November 16, 1973

TO: Mr. C. H. Kaman

FROM: Materials & Process Engineering - A. L. Belbruno

SUBJECT: Top Deflection History, Graphite #4

Graphite #3 - One layer of longitudinal graphite fiber on each side. Two layers of birch veneer with grain at 90° to graphite fiber direction. The birch veneer layers were bonded together with Plastilock 717 unsupported film, .03 pounds per sq. ft, at the same time as the graphite was cured and bonded to the wood surface. This graphite is the first used from the Narmco Rigidite #5209 GSG (Golf Shaft Grade) recently purchased from Whittaker Corp. in California. Cure cycle was 260°F for 95 minutes.

	THICK.	WEIGHT		CLAMPED LONG.	DEFLECTION CLAMPED TRANSVERSE	AROUND PERIPH.
Graphite #4	.083	288 grams (10.0 oz)	2 lbs	.024	.036	.024*
			4 lbs	.045	.060	.044

*This figure compares with .051 inches deflection for 2 lb. load for Grphite #1.

Deflection of Basic Top Material

Load	2 inch Span Fibers Longitudinal
2 lbs	.002 in.*
4 lbs	.004 in.

*This figure compares with .011 inches deflection for 2 lb load for specimen .045 in. thick with one layer of veneer, tested on 8-6-73.

A. L. Belbruno

A. L. Belbruno

cc: R. Mayerjak
L. Pickett

December 5, 1973

TO: Mr. C. H. Kaman

FROM: Materials & Process Engineering - A. L. Belbruno

SUBJECT: Top Deflection History - Graphite #4 on Standard Balladeer

	Deflection	Strings Tight
Graphite #4	Bridge - no bracing	.071 inch/20 lbs.

ALB/tm

A. L. Belbruno

cc: L. Pickett
R. Mayerjak

strings both tite & loose 047

January 30, 1974

TO: Mr. C. H. Kaman

FROM: Materials & Process Engineering - A. L. Belbruno

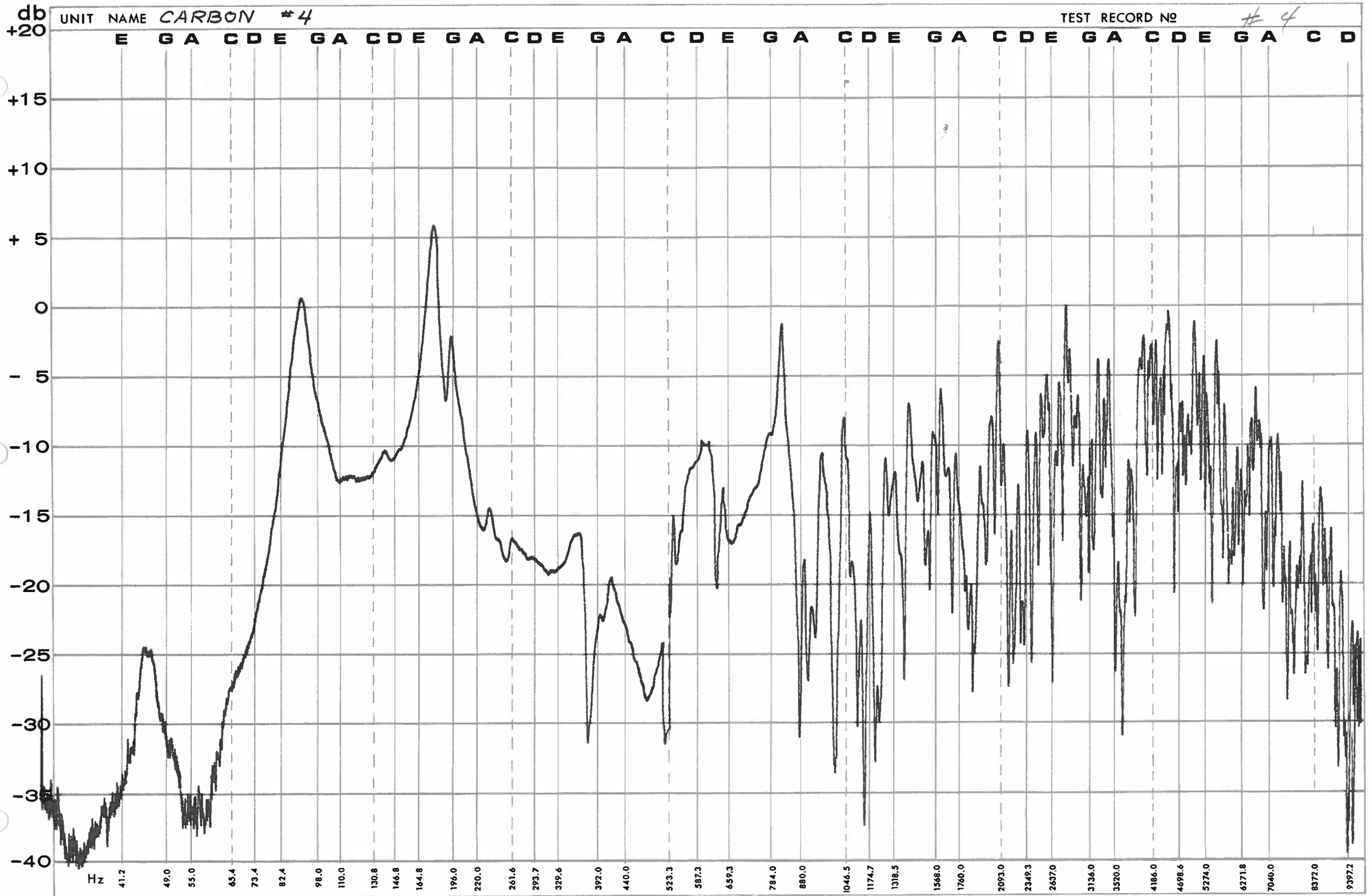
SUBJECT: Top Deflection History - Graphite #4-1

	Deflection (inches/20 lbs)	
	Strings Tight	Strings Loose
Graphite 4-1	.047	.047

A. L. Belbruno

A. L. Belbruno

cc: L. Pickett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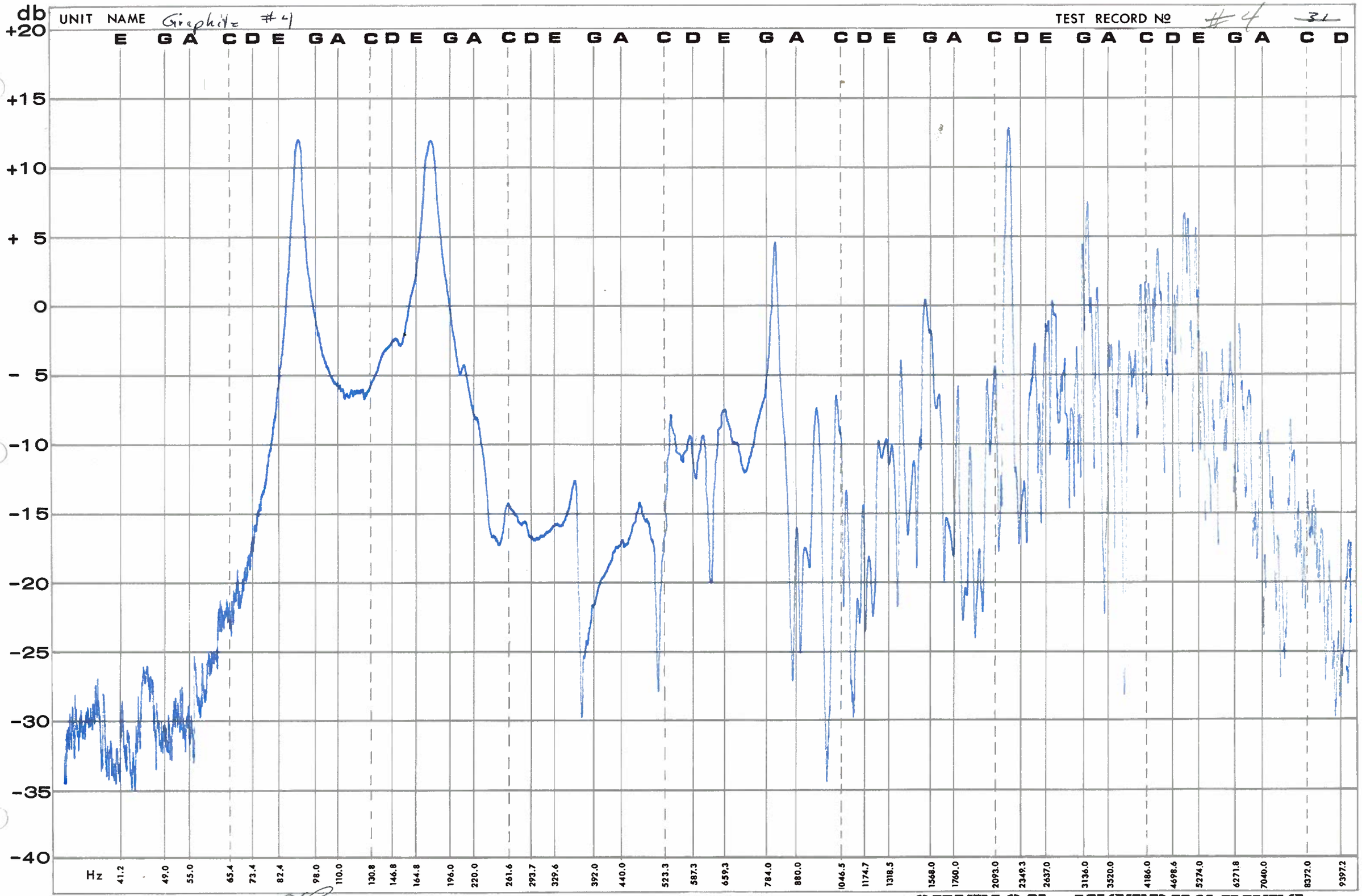
UNIT NAME CARBON #4
TEST RECORD № #4
E GA CDE GA CDE GA CDE GA CDE GA CDE GA CDE GA CDE GA CDE GA CDE GA CD
+20
+15
+10
+ 5
0
- 5
-10
-15
-20
-25
-30
-35
-40
Hz
41.2
49.0
55.0
65.4
73.4
82.4
98.0
110.0
130.8
146.8
164.8
196.0
220.0
261.6
293.7
329.6
392.0
440.0
523.3
587.3
659.3
784.0
880.0
1046.5
1174.7
1318.5
1568.0
1760.0
2093.0
2349.3
2637.0
3136.0
3520.0
4186.0
4698.6
5274.0
6271.8
7040.0
8372.0
9397.2
OPERATING TECHNICAN
DATE 3-13-74
OVATION INSTRUMENTS


UNIT NAME Graphite #4
TEST RECORD № #4 31
db
+20
+15
+10
+ 5
0
- 5
-10
-15
-20
-25
-30
-35
-40
E GA CDE GA CDE GA CDE GA CDE GA CDE GA CDE GA CDE GA CDE GA CDE GA CD
Hz
41.2
49.0
55.0
65.4
73.4
82.4
98.0
110.0
130.8
146.8
164.8
196.0
220.0
261.6
293.7
329.6
392.0
440.0
523.3
587.3
659.3
784.0
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1046.5
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1318.5
1568.0
1760.0
2093.0
2349.3
2637.0
3136.0
3520.0
4186.0
4698.6
5274.0
6271.8
7040.0
8372.0
9397.2
OPERATING TECHNICAN
DATE 1-15-74
OVATION INSTRUMENTS