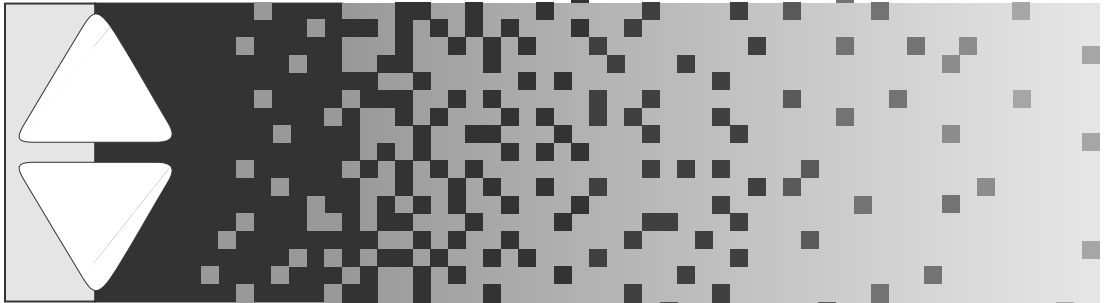


CADD-Micro[®]

Ambulatory Infusion Pump



Model 5900 Operator's Manual

Deltec

SIMS Deltec, Inc., St. Paul, MN 55112 U.S.A.

sim SMITHS INDUSTRIES
Medical Systems

This manual pertains **only** to the Deltec CADD-Micro[®], Model 5900, ambulatory infusion system.

WARNING: It is intended that this Operator's Manual *only* be utilized by clinicians. Do not permit patients to have access to this manual or otherwise disclose to the patient the security code of the pump or any information which would allow the patient to have complete access to all programming and operating functions.

CADD[®] and CADD-Micro[®] are registered trademarks of SIMS Deltec, Inc.

DURACELL[®] is a registered trademark of Duracell Inc.

EVEREADY[®] ENERGIZER[®] is a registered trademark of Union Carbide Corp.

ULTRALIFE[®] is a registered trademark of Ultralife Batteries, Inc.

U.S. Patent No. 4,731,058.

Technical Assistance

If you have comments or questions concerning the operation of the CADD-Micro® system, please call this number: 800-426-2448.

Our staff is available to help clinicians twenty-four hours a day with the programming and operation of the CADD-Micro infusion system.

SIMS Deltec, Inc.
1265 Grey Fox Road
St. Paul, Minnesota 55112 U.S.A.

Table of Contents

Introduction	1
Epidural/Subarachnoid Administration	1
About This Manual	2
Section 1 Overview of the CADD-Micro Pump	
What You Should Know Before Using the Pump	4
Warnings and Precautions	5
Items Packaged with the Pump	7
Diagram of the CADD-Micro Pump	7
The Display	8
The Keypad	10
Pump Security: Lock Levels	11
Stop and Run Modes	12
Programming Options	12
Continuous rate	12
Demand dose	13
Automatic doses	14
Lockout time	15
Reservoir volume (RES VOL)	16
GIVEN and demand dose counter	16
Section 2 Programming the Pump	
Programming Overview	17
How to Program the Pump	19
Step 1: Put the pump in the Stop mode	19
Step 2: Change to Lock Level 0 (LL0)	19
Step 3: Check the clock	20
Step 4: Enter the reservoir volume (RES VOL)	21
Step 5: Enter the continuous rate (RATE)	21
Step 6: Enter the demand dose and duration	22
Step 7: Enter the lockout time	23
Step 8: Clear the dose counter and the GIVEN value	23
Step 9: Remove existing automatic doses	24
Step 10: Enter automatic doses	24
Step 11: Reviewing the program	26
Special notes on entering multiple automatic doses	27
Preparing the Pump for the Patient	28
Change the lock level to LL1 or LL2	28
Decrease doses for the patient in LL1 (optional)	29
Changing the Program	31
Changing continuous rate, demand dose, or lockout time	31

Changing or removing an automatic dose	31
Removing all automatic doses	32

Section 3 Programming Examples

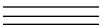
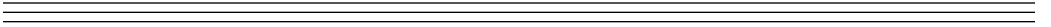
Example 1: Continuous Rate Only	36
Example 2: Continuous Rate, Demand Dose, and Automatic Doses	38
Example 3: Continuous Rate with Demand Dose	42
Example 4: Multiple Automatic Doses—Pulsed Infusion	45
Example 5: Two Rates	48
Example 6: Multiple Rates	52

Section 4 Pump Operation and Maintenance

Replacing the Battery	58
Installing a Micro Medication Reservoir (Syringe)	60
Preparing the reservoir	61
Installing the reservoir	61
Priming the pump and fluid path	62
Connecting or inserting the infusion set	62
Replacing the reservoir only	63
Starting the Pump (Run Mode)	64
Stopping the Pump (Stop Mode)	64
Resetting the Clock	65
Starting a Demand Dose	66
Stopping a Dose	67
Canceling a demand dose in progress	67
Canceling the next automatic dose	67
Adjusting Doses in LL1	68
Changing the continuous rate or demand dose	68
Changing an automatic dose	68
Viewing the Last Dose Time and Next Dose Time	69
Viewing Medication GIVEN and Demand Dose Counter	70

Section 5 Reference

Glossary	72
Pump Maintenance and Cleaning	74
Equipment Exposure to Radiation or MRI	74
Alarms and Troubleshooting	75
CADD-Micro Programming Worksheet	78
FAST Duration Chart	79
24-Hour (Military) Time Conversion Chart	80
Specifications (Nominal)	80
Limited Warranty	83



Introduction

The Deltec CADD-Micro® Model 5900 ambulatory drug delivery pump provides measured drug therapy to patients in hospital or outpatient settings.

The CADD-Micro pump is indicated for intravenous, intra-arterial, subcutaneous, intraperitoneal, epidural space, or subarachnoid space infusion. There are three options for delivery including continuous infusion, patient-activated demand doses, and programmed automatic doses. These options may be used alone, or they may be combined for prescriptions which require multiple infusion rates. The pump also features a “real time” clock which enables the pump to deliver automatic doses at specific times.

Therapy should always be overseen by a physician or a certified, licensed healthcare professional. The patient should be instructed in using and troubleshooting the pump.

Epidural/Subarachnoid Administration

The selected drug must be used in accordance with the indications included in the package insert accompanying the drug. Administration of any drug by this pump is limited by any warnings, precautions, or contraindications in the drug labeling.

Analgesics Administration of analgesics to the epidural space is limited to use with indwelling catheters specifically indicated for either short-or long-term drug delivery.
Administration of analgesics to the subarachnoid space is limited to use with indwelling catheters specifically indicated for short-term drug delivery.

Anesthetics Administration of anesthetics to the epidural space is limited to use with indwelling catheters specifically indicated for short-term drug delivery.

(continued)

WARNING

Administration of drugs to the epidural space or subarachnoid space other than those indicated for administration to the epidural space or subarachnoid space could result in death or serious injury to the patient.

To prevent the infusion of drugs that are not indicated for epidural space or subarachnoid space infusion, DO NOT use administration sets that incorporate injection sites. The inadvertent use of injection sites for infusion of such drugs may cause death or serious injury to the patient.

If the reservoir or cassette is used for epidural space or subarachnoid space drug delivery, it is strongly recommended that it be clearly differentiated from reservoirs, cassettes, or administration sets used for other routes of infusion, for example, by color coding, or other means of identification.

About This Manual

The purpose of this manual is to provide the clinician with operating instructions for the CADD-Micro pump. The sections that follow will familiarize you with the pump's features, programming options, and operating procedures.

Section 1, Overview of the CADD-Micro Pump, gives detailed descriptions of the pump's features and programming options.

Section 2, Programming the Pump, provides step-by-step instructions for programming the CADD-Micro pump and preparing it for the patient.

Section 3, Programming Examples, provides a number of examples which illustrate how the delivery options may be used and how they would be programmed into the pump.

Section 4, Pump Operation and Maintenance, provides instructions for operating and maintaining the pump. It includes procedures for changing the battery, replacing the Micro Medication Reservoir, and stopping and starting the pump.

Section 5, Reference, includes additional information and an "Alarms and Troubleshooting" guide.

Section 1



Overview of the CADD-Micro Pump

What You Should Know Before Using the Pump	4
Warnings and Precautions	5
Items Packaged with the Pump	7
Diagram of the CADD-Micro Pump	7
The Display	8
The Keypad	10
Pump Security: Lock Levels	11
Stop and Run Modes	12
Programming Options	12
Continuous rate	12
Demand dose	13
Automatic doses	14
Lockout time	15
Reservoir volume (RES VOL)	16
GIVEN and demand dose counter	16

What You Should Know Before Using the Pump

As with other CADD® pumps, programmed values remain in the pump's memory when you remove the battery. The pump also features “lock levels” which allow you to limit patient access to the pump. The CADD-Micro pump should only be used by clinicians experienced in the operation of ambulatory infusion pumps.

Before operating the CADD-Micro pump, it is important that you review this manual, paying particular attention to all warnings, cautions, and notes. This manual should be brought to the attention of, and reviewed by, all clinicians involved in operating the pump. In addition, take note of the following:

- The built-in “real time” clock enables the pump to deliver automatic doses at specific times of day, for example, every day at 9:00 AM. Set the clock when you **first open the package and check it before each time you program** the pump.
- The pump delivers microinfusions using a syringe-type mechanism. Medication is contained in a 10-ml capacity Micro Medication Reservoir. When you change the reservoir, **you must prime using the pump's PRIME key** even if you do not see air in the system. This will properly position the mechanism for delivery. Do not prime the pump while the tubing is connected to the patient.
- The pump must be in Lock Level 1 or Lock Level 0 to use the PRIME key. If you want the patient to change his or her own reservoir, make sure the pump is in Lock Level 1.
- The pump allows you to combine up to three different types of infusion: a continuous rate, demand doses, and up to 24 automatic doses. If you do not use one of the options, **program it to zero**.
- When you enter a new value into the pump's memory, the pointer automatically advances to the next function.
- Messages and questions scroll across the display. You can answer yes or no to questions with the  or  key.
- The effective rate of delivery is the sum of all delivery options. For example, if an automatic dose begins while a continuous rate is being delivered, the patient will receive the total of the rate and dose. If the patient requests a demand dose during the delivery of a continuous rate and automatic dose, the patient will receive the total of the three.

Warnings and Precautions

Do not use a pump that appears to have been damaged or tampered with, or is not functioning properly.

This device is not intended to be used for delivery of blood or cellular blood products.

This device may interfere with ECG equipment. Monitor ECG equipment carefully when using this device.

The pump is not sterile. It is not designed to be sterilized. Sterilization could damage the pump's computer and other pump parts.

The pump should be routinely cleaned and kept free of dirt, liquids, and foreign objects. (See "Pump Maintenance and Cleaning," this section.)

Do not operate the pump at temperatures below +2°C (35°F) or above 40°C (104°F).

Do not expose the pump to humidity levels above 90% R. H.

The pump is water resistant. However, total immersion is not recommended because moisture build-up within the case may damage the parts. Do not use the pump in the shower without a Shower Pouch. Do not use the pump in a sauna or steam bath.

Do not store the pump for prolonged periods with a battery; the battery could leak and damage the pump.

Do not store the pump at temperatures below -40°C (-40°F) or above 70°C (158°F).

Avoid using the pump in close proximity to sources of strong static electricity or strong electromagnetic fields. (See "Equipment Exposure to Radiation or MRI," this section.)

Do not use the pump in the presence of flammable anesthetics or explosive gases.

The pump does not have an air-in-line alarm or an air entrapment mechanism. Periodic visual inspection is therefore recommended.

Do not use solutions which are incompatible with the fluid path materials, fluid container, and administration set or which do not retain stability over the desired storage or infusion period.

Use only solutions which are stable under delivery conditions experienced during use with the pump. Observe warnings packaged with the Micro Medication Reservoir.

Purge the fluid path of all air bubbles before use.

Do not use the pump if the battery door is broken or damaged. Do not use the pump if the plastic housing is cracked or if the keypad cover is damaged or peeling.

Avoid dropping the pump or hitting the pump against a hard surface, as this could cause the battery cover to become detached or loose. If the battery door becomes detached or loose, the battery will not be properly secured; this may result in loss of power, nondelivery of drug, and, depending on the type of drug being administered, death or serious injury.

If the pump is dropped or hit, inspect the pump to ensure that the battery cover did not become dislodged. Inspection should include closing the clamp on the tubing and checking the battery door to ensure it is not broken. If there appears to be damage, the patient should be instructed to immediately contact his or her health care provider, the pump should be taken out of service, and Deltec's Customer Service department should be contacted for return authorization.

The use of a Deltec Pump Pouch is recommended. If the pump is dropped or inadvertently hit against a hard surface, the Pump Pouch is designed to minimize the need for servicing.

Items Packaged with the Pump

The following accessories are packaged with the CADD-Micro pump:

- 1 Nonsterile Micro Medication Reservoir (syringe)
- 1 Battery (9-volt)
- Operator's Manual* and warranty information
- 1 Carrying pouch
- 1 Carrying case
- Product literature

When you first remove the pump from its package, you should check the clock time and set it to the correct time if necessary.

Diagram of the CADD-Micro Pump

The following diagram illustrates the major features of the CADD-Micro pump.

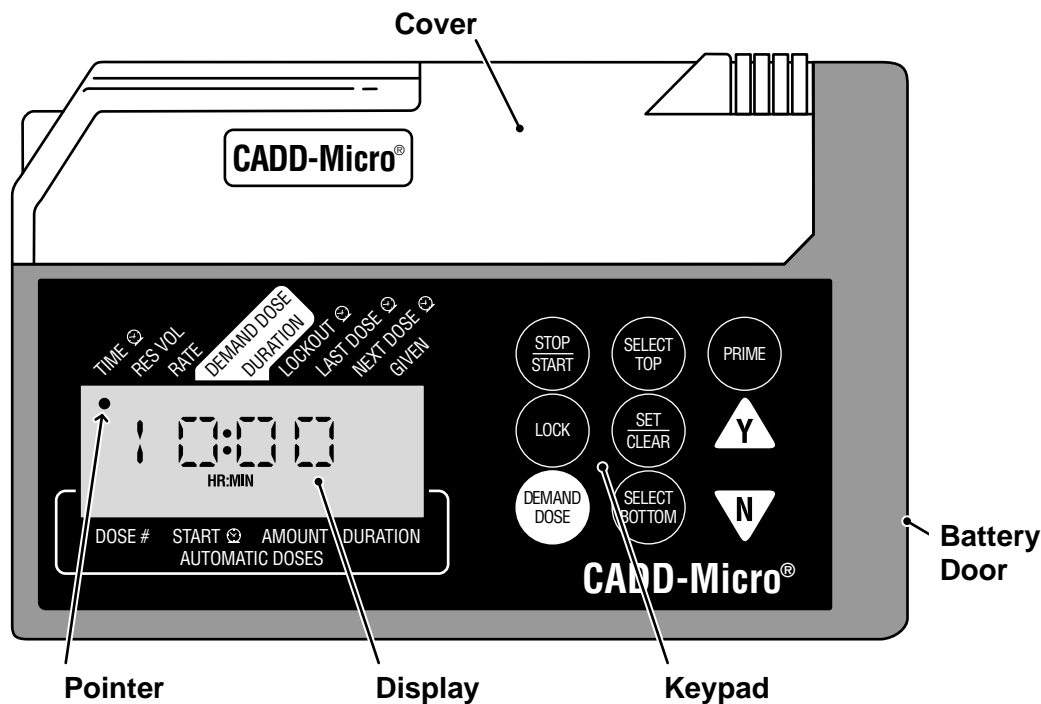


Figure 1. Diagram of the CADD-Micro pump.

The Display

The CADD-Micro pump has a Liquid Crystal Display (referred to in this manual as the *display*), which allows you to view information stored in the pump's memory.

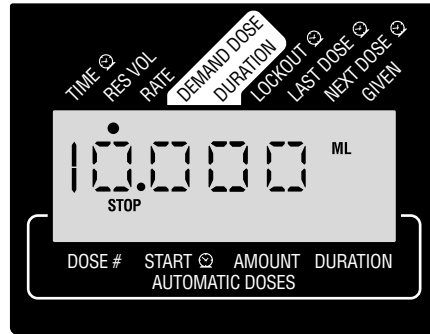


Figure 2. CADD-Micro pump display.

Labels along the top and bottom of the display correspond to functions that are programmed into the pump or calculated by the pump. A dot (●), or *pointer*, indicates which function you are viewing or programming. For example, in **Figure 2** above, the pointer is positioned under RES VOL and 10 ml appears in the display. This indicates that the value calculated for the reservoir volume is 10 ml.

“Time” is represented by a clock (⌚). For example, the lockout time is labeled on the display as LOCKOUT ⌚. The following is a brief description of each function.

TIME ⌚ is the current time of day in 24-hour military time according to the pump's internal clock. (See “24-Hour [Military] Time Conversion Chart” in Section 5.)

RES VOL approximates the volume remaining in the reservoir. It is the difference between the originally programmed RES VOL value and the volume of fluid that has been delivered. The pump automatically recalculates this value when fluid is delivered or the fluid path is primed.

RATE is the programmed continuous rate of infusion in milliliters per hour.

DEMAND DOSE is the volume of medication in milliliters programmed to be delivered when the demand dose key is pressed.

Demand Dose DURATION is the programmed length of time over which the demand dose will be delivered.

LOCKOUT ☹ is the minimum amount of time that is required to elapse between the start of one demand or automatic dose and the start of the next demand or automatic dose.

LAST DOSE ☹ is the time the last automatic or demand dose started. The pump automatically updates this value.

NEXT DOSE ☹ is the time the next scheduled automatic dose will begin. The pump automatically updates this value.

GIVEN is the total volume of medication delivered by the pump since the last time this value was cleared, excluding fluid used to prime the fluid path. The **GIVEN** function also allows you to view the number of demand doses that have been delivered.

The following automatic dose functions are listed along the bottom of the display:

DOSE # is automatically assigned to each new automatic dose entered into the pump's memory. The **DOSE #** helps to identify the doses and allows the pump to keep track of the total number of automatic doses programmed.

START ☹ is the time of day (in 24-hour military time) the automatic dose is programmed to begin.

AMOUNT is the amount of medication in milliliters that is programmed to be delivered by the automatic dose.

DURATION is the programmed length of time over which the automatic dose will be delivered.

The Keypad

The 9 keys to the right of the display are used for programming and operating the pump.



The **STOP/START** key allows you to start the pump to begin delivery or to stop the pump. (See “Stop and Run Modes” in this section.)



The **SELECT TOP** key moves the pointer along the functions at the top of the display, allowing you to view or program the values.



The **PRIME** key allows you to eliminate air from the fluid path and prepare the pump for delivery after attaching a new reservoir.



The **LOCK** key allows you to view or change the current lock level. (See “Pump Security: Lock Levels,” this section.)



The **SET/CLEAR** key is used to enter a new value into the pump’s memory, reset the RES VOL value, or clear the GIVEN value.



The **DEMAND DOSE** key is used to deliver a demand dose. A dose counter (which may be viewed under the GIVEN function) records the number of demand doses that have been delivered.



The **SELECT BOTTOM** key moves the pointer along the automatic dose functions at the bottom of the display, allowing you to view or program the values.



The **Y/Scroll Up** and the **N/Scroll Down** keys allow you to answer yes and no questions or scroll to higher or lower values during programming. When you press and hold these keys, the values scroll with increasing speed.



Pump Security: Lock Levels

The CADD-Micro pump can be set to different *lock levels* to limit patient access to programming and operating functions.

- **Lock Level 0 (LL0)** allows access to all programming and operating functions.
- **Lock Level 1 (LL1)** allows dose amounts to be decreased or increased up to the last value programmed in LL0. LL1 also allows access to functions associated with changing the reservoir.
- **Lock Level 2 (LL2)** does not allow access to any programming functions and allows limited access to operating functions.

The following table lists functions that are accessible in each lock level. Keys that are accessible in a certain lock level will beep when pressed. When a function is not accessible, the pump will ignore the key strokes and no beep will sound.

	LL0	LL1	LL2
Stop/Start the pump	Yes	Yes	Yes
Change the lock level	Yes, with security code	Yes, with security code	Yes, with security code
View pump values	Yes	Yes	Yes
Clear the GIVEN value	Yes	No	No
Clear the dose counter	Yes	No	No
Cancel the next automatic dose	Yes	Yes	Yes
Cancel a demand dose	Yes	Yes	Yes
Change RES VOL	Yes	No	No
Reset RES VOL	Yes	Yes	Only when value reaches 00.00 ml
Prime the pump	Yes	Yes	No
Program the pump	Yes	Limited (below)	No
Change the continuous rate	Yes	Decrease, or increase to the maximum value programmed in LL0	No
Change the demand dose amount	Yes	Decrease, or increase to the maximum value programmed in LL0	No
Change an automatic dose amount	Yes	Decrease, or increase to the maximum value programmed in LL0	No

Stop and Run Modes

The CADD-Micro pump has two modes of operation: Stop and Run. During the **Stop mode**, the word STOP flashes on the display and three short beeps sound every 5 minutes. The pump must be in the **Stop mode** (and the appropriate lock level) in order to program doses, prime the fluid path, or change the lock level.

During the **Run mode**, the word RUN flashes on the display and the pump delivers medication according to the programmed rate or automatic doses. While the pump delivers an automatic dose, the pointer flashes at the bottom of the display over AMOUNT. When the patient initiates a demand dose, the pointer flashes at the top of the display under DEMAND DOSE. If the pump delivers both an automatic dose *and* a demand dose, pointers flash at both positions.

Programming Options

The CADD-Micro pump offers three delivery options which may be used alone or in any combination: a **continuous rate**, a **demand dose**, and **automatic doses**. In addition, you may program a **lockout time** which limits the frequency of demand doses and a **reservoir volume** which alerts you or the patient that the volume of medication is low.

Continuous rate

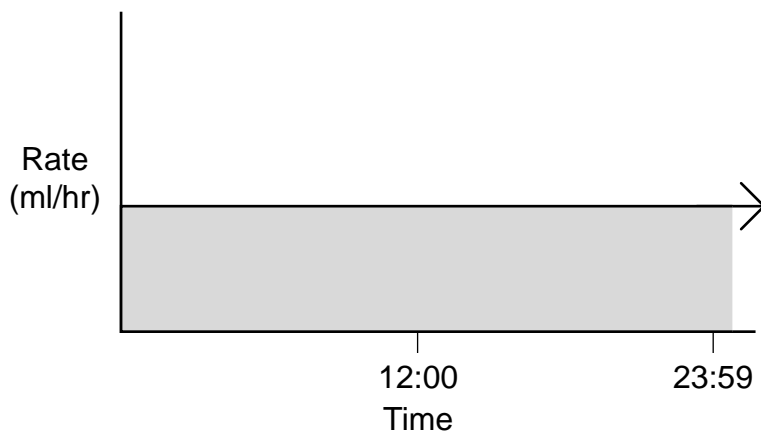


Figure 3. Continuous rate

A **continuous rate** may be used alone to deliver a constant rate of medication, or it may be used with demand doses or automatic doses. For example, you could use the continuous rate as a “Keep Vein Open” (KVO) rate.

The continuous rate is labeled RATE on the pump. You may enter the rate to the nearest 0.002 ml/hr from 0.020 ml/hr up to a maximum of 2.000 ml/hr. If a continuous rate is not desired, set it to 0.000 ml/hr.

Demand dose

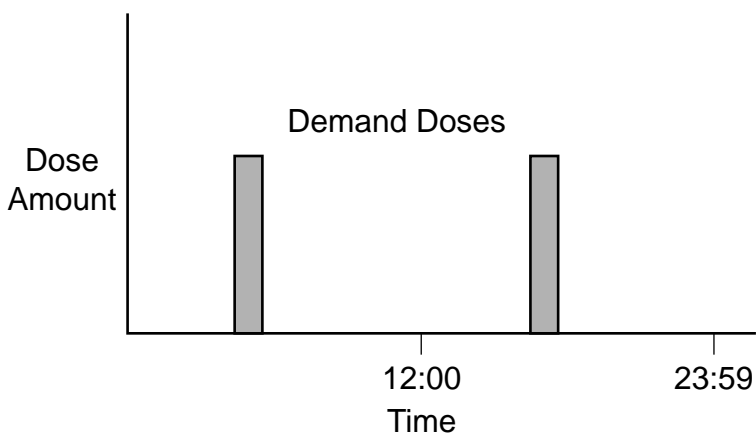


Figure 4. Demand dose

A **demand dose** allows the patient to administer a programmed amount of medication as needed. This option may be used alone for therapies in which medication is delivered strictly at the patient’s discretion, or it may be used in combination with automatic doses and a continuous rate. As the demand dose is delivered, the pointer flashes under DEMAND DOSE.

Both an amount and a duration must be entered for a demand dose. The demand dose amount is labeled DEMAND DOSE on the pump. You may set this value to the nearest 0.002 ml, from 0.020 ml up to a maximum of 1.000 ml. If a demand dose is not desired, set it to 0.000 ml.

The demand dose **duration** is labeled DURATION. You may set the duration up to a value of 24 hours or to “FAST” so the dose will be delivered as fast as the pump allows (up to 12 ml/hr). The duration may be set to the nearest minute if it is between 5 and 15 minutes or to the nearest 5 minute increment if it is longer than 15 minutes.

Automatic doses

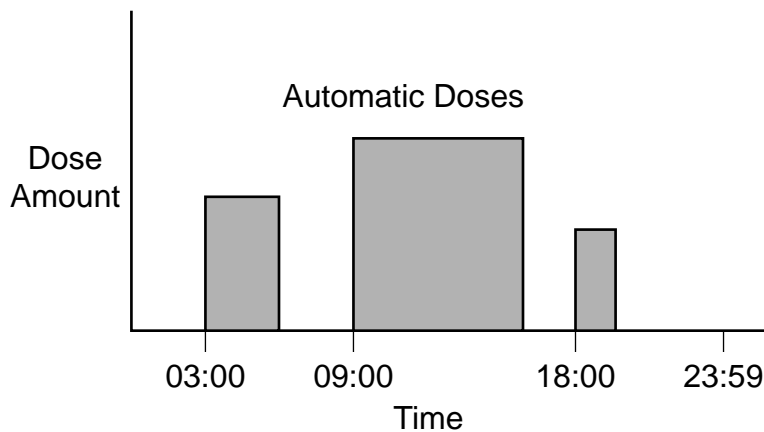


Figure 5. Automatic doses

Automatic doses may be programmed to deliver doses at specific times of the day. You may program up to 24 automatic doses, each with its own start time, amount, and duration. If the prescription calls for multiple delivery rates, you can program the necessary number of automatic doses along with an optional continuous rate to create a multiple rate therapy.

Automatic dose values are labeled along the bottom of the display. The **start time** (START ☉) is the time of day the dose will begin. It is programmed in 24-hour (military) time from 00:00 (midnight) to 23:59 (11:59 PM). If the pump is in the Run mode when the clock reaches the start time, and a lockout time is not in effect, the automatic dose will begin and the pointer will flash over AMOUNT. If the pump is not in the Run mode or the battery is removed, the automatic dose will not begin until the pump is started. Then the dose will begin in progress and will continue until it is programmed to end. The missed amount will not be made up.

You may program an automatic dose **amount** (AMOUNT) from 0.020 ml up to a maximum of 10.000 ml. If the amount is between 0.020 ml and 1.000 ml, you can program it to the nearest 0.002 ml. If the amount is more than 1.000 ml, you can program it to the nearest 0.010 ml.

You can program an automatic dose **duration** (DURATION) up to a value of 24 hours, or you can program it to “FAST” so the dose will be delivered as fast as the pump will allow (up to 12 ml/hr). If the duration

is between 5 and 15 minutes, you can program it to the nearest minute. If the duration is more than 15 minutes, you can program it to the nearest 5 minute increment.

The DOSE # is automatically assigned. The pump places all automatic doses in chronological order starting at 00:00 (midnight) regardless of the order in which they are entered and assigns the appropriate dose number from 1 to 24.

NOTE: Two automatic doses may not be programmed to overlap. However, an automatic dose and a continuous rate may deliver at the same time. The effective rate of delivery is the sum of the two.

Lockout time

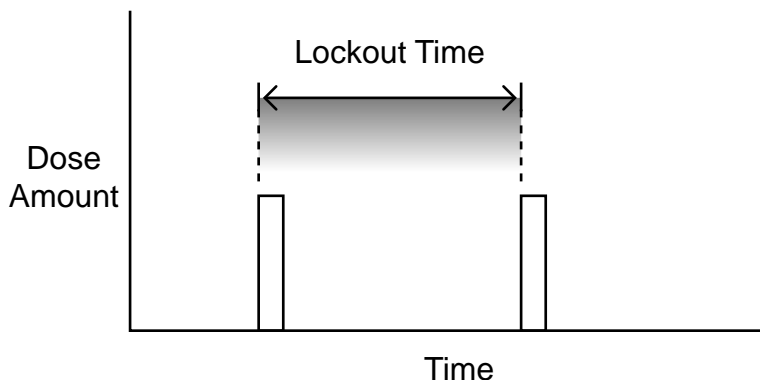


Figure 6. Lockout time

The pump features a **lockout time** which allows you to limit the frequency of doses. This is the minimum amount of time that is required to elapse between the **start** of one demand or automatic dose and the **start** of the next demand or automatic dose. It may be programmed to a value between 0 and 23 hours 55 minutes. If the lockout time is between 1 minute and 1 hour, you can set it to the nearest minute. If it is longer than 1 hour, you can set it to the nearest 5-minute increment.

NOTES:

- The lockout time prevents dose delivery even if the pump has been stopped or the battery has been removed.
- If a demand dose has been delivered, part or all of the next automatic dose could be missed if the lockout time is still in effect when the automatic dose is scheduled to begin.

Reservoir volume (RES VOL)

You may use the reservoir volume function to record the initial volume in the reservoir. When a dose is delivered or the PRIME key is used, the pump recalculates the RES VOL value to reflect the volume remaining in the reservoir. When the RES VOL value reaches 0.500 ml, an alarm sounds. The alarm sounds again with each 0.100 ml decrease in the value. When RES VOL reaches 0.000 ml, the pump stops. If you choose not to use RES VOL, you may set the value to dashes (--- ---). Then the pump will alarm only when the reservoir is empty and will display the message “HIGH PRESSURE OR SYRINGE EMPTY.”


The pump does not actually measure the volume of drug remaining in the reservoir. The RES VOL value is the difference between the original RES VOL value and the milliliters of fluid delivered, including the amount used to prime the fluid path.

When you enter the RES VOL, take into account the volume of fluid you will use to prime the entire fluid path including any extension sets or other infusion apparatus. For example, if the total amount to be infused is 9.000 ml and it will take 0.300 ml to prime the fluid path, fill the reservoir with at least 9.300 ml and program a RES VOL of 9.300 ml.

Although the RES VOL may be programmed up to 10.500 ml (to the nearest 0.100 ml), it is recommended that the reservoir not be filled with more than 10 ml of fluid. Therefore, it is not necessary to program a RES VOL greater than 10.000 ml.

GIVEN and demand dose counter

The **GIVEN** value is the amount of medication (in milliliters) delivered by the pump since the last time the GIVEN value was cleared **excluding** fluid delivered with the PRIME key. The pump calculates the GIVEN value each time a dose is delivered.

The **demand dose counter** records the number of demand doses that have been delivered since the last time the value was cleared. The dose counter may be viewed under the GIVEN function by pressing .

Both the GIVEN value and the demand dose counter should be cleared when programming a new therapy.

Section 2

Programming the Pump

Programming Overview	17
How to Program the Pump	19
Step 1: Put the pump in the Stop mode	19
Step 2: Change to Lock Level 0 (LL0)	19
Step 3: Check the clock	20
Step 4: Enter the reservoir volume (RES VOL)	21
Step 5: Enter the continuous rate (RATE)	21
Step 6: Enter the demand dose and duration	22
Step 7: Enter the lockout time	23
Step 8: Clear the dose counter and the GIVEN value	23
Step 9: Remove existing automatic doses	24
Step 10: Enter automatic doses	24
Step 11: Reviewing the program	26
Special notes on entering multiple automatic doses	27
Preparing the Pump for the Patient	28
Change the lock level to LL1 or LL2	28
Decrease doses for the patient in LL1 (optional)	29
Changing the Program	31
Changing continuous rate, demand dose, or lockout time	31
Changing or removing an automatic dose	31
Removing all automatic doses	32

Programming Overview

Prepare for programming

- Use a **CADD-Micro Pump Programming Worksheet**, if desired, to transcribe the clinician's orders into programming instructions. (A sample of the worksheet is included in Section 5.)
- Insert a fresh 9-volt alkaline or lithium battery. (See "Replacing the Battery" in Section 4.)

Program the pump

These steps are described in detail beginning on the next page. **Follow all of these steps when you program a new therapy.**

Step 1: Put the pump in Stop mode.

Step 2: Change to Lock Level 0 (LL0).

Step 3: Check the clock.

Step 4: Enter the reservoir volume (RES VOL).

Step 5: Enter the continuous rate (RATE).

Step 6: Enter the demand dose and duration.

Step 7: Enter the lockout time.

Step 8: Clear the dose counter and the GIVEN value.

Step 9: Remove existing automatic doses.

Step 10: Enter automatic doses.




Step 11: Review the program.

Prepare the pump for the patient

- Change the lock level to LL1 or LL2.
- Decrease the rate or dose amounts for the patient if desired.
- Fill and install the Micro Medication Reservoir.
- Connect the infusion set.
- Use the PRIME key to prime the pump.
- Attach or insert the infusion set.


How to Program the Pump

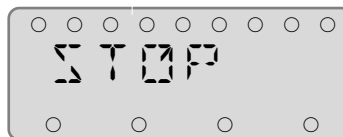
CAUTIONS: (1) While programming the pump, make sure any unused delivery options are set to zero. For example, if the therapy does not require a continuous rate, make sure RATE is set to 0.000 ml/hr. Otherwise, the pump will deliver more medication than desired.


(2) Do not use  to move the pointer or you may inadvertently clear or reprogram values. Use only  and  to move the pointer.

Step 1: Put the pump in the Stop mode


If “STOP” is flashing in the lower left corner of the display, the pump is already in the Stop mode. If “RUN” is flashing, follow these steps to stop the pump.


1. Hold  until the letters S-T-O-P appear on the display and you hear a beep.

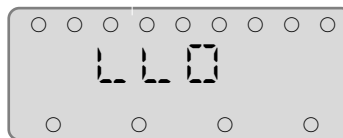



2. Release . “STOP” will flash in the lower left corner of the display and the current time of day will appear in 24-hour (military) time.

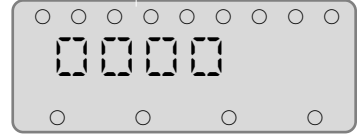
Step 2: Change to Lock Level 0 (LL0)


1. Press . (If LL0 appears, the pump is already in Lock Level 0; go to “Step 3: Check the clock.”)

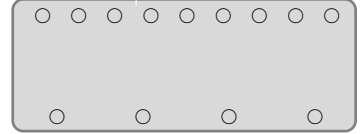
2. Press  until “LL 0” appears.



- Press  within 15 seconds (otherwise, the lock level will revert to the previous value). Four zeroes will appear on the display.




- Press  until the security code ******** appears.





CAUTION: You should not let the patient know this code to prevent the patient from programming the pump.

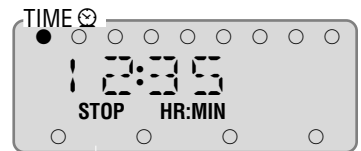
- Press  within 15 seconds to set the new lock level.





NOTE: To check the lock level, press  once to see the lock level then two more times to return to the regular display.

Step 3: Check the clock

CAUTION: Whenever the clock time is changed, any lockout time that may be in effect is cleared. If a demand dose is programmed, a demand dose could be requested immediately upon starting the pump.




- Press  to move the pointer to **TIME** . (If the time is correct, go to “Step 4: Enter the reservoir volume.”)

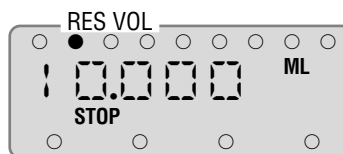



- Press  or  to select the correct time of day.
- Press . The message “CHANGE TIME OF DAY?” will appear.
- Press  to set the time you have selected.

Step 4: Enter the reservoir volume (RES VOL)

If you choose not to use RES VOL, set the value to dashes “- - - - -.”
Without a RES VOL setting, the pump will alarm only when the reservoir is empty.




1. Press  to move the pointer to RES VOL.
2. Press  or  to select the desired reservoir volume in milliliters.
(If you do not wish to use RES VOL, scroll to dashes “- - - - -” which appear in place of 0.000.)

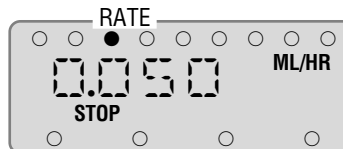



3. Press  within 15 seconds to set the RES VOL value you have selected (otherwise, the pump will retain the previous setting). The pointer will blink and move to RATE.

Step 5: Enter the continuous rate (RATE)

If a continuous rate is not required, set RATE to 0.000 ml/hr.


1. The pointer should be positioned under RATE. The current continuous rate will appear on the display. (If necessary, press  to move the pointer to RATE.)
2. Press  or  to select the desired continuous rate in milliliters per hour.
(If the prescription does not require a continuous rate, select 0.000 ml/hr.)





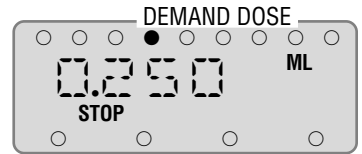
3. Press  within 15 seconds to set the continuous rate you have selected (otherwise, the pump will retain the previous setting). The pointer will blink and move to DEMAND DOSE.


Step 6: Enter the demand dose and duration

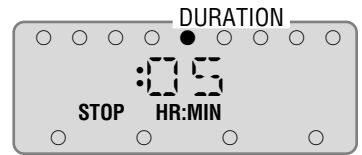
If a demand dose is not required, set DEMAND DOSE to 0.000 ml.


1. The pointer should be positioned under DEMAND DOSE. The current demand dose amount will appear on the display. (If necessary, press  to move the pointer to DEMAND DOSE.)



2. Press  or  to select the desired demand dose amount in milliliters. (If the prescription does not require a demand dose, select 0.000.)

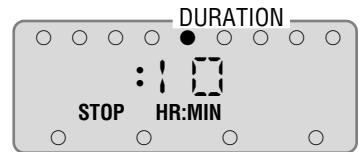




3. Press  within 15 seconds to set the amount you have selected. The pointer will blink and move to DURATION and “:05” (5 minutes) will appear on the display (this is the default duration).



NOTE: If you entered an amount of 0.000 ml, the pointer will skip over DURATION and move to LOCKOUT ; go to “Step 7: Enter the lockout time.”


4. Press  or  to select the desired duration of the demand dose in hours and minutes. To deliver the demand dose as fast as possible, scroll down to “F F Σ T.”





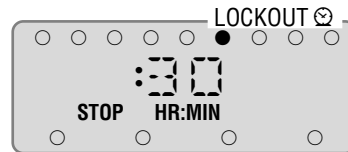
5. Press  to set the duration you have selected (otherwise, the pump will retain the previous setting). The pointer will blink and move to LOCKOUT .


Step 7: Enter the lockout time

If a lockout time is not required, set LOCKOUT ☹ to “00” hr:min.

1. The pointer should be positioned on LOCKOUT ☹. (If necessary, press  to move the pointer to LOCKOUT ☹.)






2. Press  or  to select the desired lockout time in hours and minutes. (If the prescription does not require a lockout time, select “00”.)




3. Press  within 15 seconds to set the lockout time you have selected. The pointer will blink and move to either LAST DOSE ☹ or GIVEN.

The LAST DOSE ☹ and the NEXT DOSE ☹ are automatically maintained by the pump and do not need to be entered. Go to “Step 8: Clear the dose counter and the GIVEN value.”



Step 8: Clear the dose counter and the GIVEN value



1. Press  to move the pointer to GIVEN if necessary.
2. Press  to see the **demand dose counter**. The number of demand doses delivered will appear followed by “DEMAND DOSES GIVEN.” Then the message “CLEAR DOSE COUNTER?” will scroll across the display.
3. Press  to clear the demand dose counter. (If you wish to retain the number, press .) The GIVEN value will reappear.
4. Press  to clear the GIVEN value. The pointer will blink and move to TIME ☹.

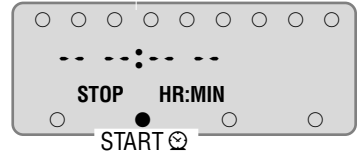
Step 9: Remove existing automatic doses


1. Press  to move the pointer to DOSE #. If “!” appears, automatic doses are programmed and must be removed.


NOTE: If “NONE” appears on the display, no automatic doses are programmed. Go to “Step 10: Enter automatic doses.”

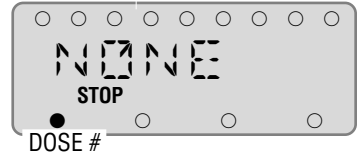
2. Press  to move the pointer to the START .

3. Press  or  until **dashes** appear (“---:---”), *not* 00:00. (The dashes are located between 00:00 and 23:55.)




4. Press . The message “REMOVE ALL DOSES?” will appear.

5. Press . “NONE” will appear on the display indicating that you have removed all automatic doses.

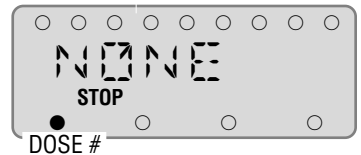



Step 10: Enter automatic doses

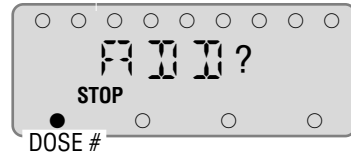
If automatic doses are not required, make sure DOSE # is set to “None.” Then go to “Step 11: Review the Program.”



1. If necessary, press  to move the pointer to DOSE #. “NONE” will appear.

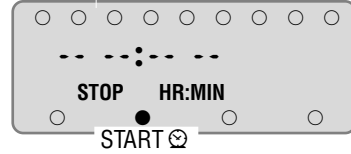
NOTE: If “!” appears, automatic doses exist and should be removed before you continue. See “Step 9: Remove existing automatic doses.”





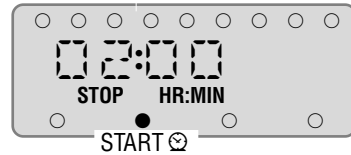
2. Press . “F F F ?” will appear.




3. Press . The pointer will move to START , and dashes will appear on the display.

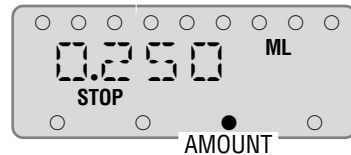



4. Press  or  to select the desired start time in 24-hour (military) time (12 midnight = 00:00, 12 noon = 12:00).





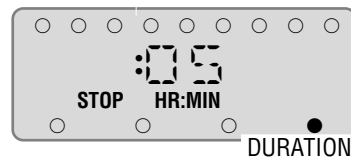
5. Press  within 15 seconds (otherwise, the pump will retain the previous setting). The pointer will blink and move to AMOUNT.


6. Press  or  to select the desired amount in milliliters.

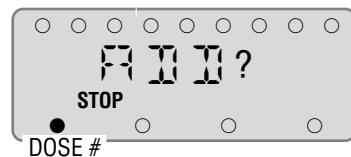


7. Press . “DOSE FIVE” will scroll across the display. The pointer will blink, move to DURATION, and “05” (5 minutes) will appear.

8. Press  or  to select the desired duration in hours and minutes or “F F S T.” (“F F S T” delivers as fast as the pump will allow, up to 12 ml/hr.)



9. Press . The pointer will blink and move to DOSE #. “F F F ?” will appear again on the display asking whether you want to add another automatic dose.



-
-
10. Press ∇ to stop. The total number of automatic doses will scroll across the display. Or, press \triangle to program the next automatic dose and repeat steps 3 through 9. You will notice minor differences when adding additional doses. (See “Special Notes,” next page.)

Step 11: Reviewing the program

1. Hold  or press it repeatedly to review the top functions.

NOTE: If the demand dose amount is zero, the pointer will skip over the demand dose DURATION. If no automatic doses are programmed, it will skip over NEXT DOSE \odot . If no demand or automatic doses are programmed, the pointer will also skip over LAST DOSE \odot .

2. Hold \circ or press it repeatedly to review the automatic doses. The pump will review the dose number, start time, amount, and duration for all programmed automatic doses in sequence.
3. If the pump is in the Stop mode and LL0, “ F? I? I? ” will appear after all doses have been displayed. Press ∇ . The total number of automatic doses programmed will scroll across the display.

Special notes on entering multiple automatic doses

When at least one automatic dose is already programmed, you will notice the following changes when you enter additional automatic doses:

- The START Ⓢ will show dashes (--:--). When you use the up scroll key, the pump will begin scrolling from the end of the preceding dose, skipping over times at which other automatic doses have already been programmed.
- The message “DISE FIDE I” will appear in step 5 (after you select the START Ⓢ) rather than in step 7 since the AMOUNT and DURATION are assumed to be the same as the preceding dose’s values.
- The AMOUNT and DURATION will be automatically set to the preceding dose’s values but may be changed if necessary.
- Since automatic doses cannot overlap, the pump will let you scroll only through amounts and durations it can deliver before the next automatic dose is programmed to start.

For example, if an automatic dose is already programmed at 02:00 (2:00 AM), and you try to enter a dose which starts 30 minutes earlier (at 01:30), the pump will allow you to scroll through only durations of up to 30 minutes. Then it will return to “F FΣ T.” Likewise, the pump will let you scroll through only amounts of 0.000 ml to 6.000 ml since the maximum amount of medication that can be delivered by an automatic dose in 30 minutes is 6 ml. (The maximum rate is 12 ml per hour; see “Specifications” in Section 5.)





- You will not be able to scroll to “F I I?” if 24 automatic doses have been programmed (the maximum) or if automatic doses have been programmed to occupy the entire day.

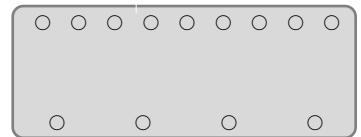
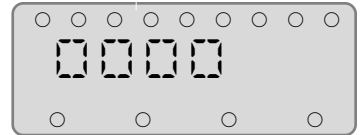
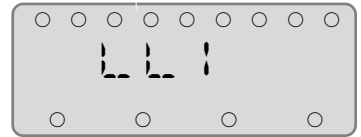
Preparing the Pump for the Patient

Change the lock level to LL1 or LL2

The lock level must be reset to LL1 or LL2 to prevent the patient from having total access to all programming and operating functions. The pump must be in the Stop mode. For more information on lock levels, see “Pump Security: Lock Levels” in Section 1.


NOTE: If you want the patient to change the reservoir, use LL1 so the priming function is accessible.

1. Press . The current lock level will appear.
2. Press  until “LL1” or “LL2” appears.
3. Press  within 15 seconds (otherwise, the lock level will revert to the previous value). Four zeroes will appear on the display.
4. Press  until the security code **** appears.



CAUTION: You should not let the patient know this code to prevent the patient from programming the pump.

5. Press  within 15 seconds to set the new lock level.




NOTE: To verify the new lock level, press  once to see the lock level then two more times to return to the regular display.

Decrease doses for the patient in LL1 (optional)


You may wish to operate the pump in LL1 so doses may be increased or decreased as needed. The values you have programmed in LL0 for the continuous rate, demand dose, and automatic doses are maximum values. You may change the lock level to LL1 and decrease these values before you give the pump to the patient. Then, while the pump is operating in LL1, you or the patient may decrease or increase dose amounts only up to the maximum programmed values. (See “Adjusting Doses in LL1” in Section 4.)

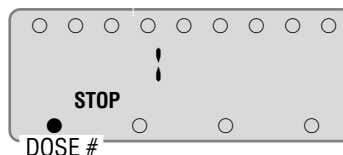
NOTE: The pump must be in LL1 *before* you decrease the doses to retain the maximum values you entered in LL0. If the pump is in LL0, the new values you enter will become the new maximum amounts.

To decrease the continuous rate or demand dose amount


1. Make sure the pump is in the Stop mode and LL1. (See the previous procedure, “Change the lock level to LL1 or LL2.”)
2. Press  to move the pointer to RATE or DEMAND DOSE.
3. Press  until the desired value appears.
4. Press  within 15 seconds to set the new value (otherwise, the pump will retain the previous setting).

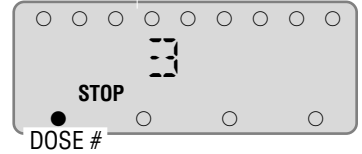
To decrease an automatic dose amount


1. Make sure the pump is in the Stop mode and LL1. (See the previous procedure, “Change the lock level to LL1 or LL2.”)
2. Press  to move the pointer to DOSE #. “!” will appear on the display (the first dose).




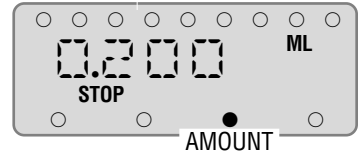
NOTE: If “NONE ” appears, no automatic doses are programmed.

3. Press  until the DOSE # for the dose you wish to change appears.




4. Press  to move the pointer to the AMOUNT.

5. Press  until the desired value appears.



NOTE: If you set the amount to 0.000, this will completely remove the dose, and “DOSE REMOVED” will scroll across the display.

6. Press  within 15 seconds to set the new value (otherwise, the pump will retain the previous setting).





Changing the Program

To make a change to the program, the pump must be in the Stop mode and LL0.

NOTE: If you wish to increase or decrease dose amounts with the pump in lock level 1, see “Adjusting Doses in LL1” in Section 4.

CAUTION: When you set a new lockout time, any lockout time that is in effect will be cleared. If a demand dose is programmed, a demand dose could be requested immediately upon starting the pump.

Changing continuous rate, demand dose, or lockout time

1. Make sure the pump is in the Stop mode and LL0.
2. Press  to move the pointer to the function you wish to change.
3. Press  or  to select the desired value.
4. Press  within 15 seconds to set the new value (otherwise, the pump will retain the previous setting).


NOTE: You may see “ONE OR MORE AUTO DOSES LOCKED OUT” indicating that the new lockout time prevents delivery of all or part of an automatic dose. The pump will not start if this condition exists; you must adjust the lockout time or the conflicting automatic dose.

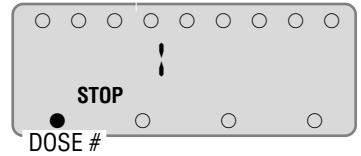
Changing or removing an automatic dose

You may change the start time, amount, or duration of an automatic dose. If you change the start time, the pump will place it in chronological order and renumber all automatic doses.


To remove an automatic dose, change the amount to 0.000 ml in step 5 of the following procedure. The pump will renumber the remaining doses. Start times, amounts, and durations for the remaining doses will not change.

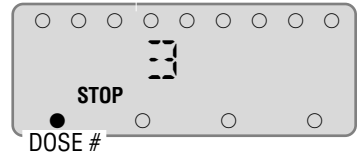
1. Make sure the pump is in the Stop mode and LL0.

2. Press  to move the pointer to DOSE #. “1” will appear on the display (the first dose).





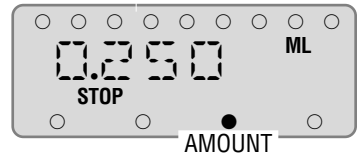
NOTE: If “NONE” appears, no automatic doses have been programmed.


3. Press  until the DOSE # for the dose you wish to change appears.



4. Press  to move the pointer to the value you wish to change (START , AMOUNT, or DURATION).


5. Use  and  to select the desired value.





6. Press  within 15 seconds to set the new value (otherwise, the pump will retain the previous setting).



NOTE: If you programmed the amount to 0.000 ml, the message “DOSE REMOVED” will scroll across the display.

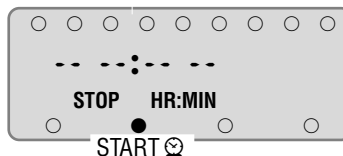
Removing all automatic doses

1. Make sure the pump is in the Stop mode and LL0.
2. Press  to move the pointer to DOSE #. “1” will appear on the display (the first dose).


NOTE: If “NONE” appears, no automatic doses are programmed.

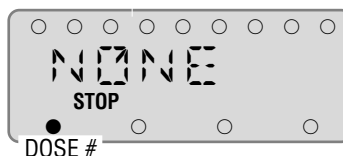
3. Press  to move the pointer to the START .

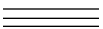
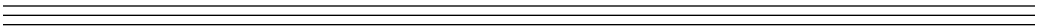
4. Press  or  until dashes “- - - - -” appear, *not* 00:00. (The dashes are located between 00:00 and 23:55.)



5. Press . The message “REMOVE ALL DOSES?” will appear.

6. Press . “NONE” will appear on the display indicating that no automatic doses are programmed.





Section 3

Programming Examples

Example 1: Continuous Rate Only	36
Example 2: Continuous Rate, Demand Dose, and Automatic Doses	38
Example 3: Continuous Rate with Demand Dose	42
Example 4: Multiple Automatic Doses—Pulsed Infusion	45
Example 5: Two Rates	48
Example 6: Multiple Rates	52

Example 1: Continuous Rate Only

The patient should receive 8 ml of drug a day to be infused at 1 ml/hr, starting at 22:00 (10 PM).

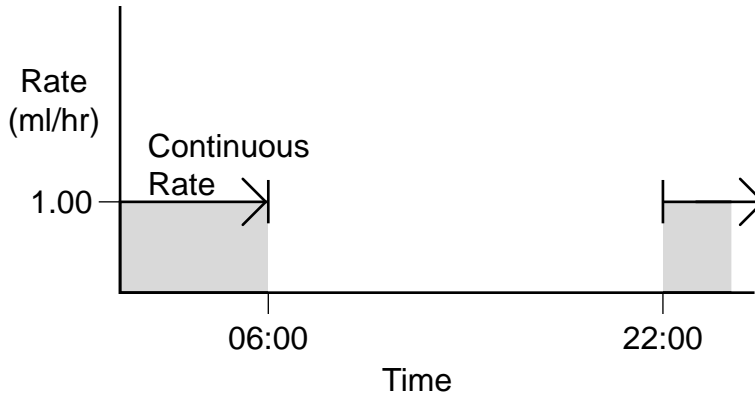


Figure 7. Graph of Example 1: An 8-hour continuous rate beginning at 22:00 (10 PM).


Discussion:

For this example, you may program a continuous rate of 1 ml/hr and have the patient run the pump from 10 PM to 6 AM. The total amount of medication to be delivered in a 24 hour period is 8 ml. Assume the priming volume is 0.300 ml. Program a reservoir volume of 8.300 ml and fill the reservoir accordingly. Enter the following values on the CADD-Micro Programming Worksheet:



RES VOL:	8.30 ml
RATE:	1.000 ml/hr
DEMAND DOSE:	0.000 ml
LOCKOUT ☹:	:00
GIVEN:	Clear
Demand dose counter:	Clear
AUTOMATIC DOSES:	NONE

How to program Example 1



Before you begin, make sure the pump is in the Stop mode and LL0.

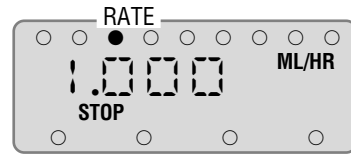
1. Press  to move the pointer to RES VOL.






2. Press  or  until "0.300" appears.

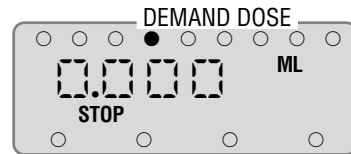
Press . The pointer will move to RATE.



3. Press  or  until "1.000" appears.




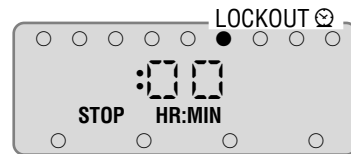
Press . The pointer will move to DEMAND DOSE.

4. Press  or  until "0.000" appears.




Press . The pointer will move to LOCKOUT .



5. Press  or  until "00" appears.




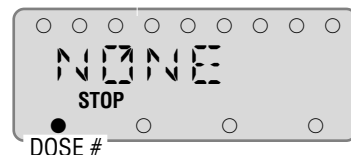
Press . If necessary, press  to move the pointer to GIVEN.

6. Press . The demand dose counter will appear followed by "DEMAND DOSES GIVEN." Then "CLEAR DOSE COUNTER?" will scroll across the display.

7. Press  to clear the dose counter. The GIVEN value will reappear.

8. Press  to clear the GIVEN value. The pointer will move to TIME .

9. Press  to make sure automatic doses are set to "NONE." If "1" appears, remove all automatic doses. (See "Removing all automatic doses," Section 2.)



Example 2: Continuous Rate, Demand Dose, and Automatic Doses

The patient should receive a constant rate of infusion at 0.100 ml/hr. The patient should also receive a 0.020 ml automatic dose at 8:00 AM (08:00) over 10 minutes, and a 0.030 ml dose at 8:00 PM (20:00) over 15 minutes. The patient may also receive boluses of 0.040 ml to be delivered over 20 minutes as needed. The reservoir volume is 10 ml.

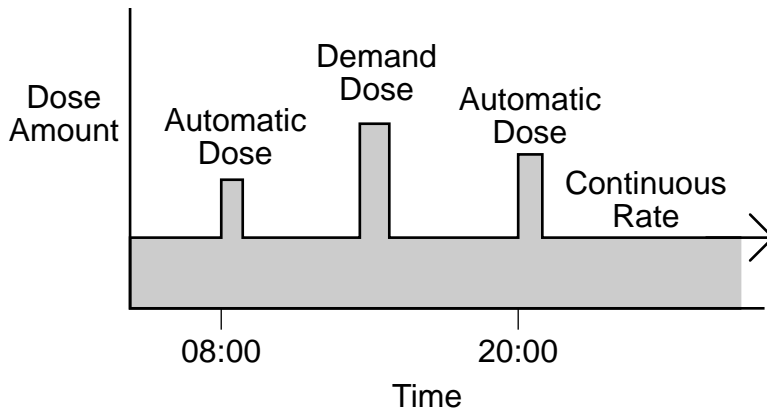


Figure 8. Graph of Example 2: Continuous rate, demand dose, and two automatic doses.

Discussion:


This example uses all three delivery options. It requires a continuous rate, a demand dose amount and duration, and two automatic doses. The total volume that will be delivered in 24 hours by the continuous rate and automatic doses is 2.450 ml. The reservoir volume of 10 ml is sufficient to allow for the continuous rate, automatic dose volumes, and demand dose volumes. The CADD-Micro Programming Worksheet would include the following values:



RES VOL:	10.000 ml
RATE:	0.100 ml/hr
DEMAND DOSE:	Amount = 0.040 ml Duration = :20 minutes
LOCKOUT Ⓞ:	:00

GIVEN:	Clear			
Demand dose counter:	Clear			
AUTOMATIC DOSES:	Dose	Start Time	Amount	Duration
	1	08:00	0.020	:10
	2	20:00	0.030	:15

How to program Example 2



Before you begin, make sure the pump is in the Stop mode and LLO.

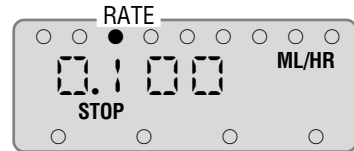
1. Press  to move the pointer to RES VOL.


2. Press  or  until "10000" appears.





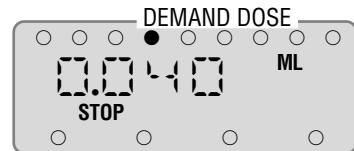
Press . The pointer will move to RATE.


3. Press  or  until "0.100" appears.



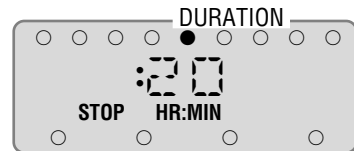
Press . The pointer will move to DEMAND DOSE.



4. Press  or  until "0.040" appears.





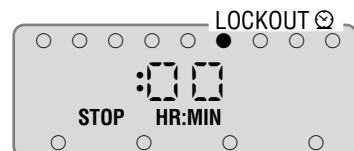
Press . The pointer will move to demand dose DURATION.



5. Press  or  until ":20" appears.





Press . The pointer will move to LOCKOUT .

6. Press  or  until ":00" appears.






Press . The pointer will move to LAST DOSE .


7. Press  to move the pointer to GIVEN.

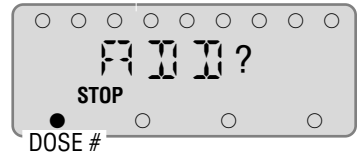
8. Press . The demand dose counter will appear, followed by “DEMAND DOSES GIVEN.” Then the message “CLEAR DOSE COUNTER?” will scroll across the display.



9. Press  to clear the dose counter. The GIVEN value will reappear.

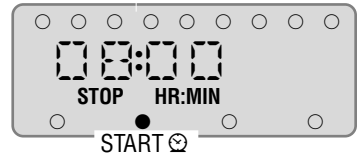
10. Press  to clear the GIVEN value. The pointer will move to TIME .


11. Press  to move the pointer to DOSE #. “NONE ” will appear on the display. (If “!” appears, you must remove the existing automatic doses before continuing. See “Removing all automatic doses” in Section 2.)


12. Press  until “A D I ? ” appears.




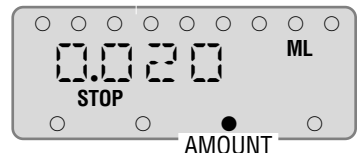
13. Press . The pointer will move to START .





14. Press  until “00:00” appears.


Press . The pointer will move to AMOUNT.

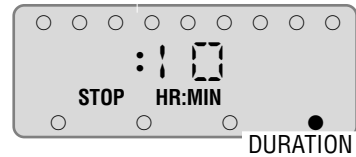
15. Press  until “0.020” appears.





Press . “DOSE #” will scroll across the display and the pointer will move to DURATION.

16. Press  until “:1” appears.

Press . The pointer will move to DOSE #, and “:1?” will appear.



17. Repeat steps 13 through 16 for the second automatic dose substituting the START , AMOUNT (0.030 ml) and DURATION (:15 minutes). When “:1?” appears after entering the duration, press  to stop programming.

Example 3: Continuous Rate with Demand Dose

The patient should receive a continuous infusion of 0.400 ml/hr. In addition, the patient can receive demand doses of 0.1 ml as needed (to be delivered as fast as possible), but a demand dose should not be allowed until 30 minutes after that start of another dose.

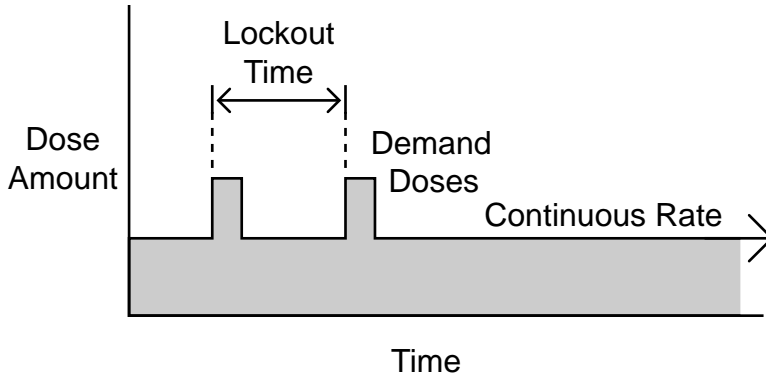


Figure 9. Graph of Example 3


Discussion:



This example requires a continuous rate, a demand dose amount and duration, and a lockout time. The total amount of medication to be delivered by the continuous rate alone is 9.600 ml in 24 hours. For this example, assume that 0.300 ml will be needed to prime the fluid path. Therefore, depending on the number of demand doses the patient initiates, the reservoir may empty before 24 hours have elapsed. The reservoir volume should be programmed to 10 ml, and the reservoir should be filled accordingly. Enter the following values on the CADD-Micro Programming Worksheet:

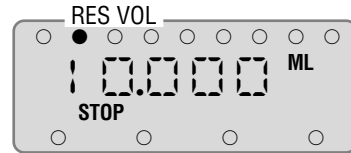
RES VOL:	10.000 ml
RATE:	0.400 ml/hr
DEMAND DOSE:	Amount = 0.100 ml
	Duration = FAST
LOCKOUT Ⓞ:	:30 (30 minutes)
GIVEN:	Clear
Demand dose counter:	Clear
AUTOMATIC DOSES:	NONE


How to program Example 3



Before you begin, make sure the pump is in the Stop mode and LL0.

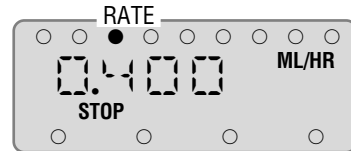
1. Press  to move the pointer to RES VOL.


2. Press  or  until “10000” appears.





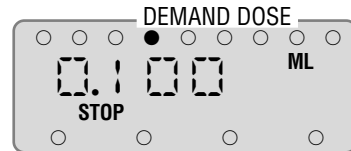
Press . The pointer will move to RATE.


3. Press  or  until “0.400” appears.





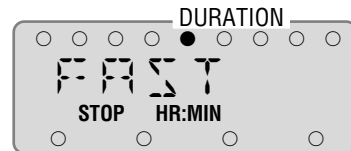
Press . The pointer will move to DEMAND DOSE.



4. Press  or  until “0.100” appears.





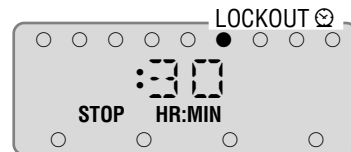
Press . The pointer will move to DURATION.



5. Press  or  until “FAST” appears.

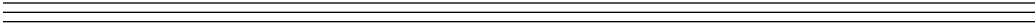








Press . The pointer will move to LOCKOUT .

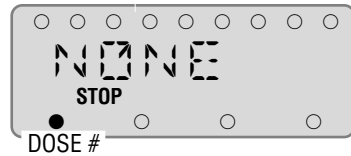
6. Press  or  until “:30” appears.



Press . The pointer will move to LAST DOSE .



7. Press  to move the pointer to GIVEN.
8. Press . The demand dose counter will appear followed by “DEMAND DOSES GIVEN.” Then the message “CLEAR DOSE COUNTER?” will scroll across the display.
9. Press  to clear the dose counter. The GIVEN value will reappear.
10. Press  to clear the GIVEN value. The pointer will move to TIME .
11. Press  to make sure automatic doses are set to “NONE.”



NOTE: If “!” appears, you must clear all automatic doses. (See “Removing all automatic doses” in Section 2.)



Example 4: Multiple Automatic Doses—Pulsed Infusion

The patient should receive a 0.500-ml pulse of drug every 90 minutes.

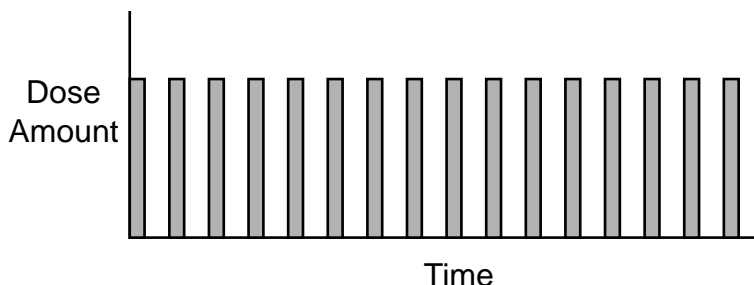


Figure 10. Graph of Example 4: Multiple Automatic Doses

Discussion:


This example requires 16 automatic doses. The total volume to be delivered in 24 hours is 8.000 ml. For this example, assume the priming volume is 0.300 ml and enter a reservoir volume of 8.300 ml. Determine the start time for each dose and select a “FAST” duration. List the doses in order by start time on a CADD-Micro Programming Worksheet.

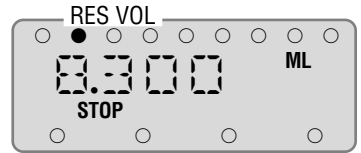
RES VOL:	08.30 ml		
RATE:	0.000 ml/hr		
DEMAND DOSE:	0.000 ml		
LOCKOUT ☹:	:00		
GIVEN:	Clear		
Demand dose counter:	Clear		
AUTOMATIC DOSES:	Dose	Start time	Amount
	1	00:00	0.500
	2	01:30	0.500
	3	03:00	0.500
	4	04:30	0.500
	5	06:00	0.500
	6	07:30	0.500
	7	09:00	0.500
	8	10:30	0.500
	9	12:00	0.500
	10	13:30	0.500
	11	15:00	0.500
	12	16:30	0.500
			FAST
			FAST
			FAST
			FAST
			FAST
			FAST
			FAST
			FAST
			FAST
			FAST
			FAST



13	18:00	0.500	FAST
14	19:30	0.500	FAST
15	21:00	0.500	FAST
16	22:30	0.500	FAST

How to program Example 4



Before you begin, make sure the pump is in the Stop mode and LL0.

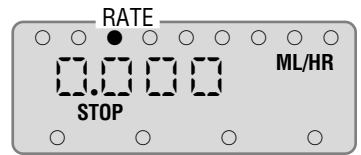
1. Press  to move the pointer to RES VOL.






2. Press  or  until "0.300" appears.

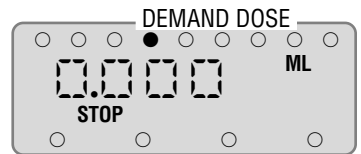
Press . The pointer will move to RATE.



3. Press  or  until "0.000" appears.



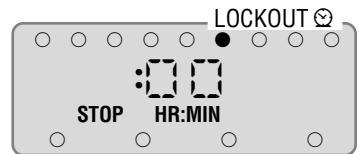
Press . The pointer will move to DEMAND DOSE.



4. Press  or  until "0.000" appears.




Press . The pointer will move to LOCKOUT .



5. Press  or  until "00" appears.




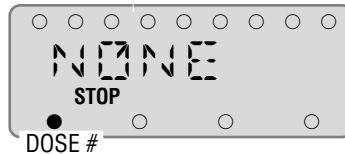
Press . Then press  to move the pointer to GIVEN if necessary.


6. Press . The demand dose counter will appear followed by "DEMAND DOSES GIVEN." Then the message "CLEAR DOSE COUNTER?" will scroll across the display.

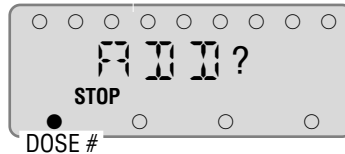
7. Press  to clear the dose counter. The GIVEN value will reappear.



8. Press  to clear the GIVEN value. The pointer will move to TIME .


9. Press  to move the pointer to DOSE #. “NONE” will appear on the display. (If “1” appears, you must clear all automatic doses. See “Removing all automatic doses” in Section 2.)

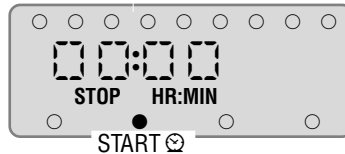



10. Press  until “F F I I ?” appears.




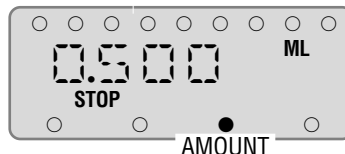
11. Press . The pointer will move to START .


12. Press  until “00:00” appears.




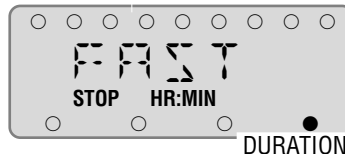
Press . The pointer will move to AMOUNT.

13. Press  until “0.500” appears.






Press . “DOSE F F I I I” will scroll across the display, and the pointer will move to DURATION.

14. Press  until “F F I I T” appears.



Press . The pointer will move to DOSE # and “F F I I ?” will appear.

15. Repeat steps 10 through 13 for the remaining 15 automatic doses substituting each dose’s START . When “F F I I ?” appears at the end of the last dose, press  to stop programming.

NOTE: If the message “DOSE LOCKED OUT” appears, a lockout time remains from the pump’s previous program. You must change the LOCKOUT  to zero.

Example 5: Two Rates

The patient should receive a continuous 1 ml/hr infusion of drug from 08:00 (8 AM) to 14:00 (2 PM), and a KVO (“keep vein open”) of 0.050 ml/hr from 14:00 to 8:00.

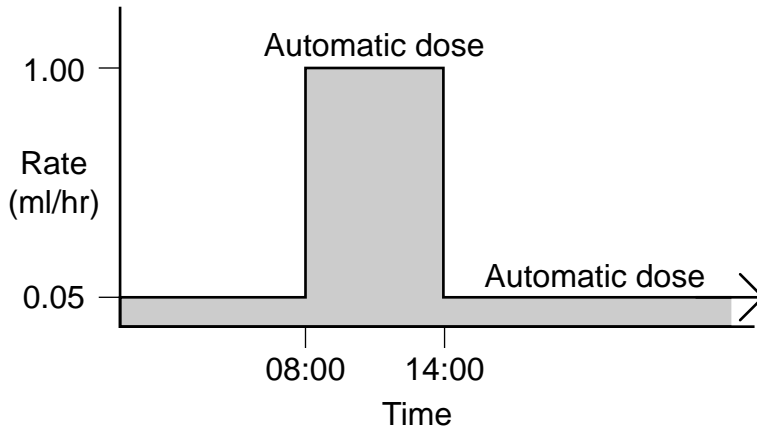


Figure 11. Graph of Example 5: Two automatic doses.

Discussion:

This example may be programmed in one of two ways: 1) a continuous KVO rate with an automatic dose at 08:00, or 2) one automatic dose from 08:00 to 14:00 and one from 14:00 to 08:00. Since the continuous rate and automatic doses are additive, it may be simpler to calculate two automatic doses. First, calculate the amount to be delivered by each automatic dose.


$$\begin{aligned} 08:00 \text{ to } 14:00 \text{ (6 hours):} & \quad 6 \text{ hr} \times 1 \text{ ml/hr} = 6 \text{ ml} \\ 14:00 \text{ to } 08:00 \text{ (18 hours):} & \quad 18 \text{ hr} \times 0.05 \text{ ml/hr} = 0.9 \text{ ml} \end{aligned}$$



The total volume to be delivered in 24 hours is 6.900 ml. For this example, assume that a reservoir volume of 7.2 ml will be sufficient for dose delivery and priming. The pump will automatically arrange automatic doses in order by start time and assign dose numbers as you enter them. Enter the following on the CADD-Micro Programming Worksheet:

RES VOL:	7.200 ml			
RATE:	0.000 ml/hr			
DEMAND DOSE:	0.000 ml			
LOCKOUT ☹:	:00			
GIVEN:	Clear			
Demand dose counter:	Clear			
AUTOMATIC DOSES:	Dose	Start time	Amount	Duration
	1	08:00	6.000	06:00
	2	14:00	0.900	18:00

How to program Example 5



Before you begin, make sure the pump is in the Stop mode and LL0.

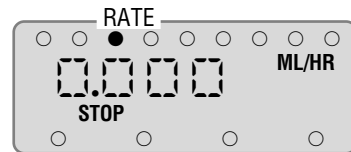
1. Press  to move the pointer to RES VOL.


2. Press  or  until "7.200" appears.





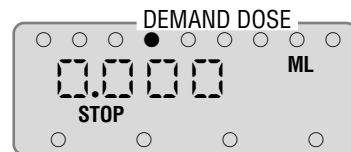
Press . The pointer will move to RATE.


3. Press  or  until "0.000" appears.





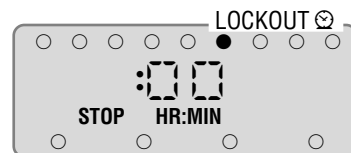
Press . The pointer will move to DEMAND DOSE.



4. Press  or  until "0.000" appears.








Press . The pointer will move to LOCKOUT ☹.

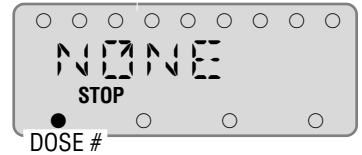
5. Press  or  until ":00" appears.




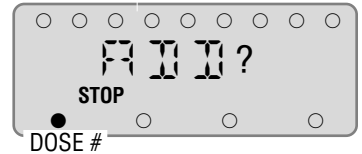
Press . Then press  to move the pointer to GIVEN if necessary.



6. Press . The demand dose counter will appear followed by “DEMAND DOSES GIVEN.” Then the message “CLEAR DOSE COUNTER?” will scroll across the display.
7. Press  to clear the dose counter. The GIVEN value will reappear.
8. Press  to clear the GIVEN value. The pointer will move to TIME .

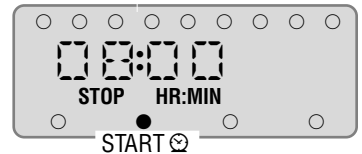
9. Press  to move the pointer to DOSE #. “NONE” will appear on the display. (If “!” appears, you must clear all automatic doses. See “Removing all automatic doses” in Section 2.)





10. Press  until “F I D ?” appears.




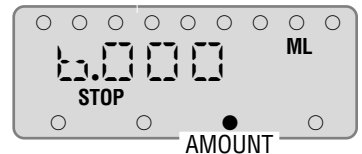
11. Press . The pointer will move to START .






12. Press  until “00:00” appears.

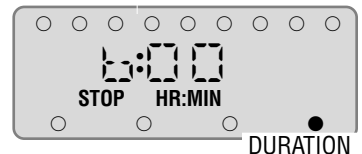
- Press . The pointer will move to AMOUNT.


13. Press  until “0.000” appears.






- Press . “DOSE FEED” will scroll across the display and the pointer will move to DURATION.


14. Press  or  until “0:00” appears.

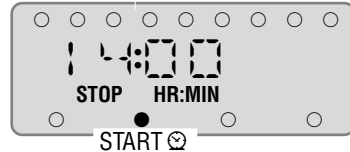



Press . The pointer will move to DOSE # and “?? ?? ?” will appear.


15. Press . The pointer will move to START .

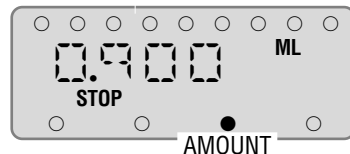
16. Press . “14:00” will appear.


Press . “DOSE AMOUNT” will scroll across the display and the pointer will move to AMOUNT.




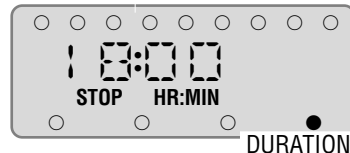
17. Press  until “0.900” appears.

Press . The pointer will move to DURATION.



18. Press  until “18:00” appears.

Press . Since you have added two doses which take up the entire day, “?? ?? ?” will not appear. The total number of doses programmed will scroll across the display and programming will be complete.



Example 6: Multiple Rates

The patient should receive 10 ml per day in the following increments:

68% of drug between 15:00 (3 PM) and 21:00 (9 PM)

15% of drug between 21:00 and 03:00 (3 AM)

2% of drug between 03:00 and 09:00 (9 AM)

15% of drug between 09:00 and 15:00.

The reservoir volume is 10 ml.

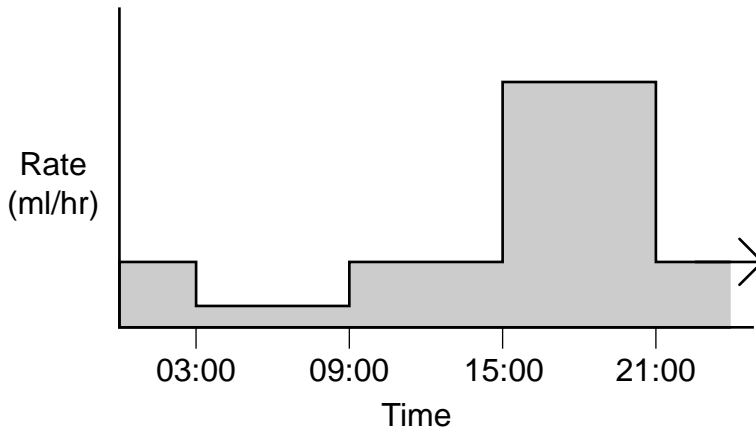


Figure 12. Graph of Example 6: Four automatic doses.

Discussion:

This example requires 4 different automatic doses, each with a 6-hour duration. First, calculate the amount of each automatic dose by multiplying the percentage of drug to be delivered by the total reservoir volume.

$$0.68 \times 10 \text{ ml} = 6.8 \text{ ml}$$

$$0.15 \times 10 \text{ ml} = 1.5 \text{ ml}$$

$$0.02 \times 10 \text{ ml} = 0.2 \text{ ml}$$

$$0.15 \times 10 \text{ ml} = 1.5 \text{ ml}$$


In this example, the total volume that will be delivered in 24 hours by the automatic doses is 10 ml. The reservoir volume is 10 ml, but the medication in the reservoir is also used to prime the fluid path. Depending on the volume needed for priming, the reservoir will probably empty before



the last automatic dose has been completely delivered. The pump will automatically stop when the RES VOL reaches 00.00 ml or when the reservoir is empty. Enter the following on the CADD-Micro Programming Worksheet:

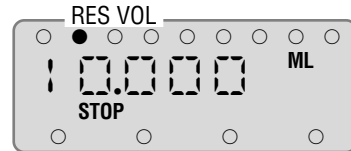
RES VOL:	10.000 ml
RATE:	0.000 ml/hr
DEMAND DOSE:	0.000 ml
LOCKOUT ☹:	:00
GIVEN:	Clear
Demand dose counter:	Clear
AUTOMATIC DOSES:	
	Dose Start time Amount Duration
	1 03:00 0.200 06:00
	2 09:00 1.500 06:00
	3 15:00 6.800 06:00
	4 21:00 1.500 06:00

How to program Example 6



Before you begin, make sure the pump is in the Stop mode and LL0.

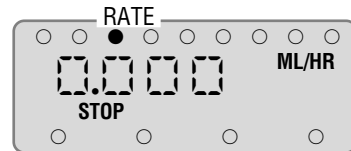
1. Press  to move the pointer to RES VOL.


2. Press  or  until “10.000” appears.





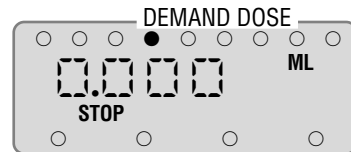
Press . The pointer will move to RATE.


3. Press  or  until “0.000” appears.



Press . The pointer will move to DEMAND DOSE.

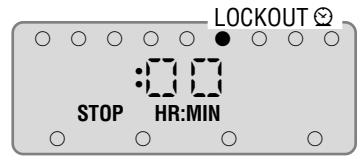
4. Press  or  until “0.000” appears.



Press . The pointer will move to LOCKOUT ☹.

5. Press **Y** or **N** until “00” appears.

Press **SET CLEAR**. Then press **SELECT TOP** to move the pointer to GIVEN if necessary.

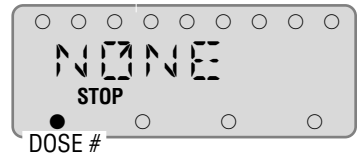


6. Press **Y**. The demand dose counter will appear followed by “DEMAND DOSES GIVEN.” Then the message “CLEAR DOSE COUNTER?” will scroll across the display.

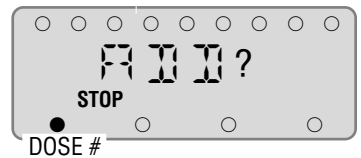
7. Press **Y** to clear the dose counter. The GIVEN value will reappear.

8. Press **SET CLEAR** to clear the GIVEN value. The pointer will move to TIME.

9. Press **0** to move the pointer to DOSE #. “NONE” will appear on the display. (If “1” appears, you must clear all automatic doses. See “Removing all automatic doses” in Section 2.)



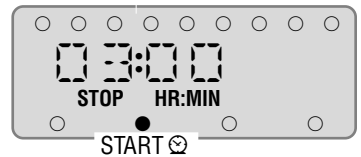
10. Press **Y** until “ADD?” appears.



11. Press **Y**. The pointer will move to START.

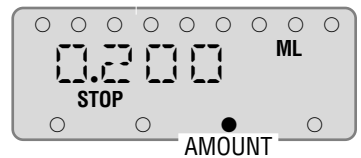
12. Press **Y** until “03:00” appears.



Press **SET CLEAR**. The pointer will move to AMOUNT.





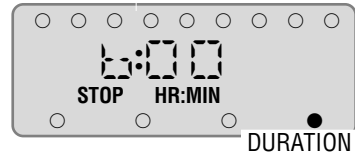
13. Press **Y** until “0.200” appears.


Press **SET CLEAR**. “DOSE FEED” will scroll across the display, and the pointer will move to DURATION.





14. Press  until “” appears.

Press . The pointer will move to DOSE # and “” will appear.



15. Repeat steps 10 through 13 for the remaining 3 automatic doses substituting each dose’s START  and AMOUNT. After you enter the last dose, the number of automatic doses programmed will scroll across the display.

NOTE: As you enter the remaining doses, the amount and duration will automatically appear. Since the amounts vary, select the correct amount for the new dose. However, since the duration is 6 hours for each dose, just press  when “” appears.

Section 4

Pump Operation and Maintenance

Replacing the Battery	58
Installing a Micro Medication Reservoir (Syringe)	60
Preparing the reservoir	61
Installing the reservoir	61
Priming the pump and fluid path	62
Connecting or inserting the infusion set	62
Replacing the reservoir only	63
Starting the Pump (Run Mode)	64
Stopping the Pump (Stop Mode)	64
Resetting the Clock	65
Starting a Demand Dose	66
Stopping a Dose	67
Canceling a demand dose in progress	67
Canceling the next automatic dose	67
Adjusting Doses in LL1	68
Changing the continuous rate or demand dose	68
Changing an automatic dose	68
Viewing the Last Dose Time and Next Dose Time	69
Viewing Medication GIVEN and Demand Dose Counter	70

Replacing the Battery

The power source for the pump is a 9-volt battery. When battery power is low, three short beeps will sound every five minutes and LOW BAT will flash on the display. The pump will still be operable. When the 9-volt battery is depleted, a continuous two-tone alarm will sound with no message.

Replace the battery with a fresh 9-volt alkaline or lithium battery such as the DURACELL® Alkaline MN 1604, the EVEREADY® ENERGIZER® Alkaline #522, or the ULTRALIFE® Lithium U9VL battery.

The pump's nonvolatile memory retains all programmed values while the battery is removed. There is no on/off switch for the pump; once you insert the battery, the pump will be in the Stop mode.

The pump is also equipped with an internal battery which powers the clock. When the clock battery is depleted, a continuous two-tone alarm will sound and "CLOCK BATTERY DEPLETED" will scroll across the display. Remove the pump from service and return the pump to SIMS Deltec, Inc.

NOTE: Before stopping the pump to change the battery, be aware that delivery will stop. If a demand dose is in progress, it will be canceled. If an automatic dose is in progress and the pump is restarted before the dose duration expires, delivery will resume, but the amount missed will not be made up. Review the NEXT DOSE ☹ to determine whether an automatic dose is scheduled to start before changing the battery.

WARNINGS:

- (1) Because there is no pump alarm to alert users that a battery has become dislodged due to a damaged battery compartment cover becoming separated from the pump or improper battery installation, it is important to carefully follow battery installation procedures.
- (2) If the pump is dropped or hit against a hard surface, the battery door may become broken or damaged. **DO NOT USE** the pump if it has been damaged in this way because the battery will not be properly secured; this may result in loss of power, nondelivery of drugs, and, depending on the type of drug being administered, death or serious injury.

-
-
- CAUTIONS:** (1) Do not use carbon-zinc or rechargeable 9-volt NiCad batteries.
(2) Always put the pump in the Stop mode before removing the battery to avoid the risk of losing programmed values.
(3) Do not store the pump for prolonged periods of time with the battery installed. Battery leakage could damage the pump.
-

1. Put the pump in the Stop mode. (See “Stopping the Pump,” this section.)
2. Remove the battery door by pressing firmly on the arrow and sliding the door off. Remove the used battery.
3. Insert the new battery matching its polarity (+ and -) with the polarity marked on the back of the pump near the battery compartment.

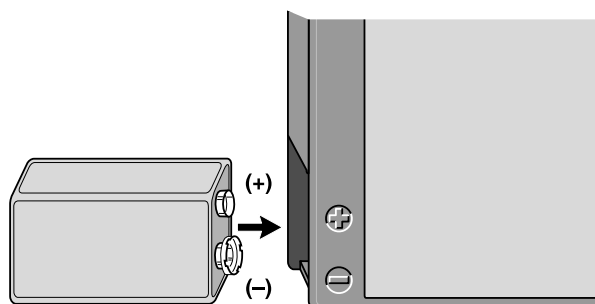



Figure 13. Match the polarity markings on the back of the pump.

4. Holding the battery in, press firmly on the arrow as you slide the battery door on. The pump will begin its power-up sequence and will review all programmed values. A series of six beeps will sound and the pump will be in the Stop mode.

NOTES:

- (1) If “EEEE” appears on the display, the power-up test has detected a fault; return the pump for service.
- (2) If “CANCEL NEXT AUTO DOSE?” scrolls through the display, the next automatic dose was canceled before the battery was removed. Press \triangle if the dose should remain canceled, or press ∇ if the dose should be delivered.
- (3) If the battery is positioned incorrectly, the pump will not operate.
- (4) To bypass the automatic review, press  three times.

Installing a Micro Medication Reservoir (Syringe)

This section describes how to install a Micro Medication Reservoir and infusion set. The last procedure in this section describes how to change the **reservoir only** keeping the patient's infusion set in place.

If you have opted to use the RES VOL function, the pump will alarm as medication becomes low. When the RES VOL value reaches 0.500 ml, two beeps will sound and the display will alternate between “L 0.500” and the RES VOL value. Two beeps will sound each time the RES VOL drops another 0.100 ml (at 0.400, 0.300, 0.200, and 0.100 ml).

When the RES VOL value reaches 0 ml, the pump will automatically stop. The pointer will move to RES VOL, “0.0000” will flash on the display, and two beeps will sound every second. To stop the alarm, press



. Then install a new reservoir.

-
- CAUTIONS:**
- (1) Do not reuse the medication reservoir. It is for single use only.
 - (2) Use the PRIME key to prime the pump. Otherwise, delivery will be inaccurate. In addition to removing air from the fluid path, the PRIME key places the reservoir plunger firmly against the drive nut for accurate delivery. Do not prime the pump while the tubing is connected to the patient.
 - (3) Always clamp the extension set tubing before disconnecting the extension set from the reservoir or removing the reservoir from the pump.
 - (4) Certain solutions may be incompatible with the materials used in the reservoir. While some incompatibilities are apparent, be aware that subtle physical, chemical, or pharmacological changes can occur. Consult the package insert of the drug or solution used. Contact the manufacturer of the drug or solution if there is any doubt about its compatibility with the reservoir. Observe time and temperature limits for stability of the drug or solution.

NOTE: If the pump is in LL2, RES VOL may be reset only after it reaches 0 ml. In LL0 or LL1, RES VOL may be reset at any time. To do this, stop the pump, move the pointer to RES VOL, and press



Preparing the reservoir

1. Using aseptic technique, remove a new reservoir from its package and unscrew the protective cap. Move the plunger back and forth to ensure ease of movement.
2. Attach a sterile hypodermic needle to the Luer fitting and fill the reservoir. Allow extra drug or solution for priming the entire fluid path including any extension sets or other infusion apparatus.
3. Expel any air from the reservoir by pointing it up, gently tapping the barrel, and pushing the plunger. Remove the hypodermic needle.
4. Using aseptic technique, connect the reservoir to a new clamped infusion set or infusion set with a needle. Twist the Luer lock fittings firmly to prevent leakage of the drug or solution.

Installing the reservoir

1. Slide the cover off the top of the pump.
2. Determine the amount of drug or solution in the new reservoir. Rotate the drive nut so its left edge lines up with the corresponding graduation on the pump. In the following figure, the drive nut is positioned at the 8 milliliter mark.

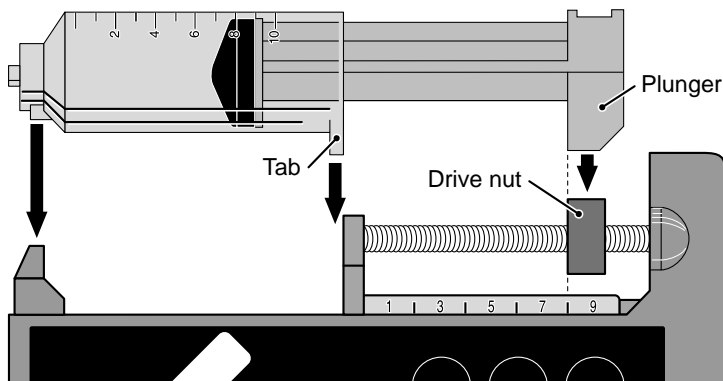


Figure 14. Placing the reservoir onto the pump.

3. Place the new reservoir onto the pump making sure the end of the

plunger is seated firmly **around the drive nut** and the reservoir tab is engaged in its slot. Snap the tip of the reservoir into place.

- Slide the cover completely onto the pump. **Prime the pump and the fluid path as described in the next section before inserting the infusion set or connecting it to the patient.**


NOTE: If the cover does not slide on completely, the reservoir may not be placed properly. Remove the cover and ensure that the end of the plunger fits around the drive nut. You may need to adjust the position of the drive nut in order for the reservoir to fit properly.

Priming the pump and fluid path

CAUTION: Always prime the pump and fluid path using the PRIME key before connecting to the patient even if you do not see air in the system. Using the PRIME key will position the end of the plunger firmly against the drive nut. Otherwise, the first dose may be inaccurate.

- Unclamp the infusion set. Hold the pump with the Luer fitting pointed upward and press . “” will appear.



- Press and hold the  key to deliver up to 0.300 ml of medication in 0.010 ml increments. One beep will sound for each 0.010 ml delivered and the volume delivered will appear. When 0.300 ml have been delivered, the pump will automatically stop.
- Check whether the system is fully primed. If not, repeat steps 1 and 2.

Connecting or inserting the infusion set

- If appropriate, clamp the catheter to avoid blood back flow. Insert the infusion set or connect the infusion set to an indwelling catheter or needle. Make sure RES VOL has been reset.
- Open all clamps and start the infusion.

Replacing the reservoir only

1. Obtain a new, filled reservoir. Keep the protective cap on the tip of the reservoir until it is installed on the pump to avoid accidental loss of medication.
2. Clamp the tubing and disconnect it from the used reservoir. **Care should be taken not to contaminate the infusion set Luer connector.**
3. Slide the cover off of the pump and discard the used reservoir.
4. Determine the amount of medication in the new reservoir. Rotate the drive nut so its left edge lines up with the corresponding graduation on the pump. (See figure 14.)
5. Place the new reservoir onto the pump making sure the plunger rod end is seated firmly **around the drive nut** and the reservoir heel is engaged in its slot. (See figure 14.) Snap the reservoir into place.
6. Slide the reservoir cover completely onto the pump. Remove the protective cap and **prime the pump and the fluid path as described on the previous page before inserting the infusion set or connecting it to the patient.**

NOTE: If the cover does not slide on completely, the reservoir may not be placed properly. Remove the cover and ensure that the end of the plunger fits around the drive nut. You may need to adjust the position of the drive nut in order for the reservoir to fit properly.



CAUTION: Always prime the pump and fluid path using the PRIME key before connecting to the patient even if you do not see air in the system. Using the PRIME key will position the end of the plunger firmly against the drive nut. Otherwise, the first dose may be inaccurate.

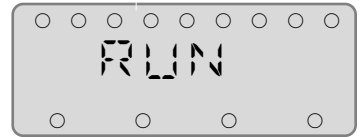
7. Connect the infusion set to the reservoir. Twist the Luer lock fittings firmly to prevent leakage of the drug or solution. Make sure RES VOL has been reset.
8. Open all clamps and start the infusion.

Starting the Pump (Run Mode)

When you put the pump in the Run mode, the continuous rate, if programmed, will begin its delivery. If an automatic dose has been programmed to deliver at that time, the automatic dose will also begin. However, any part of the automatic dose that was missed before you started the pump will not be made up.



NOTE: The pump will not enter the Run mode if none of the delivery options have been programmed into its memory. The message “NO RATE OR DOSES PROGRAMMED” will scroll across the display.

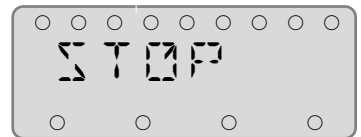
1. Hold  until the letters R-U-N appear on the display **and you hear a beep**.
2. Release . The current lock level will appear and the pump will display all of its programmed values in sequence. When it is finished, “RUN” will flash in the lower left corner of the display.



Stopping the Pump (Stop Mode)

If you stop the pump in the middle of an automatic or demand dose, delivery stops. When you restart the pump, the automatic dose will resume, but a demand dose will not. The automatic dose will continue until its duration expires but the portion of the dose that was missed will not be made up.







1. Hold  until the letters S-T-O-P appear on the display **and you hear a beep**.
2. Release . “STOP” will flash on the lower left corner of the display and the current time of day will appear.



Resetting the Clock

The pump must be in the Stop mode and LL0 to change the clock time. You may change the clock time even if automatic doses are programmed. Since automatic doses are programmed to start at a certain time of day, they will start according to the new clock time.

CAUTION: When you change the clock time, any lockout time that is in effect will be cleared. If a demand dose is programmed, a demand dose could be requested immediately upon starting the pump.


1. Put the pump into the Stop mode. (See “Stopping the Pump” in this section.)
2. Change the lock level to LL0. (See “Change to Lock Level 0” in Section 2.)
3. Press  to move the pointer to TIME .
4. Press  or  until the correct time of day appears.
5. Press . The message “CHANGE TIME OF DAY?” will appear.
6. Press  to set the new time.

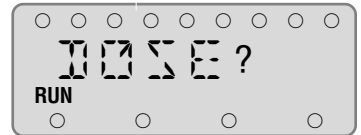
Starting a Demand Dose


If a demand dose amount has been programmed, you may start a demand dose while the pump is in the Run mode. Each time a demand dose is delivered, the pump automatically adds it to the dose counter under the GIVEN function. If no demand dose has been programmed, the pump will ignore the DEMAND DOSE key when you press it.


If you attempt to deliver a demand dose while another demand dose is being delivered, “DOSE IN PROGRESS” will appear on the display and the pump will not deliver the second dose. If you attempt to deliver a demand dose during the lockout time, “DOSE LOCKED OUT” will appear on the display and the dose will not be delivered.

NOTE: While a demand dose is being delivered, the pointer blinks in the display under DEMAND DOSE.

1. Press . “DOSE ?” will appear on the display.



2. Press  to start the demand dose. The message “DOSE STARTED” will scroll across the display and the pump will begin delivering the dose.

Or, press  if you do not wish to start the demand dose.




Stopping a Dose

In any lock level, you may stop (cancel) a demand dose in progress. You may also cancel the next automatic dose at any time up until it is scheduled to start. However, you may not cancel an automatic dose in progress.

When you cancel the next automatic dose, the NEXT DOSE ☉ function will show the start time for the following automatic dose. If no other doses are programmed, dashes “- - - - -” will display instead of the next dose time.




Canceling a demand dose in progress


NOTE: Leave the pump in the Run mode.

1. Press . “CANCEL DEMAND DOSE?” will scroll through the display.
2. Press  to stop the demand dose. (Press  if you do not wish to cancel the dose.)

Canceling the next automatic dose

NOTE: Leave the pump in the Run mode.





1. Press  until the pointer is positioned under NEXT DOSE ☉.
2. Press . The message “CANCEL NEXT AUTO DOSE?” will appear.
3. Press  to cancel the next automatic dose.

NOTE: You can reverse the cancellation of the next automatic dose. To do this, stop the pump, remove the battery, and reinsert the battery. When the message “CANCEL NEXT AUTO DOSE?” appears, press the  key. The next automatic dose will no longer be canceled.







Adjusting Doses in LL1

In Lock Level 1 (LL1), you can change the continuous rate, demand dose amount, or automatic dose amount by stopping the pump and scrolling to a lower or higher value. You are not allowed to scroll to a value higher than the maximum rate or amount programmed in Lock Level 0.




Changing the continuous rate or demand dose



1. Stop the pump. (See “Stopping the Pump,” this section.)
2. Press  to move the pointer to the function you wish to change (RATE or DEMAND DOSE amount). The current value will appear.
3. Press  or  until the desired value appears.
4. Press  within 15 seconds to set the new value. Start the pump.



Changing an automatic dose


1. Stop the pump. (See “Stopping the Pump,” this section.)
2. Press  to move the pointer to DOSE #.
3. Press  until the dose number for the automatic dose you wish to change appears.
4. Press  to move the pointer to AMOUNT. The current value will appear.
5. Press  or  until the desired value appears.
6. Press  within 15 seconds to set the new value. Start the pump.



Viewing the Last Dose Time and Next Dose Time

The **LAST DOSE**  records the time the last automatic or demand dose started. This value is automatically updated by the pump. The time displayed is the time the last dose actually started, not necessarily the time it was programmed to start. For example, the last dose may have been programmed to start at 12:00, but the pump may not have been started until 12:10. In this case, the **LAST DOSE**  would say 12:10. If the battery is removed for more than 24 hours or if the time of day is changed, the **LAST DOSE**  will clear to dashes “-- :--:-- .”



The **NEXT DOSE**  indicates the time the next automatic dose will start. This is the time the next automatic dose will actually start, not necessarily when it is programmed to start. For example, if the lockout time will prevent the next dose from starting on time, the **NEXT DOSE**  will show the actual start time.

You may view the **LAST DOSE**  and the **NEXT DOSE**  in either the Run or Stop mode.

CAUTION: Do not use the  key to move the pointer. If the pump is in the Stop mode and LL0, using this key may clear any lockout time that is in effect. This allows a demand dose, if programmed, to be requested immediately. You may also inadvertently reset the RES VOL and GIVEN values.

1. Press  to move the pointer to **LAST DOSE** . The start time of the last automatic or demand dose will appear.

NOTE: If dashes “-- :--:-- .” appear, this means no doses have been delivered within the last 24 hours or the time of day has been changed.

2. Press  again to move the pointer to **NEXT DOSE** . The start time of the next automatic dose will appear.


NOTE: If dashes “-- :--:-- .” appear, there are no automatic doses or there is only one and it has been canceled.



Viewing Medication GIVEN and Demand Dose Counter



You should review the GIVEN function periodically to ensure that the proper amount of medication is being delivered. The GIVEN function records the total volume of medication that has been delivered by the **continuous rate, demand doses, and automatic doses** since the last time this value was cleared. The demand dose counter records the number of demand doses that have been delivered.

Both values are automatically updated by the pump as fluid is delivered. Fluid delivered with the PRIME key is **not** included in the GIVEN total. The maximum volume that the pump can record under GIVEN is 19.998 ml. If more medication is delivered, this value will start over at 0.000.

The pump may be in either the Run or Stop mode to view the GIVEN value and the demand dose counter. (To clear these values, the pump must be in the Stop mode and LL0. See “Clear the dose counter and the GIVEN value” in Section 2.)

CAUTION: Do not use the  key to move the pointer. If the pump is in the Stop mode and LL0, using this key may clear any lockout time that is in effect. This allows a demand dose, if programmed, to be requested immediately. You may also inadvertently reset the RES VOL and GIVEN values.

1. Press  to move the pointer to GIVEN. The volume of medication given will appear.
2. Press . The number of demand doses that have been delivered will appear followed by the message “DEMAND DOSES GIVEN.”
3. If the pump is in the Stop mode and LL0, the message “CLEAR DOSE COUNTER?” will follow.

Press  to retain the dose counter value. Or, press  to clear the dose counter.

Section 5

Reference

Glossary	72
Pump Maintenance and Cleaning	74
Equipment Exposure to Radiation or MRI	74
Alarms and Troubleshooting	75
CADD-Micro Programming Worksheet	78
FAST Duration Chart	79
24-Hour (Military) Time Conversion Chart	80
Specifications (Nominal)	80
Limited Warranty	83

Glossary

CADD® A trademark acronym for “Computerized Ambulatory Drug Delivery.”

Continuous Rate One of the options available for delivery. This option delivers medication at a constant rate.

Display The screen or viewing area on the front of the pump that displays operating modes, values, and conditions of operation.

FAST An option that may be used as the duration for a demand dose or an automatic dose. A dose with a “FAST” duration will be delivered as fast as the pump will allow up to 12 ml/hr. (See “Specifications,” this section.)

Fluid Path The portion of the delivery system that consists of the fluid container, infusion set, and access device.

Function Any one of the rates, amounts, or times listed along the top or bottom of the pump’s display which are programmable or calculated by the pump.

Infusion The delivery of fluid or medication into the patient.

KVO (Keep Vein Open) Rate The continuous rate that has been programmed to continue pumping after a prescribed dose has been delivered.

Lock Level This term refers to the lock level (LL0, LL1, or LL2) which is set using the LOCK key. The lock level restricts access to pump programming and operation.

Luer Lock Connector The fitting which connects the patient’s access device and/or infusion set to the administration set.

Micro Medication Reservoir (Reservoir) The syringe attached to the top of the pump containing the medication to be delivered.

Microprocessor The electronic device that controls the pump.

Mode Refers to one of two operating conditions: the Stop mode, during which the pump is programmed or primed, and the Run mode, during which fluid delivery occurs.

Pointer The dot (●) in the display which indicates the function you are viewing or programming. When the pointer is positioned below or above a function, the number that appears on the display is the value that has been programmed or calculated for that function.

PRIME Key The key that allows you to pump a small volume of medication through the fluid path to purge air bubbles from the administration set and tubing. The priming procedure occurs before you connect the tubing to the patient's access device.

RATE *See* Continuous Rate.

RES VOL (Reservoir Volume) The value calculated by the pump which approximates the volume of medication remaining in the reservoir (in milliliters). This value is the difference between the value that was initially programmed and the volume of fluid delivered (including fluid delivered with the PRIME key).

Reservoir *See* Micro Medication Reservoir.

Reservoir Volume *See* RES VOL.

Scroll Keys (Also the “Y and N Keys.”) The two triangular shaped keys (△ ▽) which are used to increase or decrease the numeric value of any pump operating value. These values are shown on the display.

Value The number that was programmed into the pump or calculated by the pump for a particular function.

Y and N Keys (Also the “Scroll Keys.”) The two triangular shaped keys (△ ▽) used to respond yes or no to questions which scroll across the display.

Pump Maintenance and Cleaning

CAUTION:

- Do not immerse the pump in cleaning fluid or water. Do not allow solution to soak into the pump, accumulate on the keypad, or enter the battery compartment.
- Do not clean the pump with acetone, other plastic solvents, or abrasive cleaners.

Use any of the following solutions to clean the pump and accessories:

- Soap solution
- Benzalkonium Chloride concentrate (0.13%)
- Glutaral Concentrate, USP (2%)
- 10 percent solution of household bleach (one part household bleach to nine parts water)
- Alcohol, USP (93%)
- Isopropyl Alcohol, USP (99%)

1. Dampen a soft, lint-free cloth with cleaning solution. Apply the solution to exterior surface of the pump. *Do not allow the solution to soak into the pump.*
2. Wipe the entire surface dry with another soft, lint-free cloth. Allow the pump to dry completely before use.

Equipment Exposure to Radiation or Magnetic Resonance Imaging (MRI)

CAUTIONS:

- (1) The CADD-Micro pump **SHOULD NOT BE DIRECTLY IRRADIATED** by therapeutic levels of ionizing radiation because of the risk of permanent damage to the pump's electronic circuitry. The best procedure to follow is to remove the pump from the patient during therapeutic radiation sessions or diagnostic levels of radiographic and fluoroscopic radiation. If the pump must remain in the vicinity during a diagnostic or therapy session, it should be shielded, and its ability to function properly should be confirmed following treatment.
- (2) Magnetic fields produced by magnetic resonance imaging (MRI) equipment may adversely affect the operation of the pump. Remove the pump from the patient during MRI procedures and keep it a safe distance away from magnetic energy.

Alarms and Troubleshooting

General Alarms

What you see/hear	Problem	Action
EEEE appears with a continuous two-tone alarm.	The pump has detected an internal error. *	Remove the battery and return the pump for service.
LOW BAT flashes on the display and three beeps sound every five minutes.	The 9-volt battery power is low, but the pump is operable.	Change the 9-volt battery.
A continuous two-tone alarm sounds, “STOP” or “RUN” stops blinking, and there is no message on the display.	The 9-volt battery power is depleted. *	Change the 9-volt battery.
A continuous two-tone alarm sounds and “STOP” or “RUN” continues to blink with no message on the display.	A key may be pressed down. *	Release all keys. If the alarm continues, return the pump for service.
CLOCK BATTERY DEPLETED scrolls across the display with a continuous two-tone alarm.	The internal battery that powers the clock is depleted. *	Remove the pump from service and return it to SIMS Deltec, Inc.
HIGH PRESSURE OR SYRINGE EMPTY scrolls across the display with a continuous two-tone alarm.	There may be a blockage or kink in the fluid path or a tubing clamp may be closed. *	Locate and remove the obstruction to continue. Or, press the STOP/START key to stop the pump and the alarm, then locate and remove the obstruction. Restart the pump.
	Or, the reservoir may be empty. *	If the reservoir is empty, see “Replacing the Micro Medication Reservoir” in Section 4. NOTE: In the Stop mode, press STOP/START to silence the alarm for 2 minutes.
SYRINGE COVER REMOVED scrolls across the display with a continuous two-tone alarm.	The pump is in the Run mode but the cover is not in place. *	Replace the cover to continue operation, or press the STOP/START key to put the pump in the Stop mode and shut off the alarm.

* Fluid delivery stops when this alarm occurs. Any doses that are missed during this alarm will not be made up.

General Alarms—continued

What you see/hear	Problem	Action
COVER OFF or COVER ON scrolls across the display with two short beeps.	The pump is in the Stop mode and the cover has been removed or replaced.	No action is necessary; message confirms that you have removed or replaced the cover.
LOW and the RES VOL value flash on the display. Two beeps sound at a RES VOL value of 0.50 and with each decrease of 0.10 ml.	The RES VOL value is low, indicating that the level of medication in the reservoir is low.	Prepare to install a new reservoir.
A RES VOL value of 0.000 flashes on the display and two short beeps sound every second.	The RES VOL value has reached 0.000. The pump automatically changes to the Stop mode.	Press STOP/START to stop the alarm. The RES VOL value will automatically revert to its last programmed value. Install a new reservoir if necessary.
CANCEL DEMAND DOSE? scrolls across the display with two short beeps.	You may have inadvertently pressed the SET/CLEAR key while a demand dose was in progress.	If you do not wish to cancel the dose, press the N key.
NO RATE OR DOSES PROGRAMMED scrolls across the display with two short beeps when you try to change to the Run mode.	The pump will not allow you to change to the Run mode if a continuous rate, demand dose, or automatic doses have not been programmed.	Follow the instructions in Section 2 to program the pump.
CANCEL NEXT AUTO DOSE? scrolls across the display after you insert a new battery.	Before the battery was removed, the next automatic dose had been canceled.	If the automatic dose should remain canceled, press the Y key. If not, press the N key.
Three beeps sound every 5 minutes and “STOP” blinks on the display.	The pump is in the Stop mode.	Change the pump to the Run mode if it should be infusing and review the programmed automatic doses to see if a dose was missed.
While trying to start the pump, ONE OR MORE AUTO DOSES LOCKED OUT scrolls across the display and two short beeps sound.	The programmed lockout time will prevent delivery of all or part of automatic dose(s). The pump cannot be started.	Adjust the LOCKOUT Ⓢ or the automatic dose(s) so that no automatic doses are locked out.

Alarms While Requesting a Demand Dose

What you see/hear	Problem	Action
DOSE LOCKED OUT scrolls across the display and two short beeps sound.	A demand dose was attempted, but the lockout time prevented the dose from being delivered.	Press any key to stop the alarm and wait until the lockout time expires before requesting the demand dose.
DOSE IN PROGRESS scrolls across the display and two short beeps sound.	A demand dose was requested while another demand dose was already in progress.	Press any key to stop the alarm and wait until the current demand dose has finished its delivery.

Alarms and Messages While Programming

What you see/hear	Problem	Action
While programming an automatic dose, NEXT DOSE LOCKED OUT scrolls across the display and two short beeps sound.	The automatic dose you are programming plus the lockout time will prevent the next automatic dose (already programmed) from starting on time.	Review the values for the new dose, existing automatic doses, and the lockout time; correct the values or set the lockout time to zero so no automatic doses are locked out.
While programming an automatic dose, you are not able to scroll to FFFF?.	The maximum number of automatic doses (24) is programmed or automatic doses occupy the entire day.	Review the automatic doses; clear and/or reprogram them if necessary.
While programming LOCKOUT @, ONE OR MORE AUTO DOSES LOCKED OUT scrolls across the display and two short beeps sound.	The lockout time conflicts with an automatic dose that is already programmed, and will prevent it from starting on time.	Review the automatic doses; if necessary, correct the lockout time so that no automatic doses are locked out.
While trying to program the START @, DOSE LOCKED OUT scrolls across the display.	You have chosen a start time which causes the dose to fall within the lockout time.	Review the existing doses and the lockout time; adjust the doses or set the lockout time to zero.
While trying to program the DURATION or an AMOUNT, the display will not scroll past a certain value.	The pump will scroll only through values that do not cause the dose to overlap the next dose.	Review the existing doses and adjust start times if necessary.

FAST Duration Chart

When the duration of a demand dose or an automatic dose is programmed to “fast,” the dose will be delivered over a whole number of minutes at a maximum rate of 12 ml/hr (0.2 ml/min). The graph below illustrates the number of minutes over which various dose amounts will be delivered. For example, a 1.0 ml dose will be delivered in 5 minutes and a 4.8 ml dose will be delivered in 24 minutes.

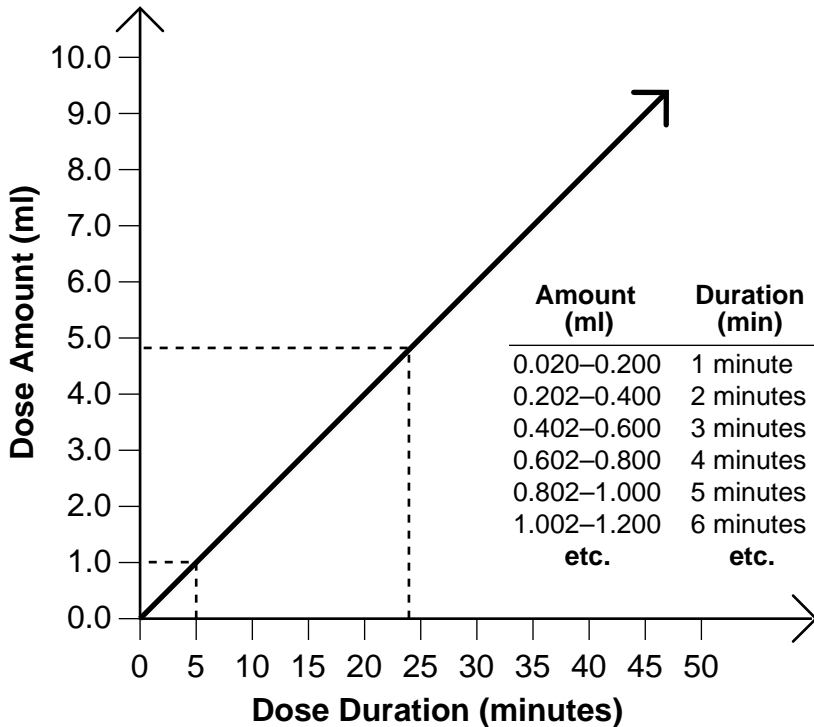


Figure 19. FAST Duration graph.

24-Hour (Military) Time Conversion Chart

12-Hour Time	24-Hour (Military) Time
12:00 AM	00:00
1:00 AM	01:00
2:00 AM	02:00
3:00 AM	03:00
4:00 AM	04:00
5:00 AM	05:00
6:00 AM	06:00
7:00 AM	07:00
8:00 AM	08:00
9:00 AM	09:00
10:00 AM	10:00
11:00 AM	11:00
12:00 PM	12:00
1:00 PM	13:00
2:00 PM	14:00
3:00 PM	15:00
4:00 PM	16:00
5:00 PM	17:00
6:00 PM	18:00
7:00 PM	19:00
8:00 PM	20:00
9:00 PM	21:00
10:00 PM	22:00
11:00 PM	23:00

Specifications (Nominal)

Programming Specifications

Maximum Infusion

Rate: 26 ml/hr (sum of 2 ml/hr continuous RATE, 12 ml/hr automatic dose, and 12 ml/hr demand dose).

Reservoir Volume: 0 to 10.500 ml in 0.100 ml increments.

Continuous Rate: 0.000, or 0.020 ml/hr to 2.000 ml/hr in 0.002 ml/hr increments.

Demand Dose Amount: 0.000, or 0.020 ml to 1.000 ml in 0.002 ml increments.

Demand Dose Duration: 5 to 15 minutes in 1-minute increments, or 15 minutes to 24 hours in 5-minute increments, or “FAST.”

Lockout Time: 0 to 1 hour in 1-minute increments, or 1 hour to 23 hours 55 minutes in 5-minute increments.

Automatic Dose Start Time: 0 to 23 hours 55 minutes in 5-minute increments.

Automatic Dose Amount: 0.020 to 1.000 ml in 0.002 ml increments, or 1.000 to 10.000 ml in 0.010-ml increments. Due to the maximum delivery rate, the amount is constrained by the maximum dose rate and the time the next automatic dose starts.

Automatic Dose Duration: 5 minutes to 15 minutes in 1-minute increments, or 15 minutes to 24 hours in 5-minute increments, or “FAST.”

“FAST” Duration: Dose is delivered over a whole number of minutes at a maximum rate of 12 ml/hr (0.2 ml/min).

Given Range: 0 to 19.998 ml.

General Pump Specifications

Size: Approximately 2.3 cm × 7.6 cm × 11.9 cm (0.9 in × 3.0 in × 4.7 in).

Weight: Approximately 255 g (9 oz.), including battery and empty reservoir.

Pump Alarms: Low 9-volt battery, low internal battery, high pressure (8 ± 4 psi), internal controller, power up fault, low volume in fluid container, empty fluid container, syringe cover sensor, key pressed. (For more information, see “Alarms and Troubleshooting,” this section.)

Power Sources: 9-volt alkaline or lithium battery powers the pump, such as the DURACELL® Alkaline MN 1604, the EVEREADY® ENERGIZER Alkaline #522, or the ULTRALIFE® Lithium U9VL battery. The expected battery life of a 9-volt battery is 7 days (nominal) at a delivery rate of 10 ml per day. This estimate is based on laboratory tests conducted at room temperature using a fresh battery. Actual battery life will vary depending on the brand of battery, battery shelf life, and temperature conditions.

An internal battery powers the clock. When it is depleted, it cannot reliably retain the clock time. This battery must be replaced by Deltec. The internal battery has an expected life of 5 years.

Limited Warranty

SIMS Deltec, Inc. (the “Manufacturer”) warrants to the Original Purchaser that the infusion pump (the “Pump”), not including accessories, shall be free from defects in materials and workmanship under normal use, if used in accordance with this Operator’s Manual, for a period of one year from the actual date of sale to the Original Purchaser. THERE ARE NO OTHER WARRANTIES.

This warranty does not cover normal wear and tear and maintenance items, and specifically excludes batteries, administration sets, extension sets or any other accessory items or equipment used with the Pump.

Subject to the conditions of and upon compliance with this Limited Warranty, the Manufacturer will repair or replace at its option without charge (except for a minimal charge for postage and handling) any Pump (not including accessories) which is defective if a claim is made during such one-year period.

The following conditions, procedures, and limitations apply to the Manufacturer’s obligation under this warranty:

- A. Parties Covered by this Warranty: This warranty extends only to the Original Purchaser of the Pump. This warranty does not extend to subsequent purchasers. The Original Purchaser may be a patient, medical personnel, a hospital, or institution which purchases the Pump for treatment of patients. The Original Purchaser should retain the invoice or sales receipt as proof as to the actual date of purchase.
- B. Warranty Performance Procedure: Notice of the claimed defect must be made in writing or by telephone to the Manufacturer as follows: Customer Service Department, SIMS Deltec, Inc., 1265 Grey Fox Road, St. Paul, MN 55112 U.S.A., (800) 426-2448. Notice to the Manufacturer must include date of purchase, model and serial number, and a description of the claimed defect in sufficient detail to allow the Manufacturer to determine and facilitate any repairs which may be necessary. **AUTHORIZATION MUST BE OBTAINED PRIOR TO RETURNING THE PUMP.** If authorized, the Pump must be properly and carefully packaged and returned to the Manufacturer, postage prepaid. Any loss or damage during shipment is at the risk of the sender.
- C. Conditions of Warranty: The warranty is void if the Pump has been 1) repaired by someone other than the Manufacturer or its authorized agent; 2) altered so that its stability or reliability is affected; 3) misused; or, 4) damaged by negligence or accident. Misuse includes, but is not limited to, use not in compliance with the Operator’s Manual or use with nonapproved accessories. The Pump is a sealed unit, and the fact that the seal has been broken will be considered conclusive evidence that the Pump has been altered or misused. Removal or damage to the Pump’s serial number will invalidate this warranty.
- D. Limitations and Exclusions: Repair or replacement of the Pump or any component part thereof is the **EXCLUSIVE** remedy offered by the Manufacturer. The following exclusions and limitations shall apply:
 - 1. No agent, representative, or employee of the Manufacturer has authority to bind the Manufacturer to any representation or warranty, expressed or implied.
 - 2. **THERE IS NO WARRANTY OF MERCHANTABILITY OR FITNESS OR USE OF THE PUMP FOR ANY PARTICULAR PURPOSE.**

-
-
3. The Pump can only be used under the supervision of medical personnel whose skill and judgment determine the suitability of the Pump for any particular medical treatment.
 4. All recommendations, information, and descriptive literature supplied by the Manufacturer or its agents are believed to be accurate and reliable, but do not constitute warranties.

E. Computer Program License:

1. The Pump is intended to be used in conjunction with a particular Licensed Computer Program supplied by Manufacturer and use of any other program or unauthorized modification of a Licensed Computer Program shall void Manufacturer's warranty as set forth above.
2. The Original Purchaser and any users authorized by the Original Purchaser are hereby granted a nonexclusive, nontransferable license to use the Licensed Computer Program only in conjunction with the single Pump supplied by Manufacturer. The Licensed Computer Program is supplied only in machine-readable object code form and is based upon Manufacturer's proprietary confidential information. No rights are granted under this license or otherwise to decompile, produce humanly readable copies of, reverse engineer, modify or create any derivative works based upon the Licensed Computer Program.
3. All other terms and conditions of this Limited Warranty shall apply to the Licensed Computer Program.

THE MANUFACTURER DISCLAIMS RESPONSIBILITY FOR THE SUITABILITY OF THE PUMP FOR ANY PARTICULAR MEDICAL TREATMENT OR FOR ANY MEDICAL COMPLICATIONS RESULTING FROM THE USE OF THE PUMP. THE MANUFACTURER SHALL NOT BE RESPONSIBLE FOR ANY INCIDENTAL DAMAGES OR CONSEQUENTIAL DAMAGES TO PROPERTY, LOSS OF PROFITS, OR LOSS OF USE CAUSED BY ANY DEFECT OR MALFUNCTION OF THE PUMP.

This warranty gives the Original Purchaser specific legal rights, and the Original Purchaser may have other legal rights which may vary from state to state.

© 1996 SIMS Deltec, Inc.
All rights reserved.
Printed in U.S.A.

SIMS Deltec, Inc.
St. Paul, Minnesota 55112 U.S.A.

7/96
40-2879-01D

