S-3300 Portable Composite Sampler Operation Manual

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SECTION I INTRODUCTION

1. GENERAL DESCRIPTION

(See Figure 1-1)

The Manning S-3300 Portable Composite Sampler is a precision instrument for drawing and storing samples of liquid for subsequent analyses in selected volume from 50 ml to 500 ml per sample. The unit self-purges before and after each sampling action to clear the intake tube of obstructions and residue from the previous sample, thus assuring that each sample is accurate and representative. A powerful vacuum system creates sample transport velocity of 1.0 m/sec (3.1 ft/sec) or better through 7.6 m (25 ft) of .95 cm (.375 in) I.D. tubing. This high speed transport velocity minimizes "settling out" of suspended solids and promotes highly accurate samples. A 7.6 m (25 ft) nylon reinforced PVC inlet hose with weighted strainer is supplied with each instrument.

The S-3300 sampler consists of three major assemblies: the top cap, the equipment chassis, and the bottle case containing 15 liter (4 gal.) polyethylene or 11 liter (3 gal.) glass autoclavable bottle (See Figure 1-2). The equipment chassis and top cap are constructed of ABS plastic, the bottle case of polyethylene. As a unit the three assemblies form an environment-resistant enclosure. Power for the sampler is supplied by either a 12-volt wet cell battery or an optional AC power supply. The instrument can be transported by one person and can be installed from the top of a manhole without requiring physical entry by the installer.

1.1 Top Cap

The removable top cap, which protects the sampler interior from the external environment, is secured to the bottle case with three toggle latches.

1.1.2 Equipment Chassis

The equipment chassis includes the microprocessor-based digital control panel and system electronics, the transparent PVC sample measuring chamber with a scale in milliliters for observing sample volume, the compressor and air valves with associated tubing, the solenoid pinch valve, battery. Figure 1-3 shows the location of the sample discharge tube, the bottle-full sensors and the fuses. Paragraph 1.4 provides correct rating for replacement fuses.

A spiral slot tube extending into the measuring chamber from the chamber top is externally adjustable for sample size (volume) from 50 to 500 milliliters (See Section II. INSTALLATION AND SAMPLE RECOVERY, and Figure 2-1 for adjustment procedures).
1.1.3 Bottle Case
The double-wall bottle case holds the sample bottle. The interior of the double-wall is filled with polystyrene foam which acts as an insulator. Ice can be added to maintain lower temperatures for biological preservation of the sample.

1.1.4 Touch-Pad Digital Control Panel (See Figure 1-4)
The panel has 24 entry pads mounted flush in the sealed membrane switch panel and a 4-digit LCD display.

The controller electronics contains an 8-bit, state-of-the-art, low-energy consumption microprocessor with two kilobytes of permanent program memory (ROM) and sufficient temporary memory (RAM) to contain all the sampling sequence instructions which the user enters through the control panel keyboard. The controller responds with an audible beep when any function key is pressed, and the display prompts the user with a flashing cursor (underline) whenever it is waiting for a digit to be entered.

In addition, the controller has an accurate real-time clock which continuously displays the time when power is present at the battery terminals and no modes are programmed. Time is recoverable during any programmed mode when DISPLAY and CLOCK are pressed.

The keyboard can be interrogated at any time to indicate the mode that is currently functioning by pressing DISPLAY and the function key.

The electronics are mounted on the back of the control panel. (See Figures 4-2 and 4-3 for controller disassembly). The controller is mounted in a molded plastic housing and will withstand immersion.

1.2 FUNCTIONAL DESCRIPTION (See Figure 1-5)
NOTE: Wherever * appears it means the * KEY on the Touch Pad Digital Control Panel (See Figure 1-4).

1.2.1 Basic Sampling Modes
TIME, * START MODE
An extremely simple mode, the * START mode, waits one hour then takes one sample each hour until the bottle is full, after which all sampler operation stops.

TIME
In the TIME mode, samples are taken at user-selected time intervals ranging from 1 minute to 99 hours, 59 minutes in increments of 1 minute.

TIME, DELAY START
The first sample may be delayed from 1 minute to 99 hours, 59 minutes, and this time delay is independent of the time between samples.

FLOW
In the FLOW mode, samples are taken after one momentary external contact closure from a flowmeter. NOTE: If the external contact is still closed at the end of the sample cycle, the controller will revert to the * START time mode and take 1 sample per hour until the bottle has been filled.

Figure 1-3. Underside of S-3300 Composite Sampler equipment chassis.
DO NOT USE ORGANIC SOLVENTS OR ABRASIVES ON THE CONTROLLER PANEL. MOST ESPECIALLY DO NOT USE ACETONE.

Figure 1-4. S-3300 Composite Sampler Keyboard Control Panel

Figure 1-5. S-3300 Sampler Functional Diagram
FLOW, DELAY START
In the FLOW mode, DELAY START operates as a pulse accumulator permitting 2 to 9999 momentary external contact closures between each sample.

TIME INTERVAL OVERRIDE OF FLOW MODE (X 02)
A programmable default time may be added to the FLOW mode by means of the X 02 command. X 02 causes a sample to be taken after the expiration of the time interval if the external flow contact has not closed first. If the contact does close first, it resets the default timer.

"OVERFLOW MONITOR" TIME DEFAULT IN FLOW MODE
If the external flow contact is still closed when the sample cycle is completed, the controller reverts to the X START time mode and takes one sample per hour until 24 bottles have been addressed. The sampler remains in the X START mode even if the external contact later opens.

1.2.2 Utility Functions:

RESET
Pressing this key once will illuminate the LED's identifying the current programmed mode. The LED's will remain on for 30 seconds, then the display will continue as it was before RESET was pressed.

Pressing RESET twice within 30 seconds clears and resets the controller. The current programmed mode is cancelled.

TEST CYCLE
Permits the user to check the sampler through one complete sampling sequence. To activate the TEST CYCLE, the RESET key is first pressed twice to cancel any current programmed mode. Then pressing TEST CYCLE will initiate one complete sample sequence.

REAL TIME CLOCK
The DISPLAY key is pressed once to blank any current display. Pressing the CLOCK key displays the time with flashing colon for 10 seconds. The display then will return to the current operating mode.

ERROR
If an illegal number such as 12 hours, 63 minutes is keyed in, the display responds with EEEE (for error) and 5 audible beeps. When CLEAR is pressed once, the least significant digit is removed. When CLEAR is pressed successively 3 more times, the remaining three digits are removed.

LOW BATTERY
If battery voltage becomes too low to drive the compressor valves, the controller will go into LOW BATTERY ALERT, will block any further sampling and will display the word HELP. If a fresh battery is then connected to the second battery terminal before the depleted battery is disconnected, the key in parameters of the operating mode will be preserved.

1.2.3 The Sample Cycle
Each sampling cycle begins with a purging action. The solenoid valves connect the positive side of the compressor to the measuring chamber. The pinch bar at the bottom of the chamber is held closed, forcing the pressurized air out through the intake hose to purge the line of possible obstructions. The action takes approximately 8 seconds. When the purge is completed the controller switches the solenoid valves to the suction side of the compressor. The pinch bar remains closed and suction draws fluid up the intake hose into the measuring chamber. When the measuring chamber is full a differential pressure switch signals the controller to operate the solenoid valves. Air is again directed under pressure to the measuring chamber, forcing excess sample liquid out through the intake tube back into the channel flow. When the fluid level in the measuring chamber has dropped to the level of the measuring port no more fluid can escape and the calibrated sample is trapped. At the end of 8 seconds the controller releases the pinch valve, allowing pressure to discharge the measured sample out the bottom of the chamber, through the pinch tube, into the sample bottle. A bottle-full sensor signals the electronics to shut down all sample operation when the sample bottle is full. No further samples will be taken.

1.3 OPTIONS
Options consist of the A1 Analog Option Package, the A2 Adjustable Purge and Draw Option, or both A1 and A2. These options are not available as field retrofits to the standard S-3300 sampler and must be stipulated at the time the original order is placed. To determine if a sampler has none, one or both options, check the small label on the equipment chassis, near the 4-socket connector (See Figure 2-1).

1.3.1 Analog Option A1:
SOFTWARE
The A1 option software consists of three programs which accept analog signals from external level or flow meters:
1. Programmable analog flow mode. The X 05 mode.
2. Programmable analog level mode. The X 06 mode.
3. Programmable stage (hydrologic event) mode. The X 09 mode.

HARDWARE
- Analog-to-digital circuit board (See Figure 4-2).
- Additional Read Only Memory (ROM) and Random Access Memory (RAM) on the processor board (See Figure 4-2).
- 10-socket connector mounted on the equipment chassis which provides three functions: (See Figure 2-1).
1. Analog level or flow input: 4-20 mA or 0-20 mA, 1-5 VDC, 0-1 VDC
2. A contact closure output upon completion of the entire sampling sequence (useful for activating a second sampler)
3. Remote start from an external contact closure.
1.3.1.1 PROGRAMMABLE ANALOG FLOW MODE (* 05)
The sampler will accept a 4-20 mA, 0-20 mA DC, 0-1 VDC, or 1-5 VDC analog signal representing a continuous flowrate in volume per unit time from an external device. The flowrate signal is continuously integrated by the * 05 mode to accumulate volume units of total flow. The operator enters a time unit (second, minute, hour, day). He also enters one number which is an accumulated volume of flow. (Any volume unit may be used because the same unit (cubic feet, gallons) is present in both the flowrate and the accumulated flow.) A sample will be taken each time an additional volume of flow of this amount is accumulated.

1.3.1.2 PROGRAMMABLE ANALOG LEVEL MODE (* 06) (See Figure 1-6)
In this mode the sampler will accept a 0-20 mA, 4-20 mA, 0-1 VDC, or 1-5 VDC analog signal from an external device which represents water levels and will sample at programmed levels. Notice in Figure 1-6 that a second sample at any level will not be taken until the next higher or lower level has been sampled.

1.3.1.3 PROGRAMMABLE STAGE (HYDROLOGIC EVENT) MODE (* 09)
(See Figure 1-7)
The purpose of the * 09 Hydrologic Stage Mode is to provide a series of samples that begins only after the start of an unusual event, (e.g. a storm runoff), takes samples representative of the rapidly rising level and then the gradually falling level of the event, and finally stops sampling as the event ends.
In the * 09 mode the following parameters are entered: one rising and one falling differential stage, and from one to six threshold stages, each with its own default time.
No sample is taken until the water level rises to the lowest threshold stage. A sample is then immediately taken, and the default time for that stage begins counting down. If the water rises more than the rising differential stage HH before the default time elapses, a sample is taken. If not, a sample is taken when the default time elapses. This process continues as the water rises through the higher threshold stages, each having its own default time. When the water begins to fall, a sample is taken only after it has fallen by an amount equal to the falling differential stage HL or when the default time for that threshold stage has elapsed.
Note that there can be a different default time for each threshold stage, but that there is only one rising differential stage and only one falling differential stage.
The following symbols appear in the display in the following order to prompt the user to enter the stage and default time parameters: (Refer to the example shown in Figure 1-7, where for simplicity only two of the six possible threshold stages are used).
HH (Maximum Analog Level)
The difference between HH and HL is the span.
HL (Minimum Analog Level)
EH (Positive Differential Stage)
Rising change in water level, which causes a sample to be taken.

- The difference between HL and LL is the span. HL and LL are expressed in the same linear units above the datum.
- Any number, up to and including 50 intermediate sampling levels L 01, L 02 ... L 50 may be entered. They may have any separations. The lowest sampling level, L 01, must be greater than LL. The highest sampling level may or may not equal HL. If it equals HL, it must be entered separately from HL (as L 07 is in the figure).
- The resolution is 1/256 of the difference between HL and LL. If a level is entered which is not an integer multiple of 1/256 of the span the nearest multiple will automatically be computed and displayed.
- A second sample is never taken at any level until after a sample is taken at the next higher or the next lower level.

Figure 1-6. An example of Programming the * 06 Analog Level Mode
concentration samples of these substances may be contaminated by contact with PVC and polypropylene, the standard S-3300 sampler may not be appropriate.

THE TOXIC MATERIALS OPTION INCLUDES:
• Chamber top and bottom of Teflon TFE
• Intake sample hose of bondable Teflon TFE (3/8" [.95 cm] I.D.)
• Glass measuring chamber with protective mesh stocking
• Sampler chamber outlet tubing of Teflon
• 3 gallon (11 liter) glass sample bottle (interchangeable with standard polyethylene sample bottle)
• Teflon sample discharge tube

1.4 SPECIFICATIONS

1.4.1 Controller

CONTROLLER PANEL:
Polycarbonate membrane switch assembly with 24 touch pads and 4-digit Liquid Crystal Display (LCD).

TIME CONTROL:
1 minute to 99 hours, 59 minutes (selectable in 1 minute increments).

FLOW CONTROL:
1 to 9999 external contact closures (per sample) from external flowmeter.

DELAY START (OF TIME CONTROL):
1 minute to 99 hours, 59 minutes (selectable in 1 minute increments).

REAL TIME CLOCK:
Programmed into digital display in hours and minutes, 00:00 to 23:59.

TEST CYCLE:
Initiates one complete sample cycle.

1.4.2 Detailed Specifications

TEMPERATURE LIMITS:
0°C to 40°C (32°F to 104°F)

SAMPLE BOTTLES:
One 4 gallon (15 liter) polyethylene bottle (std.)
One 3 gallon (1.4 liter) glass bottle (toxic option)

Power:
12VDC, 16AH wet cell battery (standard).
12VDC 10AH sealed lead battery (optional).
AC/DC power supply (optional).

FUSE:
Two 3AG, 10 amp, 32 Volts, Part No. 01544-04

SIZE & WEIGHT:
Height: 32.2 in. (81.8 cm)
Diameter: 19.8 in. (50.4 cm)
Weight (without battery): 38 lbs, (17.3 kg)
Cube ice capacity: 25 lbs

ACCESSORIES:
Suspension Harness
Battery Charger
AC/DC Power Supply
Flowmeter Connector Cable

INPUTS/OUTPUTS:
Power: Two 2-pin connectors (standard)
Signal: One 4-socket connector (standard)
Flow Pulse Input: (Switch closure approx. 10 msec.)
Sample Event Output: (500 msec. closure between pins C and D on the connector)
One 10-Socket Connector: (Only with A1 analog input option)

Analog Inputs
Remote Start Input
Sequence Complete Output

SEQUENCE OF OPERATION: (See Figure 1-8)
Purge: 6 seconds
Draw: Until chamber is full. Default time—20 seconds
Measure: 13 seconds
Discharge measured sample: 8 seconds

SAMPLE TRANSPORT VELOCITY:
Minimum of 5 ft/sec (1.5 m/sec) at 3 ft (1 m) of lift and 2.5 ft/sec (.75 m/sec) at 20 ft (6.1 m) of lift.

INLET HOSE:
0.375 in. (9.5 cm) I.D. nylon reinforced PVC, 25 ft (7.6 m) in length with weighted PVC strainer. Longer hose available.

MAXIMUM SAMPLE LIFT:
22 ft (6.7 m)

SAMPLE VOLUME:
50 ml to 500 ml ± 5 ml, externally adjustable at chamber top.

OPTIONAL CONTROLS

A1 Option

ANALOG FLOW INPUT: (X 05)
Integrates an external flowrate signal (4-20 mA, 0-20 mA, 1-5VDC, or 0-1VDC) and provides a scaled pulse output to activate sampler on flow proportional basis. Fully adjustable to four significant digits (9999) with x1, x10, x100, x1000 scaling factors.

ANALOG LEVEL INPUT: (X 06)
Accepts analog signal (4-20 mA, 0-20 mA, 1-5VDC, or 0-1VDC) that represents water level span. Program samples at up to 50 discrete level values (rising or falling).
concentration samples of these substances may be contaminated by contact with PVC and polypropylene, the standard S-3300 sampler may not be appropriate.

**THE TOXIC MATERIALS OPTION INCLUDES:**
- Chamber top and bottom of Teflon TFE
- Intake sample hose of bondable Teflon TFE (3/8" [.95 cm] I.D.)
- Glass measuring chamber with protective mesh stocking
- Sampler chamber outlet tubing of Teflon
- 3 gallon (11 liter) glass sample bottle (interchangeable with standard polyethylene sample bottle)
- Teflon sample discharge tube

1.4 SPECIFICATIONS

1.4.1 Controller

**CONTROLLER PANEL:**
Polycarbonate membrane switch assembly with 24 touch pads and 4-digit Liquid Crystal Display (LCD).

**TIME CONTROL:**
1 minute to 99 hours, 59 minutes (selectable in 1 minute increments).

**FLOW CONTROL:**
1 to 9999 external contact closures (per sample) from external flowmeter.

**DELAY START (OF TIME CONTROL):**
1 minute to 99 hours, 59 minutes (selectable in 1 minute increments).

**REAL TIME CLOCK:**
Programmed into digital display in hours and minutes, 00:00 to 23:59.

**TEST CYCLE:**
Initiates one complete sample cycle.

1.4.2 Detailed Specifications

**TEMPERATURE LIMITS:**
0°C to 40°C (32°F to 104°F)

**SAMPLE BOTTLES:**
One 4 gallon (15 liter) polyethylene bottle (std.)
One 3 gallon (11.4 liter) glass bottle (toxic option)

**Power:**
12VDC, 16AH wet cell battery (standard).
12VDC 10AH sealed lead battery (optional).
AC/DC power supply (optional).

**FUSE:**
Two 3AG, 10 amp, 32 Volts, Part No. 01544-04

**SIZE & WEIGHT:**
- Height: 32.2 in. (81.8 cm)
- Diameter: 19.8 in. (50.4 cm)
- Weight (without battery): 38 lbs. (17.3 kg)
- Cube ice capacity: 25 lbs

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ACCESSORIES:
- Suspension Harness
- Battery Charger
- AC/DC Power Supply
- Flowmeter Connector Cable

**INPUTS/OUTPUTS:**
- Power: Two 2-pin connectors (standard)
- Signal: One 4-socket connector (standard)
- Flow Pulse Input: (Switch closure approx. 10 msec.)
- Sample Event Output: (500 usec. closure between pins C and D on the connector)
- One 4-Socket Connector: (Only with A1 analog input option)
- Analog Inputs
- Remote Start Input
- Sequence Complete Output

**SEQUENCE OF OPERATION:** *(See Figure 1-8)*
- Purge: 6 seconds
- Draw: Until chamber is full. Default time—20 seconds
- Measure: 13 seconds
- Discharge measured sample: 8 seconds

**SAMPLE TRANSPORT VELOCITY:**
Minimum of 3 ft/sec (1.5 m/sec) at 3 ft (1 m) of lift and 2.5 ft/sec (.75 m/sec) at 20 ft (6.1 m) of lift.

**INLET HOSE:**
0.375 in. (.95 cm) I.D., nylon reinforced PVC, 25 ft (7.6 m) in length with weighted PVC strainer. Longer hose available.

**MAXIMUM SAMPLE LIFT:**
22 ft (6.7 m)

**SAMPLE VOLUME:**
50 ml to 500 ml ± 5 ml, externally adjustable at chamber top.

1.4.3 OPTIONAL CONTROLS

**A1 Option**

**ANALOG FLOW INPUT:** *(#05)*
Integrates an external flowrate signal (4-20 mA, 0-20 mA, 1-5VDC, or 0-1VDC) and provides a scaled pulse output to activate sampler on flow proportional basis. Fully adjustable to four significant digits (9999) with X1, X10, X100, X1000 scaling factors.

**ANALOG LEVEL INPUT:** *(#06)*
Accepts analog signal (4-20 mA, 0-20 mA, 1-5VDC, or 0-1VDC) that represents water level span. Program samples at up to 50 discrete level values (rising or falling).
HYDROLOGIC EVENT SAMPLING: († 09)
Accepts an analog signal (4-20 mA, 0-20 mA, 1-5VDC, or 0-1VDC) that represents water level span. Program samples based on combination of parameters: water level, differential rising and falling water levels, and time defaults. (Criteria suggested by U.S. Geological Survey. This program is designed to provide optimal representative sampling of an hydrologic event.)

A2 Option

ADJUSTABLE PURGE & DRAW: († 03)
Program nonstandard duration times (in seconds). Shorter times (shorter hose and low lift applications) decrease power consumption. Longer times allow use of longer hoses at high lifts (increase power consumption).

PROGRAMMABLE TIME INTERVALS († 04)
Accepts up to 12 different time intervals between sample events. Intervals from 1 minute to 99 hours 59 minutes in increments of 1 minute.

---

Figure 1-8. S-3300 Sampling Sequence Flow Chart
SECTION II
INSTALLATION & SAMPLE RECOVERY

2.1 INSTALLATION:

NOTE: Because of shipping regulations the 16 amp-hour 12 volt wet cell battery, Part No. 01390-07, is shipped dry; electrolyte is not supplied. For filling and charging instructions consult the Battery Application Note shipped with the unit. A GATES 10 amp-hour sealed rechargeable battery, Part No. 03975-01, operating at 70°F (21°C) will take 50 to 70 samples before recharging is required. Operating at lower temperatures will probably require more frequent recharging.

2.1.1 Use of Optional AC/DC Power Supply:
Where AC line power is readily available to the sampler installation site it may be desirable to use this source instead of the 12-volt battery, particularly if the number of samples to be taken exceeds battery capability (125 samples from a fully charged 16AH battery).
The Manning optional power supply is a sealed waterproof unit available for either 115 VAC (Part No. 05791-001) or 230 VAC 50/60 Hz, (Part No. 05791-002). Output is rated 12VDC, 7 amps.
The AC/DC power supply package fits in the battery well on the equipment chassis and can be secured with the battery holddown strap. The output fuse, rated 3AG, 10 amp, Part No. 03408-103, is accessible at the exterior fuse holder.
The integral cable connects to either of the two-pin connectors on the equipment chassis. (See figure 2-1).

2.1.2 Pre-installation Setup and Checkout

2.1.2.1 SETUP:

a. Release the three external latches, remove the cover and place a fully charged battery in the rectangular depression adjacent to the measuring chamber.

b. Using the two bolts and nuts supplied (for wet cell battery), connect the battery cable red lead to the positive (red) terminal and the black lead to the negative terminal of the battery.

c. Connect the battery cable connector to either of the two receptacles located closest to the battery (See Figure 2-1). The purpose for having two battery connectors is to permit a fresh battery to be connected to the unused terminal before the depleted battery is disconnected. (Internal diodes prevent cross-charging). This will save any program previously entered.

Figure 2-1. S-3300 Sampler Equipment Chassis, Top View
d. Remove the small plastic bottle from the accessory kit and install the tube on the battery overflow spout.

e. Position the overflow bottle flat against the battery and connect. Make sure it is tight.

f. Connect the intake hose to the short hose extending from the measuring chamber. The connector is a female quick-disconnect type.

2.1.2.2 CHECKOUT:

NOTE: While not mandatory, a functional checkout is recommended to assure proper operation and to familiarize personnel with the procedures affecting the various functions and modes of operation.

The following procedures can be accomplished with the sampler resting on a level surface such as a table or test bench, or on the floor.

a. Place a container of several gallons of clean water near the sampler.

b. Submerge the open end of the intake hose in the water.

c. Adjust the volume of the sample by turning the knob marked "ADJUST" clockwise (See Figure 2-1). (DO NOT TURN COUNTERCLOCKWISE). This rotates the spiral tube around a slotted tube and lowers the exit port until it reaches the bottom and suddenly reappears at the top.

Compare the exit port (at eye level) with the milliliter gradients on the chamber to determine the sample volume (See Figure 2-2).

NOTE: For convenience it should be set to the volume to be taken in field operation. It may be necessary to repeat this step several times to obtain desired volume setting.

Upon completion of preliminary sample volume adjustment outlined above for operational checkout, fine adjustment of chamber volume can be made as follows:

a. Obtain a beaker graduated in milliliters.

b. Remove the equipment chassis from the bottle case and position the beaker under the sample discharge pinch tube. Press RESET, twice, press TEST CYCLE. (A sample will be taken immediately).

c. When the sample is discharged into the beaker, compare the milliliter reading on the beaker with the level of the exit port.

d. Adjust the spiral tube for more, or less, volume, as applicable.

2.1.3 Cooling The Samples:

It is often desirable to maintain the sample at temperatures low enough to preserve the bacterial content for analysis. The S-3300 bottle case is very well insulated and is designed to permit the addition of cube or crushed ice. The following procedure is recommended for cooling:

a. Obtain about 25 pounds of cube or crushed ice, put it in the inverted top cap of the sampler and add water to about half the height of the ice. Let

---

**FIGURE 2-2. Checking Sample Volume at Eye Level**
the water cool as long as possible. For best results it should be no more than 32.2°F (0.1°C) before being used.

b. Transfer as much ice as possible to the bottle case, around the sample bottle. Install the bottle retainer plate 05474-000, and finally pour in as much of the cold water as possible. The water is necessary as a transfer medium to remove heat from the sample. If the water is initially much above the temperature of melting ice, the length of time the sample can be held at low temperature will be greatly reduced.

2.1.4 Field Installation:
The Manning S-3300 Sampler can be installed on a firm, level surface adjacent to the flow to be sampled, or suspended in a harness near or above (such as a manhole) the channel.

NOTE: For manhole installation, Manning has optionally available a suspension harness, Part No. 05792-00.

2.1.4.1 Surface Installation:
a. Position the sampler and remove the top cap.
b. Place the intake hose strainer in the channel flow (See Figure 2-3).

NOTE: The intake hose strainer should be placed in the channel main flow, not in an eddy or at the edge of the flow. Where the possibility of clogging of the strainer openings by debris exists, provisions should be made for deflecting such debris.

Vertical position of the intake will depend on the type of sample to be taken; for example, placement at the bottom of the flow will result in heavier concentration of solids in the sample, while placement at or near the top of the flow will eliminate most solids and detect oils, fats, and other floating or suspended contaminants.

NOTE: The heavy strainer supplied with the intake hose is usually sufficient to prevent the intake from being pulled to the surface of a fast channel.

c. If flow proportional samples are to be taken, place the flowmeter in position and connect the flowmeter cable to the 4-pin connector on the equipment chassis (See Figure 2-4). Refer to Section III for Flow Mode Programming.

NOTE: A dimple is provided in the bottle case for exit of the flowmeter cable and intake hose. Consult flowmeter manual for control settings.

d. If time interval sampling is desired, refer to Section III for Time Programming Procedures.

e. Install and latch the top cap.

2.1.4.2 Manhole Installation:
a. Enter the desired sampling program (See Section III) and install and latch the sampler top cap.
b. Connect the suspension harness to the sampler.

Figure 2-3. Positioning Intake Hose and Strainer
c. Position the end of the intake hose in the channel flow. (See NCTE, Paragraph 2.1.4.1 (b) for correct positioning of hose.)

d. Lower the suspension harness and sampler into the manhole. Place the ring at the top of the harness onto the customer supplied manhole hook or suspension bar.

2.2 SAMPLE RECOVERY:
Immediate sample recovery is not required since the sampler will automatically shut down when the 15 liter sample bottle is full. However, sample analyses may dictate the need for quick recovery (sample freshness, chemical additives, etc.).

NOTE: If samples are taken on a flow proportional basis, disconnect and remove the flowmeter and its mounting bracket (if mounted above sampler).

a. Raise the sampler out of the manhole and set it on a level surface. Pull the remaining intake hose up.

b. Remove the sampler top cap.

c. If installed, disconnect the flowmeter cable.

d. Remove the equipment chassis from the bottle case.

e. Attach a blank label or piece of masking tape to the bottle case and note date(s) and location of collection.

f. If the sampler is to be reinstalled for continued sampling, remove and identify the full sample bottle and install an empty bottle.

Figure 2-4. External Connections and Means of Interfacing Flowmeter
SECTION III
PROGRAMMING THE S-3300 SAMPLER

3.1 INTRODUCTION
The sampler is controlled by a microprocessor via a keyboard with liquid crystal (LCD) display, and is capable of accepting instructions to execute any of a wide variety of TIME and FLOW sampling sequences.

The "* START" command initiates the simplest of all TIME sequences. After a one hour delay one sample is taken every hour until the bottle is full, at which time the cycle stops.

In the TIME mode, the S-3300 can be instructed by the keyboard to DELAY START until after a specified time, thereafter to continue sampling after the same, or a different TIME interval until the bottle is full.

In the FLOW mode, the sampling sequence is activated by a momentary contact closure from an external flow meter which is connected to the S-3300 external connector by accessory cable, Part No. 01559-04.

The controller has a key for "TEST CYCLE" which immediately initiates the standard sampling cycle: purge 8 seconds, draw until the chamber is full, purge until only the measured sample remains, and finally discharge the measured sample into the sample bottle.

The controller also supports an accurate real-time clock which runs whenever a power source is connected, which may be set from the keyboard, and which may be observed at any time that a sample sequence is running by pressing DISPLAY, CLOCK. When no modes are programmed, real time will normally appear on the LCD display.

3.1.1 Keyboard Programming Instructions for the Standard S-3300 Sampler
The following illustrations show step-by-step procedures for programming the utility functions and the sampling modes of the standard S-3300 Composite Sampler.

TIME MODE
* START
The * START mode takes one sample per bottle per hour, after an initial delay of one hour, and stops after 24 bottles.

<table>
<thead>
<tr>
<th>STEP</th>
<th>DISPLAY BEFORE NEXT KEY IS PRESSED</th>
<th>NEXT KEY PRESS</th>
<th>RESULT:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>O RESET</td>
<td>Turns or LED's identifying current operating mode for 10 seconds</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>O RESET</td>
<td>Cancels current mode, displays real time clock</td>
</tr>
<tr>
<td>3</td>
<td>3300</td>
<td>O *</td>
<td>Select the * sequence</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>START</td>
<td>Start the sequence</td>
</tr>
</tbody>
</table>

The display begins counting down the time to the first sample.
(HRS:MIN)
**TIME MODE**

**PROGRAMMABLE SINGLE TIME INTERVAL**

Takes a sample after the time interval and continues until the bottle is full.

<table>
<thead>
<tr>
<th>STEP</th>
<th>DISPLAY BEFORE NEXT KEY IS PRESSED</th>
<th>NEXT KEY IS PRESSED</th>
<th>RESULT:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>1-6</td>
<td>LED's identifying the current operating mode, if any, come on.</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>1-6</td>
<td>Cancels current mode. Displays real time.</td>
</tr>
<tr>
<td>3</td>
<td>3300</td>
<td>1-6</td>
<td>Select TIME mode.</td>
</tr>
<tr>
<td>4</td>
<td>01:30</td>
<td>1-6</td>
<td>Select and ENTER time interval between samples. (HRS:MINS)</td>
</tr>
<tr>
<td>5</td>
<td>01:30</td>
<td>ENTER</td>
<td>Start the sequence. The first time interval begins counting down.</td>
</tr>
<tr>
<td>6</td>
<td>01:30</td>
<td>START</td>
<td>The sequence stops after the bottle is full.</td>
</tr>
</tbody>
</table>

**TIME MODE**

**TIME DELAY START**

<table>
<thead>
<tr>
<th>STEP</th>
<th>DISPLAY BEFORE NEXT KEY IS PRESSED</th>
<th>NEXT KEY IS PRESSED</th>
<th>RESULT:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>01-6</td>
<td>Select and ENTER a single time interval. Do not press start yet.</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>01-6</td>
<td>Call for DELAY START.</td>
</tr>
<tr>
<td>3</td>
<td>09:30</td>
<td>ENTER</td>
<td>Select and ENTER the delay time before the first sample.</td>
</tr>
<tr>
<td>4</td>
<td>09:30</td>
<td>START</td>
<td>Starts the sequence. The DELAY TIME counts down. The first sample is taken, and any other programmed modes are executed.</td>
</tr>
</tbody>
</table>
FLOW MODE
FIRST CLOSURE START
This sequence will automatically take one sample for each external contact closure at connector J5.

<table>
<thead>
<tr>
<th>STEP</th>
<th>DISPLAY BEFORE NEXT KEY IS PRESSSED</th>
<th>NEXT KEY, PRESS</th>
<th>RESULT:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>O RESET</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>O RESET</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>3300</td>
<td>O FLOW</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>START</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>O FLOW</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>0013</td>
<td>ENTER</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>START</td>
<td></td>
</tr>
</tbody>
</table>

FLOW MODE
DELAY START
A programmable number of external contact closures before each sampling event.

<table>
<thead>
<tr>
<th>STEP</th>
<th>DISPLAY BEFORE NEXT KEY IS PRESSED</th>
<th>NEXT, PRESS</th>
<th>RESULT:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>O RESET</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>O RESET</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>3300</td>
<td>O FLOW</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>START</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>O FLOW</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>0013</td>
<td>ENTER</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>START</td>
<td></td>
</tr>
</tbody>
</table>
## FLOW MODE

### DELAY START (CONTINUED)

<table>
<thead>
<tr>
<th>STEP</th>
<th>DISPLAY BEFORE NEXT KEY</th>
<th>NEXT, PRESS</th>
<th>RESULT:</th>
</tr>
</thead>
<tbody>
<tr>
<td>0000</td>
<td>DIS</td>
<td></td>
<td>Display ready to count external contact closures.</td>
</tr>
<tr>
<td>0013</td>
<td>E</td>
<td></td>
<td>First sample is taken after the programmed number of closures.</td>
</tr>
<tr>
<td></td>
<td>P IS PRESSED</td>
<td>PRESS</td>
<td>Sequence stops when the sample bottle is full.</td>
</tr>
</tbody>
</table>

### TIME INTERVAL OVERRIDE OF FLOW MODE

<table>
<thead>
<tr>
<th></th>
<th>DISPLAY</th>
<th>RESULT:</th>
</tr>
</thead>
<tbody>
<tr>
<td>02</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Keypad

- **Display**
- **Start**
- **Sample**
- **Flow**
- **Reset**
- **Start**
- **Operator**
- **Clear**
- **0**
- **Enter**

<table>
<thead>
<tr>
<th>STEP</th>
<th>DISPLAY BEFORE SUBMISSION</th>
<th>NEXT KEY</th>
<th>NEXT, PRESS</th>
<th>RESULT:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td>RESET</td>
<td>Display continues as before. LED's identifying current mode come on for 30 seconds.</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td>RESET</td>
<td>Cancels current mode. Displays real time clock.</td>
</tr>
<tr>
<td>3</td>
<td>3300</td>
<td></td>
<td>O Time</td>
<td>Select TIME mode. TIME LED comes on.</td>
</tr>
<tr>
<td>4</td>
<td>5:00</td>
<td>O 5 0 0</td>
<td></td>
<td>Select and ENTER default time: Hours: Minutes.</td>
</tr>
<tr>
<td>5</td>
<td>05:00</td>
<td></td>
<td>ENTER</td>
<td>Select and ENTER the + 02 mode.</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td>* 0 2</td>
<td>Select FLOW</td>
</tr>
<tr>
<td>7</td>
<td>02</td>
<td></td>
<td>ENTER</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>STEP</td>
<td>DISPLAY BEFORE NEXT KEY IS PRESSED</td>
<td>NEXT, PRESS</td>
<td>RESULT:</td>
<td></td>
</tr>
<tr>
<td>------</td>
<td>-----------------------------------</td>
<td>-------------</td>
<td>---------</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>-</td>
<td>0 4</td>
<td>Select and ENTER the number of samples per bottle.</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>04</td>
<td>ENTER</td>
<td>START the sequence.</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td></td>
<td>START</td>
<td>Display counts external flow contact closures.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0000</td>
<td>First sample is taken on first external closure.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0001</td>
<td>Sequence stops when sample bottle is full.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0024</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**UTILITY FUNCTION**

**REAL TIME CLOCK**

**14:27**

- **TO OBSERVE THE CLOCK DURING OPERATION**
  - **1**: Display
  - **2**: Clock
  - **09:17**: TIME displayed with flashing colon for 10 seconds

- **TO SET THE CLOCK**
  - **3**: O \( \text{RESET} \)
  - **4**: Clock
  - **5**: 1 4 2 7
  - **6**: 14:27
    - Colon flashes

(Cannot be set while in an operating mode.)

ENTER TIME on 24 hour basis.
UTILITY FUNCTION
RESET, TEST CYCLE

RESET
1
Press RESET twice to cancel any mode or sequence except the real time clock.

TEST CYCLE
2
Can only be used when controller is reset. Starts one complete sampling cycle as shown in Figure 1-8.

UTILITY FUNCTION
ERROR
Results from illegal digits (such as more than 59 minutes) being entered. Times out in 15 seconds.

DISPLAY BEFORE
NEXT KEY
P IS Pressed
NEXT, Press
RESULT:

5 BEEPS
Clears ERROR signal.

EEE
Continue.
UTILITY FUNCTION
CLEAR
Used to clear digits from the display before ENTER has been pressed.

01:49

HELP

123
456
789

If the battery voltage falls to a level below which one complete sampling cycle cannot be completed, the controller will stop operating and display HELP.

IMPORTANT: If OPTION A1, Analog Functions, or OPTION A2, Adjustable Purge and Draw is present, and parameters have been entered into them, the parameters will be preserved if a fresh battery is connected before the low battery is disconnected.

<table>
<thead>
<tr>
<th>STEP</th>
<th>DISPLAY BEFORE NEXT KEY IS Pressed</th>
<th>NEXT, PRESS</th>
<th>RESULT:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>01:49 Clear</td>
<td></td>
<td>Undesired entry, but ENTER not pressed yet; CLEARS 4th digit</td>
</tr>
<tr>
<td>2</td>
<td>01:4_ Clear</td>
<td></td>
<td>CLEARS 3rd digit</td>
</tr>
<tr>
<td>3</td>
<td>01:_ Clear</td>
<td></td>
<td>CLEARS 2nd digit</td>
</tr>
<tr>
<td>4</td>
<td>0:_ Clear</td>
<td></td>
<td>CLEARS 1st digit</td>
</tr>
<tr>
<td></td>
<td>_ Clear</td>
<td>ENTER desired digit</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4_</td>
<td>ETC:</td>
<td></td>
</tr>
</tbody>
</table>
UTILITY FUNCTION
DISPLAY

(1) Pressing the DISPLAY key lights the LED's of all the active keys.

(2) Pressing a lighted key then displays for 10 seconds a parameter related to that key's function.

<table>
<thead>
<tr>
<th>ST</th>
<th>DISPLAY BEFORE</th>
<th>NEXT KEY</th>
<th>NEXT, PRESS</th>
<th>RESULT:</th>
</tr>
</thead>
<tbody>
<tr>
<td>T E</td>
<td>DISPLAY IS Pressed</td>
<td>NEXT</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

WHEN TIME MODE IS OPERATING

**01:30**

DISPLAY normally shows the remaining TIME before the next sample.

**09:30**

Shows the full TIME interval for 10 seconds.

**01:00**

If DELAY START is lighted:

**00:01**

Shows the full DELAY START time for 10 seconds.

WHEN FLOW MODE IS OPERATING

**00 03**

DISPLAY normally shows how many sampling events have occurred.

**00 03**

DISPLAY does not change.

UTILITY FUNCTION
DISPLAY, CONTINUED

S T DISPLAY BEFORE E NEXT KEY P IS Pressed NEXT, PRESS RESULT:

WHEN FLOW MODE IS OPERATING (CONTINUED)

If DELAY START is lighted:

**00 02**

DISPLAY shows the remaining number of contact closures before the next sample.

**00 13**

Shows the total number of external contact closures for 10 seconds.
3.1.2 Keyboard Programming Instructions for the S-3300 Sampler with A1 and/or A2 Options:

ANALOG OPTIONS (A1)
Programmable Analog Flow Mode (* 05)
Programmable Analog Level Mode (* 06)
Programmable Stage (Hydrologic Event) Mode (* 09).

A2 OPTIONS
Adjustable Purge & Draw (* 03)
Programmable Time Intervals (* 04).

PROGRAMMABLE TOTALIZING ANALOG FLOW MODE

This example uses a maximum flow rate of 4000 volume units per minute, and takes a sample every 150,000 volume units.

* 05

---

<table>
<thead>
<tr>
<th>S</th>
<th>T</th>
<th>DISPLAY BEFORE</th>
<th>E</th>
<th>NEXT KEY</th>
<th>IS Pressed</th>
<th>NEXT, PRESS</th>
<th>RESULT:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. **3300**
   - O *
   - Selects 05 mode

2. **0**
   - 5
   - Enter the 4 significant digits of the maximum flowrate. In this example, 4000 volume units.

3. **0**
   - **5**
   - Enters 4000 volume units.
OPTION A1
PROGRAMMABLE TOTALIZING ANALOG FLOW MODE (CONTINUED) *

<table>
<thead>
<tr>
<th>STEP</th>
<th>DISPLAY BEFORE NEXT KEY IS PRESSED</th>
<th>NEXT, PRESS</th>
<th>RESULT</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>P2</td>
<td>0000</td>
<td>ENTER</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>P3</td>
<td>0001</td>
<td>ENTER</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>P4</td>
<td>1500</td>
<td>ENTER</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>P5</td>
<td>0100</td>
<td>ENTER</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
<td>START</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Enter the 4 significant digits of the minimum flowrate. In this example, 0000 volume units.

Enter the time interval between samples of the analog current (voltage) signal. Hours: minutes.

Select and ENTER the 4 most significant digits of the totalized FLOW that causes a sample event.

Select and ENTER the multiplier of the totalized flow: 0001, 0100, 01000, or 1000. In this example: 0100.

Starts the * 05 mode.

The user selects any vertical unit and uses or does not use a decimal point as required. All entries must have the implied decimal in the same position.

The resolution is 0.4% of the span.

This example uses a span of 34.5 vertical units, having a maximum of 37.0 and a minimum of 2.5 units. (Refer to Figure 1-6.)

OPTION A1
PROGRAMMABLE LEVEL MODE *

<table>
<thead>
<tr>
<th>RESULT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

| LED's identifying current operating mode, if any, come on for 10 seconds. |
| Cancels current mode. Displays real time clock. |
| Select and ENTER * 06 mode. |

| SETTING THE SPAN: |
| Select the upper limit of the span in vertical units. |

<table>
<thead>
<tr>
<th>ENTRY</th>
</tr>
</thead>
<tbody>
<tr>
<td>0370</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ENTRY</th>
</tr>
</thead>
<tbody>
<tr>
<td>06</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ENTRY</th>
</tr>
</thead>
<tbody>
<tr>
<td>00:01</td>
</tr>
</tbody>
</table>

PAGE 44

PAGE 45
### PROGRAMMABLE LEVEL MODE (CONTINUED) [OPTION A]

**Select display before next key is pressed**

<table>
<thead>
<tr>
<th>S</th>
<th>T</th>
<th>E</th>
<th>N</th>
<th>X</th>
<th>T</th>
<th>H</th>
<th>R</th>
<th>E</th>
<th>L</th>
<th>T</th>
<th>U</th>
<th>N</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>LL</td>
<td>0025</td>
<td>ENTER</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>L01</td>
<td>0040</td>
<td>ENTER</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>L02</td>
<td>0125</td>
<td>ENTER</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>L07</td>
<td>0370</td>
<td>ENTER</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Select the lower limit of the span in vertical units**

**Select the lowest sampling level. It must be greater than LL.**

**Select up to 49 more sampling levels in increasing sequence. If the highest sampling level is to be equal to HL, it must be entered again here.**

**START the sequence.**

---

### PROGRAMMABLE HYDROLOGIC STAGE MODE [OPTION A]

**This mode samples a hydrologic event as the water level rises and then falls.**

<table>
<thead>
<tr>
<th>S</th>
<th>T</th>
<th>E</th>
<th>N</th>
<th>X</th>
<th>T</th>
<th>H</th>
<th>R</th>
<th>E</th>
<th>L</th>
<th>T</th>
<th>U</th>
<th>N</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>LL</td>
<td>0025</td>
<td>ENTER</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>L01</td>
<td>0040</td>
<td>ENTER</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>L02</td>
<td>0125</td>
<td>ENTER</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>L07</td>
<td>0370</td>
<td>ENTER</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Following are the required and optional hydrologic stage parameters, in the order in which they are prompted for by the display. Up to 6 levels may be programmed.**

**REQUIRED:**

- **HH**: Level corresponding to maximum analog signal.
- **HL**: Level corresponding to minimum analog signal.
- **EH**: Differential rising level which causes a sample to be taken.
- **EL**: Differential falling level which causes a sample to be taken.
- **L01**: The level above which sampling begins and below which sampling stops.
- **P01**: The default time associated with L01.

**OPTIONAL:**

- **L02**: A level greater than L31 above which default time P02 between samples is used.
- **P02**: Default time associated with L02.
- **L06**: The highest stage level.
- **P06**: Default time associated with L06.

The following is an example of how to program the 09 mode. For simplicity, only two of the six possible stage levels are used. (See Figure 1-7). (Note that any height unit may be used, but time is always in hours and minutes.)

- **HH**: 65 FEET
- **HL**: 4 FEET
- **EH**: 4 FEET
- **EL**: 6 FEET
- **L01**: 10 FEET
- **P01**: 5 HOURS
- **L02**: 25 FEET
- **P02**: 2 HOURS
OPTION A1
PROGRAMMABLE HYDROLOGIC STAGE MODE

* 09

<table>
<thead>
<tr>
<th>STE</th>
<th>DISPLAY BEFORE P IS PressED</th>
<th>NEXT KEY NEXT, PRESS</th>
<th>RESULT:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>*</td>
<td>09</td>
</tr>
<tr>
<td>2</td>
<td>HH:</td>
<td>0650</td>
<td>ENTER</td>
</tr>
<tr>
<td>3</td>
<td>HL</td>
<td>0040</td>
<td>ENTER</td>
</tr>
<tr>
<td>4</td>
<td>DISPLAY BEFORE</td>
<td>EH</td>
<td>0040</td>
</tr>
<tr>
<td>5</td>
<td>TRM</td>
<td>EL</td>
<td>0060</td>
</tr>
<tr>
<td>6</td>
<td>NEXT KEY</td>
<td>L 01</td>
<td>0100</td>
</tr>
<tr>
<td>7</td>
<td>NEXT, PRESS</td>
<td>PAUSE</td>
<td>99</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>05:00</td>
</tr>
</tbody>
</table>

LED's identifying current mode, if any come on for 30 seconds.

Cancels current mode. Displays real time clock.

Select the * 09 function.

Select HH = 65.6 FEET.

Select HL = 4.0 FEET.

Select EH = 4.0 FEET.

Select EL = 6.0 FEET.

Select L 01 = 100 FEET.

Controller corrects L 01 to the nearest N/256 of the span.

Select P 01 = 5 hours.
### Option A1: Programmable Hydrologic Stage Mode

<table>
<thead>
<tr>
<th>Step</th>
<th>Display Before</th>
<th>Next Key</th>
<th>Press</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>L 02</td>
<td>0250</td>
<td>ENTER</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0250</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Pause</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>P : 02</td>
<td>0200</td>
<td>ENTER</td>
<td></td>
</tr>
<tr>
<td></td>
<td>02:00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>L 02</td>
<td>0* START</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **L 02** Select L 02 = 25.0 feet
- **0250** Select L 02 = 25.0 feet
- **Pause** Controller corrects L 02 to nearest N/256 of the span
- **0249** Select P 02 = 2 hours
- **02:00** Select P 02 = 2 hours
- **L 02** Select L 02

### Option A2: Adjustable Purge & Draw

- **03** This function may be appended to any time or flow function

<table>
<thead>
<tr>
<th>Step</th>
<th>Display Before</th>
<th>Next Key</th>
<th>Press</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>0*</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>03</td>
<td>ENTER</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>P -</td>
<td>009</td>
<td>ENTER</td>
<td></td>
</tr>
<tr>
<td></td>
<td>P009</td>
<td>ENTER</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>D -</td>
<td>007</td>
<td>ENTER</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0007</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>0* START</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Select purge time seconds—3 digits** Minimum = 5 seconds Maximum = 25 seconds
- **Select draw time seconds—3 digits** Minimum = 5 seconds Maximum = 125 seconds
- **START the sequence**
**OPTION A2**

**PROGRAMMABLE MULTIPLE TIME INTERVALS**

(MAXIMUM OF 12 DIFFERENT INTERVALS) *

<table>
<thead>
<tr>
<th>ST</th>
<th>DISPLAY BEFORE</th>
<th>NEXT KEY</th>
<th>RESULT:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>09:16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>0001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>0010</td>
<td>02:00</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>01:00</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**EXAMPLE:** OF 2 DIFFERENT INTERVALS:

**IMMEDIATE START:**
- 10 events 1 hours intervals
- 7 events at 2 hours intervals

<table>
<thead>
<tr>
<th>S T</th>
<th>DISPLAY BEFORE</th>
<th>NEXT KEY</th>
<th>NEXT, PRESS</th>
<th>RESULT:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>09:16</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>0001</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>0010</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>01:00</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Cancels current mode. Displays real time clock.

Select *04 function. TIME LED comes on.

Select 1 hour intervals.

Press ENTER ten (10) times to program ten 1 hour intervals.

Select and ENTER 2 hour interval.

Press ENTER seven (7) times to program seven 2 hour intervals.

Start the sequence. The first time interval begins counting down.

Press ENTER eight (8) times to program eight 8 hour intervals.

Exit from *04 mode and permits DELAY START, MULT SAMPLE or MULT BOTTLE to be programmed before STARTing if desired.

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**PAGE 53**
SECTION IV
MAINTENANCE AND TROUBLESHOOTING

4.1 MANNING WARRANTY POLICY

Manning warrants its instruments against defects in materials and workmanship for a period of one year from the date of shipment to the original purchaser. If the buyer purchases start-up service from Manning, the warranty period is 18 months from date of shipment or 12 months from equipment start-up, whichever is sooner.

Replacement and spare parts are guaranteed for 90 days, parts only. Product repairs are guaranteed for 90 days, parts and labor on the repair only. Products of other manufacturers (recorders, refrigerators, etc.) will be covered by the original equipment manufacturer's warranty. Manning will assume service responsibility when an OEM unit is supplied as part of a Manning system, but will pass warranty responsibility to the OEM when applicable. This warranty does not include limited life or consumable components such as batteries, pens, glassware, lamps, charts, etc., although these items are guaranteed to meet specifications and be in operable condition at the time of shipment.

The liability of Manning under this warranty is limited solely to replacing, repairing or issuing credit, at the discretion of Manning, for the products that become defective during the warranty period, provided that:

(1.) Manning is promptly notified within the warranty period in writing by buyer upon discovery of defects.
(2.) The defective unit is returned to Manning, transportation charges prepaid by buyer, except in the case of permanent equipment, Manning retains the option to repair on site.
(3.) Manning's examination of such unit shall disclose, to its satisfaction, that such defects or failures have not been caused by misuse, neglect, improper installation, unauthorized repair or alteration or accident.

This warranty constitutes the sole and exclusive remedy against Seller for the furnishing of nonconforming or defective goods, and Seller shall in no event be liable for any special, contingent, indirect, or consequential damages by reason of the fact that such goods shall have been nonconforming or defective, including but not limited to personal injury, property damage, anticipated profits, labor expended, delays and loss of equipment.

MANNING TECHNOLOGIES
P.O. Box 49649
Atlanta, GA 30329
(404) 633-0043

4.2 MAINTENANCE

4.2.1 Maintenance

The Manning S-3300 Portable Composite Sampler requires only minimal maintenance to assure proper and reliable operation. Figure 4-1 is an exploded view of the sampler with callouts and accompanying parts list.

4.2.2 Inspection

The following procedures are recommended after each 300 hours of sampler operation or more frequently in very dirty installations.

a. Separate the equipment chassis subassembly for the top and bottle case.
b. Remove the battery
c. Using a hose, thoroughly spray the underside of the equipment chassis with water.

d. Remove moisture with a rag or blow dry with compressed air.

4.2.3 Cleaning Sampler Interior:

a. Rinse the intake strainer using methylene chloride or other non-ketone solvent that will not affect the next sample collections.

b. Place the equipment chassis on the bottle case, immerse the intake hose in clean water, connect the battery and press TEST CYCLE. Repeat the TEST CYCLE several times.

4.2.4 Cleaning the Measuring Chamber:

a. Unscrew the top of the chamber.

b. Loosen the two holdown knobs on each side of the chamber and remove the chamber.

c. Wash with methylene chloride or solvent and water. Maximum temperature of water 140°F for soaking, 212°F for short rinse.

4.2.5 Cleaning the Chamber Top:

a. Remove the compressor lines.

b. Disconnect the sensor harness (2 wires) and tubing and remove the pressure switch.

   NOTE: The pressure switch clips onto the chamber top. Grasp the switch and pull up.

   CAUTION: Steps (a) and (b) above are important to prevent water from getting in the tubing or pressure switch and causing the sampler to malfunction.

c. Wash the underside and top of the chamber top. Dry thoroughly with a soft, lint-free cloth.

d. Apply a light coating of grease to the O-ring on the underside of the chamber top.

e. Replace the chamber top on the chamber. Screw the locking ring down tight.

f. Reinstall the pressure switch and connect the sensor harness.

g. Connect the compressor lines and pressure switch tubing as follows: (Refer to Figure 2-1):

   1. Compressor tubes: Using the large P and V, connect the pressure line to the P Barb. Connect the vacuum line to the V Barb. The sensor has the letter P adjacent to its pressure barb.

   2. Sensor tubes: Using the small P and V designations, connect the pressure tube to the P Barb and the vacuum tube to the V Barb. The sensor has the letter P adjacent to its pressure barb.

Figure 4-1. S-3300 Portable Composite Sampler, Exploded View

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4.2.6 Cleaning the Control Panel:
Use a mild cleaning solution such as Windex and wipe with a soft, lint-free cloth.

Avoid harsh cleaners such as detergents, solvents, etc., which can damage the panel. Do not use abrasives; they will scratch the panel surface. NEVER USE ACETONE!

4.2.7 Removal and Replacement of Controller and PC Boards:
(See Figures 4-2 and 4-3).
To remove the controller, remove the eight round-head Phillips screws from the keyboard. Lift the controller assembly out of the equipment chassis. Loosen the 15 terminal screws and cast off the wiring harness.

The three or four printed circuit boards making up the electronics portion of the sampler are individually removable for repair or replacement. To remove a particular circuit board, see Figure 4-2.

Immediately before replacing the controller back in its housing, remove and replace the zerust sponge (Part number 60033).

4.2.8 Cleaning the Sampler Exterior:
Assemble the equipment chassis to the bottle case, install the cover, and latch it securely. Rinse exterior with water. Remove clinging dirt or sludge with a cloth or a soft brush while washing down.

4.2.9 Fuse Access:
The 3 AG fuses rated 10 amp, 32 volts are located in fuse holders on the underside of the equipment chassis. See Figure 1.4 for fuse locations.

4.3 TROUBLESHOOTING: (See Table 4-1)
Troubleshooting instructions are based on analyses which follow a logical sequence of events leading to a malfunction. When a trouble occurs, look for the obvious possibilities first. Is the power supply connected? Are connections loose or wires broken? Is the sample bottle full? Review the malfunction, review normal operation, then check one possibility at a time starting with the easiest to verify.
### TABLE 4-1. TROUBLESHOOTING GUIDE

<table>
<thead>
<tr>
<th>TROUBLE</th>
<th>PROBABLE CAUSE</th>
<th>REMEDY</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Nothing works</td>
<td>1. Loose connection</td>
<td>Tighten connectors.</td>
</tr>
<tr>
<td></td>
<td>2. Fuse blown</td>
<td>Repair/Replace controller.</td>
</tr>
<tr>
<td></td>
<td>3. Controller problem</td>
<td>Replace fuse.</td>
</tr>
<tr>
<td>B. Weak draw</td>
<td>1. Air leaks</td>
<td>Be sure hold-down knobs of chamber are tight.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Check tubing and fittings.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Check seals in chamber.</td>
</tr>
<tr>
<td></td>
<td>2. Pinched intake hose</td>
<td>Replace parts.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Relieve pinching.</td>
</tr>
<tr>
<td></td>
<td>3. Clogging</td>
<td>Replace damaged hose.</td>
</tr>
<tr>
<td>Short samples:</td>
<td>1. Intake hose drawing air</td>
<td>Clean hose and lines.</td>
</tr>
<tr>
<td>a. Sample spurts into</td>
<td></td>
<td>Reposition intake strainer to avoid taking air.</td>
</tr>
<tr>
<td>chamber intermittently,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>triggering fill sensor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>with approx. ¼ sample</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. See “Weak Draw”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C. Compressor runs,</td>
<td>1. Leaks</td>
<td>With the chamber top off, check to see if compressed air is coming out through hole inside chamber top. If not, fault is in compressor or valves or tubing. If air is getting into the chamber, then pinch valve is not closing. Repair pinch valve.</td>
</tr>
<tr>
<td>but no purge</td>
<td>2. Pinch valve not closing</td>
<td>a. Check voltage at solenoid; if 12 VDC, then pinch solenoid needs to be replaced. If no voltage, replace controller.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b. Check battery</td>
</tr>
<tr>
<td></td>
<td></td>
<td>c. Check pinch tube; replace if damaged.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>With a Battery Voltmeter check for 12VDC at solenoid valve. If no voltage, replace controller.</td>
</tr>
<tr>
<td></td>
<td>3. Controller not giving signal</td>
<td>Clean hose.</td>
</tr>
<tr>
<td></td>
<td>4. Clogged hose</td>
<td></td>
</tr>
</tbody>
</table>

---

Figure 4-3. Disassembling the S-3300 Controller

---

TROUBLESHOOTING GUIDE CONTINUED ON NEXT PAGE...
### TABLE 4-1. TROUBLESHOOTING GUIDE CONTINUED

<table>
<thead>
<tr>
<th>TROUBLE</th>
<th>PROBABLE CAUSE</th>
<th>REMEDY</th>
</tr>
</thead>
</table>
| E. Sample drains slowly or not at all from chamber to bottle | 1. Clogged spout  
2. Controller not functioning | Clean spout.  
12 VDC to pin valve stays up. Replace controller.  
Check pin valve for clogging and pin valve for operation during cycle. |
| Chamber overfilling, cycling double at fill | 1. Fill sensor isoperative  
2. Fill sensor tubes leak or full of water | Replace fill sensor.  
Replace tubing. |
| G. Sampler will not start cycle | 1. Bottle-full sensor activated | Replace full bottle with empty bottle. |
| H. Compressor runs half-heartedly | 1. Connections loose  
2. Battery voltage below 10.8 VDC | Tighten connectors, check wires, resolder any loose wires.  
Charge or replace battery. |
| I. Runs and appears to constantly purge | 1. Fill sensor failed | Check by removing sensor wires. Start sample cycle. When draw starts, touch wires together. If draw stops and purge begins, the sensor is bad. Replace sensor. If not replace controller. |
| J. Compressor just hums | 1. Compressor bearings frozen  
2. Diaphragm locked  
3. Intake hose to compressor plugged | Replace compressor.  
Replace compressor.  
Clear hose. |
| L. Sampler works part of the time | 1. Check bottle full condition  
2. Battery voltage low  
3. Control panel component failure or faulty PC board | Install empty sample bottle.  
Charge or replace battery.  
Replace control panel or PC board. |

### SECTION V

**RECONNECTING THE A1 ANALOG OPTION INPUT**

5.1 The analog input may take any one of four different forms: 4-20 mA, 0-20 mA, 1-5 Volts DC, or 0-1 Volt DC. All samplers are connected for 0-4 mA when shipped unless specified otherwise on the purchase order. To reconnect for a different current or voltage input, simply RESOLDER the W1 and W2 jumpers on the analog option PCB (shown in Figures 4-3 and 5-1) to the appropriate new positions shown in Figure 5-1.

**IMPORTANT: THE WORK SHOULD BE DONE IN AN ATMOSPHERE OF LOW HUMIDITY. REPLACE THE ZERUST CAPSULE BEFORE CLOSING UP THE CONTROLLER.**
A. 4-20 ma INPUT
All samplers equipped with the A1 ANALOG INPUT option are shipped with this 4-20 ma connection unless specified differently on the purchase order.

B. 0-20 ma INPUT

C. 1-5 VOLT INPUT

D. 0-1 VOLT INPUT

FIGURE 5.1 Detail view of the A1 ANALOG OPTION PC Board 05830-000, showing how to connect the W1 and W2 jumpers to select any one of the 4 analog input current or voltage ranges.