LR 11,916
December 24, 1974

TO: Mr. C. H. Kaman
Mr. C. McDonough

FROM: Materials & Process Engineering - W. D. Weigel

SUBJECT: Graphite Guitar Top

For easy reference, the attached chart was prepared listing pertinent data of graphite tops fabricated through December 1974.

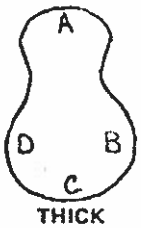
W D Weigel

WDW/tm W. D. Weigel

Att.

RECORD OF GRAPHITE TOPS G-1 to G-21

DATE (APPROX)	TOP	TYPE	VENEER (PLIES, THICKNESS, ANGLE FROM LONGITUDINAL)	GRAPHITE	ADDITIONAL ADHESIVE	TOP THICK-NESS	$K_{2\#}$ TOP SIDE	$K_{2\#}$ BACK SIDE	WEIGHT OVER-SIZED	WEIGHT TRIMMED	REMARKS
08-06-73	G-1	Flat	1 ply, .034", 90°	3M Co. SP-286-T3	None	.045"	.051	--	--	--	Used for guitar 1-1.
10-29-73	G-2	"	" , " , 45°	"	"	.045	.060	--	--	162 gm	Used for guitar 2-1.
11-03-73	G-3	"	" , " , "	"	"	.046	.063	--	--	169	Used for guitar 3-1.
11-16-73	G-4	"	2 ply, " , 90°	Narmco 5209-GSG	1 layer 717-030	.083	.024	--	--	288	Used for guitar 4-1.
12-26-73	G-5	"	1 ply, " , 45°	"	None	.050	.082	--	--	171	Top is warped. Not used for guitar.
12-26-73	G-6	"	" , " , "	"	"	.049	.066	--	--	166	Slightly warped. Used for Guitar 15-1.
01-24-74	G-7	"	2 ply, " , ±60°	"	3 layers 717-030	.090	.023	--	--	360	Top is warped, used for guitar 7-1.
02-26-74	G-8	"	" , " , "	"	?	--	.025	--	--	336	Not used for guitar.
08-08-74	G-9	Contoured	" , " , ±75°	"	1 layer 717-030 2 coats Epon 820	.084	.011	--	--	303	" " "
08-15-74	G-10	Flat	1 ply, " , 45°	"	2 layers 717-030	.052	.069	--	--	229	" " "
08-16-74	G-11	Contoured	" , " , "	"	"	.048	.042	--	--	--	Used for guitar 11-1.
08-30-74	G-12	"	" , .025", "	"	"	.039	.081	--	--	--	Used for guitar 12-1.
11-05-74	G-13	"	" , .034", -30°	"	"	--	.072	--	242 gm	--	---
11-07-74	G-14	"	" , " , 0°	"	"	--	.079	--	212	--	Used for guitar 14-1.
11-08-74	G-15	"	" , " , "	"	"	.051	.068	--	237	--	Top split longitudinally during handling. 0° veneer too weak.
11-27-74	G-16	"	" , " , +30°	"	"	--	.038	--	222	--	Cured on female mold.
12-02-74	G-17	"	" , " , +45°	"	"	.051	.033	--	220	--	" " "
12-02-74	G-18	Flat	" , " , -45°	"	"	.049	.073	.097	208	184	Bled only from bottom side thru nylon peel ply. Top is warped due to "resin rich" topside and "resin starved" bottom side.
12-09-74	G-19	"	" , " , "	"	"	.052	.060	.094	233	201	Bled only from bottom side thru perforated teflon. Less warpage than G-18.
12-12-74	G-20	"	" , " , "	"	"	.052	.067	.080	238	205	No bleeding. Top looks good. New request for less weight.
12-18-74	G-21	"	" , " , "	"	None, except Epon 820 to fill cracks in veneer	.047	.089	.100	--	164	No bleeding. Some trapped gas marks on both sides, possibly outgassing from Epon 820 repair of veneer. Very slight warp concave to -45 side.



HERC. NO.	THICK A	B	C	D	WEIGHT	K = (DEF. x 10)
2	.044	.046	.046	.045	175 grams	.91
3	.045	.044	.043	.045	171	.52
5	.050	.049	.048	.049	220	.62
8	.046	.045	.046	.052	241	.65

Hercules tops with birch veneer

1/30/75
Belbruno

4/2/76

BUZZ LOCATION	PROBLEM
Open	Nut low, bad nut slot, poor bridge support
Frets 1 and/or 2, and/or 3	Neck bowed back
at one Note (E) on different strings	Loose part or tension rod
Buzz high on neck (10th fret or so)	Too much warp, or fretboard high over the body
Buzz at a few local frets	Bent string Low fret (check with a short straight edge and rehone) Strong reconance of guitar
Most frets	a) action too low b) string too light c) picked too hard

(no date)

Bowl Assy. drawing 1110-0-250

On Standard Balladeer

top of shelf to inside of bowl = .5.708"

Shelf is 1/16" thick, 3/8" wide, 21/32" high, 58" long
Shelf is flush with top of bowl

Bowl final assy. 1111-0-200

Side of bowl routed 1/4" down and .060" deep to accommodate binding

Periphery of top routed 3/16" back from outside of bowl and .090 deep to accommodate purfling

Bowl is .070" thick – ??

@ 12th fret – 7/64 (.109") string clearance @ Bass E
5/64 (.078") string clearance @ Treble E

Standard neck is 1-11/16 at nut.

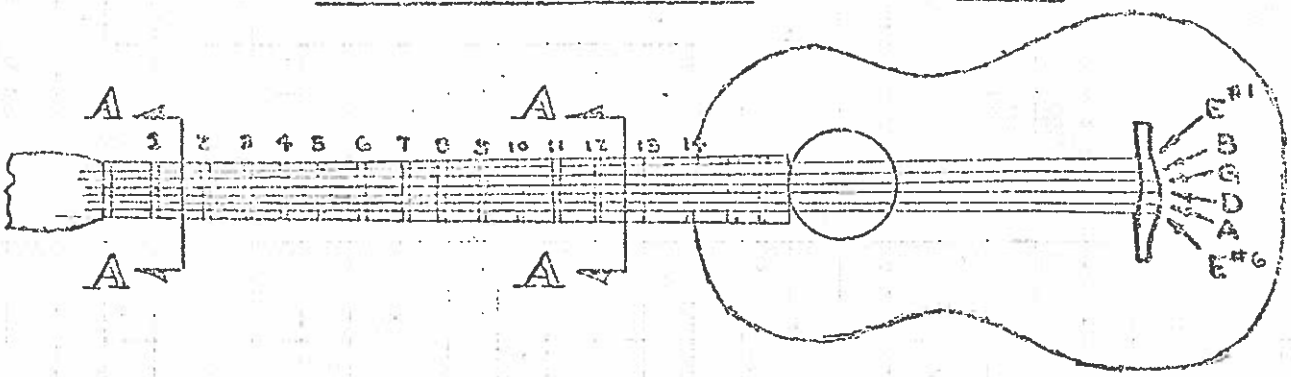
3/24/76

	Bass	Mid	Treble		
E	82.407	164.81	329.63	659.26	1318.5
F	87.307	174.61	349.23	698.46	1396.9
F#	92.499	185.	369.99	739.99	1480.
G	97.999	196.	392.	783.99	1568.
G#	103.83	207.65	415.30	830.61	1661.2
A	110.	220.	440.	880.	1760.
A#	116.54	233.08	466.16	932.33	1864.7
B	123.47	246.94	493.88	987.77	1975.5
C	130.81	(middle c) 261.63	523.35	1046.5	2093.
C#	138.59	277.18	554.37	1108.7	2217.5
D	146.38	293.66	587.33	1174.7	2349.3
D#	155.56	311.13	622.25	1244.5	2489.
E					

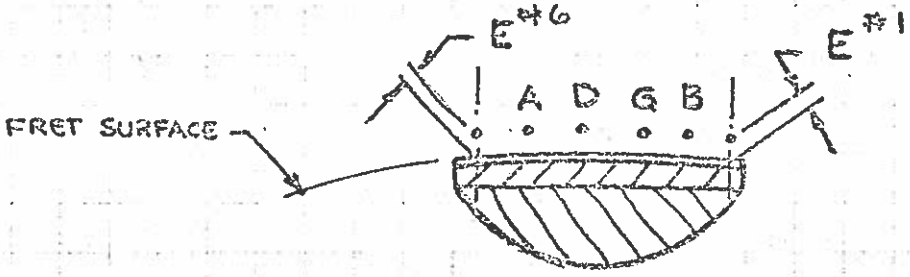
84	$E^{\#}$ x 2	168	x 2	336
85	$E^{\#}$	170		340
86	F^{b}	172		344
87	F	174		348
88	F	176		352
89	$F^{\#}$	178		356
90	$F^{\#}$	180		360
91		182		364
92		184		368
93		186		372
94		188		376

ACTION CHECK ST'D.

MAT'L: GRAPHITE TOP No. 12



PLAN VIEW OF GUITAR



VIEW~A-A

TYP.

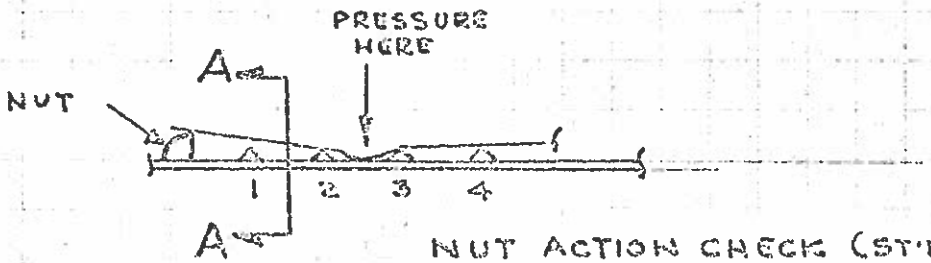
ROTATED 90° C'WISE.

ACTION ST'D.

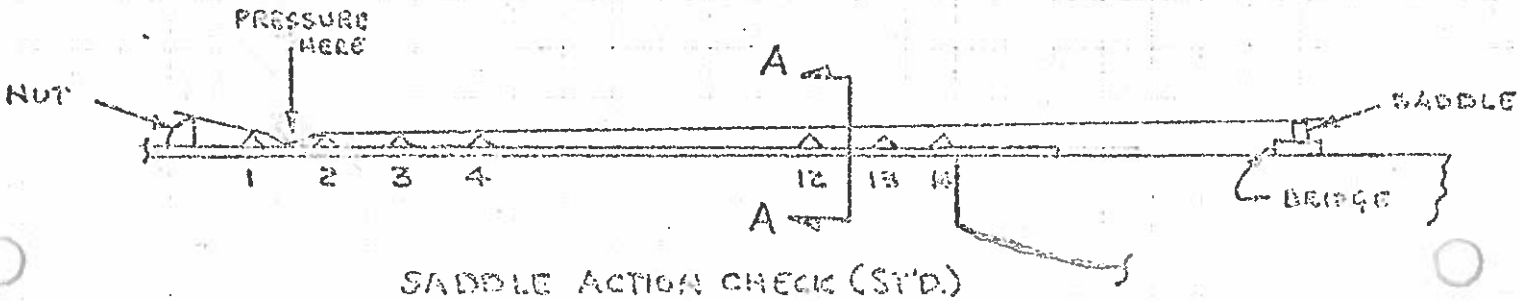
FRET No.	E#6	E#1
1	.005 MIN	.010 MIN.
12	.078	.109

ACTUAL ACTION MEASURED

FRET NO	E#6	E#1
1	.010	.010
12	.095	.065



NUT ACTION CHECK (ST'D.)



SADDLE ACTION CHECK (ST'D.)

NOTE: ACTION IS MEASURED AS A CLEARANCE AT THE FRETS INDICATED, BETWEEN THE TOP OF THE FRET & BOTTOM OF STRING.

PPG-#1 (Platen Press Graphite #1) (no date)

top { K 2# .088 x 10 = .88 dogs only
K 2# .069 x 10 = .69 clamped

dial indicator shifted minus .005 while clamping
— after correcting to zero the K was .69

4/21/75

10 Lb. Wt. – K = ~~.039~~ .078 Carbon Classic #2 GN-20->

Epon 820	– 60°	182 grams	.063
Hysol	– 60°	160.5 grams	.068
	60°	153 grams	.053
	45°	140.8 grams	.062
	45°	137.1 grams	.081
	90°	147.2 grams	.058
	90°	143.7 grams	.076

CMcD