AUTOMATIC PRODUCTS international, ltd.

OPERATING SYSTEM

SERVICE MANUAL

MODEL 402 HOT BEVERAGE MERCHANDISER

PLEASE

DO NOT REMOVE MANUAL FROM MACHINE

FOR USE WITH LOGIC CONTROL BOARD USING VERSION "E" SOFTWARE

Automatic Products
international, ltd.
300 Jacksonville Rd. ◆ Warminster, PA. ◆ 18974

WARRANTY

Automatic Products international ltd. (APi) expressly warrants these automatic merchandisers (the "Unit"), manufactured by it, to be free under normal use and service from defects in material or workmanship for a period of two (2) years from the date of delivery of this Unit to the original purchaser. This warranty extends only to the original purchaser of the Unit. The exclusive remedy for this warranty is limited to the repair or replacement, at APi's sole option, of any part or parts of the Unit that are returned to APi or to the authorized dealer or distributor of APi from whom the unit was purchased with all transportation charges prepaid, and which, on APi's examination, shall, conclusively appear to have been defective. This warranty does not:

a. extend to any Unit, or part thereof, that was subjected to misuse, neglect, or accident by other than APi after its delivery to the original purchaser;

b. extend to any Unit, or part thereof, that was modified, altered, incorrectly wired or improperly installed by anyone other than APi or used in violation of the instructions provided by APi;

c. extend to a Unit which has been repaired or altered by anyone other than APi or authorized dealer/distributor;

d. extend to a Unit which has had the serial number removed, defaced or otherwise altered;

e. extend to plastic or glass windows, lamps, fluorescent tubes and water contact parts;

f. extend to any unit used outdoors

g. extend to accessories used with the Unit that were manufactured by some person or entity other than APi.

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APi reserves the right to make any changes or improvements in its products without notice and without obligation, and without being required to make corresponding changes or improvements in Unit theretofore manufactured or sold.

Automatic Products
international, ltd.

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To achieve the most trouble-free operation from your APi 402 Hot Beverage Merchandiser, it is recommended that this service manual be thoroughly read and the instructions followed pertaining to installation, servicing and maintaining of the unit.

Should you have any questions pertaining to this manual or the vendor, please contact your APi distributor or write directly to:

Technical Services Dept.
Automatic Products int'l, ltd.
Warminster, PA. 18974 USA
Phone 1 (215) 675-4200
Fax 1 (215) 441-4234

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INTRODUCTION

The Automatic Products 402 Hot Drink Merchandiser is the latest in the state of the art vending technology. The API 402 combines the reliability, durability and simplicity of the a time proven API hot drink vendor with micro-electronics resulting in unsurpassed flexibility and adaptability to satisfy both yours and your customer's needs. The soft touch selection panel provides three strengths of fresh brewed regular coffee, plus espresso and fresh brewed tea also available in three strengths each with three levels of creamer, whitener and sugar. This allows the customer to "Build A Drink" to their personal tastes. Chocolate and soup selections are also included as standard. An optional as standard. An optional cold section also provides for up to three cold drinks. All selections can be individually priced using a controller type coin mechanism. The translucent canisters and the open canister rack design allow for easy monitoring of product levels to maintain freshness, and ease of regular cleaning to provide your customer with the best possible hot drink.

HOW TO USE THIS MANUAL

This manual is divided into three basic parts:

1. Introduction, features and installation
2. Electronic operation and mode descriptions
3. Service, operation and adjustments

THE SERVICE SECTION HAS ITS OWN INDEX LOCATED ON PAGE # 4.01 OF THE SERVICE SECTION. TO ACHIEVE THE MOST TROUBLE-FREE OPERATION FROM YOUR API 402 HOT DRINK MERCHANDISER, *IT IS RECOMMENDED THAT THIS SERVICE MANUAL BE THOROUGHLY READ AND THE INSTRUCTIONS FOLLOWED PERTAINING TO INSTALLATION, SERVICING AND MAINTAINING OF THE UNIT.*

SOFTWARE

This manual is written to incorporate the current software which is identified as **VERSION "E"** indicating that the software is a Universal Version, used for both export and domestic machines. The EPROM on the logic board will be identified by a **LIGHT GREEN** label. **VERSION "E"** software (LIGHT GREEN label) replaced Rev 4.0 consolidating all of its functions. The software change enables the delivery of a cold water shot to the beverage cup when equipped with optional hardware. The software revision can be confirmed by checking the label on the EPROM located on the logic control board.

◆ WATCH THROUGHOUT THE MANUAL FOR THIS ◆
◆ SPECIAL ♦ DIAMOND MARK. THIS INDICATES A ◆
◆ POINT OF SPECIAL INFORMATION OR A HINT ◆
◆ THAT WILL ASSIST YOU IN SETTING UP, ◆
◆ OPERATING OR TROUBLESHOOTING THE ◆
◆ MACHINE. ◆

CAUTION: Certain procedures in both the operating section and the service section require that voltage be on in the machine. Exercise extreme caution while performing these procedures. These procedures will be marked with the lightening bolt symbol as it appears at left.

CAUTION. Certain procedures in both the operating section and the service section requires a qualified trained technician to perform the particular task at hand. These procedures will be marked with the exclamation symbol as it appears at left.

NOTE: The API 402 machine operates at a level of less than 75 dba

FEATURES OF THE APi 402 HOT DRINK MERCHANDISER

SELECTION SYSTEM

- Three programmable strengths on prime selections plus chocolate and soup.
- Easy to use color coded selection buttons for variable strength products.
- Coffee strength variable by changing throw and/or brewing time.
- Executive key feature for "free" cups or jug filling.
- Variable strength additives.
- easy to change selection labels.
- selection lamps and audible tone feedback for touch sensitive buttons.
- Multi-vend possible.
- Coins for the next vend can be inserted before the end of the current vend.

SPECIFICATIONS

Models and Capacities

	Capacities lbs.	
Ingredient:	LG	FD
Regular Ground Coffee	4	-
Freeze Dried Coffee	-	1.4
Tea (Leaf -Fresh Brewed	1.1	1.1
Tea (Instant)	0.7	0.7
Sugar (2 canisters)	3.6	3.6
Creamer	1.8	1.8
Whitener	1.8	1.8
Chocolate	5.4	5.4
Soup	1.8	1.8

Cold Selections (Cold Option):

A specially designed cold bath unit is equipped with syrup dip tubes and suction lines. Up to four cold drink selections are available: Cold Water w/ carb, Cold Drink 1 (syrup w/ carb), Cold Drink 2 (syrup w/ carb), Cold Drink 2 still (syrup no carb).

* Second coffee selection whipped
* Second coffee selection - optional half cup feature

CUPS CAPACITY: 690 (180ml)
(Will vary depending on model and size of cup)

DIMENSIONS:

Height: 1829mm	(72")
Depth: 705mm	(27¾")
Width: 800mm	(31½")

ELECTRICAL AND WATER REQUIREMENTS

Electrical : 220/230/240 Volts; 50 / 60 Hz; 13 Amps
Water: Potable cold water, 1.4 Bar minimum

SHIPPING WEIGHT

Freeze-Dried	209Kg (460 lbs.)
Loose ground	227Kg (500 lbs.)

COINAGE and PAYMENT SYSTEMS:

Mars Executive, CoinCo L+, NRI G26, Simplex 5 Card readers, Mars Multicard, Girovend

PRICING

- All selections individually priced.
- Two price levels for variable strength selections.
- Separate discount pricing structure available.
- Programmable winner mode available as standard
- Free vend feature
- Full accountability including breakdown by selection and discount cash meter and counter.
- Discount available when using own cup. (Cup sensor only)

SCROLLING DISPLAY

- User friendly scrolling display to help with the selection process and provide customer feedback.
- Programmable for stand-by "operator" messages, up to 85 characters long.

OPTIONS

- Fresh Brewed Tea
- Cold unit with two syrups and three selections all available with variable carbonation.
- Cold Water Shot

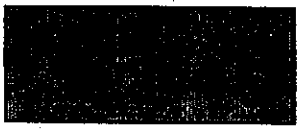
SOFTWARE IDENTIFICATION AND LABELS

The latest software revision for Model 402 will be known as "Version E" and can be identified by a light green label on the EPROM located in the center area of the logic board (see drawing below). The latest revision "E" software will be identified with a LETTER in the third position as compared to "PRIOR" software which contained a NUMBER in the third position - see example below. The other digits on the chip label also have specific meanings which are explained in the chart on the next two pages.

EXAMPLE - SOFTWARE LABEL

Chip Code First 8 Digits →

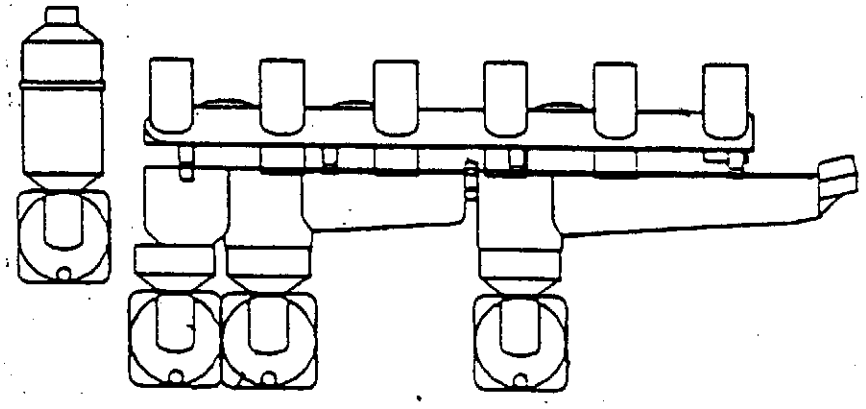
Chip Code Second 8 Digits →



← ORDER #

This software provides a maximum of six (6) selections of which three (3) are prime and can feature three strengths. Selections can include fresh brewed coffee, espresso or whipped coffee, soup or a soluble gourmet coffee, chocolate, plus a minimum of one Soluble Gourmet Coffee (SGC). Fresh brewed tea or soluble tea available in three strengths containing three levels of lightener and sugar. An additional gourmet coffee with separate sugar and whitener may be used in place of tea. The combinations of drinks available in each machine is determined by the recipes present in the particular software for each machine. See MODE 12, page 3.07 for further channel / recipe programming information..

Another change that increases the flexibility of the API 402 is the possibility of different canister rack configurations. These canister rack configurations are designated by a number that represents the number of mixing bowls or troughs, and the number of canisters in each section, reading the rack from left to right. An example would be a canister rack consisting of chocolate, soup, sugar, creme, and tea. This would be represented as 1-1-2-3. The chocolate and soup each have their own mixing bowl, while the balance of the canisters are split between two mixing channels: sugar and cream for coffee on the left sugar and cream for tea on the right. See figure below..



DEFINITIONS OF INFORMATION CONTAINED ON EPROM LABEL

TOTAL OF 16 DIGITS - FIRST 8 ON THIS PAGE SECOND 8 ON NEXT PAGE

DIGIT	FUNCTION	DESCRIPTION					
1 1st digit	CANISTER RACK CONFIGURATION	1 = SPLIT TROUGH - SOUP / SGC + 2 SOLUBLE GOURMETS 1-1-2-3 0 = STANDARD RACK CONFIGURATION 1-1-5 (optional) A = SPLIT TROUGH - 2 SOLUBLE GOURMETS 1-2-4					
0 2nd digit	INDICATES TYPE OF MIS INFORMATION THAT IS RECORDED	0= 10 PRICE LINES (See MODE 1, page 3.03 (step 12), 3.04 & 3.05 5= TOTALS BY PRODUCT BY SIZE					
E 3rd digit	SOFTWARE VERSION	EPROM VERSION - 'E' EPROM VERSION - 'D' [DISCONTINUED] EPROM VERSION - 'C'					
1 4th digit	DIGIT #4 INDICATES FACTORY SETTING OF **MODE 11**, OPTIONS 3 & 5	THIS DIGIT SETS TWO DIFFERENT FUNCTIONS: 1. ON MACHINE SELECTION PANEL, THE SELECTION CAN BE SET TO EITHER DISPENSE A CSC OR SGC BEVERAGE. 2. MACHINE CAN OPERATE EITHER ONE OR TWO CUP SIZES. (Not available in 402) **LETTER** = 'YES' FOR *CUSTOM SELECT COFFEE* (CSC) - IN 4TH SELECTION **NUMBER** = 'NO' FOR SOLUBLE GOURMET COFFEE (SGC) IN 4TH SELECTION					
	⇓ IF POSITION 4 IS ⇓	**MODE 11, OPTION 3 = ⇓**			**MODE 11, OPTION 5 = ⇓**		
	B =	CSC ON	(setting →)	YES	1 CUP SIZE	(setting →)	YES
	1 =	CSC OFF	(setting →)	NO	1 CUP SIZE	(setting →)	YES
7 5th digit	LARGE CUP SIZE	8= 8¼ oz 7= 7 oz 6= 6 oz					
0 6th digit	SMALL CUP SIZE	0 = None - one cup size setup using above setting					
B 7th digit	TEA CONFIGURATION	B= Fresh brew F= Freeze-dried X= Disabled (priced at 99.99) Z= Tea replaced with soluble gourmet (used in Rack Configuration 1 only) Y=Tea replaced with soluble gourmet & without 3rd SGC programmed (used in Rack Configuration 1 only)					
3 8th digit	COFFEE CONFIGURATIONS	L= All Freeze Dry w/extension rack - Cof 1 & 2 3= Loose Ground (single hopper) & FD Decaf H= All Freeze-dried w/o extension rack					

EPROM DEFINITIONS FOR DIGITS 9 THROUGH 16

DIGIT	FUNCTION	DESCRIPTION
1 9th digit	SELECTION/MACHINE CODE	1 = STANDARD 6 SELECTION (FOR MODEL 402 EXPORT MACHINE)
0 10th digit	LANGUAGE CODE (COMBINATION OF DIGIT 10 & 11)	0 0 = USA OR CANADA - ENGLISH SPEAKING 0 1 = CANADA -FRENCH SPEAKING 0 A = AUSTRALIA - ENGLISH O B = BELGIUM - DUTCH/FRENCH 0 C = CHILE - SPANISH 0 D = DENMARK - ENGLISH 0 E = ENGLAND - ENGLISH 0 F = SINGAPORE - ENGLISH 0 G = GERMANY 0 H = HOLLAND - DUTCH 0 I = ISRAEL - HEBREW 0 N = NEW ZEALAND - ENGLISH 0 P = PERU - SPANISH 0 R = ARGENTINA - SPANISH 0 S = SWEDEN - ENGLISH 0 T = TURKEY - TURKISH O U = UNITED KINGDOM - ENGLISH
0 11th digit		
C 12th digit	SOUP / SGC ENABLE (Product in 2nd canister from left on canister rack)	A = NO SOUP OR SOLUBLE GOURMET COFFEE #1 B = SOUP C = SOLUBLE GOURMET COFFEE #1 IN PLACE OF SOUP
0 13th digit	CUSTOMER / DESIGNATION CODE (Used for a custom programmed EPROM) (COMBINATION OF DIGIT 13 & 14)	0 0 = STANDARD FACTORY SETTINGS XX = (CUSTOM PROGRAMMED FOR PARTICULAR CUSTOMER)
0 14th digit		
0 15th digit	SOFTWARE REVISION LEVEL	REPRESENTS LATEST REVISION SOFTWARE
3 16th digit	SOFTWARE VERSION LEVEL (FOR FACTORY USE)	1 = FIRST LEVEL APPROVAL OF EPROM VERSION 2 = SECOND LEVEL APPROVAL OF EPROM VERSION

APi 402 INSTALLATION AND SET-UP INSTRUCTIONS

INSTALLATION

Unpack the vendor:

1. Remove shipping carton and plastic bag from vendor. Inspect exterior of cabinet for damage.

2. Open the machine door. The keys will be in the cup well. Inspect cabinet interior for evidence of damage.

3. Remove packing tape from coffee hopper swing out bracket, cup dispenser door, commodity trough and steam deflector, overflow and grounds waste floats.

LOCATION SITE REQUIREMENTS

CAUTION: THIS MACHINE IS DESIGNED FOR INDOOR USAGE ONLY. ANY OTHER USAGE MAY VOID THE MANUFACTURERS WARRANTY

The machine should be positioned as indicated on the installation diagram (Fig 1). 100mm clearance should be maintained behind the machine to allow for extraction and cooler exhaust air. In the LG (brewed coffee) models at least 300mm clearance is also required in front of and to the right hand side of the machine to allow the coffee swing-out bracket to swing far enough for filling

This vendor requires an external source of water and electricity for operation. The minimum requirements for these utilities are as follows:

WATER

The installation site must have a cold drinking water supply line that can be permanently coupled to the vendor. The water line should be one-half inch minimum diameter and be equipped with a manual shutoff within six feet of the machine. Water pressure should maintain 1.4 Bar (20 psi) minimum (with filter) or 0.7 Bar (10 psi) minimum (without filter) while the vendor is taking on water. If water pressure exceeds 6 Bar (90 psi), a pressure regulator should be installed in the line.

ELECTRICITY

CAUTION: THE FOLLOWING PROCEDURE REQUIRES THAT THE MACHINE HAVE POWER APPLIED AND A POTENTIAL ELECTRICAL SHOCK HAZARD EXISTS.

A grounded electrical outlet rated at 220 volts 60Hz, 230volts 50Hz, or 240 volts 50 Hz single phase and capable of delivering 15 amperes. The supplied electricity must be available within six feet of the vendor (or 240 volts 13 amperes).

- If the machine is to be used with 240 volts supply, then the directions regarding the change in positions of wires on the terminal block on the lower half of the power switch panel must be followed.

CAUTION: THE POWER CORD IN THIS MACHINE IS OF A TYPE Y ATTACHMENT. IF THE POWER CORD IS DAMAGED, IT MUST BE REPLACED BY THE MANUFACTURER, ITS SERVICE AGENT, OR A SIMILARLY QUALIFIED PERSON, IN ORDER TO AVOID A HAZARD

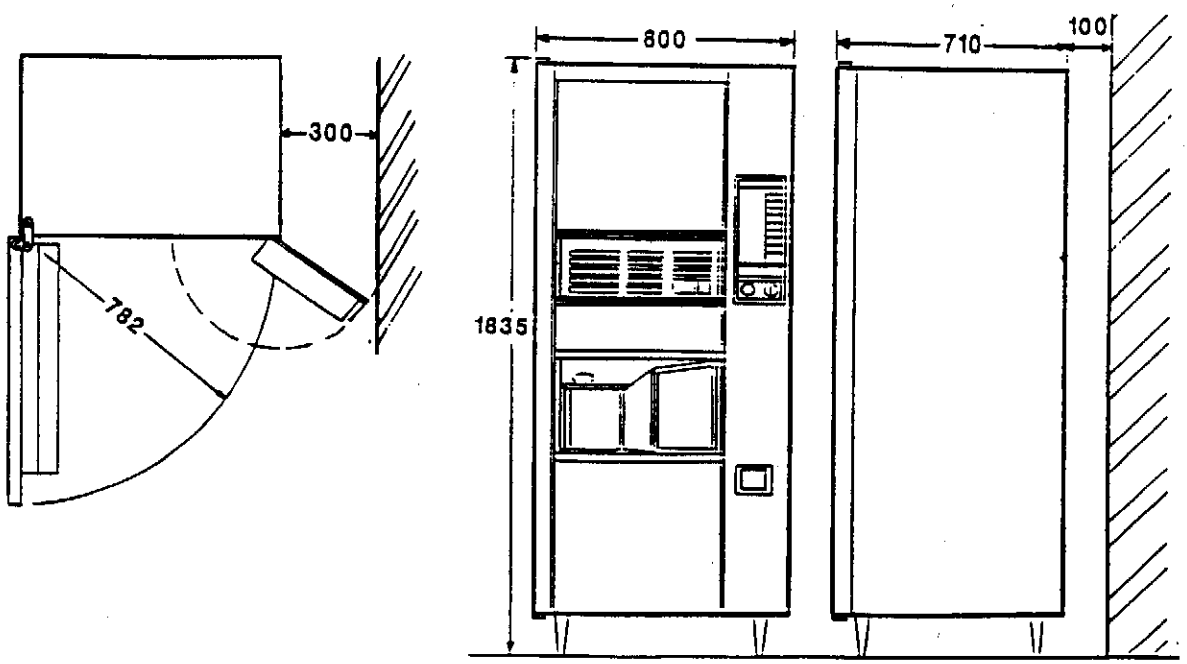


FIGURE 1

SET-UP INSTRUCTIONS - HOT DRINK

Set up the vendor at the location as follows:

1. Carefully level the vendor front to back and side to side.
2. Install the water filter cartridge (if so equipped).
3. Remove the cup dispenser shipping screw and nut.
4. Connect the vendor to the water supply line using a flexible hose or 3/8" O.D. soft copper tubing allowing one complete coil approximately three feet in diameter between the water supply line and vendor to allow movement of the vendor for cleaning and to reduce noise due to water pressure surges.
5. Plug the machine into a 220/240V 13A receptacle. Insert the plastic key into the door isolation switch (Fig. 2). Check that the tank starts to fill and that there are no leaks. The machine is equipped with a safety feature-if the inlet water valve is on for more than 90 seconds it will put the machine 'OUT OF ORDER'. Therefore to complete the filling of the heater tank you may have to power down-power up the control board to reset the 90 second timer.
6. Remove the water bath cover and fill the water bath by using the rinse hose (if applicable). The rinse head can be disconnected from the hose at the coupling and while pinching the line direct it into the water bath tank. The machine may shut down in approximately 90 seconds (a safety feature). It will then be necessary to power down/power up to restart the filling.
7. Remove the chocolate whipper bowl top.
8. Remove all shipping tape and packing from the ingredient canisters and check that they are installed in their respective places on the canister rack. Be sure the auger driver and motor drive pin are engaged (Fig. 3). The tabs on the front and back of the canisters fit in their respective slots.
9. Slide the cupwell mesh and grill in side rails and install the drip tray in the mounting slots (Fig. 4).
10. The brewer grounds splash guard is installed over two screws on the front of the brewer. Do not tighten the shield's screws. The shield is designed to be able to swing a little as the spent grounds fall against it.
11. Install tea leaf waste chute, if applicable.
12. Install the grounds bucket liner (supplied). Install the grounds bucket behind the front flange of the rear splash guard. Be sure that the float is inside the bucket.
13. Install the overflow bucket in the lower left corner of the machine. Be sure that the float and overflow hose(s) are inside the bucket.
14. Fill the canisters and hoppers with product.
15. Install the dip tubes in the syrup bottles according to the selection panel assignments.
16. Open the cup dispenser door and load with cups.
17. Install a 24V coin mechanism. Connect all harnesses.
18. Swing out the cup dispenser assembly and remove the shipping screw from the logic control board cover. Lower the cover and remove the shipping thumb nuts from the LED/label access cover (Fig. 5). Then lower the second cover, install the price labels on the selection labels, and insert into the appropriate positions.

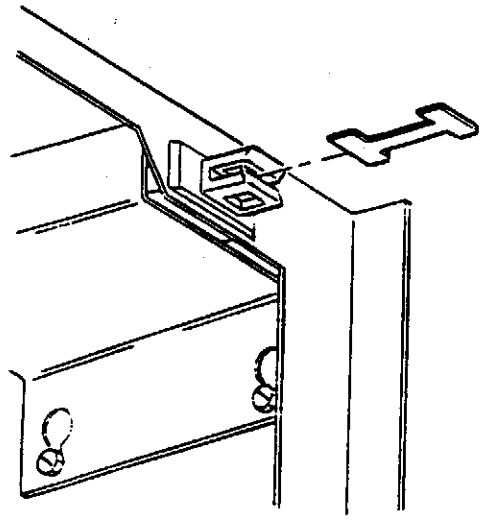


FIGURE 2

USE OF THE INTERLOCK KEY ENERGIZES THE MACHINE. THIS SHOULD BE DONE ONLY BY PROPERLY TRAINED PERSONNEL.

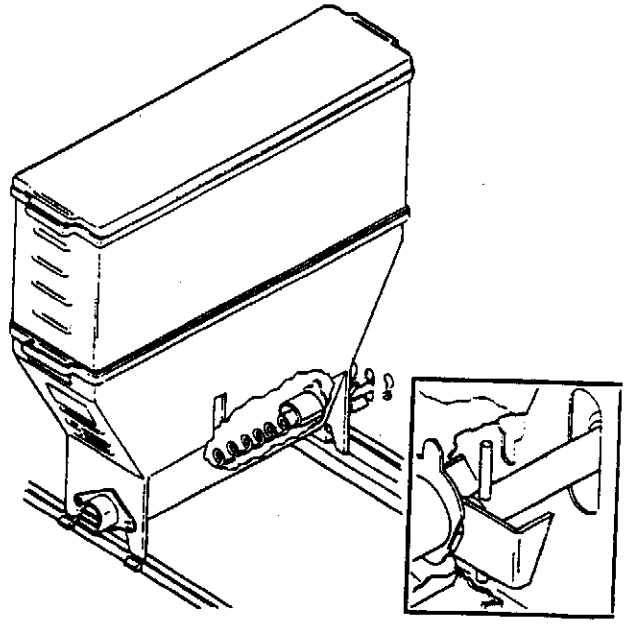


FIGURE 3

REFER TO THE ELECTRONICS SECTION OF THIS MANUAL FOR FURTHER INFORMATION ON STEPS 19 THROUGH 28:

19. Access **MODE 11** using the security key on the inside of the door and check that the configuration and options are set correctly for the machine. Proceed to **MODE 13** and set the payment options. If the discount mode is being used, selections being discounted must be assigned in **MODE 14.**
20. Set selection prices by accessing **MODE 4** and assigning prices to selections. Mild and regular strength beverages are automatically assigned the same price while each strong beverage may be assigned a different price.
21. Adjust ingredients to the correct throw by accessing **MODE 12** (see below). After confirming that the times for liquids are correct, cup levels should be adjusted using the metering screw on each commodity valve.
22. After completing the ingredient product adjustments, install the commodity chute. Check the alignment of the coffee chute to the brewer chamber.
23. Install the chocolate whipper mixing bowl cover.

SETUP INSTRUCTIONS - COLD DRINKS

24. Prime the syrup pumps by entering **MODE 8** and selecting one of the syrup pump channels (CHANNEL 51 and 52) and activating a continuous test by pressing **ENTER**. Once the pump has primed and syrup is flowing from the delivery nozzle turn off the continuous test by pressing **ENTER** again. If a pump does not prime it may be necessary to loosen the inlet check valve ball from its seat. This is done by disconnecting the inlet hose from the pump and gently inserting a small allen wrench into the pump inlet and pressing upwards to release the ball from its seat. Reconnect the inlet hose and prime the pump again.
25. It is important to purge the carbonator of air to ensure good carbonation. To do this, disconnect the electrical feed to the 3-way still water valve, open the carbonator relief valve, and run the water pump by entering **MODE 8** and selecting one of the still water channels (CHANNEL 45 - 47). Press **ENTER** to turn on the continuous test. When the carbonator is full (water will exit from the relief valve) press **ENTER** again to turn off the continuous test. Reconnect the valve electrical feed.
26. Install the CO2 bottle in the machine, secure it in place with the chain. Install the pressure regulator and tighten the large nut. Open the valve on the CO2 tank slowly and allow the pressure to stabilize. Adjust the regulator to deliver 4 Bar (60 psi) +/-0.2 Bar (3psi). Check for leaks in the CO2 system.
27. Purge the carbonator of water by removing carbonator probe plug, entering **MODE 8** and selecting a carbonated water channel (CHANNEL 48 - 50) for 3 minutes. When CO2 gas starts to exhaust out of the delivery spout press **ENTER** and replace probe plug. The carbonator will then refill.
28. Place a measuring device under the delivery nozzle and press **STILL WATER TEST** (weak tea button) and check for 170ml of water. If necessary adjust the metering screw on the still water valve. Repeat test with **CARBONATED WATER TEST** (weak coffee button) to obtain 170ml of seltzer water. If necessary adjust the carb water valve metering screw.

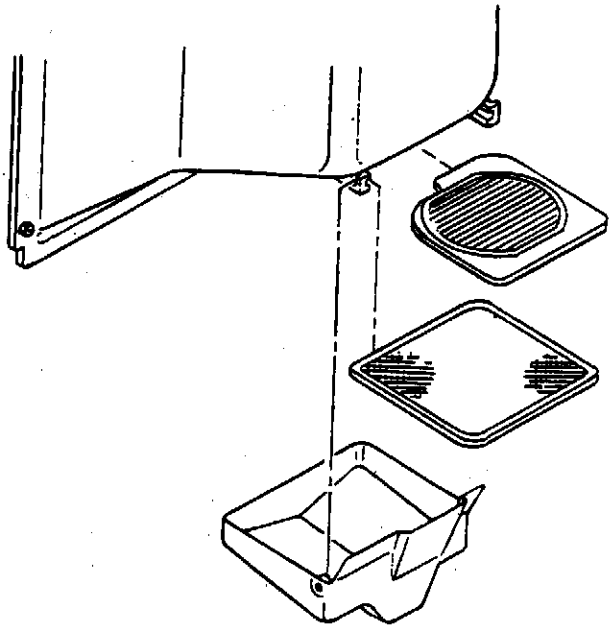


FIGURE 4

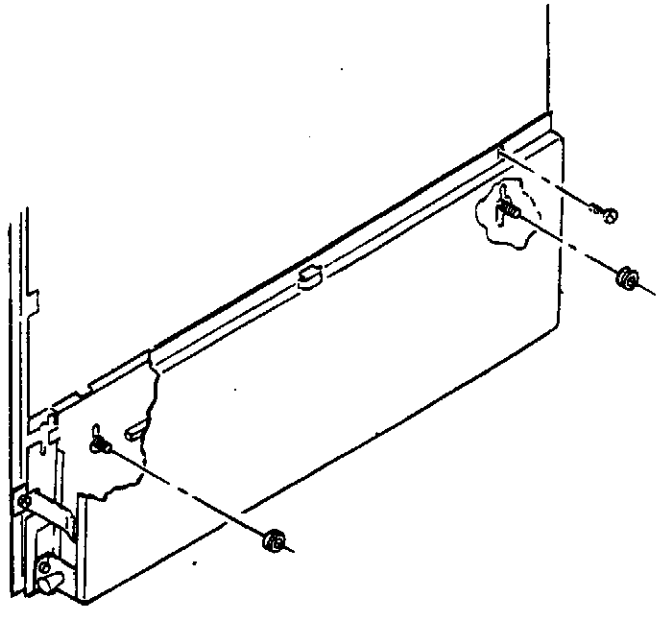


FIGURE 5

29. Adjust syrups and liquids for the correct throw by accessing **MODE 12**(see below).
30. Test all selections and additives and check that coins are accepted correctly.

ADJUSTING COMMODITY AND LIQUID AMOUNTS

CAUTION: THE BELOW PROCEDURE SHOULD BE PERFORMED BY A QUALIFIED PERSON TRAINED AND KNOWLEDGEABLE IN THE PROGRAMMING SYSTEM!

Entering **MODE 12** provides access to the channels which control the dispense times of all ingredients. The dispense time of each commodity and it's sequence in the vend cycle is controlled by the microprocessor. Precise time adjustments determine the exact amount of ingredients dispensed. This exact time sequence ability enables accuracy to 1/100 of a second.

Each channel (numbered 02 through 71) may have up to three separate settings within each channel. The settings are accessed by pressing the start/enter selection. The three settings are **START, DURATION and MODIFIER**. Each of these settings can be adjusted by increasing or decreasing the digits shown on the scrolling display by pressing the increment digit (coffee strong) or the next digit (coffee regular) buttons. See Timing Chart #1.

The **START** time of each channel indicates the time that the function or commodity begins within each vend cycle. In the case of syrups the start time is reversed and becomes the rinse time for each syrup (the time is counted backwards from the end of the water pour) to guarantee the correct rinsing of the delivery spout.

The heavier the syrup the longer the rinse time needs to be. See Timing Chart #2 for the cold drink timing. All times are permanently stored to guarantee the correct sequence of operation.

The **DURATION** determines the length of time within the vend cycle that each channel will operate. The amount of ingredient for a medium strength selection is controlled by adjusting the duration. After confirming that the duration for liquids are set correctly, cup levels should be set by adjusting the metering screw on the commodity valves.

Some channels have a third setting-a **MODIFIER**. This modifier appears in the scrolling display as a number equal to or less than 1.00. The **MODIFIER** value is the percentage of increase or decrease in ingredient throw for a strong or mild selection. For example, a **MODIFIER** of .25 on channel 15 (brewed coffee-sugar) means that for an extra sugar selection the sugar motor will run 25% longer, and for a lesser sugar selection the motor will run for a period of time that is 25% shorter.

It is important to press **START/ENTER** after changing any one of these settings and return to **MODE 12** to ensure that all new values are entered.

Each channel can be tested by pressing the **MODE 12 CHANNEL TEST** switch (medium sugar).

Chart #1

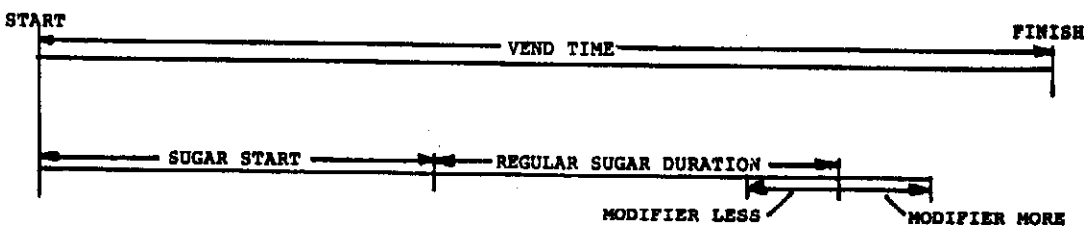
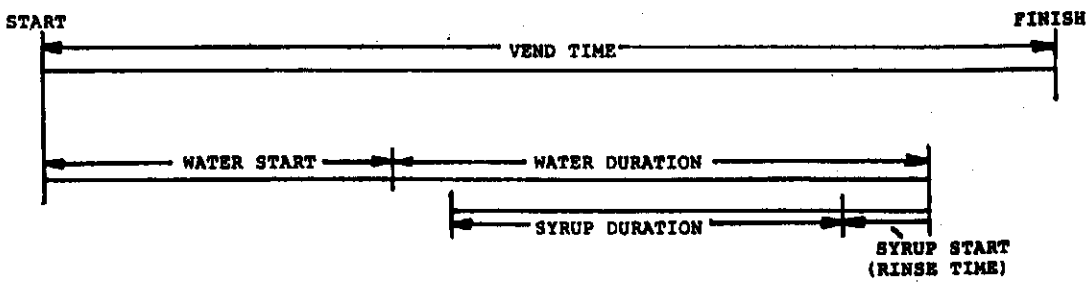


Chart #2



INTRODUCTION

There are 18 modes in which the control system can operate. The various modes are used to access the accountability data, set-up the machine and perform service diagnostics.

Mode 0 - The normal operating mode of the machine during which a user may enter coins or a debit card and select a drink.

Modes 1 - 10 - Service modes accessible by operation of the "mode" switch inside the machine. This switch is accessible once the door is opened i.e. only the main door key is required.

Modes 11 - 17 - Additional service modes accessible only if a key for the "security" switch is used.

DESCRIPTION OF MODES

Mode 0: **Operate mode.**
Normal operating mode.

Black MODE switch required:

Mode 1: **Display report.**
Displays accountability information.

Mode 2: **Test vend.**
Allows one test vend without credit.

Mode 3: **Manual and Automatic flush cycle.**
Used to flush the mixing channels and bowls with water.

Mode 4: **Set cash prices.**
Used to set/check the cash prices of all selections.

Mode 5: **Not used on the 402 drinks machine.**

Mode 6: **Diagnostics.**
Checks all segments of the scrolling display, all indicator lamps and lists closed switches.

Mode 7: **Channel timed test.**
Selected channel is turned on for the normal vend duration time.

Mode 8: **Channel continuous test.**
Selected channel is manually turned on until it is manually turned off again.

Mode 9: **Upload RS232C.**
Allows uploading of machine parameters from a programming device to the machine control board.

Mode 10: **Download RS232C.**
Allows the downloading of the machine parameters from the control board to a programming device.

Security key required:

Mode 11: **Machine configuration.**
Allows definition of machine type and options.

Mode 12: **Set channel times.**
Used to set start and duration times and strength modifiers.

Mode 13: **Set Options.**
Used to set payment options, free vend and price line values, if applicable.

Mode 14: **Set discount bits.**
Used to indicate selections to be discounted.

Mode 15: **Not used on the 402 drinks machine.**

Mode 16: **Load defaults.**
Used to load factory defaults for settings.

Mode 17: **Smart display user message.**
Used to program the scrolling message using the machine keyboard.

CAUTION: Certain procedures in both the operating section and the service section require that voltage be on in the machine. Exercise extreme caution while performing these procedures. These procedures will be marked with the lightening bolt symbol as it appears at left.

CAUTION: Certain procedures in both the operating section and the service section requires a qualified trained technician to perform the particular task at hand. These procedures will be marked with the exclamation symbol as it appears at left.

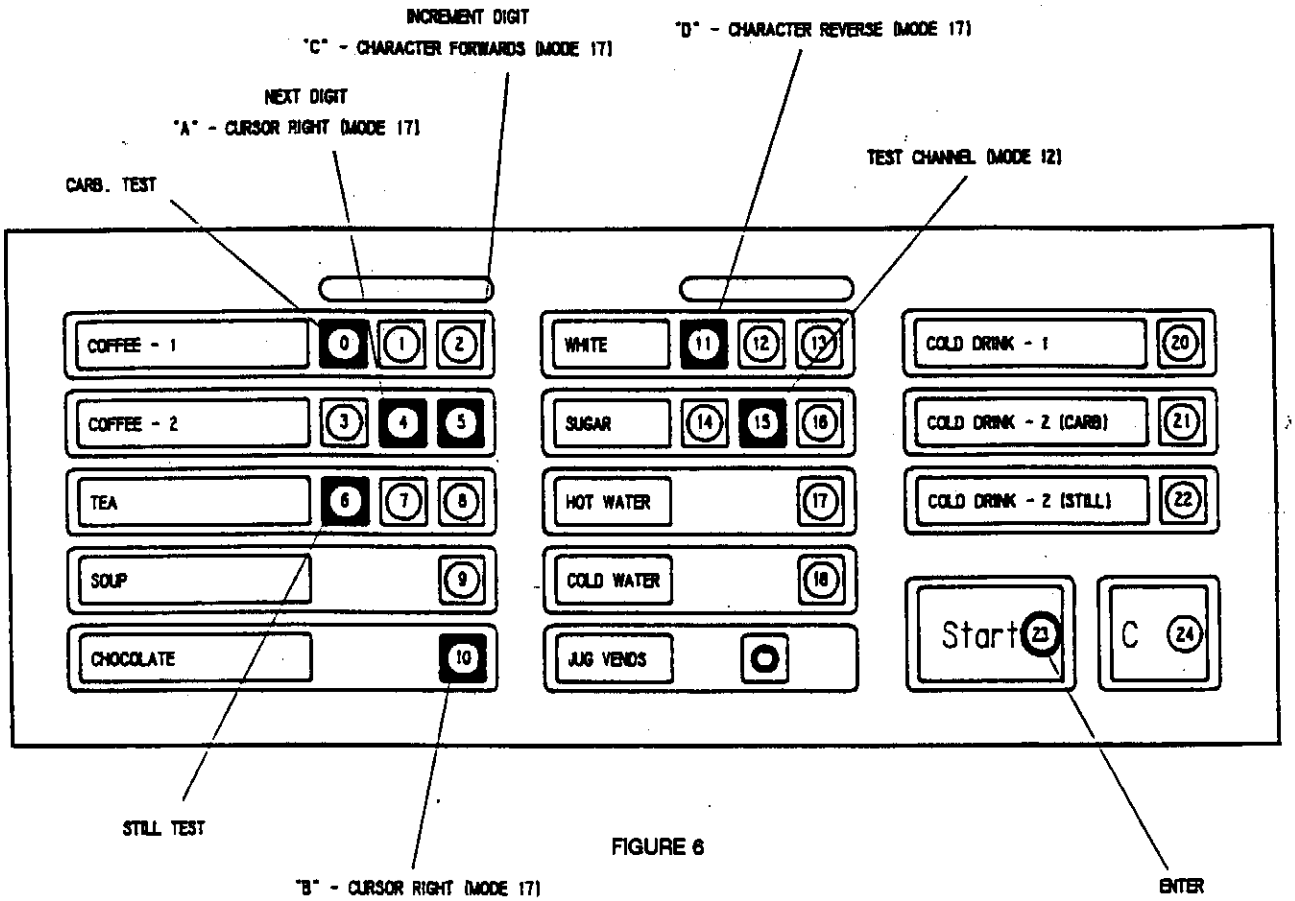


FIGURE 6

USE OF KEYBOARD

When in any of the service modes the selection panel switches perform different functions. A diagram showing the function of the switches is given in Figure 6.

INCREMENT & NEXT DIGIT

There are two buttons to carry out the incrementing of modes and values (Modes can also be incremented using the **mode** switch, inside the door).

The **increment digit** button (espresso/second coffee - strong) is used to increase the value of a particular digit e.g. from "13" to "14". The value of the digit will return to "0" after "9".

The **next digit** button (espresso/second coffee - medium) is used to move to the next digit (indicated by the flashing character), like a watch set up, e.g. from "24" to 24 and then to _24.

♦ ENTER / START

*The **START** selection switch is used as the **ENTER** button and the words are used interchangeably throughout this manual.*

SPECIAL BUTTONS

Additional facilities are available with other switches and are explained in the appropriate sections of this manual.

TO EXIT SERVICE MODE

The service mode can be exited at any time by one of the following:

Depress **mode** switch until scrolling message returns.

Depress coin return button.

Deposit coins into the machine.

Use **increment digit** and **next digit** switches to set the display to **"MODE 00"** and depress the **start** selection switch.

If the machine is left long enough without depressing any switches it will automatically return to the normal operate mode.

Remove and restore power to machine with a switch or interlock key

MODE 1 - DISPLAY REPORT

1. Open machine door. Insert the plastic key into the door isolation switch.

2. Depress the **mode** switch until the display indicates **"MODE 01"**.

3. Depressing the **START** front panel selection switch, the display will indicate **"M0 "**, followed by **"- XXXX"**. This is the total vend count.

4. Depress the **START** front panel selection switch again and the display will indicate **"M1 "**, followed by **"- XXXX.XX"**. This is the cash total taken by the machine.

5. Depress the **START** front panel selection switch again and the display will indicate **"M2 "**, followed by **"- XXXX.XX"**. This is the cash value of all discounts given.

6. Depress the **START** front panel selection switch again and the display will indicate **"M3 "**, followed by **"- XXXX"**. This is the total value of bills taken (although not normally used on the 402).

7. Depress the **START** front panel selection switch again and the display will indicate **"M4 "**, followed by **"- XXXX"**. This is the total number of discount vends.

8. Depress the **START** front panel selection switch again and the display will indicate **"M5 "**, followed by **"- XXXX.XX"**. This is the total value of card vends.

9. Depressing the **START** front panel selection switch again will cause the machine to display an additional breakdown of the vend totals. Depending on how the machine has been set-up, the breakdown will either be by product size or by price line. This cannot be changed without installing a new EPROM.

   The totals by product size will be displayed as follows:

"MA"	Coffee (mild & normal) (selection 1)
"MB"	Coffee (strong) (selection 1)
"MC"	Jug coffee (selection 1)
"MD"	Espresso/coffee (mild & normal) (selection 2)
"ME"	Espresso/coffee (strong) (selection 2)
"MF"	Jug espresso/coffee (selection 2)
"MG"	Tea (mild & normal)
"MH"	Tea (strong)
"MI"	Jug tea
"MJ"	Chocolate
"MK"	Soup
"ML"	Syrup 1
"MM"	Syrup 2
"MN"	Hot water
"MO"	Cold water
"MP"	Reserved for future use

   The totals by price line will be displayed as follows:

   "MP01 X.XX" (Price 1) **"MC01 XXXX"** (Vends for price 1)

   "MP10 X.XX" (Price 10) **"MC10 XXXX"** (Vends for price 10)

   "M$$" "XXXX" (Cash value of all vends whose prices are not one the 10 specified)

   Note: The M$$ total does not have a decimal point in the display. The last two digits represent the decimal portion of the total.

10. By depressing **START** again the display will indicate **"MODE 01"** again.

NOTE: THE NEXT MODE CAN BE ENTERED BY EITHER PRESSING THE **MODE** SWITCH INSIDE THE DOOR OR BY USING THE **INCREMENT DIGIT** AND **NEXT DIGIT** SWITCHES ON THE SELECTION PANEL.

MODE 2 - TEST VEND

MODE 2 provides a means to allow one test vend. This test vend is NOT counted in MO in the MIS. If price line MIS is in use, the vend will be recorded in the first available price line that is set to $0.00.

1. Open machine door. Insert the plastic key into the door isolation switch.

2. Depress the **mode** switch until the display indicates **"MODE 02"**.

3. Depress the **START** front panel switch, the display should indicate **"THANK YOU"** and then scroll the user message signifying that the machine is in the normal user mode.

4. The next vend will be a vend without credit and will not be included in **"M0"** but will be counted in a price line set to .00.

MODE 3 - FLUSH CYCLE

MODE 3 provides a method for routine service or location attendant personnel to perform a rinse of the brewer and commodity delivery system during routine servicing of the machine. This flush cycle should not be operated while the machine is unattended, however other tasks, such as replenishing cups may be done while the flush cycle is operating.

1. Open machine door. Insert the plastic key into the door isolation switch.

2. Depress the **mode** switch until the display indicates "**MODE 03**".

3. Depress the **START** front panel switch. The display will then show "**OPT Y/N**" with the "**N**" flashing. Use the increase digit switch (espresso/second coffee strong) to change the "**Y**" to flashing.

4. Depress the **START** front panel switch. The machine will then start a series of 3 flush cycles that will energize the brewer, each valve and whipper in sequence

5. Approximate run time for the flush cycle is one and one-half minutes.

6. At the end of the flush cycle the cupwell door will close while the display will continue to indicate "**MODE 03**" and the "**Y**" that was changed above will reset to "**N**".

AUTOMATIC FLUSH CYCLE

The machine is equipped with an automatic flush cycle which is carried out either by operating mode 3 or automatically every 12 hours. The volume of the water dispensed during the flush cycle is preset during manufacture and should not be adjusted.

1. The automatic flush will operate every 12 hours from the last time that the machine was powered up. If the machine is being used at the end of the 12th hour period it will wait for 10 minutes of complete inactivity before carrying out the cycle.

2. This automatic cycle can be disabled by removing the connector from connector P12 on the logic board. It will still be possible to carry out a manual flush using mode 3.

MODE 4 - SET CASH PRICES

1. Open machine door. Insert the plastic key into the door isolation switch.

2. Depress the **mode** switch until the display indicates "**MODE 04**".

3. Depress the **START** front panel switch, the display will indicate "**PRICE .00**"

4. Use the **next digit** to move the blinking cursor to the required digit in the display. To increase the selected digit press the **increment digit** switch. The value of the digit will return to "**0**" after "**9**".

5. When the desired price has been set on the display, press the "**START**" switch. The display will then indicate "**SELECTION**".

6. Depress the selection switches (normal panel buttons) to assign the set price to the drink selections. The selection LED will light up to indicate that the price has been set. Repeat for all selections at the set price. Two price levels are possible on variable strength selections. The strong selection can be set at different price from the two weaker selections.

7. Depress the "**START**" switch and the display will indicate "**PRICE . **". To verify the prices depress the appropriate selection switches. The price will be displayed for each selection pressed. The LEDs will remain on until a new mode is entered.

8. Depress the "**START**" switch and the display will return to "**MODE 04**".

- SETTING PRICES TO 0.00 WILL SET A SELECTION TO FREE VEND.

- SETTING A PRICE TO 99.99 WILL DISABLE A SELECTION AND CAUSE THE MESSAGE "MAKE A ANOTHER SELECTION" TO APPEAR WHEN THE SELECTION IS PRESSED. THIS IS USEFUL FOR BLOCKING UNUSED SELECTIONS OR DISABLING A SELECTION WHEN IT IS OUT OF ORDER.

MODE 5 - NOT USED ON THE 402 MACHINE

MODE 6 - DIAGNOSTICS

Mode 6 will provide a means to test the scrolling display segments, LEDs on the selection panel, and all logic level switches. The function includes a means to test all selection panel switches.

1. Open machine door. Insert the plastic key into the door isolation switch.

2. Depress the **mode** switch until the display indicates "**MODE 06**".

3. Depress the **START** front panel switch. The scrolling display will have all segments on and all LEDs will be illuminated for 10 seconds.

4. The display will then indicate all the closed switches by switch number, one after another. This function, along with the list of switches, can be used to locate problems in the machine. See the troubleshooting section in the service manual.

5. At the end of the diagnostics the display will indicate "**MODE 06**".

MODE 7 - CHANNEL TIMED TEST

Modes 7 & 8 provide a means to test the function of a specific channel or device (motor, valve, etc.) without running an entire vend. This function allows for trouble shooting purposes. Mode 7 will test a channel for the duration time that channel is set for, while Mode 8 will continuously provide power to the device until the power is removed by pressing the START button.

1. Open machine door. Insert the plastic key into the door isolation switch.
2. Depress the **mode** switch until the display indicates **"MODE 07"**.
3. Depress the **START** front panel switch. The display will indicate **"CH 00"**.
4. To select a channel use the **next digit** switch and **increment digit"** switches to select the desired channel number.
5. Depress the **START** switch and the selected channel will operate for the normal vend duration time.
6. When the selected channel is finished the display will indicate **"MODE 07"**.

MODE 8 - CHANNEL CONTINUOUS TEST

1. Open machine door. Insert the plastic key into the door isolation switch.
2. Depress the **mode** switch until the display indicates **"MODE 08"**.
3. Depress the **START** front panel switch. The display will indicate **"CH 00"**.
4. To select a channel use the **next digit** switch and **increment digit"** switches to select the desired channel number,
5. Depress the **START** switch and the selected channel will be turned on. It will stay on until the **START** switch is depressed again. The display will then indicate **"MODE 08"**. Note: The display will remain blank while the channel is on.

MODE 9 - UPLOAD RS232C - TO MACHINE

Note: At present the only device capable of being used to upload data to the machine is an IBM compatible computer.

1. Open machine door. Insert the plastic key into the door isolation switch.
2. Press the **mode** switch until the display indicates **"MODE 09"**.
3. Connect the programming device cable to P2 on the control board.
4. Depress the **START** switch before sending the file to the machine control board.
5. The display will remain blank during the file loading time. At the end of the file loading the user message will scroll on the display again.

MODE 10-DOWNLOAD RS232C - FROM MACHINE

Note: At present the only device capable of being used to download data from the machine is an IBM compatible computer.

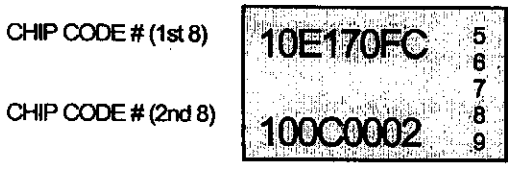
1. Open machine door. Insert the plastic key into the door isolation switch.
2. Depress the **mode** switch until the display indicates **"MODE 10"**.
3. Connect the programming device cable to P2 on the control board.
4. Depress the **START** switch. This starts sending the file to the external programming device.
5. The display will remain blank during the file sending time. At the end of the file sending the user message will scroll on the display again.

MACHINE TO MACHINE UPLOAD / DOWNLOAD

It is also possible to transfer the settings and data from one machine to another, using a special connecting cable (part # 33784). The procedure is as follows:

1. Turn off 24 Volt circuit breaker on switch panel and remove coin mech connector (P2) from logic board of both machines. .
2. Connect each end of the cable to the two P2 connectors on each machine control board. Restore power to the machine.
3. Set machine which has already been set up correctly (machine A), into mode 10.
4. Set machine to be set up (machine B) into mode 9. Machine B needs to be in an in order condition to receive the download. Depress the **START** switch.
5. Depress the **START** switch on machine A.
6. The scrolling display will go blank on machine B. When the scrolling display returns the file transfer is complete.

- Due to the complexity of the information that is transferred during the upload or download, some precautions must be observed. The information that is required is located on the paper label on the main program chip located on the logic board. The diagram below explains the information contained on the label.



- If the first date code is 05/23/90 or higher, then only the first three numbers in the chart # in both machines must match for a successful transfer.
- If the first date code is 02/28/90 or earlier then all eight digits must match exactly for a successful transfer.

MODE 11 - MACHINE CONFIGURATION

1. Open machine door. Insert the plastic key into the door isolation switch.

2. Insert security key into the service key switch, turn the switch to the "on" position and then back to the "off" position. This allows the key to be removed and prevent it being left in the machine in error.

3. The display should indicate "**MODE 11**".

4. Depress the **START** switch. The display will indicate "**CONFIG H/B/C**". The "B" should be flashing to indicate that the machine is set up as a 402 machine.

5. If the "B" is not flashing, after having just installed a new control board for example, press the **change digit** switch until it is. Then depress the **START** switch. The machine will then jump automatically to mode 16 to load the default values appropriate for the 402 machine (see **MODE 16**).

6. If the "B" was flashing correctly continue with the configuration by depressing the **START** switch.

7. The machine will then advance through a series of four questions. Each selection is made by depressing the **change digit** switch until the "**Y**" (yes) or "**N**" (no) is flashing and then activating the selection by depressing the **START** switch. The flashing character indicates the selected choice. The following questions are indicated on the display:

   "**OPT 1 Y/N**" - Is a brewer used for regular coffee?
   Y - Brewer
   N - No brewer i.e. FD coffee

   "**OPT 2 Y/N**" - Is the machine to dispense lemon tea?
   Y - Lemon tea
   N - Normal tea i.e. with milk and sugar

   "**OPT 3 Y/N**" - Is espresso (half volume) coffee available?
   Y - Espresso
   N - Second coffee selection

NOTE: The two coffee selections (if one is not espresso) allow for a whipped and a plain coffee selection. Either or both can be set as plain or whipped

   "**OPT 4 Y/N**" - Is a tea brewer being used?
   Y - Tea brewer
   N - No tea brewer i.e. Instant tea or no tea

8. When the **START** switch is pressed for the final question the display will return to "**MODE 11**".

NOTE: IT IS IMPORTANT TO RETURN TO THE "**MODE 11**" ON THE DISPLAY TO ENSURE THAT THE NEW VALUES ARE LOADED.

MODE 12 - SET TIME CHANNELS

1. Open machine door. Insert the plastic key into the door isolation switch.

2. Insert security key into the service key switch, turn the switch to the "on" position and then back to the "off" position. Remove key.

3. Depress the **mode** switch until the display indicates "**MODE 12**".

4. Depress the **START** switch. The display will indicate "**CH 00**"

4 To select a channel use the **next digit** switch and **increment digit**" switches to select the desired channel number.

5. Depress the **START** switch and the start time will be displayed in the following format - "**START 00.0**". This is the time from the beginning of the vend cycle to when the channel starts. For syrup channels the start time is in actual fact the "rinse" time i.e. time from the end of syrup dispense to the end of the water dispense.

6. To change the start time the **next digit** switch can be depressed to move the flashing character to the digit to be changed and the **increment digit** switch depressed to increase the value of the digit.

7. When the required start time has been set depress the **start** switch. This will change the previous start time to the new start time and advance to display the duration time. The display will be in the following format - "**DUR 00.00**".

8. The duration time can be changed by use of the **next digit** and **increment digit** switches.

9. When the required duration time has been set depress the **START** switch. The new duration time will replace the old time. If the channel has a modifier the display will indicate "**MOD 0.00**". If there is no modifier the display will indicate "**MODE 12**".

10. The duration sets the ingredient throw for the medium strength of selection e.g. regular coffee. The modifier value is the percentage increase and decrease in ingredient throw for the strong and weak selections on the selector panel. The modifier is set by means of the **next digit** and **increment digit** switches. By depressing the **START** switch the new modifier will replace old one. The display will then indicate "**MODE 12**".

11. The selected channel can be tested by depressing the **channel test** switch (medium sugar). The channel will be turned on for the normal vend duration. The display will indicate "**MODE 12**".

NOTE: IT IS IMPORTANT TO RETURN TO THE "**MODE 12**" ON THE DISPLAY TO ENSURE THAT THE NEW VALUES ARE LOADED.

MODE 13 - SET OPTIONS

1. Open machine door. Insert the plastic key into the door isolation switch.

2. Insert security key into the service key switch, turn the switch to the "on" position and then back to the "off" position. Remove key.

3. The display should indicate **"MODE 13"**.

4. Depress the **START** switch. The machine will then advance through a series of questions and options. Each **Y/N** selection is made by depressing the **change digit** switch until the **"Y"** (yes) or **"N"** (no) is flashing and then activating the selection by depressing the **START** switch. The following questions are indicated on the display:

   "FORCE Y/N" - Y - Forced i.e. User must make a vend before change is returned
   N - Normal

   "FREE Y/N" - Y - Free vend enabled on all selections
   N - Normal (or discounted) prices apply

NOTE: NO COIN MECHANISM IS REQUIRED IF FREE VEND IS SET UP.

   "MS1600 Y/N" - Y - European Executive changer installed
   N - US changer installed

   "ESCROW Y/N"- Not used on the 402 machine

   "MULTI Y/N"- Not used on the 402 machine. Multivend is set up in the coin mechanism.

   "DISC .00"- Any selection set up to have a discount (see mode 14) will be discounted by the factor set in this display. The discount price is obtained by multiplying the vend price by the discount factor e.g. 50p x .80 = 40p. The discounted price will be in effect for enabled selections when the discount switch is operated.

   "FREE CT 00"- This option allows a free drink after a given number of cash vends. The number in the display can be set between **"01"** (every vend) and **"255"** (every 255th vend is free). If the number is left at **"00"** no free vends will be given.

   "VOLUME .00"- Not used on the 402 machine.

   "VOL D .00"- Not used on the 402 machine.

5. Depressing the **START** switch completes the selection and returns to the beginning of the mode. The display will indicate **"MODE 13"**.

Note: It is important to return to the **"MODE 13"** on the display to ensure that the new values are loaded.

Note: If price lines are being used, the following additional steps will be required, starting at step 5:

5. Depress the **START** switch. The display will indicate **"PRICE1 .XX"**. This is the price setting for the first price line. There are ten price lines that can be set to any required value. The control will then increment the count every time a vend is made at that price (or an equivalent price obtained by discounting a higher price).

6. Set the required price using the **increment digit** and **next digit** buttons.

7. Depressing the **START** switch will increment through the 10 price line values:

   "PRICE2 .XX"
   .
   .
   "PRICE9 .XX"
   "PRICE0 .XX"

   Each price line can be set to a different value. Set any unused prices to .00.

- The first available price line set to **.00** will record all **MODE 2** test vends, all 100% discount vends and all **FREE CT** (winner) vends.

8. Depressing the **START** switch completes the selection and returns to the beginning of the mode. The display will indicate **"MODE 13"**.

Note: It is important to return to the **"MODE 13"** on the display to ensure that the new values are loaded.

MODE 14 - SET DISCOUNT BITS

1. Open machine door. Insert the plastic key into the door isolation switch.

2. Insert security key into the service key switch, turn the switch to the "on" position and then back to the "off" position. Remove key.

3. Depress the **mode** switch until the display indicates **"MODE 14"**.

4. Depress the **START** switch. The display will indicate **"SELECTION"**

5. All previously set discounts will be reset. Depress the selection switches (normal panel buttons) to change the drink selections to "discountable". The selection LED will light up to confirm that the discount is enabled. If the selection is pressed again the LED will go out again to indicate that it is not enabled.

6. Depress the **START** to complete activation of discounted selections. The display will indicate **"MODE 14"**.

MODE 15 - NOT USED ON THE 402 HOT DRINK MACHINE

MODE 16 - LOAD DEFAULTS

1. Open machine door. Insert the plastic key into the door isolation switch.

2. Insert security key into the service key switch, turn the switch to the "on" position and then back to the "off" position. Remove key.

3. Depress the **mode** switch until the display indicates "**MODE 16**".

4. Depress the **START** switch and the display will indicate "**MODE 16**" again.

5. In order to prevent accidental loading of the defaults it is now necessary to enter a code number. Using the **increment digit** and **next digit** switches change the "**16**" to "**27**" and then depress the **START** switch. The display will go blank.

♦ Changing the "16" to a "27" should be considered a password that is the only way to reload the factory standard times. To confirm that **MODE 16** was properly done turn power off and back on. If configuration and the values in **MODES 11,12** and **13** remain the same, then the reload was correctly done.

6. When initialization and loading of the default values is complete the display will scroll the user message again.

7. If setting up the machine return to mode 11 and complete the machine options.

♦ If you have been supplied with a "CUSTOM CHIP", (indicated by a F in the fourth position of the CHART # as shown in the diagram on page 1.03 describing the EPROM label) you are reloading the times and settings provided when the "CUSTOM CHIP" was created.

MODE 17 - PROGRAMMING USER MESSAGE

1. Open machine door. Insert the plastic key into the door isolation switch.

2. Insert security key into the service key switch, turn the switch to the "on" position and then back to the "off" position.

3. Depress the **mode** switch until the display indicates "**MODE 17**".

4. Depress the **START** switch. The first nine characters of the user message will be displayed with the cursor (flashing character) at position eight and a boundary character (▣) at position one.

5. The message can now be changed by moving through the message to the characters that need changing and then selecting from the list of characters and symbols.

6. **CURSOR RIGHT** -
Switch "**A**" (espresso/second coffee - medium) moves the cursor to the right in the message. Depressing switch "**A**" for less than one second will move the cursor right one character at a time. If depressed longer the rate of movement will speed up.

7. **CURSOR LEFT** -
Switch "**B**" (chocolate) moves the cursor to the left in the message. Depressing switch "**B**" for less than one second will move the cursor right one character at a time. If depressed longer the rate of movement will speed up.

8. **CHARACTER FORWARD** -
Switch "**C**" (espresso/second coffee - strong) controls the characters at the cursor location. Depressing switch "**C**" for less than one second will move forward through the character set one character at a time. If depressed longer the rate of movement will speed up. When a character has been correctly set simply move on to the next character.

9. **CHARACTER REVERSE** -
Switch "**D**" (whitener weak) also controls the characters at the cursor location. Depressing switch "**D**" for less than one second will move backward through the character set one character at a time. If depressed longer the rate of movement will speed up.

10. The (▣) character indicates the left and right boundaries of the user message.

11. The (⌟) character must be entered to indicate the end of message to be displayed. Otherwise the display message would ignore the boundary character and may scroll some characters that do not belong to the character set.

12. The message program mode should be exited by depressing the **mode** switch only.

13. **VALID CHARACTER SET** -

The following characters are available:

A through Z
0 through 9
$ ' < > * + , - . / ? ⌟
A blank is represented by a flashing underline _

♦ Approximately 85 spaces including blanks and punctuation are available for a user message to be loaded into the scrolling display. For best results leave 5-6 spaces blank at the beginning of your message. Double-check for correct spelling - errors in the middle of the message are difficult to correct.

SERVICE INDEX

CAUTION: THE FOLLOWING PROCEDURE REQUIRES THAT THE MACHINE HAVE POWER APPLIED AND A POTENTIAL ELECTRICAL SHOCK HAZARD EXISTS.

CAUTION: THE BELOW PROCEDURE SHOULD BE PERFORMED BY A QUALIFIED PERSON TRAINED AND KNOWLEDGEABLE IN THE PROGRAMMING SYSTEM!

SANITIZING AND CLEANING PROCEDURES

1. Fill cup cabinet with cups to required level. Wipe interior and exterior of cup cabinet.
2. Replenish all canisters. Clean any spills. Wipe the lids of the canisters with a damp towel. Dry all damp surfaces.
3. Run the flush cycle (MODE 3) which will take approximately 1 ½ minutes. Depress the **mode** switch until the display indicates **"MODE 03"**. Depress the **START** front panel switch. The machine will then show **"OPT Y/N"**. Use the coffee strong button to change the Y to flashing. Depress the **START** front panel switch. The machine will then start a series of flush cycles.
4. After the completion of the flush cycle, cycle brewer to the dump position by depressing the coffee brewer switch on the rear panel until the brewer reaches the forward position. Release the switch. Remove the splash guard from the front of the brewer. Using the spray hose rinse any loose grounds from the brewer and the splash guard. Replace the splash guard and restore power to machine.
5. Remove the tea waste chute (if fitted) and commodity chutes from the trough. Check all canister spouts and commodity chutes for blockages. Rinse tea chute, commodity chutes and trough with spray hose to remove any residue. If necessary the trough can be scrubbed with a damp cloth followed with a rinse of hot water from the spray hose. DO NOT SCOUR THE TROUGH WITH ANY ABRASIVE MATERIAL! Carefully dry the commodity chutes and reinstall the humidity bar (optional) and the commodity chutes.
6. Using warm water and detergent clean other interior surfaces, wipe with a damp cloth and wipe dry.
7. Remove the cup catcher, grill and drip tray, clean with hot water and detergent. Rinse with clear water and dry with clean cloth or paper towel. Clean the cupwell molding with hot water and detergent. Wipe inside of door. Replace cup catcher, grill and drip tray.
8. Remove disposable bag containing spent coffee grounds and rinse bucket with hot water and replace liner. Empty and scrub waste bucket. Rinse with anti-bacterial sanitizing solution. DO NOT rinse bucket after anti-bacterial solution is used- this will defeat it's purpose. Clean floor of machine with hot water and wipe dry. Replace buckets in machine making sure both floats are hanging free in the buckets.
9. Close and lock vendor door, insert coins, make a selection and check for proper operation. Clean exterior of door and cabinet.

QUARTERLY

CAUTION: THE BELOW PROCEDURE SHOULD BE PERFORMED BY A QUALIFIED PERSON TRAINED AND KNOWLEDGEABLE IN THE PROGRAMMING SYSTEM!

1. Cycle brewer to the `dump' position, spray with rinse hose to remove any excessive grounds. Disconnect the brewer cable from the carriage by gently pushing the carriage to the rear and lifting the cable out of its slot. Lift the lower brewer assembly latch and remove the bottom half of the brewer. Place in a bucket of hot water to allow it to soak.
2. Remove steam duct, exhaust hose, and metal screen between exhaust motor and mounting plate. Rinse clean with hot water. Dry with a clean cloth and return to position.
3. Disassemble all whipper housings and mixing bowl by spreading the wire clips and pulling straight out. Clean parts with hot water. Clean and inspect the whipper base and impeller for wear. Reassemble making sure the large `O' ring is positioned correctly inside the whipper housing.
4. Disconnect all hoses from mixing bowls, channel and delivery spout and clean with hot water. Replace hoses.
5. Remove lower half of brewer from bucket and rinse well with hot water and install on main brewer assembly. Reconnect cable. Inspect brew filter, screen and gasket for wear, rips or obstruction of the filter or screen.
6. Clean coffee chute with a dry cloth.
7. Disassemble tea brewer and inspect for worn parts. Clean any excessive tannin with an appropriate cleaner. Replace tea brewer filter.
8. Clean coin mechanism acceptor with a damp cloth and wipe dry.
9. Perform **EACH VISIT** procedure above.

RECOMMENDED PREVENTATIVE MAINTENANCE SCHEDULE

for APi Hot Beverage Merchandiser

SERVICE AT EACH INTERVAL LISTED X MONTHS OR VENDS WHICHEVER COMES FIRST	Months	Each	1	4	8	12	24	36
	Vends	Visit	2000	8000	16000	24000	48000	72000
BREWER ASM								
Filter screen, Coffee Brewer		Clean	Clean	Clean/Inspect	Replace			
Seal, Brew Chamber (Black)		Clean	Clean	Clean/Inspect				
Seal Ring, brew Filter Screen		Clean		Clean/Inspect				
Wiper Blade, Carriage				Clean/Inspect			Replace	
Brewer Carriage, Rods, Springs		Clean	Clean	Clean/Inspect		Lubricate	Lubricate	
Lubricate Brewer						Lubricate	Lubricate	
PRODUCT DELIVERY SYSTEM								
Mixing Troughs & Bowls		Clean	Clean	Clean/Inspect				Replace
Whippers		Clean	Clean	Clean/Inspect				Inspect
Exhaust System: Hose, Duct Screen		Clean	Clean	Clean/Inspect				
Liquid delivery hoses		Clean	Clean	Clean/Inspect	Replace			
Syrup Lines		Inspect	Inspect	Clean	Inspect	Replace	Clean	Replace
Coffee delivery chutes		Clean	Clean	Clean/Inspect				
Tea Brewer Filter		Clean	Clean	Replace				
Stainless Steel Dispense Tubes		Clean	Clean	Clean	Clean	Clean		
MISCELLANEOUS								
Water Inlet Filter Cartridge						Replace	Replace	
Water Valves On Water Tank						Inspect	Rebuild	
Cupwell, Overflow & Grounds Buckets		Clean						
Coin Mech		Clean	Clean	Inspect				
Water Tank Interior				Drain / Refill			Inspect	Clean

THIS SCHEDULE SHOULD BE FOLLOWED IN ADDITION TO THE "EACH VISIT" CLEANING RECOMMENDED IN THE SERVICE SECTION OF THIS MANUAL.

CLEAN =Clean and sanitize per NAMA procedures

INSPECT =Inspect for wear, product build up or broken part. After inspection- repair, adjust, clean, rebuild or replace.

REPLACE =Recommended interval for replacement

REBUILD =Remove from machine, take apart, clean and replace worn or corroded parts.

LUBRICATE =Should be cleaned, inspected, and repaired before lubrication. Recommended lubricant is a food grade, light weight oil.

FUNCTION OF THE BREWER

The heart of the AP 402 Hot Drink Merchandiser is the open cylinder brewer. It has been "time proven" and "experience improved". It is simple, lightweight, easy to clean and easy to service.

HOW THE BREWER WORKS

The word "front" used in this description refers to the parts of the brewer nearest the observer, standing before the open cabinet.

All AP 402 fresh brew machines have the brewer stopping at the same point. The brewer is stopped with the brew carriage aligned directly over the brew filter and under the coffee delivery chute. When a brewed coffee drink is selected, the ground coffee, from the LG canister, is delivered directly to the brew chamber via the stainless coffee delivery chute.

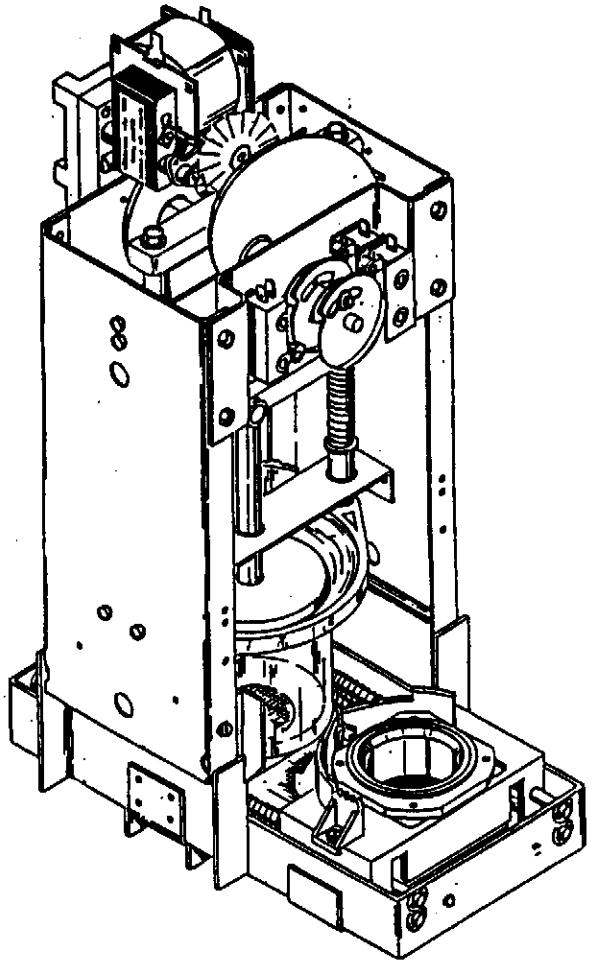


FIGURE 7

The brewer starts at the time determined by channel 8 (typically 3.00 seconds). When the brewer starts the cable will begin to retract the brew carriage towards the rear of the base assembly. Once the first switch rides up on the high side of the front cam, the brewer will continue to run until it falls back into the valley.

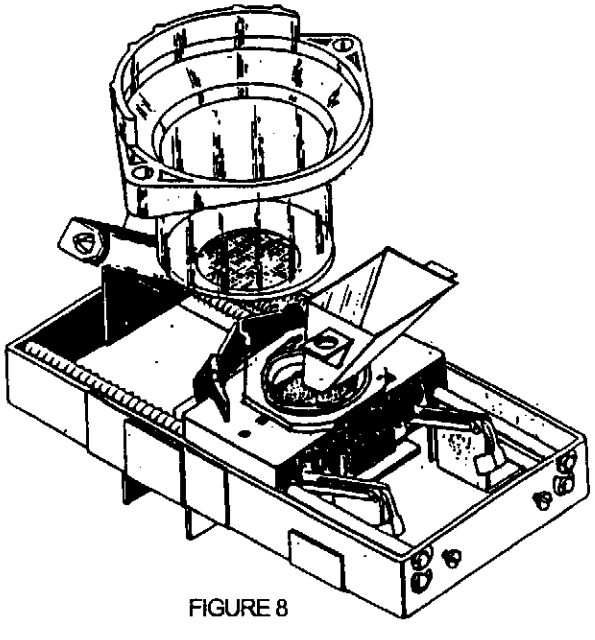


FIGURE 8

The brew carriage will continue back until it is slightly behind the clear brew cylinder when the brew cylinder starts its downward motion. At the proper time the cable is slackened slightly to allow the brew carriage to self-align with the cylinder. As the cylinder clamps down on the brew chamber seal, the roller of the second switch should be in the valley of the cam and the switch will send a signal to the logic board that it is the proper time to deliver water to the brewer. The brew water valve is energized for the duration determined by channel 9. This channel controls the total volume of water delivered to the brewer. The cylinder is held against the brew chamber seal by the springs on the cylinder support rods. As the brewer cams continue to rotate, the left rear switch rides up on the valley of the third cam and signal the logic board to pause the brewer. This pause or delay is controlled by the duration of channel 11, and will allow all the brew water to be delivered to the brewer. The length of this delay is preset and should have to be adjusted only if changing to a larger cup size. This open cylinder delay allows for longer water to coffee contact time for increased extraction and provides less back pressure in the cylinder by allowing a short degassing period. This delay is also added to the light and sugar motor start times to guarantee the correct timing of the additives. The middle cam will also signal the logic board just before the piston has contacted the cylinder and the window for delivery of brew water has closed. The water will flow into the cylinder down through the grate in the bottom of the cylinder into the coffee filled brew chamber. The grate in the bottom of the cylinder prevents the coffee grounds from floating up into the cylinder.

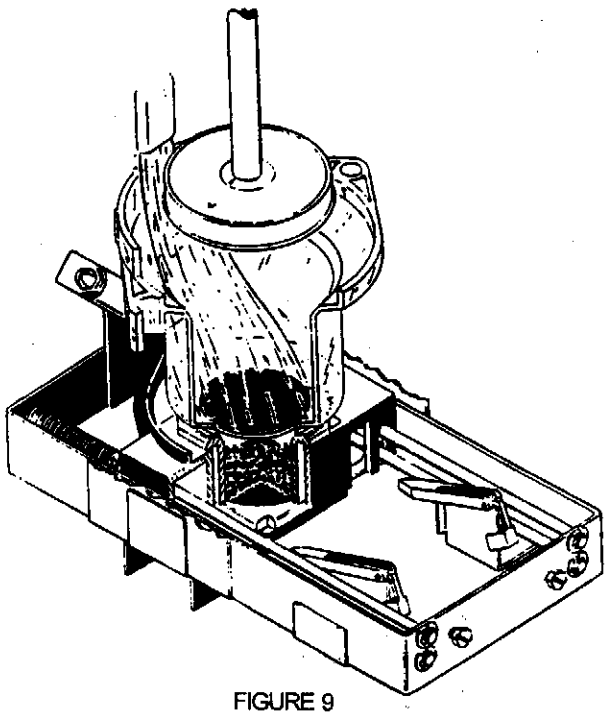


FIGURE 9

As the cycle continues, the piston is moved down into the cylinder by a large cam on the main shaft. Air trapped between the piston and the water in the cylinder is quickly heated by the hot water and begins to expand. The downward motion of the piston, plus the pressure of the expanding air, forces the water through the coffee grounds in the brew chamber and out through the delivery funnel to the trough. The heated, compressed air follows the water through the grounds forcing the remaining water out of the grounds and drying the grounds. If a duration is set in channel 12 (pressure relief delay), then the roller of the third switch falling down into the valley of the rear cam will signal the logic board to activate the pressure relief delay. This pressure relief delay allows any built-up back pressure in the brew chamber and cylinder to dissipate through the bed of grounds.

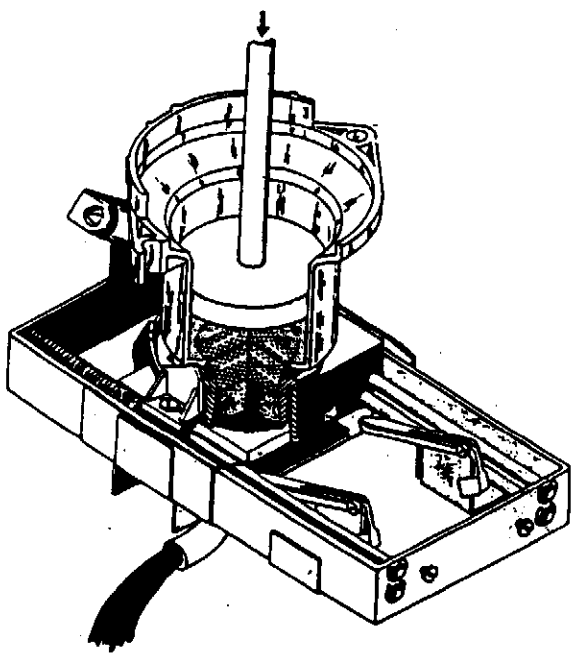


FIGURE 10

After the pressure relief delay or after the water has passed through the bed of grounds, the brewer starts the portion of the cycle that empties the brewer of spent grounds and resets the brewer for the next vend. The looseness in the brew carriage cable is removed and the piston and cylinder are raised far enough to allow the brew carriage to pass under the cylinder.

The cable is then unwound, controlling the forward motion of the brew carriage, which is being forced forward by the carriage rod springs. As the brew carriage passes over the two white pawls in the base assembly, the two ears on the sides of brew chamber lift the brew chamber allowing the brew chamber to ride up the pawls.

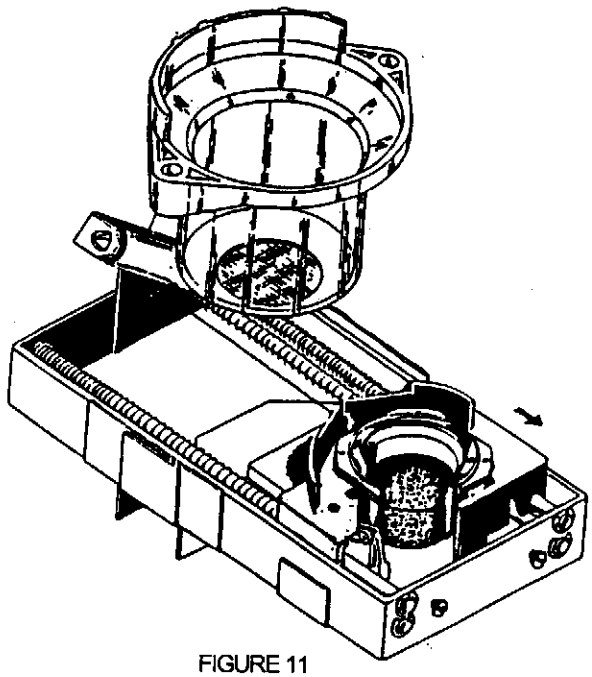


FIGURE 11

As soon as the ears are free of the support of the pawls, the brew chamber snaps downward, dislodging the spent grounds into the grounds bucket. The cable will then begin to retract the brew carriage toward the rear of the base assembly until the brew chamber is directly aligned over the filter and under the delivery chute. At this point the roller of the front switch will fall into the valley of the front cam, signaling the logic board to stop the brewer. This is the standby position and the brewer will remain in this position awaiting the next vend.

♦♦ THE STOPPING POSITION OF THE BREWER IS A CRITICAL ADJUSTMENT. MISALIGNMENT OF THE BREW CHAMBER AND THE FILTER IN THE STOPPING POSITION CAN CAUSE A LEAK BETWEEN THE BOTTOM OF THE BREW CHAMBER AND THE TOP OF THE FILTER. THE CORRECT STOPPING POSITION OF THE BREWER IS INDICATED BY THE CARRIAGE MOVING THE FILTER ASSEMBLY BACKWARDS APPROXIMATELY 3mm (1/8") AS THE BREWER COMES TO REST.

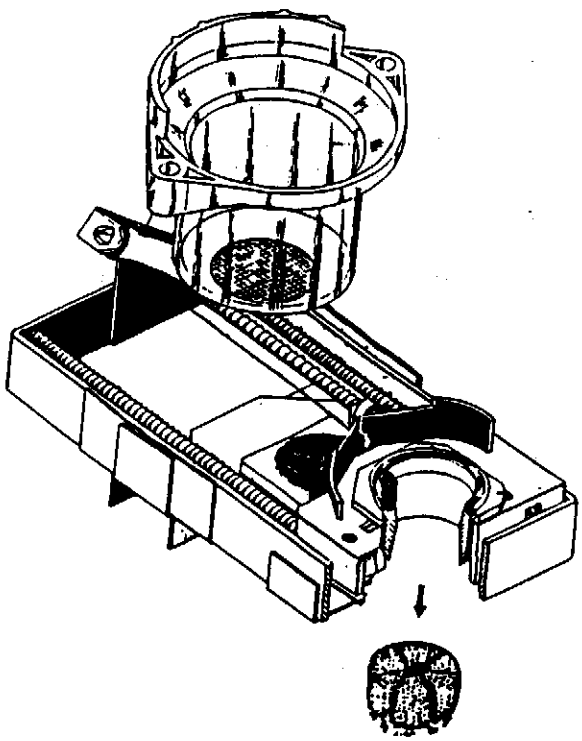


FIGURE 12

BREW CARRIAGE AND CABLE ADJUSTMENT

The horizontal movement of the carriage is caused by the springs in the base assembly. The action of the springs is controlled by the brew carriage cable assembly. The cable is wrapped on a spool and wound and unwound to move the carriage in synchronization with the other movements of the brewer. The cable spool is controlled by a gear segment driven by the rear cam of the main shaft assembly. The shape of the cam determines when the cable is wound and unwound.

When the cylinder is pressing down on the brew chamber, the cable should be slack. Just as the brew cylinder begins to raise the cable tightens, to prevent the carriage from jumping forward as the cylinder clears the alignment shoulder of the brew carriage. As soon as the cylinder is high enough to clear the carriage, the cable is unwound and the carriage moves forward to dump the spent grounds. After the spent grounds are dumped, the cable again winds on the outer spool and pulls the carriage to the stopping position.

The cable is attached to the outer section of the spool with a cotter pin. The inner portion of the spool is connected to a shaft and a small gear. The gear is rotated by a pivoting segment gear driven by a cam follower riding on the edge of the rear cam of the main shaft assembly. The inner and outer sections of the cable spool have matching teeth which provide a positive mesh but allow for adjustment. When the two parts are assembled, they are secured by a screw and washer which prevent them from being disengaged.

ADJUSTMENT OF THE BREW CABLE

CAUTION: THE FOLLOWING PROCEDURE REQUIRES THAT THE MACHINE HAVE POWER APPLIED AND A POTENTIAL ELECTRICAL SHOCK HAZARD EXISTS.

Using the brewer service switch, operate the brewer through a complete cycle and observe that:

1. The alignment shoulder of the carriage is slightly behind the rear vertical edge of the brew cylinder as the cylinder starts down.
2. The cable goes slightly slack just before the cylinder contacts the surface of the brew chamber gasket.
3. After brewing, the carriage moves forward all the way to the dump position.

If all three of these conditions are not met, then a cable adjustment should be made using the following procedure:

1. Open the coffee hopper and press the brewer cycle switch on the switch panel and allow the brewer to cycle to the brew position. Turn off power and remove the screws that secure the brewer and lift the brewer away from the water tank. Spin the brewer so the cable spool on the rear of the brewer can be accessed.
2. Mark the inner and outer section of the cable spool with a pencil line across both pieces to provide a reference mark. See FIGURE 13.
3. Restore power and cycle the brewer to the dumping position and turn off the power.

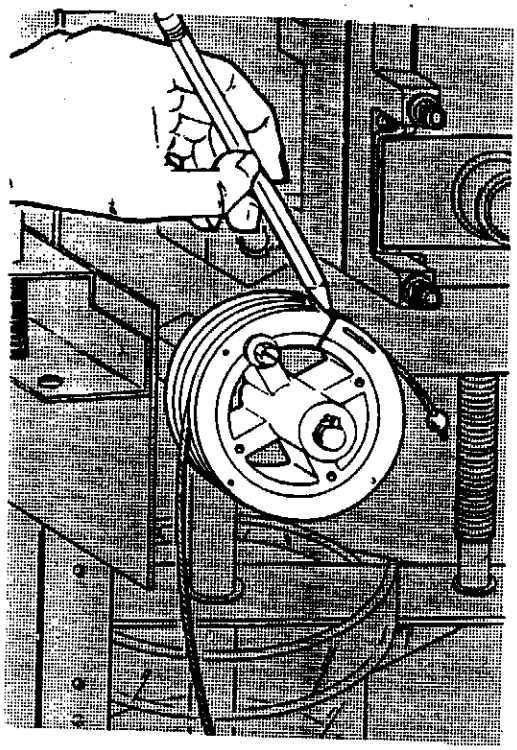


FIGURE 13

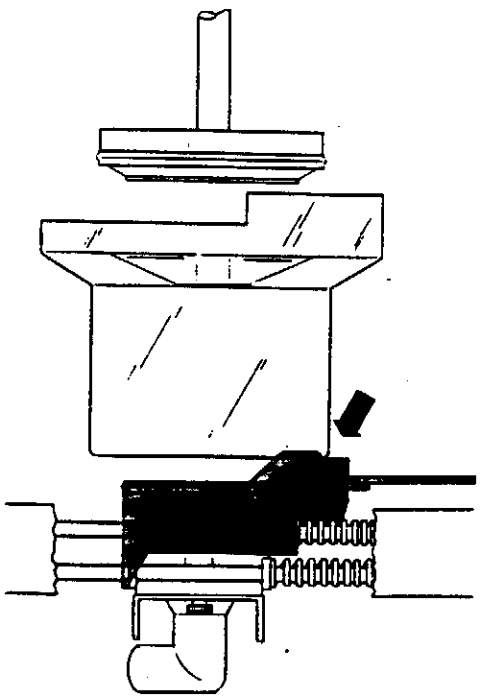


FIGURE 14

4. If the carriage was not correctly behind the cylinder and is being forced back out of the way or the cylinder is resting on top of the alignment shoulder of the brew carriage (see FIGURE 14) and causing the brew water to leak from between the cylinder and the brew chamber, then an adjustment of only one or two teeth to shorten the cable is needed - go to step 9. If the original adjustment has been lost, then a 'scratch' adjustment will have to be made - continue to step 5.
5. Confirm that the cam follower is in the deepest valley of the rear cam (See FIGURE 15) by cycling the brewer to this position. This position of the cam and follower guarantees that the brewer is in the dump position.
6. Feed the cable down between the roller and the support bracket and towards the front of the brewer. Slip the cable into the slot on the rear of the carriage.
7. Wind the cable clockwise on the outer spool until the carriage is pulled back from the inner face of the base assembly (See FIGURE 16) 3-5mm (1/8 to 3/16").
8. While holding the follower in the valley of the cam, (see FIGURE 15) install the outer section of the cable spool over the inner section. Release the follower and spool and check that the clearance set above is maintained. If so, make a new reference mark across the spool and remove the outer section of the spool and rotate it counter-clockwise one tooth-skip to Step 10.
9. Carefully pull the outer section of the cable spool off and rotate it one tooth clockwise to tighten the cable and replace the outer spool.
10. Restore power and cycle the brewer again, watching for the three conditions above.
11. If the carriage is still not being drawn back far enough during the cycle, repeat Step 9.
12. After ensuring that the cable is adjusted correctly, replace the screw and washer that secure the two halves of the cable spool and cycle the brewer to the brewing position and turn off the power. Return the brewer to its position on the water tank and replace the screws removed above. Restore power and test vend.

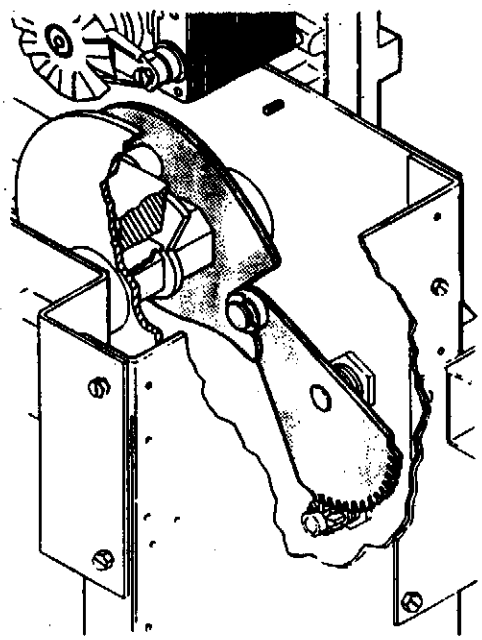


FIGURE 15

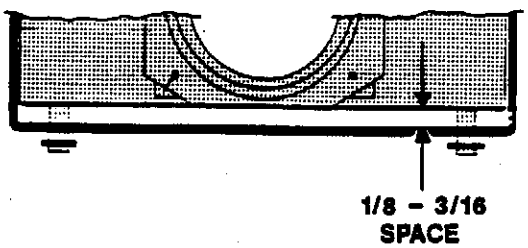


FIGURE 16

WATER SYSTEM

The water system is a gravity system (thus requiring no pumps or compressors) with an open air break at the tank inlet required by most local plumbing and health codes. The adjustable temperature control will maintain the water temperature in a range suitable for freeze-dried or near the boiling point as required for proper brewed coffee extraction.

THE WATER TANK

The water tank is constructed of stainless steel and holds approximately 9.5 liters (2.5 US gallons) of water. It has a removable lid that is sealed at the top of the tank with a gasket. The tank has two 1200 Watt heaters mounted on the left side of the tank, wired in parallel, and controlled by the adjustable thermostat with a remote sensing bulb mounted in a well on the tank lid.

WATER INTAKE SYSTEM

There are two possible configurations in the intake system. The standard method is a straight tube with a shut-off value between the inlet fitting and the water inlet valve. The optional method provides for a water filter to be installed as a part of the original equipment. The filter housing includes the shut-off valve.

The water inlet valve provides a sure method for controlling the intake of water into the water tank. The inlet water valve is controlled by a logic level probe mounted on the top left side of the heater tank and connected to P7 on the logic board. This valve also functions as a safety overflow valve. If the safety overflow switch for the liquid waste or used grounds bucket is open, the valve will not allow water into the water tank.
4663

♦ Also, if the water inlet valve remains on for more than 90 seconds, it is disabled. The water inlet circuit must then be reset by lifting the water waste bucket switch or powering the machine off/on. This will reset the 90 second fill time.

ELECTRONIC THERMOSTAT CONTROL SYSTEM

An electronic thermostat is being used to control the water temperature in the heater tank. The electronic sensor (probe) is mounted in a well in the tank lid that places it midway between the two heater elements. This sensor responds to temperature changes in the tank very quickly to maintain optimal water temperature, and is connected to a small control board mounted immediately to the left of the heater tank at the top of the cabinet. The thermostat has five ranges which are selectable by the placement of a small jumper on one of the five positions of J3. The ranges and positions are detailed in the table below.

RANGE	C°	F°
5	97	207
4	95	203
3	93	200
2	91	196
1	86	187

J3	POSITION
o o	5
o o	4
o o	3
o o	2
o o	1

The thermostat control board also has three red LEDs mounted on it. These LEDs indicate the status of the heater control circuit and are arranged with D1 at the bottom and D3 at the top. LED D1 indicates that 6.5Vdc is being supplied to the board. LED D2 indicates the status of the thermosensor, and will cycle on and off to show when the thermosensor is satisfied. If D2 is on, but the indicator light at the heater is not, then probably one of the over temp safety thermostats located under the canister rack has been tripped and should be reset to restore power to the heaters. LED D3 monitors the heater circuit and will indicate a failure mode. LED D3 on will indicate either an open circuit to the temperature sensor (probe failure) or that an overtemperature condition exists.

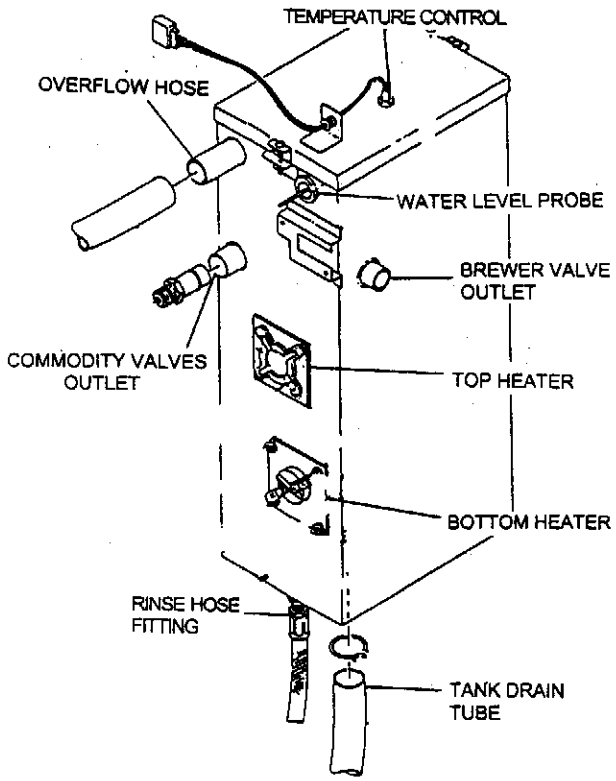


FIGURE 17

ELECTRONIC LIQUID LEVEL CONTROL (ELLC)

The Electronic Liquid Level Control (ELLC) performs three functions. The probe is connected directly to the logic board at P7-1 and 4. Its primary function is to monitor the level of water in the tank and replenish the tank as needed during normal operation. The probe's other functions are helping the logic board monitor the condition of the inlet water system and the operation of the heaters. If the logic board senses that the probe does not sense a change in water level for 90 seconds it disables the water inlet valve and turns off the heaters. Also, the logic board will not allow the heaters to turn on upon power being applied to the merchandiser until the probe has been satisfied once. Therefore it is important NOT to ground the probe while the tank is filling-this will cause the heaters to turn on before the tank is full. If it becomes necessary to operate the machine with no water in the tank, then the heater circuit must be disabled before grounding the probe.

WATER DELIVERY SYSTEM

A maximum of five valves compromise the water delivery system. They are: the Fresh Brew/Freeze-dried Coffee Water Valve, the Chocolate Water Valve, the FB/FD Tea Water Valve, the Hot Water Valve, and the Soup Water Valve. Each of these valves will release water into its particular segment of the commodity mixing channels or delivery nozzle, depending on the beverage selected.

FRESH BREW/FREEZE-DRIED COFFEE WATER VALVE

CAUTION: ADDITIONAL WATER MUST BE REMOVED FROM THE WATER TANK VIA THE DRAIN BEFORE REMOVING THE BREWER FOR SERVICE.

This valve is mounted on the face of the water tank directly in the center of the tank. In a FB machine the valve will deliver water directly to the brewer. In a FD model, the valve will deliver water to the mixing bowl mounted to the front face of the heater tank. This valve is controlled by channel 9 & 10.

SOUP, FB/FD TEA, HOT WATER AND CHOCOLATE VALVES

These four valves are mounted horizontally on the left side of the water tank. Separate valves are essential because each beverage may require a different amount of water to brew the beverage properly, and each beverage is made and released from the machine through its own delivery spout to avoid taste contamination. Each valve is controlled by at least one separate time channel on the logic board. The four valves are ganged together and share a common tank outlet. Each of these valves is connected to the commodity rack by flexible silicone tubing. Additional wires are included in the harness for use with a fresh tea brewer.

RINSE HOSE

A convenience feature is the rinse hose. This is provided for maintaining proper machine sanitation. It is long enough to reach each part of the machine which will normally require cleaning. To avoid any possibility of this hose leaking, a storage bracket has been provided, which holds the outlet of the hose above the normal water level in the tank.

OVERFLOW HOSE

Mounted in the upper left rear of the water tank is the overflow fitting. Should the water level in the tank rise too high, regardless of the reason, the excess will run out of the fitting, through the overflow tubing and directly to the liquid waste bucket. There should be no kinks or low spots in this hose.

OVERFLOW SAFETY

If the overflow condition continues the level in the waste pail will rise and eventually raise the float of the safety overflow switch shutting the water inlet valves and placing the machine on a "OUT OF ORDER" status. When "OUT OF ORDER", any coins inserted will be returned. All 110 volt functions from the motor control board will also be disabled.

OVERTEMPERATURE SAFETY THERMOSTATS

Two manually resettable overtemperature safety thermostats are inserted in the overflow hose below the canister rack. These safety thermostats sense any boiling condition that exceeds approximately 4 minutes and disables the heater circuit by opening either or both of the lines to the heaters.
The thermostat is reset by pressing the small button in the center with a pencil eraser or similar non conductive object.

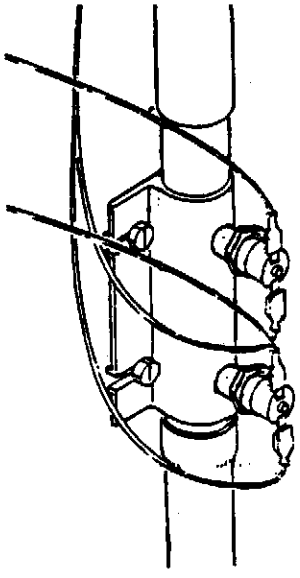


FIGURE 18

TANK DRAIN HOSE

A large diameter drain hose is fastened to the bottom of the heater tank. The purpose of this hose is to allow the tank to be emptied quickly and act as a flush to remove any accumulation of sediment or mineral build-up from the bottom of the tank.

CAUTION: DO NOT REMOVE THE LARGE PLUG FROM THE END OF THE DRAIN HOSE UNTIL THE TANK IS PARTIALLY DRAINED USING THE RINSE HOSE, AND THE BUCKET IS EMPTIED AND REPLACED INTO THE MACHINE.

♦♦ CAUTION - DRAINING THE HEATER TANK WITH THE DRAIN HOSE WILL QUICKLY EMPTY THE TANK OF EXTREMELY HOT WATER! EXERCISE EXTREME CAUTION!

THE CANISTER RACK

The support for the entire dry product commodity system is of open construction design, with a minimum of horizontal surfaces to catch dust and spillage. The motors which drive the canister augers are all located behind and under the steel cover. Each motor may be removed, if necessary, by loosening four screws and lifting it out. Water tubes, to direct the water to the mixing channel and whipper are stainless steel and permanently attached to assure proper alignment.

COMMODITY SYSTEM

Containers for the dry product which the hot beverages machine dispenses are made of rugged translucent plastic. They are designed to dispense products on a first in-first out basis in order to insure a fresh product at all times.

The augering system used to dispense the products runs in reinforced nylon bearings to assure long trouble-free life. The dispensing end of the canister may have a louvered spout. These louvers control the accuracy of discharge so that the proper mixing is assured for each drink. The translucent materials permit the service person to estimate the contents of the canister without having to open the canister. Commodity levels may be marked on the outside of the canister so that the service person can easily refill them to a pre-determined level. This type of control will reduce product waste and assure commodity freshness by the elimination of overfilling.

THE HUMIDITY BAR - OPTIONAL

The humidity bar is a vital part of the commodity system. It is electrically heated and by providing a slightly higher temperature at the canister outlet ports will prevent moisture from being absorbed by the dry products, in areas where high humidity is present. If the machine is operated in a humid atmosphere without the humidity bar in operation, it is likely that the dry products will cake and not dispense properly. The tabs on the humidity bar fit into their respective slots in the commodity rack between the canisters. The humidity bar plugs into a harness on the left side of the cabinet.

THE STEAM EXHAUST CONTROL SYSTEM

Steam from the hot water needed to make the beverages is controlled by this system. Uncontrolled steam in a vending machine will create severe problems through caking and hardening of the dry products. Such a condition will prevent proper dispensing. By moving low velocity air, in high volume through the areas where steam is generated, the steam is removed before it can reach the dry product dispensers. The air is moved by a squirrel cage blower, and discharges outside the machine cabinet. The steam is generated whenever the machine is activated to dispense a beverage. The hot water used to make coffee, tea or soup, passes through the main mixing channel as the dry products are dropped. Immediately adjacent to the mixing channel is a vacuum duct which is connected to the blower by a reinforced plastic duct.

Directly over the mixing channel is the steam deflector and commodity chute. Lightener, sugar, tea and soup products are dropped into the moving liquid in the mixing channel directly from their respective canisters. The design of this deflector is such that a constant stream of dry air is pulled down through the commodity chutes of the deflector and actually helps delivery of the product to the mixing channel. At the same time this deflector effectively prevents the steam vapor from rising in the area of the commodity canister outlets. A machine with freeze dried coffee mounted on the front of the heater tank will have an additional hose running from the exhaust fan to the freeze dried mixing bowl to remove steam from the vicinity of the bowl.

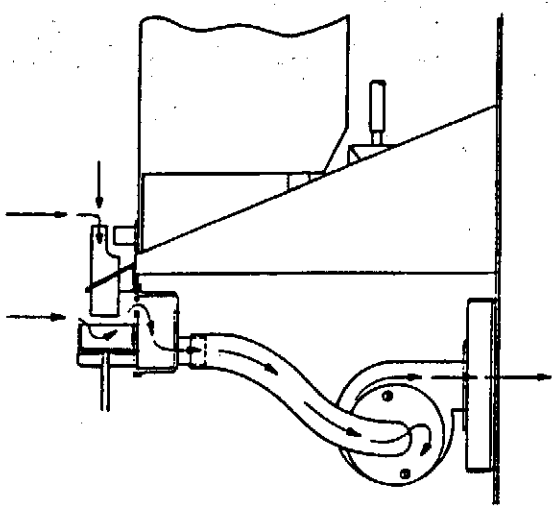


FIGURE 19

STEAM EXHAUST FLOW

The components of the steam exhaust system: the mixing channel, the steam deflector, the steam duct, the hose to the blower, and the metal screen behind the exhaust fan assembly are all easily removed for cleaning. Cleaning is easily accomplished by rinsing in hot water. The mixing channel itself, which carries the beverage, should be sanitized according to the current industry practices.

CHOCOLATE WHIPPER

The chocolate beverage is thoroughly mixed and made more attractive to the user by whipping it as it is delivered. There is a separate mixing system for chocolate. It does not pass through the same mixing system as coffee or other beverages. As soon as the water for chocolate is released the whipper motor, which runs at high speed, starts. The chocolate powder is dropped from its canister directly into the water in the mixing bowl and flows into the whipper chamber and then to the cup. The whipper parts are all of a food service approved plastic material, highly resistant to mechanical damage. They are easily removed, without tools, for sanitization. The assembly is held together by spring clips.

ADDITIONAL WHIPPERS

Additional whippers may be mounted under the canister as required for different products. Whippers are controlled by separate channels or in parallel with a water valve similar to the chocolate whipper. Electrical connectors are provided under the canister rack to allow retrofitting.

REMOVAL OF STEAM EXHAUST DUCT

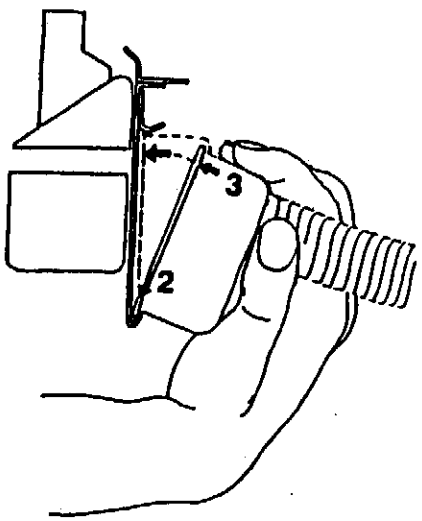


FIGURE 20

1. To remove the steam exhaust duct, pull the top down away from the front plate of the canister rack and lift from the bottom flange.
2. To install the steam exhaust duct, place the bottom lip of the duct on the bottom flange of the canister rack, behind the front plate.
3. Rotate the top of the exhaust duct toward the back of the front plate of the rack until it snaps securely in place.
4. Looking at the front of the rack, slide the duct left or right until the slots in the front plate properly line up with the ends of the exhaust duct.

FRESH TEA BREWER

The AP 402 also has the capability to deliver a cup of fresh brewed tea. The tea brewer assembly consists of three basic parts: the canister and auger motor assembly, the tea brewer and the spent tea chute and drip tray. The entire assembly occupies the extreme right position on the canister rack. The canister and motor assembly are secured to the top of the rear shelf of the canister rack by one fixed clamp that allows for easy removal. The brewer and drip tray snap into the canister rack using the same locating tabs as a normal canister. The spent tea chute clips into the front of the brewer and guides the spent leaves to the spent grounds bucket for disposal. All wiring for the tea brewer is already included in the merchandiser and consists of a 6 pin plug which is placed in a square hole in the rear face of the canister rack and the two wires for the canister motor are fed up through the top shelf of the canister rack.

The tea brewer has a simple gravity fed, open brew chamber, similar in operation to the coffee brewer, except that no piston is used. A fresh brewed tea selection, once selected, begins with the canister motor augering a small quantity of leaf tea (approximately 2.5 grams for an 180 ml drink) into the open brew chamber. The separate brewed tea water valve then opens and delivers the water to the brew chamber via a tube mounted on the side of the canister motor mounting bracket. Best results are achieved by reducing the flow of the water by adjusting the metering screw on the valve to stretch the water flow out over the longest time possible. This allows the water and tea to steep for as long as possible before the brewed tea liquid flows out the delivery spout and into the mixing channel where whitener and sugar can be added. The whitener and sugar are controlled by separate channels. The tea leaves are prevented from following the liquid by a fine mesh filter that also acts as the bottom of the brew chamber. After the liquid has seeped through the tea, the brewer cycle switch receives a start pulse from the motor control board and starts the brewer motor and its crank arm into the dump cycle. The crank arm moves the brew chamber and carriage forward as two ears on the side of the brew chamber contact two pawls that force the brew chamber up. As the ears of the brew chamber clear the support of the pawls, the four brew chamber springs snap the brew chamber down, ejecting the spent tea into the chute which guides it to the waste bucket. The brewer then cycles home to await the next vend.

TEA BREWER DISASSEMBLY AND INSPECTION PROCEDURE

The following procedure should be used for disassembly and inspection of the tea brewer in the course of normal operation and preventative maintenance.

1) Open machine door, insert plastic key into isolation switch to apply power to machine. Open swing out bracket.
2) Using the tea brewer service switch located on the power switch panel, cycle the tea brewer carriage forward approximately 25 mm (1"). The crank arm of the brew motor should point to the right side of the brewer assembly.
3) Grasp both sides of the carriage and pull the carriage forward and off the brewer assembly.
4) Components of the tea brewer are now easily accessible for inspection, etc. The crank arm, springs, bottom edge of the brew chamber, filter screen, gasket and the built-in pawls (ramps) should be included in any inspection.
5) If the loose tea is too fine, as evidenced by the tea brewer overflowing during a vend, then the filter screen may be removed and back flushed to remove any fine particles that are lodged in the mesh of the filter. If necessary, use a suitable cleaner to remove tannin form the brewer assembly.
6) If any lubrication is indicated, then the recommended lubricant is food grade mineral oil.
7) Reassembly of the brewer is the same as removal; if the machine has been reset to an operating condition, then the crank arm must be repositioned to the same position as #1 above. Gently slide the carriage onto the front of the brewer base and allow the machine to return to an operate condition, which will cycle the brewer home.

CUP DELIVERY SYSTEM

Every beverage sold through the AP 402 hot beverage merchandiser requires a clean disposable cup. Inside the machine is a storage area for a large number of cups and a device to separate and dispense a single cup for each cycle of the machine. Included in the cup system is a cup present switch which will signal the logic board that no cups are available to dispense. The logic board will change the scrolling display to an "OUT OF ORDER M01" message after trying to move the cups to the dispensing mechanism for 30 seconds.

CUP CABINET

Cups are stored in an inline flat magazine mounted on the inside of the vendor door. This magazine is completely covered to protect the cups from accidental contamination. The entire cup cabinet may be swung out for easy access to the logic board, LED board and selection labels. The base of the cup cabinet holds the cup dispenser. Cups are moved from the storage position to the dispensing mechanism (referred to as the "cup drop") as needed. When the stack of cups in the cup drop has been reduced to four or five cups the cup present switch is released which signals the logic board to energize the cup spiral motor.

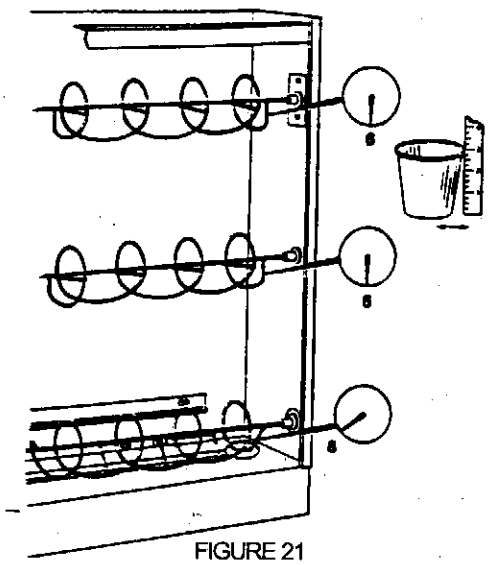


FIGURE 21

The cup spirals will turn simultaneously to advance the remaining stacks of cups on the base plate toward the cup drop opening.

When the stack of cups nearest the cup drop opening is advanced, it will drop into the remaining cups. The new cups will depress the cup present switch which signals the logic board to deactivate the cup spiral motor. The cup spirals are designed so that a stack of standard vending cup will nestle between the turns. It is important that the spirals are properly oriented to each other so the stacks of cups will advance in a vertical position.

The drawing illustrates the relationship between the three spirals. When the spirals are correctly adjusted, the return wire at the end of the spirals will point as shown. When the upper two (which should be identical) spirals point to 6 o'clock, the bottom spiral should point to 8 o'clock. This is done because the lower part of a cup is smaller in diameter than the top rim.
The spirals are properly set before the machine leaves the factory and should not require adjustment before being put in service. The synchronized movement of the three spirals is maintained by the toothed drive belts which connect the toothed gear on the end of each spiral rod and the cup spiral motor.

CUP DROP MECHANISM

The cup separator used in the AP 402 hot drink merchandiser is a Lisem separator. The rotary motion of the cup drop motor is converted to a push-pull motion by a crank arm which drives the lever of the cup drop ring. The cup to be dropped is separated from the rest of the cups in the stack by the cams of the cup ring. The cup is then guided to the cupwell by a delivery chute. As the cams return to the starting position the next cup in the stack is prepared to be dropped for the next cycle. When the cup mechanism is in a standby position the lever of the cup ring is pulled back against the arm of the cup motor cycle switch.

This is the correct stopping position. If an adjustment of the switch is necessary, loosen slightly the two mounting screws and reposition the switch until the correct stop position is achieved and retighten the screws. However, the arm of the switch should not be bottomed against the body of the switch nor against the body of the cup ring.

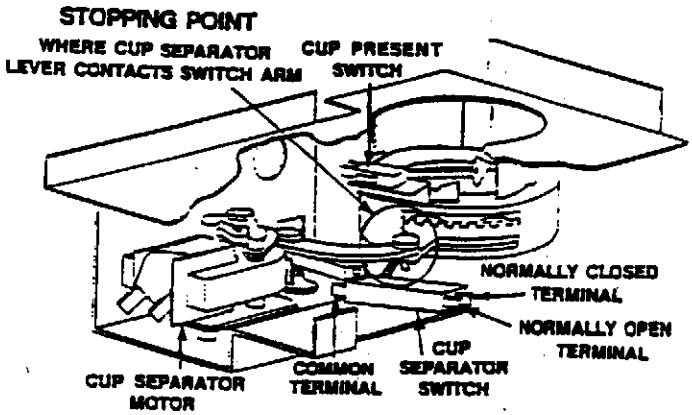


FIGURE 22

Starting voltage for the cup drop motor goes to the normally open (NO) contact of the cycle switch which is being held closed by the lever of the cup drop ring. This starting voltage is controlled by channel 3. The running voltage for the cup drop motor is connected to the normally closed (NC) contact of the switch. The common of the switch is connected to the cup drop motor.

The running voltage remains on the NC contact of the switch for the duration of the vend. If the cup drop lever fails to interrupt the voltage due to incorrect switch adjustment or a faulty switch the cup drop motor will run for the entire vend cycle.

If the start voltage remains on the NO contact of the switch longer than one complete revolution of the crank arm, the motor will run a second time. The length of the start voltage is controlled by the duration of channel 3.

CUPWELL TRAP DOOR

An option in the 402 provides for an automatic vend door to cover the opening in the cupwell. This door provides additional security and sanitation. The door is activated and opened at the beginning of each vend and will stay open for the duration of the vend and close approximately 10 seconds after the end of the vend.

The vend door assembly consists of the door, a drive motor with a large cam and two limit switches that control the motor. The limit switches receive an open and a close pulse. Each pulse will activate the motor and cause it to run to the opposite position. If a second vend commences before the close pulse is received, the door will remain open. The door has several mechanical adjustments that allow for positioning the door in the closed position to provide for minimal gaps.

COLD DRINK ASSEMBLY

An additional assembly that provides up to three cold drinks is available in the 402. This cooler unit is normally set to deliver two carbonated drinks, one of which is a fruit flavor, which is also configured to be delivered as a non-carbonated drink. Carbonation levels for all drinks are fully adjustable. The cooler unit is compact and self contained. The primary components of the cold drink unit are:

1) Refrigeration and cooling system
2) Water pump and carbonator assembly
3) Syrup pumps and drink delivery system

Each of these sub-systems will be described in the sections below. The concept behind the timing and proper mixing of the cold drinks are explained in the Set-up Section of this manual. Additional data is provided on the hydraulic diagram on the next page.

REFRIGERATION AND COOLING SYSTEM

The heart of the cold drink unit is the insulated water bath tank that hold 9.5 liters (2.5 US gallons) of water that is maintained at or near 1°C (33°F). This temperature is maintained by creating an ice bank that surrounds the evaporator cooling coils of the refrigeration system. The 1/5 hp air cooled, hermetically sealed compressor is mounted directly under the water bath and has an air intake and outlet in the rear wall of the machine. The compressor is controlled by a electronic control unit with a probe mounted on the evaporator coils that maintains an ice bank of approximately 35mm thick surrounding the coils. This ice bank provides a cooling reserve that guarantees the ingredients for the cold drinks are dispensed at the proper temperature, even during periods of heavy use. An agitator motor with a two blade propeller runs constantly to maintain an even temperature from top to bottom within the water bath and aid in heat transfer during periods of peak use.

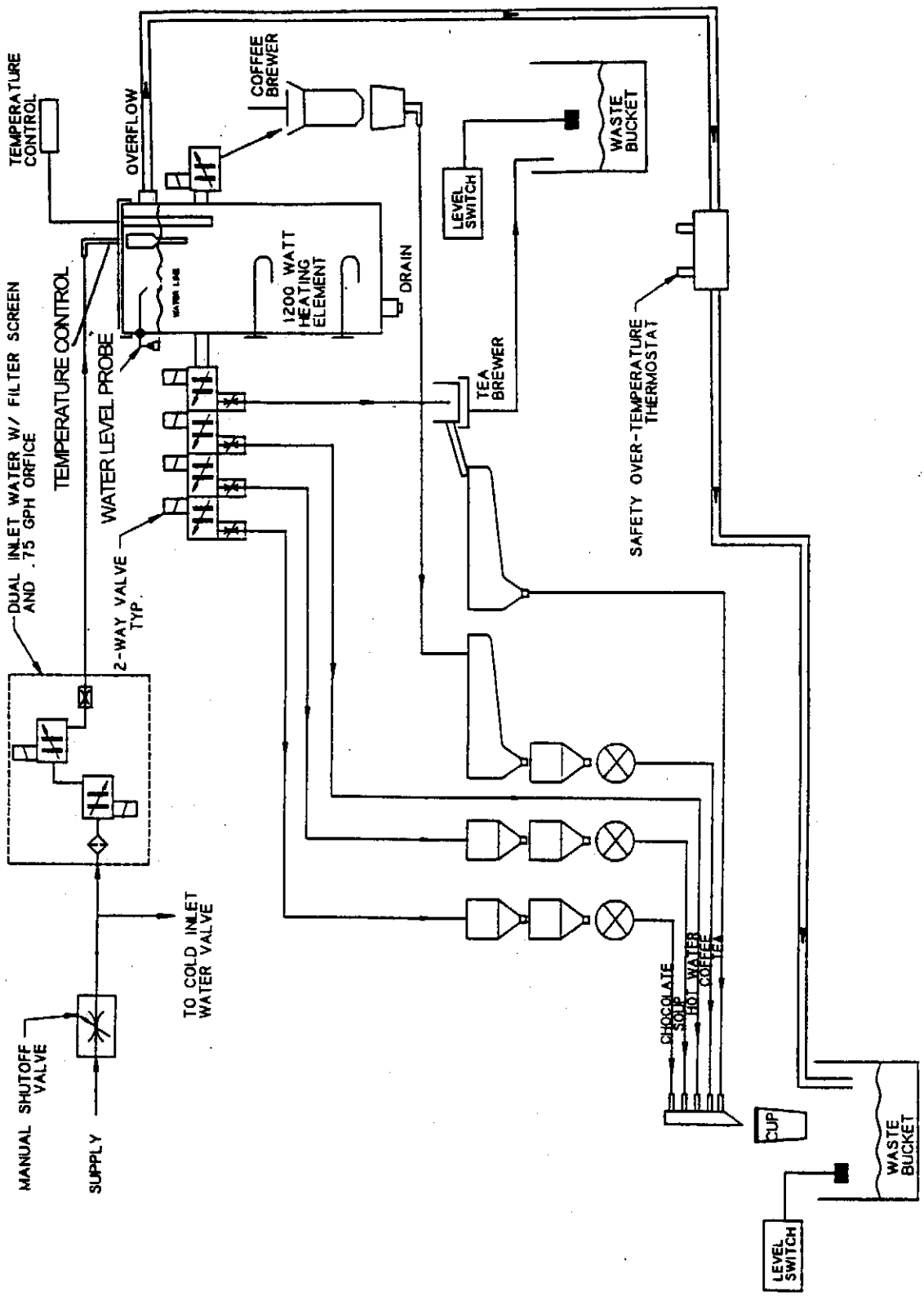
WATER PUMP AND CARBONATOR ASSEMBLY

Ambient temperature water is supplied to the cold drink unit by an additional inlet water valve mounted adjacent to primary inlet water valve below the heater tank. This ambient water is fed directly to a coupled pair of magnetically driven, piston type, oscillating pumps. These pumps increase the pressure of the water to a level required to inject it into the carbonator unit. Before the water reaches the carbonator, it passes through a helical cooling coil that surrounds the carbonator. The purpose of this cooling coil is to pre-chill the water to the proper temperature range necessary for manufacturing highly carbonated water and producing quality drinks. At the end of the cooling coil, the water reaches a three way valve. This valve, in its normal unenergized state, directs the chilled water through a double check valve and the water is injected into the carbonator to absorb the carbon dioxide gas to create carbonated water. In the energized state, the three way valve directs the chilled still water directly to the delivery nozzle for use in non-carbonated drinks. Carbonated water is supplied to the delivery nozzle by a separate two way valve on the output of the carbonator that is energized when a drink calls for carbonated water. The carbonator maintains a proper internal water level via a circular probe with a float that operates a magnetic reed switch. This switch controls the duty cycle of the water pumps, turning the pumps on when the carbonator level drops and turning the pumps off when the carbonator is full. Refill time for the carbonator from completely empty to full is 60 seconds $\pm$ 10 seconds. Carbon dioxide gas is supplied from a standard pressure cylinder through a pressure regulator set to deliver 4 Bar (60 psi). The gas is supplied to the carbonator via a reinforced hose that is connected to a single check valve mounted on the top of the carbonator body.

SYRUP PUMPS AND DRINK DELIVERY SYSTEM

The two syrup products for the cold drink selections are stored at the bottom of the cabinet. Each syrup is drawn out of its tank via drip tubes supplied with the cold bath unit. The syrup is dispensed into a selection by separate magnetically driven, piston type, oscillating pumps, similar to the water pump. The syrup pump then pushes the syrup through a stainless steel cooling tube in water bath that pre-chills the syrup to the same temperature as the water that is used for the drink. The amount of syrup delivered is controlled by the durations of channels 51 and 52. When a drink with syrup is requested, the pump is activated and delivers the pre-cooled syrup to the delivery spout where it is thoroughly blended with the correct water (still or carbonated) for that drink. After the syrup pump has de-energized, the water continues to run for a short period of time to completely rinse the delivery spout. The length of the rinse is determined by the viscous properties of the syrup - i.e. the thicker the syrup, the longer the rinse and visa versa. The rinse time is set in the start time for the syrup channel and is counted backwards from the end of the water pour time (channels 47 and 48).

HYDRAULIC DIAGRAM 402



TROUBLESHOOTING FOR AP 402 HOT DRINK MACHINE

If **START/ENTER** does not operate- check security key switch for correct position. Key should be able to be removed. If key cannot be removed, then security key switch is on and the **START/ENTER** switch is disabled.

If **MODE** switch does not operate, check P11, P13 and P16 on the logic control board to determine if the **MODE** switch is reversed with the **DISCOUNT** switch or the **CUP PRESENT** switch. The **MODE** switch should be connected to P16. The **CUP PRESENT** switch should be connected to P13.

If scrolling display on door shows "**OUT OF ORDER**":
Refer to Appendix IV - OUT OF ORDER CODES and check the three obvious reasons for the **OUT OF ORDER** message:

1) Buckets are full - **CODE M20**
2) Water tank is not full - **CODE M02**
3) Machine is out of cups - **CODE M01**

If either the water inlet valve or the cup spiral motor have been on for 90 continuous seconds the **OUT OF ORDER** message will appear. Another cause for the **OUT OF ORDER** message could be a constant low voltage source (i.e.-below 104Vac) from the transformer supplying the machine.

During initial set-up or if a logic board was changed or the software was changed, it may be necessary to proceed to **MODE 16** and reload the standard times. Caution should be observed because activating **MODE 16** will cause any channel time or price information that was changed from the standards to be lost. Further information on **MODE 16** can be obtained in the description of modes.

Using the black mode switch located on inside of the door, set the display to **MODE 6** and press START button and check the list of switches that will appear on the display for the following switches and their correct operating position.
This list of switches can be used to check each switch that functions as a sensor for the logic board. After running **MODE 6** test the first time and noting each switch number that appears, any switches' position can be physically changed to determine if the switch and its wiring to the logic board are correct. See Appendix II for membrane switch locations.

SWITCH #	INDICATION	WILL APPEAR IN NORMAL OPERATION
24 or below	faulty membrane (selector)	N
25	discount switch	Y/N
26	auto flush enable jumper	Y
27	bucket switch activated	N
28	cups present	Y
33	brewer water switch	Y
34	brewer cycle switch	Y
35	brewer delay switch	N
36	thermostat	Y/N
39	water inlet switch	Y
40	tank probe (ELLC)	N
	(See Version 2 software on next page)	
42	Jug key	Y/N
43	Syrup soldout cold #1	Y
44	Syrup soldout cold #2	Y
45	Syrup soldout cold #3	Y

EXAMPLE: Switch 39 (water present or float switch) will show in **MODE 6** normally. After disabling the water inlet valve and running water out of the tank via the rinse hose so the float drops and the switch arm drops, press **START** again to run another test. This time switch 39 should not appear. This proves that the switch, the wiring from the switch to the logic board, and the sensor circuit on the logic board are functioning correctly. A similar test for any of the other switches can be devised.

After determining that the switches function correctly and a problem can be traced to a specific channel or device, the following procedure should be used to locate the source of the problem.

Check **MODE 11** to confirm that the correct options are set for the machine (Y/N).

Visually inspect all connectors and terminals for any pins that have become loose or backed out of the connectors themselves. Also confirm that the numbers on the wires correspond to the correct pin numbers.

Check the timing chart for the specific channel involved.

Confirm the start and duration settings for the appropriate channel are correct by using the security key and accessing **MODE 12**. Check the times and run a channel test (after returning to **MODE 12**) by pressing the regular lightener selection. If the specific channel does not operate with the **MODE 12** test, proceed to **MODE 8** and select the faulty channel and press the **START** button. Once **START** is pushed, the function or device will have power applied to it and the problem can be located by using a voltmeter starting at the correct connector pins on the motor control board. The connectors must remain on the board to provide a load. If no voltage appears between the pin (determined by referring to the wiring diagram) and neutral (blue wire) then the problem is probably located in the motor control board. If voltage is present at the pins on the motor control board, then the problem is located downstream of the motor control board (i.e. between the motor control board and the device itself).

402 TROUBLE SHOOTING CHART

CAUTION. Certain procedures in the troubleshooting section require that voltage be on in the machine. Exercise extreme caution while performing these procedures to prevent injury.

PROBLEM	POSSIBLE CAUSE	REMEDY
Scrolling Display is Blank	Press any prime selection Does any selection LED come on?	YES-with any message proceed to MODE 17 to see if any user message is loaded
		YES-with no message-check ribbon cable from LCB to scrolling display to confirm that the cable is connected correctly. Confirm that a language chip is installed.
		NO Proceed to troubleshooting section regarding no power to machine.
Scrolling display shows: OUT OF ORDER	Water tank not full CODE M02	Check inlet water valves.
		Power down-power up control circuit breaker to reset 90 second safety timer.
		Check for clogged water filter
		Check water supply for minimum incoming water pressure
	Buckets are full CODE M20	Check bucket switches for correct operation. Measure MCB P7-4&6 for -6.5Vdc. If 0Vdc is measured-bucket circuit is activated.
	No cups CODE M01	Check cups and cup present switch for correct adjustment. Power down-power up control circuit breaker to reset 30 second timer to allow spiral motor to run.
	Low supply voltage (115Vac) CODE M20	Check wall outlet for 115Vac±10%
	Software or logic board has been replaced CODE M10	Check configuration in MODE 11 and reload MODE 16. Return to MODE 11 and recheck configuration and options
No power-complete machine including fluorescent light and service outlet	Power cord unplugged	Plug in power cord
	Loose or broken wire in power cord	Repair or replace
	Bad connections in power cord to EMI filter and switch panel	Check all terminals
	No voltage from wall outlet	Check outlet and supply circuit breaker
	On/off switch or wiring defective or open	Repair or replace
Machine will not vend or accept money	Circuit breaker(s) tripped	Reset or replace
	Power transformer disconnected or defective	Repair or replace Check MCB P1-3 and P1-5 for 24Vac
	Defective coin mechanism	Replace or test machine using MODE 2
	MODE 13-MS1600 option is N	Change to Y

402 TROUBLE SHOOTING CHART

PROBLEM	POSSIBLE CAUSE	REMEDY
Start/Enter does not operate	Security key switch is on	Key cannot be removed-return to off so key can be removed
Excessive amount of liquid in overflow bucket	Water level probe not connected. Tank not grounded	connect probe, ground tank.
	Water level electronic probe corroded / broken	Replace probe.
	Commodity water valve leaking	Repair or replace
	Water inlet valve leaking	Repair or replace-check supply line for high pressure. Install pressure regulator to correct.
	Flush cycle activating every 12 hours	Disable or reduce flush cycle or service machine more frequently
Lightener and/or sugar not selected but appearing in drink	Clogged exhaust system	Check steam exhaust (duct, hose, fan and humidity bar)-clean as needed
	Exhaust motor not running	Service or replace
	Scratched or defective trough causing poor wash	Replace
	Product dispensing too soon / late in previous selection	Check for incorrect channel time settings
	Mixed products in canisters	Empty products and replace
Wet grounds dispensed from brewer	Clogged brew filter	Replace
	Clogged filter support screen	Clean or replace
	Scored or cracked brew cylinder	Replace
	Worn or defective piston or seal	Replace
	Check gram throw	Using gram scale, adjust correct channels
	Soft water or coffee gases causing excessive pressure in brewer	Refer to Brewer section in manual
CONFIGURATION AND OPTIONS		
Regular coffee brewer does not operate	CHECK MODE 11 OPTIONS	Option 1 should read Y
FD regular coffee does not operate		Option 1 should read N
		Check canister rack motors for correct electrical connections
Lemon tea vends with milk & sugar		Option 2 should read Y
Normal tea vends with no milk & sugar when requested		Option 2 should read N
Espresso or 2nd whipped coffee		Option 3 should read Y
FB tea does not operate		Option 4 should read Y
FD tea does not operate		Option 4 should read N
Grounds in cup	Brewer dumping wet grounds	See wet grounds section
	Torn or ripped brew filter	Replace
	Missing funnel cover	Replace

402 TROUBLE SHOOTING CHART

PROBLEM	POSSIBLE CAUSE	REMEDY
Weak and/or cold coffee and overfilling cup	Improper gram throw	Check gram throw and adjust
	Brew water valve leaking	Repair or replace valve
	Defective or incorrectly set thermostat	Replace or adjust
	Defective heater	Replace
	Incorrect alignment of brew chamber and filter	Adjust stop position of brewer-check brewer motor brake arm for coasting
Cup occasionally not full	Overflow hose is being restricted	checked for pinching or kinking of hose
	Probe rod bent or loose	Straighten or tighten
	Channel times incorrect	Check and confirm correct time settings
	Water valves opening late due to mechanical defect or low voltage	Repair or replace valve
	Brewer cable not adjusted properly causing brewer leak	Adjust cable
	Brewer stop position incorrect trapping grounds on seal	Adjust front brewer cam or cycle switch for correct stop position
	Check brew chamber seal for excessive grounds	Check for proper alignment of coffee delivery chute
	Clogged water filter	Replace
	Low water supply or damaged supply line	Change water supply or replace water supply line
	Incorrect cylinder and carriage alignment	Check brewer cable adjustment
Pressing mode switch, does not enter service mode	Check for correct wiring of mode switch at LCB	Check LCB P-16 is mode switch
Pressing mode switch, cup spiral motor runs	Check for correct wiring of mode switch and cup present switch	Check LCB P-16 is mode switch P-13 is cup present switch
Water only-No coffee	Carriage wiper binding on filter	Confirm that brew filter is seated correctly
		Clean brew base assembly
	Warped brew filter	Replace
	Bent filter support screen	Replace
	LG canister tunneling	Agitator defective or out of position
		Auger inoperative
	Faulty interlock switch or assembly	Adjust or replace
	No coffee in canister	Service
	Check channels in MODE 12 for correct times	See timing chart
Water in grounds bucket	Brew water valve leaking	Repair or replace valve
	Defective piston seal (wet grounds)	Replace
	Incorrect cylinder and carriage alignment	Check brewer cable adjustment

402 TROUBLE SHOOTING CHART

PROBLEM	POSSIBLE CAUSE	REMEDY
Brewer leaking	Refer to brewer section in service manual	Soft water or coffee gases causing stalling or excessive pressure
	Excessive amount of coffee grounds on brew base assembly	Clean or service
	Cracked or damaged brew cylinder	Replace
	Special washers missing from between brew cylinder and cylinder rods	Replace
	Worn or damaged brew chamber seal	Replace
	Cracked or damaged brew chamber	Replace
	Worn filter or seal	Replace
	Cracked or damaged brew carriage	Replace
	Brew filter support bracket broken	Replace
	Improper brew cable adjustment	Adjust
	Funnel support brace bowed	Replace brew base frame
	Worn or broken delivery funnel	Replace
	Brew base assembly-parts worn or broken (springs, pawls, etc)	Replace parts
No cups	Cups jammed together in cup cabinet	Adjust or replace cup present switch
	Wrong type cups or cup ring	Replace cups or cup ring
	Defective cup drop motor	Replace
	Incorrect cup catcher	Replace
	Trap door not opening	Adjust or repair
Multiple or intermittent cups	Cup motor cycle switch out of adjustment, broken or defective	Adjust or replace
	Cup motor brake arm sticking on causing motor to coast	Check for rubber tip on brake arm-repair or replace
	Cup drop motor start pulse too long	Check MODE 12,channel 3 for correct duration
	Cup motor cycle switch wiring reversed	Correct wiring
Selection or additive not working	Security key switch on	Key cannot be removed-return to off so key can be removed
	Canister empty	Service machine
	Selection not activated	Check MODE 11 options
	Canister rack motors not wired correctly	Correct wiring
	Defective selection membrane or LED board	Does selection beep when pressed?
		Yes - problem is on logic or motor control board
		No - Test membrane or replace defective component

402 TROUBLE SHOOTING CHART

PROBLEM	POSSIBLE CAUSE	REMEDY
Machine vending with no money or returning money deposited and vending	Discount switch on with discount % set at 100%	Turn off discount switch
	Discount switch does not turn off free vending	Check for correct wiring of cup present and discount switches- LCB P-11 is discount switch, P-13 is cup present switch
	Free vend option set to YES	Check MODE 13, set free vend option to NO
	Free count option set incorrectly	Check MODE 13, set free count option correctly
		Set price correctly-MODE 4
COLD DRINK SYSTEM CONTROLS		
Cold drink section delivering warm drinks	Agitator motor not running	Repair or replace
	Ice bank gone	Check compressor fuse and start relay
		Check solid state thickness control, probe, power relay
	Obstructed air flow	Condenser dirty - clean
		Machine set too close to wall for correct air flow
	Incoming line voltage low	Check supply and correct
	Low on refrigerant	Follow correct procedures and check pressures
Syrup dripping at delivery spout	Air leak in syrup line	Check all connections for tightness
	Syrup tank almost empty	Service machine
Water dripping at delivery spout	Carbonated or still water valve leaking	Wear in valve - repair or replace
		Debris or dirt in valve - clean
Carbonated drink - gas only at delivery spout	Pump not working - no water in carbonator	Defective pump
		No water at pump , defective inlet valve, or low water pressure.
	Frozen water bath	Check solid state control and probe, agitator motor
Variation in drink level	Check valves leaking	Disassemble and inspect for debris
	Carbonated drink only - empty CO2 tank	Service
	Still drink only - water pump failing	Repair or replace
Low or poor carbonation in drinks	Incorrect CO2 pressure	Set regulator to 4 bar +.2(60psi+3)
	Restriction in carbonated water delivery system	Check carbonated water delivery hose for kinks
		Check delivery spout for foreign materials
	Water pump failing	Check fill time from empty - should be 60 seconds ± 10 seconds
	Delivery spout dirty	Clean
	Water bath too warm	Check temperature, agitator motor, cold control board, or compressor.

DIRECTIONS FOR REPLACEMENT OF LOGIC CONTROL BOARD

DO NOT REMOVE THE BOARD OR THE EPROM WITHOUT CARRYING OUT THIS PROCEDURE! NOTE DOWN ALL AUDIT DATA AND MACHINE SETTINGS IF POSSIBLE. THE FACTORY STANDARD SETTINGS AND PRICES WILL BE LOADED AS A RESULT OF THIS PROCEDURE.

1. Open machine door. Insert plastic key into isolation switch.
2. Depress the **mode** switch until the display indicates **"MODE 01"**.
3. Record all accountability information required by pressing the **start** switch and stepping through **MODE 1**.
4. Access MODE 4 and record all price setting information.
5. Insert security key into the service key switch, turn the switch to the "on" position and then back to the "off" position.
6. Depress the **mode** switch until the display indicates **"MODE 12"**.
7. Depress the **start** switch. The display will indicate **"CH 00"**
8. Select all channels that have been changed from the factory standards and record the START, DURATION and MODIFIER times. To select a channel use the **next digit** switch and **increment digit"** switches to select the desired channel and press **ENTER/START** to read the times from the scrolling display. Use chart in Appendix I to record information.
9. Depress the **mode** switch until the display indicates **"MODE 13"**. Press **ENTER/START** and progress through the mode and record any changes from the factory standards.
10. Remove power from the machine and using correct static handling procedures, replace board and/or software EPROM noting the correct arrangement of all connectors or the orientation of the EPROM.
11. Restore power to the machine. Insert security key into the service key switch, turn the switch to the "on" position and then back to the "off" position. This allows the key to be removed and prevent it being left in the machine in error.
12. The display should indicate **"MODE 11"**.
13. Depress the **start** switch. The display will indicate **"CONFIG H/B/C"**. The **"B"** should be flashing to indicate that the machine is set up as a 402 hot drink machine.
14. If the **"B"** is not flashing press the **change digit** switch until it is. Then depress the **START** switch. The machine will then jump automatically to mode 16 to load the default values appropriate for the 402 machine. Go to step 16.
15. If the **"B"** (402) was flashing correctly depress the **mode** switch until the display indicates **"MODE 16"**.
16. Depress the **START** switch and the display will indicate **"MODE 16"** again. Using the **increment digit** and **next digit** switches change the **"16"** to **"27"** and then depress the **START** switch. The display will go blank.
17. When initialization and loading of the default values is complete the display will scroll the user message again.
18. Return to mode 11, recheck configuration and set the machine options.
19. Access MODE 4 and set all selection prices.
20. Access MODE 12 and reset all channel times recorded in step 8 above. Proceed to MODE 13 and reset all payment options.

APPENDIX I - GRAM THROWS AND WATER VOLUMES RECOMMENDED GRAM THROWS		
	7oz	8.25oz
COFFEE	7-7.5	8-8.5
LIGHTENER	1.5-2	2-2.5
SUGAR	5-5.5	6.5-7
FD COFFEE	1.2	1.5
FD TEA	1.2	1.5
FB TEA	2.5	3-3.25
SOUP	5-5.5	6-6.5
CHOCOLATE	20-22	24-26
SGC	14-15	17-18

◆ **454 GRAMS = ONE POUND**

Examine your ingredient package for ingredient amounts. Use product manufacturers recommendations for ingredient throws. All gram throws above are approximations.

Always take three test and average for best accuracy, except for products like chocolate where the product quantity exceeds scale capacity.

Some lightener is super fine and will bind up behind louvers in spout - solution is to remove louvers or replace spout.

Different freeze dried / instant coffees can have different flow characteristics. Remove / replace louvers as necessary.

Soluble Gourmet Coffees MUST USE 180 RPM MOTOR to deliver sufficient product during the allotted time.

Zero scale before starting - nickel weighs exactly 5 grams

WATER VOLUME IN CUBIC CENTIMETERS V.S. CUP SIZE			
Nominal size	6OZ	7 OZ.	8.25 OZ.
Volume to brim (cc)	180 (cc)	210 (cc)	248 (cc)
PRACTICAL VOLUME FOR VENDING (cc's)			
COFFEE, BREWED/SOLUBLE	155	175	205
TEA - BREWED	155	175	205
TEA - SOLUBLE	155	175	205
SOUP	155	175	205
CHOCOLATE - WHIPPED	135	150	175
SGC - WHIPPED	135	150	175

30 cc = 1 ounce liquid measure

APPENDIX II - CHANNEL NUMBERS

Channel #	Description
00	Vend time
03	Cup drop
06	LG auger - reg coffee
08	Brew motor - coffee
09	Water - coffee brew
10	Water - coffee brew espresso
11	X-strong delay - coffee brewer
12	Soft water delay - coffee brew
13	Make up water - coffee brew
14	White auger - coffee brew
15	Sugar auger - coffee brew
17	Whipper - coffee espresso
20	Coffee FD auger
23	White auger - coffee FD
24	Sugar auger - coffee FD
26	Water - tea
27	Tea FD auger
28	Tea brew auger
29	Brewer motor - tea
33	Water/whipper - chocolate
34	Chocolate auger
35	Water/whipper - soup
36	Soup auger
39	Clean Cycle
40	Clean water - soup
41	White auger - FD tea
42	Sugar auger - FD tea
43	Hot water
44	Carb water
45	Still hot & cold 1
46	Still hot & cold 2
47	Still hot & cold 3
48	Carb hot & cold 1
49	Carb hot & cold 2
50	Carb hot & cold 3
51	Tank hot & cold 1
52	Tank hot & cold 2
53	Clean water - chocolate
54	Carb 10s. dispense
55	Still 10s. dispense
56	Whipper - FB coffee
57	Whipper - FD coffee
58	Water - FD coffee
59	Water - FD second/espresso coffee
60	Clean water - FD
61	Clean water - brewer
62	Clean water - tea brewer
63	Clean - tea brewer
64	Clean - coffee brewer
65	Clean - coffee whipper
69	White tea brew
70	Sugar tea brew

APPENDIX III - SWITCH DECODE TABLE

Switch #	Description	Switch Membrane Terminal #s
00	Coffee low (Selection panel)	1 & 2
01	Coffee medium " "	1 & 3
02	Coffee strong " "	1 & 4
03	Espresso low " "	1 & 5
04	Espresso medium " "	1 & 6
05	Espresso strong " "	1 & 7
06	Tea low " "	1 & 8
07	Tea medium " "	1 & 9
08	Tea strong " "	10 & 11
09	Soup " "	10 & 12
10	Chocolate " "	10 & 13
11	White low " "	10 & 14
12	White medium " "	10 & 15
13	White high " "	10 & 16
14	Sugar low " "	10 & 17
15	Sugar medium " "	10 & 18
16	Sugar high " "	19 & 20
17	Hot water " "	19 & 21
18	Cold water " "	19 & 22
19		
20	Cold drink 1 " "	19 & 24
21	Cold drink 2 " "	19 & 25
22	Cold drink 3 " "	19 & 26
23	Start " "	19 & 27
24	Cancel " "	28 & 29

Switch #	Description
25	Discount vend
26	Auto flush enable jumper
27	AC present - Bucket switches
28	Cup sold out
29	Security key
30	Mode
31	
32	
33	Brewer water
34	Brewer home
35	Brewer delay
36	Heater
37	
38	
39	Water in (Float only - Version 1 Software)
40	Water in - Probe - Version 2 or higher Software
41	
42	Carafe

APPENDIX IV: "OUT OF ORDER" CODES

Code	Out of Cups 01	No Water 02	EPROM Mismatch 10	No AC (Float high) 20
01	Out of cups			
02		No Water		
03	Out of cups	No Water		
04				
10			EPROM Mismatch	
11	Out of cups		EPROM Mismatch	
12		No Water	EPROM Mismatch	
13	Out of cups	No Water	EPROM Mismatch	
14				
20				No AC (Float high)
21	Out of cups			No AC (Float high)
22		No Water		No AC (Float high)
23	Out of cups	No Water		No AC (Float high)
24				
30			EPROM Mismatch	No AC (Float high)
31	Out of cups		EPROM Mismatch	No AC (Float high)
32		No Water	EPROM Mismatch	No AC (Float high)
33	Out of cups	No Water	EPROM Mismatch	No AC (Float high)
34				

NOTE: If a code other than one of the above appears in the scrolling display, MODE 11 is probably configured incorrectly and should be checked immediately.

APPENDIX V - CONTROL BOARD PIN CONNECTIONS

MOTOR CONTROL BOARD

P1 LOGIC POWER SUPPLY

P1-1 110Vac live to transformer primary
P1-2 110Vac return
P1-3 24Vac live to motor control board
P1-4 Key
P1-5 24Vac return

P2 110Vac CONSTANT AND SWITCHED SUPPLY VOLTAGE

P2-0 Key (future)
P2-1 110Vac to inlet water valves
P2-2 Key
P2-3 110Vac neutral
P2-4 110Vac constant supply live
P2-5 110Vac switched by bucket switches-disables all relay outputs-SWITCH #27
P2-6 Key (future)

P3 CUP DROP AND SPIRAL CONTROL

P3-1 Cup drop start pulse 110Vac controlled by channel 3
P3-2 Cup spiral advance 110Vac - disables machine 'Out of Order' 90 seconds after cup switch is on continuously
P3-4 Key
P3-5 110Vac neutral
P3-6 Cupwell door open
P3-7 Key
P3-8 Cupwell door close

P4 BREWER AND SWING OUT BRACKET

P4-1 Brewer motor 110Vac-controlled by channel 8
P4-2 Key
P4-3 Brew water valve 110Vac-controlled by channel 9 & 10
P4-4 Neutral 110Vac brewer and brew water valve
P4-5 Regular coffee auger 110Vac (through swing out interlock) controlled by channel 6
P4-6 Decaf auger motor110Vac (through swing out interlock) controlled by channel 7 (US only)

P5 COMMODITY VALVES-ALL 110Vac

P5-2 Hot water valve-controlled by channel 43
P5-3 Tea valve-controlled by channel 26
P5-4 Chocolate valve-controlled by channel 33
P5-5 Soup valve-controlled by channel 35
P5-6 Key
P5-7 Neutral

P6 CANNISTER RACK-ALL 110Vac MOTORS

		CONTROLLED BY CHANNEL #
P6-1	110Vac neutral	
P6-2	Key	
P6-3	Still water valve	45,46,47
P6-4	Carbonated water valve	48,49,50
P6-5	Syrup pump #2	52
P6-6	Syrup pump #1	51
P6-8	FD coffee	20
P6-10	Soup	36
P6-11	Tea	27,28
P6-12	Coffee white	14,23
P6-13	Coffee sugar	15,24
P6-14	Key	
P6-15	110Vac neutral	
P6-16	Chocolate auger	34
P6-17	Chocolate whipper	33
P6-18	Soup whipper	35
P6-19	Tea brewer motor	29
P6-20	Brewed tea sugar	70
P6-21	Brewed tea white	69
P6-22	Coffee whipper	17,56,57

P7 MOTOR CONTROL TO LOGIC CONTROL INTERFACE

P7-1 24Vac live
P7-2 24Vac return
P7-3 24Vdc live
P7-4 dc ground
P7-5 -6.5Vdc measured to dc ground
P7-6 ac present -6.5Vdc measure to dc ground P7-5 -6.5Vdc will drop to 0Vdc when overflow bucket circuit is open
P7-7 Key
P7-8 through 11 Data transfer lines

P8 WATER HEATER CIRCUIT

P8-1 220/240Vac live
P8-2 Neutral

P11 220/240Vac IN TO MOTOR CONTROL BOARD FOR HEATER

P11-1 220/240Vac live
P11-2 220/240Vac neutral

LOGIC CONTROL BOARD

P1 INTERCONNECT TO MOTOR CONTROL BOARD
P1-1 24Vac live
P1-2 24Vac neutral
P1-3 +24Vdc
P1-4 dc ground
P1-5 -6.5Vdc measured to dc ground
P1-6 ac present -6.5Vdc measure to dc ground P7-5
-6.5Vdc will drop to 0Vdc when overflow bucket circuit is open
P1-7 Key
P1-8 through 11 Data transfer lines

P2 EXECUTIVE COIN MECHANISM AND RS232 FOR MODES 9 & 10
P2-1 Rec +
P2-2 Rec -
P2-3 Xmit -
P2-4 Ground
P2-5 Xmit +
P2-6 +24Vac
P2-7 Key
P2-8 24Vac ground
P2-9 Txd, RS232C
P2-10 Rxd, RS232C
P2-11 DTR, RS232C

P3 DISPLAY EEPROM PROGRAM INPUT
P3-1 Rxd, RS232C
P3-2 Ground
P3-3 DTR, RS232C
P3-4 Key
P3-5 Ground

P4 DISPLAY
P4-1 to 10 Display
P4-11 Key
P4-12 to 29 Display

NOTE: THE FOLLOWING CONNECTORS ARE SENSORS ONLY AND ALL TESTING SHOULD BE DONE WITH POWER OFF AND CONNECTOR REMOVED FROM THE CIRCUIT BOARD. THE ONLY TEST THAT SHOULD BE DONE IS A CONTINUITY TEST TO CHECK THE SWITCH FOR CORRECT OPERATION.

P7 HEATER LEVEL CONTROL
(Version 2 Software) Switch 40
P7-1 Level control ground
P7-2 Key
P7-4 Level control probe

P8 SOLD OUT AND JUG SWITCHES
P8-1 to 3 Cold sold out enables
P8-5 Jug switch - SWITCH #42
P8-8 Key
P8-9 Scan 5

P9 BREWER CONTROL CIRCUIT
P9-1 Brewer delay switch - SWITCH #35
P9-2 Key
P9-3 Scan 4
P9-4 Brewer cycle switch - SWITCH #34
P9-5 Brewer water switch - SWITCH #33

P10 HEATER THERMOSTAT
P10-1 Scan 4
P10-2 Key
P10-6 Thermostat - SWITCH #36

P11 DISCOUNT SWITCH - SWITCH #25
P11-1 Discount switch (N.O.)
P11-2 Scan 3

P12 FLUSH ENABLE - SWITCH #26
P12-1 Flush interlock enable
P12-2 Scan 3

P13 CUP PRESENT SWITCH - SWITCH #28
P13-1 Cup present switch(N.C.)
P13-2 Scan 3

P16 MODE SWITCH-SWITCH #30
P16-1 Scan 3
P16-2 Mode switch(N.O.)

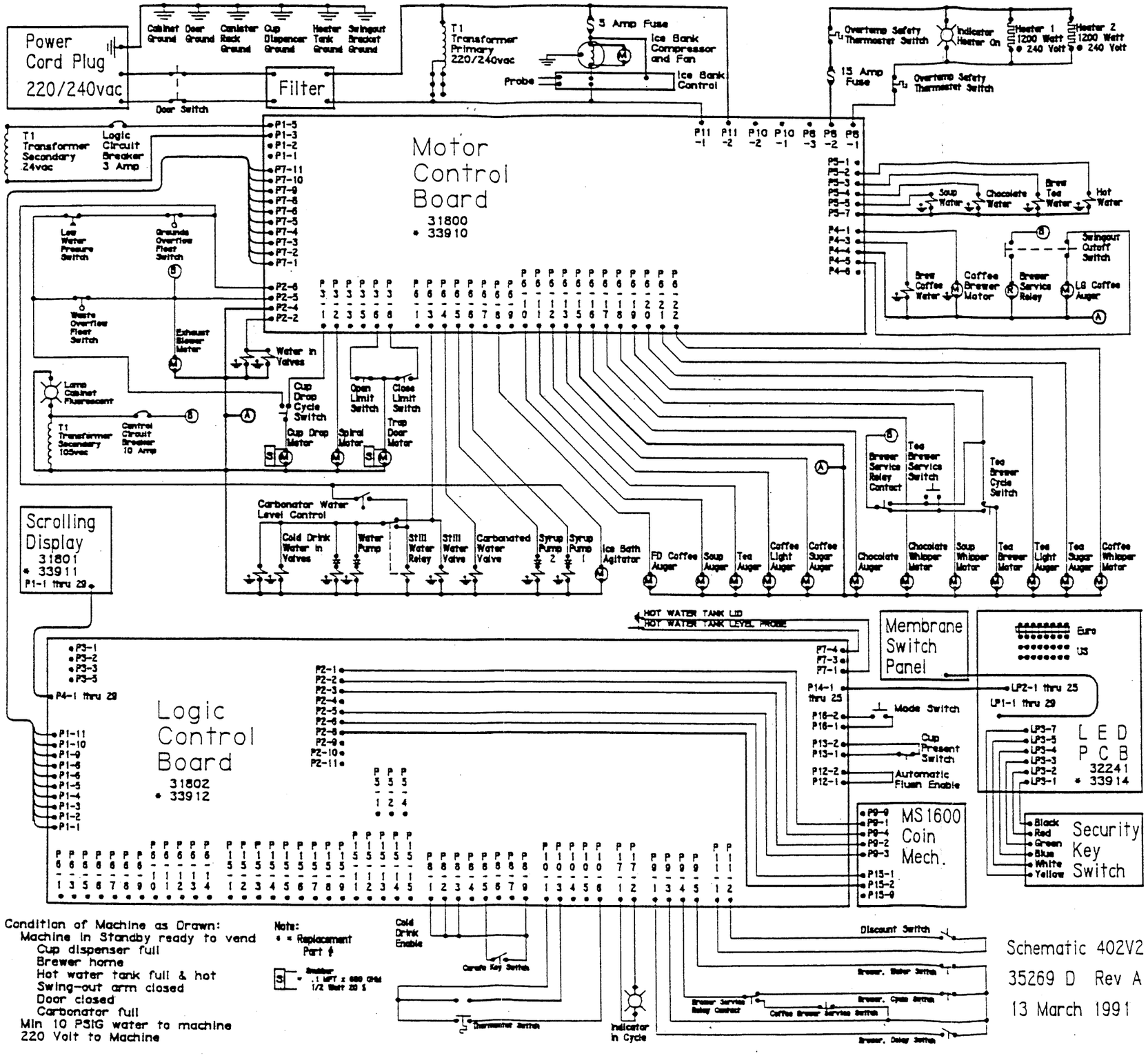
P17 CYCLE LED
P17-1 Scan 4
P17-2 LED

LED PRINTED CIRCUIT BOARD

LP1-1 THROUGH LP1-29 MEMBRANE SELECTION SWITCH

LP2-1 THROUGH LP2-25 INTERCONNECT TO LOGIC CONTROL

LP3 SECURITY KEY SWITCH-SWITCH #29
LP3-1 Black
LP3-2 Red
LP3-3 Green
LP3-4 Blue
LP3-5 White
LP3-6 Key
LP3-7 Yellow


Power Cord Plug 220/240vac
Cabinet Ground
Door Ground
Canister Rack Ground
Cup Dispenser Ground
Heater Tank Ground
Swingout Bracket Ground
Door Switch
Filter
T1 Transformer Primary 220/240vac
5 Amp Fuse
Ice Bank Compressor and Fan
Probe
Ice Bank Control
Overtemp Safety Thermostat Switch
Indicator Heater On
Heater 1 1200 Watt @ 240 Volt
Heater 2 1200 Watt @ 240 Volt
15 Amp Fuse
Overtemp Safety Thermostat Switch
T1 Transformer Secondary 24vac
Logic Circuit Breaker 3 Amp
Motor Control Board
31800
* 33910
Low Water Pressure Switch
Grounds Overflow Float Switch
Waste Overflow Float Switch
Exhaust Blower Motor
Water In Valves
Lamp Cabinet Fluorescent
T1 Transformer Secondary 105vac
Control Circuit Breaker 10 Amp
Cup Drop Cycle Switch
Cup Drop Motor
Spiral Motor
Open Limit Switch
Close Limit Switch
Trap Door Motor
Soup Water
Chocolate Water
Brew Tea Water
Hot Water
Brew Coffee Water
Coffee Brewer Motor
Brewer Service Relay
Swingout Cutoff Switch
LB Coffee Auger
Brewer Service Relay Contact
Tea Brewer Service Switch
Tea Brewer Cycle Switch
Carbonator Water Level Control
Cold Drink Water In Valves
Water Pump
Still Water Relay
Still Water Valve
Carbonated Water Valve
Syrup Pump 2
Syrup Pump 1
Ice Bath Agitator
FD Coffee Auger
Soup Auger
Tea Auger
Coffee Light Auger
Coffee Sugar Auger
Chocolate Auger
Chocolate Whipper Motor
Soup Whipper Motor
Tea Brewer Motor
Tea Light Auger
Tea Sugar Auger
Coffee Whipper Motor
Scrolling Display
31801
* 33911
P1-1 thru 29
HOT WATER TANK LID
HOT WATER TANK LEVEL PROBE
Membrane Switch Panel
Euro
US
LPZ-1 thru 25
LP1-1 thru 29
Logic Control Board
31802
* 33912
P4-1 thru 29
Mode Switch
Cup Present Switch
Automatic Flush Enable
LED PCB
32241
* 33914
MS1600 Coin Mech.
Security Key Switch
Black
Red
Green
Blue
White
Yellow
Discount Switch
Cold Drink Enable
Carafe Key Switch
Thermostat Switch
Indicator In Cycle
Brewer Service Relay Contact
Coffee Brewer Service Switch
Brewer, Water Switch
Brewer, Cycle Switch
Brewer, Delay Switch
Condition of Machine as Drawn:
Machine in Standby ready to vend
Cup dispenser full
Brewer home
Hot water tank full & hot
Swing-out arm closed
Door closed
Carbonator full
Min 10 PSIG water to machine
220 Volt to Machine
Note:
* = Replacement Part #
S = Breaker .1 MFT x 680 OHM 1/2 Watt 20 S
Schematic 402V2
35269 D Rev A
13 March 1991