Operation and Maintenance Manual

Manning Environmental Stationary Sampler Model 6901 Series

Model 6901 shown with optional 5 gallon glass bottle

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Manning
ENVIRONMENTAL • INC.

"Sampling Today's Water
for Tomorrow's World"

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Installation and Operation

INTRODUCTION

Congratulations on the purchase of a Manning Environmental, Inc. Model 6901 Sampler. The model selected is the latest in a long line of state of the art equipment produced for over twenty three years by Manning Environmental Inc. Based on this experience, if there is one thing Manning can claim it is that we know samplers. There are Manning samplers still used in regular service today that are over twenty years old. It is almost impossible to find an organization with the commitment of producing equipment with such a history of reliability, dependability, quality and value as exhibited by Manning samplers. Even so, improvement is a never ending goal at Manning. We are always interested in the perceptions and experiences of our users. If there are any suggestions or comments on our equipment, this manual, or anything Manning does, please feel free to contact us.

The unit was designed from the ground up with active user participation to ensure the features and options that are important to field use were incorporated into the unit. It employs a proven air compressor to draw the samples and an industrial grade refrigeration unit to cool and maintain them at the EPA recommended 4^0C. Backed by Manning's reputation for quality and dependability, it will provide years of reliable service.

Even if the sampler will not be used immediately upon receipt, unpack and examine it. This will help to familiarize the user with the equipment. Verify that all of the parts have been received and that no damage has occurred in shipment. If damage is noticed, immediately report the extent of it to both the transportation company and to Manning Environmental Inc. In addition, check the packing list to verify that it matches the items sent and that all accessories ordered are included with the shipment. Manning strives for 100 percent accuracy in the delivery of our equipment, but even with the most stringent quality assurance, mistakes do occur. Omissions, damage, or mistakes must be reported to Manning Environmental Inc. within 10 working days of receipt of the shipment.

This manual is designed to communicate a complete understanding of the equipment, its operation, maintenance, and functions. Manning recommends this manual and the equipment be examined completely before placing the unit into service. Manning's commitment to producing reliable, top quality products is legendary, but the possibility of breakdown or malfunction always exists. This manual should enable the diagnosis and solving of many potential problems. If the problem cannot be solved, please feel free to call our service department at 1-800-863-9337 to obtain help. Our first priority is making sure the experience with Manning equipment is an excellent one. In almost all instances the difficulty can be addressed over the phone, but in the rare instance it cannot, the equipment may need to be sent back to Manning for service. Please contact our customer service department at 1-800-863-9337 to obtain a Return Authorization Number. Then follow the shipping instructions that will be given. Please note the malfunction on the paper work so a diagnosis and a solution to the problem can be arrived at with the least amount of delay.

We recommend the following steps before attempting to use the sampler:

1. Review this manual.
2. Follow the instructions beginning on page 1-8 to assemble the 6901.
3. Set the time and activate a test cycle.
4. Program the 6901.

SECTION CONTENTS

HARDWARE

FUNCTIONAL SPECIFICATIONS:

Size	Height: 56.6 in. (145cm) Width: 23.8 in. (61cm)
Weight	Dry Weight: 160 lb (72 kg) with refrigerator
Environmental Protection	Nema 4X housing around electromechanical components.
Sample Cooling	Industrial Grade refrigeration unit.
Temperature Limits	0˚C to 50˚C (32˚F to 122˚F) without optional enclosure and heater.
Sample Pump	Diaphragm vacuum compressor pump.
Maximum Lift	26 ft (7.9 m).
Transport Velocity	Minimum of 5 ft/s at 3 ft of lift (1.52 m/s at 1 m) and 2.5 ft/s at 20 ft of lift (0.76 m/s at 6.1 m).
Sample Volume Accuracy Repeatability	Set directly in milliliters. Sample chamber is capable of holding 500ml at one time. A maximum of 2000ml can be collected using multiple chamber fills (maximum of 4) ± 0.5ml or ± 0.5% of the set volume, whichever is greater. ± 0.5ml or ± 0.5% of the average largest and smallest sample volume in a sample set, whichever is greater.
Controller Membrane Switch Electronics Internal Clock Internal Battery	Microprocessor based 2 board system which controls all functions of the unit. Ergonomically designed, hermetically Sealed, 24 key, multiple function, with 2 line by 20 character alphanumeric backlighted display. 100% Solid State. Indicates real time with ± 1min/month accuracy. 5 year internal lithium battery to maintain program logic, RAM memory, real time clock and date.
Power	STANDARD - 115 volt AC, 60 Hz. OPTIONAL - 220 volt AC, 50 Hz .
Optional Analog Input	4-20 mA

SUB-ASSEMBLIES

The sampler consists of three major sub-assemblies: the electronics enclosure, the refrigerator and the sample intake line (either a hose or flow-thru cell). As a unit, these sub-assemblies form an environmentally resistant enclosure. The sampler also has a wetted parts kit (type chosen by customer). Figure 1-1 illustrates the sampler components and their assembly.

Differences in Models

The original version of the 6901 sampler used internal components (compressor and valve) that were powered by Alternating Current (AC). The 6901AC sampler is easily identified by the red check valves located on the chamber top. Older samplers used brass air fittings on the compressor, valve, and chamber top. Current samplers use plastic quick-disconnect fittings.

The present version of the 6901 sampler uses an internal 12-Volt Direct Current (DC) power supply and its internal components (compressor and valves) use 12VDC. This allows for the use of common components between Manning's stationary and portable samplers. The 6901DC also functions better in situations where the AC line voltage is noisy or sags. The 6901DC does not use check valves on its chamber top.

The 6901 series sampler is available with either the standard 3/8" ID intake, or an optional 5/8" ID intake (6958). The 5/8" intake version has components that give the sampler a 5/8" ID flow path.

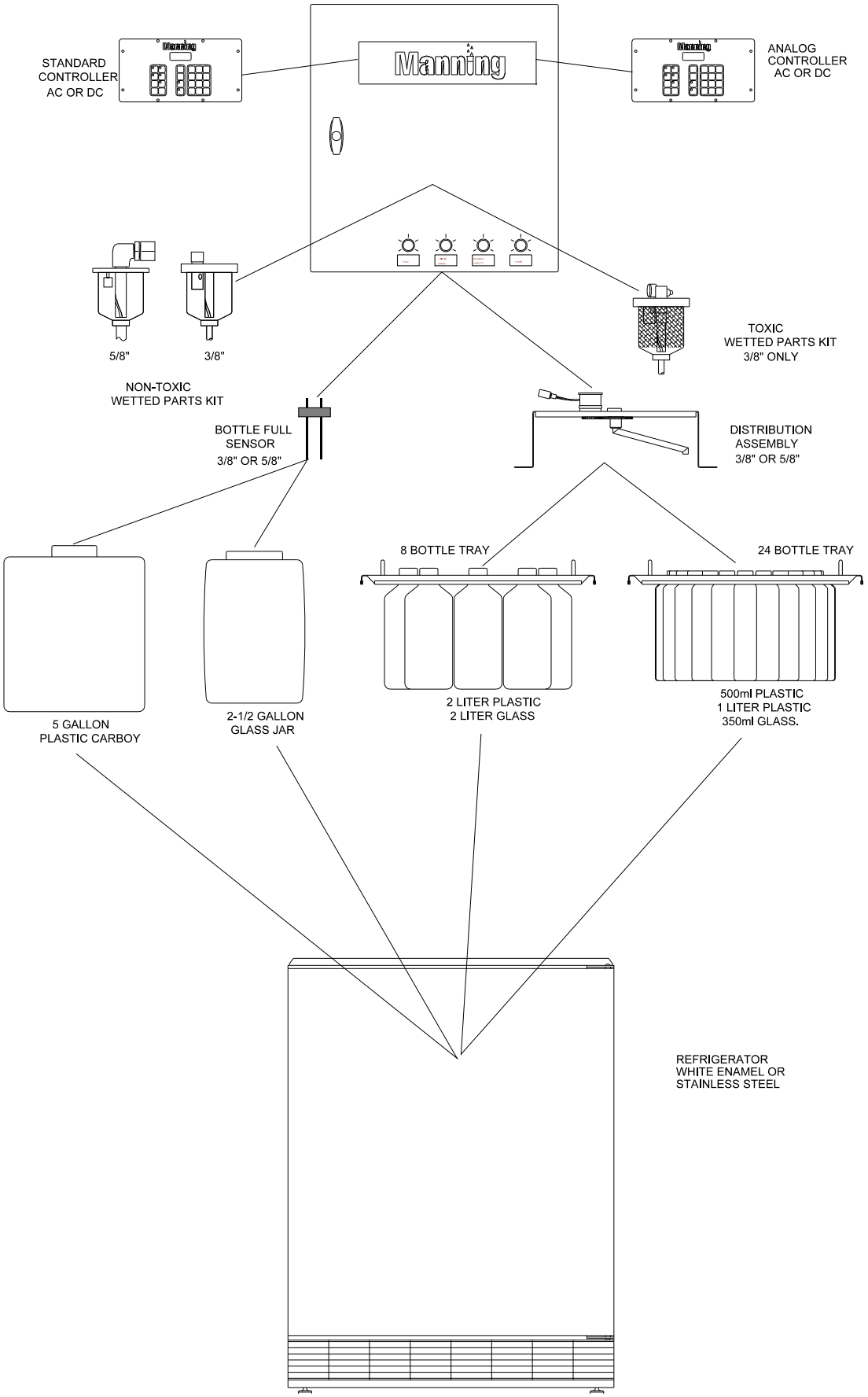


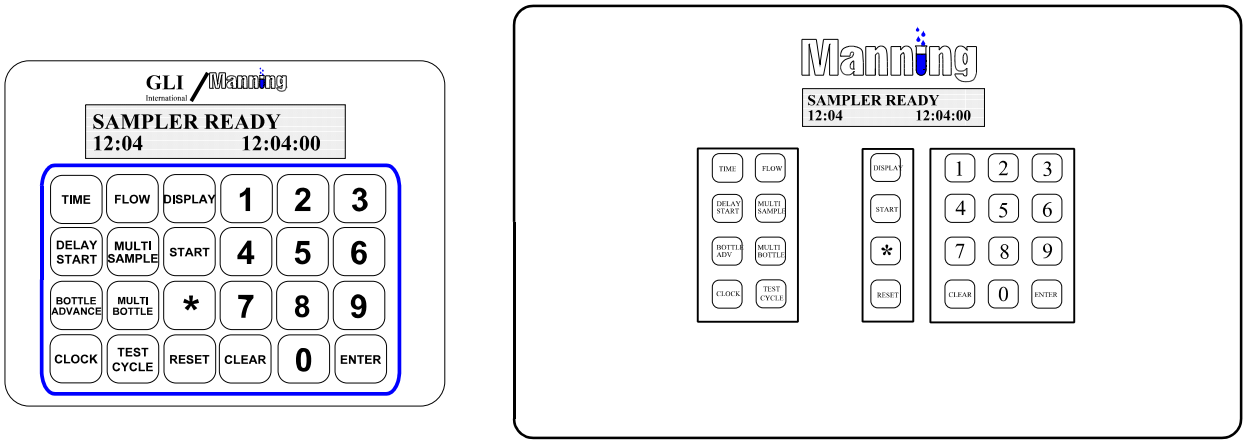
Figure 1-1 6901 Stationary Sampler Components and Assembly

Electronics Enclosure

The electronics enclosure includes the microprocessor-based controller, system electronics, the sample measuring chamber, and the vacuum pressure control components.

The Controller

The basic controller consists of a display, an audio indicator, a keypad and 2 circuit boards (Power I/O and Processor) all mounted on a rectangular aluminum backer plate. On samplers with the Analog Option, an Analog (4-20mA) board is also installed. The Power I/O (Input/Output) board converts outside power to the appropriate internal use, provides conditioning for the sampler's input/output signals, and controls the sampler's other electrical components (such as the compressor and valves). There are two versions of the Power I/O board- one for samplers with AC powered components, and one for samplers with DC powered components (current version). The Processor board contains a Z-180 microprocessor, Random-Access Memory (RAM) Read-Only Memory (ROM) memory, a Real-Time Clock (RTC), a back-up battery for the RAM and RTC, and other logic circuitry required for the controller to operate. The Processor interfaces with the keyboard, the display, the Power I/O board, and controls the audio indicator. On samplers with the Analog Option installed, the Processor board also interfaces with the Analog Board, which converts a 4-20mA signal into digital form for use by the Processor board. The keypad is a 24-key membrane switch mounted on the front of the rectangular aluminum backer plate which the operator uses to program and setup the sampler. The keys are clearly marked with their designated functions. The audio indicator proves audio feedback when a key is pressed and during certain sampler actions such as errors. The 2 line by 20 character back lighted Liquid Crystal Display (LCD) provides the operator with various sampler information during setup, programming, and operation. The audio indicator, display, and circuit boards are all mounted to the back of the controller's backer plate.



6901 Series Sampler Keypads- Current (left) and Older (right)

Refrigerator

The refrigerator is an industrial grade unit with the ability to cool and maintain samples at the EPA recommended 4ºC. Modifications have been performed on the refrigerator that enable it to withstand event the harshest environments. The condenser has been baked dip-coated with enamel and the copper refrigerant lines are coated with asphalt cork tape to prevent hydrogen sulfide gas from attacking the copper lines and the brazed joints. The thermostat is located inside the refrigerator which affords it additional protection from the environment. The evaporation coils and cabinet both have two coats of baked on acrylic enamel with the cabinet having the additional protection of an iron phosphate pre-treatment. Both the fan motor and the compressor are designed for greater durability and resistance to atmospheric attack. The unit boasts extensive insulation for maximum cooling retention, and a full perimeter magnetic door gasket with a urethane coating to resist corrosion and seal the cold inside. The door is also available with an optional locking hasp to prevent unauthorized entry. The refrigerator is available in either white enamel or stainless steel. The sample containers, suspension plate, and distributor arm for multiple bottle operation are located within the environmentally controlled chamber of the refrigerator.

Wetted Parts

Wetted parts are those pieces of the sampler that come in direct contact with the sample liquid. The main components of the wetted parts for the Manning Model 6901 are the intake hose and strainer; the measuring chamber; the discharge tubing/Spout; the bottle full sensor and the sample bottles. If the source liquid to be sampled is a non-priority pollutant (Non-Toxic) then all parts that touch the liquid are either PVC (Polyvinyl Chloride), medical grade silicone rubber, ABS (Acrylonitrile Butadiene Styrene) plastic, or Stainless Steel. Parts in contact with a sample source that is a priority pollutant (Toxic) are required to be Teflon® , glass, stainless steel, or medical grade silicone rubber. These materials are recognized and accepted as non- contaminating materials. This permits the sampling of a wide variety of toxic pollutants such as hydrocarbons and chlorine-based compounds.

Intake Hose

The 3/8" ID by 5/8" OD or 5/8" ID by 7/8" OD intake hose is constructed of either clear PVC (Polyvinyl Chloride), Nylon-reinforced PVC or Teflon® lined polyethylene. For most applications, a weighted strainer is attached at the end. Standard hose length is 10 feet (3.05 meters). Longer hose lengths are available.

Strainer

The 3/8" ID strainer is available in stainless steel, PVC, or silicone rubber. The 5/8" ID strainer is available in PVC only. By placing holes no larger than the hose ID (3/8" or 5/8") along the length of the strainer, the intake of large particles that can plug the hose or any part of the sampler is prevented. Since the strainer is also weighted, it keeps the hose inlet at the desired level in the source liquid.

Measuring Chamber

The measuring chamber is available in PVC for Non-Toxic applications or Glass for Toxic applications. A chamber top sits on top of the measuring chamber and holds the measuring chamber in place using two wingnut which are attached to threaded rods. The chamber top contains fittings for connecting the intake tube and air lines to the sampler. It also contains the

components necessary to adjust the sample volume. On toxic samplers, it is made of Teflon. The non-toxic chamber top is made from PVC. An O-ring is used to provide sealing between the chamber top and measuring chamber. The measuring chamber and chamber top are what allow Manning vacuum samplers to produce unmatched repeatability and accuracy of sample volumes

Discharge (Pinch) Tubing/Spout

The 3/8" ID or 5/8" ID discharge (pinch) tubing is supplied on both Single Bottle and Multiple Bottle samplers. With Multiple Bottle samplers, the discharge hoses extends into a spout which is constructed of PVC. The 3/8" ID spout is one piece. The 5/8" ID spout is a 2-piece "slider" design which allows the length of the spout to be adjusted. The Single Bottle units have the tube descend directly into the sample bottle. The discharge (pinch) tube supplied is always medical grade silicone rubber. The top of the discharge (pinch) tubing is attached to a chamber base which
the bottom of the measuring chamber sits on. An O-ring provides sealing between the chamber base and the measuring chamber.

Bottle Full Sensor

The bottle full sensor is only used on single bottle applications. It is a cylinder, with a hole in the middle, to allow the discharge (pinch) tube to pass through with a tight enough fit so that the sensor will not slide down the tube. Constructed of PVC, it has two stainless steel rods that protrude vertically downward from the main body of the sensor. The user positions the bottle full sensor in the container with the ends of the rods at the highest point water should be allowed to rise. Once the water level has risen and contacts the rods, a change in continuity is detected alerting the sampling unit that the liquid in the container has reached the maximum level allowed by the user. This ends the sampling cycle. There is one version for 3/8" units and one for 5/8" units.

Sample Bottles

The bottles are constructed of either HDPE (high density polyethylene), or glass. The glass containers are normally used in Toxic applications. The HDPE containers are used in Non-Toxic applications.

NOTE:	The sampler is field convertible from single bottle to multiple bottle or multiple bottle to single bottle. Contact the Manning Environmental Parts Department for assistance.

Single Bottle Sampling	Multiple Bottle Sampling
One (1) - 5 gallon HDPE pail One (1) - 5 gallon HDPE carboy One (1) - 2.5 gallon glass	Eight (8) - 2 Liter HDPE plastic Eight (8) - 2 Liter glass Twenty-four (24) - 500 ml HDPE plastic Twenty-four (24) - 1 Liter HDPE plastic Twenty-four (24) - 350 ml glass

Flow-thru Cell (for pressurized lines)

The flow-thru cell is used when a sample is desired from a pressurized line. By tapping the pressurized line fluid is forced into the cell. A valve moderates the amount of flow coming into the cell. The drain line prevents over-flow. On earlier models of the 6901, the flow-thru cell was mounted on the side of the sampler with a bracket. In its present version, the flow-thru cell is designed to be installed wherever it is most practical for the application (normally close to the pressurized source. The flow-through cell is available for 3/8" ID and 5/8" ID intake samplers. Figure 1-3 shows the flow-thru cell.

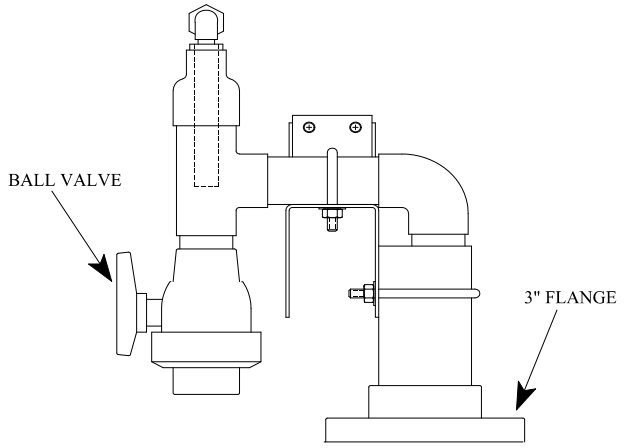


Figure 1-3 The Flow-thru Cell (older version- mounts to side of sampler)

ASSEMBLY

ASSEMBLING THE 6901 SAMPLER

Depending upon what components were ordered, the unit may be shipped with the major sub-assemblies disassembled to prevent damage during shipment.

Refrigerator

1. Locate the four feet for the refrigerator (they are in a small plastic bag inside the refrigerator, with the refrigerator owner's manual).

2. With the refrigerator empty, carefully tip it and screw a foot into the threaded hole in the bottom of each corner.

3. Adjust the feet so the refrigerator is level and does not rock.

Electronics Enclosure

NOTE:	Be careful not to scratch the painted surfaces. The surfaces are painted with corrosion resistant paint. Scratches in the paint minimize this protection.

1. Remove the four screws and lock washers from the top surface of the refrigerator.

2. Place the electronics enclosure on top of the refrigerator so the holes in the spacer bars line up with the threaded inserts in the refrigerator.

3. Replace the screws and washers and tighten the screws snugly.

4. Drop the grommet in the center hole in the electronics enclosure and refrigerator. The pinch tube and wiring are joined to the grommet and should be dropped through the hole also. Press the grommet down into the enclosure hole so the grommet flange rests on the bottom of the enclosure (see Figure 1-4).

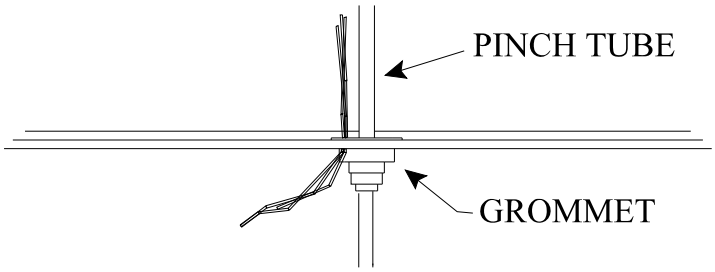


Figure 1-4 Grommet and Pinch Tube

INSTALLING SAMPLE CONTAINERS

Single Bottle Sampling

1. Center the sample bottle in the refrigerator.

2. Place the bottle full sensor ring at the desired height in the bottle.

3. Mate the bottle full sensor ring connector to the black rubber connector.

4. Run the pinch tubing through the center hole in bottle full cap.

Multi-Bottle Sampling

Suspension Plate Installation

Position the suspension plate so the handles are on the sides. Slide the plate onto the top rails in the refrigerator. The plate should be flush with the front of the refrigerator so it does not interfere with the drain trough in the rear.

Distributor Assembly

NOTE:	The short Silicone tube extension on the end of the spout is for use with all multi-bottle options except 2 liter plastic and glass. For samplers using these bottles, it is removed.

1. Verify that the timing marks on the spout gear align with the timing marks on the stepper motor gear (see Figure 1-5).

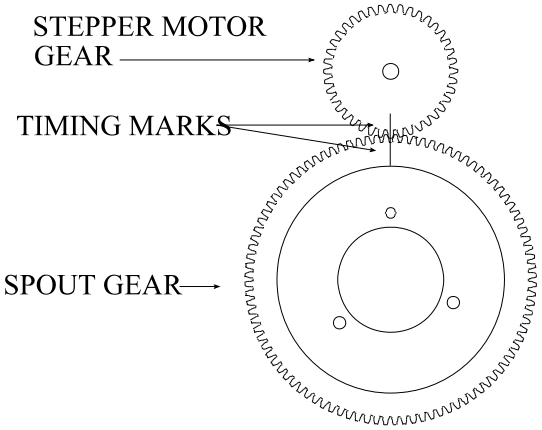


Figure 1-5 Timing Marks

2. Place the distribution assembly on the suspension plate with the plate handles poking through the slots in the distribution assembly.

3. Insert the discharge (pinch) tube into the upper union. For 3/8" ID samplers, pinch tube is inserted into the upper union until it is flush with the bottom of the union. On 5/8" ID

samplers, the upper union is machined so that the pinch tube will insert into it 1.2".

4. Mate the black rubber connectors. (Applying non-conductive grease will help if disassembly is required later.) See Figure 1-6 for an illustration of the distribution assembly.

There are wire racks inside the refrigerator so the distribution assembly can be positioned out of the way when removing the suspension plate and/or bottles. This makes it unnecessary to remove the pinch tube from the spout union or to de-mate the connector when removing the plate.

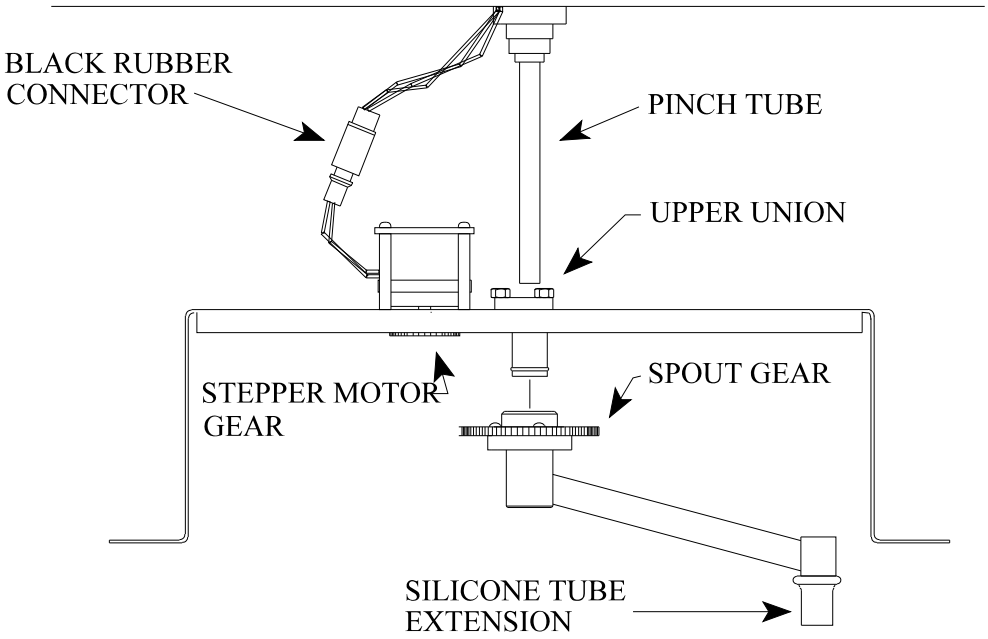


Figure 1-6 Distribution Assembly

Bottle Installation

The bottles can be installed with the suspension plate in the refrigerator, or the plate can be removed, the bottles installed, and the plate positioned back in the refrigerator.

Follow the instructions below for the type of bottles being installed.

Two Liter Plastic Bottles

To situate the two liter plastic bottles the adapter must first be positioned onto the suspension plate. The adapter is a 1.5" (inside diameter) plastic ring with a slit. The following steps communicate how to install the adapter and the two liter plastic bottles.

1. Find the slit in the side of the adapter. Turn it so that it looks like Figure 1-7:

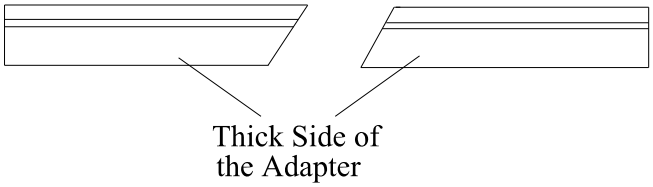


Figure 1-7 Slit in Adapter for 2 Liter Plastic Bottles

2. Press the two ends apart slightly.

3. The thick side of the adapter must be facing down toward the base of the suspension plate. Press the adapter into the hole in the suspension plate, starting with the end on the right side in Figure 1-7. If the adapter is oriented correctly, it will easily fit into the suspension plate.

4. Insert the sample bottle from underneath the suspension plate. Hold the bottle up so that the neck sticks out above the adapter. See Figure 1-8.

5. Screw the collar firmly onto the bottle. Repeat for all bottles.

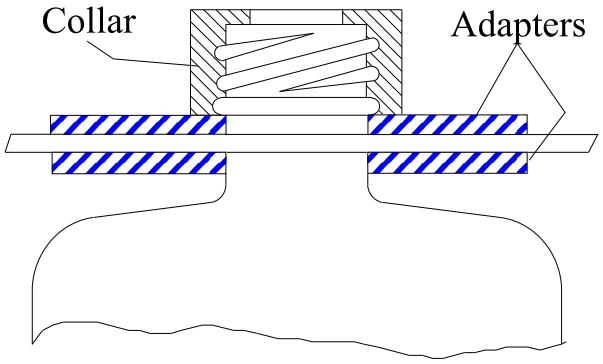


Figure 1-8 2 Liter Plastic Bottle Installed in Suspension Plate

NOTE:	The adapters must be removed from the suspension plate to install any other types of bottles besides 2 liter plastic.

Two Liter Glass Bottles

1. Insert the bottles into the holes from underneath the suspension plate.

2. Screw the collar onto the bottle to hold it in place. *Do not over*-tighten. See Figure 1-9.

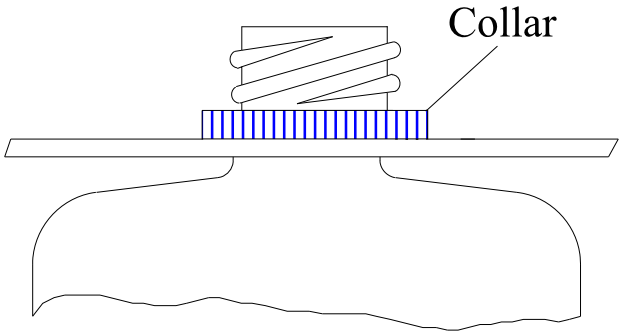


Figure 1-9 2 Liter Glass Bottle Installed in Suspension Plate

One Liter and Half-Liter Plastic Bottles

1. Insert the bottles through the larger part of the hole in the suspension plate.

2. Place the bottles so the smaller angled part of the bottles points in towards the middle of the case. Snap each bottle into place in the smaller part of the hole. Be sure the bottles are held below the threaded section. See Figure 1-10.

3. Secure bottles by placing the o-ring around them.

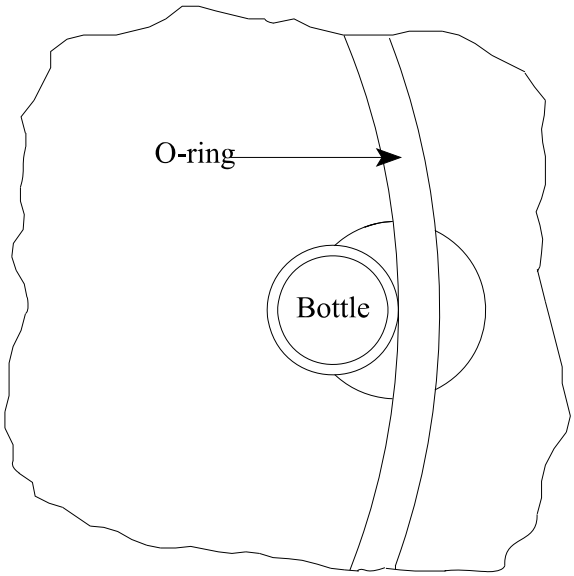


Figure 1-10 1/2 Liter and 1 Liter Bottles Installed in Suspension Plate

350 ml Glass Bottles

1. Remove the Teflon coated cap liners from the bottle caps and store them in a safe place.

2. Insert each bottle into the suspension plate from underneath the plate. See Figure 1-11.

3. Secure bottles by placing the o-ring around them.

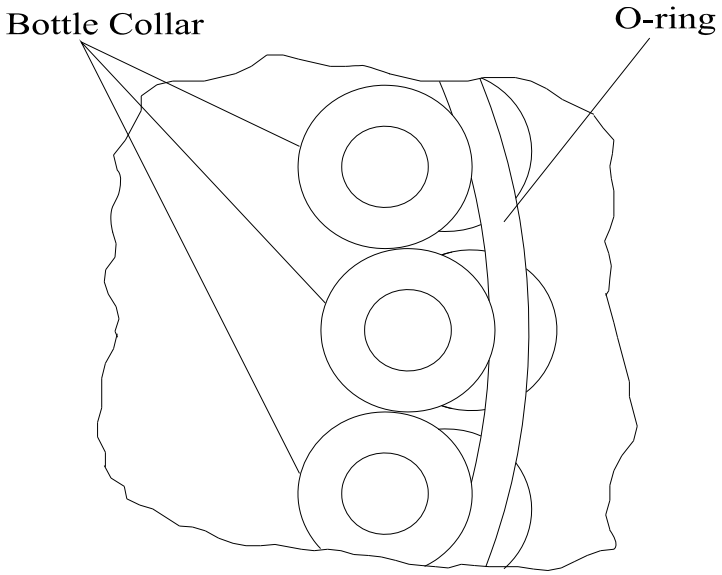


Figure 1-11 350 ml Glass Bottle Installed in a Suspension Plate

Spout Position

If the suspension plate was removed from the refrigerator, replace it. Place the spout over the last bottle in the series, since the first action of the sampling cycle is a spout advance.

INSTALLING THE SAMPLER

Install the sampler on a firm, level surface adjacent to the sampling point. If the sampler is installed outdoors, consider enclosing it in a shelter. The Manning can supply an optional full-size NEMA 3R insulated fiberglass enclosure designed for this purpose. The sampler must be positoned so that it is at a point higher than the head height of the liquid being sampled.

Connecting Power

The sampler requires a source of AC Power with ground. An AC power cord and 3-prong grounded (U.S.) plug is provided with the sampleri. For 220 VAC and international installation, the plug must be changed. If a refrigerator is being used, it is also proved with a 3-prong grounded plug, either U.S. 110 VAC type of U.S. 220 VAC type. If the sampler is being installed in a NEMA3R enclosure, the enclosure is equipped with a outtlet box. The sampler can also be hard-wired.

WARNING: Hard-wiring should only be done by a certified electrician.

Sample Intake Line

General Purpose/Non-Toxic Sampling Option

Attach the intake hose to the connector on the outside of the enclosure. On 3/8" ID units, this is a quick

disconnect fitting. On 5/8" ID units, this is a threaded connection.

Priority Pollutant/Toxic Sampling Option

1. Loosen the grooved nut at the center of the chamber top so that the compression fittings are free to move. Do not remove the knurled ring.

2. Insert the end of the intake hose (without the strainer) through the compression fitting on the enclosure wall, then through the knurled nut on chamber top, past the compression fittings, until it seats against the elbow.

3. Tighten the grooved nut finger-tight to seal and retain the intake hose. *Do not use pliers or over-tighten.*

4. Tighten compression fitting on the outside of the enclosure.

NOTE:	Rotating the hose back and forth along its axis helps get it past the compression fittings. Also, a slight chamfering or deburring of the hose end helps.

Figure 1-12 illustrates the insertion of the intake hose into the fitting at the chamber top for the priority pollutant option.

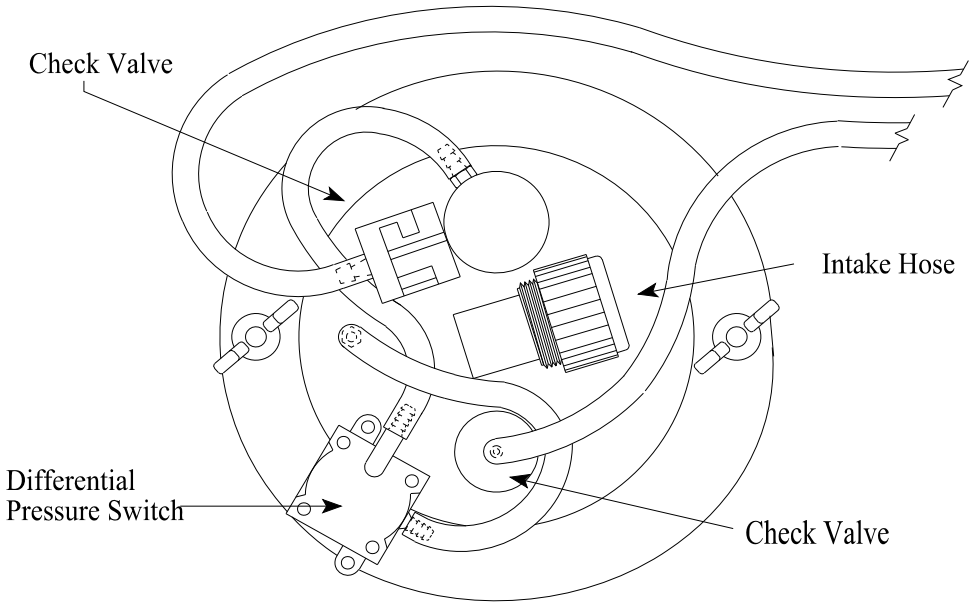


Figure 1-12 Insertion of Intake Hose into Chamber Top - Priority Pollutant Option

Intake Hose Placement

Place the intake hose strainer directly in the channel flow, not in an eddy or at the edge of the flow. In channels with debris, provide deflection to prevent clogging of strainer holes. The weight supplied with the intake hose is usually sufficient to prevent the intake from being pulled to the surface of a fast channel.

The correct vertical position of the strainer depends on the type of sample being taken. Placing the strainer at the bottom of the flow results in a heavier concentration of solids in the sample, while placing the strainer at or near the top of the flow results in heavier concentration of oils, fats, and other floating or suspended contaminants.

The intake hose should be positioned so the hose can drain between sample cycles and no low spots exist which would trap water. Figure 1-13 shows correct and incorrect hose placement.

Manning provides hoses in standard lengths (10, 25, 50 and 100 feet). In some instances it is necessary to cut the hose length down for a correct permanent installation. In these instances, remove the connector from the hose, cut the hose and then reinstall the connector. To aid in the reinstallation of the hose onto the connector, use a heat gun to carefully warm up the hose end, and then expand the hose end using a pair of round-nose pliers.

In installations where the temperature will drop below freezing for extended periods of time, covering the hose with insulation may be necessary to prevent icing. Shielding the hose from sunlight will help prevent build-up of algae inside the hose.

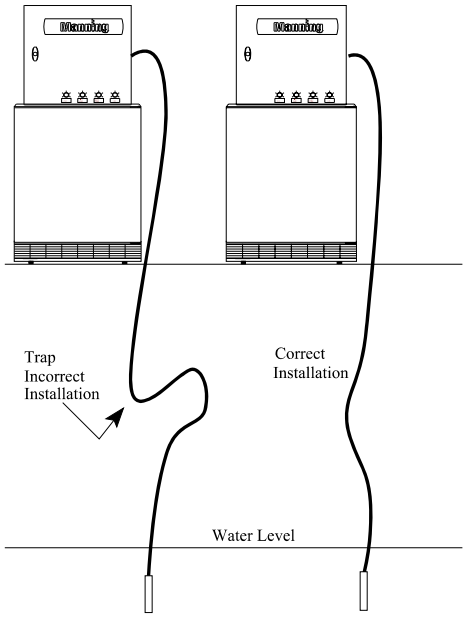


Figure 1-13 Intake Hose Placement

Flow-thru Cell Sampling Option (Old Version)

1. Mount the flow-thru cell on the side of the enclosure using the hardware provided (the flow-thru cell can be ordered with either a left or right mount). See figure 1-14.

2. Loosen the knurled nut on the flow-thru cell elbow. Slip the intake hose through the nut until it seats against the elbow. Tighten the knurled nut. *Do not use pliers or over-tighten.*

3. Attach the incoming 1-1/2" pipe to the valve.

4. Secure the 3" flange to the drain line.

5. Adjust the valve so the flow does not exceed 50 gpm at 50 psi maximum.

NOTE:	If the flow exceeds 50 gpm, back pressure will build up and the fluid will flow directly into the chamber. If the flow is lower than 1 gpm, sample size will be irregular.

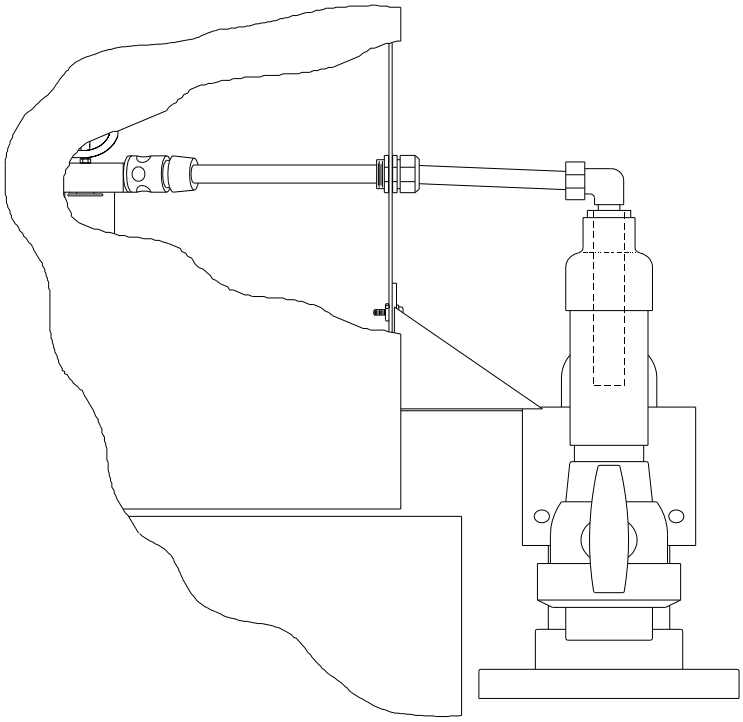


Figure 1-14 Flow-thru Cell Installation

Flow-Thru Cell Sampling Option (Present Version)

See instructions that accompany the flow-thru cell.

RUNNING A TEST CYCLE

Manning recommends running a test cycle to assure proper operation and to become familiar with the various functions and modes of operation. Since the sampler type and number of bottles were pre-configured for the unit at the factory, run a test cycle before programming any operational modes into the sampler.

1. Turn the main power switch on the central panel to the "ON" position.

2. If the multi-bottle option is being used, rotate the spout so it is over a bottle.

3. Submerge the strainer of the intake hose in a container of clean water. The amount of water should be enough to keep the strainer covered completely for several test cycles.

4. Press the TEST CYCLE key, then the ENTER key on the keypad to initiate the test cycle.

SETTING THE SAMPLE SIZE

1. Remove the two wingnuts securing the chamber top and lift the chamber top slightly.

2. Twist the spiral (outer) tube so its opening aligns with the slit in the slotted (inner) tube at the level corresponding to desired sample volume. See Figure 1-15. Make sure the sleeve stays seated up against the bottom of the chamber top.

3. Replace the chamber top and verify the alignment with the graduations on the chamber.

4. Replace the wingnuts and tighten finger-tight, making sure all o-rings are evenly compressed and will seal.

5. Activate a test cycle.

6 Measure the sample deposited.

7. Repeat steps 1 - 6 as needed to fine-tune sample volume.

NOTE:	The sample can be collected in the containers, or the distribution assembly can be removed and the sample collected in a beaker.

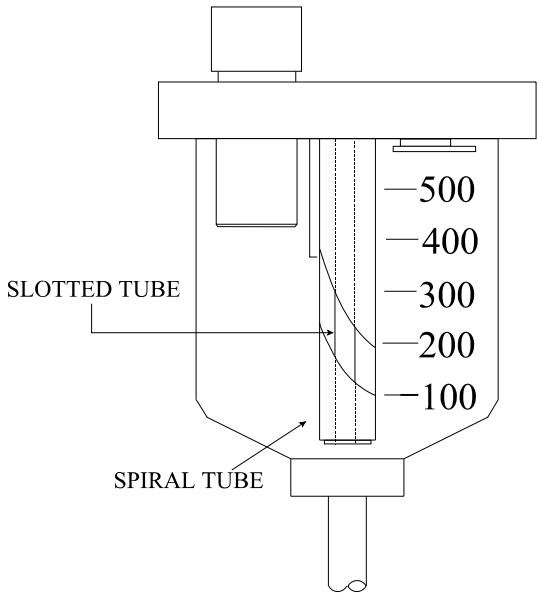


Figure 1-15 Setting Sample Size

THE SAMPLING CYCLE

There are two types of sample events. The first is time-based. In this type a time interval is defined and the sampler places a sample in each bottle based on that time interval.

The second type of sample event is flow-based. In this type an external flowmeter provides one of two types of signals: a contact closure when a specified amount of liquid has flowed past the measurement point; or with the analog option, an analog signal proportional to flow rate.

Whether the sample event is triggered by a flowmeter or by a time interval, the actual sampling cycle is the same. For the multi-bottle option, the first action is the advance of the spout to the next bottle. (For single bottle samplers, this step is omitted.) Next, the sampler activates a solenoid underneath the measuring chamber which causes a bar to pinch the silicone discharge tubing (pinch tubing). This seals off the bottom of the chamber. Then the sampler turns the compressor on, which forces pressurized air into the chamber and through the intake hose to purge the line of any contents or obstructions. This is called the "purge." When the purge is complete, the controller actuates valve(s) (one 4-way valve in AC units, two 3-way valves in DC units) which switches the vacuum side of the compressor to the chamber. The suction created draws fluid into the chamber. When the chamber is filled a sensing device (either a differential pressure switch or a magnetic float switch) signals the controller to switch back to purge. The fluid is purged to the specified volume, the pinch solenoid is releases and then the fluid is depositedr into the sample container. If a full chamber is not sensed, the sampler makes another draw attempt. If after two attempts a full chamber is still not sensed, the sampler stops the cycle until the next sample event.

If the multi-bottle option is being used, the distribution spout remains stationary until the next sample event. This delay prevents cross-contamination of the next sample.

SAMPLE RECOVERY

Immediate sample recovery is not required since the sampler will automatically shut down when the sample container is full (single bottle only), or when the program is complete. However, sample analysis may require quick recovery to maintain sample freshness or to add chemicals.

If the sample containers are to be left in the suspension plate, install the caps over the suspension collars. Then remove the suspension plate (with bottles) from the refrigerator. Lift the distribution assembly off the suspension plate and place it on the wire racks mounted in the refrigerator.

It may be easier to remove the distribution assembly first, and then install the bottle caps. To seal the 350 ml glass bottles, replace cap liners, place the caps on bottles, and put the collars in a safe place for later use.

EXTERNAL CONNECTIONS

DANGER: Turn the sampler off at the power switch and unplug the power supply before making connections. There is power on the terminal strip even with the power switch (circuit breaker) off.

Injury can result if the power is present when connections are made.

External Connections To The Sampler

Connecting external devices such as flowmeters to the sampler is accomplished by attaching wires to the appropriate terminals on TB2, located in the back of the sampler. See Figure 1-16. On samplers with the Analog option, a short pigtail is attached to TB2-5 and TB2-11 and routed through the upper water tight fitting on the right hand side of the sampler. On all other samplers, the pigtail is attached to TB2-9 and TB2-10 (Contact In). If local electrical wiring codes do not allow for the use of the pigtails, they can be removed and wires can be attached directly to TB2 terminals through the watertight fitting. Below is a description of the various input and output signals available at TB2:

Serial Out (TB2-1, TB2-6). On samplers equipped with the Serial Out option, data log information can be downloaded to a computer or other serial device. See the *91 in the Programming Section for more information. Signal ground is provided by TB2-6.

End of Sequence (TB2-3 to TB2-7). This is relay contact output that closes momentarily at the end of a sampling program sequence. The relay contact is rated at 10VA.

Analog In (TB2-5 to TB2-11). On samplers equipped with the Analog Option, a 4-20mA signal from a flowmeter is connected to this input so that the sampler can be programmed to take flow-paced samples based off the signal. TB2-5 is the positive side and TB2-11 is the negative side. The connection will place 250 Ohm load on the current loop.

+5 Volts (TB2-4). This is a +5VDC output current limited to 100mA. It is provided for interfacing with devices that require a logic pull-up signal.

Signal Ground (TB2-6). This a signal ground point for use with Serial Out and Remote Start In.

Contact In (TB2-9 to TB2-10). This is an input signal from an external device such as a flowmeter for triggering samples when the sampler is programmed one of the Flow (non-analog) programs. A "dry" contact or switch closure (resistance less than 500 Ohms) that stays closed for a minimum of 250 milliseconds is required. If the input device uses a polarity-sensitive switching device, then the postive side is connected to TB2-10 and the negative side to TB2-9. The external device's output cannot be connected to any other device besides the sampler (i.e., you cannot use one set of relay contacts to trigger two samplers).

Contact Out (TB2-8 to TB2-12). This is a relay output that closes momentarily at the end of a sample event (cycle). The relay contact is rated at 10VA.

Remote Start In (TB2-14). This is an input that allows a sampling program to be started by a remote device providing a momentary "dry" contact closure. This acts the same as pressing the <START> button on the keypad. The input requirements the same as for Contact In. If the input device uses a polarity-sensitive switching device, then the positive side is connected to TB2-14, and the negative side is connected to TB2-6. One sampler can remote start a second sampler by connecting Sequence Complete from the first sampler to Remote Start on the second sampler.

Note: In areas where there is the possibility of lighting activity, surge suppression devices should be installed to protect the sampler. This is especially important in current loops.

Alarm Option

Connections for the Alarm Option are covered in Appendix F.

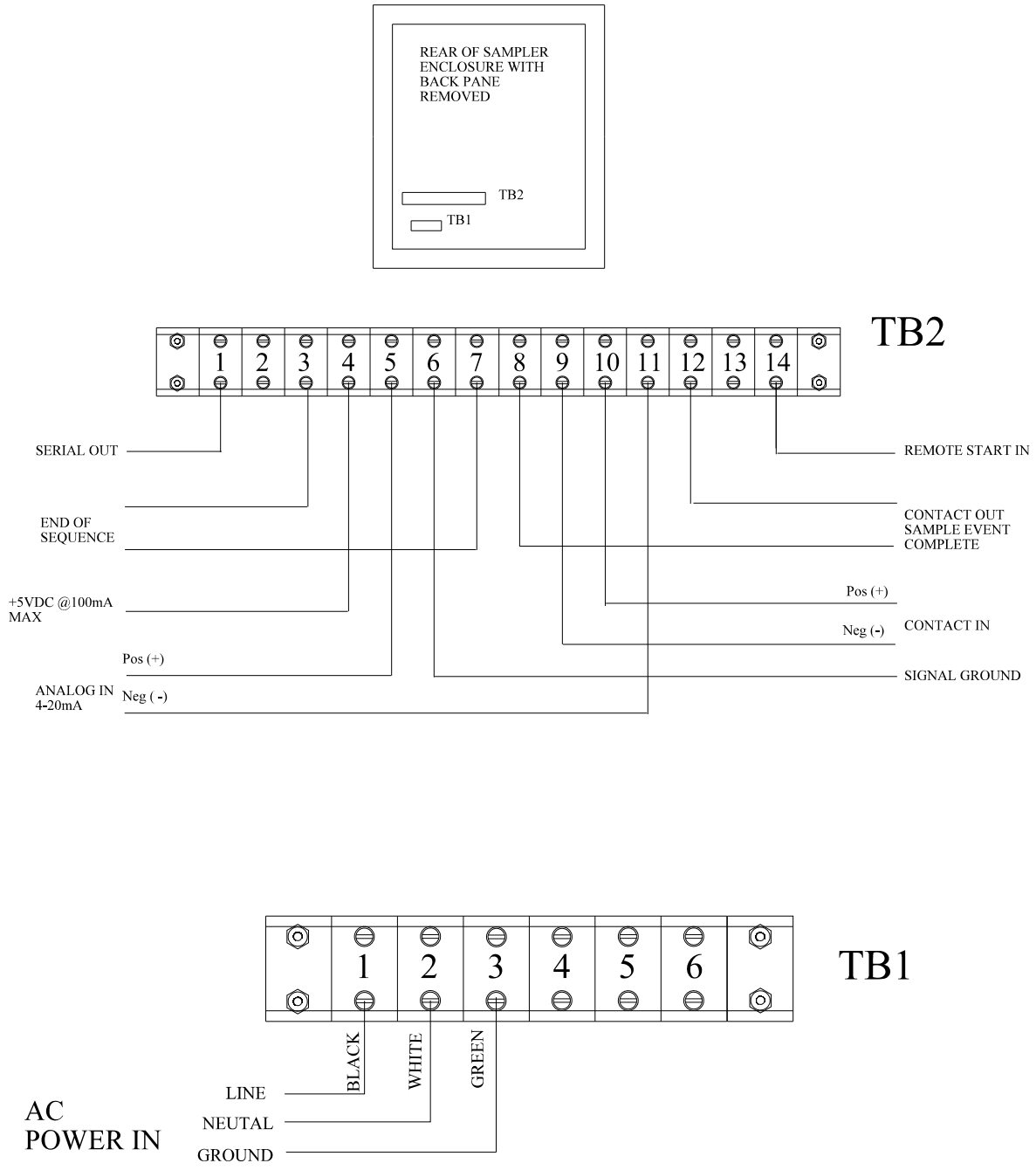


Figure 1-16 External Connections/Interface

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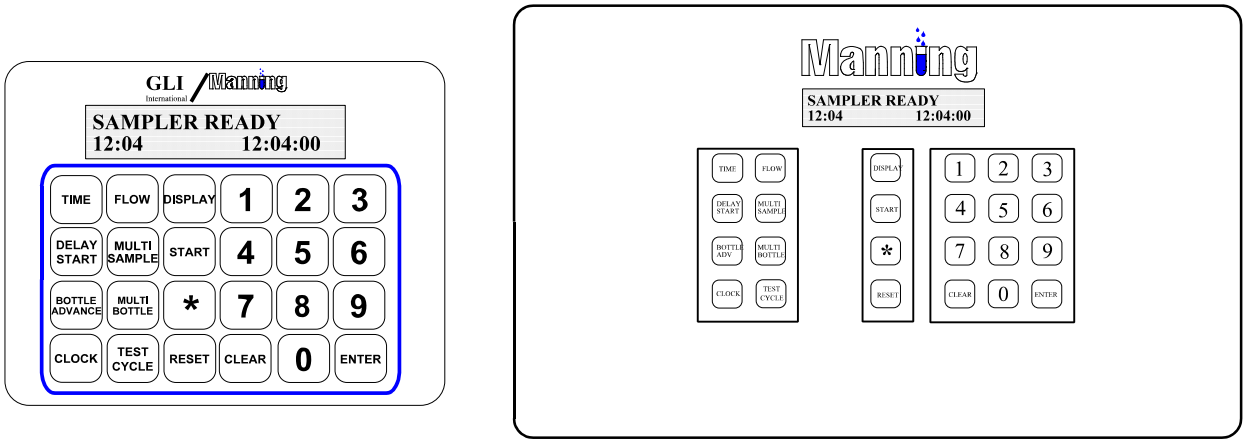
Programming

INTRODUCTION

The sampler is controlled by a microprocessor that can execute a wide variety of time and flow sampling sequences called Modes. Entries are made through a keypad (Figure 2-1) with prompts displayed on a 2 line by 20 character back-lighted LCD (Liquid Crystal Display).



Current Version **Older Version**

Figure 2-1 Manning 6901 Keypads

SAMPLER CONFIGURATION

For the sampler to function properly, it must be set-up for the specific application in which it will be used. The *99 Function configures the sampler. Configuration defines multiple variables that do not usually change between different applications. These are such things as the type of sampler (single or multiple bottle), the number of bottles, and other factors like draw time, and purge time. Instructions for configuration of the sampler begin on page 2-7.

SAMPLING MODES

The sampler has two basic Modes: Time and Flow. (NOTE: While referred to as Flow Mode, the sampler can actuate based on signals from any external device. What device or why the device is supplying the closure is transparent to the sampler. The sampler simply registers a contact closure, so actuation can occur based on pH, ORP, Level, Flow, or other parameters. Time mode is based on a preset time period that must pass before a sample is taken. Flow mode has two variants. The standard controller (contact closure

pass before a sample is taken. Flow mode has two variants. The standard controller (contact closure option) allows sampling based on contact closures from an external device. The analog controller (4-20mA option) allows sampling based on an analog signal totalized by the sampler's controller. All programs (or Modes) available for the Model 6901 are based on either Time or Flow. Instructions for programming the different Modes begin on page 2-17.

Multi-Bottle Sampling Modes
All of the programs or Modes can be used with multiple bottle samplers.

Single Bottle Modes
All General Programs (Basic Time and Flow Modes)
*02 Time Interval Override Mode
*04 Multiple Time Intervals Mode
*05 Totalizing Analog Flow Mode
*06 Totalizing Analog Level Mode

SECTION CONTENTS

UTILITY & DISPLAY FUNCTIONS

Key	Function
<RESET> <RESET>	Functions as a Reset (a soft boot in computer terms) for the sampler and clears the current program mode.
<TEST CYCLE>	Allows the user to check the sampler for mechanical operation by taking a physical sample. The operator is prompted for the number of Test Cycles (1-99, with the default being 1) to run. Test Cycle can also be used for taking an immediate (grab) sample.
<BOTTLE ADVANCE>	With Multi-bottle samplers, advances the spout clockwise 1 bottle each time the key is pressed momentarily. If the key is held down, the spout will continue to be advanced until the key is released. This function does not work when a program is running.
<CLEAR>	Clears invalid or incorrect entries before <ENTER> has been pressed. Also allows the user to step the cursor back 1 movement, clearing entries each time the key is pressed.
<CLOCK>	Sets the time on the sampler's internal clock.. To set the time, the sampler must not be running a program(the display reads SAMPLER READY). Press <CLOCK> , enter the time and then press <ENTER>. NOTE: All times are entered and displayed in 24 hour HH:MM format. For example, 6 hours would be entered as 0600 and a real time of 3:30 p.m. would be displayed as 15:30.
<DISPLAY>	Shows current program or configuration information. The information displayed depends on whether the sampler is running a program or not. If the sampler is not running a program (the display reads SAMPLER READY), pressing <DISPLAY> will show the configuration settings input in *99. If the user is in a programmed mode (e.g. a TIME, FLOW, or * Mode), pressing <DISPLAY> will show the current time, spout position(if multi-bottle) , and other information specific to the current mode. NOTE: See Appendix B for a Logic Map of the Programming Modes and what displays are active when the Display key is pressed.
*****	Used to program Star Modes.
EEEE	Indicates an error condition has occurred. Press CLEAR to reset, and re-enter the data.
KEY NOT ACTIVE	Indicates the key pressed is not active at the current time. For example, pressing an number key when the display reads SAMPLER READY will cause the sampler to display the KEY NOT ACTIVE message momentarily.

POWER GLITCH This is displayed momentarily when input power to the sampler controller momentarily goes dips(goes low and then recovers). This may occur at the beginning of a sample cycle if input power is low. This can also indicate that a sampler component is drawing an excessive amount of current.

POWER FAILURE This is displayed momentarily when input power to the sampler goes low and stays low or is turned off.

SAMPLER READY This is displayed when the sampler is on and not in an sampling program.

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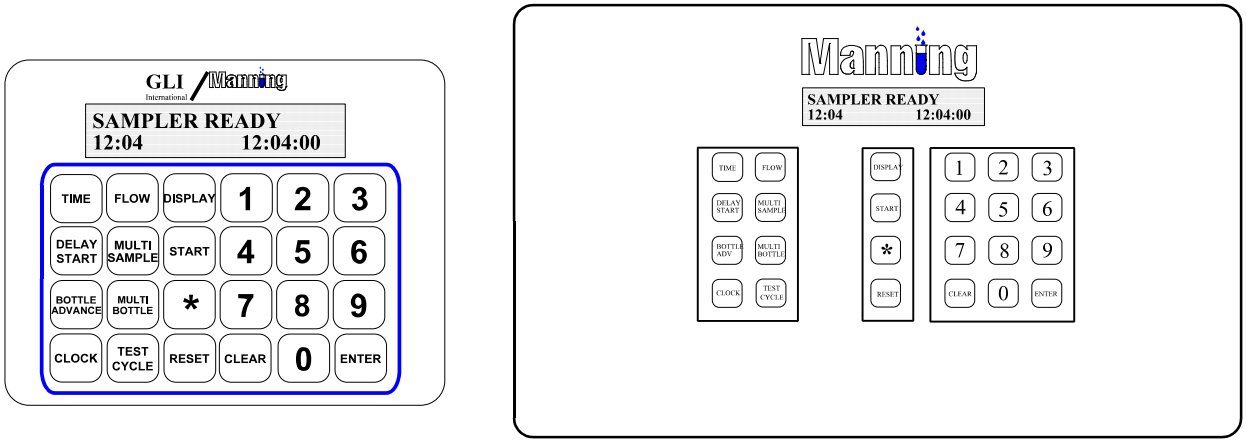

Current Version **Older Version**

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SAMPLER READY This is displayed when the sampler is on and not in an sampling program.

DISPLAY INFORMATION

The Manning sampler is capable of displaying a wealth of information through the 2 line by 20 character display. The following describes the functions and how they can be of benefit to the user:

TIME OF DAY — The time of day is always displayed in the bottom right hand corner of the display. The format is a 24 hour clock HH:MM:SS. If the display is not counting down the seconds, the controller may have quit functioning. Press <RESET> <RESET> to warm boot the system. If this does not clear the problem, please call Manning at 1-800-863-9337.

PROGRAM STATUS — The bottom left hand corner of the display is used for indicating miscellaneous program and functional information. The information displayed here varies depending on the operational status of the active program. The following highlights the function of the display in different modes:

Sampler Ready:	Shows time of day in HH:MM format (24 hour clock)
Programming:	In programming situations, the display is used for entering the data required by the particular mode that is being programmed.
Active Program:	The information displayed depends on the type of program and the status of that program. When a time is shown in this section of the display it is signified by a flashing colon. The time shown may signify time to sample, time override, purge time, draw time, or other times associated with the program. All time displays are in HH:MM format, except for configuration function times (draw time, purge time, measure time, deposit time) and *07 DELAYED SAMPLE EVENT MODE which are shown in MM:SS format. Non time displays are characterized by a 4 digit display which does not posses a flashing cursor. The information relayed here may be the sample number or the bottle number depending on the active program and its state.
Configuration:	See Appendix B for more information.
Operational:	See Appendix B for more information.

Display Bottom Line Status Information

The information displayed on the bottom line of the 2 by 20 line display is divided into three fields with one space between fields. These fields proved the operator with information about the status of the sampler. The first field (positions 1 thru 5) is used for a variety of information depending on the active program. The second field (positions 6 thru 11) is used to display status information. Field 2 is detailed below. Field 3 (positions 13 thru 20) displays the real time clock in a HH:MM:SS format.

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
S	A	M	P	L	E	R		R	E	A	D	Y							
FIELD 1					FIELD 2							FIELD 3							

Sampler 2 x 20 LCD Display

Field 2

Field 2 consists of 6 character positions (6,7,8,9,10,11). The matrix below details what characters appear in what positions. Each position is either blank or contains one character.

Field / Character	6	7	8	9	10	11
Midnight Switch *16	M					
Active Time Period *15		A				
Multi-Sample			S			
Multi-Bottle			B			
Delay Start-Time				D		
Delay Start-Pulse				P		
Flow					F	
Analog					A	
Time						T

Here are some examples of the Field 2 data:

Display on LCD	Explanation
SAMPLER READY **10:04M 10:04:00**	The sampler is not in a active sampling program, but the Midnight Switch (*16) has been set on. ("M" in 6th position of second line)
TIME **01:00 AS T 10:04:10**	The sample is programmed in a Time sampling program, has an Active Time period set, and has been programmed for Multiple Samples per Bottle.
FLOW (*05) **01:00 A 10:04:20**	The sampler is in the Analog Totalizing sampling program (*05).

*50 DISPLAY SOFTWARE VERSION

This program allows the operator to view the sampler software version (date). The software version is also momentarily displayed whenever the sampler is Warm-Booted by pressing <RESET> twice.

Display on LCD	Explanation
SAMPLER READY **10:04 10:04:00**	This display shows the sampler is ready to program. It displays the current time. Press the <*> key.
ENTER * MODE **_ _ 10:04:10**	Prompts the user to enter a program or configuration function. Press 50 and <ENTER> to display the sampler software version (date).
VERSION 7/15/98 **0050 10:04:20**	The display will change to show the version(date) of the software for 3 seconds.
SAMPLER READY **10:04 10:04:30**	The display then changes back to the SAMPLER READY prompt and is ready for further programming.

SAMPLER CONFIGURATION FUNCTIONS

*99

*99 allows the user to set the sampler's configuration. For proper operation, it is critical the unit is correctly configured. The memory comes preset with the sampler's defaults. These defaults can be reviewed or changed by entering the configuration mode (explanations and step-by-step instructions are given below). Once entries have been made in *99, re-entering the configuration mode is not necessary unless changes in the data are needed.

Display on LCD	Explanation
SAMPLER READY **10:04 10:04:00**	This display shows the sampler is ready to program. It displays the current time. From here the user can enter any TIME, FLOW, or * Mode. Press the * key to access the * Mode.
ENTER * MODE? **_ _ 10:04:00**	Prompts the user to enter either a program or the configuration function. Press 99 and <ENTER> to configure the sampler.
SAMPLER SETTING? **— 10:04:00**	Sets the sampler to a specific type of operation or bottle configuration: 1 = Single Bottle 2 = Multi-Bottle Enter the desired configuration and press <ENTER>. The default is 2 (Multi-bottle sampler).
# OF BOTTLES? **— — 10:04:00**	Sets the number of bottles (2,3,4,6,8,12, or 24) being used by the sampler in multi-bottle mode. If 1 was selected for the SAMPLER SETTING above, this prompt is bypassed. Input the number of bottles and press <ENTER>. The default is 24.
PURGE TIME? **— — 10:04:00**	Length of time (3-99 seconds) the intake line is purged before a sample is taken. Press <ENTER> to accept the default purge time or input a new 2-digit number. If air bubbles are not coming out of the intake line, or if fluid is visible in the line after the purge has been completed, increase the purge time. The default is 9 seconds.

DRAW TIME?
— — — **10:04:00**

Time window (4-150 seconds) during which a sample is drawn. Press <ENTER> to accept the displayed draw time or input a new draw time as a 3-digit number and then press <ENTER>. If the sample fluid does not reach the liquid sensor, causing the sampler to move from drawing to measuring the sampler, increase the draw time. The default is 30 seconds. NOTE: This time is the maximum time that the sampler will attempt to draw a sample. If the fluid sensor has not been triggered(i.e., the measuring chamber is not filled), the sampler will purge the line and attempt to draw the sample again. If a sample cannot be taken after the second draw time has expired, then the sampler will log a missed sample.

MEASURE TIME?
— — **10:04:00**

Time window (3-99 seconds) during which the sample is purged to the specified volume. Press ENTER to accept the measure time which is displayed or input a new measure time as a 2 digit number and then press ENTER. If the sample size is not purging to the specified volume, the measure time needs to be increased. The default is 9 seconds.

DEPOSIT TIME?
— — **10:04:00**

Time window (3-99 seconds) during which the sample is deposited in the bottle. Press ENTER to accept the time shown or input a new time as a 2 digit number and press ENTER. A longer deposit time will force the fluid into the bottle quicker. If the sample container is being filled almost completely, then the deposit time should be decreased to allow the fluid to gravity-feed into the container. The default is 8 seconds.

 # OF CHAMBER FILLS?
— **10:04:00**

The number of times (1-4) the 500ml measuring chamber is filled and deposited into a bottle, per sampling event. (Only one chamber fill is performed during a test cycle). Press ENTER to accept the number of chamber fills shown or input a new number of chamber fills and press the ENTER key. The default is 1.

AUTO RESTART?
— **10:04:00**

Sets the auto restart mode: 0 - No auto restart; 1 - auto restart activated. This option will restart the sampler and continue the program that was running, if power fails. It stores parameters, ensures orderly shutdown, and stores enough energy to complete any stepper motor steps in progress. If 0- no auto restart is selected, the sampler will reset when The default is 1- auto restart activated.

TEST CYCLE MODE?
— **10:04:00**

Sets the test cycle mode. Press <ENTER> to accept the default or input a new number corresponding to the manner in which test samples are to be taken:
0 - Only when the sampler is not running a program.
1 - In a program, but the sample does not count in the program.
2 - In a program, and the sample counts in the program.
The default is 1.

KEYPAD BEEP MODE?
— **10:04:00**

Sets whether the keypad beeps when keys are pressed:
0 - No beep 1 - Will beep.
Press <ENTER> to accept the setting shown, or input a new number and press <ENTER>. This also controls what is displayed during an analog program if the unit has the optional analog controller. These displays are explained in detail in the Analog Programming Section on page 2-8. The default is 1.

BACKLIGHT MODE?
— **10:04:00**

Sets whether the display backlights:
0 - Backlight is never on. This is good if power conversation is critical.
1 - Backlight comes on when a key is pressed. The light will automatically turn off after 10 seconds if another key is not pressed.
2- Backlight comes on when a key is pressed and also at the start of a sampling cycle. The light will automatically turn off after 10 seconds if another key is not pressed or another sampling cycle is not initiated.
3- Backlight is always on. This choice will quickly run down a battery.
The default is 1.

ENTER PASSWORD
— — — — **10:04:00**

Creates a password to stop unauthorized access. There are 2 options:
A. Press <ENTER> to accept no password - 0000 (default shown)
B. Enter a 4-digit number at the prompt and press <ENTER>. The user will be prompted to verify the password. Enter the same 4 digits and press <ENTER>. This sets the password. **RECORD** the numbers. To change a password, enter *99 mode and input the 4 digit numeric password at the PASSWORD PROTECTION prompt. Press <ENTER>. The user can now go into *99 and at the ENTER PASSWORD prompt, create a new password.

Note: Use a TEST CYCLE setting of 0 if TEST CYCLE is to be password protected while a program is running.

If the password is forgotten, call the Manning Service Department at (800)-863-9337.

After finishing the Configuration Mode, the sampler will return to the Sampler Ready prompt and the current time will be displayed. Configuration is now complete, and the sampler is ready for programming.

*91 Data Logging

The * 91 mode is the data logging function for the Manning Environmental, Inc., sampler family. The data logging function is always active, and will continuously record events and sampler activities as they occur. The system performs a bound checking function on entries. This ensures that entries which exceed the limits placed in the system are not accepted. If this happens an EEEE will appear on the display. The user simply presses <CLEAR> to remove the EEEE and is then able to continue to enter numbers. The sampler's memory holds up to 512 entries in battery backed RAM, so in case of power loss the unit will not lose logged events. If a 513th entry occurs, the unit will display a LOG FULL message and that entry and subsequent events and activities will not be recorded until the log is cleared. The unit will display the logged data on the 2 line by 20 character backlighted LCD display. The data is displayed in a coded format so the maximum amount of information is available on the screen. The codes are explained in the view menu. The *91 mode can only be entered from the SAMPLER READY prompt. The user can reach this screen from any location by pressing <RESET> twice.

Display on LCD	**Explanation**
SAMPLER READY **12:48 12:48:00**	This display shows the sampler is ready to program. It displays the current time. From here the user can enter any TIME, FLOW, or * Mode. Press the * key to access the * Mode.
ENTER * MODE? **__ __ 12:48:00**	Prompts the user to enter either a program or the configuration function. Press 91 and <ENTER> to view the data logging menu.
ID = 1 VIEW = 2 EXIT = 3 **DOWNLOAD = 4 CLEAR = 5**	This menu shows the options available in the data logging menu. It is displayed momentarily (3 seconds) before the selection menu is brought up. ID Menu -Allows the user to set Site ID information. VIEW Menu - Allows the user to review logged data. EXIT Menu - Takes the user out of the Data Logging menu and back to the Sampler Ready prompt by executing a warm start. DOWN LOAD Menu - Downloads data to a printer, DTU, or PC. CLEAR Menu - Clears all logged data, except Site ID, from memory.
ENTER MENU SELECTION **__ 12:48:00**	Enter the number coinciding with menu to be accessed and press <ENTER>. The following sections will explain each of the sub-menus:

ID MENU

The ID menu allows the user to identify a site at which the events have been logged and a corresponding date associated with the events at that site. This is represented by a four (4) digit number which the user enters in the ID Menu (see below). The system only allows for one site ID at a time. For example, the user enters 1234 as a site ID number and logs 100 samples at that site. Later the sampler was moved to a different site. If the operator enters a new site ID number (5678), the original site ID (1234) will be

Display on LCD	Explanation
SAMPLER READY **10:04M 10:04:00**	The sampler is not in a active sampling program, but the Midnight Switch (*16) has been set on. ("M" in 6th position of second line)
TIME **01:00 AS T 10:04:10**	The sample is programmed in a Time sampling program, has an Active Time period set, and has been programmed for Multiple Samples per Bottle.
FLOW (*05) **01:00 A 10:04:20**	The sampler is in the Analog Totalizing sampling program (*05).

*50 DISPLAY SOFTWARE VERSION

This program allows the operator to view the sampler software version (date). The software version is also momentarily displayed whenever the sampler is Warm-Booted by pressing <RESET> twice.

Display on LCD	Explanation
SAMPLER READY **10:04 10:04:00**	This display shows the sampler is ready to program. It displays the current time. Press the <*> key.
ENTER * MODE **_ _ 10:04:10**	Prompts the user to enter a program or configuration function. Press 50 and <ENTER> to display the sampler software version (date).
VERSION 7/15/98 **0050 10:04:20**	The display will change to show the version(date) of the software for 3 seconds.
SAMPLER READY **10:04 10:04:30**	The display then changes back to the SAMPLER READY prompt and is ready for further programming.

SAMPLER CONFIGURATION FUNCTIONS

*99

*99 allows the user to set the sampler's configuration. For proper operation, it is critical the unit is correctly configured. The memory comes preset with the sampler's defaults. These defaults can be reviewed or changed by entering the configuration mode (explanations and step-by-step instructions are given below). Once entries have been made in *99, re-entering the configuration mode is not necessary unless changes in the data are needed.

Display on LCD	Explanation
SAMPLER READY **10:04 10:04:00**	This display shows the sampler is ready to program. It displays the current time. From here the user can enter any TIME, FLOW, or * Mode. Press the * key to access the * Mode.
ENTER * MODE? **_ _ 10:04:00**	Prompts the user to enter either a program or the configuration function. Press 99 and <ENTER> to configure the sampler.
SAMPLER SETTING? **— 10:04:00**	Sets the sampler to a specific type of operation or bottle configuration: 1 = Single Bottle 2 = Multi-Bottle Enter the desired configuration and press <ENTER>. The default is 2 (Multi-bottle sampler).
# OF BOTTLES? **— — 10:04:00**	Sets the number of bottles (2,3,4,6,8,12, or 24) being used by the sampler in multi-bottle mode. If 1 was selected for the SAMPLER SETTING above, this prompt is bypassed. Input the number of bottles and press <ENTER>. The default is 24.
PURGE TIME? **— — 10:04:00**	Length of time (3-99 seconds) the intake line is purged before a sample is taken. Press <ENTER> to accept the default purge time or input a new 2-digit number. If air bubbles are not coming out of the intake line, or if fluid is visible in the line after the purge has been completed, increase the purge time. The default is 9 seconds.

DRAW TIME?
— — — **10:04:00**

Time window (4-150 seconds) during which a sample is drawn. Press <ENTER> to accept the displayed draw time or input a new draw time as a 3-digit number and then press <ENTER>. If the sample fluid does not reach the liquid sensor, causing the sampler to move from drawing to measuring the sampler, increase the draw time. The default is 30 seconds. NOTE: This time is the maximum time that the sampler will attempt to draw a sample. If the fluid sensor has not been triggered(i.e., the measuring chamber is not filled), the sampler will purge the line and attempt to draw the sample again. If a sample cannot be taken after the second draw time has expired, then the sampler will log a missed sample.

MEASURE TIME?
— — **10:04:00**

Time window (3-99 seconds) during which the sample is purged to the specified volume. Press ENTER to accept the measure time which is displayed or input a new measure time as a 2 digit number and then press ENTER. If the sample size is not purging to the specified volume, the measure time needs to be increased. The default is 9 seconds.

DEPOSIT TIME?
— — **10:04:00**

Time window (3-99 seconds) during which the sample is deposited in the bottle. Press ENTER to accept the time shown or input a new time as a 2 digit number and press ENTER. A longer deposit time will force the fluid into the bottle quicker. If the sample container is being filled almost completely, then the deposit time should be decreased to allow the fluid to gravity-feed into the container. The default is 8 seconds.

 # OF CHAMBER FILLS?
— **10:04:00**

The number of times (1-4) the 500ml measuring chamber is filled and deposited into a bottle, per sampling event. (Only one chamber fill is performed during a test cycle). Press ENTER to accept the number of chamber fills shown or input a new number of chamber fills and press the ENTER key. The default is 1.

AUTO RESTART?
— **10:04:00**

Sets the auto restart mode: 0 - No auto restart; 1 - auto restart activated. This option will restart the sampler and continue the program that was running, if power fails. It stores parameters, ensures orderly shutdown, and stores enough energy to complete any stepper motor steps in progress. If 0- no auto restart is selected, the sampler will reset when The default is 1- auto restart activated.

TEST CYCLE MODE?
— **10:04:00**

Sets the test cycle mode. Press <ENTER> to accept the default or input a new number corresponding to the manner in which test samples are to be taken:
0 - Only when the sampler is not running a program.
1 - In a program, but the sample does not count in the program.
2 - In a program, and the sample counts in the program.
The default is 1.

KEYPAD BEEP MODE?
— **10:04:00**

Sets whether the keypad beeps when keys are pressed:
0 - No beep 1 - Will beep.
Press <ENTER> to accept the setting shown, or input a new number and press <ENTER>. This also controls what is displayed during an analog program if the unit has the optional analog controller. These displays are explained in detail in the Analog Programming Section on page 2-8. The default is 1.

BACKLIGHT MODE?
— **10:04:00**

Sets whether the display backlights:
0 - Backlight is never on. This is good if power conversation is critical.
1 - Backlight comes on when a key is pressed. The light will automatically turn off after 10 seconds if another key is not pressed.
2- Backlight comes on when a key is pressed and also at the start of a sampling cycle. The light will automatically turn off after 10 seconds if another key is not pressed or another sampling cycle is not initiated.
3- Backlight is always on. This choice will quickly run down a battery.
The default is 1.

ENTER PASSWORD
— — — — **10:04:00**

Creates a password to stop unauthorized access. There are 2 options:
A. Press <ENTER> to accept no password - 0000 (default shown)
B. Enter a 4-digit number at the prompt and press <ENTER>. The user will be prompted to verify the password. Enter the same 4 digits and press <ENTER>. This sets the password. **RECORD** the numbers. To change a password, enter *99 mode and input the 4 digit numeric password at the PASSWORD PROTECTION prompt. Press <ENTER>. The user can now go into *99 and at the ENTER PASSWORD prompt, create a new password.

Note: Use a TEST CYCLE setting of 0 if TEST CYCLE is to be password protected while a program is running.

If the password is forgotten, call the Manning Service Department at (800)-863-9337.

After finishing the Configuration Mode, the sampler will return to the Sampler Ready prompt and the current time will be displayed. Configuration is now complete, and the sampler is ready for programming.

*91 Data Logging

The * 91 mode is the data logging function for the Manning Environmental, Inc., sampler family. The data logging function is always active, and will continuously record events and sampler activities as they occur. The system performs a bound checking function on entries. This ensures that entries which exceed the limits placed in the system are not accepted. If this happens an EEEE will appear on the display. The user simply presses <CLEAR> to remove the EEEE and is then able to continue to enter numbers. The sampler's memory holds up to 512 entries in battery backed RAM, so in case of power loss the unit will not lose logged events. If a 513th entry occurs, the unit will display a LOG FULL message and that entry and subsequent events and activities will not be recorded until the log is cleared. The unit will display the logged data on the 2 line by 20 character backlighted LCD display. The data is displayed in a coded format so the maximum amount of information is available on the screen. The codes are explained in the view menu. The *91 mode can only be entered from the SAMPLER READY prompt. The user can reach this screen from any location by pressing <RESET> twice.

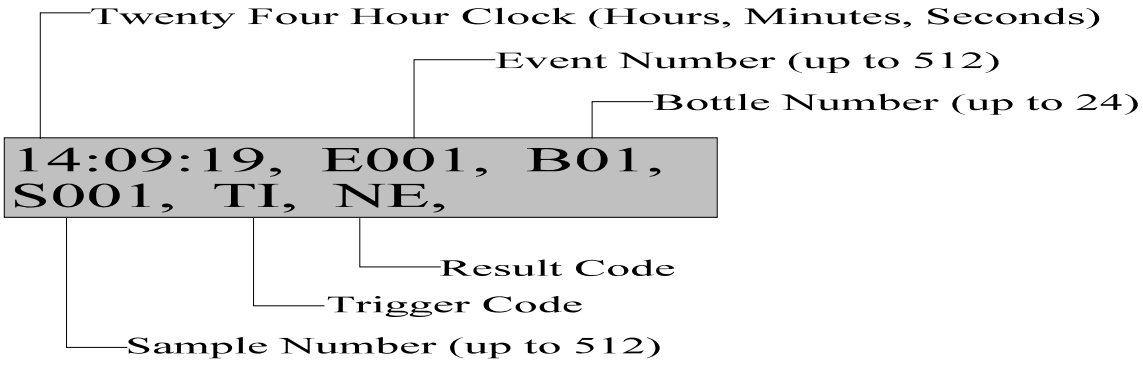
Display on LCD	**Explanation**
SAMPLER READY **12:48 12:48:00**	This display shows the sampler is ready to program. It displays the current time. From here the user can enter any TIME, FLOW, or * Mode. Press the * key to access the * Mode.
ENTER * MODE? **__ __ 12:48:00**	Prompts the user to enter either a program or the configuration function. Press 91 and <ENTER> to view the data logging menu.
ID = 1 VIEW = 2 EXIT = 3 **DOWNLOAD = 4 CLEAR = 5**	This menu shows the options available in the data logging menu. It is displayed momentarily (3 seconds) before the selection menu is brought up. ID Menu -Allows the user to set Site ID information. VIEW Menu - Allows the user to review logged data. EXIT Menu - Takes the user out of the Data Logging menu and back to the Sampler Ready prompt by executing a warm start. DOWN LOAD Menu - Downloads data to a printer, DTU, or PC. CLEAR Menu - Clears all logged data, except Site ID, from memory.
ENTER MENU SELECTION **__ 12:48:00**	Enter the number coinciding with menu to be accessed and press <ENTER>. The following sections will explain each of the sub-menus:

ID MENU

The ID menu allows the user to identify a site at which the events have been logged and a corresponding date associated with the events at that site. This is represented by a four (4) digit number which the user enters in the ID Menu (see below). The system only allows for one site ID at a time. For example, the user enters 1234 as a site ID number and logs 100 samples at that site. Later the sampler was moved to a different site. If the operator enters a new site ID number (5678), the original site ID (1234) will be

overwritten with the new site ID number (5678). The operator should download the data before changing site ID numbers in this scenario.

ENTER MENU SELECTION **__ 12:48:00**	At this prompt input a <1> and press <ENTER>
ENTER 4 DIGIT ID # **__ __ __ __ 12:48:00**	The user enters a 4 digit number that corresponds to the site at which the samples will be taken. Only one site number can be used at a time. Entering a new site number overwrites all stored site numbers.
ENTER MONTH MM # **__ __ 12:48:00**	This display asks the user to enter the current month in two digit format. For example 03 = March, 11 = November, etc...
ENTER DAY DD # **__ __ 12:48:00**	The user enters the two digit number corresponding to the current day. The first day of the month being 01, the last being 30 or 31.
ENTER YEAR YYYY # **__ __ __ __ 12:48:00**	The operator enters the current year in four digit format.

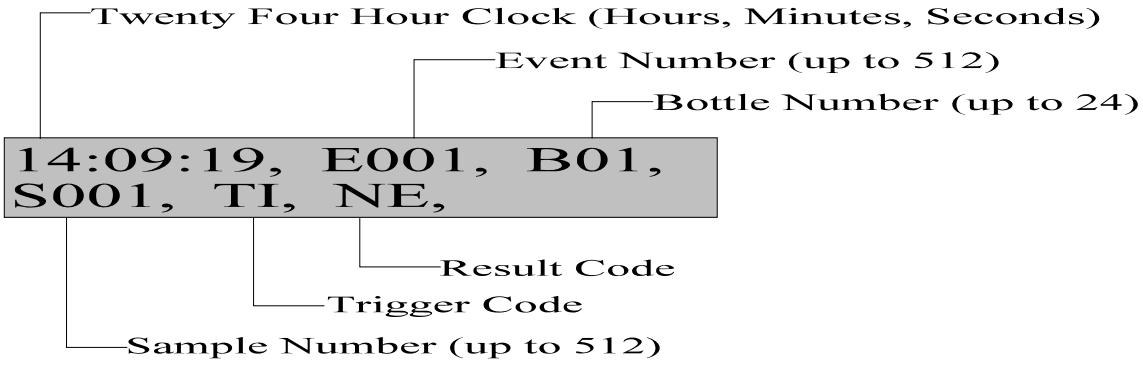


VIEW MENU

The view menu allows the user to review logged events and activities. The data logged is not limited to sampling events. Activities such as power failure, warm starts, cold starts, etc. are also logged to provide the operator with a detailed history of the activities of the unit. The data in the VIEW menu is shown in coded format to allow the maximum amount of data to be displayed in the smallest amount of space.

overwritten with the new site ID number (5678). The operator should download the data before changing site ID numbers in this scenario.

ENTER MENU SELECTION **__ 12:48:00**	At this prompt input a <1> and press <ENTER>
ENTER 4 DIGIT ID # **__ __ __ __ 12:48:00**	The user enters a 4 digit number that corresponds to the site at which the samples will be taken. Only one site number can be used at a time. Entering a new site number overwrites all stored site numbers.
ENTER MONTH MM # **__ __ 12:48:00**	This display asks the user to enter the current month in two digit format. For example 03 = March, 11 = November, etc...
ENTER DAY DD # **__ __ 12:48:00**	The user enters the two digit number corresponding to the current day. The first day of the month being 01, the last being 30 or 31.
ENTER YEAR YYYY # **__ __ __ __ 12:48:00**	The operator enters the current year in four digit format.



VIEW MENU

The view menu allows the user to review logged events and activities. The data logged is not limited to sampling events. Activities such as power failure, warm starts, cold starts, etc. are also logged to provide the operator with a detailed history of the activities of the unit. The data in the VIEW menu is shown in coded format to allow the maximum amount of data to be displayed in the smallest amount of space.

TIME: Twenty-four hour clock in HH:MM:SS format.

EVENT #: An "E" marks the beginning of data related to Event # and is separated from the Time by a comma. The event number represents the sequential order of the events that have been logged since the log was cleared. For example E001 would be the first logged event with E512 being the last since the unit logs a maximum of 512 events.

BOTTLE #: Preceded by a "B", the Bottle # is separated from the Event # by a comma. Bottle number indicates the Bottle in which the sample was placed.

SAMPLE #: This is the first entry on the 2nd line of the display. It is indicated by an "S".

TRIGGER CODES: The trigger code shows the operator what triggered or initiated the sample to be taken. The following shows the letter corresponding to the sample trigger:

TI = Time Interval	TO = Time Override
CC = Contact Closure	AL = Analog Level
AF = Analog Flow	RD = Rising Delta
FD = Falling Delta	TC = Test Cycle (In a program mode)
TY = Test Cycle (Not in a program mode)	

RESULT CODES: The result code indicates whether the unit was successful or unsuccessful in collecting the sample. If the sampler was successful, a result code of NE will be displayed. If the unit did not collect the sample either a BF or NF will be displayed. The codes are as follows:

NE = No Error	NF = No Fluid
BF = Bottle Full	

ACTIVITY LOG: The unit also logs data about non-sampling events such as power failures, start sequences, reset occurrences, etc. This data displayed is the time, in twenty four hour format, the event # and the activity (in this example START):

```
16:04:44,E001,START
```

Each time the particular activity is executed (in this case START), the data will be stored in the log. This also applies to resets, power failures, etc... The storage of this information increases the user's ability to understand the sampling events and how other activities might have effected the sampling program.

```
ENTER SELECTION
__          12:48:00
```

At this prompt input <2> and press <ENTER>

# OF EVENTS = __ __ __ **12:48:00**	Shows the operator the number of events logged. The sampler holds a total of 512 events. This is a momentary display (3 seconds).
ENTER THE START # **__ __ __** **12:48:00**	The operator is then prompted to enter the event number at which they want to begin the display of logged events. Input the starting event # as a three digit number and press <ENTER>
ENTER THE COUNT # **__ __ __** **12:48:00**	The user is then prompted to enter the number of events they wish to view. Input the number of events to be viewed as a three digit number and press <ENTER>. This feature allows the user to view all the logged events, a section of the logged events (300 to 400 for example), or a single event.
ENTER SCROLL SECONDS **__ __** **12:48:00**	To set the scroll seconds enter a two digit number (00 to 99) representing the amount of time, in seconds, you wish the display to show a logged event before advancing to the next event. After inputting the number, press <ENTER> The sampler automatically advances sequentially through the logged events, first displaying the site data and then displaying each event for the set number of scroll seconds. This will continue until the number of events entered in the COUNT # have been displayed. The sampler will then return to the ENTER SELECTION prompt within *91. The operator can control the display of events with 3 keys. RESET KEY: Pressing the reset key will terminate the display of events and return to the data logging menu. DISPLAY KEY: Pressing the display key will advance the display to the next event. Each press of the display key will advance the display to the next event. CLEAR KEY: Pressing the clear key will move the display backwards to the previous event. Pressing and holding the clear key will pause the display of events.
PUSH THE DISPLAY KEY FOR NEXT EVENT	This is a momentary display (3 seconds) to remind the user that they can manually advance the log review or that the unit will do it automatically based on the time set at the scroll seconds prompt.

```
_ _:_ _:_ _ , E_ _ _ , B_ _
S_ _ _ ,  _ _,    _ _
```

This display is divided into multiple sections to communicate information about the logged sample.

1st Line

1st field - Time at which the sample was logged.

2nd field - Headed by a capital "E", indicates the event number.

3rd field - Headed by a capital "B" represents the bottle number.

2nd Line

1st field - Headed by a capital "S" indicates the sample number.

2nd field - Trigger Codes - This is a 2 letter code that specifies what initiated the sample. For a complete list of codes, refer to page 11 - TRIGGER CODES.

3rd field - The last field signifies result code. This tells the user whether the sampler was successful or unsuccessful in collecting a sample and why.

To quit viewing data, simply press <RESET> once. This takes you to the beginning of the menu selection in the Data Logging menu. The unit will continue to show the events either based on the scroll time or by pressing <DISPLAY> until the STOP # is reached. At this point the unit will return the operator to the ENTER SELECTION prompt.

EXIT MENU

This menu allows the user to exit back to the SAMPLER READY prompt from which other programs or functions can be entered. The only other way to exit the data logging menus is to press <RESET> <RESET>. However, this will be logged as an activity, whereas using the exit menu will not.

```
ENTER SELECTION
      __          12:48:00
```

At this prompt input a <3> and press <ENTER>. The unit will execute a warm start and return to the SAMPLER READY prompt.

DOWNLOAD MENU

The download menu is intended to allow the operator to make either a hard copy (by sending the data to a printer) or an electronic copy (by sending the data to a PC or a Data Transfer Unit). The data is in ASCII format and is comma delimited for easier interface with commercially available spreadsheet programs. The Baud Rate is fixed at 9600 baud with 8 bits no parity and 1 stop bit. The download menu is identical to the VIEW menu. The only difference is that when the data is reviewed, it is also being downloaded to the device of choice. If downloading to a computer, a terminal program is required. **NOTE: Downloading is only possible on samplers with the serial option installed**.

CLEAR LOG DATA **NO = 1 YES = 2 12:48:00**
ENTER SELECTION **__ 12:48:00**

At this prompt input a <4> and press <ENTER>

 # OF EVENTS = __ __ __ **12:48:00**

Shows the operator the number of events logged. The sampler holds a total of 512 events. This is a momentary display (3 seconds).

ENTER THE START # **__ __ __ 12:48:00**

The operator is then prompted to enter the point (event #) at which they want to begin the display of logged events. Input the starting point as a 3 digit number and press <ENTER>

ENTER THE COUNT # **__ __ __ 12:48:00**

The user is then prompted to enter the number of events they wish to view. Input the number of events to be viewed as a 3 digit number and press <ENTER>. This feature allows the user to view all the logged events, a section of the logged events (300 to 400 for example), or a single event.

ENTER SCROLL SECONDS **__ __ 12:48:00**

To set the scroll seconds, enter a 2 digit number representing the amount of time, in seconds, you wish the display to show a logged event before advancing to the next screen. After inputting press <ENTER>. NOTE: entering a scroll time of 00 seconds will allow downloading at the maximum speed.

The sampler will display the logged data as it is being downloaded.

CLEAR MENU

The sampler is capable of holding up to 512 events or activities in memory. Once the memory is full, the unit will not store any additional data until the event log is cleared. Once the log has been cleared the information that had been stored there is permanently erased. If the data is critical please review the DOWNLOAD menu above for information on how to save the logged events and activities in either electronic format or hard copy.

There are two methods of clearing data from memory - through the *91 function or through the *14 function. *91 allows the operator to clear the logged data from the clear menu. This method has allows the operator to back out of the clear operation without actually clearing the data. The sequence of steps is detailed below:

ENTER MENU SELECTION **__ 12:48:00**

At this prompt input a <5> and press <ENTER>

CLEAR LOG DATA **NO = 1 YES = 2 12:48:00**	This display is shown momentarily to orient the user to the upcoming menu selection.
CLEAR?? NO = 1 YES = 2 **12:48:00**	Enter your selection at the prompt: 1 This does not clear the data and will take you back to the ENTER SELECTION prompt. 2 This will clear all data. If the data needs to be retained, make sure a backup exists. Once the data has been deleted it is unrecoverable. After the data is cleared, you will be taken back to the ENTER SELECTION prompt.

*14 CLEAR LOG DATA

* 14 Clear Log Data option allows the operator to clear the logged data without entering the *91 data logging program. This selection does not give the user the opportunity to back-out of the clearing of the log. This is an immediate and unalterable erasure. The *14 clear data unlike the *91 clear data is accessible from the SAMPLER READY prompt

SAMPLER READY **12:48 12:48:00**	This display shows the sampler is ready to program. It displays the current time. From here the user can enter any TIME, FLOW, or * Mode. Press the * key to access the * Mode.
ENTER * MODE? **__ __ 12:48:00**	Prompts the user to enter either a program or the configuration function. Press 14 and <ENTER> to erase the logged data.
CLEARING LOG DATA	The menu shows the log being cleared. The log is now clear. The data that was contained within the log is now erased and is unrecoverable.
SAMPLER READY **12:48 12:48:00**	The unit returns to the SAMPLER READY prompt awaiting further action.

ANALOG OPTION PROGRAMMING

This section explains how to program the sampler if the unit has the optional analog controller. If it was not ordered, it is not necessary to read this section. The analog option allows the sampler to accept an analog signal (4-20mA) from an external device.

When using any of the analog programming Modes (*05,*06, *09, *11, and *13), the sampler will prompt the user to enter an upper and a lower limit. These limits can refer to flow or level depending on the program. The limits are important because of the Analog to Digital Converter(ADC) in the 6901. The ADC has an 8-bit output that allows an analog signal to be divided into 256 (0 to 255) divisions which digitizes the signal. The The lower limit will correspond to the lowest signal level (4mA in 4-20mA) sent from the external device. The higher limit will correspond to the highest signal level (20mA in 4-20mA) sent from the external device. The difference between the lower limit and the higher limit is the span. The processor divides the span into 256 evenly spaced steps.

For example, with a 4-20mA signal, if you set the lower limit to equal 4 ft and the upper limit to equal 44 feet the following values would automatically be assigned to each:

Analog Signal	Level	A/D Digital Value
4mA	4ft.	0
8mA	14ft.	63
12mA	24ft.	127
16mA	34ft.	180
20mA	44ft.	255

Totalizing

When the current of a signal varies corresponding to a flow, then the signal can be used to totalize (accumulate) the flow. Then, a sample can be taken an a predetermined trigger level Each time the analog signal is read, a value is obtained that can be converted into flow. When the sampler is in an analog programming mode, it will read the analog signal each minute. **Therefore, for analog signals representing flow, the values entered into the sampler during programming must be in volume units per minute**. The time interval between analog signal readings cannot be changed. If your flow measuring device is calibrated in gallons per day, then the minimum and maximum values must be divided by 1440 (60 minutes x 24 hours) to obtain the gallons per minute values. When the sampler reads the analog signal, the display shows messages indicating that the analog signal is being read, along with the value of the signal in milliamps, volts, and as a digital value (0-255).
For example, (using a 4-20mA signal) when the analog signal is 12mA, then we know that the flow rate is half of the total. If maximum flow is 100 and minimum is 0, then the flow rate is 50. The volume units of the number are determined by the volume units of the maximum and minimum flows. If they are in liters

then the flow is in liters, if they are in gallons then the flow is in gallons.

*08 Analog Display Routine

The analog display routine allows the operator to display the analog signal received from an external meter (level, flow pH, etc.). This routine can be used while the sampler is being installed, connected to a flow meter, or to check the calibration of the sampler's analog to digital converter.

The program is started by entering <*08> at the "SAMPLER READY" prompt. The analog value will be displayed in three formats: 1) As a digital value (0 to 255); 2) As a DC voltage (1 to 5 VDC); and 3) in milliamps (4.0 to 20.0 mA). The program will continue to loop until reset by the operator pressing and holding the <RESET> until the sampler resets. The analog input signal can be varied while the program is running and the display will change accordingly.

The sampler's analog routine can be calibrated by inputting a known milliamp signal or attaching a variable voltage source across the analog input terminals.

ANALOG VALUES TABLE
TABLE A1

mA	DC VOLTS	DIGITAL VALUE
4.0	1.00	000
5.0	1.25	015
6.0	1.50	031
7.0	1.75	047
8.0	2.00	063
9.0	2.25	079
10	2.50	095
11	2.75	111
12	3.00	127
13	3.25	143
14	3.50	159
15	3.75	175
16	4.00	191
17	4.25	207
18	4.50	223
19	4.75	239
20	5.00	255

Table A1 is a conversion table for the analog values. For example, if a voltage of 3.00 volts is placed across the analog input terminals the sampler should display 12 mA, 3.00 VDC and a digital value of 127. The analog input circuit is designed with a precision 250 ohm resistor across the input terminals. When an mA analog signal is input the current flows through the 250 ohm resistor generating a voltage drop proportional

to the current flow. At 12 mA the voltage drop is .012x250 = 3.00 volts. The three volts is converted into a digital value 127. When a three volt signal is placed across the analog input terminals it generates a current flow according to ohms law of I = 3/250 = .012 mA.

Current loop calibrators are a common method of testing and calibrating 4-20mA current loops. It is also possible to use a known voltage source such as small batteries and a voltmeter for testing and calibration purposed.

A 4-20 mA source can be calibrated by placing a 250 ohm resistor in the loop and measuring the voltage drop across the resistor with a voltmeter. Table A1 can be used to interpolate the corresponding mA signal or Ohms law (V/R = 1) can be used to calculate the mA signal. If the voltage is 4.25, then the mA signal is 4.25/250 = .017 amps or 17 mA.

ADD-ON PROGRAMMING FUNCTIONS

Multiple Bottles per Sampling Event

Multiple Bottles per Sampling Event is not a stand alone function but works in conjunction with TIME, FLOW and certain * Modes (*02, *04, *05, *06, *09) to expand the capabilities of the sampler. This option places 1 sample in from 2-24 bottles in rapid succession during 1 sampling event (such as a contact closure or a time interval). To use Multiple Bottle per Sampling Event, the user selects the mode of choice - a TIME, FLOW, or * Mode. After entering the required information, the PUSH START/OPTIONS prompt will appear on the display. At this cue press <MULTI BOTTLE> and enter the number of bottles into which 1 sample should be placed, in rapid succession. For example, Multiple Bottles per Sampling Event would be used if a sample is to be taken every 100,000 gallons, and 1 sample is to be placed in 5 different bottles each time there is a contact closure. The unit would start the sampling sequence after it had received a contact closure. It would draw and place 1 sample in the first bottle, immediately move to the second, draw and place 1 sample in that bottle, immediately move to the third, draw and place 1 sample in that bottle and so on until it had deposited 1 sample in the specified number of bottles (in this example 5).

Display on LCD	Explanation
SAMPLER READY **12:48 12:48:00**	This display indicates the sampler is ready to program. Multiple Bottles per Sampling Event is not a stand alone program. It works in conjunction with FLOW, TIME, and certain * Modes. In this example <FLOW> was pushed as the mode of choice.
PUSH START/OPTIONS **12:48:00**	At this prompt the user selects Multiple Bottles per Sampling Event, by pressing <MULTI BOTTLE>.
BOTTLES PER SAMPLE? **__ __ 12:48:00**	Input the number of bottles into which 1 sample will be placed in rapid succession during a sampling event and press <ENTER>.
PUSH START/OPTIONS **12:48:00**	At this point, simply press <START>. NOTE: Multiple Bottles per Sampling Event and Multiple Samples per Bottle cannot be selected simultaneously. They are mutually exclusive options.
FLOW MODE **0000 B F 12:48:00**	The unit is now waiting for a contact closure to initiate the sample sequence.

Multiple Samples per Bottle

Multiple Samples per Bottle is not a stand alone function but works in conjunction with other TIME, FLOW and certain * Modes (*02, *04, *05, *06, *09) to expand the capabilities of the sampler. The sampler places from 2 to 99 samples in each bottle. In order to use Multiple Samples per Bottle, the user selects the mode of choice - a TIME, FLOW, or * Mode. After entering the required information, the PUSH START/ OPTIONS prompt will appear on the display. At this cue press <MULTI SAMPLE> and enter the number of samples per bottle. For example, if Flow Mode were being used and Multiple Samples Per Bottle is set at 5, each time an event occurred, such as a contact closure or the end of a time interval, the sampler would place a sample in a bottle. When the next event occurs, the sampler would place another sample in the SAME bottle, until 5 samples had been placed in that bottle. It would then advance the spout to the next bottle in sequence. The sampler would then repeat the process above for the current bottle. This would continue until the total number of bottles the unit is configured for (set in *99) have received their allocation of samples.

Although primarily designed for multi-bottle samplers, Multiple Samples per Bottle can also be used to set a limit on the number of samples that a single bottle sampler takes. In this instance, the sampler deposits samples into the container until the number of samples entered after pressing <MULTI SAMPLE> has been reached. Note: A bottle full condition takes precedence over this.

Display on LCD	Explanation
SAMPLER READY **12:48 12:48:00**	This display indicates the sampler is ready to program. Multiple Samples per Bottle is not a stand alone program. It works in conjunction with FLOW, TIME and certain * Modes. In this example <FLOW> was pushed as the mode of choice.
PUSH START/OPTIONS **12:48:00**	At this prompt the user selects Multiple Samples per Bottle, by pressing <MULTI SAMPLE>.
SAMPLES PER BOTTLE? **__ __ 12:48:00**	Input the number of bottles into which 1 sample will be placed during a sampling event and press <ENTER>.
PUSH START/OPTIONS **12:48:00**	At this point, simply press <START>. NOTE: Multiple Bottles per Sampling Event and Multiple Samples per Bottle cannot be selected simultaneously. They are mutually exclusive options.
FLOW MODE **0000 S F 12:48:00**	The unit is now waiting for a contact closure to initiate the sample sequence.

Delay Start - Time

Delay Start - Time works in conjunction with TIME and certain * Modes to expand the capabilities of the sampler. It is not a stand alone program and cannot be used with * Start, FLOW MODES, *01, *05, *06, *09, *11, *12, or *13. Delay Start - Time works by allowing the user to add a period of time to the beginning of a TIME or * Mode to delay the start of the program. This time period must elapse before the program can begin to operate. **NOTE:** Some programs already have a Delay Start - Time in the program negating the user's ability to add an additional Delay Start - Time. The user selects the mode of choice and enters the required information. The PUSH START/OPTIONS prompt will then appear on the display. At this cue press <DELAY START> and enter the amount of time (in HH:MM format) the sampler is to wait before beginning the program. Once the Delay Start has elapsed, the program will start. For example, if the sampler were programmed with a 9.5 hour Delay Start - Time and a 1.5 hour Time Interval, the sampler would wait for 11 hours until the first sample is taken, (9.5 hours of Delay Start - Time and 1.5 hours for the Time Interval). The sampler would then take a sample every 1.5 hours until all of the bottles (set in *99) each have a sample placed in them or a bottle full condition occurs.

Display on LCD	Explanation
SAMPLER READY **12:48 12:48:00**	This display indicates the sampler is ready to program. Delay Start - Time is not a stand alone program. It works in conjunction with TIME, and certain * Modes. In this example <TIME> was pushed as the mode of choice.
ENTER INTERVAL TIME **_ _:_ _ 12:48:00**	Enter the time interval as a 4-digit number (HH:MM format) and then press <ENTER>.
PUSH START/OPTIONS **12:48:00**	The program can then be started by pressing <START> or other functions can be added on such as Delay Start - Time. In this example <DELAY START> was pressed.
ENTER DELAY START **_ _:_ _ 12:48:00**	This display prompts the user to enter a Delay Start time (in HH:MM format). This is the amount of time the sampler is to wait before starting the regular program (in this case TIME mode).
PUSH START/OPTIONS **12:48:00**	The sampler is now ready to begin operation. Press <START> to begin the Delay Start countdown, or add other options such as Multiple Samples per Bottle or Multiple Bottles per Sampling Event.
DELAY START TIME **_ _:_ _ 12:48:00**	This display shows the time remaining on the Delay Start.
TIME TO NEXT SAMPLE **_ _:_ _ D T 12:48:00**	Once the Delay Start has counted down to zero, the Interval Time entered earlier will begin counting down. This display shows the time left to take a sample. As mentioned above, Delay Start - Time works with TIME, and certain * Modes.

*16 Midnight Switch(Bottle Advance)

This program allows the operator to toggle the midnight switch on(active) or off(inactive) on samplers configured for multi-bottle operation. With the midnight switch active(on), the sampler will advance the spout to the next bottle on the first sample initiation after midnight. For example, if your sampler is programmed to take samples based on flow (contact closure) input, with multiple samples in each bottle, the first contact closure that the sampler received after midnight will cause the spout to advance to the next bottle, even if the programmed number of samples per bottle had not been met. This allows separation of sample bottles by day of week.

*16 works in a toggle mode, that is if the midnight switch is off entering *16 will toggle in on. If the midnight switch is on, entering *16 will toggle it off. *16 Mode is not available if the sampler is configured (*99 Mode) as a single-bottle unit.

SAMPLER READY **12:48 12:48:00**	This display indicates the sampler is ready to program. Delay Start - Time is not a stand alone program. It works in conjunction with TIME, and certain * Modes. In this example <TIME> was pushed as the mode of choice.
ENTER * MODE **— —** **12:48:00**	The sampler is now prompting for a star mode to be input. Enter the numbers which represent the star mode of choice, in this case 16, and then press <ENTER>.
MIDNIGHT SWITCH ON **12:48:00**	Momentarily displays that midnight switch is on.
SAMPLER READY **12:48M 12:48:00**	The display now returns to SAMPLER READY. In position 6 of the second line of the display a “M” is showing. This indicates to the operator that the midnight switch is active. The midnight switch remains active until the operator enters *16 Mode again to toggle it off. Resetting the sampler by pressing <RESET> twice will not turn the midnight switch off.

GENERAL PROGRAMS

Time Mode - * Start

* START is a unique programming mode. It is unlike any other mode in that it automatically programs the unit to take a sample every hour. Simply press the * key and then <START>. As soon as <START> is pressed, the sampler begins counting down 1 hour. At the end of that hour the sample sequence will be initiated. The sampler will advance the spout, draw 1 sample, and place it in a bottle. The time interval will reset as soon as the sample cycle starts. At the end of the second hour the spout will advance and another sample will be taken and deposited. This will continue until the total number of bottles the unit is configured for (set in *99) each have 1 sample placed in them or a bottle full condition occurs. The sequence will then be finished and the unit will stop operation waiting for the same or a new program to be entered. For example, if the sampler was configured for 24 bottles, the sampler would place 1 sample in each bottle, over a 24 hour period for a total of 24 samples, and then stop operation.

Display on LCD	Explanation
SAMPLER READY **10:04 10:04:00**	This display indicates the sampler is ready to program and displays the current time. Press the * key to begin programming.
ENTER * MODE **__ __ 10:04:00**	At the ENTER * MODE prompt, press <START> to begin the * Start Mode.
TIME TO NEXT SAMPLE **01:00 T 10:04:00**	The sampler is automatically programmed and the display will show the time (in HH:MM format) until the next sample.

Time Mode - Single Time Interval

This mode is similar to * START except the user sets the Time Interval instead of having it automatically set to 1 hour. The user enters a time in HH:MM format from 1 minute to 99 hours and 59 minutes. This time interval is used to initiate each sampling sequence in this program until the sampler ends its cycle and/or is re-programmed. After the time interval is entered and the program has been initiated by pressing <START>, the sampler will begin counting down the time interval. When the interval has elapsed, the unit will advance the spout, draw 1 sample, and place it in a bottle. The timer will reset as soon as the sample cycle starts and will immediately begin counting down the same time interval again. After the interval has elapsed again, the spout will advance and another sample will be taken and deposited. This will continue until the total number of bottles the unit is configured for (set in *99) each have 1 sample placed in them or a bottle full condition occurs. For example, if the time interval is set for 1 hour 30 minutes, the sampler would count down 1 hour and 30 minutes, advance the spout, take the first sample, and reset the timer. After another 1 hour and 30 minutes the spout would advance to bottle 2, the sampler would take a sample and reset the timer, etc.

Display on LCD	**Explanation**
SAMPLER READY **10:04 10:04:00**	This display indicates the sampler is ready to program and displays the current time. Press <TIME> to begin programming.
ENTER INTERVAL TIME **__ __:__ __ 10:04:00**	Enter the time interval as a 4-digit number (HH:MM format) and then press <ENTER>.
PUSH START/OPTIONS **10:04:00**	The program can then be started by pressing <START> or other functions can be added. In this example, <START> is pressed.
TIME TO NEXT SAMPLE **__ __:__ __ T 10:04:00**	The display will show the time until the next sample.

*15 Time Mode - Active Sampling Period

This mode is similar to TIME MODE - SINGLE TIME INTERVAL, but *15 allows the operator to program an active sampling period (range 00:00 to 99:59) that will terminate sampling when the active sampling period has expired. The active time period does not start counting down until a sampling program has been entered and a sample triggered. If the operator enters a delay start time, then the active sampling period does not start until the delay start time has expired and a sample is attempted. When the active time period expires (counts down to 00:00) the next time a sample is attempted a message will be displayed indicating the active time period has expired and no sample will be taken. An active time period expired message will be logged.

If an end of sequence even (such as a bottle full) occurs before the active sampling period expires, then the active time period will have no effect. If the active time period expires while a sample is in process the sample will be completed and no more samples will be taken. There are two methods to clear an active time period. First, reset the sampler by pressing <RESET> twice. This will initiate a WARM START and set the active time to 00:00. The second method is to enter the *15 mode and enter a time of 00:00. The "A" will disappear from the second line indicating no active time period is active. For sampling situations where an active sampling period is not desired the operator will not enter an active time value.

The major use of the active sampling period will be in industrial monitoring situations where (as dictated by the EPA) a valid sample period cannot be longer than 24 hours. For example, if an active sampling period of 24 hours is required, then the operator would enter (starting from the SAMPLER READY display) the *15 mode. The software will prompt the operator to enter the active time period. The operator enters an ACTIVE TIME PERIOD of 24:00. An "A" will appear in postion seven on the bottom of the two line by twenty character display indicating an active time has been entered. The operator then enters a sampling program (time, flow, etc.).

Display on LCD	**Explanation**
SAMPLER READY **04/30 10:04:00**	This display indicates the sampler is ready to program and alternately displays the current time and date. Press the ***** key to begin programming.
ENTER PROGRAM # **__ __ 10:04:00**	The sampler is now prompting for a star mode to be input. Enter the numbers which represent the star mode of choice, in this example 15, and press <ENTER>.
ENTER ACTIVE TIME **__ __: __ __ 10:04:00**	The sampler then asks for an active time period. This is the amount of time (1 min to 99 hours and 59 min) during which the sampler will place samples in the sample container(s). Enter the time in HH:MM format and press <ENTER>.
SAMPLER READY **04:30:02 A 10:04:00**	The sampler will return to the SAMPLER READY message and display an "A" on the bottom line in character position seven indicating an active time has been entered.

Once the active period has been setup using Program15, you can then enter a sampling program.

Flow Mode

Flow Modes differ from Time Modes in that instead of taking a sample after a time interval has elapsed, the unit will take samples after receipt of a contact closure from an external device. Whether those contact closures are based off Flow, pH, Level, ORP, DO, etc. is transparent to the sampler. The unit simply acknowledges a contact closure was received and that in turn triggers the sample collection process. In FLOW Mode the sampler does not control totalization, logging, or the meeting of certain parameters, etc. so they must be done by the external device. Once the parameters have been met, a contact closure will be output to the sampler. Every time a contact closure is received, the sample collection process is initiated. The sampler will advance the spout, draw 1 sample and place it in a bottle. It will then wait for the next contact closure while displaying a running tally indicating the number of samples taken to that point. This will continue until the total number of bottles the unit is configured for (set in *99) each have a sample placed in them or a bottle full condition occurs. If either of these two conditions occur, the sampler ends the program. **NOTE: If the contact is closed at the end of the sample cycle, the controller will initiate another sample cycle.**

Display on LCD	Explanation
SAMPLER READY **10:04 10:04:00**	This display indicates the sampler is ready to program and displays the current time. Press <FLOW> to begin programming.
PUSH START/OPTIONS **10:04:00**	The program can then be started by pressing <START> or other functions can be added. In this example, <START> was pressed.
FLOW MODE **0000 F 10:04:00**	The sampler is now waiting to accept contact closures to trigger the sample collection process.

Flow Mode - Pulse Accumulation

FLOW Mode - Pulse Accumulation operates the same as FLOW Mode except instead of taking a sample after every contact closure, a sample is taken after a set number of contact closures (from 2 - 9,999) have been accumulated. **NOTE:** This program uses <DELAY START> for setting the number of contact closures to be accumulated. The display will show the number of contact closures the sampler is programmed to accumulate before taking a sample. Every time a contact closure is received, the sampler will decrease the number needed on the display by one. This shows how many more contacts have yet to be accumulated before a sample is taken. Once the set number of contact closures are received, the sampler will advance the spout, draw 1 sample and then place it in a bottle. It will then wait for the next accumulation. This will continue until the total number of bottles the unit is configured for (set in *99) each have a sample placed in them or a bottle full condition occurs. If, either of these two conditions occur, the sampler ends the program. **NOTE: If the contact is closed at the end of the sample cycle, the controller will count down one contact closure.**

Display on LCD	Explanation
SAMPLER READY **10:04 10:04:00**	This display indicates the sampler is ready to program and displays the current time. Press <FLOW> to begin programming.
PUSH START/OPTIONS **10:04:00**	To set the number of contacts to be accumulated in FLOW Mode - Pulse Accumulation, press <DELAY START> and then the <START> button.
DELAY IN PULSES? **_ _ _ _ 10:04:00**	The user is now prompted to set the number of contact closures the sampler will accumulate before taking a sample (2 - 9,999). Until it is changed or ends its cycle, it will always accumulate the same number of pulses before taking a sample.
PUSH START/OPTIONS **10:04:00**	Unless add-on options to the program are desired, press <START>.
FLOW MODE **_ _ _ _ P 10:04:00**	This display shows the number of contact closures remaining before a sample will be taken. As contact closures are received the sampler counts down until it reaches 0. It will then take a sample and reset to accumulate the entered number of contact closures again.

MULTI-BOTTLE SAMPLING PROGRAMS

*01 Flow Mode - Independently Timed Spout Advance

The *01 program is used to obtain flow proportional samples over a period of time. Each bottle the sampler is configured for has a time interval (referred to as a time window) during which it is active. Samples can only be placed in THAT bottle during THAT active time window. Once the sampler is programmed, it waits for a contact closure while counting down the time interval that was set. If it receives a contact closure, while counting down the Time Interval, a sample sequence will be initiated. The sampler will advance the spout, draw 1 sample, and place it in the active bottle. For every contact closure received during the active time window, the sampler will place 1 sample in the SAME active bottle. Once the first time window has elapsed (all the time windows have the same time increment), the sampler will begin counting down the second time window while waiting for contact closures for the next active bottle. This continues until all of the bottles (set in *99) have at least 1 sample placed in them. A bottle could potentially have more than 1 sample if more than 1 contact closure is received during the bottle's active time window. If the sampler has not received a contact closure by the end of the active time window the unit will advance the bottle spout and place 1 sample in the bottle that had most recently been active. **NOTE: If the contact is closed at the end of the sample cycle, the controller will initiate another sample cycle. There is no overflow protection in this mode. Make sure that the sample volume is small enough compared to the flow rate to prevent over-filling.**

Display on LCD	Explanation
SAMPLER READY **12:48 12:48:00**	This display indicates the sampler is ready to program and displays the current time. Press the ***** key to begin programming.
ENTER * MODE **__ __ 12:48:00**	The sampler is now prompting for a star mode to be input. Enter the numbers which represent the star mode of choice, in this example 01, and press <ENTER>.
ACTIVE TIME INTERVAL **__ __: __ __ 12:48:00**	The sampler then asks for an interval time. This is the amount of time (1 min to 99 hours and 59 min) during which the sampler will place samples in the active bottle. Enter the time in HH:MM format and press <ENTER>.
PUSH START/OPTIONS **12:48:00**	If no add-on options are desired, press <START> to begin the program.
FLOW MODE (* 01) **__ __ __ __ FT 12:48:00**	The sampler is now waiting to receive contact closures and is independently counting down the interval time.

*02 Flow Mode - Time Interval Override

*02 operates much like basic FLOW mode except a time override is added. The override time ensures a sample is collected, after a set amount of time has elapsed, if a contact closure has not been received. Once the program has been started the sampler will immediately begin counting down the override time. The sampler is also concurrently waiting for contact closures. Every time a contact closure is detected the sampler will advance the spout, draw a sample, and then place it in a bottle. It will then wait for the next contact closure while displaying a running tally indicating the number of samples collected to that point. If there have been no contact closures by the end of the override time the user specifies, the sampler will advance the spout, draw a sample, and then place it in a bottle. The override timer will then reset and immediately start counting down again while waiting for the next contact closure. This will continue until the total number of bottles the unit is configured for (set in *99) each have their set number of samples placed in them or a bottle full condition occurs. If either of these two conditions occur, the sampler ends the program. **NOTE: If the contact is closed at the end of the sample cycle, the controller will initiate another sample cycle.**

Display on LCD	Explanation
SAMPLER READY **12:48 12:48:00**	This display indicates the sampler is ready to program and displays the current time. Press the ***** key to begin programming.
ENTER * MODE **__ __ 12:48:00**	The sampler is now prompting for a star mode to be input. Enter the numbers which represent the star mode of choice, in this example 02, and press <ENTER>.
TIME OVERRIDE? **__ __ : __ __ 12:48:00**	Input the maximum time the sampler will be allowed to wait to receive a contact closure, understanding that if the unit has not received a closure in this time, it will automatically take a sample. Press <ENTER> after inputing.
PUSH START/OPTIONS **12:48:00**	If no add-on options are desired, press <START> to begin the program.
FLOW MODE (* 02) **__ __ __ __ FT 12:48:00**	The sampler is now ready to receive contact closures and is independently counting down the Time Override.

*03 Flow Mode - External Event

*03 is used for monitoring intermittent events by combining portions of Flow and Time modes. *03 differs from regular flow modes based on the way the sampler interacts with the contact closures it receives. In normal flow mode the sampler receives a momentary closure from an external device, and this initiates a sampling cycle. In *03 the sampler also initiates a sample cycle based off the initial contact closure it receives. Once it has received that initial closure, the contact must remain closed for *03 to operate as intended. By the contact remaining closed, the time portion of the mode is brought into effect and the unit will take samples based off a user set time interval. For example, assume the user has an external device with a relay that is normally open. The user sets a high and low trip point within the device. If an event takes place based on the high or low set point, the unit will send a closure to the sampler. This causes a sampling cycle to take place. If the contact does not remain closed, the unit will act as if it were programmed for regular flow mode, and simply take samples each time a contact closure is received. If the relay remains closed, however, the unit will then start to count down the user set time interval and once that interval has elapsed, take a sample. Each time the interval elapses, the unit will perform a sampling sequence. This will continue until the total number of bottles the unit is configured for (set in *99) each have their set number of samples placed in them or a bottle full condition occurs. If the contact opens before either of these two occurrences the sampler will suspend operation until it once again receives a contact closure that remains closed. After receiving another contact that remains closed the sampler will begin where it left off from the last contact closure.

Display on LCD	Explanation
SAMPLER READY **12:48 12:48:00**	This display indicates the sampler is ready to program and displays the current time. Press the ***** key to begin programming.
ENTER * MODE **__ __ 12:48:00**	The sampler is now prompting for a star mode to be input. Enter the numbers which represent the star mode of choice, in this example 03, and press <ENTER>.
ENTER TIME INTERVAL **__ __:__ __ 12:48:00**	Input a time interval in HH:MM format.
PUSH START/OPTIONS **12:48:00**	If no add-on options are desired, press <START> to begin the program. NOTE: DELAY START does not work with *03.
FLOW MODE (* 03) **__ __ __ __ FT 12:48:00**	The sampler is now ready to receive contact closures and is independently counting down the Time Override.

*04 Time Mode - Multiple Intervals

The *04 mode allows programming of up to 12 DIFFERENT non-uniform time intervals (1 min to 99 hours and 59 minutes). Non uniform time intervals refer to each interval being different from the previous or next interval. Once an interval is entered, the user is given the option of repeating the interval or entering a new interval. To repeat the interval, press <ENTER> once for each time the user wants the same interval repeated. The display will show the COUNT increasing, indicating the same interval is being logged multiple times. An interval can be the same as a previous interval as long as there is a DIFFERENT interval between them. For example if 01:00 was entered for the first interval, 02:00 for the second, and then 01:00 was entered again, this would be counted as THREE different intervals. After the program is initiated, the sampler will begin counting down the first interval. Once that interval has elapsed, the unit will start the sample taking sequence and will immediately start counting down the next interval. The sampler will draw and place a sample in 1 bottle and then advance the spout. The sampler will repeat the operation each time an interval expires. The sampler will continue this pattern until all the intervals entered have expired, the total number of bottles the unit is configured for (set in *99) each have at least 1 sample placed in them, or a bottle full condition occurs. Data entry can be ended at any time by pressing the * key.

Display on LCD	Explanation
SAMPLER READY **12:48 12:48:00**	This display indicates the sampler is ready to program and displays the current time. Press the ***** key to begin programming.
ENTER * MODE **__ __ 12:48:00**	The sampler is now prompting for a star mode to be input. Enter the numbers which represent the star mode of choice, in this example 04, and press <ENTER>.
ENTER FIRST INTERVAL **__ __ :__ __ 12:48:00**	The user is prompted to input the first time interval in HH:MM format. Once the entry is complete press <ENTER>. The sampler considers this the FIRST time interval.
INTERVAL:1 COUNT: 1 **01 :00 12:48:00**	The display is now indicating it has recorded 1 interval (up to 12 different ones can be entered) and the interval has not been repeated. In this example the user entered an interval of 1 Hour. The user must now input a new interval or repeat the current interval.
INTERVAL:2 COUNT: 1 **02 :00 12:48:00**	The user inputs a new interval (0200) representing 2 hours. The display indicates the new interval has been logged by showing a (2) after the interval.
INTERVAL:2 COUNT: 2 **02 :00 12:48:00**	The user decides to duplicate the last interval. Press <ENTER> once for each time the current interval should be repeated. THIS DOES NOT COUNT AS A NEW INTERVAL as shown by the 2 after the COUNT.
INTERVAL:2 COUNT: 3 **02 :00 12:48:00**	In this example, the user has pressed <ENTER> again to log another interval of the same length. This is the third interval of 2 hours.

INTERVAL:3 COUNT: 1 **01 : 00 12:48:00**	The user has now logged a third DIFFERENT interval. Even though this is the same as Interval 1, it is considered a different interval since it is not the same as the previous interval. An interval that has been entered before can be repeated as long as there is a different interval between intervals of like time. If 12 different intervals are logged the PUSH START/OPTIONS prompt will appear. Otherwise data entry can be terminated at any point by pressing the * key.
PUSH START/OPTIONS **12:48:00**	If no add-on options are desired, press <START> to begin the program.
TIME TO NEXT SAMPLE **01:00 FT 12:48:00**	The sampler displays the first time interval to be counted down.

*07 Flow Mode - Time Interval Delay

*07 operates much like basic FLOW mode except a time interval delay is added after a contact closure has been received. Just like in FLOW mode, the sampler waits for receipt of a contact closure. Once that closure has been taken, the unit immediately begins counting down a user set time interval delay. Once the delay has counted down, the unit performs a sampling sequence. It will then wait for the next contact closure while displaying a running tally indicating the number of samples collected to that point. Upon the next closure the unit will once again count down the user set interval and then take a sample. This will continue until the total number of bottles the unit is configured for (set in *99) each have their set number of samples placed in them or a bottle full condition occurs. If either of these two conditions occur, the sampler ends the program.

Display on LCD	Explanation
SAMPLER READY **12:48 12:48:00**	This display indicates the sampler is ready to program and displays the current time. Press the ***** key to begin programming.
ENTER * MODE **__ __ 12:48:00**	The sampler is now prompting for a star mode to be input. Enter the numbers which represent the star mode of choice, in this example 02, and press <ENTER>.
TIME DELAY? **__ __ : __ __ 12:48:00**	Input the time the sampler is to wait, after receipt of a contact closure, to take a sample. After getting the signal the unit will count down the interval and take a sample. Press <ENTER> after input.
PUSH START/OPTIONS **12:48:00**	If no add-on options are desired, press <START> to begin the program.
DELAYED SAMPLE (*07) **__ __ __ __ F 12:48:00**	The sampler is now ready to receive contact closures.

ANALOG SAMPLING PROGRAMS

*05 Flow Mode - Totalizing Analog

The *05 mode works much like FLOW mode except instead of relying on a contact closure, the sampler integrates and totalizes an analog signal (4-20mA) from an external device which represents flow rate. For more details on how the analog controller works, refer to the analog programming section on page 2-8. Since the sampler does not ask for a definition of the volume unit of the flow rate, ANY can be used, i.e. cubic feet, liters or gallons. Once the unit is programmed, it begins reading the analog signal once per minute to internally totalize and keep track of the volume. When the totalized flow rate matches the Sample Trigger Volume entered by the user, the sample collection process is initiated. The unit will advance the spout, take a sample and deposit it in the first bottle. Every time the totalized volume matches the Sample Trigger Volume, the sampler will take a sample and deposit it, and then move to the next bottle in sequence. The sampler will continue this pattern of depositing a sample in each bottle, until the total number of bottles the unit is configured for (set in *99) each have a sample placed in them or a bottle full condition occurs.

NOTE: In order for the sampler to correctly scale the analog signal being output from the external device, the parameters (in this case maximum and minimum flow) set in the sampler and the external device must be the same. This is to ensure that if the external device is reading 100,000 gallons and outputting a 4mA signal, the sampler will also know that 100,000 gallons is equal to 4mA. If the parameters do not correspond there is a risk that the sampler will potentially not scale the analog signal correctly and will subsequently not take samples at the anticipated or correct instances.

Display on LCD	Explanation
SAMPLER READY **12:48 12:48:00**	This display indicates the sampler is ready to program and displays the current time. Press the ***** key to begin programming.
ENTER * MODE **__ __ 12:48:00**	The sampler is now prompting for a star mode to be input. Enter the numbers which represent the star mode of choice, in this example 05, and press <ENTER>.
MAXIMUM FLOW RATE? **__ __ __ __ 12:48:00**	Input the 4 most significant digits of the Maximum anticipated flow rate. Since the unit of measurement is generic it can stand for any volume/minute. If the flow rate is 40, it could be entered as: 4000, 0400, or 0040. The decimal point is implied, in each case, so be consistent with all entries.
MINIMUM FLOW RATE? **__ __ __ __ 12:48:00**	Enter the 4 most significant digits of the Minimum anticipated flow rate. The same criteria apply to this input as to Maximum Flow Rate.

FLOW MULTIPLIER? **— — — —** **12:48:00**	The Flow Multiplier is used to scale the Maximum & Minimum Flow Rates. If the Max flow rate is 40,000, enter it as 4000 (first 4 significant digits). The user would then enter a Flow Multiplier of 10 (4000 x 10 = 40,000) to have the unit scale the flow rate as 40,000.
SAMPLE TRIGGER? **— — — —** **12:48:00**	Enter the 4 most significant digits that tell the sampler at what accumulation of totalized flow a sample should be taken. Remember the decimal point is implied and must be consistent with previous entries. If the user wanted to take a sample at 150,000 units, the entry would be 1500.
TRIGGER MULTIPLIER? **— — — —** **12:48:00**	The Trigger Multiplier is used to increase, if necessary, the Sample Trigger. Using the example above, if 150,000 units is the Trigger point, the Trigger Multiplier would be 100 (1500 x 100 = 150,000).
PUSH START/OPTIONS **12:48:00**	If no add-on options are desired, press <START> to begin the program.
FLOW MODE (*05) **— — — —** **A** **12:48:00**	The sampler is now waiting to take samples.

*06 Analog Level Mode

The *06 mode expands the capability of the sampler by allowing it to collect samples based on changing level parameters. The sampler is used in conjunction with an external device which outputs an analog signal (4-20mA, 0-20mA, 0-1V, or 1-5V DC) representing level (for more details on how the analog controller works, refer to the analog programming section on page 2-8). The sampler does not ask for a definition of this level unit, so ANY can be used, i.e. feet, meters, or inches. Once the unit is programmed and started, the sampler integrates the analog signal once per minute to internally track the water level. When the source water level rises above or falls below a Sampling Level, the sample collection process is initiated. The sampler will advance the spout, take a sample and deposit it in the first bottle. Every time a Sample Level is exceeded or passed after that, the sampler will take a sample, deposit it, and then move to the next bottle in sequence. The sampler will continue this pattern of depositing samples in each bottle until the total number of bottles the unit is configured for (set in *99) each have a sample placed in them or a bottle full condition occurs.

To use the *06 mode, the following entries must be entered:

UPPER LEVEL LIMIT — This is the highest anticipated level of the source liquid. It acts as a ceiling. If the water ever rises above the Upper Level Limit, the sampler considers the level as temporarily fixed at the highest Sampling Level (once the level falls below this point, normal program operation resumes). It is important to make sure the Upper Level Limit is high enough to prevent this from occurring.

LOWER LEVEL LIMIT — This is the lowest anticipated level of the source liquid. It acts as a floor. If it is possible for the level to drop below the Lower Level Limit, and it does, the sampler considers the level as temporarily fixed at the Lower Level Limit (once the level rises above this point, normal program operation resumes). It is important to make sure the Lower Level Limit is low enough to prevent this from occurring.

SAMPLING LEVEL (1-32) — These are the levels at which samples will be taken (up to 32 levels can be programmed). Enter the level as a 4-digit number. Remember the decimal point is implied, and must be consistent with previous ones. The unit of measure is generic so it can be feet, meters, etc. The * key will end data entry at any time if all 32 levels are not going to be entered.

The difference (delta) between the Upper Level Limit and the Lower Level Limit is called the span (or distance). In figure 2-2, the Upper Level Limit is 37 and the Lower Level Limit is 2.5, so the span is 34.5. The controller divides the span into 256 equal steps, with each step equal to 0.39% (1/256) of the total. The sampler will always display the next acceptable level. A level that is greater can be entered or the user can accept the displayed entry.

The lowest Sampling Level, must be greater than the Lower Level Limit and each successive level must be greater than the previous level. In figure 2-2, the Lower Level Limit is 2.5 and Sampling Level 1 is 4.0. The highest sampling level can be equal to the Upper Level Limit, although this is not necessary. If it is equal to the Upper Level Limit, it must be entered separately. In figure 2-2, the highest sampling level is equal to the Upper Level Limit so it is entered as Sampling Level 7. Press <START> to begin the program.

NOTE: In order for the sampler to correctly scale the analog signal being output from the external device, the parameters (in this case Upper Level Limit and Lower Level Limit) set in the sampler and the external device must be the same. This is to ensure that if the external device is reading 10 feet and outputting a 4mA signal, the sampler will also know that 10 feet is equal to 4mA. If the parameters do not correspond, there is a risk that the sampler will potentially not scale the analog signal correctly and will subsequently not take samples at the anticipated or correct instances.

The Dots Represent Sample Events.

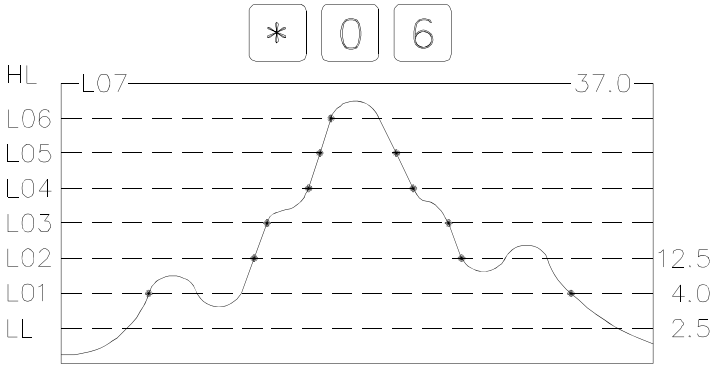


Figure 2-2 The Totalizing Analog Level Mode.

Display on LCD	Explanation
SAMPLER READY **12:48 12:48:00**	This display indicates the sampler is ready to program and displays the current time. Press the ***** key to begin programming.
ENTER * MODE **— —** **12:48:00**	The sampler is now prompting for a star mode to be input. Enter the numbers which represent the star mode of choice, in this example 06, and press <ENTER>.
UPPER LEVEL LIMIT? **— — — —** **12:48:00**	Enter the Upper Level Limit as a 4-digit number. Remember the decimal is implied in this program and the unit of measure is generic, so if the user wants 10 feet/meters/inches/millimeters, it could be entered as 0010, 0100, or 1000. Make sure to be CONSISTENT in entries throughout the program.
LOWER LEVEL LIMIT? **— — — —** **12:48:00**	Enter the Lower Level Limit as a 4-digit number. Remember to be consistent with the implied decimal from previous entries.
SAMPLING LEVEL 1? **— — — —** **12:48:00**	Enter the first level as a 4-digit number remembering to put in the implied decimal point. Sampling Level 1 must be greater than the Lower Level Limit.

SAMPLING LEVEL 2? **__ __ __ __ 12:48:00**	Continue to enter 4-digit numbers for Sampling Levels (up to 32 levels) remembering that each subsequent level must be greater than the proceeding one and that the decimal point is implied and must be consistent with previous entries. The user can end data entry at any point by pressing the * key.
PUSH START/OPTIONS **12:48:00**	If no add-on options are desired, press <START> to begin the program.
FLOW MODE (* 06) **__ __ __ __ A 12:48:00**	The sampler will immediately begin reading the analog signal.

*09 Hydrologic Level Event Mode

(Storm Water Sampling)

The *09 mode is used primarily for Storm Water Sampling, although it can be used to sample in any situation where there are rising and falling levels. The sampler is used in conjunction with an external device which outputs an analog signal (4-20mA, 0-20mA, 0-1V, or 1-5V DC) representing level (for more details on how the analog controller works, refer to the analog programming section on page 2-8). The sampler does not ask for a definition of this level so ANY can be used, i.e. feet, meters, or inches. After the unit has been programmed and started, it reads the analog signal once per minute to internally track the water level. Sampling does not begin until the source water level reaches Sampling Level 1. Once this has occurred, a sample is taken and the Time Override for Sampling Level 1 begins counting down. After Sampling Level 1 is reached, *09 Mode has 3 ways to trigger a sample:

1) When the analog signal corresponds to a Sampling Level.
2) The rise or fall of the water level by a user set amount (Rising or Falling Delta).
3) When the Time Override has elapsed if there has not been a large enough increase or decrease in water level or another Sampling Level has not been reached.

If any of these occur, the sampler will advance the spout, take a sample and deposit it in the first bottle. The sampler will continue this pattern of depositing samples in each bottle, until the total number of bottles the unit is configured for (set in *99) each have a sample placed in them or a bottle full condition occurs. If either of the first two triggering conditions is met (the analog signal corresponding to a Sampling Level or a Rising or Falling Delta), the Time Override is reset, and begins counting down again. A different Time Override can be set for each level entered. Each Time Override is only active in that portion or range of the total span that corresponds to its Sampling Level. Time Override 4 is active from the start of Sampling Level 4 to the beginning of Sampling Level 5.

The following entries are required. See figure 2-3 for an example.

Upper Level Limit	Maximum Analog Level (hydrologic high point) 100% of span.
Lower Level Limit	Minimum Analog level (hydrologic low point). 0% of span. The difference between the Upper Level Limit and the Lower Level Limit is the span.
Rising (positive) Delta	Rising change in water level, resulting in a sample. NOTE: The user can enter only 1 Rising Delta for the duration of the program.
Falling (negative) Delta	Falling change in water level, resulting in a sample. NOTE: The user can enter only 1 Falling Delta for the duration of the program.
Sampling Level 1	Water level at which the first sample will be taken, and which is associated with Time Override 1.
Time Override 1	Time Override to the next sample in the range. Causes a sample to be taken if the Rising or Falling Delta, or Sampling Level 2 has not been met within the override time. It will reset after a sample is taken.
Sampling Level 2-6	Subsequent higher levels at which samples will be taken.
Time Override 2-6	Subsequent Time Overrides that correspond to the equivalent Sampling Level.

The difference (delta) between the Upper Level Limit and the Lower Level Limit is called the span (or distance). In figure 2-3, the Upper Level Limit is 65 and the Lower Level Limit is 4, so the span is 61. The controller divides the span into 256 equal steps, with each step equal to .39% (1/256) of the total. If a level which is not a multiple of 1/256 is entered, the controller will indicate an acceptable entry. Up to 6 levels can be entered, however data entry can be stopped at any time by pressing the * key. After the * key is pressed, the LCD will prompt the user to either start the Program or add-on other options.

NOTE: In order for the sampler to correctly scale the analog signal being output from the external device, the parameters (in this case Upper Level Limit and Lower Level Limit) set in the sampler and the external device must be the same. This is to ensure that if the external device is reading 10 feet and outputting a 4mA signal, the sampler will also know that 10 feet is equal to 4mA. If the parameters do not correspond, there is a risk that the sampler will potentially not scale the analog signal correctly and will subsequently not take samples at the anticipated or correct instances.

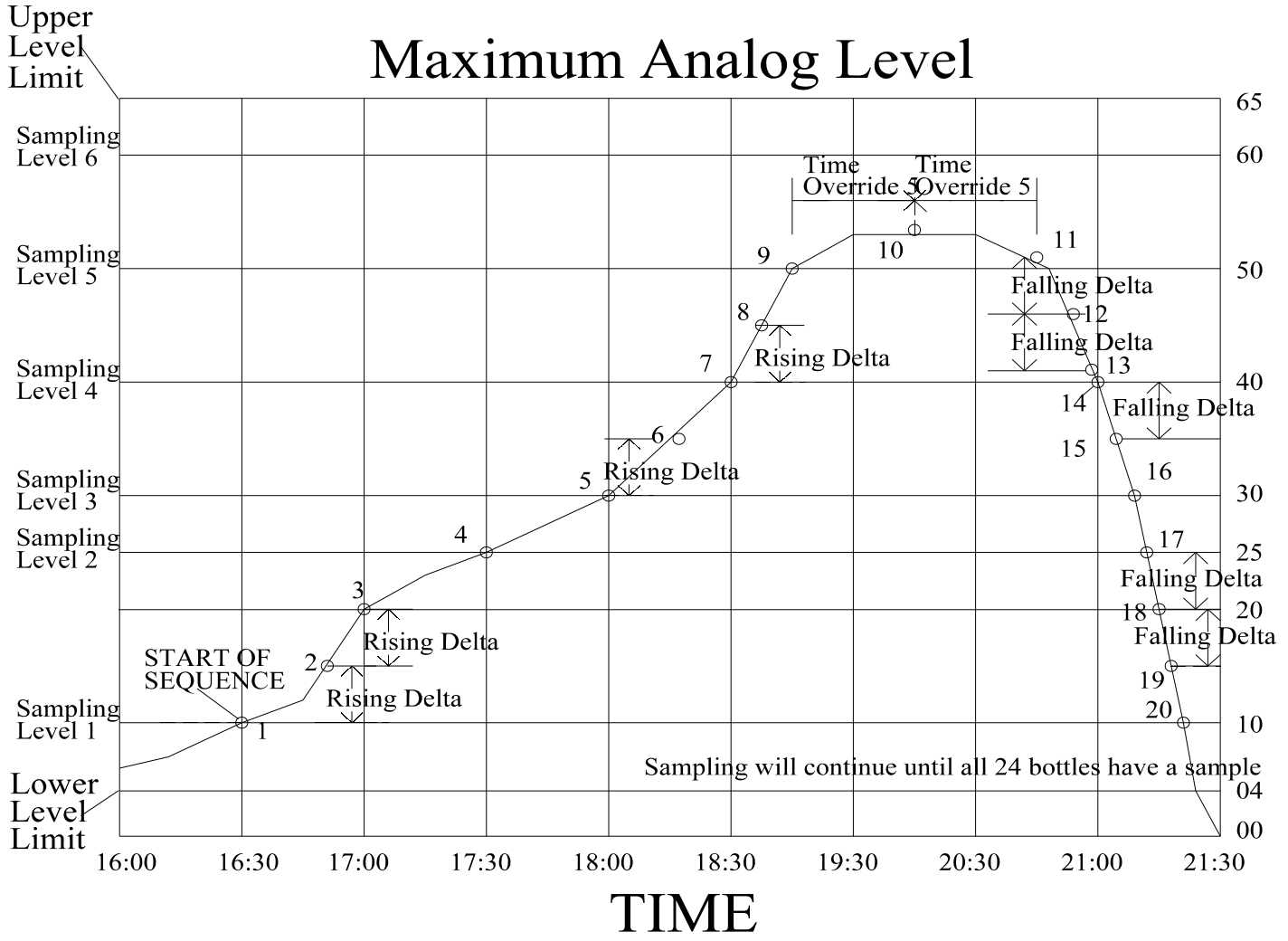


Figure 2-3 The *09 Storm Water Sampling Mode

Display on LCD **Explanation**

SAMPLER READY **12:48 12:48:00**	This display indicates the sampler is ready to program and displays the current time. Press the ***** key to begin programming.
ENTER * MODE **— —** **12:48:00**	The sampler is now prompting for a star mode to be input. Enter the numbers which represent the star mode of choice, in this example 09, and press <ENTER>.
UPPER LEVEL LIMIT? **— — — —** **12:48:00**	Enter the Upper Level Limit as a 4-digit number. Remember the decimal is implied in this program and the unit of measure is generic, so if the entry were to be 10 feet/meters/inches/millimeters, it could be entered as 0010, 0100, or 1000. Be CONSISTENT in all entries throughout the program.
LOWER LEVEL LIMIT? **— — — —** **12:48:00**	Enter the Lower Level Limit as a 4-digit number. Remember to be consistent with the implied decimal from previous entries.
RISING DELTA? **— — — —** **12:48:00**	Enter a 4-digit number which represents the rising change in water level that will trigger a sample to be taken. If the rise of the water is equal to or greater than this number a sample will be taken.
FALLING DELTA? **— — — —** **12:48:00**	Enter a 4-digit number which represents the falling change in water level that will trigger a sample to be taken. If the fall of the water is equal to or greater than this number a sample will be taken.
SAMPLING LEVEL 1? **— — — —** **12:48:00**	Enter a 4-digit number that represents the lowest level at which a sample is to be taken. Must be greater than the Lower Level Limit. Remember to be consistent with the implied decimal from previous entries.
TIME OVERRIDE 1? **— — : — —** **12:48:00**	Enter a time in HH:MM format. This is the amount of time after Sampling Level 1 during which the sampler waits for an event (Rising or Falling Delta, Sampling Level 2 reached, etc.). If no event occurs before the interval is done, a sample will be taken. If an event occurs, the Time Override will reset, or move to Time Override 2 if Sampling Level 2 has been reached.
SAMPLING LEVEL 2? **— — — —** **12:48:00**	Enter a 4-digit number representing the next level at which a sample should be taken, keeping consistent with the implied decimal point in previous entries. A sample will be taken when the water level rises to this point. Must be greater than Sampling Level 1.
TIME OVERRIDE 2? **— — — —** **12:48:00**	Enter a time in HH:MM format. Operates on the same principal as Time Override 1.

SAMPLING LEVEL 3? **__ __ __ __ 12:48:00**	Enter a 4-digit number. Operates the same as previous Sampling Levels.
TIME OVERRIDE 3? **__ __ __ __ 12:48:00**	Enter a time in HH:MM format. Operates on the same principal as Time Override 1. Continue to enter Levels and Times for up to 6 levels. Data entry can be ended at any time by pressing the * key. The last level can be equal to the Upper Level Limit but it is not necessary. If it is equal it must be entered separately.
PUSH START/OPTIONS **12:48:00**	If no add-on options are desired, press <START> to begin the program.
FLOW MODE (*09) **__ __ __ __ A 12:48:00**	The sampler will immediately begin reading the analog signal.

MULTI-BOTTLE FLOW COMPOSITE PROGRAMS

*10 Flow Mode - Multiple Bottle Composite

The *10 mode augments basic flow mode by allowing Multiple Bottles per Sample and Multiple Samples per Bottle to be used together. Normally they are mutually exclusive but *10 combines the two, using Flow with Multiple Bottles per Sample as the base. It adds Multiple Samples per Bottle by letting the user place multiple samples (1-99) in the same bottle creating a composite sample. NOTE: The number of samples should be equal to or less than the volume of the sample containers divided by the volume of the sample, to prevent over filling. The unit operates by accepting contact closures from an external device. Whether those contact closures are based off Flow, pH, Level, ORP, DO etc. is transparent to the sampler. The unit simply acknowledges a contact closure was received and that in turn triggers the sample collection process. In *10 the sampler does not control totalization, logging, or the meeting of certain parameters, etc. so they must be done by the external device. Once the parameters have been met, a contact closure will be output to the sampler. Every time a contact closure is received, the sample collection process is initiated. The unit will advance the spout, draw its samples and place them in the correct bottles. It will then wait for the next contact closure. This will continue until the total number of bottles the unit is configured for (set in *99) each have a sample placed in them or a bottle full condition occurs. If either of these two conditions are met, the sampler ends the program.

For example, assume the sampler is configured for 24 bottles and Samples per Bottle is set to 3 (see step by step programming below). The sampler, after receiving a contact closure, will in rapid succession place 1 sample in each bottle it is configured for (set in *99). In this case, since the sampler is configured for 24 bottles, a total of 24 samples would be deposited (one in each bottle). After depositing this set of samples the unit would pause awaiting the next contact closure to place the second set of samples in the bottles (there would be 48 total samples taken after the second contact closure - 2 in each bottle). After the third set, the sampler would end the sequence and wait for a new program (there would be 72 total samples taken - 3 in each bottle).

The override time causes the unit to take samples if the contact closure fails to occur. The override time starts counting down immediately after pressing <START>. If a contact closure is received, the override time resets and immediately begins to count down again. NOTE: This means that the override time must be longer than the time it takes for the sampling sequence to complete. If it is not, the override time will elapse while the sampler is in the sequence causing the sampler to immediately start another sequence after it finishes the previous one.

Display on LCD	Explanation
SAMPLER READY **12:48 12:48:00**	This display indicates the sampler is ready to program and displays the current time. Press the ***** key to begin programming.

ENTER * MODE **__ __ 12:48:00**	The sampler is now prompting for a star mode to be input. Enter the numbers which represent the star mode of choice, in this example 10, and press <ENTER>.
SAMPLES PER BOTTLE? **__ __ 12:48:00**	Enter the number of samples per bottle as a 2-digit number (1-99). Make sure the volume to be placed in the bottles is not greater than the actual volume of the bottles.
TIME OVERRIDE? **__ __:__ __ 12:48:00**	Enter in HH:MM format. Remember to allow enough time for the sampler to collect the required samples.
PUSH START/OPTIONS **12:48:00**	If no add-on options are desired, press <START> to begin the program.
FLOW MODE (*10) **__ __ __ __ B F 12:48:00**	The sampler is now ready to receive contact closures and is independently counting down the interval time.

*11 Flow Mode - Totalizing Analog Multiple Bottle Composite

This mode is a combination of *05 (the ability to process an analog signal), and *10 (the ability to use Multiple Bottles per Sample and Multiple Samples per Bottle together). *11 works by integrating and totalizing an analog signal (4-20mA, 0-20mA, 0-1V, or 1-5V DC) from an external device that represents flow rate. For more details on how the analog controller works, refer to the analog programming section on page 2-8. Since the sampler does not ask for a definition of the volume unit of the flow rate, ANY can be used, i.e. cubic feet, liters or gallons. Once the unit is programmed, it begins reading the analog signal once per minute to internally totalize and keep track of the volume. When the totalized flow rate matches the Sample Trigger Volume entered, the sample collection process is initiated. The unit will advance the spout and in rapid succession draw and place its samples. The unit will then pause awaiting the next trigger. Every time the totalized volume matches the Sample Trigger Volume, the sampler will draw its samples, deposit them, and wait for another Sample Trigger. The sampler will continue this pattern until the total number of bottles the unit is configured for (set in *99) each have a sample placed in them or a bottle full condition occurs.

For example, assume the sampler is configured for 24 bottles and Samples per Bottle is set to 3 (see step by step programming below). The sampler, after receiving a contact closure, will in rapid succession place 1 sample in each bottle it is configured for (set in *99). In this case, since the sampler is configured for 24 bottles, a total of 24 samples would be deposited (one in each bottle). After depositing this set of samples the unit would pause awaiting the next contact closure to place the second set of samples in the bottles (there would be 48 total samples taken after the second contact closure - 2 in each bottle). After the third set, the sampler would end the sequence and wait for a new program (there would be 72 total samples taken - 3 in each bottle).

NOTE: In order for the sampler to correctly scale the analog signal being output from the external device, the parameters (in this case maximum and minimum flow) set in the sampler and the external device must be the same. This is to ensure that if the external device is reading 100,000 gallons and outputting a 4mA signal, the sampler will also know that 100,000 gallons is equal to 4mA. If the parameters do not correspond, there is a risk that the sampler will potentially not scale the analog signal correctly and will subsequently not take samples at the anticipated or correct instances.

The override time causes the unit to take samples if the Flow Trigger fails to occur. The override time starts counting down immediately after pressing <START>. If the Flow Trigger is received, the override time resets and immediately begins to count down again. NOTE: This means that the override time must be longer than the time it takes for the sampling sequence to complete. If it is not, the override time will elapse while the sampler is in the sequence causing the sampler to immediately start another sequence after it finishes the previous one. The time override fills bottles the same way as if a Flow Trigger were received. This will continue until the maximum number of samples (1-99) have been placed in the bottles (the number of samples should be equal to or less than the volume of the sample containers divided by the volume of the sample, to prevent over filling).

Display on LCD	Explanation
SAMPLER READY **12:48 12:48:00**	This display indicates the sampler is ready to program and displays the current time. Press the ***** key to begin programming.
ENTER * MODE **__ __ 12:48:00**	The sampler is now prompting for a star mode to be input. Enter the numbers which represent the star mode of choice, in this example 11, and press <ENTER>.
MAXIMUM FLOW RATE? **__ __ __ __ 12:48:00**	Input the 4 most significant digits of the Maximum anticipated flow rate. Since the unit of measurement is generic it can stand for any volume/minute. If the flow rate is 40, it could be entered as: 4000, 0400, or 0040. The decimal point is implied, in each case, so be consistent with all entries.
MINIMUM FLOW RATE? **__ __ __ __ 12:48:00**	Enter the 4 most significant digits of the Minimum anticipated flow rate. The same criteria apply to this input as to Maximum Flow Rate.
FLOW MULTIPLIER? **__ __ __ __ 12:48:00**	The Flow Multiplier is used to scale the Maximum & Minimum Flow Rates. If the Max flow rate is 40,000, enter it as 4000 (first 4 significant digits). The user would then enter a Flow Multiplier of 10 (4000 x 10 = 40,000) to have the unit scale the flow rate as 40,000.
SAMPLE TRIGGER? **__ __ __ __ 12:48:00**	Enter the 4 most significant digits of totalized flow at which a sample should be taken. Remember the decimal point is implied and must be consistent with previous entries. If the user wanted to take a sample every 150,000 units, the entry would be 1500.
TRIGGER MULTIPLIER? **__ __ __ __ 12:48:00**	The Trigger Multiplier scales the Sample Trigger. Using the example above, if 150,000 units is the Trigger point, the Trigger Multiplier would be 100 (1500 x 100 = 150,000).
SAMPLES PER BOTTLE? **__ __ 12:48:00**	Enter the number of samples per bottle as a 2-digit number (1-99). Make sure the volume to be placed in the bottles is not greater than the actual volume of the bottles.
TIME OVERRIDE? **__ __ : __ __ 12:48:00**	Enter in HH:MM format. Remember to allow enough time for the sampler to collect the required samples.
PUSH START/OPTIONS **12:48:00**	If no add-on options are desired, press <START> to begin the program.
FLOW MODE (*11) **__ __ __ __ A 12:48:00**	The sampler will immediately begin reading the analog signal.

*12 Flow Mode - Multiple Bottle Composite with Bottle Groups

The *12 mode functions almost identically to *10 mode, however, in this mode, up to 24 separate bottle groups can be created which accept composite samples. *12 is useful when it is not possible to collect samples on a regular basis, such as on a weekend or at a remote site. In this mode the user selects the number of bottle groups, how long each group is active (receives samples), the maximum number of samples a group will take, and a time override. NOTE: The number of **bottle groups** is entered, not the number of bottles in a group. After pushing <START>, the sampler immediately begins counting down the Delay Start. Once the Delay Start has finished counting down the sampler will be ready to receive an event (contact closure or time override). The finish of the Delay Start will also start the time override counting down. If the sampler receives an event, the unit will initiate the sampling sequence. There are several simultaneous actions.

1) The spout will advance to the first bottle in the active bottle group and begin the sampling process.

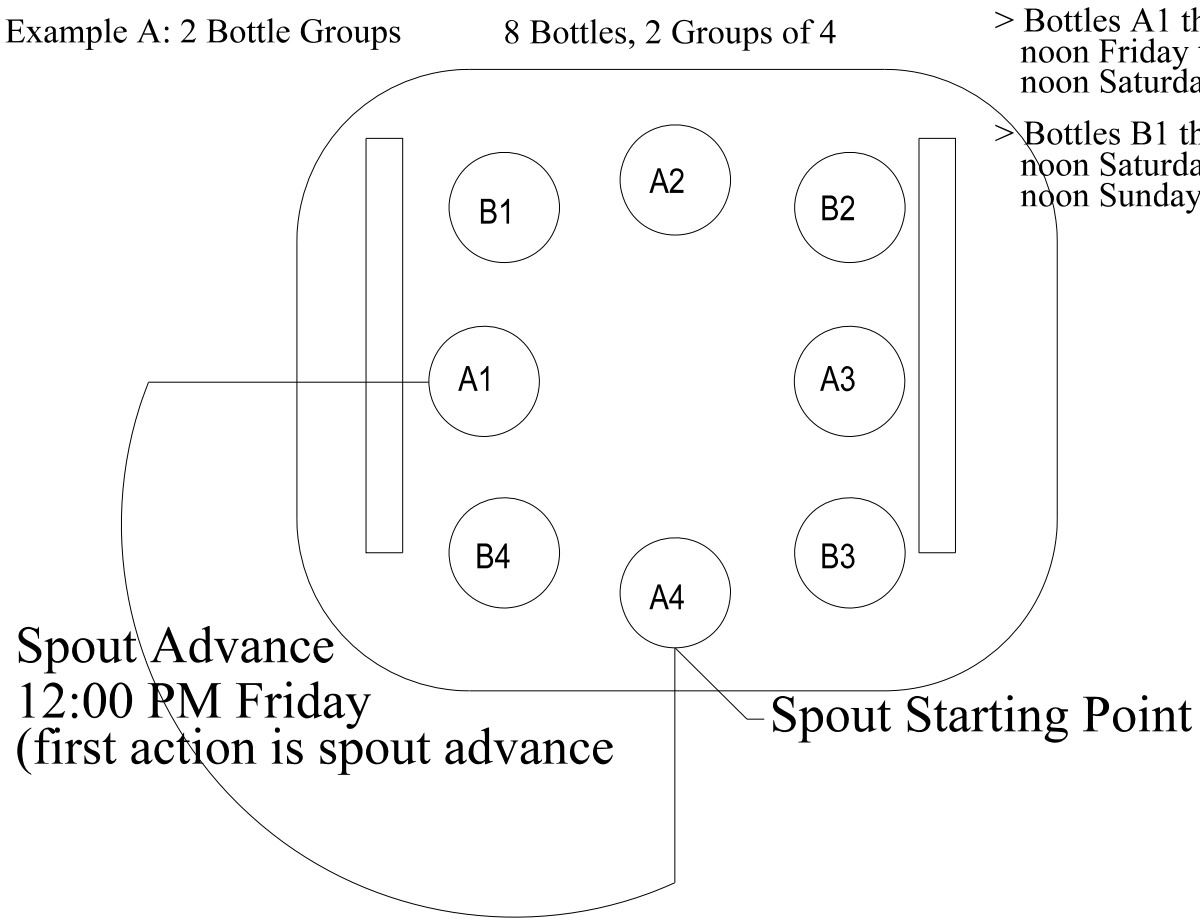
2) The active bottle group time will begin counting down. NOTE: Make sure the active time period allows enough time to collect all the samples required. If the active time period elapses before the Samples per Bottle has been satisfied, the unit will finish the sequence in progress and then move to the next bottle group without completing the current bottle group.

3) The time override will reset and begin counting down again. The override time causes the unit to take samples if a contact closure fails to occur. The override time starts counting down immediately after pressing <START>. NOTE: The override time must be longer than the time it takes for the sampling sequence to complete. If it is not, the override time will elapse while the unit is in a sampling sequence causing another sequence to begin immediately after finishing the previous one.

The first bottle group will be active and receive all samples for its active time period, up to the maximum number of samples. If the maximum is reached, the sampler will still wait out the rest of the active time before switching to the next bottle group. After the initiation of a sampling sequence, the sampler will advance to the first bottle in the group. The unit will place 1 sample in this bottle, and then advance to the next bottle in the group and deposit a sample. This will continue until all the bottles in the group have 1 sample placed in them (see NOTE on #2 above). The sampler will then wait for another event (contact closure or a time override elapse (see NOTE on #3 above)). When the event occurs the unit will place another sample in each bottle of the active group. This will continue, as events take place, until the specified number of Samples per Bottle is reached and all Bottle Groups have been utilized. See page 2-36 for a full explanation of how bottle groups are divided and what order the spout fills the bottles.

Display on LCD	Explanation
SAMPLER READY **12:48 12:48:00**	This display indicates the sampler is ready to program and displays the current time. Press the ***** key to begin programming.
ENTER * MODE **— —** **12:48:00**	The sampler is now prompting for a star mode to be input. Enter the numbers which represent the star mode of choice, in this example 12, and press <ENTER>.

SAMPLES PER BOTTLE? **__ __ 12:48:00**	Enter number of samples per bottle as a 2-digit number (1-99). Make sure the volume to be placed in the bottles is not greater than the actual volume of the bottles.
TIME OVERRIDE? **__ __ : __ __ 12:48:00**	Enter in HH:MM format. Remember to allow enough time for the sampler to collect the required samples.
ENTER DELAY START **__ __ : __ __ 12:48:00**	This display prompts the user to enter a delay start time (HH:MM format). This is the amount of time the sampler is to wait before starting.
ACTIVE PERIOD? **__ __ : __ __ 12:48:00**	Enter a time (HH:MM format). This is the time window in which bottle groups are active. It applies to all bottle groups. Make sure it is long enough to allow the sampler to collect the number of samples required.
# OF BOTTLE GROUPS? **__ __ 12:48:00**	Enter a 2-digit number (must be an integer). This is the number of bottle groups to be created from the number of bottles set in *99.The number of bottles will be divided by the number of bottle groups to determine how many bottles are in a group.
PUSH START/OPTIONS **12:48:00**	If no add-on options are desired, press <START> to begin the program.
DELAY START TIME **__ __:__ __ 12:48:00**	This display shows the time remaining on the Delay Start.
FLOW MODE (*12) **__ __ __ __ SDFT 12:49:00**	The sampler is now waiting to receive contact closures and is independently counting down the interval time.



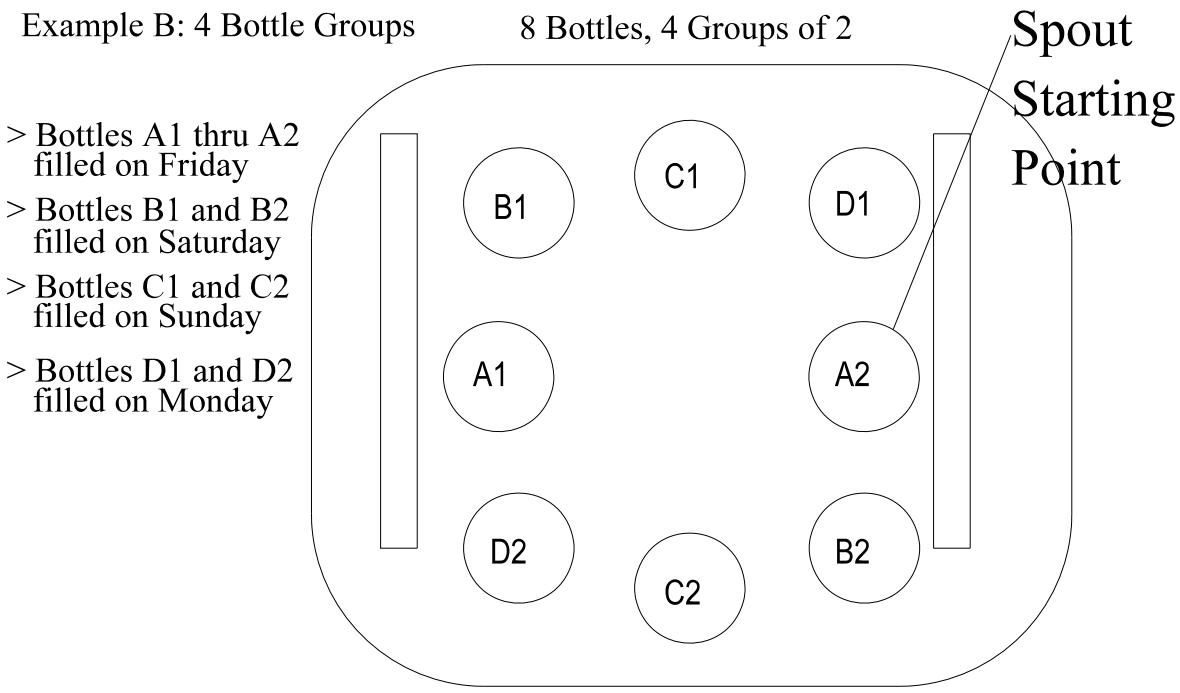


Figure 2-4 Bottle Group and Spout Advance

*13 Flow Mode - Totalizing Analog Multiple Bottle Composite with Bottle Groups

The *13 mode functions in the same way as the *12 mode, except it integrates and totalizes an analog signal (4-20mA) from an external device that represents flow rate. Since the sampler does not ask for a definition of the volume unit of the flow rate, ANY can be used, i.e. cubic feet, liters or gallons. For more details on how the analog controller works, refer to the analog programming section on page 2-8. *13 is useful when it is not possible to collect samples on a regular basis, such as on a weekend or at a remote site. In this mode the user selects the number of bottle groups, how long each group is active (receives samples), the maximum number of samples a group will take, and a time override. NOTE: The number of **bottle groups** is entered, not the number of bottles in a group. After pushing <START>, the sampler immediately begins counting down the Delay Start. Once the Delay Start has finished counting down, the sampler will begin reading the analog signal and be ready to act on an event (totalized volume or time override). The finish of the Delay Start will also start the time override counting down. If the sampler receives an event, the unit will initiate the sampling sequence. There are several simultaneous actions:

1) The spout will advance to the first bottle in the active bottle group and begin the sampling process.

2) The active bottle group time will begin counting down. NOTE: Make sure the active time period allows enough time to collect all the samples required. If the active time period elapses before the Samples per Bottle has been satisfied, the unit will finish the sequence in progress and then move to the next bottle group without completing the current bottle group.

3) The time override will reset and begin counting down again. The override time causes the unit to take samples if the Flow Trigger fails to occur. The override time starts counting down immediately after pressing <START>. NOTE: The override time must be longer than the time it takes for the sampling sequence to complete. If it is not, the override time will elapse while the unit is in a sampling sequence causing another sequence to begin immediately after finishing the previous one.

The first bottle group will be active and receive all samples for its active time period, up to the maximum number of samples. If the maximum is reached, the sampler will still wait out the rest of the active time before switching to the next bottle group. After the initiation of a sampling sequence, the sampler will advance to the first bottle in the group. The unit will place 1 sample in this bottle, and then advance to the next bottle in the group and deposit a sample. This will continue until all the bottles in the group have 1 sample placed in them (see NOTE on #2 above). The sampler will then wait for another event (totalized volume or time override (see NOTE on #3 above)). When the event occurs the unit will place another sample in each bottle of the active group. This will continue, as events take place, until the specified number of Samples per Bottle is reached and all Bottle Groups have been utilized. See page 2-36 for a full explanation of how bottle groups are divided and what order the spout fills the bottles.

NOTE: In order for the sampler to correctly scale the analog signal being output from the external device, the parameters (in this case maximum and minimum flow) set in the sampler and the external device must be the same. This is to ensure that if the external device is reading 100,000 gallons and outputting a 4mA signal, the sampler will also know that 100,000 gallons is equal to 4mA. If the parameters do not correspond, there is a risk that the sampler will potentially not scale the analog signal correctly and will subsequently not take samples at the anticipated or correct instances.

Display on LCD	Explanation
SAMPLER READY **12:48 12:48:00**	This display indicates the sampler is ready to program and displays the current time. Press the ***** key to begin programming.
ENTER * MODE **__ __ 12:48:00**	The sampler is now prompting for a star mode to be input. Enter the numbers which represent the star mode of choice, in this example 13, and press <ENTER>.
MAXIMUM FLOW RATE? **__ __ __ __ 12:48:00**	Input the 4 most significant digits of the Maximum anticipated flow rate. Since the unit of measurement is generic it can stand for any volume/minute. If the flow rate is 40, it could be entered as: 4000, 0400, or 0040. The decimal point is implied, in each case, so be consistent with all entries.
MINIMUM FLOW RATE? **__ __ __ __ 12:48:00**	Enter the 4 most significant digits of the Minimum anticipated flow rate. The same criteria apply to this input as to Maximum Flow Rate.
FLOW MULTIPLIER? **__ __ __ __ 12:48:00**	The Flow Multiplier is used to scale the Maximum & Minimum Flow Rates. If the Max flow rate is 40,000, enter it as 4000 (first 4 significant digits). The user would then enter a Flow Multiplier of 10 (4000 x 10 = 40,000) to have the unit scale the flow rate as 40,000.
SAMPLE TRIGGER? **__ __ __ __ 12:48:00**	Enter the 4 most significant digits of totalized flow at which a sample should be taken. Remember the decimal point is implied and must be consistent with previous entries. If the user wanted to take a sample every 150,000 units, the entry would be 1500.
TRIGGER MULTIPLIER? **__ __ __ __ 12:48:00**	The Trigger Multiplier scales the Sample Trigger. Using the example above, if 150,000 units is the Trigger point, the Trigger Multiplier would be 100 (1500 x 100 = 150,000).
SAMPLES PER BOTTLE? **__ __ __ __ 12:48:00**	Enter the number of samples per bottle as a 2-digit number (1-99). Make sure the volume to be placed in the bottles is not greater than the actual volume of the bottles.
TIME OVERRIDE? **__ __ : __ __ 12:48:00**	Enter in HH:MM format. Remember to allow enough time for the sampler to collect the required samples.
ENTER DELAY START **__ __ : __ __ 12:48:00**	This display prompts the user to enter a delay start time (HH:MM format). This is the amount of time the sampler is to wait before starting.

ACTIVE PERIOD? **__ __ : __ __ 12:48:00**	Enter a time (HH:MM format). This is the time window in which bottle groups are active. It applies to all bottle groups. Make sure it is long enough to allow the sampler to collect the number of samples required.
# OF BOTTLE GROUPS? **__ __ __ __ 12:48:00**	Enter a 2-digit number (must be an integer). This is the number of bottle groups to be created from the number of bottles set in *99.
PUSH START/OPTIONS **12:48:00**	If no add-on options are desired, press <START> to begin the program.
DELAY START TIME **__ __:__ __ 12:48:00**	This display shows the time remaining on the Delay Start.
FLOW MODE (*13) **__ __ __ __ SDAT 12:48:00**	Once the Delay Start ends, the sampler will immediately begin reading the analog signal and begin counting down the Time Override.

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Maintenance and Troubleshooting

MAINTENANCE

The 6901 sampler requires only minimal maintenance to ensure proper and reliable operation.

CLEANING THE CONTROL PANEL

Use a mild cleaning solution and wipe with a soft, lint-free cloth.

CAUTION:	Do not use harsh cleaners (detergents, solvents, etc.) which can damage the panel surface. Do not use abrasives which can scratch the panel and fog the window above the LCD display.

CLEANING THE WETTED PARTS

Note:	Solvents and solvent contaminated fluids must be disposed of according to approved procedures.

Manning Environmental Inc. recommends instituting a cleaning regime for the sampling equipment. The following are a few of the many reasons why a cleaning regime is important:

1. It validates that the samples taken will be as free as possible from constituents that are not contained within the sample itself.

2. It contributes to ensuring that the statistical validity of the samples being examined will be maximized by reducing systematic error, if the regime is followed very closely.

3. It contributes to the longevity of the sampling equipment.

4. It provides documentation for challenged results.

For a detailed description of a cleaning protocol refer to U.S. Environmental Protection Agency Publications EPA-600/4-77-039 ("Sampling of Water and Wastewater" by Dr. Phillip E. Shelley), or consult with the facility that will do the actual testing of the samples. They should be able to assist in setting a cleaning regime that will help produce the most accurate results possible.

The following procedures are very general outlines of steps for cleaning certain parts of the sampler:

All toxic option (non-contaminating) wetted parts are autoclavable. Standard PVC wetted parts are not.

Intake Hose

There are two types of intake hose used with the sampler - PVC and Teflon®. PVC intake hose is used for general purpose sampling (Non-Toxic) applications. Teflon® hose is used for priority pollutant sampling (Toxic) applications.

1. Remove the intake hose. Remove the strainer if necessary. Do not loosen the compression rings!

2. Wash the intake hose and strainer using a cleaning solution appropriate for the application. The use of methylene chloride or other solvents may leave a residue which could contaminate future samples. Use a test tube brush to scrub the internal surfaces of the strainer, pull the brush through the hose with a wire to clean the internal surfaces of the hose.

3. Rinse the hose and strainer thoroughly in clean water and reassemble.

It may be easier and more convenient to simply use a new hose for each sample configuration. This eliminates cleaning and disposal of potentially hazardous regulated chemicals.

Measuring Chamber

Caution:	Do not allow water to enter the differential pressure switch. Remove the pressure switch and its tubing before turning the chassis top or chamber top upside down. Unplug the tubing for additional protection. **FAILURE TO KEEP THE PRESSURE SWITCH DRY WILL RESULT IN SWITCH FAILURE.**

1. Pop the gray differential pressure switch and the attached tubing off the top of the measuring chamber.

2. Remove the pressure and vacuum tubes from the red barbed fittings on the chamber top.

3. Disassembly of the red check valves is not necessary. If for some reason it becomes necessary simply twist and pull to separate the two pieces. Do not disassemble the white check valves inside.

4. Remove the two wingnuts from the top of the measuring chamber and lift the chamber top off the chamber.

5. Check the two o-rings, one at the top and one at the bottom of the measuring chamber, for gauges and imperfections, and replace the o-rings if necessary. (Do not use lubrication, as it may cause contamination.)

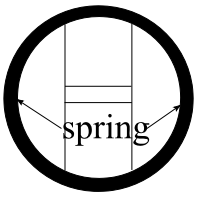
6. Wash the chamber with an appropriate cleaning solution. A test tube brush can be used to scrub the internal surfaces of the top fittings, slit tube and sleeve. Clean the chamber base and pinch tube.

7. Rinse all parts thoroughly in clean water. Blow water out of all tubing and reassemble.

Re-assembling Check Valves

If the check valve housing was taken apart, re-assemble as shown below:

Pressure Line
Sensor Tube Valve
This end of the white check valve faces the base of the red check valve housing.



Top Valve (vertical mount)
This end faces the base of the check valve housing.
To seal the check valve housings, press the barbed end onto the mounted end. Twist to lock.

Spout (multiple bottle units only)

1. Remove the spout from the upper union by gently pulling the spout gear from below. (Rotating back and forth may help.)

2. Wash the spout with the appropriate cleaning solution. Use a test tube brush to clean the internal surfaces of the spout and upper union.

3. Rinse thoroughly with clean water and re-assemble. When replacing the spout, the timing mark on the stepper motor gear must align with the timing mark on the spout gear.

Sample Containers

1. Wash with the appropriate cleaning solution. Use a brush to clean the internal surfaces.

2. Rinse thoroughly in clean water.

3. Glass bottles are Autoclavable. Polyethylene Suspension rings and caps are not.

ENVIRONMENTAL PROTECTION

Once a year (or as necessary) replace the two Zerust vapor barrier sponges on the back inside walls of the enclosure. If the sampler is in an area of high humidity, the use of additional desiccant may be desirable.

REMOVING AND REPLACING THE CONTROLLER

To remove the controller, remove the enclosure back, remove the hold down screws and detach the wires from the controller. To replace the controller, tighten the hold down screws, re-attach the wires, and replace

the enclosure back.

CHECKING THE PINCH VALVE

Frequently the pinch valve and the controller fail together. To determine whether one or both parts are needed, follow these instructions.

1. Remove the chassis and locate the white pinch valve wires. Cut the wires 2" to 3" from the solenoid.

2. Press the TEST CYCLE key. During the part of the cycle when the pinch valve should have been closing, check for 12VDC on the controller side of the wires.

3. Call the Manning Factory Service Department (800-863-9337) for assistance if necessary.

4. Use a butt-splice or twist connector to splice the wires.

Quick Check: A quick way to check for 12 VDC is to push a straight pin (or similar sharp conductor) through the insulation and into each wire. Be careful not to push the pins all the way through the wires. Attach the volt meter to the pins to check for a 12 VDC.

CHECKING THE DIFFERENTIAL PRESSURE SWITCH

Pressure switch failure can have serious consequences so it is important to replace the switch as soon as possible when it begins to fail.

CAUTION:	If the pressure switch fails completely, water can flow into the chamber and into the compressor, resulting in more expensive repairs.

To check the pressure switch or fill sensor, follow these instructions.

1. Disconnect the wires leading to the pressure switch.

2. Press the TEST CYCLE key. During the draw cycle, touch the wires together before the chamber fills completely. **Do not let the chamber fill completely.**

   If the draw stops and the purge begins, replace the pressure switch.

   If the draw does not stop, replace the controller.

3. Call the Manning Service Department (800-863-9337) if assistance is needed.

TROUBLESHOOTING

Troubleshooting instructions are based on a logical sequence of events leading to a malfunction. If trouble occurs, look for the most simple solution first. Is the power supply connected? Are any connections loose or wires broken? Review the problem, review normal operating procedures, and then check one possibility at a time starting with the easiest to verify. If the malfunction continues, call the Manning Environmental, Inc. Service Department at 1-800-863-9337. We can often assist over the phone. We can also advise whether or not certain repairs are best done in the field or in our factory.

Note: Follow instructions in the Maintenance section when removing the controller (see page 3-4)

Problem	Possible Cause	Remedy
System non-responsive	Circuit Breaker tripped	Turn the on/off switch to on.
	Loose Connection	Check connectors on the I/O board. Tighten if necessary.
	Controller Lock-up	Push the hard reset button located on the lower left side of the processor board. See figure 3-2. **Note: The configuration information will have to be re-entered in *99.**
	Controller Failure	Remove and replace controller. (see parts list)
Works inconsistently	Loose Wiring	Check the wiring, starting with the power connections.

Problem	Possible Cause	Remedy
Water Spurts into the Chamber	Intake Hose Drawing Air	Reposition intake hose.
	Controller Failing	Remove and replace controller. (see parts list)
Chamber Overfills	Twisted Pinch Tube	Check tube, untwist.
	Pressure Switch Failure	Can cause serious damage. See the detailed instructions on how to check the pressure switch.

Weak Vacuum	Intake Hose Pinched Hose Line Clogged Air Leak Pinch Valve Failure Compressor Failure	Check the hose for pinch damage, replace if damaged. Flush with water to clear the clog. Check and tighten the wingnuts at the top of the chamber. Check tubing, fittings, o-rings, and chamber seals. Replace parts if necessary. Check the pinch valve for freedom of movement. If it is hard to move or sticks, refer to the detailed instructions in this section on how to check the pinch valve. Replace the compressor or send to the factory for service.
Compressor hums, no action	Hose Clogged Compressor Failure	Flush hose with water to clear the clog. Replace the compressor or send to the factory for service.
Compressor runs, no purge	Air Leak or Bad Seals Pinch Valve Failure Pinch Tubing Clogged or Twisted	Check all o-rings and seals. Check the pinch valve for freedom of movement. If it is hard to move or sticks, refer to the detailed instructions in this section on how to check the pinch valve. Untwist or flush with water to clear the clog.
Purges Constantly or the draw cuts off before the chamber is full	Draw Time Set Too Short Controller Failure Pressure Switch Failure	Increase the draw time set during *99 configuration. Remove and replace the controller. (see the parts list) Can cause serious equipment damage. See the detailed instructions on how to check the pressure switch.

Problem	**Possible Cause**	**Remedy**
Controller does not respond	Password in Effect Controller Failure	Enter the password. Remove and replace the controller. (see parts list)

Keypad inoperative	Membrane Switch Failure	Remove and replace the membrane switch (see parts list)
*99 self-test error	Controller Failure	Remove and replace the controller. (see parts list)
Forgotten Password	N/A	Call Manning Service Department

PARTS LIST

The following is a partial list of the spare parts available from the Manning Environmental. To order a part or for more information on a part number not listed, call the Manning Parts Department at 800-863-9337.

CAUTION: Non-Toxic refers to General Sampling; Toxic refers to Priority Pollutant Sampling.

1. SB to MB Conversion Kit 3/8" ID (select bottle configurations below)
P/N 889770 Includes: (used for both Non-Toxic and Toxic)
-distribution assembly
-distribution assembly holders
-miscellaneous hardware
-spout assembly
-instruction drawing

Bottle Configuration Kits (must select one)
P/N 889655 (Non-Toxic) 24, 500 ml polyethylene bottles w/Bottle Positioning Plate
P/N 889656 (Non-Toxic) 24, 1000 ml polyethylene bottles w/Bottle Positioning Plate
P/N 889680 (Non-Toxic) 8, 2000 ml polyethylene bottles w/Bottle Positioning Plate
P/N 889657 (Toxic) 24, 350 ml glass bottles w/Bottle Positioning Plate
P/N 889658 (Toxic) 8, 2000 ml glass bottles w/Bottle Positioning Plate

2. MB to SB Conversion Kit 3/8" ID (select bottle & measuring chamber below)
P/N 889666 Includes: (For non-toxic conversions)
-Bottle Full Sensors
-Bottle Full Sensor Harness
P/N 889667 Includes: (For toxic conversions)
-Bottle Full Sensor
-Bottle Full Sensor Harness

3. NT to T Conversion Kit 3/8" ID (select bottle configurations below)
P/N 889676 Includes: (used for Single Bottle)
-Toxic Chamber Top
-Glass Measuring Chamber
-Instruction Drawing
-Toxic Chamber Base
-25' Teflon lined hose w/SS Strainer
P/N 889664 Includes: (used for Multi-Bottle)
-Toxic Chamber Top
-Glass Measuring Chamber
-Instruction Drawing
-Toxic Chamber Base
-25' Teflon lined hose w/SS Strainer

Bottle Configuration Kits

P/N 889715 2.5 gallon glass bottle, with Teflon lid liner
P/N 889141 24, 350 ml glass bottles
P/N 889608 8, 2000 ml glass bottles

BOTTLES & RELATED SPARE PARTS

P/N 687535 5 Gallon polyethylene bottle w /cap
P/N 889804 5 Gallon HDPE pail w/ seal
P/N 889715 2.5 Gallon glass bottle, w/ Teflon lid liner
P/N 889141 350 ml glass bottle set w/ Teflon-lined caps - (24 ea)
P/N 889041 500 ml polyethylene bottle set w/ caps - (24 ea)
P/N 889117 1000 ml polyethylene bottle set w/ caps - (24 ea)
P/N 889713 2000 ml polyethylene bottle set w/ caps - (8 ea)
P/N 889608 2000 ml glass bottle set w/ Teflon-lined caps - (8 ea)
P/N 687552 2000 ml glass bottle (1 ea)
P/N 687533 1000 ml polyethylene bottle (1 ea)
P/N 687543 500 ml polyethylene bottle (1 ea)
P/N 687538 350 ml glass bottle (1 ea)
P/N 564241 500 ml and 1000 ml bottle cap (1 ea)
P/N 579577 Teflon Lid Liner for 350 ml glass bottle (1 ea)
P/N 579959 Teflon Lid Liner for 2 liter glass bottle (1 ea)
P/N 579977 Teflon Lid Liner for 2.5 gallon bottle (1 ea)

BOTTLE FULL SENSOR

P/N 889821 3/8" Bottle Full Sensor (for Toxic or Non-Toxic)
P/N 889830 5/8" Bottle Full Sensor (for Toxic or Non-Toxic)
P/N 818029 Bottle Full Sensor Harness

DISTRIBUTION SPARE PARTS

P/N 889081 PVC Spout Assembly, 3/8" ID
P/N 889701 PVC Spout Assembly, 5/8" ID
P/N 889707 Stepper Motor Sub-assembly
P/N 552042 3/8" ID Upper Union
P/N 552093 5/8" ID Upper Union
P/N 542202 O-ring, Upper Union
P/N 542186 O-ring, Upper Union

SUSPENSION PLATE PARTS

P/N 889689 Suspension Plate, 24-bottle
P/N **889614** Suspension Plate, 8-bottle
P/N 542224 O-ring, Suspension Plate
P/N 612991 Cable Tie, Pushbutton

HOSE & STRAINER ASSEMBLY

P/N 889147 3/8" PVC Strainer (Non-Toxic)
P/N 579591 3/8" Stainless Steel Strainer
P/N 889815 3/8" Clear PVC Hose w/ PVC Strainer - 10'
P/N 889818 3/8" Clear PVC Hose w/ PVC Strainer - 25'
P/N 889816 3/8" Clear PVC Hose w/ SS Strainer - 10'
P/N 889817 3/8" Clear PVC Hose w/ SS Strainer - 25'
P/N 889814 3/8" Reinforced Hose w/ PVC Strainer - 10'
P/N 889064 3/8" Reinforced Hose w/ PVC Strainer - 25'
P/N 889813 3/8" Reinforced Hose w/ SS Strainer - 10'
P/N 889773 3/8" Reinforced Hose w/ SS Strainer - 25'
P/N 889810 3/8" Teflon Hose w/ SS Strainer - 10'
P/N 889673 3/8" Teflon Hose and SS Strainer, 25' - Toxic
P/N 552018 5/8" PVC Strainer (Non-Toxic)
P/N 889850 5/8" Clear PVC Hose w/ PVC Strainer - 10'
P/N 889851 5/8" Clear PVC Hose w/ PVC Strainer - 25'
P/N 889852 5/8" Reinforced Hose w/ PVC Strainer - 10'
P/N 889853 5/8" Reinforced Hose w/ PVC Strainer - 25'

BULK HOSE
(Bulk hose is sold by the inch)

P/N 566917 3/8" ID Clear PVC Hose
P/N 566906 3/8" ID Nylon Reinforced PVC Hose
P/N 566918 5/8" ID Clear PVC Hose
P/N 566901 5/8" ID Nylon Reinforced PVC Hose
P/N 566920 3/8" ID Teflon-lined hose

HOSE CONNECORS

P/N 552039 Female Quick-Disconnect Coupling (used with all 3/8" ID Non-Toxic hose)
P/N 579518 5/8" ID Threaded Connector (used with all 5/8" ID Non-Toxic hose)

PINCH BRACKET SPARE PARTS

P/N 889665 Pinch Bracket Assembly
P/N 640525 Pinch Solenoid
P/N 548034 Pinch Spring
P/N 579497 Pull Bar
P/N 579567 Pinch Bar
P/N 579507 Threaded Chamber Hold-Down Rod

AIR AND DISCHARGE (PINCH) TUBING, ASSEMBLIES, AND FITTINGS

P/N 655900 Tubing, Air, Pressure Switch
P/N 566905 3/8" ID Pinch Tubing
P/N 889683 Chamber Base Assembly, 3/8" ID, Non-Toxic Muli-Bottle Sampler
P/N 889686 Chamber Base Assembly, 3/8" ID, Non-Toxic Single-Bottle Sampler
P/N 566919 5/8" ID Pinch Tubing
P/N 889827 Chamber Base Assembly, 5/8" ID, Non-Toxic Muli-Bottle Sampler
P/N 889826 Chamber Base Assembly, 5/8" ID, Non-Toxic Muli-Bottle Sampler
P/N 566911 Clear Air Tubing (6901AC)
P/N 566913 Blue Air Tubing (6901AC)
P/N 566911 Clear Air Tubing (6901AC)
P/N 566915 Blue Air Tubing (6901DC)
P/N 566916 Red Air Tubing (6901DC)
P/N 552175 Air Tubing Fitting, Quick-Disconnect, 90-Degree Elbow, Coarse Thread
P/N 552177 Air Tubing Fitting, Quick-Disconnect, 90-Degree Elbow, Fine Thread
P/N 552101 Air Tubing Fitting, Quick-Disconnect, Straight, Coarse Thread
P/N 552176 Air Tubing Fitting, Quick-Disconnect, Straight, Fine Thread
P/N 552087 Fitting, Barbed (Used with 655900)
P/N 552174 Fitting, Compression, 90-Degree Elbow (6901AC)
P/N 552097 Air Tubing Fitting, Quick-Disconnect, 3/8" ID, Straight (6901AC)
P/N 552098 Air Tubing Fitting, Quick-Disconnect, 3/8" ID, 90-Degree Elbow (6901AC)
P/N 787812 Y-Connector, Air Tubing

ELECTRONIC/CONTROLLER SPARE PARTS

P/N 886313 Standard Controller Assembly (6901AC)
P/N 886314 Analog Controller Assembly (6901AC)
P/N 889779 Standard Controller Assembly (6901DC)
P/N 886786 Analog Controller Assembly (6901DC)
P/N 886290 Processor Board
P/N 889182 Display Assembly
P/N 761612 Ribbon Cable Assembly, Display
P/N 886294 Power and I/O Board (6901AC)
P/N 886301 Power and I/O Board (6901DC)
P/N 886158 Alarm Board
P/N 810055 Ribbon Cable Assembly, 16-Wire, Alarm Board to Controller
P/N 889196 Analog Board
P/N 810035 Ribbon Cable, 14-wire, Analog Controller
P/N 889076 Ribbon Cable, 16-wire, Analog Controller
P/N 889199 Analog Upgrade Kit (Analog Board and Ribbon Cables)
P/N 675561 Keypad Assembly (Keypad mounted on rectangular backer)
P/N 540066 Controller Gasket, Rectangular
P/N 889829 Audio Indicator Assembly
P/N 640541 Transformer AC (6901AC)
P/N 675416 Line Filter, Power (6901AC)
P/N 640537 Power Supply, Switching, 12VDC (6901DC)
P/N 638574 On/Off Switch/Circuit Breaker, Rectangular

P/N 675427 Indicator Lamp, 120 VAC, Amber
P/N 783027 Zerust Vapor Barrier Capsule

MEASURING ASSEMBLY SPARE PARTS

P/N 579555 Measuring Chamber - Non-Toxic
P/N 687539-1 Measuring Chamber, Glass - Toxic
P/N 889703 5/8" ID Chamber Top (6958)
P/N 889718 3/8" ID Chamber Top - Non-Toxic (6901AC)
P/N 889719 3/8" ID Chamber Top - Toxic (6901AC)
P/N 889727 3/8" ID Chamber Top - Non-Toxic (6901DC)
P/N 889688 3/8" ID Chamber Top Subassembly, Non-toxic (no air fittings)
P/N 638522 Pressure Switch Assembly
P/N 656868 Check Valve, Air, Fine Thread (6901AC)
P/N 565869 Check Valve, Air, Coarse Thread (6901AC)
P/N 579409 Float Seal, Chamber Top
P/N 542180 O-Ring, Chamber Top
P/N 542187 O-Ring, Chamber Base
P/N 552038 Inlet, 3/8" ID Non-Toxic Chamber Top (also used on short intake hose- mates with 552039)
P/N 542229 O-Ring, Chamber Top Inlet, 3/8" ID Non-Toxic Chamber Top

MECHANICAL SPARE PARTS

P/N 889720 Stationary Sampler Maintenance Kit (6901AC)
P/N 889709 Stationary Sampler Maintenance Kit (6901DC)
P/N 675415 Compressor, 120VAC (6901AC)
P/N 675544 Compressor, 220VAC (6901AC)
P/N 675504 Compressor, 12VDC (6901DC)
P/N 565861 4-Way Air Valve, 120VAC (6901AC)
P/N 565867 4-Way Air Valve, 220VAC (6901AC)
P/N 565864 3-Way Air Valve, 12VDC (6901DC)

MISCELLANEOUS

P/N 889013 Refrigerator, White Enamel, 120VAC
P/N 889049 Refrigerator, Stainless Steel, 120VAC
P/N 717699 Instruction Manual.

Appendix A

How to Return Equipment

Contact the Manning Environmental Service Department before returning any equipment for repair. Many problems can be diagnosed and resolved over the telephone. Manning will issue a Return Material Authorization (RMA) number if it is deemed necessary that the equipment be returned for repair.

If you do need to return equipment, follow these guidelines:

- Pack equipment carefully, preferably in the original carton.
- Enclose specific information about the problem.
- Enclose a contact name and phone number in case our Factory Service Department needs additional information.
- Enclose a purchase order authorizing repairs.
- Ship the equipment to the address below. Our Receiving Department will not accept collect shipments.

The Service Department phone number is (800) 863-9337. The Service Department will notify you of the type of repair needed and an estimate of how much the repair will be. Manning will ask for authorization before proceeding.

Address For Repairs:

Manning Environmental, Inc.
c/o Service Department
401 West 8th St.
Georgetown, Texas 78626

Appendix B
Display Function Chart

The Model 6901 sampler is capable of performing a program status review or a sampler configuration review. Where the user is within the programming of the unit (PROGRAM OR NON PROGRAM MODE) will determine what status indicators are displayed.

PROGRAM MODE:
The sampler possesses the ability to review the status of a program while it is in progress. This is useful if the operator wants to determine whether certain parameters have been met, such as how much time is left in a Time Override, for example. While in a program mode the user presses the DISPLAY key. The first status indicator will appear (see charts for which displays will appear with each program). Each time the DISPLAY key is pressed after that the next status indicator in sequence will be shown. If the DISPLAY key is not pressed for 6 seconds the unit will time out and return to the active program mode display. The next time the user presses the DISPLAY key, the status indicator that was being shown when the sampler timed out, will appear. For example, assume the status indicator "Time Override 00:00" is being shown and the unit times out. The next time the DISPLAY key is pressed the unit would return to the "Time Override 00:00" status indicator display. The user would then have to press the DISPLAY key to continue to scroll through the status indicators.

NON PROGRAM MODE:
The 6901 is also capable of reviewing the configuration information (*99 mode) of the sampler. Pressing the DISPLAY key while not in a program mode (the display will be showing the SAMPLER READY prompt) will allow the user to view the information entered when the sampler was configured. The operation works exactly the same as the PROGRAM MODE above except that once the sampler times out, it will return to the SAMPLER READY display.

The following grid charts detail which displays are active with each program mode:

Appendix C
Optional Wall Mounting

Wall Mount

This option allows the sampler enclosure to pivot out from the wall so that you can access the electronics without removing the sampler from the mountings.

If you ordered the wall mount option with your sampler, you will received hardware and more detailed drawings with the wall mount.

Figure A-1 shows the wall mount option.

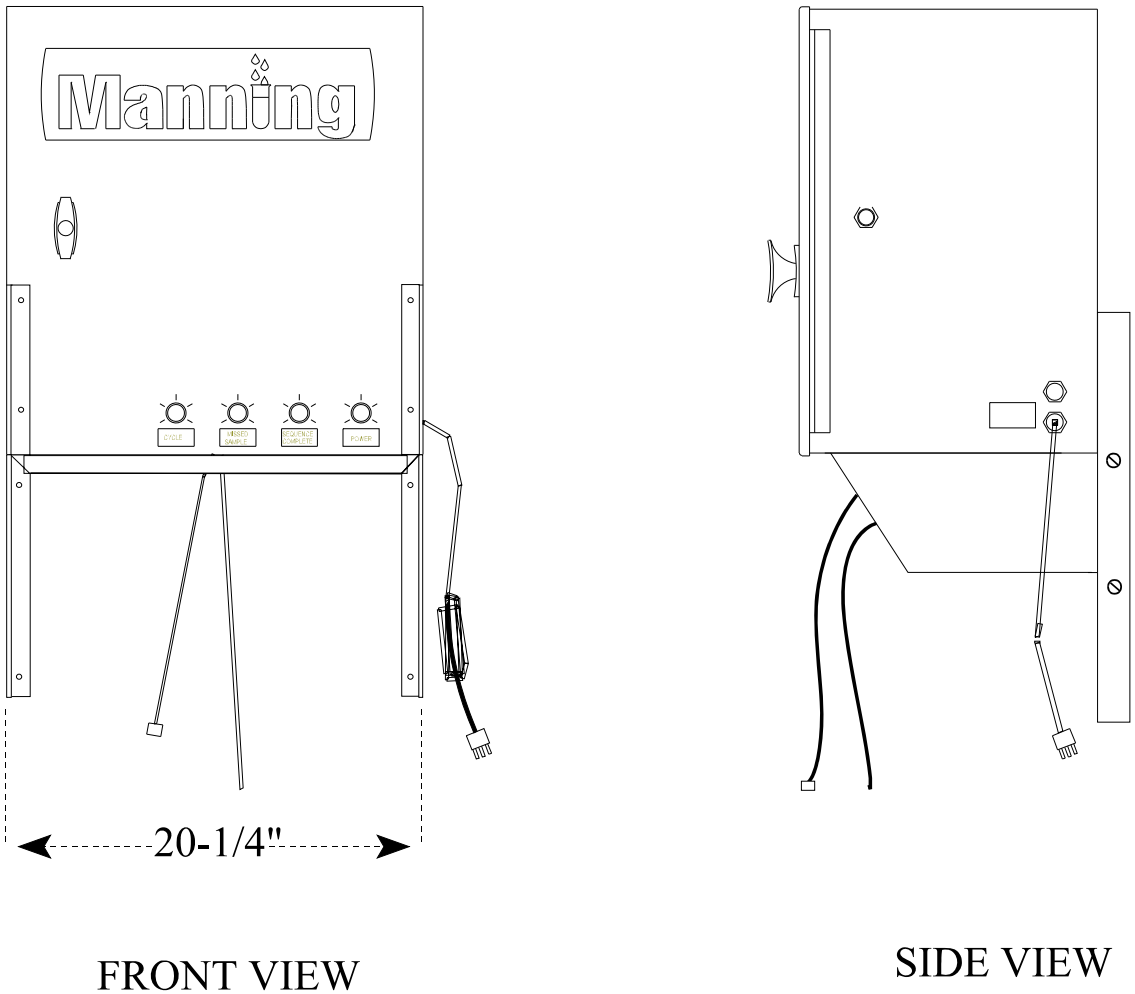


Figure A-1 Wall Mount Option

Appendix D
Optional Leg Mounts

Leg Mount

Figure A-2 shows the leg mounts available for the Model 6901. If you ordered this option, you will receive hardware and more detailed drawings with your order.

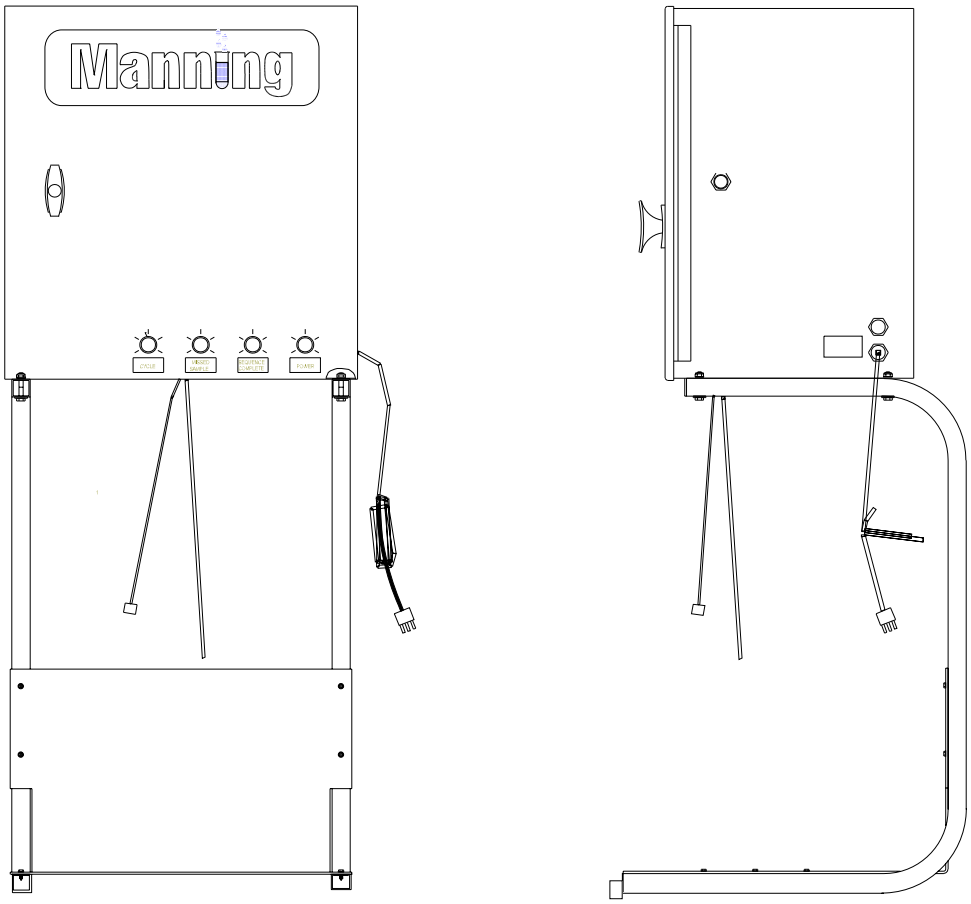


Figure A-2 Leg Mount Option

Appendix E
Heater Option

Heater Option

Manning does not recommend operation of the sampler in temperatures below 32ºF. With out heaters and/or other environmental protection. Manning offers optional heaters for both the electronics enclosure and the refrigerator. The heater consists of a thermal blanket mounted on a metal bracket with a thermostat.

In conditions where the temperature is expected to remain below freezing for extended periods of time, Manning recommend the optional NEMA3 sampler enclosure with heater.

The heater is a factory-installed option.
.

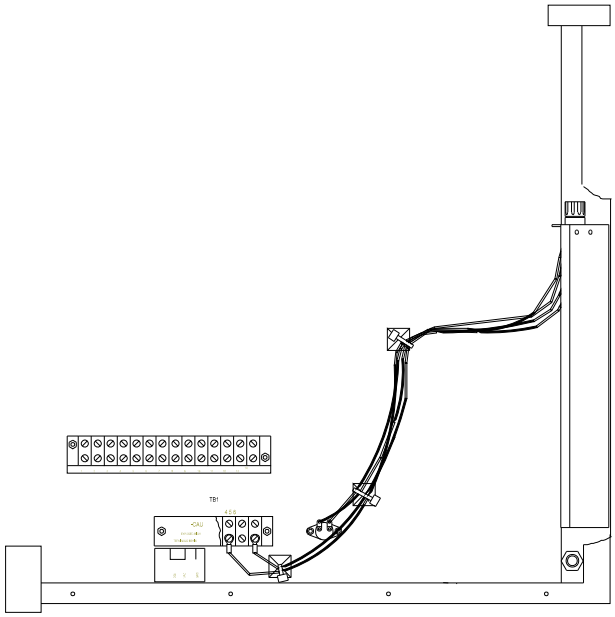


Figure A-3 Heater Option

Appendix F
Alarm Option

Alarm Option

There are several alarm options available, all of which are factory installed. The main part of the alarm option the Alarm Board, which is mounted to the back of the central panel. It is connected to the controller by a 16-wire ribbon cable. The alarm board is capable of providing 2 sets of 5A normally-open relay contacts for each of the following conditions:

1) Sample Cycle- The relay contacts are closed during the sample cycle.
2) Missed Sample- The relay contacts are closed if a sample is missed. (The chamber was not filled in either of the two draw attempts during a sample cycle. The relay contacts open at the beginning of the next sample cycle).
3) Bottle Full or End of Sequence. For single-bottle samplers, the relay contacts are closed when a bottle full condition is sensed. For muli-bottle samplers, the relay contact are closed when after the last sample is deposited into the last bottle- the end of the sample program sequence.

Normally, a lamp is mounted on the front door of the enclosure for each alarm installed. Additionally, an audio alarm can be added. Both the lamps and the audio alarms are AC-powered, so they can share the same set of contacts. This leaves the second set of contacts free for customer use.

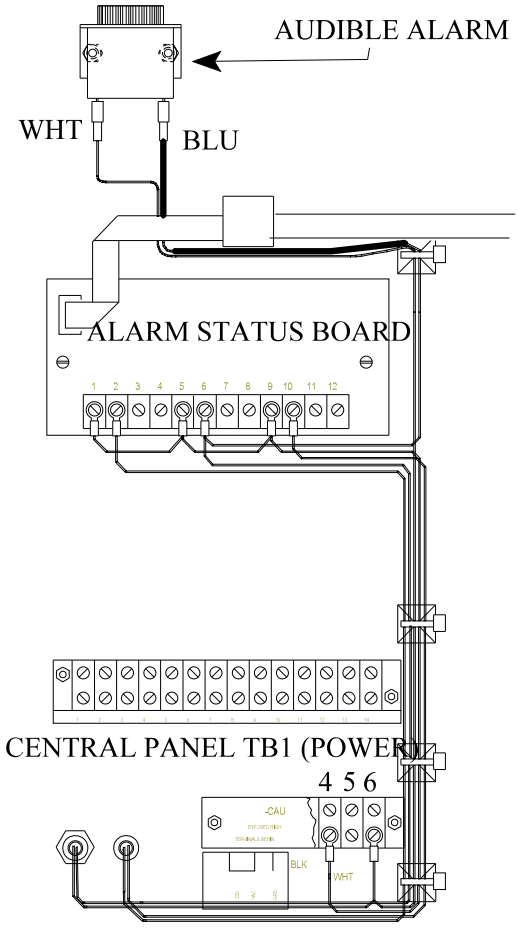


Figure A-4 Alarm Option

Appendix G
Additional Drawings

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PARTS LIST
6901 Stationary Vacuum Sampler

The following is a partial list of the spare parts available from the Manning Environmental Parts Department. To order a part or for more information on a part number not listed, call the Manning Parts Department at 800-863-9337.

CAUTION: Non-Toxic refers to General Sampling; Toxic refers to Priority Pollutant Sampling.

1. SB to MB Conversion Kit (does not include bottles)
PN# 889770 Includes: (used for both Non-Toxic and Toxic)
-stepper motor
-spout assembly
-left & right BPP hangers
-chamber base
-miscellaneous hardware
-instruction drawing

Bottle Configuration Kits
PN# 889655 (Non-Toxic)
24, 500 ml polyethylene bottles w/Bottle Positioning Plate

PN# 889656 (Non-Toxic) 24, 1000 ml polyethylene bottles w/Bottle Positioning Plate

PN# 889680 (Non-Toxic) 8, 2000 ml polyethylene bottles w/Bottle Positioning Plate

PN# 889657 (Toxic) 24, 350 ml glass bottles w/Bottle Positioning Plate

2. MB to SB Conversion Kit
PN# 889774 Includes:
(For non-toxic conversions does not include bottle)
-Bottle Full Sensors
-Bottle Full Sensor Harness
-Chamber Base

Bottle Configuration Kits
PN# 889715 2.5 gallon glass bottle, with Teflon lid liner

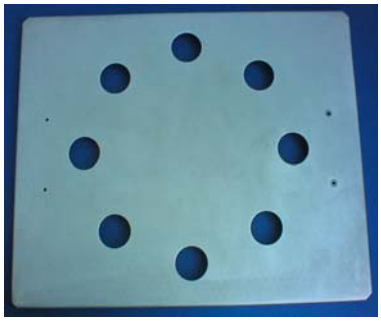
BOTTLES & RELATED SPARE PARTS

PN# 687535 5 Gallon polyethylene bottle w /cap
PN# 889804 5 Gallon HDPE pail w/ seal

PN# 687547 2.5 gallon polyethylene bottle w/cap

PN# 687551 4 gallon polyethylene bottle w/cap

PN# 889689 24 Bottle Positioning plate



PN# 889614 8 bottle positioning plate (shown without handles)

1 Liter Bottle - Left
500ml Bottle - Right

PN# 889141 350 ml glass bottle set w/ Teflon-lined caps - (24 ea)

PN# 889041 500 ml polyethylene bottle set w/ caps - (24 ea)

PN# 889117 1000 ml polyethylene bottle set w/ caps - (24 ea)

PN# 889713 2000 ml polyethylene bottle set w/ caps - (8 ea)

PN# 889608 2000 ml glass bottle set w/ Teflon-lined caps - (8 ea)

PN# 687552 2000 ml glass bottle (1ea)

PN# 687533 1000 ml polyethylene bottle (1ea)

PN# 687534 500 ml polyethylene bottle (1ea)

PN# 687538 350 ml glass bottle (1ea)

PN# 564241 500ml bottle cap (1ea)

PN# 564241 1000ml bottle cap (1ea)

PN# 579577 Teflon Lid liner for 350ml glass bottle (1ea)

PN# 579959 Teflon Lid liner for 2 liter glass bottle (1ea)

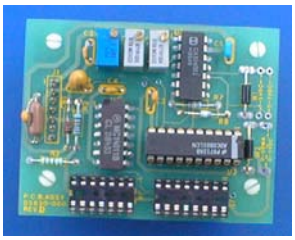
PN# 579977 Teflon Lid liner for 2.5 gallon glass bottle (1ea)

DISTRIBUTION SPARE PARTS ELECTRONIC/ CONTROLLER

PN# 540066 - Gasket for 6901 Keypad (Gasket only, no backer or keypad)

PN# 638577 - 6901 Keypad (Keypad only, no gasket or backer)

Not Shown
PN# 423735 - Backer for 6901 Keypad



DC ONLY

PN# 889196 - Analog Board

PN# 889199 - Analog Upgrade (includes necessary cables - PN# 889076 & 810035)

DC ONLY

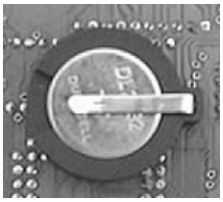
PN# 886290 - CPU Board

DC ONLY

PN# 886301 - Power Board

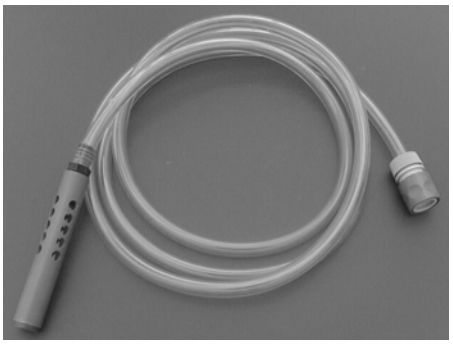
PN# 889768 - Analog Controller without Housing

PN# 889779 - Standard Controller without Housing



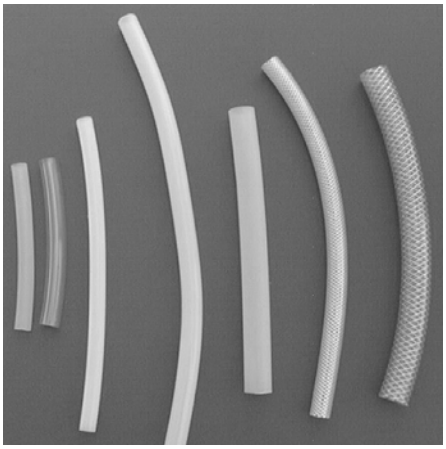
PN# 601851
Lithium Battery

SPARE PARTS
HOSE & STRAINER ASSEMBLY



Various Strainers (Left to Right)

PN# 552018 - 5/8" PVC
PN# 889147 - 3/8" PVC
PN# 579591 - 3/8" All Stainless Steel



Various Hoses (Left to Right)

PN# 566905 - 3/8" Pinch Tubing

PN# 566917 - 3/8" Clear PVC Intake
Not Shown
PN# 566918 - 5/8" Clear PVC Intake

PN# 566920 - 3/8" Teflon Lined Polyethylene
Not Shown
PN# 566902 - 5/8" Teflon lined Polyethylene

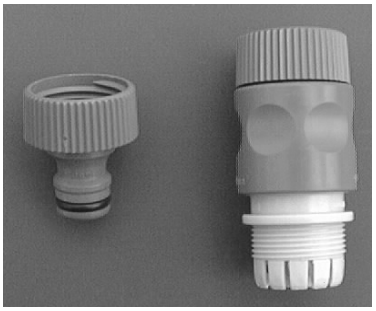
PN# 566919 - 5/8" Pinch Tubing

PN# 566899 - 5/8" Pinch Tubing for 5200 & 5000 Series Stationary Units

PN# 566906 - 3/8" Braided PVC Intake

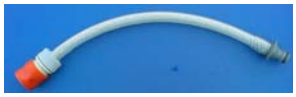
PN# 566901 - 5/8" Braided PVC Intake

PN# 566917 3/8" Clear PVC Hose (purchased by inch)
PN# 889815 3/8" Clear PVC Hose w/ PVC Strainer - 10'
PN# 889818 3/8" Clear PVC Hose w/ PVC Strainer - 25'
PN# 889816 3/8" Clear PVC Hose w/ SS Strainer - 10'
PN# 889817 3/8" Clear PVC Hose w/ SS Strainer - 25'
PN# 889814 3/8" Reinforced Hose w/ PVC Strainer - 10'
PN# 889064 3/8" Reinforced Hose w/ PVC Strainer - 25'
PN# 889813 3/8" Reinforced Hose w/ SS Strainer - 10'
PN# 889773 3/8" Reinforced Hose w/ SS Strainer - 25'
PN# 889810 3/8" Teflon Hose w/ SS Strainer - 10'
PN# 889673 3/8" Teflon Hose and SS Strainer, 25' - Toxic



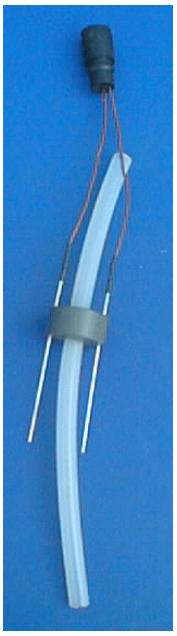
PN# 552039 - Quick Disconnect Hose Fittings

PN# 552038 - Male Fitting for Quick Disconnect

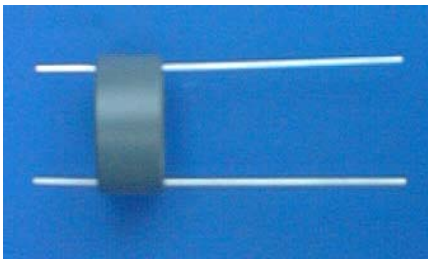


PN# 889828 - Short Hose Assembly (6901)

MISCELLANEOUS
PN# 717699 Instruction Manual

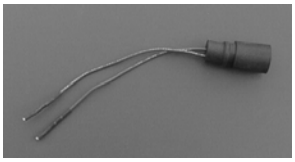


PN# 889819 - Bottle Full shut off switch with connector (shown installed on hose, hose not included)



PN# 889821 3/8" Bottle Full Sensor (for Toxic or Non-Toxic)

PN# 889830 5/8" Bottle Full Sensor (for Toxic or Non-Toxic)

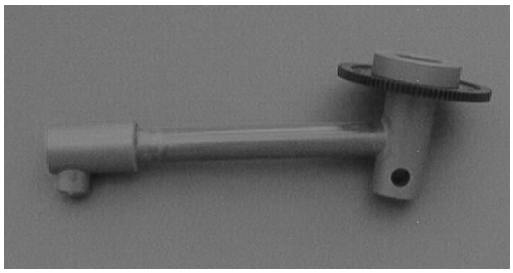


PN# 818029 Bottle Full Sensor Harness

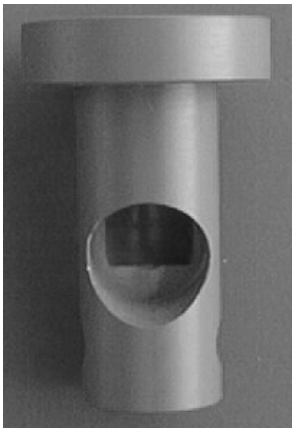
PN# 783027 Z-Rust Capsule

PN# 889707 - 6901 Stepper Motor

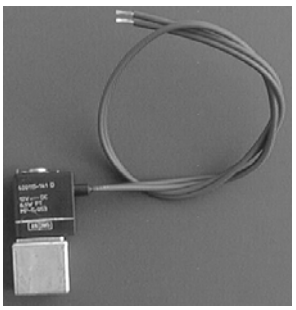
PN# 579530 - Pull rod for spout assembly



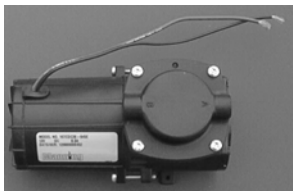
PN# 889081 - Spout Assembly for 6901 - PVC (shown without pull rod (PN# 579530)



PN# 552095 - 5/8" Lower Union for Spout



PN# 565864 - 3 way 12VDC air valve

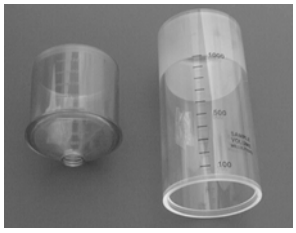


PN# 675504 - Air Compressor (no fittings)

PN# 621502 - Valve Flappers (Plastic)

PN# 621102 - Valve Flappers (Stainless Steel)

PN# 621103 - Compressor Head Plastic

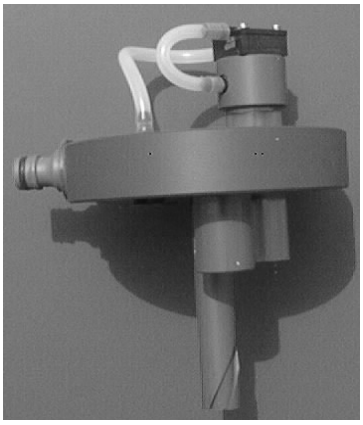


PN# 579555 - 500ml Measuring chamber

PN# 579402 - 1 Liter Measuring Chamber (used only on 5000 & 5200 models

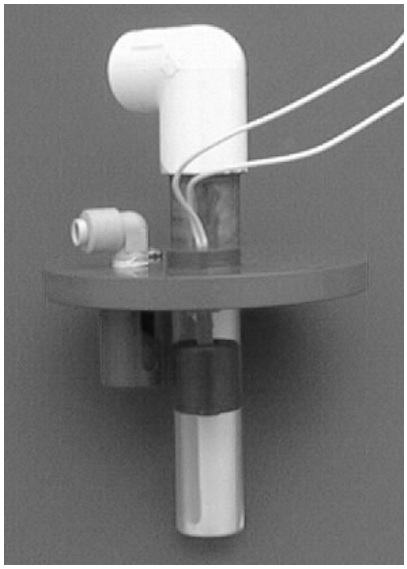
PN# 687539-1 - 500ml Glass Measuring Chamber

PN# 552042 - 3/8" Upper Union

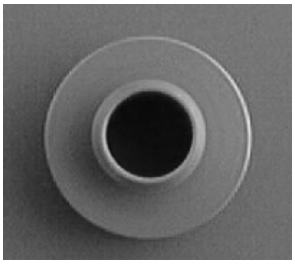


DC ONLY

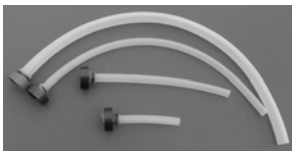
PN# 889727 - 3/8" Chamber Top (shown without fittings)



PN# 889703 - 5/8" Chamber Top with Magnetic Float Switch



PN# 579397 - 5/8" Chamber Base



PN# 889826 - 5/8" Chamber Base with Pinch Tubing (4901)

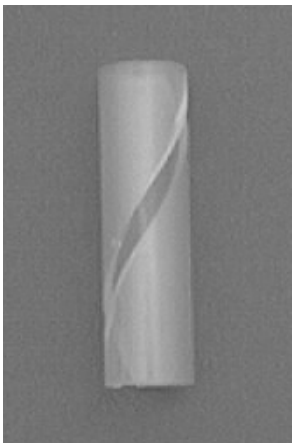
PN# 889827 - 5/8" Chamber Base with Pinch Tubing (6901)

PN# 889686 - 3/8" Chamber Base with Pinch Tubing - Single Bottle 6901 Series

PN# 889683 - 3/8" Chamber Base with Pinch Tubing - Multiple Bottle 6901 Series

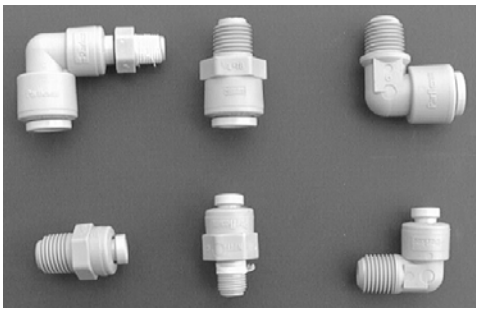
PN# 889684 - 3/8" All Configurations 4901

PN# 638560 Chamber Full Shut-off switch



PN# 579499 - 5/8" Spiral Tube

PN# 579498 - 5/8" Slotted Tube (Not Shown)



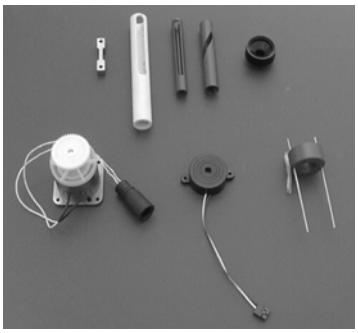
Various Collets shown left to right

PN# 579515
PN# 552097
PN# 552098
PN# 552101
PN# 555176
PN# 552177

OLD STYLE AC ONLY

PN# 565868 - Check Valve

PN# 565869 - Check Valve



Various Items (Left to Right)

PN# 579576 - Pinch Bar

PN# 552067 - 3/8" Toxic Slotted Tube

PN# 579501 - 3/8" Slotted Tube

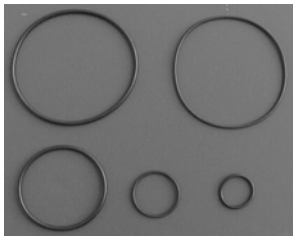
PN# 579500 - 3/8" Spiral Tube

PN# 579496 - 3/8" Chamber Base

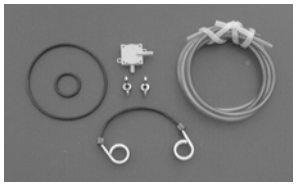
PN# 889707 - Stepper Motor

PN# 889829 - Buzzer for Keypad

PN# 889831 - 3/8" Bottle Full Sensor

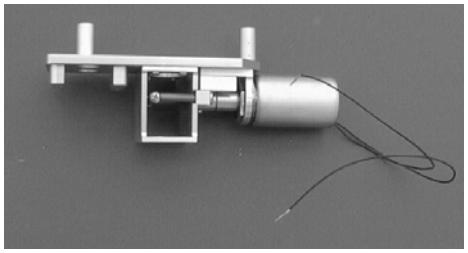


PN# 542180 - O-Ring Chamber Top 4901/6901
PN# 542186 - O-Ring
PN# 542187 - O-Ring Chamber Base 4901/6901
PN# 542216 - O-Ring
PN# 542224 - O-Ring
PN# 542225 - O-Ring
PN# 542226 - O-Ring
PN# 542227 - O-Ring
PN# 542229 - O-Ring



PN# 889709 - Maintenance Kit - 6901

PN# 640525 - Pinch Solenoid with throw rod

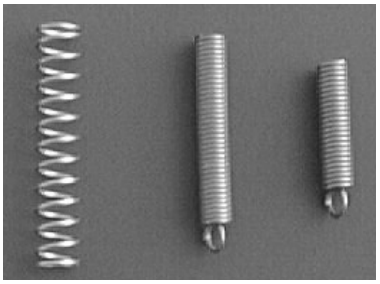


PN# 889665 - Pinch Valve Assembly

PN# 579553 - Bounce Pad for Pinch Valve Assembly (Not shown)

PN# 579576 - Pinch Bar for Pinch Valve Assembly (Not shown)

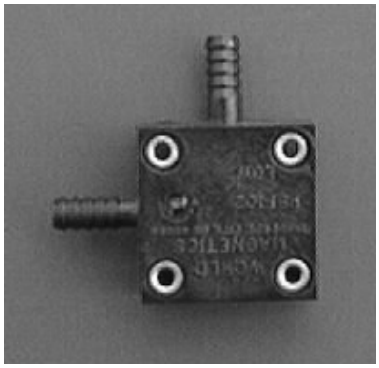
PN# 579497 - Pull Bar for Pinch Valve Assembly - 4901/6901 (Not shown)



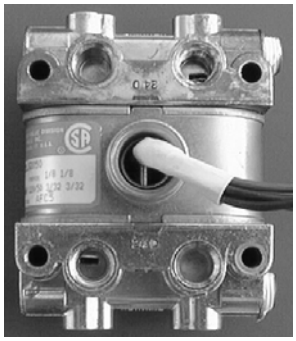
PN# 548015 - Pinch Spring for 5000 series samplers (stationary)

PN# 548031 - Pinch Spring for 5000 series samplers (stationary)

PN# 548034 - Pinch Spring (4901 & 6901)

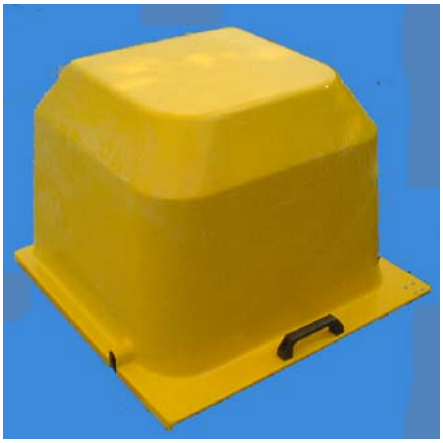


PN# 638541 - Pressure Switch

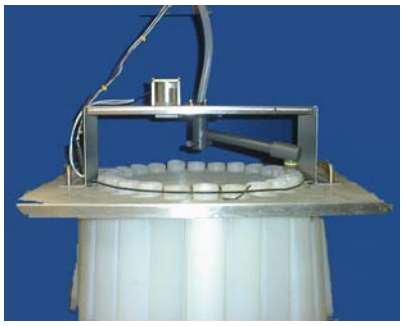


OLD STYLE
AC ONLY

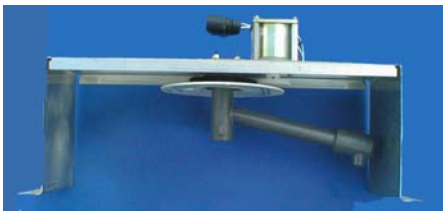
PN# 564861 - 4 Way Valve



PN# 889888 Fiberglass refrigerator Cover



889702 (shown with spout which is not included in 889702) installed on 24 bottle suspension plate



PN# 889702 Distribution assembly with stepper motor and bracket (Spout not included)

PN# 545059 Refrigerator Plug

Refrigerator - drilled and tapped.

PN# 889013 Standard 110VAC Refrigerator

PN# 889049 Stainless Steel 110VAC Refrigerator

PN# 889016 Standard 220VAC Refrigerator

PN# 889051 Stainless Steel 220VAC Refrigerator

TIME PROGRAMS	FIRST AT __:__ LAST AT __:__	TIME DIFF __:__ ACTIVE TIME _:__:__	THE SPOUT IS POINTED AT BOTTLE __	TIME TO NEXT SAMPLE __:__	ATTEMPTED SAMPLE = __ VALID _ MISSED _	THE PROGRAM HAS BEEN DELAYED FOR __:__	THIS BOTTLE CONTAINS _ SAMPLES	SAMPLES ARE TAKEN EVERY __ FLOW PULSES	BOTTLE ACTIVE PERIOD __:__	TIME OVERRIDE__:__	THE NEXT SAMPLE WILL OCCUR IN __ __:__ __	ACTIVE GROUP PERIOD_ _:__
* Start	✓	✓	✓	✓	✓		✓					
STI	✓	✓	✓	✓	✓		✓					
STI w/ DS	✓	✓	✓	✓	✓	✓	✓					
STI w/ MB	✓	✓	✓	✓	✓		✓					
STI w/ MS	✓	✓	✓	✓	✓		✓					
STI w/ MB & DS	✓	✓	✓	✓	✓		✓					
STI w/ MB & DS	✓	✓	✓	✓	✓	✓	✓					
STI w/ MS & DS	✓	✓	✓	✓	✓	✓	✓					

STI = Single Time Interval MB = Multi Bottle MS = Multi Sample DS = Delay Start

FLOW PROGRAMS	FIRST AT __:__ LAST AT __:__	TIME DIFF __:__ ACTIVE TIME _:__:__	THE SPOUT IS POINTED AT BOTTLE __	TIME TO NEXT SAMPLE __:__	ATTEMPTED SAMPLE = __ VALID _ MISSED _	THE PROGRAM HAS BEEN DELAYED FOR __:__	THIS BOTTLE CONTAINS _ SAMPLES	SAMPLES ARE TAKEN EVERY __ FLOW PULSES	BOTTLE ACTIVE PERIOD __:__	TIME OVERRIDE__: __	THE NEXT SAMPLE WILL OCCUR IN __ __:__ __	ACTIVE GROUP PERIOD_ _:__
Flow Mode	✓	✓	✓		✓		✓					
Flow w/ DS	✓	✓	✓		✓		✓	✓				
Flow w/ MB	✓	✓	✓		✓		✓					
Flow w/ MS	✓	✓	✓		✓		✓					
Flow w/ MB & DS	✓	✓	✓		✓		✓	✓				
Flow w/ MS & DS	✓	✓	✓		✓		✓	✓				

MB = Multi Bottle MS = Multi Sample DS = Delay Start

* MODE PROGRAMS	FIRST AT __:__ LAST AT __:__	TIME DIFF __:__ ACTIVE TIME _:__:__	THE SPOUT IS POINTED AT BOTTLE __	TIME TO NEXT SAMPLE __:__	ATTEMPTED SAMPLE = __ VALID _ MISSED _	THE PROGRAM HAS BEEN DELAYED FOR __:__	THIS BOTTLE CONTAINS _ SAMPLES	SAMPLES ARE TAKEN EVERY __ FLOW PULSES	BOTTLE ACTIVE PERIOD __:__	TIME OVERRIDE__:__	THE NEXT SAMPLE WILL OCCUR IN __ __:__ __	ACTIVE GROUP PERIOD_ _:__
* 01	✓	✓	✓		✓		✓	✓	✓			
*02	✓	✓	✓		✓		✓			✓		
*02 w/ DS DSDS	✓	✓	✓		✓	✓	✓			✓		
*02 w/ MB	✓	✓	✓		✓		✓			✓		
*02 w/ MS	✓	✓	✓		✓	✓	✓			✓		
*02 w/ MB&DS	✓	✓	✓		✓	✓	✓			✓		
*02 w/ MS&DS	✓	✓	✓		✓	✓	✓			✓		
*04	✓	✓	✓	✓	✓	✓	✓					
*04 w/ DS	✓	✓	✓	✓	✓	✓	✓				✓	
*04 w/ MB	✓	✓	✓	✓	✓	✓	✓					
*04 w/ MS	✓	✓	✓	✓	✓	✓	✓					
*04 w/ MB&DS	✓	✓	✓	✓	✓	✓	✓					

* MODE PROGRAMS	FIRST AT __:__ LAST AT __:__	TIME DIFF __:__ ACTIVE TIME _:__:__	THE SPOUT IS POINTED AT BOTTLE __	TIME TO NEXT SAMPLE __:__	ATTEMPTED SAMPLE = __ VALID _ MISSED _	THE PROGRAM HAS BEEN DELAYED FOR __:__	THIS BOTTLE CONTAINS _ SAMPLES	SAMPLES ARE TAKEN EVERY __ FLOW PULSES	BOTTLE ACTIVE PERIOD __:__	TIME OVERRIDE__:__	THE NEXT SAMPLE WILL OCCUR IN __ __:__ __	ACTIVE GROUP PERIOD_ _:__
*04 w/ MS&DS DS	✓	✓	✓	✓	✓	✓	✓					
*05	✓	✓	✓		✓		✓				✓	
*05 w/ MB	✓	✓	✓		✓		✓				✓	
*05 w/ MS	✓	✓	✓		✓		✓				✓	
*06	✓	✓	✓		✓		✓					
*06 w/ MB	✓	✓	✓		✓		✓					
*06 w/ MS	✓	✓	✓		✓		✓					
*09	✓	✓	✓		✓					✓		
*09 w/ MB	✓	✓	✓		✓		✓			✓		
*09 w/ MS	✓	✓	✓		✓		✓			✓		
*10	✓	✓	✓		✓		✓			✓		
*10 w/ DS	✓	✓	✓		✓	✓	✓			✓		
*11	✓	✓	✓		✓		✓			✓	✓	
*12	✓	✓	✓		✓	✓	✓			✓		✓
*13	✓	✓	✓		✓	✓	✓			✓	✓	✓

MB = Multi Bottle MS = Multi Sample DS = Delay Start

Part Number 717699 February 2001

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