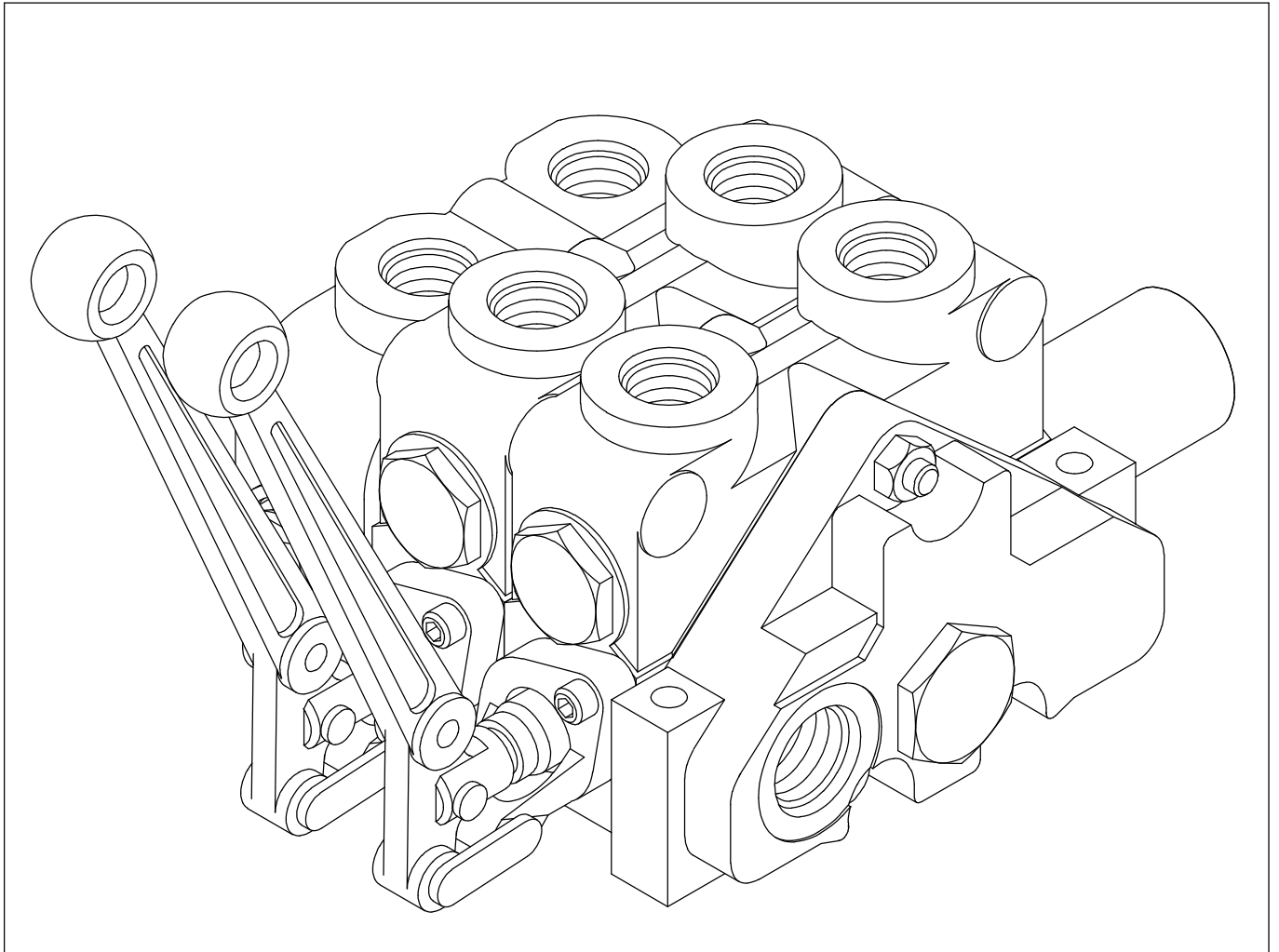
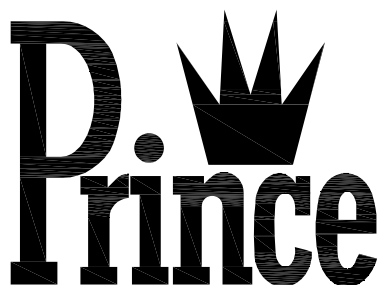


SERIES "20" SECTIONAL BODY DIRECTIONAL CONTROL VALVE PARTS MANUAL



PRINCE MANUFACTURING CORPORATION



Date: Aug 2022

INDEX	
PAGE:	
2	SAFETY PRECAUTIONS
3	ASSEMBLY INSTRUCTIONS, PORT IDENTIFICATION, AND SPECIFICATIONS
4-8	WORK SECTIONS
9-12	SPOOL IDENTIFICATION CHARTS
10-12	PORT RELIEF CARTRIDGES
13-17	SPOOL ATTACHMENT OPTIONS
18-20	HANDLE & JOYSTICK OPTIONS
21-27	INLET, MID-INLET & OUTLET SECTIONS
28-31	UTILITY SECTIONS (SOLENOID)
32-36	SOLENOID OPERATORS
37	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.

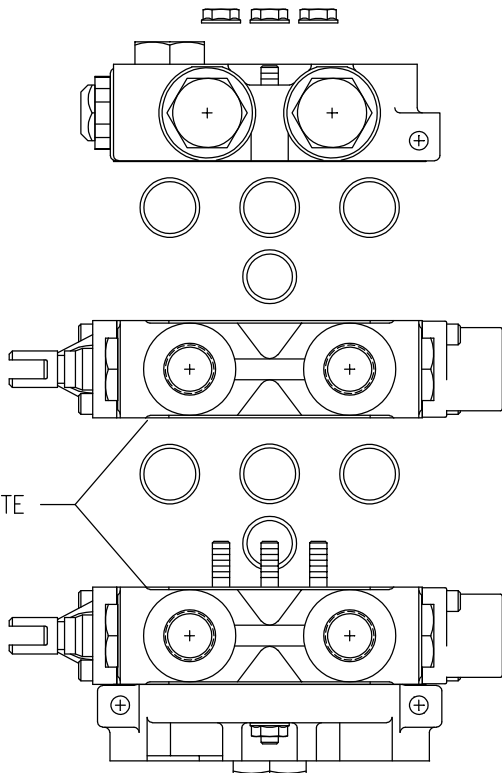


WARNING: DISCONNECTING THE HYDRAULIC LINES WHILE THE CYLINDER OR MOTOR IS UNDER LOAD MAY RESULT IN THE UNEXPECTED RAPID MOVEMENT OF MACHINE RESULTING IN SERIOUS PERSONAL INJURY.

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.



TIEROD KITS (INCL. BETWEEN SECTION SEALS):

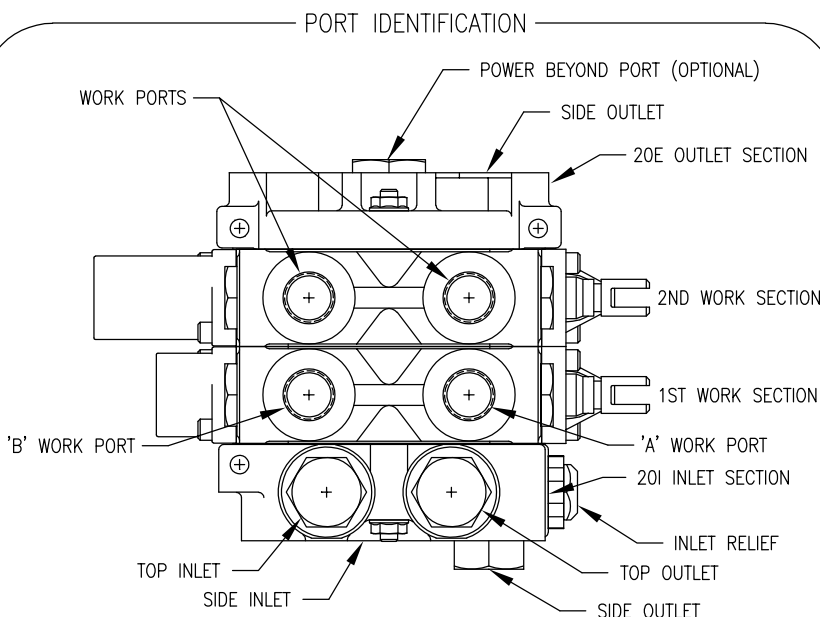
PART NO.:		PART NO.:	
660402001	1 SECTION*	660402005	5 SECTION*
660402002	2 SECTION*	660402006	6 SECTION*
660402003	3 SECTION*	660402007	7 SECTION*
660402004	4 SECTION*	660402008	8 SECTION*

*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.

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-LB.
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-LB.
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.



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.

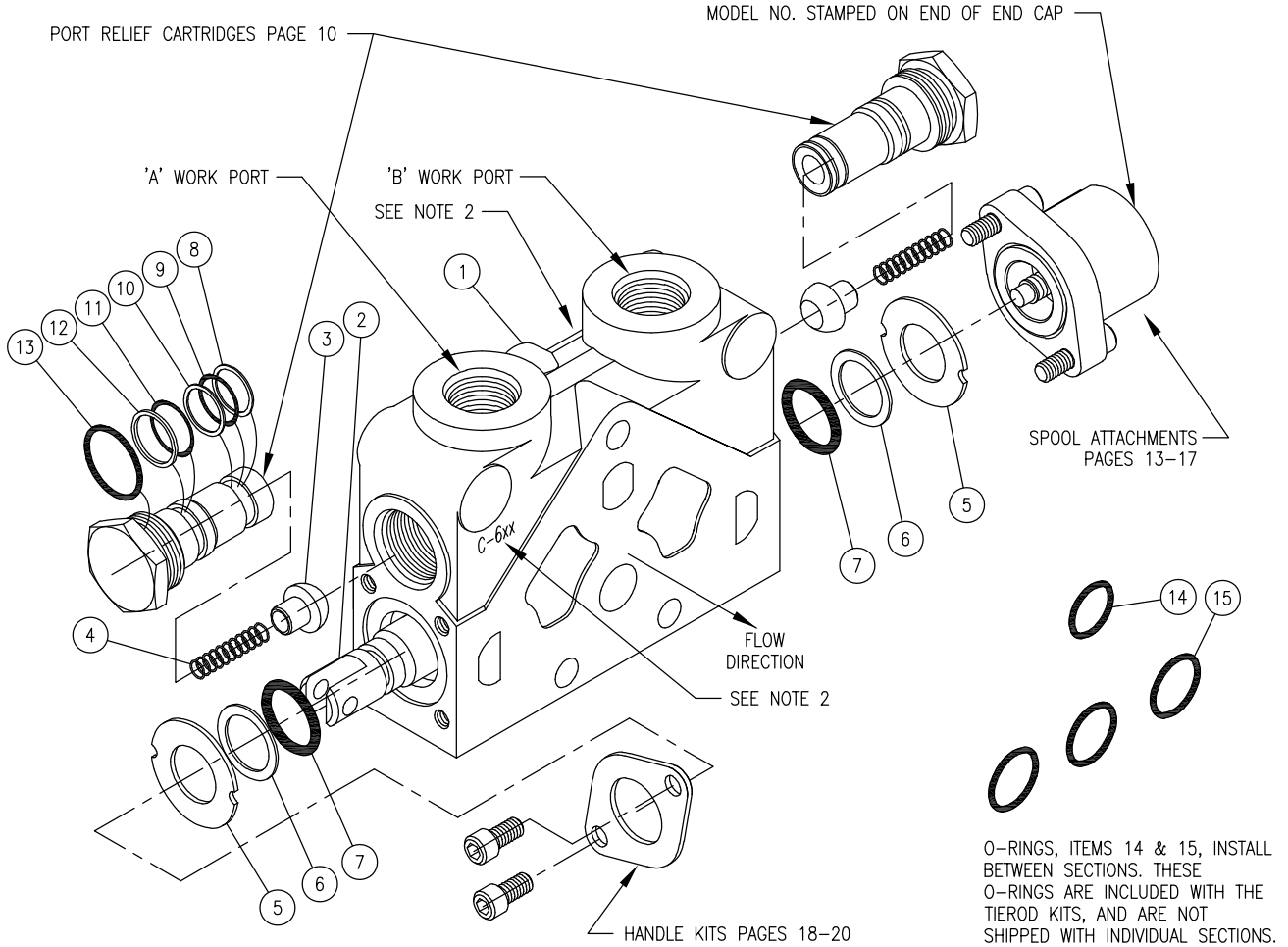
SERIES 20 SPECIFICATIONS

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



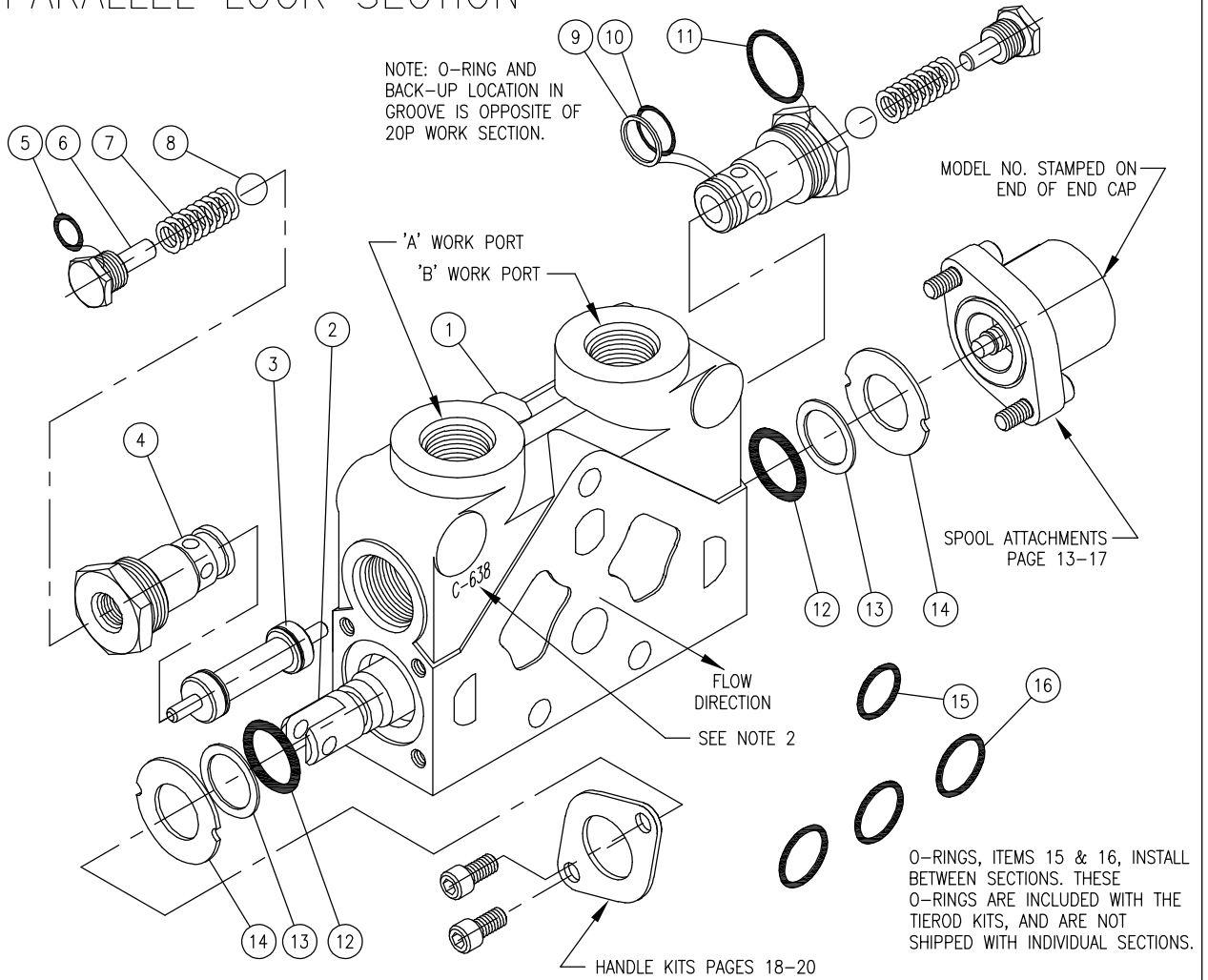
ITEM	QTY	PART NO.	DESCRIPTION
1	1		VALVE BODY
2	1	SEE NOTE 1	SPOOL
3	2	670100024	LOAD CHECK POPPET
4	2	670300056	LOAD CHECK SPRING
5	2 *	670500065	WASHER
6	2 *	670500064	SPOOL BACKUP WASHER
7	2 *	240000210	-210 O-RING
8	2	240005015	BACKUP WASHER
9	2	240000015	-015 O-RING
10	2	240005015	BACKUP WASHER
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

} These are matched parts and are not sold separately.
 } FOR SPOOL OPTION 'A' ONLY, 1 EACH, SEE PAGE 9.
 } REPLACEMENT SEAL KIT;
 } P/N 660585001
 } (SEE PAGE 14 FOR FLOAT SECTION SEAL KIT)
 } REPLACEMENT SEAL KIT P/N 660585004

NOTES:

- SEE SPOOL IDENTIFICATION CHART ON PAGE 9.
- 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 14)

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	240016830 *	BACKUP WASHER
10	2	240000015 *	-015 O-RING
11	2	240000117 *	-117 O-RING
12	2	240000210 *	-210 O-RING
13	2	670500064	SPOOL BACKUP 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.

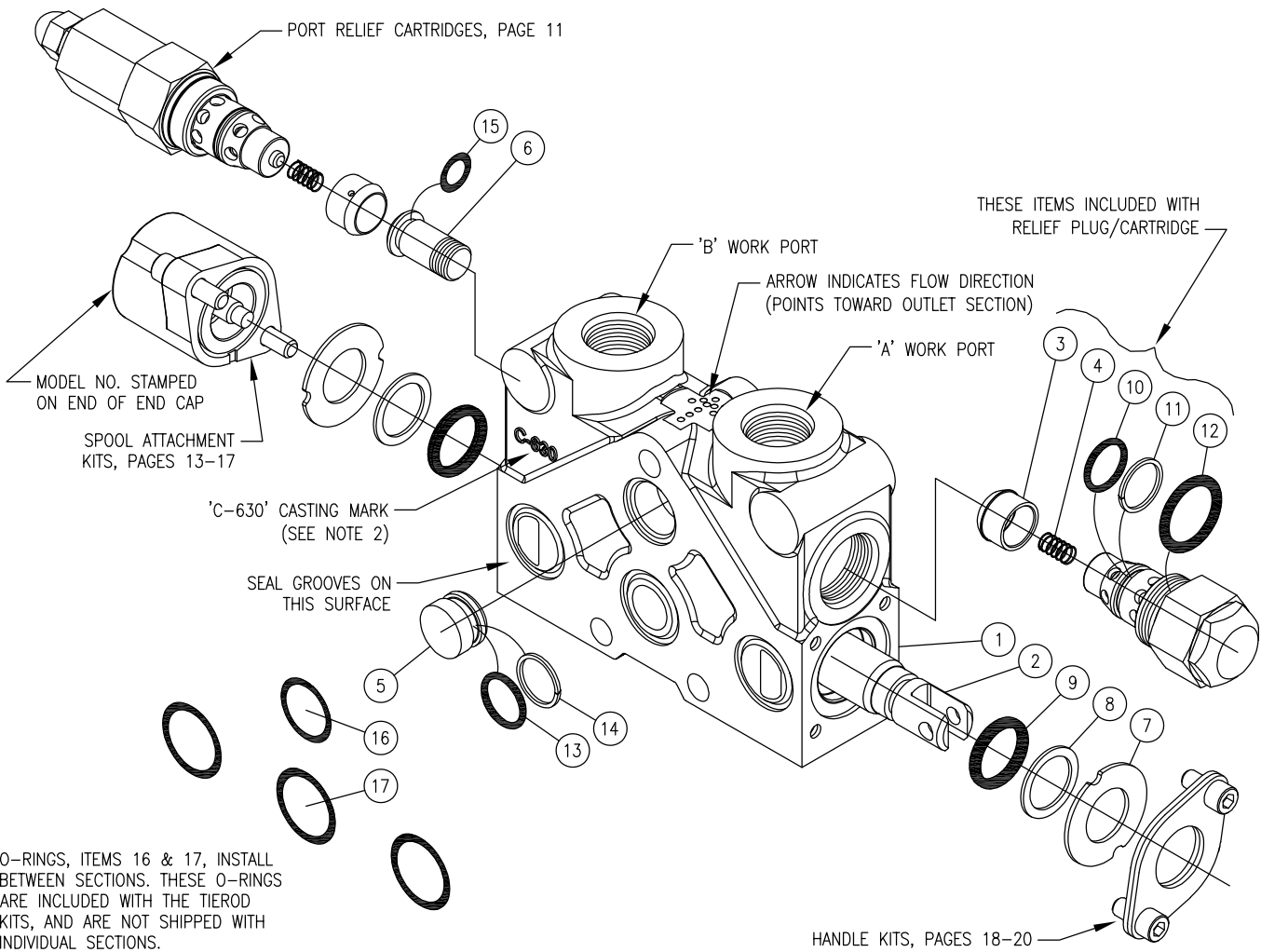
CHECK VALVE CARTRIDGE P/N 660290007

* REPLACEMENT SEAL KIT P/N 660585008

NOTES:

- SEE SPOOL IDENTIFICATION CHART ON PAGE 8.
- LOCK VALVE WORK SECTIONS HAVE 'C-638' ON RIGHT SIDE OF CASTING AND 'L' ON LEFT SIDE OF CASTING.

20S SERIES WORK SECTION



O-RINGS, ITEMS 16 & 17, INSTALL BETWEEN SECTIONS. THESE O-RINGS ARE INCLUDED WITH THE TIEROD KITS, AND ARE NOT SHIPPED WITH INDIVIDUAL SECTIONS.

ITEM	QTY	PART NO.	DESCRIPTION
1	1	-	VALVE BODY, SERIES } These are matched parts and are not sold separately.
2	1	SEE NOTE 1	SPOOL ASSY. }
3	2	670100045	LOAD CHECK POPPET
4	2	670300147	LOAD CHECK SPRING
5	1	671400337	PLUG
6	1	671600141	PLUG, HEX SOCKET
7	2	670500065	WASHER
8	2	670500064	SPOOL B/U WASHER
9	2	240000210	-210 O-RING
10	2	240000016	-016 O-RING
11	2	240005016	B/U WASHER
12	2	240000117	-117 O-RING
13	1	240000016	-016 O-RING
14	1	240005016	B/U WASHER
15	1	240000905	O-RING
16	1	240000019	-019 O-RING } REPLACEMENT SEAL KIT
17	3	240000021	-021 O-RING } P/N 660585004

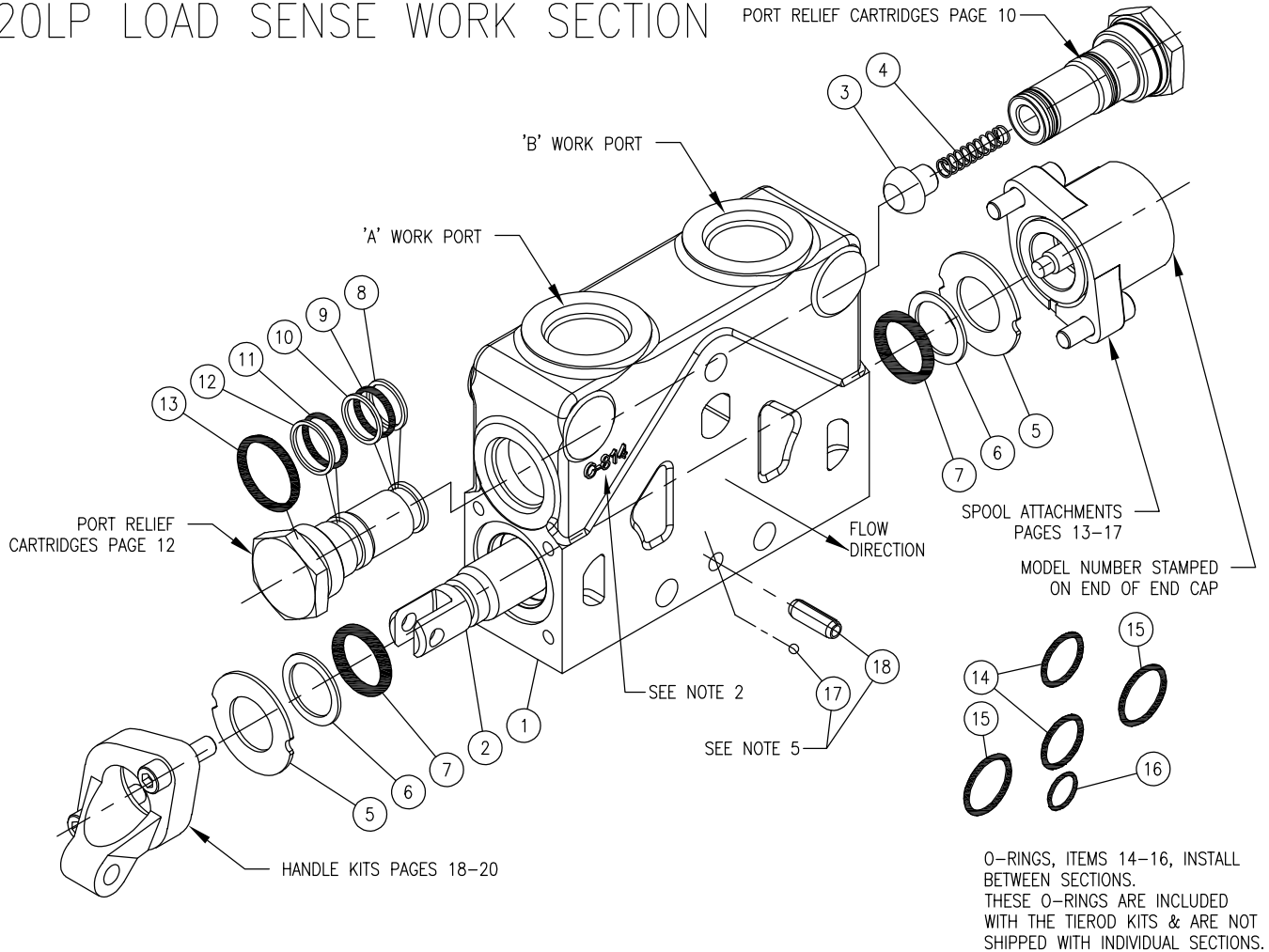
REPLACEMENT SEAL KIT
P/N 660585013

NOTES:

- SEE '20S' SERIES SPOOL IDENTIFICATION CHART ON PAGE 11.
- '20S' SERIES WORK SECTIONS HAVE 'C-630' CASTING NO. ON LEFT SIDE, ADJACENT TO 'B' WORK PORT. O-RING GROOVES ARE ON THE OPPOSITE FACE (RELATIVE TO CASTING MARK) AS COMPARED TO OTHER STANDARD 20P SECTIONS.
- A SERIES SECTION MUST BE FOLLOWED BY ANOTHER SERIES SECTION, A TANDEM SECTION, OR THE OUTLET SECTION IN A STACK VALVE ASSEMBLY.

20LP LOAD SENSE WORK SECTION

PORT RELIEF CARTRIDGES PAGE 10



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	2	240000019	-019 O-RING
15	2	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.

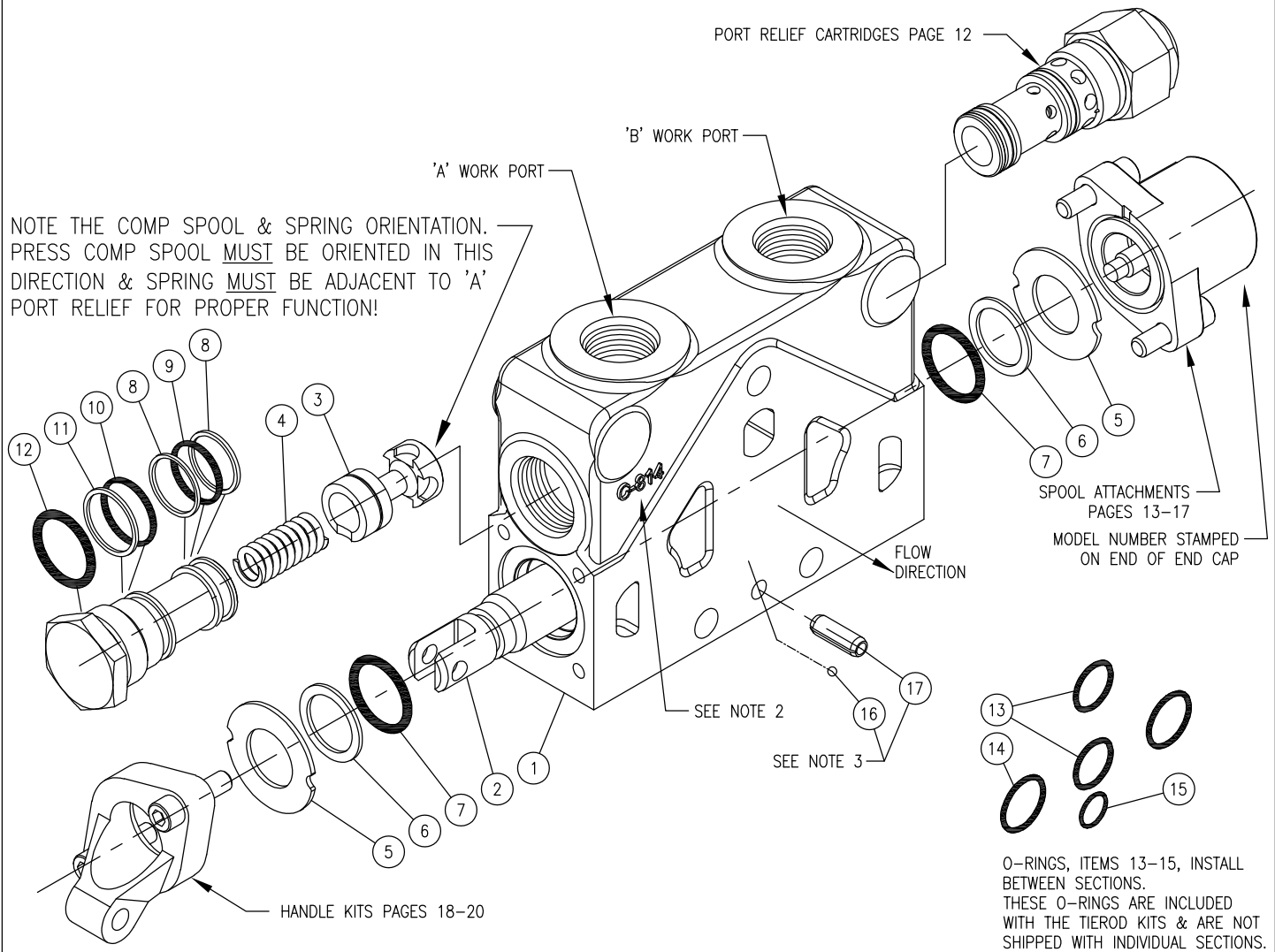
REPLACEMENT SEAL KIT P/N 660585001 (SEE PAGE 14 FOR FLOAT SECTION SEAL KIT)

REPLACEMENT SEAL KIT P/N 660585004

NOTES:

- SEE SPOOL IDENTIFICATION CHART ON PAGE 9.
- 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 14.
- INSTALL STEEL BALL INTO ANGLED HOLE PRIOR TO INSTALLING SPRING PIN. PRESS SPRING PIN IN TO A DEPTH OF .150" BELOW SURFACE OF BODY TO RETAIN STEEL BALL.

20LPC LOAD SENSE PRESSURE COMPENSATED WORK SECTION



O-RINGS, ITEMS 13-15, INSTALL BETWEEN SECTIONS. THESE O-RINGS ARE INCLUDED WITH THE TIEROD KITS & ARE NOT SHIPPED WITH INDIVIDUAL SECTIONS.

ITEM	QTY.	PART NO.	DESCRIPTION
1	1	-	VALVE BODY
2	1	SEE NOTE 1	SPOOL
3	1	610101002	SPOOL, PRESSURE COMPENSATOR
4	1	670300152	SPRING, PRESSURE COMPENSATOR
5	2	670500065	WASHER
6	2	670500064	SPOOL BACKUP WASHER
7	2	240000210	-210 O-RING
8	4	240005017	BACKUP WASHER
9	2	240000017	-017 O-RING
10	2	240005018	BACKUP WASHER
11	2	240000018	-018 O-RING
12	2	240000117	-117 O-RING
13	2	240000019	-019 O-RING
14	2	240000021	-021 O-RING
15	1	240000011	-011 O-RING
16	1	230009024	STEEL BALL
17	1	190100071	SPRING PIN

These are matched parts and are not sold separately.

REPLACEMENT SEAL KIT P/N 660585001

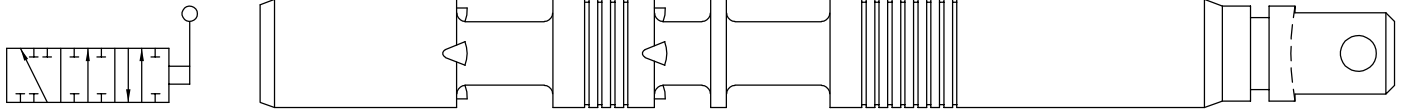
REPLACEMENT SEAL KIT P/N 660585004

NOTES:

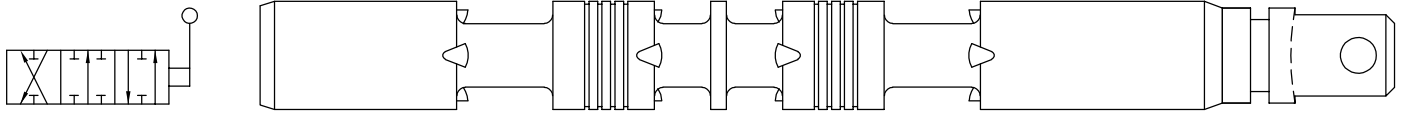
- SEE PAGE 12 FOR 20LPC SPOOL IDENTIFICATION CHART AND PORT RELIEF CARTRIDGE INFORMATION.
- LOAD SENSE PRESSURE COMPENSATED WORK SECTIONS HAVE 'C-814' CASTING NO. ON RIGHT SIDE OF CASTING AND 'LS' ON LEFT SIDE OF CASTING (WHEN VIEWED FROM FRONT/HANDLE END OF SECTION).
- INSTALL STEEL BALL INTO ANGLED HOLE PRIOR TO INSTALLING SPRING PIN. PRESS SPRING PIN IN TO A DEPTH OF .150" BELOW SURFACE OF BODY TO RETAIN STEEL BALL.

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

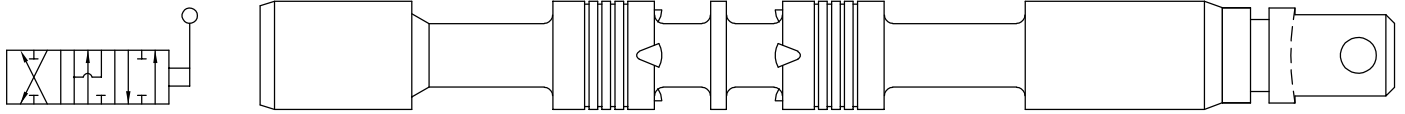
OPTION 'A' 3 WAY 3 POSITION WORK PORT BLOCKED IN NEUTRAL, 'A' PORT PLUGGED (SEE BELOW)



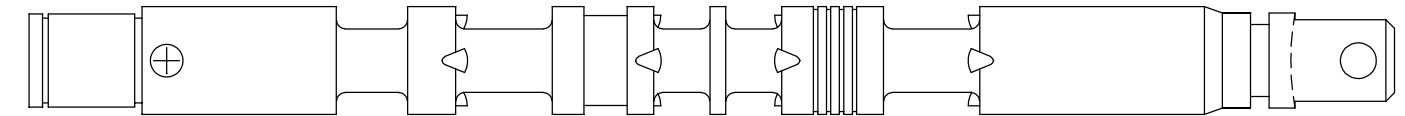
OPTION 'B' 4 WAY 3 POSITION TANDEM CENTER WORK PORTS BLOCKED IN NEUTRAL



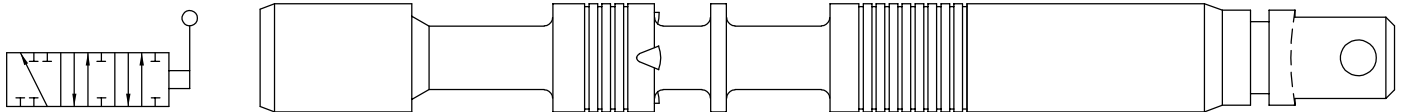
OPTION 'C' 4 WAY 3 POSITION MOTOR, WORK PORTS OPEN IN NEUTRAL



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

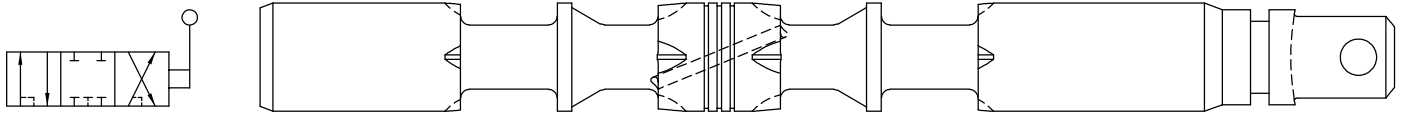


OPTION 'E' 3 WAY 3 POSITION MOTOR, WORK PORT TO TANK IN NEUTRAL, 'A' PORT PLUGGED (SEE BELOW)

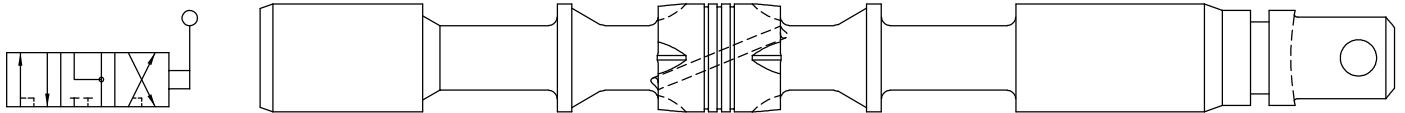


SERIES 20 LOAD SENSE (20LP) SPOOLS

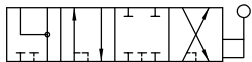
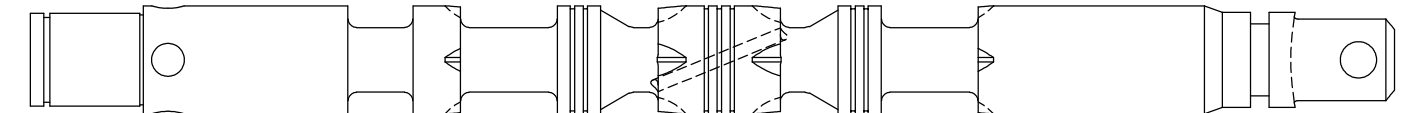
OPTION 'J' 4 WAY 3 POSITION TANDEM CENTER, LOAD SENSE, WORK PORTS BLOCKED IN NEUTRAL



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



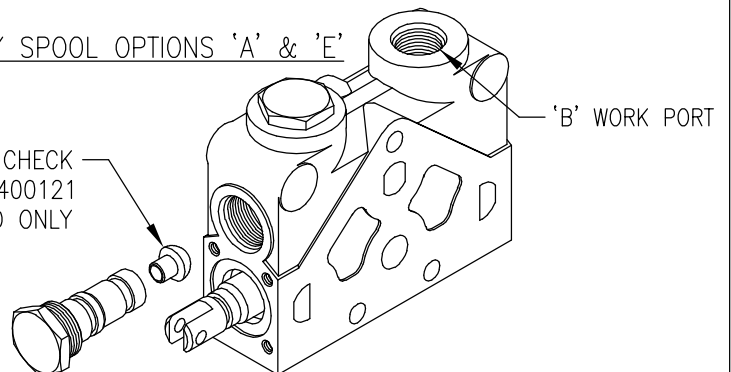
OPTION 'M' 4 WAY 4 POSITION TANDEM CENTER FLOAT, LOAD SENSE, WORK PORTS BLOCKED IN NEUTRAL



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

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

3-WAY LOAD CHECK
PLUG 671400121
THIS END ONLY



WORK PORT RELIEF CARTRIDGES FOR 20P, 20T, 20L, 20LP SECTIONS

(FOR '20S' SECTIONS, SEE PG. 11)
(FOR '20LPC' SECTIONS, SEE PG. 12)

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

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
	660190043	SHIM KIT/ASSORTMENT
	660585012	SEAL KIT, ALL CARTRIDGES

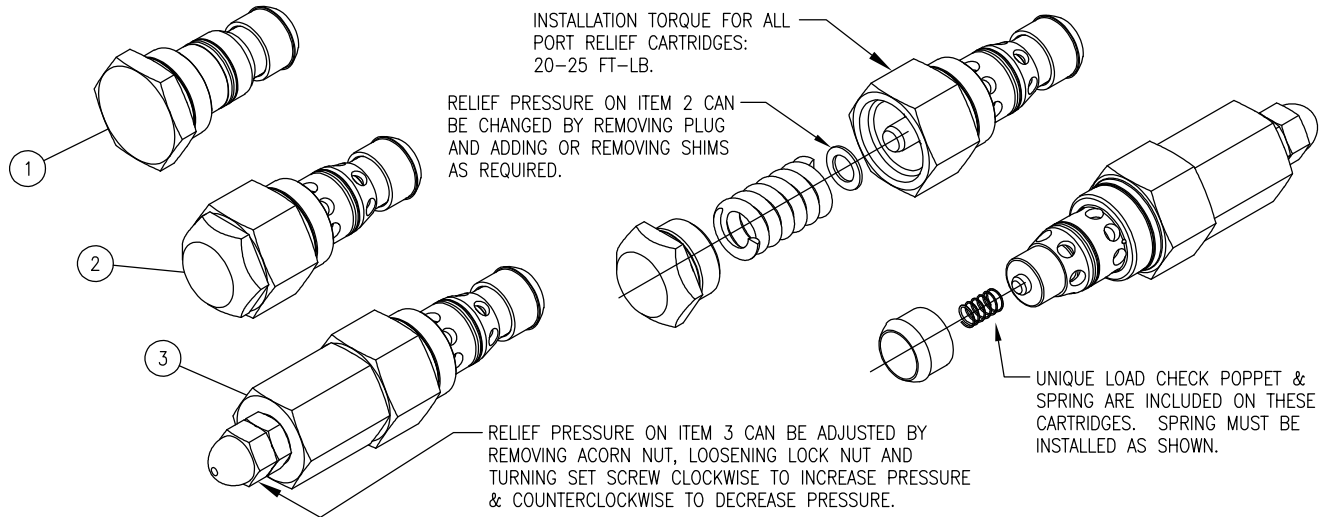
NOTE: PORT RELIEF CARTRIDGE CAN BE ORDERED PRESET TO A SPECIFIC PRESSURE, SEE '20PR' ORDER CODE IN CATALOG. PART NUMBERS SHOWN ABOVE ARE NOT PRESET.

SEE PAGE 21 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).

WORK PORT RELIEF CARTRIDGES FOR '20S' SERIES SECTIONS



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	660290020	OPTION A; NO-RELIEF PLUG ASSY.
2	660290621	OPTION B; SHIM ADJ. RELIEF CART. 500-1350 PSI (STANDARD SETTING 1350 PSI)
2	660290623	OPTION C; SHIM ADJ. RELIEF CART. 1351-1750 PSI (STANDARD SETTING 1750 PSI)
2	660290625	OPTION D; SHIM ADJ. RELIEF CART. 1751-2200 PSI (STANDARD SETTING 2200 PSI)
2	660290627	OPTION E; SHIM ADJ. RELIEF CART. 2201-3000 PSI (STANDARD SETTING 2500 PSI)
3	660290601	OPTION F; ADJUSTABLE RELIEF CART. 500-1350 PSI (STANDARD SETTING 1350 PSI)
3	660290603	OPTION G; ADJUSTABLE RELIEF CART. 1351-1750 PSI (STANDARD SETTING 1750 PSI)
3	660290605	OPTION H; ADJUSTABLE RELIEF CART. 1751-2200 PSI (STANDARD SETTING 2200 PSI)
3	660290607	OPTION J; ADJUSTABLE RELIEF CART. 2201-3000 PSI (STANDARD SETTING 2500 PSI)
	672000202	.010 SHIM
	672000203	.018 SHIM
	672000204	.026 SHIM
	672000205	.041 SHIM
	660190043	SHIM KIT

(SHIM QTY. & THICKNESS ARE AS REQUIRED)

NOTE: THE PORT RELIEF CARTRIDGES AS SHOWN HERE ARE NOT PRESET TO A SPECIFIC PRESSURE. SHIM ADJUSTABLE CARTRIDGES INCLUDE SHIM KIT 660190043.

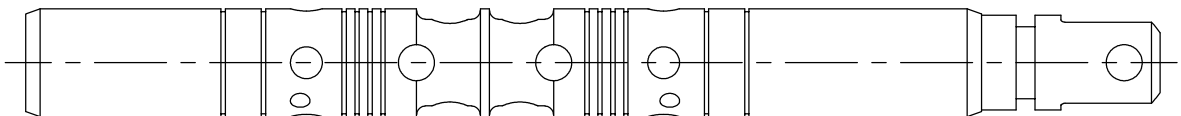
SEE PAGE 21 FOR RELIEF SPRING PART NUMBERS

NOTES:

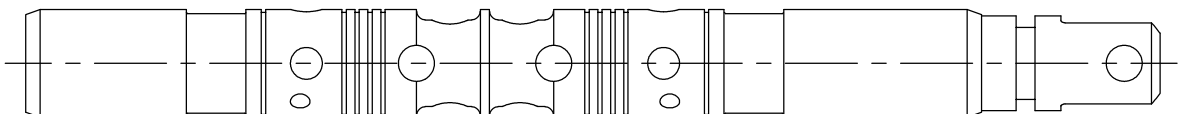
1. DUE TO INTERFERENCE, ADJUSTABLE PORT RELIEF CARTRIDGES (ITEM 3) CANNOT BE USED ON THE 'A' PORT END OF WORK SECTION WHEN THE STANDARD LEVER HANDLE (HANDLE OPTION 1) IS USED.

'20S' SERIES SPOOL ASSY'S:

OPTION 'N'; SERIES SECTION, 4 WAY 3 POSITION TANDEM CENTER, WORK PORTS BLOCKED IN NEUTRAL.

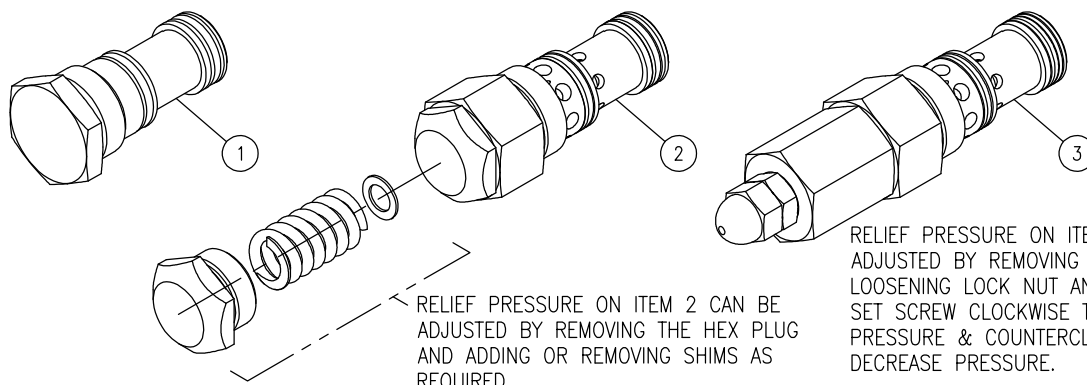


OPTION 'P'; SERIES SECTION, 4 WAY 3 POSITION MOTOR SPOOL, WORK PORTS OPEN TO TANK IN NEUTRAL.



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

WORK PORT RELIEF CARTRIDGES FOR '20LPC' PRESSURE COMP. SECTIONS



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

RELIEF PRESSURE ON ITEM 2 CAN BE ADJUSTED BY REMOVING THE HEX PLUG AND ADDING OR REMOVING SHIMS AS REQUIRED.



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	660290022	OPTION A; NO-RELIEF PLUG ASSY.
2	660290641	OPTION B; SHIM ADJ. RELIEF CART. 500-1350 PSI (STANDARD SETTING 1350 PSI)
2	660290643	OPTION C; SHIM ADJ. RELIEF CART. 1351-1750 PSI (STANDARD SETTING 1750 PSI)
2	660290645	OPTION D; SHIM ADJ. RELIEF CART. 1751-2200 PSI (STANDARD SETTING 2200 PSI)
2	660290647	OPTION E; SHIM ADJ. RELIEF CART. 2201-3000 PSI (STANDARD SETTING 2500 PSI)
3	660290661	OPTION F; ADJUSTABLE RELIEF CART. 500-1350 PSI (STANDARD SETTING 1350 PSI)
3	660290663	OPTION G; ADJUSTABLE RELIEF CART. 1351-1750 PSI (STANDARD SETTING 1750 PSI)
3	660290665	OPTION H; ADJUSTABLE RELIEF CART. 1751-2200 PSI (STANDARD SETTING 2200 PSI)
3	660290667	OPTION J; ADJUSTABLE RELIEF CART. 2201-3000 PSI (STANDARD SETTING 2500 PSI)
	672000202	.010 SHIM
	672000203	.018 SHIM
	672000204	.026 SHIM
	672000205	.041 SHIM
	660190043	SHIM KIT

NOTE: INDIVIDUAL PORT RELIEF CARTRIDGES AS SHOWN HERE ARE NOT PRESET TO A SPECIFIC PRESSURE. INDIVIDUAL SHIM ADJUST. CARTS. INCLUDE SHIM KIT 660190043.

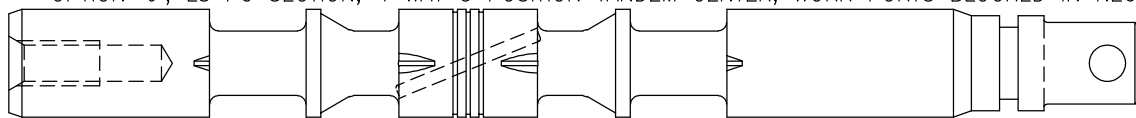
SEE PAGE 21 FOR RELIEF SPRING PART NUMBERS

NOTES:

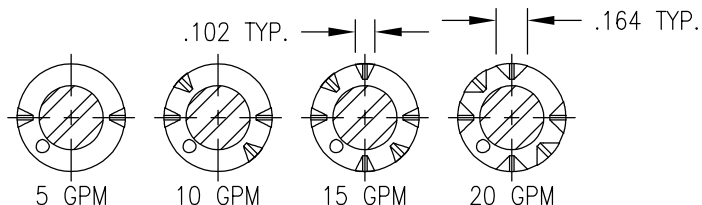
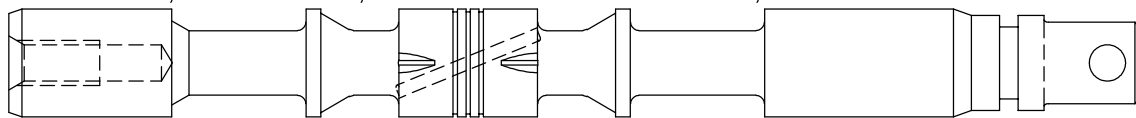
1. DUE TO INTERFERENCE, ADJUSTABLE PORT RELIEF CARTRIDGES (ITEM 3) CANNOT BE USED ON THE 'A' PORT END OF WORK SECTION WHEN THE STANDARD LEVER HANDLE (HANDLE OPTION 1) IS USED.

SPOOLS FOR '20LPC' LOAD SENSE PRESSURE COMPENSATED SECTIONS:

OPTION 'J'; LS PC SECTION, 4 WAY 3 POSITION TANDEM CENTER, WORK PORTS BLOCKED IN NEUTRAL.



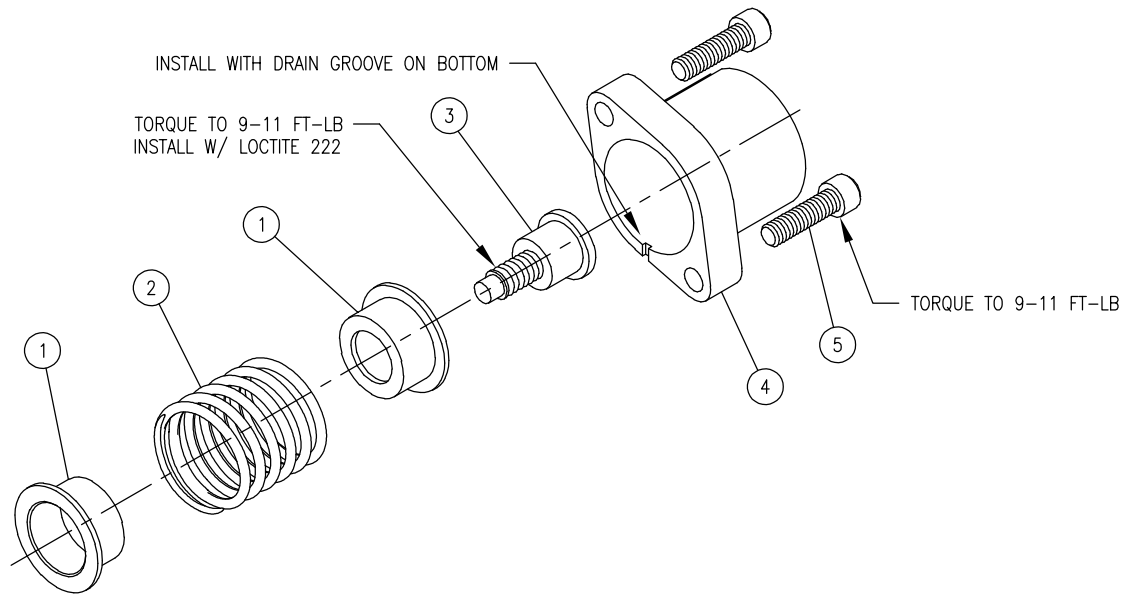
OPTION 'K'; LS PC SECTION, 4 WAY 3 POSITION MOTOR SPOOL, WORK PORTS OPEN TO TANK IN NEUTRAL.



NOTE: ENDS OF SPOOL WILL VARY DEPENDING ON DESIGN OF SECTION.

NOTE: THE NUMBER OF METERING NOTCHES IS THE DISTINGUISHING FEATURE BETWEEN THE 5, 10, 15 & 20 GPM SPOOLS. THE 5 GPM SPOOL (SHOWN ABOVE) HAS 2 SETS (ROWS) OF NOTCHES, THE 10 GPM SPOOL HAS 4 SETS, THE 15 GPM HAS 6 SETS, AND THE 20 GPM HAS 6 SETS OF LARGER NOTCHES.

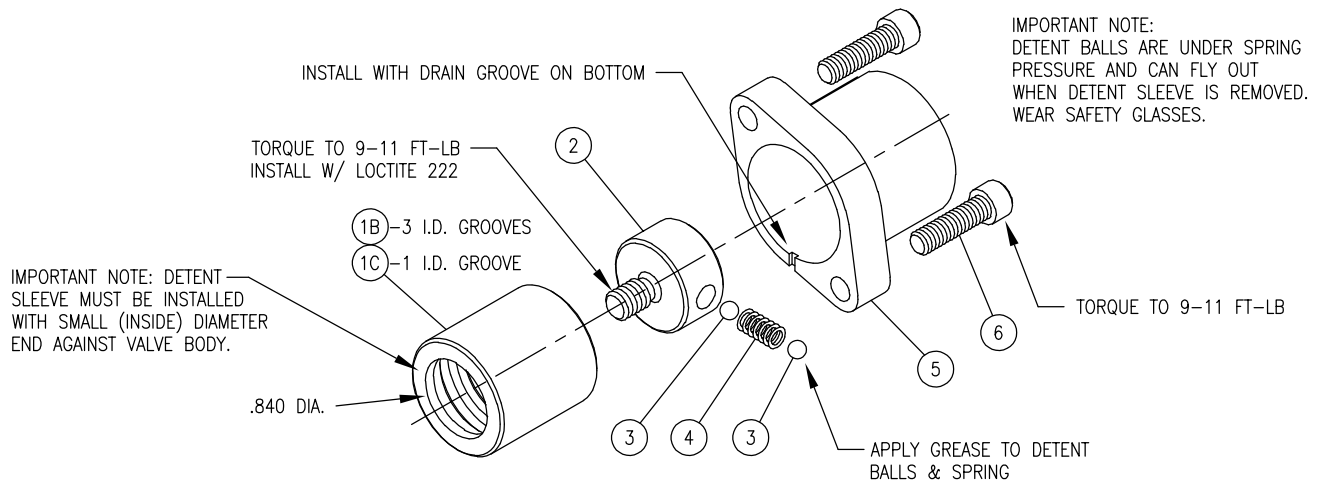
NOTE: SPOOLS ARE NOT AVAILABLE AS REPAIR PARTS. THIS INFORMATION IS FOR IDENTIFICATION PURPOSES.



SPRING CENTER TO NEUTRAL, SPOOL ATTACHMENT OPTION A

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

} SPRING CENTER KIT, P/N 660190003

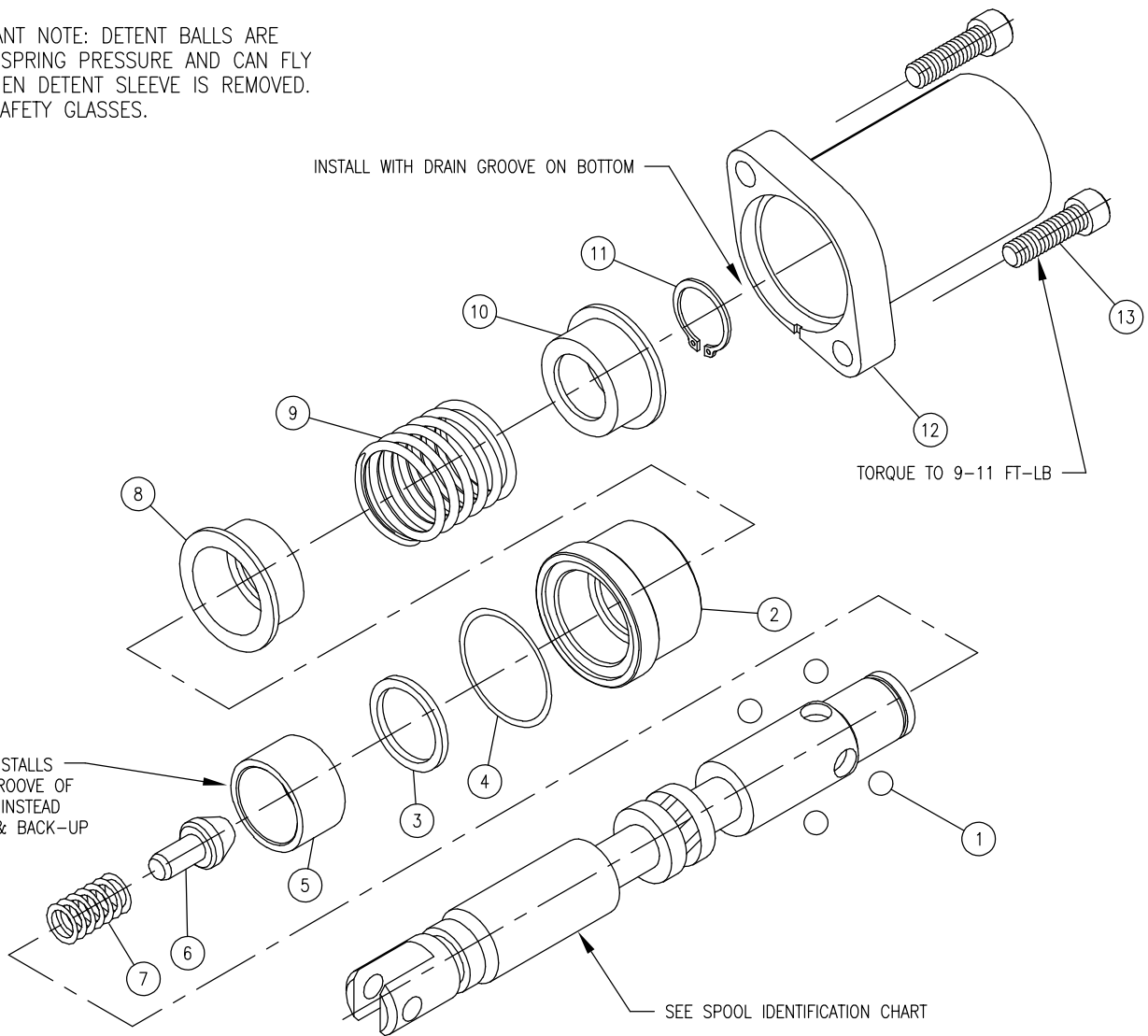


3 POSITION DETENT, SPOOL ATTACHMENT OPTION B
 FRICTION DETENT, SPOOL ATTACHMENT OPTION C

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); P/N 660190004
 FRICTION DETENT KIT (INCL. ITEM 1C); P/N 660190005

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



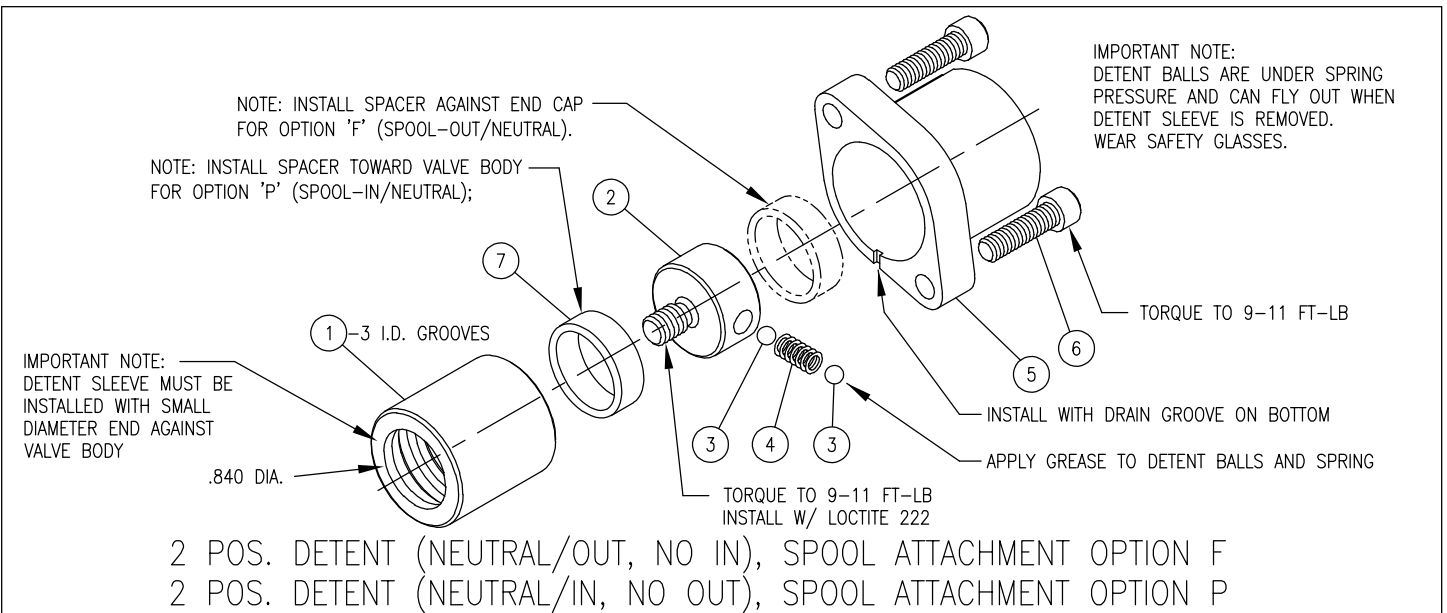
SPRING CENTER FLOAT DETENT SPOOL ATTACHMENT OPTION D

ITEM	QTY	PART NO.	DESCRIPTION
1	4	230009017	STEEL BALL
2	1	670700042	FLOAT DETENT SLEEVE
3	1	240010116	QUAD RING
4	1	240000023	023 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

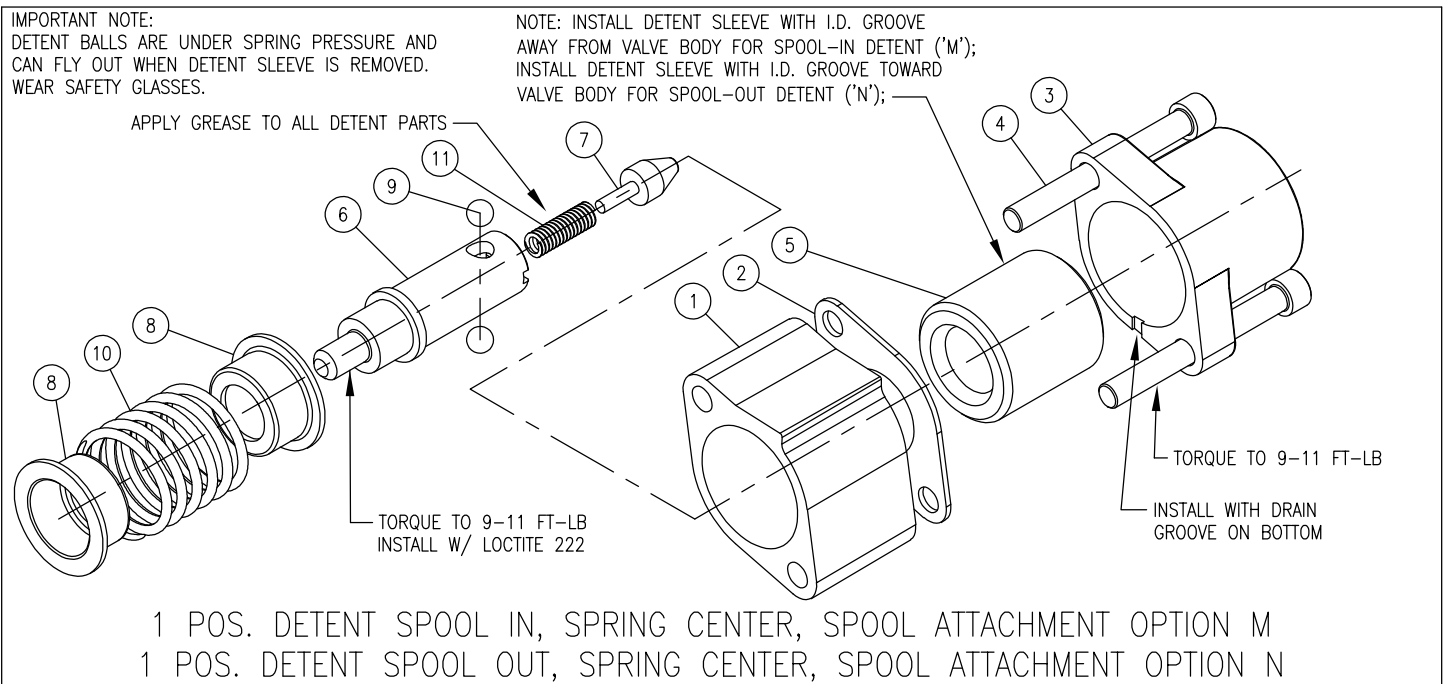
NOTES:

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.



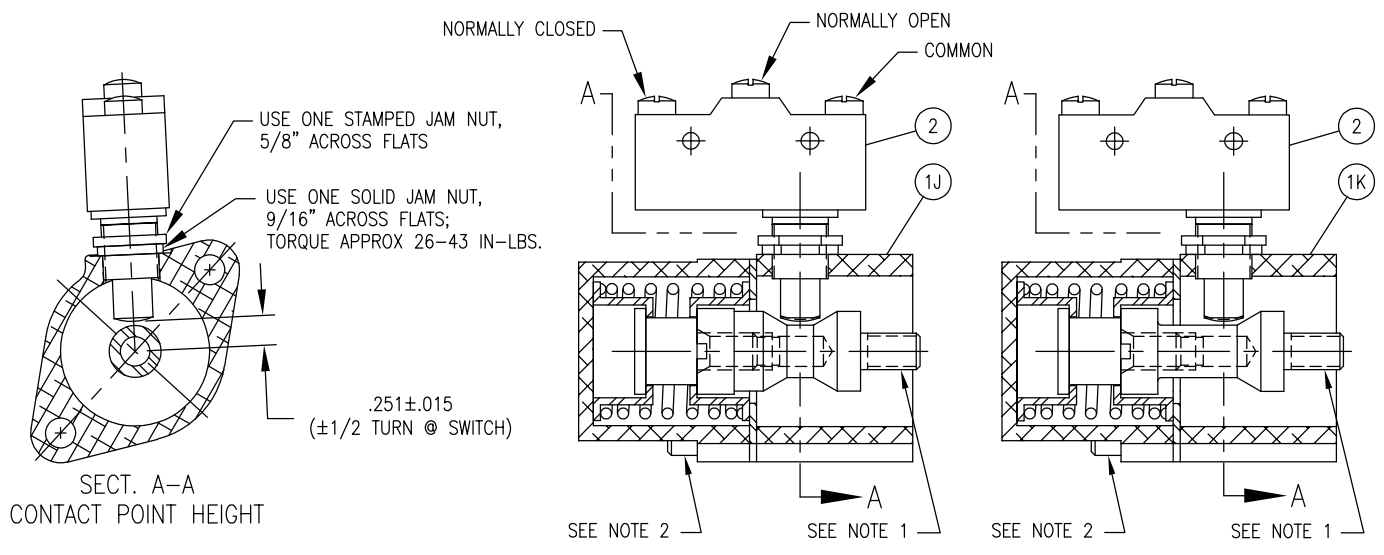
ITEM	QTY	PART NO.	DESCRIPTION
1	1	670700041	3 POSITION DETENT SLEEVE
2	1	670700040	DETENT RETAINER
3	2	230009009	STEEL BALL
4	1	670300059	SPRING, DETENT
5	1	671400091	END CAP
6	2	170003038	CAP SCREW
7	1	671200041	SPACER, DETENT

} 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

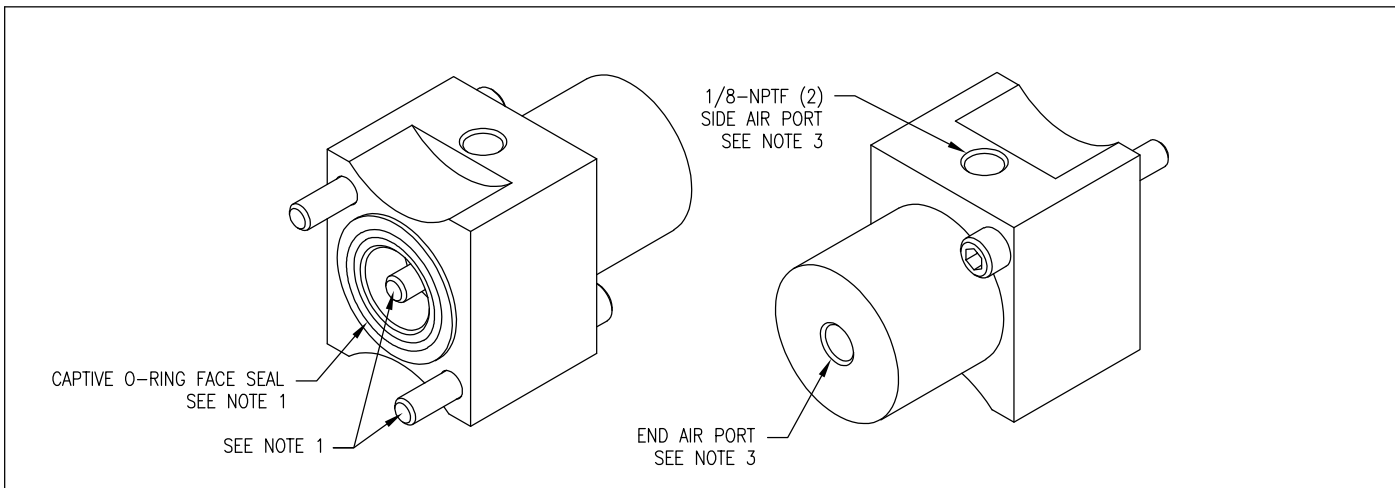


NOTES:

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

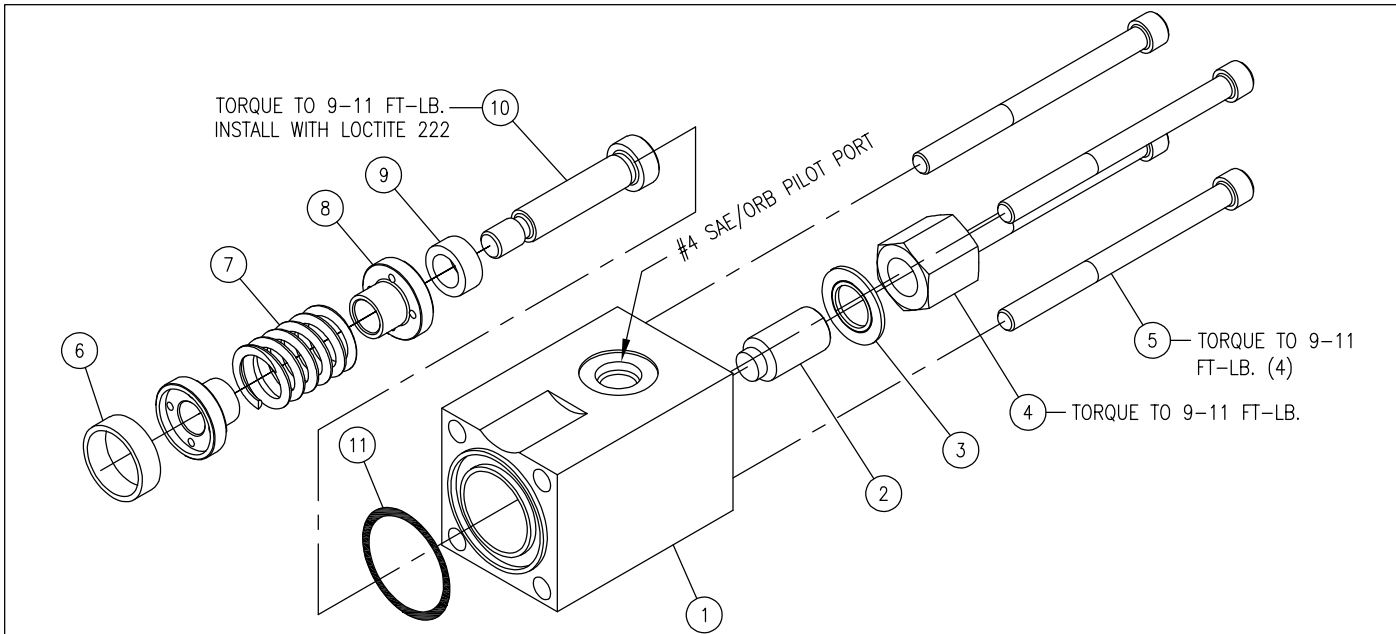


NOTES:

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-LB. TORQUE 1/4-20 CAP SCREWS TO 9-11 FT-LB.
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.



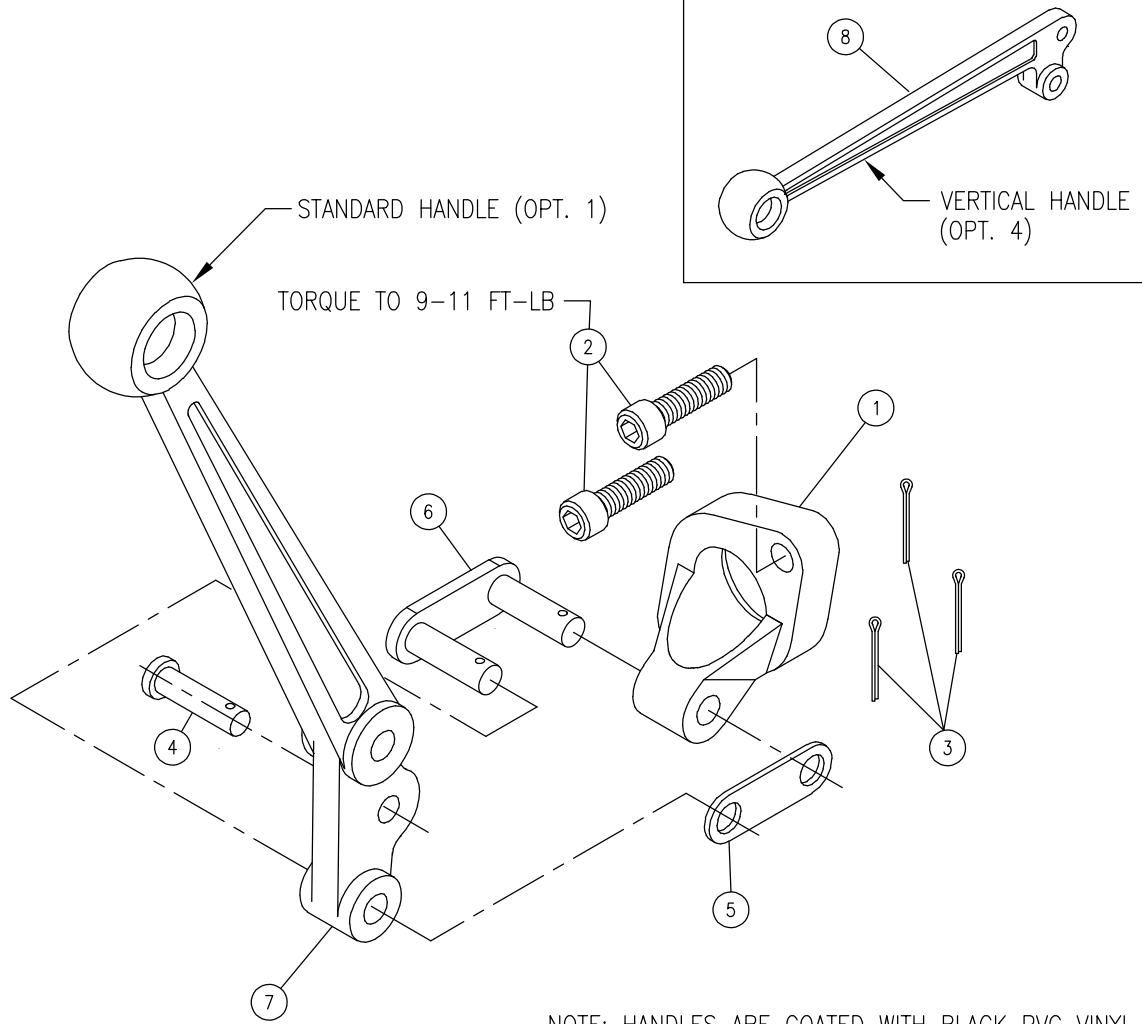
HYDRAULIC ACTUATOR, SPOOL ATTACHMENT OPTION H

ITEM	QTY *	PART NO.	DESCRIPTION
1	1	670600066	ACTUATOR BODY
2	1	220000432	SET SCREW, DOG POINT
3	1	500507512	SEALING WASHER
4	1	500507514	ACORN NUT
5	4	170003055	HEX SOCKET CAP SCREW
6	1	671200066	SPACER
7	1	670300132	SPRING, CENTERING
8	2	671400158	SPRING END
9	1	671200023	WASHER
10	1	220000415	SHOULDER SCREW
11	1	240000122	-122 O-RING SEAL

HYDRAULIC ACTUATOR KIT, #660190055

NOTES:

1. * - QUANTITIES SHOWN ARE PER ACTUATOR (2 ACTUATORS REQUIRED PER WORK SECTION).
2. THE O-RING SEAL, ITEM 11, IS NOT INCLUDED IN ANY SEAL KIT.

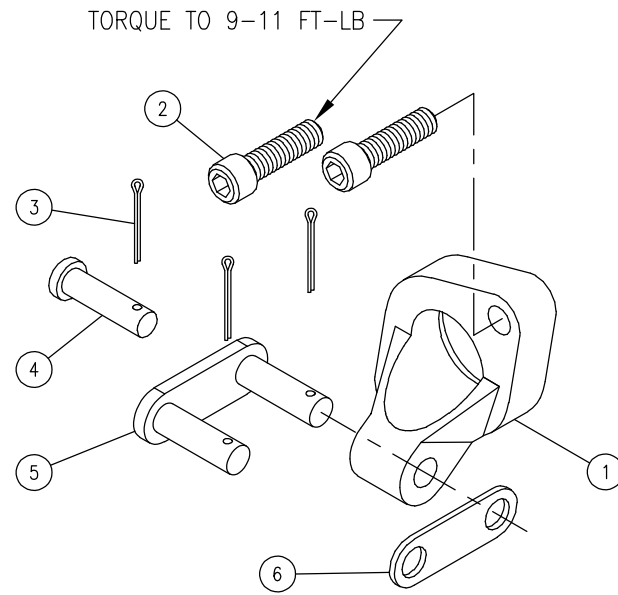


COMPLETE STANDARD HANDLE KIT (OPTION 1)

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	670500133	LINK ASSY
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)

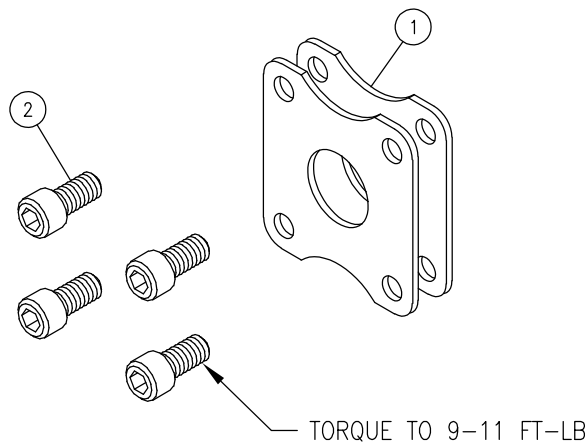
COMPLETE VERTICAL HANDLE KIT (OPTION 4)

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	670500133	LINK ASSY
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)



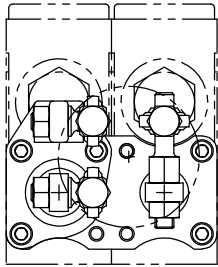
LESS HANDLE ONLY (OPTION 2)

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	670500133	LINK ASSY
6	1	670500066	LINK, FLAT
			CLEVIS KIT P/N 660190026 PIN KIT P/N 660190011 COMPLETE KIT P/N 660190027

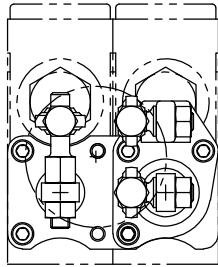


LESS COMPLETE HANDLE (OPTION 3)

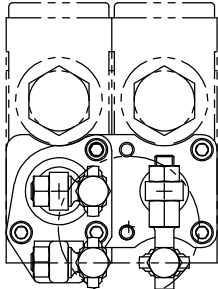
ITEM	QTY	PART NO.	DESCRIPTION
1	2	670500111	PLATE, RETAINER
2	4	170003017	CAP SCREW
			RETAINER KIT P/N 660190025



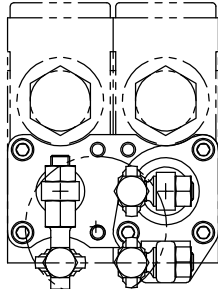
CLEVIS TANG UPPER LEFT



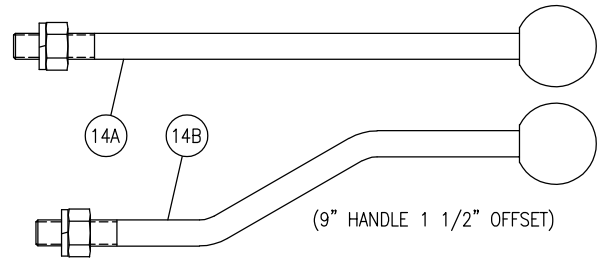
CLEVIS TANG UPPER RIGHT



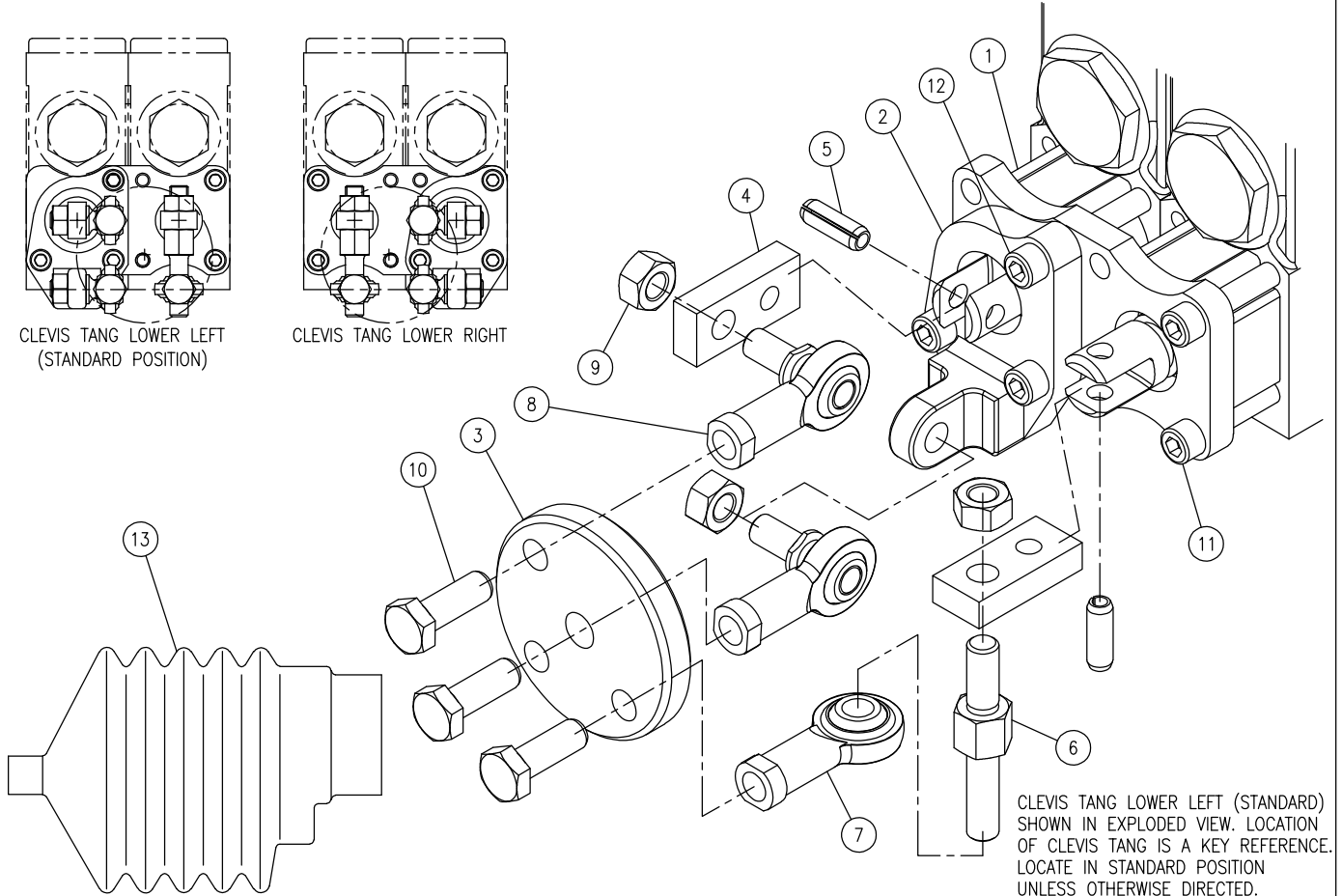
CLEVIS TANG LOWER LEFT
(STANDARD POSITION)



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

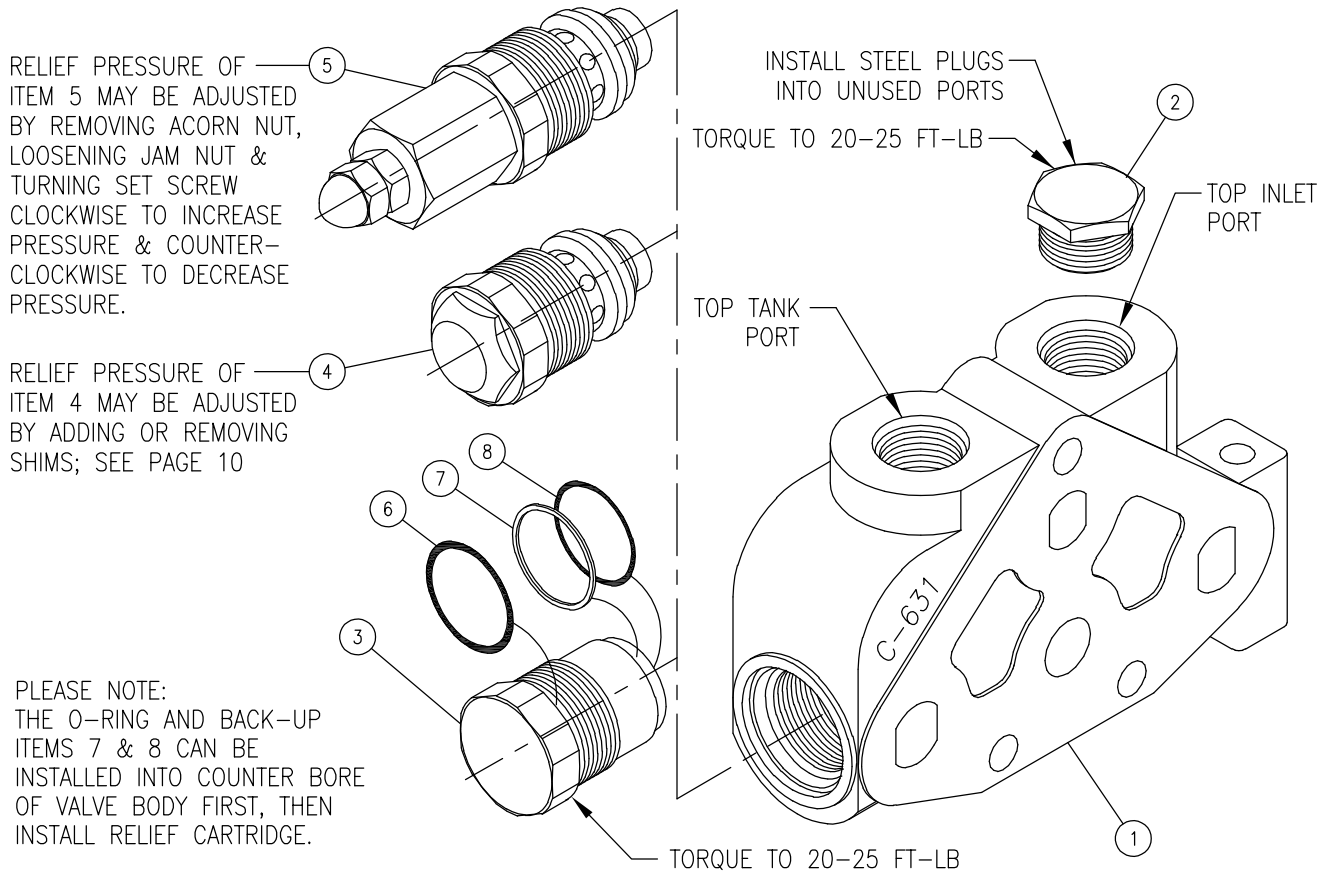
ITEM	QTY	PART NO.	DESCRIPTION
1	1	671200037	SPACER
2	1	671400165	CLEVIS
3	1	671400166	HANDLE PLATE
4	2	671400230	SPOOL ADAPTER LINK
5	2	190100071	ROLL PIN
6	1	671900050	SPOOL STUD
7	1	671400252	ROD END W/EYE
8	2	660390016	ROD END W/STUD
9	3	220000125	HEX NUT 5/16-24
10	3	170002114	CAP SCREW 5/16-24
11	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	660180047	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.

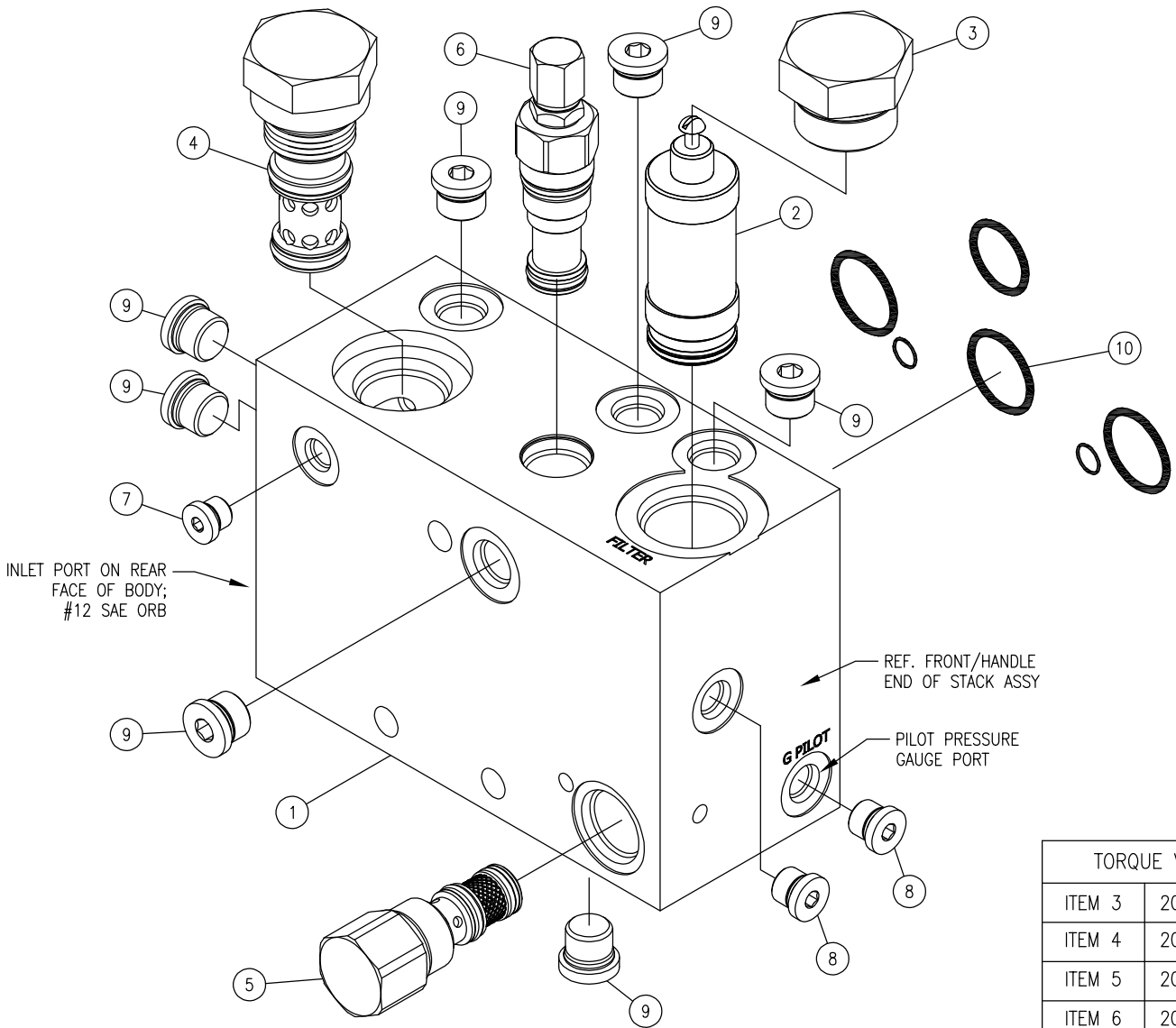
20I BODIES HAVE "C-631" ON CASTING AS SHOWN.

ITEM	QTY	PART NO.	DESCRIPTION	RELIEF OPTION	STANDARD MUSIC WIRE SPRING#	STAINLESS STEEL WIRE SPRING#
1	1	626315001	INLET BODY #10 SAE			
1	1	626316001	INLET BODY #12 SAE			
1	1	626313001	INLET BODY 3/4 NPTF			
2	3	200400030	STEEL PLUG #10 SAE	B & F	670300096	
2	3	200500007	STEEL PLUG #12 SAE	C & G	670300068	670300071
2	3	200300028	STEEL PLUG 3/4 NPTF	D & H	670300069	670300058
3	1	660290001	OPTION A NO RELIEF PLUG	E & J	670300070	670300072
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)			
			SHIMS; SEE PAGE 11			
				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.

20IC2F SERIES 20 INLET SECTION

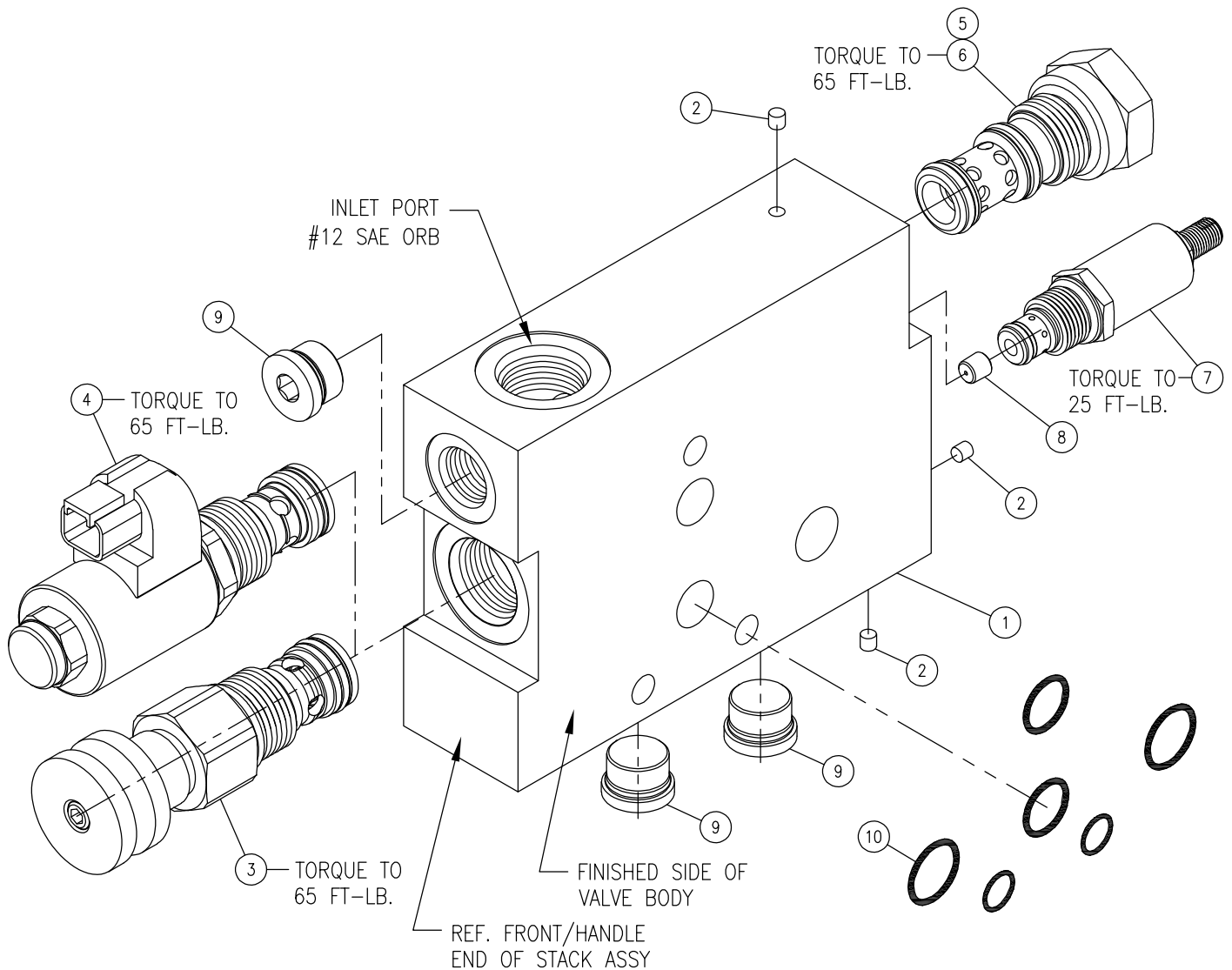


TORQUE VALUES:	
ITEM 3	20-25 FT-LB
ITEM 4	20-25 FT-LB
ITEM 5	20-25 FT-LB
ITEM 6	20-25 FT-LB

ITEM	QTY	PART NO.	DESCRIPTION
1	1	660390035	INLET BODY ASSY.
2	1	660290023	CARTRIDGE FILTER
3	1	200600008	PLUG, HEX HEAD #14 ORB
4	1	270006342	PRESSURE COMP. REGULATOR CARTRIDGE, 350 PSI
5	1	270006322	PRESSURE REDUCING VALVE, 350 PSI
6	1	270006093	P.O. RELIEF VALVE
7	1	200100189	PLUG, HEX SOCKET #3 ORB
8	2	200200083	PLUG, HEX SOCKET #4 ORB
9	7	200300103	PLUG, HEX SOCKET #6 ORB
10	1	660585004	SEAL KIT, BETWEEN SECTIONS (SEE NOTE 1)

- NOTE:
1. BETWEEN SECTION O-RINGS, ITEM 10, ARE ALSO INCLUDED WITH THE TIEROD KITS. THEY ARE NOT SHIPPED WITH THE INDIVIDUAL SECTIONS.
 2. BODY WIDTH REQUIRES USE OF A TIEROD KIT FOR ONE EXTRA SECTION THAN WHAT IS USED IN THAT VALVE ASSEMBLY.
 3. INLET ASSY REQUIRES THE USE OF WORK SECTIONS HAVING PILOT PASSAGE HOLES.

20IF15_ FLOW CONTROL 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	670600073	INLET BODY (REQUIRES ITEM 2 TO BE INSTALLED BEFORE USE!)
2	3	672301002	RIVET PLUG 5mm
3	1	270006305	OPTION M; FLOW CONTROL CARTRIDGE, MANUAL
4	1	660390171	OPTION P12D; FLOW CONTROL CARTRIDGE & COIL ASSY, PROPORTIONAL
5	1	270006308	PRESSURE COMPENSATOR, 90 PSI (USE WITH OPTION M)
6	1	270006304	PRESSURE COMPENSATOR, 150 PSI (USE WITH OPTION P12D)
7	1	270006303	RELIEF CARTRIDGE, ADJUSTABLE (2000-3500 PSI)
8	1	200100326	ORIFICE PLUG .055 DIA.
9	3	200300104	PLUG, HEX SOCKET #6 ORB
10	1	660585004	SEAL KIT, BETWEEN SECTIONS w/PILOT (NOTE 3)

NOTE:

- (ITEM 4) SOLENOID COIL IS 12 VDC WITH INTEGRAL DEUTSCH CONNECTOR #DT04-2P.
- SOLENOID CARTRIDGE INCLUDES MANUAL OVERRIDE PROTECTION (ON-OFF), LOCATED UNDER HEX CAP.
- BETWEEN SECTION O-RINGS ARE INCLUDED WITH TIEROD KITS, AND ARE NOT SHIPPED WITH INDIVIDUAL SECTIONS.

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.

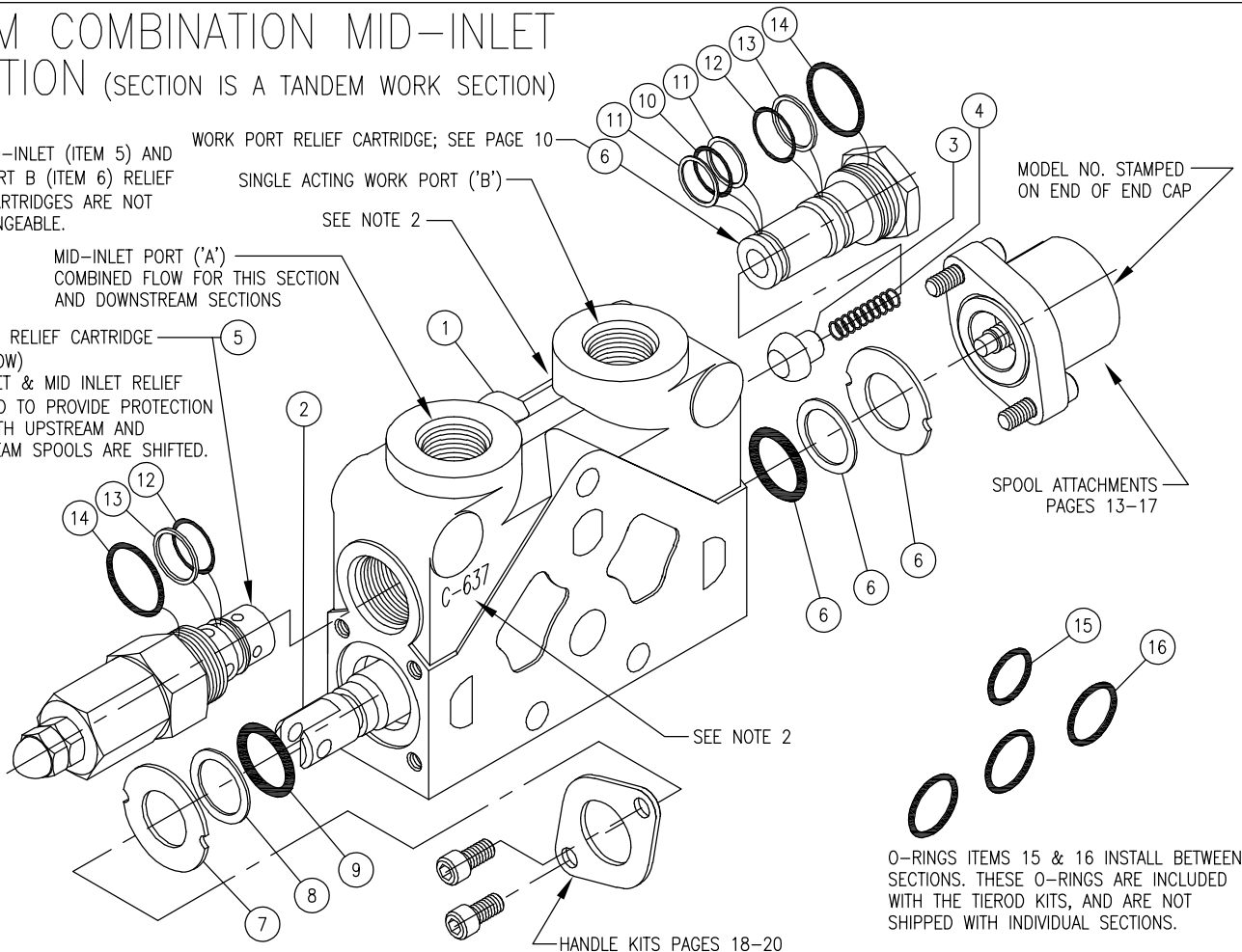
WORK PORT RELIEF CARTRIDGE; SEE PAGE 10

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.



MODEL NO. STAMPED ON END OF END CAP

SPOOL ATTACHMENTS PAGES 13-17

SEE NOTE 2

HANDLE KITS PAGES 18-20

O-RINGS ITEMS 15 & 16 INSTALL BETWEEN SECTIONS. THESE O-RINGS ARE INCLUDED WITH THE TIEROD KITS, AND ARE NOT SHIPPED WITH INDIVIDUAL SECTIONS.



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 10)	WORK PORT RELIEF CARTRIDGE, WORK PORT 'B' (SEE PAGE 10)
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

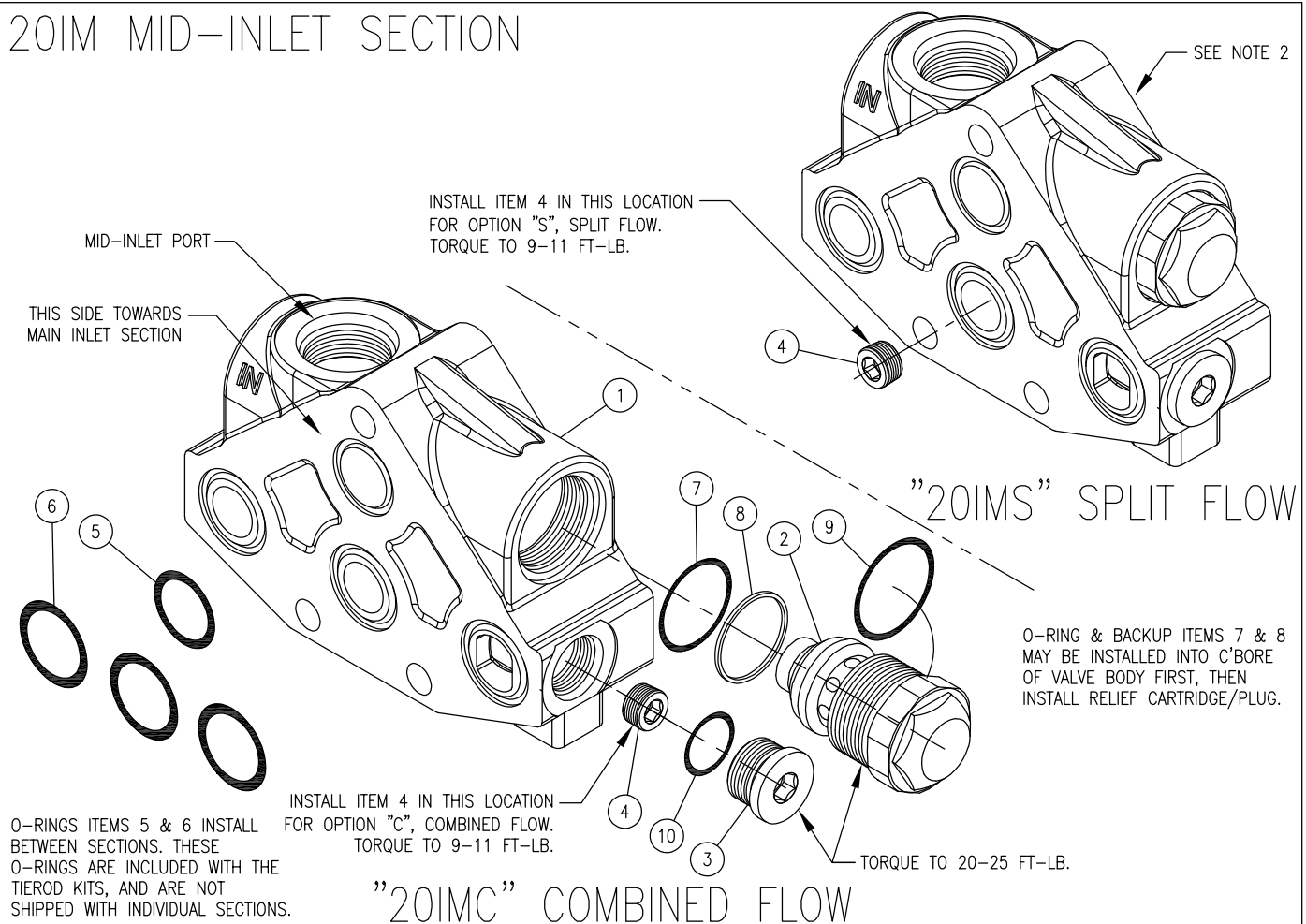
REPLACEMENT SEAL KIT
P/N 660585001

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



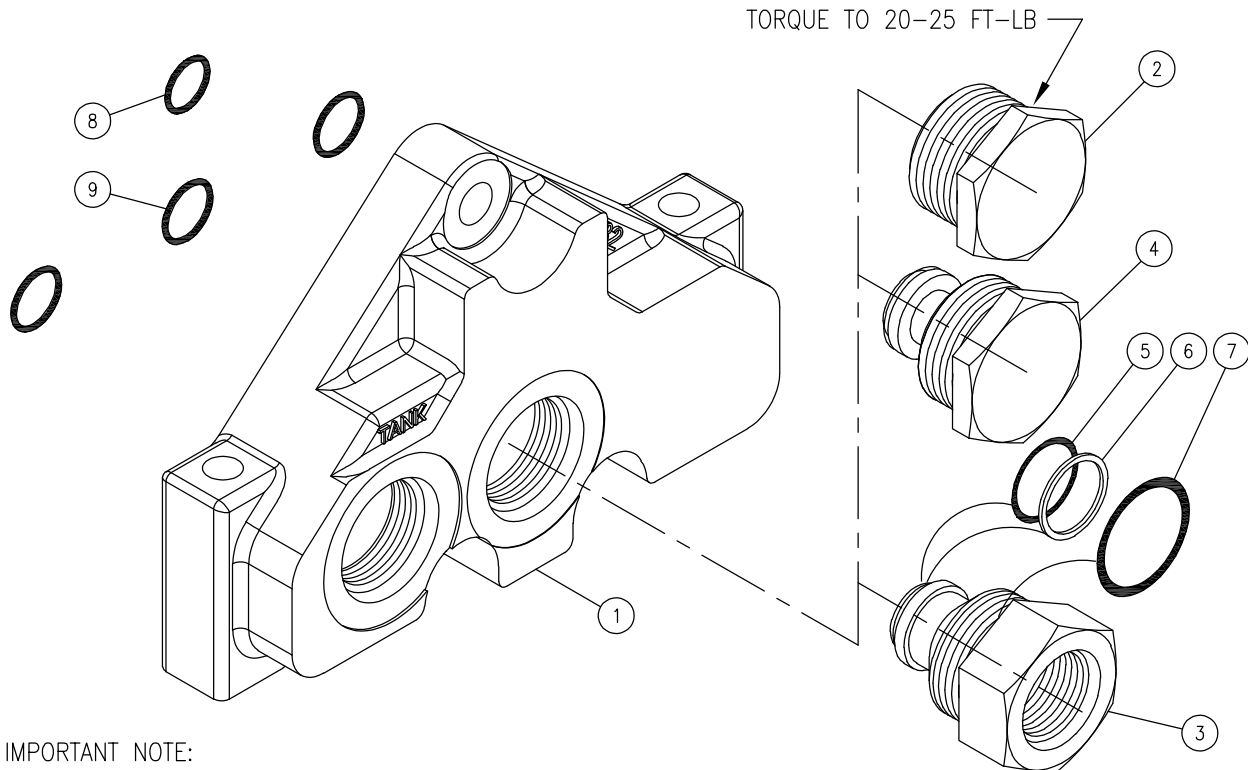
WARNING: OVERPRESSURE MAY CAUSE SUDDEN AND UNEXPECTED FAILURE OF A COMPONENT IN THE HYDRAULIC SYSTEM RESULTING IN SERIOUS PERSONAL INJURY. ALWAYS USE A GAUGE WHEN ADJUSTING A RELIEF VALVE.

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:

- 20IM MID-INLET SECTIONS HAVE 'C-662' CASTING NO. IN RECESS ON LEFT SIDE OF CASTING (TOWARD OUTLET).
- 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 THE 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 port must also be connected to tank. When the spools are in neutral the inlet is connected to the power beyond port.

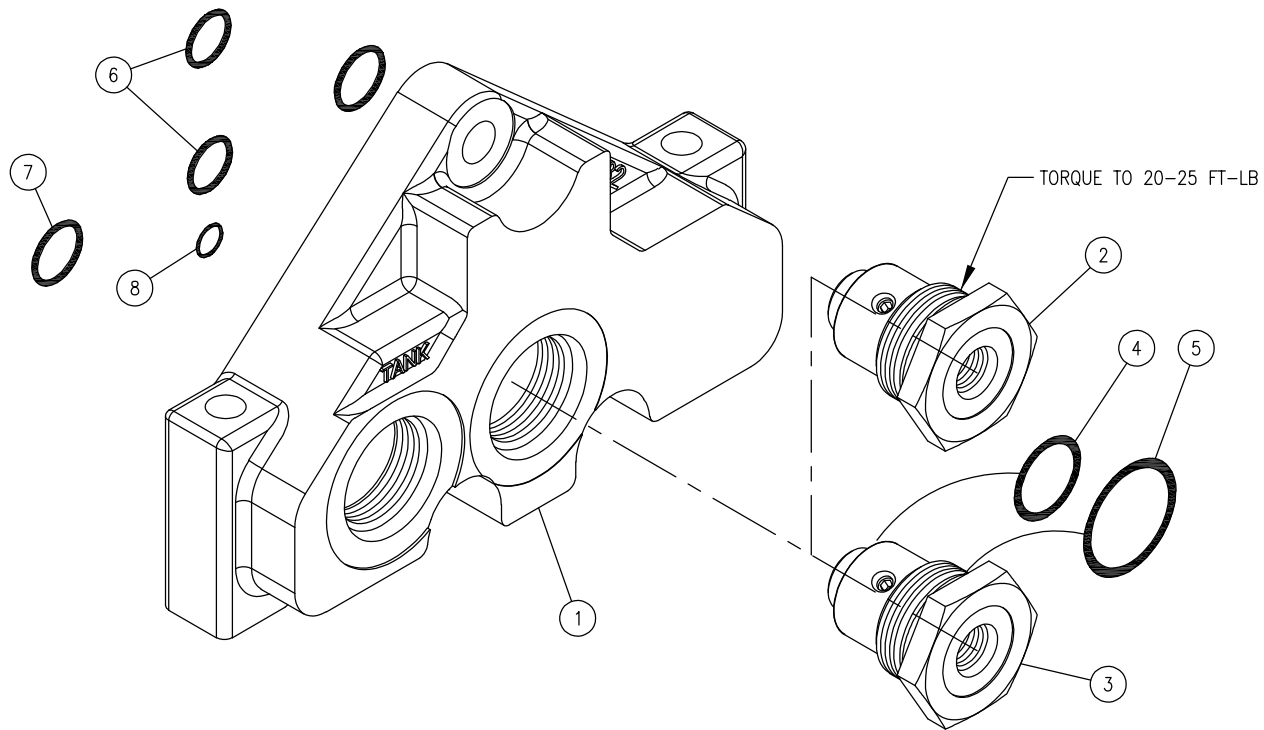
OPTION 3; CLOSED CENTER OUTLET

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 section, or the relief cartridge is set to a pressure higher than the pump compensator setting.

NOTE:

1. O-RINGS, ITEMS 8 & 9, ARE ALSO INCLUDED WITH THE 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.

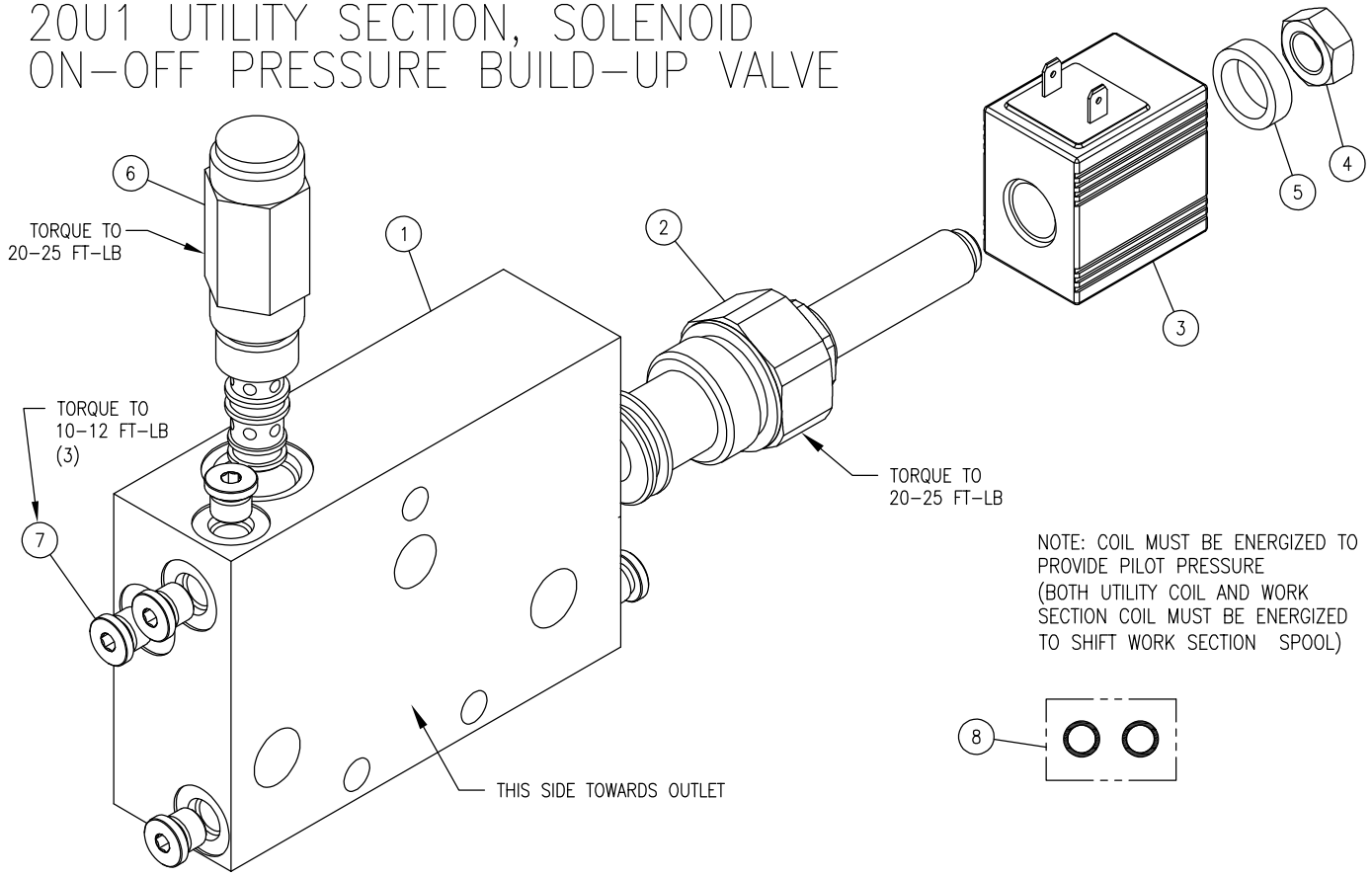
OPTION 2; LOAD SENSE PLUG WITHOUT DRAIN ORIFICE; #4 SAE ORB LOAD SENSE PORT

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 INCLUDED WITH THE TIEROD KITS. THEY ARE NOT SHIPPED WITH THE INDIVIDUAL SECTIONS.

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



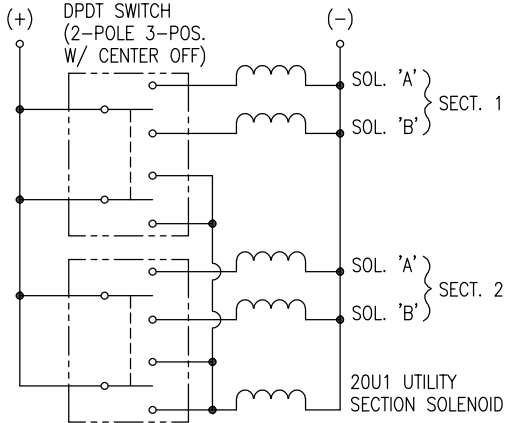
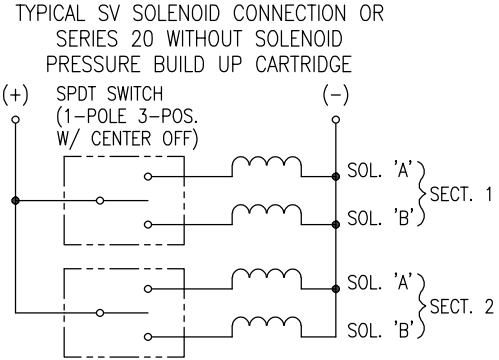
NOTE: COIL MUST BE ENERGIZED TO PROVIDE PILOT PRESSURE (BOTH UTILITY COIL AND WORK SECTION COIL MUST BE ENERGIZED TO SHIFT WORK SECTION SPOOL)

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	220001306	COIL NUT
5	1	671200011	SPACER
6	1	270006092	PRESSURE REDUCING CARTRIDGE
7	5	200200083	PLUG, HEX SOCKET #4 ORB
8	1	660585006	SEAL KIT, BETWEEN SECTION PILOT SEAL

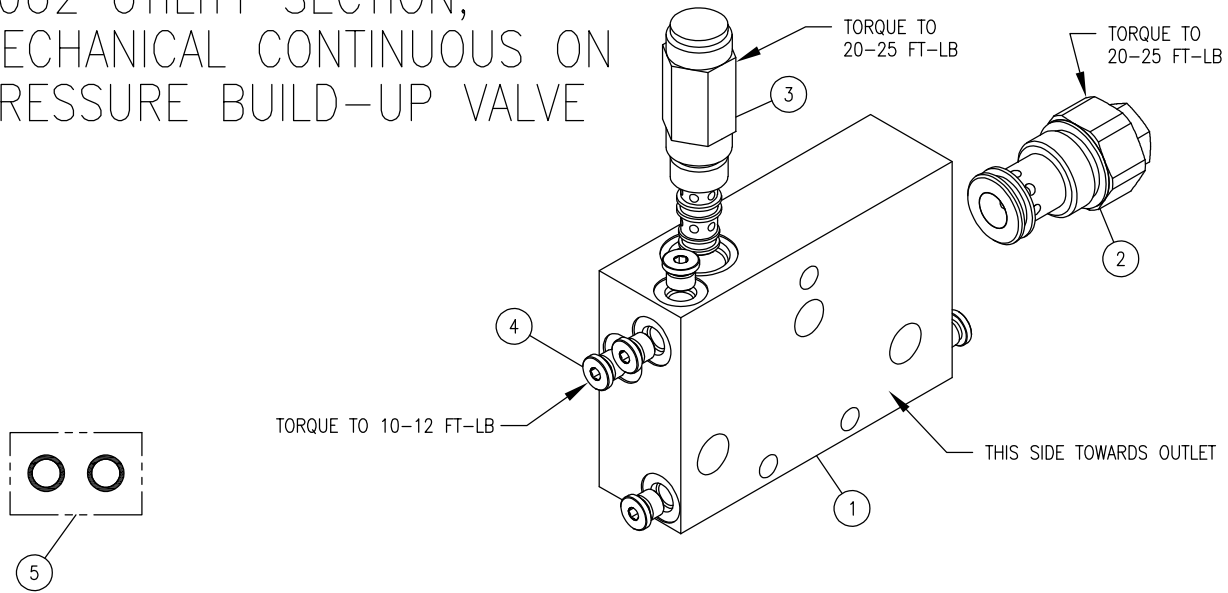
* 20U1 COIL OPTIONS:		* COIL P/N
12L	12 VDC 24" LEAD WIRES	671302220
12Q	12 VDC DUAL SPADES	671302226
12H	12 VDC DIN-43650	671302221
12D	12 VDC DEUTSCH (DT04-2P)	671302222
24L	24 VDC 24" LEAD WIRES	671302223
24Q	24 VDC DUAL SPADES	671302227
24H	24 VDC DIN-43650	671302224
24D	24 VDC DEUTSCH (DT04-2P)	671302225
11L	120 VAC 6" WIRE LEADS	671302228

(ILLUSTRATION IS APPLICABLE FOR ALL SOLENOID SECTIONS.)

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



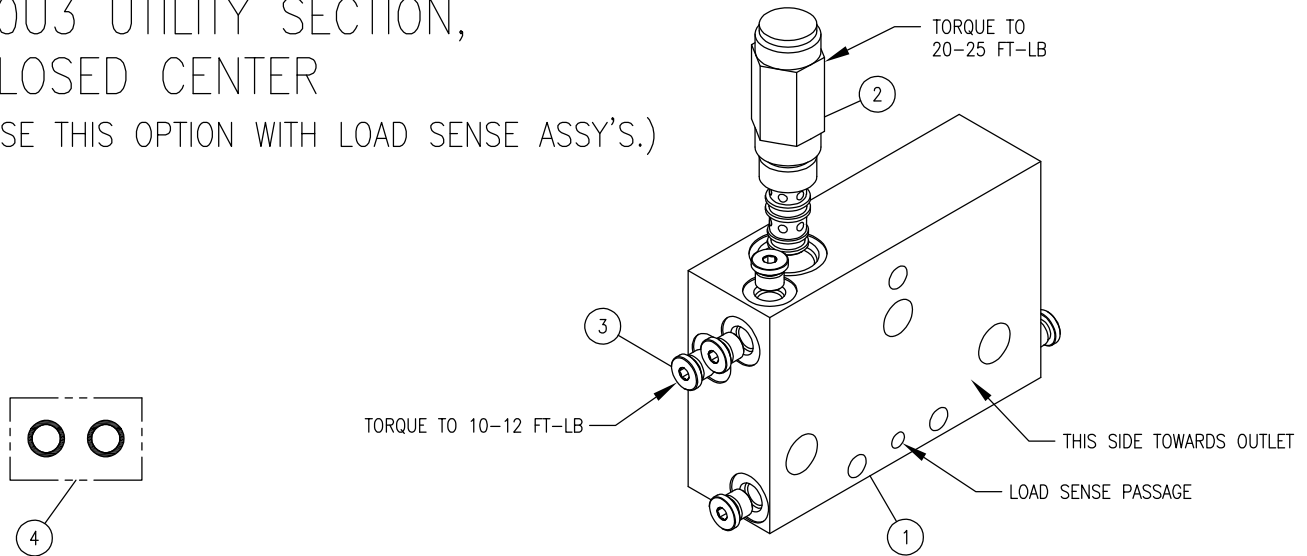
20U2 UTILITY SECTION, MECHANICAL CONTINUOUS ON PRESSURE BUILD-UP VALVE



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

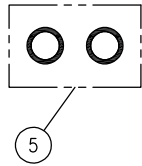
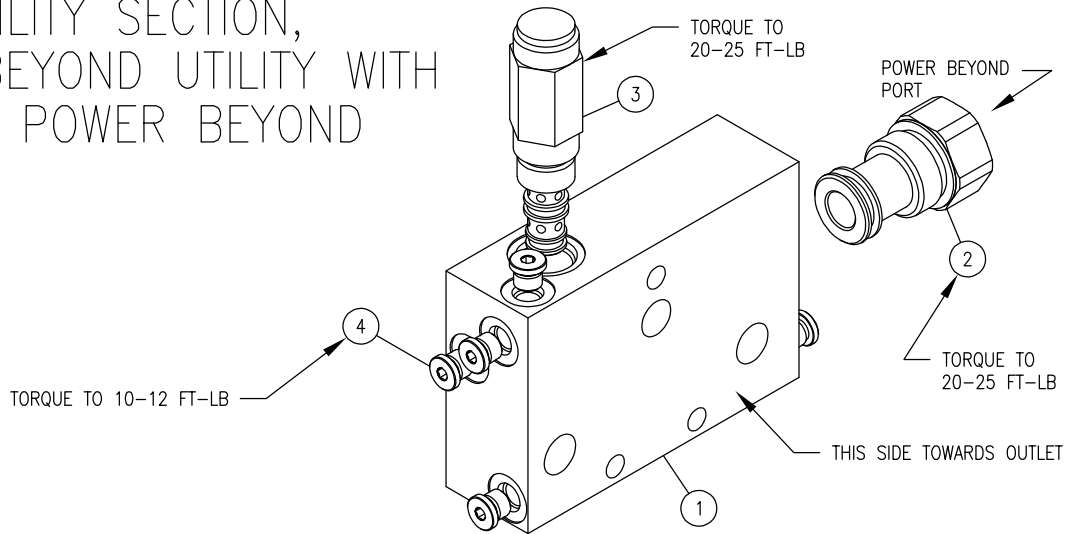
ITEM	QTY	PART NO.	DESCRIPTION
1	1	670600024	BODY
2	1	660290010	PRESSURE BUILD-UP CARTRIDGE, MECHANICAL
3	1	270006092	PRESSURE REDUCING CARTRIDGE
4	5	200200083	PLUG, HEX SOCKET #4 ORB
5	1	660585006	BETWEEN SECTION PILOT SEAL KIT

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 ORB
4	1	660585006	BETWEEN SECTION PILOT SEAL KIT

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

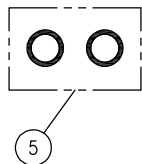
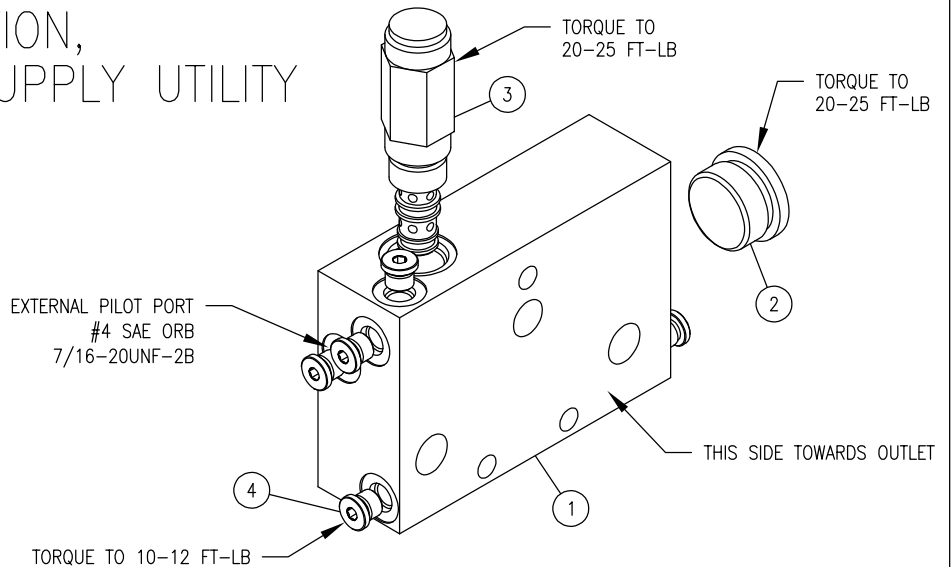


WITH SERIES 20 SOLENOID OPERATED ASSEMBLIES, THE POWER BEYOND LINE IS CONNECTED TO THE UTILITY SECTION AND NOT TO A POWER BEYOND PORT IN THE OUTLET SECTION.

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

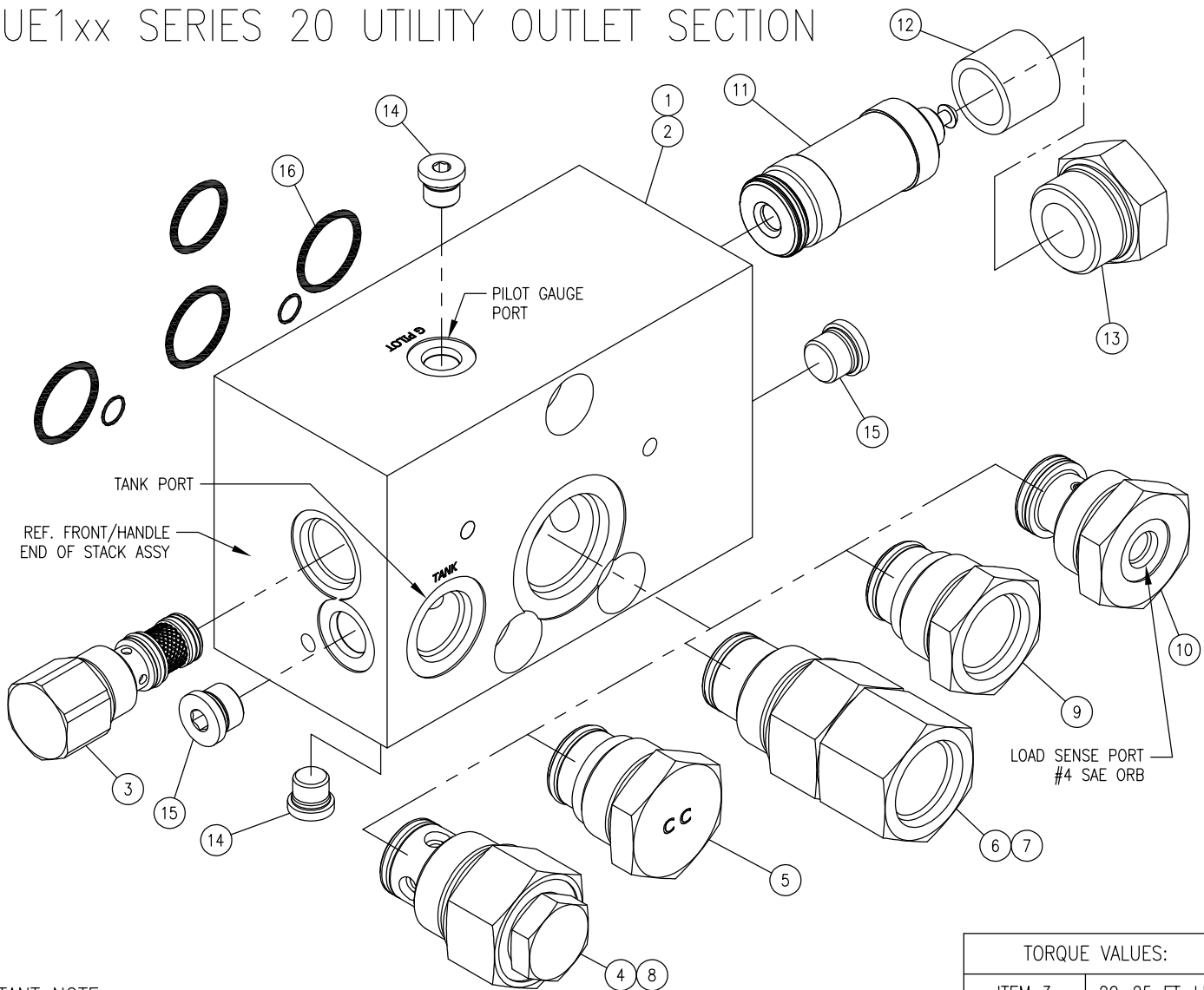
20U5 UTILITY SECTION, EXTERNAL PILOT SUPPLY UTILITY



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

20UE1xx SERIES 20 UTILITY OUTLET SECTION



IMPORTANT NOTE:

AT LEAST ONE OF THE OUTLET PORTS OF THE VALVE ASSEMBLY MUST BE CONNECTED TO TANK IN ALL CIRCUITS. WHEN A POWER BEYOND PLUG IS INSTALLED THE POWER BEYOND PORT CONNECTS TO A DOWNSTREAM FUNCTION, AND THE OUTLET PORT/PORTS ARE CONNECTED TO TANK.

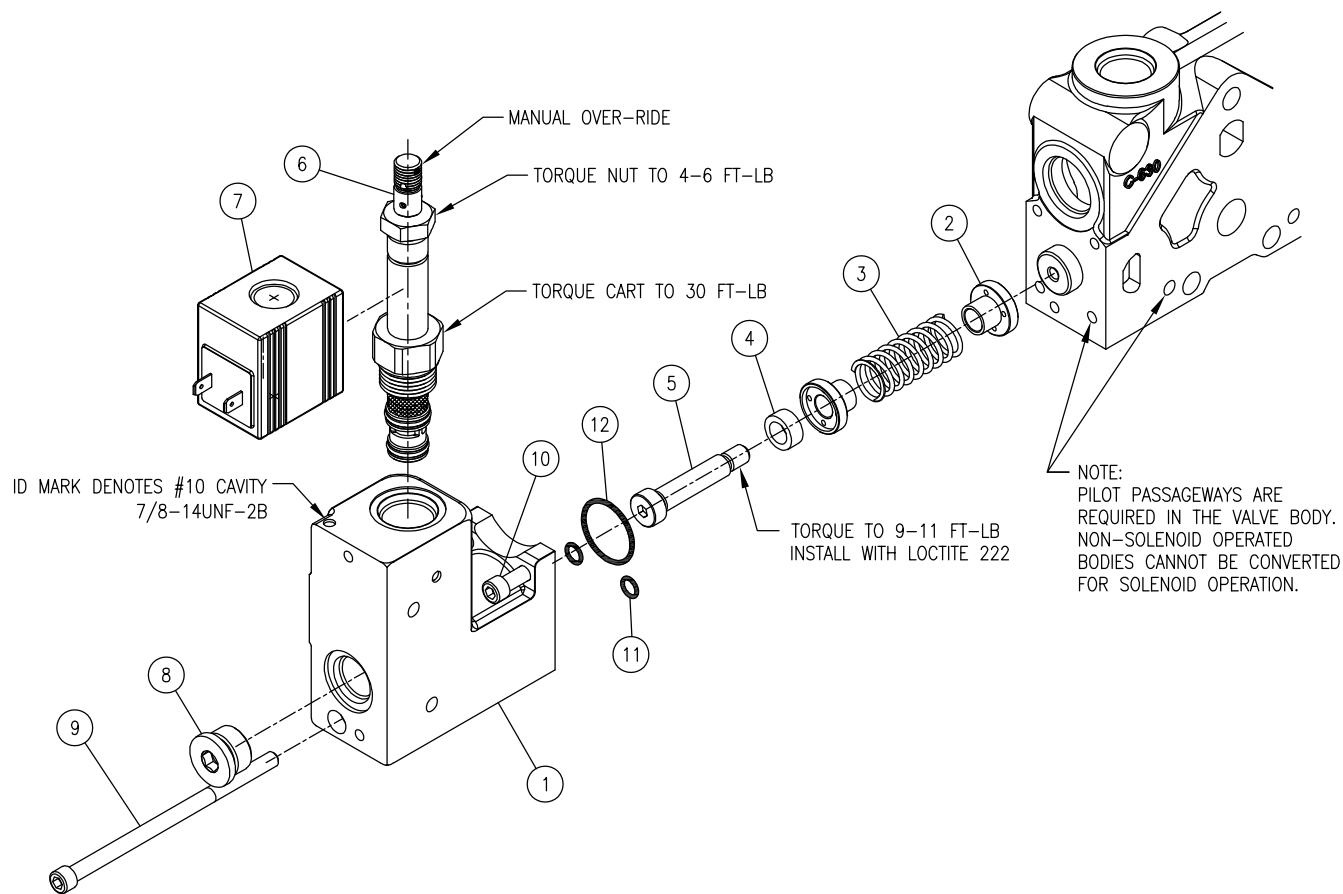
TORQUE VALUES:	
ITEM 3	20-25 FT-LB
ITEMS 4-10	20-25 FT-LB
ITEM 13	20-25 FT-LB

ITEM	QTY	PART NO.	DESCRIPTION
1	1	660390032	OUTLET BODY ASSY (FOR PRESSURE BUILD-UP OPTIONS 2-7)
2	1	660390036	OUTLET BODY ASSY (FOR PRESSURE BUILD-UP OPTION 8)
3	1	270006322	P.O. PRESSURE REDUCING VALVE (350 PSI)
4	1	660312012	OPT 2; MECH. PRESSURE BUILD-UP CART.
5	1	660312005	OPT 3; CLOSED CENTER PLUG ASSY
6	1	660312014	OPT 4; MECH. PRESSURE BUILD-UP w/ #12 ORB POWER BEYOND PORT
7	1	660312018	OPT 5; MECH. MEDIUM PRESSURE BUILD-UP w/ #12 ORB POWER BEYOND PORT
8	1	660312017	OPT 6; MECH. MEDIUM PRESSURE BUILD-UP
9	1	660312008	OPT 7; POWER BEYOND PLUG ASSY, #12 ORB (NO BUILD-UP)
10	1	660290024	OPT 8; LOAD SENSE PLUG ASSY (CLOSED CENTER)
11	1	660290023	FILTER CARTRIDGE *
12	1	671200071	SPACER, FILTER (* -SPACER MUST BE PRESENT WHEN OPTIONAL FILTER IS USED)
13	1	200600008	PLUG, HEX HEAD #14
14	2	200200083	PLUG, HEX SOCKET #4
15	2	200300103	PLUG, HEX SOCKET #6
16	1	660585004	SEAL KIT, BETWEEN SECTIONS (SEE NOTE 1)

NOTE:

- BETWEEN SECTION O-RINGS, ITEM 16, ARE ALSO INCLUDED WITH THE TIEROD KITS. THEY ARE NOT SHIPPED WITH THE INDIVIDUAL SECTIONS.
- BODY WIDTH REQUIRES USE OF A TIEROD KIT FOR ONE EXTRA SECTION THAN WHAT IS USED IN THAT VALVE ASSEMBLY.

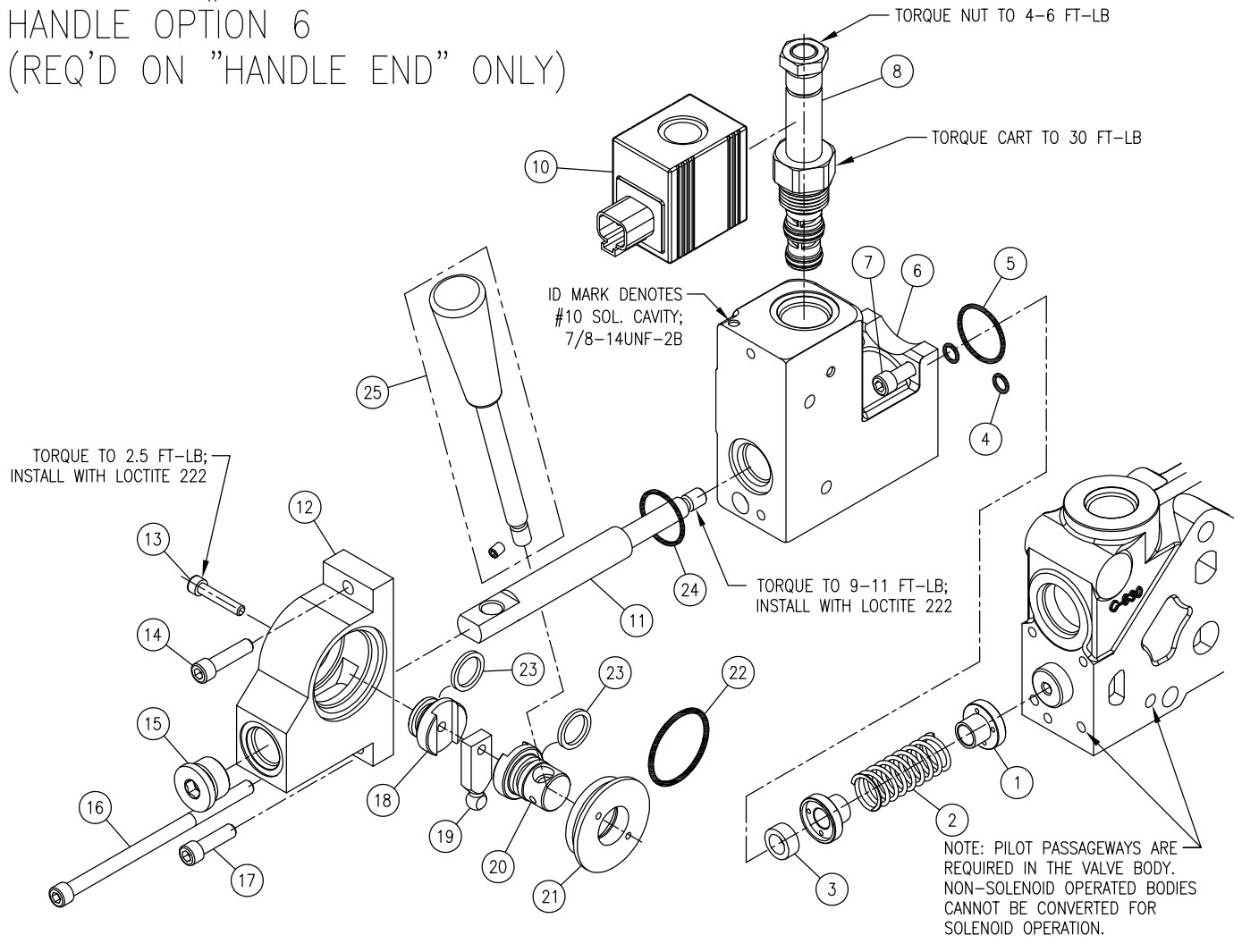
SERIES 20 #10 'S' SPLIT SOLENOID OPERATORS;
 HANDLE OPTION 5 (USED ON BOTH ENDS) &
 HANDLE OPTION 6 (USED ON END OPPOSITE HANDLE ONLY)



ACTUATOR BODY USES CASTING #C-917

ITEM	QTY	PART NO.	DESCRIPTION	NOTES:
1	1	660390045	ACTUATOR BODY ASSY	1. QUANTITIES SHOWN ARE PER END ONLY. 2. HANDLE OPTION 5 REQUIRES 2 SETS OF PARTS PER WORK SECTION. HANDLE OPTION 6 REQUIRES ONE SET OF HANDLE END PARTS (pg 32) AND ONE SET OF NO-HANDLE END PARTS (pg 33) PER WORK SECTION. 3. TORQUE 1/4-20 CAP SCREWS TO 9-11 FT-LB.
2	2	671400158	SPRING END	
3	1	670300089	SPRING, CENTERING	
4	1	671200023	WASHER	
5	1	220000415	SHOULDER SCREW	
6	1	660263024	SOLENOID CARTRIDGE w/NUT	
7	1	SEE CHART *	SOL COIL (SEE CHART, PAGE 33)	
8	1	200300104	PLUG, #8 SAE ORB	
9	1	170003052	CAP SCREW	
10	2	170003038	CAP SCREW	
11	2	240000010	-010 O-RING	
12	1	240000022	-022 O-RING	
SEAL KITS				
		660585004	BETWEEN SECTIONS SEAL KIT, NO PILOT SEAL (ONE KIT REQ'D PER SECTION)	
		660585006	BETWEEN SECTIONS PILOT SEAL KIT (ONE KIT REQ'D PER SECTION)	
		660585011 **	COMPL. SOLENOID OPER'D SECT SEAL KIT, HANDLE OPTION 1-4 (1 REQ'D PER SECT)	
		660590030 **	COMPL. SOLENOID OPER'D SECT SEAL KIT, HANDLE OPTION 5-6 (1 REQ'D PER SECT)	
			** (INCLUDES BETWEEN SECTION AND PILOT C'BORE SEALS)	

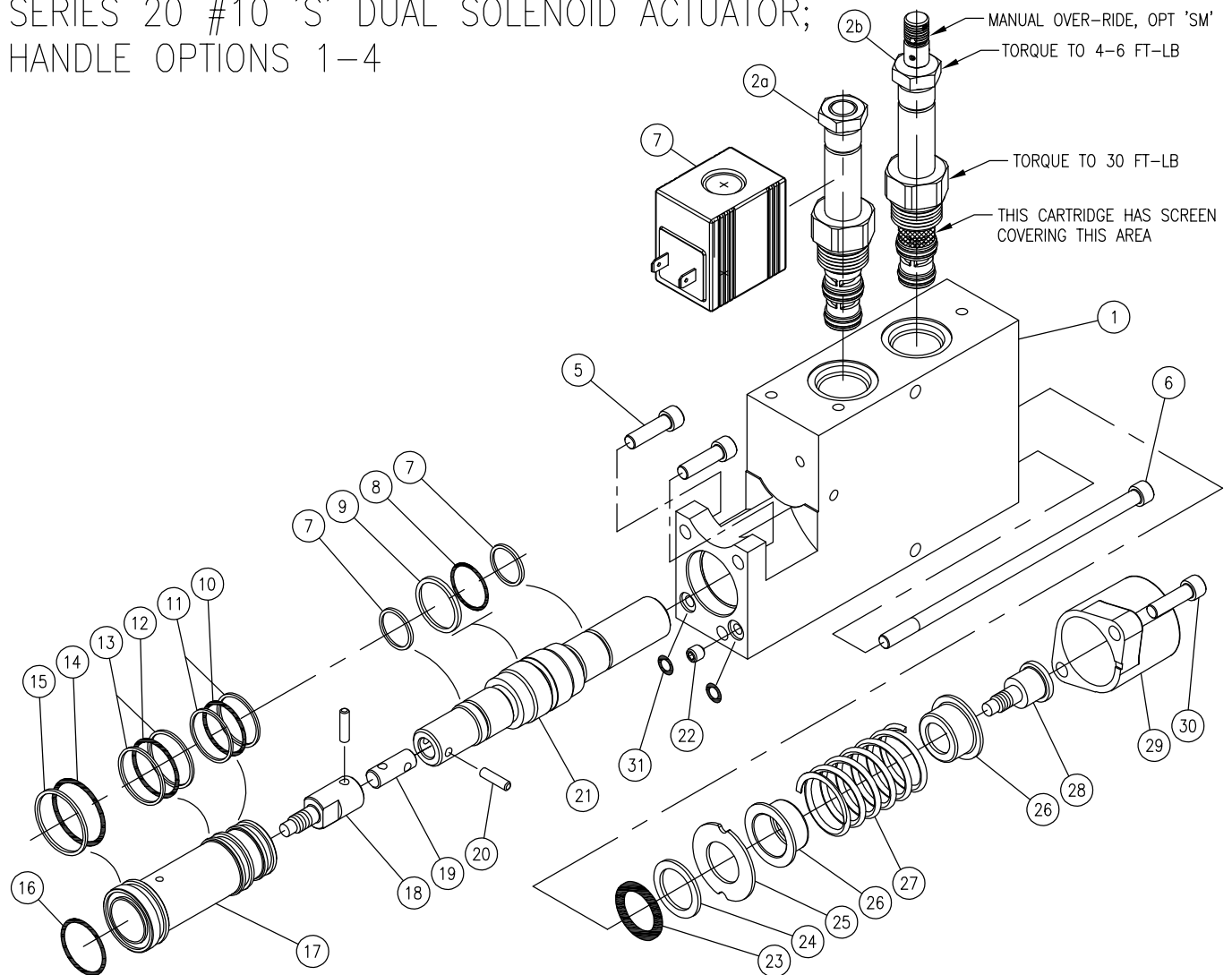
SERIES 20 #10 'S' SPLIT SOLENOID OPERATOR;
HANDLE OPTION 6
(REQ'D ON "HANDLE END" ONLY)



ITEM	QTY	PART NO.	DESCRIPTION	ACTUATOR BODY USES CASTING #C-917
1	2	671400158	SPRING END	<p>NOTES:</p> <p>1. QUANTITIES SHOWN ARE FOR HANDLE END ONLY.</p> <p>2. HANDLE OPTION 6 REQUIRES ONE SET OF HANDLE END PARTS (pg 33) AND ONE SET OF NO-HANDLE END PARTS (pg 32) PER WORK SECTION.</p> <p>3. TORQUE 1/4-20 CAP SCREWS TO 9-11 FT-LB.</p>
2	1	670300089	SPRING, CENTERING	
3	1	671200023	WASHER	
4	2	240000010	-010 O-RING	
5	1	240000022	-022 O-RING	
6	1	660390045	ACTUATOR BODY ASSY	
7	2	170003038	CAP SCREW	
8	1	660263021	SOLENOID CARTRIDGE w/NUT	
9	-	-	-	
10	1	SEE CHART *	SOLENOID 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	

#10 COIL OPTION:		* COIL P/N
12L	12 VDC 24" LEAD WIRES	671302220
12Q	12 VDC DUAL SPADES	671302226
12H	12 VDC DIN-43650	671302221
12D	12 VDC DEUTSCH (DT04-2P)	671302222
24L	24 VDC 24" LEAD WIRES	671302223
24Q	24 VDC DUAL SPADES	671302227
24H	24 VDC DIN-43650	671302224
24D	24 VDC DEUTSCH (DT04-2P)	671302225
11L	120 VAC 6" WIRE LEADS	671302228

SERIES 20 #10 'S' DUAL SOLENOID ACTUATOR;
HANDLE OPTIONS 1-4

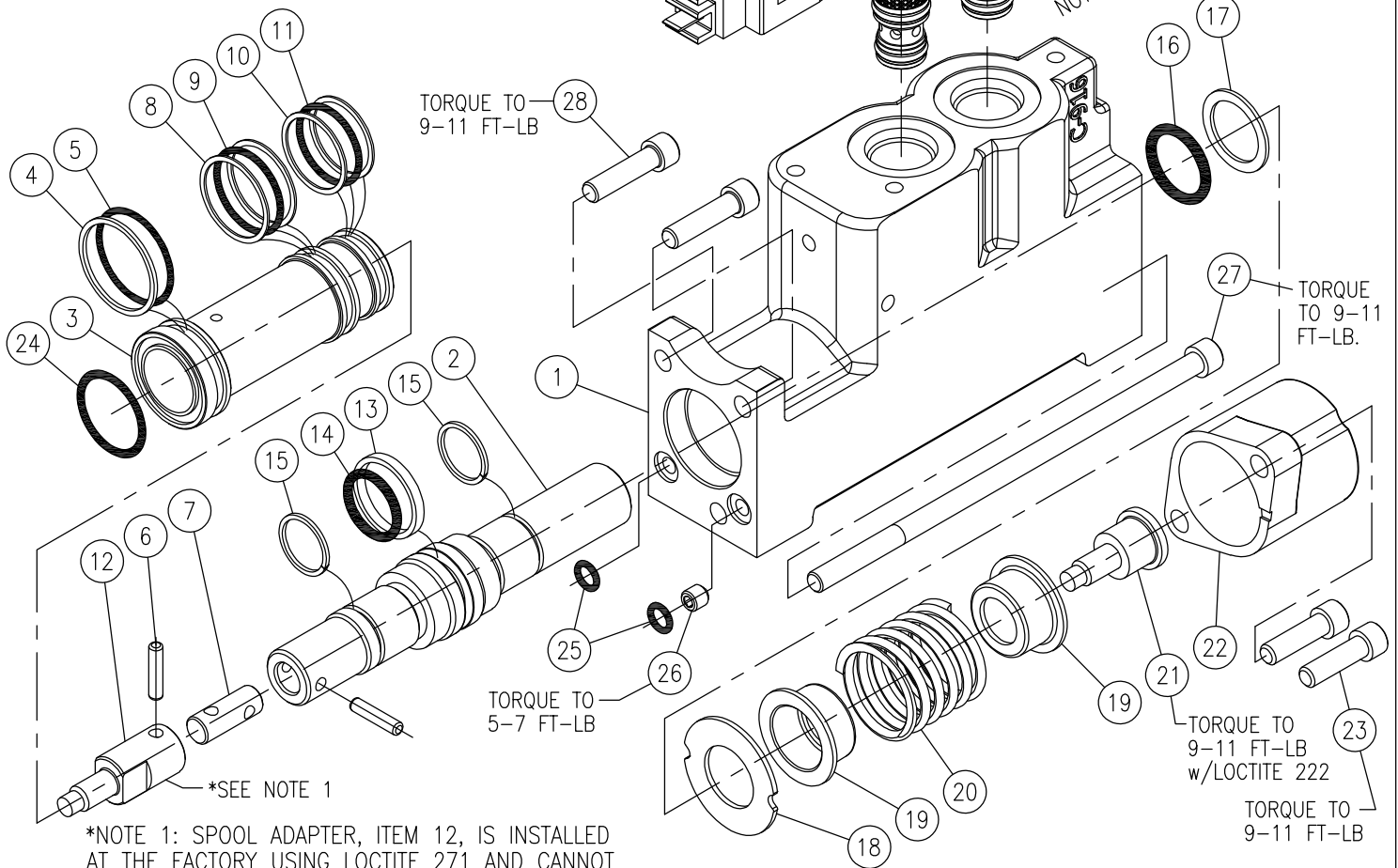
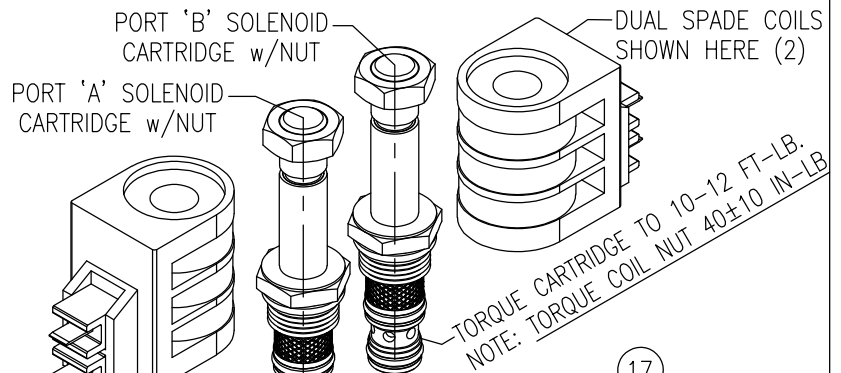


ITEM	QTY	PART NO.	DESCRIPTION	ITEM	QTY	PART NO.	DESCRIPTION																														
1	1	660390021	ACTUATOR BODY SUB-ASSY	25	1	670500065	WASHER																														
2a	2	660263021	'S' SOL CARTRIDGE/NUT, STD	26	2	671400089	STOP CUP																														
2b	2	660263024	'SM' SOL CARTRIDGE/NUT	27	1	670300127	SPRING, CENTERING																														
3	-	-	-	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	31	2	240000010	O-RING, PILOT SEAL																														
7	2	240019016	SEAL WASHER	NOTES: 1. TORQUE 1/4-20 CAP SCREWS TO 9-11 FT-LB. 2. THE VALVE BODY MUST BE MACHINED TO ACCEPT THE ACTUATOR BODY. THIS OPTION CANNOT BE ADDED TO A STANDARD S20 MANUAL WORK SECTION.																																	
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																																		
						<table border="1"> <thead> <tr> <th colspan="2">#10 COIL OPTION:</th> <th>* COIL P/N</th> </tr> </thead> <tbody> <tr> <td>12L</td> <td>12 VDC 24" LEAD WIRES</td> <td>671302220</td> </tr> <tr> <td>12Q</td> <td>12 VDC DUAL SPADES</td> <td>671302226</td> </tr> <tr> <td>12H</td> <td>12 VDC DIN-43650</td> <td>671302221</td> </tr> <tr> <td>12D</td> <td>12 VDC DEUTSCH (DT04-2P)</td> <td>671302222</td> </tr> <tr> <td>24L</td> <td>24 VDC 24" LEAD WIRES</td> <td>671302223</td> </tr> <tr> <td>24Q</td> <td>24 VDC DUAL SPADES</td> <td>671302227</td> </tr> <tr> <td>24H</td> <td>24 VDC DIN-43650</td> <td>671302224</td> </tr> <tr> <td>24D</td> <td>24 VDC DEUTSCH (DT04-2P)</td> <td>671302225</td> </tr> <tr> <td>11L</td> <td>120 VAC 6" WIRE LEADS</td> <td>671302228</td> </tr> </tbody> </table>		#10 COIL OPTION:		* COIL P/N	12L	12 VDC 24" LEAD WIRES	671302220	12Q	12 VDC DUAL SPADES	671302226	12H	12 VDC DIN-43650	671302221	12D	12 VDC DEUTSCH (DT04-2P)	671302222	24L	24 VDC 24" LEAD WIRES	671302223	24Q	24 VDC DUAL SPADES	671302227	24H	24 VDC DIN-43650	671302224	24D	24 VDC DEUTSCH (DT04-2P)	671302225	11L	120 VAC 6" WIRE LEADS	671302228
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SERIES 20 #8 'C/CM' SINGLE ENDED SOLENOID ACTUATOR ASSY.

PLEASE NOTE; THIS VALVE'S BODY MUST BE MACHINED TO ACCEPT THE ACTUATOR BODY. THE SOLENOID OPTION CANNOT BE ADDED TO A STANDARD NON-SOLENOID WORK SECTION.

SOLENOID CARTRIDGES AND COILS ARE NOT INCLUDED IN ACTUATOR KIT. SEE PAGE 36.



*NOTE 1: SPOOL ADAPTER, ITEM 12, IS INSTALLED AT THE FACTORY USING LOCTITE 271 AND CANNOT BE DISASSEMBLED UNDER NORMAL CIRCUMSTANCES.

ACTUATOR BODY USES CASTING #C-916

SOLENOID ACTUATOR SUB-ASSY. #660190044 (#8 ON-OFF, C/CM)

ITEM	QTY	PART NUMBER	DESCRIPTION	ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	660390023	#8 ACTUATOR BODY ASSY.	17	1	670500064	SEAL BACKUP WASHER
2	1	610100017	ACTUATOR SPOOL	18	1	670500065	WASHER
3	1	671400285	SLEEVE	19	2	671400089	STOP CUP
4	1	240005023 *	BACK-UP WASHER	20	1	670300127	SPRING, CENTERING
5	1	240000023 *	O-RING	21	1	671900033	SPOOL ADAPTER
6	2	190100087	PIN, DOWEL	22	1	671400091	END CAP
7	1	671400207	PIN	23	1	170003038	CAP SCREW, HEX SOCKET
8	2	240043021 *	BACKUP WASHER	24	1	240000021 *	O-RING
9	1	240000021 *	O-RING	25	2	240000010 *	O-RING
10	2	240044020 *	BACKUP WASHER	26	1	671400287	ORIFICE PLUG
11	1	240000020 *	O-RING	27	1	170003114	CAP SCREW, HEX SOCKET
12	1	671900111	SPOOL ADAPTER	28	2	170003018	CAP SCREW, HEX SOCKET
13	1	240016627 *	SEAL RING	* #660590031; S20 S/C/CM SOL. HOUSING SEAL KIT			
14	1	240000115 *	O-RING				
15	2	240019016 *	WASHER				
16	1	240000210 *	O-RING, SPOOL SEAL				

SERIES 20 #8/#7 'D/DM/DP' DOUBLE ENDED SOL. ACTUATOR ASSY

TWO REQUIRED PER WORK SECTION

ACTUATOR ASSY. #660190046 (#8 ON-OFF, D/DM)

ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	660390025	#8 ACTUATOR BODY ASSY
2	1	220000415	SHOULDER SCREW
3	1	671200023	SPACER
4	2	671400158	SPRING END
5	1	670300089	SPRING, CENTERING
6	1	671400287	ORIFICE PLUG
7	2	240000010 *	O-RING
8	1	240000022 *	O-RING
9	2	170003038	CAP SCREW, HEX SOCKET
10	1	170003052	CAP SCREW, HEX SOCKET
11	1	200300104	PLUG, HEX SOCKET #8

PLEASE NOTE: THIS VALVE'S BODY MUST BE MACHINED TO ACCEPT THE ACTUATOR BODY. THE SOLENOID OPTION CANNOT BE ADDED TO A STANDARD NON-SOLENOID WORK SECTION.

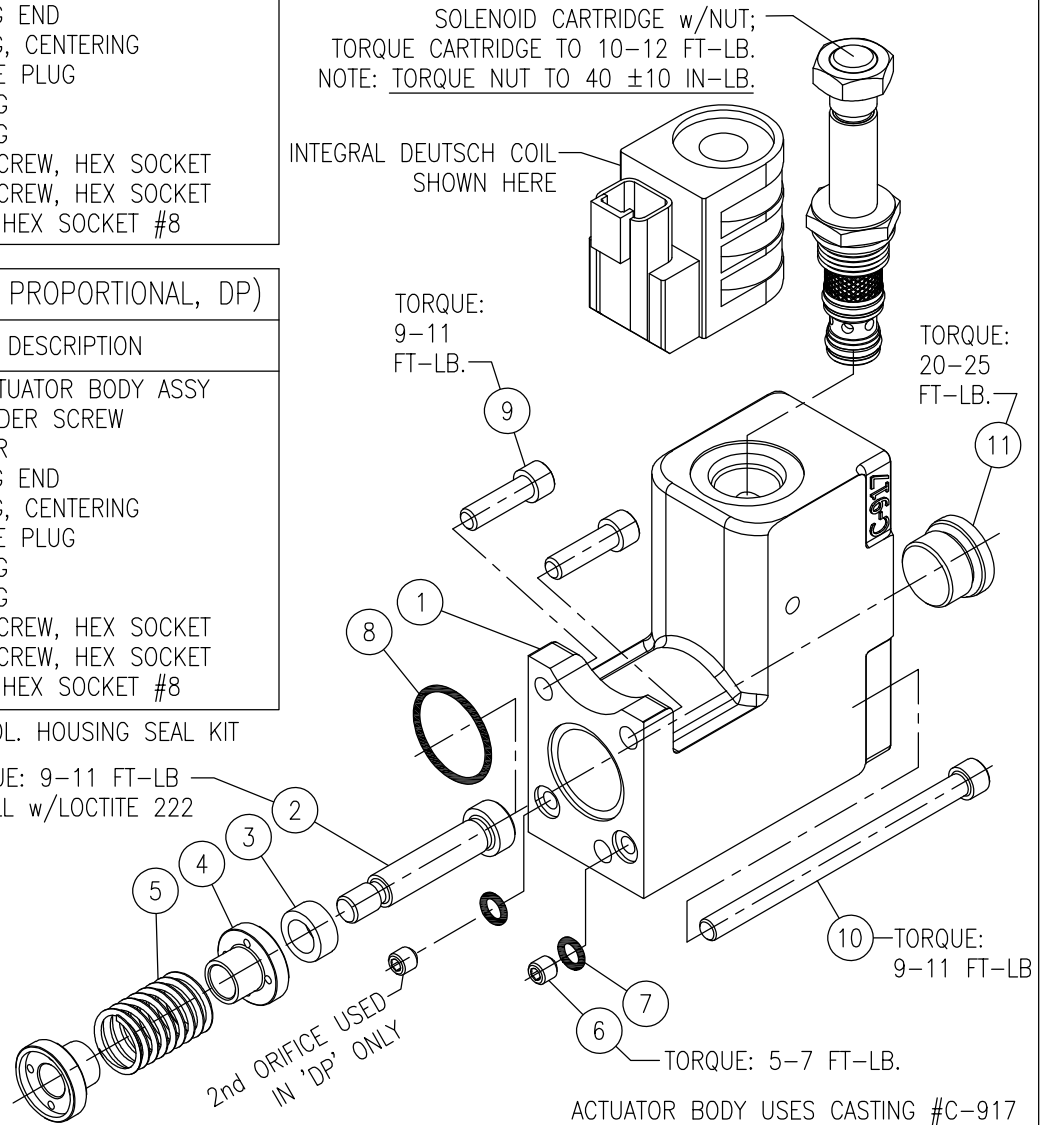
SOLENOID CARTRIDGES AND COILS ARE NOT INCLUDED IN ACTUATOR KIT. SEE BELOW.

ACTUATOR ASSY #660190047 (#7 PROPORTIONAL, DP)

ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	660390026	#7 ACTUATOR BODY ASSY
2	1	220000415	SHOULDER SCREW
3	1	671200023	SPACER
4	2	671400158	SPRING END
5	1	670300153	SPRING, CENTERING
6	2	671400287	ORIFICE PLUG
7	2	240000010 *	O-RING
8	1	240000022 *	O-RING
9	2	170003038	CAP SCREW, HEX SOCKET
10	1	170003052	CAP SCREW, HEX SOCKET
11	1	200300104	PLUG, HEX SOCKET #8

* #660590032; S20 T/D/DM/DP SOL. HOUSING SEAL KIT

TORQUE: 9-11 FT-LB
INSTALL w/LOCTITE 222



SERIES 20 'C/D' SOLENOID CARTRIDGES & COILS:

SOLENOID CARTRIDGE INFO FOR C/D ASSEMBLIES:

OPTION	PART NUMBER	DESCRIPTION
C/D	660263014	#8 CARTRIDGE, STANDARD +
CM/DM	660263015	#8 CARTRIDGE, MANUAL OVER-RIDE +
CP/DP	660263011	#7 CARTRIDGE, PROPORTIONAL ++
	660580027	+ SEAL KIT, #8 CARTRIDGE ONLY
	660580028	++SEAL KIT, #7 CARTRIDGE ONLY

(NOTE: #7 CARTRIDGES DO NOT INTERCHANGE WITH #8 CARTRIDGES & REQUIRE SPECIAL BODIES.)

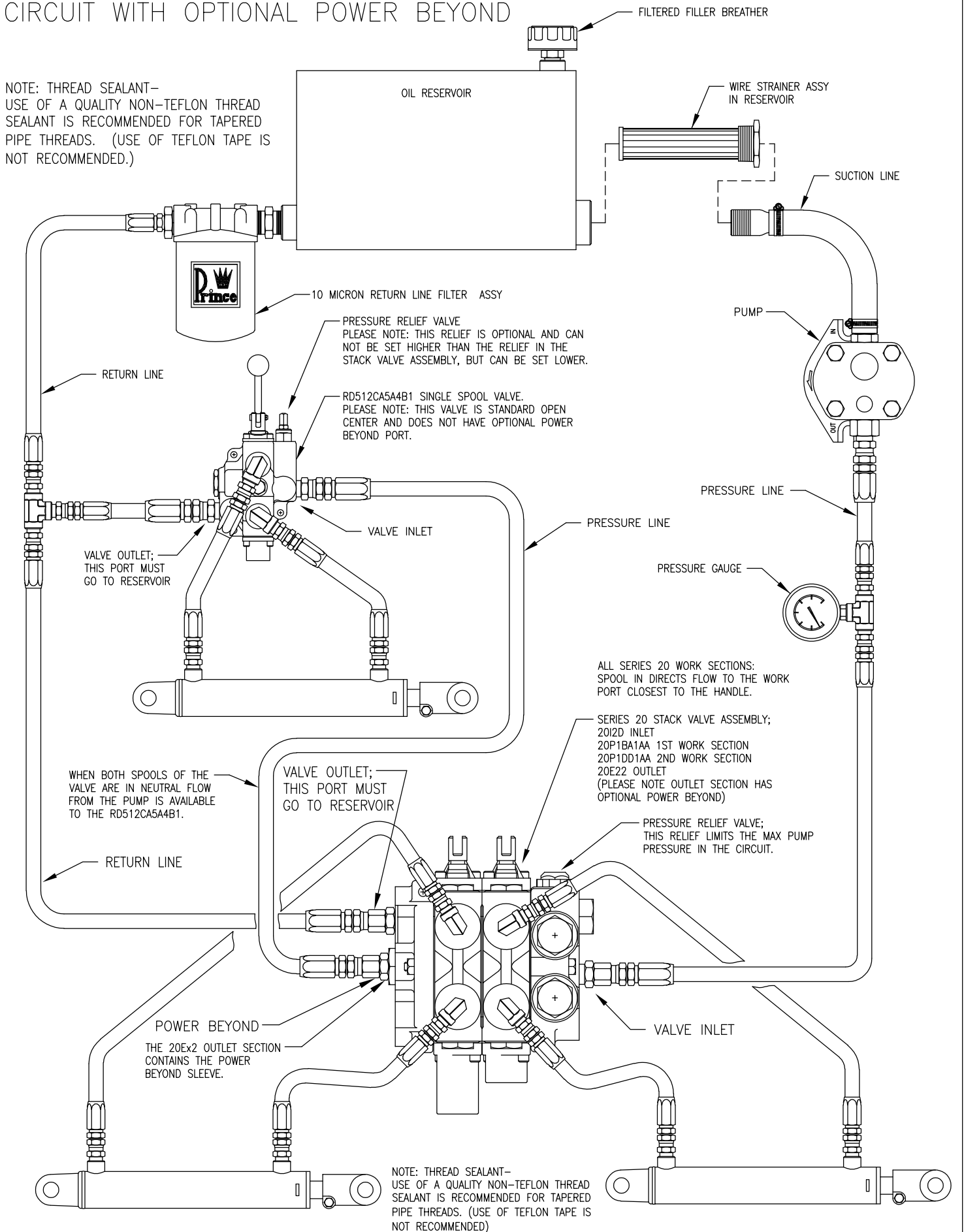
SOLENOID COIL INFO FOR C/D ASSEMBLIES:

QTY	PART NUMBER	DESCRIPTION
12D	671302163	12 VDC INTEGRAL DEUTSCH
12H	671302168	12 VDC DIN-43650
12L	671302160	12 VDC DUAL LEAD WIRES
12Q	671302165	12 VDC DUAL SPADES
24D	671302164	24 VDC INTEGRAL DEUTSCH
24H	671302169	24 VDC DIN-43650
24L	671302167	24 VDC DUAL LEAD WIRES
24Q	671302166	24 VDC DUAL SPADES
11H	671302170	110 VAC DIN-43650

THESE PARTS ARE NOT COMPATABLE WITH 'S' OR 'T' STYLE VALVE WORK SECTIONS.

EXAMPLE SERIES 20 STACK VALVE HYDRAULIC CIRCUIT WITH OPTIONAL POWER BEYOND

NOTE: THREAD SEALANT—
USE OF A QUALITY NON-TEFLON THREAD
SEALANT IS RECOMMENDED FOR TAPERED
PIPE THREADS. (USE OF TEFLON TAPE IS
NOT RECOMMENDED.)





Prince Manufacturing Corporation

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