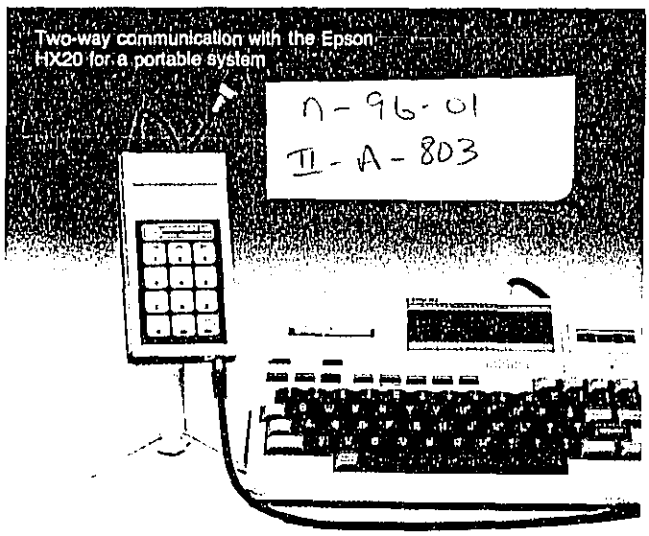

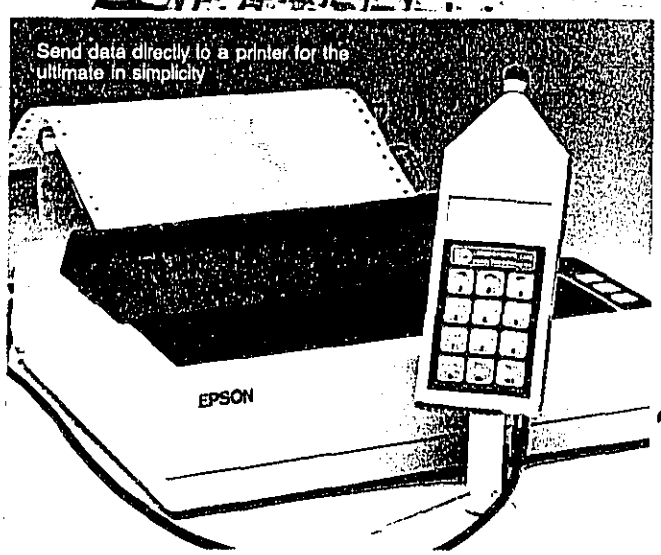

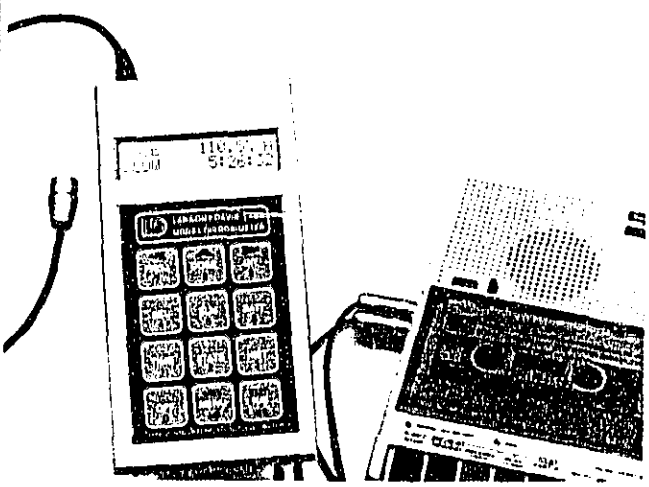

The New 700

Two in One 110dB Dynamic Range Dosimeter/Sound Level Meter

FIVE STATE OF THE ART ADVANCEMENTS:

- 110dB dynamic range (35 to 145dB in one range.)
- Accurate RMS of a single 200μs pulse.
- Two-way computer interface through RS-232 compatible port. Fully programmable.
- Four different types of data histories. 7000 sample capacity.
- After a noise measurement is made, over 40,000 different combinations of Threshold, Criterion Level and Exchange Rate selections are available for computing dose.

EASY TO USE AND AVAILABLE

32 Character Display, auto on/off at precise time and date, nonvolatile memories, data preserved through battery change, programmable, and rugged design. 2 year warranty program. Available on GSA contract.

LARSON·DAVIS LABORATORIES
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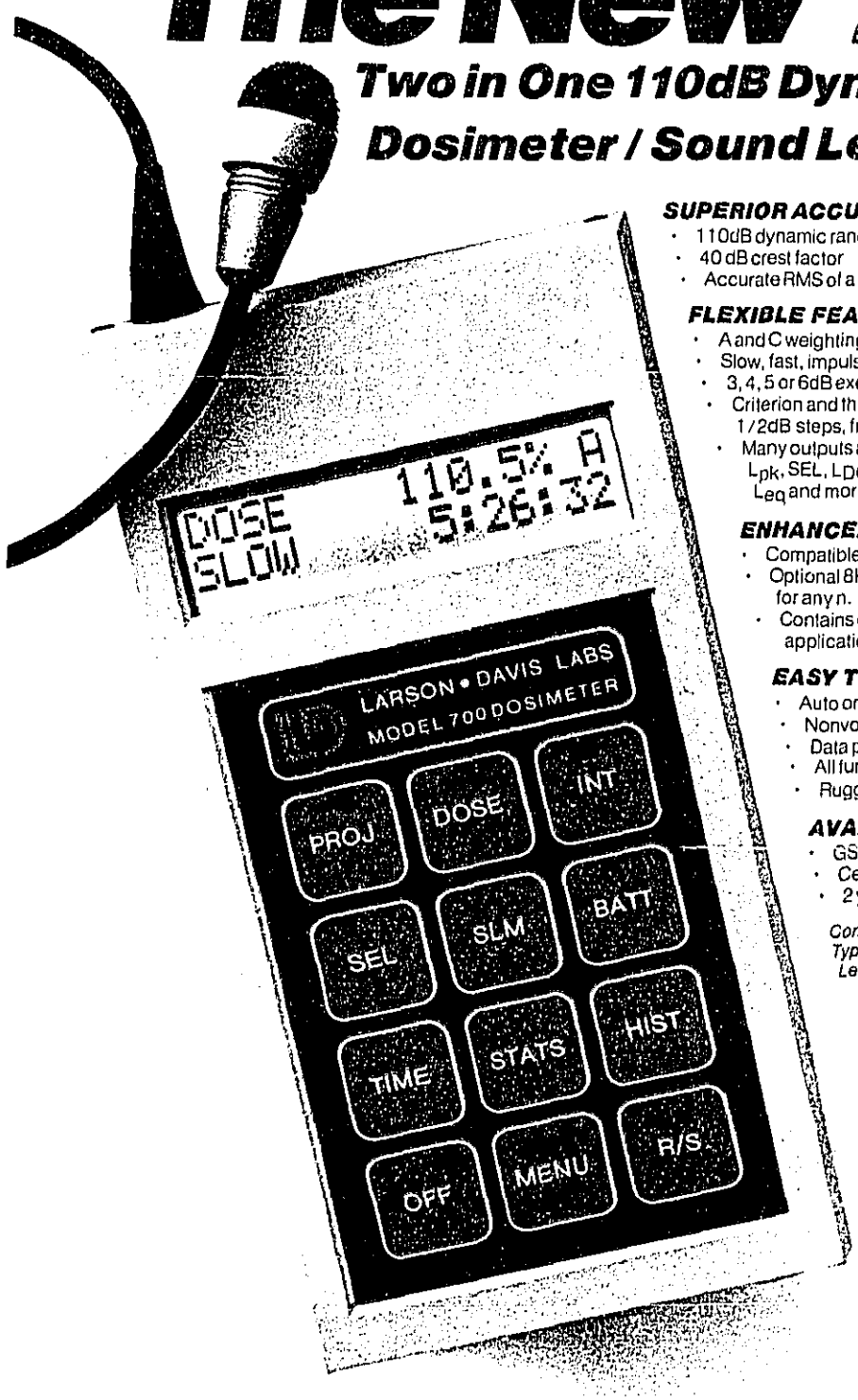
Provo, UT 84601 U.S.A.
801-375-0177 Telex 705560
FAX 801-375-0182

The New 700

Two in One 110dB Dynamic Range Dosimeter / Sound Level Meter



SUPERIOR ACCURACY

- 110dB dynamic range (35 to 145dB in *one* range)
- 40 dB crest factor
- Accurate RMS of a single 200 μs pulse

FLEXIBLE FEATURES

- A and C weighting
- Slow, fast, impulse, peak or integrate
- 3, 4, 5 or 6dB exchange rates
- Criterion and threshold levels settable in 1/2dB steps, from 35 to 145dB
- Many outputs available: Dose, Projected Dose, L_{pk}, SEL, LDOD, L_{OSHA}, L_{max}, L_{min}, L_{eq} and more.

ENHANCEABLE

- Compatible with RS-232 Interface
- Optional 8K memory for time history and L_n for any n.
- Contains customizing ROM for special user applications.

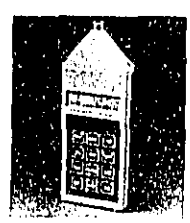
EASY TO USE

- Auto on/off at precise time & date
- Nonvolatile memories
- Data preserved through battery change
- All functions fully programmable
- Rugged design

AVAILABLE

- GSA contract
- Certification services
- 2 yr. warranty program

Convertible to Type 2 Sound Level Meter



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Model 700
Integrating Sound Level Meter
Noise Dosimeter

LARSON • DAVIS
INCORPORATED

The **Model 700** from LARSON·DAVIS Laboratories is a combination Type 2 integrating sound level meter and dosimeter that substantially exceeds all worldwide accuracy requirements for the measurement of noise. Its internal software is designed to accommodate changing regulations and to overcome sound measurement problems.

Many of the dosimeters and sound level meters in the market create significant measurement errors because of their limited dynamic range, pulse range, and crest factor. The **Model 700** does not have these limitations.

Built to the size and cost of a dosimeter, it is basically a complete noise monitoring system that contains many features which ensure quality measurements for many years.

Some of its most prominent applications and features are as follows:

Features and Functions

- Meets all requirements of ANSI S1.4, IEC 651, and IEC 804 for Type 2 accuracy.
- 110 dB dynamic range for error free measurements
- Impulse measuring range greater than 100 dB
- Standard microphone allows measurements between 35 and 145 dB(A) in one range. Optional microphones allow measurements as low as 20 dB or as high as 190 dB(A).
- Selectable A and C weighting
- Dual detectors provide simultaneous RMS and PEAK measurements.
- Measures FAST, SLOW, Unweighted PEAK, Weighted PEAK, Impulse, L_{eq}, LDOD, LOSHA, Dose, Projected Dose, TWA, SEL, L_{max}, L_{min}, L_n, and more
- User selectable exchange rate, criterion, and threshold
- Measures and stores more than 40,000 different DOSE combinations in a single measurement
  Allows comparisons of different DOSE standards using the same data
- Selectively creates special exceedance reports when signal level rises above a user-set threshold.
- Time history sampling periods are user selectable from 32 samp/s to 1 samp/255 s, with memory capacity of up to 7,000 samples.
- Quartz clock/calendar system for data annotation and automatic time scheduled operation
- RS-232 computer interface standard
  All functions fully programmable
  Software available for IBM™ compatible computers
- Direct printer interface to print and graph all measurement results
- Direct tape recorder interface for storage of digital data
- Uses standard 9 V cell (40 hr life)
  Also operates from external battery or AC adapter
- Rugged ABS case with EMI and RFI protection
  Small
  Lightweight
- Optional certification for intrinsic safety (UL, BASEEFA)
- Environmental enclosures available for system security and harsh weather conditions
- Available on GSA contract
- 2-year warranty program

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Applications and Uses

- Employee noise exposure programs
- Noise survey instrument
- Community and environmental noise analysis
- Aircraft/Airport noise monitoring
- Traffic surveys
- Measurement of sonic boom, artillery, automatic weapon fire, and other highly impulsive noise events
- Production line testing

Flexible Features

Single, Preset Dynamic Range

- Standard 110 dB range

The dynamic range of a sound level meter is defined as a measure of the dB ratio between the largest and smallest measurable signal within a single range setting. Dynamic range is a key indication of the ability of an instrument to accurately respond to any changes in noise levels, regardless of how impulsive the noise is.

With the **Model 700**, measurements can be made from 35 to 145 dB(A) (41 to 145 dB(C)). This large range is essential for industrial, community, and environmental noise monitoring programs. While such a large dynamic range may not always be needed for assessing the risk of hearing loss, it is essential for assessing the irritating effects of noise.

This large range also eliminates the need for range switches and autoranging circuits and prevents the loss or inaccurate measurement of data due to overload, under-range, or autorange errors.

- Optional range floors

Although the 110 dB dynamic range cannot be altered, the range floor and ceiling can be moved for special needs.

Upon request at the time of purchase, the range floor can be lowered to 30 dB(A) (which will lower the ceiling to 140 dB(A)) at no extra cost. Other combinations, such as 20 to 130 dB(A) or 90 to 200 dB(A), require special LARSON•DAVIS microphones systems and involve additional cost.

Filter Weighting, A and C

A-weighting is used to measure environmental noise. It is the most common measurement because it correlates well with subjective loudness and noise induced hearing loss.

C-weighting is necessary to provide single-number data for purposes such as evaluating the noise reduction rating of hearing protectors, determining when low frequency noise is a problem, and measuring sonic boom and artillery fire.

Five Detection Modes (Impulse, Peak, Slow, Fast, Integration)

In spite of its small size, the **Model 700** provides a full compliment of detector modes for the thorough analysis of all types of sounds.

While Slow is the currently used standard for most noise dosimeters, all Slow output parameters of the **Model 700** can be measured in terms of the other listed detection modes.

- 200 µs pulse rms level error < 1.5 dB

Ambient noise levels in the work place environment can range from very small to very large SPLs over short intervals of time. Noise impulses (caused by pneumatic tools, punch presses, steam valves, explosions, etc.) can instantaneously raise ambient noise levels to very high SPLs.

With a pulse range of more than 100 dB (IEC 804), accurate measurement of all types of noise is assured regardless of the background noise level or reverberation time of the work area. For a single 200 µs pulse, the error is less than 1.5 dB, even when the background noise is 110 dB less than the amplitude of the measured pulse.

The performance of the **Model 700** represents a significant technological breakthrough in the accurate measurement of impulsive sounds. This breakthrough ensures that normally diffi-

cult tests, such as measuring the energy of a rifle shot in a quiet open field, are performed properly.

- 40 dB Crest Factor

The **Model 700** has a 40 dB crest factor that virtually reaches the theoretical limit of any sound measurement equipment using A- or C-weighted filters.

Using a parallel detection system, the integrated level and peak data readings are taken simultaneously for each time interval. These samples can be stored simultaneously in a time history file, enabling direct measurement of the true crest factor of any noise.

- 8 and 32 samp/s

In the integration mode, the **Model 700** reads 8 samp/s when using the Slow detector and 32 samp/s when using the Fast detector.

Selectable Exchange Rates

Four selectable exchange rates of 3, 4, 5, and 6 dB are available for current or future needs

Adjustable Criterion and Threshold Levels

Dose and Leq criterion and threshold levels are adjustable in 1 dB steps anywhere in the 35 to 145 dB measurement range. While many industrial measurements will use the 80 dB threshold and 90 dB criterion, special applications are now feasible. For example, the contribution of sound above a 115 dB threshold to a daily Dose could be measured by setting a 90 dB criterion level and a 115 dB threshold level.

- 40,000 combinations available

More than 40,000 different combinations of Dose data are captured *accurately* and *simultaneously* during a single measurement period. Because the **Model 700** captures all measured data, even below the selected threshold level, thousands of different Dose combinations can be displayed.

- Logged Data Logic©

The **Model 700** provides the capability to perform "what if" analysis on data stored in memory. Using an exclusive new Logged Data Logic (LDL) storage technique, prior data based on particular threshold limit, criterion, and exchange rate parameters can be accurately retabulated using new parameters in any combination.

With more than one hundred selectable thresholds and criterions available and with four exchange rates, thousands of possible ways to analyze the same database are made available. This means that data stored in a computer or on a tape can be reloaded into a **700** and reevaluated under a new standard or law without retaking the data. This feature alone can save an industrial hygienist several man-years of effort if standards or legal requirements change.

The LDL function is a mathematically exact method and should not be confused with less accurate statistical approximation techniques.

Most Needed Measurements

Besides Dose and Projected Dose, numerous acoustic parameters such as L_{eq}, SEL, L_{max}, L_{min}, and L_{pk} are available.

With selectable exchange rates, L_{DOD} (4 dB) and L_{OSHA} (5 dB) are easily measured.

Using the LDL function, an exact comparison can be made between L_{OSHA}, L_{DOD}, and a 3 dB Dose for the same measurement period.

The ability to store multiple blocks of data on demand from the keyboard opens up new avenues for simple and effective data measuring. For example, a user could walk around a constant noise source and sample at specified locations. Each sample sequence, representing a different measurement position, would be stored in the **Model 700** and retrieved at the end of the test sequence by reading the display through the keyboard control or by transferring the data to a computer or a printer.

Automatic Time/Date Scheduling

The **Model 700** has a quartz clock/calendar for automatic time-scheduled operation. Two start and stop times can be set with 1/1000 s accuracy from the keyboard or from a remote computer.

Three possible applications follow:

1. On Friday, a dosimeter is set to start at the beginning and stop at the end of the follow-

ing Monday's shift. Also, the lunch hour, or one other time period, is programmed out. On Monday, the dosimeter turns on and off automatically, not even needing the presence of the person responsible for the noise measurements.

2. For long-time environmental use, one start and one stop time are programmed (for example, 0900 6 March 91 to 0300 3 April 91).

3. Such a versatile unit allows a network of **700s** to compete with a large microphone array, with respect to both cost and performance. Each **700** in the network is set to the same start and stop times. Measurements are made, and the data from each dosimeter is read into a computer at the end of the measurement period and comparatively analyzed. To avoid a mix-up, each dosimeter has its own digitally coded serial number which is read out with the data. Thus, a costly communication system is avoided, making the overall system very portable and adaptable.

Two-way Computer and Tape Interface

For programming measurement modes, providing real-time data measurements, and storing data in a central file for later computer analysis, the **Model 700** has an RS-232 port which allows two-way communication with most computers.

Data can also be sent from the **700** to a tape drive for storage and later retrieval.

Direct Printer Interface

Built into the software of the **Model 700** are print commands that allow direct down-loading of data to an Epson™ or Epson compatible printer.

Easy to Use

Even with its many features, the **Model 700** is easy to use. The manual measurement of Dose requires only the press of one button to turn the device on and one press to start the measurement sequence. The reverse procedure stops the measurement period and turns the device off.

- Two line, 32 character LCD display

The 2 line, 32 character LCD display is the most clearly annotated in the industry, displaying all pertinent measurements . The graphics capability displays a 120 dB range, thermometer-style bar graph, with 1 dB resolution. Elapsed time is always displayed with the Dose and Equivalent Level measurements to notify the operator that measurement is in process.

Rugged, Secure, Safe Design

- Shielded, plastic case

A shielded ABS plastic case with a sealed keyboard typifies the extra rugged construction of the **Model 700**. The unit has been dropped from 6 ft over 70 times with only 3 failures and from 3 ft over 100 times with no failures. Temperature and humidity stability are excellent.

In addition, the microphone and cable connections are designed to take the heavy use of an industrial setting, and the circuits are internally shielded, providing protection against radio frequency and electromagnetic interference.

- Nonvolatile memory

With nonvolatile memory, the **Model 700** can be stored for months, or a battery change can be made without loss of mode selection or data. Therefore, in most situations the keyboard needs programming only once.

The internal 9 V battery has an expected life of more than 40 hr. Power is automatically turned off when the battery is low or after 12 min in the STOP mode.

For longer measurement needs, the **700** can operate for months from an external 12 V battery.

- Data security

The keyboard and display can be disabled by entering a user defined code. This prevents accidental or unauthorized keyboard input.

- Shock proof

The plastic case provides additional protection against electrical shock, one of the key reasons plastic was selected over metal. The **Model 700** can be modified to be UL listed as intrinsically safe for Class I (groups A, B, C, & D), Class II

(groups E, F, & G), and Class III. This modification requires the use of a 9 V carbon-zinc battery, which will reduce the expected operation time to 16 hr. BASEEFA listing is also available.

- Two-year warranty

Although the **Model 700** contains numerous sophisticated features, the size and cost are equivalent to that of ordinary dosimeters. Product performance is assured with a 2-year warranty program.

Reports

One summary and three history reports are available. (See attached samples.) The summary report is standard, but the printing of the history reports is optional. Any combination of one, two, or all three histories can be chosen by the operator. These histories are as follows:

Interval: This report consists of sequential time intervals, with each interval containing the L_{eq}, L_{max}, L_{pk}, SEL, duration, start time, etc. Four Ln values per interval can be collected. The interval time period can be set for as short as 1 min to as long as 99 hr.

History: This report consists of a sequence of short time periods which are user selectable from 1/32 s to 255 s. Each time period contains the average rms level (L_{eq}) for each period. The maximum peak level for each period is optional.

Exceedance: This report is composed of the set of events in which a user-selectable threshold level is exceeded. For each event exceeded, the maximum level, peak level, L_{eq}, start time of event, duration of event, etc., will be stored.

Memory

There are approximately 7000 bytes of memory available in the 700. Memory is shared by the three different types of histories. Each of the histories may be disabled, thus saving memory for just one or two of the histories. The amount of memory used by each history is as follows:

Interval: There are 20 bytes/interval-period or 29 bytes if interval L_ns are enabled (plus 1000 bytes used for L_n calculation). If interval history without L_ns is selected, then approximately 350 periods can be collected. If each period is set to an hour, over 14 days of hourly samples can be taken. (Eight days, if L_ns are enabled.)

History: There is one byte/period for rms alone or two bytes/period if both rms and peak are selected. Approximately 7000 rms history samples are available. For a history period of one minute, data can be taken for over two weeks.

Exceedance: Each exceedance takes 19 bytes. If exceedance alone is used, over 360 events can be stored.

Microphone Preamps

782

This is the Model 700's standard preamplifier. Measuring 3/8 in. in diameter and 1/2 in. in length, it is permanently attached to the 700 by a 3 ft cable. It is used with the M1 microphone to achieve Type 2 accuracy.

784

This miniature preamp is 1/2 in by 1/2 in and supports a precision Type 1 prepolarized microphone such as the LARSON•DAVIS M3 or M4. Its

primary purpose is for dosimetry when Type 1 accuracy is required. The 784 must be used with Option 16 to provide Type 1 response. This preamp is permanently mounted to a 3½ ft cable.

785

This preamp is ½ in. in diameter and 5 in. in length and supports a precision prepolarized microphone. The 785 must be used with Option 16 to provide Type 1 response. The 785's 5-pin connector attaches to the nose cone (Option 17) or to the ECXXX cable (XXX is the user selected length in feet). The 785 can be mounted on a tripod using a standard ½ in preamp clamp.

Model 700 Options

Option 16

This option modifies the compensation network of the standard Type 2 input to suit the flatter response of Type 1 microphones, such as the LARSON•DAVIS M3 and M4. The 784 and 785 microphone preamps require this option for Type 1 response.

Option 17

This option is a permanently mounted nose cone with a 5-pin connector for connecting the 785 preamp or ECXXX cable (XXX is the user-selected length in feet).

Option 18 (700/UL)

This option modifies the Model 700 for use in hazardous locations. The instrument is made intrinsically safe for use in Class I (Groups A, B, C, and D), Class II (Groups E, F, and G), and Class III (Temporary Code T3C) as listed by Underwriters Laboratories. This modification requires the use of a 9 V carbon-zinc battery, which will reduce the expected operation time to 16 hr.

Option 20 (700/BA)

This option modifies the Model 700 for BASEEFA intrinsic safety. Changes include a potting compound, a modified 782 preamp, and various internal components.

BASEEFA No. Ex 89C2357, EEx ia IIC T5.

BASEEFA SYST No. 892372.

HSE(M) No. Ex 89B7358, EEx ia I.

700-SW2 Software

Available on 5¼ or 3½ in diskettes, this software facilitates controlling the 700 from IBM™ compatible computers. Data can be downloaded to disc files, graphed on screen, and sent to a printer. LOTUS 1, 2, 3™ (not included) allows further manipulation. Since Model 700 parameters can be stored in macros, programming many units for the same test becomes a routine matter.

A LARSON•DAVIS cable/level converter is needed to connect the 700 to the computer. (Part No. 700-C10A, B, or C)

Model 700 Specifications

Acoustical and Electrical

Dynamic Range
110 dB min. (35 to 145 dB(A) standard)

Crest Factor
40 dB (based on 1 s rms integration)

Pulse Range
> 80 dB (4 kHz, 1 ms burst)

Single Pulse Response
Less than1.5 dB error (1 kHz at 140 dB)

Noise Floor —Standard Type 2
35 dBA, 38 dBC (Slow/Impulse)
40 dBA, 43 dBC (Fast)
50 dB weighted peak
105 dB unweighted peak

Frequency Response
A- and C-weight meet ANSI S1-4 1983

Peak Detector Flat
11 Hz to 10 kHz

Detector Accuracy
Less than 0.5 dB error from 40 to 140 dB (true rms)

Power Supply
9 V alkaline battery, external supply: 7 to 16 Vdc at 80 mA peak and 15 mA rms max. ("LOW BATTERY" indicated in display; automatic turnoff)

Operating Time
40 hr cont., 3 mo memory retention (battery-life indication selected from keyboard)

Standards Met

ANSI.4 (1983) Type 1 or Type 2
IEC 651 Type 1 or Type 2
IEC 804 Type 1 or Type 2

Operational

Frequency Weighting
RMS: A- and C-weight
Peak: A, C, and unweighted

Detector Rates
Slow, Fast, Impulse, Peak (rise time: 50 µs)

Resolution
dB levels:
0.1 dB ave. reading,
0.5 dB others
Dose: 0.1%
Elapsed time: 1 s

Keyboard
12 position membrane keypad

Display
2 line, 32 character, .22 in high
Full ASCII character set

Bargraph
120 dB range, 1 dB resolution for SPL

Run-time Clock
1 s min., 9999 hr 59 min 59 s max. (416 days)

Real-time Clock/Calender
Military time clock: hh:mm:ss (1 s resolution)
99 yr calendar: mo/day/yr
Auto. run/stop with two alarm dates and four alarm times

Data Communication
RS-232C port, 8 bit ASCII, NRZ, no parity, full duplex (for programming and data readout), up to 19.2 k baud data transfer

Calibration
Four turn control on back, fast SPL cal, digitally stored

Microphone
½ in Electret Type 1
⅜ in Electret Type 2

Measurements Made and Displayed
L_{eq}, L_{DOD}, L_{OSHA}, SEL, SPL, Dose, Projected Dose, L_n, L_{min}, L_{max}, L_{pk}
Counts of Peak Exceedances, RMS Exceedances, and Overloads

Programmable Parameters
Detector, weight, exchange rate, criterion, threshold, L_n 1 to 4, rms exceedance threshold, peak exceedance threshold, peak weight, two alarm dates, four alarm times

Environmental

Effect of Temperature
Less than 0.2 dB error from -18 to 49 °C (0 to 120 °F)

Storage Temperature Range
-30 to 60 °C (-20 to +140 °F)

Effect of Humidity
Less than 0.2 dB error with 90% humidity at 40 °C (104 °F)

Effect of Magnetic Fields

47 dB max. (A- or C-weight) @ 80 A/M (1 Orsted at 60 Hz)
67 dBA max. and 65 dB(C) max. @ 800 A/M (10 Orsted at 60 Hz)

Effect of Acoustic Energy Without Microphone

With input loaded to 4 pF, less than 45 dBC (Fast) in 100 dB SPL field (31 to 8 kHz)

Physical

Dimensions

Width: 7.5 cm (3 in)
Length: 15.0 cm (6 in)
Depth: 2.5 cm (1 in)

Weight: 326 g (11.50 oz)