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Multifrequency Reproducer Calibration Tapes for Open-Reel Applications

0 INTRODUCTION

These tapes 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 either **NAB** (IEC2) or **AES** (IEC2) **equalization** (shown in **bold face**) or IEC (IEC1, also CCIR) equalization, for reference fluxivities of 200, 250, G320, or 355 nanowebers per meter (nWb/m). 500 nWb/m is also available on request.

See "Choosing and Using MRL Calibration Tapes for Audio Tape Recorder Standardization", MRL Publication Choo&U http//:home.comcast.net/~mrltapes/choo&u.pdf, 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 for Open-Reel Applications

Tape Width *Playing Time*	Tape Speed	Equalization Standard	Fringing Compensated?	Level of Frequency Response Section	Catalog Number for Reference Fluxivity: 200 nWb/m	250 nWb/m	G320 nWb/m	355 nWb/m	Price
6.3 mm **¼ inch** *6 minutes*	95 mm/s **3.75 in/s**	IEC & **NAB**	No	-10 dB	**21F101-A**	**21F201-A**	—	—	115 $
	190 mm/s **7.5 in/s**	IEC (IEC1)		-10 dB	21T102	21T202	21T302	—	
		NAB (IEC2)		-10 dB	**21T104**	**21T204**	—	**21T404**	
	380 mm/s **15 in/s**	IEC (IEC1)		0 dB	21J103	21J203	21J303[a]	21J403	
		NAB (IEC2)		0 dB	**21J105**	**21J205**	—	**21J405**	
	760 mm/s **30 in/s**	**AES** (IEC2)		0 dB	**21L121**	**21L221**	—	**21L421**	125 $
12.5 mm **½ inch** *8 minutes*	95 mm/s **3.75 in/s**	IEC & **NAB**	Yes[b]	-10 dB	**31F156-A**	**31F256-A**	—	—	220 $
	190 mm/s **7.5 in/s**	IEC (IEC1)		-10 dB	31T128	31T228	31T328	—	
		NAB (IEC2)		-10 dB	**31T118**	**31T218**	—	**31T418**	
	380 mm/s **15 in/s**	IEC (IEC1)		0 dB	31J129	31J229	31J329[a]	31J429	
		NAB (IEC2)		0 dB	**31J119**	**31J219**	—	**31J419**	
	760 mm/s **30 in/s**	**AES** (IEC2)		0 dB	**31L120**	**31L220**	—	**31L420**	245 $
25 mm **1 inch** *10 minutes*	95 mm/s **3.75 in/s**	IEC & **NAB**	Yes[b]	-10 dB	**41F157-A**	**41F257-A**	—	—	470 $
	190 mm/s **7.5 in/s**	IEC (IEC1)		-10 dB	41T125	41T225	41T325	—	
		NAB (IEC2)		-10 dB	**41T115**	**41T215**	—	**41T415**	
	380 mm/s **15 in/s**	IEC (IEC1)		0 dB	41J126	41J226	41J326[a]	41J426	
		NAB (IEC2)		0 dB	**41J116**	**41J216**	—	**41J416**	
	760 mm/s **30 in/s**	**AES** (IEC2)		0 dB	**41L117**	**41L217**	—	**41L417**	540 $
50 mm **2 inch** *16 minutes*	190 mm/s **7.5 in/s**	IEC (IEC1)	Yes[b]	-10 dB	51T122	51T222	51T322	—	875 $
		NAB (IEC2)		-10 dB	**51T112**	**51T212**	—	**51T412**	
	380 mm/s **15 in/s**	IEC (IEC1)		0 dB	51J123	51J223	51J323[a]	51J423	
		NAB (IEC2)		0 dB	**51J113**	**51J213**	—	**51J413**	
	760 mm/s **30 in/s**	**AES** (IEC2)		0 dB	**51L114**	**51L214**	—	**51L414**	990 $

[a] Previously, all signals except for the Reference Fluxivity on the G320 nWb/m version were recorded at -10 dB. Now all signals are recorded at 0 dB, and these tapes are designated as the "-A" version.

[b] Fringing compensation is for narrow-track systems (1- or 2-mm track width). For wide-track systems (>5 mm track width), inquire for the part number of the corresponding Calibration Tape without fringing compensation.

Prices are in US $, and do not include shipping or applicable taxes. **Prices may be changed without notice.**

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

This tape is wound ***TAIL OUT***, meaning that the beginning of the program is at the center of the reel. You need to ***REWIND IT*** before using. Put this calibration tape, with the label side up, on the ***TAKEUP*** (right) side and your empty reel on the ***SUPPLY*** (left) side. ***REWIND*** this tape and then perform your calibrations, the tape will then play onto its original reel. Store tail out for best results. And of course, ***DO NOT ERASE OR RECORD*** over your calibration tape. Use a reel of blank tape to calibrate your machine's recording circuits.

First. 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 readjust 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.