M-3T Control Electronics Unit

Operating Instructions

The Meyer Sound M-3T is an active signal processor designed for use with Meyer Sound MSL-3 loudspeakers. It is a single channel device, and occupies a single 1 3/4-inch rack space. the functions of the M-3T are:

- **Iso Input™ to prevent ground loops**
- **Active crossover for biamplification**
- **Loudspeaker frequency response and phase response alignment**
- **High frequency time correction**
- **Muting relays to prevent turn on/off transients**
- **SpeakerSense™ driver protection**

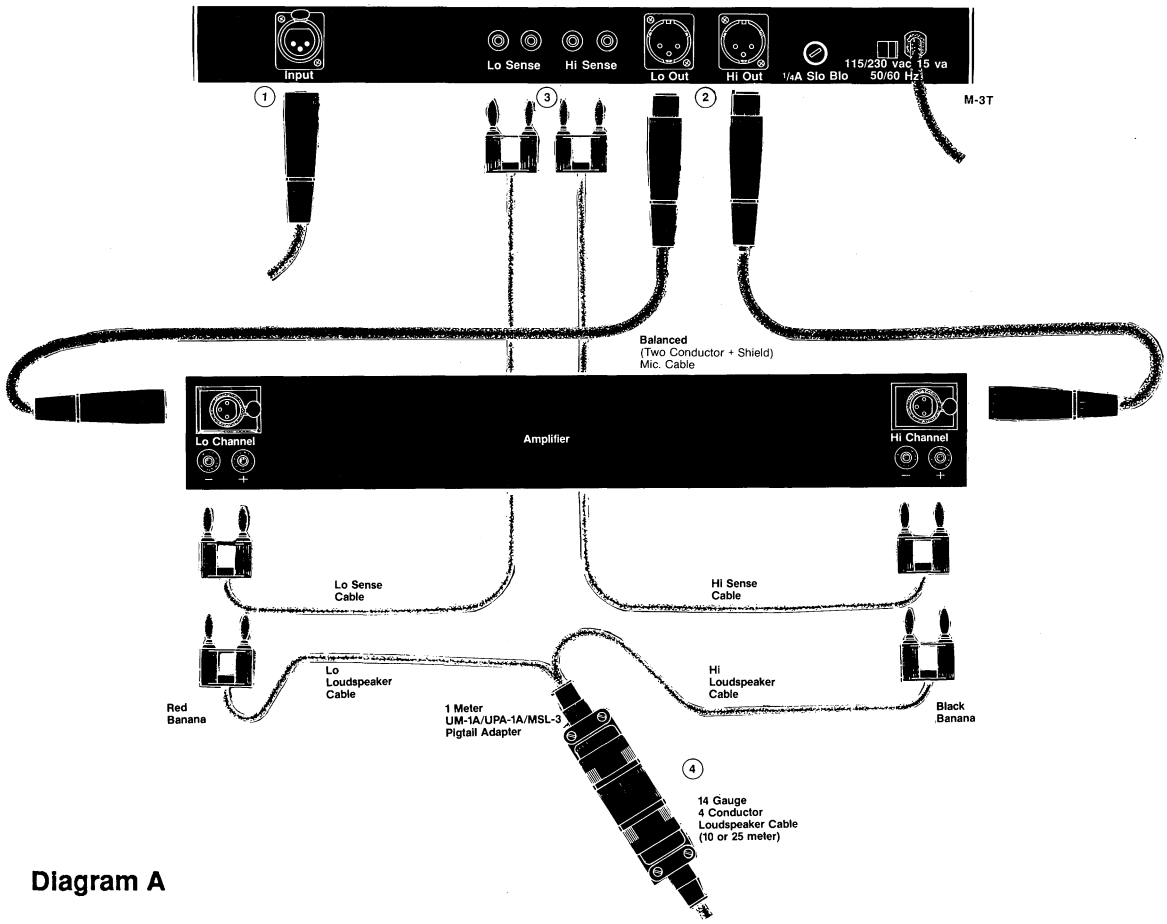

Diagram A

Connections

The M-3T operates at line level and is designed to be the last component in the chain before the power amplifier. Connections to the M-3T should be made according to diagram A.

1. Signal **Input** to M-3T may be either balanced or unbalanced. For best signal-to-noise ratio, the average input level should be at least 1 volt RMS. The M-3T will accept peak inputs of up to +25dBv balanced, or +19dBv unbalanced (see figure 1).

2. Signal **Outputs** from the M-3T may be either balanced or unbalanced. The maximum output levels before clipping are +24dBv balanced, +18dBv unbalanced (see figure 1). Because of the isolated and floating topology of the Iso Input™, it is virtually impossible for ground loops to develop as long as no pin of the input is linked to the connector shell. (The connector shell is connected to earth through the chassis.)

3. SpeakerSense connections are made from the output of the power amplifier back to the M-3T **Sense** inputs. The **Hi** output of the power amplifier **must** be connected to the **Hi** Sense input, and the **Lo** output of the power amplifier to the **Lo** Sense input in order for the **SpeakerSense** driver protection circuitry to operate properly.
Note. Polarity of these connections does not matter.

4. Connections between the power amplifier outputs and the MSL-3 loudspeaker should be made according to the instructions for the loudspeaker. These connections **must be verified for correct polarity,** and correct channel assignment (Hi to Hi, Lo to Lo). Color codes for the Pigtail adapter and the loudspeaker cable are the following:

+Lo: Red	P-Connector pin #1
-Lo: Black	P-Connector pin #2
-Hi: Green	P-Connector pin #3
+Hi: White	P-Connector pin #4

Signal Source Output Configuration	Wiring of Iso Input™ Pin 1	Pin 2	Pin 3	Output Connector Polarity Pin 1	Pin 2	Pin 3	Comments
Balanced	n/c	−	+	GND	−	+	Best CMR
	n/c	+	−	GND	+	−	Lowest hum
Unbalanced	n/c	GND	+	GND	−	+	Best performance
	n/c	+	GND	GND	+	−	unbalanced

Figure 1. Polarity Table

Note. GND = Signal Ground
Do not connect the shield to any pin. The shield may be connected to the shell.

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Once all the connections have been made and verified, the system is ready to operate.

- Set the power amplifier level controls (if any) to 20dB gain.
- Advance the M-3T **Level** control to set the system sensitivity. If the system is not operating properly, recheck all connections.

Note. The Level controls are calibrated and may be used to balance two systems.

Preset Panel Controls

The setup controls on the M-3T Preset Panel are designed to be used to tailor the system response for different applications. Remove the Preset Panel cover plate to adjust the controls.

Safe Switch. The M-3T incorporates three limiters in the **SpeakerSense** driver protection circuitry (see detailed description, below). When the **Safe** switch is engaged the RMS limiters come on at lower power levels, affording added protection when heavy continous power demands are placed on the system. (The VHF peak limiter threshold is unaffected). For operator convenience a Green LED indicator is provided on the M-3T front panel. When the **Safe** switch is engaged this indicator will light. **Note.** It is recommended that the **Safe** switch is engaged until the operator is familiar with the system's capabilities.

VHF Switch and Control. The **VHF Switch** affects the very high frequency response of the system. It selects either a preset **(CAL)** high frequency response or variable response **(VAR)**. In the **VAR** position, system response around 16kHz is adjustable (screwdriver adjustment) from +5dB to -2dB around the preset point (CCW for increased level at 16kHz). This feature may be used to emphasize or de-emphasize sibilants, compensate for room acoustics, etc.

High Frequency Equalization Switch (HF Eq). When this switch is up it introduces a boost at approximately 8kHz to compensate for a similar dip in the MSL-3 frequency response. With the switch down, the M-3T is compatible with the M-3.

Time Correction Switch (TC). When this switch is up it introduces a frequency dependent delay into the high frequency signal. This delay improves the time coherence in the critical range above 2kHz.

Lo Cut Switch. This switch introduces a 6dB/octave high pass filter at 160 Hz. It is designed to provide crossover slope when using subwoofers, but can also be used to compensate for the proximity effect of cardioid microphones. This filter should be inserted when subwoofers are used (see **Use with Meyer Sound Subwoofers)**.

SpeakerSense™

Through the **Sense** connections back to the M-3T from the power amplifiers, the **SpeakerSense** circuitry of the M-3T continuously monitors the voltages across both high and low frequency drivers. If the amplifier output exceeds the safe operating limits of the drivers, independent limiters are automatically activated, holding down the power level of the M-3T outputs.

The operation of the SpeakerSense circuitry is indicated by a set of five LEDS located on the front panel.

- **Sense** Indicators. These function as signal presence indicators, and verify that the **Sense** connections back to the M-3T are made. These indicators will be green whenever a signal is present, or will flicker at low signal levels. If the **Sense** connections are not made or swapped, or if the gain of the power amplifier is greater than 32dB or approximately below unity gain, the indi cators will turn red and the outputs will be muted.
- **Limit** Indicators. These indicators will come on whenever the corresponding limiter is activated. A moderate amount of flashing of these indicaters is acceptable.

Limiter Operation

To verify limiter operation in the field:

- Disconnect loudspeakers, leaving the amplifier and the M-3T in their standard connection configuration.
- If your amplifier requires a load, use resistive loads sufficient to dissipate the full power of the amplifier.
- Turn on both the M-3T and the amplifier.
- Set the **VHF** switch to CAL, the **Lo Cut** out, and the **Safe** switch in.
- Supply an input to the M-3T, preferably a sine-wave oscillator. If you do not have an oscillator, use a microphone and a mixer to produce a line level signal.
- Set the input frequency according to this table:

	Oscillator	Microphone
LF limiter	200Hz	low growl
HF limiter	5,000Hz	loud whistle
VHF limiter	16,000Hz	loud hiss

- Bring up the input until you see the corresponding limit indicator come on. In each case the indicator will light **only** if the limiter actually operates. This provides a positive indication that the limiter is functioning.

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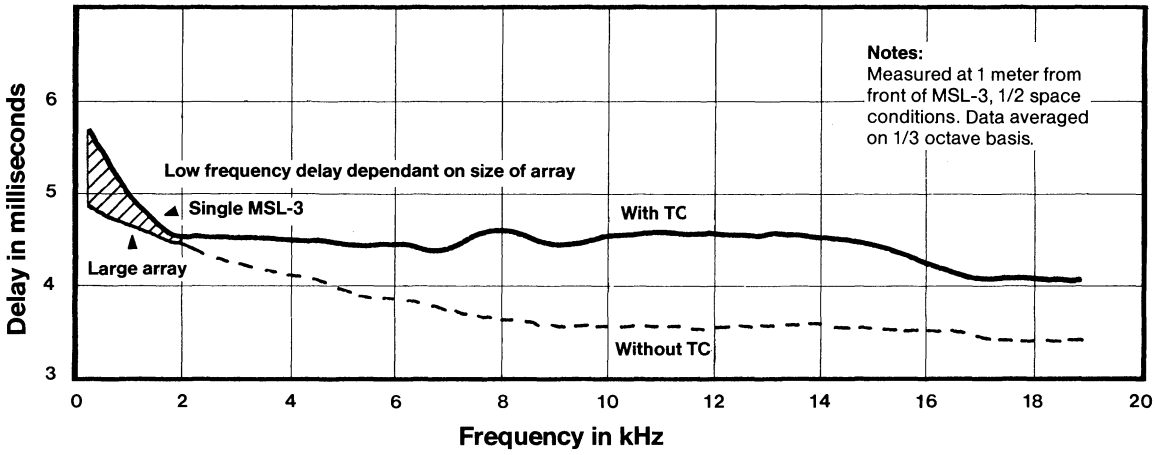
Time Correction

Because of mass-related and other delay phenomena common to all conventional loudspeaker systems, high frequencies are out of synchronization with low frequencies. The frequency-dependent time correction circuit reduces the net group delay of a large MSL-3 array to less than 1 msec. This approaches the time-response of an ideal, massless gas sphere.



Note. Measured at 1 meter from front of MSL-3, 1/2 space conditions. Data averaged on 1/3 octave basis

Balancing Amplifier Gain

The standard connection configuration for the M-3T Control Electronics Unit uses a single two-channel amplifier as a bi-amplifier, one channel for the lows and one for the highs. In large systems where a number of M-3Ts are used, some users prefer to assign one or more amplifiers only to the lows, and other amplifiers only to the highs. In either case the **Lo** and **Hi** amplifiers **must** have equal gain. To balance your system, you will need an oscillator and an RMS-reading voltmeter.

- Connect the M-3T and amplifiers as you wish to use them, **leaving speakers disconnected**.
- If an amplifier requires a load, use an 8-ohm resistor sufficient to dissipate the full power of the amplifier.
- Input the oscillator to the M-3T and set its frequency to 800Hz +/- 5Hz (use a frequency counter if you have one).
- Set the M-3T **Lo Cut** switch out, the **VHF** switch to **CAL**, and the **Safe** switch out.
- Measuring with the voltmeter at the Hi amplifier output, advance the M-3T **Level** control to a convenient reading (a few volts).
- Now measure at the **Lo** amplifier output. If the level is different, adjust the input **Level** control of the **Lo** amplifier until the **Hi** and **Lo** outputs are equal.

Use with Meyer Sound Subwoofers

All Meyer Sound Subwoofers are designed to be used with the Meyer Sound **B-2A Control Electronics Unit**. When the MSL-3 is used with Meyer Sound subwoofers, you should connect your system according to diagram B.

Note that the **HI** output of the B2-A is left unconnected. For proper crossover **you must switch the M-3T Lo Cut in.**

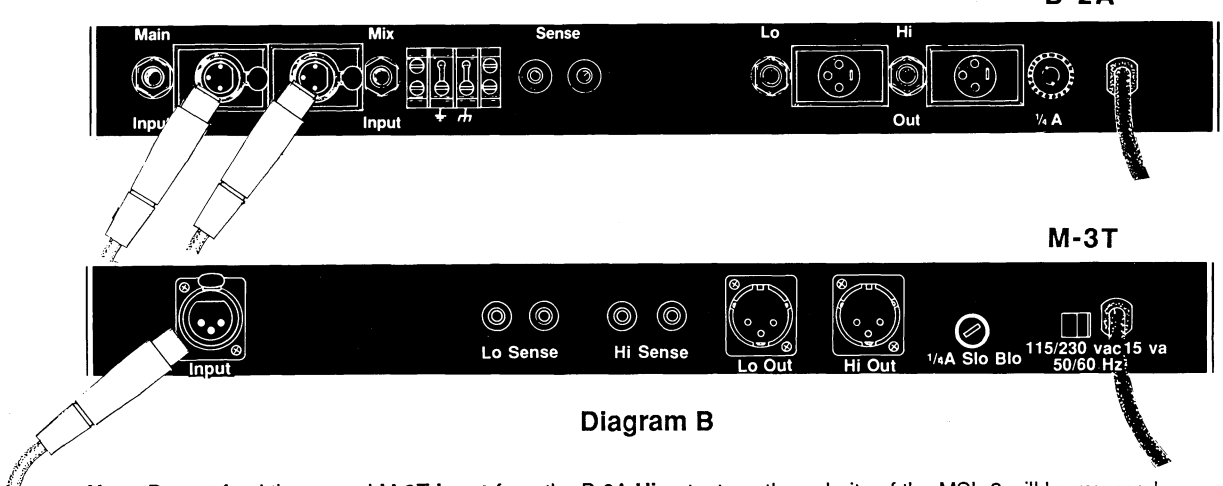


Diagram B

Note. Do **not** feed the normal M-3T **Input** from the B-2A **Hi** output, as the polarity of the MSL-3 will be reversed, resulting in a response dip at 100Hz.

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Specifications

Input	
Type	Balanced Iso-Input™ (female XLR pins 1, 2 & 3 transformer isolated, shell connected to chassis/AC mains ground)
Impedance	10k ohms resistive, balanced (XLR pin 3 to 2) 5k ohms resistive, unbalanced (XLR pin 3 to 1 or pin 2 to 1)
Maximum input	+19 dBV balanced or unbalanced (any pin configuration)
Output	
Type	Hi and Lo channel balanced, active push-pull, 200 ohms output impedance (male XLR)
Maximum output[1]	+24 dBV balanced +18 dBV unbalanced
Dynamic range[2]	124 dB Lo channel 110 dB Hi Channel HF and TC out 103 dB Hi Channel HF and TC in
Crossover frequency	800 Hz
Sense	
Input	Dual banana jacks, Hi and Lo channel 10k ohm impedance, capacitively coupled, polarity insensitive
Mute circuit	Independent Hi and Lo channel mute when power amplifier gain is <0 dB or >32 dB automatically resets every two seconds, sense LED turns red during mute
Driver protection	
Low channel	RMS limiter
High channel	RMS limiter VHF peak limiter
High frequency delay	Active all-pass TC switch for delay alignment of tweeter array
Indicators	
Sense; Hi and Lo	Red/Green LEDs (Red indicates mute and sense line error)
Limit; Hi, Lo and VHF	Red LEDs
Safe	Green LED
Power supply	Red/Green LED (Red indicates power supply malfunction)
Controls	
Front panel	Input attenuator, AC power switch
Sub panel	Lo Cut switch, Safe switch, TC switch, HF Eq switch, VHF Var/Cal switch, VHF Var control (screwdriver adjust)
Power	120/240V AC (rear panel selectable), 50/60Hz, 10 watts
Physical dimensions	Standard 19" rack mount, 19"W x 1 3/4"H x 7 3/4"D
Weight	8 lbs. (3.36kg)

Conditions for specifications (unless otherwise stated):
110 V AC, 60 Hz mains, 600 ohm source impedance, 10k ohm load impedance, 20 dB power amplifier gain, Lo Cut out, Safe out, Time corrector in, HF Eq in, all measurements balanced

Notes:
1. **800 Hz (worst case frequency both channels), < 0.1% THD**
2. **A weighted noise floor to maximum output at 800 Hz**

Patent Pending

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