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Three-Frequency Calibration Tapes: 1 kHz, 10 kHz, and 50 Hz, 1/3 each

These "minimalist" three-frequency Calibration Tapes contain a 1 kHz signal for setting level, a 10 kHz signal for setting azimuth and high-frequency equalization, and a 50 Hz signal for checking the low-frequency equalization. They are shown in the table below for ¼-, ½-, 1-, and 2-inch widths; and 3.75-, 7.5-, 15-, and 30-in/s tape speeds.

Catalog numbers are shown for reference fluxivities of both 250 nWb/m ("+3 dB") and 355 nWb/m ("+6 dB"). All tones are recorded at 0 dB on all tapes except at 3.75 in/s all tones are recorded at -10 dB to avoid saturating the tape at high frequencies. All of these recordings are fringing compensated.

For 2-track ½ inch, or 2- or 4-track 1inch use, inquire for the catalog numbers of non-fringing compensated tapes. Please also see Publication LF, on the oher side.

Catalog numbers and prices are given for total durations of 4 minutes (72 s per tone) and for 8 minutes (152 s per tone).

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, as well as descriptions of other test signals that are available from MRL, and notes on using Calibration Tapes.

Table of Three-Frequency Calibration Tapes with 1 kHz, 10 kHz, and 50 Hz, 1/3 each

Medium	Tape Speed	Equalization Standard	Level of Recorded Signals*	4 minutes total (72 s per tone)			8 minutes total (152 s per tone)		
				Catalog Number for Reference Fluxivity of:		Price	Catalog Number for Reference Fluxivity of:		Price
				250 nWb/m ("+3 dB")	355 nWb/m ("+6 dB")		250 nWb/m ("+3 dB")	355 nWb/m ("+6 dB")	
¼ in	**3.75 in/s**	IEC & **NAB**	-10 dB	**221-070-382-100**	**221-070-412-106**		**221-070-382-126**	**221-070-412-122**	
	7.5 in/s	IEC (IEC1)	0 dB	231-070-482-100	231-070-512-106		231-070-482-126	231-070-512-122	
		NAB (IEC2)	0 dB	**233-070-482-106**	**233-070-512-102**	100 $	**233-070-482-122**	**233-070-512-128**	140 $
	15 in/s	IEC (IEC1)	0 dB	241-070-482-107	241-070-512-103		241-070-482-123	241-070-512-129	
		NAB (IEC2)	0 dB	**243-070-482-103**	**243-070-512-109**		**243-070-482-129**	**243-070-512-125**	
	30 in/s	**AES** (IEC2)	0 dB	**251-070-482-104**	**251-070-512-100**	105 $	**251-070-482-120**	**251-070-512-126**	155 $
½ in	**3.75 in/s**	IEC & **NAB**	-10 dB	**321-070-382-109**	**321-070-412-105**		**321-070-382-125**	**321-070-412-121**	
	7.5 in/s	IEC (IEC1)	0 dB	331-070-482-109	331-070-512-105		331-070-482-125	331-070-512-121	
		NAB (IEC2)	0 dB	**333-070-482-105**	**333-070-512-101**	145 $	**333-070-482-121**	**333-070-512-127**	225 $
	15 in/s	IEC (IEC1)	0 dB	341-070-482-106	341-070-512-102		341-070-482-122	341-070-512-128	
		NAB (IEC2)	0 dB	**343-070-482-102**	**343-070-512-108**		**343-070-482-128**	**343-070-512-124**	
	30 in/s	**AES** (IEC2)	0 dB	**351-070-482-103**	351-070-512-109	170 $	**351-070-482-129**	**351-070-512-125**	250 $
1 in	**3.75 in/s**	IEC & **NAB**	-10 dB	**421-070-382-108**	**421-070-412-104**		**421-070-382-124**	**421-070-412-120**	
	7.5 in/s	IEC (IEC1)	0 dB	431-070-482-108	431-070-512-104		431-070-482-124	431-070-512-120	
		NAB (IEC2)	0 dB	**433-070-482-104**	**433-070-512-100**	265 $	**433-070-482-120**	**433-070-512-126**	415 $
	15 in/s	IEC (IEC1)	0 dB	441-070-482-105	441-070-512-101		441-070-482-121	441-070-512-127	
		NAB (IEC2)	0 dB	**443-070-482-101**	**443-070-512-107**		**443-070-482-127**	**443-070-512-123**	
	30 in/s	**AES** (IEC2)	0 dB	**451-070-482-102**	**451-070-512-108**	305 $	**451-070-482-128**	**451-070-512-124**	475 $
2 in	**7.5 in/s**	IEC (IEC1)	0 dB	531-070-482-107	531-070-512-103		531-070-482-123	531-070-512-129	
		NAB (IEC2)	0 dB	**533-070-482-103**	**533-070-512-109**		**533-070-482-129**	**533-070-512-125**	
	15 in/s	IEC (IEC1)	0 dB	541-070-482-104	541-070-512-100	375 $	541-070-482-120	541-070-512-126	570 $
		NAB (IEC2)	0 dB	**543-070-482-100**	**543-070-512-106**		**543-070-482-126**	**543-070-512-122**	
	30 in/s	**AES** (IEC2)	0 dB	**551-070-482-101**	**551-070-512-107**	420 $	**551-070-482-127**	**551-070-512-123**	645 $

* Because of tape saturation at the higher frequencies at lower speeds, some tapes are recorded at -10 dB.

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

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Calibrating Tape Reproducer Low-frequency Response – A Tutorial

Calibrating the low-frequency response of a tape *recorder* is easy, because the inherent response of all blank tapes is *flat* from around 250 Hz down to dc. Because of this, tape recorder/reproducers usually do not have any adjustment for the low-frequency response in *recording*.

The problems come in calibrating the frequency response of the tape *reproducer*, because all reproducing heads have "ripples" (usually called "head bumps") in the low-frequency region (16...250 Hz). For starters, you should go look at the graphs of head bumps at http://www.endino.com/graphs/ .

Because of this, a measurement at a single low-frequency usually gives a misleading idea of the reproducer's low-frequency response. The real dilemma is that engineers want to be able to adjust the low-frequency response at *one* frequency, and ask "what frequency is the one to use to align the low-frequency response"?

MRL has made Calibration Tapes with a 100 Hz tone because some consoles come with an oscillator that has only a 100 Hz tone for the low frequency adjustment. Because of that, we formerly put a 100 Hz tone on those "short" MRL Calibration Tapes[1].

But now we realize that 100 Hz is a *terrible* frequency for calibrating the reproducer low-frequency response:

The NAB tape equalization curve has a 3 dB boost at 50 Hz in recording, so it requires a 3 dB droop at 50 Hz in reproduction to get an overall flat response. When you attempt to flatten the LF response by moving the transition frequency of the LF repro equalizer to a higher or lower frequency (which is what you do with the LF pot), you find that you can only make a small change in the response at 100 Hz, but that it gives larger change in the response at 50 Hz – 0.4 dB change at 100 Hz gives a 1 dB change at 50 Hz, and a 1.5 dB change at 25 Hz.

So if you have only a 100 Hz low-frequency tone it is better that you ***not*** *attempt to adjust the reproducer low-frequency response at all.*

On top of the head-bump problem is the "fringing" problem when reproducing a full-track recording (all MRL Calibration Tapes) on your multi-track reproducer. Fringing causes a low-frequency boost *in reproduction only* when the *recorded track is wider than the reproducing-head core*. This is most commonly a measurement problem when playing a full-track "Calibration Tape" on a multi-track reproducer. But the amount of fringing is dependent not only on the track configuration (width of track and guard-band), but also on the measurement frequency and the exact details of the reproducing head construction. Each type of head is different. And there is no available theory for an accurate three-dimensional calculation of the fringing. We make calibration tapes both without and with a very approximate fringing compensation. You should use the appropriate Calibration Tape – that is, with or without the fringing compensation, but you shouldn't rely on it for an *accurate* low-frequency calibration.

Therefore we recommend that you set the reproducer LF response while recording and reproducing on the machine under test, as recommended in the instruction books of many professional tape recorders. Or see http://home.comcast.net/~mrltapes/mcknight_low-frequency-response-calibration.pdf for details. Once you have done that, you can play a 50 Hz Calibration Tape tone and note the playback level for each channel on your machine. For subsequent calibrations of this machine, you should adjust the repro LF EQ to set the 50 Hz tone to this level.

We have therefore replaced the "short" Calibration Tapes that have a 100 Hz tone with similar tapes having 50 Hz as the low-frequency tone – see http://home.comcast.net/~mrltapes/pub070.pdf and http://home.comcast.net/~mrltapes/pub043.pdf

Unlike the high-frequency recording response, which depends on the characteristics of the blank tape that you are using, the low-frequency response of the recorder and reproducer are independent of the tape. So if you are not equipped or not qualified to make the low-frequency response measurement and adjustment yourself, you should hire a qualified technician to do it. Once you've done that, you should never need to do it again.

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[1] See http://home.comcast.net/~mrltapes/pub644.pdf and http://home.comcast.net/~mrltapes/pub673.pdf