POWERS
PROCESS CONTROLS
A UNIT OF MARK CONTROLS CORPORATION

Technical Instruction
TI 800-1
July 1987

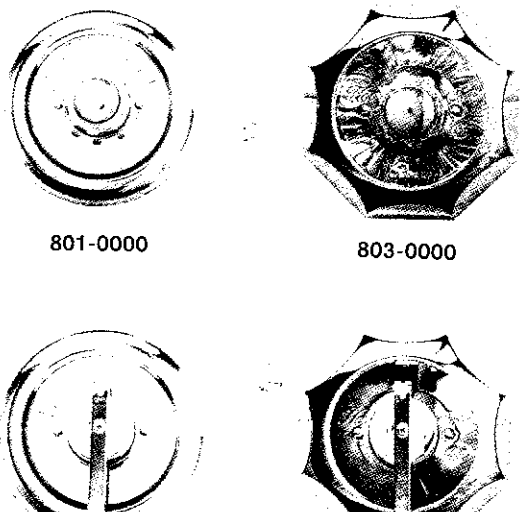
BILTMORES

SERIES 800 VALVES

DESCRIPTION

The Biltmores are pressure balancing mixers which deliver a predetermined mix of hold and cold water compensating for pressure fluctuations in the hot and cold water supply.

The Biltmores feature a poppet type balancing valve as part of a replaceable balancing cartridge. The poppet type construction offers a distinct advantage in that it will not stick due to lime build-up or foreign particles in the supply water. The adjustable maximum temperature stop prevents accidental scalding caused by over-adjustment of the handle.



SPECIFICATIONS

Operating

Capacity: Shower and Tub
4 GPM @ 45 PSI differential
(0.25 l/s @ 310 kPa)

Maximum pressure (static). . . . . .125 PSI (862 kPa)
Maximum inlet temperature. . . . . 180°F (82°C)
Inlet and outlet sizes. . . . . .1/2" NPT
Built-in shutoff. . . . . .All Models
Rough-in guide. . . . . All Models
Maximum temperature adjustment. . . . . All Models

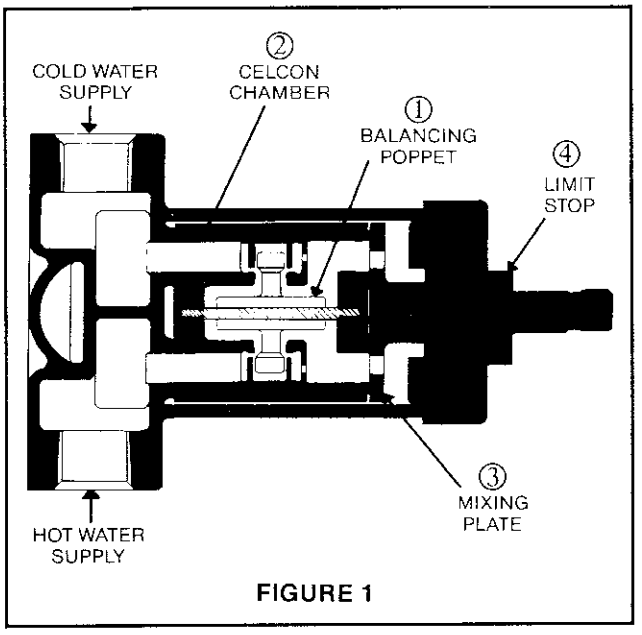


FIGURE 1

APPLICATION

The Biltmores are particularly recommended in showers and shower/tub installations for hotels, motels, high rise apartments and condominiums.

OPERATION

Hot and cold water enter their respective ports and the pressures are equalized through the action of the balancing poppet (1). The entire balancing poppet assembly is contained in a Celcon® chamber (2). This chamber is replaceable as a complete balance cartridge. After the hot and cold pressures are equalized, they are mixed by the action of the mixing plate (3). As the temperature adjustment stem is rotated from shutoff to maximum hot water discharge temperature, the mixing plate passes the required proportion of hot and cold water to produce the control point. With the adjustment stem in its full clockwise positon, shutoff is obtained by closing off both supplies.

The maximum temperature adjustment stop (4) allows the user to set the desired maximum discharge temperature. This mixer does not recognize supply water temperature changes so any variation in the water temperature will affect the control point and the maximum discharge temperature setting.

CAUTION: Maintenance of unit requires resetting of maximum temperature stop.

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MAINTENANCE
Trouble shooting Pointers

What to look for if...

1. The flow of water is less than desired..
   a. Valves upstream from supply not fully open
   b. Low inlet water supply pressure(s)
   c. Accumulation of lime deposits on hot water pipes, restricting flow of hot water
   d. Shower head clogged

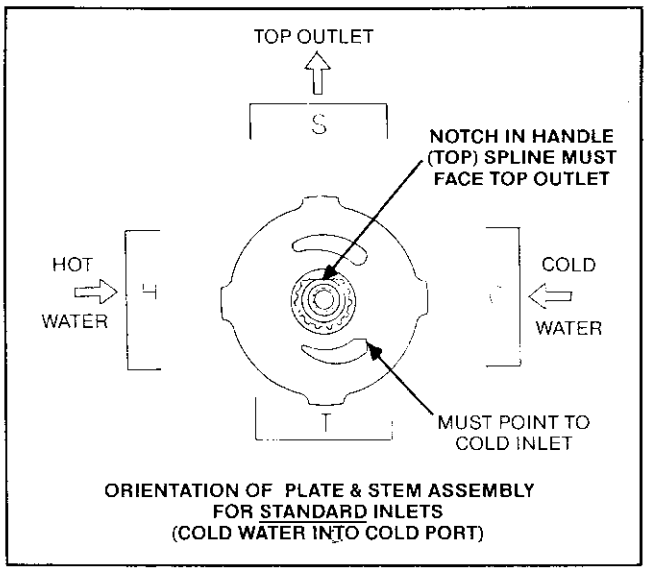
2. Flow of water is completely shut off...
   a. Valves upstream from supply completely closed
   b. Failure of hot or cold water supply pressure. The mixer is designed such to restrict the flow of water on hot or cold water supply failure

3. Flow is untempered hot or cold water...
   a. Diaphragm is ruptured, replace with new balance cartridge

4. Flow of water continues when mixer is shut off...
   a. Worn shut off (throttle) discs, replace shut off discs
   b. Foreign particles on mixing plate, causing scratches

5. Maximum temperature is too low...
   a. Accumulation of lime deposits in hot water pipes, restricting flow of hot water
   b. Concealed maximum temperature stop is not at desired adjustment point
   c. Hot water supply temperature is too low

6. Valve opens with hot water rather than cold...
   a. The inlet water supplies are connected to the wrong ports. See Figure 2 for instructions on reversing the mixing plate



ORIENTATION OF PLATE & STEM ASSEMBLY FOR STANDARD INLETS (COLD WATER INTO COLD PORT)

FIGURE 2

REVERSED INLETS
Cold into hot, hot into cold

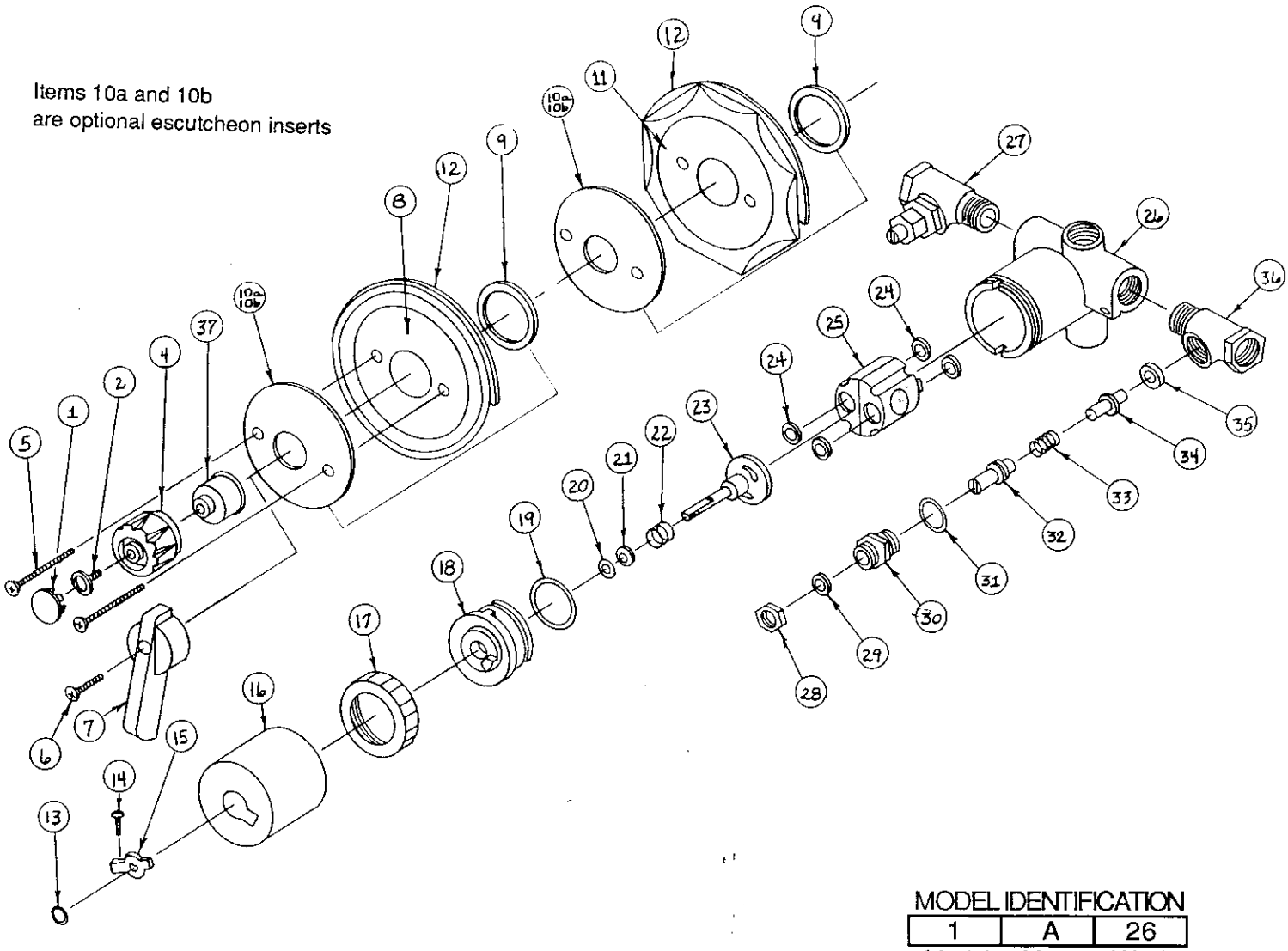
If reversed inlets are required, place mixer stem in closed (full clockwise) position, remove o-ring, limit stop and sleeve, unscrew and remove bonnet retainer. Pull bonnet, stem and mixing plate out of mixer body and rotate 180° making certain the alignment tabs on the bonnet are secure in the notches on the mixer body. Replace bonnet retainer, slide sleeve over retainer, install limit stop over stem, replace o-ring.

With mixer in closed position, the notch in the spline on the stem (Figure 2) must face top outlet for standard inlet installation (cold water to cold port on right side). For reversed inlets (cold water to hot port on left side), the notch in the spline on the stem must face bottom outlet.

NOTE: hot and cold inlets should be re-identified for reversed inlets to avoid confusion during future mixer maintenance

REPAIR ITEMS:	TROUBLESHOOTING	RECOMMENDED REPAIR KIT
SOFT COMPONENTS (Valve and Checkstops)	1. Water leak at stem and/or bonnet 2. Flow of water continues after mixer is turned off 3. Checkstops will not shut-off water flow 4. Crossover	**800-030** Includes items: 13,19,20,24(4),29(2), 31(2),35(2)
BALANCING CARTRIDGE	1. Variable or untempered discharge temperature	**800-031** Includes items: 19,20,24(4),25
STEM AND PLATE REPLACEMENT	1. Flow of water continues after mixer is turned off 2. Handle splines on stem damaged, not grasping	**800-032** Includes items: 13,14,15,19,20,21,22,23,24(2)
INTERNAL REBUILD KIT	Note: Required if both Balancing Cartridge and Stem and Plate replacement needed	**800-163** Includes items: 13,14,15,19,20,21,22,23,24(4),25
CHECKSTOP REBUILD KIT	1. Checkstop will not shut-off or allow full flow 2. Crossover	**800-049** Includes items: 29(2), 31(2), 33(2), 34(2), 35(2)
BONNET REPAIR KIT	1. Temp. limit stop stub broken off	**800-044** Includes items 18, 19, 20

Items 10a and 10b
are optional escutcheon inserts



MODEL IDENTIFICATION

1	A	26
Model	Year	Week

ITEM	PART NO	DESCRIPTION	MATERIAL	KIT NO.***
1	800-018	Plug button	C.P. Steel	800-035
2	800-168	Screw (8-32 x 3/4")	Brass	800-034,035
4	800-018	Acrylic knob	—	800-035
5	800-080	Screw (8-32 x 3")	C.P. Brass	800-033,040,041
6	800-079	Screw (8-32 x 5/8")	C.P. Brass	800-033,036
7	800-077	Lever handle	Cast	800-036
8	800-040	Round dial	St.Stl.	800-040
	800-078	Hex dial	St.Stl.	800-041
9	800-020	Gasket	—	800-040,041
10-a	800-075	Insert (English)- Hex	—	800-075
10-b	800-076	Insert (French)-Hex	—	800-076
11-a	800-104	Insert-Round dial	—	800-104
12	401-229	Adhesive gasket	—	—
13	047-008	O-Ring	Rubber	800-030,-032,-163
14	800-024	Screw (800-067)	C.P. Brass	800-032,-163
15	800-024	Limit stop (800-016)	Brass	800-032,-163
16	800-015	Sleeve	C.P. Brass	—
17	800-054	Bonnet retainer	Bronze	—
18	800-005	Bonnet	Celcon	800-030, -044
19	800-064	O-Ring1-5/16x1-1/2x3/32	Rubber	800-030,-031, -044,-163

***Note: parts must be ordered by KIT NO., not by individual part number

ITEM	PART NO.	DESCRIPTION	MATERIAL	KIT NO.***
20	800-063	O-Ring 5/16x9/16x1/8	Rubber	800-030,-031,-032, -044, -163
21	800-050	Washer	St. Stl.	800-032,-163
22	800-084	Spring	St. Stl.	800-032,-163
23	800-012	Stem assembly	—	800-032,-163
24	400-023	Throttle discs	Rubber	800-030,-031,-032,-163
25	800-006HC	Balance cartridge	—	800-031,-163
26	800-003	Body	Bronze	—
27	800-045	Screwed checkstop	—	800-045 (PAIR)
	800-047	Sweat checkstop	—	800 047 (PAIR)
28	800-057	Bonnet nut	Brass	800-030,-045,-047
29	800-058	Bonnet seal	Rubber	800-030,045,047,049
30	800-055	Bonnet	Brass	800-045,047
31	800-056	Bonnet gasket	Rubber	800-030,045,047,049
32	800-059	Stem	Brass	800-045,047
33	800-062	Plunger spring	St. Stl.	800-045,047,049
34	800-060	Plunger	Brass	800-045,047,049
35	800-061	Plunger disc	Rubber	800-030,045,047,049
36	800-069	Body (screwed)	Bronze	800-045
	800-102	Body (sweat)	Bronze	800-047
37	800-144	Plastic insert	-	800-035

ADDITIONAL KITS AVAILABLE:	KIT NO.
STEM EXTENSION KIT	800-109
THIN WALL MOUNTING KIT	800-100

	KIT NO.
VANDAL-PROOF SCREWS (10 sets of 4 screws)	800-034
COLOR INSERT - 803/804 (English only)	800-104

SERVICING

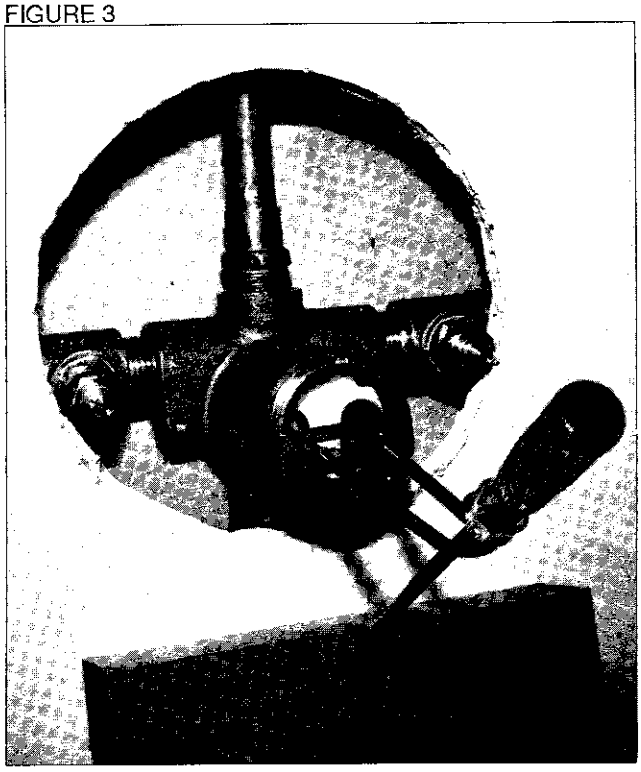
Remove handle and dial assembly. Remove o-ring, limit stop and sleeve, unscrew bonnet retainer and remove bonnet by gently pulling on stem.

To remove the balance cartridge, use cartridge puller kit #401-202 as shown in Figure 3. If puller is not available, remove shut off discs and use small pliers to grip cartridge. Pull straight out.

Replace necessary items as recommended on page 2 and re-assemble. When replacing bonnet make certain alignment tabs on bonnet are secure in notches in valve body. Screw bonnet retainer onto body, tightening to 20 ft-lbs. Be sure that sleeve is placed over bonnet retainer, then install limit stop onto stem, replace o-ring.

To service checkstops, turn off main water supplies upstream of mixer. Unscrew bonnet nut, bonnet and remove plunger. Replace necessary items as recommended on page 2 and re-assemble.

FIGURE 3



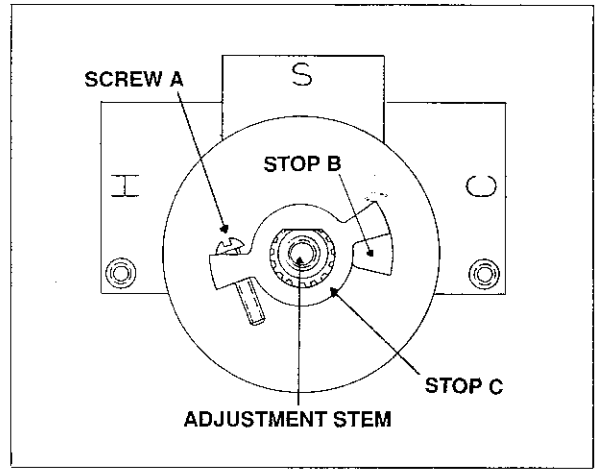
MAXIMUM TEMPERATURE SETTING

(Refer to Figure 4)

This must be set at the jobsite. Mixer will pass full HOT water. Rotate stem to desired maximum temperature. Adjust screw A until it touches stop B.

CAUTION: Adjustable stop C must be utilized for proper operation

FIGURE 4



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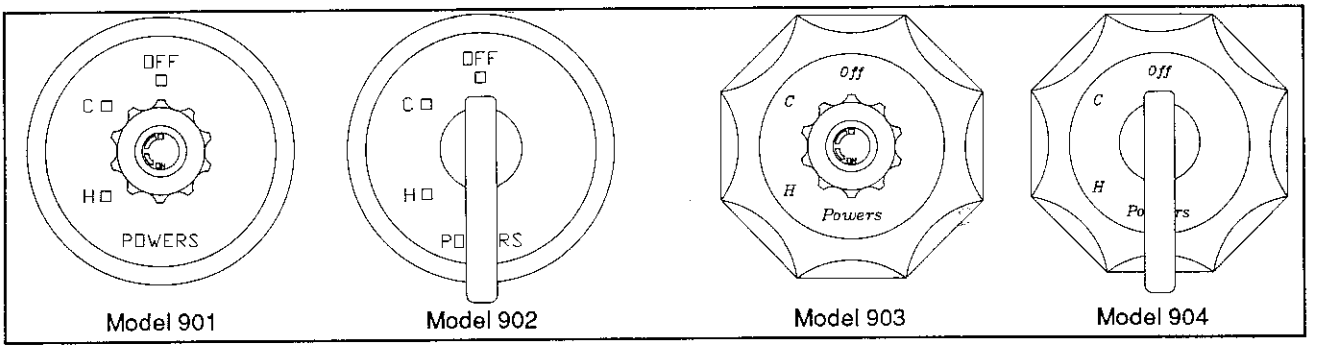
POWERS
PROCESS CONTROLS
Quality...Our Commitment

Technical Instruction
TI 900 - 1
March 1989

BILTMORE
Series 900 Valves



Model 901 Model 902 Model 903 Model 904

DESCRIPTION

The BILTMORE is a pressure balancing mixer which delivers a predetermined mix of hot and cold water by compensating for pressure fluctuations in the hot and cold water supply.

The BILTMORE features a balancing poppet design valve as part of a replaceable balancing cartridge. The poppet type construction offers a distinct advantage in that it will not stick due to lime build-up or foreign particles in the supply water. The adjustable maximum temperature stop prevents over-adjustment of the handle. The safety feature of the BILTMORE closes either hot or cold supply water, to prevent a continued spray of all hot or all cold water, should either supply fail.

SPECIFICATIONS
Operating

Capacity	4.75 ±.5 GPM @ 45 PSI Differential (0.29 ±.03 l/s @ 310 kPa)
Maximum Pressure (static)	125 PSI (862 kPa)
Maximum Inlet Temperature	180°F (82°C)
Inlet and Outlet Sizes	1/2" sweat or NPT thread
Built-in Shutoff	All Models
Rough-in Guide	All Models
Maximum Temperature Adjustment	All Models

APPLICATION

The BILTMORE is particularly recommended for shower and shower / tub installations in hotels, motels, high rise apartments and condominiums.

OPERATION (see Figure 1)

Hot and cold water enter their respective ports and the pressures are equalized through the action of the balancing poppets (1). The entire balancing poppet assembly is contained in a Celcon chamber (2). This chamber is replaceable as a complete balancing cartridge. After the hot and cold pressures are equalized, they are mixed by the action of the mixing plate (3). As the temperature adjustment stem is rotated from shutoff to maximum hot water discharge temperature, the mixing plate passes the required proportion of hot and cold water to produce the desired water temperature. With the adjustment stem in its full clockwise position, shutoff is obtained by closing off both supplies.

The maximum temperature adjustment stop (located in the mixer handle) allows the user to set the desired maximum discharge temperature. This mixer does not compensate for supply water temperature changes so any variation in the water temperature will affect the control point and the maximum discharge temperature setting.

CAUTION: Maintenance of the unit requires resetting of the maximum temperature stop

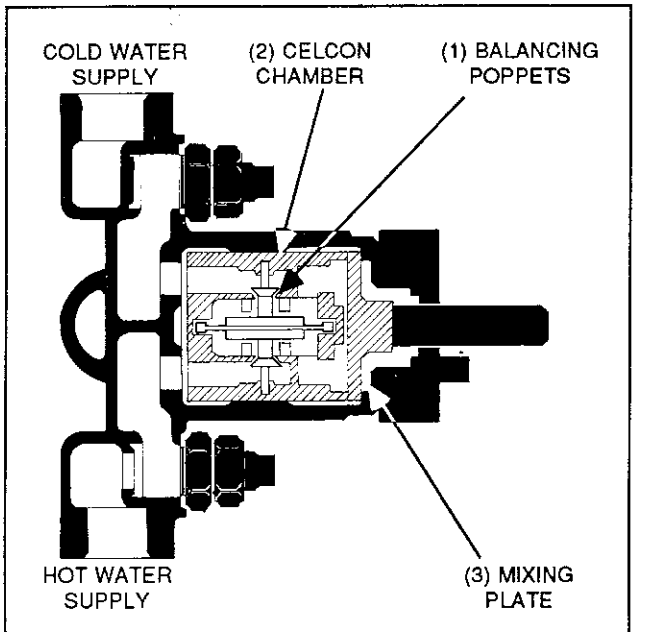


Figure 1

MAINTENANCE
Troubleshooting Pointers

What to look for if...

1. The flow of water is less than desired...
•valves upstream from supply not fully open
•low inlet water supply pressure(s)
•accumulation of lime deposits in hot water pipes, restricting flow of hot water
•showerhead clogged

2. The flow of water is completely shut off...
•valves upstream from supply completely closed
•failure of hot or cold water supply pressure, the mixer is designed such as to restrict the flow of water on hot or cold water supply failure
•checkstops are closed

3. The flow is untempered hot or cold water...
•diaphragm is ruptured, replace with new balance chamber

4. The flow of water continues after mixer is shut off...
•worn shutoff discs, replace shutoff discs
•foreign particles on mixing plate, causing scratches, replace stem and plate
•worn discs on inlet ports of balancing cartridge, replace discs

5. The maximum temperature is too low...
•accumulation of lime deposits in hot water pipes, restricting flow of hot water
•concealed maximum temperature stop is not at desired adjustment point
•hot water supply temperature is too low

6. The valve opens with hot water flow rather than cold water flow...
•inlet water supplies are connected to the wrong ports, see instructions on reversed inlets that follow

REVERSED INLETS
Cold into hot, hot into cold

If *reversed inlets* are required due to back-to-back installation, place mixer stem in closed position (full clockwise). Rotate stem and mixing plate only 180°, **the word 'TOP' stamped on stem must face down toward tub outlet**. Be certain the plastic stop on the bonnet remains in the three o'clock position. **The arrow shaped end of the crescent opening on the mixing plate must face toward the cold water inlet.**

NOTE: hot and cold inlets should be re-identified for reversed inlets to avoid confusion during future mixer maintenance

Orientation of Plate & Stem Assembly for STANDARD INLETS (Cold water into Cold Port)

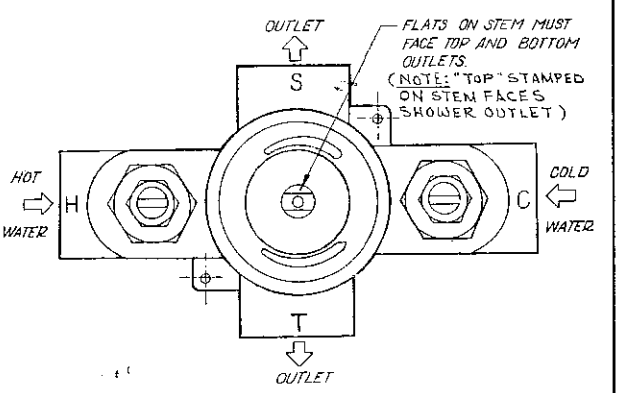
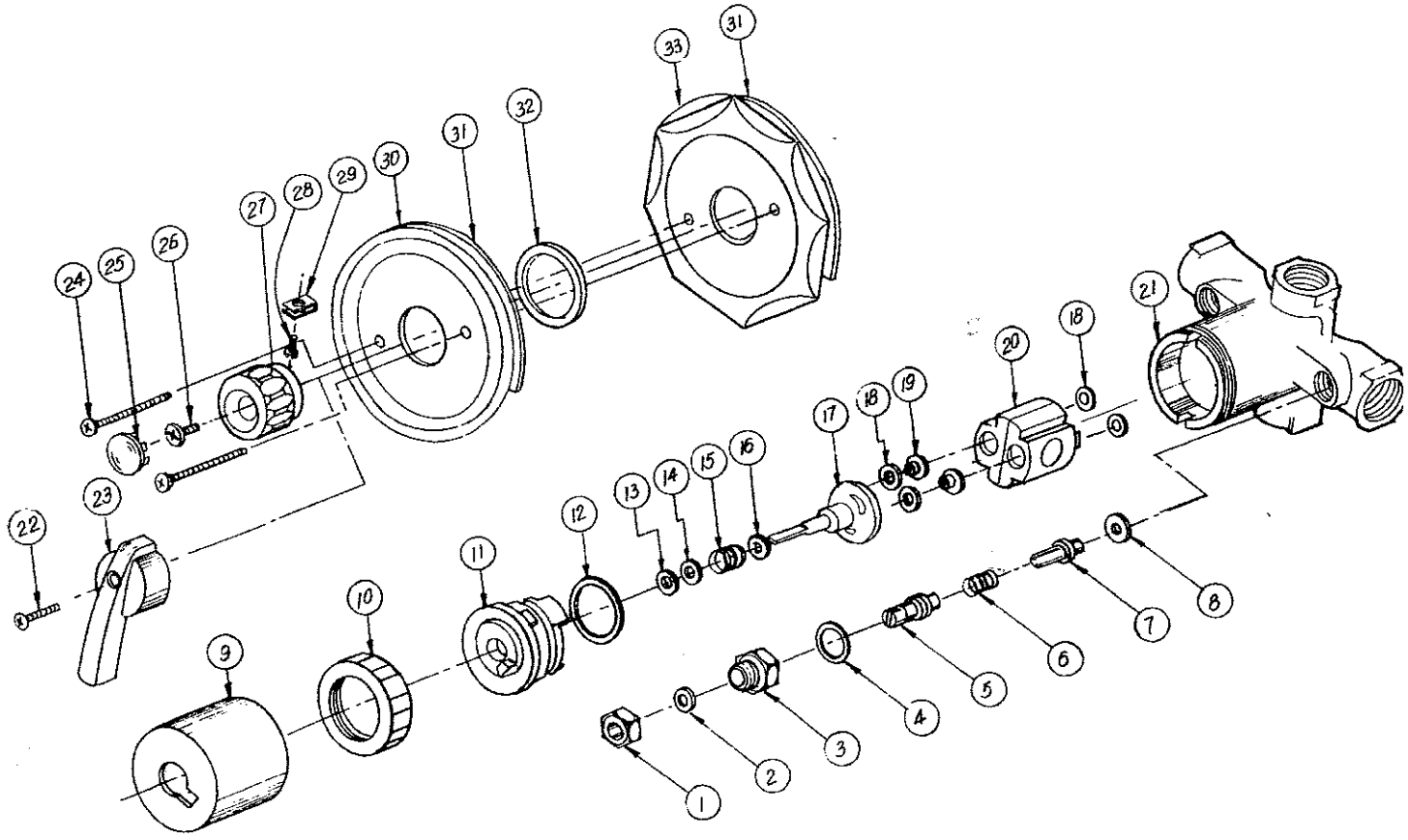


Figure 2

REPAIR KITS...	TROUBLESHOOTING	REPAIR KIT NO.
Gasket and Disc Replacement (mixer and checkstops)	• Water leaks at valve stem and / or bonnet • Water leaks at valve shut-off • Water leaks at checkstop	900-030 Items: 2 (2), 4 (2), 8 (2), 12, 13, 16, 18 (4)
Internals Replacement	• With mixer handle in MID position hot water flows with cold water checkstop closed or cold water flows with hot water checkstop closed	900-031 Items: 11, 12, 13, 14, 15, 16, 17, 18 (4), 19 (2), 20
Checkstop Replacement	• Checkstop will not completely shut-off	900-049 Items (2 of each): 1, 2, 3, 4, 5, 6, 7, 8

ADDITIONAL KITS...

Stem Extension	900-109
Vandal-proof screws (for handle and faceplate)	900-034
Lucite Handle Assembly	900-035
Lever Handle Assembly	900-036
Round Faceplate Assembly	900-040
Octagon Faceplate Assembly	900-041



MODEL IDENTIFICATION

1	A	26
Model	Year	Week

Located on mylar label adhered to bonnet nut

ITEM	PART NO.	DESCRIPTION	MATERIAL	KIT NO. ***
1	900-057	bonnet nut	brass	900-049
2	900-058	bonnet seal	rubber	900-030, 049
3	900-055	checkstop bonnet	brass	900-049
4	900-027	bonnet o-ring	rubber	900-030, 049
5	900-059	stem	brass	900-049
6	900-026	plunger spring	stainless steel	900-049
7	800-060	plunger	brass	900-049
8	800-061	plunger disc	rubber	900-030, 049
9	800-015	sleeve	c.p. brass	
10	900-017	bonnet retainer	bronze	
11	900-015	mixer bonnet	celcon	
12	800-064	o-ring, 1-1/4 x 1-7/16 x 3/32	rubber	900-030, 031
13	800-063	o-ring, 5/16 x 9/16 x 1/8	rubber	900-030, 031
14	800-050	washer	stainless steel	900-031
15	900-033	spring	stainless steel	900-031
16	900-014	washer	fiber	900-030, 031
17	900-012	throttling stem	---	900-031
18	400-023	throttle discs	rubber	900-030, 031*
19	900-028	restrictor	brass	*
20	900-005*	balance chamber	celcon	900-031
21	900-003	threaded body	bronze	
	900-004	sweat body	bronze	
22	800-164	screw 8-32 x 5/8"	c.p. brass	900-036
23	900-018	lever handle	cast .	900-036
24	900-039	screw 8-32 x 3"	brass	900-040, 041
25	900-024A**	plug button	acrylic	900-035
26	800-168	screw 8-32 x 3/4"	brass	900-035
27	900-019	lucite handle	acrylic	900-035
28	030-046	screw 6-32 x 1/2"	brass	900-035, 036
29	900-047	limit adjustment	steel	900-035, 036
30	900-020	round dial plate	stainless steel	900-040
31	401-229	adhesive gasket	buna - N	900-040, 041
32	800-020	gasket	buna - N	900-040, 041
33	900-078	octagon dial plate	stainless steel	900-041

* Balance Chamber #900-005 includes items 18, 19, 20

** Plug Button with insert #900-024B included with Lucite handle #900-019

*** Parts must be ordered by KIT NO., not by individual part number

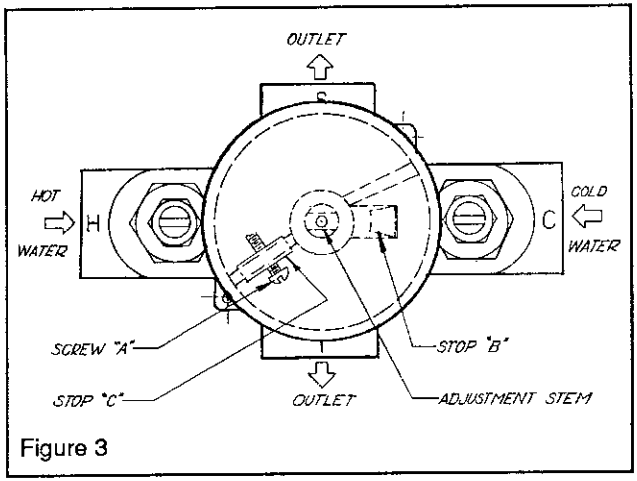


Figure 3

SERVICING

To service mixer, shut off water supply at the checkstops. Remove handle and dial assembly. Remove sleeve, unscrew bonnet retainer and remove bonnet by gently pulling on the stem.

To remove balance chamber, remove shut off discs and restrictors and use needle nose pliers to grip cartridge. Pull straight out.

Re-assemble, be certain alignment tabs in bonnet are secure in the notches on the mixer body. Screw bonnet retainer onto body, tighten to 20 ft.-lbs. Slide sleeve over bonnet retainer. Turn water on at checkstops. Replace dial assembly and handle.

To service checkstops, turn off water supplies upstream of mixer. Unscrew bonnet nut, bonnet and remove plunger. Replace items as required.

MAXIMUM TEMPERATURE SETTING
See Figure 3

The maximum temperature setting must be adjusted at the jobsite. Rotate stem to desired maximum temperature but in no case greater than 115°F. The maximum temperature adjustment screw, screw A is located in the mixer handle. Adjust screw A, place handle onto stem to test screw position, screw should be resting against Stop B on the bonnet when the maximum temperature is set as desired. If the flowing water temperature is below the desired setpoint, adjust screw clockwise. If the flowing water temperature is above the desired setpoint, adjust screw counter-clockwise.

The maximum temperature setting must be re-adjusted if the hot water supply temperature is changed, and also seasonally to compensate for changes in the cold water supply temperatures.