUCTIONS:

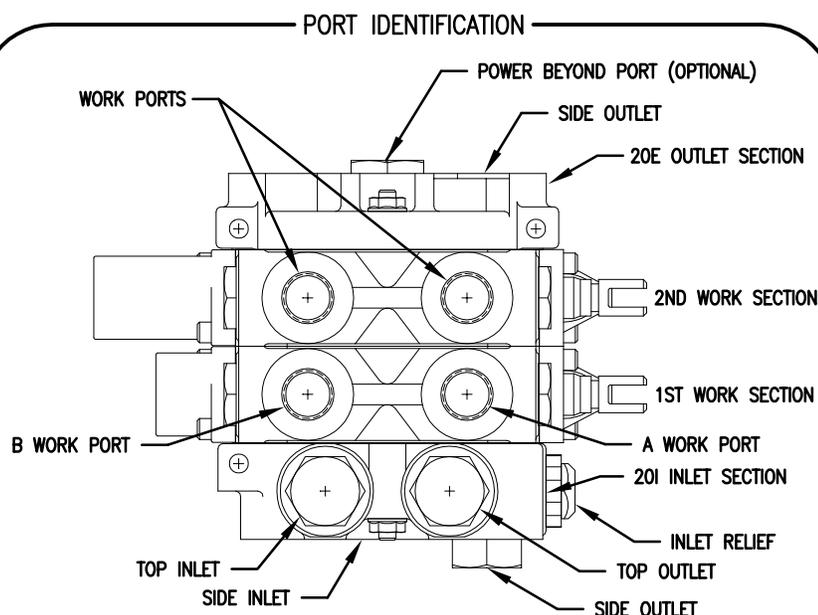
1. THE ASSEMBLY TABLE AND ASSEMBLY AREA MUST BE CLEAN AND SHOULD NOT BE SUBJECT TO PARTICULATE FALLOUT.
2. ANY HYDRAULIC FITTINGS, LINES OR FLUIDS SHOULD BE CLEAN.
3. THE SECTIONS SHOULD BE LAID OUT ON THE TABLE (WITH THE ORING GROOVES FACING UP) IN ORDER OF ASSEMBLY. WIPE GROUND SURFACES CLEAN WITH A LINT FREE CLOTH AND CHECK ORING GROOVES FOR DEBRIS. PLACE LIGHTLY OILED ORINGS INTO ORING GROOVES. DO NOT USE GREASE ON ORINGS OR IN ORING GROOVES.
4. INSERT TIEROD BOLTS, WITH NUTS INSTALLED ON ONE END, THROUGH HOLES IN THE OUTLET SECTION.
5. POSITION THE OUTLET SECTION WITH TIERODS INSTALLED, ON ITS SIDE SO TIERODS ARE VERTICAL.
6. SLIDE THE WORK SECTIONS DOWN THE TIERODS AND POSITION OVER THE OUTLET SECTION.
7. REPEAT FOR REMAINING WORK SECTIONS AND INLET. MAKE CERTAIN ORINGS STAY IN GROOVES DURING ASSEMBLY.
8. INSTALL NUTS ONTO INLET END OF TIERODS. WITH SOME DOWNWARD PRESSURE ON THE ASSEMBLY, TIGHTEN THE NUTS TILL THEY ARE SNUG.
9. ROLL THE ASSEMBLY SO THAT THE TIERODS ARE HORIZONTAL AND THE WORK PORTS ARE DOWN (VALVE UPSIDE DOWN).
10. USING A TORQUE WRENCH, PROGRESSIVELY TIGHTEN TIEROD NUTS TO 30-32 FT-LBS.
11. INSTALL HANDLES AND OPERATE SPOOLS. MAKE CERTAIN THAT SPOOLS DO NOT BIND AND THAT SPOOLS WITH SPRING CENTER, FREELY RETURN TO NEUTRAL.
12. IF A SPOOL BINDS LOOSEN TIEROD NUTS. RE-TORQUE ALL NUTS TO 20, THEN 25, AND FINALLY 30 FT-LBS.
13. IF A SPOOL STILL BINDS CHECK FOR A PINCHED O-RING OR CONTAMINATION BETWEEN THE SECTIONS. DO NOT USE THE VALVE IF A SPOOL BINDS.

TIEROD KITS (INCL. BETWEEN SECTION SEALS):

PART NO.:		PART NO.:	
660402001	1 SECTION*	660402005	5 SECTION*
660402002	2 SECTION*	660402006	6 SECTION*
660402003	3 SECTION*	660402007	7 SECTION*
660402004	4 SECTION*	660402008	8 SECTION*

*NUMBER OF WORK SECTIONS

PLEASE NOTE: BE VERY CAREFUL NOT TO NICK OR SCRATCH THE PRECISION GROUND SURFACES ON THE SECTIONS. ALSO TAKE CARE TO KEEP THESE SURFACES CLEAN DURING ASSEMBLY.



PLEASE NOTE:
UNUSED INLET AND OUTLET PORTS MUST BE PLUGGED WITH A STEEL PLUG.
WHEN OPTIONAL POWER BEYOND IS USED AN OUTLET PORT MUST ALSO BE CONNECTED TO TANK.

SERIES 20 SPECIFICATIONS

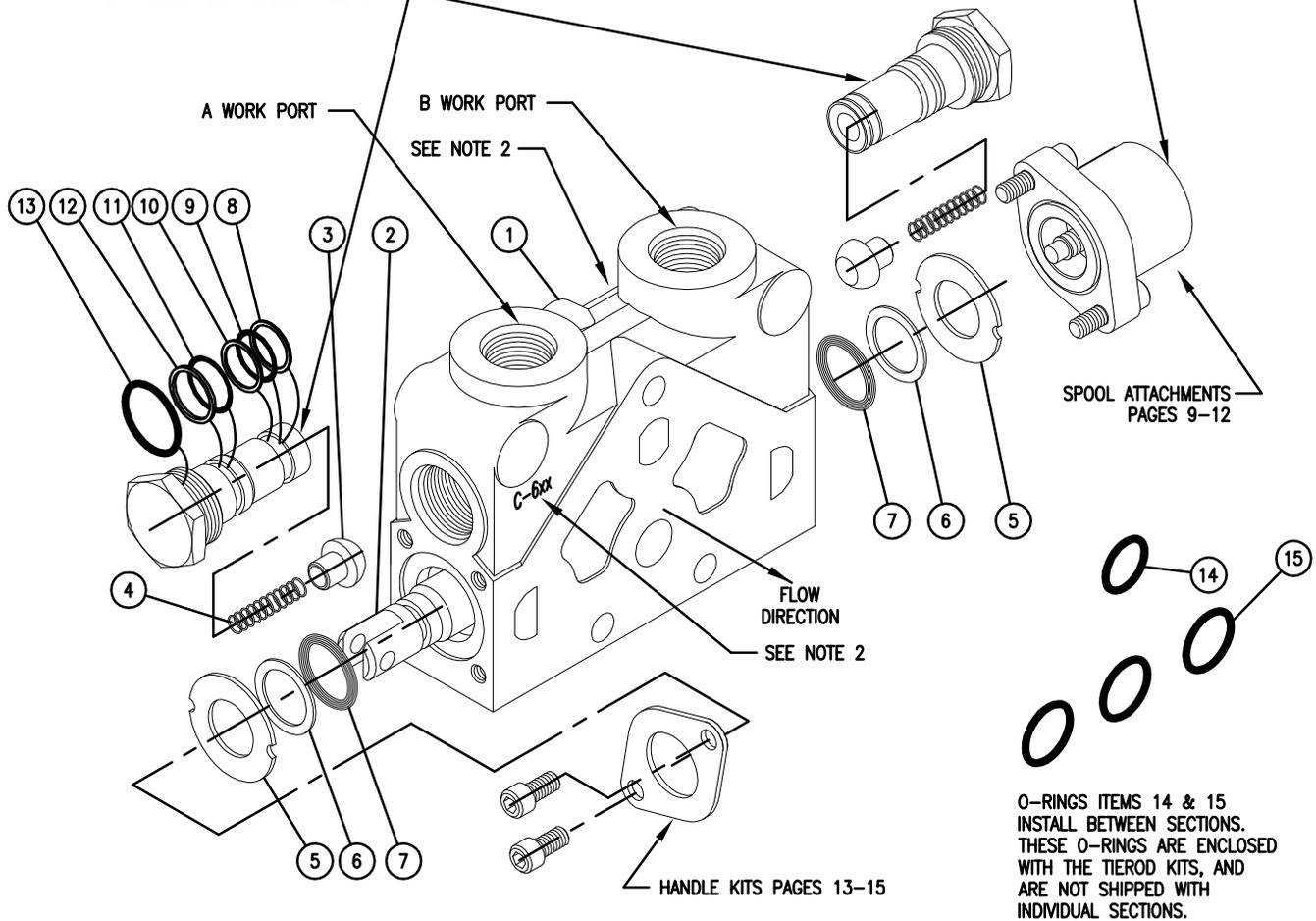
MAXIMUM OPERATING PRESSURE.....3500 PSI
 MAXIMUM TANK PRESSURE.....500 PSI
 MAXIMUM OPERATING TEMPERATURE.....180°F
 RECOMMENDED FILTRATION....ISO 4406 19/17/14
 NOMINAL FLOW RATING.....20 GPM
 REFER TO CATALOG FOR PRESSURE DROPS

20P/20L/20LP WORK SECTIONS ARE
 PARALLEL CIRCUIT CONSTRUCTION.
 20T WORK SECTION IS TANDEM
 CONSTRUCTION.

20P PARALLEL WORK SECTION 20T TANDEM WORK SECTION

MODEL NO. STAMPED ON END OF END CAP

PORT RELIEF CARTRIDGES PAGE 8



ITEM	QTY	PART NO.	DESCRIPTION
1	1		VALVE BODY
2	1	SEE NOTE 1	SPOOL
3	2	670100024	LOAD CHECK POPPET
4	2	670300056	LOAD CHECK SPRING
5	2 *	670500065	WASHER
6	2 *	670500064	SPOOL B/U WASHER
7	2 *	240000210	210 O-RING
8	2	240005015	B/U WASHER
9	2	240000015	015 O-RING
10	2	240005015	B/U WASHER
11	2	240000016	016 O-RING
12	2	240005016	B/U WASHER
13	2	240000117	117 O-RING
14	1	240000019	019 O-RING
15	3	240000021	021 O-RING

These are matched parts and are not sold separately.

FOR SPOOL OPTION A ONLY 1 EACH, SEE PAGE 7.

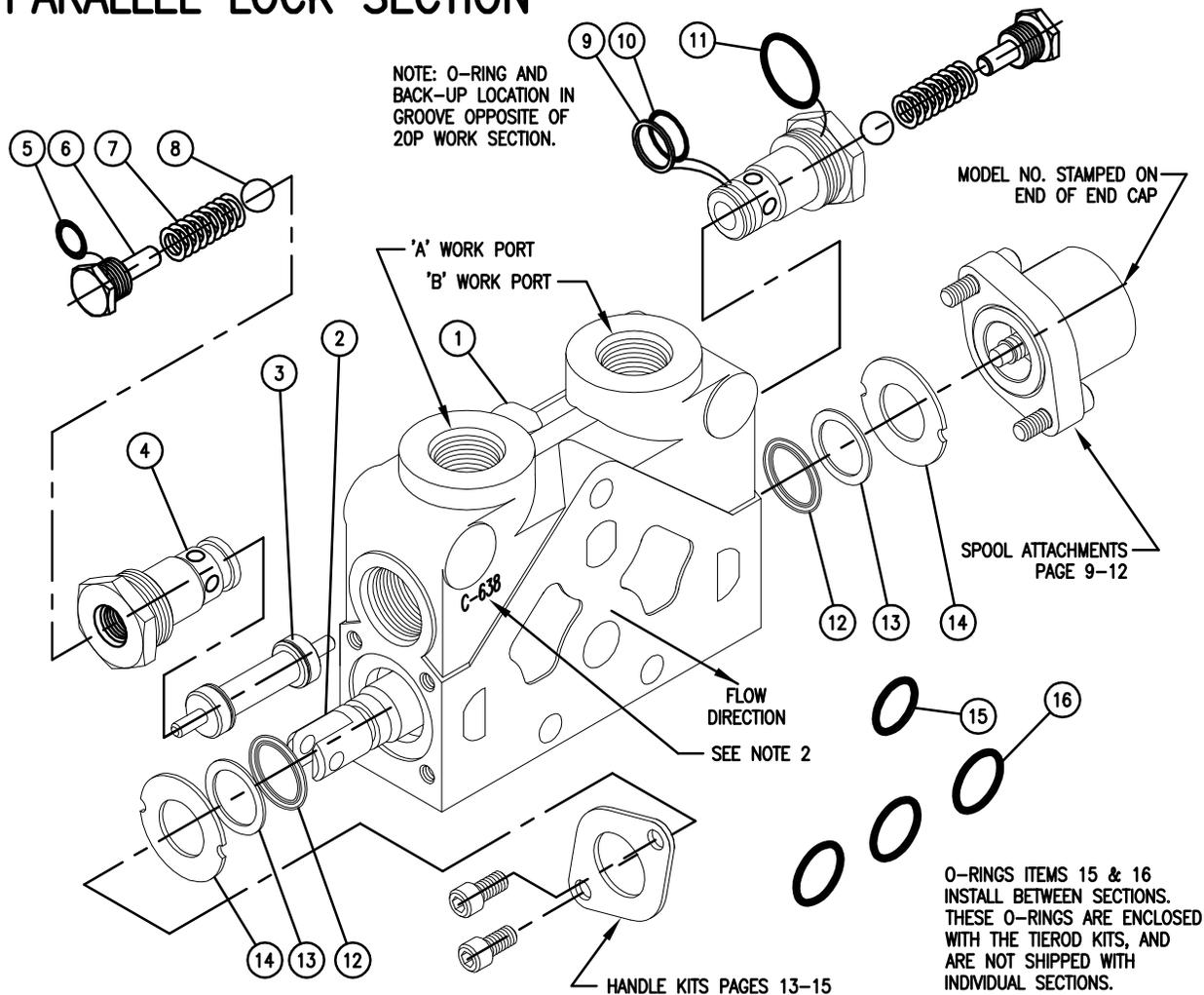
REPLACEMENT SEAL
KIT P/N 660585001
SEE PAGE 10 FOR
FLOAT SECTION SEAL KIT

REPLACEMENT SEAL
KIT P/N 660585004

NOTES:

- SEE SPOOL IDENTIFICATION CHART ON PAGE 7.
- 20P PARALLEL WORK SECTIONS HAVE 'C-630' CASTING NO. ON RIGHT SIDE, AND 'P' ON LEFT SIDE OF CASTING. 20T TANDEM WORK SECTIONS HAVE 'C-637' CASTING NO. ON RIGHT SIDE, AND 'T' ON LEFT SIDE OF CASTING.
- 3-WAY SECTIONS, SPOOL OPTION 'A', HAVE STEEL PLUG PART NO. 200300040 IN 'A' WORK PORT.
- * - QTY. OF ITEMS 5, 6 & 7 IS 1 EACH WHEN USING FLOAT SPOOL ATTACHMENT, OPTION 'D'. (SEE PAGE 10)

20L PARALLEL LOCK SECTION



ITEM	QTY	PART NO.	DESCRIPTION
1	1		VALVE BODY
2	1	SEE NOTE 1	3 WAY 4 POS. MOTOR SPOOL
3	1		SHUTTLE SPOOL
4	2	671600099	CHECK VALVE CART. BODY
5	2	240000905 *	-905 O-RING
6	2	671600098	PLUG
7	2	670300081	SPRING, CHECK VALVE
8	2	230009003	STEEL BALL
9	2	240019015 *	B/U WASHER
10	2	240000015 *	-015 O-RING
11	2	240000117 *	-117 O-RING
12	2	240000210 *	-210 O-RING
13	2	670500064	SPOOL BACK-UP WASHER
14	2	670500065	WASHER
15	1	240000019 *	-019 O-RING
16	3	240000021 *	-021 O-RING

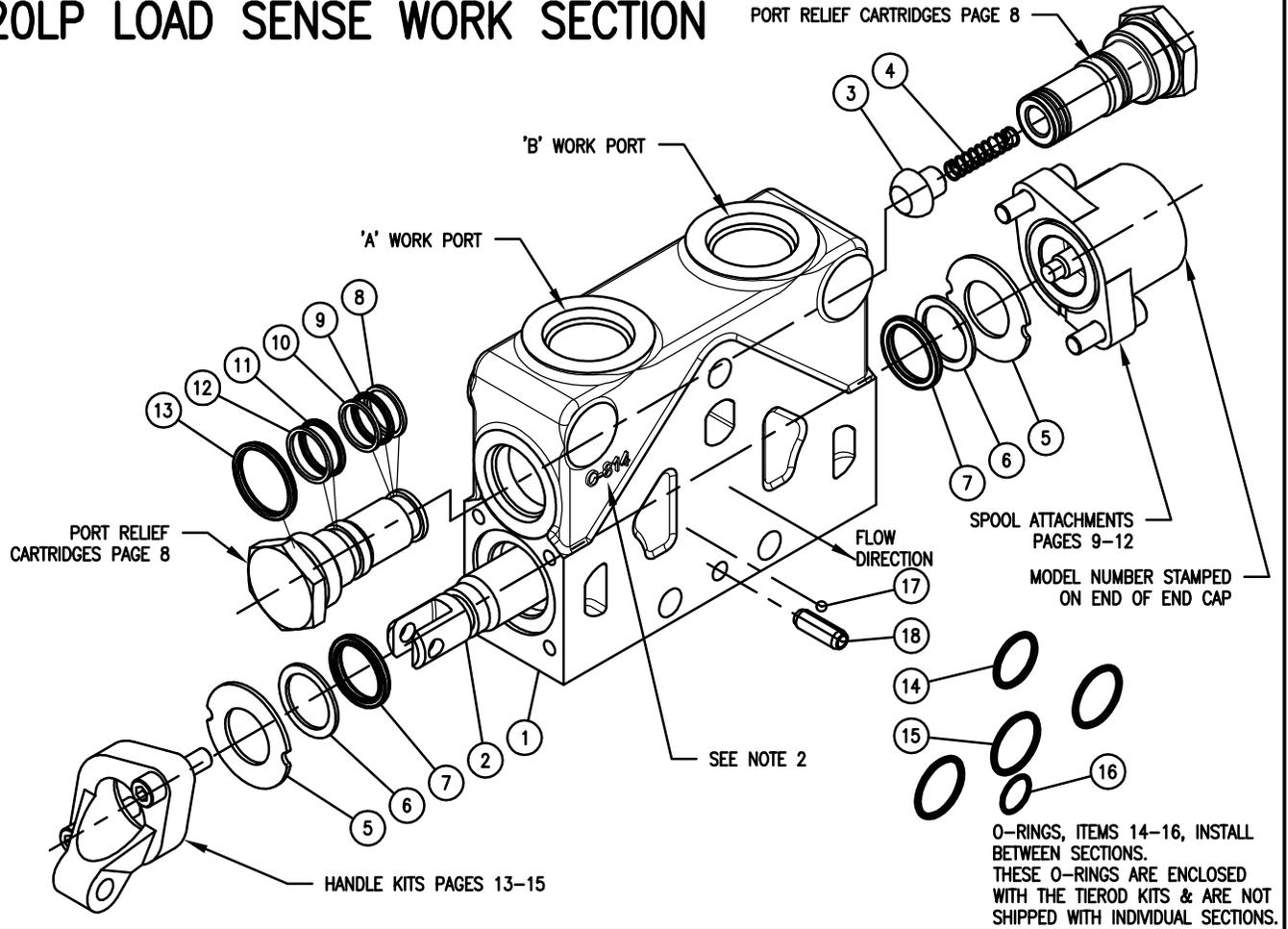
} These are matched parts and are not sold separately.
 } CHECK VALVE CARTRIDGE P/N 660290007
 * REPLACEMENT SEAL KIT P/N 660585008

NOTES:

- SEE SPOOL IDENTIFICATION CHART ON PAGE 7.
- LOCK VALVE WORK SECTIONS HAVE 'C-638' ON RIGHT SIDE OF CASTING AND 'L' ON LEFT SIDE OF CASTING.

20LP LOAD SENSE WORK SECTION

PORT RELIEF CARTRIDGES PAGE 8



ITEM	QTY.	PART NO.	DESCRIPTION
1	1		VALVE BODY
2	1	SEE NOTE 1	SPOOL
3	1	670100024	LOAD CHECK POPPET
4	1	670300056	LOAD CHECK SPRING
5	2 *	670500065	WASHER (SEE NOTE 4)
6	2 *	670500064	SPOOL BACKUP WASHER (SEE NOTE 4)
7	2 *	240000210	-210 O-RING (SEE NOTE 4)
8	2	240005015	BACKUP WASHER
9	2	240000015	-015 O-RING
10	2	240005015	BACKUP WASHER
11	2	240000016	-016 O-RING
12	2	240005016	BACKUP WASHER
13	2	240000117	-117 O-RING
14	1	240000019	-019 O-RING
15	3	240000021	-021 O-RING
16	1	240000011	-011 O-RING
17	1	230009024	STEEL BALL
18	1	190100071	SPRING PIN

These are matched parts and are not sold separately.

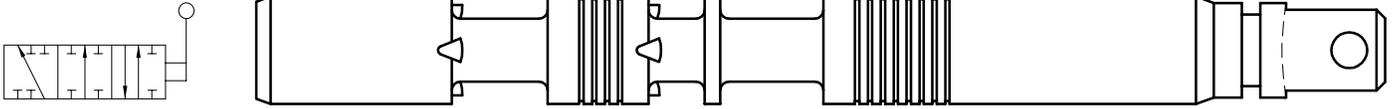
REPLACEMENT SEAL KIT P/N 660585004
SEE PAGE 10 FOR FLOAT SECTION SEAL KIT

NOTES:

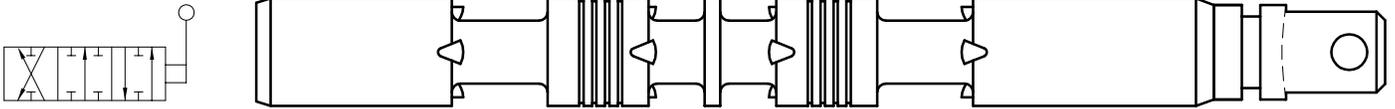
- SEE SPOOL IDENTIFICATION CHART ON PAGE 7.
- LOAD SENSE WORK SECTIONS HAVE 'C-814' CASTING NO. ON RIGHT SIDE OF CASTING AND 'LS' ON LEFT SIDE OF CASTING (WHEN VIEWED FROM FRONT/SPOOL END OF SECTION).
- 3-WAY SECTIONS, SPOOL OPTION 'H', HAVE A STEEL PLUG INSTALLED IN 'A' WORK PORT.
- * - QUANTITY OF ITEMS 5, 6 & 7 IS 1 EACH WHEN USING FLOAT SPOOL ATTACHMENT, OPTION 'D'. SEE PAGE 10.

SERIES 20 (20P, 20L, 20T) SPOOLS

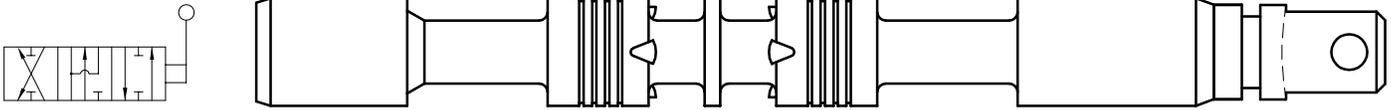
OPTION 'A' 3 WAY 3 POSITION WORK PORT BLOCKED IN NEUTRAL, 'A' PORT PLUGGED (SEE BELOW)



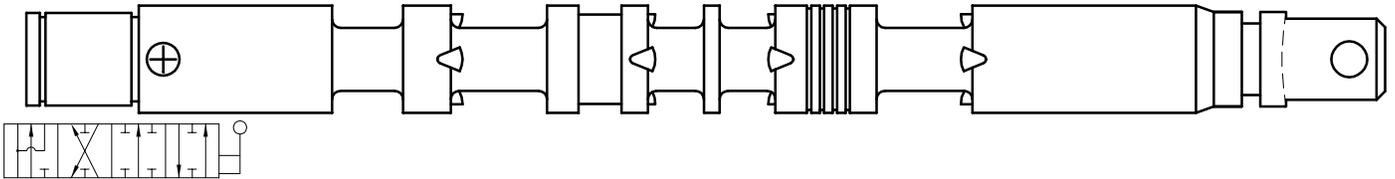
OPTION 'B' 4 WAY 3 POSITION TANDEM CENTER WORK PORTS BLOCKED IN NEUTRAL



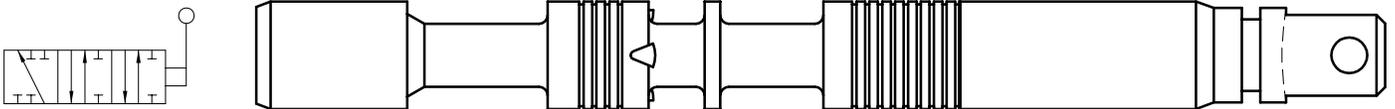
OPTION 'C' 4 WAY 3 POSITION MOTOR, WORK PORTS OPEN IN NEUTRAL



OPTION 'D' 4 WAY 4 POSITION TANDEM CENTER FLOAT, WORK PORTS BLOCKED IN NEUTRAL

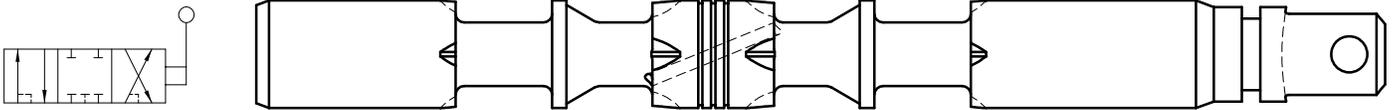


OPTION 'E' 3 WAY 3 POSITION MOTOR, WORK PORT TO TANK IN NEUTRAL, 'A' PORT PLUGGED (SEE BELOW)

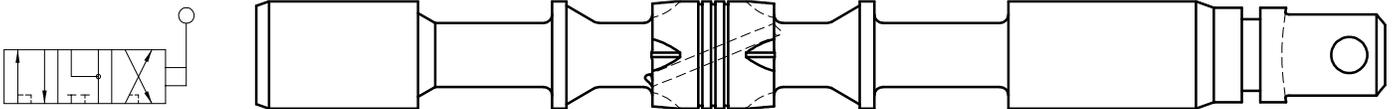


SERIES 20 LOAD SENSE (20LP) SPOOLS

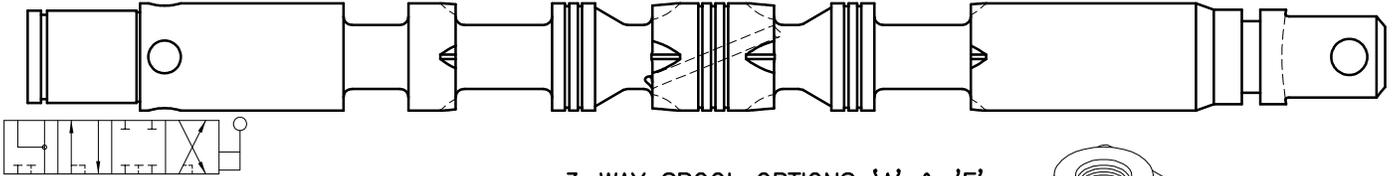
OPTION 'J' 4 WAY 3 POSITION TANDEM CENTER, LOAD SENSE, WORK PORTS BLOCKED IN NEUTRAL



OPTION 'K' 4 WAY 3 POSITION MOTOR, LOAD SENSE, WORK PORTS OPEN IN NEUTRAL



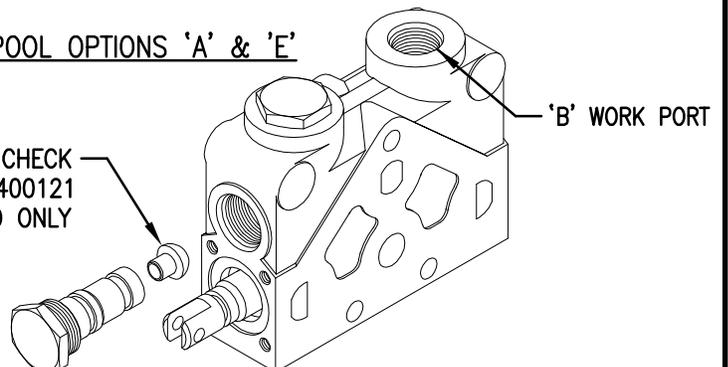
OPTION 'M' 4 WAY 4 POSITION TANDEM CENTER FLOAT, LOAD SENSE, WORK PORTS BLOCKED IN NEUTRAL



3-WAY SPOOL OPTIONS 'A' & 'E'

NOTE:
SPOOLS ARE NOT AVAILABLE AS
REPAIR PARTS. THIS INFORMATION
IS FOR IDENTIFICATION PURPOSES.

3-WAY LOAD CHECK
PLUG 671400121
THIS END ONLY



PORT RELIEF CARTRIDGES

INSTALLATION TORQUE FOR ALL
PORT RELIEF CARTRIDGES:
20-25 FT-LBS

RELIEF PRESSURE ON ITEMS 2
& 5 CAN BE CHANGED BY
REMOVING PLUG AND ADDING
OR REMOVING SHIMS.

UNIQUE LOAD CHECK POPPET
& SPRING ARE INCLUDED ON
ITEMS 5 AND 6 ONLY.
(POPPET/SPRING ARE SEPARATE
ON ALL OTHER CARTRIDGES.)

RELIEF PRESSURE ON ITEMS 3 & 6 CAN
BE ADJUSTED BY REMOVING ACORN NUT,
LOOSENING LOCK NUT AND TURNING SET
SCREW CLOCKWISE TO INCREASE
PRESSURE & COUNTERCLOCKWISE TO
DECREASE PRESSURE.



WARNING: OVERPRESSURE MAY CAUSE SUDDEN AND UNEXPECTED FAILURE OF
A COMPONENT IN THE HYDRAULIC SYSTEM RESULTING IN SERIOUS PERSONAL
INJURY. ALWAYS USE A GAUGE WHEN ADJUSTING A RELIEF VALVE.

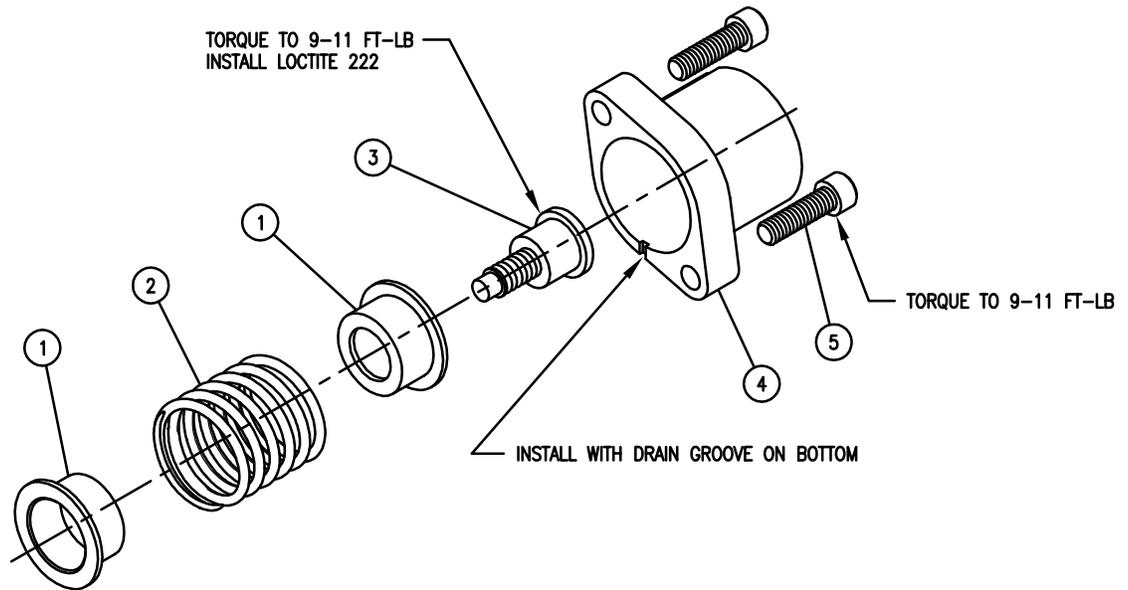
ITEM	PART NO.	DESCRIPTION
1	660290002	OPTION A NO RELIEF PLUG
2	660290301	OPTION B SHIM ADJ. RELIEF CART. 500-1350 PSI PRESET 1350 PSI
2	660290303	OPTION C SHIM ADJ. RELIEF CART. 1351-1750 PSI PRESET AT 1750 PSI
2	660290305	OPTION D SHIM ADJ. RELIEF CART. 1751-2200 PSI PRESET AT 2200 PSI
2	660290307	OPTION E SHIM ADJ. RELIEF CART. 2201-3000 PSI PRESET AT 2500 PSI
3	660290401	OPTION F ADJ. RELIEF CART. 500-1350 PSI PRESET AT 1350 PSI
3	660290403	OPTION G ADJ. RELIEF CART. 1351-1750 PSI PRESET AT 1750 PSI
3	660290405	OPTION H ADJ. RELIEF CART. 1751-2200 PSI PRESET AT 2200 PSI
3	660290407	OPTION J ADJ. RELIEF CART. 2201-3000 PSI PRESET AT 2500 PSI
4	660290003	OPTION K ANTI-CAVITATION CARTRIDGE
5	660290501	OPTION L SHIM ADJ. RELIEF ANTI-CAV CART. 500-1350 PSI PRESET 1350 PSI
5	660290503	OPTION M SHIM ADJ. RELIEF ANTI-CAV CART. 1351-1750 PSI PRESET AT 1750 PSI
5	660290505	OPTION N SHIM ADJ. RELIEF ANTI-CAV CART. 1751-2200 PSI PRESET AT 2200 PSI
5	660290507	OPTION P SHIM ADJ. RELIEF ANTI-CAV CART. 2201-3000 PSI PRESET AT 2500 PSI
6	660290701	OPTION S ADJ. RELIEF ANTI-CAV CART. 500-1350 PSI PRESET 1350 PSI
6	660290703	OPTION T ADJ. RELIEF ANTI-CAV CART. 1351-1750 PSI PRESET AT 1750 PSI
6	660290705	OPTION W ADJ. RELIEF ANTI-CAV CART. 1751-2200 PSI PRESET AT 2200 PSI
6	660290707	OPTION Y ADJ. RELIEF ANTI-CAV CART. 2201-3000 PSI PRESET AT 2500 PSI
	672000202	.010 SHIM
	672000203	.018 SHIM
	672000204	.026 SHIM
	672000205	.041 SHIM
	660585012	SEAL KIT, ALL CARTRIDGES

NOTE: PORT RELIEF CARTRIDGE CAN BE ORDERED PRESET
TO A SPECIFIC PRESSURE. SEE '20PR' ORDER CODE IN
CATALOG. ABOVE PART NUMBERS ARE NOT PRESET.

SEE PAGE 16 FOR RELIEF SPRING PART NUMBERS

NOTES:

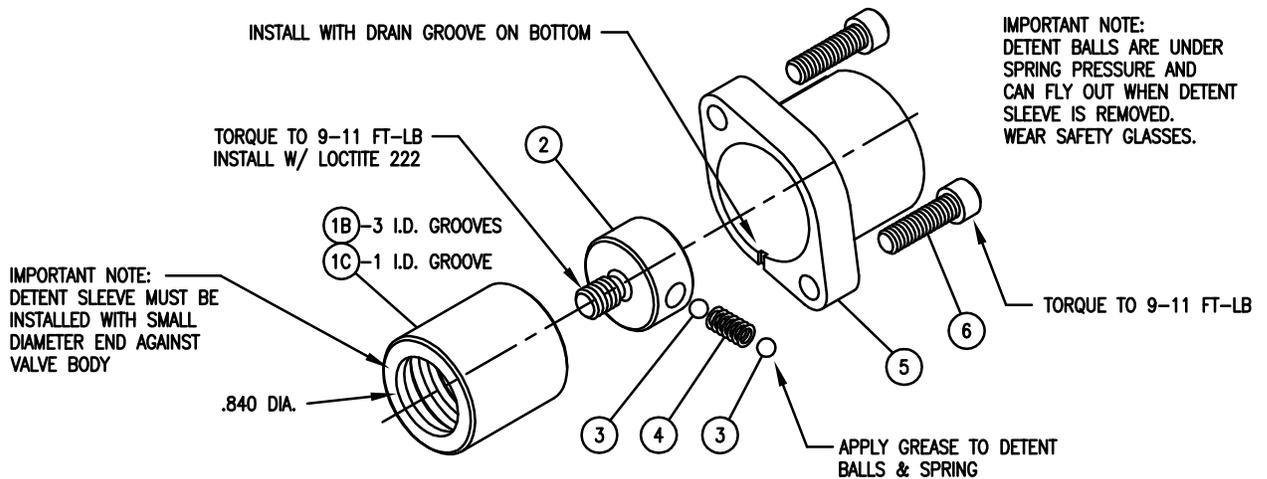
1. DUE TO INTERFERENCE, ADJUSTABLE PORT RELIEF CARTRIDGES (ITEMS 2 & 5) CANNOT BE USED ON THE 'A' PORT
END OF WORK SECTION WHEN THE STANDARD LEVER HANDLE (HANDLE OPTION 1) IS USED, OR WITH FLOAT SPOOL
ATTACHMENT (ATTACHMENT OPTION D).



SPRING CENTER TO NEUTRAL, SPOOL ATTACHMENT OPTION A

ITEM	QTY	PART NO.	DESCRIPTION
1	2	671400089	STOP CUP
2	1	670300057	SPRING
3	1	671900033	ADAPTER
4	1	671400091	END CAP
5	2	170003038	CAP SCREW

} SPRING CENTER KIT, NO. 660190003

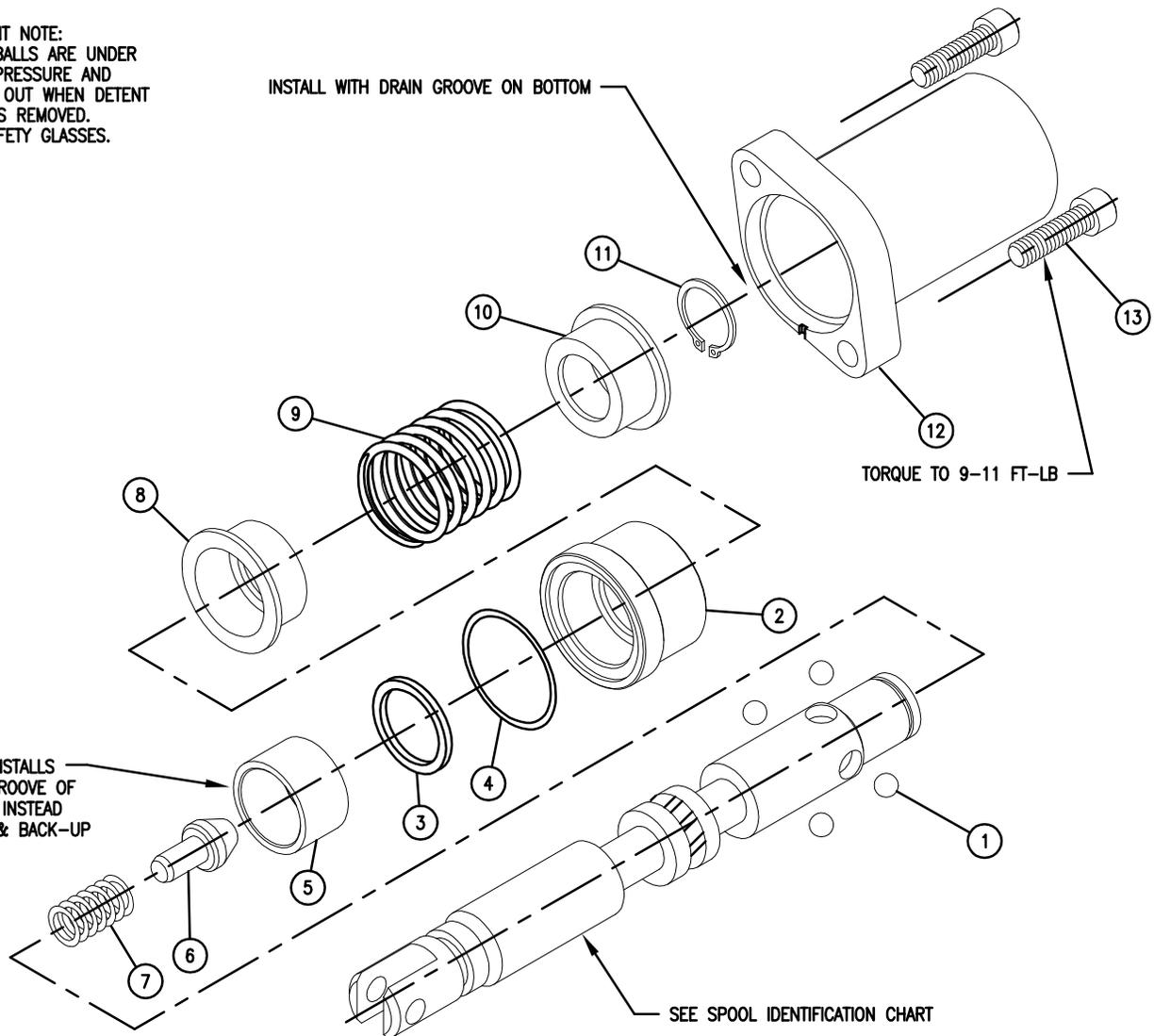


3 POSITION DETENT, SPOOL ATTACHMENT OPTION B FRICTION DETENT, SPOOL ATTACHMENT OPTION C

ITEM	QTY	PART NO.	DESCRIPTION
1B	1	670700041	3 POSITION DETENT SLEEVE
1C	1	670700046	FRICTION DETENT SLEEVE
2	1	670700040	DETENT RETAINER
3	2	230009009	STEEL BALL
4	1	670300059	SPRING, DETENT
5	1	671400091	END CAP
6	2	170003038	CAP SCREW

} 3 POS. DETENT KIT (INCL. ITEM 1B); #660190004
FRICTION DETENT KIT (INCL. ITEM 1C); #660190005

IMPORTANT NOTE:
 DETENT BALLS ARE UNDER
 SPRING PRESSURE AND
 CAN FLY OUT WHEN DETENT
 SLEEVE IS REMOVED.
 WEAR SAFETY GLASSES.



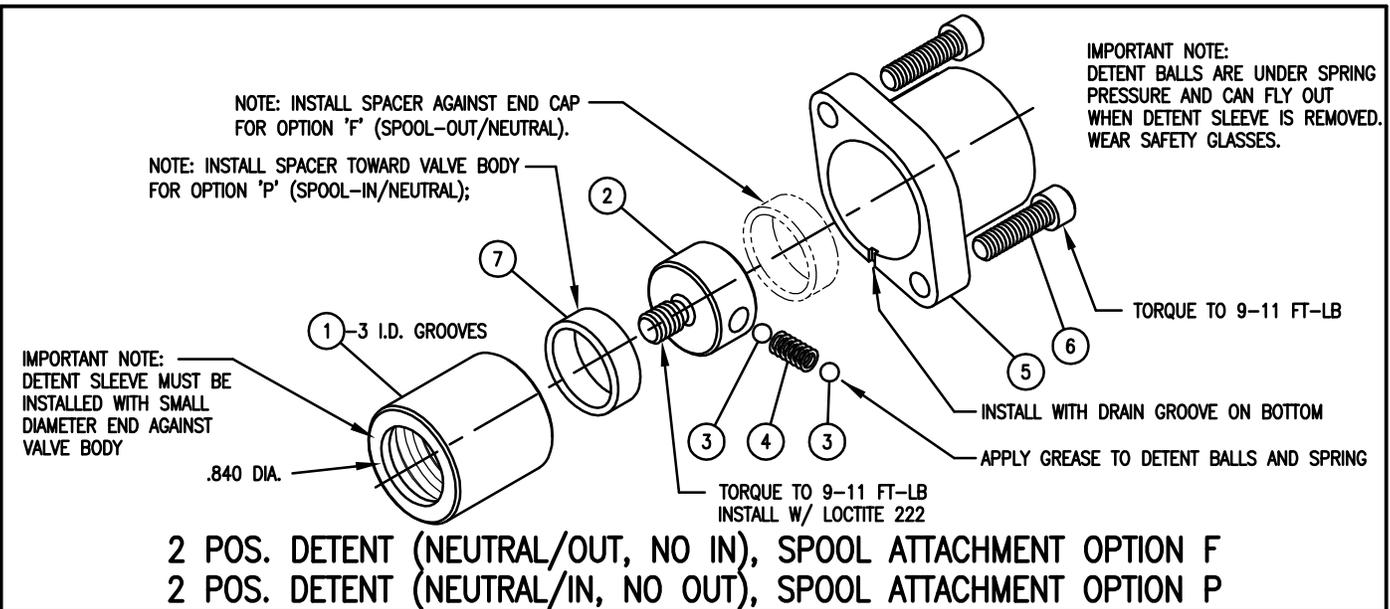
SPRING CENTER FLOAT DETENT SPOOL ATTACHMENT OPTION D

ITEM	QTY	PART NO.	DESCRIPTION
1	4	230009017	STEEL BALL
2	1	670700042	FLOAT DETENT SLEEVE
3	1	240010116	QUAD RING
4	1	240000023	O23 O-RING
5	1	670700043	FLOAT SLEEVE
6	1	670100022	POPPET
7	1	670300061	POPPET SPRING
8	1	671400094	STOP CUP
9	1	670300064	SPRING, CENTERING
10	1	671400094	STOP CUP
11	1	230005062	SNAP RING
12	1	671400095	END CAP
13	2	170003038	CAP SCREW

} FLOAT SECT. SEAL KIT P/N 660585005 (PLUS OTHERS)
 } SPRING CENTER FLOAT
 DETENT KIT; 660190021

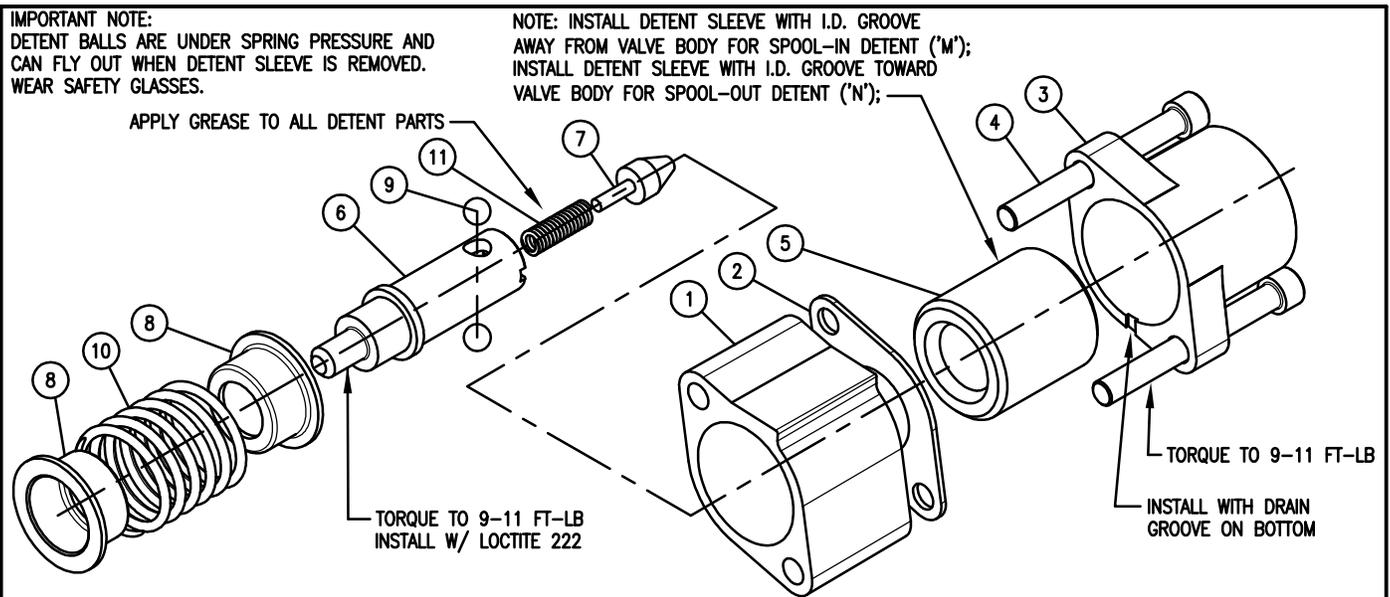
NOTES:

1. THIS OPTION CANNOT BE ADDED IN THE FIELD. MUST BE USED WITH FLOAT SPOOL.
2. INSTALL ITEMS 2, 3, 4 & 5 OVER SPOOL. THEN INSTALL ITEMS 7 & 6 INTO SPOOL AND COMPRESS POPPET SPRING. INSTALL STEEL BALLS ITEM 1, AND SLIDE STOP CUP ITEM 8 OVER SPOOL. INSTALL ITEMS 9 & 10, COMPRESS CENTERING SPRING AND INSTALL SNAP RING ONTO END OF SPOOL.



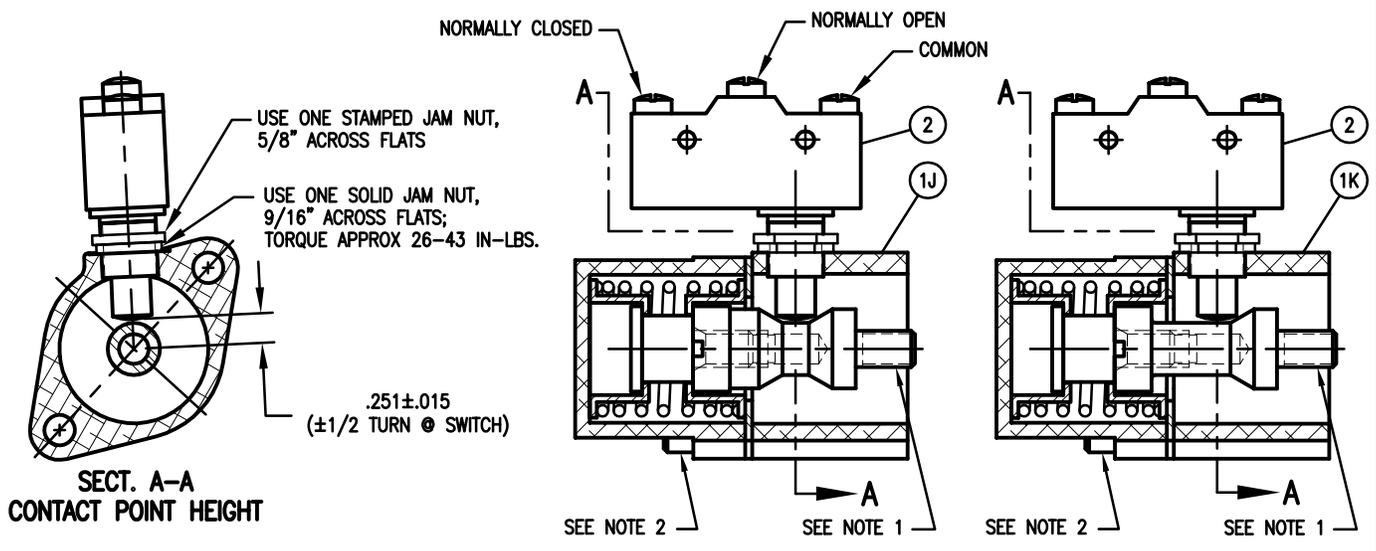
ITEM	QTY	PART NO.	DESCRIPTION
1	1	670700041	3 POSITION DETENT SLEEVE
2	1	670700040	DETENT RETAINER
3	2	230009009	STEEL BALL
4	1	670300059	SPRING, DETENT
5	1	671400091	END CAP
6	2	170003038	CAP SCREW
7	1	671200041	SPACER, DETENT

} 2 POS. DETENT KIT (OPTIONS F & P); #660190032



ITEM	QTY	PART NO.	DESCRIPTION
1	1	671200032	DETENT SPACER
2	1	670500069	RETAINER PLATE
3	1	671400091	END CAP
4	2	170003027	CAP SCREW
5	1	670700059	DETENT SLEEVE
6	1	670700058	DETENT RETAINER
7	1	670100009	POPPET
8	2	671400089	STOP CUP
9	2	230009009	STEEL BALL
10	1	670300057	SPRING, CENTERING
11	1	670300123	SPRING, DETENT

} 1 POS. DETENT KIT (OPTIONS M & N); #660190030

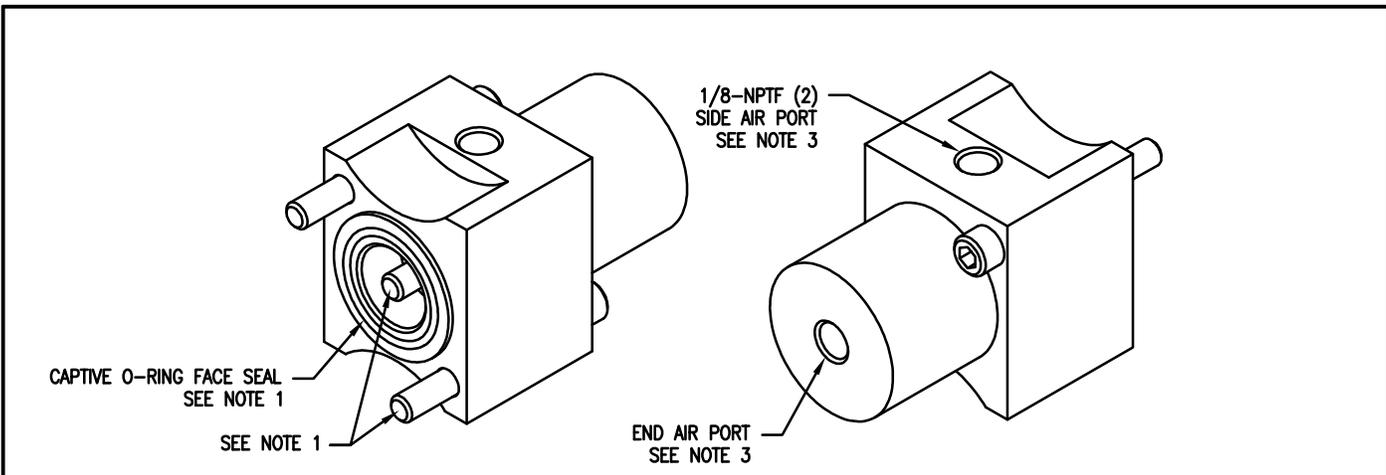


NOTES:

1. TORQUE ADAPTER AND MICROSWITCH ADAPTER TO 9-11 FT-LBS, INSTALL USING LOCTITE 222.
2. TORQUE 1/4-20 CAP SCREWS TO 9-11 FT-LBS.
3. MICROSWITCH MAY BE ORIENTED UPWARDS (TOWARDS WORK PORTS) WHEN USING RELIEF OPTIONS 'A' OR 'K' AT WORK PORT 'B'. ALL OTHER RELIEF OPTIONS REQUIRE MICROSWITCH TO BE ORIENTED DOWNWARDS (AWAY FROM WORK PORTS).

SPOOL ATTACH. OPT. J; SPRING CENTER W/ MICROSWITCH (SWITCHES @ SPOOL IN & OUT)
SPOOL ATTACH. OPT. K; SPRING CENTER W/ MICROSWITCH (SWITCHES @ SPOOL IN ONLY)

ITEM	QTY	PART NO.	DESCRIPTION
1J	1	660190033	OPTION J; SPRING CENTER MICROSWITCH KIT, COMPLETE (INCL. MICROSWITCH)
1K	1	660190034	OPTION K; SPRING CENTER MICROSWITCH KIT, COMPLETE (INCL. MICROSWITCH)
2	1	671300055	MICROSWITCH, SPDT

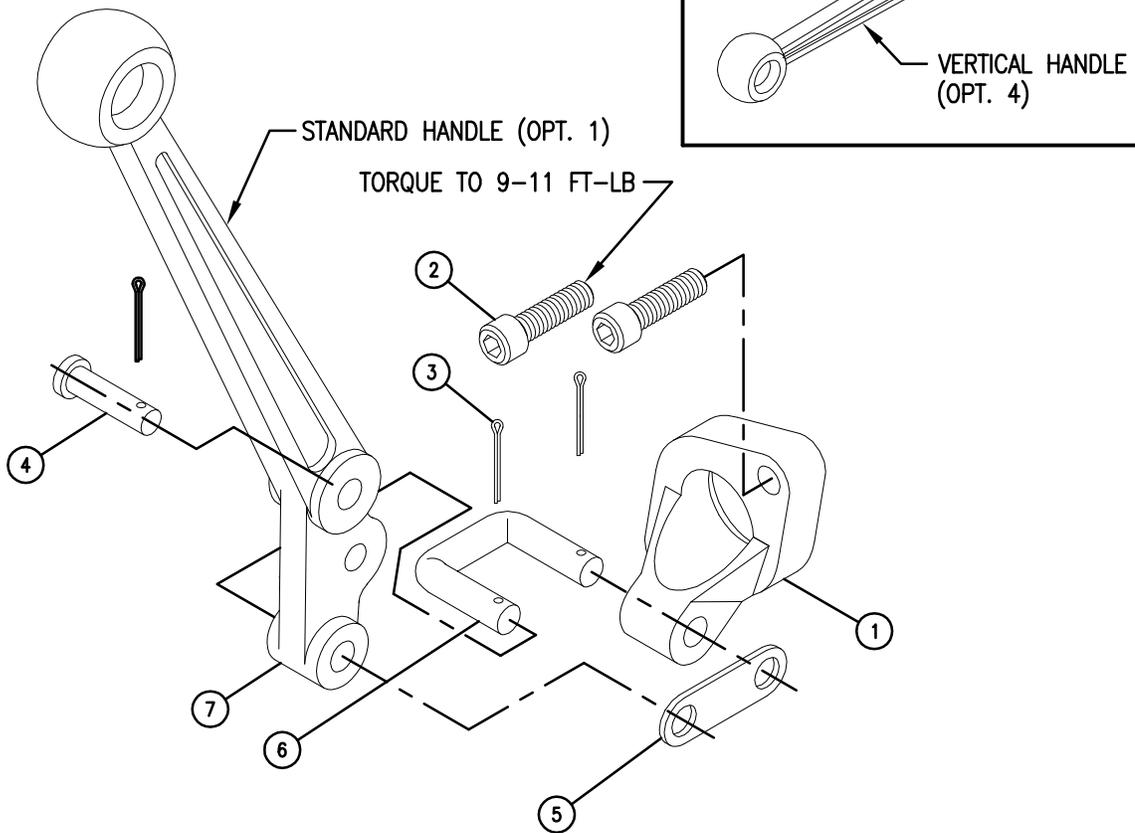


NOTES:

1. INSTALLATION: DO NOT USE WASHER 670500065 IN OUTER COUNTERBORE OF THE ATTACHMENT END OF BODY WHEN INSTALLING THIS KIT. ACCESS HEX SOCKET CAPSCREW THROUGH THE END PORT HOLE OF HOUSING. INSTALL CAPSCREW INTO SPOOL END USING LOCTITE 222, TORQUE TO 9-11 FT-LBS. TORQUE 1/4-20 CAP SCREWS TO 9-11 FT-LBS.
2. MAX. AIR PRESSURE: 130 PSI.
3. SIDE AIR PORT MAY BE ORIENTED UPWARDS (TOWARDS WORK PORTS) WHEN USING RELIEF OPTIONS 'A' OR 'K' AT WORK PORT 'B'. ALL OTHER RELIEF OPTIONS REQUIRE SIDE AIR PORT TO BE ORIENTED DOWNWARDS (AWAY FROM WORK PORTS).

SPOOL ATTACHMENT OPTION E: SPRING CENTER PNEUMATIC ACTUATOR

ITEM	QTY	PART NO.	DESCRIPTION
1	1	660190028	PNEUMATIC ACTUATOR ASSY.



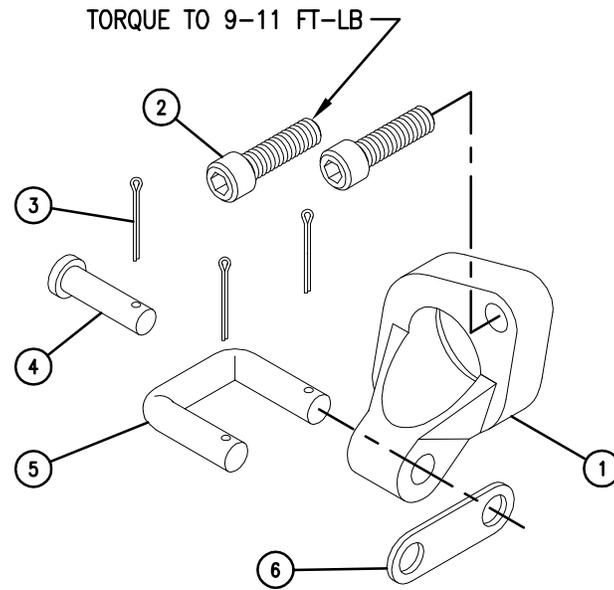
NOTE: HANDLES ARE COATED WITH BLACK PVC VINYL.

COMPLETE STANDARD HANDLE KIT (OPTION 1)

ITEM	QTY	PART NO.	DESCRIPTION
1	1	671400092	HANDLE CLEVIS
2	2	170003038	CAP SCREW
3	3	220001512	COTTER PIN
4	1	671700015	CLEVIS PIN
5	1	670500066	LINK
6	1	670500067	LINK
7	1	670400054	HANDLE
			} KIT: 660190026 } STD. HANDLE KIT, P/N 660190002 } COMPLETE STD. HANDLE KIT, P/N 660190007 PIN KIT P/N 660190011 (INCLUDES ITEMS 3-6)

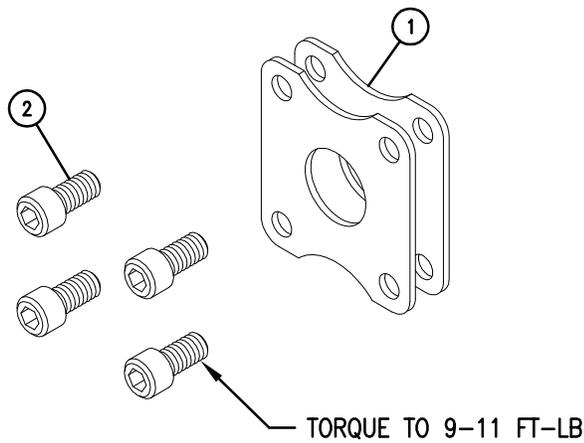
COMPLETE VERTICAL HANDLE KIT (OPTION 4)

ITEM	QTY	PART NO.	DESCRIPTION
1	1	671400092	HANDLE CLEVIS
2	2	170003038	CAP SCREW
3	3	220001512	COTTER PIN
4	1	671700015	CLEVIS PIN
5	1	670500066	LINK
6	1	670500067	LINK
8	1	670400058	HANDLE
			} KIT: 660190026 } VERT. HANDLE KIT, P/N 660190001 } COMPLETE VERT. HANDLE KIT, P/N 660190006 PIN KIT P/N 660190011 (INCLUDES ITEMS 3-6)



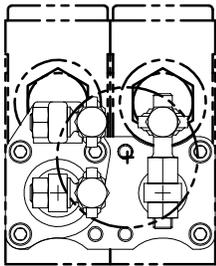
LESS HANDLE ONLY (OPTION 2)

ITEM	QTY	PART NO.	DESCRIPTION
1	1	671400092	HANDLE CLEVIS
2	2	170003038	CAP SCREW
3	3	220001512	COTTER PIN
4	1	671700015	CLEVIS PIN
5	1	670500067	LINK, FORMED
6	1	670500066	LINK, FLAT
			} CLEVIS KIT P/N 660190026 } PIN KIT P/N 660190011 } COMPLETE KIT P/N 660190027

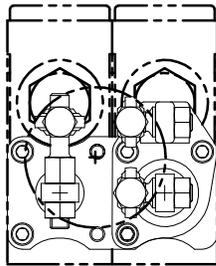


LESS COMPLETE HANDLE (OPTION 3)

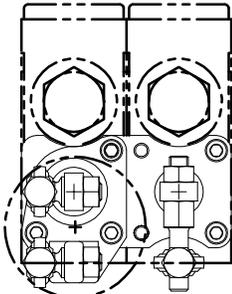
ITEM	QTY	PART NO.	DESCRIPTION
1	2	670500111	PLATE, RETAINER
2	4	170003017	CAP SCREW
			} RETAINER KIT P/N 660190025



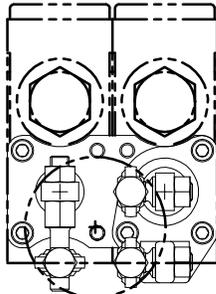
CLEVIS TANG UPPER LEFT



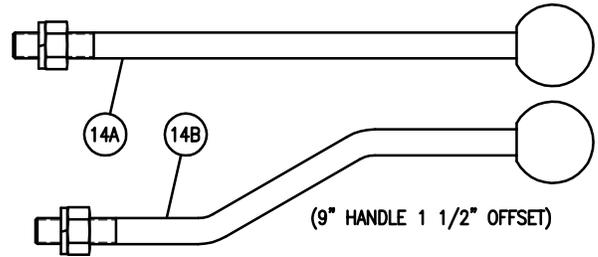
CLEVIS TANG UPPER RIGHT



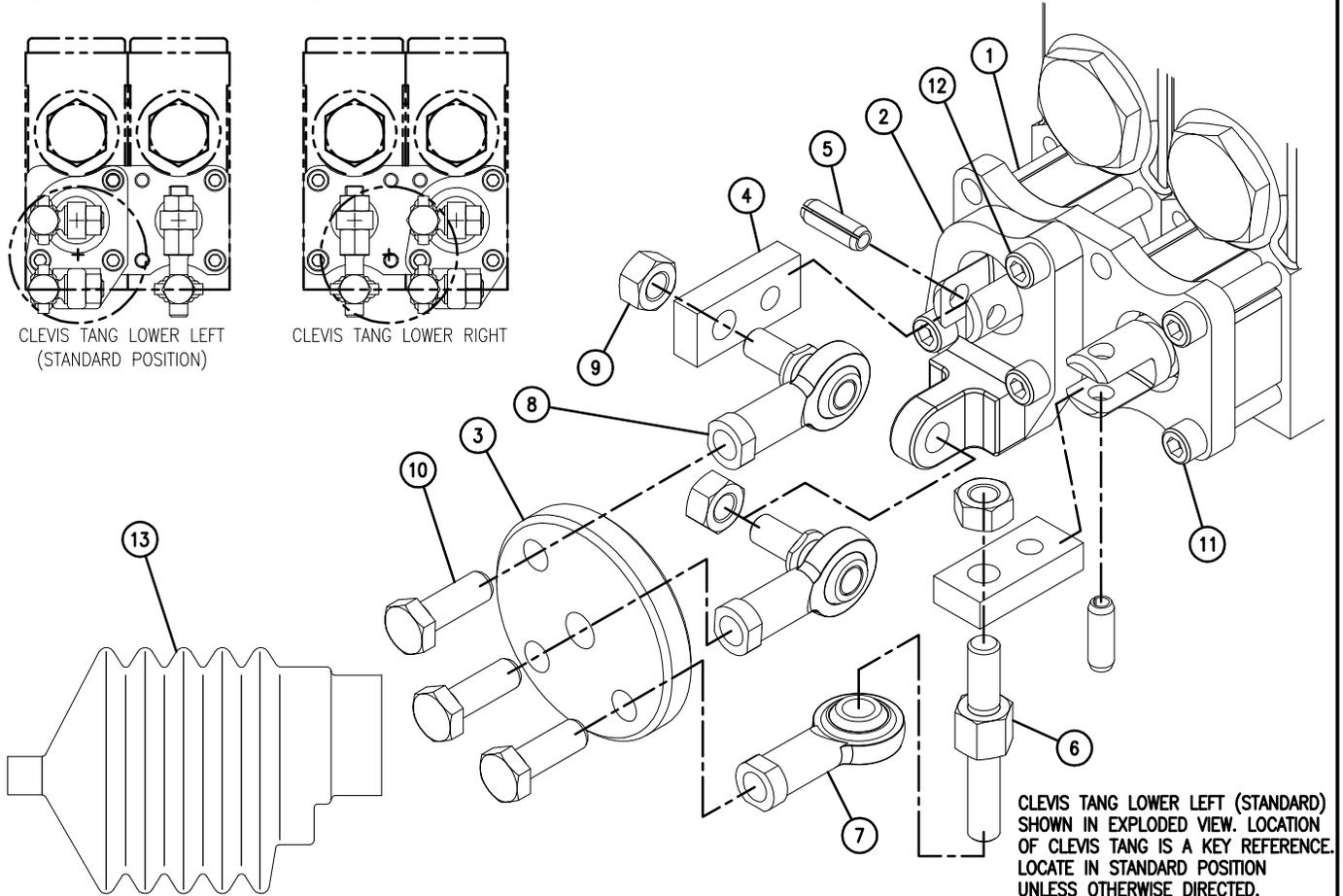
CLEVIS TANG LOWER LEFT
(STANDARD POSITION)



CLEVIS TANG LOWER RIGHT



(9" HANDLE 1 1/2" OFFSET)



CLEVIS TANG LOWER LEFT (STANDARD) SHOWN IN EXPLODED VIEW. LOCATION OF CLEVIS TANG IS A KEY REFERENCE. LOCATE IN STANDARD POSITION UNLESS OTHERWISE DIRECTED.

SERIES 20 JOYSTICK SUB-ASSY

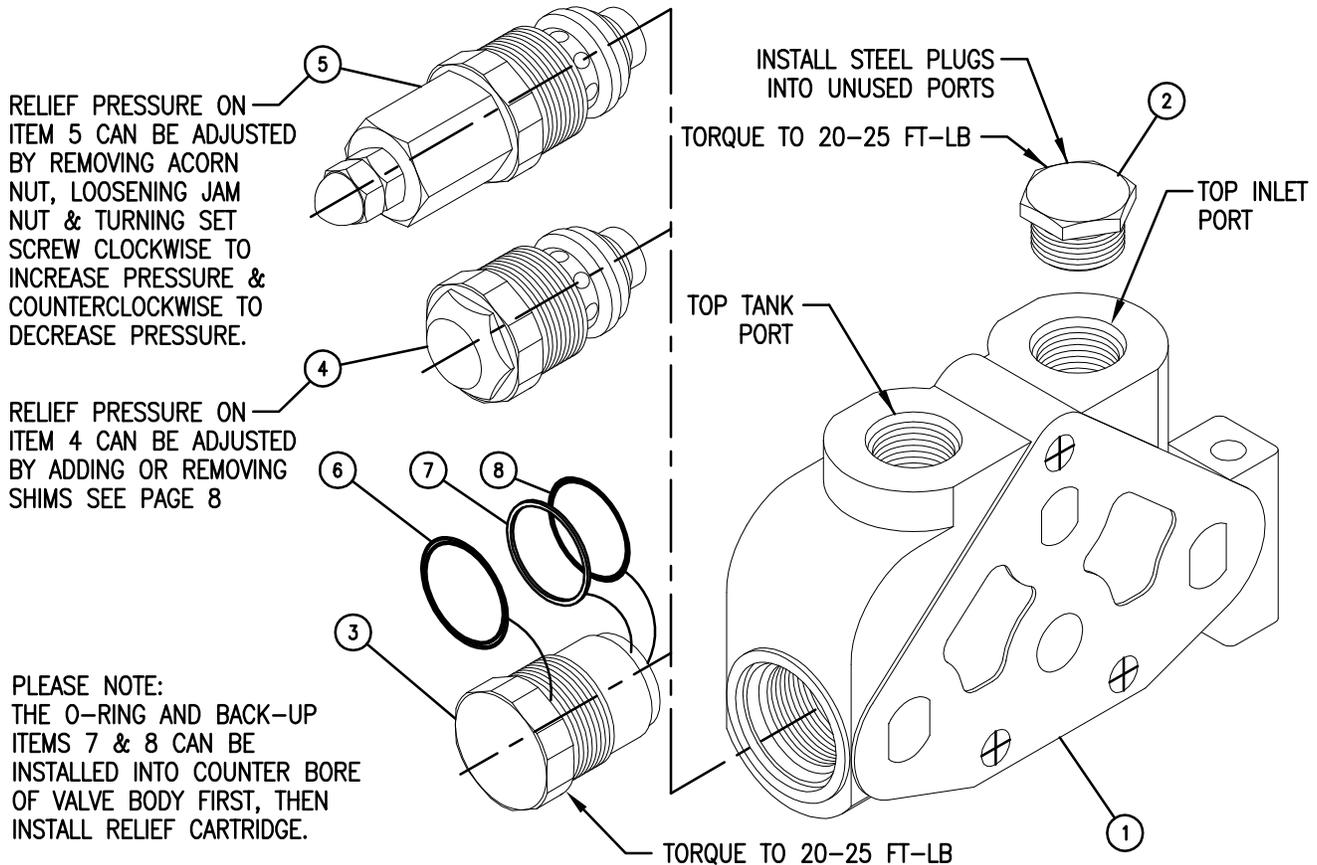
ITEM	QTY	PART NO.	DESCRIPTION
1	1	671200037	SPACER
2	1	671400165	CLEVIS
3	1	671400166	HANDLE PLATE
4	2	671400230	SPOOL ADAPTER LINK
5	2	190100071	ROLL PIN
6	1	671900050	SPOOL STUD
7	1	671400252	ROD END W/EYE
8	2	660390016	ROD END W/STUD
9	3	220000125	HEX NUT 5/16-24
10	3	170002114	CAP SCREW 5/16-24
11	2	170003006	CAP SCREW 1/4-20
12	3	170003034	CAP SCREW 1/4-20
13	1	671300028	BOOT
14A	1	660150006	HANDLE KIT, STRAIGHT
14B	1	660190047	HANDLE KIT, OFFSET

INSTALLATION PROCEDURE:
 LOOSELY PRE-ASSEMBLE ROD ENDS TO HANDLE PLATE. INSTALL ADAPTER LINKS INTO SPOOL ENDS USING ROLL PINS. ALIGN SPOOL LINKS WITH CLEVIS TANG. LOOSELY INSERT ROD END STUDS INTO LINK/TANG. ROTATE 2ND SPOOL TANG 90°. INSERT SMOOTH END OF SPOOL STUD INTO ROD END & ROTATE ASSY SUCH THAT THE SPOOL STUD THREAD CAN BE INSERTED INTO 2ND SPOOL LINK.
 NOTE: CLEAN ALL THREADED PARTS WITH ALCOHOL, DRY AND INSTALL WITH LOCTITE 680. PROPERLY TORQUE ALL FASTENERS.
 TORQUE 1/4-20UNC FASTENERS TO 60-80 IN-LBS.
 TORQUE 5/16-24UNF FASTENERS TO 170-190 IN-LBS.

COMPLETE JOYSTICK ASSY WITH STRAIGHT HANDLE (ITEMS 1-13, 14A):
 660190016 (REPAIR KIT, COMPLETE)
 20JS (TO BE ASSEMBLED ON VALVE ASSY FROM FACTORY)

COMPLETE JOYSTICK ASSY WITH OFFSET HANDLE (ITEMS 1-13, 14B):
 660190017 (REPAIR KIT, COMPLETE)
 20JO (TO BE ASSEMBLED ON VALVE ASSY FROM FACTORY)

20I SERIES 20 INLET SECTION



WARNING: OVERPRESSURE MAY CAUSE SUDDEN AND UNEXPECTED FAILURE OF A COMPONENT IN THE HYDRAULIC SYSTEM RESULTING IN SERIOUS PERSONAL INJURY. ALWAYS USE A GAUGE WHEN ADJUSTING A RELIEF VALVE.

ITEM	QTY	PART NO.	DESCRIPTION	RELIEF	STANDARD MUSIC	STAINLESS STEEL
				OPTION	WIRE SPRING#	WIRE SPRING#
1	1	626315001	INLET BODY #10 SAE	B & F	670300096	
1	1	626316001	INLET BODY #12 SAE	C & G	670300068	670300071
1	1	626313001	INLET BODY 3/4 NPTF	D & H	670300069	670300058
2	3	200400030	STEEL PLUG #10 SAE	E & J	670300070	670300072
2	3	200500007	STEEL PLUG #12 SAE			
2	3	200300028	STEEL PLUG 3/4 NPTF			
3	1	660290001	OPTION A NO RELIEF PLUG			
4	1	660290101	OPTION B SHIM ADJ. RELIEF CART. 500-1350 PSI PRESET AT 1350 PSI			
4	1	660290103	OPTION C SHIM ADJ. RELIEF CART. 1351-1750 PSI PRESET AT 1750 PSI			
4	1	660290105	OPTION D SHIM ADJ. RELIEF CART. 1751-2200 PSI PRESET AT 2200 PSI			
4	1	660290107	OPTION E SHIM ADJ. RELIEF CART. 2201-3000 PSI PRESET AT 2500 PSI			
5	1	660290201	OPTION F ADJ. RELIEF CART. 500-1350 PSI PRESET AT 1350 PSI			
5	1	660290203	OPTION G ADJ. RELIEF CART. 1351-1750 PSI PRESET AT 1750 PSI			
5	1	660290205	OPTION H ADJ. RELIEF CART. 1751-2200 PSI PRESET AT 2200 PSI			
5	1	660290207	OPTION J ADJ. RELIEF CART. 2201-3000 PSI PRESET AT 2500 PSI			
5	1	660290209	OPTION K ADJ. RELIEF CART. 3001-3500 PSI PRESET AT 3250 PSI			
6	1	240000023	023 O-RING			
7	1	240005022	B/U WASHER			
8	1	240000022	022 O-RING			
				SEAL KIT NO. 660585002 (PLUS OTHERS)		
NOTE: INLET RELIEF CARTRIDGES CAN BE ORDERED PRESET TO A SPECIFIC PRESSURE. SEE '20IR' ORDER CODE IN CATALOG. ABOVE PART NUMBERS ARE NOT PRESET.						

NOTE:

1. THE UNUSED INLET PORT CAN BE USED AS A GAUGE PORT.
2. RELIEF CARTRIDGES ARE AVAILABLE WITH STAINLESS STEEL SPRINGS, CALL FOR AVAILABILITY.

20TM COMBINATION MID INLET SECTION (SECTION IS A TANDEM WORK SECTION)

NOTE: MID-INLET (ITEM 5) AND WORK PORT B (ITEM 6) RELIEF PLUGS/CARTRIDGES ARE NOT INTERCHANGEABLE.

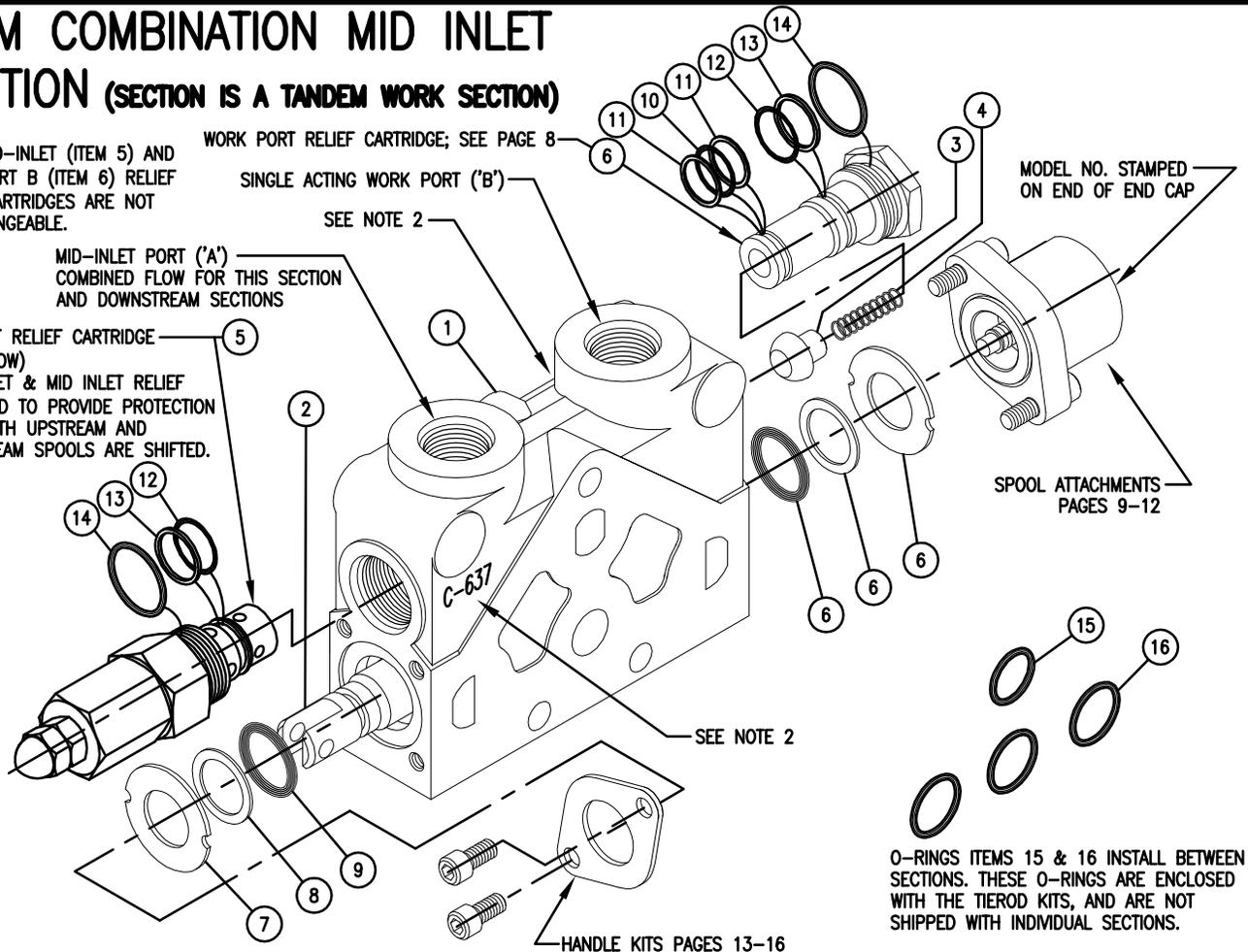
WORK PORT RELIEF CARTRIDGE; SEE PAGE 8

SINGLE ACTING WORK PORT ('B')

SEE NOTE 2

MID-INLET PORT ('A')
COMBINED FLOW FOR THIS SECTION AND DOWNSTREAM SECTIONS

MID-INLET RELIEF CARTRIDGE (SEE BELOW)
BOTH INLET & MID INLET RELIEF ARE REQ'D TO PROVIDE PROTECTION WHEN BOTH UPSTREAM AND DOWNSTREAM SPOOLS ARE SHIFTED.



WARNING: OVERPRESSURE MAY CAUSE SUDDEN AND UNEXPECTED FAILURE OF A COMPONENT IN THE HYDRAULIC SYSTEM RESULTING IN SERIOUS PERSONAL INJURY. ALWAYS USE A GAUGE WHEN ADJUSTING A RELIEF VALVE.

ITEM	QTY	PART NO.	DESCRIPTION
1	1		VALVE BODY
2	1	SEE NOTE 1	SPOOL
3	1	670100024	LOAD CHECK POPPET
4	1	670300056	LOAD CHECK SPRING
5	1	660290016	MID-INLET RELIEF OPTION A, NO-RELIEF PLUG
5	1	660290801	MID-INLET RELIEF OPT. B, SHIM ADJ. RELIEF CART.; 1350 PSI (500-1350 PSI)
5	1	660290803	MID-INLET RELIEF OPT. C, SHIM ADJ. RELIEF CART.; 1750 PSI (1351-1750 PSI)
5	1	660290805	MID-INLET RELIEF OPT. D, SHIM ADJ. RELIEF CART.; 2200 PSI (1751-2200 PSI)
5	1	660290807	MID-INLET RELIEF OPT. E, SHIM ADJ. RELIEF CART.; 2500 PSI (2201-3000 PSI)
5	1	660290451	MID-INLET RELIEF OPT. F, ADJ. RELIEF CART.; 1350 PSI (500-1350 PSI)
5	1	660290453	MID-INLET RELIEF OPT. G, ADJ. RELIEF CART.; 1750 PSI (1351-1750 PSI)
5	1	660290455	MID-INLET RELIEF OPT. H, ADJ. RELIEF CART.; 2200 PSI (1751-2200 PSI)
5	1	660290457	MID-INLET RELIEF OPT. J, ADJ. RELIEF CART.; 2500 PSI (2201-3000 PSI)
6	1	(SEE PAGE 8)	WORK PORT RELIEF CARTRIDGE, WORK PORT 'B' (SEE PAGE 8)
7	2	670500065	WASHER
8	2	670500064	SPOOL BACKUP WASHER
9	2	240000210	-210 O-RING
10	1	240000015	-015 O-RING
11	2	240005015	BACKUP WASHER
12	2	240000016	-016 O-RING
13	2	240005016	BACKUP WASHER
14	2	240000117	-117 O-RING
15	1	240000019	-019 O-RING
16	3	240000021	-021 O-RING

These are matched parts and are not sold separately.

NOT AVAIL-ABLE WITH HANDLE OPTION 1

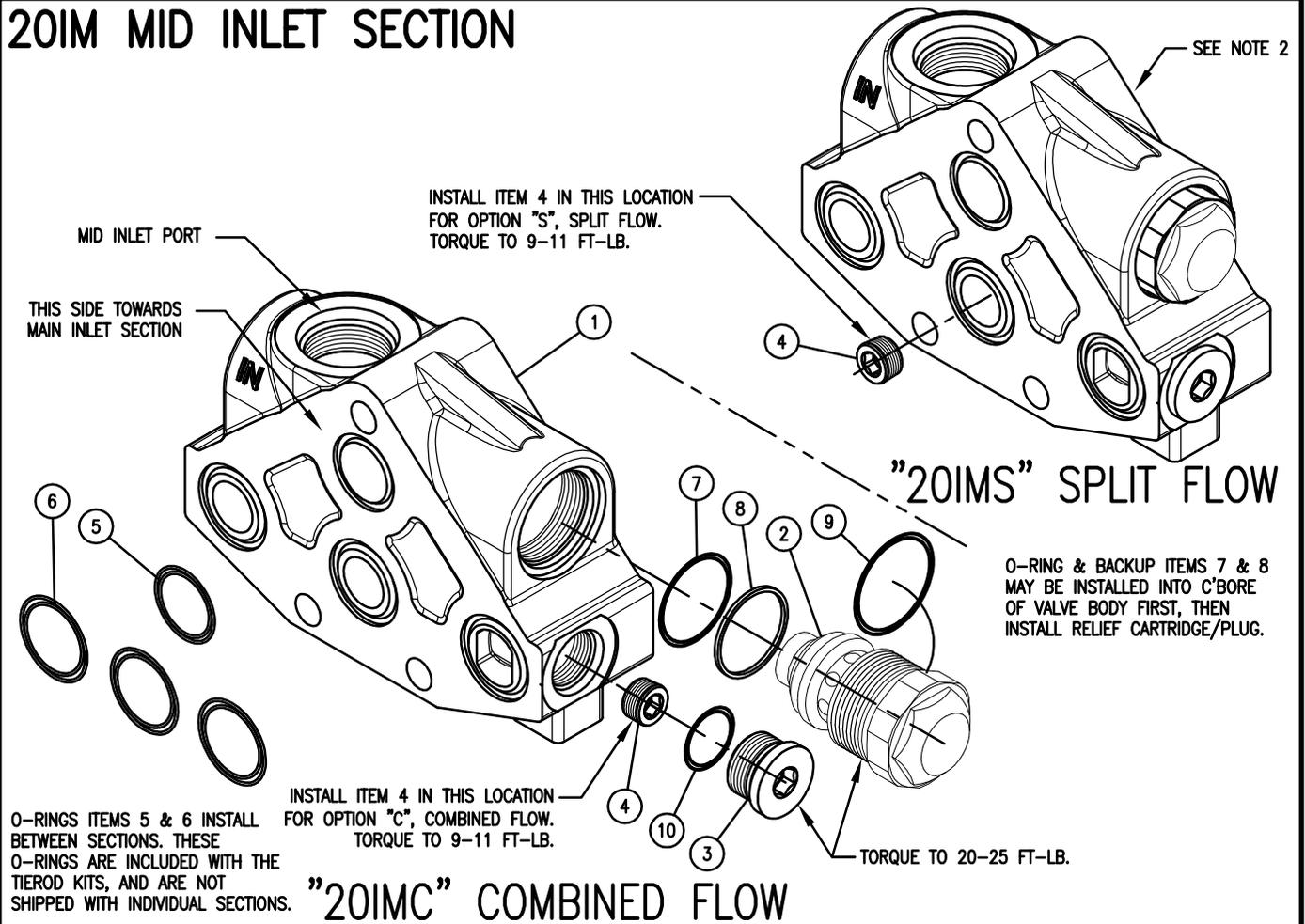
REPLACEMENT SEAL KIT P/N 660585001

REPLACEMENT SEAL KIT P/N 660585004

NOTES:

1. SPOOL IS A CUSTOM SPOOL USED FOR ONLY THE 20TM SECTION.
2. 20TM COMBINATION MID-INLET SECTIONS HAVE 'C-637' CASTING NO. ON RIGHT SIDE AND 'T' ON LEFT SIDE OF CASTING.

20IM MID INLET SECTION



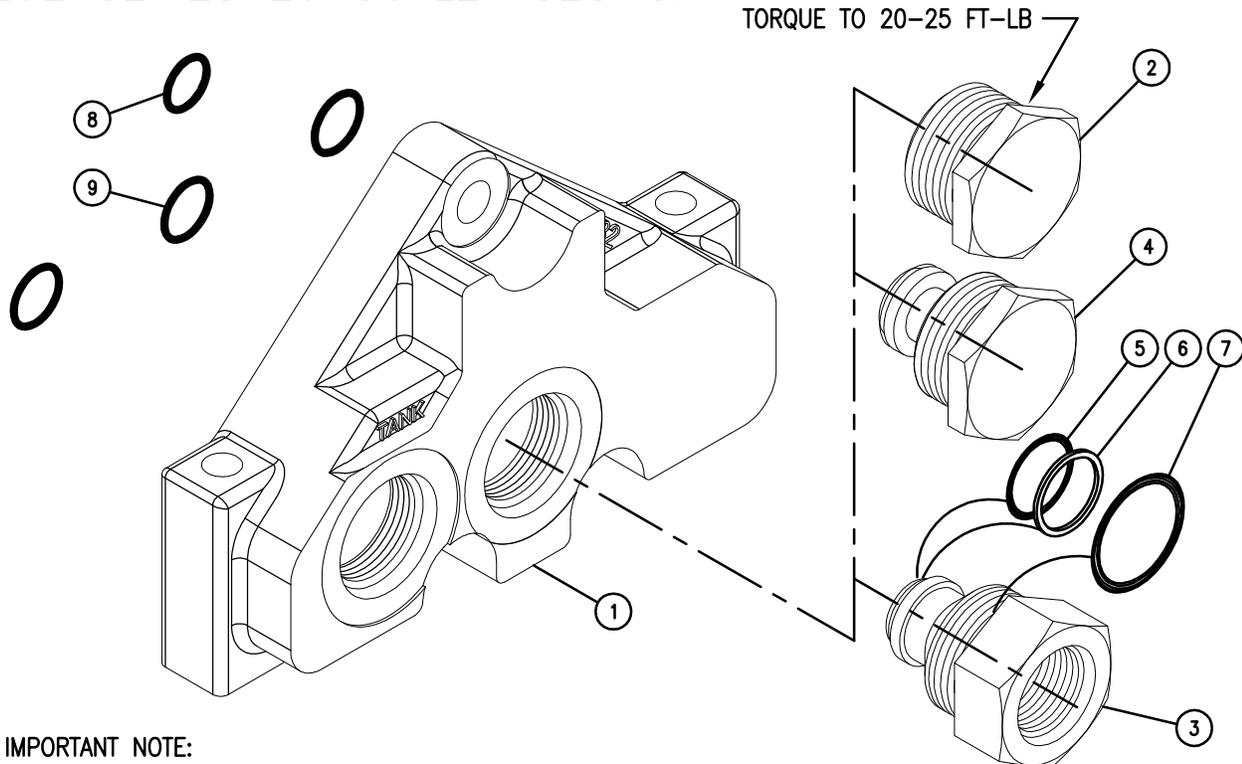
WARNING: OVERPRESSURE MAY CAUSE SUDDEN AND UNEXPECTED FAILURE OF A COMPONENT IN THE HYDRAULIC SYSTEM RESULTING IN SERIOUS PERSONAL INJURY. ALWAYS USE A GAUGE WHEN ADJUSTING A RELIEF VALVE.

ITEM	QTY	PART NO.	DESCRIPTION
1	1	626625001	MID INLET BODY, #10 SAE PORT
1	1	626626001	MID INLET BODY, #12 SAE PORT
1	1	626622001	MID INLET BODY, 1/2-NPTF PORT
1	1	626623001	MID INLET BODY, 3/4-NPTF PORT
1	1	626629001	MID INLET BODY, 3/4-BSPP PORT
2	1	660290001	OPTION A, NO-RELIEF PLUG
2	1	660290101	OPTION B, SHIM ADJ. RELIEF CART.; 1350 PSI (500-1350 PSI)
2	1	660290103	OPTION C, SHIM ADJ. RELIEF CART.; 1750 PSI (1351-1750 PSI)
2	1	660290105	OPTION D, SHIM ADJ. RELIEF CART.; 2200 PSI (1751-2200 PSI)
2	1	660290107	OPTION E, SHIM ADJ. RELIEF CART.; 2500 PSI (2201-3000 PSI)
2	1	660290201	OPTION F, ADJ. RELIEF CART.; 1350 PSI (500-1350 PSI)
2	1	660290203	OPTION G, ADJ. RELIEF CART.; 1750 PSI (1351-1750 PSI)
2	1	660290205	OPTION H, ADJ. RELIEF CART.; 2200 PSI (1751-2200 PSI)
2	1	660290207	OPTION J, ADJ. RELIEF CART.; 2500 PSI (2201-3000 PSI)
2	1	660290209	OPTION K, ADJ. RELIEF CART.; 3250 PSI (3001-3500 PSI)
3	1	200300104	PLUG, HEX SOCKET, 8 SAE
4	1	200018001	PLUG, PIPE (SEE ABOVE FOR INSTALLATION LOCATION. ONE PIECE ONLY PER ASSY!)
5	1	240000019	-019 O-RING
6	3	240000021	-021 O-RING
7	1	240000022	-022 O-RING
8	1	240005022	BACKUP WASHER
9	1	240000023	-023 O-RING
10	1	240000908	-908 O-RING

NOTES:

1. 20IM MID-INLET SECTIONS HAVE 'C-662' CASTING NO. IN RECESS ON LEFT SIDE OF CASTING (TOWARD OUTLET).
2. RELIEF CARTRIDGES ARE AVAILABLE WITH STAINLESS STEEL SPRINGS, CALL FOR AVAILABILITY.

20E SERIES 20 OUTLET SECTION



IMPORTANT NOTE:
ONE OF THE OUTLET PORTS OF THE VALVE ASSEMBLY MUST BE CONNECTED TO TANK IN ALL CIRCUITS. WHEN POWER BEYOND PLUG, ITEM 3, IS INSTALLED THE POWER BEYOND PORT CONNECTS TO DOWNSTREAM VALVE AND ONE OF THE OUTLET PORTS IS CONNECTED TO TANK.

PLEASE NOTE:
THE O-RING AND BACK-UP, ITEMS 5 & 6, CAN BE INSTALLED INTO COUNTERBORE OF VALVE BODY FIRST, THEN INSTALL CARTRIDGE, ITEM 3 OR 4.

ITEM	QTY	PART NO.	DESCRIPTION
1	1	626325001	OUTLET BODY, #10 SAE
1	1	626326001	OUTLET BODY, #12 SAE
1	1	626323001	OUTLET BODY, 3/4-NPTF
2	1	660290006	OPTION 1; CONVERSION PLUG
3	1	660290004	OPTION 2; POWER BEYOND CARTRIDGE, #10 SAE P.B.
3	1	660290017	- POWER BEYOND CARTRIDGE, 3/4-NPTF P.B.
4	1	660290005	OPTION 3; CLOSED CENTER CARTRIDGE
5	1	240000017	-017 O-RING
6	1	240005017	B/U WASHER
7	1	240000914	-914 O-RING
8	1	240000019	-019 O-RING
9	3	240000021	-021 O-RING

} SEAL KIT P/N 660585003
(SEE NOTE 1)

OPTION 1; STANDARD OPEN CENTER OUTLET WITH CONVERSION PLUG

This is the standard outlet option. This option allows for conversion in the field for power beyond or closed center applications. When the spools are in neutral the inlet is unloaded to tank.

OPTION 2; POWER BEYOND OUTLET WITH #8 SAE BEYOND PORT

This option provides for a high pressure power beyond port. This would be used if a valve is to be added downstream. The outlet must also be connected to tank. When the spools are in neutral the inlet is connected to power beyond port.

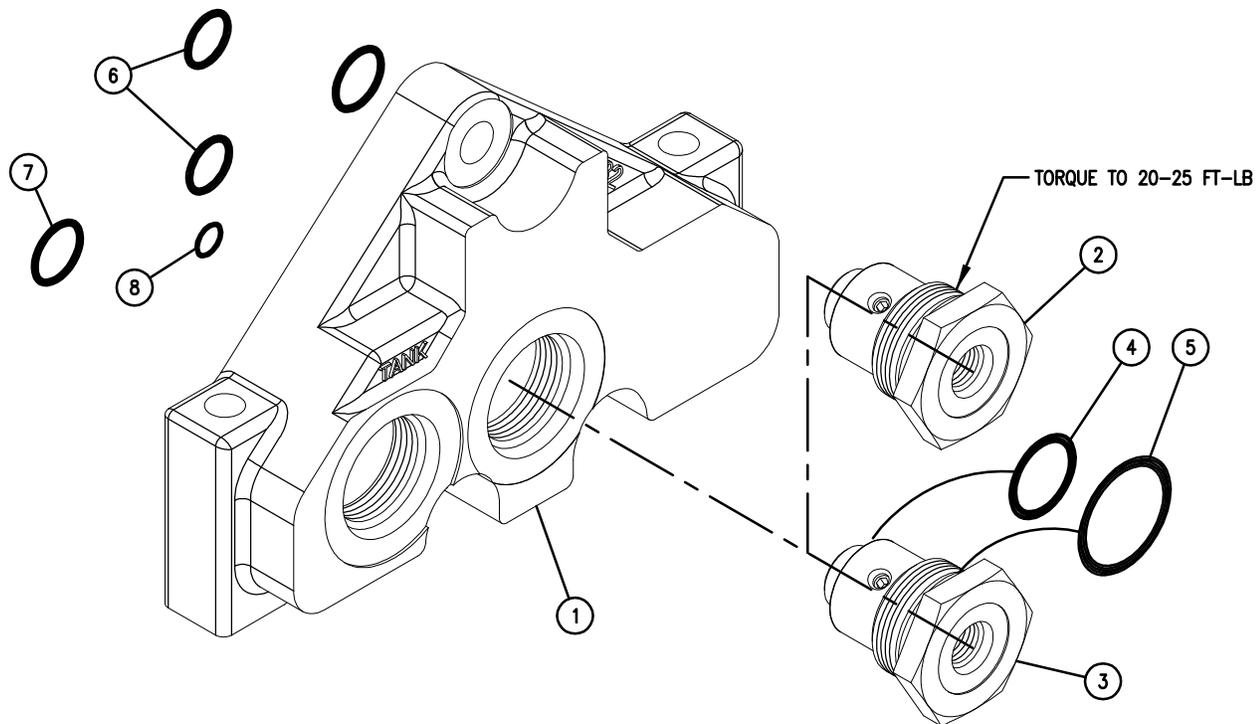
OPTION 3; CLOSED CENTER OUTLET

This option provides for closed center operation. This is typically used with a variable displacement pressure compensated pump or in a system with an unloading valve. When the spools are in neutral the inlet port is blocked. When a closed center configuration is used, a no-relief plug is often installed in the inlet, or the relief cartridge is set to a pressure higher than the pump compensator setting.

NOTE:

1. O-RINGS, ITEMS 8 & 9, ARE ALSO ENCLOSED WITH TIEROD KITS. THEY ARE NOT SHIPPED WITH THE INDIVIDUAL SECTIONS.

20LE SERIES 20 LOAD SENSE OUTLET SECTION



IMPORTANT NOTE: ONE OF THE OUTLET PORTS OF THE VALVE ASSEMBLY MUST BE CONNECTED TO TANK IN ALL CIRCUITS.

PLEASE NOTE:
THE O-RING, ITEM 4, CAN BE INSTALLED INTO COUNTERBORE OF VALVE BODY FIRST, THEN INSTALL PLUG, ITEM 2 OR 3.

ITEM	QTY	PART NO.	DESCRIPTION
1	1	20LE1	OUTLET BODY, LOAD SENSE, #10 SAE
1	1	20LE2	OUTLET BODY, LOAD SENSE, #12 SAE
1	1	20LE3	OUTLET BODY, LOAD SENSE, 3/4 NPTF
2	1	660290018	OPTION 1; LOAD SENSE PLUG WITH DRAIN ORIFICE
3	1	660290019	OPTION 2; LOAD SENSE PLUG WITHOUT DRAIN ORIFICE
4	1	240017018	-018 O-RING
5	1	240000912	-912 O-RING
6	2	240000019	-019 O-RING
7	2	240000021	-021 O-RING
8	1	240000011	-011 O-RING
			} SEAL KIT P/N 660585010 } SEAL KIT P/N 660585004 (SEE NOTE 1) } (SEE NOTE 1)

OPTION 1; LOAD SENSE PLUG WITH DRAIN ORIFICE; #4 SAE ORB LOAD SENSE PORT

This cartridge has a #4 SAE ORB port for connecting the load sense line to the pump. It also includes a built-in line bleed orifice to prevent high pressure from being trapped in the load sense line.

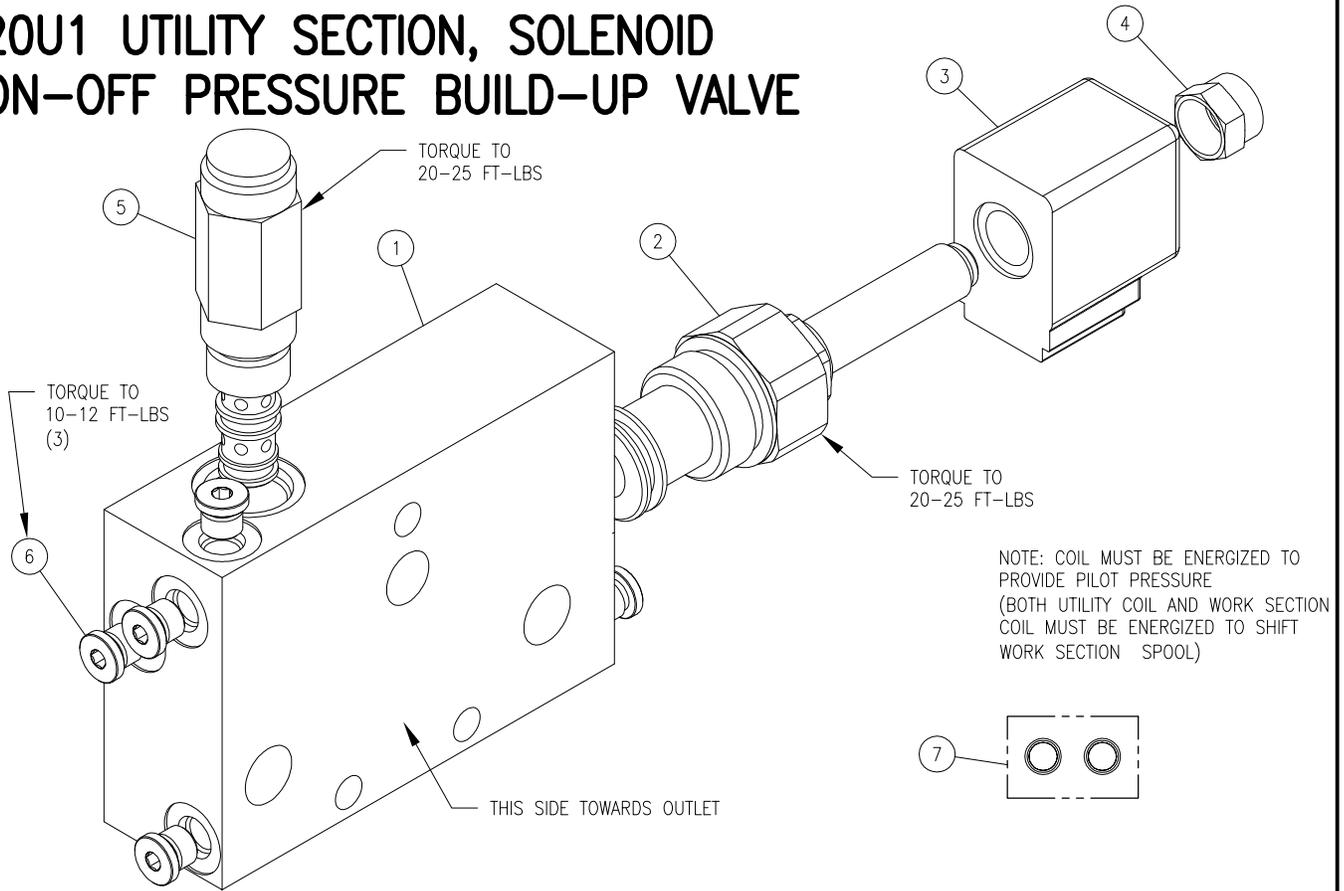
OPTION 2; LOAD SENSE PLUG WITHOUT DRAIN ORIFICE; #4 SAE ORB LOAD SENSE PORT

This cartridge has a #4 SAE ORB port for connecting the load sense line to the pump. It does not include an orifice to relieve pressure trapping, which must be provided elsewhere in the control circuit.

NOTE:

1. O-RINGS, ITEMS 6, 7 & 8, ARE ALSO ENCLOSED WITH THE TIEROD KITS. THEY ARE NOT SHIPPED WITH THE INDIVIDUAL SECTIONS.

20U1 UTILITY SECTION, SOLENOID ON-OFF PRESSURE BUILD-UP VALVE



ITEM	QTY	PART NO.	DESCRIPTION
1	1	670600024	BODY
2	1	660290011	PRESSURE BUILD UP CARTRIDGE, SOLENOID OPERATED
3	1	SEE CHART *	SOLENOID COIL
4	1	671800021	COIL NUT
5	1	270006092	PRESSURE REDUCING CARTRIDGE
6	5	200200083	PLUG, HEX SOCKET
7	1	660585006	BETWEEN SECTION PILOT SEAL KIT

COIL OPTION:		* COIL P/N	COIL/CARTRIDGE SUB-ASSY P/N
12L	12 VDC LEAD WIRE	671302003	660390153
12Q	12 VDC SPADE	671322004	660390154
12H	12 VDC DIN-43650	671302002	660390152
12W	12 VDC WEATHER PACK	671302013	660390163
24L	24 VDC LEAD WIRE	671302007	660390157
24Q	24 VDC SPADE	671322008	660390158
24H	24 VDC DIN-43650	671302006	660390156
11C	120 VAC CONDUIT	671302009	660390159
11H	120 VAC DIN-43650	671302010	660390160

TYPICAL SV SOLENOID CONNECTION OR SERIES 20 WITHOUT SOLENOID PRESSURE BUILD UP CARTRIDGE

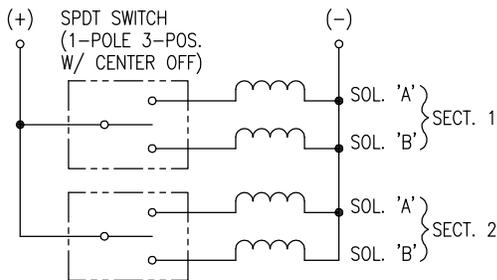
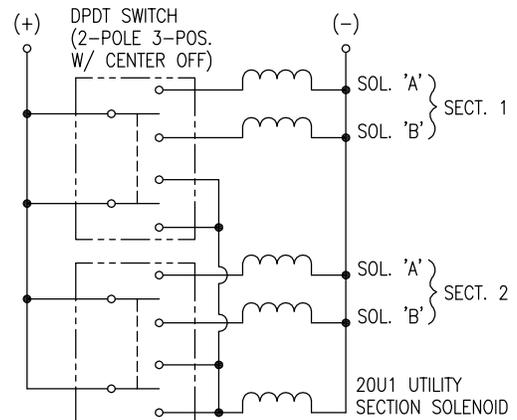
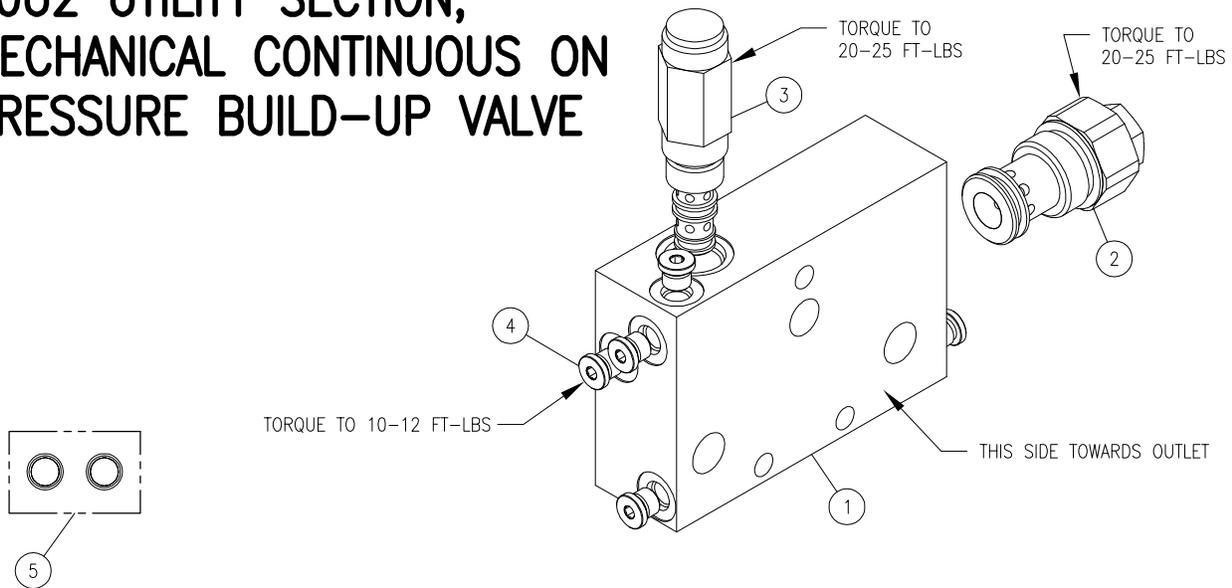


ILLUSTRATION IS APPLICABLE FOR ALL SOLENOID SECTIONS.

TYPICAL SERIES 20 SOLENOID CONNECTION WITH 20U1 SOLENOID OPERATED PRESSURE BUILD-UP CARTRIDGE



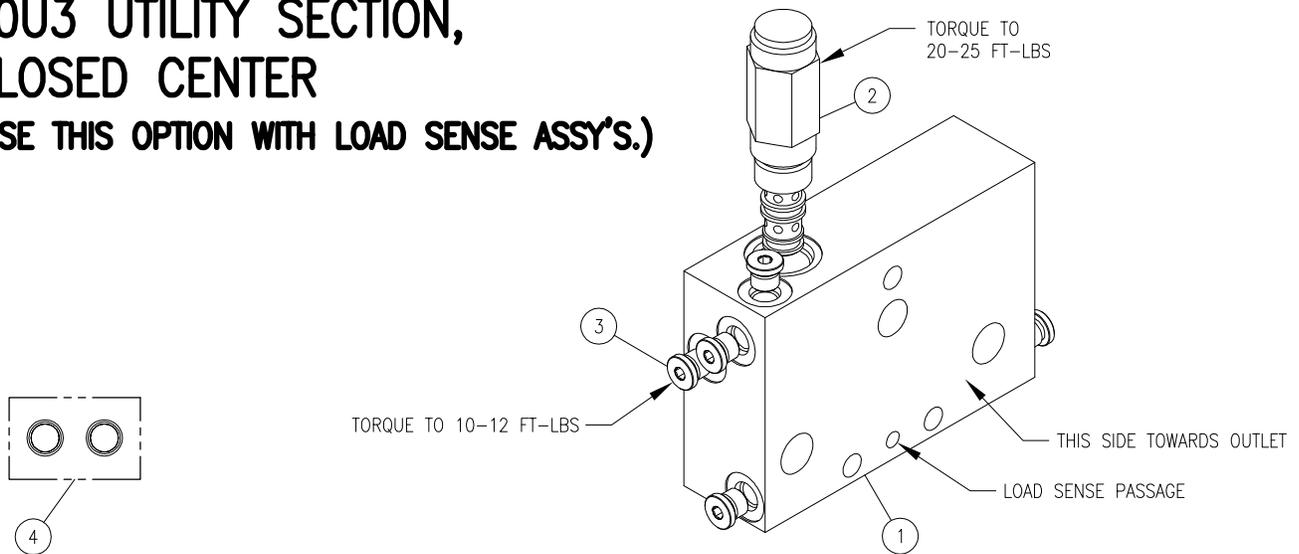
20U2 UTILITY SECTION, MECHANICAL CONTINUOUS ON PRESSURE BUILD-UP VALVE



NOTE: 20U2 PROVIDES 350 TO 500 PSI PILOT PRESSURE TO SOLENOID OPERATORS.

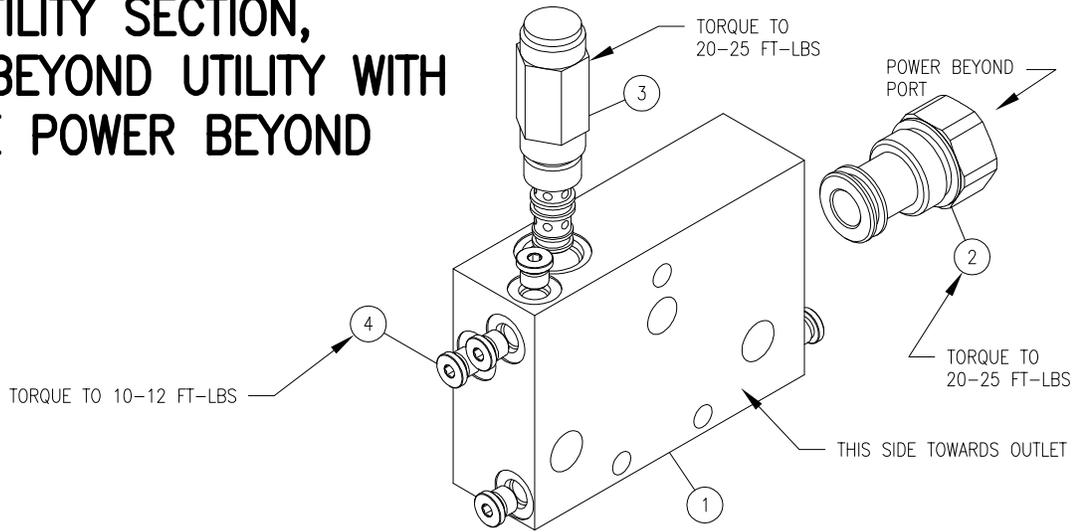
ITEM	QTY	PART NO.	DESCRIPTION
1	1	670600024	BODY
2	1	660290010	PRESSURE BUILD-UP CARTRIDGE, MECHANICAL
3	1	270006092	PRESSURE REDUCING CARTRIDGE
4	5	200200083	PLUG, HEX SOCKET
5	1	660585006	BETWEEN SECTION PILOT SEAL KIT

20U3 UTILITY SECTION, CLOSED CENTER (USE THIS OPTION WITH LOAD SENSE ASSY'S.)



ITEM	QTY	PART NO.	DESCRIPTION
1	1	670600025	BODY
2	1	270006092	PRESSURE REDUCING CARTRIDGE
3	5	200200083	PLUG, HEX SOCKET
4	1	660585006	BETWEEN SECTION PILOT SEAL KIT

20U4 UTILITY SECTION, POWER BEYOND UTILITY WITH #10 SAE POWER BEYOND PORT

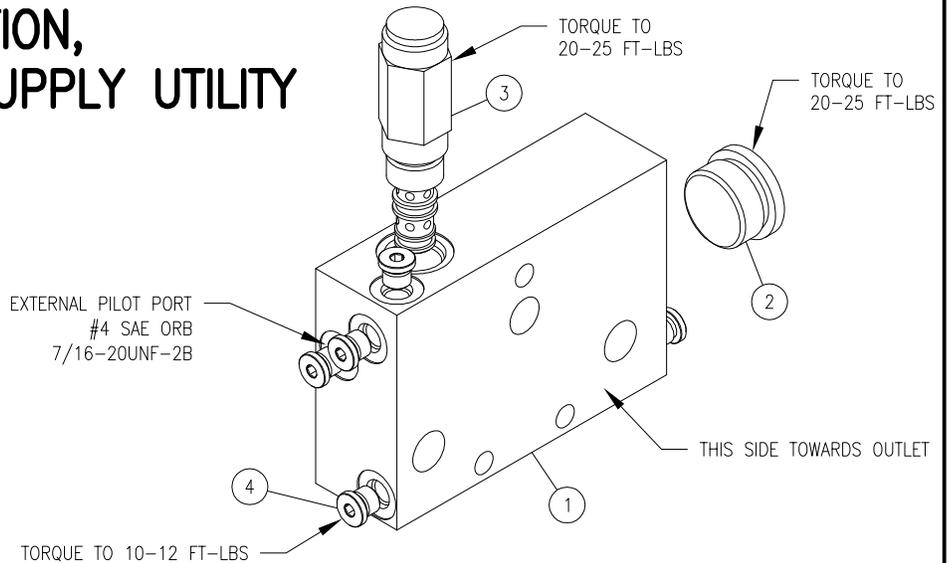


WITH SERIES 20 SOLENOID OPERATED ASSEMBLIES, THE POWER BEYOND LINE IS CONNECTED TO THE UTILITY SECTION AND NOT TO A POWER BEYOND PORT IN THE OUTLET SECTION.

NOTE: PRESSURE BUILD-UP MUST BE PROVIDED BY THE FUNCTION DOWNSTREAM OF THE POWER BEYOND. THERE MUST BE A MINIMUM OF APPROX. 350 PSI PRESSURE DIFFERENCE BETWEEN THE POWER BEYOND PORT AND THE TANK PORT.

ITEM	QTY	PART NO.	DESCRIPTION
1	1	670600024	BODY
2	1	660290012	POWER BEYOND CARTRIDGE
3	1	270006092	PRESSURE REDUCING CARTRIDGE
4	5	200200083	PLUG, HEX SOCKET
5	1	660585006	BETWEEN SECTION PILOT SEAL KIT

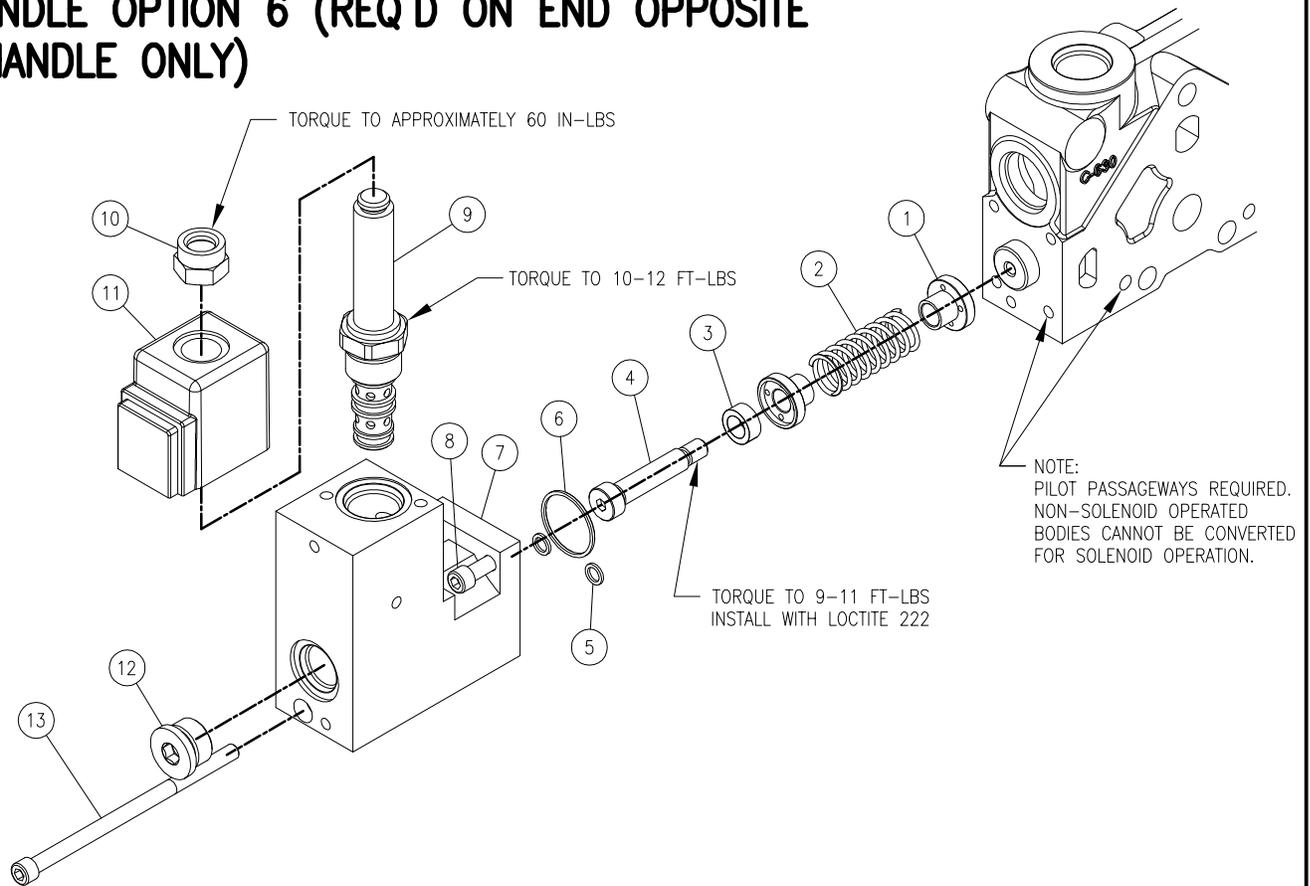
20U5 UTILITY SECTION, EXTERNAL PILOT SUPPLY UTILITY



NOTE: EXTERNAL PILOT SHOULD SUPPLY FLOW AND PRESSURE @ 350 PSI MINIMUM.

ITEM	QTY	PART NO.	DESCRIPTION
1	1	670600026	BODY
2	1	200700026	PLUG, HEX SOCKET
3	1	270006092	PRESSURE REDUCING CARTRIDGE
4	5	200200083	PLUG, HEX SOCKET
5	1	660585006	BETWEEN SECTION PILOT SEAL KIT

**SERIES 20 SPLIT SOLENOID OPERATORS;
HANDLE OPTION 5 (REQ'D ON BOTH ENDS) &
HANDLE OPTION 6 (REQ'D ON END OPPOSITE
HANDLE ONLY)**



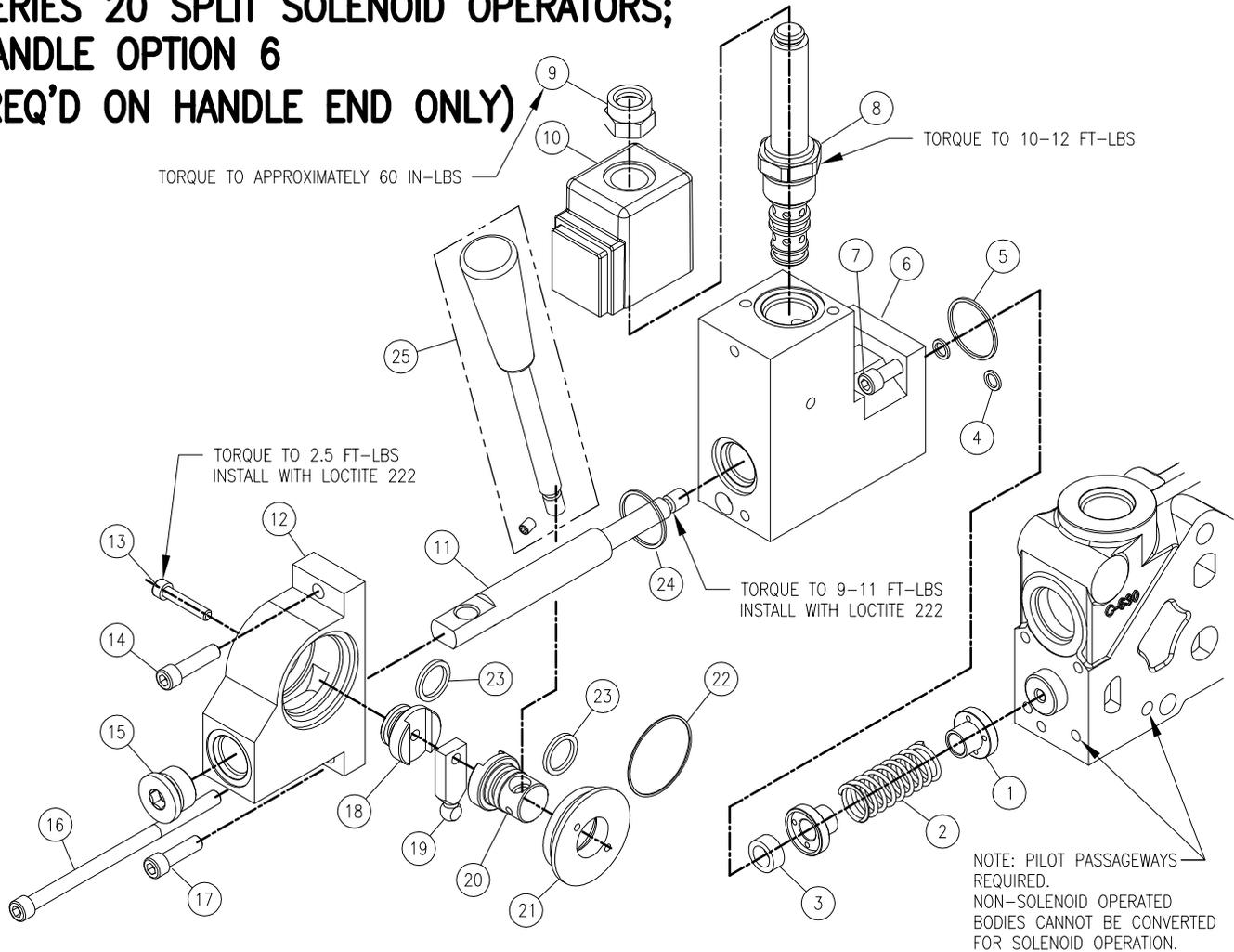
ITEM	QTY	PART NO.	DESCRIPTION
1	2	671400158	SPRING END
2	1	670300089	SPRING, CENTERING
3	1	671200023	WASHER
4	1	220000415	SHOULDER SCREW
5	2	240000010	-010 O-RING
6	1	240000022	-022 O-RING
7	1	660390002	ACTUATOR BODY
8	2	170003038	CAP SCREW
9	1	660263003	SOLENOID CARTRIDGE
10	2	671800021	COIL NUT
11	1	SEE CHART *	COIL (SEE CHART @ FOLLOWING PAGE)
12	1	200300104	PLUG, #8 SAE ORB
13	1	170003052	CAP SCREW

NOTES:
QUANTITIES ARE PER END ONLY.
HANDLE OPTION 5 REQUIRES 2 SETS OF PARTS.
HANDLE OPTION 6 REQUIRES ONE SET OF NO HANDLE
END PARTS AND ONE SET OF HANDLE END PARTS.
TORQUE 1/4-20 CAP SCREWS TO 9-11 FT-LBS.

SEAL KITS

660585004	BETWEEN SECTIONS SEAL KIT (ONE REQUIRED PER SECTION)
660585006	BETWEEN SECTIONS PILOT SEAL KIT (ONE REQUIRED PER SECTION)
660590008	SOLENOID CARTRIDGE SEAL KIT (ONE REQUIRED PER CARTRIDGE)
660585011 **	COMPL. SOLENOID OPER'D SECT SEAL KIT, HANDLE OPTIONS 1-4 (ONE REQ'D PER SECT)
660590030 **	COMPL. SOLENOID OPER'D SECT SEAL KIT, HANDLE OPTIONS 5-6 (ONE REQ'D PER SECT)
** (INCLUDES BETWEEN SECTION, PILOT AND CARTRIDGE SEALS)	

SERIES 20 SPLIT SOLENOID OPERATORS; HANDLE OPTION 6 (REQ'D ON HANDLE END ONLY)



ITEM	QTY	PART NO.	DESCRIPTION
1	2	671400158	SPRING END
2	1	670300089	SPRING, CENTERING
3	1	671200023	WASHER
4	2	240000010	-010 O-RING
5	1	240000022	-022 O-RING
6	1	660390002	ACTUATOR BODY
7	2	170003038	CAP SCREW
8	1	660263003	SOLENOID CARTRIDGE
9	1	671800021	COIL NUT
10	1	SEE CHART *	COIL
11	1	671400157	ADAPTER
12	1	670600023	HANDLE HOUSING
13	1	220000419	CAP SCREW
14	1	170003018	CAP SCREW
15	1	200300104	PLUG, #8 SAE ORB
16	1	170003053	CAP SCREW
17	1	170003018	CAP SCREW
18	1	671400208	LEFT SHAFT
19	1	671400210	PIVOT PIN
20	1	671400209	RIGHT SHAFT
21	1	671400154	GLAND
22	1	240000918	-918 O-RING
23	2	240010113	QUAD RING
24	1	240000118	-118 O-RING
25	1	660190022	HANDLE KIT

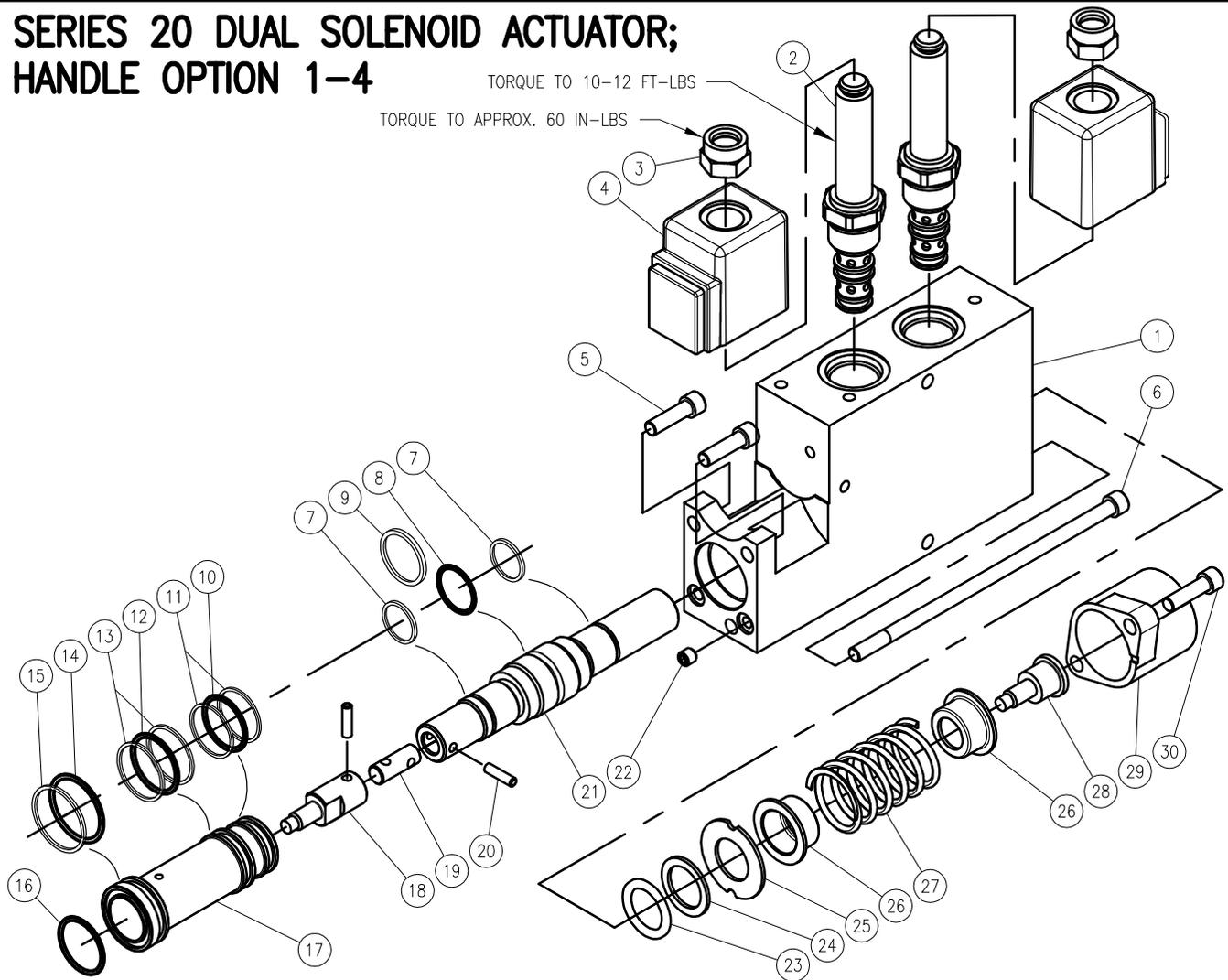
HANDLE OPTION 6 REQUIRES ONE SET OF HANDLE END PARTS AND ONE SET OF NO HANDLE END PARTS

NOTES:
QUANTITIES ARE FOR HANDLE END ONLY
TORQUE 1/4-20 CAP SCREWS TO 9-11 FT-LBS

COIL OPTION:		* COIL P/N	COIL/CARTRIDGE SUB-ASSY P/N: (HANDLE OPTIONS 5 & 6 ONLY)
12L	12 VDC LEAD WIRE	671302003	660390103
12Q	12 VDC SPADE	671322004	660390104
12H	12 VDC DIN-43650	671302002	660390102
12W	12 VDC WEATHER PACK	671302013	660390113
24L	24 VDC LEAD WIRE	671302007	660390107
24Q	24 VDC SPADE	671322008	660390108
24H	24 VDC DIN-43650	671302006	660390106
11C	120 VAC CONDUIT	671302009	660390109
11H	120 VAC DIN-43650	671302010	660390110

SERIES 20 DUAL SOLENOID ACTUATOR; HANDLE OPTION 1-4

TORQUE TO 10-12 FT-LBS
TORQUE TO APPROX. 60 IN-LBS



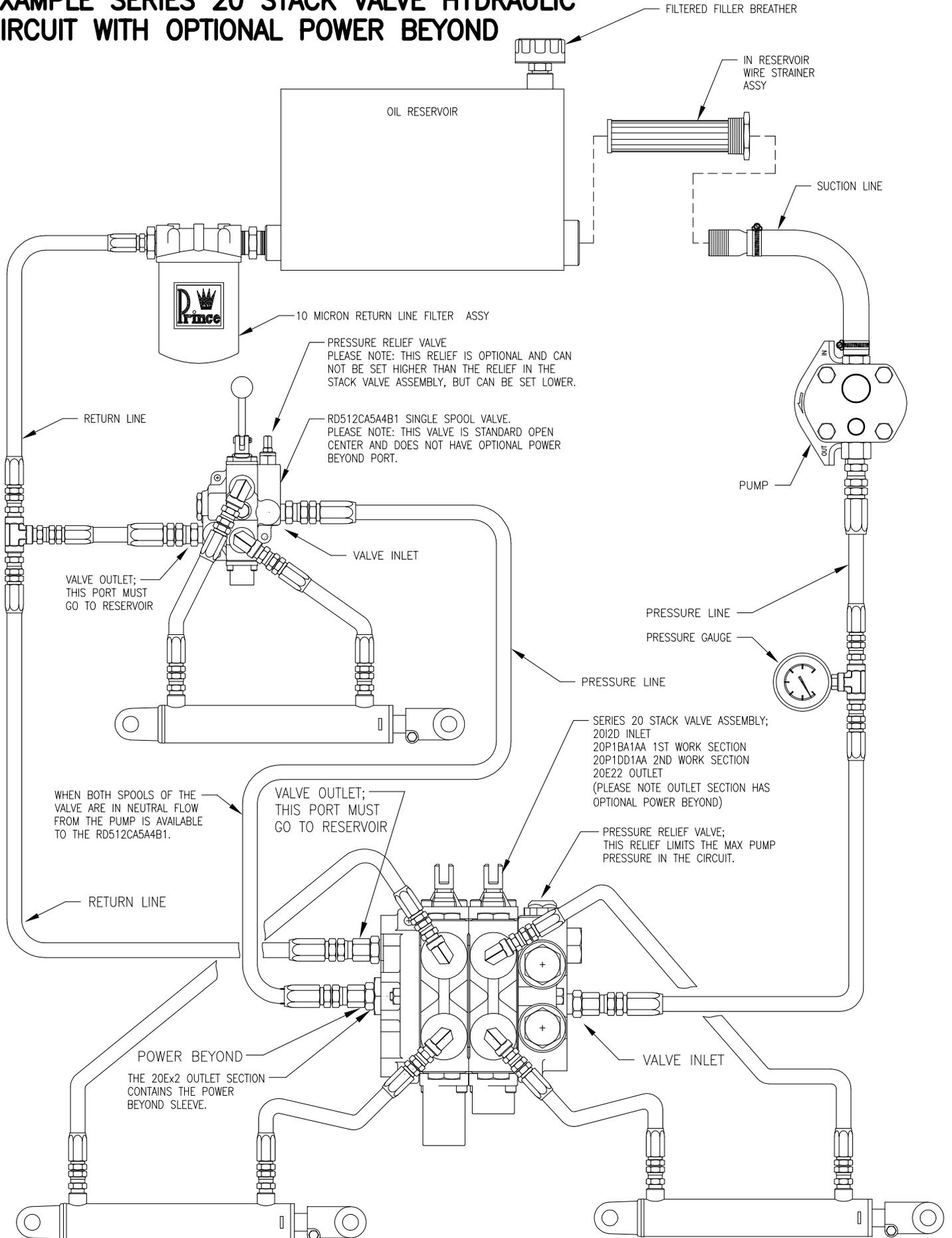
ITEM	QTY	PART NO.	DESCRIPTION	ITEM	QTY	PART NO.	DESCRIPTION
1	1	660390021	ACTUATOR BODY SUB-ASSY	26	2	671400089	STOP CUP
2	2	660263002	SOLENOID CARTRIDGE	27	1	670300127	SPRING, CENTERING
3	2	671800021	COIL NUT	28	1	671900033	ADAPTER, SPOOL
4	2	SEE CHART	SOLENOID COIL	29	1	671400091	END CAP
5	2	170003038	CAP SCREW	30	2	170003038	CAP SCREW
6	1	170003114	CAP SCREW				
7	2	240019016	SEAL WASHER				
8	1	240000115	O-RING				
9	1	240016627	SEAL RING				
10	1	240000020	O-RING				
11	2	240044020	BACKUP WASHER				
12	1	240000021	O-RING				
13	2	240044021	BACKUP WASHER				
14	1	240000023	O-RING				
15	1	240005023	BACKUP WASHER				
16	1	240000021	O-RING, FACE				
17	1	671400285	SLEEVE				
18	1	671900111	ADAPTER				
19	1	671400207	PIN				
20	2	190100087	PIN				
21	1	610100016	SPOOL				
22	1	671400287	ORIFICE PLUG, .035				
23	1	240000210	O-RING				
24	1	670500064	SPOOL BACKUP WASHER				
25	1	670500065	WASHER				

NOTES:

1. TORQUE 1/4-20 CAP SCREWS TO 9-11 FT-LBS.
2. VALVE BODY IS MACHINED TO ACCEPT THE ACTUATOR BODY. THIS OPTION CANNOT BE ADDED TO A STANDARD S20 WORK SECTION.

COIL OPTIONS:		COIL P/N:
12L	12 VDC LEAD WIRE	671302003
12Q	12 VDC SPADE	671322004
12H	12 VDC DIN	671302002
24L	24 VDC LEAD WIRE	671302007
24Q	24 VDC SPADE	671322008
24H	24 VDC DIN	671302006
11C	120 VAC CONDUIT	671302009
11H	120 VAC DIN	671302010
12W	12 VDC WEATHER PACK	671302013

EXAMPLE SERIES 20 STACK VALVE HYDRAULIC CIRCUIT WITH OPTIONAL POWER BEYOND





Prince Manufacturing Corporation

P.O. Box 7000

612 North Derby Lane

North Sioux City, SD 57049-7000

Phone: (605) 235-1220

OEM Sales Fax: (605) 235-1082 Distributor Sales Fax: (605) 217-6300

URL: www.princehyd.com

E-mail: prince@princehyd.com