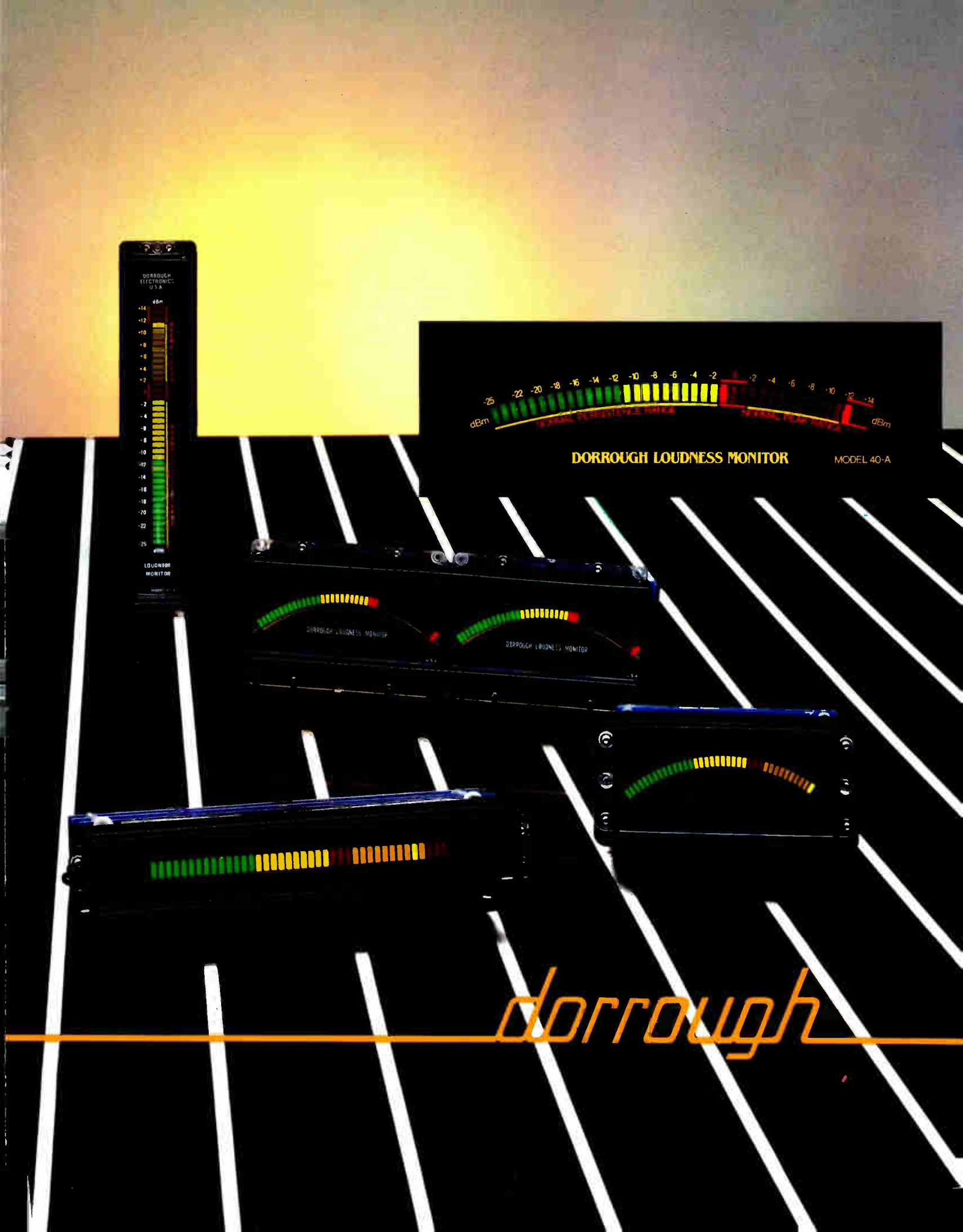
DORROUGH ELECTRONICS U.S.A.
dBm
LOUDNESS MONITOR
dBm
DORROUGH LOUDNESS MONITOR
MODEL 40-A
dorrough

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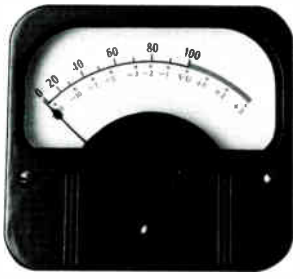

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The PPM also has a scale that does not relate directly to measured program level, but only indicates relative levels. The numbers are arbitrary and could be just as well represented by fruit symbols or stick figures. Modern technology has eliminated the need to stare at a narrow mechanical needle oscillating in an analog motion to set level.

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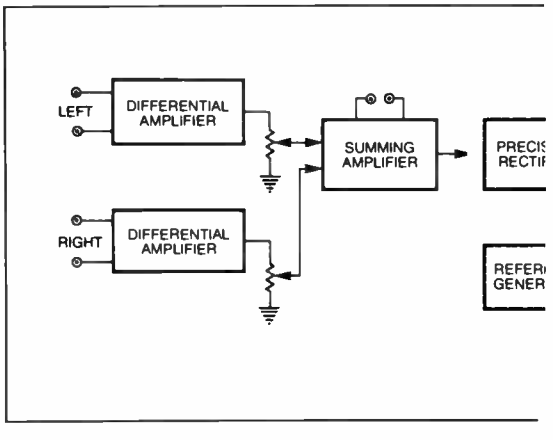
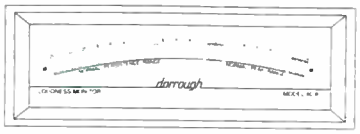
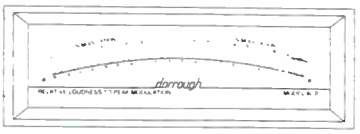
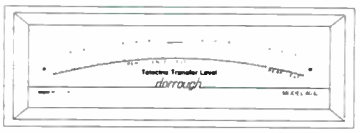
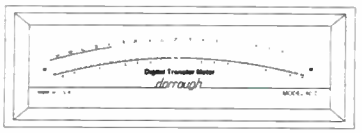
Most contemporary studios have tried to solve their metering problems by using both VU and PPM meters on the same source in an attempt to get the maximum usable level out of a piece of program material. This has led to cramped and overly complex metering bridges and panels, and does not overcome the limi-



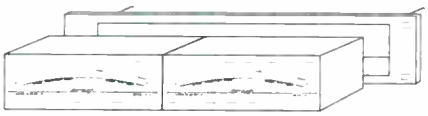
dorrough

DORROUGH ELECTRONICS
5221 Collier Place • Woodland Hills, CA 91364
PH: (818) 999-1132 • FAX: (818) 998-1507

DORROUGH METERS

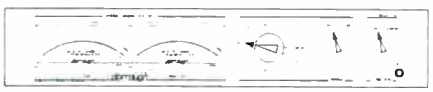
	Model Number	Description	Price
 40-A	Model 40-A	Standard Dorrough Loudness Meter	$ 475.00
	Model 40-AP	Peak Hold Version	$ 595.00
 40-B	Model 40-B	Relative Loudness to Peak Modulation Meter	$ 475.00
	Model 40-BP	Peak Hold Version	$ 595.00
 40-C	Model 40-C	Telecine Transfer Meter	$ 475.00
	Model 40-CP	Peak Hold Version	$ 595.00
 60-D	Model 60-D	Digital Transfer Meter	$ 475.00
	Model 60-DP	Peak Hold Version	$ 595.00
	Model 10-A (or B)	Panel Mount Meter - 2.00" (H) x 4.25" (W)	$ 475.00
	Model 12-A (or B)	Panel Mount Meter - 2.00" (H) x 8.562" (W)	$ 950.00
	Model 20-A (or B)	Panel Mount Meter - 1 RU (H) x 1/2 RU (W)	$ 475.00
	Model 21-A (or B)	Panel Mount Meter - 7.90" (H) x 1.30" (W)	$ 475.00

RACK MOUNT KITS



Model 40-D	19" (W) x 3.50" (H) for dual Model 40 or 60	$ 45.00
Model 40-S	19" (W) x 3.50" (H) for single Model 40 or 60	$ 45.00
Model 20-D1	19" (W) x 1.75" (H) for dual Model 20	$ 45.00
Model 20-D2	19" (W) x 3.50" (H) for dual Model 20	$ 45.00
Model 20-S1	19" (W) x 1.75" (H) for single Model 20	$ 45.00
Model 20-D2	19" (W) x 3.50" (H) for dual Model 20	$ 45.00
	Consult factory for other available models	

STEREO TEST SET

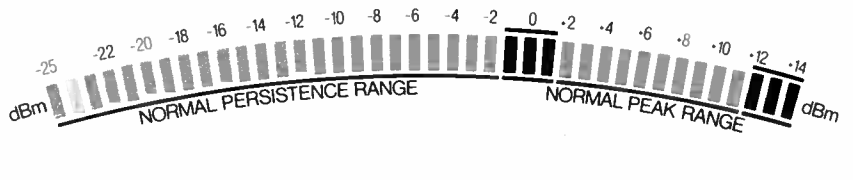


Model 1200	Stereo Signal Test Set	$ 1650.00

AUDIO PROCESSING

Model 610-A-AM	Discriminate Audio Processor for AM	$ 3200.00
Model 610-A-FM	Discriminate Audio Processor for FM	$ 6200.00
Model 610-A-TV	Discriminate Audio Processor for TV	$ 3200.00
Model 610-A-HF	Discriminate Audio Processor for HF	$ 3200.00

Meter Scale



MODEL 40-A

tations inherent in these systems.

Even the switchable bar graph meters offered as a solution by some console manufacturers suffer from the same ballistic limitations.

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Years of hands-on experience and frustration with both VU and PPM metering led to the development of the DORROUGH Loudness Monitors. DORROUGH's research has established the relationship between integration time, RMS metering and the display of peak levels. It displays, in an easy to read format, the *actual energy content* of the program material regardless of frequency, while still indicating the peak amplitude of the complex audio signal. The Loudness Monitor allows the operator to ride levels in a manner such that all program material can be adjusted for equal perceived loudness while protecting the peak of the waveform. Now, one meter gives you more complete and more usable information than any combination of peak hold, VU and PPM indicators.

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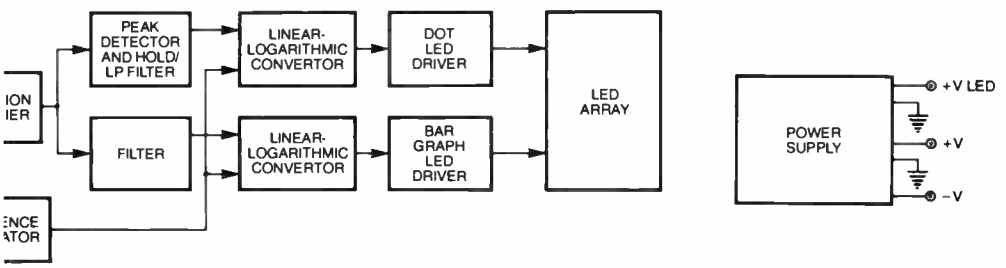
Each DORROUGH Loudness Monitor features Right and Left inputs for use in stereo mixing applications. With one instrument, the operator can easily see the stereo mix and avoid the classic in-phase/out-of-phase problem. "Center channel build-up," the addition of in-phase or monophonic material, which causes the mix to be perceived as louder, will appear as a sudden increase in level. This is especially important in preparing stereo program material for broadcast, while still being able to maintain monaural compatability.



Block Diagram

With the DORROUGH Loudness Monitor's long scale, even clicks and pops that sould be difficult to locate in the mix, appear on the meter scale.

THEORY OF OPERATION

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INPUT LEVEL:
-30 to +20 dBm
(shipped calibrated to +8dBm)

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20K Ohm, Balanced;
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POWER:
110 VAC, 50/60 Hz
Self powered
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5221 Collier Place
Woodland Hills, CA 91364
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DORROUGH LOUDNESS MONITOR
MODEL 40-A
dBm
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dorrough

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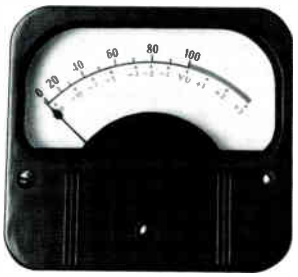

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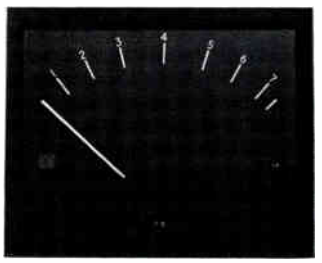

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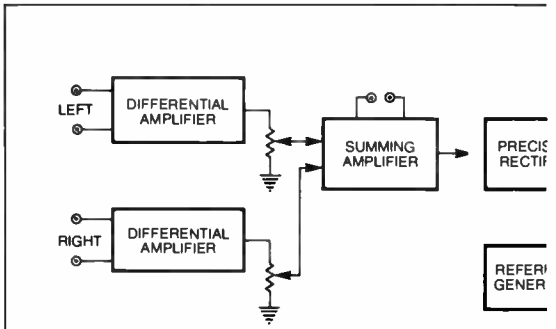

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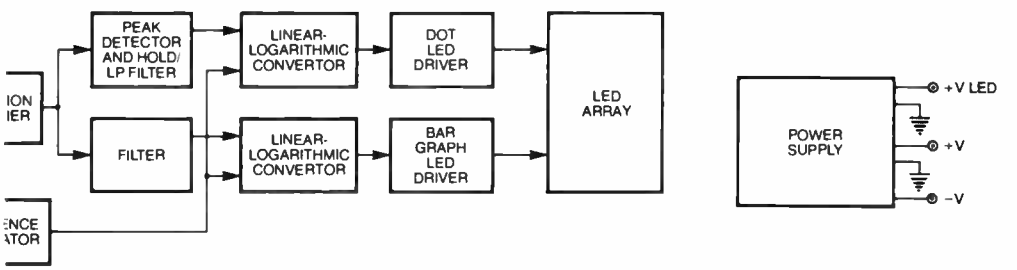

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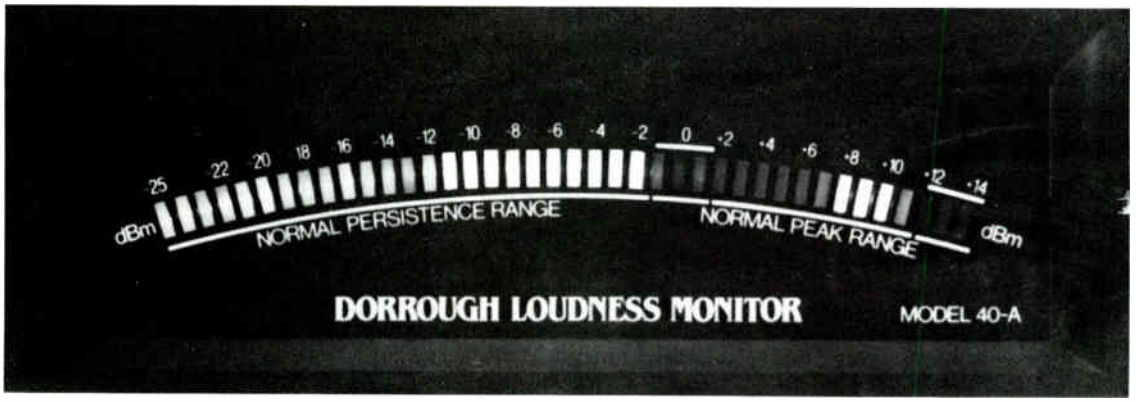
5221 Collier Place
Woodland Hills, CA 91364
Telephone: (818) 999-1132

Dorrough Program Level Meter



Model 40-A

Simultaneous Display in LED Form of the Peak Amplitude and Average Persistence of the Complex Audio Waveform.

Effective Monitoring for Equal Loudness

DORROUGH ELECTRONICS

5221 Collier Place
Woodland Hills, CA 91364, USA
Telephone: (818) 999-1132

Available in smaller size for console mounting.

Catalogue Sheet 03-86

DORROUGH LOUDNESS MONITORS

Model 10-A

Single meter, console or panel, 3/16" LEDs in arc configuration.
Dimensions: 4.25" x 2.0"

Price: $475.00

Model 12-A

Dual meter (two side by side), console or panel mount, 3/16" LEDs in arc configuration.
Dimensions: 8.562" x 2.0"

Price: $950.00

Model 20-A

Single meter, console or panel mount, straight lined ½" LEDs, designed to be used in the horizontal position.
Dimensions: 7.93" x 1.3"

Price: $475.00

Model 21-A

Same as Model 20-A but designed to be used in the vertical position.

Price:: $475.00

Model 40-A

Single meter ½" LEDs in arc configuration, complete enclosed cabinet for table top use.

Price: $475.00

Single or double standard rack mounting available for the 40-A

Price: $45.00

Dorrough Electronics
5221 Collier Place
Woodland Hills, California 91364
818-999-1132

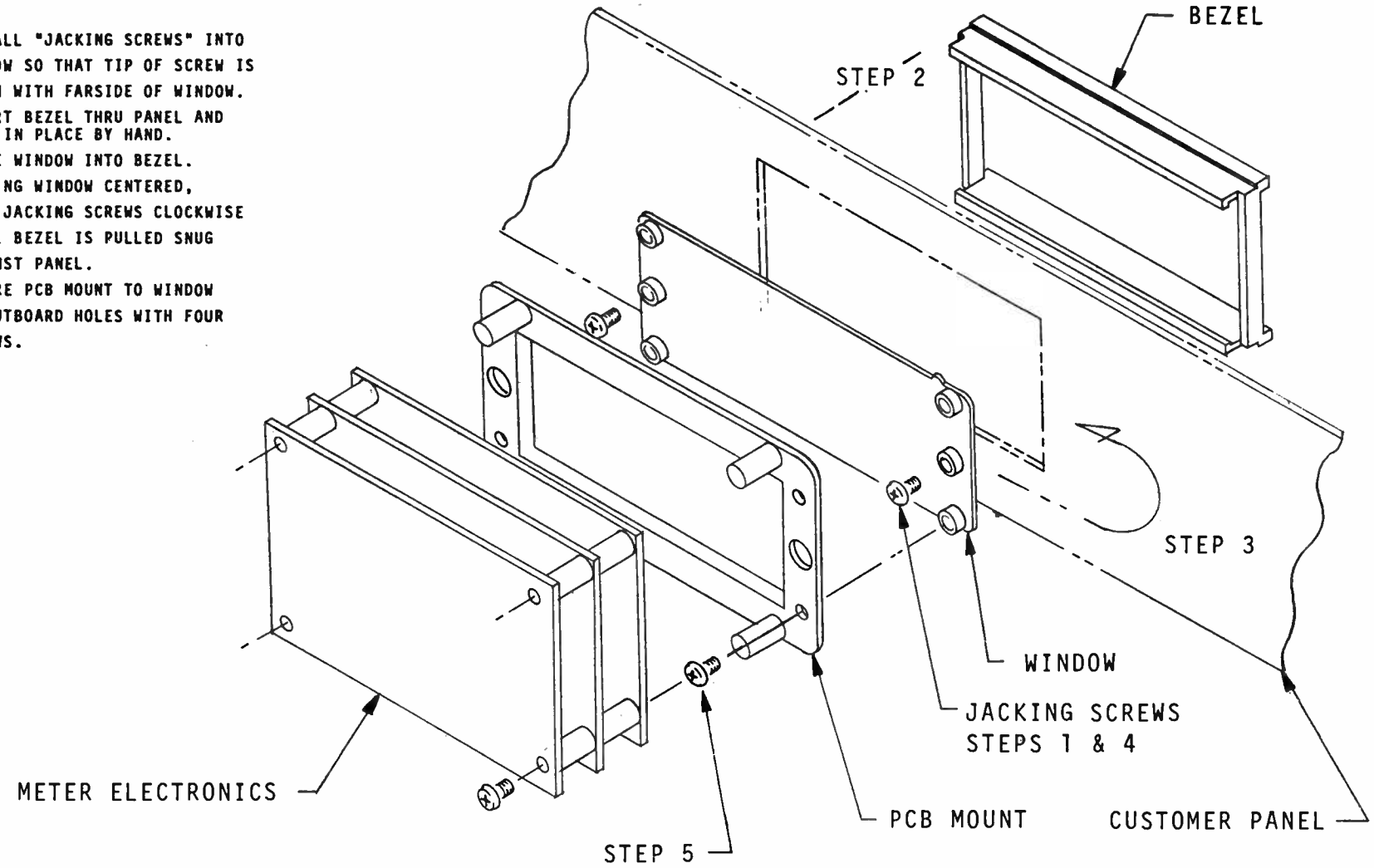
STEP 1. INSTALL "JACKING SCREWS" INTO WINDOW SO THAT TIP OF SCREW IS FLUSH WITH FARSIDE OF WINDOW.

STEP 2. INSERT BEZEL THRU PANEL AND HOLD IN PLACE BY HAND.

STEP 3. SLIDE WINDOW INTO BEZEL.

STEP 4. KEEPING WINDOW CENTERED, TURN JACKING SCREWS CLOCKWISE UNTIL BEZEL IS PULLED SNUG AGAINST PANEL.

STEP 5. SECURE PCB MOUNT TO WINDOW AT OUTBOARD HOLES WITH FOUR SCREWS.



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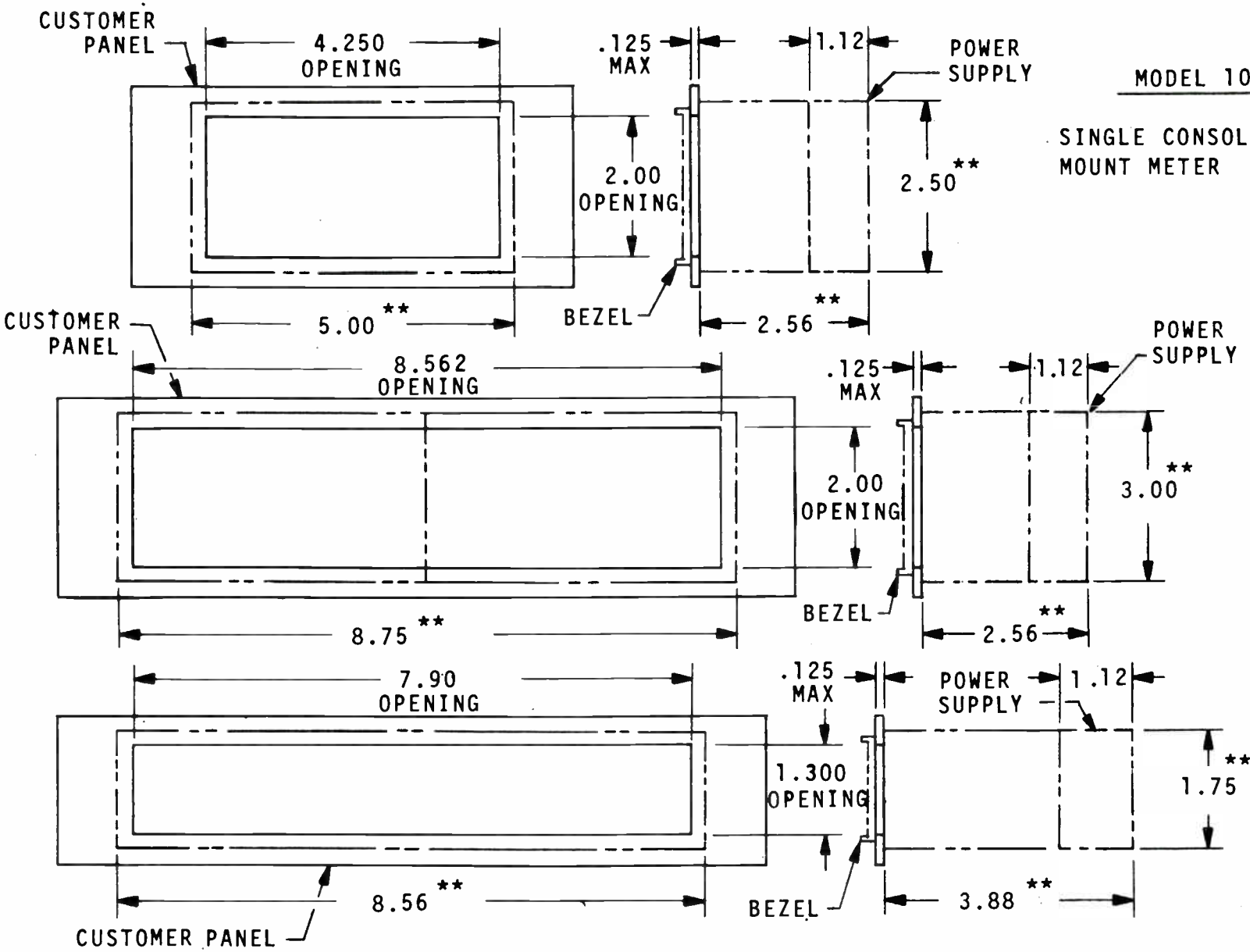
Or a Dorrough Distributor

METER PHYSICAL SPECIFICATIONS



MODEL 10-A

SINGLE CONSOLE OR PANEL MOUNT METER

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DUAL CONSOLE OR PANEL MOUNT METER

MODEL 20-A

CONSOLE OR PANEL MOUNT METER WITH STRAIGHT LINED LED'S

MODEL 21-A

SAME AS MODEL 20-A EXCEPT USED IN A VERTICAL POSITION

** DENOTES METER CLEARANCE REQUIRED BEHIND CUSTOMER PANEL

* A 1.00" CLEARANCE BEHIND THE METER IS RECOMMENDED FOR HEAT DISSAPATION AND WIRING OF METER.

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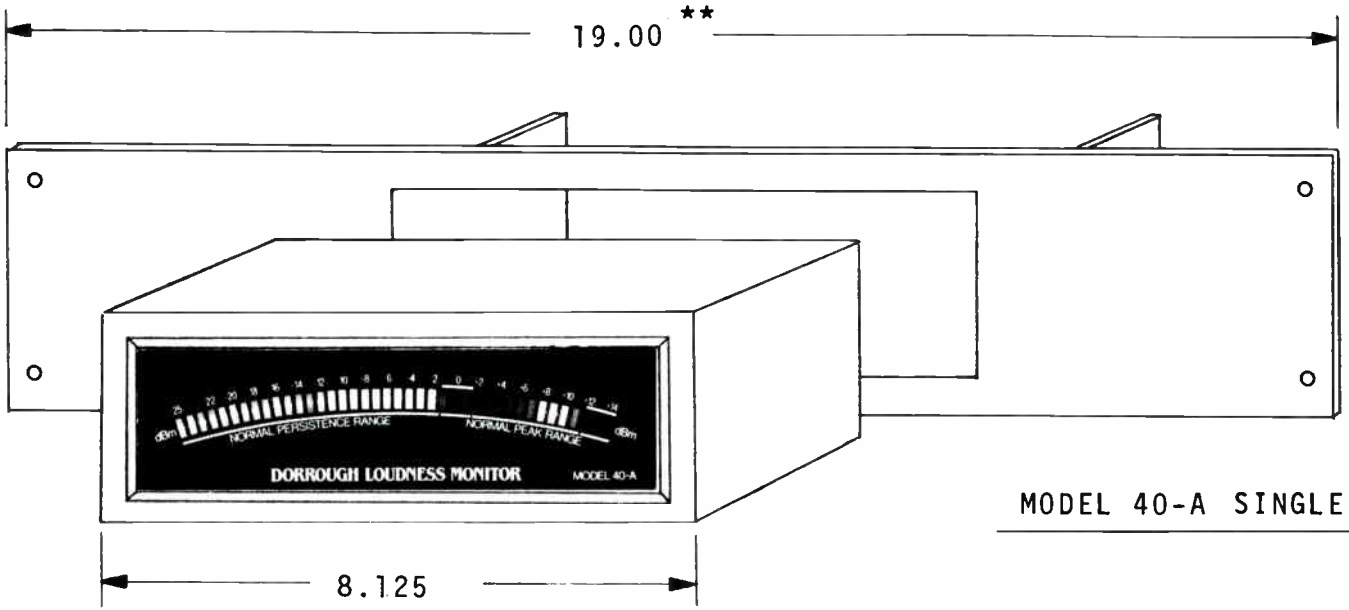
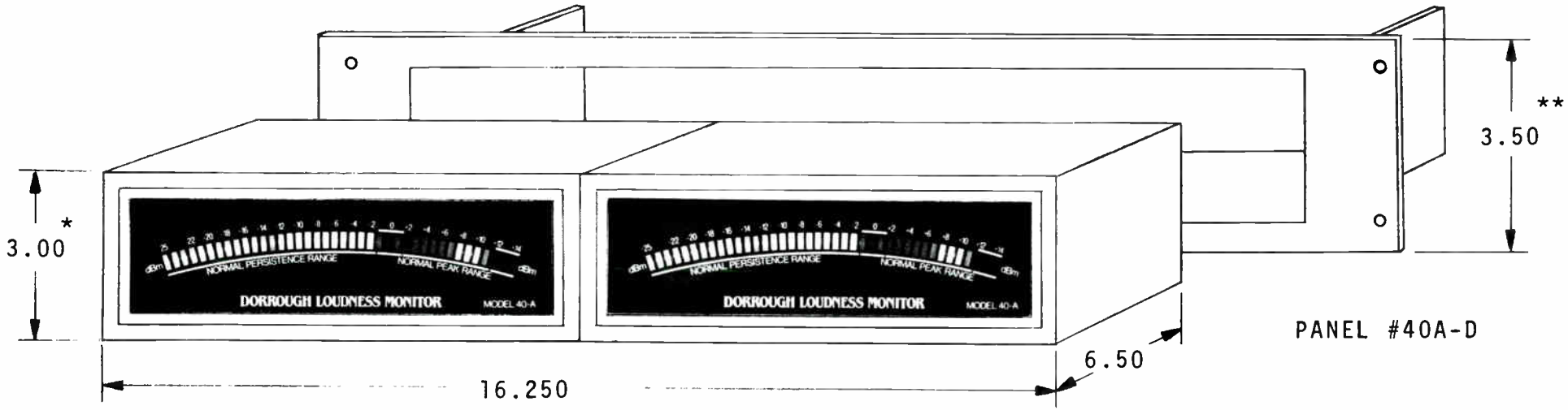
METER PHYSICAL SPECIFICATIONS

** DIMENSIONS SHOWN ARE TYPICAL FOR BOTH PANELS.

* DIMENSION INDICATED INCLUDES MOUNTING PADS



MODEL 40-A SINGLE METER



PANEL #40A-D

MODEL 40-A DUAL METER

DORROUGH ELECTRONICS
5221 Collier Place
Woodland Hills, California 91364
(818) 999-1132
Or a Dorrough Distributor

Perfection in Broadcast Signal Processing

Digital Tri-Band Signal Processing and Accurate Loudness Monitoring

Application for AM, FM, and TV

DORROUGH ELECTRONICS

The Discriminate Audio Processor

The Discriminate Audio Processor Model 610 is a digital controlled tri-band audio processor. A maximum of three channels has proved to be the most colorless and least modifying of program material. The use of gain reduction independently in the three channels eliminates the typical restrictions heard on single channel devices. It is the intention of this device by virtue of the three bands not to doctor or modify the average or peak of the program content in any way that would be offensive to the ear.

The Discriminate Audio Processor Model 610 operates in the following sequence:

Splitter,
Three Channels,
Program Equalizer,
Peak Limiter.

Digital Control

The unit utilizes a frequency discriminate digital control signal, operating in real time, to control the action of analog attenuators, which are located within the discriminate path of the input audio signal. This concept eliminates the delay in attenuator action associated with standard servo approaches and their attendant action on the leading edge of the input wave. The independent channel parameters are on a programmable EPROM and TTL logic is used throughout.

Equalization

A four position equalizer appears on the front panel and is electrically positioned after the three channels and before the Peak Limiter. These "pleasure" controls are provided for individual tailoring of program material. The instruction manual suggests settings with electrical explanations.

Peak Limiter

The Peak Limiter is designed with a combination of soft and hard clipping, followed by 15 kHz low pass filter. Peak Limiters are available for AM, FM, and TV applications.

LED Metering

LED metering is used for each of the three channels with individual LEDs for indicating quieting mode and clip level. The Output Meter enables precise setting of relative loudness levels desired to peak modulation. The large LED array is a visual display of the weighted or loudness factor of the program material.

The system is essentially free of all internal adjustments. The initial installation and setup procedure will usually require front panel adjustments only.

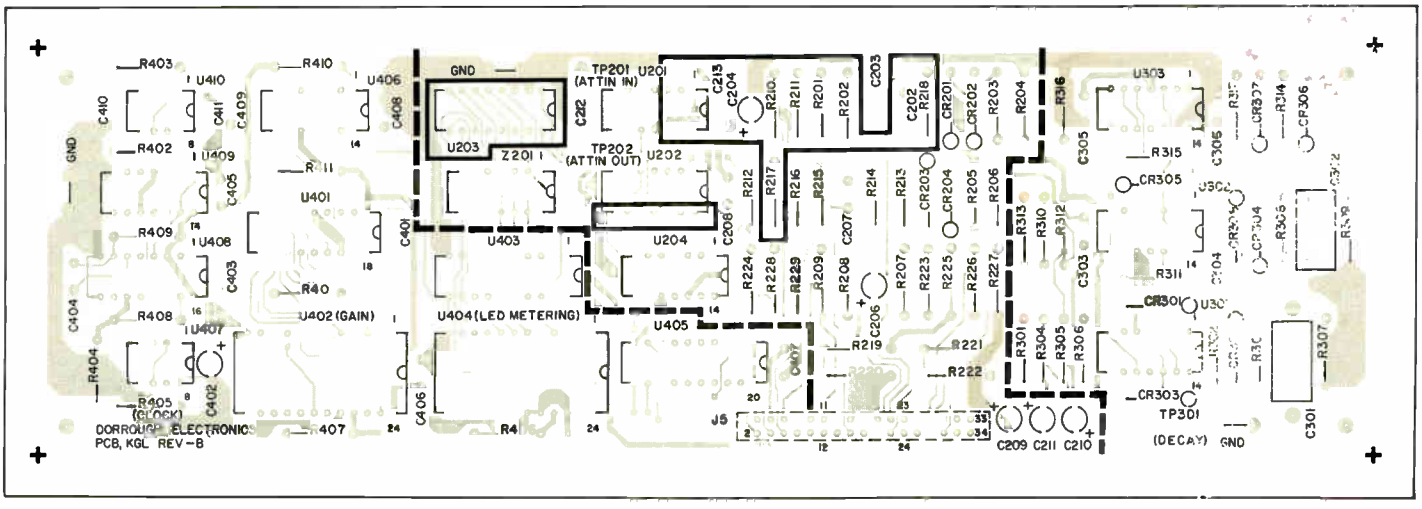
Entry portals are available as standard for interfacing with any of the AM stereo systems. Units track in the stereo mode with digital perfection.

For further information, contact:

DORROUGH ELECTRONICS
5221 Collier Place
Woodland Hills, California 91364
(213) 999-1132

Or a Dorrough Distributor

Single Digital Channel

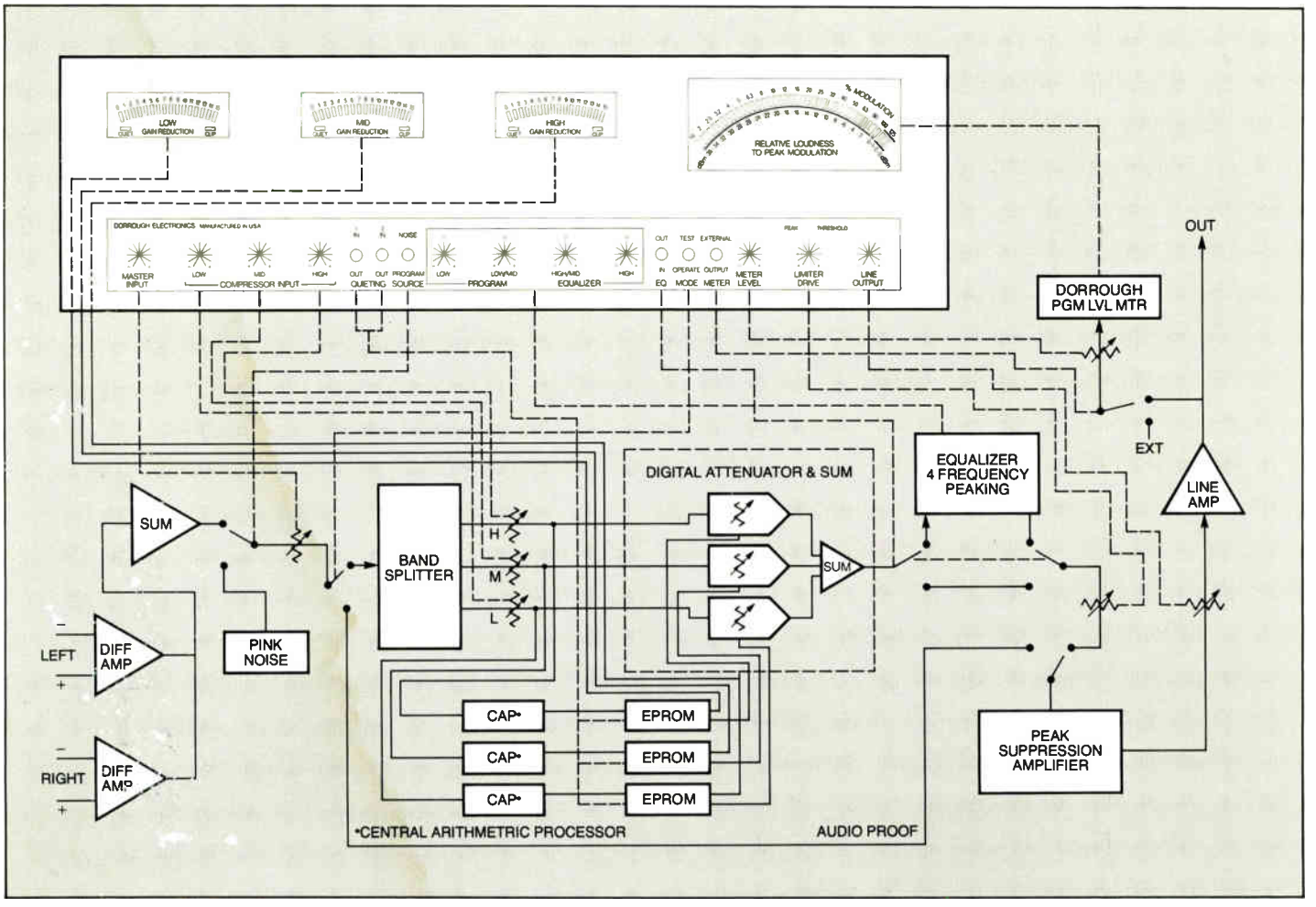


Model 610

Specifications

Input	−20 dBm at 600Ω or 0 dBm Balanced differential 10k bridging input
Output Level	+20 dBm
Output Impedance	Balanced differential for 600Ω load
Number of Discriminate Bands	Three
Crossover Frequencies	173 kHz and 6.5 kHz
15 kHz Filter Response	−34 dB at 19 kHz (FM)
Signal to Noise Ratio	68 dB under operating conditions 75 dB under proof conditions
Attack Time	EPROM controlled
Release Time	EPROM controlled
Thresholds	EPROM controlled
Power Requirements	110/220 volts, 50/60 Hz, 75 watts
Dimensions	Standard 19" rack mount, 5-1/4" high
Weight	Shipping weight 19 lbs.
Price	$3900.00. Arrangements can be made for factory installation. Please inquire.

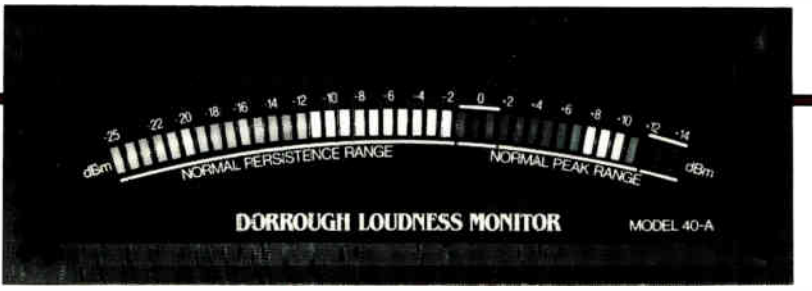
Simplified Block Diagram



DORROUGH ELECTRONICS

5221 Collier Place
Woodland Hills, CA 91364
Telephone: (213) 999-1132

The Dorrough Loudness Monitor



Model 40-A

The Dorrough Loudness Monitor is an indicating device which displays the composition of the average acoustically related program material in visual form, as well as peak amplitude of the audio signal.

Equal energy, properly weighted for program material, will be discerned as equal in loudness. Since energy can be displayed as a function of amplitude and time, an oscilloscope can be used to confirm that large amplitudes of short tone bursts will be equal in loudness, as perceived by the ear, to longer tone bursts of lower amplitude.

Observation of the complex audio signal on an oscilloscope will indicate the peak excursions of the program material. The use of an oscilloscope with variable or long persistence CRT will show additional information relative to recurrent amplitudes which are displayed by the persistence of the screen as a concentrated band of energy about the center of the CRT. It is these two pieces of information which provide the composition of acoustically related visual indication of the complex audio signal. It is on this principle that the Dorrough Program Level Meter was developed.

The Dorrough Program Level Meter consists of 40 LEDs mounted in a single arched scale, so that it can be easily related to existing metering forms. Starting from the left side of the meter, levels −25 dB to −12 dB below reference level are displayed by green LEDs; −11 dB to −2 dB are displayed by yellow LEDs; −1 through 0 to +1 dB are displayed by red LEDs; +2 dB to +11 dB are also in yellow, with +12 dB to +14 dB above reference indicated with red LEDs.

Circuitry permits amplitudes of short durations to illuminate a single LED indicating peak level, while amplitudes of longer duration illuminate a series of LEDs in bar graph form, which indicate information which is generally recurrent or persistent in amplitude.

The ballistics of the persistence scale are not likened to those standardized for the VU Meter. The time constants employed in the Dorrough Program Level Meter were objectively selected after evaluating various types of program material. Risetimes were selected so that average program material would be so indicated in the yellow (−11 dB to −2 dB) on the persistence scale. Peak amplitude excursions would also be so indicated in the yellow (+2 dB to +11 dB) peak scale. To eliminate possible confusion, the red (−1 dB, 0, +1 dB) LEDs in the persistence scale are not illuminated by peak information.

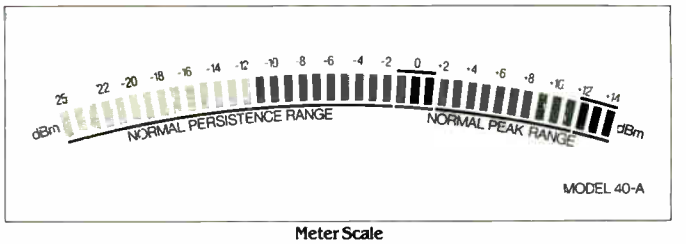
Perceived loudness to the ear from source to source is thus determined by the function by which circuit (peak or persistence) is first to illuminate its respective set of red LEDs.

Program adjustments for equal perceived loudness should be holding either the "peak" or "persistence" excursions to its corresponding red LED area.

An additional feature of importance to stereophonic broadcasting is the provision of left and right program inputs for display on a single indicating instrument. Observation of this display advises the operator of proper operating levels to avoid "center channel buildup," which is the addition of in-phase or monophonic program material, which makes that information to be perceived as louder than stereophonic material.

The adjustment of program levels with this instrument indicating composite material, as well as peak and persistent amplitudes, provides a more consistent input to the audio processing equipment. The obvious result of this is more consistent audio processing, and a lessened listener fatigue.

Meter Scale

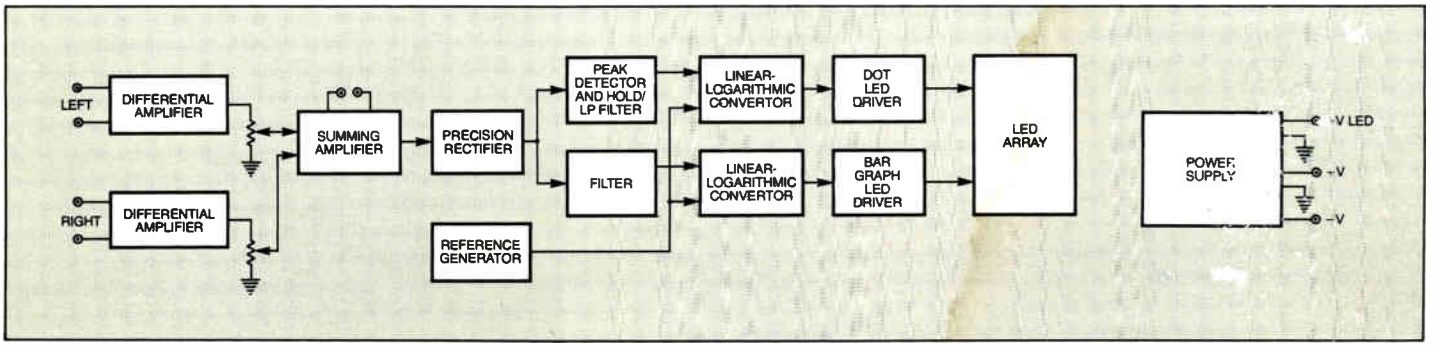


Meter Scale

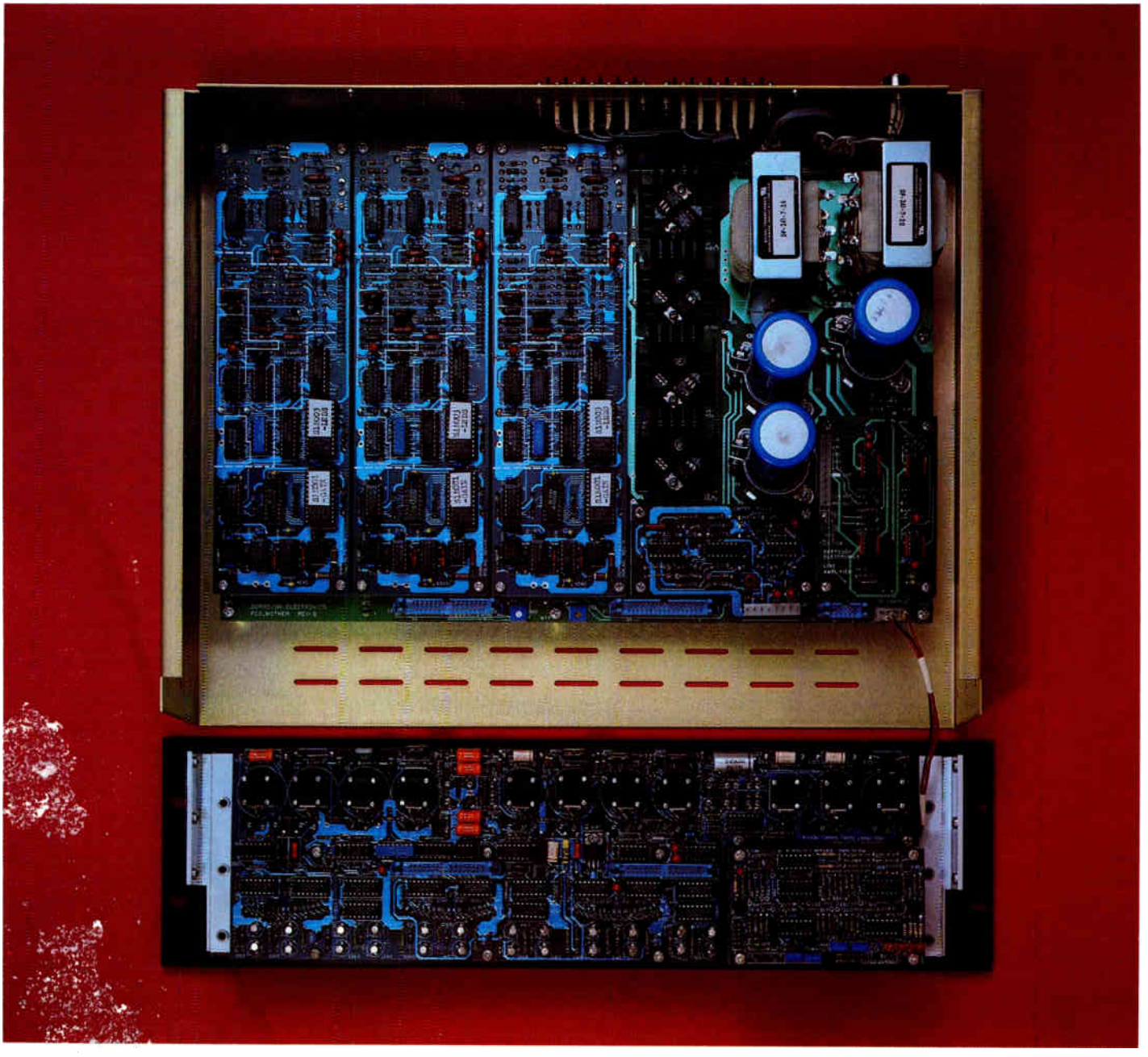
Specifications

Input Level	−30 to +20 dBm, shipped calibrated to +8 dBm
Input Impedance	20k balanced, 10k un-balanced
Power	110 Vac, 50/60 Hz
Size	8-1/8" wide × 3" high × 6-3/8" deep
Weight	2-3/4 lbs.
Price	Single unit $475.00. Available as a single unit, rack mount, or as a console panel replacement.

Block Diagram



Interior View



Each of the three compressor channels are powered independently and are interchangeable. The line amplifier and the peak limiter are also plug in cards. The front panel display board contains the equalizer circuit, pink noise source, and meter displays for the low, mid, and high channels.