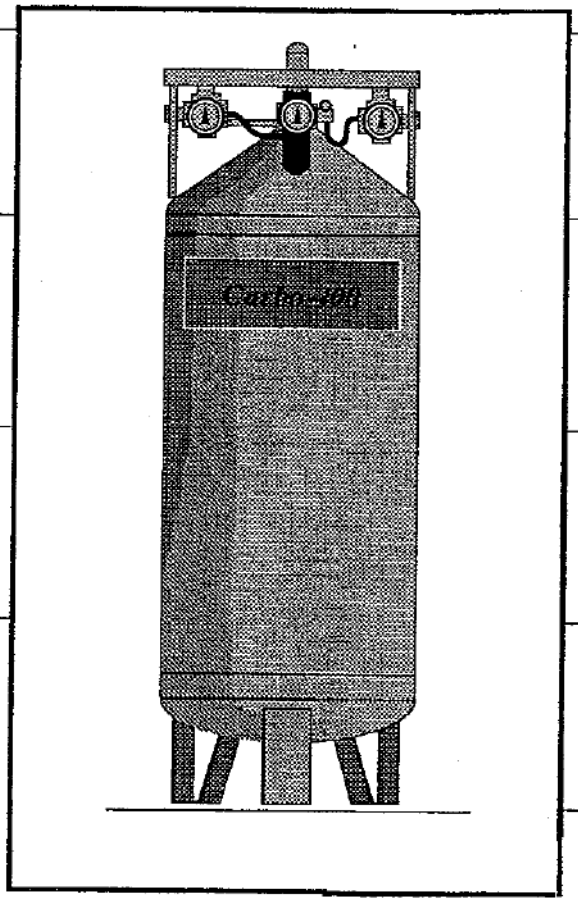
SERVICE MANUAL

Carbo-400

CARBON DIOXIDE SUPPLY SYSTEM FOR McDONALD'S RESTAURANTS



MVE®

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INTRODUCTION

The MVE Carbo-400 is a "Carbon Dioxide Supply System" that has been designed to meet the special requirements of the McDonald's restaurant beverage system. The large internal vaporizer allows it to deliver CO2 gas to the beverage system carbonator while it pressure transfers bulk syrup into the stores McBulk syrup storage tanks.

HOW TO USE THIS MANUAL

Routine service and maintenance on the Carbo-400 can be accomplished with the knowledge gained by reading this manual. If additional information is needed, contact:

MVE, Inc.
Technical Service Department
Phone: (800) 253-1769
Fax (612) 882-5185

The manual is divided into five major sections: Safety, Components, System Operation, Trouble Shooting and Repair. It is important to read all of these sections before you perform service work on the Carbo-400.

The Components Section contains schematics, illustrations, and diagrams of the individual parts that make up the Carbo–400. The item numbers that point out these parts are used through out this manual to identify the component you are working on. The same item numbers are used in the "Equipment Manual: Carbo-400" that is supplied with the tank to the McDonald's store manager.

The repair procedures are divided into three categories: adjustments, removal of isolated parts, and pressurized parts replacement.

The trouble shooting guide will refer you to the proper repair procedure as a means of solving the problem.

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SAFETY INFORMATION

The Carbo-400 storage tank is designed for the safe storage of carbon dioxide refrigerated liquid. No modifications or changes should be made in the equipment without proper authorization from MVE, Inc.

WARNING

Before removing cylinder parts or loosening fittings that connect directly to the pressure vessel, empty the container of liquid and release the vapor pressure in a safe manner. External valves and fittings can become extremely cold and may cause painful burns to personnel unless properly protected. Personnel must wear protective gloves and eye protection whenever removing parts or loosening fittings. Failure to do so may result in personal injury because of the extreme cold and pressure in cylinder.

CARBON DIOXIDE CAUTIONS

Carbon dioxide gas is an asphyxiant. Concentrations of 10% or more can produce unconsciousness or death. Lower concentrations can cause headache, sweating, rapid breathing, increased heart rate, shortness of breath, or dizziness. Carbon dioxide is an odorless gas and should be treated as a material with poor warning properties.

It is heavier than air so high concentrations may be found in low areas such as basements.

RESCUE AND FIRST AID CONSIDERATIONS

Do not attempt to remove an individual without utilizing proper rescue equipment or you may also become a casualty.

If the exposed person is unconscious, obtain assistance and put into effect the established emergency procedures.

If a person has inhaled large amounts of carbon dioxide and is exhibiting adverse effects, move the exposed individual to fresh air at once. If breathing has stopped, perform artificial respiration. Keep the affected person warm and at rest. Get medical attention as soon as possible.

If solid CO2 (dry ice) or cold CO2 vapor comes in contact with the eyes, stop the exposure immediately and obtain medical attention.

More information can be obtained by contacting your CO2 supplier or the Compressed Gas Association, 1235 Jefferson Davis Highway, Arlington, VA 22202.

SERVICE POLICY

MVE makes every effort to manufacture the Carbo-400 to the high standards required for a cryogenic pressure vessel. The inner vessel is designed, inspected and tested to the requirements of the ASME Pressure Vessel Code Section 8, Division 1. The vacuum insulation system and plumbing components are performance tested at the factory. However, even the finest equipment may require some service to be performed in the field by authorized agents. Read this section to understand the agent's responsibilities before any work on the Carbo—400 is started.

WARRANTY

MVE, Inc., the manufacturer of the Carbo-400, warrants to the purchaser of the Carbo-400 that the product shall be free from defects in material and workmanship which result in the breakdown or failure under normal use for a period of 1 year from the date of installation to the original purchaser. MVE warrants the component plumbing parts for a period of 1 year and warrants the vacuum performance of this tank for a period of 5 years.

MVE's liability under this warranty shall be limited to the lesser of the repair, replacement, or refund of the purchase price, of the equipment that proves to be defective, MVE shall not be liable for any defects caused by the effects of normal wear and tear, erosion, corrosion, fire, or explosion, and shall not be liable for any special, indirect, or consequential damage incurred by the purchaser as a result of any claimed defect.

MVE, Inc., specifically makes no warranties or guarantees, express or implied, including but not limited to the warranties of merchantability or fitness for the particular purpose or use, other than those specified herein. No warranties shall be implied under the uniform commercial code other than warranty of title.

DEFECTIVE OR MISSING PARTS

Defective parts should be returned to the factory as soon as possible. Prior to returning the part, contact:

MVE
Technical Service Department
Phone: (800) 253-1769
Fax (612) 882-5185

for a Customer Return Authorization number.

Missing parts should be reported to the Customer Service Group at MVE.

ORDERING PARTS/SERVICE

How to Order

For prompt service and shipment, contact MVE at 1-800-253-1769 or one of its authorized distributors. To insure prompt processing of your orders, list each item separately, taking care to specify quantity, the part number, and description of each item ordered.

Terms

Terms of NET 30 days will be extended to those customers of known and acceptable financial standing. All other orders must be accompanied by a check or will be shipped C.O.D. Customers desiring to purchase on an open account should direct its inquiries to the credit department. All sales taxes are the responsibility of the buyer. Prices quoted do not include sales tax. MVE, at its option, may charge for and collect sales taxes. Prices and terms, designs, materials, specifications, weights and

dimensions for equipment or parts are subject to change without notice.

Method of Shipment

All merchandise is priced F.O.B. factory. All shipments are carefully packed and labeled to prevent damage or loss. Crates, boxes and cartons used are of approved weight and strength. Orders not routed by the purchaser will be shipped at our discretion via the best method possible without any liability on our part for such selection.

Purchaser Pick-Up

Service parts and orders must be received at least 24 hours prior to personal pick-up . Equipment orders must be received at least 7 days prior to personal pick-up.

Damaged and Lost Shipments

The responsibility of MVE ceases upon acceptance of its products being shipped in good condition by the carrier. Any damage or loss sustained in shipment should be reported to the delivering carrier immediately. The carrier is responsible for all shipments. If you receive a damaged shipment, ask the carrier's agent for a claim form and have the carrier prepare an inspection report for you. The completed claim inspection report, a copy of MVE's invoice, the freight bill, and a letter estimating the cost of repair or replacement must be submitted to the carrier before they can process your claim.

Compare the number of cartons listed on our packing list or Bill of Lading. If they do not agree, be sure to note the shortage on the receipt. The carrier is responsible for delivery of the specified number of cartons.

UPS shipments are insured individually and UPS will replace all merchandise that is lost.

Notify us immediately if you wish to trace merchandise lost in transit.

Return of Merchandise

No merchandise is to be returned without our approval. The purchaser must prepay the freight for all returned goods. After receiving our approval, all merchandise must be returned to our factory:

MVE, Inc.
Interstate 575 & Airport Drive
Canton, Georgia 30114

MVE, Inc. is not responsible for merchandise returned to any location other than our factory.

The merchandise authorized to be returned must be in NEW, unused condition and in its original carton with all original packing. A credit will be allowed amounting to the original selling price or current selling price, whichever is lower, less a 15% restocking charge, with a minimum charge of $20.00 for each return to cover cost of receiving, inspection, testing, repacking and processing all documents.

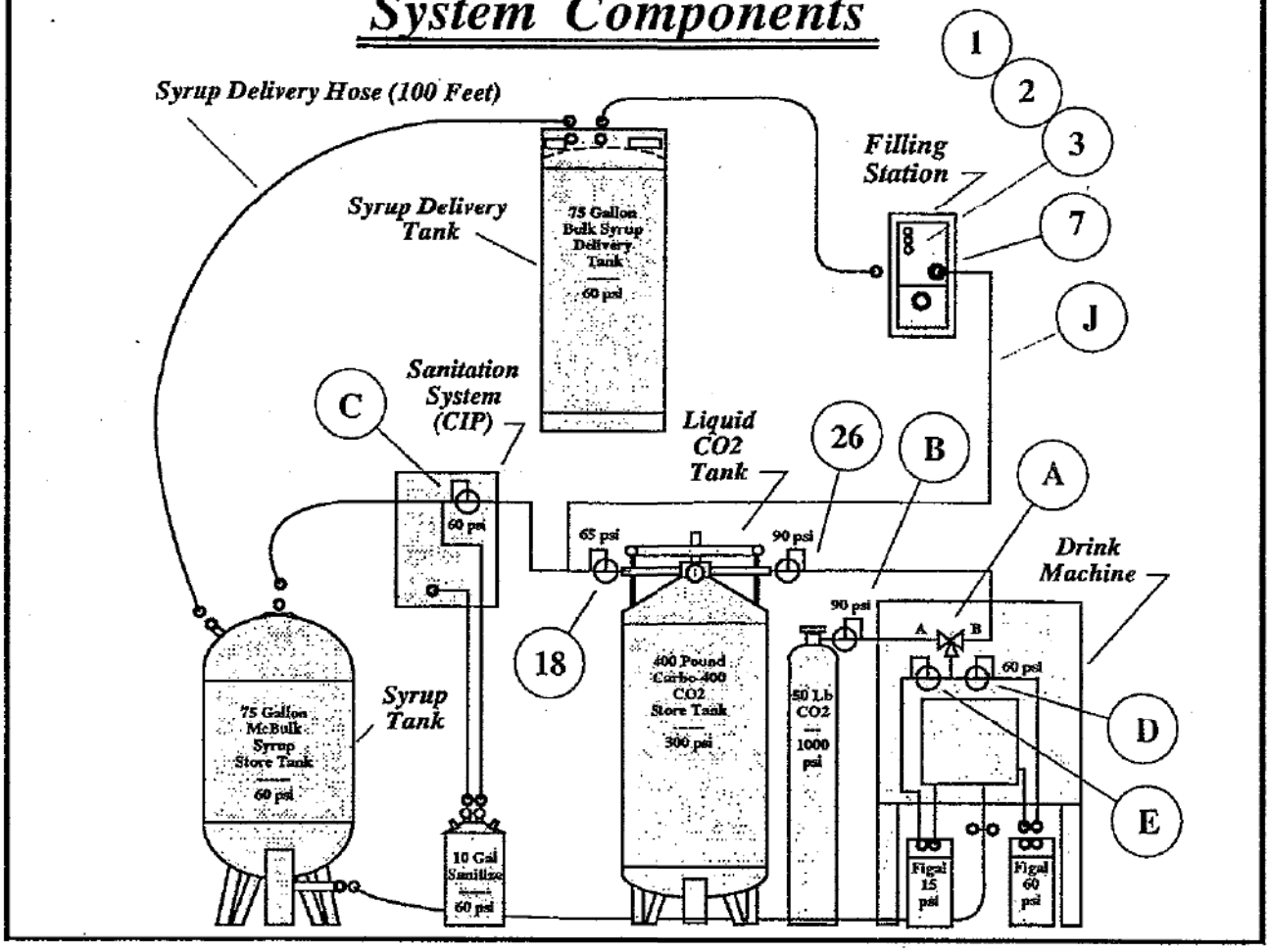
Customer Return Authorization

1. Call MVE and ask for Customer Service.
2. Indicate customer name, bill to address, ship to address, invoice number and part number.
3. Indicate reason for return and any additional comments.
4. A Customer Return Authorization Number (CRA#) will be assigned.

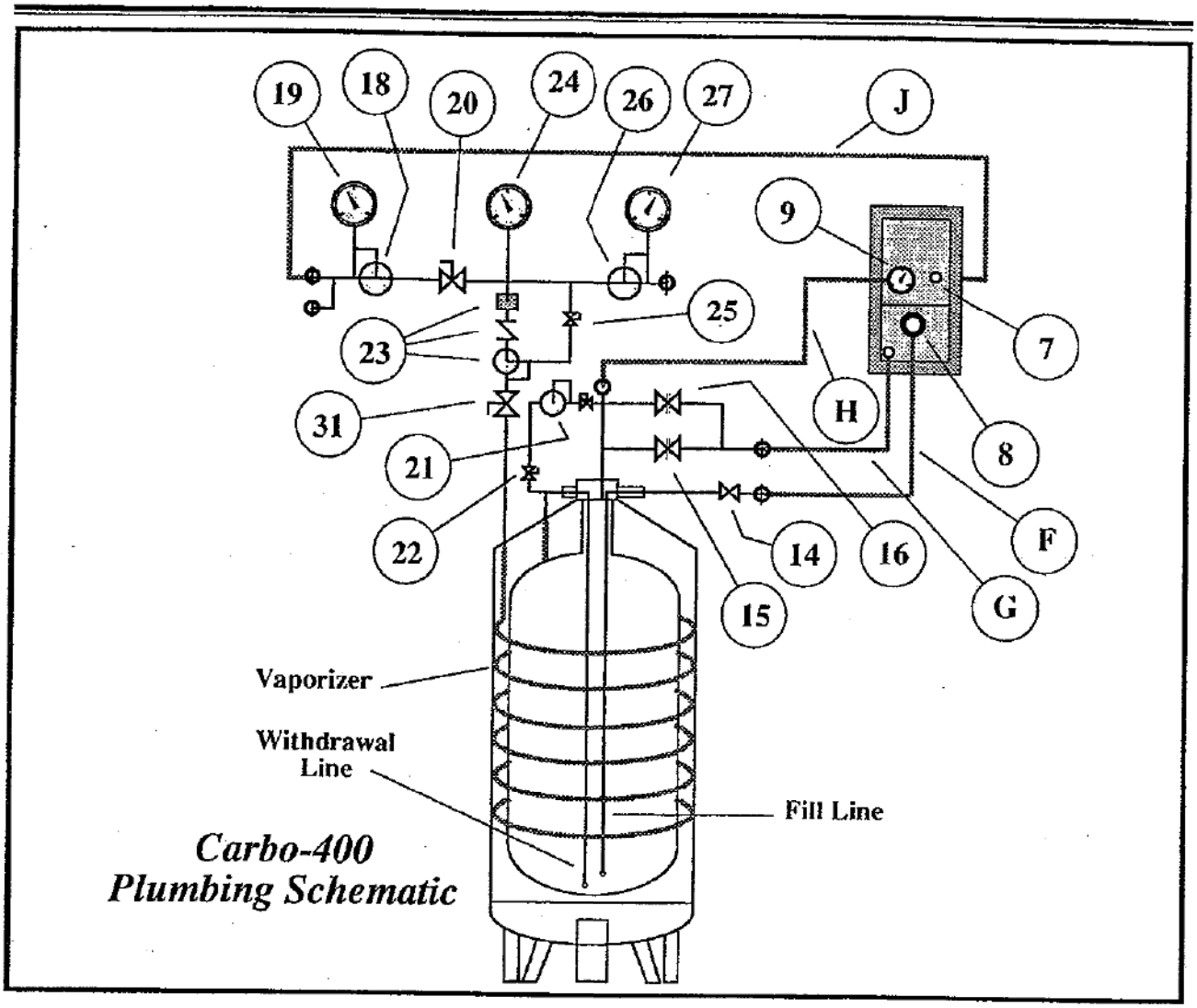
This number should be printed with black marker on the package to be returned.

5. Credit will be issued to account upon receipt of returned part or tank.
6. If a replacement part or tank is needed, place the order at this time.

McDonald's Beverage System Components



ITEM	DESCRIPTION	FUNCTION
A	CO2 Switch over valve	Directs CO2 from cylinder (A) to bulk(B).
B	Regulator (set at 90 psi)	Controls CO2 pressure from cylinder.
C	Regulator (set at 60 psi)	Controls CO2 pressure to syrup tank.
D	Regulator (set at 60 psi)	Controls CO2 pressure to figal
E	Regulator (set at 15 psi)	Controls CO2 pressure to Diet Coke.
F	Filling Line	Connects tank to Filling Station.
G	Vent Line	Vents CO2 gas outside
H	Pressure Gauge Line	Pressurizes gauge in Filling Station.
J	2 Pin Pressure Line	Pressurizes 2 pin connector
1	Level Indicator Light (green)	Fill the tank (level is between 300 & 100 pounds).
2	Level Indicator Light (red)	Don't Fill (level is above 300 pounds).
3	Level Indicator Light (yellow)	Low level alarm (level is below 100 lbs.
7	2 Pin Connector	Source for syrup delivery pressure line
8	Fill Connector	Liquid CO2 Filling Connection
9	Tank Pressure Gauge	Displays tank pressure.



ITEM	DESCRIPTION	FUNCTION
14	Fill Isolation Valve	Isolates tank pressure
15	Relief Valve (450psi)	Secondary Safety relief device
16	Relief Valve (300psi)	Prevents tank over-pressurization.
18	Regulator (Set @ 65psi)	Controls the pressure to the syrup system.
19	Syrup Pressure Gauge	Displays syrup system pressure.
20	ON/OFF Valve (Syrup)	Provides CO2 gas to the syrup system
21	Regulator (Set @ 140psi)	Controls CO2 tank pressure.
22	Regulator Isolation Valve	Isolates pressure control regulator.
23	Combination Filter/Regulator	Shuts off CO2 in emergencies.
24	Tank Pressure Gauge	Displays tank operating pressure
25	System reset button	Repressurizes the system after pressure shut-down
26	Regulator (Set @ 90 psi)	Controls pressure to the carbonator
27	Carbonator Pressure Gauge	Displays Carbonator inlet pressure
31	ON/OFF Valve (Gas)	Provides CO2 gas to entire system

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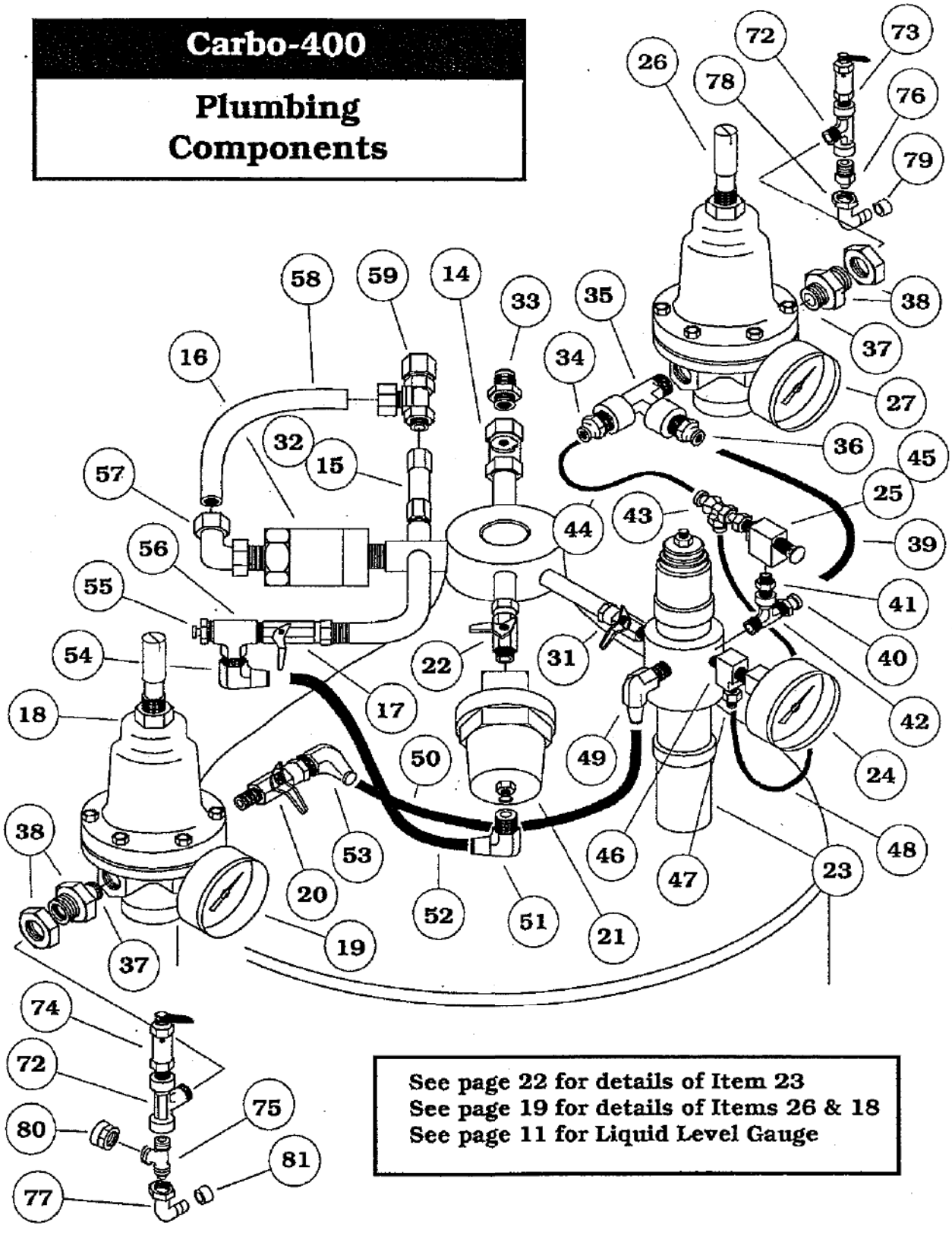
Plumbing Components



See page 22 for details of Item 23
See page 19 for details of Items 26 & 18
See page 11 for Liquid Level Gauge

ITEM	NUMBER	QTY	DESCRIPTION
14	1714611	1	Isolation Valve-Fill
15	1812062	1	Relief Valve- 450 psi
16	1811252	1	Relief Valve- 300 psi
17	1716162	1	Isolation Valve (Economizer) 1/4MPT X 1/4 FPT
18	2111549	1	Syrup Hi-Flow Regulator 1/4FPT Inlet/Outlet
19	2013959	1	Pressure Gauge 0-160psi 1/8"MPT 2" Dial
20	1716162	1	On/OFF Valve (Syrup) 1/4"MPT X 1/4" FPT
21	2110022	1	Economizer Regulator 1/4" NPT Set @ 140psi
22	1716162	1	Isolation Valve 1/4" MPT X 1/4 FPT
23	1812319	1	Shut Down Regulator W/Check Valve & Filter
24	2014039	1	Pressure Gauge 0-400psi 1/8" MPT 2" Dial
25	1717889	1	Reset Valve, Push Button
26	2111549	1	Carbonator Hi-Flow Reg. 1/4" FPT Inlet/Outlet
27	2013959	1	Pressure Gauge 0-160psi 1/8" MPT 2" Dial
31	1716162	1	ON/OFF Valve (Gas) 1/4" MPT X 1/4" FPT
32	1611592	1	Pipe Away Adapter 3/8" FPT
33	1110112	1	Fill Connector Male 5/8" Flare X 3/8" MPT
34	1013662	1	Connector, Brass 1/8" OD X 1/4" MPT W/.008" Orifice
35	1213072	1	Street Tee Brass 1/4" NPT
36	1013322	1	Connector, Brass 1/4" OD X 1/4" MPT
37	1311842	2	Nipple Brass 1/4" Close X 7/8"LG
38	1013362	2	Anchor Connector, Brass 1/4" FPT X 3/4-16
39	2811836	1	Black Nylon Tubing 1/4"
40	1013322	1	Connector, Brass 1/4" OD X 1/4" MPT
41	1213502	1	Reducer Brass 1/4" MPT X 1/8" MPT

ITEM	NUMBER	QTY	DESCRIPTION
42	1213072	1	Street Tee Brass 1/4 NPT
43	1213332	1	Tee Brass Male Run 1/8" MPT X 1/8" OD
44	2811346	1	Black Nylon Tubing 1/8"
45	1717899	1	Brass Button 3/16"Dia Stem
46	1213452	1	Street Tee 1/8" Brass
47	1013632	1	Connector Brass 1/8" OD X 1/8" MPT
48	2811346	1	Black Nylon Tubing 1/8"
49	1213112	1	Elbow Brass 90 1/4" OD X 1/4" MPT
50	2811836	1	Black Nylon Tubing 1/4" OD
51	1213112	1	Elbow Brass 90 1/4" OD X 1/" MPT
52	2811836	1	Black Nylon Tubing 1/4"
53	1213112	1	Elbow Brass 90 1/4" OD C 1/4" MPT
54	1213112	1	Elbow Brass 90 1/4" OD X 1/4" MPT
55	1013662	1	Connector Brass 1/8" OD X 1/4" MPT W/.008 Orifice
56	1210622	1	Tee Brass 1/4" FPT
57	1013846	1	Elbow Nylon 90 1/2" OD X 1/2" MPT
58	2811726	1	White Nylon Tubing 1/2"
59	1013706	1	Tee White Nylon 1/2" OD X 3/8" MPT
72	1213092	2	Tee-1/4 " Branch
73	1812352	1	Relief Valve-130 psi
74	1812342	1	Relief Valve-70 psi
75	1111512	1	Tee-1/4" MPT X 3/8" Flare
76	1111502	1	Connector 1/4"MPT X 1/4" Flare
77	1611461	1	90 Elbow-1/4" Hose X 1/4" Flare
78	1611821	1	90 Elbow 3/8" Hose X 1/4" Flare
79	3411331	1	Clamp-3/8" ID Tube
80	1111292	1	Cap Nut-1/4" 45 degree Flare
81	3411511	1	Clamp-1/4" ID Tube

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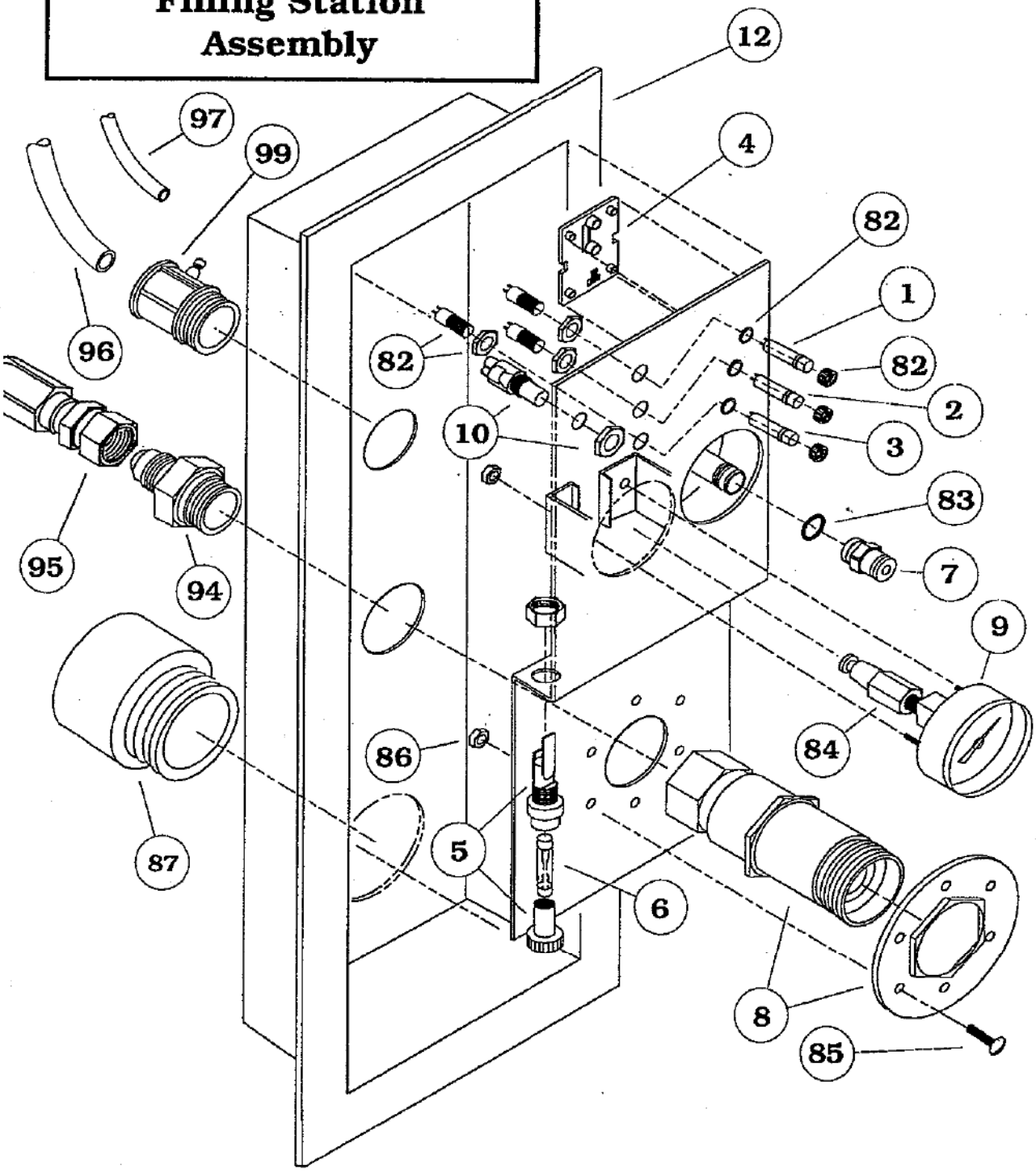
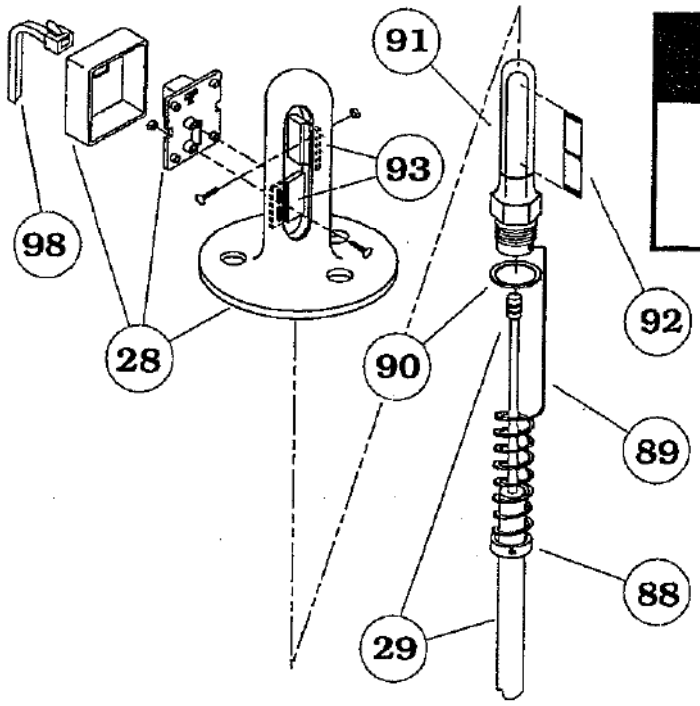
Filling Station Assembly





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Liquid Level Gauge

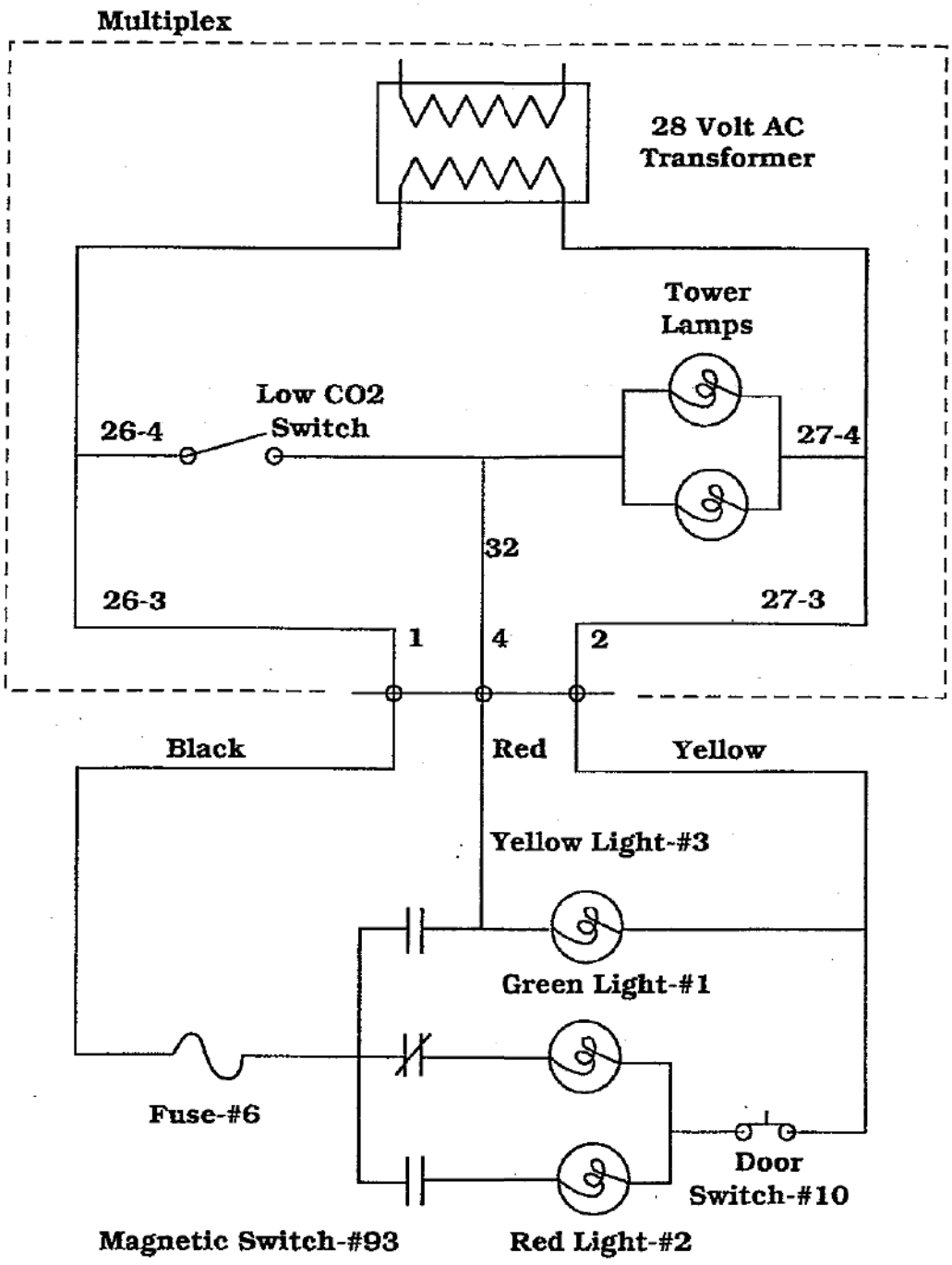
ITEM	NUMBER	QTY	DESCRIPTION
1	4614609	1	Green Light
2	4614619	1	Red Light
3	4614629	1	Yellow Light
4	N/A	1	Circuit Assembly
5	4614359	1	Fuse Holder
6	4614569	1	Fuse (1 AMP)
7	1013819	1	2 Pin Connector
8	1311952	1	Fill Connection
9	2012279	1	Pressure Gauge (0-400 psi)
10	4614639	1	Door Switch
12	8512629	1	Flush Mount Box
28	5411279	1	Sight Gauge Protector W/Magnetic Switch Assy.
29	5411259	1	Sight Gauge Float
82	4614599	3	Light Socket
83	*	1	O-Ring (2 PIN)

ITEM	NUMBER	QTY	DESCRIPTION
84	1013472	1	Connector Brass 18 ODT X 1/8 FPT
85	2910971	6	Machine Screw
86	2913771	6	Nut
87	4613889	1	Connector-2 1/2" PVC
88	5411142	1	Adjusting Collar
89	5411051	1	Spring
90	2300129	1	O-Ring (sight gauge)
91	5411189	1	Sight Gauge
92	3833089	1	Decal-Liquid Level
93	**	2	Magnetic Switch
94	1111182	1	Connector Brass 5/8" Flare X 3/4" MPT
95	3711097	1	Fill Hose-1"
96	2811726	1	1/2" OD Nylon Tube
97	2811826	1	1/8" OD Nylon Tube
98	4615129	1	4 Wire Cord W/Plugs
99	3411649	1	Clamp-Vent Connector

* Part of Item 7

** Part of item 28

System Wiring Diagram



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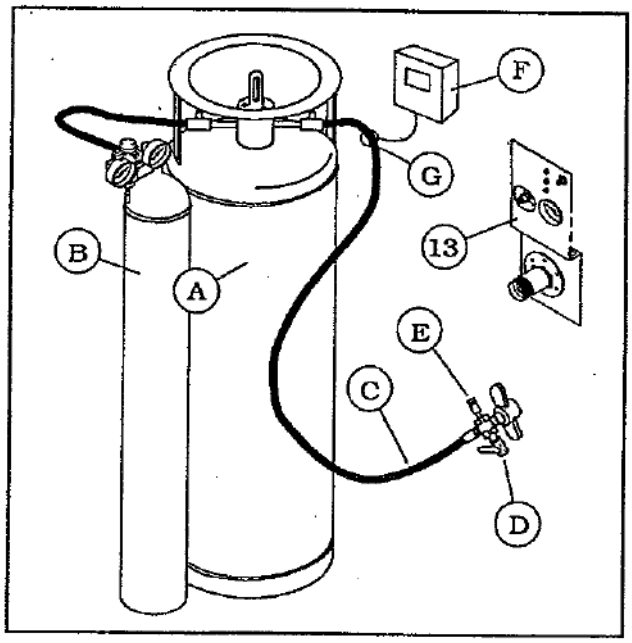
System Operations



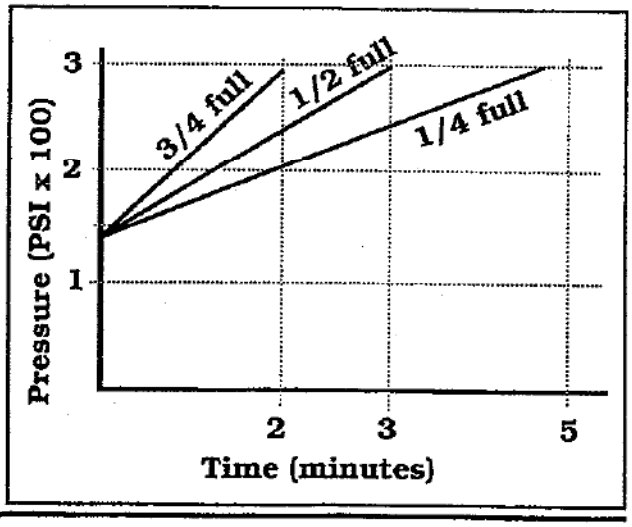
System Operation-Filling

The Carbo–400 system is designed to be filled from outside the restaurant through the Fill Station (Item 13). The distributor should have a liquid delivery tank (Item A), a high pressure back up with regulator (Item B), and a 50 ft. filling hose (Item C). The liquid in the delivery tank should be saturated at 300 psi for optimum filling. The high pressure back up bottle should be connected through a regulator to the vent valve of the delivery tank. The regulator should be set at 300 psi to help maintain the delivery tank pressure while filling. The 50 ft. delivery hose should be connected to the liquid valve. It should have a vent valve (Item D) and line relief valve (Item E) located at the filling end. A flow meter (Item F) can be added to this system at connection (Item G) to measure the amount of liquid CO2 delivered.

The normal filling operation of the Carbo–400 system is:

1. Open the fill station (Item 13) and read the level indicator lights (Item 1,2 and 3) and the pressure gauge (Item 9).
2. If the red indicator light (Item 2) is on, DO NOT FILL.
3. If the yellow or green light (Item 1 or 3) is on, connect the fill hose to the Fill Connection (Item 8) by threading the wing nut until it stops.
4. If the pressure gauge (Item 9) is below 180 psi go to step 7. If it is above 180 psi vent the tank as described in step 5 & 6.
5. With the tank liquid valve (Item A) still closed, open the delivery hose vent valve (Item D) until the tank pressure falls to 150 psi.
6. Close the vent valve (Item D) and open the tank liquid valve (Item A).
7. Fill the tank until the red light comes on and the delivery pressure and tank pressure equalize.
8. If the pressures equalize before the red light comes on repeat steps 5,6, and 7.

The Carbo–400 is designed to fill without the need to vent if the delivery system tank pressure is between 130 & 150 psi and the storage tank is more than 1/2 full at the beginning of the delivery. Refer to the following table for the normal filling times.



System Operation -Gas Withdrawal

The Carbo–400 system is designed to store liquid CO2 at pressures between 130 psi and 300 psi and deliver it as CO2 gas.

The plumbing is divided into two systems. One that provides gas to the beverage carbonator at 90 psi and one that delivers 65 psi gas to the syrup system.

The Carbo–400 tank provides gas, during normal operating pressure of 140 psi, by pulling liquid CO2 up from the bottom and vaporizing it in a coil that is connected to the inside of the tanks vacuum jacket. As the cold liquid vaporizes it will form frost on the outside of the tank. The CO2 gas flows out of the vaporizer and through a filter to remove any impurities. It then passes through the pressure reducing regulator and on to the beverage system.

If the tank was recently filled its pressure will be above the normal 140 psi. The pressure control regulator (Item 21) will open. It will take gas from the top of the tank and feed it into the vaporizer and through to the beverage system. The tank pressure will be reduced while the gas is removed until 140 psi is reached. At that time the pressure maintaining regulator will close and liquid will begin to be drawn from the tank. The adjustment of this regulator (page 20) is what controls the normal operating pressure of the Carbo-400 system.

Large quantities of gas are required for sanitizing and transferring syrup into the McBulk Syrup tanks. The vaporizer is designed to do these operations under normal conditions. The storage tank should be in an environment where it is 60 degrees F or warmer. The pressure should be 140 psi or greater and there should be more than 75 pounds of CO2 in the tank.

A syrup transfer will vaporize 5 pounds of liquid CO2 to push 75 gallons of syrup from the syrup delivery tank into the McBulk Syrup storage tank. The transfer takes place after the syrup delivery hose is attached to the 2 pin connector in the filling station. The transfer time under normal conditions is 8 minutes. The Carbo–400 storage tank will be completely frosted on the outside after the syrup transfer. The frost should be allowed to thaw off the tank (approx. 10 minutes) before another transfer is made.

The sanitation cycle of the clean in place (CIP) system vaporizes 1 pound of liquid CO2 during its 10 minute cycle.

System Operation-Shut Down Regulator

The Carbo–400 storage tank is equipped with a combination filter shut off regulator (Item 23). CO2 gas that is exiting the vaporizer passes through this component before it has its pressure reduced for carbonation or syrup system operation.

If the tank pressure falls below 100 psi the shut off regulator will close and stop the flow of gas to the beverage equipment. This protects the tank from system leaks that would depressurize the CO2 until it formed dry ice (70 psi).

The filter element and check valve are located inside this component. The filter bowl can be removed, after pressure has been released from this system, to clean or replace its elements.

System Operation-Safety Devices

The Carbo–400 is a pressure vessel that is designed to the ASME, Section 8 Division 1, Code. It is required to have safety relief devices that connect to the top of the pressure vessel and vent outside the restaurant. These valves are designed to handle excessive pressure rise

in the vessel even in a fire condition.

The primary safety relief valve (Item 16) is set to open at 300 psi.

System Operation-Electronic Level Indicator

The Carbo-400 system is designed to interface with the beverage machine and towers to provide an electronic sentry to warn of abnormal system conditions.

The system will read the liquid CO2 level and illuminate the appropriate light in the filling station. If the storage tank is between 3/4 and full it will show the red light (DON'T FILL). When the level drops below 3/4 the green light (FILL) comes on and stays on until the level drops to 1/4 full. The yellow light at the fill station and the drink tower comes on if the CO2 level drops below 1/4 full. At that time the store manager has 100 pounds of CO2 left and should call the distributor for filling.

The yellow drink tower light that came on when the CO2 level is low is also used to indicate low CO2 inlet pressure (below 100 psi).

Routine Maintenance

The Carbo–400 requires only a small amount of routine maintenance to keep the system working properly. The basic principles of this system is that when the tank has Liquid CO2 in it and is operating between 130 psi and 150 psi, it is acting normal. The Equipment Manual provided to the restaurant management asks that they check the gauges for normal operation on a routine basis. Their trouble shooting guide will cover routine examination and direct them to call for service if the system acts abnormally.

Trouble Shooting Guide

Problem	Probable Cause	Corrective Action
Tank won't fill	Tank is already full (Red light is not on)	Check float gauge (Item 91) . If low, shake tank to unstick float.
		Check float gauge (Item 91), if high, replace red light bulb (Item 2) and fuse (Item 6).
	Tank pressure is above 200 psi.	Vent tank to 150 psi and fill. See Troubleshooting guide for tank high pressure.
	Delivery tank pressure is too low (below 285 psi).	Boost pressure up to 300 psi, with a high pressure cylinder and regulator.
	Isolation valve (Item 14) is closed.	Open valve.
	Blockage of hoses or fillings	Remove hoses and check for obstructions.

Problem	Probable Cause	Corrective Action
Tank Pressure is too low (below 130 psi).	Leaks in the plumbing	Leak check all the plumbing, hoses, fillings and filling station connections with snoop.
		Leaks in the liquid level gauge (Item 91). See repair procedure for level gauge replacement (page 23)
		Leak on the fill fitting (Item 8) Isolate (Item 8) with valve (Item 14) and replace fitting.
	Pressure control regulator (Item 21) is set too low.	Adjust as described in repair procedure (page 20). Note: Adjusting the regulator will not be noticed until after the next fill.
Tank Pressure is too high (above 200 psi)	System is not in use.	Turn the selector valve on the Multi-Plex to "B" side.
	Tank was recently filled	The pressure slowly reduces from 300 psi to 140 psi as gas is used. A normal store will reduce the pressure in 48 hours.
	The pressure control regulator (Item 21) is off.	Open the isolation valves (Item 17 and 22).
	The pressure control regulator (Item 21) is set too high.	Adjust the regulator per the repair procedure found on (page 20).
	Weak vacuum. The side of the tank is cold or sweats during periods of non-use (morning set-up).	Call factory for assistance.
Tank is always frosting.	During a high use period or syrup transfer.	Normal-the frost will go away after the high use is over.
	Tank pressure is normal but frost won't go away-Leak in beverage system.	Leak check the tank and beverage system.

Problem	Probable Cause	Corrective Action
Tank is always frosting.	Tank pressure is high and frost won't go away.	Leak check the tank and beverage system. If a leak is not found and the pressure does not go down; there may be a bad vacuum. Call Factory for assistance.
Tank won't supply gas.	Valves are shut off.	Open the ON/OFF valves (Item 20) for syrup and (Item 31) for system and make sure the pressure on (Item 24) is above 100 psi.
		Push the reset button (Item 25) & make sure the gauges read properly (Item 19 should read 65 psi) and (Item 27 should read 90 psi).
		Adjust the regulators (Item 18 and 26) with the procedure on (pg.19)
		Turn the switch-over valve on the Multi-Plex to the "B" side.
	Low pressure in the tank - Both pressure gauges (Item 24) on the tank and (Item 9) in the filling station read the same (below 90 psi).	Tank is empty. Refill
		Tank has depressurized and become dry ice if the gauges read 60-70 psi. Find the leak and repair.
	Low pressure in the tank- The filling station and tank pressure gauge (Item 24 & Item 9) reads normal but the tank gauge (Item 19 & Item 27) reads 0.	The automatic shut down regulator has been activated. Push the reset (Item 25) until the pressure returns to normal.
	Low pressure in the tank - The filling station gauge (Item 9) reads normal but the tank gauge (Item 24) reads below 90 psi.	Push the reset (Item 25) until pressure returns.
		Check for obstructions in the filter (Item 23) by using the procedure on (page 22) .
		There may be an obstruction inside the withdrawal tube. Call the factory for assistance.

Problem	Probable Cause	Corrective Action
Filling Station lights don't operate properly.	All lights are out	Replace the fuse (Item 6)
		Check the transformer in the Multi-Plex for 22 volts.
		Check the wiring connections between the Multi-Plex and the filling station.
		Replace the lights (Items 1,2, & 3).
	Red light won't come on after a fill. (Other lights work.)	Tank did not completely fill. Vent to 150 psi and refill.
		Float rod (Item 29) is stuck. Shake the tank to see if it rises.
		Check and replace fuse (Item 6) and red light (Item 2).
		Adjust the top magnetic switch (Item 93) with procedure on (page 21).
	Yellow light won't come on when tank level is low. (Other lights work.)	Check and replace fuse (Item 6) and yellow light (Item 3).
		Adjust the lower magnetic switch (Item 93) with the procedure found on (page 21).
	Fuses keep burning out.	Make sure that the transformer in the Multi-Plex is outputting 24 to 30 volts AC.
		Check the connection to the Multi-Plex for proper installation. See Carbo-400 Installation Manual.
		Make sure proper fuse is being used.

Repair Procedure, for Component Adjustments

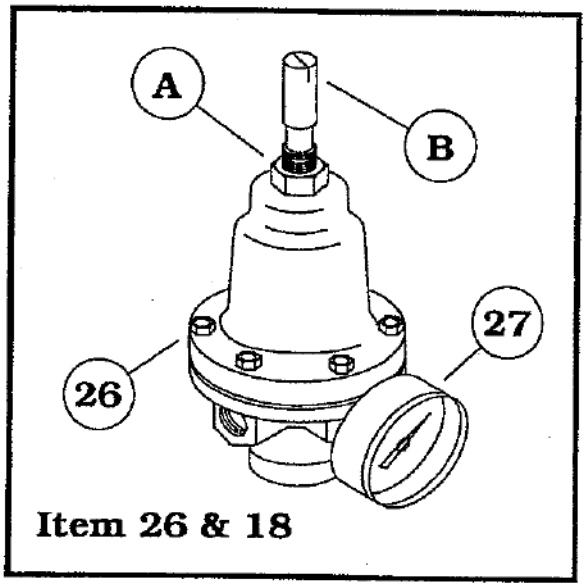
The following section covers the basic adjustments that can be made to the Carbo-400 System without taking the tank out of service and removing its CO2 product. Each procedure is referenced by the item number of the component and has an illustration that refers to the parts needed for adjustment. No special tools are required.

Item 26 - Carbonator Regulator

Adjustment to Item 26 will vary the CO2 line pressure that is providing gas to the beverage carbonator. The recommended pressure setting is 90 psig.

To Adjust:

1. Make sure the system is on, (ON/OFF valve Item 31 is open) and the Multi-Plex CO2 selector valve is in the "B" position.
2. Loosen the locknut (Item A) on the regulator (Item 26).
3. Tighten or loosen the adjusting knob (Item B) until the proper pressure reading is seen on the pressure gauge (Item 27).
4. Confirm the new setting by watching the pressure gauge (Item 27) while CO2 flow is happening (ie, drinks are being made).
5. While holding (Item B) in its position, tighten the locknut (Item A).



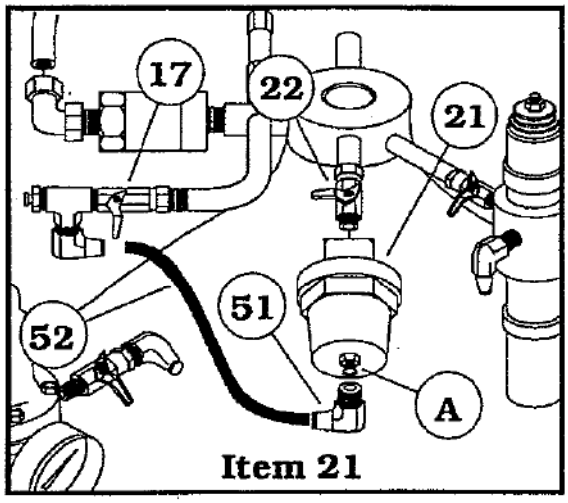
Item 26 & 18

Item 18 - Syrup Regulator

Adjustment to the syrup regulator will vary the CO2 line pressure to the syrup Clean-In-Place (CIP) panel and the 2-pin connector at the filling station. The normal setting for the syrup regulator is 65 psig.

To Adjust:

1. Follow the same procedures on Item 18 as used to adjust Item 26.
2. Confirm the setting by releasing a small amount of CO2 through the CIP manual CO2 purge button.
3. Tighten the locknut while holding the adjusting post in position.



Item 21

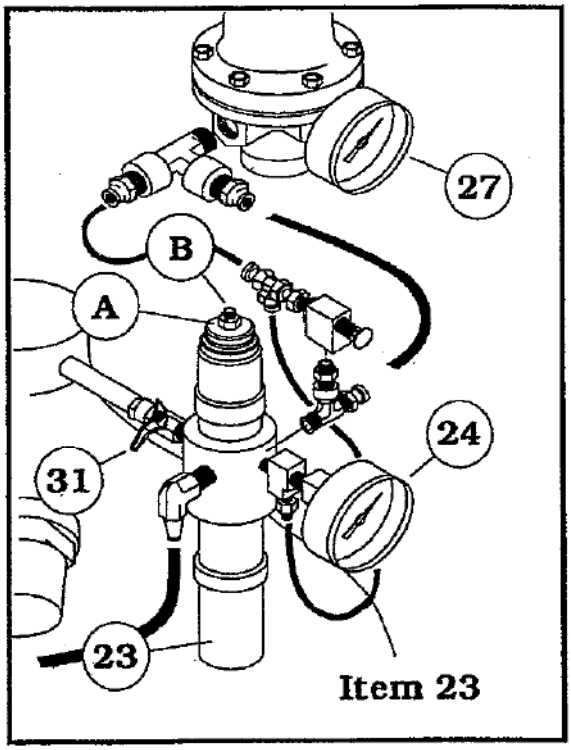
Item 21- Pressure Control Regulator

The pressure control regulator is designed to be open at the set pressure or higher. This allows gas to be taken from the top of the tank and supplied to the restaurant. While the regulator is open the tank pressure will decrease.

This style of regulator (Economizer) does not display changes in its setting on the tank pressure gauge (Item 24). The proper adjustment requires the removal of the regulator (Item 21) and bench adjustment. This regulator should be set at 140 psig.

To Adjust:

1. Close isolation valves (Item 17 & 22).
2. Remove the hose (Item 51) from the regulator.
3. Remove the regulator (Item 21).
4. Attach a CO2 pressure source with adjustable regulator to (Item 51).
5. Slowly increase the pressure until gas exits the regulator (Item 21) where it was connected to (Item 22).
6. Adjust the screw (Item A) until the proper opening pressure is determined.
7. Replace the regulator and open the isolation valves.



Item 23

Item 23- Safety Shut-Down Regulator

The shut down regulator is normally open at the system operating pressures. It is designed to shut the gas supply off if the tank pressure drops too low. The opening pressure of this regulator should be set at 80 psi.

To Adjust:

1. Shut the ON/OFF valves (Item 20 & 31)
2. Turn the CO2 switch over valve on the Multi-Plex to the "A" side. (CO2 back up bottle).
3. Slowly vent the carbonator CO2 supply line until 0 psi is read on pressure gauge (Item 27).
4. Open ON/OFF valve (Item 31)
5. Watch the pressure rise on the pressure gauge (Item 27). When the needle jumps and you hear the regulator (Item 23) click, record the pressure. This is the set pressure.

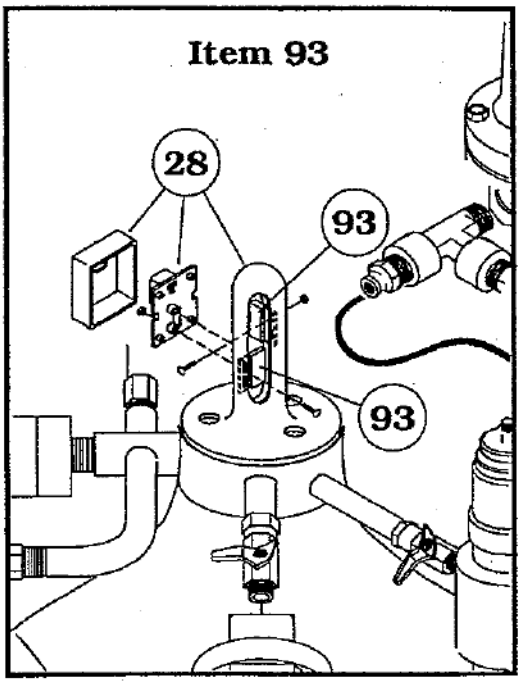
6. Adjust the screw on top of the regulator (Item 23) by loosening the locknut (Item.A) and adjusting (Item B) in or out.
7. Repeat steps 1 thru 5 to confirm the new set pressure. Adjust until the proper pressure is reached.
8. Open ON/OFF valves (Items 20 & 31).
9. Switch back to the "B" side on the Multi-Plex.

Item 93- Liquid Level Magnetic Switches

The switches (Item 93) are attached to the float gauge protector (Item 29) with slots that allow for vertical adjustment. The switches are factory set so that when the level rises to 300 pounds of CO2 the top switch closes. When the level of CO2 falls to 100 pounds of CO2 the bottom switch closes. The magnet on the float (Item 29) causes this action.

To Adjust The Top Switch:

1. The tank must be allowed to run empty and the store switched over to the "A" side for back-up CO2.
2. Fill the tank (with a flow meter) to 300 pounds of CO2.
3. Loosen the top switch (Item 93) and move it until the red light (Item 2) just comes on.
4. Retighten the switch.
5. Turn the CO2 selector switch on the Multi-Plex back to the "B" side.



To Adjust The Bottom Switch:

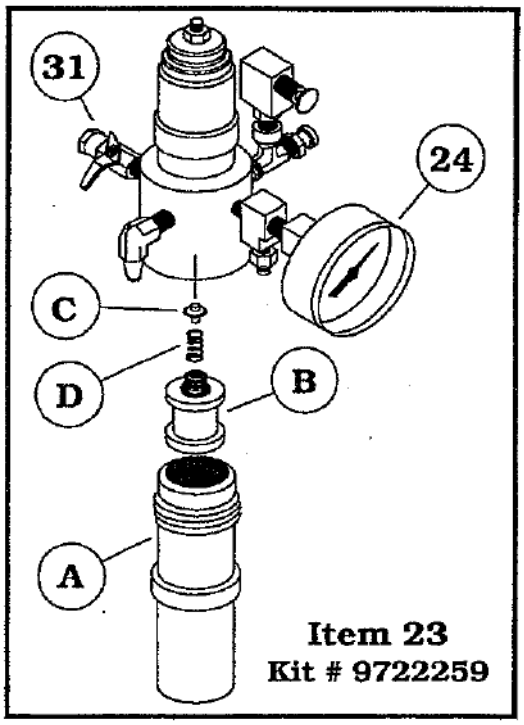
1. Use the same procedure as above, except fill 100 pounds of CO2 in step 2 and adjust the lower switch until the yellow light (Item 3) just comes on.

Repair Procedure- for Components with Isolation Valves

These components should be periodically inspected for wear and replaced if necessary. They are easily accessed and will not interrupt beverage service.

Item 23- Filter And Check Valve Assembly

The shut down regulator also contains a gas filter and check valve that protect the system from contamination.

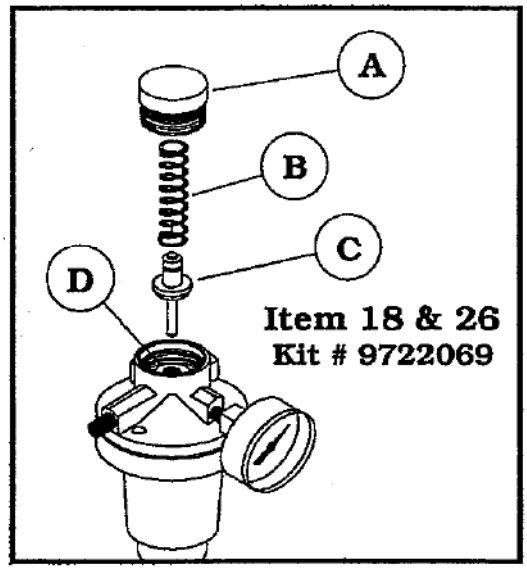


To Replace:

1. Switch the Multi-Plex selector valve to the "A" side for back-up CO2.
2. Close the ON/Off valves (Items 31 & 20).
3. Depressurize the CO2 line to the Multi-Plex until the pressure gauge (Items 19, 24 and 27) read 0 psig.
4. Unscrew the filter bowl (Item A) of the regulator (Item 23).
5. Inspect the inside of the bowl and white filter for discoloration.
6. If dirty, remove the filter (Item B) being careful that the check valve (Item C) and spring (Item D) don't get lost.
7. Wash and dry parts (Items A,C & D) and replace the filter (Item B)
8. Reassemble the parts.
9. Open the valves (Items 20 and 31) and repressurize the system by pushing the reset button (Item 25)
10. Switch back to the "B" side of the Multi-Plex.

Item 18 And 26-Regulator Seat And Poppet Replacement

Wear and foreign material can cause the regulator seats to leak and not hold pressure.



To Replace:

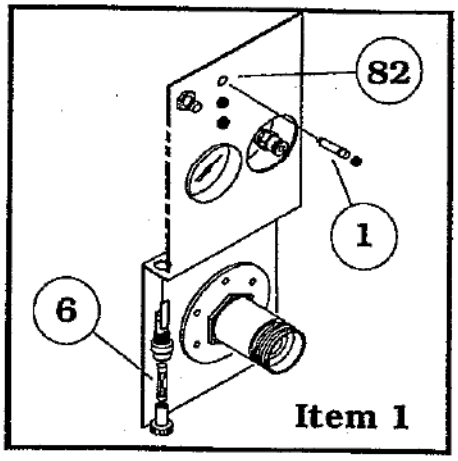
1. Switch to the "A" side of the CO2 selector valve on the Multi-Plex machine.
2. Turn off valves (Items 20 and 31)
3. Depressurize the lines until gauges (Items 19,24 & 27) read 0 psi.
4. Unscrew the bottom of the regulator (Item A).
5. Remove the spring (Item B) and poppet (Item C).
6. Inspect the seat (Item D) and poppet (Item C) for wear. Clean or replace worn parts.
7. Reassemble the regulator (Items 18 or 26).
8. Turn valves (Item 20 and 31) on and repressurize the system by pushing the reset button (Item 25).
9. Switch back to the "B" side of the Multi-Plex.

Item 1, 2 And 3- Level Indicator Light Replacement

The level indicator lights can be replaced from the front of the filling station panel without removing the panel.

To Replace:

1. Remove the fuse (Item 6) by unscrewing the holder 1/4 turn.
2. Unscrew the black knurled ring around the light to be replaced.
3. Pull the light straight out of its socket.
4. Look into the socket (Item 82) to find the alignment of the 2 pins.
5. The lights pins are off center slightly and if the light doesn't slip into the socket easily, turn it 180 degrees and try again.
6. Reassemble the parts and replace the fuse.



Item 1

Repair Procedure- for Components that Are Always Pressurized

Certain components are connected directly to the pressure vessel of the Carbo–400 tank. Isolation and ON/OFF valves (Items 14,17,22 and 31) connect to the pressure vessel so that other components can be removed without depressurizing the tank. The safety relief valves (Items 15 & 16) connect directly to the pressure vessel and are not isolated with a valve. The liquid level gauge (Item 91) is connected directly to the pressure vessel. When working on any component connected to the pressure vessel, remove the liquid and depressurize the system

To Depressurize:

1. Allow the Carbo–400 tank to go empty of CO2.
2. Turn the CO2 selector valve on the Multi-Plex to the "A" side for back-up CO2.
3. Vent the tank by connecting the fill hose to (Item 8) in the filling station and opening the fill hose vent valve.
4. Make sure both pressure gauges (Items 24 & 9) read 0 psi.
5. Vent the CO2 pressure from the Carbonator line and syrup line until gauges (Items 19 & 27) read 0 psi.

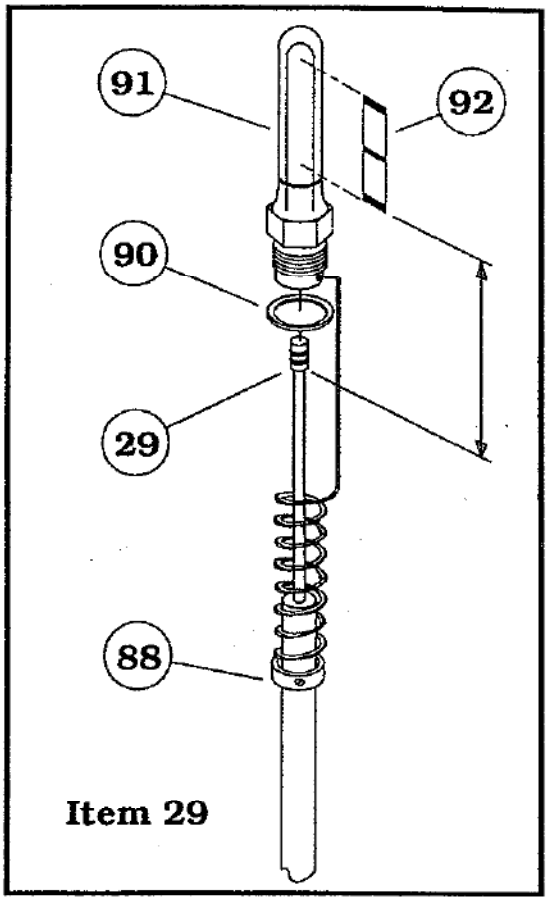
Item 29, 88 and 89 - Liquid Level Float Adjustment

The liquid level float operates by floating an aluminum float rod (Item 29) in the liquid CO2. The attached spring (Item 89) compensates for the weight of the rod and makes it buoyant in the liquid.

To Adjust:

1. Follow the depressurization procedures on this page.
2. Remove the sight glass protector (Item 28).
3. Unscrew the sight glass (Item 91) and lift it vertically out of the tank.

4. Hold the sight glass (Item 91) so that the float (Item 29) hangs down.
5. The bottom of the float indicator should be level with the lower mark on the decal (Item 92).
6. Loosen the spring collar (Item 88) and move it up or down to adjust the indicator. Retighten the collar and repeat step 4 through 6 until the float is adjusted properly.
7. Replace the 0-ring (Item 90) if necessary.
8. Slide the float assembly back into the tank and through the guide located inside the vessel. The guide keeps the float straight up and down. It is approximately 27 inches inside the tank.
9. Tighten the sight glass (Item 91) hand tight, until it stops. Now turn it 1/4 turn clockwise to seal it. (Approx. 80 inch/lbs.)
   Do Not Over Tighten.
10. Pressurize the vessel and leak check with snoop.
11. Reassemble the sight gauge protector (Item 28).
12. Fill the tank and switch back to the "B" side of the Multi-Plex selector valve.



Item 29

Items 14, 17, 22, and 31 Valves and 15 and 16 Safeties

To replace the following parts or any part connected directly to the pressure vessel.

To Replace:

1. Follow the procedure to depressurize the tank found on page 23.
2. Remove and replace the parts.
3. Pressurize the tank and leak check with snoop.
4. Fill the tank and switch back to the "B" side of the Multi-Plex selector valve.

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