

Table 1. *Gunshot residues in paraffin casts of Lee Harvey Oswald's hands and right cheek (data from FBI). Amount in micrograms per sample.*

TREATMENT	BARIUM	ANTIMONY
Left Hand (Inside)	3.02	0.114
Left Hand (Outside)	0.28	0.029
Right Hand (Inside)	6.32	0.249
Right Hand (Outside)	0.14	0.029
Cheek (Inside)	0.30	0.015
Cheek (Outside)	0.97	0.012

STARTLE RESPONSE

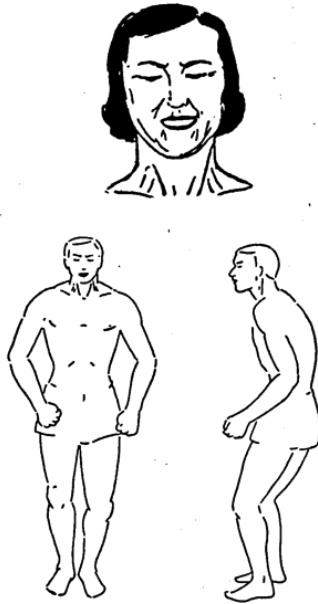


Figure 6.2. The startle reaction is an involuntary muscular reflex most commonly induced by a sudden loud noise. Contraction of the neck and facial muscles causes a characteristic grimace. Contraction of the limb muscles causes buckling of the knees and folding of the arms; basically movement toward a foetal position [from Eaton (1984) Neural Mechanisms of Startle Behavior].

analysts.

RELATIVE MAGNITUDE OF EPISODE	EPISODE DESIGNATION	ANALYST	FRAME No. AT OUTSET
Largest	A1	Alvarez	312
		Hartmann	313
		Scott	313
	A2	Alvarez	330
		Hartmann	331
		Scott	331
2nd Largest	B	Alvarez	182
		Hartmann	191
		Scott	193
3 rd Largest	C	Alvarez	221
		Hartmann	227
		Scott	226
4 th Largest	D	Hartmann	158
		Scott	158
5 th Largest	E	Alvarez	291
		Hartmann	290
		Scott	290

The original table appears on p. 30 of the panel report. The table has been simplified by showing only the onset of the jiggle, the original table also included the estimated peak. Alvarez' selections are from his 1975 article in the American Journal of Physics.

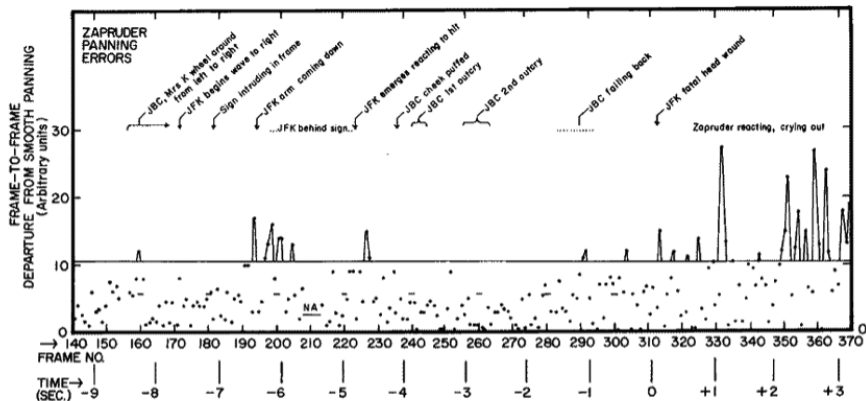


FIGURE II-4.—Errors in smooth tracking, as measured from one frame to another by Frank Scott. (Measures were reduced from Scott's graphs to numerical measures presented here by W. K. Hartmann, by method described in text.)

Figure 6.3. Hartmann and Scott's plot of panning error in the Zapruder frames and corresponding events depicted in the 12 sec segment of the film [from 6 HSCA 24]. The very large amplitude peaks at the end of the segment (frames 330 and after) are interpreted as poor panning due to Zapruder being upset at the circumstances. The prior smaller peaks were presumptive startle reactions as enumerated in Table 2.

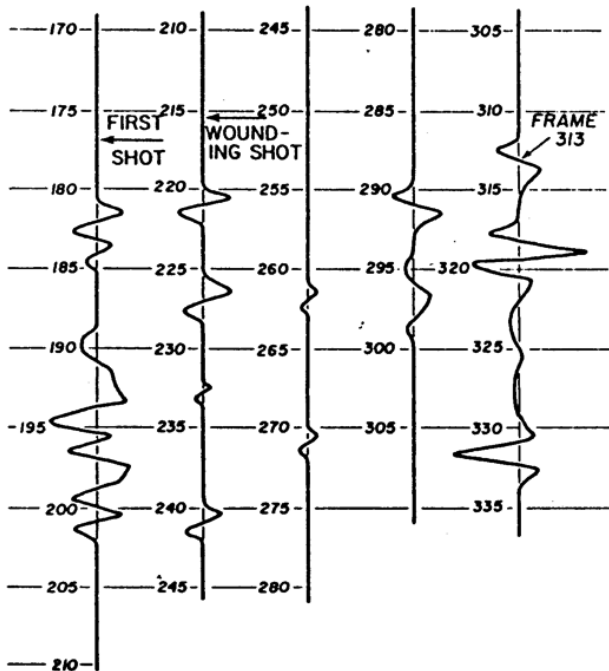


Figure 6.4. Alvarez' plot of angular acceleration of Zapruder's camera. His indications (arrows) of the timing of the shots resulted from a mistaken notion that there would be a one-third second delay between the arrival of the sound and the induced startle. His actually measured camera displacements were essentially the same as those reported by Hartmann and Scott (see Table 2). [From Alvarez (1975) *Amer. J. Physics* 44:813].

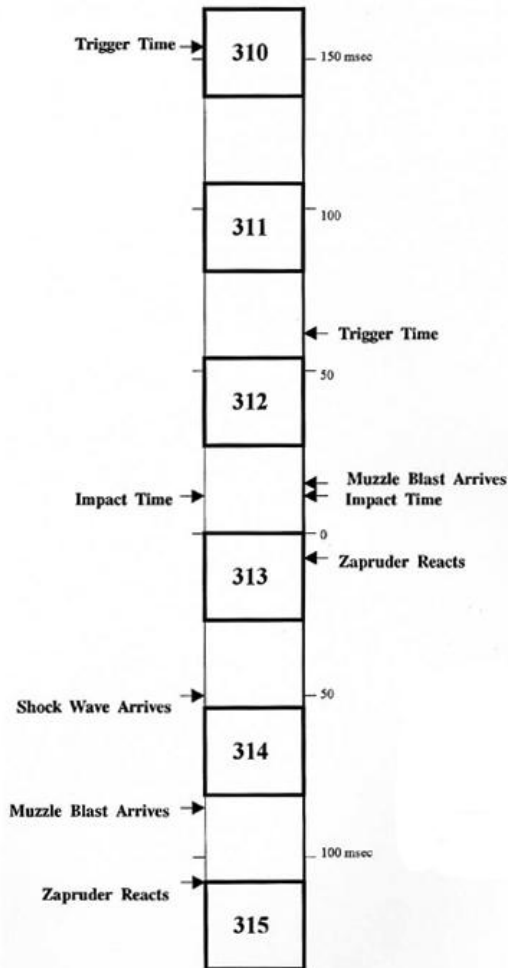


Figure 6.6. Diagram illustrating the relationship among acoustic and ballistic events during the fatal episode depicted in the Zapruder film. Had the fatal shot come from the book depository, the shock wave and the muzzle blast would have arrived at Zapruder's position some time well after bullet impact. Contrarily, if the shot emanated from the grassy knoll, then the arrival of the shock wave and muzzle blast at Zapruder's position would have been virtually simultaneous with the bullet impact. Thus, the blur at Z-313 is consistent with the latter but not the former supposition.

... position in X-ray

To Lawrence Angel



← Top view sketch is deduced, not observed

Figure 8.1. Lawrence Angel's positioning of the skull fragments recovered in Dallas, most notably the "Harper" piece and the "Delta" piece. The handwritten notation at the upper left reads, "= position in X-ray" and to the lower right reads, "Top view sketch is deduced, not observed." Note that Angel depicts the Delta piece as frontal bone.

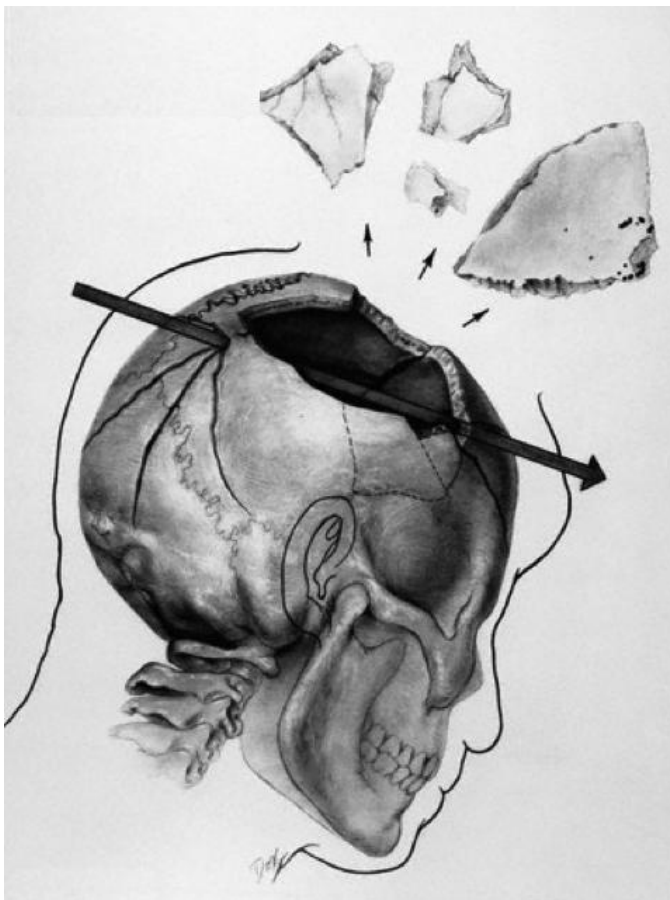


Figure 8.2. The Baden/Dox illustration. The illustration depicts the official version rather than the much more extensive damage seen in the autopsy films. For example, the deflected temporal bone (the “devil’s ear”) is not shown. The “Delta” piece (rightmost) is depicted as parietal bone instead of frontal bone, directly contrary to the expert analysis elicited by the HSCA. A bullet hole is substituted for the metal fragment seen in the x-rays. Worse, a bridge of bone is inserted between the entry point and the massive defect, making it appear that there was a through-and-through bullet hole in the back of the head, contrary to the autopsy films and the statements of the autopsy attendants. Illustration by Ida Dox.

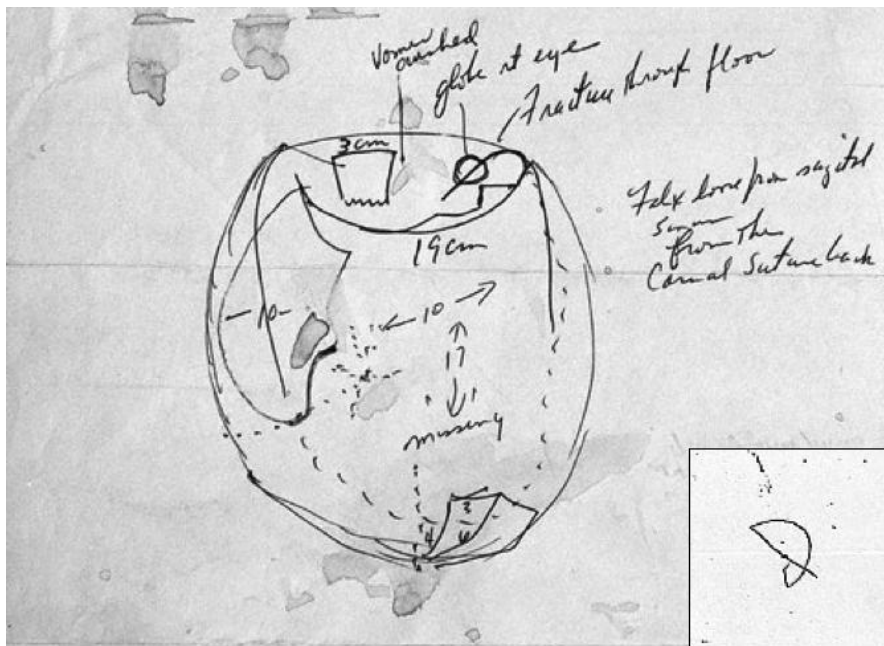


Figure 8.3. Boswell's blood-stained autopsy notes. From front to back the handwritten notations appear to read: "vomer crushed," "globe of eye," "Fracture through floor," "Falx torn from sagittal 5 cm from the Coronal suture back." The vomer is the bony roof of the oral cavity; the falx is the dural covering of the cerebrum between the hemispheres. Within the hand drawing itself there are notes indicating an area "10" cm wide by "17" cm long where bone was "missing." Dotted lines to the right and to the posterior left evidently demarcate the edges of the cranial defect. The "19 cm" seems to refer to the length of the anterior margin of the cranial defect which apparently continued as a fracture through the floor of the right orbit. Three bone islands, that is bone fragments separated from the cranium but adherent to the scalp are depicted, two adjacent to one another in the posterior skull, and a larger one on the left side with its width of "10" cm indicated. By itself at the bottom of the page (inset bottom right) is a drawing that matches the shape of a skull fragment that was recovered from Elm street in Dallas. The latter corroborates Boswell's account of reconstructing the entry wound based on a notch in this fragment.

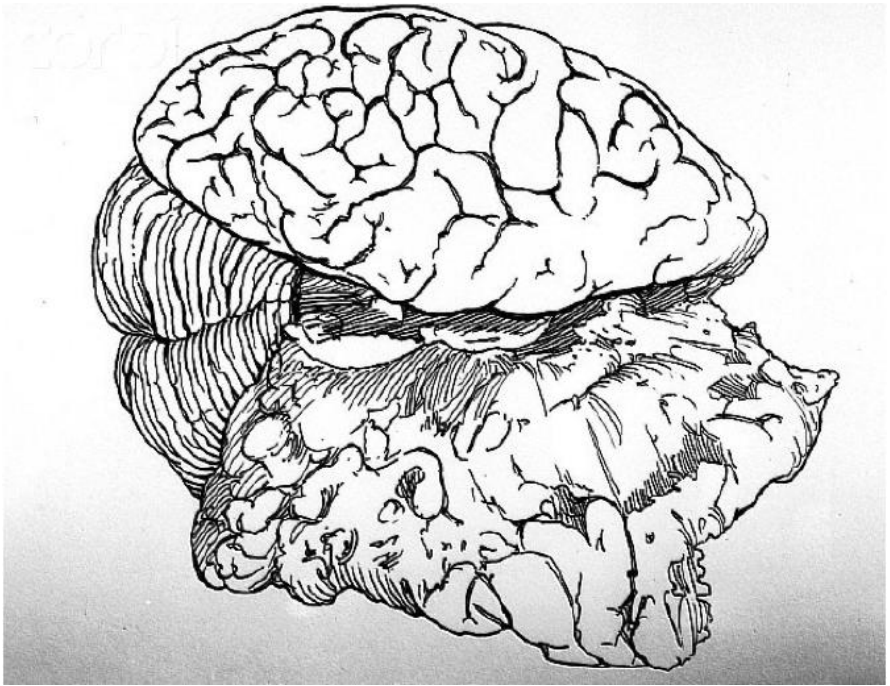


Figure 8.9. An illustration of the President's brain drawn from a photograph taken after fixation in formalin some days after the autopsy. The obvious damage is confined to the right cerebral hemisphere with no apparent damage to the cerebellum and thus the bullet must have entered and exited high on the right side of the cranium. Illustration by Ida Dox.

LOCATION OF INSHOOT WOUND IN BACK OF GOV. CONNALLY

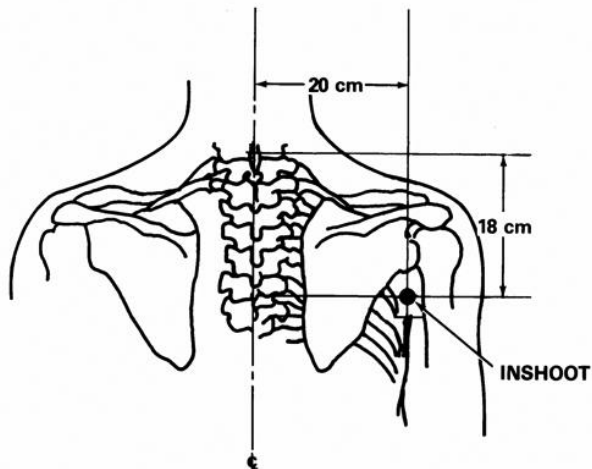


Figure 9.2. HSCA exhibit F-377, a diagram showing the location of Governor Connally's entrance wound near the right armpit. (From 2 HSCA 181).

Table 3. Energy Dispersive X-Ray Analysis of Bullet Holes in Clothing (11/10/77)

GARMENT	AREA	COPPER	LEAD	IRON
JFK Coat	Defect	874*	478	3302**
	Control	346	245	431
JFK Shirt	Back Defect	148	201	-
	Collar	255	81	-
	R. Front Defect	494***	307	-
	L. Front Defect	166	139	-
JFK Tie	Nick	231	70	-
	Control	240	104	-

* borderline - only a trace ** Blood stain - iron present *** borderline - only a trace

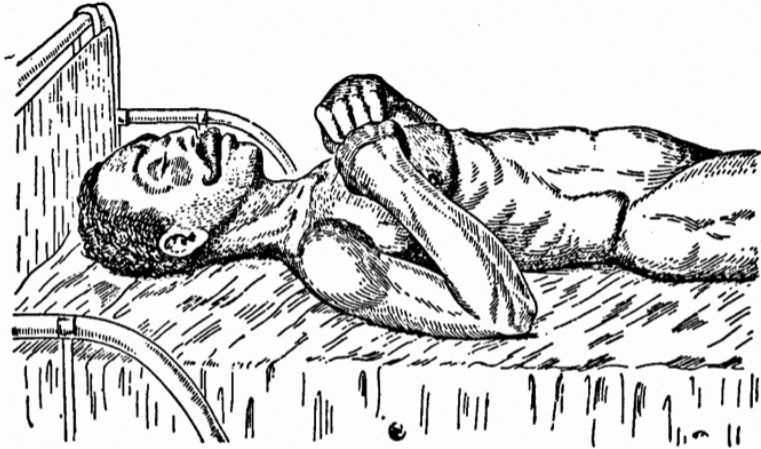
GARMENT	AREA	COPPER	LEAD	IRON
JBC Coat	Sleeve Defect	184	125	239
	Control	142	143	212
	Back Defect	437	190	620
	Control	327	127	305
	Front Defect	4529*	208	4833***
	Control	9281**	106	103
JBC Shirt	Front Defect	324	136	610
	Collar	198	11	152
	Back Defect	185	58	371
	Control	193	0	162
	Cuff Defect	157	107	196
	Control	128	5	160
JBC Trousers	Defect	270	90	5557
	Control	230	113	5421

* Copper present in quantity ** Aberrant count *** Blood stain - iron present

JBC – Repeat Analysis: date 11/15/77

GARMENT	AREA	COPPER	LEAD	IRON
JBC Coat	Front Defect	4532*		
	Above	550		
	Below	411		

* Copper confirmed



Contracture-in-flexion of the arms due to a lesion of spinal segment C7.

Figure 9.4. A nineteenth century woodcut depicting a patient suffering from a bilateral contracture in flexion, the condition described by John Lattimer as “Thorburn’s position.”

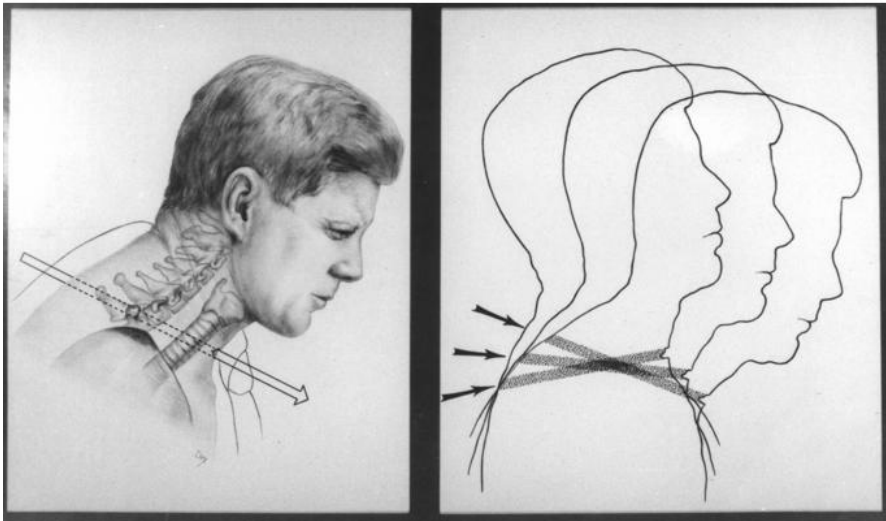


Figure 9.5. HSCA Exhibit II-13, the forensic pathology panel's illustration of how an anatomically upward trajectory through the President's body could have resulted from a bullet originating six stories above. Note that the President's arm is not raised in the illustration although the Zapruder film shows that he was waving to the crowd on Elm Street. (Illustration by Ida Dox).

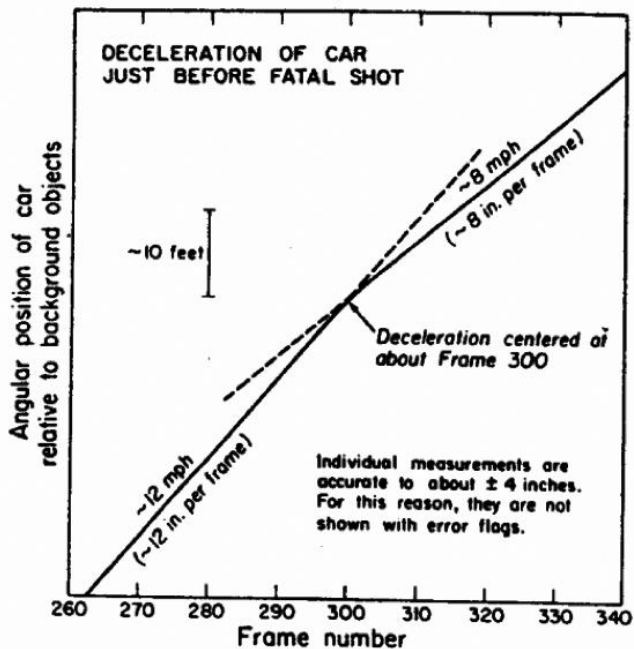


Figure 10.1. The velocity of the limousine on Elm Street plotted from its position in the Zapruder film in a study by Luis Alvarez, cited by the Forensic Pathology Panel, which then concluded that the President's backward motion was caused by the acceleration of the limousine. Actually, the opposite happened. The driver hit the brake and the passengers, including the President, lurched forward (from *Amer. J. Physics* 44:813).

Table 5. *Energy Budget of the Gunshot to the Head*

Kinetic Energy on impact - at 1800 ft/sec:

$$\text{K.E.} = (.023)(1800)^2/2g = 1157.1 \text{ ft-lbs} \quad (\text{a})$$

Kinetic Energy entering brain case - at 1250 ft/sec:

$$\text{K.E.} = (.023)(1250)^2/2g = 558.0 \text{ ft-lbs} \quad (\text{b})$$

Kinetic Energy leaving brain case - at 1150 ft/sec:

$$\text{K.E.} = (.023)(1150)^2/2g = 472.3 \text{ ft-lbs} \quad (\text{c})$$

Kinetic Energy leaving head - at 600 ft/sec:

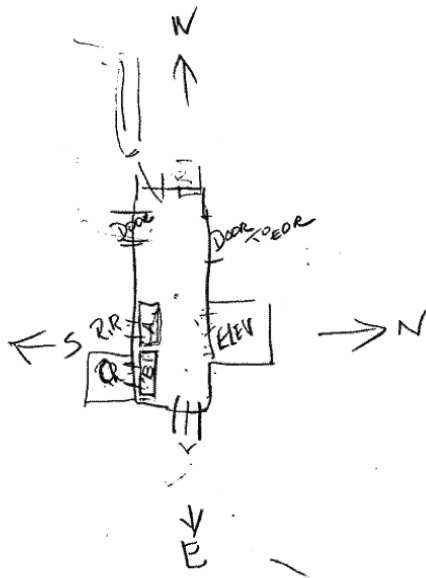
$$\text{K.E.} = (.023)(600)^2/2g = 128.6 \text{ ft-lbs} \quad (\text{d})$$

$$g = 32.2 \text{ ft/sec}^2$$



Figure 10.2. Warren Commission Exhibit 388, an illustration prepared at the direction of chief autopsy surgeon James Humes showing the President's head wound with an entry at the base of the skull and exit through the top. The Zapruder film fails to show the President's head deflected in this manner. Note that a "fragment" is pictured behind the eye, but not at the back of the skull. Illustration by H.A. Rydberg.

Tomlinson X-2



TOMLINSON EXHIBIT No. 2

Figure 11.3. Warren Commission Exhibit Tomlinson 2. The juxtaposition of the two stretchers to one another, to the elevator, and to the closet as hand drawn by hospital engineer Darrell Tomlinson who found the magic bullet on one of the stretchers.

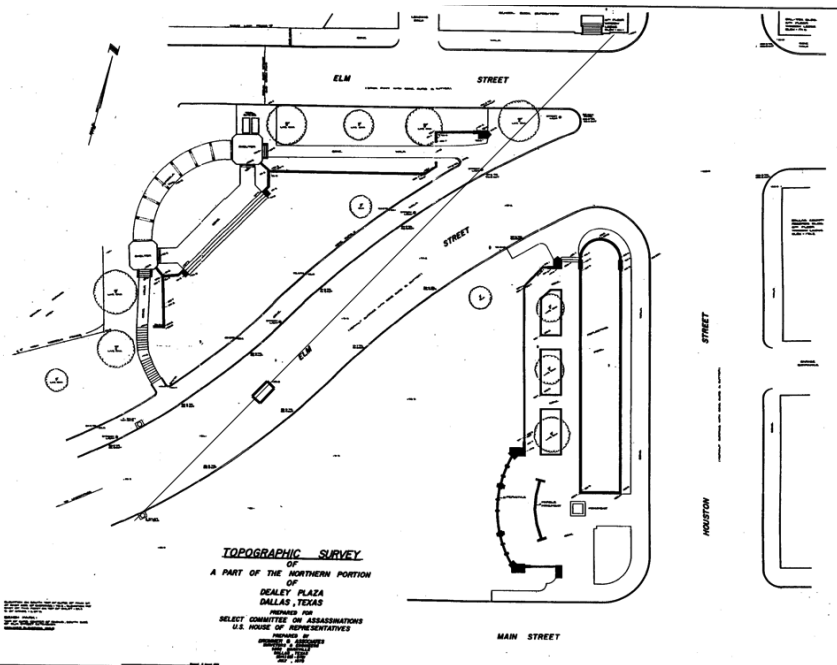


Figure 11.5. The line of fire from the sniper's nest to the grass next to the manhole where a bullet was allegedly found. The bullet track aligns with the position of the limousine at Z-frame 325.

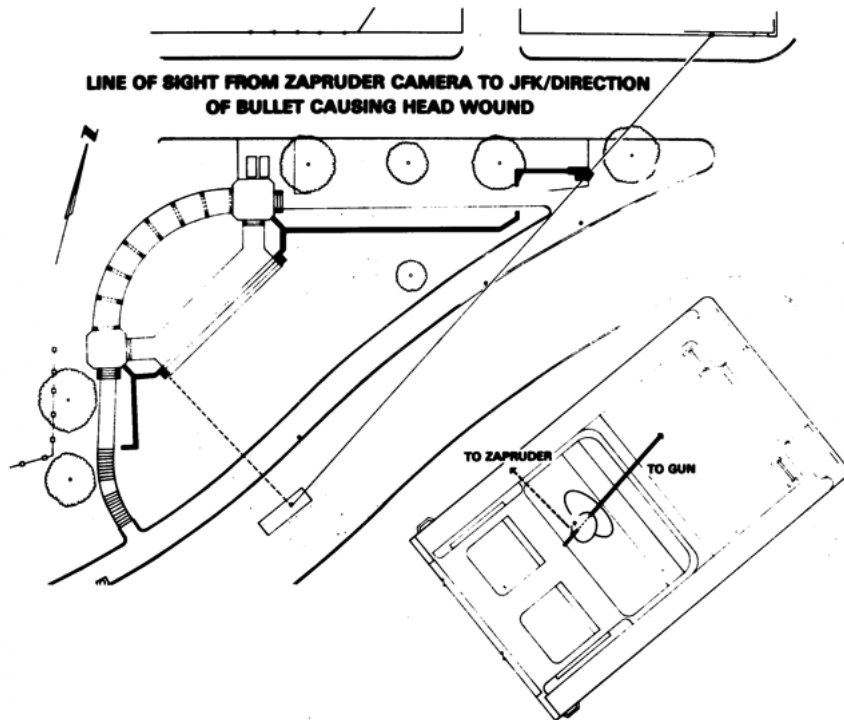


Figure 12.1. HSCA Exhibit F-138. The HSCA's trajectory "expert" Thomas Canning placed the President in the middle of the back seat. He was actually seated to the right with his arm on the windowledge. The leftward shift does help explain how the exiting bullet missed Governor Connally.

LOCATION OF HEAD WOUNDS IN PRESIDENT KENNEDY

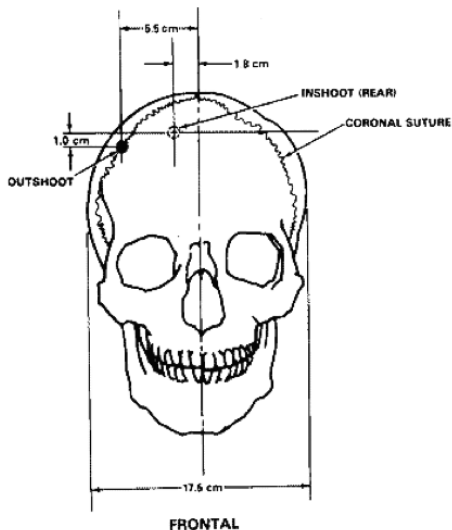


FIGURE II-7

Figure 12.2. HSCA Exhibit F-147. Canning's illustration of the location of the outshoot is disproportionate with the measurements indicated in the dimension lines. Moreover they were inconsistent with the measurements provided by the forensic pathology panel.

$$81^2 = (81 - 2.4)^2 + (\text{base})^2; \text{base} = 19.6 \text{ cm}$$

$$19.6 / 81 = .2419; [\text{Sine } 14^\circ = .2419]$$

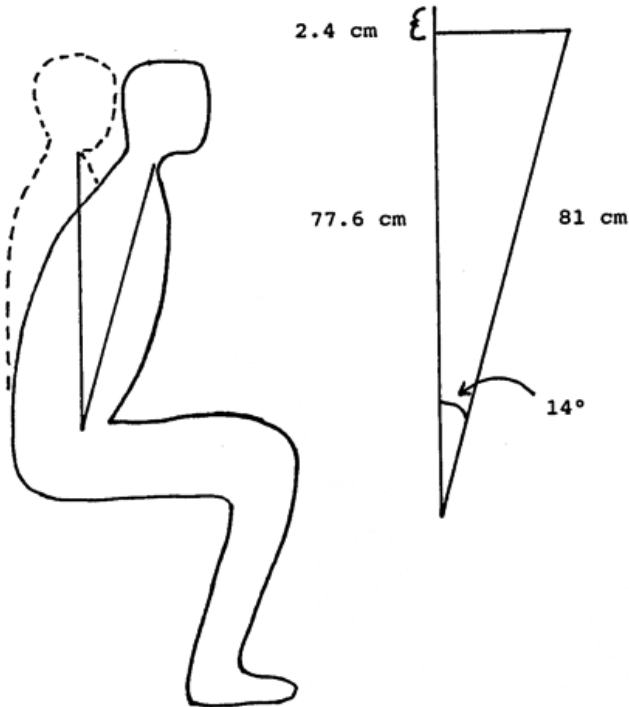


Figure 12.5. Canning's geometry held that a forward lean of 14 degrees would lower his larynx by 2.4 cm (one inch). That would be true only if the President were over seven feet tall! Canning was "stretching" the truth.

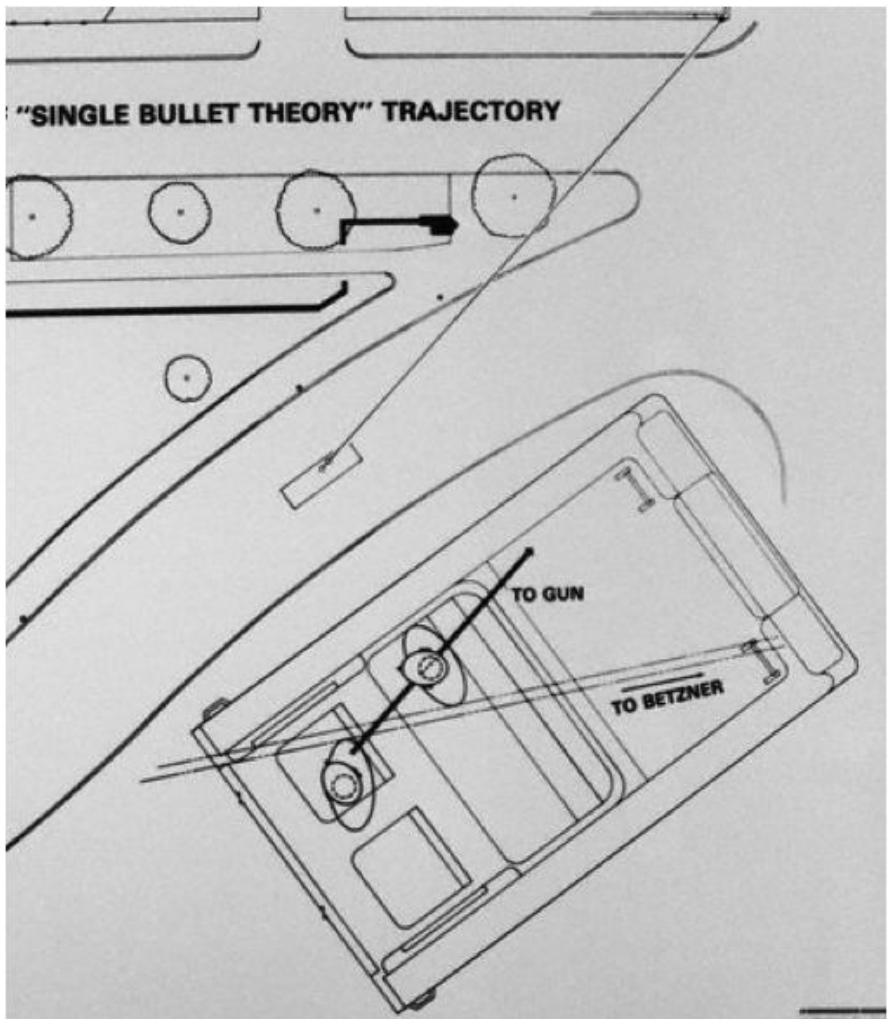


Figure 12.6. HSCA Exhibit F-144. Canning cited but then ignored a "stereophotogrammetric" study which placed the President's throat wound in direct line with the Governors back wound, relative to the limousine. Canning slid the governor six inches to the left in this illustration in order to make the wounds align with the sniper's nest.

Table 6. *Bullets With Antimony Levels in the Same Range as Carcano Bullets Cited in Publications by Vincent P. Guinn Prior to 1978. PPM = parts per million, SD = standard deviation.*

Manufacture	Caliber	PPM \pm SD	Publication
Carcano	6.5mm	24-1219 \pm nd	Guinn & Nichols (1978)
Winchester	.32	160 \pm 40	Lukens & Schlesinger (1970)
Winchester	.45	450 \pm 160	“
Winchester	9mm	800 \pm 160	“
Winchester	9mm	900 \pm 700	“
Winchester	.38	1100 \pm nd	“
Military	.45	70 \pm nd	Lukens & Guinn (1971)
U.S. Cartridge	.38	30 \pm nd	“
Union Metallic	.38	820 \pm nd	“
Remington	.38	130 \pm nd	“
Western	.38	440 \pm nd	“
Winchester	.38	760 \pm nd	“
Crossman	.22	200 \pm nd	?

*nd = data not shown in publication; *Guinn cited as collaborator.*

Table 7. *Trace Element Composition of 6.5 Mannlicher-Carcano Bullet Lead in parts per million. (Source: Guinn at 1 HSCA 547).*

LOT – BULLET	SILVER	ANTIMONY
6000 – A	11.8 ± 0.4	173 ± 3
– B	13.5 ± 0.5	261 ± 3
6001 – A	12.2 ± 0.6	158 ± 3
– B	15.3 ± 0.5	732 ± 5
– C	8.5 ± 0.4	1218 ± 7
– D	11.6 ± 0.4	161 ± 3
6002 – A	9.1 ± 0.4	385 ± 4
– B	9.7 ± 0.4	949 ± 6
– C	6.0 ± 0.3	24 ± 1
– D	8.3 ± 0.6	121 ± 2
6003 – A	15.9 ± 7.9	730 ± 5
– B	7.9 ± 0.4	80 ± 2
– C	8.8 ± 0.4	464 ± 5
– D	8.7 ± 0.4	240 ± 3

The standard deviation is based only on the counting statistics of a single measurement.

Table 8. *Homogeneity of 6.5 Mannlicher-Carcano Bullets: four specimens tested from each of three bullets using Neutron Activation Analysis. (Source: Guinn at 1 HSCA 549).*

LOT & SPECIMEN	ANTIMONY	SILVER
6001 C	1139 \pm 60	8.5 \pm 0.4
6001 C1	1062 \pm 60	9.5 \pm 0.4
6001 C2	1235 \pm 93	10.1 \pm 0.6
6001 C3	1156 \pm 90	9.2 \pm 0.5
MEAN	1148 \pm 71	9.3 \pm 0.7
6002 A	358 \pm 47	9.1 \pm 0.4
6002 A1	983 \pm 51	10.3 \pm 0.3
6002 A2	869 \pm 47	9.9 \pm 0.3
6002 A3	882 \pm 81	10.2 \pm 0.5
MEAN	773 \pm 281	9.9 \pm 0.5
6003 A	667 \pm 58	15.9 \pm 0.5
6003 A1	395 \pm 54	9.6 \pm 0.4
6003 A2	363 \pm 39	8.3 \pm 0.3
6003 A3	441 \pm 51	9.8 \pm 0.4
MEAN	466 \pm 137	10.9 \pm 3.4

Standard deviation shown with mean values based upon the spread of the four individual measurements.

Table 9.- Results From INAA of Evidence Specimens at U. C. Irvine (Source: Guinn at 1 HSCA 538).

SPECIMEN	% LEAD	ANTIMONY	SILVER	COPPER	WEIGHT (MG)
CE-399 (Q1)	101 \pm 4	833 \pm 9	7.9 \pm 1.4	58 \pm 3	10.7
CE-842 (Q9)	104 \pm 2	797 \pm 7	9.8 \pm 0.5	994 \pm 7	16.4
CE-567 (Q2)	95 \pm 2	602 \pm 4	8.1 \pm 0.6	40 \pm 1	50.5
CE-843 (Q4)	95 \pm 2	621 \pm 4	7.9 \pm 0.3	40 \pm 2	41.9
CE-840 (Q14a)	94 \pm 2	638 \pm 4	8.6 \pm 0.3	44 \pm 2	33.4
(Q14b)	103 \pm 2	647 \pm 4	7.9 \pm 0.5	42 \pm 2	33.8
CE-573 (Q188)	100 \pm 2	17 \pm 2	20.6 \pm 0.6	100 \pm 3	-
CE-141 (Q8)	107 \pm 2	15 \pm 1	22.4 \pm 1.0	22 \pm 1	-

The \pm values shown for Pb, Sb and Cu represent one standard deviation, based only on the counting statistics. For Ag, which was measured twice on each sample the \pm value shown is 1 s.d. calculated either from the counting statistics or from the spread of the two values, whichever resulted in the larger s.d. value.

Table 10. *Reproducibility of NAA Measurements on Two Bullet Specimens (Source: Guinn at 1 HSCA 548).*

SPECIMEN	REPLICATE	ANTIMONY	SILVER
6001 B	1	621 \pm 56	15.3 \pm 0.5
	2	646 \pm 55	16.6 \pm 0.4
	3	646 \pm 55	13.9 \pm 0.4
	4	791 \pm 55	15.0 \pm 0.4
	MEAN	676 \pm 78	15.2 \pm 0.4
6002 B	1	990 \pm 60	9.7 \pm 0.4
	2	1007 \pm 56	10.1 \pm 0.4
	3	942 \pm 56	9.8 \pm 0.4
	4	946 \pm 56	10.7 \pm 0.4
	MEAN	971 \pm 32	10.1 \pm 0.5

Table 11. *Results of FBI Neutron Activation Analysis of JFK Bullet Specimens: antimony in parts per million (four readings). (Source, Guinn 1979, Anal. Chem. 51:492A).*

SAMPLE No.		1	2	3	4
Stretcher Bullet	Q1	945	1002	813	705
Fragment from JBC	Q9	977	1090	773	676
Fragment from Car	Q2	745	747	626	534
Fragment from JFK	Q 4.5	783	858	614	561
Fragment from Rug	Q14	793	879	629	562

FBI Neutron Activation Analysis Conducted by John Gallagher, Frank Dyer and Juel Emery at the Oak Ridge National Laboratory. The values in this table were calculated by Vincent P. Guinn from raw data obtained by FOIA suit by John Nichols.

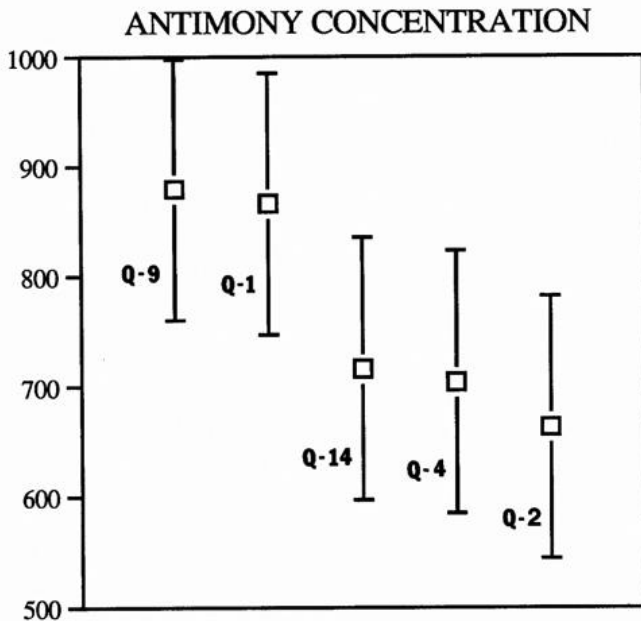


Figure 13.6. Graphic illustration of the FBI results from measurement of antimony in five evidence specimens (Q-9 from CE-399). Squares are the mean values and bars represent the variation around the mean from the replicated measurements. Because of the overlap the FBI considered the results to be inconclusive with respect to associating fragments to particular bullets.

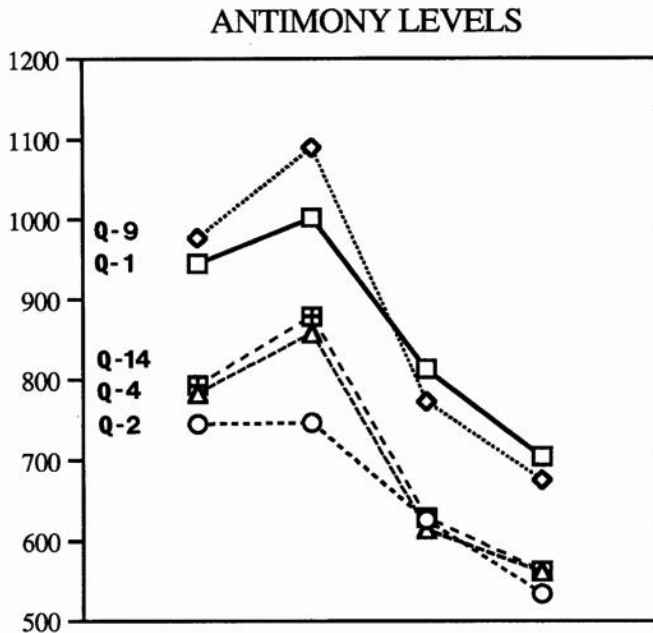


Figure 13.7. Graphic illustration of the same FBI data but with the individual measurements plotted by replicate date. Guinn argued that specimens Q-1 and Q-9 co-varied with one another in a non-overlapping way from the other specimens.

Table 12. *Firearms Evidence in the Tippit Murder Case: the last column shows the date when the FBI received the evidence from the DPD.*

ITEM	EXHIBIT No.	PROVENANCE	DATE
.38 Special Revolver (S&W)	CE-143 [C-15]	Oswald	23 Nov. 1963
.38 Special Cartridge (Winchester)	CE-145 [Q-177]	In Pistol	03 Dec. 1963
.38 Special Cartridge (Remington)	CE-145 [Q-178]	In Pistol	03 Dec. 1963
.38 Special Cartridge (Winchester)	CE-518 [Q-78]	In Pistol	30 Nov. 1963
.38 Special Cartridge (Winchester)	CE-518 [Q-79]	In Pistol	30 Nov. 1963
.38 Special Cartridge (Remington)	CE-518 [Q-80]	In Pistol	30 Nov. 1963
.38 Special Cartridge (Remington)	CE-518 [Q-81]	In Pistol	30 Nov. 1963
.38 Special Cartridge (Winchester)	CE-592 [Q-82]	In Pocket	30 Nov. 1963
.38 Special Cartridge (Winchester)	CE-592 [Q-83]	In Pocket	30 Nov. 1963
.38 Special Cartridge (Winchester)	CE-592 [Q-84]	In Pocket	30 Nov. 1963
.38 Special Cartridge (Winchester)	CE-592 [Q-85]	In Pocket	30 Nov. 1963
.38 Special Cartridge (Winchester)	CE-592 [Q-86]	In Pocket	30 Nov. 1963
.38 Special Casing (Remington)	CE-47 [Q-74]	On lawn?	30 Nov. 1963
.38 Special Casing (Winchester)	CE-48 [Q-75]	On lawn?	30 Nov. 1963
.38 Special Casing (Winchester)	CE-49 [Q-76]	On lawn?	30 Nov. 1963
.38 Special Casing (Remington)	CE-50 [Q-77]	On lawn?	30 Nov. 1963
.38 Special Bullet (Winchester)	CE-602 [Button]	In Ambulance	23 Nov. 1963
.38 Special Bullet (Winchester)	CE-603 [C-253]	Tippit Autopsy	Mar. 1964
.38 Special Bullet (Remington)	CE-604 [C-252]	Tippit Autopsy	Mar. 1964
.38 Special Bullet (Winchester)	CE-605 [C-251]	Tippit Autopsy	Mar. 1964

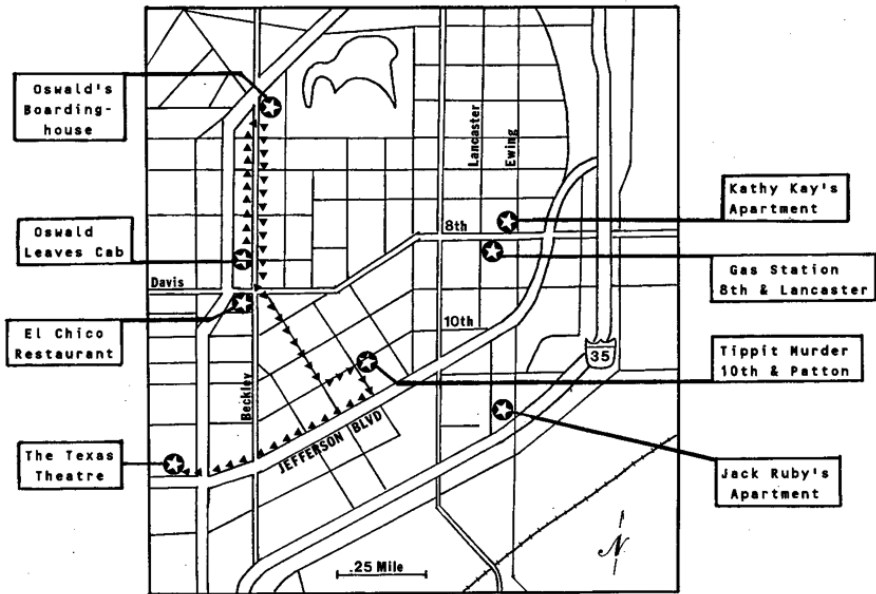


Figure 14.4. Map of central Oak Cliff showing location of key events. Oswald's path shown with arrowheads. The Harlandale address was two blocks south of where Ewing crossed the railroad tracks.

Least-Squares Fits to Channel 2 Dispatcher's Time Annotations Showing Times of DPD Chief's Radio Transmissions.

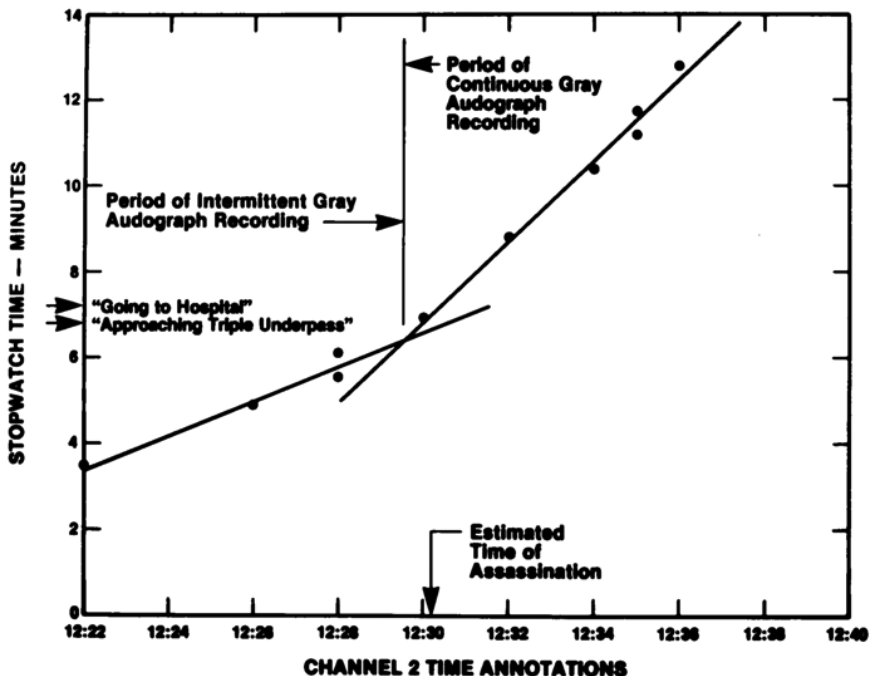


Figure 16.3. HSCA Exhibit F-366, a plot of the Ch-2 dispatcher's time notations against playback time of the recording. Prior to 12:30, the approximate time of the assassination, there was poor agreement indicating that the recorder was stopping. After 12:30 there was a one-to-one relationship indicating that the recording was continuous, probably due to the heavy radio traffic related to the crisis.

**Least-Squares Fit to Channel 1 Dispatcher's Time
Annotations Showing Time of First Set of Gunfire-Like Events.**

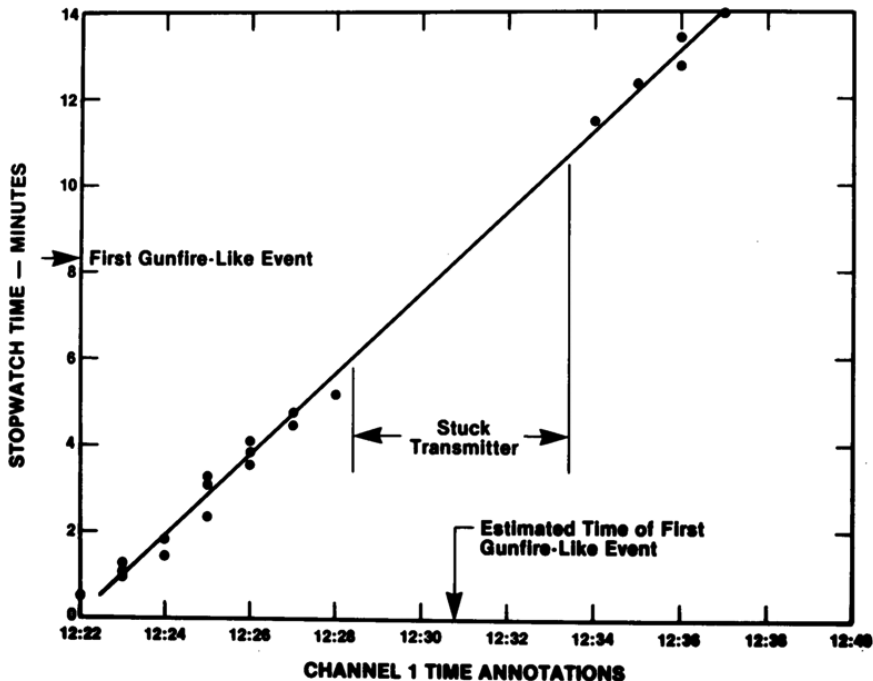


Figure 16.4. HSCA Exhibit F-365, a plot of the dispatcher's time notations on Ch-1 beginning at 12:22 against playback time. The putative gunshots were found at a time corresponding to 12:30 to 12:31 by the dispatcher's clock. The slope of the regression line is 5% too steep due to a playback speed problem.

Least-Squares Fit to Channel 1 Dispatcher's Time Annotations Showing Time of First Set of Gunfire-Like Events.

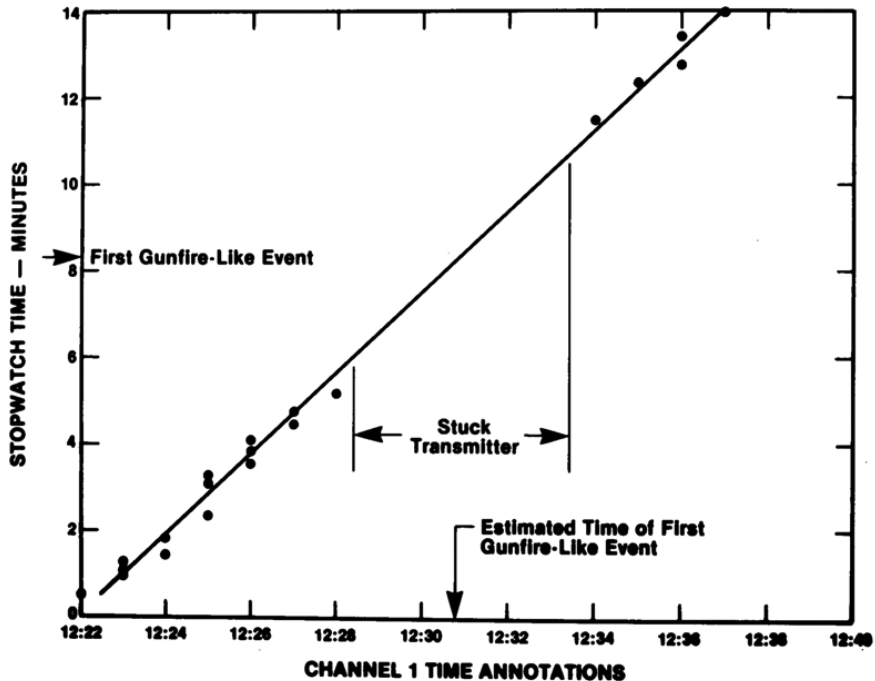
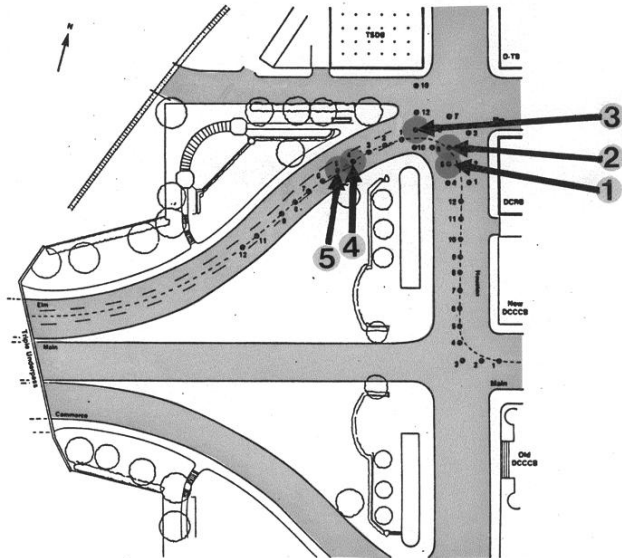


Figure 16.4. HSCA Exhibit F-365, a plot of the dispatcher's time notations on Ch-1 beginning at 12:22 against playback time. The putative gunshots were found at a time corresponding to 12:30 to 12:31 by the dispatcher's clock. The slope of the regression line is 5% too steep due to a playback speed problem.

TIME OF 1ST IMPULSE	MICROPHONE NUMBER	RIFLE LOCATION	CORRELATION COEFFICIENT
136.20 sec	-	-	All < 0.5
137.70 sec	2 (5)	TSBD	0.8
“	2 (5)	TSBD	0.7
“	2 (6)	TSBD	0.8
“	2 (6)	Knoll	0.7
139.27 sec	2 (6)	TSBD	0.8
“	2 (6)	TSBD	0.6
“	2 (10)	TSBD	0.6
“	3 (5)	Knoll	0.6
140.32 sec	2 (11)	TSBD	0.6
145.15 sec*	3 (4)	Knoll	0.8
“	3 (7)	TSBD	0.7
“	3 (8)	TSBD	0.7
145.61 sec	3 (5)	TSBD	0.8
“	3 (6)	TSBD	0.8
“	3 (8)	TSBD	0.7

**Subsequent analysis resets the onset of this impulse to 144.9 seconds*



MICROPHONE LOCATIONS AT DEALEY PLAZA

Figure 16.5 The 36 microphone locations for acoustical tests in Dealey Plaza and the five where matches to the suspect sounds were obtained numbered in the order that they occur in the police recording. Note that the chronological sequence matched the topological sequence. It was the order in the data, and not just the matching, that led the acoustical experts to conclude that the suspect sounds were the assassination gunshots.

IMPULSES ON THE DALLAS POLICE DEPARTMENT RECORDING ASSOCIATED WITH ECHOES

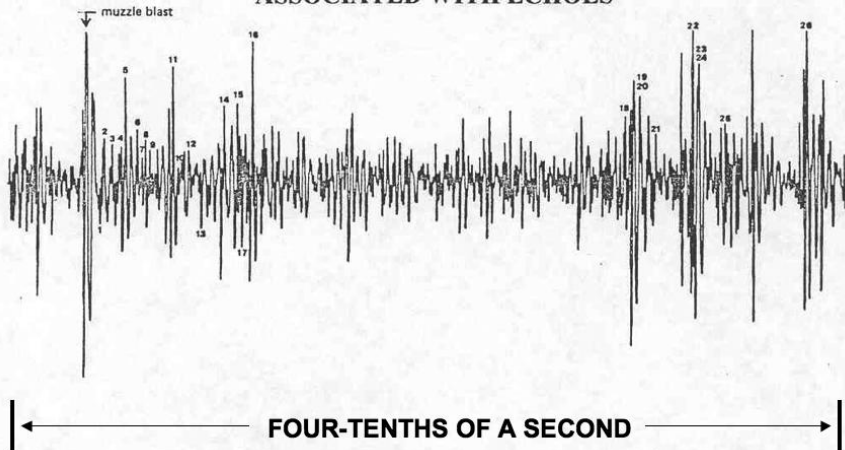


Figure 16.6. HSCA Exhibit F-667, an oscillograph of the impulses on the DPD recording at 145.1 sec (Table 13) that matched to the test shot from the grassy knoll. The numbered impulses were the 26 that Weiss & Aschkenasy associated with echo producing structures in Dealey Plaza.

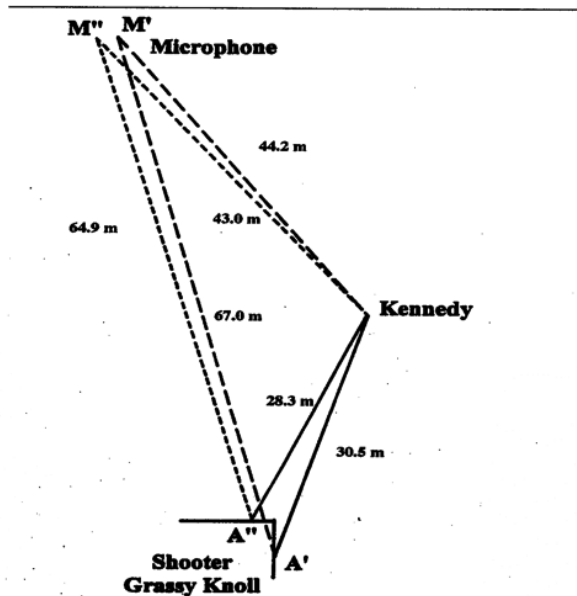


FIGURE 4 Geometry relating the sound paths for the muzzle blasts and the shock waves to the bullet flight paths for the test shot in 1978 and putative assassin's shot in 1963 giving the parameters for solving muzzle velocity from the shock wave precedence.

M'' = test microphone position, **M'** = acoustically determined microphone position, **A''** = test shooter position, **A'** = acoustically determined shooter position.

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Figure 16.7. Shock wave precedence and the geometry of sound paths used to calculate the muzzle velocity of the weapon on the grassy knoll. Cloud chamber photograph at lower left captured the shock wave emanating from the nose of a projectile. Arrow at upper left points at the shock wave preceding the muzzle blast on the DPD impulse pattern identified as the grassy knoll gunshot.

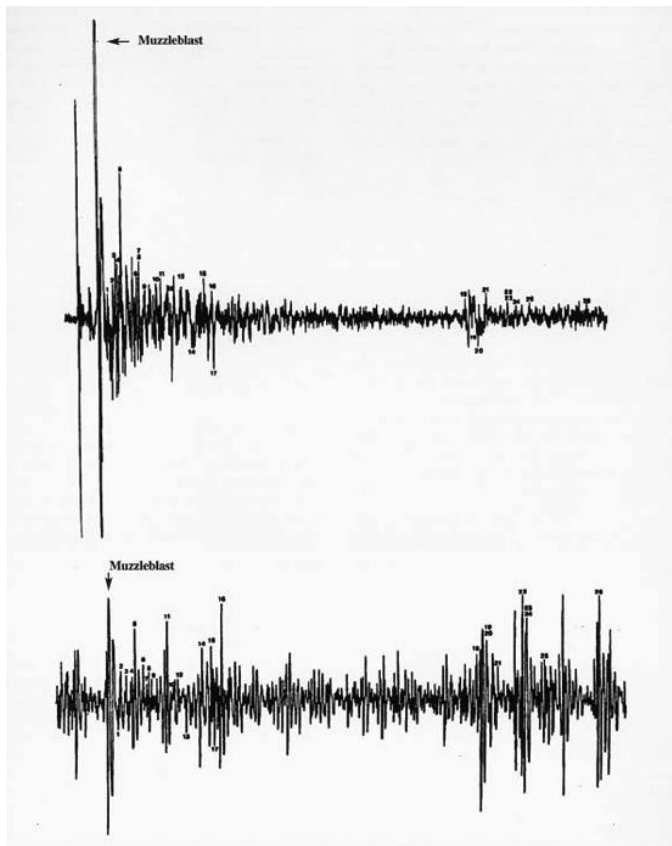


Figure 17.1. Top: The oscillograph of the test shot from the grassy knoll. Bottom: The oscillograph of the suspect pattern on the police dictabelt which matched to a test shot from the grassy knoll. The numbers show the position of corresponding peaks. Whereas the top plot is from a high-fidelity recording, amplitude in the bottom plot is distorted by the AGC.

"You want me to hold this traffic on Stemmons until we find out something, or let it go." ⁶⁴

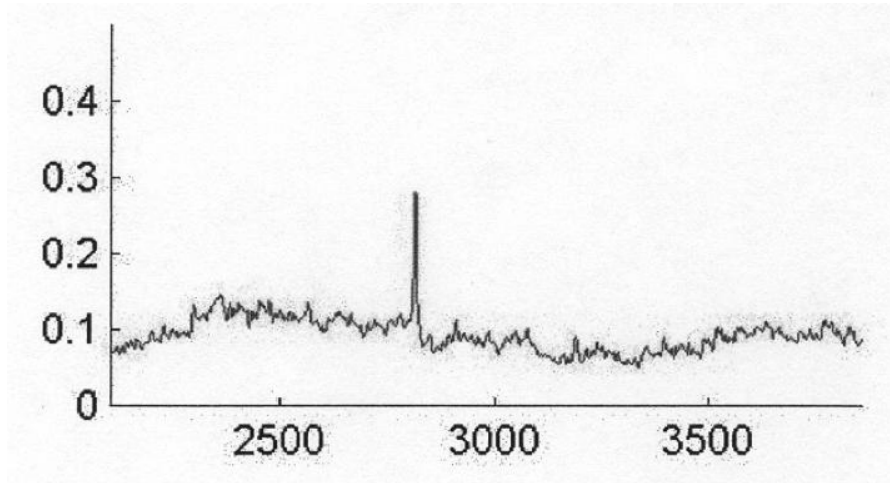


Figure 17.2. Peak correlation comparison of the frequencies around the Decker broadcast on Ch-1 and Ch-2. A peak is generated when the utterances align. In this comparison the peak reached nearly 0.3 against a background that averaged around 0.1 (from Linsker et al. 2005).

patterns (**Fig. 17.3**). The result of Garwin's computer analysis of these two segments gave a robust correlation coefficient of 0.8.⁶⁵

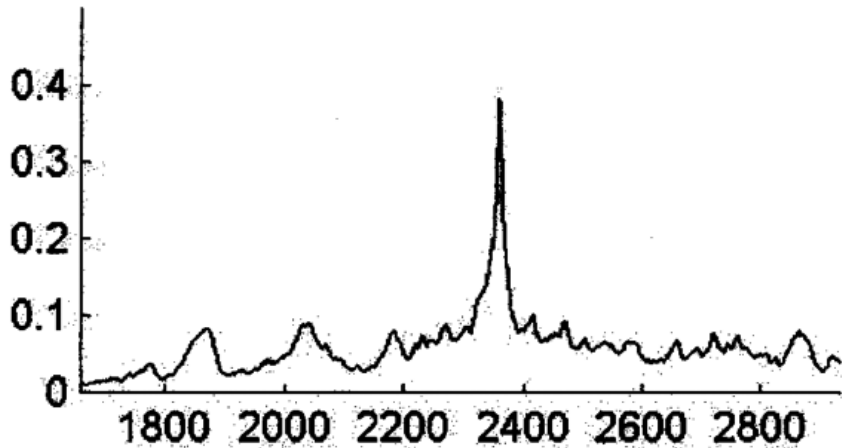


Figure 17.3 Peak correlation comparison of the frequencies around the Bellah broadcast on Ch-1 and Ch-2 The peak reached nearly a value of 0.4 against a background that averaged around 0.1 (from Linsker et al. 2005).

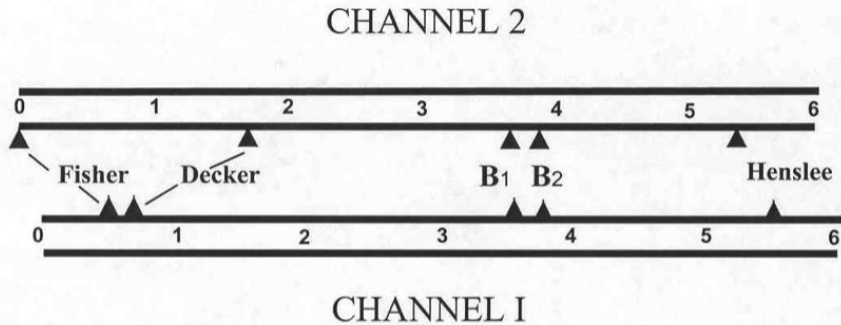


Figure 17.4. Timeline of the simulcasts (triangles) over six minute segments of Ch-1 and Ch-2. The timeline is arbitrarily synchronized to the pair of broadcasts by Sgt. Bellah (B1, B2). Regardless of which cross-talk one selects as the tie point, all other simulcasts appear to be out of synch. The greatest asynchrony occurs if one uses the Decker crosstalk, the one selected by the NRC panel.

Table 14.- *Speed corrected playback time intervals between simulcasts on the Dallas Police recordings (in seconds). Data from O'Dell (2003)*

INTERVAL	CH-1	CH-2	OFFSET
CHECK ¹ to HOLD	10	99	89
HOLD ² to YOU	174	143	31
YOU ³ to ALL ⁴	15	12	3
YOU to ATTENTION ⁵	114	90	24

1 = "I'll check it", 2 = "Hold everything secure", 3 = "You want me to hold traffic on Stemmons", 4 = "I'll check all these motorcycle radios", 5 = "Attention all emergency equipment."

Table 15. *Least squares regression of time intervals among dispatcher's time notations against expected time with and without corrections for the offsets noted in Table 16 and as discussed in the text. All times in speed corrected playback in seconds. Data from O'Dell (2003). Correlation Coefficient (r) = 0.99 for all three regressions.*

DISPATCHER NOTATIONS	EXPECTED TIMELINE	OBSERVED TIMELINE	ALTERNATIVE TIMELINE	NRC/IBM TIMELINE
12:30	0	0	0	0
12:31	60	94	94	94
12:32	120	121	121	152
12:34	240	213	213	244
12:35a	300	269	293	324
12:35b	300	300	324	355
12:36a	360	330	354	385
12:36b	360	362	386	417
SLOPE		.91	.99	1.07

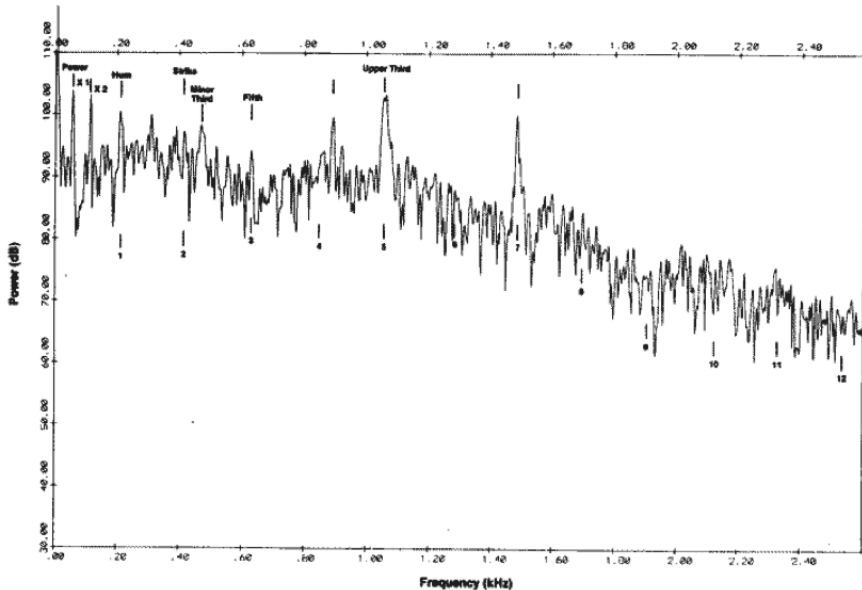


FIG. 23. ENERGY SPECTRUM OF TAPE SEGMENT CONTAINING THE SOUND OF A BELL.

Figure 17.5. Spectrogram of the bell sound on Ch-1. The internodes on the bell vibrate at harmonic frequencies which are multiples of the fundamental frequency, except for the third harmonic, the tierce note, which is characteristically a fifth above the expected octave. Note also the spectral peaks at X1 and X2 which are the 60 and 120 Hz hums from the electrical power (from BBN Report 8 HSCA 111).

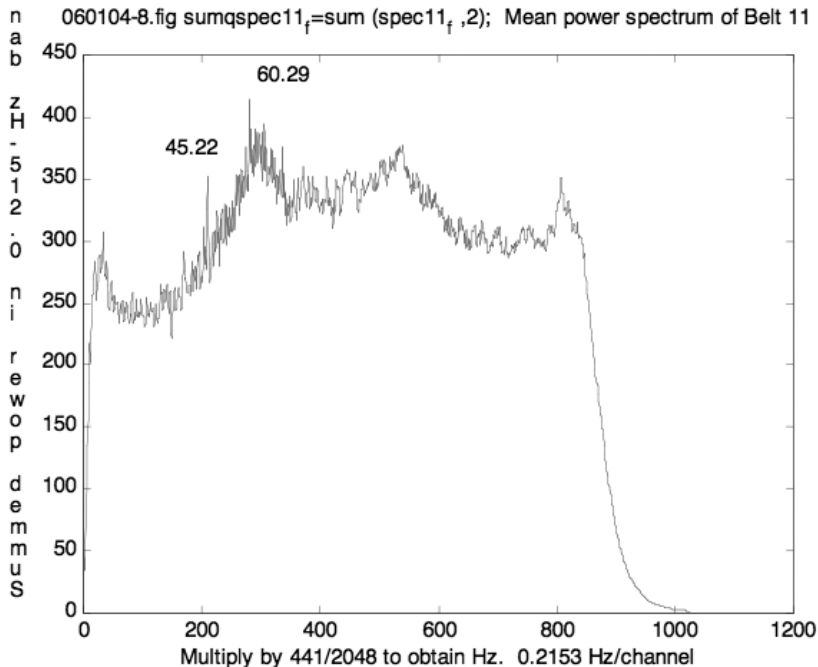


Figure 17.6. Energy spectrum of Dictabelt No. 11. The scale is expanded to expose detail yet there is only a barely perceptible 60 Hz peak with harmonic peaks around 120 and 180 (far right). This evidence suggests that the police Dictaphone was functioning properly. The plot was made by Paul Horowitz from a playback made by the Cutting Corporation in 2004.

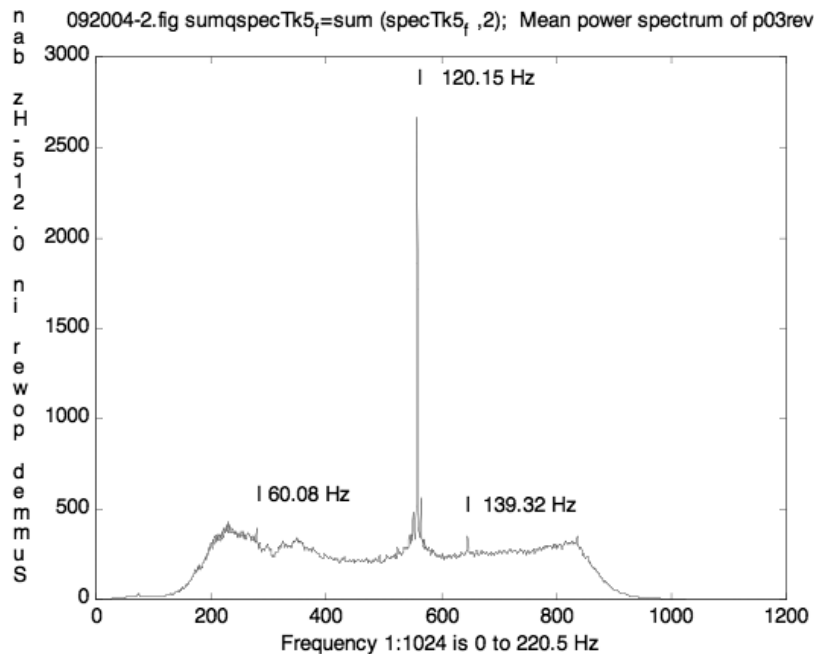


Figure 17.7. Energy spectrum of Dictabelt No. 10 shown in a plot by Paul Horowitz. A very prominent 120 Hz hum is present with a barely perceptible 60 Hz hum. This playback of Dictabelt 10 was made by the FBI in 1981 but the 120 cycle hum is present on all playbacks of number ten. The presence of the stray hum suggests that the dictabelt in the archives may be a copy and not the original.

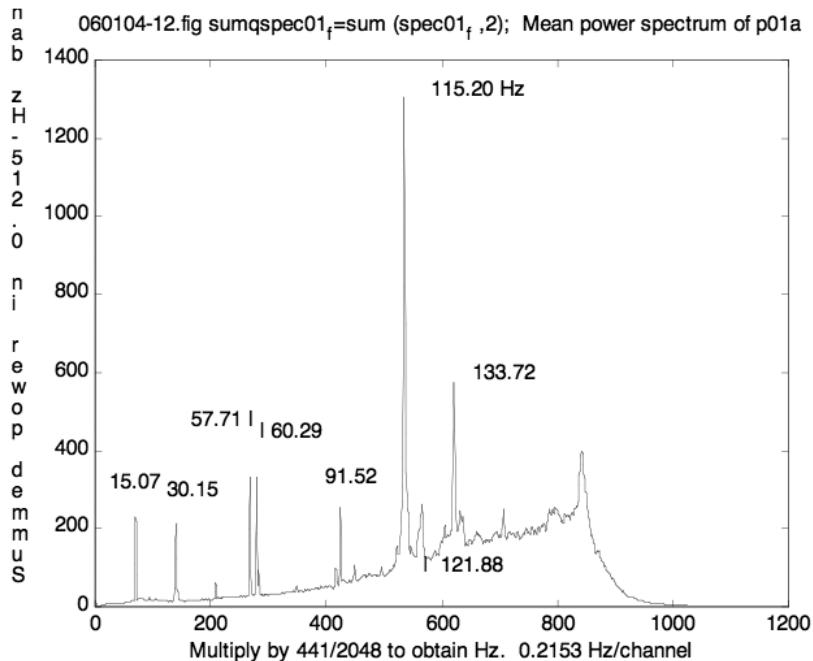


Figure 17.8. Energy spectrum of a tape recording of a playback, not an original, of Dictabelt No. 10 made by the Dallas Police in 1964. The graph prepared by Paul Horowitz reveals two 60 Hz hums and two 120 Hz hums. The playback speed was set to match the second 60 Hz hum, thus the first 60 Hz hum, at this slower playback appears at the 57 Hz position and its harmonic at 115 Hz.

Table 16. *Time coverage on Police Dictabelts from 22 November 1963 (from Scally 2004).*

BELT No.	START TIME	END TIME	COVERAGE
1	6:02	7:24	82
2	7:24	7:58	34
3	7:58	8:31	33
4	8:31	9:10	39
5	9:10	9:43	33
6	9:43	10:18	35
7	10:18	10:56	38
8	10:56	11:29	33
9	11:29	12:05	36
10	12:05	12:40	35
11	12:40	13:12	32
12	13:12	13:44	32
13	13:44	14:16	32
“1”	14:16	14:48	32

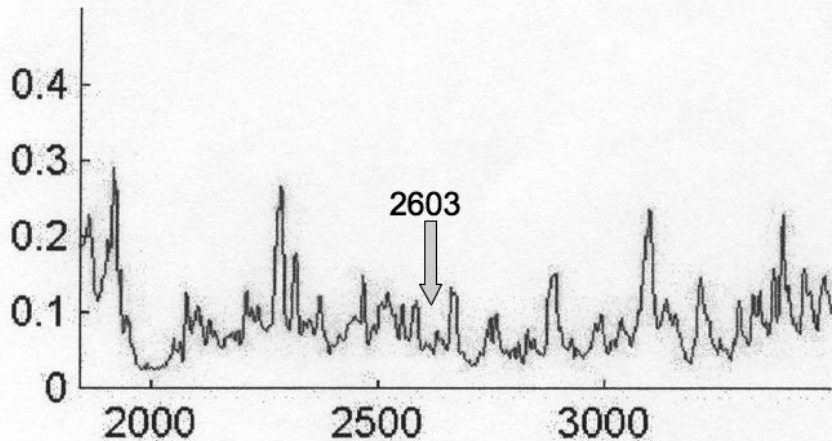


Figure 17.9. Peak correlation comparison of the frequencies surrounding the Fisher broadcasts by Linsker et al. (2005). The utterance occurs just to the right of the 2500 delay marker, actually at 2603, where no significant peak arises. The graph shows a background averaging around 0.1 with scattered “accidental” peaks, several of which are greater than 0.2 and one of which reaches 0.3.

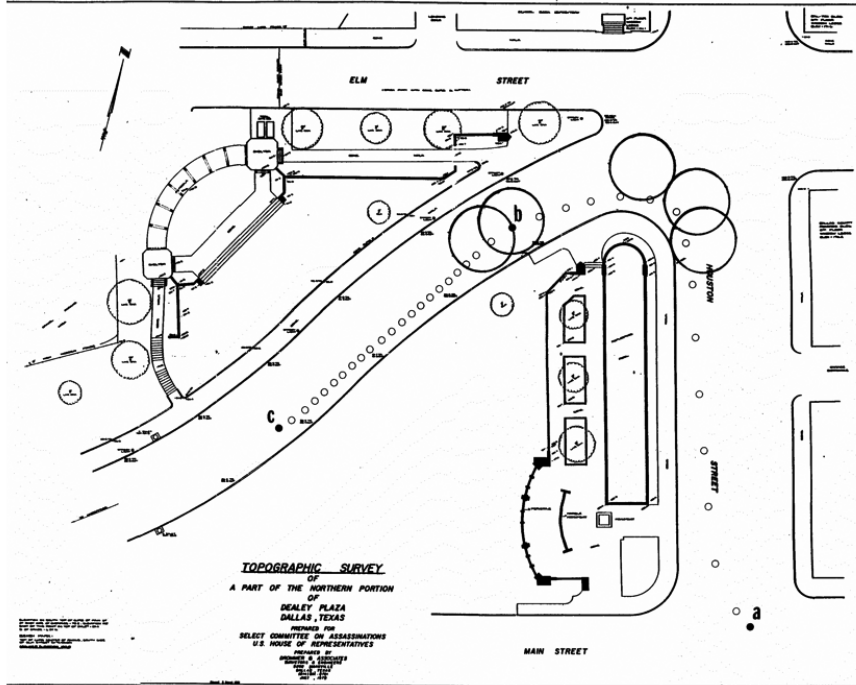


Figure 18.1. The hypothesized location of McLain's motorcycle at one second intervals (open dots) between where it was filmed by Robert Hughes (a) and photographed by Wilma Bond (c). Predicted location during each successive shot shown by large circles with (b) the identified location at the time of the grassy knoll shot.

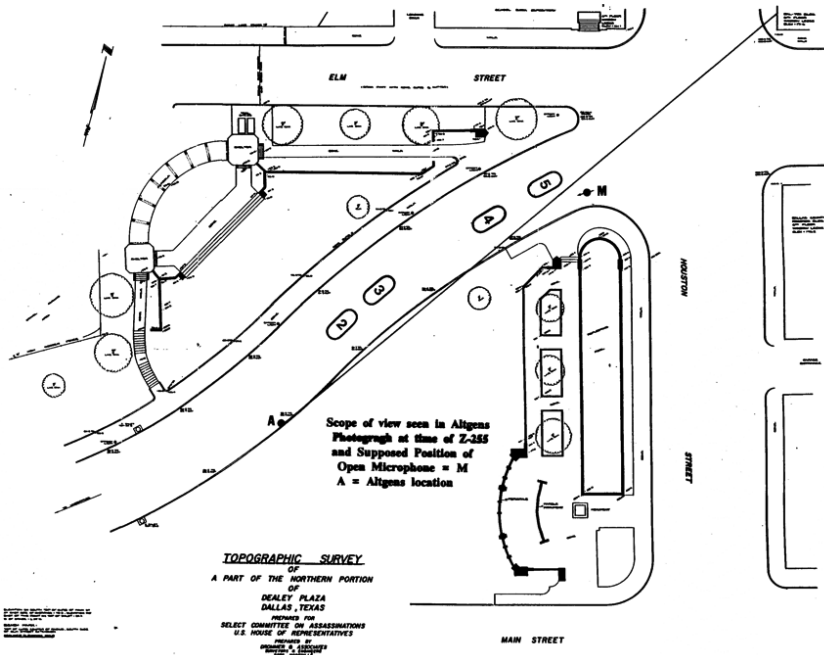


Figure 18.4. Plat of Dealey Plaza showing that Altgens' right hand scope of view ended in line with the Dal-Tex building and does not include the area where the acoustics predicts the open microphone (M) to be.

Table 18. Sequence of filmed events relative to the fatal shot at Z-313

FILM FRAME	EVENT	TIME (seconds) from Z-313
Wiegman-1	Mayor's car turning on to Elm	-3 sec
Wiegman (+2 sec)	Mayor's car under signal	-1.5 sec
Dorman-1	Mayor's car under signal	-1.5 sec
Dorman (+5 - 7.5 sec)	Cop at corner	+3 - 5.5 sec
Zapruder 360-405	Mrs. JFK on trunk	+2.5 - 5 sec
Zapruder 448	Limo at underpass	+8 sec
Wiegman (+10 sec)	Limo at underpass	+8 sec
Wiegman (+26 sec)	Hester rises	+24 sec
Bell	Hester rises	+24 sec
Bell	McLain passes Hargis	+23 sec

Table 19. Synchronization of cinematic and acoustical events during the assassination. The anchor point, the fatal shot at Z-313, is time zero (T_0).

AUDIO			FILM			
ACOUSTICAL IMPULSE	ELAPSED ^a TAPE TIME	TIME ^b FROM T_0	Z-FRAME EQUIVA-LENT	Z-FRAME ^c BLUR	Z-FILMED REACTIONS	Z-FILM EVENT
1	136.2	-9.1	Z-146	Z-152	Z-162-167	(A)
2	137.7	-7.6	Z-175	Z-189	Z-194-207	(B)
3	139.3	-5.9	Z-204	-	Z-202	(C)
4	140.3	-4.8	Z-224	Z-227	Z-224	(D)
5	144.9	0	Z-312	Z-313	Z-313	(E)
6	145.6	+0.7	Z-326	Z-330	-	(F)