

# **DIMENSIONAL STANDARDS**

## **DISC PHONOGRAPH RECORDS FOR HOME USE**

**Bulletin No. E 4**

*Also includes:*

## **STANDARD RECORDING AND REPRODUCING CHARACTERISTIC**

**Bulletin No. E 1**



**Revised: November 6, 1978**

These are dimensional standards to facilitate equipment design and assure interchangeability. They are not intended to indicate or imply quality or performance levels.

**RECORDING INDUSTRY ASSOCIATION OF AMERICA, INC.**

**ONE EAST 57TH STREET**

**NEW YORK, N.Y. 10022**

# R. I. A. DIMENSIONAL CHARACTERISTICS

## 33 $\frac{1}{3}$ RPM PHONOGRAPH RECORDS FOR HOME USE

DESCRIPTION	7" Records		10" Records		12" Records	
	(millimeters)	inches	(millimeters)	inches	(millimeters)	inches
<b>Outside Diameter</b>	(174.6 ± .8mm)	6.875 ± 0.031"	(250.8 ± .8mm)	9.875 ± 0.031"	(301.6 ± .8mm)	11.875 ± 0.031"
<b>Thickness</b>						
a. Flush Design	(1.9 + .3mm - .4mm)	.075 + .010"	(1.9 ± .3mm)	.075" ± .010"	(1.9 ± .3mm)	.075" ± .010"
b. Contour Design (See drawings)						
	Fig. 2; Fig. 3		Figure 1		Figure 1	
<b>Center Hole Diameter</b>	(Same as 10")		(7.26 + .025mm - .05mm)	0.286 "+ 0.001" - 0.002"	(Same as 10")	
<b>Center of Gravity</b>						
Max. Balance Dia. Concentric with Hole	(11.1mm)	0.437"	(11.1mm)	0.437"	(11.1mm)	0.437"
<b>Lead-in Spiral</b>						
a. To start at record edge						
b. Grooves per inch	(Same as 10")		16 ± 2		(Same as 10")	
c. Contour to be same as recording grooves						
NOTE: In addition, there shall be at least one complete unmodulated groove at recording pitch.						
<b>Margin Diameter,</b> the outer set-down limit of reproducing stylus.	(172.2mm)	6.781"	(246.8mm)	9.719"	(297.6mm)	11.719"
<b>Diameter of Outermost Groove at Recording Pitch</b>	(168.3mm)	6.625" MAX	(241.3mm)	9.500" MAX	(292.1mm)	11.500" MAX
<b>Recording Groove Contour</b>						
a. Included Angle	(Same as 10")		90° ± 5°		(Same as 10")	
b. Bottom Radius	(Same as 10")		(0.006mm)	0.00025" max.	(Same as 10")	
c. Width—Monophonic	(Same as 10")		(0.056mm)	0.0022"	(Same as 10")	
d. Width—Stereophonic— Instantaneous	(Same as 10")		(0.025mm)	.0010" min.	(Same as 10")	
<b>Minimum Inside Diameter of Recording</b>	(108mm)	4.250"	(120.6mm)	4.750"	(Same as 10")	

# R. I. A. A. DIMENSIONAL CHARACTERISTICS

## 33 1/3 RPM PHONOGRAPH RECCRDS FOR HOME USE

DESCRIPTION	7" Records		10" Records		12" Records	
	(millimeters)	Inches	(millimeters)	Inches	(millimeters)	Inches
<b>Runout of Recording Grooves Related to Center Hole</b> Note: This TIR measurement is to be independent of recording pitch.	(Same as 10")		(0.41mm)	0.016" MAX TIR	(Same as 10")	
<b>Lead-out Spiral</b> Note: The number of grooves per inch shall be so chosen that the spiral contains at least one complete revolution.	(Same as 10")		2 to 6 grooves/inch		(Same as 10")	
<b>Stopping Groove, Closed Concentric Circle</b>						
a. Diameter	$\left( \begin{array}{l} 98.4 + 0\text{mm} \\ -2\text{mm} \end{array} \right)$	$3.875 - 0.000''$ $-0.078$	(106.4 ± .8mm)	4.187 ± 0.031"	(Same as 10")	
b. Width						
<b>Direction of Rotation—</b> Clockwise, when observer faces side of record being played.						
<b>Rotational Speed</b> with 60 Hz line freq. max speed error ± 0.5%	33-1/3 RPM		33-1/3 RPM		33-1/3 or 45 RPM	
<b>Crossover Spiral</b> The number of grooves joining successive bands on a record shall not be less than 16 per inch.						

### CROSS SECTION 10" & 12" CONTOURED RECORDS

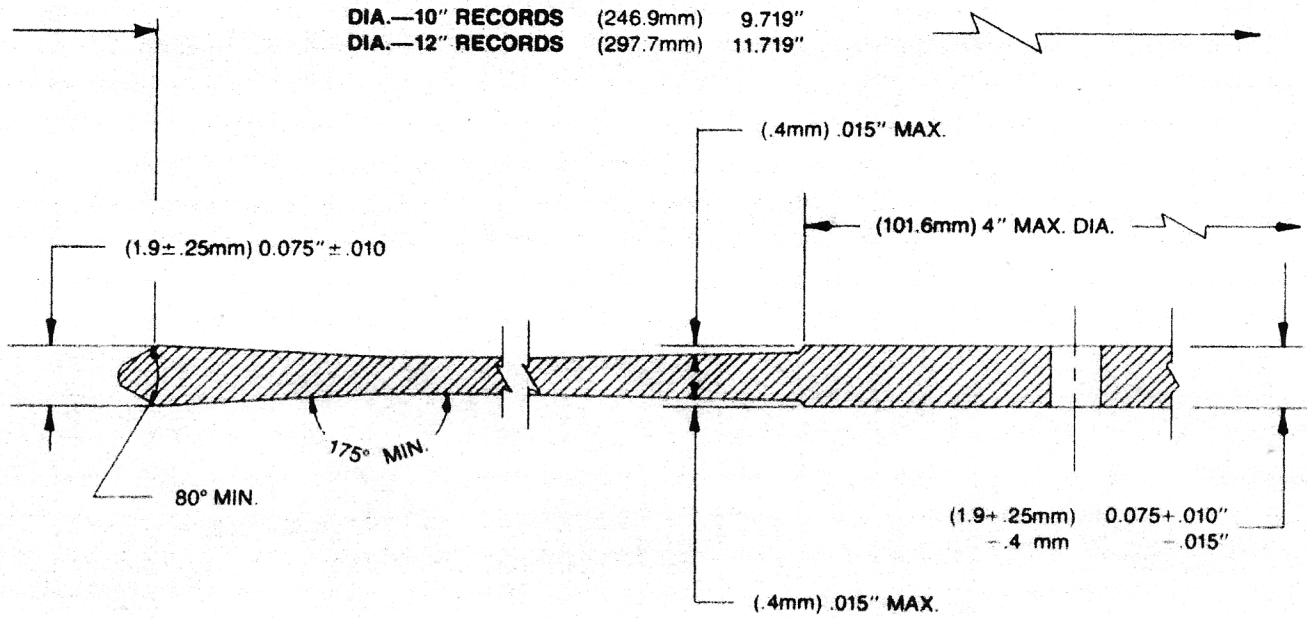
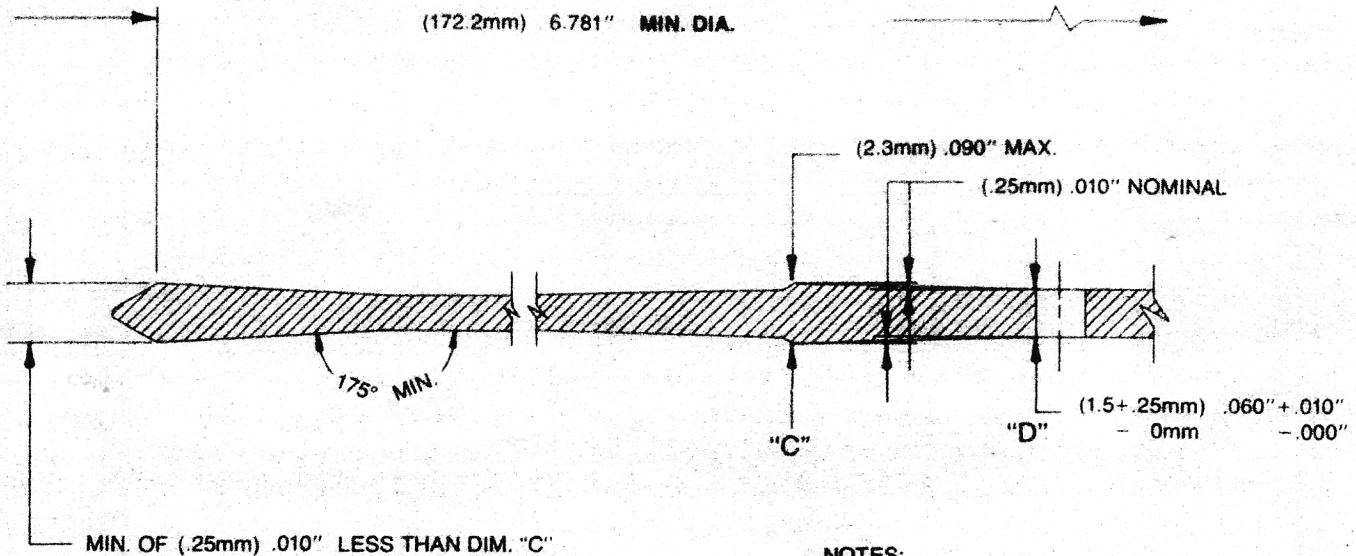


Figure 1

### ALTERNATE CROSS SECTION, 7"-33-1/3 RPM CONTOURED RECORDS



**NOTES:**

- Thickness D not greater than C.
- Applicable dimensions not shown are same as Figure 3.
- No portion of the label area inside its perimeter shall extend beyond a plane through the circle of the surface of the perimeter

Figure 2

### 33-1/3 RPM 7" RECORD DIMENSIONS

**millimeters**

**inches**

(168.3+0mm)  
-1.5mm

6.625"+0.000  
-0.062

(108mm)

FIRST SOUND GROOVE

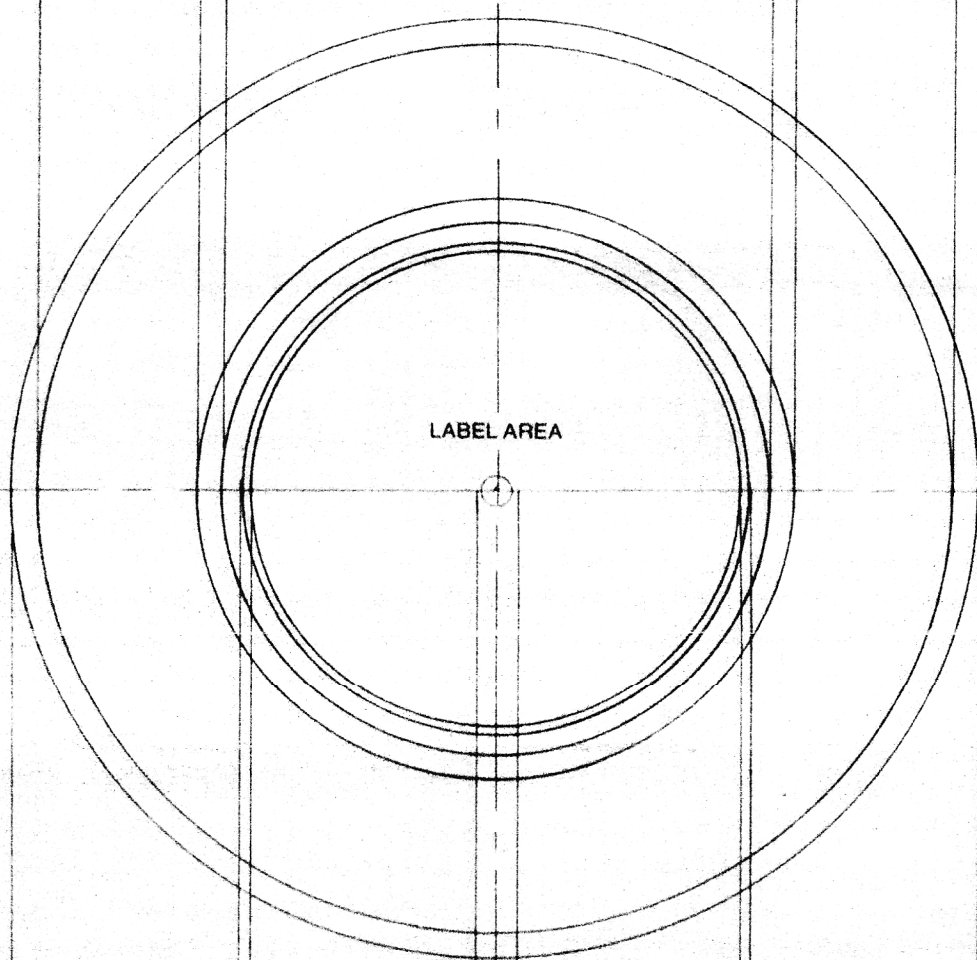
4.250" DIA.

(98.4mm)

LAST SOUND GROOVE

CONCENTRIC GROOVE

3.875"



LABEL AREA

(7.26+ .02mm)  
- .05mm

286+ .001"  
- .002"

DIAMETER

(88.9±.8mm)

DIAMETER

3.500±0.031"

(92.1+0)  
-8mm

DIAMETER

3.625+0.000"  
-0.031"

(174.6±.8mm)

DIAMETER

6.875±0.031"

(.66mm)

.026" MIN.

(1.32mm)

.052" MAX.

A

B

(.25mm) .010" NOMINAL

(1.5+ .25mm) .060+ .010  
-0 - .000

(2.3mm) .090" MAX.

**Figure 3**

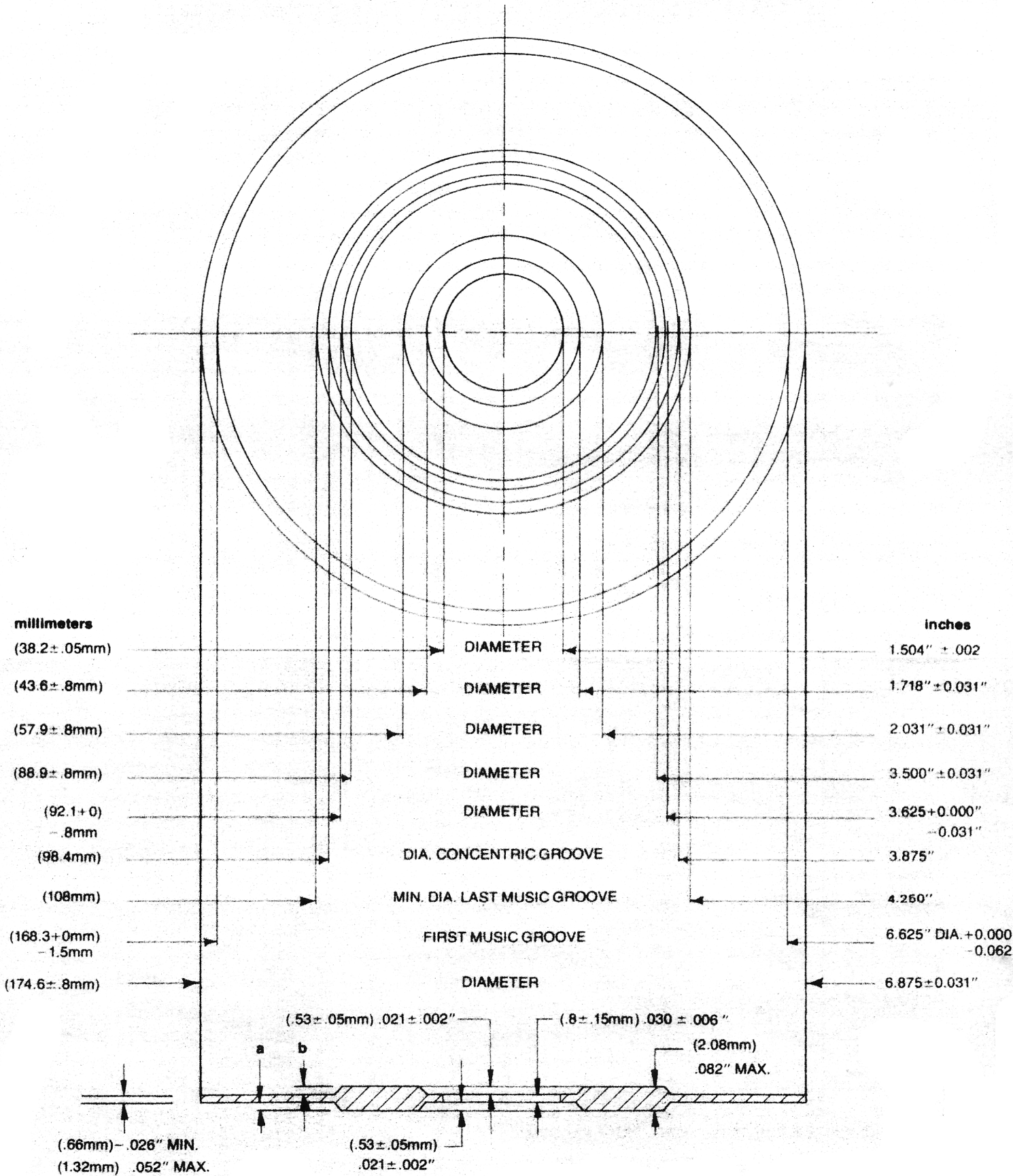
**NOTES:**  
STEPS A AND B SHALL NOT DIFFER BY MORE THAN .010 (.25mm)  
No portion of the label area inside its perimeter shall extend beyond a plane through the circle of the surface at the perimeter.

# R. I. A. A. DIMENSIONAL CHARACTERISTICS

## 45 RPM PHONOGRAPH RECORDS FOR HOME USE

DESCRIPTION	(millimeters)	inches
<b>Outside Diameter</b>	(174.6 ± .8mm)	6.875 ± 0.031"
<b>Thickness</b>		
a. Recording area, measured at 4 points from edge 90° apart	(.66mm—1.32mm)	0.026"—0.052" max.
b. Label area—see drawing of cross section (attached)		
<b>Center hole diameter</b> to be measured under the weight of the record on a tapered plug gauge.	(38.2 ± .05mm)	1.504 ± 0.002"
<b>Lead-in Spiral</b>		
a. To start at record edge		
b. Grooves per inch		16 ± 2
c. Shape to be same as recording grooves		
NOTE: In addition there shall be at least one complete unmodulated groove at recording pitch.		
<b>Margin diameter</b> , the outer set-down limit of the reproducing stylus	(172.2mm)	6.781"
<b>Diameter Outermost Groove</b> at Recording Pitch	( 168.3+0mm -1.5mm )	6.625+0.000" -0.062"
<b>Recording Groove Contour</b>		
a. Included angle	90° ± 5°	
b. Bottom radius	(.006mm)	0.00025" max.
c. Width—Monophonic	(0.056mm)	.0022"
d. Width—Stereophonic, Instantaneous	(.025mm)	.001" min.
<b>Minimum Inside Diameter</b> of Recording	(108mm)	4.25"
<b>Runout of Recording Grooves</b> Relative to Center Hole (Total Indicated Runout)	(0.4mm)	0.016" MAXTIR
<b>Lead-out Spiral</b>		
a. Grooves per inch	2-5	
b. Contour, same as recording grooves except width may increase to 0.006"		
<b>Stopping Groove</b> , Closed Concentric Circle		
a. Diameter	( 98.4+0mm -2mm )	3.875+0.000"
b. Width	(.08mm)	0.003" MIN
<b>Direction of Rotation</b> —Clockwise, when observer faces side of record being played		
<b>Rotational Speed</b> with 60Hz line freq., max speed error ±0.5%	45 RPM	
<b>Crossover Spiral</b>		
The number of grooves joining successive bands on a record shall not be less than 16 per inch.		

# 45 RPM 7" RECORD DIMENSIONS



STEPS "a" AND "b" SHALL NOT DIFFER BY MORE THAN .010 (.25mm)

Figure 4

## RECORDING CHARACTERISTICS

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### Statement of Recording Characteristics

With constant voltage applied to that point in the recording chain where the normal signal has the frequency characteristic that it is desired subsequently to reproduce, the curve of recorded velocity versus frequency shall be that which results from the combination of the following three curves:

- one rising with frequency in conformity with the admittance of a parallel combination of a capacitance and a resistance having a time-constant of  $t_1$ ,
- one rising with frequency in conformity with the admittance of a series combination of a capacitance and a resistance having a time-constant of  $t_2$ ,
- one falling with rise of frequency in conformity with the impedance of a series combination of a capacitance and a resistance having a time-constant of  $t_3$ .

The combined curve is defined by:

$$N(\text{dB}) = 10 \log \left( 1 + 4\pi^2 f^2 t_1^2 \right) - 10 \log \left( 1 + \frac{1}{4\pi^2 f^2 t_2^2} \right) + 10 \log \left( 1 + \frac{1}{4\pi^2 f^2 t_3^2} \right)$$

where  $f$  is the frequency in hertz (cycles per second) and  $t_1$ ,  $t_2$ , and  $t_3$  are as follows:

$t$	Fine Groove
$t_1$	$75 \times 10^{-6}$ seconds
$t_2$	$318 \times 10^{-6}$ seconds
$t_3$	$3180 \times 10^{-6}$ seconds

These curves are shown in Figure A.



## REPRODUCING CHARACTERISTICS

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### Statement of Reproducing Characteristics

With constant velocity of the reproducing stylus tip, the curve of voltage output of the reproducing chain versus frequency shall be that which results from the combination of the following three curves:

—one falling with rise of frequency in conformity with the impedance of a parallel combination of a capacitance and a resistance having a time-constant of  $t_1$ ,

—one falling with rise of frequency in conformity with the impedance of a series combination of a capacitance and a resistance having a time-constant of  $t_2$ ,

—one rising with frequency in conformity with the admittance of a series combination of a capacitance and a resistance having a time-constant of  $t_3$ .

The combined curve is defined by:

$$N(\text{dB}) = 10 \log \left( 1 + \frac{1}{4\pi^2 f^2 t_2^2} \right) - 10 \log \left( 1 + 4\pi^2 f^2 t_1^2 \right) - 10 \log \left( 1 + \frac{1}{4\pi^2 f^2 t_3^2} \right)$$

where  $f$  is the frequency in hertz (cycles per second) and  $t_1$ ,  $t_2$ , and  $t_3$  are as follows:

$t$	Fine Groove
$t_1$	$75 \times 10^{-6}$ seconds
$t_2$	$318 \times 10^{-6}$ seconds
$t_3$	$3180 \times 10^{-6}$ seconds

These curves are shown in Figure A.

<b>FREQUENCY</b>	<b>RECORDING CHARACTERISTIC</b>	<b>REPRODUCING CHARACTERISTIC</b>
20000	+19.60	-19.60
18000	+18.70	-18.70
16000	+17.70	-17.70
15000	+17.17	-17.17
14000	+16.64	-16.64
13000	+15.95	-15.95
12000	+15.28	-15.28
11000	+14.55	-14.55
10000	+13.75	-13.75
9000	+12.88	-12.88
8000	+11.91	-11.91
7000	+10.85	-10.85
6000	+ 9.62	- 9.62
5000	+ 8.23	- 8.23
4000	+ 6.64	- 6.64
3000	+ 4.76	- 4.76
2000	+ 2.61	- 2.61
1000	0	0
700	- 1.23	+ 1.23
400	- 3.81	+ 3.81
300	- 5.53	+ 5.53
200	- 8.22	+ 8.22
100	-13.11	+13.11
70	-15.31	+15.31
50	-16.96	+16.96
30	-18.61	+18.61
20	-19.30	+19.30

Relative velocity (In dB) or voltage level

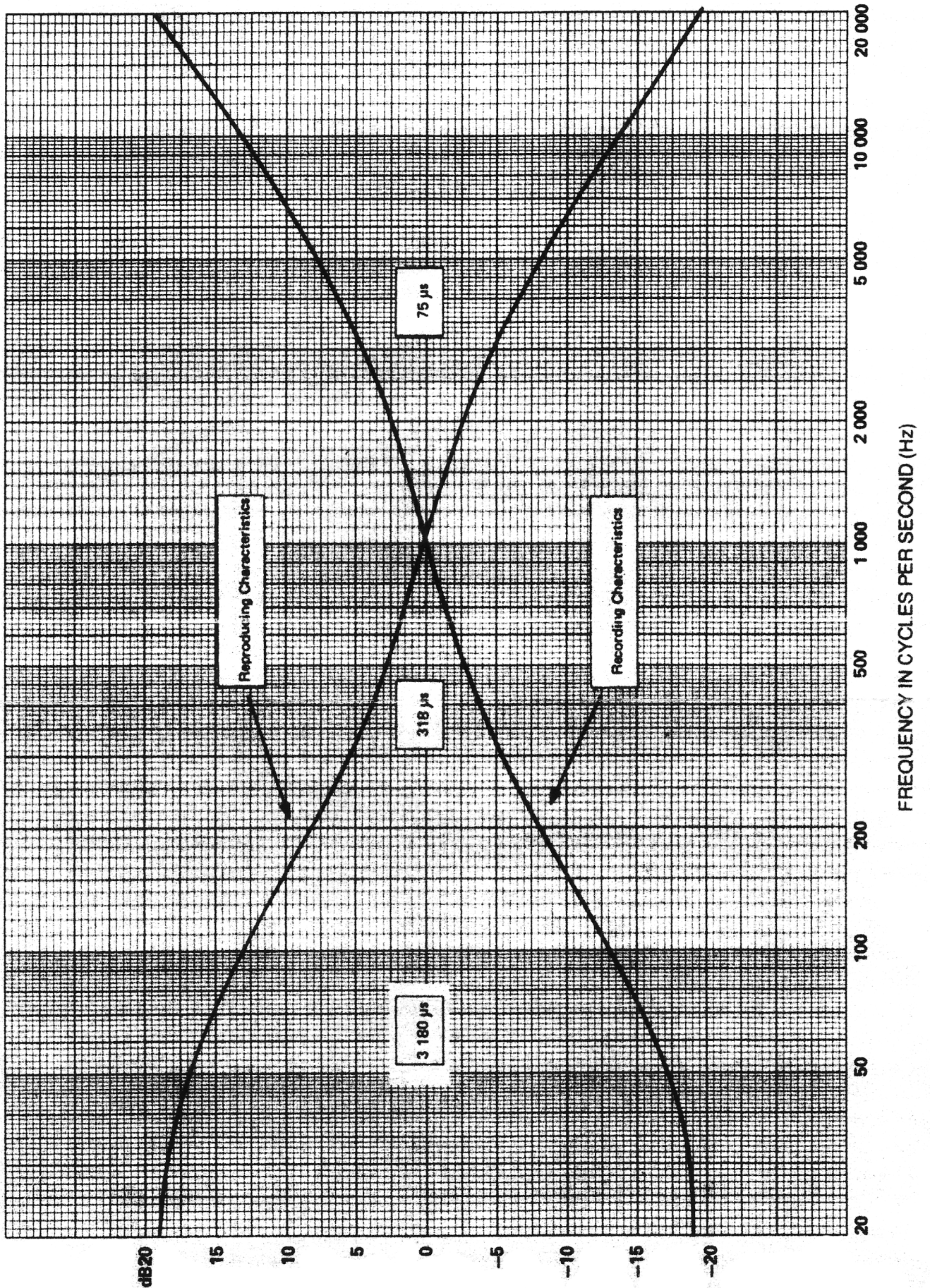


FIG. A—CHARACTERISTICS FOR FINE GROOVE DISC RECORDS.