ABBOTT

GEMSTAR™

System Operating Manual

For use with the
Abbott GemStar Pump
List 13000-36

ABBOTT LABORATORIES, NORTH CHICAGO, IL 60064, USA

430-600095-002 (Rev. 8/02)

Abbott GemStar™ Pump

System Operating Manual

For use with the Abbott GemStar Pump

List 13000-36

PLEASE
Read this entire manual before using the Abbott GemStar Pump

This manual is designed for use by healthcare professionals, caregivers, and patients.

For consultation and technical support, contact your local Abbott Laboratories sales office.

This manual is designed for use with Abbott GemStar Pumps used in the United Kingdom, Australia, and other English-speaking countries.

Change History

Part Number	*Description of Change*	*Pages Changed*
430-600095-001 (Rev. 3/00)	Original Release	N/A
430-600095-002 (Rev. 8/02)	Second Release	N/A

Contents

Notes

Introduction

The Abbott GemStar™ Pump is a small and lightweight, single-channel infusion device that can be powered by AC mains adaptor, rechargeable battery pack, two disposable AA batteries, or the Abbott GemStar Docking Station. The Abbott GemStar Pump is designed for use in the home, in the hospital, or anywhere electronic infusion is required. When powered by batteries, the Abbott GemStar Pump is ideal for ambulatory patients.

The following conventions are used throughout this manual:

Convention	Use	Example
[ALL CAPS]	Keys	Press **[YES/ENTER]** to continue.
`ALL CAPS`	Display messages	The pump displays `END OF INFUSION`.

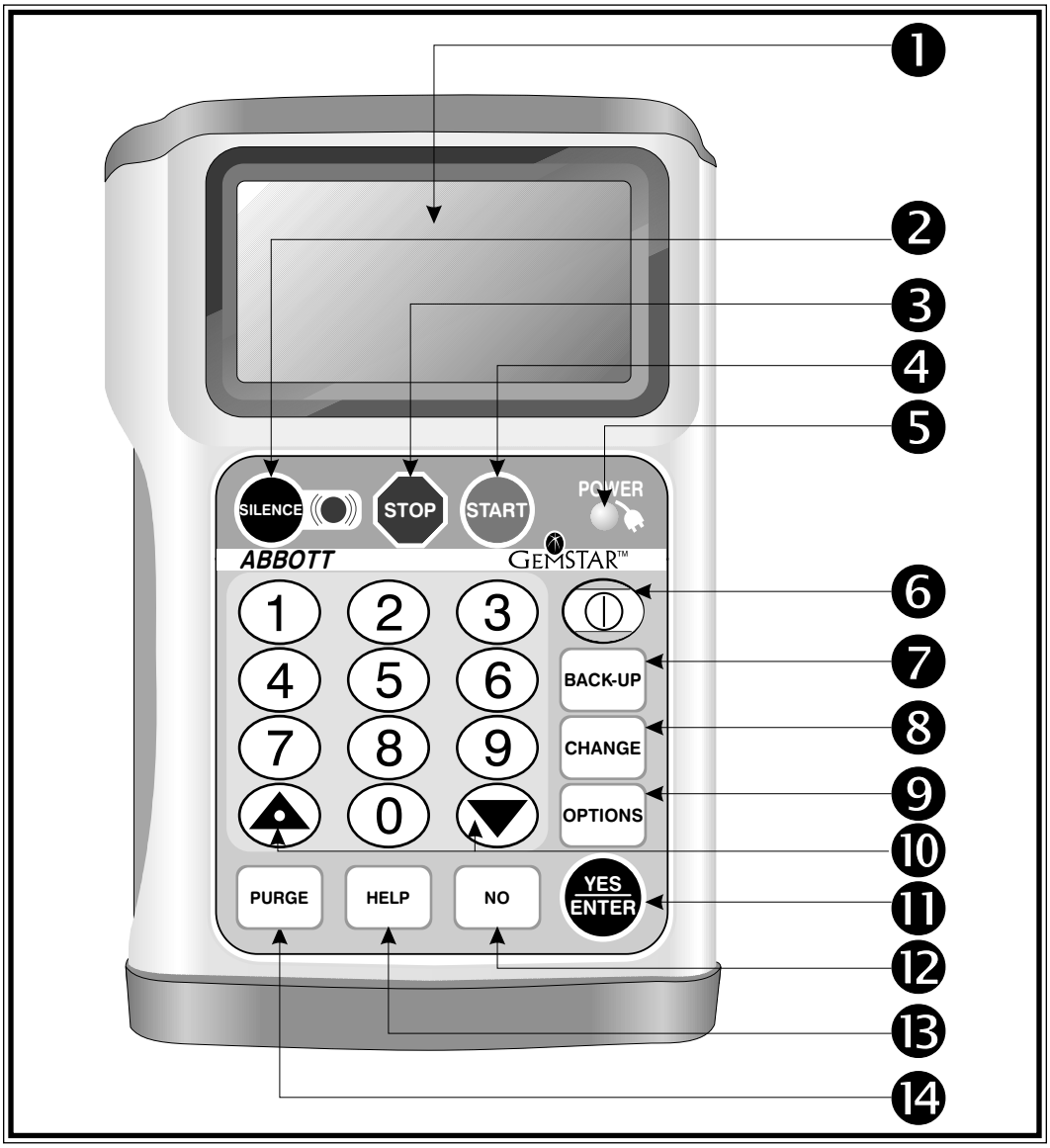
WARNING: A WARNING message contains special safety emphasis and must be observed at all times. Failure to observe a warning message is potentially life threatening.

CAUTION: A CAUTION usually appears in front of a procedure or statement. It contains information that could prevent irreversible product damage or hardware failure. Neglecting to pay attention to a caution could result in serious patient or user injury.

Note: A NOTE provides information to help clarify a procedure or statement.

Tip: A TIP emphasizes a procedure or statement that makes the pump easier to use.

Abbott GemStar Pump Layout



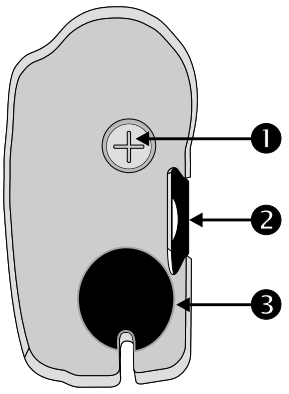
1	DISPLAY	• Four-line display indicates the pump's status.
2	SILENCE	• Temporarily silences alarm.
3	STOP	• Stops infusion.
4	START	• Starts infusion.
5	POWER INDICATOR	• Indicates the pump is powered by AC mains when lit continuously. • Indicates the pump is powered by external batteries when flashing.
6		• Powers the pump on or off.
7	BACK-UP	• Provides access to previous steps during programming. • Exits Help, Change, and Options menus.
8	CHANGE	• Provides access to these menu items from the STOP or RUN mode*: 1 Review/Resume 2 New Container 3 New Program 4 Change Program 5 Piggybacking • Corrects an entry during a programming step.
9	OPTIONS	• Provides access to these menu items from the STOP or RUN mode*: 1 Review Program 2 Histories 3 Keypad Lock 4 Pump Settings 5 Set Clock 6 Print 7 Speed Protocol 8 Next Dose
10		• Scrolls through display messages. • UP arrow enters a decimal point in numeric entries.
11	YES/ENTER	• Responds "YES" to display questions. • Accepts entries and advances to the next step.
12	NO	• Responds "NO" to display questions.
13	HELP	• Provides context-sensitive information during programming steps and alarm conditions. • Otherwise displays Shift Totals.
14	PURGE	• Clears an AIR-IN-LINE alarm. • Primes an Abbott GemStar Pump Set.

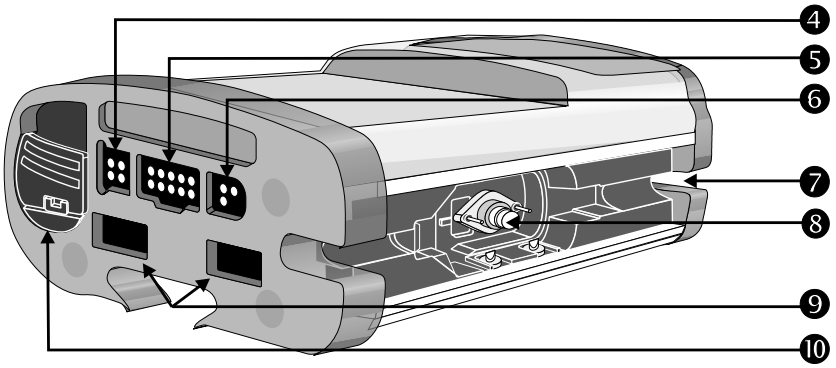
* Not all menu items are available with all modes. Refer to the appropriate section for more information.

Abbott GemStar Pump Components

1	Bolus Button	Press this button to initiate a bolus delivery if available in the current program.
2	Pole Clamp Track	Use to connect to an optional pole clamp.
3	Cassette Release Button	Push down on this button to release the cassette from the pump.
4	Power Connector	Use to connect AC mains adaptor to the pump.
5	Data Port Connector	Use to connect a printer or computer to the pump.
6	Bolus Connector	Use to connect a bolus cord to the pump.
7	Tubing Channel	Align pump set tubing in this channel.
8	Cassette Pocket	Load the cassette into this pocket.
9	Battery Pack Connector	Use to connect the Abbott GemStar Rechargeable Battery Pack to the pump.
10	Battery Compartment	Install two fresh, disposable AA batteries in this compartment for battery power.

Top View





Therapies

Seven types of therapy are available for delivery of medications and fluids. The following table lists available features and possible applications of each therapy.

Therapy	Possible Applications	AUTO KVO	TITRATION	PIGGY-BACKING	BOLUS	LOADING DOSE	TAPER UP / DOWN
Weight Dosed	Critical care, pediatrics	•	•				
Pain Management	Administration of analgesics or anesthetics for patient-controlled pain management (PCA)				•	•	
mL/hr Only	Simple rate programming	•	•	•			
Intermittent	Interval-based therapies such as antibiotics						
TPN	Total Parenteral Nutrition fluid delivery						•
Continuous	Delivery of mg, mcg, or mL/hr with a selectable KVO (Keep Vein Open) option		•	•			
Variable Time	Chronotherapy				•		
Legend: • = Available							

Note: Menu items may vary depending on the pump's configuration.

Abbott GemStar Pump Features

• ***Adjustable Settings***	Adjusts the distal occlusion pressure limits, air sensor sensitivity, real-time clock, and audible alarm volume.	Refer to the "Options Menu" section.
• ***Alerts and Alarms***	Signals audible and visual alarms when attention is required.	Refer to the "Troubleshooting" section.
• ***Audible Keypad Response***	Sounds a single beep when any key is pressed. If an invalid key is pressed, the pump sounds a flutter tone.	Refer to *Abbott GemStar Pump Layout* in this section for keypad information.
• ***Keypad Lock***	Restricts access to various options. Four lock levels are available.	Refer to the "Options Menu" and "Clinician Instructions" sections.
• ***New Container***	Repeats the current program without reprogramming the pump.	Refer to the "Basic Operation" section.
• ***Piggybacking***	Allows delivery from a secondary container during a Continuous or mL/hr Only program.	Refer to the appropriate therapy section.
• ***Power-on Self-test***	Performs a self-test each time the pump is powered on.	Refer to the "Basic Operation" section.
• ***Operation Test***	Performs user-assisted tests to verify the pump is functioning properly.	Refer to the "Operation Test" section.
• ***Program History***	Maintains a history event log, with a date and time stamp of each event for each program. Review the history on the display, or download it to a printer or computer.	Refer to the "Options Menu" section.
• ***Speed Protocols***	Stores up to nine frequently used programs in the pump's memory for quick access.	Refer to the "Options Menu" section.

Menu System

The Abbott GemStar Pump uses a menu system that provides step-by-step guidance through all of the pump's functions. Refer to the following table for a list of functions within each menu. Use the keypad to select menu items, answer display prompts, and enter numeric values as required.

Note: Menu items may vary depending on the pump's configuration.

Tip: A menu item does not have to be on the display to be selected.

Programming Menu	**Select NEW PROGRAM from the Change Menu to access the Programming Menu. Refer to the "Basic Operation" section for more information on accessing the Programming Menu.**	
1 WEIGHT DOSED 2 PAIN MANAGEMENT 3 ML/HR ONLY 4 INTERMITTENT 5 TPN 6 CONTINUOUS 7 VARIABLE TIME	Press the number key corresponding to the therapy type to be programmed. For example, press [**2**] to select Pain Management.	Refer to the appropriate therapy section for instructions on entering a program.
Change Menu	**Press [CHANGE] to access the Change Menu.**	
1 REVIEW/RESUME 2 NEW CONTAINER 3 NEW PROGRAM 4 CHANGE PROGRAM 5 PIGGYBACKING	Press the number key corresponding to the desired Change Menu function. *Note: Piggybacking is only available in mL/hr Only and Continuous therapies.*	For menu item [**2**], refer to *Starting a New Container* in the "Basic Operation" section for instructions. For menu items [**3**], [**4**], and [**5**], refer to the appropriate therapy section for instructions.
Options Menu	**Press [OPTIONS] to access the Options Menu.**	
1 REVIEW PROGRAM 2 HISTORIES 3 KEYPAD LOCK 4 PUMP SETTINGS 5 SET CLOCK 6 PRINT 7 SPEED PROTOCOL 8 NEXT DOSE	Press the number key corresponding to the desired Option Menu function.	Refer to the "Options Menu" section for instructions.

Operating Modes

The Abbott GemStar Pump has four operating modes:

• ***Help Mode***	The pump enters the HELP mode when **[HELP]** is pressed while programming or during an alarm condition. The HELP mode displays additional information.
• ***Programming Mode***	The pump enters the PROGRAMMING mode after the pump is powered on or when **[CHANGE]** is pressed.
• ***Run Mode***	After **[START]** is pressed, the pump enters the RUN mode, even during periods of non-delivery.
• ***Stop Mode***	When programming is complete, the pump enters the STOP mode until **[START]** is pressed to begin the programmed therapy. When the programmed therapy is complete, and during certain alarm conditions, the pump automatically enters the STOP mode. Press **[STOP]** to enter the STOP mode at any time.

Abbott GemStar Pump Set

The Abbott GemStar Pump must be operated with an Abbott GemStar Pump Set, which is a sterile, single-use, disposable pump set.

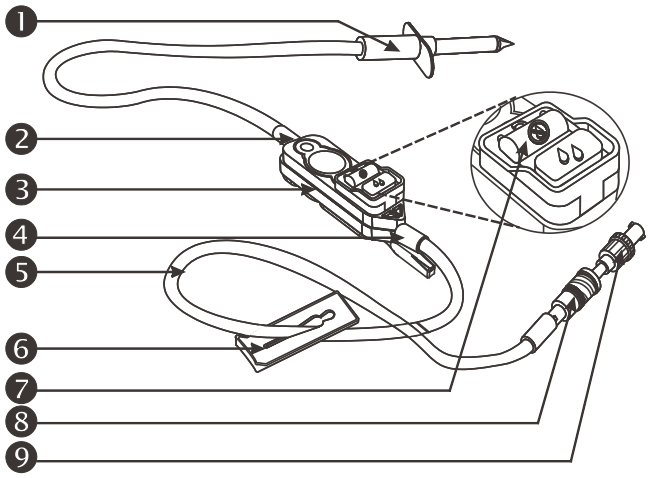
STERILE ②

Fluid path and areas beneath undisturbed protective set covers are sterile and nonpyrogenic in the intact unit package.

Contact an Abbott Laboratories Representative for more information on selecting the appropriate pump set configuration.

Additional disposable components, such as air-eliminating filters and extension sets, may be added to the line as required by the therapy. To use an Abbott GemStar Pump Set, follow the instructions included with the set.

The basic components of the Abbott GemStar Pump Set are shown below:



1	Piercing Pin
2	Proximal End
3	Cassette
4	Distal End
5	Tubing
6	Slide Clamp
7	Flow Stop
8	Secure Lock
9	Anti-Siphon Valve

Indications for Use

Physicians or certified, licensed healthcare professionals should always oversee infusions. Pump users should be under the supervision of a healthcare professional and should be instructed in using and troubleshooting the pump. Instruction should emphasize preventing intravenous (I.V.) related complications, including appropriate precautions to prevent accidental infusion of air.

The pump is suitable for intravenous, arterial, subcutaneous, short-term epidural infusion and parenteral administration of general I.V. fluids, medications, nutritional fluids, and blood/blood products. The epidural route is recommended to provide anesthesia or administer analgesia for periods up to 96 hours.

Note: Epidural administration of anesthetics is recommended in the continuous mode only. Epidural administration of analgesics may be delivered by continuous, bolus, or continuous with bolus.

For epidural use, the administration of drugs is restricted to those anesthetic and analgesic drugs approved for continuous epidural administration: e.g., Chloroprocaine Hydrochloride USP, Lidocaine Hydrochloride USP, and Morphine Sulfate Injection USP (Preservative Free).

WARNING: Delayed respiratory depression following continuous epidural administration of preservative-free morphine sulfate has been reported.

For epidural administration, the following is recommended:

- Nylon or Teflon® catheter
- Pump sets without Y-sites
- Stickers for the tubing indicating ongoing administration

Note: Facilities practicing epidural anesthesia/analgesia must be staffed and equipped to manage cardio-pulmonary resuscitation. Supplies should include oxygen, naloxone, and other appropriate resuscitative drugs and equipment. Continuous monitoring (e.g., oximetry) is recommended for the patient during epidural administration, as well as frequent patient observation for side effects (for up to 24 hours) following completion of drug administration by the epidural route.

Contraindications for Use

The Abbott GemStar Pump should not be operated by persons who do not have the mental and physical capability or the emotional stability to properly operate this pump.

Drugs not compatible with silicone rubber or PVC plastic, or not stable under infusion conditions, should not be used with this system.

Warnings and Cautions

The following is a list of warnings and cautions that should be heeded when operating the Abbott GemStar Pump. Elsewhere in this manual, warnings and cautions that are relevant to the procedure being discussed are repeated. Pay attention to all alert messages.

General Cautions

- Federal (USA) law restricts this device to sale by or on the order of a physician or other licensed practitioner.
- Manual references to specific values are approximate only, unless indicated otherwise. Air-in-line sensitivity values are approximate only.
- Disconnect the pump from the patient BEFORE connecting the pump to a computer or printer.
- For those patients who are likely to be adversely affected by unintended operations and failures, including interrupted medication or fluid delivery from the device, close supervision and provision for immediate corrective action should be provided.

Regarding Drugs Used, Pump Sets, and Containers

- USE ONLY Abbott GemStar Pump Sets with the Abbott GemStar Pump. Use of unauthorized sets may result in injury to the patient or damage to the pump.
- NEVER use drugs that are incompatible with silicone rubber or PVC plastic.
- To reduce the loss of potency for drugs known to be absorbed by PVC plastic and silicone, begin infusion as soon as practical after priming the pump set. Use of high flow rates during infusion will minimize drug absorption.
- DO NOT use medications which are unstable under infusion conditions.
- ALWAYS use connections with Luer Lock™ fittings.
- Use aseptic technique with all fluid-path connections. Remove the protective coverings as assembly progresses.
- ALWAYS close the slide clamps before removing the cassette from the pump.
- Ensure the cassette is properly installed before using the pump.
- Arrange tubing, cords, and cables to minimize the risk of patient strangulation or entanglement.
- When using the pump for secondary delivery (piggybacking), ensure the fluids being administered are chemically and physically compatible.
- NEVER use vented fluid containers (e.g., glass or rigid plastic) unless suspended from a pole.
- Stop infusion if signs or symptoms of infiltration occur.
- *In vitro* studies have shown that infusing older units of additive solution packed red blood cells or frozen deglycerolized red blood cells at rates greater than 200 mL/hr may produce some level of hemolysis that may be considered clinically unacceptable.
- Failure to use the anti-siphon valve may result in unrestricted flow.
- When infusing short-half-life drugs (i.e. those dosed with units of mcg/kg/min) at very low rates (0.8 mL/hr or less) the rate may be too slow for that drug. Consider using a lower drug concentration with these drugs so a pump rate above 0.8 mL/hr can be used.
- If the cassette is removed from the pump, ALWAYS disconnect the pump set from the patient and purge the line before restarting therapy.

Regarding Air-In-Line and Infusion

- To reduce the risk of infusing air, use an air-eliminating filter when the air sensitivity is set to OFF.
- ALWAYS remove all air from the cassette, tubing, and injection site prior to connecting to the patient. ALWAYS disconnect the pump set from the patient prior to priming or purging.
- ALWAYS set the Air Sensitivity to either ON or 2mL when using vented drip chambers.

Regarding Pump Operation

- If the pump does not perform as stated in this manual, remove the pump from service IMMEDIATELY.
- ALWAYS connect to a grounded AC mains power source when using AC mains power. If the quality of the grounding source is in doubt, operate the pump only with batteries.
- USE ONLY the AC mains adaptors specifically labeled for use with the Abbott GemStar Pump.
- Installing disposable batteries is recommended, regardless of the power source used, to provide continuing operation if the external power source fails. ALWAYS replace BOTH batteries with new batteries when a change is required.
- The use of rechargeable batteries in the battery compartment is NOT recommended.
- ALWAYS avoid sources of high-intensity electromagnetic radiation (e.g., radio transmitters, MRI scanners, microwave ovens, X-ray machines, and CAT scanners).
- Use of radio-frequency emitting devices, such as cellular telephones, 2-way radios, and Electrical Surgical Devices (ESU), in close proximity to this device may affect its operation.
- Possible explosion hazard exists if the pump is used in the presence of flammable anesthetics. NEVER use the pump in the presence of flammable or explosive vapors.
- Non-hazardous, low-level electrical potentials are commonly observed when fluids are administered using infusion devices. These potentials are well within accepted safety standards, but may create artifacts on voltage-sensing equipment, such as ECG, EMG, and EEG machines. These artifacts vary at a rate that is associated with the infusion rate. If the monitoring machine is not operating correctly or has loose or defective connections to its sensing electrodes, these artifacts may be accentuated so as to simulate actual physiological signals. To determine if the abnormality in the monitoring equipment is caused by the infusion device instead of some other source in the environment, set the infusion device so that it is temporarily not delivering fluid. Disappearance of the abnormality indicates that it was probably caused by electronic noise generated by the infusion device. Proper setup and maintenance of the monitoring equipment should eliminate the artifact. Refer to the appropriate monitoring system documentation for setup and maintenance instructions.

Regarding Handling and Maintenance

- Product damage may occur if proper care is not exercised during unpacking, installation, and use. Should the pump inadvertently be subjected to mishandling, check connections and programmed data to confirm no damage has occurred. Refer to the “Operation Test” section for further information.
- ALWAYS fully close the battery door when using disposable batteries.
- ALWAYS avoid dropping or hitting the pump. If the pump is dropped or hit, ALWAYS verify programmed data.
- NEVER use sharp objects (e.g., fingernails, pens, pencils, or other probes) to program or clean the pump.
- Use care not to damage the silicone seals around the sensor bodies in the cassette pocket.

- To avoid mechanical or electronic damage, NEVER submerge pump in water or other fluids and avoid fluid spills. If pump becomes wet, dry it immediately with a dry, lint-free cloth. Check connections and programmed data.
- Some cleaning and sanitizing compounds may slowly degrade components made from some plastic materials. DO NOT use compounds containing combinations of isopropyl alcohol and dimethyl benzyl ammonium chloride.
- DO NOT sterilize by heat, steam, ethylene oxide (ETO), or radiation. Apply disinfectants to the outside surface of the pump only. DO NOT use abrasive cleaners or materials on the pump. Using abrasive cleaners or cleaning solutions not recommended by Abbott Laboratories may result in product damage.
- USE ONLY the AC mains adaptor specifically labeled for use with the Abbott GemStar Pump to charge the battery pack.
- The Abbott GemStar AC Mains Adaptor is for use with the Abbott GemStar Pump or Abbott GemStar Battery Pack only. DO NOT use the Abbott GemStar AC mains adaptor with other products.
- During charging, the battery pack is warm. If the battery pack becomes hot to the touch, IMMEDIATELY unplug the AC mains adaptor and contact Abbott Customer Support.
- Please comply with local disposal and recycling regulations as appropriate for disposable batteries, rechargeable battery packs, medical electronic components, and pump sets.

Notes

System Setup

The minimum elements required for using the Abbott GemStar Pump are:

- Abbott GemStar Pump
- Appropriate power source
- Appropriate Abbott GemStar Pump Set
- Appropriate fluid container
- Patient access device

Air-eliminating filters and extension sets may be added to the line as required by the therapy.

Note: Contact an Abbott Laboratories Representative for more information on selecting the appropriate pump set configuration.

Setup Overview

1. Select an appropriate power source.
2. Prime the pump set.
3. Load the cassette into the pump.
4. Select the appropriate optional system components, such as a bolus cord, as required.

Selecting a Power Source

The Abbott GemStar Pump may be powered by one or more of the following:

- Abbott GemStar AC Mains Adaptor
- Abbott GemStar Battery Pack
- Two disposable AA batteries

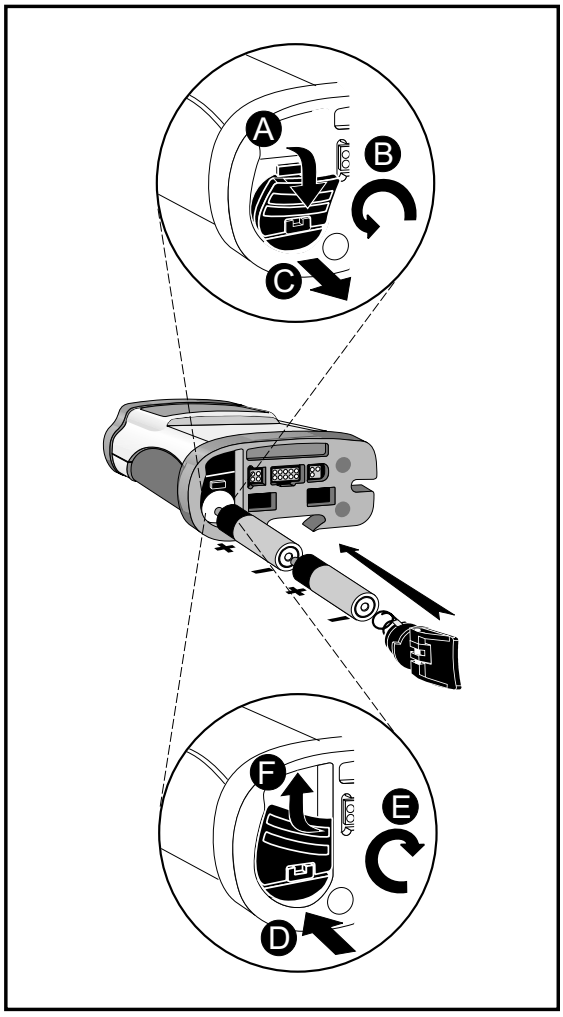
CAUTION: **To ensure proper pump operation, ALWAYS replace BOTH batteries with fresh, disposable AA batteries when a change is required.**

Use of rechargeable batteries in the battery compartment is NOT recommended.

Installing disposable batteries is recommended, regardless of the power source used, to provide continuing operation if the external power source fails.

Installing Disposable Batteries

1. Flip up the tab of the battery door (A) on the bottom of the pump.
2. While holding onto the tab, turn the battery door counterclockwise (B) until it is released from the battery compartment. Pull the door free (C) and remove any existing batteries.
3. Install two fresh, disposable AA batteries into the battery compartment. Ensure the negative and positive battery terminals are inserted according to the diagram at right.
4. Return the battery door to the battery compartment (D).
5. Turn the battery door clockwise (E). Ensure the battery door is secured under the slot. Snap the tab down to lock the battery door in place (F).



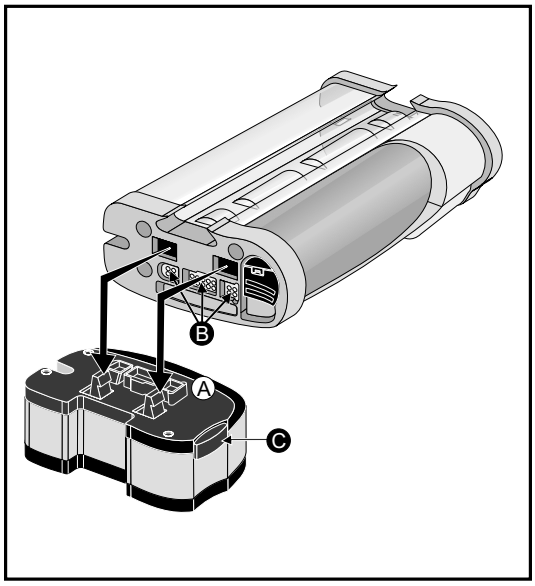
Connecting the Rechargeable Battery Pack

To connect the battery pack:

1. Align the connectors on the top of the battery pack (A) with the connectors on the bottom of the pump (B).
2. Snap the battery pack into place.

To release the battery pack:

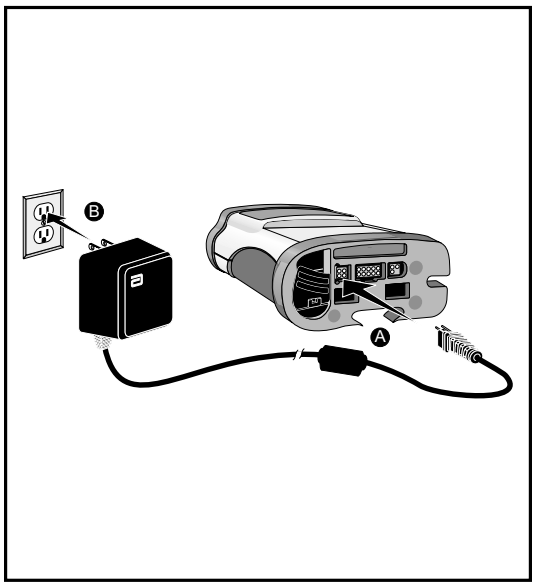
1. Press the release button (C) on the battery pack.
2. Remove the battery pack from the pump.



Connecting the Abbott GemStar AC Mains Adaptor

1. Connect the cord of the AC mains adaptor to the connector labeled "3VDC" on the bottom of the pump.
2. Plug the AC mains adaptor into a standard wall outlet.

CAUTION: **ALWAYS connect to a grounded AC mains power source when using the AC mains adaptor. USE ONLY AC mains adaptors specifically labeled for use with the Abbott GemStar Pump.**



Priming an Abbott GemStar Pump Set

The Abbott GemStar Pump Set must be primed to eliminate air from the cassette and tubing before loading into the pump.

WARNING: ALWAYS remove air from the cassette, tubing, and injection site prior to connecting to the patient. ALWAYS disconnect the pump set from the patient prior to priming or purging. Arrange tubing, cords, and cables to minimize the risk of patient strangulation or entanglement.

Failure to use the anti-siphon valve may result in unrestricted flow.

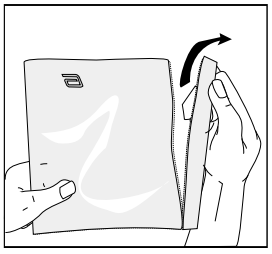
CAUTION: USE ONLY Abbott GemStar Pump Sets with the Abbott GemStar Pump. Use of unauthorized sets may result in injury to the patient or damage to the pump.

To prevent contamination, use aseptic technique with all fluid-path connections. Remove protective coverings as assembly progresses.

Note: Refer to the appropriate instructions included with the pump set for more information.

False occlusion alarms and fluid delivery inconsistencies may occur when pumping viscous fluids in microbore tubing at rates greater than 500 mL/hr.

Opening the Pump Set



1. Open the Abbott GemStar Pump Set package and remove the contents.

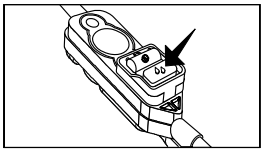
Note: Packaging may differ from the diagram shown.

2. Remove the protective covers from the fluid container administration port and the pump set.

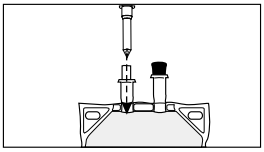
Priming Pump Sets WITHOUT a Drip Chamber

WARNING: Failure to use the anti-siphon valve may result in unrestricted flow.

1. Push down on the flow stop to ensure the cassette is in the open (priming) position.

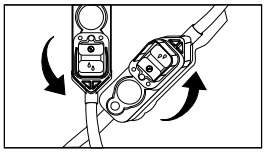


2. Hold the flexible fluid container with the administration port pointed toward the ceiling and insert the piercing pin.

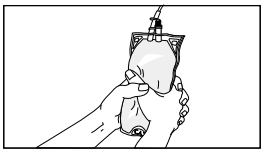


3. Open the slide clamp.

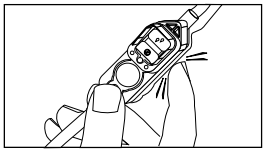
4. Invert the cassette approximately 45°.



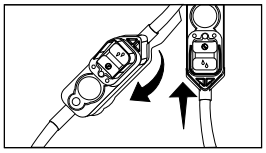
5. While holding the inverted cassette, squeeze or roll the flexible fluid container to eliminate air from the container, cassette, and tubing.



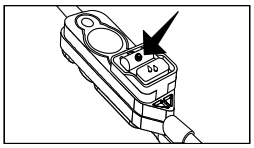
6. If necessary, tap the cassette to eliminate any remaining air bubbles.



7. Return the cassette to the upright position. Continue priming until fluid fills the tubing.



8 Push down on the flow stop to ensure the cassette is in the closed position.



9 Insert the cassette into the cassette pocket. Refer to "Loading the Cassette" on page 26.

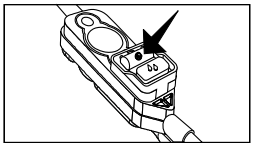
CAUTION: When priming is complete, ensure no fluid flows at the distal end of the pump set. If flow is observed, DO NOT use the pump set.

10 Connect the pump set to the patient-access device.

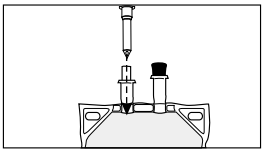
Priming Pump Sets WITHOUT a Drip Chamber Using the PURGE Key

WARNING: Failure to use the anti-siphon valve may result in unrestricted flow.

1 Push down on the flow stop to ensure the cassette is in the closed position.



2 Hold the flexible fluid container with the administration port pointed toward the ceiling and insert the piercing pin.



3 Insert the cassette into the cassette pocket. Refer to "Loading the Cassette" on page 26.

4 Press [**PURGE**]. `PRIME THE SET?` displays. Press [**YES**/**ENTER**].

5 While holding the flexible fluid container with the administration port pointing toward the ceiling, press and hold [**PURGE**].

Note: Purge rate is 250 mL/hr. The pump purges for up to 2 minutes each time you press and hold [**PURGE**].

Continue using the PURGE key until fluid fills the tubing. Ensure all air is removed from the container, cassette, and tubing.

CAUTION: When priming is complete, ensure no fluid flows at the distal end of the pump set. If flow is observed, DO NOT use the pump set.

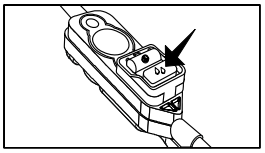
6 Connect the pump set to the patient-access device.

Priming Pump Sets WITH a Drip Chamber

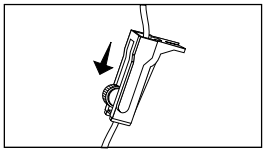
WARNING: Failure to use the anti-siphon valve may result in unrestricted flow.

ALWAYS set the Air Sensitivity to either ON or 2mL when using vented drip chambers.

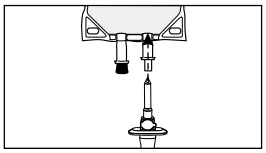
1 Push down on the flow stop to ensure the cassette is in the open (priming) position.



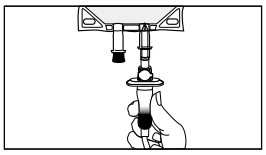
2 Close the CAIR® (roller) clamp.



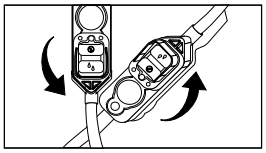
3 Insert the piercing pin into the container. Suspend the container on an I.V. Pole.



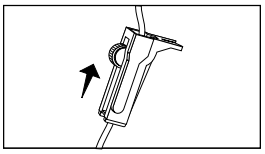
4 Squeeze the drip chamber until filled halfway.



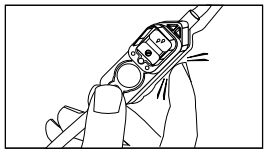
5 Invert the cassette approximately 45°.



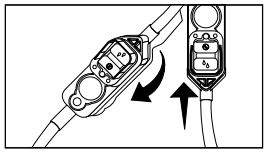
6 Open the CAIR® (roller) clamp.



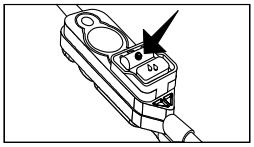
7 If necessary, tap the cassette to eliminate any remaining air bubbles.



8 Return the cassette to the upright position. Continue priming until fluid fills the tubing.



9 Push down on the flow stop to ensure the cassette is in the closed position.



10 Insert the cassette into the cassette pocket. Refer to "Loading the Cassette" on page 26.

CAUTION: When priming is complete, ensure no fluid flows at the distal end of the pump set. If flow is observed, DO NOT use the pump set.

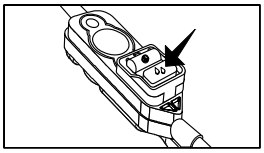
11 Connect the pump set to the patient-access device.

Priming Pump Sets WITH a Drip Chamber Using the PURGE Key

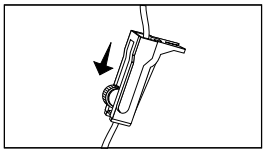
WARNING: Failure to use the anti-siphon valve may result in unrestricted flow.

ALWAYS set the Air Sensitivity to either ON or 2mL when using vented drip chambers.

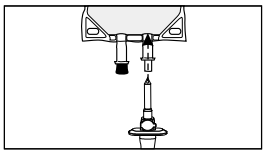
1 Push down on the flow stop to ensure the cassette is in the open (priming) position.



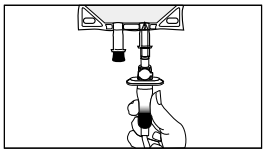
2 Close the CAIR® (roller) clamp.



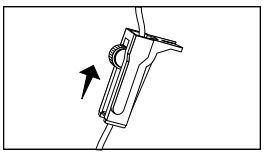
3 Insert the piercing pin into the container. Suspend the container on an I.V. Pole.



4 Squeeze the drip chamber until filled halfway.



5 Open the CAIR® (roller) clamp.



6 Insert the cassette into the cassette pocket. Refer to "Loading the Cassette" on page 26.

7 Press [**PURGE**]. `PRIME THE SET?` displays. Press [**YES**/**ENTER**].

8 Press and hold [**PURGE**].

Note: Purge rate is 250 mL/hr. The pump purges for up to 2 minutes each time you press and hold [**PURGE**].

Continue using the PURGE key until fluid fills the tubing. Ensure all air is removed from the container, cassette, and tubing.

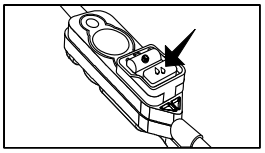
CAUTION: When priming is complete, ensure no fluid flows at the distal end of the pump set. If flow is observed, DO NOT use the pump set.

9 Connect the pump set to the patient-access device

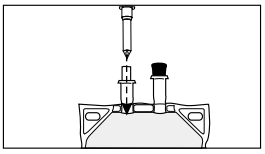
Priming Pump Sets with Extensions

WARNING: Failure to use the anti-siphon valve may result in unrestricted flow.

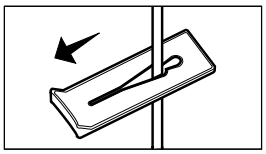
1. Push down on the flow stop to ensure the cassette is in the open (priming) position.



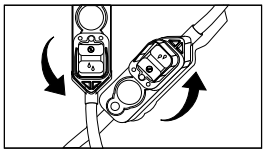
2. Hold the flexible fluid container with the administration port pointed toward the ceiling and insert the piercing pin.



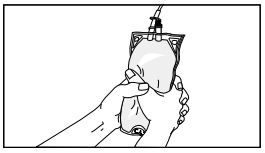
3. Open the slide clamp.



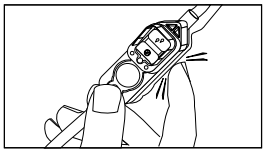
4. Invert the cassette approximately 45°.



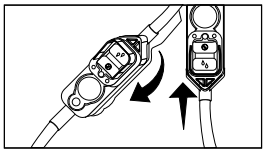
5. While holding the inverted cassette, squeeze or roll the flexible fluid container to eliminate air from the container, cassette, and tubing.



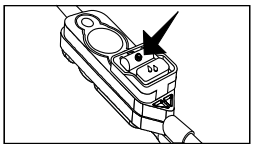
6. If necessary, tap the cassette to eliminate any remaining air bubbles.



7. Return the cassette to the upright position. Continue priming until fluid fills the tubing.



8 Push down on the flow stop to ensure the cassette is in the closed position.



9 Insert the cassette into the cassette pocket. Refer to “Loading the Cassette” on page 26.

Note: Extension set with anti-siphon valve must be attached before patient-use.

10 Connect the extension set to the pump set (refer to the instructions that come with the pump set).

11 Press [**PURGE**]. `PRIME THE SET?` displays. Press [**YES**/**ENTER**].

12 Press and hold [**PURGE**].

Note: Purge rate is 250 mL/hr. The pump purges for up to 2 minutes each time you press and hold [**PURGE**].

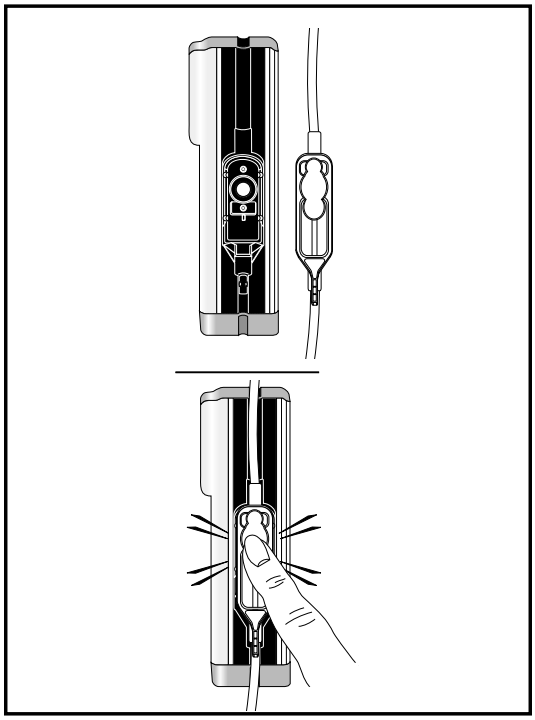
Continue using the PURGE key until fluid fills the tubing. Ensure all air is removed from the container, cassette, and tubing.

CAUTION: When priming is complete, ensure no fluid flows at the distal end of the pump set. If flow is observed, DO NOT use the pump set.

13 If extension set has a Y-extension, prime it if needed.

14 Connect the pump set to the patient-access device.

Loading the Cassette



1. Align the cassette as shown.
2. Insert the cassette into the cassette pocket.
3. Push the cassette into the pocket until it is firmly seated. When properly installed, the cassette cannot be removed from the pocket unless the cassette release button is pushed.

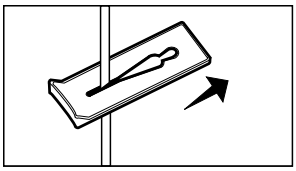
CAUTION: Ensure the cassette is properly installed.

4. Align the tubing in the tubing channel.

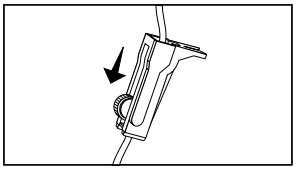
CAUTION: Before connecting to the patient-access device, ensure no fluid flows at the distal end of the pump set while the pump is in the STOP mode. If flow is observed, DO NOT use the pump set.

5. Connect the pump set to the patient-access device.

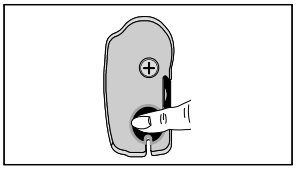
Releasing the Cassette



1 Close the slide clamp or CAIR® (roller) clamp on the distal line.



2 Push down on the cassette release button on the top of the pump.



3 Remove the cassette.

Note: When the cassette is released from the pump, the cassette flow stop automatically reverts to the closed position, preventing free flow.

Notes

Basic Operation

Quick Start

To start a therapy:

1. **Determine the program settings**. Refer to the appropriate therapy section for a worksheet (that may be copied) to record the program settings.
2. **Set up the pump and prime the cassette**. Refer to the "System Setup" section.
3. **Power-on the pump and access the Programming Menu**. Refer to *Powering On the Pump* in this section.
4. **Select the therapy type and follow the display prompts to enter the program**. Refer to the appropriate therapy section for detailed instructions.
5. **Press [START] to begin delivery**.

Tip: To enter a new program when the pump is already powered on: (1) Press [**STOP**] to place the pump in STOP mode, (2) press [**CHANGE**] to access the Change Menu, and (3) select NEW PROGRAM. The current program clears and the pump displays the Programming Menu.

Operating Tips

Many of the pump's functions advance to the next step automatically when the display prompt is answered. Use the number keys to enter requested values, then press [**YES**/**ENTER**] to advance to the next step. The following keys are useful during programming:

[**HELP**]	During programming and alarm conditions press [**HELP**] to display information about the current condition. Otherwise press [**HELP**] to display shift totals.
	Press the up or down arrow to scroll through long display messages. Press the up arrow to insert a decimal point in a numeric value.
[**CHANGE**]	If you enter an incorrect numeric value during programming, press [**CHANGE**] before pressing [**YES**/**ENTER**] to reset the value to zero.
[**BACK-UP**]	Press [**BACK-UP**] to return to a previous display, to exit OPTIONS, or to exit the HELP mode.

Note: To power-off the pump, press and HOLD ⏻ until the display clears.

Powering On the Pump

CAUTION: If the self-test does not display or if beeps do not sound at power-on, contact Abbott Customer Support before using the pump.

1 Press [⏻] to power-on the pump. The pump completes a self-test and displays the currently set time. No response is required. If the set time is not correct, refer to *Setting the Clock* in the "Options Menu" section.

```
GEMSTAR 7
UNIT SELF-TEST
TIME IS 10:00 A M
FRI, 1 JAN 99
```

Note: The self-test takes approximately 30 seconds to complete. If the pump is locked, lock symbols appear at the beginning and end of the second line: 🔒 *UNIT SELF-TEST* 🔒.

2 The pump evaluates the available power source(s). Respond to the display message as described in the following table:

Display Message	Power Source(s)	User Response
No message displays	AC power and disposable batteries	No response required, the pump advances to the next step.
LOW BATTERIES ENTER TO CONFIRM	AC power and low voltage disposable batteries; or low voltage disposable batteries only	Press [**YES**/**ENTER**] to confirm. Power-off the pump and install two fresh disposable AA batteries to ensure backup power source.
NO INTERNAL BATT NO POWER LOSS ALARM AVAILABLE ENTER TO CONFIRM	No disposable batteries or dead disposable batteries; and external power	Press [**YES**/**ENTER**] to confirm. Power-off the pump and install two fresh, disposable AA batteries to ensure backup power source.
USING BATTERIES ENTER TO CONFIRM	Disposable batteries only	Press [**YES**/**ENTER**] to confirm. If an external power source is in use, ensure the connections are secure.
USING EXT BATT ENTER TO CONFIRM	Docking station battery or battery pack; and disposable batteries	Press [**YES**/**ENTER**] to confirm. If an AC mains adaptor is in use, ensure the connections are secure.

Accessing the Programming Menu

After powering on, the pump determines if a program is currently stored in its memory. Respond to the display message as described in the following table:

Display Message	Condition	User Response
No message; the pump displays the Programming Menu.	Pump memory is clear.	➤ To enter a new program: Select a therapy from the Programming Menu and enter a new program. Refer to the appropriate therapy section for instructions.
CURRENT THERAPY: *(type of therapy)* USE CURRENT? YES OR NO	A program is currently stored in pump memory.	➤ To continue the current program: Press [**YES**/**ENTER**]. *Note: A program review is required if the pump has been powered off for 5 or more minutes.* ➤ To reset the current program: 1. Press [**YES**/**ENTER**]. 2. Press [**CHANGE**] to access the Change Menu. Refer to *Starting a New Container* on the following page. *Note: If the pump has been powered off for 5 or more minutes, the Change Menu displays automatically.* ➤ To enter a new program: 1. Press [**NO**]. CLEARING PROGRAM displays. 2. Select a therapy from the Programming Menu and enter a new program. Refer to the appropriate therapy section for instructions.

Programming the Pump

The pump's menu system provides step-by-step guidance through the programming process. Refer to the appropriate therapy section for more information on programming the pump.

1. Select the desired therapy from the Programming Menu.
2. Enter the requested parameters as prompted. Refer to the appropriate therapy section for a programming worksheet.

Note: Program parameters can be changed at any time until the Program Review is complete. Press [**BACK-UP**] *to return to previous program displays and make changes as desired. Changing some parameters may require new entries for subsequent program displays.*

3. Review the program, if required. Press [**YES**/**ENTER**] when done.
4. SAVING PROGRAM displays and the program is stored in the pump's memory, then the pump enters the STOP mode.

Tip: If you enter an incorrect numeric value during programming, press [**CHANGE**] BEFORE pressing [**YES**/**ENTER**] to reset the value to zero. Then enter the correct value.

Starting a New Container

Note: The NEW CONTAINER function is not available when the pump is in FULL Lock. Refer to the "Options Menu" section for more information on locking the keypad.

To repeat the current program with a new container:

1. From the STOP mode, press [**CHANGE**] to access the Change Menu.
2. Select `NEW CONTAINER` from the Change Menu. `NEW CONTAINER` displays for several seconds and the amount infused clears from the pump's memory.
3. Review the program.
4. Press [**START**] to begin delivery.

Weight Dosed

Therapy Features and Specifications

This therapy allows programming of delivery rate as a function of body weight.

- Programming ranges are listed in the programming worksheet included in this section. If a number outside of the acceptable program range is entered, an error message displays the minimum or maximum value allowed.
- The air sensitivity in a Weight Dosed program is automatically set to ON. This setting may be changed through the Options Menu after programming is complete. Refer to *Air Sensitivity* in the "Options Menu" section for more information.
- The pump automatically delivers KVO (Keep Vein Open) after the programmed VTBI (Volume To Be Infused) has completed.
- The rate can be titrated while the pump is infusing.

WARNING: ALWAYS set the Air Sensitivity to either ON or 2mL when using vented drip chambers.

Weight Dosed Programming

1. Select `WEIGHT DOSED` from the Programming Menu.
2. Select the unit of measure.
3. Enter the patient weight, if required.

*Note: **Total concentration is ALWAYS entered as mg in mL**, even if mcg is the selected unit of measure.*

4. Enter the concentration as mg in mL:

Tip: Use [▼] to toggle between mL and mg.

- Enter the value in mg when "`mg`" flashes on the display.
- Enter the value in mL when "`mL`" flashes on the display.
- Press [**YES**/**ENTER**] to confirm.

5. Enter the rate.

   The pump automatically displays the mL/hr equivalent even when another unit of measure is selected.

6. Enter the VTBI.
7. Review the program.

WARNING: If the cassette is removed from the pump, ALWAYS disconnect the pump set from the patient and purge the line before restarting therapy.

Auto KVO

When the programmed VTBI has completed delivery, Auto KVO delivery begins automatically and the empty container alarm sounds.

Note: Auto KVO delivers even while the empty container alarm sounds. Press [**SILENCE**] *to quiet the alarm for 2 minutes.*

If the weight dosed rate is greater than or equal to 1 mL/hr, the Auto KVO delivers at 1 mL/hr. If the weight dosed rate is less than 1 mL/hr, the Auto KVO delivers at the same rate.

Rate Titration

To titrate the rate while the pump is infusing:

1. In the RUN mode, press the numeric keys corresponding to the new rate. The rate flashes on the display. Press [**YES**/**ENTER**].

   For example: if the current rate is 4.0 mg/kg/hr, press [**5**] [**YES**/**ENTER**] to change the rate to 5.0 mg/kg/hr.

   Press [▼] to enter the rate in mL. When using units other than mL, the pump automatically adjusts the mL/hr value.

   You have approximately five seconds after pressing a key to press another numeric key, the decimal key, or [**YES**/**ENTER**]. If no key is pressed within five seconds, the rate does not change and the delivery continues as programmed.

2. `NEW RATE` displays with the new value.
   - Press [**YES**/**ENTER**] within 10 seconds to accept the change and begin delivery at the new rate.
   - Press [**NO**] to continue delivery at the programmed rate.

Changing a Weight Dosed Program

Note: You cannot change a program when the pump is in FULL or NEW CONTAINER Lock.

Can be changed at any time	Cannot be changed
• Delivery rate • VTBI • Patient weight	• Unit of measure • Concentration (amount of drug)

To change a program:

1. From the STOP mode, press [**CHANGE**] and select [**4**] `CHANGE PROGRAM`.
2. As each program parameter displays, make the desired changes or press [**YES**/**ENTER**] to accept the current setting.
3. Review the program.
4. Press [**START**] to begin delivery.

Abbott GemStar™
Weight Dosed Programming Worksheet

GIVE: _____

Parameter	Selections and/or Values to be Entered	Programmable Ranges
Therapy	Weight Dosed	N/A
Unit of Measure	❑ mcg/kg/min ❑ mcg/kg/hr ❑ mcg/min ❑ mg/kg/min ❑ mg/kg/hr ❑ mg/min ❑ mL/hr	N/A
Patient Weight	(When programming in kg/min or kg/hr) _____	2.0 - 200.0 kg
Concentration (2 entries are required. Use ▼ to toggle)	(For all units of measure EXCEPT mL/hr) _____mg in _____mL	0.1 - 9999000 mg 0.1 - 9999 mL
Rate	_____	(see below *)
VTBI (Volume To Be Infused)	_____	0.1 - 9999 mL

* Programmable Ranges for Rate:
0.1 - 8333 mg/kg/min
0.1 - 500000 mg/kg/hr
0.1 - 16666 mg/min
0.01 - 166666 mcg/kg/min
0.01 - 9999999 mcg/kg/hr
0.01 - 166666 mcg/min
0.1 - 1000 mL/hr

CAUTION: When infusing short-half-life drugs (i.e. those dosed with units of mcg/kg/min) at very low rates (0.8 mL/hr or less) the rate may be too slow for that drug. Consider using a lower drug concentration with these drugs so a pump rate above 0.8 mL/hr can be used.

Pain Management

Therapy Features and Specifications

This therapy allows programming of a continuous only, bolus only, or continuous with bolus delivery.

- Programming ranges are listed in the programming worksheet included in this section. If a number outside of the acceptable program range is entered, an error message displays the minimum or maximum value allowed.
- In Continuous + Bolus protocols, you may zero either the continuous rate or the bolus when entering or changing a program. The continuous rate and bolus volume cannot be zero at the same time.
- The default bolus delivery rate is 125 mL/hr.
- A loading dose may be set during programming, which can be delivered after programming and priming are complete. The loading dose rate is 125 mL/hr.

Note: The use of a lockbox is recommended with pain management protocols. Refer to "Using the Abbott GemStar Lockboxes" on page 106 for instructions on using a lockbox with the Abbott GemStar Pump.

Pain Management Programming

1. Select PAIN MANAGEMENT from the Programming Menu.
2. Select the delivery mode.

Note: If you select Continuous + Bolus, you can change the continuous delivery rate or bolus amount to zero through the CHANGE menu without reprogramming the pump.

3. Select the unit of measure and concentration as required.
4. Set the continuous delivery rate.

Note: The pump only delivers in increments of 0.1 mL. Values entered in a Pain Management therapy may be rounded to the nearest 0.1 mL. For example, at a concentration of 15 mg/mL, a rate of 5 mg rounds to 4.5 mg.

5 mg = .333 mL
4.5 mg = .3 mL

When a value is rounded, the pump sounds four quick beeps, ROUNDING *displays for a few seconds, and then the rounded value displays. Press* [**YES**/**ENTER**] *to accept the rounded value and continue to the next step.*

5. Program a loading dose as required.

6 Program a bolus dose with lockout time and dose limit as required.

Regarding a 1-Hour or 4-Hour Dose Limit: The hour dose limit is the maximum volume (continuous plus bolus or bolus only amount) that may be delivered over the selected period. When the programmed dose limit is reached, the continuous delivery stops and a new bolus is not allowed. As the oldest delivery amounts age out of the Hour Dose Limit record, the pump accepts bolus requests or resumes continuous delivery (if programmed).

Note: If a 1-hour or 4-hour dose limit is programmed, a bolus in progress does not stop until the individual bolus volume has been delivered. Therefore, a bolus delivery initiated before the programmed dose limit is reached may exceed the dose limit at the completion of the bolus.

Loading doses are not included in the hour dose limit volume and a dose limit in effect does not prevent the delivery of a loading dose.

7 If programmed in units of mcg or mg, the line displaying the units flashes. Enter the container size in proper unit measure or see the note below.

Note: In order to enter the total in mL when programming a concentration, press [▼] *to move to the mL line. Enter the mL value when* mL *flashes on the display.*

8 Select the air sensitivity.

9 Review the program.

WARNING: If the cassette is removed from the pump, ALWAYS disconnect the pump set from the patient and purge the line before restarting therapy.

Bolus Delivery

Bolus doses and delivery limits are set during programming. The default bolus dose delivery rate in a pain management protocol is 125 mL/hr.

A bolus cord is available for patient bolus requests; refer to *Connecting the Bolus Cord* in the “Optional System Components” section for more information.

Delivering a Bolus Dose

From the RUN mode, press either the bolus button [+] on the top of the pump or the button on the end of the bolus cord to begin bolus dose delivery. BOLUS DELIVERY flashes on the display, and the amount infused accrues as the delivery progresses.

When the bolus dose is complete, the following will occur:

- The bolus request and delivery amount are recorded to the event and bolus history logs.
- Delivered boluses are added to the total bolus amount in the program amounts.
- The bolus lockout time is reset (if applicable) and subsequent bolus requests are ignored until the lockout time has elapsed.
- Programmed infusion continues.

Note: ALL bolus requests are recorded to the Event and Bolus History logs.

If the bolus delivery does not start, it may be locked out by one of the following conditions:

- Bolus lockout period
- Loading dose delivery in progress
- Bolus dose delivery in progress
- Bolus per-hour limit
- 1-hour or 4-hour dose limit

Bolus Dose Interruptions

Bolus deliveries may be interrupted by pressing [**STOP**] or by an alarm condition.

When [**START**] is pressed again, COMPLETE BOLUS NOW? displays. Refer to the following table for the appropriate response:

To do this:	Press this key:	Bolus lockout time is set to:
Deliver the remaining bolus amount	[**YES**/**ENTER**]	The time of delivery completion
Clear the undelivered bolus amount	[**NO**]	The time the bolus was interrupted

Loading Dose Delivery

A loading dose is set during programming and can be delivered after programming and priming are complete.

Note: Loading dose amounts are not included in a 1-hour or 4-hour limit.

Delivering a Loading Dose

1. After priming and programming are complete, press [**START**].
2. `DELIVER THE LOADING DOSE NOW?` displays. Press [**YES**/**ENTER**] to begin delivery.

When the loading dose is complete, the following will occur:

- Programmed infusion begins automatically.
- The dose amount is recorded to the history log.
- The bolus lockout time is reset (if applicable) and subsequent bolus requests are ignored until the lockout time has elapsed.

Loading Dose Interruptions

Loading dose deliveries may be interrupted by pressing **[STOP]** or by an alarm condition.

When the interruption is resolved, press [**START**]. `COMPLETE THE LOADING DOSE?` displays. Refer to the following table for the appropriate response:

To do this:	Press this key:
Deliver the remaining loading dose amount	[**YES**/**ENTER**]
Clear the undelivered loading dose amount	[**NO**]

Changing a Pain Management Program

Note: You cannot change a program when the pump is in FULL or NEW CONTAINER Lock. With a RATE CHANGE Lock, the continuous delivery rate and bolus amount can be changed within the set ranges.

Can be changed at any time		Cannot be changed
• Delivery rate • Bolus • Bolus lockout	• Container size • Air sensitivity • Dose limit amount	• Delivery mode • Unit of measure • Concentration • Dose limit type

Note: Although the delivery mode cannot be changed, if a Continuous + Bolus therapy is programmed, the continuous rate or bolus amount can be changed to zero. This function may be restricted by the minimum values set with a RATE CHANGE Lock.

To change a program:

1. From the STOP mode, press [**CHANGE**] and select [**4**] `CHANGE PROGRAM`.
2. As each program parameter displays, make the desired changes, or press [**YES**/**ENTER**] to accept the current setting.
3. Review the program.
4. Press [**START**] to begin delivery.

Abbott GemStar™
Pain Management Programming Worksheet

GIVE: _____

Parameters	Selections and/or Values to be Entered	Programmable Ranges
Therapy	Pain Management	N/A
Delivery Mode	❑ Continuous ❑ Bolus Only ❑ Continuous + Bolus	N/A
Unit of Measure	❑ Concentration:_____ mg/mL ❑ Concentration:_____ mcg/mL ❑ mL	0.1 - 100 mg/mL 1 - 1000 mcg/mL
Continuous Rate	_____	0.1 - 2500 mg/hr 1 - 25000 mcg/hr 0.1 - 25.0 mL/hr
Loading Dose	❑ No ❑ Yes Amount:_____	0.1 - 2500 mg 1 - 25000 mcg 0.1 - 25.0 mL
Bolus Dose	_____	0 - 2500 mg 0 - 25000 mcg 0 - 25.0 mL
Bolus Lockout	_____minutes	5 - 999 min
Optional Dose Limit	❑ 4-hour limit Amount:_____ ❑ 1-hour limit Amount:_____ ❑ # boluses/hour Number:_____ ❑ No dose limit	4X rate - 400 mL, 40000 mg, 400000 mcg* Rate - 100 mL, 10000 mg, 100000 mcg* 1 - 12 * For continuous plus bolus delivery.
	Note: For Bolus Only, the 1 or 4 hour limit minimum is 1 bolus dose.	
Container Size	_____	0.1 - 99999 mg 1 - 9999000 mcg 0.1 - 9999 mL
Air Sensitivity	❑ On Alarms at approx. 0.5 mL of air ❑ 2 mL Alarms at approx. 2 mL of air ❑ Off No alarm	N/A

mL/hr Only

Therapy Features and Specifications

This therapy allows quick programming of delivery rate in milliliters (mL) only.

- Programming ranges are listed in the programming worksheet included in this section. If a number outside of the acceptable program range is entered, an error message displays the minimum or maximum value allowed.
- The air sensitivity is automatically set to ON. This setting may be changed through the Options Menu after programming is complete. Refer to *Air Sensitivity* in the "Options Menu" section for more information.
- The pump automatically delivers KVO (Keep Vein Open) after the programmed VTBI (Volume To Be Infused) is complete.
- The rate can be titrated while the pump is infusing.
- An optional secondary container can be "piggybacked" on the primary container during regular delivery using an Abbott GemStar Piggyback Pump Set. Refer to *Piggybacking* in this section for more information.
- A program review is not required and is only available through the Change or Options Menu.

WARNING: ALWAYS set the Air Sensitivity to either ON or 2mL when using vented drip chambers.

mL/hr Only Programming

1. Select `mL/hr Only` from the Programming Menu.
2. Enter the rate.
3. Enter the VTBI.

Note: A program review is not required for mL/hr Only programs.

WARNING: If the cassette is removed from the pump, ALWAYS disconnect the pump set from the patient and purge the line before restarting therapy.

Auto KVO

When the programmed VTBI has completed delivery, Auto KVO delivery begins automatically and the empty container alarm sounds.

Note: Auto KVO delivers even while the empty container alarm sounds. Press [**SILENCE**] *to quiet the alarm for 2 minutes.*

If the mL/hr Only rate is greater than or equal to 1 mL/hr, the Auto KVO delivers at 1 mL/hr. If the mL/hr Only rate is less than 1 mL/hr, the Auto KVO delivers at the same rate.

Rate Titration

To titrate the rate while the pump is infusing:

1. In the RUN mode, press the numeric keys corresponding to the new rate. The rate flashes on the display. Press [**YES**/**ENTER**].

   For example, if the current rate is 100 mL/hr, press [**5**] [**0**] [**YES**/**ENTER**] to change the rate to 50 mL/hr.

   Note: You have approximately five seconds after pressing a key to press another numeric key, the decimal key, or [**YES**/**ENTER**]. *If no key is pressed within five seconds, the rate does not change and the delivery continues as programmed.*

2. `NEW RATE` displays with the new value.
   - Press [**YES**/**ENTER**] within 10 seconds to accept the change and begin delivery at the new rate.
   - Press [**NO**] to continue delivery at the programmed rate.

Piggybacking

Piggybacking with the Abbott GemStar Pump requires the use of an Abbott GemStar Primary Piggyback Pump Set with a proximal Y-site backcheck valve and a secondary piggyback set with an extension hook. **The secondary container must be higher than the primary container**. Refer to the instructions included with the piggyback pump set for more information.

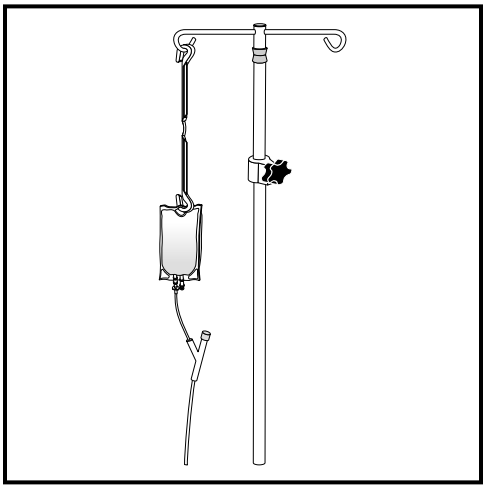
WARNING: When using the pump for secondary delivery (piggybacking), ensure the fluids being administered are chemically and physically compatible.

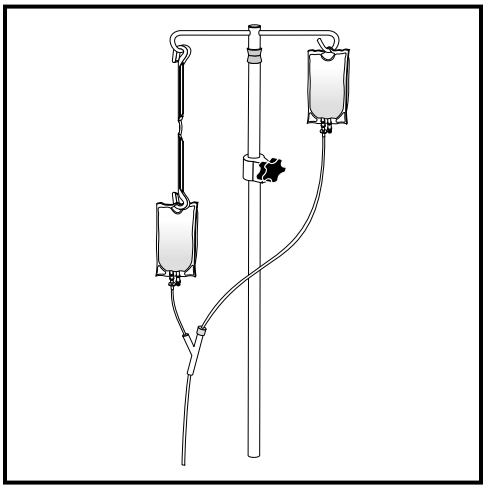
The piggyback rate and piggyback VTBI display until the secondary container has been delivered. Then the primary delivery resumes automatically.

Note: Piggyback infusion amount is NOT added to the primary programmed infusion amount.

Preparing for Secondary Delivery (Piggybacking)

1. Ensure a primary piggyback pump set with a proximal Y-site backcheck valve is in place.
2. Use the extension hook from the secondary pump set to suspend the primary container from the I.V. pole.
3. Prepare the secondary pump set according to the instructions included with the set.
4. Attach a needle or blunt cannula (if appropriate) and prime the secondary pump set.
5. Suspend the secondary container from the I.V. pole.



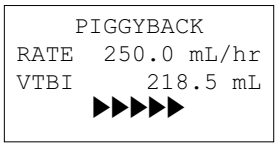


Note: When using a secondary container of 500 mL or greater, ensure the bottom of the secondary container is at least 7 inches (17.8 cm) above the fluid level in the primary container. Use additional extension hooks if necessary.

6. Connect the secondary pump set to the proximal Y-site (or proximal port).

Programming a Secondary Delivery (Piggybacking)

Note: To distinguish the piggyback delivery from the primary delivery, PIGGYBACK *displays and the piggyback VTBI counts down to completion. For example, a piggyback rate of 250 mL/hr with a* ***remaining*** *VTBI of 218.5 mL will display as shown.*



Tip: Prepare and set up containers BEFORE programming the pump for piggyback delivery.

1. Press [**CHANGE**] and select [**5**] PIGGYBACKING from the Change Menu.
2. Enter the dose amount for the secondary container.
3. Enter the infusion time for the secondary container.
4. Open the slide clamp or CAIR® (roller) clamp on the tubing of the secondary set.
5. Press [**YES**/**ENTER**] to begin piggyback delivery.

Note: Primary flow stops until the secondary VTBI is delivered; then primary flow automatically resumes. Any remaining secondary fluid will be delivered at the primary rate. The maximum piggyback rate is 300 mL/hr. For secondary rates above 300 mL/hr, flow may occur from the primary container.

Changing a Piggyback Delivery

1. Press [**CHANGE**] and select [**5**] PIGGYBACKING from the Change Menu.
2. Press [**CHANGE**] to reset the dose amount to zero.
3. Enter the new piggyback dose amount and press [**YES**/**ENTER**].
4. Set the infusion time for the secondary container.
5. Press [**YES**/**ENTER**] to begin piggyback delivery.

Note: You must know the amount that has already been delivered. When the piggyback dose amount is changed, the pump begins a new VTBI countdown.

Canceling a Piggyback Delivery

1. Press [**CHANGE**] and select [**5**] PIGGYBACKING from the Change Menu.
2. Press [**CHANGE**] to reset the dose amount to zero.
3. Press [**YES**/**ENTER**] to cancel piggyback delivery.

Changing a mL/hr Only Program

Note: You cannot change a program when the pump is in FULL or NEW CONTAINER Lock.

Can be changed at any time
• Delivery rate • Container size • Piggybacking

To change a program:

1. From the STOP mode, press [**CHANGE**] and select [**4**] `CHANGE PROGRAM`.
2. As each program parameter displays, make the desired changes or press [**YES**/**ENTER**] to accept the current setting.
3. Press [**START**] to begin delivery.

Note: A program review is not required and is only available through the Change or Options Menu.

Abbott GemStar™
mL/hr Only Programming Worksheet

GIVE: _____

Parameter	Selections and/or Values to be Entered	Programmable Ranges
Therapy	mL/hr Only	N/A
Rate	_____	0.1 - 1000 mL/hr
VTBI (Volume To Be Infused)	_____	0.1 - 9999 mL

Intermittent

Therapy Features and Specifications

This therapy allows programming of multiple doses at regular intervals.

- Programming ranges are listed in the programming worksheet included in this section. If a number outside of the acceptable program range is entered, an error message displays the minimum or maximum value allowed.
- Optional KVO (Keep Vein Open) may be set during programming.
- The pump may be disconnected from the patient between dose deliveries. A call back alarm can be set to alert the patient or caregiver to reconnect the pump before the next scheduled delivery begins. The pump must remain powered on for the call back alarm to function.

Intermittent Programming

1. Select INTERMITTENT from the Programming Menu.
2. Enter the dose amount.
3. Enter the infusion time for each dose.

   For example, press [**2**] [**0**] if each dose is to deliver for 20 minutes.
4. Enter the frequency of dose deliveries.

   For example, press [**2**] [**0**] [**0**] to start a dose every two hours.
5. Enter the total number of doses in the container.

   To determine the number of doses in the container, divide the volume in the container by the dose amount.
6. Enter the KVO rate.

   KVO delivers before a delayed start time, between doses, and after the last dose until the total container is infused.

   If no KVO is desired, press [**YES**/**ENTER**] while the value displayed is zero.
7. Enter the container size.

   The pump automatically calculates the minimum container size required to deliver the number of programmed doses and KVO between doses.

Note: If KVO is desired before a delayed start, you must increase the container size to accommodate the desired KVO volume.

8. Select the air sensitivity.

9 SET CALL BACK ALARM FOR NEXT DOSE? displays.

The pump may be disconnected from the patient between dose deliveries. The call back alarm can be set to alert the patient or caregiver to reconnect the pump before the next scheduled delivery begins. At the set time before each dose, the alarm sounds, START flashes on the display, and the alarm LED flashes. Press [**SILENCE**] to silence the alarm for three minutes. Then reconnect the pump to the patient.

For example, press [**1**] [**0**] to set the alarm to sound 10 minutes before the start of the next scheduled delivery.

When programming the call back alarm, be sure to allow enough time for the patient or caregiver to reconnect the pump to the patient and to press [**START**] BEFORE the scheduled dose start time.

- Press [**YES**/**ENTER**] to set the call back alarm.
- Press [**NO**] if you do not want to set the call back alarm.

Note: The call back alarm works only when the pump is powered on AND in the STOP mode. DO NOT power-off the pump while it is disconnected from the patient if you have set the call back alarm.

10 Confirm the displayed time is correct. Press [**OPTIONS**] to change the clock if required.

11 The current time and START NOW? displays.

- Press [**YES**/**ENTER**] to begin delivery when the pump enters the RUN mode.
- Press [**NO**] to set a delayed start time. SET START TIME displays. Enter the desired start time and press [**YES**/**ENTER**] when done.

12 Review the program.

WARNING: If the cassette is removed from the pump, ALWAYS disconnect the pump set from the patient and purge the line before restarting therapy.

Tip: To use a delayed start without specifying a start time: (1) Press [**YES**/**ENTER**]; (2) Complete the program review; (3) Power-off the pump; (4) When the pump is powered on again, complete the program review, then press [**START**] to begin delivery.

Intermittent Delivery Interruptions

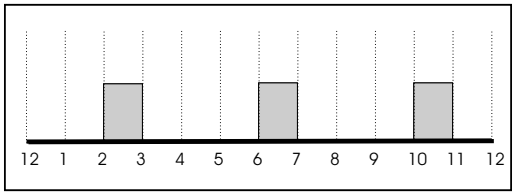
Missed Start Time

- If the programmed start time is missed, it can be changed through the Options Menu. Refer to *Next Dose* in the "Options Menu" section more information.
- If the pump remains in the STOP mode and the first dose is missed, press [**START**] to begin delivery immediately and all subsequent doses will be shifted.
- If the pump is programmed with a delayed start time and is then powered off before [**START**] is pressed, the pump will skip to the NEXT occurrence of the programmed start time.

  For example, the current time is 10:00 PM. The user sets the delayed start time for 10:30 PM and then powers off the pump. The user does not power on the pump until 10:40 PM, which is 10 minutes AFTER the scheduled start time. The pump does not begin delivery until 10:30 PM the FOLLOWING day.

Dose Interruptions

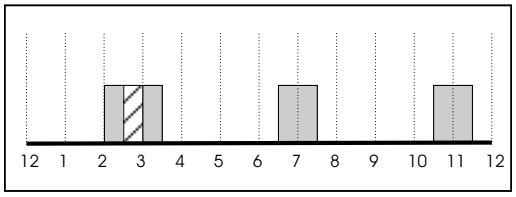
To understand how interruptions are resolved, compare the normal Intermittent delivery diagram below for a 1-hour dose every four hours, to the interruption diagrams shown in the examples:



Dose Delivered - 

- If an Intermittent dose is interrupted and the pump is placed in the RUN mode during the on or off cycle of the current dose, the dose continues delivery from the point where it was interrupted and all subsequent doses are shifted.

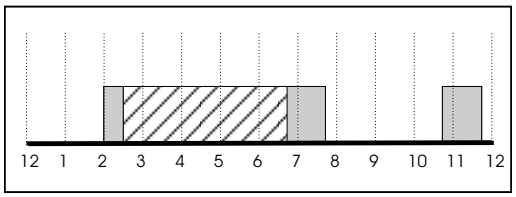
For example, in the following diagram, an intermittent dose was started at 2:00. The dose was interrupted during the current dose cycle and was started again before the end of the current dose cycle.



Dose Delivered - ▯ Dose Interrupted - ▨

- If an Intermittent dose is interrupted and the pump is placed in the RUN mode after the off cycle of the current dose, the next dose begins delivery and all subsequent doses are shifted if necessary.

  For example, in the following diagram, an intermittent dose was stared at 2:00. It was interrupted during the current delivery cycle at 2:30, but was not started again until after the current delivery cycle at 6:45:



Dose Delivered - ▯ Dose Interrupted - ▨

- When the dose is complete, the start time for the Next Dose displays. To change the start time refer to the “Options Menu” section.
- Any missed Intermittent doses, except the first dose, are added to the end of the delivery schedule.

Changing an Intermittent Program

Note: You cannot change a program when the pump is in FULL or NEW CONTAINER Lock.

Can be changed at any time	Can be changed if no dose is in progress	Cannot be changed after [START] is pressed
• Dose parameters • KVO rate • Container size • Air sensitivity • Call back alarm	• Next dose start time	• Current time

To change a program:

1. From the STOP mode, press [**CHANGE**] and select [**4**] `CHANGE PROGRAM`.
2. As each program parameter displays, make the desired changes or press [**YES**/**ENTER**] to accept the current setting.
3. Review the program.
4. Press [**START**] to begin delivery.

Abbott GemStar™
Intermittent Programming Worksheet

GIVE: _____

Parameters	Selections and/or Values to be Entered	Programmable Ranges
Therapy	Intermittent	N/A
Dose Amount	_____	0.1 - 9600 mL
Infusion Time Per Dose	_____ hrs:min	1 min - 24 hrs
Dose Frequency	_____ hrs:min	(Infusion time per dose + 1 min) to 96 hrs
Number of Doses Per Container	_____	1 - 999
KVO (Keep Vein Open)	❑ No KVO Rate: 0.0 ❑ Yes KVO Rate: _____	0.1 -5.0 mL/hr
Container Size*	_____	0.1 - 9999 mL
Air Sensitivity	❑ On Alarms at approx. 0.5 mL of air ❑ 2 mL Alarms at approx. 2 mL of air ❑ Off No alarm	N/A
Call Back Alarm	❑ No ❑ Yes Alarm: _____hrs:min before start	1 min - time between doses
Start Time	❑ Start immediately after programming ❑ Start time: _____ Specify AM or PM if not 24-hour clock.	12:00 AM - 11:59 PM or 00:00 - 23:59

* The pump automatically calculates the minimum container size required to deliver the number of programmed doses and KVO between doses. If KVO is desired before a delayed start, you must increase the container size to accommodate the desired KVO volume.

Total Parenteral Nutrition (TPN)

Therapy Features and Specifications

This therapy allows programming of Total Parenteral Nutrition (TPN) protocols.

- Programming ranges are listed in the programming worksheet included in this section. If a number outside of the acceptable program range is entered, an error message displays the minimum or maximum value allowed.
- Taper Up and Taper Down may be programmed to gradually increase and decrease the rate of delivery at the beginning and end of a therapy. If Taper Down is selected during programming, the pump allows auto tapering if the continuous delivery is stopped before the programmed volume has completed delivery.
- Optional KVO (Keep Vein Open) may be set during programming.

TPN Programming

1. Select TPN from the Programming Menu.
2. Select the TPN delivery mode.
3. Enter the total VTBI (Volume To Be Infused).

   Maximum VTBI is 9600 mL minus any taper amount.
4. Enter the Taper Up and Taper Down times (if applicable).

   Note: Time is entered in hours:minutes. For one hour, press [**1**] [**0**] [**0**]*; not* [**6**] [**0**].
5. Enter the total time to infuse.
6. Enter the KVO rate. If no KVO is desired, press [**YES**/**ENTER**] while the value displayed is zero.

   Note: KVO runs after Taper Down until the total container is infused.
7. Enter the container size (VTBI + KVO).

   Note: If KVO is programmed, you must increase the container size to accommodate the desired KVO volume.
8. Select the air sensitivity.
9. Review the program.

WARNING: If the cassette is removed from the pump, ALWAYS disconnect the pump set from the patient and purge the line before restarting therapy.

Changing a TPN Program

Note: You cannot change a program when the pump is in FULL or NEW CONTAINER Lock.

Can be changed before [START] is pressed	Can be changed at any time	Cannot be changed
• VTBI • Taper times • Total TPN time	• KVO rate • Increase container size only • Air sensitivity	• Delivery mode

To change a program:

1. From the STOP mode, press [**CHANGE**] and select [**4**] `CHANGE PROGRAM`.
2. As each program parameter displays, make the desired changes or press [**YES**/**ENTER**] to accept the current setting.
3. Review the program.
4. Press [**START**] to begin delivery.

TPN Auto Taper Down

Auto Taper Down is only available if a Taper Down time was entered during programming. Auto Taper Down may be activated when the continuous delivery portion of a TPN with Taper Down protocol is stopped. Auto Taper Down is not available while the pump is in an alarm condition.

1. Press [**STOP**] during TPN delivery.

   `DO YOU WANT AUTO TAPERING?` displays.

   - Press [**NO**] to return to the STOP mode and then, if desired, press [**START**] to resume therapy.
   - Press [**YES**/**ENTER**] to set Auto Taper Down.

2. Enter the Auto Taper Down time.

   The maximum Auto Taper Down time is three hours OR two times the remaining volume divided by the continuous delivery rate, whichever is less.

   Note: Time is entered in hours:minutes. For one hour, press [**1**] [**0**] [**0**]*; not* [**6**] [**0**].

3. Press [**YES**/**ENTER**] to return to the RUN mode, then press [**START**] to begin Auto Taper Down.

Abbott GemStar™ TPN Programming Worksheet

GIVE: _____

Parameters	Selections and/or Values to be Entered	Programmable Ranges
Therapy	TPN	N/A
Delivery Mode	❑ Continuous ❑ Continuous + Taper Down ❑ Continuous + Taper Up ❑ Continuous + Taper Up and Down	N/A
VTBI (Volume To Be Infused)	_____mL	1 - 9600 mL*
Taper Up	❑ No ❑ Yes _____hrs:min	1 min - 3 hrs
Taper Down	❑ No ❑ Yes _____hrs:min	1 min - 3 hrs**
Total Time to Infuse	_____hrs:min	1 min - 24 hrs
KVO (Keep Vein Open)	❑ No KVO Rate: 0.0 ❑ Yes KVO Rate: _____	1.0 - 5.0 mL/hr
Container Size (VTBI + KVO)	_____mL	9999 mL max
Air Sensitivity	❑ On Alarms at approx. 0.5 mL of air ❑ 2 mL Alarms at approx. 2 mL of air ❑ Off No alarm	N/A

* Maximum VTBI is 9600 mL minus any taper amount.

** Programmable ranges for taper down are 1 minute to 3 hours OR 2 times the remaining volume divided by the continuous delivery rate, whichever is less.

Notes

Continuous

Therapy Features and Specifications

This therapy allows programming of a continuous delivery.

- Programming ranges are listed in the programming worksheet included in this section. If a number outside of the acceptable program range is entered, an error message displays the minimum or maximum value allowed.
- Optional KVO (Keep Vein Open) may be set during programming.
- The rate can be titrated while the pump is infusing.
- An optional secondary container can be "piggybacked" on the primary container during regular delivery using an Abbott GemStar Piggyback Pump Set. Refer to *Piggybacking* in this section for more information.

Continuous Programming

1. Select CONTINUOUS from the Programming Menu.
2. Select the unit of measure and concentration as required.
3. Enter the rate.
4. Enter the VTBI.
5. Enter the KVO rate, if desired.

   KVO runs after the programmed VTBI until the total container is infused. If no KVO is desired, press [**YES**/**ENTER**] while the value displayed is zero.
6. Enter the container size (VTBI + KVO).

   VTBI is the default value on the CONTAINER display.

   Note: If KVO is programmed, you must increase the container size to accommodate the KVO delivery.

   In order to enter the total in mL when programming a concentration, press [▼] to move to the mL line and enter the mL size.
7. Select the air sensitivity.
8. Review the program.

WARNING: If the cassette is removed from the pump, ALWAYS disconnect the pump set from the patient and purge the line before restarting therapy.

Rate Titration

To titrate the rate while the pump is infusing:

1. In the RUN mode, press the numeric keys corresponding to the new rate. The rate flashes on the display. Press [**YES**/**ENTER**].

   For example: if the current rate is 100 mL/hr, press [**5**] [**0**] [**YES**/**ENTER**] to change the rate to 50 mL/hr.

   Note: You have approximately five seconds after pressing a key to press another numeric key, the decimal key, or [**YES**/**ENTER**]. *If no key is pressed within five seconds, the rate does not change and the delivery continues as programmed.*

2. `NEW RATE` displays with the new value.
   - Press [**YES**/**ENTER**] within 10 seconds to accept the change and begin delivery at the new rate.
   - Press [**NO**] to continue delivery at the programmed rate.

Piggybacking

Piggybacking with the Abbott GemStar Pump requires the use of an Abbott GemStar Primary Piggyback Pump Set with a proximal Y-site backcheck valve and a secondary piggyback set with an extension hook. **The secondary container must be higher than the primary container**. Refer to the instructions included with the piggyback pump set for more information.

WARNING: When using the pump for secondary delivery (piggybacking), ensure the fluids being administered are chemically and physically compatible.

The piggyback rate and piggyback VTBI display until the secondary container has been delivered. Then the primary delivery resumes automatically.

Note: Piggyback infusion amount is NOT added to the primary programmed infusion amount.

Preparing for Secondary Delivery (Piggybacking)

1. Ensure a primary piggyback pump set with a proximal Y-site backcheck valve is in place.

2. Use the extension hook from the secondary pump set to suspend the primary container from the I.V. pole.

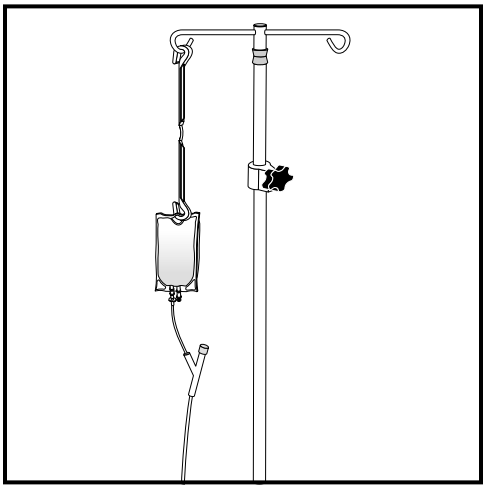
3. Prepare the secondary pump set according to the instructions included with the set.

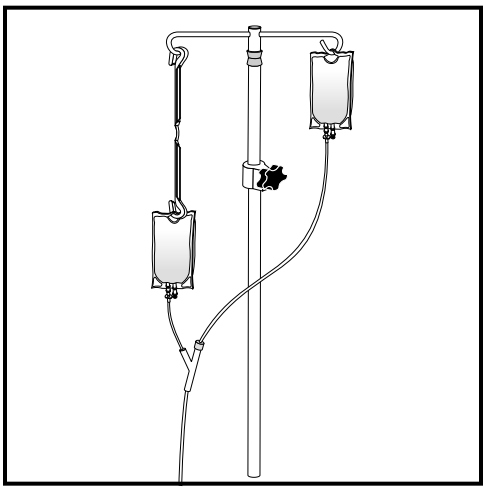
4. Attach a needle or blunt cannula (if appropriate) and prime the secondary pump set.

5. Suspend the secondary container from the I.V. pole.

Note: When using a secondary container of 500 mL or greater, ensure the bottom of the secondary container is at least 7 inches (17.8 cm) above the fluid level in the primary container. Use additional extension hooks if necessary.

6. Connect the secondary pump set to the proximal Y-site (or proximal luer port).





Programming a Secondary Delivery (Piggybacking)

Note: To distinguish the piggyback delivery from the primary delivery, PIGGYBACK *displays and the piggyback VTBI counts down to completion. For example, a piggyback rate of 250 mL/hr with a* ***remaining*** *VTBI of 218.5 mL will display as shown.*

```
    PIGGYBACK
RATE  250.0 mL/hr
VTBI     218.5 mL
        ▶▶▶▶▶
```

Tip: Prepare and set up containers BEFORE programming the pump for piggyback delivery.

1. Press [**CHANGE**] and select [**5**] PIGGYBACKING from the Change Menu.
2. Enter the dose amount for the secondary container.
3. Enter the infusion time for the secondary container.
4. Open the slide clamp or CAIR® (roller) clamp on the tubing of the secondary set.
5. Press [**YES**/**ENTER**] to begin piggyback delivery.

Note: Primary flow stops until the secondary VTBI is delivered; then primary flow automatically resumes. Any remaining secondary fluid will be delivered at the primary rate. The maximum piggyback rate is 300 mL/hr. For secondary rates above 300 mL/hr, flow may occur from the primary container.

Changing a Piggyback Delivery

1. Press [**CHANGE**] and select [**5**] PIGGYBACKING from the Change Menu.
2. Press [**CHANGE**] to reset the dose amount to zero.
3. Enter the new piggyback dose amount and press [**YES**/**ENTER**].
4. Set the infusion time for the secondary container.
5. Press [**YES**/**ENTER**] to begin piggyback delivery.

Note: You must know the amount that has already been delivered. When the piggyback dose amount is changed, the pump begins a new VTBI countdown.

Canceling a Piggyback Delivery

1. Press [**CHANGE**] and select [**5**] PIGGYBACKING from the Change Menu.
2. Press [**CHANGE**] to reset the dose amount to zero.
3. Press [**YES**/**ENTER**] to cancel piggyback delivery.

Changing a Continuous Program

Note: You cannot change a program when the pump is in FULL or NEW CONTAINER Lock.

Can be changed at any time		Cannot be changed
• Delivery rate • VTBI • KVO rate	• Container size • Air sensitivity • Piggybacking	• Unit of measure • Concentration

To change a program:

1. From the STOP mode, press [**CHANGE**] and select [**4**] `CHANGE PROGRAM`.
2. As each program parameter displays, make the desired changes or press [**YES**/**ENTER**] to accept the current setting.
3. Review the program.
4. Press [**START**] to begin delivery.

Abbott GemStar™
Continuous Programming Worksheet

GIVE: _____

Parameter	Selections and/or Values to be Entered	Programmable Ranges
Therapy	Continuous	N/A
Unit of Measure	❑ Concentration:_____ mg/mL ❑ Concentration:_____ mcg/mL ❑ mL	0.1 - 1000 mg/mL 1 - 1000 mcg/mL
Rate	_____	0.1 - 9999 mg/hr 1 - 999900 mcg/hr 0.1 - 1000 mL/hr
VTBI (Volume To Be Infused)	_____	0.1 - 99999 mg 1 - 9999000 mcg 0.1 - 9999 mL
KVO (Keep Vein Open)	❑ No KVO Rate: 0.0 ❑ Yes KVO Rate:_____	0.1 - 5.0 mL/hr
Container Size (VTBI + KVO)	_____	0.1 - 99999 mg 1 - 9999000 mcg 0.1 - 9999 mL
Air Sensitivity	❑ On Alarms at approx. 0.5 mL of air ❑ 2 mL Alarms at approx. 2 mL of air ❑ Off No alarm	N/A

Variable Time

Therapy Features and Specifications

This therapy allows programming of multiple doses at specified times.

- Programming ranges are listed in the programming worksheet included in this section. If a number outside of the acceptable program range is entered, an error message displays the minimum or maximum value allowed.
- Optional KVO (Keep Vein Open) may be set during programming.
- The default bolus delivery rate is 400 mL/hr.

Variable Time Programming

1. Select VARIABLE TIME from the Programming Menu.
2. Select the phase type. Press [**1**] for Percentages, [**2**] for Rates, or [**3**] for Doses.
3. Select the unit of delivery.
4. Change the displayed time if necessary.
5. Enter the optional base rate with start and stop time.
6. If programming in Rates or Doses, go to step 7. If programming in Percentages, set the daily amount.
7. Enter the phase information for each phase. Up to 24 phases can be programmed.

Note: If programming in percentages, the total daily amount of all phases programmed must equal 100%.

8. Enter the optional bolus dose and its lockout.
9. Enter the optional KVO.
10. Enter the container size.

    The pump calculates the minimum container size required to deliver the phases, base rate, and KVO for one day or in a 24-hour period. **If delivering the protocol for more than one day, multiply this amount by the number of days of therapy**.

Note: You must increase the container size to accommodate bolus deliveries.

11. Select the air sensitivity.
12. Review the program.

WARNING: If the cassette is removed from the pump, ALWAYS disconnect the pump set from the patient and purge the line before restarting therapy.

Note: With variable time programming, the pump keeps track of where it is in the program each minute of the entire 24-hour period. For example, if Phase 1 is missed, and the pump is placed in RUN *mode in the middle of Phase 2, it starts delivery according to the program parameters from the middle of Phase 2.*

Variable Time Delivery Interruptions

If a phase is interrupted and the pump is placed in the RUN mode:	Then:
Before the end of the phase.	The phase runs to its scheduled stop time.
After the end of the phase, but before the beginning of the next start time.	The next phase begins delivery at the scheduled start time. All applicable Base Rate or KVO delivery infuses while waiting for the start of the next phase.
In the middle of a phase and the phase start was missed because of a program interruption or a missed program start.	The pump immediately begins delivery of the current phase at its current time-based point.

Changing a Variable Time Program

Note: You cannot change a program when the pump is in FULL or NEW CONTAINER Lock.

Can be changed at any time	Can ONLY be changed before [START] is pressed	Cannot be changed
• KVO rate • Container size • Air sensitivity • Bolus	• Current time • Base rate • Daily amount • Phase parameters	• Unit of measure • Concentration • Phase type

To change a program:

1. From the STOP mode, press [**CHANGE**] and select [**4**] `CHANGE PROGRAM`.
2. As each program parameter displays, make the desired changes or press [**YES**/**ENTER**] to accept the current setting.
3. Review the program.
4. Press [**START**] to begin delivery.

Note: The container size cannot be made smaller than the daily total of phases, base rate, and KVO combined; or the current amount delivered, whichever is greater.

Abbott GemStar™
Variable Time Programming Worksheet

GIVE: _____

Parameter	Selections and/or Values to be Entered	Programmable Ranges
Select Phase Type	❑ Percentages ❑ Rates ❑ Doses	0.1 - 100%* 0.1 - 400 mL/hr 0.1 - 9600 mL
Unit of Measure	❑ Concentration:_____ mg/mL ❑ Concentration:_____ mcg/mL ❑ mL	0.1 - 1000 mg/mL 1 - 1000 mcg/mL
Current Time	Confirm or correct current time.	12:00 AM - 11:59 PM or 00:00 - 23:59
Base Rate	❑ No ❑ Yes Start time:_____ Stop time:_____ Rate:_____	12:00 AM - 11:59 PM or 00:00 - 23:59 0.1 - 400 mL/hr
Total Daily Amount for All Phases: _____ (required only when programming in percentages) ———- SEE ATTACHED WORKSHEET———-		
Bolus Dose	_____	0.1 mL - 25.0 mL 0.1 mg - 2500 mg 1 mcg - 25000 mcg
Bolus Lockout	_____minutes	5 - 999 min
KVO (Keep Vein Open)	❑ No KVO Rate: 0.0 ❑ Yes KVO Rate:_____	0.0 - 5.0 mL/hr
Container Size (Total Daily Amount X Number of Days of Therapy)	_____	0.1 - 99999 mg 1 - 9999000 mcg 0.1 - 9999 mL
Air Sensitivity	❑ On Alarms at approx. 0.5 mL of air ❑ 2 mL Alarms at approx. 2 mL of air ❑ Off No alarm	N/A

*Sum of all phases must equal 100% when programmed in percentages.

Variable Time

Phase	Start Time	Stop Time	Percentage	Rate	Dose
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
TOTAL	*Note: The sum of all phases must equal 100% when programmed in percentages.*				

Options Menu

Overview

1. Press [**OPTIONS**] from the RUN or STOP mode.
2. Select the number key that corresponds to the desired function.
3. Follow the display prompts for the selected function. Refer to the appropriate Options Menu function description in this section for more information.

```
1   REVIEW PROGRAM
2   HISTORIES
3   KEYPAD LOCK
4   PUMP SETTINGS
5   SET CLOCK
6   PRINT
7   SPEED PROTOCOL
8   NEXT DOSE
```

Note: Menu selections may vary depending on the configuration of the pump. Some Options Menu functions are not available in all modes.

Tips for Using the Options Menu

The following keys are helpful when using the Options Menu:

[**1**] - [**8**]	Press the corresponding number key to select a menu function.
[**YES**/**ENTER**]	Press [**YES**/**ENTER**] to accept changes, or to continue when done viewing a display.
	Press the up or down arrow to scroll through long display messages.
[**BACK-UP**]	Press [**BACK-UP**] to return to a previous display or to exit OPTIONS.

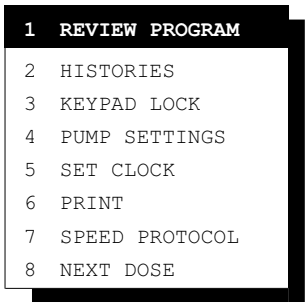
Tip: A menu item does not have to be on the display to be selected. For example, only items 1 through 4 display when the Options Menu is first accessed. To select the Print Menu without scrolling the display, press [**6**].

Note: When the pump exits OPTIONS, the display returns to the mode the pump was in when the Options Menu was accessed.

Select this item from the Options Menu:	To do this function:	Comments:
REVIEW PROGRAM	Display the current program settings.	N/A
HISTORIES	Display the history for the latest 400 events, shift or volume totals, bolus history (if available), or current configuration settings. Clear the history. Access the Operation Test.	N/A
KEYPAD LOCK	Access the locking and unlocking functions to prevent unauthorized alteration of the infusion protocol.	The lock levels allow the clinician to restrict access to various levels of pump operation. When the pump is locked under a particular level, a small lock symbol displays by the name of the applied lock level on the Keypad Lock Menu.
PUMP SETTINGS	Change the air sensor, occlusion sensor, and sound level settings.	N/A
SET CLOCK	Set the clock.	The clock can be displayed in 12-hour or 24-hour format.
PRINT	Print the history event log, bolus history (if available), current program settings, and speed protocols.	Files may be downloaded to a printer or personal computer.
SPEED PROTOCOLS	Assign, review/recall, and delete the stored protocols.	Allows up to 9 speed protocols to be saved in pump memory. Removing power has no effect on the Speed Protocol settings.
NEXT DOSE	Change the start time of the next dose when an interruption has caused a missed dose in an intermittent program.	NEXT DOSE appears on the menu only when the pump is in an intermittent program and changing the next dose is allowed.

Review Program

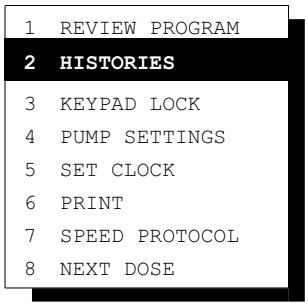
1. Select REVIEW PROGRAM from the Options Menu; PROGRAM REVIEW displays.
2. Press [**YES**/**ENTER**] or [**BACK-UP**] when done to exit OPTIONS.



Tip: PROGRAM REVIEW is also accessed by selecting Review/Resume from the Change Menu; or at power-on if a program is stored in the pump's memory and the pump has been powered off for 5 or more minutes.

Histories

1. Select HISTORIES from the Options Menu.
2. Select the number key that corresponds to the desired function.
3. Complete the appropriate steps for the selected function.



Select this item from the Histories Menu:	To do this function:	Display includes:
HISTORY	Display history event log of the latest 400 events.	• Current date and time • Date and time the program was cleared, a new container was selected, or a speed protocol was recalled • History event log of the latest 400 events
SHIFT TOTALS	Display or clear shift totals.	• Time and date when shift was cleared • Volume infused in the shift • Any relevant program-specific information
VOLUME TOTALS	Display volume totals.	• Amount infused • VTBI • Any relevant program-specific information
CONFIGURATION	Display pump configuration.	Dependent upon pump configuration
CLEAR HISTORY	Clear history event log and bolus history.	CLEARING HISTORY displays for 3 to 4 seconds.
BOLUS HISTORY	Display bolus history in hourly increments for the last 48 hours. Bolus History is available only when a bolus is programmed or has been programmed during the last 48 hours.	• Current date and time • Number of boluses delivered • Number of bolus demands • Amount delivered through bolus delivery
OPERATION TEST	Perform user-assisted Operation Test.	• Display messages guide the user through each section of the test

Display History, Shift Totals, Volume Totals, and Configuration

Note: Some menu items may not be available depending on the configuration of the pump.

1. Select the number key that corresponds to the desired function.
2. Press [**BACK-UP**] when done to exit OPTIONS.

Note: For Shift Totals only, the pump displays `CLEAR TOTALS? YES OR NO`*. Press* [**YES**/**ENTER**] to clear the shift totals or press [**NO**] to exit *OPTIONS without clearing the shift totals.*

Tip: Press and hold ▲ or ▼ to scroll through the history displays faster.

```
VERSION N.NNN
S/N XXXXXXXX
TIME IS 09:00 AM
FRI, 11 JUN 99

NEW CONTAINER
08:15AM 11 JUN

HISTORY CLEARED
11:00PM  10 JUN
EVENT LOG
PM11:18  SET  ON
AIR SENSITIVITY
PM11:18 SET CONT
SIZE  100 mL
PM11:18 SET RATE
1.0 mL/hr
PM11:18 SHIFT
CLEARED
END OF EVENT LOG
```

Sample History Event Log

Clear History Event Log and Bolus History

1. Select `CLEAR HISTORY` from the Histories Menu.
2. `CLEARING HISTORY` displays for 3-4 seconds before the pump exits OPTIONS.

Tip: Press [**BACK-UP**] to exit OPTIONS immediately.

Display Bolus History

1. Select `BOLUS HISTORY` from the Histories Menu.
2. Press [**BACK-UP**] when done to exit OPTIONS.

Note: Bolus History is only available if the current program has a bolus programmed, or had a bolus programmed at one time. The Bolus History is maintained in hourly increments for the latest 48 hours.

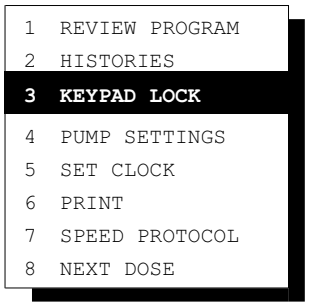
The Bolus History is cleared when a new program is entered, a Speed Protocol is recalled, or the History is cleared.

```
TIME IS 09:15 AM
FRI, 11 JUN 99
BOL DEL      NNNN
BOL DEM      NNNN
BOL AMT XXXX.X mL
XX:XXM TO XX:XXM
```

Operation Test

This function allows the testing of various pump operations to ensure the Abbott GemStar Pump is working properly. Refer to the “Operation Test” section for instructions.

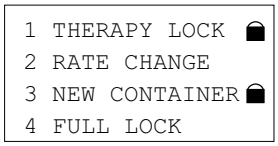
Keypad Lock



1. Select KEYPAD LOCK from the Options Menu.
2. Select the desired lock level.

The following lock levels, listed from lowest to highest restrictions, are available:

Lock Level	Abbreviation
Therapy Lock	T
Rate Change Lock	R
New Container Lock	N
Full Lock	F



The Abbott GemStar Pump allows two lock levels to be applied at the same time. Therapy Lock may be used with either Full Lock, New Container Lock or Rate Change Lock.

When two lock levels are applied, if a function is available under one lock level but not the other, the more stringent restrictions apply.

When the pump is locked under a particular level, a small lock symbol (🔒) appears next to the applied lock level as shown above. When the pump is in RUN or STOP mode, the lock symbol appears in the lower left corner of the display and the lock level abbreviation appears in the lower right corner.

The table on the following page lists the functions available for each lock level. **Refer to "Clinician Instructions" on page 85 for detailed instructions**.

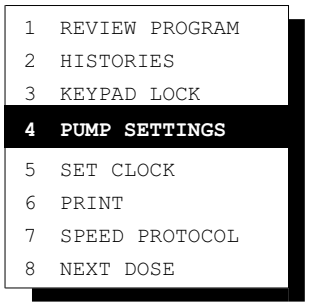
Abbott GemStar™ Keypad Lock Level Functions

U = Unlock
T = Therapy Lock
R = Rate Change Lock
N = New Container Lock
F = Full Lock
• = Function is Available

Function	U	T	R	N	F	Comments
Lock/Unlock Keypad	•	•	•	•	•	Rate Change Lock is available only if the current program is Pain Management.
Power Pump On or Off	•	•	•	•	•	
Start or Stop Infusion	•	•	•	•	•	
Access Display, Help, Print, and Program Review Functions	•	•	•	•	•	
Deliver a Bolus	•	•	•	•	•	If programmed.
Silence an Alarm	•	•	•	•	•	
Select a New Container	•	•	•	•		
Purge	•	•	•	•		
Change a Program	•	•	•			Under Rate Change Lock, only the delivery rate or bolus dose volume can be changed and must be within the preset values.
Review/Recall Speed Protocol	•	•				Under Therapy Lock, the recalled protocol must be the same type that was programmed when the pump was locked.
Assign or Delete Speed Protocol	•	•				
Set Air Sensitivity, Distal Occlusion Level, Sound Level, and Clock	•	•				
Clear Shift Totals	•	•	•	•		
Program and Deliver a Loading Dose (Outside of Programming Mode)	•	•				
Enter a New Program	•	•				Under Therapy Lock, the new program must be of the same type that was programmed when the pump was locked.
Piggybacking	•	•				
Rate Titration	•	•				
Operation Test	•					
Clear History	•					
Select Another Therapy	•					

Change Pump Settings

1. Select PUMP SETTINGS from the Options Menu.
2. Select the number key that corresponds to the desired pump setting.
3. Follow the display prompts. Refer to the appropriate steps of the desired pump setting for more information.



Select this item from the Pump Settings Menu:	To do this function:	Comments:
AIR SENSOR	Change the air sensor sensitivity.	The air alarm sounds when the pump detects an air bubble of approximately 0.5 mL when ON; or at approximately 2 mL when 2 mL is selected. The air alarm does **not** sound if OFF is selected. The air alarm may also be set during programming if the current therapy allows it. Removing power has no effect on the air alarm setting.
OCCL SENSOR	Change the distal occlusion sensor sensitivity.	Default Setting: High The pump alarms when distal pressure is greater than the selected occlusion sensor limit.
SOUND LEVEL	Adjust the audible alarm level.	Default Setting: Maximum

Air Sensitivity

WARNING: To reduce the risk of infusing air, use an air-eliminating filter when the air sensitivity is set to OFF.

The current air sensitivity flashes on the display.

```
AIR SENSITIVITY
1 ON
2 2 mL
3 OFF
```

1. Select the desired Air Sensitivity level:
   - If `OFF` is selected, `AIR ELIMINATING FILTER IS RECOMMENDED` displays.
   - If `ON` or `2 mL` is selected, `CHANGE AIR ALARM FROM XXXX TO XXXX` displays.

```
CHANGE AIR ALARM
   FROM: XXXX
     TO: XXXX
   YES OR NO
```

2. Select [**YES**/**ENTER**] or [**NO**]:
   - If [**NO**] is selected, the air sensitivity does not change, the current air alarm status displays, and the pump exits OPTIONS.
   - If [**YES**/**ENTER**] is selected, the new setting is accepted, the air alarm status displays for approximately 3 seconds, before the pump exits OPTIONS.

Occlusion Sensor

```
DISTAL OCCLUSION
1 HIGH
2 MEDIUM
3 LOW
```

1. Select the desired setting.
2. `MAKE XXXXX DEFAULT?` displays. Select [**YES**/**ENTER**] or [**NO**].
   - If [**NO**] is selected, the distal occlusion setting is temporarily in effect until a new program is entered or the pump has been off for more than 24 hours.
   - If [**YES**/**ENTER**] is selected, the distal occlusion setting is permanent until the setting is changed again.

Sound Level

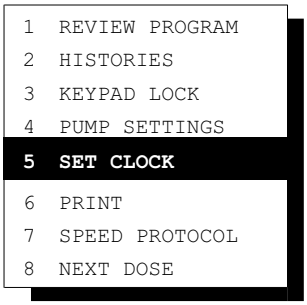
```
- ■■■■■■■■ +
USE ▲▼ TO ADJUST
THE SOUND LEVEL
ENTER WHEN DONE
```

1. When the Sound Level function is accessed, the pump sounds intermittent beeps at the current sound level. The blocks on the top line of the display indicate the current sound level. Use [▲] to increase the sound level. Use [▼] to decrease the sound level.

Tip: Press [**CHANGE**] to restore the sound level to the default setting.

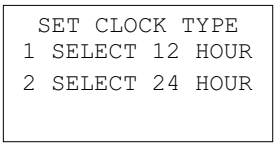
2. Press [**YES**/**ENTER**] when done.

Set Clock



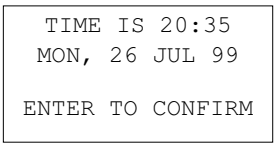
1. Select SET CLOCK from the Options Menu.
2. Select 12-Hour or 24-Hour format (24-Hour format is shown in example).
3. Use the arrow keys to set the weekday and month.
4. Use the number keys to enter the current day, year, and time.

Note: When entering the time in 12-Hour format, use ▲▼ to toggle between AM and PM.



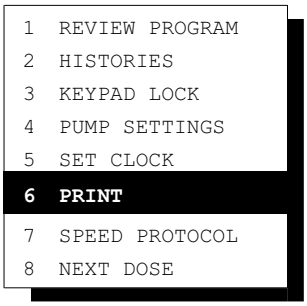
5. Press [**YES**/**ENTER**] to confirm.

Tip: To view the clock from the RUN or STOP mode, press [**YES**/**ENTER**], then immediately press and HOLD [**1**]. The clock displays until [**1**] is released.



Print

WARNING: Disconnect the pump from the patient BEFORE connecting the pump to a printer or computer.



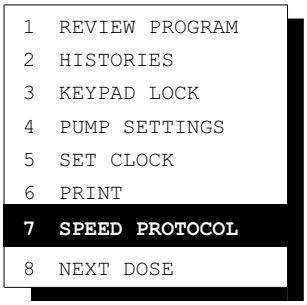
Note: Ensure the printer is connected to the pump BEFORE selecting a print function. Refer to "Connecting to a Printer" in this section for more information.

1. Select PRINT from the Options Menu.
2. Select the number key that corresponds to the desired print function.
3. When the print transmission is complete, the pump exits OPTIONS.

Select this item from the Print Menu:	To do this function:
PRINT HISTORY	Print the current program, shift and volume totals, and history event log up to the most recent 400 events since the history was last cleared.
PRINT PROGRAM	Print the current program.
PRINT PROTOCOL	Print a specified speed protocol or a complete list of all speed protocols. If a protocol is not assigned, NOT ASSIGNED prints next to that protocol number.
PRINT BOLUS Hx	Print the current program, shift and volume totals, and the bolus history (Hx) for the latest 48 hours, when the current program has a bolus programmed or had a bolus programmed at one time.
STOP PRINT	Cancel the print function. This function is only available if you have selected one of the print functions above.

Speed Protocol

1. Select SPEED PROTOCOL from the Options Menu.
2. Select the number key that corresponds to the desired protocol function.
3. Follow the display prompts. Refer to the appropriate Speed Protocol functions for more information.



Select this item from the Speed Protocol Menu:	To do this function:
ASSIGN	Store a program in pump memory for later use.
REVIEW/RECALL	Review assigned protocols from the RUN or STOP mode. Recall an assigned protocol from the STOP mode.
DELETE	Delete protocols from pump memory.

Assign

1. Select ASSIGN from the Speed Protocol menu.
2. Select [**1**] - [**9**] to assign to the new protocol.

   If the selected speed protocol is already assigned, REPLACE PROTOCOL ASSIGNMENT? displays.

   - Press [**YES**/**ENTER**] to replace the protocol. The new speed protocol displays and the pump exits OPTIONS.
   - Press [**NO**] to keep the existing protocol and exit OPTIONS.

Review/Recall

1. Select REVIEW/RECALL from the Speed Protocol menu.
2. Select the desired protocol to review/recall.
3. Review the program.
4. Press [**YES**/**ENTER**]:
   - If in the STOP mode, select [**1**] to recall the protocol; or select [**2**] to review another protocol.
   - If in the RUN mode, the pump exits OPTIONS.

Delete

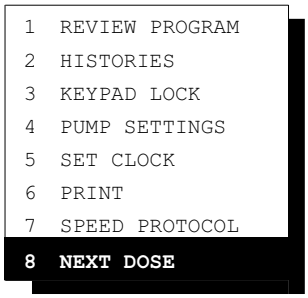
1. Select DELETE from the Speed Protocol Menu.
2. Select the desired protocol to delete.
3. Press [**YES**/**ENTER**] to confirm deletion, or [**NO**] to exit OPTIONS without deleting.

Next Dose

This function is only available when the current therapy is Intermittent and the pump is not delivering a dose.

To set the time for the next dose:

1. Select NEXT DOSE from the Options Menu.
2. Use the number keys to enter the start time for the next dose. Press [**YES**/**ENTER**] when done to accept the change and exit OPTIONS.



Tip: Use ▲ ▼ to toggle between AM and PM.

Connecting to the Data Port

The Data Port may be used to connect the Abbott GemStar Pump to a Seiko® DPU 414 or compatible serial printer to print the Operation Test results or the files available from the Print Menu. Using communication software included with most computer operating systems (or available from local sources), these files can also be transferred to a computer.

WARNING: Disconnect the pump from the patient BEFORE connecting the pump to a printer or computer.

Equipment Needed

	Connect to Printer	Connect to Computer
Abbott GemStar Pump	●	●
Abbott Serial Printer Cable List 13078-01	●	●
Seiko DPU 414 or Compatible Serial Printer	●	
Serial DB9 Female-to-Female Gender Changer*		●
Null Modem*		●
Computer*		●

*Available from local sources.

Configuration Settings

Refer to the printer or computer documentation for information on configuration settings. The printer or computer must be configured as follows to use the Data Port:

Baud Rate	=	2400
Data Bits	=	8
Stop Bits	=	1
Parity	=	None
Carriage Return (+Line Feed)	=	CR+LF
Flow Control	=	None

When using the Seiko DPU 414 printer, the switch settings MUST be configured to work with the Abbott GemStar Pump.

To configure the switch settings on the Seiko DPU 414:

1. Slide the POWER switch to ON while pressing the ONLINE button.
2. After the list of the current settings starts printing out, release the ONLINE button.
3. Set the switches according to the table below.
   Push ONLINE button to continue setting switches.
   - Press ONLINE to set switch ON.
   - Press FEED to set switch OFF.
4. Continue setting switches until “Dip SW setting complete!!” is printed.

Switch Settings for Seiko DPU-414 Printer

Switch	Function		Setting	Button to Press	
SW1-1	Input Method:	Serial	Off		FEED
SW1-2	Printing Speed:	High	On	ONLINE	
SW1-3	Auto Loading:	On	On	ONLINE	
SW1-4	CR function:	CR and LF	On	ONLINE	
SW1-5	DIP SW setting command:	Enabled	On	ONLINE	
SW1-6	Printing density:	100%	Off		FEED
SW1-7	Printing density:	100%	On	ONLINE	
SW1-8	Printing density:	100%	On	ONLINE	
SW2-1	Print Mode:	40 columns	On	ONLINE	
SW2-2	User defined char:	On	On	ONLINE	
SW2-3	Ordinary Characters:	On	On	ONLINE	
SW2-4	Zero Font:	No slash	On	ONLINE	
SW2-5	Character Set:	American	On	ONLINE	
SW2-6	Character Set:	American	On	ONLINE	
SW2-7	Character Set:	American	On	ONLINE	
SW2-8	Character Set:	American	Off		FEED
SW3-1	Data bit length:	8 bits	On	ONLINE	
SW3-2	Parity:	No parity	On	ONLINE	
SW3-3	Parity condition:	Odd	On	ONLINE	
SW3-4	Flow control:	H/S busy	On	ONLINE	
SW3-5	Baud rate:	2400 bps	On	ONLINE	
SW3-6	Baud rate:	2400 bps	Off		FEED
SW3-7	Baud rate:	2400 bps	Off		FEED
SW3-8	Baud rate:	2400 bps	On	ONLINE	

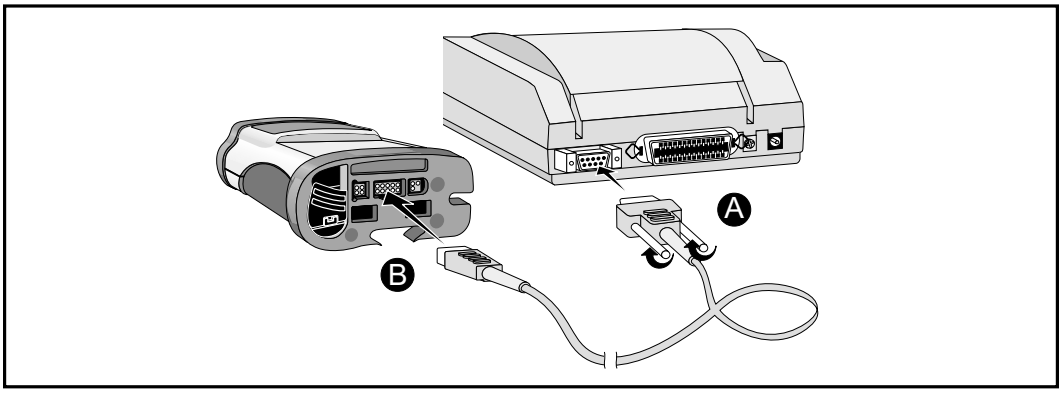
Connecting to the Seiko Printer

WARNING: Disconnect the pump from the patient BEFORE connecting the pump to a printer or computer.

CAUTION: Do not connect the Abbott GemStar AC Mains Adaptor to a printer.

Note: For maximum battery life, the pump should be operated on AC mains when connected to a printer or computer.

1. Connect the serial printer cable to the printer and to the data port on the bottom of the pump.
2. Ensure the printer is ONLINE and ready to receive data. Refer to printer documentation for more information.
3. Ensure paper is loaded in the printer.
4. Select the desired print function from the pump menu.



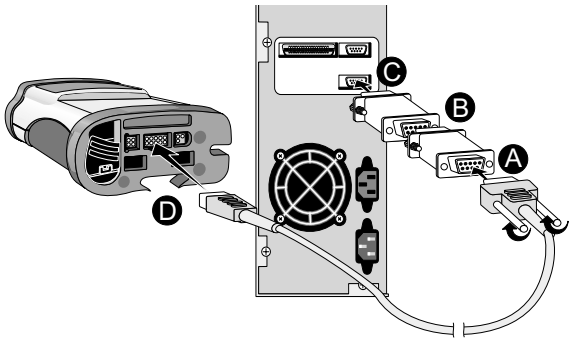
Connecting to a Computer

WARNING: Disconnect the pump from the patient BEFORE connecting the pump to a printer or computer.

Note: For maximum battery life, the pump should be operated on AC mains when connected to a printer or computer.

1. Connect the serial printer cable to the null modem (A).
2. Connect the null modem to the serial gender changer (B).
3. Connect the serial gender changer to the serial port of the computer (C).
4. Connect the serial printer cable to the data port (D) on the bottom of the pump.
5. Configure the communications software on the computer. Refer to *Configuration Settings* on page 80.

Tip: After the data transfer is complete, the file may be viewed or printed using any text editor.



Notes

Clinician Instructions

The instructions in this section apply to special features available to clinicians. If desired, remove this section from the manual to prevent unauthorized access to these features.

Clinician Locking Sequence Instructions

Locking the Pump

To lock the pump from the RUN or STOP mode:

1. Press [**OPTIONS**] to display the Options Menu.
2. Select KEYPAD LOCK from the Options Menu.

Note: If the pump is already in a single lock state, the Lock Sequence Number must be entered before a second lock level can be applied. Refer to "Adding a Second Lock Level" for more information.

3. Select the desired lock level.

   For THERAPY, NEW CONTAINER and FULL Lock, go to step 5.

4. For RATE CHANGE Lock, set the minimum and maximum programmable ranges for the continuous delivery rate and bolus dose in a Pain Management program.

Tip: Press [▼] to toggle between the MIN and MAX values.

- MIN flashes on the display. Enter the minimum value.
- MAX flashes on the display. Enter the maximum value.
- Press [**YES**/**ENTER**] when done.
- Repeat step 4 for bolus dose if available in the current program.

5. Enter the lock sequence number. Asterisks display as the numbers are entered.
   - For THERAPY Lock, enter [**0**][**0**][**0**][**3**][**1**].
   - For UNLOCKED, FULL, NEW CONTAINER, and RATE CHANGE lock levels, enter [**1**][**3**][**0**][**0**][**0**].

Note: Default lock sequence numbers are shown.

Adding a Second Lock Level

1. Complete steps 1 and 2 for “Locking the Pump”.

Note: When the pump is in a single lock state, the pump displays ENTER LOCK SEQUENCE NUMBER*. For example, if the pump is currently under THERAPY LOCK for Pain Management, and the clinician wants to add RATE CHANGE as a second lock level, the pump will request the Lock Sequence Number before RATE CHANGE lock can be added.*

2. Enter the Lock Sequence Number.
3. Complete steps 4 and 5 for “Locking the Pump”.

Note: When two lock levels are applied, if a function is available under one lock level but not the other, the more stringent restrictions apply.

Unlocking the Pump

1. Select the locked level from the Keypad Lock Menu.
2. Enter the lock sequence number for that level.

Note: If the pump is locked under two levels, each level must be unlocked separately. Unlocking one level has no effect on the other level. For example, if both THERAPY and RATE CHANGE lock levels are applied, the clinician must unlock both the RATE CHANGE and THERAPY locks.

3. The pump displays the current lock levels. Press [**YES**/**ENTER**] to return to the mode the pump was in when the Options Menu was selected.

Program and Deliver a Clinician Activated Loading Dose

This feature is available only when the keypad is UNLOCKED or when THERAPY is the only lock level. The loading dose rate is 125 mL/hr.

1. From the STOP mode, press [**YES**/**ENTER**] immediately followed by [**0**].
2. PROGRAM A LOADING DOSE? displays.
3. Press [**YES**/**ENTER**] to continue.
4. Enter the loading dose. Press [**YES**/**ENTER**] when done.
5. DELIVER THE LOADING DOSE NOW? displays.

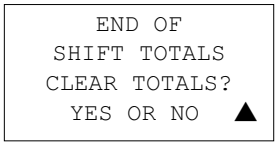
Note: If [**YES**/**ENTER**] *is pressed, infusion DOES NOT begin automatically when the clinician activated loading dose is complete. Press* [**START**] *to resume infusion after the loading dose is complete.*

Note: If [**NO**] *is pressed, the pump returns to the* STOP *mode. When* [**START**] is pressed, `DELIVER LOADING DOSE NOW?` *displays again. Press* [**YES**/**ENTER**] *to deliver the loading dose. Infusion resumes automatically when the loading dose is complete. Press* [**NO**] *to cancel the loading dose and resume infusion.*

- Press [**YES**/**ENTER**] to deliver the loading dose. After the loading dose is complete, press [**START**] to resume infusion.
- Press [**NO**] to return to the STOP mode. Press [**START**] to resume infusion.

Display Shift Totals

1. Press [**OPTIONS**] and select HISTORIES.
2. Select `SHIFT TOTALS` from the Histories Menu.
3. The shift totals display. Use the [▲] and [▼] to scroll the display. When done, the pump displays `CLEAR TOTALS? YES OR NO`.



4. Press [**YES**/**ENTER**] to clear the shift totals or press [**NO**] to exit OPTIONS without clearing the shift totals.

Tip: Press [**HELP**] to display shift totals when the pump is not in PROGRAMMING mode or an alarm condition.

Notes

Troubleshooting

This section contains information on audible and visual alarms that may occur with the Abbott GemStar Pump.

CAUTION: If the pump does not perform as stated in this manual, stop using it IMMEDIATELY.

For consultation and technical support contact your local Abbott Laboratories sales office.

Tip: Press [**HELP**] for additional information during programming and alarm conditions.

Alarm Messages

Alarm Display Message	Is the pump infusing?	Alarm	Cause/ Condition	Remedy
Y = Yes N = No			A = Audible alarm V = Visual alarm	
AIR IN LINE • Pump automatically enters STOP mode.	N	A/V	The specified volume of air has been detected in the line distal to the cassette while infusing.	1. Press [**SILENCE**] to quiet the alarm for 1 minute. 2. Press [**STOP**] to clear the alarm. 3. **Disconnect the patient from the pump set**. 4. Press and hold [**PURGE**]. *Note: Purge rate is 250 mL/hr. The pump purges for up to 2 minutes each time you press and hold* [**PURGE**]. 5. Reconnect the pump set to the patient-access device. 6. Press [**START**] to begin delivery.

Alarm Display Message	Is the pump infusing?	Alarm	Cause/ Condition	Remedy
Y = Yes N = No			A = Audible alarm V = Visual alarm	
CHANGE BATTERIES	N	A/V	The pump has entered the STOP mode due to battery voltage below acceptable levels.	1. Replace **both** disposable batteries with fresh AA batteries and press [ⓘ] to restart the pump; OR temporarily connect the pump to the AC mains adaptor and the pump will automatically restart. Replace both batteries as soon as possible. 2. After power-on, resume the current program. Refer to *Accessing the Programming Menu* in the "Basic Operation" section for more information.
CHECK CASSETTE-X	N	A/V	The cassette is improperly installed or not installed. X indicates where to look for the cause of the alarm: A = Air Sensor D = Distal P = Proximal	1. Press [**SILENCE**] to quiet the alarm for 1 minute. 2. Press [**STOP**] to place the pump in the STOP mode. 3. Reinstall the cassette. 4. Press [**START**] to begin delivery.
CALL 1.800.XXX.XXXX CODE: NN/MMM/TTT	N	A/V	The pump has detected a condition that may require service.	1. Write down the codes and telephone number. 2. Power-off the pump. If the pump does not power-off, disconnect external power and remove the batteries. 3. Call the telephone number shown on the display message.

Alarm Display Message	Is the pump infusing?	Alarm	Cause/ Condition	Remedy
Y = Yes N = No			A = Audible alarm V = Visual alarm	
DIST. OCCLUSION	N	A/V	The pump has detected sustained distal pressure over the user-selected limit. To avoid a bolus infusion after an occlusion,refer to page 126.	1. Press [**SILENCE**] to quiet the alarm for 1 minute. 2. Press [**STOP**] to place the pump in the stop mode. 3. Check for sources of distal occlusion: ⇒ Kinked tubing below the pump ⇒ Clamped patient-access device ⇒ Clogged I.V. filter ⇒ Other obstructions 4. If the problem persists, remove and reinstall the cassette. Refer to *Loading the Cassette* in the "System Setup" section. 5. Press [**START**] to begin delivery.

Alarm Display Message	Is the pump infusing?	Alarm	Cause/ Condition	Remedy
Y = Yes N = No			A = Audible alarm V = Visual alarm	
LOW BATTERIES	Y	A/V	The pump has detected battery voltage below acceptable levels and the batteries are the primary power source. *Note: The pump allows the user to clear the LOW BATTERIES audible and visual alarm. If the condition has not been corrected after 15 minutes, the audible and visual alarms resume.* *If the pump is infusing and a LOW BATTERIES alarm occurs, the pump continues for approximately 30 minutes* before it can no longer deliver due to insufficient power.* ****If an external power source is used, the rate is changed, or the pump is powered-on after a** LOW BATTERIES **alarm and those same batteries are still in the pump, this interval may be different.***	1. Press [**SILENCE**] to quiet the alarm for 15 minutes. 2. Press [**STOP**] to place the pump in the STOP mode. 3. Connect the pump to AC mains adaptor, rechargeable battery pack, OR replace **both** disposable batteries with fresh AA batteries. 4. Press [**START**] to begin delivery.
POWER LOSS	N	A/V	The pump has detected a power failure due to one of the following: • Batteries have been removed while the pump was on battery source. • External power has failed or has been disconnected and no batteries are installed. • Pump has been powered on with insufficient power source.	1. Connect the pump to AC mains adaptor, rechargeable battery pack, OR replace **both** disposable batteries with fresh AA batteries. 2. Power-on the pump. Review the program if required. 3. Press [**START**] to begin delivery.

Alarm Display Message	Is the pump infusing?	Alarm	Cause/ Condition	Remedy
Y = Yes N = No			A = Audible alarm V = Visual alarm	
PROX. OCCLUSION	N	A/V	The pump has detected sustained negative pressure on its proximal side.	1. Press [**SILENCE**] to quiet the alarm for 1 minute. 2. Press [**STOP**] to place the pump in the stop mode. 3. Check for sources of proximal occlusion: ⇒ Kinked tubing above pump ⇒ Blockage in the bag and in the spike ⇒ Empty bag ⇒ High torque syringe ⇒ Other obstructions 4. If the problem persists, clamp the distal line and reinstall the cassette. Refer to *Loading the Cassette* in the "System Setup" section. If the alarm still persists, power-off the pump. Clamp the distal line, then power-on the pump. 5. Press [**START**] to begin delivery.
USING BATTERIES	Y	V	This is a normal response when: • The pump has been powered on with only disposable batteries as a power source; **or** • The pump has switched to internal power (disposable batteries) due to a loss of external power or a reduction in external power below acceptable levels.	When powering on the pump: • Press [**YES**/**ENTER**] to confirm disposable batteries are the only power source. When switching from AC mains: • Press [**SILENCE**] to clear the alarm.

Alarm Display Message	Is the pump infusing?	Alarm	Cause/ Condition	Remedy
Y = Yes N = No			A = Audible alarm V = Visual alarm	
USING EXT BATT	Y	V	This is a normal response when: • The pump has been powered on with external batteries as a power source; **or** • The pump has switched to external battery power due to a loss of AC mains; **or** • The pump has switched to external battery power while running on internal batteries.	When powering on the pump: • Press [**YES**/**ENTER**] to confirm external battery power source. When switching from AC mains: • Press [**SILENCE**] to clear the alarm.

Alert Messages

Alert Display Message	Is the pump infusing?	Alarm	Cause/ Condition	Remedy
Y = Yes N = No			A = Audible alarm V = Visual alarm	
ALMOST EMPTY	Y	A/V	Delivery will complete in 30 minutes or less. For bolus only program, delivery will complete during the next bolus delivery.	• Press [**SILENCE**] to quiet the alarm for 10 minutes. *Note: This alert is only available with Pain Management protocols.*

Alert Display Message	Is the pump infusing?	Alarm	Cause/ Condition	Remedy
Y = Yes N = No			A = Audible alarm V = Visual alarm	
CHECK PRINTER	Y	A/V	• The printer has not responded to commands from the pump. • The printer is not properly connected to the pump.	1. Press [**SILENCE**] to quiet the alarm for 2 minutes. 2. Ensure the printer is properly connected to the pump by checking the following: ⇒ Printer is powered on and in ONLINE mode. ⇒ Cable is plugged in to both the pump and the printer. ⇒ Cable part number and printer settings are correct. 3. If the problem continues, select STOP PRINT from the Print Menu to cancel all print jobs.
EMPTY CONTAINER • The pump does not infuse unless Auto KVO is delivering in a mL/hr Only or Weight Dosed programs.	N	A/V	The pump has delivered the programmed container size or the pump has delivered the VTBI programmed AND Auto KVO is delivering.	1. Press [**SILENCE**] to quiet the alarm for 2 minutes. 2. Press [**STOP**] to place the pump in the STOP mode and clear the alarm. 3. Use the NEW CONTAINER function to repeat the current program. Refer to *Starting a New Container* in the "Basic Operation" section.

Alert Display Message	Is the pump infusing?	Alarm	Cause/ Condition	Remedy
Y = Yes N = No			A = Audible alarm V = Visual alarm	
END OF INFUSION • The pump delivers KVO if selected.	N	A/V	The pump has delivered the entire programmed protocol.	If no KVO is selected: 1. Press [**SILENCE**] to quiet the alarm for 2 minutes. 2. Press [**STOP**] to place the pump in the STOP mode and clear the alarm. If KVO is selected: 1. The pump sounds 5 beeps approximately every 15 minutes. 2. Press [**STOP**] to place the pump in STOP mode and clear the alarm.
FLASHING DISPLAY • Line four of the display flashes.	N	A/V	A Non-programming Callback has occurred because the pump has been waiting for more than three minutes for a keypress on a non-programming input or a confirmation display.	Follow the instructions on the display to clear the alarm.
PROGRAMMING INCOMPLETE	N	A/V	Programming has not been completed and no keys have been pressed within three minutes.	1. Press any key to clear the alarm. 2. Complete the program entries.
START • START flashes on the display. Other parts of the display are not affected.	N	A/V	A Stop Mode Callback has occurred because the programmed pump has remained in the STOP mode for more than three minutes.	1. Press [**SILENCE**] to quiet the alarm for 3 minutes. 2. Follow the instructions on the display to clear the alarm.

Other Display Messages

Other Display Message	Cause/Condition	Remedy
KEYPAD LOCKED	User has attempted to perform a function that has been locked out.	Unlock the keypad to access the desired function.
NOT ALLOWED DURING INFUSION PRESS STOP TO HALT DELIVERY	User has attempted to perform a function that is not available in RUN mode.	• Press [**STOP**] to access the desired function. • Press [**YES**/**ENTER**] to return to the RUN mode display.
ROUNDING • The pump sounds four quick beeps and displays the rounded number.	The pump has rounded a number that was entered during programming.	Press [**YES**/**ENTER**] to accept the rounded value and continue to the next step.
DOSE IN PROGRESS NEW CONTAINER NOT ALLOWED	User has attempted to access NEW CONTAINER function when it is not allowed.	Press [**STOP**] to stop delivery, then access NEW CONTAINER through the Change Menu.
CANNOT CHANGE CLOCK WHILE TIME BASED DELIVERY IS IN PROGRESS	User has attempted to change the clock during a time-based delivery.	1. Press [**STOP**]. 2. Clear the program through the Change Menu. 3. Change the clock through the Options Menu. 4. Reprogram the pump.
PROGRAM EXCEEDS MAX CONTAINER SIZE. CHANGE PROGRAM VALUES.	The VTBI + KVO volume resulted in a container size greater than the allowed value.	1. Press [**HELP**] to display the allowed values. 2. Change the program values.
THIS OPTION NOT AVAILABLE WHILE PROGRAMMING THE PUMP	User has attempted to access a function that is not available from the first programming display.	1. Press [**YES**/**ENTER**] to return to the first programming display. 2. Complete programming. 3. Access desired function.

Notes

Maintenance

Pump Storage

Store the Abbott GemStar Pump in a cool, dry place. **Remove the disposable batteries and the battery pack before storing the pump**.

Program and event history are protected in the software memory for at least one year when power is removed from the pump.

Cleaning and Disinfecting

Establish a routine schedule for cleaning the pump to keep the case exterior, cassette pocket, and tubing channel free of contamination.

CAUTION: **To avoid mechanical or electronic damage, do not immerse pump in any fluids or cleaning solutions.**

Some cleaning and sanitizing compounds may slowly degrade components made from some plastic materials. Do not use compounds containing combinations of isopropyl alcohol and dimethyl benzyl ammonium chloride.

Do not sterilize by heat, steam, ETO, or radiation. Apply disinfectants to the outside surface of the pump only. Do not use abrasive cleaners or materials on the pump. Using abrasive cleaners or cleaning solutions not recommended by Abbott Laboratories may result in product damage.

To avoid pump damage, cleaning solutions should be used only as directed in the table on the following page. The disinfecting properties of cleaning solutions vary; consult the manufacturer for specific information.

Never use sharp objects (such as pens, pencils, fingernails, paper clips, needles, etc.) to clean the pump.

Recommended Cleaning Solutions

The pump is not adversely affected by the recommended cleaning solutions in the table below:

Note: NOT all cleaning solutions are disinfectants. Check product labeling.

Cleaning Solution	Manufacturer	Preparation
Super Edisonite®	S. M. Edison Chemical Co.	Per manufacturer's recommendation
Vesphene II se®	Calgon Vestal Laboratories	Per manufacturer's recommendation
Manu-Klenz®	Calgon Vestal Laboratories	Per manufacturer's recommendation
Formula C™	Diversey Corp.	Per manufacturer's recommendation
Household bleach	Various	Per healthcare facility procedures; DO NOT exceed one part bleach in ten parts water

Cleaning the Pump Case

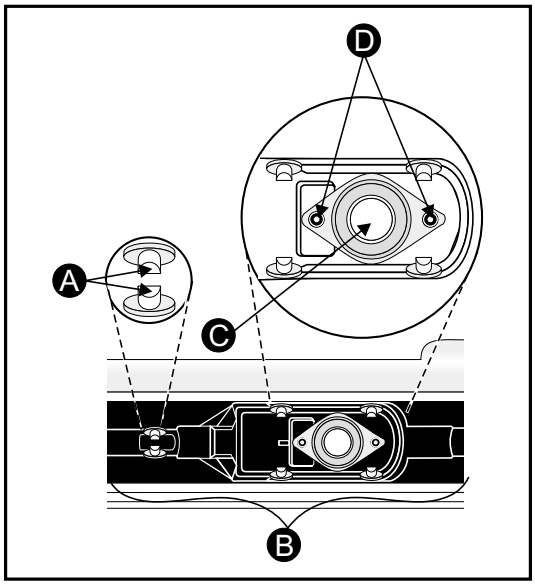
1. Power-off the pump.
2. Disconnect the pump from AC mains power.
3. Clean the exposed surfaces of the pump with a soft, lint-free cloth dampened with the appropriate cleaning solution.
4. Wipe the solution from the pump surface with a water-moistened, lint-free cloth.
5. Use a dry, lint-free cloth to dry the pump after cleaning.

Cleaning the Cassette Pocket and Tubing Channel

The area containing the ultrasonic sensors, located in the cassette pocket, should be cleaned on a regular basis.

CAUTION: Use care not to damage the silicone seals around the sensor bodies.

1. Remove the cassette, if installed.
2. Use a cotton swab, moistened with an approved cleaning solution, to clean the sensor faces (A), tubing channel (B), plunger tip (C), and sensor pins (D).
3. Dry the sensor faces and tubing channel and ensure that the sensor faces are free of detergent film and/or debris.



Repair

- The Abbott GemStar Pump has no user-serviceable components, with the exception of disposable batteries.
- If the display clock stops working, contact Abbott Laboratories Customer Support to arrange for lithium battery replacement.
- **Homecare Customers:** Call your healthcare professional or homecare company regarding any required service or repairs. DO NOT attempt to repair the pump for any reason.
- The Abbott GemStar Pump is covered by a manufacturer's warranty for one year after purchase. During this time, opening the pump case for any reason voids this warranty. Refer to the "Warranty" section for details.
- Refer all service to Abbott certified technicians only. An *Abbott GemStar Technical Field Service Manual* is available to Abbott certified technicians.

Notes

Operation Test

This test is designed to ensure your Abbott GemStar Pump is operating properly. Abbott Laboratories recommends performing this test a minimum of once every 12 months. Refer to facility requirements to determine additional testing needs.

The test can be performed when the pump is in the STOP mode and requires approximately 15 minutes to complete. Each section of the test must be run in sequence. The pump automatically sets the delivery rate when required during the Operation Test.

Note: This test is only available when the pump is UNLOCKED.

WARNING: Disconnect the pump from the patient BEFORE performing the Operation Test.

Equipment Required

- Abbott GemStar Pump
- Two Abbott GemStar **Microbore** Pump Sets **without** a filter
- Reservoir with at least 50 mL of water
- 20+ mL or larger graduated cylinder (graduated in 0.1 mL)
- Two fresh, disposable AA batteries
- Appropriate Abbott GemStar AC Mains Adaptor or other Abbott approved external power source

Test Setup

Note: The pump clears any program and shift totals stored in pump memory before starting the Operation Test.

1. Connect the external power source and install two fresh, disposable AA batteries.
2. Power-on the pump.
3. Press [**OPTIONS**].
4. Select `HISTORIES` from the Options Menu.
5. Select `OPERATION TEST` from the Histories Menu.
6. Follow the instructions on the display. The pump provides step-by-step guidance through each section of the test.

Performing the Operation Test

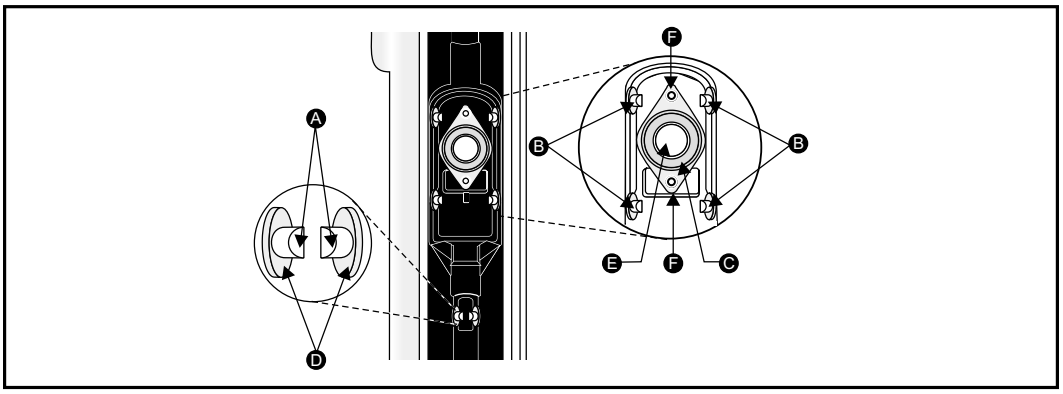
Tip: The checklist at the end of this section may be copied to record test results.

Case Inspection

1. Visually inspect the case and keypad for damage. Check the case for missing screws, or labels.
2. Enter the results:
   - If the pump is free of damage and all the screws and labels are in place, press [**YES**/**ENTER**].
   - If damage is found on the case or keypad, or any screws or labels are missing, press [**NO**].

Cassette Pocket and Latch Inspection

1. Visually inspect the cassette pocket and the sensors (A). Verify that they are free of dirt and residue.
2. Verify that the four cassette latches (B) are present. Verify that they open and close when the cassette release button is pressed.
3. Verify that the plunger seal (C) and sensor seals (D) are present and intact.
4. Verify that the plunger (E) is not scraped or damaged.
5. Verify that the sensor pins (F) are not damaged.
6. Install the cassette. Verify that the cassette fits smoothly and securely.
7. Enter the results:
   - If the cassette pocket area and latches are free of damage, and ALL of the above steps are verified, press [**YES**/**ENTER**].
   - If damage is found, or ANY of the above steps cannot be verified, press [**NO**].



Power Check

1. The display indicates that an external power source and batteries are connected. Press [▼].
2. Remove both disposable batteries and press [▼]. The display indicates that only external power is connected. Press [▼].
3. Install both disposable batteries.
4. Disconnect the external power source and press [▼].
5. The display indicates that only batteries are connected and displays the test results. Press [▼].
6. If the pump fails, reconnect the external power source and press [▲] to rerun the test, or press [**YES**/**ENTER**] to confirm failure.

Keypad Test

1. Press each key, including the Bolus Button. Press [**YES**/**ENTER**] last.
2. Enter the results:
   - If each key makes an audible tone, press [**YES**/**ENTER**].
   - If any key does not make an audible tone, press [**NO**].

Display Test

1. Press [**YES**/**ENTER**] when prompted. The display fills with solid boxes for approximately 10 seconds. To view the solid boxes for another 10 seconds after the display times-out, press [▲].
2. Enter the results:
   - If the display fills with solid boxes, press [**YES**/**ENTER**].
   - If the display does not fill with solid boxes, press [**NO**].

LED Test

1. Verify that both the Power (green) and Alarm (red) LEDs illuminate. Refer to the *Abbott GemStar Pump Layout* in the "Introduction" section for the location of the LEDs.
2. Enter the results:
   - If both LEDs illuminate, press [**YES**/**ENTER**].
   - If either of the LEDs does not illuminate, press [**NO**].

Volume Accuracy Test

The pump should deliver between 19.0 to 21.0 mL within approximately 3 minutes to pass this test.

1. Load a primed pump set into the pump. Press [▼].
2. Place the proximal end in the reservoir of water. Press [▼].
3. Place the distal end in a 20+ mL graduated cylinder. Press [▼].
4. Press [**START**].
5. Enter the results:
   - If the pump delivers between 19.0 to 21.0 mL, press [**YES**/**ENTER**].
   - If the pump does not deliver between 19.0 to 21.0 mL, press [**NO**].

Distal Occlusion Test

The occlusion should occur within approximately 30 seconds to pass this test.

1. Clamp the pump set **10 to 12 inches** (25.4 to 30.5 cm) below the cassette.
2. Press [**START**].
3. The test result displays. Release the clamp and press [▼].
   - If the test is passed, the pump advances to the next test.
   - If the test is failed, clean the sensors and press [▲] to rerun the test or press [**YES**/**ENTER**] to confirm failure.

Note: Clean the sensor pins before repeating the distal occlusion test. Refer to the "Maintenance" section for instructions.

Proximal Occlusion Test

The occlusion should occur within approximately 30 seconds to pass this test.

1. Clamp the pump set above the cassette.
2. Press [**START**].
3. The test result displays. Press [▼].
   - If the test is passed, the pump advances to the next test.
   - If the test is failed, clean the sensors and press [▲] to rerun the test or press [**YES**/**ENTER**] to confirm failure.

Note: Clean the sensor pins before repeating the proximal occlusion test. Refer to the "Maintenance" section for instructions.

Air-in-line Test

The air-in-line alarm should occur within approximately 1 minute to pass this test.

1. Release the clamp.
2. Remove the proximal end of the pump set from the reservoir. Press [▼].
3. Press [**START**].
4. The test result displays. Press [▼].
   - If the test is passed, the pump advances to the next test.
   - If the test is failed, clean the sensors and press [▲] to rerun the test or press [**YES**/**ENTER**] to confirm failure.

Note: Clean the sensor faces before repeating the air-in-line-test. Refer to the "Maintenance" section for instructions.

Printing Test Results

When the test is complete, the pump displays an option to print the test results. If desired, follow the steps below to print the test results. An example of the printed test results is shown.

Note: For maximum battery life, the pump should be operated on AC mains when connected to a printer or computer.

1. Connect the serial printer cable (List 13078-01) to the pump. Refer to *Connecting to a Printer* in the "Options Menu" section for more information.
2. Press [**YES**/**ENTER**] to print the test results.
3. After the results have been transmitted to the printer, or if [**NO**] is pressed, the pump automatically proceeds to the Main Programming Menu.

```
****************************************
*           ABBOTT GemStar             *
*           OPERATION TEST             *
*               RESULTS                *
****************************************

PUMP SERIAL NUMBER: XXXXXXXXX


            10:45AM 4 JUL 99
              VERSION n.n.n

 1. Case Inspection          PASS
 2. Cassette Pocket & Latch  PASS
 3. Power Check              PASS
 4. Keypad Test              PASS
 5. Display Test                  FAIL
 6. LED Test                 PASS
 7. Volume Accuracy Test     PASS
 8. Distal Occlusion Test    PASS
 9. Proximal Occlusion Test  PASS
10. Air-in-line Test         PASS
****************************************
* VERIFIED BY:                         *
****************************************
****************************************
*               END OF                 *
*          OPERATION TEST              *
*              RESULTS                 *
****************************************
12345678901234567890123456789012345678901
```

Abbott GemStar™ Operation Test Checklist

	Pass	Fail
Case Inspection	❑	❑
Cassette Pocket and Latch Inspection	❑	❑
Power Check	❑	❑
Keypad Check	❑	❑
Display Test	❑	❑
LED Test	❑	❑
Volume Accuracy Test	❑	❑
Distal Occlusion Test	❑	❑
Proximal Occlusion Test	❑	❑
Air-in-line Test	❑	❑
Printed Test Results	❑	❑
Serial Number:		
Verified By:	Date:	

Optional System Components

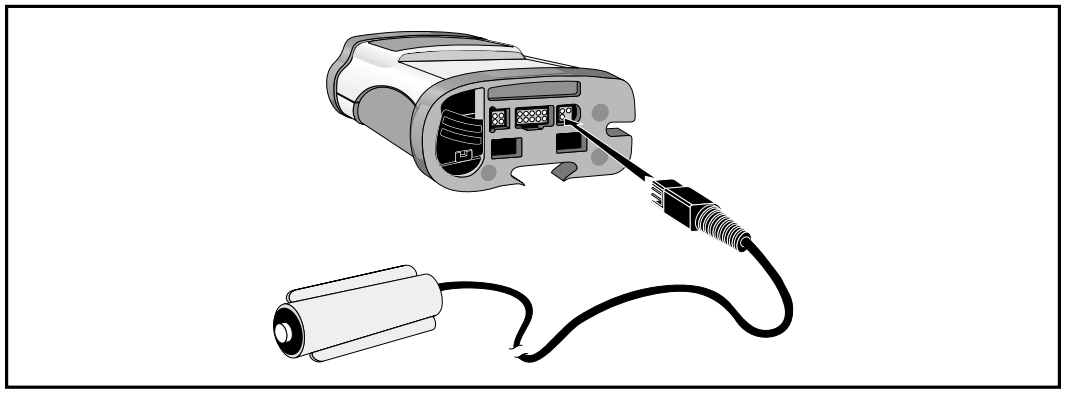
All Abbott GemStar Optional System Components are composed of latex-free components only.

Product Description	List #	Description
Abbott GemStar AC Mains Adaptor (110 Volts - USA)	13026-01	Wall-mount adaptor plugs into a 110 VAC mains supply to power the Abbott GemStar. 6 ft (1.8 m) cord
Abbott GemStar AC Mains Adaptor (100 – 240 Volts - Universal)	13072-01	Tabletop adaptor plugs into a 100 – 240 VAC mains supply to power the Abbott GemStar.
Abbott GemStar Bolus Cord	13027-01	Allows bolus requests to be made up to 6 feet (1.8 m) from the pump.
Abbott GemStar Pole Clamp	13076-01	Attaches the Abbott GemStar Pump to an I.V. pole. The clamp is mounted to the track on the back of the pump. Press the release button to remove the pump.
Abbott GemStar Battery Pack	13073-01	The rechargeable nickel metal hydride batteries power the Abbott GemStar Pump during periods of transport or when use of AC power is not desirable. The battery pack is recharged using an Abbott GemStar AC Mains Adaptor.
Abbott GemStar PCA Syringe Lockbox (60 mL)	13071-01	Locks the Abbott GemStar Pump and a 60 mL Abbott PCA syringe in a plastic enclosure. The lockbox can be attached to an I.V. pole using the Abbott GemStar Pole Clamp (available separately).
Abbott GemStar Lockbox (250 mL)	13024-01	Locks the Abbott GemStar Pump and up to a 250 mL flexible I.V. container in a plastic enclosure. The lockbox can be attached to an I.V. pole using the Abbott GemStar Pole Clamp (available separately).
Abbott Carrying Case - 250 mL	13594-01	Soft-sided carrying case can be worn around the waist to hold the Abbott GemStar Pump and up to a 250 mL flexible container.
Abbott Carrying Case - 500 mL	13079-01	Soft-sided carrying case can be worn around the waist or over the shoulder to hold the Abbott GemStar Pump and up to a 500 mL flexible container.
Abbott Carrying Case - 1000 mL	13980-01	Soft-sided carrying case can be worn around the waist or over the shoulder to hold the Abbott GemStar Pump and up to a 1000 mL flexible container.
Abbott Carrying Case - 3 Liter	13593-01	Soft-sided carrying case can be worn around the waist or as a backpack to hold a 3 liter or smaller flexible container and the Abbott GemStar Pump with batteries or battery pack. Includes List 13590-01.

Product Description	List #	Description
Abbott 3 Liter Carrier	13590-01	Interior support for the Abbott Carrying Case - 3 Liter.
Abbott GemStar Docking Station (100 – 240 Volts)	13075-01	Plugs into a 100 – 240 VAC Volt mains supply to power the Abbott GemStar Pump while mounted on an I.V. pole. During periods of transport, an internal rechargeable battery pack powers the pump for up to 16 hours at a rate of 125 mL/hr or less. When the AC mains supply is attached, the internal batteries are recharged in 4 to 6 hours.
Abbott GemStar Serial Printer Cable	13078-01	Connects the Abbott GemStar Pump to a compatible serial printer or computer to download the event history, program, or speed protocol information.

Connecting the Bolus Cord (List 13027-01)

Connect the bolus cord to the port labeled “Bolus” on the bottom of the pump.



Recharging the Battery Pack (List 13073-01)

The Abbott GemStar Battery Pack may be recharged using the Abbott GemStar AC Mains Adaptor (List 13026-01 [USA] or 13072-01 [Universal]).

CAUTION: ALWAYS connect to a grounded AC mains outlet when using AC mains adaptor.

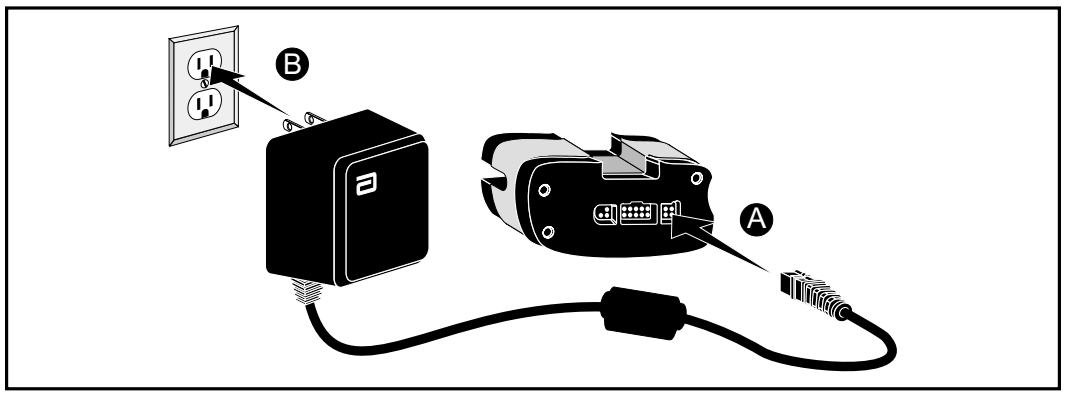
USE ONLY AC mains adaptors specifically labeled for use with the Abbott GemStar Pump to charge the battery pack.

During charging, the battery pack is warm. If the battery pack becomes hot to the touch, IMMEDIATELY unplug AC mains power and contact Abbott Customer Support.

The battery pack light illuminates yellow while the battery pack is charging. When the battery pack is fully charged, the light illuminates green.

Note: Refer to the instructions included with the Abbott GemStar Battery Pack for more information.

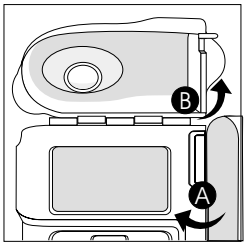
1. Plug the pin connector of the AC mains adaptor (List 13026-01 [USA] or 13072-01 [Universal]) into the port on the bottom of the battery pack.
2. Plug the AC mains adaptor into a standard wall outlet.
3. Leave the pack connected to the AC mains adaptor for at least 8 hours to completely recharge the pack.



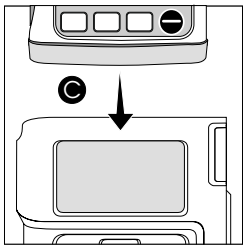
Using the Abbott GemStar Lockboxes

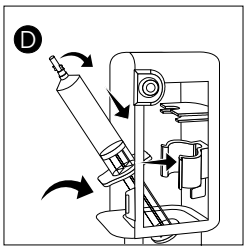
The Abbott GemStar Lockbox is an enclosure that can be locked with a key to secure the pump, and a flexible container or syringe. When the pump is secured in the lockbox, the user has access to the AC mains connector, data and bolus ports, keypad, and bolus button.

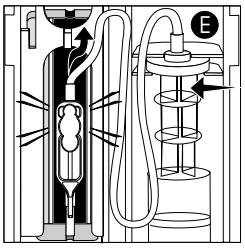
60 mL Lockbox (List 13071-01)



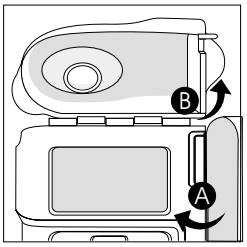
1. Open the lockbox (A).
2. Flip the top door up (B).
3. Align the pump with the lockbox (C).
4. Slide the pump down into the lockbox until fully seated.
5. Flip the top door down.
6. Connect the pump set to the syringe and prime.
7. Place the syringe inside the lockbox (D).
8. Insert the cassette into the pump (E).
9. Ensure the tubing will not be pinched when closing the lockbox.
10. Close and lock the lockbox.
11. Remove the key.



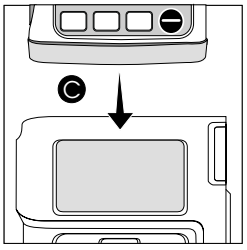




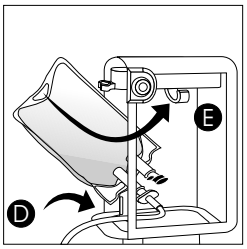
250 mL Lockbox (List 13024-01)



1. Open the lockbox (A).
2. Flip the top door up (B).
3. Align the pump with the lockbox (C).
4. Slide the pump down into the lockbox until fully seated.
5. Flip the top door down.
6. Connect the pump set to the bag and prime.
7. Place the flexible container inside the lockbox with the administrative port down (D).



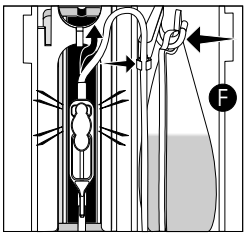
8. Hang the bag on the hook inside the lockbox (E).
9. Insert the cassette into the pump (F).
10. Ensure the tubing will not be pinched when closing the lockbox.



11. Close and lock the lockbox.
12. Remove the key.

Removing the Lockbox

1. Remove the lockbox from the pole.
2. Unlock the lockbox.
3. Open the lockbox and flip the top door up.
4. Press the cassette release button to remove the cassette.
5. Lift the pump out of the lockbox.



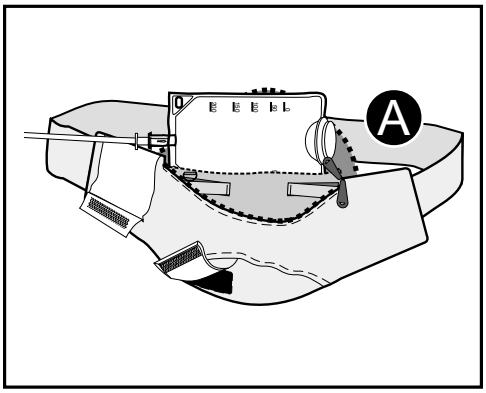
Using the Abbott Carrying Cases

Ensure the administration set is fully primed and the cassette is properly loaded before placing the pump in the carrying case. Refer to the "System Setup" section for more information.

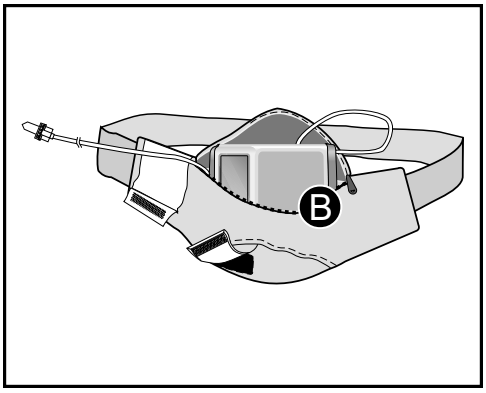
Carrying Case - 250 mL (List 13594-01)

This soft-sided carrying case may be worn around the waist. It is designed to hold the Abbott GemStar Pump and up to a 250 mL flexible fluid bag.

1 Place the fluid bag in the zippered compartment (A) on the backside of the case. Ensure the bag spike is positioned so that the fluid flow is not restricted.

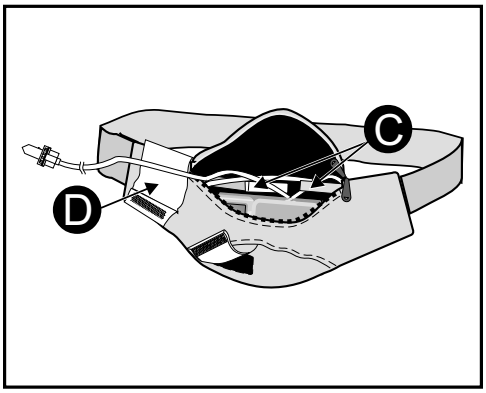


2 Place the pump inside the front compartment (B) of the case.



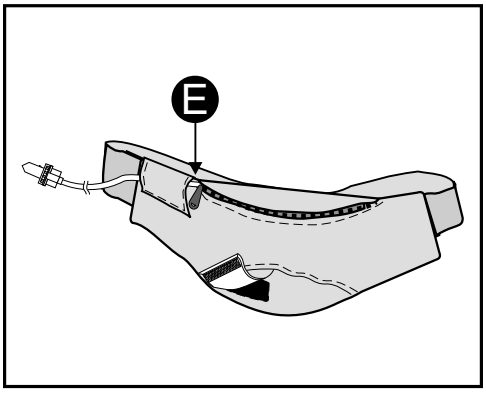
3 Secure the tubing to the inside of the pack with the Velcro® tabs (C). Ensure the tubing is not kinked.

4 Use the large Velcro flap (D) on the upper left side of the case to secure the tubing on the outside of the case.



5 Ensure the tubing exits the side of the case near the zipper tab when the zipper is closed (E).

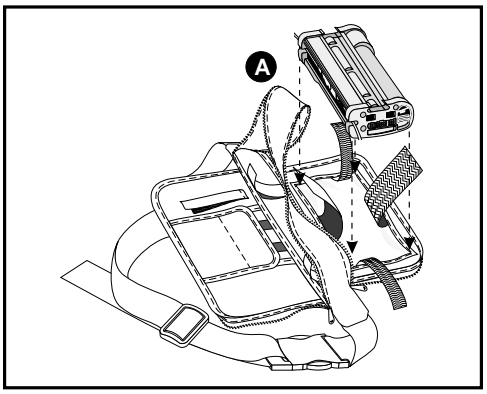
6 Place the case around the waist. Snap the buckle together to secure. Adjust the belt for a snug, comfortable fit.



Carrying Case - 500 mL (List 13079-01) or 1000 mL (List 13980-01)

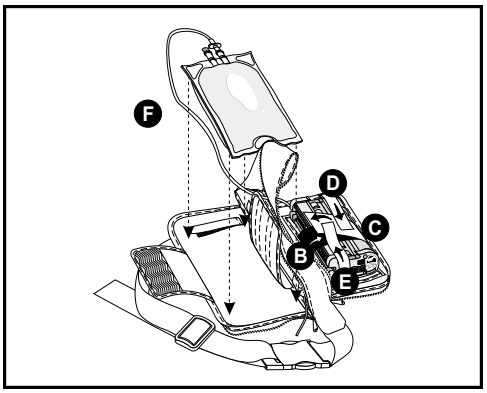
These soft-sided carrying cases may be worn around the waist or over the shoulder. They are designed to hold the Abbott GemStar Pump and up to a 500 mL (List 13079-01) or a 1000 mL (List 13980-01) flexible fluid bag.

1 Place the pump on the inside front window (A). Ensure the keypad is facing the "window".

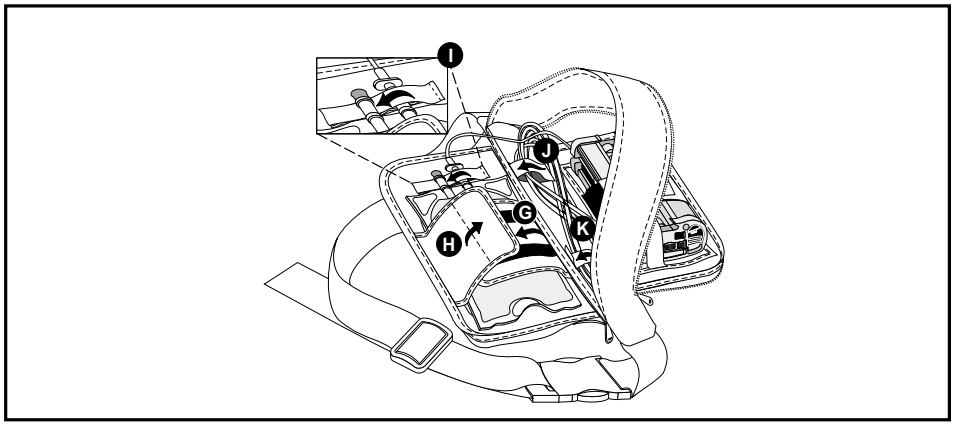


2 Secure the pump with the large side straps (B) and (C). Then secure the top (D) and bottom (E) straps.

3 Place the fluid bag on the backside of the compartment (F).



4. Secure the bag with flaps (G) and (H).
5. Secure the bag spike with strap (I). Ensure that the fluid flow is not restricted.
6. Use a "figure-8" pattern to wrap the tubing. Secure the tubing to the inside of the case with tabs (J) and (K). Ensure the tubing is not kinked.
7. Zip the case closed. Ensure the tubing exits through one of the sides near the zipper tab when the case is closed.
8. Place the case around the waist with the front "window" facing away from the body. Snap the buckle together to secure. Adjust the belt for a snug, comfortable fit.



Carrying Case - 3 Liter (List 13593-01)

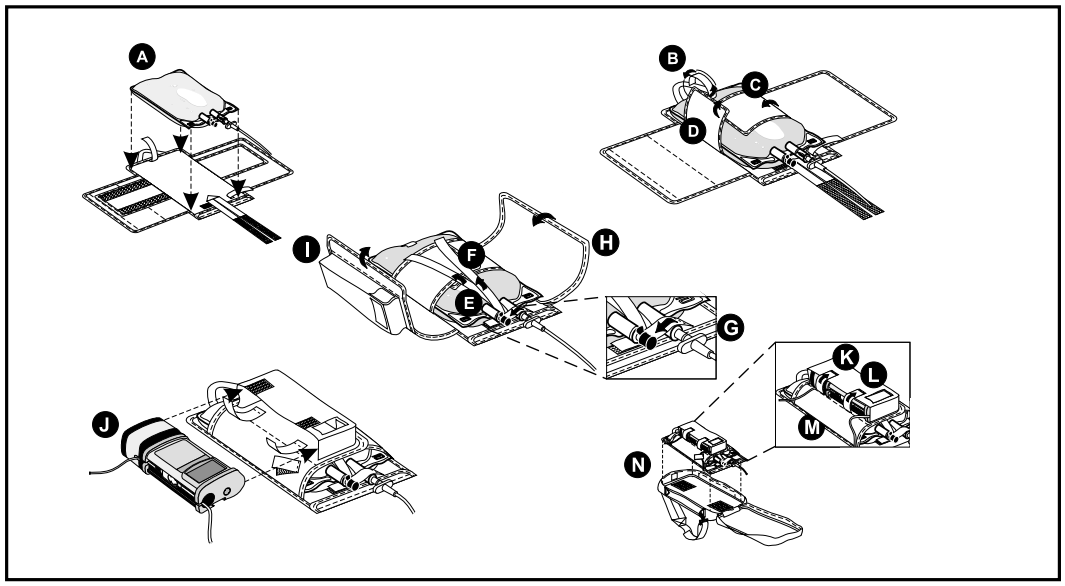
This soft-sided carrying case may be worn around the waist or as a backpack. It is designed to hold the Abbott GemStar Pump with batteries or a battery pack, and up to a 3 liter flexible fluid bag.

Note: This carrying case includes an interior support (Abbott 3 Liter Carrier List 13590-01) that may be removed from the case and used separately.

1. Unzip the carrying case and release all Velcro straps and flaps.
2. Place the fluid bag on the carrying case as shown (A).
3. Hook top strap (B) through the hole in the top of the fluid bag and secure.
4. Fold small flaps (C) and (D) over the bag as shown and secure.
5. Secure straps (E) and (F) across the length of the fluid bag and over the small flaps.
6. Secure the spike connection with strap (G).
7. Fold large flaps (H) and (I) over as shown and secure.
8. Place the pump, with the keypad facing upward, inside the pocket (J) on the flap. The pump's display should be visible through the opening on the front of the pocket.

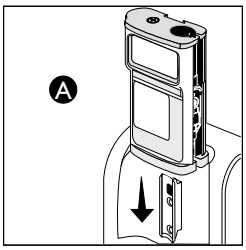
9. Secure the pump with straps (K) and (L).
10. Secure the tubing with strap (M).
11. Place the secured pump (N) inside the large zipper case or other carrying case.
12. Zip the large case closed.
13. If desired, route the tubing through the loops on the bottom of the carrying case. Ensure the tubing is not kinked.
14. Adjust the shoulder straps and waist belt for a snug, comfortable fit.

Tip: When not using the waist belt, secure it under the large flap on the back of the case.



Using the Abbott GemStar Docking Station (List 13075-01)

Connecting the Pump

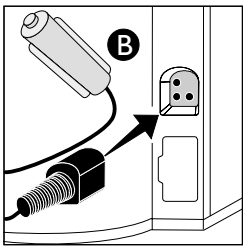


1. Mount the docking station to the I.V. pole and tighten the knob.
2. Align the connectors on the bottom of the pump with the connectors on the docking station. Slide the pump into the docking station until it snaps into place (A).
3. Connect the docking station to AC mains power.

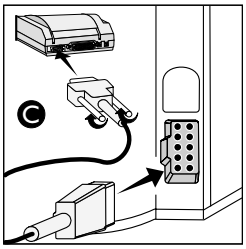
The docking station light illuminates yellow while the docking station is charging. When the docking station is fully charged, the light illuminates green.

Connecting the Bolus Cord and Printer Cable

WARNING: Disconnect the pump from the patient BEFORE connecting the pump to a printer or computer.



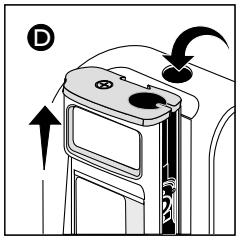
1. Plug the bolus cord (B) into the bolus port on the rear, right side of the docking station.



2. Plug the printer cable (C) into the printer port on the rear, right side of the docking station.

Disconnecting the Pump

To remove the pump, press the release button (D) on the top of the docking station and slide the pump out.



Pump Sets

The Abbott GemStar Pump Sets, listed in the table on the following page, are available for use with the Abbott GemStar Pump.

Contact an Abbott Laboratories Representative for appropriate pump set configurations.

Note: All Abbott GemStar Pump Sets are composed of latex-free components only.

CAUTION: USE ONLY Abbott GemStar Pump Sets with the Abbott GemStar Pump. Use of unauthorized sets may result in injury to the patient or damage to the pump.

STERILE

Fluid path and areas beneath undisturbed protective set covers are sterile and nonpyrogenic in the intact unit package.

Note: The disposable pump sets should be changed per the Centers for Disease Control (CDC) guidelines or health care provider policy. Discard after use.

The following sets are a representation of the GemStar™ Pump Sets currently available to the market:

LIST NO.	DESCRIPTION
Ambulatory Sets	
13271	GemStar™ Pump Set, LifeShield®, Secure Lock, Pre-Pierced Y-Site, Non-Vented, Orange Polyethylene-Lined Light Resistant Microbore Tubing, Pressure-Activated Anti-Siphon Valve, Latex-Free, 96 in (244 cm)_
13273	GemStar™ Pump Set, Secure Lock, Non-Vented, Microbore Tubing, Pressure-Activated Anti-Siphon Valve, Latex-Free, 96 in (244 cm)
General Infusion Sets	
13268	GemStar™ Primary Piggyback Pump Set, LifeShield®, Secure Lock, Convertible Piercing Pin, Macrobore Tubing, Pressure-Activated Anti-Siphon Valve, Latex-Free, 110 in (279 cm)
Pain Management Sets	
13261	GemStar™ Pump Set, Secure Lock, Non-Vented, Microbore Tubing (Yellow Striped), Split Set with Integral Pressure-Activated Anti-Siphon Valve on Extension Set, Latex-Free, 110 in (279 cm)
13262	GemStar™ Pump Set with PCA Extension, Secure Lock, Non-Vented, Microbore Tubing, Split Set with Integral Pressure-Activated Anti-Siphon Valve on Extension Set, Latex-Free, 110 in (279 cm)
13047	GemStar™ Pump Set with PCA Extension, Secure Lock, Non-Vented with PCA Injector and Female Luer Lock™ Adapter, Microbore Tubing, Split Set with Integral Pressure-Activated Anti-Siphon Valve, Latex-Free, 96 in (244 cm)

Abbott GemStar Pump Specifications

Physical	The Abbott GemStar Pump is composed of latex-free components only
Dimensions:	Height: 5.5 in. (14.0 cm) Width: 3.8 in. (9.7 cm) Depth: 2.0 in. (5.1 cm)
Weight:	Approximately 17 oz. (482 grams) excluding batteries
Transport and Storage Environment	Store in cool and dry environment
Ambient Temperatures:	-4° to +140° F (-20° to +60° C)
Relative Humidity:	10% to 90%
Atmospheric Pressure:	0 - 10,000 ft. (0 - 3,000 m) equivalent pressure
Operating Environment	
Ambient Temperatures:	+41° to +104° F (+5° to +40° C)
Power Sources	
AC Mains:	Wall-mount AC mains adaptor; 6 ft. (1.8 m) cord; molded plug Input: 110 VAC Output: 3.0 VDC Tabletop AC mains adaptor; molded plug Input: 100 - 240 VAC Output: 3.0 VDC
Battery:	Two disposable AA batteries
Battery Pack:	Rechargeable using Abbott GemStar AC Mains Adaptor
Power Capacity	Using two fresh, disposable AA batteries or a charged battery pack, at room temperature, the pump is capable of delivering approximately: 96 hours at rates below 5 mL/hr 48 hours at rates at or above 5 mL/hr but below 25 mL/hr 24 hours at rates at or above 25 mL/hr but below 125 mL/hr 3000 mL at a rate of 125 mL/hr or higher
Pump Mechanism	Volumetric, Piston Driven
Memory Protection	Current program and 400-event (history) log protected by internal lithium battery-backed memory for at least one year after power is removed
Operating Controls	One 23-key keypad; bolus, data port, and AC mains jacks; bolus button

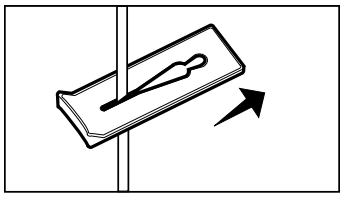
External Power LED	Green LED marked with plug icon illuminates continuously when pump is connected to AC mains Green LED flashes when pump is connected to external batteries
Alarm LED	Red LED marked with alarm icon illuminates during alarm conditions
Audible Alarm	The audible alarm is user-adjustable from the maximum volume down to silent The alarm automatically reverts to the maximum volume if the user does not respond within one minute
Display	Backlit, four-line-by-sixteen-character alphanumeric graphics display
Backlight on AC:	Continuous
Backlight on Batteries:	Continuous during programming, program review, and history display; otherwise activated by keypress or alarm; not activated by bolus request
Real Time Clock	Accuracy of ±1 minute per month or better
Print Function	
Port & Interface:	RS-232 serial interface port, minimum baud rate of 2400, isolated circuit
Printers:	Seiko DPU 414 or compatible serial printer
System Accuracy	± 10% for rates of 0.1 to less than 5 mL/hr ± 5% for rates of 5 to 1000 mL/hr
Air Sensitivity	
ON:	Pump alarms at approximately 0.5 mL of air Alarms for any bubble greater than 500 microliters with a tolerance of 200 microliters
2 mL:	Pump alarms at approximately 2 mL of air Alarms when pump detects 2.0 +1.0/-0.2 mL of air in 6 mL of total volume delivered
OFF:	Alarm is not activated Recommend using air-eliminating filter when Air Sensitivity is set to OFF
Occlusion Sensitivity	
Distal Occlusion:	
Low	Alarms when pump detects distal pressure greater than 7 psi (48 kPa) ± 5 psi (±34 kPa)
Medium	Alarms when pump detects distal pressure greater than 12 psi (83 kPa) ± 8 psi (±55 kPa)
High	Alarms when pump detects distal pressure greater than 26 psi (179 kPa) ±14 psi (±96 kPa)
Proximal Occlusion:	Alarms when pump detects proximal pressure less than or equal to -4 psi (-28 kPa)

Piggyback Rate	0.1 to 300 mL per hour
Pump Self-Tests and Safety Features	Self-test performed when the power switch is activated Diagnostic routine, including motor speed and air-detection monitoring, is repeated continuously while the pump is powered on Error and alarm conditions are indicated by both audible and visual alarms; delivery in progress is stopped, if appropriate (refer to the "Troubleshooting" section)

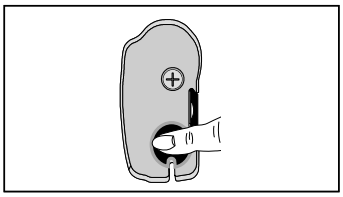
Occlusion Information

Avoiding Bolus Infusion After Occlusion

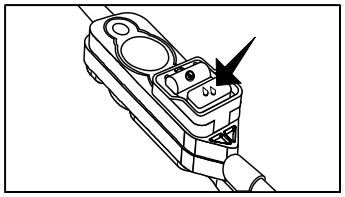
1. Press [**STOP**].
2. Close the distal clamp.



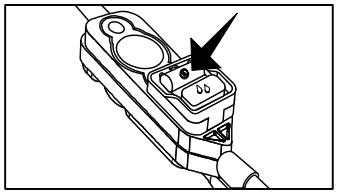
3. Press the cassette release button to remove the cassette from the pump.



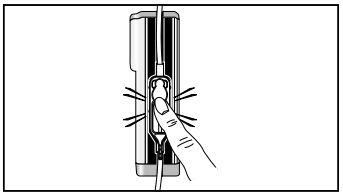
4. Press down on (◊◊) to open the flow stop.
5. Wait 10 seconds.



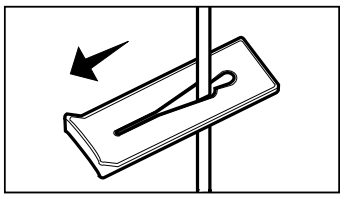
6. Press down on (⊘) to close the flow stop.



7. Load the cassette into the pump.



8. Open the distal clamp.
9. Review the program.
10. Press [**START**] to start the pump.



Stored Occlusion Volume

Delivery Rate of 25 mL/hr at	Pressure Limit		Stored Volume in mL		Time to Occlude in seconds	
Pressure Setting:	**Macro**	**Micro**	**Macro**	**Micro**	**Macro**	**Micro**
Low	7 psig (48.3 kPa)	7 psig (48.3 kPa)	0.26	0.09	50	15
Medium	14 psig (96.5 kPa)	13 psig (89.6 kPa)	0.54	0.14	96	23
High	32 psig (220.6 kPa)	30 psig (206.8 kPa)	1.24	0.40	254	83

Delivery Rate Accuracy

The following trumpet curves represent the typical flow rate deviations, both positive and negative, from the set flow rate under test conditions defined by International Electrotechnical Commission (IEC) Standards for infusion pumps. Using these curves, the medical professional may determine if the device can be expected to perform in a manner suitable for the drug or fluid to be infused.

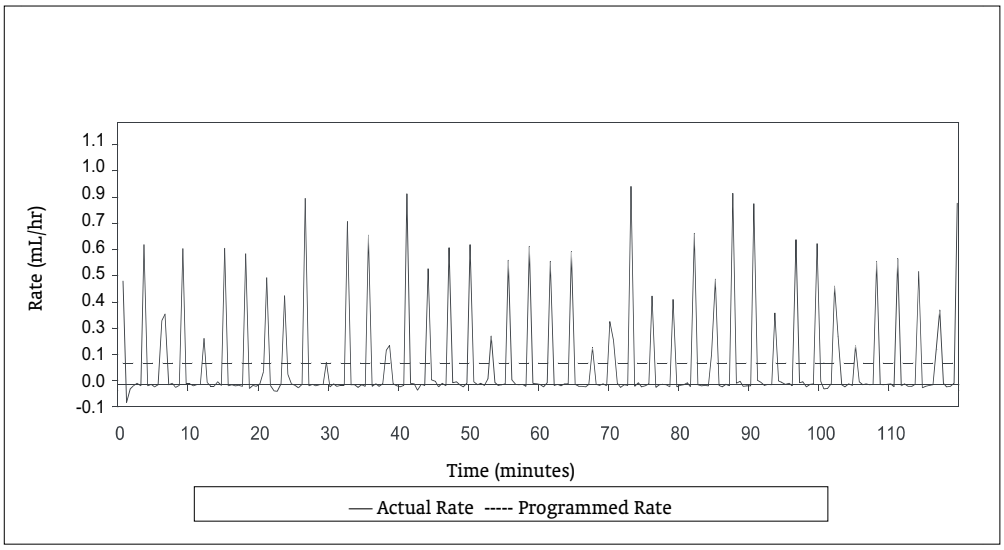
The typical accuracy for this device is ± 5% of the set rate for most conditions, after a period of normalization. It is recommended that the medical professional refer to the following curves when making decisions regarding drug and fluid administration.

The maximum over-infusion which may occur from a single fault condition is 2.78 mL.

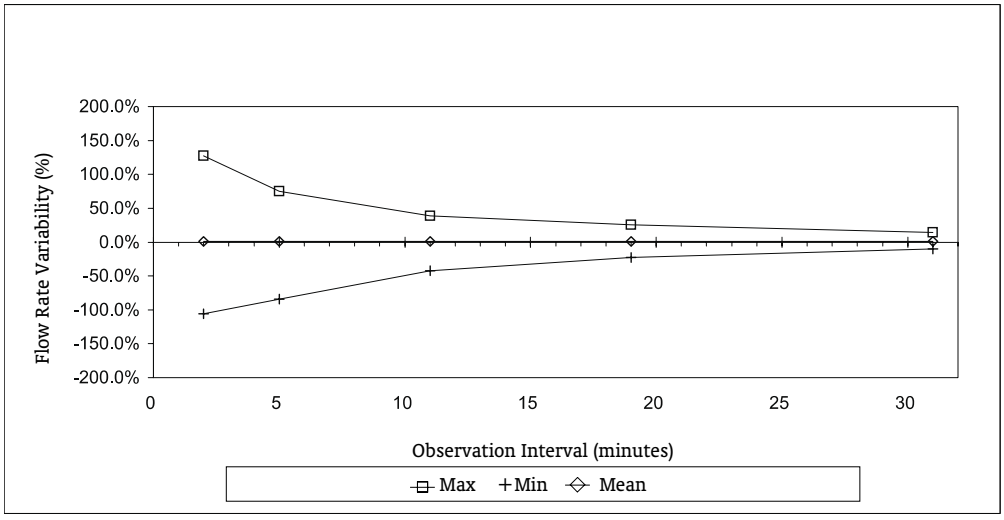
The sets used in this testing are comparable to Abbott GemStar Pump Set List 13273.

Note: False occlusion alarms and fluid delivery inconsistencies may occur when pumping viscous fluids in microbore tubing at rates greater than 500 mL/hr.

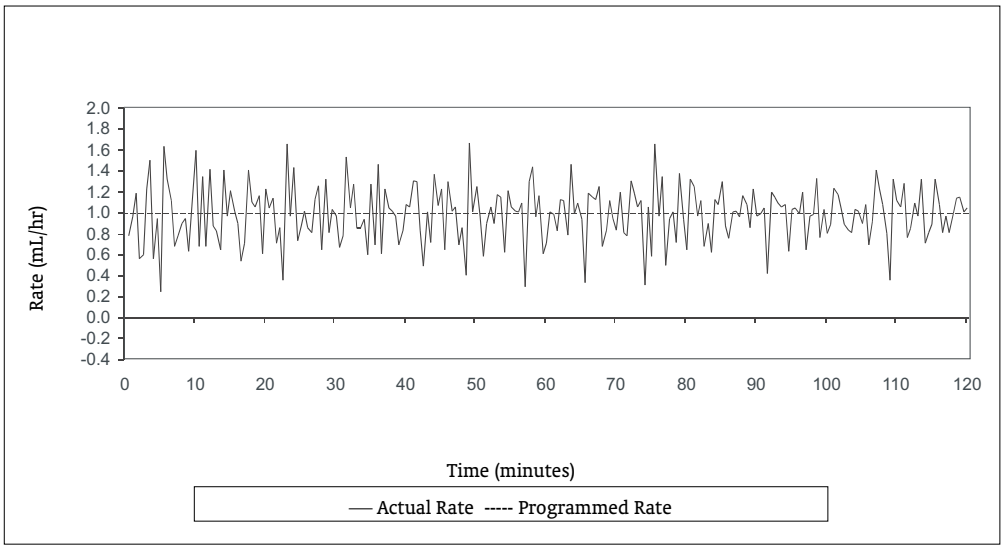
FLOW RATE
0.1 mL, 0 mm Hg Delivery Head, Start Up



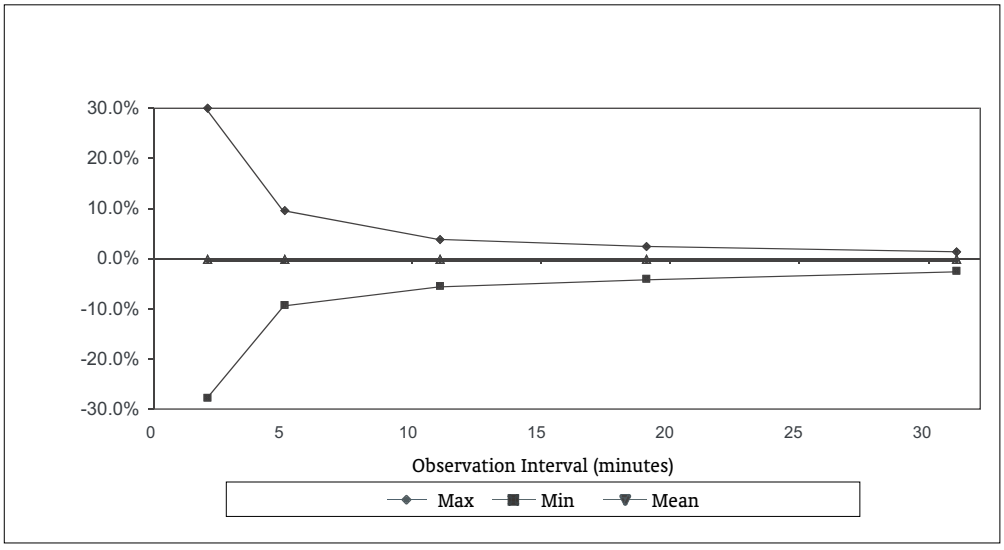
PERCENT ERROR
0.1 mL, 0 mm Hg Delivery Head, Start Up



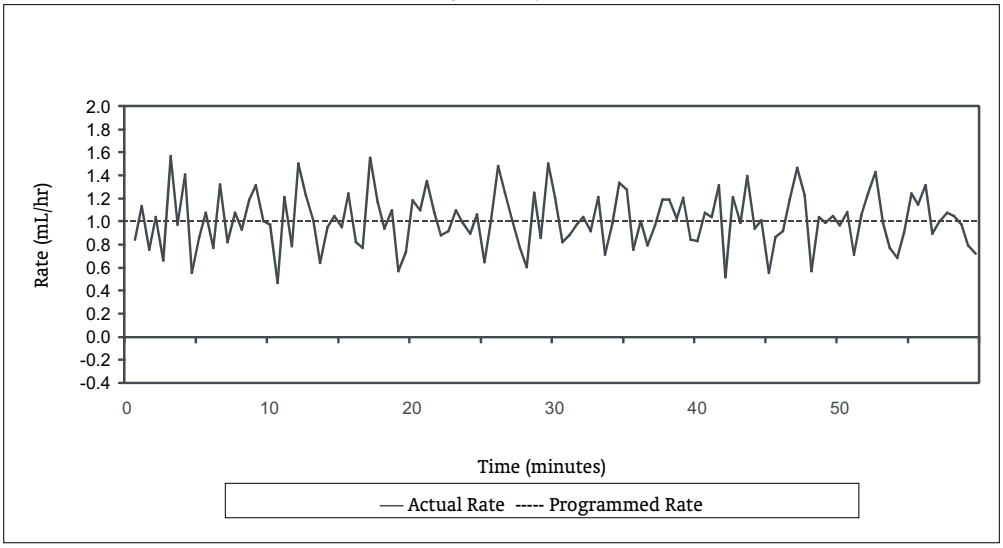
FLOW RATE
1 mL, 0 mm Hg Delivery Head, Start Up



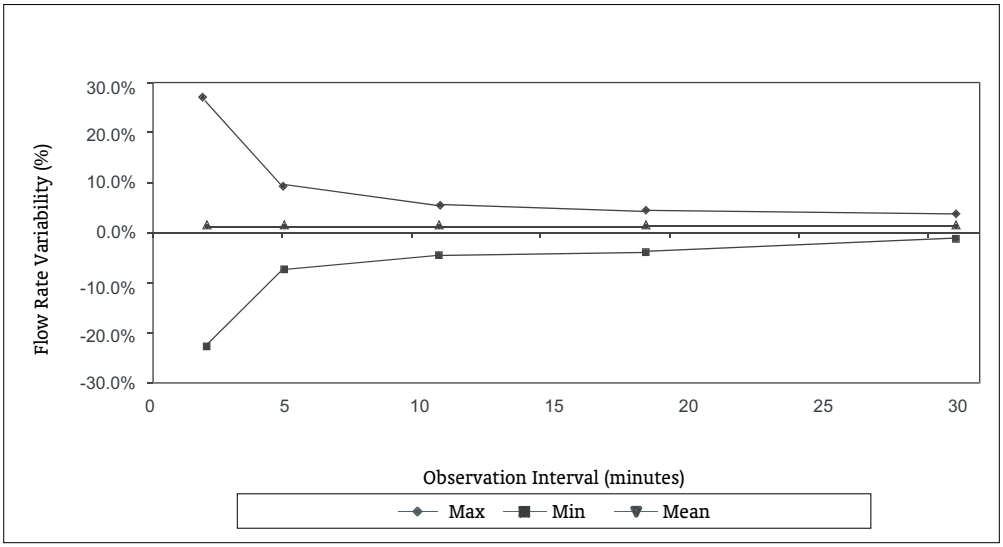
PERCENT ERROR
1 mL, 0 mm Hg Delivery Head, Start Up



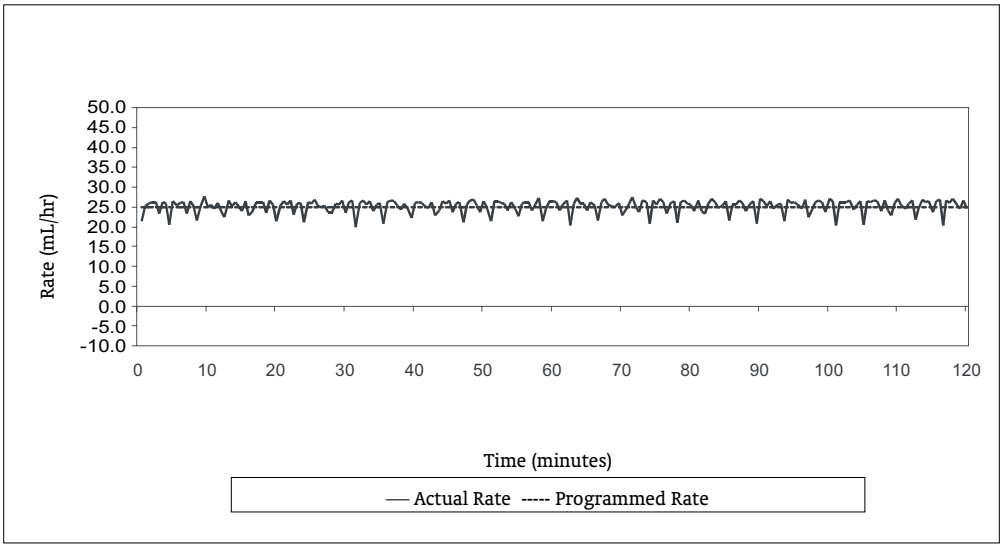
FLOW RATE
1 mL, 0 mm Hg Delivery Head, Hour 96



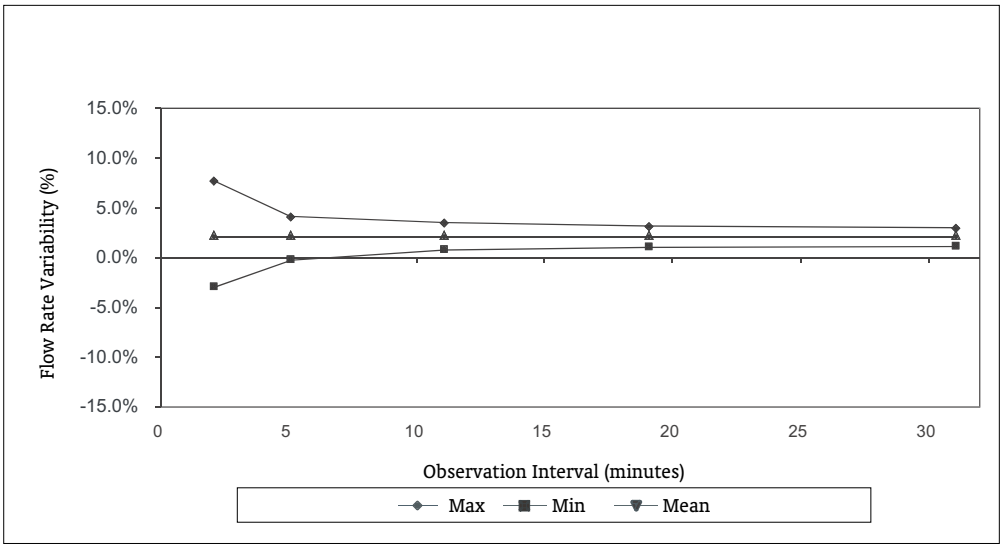
PERCENT ERROR
1 mL, 0 mm Hg Delivery Head, Hour 96



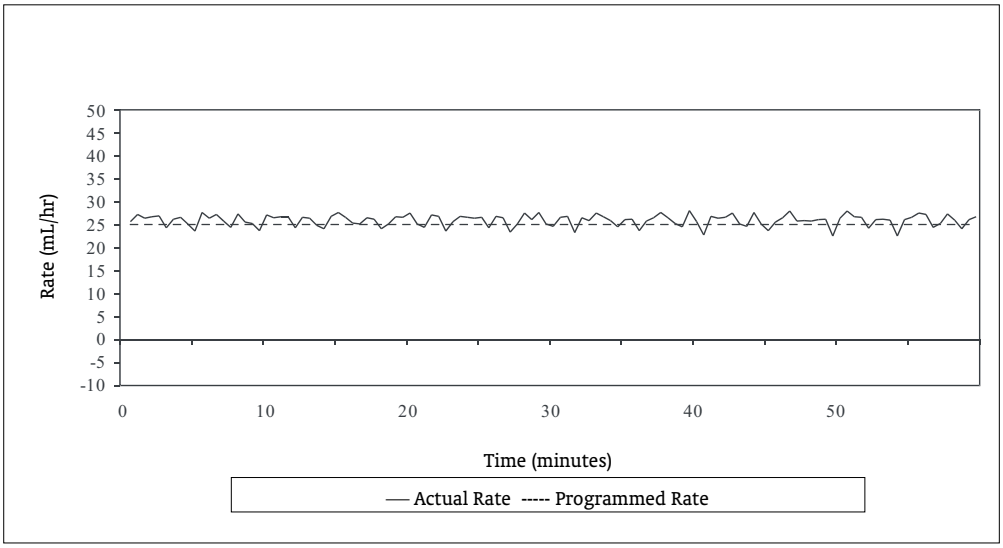
FLOW RATE
25 mL, 0 mm Hg Delivery Head, Start Up



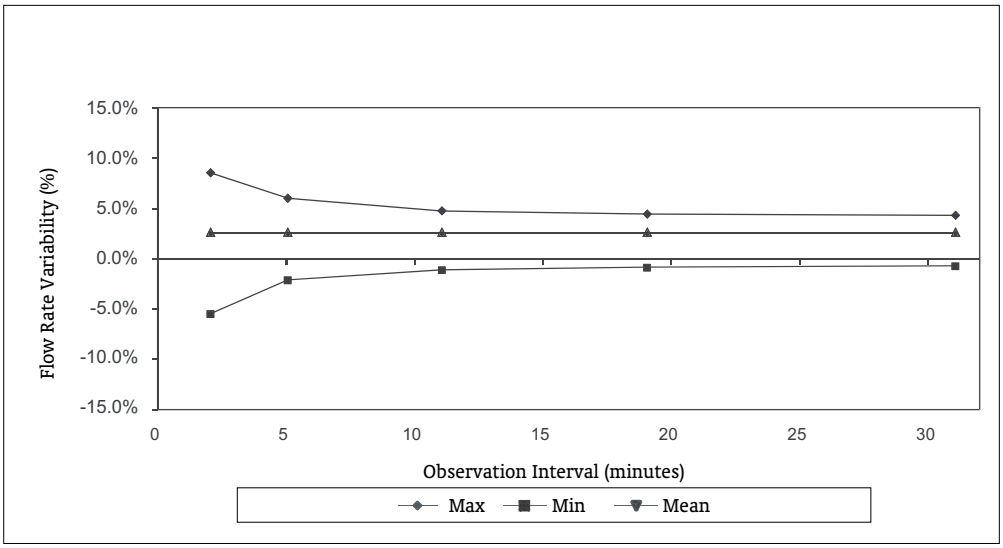
PERCENT ERROR
25 mL, 0 mm Hg Delivery Head, Start Up



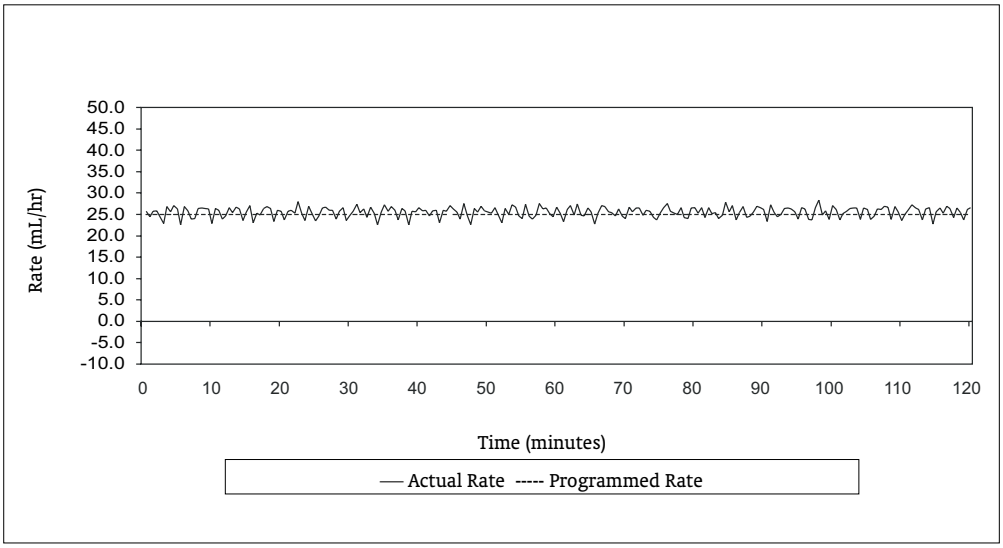
FLOW RATE
25 mL, 0 mm Hg Delivery Head, 96 Hour



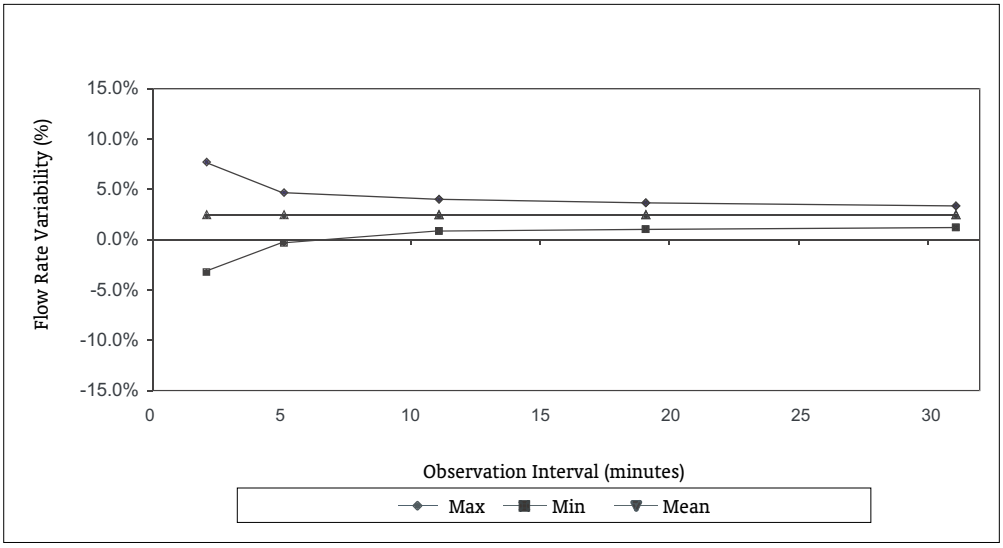
PERCENT ERROR
25 mL, 0 mm Hg Delivery Head, 96 Hour



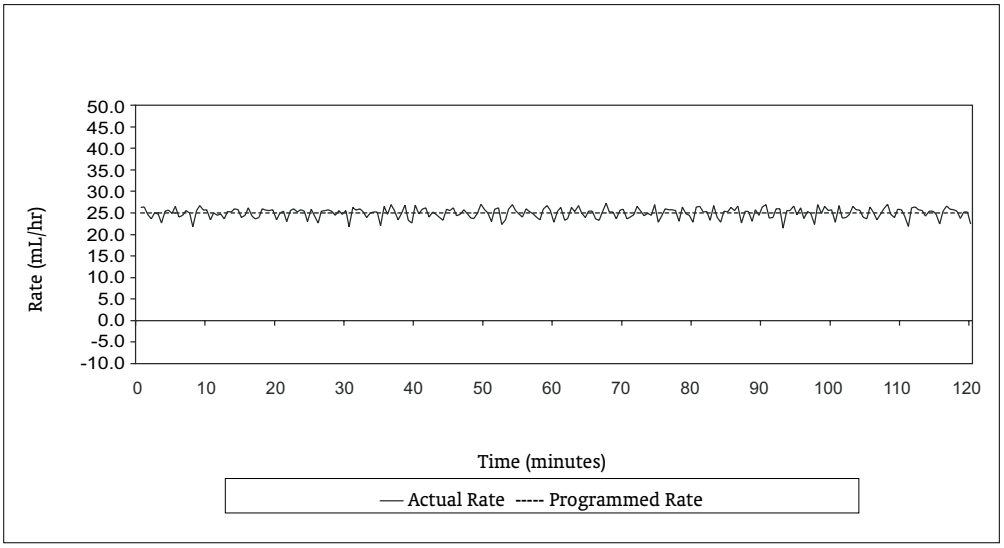
FLOW RATE
25 mL, -100 mm Hg Delivery Head, Start Up



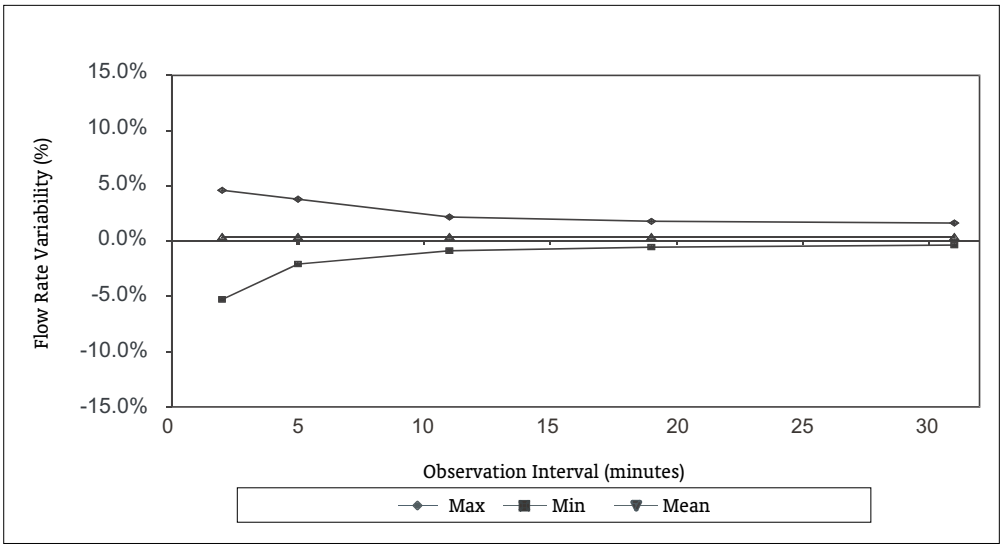
PERCENT ERROR
25 mL, -100 mm Hg Delivery Head, Start Up



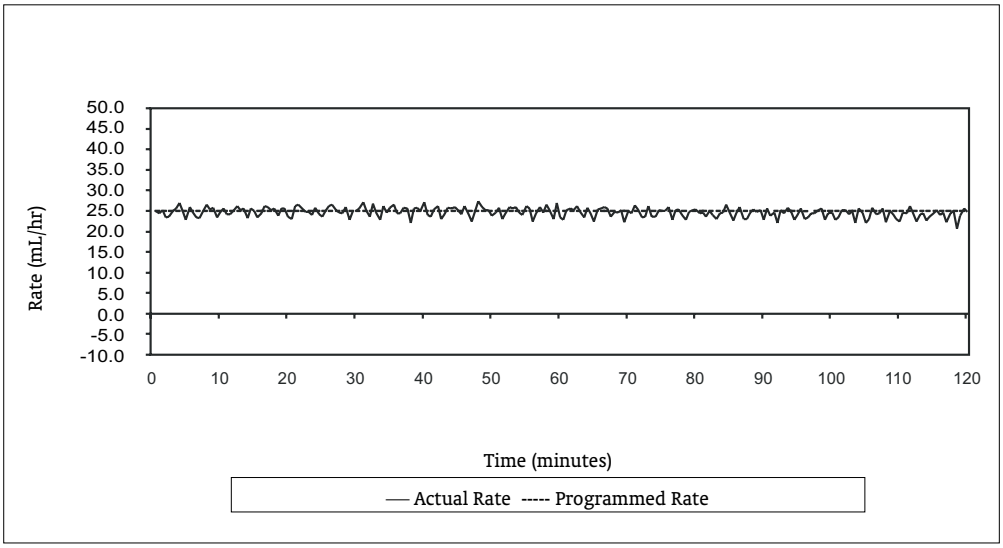
FLOW RATE
25 mL, +100 mm Hg Delivery Head, Start Up



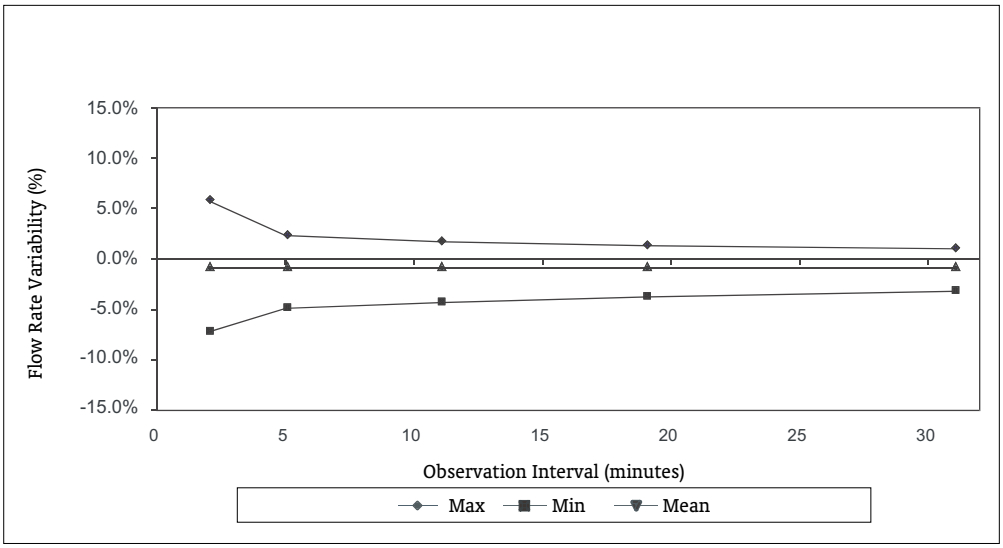
PERCENT ERROR
25 mL, +100 mm Hg Delivery Head, Start Up



FLOW RATE
25 mL, 0 mm Hg Delivery Head, -20 in H2O Filling Head, Start Up



PERCENT ERROR
25 mL, 0 mm Hg Delivery Head, -20 in H2O Filling Head, Start Up



Notes

Warranty

The Abbott GemStar Pump has been carefully manufactured using high-quality components. It is warranted to be free from defects in material and workmanship for a period of one year from the date of purchase under normal use and service. The warranty on the optional battery pack and other accessories is limited to 90 days.

On return to Abbott Laboratories, the pump will be repaired or replaced within the terms of this warranty. Material returned to Abbott Laboratories must be properly packaged and sent freight prepaid.

This warranty shall not apply if the pump has been repaired by anyone other than Abbott Laboratories qualified service personnel; or altered in any way which, in Abbott Laboratories' judgment, affects its stability or reliability; or if the serial number has been altered, effaced, or removed.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED.

Notes

WARNING: **Federal (USA) law restricts this device to sale by or on the order of a physician or other licensed practitioner.**

WARNING: **Possible explosion hazard exists if used in the presence of flammable anesthetics.**

CE 0050

Authorized Representative:
Abbott Logistics B.V.
PO Box 365
8000 AJ Zwolle
Netherlands

UL2601.1
NRTL/C
C22.2 No. 601.1

CSA is a registered trademark of the Canadian Standards Association. The use of NRTL/C adjacent to the CSA mark indicates that the product has been certified by CSA to U.S. and Canadian standards. CSA has been accredited by the U.S. Occupational Safety and Health Administration (OSHA) as a Nationally Recognized Test Laboratory (NRTL).

Type BF

Equipment providing a degree of protection higher than that for Type B equipment against electrical shock particularly regarding allowable leakage currents and having an F-Type applied part.

IPX1

Protected against dripping water.

Attention: Consult accompanying documents.

Abbott GemStar Manual 430-600095-002 (Rev. 8/02)