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Four-Frequency Calibration Tapes: 1 kHz, 10 kHz, 16 kHz, and 50 Hz, ¼ each

These "minimalist" four-frequency Calibration Tapes contain a 1 kHz signal for setting level, a 10 kHz signal for setting azimuth and high-frequency equalization, a 16 kHz signal for checking high-frequency response, 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 15- and 30-in/s tapes; all tones are recorded at -10 dB on 3.75- and 7.5 in/s tapes, 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 1 inch use, inquire for the catalog numbers of non-fringing compensated tapes. Please also see Publication LF, on the other side.

Catalog numbers and prices are given for total durations of 4 minutes (54 s per tone) and for 8 minutes (115 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 Four-Frequency Calibration Tapes with 1 kHz, 10 kHz, 16 kHz, and 50 Hz, ¼ each

Medium	Tape Speed	Equalization Standard	Level of Recorded Signals*	4 minutes total (54 s per tone)			8 minutes total (115 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	221-043-382-104	221-043-412-100	100 \$	221-043-382-120	221-043-412-120	140 \$
	7.5 in/s	IEC (IEC1)	-10 dB	231-043-382-101	231-043-412-107		231-043-382-127	231-043-412-123	
		NAB (IEC2)	-10 dB	233-043-382-107	233-043-412-103		233-043-382-123	233-043-412-129	
	15 in/s	IEC (IEC1)	0 dB	241-043-482-101	241-043-512-107		241-043-482-127	241-043-512-123	
		NAB (IEC2)	0 dB	243-043-482-107	243-043-512-103		243-043-482-123	243-043-512-129	
30 in/s	AES (IEC2)	0 dB	251-043-482-108	251-043-512-104	105 \$	251-043-482-124	251-043-512-120	155 \$	
½ in	3.75 in/s	IEC & NAB	-10 dB	321-043-382-103	321-043-412-109	145 \$	321-043-382-129	321-043-412-125	225 \$
	7.5 in/s	IEC (IEC1)	-10 dB	331-043-382-100	331-043-412-106		331-043-382-126	331-043-412-122	
		NAB (IEC2)	-10 dB	333-043-382-106	333-043-412-102		333-043-382-122	333-043-412-128	
	15 in/s	IEC (IEC1)	0 dB	341-043-482-100	341-043-512-106		341-043-482-126	341-043-512-122	
		NAB (IEC2)	0 dB	343-043-482-106	343-043-512-102		343-043-482-122	343-043-512-128	
30 in/s	AES (IEC2)	0 dB	351-043-482-107	351-043-512-103	170 \$	351-043-482-123	351-043-512-129	250 \$	
1 in	3.75 in/s	IEC & NAB	-10 dB	421-043-382-102	421-043-412-108	265 \$	421-043-382-128	421-043-412-124	415 \$
	7.5 in/s	IEC (IEC1)	-10 dB	431-043-382-109	431-043-412-105		431-043-382-125	431-043-412-121	
		NAB (IEC2)	-10 dB	433-043-382-105	433-043-412-101		433-043-382-121	433-043-412-127	
	15 in/s	IEC (IEC1)	0 dB	441-043-482-109	441-043-512-105		441-043-482-125	441-043-512-121	
		NAB (IEC2)	0 dB	443-043-482-105	443-043-512-101		443-043-482-121	443-043-512-127	
30 in/s	AES (IEC2)	0 dB	451-043-482-106	451-043-512-102	305 \$	451-043-482-122	451-043-512-128	475 \$	
2 in	7.5 in/s	IEC (IEC1)	-10 dB	531-043-382-108	531-043-412-104	375 \$	531-043-382-124	531-043-412-120	570 \$
		NAB (IEC2)	-10 dB	533-043-382-104	533-043-412-100		533-043-382-120	533-043-412-126	
	15 in/s	IEC (IEC1)	0 dB	541-043-482-108	541-043-512-104		541-043-482-124	541-043-512-120	
		NAB (IEC2)	0 dB	543-043-482-104	543-043-512-100		543-043-482-120	543-043-512-126	
	30 in/s	AES (IEC2)	0 dB	551-043-482-105	551-043-512-101		420 \$	551-043-482-121	

* Because of tape saturation at the higher frequencies at lower speeds, 3.75- and 7.5 in/s tapes are recorded at -10 dB.

Prices are in US \$, and do not include shipping or applicable taxes.

Prices may be changed without notice.

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 Tapes¹.

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.

¹ See <http://home.comcast.net/~mrltapes/pub644.pdf> and <http://home.comcast.net/~mrltapes/pub673.pdf>