Datrend Systems Inc.

Interface With medTester

1. INTRODUCTION

The **medTester 5000B** is part of an equipment management data base and testing system available from DNI Nevada Inc.(now Fluke Biomedical Corp.). To use Infutest with medTester, your medTester must have the *medCheck* firmware option installed, plus you must be able to use the equipment data base program Sentinel, also by DNI Nevada.

2. SETTING UP

Use a Datrend Systems SSC-1 cable to connect Infutest to <u>COM2</u> of the medTester. Do not use a null modem cable or adaptor.

Do not connect medTester to Infutest using the medTester serial cable supplied by DNI Nevada. This is a null modem cable for connecting COM1 of the medTester to a PC.

Power up medTester and select **UTIL** from the main menu level, followed by **PORTS**. Set **COM1** to **OFF** and **COM2** to **ON**. Return to the **UTIL** menu.

Select **RS232** and then **COM2**. Program COM2 as follows:

> Set **Baud Rate** to **9600**
> Set **Stop Bits** to **1**
> Set **Length** to **8**
> Set **Parity** and **CTS** to **OFF**

3. DESIGNING CHECKLISTS

A **Checklist** is a list of instructions or "check items" which medTester performs sequentially and automatically, pausing occasionally for data input from the user via the medTester keyboard, or from an external device connected to medTester's COM2 port. Checklists are created on a PC using the Sentinel program, and then are downloaded from your PC into medTester's memory.

To control Infutest with medTester, your Checklist must included check items which begin with **\M** followed by an Infutest remote control command. A check item beginning with **\M** tells medTester to get

data from COM2, instead of from the medTester keyboard. In executing a Checklist with **\M** items, the medTester will transmit whatever characters follow **\M** to the Infutest via COM2, and then will wait for data to be returned via COM2. Depending on the command which follows the **\M**, Infutest may return up to 40 characters of data to the medTester.

\M is also necessary to introduce delays into the Checklist so the Infutest has time to start the test and collect some measurement data. The syntax for this is:

> **\M** *pause*

where *pause* is the number of seconds (1 to 32000) you want medTester to wait until it continues with the next check item.

For example, your Checklist might begin with some PASS/FAIL items (**\P** items) for inputting information about the condition of the pump under test, such as the line cord and front panel keys and displays, and it might end with AutoSequence 10 to test electrical safety of the pump. In between, you want to conduct a test on Channel A to check the flow at 100 ml/hr, and then measure the occlusion pressure. To do the flow test, your Checklist could include the following items:

> \M RTA1
> \M 180
> \M STA
> \M GSA1

This portion of a Checklist starts a Single Rate Test on Channel A and runs the test for three minutes. The flow test is stopped and medTester requests Infutest to return the summary of the measurements made during the test via the GSA1 command.

Now you want the medTester to tell Infutest to run the Occlusion Pressure Test. To do that, the previous check items would be succeeded by:

> \M RTA4
> \M 60
> \M STA
> \M GSA4

These check items start an Occlusion Pressure Test

and run that test for one minute. The test is stopped and medTester requests Infutest to return the occlusion pressure measured via the GSA4 command.

A complete description of the Infutest remote control commands is given in the *Infutest Operating Manual.*

4. ENTERING CHECKLISTS WITH SENTINEL

To input the Checklists described in the previous section via DNI Nevada's Sentinel program, boot Sentinel on your PC and press D to select *"Reference Databases"* from the *"Main Menu"*. Press C to select *"Procedures Maintenance"*, then press A to display the *"Relational Procedures Maintenance"* screen. Press the h key to create a new procedure. Type **INFUTEST SR1** in the Procedure Name box, hit e twice, and then press u to begin editing the new Checklist you have just created.

On the *PROCEDURE ITEMS MAINTENANCE* screen, press h to view the *CHECK ITEM MASTER LIST*. Now press hagain to display the *CHECK ITEM RECORD* input box. This box allows you to enter new Check Items into Sentinel's Master List. For the command

\M RTA1

in the checklist of the previous section, enter **INFUTEST** in the "Type" box, enter **RTA1** in the "Desc." box, and enter **M** in the "Control" box. Now press u to save this new Check Item.

NOTE: ___DO NOT___ enter \M RTA1 in the "Desc." box. Enter only **RTA1**. Sentinel takes care of the \M via the character you enter in the "Control" box.

Press h again to add the 180-second delay command:

\M 180

to the Master List. In the *CHECK ITEM RECORD* box, enter **DELAY** in the "Type" box, enter **180** in the "Desc." box, and enter **M** in the "Control" box. Press u to save this timed delay command in Sentinel's Master List. Do not enter \M 180 in the "Desc." box. Enter only **180**. Sentinel takes care of the \M via the character you enter in the "Control" box.

Continue with this process, adding the remaining INFUTEST and DELAY commands to Sentinel's Master List. Once you have finished entering all the new Check Items, use the **wy** keys to scroll through the

Master List and tag your new Check Items in the correct order by pressing the **k** bar. Press u to copy the tagged Check Items into your new Checklist INFUTEST SR1. Exit the *PROCEDURE ITEMS MAINTENANCE* screen by pressing the ^ key**.** Keep pressing ^until you are back to Sentinel's *Main Menu.*

After downloading your Checklists from Sentinel to medTester via Sentinel's *Communications Menu*, press UTIL and PORTS on medTester's keypad and set COM1 to OFF and set COM2 to ON. Now press the UTIL, RS232 and COM2 keys on the medTester and check the settings are 9600 baud, 1 stop bit, parity OFF, length 8 bits, and CTS OFF. Connect medTester's COM2 to Infutest using a Datrend SSC-1 cable. You can then execute the Infutest Checklist by typing

INFUTEST SR1

on the medTester keypad and pressing "ENT".

5. medTester "BUGS"

DNI Nevada's medTester 5000B appears to have a number of software bugs related to interface with externally connected devices. The type of bugs you may experience with your medTester will depend on the software version and hardware configuration of your instrument. This section lists bugs which we have discovered or which have been reported by our customers to date.

a. medTester software ***versions 3.55 and earlier*** have problems in retrieving data via COM2. To overcome this medTester bug, precede Infutest "Get Summary" commands in checklists with a PASS/FAIL prompt. The following example illustrates the patch:

```
\M  RTA1
\M  180
\M  STA
\P  GET DATA FROM INFUTEST
\M  GSA1
```

The first command starts a Single Rate Test on Infutest Channel A. The second command provides a delay of 180 sec. The next command stops the Infutest. The \P command which follows makes medTester ready to receive data via COM2 (note medTester will wait at this point until you press PASS or FAIL on the medTester keyboard). The last command downloads the test summary from the Infutest.

b. ***Do not plug an external keyboard into medTester when you are using medTester COM2.*** medTester may default to reading data from the external keyboard rather than downloading data via COM2.

c. After downloading any Sentinel data from your PC to medTester via COM1, check that medTester COM1 is **_OFF_**, COM2 is **_ON_** and that COM2 stop bits remains set to **1**.

d. ***Depending on the version of your medTester, the RTS line of COM2 may inadvertently switch low after certain operations. In order for Infutest to transmit data to medTester, medTester's RTS line must stay <u>high</u>*** (the default). The best way to determine that RTS is high is to install an RS-232 breakout box between Infutest and medTester COM2 at the medTester end. Note that medTester is the Data Terminal Equipment (DTE).

If you don't have an RS-232 breakout box, you can open the DB-25 shell on your Datrend SSC-1 cable and plug this end into medTester COM2. Use a voltmeter to probe COM2 pin 4 (RTS) with respect to pin 7 (GND). The reading should be higher than + 4 VDC. If the voltage is negative, medTester's RTS signal will prevent Infutest from downloading data.

To overcome this problem on the medTester, you can modify your Datrend SSC-1 cable by opening the DB-25 shells and cutting the wires connected to pins 4 and 5. Solder a jumper lead so that ***pin 4*** of the SSC-1 is shorted to ***pin 5***. Perform this modification at ***both*** ends of the SSC-1. This will override Infutest's RTS/CTS signalling.

6. DEBUGGING YOUR SYSTEM

In debugging your medTester-Infutest setup, you should start by using simple 4-item Checklists like the examples given in this app note. Always use a Datrend SSC-1 cable, or make a cable using the wiring information given in Chapter 3, Section 3.3 of the *Infutest Operating Manual.*

If the Infutest does not respond to "run test" commands (e.g. RTA1) by starting a flow test, you are probably having hardware problems (e.g. cable, serial port setup, etc.). If the Infutest seems to respond to "run test" and "stop test" commands, but won't return test data to medTester, you are probably experiencing

medTester bugs like (a.), (b.) or (d.) discussed in the previous section.

7. COMMAND SUMMARY

The table on the following page lists all the Infutest commands which are compatible with the medTester 5000B. Further information on the format of data returned by the Infutest in response to the "GS" commands can be found in the *Infutest Operating Manual.*

Datrend Systems Inc.

Infutest 2000 Series C Remote Control Commands

Command description	CHAN A Command	CHAN B Command	Data transmitted from Infutest to medTester
Start a Single Rate Test	RTA1	RTB1	*
Start a Dual Rate Test	RTA2	RTB2	*
Start a PCA Pump Test	RTA3	RTB3	*
Start an Occlusion Pressure Test	RTA4	RTB4	*
Start AutoSequence number X	RSAX, X=1, 2...9	RSBX, X=1, 2...9	*
Stop a Test	STA	STB	*
Download Single Rate Test Summary Data	GSA1	GSB1	hh:mm:ss VVVVV ml AAAAA ml/h where hh:mm:ss = infusion time VVVVV = infused volume AAAAA = average infusion rate
Download Dual Rate Test Summary Data	GSA1 for RATE#1 GSA2 for RATE #2	GSB1 for RATE#1 GSB2 for RATE #2	hh:mm:ss VVVVV ml AAAAA ml/h where: hh:mm:ss = infusion time VVVVV = infused volume AAAAA = average infusion rate
Download PCA Pump Test Summary Data	GSA3	GSB3	VVVVV ml AAAAA ml/h mm:ss where: VVVVV = average bolus volume AAAAA = avg bolus delivery rate mm:ss = average lockout time
Download Occlusion Pressure Test Summary Data	GSA4	GSB4	<type> PP.P psi pppp mmHg at mm:ss where: <type> = MAX, NRS or OVP PP.P = occlusion pressure, PSI pppp = occlusion pressure, mmHg mm:ss = time of occl. pressure
Identify instrument connected to COM2	IDENT	IDENT	INFUTEST 2000,VER X.X,N where: X.X = Infutest software version N = # of channels (1, 2, or 4)

<u>Notes:</u>

1. To control RSM channels C and D, replace "A" and "B" characters in commands above with "C" and "D" respectively.

2. For Run Sequence ("RS") commands, ensure that Infutest AutoSequence parameter *"OUTPUT TO"* is set to "Printer". Alternatively, AutoSequence *AUTO-OUTPUT* must be set to "Off".

3. Do NOT use Infutest "DL" or "GR" commands with medTester.