instructions for

Q-400 and Q-500

Noise Dosimeters

nqa. ISO 9001 Registered

UKAS QUALITY MANAGEMENT 015

QUEST TECHNOLOGIES

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INTRODUCTION

The Q-400 and the Q-500 accumulate, calculate, and display noise measurement data. (See Figure 1.)

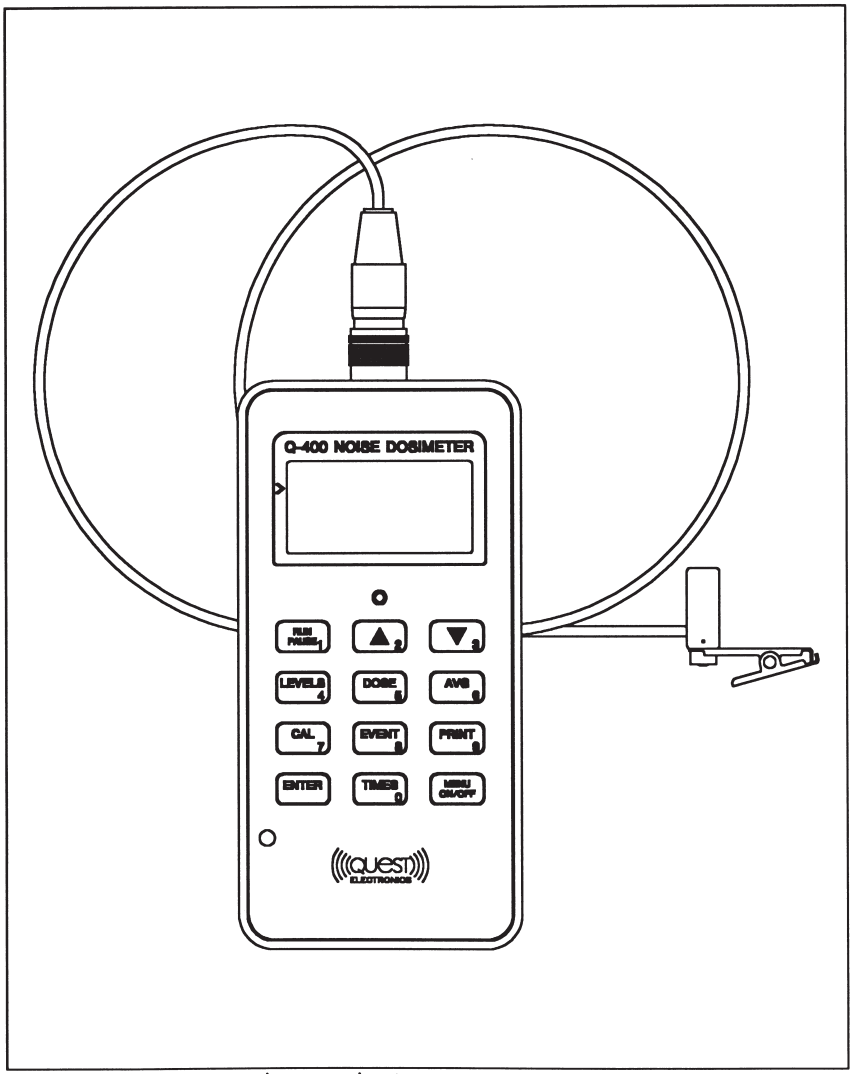


Figure 1. Q-400 Noise Dosimeter.

Either dosimeter will function as a Personal Noise Dosimeter, an Environmental Monitor, or an Event Monitor. The Q400 provides Type 2 measurement accuracy, while the Q500 is a precision Type 1 instrument.

- When used as a Personal Noise Dosimeter:

  The dosimeter may be clipped on a belt or worn in a shirt pocket. The small microphone is simply clipped to the shirt or shirt collar near the ear.

- When used as an Environmental Monitor or Events Monitor:

  The dosimeter may be either hand held or mounted to a standard camera tripod. The microphone is connected to the "Microphone Boom" and the unit is held similarly to a sound level meter.

- When used with a Personal Computer:

  The Quest Noise Manager Software package allows the user to analyze and print out pre-recorded data in extreme accuracy and detail.

- When used with a Printer:

  The dosimeter can print detailed reports of noise events. It connects to a printer by using a Quest "Parallel Printer Interface" or "Serial Computer Interface".

The dosimeter can function as two simultaneously operating noise dosimeters. When this is done, each is programmed with a different set-up. The dosimeter can also be programmed to perform the C - A measurement.

BATTERY INSTALLATION AND REMOVAL

The battery must be a 9 Volt alkaline type.
(Examples are: NEDA 1604A, IEC 6LF22, or IEC 6LR61)

- Replace the battery as follows (see Figure 2):

1.) Remove the battery cover.

2.) Lift the non-terminal end of the battery out of the battery compartment.

3.) Remove the battery.

4.) Notice the battery orientation drawing on the battery cover. Be sure that the battery is properly oriented with respect to the battery compartment terminals.

5.) Angle the non-terminal side of the battery into the battery compartment, and press the terminal end down into the holder.

6.) Install the battery cover.

Note: Battery life is affected by the dosimeter measuring setup parameters. Refer to the specifications for details.

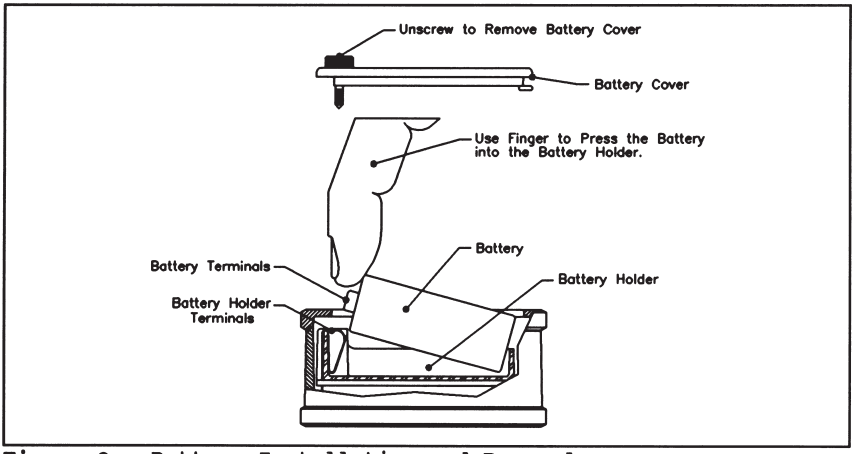


Figure 2. Battery Installation and Removal.

An internal battery powers the clock and memory. When this battery's voltage gets low, data memory and setup will not be retained when a 9V battery is not in the dosimeter. The memory only draws current from this battery when a 9V battery is not in the unit. Contact the factory or a Quest service center for replacement.

AC/DC ADAPTER INSTALLATION
Quest part number 056-973

The dosimeter can operate from one of the following power sources if desired:

- Any AC power source (9 to 18 VAC, 35 mA minimum)
  (Such as the Quest Model 920 AC Power Supply)

- Any DC power source (12 to 24 VDC, 35 mA minimum)
  (The polarity of the DC Plug does not matter.)

The power source must have a 3.5mm (1/8") phone plug.

Simply install the AC/DC Adapter into the dosimeter battery compartment in place of the battery as follows:

- Remove the battery from the battery compartment as follows:

  1.) Remove the battery cover. (See Figure 2.)

  2.) Lift the terminal end of the battery out of the battery compartment.

  3.) Remove the battery.

- Install the AC/DC Adapter as follows:

  1.) Position the dosimeter so that the battery compartment is facing upwards.

  2.) Snap the AC/DC Adapter into the dosimeter and fasten the cover.

  3.) Plug the desired power source (see above) into the AC/DC Adapter jack.

The dosimeter is now ready for operation.

Note: Safety approvals for dosimeter use in hazardous locations are for battery operation only. Do not use the AC/DC adapter in an environment classified as hazardous by the local electrical code or governing agency.

CABLE REMOVAL OR ATTACHMENT

Remove or attach the Cable Connector as follows:

- To remove the Cable Connector from the dosimeter:
  - Gently grasp and pull the Knurled Ring of the Cable Connector.
- To attach the Cable Connector to the dosimeter:

  1.) Grasp the black Rubber Boot of the Cable Connector.

  2.) Gently press the Cable Connector against the dosimeter connector while slowly rotating it. When it is properly lined up, it will stop rotating and slide into the dosimeter.

  3.) Insert the cable connector until a "click" is heard. The Cable Connector is now attached.

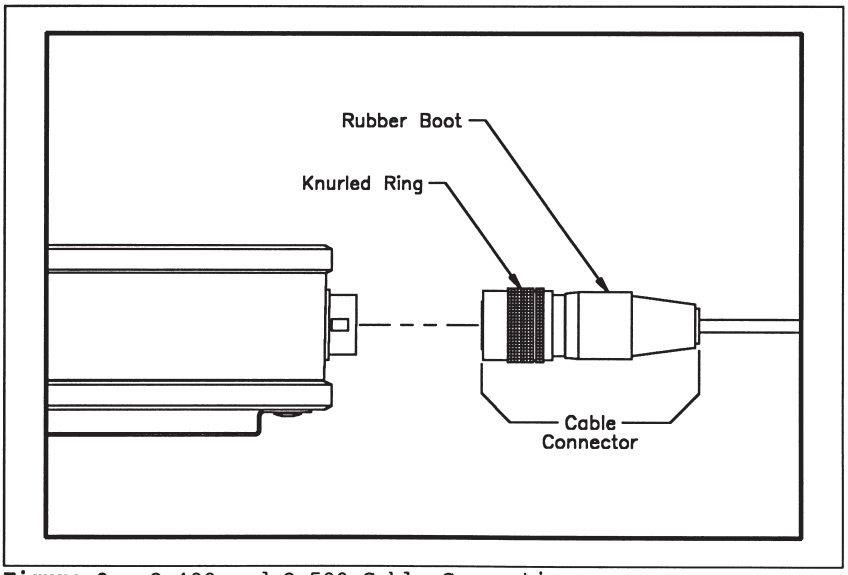


Figure 3. Q-400 and Q-500 Cable Connection.

USING THE MICROPHONE BOOM

The Microphone can be mounted on the Microphone Boom. This makes the dosimeter easier to use when hand-held or tripod-mounted.

The Microphone Boom attaches to the back of the dosimeter as follows:

1.) Connect the Microphone to the Microphone Boom in one of the following ways:

- Clip the Microphone to the Microphone Boom.
- Unscrew the Microphone Clip from the Microphone and screw the Microphone Boom to the Microphone.

2.) Carefully wind the cable onto the upper portion of the Microphone Boom.

3.) Insert the Microphone Boom Pin into the center hole on the Belt Clip.

4.) Fasten the bottom of the Microphone Boom to the Belt Clip with the Microphone Boom Thumbscrew.

The exposed end of the Microphone Boom Thumbscrew is threaded so that a tripod can be connected to it.

UP AND RUNNING

Turning the Dosimeter On:

1.) [MENU ON/OFF] ——> **" QUEST "**, the Software Revision Level and **"INITIALIZING"** will appear. If **"CRITICAL RESET"** appears, see APPENDIX, Displayed Warning Messages.

2.) [MENU ON/OFF] ——> **"SETUP"** menu will appear. The unit is now ready to operate.

Turning the Dosimeter Off:

1.) [MENU ON/OFF] ——> **"SETUP"** menu will appear with **"OFF-5"** highlighted.

2.) [ENTER] ——> Press and hold the key. **"OFF-5"** will count down to **"OFF-0"** and the dosimeter will turn off.

Starting and Stopping the Logging of Data:

1.) [RUN PAUSE 1] ——> Press to **"RUN"** (Start Logging) and press again to **"PAUSE"** (Stop Logging).

CALIBRATION

The dosimeter should be calibrated before each use.

To calibrate the microphone sensitivity:

CAL Key (CAL 7) ——> **"PRE-SURVEY"**
"PRE-SURVEY"

Note that PRE-SURVEY Calibration can only be done after a unit RESET. (No Run Time stored in the unit)

To periodically check the Acoustic Calibration:

CAL Key (CAL 7) ——> **"PERIODIC CHECK"**
"PERIODIC CHECK"

Periodically check the Acoustic Calibration of the dosimeter during and after use. Up to 8 Calibration Levels and Calibration Times can be saved throughout a measurement period.

To review the stored Calibration Levels and Times:

CAL Key (CAL 7) ——> **"REVIEW"**
"REVIEW"

See "DETAILED PROGRAMMING INSTRUCTIONS" if needed.

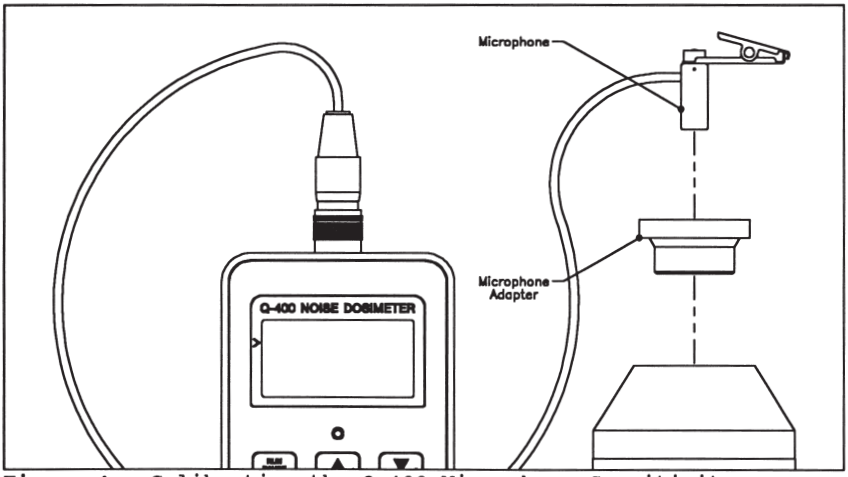


Figure 4. Calibrating the Q-400 Microphone Sensitivity.

The dosimeter will maintain its accuracy for many months of use. However, it is recommended that the dosimeter be returned annually to a Quest Authorized Service Station for a recalibration. Calibration standards, traceable to the National Institute of Standards and Technology (NIST) are maintained and used by Quest.

ABOUT THE DISPLAY

OL - Overload indicator lights when the sound level exceeds the measurement range of the instrument. While in RUN, this indicator stays lit until the dosimeter is RESET.

SLOW or **FAST** - indicates the time response of the measurement being viewed.

C, **A**, or **C-A** - indicates the frequency weighting of the measurement being viewed.

RUN or **PAUSE** - indicates the operating status of the instrument.

LOBAT - when first lit, indicates 8 hours of measurement time remaining on the battery.

Display Function Structure

Pressing the Display Function Keys provides the following displays:

LEVELS 4	---->	**"SPL"**	* Sound Pressure Level
		"PEAK"	* Absolute Unweighted Peak
		"MAX"	* Maximum Level
		"MIN"	* Minimum Level
DOSE 5	---->	**"DOSE"**	* Dose
		"PrD.8"	* 8 Hour Projected Dose
		"PrD.(Prt)"	* Variable Projected Dose
		"EXP"	* Exposure
AVG 6	---->	**"SEL"**	* Sound Exposure Level
		"LAV"	* Average Level (or LEQ)
		"TWA"	* Time Weighted Average
		"TWA (Prt)"	* Projected Time Weighted Avg.
EVENT 8	---->	**"Rev"**	Review Previous Events
		"Cev"	Current Event

When the dosimeter is not in the Event Mode:

TIMES 0	---->	**"Run Time"**	Total Run Time
		"PSTime"	Total Pause Time
		"ULTime"	Upper Limit Time Total
		"PKTime"	Time that Peak Occurred
		"MaxTime"	Time that Max Occurred
		"MinTime"	Time that Min Occurred
		"LoggTime"	Remaining Logging Time

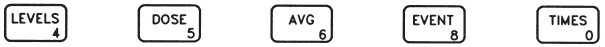
When the dosimeter is in the Event Mode:

TIMES 0	---->	**"Run Time"**	Event Run Time
		"PKTime"	Time that Event Peak Occurred
		"MaxTime"	Time that Event Max Occurred
		"MinTime"	Time that Event Min Occurred
		"LoggTime"	Remaining Logging Time

* See "APPENDIX, Acoustical Definitions" for more detail

Display Operation

Display Function Keys are as follows:



They allow the user to:

- Display Dosimeter 1 or Dosimeter 2 functions.
- Update the display information when briefly pressed.

Action Keys are as follows:

They allow the user to:

- Select a specific function to display.
- Enlarge some display characters for clarity.

Change the displayed information as follows:

1.) Briefly Press a desired Display Function Key. (**LEVELS**, **DOSE**, **AVG**, **EVENT**, or **TIMES**)

- To alternate between Dosimeter 1 and Dosimeter 2 for **LEVELS**, **DOSE**, **AVG**, or **TIMES**:
  - Alternately press the same Display Function Key.

2.) Use the **UP ARROW** and **DOWN ARROW** Keys to move the desired function so that the White Arrow (>) points to it.

- To alternately change the size of the numbers pointed to by the White Arrow:
  - Alternately press the **ENTER** Key.
- To make the display continuously update:
  - Press and hold the Display Function Key for a few seconds to enter this mode. Briefly press a Display Function Key to exit this mode.

NOTE: See "DISPLAY FUNCTION STRUCTURE" to see which functions are controlled with each Display Function Key.

SECURITY CODES

The Security Function allows you to "Lock-Out" another person's access to the dosimeter.

- A Security Code is needed to place the dosimeter into the Secured mode.
- Only the number keys will operate when the security feature is enabled.
- The Security Code is also needed to exit the Secured mode.
- When the Security Function is disabled, all keys function normally.

The 4-Digit Security Code menu is arranged as follows:

"SECURE"

"SECURE ENABLE"	Select to Enable Security
"CHANGE CODE"	Select to Enter New Security Code

Note that the Security Function can be used with either Level Triggered Events or Auto-On.

See the "DETAILED PROGRAMMING INSTRUCTIONS" for more information about the various modes of operation.

The dosimeter arrives from the factory with the 4 digit security code set to 1111. This code is initially needed to allow access to the dosimeter **"CHANGE CODE"** feature. You can then change the code to your own 4 digit security code:

Once you have changed the security code, be sure that you don't forget it! If you do, once the unit is placed into the SECURE Mode (**"SECURE ENABLE"**), you will not be able to disable it unless you know the exact code.

Memorize your code and, if you wish, record the code here.

OPERATOR SECURITY CODE ____ ____ ____ ____

If the code is forgotten, you must do one of the following:

- Call Quest at 1-800-245-0779. Quest will provide you with a security code that will allow you to gain access to the Security Function.
- FAX Quest at 1-414-567-4047. Quest will FAX you a security code that will allow you to gain access to the Security Function.

USING THE EVENT MODES

The Event Modes (Manually-Entered or Level-Triggered) can be used to store, review, and print out up to 999 events.

Storing Manually Entered Events

The dosimeter will store an Event each time that it is Run and Paused.

Be sure that the Level-Triggered Event Mode is off (DISABLED). To disable it, see the "DETAILED PROGRAMMING INSTRUCTIONS" if needed.

[MENU ON/OFF]

"SETUP"
"EVENTS"

Operate the Manually-Entered Event Mode as follows:

1.) Reset the dosimeter. This clears all stored data.

2.) [EVENT 8] ——> **"EVENTS / VIEW"**

- **"001"** will be highlighted above **"Cev"** (Current Event).

3.) [RUN PAUSE$_1$] ——> **"RUN"** or **"PAUSE"**

- Press to start and stop each Event. An Event will be stored each time that this is done. (Current Event 001 will increase to 002, 003, etc. as each event is stored.)
- Accumulate as many Events as desired. The number over **"Cev"** (Current Event) is the last event number that has been recorded.
- To review the data, see "Reviewing Events" (located within this section).

Exit the Manually-Entered Event Mode as follows:

1.) [MENU ON/OFF] ——> **"EVENT MODE / EXITED"**

2.) [MENU ON/OFF] ——> **"SETUP"** menu will appear.

Storing Level-Triggered Events

The dosimeter will store an Event each time that the sound level goes above the **"LEVEL ON"** setting and then goes below the **"LEVEL OFF"** setting.

Be sure that the Level-Triggered Event Mode is enabled.

To program the dosimeter to operate in the Level-Triggered Event Mode, see "DETAILED PROGRAMMING INSTRUCTIONS" if needed.

[MENU ON/OFF]

"SETUP"
"EVENTS"

Enter and operate the Level-Triggered Event Mode as follows:

1.) Reset the dosimeter. This clears all stored data.

2.) [EVENT 8] ——> **"EVENTS / VIEW"**

- **"001"** will be highlighted above **"Cev"** (Current Event).
- Measure sound levels that go above and below the programmed levels. Accumulate as many Events as desired.
  - The unit will enter the Run mode each time that the sound level exceeds the programmed **"LEVEL ON"**.
  - The unit will return to the Pause mode each time that the sound level drops below the programmed **"LEVEL OFF"**.
  - Each time that the unit Runs and Pauses, an Event will be stored. (Current Event 001 will increase to 002, 003, etc. as each event is stored.)
  - The number over **"Cev"** (Current Event) is the last event number that has been recorded.
  - To review the data, see "Reviewing Events" (located within this section).

Exit the Level-Triggered Event Mode as follows:

1.) [MENU ON/OFF] ——> **"EVENT MODE / EXITED"**

2.) [MENU ON/OFF] ——> **"SETUP"** menu will appear.

Reviewing Events

Each stored Event can be reviewed as follows:

1.) [EVENT 8] ——> **"EVENTS / VIEW"**

- **"XXX"** (representing the Current Event Number) will be highlighted above **"Cev"** (Current Event).

2.) [EVENT 8] ——> **"EVENTS / VIEW"**

- After pressing the key again, **"001"** will be highlighted above **"Rev"** (Review Event).

3.) [▲ 2] [▼ 3]

- Use these keys to change the **"Rev"** (Review Event) number to the event that you wish to review.

4.) [LEVELS 4] [DOSE 5] [AVG 6] [TIMES 0]

- Press a Display Function Key for the function that you wish to review.

- Each time that the same Display Function Key is pressed, the display will alternate between Dosimeter 1 and Dosimeter 2 for that event.

5.) [▲ 2] [▼ 3]

- Use these keys to review all event information within each Display Function for Dosimeter 1 and 2. (See next page.)

Dosimeter 1 or 2 Event Information can be reviewed for each Display Function Key:

LEVELS 4 ——>	**"SPL"**	* Sound Pressure Level
	"PEAK"	* Absolute Unweighted Peak
	"MAX"	* Maximum Level
	"MIN"	* Minimum Level
DOSE 5 ——>	**"DOSE"**	* Dose
	"PrD.8"	* 8 Hour Projected Dose
	"PrD.(Prt)"	* Variable Projected Dose
	"EXP"	* Exposure
AVG 6 ——>	**"SEL"**	* Sound Exposure Level
	"LAV"	* Average Level (or LEQ)
	"TWA"	* Time Weighted Average
	"TWA (Prt)"	* Projected TWA
TIMES 0 ——>	**"RunTime"**	Event Run Time
	"PKTime"	Time when Event Peak Occurred
	"MaxTime"	Time when Event Max Occurred
	"MinTime"	Time when Event Min Occurred
	"LoggTime"	Remaining Logging Time

6.) ENTER

- If desired, press to alternately enlarge or shrink the character size of the function pointed to by the white arrow. Note that the "TIMES" information does not respond this way. It always remains small.

NOTE: See "APPENDIX, Acoustical Definitions" for more detail about any items preceded by "*".

C - A WEIGHTING

Select C - A by programming the Response and Weighting for Dosimeter 1 and Dosimeter 2 as follows:

"SETUP"
"RESP/WT"
"DOS1" Set both dosimeters to SLOW or
"DOS2" set both dosimeters to FAST.
They must be set identically!
"WGHT" Weighting, Select:
"1 = A" / "2 = C"

- Also, both dosimeters (1 & 2) must have the following three parameters set identically:
  - "TL" Threshold Level
  - "ER" Exchange Rate
  - "CL" Criterion Level

See "DETAILED PROGRAMMING INSTRUCTIONS" if needed.

- C - A information is only presented in the printout when the above settings are properly set. C - A information is not available from the dosimeter display.

The dosimeter calculates C - A (Dosimeter 2 - Dosimeter 1) for the following parameters:

Lavg	(dB)	or Leq when Exchange Rate is 3 dB
TWA	(dB)	Time Weighted Average, 8 Hours
TWA [Prt]	(dB)	Projected TWA, Projection Time
Dose	(%)	Dose accumulated over Run Time
Dose [8]	(%)	Projected Dose, always 8 Hour
Dose [Prt]	(%)	Projected Dose, Projection Time
SEL [ER]	(dB)	Sound Exposure Level, 1 Second
Pa^2H		Exposure in Pascal Squared Hours

- All parameters can be calculated with either 3, 4, 5, or 6 dB Exchange Rates.

When C - A is properly set up, C - A data samples will be calculated as follows:

- ["C" Weighted Data] - ["A" Weighted Data] = ["C - A" Data]

USING AUTO-ON / TIMED RUN

Program the Automatic Start/Stop function as follows:

"AUTO-ON"
"ENABLE Y/N" Turn Auto-On/Timed Run On or Off
"MODE DAILY" Program Daily Start/Duration
"MODE WEEKDAY" Program Days of Week, Start/Duration
"MODE DATE" Program One Day for Start/Duration

See DETAILED PROGRAMMING INSTRUCTIONS if needed.

To Activate or De-activate the Auto-On / Timed Run Feature:

A.) Select **"Y"** (Yes) or **"N"** (No) for **"ENABLE"**.

To Start and Log at a specific time every day of the week:

A.) Select **"MODE DAILY"**.

B.) Enter the Start Time and the Duration.

To Start and Log at a specific time on selected days of the week:

A.) Select **"MODE WEEKDAY"**.

B.) Enter the desired Day of the Week that the unit is to Log. (SMTWTFS)

C.) Enter the Start Time and the Duration. It will Start and Log identically for each day that is selected.

To Start and Log on one specific date:

A.) Select **"MODE DATE"**.

B.) Enter the desired Date that the unit is to Log. (MONTH and DAY).

C.) Enter the Start Time for that Date and the Duration. The unit will Start and Log on only that Date.

To perform a **Timed Run** for a desired length of time:

A.) Select **"MODE DAILY"**, **"MODE WEEKDAY"**, or **"MODE DATE"**.

B.) Proceed to **"DURATION"** and set the desired Timed Run length.

C.) Any time that the **RUN** Key is pressed, the unit will do a Timed Run for that Duration.

NOTES:

- The unit must be Off when waiting to go into the Auto-On mode.
- When the unit starts, there is a 10 second **"INITIALIZATION"** (warm-up) period where no data is gathered. If this is of concern, allow for the 10 seconds when programming the Start Time.
- *The Auto-On should be disabled after the study.* Otherwise, when the unit is turned off and put away, it may turn on again automatically. This would accumulate useless data and also wear out the battery.

MEASURING Ldn

Ldn is a measurement where 10 dB is automatically added to all data between 2200 (10P.M.) and 0700 (7A.M.).

Ldn operates automatically (only on DOSIMETER 1) if it is programmed into this mode.

When Ldn is programmed Yes [Y], it automatically programs DOSIMETER 1 to the following:

- ER (Exchange Rate) is set to 3 dB.
- TL (Threshold Level) is set to 40 dB.

Be sure that Ldn is enabled [Y] as follows:

"SETUP"
"DOSE1"
***"LDN"** [Y] (Day/Night Levels)

See DETAILED PROGRAMMING INSTRUCTIONS if needed.

NOTES:

- Ldn will be logged only when Ldn is enabled during the measurement period.
- Ldn will be printed only if Ldn has been logged during the measurement period.
- The Event mode is disabled while running Ldn.

NOTE: See "APPENDIX, Acoustical Definitions" for more detail about any items preceded by "*".

PRINTER USE

Printer Connection

The dosimeter requires one of the following INTERFACE Modules to connect to the printer (or computer).

- PARALLEL PRINTER INTERFACE (Stk. # 056-957)

  Converts the dosimeter to parallel output for Parallel Printer operation.

- SERIAL COMMUNICATIONS INTERFACE (Stk. # 056-956)

  Converts the dosimeter output to serial RS-232 levels. It connects to a Serial Printer (or a Computer COM Port).

Each Interface is powered by either a 9 volt battery or the MODEL 920 AC Power Supply. (See ACCESORIES, Quest Stock # 56-067)

An adapter may be necessary for proper mating of the SERIAL COMMUNICATIONS INTERFACE with the printer connector.

To connect the dosimeter to either a Serial or Parallel Printer:

1.) Remove the microphone cable from the dosimeter as follows:

   A.) Grasp the knurled microphone cable connector and gently pull to remove the microphone cable.

2.) Connect the cable connector of the interface box to the dosimeter as follows:

   A.) Grasp the black rubber boot of the cable connector.

   B.) Gently press the connector against the dosimeter connector while rotating it. When it is properly lined up, it will stop rotating and slide into the dosimeter.

   C.) Insert the connector until a "click" is heard. The cable is now connected.

3.) Insert the other cable connector (attached to the flat cable) into the Printer Port.

Preparing to Print

Only data that has been selected for logging can be printed.

Use the dosimeter with a Printer as follows:

1.) Accumulate data with the dosimeter.

2. Place it in the Pause Mode.

3.) Remove the microphone from the dosimeter and connect the printer.

4.) Turn on the printer, the Interface Module, and the dosimeter.

Selecting What to Print

To print all available data:

- PRINT 9 ——> **"PRINT ALL"**

To print selected data:

- PRINT 9 ——> **"PRINT SELECTED"**

To abort a printout:

- Press the **MENU - ON/OFF** Key during a printout.

  NOTE: The printer may print for several seconds after the **MENU - ON/OFF** Key is pressed. This is due to data stored in the printer's buffer memory.

- If you abort a printout, data stored in the dosimeter is not destroyed. Simply print again.

Printer Configuration

Your printer's settings typically will not have to be changed to work with the dosimeter. Simply set the dosimeter to work with your present printer settings.

- **General Printer Configuration (Parallel and Serial)**

  - Each line of print must end with the following two EOL (End of Line) characters:

    LF (Line Feed)
    CR (Carriage Return)

  - The EOL (End of Line) characters can be:

    - Both set within the printer configuration.
    - Both set within the dosimeter configuration.
    - One setting within the printer configuration and one setting within the dosimeter configuration.

  - The dosimeter can be programmed to one of the following four settings:

    LF/CR (Line Feed followed by Carriage Return)
    CR/LF (Carriage Return followed by Line Feed)
    LF (Line Feed only)
    CR (Carriage Return only)

- To try a few lines of print, depress **PRINT** twice. If the printer does not work properly, change the dosimeter setting until it works.

- If the system still does not print properly, you may need to change the printer setup. Refer to the printer manual to aid in the printer configuration. After changing the printer setup, it is usually necessary to reset the printer as follows:

    - Turn the printer off for a few seconds and then back on. Most printers only read these switches during the turn on.

If more information is needed as to how to change the dosimeter settings, see "DETAILED PROGRAMMING INSTRUCTIONS".

- **Parallel Printer Configuration**

    - The printer must be Centronics compatible.

    - The dosimeter baud rate does not matter.

    - If the printer operates in either the Serial or Parallel mode, be sure that it is set to Parallel.

- **Serial Printer Configuration**

    - If the printer operates in either the Serial or Parallel mode, be sure that it is set to Serial.

    - The printer must be RS-232C compatible.

    - Match the dosimeter's and the printer's baud rates.

        - 300 600 1200 2400 4800 9600 19200

    - Match the dosimeter's and the printer's data formats.

        - Each character sent from the dosimeter consists of 10 bits:

            - 1 Start bit
            - 8 data bits
            - 1 Stop Bit
            - No Parity (Disabled)

    - Match the dosimeter's and the printer's Handshake options.

        - NONE HARDWARE XON/XOFF

SAMPLE PRINTOUTS

The following pages describe each section of the printout.

Each item may be selected from the "PRINT SELECTED" menu (below) which will affect:

- What specific Section is to be printed.
- What data is to be included within Printout Sections.

■ PRINT 9 ———> **"PRINT SELECTED"**

"HEADER"	[Y/N]	Name, Work Area, Comments, etc.
"CALIBRATION"	[Y/N]	Pre-survey/Periodic Checks
"DOSE1"	[Y/N]	Dosimeter 1 Information
"DOSE2"	[Y/N]	Dosimeter 2 Information
"PARAMETERS"	[Y/N]	Dosimeter Setup Parameters
"SUMMARY"	[Y/N]	Time and Data Summary
"PEAK"	[Y/N]	Peak Levels
"U.L."	[Y/N]	Upper Limit Time
"STATISTICS"	[Y/N]	% Time Statistical Distribution
"LN LEVELS"	[Y/N]	Exceedance Levels, L01 - L100
"EVENTS"	[Y/N]	All Events
"TIME HISTORY"		Time History
"LAVG"	[Y/N]	Average Time History
"MAX"	[Y/N]	Maximum Level Time History
"PEAK"	[Y/N]	Peak Level Time History
"LC-A"	[Y/N]	C minus A Time History
"TIME HISTORY"		Time History
"TABULAR/GRAPHICAL"		Time History Format
"SAMPLES/LINE"		Enter 1 to 120

Use the **UP** and **DOWN** arrow keys to advance through the print selections. Depressing the **ENTER** key toggles between Y or N.

Note that the Time History Printout (Figures 10, 11, and 12) is printed in both the **"GRAPHICAL"** and **"TABULAR"** formats. This printout has been shortened and rearranged to provide a good example of what the various printouts will look like.

Header Section Figure 5

"HEADER" Name, Work Area, Comments, etc.

The Header Printout will occur only if:

- Header is selected.
  - **"HEADER"** (Selected if Yes)

The Header states the following:

- The Model Number: Q-400 or Q-500 Noise Logging Dosimeter
- The Unit Software Rev Level: Unit Version Number: X.XX
- "Noise Manager" Software Rev Level: Appears if used.
- The Serial Number: 2 Letters followed by 7 Digits

The Header provides locations for the user to write in the following data:

- Name
- Work Area
- Comments

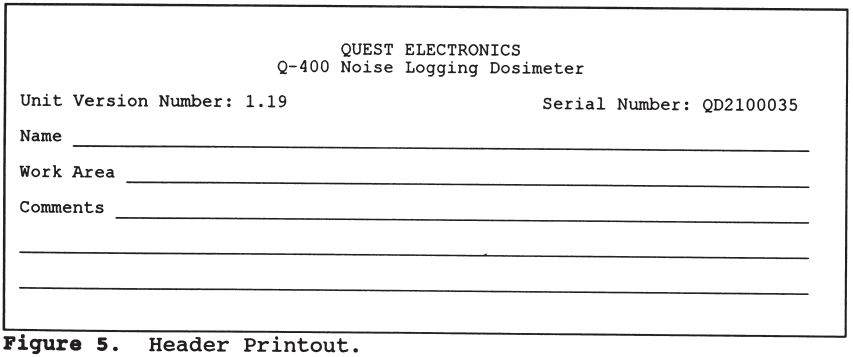


Figure 5. Header Printout.

Calibration Section Figure 6

"CALIBRATION" Pre-survey/Periodic Checks

The Calibration Printout will occur only if:

- Calibration is selected.
  - **"CALIBRATION"** (Selected if Yes)

The Calibration is printed out as follows:

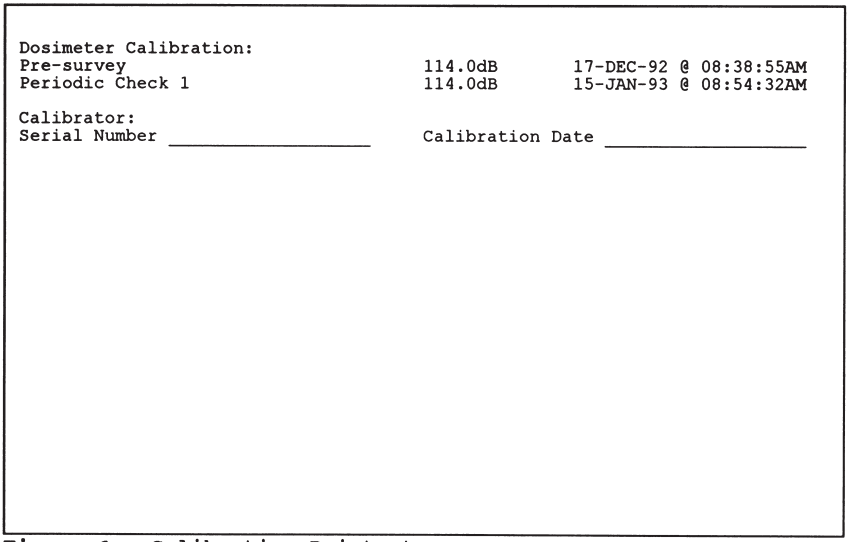


Figure 6. Calibration Printout.

Setup Section Figure 7

"DOSE1"	Dosimeter 1 Information
"DOSE2"	Dosimeter 2 Information
"PARAMETERS"	Dosimeter Setup Parameters

The Setup Printout will occur only if A and B are selected as follows:

A.) Parameters is selected:

- **"PARAMETERS"** (Selected if Yes)

B.) One or both of the following are selected:

- **"DOSE1"** (Selected if Yes)
- **"DOSE2"** (Selected if Yes)

The Setups for Dosimeter 1 and Dosimeter 2 Parameters are printed out as follows:

```
Auto Settings:
Auto-On Disabled Mode - Daily  Time 07:00:00AM Duration 00:02 H:M
Level Triggered Events Off

Dosimeter 1 Parameters:
Range       70-140dB       Weighting          A       Time Constant  Slow
Criterion      90dB        Threshold       80dB       Exchange Rate   5dB
Prj Period    4.00H        Upper Limit    115dB       Ldn             Off

Dosimeter 2 Parameters:
Range       70-140dB       Weighting          C       Time Constant  Slow
Criterion      90dB        Threshold       80dB       Exchange Rate   5dB
Prj Period    4.00H        Upper Limit    115dB
```

Figure 7. Setup Printout.

Time Summary / Data Summary Section Figure 8

"DOSE1"	Dosimeter 1 Information
"DOSE2"	Dosimeter 2 Information
"SUMMARY"	Time and Data Summary
"PEAK"	Peak Levels
"U.L."	Upper Limit Time

The Summary Printout (Time Summary / Data Summary) will occur only if A and B are selected as follows:

A.) Summary is selected:

- **"SUMMARY"** (Selected if Yes)

B.) One or both of the following are selected:

- **"DOSE1"** (Selected if Yes)
- **"DOSE2"** (Selected if Yes)

Peak Level and/or Upper Limit Time will print within Dosimeter 1 or 2 Data Summaries only if one or both of the following are selected:

- **"PEAK"** (Selected if Yes)
- **"U.L."** (Selected if Yes)

Printed data within the Summary is always computed for the Total Run Time (total of all events).

The Time and Data Summary are printed as follows:

```
Time Summary:
Number of Events     1
Event Started              Event Stopped
15-JAN-93 @ 10:56:38AM     15-JAN-93 @ 10:58:42AM     Event     1

Total Run       0:02:00    Total Pause      1:22:51

Data Summary [Dosimeter 1, A / Slow, Threshold  80dB, Exchange Rate 5dB]
Peak Level  102.6dB        15-JAN-93 @ 10:56:42AM
Max Level    88.0dB        15-JAN-93 @ 10:56:42AM
Min Level    73.4dB        15-JAN-93 @ 10:56:42AM
UL Time         0:00:00
Lavg         80.5dB        Dose          0.11%        SEL(5)       115.1dB
TWA          41.0dB        Dose[8]      26.40%        Ldn              OFF
TWA[ 4.00]   75.5dB        Dose[ 4.00]  13.20%

Data Summary [Dosimeter 2, C / Slow, Threshold  80dB, Exchange Rate 5dB]
Peak Level  102.6dB        15-JAN-93 @ 10:56:42AM
Max Level    88.6dB        15-JAN-93 @ 10:56:42AM
Min Level    77.3dB        15-JAN-93 @ 10:56:39AM
UL Time         0:00:00
Lavg         84.5dB        Dose          0.19%        SEL(5)       119.0dB
TWA          44.9dB        Dose[8]      45.60%
TWA[ 4.00]   79.5dB        Dose[ 4.00]  22.80%

C-A [Dosimeter 2 - Dosimeter 1]
Lavg          4.0dB        Dose          0.08%        SEL(5)         3.9dB
TWA           3.9dB        Dose[8]      19.20%
TWA[ 4.00]    4.0dB        Dose[ 4.00]   9.60%
```

Figure 8. Time Summary / Data Summary Printout.

Event Summary Section Figure 9

"DOSE1"	Dosimeter 1 Information
"DOSE2"	Dosimeter 2 Information
"PEAK"	Peak Levels
"U.L."	Upper Limit Time
"EVENTS"	All Events

An Event Summary Printout will occur only if A and B are selected as follows:

A.) Events is selected:

- **"EVENTS"** (Selected if Yes)

B.) One or both of the following are selected:

- **"DOSE1"** (Selected if Yes)
- **"DOSE2"** (Selected if Yes)

Peak Level and/or Upper Limit Time will print within Dosimeter 1 and/or Dosimeter 2 Data Summaries only if one or both of the following are selected:

- **"PEAK"** (Selected if Yes)
- **"U.L."** (Selected if Yes)

Each Event Summary is computed for the Run Time of each event.

Event Summaries are printed as follows:

```
Event     1

Name _____________________________________________________

Work Area ________________________________________________

Comments _________________________________________________

_____________________________________________________________

_____________________________________________________________

Event Started              Event Stopped
15-JAN-93 @ 10:56:38AM     15-JAN-93 @ 10:58:42AM

Run Time         0:02:00

Data Summary [Dosimeter 1, A / Slow, Threshold  80dB, Exchange Rate 5dB]
Peak Level  102.6dB        15-JAN-93 @ 10:56:42AM
Max Level    88.0dB        15-JAN-93 @ 10:56:42AM
Min Level    73.4dB        15-JAN-93 @ 10:56:42AM
Lavg         80.5dB        Dose          0.11%       SEL(5)      115.1dB
TWA          41.0dB        Dose[8]      26.40%
TWA[ 4.00]   75.5dB        Dose[ 4.00]  13.20%

Data Summary [Dosimeter 2, C / Slow, Threshold  80dB, Exchange Rate 5dB]
Peak Level  102.6dB        15-JAN-93 @ 10:56:42AM
Max Level    88.6dB        15-JAN-93 @ 10:56:42AM
Min Level    77.3dB        15-JAN-93 @ 10:56:39AM
Lavg         84.5dB        Dose          0.19%       SEL(5)      119.0dB
TWA          44.9dB        Dose[8]      45.60%
TWA[ 4.00]   79.5dB        Dose[ 4.00]  22.80%

C-A [Dosimeter 2 - Dosimeter 1]
Lavg          4.0dB        Dose          0.08%       SEL(5)        3.9dB
TWA           3.9dB        Dose[8]      19.20%
TWA[ 4.00]    4.0dB        Dose[ 4.00]   9.60%
```

Figure 9. Event Summary Printout.

"DOSE1"	Dosimeter 1 Information
"DOSE2"	Dosimeter 2 Information
"LAVG"	Average Time History
"MAX"	Maximum Level Time History
"PEAK"	Peak Level Time History
"LC-A"	C minus A Time History
"SAMPLES/LINE"	Enter 1 to 120

A Time History Printout will occur if A and B are selected as follows:

A.) If one or more of the following selections are made from the **"TIME HISTORY"** menu:

- **"LAVG"** (Selected if Yes)
- **"MAX"** (Selected if Yes)
- **"PEAK"** (Selected if Yes)
- **"LC-A"** (Selected if Yes)

B.) If one or both of the following are selected:

- **"DOSE1"** (Selected if Yes)
- **"DOSE2"** (Selected if Yes)

If both Dosimeters are selected, each Dosimeter will produce Time Histories based on the selection of LAVG, MAX, PEAK, and/or LC-A.

Only data that has been logged can later be printed. See DETAILED PROGRAMMING INSTRUCTIONS if needed.

Note that the Time History Printout example (Figures 10, 11, and 12) is printed in both the **"TABULAR"** and **"GRAPHICAL"** formats.

Calculate the "Time per Line" (time between lines of print on the graph) as follows:

- The dosimeter logs information as "Time per Sample".
  - (01 SEC / SAMPLE) (10 SEC / SAMPLE) (01 MIN / SAMPLE)
  - To set the "Time per Sample", see PROGRAMMING MENU STRUCTURE if needed.
- The Printout is programmed as "Samples per Line":
  - **"SAMPLES/LINE"** (1 to 120)
- Multiply the "Time per Sample" by the "Samples per Line" to get the "Time per Line".

EXAMPLE:

(1 Minute / Sample) X (10 Samples / Line) = 10 Minutes / Line

TABULAR FORMAT

Lavg TIME HISTORY [Dosimeter 1] Page 1
Weighting A Time Constant Slow
Threshold 80dB Exchange Rate 5dB

10 (Sec)
22-JAN-93

Time	Lavg				
03:17:01PM	93.9dB	91.4dB	86.2dB	87.8dB	99.1dB
03:17:51PM	97.2dB	95.5dB	88.8dB	91.4dB	0.0dB
03:18:41PM	91.3dB	95.9dB	98.0dB	63.3dB	97.7dB
03:19:31PM	97.9dB	62.6dB	84.5dB	93.7dB	95.8dB
Time	Lavg				

Max TIME HISTORY [Dosimeter 1] Page 1
Weighting A Time Constant Slow
Threshold 80dB Exchange Rate 5dB

10 (Sec)
22-JAN-93

Time	Max				
03:17:01PM	99.3dB	101.2dB	96.8dB	99.7dB	105.1dB
03:17:51PM	105.2dB	103.3dB	102.9dB	104.1dB	76.2dB
03:18:41PM	103.4dB	105.8dB	108.0dB	82.9dB	108.2dB
03:19:31PM	107.4dB	82.2dB	102.5dB	106.2dB	105.4dB
Time	Max				

Peak TIME HISTORY Page 1

10 (Sec)
22-JAN-93

Time	Peak				
03:17:01PM	121.6dB	117.9dB	120.5dB	119.1dB	123.8dB
03:17:51PM	126.3dB	126.3dB	122.3dB	130.3dB	115.7dB
03:18:41PM	127.2dB	127.9dB	128.0dB	110.2dB	126.2dB
03:19:31PM	127.2dB	120.0dB	124.0dB	128.0dB	124.6dB
Time	Peak				

Figure 10. Time History Printout (Tabular Format).

GRAPHICAL FORMAT

```
Lavg TIME HISTORY [Dosimeter 1]                                    Page    1
Weighting     A   Time Constant Slow
Threshold  80dB   Exchange Rate  5dB

10   (Sec)
22-JAN-93            40        60        80       100       120       140
Time           Lavg  +----+----+----+----+----+----+----+----+----+----+
03:17:01PM   93.9dB  **************************
03:17:11PM   91.4dB  ************************
03:17:21PM   86.2dB  ***********************
03:17:31PM   87.8dB  ************************
03:17:41PM   99.1dB  ******************************
03:17:51PM   97.2dB  ****************************
03:18:01PM   95.5dB  ***************************
03:18:11PM   88.8dB  ************************
03:18:21PM   91.4dB  ************************
03:18:31PM    0.0dB
Time           Lavg  +----+----+----+----+----+----+----+----+----+----+
                     40        60        80       100       120       140

Max TIME HISTORY [Dosimeter 1]                                     Page    1
Weighting     A   Time Constant Slow
Threshold  80dB   Exchange Rate  5dB

10   (Sec)
22-JAN-93            40        60        80       100       120       140
Time            Max  +----+----+----+----+----+----+----+----+----+----+
03:17:01PM   99.3dB  ==============================
03:17:11PM  101.2dB  ================================
03:17:21PM   96.8dB  ============================
03:17:31PM   99.7dB  ==============================
03:17:41PM  105.1dB  ==================================
03:17:51PM  105.2dB  ==================================
03:18:01PM  103.3dB  ================================
03:18:11PM  102.9dB  ================================
03:18:21PM  104.1dB  ==================================
03:18:31PM   76.2dB  ==================
Time            Max  +----+----+----+----+----+----+----+----+----+----+
                     40        60        80       100       120       140


Peak TIME HISTORY                                                  Page    1


10   (Sec)
22-JAN-93            40        60        80       100       120       140
Time           Peak  +----+----+----+----+----+----+----+----+----+----+
03:17:01PM  121.6dB  ----------------------------------------
03:17:11PM  117.9dB  ---------------------------------------
03:17:21PM  120.5dB  ----------------------------------------
03:17:31PM  119.1dB  ---------------------------------------
03:17:41PM  123.8dB  ----------------------------------------
03:17:51PM  126.3dB  ----------------------------------------
03:18:01PM  126.3dB  ----------------------------------------
03:18:11PM  122.3dB  ----------------------------------------
03:18:21PM  130.3dB  ----------------------------------------
03:18:31PM  115.7dB  ---------------------------------------
Time           Peak  +----+----+----+----+----+----+----+----+----+----+
                     40        60        80       100       120       140
```

Figure 11. Time History Printout (Graphical Format).

TABULAR FORMAT

```
C-A Lavg TIME HISTORY [Dosimeter 2 - Dosimeter 1]                    Page    1
Weighting      C    Time Constant Slow    Weighting      A    Time Constant Slow
Threshold   80dB    Exchange Rate  5dB    Threshold   80dB    Exchange Rate  5dB

10    (Sec)
22-JAN-93
Time         C-A Lavg
03:17:01PM     3.5dB     0.7dB     5.2dB     2.5dB     1.4dB
03:17:51PM     3.3dB     3.6dB     4.0dB     5.9dB    79.8dB
03:18:41PM     2.7dB     2.4dB     3.3dB    10.2dB     1.3dB
03:19:31PM     1.2dB    18.9dB     3.5dB     1.8dB     0.9dB
Time         C-A Lavg

C-A Max TIME HISTORY [Dosimeter 2 - Dosimeter 1]                     Page    1
Weighting      C    Time Constant Slow    Weighting      A    Time Constant Slow
Threshold   80dB    Exchange Rate  5dB    Threshold   80dB    Exchange Rate  5dB

10    (Sec)
22-JAN-93
Time         C-A Max
03:17:01PM     4.0dB     0.6dB     5.0dB     0.9dB     1.3dB
03:17:51PM     3.9dB     4.1dB     6.0dB     5.7dB    12.8dB
03:18:41PM     2.6dB     2.4dB     2.8dB     4.3dB     1.0dB
03:19:31PM     0.9dB     7.7dB     1.2dB     0.8dB     0.4dB
Time         C-A Max
```

GRAPHICAL FORMAT

```
C-A Lavg TIME HISTORY [Dosimeter 2 - Dosimeter 1]                    Page    1
Weighting      C    Time Constant Slow    Weighting      A    Time Constant Slow
Threshold   80dB    Exchange Rate  5dB    Threshold   80dB    Exchange Rate  5dB

10    (Sec)
22-JAN-93              0         5         10        15        20        25
Time         C-A Lavg  +----+----+----+----+----+----+----+----+----+----+
03:17:01PM     3.5dB   ********
03:17:11PM     0.7dB   **
03:17:21PM     5.2dB   ***********
03:17:31PM     2.5dB   ******
03:17:41PM     1.4dB   ***
03:17:51PM     3.3dB   *******
03:18:01PM     3.6dB   ********
Time         C-A Lavg  +----+----+----+----+----+----+----+----+----+----+
                       0         5         10        15        20        25

C-A Max TIME HISTORY [Dosimeter 2 - Dosimeter 1]                     Page    1
Weighting      C    Time Constant Slow    Weighting      A    Time Constant Slow
Threshold   80dB    Exchange Rate  5dB    Threshold   80dB    Exchange Rate  5dB

10    (Sec)
22-JAN-93              0         5         10        15        20        25
Time         C-A Max   +----+----+----+----+----+----+----+----+----+----+
03:17:01PM     4.0dB   =========
03:17:11PM     0.6dB   ==
03:17:21PM     5.0dB   ===========
03:17:31PM     0.9dB   ==
03:17:41PM     1.3dB   ===
03:17:51PM     3.9dB   ========
03:18:01PM     4.1dB   =========
Time         C-A Max   +----+----+----+----+----+----+----+----+----+----+
                       0         5         10        15        20        25
```

Figure 12. C-A Time History (Tabular and Graphical Format).

% Time Statistical Distribution Section Figure 13

"DOSE1"	Dosimeter 1 Information
"DOSE2"	Dosimeter 2 Information
"STATISTICS"	% Time Statistical Distribution

The % Time Statistical Distribution Printout will occur only if A and B are selected as follows:

A.) Statistics is selected:

- **"STATISTICS"** (Selected if Yes)

B.) One or both of the following are selected:

- **"DOSE1"** (Selected if Yes)
- **"DOSE2"** (Selected if Yes)

Statistics for Dosimeter 1 and Dosimeter 2 Data are printed out as follows:

```
% TIME STATISTICAL DISTRIBUTION [Dosimeter 1]                    Page    1
Weighting     A   Time Constant Slow

Total Samples       3843
Total Run        0:02:00

                          0         20        40        60        80       100
 dB    Samples   % Time   +----+----+----+----+----+----+----+----+----+----+
 73         14    0.36%   *
 74         66    1.71%   *
 75        200    5.20%   ***
 76        239    6.21%   ****
 77        254    6.60%   ****
 78        251    6.53%   ****
 79        341    8.87%   *****
 80        255    6.63%   ****
 81        380    9.88%   *****
 82        366    9.52%   *****
 83        543   14.12%   ********
 84        438   11.39%   ******
 85        201    5.23%   ***
 86        148    3.85%   **
 87        140    3.64%   **
 88          7    0.18%   *
```

Figure 13. % Time Statistical Distribution Printout.

Exceedance Levels Section Figure 14

"DOSE1"	Dosimeter 1 Information
"DOSE2"	Dosimeter 2 Information
"LN LEVELS"	Exceedance Levels, L01 to L100

The Exceedance Level Printout will occur only if A and B are selected as follows:

A.) LN Levels is selected:

- **"LN LEVELS"** (Selected if Yes)

B.) One or both of the following are selected:

- **"DOSE1"** (Selected if Yes)
- **"DOSE2"** (Selected if Yes)

The distribution is always accumulated without a threshold.

An LN Table for either Dosimeter 1 or Dosimeter 2 (or both) will be printed out as follows:

```
EXCEEDANCE LEVELS [Dosimeter 1]
Weighting      A   Time Constant Slow

L01    87dB   L02    87dB   L03    87dB   L04    86dB   L05    86dB
L06    86dB   L07    86dB   L08    85dB   L09    85dB   L10    85dB

L11    85dB   L12    85dB   L13    84dB   L14    84dB   L15    84dB
L16    84dB   L17    84dB   L18    84dB   L19    84dB   L20    84dB

L21    84dB   L22    84dB   L23    84dB   L24    84dB   L25    83dB
L26    83dB   L27    83dB   L28    83dB   L29    83dB   L30    83dB

L31    83dB   L32    83dB   L33    83dB   L34    83dB   L35    83dB
L36    83dB   L37    83dB   L38    83dB   L39    82dB   L40    82dB

L41    82dB   L42    82dB   L43    82dB   L44    82dB   L45    82dB
L46    82dB   L47    82dB   L48    81dB   L49    81dB   L50    81dB

L51    81dB   L52    81dB   L53    81dB   L54    81dB   L55    81dB
L56    81dB   L57    81dB   L58    80dB   L59    80dB   L60    80dB

L61    80dB   L62    80dB   L63    80dB   L64    80dB   L65    79dB
L66    79dB   L67    79dB   L68    79dB   L69    79dB   L70    79dB

L71    79dB   L72    79dB   L73    79dB   L74    78dB   L75    78dB
L76    78dB   L77    78dB   L78    78dB   L79    78dB   L80    77dB

L81    77dB   L82    77dB   L83    77dB   L84    77dB   L85    77dB
L86    77dB   L87    76dB   L88    76dB   L89    76dB   L90    76dB

L91    76dB   L92    76dB   L93    75dB   L94    75dB   L95    75dB
L96    75dB   L97    75dB   L98    74dB   L99    74dB   L100   73dB
```

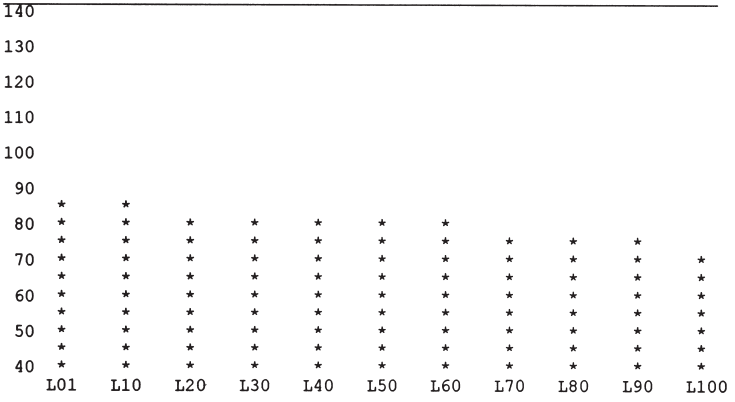


Figure 14. Exceedance Levels Printout.

SIMPLIFIED PROGRAMMING INSTRUCTIONS

Programming Keys are as follows:

They allow the user to:

- Acoustically Calibrate the dosimeter.
- Select Printouts and other printer parameters.
- Enter menus and change settings.

Action Keys are as follows:

They allow the user to:

- Highlight and select a function within a menu.
- Enable or disable a function.
- Modify a function's value or setting.

NOTE: See "PROGRAMMING MENU STRUCTURE" to locate various functions within the layers of menus.

1.) Use one of the Programming Keys (**CAL**, **PRINT**, and **MENU - ON/OFF**) to enter the proper menu leading to the desired item to change (or check).

2.) Select an item and change (or check) its value as follows:

A.) Use either the **UP ARROW** and **DOWN ARROW** Keys or the **ENTER** Key (if needed) to highlight an item.

B.) Use either the **ENTER** Key, the **UP ARROW** and **DOWN ARROW** Keys, or the **NUMBER** Keys to select or change the item or value.

3.) Repeat Steps 2A and 2B as needed to change (or check) all settings within each menu. Change values if necessary.

Exit the Programming Mode as follows:

1.) Use the **ENTER** Key (if needed) to return the highlighting to a function.

2.) Then press the **MENU - ON/OFF** Key until it returns to the main menu beginning with **"SETUP"**.

See "DETAILED PROGRAMMING INSTRUCTIONS" if more detail is needed.

PROGRAMMING MENU STRUCTURE

The menu structure of the Programming Keys is as follows:

NOTE: See "APPENDIX, Acoustical Definitions" for more detail about any items preceded by "*".

CAL Key

CAL 7	
"PRE-SURVEY"	Electronic Calibration Procedure
CAL 7	
"PERIODIC CHECK"	Saves up to 8 Calibration Level Checks and the Times that they were performed.
CAL 7	
"REVIEW"	Reviews the saved Calibration Level Checks and the Times that they were performed.

PROGRAMMING MENU STRUCTURE (Cont.)

PRINT Key

PRINT 9

"PRINT ALL" Print all available data

PRINT 9

"PRINT SELECTED"		Print User-Selected Data
"HEADER"	[Y/N]	Name, Work Area, Comments, etc.
"CALIBRATION"	[Y/N]	Pre-survey/Periodic Checks
"DOSE1"	[Y/N]	Dosimeter 1 Information
"DOSE2"	[Y/N]	Dosimeter 2 Information
"PARAMETERS"	[Y/N]	Dosimeter Setup Parameters
"SUMMARY"	[Y/N]	Time and Data Summary
***"PEAK"**	[Y/N]	Peak Levels
***"U.L."**	[Y/N]	Upper Limit Time
***"STATISTICS"**	[Y/N]	% Time StatisticalDistrib.
***"LN LEVELS"**	[Y/N]	Exceedance Levels, L01 - L100
***"EVENTS"**	[Y/N]	All Events
***"TIME HISTORY"**		Time History Selection
***"LAVG"**	[Y/N]	Average Time History
***"MAX"**	[Y/N]	Maximum Level Time History
***"PEAK"**	[Y/N]	Peak Level Time History
***"LC-A"**	[Y/N]	C minus A Time History
"TABULAR"		Select Tabular or Graphical
"SAMPLES/LINE"		Enter 1 to 120

PRINT 9

"PRINTER SETUP"		Interface Setup
***"BAUD"**		300 600 1200 2400 4800 9600
***"EOL"**		End of Line Characters: LF & CR
"PAGE BREAKS"	[Y/N]	Used with Page Printer
"HANDSHAKE"		NONE HARWARE XON/XOFF

PROGRAMMING MENU STRUCTURE (Cont.)

MENU ON/OFF Key

MENU ON/OFF

"SETUP"		Used to Program Dosimeter Setups
"DOSE1"		Setup for Dosimeter #1
***"Prt"**		Projection Time, 1 to 18 hrs.
***"TL"**		Threshold Level, 40 TO 140 dB
***"ER"**		Exchange Rate: 3, 4, 5, or 6 dB
***"UL"**		Upper Limit, 40 TO 140 dB
***"CL"**		Criterion Level, 40 TO 140 dB
***"LDN"**	[Y/N]	Day/Night Levels

MENU ON/OFF

"SETUP"	Used to Program Dosimeter Setups
"DOSE2"	Setup for Dosimeter #2
***"Prt"**	Projection Time, 1 to 18 hrs.
***"TL"**	Threshold Level, 40 TO 140 dB
***"ER"**	Exchange Rate: 3, 4, 5, or 6 dB
***"UL"**	Upper Limit, 40 TO 140 dB
***"CL"**	Criterion Level, 40 TO 140 dB

MENU ON/OFF

"SETUP"	Used to Program Dosimeter Setups
"RESP/WT"	Setup for Response & Weighting
"DOS1"	Select SLOW or FAST
"DOS2"	Select SLOW or FAST
"WGHT"	Dosimeter Weightings, Select

- Dosimeter 1 = A / Dosimeter 2 = A
- Dosimeter 1 = C / Dosimeter 2 = C
- Dosimeter 1 = A / Dosimeter 2 = C

PROGRAMMING MENU STRUCTURE (Cont.)

MENU ON/OFF Key

MENU ON/OFF

"SETUP"		Used to Program Dosimeter Setups
"LOGGING"		Setup for Logging
"DOSIMETERS"		Select 1 or 2 Dosimeter Logging
***"LAVG"**	[Y/N]	Select to Log the Average Level
***"MAX"**	[Y/N]	Select to Log the Maximum Level
***"PEAK"**	[Y/N]	Select to Log the Peak Level
"01 SEC"		1 sec., 10 sec., 1 min. Logging

MENU ON/OFF

"SETUP"	Used to Program Dosimeter Setups
"CLK-SET"	Setup for the Clock
"TIME"	Enter the Real Time
"DATE"	Enter the Present Date
"12-HOUR"	Select 12 or 24 Hour Clock
"MO.-DAY"	Select MO.-DAY or DAY-MO. Format

MENU ON/OFF

"SETUP"		Used to Program Dosimeter Setups
"EVENTS"		
"TRIG ENABLE"	[Y/N]	Level-Activated Event
"LEVEL ON"		Modify, 70 TO 140 dB
"LEVEL OFF"		Modify, 70 TO 140 dB

MENU ON/OFF

"OFF-5"	Used with **ENTER** to turn unit Off

PROGRAMMING MENU STRUCTURE (Cont.)

MENU ON/OFF Key

MENU ON/OFF

"RESET-5" — Used with **ENTER** to Reset unit

MENU ON/OFF

"SECURE" — Settable 4-Digit Security Code

- **"SECURE ENABLE"** — Select to Enable Security
- **"CHANGE CODE"** — Select to Enter New Security Code

MENU ON/OFF

"BATTERY" — Indicates Battery Condition

MENU ON/OFF

"AUTO-ON" — Program Automatic Start/Stop

- **"ENABLE Y/N"**
  - **"MODE DAILY"** — Program Daily Start/Run Time
  - **"MODE WEEKDAY"** — Program Days of Week for Start/Run
  - **"MODE DATE"** — Program One Day for Start/Run Time

SETTING UP MEASUREMENT PARAMETERS

The following 2 pages provide step-by-step worksheets for programming setup parameters into the dosimeter. If you need help in programming see the "DETAILED PROGRAMMING INSTRUCTIONS" section.

The following are some typical setups that can be programmed into the dosimeter. Although they are correct as of the time of printing, check your regulations before taking data. Regulations change and you must be sure that your settings are correct.

OSHA Hearing Conservation

A Weighting 80dB Threshold 5dB Exchange Rate

90dB Criterion Level LDN- No Slow Response

OSHA Compliance

Same as above except with 90dB Threshold

Department of Defense

A Weighting 80dB Threshold 4 dB Exchange Rate

84dB Criterion Level LDN- No Slow Response

IEC Noise Monitoring

A Weighting 40dB Threshold 3dB Exchange Rate

85dB Criterion Level Slow Response

Setup # 1

MENU - ON/OFF Key ——> "SETUP" ——> "DOSE$_1$"

"Prt"	_____	hrs.
"TL"	_____	dB
"ER"	_____	dB
"UL"	_____	dB
"CL"	_____	dB
"LDN"	_____	Yes or No

MENU - ON/OFF Key ——> "SETUP" ——> "DOSE$_2$"

"Prt"	_____	hrs.
"TL"	_____	dB
"ER"	_____	dB
"UL"	_____	dB
"CL"	_____	dB

MENU - ON/OFF Key ——> "SETUP" ——> "RESP/WT"

"DOS$_1$"	_____	SLOW or FAST
"DOS$_2$"	_____	SLOW or FAST
"WGHT"	_____	A / A C / C A / C

MENU - ON/OFF Key ——> "SETUP" ——> "LOGGING"

"DOSIMETERS"	_____	1 or 2
"LAVG"	_____	Yes or No
"MAX"	_____	Yes or No
"PEAK"	_____	Yes or No
"01 SEC"	_____	01-SEC 10-SEC 01-MIN

MENU - ON/OFF Key ——> "SETUP" ——> "CLK-SET"

"TIME"		Check the Time
"DATE"		Check the Date
"12-HOUR"	_____	12-HOUR or 24-HOUR
"MO.-DAY"	_____	MO.-DAY or DAY-MO.

MENU - ON/OFF Key ——> "SETUP" ——> "EVENTS"

"TRIG ENABLE"	_____	Yes or No
"LEVEL ON"	_____	Any Allowable Level
"LEVEL OFF"	_____	Any Allowable Level

MENU - ON/OFF Key ——> "AUTO-ON" ——> "ENABLE Y/N"

"MODE DAILY"	___:___■___	Start■Duration
"MODE WEEKDAY"	SMTWTFS■___:___■___	Day■Start■Duration
"MODE DATE"	___ /___■___:___■___	Mo./Day■Start■Duration

Setup # 2

MENU - ON/OFF Key ——> **"SETUP"** ——> **"DOSE$_1$"**

"Prt"	_____	hrs.
"TL"	_____	dB
"ER"	_____	dB
"UL"	_____	dB
"CL"	_____	dB
"LDN"	_____	Yes or No

MENU - ON/OFF Key ——> **"SETUP"** ——> **"DOSE$_2$"**

"Prt"	_____	hrs.
"TL"	_____	dB
"ER"	_____	dB
"UL"	_____	dB
"CL"	_____	dB

MENU - ON/OFF Key ——> **"SETUP"** ——> **"RESP/WT"**

"DOS$_1$"	_____	SLOW or FAST
"DOS$_2$"	_____	SLOW or FAST
"WGHT"	_____	A / A C / C A / C

MENU - ON/OFF Key ——> **"SETUP"** ——> **"LOGGING"**

"DOSIMETERS"	_____	1 or 2
"LAVG"	_____	Yes or No
"MAX"	_____	Yes or No
"PEAK"	_____	Yes or No
"01 SEC"	_____	01-SEC 10-SEC 01-MIN

MENU - ON/OFF Key ——> **"SETUP"** ——> **"CLK-SET"**

"TIME"		Check the Time
"DATE"		Check the Date
"12-HOUR"	_____	12-HOUR or 24-HOUR
"MO.-DAY"	_____	MO.-DAY or DAY-MO.

MENU - ON/OFF Key ——> **"SETUP"** ——> **"EVENTS"**

"TRIG ENABLE"	_____	Yes or No
"LEVEL ON"	_____	Any Allowable Level
"LEVEL OFF"	_____	Any Allowable Level

MENU - ON/OFF Key ——> **"AUTO-ON"** ——> **"ENABLE Y/N"**

"MODE DAILY"	___:___■___	Start■Duration
"MODE WEEKDAY"	SMTWTFS■___:___■___	Day■Start■Duration
"MODE DATE"	___ /___■___:___■___	Mo./Day■Start■Duration

DETAILED PROGRAMMING INSTRUCTIONS

After becoming familiar with the dosimeter, the "PROGRAMMING MENU STRUCTURE" section should provide enough information about programming. However, if more detailed programming instructions are desired, use this section. The following pages provide step by step instructions.

Use this section as follows:

1.) Locate the item within this section.

2.) Follow the detailed procedure listed for each function.

CAL Key
"PRE-SURVEY"

Acoustically Calibrate the dosimeter as follows:

1.) Turn the dosimeter On.

2.) Press the **CAL** Key. **"PRE-SURVEY"** will be highlighted.

3.) Press the **ENTER** Key. **"CALIBRATOR"** will appear.

4.) Use the **UP ARROW** and **DOWN ARROW** Keys to set the number to match the output level listed on the acoustic calibrator.

5.) Turn on the calibrator (1000 Hz). Listen to see that the calibrator is producing a tone. If no tone is present, see the calibrator manual to correct the problem.

6.) Insert the Microphone and Adapter into the Calibrator.

7.) Press the **ENTER** Key.

8.) **"CALIBRATING..."** will appear for a moment with **"..."** slowly moving left to right. This means that the system is attempting to calibrate.

- If **"BAD CALIBRATION / TO TRY AGAIN / PRESS (CAL)"** appears or the **SPL** does not match the entered calibrator level by +/- 0.1 dB:
  - Check the calibration system.
  - Repeat steps 2 through 8 to obtain a valid calibration.

9.) Exit this mode by pressing the **MENU ON/OFF** Key.

- For the **"PEAK"** level to be accurate, the **"SPL"** calibration level must be in the range of 100 to 140 dB.
    - A valid **"PEAK"** level (at 1000Hz) is 2.0 to 4.0 dB higher than the calibration level.
- If a new **"PRE-SURVEY"** Calibration is performed, the old calibration is discarded along with all old **"PERIODIC CHECK"** Levels and Times. This is the only way to delete all previously entered **"PERIODIC CHECK"**s.
- The Sound Level Calibrator output will be affected slightly due to altitude (atmospheric pressure). If calibrating at high altitudes, see the calibrator manual for altitude correction values.

CAL Key:
"PERIODIC CHECK"

Up to 8 Calibration Levels and Calibration Times can be saved throughout a measurement period.

NOTE: If you try to save more than 8 levels, the **ENTER** key will not appear to work.

Periodically check the Acoustic Calibration of the dosimeter as follows:

1.) Turn on the calibrator (1000 Hz). Listen to see if the calibrator is producing a tone. If no tone is present, see the calibrator manual to correct the problem.

2.) Insert the Microphone and Adapter into the calibrator.

3.) Press the **CAL** Key. **"PRE-SURVEY"**, **"PERIODIC CHECK"**, and **"REVIEW"** will appear in the menu.

4.) Use the **UP ARROW** and **DOWN ARROW** Keys to highlight **"PERIODIC CHECK"**.

5.) Press the **ENTER** Key. **"CAL. CHECK"** followed by **"LEVEL = XX.X dB"** (where XX.X is the SPL value) will appear.

6.) Press the **ENTER** Key to save the dB Level and time of check.

7.) Exit this mode by pressing the **MENU ON/OFF** key.

- To delete the old **"PERIODIC CHECK"** levels and times, it is necessary to perform a new **"PRE-SURVEY"** calibration. The old calibration is then discarded along with all old **"PERIODIC CHECK"** levels and times.

CAL Key:
"REVIEW"

Review the Initial Calibration (followed by **"**"**) and up to 8 **"PERIODIC CHECK"**s of the Acoustic Calibration as follows:

1.) Press the **CAL** key. **"PRE-SURVEY"**, **"PERIODIC CHECK"**, and **"REVIEW"** will appear in the menu. **"PRE-SURVEY"** will be highlighted.

2.) Use the **UP ARROW** and **DOWN ARROW** keys to highlight **"REVIEW"**.

3.) Press the **ENTER** key. The Main Calibration is shown followed by any **"PERIODIC CHECK"**s that were entered.

4.) Use the **UP ARROW** and **DOWN ARROW** keys to observe up to 8 **"PERIODIC CHECK"** dB values and times within the display.

5.) Exit this mode by pressing the **MENU ON/OFF** key.

- To delete the old **"PERIODIC CHECK"** levels and times, it is necessary to perform a new **"PRE-SURVEY"** calibration. The old calibration is then discarded along with all old **"PERIODIC CHECK"** levels and times.

PRINT Key:
"PRINT ALL"

Print all available data as follows:

1.) Press the **PRINT** key. **"PRINT ALL"** will appear highlighted.

2.) Press the **PRINT** key. **"PRINTING..."** will appear and the printing will begin if all connections and printer settings are proper.

See the "SAMPLE PRINTOUTS" section to see what information is contained within each printout section.

If you wish to print only certain sections of the total printout, then look at the following section, **"PRINT SELECTED"**.

PRINT Key:
"PRINT SELECTED"

Print User-Selected Data as follows:

1.) Press the **PRINT** key. **"PRINT ALL"** will appear highlighted.

2.) Use the **UP ARROW** and **DOWN ARROW** keys to highlight **"PRINT SELECTED"**.

3.) Press the **ENTER** key. **"HEADER"** will appear.

- To select which information to print:
  (**"Y"** will print, **"N"** will not print)

  A.) Press the **UP ARROW** and **DOWN ARROW** keys to highlight an item.

See the "SAMPLE PRINTOUTS" section to see how the following selections relate to each printout.

"HEADER"	[Y/N]	Name, Work Area, Comments, etc.
"CALIBRATION"	[Y/N]	Pre-survey/Periodic Checks
"DOSE1"	[Y/N]	Dosimeter 1 Information
"DOSE2"	[Y/N]	Dosimeter 2 Information
"PARAMETERS"	[Y/N]	Dosimeter Setup Parameters
"SUMMARY"	[Y/N]	Time and Data Summary
"PEAK"	[Y/N]	Peak Levels
"U.L."	[Y/N]	Upper Limit Time
"STATISTICS"	[Y/N]	% Time Statisticl Distribution
"LN LEVELS"	[Y/N]	Exceedance Levels, L01 - L100
"EVENTS"	[Y/N]	All Events
"TIME HISTORY"		Time History
"LAVG"	[Y/N]	Average Time History
"MAX"	[Y/N]	Maximum Level Time History
"PEAK"	[Y/N]	Peak Level Time History
"LC-A"	[Y/N]	C minus A Time History
"TABULAR"		Select Tabular or Graphical
"SAMPLES/LINE"		Enter 1 to 120

B.) Use the **ENTER** key (for either a Yes/No or Tabular/Graphical response). Use the **UP ARROW** and **DOWN ARROW** keys to enter the Samples per Line.

C.) Repeat Steps A and B to select as many of the above as desired.

4.) When all selections are completed, press the **PRINT** key twice. **"PRINTING..."** will appear and the printing will begin if all connections and printer settings are proper.

PRINT Key:
"PRINTER SETUP"

1.) Press the **PRINT** key. Use the **UP ARROW** and **DOWN ARROW** keys to highlight **"PRINTER SETUP"**.

2.) Press **ENTER**. The following three items will appear.

"BAUD" (Highlighted)
"EOL"
"PAGE BREAKS" (**"HANDSHAKE"** will not appear)

- Set the Baud Rate as follows:

A.) Press the **ENTER** key. The present Baud Rate setting will become highlighted. Use the **UP ARROW** and **DOWN ARROW** keys to change it to one of the following:

300 600 1200 2400 4800 9600 19200

B.) Press **ENTER** to again highlight **"BAUD"**.

C.) If desired, continue on to the next setting. Otherwise, exit this mode by pressing **MENU ON/OFF**.

- Set the End of Line Characters **"LF"** & **"CR"** as follows:

A.) Use the **UP** or **DOWN ARROW** keys to highlight **"<EOL>"**.

B.) Press the **ENTER** key to highlight the present EOL setting. Use the **UP ARROW** and **DOWN ARROW** keys to change the **"<EOL>"** setting to one of the following:

"LF/CR" Line Feed followed by Carriage Return
"CR/LF" Carriage Return followed by Line Feed
"LF ONLY" Line Feed only
"CR ONLY" Carriage Return only

C.) Press **ENTER** to again highlight **"<EOL>"**. Continue on, or exit this mode by pressing **MENU ON/OFF**.

- Select Page Breaks as follows:

A.) Highlight **"PAGE BREAKS"** with the **UP/DOWN ARROWS**.

B.) Use the **ENTER** key to select **"Y"** (Yes) or **"N"** (No).

C.) Continue, or exit by pressing **MENU ON/OFF**.

- Select Handshake method as follows:

A.) Highlight **"HANDSHAKE"** with the **UP** or **DOWN ARROWS**.

B.) Press **ENTER** to select **"NONE"**, **"HARDWARE"** or **"XON/XOFF"**. This should match the setting of your serial printer or computer COM port.

C.) Exit this mode by pressing the **MENU ON/OFF** key.

MENU - **ON/OFF** Key:
"SETUP"
"DOSE1"
"DOSE2"

NOTE: These settings cannot be changed if the unit has any data stored (Run Time) in it.

Setup Dosimeter #1 and/or #2 as follows:

1.) Press the **MENU ON/OFF** key. **"OFF-5"** will appear and is highlighted.

2.) Use the **UP ARROW** and **DOWN ARROW** keys to highlight **"SETUP"**.

3.) Press the **ENTER** key. **"DOSE1"** will appear highlighted. **"DOSE2"** will appear but is not highlighted.

4.) Use the **UP ARROW** and **DOWN ARROW** keys to highlight either **"DOSE1"** or **"DOSE2"**.

5.) Press the **ENTER** key. The following items will appear:

"Prt"		Projection Time, 1 to 18 hrs in 1/4 hr steps
"TL"		Threshold Level, 40 to 140 dB
"ER"		Exchange Rate: 3, 4, 5, or 6 dB
"UL"		Upper Limit, 40 to 140 dB
"CL"		Criterion Level, 40 to 140 dB
"LDN"	[Y/N]	Day/Night Levels (only on **"DOSE1"**)

- To change an item's value:

  A.) Use the **UP ARROW** and **DOWN ARROW** keys to highlight an item.

  B.) Press the **ENTER** key to highlight the value.

  C.) Use the **UP ARROW** and **DOWN ARROW** keys to change the value.

  D.) Press the **ENTER** key to highlight the item that just had its value changed.

  E.) Repeat Steps A through D to change more items.

- To change the **"LDN"** Yes/No answer:

  A.) Use the **UP ARROW** and **DOWN ARROW** keys to highlight **"LDN"**.

  B.) Use the **ENTER** key to change Yes/No.

6.) When all values are properly set, press the **MENU ON/OFF** key twice to return to the **"SETUP"** menu.

MENU - ON/OFF Key:
"SETUP"
"RESP/WT"

NOTE: These settings cannot be changed if the unit has any data stored (Run Time) in it.

Set up the Response and Weighting as follows:

"DOS1"	Response, Select **"SLOW"** or **"FAST"**
"DOS2"	Response, Select **"SLOW"** or **"FAST"**
"WGHT"	Weighting, Select 1 of 3:

DOS1 = WGHT / DOS2 = WGHT

"1 = A" / "2 = A"
"1 = C" / "2 = C"
"1 = A" / "2 = C"

1.) Press the **MENU ON/OFF** key. **"OFF-5"** will appear and is highlighted.

2.) Use the **UP ARROW** and **DOWN ARROW** keys to highlight **"SETUP"**.

3.) Press the **ENTER** key. **"DOSE1"** will appear highlighted.

4.) Use the **UP ARROW** and **DOWN ARROW** keys to highlight **"RESP/WT"**.

5.) Press the **ENTER** key.

- To change **"DOSE1"** or **"DOSE2"** (Dosimeter 1 or 2):

  A.) Use the **UP ARROW** and **DOWN ARROW** keys to highlight either **"DOSE1"** or **"DOSE2"**.

  B.) Press the **ENTER** key to change **"SLOW"** / **"FAST"**.

- To change **"WGHT"** (Weighting):

  A.) Use the **UP ARROW** and **DOWN ARROW** keys to highlight **"WGHT"**.

  B.) Use the **ENTER** key to select one of the following:

DOS1 = WGHT / DOS2 = WGHT

"1 = A" / "2 = A"
"1 = C" / "2 = C"
"1 = A" / "2 = C"

6.) When all values are properly set, press the **MENU ON/OFF** key twice to return to the **"SETUP"** menu.

MENU - ON/OFF Key:
"SETUP"
"LOGGING"

Select the items to be Logged as follows:

"DOSIMETERS"		Select 1 or 2 Dosimeter Mode
"LAVG"	[Y/N]	Select to Log the Average Level
"MAX"	[Y/N]	Select to Log the Maximum Level
"PEAK"	[Y/N]	Select to Log the Peak Level
"01 SEC"		1 Sec., 10 Sec., or 1 Min. Logging

1.) Press the **MENU ON/OFF** key. **"OFF-5"** will appear and is highlighted.

2.) Use the **UP ARROW** and **DOWN ARROW** keys to highlight **"SETUP"**.

3.) Press the **ENTER** key. **"DOSE1"** will appear and is highlighted.

4.) Use the **UP ARROW** and **DOWN ARROW** keys to highlight **"LOGGING"**.

5.) Press the **ENTER** key. **"DOSIMETERS"** will appear and is highlighted.

- To select the number of **"DOSIMETERS"** to log:

  A.) Press the **ENTER** key to display either **"1"** or **"2"**.

- To change Yes/No answers:

  A.) Use the **UP ARROW** and **DOWN ARROW** keys to highlight either **"LAVG"**, **"MAX"**, or **"PEAK"**.

  B.) Use the **ENTER** key to change Yes/No.

- To change **"01-SEC"**, **"10-SEC"**, or **"01-MIN"**:

  A.) Use the **UP ARROW** and **DOWN ARROW** keys to highlight the item.

  B.) Use the **ENTER** key to change it.

6.) When all values are properly set, press the **MENU ON/OFF** key twice to return to the **SETUP** menu.

MENU - ON/OFF Key:
"SETUP"
"CLK-SET"

NOTE: These settings cannot be changed if the unit has any data stored (Run Time) in it.

Set up the Clock as follows:

"TIME"	Enter with the NUMBER Keys
"DATE"	Enter with the NUMBER Keys
"12-HOUR"	Select 12 or 24 Hour Clock Format
"MO.-DAY"	Select MO.-DAY or DAY-MO. Format

1.) Press the **MENU ON/OFF** key. **"OFF-5"** is highlighted.

2.) Use the **UP ARROW** and **DOWN ARROW** keys to highlight **"SETUP"**.

3.) Press the **ENTER** key. **"DOSE1"** will appear highlighted.

4.) Use the **UP ARROW** and **DOWN ARROW** keys to highlight **"CLK-SET"**.

5.) Press the **ENTER** key. **"TIME"** will appear highlighted.

6.) Check the settings. If necessary, correct the settings as follows:

- To select either the **"12-HOUR"** / **"24 HOUR"** or the **"MO.-DAY"** / **"DAY-MO."** format:

  A.) Use the **UP ARROW** and **DOWN ARROW** keys to highlight the item.

  B.) Use the **ENTER** key to change it.

  C.) If desired, continue on to another setting. Otherwise, press the **MENU ON/OFF** key twice to return to the **"SETUP"** menu.

- To change the **"DATE"**:

  A.) Use the **UP ARROW** and **DOWN ARROW** keys to highlight **"DATE"** if it is not highlighted.

  B.) Press the **ENTER** key. The first digit becomes highlighted.

  C.) Use the **NUMBER** keys to enter the correct Date. After the last digit is entered, **"DATE"** will again appear highlighted.

  D.) If desired, continue on to another setting. Otherwise, press the **MENU ON/OFF** key twice to return to the **"SETUP"** menu.

- To change the **"TIME"** when in the **"12-HOUR"** format:

  A.) Use the **UP ARROW** and **DOWN ARROW** keys to highlight **"TIME"** if it is not highlighted.

  B.) Press the **ENTER** key. The first digit becomes highlighted. Seconds will return to 00 and will stop counting.

  C.) Use the **NUMBER** keys to enter the correct Time.

  D.) Use the **UP ARROW** and **DOWN ARROW** keys to select **"AM"** or **"PM"**.

  E.) Use the **ENTER** key to Highlight **"TIME"**. The clock will begin counting.

  F.) If desired, continue on to another setting. Otherwise, press the **MENU ON/OFF** key twice to return to the **"SETUP"** menu.

- To change the **"TIME"** when in the **"24-HOUR"** format:

  A.) Use the **UP ARROW** and **DOWN ARROW** keys to highlight **"TIME"** if it is not highlighted.

  B.) Press the **ENTER** key. The first digit becomes highlighted. Seconds will stop counting.

  C.) Use the **NUMBER** keys to enter the correct Time.

  D.) When the last digit is entered, **"TIME"** will appear highlighted and the clock will begin counting.

  E.) If desired, continue on to another setting. Otherwise, press the **MENU ON/OFF** key twice to return to the **"SETUP"** menu.

MENU - ON/OFF Key:
"SETUP"
"EVENTS"

NOTE: These settings cannot be changed if the unit has any data stored (Run Time) in it.

Set up Level-Triggered Events as follows:

"TRIG ENABLE"	Level-Activated Event, Yes/No
"LEVEL ON"	Modify, 40 to 140 dB
"LEVEL OFF"	Modify, 40 to 140 dB

1.) Press the **MENU - ON/OFF** key until the **"SETUP"** Menu appears.

2.) Use the **UP ARROW** and **DOWN ARROW** keys to highlight **"SETUP"**.

3.) Press the **ENTER** key. A menu with **"EVENTS"** will appear.

4.) Use the **UP ARROW** and **DOWN ARROW** keys to highlight **"EVENTS"**.

5.) Press the **ENTER** key. **"TRIG ENABLE"** will appear and is highlighted.

- To change the dB value for **"LEVEL ON"** and **"LEVEL OFF"**:

  A.) Use the **UP ARROW** and **DOWN ARROW** keys to highlight either **"LEVEL ON"** or **"LEVEL OFF"**.

  B.) Press the **ENTER** key to highlight the dB value to be changed.

  C.) Use the **UP ARROW** and **DOWN ARROW** keys to change its value.

  D.) When the desired value is displayed, press the **ENTER** key. Either **"LEVEL ON"** or **"LEVEL OFF"** will again appear highlighted.

- To select Level-Triggered Event:

  A.) Use the **UP ARROW** and **DOWN ARROW** keys to highlight **"TRIG ENABLE"**.

  B.) Press the **ENTER** key to select **"Y"** (Yes).

  C.) Press the **MENU - ON/OFF** key twice. It will return to the main menu beginning with **"SETUP"**.

  - Level-Triggered Event will not be entered until the **EVENT** key is pressed. (See the following section.)

- To enter the Level-Triggered Event mode:

  A.) Press the **EVENT** key when ready to begin taking data.

  - If **"TRIG ENABLE"** was set to **"Y"**, the Level-Triggered Event mode will start when the **EVENT** key is pressed. The **RUN /PAUSE** key will not operate in this mode. Sound Levels will control Run and Pause.

  - If **"TRIG ENABLE"** was set to **"N"**, the Level-Triggered Event mode will not be entered when the **EVENT** key is pressed. The Manually-Triggered Event will be entered instead.

- To exit the Level-Triggered Event mode:

  A.) Depress **MENU - ON/OFF**. The display will read **"EVENT MODE EXITED"**.

See "USING THE EVENT MODES" for detailed instructions on how to operate this mode.

MENU - ON/OFF Key:
"OFF-5"

Turn the dosimeter off as follows:

1.) Press the **MENU - ON/OFF** Key until the **"SETUP"** Menu appears with **"OFF-5"** highlighted.

2.) Press and hold the **ENTER** Key. **"OFF-5"** will count down to **"OFF-0"** and the dosimeter will turn off.

MENU - ON/OFF Key:
"RESET-5"

Reset all stored data in the dosimeter as follows:

1.) Depress **MENU - ON/OFF** until the **"SETUP"** Menu appears with **"OFF-5"** highlighted.

2.) Use the **UP ARROW** and **DOWN ARROW** keys to highlight **"RESET-5"**.

3.) Press and hold the **ENTER** key. **"RESET-5"** will count down to **"RESET-0"** and then reset.

MENU - ON/OFF Key:
"SECURE"

Operate the 4-Digit Security Code as follows:

"SECURE ENABLE" Select to Enable Security
"CHANGE CODE" Select to Enter New Security Code

1.) Press the **MENU - ON/OFF** key until the **"SETUP"** Menu appears.

2.) Use the **UP ARROW** and **DOWN ARROW** keys to highlight **"SECURE"**.

3.) Depress **ENTER**. **"SECURITY"** will appear with **"SECURE ENABLE"** highlighted.

- To change the Security Code:

A.) Use the **UP ARROW** and **DOWN ARROW** keys to highlight **"CHANGE CODE"**.

B.) Depress **ENTER**. **"ENTER SECURITY CODE: XXXX"** will appear.

C.) Use the **NUMBER** keys to enter the 4-Digit Security code.

- If the code is wrong, **"INCORRECT CODE"** will appear. Try again.
- If the code is correct, **"ENTER NEW CODE: XXXX"** will appear.

D.) When the code is valid and **"ENTER NEW CODE: XXXX"** is present, enter the new 4-Digit security code.

E.) After enterin the code, the display asks you to **"REENTER NEW CODE: XXXX"** to match the first entry.

- If the code is not identical, **"CODE MISMATCH"** will appear. Try again.
- When the code is identical, **"SECURITY CODE HAS BEEN SAVED"** will appear and the code is saved.

F.) Depress **MENU - ON/OFF**. The **"SETUP"** Menu will appear.

- To enter the Security mode with or without Level Triggered Events activated:

  A.) Press the **ENTER** key. **"ENTER SECURITY CODE: XXXX"** will appear.

  B.) Use the **NUMBER** keys to enter the 4-digit security code. When the last digit is entered, one of two things will happen:

  - If the code is wrong, **"INCORRECT CODE"** will appear and the dosimeter cannot be secured. Try again.
  - If the code is correct, **"PRESS RUN TO SECURE"** will appear with the unit in the Pause mode. Secure and Run the dosimeter as follows:
    - Depress **"RUN / PAUSE"**. **"SECURED CODE: XXXX"** will appear. The dosimeter is now Secured in the Run mode.
    - If another key is pressed, **"SECURITY DISABLED"** will appear. If this happens, start over at Step 1.

- To exit the Security mode with or without Level Triggered Events activated:

  A.) **"SECURED CODE: XXXX"** is present in the display.

  B.) Use the **NUMBER** keys to enter the 4-digit security code. When the last digit is entered, one of two things will happen:

  - If the code is wrong, **"INCORRECT CODE"** will appear and the dosimeter cannot be removed from the secured mode. Try again.
  - When the code is correct, **"SECURED / CODE: XXXX "**:
    - Will disappear if Level Triggered event was not activated. Return the dosimeter display to its normal function as follows:

      1.) Press the **RUN/PAUSE** key.

      2.) Press the **MENU - ON/OFF** key to return to the **"SETUP"** Menu.

    - Will enter the Event mode if Level Triggered Event was activated. Return the dosimeter display to its normal function as follows:

      1.) Press the **MENU - ON/OFF** key. **"EVENT MODE EXITED"** will appear.

      2.) Press the **MENU - ON/OFF** key again to return to the **"SETUP"** Menu.

- To enter the Security mode with Auto-On activated:

  A.) Press the **ENTER** key. **"ENTER SECURITY CODE: XXXX"** will appear.

  B.) Use the **NUMBER** keys to enter the 4-digit security code. When the last digit is entered, one of two things will happen:

  - If the code is wrong, **"INCORRECT CODE"** will appear and the dosimeter cannot be secured. Try again.

  - If the code is correct, **"PRESS RUN TO SECURE"** will appear with the unit in the Pause mode. Secure the dosimeter in the Auto-On mode as follows:

    - Press the **"RUN / PAUSE"** key. **"SECURED CODE: XXXX"** will briefly appear. Then the display will go blank. The dosimeter is now Secured and will start when Auto-On tells it to.

    - If any other key is pressed, **"SECURITY DISABLED"** will appear. If this happens, start over at Step 1.

- To exit the Security mode with Auto-On activated:

  A.) Press the **"MENU ON / OFF"** key. **"((QUEST))"** will appear for a few seconds followed by **"SECURED CODE: XXXX"**. You have about 8 seconds to enter the proper code to remove Security. If you are not successful, **"INCORRECT CODE"** will appear and the display will go blank. Repeat this step to try again.

  - When the code is correctly entered, the display will immediately go blank. Press the **"MENU ON / OFF"** key to return to the **"SETUP"** Menu.

The dosimeter has two Security Codes that can be used:

- The Quest Security Code (only available by contacting Quest by either phone or FAX.)

- The User Security Code.

See USING SECURITY CODES for more information on these codes. A location is included there so that you can record your code if you wish.

MENU - ON/OFF Key:
"BATTERY"

To Check the dosimeter Battery condition:

1.) During normal operation, press the **MENU ON/OFF** Key. **"BATTERY"** will appear in the menu.

2.) Use the **UP ARROW** and **DOWN ARROW** Keys to highlight **"BATTERY"**.

3.) Press the **ENTER** Key.

4.) The display will list:

"BATT = X.X VOLTS"
"GOOD FOR XX MORE HOURS OF USE."

MENU - ON/OFF Key:
"AUTO-ON"
"ENABLE Y/N"

See "USING AUTO-ON / TIMED RUN" for information on how to use these features.

- Note that the Timed Run mode does not appear on the display. The duration of the Timed Run is equal to the programmed Duration for either **"DAILY"**, **"WEEKDAY"**, or **"DATE"**. Therefore, three Timed Run Durations can be independently stored and used simply by selecting either **"DAILY"**, **"WEEKDAY"**, or **"DATE"**.

Program the Auto-On function as follows:

"MODE DAILY"	Program Daily Start/Duration
"MODE WEEKDAY"	Program Days of Week for Start/Duration
"MODE DATE"	Program One Day for Start/Duration

1.) Depress **MENU ON/OFF** until **"AUTO-ON"** appears in the menu.

2.) Use the **UP ARROW** and **DOWN ARROW** keys to highlight **"AUTO-ON"**.

3.) Depress **ENTER**. **"ENABLE"** will appear highlighted, followed by the present mode (**"DAILY"**, **"WEEKDAY"**, or **"DATE"**) that the dosimeter is in.

- To **"ENABLE"** or **"DISABLE"** Auto-On / Timed Run:

A.) Be sure that **"ENABLE"** is highlighted.

B.) Press the **ENTER** key to select either **"Y"** or **"N"**.

C.) Depress **MENU ON/OFF** to return to the **"SETUP"** menu.

- When Auto-On / Timed Run is enabled, be sure that the proper selection (**"DAILY"**, **"WEEKDAY"**, or **"DATE"**) appears under **"ENABLE"** in the display before leaving the menu. Auto-On will then automatically operate in this mode. Timed Run will operate for the Duration that is associated with **"DAILY"**, **"WEEKDAY"**, or **"DATE"**.

- Each of the following modes (**"DAILY"**, **"WEEKDAY"**, or **"DATE"**) can be set and stored independently. Therefore, each mode can have a different Start Time and duration programmed into memory.

- To program **"DAILY"**:

A.) Use the **UP ARROW** and **DOWN ARROW** keys to highlight **"MODE"**.

B.) Depress **ENTER** to move the highlighting to the right. Either **"DAILY"**, **"WEEKDAY"**, or **"DATE"** will be highlighted.

C.) Press the **UP ARROW** or **DOWN ARROW** keys until **"DAILY"** appears.

D.) Depress **ENTER**. **"MODE DAILY"** will appear. **"TIME"** will be highlighted.

"XX:YY:ZZ AA" represents the Start Time.
XX = Hours
YY = Minutes
ZZ = Seconds
AA = AM or PM (only appears in 12 Hour Mode)

E.) Depress **ENTER**. The first digit (X) will appear highlighted.

F.) Set the Start Time in either the 12 or 24 hour mode as follows:

- 12-Hour mode:

1). Use the **NUMBER** keys to enter Hours, Minutes, and Seconds. Use the **UP ARROW** and **DOWN ARROW** keys to change between **"AM"** and **"PM"**.

2.) Depress **ENTER**. **"DURATION"** will appear.

- 24-Hour mode:

1). Use the **NUMBER** keys to enter Hours, Minutes, and Seconds.

2.) When the last digit of the minutes is entered, **"DURATION"** will appear.

G.) Use the **NUMBER** keys to enter **"DURATION"** as follows:

2 digits for **"HOURS:"** (0 to 99)
2 digits for **"MIN:"** (0 to 59)

H.) When the last digit is entered, **"MODE DAILY"** will appear.

I.) Press the **MENU ON/OFF** key twice to return the dosimeter to the **"SETUP"** menu.

- Turn the dosimeter Off. If Auto-On is enabled, the unit will automatically Start and Run per the **"DAILY"** programmed setup.

- To program **"WEEKDAY"**:

A.) Use the **UP** or **DOWN ARROW** keys to highlight **"MODE"**.

B.) Depress **ENTER** to move the highlight to the right. **"DAILY"**, **"WEEKDAY"**, or **"DATE"** will be highlighted.

C.) Press the **UP ARROW** and **DOWN ARROW** keys until **"WEEKDAY"** appears.

D.) Press the **ENTER** key to select it. **"MODE WEEKDAY"** will appear. **"DAYS"** will be highlighted followed by seven character positions:

  - **SMTWTFS** = **S**un **M**on **T**ues **W**ed **T**hurs **F**ri **S**at

  - Each Letter (**"SMTWTFS"**) represents a day that the dosimeter will place itself into the Run mode.

  - If a Dash (**"-"**) appears, this represents a day that the dosimeter will remain in the Pause mode.

- Enter each Run Day as follows:

  1.) Press the **ENTER** key. A character position will appear highlighted.

  2.) Use the **UP** or **DOWN ARROW** keys to select either a **"-"** or a day that the dosimeter will Run.

  3.) Repeat steps 1 and 2 until all Run Days are entered.

  4.) Depress **ENTER**. **"DAYS"** will be highlighted.

E.) Use the **UP ARROW** and **DOWN ARROW** key to highlight **"TIME"**. Enter the Start Time as follows:

"XX:YY:ZZ AA" represents the Start Time.
XX = Hours
YY = Minutes
ZZ = Seconds
AA = AM or PM (only appears in 12 Hour Mode)

F.) Press the **ENTER** Key. The first digit (X) will appear highlighted.

G.) Set the Start Time in either the 12 or 24 hour mode as follows.

- 12-Hour mode:

1). Use the **NUMBER** Keys to enter Hours, Minutes, and Seconds. Use the **UP ARROW** and **DOWN ARROW** Keys to change between **"AM"** and **"PM"**.

2.) Press the **ENTER** Key. **"DURATION"** will appear.

- 24-Hour mode:

1). Use the **NUMBER** Keys to enter Hours, Minutes, and Seconds.

2.) When the last digit of the minutes is entered, **"DURATION"** will appear.

H.) Use the **NUMBER** Keys to enter **"DURATION"** as follows:

2 digits for **"HOURS:"** (0 to 99)

2 digits for **"MIN:"** (0 to 59)

I.) When the last digit is entered, **"MODE WEEKDAY"** will appear.

J.) Press the **MENU ON/OFF** Key twice to return the dosimeter to the **"SETUP"** menu.

- Turn the dosimeter Off. If Auto-On is enabled, the unit will automatically Start and Run per the **"WEEKDAY"** programmed setup.

- To program **"DATE"**:

A.) Use the **UP ARROW** and **DOWN ARROW** Keys to highlight **"MODE"**.

B.) Press the **ENTER** Key to move the highlighting to the right. Either **"DAILY"**, **"WEEKDAY"**, or **"DATE"** will be highlighted.

C.) Press the **UP ARROW** and **DOWN ARROW** Keys until **"DATE"** appears.

D.) Press the **ENTER** Key to select it. **"MODE DATE"** will appear. **"DATE"** will be highlighted.

"XX-YY M-D"(Month-Day) or **"YY-XX D-M"**(Day- Month)
XX = Month
YY = Day

E.) Press the **ENTER** Key. The first digit (X) will appear highlighted.

F.) Use the **NUMBER** Keys to enter all 4 digits. When the last digit is entered, **"DATE"** will again become highlighted.

G.) Use the **UP ARROW** and **DOWN ARROW** Key to highlight **"TIME"**.

"XX:YY:ZZ AA" represents the Start Time.
XX = Hours
YY = Minutes
ZZ = Seconds
AA = AM or PM (only appears in 12 Hour Mode)

H.) Press the **ENTER** Key. The first digit (X) will appear highlighted.

I.) Set the Start Time in the 12 or 24 hour mode as follows.

- 12-Hour mode:

1). Use the **NUMBER** Keys to enter Hours, Minutes, and Seconds. Use the **UP ARROW** and **DOWN ARROW** Keys to change between **"AM"** and **"PM"**.

2.) Press the **ENTER** Key. **"DURATION"** will appear.

- 24-Hour mode:

1). Use the **NUMBER** Keys to enter Hours, Minutes, and Seconds.

2.) When the last digit of the minutes is entered, **"DURATION"** will appear.

J.) Use the **NUMBER** Keys to enter the **"DURATION"** as follows:

- 2 digits for **"HOURS:"** (0 to 99)

- 2 digits for **"MIN:"** (0 to 59)

K.) When the last digit is entered, **"MODE DATE"** will appear.

L.) Press the **MENU ON/OFF** Key twice to return the dosimeter to the **"SETUP"** menu.

- Turn the dosimeter Off. If Auto-On is enabled, the unit will automatically Start and Run per the **"DATE"** programmed setup.

SPECIFICATIONS

Standards: Q-400: type 2 Q-500: type 1
ANSI S1.25 - 1991, ANSI S1.4 - 1983
IEC 651 - 1979, IEC 804 - 1985

Measuring Range: 40 - 140dB with both dosimeter 1 and 2 set to either A or C weighting. Maximum level is for sinusoidal signals. A signal with a 10dB crest factor will be measured accurately if its RMS level is 10dB below the maximum level. Note: If one dosimeter is set to A weighting and the other to C weighting, the measuring range is 70 - 140dB.

Detector: True RMS, 63dB Pulse Range

Display: Multi-line LCD with Annunciators for SLOW, FAST, C, A, LOBAT, RUN and PAUSE

Data Output: Uses Interface Modules to condition the data.
Selectable Baud:
- 300 600 1200 2400 4800 9600 19200.

Connector: Uses the microphone connector.

Microphone: Q-400 8mm Shoulder-Mount, Type 2.
One piece system:
- Cable, Connector, and Microphone

Q-500 1/2-inch Shoulder-Mount, Type 1
Two piece system:
- Cable, Connector, and Preamp
- QE-4846 Precision Microphone

Battery: Single 9-volt alkaline.
Battery Life: Dependent upon Dosimeter 1 & 2 setups.

- When both Threshold levels are set above 70 dB and both Weightings are either "A" or "C":
  - Q-400 Approximately 48 Hours
  - Q-500 Approximately 30 Hours
- Either Threshold 1 or 2 set below 70dB or weighting set to 1 = A / 2 = C
  - Q-400 Approximately 22 Hours
  - Q-500 Approximately 15 Hours

Shelf life is typically 4 months due to memory and clock requirements.

Integration Time: Signal dependent: With a 3dB Exchange (doubling) rate and a constant input level of 140dB the integration time would be 62 hours, 24 minutes. As the signal level decreases and the exchange rate increases, the integration time increases.

Battery Test:	Appears in the display. Use the keypad to request the Battery Voltage and Remaining Time on the battery.
Memory and Clock/Calendar Battery Backup:	Lithium cell, 1 to 2 year life not including time that the 9 volt battery is installed. For long life, keep a good 9 volt battery installed. (Replacement only by Authorized Service Center)
Temperature:	-10° to +50°C operating; -20° to +60°C storage (battery removed)
Humidity:	0 to 95% non-condensing
Magnetic Field Effects:	Negligible below 50 Oersteds at 50 to 60 Hz. Tested for RF succeptibility with <1dB error at field strengths to 10 V/m over the frequency range of 10 MHz to 500 MHz.
Size:	5.5 x 2.8 x 1.4 inches (140 x 70 x 40 mm)
Weight:	15.5 oz. (440 grams)
Construction:	Cast aluminum housing with tamper-, water-, and dust-resistant security cover.

Displayed vs: Printed Data:

The dosimeter displays and/or prints data for the following:

- "*" indicates that these functions can be directly read from the display.
- "#" indicates that these functions can be sent in printed page form to either a computer or a printer.
- "[ ]" indicates the wording on the display. The display text appears inside of the parenthesis.

* Sound Pressure Level [SPL].
*# Peak Level [PEAK].
*# Maximum Level [MAX]
*# Minimum Level [MIN]

*# Dose [% DOSE].
*# 8 Hour Projected Dose [PrD.8].
*# Projected Dose [PrD.(Prt)], 1 to 18 hour user-selectable.
*# Exposure [EXP] in Pascal Squared Hours [Pa^2 h].

*# Sound Exposure Level [SEL]
*# Average Sound Level [LAV]. This is also called Equivalent Level [LEQ] when using 3dB Exchange Rate.
*# Time Weighted Average [TWA]

*# Projected Time Weighted Average [TWA (Prt)]

*# Run Time [RunTime], Pause Time [PSTime], Upper Limit Time [ULTime], Peak Time [PKTime], Maximum Time [MaxTime], Minimum Time [MinTime], and Remaining Logging Time [LoggTime].

*# Up to 999 different events.

1-second, 10-second or 1-minute Time History.

Peak and Maximum Time Histories.

An Exceedance Level Distribution, L01 to L100.

Day/Night levels [LDN]. This adds a 10 dB noise penalty between 2200 (10 P.M.) and 0700 (7 A.M.).

C - A Measurement Capability.

*# Calibration level.

* Battery Status in hours of use left in battery.

Additional dosimeter "SETUP" features that are user-programmable from the keyboard:

Security Code Feature [SECURE]. Locks out Keyboard.

Auto-On; [DAILY], [WEEKDAY], or [DATE].

Timed Run; Allows the operator to manually place the unit into the Run mode for one of three user-programmed durations. (Duration time is programmed into the Auto-On feature -- DAILY, WEEKDAY, or DATE.)

Selection of Dosimeter 1 or Dosimeter 2 data.

Projection Time [Prt], 1 HR to 16 HR (1/4 HR increments).

Exchange Rates [ER] of 3, 4, 5, or 6 dB.

Threshold Level setting [TL] from 40 to 140 dB.

Criterion Level setting [CL] from 40 to 140 dB.

Upper Limit setting [UL] from 40 to 140 dB.

SLOW or FAST Response, A or C Weighting.

Selection of either 12- or 24-hour Real Time clock.

PRINT Key Menu allows the user to print specific sections of the Printout as desired.

LOGGING TIME LIMITATIONS

The dosimeter can be set to log the following items:

- LAVE (Dosimeter 1)
- LAVE (Both Dosimeters)
- LMAX (Dosimeter 1)
- LMAX (Both Dosimeters)
- PEAK (Unweighted)

The following control the maximum Logging Time:

- The Logging Sample Rate (Time per Sample)
- The Total Number of Items (above) to log.

The following chart shows logging time versus logging rate and number of items logged.

Total Items Logged	APPROXIMATE LOGGING TIME		
	1 Sec. Log Sample Rate	10 Sec. Log Sample Rate	1 Min. Log Sample Rate
1	17.6 Hours	176 Hours	1056 Hours
2	8.8 Hours	88 Hours	528 Hours
3	5.8 Hours	58 Hours	352 Hours
4	4.4 Hours	44 Hours	264 Hours
5	3.5 Hours	35 Hours	210 Hours

ENERGY OVERLOAD

The amount of acoustic energy that can be measured between instrument resets is limited. If this energy is exceeded, math overflow errors will result. The rate at which energy is accumulated depends upon the SPL and the exchange rate and the value of SEL is a good indication of this. The limits per exchange rate are as follows:

Maximum SEL	Exchange rate
193.5	3dB
244	4dB
295	5dB
347	6dB

For example the 3dB limit would be reached after 62 hours, 24 minutes with a constant level of 140dB. The time would double for every 3dB decrease in level, so for practical situations encountered in the field the limitations should not be a problem.

PRINCIPLES OF OPERATION

General Characteristics

The Q-400 and Q-500 dosimeters use low power state-of-the-art circuitry. Each dosimeter is very stable and reliable over a wide range of environmental conditions.

The low power circuitry gives each dosimeter a long battery life. When the 9 volt battery is changed, all dosimeter information is retained due to an internal lithium battery. The lithium battery lasts for many years before needing replacement. (See SPECIFICATIONS)

A rubberized Key Pad is used for all data entry and settings. Menus appear on the display and the keys are used to enter changes.

A block diagram of the Q-400 and Q-500, is shown in Figure 15.

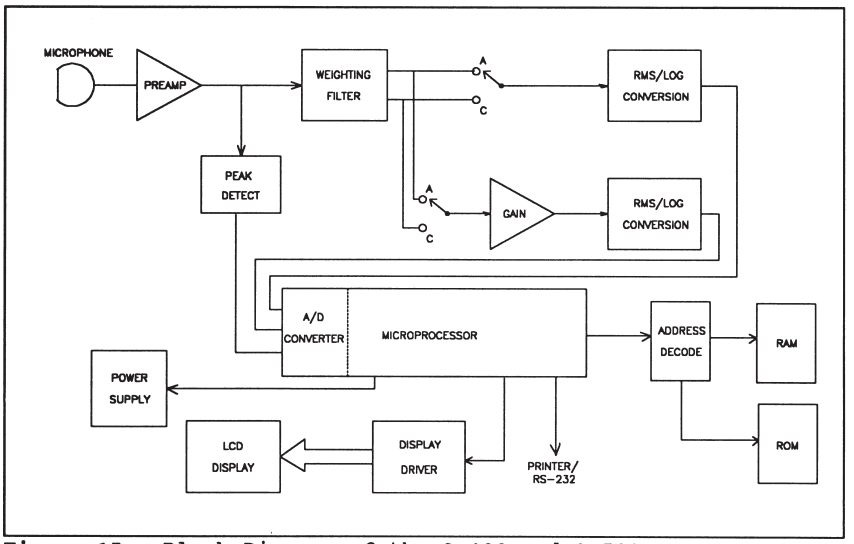


Figure 15. Block Diagram of the Q-400 and Q-500.

Microphone Characteristics

The Q-400 Noise Dosimeter uses an 8 mm omnidirectional ceramic microphone. It is buffered by a high impedance FET input stage. (See Figure 16.)

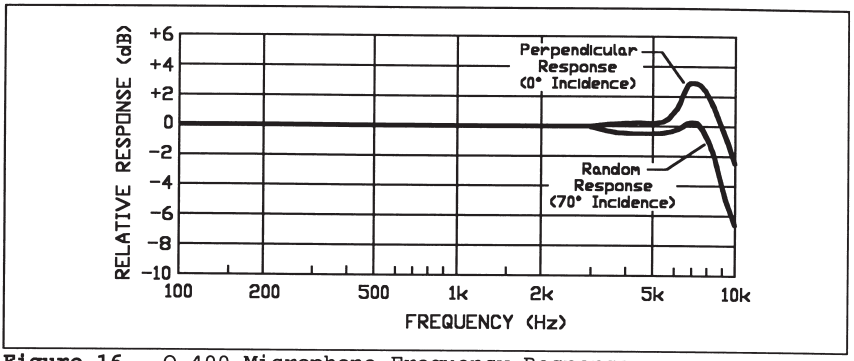


Figure 16. Q-400 Microphone Frequency Response.

The Q-500 Noise Dosimeter uses a 1/2-inch free field prepolarized condenser (electret) microphone. It is buffered by a high impedance FET preamp. (See Figure 17.)

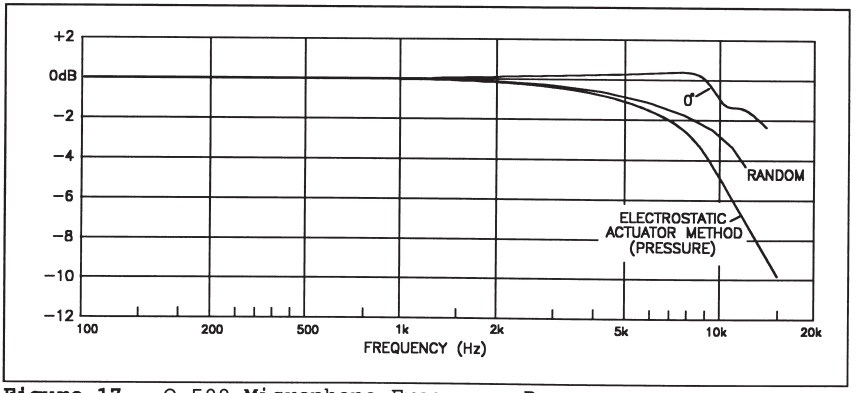


Figure 17. Q-500 Microphone Frequency Response.

Weighting Characteristics

The Q-400 and Q-500 both have "A" and "C" weighting characteristics as shown in Figure 18. For most industrial and community noise measurement requirements, the "A" weighting should be used. The "A" weighting has a response similar to the human ear. The "C" weighting is used for measuring noise reduction in hearing protectors and other scientific purposes.

Both the Q-400 and Q-500 can be programmed to perform the "C - A" function. (See USING C - A)

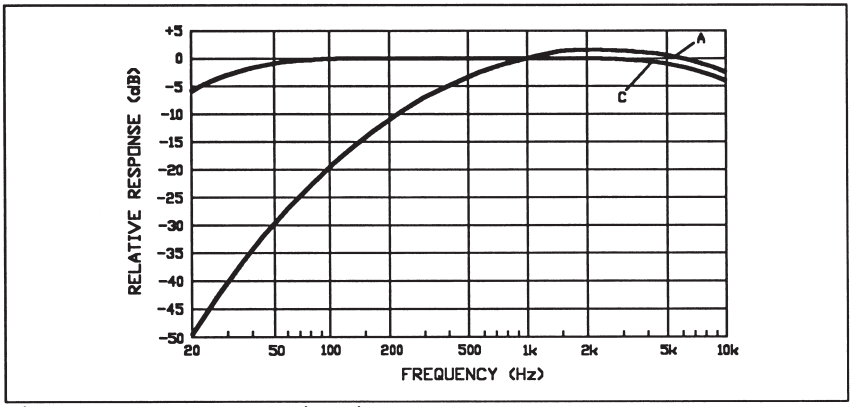


Figure 18. A and C Weighting.

TYPICAL OPERATING PROCEDURE

As a Personal Noise Dosimeter

1.) Check all dosimeter setups that are relevent to the measurement. Change where needed. See DETAILED OPERATING INSTRUCTIONS if necessary.

2.) Reset the dosimeter.

MENU ON/OFF Key
"RESET-5"

3.) Perform a Pre-Survey Calibration of the dosimeter.

CAL Key
"PRE-SURVEY"

4.) Attach the microphone to the operator's shirt as shown in Figure 19. Keep it high on the shoulder and away from the neck as far as practical.

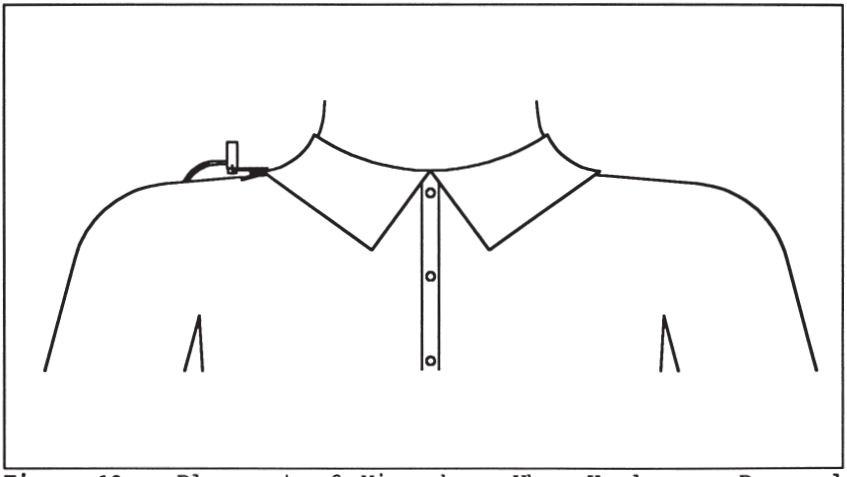


Figure 19. Placement of Microphone When Used as a Personal Monitor.

5.) Press the **RUN/PAUSE** Key to place the dosimeter into the RUN mode.

6.) Install the Security Cover and attach the unit to the operator's belt or pocket.

7.) At the end of the measurement period, remove the unit from the operator's belt or pocket.

8.) Remove the security cover and press the **RUN/PAUSE** Key.

9.) Remove the dosimeter and microphone from the operator.

10.) Evaluate the desired data by the following method(s):

- Use the Display Function Keys to display the data.
- Use a printer (or computer) to list a printout.
- Transfer the data to a computer for further analysis.

11.) Turn the dosimeter off.

MENU ON/OFF Key
"OFF-5"

As an Environmental Monitor

With the unit in the Run mode, it will integrate all noise.
If installing or removing the Security Cover, do it very gently!

1.) Check all dosimeter setups that are relevent to the measurement. Change where needed. See DETAILED OPERATING INSTRUCTIONS if necessary.

2.) Perform a Pre-Survey Calibration of the dosimeter.

CAL Key
"PRE-SURVEY"

3.) Connect the Microphone Boom to the dosimeter.

4.) Wrap the cable neatly around the Boom and connect the microphone to the top of the Boom.

5.) Attach the unit to a tripod if desired.

6.) For the best accuracy, point the microphone as follows:

- Q-400 Upward forming approximately a 70 degree angle with the noise source.
- Q-500 Directly at the noise source.

7.) Reset the dosimeter.

MENU ON/OFF Key
"RESET-5"

8.) Press the **RUN/PAUSE** Key to place the dosimeter into the RUN mode.

9.) Perform the measurement for the desired time period.

10.) Press the **RUN/PAUSE** Key at the end of the period.

11.) Perform a Periodic Check of the dosimeter at the end of the measurement period if necessary.

CAL Key
"PERIODIC CHECK"

12.) Record or print the data.

13.) Turn the dosimeter off.

MENU ON/OFF Key
"OFF-5"

As a Survey Event Monitor

Up to 999 different Events can be stored.

1.) Check all dosimeter setups that are relevent to the measurement. Change where needed. See DETAILED OPERATING INSTRUCTIONS if necessary.

2.) Reset the dosimeter.

MENU ON/OFF Key
"RESET-5"

3.) Perform a Pre-Survey Calibration of the dosimeter.

CAL Key
"PRE-SURVEY"

4.) Connect the Microphone Boom to the dosimeter.

5.) Wrap the cable neatly around the Boom and connect the microphone to the top of the Boom.

6.) For the best accuracy, point the microphone as follows:

- Q-400 Upward forming approximately a 70 degree angle with the noise source.
- Q-500 Directly at the noise source.

7.) Press the **EVENT** Key to monitor the event number. (Cev = Current Event Number)

8.) Use the **RUN/PAUSE** Key to Run and then Pause the dosimeter at each event location as needed.

1st Location: **"Cev"** will be **"1"**.
2nd Location: **"Cev"** will be **"2"**.
etc.

Be sure that a representative sample of noise in each location has been accumulated.

See USING THE EVENT MODES for details on how to use Events.

ACCURACY

For maximum accuracy, it is important to use the dosimeter correctly and to understand its limitations.

It will correctly integrate all sound levels within the range of the instrument.

A few items related to accuracy are as follows:

Low Level Measurements

The effect of the "Noise Floor" on low level readings can cause inaccurate data.

In a "Perfectly Quiet" room, the "Noise Floor" produced by the microphone is approximately:

- 35 dB on "A" Weighting.
- 45 dB on "C" Weighting.

Measurements must always be at least 5 dB above the "Noise Floor". to be valid. Therefore, the lowest possible measurements of the dosimeter are approximately:

- 40 dB on "A" Weighting (Lowest Valid Reading).
- 50 dB on "C" Weighting (Lowest Valid Reading).

Accuracy of Readings

There is a tendency to overestimate the accuracy of digital readings.

The values (such as Leq) are computed to a precision of 0.1 dB. However, the absolute accuracy of the reading is not 0.1 dB, but is accurate to the stated overall accuracy of the instrument.

The 0.1 dB resolution is useful in determining the minimum sample time required to get an accurate short term measurement.

- If, for example, the Leq is increasing 0.3 dB every second, then a longer sample time is required.
- If the Leq is remaining stable from second to second within a few tenths of a dB, then the sample time is long enough.

Microphone Positioning

The dosimeter measures sound most accurately without the presence of sound reflecting or absorbing objects.

Any near-by object or surface (including the operator) will act as a reflector or absorber of sound.

To minimize these errors, use the dosimeter as follows:

- When taking Hand-Held measurements:
  - Connect the Microphone Boom. (See USING THE MICROPHONE BOOM.)
  - Hold the dosimeter with your arm extended and point the microphone as follows:
    - Q-400 Upward forming approximately a 70 degree angle with the noise source.
    - Q-500 Directly at the noise source.
- When taking Tripod-Held measurements:
  - Connect the Microphone Boom. (See USING THE MICROPHONE BOOM.)
  - Mount the dosimeter to the tripod mount (located on the belt clip) with the microphone pointed as follows:
    - Q-400 Upward forming approximately a 70 degree angle with the noise source.
    - Q-500 Directly at the noise source.
- When taking Personal Noise Dosimeter Measurements:
  - Connect the Microphone to the shirt collar or shoulder. (See Figure 19.) Keep it high on the shoulder and away from the neck if possible.
  - If the noise seems to be coming from one location, place the microphone near the ear facing that location.
  - Install a Windscreen on the microphone. It helps to do the following:
    - holds the microphone in an upright position.
    - keeps the microphone from brushing against clothing. This can produce higher than normal noise levels into the microphone.

Microphone Windscreen

It is recommended that a windscreen be used at all times. The Q-400 uses the WS-5 Windscreen and the Q-500 uses the WS-7 Windscreen. Using a windscreen will improve the accuracy by minimizing the effect of the following:

- Wind blowing across the microphone can produce higher than normal sound level readings.
  - The windscreen blocks wind from direct contact with the microphone, producing less unwanted noise.
- Clothing brushing against the microphone can produce higher than normal sound level readings.
  - The windscreen helps position the microphone so that clothing cannot brush against it as easily.
- Dirt entering the microphone, in time, can damage the microphone, possibly changing the microphone's frequency characteristics.
  - The windscreen catches and collects this dirt before it enters the microphone.

Simply insert the microphone into the windscreen and gently pull it over the Velcro strip.

TROUBLESHOOTING

Blank display when the **ON/OFF** Key is pressed:

- Replace the battery with a known fresh battery.

Unit does not calibrate:

- Perform a Battery Check. Battery must check OK.
- Check the Calibrator; Listen for a tone from its output.
- Reset the dosimeter and try again.
- Try a different microphone if you have another dosimeter. If this works, the microphone needs replacing.
- Return for service.

Unit is erratic:

- Try a different microphone if you have another unit. (The microphone or preamp could be intermittant.)
- Return for service.

Displayed Warning Messages

If the **MENU ON/OFF** Key is pressed while in the RUN mode, the display will read:

"KEY UNAVAILABLE, UNIT MUST BE IN THE (PAUSE) MODE"

If this appears, press the **PAUSE** Key to enter the Pause mode.

When the **PRINT** Key is pressed and the dosimeter is finished sending data to the printer, the display will read:

"PRINTOUT COMPLETED OR TERMINATED"

If this appears and the unit did not print properly, recheck the setup and try to print again.

If the dosimeter has accumulated some Run Time, the unit must be reset before setup parameters can be changed. Otherwise, the total stored data could be accumulated with different setups, thus causing bad data.

The following message will appear if you attempt to change the setup during data accumulation:

"THIS SELECTION MAY NOT BE MADE UNTIL UNIT IS RESET"

If this appears, do a **RESET** of the dosimeter before changing setup parameters.

If the dosimeter is in the Ldn mode, the Event mode cannot be used.

The following message will appear if you attempt to use Events:

"NO EVENT DISPLAY WHILE LDN IS ACTIVE"

Displayed Warning Messages, continued

If the dosimeter reaches the end of its logging memory, the following message will appear on the display:

"RUN STOPPED / OUT OF MEMORY"

The dosimeter is out of memory and it is automatically placed into the Pause mode.

On power up, the display normally reads **"Q400 REV. x.xx"** **"INITIALIZING"**

If "INITIALIZING" is replaced by one of the following statements, setup data has been lost, probably due to a weak internal memory backup battery. The battery should be replaced by an authorized Quest service center.

"DEFAULT 1" indicates the peak calibration values have been lost, resulting in inaccurate peak readings.

"DEFAULT 2" indicates that the serial number has been lost. The serial number may be re-entered in memory by sending the command #SAQxxxxxxxx (where xxxxxxxx is the remainder of the unit's serial number) via the serial data interface module. A communications package such as Procomm or Windows Terminal may be used.

"DEFAULT 4" indicates that the dosimeter setup information has been lost. Setup has reverted back to factory default settings. Check setup parameters before performing a study.

"DEFAULT 3" indicates that both 1 and 2 have occurred.

"DEFAULT 5" indicates that both 1 and 4 have occurred.

"DEFAULT 6" indicates that both 2 and 4 have occurred.

"DEFAULT 7" indicates that 1, 3 and 4 have occurred.

ACCESSORIES

Microphone / Preamp

56-963 Q-400, 8mm Shoulder-Mount Dosimeter Microphone, Type 2. One piece system including Cable, Connector, and Microphone

56-826 Q-500, 1/2-inch Shoulder-Mount Dosimeter Microphone Preamp, Type 1. Consists of a Cable, Connector, and Preamp. Requires the QE-4146 Precision Microphone. (See next item.)

59-491 QE-4146 Precision Microphone, 1/2-inch free-field prepolarized condenser (electret). Q-500 only.

58-852 Earloops to hold microphone at the ear, package of 10. (For use with the Q-400 8mm Shoulder-Mount Dosimeter Microphone only.)

56-830 Clothing Clips, package of 5, for microphone cable. (For use with the Q-400 or Q-500.)

Data Interface Modules

56-957 Parallel Printer Interface
- Centronics Compatable

56-956 Serial Communications Interface
- 25-pin, RS-232 Female
- Powered by either:
  - One 9 Volt Battery, included.
  - MODEL 920 AC Power Supply, not included.

Printer

56-022 80 Column Parallel Printer, 110 volt only.

Power Supplies

56-973 AC/DC Adapter
- Inserts into Battery Compartment.
- Can be used with the MODEL 920 AC Power Supply, not included.

56-067 MODEL 920 AC Power Supply
- 120 VAC to 9 VDC

QuestSuite for Windows Software

Provides data downloading and dosimeter setup capability using a personal computer. Graphing and data editing functions are provided for doing noise exposure predictions. Auto searches for levels or database parameters. Compatible with Windows 3.1, Windows 95 or Windows NT.

Windscreens

58-452 WS-5 Windscreen, (8mm I.D.), package of 10.
- Use with the Q-400 Microphone.

59-344 WS-7 Windscreen, (1/2 inch I.D.), package of 3.
- Use with the Q-500 Microphone.

Calibrator Adapters

56-989 Calibrator Adapter, 8 mm to 1 inch coupler.
- Use with the Q-400 Microphone.
- Fits QC-10 and QC-20.

58-839 Calibrator Adapter, 8 mm to 1 1/8 inch coupler.
- Use with the Q-400 Microphone.
- Fits CA-12, CA-15, CA-22 and CA-32.

56-990 Calibrator Adapter, 1/2 inch to 1 inch coupler.
- Use with the Q-500 Microphone.
- Fits QC-10 and QC-20.

58-928 Calibrator Adapter, 1/2 inch to 1 1/8 inch coupler.
- Use with the Q-500 Microphone.
- Fits CA-12, CA-15, CA-22 and CA-32.

Tripods

59-045 TP-1 Tripod
- Large - will not fit into carrying cases.

59-046 TP-2 Tripod
- Small - will fit into some carrying cases.

QUEST SERVICE POLICY

Service Policy

The Quest product you have purchased is one of the finest acoustic instruments available. It is backed by our full one year warranty which seeks complete customer satisfaction. This is your assurance that you can expect prompt courteous service for your equipment from the entire Quest service organization.

Should your Quest equipment need to be returned for repair or recalibration, please contact the Service Department at (800) 245-0779 (USA) or Fax (262) 567-4047 for a Return Authorization Number. The RA number is valid for 30 days, and must be shown on the shipping label and purchase order/cover letter. If you are unable to return instruments in that time call for a new RA number. Send it prepaid and properly packed in the original shipping carton directly to Quest Technologies, 1060 Corporate Center Drive, Oconomowoc, WI 53066 U.S.A.

Repair or replacement work done under warranty will be performed free of charge, and the instrument will be returned to you prepaid. Your copy or a photocopy of the Quest Registration Card will serve as proof of warranty should the factory require this information.

If for any reason you should find it necessary to contact the factory regarding service or shipping damage, please direct your calls or letters to the attention of the Service Manager, Quest Technologies, (262) 567-9157 or (800) 245-0779. Office hours are from 7 AM to 6 PM (Central Standard Time) Monday through Friday.

For service or recalibration outside the U.S.A., please contact your local Quest Dealer or fax Quest U.S.A. at 1-262-567-4047.

QUEST WARRANTY POLICY

Warranty Policy

Quest Technologies warrants our instruments to be free from defects in materials and workmanship for one year under normal conditions of use and service. For U.S.A. customers we will replace or repair (our option) defective instruments at no charge, excluding batteries, abuse, misuse, alterations, physical damage, or instruments previously repaired by other than Quest Technologies. Microphones, sensors, and printers may have shorter warranty periods. This warranty states our total obligation in place of any other warranties expressed or implied. Our warranty does not include any liability or obligation directly resulting from any defective instrument or product or any associated damages, injuries, or property loss, including loss of use or measurement data.

For warranty outside the U.S.A., a minimum one year warranty applies to the same limitation and exceptions as above with service provided or arranged through the authorized Quest distributor or our Quest European Service Laboratory. Foreign purchasers should contact the local Quest distributor for details.

APPENDIX

Definitions

All definitions are in reference to the way that they are used with either the Q-400 or Q-500 dosimeter.

BAUD: Units: Bits per Second

Baud Rate

The rate of data transfer between the dosimeter and a printer or computer in the serial output mode.

CL: Units: decibels (dB)

Criterion Level

It is the constant sound level that, if applied for 8 hours, would accumulate a DOSE of 100%. (Used in Dose measurements.)

DOSE: Units: Percent (%)

Dose

A percentage of the maximum allowable daily noise dose. This as a computation that is based on the following variables: Criterion Level (CL), Lower Threshold (LT), and Exchange Rate (ER).

EOL: Units: LF and CR

End of Line Character

These are printer instructions that can be placed at the end of each line of type in the printout. The dosimeter can be programmed to send Line Feed (LF) and Carriage Return (CR) instructions.

ER: Units: decibels (dB)

Exchange Rate

It is the number of dB that a sound must change to either halve or double the rate of dose accumulation.
(3, 4, 5, or 6 dB exchange rates are common.)

EVENTS: Units: Each occurance

Events

Each time that the dosimeter is in the Run mode and then Pauses creates an event.

EXP: Units: Pascal Squared Hours (Pa^2H)

Exposure

It is a method of measuring dosage. Pa^2H is a linear unit rather than a percentage.

1 Pascal is equal to 94 dB. 94 dB for 1 Hour equals 1 Pa^2H.

Examples of the 94 dB/time relationship:

- 94 dB for 1 Hour = 1.00 Pa^2H
- 94 dB for 8 Hours = 8.00 Pa^2H

The accumulation of Pa^2H will double (or halve) for every 3 dB of change from 94 dB as follows:

- 97 dB for 1 Hour = 2.00 Pa^2H
- 94 dB for 1 Hour = 1.00 Pa^2H
- 91 dB for 1 Hour = .50 Pa^2H
- 88 dB for 1 Hours = .25 Pa^2H
- 85 dB for 1 Hours = .125 Pa^2H

1 Pa^2H is typically the maximum allowable Exposure.

- 85 dB for 8 Hours = 1 Pa^2H

FAST: Units: Time (milliseconds)

Fast Response

A Time Constant of 125 milliseconds. When Fast is used, a fluctuating noise into the dosimeter will cause SPL to closely track the fluctuation.

LAVG: Units: decibels (dB)

Average Level

It is the average sound level for the measurement period based on either a 4, 5, or 6 dB Exchange Rate (ER). If the Exchange Rate (ER) is 3 dB, then LAVG becomes LEQ.

LC - A: Units: decibels (dB)

C minus A

The dosimeter calculates C - A (Dosimeter 2 - Dosimeter 1) for the following parameters:

- Lavg (dB) (or Leq when Exchange Rate is 3 dB)
- TWA (dB) (Time Weighted Average, 8 Hours)
- Ta [Vt] (dB) (Projected TWA, Variable Time)
- Dose (%) (or Leq when Exchange Rate is 3 dB)
- Dose [8] (%) (Projected Dose, always 8 Hour)
- Dose [Vt] (%) (Projected Dose, Variable Time)
- SEL [ER] (dB) (Sound Exposure Level, 1 Second)
- Pa^2H (Exposure in Pascal Squared Hours)

- Can be calculated with 3, 4, 5, or 6 dB Exchange Rates.

LEQ: Units: decibels (dB)

Equivalent Continuous Sound Level

It is the average sound level for the measurement period based on a 3 dB Exchange Rate (ER).

If the Exchange Rate (ER) is 4, 5, or 6 dB, then LEQ becomes LAVG.

LDN: Units: decibels (dB)

Day/Night Sound Level

It is the average sound pressure during a 24 hour calendar day. However, all sound pressures between the hours of 10 pm and 7 am (2200 to 0700 hours) are increased by 10 dB before being averaged. Unless otherwise stated, A-Weighting should be used and is generally assumed.

The dosimeter will only measure LDN when programmed to do so. It automatically will program itself to the 3 dB Exchange Rate since LDN is not defined for other Exchange Rates.

LN: Units: decibels (dB) / % of Run Time

Exceedance Level

Each Exceedance Level shows the level that was exceeded for the percentage of total Run Time.

MAX: Units: decibels (dB)

Maximum Level

The highest sound pressure level that occurs during a given time period.

MIN: Units: decibels (dB)

Minimum Level

The lowest sound pressure level that occurs during a given time period.

PEAK: Units: decibels (dB)

Absolute Unweighted Peak

It is the highest instantaneous sound pressure that occurs during a given time period.

PrD.(Prt): Units: Percent (%)

Projected Dose

It is computed by measuring dose for some time period and extrapolating it to a different time period.

(Example: 50% Dose / 4 hrs = 75% Projected Dose / 6 hrs)

SEL: Units: decibels (dB)

Sound Exposure Level

It is the constant sound level which, if lasting for one second, would deliver the same amount of acoustical energy as that delivered over the entire measurement period.

Technically speaking, it is usually measured with a 3 dB Exchange Rate. However, the dosimeter will also allow SEL to be measured with 4, 5, or 6 dB Exchange Rates. On a printout, the exchange rate is shown in parenthesis.

SLOW: Units: Time (seconds)

Slow Response

A Time Constant of 1 second. When Slow is used, a fluctuating noise into the dosimeter will cause SPL to operate in a much slowed-down fashion.

SPL: Units: decibels (dB)

Sound Pressure Level

It is the sound pressure, referred to 20 uPa (0.00002 N/m^2). The word "Level" indicates that the sound pressure is a certain level above the reference level. The SPL is displayed each second as the maximum value (Slow or Fast Response) for the previous 1 second period.

STATISTICS:

% Time Statistical Distribution

For a given run time, the percentage of time that a sound level occured at a specific dB level.

TIME HISTORY: Units: Listed Form (Min. or Sec.)

Time History

A Printout list (and Graph) showing how levels were accumulated over time. A printout can be made for each of the following: Lavg, Lmax, Peak, and LC-A.

C - A is used mainly when determining earmuff noise reduction effectiveness.

TL: Units: decibels (dB)

Threshold Level

It is a preset dB level below which sound is not accumulated or averaged into LAVG, LEQ, or Dose.

TWA (Prt): Units: decibels (dB)

Projected Time Weighted Average

It is used to determine the TWA when the operator wishes to use a measurement time that is different from the worker's exposure time.

Note that a short term sample can only be used if the average noise in the work area is relatively constant.

For example, a worker is only working a 4 hour day and you wish to determine the worker's TWA by making a 5 minute measurement, do as follows:

1.) Program the Projection Time (Prt) to 4 hours. Note that the preset time period can be set from 1 to 16 Hours in 1/4 Hour steps.

2.) Take a 5 minute sample. This average level is then assumed to be constant over the Projection Time (Prt).

3.) Read out the Projected Time Weighted Average [TWA (Prt)].

TWA: Units: decibels (dB)

Time Weighted Average

It is the sound level that is accumulated for any time period but with its average level computed over an 8 hour time period.

- If the time period is less than 8 hours, the Time Weighted Average will always be less than the Average Sound Level (LAVG).

- If the time period is more than 8 hours, the Time Weighted Average will always be more than the Average Sound Level (LAVG).

It is usually measured with A Weighting, Slow Response, and a 5 dB Exchange Rate. However, the dosimeter will allow either A or C-Weighting, either Slow or Fast Response, and either a 3, 4, 5, or 6 dB Exchange Rate.

UL: Units: Minutes / Seconds

Upper Limit Time

It is the total time that the sound level exceeds a preset level.

Acoustical Formulas

Both the Q-400 and Q-500 use the following formulas to calculate the accumulated data:

$$Dose = \frac{100}{TC}\left[\int_0^{RTIME} 2^{(LS-CL)/ER}\, dt\right]$$

$$PrD_{8\ HOURS} = DOSE \times \frac{TC}{RTIME}$$

$$PrD_{x\ HOURS} = DOSE \times \frac{Prt}{RTIME}$$

$$L_{AVG} = ER\left[LOG_2 \int_0^{RTIME} 2^{LS/ER}\, dt - LOG_2(RTIME)\right]$$

$$L_{EQ} = 3.01\left[LOG_2 \int_0^{RTIME} 2^{LS/3.01}\, dt - LOG_2(RTIME)\right]$$

$$SEL = ER\left[LOG_2 \int_0^{RTIME} 2^{LS/ER}\, dt\right]$$

$$TWA = ER\left[LOG_2 \int_0^{RTIME} 2^{LS/ER}\, dt - LOG_2(TC)\right]$$

$$TWA_{x\ HOURS} = L_{AVG} + ER \times LOG_2\left[\frac{Prt}{TC}\right]$$

$$LDN = ER\left[LOG_2 \int_0^{RTIME} 2^{LD/ER}\, dt - LOG_2(RTIME)\right]$$

$$Pa^2H = \left[2^{(L_{EQ}-94)/3.01}\right]\frac{RTIME}{3600}$$

$$LHIST = ER\left[LOG_2 \int_0^{HTIME} 2^{LS/ER}\, dt - LOG_2(HTIME) \right]$$

$$\%\ TIME\ STAT\ DIST = 100 \times \frac{SC}{TS}$$

Where:

LS = Sound Level in dB with the selected Time Constant (Slow or Fast). Its value is entered only when the Sound Level is greater than the Threshold Level. It is entered as minus infinity if the level is less than the Threshold Level.

LD = Same as LS except 10 dB is added to the Sound Level between 2200 (10 P.M.) and 0700 (7 A.M.) if the dosimeter is operating in the Ldn mode.

TC = 8 Hour Criterion Time. Enter 28800 seconds.

RTIME = Run Time in seconds.

ER = Exchange Rate in dB. (Selectable 3, 4, 5 or 6 dB)

CL = Criterion Level in dB. (Selectable 40 to 140 dB)

LHIST = Integrated Level stored either in 1 second, 10 second, or 1 minute periods based on the programmed Logging setup.

HTIME = Time (in seconds) used to compute Time History. (Selectable: 1 second, 10 seconds, or 1 minute.)

SC = Sample Counts. The number of samples occurring at the same dB level.

TS = Total Samples. The total number of samples during the Run Time.

Prt = Projection Time in seconds.

For definitions of the following:

DOSE	CL	LAVG
PrD (Projected Dose)	ER	LEQ
TWA	Pa^2H (Exposure)	SEL
TWA (Projected TWA)	LDN	% TIME STAT DIST

See APPENDIX, Acoustical Definitions.

Microphone Input / Data Output Connector

The Connector of the Q-400 and Q-500 has 2 functions:

- Connects the Microphone / Cable Assembly.
- Connects to one of the following INTERFACE Module:
  - PARALLEL PRINTER INTERFACE Module
  - SERIAL COMMUNICATIONS INTERFACE Module

The functions for the 10 terminals within the connector are as follows:

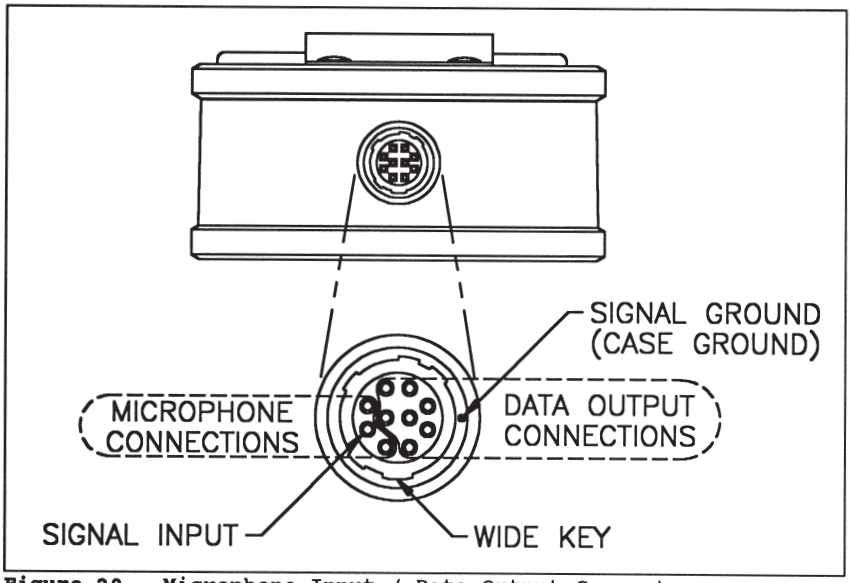


Figure 20. Microphone Input / Data Output Connector.

Parallel Printer Interface

The Parallel Printer Interface is compatible with most Centronic compatible printers. It converts data from the Q-400 and Q-500 into parallel information.

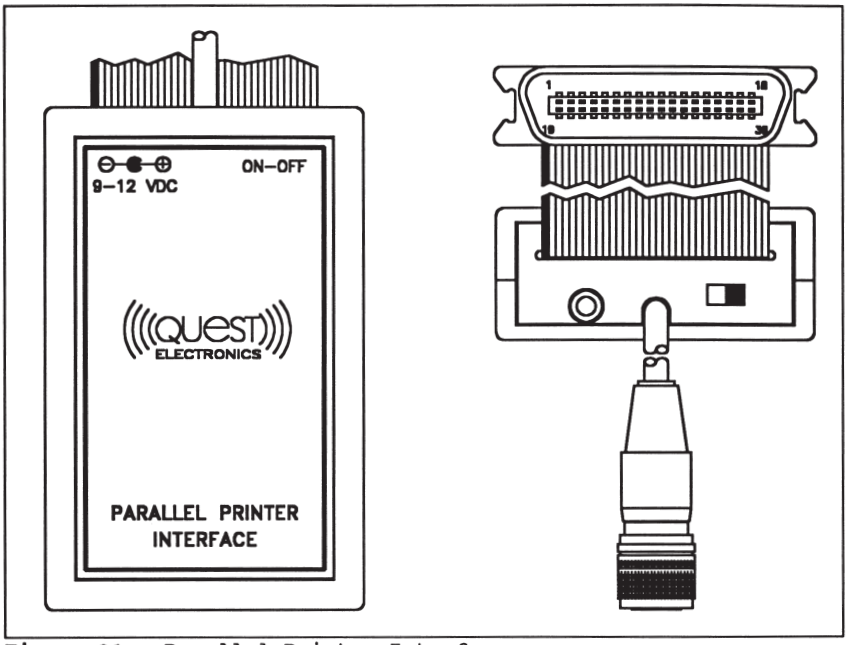


Figure 21. Parallel Printer Interface.

The Output Format of the Parallel Printer Interface:

- The dosimeter sets up 8 data lines.
  - If the Busy line is not high, the dosimeter sends a Strobe pulse.
  - If the Busy line is high, the dosimeter will wait.

Serial Communications Interface

The Serial Communications Interface is compatible with most Computer COM Ports and most Serial Printers. It converts data from the Q-400 and Q-500 into serial information.

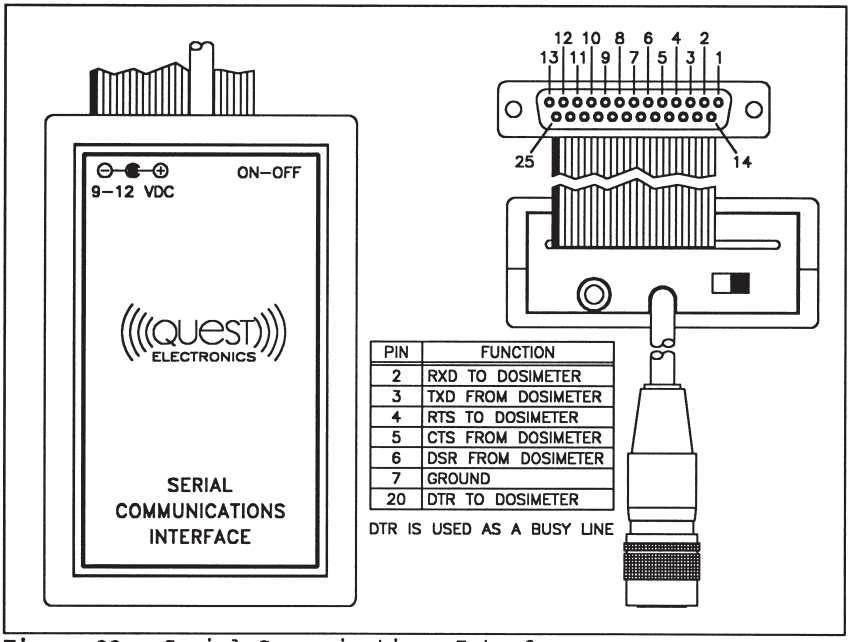


Figure 22. Serial Communications Interface.

The Output Format of the Serial Communications Interface:

- The Output is RS-232 compatible.
- The dosimeter baud rate can be programmed to 300, 600, 1200, 2400, 4800, 9600 or 19200 baud.
- Each character consists of:
  - 1 Start bit
  - 8 data bits
  - 1 Stop bit
  - No Parity (disabled)
- The data is sent asynchronously. The Data Set Ready (DSR) line is checked before sending a character.

for your sound measurement and analysis needs . . .

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