

## Multifrequency Reproducer Calibration Tapes for 15 in/s with MRL “Studio Master” Equalization, for Open-Reel Applications

### 0 INTRODUCTION

The standard NAB equalization for the 15 in/s tape speed is obsolete from a performance viewpoint for use with “modern” recording tapes – that is, blank tapes made since about 1970(!). It is usually still used, and that is only *because* it is standard – that is, there are many recordings made this way, and many recorders and reproducers that are set to this equalization.

But if you are interested in using a better, but *non standard*, equalization, consider the “MRL Studio Master” (MRL-SM) equalization. It is similar to the 15 in/s IEC1 (CCIR) equalization, but with a further 3 dB increase in the high-frequency flux level recorded on the tape. For a discussion of how tape equalization works, and what the standard equalizations are, please click on, and read, <http://home.flash.net/~mrltapes/equaliz.html> . For the explanation of what the SM equalization is, and why we recommend using it, please click on, and read, [http://home.flash.net/~mrltapes/mcknight\\_proposed-mastering-eq.pdf](http://home.flash.net/~mrltapes/mcknight_proposed-mastering-eq.pdf) .

The Calibration Tapes on this page contain a series of recorded sine-wave signals for general-purpose use for standardizing azimuth, equalization, and sensitivity (usually called “gain” or “level”) of open-reel analog audio magnetic tape reproducers. They are not intended for testing tape reproducer speed, flutter, distortion, or track placement.

Table 1 shows the catalog numbers for tapes with the MRL “Studio Master” (SM) equalization. **NOTE THAT THIS IS BASED ON THE IEC1 (CCIR) CURVE, BUT IS NOT A STANDARD EQUALIZATION!** Tapes are shown below for reference fluxivities of 250 or 355 nanowebers per meter (nWb/m). These tapes are also available at 500 nWb/m.

See “Choosing and Using MRL Calibration Tapes for Audio Tape Recorder Standardization”, MRL Publication Choo&U, for more information on choosing and converting between different equalizations and levels. It also has descriptions of other test signals that are available from MRL, notes on using Calibration Tapes, and MRL’s specifications.

The signals on these tapes can be monitored with a voltmeter—either the program level meter in the tape reproducer or an external voltmeter. Useful auxiliary test equipment includes a loudspeaker or headphones to hear the voice announcements of frequencies and levels, an oscilloscope to observe waveforms, and a level recorder in order to provide a graph of the frequency response.

Section 1 below specifies the contents of the MRL Multifrequency Calibration Tapes for each tape speed, and Section 2 gives our brief instructions for using the MRL Multifrequency Calibration Tapes.

Table 1 MRL Multifrequency Calibration Tapes with MRL “Studio Master” Equalization

Tape Width <i>Playing Time</i>	Tape Speed	Equalization (Non-Standard)	Fringing Compensated?	Level of Frequency Response Section	Catalog Number for Reference Fluxivity (Level) of		Price
					250 nWb/m (+3 dB)	355 nWb/m (+6 dB)	
6.3 mm <b>¼ inch</b> <i>6 minutes</i>	380 mm/s <b>15 in/s</b>	MRL-SM (Studio Master)	Yes <sup>a</sup>	0 dB	244-101-482-114	244-101-512-110	120 \$
			No <sup>b</sup>		244-101-480-116	244-101-510-112	
12.5 mm <b>½ inch</b> <i>8 minutes</i>			Yes <sup>a</sup>		344-103-482-120	344-103-512-126	225 \$
			No <sup>b</sup>		344-103-480-122	344-103-510-128	
25 mm <b>1 inch</b> <i>10 minutes</i>			Yes <sup>a</sup>		444-103-482-132	444-103-512-138	475 \$
			No <sup>b</sup>		444-103-480-134	444-103-510-130	
50 mm <b>2 inch</b> <i>16 minutes</i>			Yes <sup>a</sup>		544-103-482-144	544-103-512-140	890 \$
			No <sup>b</sup>		544-103-480-146	544-103-510-142	

<sup>a</sup> Fringing compensation is for narrow-track systems, with 1- or 2-mm wide tracks.

<sup>b</sup> For wide-track systems (>5 mm track width), fringing compensation should not be used.

## 1 CONTENTS OF THE CALIBRATION TAPES

The MRL Multifrequency Reproducer Calibration Tapes contain three separate sections. The Reference Fluxivity Section is usually used to set the reproducer gain to give the reference deflection (0 dB) when the program level meter is a vu meter. The Azimuth, Phase, and Preliminary Equalization Adjusting Section is used to set the azimuth of the heads, and to perform preliminary equalization calibration. The Frequency Response Calibration Section is used to calibrate the frequency response of the reproducer. Each section is voice announced. The details are given in Table 2 below. **Note: You can also special order any Multifrequency tape with a total duration of 8- or 16-minutes, as shown below for the ½- or 2-inch widths.** Inquire for prices.

Table 2 Contents of the Multifrequency Tapes

Section	Frequency	Duration of Tone for a Tape Width of:			
		¼ in	½ in	1 in	2 in
Reference Fluxivity	1000 Hz	30 s	57 s	78 s	120 s
Azimuth, Phase, & Preliminary Response	500 Hz	20 s	25 s	37 s	60 s
	8 kHz	20 s	20 s	28 s	45 s
	16 kHz	20 s	20 s	28 s	45 s
	500 Hz	—	22 s	31 s	47 s
	10 kHz	—	50 s	68 s	105 s
Amplitude/frequency Response	32 Hz	10 s	11 s	15 s	25 s
	63 Hz	10 s	11 s	15 s	25 s
	125 Hz	10 s	11 s	15 s	25 s
	250 Hz	10 s	11 s	15 s	25 s
	500 Hz	10 s	11 s	15 s	25 s
	1 kHz	10 s	11 s	15 s	25 s
	2 kHz	10 s	11 s	15 s	25 s
	4 kHz	10 s	11 s	15 s	25 s
	8 kHz	10 s	11 s	15 s	25 s
	10 kHz	10 s	11 s	15 s	25 s
	12.5 kHz	10 s	11 s	15 s	25 s
	16 kHz	10 s	11 s	15 s	25 s
20 kHz	10 s	11 s	15 s	25 s	
Reference Fluxivity	1000 Hz	30 s	57 s	78 s	120 s
Approximate Total Duration		6 min	8 min	10 min	16 min

## 2 INSTRUCTIONS

The instruction book provided with your tape reproducer gives a procedure for adjusting it, and we recommend that you follow that procedure. Here are a few additional suggestions.

### 2.1 Preliminary

Play the Multifrequency Calibration Tape, and check (without adjusting) the reproducer gain, the head azimuth, and the high and low frequency response.

*If the reproducer was in adjustment previously, but now shows an incorrect azimuth, sensitivity, or response, check the mechanical alignment of the transport and heads before adjusting the electronics.*

*Mechanical errors cannot be properly compensated by electronics adjustments.*

### 2.2 Reference Fluxivity Section

The reference fluxivity tone on the Multifrequency Calibration Tape is usually used to adjust the reproducer gain control so that the output signal from this recording produces the reference deflection (0 dB) on a Standard Volume Indicator (vu meter).

We record a Reference Fluxivity Section at both the beginning and end of the calibration tape, giving you easy access to it for the system gain calibration, as needed before and after the remainder of the calibrations.

In some cases the reference fluxivity of the calibration tape that you have will not correspond to your requirements for a particular application. Then you must set the reproducer gain control so that the reference fluxivity section of the calibration tape produces some reading other than 0 dB. See the MRL Publication Choo&U for instructions in this case.

*Note that when you eventually perform the recording calibration using your blank tape, you should always follow the normal procedure of setting the recording gain and calibration controls so the program level indicator reads 0 dB.*

### 2.3 Azimuth, Phase, and Preliminary Response Section

Using the first tone of this section, announced as “set gain for azimuth and frequency response calibration”, set the reproducer gain to give a convenient output reading such as 0 dB on the tape reproducer’s own level indicating meter, or an external voltmeter. **Do not re-adjust the gain control during the remainder of the azimuth and frequency response tests.**

Using the “coarse azimuth set” tone, then the “fine azimuth set” tone, check the head azimuth. The first tone alone may be used on equipment whose response does not extend to the frequency of the second tone.

The three tones in the Azimuth and Phase Calibration Section may be used for a preliminary or approximate calibration of the high-frequency response of the system. On ½ inch and wider tapes, an additional 500 Hz and a 10 kHz signal are recorded. Thus, in many cases it may not be necessary to use the entire Frequency Response Calibration Section. This procedure can save operator time and tape wear.

### 2.4 Frequency Response Calibration Section

Tones in this section may be used to take data and to perform adjustments in order to obtain the most uniform frequency response. Readout can be manual (voltage level meter, pencil and paper), or automatic (graphic level recorder).

On multi-track reproducers the manufacturer’s manual instructs you to make the final adjustment of the reproducer low-frequency equalization while recording and reproducing on the system under test, rather than from the Calibration Tape. We recommend that you follow this procedure. See Sec. 2.2 of the MRL Publication Choo&U for a detailed description of this procedure.