

SERVICE MANUAL No. I-0160

**4" CLASS 600
 MULTIPOINT SELECTOR VALVE
 WITH HIGH DIFFERENTIAL PRESSURE SEAL**

CUSTOMER: _____
 P.O.#: _____
 W.O.#: _____
 TAG: _____
 DATE: _____

APPLIES TO OPERATOR MODEL: _____

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I INTRODUCTION

As many as eight flow-lines can be manifolded through one BETTIS Multiport Selector Valve. The valve allows diversion of an individual flow-line to a test outlet for testing or sampling, while combining the flow of the other flow-lines into a separate group outlet.

II VALVE SPECIFICATIONS

TRIM	RATING		SIZE	ANSI 300RF CONNECTION			WEIGHT
	MAXIMUM WORKING PRESSURE PSIG	WORKING TEMP °C		EIGHT FLOWLINE INLET PORTS	ONE TEST OUTLET PORT	ONE GROUP OUTLET PORT	
STD.	740	38	4x8	NPS 4	NPS 4	NPS 8	VALVE lbs. 1275
HIGH TEMP	600	260					

TRIM	RATING		SIZE	ANSI 600RF CONNECTION			WEIGHT
	MAXIMUM WORKING PRESSURE PSIG	WORKING TEMP °C		EIGHT FLOWLINE INLET PORTS	ONE TEST OUTLET PORT	ONE GROUP OUTLET PORT	
STD.	1480	38	4x8	NPS 4	NPS 4	NPS 8	VALVE lbs. 1375
HIGH TEMP	600	260					

Cv = 270 FOR TEST OUTLET FLOW

Cv = 660 FOR GROUP OUTLET FLOW

SHELL HYDROSTATIC TEST PRESSURE = 2220 PSIG (15300 kPa)

STANDARD TRIM

MAXIMUM DIFFERENTIAL: TEST - GROUP = 200 PSID (1380 kPa)

MAXIMUM DIFFERENTIAL: GROUP - TEST = 150 PSID (1030 kPa)

HIGH TEMPERATURE TRIM

MAXIMUM DIFFERENTIAL: TEST - GROUP = 300 PSID (2070 kPa)

MAXIMUM DIFFERENTIAL: GROUP - TEST = 250 PSID (1720 kPa)

INTERMITTENT SEAL EXPOSURE AT 285°C FOR 15 MINUTES WITH MAXIMUM BODY PRESSURE OF 1100 PSIG AND MAXIMUM DIFFERENTIAL.

STATIC STATIONARY DIFFERENTIAL: TEST - GROUP 800 PSID FOR 15 MINUTES AT 40°C.

STATIC STATIONARY DIFFERENTIAL: GROUP - TEST 400 PSID FOR 15 MINUTES AT 40°C.

NOTE: In emergency situations only, the 4x8 Multiport Selector Valve seal can maintain static stationary differential pressure per specifications above. Do not operate the motor operator at higher than the above maximum differential pressure because damage may occur to motor operator.

ACTUATOR SPECIFICATIONS

Torque at maximum differential should be between 21 - 29 kgf-m (150 - 210 ft-lb)

Plug position tolerance: $\pm 2^\circ$

Actuator speed: 1.4 rpm

Actuator weight: 60 kg (130 lb)

Actuator position accuracy: $\pm 1^\circ$

III VALVE ASSEMBLY

Refer to typical valve assembly drawing on page 6, and typical valve detail drawing on page 7.

Ensure all the parts are clean and in good condition before assembling the Multiport Selector Valve. Use ESSO Valve Grease No. 1, or a suitable equivalent, to lubricate the components.

A. BODY: (110)

1. Visually inspect all internal and external surfaces and threads.
2. Lubricate and install the 25% C/PTFE bushing (120)

B. PLUG: (130)

1. Lubricate and install the lower plug o-ring (133), with the PTFE backup ring (136) installed "above" the o-ring, toward the bonnet.
2. Lubricate and install the seal adjusting nut (138) by turning it clockwise (ie. viewing toward the plug centerline) until solid. Follow with three seal wave springs (140). Ensure the three seal wave springs are aligned on the seal adjusting nut.

NOTE: If the seal wave springs are not aligned, the plug seal may not hold rated differential pressure.

3. Install the seal back-up plate (143) against the shoulder in the plug.

4. Lubricate and install the plug seal o-ring (149) on the stainless steel end of the seal assembly (142). Lubricate and install the plug seal assembly, with the plug seal o-ring properly positioned, into the plug.

NOTE: Press seal assembly into the plug using hand force only.

5. Install the single scraper wave spring (158), followed by the scraper (154), into the plug.

NOTE: Lubricate the spring and scraper so that they stay in place in the plug during assembly. Ensure that the scraper fits freely into the plug. Check by pushing into the plug using both hands, then letting go to see if the scraper returns to its original position.

6. Lubricate and install the plug bushing (120) into the body.
7. Lower the plug vertically into the body, ensuring that the plug seal and scraper clear the body bore. When installed, the plug rests on top of the bushing.
8. Install and grease the tapered bearing cone and rollers (160) onto the plug.

C. BONNET: (162)

1. Lubricate and install the bearing cup (160) into the bonnet.
2. Lubricate and install the PTFE backup ring (170), followed by the upper plug o-ring (167), into bonnet bores' upper groove (ie. viewing from the bottom of the bonnet). Next, lubricate and install the upper plug polypak (164), into the bonnet bores' lower groove.

NOTE: The PTFE backup ring is installed toward the bonnets' top surface, as installed.

3. Lubricate and install the bonnet o-ring (173) into the bonnets' outer groove.
4. From the bonnets' top surface, lubricate and install the wiper (171) and grease fitting (178).

NOTE: Pump grease through the grease fitting to fill the bearing bore.

5. Install the injection nipple (177), 90° elbow (175), nipple, ball valve (174) and vent plug (176), ensuring that they are clean and well oiled.
6. Using two lifting eyes installed into the 1/2-13UNC jacking screw holes provided in the bonnet, vertically lift and set the bonnet in place on the valve body with the seal injection fittings over the group outlet. The bonnet stud holes must be aligned with the bodies tapped stud holes.

NOTE: Ensure the bonnet is flat and lowered slowly onto the top of the valve body, in order to prevent damaging the body o-ring and plug seals. Push the bonnet down by hand only, or rubber mallet.

7. Install the sixteen bonnet studs (180). Use Jet-Lube Kopr-Kote anti-seize lubricant, or a suitable equivalent.

8. Install the two lifting lugs (179) 90° from the group outlet.

NOTE: The required lifting lug position is 90° from the position shown in the typical assembly drawing on page 6.

9. Tighten two of the sixteen bonnet nuts (182), at a 180° interval, then ensure that the plug (130) rotates freely through a complete revolution.
10. Tighten the remaining nuts after confirming that the bonnet (162) and plug (130) have been centred. Torque the nuts to 450 ft-lbs.

D. PLUG SEAL ADJUSTMENT (162):

1. Adjust the plug seal assembly (142), by aligning the plug (130) with an open (ie. home test) port, then turning the adjusting nut (138) counter clockwise with adjusting tool (ie. viewing toward the plug centerline) until the scraper just touches the inside wall surface.
2. Rotate the plug (130) at least one complete revolution to check for binding or excessive turning torque then tighten the adjusting nut (138) counter clockwise, viewing towards the plug centerline, with the supplied adjusting tool to 40 ft.lbs of torque.

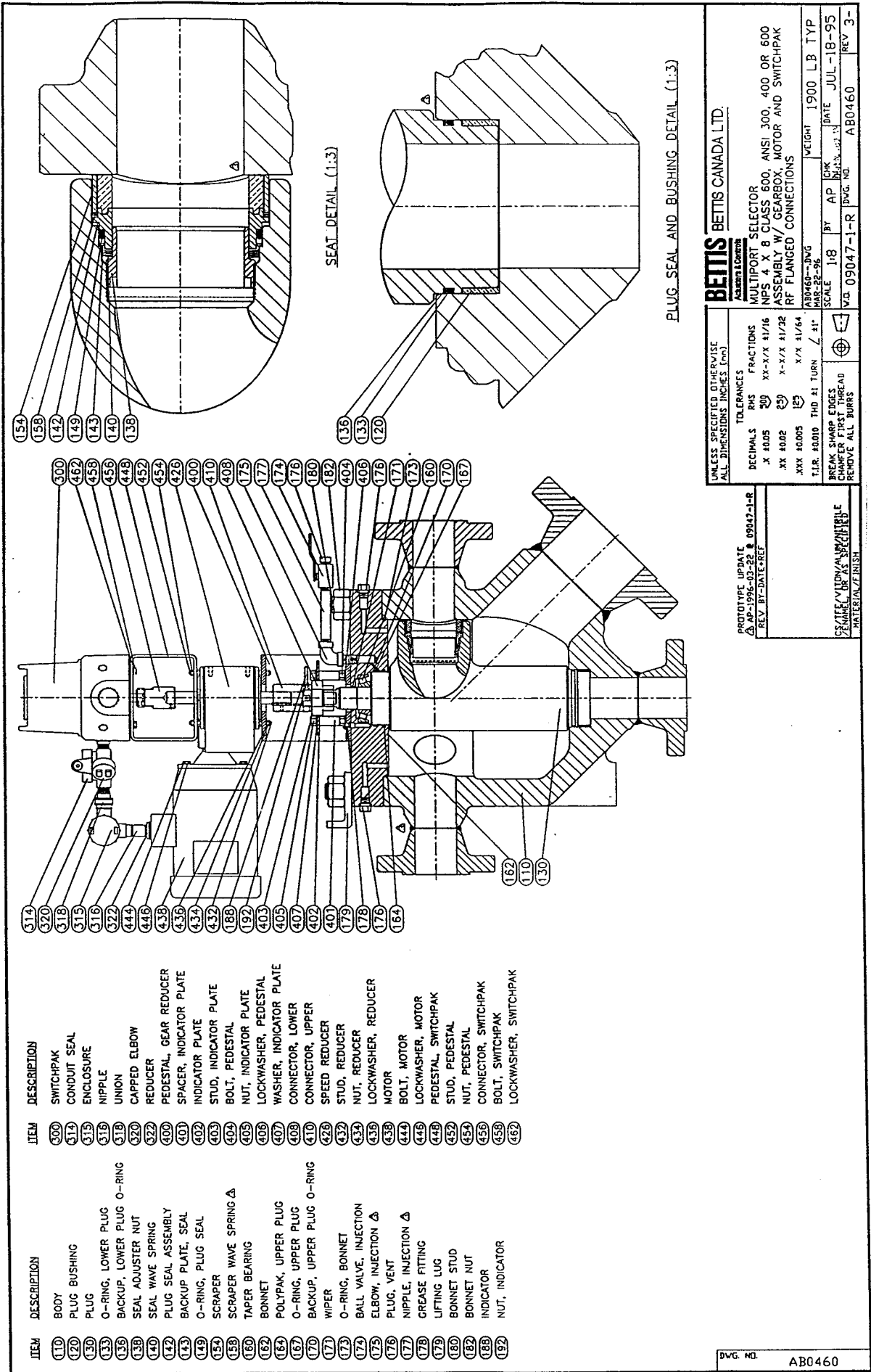
NOTE: Do not over tighten the adjusting nut (138), as damage to the plug seal assembly may result.

3. Turn the plug (130) at least one complete revolution while checking for smooth movement. If the plug seal assembly (142) is binding at inlet ports when the plug is rotated, the plug seal assembly (142) or the seal wave springs (140) are not in their proper position(s). See disassembly procedure below, if required.
4. Install the two bonnet vent plugs (176).
5. Perform any required leakage test(s).

IV VALVE DISASSEMBLY

Refer to typical valve assembly drawing on page 6, and typical valve detail drawing on page 7.

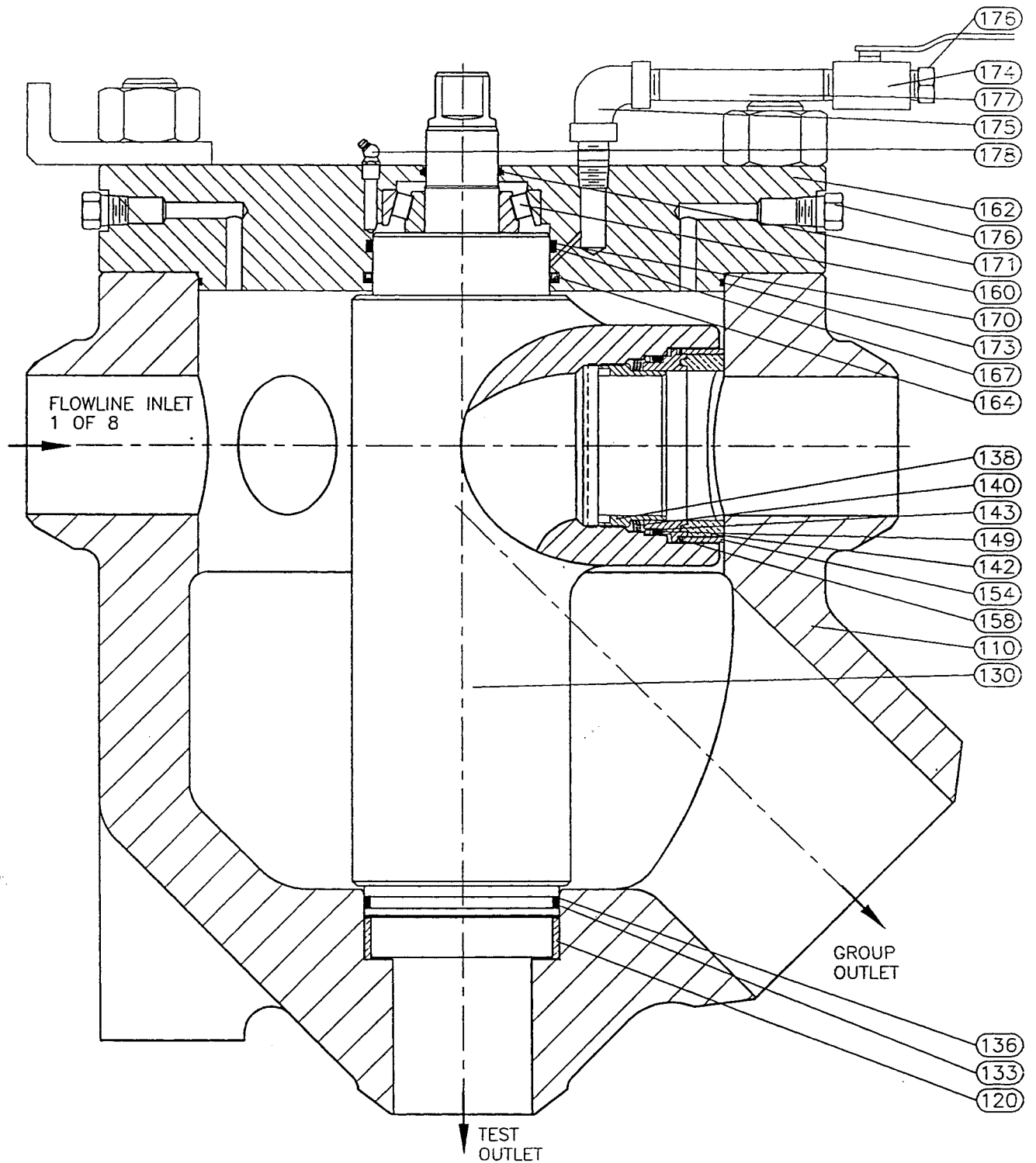
1. Ensure that both the group and test pressures are zero before proceeding.
2. Open a home test port for access to the seat assembly. Turn the seal adjusting nut (138) clockwise until solid (ie. viewing toward plug centerline), in order to release the spring load from the plug seal assembly, and provide clearance for the scraper in the body.
3. Remove the sixteen bonnet nuts (182) and studs (180). Using two lifting eyes in the 1/2-13UNC jacking screw holes provided in the bonnet, lift the bonnet (162) vertically until it clears the plug and body. Set the bonnet aside.
4. Remove the plug (130), complete with all seal components, from the valve body.
5. Disassemble the plug and plug seal, and inspect all components. Reassemble following above Valve Assembly procedure.



- | | | | |
|-----|-------------------------|-----|-------------------------|
| 314 | SWITCHPAK | 300 | SWITCHPAK |
| 320 | CONDUIT SEAL | 462 | CONDUIT SEAL |
| 318 | ENCLOSURE | 142 | ENCLOSURE |
| 315 | NIPPLE | 458 | NIPPLE |
| 316 | UNION | 143 | UNION |
| 322 | CAPPED ELBOW | 456 | CAPPED ELBOW |
| 444 | REDUCER | 448 | REDUCER |
| 446 | PEDESTAL, GEAR REDUCER | 452 | PEDESTAL, GEAR REDUCER |
| 439 | SPACER, INDICATOR PLATE | 454 | SPACER, INDICATOR PLATE |
| 436 | INDICATOR PLATE | 426 | INDICATOR PLATE |
| 434 | STUD, INDICATOR PLATE | 400 | STUD, INDICATOR PLATE |
| 432 | BOLT, PEDESTAL | 410 | BOLT, PEDESTAL |
| 188 | NUT, INDICATOR PLATE | 408 | NUT, INDICATOR PLATE |
| 192 | LOCKWASHER, PEDESTAL | 175 | LOCKWASHER, PEDESTAL |
| 403 | WASHER, INDICATOR PLATE | 177 | WASHER, INDICATOR PLATE |
| 405 | CONNECTOR, LOWER | 174 | CONNECTOR, LOWER |
| 407 | CONNECTOR, UPPER | 176 | CONNECTOR, UPPER |
| 402 | SPEED REDUCER | 180 | SPEED REDUCER |
| 401 | NUT, REDUCER | 182 | NUT, REDUCER |
| 179 | LOCKWASHER, REDUCER | 404 | LOCKWASHER, REDUCER |
| 178 | MOTOR | 178 | MOTOR |
| 176 | BOLT, MOTOR | 171 | BOLT, MOTOR |
| 164 | LOCKWASHER, MOTOR | 173 | LOCKWASHER, MOTOR |
| 167 | PEDESTAL, SWITCHPAK | 160 | PEDESTAL, SWITCHPAK |
| 170 | STUD, PEDESTAL | 170 | STUD, PEDESTAL |
| 168 | NUT, PEDESTAL | 164 | NUT, PEDESTAL |
| 169 | CONNECTOR, SWITCHPAK | 459 | CONNECTOR, SWITCHPAK |
| 167 | BOLT, SWITCHPAK | 458 | BOLT, SWITCHPAK |
| 162 | LOCKWASHER, SWITCHPAK | 462 | LOCKWASHER, SWITCHPAK |

- | | | | |
|-----|-----------------------|-----|-----------------------|
| 110 | BODY | 154 | PLUG SEAL AND BUSHING |
| 120 | PLUG BUSHING | 158 | PLUG SEAL AND BUSHING |
| 130 | PLUG | 142 | PLUG SEAL AND BUSHING |
| 133 | O-RING, LOWER PLUG | 143 | PLUG SEAL AND BUSHING |
| 136 | BACKUP, LOWER PLUG | 140 | PLUG SEAL AND BUSHING |
| 138 | O-RING, LOWER PLUG | 136 | PLUG SEAL AND BUSHING |
| 140 | SEAL ADJUSTER NUT | 138 | PLUG SEAL AND BUSHING |
| 142 | SEAL WAVE SPRING | 135 | PLUG SEAL AND BUSHING |
| 143 | PLUG SEAL ASSEMBLY | 137 | PLUG SEAL AND BUSHING |
| 149 | BACKUP PLATE, SEAL | 139 | PLUG SEAL AND BUSHING |
| 151 | O-RING, PLUG SEAL | 141 | PLUG SEAL AND BUSHING |
| 152 | SCRAPER WAVE SPRING | 144 | PLUG SEAL AND BUSHING |
| 153 | TAPER BEARING | 145 | PLUG SEAL AND BUSHING |
| 154 | BONNET | 146 | PLUG SEAL AND BUSHING |
| 157 | POLYPAK, UPPER PLUG | 147 | PLUG SEAL AND BUSHING |
| 161 | O-RING, UPPER PLUG | 149 | PLUG SEAL AND BUSHING |
| 167 | BACKUP, UPPER PLUG | 150 | PLUG SEAL AND BUSHING |
| 170 | O-RING, UPPER PLUG | 151 | PLUG SEAL AND BUSHING |
| 171 | WIPER | 152 | PLUG SEAL AND BUSHING |
| 173 | O-RING, BONNET | 153 | PLUG SEAL AND BUSHING |
| 174 | BALL VALVE, INJECTION | 155 | PLUG SEAL AND BUSHING |
| 175 | ELBOW, INJECTION | 156 | PLUG SEAL AND BUSHING |
| 176 | PLUG, VENT | 157 | PLUG SEAL AND BUSHING |
| 179 | NIPPLE, INJECTION | 159 | PLUG SEAL AND BUSHING |
| 178 | GREASE FITTING | 160 | PLUG SEAL AND BUSHING |
| 179 | LIFTING LUG | 161 | PLUG SEAL AND BUSHING |
| 180 | BONNET STUD | 162 | PLUG SEAL AND BUSHING |
| 182 | BONNET NUT | 163 | PLUG SEAL AND BUSHING |
| 188 | INDICATOR | 164 | PLUG SEAL AND BUSHING |
| 192 | NUT, INDICATOR | 165 | PLUG SEAL AND BUSHING |

PROTOTYPIC UPDATE A-AP-1996-03-22 & 09042-1-R REV. BY: DATE: REF		BETTS Acquisitions BETTS CANADA LTD. MULTIPROT SELECTOR NPS 4 X B CLASS 600, ANSI 300, 400 OR 600 ASSEMBLY W/ GEARBOX, MOTOR AND SWITCHPAK RF FLANGED CONNECTIONS	
UNLESS SPECIFIED OTHERWISE ALL DIMENSIONS INCHES (DIM)		TOLERANCES DECIMALS .005 FRACTIONS XX-X/X X1/16 .XX .002 .25 X-X/X X1/32 .XXX .0005 .125 X/X X1/64 T.I.R. .0010 THD 2:1 TURN / 31°	
SCALE 1:8 BY AP DATE JUL-18-95 v.d. 09047-1-R Dwg. No. AB0460		WEIGHT 1900 LB TYP	
BREAK SHARP EDGES CHAMFER FIRST THREAD REMOVE ALL BURRS		DATE: JUL-18-95 Dwg. No. AB0460	
SCALE 1:8 BY AP DATE JUL-18-95 v.d. 09047-1-R Dwg. No. AB0460		WEIGHT 1900 LB TYP	
BREAK SHARP EDGES CHAMFER FIRST THREAD REMOVE ALL BURRS		DATE: JUL-18-95 Dwg. No. AB0460	
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BREAK SHARP EDGES CHAMFER FIRST THREAD REMOVE ALL BURRS		DATE: JUL-18-95 Dwg. No. AB0460	



NOTE:
 1) REFER TO ASSEMBLY DRAWING AB0460 FOR COMPONENT DESCRIPTIONS

FIGURE 1 -- 4x8 CL 600 VALVE CUTAWAY DRAWING

V ACTUATOR ASSEMBLY

A. PEDESTAL, CONNECTOR, SPEED REDUCER AND MOTOR

Refer to typical valve assembly drawing on page 6.

1. Set the speed reducer pedestal (400) in place.
2. Install two bolts (404) and lockwashers (406); two studs (403), flatwashers (407) and nuts (405) with indicator plate (402) and spacers (401).
3. Install the lower connector (408) with the indicator pointed to the plug seal assembly location.
4. Install indicator (188) on the upper connector.
5. Install the upper connector (410) with the setscrew started, but without the connector bolt and locknut.
6. Install the speed reducer (426) with key, and four bolts (432), washers (436) and nuts (434).
7. Check for free rotation between the two connector halves to confirm good shaft alignment. Adjust if necessary.
8. Tighten all mounting bolts and nuts.
9. Install and tighten the connector bolt (412) and locknut and tighten the setscrew.
10. Install the motor (438) with four bolts (444) and lockwashers (446). Align and tighten.

B. TYPICAL ELECTRICAL CONDUIT, SWITCHPAK PEDESTAL AND CONNECTOR

Refer to typical valve assembly drawing on page 6.

1. Set Switchpak pedestal (448) in place and install the four bolts (452) and washers (454)
2. Start the two setscrews in the Switchpak connector (456) and place on the speed reducer shaft.
3. Set the Switchpak (300) in place and install the four bolts (458) and washers (462).
4. Install the electrical conduit as follows:
 - a) On the motor side, install the 1/2 NPT reducer (322), the 1/2 NPT nipple (316), the 1/2 NPT capped elbow (315) and half of the union (318).
 - b) On the Switchpak side, install the 1/2 NPT reducer, the 1/2 NPT nipples (316), the 1/2 NPT elbow, the 1/2 NPT seal (314) and the second half of the union (318).

5. Install all wiring according to the electrical diagram and local regulations.
6. Check shaft alignment by rotating both shafts independently, without binding occurring in the connector. Adjust if necessary.
7. Tighten all mounting bolts, nuts and setscrews.

C. LOCAL STEPPING COMMAND ELECTRICAL CONDUIT, SWITCHPAK PEDESTAL AND CONNECTOR

Refer to local stepping command electrical assembly drawing on page 13.

1. Set the Switchpak pedestal (448) in place and install the four studs (452), four flatwashers (455), four lockwashers (453) and four nuts (454).
2. Install the Switchpak connector (456) on the speed reducer shaft, followed by the Switchpak coupling (455) and the Switchpak coupling adapter.
3. Off of the Switchpak pedestal, assemble the Switchpak (300), 1 NPT x 3/4 NPT reducer (322), two 3/4 NPT close nipples (310), seal enclosure (315), seal cover (314) and the junction box. (370).
4. Position the Switchpak and junction box assembly on the pedestal using the spacers (371), bolts (372), lockwashers (374) and nuts (373), engaging the Switchpak coupling adapter.
5. Install the four Switchpak bolts (458) and lockwashers (462).
6. Off the Switchpak pedestal assemble the push button station (350), local/remote switch (355), jog push button (356), 3/4 NPT capped elbow (321), 3/4 NPT x 2.50 long nipple (317) and 3/4 NPT x 3.00 long nipple (318). Thread into the seal enclosure until the back of the push button station is flush with the Switchpak pedestal. Loosely install the pushbutton station bolts (351), lockwashers (354) and nuts.
7. Between the motor terminal box (438) and the seal enclosure, install one 3/4 NPT close nipple (310), one 3/4 NPT x 3.00 long nipple (318), one 3/4 NPT x 3.25 long nipple (311), one 3/4 NPT x 3.50 long nipple (312), two 3/4 NPT capped elbows (321), and the 3/4 NPT union (320).
8. Install all wiring according to the electrical diagram and local regulations.
9. Check shaft alignment by rotating both shafts independently, without binding occurring in the connector. Adjust if necessary.
10. With the Switchpak relay bracket and push button station aligned on the Switchpak pedestal, tighten all mounting bolts, nuts and setscrews.

VI CAM ADJUSTING

Refer to Switchpak assembly drawing on page 12, and the typical wiring diagram on page 16.

A. Objective: To align valve plug (130) at each port upon application of command signal to electric actuator.

B. Pre-requisites:

1. Switchpak is assembled and installed according to factory specifications.
2. Typical wiring and controls are according to the wiring diagram, and the eight on/off command switches and main on/off switch (ie. disconnect means) are in place.
3. Power supply is present.
4. Connections:
 - a) Connect motor electrical supply to terminals 13 and 14.
 - b) Connect instrumentation electrical supply to terminals 11 and 12, with the positive (+) lead to terminal 12.

NOTE: The negative (-) lead will be connected via terminals 1 through 8 as the desired port is selected. The instrumentation electrical supply should have an ON/OFF switch to isolate it from the unit while adjustments are being made.

C. Before proceeding with the Switchpak cam adjustment, ensure that:

1. All of the port plugs are removed; or the indicator is in place accurately, whichever is applicable, to check for the plug (130) and port position.
2. Cam setscrew (12) is flush with cam (10) and the signal adjuster screw (13) standout is just sufficient to trigger microswitch (16).
3. Limit switch No. 1 (lowest on stack) corresponds with Port #1.

NOTE: If signal adjuster screw (13) standout is excessive, it could damage the microswitch (16) or lever during rotation. Notice that since cam setscrew (12) is opposite to signal adjuster screw (13) on each cam, some cams can be preset to reduce trial and error repetitions.

D. Cam Adjusting Procedure

NOTE: Before locking each cam (10) in place, confirm signal adjuster screw (13) standout is just sufficient to actuate microswitch (16).

1. Close main switch and command switch #1 to start actuator, then open main switch manually when plug (130) and port #1 are aligned.

2. Rotate cam #1 until the signal adjuster screw (13) triggers the switch then advance the cam, radially approximately 1° , to account for the motor and drive train momentum to preset cam #1.

With the plug (130) still aligned to #1 port, make the following preliminary adjustments:

NOTE: Opposing ports (180° to each other) can be preset.
ie. number 4 port is opposite to number 8

3. Preset cam #5. Align the trigger screw of cam #5 with the setscrew of cam #1. To tighten cam #5 setscrew, insert Allen key between the two switch stacks.
4. Apply power (connect negative lead to terminal #2, turn switch on and off) and manually stop at port #2. Adjust cam #2 as per step 2 above.
5. Preset cam #6. Align the trigger screw of cam #6 with the setscrew of cam #2. To tighten the setscrew, insert the Allen key between the two switch stacks.
6. Apply power (connect negative lead to terminal #3, turn switch on and off) and manually stop at port #3. Adjust cam #3 as per step 2 above.
7. Preset cam #7. Align the trigger screw of cam #7 with the setscrew of cam #3 and tighten.
8. Apply power (connect negative lead to terminal #4, turn switch on and off) and manually stop at port #4. Adjust cam #4 as per step 2 above. Preset cam #8 as per step 3 above.
9. Continue to activate command switches for remainder of ports, and adjust cams for over/under travel.

NOTE: Always open main switch or disconnect motor power when adjusting or servicing Switchpak.

E. Jog Feature

1. Select "local setting" on the remote/local switch.
2. Depress the "JOG" switch and maintain it until the indicator is aligned over the desired port then release it.

NOTE: When viewed from above, the plug rotates counter-clockwise (CCW) only.

F. Finally

1. Pour seal, or tag.
2. Install the 1 NPT caplug in the Switchpak.
3. Install the 1/2 NPT port plugs in the Switchpak.

ITEM	DESCRIPTION	MATERIAL	QTY	NOTE
1	HOUSING	TENZALLOY	1	
2	COVER	TENZALLOY	1	
5	SHAFT	SS 316	1	
10	CAM	AL 6061-T6	8	
12	SETScrew, CAM	SS 304	8	
13	TRIGGER SCREW	NYLON	8	
14	PRESSURE LAMINATE	PHENOL FABRIC	10	
15	TERMINAL BLOCK	MK3/12 MELAMINE	2	
16	MICROSWITCH	DT-2RV3-A7	8	
17	GROUND SCREW	SS 304	1	
18	O-RING, SHAFT	NITRILE	1	
19	O-RING, HOUSING	NITRILE	1	
28	HEATER	CERAMIC	1	(D)
31	DRAIN	SS 304	1	

NOTE:
 (D) DENOTES SUPPLIED AS OPTION
 - FASTENERS AND SERVICE TOOLS ARE ANSI/INCH SIZE

SWITCHPAK INSTALLATION AND SERVICE

SWITCHPAK ROTARY POSITION INDICATING SWITCHES, MODELS SW28XX, ARE SUPPLIED WITH 8 SWITCHES, ADJUSTABLE THROUGH 360° OF SHAFT ROTATION. THE DRAWING ILLUSTRATES A TYPICAL 8 SWITCH UNIT AND MOUNTING ARRANGEMENT. THE ENCLOSURE IS WATERTIGHT AND SUITABLE FOR INSTALLATION IN CLASS 1 DIV. 1 GROUP C & D HAZARDOUS LOCATIONS.

INSTALLATION

1. REMOVE COVER (2).
2. ATTACH HOUSING (1) TO STATIONARY BRACKET, WITH CAM SHAFT AND ROTARY STEM ENGAGED.
3. BEFORE TIGHTENING MOUNTING BOLTS, ALIGN CAM SHAFT CONCENTRIC TO STEM AND POSITION CAMS WITH SETSCREWS (12) AS SHOWN. ENSURE THAT BOTH STEM AND SHAFT CAN BE ROTATED WITHOUT BINDING BEFORE TIGHTENING SETSCREWS.
4. IN HAZARDOUS LOCATIONS, INSTALL SEALING FITTING(S) IN ACCORDANCE WITH LOCAL REGULATIONS AND NATIONAL CODE.
5. SECURE GROUND WIRE(S) TO GROUND SCREW (17). ENSURE THAT ALL WIRES ARE FREE OF STRAIN AND LOCATED TO CLEAR COVER.

SETPOINT ADJUSTMENT

SETPOINTS ARE FACTORY SET PER WIRING DIAGRAM, IF APPLICABLE. TO ADJUST, LOOSEN SETSCREW (12), ROTATE CAM TO POSITION DESIRED AND RE-TIGHTEN SETSCREW.

SENSITIVITY ADJUSTMENT

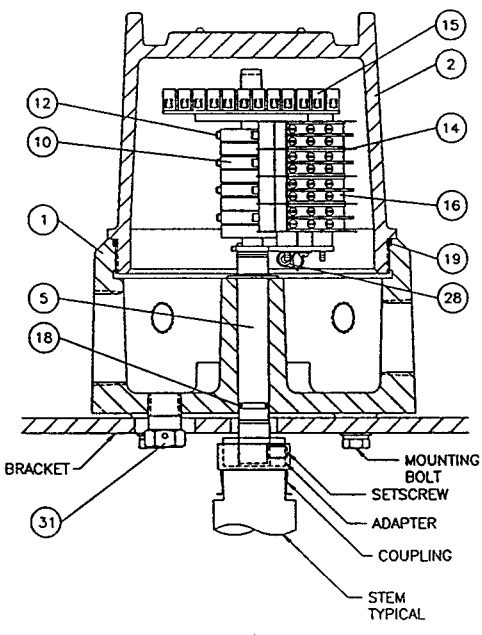
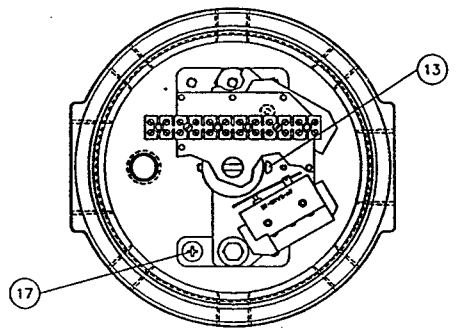
SENSITIVITY IS NORMALLY FACTORY SET. TO ADJUST, TURN TRIGGER SCREW (13) OUT TO ADVANCE AND LENGTHEN SIGNAL, TURN IN TO SHORTEN AND DELAY. USE 0.001" FEELER (GAP) GAUGE TO ENSURE NO SWITCH LEVER CONTACT WITH SWITCH BODY.

MICROSWITCH REPLACEMENT

1. DISCONNECT SUPPLY CIRCUIT(S) BEFORE REMOVING COVER.
2. ROTATE CAM SHAFT TO INTERMEDIATE (MICROSWITCHES UNACTUATED) POSITION.
3. DEMOUNT TERMINAL STRIP(S) IF PRESENT.
4. NOTE MICROSWITCH ARRANGEMENT (TWO STACKS, STAGGERED WITH SPACERS ABOVE ONE, BELOW THE OTHER) FOR RE-ASSEMBLY.
5. REMOVE MICROSWITCH MOUNTING SCREWS.
6. REPLACE DEFECTIVE MICROSWITCH AND CHECK THAT LAMINATE SEPARATES EACH SWITCH.
7. REPLACE MICROSWITCH MOUNTING SCREWS

CAUTION

ENSURE COVER JOINT THREADS AND O-RING ARE FREE OF DEBRIS AND LUBRICATED BEFORE REPLACING COVER. IN HAZARDOUS LOCATIONS, KEEP COVER TIGHTLY CLOSED WHILE CIRCUITS ARE ALIVE.



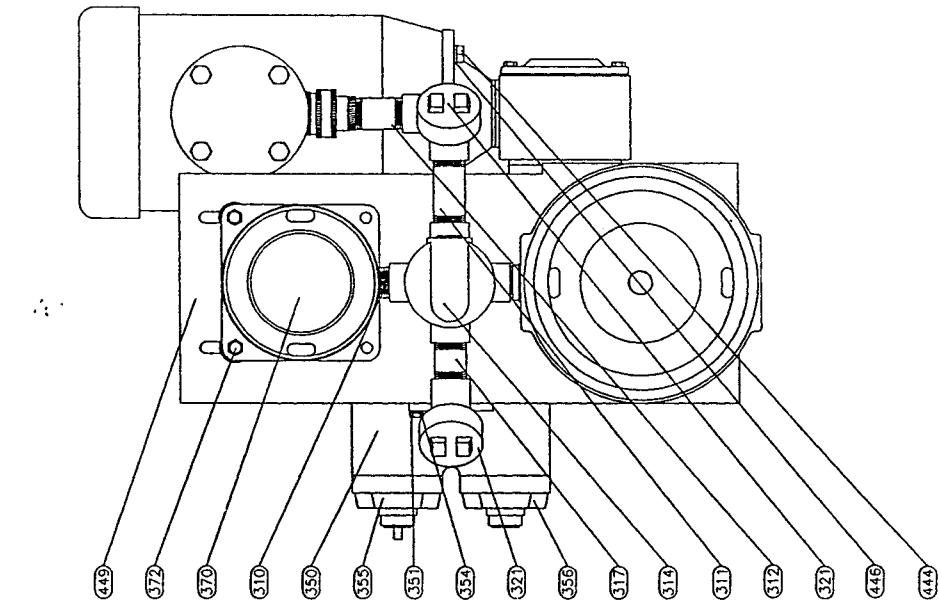
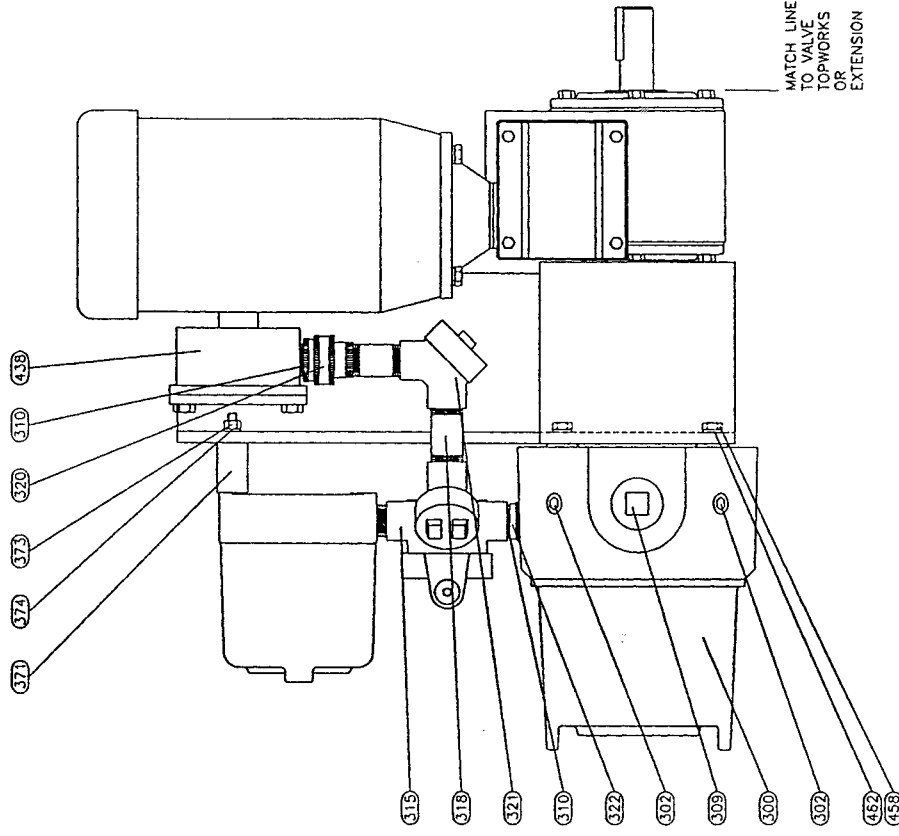
TOLERANCES		
DECIMALS	RMS	FRACTIONS
.X ±0.05	200	XX-X/X ±1/16
.XX ±0.02	250	X-X/X ±1/32
.XXX ±0.005	125	X/X ±1/64
T.I.R. ±0.010		THD ±1 TURN / ±1°

BETTIS BETTIS CANADA LTD.
 Actuators & Controls
 SWITCHPAK SW28XX
 INSTALLATION AND ADJUSTMENT

1-0048--DWG_VIEW_08
 JAN-09-96

SCALE 1:3 BY VI CHK M.H.s.t.f.f. DATE DEC-04-95
 V.D. 7482-1-B DWG. NO. 1B0048-08 REV --

REV BY-DATE+REF
MATERIAL/FINISH



- ITEM DESCRIPTION
- 300 SWITCHPAK
 - 302 ENTRY PLUG
 - 309 ENTRY PLUG
 - 310 NIPPLE
 - 311 NIPPLE
 - 312 NIPPLE
 - 315 SEAL COVER
 - 319 SEAL ENCLOSURE
 - 317 NIPPLE
 - 318 NIPPLE
 - 320 UNION
 - 321 CAPPED ELBOW
 - 322 REDUCER
 - 325 CAPPED TEE, RELAY
 - 350 PUSH BUTTON STATION
 - 351 BOLT, PUSH BUTTON STATION
 - 354 LOCKWASHER, PUSH BUTTON STATION
 - 355 LOCAL/REMOTE SWITCH
 - 356 JOG PUSH BUTTON
 - 370 JUNCTION BOX
 - 371 SPACER, JUNCTION BOX
 - 372 BOLT, JUNCTION BOX
 - 373 NUT, JUNCTION BOX
 - 374 LOCKWASHER, JUNCTION BOX
 - 375 MOTOR
 - 438 BOLT, MOTOR
 - 444 LOCKWASHER, MOTOR
 - 449 PEDESTAL, SWITCHPAK
 - 458 BOLT, SWITCHPAK
 - 452 LOCKWASHER, SWITCHPAK

MATCH LINE
TO VALVE
TOPWORKS
OR
EXTENSION

BETTS BETTS CANADA LTD.
Account & Control

UNLESS SPECIFIED OTHERWISE
ALL DIMENSIONS IN INCHES (CON)

TOLERANCES	DECIMALS	RMS	FRACTIONS
	.X ±0.05	209	XX- $\frac{Y}{Z}$ X $\frac{1}{16}$
	.XX ±0.02	259	X- $\frac{Y}{Z}$ X $\frac{1}{32}$
	.XXX ±0.005	125	X- $\frac{Y}{Z}$ X $\frac{1}{64}$
T.I.R. ±0.010			THD. ±1 TURN $\frac{1}{2}$ 31°

ADD 4070, 4072
APR-1986-12-0780947-1-R
PROTOTYPE REVISION
AP-1996-04-0480947-1-R
REV BY-DATE*REF

MULTIPORT SELECTOR
ELECTRICAL ASSEMBLY DETAIL
120VAC MOTOR
OPTIONAL LOCAL STEPPING COMMAND, WITH SJ1

WEIGHT 125 LB
SCALE 1:4
DATE DEC-01-95
BY AP
DWG. NO. 180163
REV 2

CS/CIF/VIDW/AM/INTRILE
CHAMFER FIRST THREAD
SPECIFIED
MATERIAL FINISH

VII VALVE INSTALLATION

Before installing the unit, observe the following:

1. Check for external physical damage.
2. Check for any visible leakage of gear oil from the speed reducer (426).
3. Visually inspect inside of valve through group outlet port checking for damage, rust and debris.
4. Check the wiring arrangement using the attached diagram on page 16, or as supplied for a particular order/unit.
5. Connect power supply and signal circuits to test the plug (130) location and motor (438) rotation at each port.

NOTE: The Multiport Selector Valve is factory adjusted when supplied with actuator and should not require further adjustment.

6. Connect piping.

NOTE: When hydrotesting external piping, position plug between any two inlet ports in order to equalize test pressure between the valve body and external piping, and prevent possible seal damage from occurring.

VIII VALVE MAINTENANCE

The Multiport Selector Valve is shipped completely greased and lubricated, but it is recommended that the unit be checked prior to operation if it has been stored for more than one year.

1. Check speed reducer oil at regular intervals, and change the oil each one hundred running hours or once a year, whichever comes first. Use Mobile Synthetic SHC-634 ISO VG460 lubricant, or a suitable equivalent.
2. Make sure the oil in the speed reducer (428) is at the indicated level.

NOTE: Excessive oil could cause pressure build-up, leakage and overheating which will result in rapid wear of the oil seals, bearing and gears.

3. Lubricate bearing (160) through grease nipple every six months, or as needed. Use Dow Corning Extreme High Temp #41 grease, or a suitable equivalent.
4. Do not lubricate the motor because it is a sealed unit.

IX TROUBLESHOOTING

A. Actuator does not align plug (130) to port.

1. If alignment is off only at one or two ports but the rest are aligned, then refer to assembly and adjustment procedures on pages 3 through 14.
2. If alignment is off in the same direction for all ports then:
 - a) Check the valve/actuator connector for looseness.
 - b) Check the Switchpak/actuator connector for looseness.
 - c) Check the motor for stalling or overload.
 - d) Check the speed reducer for visual leakage or noisy gear.
 - e) Check the accuracy of the position indicator itself.

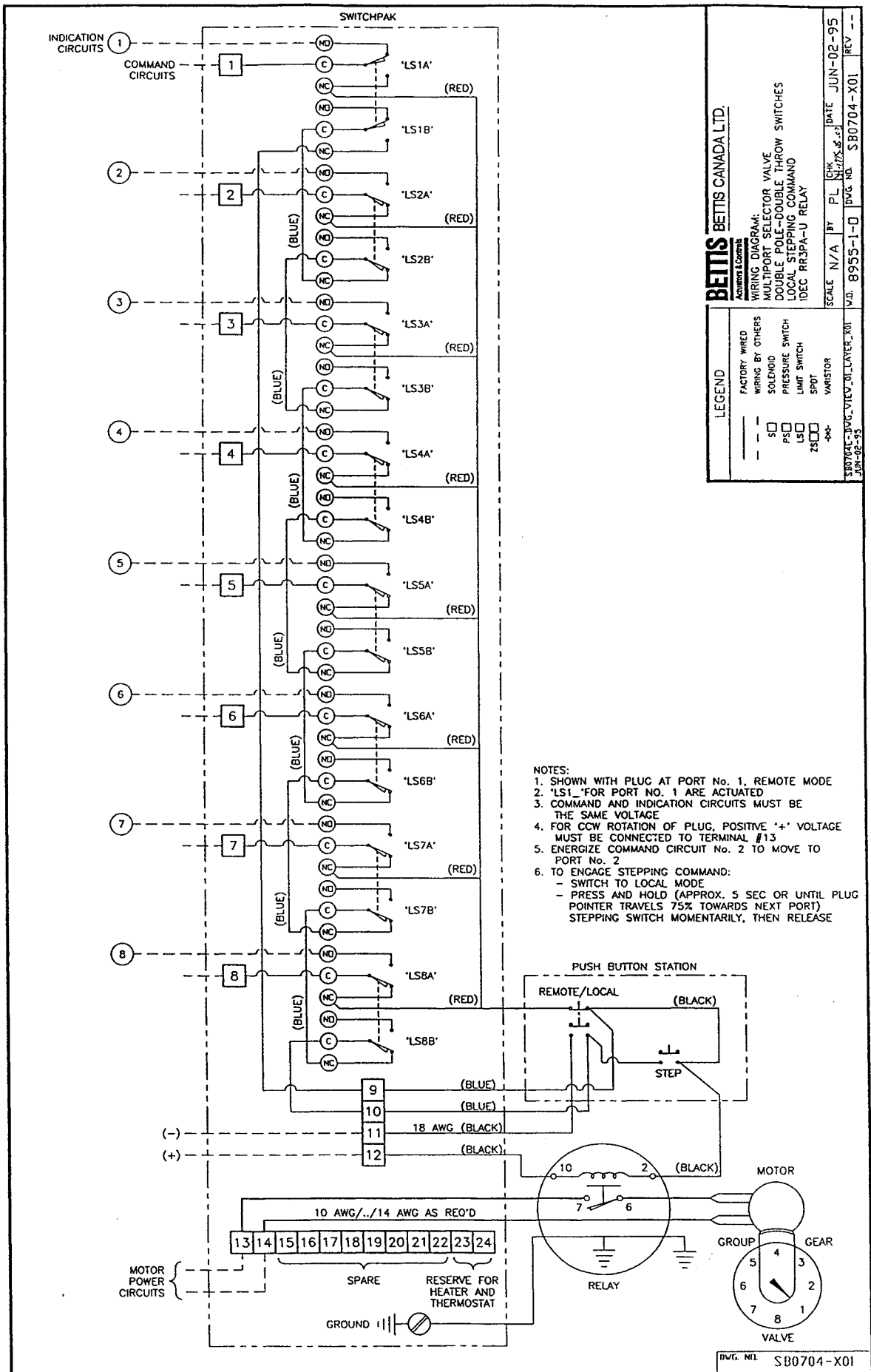
NOTE: Refer to typical assembly drawing on page 6, and the Switchpak assembly drawing on page 12.

B. Plug seal assembly leaks.

1. Refer to specification for rated differential pressure limitations.
2. Check that the plug is aligned with port.
3. Remove the plug from (home test) port and check for plug seal assembly damage (ie. scratches).
4. If more information is required, contact the factory.

C. Plug to bonnet storm seal leaks to atmosphere.

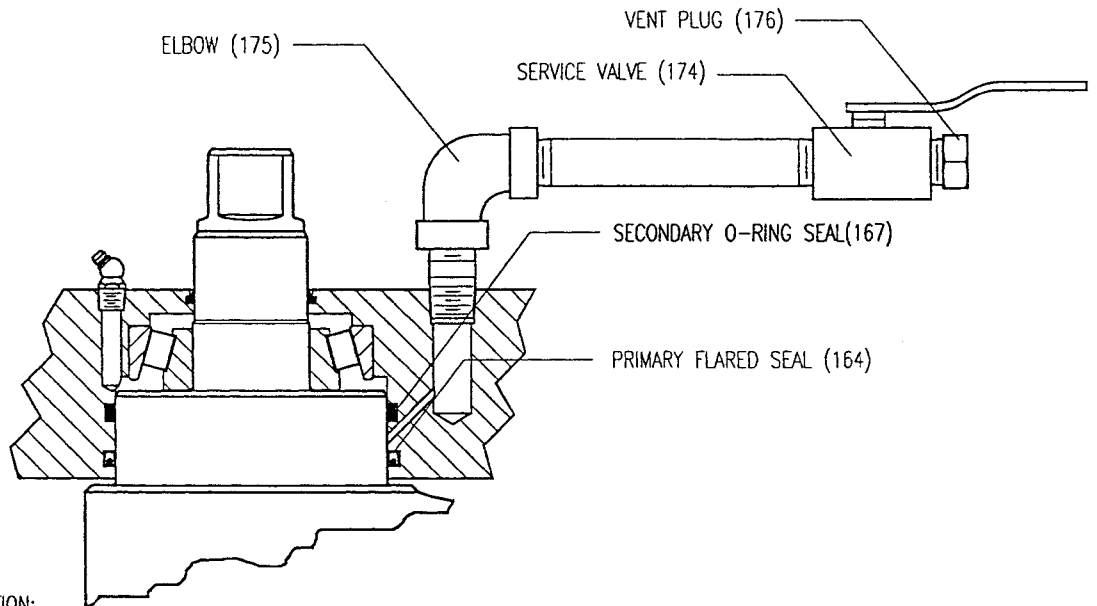
1. Refer to the injection system drawing on page 17.
2. The Multiport Selector Valve is shipped with the service valve in the normally closed position.
3. To determine if the primary seal has failed, remove the vent plug (176) from, and gradually open the service valve. Any leakage occurring past the primary seal will drain out of the open service valve.
4. If more information is required, contact the factory.



BETTS
Achieving Excellence

BETTS CANADA LTD.
WIRING DIAGRAM:
MULTI-PORT SELECTOR VALVE
DOUBLE POLE-DOUBLE THROW SWITCHES
LOCAL STEPPING COMMAND
IDEC RR3PA-U RELAY

SCALE	N/A	BY	PL	CHK	DATE	JUN-02-95	REV	--
V.D.	8955-1-D					SB0704-X01		



PLUG SEAL OPERATION:

TWO PLUG SEALS ARE PROVIDED, A PRIMARY FLARED SEAL AND A SECONDARY O-RING. UNDER NORMAL OPERATING CONDITIONS THE SERVICE VALVE REMAINS CLOSED AND THE PRIMARY FLARED SEAL IS EFFECTIVE. THE FIELD OPERATOR, AS REQUIRED, MAY CHECK FOR A PRIMARY SEAL BY REMOVING THE VENT PLUG AND OPENING THE SERVICE VALVE. IF THE PRIMARY SEAL HAS FAILED, STEM LEAKAGE WILL BE RELEASED THROUGH THE OPENED SERVICE VALVE. WITH THE SERVICE VALVE SUBSEQUENTLY CLOSED, THE SECONDARY O-RING BECOMES ENERGIZED. IN AN EMERGENCY SITUATION WHERE BOTH PLUG SEALS HAVE FAILED, WITH THE VENT PLUG REMOVED AND THE SERVICE VALVE CLOSED, A GIANT BUTTONHEAD FITTING MAY BE INSTALLED INTO THE SERVICE VALVE. SEALANT MAY THEN BE INJECTED WITH THE SERVICE VALVE OPENED INTO THE BORE OF THE BONNET, CREATING A TEMPORARY SEAL.

FIGURE 2 -- INJECTION SYSTEM OPERATION

X MULTIPOINT SELECTOR VALVE NOTES

Lined area for notes, consisting of 30 horizontal lines.