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SERVICE MANUAL No. I-0052

3" ANSI 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 seven 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	3x6	NPS 3	NPS 3	NPS 6	VALVE lbs. 800
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.	1440	38	3x6	NPS 3	NPS 3	NPS 6	VALVE lbs. 860
HIGH TEMP	1200	260					

$C_v = 151$ FOR TEST OUTLET FLOW

$C_v = 369$ FOR GROUP OUTLET FLOW

SHELL HYDROSTATIC TEST PRESSURE = 2160 PSIG (14900 kPa)

STANDARD TRIM

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

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

HIGH TEMPERATURE TRIM

MAXIMUM DIFFERENTIAL: TEST - GROUP = 400 PSIG (2760 kPa)

MAXIMUM DIFFERENTIAL: GROUP - TEST = 350 PSIG (2415 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 1000 PSID FOR 15 MINUTES @ 40°C

STATIC STATIONARY DIFFERENTIAL: GROUP - TEST 500 PSID FOR 15 MINUTES @ 40°C

NOTE: In emergency situations only, the 3x6 Multiport Selector Valve can maintain a static stationary differential pressure per specifications above. Do not operate the motor operator at higher than maximum differential pressure because damage may result to the motor operator.

ACTUATOR SPECIFICATIONS

PLUG POSITION TOLERANCE: $\pm 2^\circ$

TORQUE @ MAXIMUM DIFFERENTIAL SHOULD BE BETWEEN 100 AND 170 ft.lbs.

ACTUATOR SPEED: 1.4 RPM

WEIGHT: 130 lbs.

POSITION ACCURACY: $\pm 1^\circ$

III VALVE ASSEMBLY

Refer to typical assembly drawing on page 6.

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 internal and external surfaces and threads.
2. Lubricate and install teflon / 25% carbon plug bushing (120).

B. PLUG: (130)

1. Lubricate and install the lower plug o-ring (133) with the teflon backup ring (136) "above" the o-ring.
2. Lubricate and install the seal adjusting nut (138) with three seal wave springs (140) followed by the wave spring backup (143). Make sure these springs are placed properly on the step of the adjusting nut. If these springs are not in the proper place, it is impossible to get the plug seal assembly (145, 146) to hold pressure.
3. Install the seal back-up plate (143) against its' shoulder in the plug.
4. Lubricate and place the plug seal o-ring (149) on the stainless steel portion of the plug seal assembly (145, 146). Lubricate and install the plug seal assembly, with the plug seal o-ring properly positioned into the plug.

NOTE: Push seal into plug's seat pocket by hand only.

5. Install one scraper wave spring (158), followed by the scraper (154), into the plug over the seal assembly.

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

6. Lower the plug (130) assembly vertically into the body ensuring that the plug seal and scraper clear the body bore. When installed the plug assembly rests on top of the bushing.
7. Install and grease the tapered bearing cone (160) and rollers onto the plug.

C. BONNET: (162)

1. Lubricate and install the bearing cup (160) inside the bonnet.
2. Lubricate and install the o-ring (167) and the teflon backup ring (170) in the I.D. groove.

NOTE: Backup ring (170) is above o-ring (167) when the bonnet is installed on the body.

3. Lubricate and install the o-ring (173) in the outer groove.
4. Install the wiper (171) and the grease nipple (178).

NOTE: Grease to flush and fill passage at this time.

5. Set the bonnet in place with the actuator mounting holes straddling centerline of the "group outlet" port, ensuring that the bonnet is placed flat on top of the valve body to prevent damaging the o-ring (167). Place bonnet such that 1/2 NPT is located over group outlet.

NOTE: Push bonnet down into the body by hand or by using rubber mallet.

6. Install studs (180) with anti-seize lubricant C5-A high-temp copper compound, or a suitable equivalent.
7. Tighten two of the sixteen bonnet nuts (182) at a 180° interval, then ensure that the plug (130) rotates freely through a complete revolution.
8. Tighten the remaining nuts after confirming bonnet (162) and plug (130) have been centred. Torque the nuts to 250 ft.lbs.
9. Adjust the plug seal assembly (145, 146), by first aligning the plug (130) with an open (ie. home test) port, then turn the adjusting nut (138) counter clockwise, viewing towards the plug centerline, with adjusting tool until the scraper (154) just touches the inside wall surface.
10. Rotate plug (130) at least one revolution and check for binding or excessive turning torque (ie. it should be 7 to 10 ft.lbs), then tighten the adjusting nut (138) with the supplied adjusting tool counter clockwise, viewing towards the plug centerline, to 35 ft.lbs. of torque.

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

11. Turn the plug (130) at least one revolution and check for smooth movement. If plug seal assembly (145, 146) is binding at each port when plug (130) is rotating, that means either the plug seal or the wave springs (140) are not in the proper position. See disassembly procedure below, if required.
12. Install vent plug (176) in the bonnet port.
13. Perform any required leakage test(s).

IV VALVE DISASSEMBLY

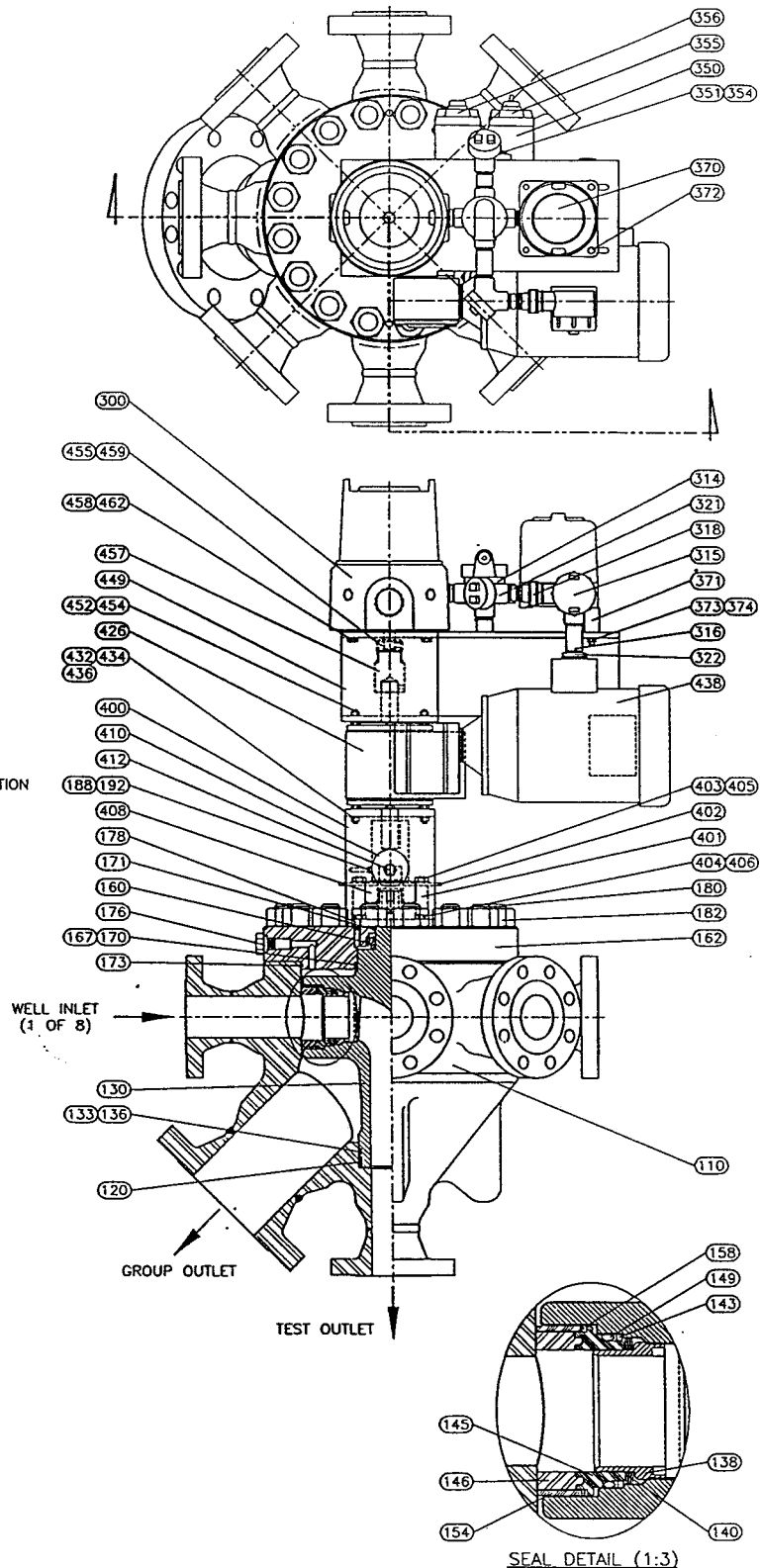
Refer to typical valve assembly drawing on page 6.

1. Release the pressure to zero before proceeding.
2. Remove plug or fitting from port for access and turn the seal adjusting nut (138) clockwise to release load on plug seal assembly (145, 146) and scraper (154) to clear body bore.
3. Remove the sixteen bonnet nuts (182) and studs (180). Remove the bonnet (162) with a straight lift along axis.

NOTE: Bonnet has two tapped holes that can be used for lifting.

4. Remove the plug (130) from the valve body (110).

- | ITEM | DESCRIPTION |
|------|---------------------------------|
| 110 | BODY |
| 120 | PLUG BUSHING |
| 130 | PLUG |
| 133 | O-RING, LOWER PLUG |
| 136 | O-RING BACKUP |
| 138 | SEAL ADJUSTER NUT |
| 140 | WAVE SPRING SEAL |
| 143 | SEAL WAVE SPRING BACKUP |
| 145 | SEAT RING |
| 146 | SEAL INSERT |
| 149 | O-RING, PLUG SEAL |
| 154 | SCRAPER |
| 158 | SPRING, SCRAPER |
| 160 | TAPER BEARING |
| 162 | BONNET |
| 167 | O-RING, UPPER PLUG |
| 170 | O-RING BACKUP |
| 171 | WIPER |
| 173 | O-RING, BONNET |
| 176 | VENT PLUG |
| 178 | GREASE FITTING |
| 180 | BONNET STUD |
| 182 | BONNET NUT |
| 188 | INDICATOR |
| 192 | NUT, INDICATOR |
| 300 | SWITCHPAK |
| 314 | ENCLOSURE |
| 315 | ENCLOSURE |
| 316 | NIPPLE |
| 318 | UNION |
| 321 | CAPPED ELBOW |
| 322 | REDUCER |
| 350 | PUSH BUTTON STATION |
| 351 | BOLT, PUSH BUTTON STATION |
| 354 | LOCKWASHER, PUSH BUTTON STATION |
| 355 | LOCAL/REMOTE PUSH BUTTON |
| 356 | JOG PUSH BUTTON |
| 370 | JUNCTION BOX |
| 371 | SPACER, JUNCTION BOX |
| 372 | BOLT, JUNCTION BOX |
| 373 | NUT, JUNCTION BOX |
| 374 | LOCKWASHER, JUNCTION BOX |
| 400 | PEDESTAL, GEAR REDUCER |
| 401 | SPACER, INDICATOR PLATE |
| 402 | INDICATOR PLATE |
| 403 | STUD, INDICATOR PLATE |
| 404 | BOLT, PEDESTAL |
| 405 | NUT, INDICATOR PLATE |
| 406 | LOCKWASHER, PEDESTAL |
| 408 | CONNECTOR, LOWER |
| 410 | CONNECTOR, UPPER |
| 412 | BOLT, CONNECTOR, LOWER |
| 426 | SPEED REDUCER |
| 432 | STUD, REDUCER |
| 434 | NUT, REDUCER |
| 436 | LOCKWASHER, REDUCER |
| 438 | MOTOR |
| 449 | PEDESTAL, SWITCHPAK |
| 452 | STUD, PEDESTAL |
| 454 | NUT, PEDESTAL |
| 455 | COUPLING, SWITCHPAK |
| 457 | CONNECTOR, SWITCHPAK |
| 458 | BOLT, SWITCHPAK |
| 459 | ADAPTER, SWITCHPAK |
| 462 | LOCKWASHER, SWITCHPAK |



DWG. NO. AB0230-30

ILLUSTRATES ESSENTIAL PARTS AND CONSTRUCTION
END CONNECTIONS MAY VARY

UNLESS SPECIFIED OTHERWISE ALL DIMENSIONS INCHES (mm)		BETTS BETTS CANADA LTD. Actuators & Controls	
		MULTIPORT SELECTOR VALVE	
		NPS 3 X 6	
		ASSEMBLY w/ ELECTRIC ACTUATOR	
		FLANGED CONNECTIONS	
		w/ HIGH PRESSURE DIFFERENTIAL SEAL	
REV BY-DATE-REF	A-023030.DWG_VIEW_30	WEIGHT	1100 LB
TOLERANCES	SCALE 1:8	BY VL	CHK
XXX ±0.5 (#10)			DATE AUG-21-96
XX ±0.2 (#5)			W.D. 10778-1-□
X ±0.1 (#2)		DWG. NO.	AB0230-30
		REV	--

V ACTUATOR ASSEMBLY

A. PEDESTAL, CONNECTOR, SPEED REDUCER AND MOTOR

Refer to typical assembly drawing on page 6.

1. Set the speed reducer pedestal (400) in place.
2. Install two bolts (404), two lockwashers (406), two spacers (401), two studs (403), and four nuts (405) with indicator plate (402).
3. Install the lower connector (408).
4. Install the indicator (188) on the upper connector (410).
5. Install the upper connector (410) with setscrew (415) started, but without the connector bolt and locknut.
6. Install the speed reducer (426) with key (418) and four bolts (432), lockwashers (436) and nuts (434).
7. Check for free rotation between connector halves to confirm shaft alignment. Adjust if necessary.
8. Tighten above mounting bolts and nuts.
9. Install and tighten the lower connector bolt (412) and locknut and tighten the setscrew (415).
10. Install the motor (438) with four bolts and lockwashers. Align and tighten.

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

Refer to the Switchpak assembly drawing on page 11.

1. Set the Switchpak pedestal (449) in place and install four studs (452), four flatwashers (455), four lockwashers (453) and four nuts (454).
2. Install the Switchpak connector (457) 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 encloser until the back of the push button station is flush with the Switchpak pedestal. Loosely install the push button station bolts (351), lockwashers (354) and nuts.
7. Between the motor terminal box (438) and the seal encloser, 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 the Switchpak assembly drawing on page 11, and the typical wiring diagram on page 14.

- 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 wiring diagram on page 14, and the eight on/off command switches and main on/off switch (disconnect means) are in place.
 3. Power supply is present.
 4. Connections
 - a) Terminals 13 and 14 connect 110 VAC electrical supply.
 - b) Terminals 11 and 12 connect 24 VDC command electrical supply with the positive (+) lead to terminal 12.

NOTE: The negative (-) will be connected to terminals 1 through 8 as the desired port is selected. The 24 VDC electrical supply should have an ON/OFF switch to isolate it from the unit while adjustments are being made.

C. Before proceeding with cam adjustment, ensure that:

1. All port plugs are removed; or indicator is in place accurately, whichever is applicable, to check for 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 that 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.
i.e. 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 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. Again, to tighten the setscrew, insert the Allen key between the two switch stacks.
6. Apply power (connect negative 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 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 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

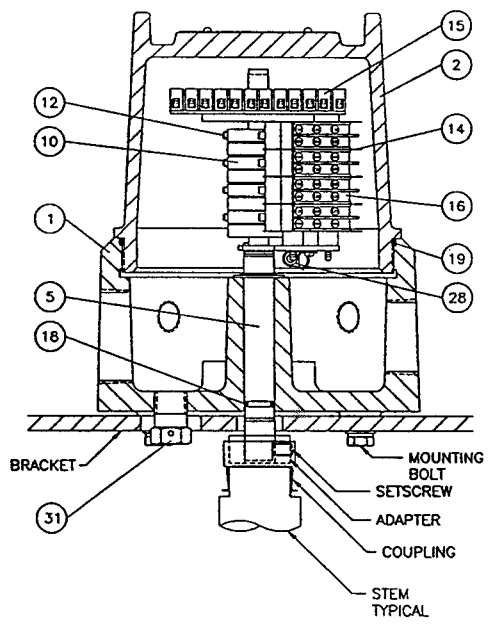
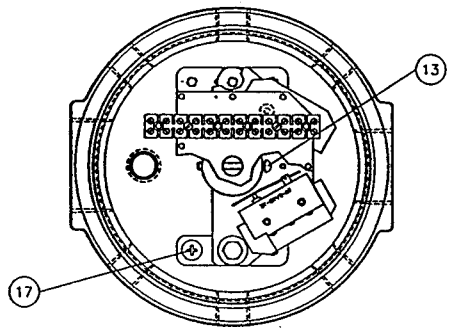
SENSITIVITY IS NORMALLY FACTORY SET. TO ADJUST, TURN TRIGGER SCREW (13) OUT TO ADVANCE AND LENGTHEN SIGNAL, TURN IN TO SHORTEN AND DELAY. USE 0.001" FEELER (GAP) GAUGE TO ENSURE NO SWITCH LEVER CONTACT WITH SWITCH BODY.

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.



UNLESS SPECIFIED OTHERWISE ALL DIMENSIONS INCHES (mm)		BETTIS BETTIS CANADA LTD.	
TOLERANCES		Actuators & Controls	
DECIMALS	RMS FRACTIONS	SWITCHPAK SW28XX	
.X ±0.05	XX-X/X ±1/16	INSTALLATION AND ADJUSTMENT	
.XX ±0.02	X-X/X ±1/32	1-0048--DWG_VIEW_08	
.XXX ±0.005	X/X ±1/64	JAN-09-96	
T.I.R. ±0.010 THD ±1 TURN	∠ ±1°	SCALE	1:3
BREAK SHARP EDGES CHAMFER FIRST THREAD REMOVE ALL BURRS		BY	VL
		CHK	Wette et al
		DATE	DEC-04-95
MATERIAL/FINISH		W.D.	7482-1-B
		DWG. NO.	1B0048-08
		REV	--

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 valve through group outlet port.
4. Check the wiring arrangement using the attached diagram on page 14 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 the 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 hundred running hours or once a year, whichever comes first. Use Mobile Synthetic SHC-634 ISO VG460 lubricant or equivalent.
2. Make sure oil in the speed reducer (426) is at indicated level.

NOTE: Excessive oil could cause pressure build-up, leakage and overheating which will result in rapid wear of 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 procedure on pages 3 through 12.
 - 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 assembly and adjustment procedures on pages 3 through 12, as required.

- B. Plug seal assembly leaks.
 - 1. Refer to specification for differential pressure limitations.
 - 2. Check if 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.

