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TOA PROFESSIONAL SOUND SYSTEM

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# FLOOR MONITOR SPEAKER SYSTEM

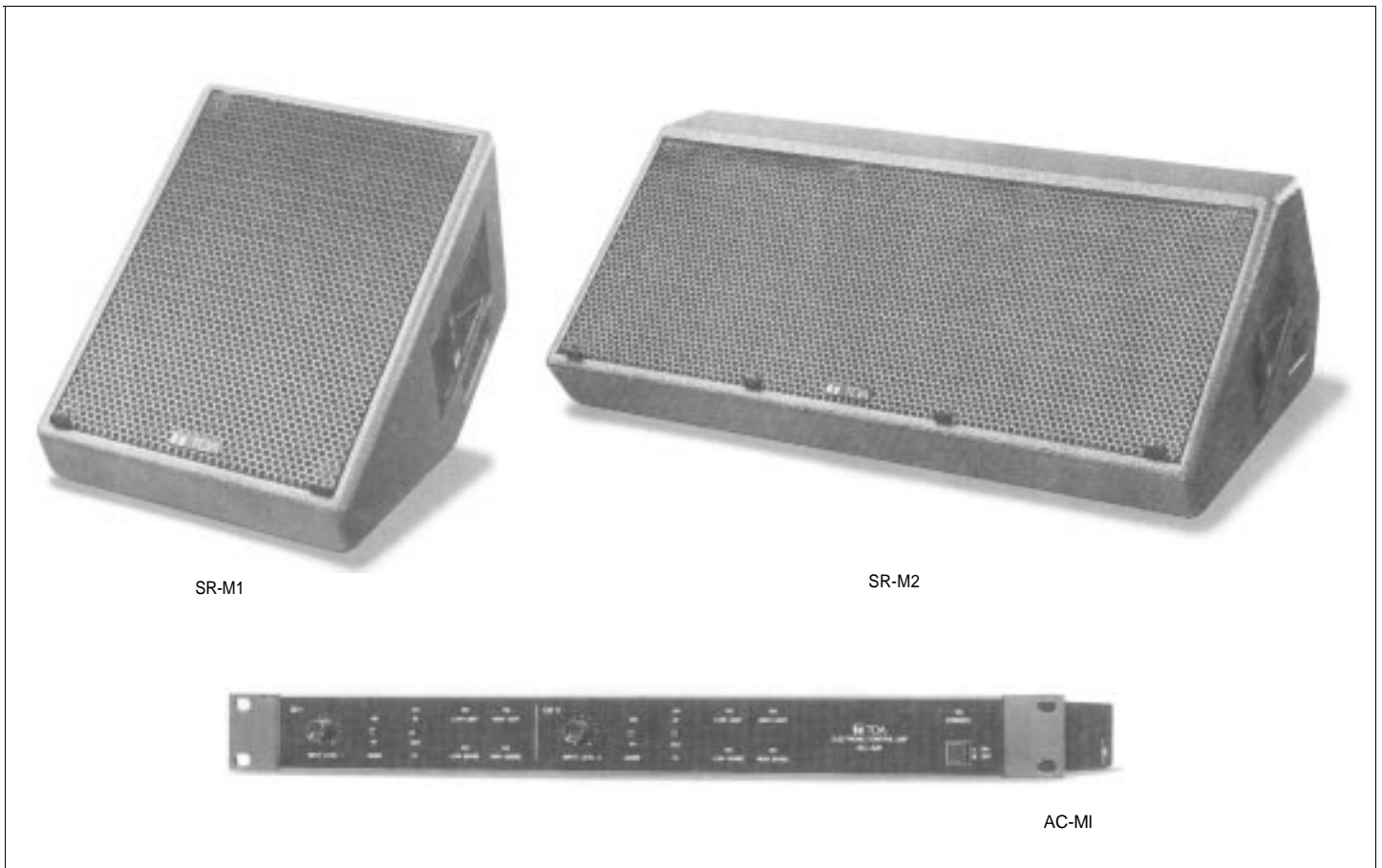
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**SR-M1** Single -Woofer Monitor Speaker

**SR-M2** Twin -Woofer Monitor Speaker

**AC-M1** Electronic Control Unit

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## FEATURES

1. 2-way, ported, bi-amplified systems.
2. 40 x 40 degree CD horn/compression driver for HF.
3. Powerful 12" (30cm) LF drivers and titanium HF compression driver.
4. Heavy duty enclosure construction.
5. Phase and driver time offset correction.
6. Active signal processing with sophisticated speaker protection.
7. "Floor Correction" circuitry.
8. Signal dependent limiting parameters.
9. Electronically-balanced inputs and outputs.
10. Neutrik Speakon (for SR's), XLR (for AC-M1) connectors.

## DESCRIPTION

TOA's SR-M1 and SR-M2 are actively processed, two way, Stage/Floor Monitor Systems that feature high power handling, bi-amplification, porting and the extremely rugged construction necessary for reliable, portable use. Where every dB counts, they maximize the audio information most critical to the performer by addressing problems specific to floor monitors. Both systems are designed to work with the AC-MI Electronic Control Unit for best performance. In one rack space each provides two independent bi-amp channels, crossover phase alignment, driver offset time correction, CD (constant directivity) horn EQ to correct for losses inherent in CD horns, plus both LF and HF limiting.

### DRIVERS:

Both systems are two-way, but the SR-M1 has a single 12" (30cm) woofer and the SR-M2 has two 12" (30cm) woofers. The 12" woofers, coupled with their 7.9" (200mm) magnets (16,200 Gauss flux density), provide high efficiency and excellent transient response for the lower frequencies. LF power handling is 300 watts AES (M1) and 600 watts AES (M2)\*. Both systems use the same titanium diaphragm, high frequency compression driver: the TOA HFD-652. It has a very smooth frequency response and superb transient reproduction. Its RMS power rating is a robust 80 watts\*. The driver is coupled to a 40 x 40 degree CD horn crossed over at 1kHz. This means highly efficient, focused HF coverage to cut through ambient sound levels and reduce on-stage high frequency leakage into other microphones.

### FLOOR CORRECTION:

A unique system feature is the "FC" or "Floor Correction" function. When slant type monitors operate on a floor, some of their sound is reflected off the floor, acoustically interfering with their own direct sound. This causes audible cancellations in the critical midrange and thus a loss of this information to the performer. TOA's engineers designed circuitry into the AC-MI to correct for this problem. This means performers will hear more of the critical information they need at lower levels. Also, the smoothed frequency response can result in higher gain before feedback.

### DRIVER PROTECTION:

The driver protection in the AC-MI is more than simple limiting. For example, high pass filters for the LF sections provide sub-sonic protection. Limiting is done by directly sensing amplifier outputs. This means the limiters will only respond to audio actually "seen" by the speakers. Separate limiters with different processing are used to protect the HF and LF drivers.

The limiting attack and release times are dependent on the characteristics of the signal, for virtually transparent operation. Typical LF limiters for bi-amped monitors simply reduce the entire woofer output when limiting excessive lower frequency signals, such as kick drum. Unfortunately, this reduces what the performer needs to hear from the higher frequency portion of the woofer's output. The AC-MI is designed to correct this problem by being able to limit lower frequencies to the woofer without limiting the higher frequencies at the same time. Separate overall LF limiting protects the latter range.

### TIME/PHASE CORRECTION:

The frequency response is very smooth, particularly through the crossover, because of the crossover phase, driver time offset and frequency response processing provided by the AC-MI. This means you get a higher quality monitor mix with less prominent ring modes, both of which minimize EQ adjustments. The time domain processing also corrects factor which lead to improved gain before feedback margins, and that EQ alone could not, especially when microphones are in the speaker's proximity.

### CONSTRUCTION:

The SR-M1/M2 enclosures are constructed of APITON plywood, one of the densest, toughest plywoods made. (A more common use is as the flooring for semi-trailers!) It eliminates undesirable acoustic effects from cabinet resonances and flexing and it makes the enclosures extremely rugged for road use. They are finished in a tough, black epoxy paint with a heavy gauge, removable, perforated steel grille to protect the drivers. Drivers can be serviced from the front. No fewer than 8 machine screws and "T" nuts are used to securely mount the woofers. On both sides of the enclosure there is a recessed, heavy duty handle and a Neutrik NL4MPR Speakon connector. The two Speakons are wired in parallel for loop-through operation.

### AC-M1:

The AC-MI Electronic Control Unit has electronically balanced inputs and outputs capable of +26dB (ref. OdB=0.775V). The limiter sense inputs are bridging (10k ohm), allowing connection to the amplifier outputs using standard shielded pair audio cable. The front panel includes for each channel: FC Mode In/Out; Input level; M1/M2 Select; LF/HF Sense Input and Limit Lights. It has XLR audio and binding post sense connectors.

\*Note At least 300 watts per HF and LF driver is recommended to avoid possible speaker damage due to clipping with lower power amplifiers.

## INPUT CONNECTOR

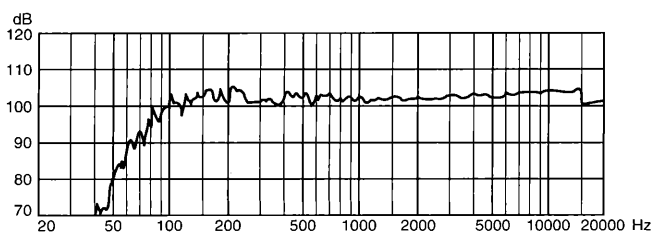
Two Neutrik NL4MPR connectors are provided on both sides of the speaker. They are internally parallel-connected, so either may be used for loop-through connections, Each connector contact is wired as shown in the right table.

Contact number	SR-M1/SR-M2
1 +	LOW +
1 -	LOW -
2 +	HIGH +
2 -	HIGH -

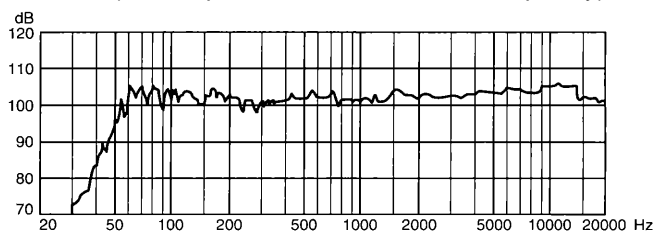
Applicable cable connector is Neutrik NL 4FC.

## CHARACTERISTIC DIAGRAMS (1/3 Octave Pink Noise)

- SR-M1 (1/4W input/1m, at 2kHz of HIGH frequency)



- SR-M2 (1/4W input/1m, at 2kHz of HIGH frequency)

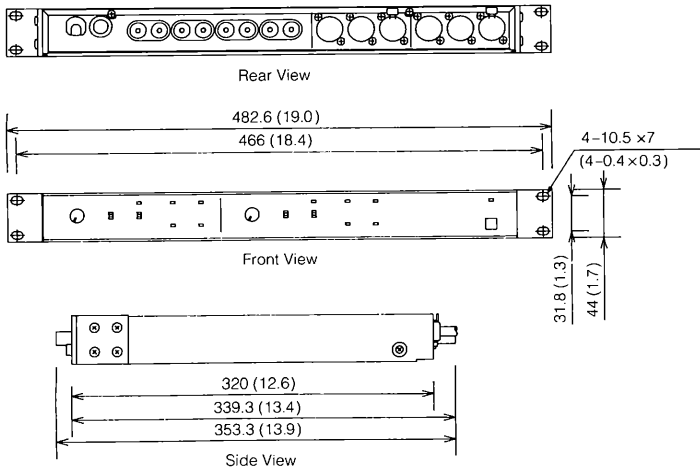


Model No.	AC-M1	
<b>PERFORMANCE</b>		
Total Harmonic Distortion	Under 0.05% (1 kHz)	
Noise Level	Better than -85dBm (-110 below max o/p)	
<b>INPUT &amp; OUTPUT</b>		
Nominal Input Level	+4dB, 20k ohms I/P impedance (electronically balanced)	
Nominal Output Level	+4dB into 600 ohms load (electronically balanced)	
Maximum Input Level	+26dB	
Maximum Output Level	+26dB	
Sense input	1 Ok ohms input impedance	
Maximum Sense Input	150V	
Attack Times	Dependent on signal characteristics	
Release Times	Dependent on signal characteristics	
Limiting Ratio	Approximately 10:1 "Soft knee" threshold	
<b>STANDARD ACCESSORIES</b>		
	Spare fuse 1	
	Rack screws [metric] 4	
<b>PANEL FUNCTIONS (Front Panel)</b>		
Operating Controls (per channel)	Select Switch	M1 or M2 Spkr
	Floor Correction Input	FC In/Out Level control
Operating Controls (common to both)	Power	On/Off
LED Indicators (per channel)	FC	In
	Low Sense	Signal at LF sense I/P
	High Sense	Signal at HF sense I/P
	Low Limit	LF limit active
	High Limit	HF limit active
LED Indicators (common to both)	Power	On
<b>-POWER</b>		
Power Requirements	AC Mains, 50Hz/60Hz	
Power Consumption	18W (120V AC version)	
	16W (220/240V AC version)	
	Fuse 0.63A 120V/0.2A 220/240V	
<b>PHYSICAL</b>		
Finish	Black	
Dimensions	482.6W x 44.OH x 353.3D mm (19W x 1.73H x 13.91D in.)	
Weight	5.0kg (11.0lbs.)	

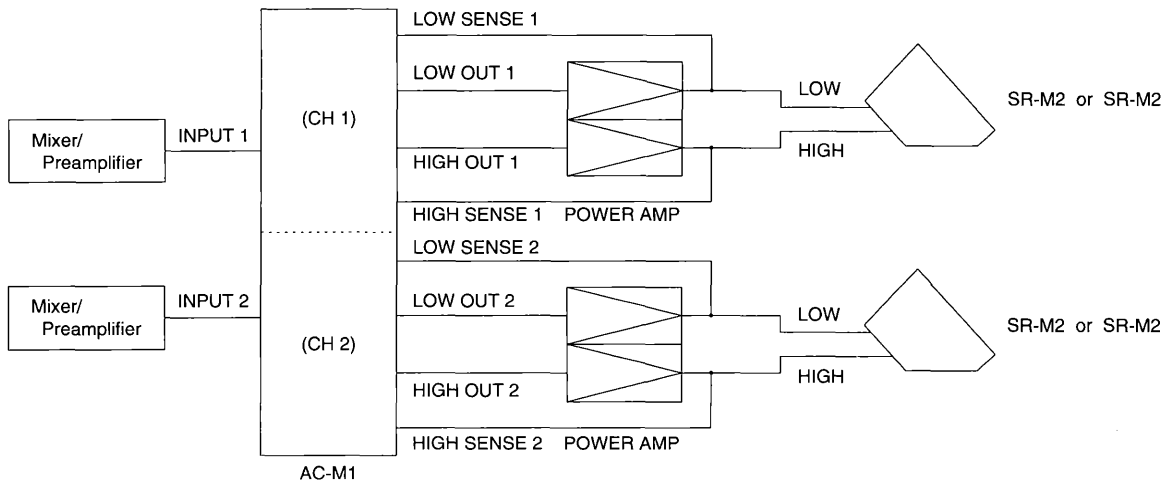
NOTE: OdB=0.775V RMS

## AC-M1

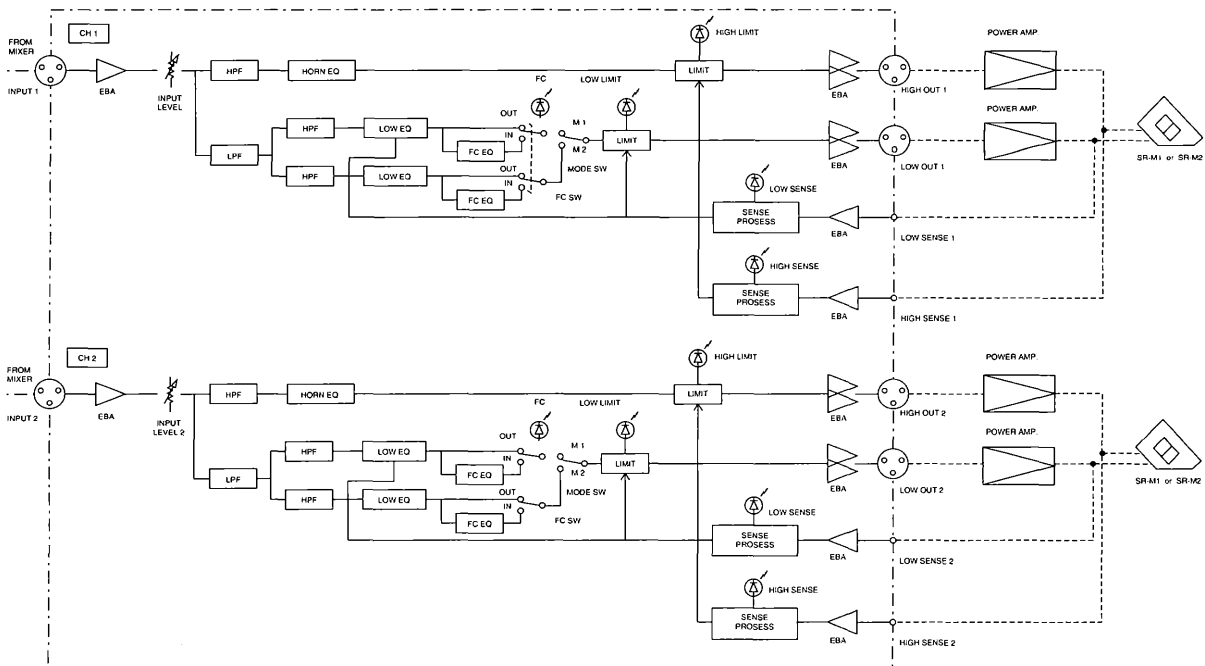
Unit:mm( in.)



# CONNECTION DIAGRAM



# BLOCK DIAGRAM



# SPECIFICATIONS

Model No.	SF-M1
<b>PERFORMANCE</b>	
Sensitivity (pink noise 1W/1m) -	
Low Frequency (200kHz to 1kHz)	99dB SPL
High Frequency (1kHz to 5kHz)	109dB SPL
Frequency Response	70Hz to 20kHz (When used with AC-M1)
AES Power Handling LF	300W RMS
24 Hour Power Handling LF (50Hz to 1kHz)	
Pink Noise	120W RMS
Program	360W RMS
HF (1kHz to 20kHz)	
Pink Noise	80W RMS
Program	240W RMS
<b>ELECTRICAL</b>	
Nominal Crossover Point	1kHz
Nominal Impedance LF	8 ohms
Nominal Impedance HF	16 ohms
<b>PHYSICAL</b>	
Low Frequency Driver	30cm (12 in.) dia. cone x 1
High Frequency Driver	Titanium comp. driver
High Frequency Horn	CD horn (40 horz x 40 vert)
Enclosure	Ported
Enclosure Material	Apiton plywood 18mm (0.7 in.) thick
Enclosure Finish	Epoxy paint (black)
Perforated Steel Grille Finish	Acrylic paint (black)
Input Connector	Neutrik NL4MPR x 2
Dimensions	390W x 439H x 662D mm (15.4W x 17.3H x 26.1D in.)
Weight	32kg (71lbs.)
RECOMMENDED ACCESSORY	AC-M1 Electronic Control Unit

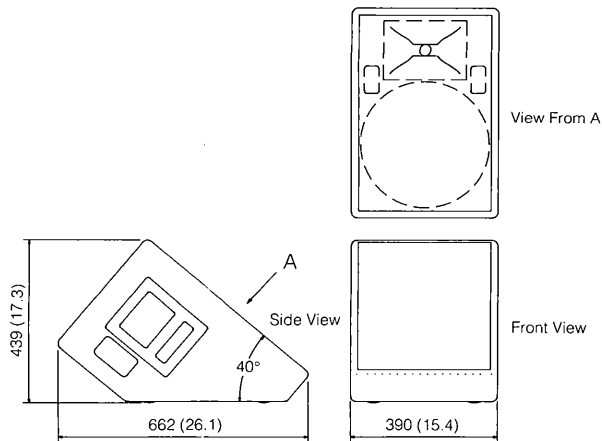
NOTE OdB SPL=20uPa

Model No.	SR-M2
<b>PERFORMANCE</b>	
Sensitivity (pink noise 1W/1m) -	
Low Frequency (200kHz to 1kHz)	102dB SPL
High Frequency (1kHz to 5kHz)	109dB SPL
Frequency Response	45Hz to 20kHz (When used with A C - M 1 )
AES Power Handling LF	600W RMS
24 Hour Power Handling LF (50Hz to 1kHz)	
Pink Noise	240W RMS
Program	720W RMS
HF (1kHz to 20kHz)	
Pink Noise	80W RMS
Program	240W RMS
<b>ELECTRICAL</b>	
Nominal Crossover Point	1kHz
Nominal Impedance LF	8 ohms (2 x 16 ohm)
Nominal Impedance HF	16 ohms
<b>PHYSICAL</b>	
Low Frequency Driver	30cm (12 in.) dia. cone x 2
High Frequency Driver	Titanium comp. driver
High Frequency Horn	CD horn (40 horz x 40 vert)
Enclosure	Ported
Enclosure Material	Apiton plywood 18mm (0.7 in.) thick
Enclosure Finish	Epoxy paint (black)
Perforated Steel Grille Finish	Acrylic paint (black)
Input Connector	Neutrik NL4MPR x 2
Dimensions	802W x 346H x 618D mm (35.5W x 13.6H x 24.3D in.)
Weight	56kg (123lbs)
RECOMMENDED ACCESSORY	AC-M1 Electronic Control Unit

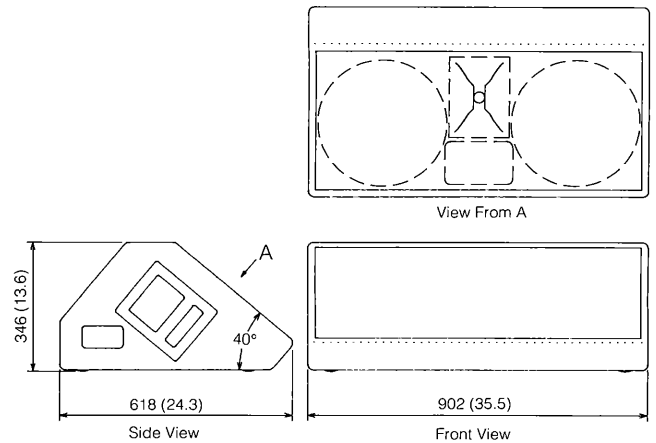
NOTE OdB SPL=20uPa

## DIMENSIONAL DIAGRAM

SR-M1



SK-M2



## ARCHITECT'S AND ENGINEER'S SPECIFICATIONS

### SR-M2/SR-M1 Monitor Speaker

The loudspeaker shall be a bi-amplified, ported, floor monitor type system with two 30cm (12 in.) [one 30cm (12 in.)] low frequency drivers with 200mm (7.9 in.) diameter magnets and 16,200 Gauss flux density in the voice coil gap plus a high frequency titanium diaphragm, compression driver coupled to a 40 x 40 degree constant beam width horn. The crossover point shall be 1kHz. The low frequency power rating shall be 240W RMS (120W RMS); the high frequency power rating shall be 80W RMS. Power ratings measured using pink noise with a crest factor 10dB above RMS from LF50Hz to 1kHz; HF 1kHz to 20kHz for 24 hours. The frequency response shall be from 45Hz to 20kHz [70Hz to 20kHz] with a sensitivity of LF 102dB [99dB] SPL; HF 109dB SPL at 1W/1m using pink noise band limited LF 200Hz to 1kHz; HF 1kHz to 5kHz. The nominal impedance of the system shall be LF 8 ohms; HF 16 ohms.

The enclosure shall be constructed of APITON plywood 18mm (0.7 in.) thick, finished with a rugged, black epoxy paint. There shall be two Neutrik NL4MPR connectors wired in parallel, one at each end of the enclosure, for "loop through" type connections. The jacks shall be replaceable with any connector using standard Canon EP type mounting. The speaker grille shall be perforated steel painted black acrylic. A heavy duty carrying handle shall be provided on each end of the enclosure.

The speaker baffle/acoustic axis for the system shall be 50 degrees up from horizontal in the normal operating position. The enclosure design shall allow positioning for operation with the speaker baffle/axis aimed horizontally.

The system shall be 902W x 346H x 618D mm (35.5W x 13.6H x 24.3D in.) [390W x 439H x 662D mm (15.4W x 17.3H x 26.1D in.)] and weigh 56kg (123lbs.) [32kg (71 lbs.)].

Recommended Accessory: TOA AC-MI Electronic Control Unit-provides phase corrected electronic crossover, CD horn equalization, Floor Correction function, speaker time off-set correction and limiting.

The loudspeaker system shall be the TOA SR-M2 [SR-M1].

NOTE: Acoustic specifications are based on use with the TOA AC-M1 Electronic Control Unit

### AC-MI Electronic Control Unit

The device shall be dual channel, with each channel able to function independently as an active signal processor/crossover/limiter for the TOA SR-M1 and SR-M2 speaker systems. Nominal output level shall be +4dB into 600 ohms (maximum +26dB), electronically balanced, at less than 0.05% THD at 1kHz. Hum and noise shall be more than 85dB below 0dB. Nominal input level shall be +4dB (maximum +26dB); input impedance 20k ohm, electronically balanced. Gain below the limiter threshold shall be unity. The limiter sense input impedance shall be 10k ohms with a maximum input of 150V.

Front panel controls and switches shall include: POWER On/Off for the unit; INPUT LEVEL; MODE M1/M2 to select speaker type (SR-M1/SR-M2); FC (Floor Correction) In/Out. Front panel indicators for each channel shall include: FC IN; Low Sense, High

Sense (detect signals at the sense inputs); Low Limit, High Limit (sense signals are above limit thresholds). A POWER On indicator shall also be provided.

The FC IN mode shall provide signal processing, dependent on the MODE selection (M1 or M2), to correct frequency response variations at normal listening positions on axis to the speaker when floor mounted. The variations are those caused by comb filtering, due to time arrival differences at the listener, between the direct sound from the speaker and sound from the speaker reflected from the floor between the listener and speaker. The FC OUT mode bypasses this processing in both M1 and M2 modes for normal frequency response when the speaker is not floor mounted.

The unit shall provide separate LF and HF limiters on each channel for protection of the LF and HF drivers of the SR-M1 and SR-M2 systems from excessive amplifier voltages. Sense input voltages for the limiter circuitry shall be from the output of the power amplifiers for those drivers. The limiting thresholds shall be non-adjustable and factory set at appropriate levels in the circuitry for the drivers in each system, depending on the MODE selection (M1 or M2) and shall be independent of amplifier gain. The gain reduction method for limiting modes shall be approximately a 10:1 ratio with a "soft knee" threshold. The dynamic attack and release times shall be dependent both on the MODE selection (M1 or M2) and on signal characteristics.

Limiting for the LF drivers shall be dependent on the MODE selection (M1 or M2) and shall allow limiting of excessive lower frequency signals to the drivers without altering the gain of the higher frequency signals to the same drivers. An overall LF limiter shall limit the latter frequencies. Separate limiter circuitry for the HF drivers shall be provided for each channel.

The unit shall provide a nominal 1kHz, phase corrected, electronic crossover for the LF and HF drivers. Driver offset time correction shall also be provided. CD horn equalization shall be provided to correct for power response loss at high frequencies. The LF driver equalization shall be dependent on the MODE selection (M1 or M2) and provide a flat LF frequency response and protective sub sonic filtering.

The rear panel shall include: two XLR-F for the signal inputs; four XLR-M for the signal outputs; a pair of banana plug type binding posts for each of the four sense inputs; a fuse holder with a replaceable 5/8 amp (2/10 amp 220/240V) fuse with 1 spare fuse provided.

Power consumption shall be 18 watts at 120V AC (16W 220/240 V AC version). The unit shall be enclosed in a durable, black-coated 1.0mm (.04 in.) steel enclosure, mechanically reinforced by a 2.0mm (0.08 in.) thick, black-anodized, aluminum front panel. Overall dimensions shall be 482.6W x 44.0H x 353.3D mm (19W x 1.73H x 13.91D in.). Weight shall be 5.0kg (11.0lbs.). Standard E.I.A. equipment rack mounting shall be provided.

The dual channel signal processor/crossover/limiter shall be the TOA model AC-M1.

NOTE. 0dB=0.775V RMS

