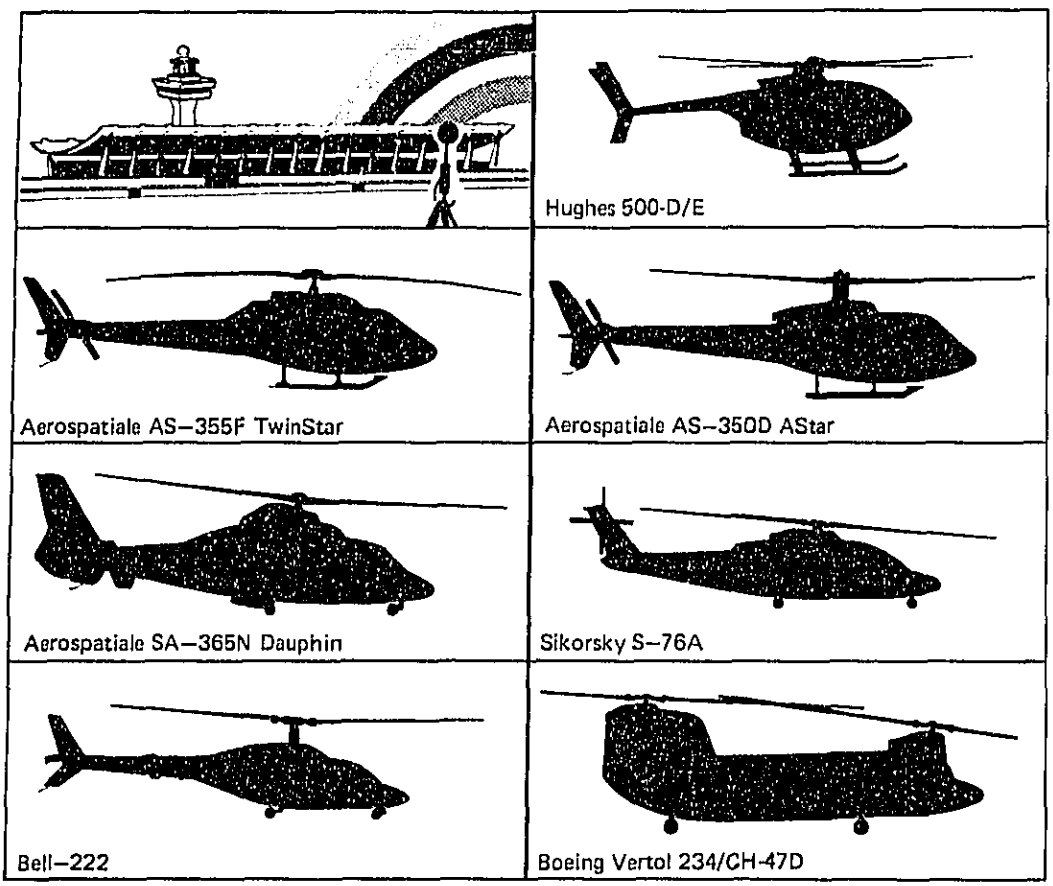
US.Department
of Transportation
Federal Aviation Administration

Report No.
FAA–EE–86–01

March 1986

Analysis of Helicopter Noise Data Using International Helicopter Noise Certification Procedures

Office of Environment and Energy
Washington, D.C. 20591



Document is available to the U.S.
public through the National
Technical Information Service
Springfield, Virginia 22161

by
J. Steven Newman
Edward J. Rickley
Dennis A. Levanduski
Susan B. Woolridge

NOTICE

The United States Government does not endorse products or manufacturers. Trade or manufacturers' names are used as necessary in documenting the subject test program.

Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
FAA-EE-86-01		

4. Title and Subtitle
Analysis of Helicopter Noise Data Using International Helicopter Noise Certification Procedures

5. Report Date
March 1986

6. Performing Organization Code

7. Author(s) J. Steven Newman, Edward J. Rickley (1), Dennis A. Levanduski (2), Susan B. Woolridge (2)

8. Performing Organization Report No.

9. Performing Organization Name and Address
Federal Aviation Administration, Office of Environment and Energy, Noise Abatement Division, Noise Technology Branch, (AEE-120), 800 Independence Ave., SW Washington, DC 20591

10. Work Unit No. (TRAIS)

11. Contract or Grant No.

13. Type of Report and Period Covered

12. Sponsoring Agency Name and Address
Federal Aviation Administration, Office of Environment and Energy, Noise Abatement Division, Noise Technology Branch, (AEE-120), 800 Independence Ave., SW Washington, DC 20591

14. Sponsoring Agency Code

15. Supplementary Notes
(1) U.S. DOT, Transportation Systems Center, Kendall Square, Cambridge, Mass 02142
(2) ORI, Inc., 1375 Piccard Drive, Rockville, MD 20850

16. Abstract

This report documents the results of a Federal Aviation Administration (FAA) noise measurement flight test program involving seven helicopters and establishes noise levels using the basic testing, reduction and analysis procedures specified by the International Civil Aviation Organization (ICAO) for helicopter noise certification supplemented with some procedural refinements contained in ICAO Working Group II recommendations for incorporation into the standard. The helicopters analyzed in this report include the Hughes 500 D/E, the Aerospatiale AS 350D (AStar), the Aerospatiale AS 355F (TwinStar), the Aerospatiale SA 365 (Dauphin), the Bell 222 Twin Jet, the Boeing Vertol 234/CH 47-D, and the Sikorsky S-76. The document discusses the evolution of international helicopter noise certification procedures and describes in detail the data acquisition, reduction and adjustment procedures. Noise levels are plotted versus the logarithm of maximum gross takeoff weight and are shown relative to the ICAO noise level limits. Data from the ICAO Committee on Aircraft Noise (CAN) Seventh meeting "request for data" are also presented. Reference testing and operational data are provided for each helicopter.

17. Key Words	18. Distribution Statement
helicopter, noise, heliport environmental impact, ICAO noise certification standards, aircraft noise, heliport, ICAO Annex 16	This document is available to the public through the National Technical Information Service, Springfield, VA 22161

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	283	

Form DOT F 1700.7 (8-72) Reproduction of completed page authorized

ACKNOWLEDGEMENTS

The authors would like to especially thank Mr. Graham Watson of TSC for his assistance in processing and reducing acoustical and tracking data.

TABLE OF CONTENTS

List of Tables

List of Tables (continued)

List of Figures

List of Figures (continued)

GLOSSARY

AGL	-	Above ground level
AIR	-	Aerospace Information Report
AL	-	A-weighted sound level (L_A), in decibels (abbreviation)
AL_M	-	Maximum A-weighted sound level (L_{AM}), in decibels (abbreviation)
ALT	-	Aircraft altitude above the microphone location
APP	-	Approach operational mode
CAN		Committee on Aviation Noise
CAEP		Committee on Aircraft Environmental Protection
CLC	-	Centerline center
CPA	-	Closest point of approach
d	-	Distance
dB	-	Decibel
dBA	-	A-weighted sound level (L_A), in decibels
df	-	Degree of freedom
Δ	-	Delta, or incremental change in value
Δ 1	-	Correction term obtained by correcting SPL values for atmospheric absorption and flight track deviations per FAR 36, Amendment 9, Appendix A, Section A36.11, Paragraph D
DUR(A)	-	"10 dB-Down" duration of L_A time history
EPNL	-	Effective Perceived Noise Level
EV	-	Event, test run number
FAA	-	Federal Aviation Administration
FAR	-	Federal Aviation Regulation
FAR-36	-	Part 36 of the Federal Aviation Regualtion
GLR	-	Graphic level recorder

HIGE	–	Hover in ground effect
HOGE	–	Hover out of ground effect
IAS	–	Indicated airspeed
ICAO	–	International Civil Aviation Organization
IRIG-B	–	Inter-Range Instrumentation Group B (established technical time code standard)
KIAS	–	Knots Indicated Airspeed
K(P)	–	Propagation constant describing the change in noise level with distance
K(S)	–	Propagation constant describing the change in SEL with distance
Kts	–	Knots
L_A	–	A-weighted sound level, in decibels (symbol for)
Leq	–	Equivalent sound level, in decibels
LFO	–	Level flyover operational mode
M_A	–	Advancing-blade tip Mach number
MGTOW		Maximum gross takeoff weight
M_R	–	Rotational Mach number
M_T	–	Translational Mach number
N	–	Sample size
NWS	–	National Weather Service
$OASPL_M$	–	Maximum overall sound pressure level in decibels
PISLM	–	Precision Integrating Sound Level Meter
PNLm	–	Maximum Perceived Noise Level
PNLTm	–	Maximum Tone Corrected Perceived Noise Level
POP	–	Photo overhead positioning systems
RH	–	Relative humidity in percent
RPM	–	Revolutions per minute

SAE	-	Society of Automotive Engineers
SEL	-	Sound Exposure Level, in decibels. The integration of the AL time history, normalized to one second (symbol is L_{AE})
SEL_{AM}	-	As measured sound exposure level
$SEL-AL_M$	-	Duration correction factor
SHP	-	Shaft horsepower
SLR	-	Single lens reflex (35 mm camera)
SPL	-	Sound pressure level
T	-	Ten dB down duration time
TC	-	Tone correction calculated at PNLTm
T/O	-	Takeoff
TOH		Time at Overhead
TSC	-	Department of Transporation, Transportation Systems Center
V	-	Velocity in knots or meters per second depending on context
VASI	-	Visual Approach Slope Indicator
V_H	-	Maximum speed in level flight with maximum continuous power
V_{NE}	-	Never-exceed speed
Vy	-	Velocity for best rate of climb

1.0 INTRODUCTION

One of the program objectives of the 1983 Federal Aviation Administration (FAA) noise measurement/flight test program was to further explore the helicopter noise certification process and learn from practical application of existent standards.

This report provides EPNL values derived from a flight test program which used the basic helicopter noise certification testing, reduction and analysis procedures of the International Civil Aviation Organization (ICAO), Annex 16, as amended at the seventh meeting of the ICAO Committee on Aircraft Noise (CAN/7) along with many of the proposed refinements of the recent Working Group (WG) II report from the October 1985 meeting in Ottawa. The WG II recommendations will be considered at the first meeting of Committee on Aviation Environmental Protection (CAEP) in Montreal in June 1986. The detailed procedures used in this report are described in section 5 and 6. The levels have been developed through a rigorous process and represent the specified conditions.

The helicopters addressed in this report include the Hughes 500 D/E (Hughes is now a subsidiary of McDonnell Douglas Corporation), the Aerospatiale AS 350D (AStar), the Aerospatiale AS 355F (TwinStar), the Aerospatiale SA 365N (Dauphin), the Bell 222 (Twin Jet), the Boeing Vertol 234/CH 47-D, and the Sikorsky S-76A.

This document is a companion report to a series of seven previously published reports (known as the "Rainbow" reports) which describe the acoustical characteristics of the helicopters and provide analyses and discussions addressing topics ranging from acoustical propagation to the environmental impact of helicopter noise.

The helicopter noise measurement flight test program for the seven helicopters was conducted by the FAA at Dulles International Airport during the summer of 1983. Acoustical, trajectory, and meteorological data were collected during these controlled tests. All of the tests were conducted by the FAA in cooperation with the helicopter manufacturers and were supported by a number of other Federal agencies.

The test program was designed to address a series of objectives including: 1) the acquisition of acoustical data for use in heliport environmental impact analyses, 2) the documentation of directivity characteristics for static operation of helicopters, 3) the establishment of ground-to-ground acoustical propagation relationships for helicopters, 4) the determination of noise event duration influences on energy dose acoustical metrics, 5) the examination of the differences between noise measured by surface microphones and microphones mounted at a height of four feet (1.2 meters), and 6) the documentation of noise levels acquired using international helicopter noise certification test procedures. This report specifically addresses the last objective.

For further information consult the previously published "Rainbow" reports (Ref. 1 through Ref. 7). Also, Appendix J of this document contains errata for those seven reports.

2.0 TEST HELICOPTERS

Table 2.0-1 on pages 4,5, and 6 provides a listing of the helicopters examined in this report along with important reference characteristics. One might note that Appendix H contains the same table using units of knots/pounds/feet/seconds and degrees in Fahrenheit.

Helicopter Characteristics
mps/kg/meters/seconds/C

TABLE 2.0-1A

	MANUFACTURER	Hughes	Aerospatiale	Aerospatiale	Aerospatiale	BELL Heli TEXTR	Sikorsky Aircra	Boeing Vertol
	TYPE	Single Rotor	Single Rotor	Single Rotor	Single Rotor	Single Rotor	Single Rotor	Tandem Rotor
	MODEL	500D	AS 350D AStar	AS 355F Twinsta	SA 365N Daup 2	BELL 222	S-76A	234
	YEAR OF 1ST C.A.	1976	1978	1981	1981	1979	1978	1981
	DATA SOURCE	Hughes	Aerospatiale	Aerospatiale	Aerospatiale	BELL Heli TEXTR	Sikorsky Aircra	Boeing Vertol
	MAX T/O MASS (MTOM) kg	1361	1951	2300	3850	3560	4672	21999
	LOG(MTOM)	3.13	3.29	3.36	3.59	3.55	3.67	4.34
P	MODEL	Det Die Allison	Lycoming LTS	Allison	Turbomeca	Lycoming LTS	Detroi Die All	Lycoming
O		250-C20B	101-600A2	250C20f	ARRIEL 1C	101-650C-3	250-C30	T53-L-712
W	NO. OF ENGINES	1	1	2	2	2	2	2
E	MTOP (kw)/ENGINE	280	459	313	529	429	504	3039
R	TOTAL POWER (kw)	280	459	626	1058	858	1008	6078
R	NO.OF BLADES	5	3	3	4	2	4	3
O	DIAMETER (m)	8.05	10.70	10.69	11.93	12.12	13.41	18.29
T M	RPM	492	386	394	365	348	293	225
O A	RPS	8.20	6.43	6.57	6.08	5.80	4.88	3.75
R I	ROT TIP SPEED (m/s)	207.36	216.26	220.53	228.00	220.84	205.73	215.47
N	ISC R-TIP MACH #	0.6094	0.6355	0.6481	0.6701	0.6490	0.6046	0.6332
	Fund BPF (Hz)	41.00	19.30	19.70	24.33	11.60	19.53	11.25
	ROTATION DIR (Note 1)	CCW	CW	CW	CW	CCW	CCW	FRONTAL - CCW REAR - CW (Note 2)
S	NO. OF BLADES	4	2	2	13	2	4	*
Y	DIAMETER (m)	1.40	1.86	1.86	0.90	1.98	2.44	*
S T	RPM	3210	3043	3068	4706	1881	1411	*
T A	RPS	34.83	34.05	34.80	78.43	31.35	24.85	*
T I	ROT TIP SPEED (m/s)	141.65	198.97	203.35	221.77	195.01	205.82	*
L	ISC R-TIP MACH #	0.4751	0.5847	0.5976	0.6517	0.5731	0.6049	*
	Fund BPF (Hz)	147.33	68.10	69.60	1019.63	62.70	107.40	*
	ROTATION DIR (Note 3)	R/F	F/R	F/R	F/R	F/R	F/R	*
	MOUNTING SIDE	LEFT	RIGHT	RIGHT	MIDDLE (Note 4)	LEFT	LEFT	*

(continued)

Helicopter Characteristics
mps/kg/meters/seconds/C

TABLE 2.0-1B

		Hughes Single Rotor 500D	Aerospatiale Single Rotor AS 350D AStar	Aerospatiale Single Rotor AS 355F Twinstar	Aerospatiale Single Rotor SA 365N Dauph 2	BELL Heli TEXTR Single Rotor BELL 222	Sikorsky Aircra Single Rotor S-76A	Boeing Vertol Tandem Rotor 234
TAKEOFF	TEST SERIES	I	E	E	E	K	F	G
	AVG TEST TEMP (C)	28.0	24.0	20.0	16.3	36.5	22.0	31.1
	AVG TEST IAS (m/s)	30.37	27.17	28.48	38.61	33.37	40.41	42.21
	AVG TEST DRC (m/s)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	AVG TEST CLIMB ANGLE (degrees)	13.15	14.41	15.55	6.15	15.65	9.69	9.43
	TEST CLC AVG ALTITUDE (m)	120	179	183	101	223	122	99
	REFERENCE VALUES							
	REF Vy (m/s)	31.92	28.31	28.31	38.61	33.46	38.10	43.76
	REF DRC (m/s)	9.65	8.89	9.50	8.13	8.13	6.86	5.69
	REF CLIMB ANGLE (degrees)	17.60	18.30	19.60	12.20	14.10	10.30	7.50
	REF. ALT. CLC (m)	178.61	185.92	197.80	128.00	145.39	111.56	85.65
APPROACH	TEST SERIES	F	F	F	F	L	I	H
	AVG TEST TEMP (C)	26.0	27.8	21.0	20.3	26.5	28.0	32.2
	AVG TEST IAS (m/s)	31.57	33.35	31.97	39.00	33.46	38.10	42.30
	AVG APPROACH ANGLE (degrees)	5.58	5.87	6.10	5.37	6.98	5.43	7.34
	REFERENCE TABLE							
	REF AIRSPEED (m/s)	31.92	28.31	28.31	38.61	33.46	38.10	43.76
	REF APPROACH ANGLE (degrees)	6	6	6	6	6	6	6
	REF ALTITUDE CLC (m)	120	120	120	120	120	120	120

(continued)

Helicopter Characteristics
mps/kg/meters/seconds/C

TABLE 2.0-1C

	Hughes Single Rotor 500D	Aerospatiale Single Rotor AS 350D AStar	Aerospatiale Single Rotor AS 355F Twinstar	Aerospatiale Single Rotor SA 365N Daup 2	BELL Heli TEXTR Single Rotor BELL 222	Sikorsky Aircra Single Rotor S-76A	Boeing Vertol Tandom Rotor 234
TEST SERIES	A	A	A	A	C	B	A
AVG TEST RPM	490	385	390	355	346	293	225
AVG TEST IAS (m/s)	55.60	58.07	59.18	47.23	45.38	65.38	68.83
AVG TEST TEMP (C)	31.0	28.0	19.0	19.0	30.0	17.0	22.2
AVG TEST ADV MACH NO.	0.7498	0.7870	0.8098	0.6434	0.8201	0.7940	0.8252
REFERENCE VALUES							
REF RPM	(Note 5) 491	386	394	345	348	293	225
REF AIRSPEED (m/s)	64.38	58.17	58.17	49.50	65.38	66.92	69.46
REF TEMP (C)	15	15	15	15	15	15	15
REF ADV MACH NO	0.7986	0.8044	0.8190	0.6748	0.8409	0.8014	0.8374

Note 1 - Main rotor observations taken from looking down on helicopter. Main rotor abreviations: CW - clockwise, CCW - counter clockwise.
Note 2 - Boeing has 2 main rotors. Observations taken by looking down on helicopter.
Note 3 - Tail rotor observations taken from left side of helicopter. Tail rotor abreviations: R/F -rear to front, F/R - front to rear.
Note 4 - Dauphin 2 has a fenestron tail rotor.
Note 5 - Hughes 500D, 492 RPM is defined as 100%.

(End Table 1)

3.0 HELICOPTER NOISE CERTIFICATION DEVELOPMENT: BACKGROUND & REFERENCE CONDITIONS

3.1 BACKGROUND

This section reviews the evolution of international and domestic helicopter noise certification standards. An enormous amount of effort on the part of government and industry has led to the current ICAO noise standard, which is essentially an "umbrella" standard established primarily to insure that future helicopter designs are not substantially noisier than older models which easily meet this standard. The following list identifies the "highlights" in the seventeen year process leading to the recent publication of proposed U.S. helicopter noise standards.

1. January 1969 - FAA conference on Short Takeoff and Landing (STOL) Transport Aircraft Certification which included helicopters

2. November - December 1969 - ICAO Special Meeting on Aircraft Noise in Vicinity of Aerodromes - Annex 16 drafted

3. November 1971 - 2nd ICAO meeting (CAN/2) on airport noise that established working group on V/STOL (V - vertical, STOL - Short Takeoff and Landing) aircraft

4. March 1973 - 3rd ICAO meeting (CAN/3) including studies on V/STOL standards

5. December 1973 - FAA Advance Notice of Proposed Rulemaking (ANPRM), (Notice No. 73-32; 38 FR 35487): Helicopter Noise Standards

6. January - February 1975 - 4th ICAO meeting (CAN/4) STOL recommendations for airports noise standards

7. November 1976 - 5th ICAO meeting (CAN/5), continuation of studies of V/STOL aircraft standards

8. May - June 1979 - 6th ICAO meeting (CAN/6), specific recommendations for standards for helicopters proposed to ICAO Annex 16

9. July 1979 - United States, FAA Issued Notice of Proposed Rulemaking 79-13, Helicopter Noise Standards

10. November 1981 - Withdrawal of FAA Notice of Proposed Rulemaking 79-13, Helicopter Noise Standards

11. May 1983 - 7th ICAO meeting (CAN/7), specific recommendations to alter noise standards for helicopters to relax stringency due to economic effects

12. October 1985 - ICAO Working Group II, Helicopter Noise Measurement Repeatability Program recommendations

13. November 1985 - ICAO Helicopter Noise Limits effectivity date

14. March 1986 - FAA issued Notice of Proposed Rulemaking 86-3, Helicopter Noise Standards

3.2 DEFINITION OF REFERENCE CONDITIONS

In order to assure an equitable, consistent, and repeatable noise level evaluation process, reference testing conditions have been established. Each parameter defined as a reference parameter would contribute to variability in data if that parameter were not constrained. The data adjustment process described in Sections 5 and 6 below involve, in each case, adjustments from test environmental or operational conditions to reference conditions. The reference conditions established for each helicopter are summarized in Table 2.0-1.

3.3 PRE-PUBLICATION COMMENTS FROM MANUFACTURERS

All the manufacturers of the tested helicopters were given the opportunity to comment on the first (advance) draft of this report in order that they might evaluate the reported noise levels and comment on other aspects of the report.

It is interesting, distressing and instructive to note the difficulties in identifying reference operational parameters. All reference parameters utilized in the original Rainbow (1983) noise measurement flight tests were provided by manufacuters representatives. As seen below, upon review several years later, different manufacturers' representatives have in all earnestness provided slightly different values. This occurrence has not been uncommon in the pre-certification learning process. Responding to this "problem in specificity", members of the international helicopter noise certification community have joined in efforts to define more rigorously reference parameters in the current ICAO-CAEP, Working Group (WG) II, Helicopter Noise Measurement Repeatability Program (HNMRP).

Comments received from the manufacturers of the test helicopters and the estimated effects of changed parameters are sumarized in the following paragraphs:

McDonnell Douglas Helicopter Company 500 D/E (formerly Hughes 500 D/E)

In the case of the Hughes 500 D/E, the manufacturer identified a slightly different value for Vy (the speed for the best rate of climb) and the value for BRC (the best rate of climb):

1983 values: Vy = 31.92 m/s, BRC = 9.65 m/s, Ref. Alt. = 178.61 m

1986 values: Vy = 32.93 m/s, BRC = 9.52 m/s, Ref. Alt. = 164.3 m

The lower altitude associated with the 1986 information would increase the EPNL by approximately 0.5 decibels.

Hughes also specified a different value of Vh, identifying 122.4 knots as opposed to 125 knots. This minor difference results in a difference in advancing Mach number from 0.7986 to 0.7952. In the case of the 500 D/E, the PNLTm vs. advancing Mach function is rather shallow and indeterminate

at the centerline site for the acquired test data. Therefore one would not expect much difference in the three microphone average noise level.

The lack of PNLTm dependency on advancing Mach number at the center site for the 500 D/E remains an area for further investigation.

In any event these comments further emphasize the need to tie the reference airspeed to an unambiguous value as recommended in the Ottawa ICAO WG II report (Reference 4).

Aerospatiale Dauphin

In a March 5 telecopieur (facsimile) Aerospatiale (Marignane, France) provided data which permitted the estimation of sideline-right noise levels on the approach operation. (Equipment malfunction resulted in the loss of FAA/TSC recorder data at that site.) Utilizing the Aerospatiale data along with data from the French Service Technique de la Navigation Aerienne (STNA), it was determined that the average difference in left-side to right-side noise levels from four test programs was 2.82 decibels as seen in Table 3.3-1. Using these manufacturer furnished data, right-side levels were estimated in Table 3.3-1 and used in computing the three microphone average EPNL.

Aerospatiale (Marignane) identified reference level flyover conditions as:

Vh = 154 knots
RPM = 362
Weight = 3850 Kg
Temperature = 15 degrees C

Using ICAO Annex 16 provisions allowing establishment of the reference speed as .45 Vh plus 65 knots one arrives at a reference speed of 134.3 knots (69.09 m/s).

This is in contrast to the 135 knot airspeed used in this report as a reference value.

A more significant difference is the rotor speed which Aerospatiale (Marignane) identified as 362 RPM in contrast to the previously provided value of 365 (Aerospatiale, Grand Prarie Texas).

The result of these differences is a 0.8675 advancing Mach number rather than the 0.8748 advancing Mach number used in this report.

This difference in Mach value would lower EPNL values by approximately 0.6 dB according to Aerospatiale data. Data acquired in the 1983 FAA program indicates approximately a 0.4 dB difference associated with this difference in Mach number.

TABLE 3.3-1

LEFT SIDE / RIGHT SIDE EPNdB ANALYSIS: SA 365N DAUPHIN

TEST	EPNdB LEFT	EPNdB CENTER	EPNdB RIGHT	3 MIC AVERAGE	L - R	C - L	C -R
N.5100	91.00	96.40	90.40	92.60	0.60	5.40	6.00
N1.6011	93.00	94.50	90.10	92.53	2.90	1.50	4.40
G.6009	92.50	95.50	88.80	92.27	3.70	3.00	6.70
N.6015	93.50	93.40	89.40	92.10	4.10	-0.10	4.00
AVERAGE	92.50	94.95	89.68	92.38	2.82	2.45	5.28
N.FAA EPNdB	95.50	95.90	NA	NA	NA	0.40	NA

REFERENCE TELEX/TELECOPIEUR 5-MAR-86, FROM H. J. MARZE, AEROSPATIALE
ANALYSIS DATE: 7-MAR-86

Aerospatiale provided the following summary/comparison table (in a March 14 telecopieur/facsimile message) showing noise levels from one of their test programs along with Dauphin data contained in this report (right-side approach adjusted per procedure described above).

TABLE 3.3-2

Aerospatiale Summary EPNL Data
(telecopieur March 14, 1986)

		Left	Center	Right	Avg	Data
Approach	FAA	95.54	95.86	92.21	94.70	+2.07
	AS	90.99	96.42	90.35	92.63	
Level	FAA	91.90	90.43	90.26	91.01	+0.08
Flyover	AS	90.90	91.66	90.24	90.93	
Takeoff	FAA	93.83	96.38	87.78	92.67	+1.36
	AS	97.70	94.03	87.20	91.31	

The differences shown in the right column demonstrate excellent agreement for level flyover, a 1.36 dB difference for takeoff and a 2.07 dB difference on approach. Comparisons with the full results from the other test programs (see Table 3.3-1) were not possible. Differences in the reported levels have been analyzed in detailed comments submitted to the FAA by Aerospatiale.

Aerospatile identifies several differences between French program analysis procedures and those employed in the FAA programs, specifically: analyzer dynamic response, treatment of ambient noise, bandsharing of tones, mass change corrections, and correction procedures. French data have been

adjusted using sensitivity curves, while correction algorithms have been used with FAA data. The French program has used continuous tracking while the FAA program has employed three "enhanced" photo-altitude systems with Doppler "Time Overhead" (TOH) flight path synchronization.

Aerospatiale notes that level flyover data in this report is adjusted to a 15 degree C reference value while their test data was adjusted to 25 degree C. Other differences such as rotor speed and IAS result in a net change in Mach number which translates to a 0.5 to 1.5 dB difference in EPNL, depending on values employed.

Wind influences aloft in the FAA test (wind at altitude unidentified in French program) were mentioned as factors possibly influencing source emission characteristics.

In the FAA test approach operation cross winds from the left at 5 to 8 knots were identified as likely factors in elevated left side noise levels seen in only one of four French measurement programs.

It was noted that takeoff performance for the Dauphin in the FAA test was below the anticipated reference although the 25% deviation was within the allowable ICAO adjustment window.

Although high humidity was cited as a possible source of differences for level flyover the influence is not considered to be significant because atmospheric attenuation at controlling frequencies is independent of humidity above approximately 60% RH. Further as FAA microphones are electret type, there is no problem of arcing which is typical at high humidity for condenser microphones.

The reader may refer to detailed test descriptions in each of the separate Rainbow reports for further information useful in comparing Rainbow data with other program data.

The authors of this document wish to thank Aerospatiale for their thorough and insightful examination of the noise levels in this document within the context of FAA-EE-84-2 and their own measurement experience.

OTHER COMMENTS

Telephone comments received from other manufacturers (Boeing Vertol, Sikorsky and Bell) involved requests for:

-elaboration on topics related to data acquisition

-elaboration on specific data adjustment and testing procedures

These requests have been addressed.

4.0 DATA ACQUISITION

This section describes the noise measurement flight test program data acquisition systems.

4.1 MEASUREMENT FACILITY

The noise-measurement flight-test site was adjacent to the approach end of Runway 12 at Dulles International Airport. This location was chosen because of the low ambient noise level, positive air traffic control, security, and availability of emergency equipment.

The test area was nominally flat, with a ground cover of short, clipped grass, approximately 1800 feet by 2200 feet, and was bordered on the north, south, and west by woods.

Runway 12/30 was closed during the test so that interference from other aviation activity would be minimal. Airport traffic continued to operate on runways approximately two and three miles east of the test site.

4.2 MICROPHONE LOCATIONS

Figure 4.2-1 is a diagram of the test site detailing the location of the eight microphone locations which made up the two measurement arrays. One array was used for flight operations, the other for static operations.

The microphone array for flight operations consisted of two sideline sites, numbered 2 and 3 in Figure 4.2-1, and three centerline sites, numbered 5, 1, and 4, located directly below the flight path of the helicopter. The north sideline site, numbered 3, was located in a lightly wooded area and was offset 46 feet to the west to provide sufficient clearance from surrounding trees and bushes. The ICAO helicopter noise certification array consisted of sites 1, 2, and 3. Adjustments were made to the site 3 data accounting for the offset.

4.3 FLIGHT PATH MARKERS AND THE APPROACH GUIDANCE SYSTEM

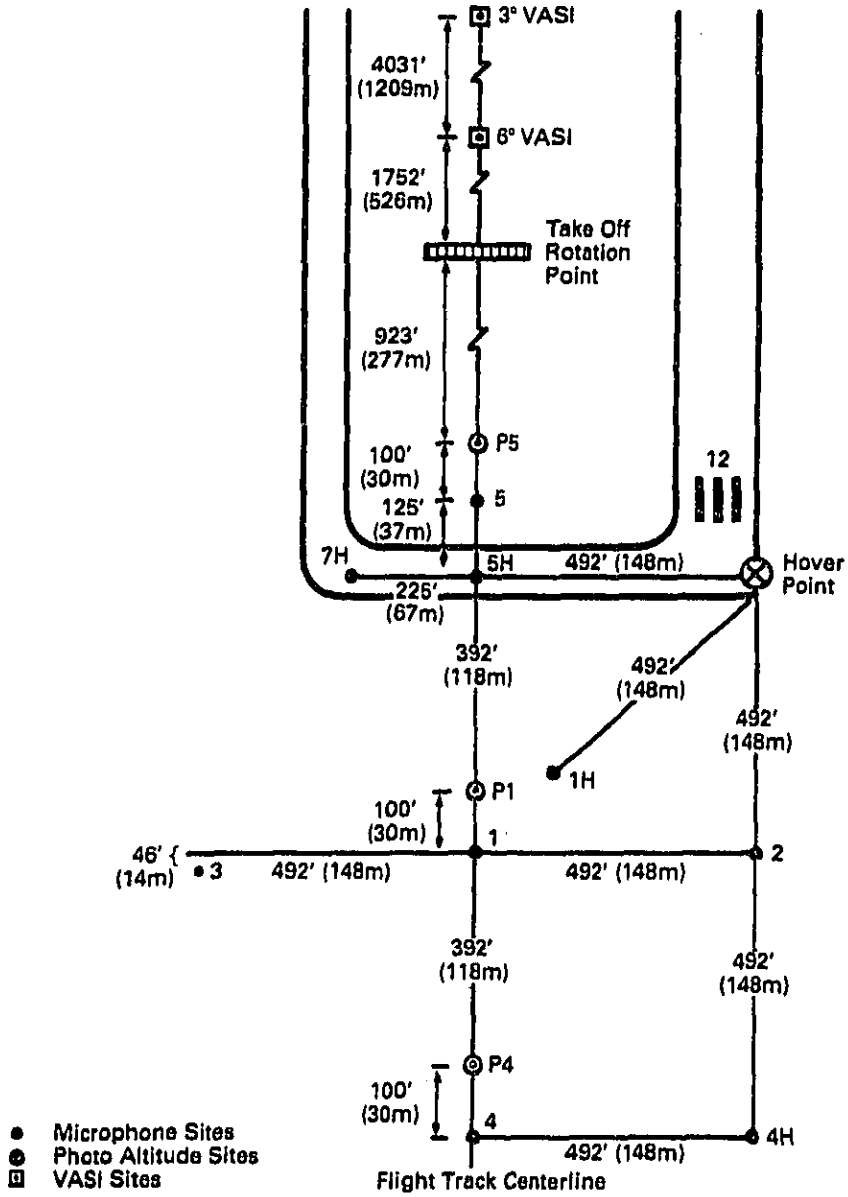
The takeoff rotation point was defined by markers which were constructed of squares of plywood painted bright yellow with a black "X" in the center. The takeoff rotation point was located 1640 feet (500m) from the center-line center microphone location. Four portable battery-powered spotlights were situated at various locations to assist pilots in maintaining a proper flight path over the centerline microphone array.

Approach guidance was provided to the pilots by means of a Visual Approach Slope Indicator (VASI) and through verbal commands from an observer using a balloon-tracking theodolite. Both methods assisted the helicopter pilots in adhering to the centerline microphone array and in maintaining the proper approach path.

The VASI system used during the tests was a three-light arrangement giving vertical displacement information within +/- 0.5 degrees of the reference

FIGURE 4.2-1

Noise Measurement and Photo Site Schematic



NOTES: Broken Line Indicates not to Scale.
Metric Measurements to
Nearest Meter.

approach slope. The pilot observed a green light if the helicopter was within 0.5 degrees of the approach slope, red if below the approach slope, and white if above the approach slope.

The theodolite system, used in conjunction with the VASI, provided accurate approach guidance to the pilot. A brief time lag existed between the instant the theodolite observer perceived deviation, transmitted a command, and the pilot made the correction. The theodolite crew, however, was generally able to alert the pilot of approach path deviations (slope and lateral displacement) before the helicopter exceeded the limits of the one degree green light span of the VASI. Thus, the helicopter only occasionally and temporarily deviated more than 0.5 degrees from the reference approach path.

4.4 PHOTO-ALTITUDE DETERMINATION SYSTEM

The helicopter altitude over a given microphone during a given event was determined by the photographic technique described in the Society of Automotive Engineers AIR-902 (Ref. 9). This technique involves photographing an aircraft during a flyover event and proportionally scaling the resulting image with the known dimensions of the aircraft. The camera is initially calibrated by photographing a test object of known size, from a known distance. Measuring the resulting image enables calculation of the effective focal length from the proportional relationship:

(Image Length/Object Length) = (Effective Focal Length/Object Distance)

This relationship is used to calculate the distance from the microphone to the aircraft. Effective focal length is determined during camera calibration. Object length is determined from the physical dimensions of the aircraft and the image size is measured on the photograph. These measurements lead to the calculation of object distance or slant distance from camera (or microphone) to the aircraft. The concept applies similarly to measuring an image on a print, or measuring a projected image from a slide.

The SAE-902 technique implemented during the 1983 helicopter tests utilized three 35mm single lens reflex (SLR) cameras using slide film. A camera was positioned 100 feet from each of the centerline microphone locations. Lenses with different focal lengths, each individually calibrated, were used in photographing helicopters at differing altitudes in order to more fully "fill the frame" and reduce image measurement error.

The photographer was aided in estimating when the helicopter was directly overhead by means of a photo-overhead positioning system (POPS). The POP system consisted of two parallel (to the ground) wires in a vertical plane orthogonal to the flight path. The photographer, lying beneath the POP system, initially positioned the camera to coincide with the vertical plane of the two guide wires. The photographer tracked the approaching helicopter in the viewfinder and tripped the shutter when the helicopter crossed the superimposed wires.

A scale graduated in 1/32 inch increments was used to measure the projected image. This scaling resolution translated to an error in altitude of less than one percent. Other errors may be introduced by the orientation of the helicopter, off-center images and focal-plane shutter distortion. As the helicopters were not turning during the test runs, the helicopter dimension (horizontal stablizer or skids) measured was well within 10 degrees of perpendicular to the line of sight. A 10 degree offset would introduce a range error of 1.5% . Possible errors due to off-center images and focal-plane shutter distortion were essentually eliminated as the photographers were professionals who centered the image and tracked the target so that its image in the camera was stationary. Although SAE AIR-902 states that any system used by a ground observer to determine minimum aircraft distance should have an accuracy of less than 12%, (equivalent to 1 dB error on AL_M or 0.64 dB in EPNL), the maximum error in the photoscaling technique utilized for these controlled tests to determine aircraft distance is closer to +/-5%, which translates to less than 0.3 dB error in corrected EPNL data. Photo-scaling techniques have been used for years and are approved by the FAA and certificating authorities around the world for aircraft noise certification.

4.5 DOPPLER-SHIFT POSITON DETERMINATION TECHNIQUE

Procedures to adjust aircraft noise level data for differences between the test and reference aircraft position and meteorological data require synchronization of the measured noise data with aircraft position data.

Aircraft position data synchronized with portable time code generators to the acoustic data were obtained using a procedure developed to extract the "time at overhead" (TOH) from the acoustic 1/3-octave sound pressure level data itself. The TOH, thus obtained, was then used with the photographic altitude data and the cockpit speed and climb/descent angle information to calculate the average flight path synchronized to the noise data.

The procedure developed to obtain TOH depends upon the spectral irregularities of the measured noise data resulting from ground reflections. The direct wave of the noise data from the aircraft to the microphone receiver instantaneously adds with the reflected wave from the ground surface, causing a constructive and destructive interference pattern. The nature and frequency of the interference depends upon the geometric relationship between the microphone height and the direct and reflected path lengths. Since the aircraft is moving relative to the microphone position, the geometric relationship is constantly changing and produces a "Doppler-like" frequency shift in the destructive interference pattern as the aircraft approaches and then moves on past the microphone measuring station. Unlike a true Doppler frequency shift (i.e., the observed frequency changing from higher to lower frequencies as the source approaches the receiver and then continues to decrease in value as the

source moves away form the receiver) the destructive interference frequency, while also shifting from higher to lower frequencies as the aircraft approaches the receiver from down-track, goes through a minimum frequency at the overhead point then reverses direction and shifts back to higher frequencies as the aircraft moves up-track from the receiver. With a knowledge of the speed of the aircraft, its climb/descent angle and its altitude at the overhead point, the destructive interference frequency can be calculated at the overhead point and at points projected up and down the flight path.

A computer program was prepared to inspect each 1/2 second linear noise data record of an aircraft fly-by and compare levels in adjacent 1/3-octave frequency bands searching out possible destructive interference "nulls" in the spectral sound pressure level data. A plot of "nulls" vs 1/3-octave frequency band and time is shown in Figure 4.5-1 for a typical helicopter level fly-by. The asterisks (*) indicate the frequency bands where a "null" was found in each spectral record.

Time at overhead from the above method compares within plus or minus 0.5 seconds with TOH obtained using phototheodolite tracking data. This translates to an error of less than 0.5 EPNdB in corrected sound level for the case shown in Figure 4.5-1.

For the case shown in Figure 4.5-1, the minimum destructive interference frequency is calculated to be 69.62 Hz at overhead. Note in Figure 4.5-1 the highlighted Doppler-like destructive interference null pattern with a minimum frequency plateau at band 18 (56.2-70.8 Hz). Since the case presented is a level flyover, the destructive interference "null" pattern can be shown to be symmetrical about the overhead point, thus the aircraft was at overhead at the point indicated in Figure 4.5-1 (the midpoint of the minimum frequency plateau of the destructive interference null pattern). Taking into account sound propagation time and the time at the midpoint of the measured 1/2 second data record, the aircraft overhead time (TOH) is computed. Approach and takeoff data events produce a skewed null pattern. With a knowledge of aircraft speed and climb/descent angle, the offset of the overhead point within the minimum frequency plateau of the null pattern is easily calculated.

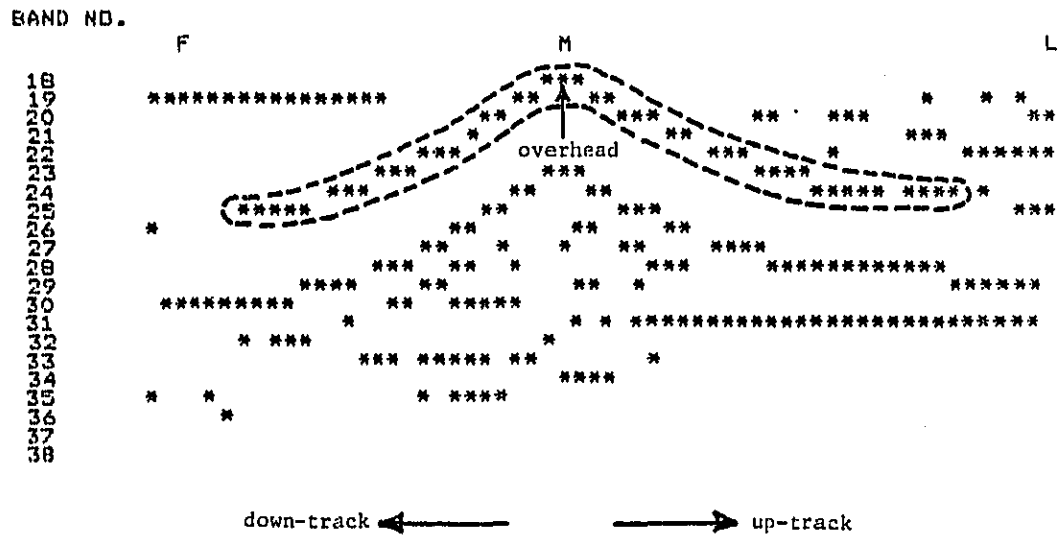
It is to be noted that not all "null" patterns are as "clean" as shown in Figure 4.5-1 and require some operator judgements to ensure proper selection of the minimum frequency distructive interference plateau.

4.6 COCKPIT PHOTO DATA

The helicopters' speed, altitude, and torque were documented for each run in photographs of the cockpit instrument panel. The photographs were taken with a 35mm SLR camera using an 85mm lens and high speed slide film. The photos were taken when the aircraft was approximately over the center-line center microphone location and represent a typical moment during a particular test event. This data acquisition system was augmented by an experienced cockpit observer who provided additional written documentation of the operational parameters.

FIGURE 4.5-1

NULL-SHIFT INTERFERENCE PATTERN



RECORD #M = 33 RETARD TIME = 0.435 SEC.

CALCULATED OVERHEAD IN RETARDED TIME: 06:08:48.56

CLIMB/DESCENT ANGLE	0.0	DEGREES
ALTITUDE	484.8	FEET
SPEED	221.0	FEET/SEC.
MICROPHONE HEIGHT	4.0	FEET
TEMPERATURE	56.5	DEGREES F
MINIMUM FREQUENCY	69.6	HZ

4.7 UPPER-AIR METEOROLOGICAL DATA

The National Weather Service (NWS) at Sterling, Virginia provided upper air meteorological data obtained from balloon-borne radiosondes. These data consisted of pressure, temperature, relative humidity, wind direction, and wind speed at 100 foot intervals from the ground.

4.8 SURFACE METEOROLOGICAL DATA

The National Weather Service (NWS) at Dulles International Airport provided temperature, windspeed, and wind direction. Data were collected every 15 minutes at a location approximately 2.5 miles from the test site. This information was used in implementing corrections and adjustments to data. Meteorological data are provided for each separate helicopter test program in the respective report (references 1-7).

5.0 RECORDING AND PRE-PROCESSING OF ACOUSTICAL DATA

The data analysis and reduction procedures used in this report are identified below and in Chapter 6.

The data acquisition, reduction and adjustment procedures represent the basic ICAO CAN/7 approach with the incorporation of some of the recommendations of WG II to the first meeting of CAEP scheduled for June 1986 in Montreal.

The source noise corrections mandated in CAN/7 have been implemented using the refined procedures specified in Ottawa recommendations to CAEP/1 (see section 6.3).

The airspeed used in each test as the reference airspeed was in accordance with the less rigorous definition of CAN/7 which specified airspeeds not actually identified in airworthiness certification. A more specific reference airspeed has been recommended in the Ottawa WG II report.

The ICAO Annex 16 (CAN/7) No Correction Window, Appendix 4, Section 9.1 a-e has not been employed in any instance. The limitations on correction values specified in Annex 16 (CAN/7 Chapter 8.7) have not been observed. All data have been adjusted as necessary to reference conditions.

The takeoff reference path has been established in each case in accordance with the recommendations of the Ottawa Working Group II, shown below, except that minimum specification engine performance was not required at the time of the tests (1983). In the case of US built helicopters the minimum specification performance is the same as the performance used in the Rainbow program.

> Recommended change of ICAO WG II (Ottawa 1985) to ICAO Annex 16 Chapter 8.6.2.1.f
>
> the reference takeoff path is defined as a straight line segment inclined from the starting point (500 meters prior to the center microphone located 20 meters above ground level) at an angle defined by BRC and Vy for minimum specification engine performance.

All reference performance data requested from the manufacturers were for sea level pressure, 59 degrees F conditions.

Reference data were provided by the manufacturers. In future test programs (in accordance with the Ottawa recommendations) it is anticipated that minimum specification engine performance parameters will be used. Also, takeoff performance will be indexed to 25 degrees C while level flyover performance will continue to be indexed to 15 degrees C.

5.1 MAGNETIC RECORDING SYSTEMS

Nagra two-channel direct-mode tape recorders were deployed at each site during the noise-measurement flight-test program. On one channel the noise data were recorded with essentially flat frequency response, while on the second channel the data were first weighted and amplified using a high pass pre-emphasis filter.

Helicopter acoustical signals are characterized by large level differences (30 to 60 dB) between the high and low frequencies and as such the use of pre-emphasis was necessary in order to boost the high frequency portion of the acoustical signal. The pre-emphasis network rolled off those frequencies below 10,000 Hz at 20 dB per decade. Recording gains were adjusted so that the best possible signal-to-noise ratio would be achieved while allowing enough "head room" to comply with applicable distortion avoidance requirements.

Inter-Range Instrumentation Group-B (IRIG-B) time code was recorded on the cue channel of each system.

The typical measurement system consisted of a Gen Rad P-42 preamp and a Gen Rad 1/2 inch electret microphone (oriented for grazing incidence) mounted on a tripod with the microphone four feet (1.2 meters) from the ground. Each microphone was covered with a 3 inch windscreen, and a 100 foot (30.5 meter) cable connected the preamp and the magnetic recording system. Figure 5.1-1 is a schematic of the microphone and magnetic recording system

Figure 5.1-2 is a schematic diagram of the microphone locations for the flight operation array.

5.2 MAGNETIC RECORDING DATA REDUCTION AND CORRECTION

The analog magnetic tape recordings collected during the noise measurement flight test program were analyzed at the Transportation Systems Center (TSC) facility in Cambridge, Massachusetts. The tapes were entered into magnetic disc storage after filtering and digitizing using the GenRad 1921 one-third octave real-time analyzer. Recording system frequency response adjustments were applied, assuring overall linearity of the recording and reduction system. The 24 one-third octave sound pressure levels (SPLs) for contiguous one-half second integration periods (spectral time history) make up the "raw data" base for each event. Data reduction followed the basic procedures defined in the Reference (11).

FIGURE 5.1-1

NAGRA Tape Recorder
Acoustical Measurement Instrumentation

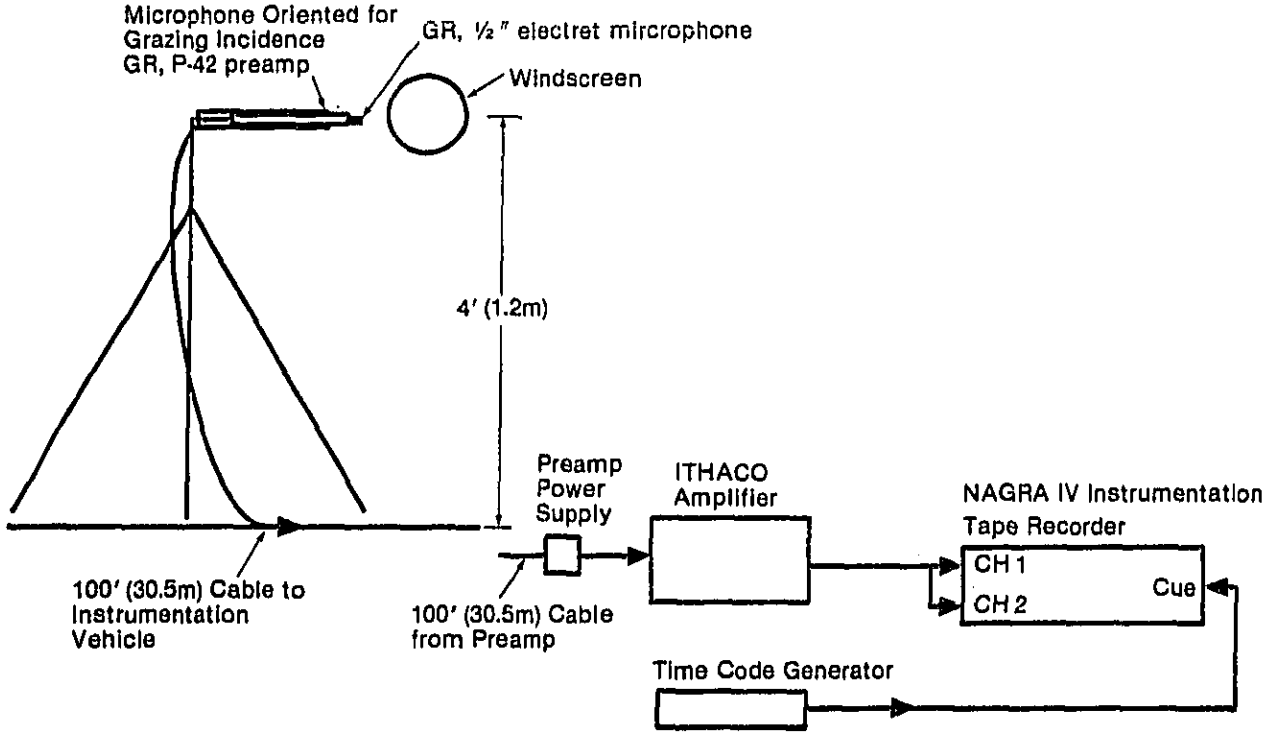
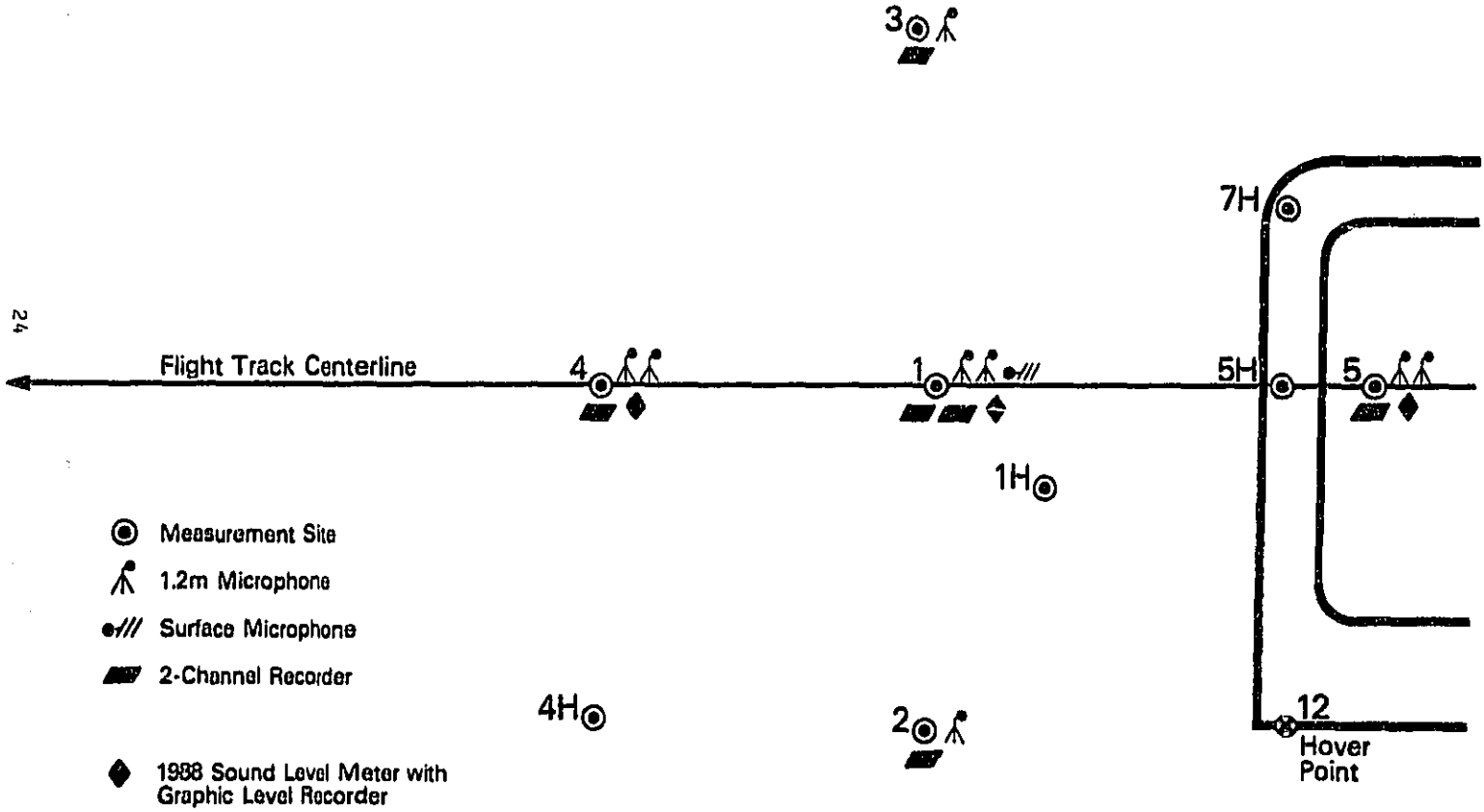


FIGURE 5.1-2

Microphone and Acoustical Measurement Instrument Deployment Flight Operations



5.3 AMBIENT NOISE

The ambient noise is considered to consist of both the acoustical background noise and the electrical noise of the measurement system. For each event, the ambient noise level was derived from the five to ten-second time averaged sound level recorded immediately prior to the event. The ambient noise was used to correct the measured raw spectral data by subtracting the ambient level from the measured noise levels on an energy basis. This subtraction yielded the ambient corrected signal level. The following exceptions are noted:

1. At one-third octave frequencies of 630 Hz and below, if the measured level was within 3 dB of the ambient level, the measured level was corrected by being set equal to the ambient. If the measured level was less than the ambient level, the measured level was not corrected.

2. At one-third octave frequencies above 630 Hz, if the measured level was within 3 dB or less of the ambient, the level was identified as "masked".

5.4 SPECTRAL SHAPING

The raw spectral data, corrected for ambient noise, were adjusted by sloping the spectrum shape at -3 dB per one-third octave for those bands (above 1.25 kHz) where the signal to noise ratio was less than 3 dB, i.e., "masked" bands. This procedure was applied in cases involving no more than 9 "masked" one-third bands. The shaping of the spectrum over this 9-band range was conducted to minimize EPNL data loss. This spectral shaping methodology deviates from Annex 16 (and FAR-36) procedures in that the extrapolation includes four more bands than normally allowed.

5.5 ANALYSIS SYSTEM TIME CONSTANT, SLOW RESPONSE

The corrected raw spectral data (contiguous linear 1/2 second records of data) were processed using a sliding window or weighted running logarithmic averaging procedure to achieve an effective "slow" dynamic response equivalent to the "slow response" characteristic of sound level meters as required under the provisions of Annex 16 and FAR 36. The following relationship using four consecutive data records was used:

$$SLi = 10 \text{ Log } [\ 0.13 * (10^{\cdot 1Li-3}) + 0.21 * (10^{\cdot 1Li-2}) + 0.27 * (10^{\cdot 1Li-1}) + 0.39 * (10^{\cdot 1Li})\ ]$$

where Li is the one-third octave band sound pressure level for the ith one-half second record number and SLi is the SLOW detected one-third octave band sound pressure level for the ith one-half second record number. These coefficients differ slightly from those proposed in U.S. Working Paper 6 (WP-6), from the April 1985 ICAO CAEP Working Group II meeting in Tokyo, Japan (Ref. 12) and in the Helicopter Noise Measurement Repeatability Program Coordinators' Working Paper, "Detector Response"

to be presented in Paris in April 1986. However, the coefficients used in this report and those proposed in WP-6 yield essentially identical results.

5.6 BANDSHARING OF TONES

All calculations of PNLTm included testing for the presence of band sharing and adjustment in accordance with the procedures defined in ICAO Annex 16, Appendix 2, Section 4.3.2 and FAR-36, Appendix B, Section 36.2.3.3.

5.7 TONE CORRECTIONS

Tone corrections were computed initiating the adjustment procedure at 50 Hz (Band 17), two bands prior to the initiation point used for fixed wing aircraft (80 Hz, Band 19). The initiation of the tone correction procedure at a lower frequency reflects recognition of the strong low frequency tonal content of helicopter noise. This procedure is in accordance with the requirements of ICAO Annex 16, Appendix 4, paragraph 4.3. Lower range tone corrections were assigned using the revised F-value fence of 1.5 dB.

5.8 OTHER METRICS

In addition to the EPNL/PNLT family of metrics and the SEL/AL family, the Overall Sound Pressure Level (OASPL) and 10-dB down duration times are presented as part of the "As Measured" data set in Appendix B. The A-Weighted Sound Level (AL) and the OASPL were computed using the acoustical spectrum from 24 to 10,000 Hz, Bands 14 through 40.

6.0 DATA ADJUSTMENT PROCESS

6.1 DELTA 1 CORRECTION: SPHERICAL SPREADING AND ATMOSPHERIC ABSORPTION

Spherical spreading and atmospheric absorption were implemented in accordance with the procedures outlined in Annex 16, Appendix 1, Section 9.4. The process of correcting data for spherical spreading and atmospheric absorption included:

1. Adjusting the measured one-third octave SPLs of the PNLTm spectra to the standard acoustical day, 77F-70% RH, conditions utilizing on site 10 meter meteorological data.

2. Adjusting for the change in atmospheric absorption associated with the difference in slant range between the actual and reference position of the helicopter at the time of PNLTm.

The Delta 1 correction derived from the difference between as measured PNLTm and adjusted PNLTm is arithmetically applied to the as measured EPNL.

Delta 1 = PNLTm (as measured) - PNLTm (adjusted).

6.2 DELTA 2 CORRECTION: DISTANCE-DURATION AND GROUNDSPEED-DURATION

Procedures outlined in Annex 16, Appendix 4, Section 9.4.2 revised (as reported in CAN/7 Report on Agenda Item 3, pages 3 through 46) were used in implementing the duration adjustments.

Delta 2 = [-7.5 Log (CPAtest/CPAref)] + [10 Log (Vg test/Vg ref)]

where the CPA is the closest point of approach and the Vg is the ground speed. In the absence of ground speed data, the indicated airspeed was utilized.

The Delta 2 correction is applied arithmetically to the as measured EPNL.

6.3 DELTA 3 CORRECTION: SOURCE NOISE

The source noise correction is applied only in the case of level flyover. This adjustment accounts for changes in sound level associated with deviation of the advancing blade Mach number from the reference values. Deviations may be associated with rotor RPM, ambient temperature, or airspeed deviations from reference condition.

A separate PNLTm versus Mach number function was developed for the centerline and each of the two sideline microphones for each helicopter tested. In each case a regression line was fitted to the data set and the slope was determined. The following relationship was used to compute adjustment values in cases where a linear curve fit yielded the best R-square.

Delta 3 = slope * (reference Mach # - test Mach #)

The Delta 3 correction is applied arithmetically to the as measured EPNL.

In this report, both second order and first order curve fits were generated for each PNLTm Mach data set. The best fit (R-square) curve was used in correcting data for each microphone. It is noted that in some other test programs another independent variable of Mach number might yield the best fit relationship.

(The computational details of the adjustment process are included for each helicopter in respective appendicies).

The text of the proposed amendment (Ottawa, October 1985) to ICAO Annex 16, provides a rigorous specificaton of how to implement the exising source noise correction requirement.

> Ottawa Proposed Amendment - to ICAO Annex 16, Appendix 4, 9.5 Correction of Noise at Source
>
> If any combination of the following three factors, 1) airspeed deviations from reference, 2) rotor speed deviations from reference, or 3) temperature deviations from reference, results in an advancing blade tip Mach number which deviates from the reference Mach value, then source noise adjustments shall be determined. This adjustment shall be determined from manufactures data approved by the certificating authorities.
>
> Note - This adjustment is based upon a sensitivity curve of PNLTm versus advancing blade tip Mach number, deduced from overflight carried out at different airspeed providing a range of advancing blade tip Mach numbers which encompass the reference value. If unable to attain the reference value then an extrapolation of the sensitivity curve is permitted if data cover at least a range of 0.03 Mach units. The advancing blade tip Mach number shall be computed using true airspeed, onboard outside air temperature (OAT), and rotor speed. A seperate PNLTm versus advancing blade tip Mach number function shall be derived for each of the three certification microphone location, centerline, sideline left, and sideline right. Sideline left and right are defined relative to the direction of flight on a particular test run. PNLTm adjustments are to be applied to each microphone using the appropriate function.

This is the procedure employed in this document. Also, consistent with another Ottawa WG II recommendation to ammend Annex 16, Ch. 8.6.1.5, a reference temperature of 15 degrees C has been used to implement source noise adjustments.

7.0 ANALYSIS OF DATA

7.1 SUMMARY EPNL DATA PER ICAO PROCEDURE

Table 7.1-1 provides a synopsis of EPNL values obtained using ICAO noise certification procedures and recommended refinements identified in Section 5, for the Rainbow Series test helicopters.

Table 7.1-1 also lists the corresponding EPNL values for helicopters included in the ICAO CAEP Working Group II Helicopter Noise Data Base hereafter referred to as ICAO Data Base 2. It is important to observe that the "ICAO Data Base 2" itself is a compilation of data acquired under generally similar test conditions. The "ICAO Data Base 2" was formulated from responses to the ICAO CAN/7 (Montreal 1983) Recommendation 1/4 which requested data acquired using the CAN/7 version of correction and adjustment procedures. Table 7.1-1 also contains data from an earlier ICAO compilation made in 1978 at a Working Group meeting in Tokyo. This data base is hereafter referred to as "ICAO Data Base 1".

7.2 RAINBOW DATA: EPNL/LOG (MGTOW) REGRESSION

Table 7.2-1 provides a linear regression analysis of the Rainbow Data as a function of the logarithm of maximum gross takeoff weight (MGTOW). A serparate analysis has been performed for the three different certification operations. In each case the correlation coefficient (R) and coefficient of determination (R^2) have been provided for the relationship. Attention is focused on the slopes of the relationships and R-square values which indicate the extent of EPNL dependency on Log MGTOW. It should be noted that the regression independent variable noise is Log weight, expressed in pounds, not kilo-pounds as in the limit equations below.

Figure 7.2-1 provides a scatter plot of the Rainbow takeoff data along with the line of regression and also the weight dependent (i.e., between 800 and 80,000 kg) ICAO noise certification limit line for the takeoff operation.

ICAO NOISE CERTIFICATION LIMITS

TAKEOFF: EPNL Limit = 86.61 + (9.97 * Log (MGTOW))

LEVEL FLYOVER: EPNL Limit = 85.61 + (9.97 * Log (MGTOW))

APPROACH: EPNL Limit = 87.61 + (9.97 * Log (MGTOW))

(weight expressed in thousands of pounds)

These equations represent the limitations over the weight dependent portion of the noise standard.

Data points are identified by helicopter model in the legend in Table 7.2-2. Figures 7.2-2 and 7.2-3 provide similar plots for the level flyover and approach operations respectively.

TABLE 7.1-1

HELICOPTER DATA SUMMARY TABLE

HELICOPTER	MGTOW (LBS)	LCG MGTOW (LBS)	EPNL DATA ICAO TAKEOFF	EPNL DATA ICAO LFO	EPNL DATA ICAO APPROACH
RAINBOW REPORT (1986)					
500 D/E	3,000	3.48	84.14	85.11	86.89
ASTAR	4,300	3.63	87.21	86.78	89.64
TWINSTAR	5,070	3.71	87.59	88.48	91.70
DAUPHIN	8,488	3.93	92.67	91.01	94.71
222 TWINJET	7,850	3.89	89.35	91.64	93.91
VERTOL	48,500	4.69	93.61	92.78	99.54
S-76A	10,300	4.01	91.00-	89.67	93.09
ICAO DATA BASE 1 (1977)					
AS 350	4,180	3.62	89.20	87.20	91.20
SA 342	4,180	3.62	NA	88.20	95.50
SA 342	3,520	3.55	89.80	NA	NA
SA 360	6,600	3.82	92.40	NA	NA
SA 365	7,480	3.87	89.40	NA	94.00
SA 330J	16,280	4.21	97.80	93.60	96.10
SA 321F	25,300	4.40	98.40	92.00	98.60
A 109	5,390	3.73	NA	90.40	93.00
MI 6A	88,440	4.95	NA	103.40	107.40
MI 2	7,755	3.89	NA	89.50	96.10
MI 8	25,212	4.40	NA	97.30	99.60
WG 13	9,350	3.97	91.60	97.70	96.90
BO 105	5,060	3.70	88.40	89.60	91.10
BELL 47G	2,728	3.44	NA	90.30	89.60
H 300C	1,804	3.26	NA	80.60	NA
S 64	42,812	4.63	NA	97.70	98.60
ICAO DATA BASE 2 (1985)					
A109 A	5,733	3.76	92.40	91.80	93.00
206L	4,000	3.60	85.90	85.80	90.30
212 H-1	10,500	4.02	91.70	94.60	95.70
500C	2,551	3.41	85.10	85.80	87.70
BK117	6,284	3.80	88.80	92.60	90.40
BK117 P2	6,174	3.79	88.80	92.50	90.20
BO105 C	5,072	3.71	89.70	90.40	90.60
MI-26 I	123,480	5.09	NA	106.00	NA
MI-8	26,460	4.42	100.00	97.00	100.20
S-61 H-3	22,050	4.34	95.90	92.60	94.00
S-65 H-53	36,989	4.57	95.70	97.10	99.90
S-76	10,024	4.00	91.60	91.30	93.80
UH-60A	20,253	4.31	89.20	96.80	96.90
W30-100	12,002	4.08	92.60	93.70	97.80

TABLE 7.2-1

Rainbow Data: EPNL Levels/Log MGTOW Regression

*** TAKEOFF (ICAO) ***
RAINBOW REPORT SERIES

EPNL LEVELS / LOG MGTOW (LBS)
LINEAR REGRESSION EQUATION

Y≡EPNL

Y =	SLOPE *X +	INTERCEPT
=	7.31	-60.80

X≡LOG MGTOW (LBS)

CORREL =	0.8600	MEAN X =	3.91
R SQ. =	0.7396	S.D. X =	0.3921
STD.ERR =	1.8639	MEAN Y =	89.37
TOT VAR =	11.1186	S.D. Y =	3.3345
SAMPLE =	7		

*** LFO (ICAO) ***
RAINBOW REPORT SERIES

EPNL LEVELS / LOG MGTOW (LBS)
LINEAR REGRESSION EQUATION

Y =	SLOPE *X +	INTERCEPT
=	5.87	66.44

CORREL =	0.8381	MEAN X =	3.91
R SQ. =	0.7024	S.D. X =	0.3921
STD.ERR =	1.6404	MEAN Y =	89.35
TOT VAR =	7.5344	S.D. Y =	2.7449
SAMPLE =	7		

*** APPROACH (ICAO) ***
RAINBOW REPORT SERIES

EPNL LEVELS / LOG MGTOW (LBS)
LINEAR REGRESSION EQUATION

Y =	SLOPE *X +	INTERCEPT
=	9.70	54.89

CORREL =	0.9483	MEAN X =	3.91
R SQ. =	0.8994	S.D. X =	0.3921
STD.ERR =	1.3937	MEAN Y =	92.78
TOT VAR =	16.0856	S.D. Y =	4.0107
SAMPLE =	7		

TABLE 7.2-2

Legend: Rainbow Data Base

GRAPH LEGEND
RAINBOW SERIES

# ON GRAPH	HELICOPTER
1	500 D/E
2	ASTAR
3	TWINSTAR
4	222 TWINJET
5	DAUPHIN
6	S-76A
7	234/CH-47D

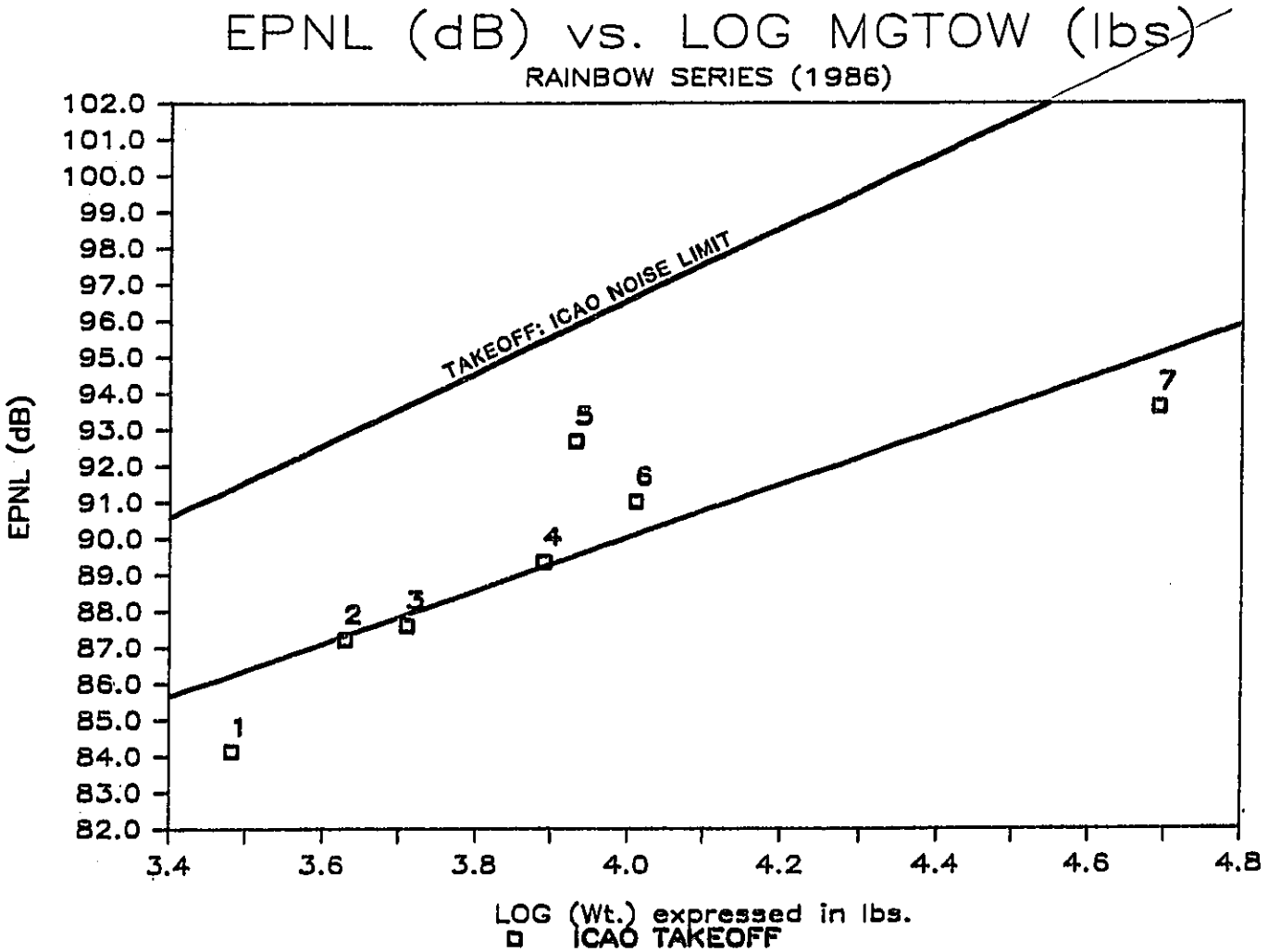

EPNL (dB) vs. LOG MGTOW (lbs)
RAINBOW SERIES (1986)
TAKEOFF: ICAO NOISE LIMIT
EPNL (dB)
102.0
101.0
100.0
99.0
98.0
97.0
96.0
95.0
94.0
93.0
92.0
91.0
90.0
89.0
88.0
87.0
86.0
85.0
84.0
83.0
82.0
3.4
3.6
3.8
4.0
4.2
4.4
4.6
4.8
1
2
3
4
5
6
7
LOG (Wt.) expressed in lbs.
ICAO TAKEOFF

FIGURE 7.2-1

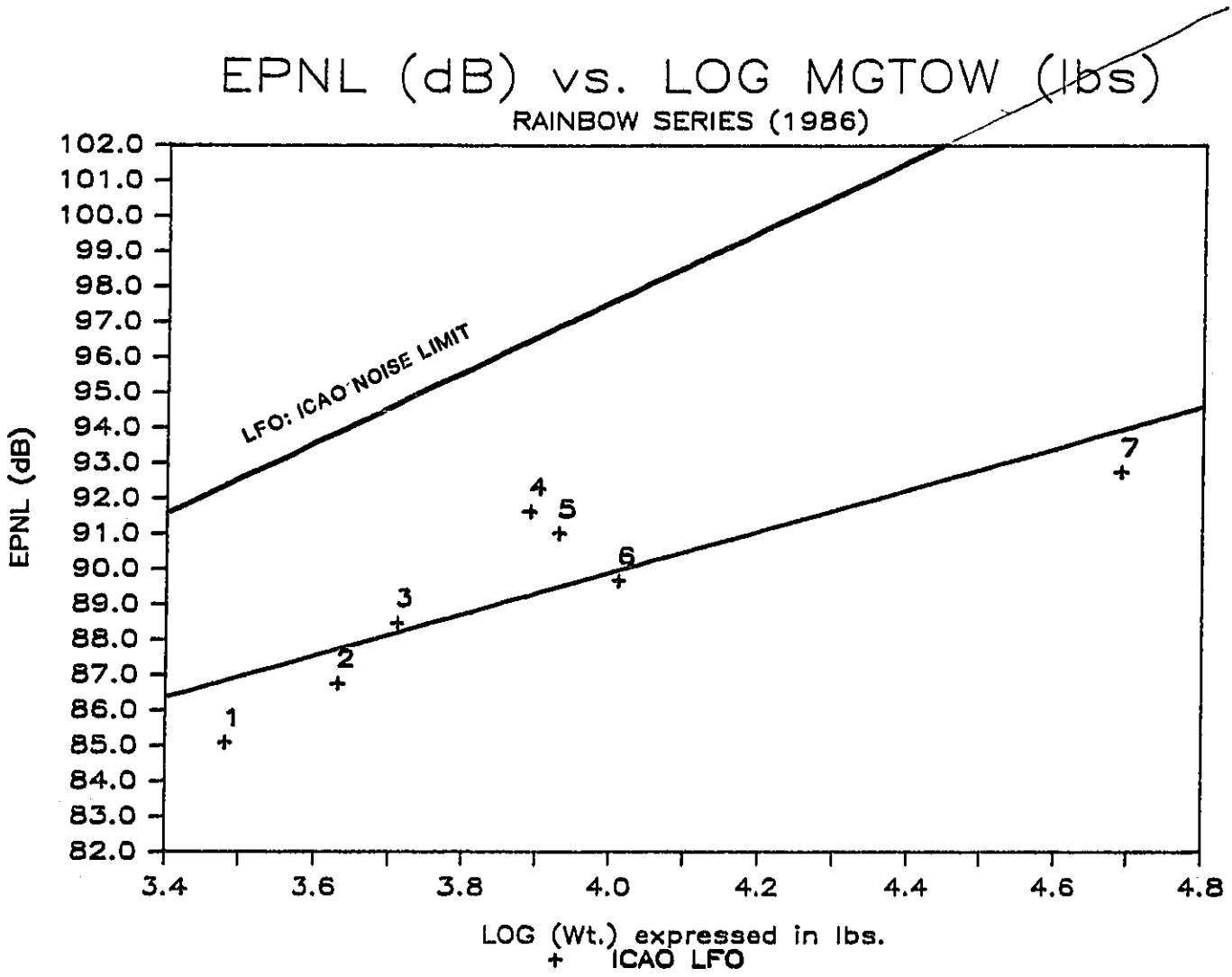

EPNL (dB) vs. LOG MGTOW (lbs)
RAINBOW SERIES (1986)
LFO: ICAO NOISE LIMIT
EPNL (dB)
102.0
101.0
100.0
99.0
98.0
97.0
96.0
95.0
94.0
93.0
92.0
91.0
90.0
89.0
88.0
87.0
86.0
85.0
84.0
83.0
82.0
3.4
3.6
3.8
4.0
4.2
4.4
4.6
4.8
LOG (Wt.) expressed in lbs.
+ ICAO LFO
1
2
3
4
5
6
7

FIGURE 7.2-2

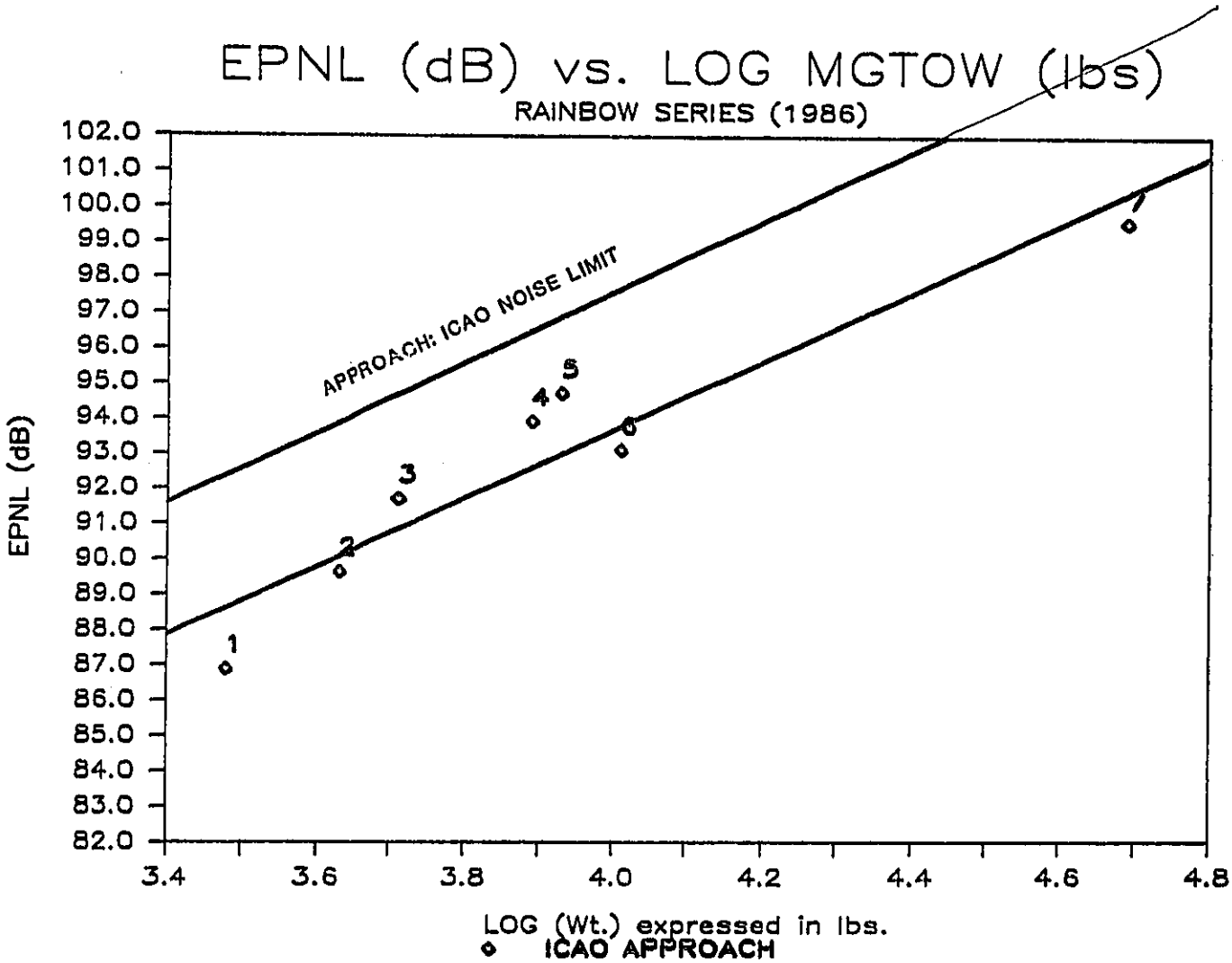

EPNL (dB) vs. LOG MGTOW (lbs)
RAINBOW SERIES (1986)
APPROACH: ICAO NOISE LIMIT
EPNL (dB)
102.0
101.0
100.0
99.0
98.0
97.0
96.0
95.0
94.0
93.0
92.0
91.0
90.0
89.0
88.0
87.0
86.0
85.0
84.0
83.0
82.0
3.4
3.6
3.8
4.0
4.2
4.4
4.6
4.8
LOG (Wt.) expressed in lbs.
ICAO APPROACH

FIGURE 7.2-3

Table 7.2-3 contains a regression analysis (similar to Table 7.2-1) for the same data except that the tandem rotor BV-234 has been deleted from the data set. This analysis has been done in order to demonstrate the sensitivity of the computed regression slopes to the absence or presence of a single anchoring datum. The legend for the adjusted data set is shown in Table 7.2-4. In each certification flight mode the slopes swing from slightly less than the ICAO limit line slopes to slightly greater than the limit line slopes. The deletion of any other single point such as the Hughes 500 D/E would likely achieve a slope close to that of the ICAO limit lines.

Figures 7.2-4, 7.2-5, and 7.2-6 provide scatter plots with regression lines and noise limits for the different flight modes for the Rainbow data base minus the BV-234.

7.3 ICAO DATA BASE 2: EPNL/LOG (MGTOW) REGRESSION

Table 7.3-1 contains a regression analysis for the ICAO Data Base 2. As in Tables 7.2-1 and 7.2-2 the regression relation characteristics are provided along with goodness of fit information (R-square). It is interesting to note the closeness of the ICAO Data Base slopes to those of the noise limit lines.

Figures 7.3-1 through 7.3-3 provide scatter plots with regression lines and noise limits for the different flight modes for ICAO Data Base 2. The legend for points in the ICAO data base is contained in Table 7.3-2.

7.4 RAINBOW DATA AND ICAO DATA BASE 2: EPNL/LOG (MGTOW) REGRESSION

Table 7.4-1 provides the regression analysis information for the merged data sets (Rainbow + ICAO Data Base 2). Table 7.4-2 identifies the index used for each helicopter in the merged data set plots which follow in Figures 7.4-1 through 7.4-3. A certain few helicopters appear in both data bases (e.g. the S-76) representing rigorous flight test data from different test programs.

7.5 ICAO DATA BASE 1: EPNL/LOG (MGTOW) REGRESSION

Table 7.5-1 provides regression analysis for a set of data developed at the December 1978 ICAO CAN Working Group B meeting in Tokyo (information tabulated in Reference 8). The data set was identified at the Tokyo meeting as Working Paper 25. I hereafter refer to it as ICAO Data Base 1. Data are plotted with the regression line and noise level limits in Figures 7.5-1 through 7.5-3. Individual points are identified in Table 7.5-2.

7.6 MERGED DATA: EPNL/LOG (MGTOW) REGRESSION

ICAO Data Base 1, ICAO Data Base 2 and Rainbow Data are grouped and analyzed for the best linear fit EPNL/Log MGTOW in Table 7.6-1. Data are plotted in Figures 7.6-1 through 7.6-3 and are identified in Table 7.6-2. As discussed above, certain helicopter models have been tested in more

TABLE 7.2-3

Rainbow Data: EPNL Levels/Log MGTOW Regression minus BV 234/CH-47D

*** TAKEOFF (ICAO) ***
RAINBOW SERIES MINUS BV 234/CH-47D

EPNL LEVELS / LOG MGTOW (LBS)
LINEAR REGRESSION EQUATION

Y≡EPNL

Y =	SLOPE *X +	INTERCEPT
=	13.99	35.86

X≡LOG MGTOW (LBS)

CORREL =	0.9362	MEAN X =	3.78
R SQ. =	0.8764	S.D. X =	0.2024
STD.ERR =	1.1883	MEAN Y =	88.66
TOT VAR =	9.1419	S.D. Y =	3.0236
SAMPLE =	6		

*** LFO (ICAO) ***
RAINBOW SERIES MINUS BV 234/CH-47D

EPNL LEVELS / LOG MGTOW (LBS)
LINEAR REGRESSION EQUATION

Y =	SLOPE *X +	INTERCEPT
=	11.12	46.82

CORREL =	0.8961	MEAN X =	3.78
R SQ. =	0.8030	S.D. X =	0.2024
STD.ERR =	1.2457	MEAN Y =	88.78
TOT VAR =	6.3007	S.D. Y =	2.5101
SAMPLE =	6		

*** APPROACH (ICAO) ***
RAINBOW SERIES MINUS BV 234/CH-47D

EPNL LEVELS / LOG MGTOW (LBS)
LINEAR REGRESSION EQUATION

Y =	SLOPE *X +	INTERCEPT
=	13.50	40.68

CORREL =	0.9292	MEAN X =	3.78
R SQ. =	0.8634	S.D. X =	0.2024
STD.ERR =	1.2151	MEAN Y =	91.66
TOT VAR =	8.6489	S.D. Y =	2.9409
SAMPLE =	6		

TABLE 7.2-4

Legend: RA Rainbow Data Base minus BV 234/CH-47D

GRAPH LEGEND
RAINBOW SERIES
(MINUS 234/CH-47D)

# ON GRAPH	HELICOPTER
1	500 D/E
2	ASTAR
3	TWINSTAR
4	222 TWINJET
5	DAUPHIN
6	S-76A

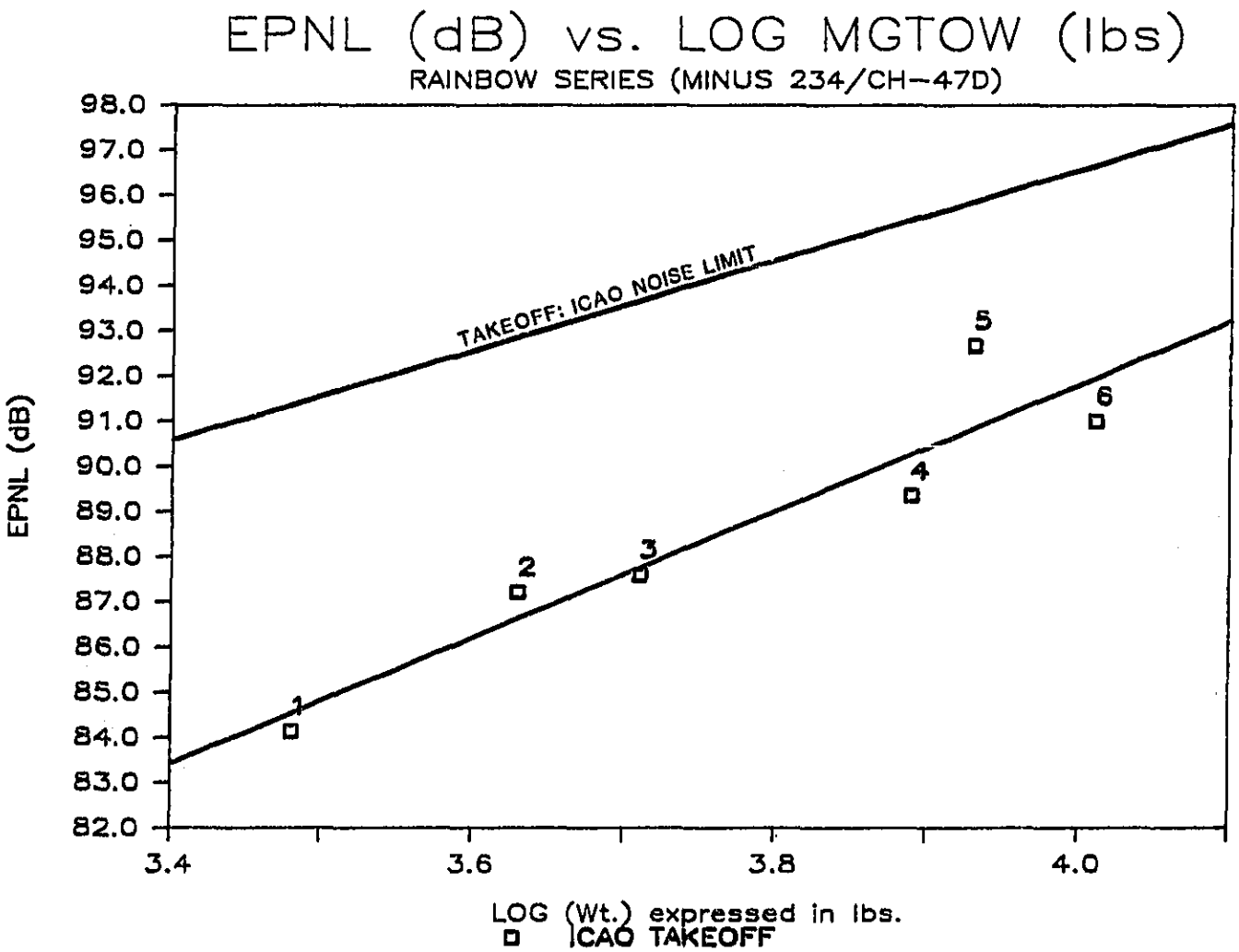

EPNL (dB) vs. LOG MGTOW (lbs)
RAINBOW SERIES (MINUS 234/CH-47D)
EPNL (dB)
98.0
97.0
96.0
95.0
94.0
93.0
92.0
91.0
90.0
89.0
88.0
87.0
86.0
85.0
84.0
83.0
82.0
TAKEOFF: ICAO NOISE LIMIT
1
2
3
4
5
6
3.4
3.6
3.8
4.0
LOG (Wt.) expressed in lbs.
ICAO TAKEOFF

FIGURE 7.2-4

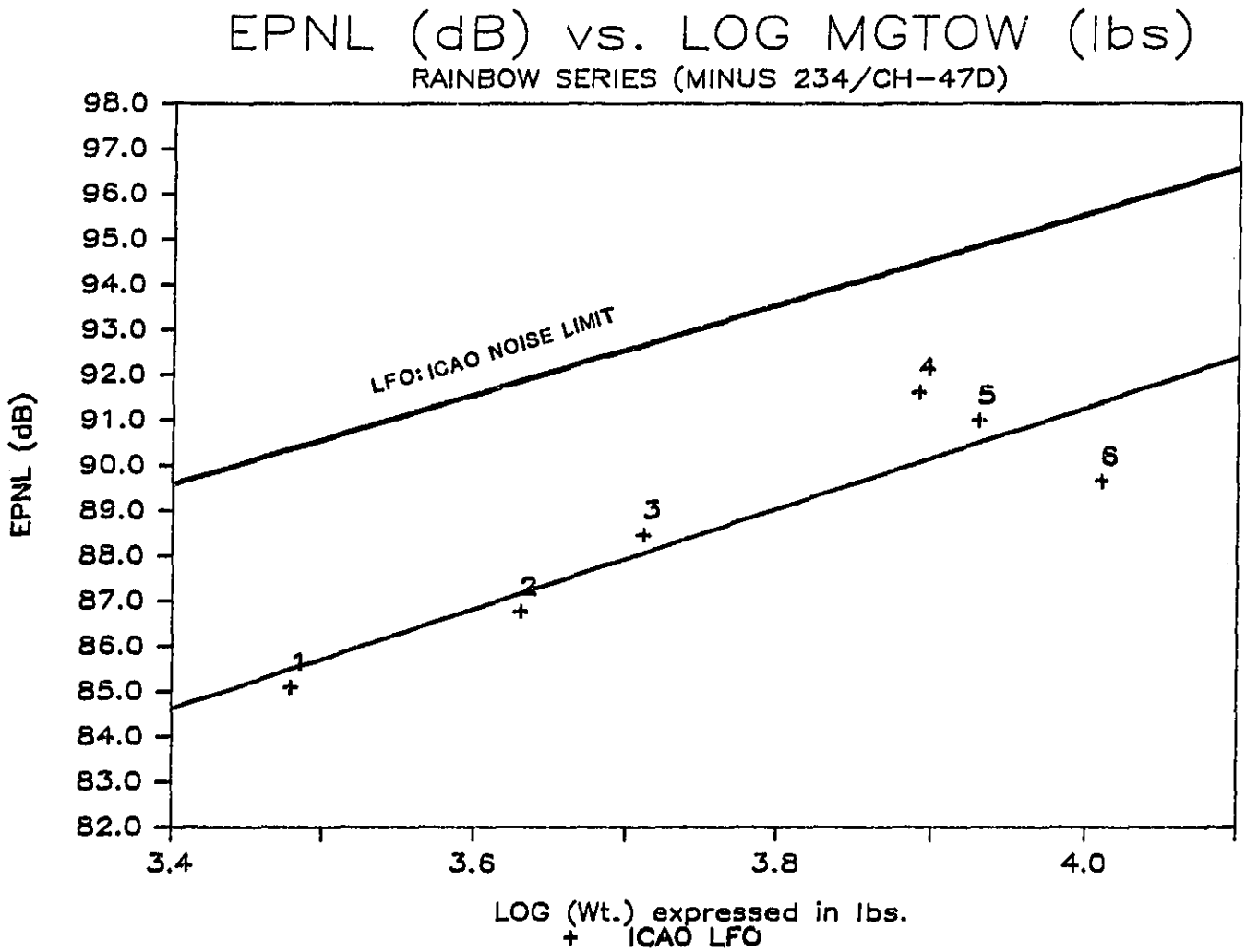

EPNL (dB) vs. LOG MGTOW (lbs)
RAINBOW SERIES (MINUS 234/CH-47D)
98.0
97.0
96.0
95.0
94.0
93.0
92.0
91.0
90.0
89.0
88.0
87.0
86.0
85.0
84.0
83.0
82.0
EPNL (dB)
LFO: ICAO NOISE LIMIT
1
2
3
4
5
6
3.4
3.6
3.8
4.0
LOG (Wt.) expressed in lbs.
+ ICAO LFO

FIGURE 7.2-5

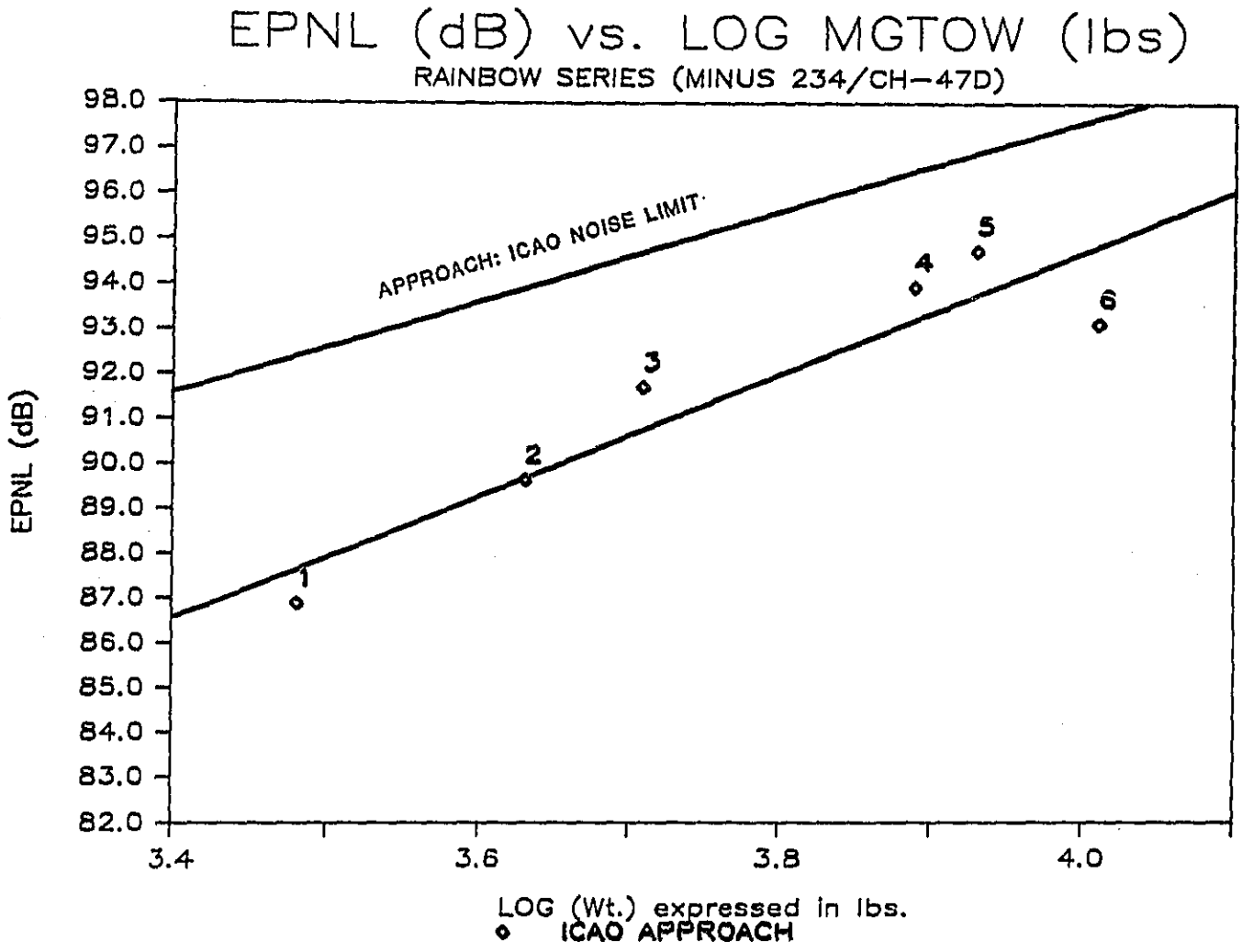

EPNL (dB) vs. LOG MGTOW (lbs)
RAINBOW SERIES (MINUS 234/CH-47D)
APPROACH: ICAO NOISE LIMIT
EPNL (dB)
98.0
97.0
96.0
95.0
94.0
93.0
92.0
91.0
90.0
89.0
88.0
87.0
86.0
85.0
84.0
83.0
82.0
3.4
3.6
3.8
4.0
1
2
3
4
5
6
LOG (Wt.) expressed in lbs.
ICAO APPROACH

FIGURE 7.2-6

TABLE 7.3-1

ICAO Data Base 2: EPNL Levels/Log MGTOW Regression

*** TAKEOFF (ICAO) ***
ICAO DATA BASE 2

EPNL LEVELS / LOG MGTOW (LBS)
LINEAR REGRESSION EQUATION

Y ≡ EPNL

X ≡ LOG MGTOW (LBS)

Y =	SLOPE *X +	INTERCEPT
=	9.81	52.23

CORREL =	0.8227	MEAN X =	3.99
R SQ. =	0.6768	S.D. X =	0.3477
STD.ERR =	2.4626	MEAN Y =	91.34
TOT VAR =	17.2009	S.D. Y =	4.1474
SAMPLE =	13		

*** LFO (ICAO) ***
ICAO DATA BASE 2

EPNL LEVELS / LOG MGTOW (LBS)
LINEAR REGRESSION EQUATION

Y =	SLOPE *X +	INTERCEPT
=	10.56	50.51

CORREL =	0.9315	MEAN X =	4.06
R SQ. =	0.8677	S.D. X =	0.4458
STD.ERR =	1.9133	MEAN Y =	93.43
TOT VAR =	25.5437	S.D. Y =	5.0541
SAMPLE =	14		

*** APPROACH (ICAO) ***
ICAO DATA BASE 2

EPNL LEVELS / LOG MGTOW (LBS)
LINEAR REGRESSION EQUATION

Y =	SLOPE *X +	INTERCEPT
=	10.42	52.34

CORREL =	0.9056	MEAN X =	3.99
R SQ. =	0.8201	S.D. X =	0.3477
STD.ERR =	1.7727	MEAN Y =	93.88
TOT VAR =	16.0164	S.D. Y =	4.0021
SAMPLE =	13		

TABLE 7.3-2

Legend: ICAO Data Base 2

GRAPH LEGEND
ICAO DATA BASE 2

# ON GRAPH	HELICOPTER
1	500C
2	206L
3	B0105 C
4	A109 A
5	BK117 P2
6	BK117
7	S-76
8	212 H-1
9	W30-100
A	UH-60A
B	S-61 H-3
C	MI-8
D	S-65 H-53
E	MI-26 I

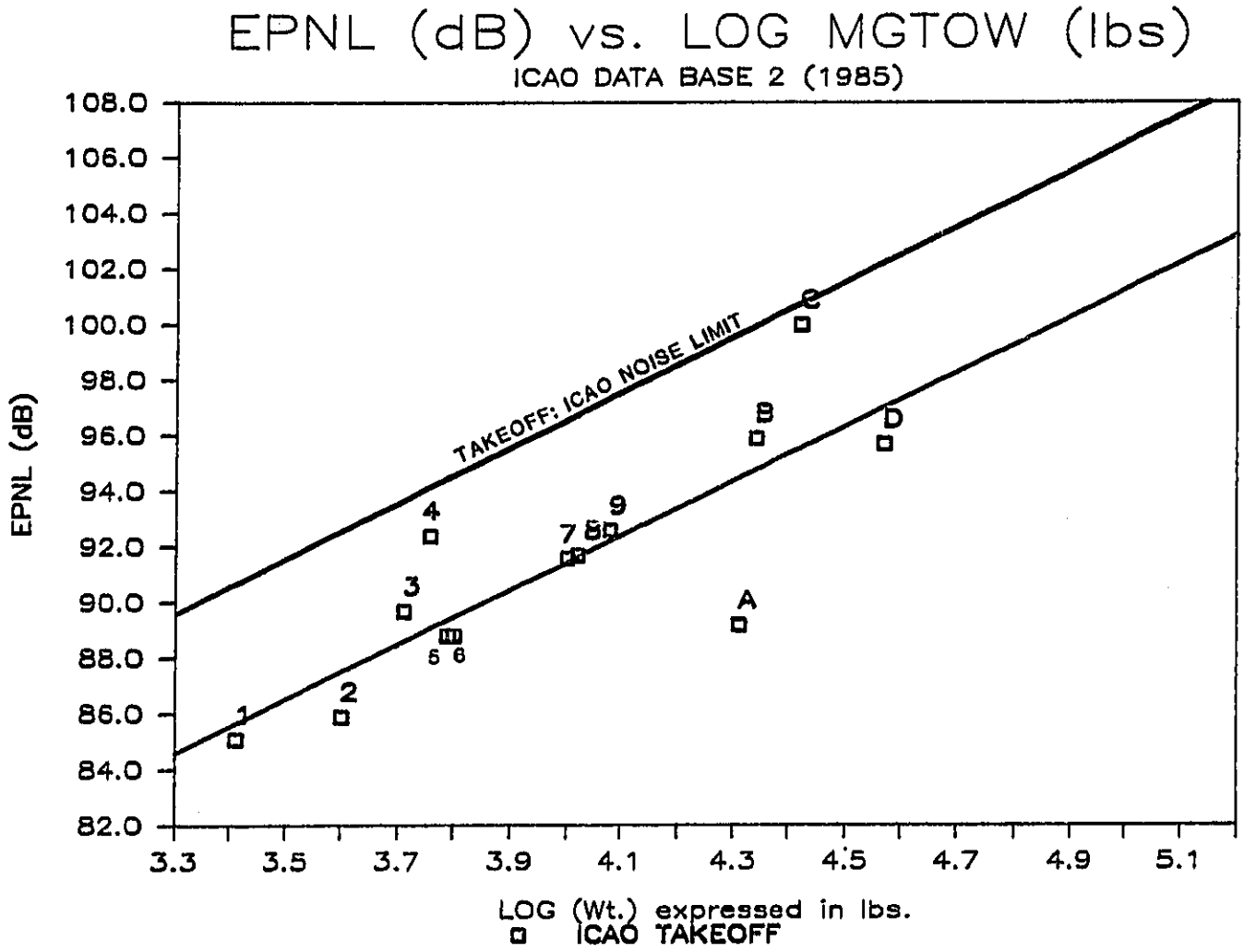

EPNL (dB) vs. LOG MGTOW (lbs)
ICAO DATA BASE 2 (1985)
EPNL (dB)
108.0
106.0
104.0
102.0
100.0
98.0
96.0
94.0
92.0
90.0
88.0
86.0
84.0
82.0
TAKEOFF: ICAO NOISE LIMIT
1
2
3
4
5
6
7
8
9
A
B
C
D
3.3
3.5
3.7
3.9
4.1
4.3
4.5
4.7
4.9
5.1
LOG (Wt.) expressed in lbs.
ICAO TAKEOFF

FIGURE 7.3-1

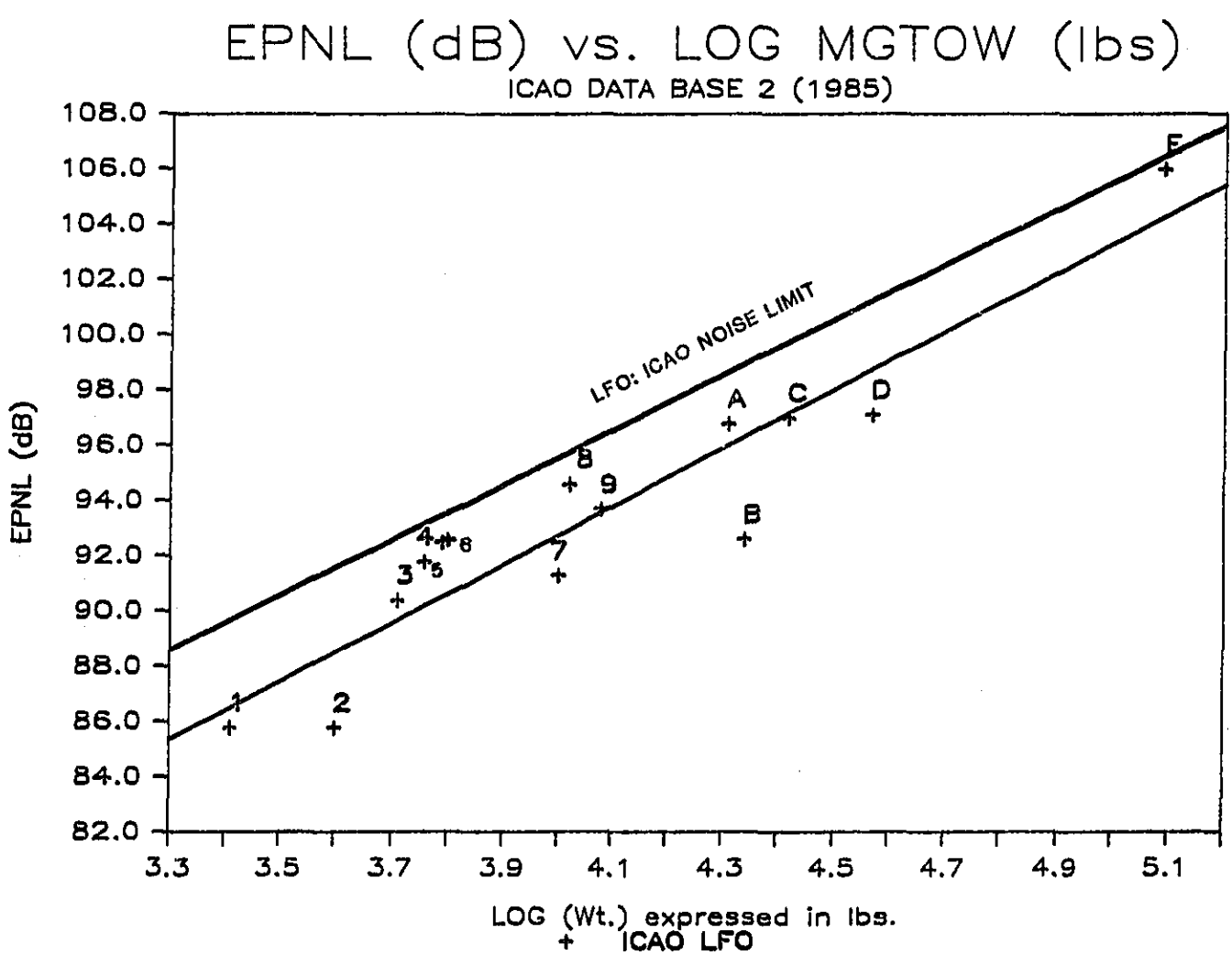

EPNL (dB) vs. LOG MGTOW (lbs)
ICAO DATA BASE 2 (1985)
EPNL (dB)
108.0
106.0
104.0
102.0
100.0
98.0
96.0
94.0
92.0
90.0
88.0
86.0
84.0
82.0
LFO: ICAO NOISE LIMIT
A
B
C
D
E
1
2
3
4
5
6
7
8
9
3.3
3.5
3.7
3.9
4.1
4.3
4.5
4.7
4.9
5.1
LOG (Wt.) expressed in lbs.
+ ICAO LFO

FIGURE 7.3-2

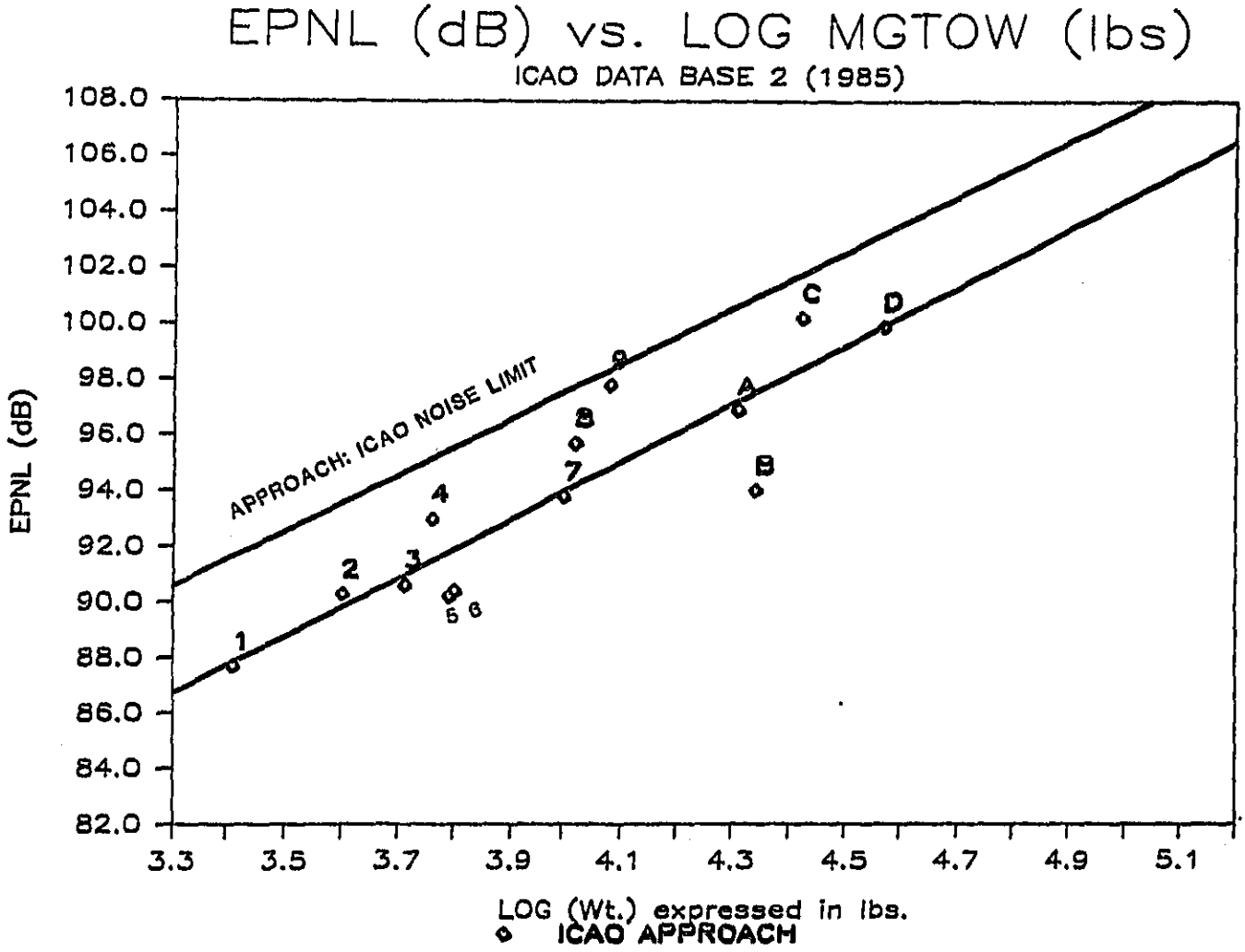

EPNL (dB) vs. LOG MGTOW (lbs)
ICAO DATA BASE 2 (1985)
EPNL (dB)
108.0
106.0
104.0
102.0
100.0
98.0
96.0
94.0
92.0
90.0
88.0
86.0
84.0
82.0
APPROACH: ICAO NOISE LIMIT
1
2
3
4
5
6
7
8
9
A
B
C
D
3.3
3.5
3.7
3.9
4.1
4.3
4.5
4.7
4.9
5.1
LOG (Wt.) expressed in lbs.
ICAO APPROACH

FIGURE 7.3-3

TABLE 7.4-1

Rainbow and ICAO Data Base 2: EPNL Levels/Log MGTOW Regression

*** TAKEOFF (ICAO) ***
RAINBOW SERIES & ICAO DATA BASE 2

EPNL LEVELS / LOG MGTOW (LBS)
LINEAR REGRESSION EQUATION

Y ≡ EPNL

Y =	SLOPE *X +	INTERCEPT
=	9.03	54.90

X ≡ LOG MGTOW (LBS)

CORREL =	0.8210	MEAN X =	3.96
R SQ. =	0.6740	S.D. X =	0.3556
STD.ERR =	2.2951	MEAN Y =	90.65
TOT VAR =	15.3055	S.D. Y =	3.9122
SAMPLE =	20		

*** LFO (ICAO) ***
RAINBOW SERIES & ICAO DATA BASE 2

EPNL LEVELS / LOG MGTOW (LBS)
LINEAR REGRESSION EQUATION

Y =	SLOPE *X +	INTERCEPT
=	9.86	52.53

CORREL =	0.8797	MEAN X =	4.01
R SQ. =	0.7740	S.D. X =	0.4257
STD.ERR =	2.3261	MEAN Y =	92.07
TOT VAR =	22.7397	S.D. Y =	4.7686
SAMPLE =	21		

*** APPROACH (ICAO) ***
RAINBOW SERIES & ICAO DATA BASE 2

EPNL LEVELS / LOG MGTOW (LBS)
LINEAR REGRESSION EQUATION

Y =	SLOPE *X +	INTERCEPT
=	10.19	53.19

CORREL =	0.9204	MEAN X =	3.96
R SQ. =	0.8472	S.D. X =	0.3556
STD.ERR =	1.5805	MEAN Y =	93.50
TOT VAR =	15.4860	S.D. Y =	3.9352
SAMPLE =	20		

TABLE 7.4-2

Legend: Rainbow and ICAO Data Base 2

GRAPH LEGEND
RAINBOW & ICAO DATA BASE 2

# ON GRAPH	HELICOPTER
1	500C
2	500 D/E
3	206L
4	ASTAR
5	TWINSTAR
6	BO105 C
7	A109 A
8	BK117 P2
9	BK117
A	222 TWINJET
B	DAUPHIN
C	S-76
D	S-76A
E	212 H-1
F	W30-100
G	UH-60A
H	S-61 H-3
I	MI-8
J	S-65 H-53
K	234/CH-47D
L	MI-26 I

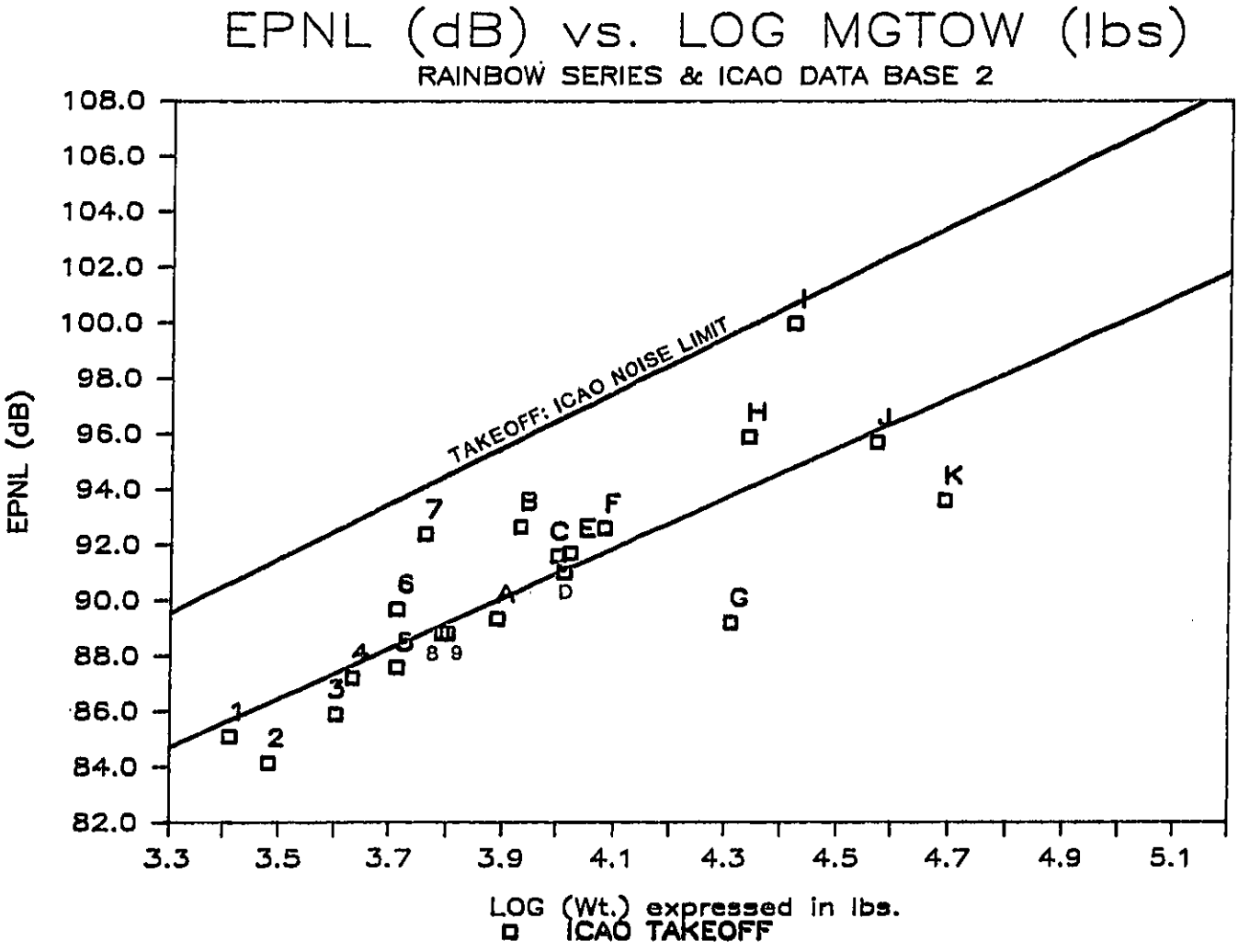

EPNL (dB) vs. LOG MGTOW (lbs)
RAINBOW SERIES & ICAO DATA BASE 2
EPNL (dB)
108.0
106.0
104.0
102.0
100.0
98.0
96.0
94.0
92.0
90.0
88.0
86.0
84.0
82.0
TAKEOFF: ICAO NOISE LIMIT
1
2
3
4
5
6
7
8 9
A
B
C
D
E
F
G
H
I
J
K
3.3
3.5
3.7
3.9
4.1
4.3
4.5
4.7
4.9
5.1
LOG (Wt.) expressed in lbs.
ICAO TAKEOFF

FIGURE 7.4-1

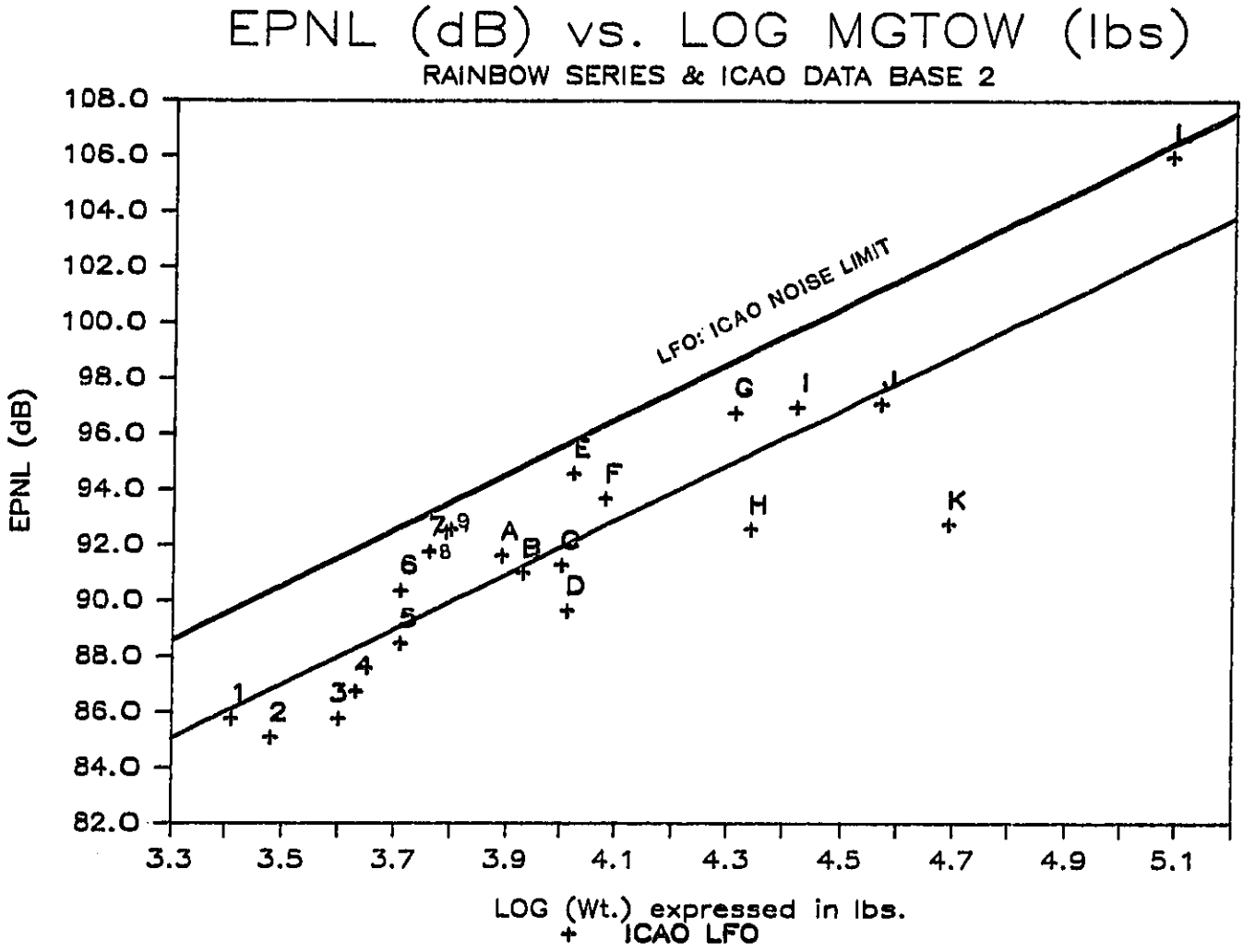

EPNL (dB) vs. LOG MGTOW (lbs)
RAINBOW SERIES & ICAO DATA BASE 2
EPNL (dB)
108.0
106.0
104.0
102.0
100.0
98.0
96.0
94.0
92.0
90.0
88.0
86.0
84.0
82.0
LFO: ICAO NOISE LIMIT
3.3
3.5
3.7
3.9
4.1
4.3
4.5
4.7
4.9
5.1
LOG (Wt.) expressed in lbs.
ICAO LFO

FIGURE 7.4-2

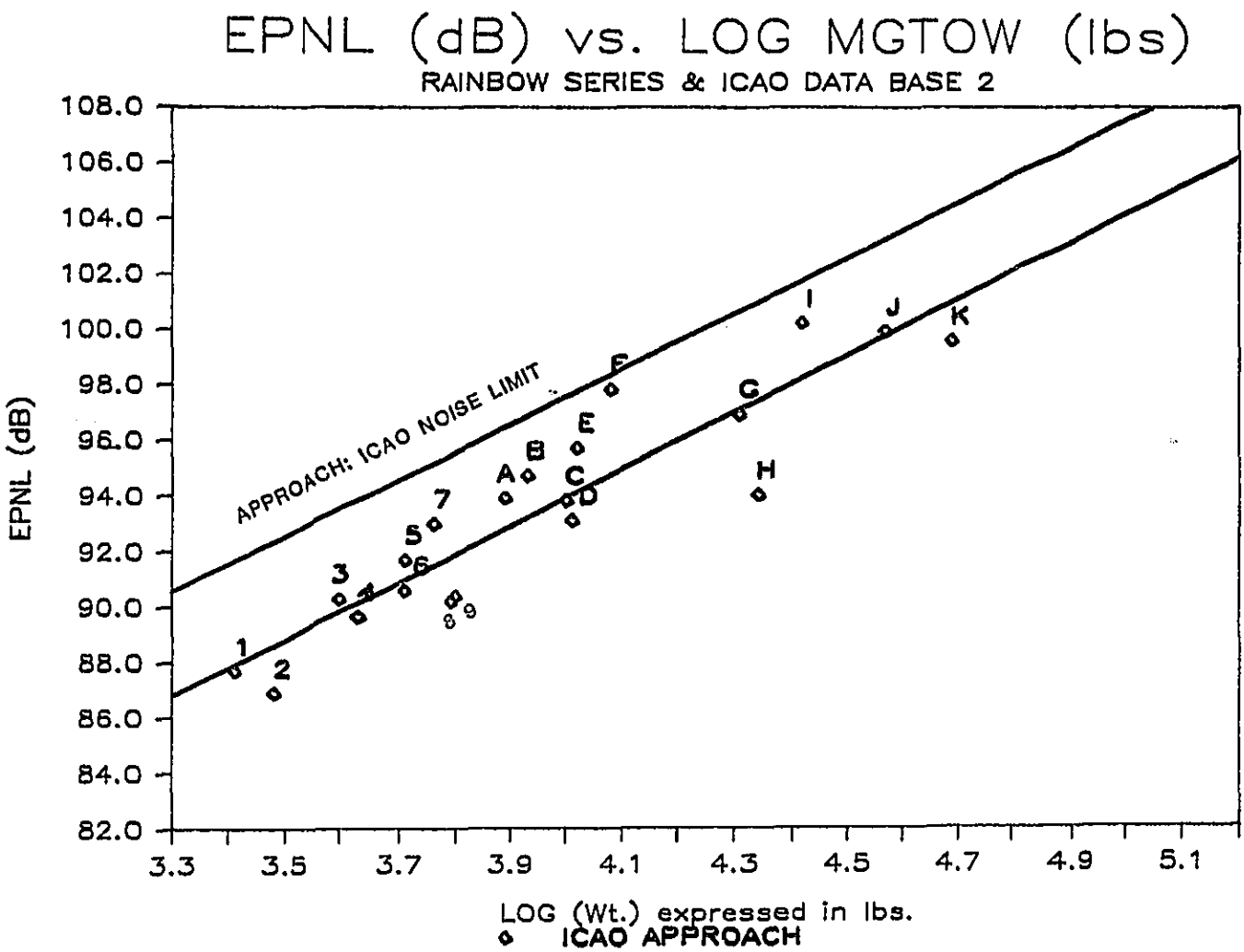

EPNL (dB) vs. LOG MGTOW (lbs)
RAINBOW SERIES & ICAO DATA BASE 2
APPROACH: ICAO NOISE LIMIT
EPNL (dB)
108.0
106.0
104.0
102.0
100.0
98.0
96.0
94.0
92.0
90.0
88.0
86.0
84.0
82.0
3.3
3.5
3.7
3.9
4.1
4.3
4.5
4.7
4.9
5.1
LOG (Wt.) expressed in lbs.
ICAO APPROACH

FIGURE 7.4-3

TABLE 7.6-1

ICAO Data Base 1: EPNL Levels/Log MGTOW Regression

```
*** TAKEOFF (ICAO) ***
ICAO DATA BASE 1

EPNL LEVELS / LOG MGTOW (LBS)
LINEAR REGRESSION EQUATION
-----------------------------------
    Y =     SLOPE *X  +    INTERCEPT
      =     12.19              44.68

CORREL  =  0.9109  MEAN X =    3.89
R SQ.   =  0.8297  S.D. X =  0.2925
STD.ERR =  1.7442  MEAN Y =   92.13
TOT VAR = 15.3136  S.D. Y =  3.9133
SAMPLE  =       8


*** LFO (ICAO) ***
ICAO DATA BASE 1

EPNL LEVELS / LOG MGTOW (LBS)
LINEAR REGRESSION EQUATION
-----------------------------------

    Y =     SLOPE *X  +    INTERCEPT
      =     10.31              51.00

CORREL  =  0.8801  MEAN X =    3.99
R SQ.   =  0.7745  S.D. X =  0.4989
STD.ERR =  2.9001  MEAN Y =   92.12
TOT VAR = 34.1931  S.D. Y =  5.8475
SAMPLE  =      13


*** APPROACH (ICAO) ***
ICAO DATA BASE 1

EPNL LEVELS / LOG MGTOW (LBS)
LINEAR REGRESSION EQUATION
-----------------------------------

    Y =     SLOPE *X  +    INTERCEPT
      =      9.44              57.90

CORREL  =  0.9181  MEAN X =    4.03
R SQ.   =  0.8428  S.D. X =  0.4513
STD.ERR =  1.9219  MEAN Y =   95.98
TOT VAR = 21.5436  S.D. Y =  4.6415
SAMPLE  =      13
```

Y≡EPNL

X≡LOG MGTOW (LBS)

TABLE 7.5-2

Legend: ICAO Data Base 1

GRAPH LEGEND
ICAO DATA BASE 1

# ON GRAPH	HELICOPTER
1	H 300C
2	BELL 47G
3	SA 342
4	AS 350
5	SA 342
6	BO 105
7	A 109
8	SA 360
9	SA 365
A	MI 2
B	WG 13
C	SA 330J
D	MI 8
E	SA 321F
F	S 64
G	MI 6A

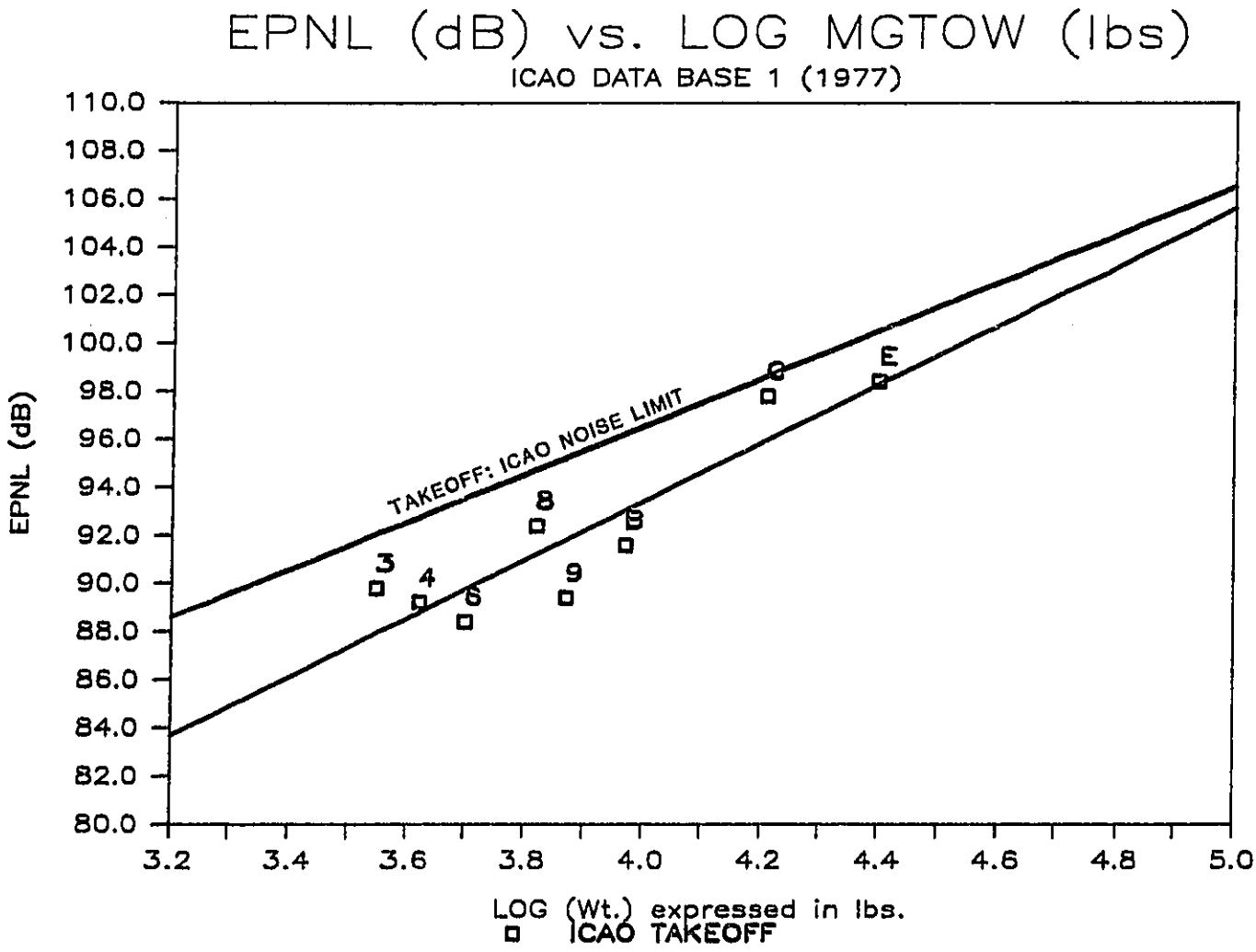

EPNL (dB) vs. LOG MGTOW (lbs)
ICAO DATA BASE 1 (1977)
EPNL (dB)
110.0
108.0
106.0
104.0
102.0
100.0
98.0
96.0
94.0
92.0
90.0
88.0
86.0
84.0
82.0
80.0
TAKEOFF: ICAO NOISE LIMIT
3
4
6
8
9
C
E
3.2
3.4
3.6
3.8
4.0
4.2
4.4
4.6
4.8
5.0
LOG (Wt.) expressed in lbs.
ICAO TAKEOFF

FIGURE 7.5-1

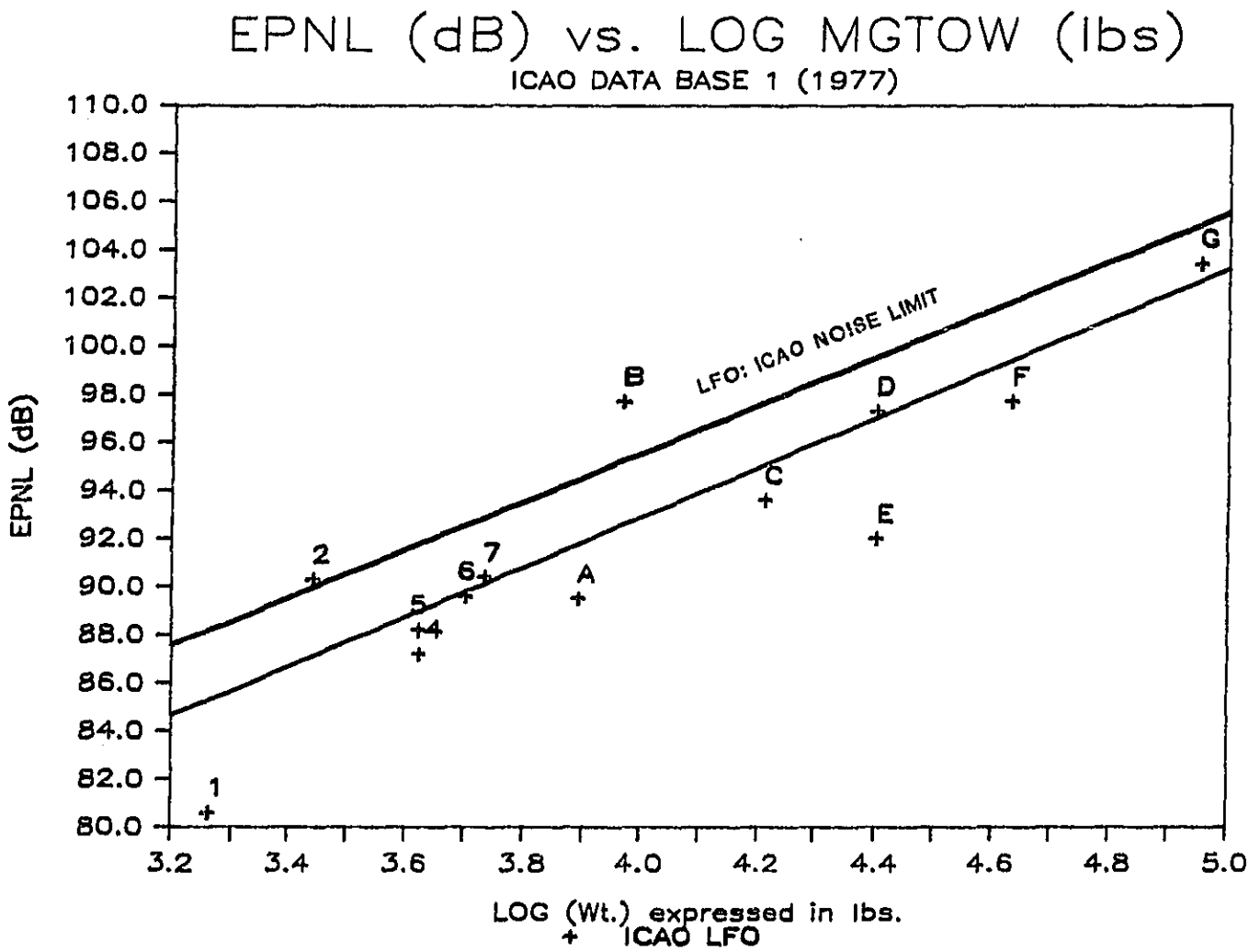

EPNL (dB) vs. LOG MGTOW (lbs)
ICAO DATA BASE 1 (1977)
EPNL (dB)
110.0
108.0
106.0
104.0
102.0
100.0
98.0
96.0
94.0
92.0
90.0
88.0
86.0
84.0
82.0
80.0
3.2
3.4
3.6
3.8
4.0
4.2
4.4
4.6
4.8
5.0
LFO: ICAO NOISE LIMIT
1
2
4
5
6
7
A
B
C
D
E
F
G
LOG (Wt.) expressed in lbs.
+ ICAO LFO

FIGURE 7.5-2

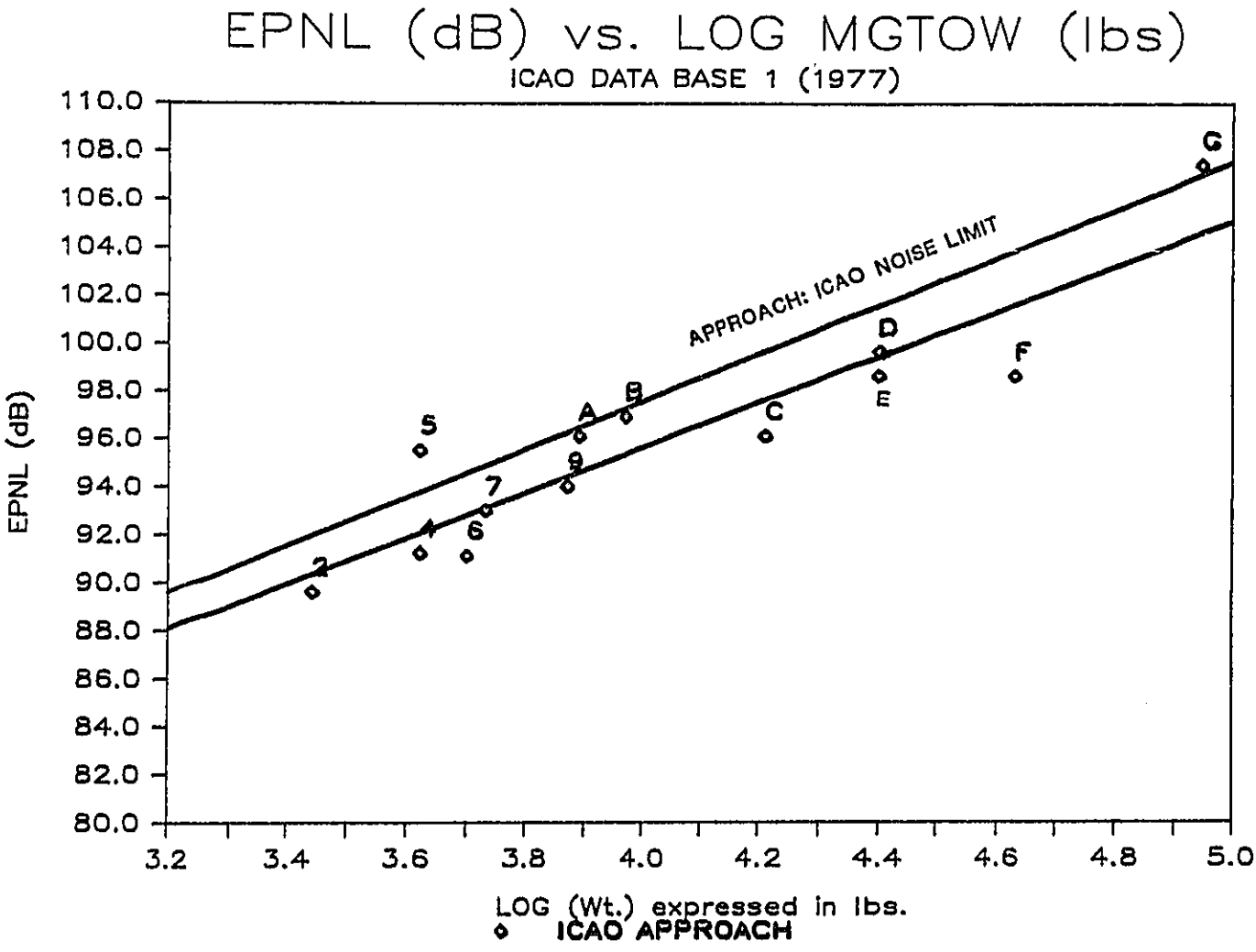

EPNL (dB) vs. LOG MGTOW (lbs)
ICAO DATA BASE 1 (1977)
EPNL (dB)
110.0
108.0
106.0
104.0
102.0
100.0
98.0
96.0
94.0
92.0
90.0
88.0
86.0
84.0
82.0
80.0
3.2
3.4
3.6
3.8
4.0
4.2
4.4
4.6
4.8
5.0
APPROACH: ICAO NOISE LIMIT
A
B
C
D
E
F
G
1
2
3
4
5
6
7
8
9
LOG (Wt.) expressed in lbs.
ICAO APPROACH

FIGURE 7.5-3

TABLE 7.6-1

Merged Data Sets: EPNL Levels/Log MGTOW Regression

*** TAKEOFF (ICAO) ***
RAINBOW, ICAO DB1 & ICAO DB2

EPNL LEVELS / LOG MGTOW (LBS)
LINEAR REGRESSION EQUATION

Y ≡ EPNL

Y =	SLOPE	*X +	INTERCEPT
=	9.40		54.03

X ≡ LOG MGTOW (LBS)

CORREL =	0.8073	MEAN X =	3.94
R SQ. =	0.6517	S.D. X =	0.3347
STD.ERR =	2.3447	MEAN Y =	91.07
TOT VAR =	15.2021	S.D. Y =	3.8990
SAMPLE =	28		

*** LFO (ICAO) ***
RAINBOW, ICAO DB1 & ICAO DB2

EPNL LEVELS / LOG MGTOW (LBS)
LINEAR REGRESSION EQUATION

Y =	SLOPE	*X +	INTERCEPT
=	10.05		51.85

CORREL =	0.8792	MEAN X =	4.00
R SQ. =	0.7730	S.D. X =	0.4477
STD.ERR =	2.4773	MEAN Y =	92.09
TOT VAR =	26.2160	S.D. Y =	5.1202
SAMPLE =	34		

*** APPROACH (ICAO) ***
RAINBOW, ICAO DB1 & ICAO DB2

EPNL LEVELS / LOG MGTOW (LBS)
LINEAR REGRESSION EQUATION

Y =	SLOPE	*X +	INTERCEPT
=	10.02		54.51

CORREL =	0.9041	MEAN X =	3.99
R SQ. =	0.8173	S.D. X =	0.3910
STD.ERR =	1.8820	MEAN Y =	94.48
TOT VAR =	18.7854	S.D. Y =	4.3342
SAMPLE =	33		

TABLE 7.6-2

Legend: Merged Data Sets

GRAPH LEGEND
RAINBOW, ICAO DB-1 & ICAO DB-2

# ON GRAPH	HELICOPTER
1	H 300C
2	500C
3	BELL 47G
4	500 D/E
5	SA 342
6	206L
7	AS 350
8	SA 342
9	ASTAR
A	BO 105
B	TWINSTAR
C	BO105 C
D	A 109
E	A109 A
F	BK117 P2
G	BK117
H	SA 360
I	SA 365
J	MI 2
K	222 TWINJET
L	DAUPHIN
M	WG 13
N	S-76
O	S-76A
P	212 H-1
Q	W30-100
R	SA 330J
S	UH-60A
T	S-61 H-3
U	MI 8
V	SA 321F
W	MI-8
X	S-65 H-53
Y	S 64
Z	234/CH-47D
A1	MI 6A
A2	MI-26 I

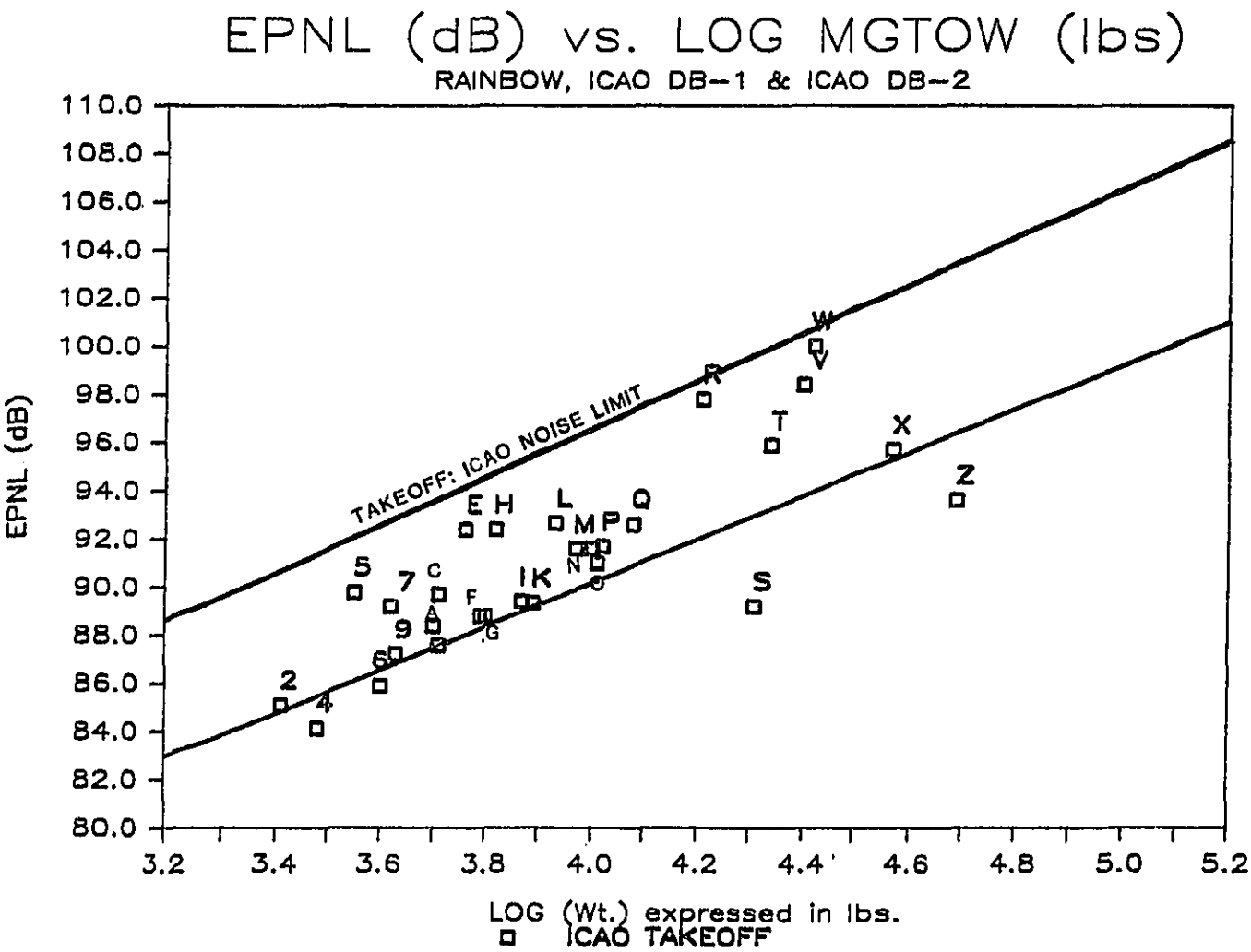

EPNL (dB) vs. LOG MGTOW (lbs)
RAINBOW, ICAO DB–1 & ICAO DB–2
TAKEOFF: ICAO NOISE LIMIT
EPNL (dB)
110.0
108.0
106.0
104.0
102.0
100.0
98.0
96.0
94.0
92.0
90.0
88.0
86.0
84.0
82.0
80.0
3.2
3.4
3.6
3.8
4.0
4.2
4.4
4.6
4.8
5.0
5.2
LOG (Wt.) expressed in lbs.
ICAO TAKEOFF

FIGURE 7.6-1

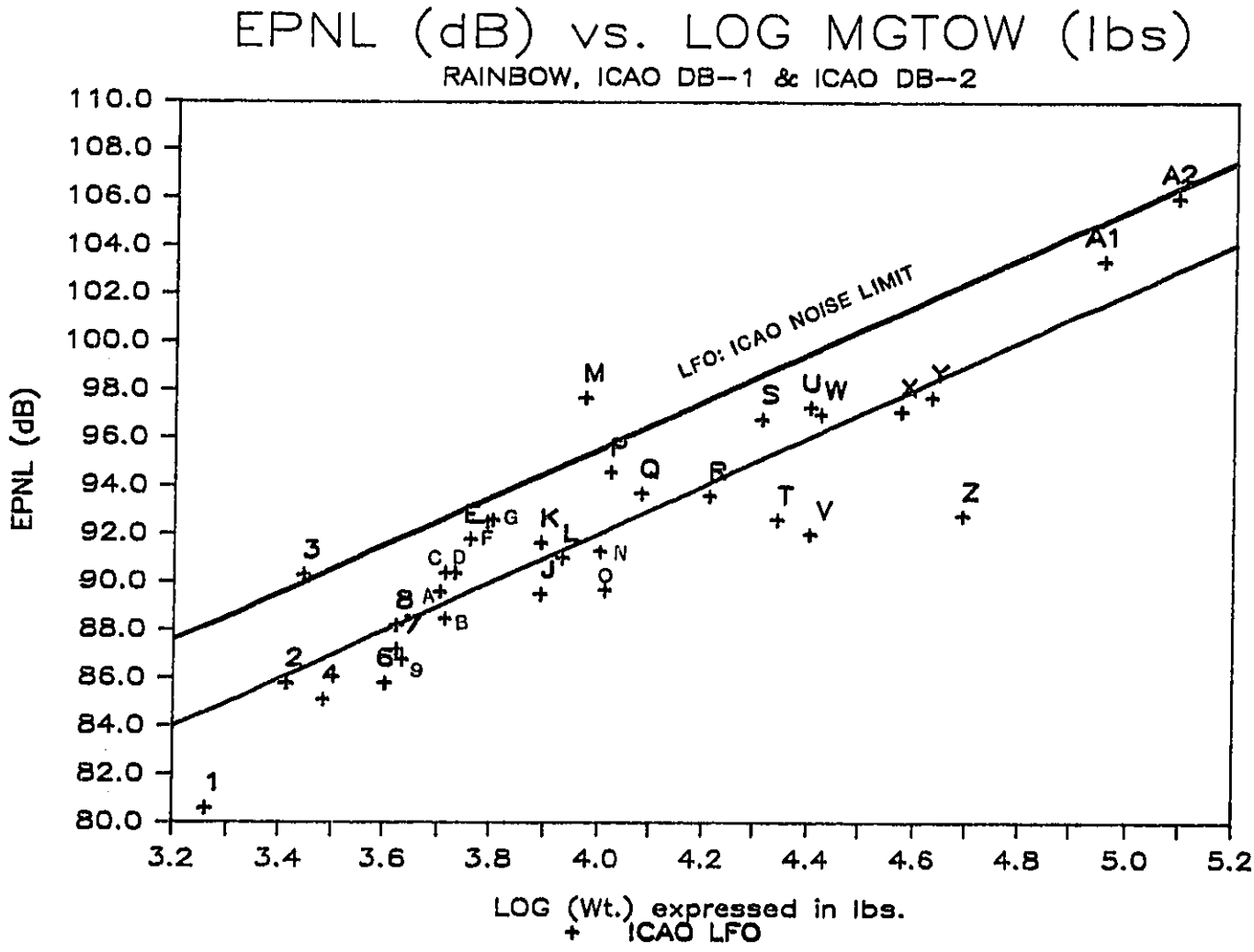

EPNL (dB) vs. LOG MGTOW (lbs)
RAINBOW, ICAO DB–1 & ICAO DB–2
EPNL (dB)
110.0
108.0
106.0
104.0
102.0
100.0
98.0
96.0
94.0
92.0
90.0
88.0
86.0
84.0
82.0
80.0
3.2
3.4
3.6
3.8
4.0
4.2
4.4
4.6
4.8
5.0
5.2
LFO: ICAO NOISE LIMIT
LOG (Wt.) expressed in lbs.
+ ICAO LFO

FIGURE 7.6-2

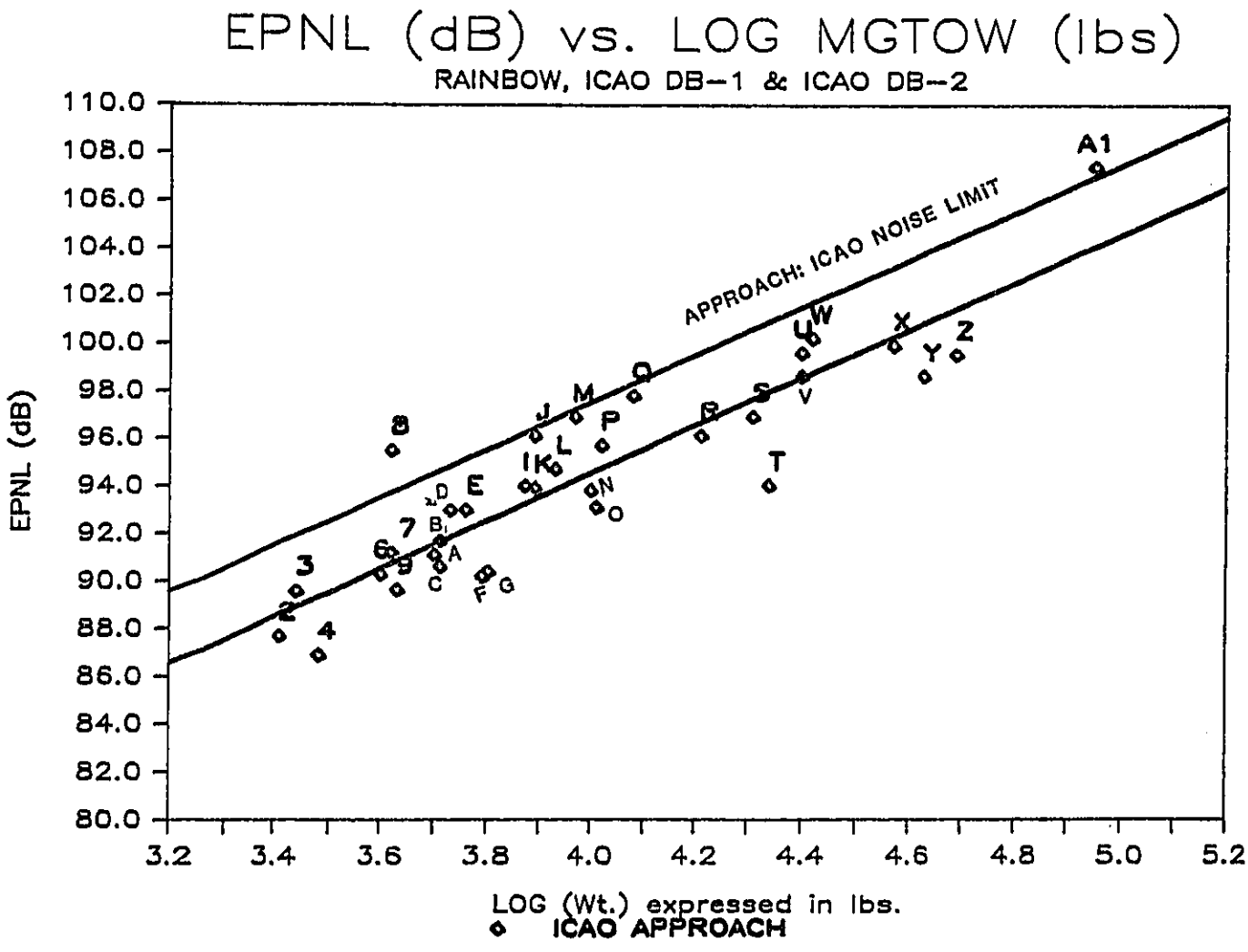

EPNL (dB) vs. LOG MGTOW (lbs)
RAINBOW, ICAO DB–1 & ICAO DB–2
APPROACH: ICAO NOISE LIMIT
EPNL (dB)
110.0
108.0
106.0
104.0
102.0
100.0
98.0
96.0
94.0
92.0
90.0
88.0
86.0
84.0
82.0
80.0
3.2
3.4
3.6
3.8
4.0
4.2
4.4
4.6
4.8
5.0
5.2
LOG (Wt.) expressed in lbs.
ICAO APPROACH

FIGURE 7.6-3

than one program. Since each program is unique and a different helicopter (serial number) is involved in each program (often at somewhat different weights or operational conditions) no data have been excluded in the merged set.

7.7 SUMMARY OF EPNL/LOG (MGTOW) REGRESSION

Table 7.7-1 (A-C) summarizes the linear regression information developed in the Sections 7.2, 7.3, 7.4, and 7.5. The table shows the coefficients of determination and regression equations for each scenario. Table 7.7-1 also provides a second order curve fit to the variable Log (MGTOW). In every case except one,the second order R-square value is markedly improved relative to the linear R-square value. In the case of the merged Rainbow and ICAO data sets the takeoff and level flyover R-square values are markedly improved with marginal improvement on the approach operation. This insight may provide guidance for empirical EPNL prediction efforts and future evaluation of noise standard limits.

7.8 SYNOPSIS OF LINEAR SOURCE NOISE ADJUSTMENT RELATIONSHIPS

This section summarizes the characteristics of linear relationships developed for the Rainbow test helicopters linking PNLTm and the advancing blade tip Mach number for source noise adjustments. These adjustments were applied only to level flyover data and were not applied to takeoff and approach measurements.

As seen in the appendices of this report, the best curve fit was used in implementing source noise adjustments for each microphone, for each helicopter. In some cases this was a linear fit; in others a second order fit was best. For comparison purposes a linear curve fit has been used in this section for all scenarios.

PNLTm versus advancing Mach number relationships have been developed for helicopter left-side, right-side and centerline measurement locations. Table 7.8-1 shows the slope and R-square value by helicopter and microphone location. The averaged slopes and R-square values are shown along with standard deviation. To the right side of the table is the three microphone average slope and the three microphone average R-square, along with the Mach number range spanned by the data.

Among the interesting features of this table one sees a dominant sensitivity indicated by the larger regression slopes, on the right side of the helicopter even in the case of the counter clockwise Aerospatiale models. Another interesting feature is the very steep right side slope for the Bell 222. Also of note is the BV-234 asymmetry in slopes in a situation where each side of the helicopter has an advancing blade tip. It is very likely that the tail rotor acoustical contribution to the PNLTm is a factor which, if quantified, would explain some of the single rotor helicopter results.

Table 7.8-2 incorporates the Hughes 500 D/E in the data base. The Hughes 500 D/E was deleted from Table 7.8-1 because of the anomalous results seen

TABLE 7.7-1A

Summary of 1st and 2nd Order Curve Fits: EPNL/Log MGTOW

REGRESSION AND 2nd ORDER FUNCTION SUMMARY TABLE

ICAO TAKEOFF

REGRESSION TEST SERIES	LINEAR R^2	LINEAR FUNCTION	2nd ORDER R^2	2nd ORDER FUNCTION
RAINBOW SERIES	0.7396	Y = (7.31 * X) + 60.80	0.8973	Y = -93.81 + (83.32 * X) + (-9.25 * X^2)
RAINBOW W/OUT BV 234/CH-47D	0.8764	Y = (13.99 * X) + 35.86	0.8557	Y = -104.86 + (89.25 * X) + (-10.04 * X^2)
ICAO DATA BASE 1	0.8297	Y = (12.19 * X) + 44.68	0.8906	Y = 211.72 + (-72.35 * X) + (10.64 * X^2)
ICAO DATA BASE 2	0.6768	Y = (9.81 * X) + 52.23	0.8505	Y = 21.23 + (25.39 * X) + (-1.94 * X^2)
RAINBOW & ICAO DATA BASE 2	0.6740	Y = (9.03 * X) + 54.90	0.8572	Y = -49.59 + (61.10 * X) + (-6.43 * X^2)
RAINBOW, ICAO D-BASE 1 ICAO D-BASE 2	0.6517	Y = (9.04 * X) + 54.03	0.8506	Y = -43.92 + (58.33 * X) + (-6.07 * X^2)

TABLE 7.7-1B

Summary of 1st and 2nd Order Curve Fits: EPNL/Log MGTOW

REGRESSION AND 2nd ORDER FUNCTION SUMMARY TABLE

ICAO LFO

REGRESSION TEST SERIES	LINEAR R^2	LINEAR FUNCTION	2nd ORDER R^2	2nd ORDER FUNCTION
RAINBOW SERIES	0.7024	Y = (5.87 * X) + 66.44	0.8530	Y = -63.25 + (69.62 * X) + (-7.76 * X^2)
RAINBOW W/OUT BV 234/CH-47D	0.8030	Y = (11.12 * X) + 46.82	0.8228	Y = -289.60 + (191.05 * X) + (-24.00 * X^2)
ICAO DATA BASE 1	0.7745	Y = (10.31 * X) + 51.00	0.9116	Y = 29.56 + (20.95 * X) + (-1.30 * X^2)
ICAO DATA BASE 2	0.8677	Y = (10.56 * X) + 50.51	0.9225	Y = 68.72 + (1.82 * X) + (1.04 * X^2)
RAINBOW & ICAO DATA BASE 2	0.7740	Y = (9.86 * X) + 52.53	0.8949	Y = 56.49 + (7.95 * X) + (0.23 * X^2)
RAINBOW, ICAO D-BASE 1 ICAO D-BASE 2	0.7730	Y = (10.05 * X) + 51.85	0.9041	Y = 45.07 + (13.37 * X) + (-0.40 * X^2)

TABLE 7.7-1C

Summary of 1st and 2nd Order Curve Fits: EPNL/Log MGTOW

REGRESSION AND 2nd ORDER FUNCTION SUMMARY TABLE

ICAO APPROACH

REGRESSION TEST SERIES	LINEAR R^2	LINEAR FUNCTION	2nd ORDER R^2	2nd ORDER FUNCTION
RAINBOW SERIES	0.8994	Y = (9.70 * X) + 54.89	0.9334	Y = -45.54 + (59.07 * X) + (-6.01 * X^2)
RAINBOW W/OUT BV 234/CH-47D	0.8634	Y = (13.50 * X) + 40.68	0.9055	Y = -382.50 + (239.84 * X) + (-30.19 * X^2)
ICAO DATA BASE 1	0.8428	Y = (9.44 * X) + 57.90	0.9097	Y = 101.25 + (-11.60 * X) + (2.52 * X^2)
ICAO DATA BASE 2	0.8201	Y = (10.42 * X) + 52.34	0.8844	Y = 29.81 + (21.74 * X) + (-1.41 * X^2)
RAINBOW & ICAO DATA BASE 2	0.8472	Y = (10.19 * X) + 53.19	0.9003	Y = -6.45 + (39.90 * X) + (-3.67 * X^2)
RAINBOW, ICAO D-BASE 1 ICAO D-BASE 2	0.8173	Y = (10.02 * X) + 54.51	0.8982	Y = 61.44 + (6.62 * X) + (0.41 * X^2)

TABLE 7.8-1

Summary Table: Level Flyover Source Noise Adjustment Functions

SUMMARY TABLE FOR ALL RAINBOW HELICOPTER LINEAR SLOPES
(EXCEPT HUGHES 500 D/E)
ANAL DATE: 18-Mar-86

HELICOPTER	LEFT SIDELINE SLOPE	LEFT SIDELINE R^2	CENTER LINE SLOPE	CENTER LINE R^2	RIGHT SIDELINE SLOPE	RIGHT SIDELINE R^2	3 MIC AVERAGE SLOPE	3 MIC AVERAGE R^2	ADV. MACH RANGE MIN	ADV. MACH RANGE MAX
AEROSPATIALE ASTAR	42.52	0.761	44.72	0.720	55.82	0.860	47.69	0.780	0.7324	0.8173
AEROSPATIALE DAUPHIN	52.51	0.745	25.75	0.641	57.76	0.663	45.34	0.683	0.7928	0.8556
AEROSPATIALE TWINSTAR	51.63	0.806	55.59	0.705	78.26	0.683	61.83	0.731	0.7293	0.8183
BELL 222 TWIN JET	65.33	0.646	35.16	0.654	110.93	0.896	70.47	0.732	0.7942	0.8471
BOEING VERTOL	29.72	0.280	46.66	0.600	52.79	0.855	43.06	0.578	0.7495	0.8326
SIKORSKY S-76A	78.90	0.840	75.20	0.798	97.15	0.916	83.75	0.851	0.7516	0.8240
AVERAGE	53.44	0.680	47.18	0.686	75.45	0.812				
STD. DEV.	15.68	0.19	15.63	0.06	22.17	0.10				

TABLE 7.8-2

SUMMARY TABLE FOR ALL RAINBOW HELICOPTER LINEAR SLOPES

HELICOPTER	LEFT SIDELINE SLOPE	LEFT SIDELINE R^2	CENTER LINE SLOPE	CENTER LINE R^2	RIGHT SIDELINE SLOPE	RIGHT SIDELINE R^2	3 MIC AVERAGE SLOPE	3 MIC AVERAGE R^2	ADV. MACH RANGE MIN	ADV. MACH RANGE MAX
AEROSPATIALE ASTAR	42.52	0.761	44.72	0.720	55.82	0.860	47.69	0.780	0.7324	0.8173
AEROSPATIALE DAUPHIN	52.51	0.745	25.75	0.641	57.76	0.663	45.34	0.683	0.7928	0.8556
AEROSPATIALE TWINSTAR	51.63	0.806	55.59	0.705	78.26	0.683	61.83	0.731	0.7293	0.8183
BELL 222 TWIN JET	65.33	0.646	35.16	0.654	110.93	0.896	70.47	0.732	0.7942	0.8471
BOEING VERTOL	29.72	0.280	46.66	0.600	52.79	0.855	43.06	0.578	0.7495	0.8326
HUGHES 500	30.87	0.485	-15.96	0.163	59.65	0.607	24.85	0.418	0.7099	0.7646
SIKORSKY S-76A	78.90	0.840	75.20	0.798	97.15	0.916	83.75	0.851	0.7516	0.8240
AVERAGE	50.21	0.652	38.16	0.612	73.19	0.783				
STD. DEV.	16.53	0.19	26.41	0.19	21.26	0.12				

at the centerline location. The result at centerline was statistically insignificant with an R-square of 0.163. (In the source adjustment a null function was used to adjust the 500 D/E centerline data.) This very poor correlation is in sharp contrast to most other results showing R-square values in the 0.6 to 0.8 range.

The average and statistical variation in slope have been identified in order to examine consistency and explore the suitability of a generalized correction relationship. As one can see, while individual helicopters display very unique characteristics, a generalized slope can be identified with a value between 35 and 75.

REFERENCES

1. Newman, J. Steven, Edward J. Rickley, Tyrone L. Bland, Sharon A. Daboin. Noise Measurement Flight Test: Data/Analyses Bell 222 Twin Jet Helicopter - FAA-EE-84-01, Federal Aviation Administration. Washington, DC, Febraury 1984.

2. Newman, J. Steven, Edward J. Rickley, Kristy R. Beattie, Sharon A. Daboin. Noise Measurement Flight Test: Data/Analyses Aerospatiale SA 365N Dauphin Helicopter - FAA-EE-84-02, Federal Aviation Administration, Washington, DC, April 1984.

3. Newman, J. Steven, Edward J. Rickley, Kristy R. Beattie, Tyrone L. Bland. Noise Measurement Flight Test: Data/Analyses Hughes 500D - FAA-EE-84-03, Federal Aviation Administration, Washington, DC, June 1984.

4. Newman, J. Steven, Edward J. Rickley, Kristy R. Beattie, Tyrone L. Bland. Noise Measurement Flight Test: Data/Analyses Aerospatiale AS 355F TwinStar - FAA-EE-84-04, Federal Aviation Administration, Washington, DC, June 1984.

5. Newman, J. Steven, Edward J. Rickley, Kristy R. Beattie, Tyrone L. Bland. Noise Measurement Flight Test: Data/Analyses Aerospatiale AS 350D AStar Helicopter - FAA-EE-84-05, Federal Aviation Administration, Washington, DC, September 1984.

6. Newman, J. Steven, Edward J. Rickley, Kristy R. Beattie, Tyrone L. Bland. Noise Measurement Flight Test: Data/Analyses Sikorsky S-76A Helicopter - FAA-EE-84-06, Federal Aviation Administration, Washington, DC, September 1984.

7. Newman, J. Steven, Edward J. Rickley, Kristy R. Beattie, Tyrone L. Bland. Noise Measurement Flight Test: Data/Analyses Boeing Vertol 234/CH47-D Helicopter - FAA-EE-84-07, Federal Aviation Administration, Washington, DC, September 1984.

8. Newman, J. Steven, Edward J. Rickley. Noise Levels of Eight Helicopters Using Proposed International Certification Procedures - FAA-EE-79-03, Federal Aviation Administration, Washington, DC, March 1979.

9. SAE Report AIR-902, Determination of Minimum Distance from Ground Observer to Aircraft for Acoustic Tests. May 15, 1966.

10. Working Group B, International Civil Aviation Organization Committee on Noise, "Working Paper 25" developed at the Tokyo meeting, December 1978.

11. ICAO Annex 16 to the Convention on International Civil Aviation, "Environmental Protection", Volume I - Aircraft Noise, 1981.

12. ICAO Working Group II Working Paper 6 on Agenda Item 5.b: Helicopter Noise Certification Testing Procedures (presented by the Program Coordinator of the Helicopter Noise Measurement Repeatability Program at the WG II meeting in Tokyo, Japan), March 1985.

13. ICAO CAEP Working Group II Helicopter Noise Measurement Repeatability Program Program Coordinator Report, Ottawa, Canada, BIP-1 (Background Information Paper), October 9, 1985.

14. ICAO CAEP Working Group II Rapporteur Report of the Ottawa Meeting, January 1986

15. Personal Communication - Telex/Telicopieur: March 5, 1986 from Mr. H. J. Marze, Aerospatiale, Marignane, France to Mr. J. S. Newman, FAA, Washington, DC, United States.

16. Personal Communication - Telephone: March 7, 1986 from Dr. D. JanakiRam, McDonnell Douglas Helicopter Company (formerly Hughes), with Mr. J. S. Newman, FAA, Washington, DC, United States.

17. Personal Communication - Telephone: March 12, 1986 from Mr. Sternfeld, Boeing Vertol, with J. S. Newman, FAA, Washington, DC, United States.

18. Personal Communication - Telephone: March 12, 1986 from Mr. Yoerkie, Sikorsky, with Mr. J. S. Newman, FAA, Washington, DC, United States.

19. Personal Communication - Telephone: March 12, 1986 from Mr. C. Cox, Bell Helicopter Textron, with Mr. J. S. Newman, FAA, Washington, DC, United States.

APPENDICES A-G

A. Hughes 500 D/E, A1-A3

B. Aerospatiale AS 350D (AStar), B1-B3

C. Aerospatiale AS 355F (TwinStar), C1-C3

D. Aerospatiale SA 365N (Dauphin), D1-D3

E. Bell 222 Twin Jet, E1-E3

F. Boeing Vertol 234/CH-47D, F1-F3

G. Sikorsky S-76A, G1-G3

Appendices A-G contain the data and related analyses for the Rainbow Series helicopters.

Section one (e.g. A1) of each appendix (A-G) contains the fully corrected magnetic recording data. The following two pages include an explanation on how to read section one and the definitions to be used for section one.

Section two (e.g. A2) of each appendix (A-G) contains the source noise correction background data. Provided are the test background reference advancing blade tip Mach number, the PNLTm and altitude adjusted PNLTm values, and the best fit function analysis with linear and second order functions. Included are graphs showing advancing blade tip Mach number vs PNLTm for left, center, and right side microphone locations.

Section three (e.g. A3) of each appendix (A-G) contains the EPNL Summary Tables providing location averages (left, center, and right), three microphone averages, and overall summary of all valid three microphone averages.

Correction Data using "Simplified Procedure" are presented:

The key to the table numbering system is as follows:

Table No.	J.	1-1.	1

Appendix No.----------

Helicopter No. & Microphone Location--

Page No. of Group----------

Table No.	J.1-X-s	Aerospatiale	SA 365N (Dauphin)
	J.2-X.X	Aerospatiale	SA 355F (TwinStar)
	J.3-X-X	Aerospatiale	SA 350D (AStar)
	J.4-X-X	Sikorsky	S-76 (Spirit)
	J.5-X-X	Bell	222
	J.6-X-X	Hughes	500D/E
	J.7-X-X	Boeing Vertol	CD-470D (Chinook)

Microphone No.	1	centerline-center
	2	sideline 150m south
	3	sideline 150m north

DEFINITIONS

A brief synopsis of "Correction Data" column heading is presented.

EV	Event number
EPNL	Effective Perceived Noise Level
SEL	Sound Exposure Level, the total sound energy measured within the period determined by the 10dB down duration of the A-Weighted time history. Reference duration, 1-second.
PNLTm	Tone Corrected Perceived Noise Level (maximum)
AL_M	A-weighted Sound Level (maximum)
Δ 1 (P)	Spherical spreading and atmospheric absorption adjustment to PNLTm per Annex 16, Chapter 2, Appendix 1, Section 9.4 using 10 meter temperature and relative humidity data. T_{ref}=77 F, RH_{ref}=70%.
Δ1 (A)	Spherical spreading and atmospheric absorption adjustment to ALm.
Δ2	Duration adjustment= -7.5 Log (CPA/CPAR) + 10.0 Log GRND SPD/REF SPD
Δ3	Advancing blade tip Mach number adjustment
Acoustic Angle	The angle between the aircraft flight path and the noise path at time of PNLTm
CPA	Distance aircraft to receiver at closest point of approach
SR	Slant Range-distance aircraft to receiver at time of PNLTm
CPAR	Reference closest point of approach
SRR	Reference slant range
GRND SPD	Aircraft ground speed
REF SPD	Reference aircraft speed

APPENDIX A (A1-A3)

HUGHES 500 D/E

TABLE A1-1

TABLE NO. 1.6-1.1

HUGHES 500D HELICOPTER

DOT/TSC
2/ 5/86

CORRECTION DATA*

SITE: 1 CENTERLINE - CENTER JUNE 22,1983

	CORRECTED				CORRECTIONS (dB)				ACOUSTIC ANGLE	TRACKING DATA (Meters) (ACTUAL)		(REFERENCE)		SPEED(m/sec)	
Ev	EPNL	SEL	PNLTm	ALm	/\1(P)	/\1(A)	/\2	/\3	(Deg)	CPA	SR	CPAR	SRR	GRND	REF
6 DEGREE APPROACH -- TARGET IAS 62 KTS. (ICAO)															
F1	89.3	87.9	90.1	78.8	-2.25	-2.13	1.37	-	115.7	94.6	105.0	119.3	132.4	31.9	27.7
F2	87.3	85.1	89.2	77.1	-2.24	-2.12	0.69	-	99.7	94.6	96.0	119.3	121.1	27.3	27.7
F3	90.5	88.8	91.9	80.4	-2.81	-2.65	1.74	-	132.7	90.0	122.5	119.3	162.5	33.4	27.7
F4	89.7	88.1	90.5	78.2	-2.42	-2.30	1.96	-	88.5	92.8	92.8	119.3	119.4	36.0	27.7
F5	87.1	84.7	89.4	77.0	-2.16	-2.03	0.89	-	80.8	95.5	96.8	119.3	120.9	28.8	27.7
F6	88.5	86.9	90.5	79.4	-3.09	-2.92	1.65	-	112.7	86.6	93.9	119.3	129.3	31.9	27.7
Avg.	88.7	86.9	90.3	78.5	-2.49	-2.36	1.38	-	105.0	92.4	101.2	119.3	130.9	31.5	27.7
Std Dv	1.3	1.7	1.0	1.3	0.37	0.35	0.50	-	19.1	3.4	11.3	0.0	16.3	3.1	0.0
90% CI	1.1	1.4	0.8	1.1	0.31	0.29	0.41	-	15.7	2.8	9.3	0.0	13.4	2.6	0.0
TAKEOFF -- TARGET IAS 62 KTS. (ICAO)															
117	82.1	80.2	83.2	71.2	-4.46	-4.14	0.95	-	81.5	108.4	109.6	170.3	172.2	28.3	31.9
118	82.3	80.4	83.2	71.4	-4.29	-4.01	1.13	-	60.8	110.3	126.3	170.3	195.0	29.8	31.9
119	82.4	80.6	82.3	70.8	-3.56	-3.33	0.95	-	101.9	119.0	121.6	170.3	174.1	30.4	31.9
120	83.5	81.8	83.4	72.0	-3.79	-3.45	1.01	-	101.3	116.9	119.3	170.3	173.7	30.4	31.9
121	83.2	81.4	84.0	72.0	-3.33	-3.11	1.03	-	74.4	121.6	126.3	170.3	176.9	31.4	31.9
122	83.4	81.6	83.4	71.5	-3.56	-3.29	1.17	-	78.6	119.0	121.4	170.3	173.8	31.9	31.9
Avg.	82.8	81.0	83.3	71.5	-3.83	-3.55	1.04	-	83.1	115.9	120.8	170.3	177.6	30.3	31.9
Std Dv	0.6	0.7	0.6	0.5	0.45	0.42	0.09	-	16.0	5.3	6.1	0.0	8.7	1.3	0.0
90% CI	0.5	0.6	0.5	0.4	0.37	0.34	0.08	-	13.2	4.4	5.1	0.0	7.1	1.0	0.0
TAKEOFF -- STANDARD (SEE TEXT)															
K27	82.7	80.7	84.1	72.0	-5.26	-4.92	1.96	-	79.0	99.5	101.4	170.3	173.5	33.4	31.9
K28	83.4	81.5	84.3	72.3	-4.19	-3.92	1.47	-	95.3	110.8	111.2	170.3	171.1	32.4	31.9
K30	83.0	81.1	83.2	71.7	-3.56	-3.35	1.19	-	56.8	118.3	141.3	170.3	203.5	31.9	31.9
K31	84.1	82.2	85.1	73.0	-3.53	-3.30	1.32	-	90.6	118.5	118.6	170.3	170.3	32.9	31.9
K32	83.0	81.4	82.2	70.7	-3.62	-3.44	1.30	-	90.1	116.9	116.9	170.3	170.3	32.4	31.9
Avg.	83.3	81.4	83.8	71.9	-4.03	-3.79	1.45	-	82.4	112.8	117.9	170.3	177.7	32.6	31.9
Std Dv	0.6	0.5	1.1	0.8	0.74	0.68	0.30	-	15.5	8.1	14.7	0.0	14.4	0.6	0.0
90% CI	0.5	0.5	1.0	0.8	0.70	0.65	0.29	-	14.8	7.7	14.0	0.0	13.8	0.6	0.0

*- Data Corrected Using 'Simplified Procedure'

TABLE A1-2

TABLE NO. 1.6-1.2

HUGHES 500D HELICOPTER

CORRECTION DATA*

DOT/TSC
2/ 6/86

SITE: 1 CENTERLINE - CENTER JUNE 22,1983

	CORRECTED				CORRECTIONS (dB)				ACOUSTIC ANGLE	TRACKING DATA (Meters) (ACTUAL)		(REFERENCE)		SPEED(m/sec)	
Ev	EPNL	SEL	PNLTm	ALm	/\1(P)	/\1(A)	/\2	/\3	(Deg)	CPA	SR	CPAR	SRR	GRND	REF
500 FT. FLYOVER -- TARGET IAS 125 KTS.															
A38	83.7	81.0	86.2	73.4	-1.84	-1.74	1.07	0.0	105.8	123.1	128.0	150.0	155.9	61.7	55.9
A39	82.9	80.2	85.7	72.9	-0.34	-0.35	-0.21	0.0	106.3	143.2	149.2	150.0	156.3	51.4	55.9
A40	83.5	80.4	86.5	73.4	-0.27	-0.27	0.15	0.0	96.5	144.1	145.0	150.0	151.0	56.1	55.9
A41	83.3	80.3	86.6	73.4	-0.90	-0.91	0.30	0.0	97.0	135.8	136.9	150.0	151.1	55.6	55.9
A42	82.5	79.6	86.4	73.0	-0.03	-0.05	-0.14	0.0	96.1	147.9	148.7	150.0	150.9	53.5	55.9
A43	82.7	79.7	85.9	72.7	-0.34	-0.37	0.05	0.0	117.2	142.9	160.8	150.0	168.7	54.5	55.9
A44	82.4	79.4	85.7	72.8	-0.82	-0.82	0.36	0.0	102.9	136.8	140.3	150.0	153.9	56.6	55.9
Avg.	83.0	80.1	86.1	73.1	-0.65	-0.64	0.23	0.0	103.1	139.1	144.1	150.0	155.4	55.6	55.9
Std Dv	0.5	0.6	0.4	0.3	0.61	0.57	0.43	0.0	7.6	8.2	10.4	0.0	6.3	3.2	0.0
90% CI	0.4	0.4	0.3	0.2	0.45	0.42	0.31	0.0	5.6	6.0	7.7	0.0	4.6	2.4	0.0
500 FT. FLYOVER -- TARGET IAS 111 KTS.															
B45	84.5	81.3	87.7	74.4	-0.02	-0.05	0.41	0.0	94.1	148.2	148.5	150.0	150.4	54.0	49.6
B46	82.7	79.9	85.8	72.9	0.31	0.24	0.05	0.0	100.5	152.8	155.4	150.0	152.5	50.9	49.6
B47	83.8	80.6	86.5	73.3	-0.42	-0.40	0.32	0.0	101.4	142.5	145.4	150.0	153.0	51.4	49.6
B48	83.1	80.1	86.5	73.2	0.20	0.16	-0.15	0.0	104.5	151.6	156.6	150.0	154.9	48.4	49.6
B49	84.1	81.0	86.6	73.3	-0.16	-0.18	0.07	0.0	100.4	146.0	148.5	150.0	152.5	49.4	49.6
Avg.	83.7	80.6	86.6	73.4	-0.02	-0.05	0.14	0.0	100.2	148.2	150.9	150.0	152.7	50.8	49.6
Std Dv	0.7	0.6	0.7	0.6	0.29	0.26	0.22	0.0	3.8	4.2	4.8	0.0	1.6	2.2	0.0
90% CI	0.7	0.6	0.6	0.5	0.28	0.25	0.21	0.0	3.6	4.0	4.6	0.0	1.5	2.1	0.0
500 FT. FLYOVER -- TARGET IAS 97 KTS.															
C50	83.9	80.8	87.0	73.3	-0.15	-0.16	0.07	0.0	107.4	146.2	153.2	150.0	157.2	43.2	43.4
C51	84.4	81.2	86.6	73.5	0.20	0.14	0.17	0.0	95.0	151.0	151.6	150.0	150.6	45.3	43.4
C52	83.3	80.2	86.0	72.5	-0.06	-0.05	0.18	0.0	107.9	147.9	155.4	150.0	157.6	44.7	43.4
C53	84.8	81.5	87.4	73.4	-4.98	-4.63	2.13	0.0	125.9	92.8	114.5	150.0	185.1	49.4	43.4
Avg.	84.1	80.9	86.7	73.2	-1.25	-1.17	0.64	0.0	109.0	134.5	143.7	150.0	162.6	45.7	43.4
Std Dv	0.6	0.6	0.6	0.5	2.49	2.31	1.00	0.0	12.7	27.9	19.5	0.0	15.3	2.6	0.0
90% CI	0.8	0.7	0.7	0.6	2.93	2.71	1.17	0.0	14.9	32.8	23.0	0.0	18.0	3.1	0.0
500 FT. FLYOVER -- TARGET IAS 83.5 KTS.															
D54	84.6	81.3	87.8	74.0	-1.71	-1.64	0.97	0.0	108.9	125.6	132.8	150.0	158.6	40.6	37.1
D55	84.3	81.2	86.8	73.4	-3.22	-3.03	1.28	0.0	106.1	108.6	113.1	150.0	156.1	39.1	37.1
D56	83.9	81.0	86.3	72.8	-1.06	-1.05	0.67	0.0	111.4	133.3	143.2	150.0	161.1	39.6	37.1
D57	85.9	83.0	87.7	73.8	-3.60	-3.35	1.59	0.0	117.4	105.7	119.0	150.0	168.9	41.1	37.1
Avg.	84.7	81.6	87.1	73.5	-2.40	-2.27	1.13	0.0	111.0	118.3	127.0	150.0	161.2	40.1	37.1
Std Dv	0.9	0.9	0.7	0.5	1.21	1.10	0.40	0.0	4.8	13.3	13.6	0.0	5.5	0.9	0.0
90% CI	1.0	1.1	0.9	0.6	1.42	1.29	0.47	0.0	5.6	15.6	16.0	0.0	6.5	1.1	0.0
1000 FT. FLYOVER -- TARGET IAS 125 KTS.															
E58	79.7	77.0	79.8	67.1	-0.07	-0.15	0.10	-	104.2	292.0	301.2	300.0	309.5	56.1	55.9
E59	78.9	76.5	79.9	67.8	0.25	0.19	-0.04	-	80.1	301.7	306.2	300.0	304.5	55.6	55.9
E60	79.1	76.8	79.8	67.5	-0.07	-0.06	0.11	-	93.2	294.6	295.1	300.0	300.5	56.6	55.9
Avg.	79.2	76.8	79.8	67.5	0.04	-0.01	0.06	-	92.5	296.1	300.9	300.0	304.8	56.1	55.9
Std Dv	0.4	0.3	0.1	0.3	0.18	0.18	0.08	-	12.1	5.0	5.6	0.0	4.5	0.5	0.0
90% CI	0.7	0.4	0.1	0.6	0.31	0.30	0.14	-	20.3	8.5	9.4	0.0	7.6	0.9	0.0

*- Data Corrected Using 'Simplified Procedure'

TABLE A1-3

TABLE NO. 1.6-1.3

HUGHES 500D HELICOPTER

DOT/TSC
2/ 6/86

CORRECTION DATA*

SITE: 1 CENTERLINE - CENTER JUNE 22,1983

	CORRECTED				CORRECTIONS (dB)				ACOUSTIC ANGLE	TRACKING DATA (Meters) (ACTUAL)		(REFERENCE)		SPEED(m/sec)	
Ev	EPNL	SEL	PNLTm	ALm	/\1(P)	/\1(A)	/\2	/\3	(Deg)	CPA	SR	CPAR	SRR	GRND	REF
6 DEGREE APPROACH -- TARGET IAS 72 KTS.															
G7	89.1	87.5	92.3	81.1	-3.21	-2.99	1.48	-	84.9	85.8	86.2	119.3	119.8	37.0	33.7
G8	88.1	85.9	90.8	78.1	-2.79	-2.66	1.04	-	103.6	89.3	91.9	119.3	122.8	34.5	33.7
G9	87.8	85.5	90.2	77.3	-2.13	-2.03	1.75	-	115.8	95.4	106.0	119.3	132.6	42.7	33.7
G10	89.1	87.4	90.9	79.1	-3.18	-3.04	1.05	-	85.4	85.5	85.8	119.3	119.7	33.4	33.7
G11	89.1	87.3	91.6	79.5	-2.31	-2.20	1.13	-	113.3	93.7	102.1	119.3	129.9	36.5	33.7
Avg.	88.7	86.7	91.2	79.0	-2.72	-2.58	1.29	-	100.6	90.0	94.4	119.3	125.0	36.8	33.7
Std Dv	0.7	0.9	0.8	1.4	0.49	0.46	0.31	-	14.8	4.5	9.2	0.0	6.0	3.6	0.0
90% CI	0.6	0.9	0.8	1.4	0.47	0.44	0.30	-	14.1	4.3	8.8	0.0	5.7	3.4	0.0
6 DEGREE APPROACH -- TARGET IAS 52 KTS.															
H12	89.4	86.9	90.6	78.4	-2.55	-2.46	1.53	-	112.2	92.2	99.6	119.3	128.9	27.3	23.2
H13	91.4	90.1	91.7	80.4	-3.14	-2.90	1.57	-	89.7	86.7	86.7	119.3	119.3	26.2	23.2
H14	89.9	88.4	89.2	77.5	-2.58	-2.44	2.32	-	92.6	91.2	91.3	119.3	119.5	32.4	23.2
H15	89.5	87.6	88.9	77.5	-2.48	-2.35	0.91	-	124.9	92.4	112.7	119.3	145.4	23.7	23.2
H16	91.4	90.4	92.8	81.2	-2.91	-2.78	1.93	-	90.4	87.8	87.8	119.3	119.3	28.8	23.2
Avg.	90.3	88.7	90.6	79.0	-2.73	-2.59	1.65	-	102.0	90.1	95.6	119.3	126.5	27.7	23.2
Std Dv	1.0	1.5	1.7	1.7	0.28	0.24	0.52	-	15.8	2.6	10.8	0.0	11.4	3.2	0.0
90% CI	1.0	1.5	1.6	1.6	0.27	0.23	0.50	-	15.1	2.5	10.3	0.0	10.8	3.1	0.0
9 DEGREE APPROACH -- TARGET IAS 62 KTS.															
J23	87.1	85.2	88.4	75.9	-0.48	-0.51	1.20	-	103.8	112.0	115.3	118.5	122.1	35.0	27.7
J24	87.5	85.7	87.8	75.7	-2.24	-2.12	1.59	-	94.1	93.5	93.7	118.5	118.8	33.4	27.7
J25	86.7	85.2	86.9	75.1	-2.27	-2.19	1.93	-	100.0	93.0	94.4	118.5	120.3	36.0	27.7
J26	87.1	85.4	88.4	76.3	-1.92	-1.84	1.28	-	109.8	98.6	104.8	118.5	126.0	32.4	27.7
Avg.	87.1	85.4	87.9	75.8	-1.73	-1.61	1.50	-	101.9	99.3	102.1	118.5	121.8	34.2	27.7
Std Dv	0.3	0.2	0.7	0.5	0.85	0.78	0.33	-	6.6	8.8	10.2	0.0	3.1	1.6	0.0
90% CI	0.4	0.3	0.8	0.6	1.00	0.91	0.39	-	7.8	10.4	12.0	0.0	3.6	1.9	0.0
12 DEGREE APPROACH -- TARGET IAS 62 KTS.															
L33	86.3	84.2	87.4	75.5	-1.77	-1.71	1.09	-	90.8	96.9	96.9	117.4	117.4	30.9	27.7
L34	86.1	84.6	86.9	75.1	-1.55	-1.49	1.17	-	95.9	98.9	99.5	117.4	118.0	31.9	27.7
L35	84.9	83.1	86.6	74.9	-1.94	-1.86	1.16	-	93.5	95.0	95.1	117.4	117.6	30.9	27.7
L36	89.8	88.0	91.6	79.6	-2.22	-2.13	1.02	-	100.9	92.5	94.2	117.4	119.5	29.3	27.7
L37	86.0	84.2	86.3	74.4	-1.80	-1.73	1.03	-	106.1	96.6	100.5	117.4	122.1	30.4	27.7
Avg.	86.6	84.8	87.7	75.9	-1.86	-1.78	1.09	-	97.4	96.0	97.2	117.4	118.9	30.7	27.7
Std Dv	1.9	1.8	2.2	2.1	0.25	0.23	0.07	-	6.1	2.4	2.7	0.0	2.0	0.9	0.0
90% CI	1.8	1.8	2.1	2.0	0.24	0.22	0.07	-	5.8	2.3	2.6	0.0	1.9	0.9	0.0

*- Data Corrected Using 'Simplified Procedure'

TABLE A1-4

TABLE NO. 1.6-2.1

HUGHES 500D HELICOPTER

CORRECTION DATA*

DOT/TSC
2/ 5/86

SITE: 2 SIDELINE - 150 M. SOUTH JUNE 22,1983

	CORRECTED				CORRECTIONS (dB)				ACOUSTIC ANGLE	TRACKING DATA (Meters) (ACTUAL)		(REFERENCE)		SPEED(m/sec)	
Ev	EPNL	SEL	PNLTm	ALm	/\1(P)	/\1(A)	/\2	/\3	(Deg)	CPA	SR	CPAR	SRR	GRND	REF
6 DEGREE APPROACH -- TARGET IAS 62 KTS. (ICAO)															
F1	87.5	85.7	87.6	75.9	-0.85	-0.80	0.87	-	108.7	176.9	186.7	191.7	202.3	31.9	27.7
F2	85.9	84.2	87.1	74.4	-0.88	-0.77	0.19	-	118.3	176.9	200.9	191.7	217.7	27.3	27.7
F3	87.0	85.1	86.4	74.9	-1.00	-0.92	1.12	-	133.3	174.5	239.7	191.7	263.3	33.4	27.7
F4	88.8	86.7	89.0	76.6	-0.83	-0.81	1.42	-	119.2	175.9	201.5	191.7	219.5	36.0	27.7
F5	86.6	84.8	88.1	76.2	-0.80	-0.73	0.42	-	107.9	177.4	186.4	191.7	201.5	28.8	27.7
F6	86.6	84.4	88.1	75.8	-0.99	-1.01	0.95	-	108.5	172.8	182.2	191.7	202.1	31.9	27.7
Avg.	87.1	85.1	87.7	75.6	-0.89	-0.84	0.83	-	116.0	175.7	199.6	191.7	217.7	31.5	27.7
Std Dv	1.0	0.9	0.9	0.8	0.08	0.10	0.45	-	9.9	1.8	21.2	0.0	23.8	3.1	0.0
90% CI	0.8	0.8	0.8	0.7	0.07	0.09	0.37	-	8.1	1.5	17.5	0.0	19.5	2.6	0.0
TAKEOFF -- TARGET IAS 62 KTS. (ICAO)															
I17	85.0	82.9	85.5	72.9	-2.05	-1.94	0.15	-	81.4	184.6	186.7	227.0	229.6	28.3	31.9
I18	85.3	83.2	85.6	72.9	-1.99	-1.86	0.36	-	78.2	185.7	189.7	227.0	231.9	29.8	31.9
I19	85.5	83.5	85.0	73.1	-1.73	-1.62	0.35	-	56.7	191.0	228.5	227.0	271.6	30.4	31.9
I20	85.9	83.7	85.4	73.0	-1.80	-1.67	0.37	-	95.3	189.7	190.5	227.0	227.9	30.4	31.9
I21	85.6	83.5	85.2	72.7	-1.61	-1.55	0.46	-	85.5	192.6	193.2	227.0	227.7	31.4	31.9
I22	85.4	83.2	84.9	72.5	-1.74	-1.64	0.56	-	65.6	191.0	209.8	227.0	249.3	31.9	31.9
Avg.	85.4	83.3	85.3	72.9	-1.82	-1.71	0.37	-	77.1	189.1	199.7	227.0	239.6	30.3	31.9
Std Dv	0.3	0.3	0.3	0.2	0.17	0.15	0.14	-	13.9	3.2	16.3	0.0	17.6	1.3	0.0
90% CI	0.3	0.2	0.2	0.2	0.14	0.13	0.11	-	11.5	2.6	13.4	0.0	14.5	1.0	0.0
TAKEOFF -- STANDARD (SEE TEXT)															
K27	84.1	82.1	84.0	71.6	-2.25	-2.14	0.97	-	85.2	179.5	180.2	227.0	227.7	33.4	31.9
K28	85.9	83.9	85.2	73.0	-1.89	-1.80	0.72	-	79.9	186.0	188.9	227.0	230.5	32.4	31.9
K30	85.1	82.8	84.5	71.8	-1.64	-1.59	0.57	-	76.3	190.5	196.1	227.0	233.6	31.9	31.9
K31	85.1	83.1	84.6	72.1	-1.65	-1.58	0.70	-	76.0	190.7	196.5	227.0	233.9	32.9	31.9
K32	85.0	82.7	84.9	72.6	-1.68	-1.60	0.65	-	89.4	189.7	189.7	227.0	227.0	32.4	31.9
Avg.	85.0	82.9	84.6	72.2	-1.82	-1.74	0.72	-	81.4	187.3	190.3	227.0	230.5	32.6	31.9
Std Dv	0.6	0.7	0.5	0.6	0.26	0.24	0.15	-	5.8	4.7	6.7	0.0	3.2	0.6	0.0
90% CI	0.6	0.7	0.5	0.5	0.25	0.23	0.14	-	5.5	4.5	6.4	0.0	3.1	0.6	0.0

*- Data Corrected Using 'Simplified Procedure'

TABLE A1-5

TABLE NO. 1.6-2.2

HUGHES 5000 HELICOPTER

CORRECTION DATA*

DOT/TSC
2/ 5/86

SITE: 2 — SIDELINE - 150 M. SOUTH — JUNE 22,1983

Ev	CORRECTED EPNL	CORRECTED SEL	CORRECTED PNLTm	CORRECTED ALm	CORRECTIONS (dB) /\1(P)	/\1(A)	/\2	/\3	ACOUSTIC ANGLE (Deg)	TRACKING DATA (Meters) (ACTUAL) CPA	SR	(REFERENCE) CPAR	SRR	SPEED(m/sec) GRND	REF
500 FT. FLYOVER -- TARGET IAS 125 KTS.															
A38	87.2	85.0	89.4	76.8	-0.73	-0.73	0.73	2.03	100.1	193.6	196.6	212.1	215.5	61.7	55.9
A39	87.4	85.1	89.8	77.1	-0.06	-0.07	-0.28	3.74	108.3	206.8	217.8	212.1	223.5	51.4	55.9
A40	87.1	84.7	89.6	76.7	-0.05	-0.08	0.09	2.91	102.3	207.4	212.3	212.1	217.1	56.1	55.9
A41	87.2	84.8	89.4	76.7	-0.35	-0.37	0.14	2.96	102.6	201.8	206.8	212.1	217.4	55.6	55.9
A42	86.7	84.3	89.7	77.1	0.04	0.02	-0.16	3.27	105.3	210.0	217.7	212.1	219.9	53.5	55.9
A43	87.0	84.6	90.2	77.2	-0.3	-0.16	-0.02	3.05	102.1	206.6	211.3	212.1	217.0	54.5	55.9
A44	84.9	82.5	88.1	75.5	-0.37	-0.34	0.21	1.38	106.7	202.4	211.4	212.1	221.5	56.6	55.9
Avg.	86.8	84.4	89.5	76.7	-0.24	-0.25	0.10	2.76	103.9	204.1	210.6	212.1	218.8	55.6	55.9
Std Dv	0.9	0.9	0.7	0.6	0.27	0.26	0.33	0.80	2.9	5.5	7.3	0.0	2.9	3.2	0.0
90% CI	0.6	0.6	0.5	0.4	0.20	0.19	0.24	0.58	2.1	4.0	5.3	0.0	2.1	2.4	0.0
500 FT. FLYOVER -- TARGET IAS 111 KTS.															
B45	85.2	82.7	87.6	74.6	-0.06	0.03	0.40	0.95	98.2	210.3	212.4	212.1	214.3	54.0	49.6
B46	84.2	81.7	86.6	73.8	0.18	0.15	0.09	1.20	97.4	213.5	215.3	212.1	213.9	50.9	49.6
B47	85.7	83.4	88.6	75.5	-0.15	-0.24	0.25	2.24	97.8	206.4	208.3	212.1	214.1	51.4	49.6
B48	84.9	82.5	87.9	75.2	0.09	0.13	-0.12	1.43	109.9	212.7	226.1	212.1	225.5	48.4	49.6
B49	86.5	83.9	88.9	75.7	-0.05	-0.08	0.03	2.59	100.8	208.8	212.6	212.1	216.0	49.4	49.6
Avg.	85.3	82.8	87.9	74.9	0.00	-0.00	0.13	1.68	100.8	210.3	214.9	212.1	216.8	50.8	49.6
Std Dv	0.9	0.8	0.9	0.8	0.13	0.16	0.20	0.70	5.2	2.9	6.7	0.0	5.0	2.2	0.0
90% CI	0.8	0.8	0.9	0.7	0.13	0.15	0.19	0.67	5.0	2.8	6.4	0.0	4.7	2.1	0.0
500 FT. FLYOVER -- TARGET IAS 97 KTS.															
C50	84.5	81.9	87.0	74.0	-0.15	-0.04	0.03	1.23	105.3	208.9	216.6	212.1	219.9	43.2	43.4
C51	85.8	83.5	87.6	74.8	0.14	0.10	0.19	2.06	105.7	212.2	220.5	212.1	220.4	45.3	43.4
C52	84.4	81.8	86.2	73.4	0.06	0.03	0.17	1.11	111.5	210.0	225.7	212.1	228.0	44.7	43.4
C53	85.6	83.5	88.3	74.5	-1.84	-1.76	1.17	1.36	129.6	175.9	228.2	212.1	275.2	49.4	43.4
Avg.	85.1	82.7	86.8	74.2	-0.45	-0.42	0.39	1.44	113.0	201.8	222.8	212.1	235.9	45.7	43.4
Std Dv	0.8	0.9	0.6	0.6	0.94	0.90	0.52	0.43	11.4	17.3	5.2	0.0	26.5	2.6	0.0
90% CI	0.9	1.1	0.8	0.8	1.10	1.06	0.62	0.50	13.4	20.3	6.2	0.0	31.1	3.1	0.0
500 FT. FLYOVER -- TARGET IAS 83.5 KTS.															
D54	84.5	82.0	86.5	73.2	-0.72	-0.72	0.67	0.85	99.5	195.1	197.9	212.1	215.1	40.6	37.1
D55	85.1	83.0	85.9	73.7	-1.31	-1.26	0.68	1.90	108.5	184.7	194.7	212.1	223.6	39.1	37.1
D56	85.0	82.7	86.4	73.1	-0.47	-0.47	0.47	0.94	90.5	200.1	200.1	212.1	212.1	39.6	37.1
D57	85.4	83.4	85.8	73.8	-1.44	-1.35	0.93	1.55	103.4	183.0	188.1	212.1	218.1	41.1	37.1
Avg.	85.0	82.8	86.1	73.5	-0.98	-0.95	0.69	1.31	100.5	190.7	195.2	212.1	217.2	40.1	37.1
Std Dv	0.4	0.6	0.4	0.3	0.46	0.42	0.19	0.50	7.6	8.2	5.2	0.0	4.9	0.9	0.0
90% CI	0.4	0.7	0.4	0.4	0.55	0.50	0.22	0.59	8.9	9.7	6.1	0.0	5.8	1.1	0.0
1000 FT. FLYOVER -- TARGET IAS 125 KTS.															
E58	80.4	78.1	81.0	68.4	-0.07	-0.13	0.09	-	92.9	327.5	327.9	335.4	335.9	56.1	55.9
E59	80.0	77.8	80.5	68.5	0.33	0.20	-0.03	-	109.1	336.2	355.8	335.4	355.0	55.6	55.9
E60	80.5	78.5	80.9	68.8	0.06	-0.02	0.11	-	102.7	329.9	338.2	335.4	343.9	56.6	55.9
Avg.	80.3	78.1	80.8	68.5	0.11	0.02	0.06	-	101.6	331.2	340.7	335.4	344.9	56.1	55.9
Std Dv	0.3	0.4	0.3	0.2	0.20	0.17	0.08	-	8.2	4.5	14.1	0.0	9.6	0.5	0.0
90% CI	0.5	0.6	0.4	0.3	0.34	0.28	0.13	-	13.8	7.6	23.8	0.0	16.2	0.9	0.0

*- Data Corrected Using 'Simplified Procedure'

TABLE A1-6

TABLE NO. 1.6-2.3

HUGHES 500D HELICOPTER

DOT/TSC
2/ 5/86

CORRECTION DATA*

SITE: 2 SIDELINE - 150 M. SOUTH JUNE 22,1983

	CORRECTED				CORRECTIONS (dB)				ACOUSTIC ANGLE	TRACKING DATA (Meters) (ACTUAL)		(REFERENCE)		SPEED(m/sec)	
Ev	EPNL	SEL	PNLTm	ALm	/\1(P)	/\1(A)	/\2	/\3	(Deg)	CPA	SR	CPAR	SRR	GRND	REF
6 DEGREE APPROACH -- TARGET IAS 72 KTS.															
G7	87.1	85.1	89.5	77.1	-1.06	-0.97	0.75	-	112.2	172.4	186.2	191.7	207.0	37.0	33.7
G8	87.1	85.2	89.2	76.5	-0.94	-0.91	0.41	-	100.2	174.1	176.9	191.7	194.8	34.5	33.7
G9	88.3	86.7	90.7	78.4	-0.74	-0.69	1.28	-	101.4	177.3	180.9	191.7	195.5	42.7	33.7
G10	85.6	83.5	86.8	74.4	-1.10	-1.03	0.31	-	122.7	172.2	204.7	191.7	227.9	33.4	33.7
G11	87.1	85.0	88.7	76.2	-0.80	-0.76	0.62	-	101.8	176.4	180.3	191.7	195.8	36.5	33.7
Avg.	87.0	85.1	89.0	76.5	-0.93	-0.87	0.67	-	107.7	174.5	185.8	191.7	204.2	36.8	33.7
Std Dv	0.9	1.1	1.4	1.4	0.16	0.14	0.38	-	9.7	2.3	11.1	0.0	14.2	3.6	0.0
90% CI	0.9	1.1	1.4	1.4	0.15	0.14	0.36	-	9.3	2.2	10.6	0.0	13.5	3.4	0.0
6 DEGREE APPROACH -- TARGET IAS 52 KTS.															
H12	86.7	84.1	87.2	74.9	-0.88	-0.82	0.98	-	98.9	175.6	177.8	191.7	194.0	27.3	23.2
H13	87.7	86.0	88.1	75.6	-1.01	-0.95	0.86	-	113.4	172.8	188.2	191.7	208.8	26.2	23.2
H14	89.1	87.1	87.6	75.3	-0.87	-0.79	1.74	-	110.6	175.1	187.1	191.7	204.7	32.4	23.2
H15	86.2	83.5	85.2	72.5	-0.81	-0.77	0.36	-	105.3	175.8	182.2	191.7	198.7	23.7	23.2
H16	88.0	86.4	88.5	75.9	-1.54	-1.47	1.45	-	97.5	163.6	165.0	191.7	193.3	28.8	23.2
Avg.	87.5	85.4	86.9	74.8	-1.02	-0.96	1.08	-	105.1	172.6	180.1	191.7	199.9	27.7	23.3
Std Dv	1.1	1.6	1.3	1.4	0.30	0.29	0.54*	-	7.0	5.2	9.4	0.0	6.7	3.2	0.0
90% CI	1.1	1.5	1.2	1.3	0.28	0.28	0.51	-	6.6	4.9	9.0	0.0	6.4	3.1	0.0
9 DEGREE APPROACH -- TARGET IAS 62 KTS.															
J23	87.2	85.6	87.1	75.1	0.01	-0.03	1.08	-	122.0	187.2	220.7	191.2	225.4	35.0	27.7
J24	87.2	85.3	86.3	74.7	-0.61	-0.61	1.07	-	85.9	176.7	177.1	191.2	191.6	33.4	27.7
J25	87.2	85.3	86.7	74.9	-0.61	-0.60	1.40	-	79.6	176.5	179.5	191.2	194.4	36.0	27.7
J26	87.2	85.7	87.2	75.6	-0.51	-0.46	0.88	-	100.4	179.5	182.5	191.2	194.4	32.4	27.7
Avg.	87.2	85.5	86.8	75.1	-0.43	-0.42	1.11	-	97.0	180.0	189.9	191.2	201.4	34.2	27.7
Std Dv	0.0	0.2	0.4	0.4	0.30	0.27	0.22	-	18.8	5.0	20.6	0.0	16.0	1.6	0.0
90% CI	0.0	0.3	0.5	0.4	0.35	0.32	0.25	-	22.1	5.9	24.2	0.0	18.8	1.9	0.0
12 DEGREE APPROACH -- TARGET IAS 62 KTS.															
L33	85.9	84.0	85.7	73.6	-0.46	-0.49	0.69	-	92.9	178.1	178.4	190.5	190.7	30.9	27.7
L34	86.9	85.4	86.8	74.8	-0.41	-0.43	0.81	-	96.0	179.2	180.2	190.5	191.5	31.9	27.7
L35	86.2	84.2	87.2	74.9	-0.52	-0.52	0.70	-	107.8	177.1	186.0	190.5	200.1	30.9	27.7
L36	88.8	86.8	88.4	77.4	-0.60	-0.59	0.51	-	126.9	175.8	219.9	190.5	238.3	29.3	27.7
L37	87.1	85.6	86.9	73.7	-0.51	-0.48	0.62	-	111.9	177.9	191.7	190.5	205.2	30.4	27.7
Avg.	87.0	85.2	86.8	74.9	-0.50	-0.50	0.67	-	107.1	177.6	191.3	190.5	205.2	30.7	27.7
Std Dv	1.1	1.1	1.0	1.5	0.07	0.06	0.11	-	13.6	1.3	16.9	0.0	19.5	0.9	0.0
90% CI	1.1	1.1	1.0	1.4	0.07	0.06	0.11	-	13.0	1.2	16.1	0.0	18.6	0.9	0.0

*- Data Corrected Using 'Simplified Procedure'

TABLE A1-7

TABLE NO. 1.6-3.1

HUGHES 500D HELICOPTER

DOT/TSC
2/ 5/86

CORRECTION DATA*

SITE: 3 SIDELINE - 150 M. NORTH JUNE 22,1983

	CORRECTED				CORRECTIONS (dB)				ACOUSTIC ANGLE	TRACKING DATA (Meters) (ACTUAL)		(REFERENCE)		SPEED(m/sec)	
Ev	EPNL	SEL	PNLTm	ALm	/\1(P)	/\1(A)	/\2	/\3	(Deg)	CPA	SR	CPAR	SRR	GRND	REF
6 DEGREE APPROACH -- TARGET IAS 62 KTS. (ICAO)															
F1	86.2	83.7	87.0	74.1	-0.74	-0.68	0.84	-	107.6	178.7	187.5	191.7	201.1	31.9	27.7
F2	83.6	81.0	84.1	71.1	-0.71	-0.67	0.16	-	109.8	178.7	189.9	191.7	203.7	27.3	27.7
F3	85.6	82.9	86.0	73.0	-0.88	-0.81	1.09	-	132.1	176.2	237.6	191.7	258.4	33.4	27.7
F4	85.2	82.5	85.1	71.7	-0.78	-0.69	1.38	-	115.2	177.7	196.4	191.7	211.8	36.0	27.7
F5	83.4	80.7	86.1	73.1	-0.64	-0.61	0.39	-	102.8	179.2	183.8	191.7	196.6	28.8	27.7
F6	85.3	82.5	86.0	73.4	-0.90	-0.85	0.92	-	106.1	174.5	181.6	191.7	199.5	31.9	27.7
Avg.	84.9	82.2	85.7	72.7	-0.77	-0.72	0.80	-	112.3	177.5	196.1	191.7	211.8	31.5	27.7
Std Dv	1.1	1.2	1.0	1.1	0.10	0.09	0.45	-	10.6	1.8	21.0	0.0	23.4	3.1	0.0
90% CI	0.9	0.9	0.8	0.9	0.08	0.08	0.37	-	8.7	1.5	17.2	0.0	19.3	2.6	0.0
TAKEOFF -- TARGET IAS 62 KTS. (ICAO)															
I17	83.6	81.5	83.2	72.1	-1.87	-1.75	0.09	-	67.5	188.3	203.9	227.0	245.7	28.3	31.9
I18	83.9	81.9	82.6	71.3	-1.78	-1.72	0.30	-	44.2	189.4	271.8	227.0	325.6	29.8	31.9
I19	84.1	82.3	83.2	71.9	-1.52	-1.44	0.28	-	76.1	194.9	200.7	227.0	233.8	30.4	31.9
I20	84.7	82.7	84.7	72.7	-1.62	-1.51	0.30	-	89.5	193.6	193.6	227.0	227.0	30.4	31.9
I21	84.5	82.7	85.1	73.4	-1.43	-1.34	0.40	-	78.1	196.6	200.9	227.0	231.9	31.4	31.9
I22	84.1	82.1	83.1	71.3	-1.53	-1.48	0.50	-	123.3	194.9	233.2	227.0	271.6	31.9	31.9
Avg.	84.1	82.2	83.6	72.1	-1.62	-1.54	0.31	-	79.8	192.9	217.4	227.0	255.9	30.3	31.9
Std Dv	0.4	0.5	1.0	0.8	0.17	0.16	0.14	-	26.2	3.3	30.0	0.0	37.7	1.3	0.0
90% CI	0.3	0.4	0.8	0.7	0.14	0.13	0.11	-	21.5	2.7	24.7	0.0	31.0	1.0	0.0
TAKEOFF -- STANDARD (SEE TEXT)															
K27	84.3	82.1	84.5	72.4	-2.03	-1.95	0.90	-	75.4	183.1	189.2	227.0	234.5	33.4	31.9
K28	83.7	82.0	84.3	71.7	-1.67	-1.61	0.65	-	111.0	189.8	203.3	227.0	243.1	32.4	31.9
K30										NO TRACKING DATA					
K31	84.8	82.8	85.3	72.6	-1.44	-1.36	0.64	-	110.5	194.6	207.7	227.0	242.3	32.9	31.9
K32	83.5	81.8	82.6	71.1	-1.50	-1.42	0.59	-	54.1	193.5	239.1	227.0	280.4	32.4	31.9
Avg.	84.1	82.1	84.2	72.0	-1.66	-1.58	0.69	-	87.7	190.2	209.8	227.0	250.1	32.8	31.9
Std Dv	0.6	0.4	1.1	0.7	0.27	0.27	0.14	-	28.0	5.2	21.0	0.0	20.6	0.5	0.0
90% CI	0.7	0.5	1.3	0.8	0.31	0.31	0.16	-	32.9	6.1	24.7	0.0	24.2	0.6	0.0

*- Data Corrected Using 'Simplified Procedure'

TABLE A1-8

TABLE NO. 1.6-3.2

HUGHES 500D HELICOPTER

CORRECTION DATA*

DOT/TSC
2/ 5/86

SITE: 3 SIDELINE - 150 M. NORTH JUNE 22,1983

Ev	CORRECTED EPNL	CORRECTED SEL	CORRECTED PNLTm	CORRECTED ALm	CORRECTIONS (dB) /\1(P)	/\1(A)	/\2	/\3	ACOUSTIC ANGLE (Deg)	TRACKING DATA (Meters) (ACTUAL) CPA	SR	(REFERENCE) CPAR	SRR	SPEED(m/sec) GRND	REF
500 FT. FLYOVER -- TARGET IAS 125 KTS.															
A38	86.1	84.2	88.1	76.3	-0.66	-0.68	0.71	1.05	104.5	194.8	201.2	212.1	219.1	61.7	55.9
A39	85.1	83.0	87.9	75.5	-0.01	0.01	-0.30	1.94	123.3	208.1	249.1	212.1	253.9	51.4	55.9
A40	85.4	83.3	88.0	75.7	0.06	0.03	0.07	1.51	113.2	208.7	227.2	212.1	230.9	56.1	55.9
A41	85.8	83.6	88.8	76.7	-0.24	-0.27	0.12	1.53	113.5	203.1	221.6	212.1	231.4	55.6	55.9
A42	85.2	83.0	87.1	75.0	0.14	0.11	-0.18	1.69	101.5	211.4	215.8	212.1	216.5	53.5	55.9
A43	84.9	82.8	88.0	76.0	-0.02	-0.04	-0.04	1.58	109.2	208.0	220.2	212.1	224.7	54.5	55.9
A44	86.3	84.2	88.7	76.5	-0.24	-0.27	0.19	2.66	79.1	203.7	207.5	212.1	216.0	56.6	55.9
Avg.	85.5	83.4	88.1	76.0	-0.14	-0.16	0.08	1.71	106.3	205.4	220.4	212.1	227.5	55.6	55.9
Std Dv	0.6	0.6	0.6	0.6	0.27	0.27	0.33	0.50	13.9	5.5	15.4	0.0	13.3	3.2	0.0
90% CI	0.4	0.4	0.4	0.4	0.20	0.20	0.24	0.36	10.2	4.0	11.3	0.0	9.7	2.4	0.0
500 FT. FLYOVER -- TARGET IAS 111 KTS.															
B45	85.9	83.6	88.4	76.0	0.12	0.09	0.38	1.84	98.0	211.6	213.7	212.1	214.2	54.0	49.6
B46	84.3	82.1	86.0	73.7	0.28	0.21	0.07	2.32	100.8	214.9	218.8	212.1	216.0	50.9	49.6
B47	84.9	82.5	86.5	74.2	-0.09	-0.10	0.23	1.16	111.5	207.6	223.1	212.1	228.0	51.4	49.6
B48	84.7	82.4	86.3	74.6	0.25	0.17	-0.14	2.76	87.3	214.1	214.3	212.1	212.4	48.4	49.6
B49	84.4	82.0	86.4	74.1	0.07	0.01	0.01	1.34	119.3	210.1	241.0	212.1	243.3	49.4	49.6
Avg.	84.8	82.5	86.7	74.5	0.13	0.08	0.11	1.88	103.4	211.7	222.2	212.1	222.8	50.8	49.6
Std Dv	0.6	0.6	0.9	0.9	0.15	0.12	0.20	0.67	12.4	3.0	11.2	0.0	13.0	2.2	0.0
90% CI	0.6	0.6	0.9	0.8	0.14	0.12	0.19	0.64	11.8	2.8	10.7	0.0	12.4	2.1	0.0
500 FT. FLYOVER -- TARGET IAS 97 KTS.															
C50	84.9	82.5	85.9	73.6	0.05	0.00	0.01	2.38	99.5	210.3	213.2	212.1	215.0	43.2	43.4
C51	84.7	82.3	85.9	73.4	0.23	0.17	0.16	1.07	93.6	213.6	214.0	212.1	212.5	45.3	43.4
C52	84.7	82.6	85.8	73.8	0.13	0.07	0.15	2.15	97.4	211.4	213.2	212.1	213.9	44.7	43.4
C53	84.1	81.8	86.1	73.6	-1.78	-1.72	1.16	0.70	132.0	177.0	238.0	212.1	285.3	49.4	43.4
Avg.	84.6	82.3	86.0	73.6	-0.34	-0.37	0.37	1.57	105.6	203.1	219.6	212.1	231.7	45.7	43.4
Std Dv	0.4	0.4	0.1	0.2	0.96	0.90	0.53	0.82	17.8	17.5	12.3	0.0	35.7	2.6	0.0
90% CI	0.4	0.4	0.1	0.2	1.13	1.06	0.62	0.96	20.9	20.5	14.4	0.0	42.0	3.1	0.0
500 FT. FLYOVER -- TARGET IAS 83.5 KTS.															
D54	84.4	82.0	86.0	73.2	-0.67	-0.66	0.65	1.64	87.6	196.4	196.5	212.1	212.3	40.6	37.1
D55	84.3	82.0	85.5	73.1	-1.21	-1.20	0.66	0.98	113.9	185.9	203.2	212.1	231.9	39.1	37.1
D56	84.5	82.5	85.7	72.9	-0.23	-0.30	0.45	1.82	160.3	201.4	596.6	212.1	628.4	39.6	37.1
D57	84.4	82.3	85.7	73.6	-1.34	-1.29	0.91	0.80	122.9	184.1	219.4	212.1	252.7	41.1	37.1
Avg.	84.4	82.2	85.7	73.2	-0.86	-0.86	0.67	1.31	121.1	191.9	304.0	212.1	331.3	40.1	37.1
Std Dv	0.1	0.2	0.2	0.3	0.51	0.47	0.19	0.50	30.1	8.3	195.4	0.0	198.7	0.9	0.0
90% CI	0.1	0.3	0.3	0.4	0.60	0.55	0.22	0.58	35.4	9.8	229.8	0.0	233.8	1.1	0.0
1000 FT. FLYOVER -- TARGET IAS 125 KTS.															
E58	80.2	77.5	81.7	68.8	0.02	-0.04	0.08	-	90.4	329.2	329.3	335.4	335.4	56.1	55.9
E59	79.5	77.2	81.4	69.4	0.33	0.25	-0.05	-	109.1	337.9	337.6	335.4	354.9	55.6	55.9
E60	80.1	77.8	81.4	69.0	0.08	0.02	0.09	-	92.9	331.6	332.1	335.4	335.9	56.6	55.9
Avg.	79.9	77.5	81.5	69.1	0.14	0.08	0.04	-	97.5	332.9	339.6	335.4	342.1	56.1	55.9
Std Dv	0.4	0.3	0.2	0.3	0.16	0.15	0.08	-	10.1	4.5	15.6	0.0	11.1	0.5	0.0
90% CI	0.6	0.5	0.3	0.6	0.28	0.26	0.13	-	17.1	7.6	26.3	0.0	18.8	0.9	0.0

*- Data Corrected Using 'Simplified Procedure'

TABLE A1-9

TABLE NO. 1.6-3.3

HUGHES 500D HELICOPTER

DOT/TSC
2/ 5/86

CORRECTION DATA*

SITE: 3 SIDELINE - 150 M. NORTH JUNE 22,1983

	CORRECTED				CORRECTIONS (dB)				ACOUSTIC ANGLE	TRACKING DATA (Meters) (ACTUAL)		(REFERENCE)		SPEED(m/sec)	
Ev	EPNL	SEL	PNLTm	ALm	/\1(P)	/\1(A)	/\2	/\3	(Deg)	CPA	SR	CPAR	SRR	GRND	REF
6 DEGREE APPROACH -- TARGET IAS 72 KTS.															
G7	83.8	81.6	84.4	71.3	-0.93	-0.91	0.72	-	104.2	174.1	179.6	191.7	197.7	37.0	33.7
G8	83.3	80.8	84.3	71.8	-0.86	-0.80	0.37	-	119.0	175.9	201.1	191.7	219.2	34.5	33.7
G9	83.7	81.1	84.6	71.2	-0.68	-0.62	1.24	-	97.7	179.2	180.8	191.7	193.4	42.7	33.7
G10	84.5	82.2	85.9	73.4	-0.95	-0.90	0.28	-	115.6	173.9	192.9	191.7	212.6	33.4	33.7
G11	84.8	82.4	85.8	72.9	-0.72	-0.69	0.58	-	111.7	178.3	191.9	191.7	206.3	36.5	33.7
Avg.	84.0	81.6	85.0	72.1	-0.83	-0.78	0.64	-	109.7	176.3	189.3	191.7	205.9	36.8	33.7
Std Dv	0.6	0.7	0.8	1.0	0.12	0.13	0.38	-	8.7	2.4	9.0	0.0	10.5	3.6	0.0
90% CI	0.6	0.7	0.8	0.9	0.12	0.12	0.36	-	8.3	2.3	8.6	0.0	10.1	3.4	0.0
6 DEGREE APPROACH -- TARGET IAS 52 KTS.															
H12	87.1	85.3	86.8	75.7	-0.78	-0.72	0.94	-	133.8	177.4	245.7	191.7	265.4	27.3	23.2
H13	86.5	84.8	85.4	72.5	-0.89	-0.87	0.83	-	79.2	174.5	177.7	191.7	195.1	26.2	23.2
H14	85.6	83.2	84.1	71.9	-0.75	-0.72	1.70	-	112.5	176.9	191.5	191.7	207.5	32.4	23.2
H15	87.0	85.2	85.4	72.7	-0.72	-0.66	0.33	-	74.7	177.6	184.1	191.7	190.7	23.7	23.2
H16	86.1	83.7	86.1	73.0	-0.80	-0.79	1.23	-	97.6	175.1	176.7	191.7	193.4	28.8	23.2
Avg.	86.5	84.4	85.5	73.2	-0.79	-0.75	1.01	-	99.6	176.3	195.1	191.7	212.0	27.7	23.2
Std Dv	0.6	0.9	1.0	1.5	0.06	0.08	0.51	-	24.3	1.4	28.9	0.0	30.4	3.2	0.0
90% CI	0.6	0.9	1.0	1.4	0.06	0.08	0.48	-	23.2	1.3	27.5	0.0	28.9	3.1	0.0
9 DEGREE APPROACH -- TARGET IAS 62 KTS.															
J23	84.7	82.3	84.7	73.2	0.14	0.12	1.05	-	124.2	189.2	228.8	191.2	231.2	35.0	27.7
J24	84.2	81.7	83.5	70.5	-0.52	-0.53	1.04	-	94.8	178.5	179.1	191.2	191.9	33.4	27.7
J25	84.9	82.2	85.9	72.8	-0.51	-0.51	1.36	-	110.8	178.3	190.7	191.2	204.5	36.0	27.7
J26	84.4	81.9	84.4	71.4	-0.33	-0.32	0.85	-	126.3	181.3	225.0	191.2	237.2	32.4	27.7
Avg.	84.6	82.0	84.6	71.9	-0.30	-0.31	1.07	-	114.0	181.8	205.9	191.2	216.2	34.2	27.7
Std Dv	0.3	0.3	1.0	1.3	0.31	0.30	0.21	-	14.5	5.1	24.7	0.0	21.6	1.6	0.0
90% CI	0.4	0.3	1.2	1.5	0.36	0.36	0.25	-	17.1	6.0	29.1	0.0	25.4	1.9	0.0
12 DEGREE APPROACH -- TARGET IAS 62 KTS.															
L33	84.1	81.7	84.8	72.4	-0.47	-0.33	0.64	-	111.1	180.8	193.8	190.5	204.2	30.9	27.7
L34										NO TRACKING DATA					
L35	83.9	81.0	84.6	71.6	-0.42	-0.38	0.66	-	114.8	179.7	198.1	190.5	209.9	30.9	27.7
L36	86.3	82.8	87.2	73.3	-0.51	-0.46	0.46	-	121.8	178.4	209.8	190.5	224.0	29.3	27.7
L37	84.7	82.1	84.5	71.1	-0.35	-0.35	0.57	-	106.5	180.6	198.4	190.5	198.6	30.4	27.7
Avg.	84.8	81.9	85.3	72.1	-0.44	-0.38	0.58	-	113.6	179.9	197.5	190.5	209.2	30.3	27.7
Std Dv	1.1	0.7	1.3	1.0	0.07	0.06	0.09	-	6.4	1.1	9.1	0.0	10.9	0.7	0.0
90% CI	1.3	0.9	1.5	1.2	0.08	0.07	0.11	-	7.6	1.3	10.7	0.0	12.8	0.9	0.0

*- Data Corrected Using "Simplified Procedure"

TABLE A2-1

ADV. MACH FOR TARGET CONDITIONS ANAL. DATE: 11-Mar-86

HUGHES 500 D/E
ADV. MACH SERIES REFERENCE NUMBERS

TEMPERATURE 59 degrees F (15 degrees C)

SERIES	IAS	TEMP (F)	ROTOR RPM	BLADE DIAM.	ADVM #
A	125.00	59.00	492.00	26.41	0.7986
B	111.00	59.00	492.00	26.41	0.7774
C	97.00	59.00	492.00	26.41	0.7562
D	83.50	59.00	492.00	26.41	0.7358

TEMPERATURE 77 degrees F (25 degrees C)

SERIES	IAS	TEMP (F)	ROTOR RPM	BLADE DIAM.	ADVM #
A	125.00	77.00	492.00	26.41	0.7851
B	111.00	77.00	492.00	26.41	0.7642
C	97.00	77.00	492.00	26.41	0.7434
D	83.50	77.00	492.00	26.41	0.7233

TARGET CONDITIONS

SERIES	DESCRIPTION
A	500 FT. LFO IAS = 125 KTS.
B	500 FT. LFO IAS = 111 KTS.
C	500 FT. LFO IAS = 97 KTS.
D	500 FT. LFO IAS = 83.5 KTS.

* 492.00 RPM = 103% ROTOR SPEED (STANDARD)

TABLE A2-2

ACTUAL TEST CONDITIONS ANAL. DATE: 11-Mar-86

HUGHES 500 D/E

EVENT	IAS	TEMP (F)	ROTOR RPM	BLADE DIAM.	ADVM #
A38	120.00	92.00	490.00	26.41	0.7646
A39	100.00	91.00	490.00	26.41	0.7359
A40	109.00	90.00	490.00	26.41	0.7498
A41	108.00	89.00	490.00	26.41	0.7490
A42	104.00	88.00	490.00	26.41	0.7438
A43	106.00	87.00	490.00	26.41	0.7474
A44	110.00	86.00	490.00	26.41	0.7540
B45	105.00	86.00	490.00	26.41	0.7466
B46	99.00	85.00	490.00	26.41	0.7385
B47	100.00	85.00	490.00	26.41	0.7399
B48	94.00	85.00	490.00	26.41	0.7311
B49	96.00	85.00	490.00	26.41	0.7340
C50	84.00	85.00	490.00	26.41	0.7163
C51	88.00	86.00	490.00	26.41	0.7216
C52	87.00	86.00	490.00	26.41	0.7201
C53	96.00	86.00	490.00	26.41	0.7334
D54	79.00	86.00	490.00	26.41	0.7083
D55	76.00	86.00	490.00	26.41	0.7039
D56	77.00	86.00	490.00	26.41	0.7053
D57	80.00	86.00	490.00	26.41	0.7098

TABLE A2-3

ACTUAL TEST NOISE DATA
ANAL. DATE: 11-Mar-86

HUGHES 500 D/E

EVENT	TEST ALT	---- AS MEAS. PNLTM ---- LEFT	CENTER	RIGHT	-- PNLTM 492 FOOT NORM. -- LEFT	CENTER	RIGHT
A38	408.00	87.70	88.10	88.10	86.85	86.22	87.25
A39	473.70	86.00	86.10	86.10	85.81	85.72	85.91
A40	476.60	86.40	86.80	86.70	86.24	86.48	86.54
A41	449.70	87.50	87.50	86.80	87.07	86.60	86.37
A42	489.10	85.30	86.40	86.40	85.27	86.34	86.37
A43	472.90	86.40	86.30	87.30	86.20	85.90	87.10
A44	452.70	87.10	86.50	86.30	86.70	85.66	85.90
B45	490.10	86.70	87.70	86.40	86.68	87.66	86.38
B46	505.20	85.20	85.50	83.40	85.33	85.77	83.53
B47	471.60	85.40	86.90	86.50	85.19	86.47	86.29
B48	501.40	86.40	86.30	83.30	86.50	86.49	83.40
B49	483.10	85.00	86.80	86.30	84.91	86.62	86.21
C50	483.80	85.90	87.10	83.50	85.82	86.93	83.42
C51	499.30	84.60	86.40	85.40	84.67	86.55	85.47
C52	489.10	85.10	86.10	83.60	85.07	86.04	83.57
C53	308.40	87.20	92.40	86.70	85.38	87.70	84.88
D54	416.10	86.40	89.50	85.10	85.63	87.81	84.33
D55	360.40	85.70	90.00	85.30	84.37	86.87	83.97
D56	441.30	85.90	87.30	84.10	85.38	86.21	83.58
D57	350.80	86.30	91.30	85.70	84.88	87.90	84.28

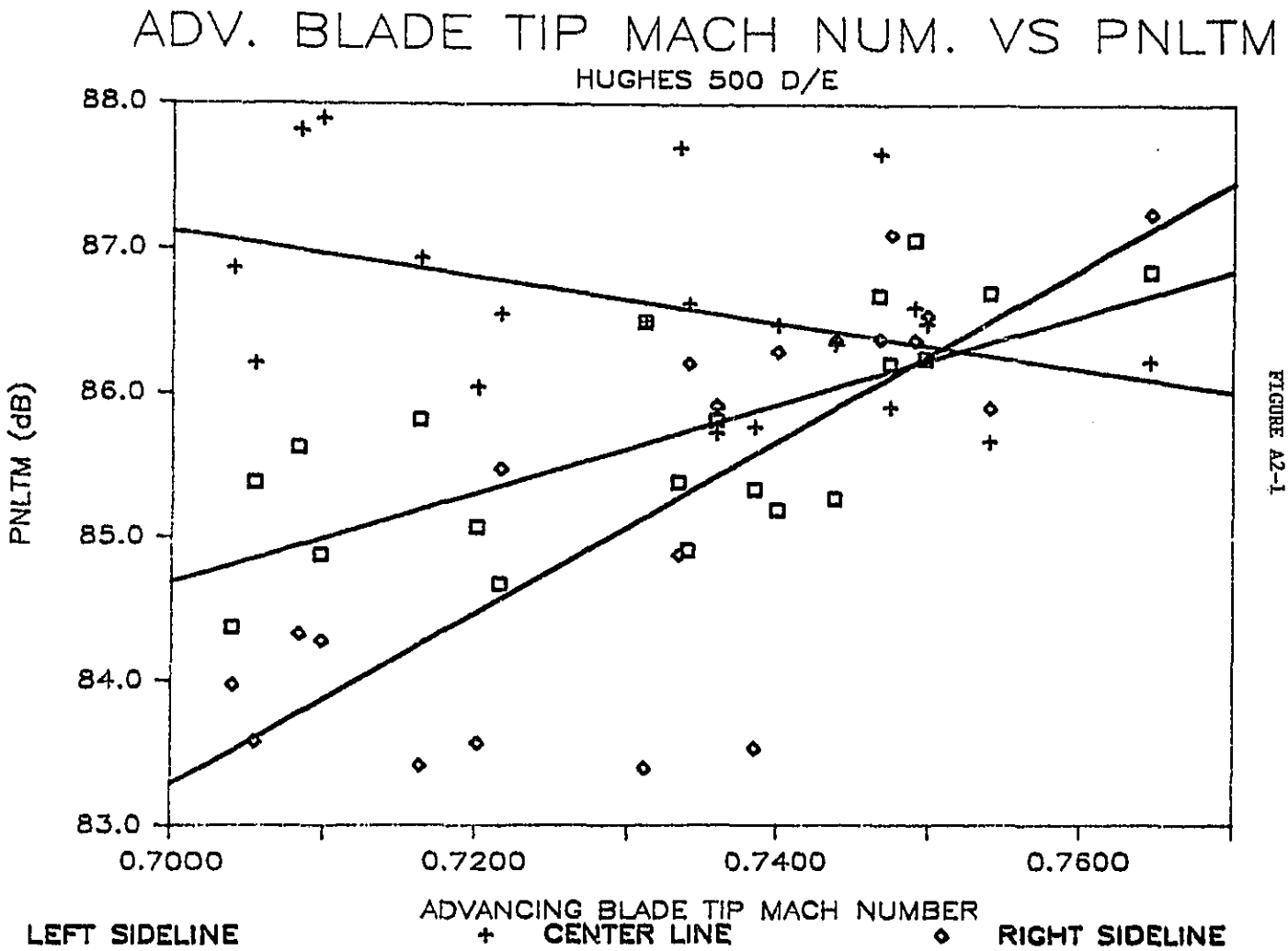

ADV. BLADE TIP MACH NUM. VS PNLTM
HUGHES 500 D/E
88.0
87.0
86.0
85.0
84.0
83.0
PNLTM (dB)
0.7000
0.7200
0.7400
0.7600
ADVANCING BLADE TIP MACH NUMBER
LEFT SIDELINE
CENTER LINE
RIGHT SIDELINE

FIGURE A2-1

TABLE A2-4

HUGHES 500 D/E
LEFT SIDELINE

ANAL. DATE: 11-Mar-86

EVENT	X INPUT	Y INPUT
A38	0.7646	86.85
A39	0.7359	85.81
A40	0.7498	86.24
A41	0.7490	87.07
A42	0.7438	85.27
A43	0.7474	86.20
A44	0.7540	86.70
B45	0.7466	86.68
B46	0.7385	85.33
B47	0.7399	85.19
B48	0.7311	86.50
B49	0.7340	84.91
C50	0.7163	85.82
C51	0.7216	84.67
C52	0.7201	85.07
C53	0.7334	85.38
D54	0.7083	85.63
D55	0.7039	84.37
D56	0.7053	85.38
D57	0.7098	84.88

LINEAR REGRESSION EQUATION

Y =	SLOPE	* X +	INTERCEPT	
=	30.87		63.08	
R SQ.	=	0.485	MEAN X =	0.7327
R	=	0.696	S.D. X =	0.0176
STD.ERR	=	0.577	MEAN Y =	85.70
CORREL	=	0.696	S.D. Y =	0.78
SAMPLE	=	20	TOT VAR =	0.61

TABLE A2-5

LINEAR REGRESSION EQUATION

Y =	SLOPE	* X	+	INTERCEPT	
=	30.87			63.08	

R SQ.	= 0.485	MEAN X =	0.7327
R	= 0.696	S.D. X =	0.0176
STD.ERR	= 0.577	MEAN Y =	85.70
CORREL	= 0.696	S.D. Y =	0.78
SAMPLE	= 20	TOT VAR =	0.61

SECOND ORDER EQUATION

Y =	A	+	B1	* X	+	B2	*X'
Y =	364.60	+	-794.49	* X	+	564.50	*X'

R SQ.	= 0.075	MEAN X =	0.7327
R	= 0.273	S.D. X =	0.0176
STD.ERR	= 0.567	MEAN Y =	85.70
SAMPLE	= 20	S.D. Y =	0.78

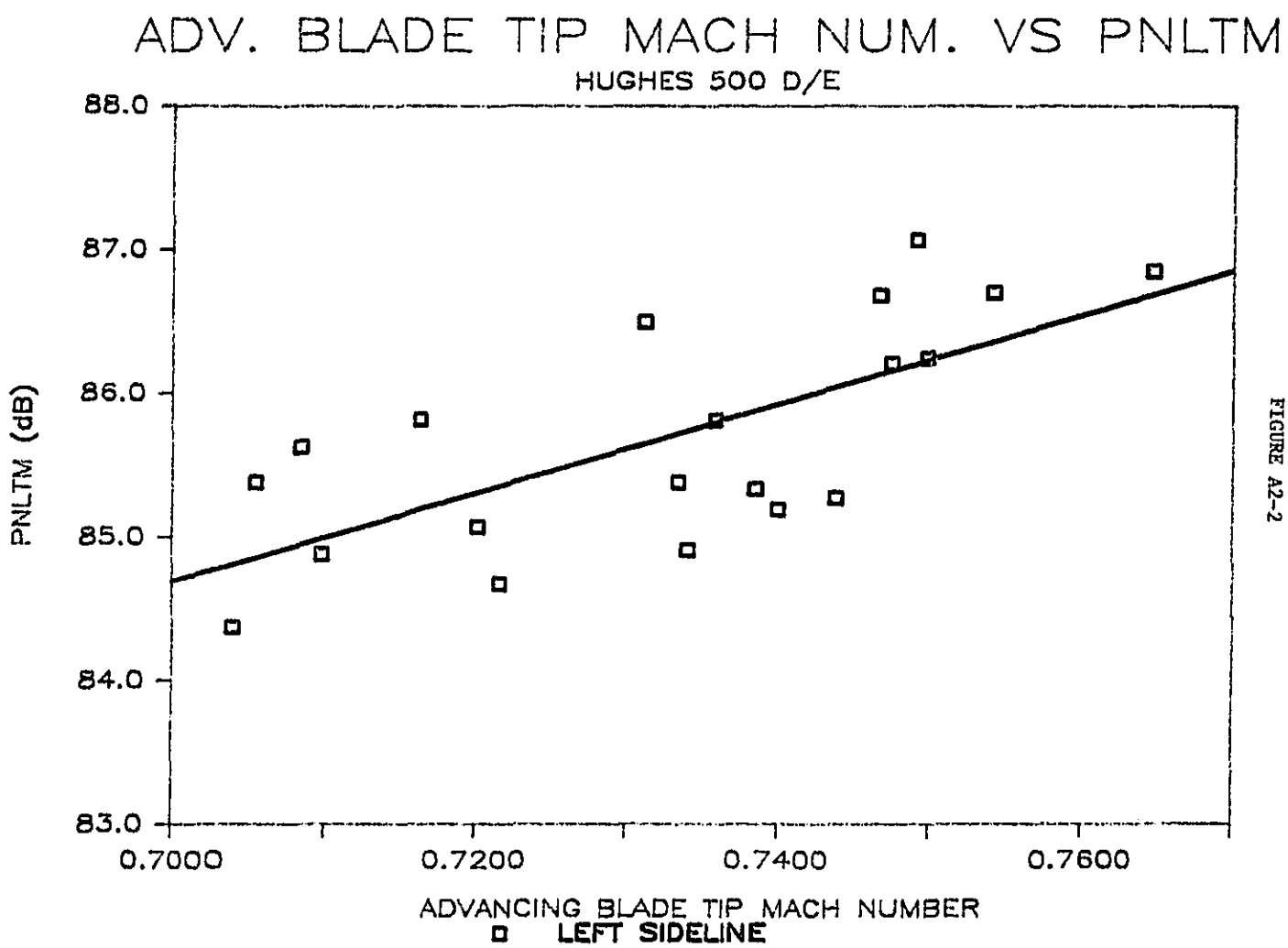

ADV. BLADE TIP MACH NUM. VS PNLTM
HUGHES 500 D/E
88.0
87.0
86.0
85.0
84.0
83.0
PNLTM (dB)
0.7000
0.7200
0.7400
0.7600
ADVANCING BLADE TIP MACH NUMBER
LEFT SIDELINE

FIGURE A2-2

TABLE A2-6

HUGHES 500 D/E
CENTER LINE

ANAL. DATE: 11-Mar-86

EVENT	X INPUT	Y INPUT
A38	0.7646	86.22
A39	0.7359	85.72
A40	0.7498	86.48
A41	0.7490	86.60
A42	0.7438	86.34
A43	0.7474	85.90
A44	0.7540	85.66
B45	0.7466	87.66
B46	0.7385	85.77
B47	0.7399	86.47
B48	0.7311	86.49
B49	0.7340	86.62
C50	0.7163	86.93
C51	0.7216	86.55
C52	0.7201	86.04
C53	0.7334	87.70
D54	0.7083	87.81
D55	0.7039	86.87
D56	0.7053	86.21
D57	0.7098	87.90

LINEAR REGRESSION EQUATION

Y =	SLOPE	* X +	INTERCEPT	
=	-15.96		98.29	
R SQ. =	0.163	MEAN X =	0.7327	
R =	0.404	S.D. X =	0.0176	
STD.ERR =	0.655	MEAN Y =	86.60	
CORREL =	-0.404	S.D. Y =	0.70	
SAMPLE =	20	TOT VAR =	0.49	

TABLE A2-7

LINEAR REGRESSION EQUATION

Y =	SLOPE	* X +	INTERCEPT	
=	-15.96		98.29	

R SQ.	= 0.163	MEAN X =	0.7327
R	= 0.404	S.D. X =	0.0176
STD.ERR	= 0.655	MEAN Y =	86.60
CORREL	= -0.404	S.D. Y =	0.70
SAMPLE	= 20	TOT VAR =	0.49

SECOND ORDER EQUATION

Y =	A	+	B1	* X +	B2	*X'
Y =	151.12	+	-160.58	* X +	98.91	*X'

R SQ.	= -0.386	MEAN X =	0.7327
R	= ERR	S.D. X =	0.0176
STD.ERR	= 0.674	MEAN Y =	86.60
SAMPLE	= 20	S.D. Y =	0.70

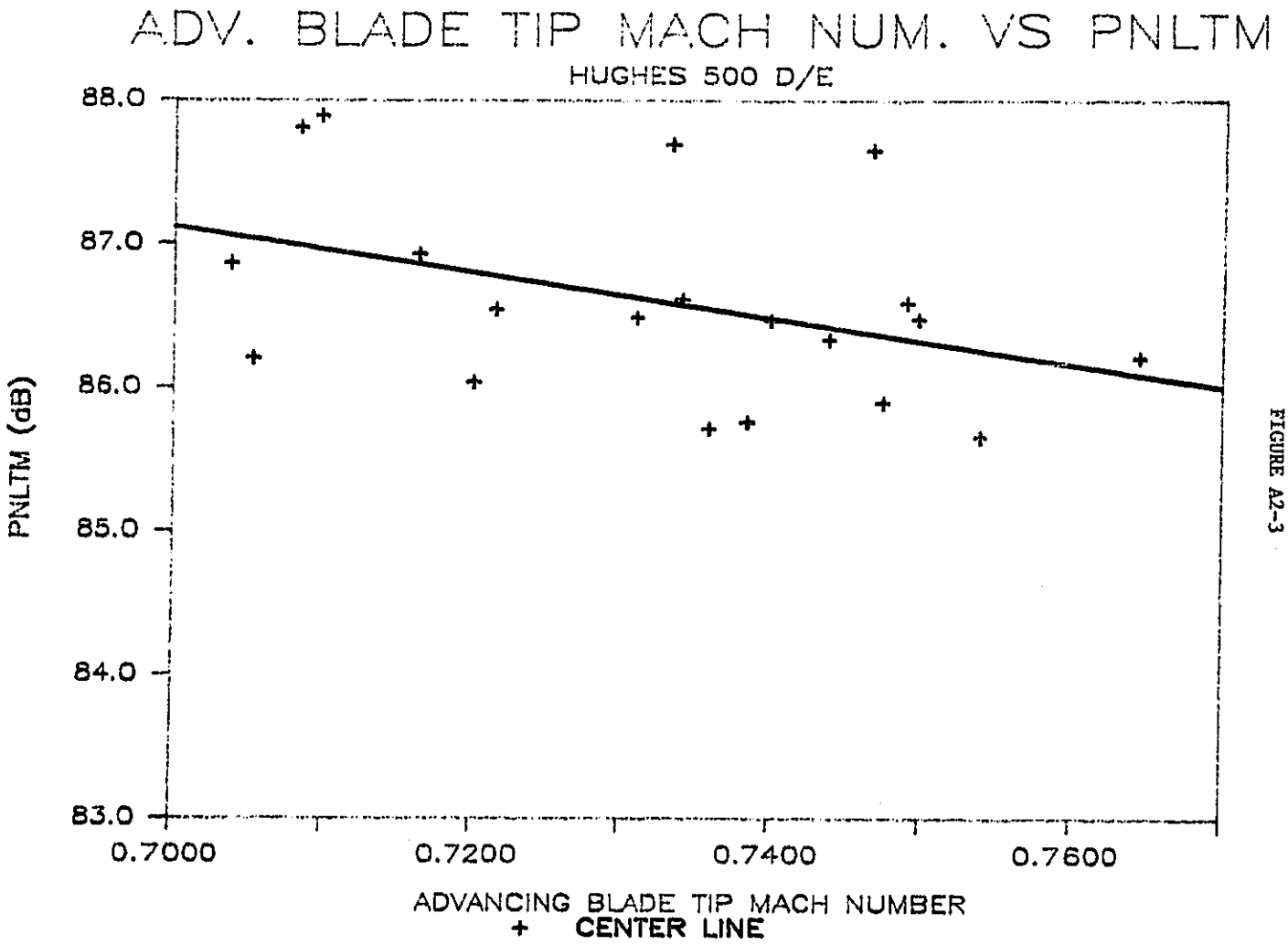

ADV. BLADE TIP MACH NUM. VS PNLTM
HUGHES 500 D/E
88.0
87.0
86.0
85.0
84.0
83.0
PNLTM (dB)
0.7000
0.7200
0.7400
0.7600
ADVANCING BLADE TIP MACH NUMBER
+ CENTER LINE

FIGURE A2-3

TABLE A2-8

HUGHES 500 D/E
RIGHT SIDELINE

ANAL. DATE: 11-Mar-86

EVENT	X INPUT	Y INPUT
A38	0.7646	87.25
A39	0.7359	85.91
A40	0.7498	86.54
A41	0.7490	86.37
A42	0.7438	86.37
A43	0.7474	87.10
A44	0.7540	85.90
B45	0.7466	86.38
B46	0.7385	83.53
B47	0.7399	86.29
B48	0.7311	83.40
B49	0.7340	86.21
C50	0.7163	83.42
C51	0.7216	85.47
C52	0.7201	83.57
C53	0.7334	84.88
D54	0.7083	84.33
D55	0.7039	83.97
D56	0.7053	83.58
D57	0.7098	84.28

LINEAR REGRESSION EQUATION

Y =	SLOPE	* X +	INTERCEPT	
=	59.65		41.53	
R SQ. =	0.607	MEAN X =	0.7327	
R =	0.779	S.D. X =	0.0176	
STD.ERR =	0.870	MEAN Y =	85.24	
CORREL =	0.779	S.D. Y =	1.35	
SAMPLE =	20	TOT VAR =	1.83	

TABLE A2-9

LINEAR REGRESSION EQUATION

Y =	SLOPE	* X +	INTERCEPT		
=	59.65		41.53		
R SQ. =	0.607	MEAN X =	0.7327		
R =	0.779	S.D. X =	0.0176		
STD.ERR =	0.870	MEAN Y =	85.24		
CORREL =	0.779	S.D. Y =	1.35		
SAMPLE =	20	TOT VAR =	1.83		

SECOND ORDER EQUATION

Y =	A	+	B1	* X +	B2		*X'
Y =	322.60	+	-709.71	* X +	526.20		*X'
R SQ. =	0.518	MEAN X =	0.7327				
R =	0.720	S.D. X =	0.0176				
STD.ERR =	0.880	MEAN Y =	85.24				
SAMPLE =	20	S.D. Y =	1.35				

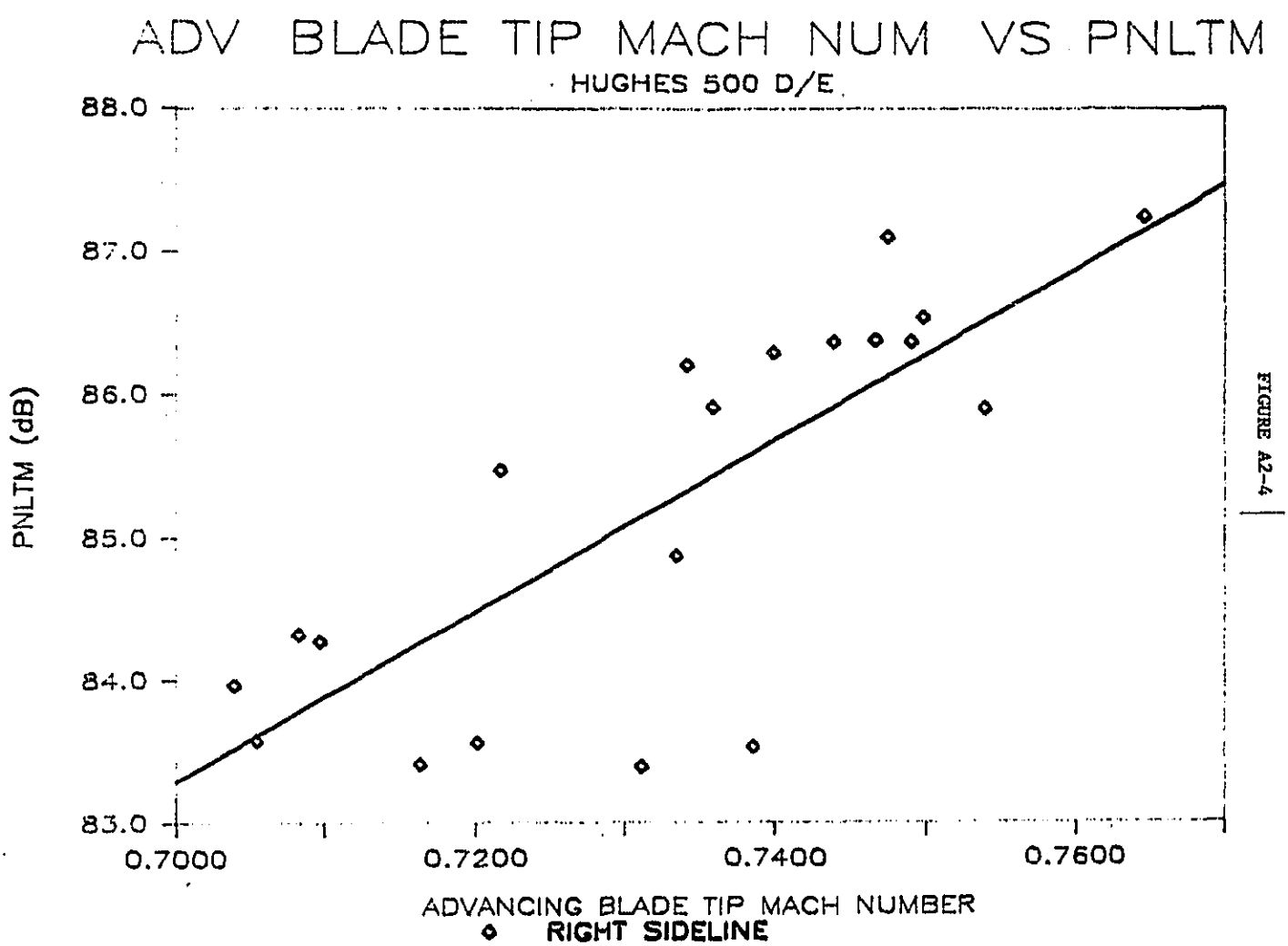

ADV BLADE TIP MACH NUM VS PNLTM
HUGHES 500 D/E
88.0
87.0
86.0
85.0
84.0
83.0
PNLTM (dB)
0.7000
0.7200
0.7400
0.7600
ADVANCING BLADE TIP MACH NUMBER
RIGHT SIDELINE

FIGURE A2-4

A: 10-Mar-86

TABLE A3-1

SUMMARY EPNL LEVELS (dB)
DATA PROCESSED PER ICAO CERTIFICATION PROCEDURES

HELICOPTER: HUGHES 500 D/E
OPERATION: ICAO TAKEOFF

EVENT NUMBER	LEFT SIDELINE	CENTER LINE CENTER	RIGHT SIDELINE	3 MIC AVERAGE
SITE	2	1	3	
I17	85.00	82.10	83.60	83.57
I18	85.30	82.30	83.90	83.83
I19	85.50	82.40	84.10	84.00
I20	85.90	83.50	84.70	84.70
I21	85.60	83.20	84.50	84.43
I22	85.40	83.40	84.10	84.30
AVERAGE	85.45	82.82	84.15	84.14
STD. DEV.	0.30	0.62	0.40	0.42
90% C.I.	0.25	0.51	0.33	0.34

TABLE A3-2

SUMMARY EPNL LEVELS (dB)
DATA PROCESSED PER ICAO CERTIFICATION PROCEDURES

HELICOPTER: HUGHES 500 D/E
OPERATION: ICAO LFO

EVENT NUMBER	LEFT SIDELINE	CENTER LINE CENTER	RIGHT SIDELINE	3 MIC AVERAGE
SITE	2/3	1	3/2	
A38	86.10	83.70	87.20	85.67
A39	85.10	82.90	87.40	85.13
A40	85.40	83.50	87.10	85.33
A41	85.80	83.30	87.20	85.43
A42	85.20	82.50	86.70	84.80
A43	84.90	82.70	87.00	84.87
A44	84.90	82.40	86.30	84.53
AVERAGE	85.34	83.00	86.99	85.11
STD. DEV.	0.46	0.51	0.37	0.40
90% C.I.	0.34	0.37	0.27	0.29

TABLE A3-3

SUMMARY EPNL LEVELS (dB)
DATA PROCESSED PER ICAO CERTIFICATION PROCEDURES

HELICOPTER: HUGHES 500 D/E
OPERATION: ICAO APPROACH

EVENT NUMBER	LEFT SIDELINE	CENTER LINE CENTER	RIGHT SIDELINE	3 MIC AVERAGE
SITE	3	1	2	
F1	86.20	89.30	87.50	87.67
F2	83.60	87.30	85.90	85.60
F3	85.60	90.50	87.00	87.70
F4	85.20	89.70	88.80	87.90
F5	83.40	87.10	86.60	85.70
F6	85.30	88.50	86.60	86.80
AVERAGE	84.88	88.73	87.07	86.89
STD. DEV.	1.13	1.35	1.00	1.04
90% C.I.	0.93	1.11	0.82	0.85

APPENDIX B (B1-B3)

AEROSPATIALE AS 350D, ASTAR

TABLE B1-1

TABLE NO. J.3-1.2 (REV. 2)

AEROSPATIALE AS-350D HELICOPTER (ASTAR)

DOT/TSC
3/13/86

CORRECTION DATA*

SITE: 1 CENTERLINE - CENTER JUNE 8,1983

Ev	CORRECTED EPNL	SEL	PNLTM	ALM	CORRECTIONS (dB) /\1(P)	/\1(A)	/\2	/\3	ACOUSTIC ANGLE (Deg)	TRACKING DATA (Meters) (ACTUAL) CPA	SR	(REFERENCE) CPAR	SRR	SPEED(m/sec) GRND	REF
500 FT. FLYOVER -- TARGET IAS 143 MPH.															
N41	88.9	85.8	92.1	79.2	1.42	1.47	-0.51	0.72	140.7	170.7	269.6	150.0	237.0	62.6	63.9
N42	88.6	85.4	91.3	78.4	2.32	2.07	-0.70	-	145.5	180.7	318.8	150.0	264.6	62.6	63.9
N43	89.9	86.5	93.3	79.2	1.53	1.39	-0.23	0.26	145.1	168.6	294.9	150.0	262.3	66.1	63.9
N44	88.7	85.6	91.2	78.4	1.31	1.24	-0.46	0.72	135.7	168.1	240.6	150.0	214.7	62.6	63.9
Avg.	89.0	85.8	92.0	78.8	1.64	1.54	-0.47	0.57	141.8	172.0	281.0	150.0	244.7	63.5	63.9
Std Dv	0.6	0.5	1.0	0.5	0.46	0.36	0.19	0.27	4.6	5.9	33.6	0.0	23.6	1.8	0.0
90% CI	0.7	0.6	1.1	0.6	0.54	0.43	0.23	0.45	5.4	6.9	39.5	0.0	27.7	2.1	0.0
500 FT. FLYOVER -- TARGET IAS 130.5 MPH.															
A22	87.2	84.1	90.0	76.7	1.03	0.88	-0.27	0.55	144.3	162.1	277.6	150.0	257.0	58.1	58.3
A23	88.2	84.5	92.1	78.6	2.52	2.01	-0.64	0.55	130.9	181.7	240.5	150.0	198.6	58.1	58.3
A24	88.1	84.6	91.2	77.6	1.05	0.88	-0.27	0.55	144.3	162.1	277.6	150.0	256.9	58.1	58.3
A25	88.6	85.1	91.0	77.8	1.72	1.47	-0.46	0.59	142.5	172.1	282.9	150.0	246.6	58.1	58.3
A26	88.6	84.9	91.4	77.8	0.62	0.48	-0.13	0.59	143.4	155.4	260.6	150.0	251.5	58.1	58.3
A27	88.6	85.2	90.1	76.8	2.53	2.33	-0.67	0.59	154.0	183.6	418.7	150.0	342.0	58.1	58.3
Avg.	88.2	84.7	91.0	77.5	1.58	1.34	-0.41	0.57	143.2	169.5	293.0	150.0	258.8	58.1	58.3
Std Dv	0.5	0.4	0.8	0.7	0.81	0.72	0.22	0.02	7.3	11.5	63.5	0.0	46.4	0.0	0.0
90% CI	0.4	0.3	0.6	0.6	0.67	0.59	0.18	0.02	6.0	9.5	52.2	0.0	38.2	0.0	0.0
500 FT. FLYOVER -- TARGET IAS 116 MPH.															
B28 B29	87.6	83.6	91.6	77.4	2.08	1.49	-0.25	0.41	164.4	165.4	615.1 NO TRACKING DATA	150.0	557.8	52.7	51.9
B30	85.7	82.1	88.2	74.4	-0.04	-0.14	0.14	-	134.2	146.8	204.8	150.0	209.3	52.7	51.9
B31	85.9	82.4	87.9	73.9	1.08	0.91	-0.17	-	141.2	161.7	258.4	150.0	239.7	52.7	51.9
Avg.	86.4	82.7	89.2	75.2	1.04	0.75	-0.09	0.41	146.6	158.0	359.4	150.0	335.6	52.7	51.9
Std Dv	1.0	0.8	2.0	1.9	1.06	0.83	0.21	-	15.8	9.9	223.1	0.0	193.1	0.0	0.0
90% CI	1.7	1.3	3.4	3.2	1.79	1.39	0.35	-	26.6	16.7	376.1	0.0	325.5	0.0	0.0
500 FT. FLYOVER -- TARGET IAS 101.5 MPH.															
C32 C33	87.7	84.0	90.2	75.1	2.19	1.72	-0.14	-	153.8	172.1	389.3 NO TRACKING DATA	150.0	339.4	48.7	45.4
C34	87.8	84.2	89.9	76.6	1.86	1.58	-0.55	0.60	115.4	174.2	192.9	150.0	166.1	44.7	45.4
C35	87.2	83.4	88.7	75.4	1.07	0.82	-0.32	0.60	94.7	162.1	162.7	150.0	150.5	44.7	45.4
C36	87.2	84.0	88.9	75.4	1.23	1.05	-0.47	0.72	136.7	165.5	241.5	150.0	218.9	43.8	45.4
Avg.	87.5	83.9	89.4	75.6	1.59	1.29	-0.37	0.64	125.2	168.5	246.6	150.0	218.7	45.5	45.4
Std Dv	0.3	0.4	0.7	0.6	0.53	0.43	0.18	0.07	25.7	5.6	100.5	0.0	85.6	2.2	0.0
90% CI	0.4	0.4	0.9	0.7	0.62	0.50	0.21	0.12	30.2	6.6	118.3	0.0	100.7	2.6	0.0
500 FT. FLYOVER -- TARGET IAS 86 MPH.															
N45	87.3	84.3	89.1	75.6	-0.05	-0.15	-0.08	0.64	128.7	146.7	188.0	150.0	192.2	37.1	38.4
N46	87.2	83.6	89.9	76.3	2.12	1.90	-0.74	-	108.0	179.7	188.9	150.0	157.7	37.1	38.4
N47	86.4	83.1	88.2	74.8	1.12	0.98	-0.44	0.67	127.7	163.9	207.1	150.0	189.6	37.1	38.4
N48	85.9	82.6	87.1	74.1	0.95	0.77	-0.38	-	106.8	161.0	168.2	150.0	156.7	37.1	38.4
Avg.	86.7	83.4	88.6	75.2	1.03	0.87	-0.41	0.65	117.8	162.8	188.1	150.0	174.0	37.1	38.4
Std Dv	0.7	0.7	1.2	0.9	0.89	0.84	0.27	0.02	12.0	13.5	15.9	0.0	19.5	0.0	0.0
90% CI	0.8	0.8	1.4	1.1	1.05	0.99	0.32	0.09	14.2	15.9	18.7	0.0	22.9	0.0	0.0

*- Data Corrected Using 'Simplified Procedure'

TABLE B1-2

TABLE NO. J.3-2.2 (REV. 2)

AEROSPATIALE AS-350D HELICOPTER (ASTAR)

DOT/TSC
3/13/86

CORRECTION DATA*

SITE: 2 SIDELINE - 150 M. SOUTH JUNE 8,1983

	CORRECTED				CORRECTIONS (dB)				ACOUSTIC ANGLE	TRACKING DATA (Meters) (ACTUAL)		(REFERENCE)		SPEED(m/sec)	
Ev	EPNL	SEL	PNLTm	ALm	/\1(P)	/\1(A)	/\2	/\3	(Deg)	CPA	SR	CPAR	SRR	GRND	REF
500 FT. FLYOVER -- TARGET IAS 143 MPH.															
N41	87.7	84.8	90.1	77.4	1.30	0.96	-0.31	0.90	149.6	226.6	448.2	212.1	419.6	62.6	63.9
N42	86.3	83.0	88.2	75.2	1.48	1.19	-0.41	-	133.5	234.2	322.7	212.1	292.3	62.6	63.9
N43	88.4	85.9	91.3	78.2	0.86	0.78	-0.05	0.32	138.7	225.1	341.4	212.1	321.7	66.1	63.9
N44	86.7	84.7	87.6	76.2	0.66	0.68	-0.28	0.69	110.4	224.7	239.8	212.1	226.4	62.6	63.9
Avg.	87.3	84.6	89.3	76.8	1.07	0.90	-0.26	0.64	133.1	227.6	338.0	212.1	315.0	63.5	63.9
Std Dv	1.0	1.2	1.7	1.3	0.38	0.22	0.15	0.29	16.5	4.5	85.7	0.0	80.3	1.8	0.0
90% CI	1.1	1.4	2.0	1.6	0.45	0.26	0.18	0.50	19.4	5.2	100.8	0.0	94.5	2.1	0.0
500 FT. FLYOVER -- TARGET IAS 130.5 MPH.															
A22	86.8	84.3	89.5	76.7	0.62	0.45	-0.14	0.69	109.4	220.2	233.4	212.1	224.8	58.1	58.3
A23	86.0	83.2	87.3	75.7	1.41	1.15	-0.35	0.53	120.8	234.9	273.4	212.1	246.9	58.1	58.3
A24	87.1	84.7	89.6	77.5	0.58	0.47	-0.14	0.69	98.2	220.2	222.5	212.1	214.3	58.1	58.3
A25	84.8	82.5	85.7	74.0	0.92	0.80	-0.25	0.56	98.0	227.7	229.9	212.1	214.2	58.1	58.3
A26	86.7	84.1	89.6	76.3	0.32	0.24	-0.06	0.74	131.3	215.2	286.5	212.1	282.4	58.1	58.3
A27	85.4	82.9	88.0	75.8	1.49	1.20	-0.37	0.56	114.7	236.4	260.2	212.1	233.4	58.1	58.3
Avg.	86.1	83.6	88.3	76.0	0.89	0.72	-0.22	0.63	112.1	225.8	251.0	212.1	236.0	58.1	58.3
Std Dv	0.9	0.9	1.6	1.2	0.47	0.40	0.13	0.09	13.0	8.7	26.1	0.0	25.9	0.0	0.0
90% CI	0.7	0.7	1.3	1.0	0.39	0.33	0.10	0.07	10.7	7.1	21.5	0.0	21.3	0.0	0.0
500 FT. FLYOVER -- TARGET IAS 116 MPH.															
B28	85.8	83.4	87.8	75.4	0.81	0.60	-0.09	0.51	99.5	222.7	225.8	212.1	215.1	52.7	51.9
B29	84.8	82.5	85.8	74.0	0.74	0.58	-0.09	0.39	110.6	223.2	238.6	212.1	226.7	52.7	51.9
B30	85.0	82.6	87.0	74.6	0.08	-0.04	0.12	-	101.6	209.3	213.6	212.1	216.5	52.7	51.9
B31	83.4	81.4	84.4	72.6	0.61	0.47	-0.05	-	119.8	220.0	253.5	212.1	244.4	52.7	51.9
Avg.	84.7	82.5	86.2	74.1	0.56	0.40	-0.03	0.45	107.9	218.8	232.9	212.1	225.7	52.7	51.9
Std Dv	1.0	0.8	1.5	1.2	0.33	0.30	0.10	0.08	9.3	6.5	17.1	0.0	13.5	0.0	0.0
90% CI	1.2	0.9	1.7	1.4	0.39	0.35	0.12	0.38	10.9	7.7	20.1	0.0	15.9	0.0	0.0
500 FT. FLYOVER -- TARGET IAS 101.5 MPH.															
C32	84.5	82.0	86.2	73.7	0.96	0.83	0.08	-	114.3	227.6	249.7	212.1	232.7	48.7	45.4
C33										NO TRACKING DATA					
C34	83.9	81.6	85.3	72.9	1.06	0.89	-0.32	0.57	117.1	229.2	257.6	212.1	238.4	44.7	45.4
C35	-	83.1	87.3	74.4	0.63	0.49	-	0.75	93.4	220.3	220.7	212.1	212.5	44.7	45.4
C36	83.1	81.2	84.5	72.4	0.71	0.59	-0.31	0.68	115.0	222.8	245.7	212.1	234.0	43.8	45.4
Avg.	83.8	82.0	85.8	73.3	0.84	0.70	-0.18	0.67	109.9	225.0	243.4	212.1	229.4	45.5	45.4
Std Dv	0.7	0.8	1.2	0.9	0.20	0.19	0.23	0.09	11.1	4.2	16.0	0.0	11.5	2.2	0.0
90% CI	1.1	1.0	1.4	1.0	0.24	0.22	0.38	0.15	13.1	4.9	18.8	0.0	13.6	2.6	0.0
500 FT. FLYOVER -- TARGET IAS 86 MPH.															
N45	-	80.6	86.2	73.9	0.09	-0.03	-	0.80	67.0	209.2	227.4	212.1	230.5	37.1	38.4
N46	84.4	81.9	85.0	72.1	1.32	1.07	-0.47	-	97.2	233.4	235.3	212.1	213.8	37.1	38.4
N47	85.2	82.6	86.5	74.0	0.72	0.55	-0.30	0.84	104.7	221.5	229.0	212.1	219.3	37.1	38.4
N48	83.0	80.9	83.8	71.0	0.47	0.44	-0.26	-	115.9	219.5	243.9	212.1	235.8	37.1	38.4
Avg.	84.2	81.5	85.4	72.8	0.65	0.51	-0.34	0.82	96.2	220.9	233.9	212.1	224.8	37.1	38.4
Std Dv	1.1	0.9	1.2	1.5	0.52	0.45	0.11	0.03	20.9	9.9	7.5	0.0	10.1	0.0	0.0
90% CI	1.9	1.1	1.5	1.7	0.61	0.53	0.19	0.13	24.6	11.7	8.8	0.0	11.8	0.0	0.0

*- Data Corrected Using 'Simplified Procedure'

TABLE B1-3

TABLE NO. J.3-3.2 (REV. 2)

AEROSPATIALE AS-350D HELICOPTER (ASTAR)

DOT/TSC
3/13/86

CORRECTION DATA*

SITE: 3 SIDELINE - 150 M. NORTH JUNE 8,1983

	CORRECTED				CORRECTIONS (dB)				ACOUSTIC ANGLE	TRACKING DATA (Meters) (ACTUAL)		(REFERENCE)		SPEED(m/sec)	
Ev	EPNL	SEL	PNLTm	ALm	/\1(P)	/\1(A)	/\2	/\3	(Deg)	CPA	SR	CPAR	SRR	GRND	REF
500 FT. FLYOVER -- TARGET IAS 143 MPH.															
N41										NO TRACKING DATA					
N42	87.5	85.2	89.4	77.2	1.41	1.28	-0.44	-	139.5	235.7	363.2	212.1	326.8	62.6	63.9
N43	86.4	84.2	88.2	76.9	0.85	0.83	-0.07	0.25	131.3	226.5	301.4	212.1	282.2	66.1	63.9
N44	88.2	85.7	90.2	77.9	0.95	0.77	-0.30	0.90	102.7	226.1	231.8	212.1	217.5	62.6	63.9
Avg.	87.4	85.0	89.3	77.3	1.07	0.96	-0.27	0.57	124.5	229.5	298.8	212.1	275.5	63.8	63.9
Std Dv	0.9	0.8	1.0	0.5	0.30	0.28	0.19	0.46	19.3	5.4	65.7	0.0	55.0	2.0	0.0
90% CI	1.6	1.3	1.7	0.9	0.50	0.47	0.31	2.05	32.6	9.2	110.8	0.0	92.7	3.5	0.0
500 FT. FLYOVER -- TARGET IAS 130.5 MPH.															
A22	84.8	82.3	87.3	75.1	0.74	0.54	-0.16	0.53	122.3	221.6	262.3	212.1	251.1	58.1	58.3
A23	87.4	84.5	90.0	76.4	1.42	1.18	-0.37	0.69	130.9	236.4	312.6	212.1	280.5	58.1	58.3
A24	84.5	82.4	87.0	75.0	0.25	0.16	-0.16	0.53	109.3	221.7	234.9	212.1	224.7	58.1	58.3
A25	86.6	84.1	88.2	75.9	1.15	0.91	-0.27	0.74	101.6	229.6	234.4	212.1	216.6	58.1	58.3
A26										NO TRACKING DATA					
A27	87.2	84.3	89.5	76.8	1.57	1.30	-0.39	0.74	104.6	238.2	246.1	212.1	219.2	58.1	58.3
Avg.	86.1	83.5	88.4	75.9	1.03	0.82	-0.27	0.65	113.7	229.5	258.1	212.1	238.4	58.1	58.3
Std Dv	1.4	1.1	1.3	0.8	0.54	0.47	0.11	0.11	12.4	7.9	32.5	0.0	27.2	0.0	0.0
90% CI	1.3	1.0	1.2	0.7	0.51	0.45	0.11	0.10	11.8	7.5	31.0	0.0	25.9	0.0	0.0
500 FT. FLYOVER -- TARGET IAS 116 MPH.															
B28	84.1	81.3	85.5	73.3	0.86	0.68	-0.11	0.39	94.0	224.1	224.7	212.1	212.6	52.7	51.9
B29	86.6	83.8	87.9	75.5	0.88	0.69	-0.12	0.51	90.6	224.7	224.7	212.1	212.1	52.7	51.9
B30	83.4	81.6	84.5	72.9	0.11	0.01	0.10	-	73.6	210.6	219.6	212.1	221.2	52.7	51.9
B31	85.8	83.2	87.4	74.9	0.75	0.54	-0.07	-	110.7	221.4	236.7	212.1	226.8	52.7	51.9
Avg.	85.0	82.5	86.3	74.1	0.65	0.48	-0.05	0.45	92.2	220.2	226.4	212.1	218.2	52.7	51.9
Std Dv	1.5	1.2	1.6	1.3	0.36	0.32	0.10	0.08	15.2	6.6	7.3	0.0	7.1	0.0	0.0
90% CI	1.7	1.5	1.9	1.5	0.43	0.38	0.12	0.38	17.9	7.7	8.6	0.0	8.3	0.0	0.0
500 FT. FLYOVER -- TARGET IAS 101.5 MPH.															
C32	85.8	83.5	86.3	74.1	1.11	0.88	0.06	-	87.6	229.1	229.3	212.1	212.3	48.7	45.4
C33										NO TRACKING DATA					
C34	86.0	83.3	86.8	74.0	1.26	0.99	-0.34	0.75	109.6	230.7	244.8	212.1	225.1	44.7	45.4
C35	85.9	82.5	84.9	72.2	0.67	0.53	-0.21	0.57	82.0	221.7	223.9	212.1	214.2	44.7	45.4
C36	85.9	83.2	87.0	74.4	0.81	0.64	-0.33	0.90	114.8	224.2	246.9	212.1	233.6	43.8	45.4
Avg.	85.9	83.1	86.2	73.7	0.96	0.76	-0.20	0.74	98.5	226.4	236.2	212.1	221.3	45.5	45.4
Std Dv	0.1	0.4	0.9	1.0	0.27	0.21	0.19	0.17	16.1	4.2	11.4	0.0	9.9	2.2	0.0
90% CI	0.1	0.5	1.1	1.1	0.32	0.25	0.22	0.28	19.0	4.9	13.4	0.0	11.7	2.6	0.0
500 FT. FLYOVER -- TARGET IAS 86 MPH.															
N45	83.7	81.4	84.8	72.2	0.14	0.03	-0.13	0.61	100.5	210.6	214.2	212.1	215.8	37.1	38.4
N46	85.6	82.8	86.6	73.9	1.45	1.13	-0.49	-	103.9	234.9	242.0	212.1	218.5	37.1	38.4
N47	83.9	81.2	85.4	72.4	0.73	0.57	-0.32	0.64	100.0	223.0	226.4	212.1	215.4	37.1	38.4
N48	85.2	82.6	86.3	73.5	0.66	0.48	-0.29	-	102.4	220.9	226.2	212.1	217.2	37.1	38.4
Avg.	84.6	82.0	85.7	73.0	0.74	0.55	-0.31	0.62	101.7	222.3	227.2	212.1	216.7	37.1	38.4
Std Dv	0.9	0.8	0.8	0.8	0.54	0.45	0.15	0.02	1.8	10.0	11.4	0.0	1.4	0.0	0.0
90% CI	1.1	0.9	1.0	1.0	0.63	0.53	0.17	0.09	2.1	11.7	13.4	0.0	1.7	0.0	0.0

*- Data Corrected Using 'Simplified Procedure'

TABLE B2-1

ADV. MACH FOR TARGET CONDITIONS ANAL. DATE: 10-Mar-86

AEROSPATIALE AS 350D ASTAR
ADV. MACH SERIES REFERENCE NUMBERS

TEMPERATURE 59 degrees F (15 degrees C)

SERIES	IAS	TEMP (F)	ROTOR RPM	BLADE DIAM.	ADVM #
A	113.00	59.00	386.00	35.10	0.8064
B	100.00	59.00	386.00	35.10	0.7868
C	88.00	59.00	386.00	35.10	0.7686
M	74.00	59.00	386.00	35.10	0.7474
N	124.00	59.00	386.00	35.10	0.8231

TEMPERATURE 77 degrees F (25 degrees C)

SERIES	IAS	TEMP (F)	ROTOR RPM	BLADE DIAM.	ADVM #
A	113.00	77.00	386.00	35.10	0.7928
B	100.00	77.00	386.00	35.10	0.7735
C	88.00	77.00	386.00	35.10	0.7556
M	74.00	77.00	386.00	35.10	0.7348
N	124.00	77.00	386.00	35.10	0.8091

TARGET CONDITIONS

SERIES	DESCRIPTION
A	500 FT. LFO IAS = 113 KTS.
B	500 FT. LFO IAS = 100 KTS.
C	500 FT. LFO IAS = 88 KTS.
M	500 FT. LFO IAS = 74 KTS.
N	500 FT. LFO IAS = 124 KTS.

* 386.00 RPM = 100% ROTOR SPEED

TABLE B2-2

ACTUAL TEST CONDITIONS ANAL. DATE: 10-Mar-86

AEROSPATIALE AS 350D ASTAR

EVENT	IAS	TEMP (F)	ROTOR RPM	BLADE DIAM.	ADVM #
A22	112.89	73.00	385.00	35.10	0.7940
A23	112.89	73.00	385.00	35.10	0.7940
A24	112.89	73.00	385.00	35.10	0.7940
A25	112.89	74.00	385.00	35.10	0.7932
A26	112.89	74.00	385.00	35.10	0.7932
A27	112.89	74.00	385.00	35.10	0.7932
B28	102.47	74.00	385.00	35.10	0.7777
B29	102.47	74.00	385.00	35.10	0.7777
B30	NA	74.00	385.00	35.10	NA
B31	NA	74.00	385.00	35.10	NA
C32	NA	74.00	385.00	35.10	NA
C33	94.66	74.00	385.00	35.10	0.7660
C24	86.84	73.00	385.00	35.10	0.7551
C35	86.84	73.00	385.00	35.10	0.7551
C36	85.10	73.00	385.00	35.10	0.7525
M45	72.08	73.00	385.00	35.10	0.7330
M46	NA	73.00	385.00	35.10	NA
M47	72.08	74.00	385.00	35.10	0.7324
M48	NA	74.00	380.00	35.10	NA
N41	121.58	73.00	385.00	35.10	0.8069
N42	NA	73.00	385.00	35.10	NA
N43	128.52	73.00	385.00	35.10	0.8173
N44	121.58	73.00	385.00	35.10	0.8069

TABLE B2-3

ACTUAL TEST NOISE DATA
ANAL. DATE: 10-Mar-86

AEROSPATIALE AS 350D ASTAR

EVENT	TEST ALT	---- AS MEAS. PNLTM ---- LEFT	CENTER	RIGHT	-- PNLTM 492 FOOT NORM. -- LEFT	CENTER	RIGHT
A22	535.70	86.00	88.40	88.20	86.38	89.14	88.58
A23	600.00	85.40	89.00	87.90	86.34	90.72	88.84
A24	535.80	86.20	89.60	88.40	86.58	90.34	88.78
A25	568.60	84.20	88.70	86.40	84.87	89.95	87.07
A26	513.90	NA	90.10	88.50	NA	90.48	88.69
A27	606.40	85.90	87.00	86.50	86.90	88.81	87.50
B28	546.70	84.20	89.10	86.50	84.68	90.01	86.98
B29	549.30	84.60	NA	86.50	85.10	NA	87.00
B30	485.50	84.40	88.20	86.90	84.34	88.08	86.84
B31	534.60	NA	86.90	86.70	NA	87.62	87.07
C32	568.50	85.30	88.00	85.10	85.97	89.25	85.77
C33	562.80	NA	88.60	NA	NA	89.76	NA
C24	575.40	83.60	87.40	84.80	84.33	88.76	85.53
C35	536.00	83.70	87.00	85.90	84.09	87.74	86.29
C36	547.00	83.10	86.90	85.30	83.58	87.82	85.78
M45	485.30	84.10	88.50	85.30	84.04	88.38	85.24
M46	593.50	83.70	87.70	85.10	84.59	89.32	85.99
M47	541.60	84.00	86.50	84.90	84.44	87.33	85.34
M48	532.30	83.30	86.20	85.60	83.65	86.88	85.95
N41	563.90	NA	90.00	87.90	NA	91.18	88.53
N42	596.80	86.70	89.00	88.00	87.62	90.67	88.92
N43	557.20	87.10	91.50	90.10	87.67	92.58	90.67
N44	555.50	86.20	89.20	88.30	86.76	90.25	88.86

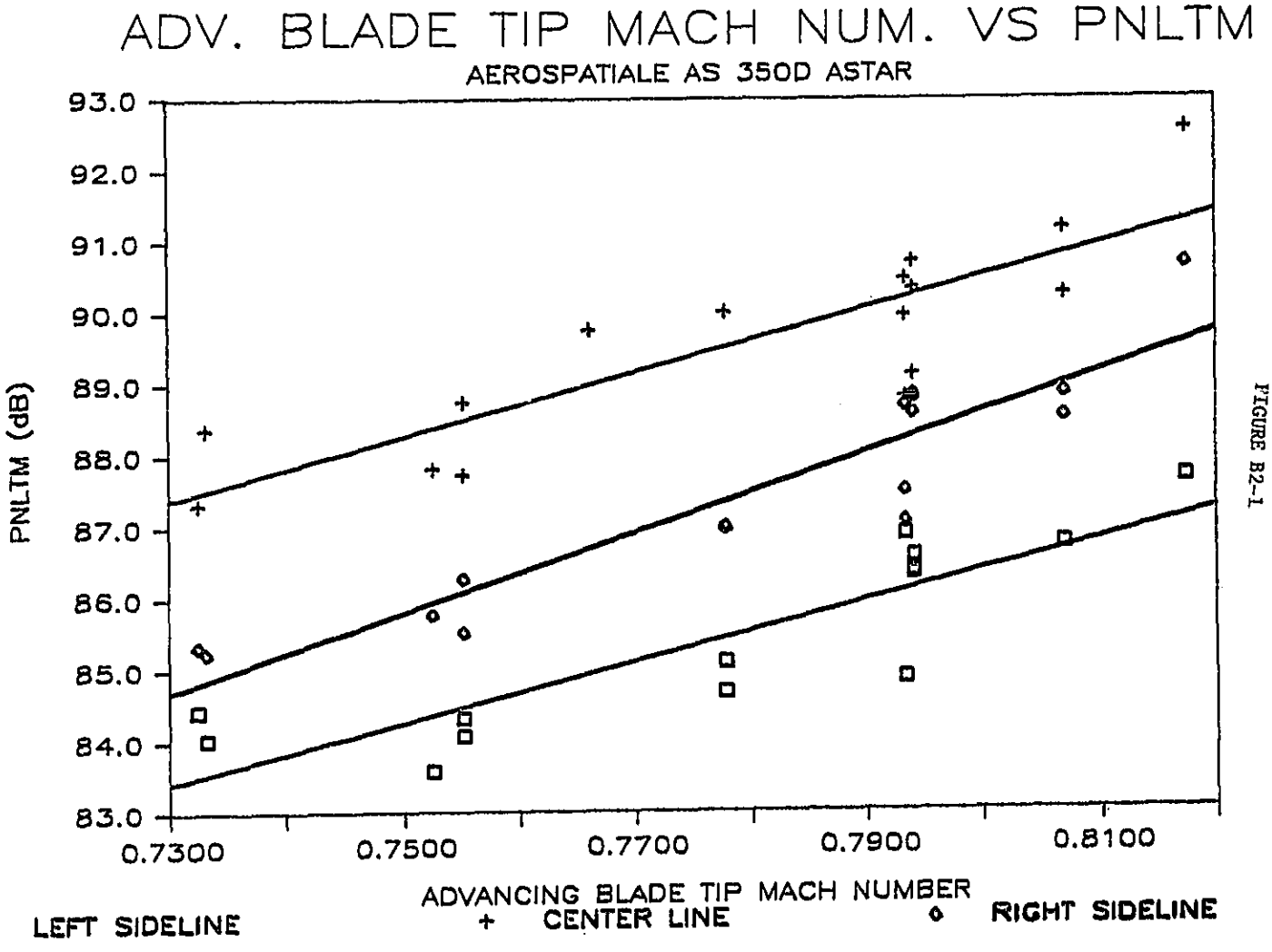

ADV. BLADE TIP MACH NUM. VS PNLTM
AEROSPATIALE AS 350D ASTAR
PNLTM (dB)
93.0
92.0
91.0
90.0
89.0
88.0
87.0
86.0
85.0
84.0
83.0
0.7300
0.7500
0.7700
0.7900
0.8100
ADVANCING BLADE TIP MACH NUMBER
LEFT SIDELINE
+ CENTER LINE
◇ RIGHT SIDELINE

FIGURE B2-1

TABLE B2-4

AEROSPATIALE AS 350D ASTAR
LEFT SIDELINE

ANAL. DATE: 10-Mar-86

EVENT	X INPUT	Y INPUT
A22	0.7940	86.38
A23	0.7940	86.34
A24	0.7940	86.58
A25	0.7932	84.87
A26	0.7932	NA
A27	0.7932	86.90
B28	0.7777	84.68
B29	0.7777	85.10
B30	NA	84.34
B31	NA	NA
C32	NA	85.97
C33	0.7660	NA
C24	0.7551	84.33
C35	0.7551	84.09
C36	0.7525	83.58
M45	0.7330	84.04
M46	NA	84.59
M47	0.7324	84.44
M48	NA	83.65
N41	0.8069	NA
N42	NA	87.62
N43	0.8173	87.67
N44	0.8069	86.76

LINEAR REGRESSION EQUATION

Y =	SLOPE	* X +	INTERCEPT	
=	42.52		52.38	
R SQ. =	0.761	MEAN X =	0.7769	
R =	0.872	S.D. X =	0.0269	
STD.ERR =	0.668	MEAN Y =	85.41	
CORREL =	0.872	S.D. Y =	1.31	
SAMPLE =	14	TOT VAR =	1.72	

TABLE B2-5

LINEAR REGRESSION EQUATION

Y =	SLOPE	* X	+	INTERCEPT	
=	42.52			52.38	

R SQ. =	0.761	MEAN X =	0.7769
R =	0.872	S.D. X =	0.0269
STD.ERR =	0.668	MEAN Y =	85.41
CORREL =	0.872	S.D. Y =	1.31
SAMPLE =	14	TOT VAR =	1.72

SECOND ORDER EQUATION

Y =	A	+	B1	* X	+	B2	*X'
Y =	412.94	+	-892.58	* X	+	605.58	*X'

R SQ. =	0.673	MEAN X =	0.7769
R =	0.821	S.D. X =	0.0269
STD.ERR =	0.561	MEAN Y =	85.41
SAMPLE =	14	S.D. Y =	1.31

ADV. BLADE TIP MACH NUM. VS PNLTM

AEROSPATIALE AS 350D ASTAR

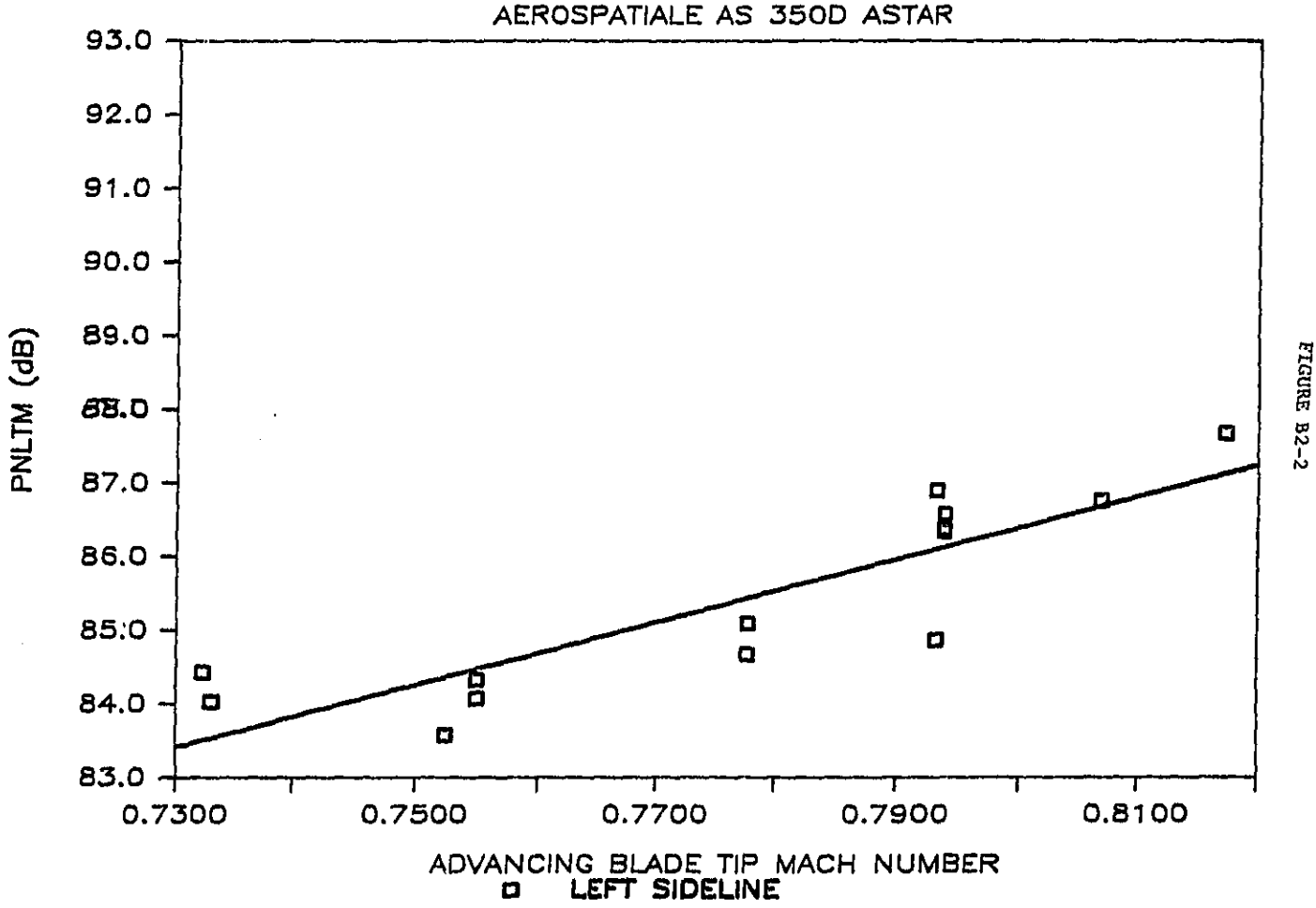


FIGURE B2-2

TABLE B2-6

AEROSPATIALE AS 350D ASTAR
CENTER LINE

ANAL. DATE: 10-Mar-86

EVENT	X INPUT	Y INPUT
A22	0.7940	89.14
A23	0.7940	90.72
A24	0.7940	90.34
A25	0.7932	89.95
A26	0.7932	90.48
A27	0.7932	88.81
B28	0.7777	90.01
B29	0.7777	NA
B30	NA	88.08
B31	NA	87.62
C32	NA	89.25
C33	0.7660	89.76
C24	0.7551	88.76
C35	0.7551	87.74
C36	0.7525	87.82
M45	0.7330	88.38
M46	NA	89.32
M47	0.7324	87.33
M48	NA	86.88
N41	0.8069	91.18
N42	NA	90.67
N43	0.8173	92.58
N44	0.8069	90.25

LINEAR REGRESSION EQUATION

Y =	SLOPE	* X +	INTERCEPT	
=	44.72		54.74	
R SQ. =	0.720	MEAN X =	0.7790	
R =	0.848	S.D. X =	0.0266	
STD.ERR =	0.768	MEAN Y =	89.58	
CORREL =	0.848	S.D. Y =	1.40	
SAMPLE =	16	TOT VAR =	1.97	

TABLE B2-7

LINEAR REGRESSION EQUATION

Y =	SLOPE	* X +	INTERCEPT		
=	44.72		54.74		

R SQ.	=	0.720	MEAN X =	0.7790	
R	=	0.848	S.D. X =	0.0266	
STD.ERR	=	0.768	MEAN Y =	89.58	
CORREL	=	0.848	S.D. Y =	1.40	
SAMPLE	=	16	TOT VAR =	1.97	

SECOND ORDER EQUATION

Y =	A	+	B1	* X	+	B2	*X'
Y =	298.67	+	-587.18	* X	+	408.76	*X'

R SQ.	=	0.617	MEAN X =	0.7790	
R	=	0.786	S.D. X =	0.0266	
STD.ERR	=	0.752	MEAN Y =	89.58	
SAMPLE	=	16	S.D. Y =	1.40	

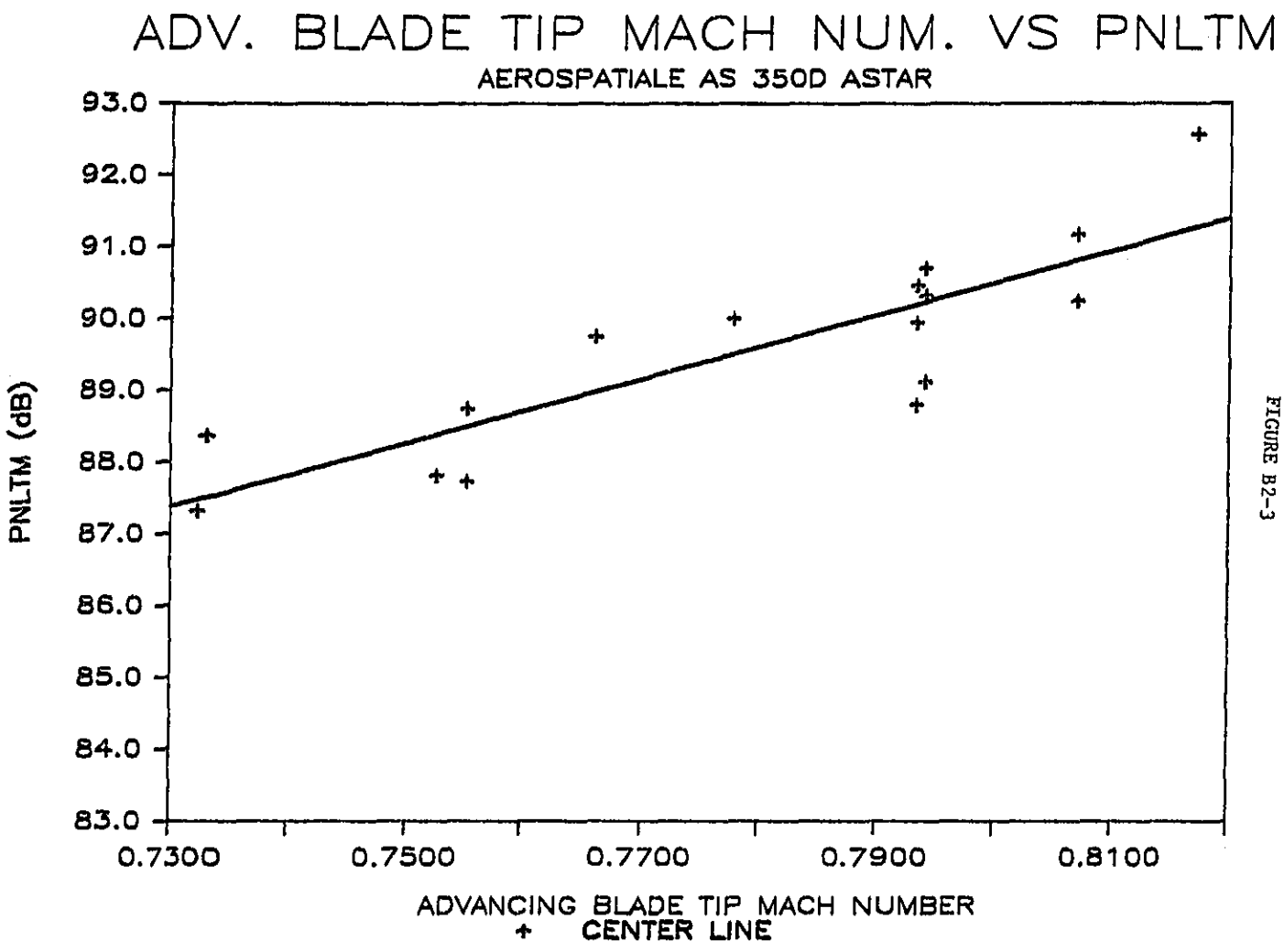

ADV. BLADE TIP MACH NUM. VS PNLTM
AEROSPATIALE AS 350D ASTAR
93.0
92.0
91.0
90.0
89.0
88.0
87.0
86.0
85.0
84.0
83.0
PNLTM (dB)
0.7300
0.7500
0.7700
0.7900
0.8100
ADVANCING BLADE TIP MACH NUMBER
+ CENTER LINE

FIGURE B2-3

TABLE B2-8

AEROSPATIALE AS 350D ASTAR
RIGHT SIDELINE

ANAL. DATE: 10-Mar-86

EVENT	X INPUT	Y INPUT
A22	0.7940	88.58
A23	0.7940	88.84
A24	0.7940	88.78
A25	0.7932	87.07
A26	0.7932	88.69
A27	0.7932	87.50
B28	0.7777	86.98
B29	0.7777	87.00
B30	NA	86.84
B31	NA	87.07
C32	NA	85.77
C33	0.7660	NA
C24	0.7551	85.53
C35	0.7551	86.29
C36	0.7525	85.78
M45	0.7330	85.24
M46	NA	85.99
M47	0.7324	85.34
M48	NA	85.95
N41	0.8069	88.53
N42	NA	88.92
N43	0.8173	90.67
N44	0.8069	88.86

LINEAR REGRESSION EQUATION

Y =	SLOPE	* X +	INTERCEPT	
=	55.82		43.95	
R SQ. =	0.860	MEAN X =	0.7798	
R =	0.928	S.D. X =	0.0264	
STD.ERR =	0.614	MEAN Y =	87.48	
CORREL =	0.928	S.D. Y =	1.59	
SAMPLE =	16	TOT VAR =	2.52	

TABLE B2-9

LINEAR REGRESSION EQUATION

Y =	SLOPE	* X +	INTERCEPT		
=	55.82		43.95		
R SQ.	=	0.860	MEAN X =	0.7798	
R	=	0.928	S.D. X =	0.0264	
STD.ERR	=	0.614	MEAN Y =	87.48	
CORREL	=	0.928	S.D. Y =	1.59	
SAMPLE	=	16	TOT VAR =	2.52	

SECOND ORDER EQUATION

Y =	A	+	B1	* X +	B2	*X'	
Y =	336.58	+	-702.61	* X +	490.84	*X'	
R SQ.	=	0.781	MEAN X =	0.7798			
R	=	0.884	S.D. X =	0.0264			
STD.ERR	=	0.552	MEAN Y =	87.48			
SAMPLE	=	16	S.D. Y =	1.59			

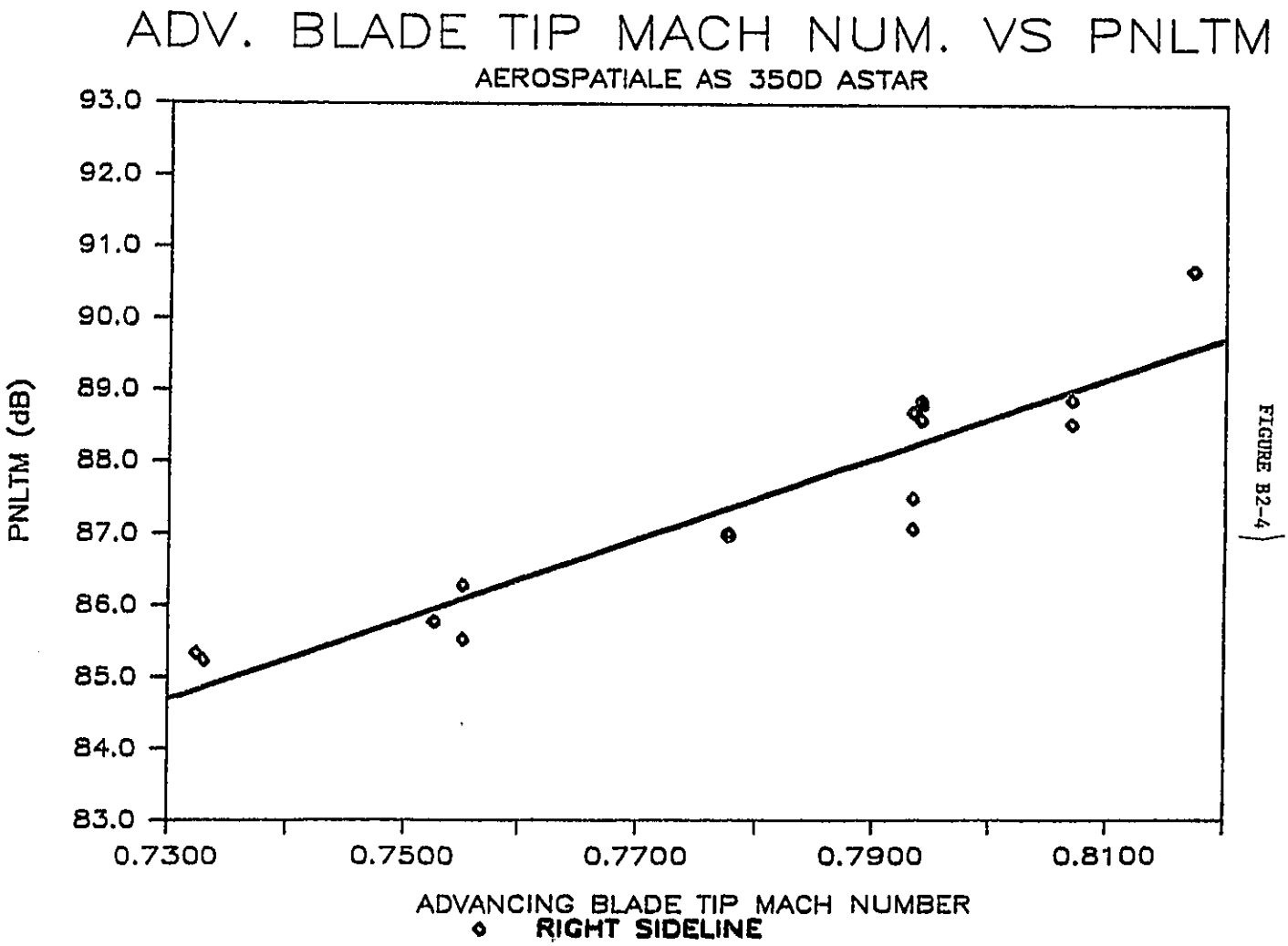

ADV. BLADE TIP MACH NUM. VS PNLTM
AEROSPATIALE AS 350D ASTAR
PNLTM (dB)
93.0
92.0
91.0
90.0
89.0
88.0
87.0
86.0
85.0
84.0
83.0
0.7300
0.7500
0.7700
0.7900
0.8100
ADVANCING BLADE TIP MACH NUMBER
RIGHT SIDELINE

FIGURE B2-4

TABLE B3-1

SUMMARY EPNL LEVELS (dB)
DATA PROCESSED PER ICAO CERTIFICATION PROCEDURES

HELICOPTER: AEROSPATIALE AS-350D ASTAR
OPERATION: ICAO TAKEOFF

EVENT NUMBER	LEFT SIDELINE	CENTER LINE CENTER	RIGHT SIDELINE	3 MIC AVERAGE
SITE	2	1	3	
E11	NA	87.90	88.20	0.00
E12	NA	NA	NA	0.00
E13	NA	86.20	86.80	0.00
E15	86.80	86.10	86.40	86.43
E16	87.70	86.90	87.90	87.50
E17	87.80	88.00	87.30	87.70
AVERAGE	87.43	87.02	87.32	87.21
STD. DEV.	0.55	0.90	0.75	0.68
90% C.I.	0.93	0.86	0.71	1.15

A: 13-Mar-86

TABLE B3-2

SUMMARY EPNL LEVELS (dB)
DATA PROCESSED PER ICAO CERTIFICATION PROCEDURES

HELICOPTER: AEROSPATIALE AS-350D ASTAR
OPERATION: ICAO LFO

EVENT NUMBER	LEFT SIDELINE	CENTER LINE CENTER	RIGHT SIDELINE	3 MIC AVERAGE
SITE	2/3	1	3/2	
A22	84.80	87.60	86.80	86.40
A23	86.00	88.20	87.40	87.20
A24	84.50	88.10	87.10	86.57
A25	84.80	88.60	86.60	86.67
A26	NA	88.60	86.70	0.00
A27	85.40	88.60	87.20	87.07
AVERAGE	85.10	88.28	86.97	86.78
STD. DEV.	0.60	0.40	0.31	0.34
90% C.I.	0.57	0.33	0.26	0.32

A: 10-Mar-86

TABLE B3-3

SUMMARY EPNL LEVELS (dB)
DATA PROCESSED PER ICAO CERTIFICATION PROCEDURES

HELICOPTER: AEROSPATIALE AS-350D ASTAR
OPERATION: ICAO APPROACH

EVENT NUMBER	LEFT SIDELINE	CENTER LINE CENTER	RIGHT SIDELINE	3 MIC AVERAGE
SITE	3	1	2	
F1	89.90	93.90	87.40	90.40
F2	87.80	93.90	86.80	89.50
F3	88.10	94.10	86.80	89.67
F4	88.60	94.20	NA	0.00
F5	88.20	93.40	86.70	89.43
F6	88.30	93.80	NA	0.00
F8	88.00	92.30	87.20	89.17
F9	89.10	93.20	86.80	89.70
AVERAGE	88.50	93.60	86.95	89.64
STD. DEV.	0.69	0.62	0.28	0.42
90% C.I.	0.46	0.42	0.23	0.34

APPENDIX C (C1-C3)

AEROSPATIALE AS 355F, TWINSTAR

TABLE C1-1

TABLE NO. J.2-1.1 (REV.2)

AEROSPATIALE SA-355F HELICOPTER (TWINSTAR)

DOT/TSC
3/12/86

CORRECTION DATA*

SITE: 1 CENTERLINE - CENTER JUNE 7,1983

	CORRECTED				CORRECTIONS (dB)				ACOUSTIC ANGLE	TRACKING DATA (Meters) (ACTUAL)		(REFERENCE)		SPEED(m/sec)	
Ev	EPNL	SEL	PNLTm	ALm	/\1(P)	/\1(A)	/\2	/\3	(Deg)	CPA	SR	CPAR	SRR	GRND	REF
500 FT. FLYOVER -- TARGET IAS 130.5 MPH.															
A1	88.8	85.0	92.0	78.0	0.17	0.18	-0.05	0.48	129.7	154.6	201.0	150.0	195.0	59.0	58.3
A2	89.2	85.3	91.7	77.9	-0.93	-0.85	0.30	0.48	142.4	138.8	227.5	150.0	245.8	59.0	58.3
A3	88.8	84.9	92.2	78.5	-0.73	-0.66	0.25	0.48	132.4	141.2	191.3	150.0	203.2	59.0	58.3
A4	89.4	85.6	91.8	78.0	-0.49	-0.42	0.23	0.38	132.2	144.7	195.3	150.0	202.4	59.9	58.3
A5	88.2	84.7	91.6	76.8	0.14	0.20	0.02	0.38	142.2	154.3	251.9	150.0	244.9	59.9	58.3
A6	89.1	85.2	92.0	78.1	-0.50	-0.43	0.20	0.46	131.9	144.8	194.7	150.0	201.7	59.5	58.3
Avg.	88.9	85.1	91.9	77.9	-0.39	-0.33	0.16	0.44	135.1	146.4	210.3	150.0	215.5	59.4	58.3
Std Dv	0.4	0.3	0.2	0.6	0.45	0.43	0.14	0.05	5.6	6.6	24.3	0.0	23.3	0.4	0.0
90% CI	0.4	0.3	0.2	0.5	0.37	0.36	0.12	0.04	4.6	5.4	20.0	0.0	19.1	0.4	0.0
500 FT. FLYOVER -- TARGET IAS 116 MPH.															
B8	87.6	84.0	89.8	76.0	-0.45	-0.39	0.18	0.46	120.4	145.1	168.1	150.0	173.8	52.7	51.9
B9	87.6	84.0	91.2	76.7	0.38	0.33	-0.19	0.67	139.2	157.2	240.5	150.0	229.5	51.4	51.9
B10	87.4	83.8	89.8	75.9	-0.08	-0.04	-0.08	0.74	126.1	150.5	186.3	150.0	185.7	51.0	51.9
B11	87.3	83.7	90.1	76.4	0.03	0.06	-0.20	0.89	131.5	152.3	203.4	150.0	200.3	50.1	51.9
B12	88.1	84.5	89.9	76.1	0.55	0.56	-0.18	0.53	128.4	160.5	204.7	150.0	191.3	52.3	51.9
B13	87.8	84.0	90.7	77.0	1.01	0.95	-0.52	0.89	128.6	167.8	214.7	150.0	192.0	50.1	51.9
Avg.	87.6	84.0	90.3	76.4	0.24	0.24	-0.16	0.70	129.0	155.6	202.9	150.0	195.4	51.3	51.8
Std Dv	0.3	0.3	0.6	0.4	0.52	0.47	0.23	0.18	6.2	8.0	24.7	0.0	18.8	1.1	0.0
90% CI	0.2	0.2	0.5	0.4	0.42	0.39	0.19	0.15	5.1	6.6	20.3	0.0	15.5	0.9	0.0
500 FT. FLYOVER -- TARGET IAS 101.5 MPH.															
C14	86.7	83.2	89.9	76.2	0.46	0.45	-0.58	0.68	127.1	159.2	199.5	150.0	188.0	45.2	49.4
C15	86.8	83.4	89.4	75.6	-0.94	-0.88	-0.16	0.75	124.6	138.0	167.6	150.0	182.2	44.7	49.4
C16	87.0	83.6	90.3	76.6	-0.34	-0.28	-0.28	0.61	141.5	146.9	236.3	150.0	241.2	45.6	49.4
C17	85.7	82.3	88.0	73.9	-0.78	-0.74	-0.12	-0.52	124.9	139.8	170.4	150.0	182.8	45.6	49.4
C18	85.9	82.5	88.6	74.6	-0.27	-0.24	-0.30	-0.52	123.3	147.6	176.5	150.0	179.4	45.6	49.4
Avg.	86.4	83.0	89.3	75.4	-0.37	-0.34	-0.29	0.20	128.3	146.3	190.1	150.0	194.7	45.3	49.4
Std Dv	0.6	0.6	1.0	1.1	0.55	0.52	0.18	0.66	7.5	8.4	28.7	0.0	26.2	0.4	0.0
90% CI	0.6	0.5	0.9	1.1	0.52	0.50	0.17	0.63	7.2	8.0	27.4	0.0	24.9	0.4	0.0

*- Data Corrected Using 'Simplified Procedure'

TABLE C1-2

TABLE NO. J.2-1.3 (REV.2)

AEROSPATIALE SA-355F HELICOPTER (TWINSTAR)

DOT/TSC
3/12/86

CORRECTION DATA*

SITE: 1 CENTERLINE - CENTER JUNE 7,1983

	CORRECTED				CORRECTIONS (dB)				ACOUSTIC ANGLE	TRACKING DATA (Meters) (ACTUAL)		(REFERENCE)		SPEED(m/sec)	
Ev	EPNL	SEL	PNLTm	ALm	/\1(P)	/\1(A)	/\2	/\3	(Deg)	CPA	SR	CPAR	SRR	GRND	REF
TAKEOFF -- TARGET IAS 63 MPH. STANDARD (SEE TEXT)															
G38	87.0	83.9	86.9	73.0	-3.87	-3.73	1.68	-	127.6	128.2	161.8	186.6	235.4	31.3	28.2
G39	86.2	83.4	86.2	72.8	-3.49	-3.16	1.50	-	103.4	135.2	139.0	186.6	191.8	31.3	28.2
G40	87.2	83.9	88.1	73.7	-3.85	-3.75	1.75	-	123.5	127.7	153.2	186.6	223.8	31.7	28.2
G41	87.0	83.9	87.5	73.5	-2.76	-2.71	0.96	-	120.1	142.0	164.1	186.6	215.7	28.6	28.2
Avg.	86.9	83.8	87.2	73.3	-3.49	-3.34	1.47	-	118.7	133.3	154.5	186.6	216.7	30.7	28.2
Std Dv	0.5	0.2	0.8	0.4	0.52	0.50	0.36	-	10.6	6.7	11.3	0.0	18.5	1.4	0.0
90% CI	0.5	0.3	0.9	0.5	0.61	0.59	0.42	-	12.5	7.9	13.3	0.0	21.7	1.7	0.0
9 DEGREE APPROACH -- TARGET IAS 63 MPH.															
H34	93.1	90.4	94.7	81.7	-0.02	-0.06	0.59	-	105.0	118.2	122.4	118.5	122.7	32.2	28.2
H35	92.8	90.4	93.1	80.2	0.23	0.13	0.73	-	104.7	121.4	125.5	118.5	122.5	33.9	28.2
H36	92.7	90.0	93.8	80.5	-0.09	-0.15	0.62	-	85.7	117.1	117.5	118.5	118.9	32.2	28.2
H37	93.1	90.3	94.1	81.2	0.04	-0.03	0.87	-	100.1	118.5	120.3	118.5	120.4	34.4	28.2
Avg.	92.9	90.3	93.9	80.9	0.04	-0.03	0.70	-	98.9	118.8	121.4	118.5	121.1	33.2	28.2
Std Dv	0.2	0.2	0.7	0.7	0.14	0.12	0.13	-	9.1	1.8	3.4	0.0	1.9	1.2	0.0
90% CI	0.2	0.2	0.8	0.8	0.16	0.14	0.15	-	10.7	2.1	4.0	0.0	2.2	1.4	0.0
500 FT. FLYOVER -- TARGET IAS 145 MPH.															
N49	90.4	86.9	92.7	78.7	-0.14	-0.31	0.17	1.05	152.8	146.2	319.8	150.0	328.1	66.1	64.8
N50	90.9	86.8	95.4	81.4	-0.27	-0.44	0.04	1.48	143.6	144.1	242.6	150.0	252.6	63.5	64.8
N51	91.2	87.4	94.2	80.4	-0.33	-0.44	-0.13	1.96	129.1	143.5	184.8	150.0	193.3	60.8	64.8
N52	90.9	86.9	95.1	80.4	0.19	0.04	-0.09	1.45	142.5	151.2	248.4	150.0	246.4	63.9	64.8
N53	91.3	87.4	94.8	81.2	0.03	-0.14	-0.11	1.71	139.5	148.2	228.3	150.0	231.0	62.6	64.8
Avg.	91.0	87.1	94.5	80.4	-0.10	-0.26	-0.02	1.53	141.5	146.6	244.8	150.0	250.3	63.4	64.8
Std Dv	0.3	0.3	1.1	1.0	0.21	0.21	0.13	0.34	8.5	3.2	48.8	0.0	49.2	2.0	0.0
90% CI	0.3	0.3	1.0	1.0	0.20	0.20	0.12	0.32	8.1	3.0	46.5	0.0	46.9	1.9	0.0
500 FT. FLYOVER -- TARGET IAS 86 MPH.															
N54	88.4	85.0	89.8	76.2	-0.03	-0.20	-0.26	1.71	135.7	147.7	211.5	150.0	214.8	39.7	38.4
N55	87.9	84.7	90.3	76.8	-0.36	-0.45	0.24	1.17	125.9	143.8	177.5	150.0	185.2	39.4	38.4
N56	88.1	84.8	89.1	75.6	0.11	-0.03	0.20	1.02	113.0	149.8	162.8	150.0	163.0	40.2	38.4
Avg.	88.1	84.9	89.7	76.2	-0.09	-0.23	0.06	1.30	124.9	147.1	183.9	150.0	187.7	38.4	38.4
Std Dv	0.3	0.2	0.6	0.6	0.24	0.21	0.28	0.36	11.4	3.1	25.0	0.0	26.0	2.4	0.0
90% CI	0.4	0.3	1.0	1.0	0.41	0.36	0.47	0.61	19.2	5.2	42.1	0.0	43.8	4.0	0.0

*- Data Corrected Using 'Simplified Procedure'

TABLE C1-3

TABLE NO. J.2-2.1 (REV.2)

AEROSPATIALE SA-355F HELICOPTER (TWINSTAR)

DOT/TSC
3/12/86

CORRECTION DATA*

SITE: 2 SIDELINE - 150 M. SOUTH JUNE 7,1983

	CORRECTED				CORRECTIONS (dB)				ACOUSTIC ANGLE	TRACKING DATA (Meters) (ACTUAL)		(REFERENCE)		SPEED(m/sec)	
Ev	EPNL	SEL	PNLTm	ALm	/\1(P)	/\1(A)	/\2	/\3	(Deg)	CPA	SR	CPAR	SRR	GRND	REF
500 FT. FLYOVER -- TARGET IAS 130.5 MPH.															
A1	89.5	85.7	91.9	77.9	-0.03	-0.02	0.01	1.43	117.2	214.8	241.6	212.1	238.6	59.0	58.3
A2	87.3	83.9	88.3	75.4	-0.62	-0.55	0.18	0.45	135.8	203.8	292.4	212.1	304.3	59.0	58.3
A3	89.1	86.0	91.2	78.0	-0.48	-0.51	0.15	1.43	130.7	205.4	270.8	212.1	279.6	59.0	58.3
A4	87.9	84.5	88.6	75.6	-0.56	-0.36	0.18	0.36	133.3	207.9	285.7	212.1	291.6	59.9	58.3
A5	89.4	85.6	91.8	77.8	-0.02	0.00	0.08	1.15	124.1	214.6	259.2	212.1	256.2	59.9	58.3
A6	89.2	85.6	90.3	77.0	-0.34	-0.32	0.15	1.36	121.6	207.9	244.1	212.1	249.1	59.5	58.3
Avg.	88.7	85.2	90.4	77.0	-0.34	-0.29	0.12	1.03	127.1	209.1	265.7	212.1	269.9	59.4	58.3
Std Dv	0.9	0.8	1.6	1.2	0.26	0.24	0.07	0.50	7.3	4.6	21.1	0.0	25.9	0.4	0.0
90% CI	0.7	0.7	1.3	1.0	0.22	0.19	0.06	0.41	6.0	3.8	17.4	0.0	21.3	0.4	0.0
500 FT. FLYOVER -- TARGET IAS 116 MPH.															
B8	86.4	83.2	87.2	74.1	-0.35	-0.33	0.14	0.42	115.2	208.1	230.1	212.1	234.5	52.7	51.9
B9	87.9	84.6	89.8	76.1	0.06	0.05	-0.11	1.31	116.7	216.7	242.5	212.1	237.4	51.4	51.9
B10	86.4	83.2	87.0	73.9	-0.15	-0.14	-0.07	0.69	114.1	211.9	232.1	212.1	232.3	51.0	51.9
B11	87.4	84.2	89.2	76.4	-0.09	-0.09	-0.17	1.65	100.8	213.2	217.0	212.1	216.0	50.1	51.9
B12	87.2	83.7	87.8	74.5	0.13	0.20	-0.07	0.49	113.9	219.1	239.7	212.1	232.1	52.3	51.9
B13	88.1	84.3	89.4	76.1	0.45	0.41	-0.34	1.65	109.5	224.4	238.0	212.1	225.0	50.1	51.9
Avg.	87.2	83.9	88.4	75.2	0.01	0.02	-0.10	1.03	111.7	215.6	233.2	212.1	229.6	51.3	51.8
Std Dv	0.7	0.6	1.2	1.1	0.27	0.26	0.16	0.57	5.9	5.8	9.2	0.0	7.8	1.1	0.0
90% CI	0.6	0.5	1.0	0.9	0.23	0.22	0.13	0.47	4.8	4.8	7.6	0.0	6.4	0.9	0.0
500 FT. FLYOVER -- TARGET IAS 101.5 MPH.															
C14	85.6	82.3	86.8	73.4	0.15	0.14	-0.48	0.73	116.1	218.1	242.9	212.1	236.3	45.2	49.4
C15	85.9	82.6	87.0	73.7	-0.54	-0.53	-0.29	0.70	106.2	203.2	211.6	212.1	220.9	44.7	49.4
C16	85.8	82.6	86.0	73.7	-0.30	-0.26	-0.31	0.67	119.8	209.4	241.4	212.1	244.5	45.6	49.4
C17	85.7	82.5	87.2	73.8	-0.49	-0.47	-0.23	0.56	117.9	204.5	231.4	212.1	240.0	45.6	49.4
C18	86.1	82.8	87.5	74.0	-0.25	-0.25	-0.31	0.67	111.8	209.8	226.0	212.1	228.4	45.6	49.4
Avg.	85.8	82.6	86.9	73.7	-0.29	-0.27	-0.32	0.67	114.4	209.0	230.7	212.1	234.0	45.3	49.4
Std Dv	0.2	0.2	0.6	0.2	0.27	0.26	0.09	0.06	5.5	5.9	12.8	0.0	9.4	0.4	0.0
90% CI	0.2	0.2	0.5	0.2	0.26	0.25	0.09	0.06	5.2	5.6	12.2	0.0	9.0	0.4	0.0

*- Data Corrected Using 'Simplified Procedure'

TABLE C1-4

TABLE NO. J.2-2.3 (REV.2)

AEROSPATIALE SA-355F HELICOPTER (TWINSTAR)

DOT/TSC
3/12/86

CORRECTION DATA*

SITE: 2 SIDELINE - 150 M. SOUTH JUNE 7,1983

Ev	CORRECTED EPNL	SEL	PNLTm	ALm	CORRECTIONS (dB) /\1(P)	/\1(A)	/\2	/\3	ACOUSTIC ANGLE (Deg)	TRACKING DATA (Meters) (ACTUAL) CPA	SR	(REFERENCE) CPAR	SRR	SPEED(m/sec) GRND	REF
TAKEOFF -- TARGET IAS 63 MPH. STANDARD (SEE TEXT)															
G38	86.7	84.2	85.1	72.7	-2.08	-2.04	1.09	-	111.3	196.8	211.1	239.4	256.9.	31.3	28.2
G39	87.1	84.5	86.1	73.6	-1.84	-1.83	1.02	-	116.8	201.4	225.6	239.4	268.1	31.3	28.2
G40	86.5	84.2	85.4	72.9	-2.12	-2.03	1.16	-	105.4	196.5	203.8	239.4	248.3	31.7	28.2
G41	-	84.2	85.4	72.6	-1.66	-1.57	-	-	107.2	206.0	215.7	239.4	250.6	28.6	28.2
Avg.	86.7	84.3	85.5	73.0	-1.92	-1.87	1.09	-	110.2	200.2	214.1	239.4	256.0	30.7	28.2
Std Dv	0.3	0.2	0.4	0.5	0.22	0.22	0.07	-	5.0	4.5	9.1	0.0	8.9	1.4	0.0
90% CI	0.5	0.2	0.5	0.6	0.25	0.26	0.12	-	5.9	5.3	10.7	0.0	10.4	1.7	0.0
9 DEGREE APPROACH -- TARGET IAS 63 MPH.															
H34	88.0	85.3	86.0	73.7	-0.01	-0.12	0.59	-	115.0	190.5	210.2	191.2	210.9	32.2	28.2
H35	89.4	86.6	88.1	73.6	0.12	-0.03	0.79	-	140.2	192.5	301.0	191.2	299.0	33.9	28.2
H36	88.4	85.4	86.0	73.0	-0.04	-0.14	0.60	-	121.4	189.8	222.3	191.2	223.9	32.2	28.2
H37	88.2	85.1	87.6	73.5	0.01	-0.10	0.88	-	131.3	190.6	253.7	191.2	254.4	34.4	28.2
Avg.	88.5	85.6	87.0	73.5	0.02	-0.10	0.71	-	127.0	190.9	246.8	191.2	247.0	33.2	28.2
Std Dv	0.6	0.7	1.1	0.3	0.07	0.05	0.14	-	11.1	1.1	40.5	0.0	39.1	1.2	0.0
90% CI	0.7	0.8	1.3	0.4	0.08	0.06	0.17	-	13.1	1.3	47.7	0.0	46.0	1.4	0.0
500 FT. FLYOVER -- TARGET IAS 145 MPH.															
M49	89.6	85.9	90.5	77.3	-0.04	-0.22	0.14	0.98	131.0	208.9	276.7	212.1	281.0	66.1	64.8
M50	93.4	89.9	96.2	82.9	-0.14	-0.27	-0.02	5.05	112.3	207.5	224.3	212.1	229.3	63.5	64.8
M51	89.9	86.1	91.2	78.1	-0.15	-0.29	-0.20	1.82	107.6	207.0	217.2	212.1	222.6	60.8	64.8
M52	94.6	91.1	98.3	84.3	0.10	-0.02	-0.06	4.96	126.4	212.4	263.8	212.1	263.4	63.9	64.8
M53	89.7	86.2	90.8	77.7	0.03	-0.15	-0.12	1.59	122.7	210.3	249.9	212.1	252.0	62.6	64.8
Avg.	91.4	87.8	93.4	80.1	-0.04	-0.19	-0.05	2.88	120.0	209.2	246.4	212.1	249.7	63.4	64.8
Std Dv	2.4	2.4	3.6	3.3	0.11	0.11	0.13	1.96	9.8	2.2	25.4	0.0	24.1	2.0	0.0
90% CI	2.3	2.3	3.4	3.1	0.10	0.10	0.12	1.87	9.3	2.1	24.2	0.0	23.0	1.9	0.0
500 FT. FLYOVER -- TARGET IAS 86 MPH.															
N54	86.7	83.5	87.0	73.5	-0.01	-0.15	-0.24	1.59	111.8	209.9	226.1	212.1	228.4	35.7	38.1
N55	84.9	81.6	87.2	73.1	-0.14	-0.28	0.18	-0.17	128.7	207.2	265.6	212.1	271.9	39.4	38.4
N56	86.4	83.4	86.1	72.9	0.10	-0.08	0.21	0.95	114.1	211.4	231.6	212.1	232.4	40.2	38.4
Avg.	86.0	82.8	86.8	73.1	-0.02	-0.17	0.05	0.79	118.2	209.5	241.1	212.1	244.3	38.4	38.3
Std Dv	1.0	1.0	0.6	0.3	0.12	0.10	0.25	0.89	9.2	2.1	21.4	0.0	24.0	2.4	0.2
90% CI	1.6	1.7	1.0	0.6	0.20	0.17	0.42	1.50	15.5	3.6	36.1	0.0	40.5	4.0	0.4

*- Data Corrected Using 'Simplified Procedure'

TABLE C1-5

TABLE NO. J.2-3.1 (REV.2)

AEROSPATIALE SA-355F HELICOPTER (TWINSTAR)

DOT/TSC
3/12/86

CORRECTION DATA*

SITE: 3 SIDELINE - 150 M. NORTH JUNE 7,1983

	CORRECTED				CORRECTIONS (dB)				ACOUSTIC ANGLE	TRACKING DATA (Meters) (ACTUAL)		(REFERENCE)		SPEED(m/sec)	
Ev	EPNL	SEL	PNLTm	ALm	/\1(P)	/\1(A)	/\2	/\3	(Deg)	CPA	SR	CPAR	SRR	GRND	REF
500 FT. FLYOVER -- TARGET IAS 130.5 MPH.															
A1	87.0	83.7	88.4	75.5	0.05	0.06	-0.01	0.45	104.9	216.2	223.7	212.1	219.5	59.0	58.3
A2	89.3	85.9	90.5	77.4	-0.50	-0.45	0.16	1.43	90.8	205.2	205.2	212.1	212.1	59.0	58.3
A3	86.7	83.6	88.5	75.4	-0.43	-0.45	0.13	0.45	124.7	206.8	251.4	212.1	257.9	59.0	58.3
A4	89.2	86.1	90.6	77.8	-0.40	-0.30	0.16	1.15	121.7	209.2	245.9	212.1	249.3	59.9	58.3
A5	86.3	83.3	88.4	75.3	0.02	0.03	0.05	0.36	90.6	216.0	216.0	212.1	212.1	59.9	58.3
A6	88.3	85.1	89.7	76.9	-0.32	-0.28	0.13	0.42	99.0	209.3	211.9	212.1	214.8	59.5	58.3
Avg.	87.8	84.6	89.4	76.4	-0.26	-0.23	0.10	0.71	105.3	210.4	225.7	212.1	227.6	59.4	58.3
Std Dv	1.3	1.2	1.1	1.1	0.24	0.23	0.07	0.46	14.9	4.7	18.9	0.0	20.5	0.4	0.0
90% CI	1.1	1.0	0.9	0.9	0.20	0.19	0.06	0.38	12.2	3.8	15.5	0.0	16.9	0.4	0.0
500 FT. FLYOVER -- TARGET IAS 116 MPH.															
B8	87.5	84.4	88.2	75.4	-0.28	-0.27	0.11	0.93	101.4	209.4	213.7	212.1	216.4	52.7	51.9
B9	85.4	82.8	86.7	73.8	0.13	0.17	-0.13	0.62	104.1	218.1	224.9	212.1	218.7	51.4	51.9
B10	87.8	84.9	88.8	76.2	-0.11	-0.07	-0.09	1.43	97.5	213.3	215.1	212.1	213.9	51.0	51.9
B11	85.9	82.8	87.8	74.1	-0.05	-0.02	-0.19	0.88	110.3	214.6	228.8	212.1	226.2	50.1	51.9
B12	87.9	84.7	88.7	75.5	0.27	0.24	-0.09	1.06	113.7	220.5	240.9	212.1	231.7	52.3	51.9
B13	85.2	82.2	87.4	73.9	0.52	0.49	-0.36	0.83	106.4	225.9	235.4	212.1	221.1	50.1	51.9
Avg.	86.6	83.6	87.9	74.8	0.08	0.09	-0.12	0.96	105.6	217.0	226.5	212.1	221.4	51.3	51.8
Std Dv	1.3	1.2	0.8	1.0	0.29	0.27	0.15	0.27	5.9	5.8	10.9	0.0	6.6	1.1	0.0
90% CI	1.0	1.0	0.7	0.8	0.24	0.22	0.13	0.22	4.9	4.8	8.9	0.0	5.4	0.9	0.0
500 FT. FLYOVER -- IAS 101.5 MPH.															
C14	84.8	81.9	86.7	73.7	0.23	0.21	-0.50	0.63	93.6	219.5	219.9	212.1	212.5	45.2	49.4
C15	86.1	82.8	87.5	74.0	-0.53	-0.48	-0.32	0.79	103.1	204.6	210.0	212.1	217.8	44.7	49.4
C16	84.3	81.4	86.8	73.1	-0.16	-0.17	-0.33	0.56	99.9	210.8	213.9	212.1	215.3	45.6	49.4
C17	86.3	83.1	87.9	74.6	-0.43	-0.48	-0.25	0.67	97.0	205.8	207.4	212.1	213.7	45.6	49.4
C18	84.7	81.7	87.0	74.0	-0.13	-0.14	-0.34	0.56	102.9	211.4	216.9	212.1	217.6	45.6	49.4
Avg.	85.3	82.2	87.2	73.9	-0.20	-0.21	-0.35	0.64	99.3	210.4	213.6	212.1	215.4	45.3	49.4
Std Dv	0.9	0.7	0.5	0.6	0.30	0.29	0.09	0.10	4.1	5.9	5.1	0.0	2.3	0.4	0.0
90% CI	0.9	0.7	0.5	0.5	0.28	0.27	0.09	0.09	3.9	5.6	4.8	0.0	2.2	0.4	0.0

*- Data Corrected Using 'Simplified Procedure'

TABLE C1-6

TABLE NO. J.2-3.3 (REV.2)

AEROSPATIALE SA-355F HELICOPTER (TWINSTAR)

DOT/TSC
3/12/86

CORRECTION DATA*

SITE: 3 SIDELINE - 150 M. NORTH JUNE 7,1983

Ev	CORRECTED EPNL	SEL	PNLTm	ALm	CORRECTIONS (dB) /\1(P)	/\1(A)	/\2	/\3	ACOUSTIC ANGLE (Deg)	TRACKING DATA (Meters) (ACTUAL) CPA	SR	(REFERENCE) CPAR	SRR	SPEED(m/sec) GRND	REF
TAKEOFF -- TARGET IAS 63 MPH. (SEE TEXT)															
038	87.2	84.6	86.7	74.2	-1.85	-1.80	1.02	-	107.4	201.3	211.0	239.4	250.9	31.3	28.2
039	87.2	84.9	87.1	74.0	-1.55	-1.65	0.94	-	91.9	206.1	206.2	239.4	239.5	31.3	28.2
040	87.3	84.8	86.6	74.1	-1.83	-1.82	1.09	-	99.7	201.0	203.9	239.4	242.9	31.7	28.2
041	87.1	84.7	87.7	74.8	-1.37	-1.41	0.48	-	128.3	210.7	268.4	239.4	304.9	28.6	28.2
Avg.	87.2	84.7	87.0	74.3	-1.65	-1.67	0.88	-	106.8	204.8	222.4	239.4	259.5	30.7	28.2
Std Dv	0.1	0.1	0.5	0.4	0.23	0.19	0.28	-	15.6	4.6	30.8	0.0	30.6	1.4	0.0
90% CI	0.1	0.1	0.6	0.4	0.27	0.22	0.32	-	18.4	5.4	36.2	0.0	36.0	1.7	0.0
9 DEGREE APPROACH -- TARGET IAS 63 MPH.															
H34	93.2	90.5	95.6	82.2	0.10	0.04	0.55	-	82.5	193.1	194.7	191.2	192.8	32.2	28.2
H35	92.3	89.8	93.3	79.6	0.20	0.15	0.75	-	81.2	195.1	197.4	191.2	193.4	33.9	28.2
H36	93.3	90.3	95.7	81.8	0.08	0.01	0.56	-	92.5	192.4	192.6	191.2	191.4	32.2	28.2
H37	93.6	90.6	94.7	82.4	0.12	0.03	0.84	-	102.2	193.2	197.7	191.2	195.6	34.4	28.2
Avg.	93.1	90.3	94.8	81.5	0.12	0.06	0.67	-	89.6	193.4	195.6	191.2	193.3	33.2	28.2
Std Dv	0.6	0.4	1.1	1.3	0.05	0.06	0.14	-	9.8	1.2	2.4	0.0	1.8	1.2	0.0
90% CI	0.7	0.4	1.3	1.5	0.06	0.07	0.17	-	11.5	1.4	2.9	0.0	2.1	1.4	0.0
500 FT. FLYOVER -- TARGET IAS 145 MPH.															
M49	94.2	90.5	96.6	83.0	0.00	-0.17	0.12	3.77	129.6	210.3	273.1	212.1	275.5	66.1	64.8
M50	88.8	85.4	91.2	78.1	-0.11	-0.21	-0.04	1.38	126.6	208.8	260.2	212.1	264.4	63.5	64.8
M51	95.6	92.6	97.7	84.7	-0.09	-0.26	-0.22	6.26	131.1	208.4	276.7	212.1	281.7	60.8	64.8
M52	88.8	85.6	90.8	78.4	0.18	0.03	-0.08	1.35	126.2	213.8	265.1	212.1	263.0	63.9	64.8
M53	94.4	91.1	96.1	83.1	0.11	-0.07	-0.14	5.66	95.0	211.7	212.5	212.1	212.9	62.6	64.8
Avg.	92.3	89.0	94.5	81.5	0.02	-0.14	-0.07	3.68	121.7	210.6	257.5	212.1	259.5	63.4	64.8
Std Dv	3.3	3.3	3.2	3.0	0.13	0.12	0.13	2.31	15.1	2.2	26.0	0.0	27.2	2.0	0.0
90% CI	3.1	3.2	3.1	2.9	0.12	0.11	0.12	2.20	14.4	2.1	24.8	0.0	25.9	1.9	0.0
500 FT. FLYOVER -- TARGET IAS 86 MPH.															
M54										NO TRACKING DATA					
M55	85.4	82.3	86.3	73.2	-0.03	-0.21	0.16	1.08	122.8	208.6	248.0	212.1	252.7	39.4	38.4
M56	86.1	83.1	85.7	72.8	0.12	-0.05	0.19	-0.08	93.2	212.8	213.1	212.1	212.5	40.2	38.4
Avg.	85.8	82.7	86.0	73.0	0.04	-0.13	0.18	0.50	108.0	210.7	230.6	212.1	232.4	39.8	38.4
Std Dv	0.5	0.6	0.4	0.3	0.11	0.11	0.02	0.82	20.9	3.0	24.7	0.0	28.1	0.6	0.0
90% CI	2.3	2.6	1.8	1.2	0.47	0.51	0.09	3.66	93.2	13.4	110.1	0.0	125.6	2.8	0.0

*- Data Corrected Using "Simplified Procedure"

TABLE C2-1

ADV. MACH FOR TARGET CONDITIONS ANAL. DATE: 10-Mar-86

AEROSPATIALE AS 355F TWINSTAR
ADV. MACH SERIES REFERENCE NUMBERS

TEMPERATURE 59 degrees F (15 degrees C)

SERIES	IAS	TEMP (F)	ROTOR RPM	BLADE DIAM.	ADVM #
A	113.00	59.00	394.00	35.07	0.8190
B	100.00	59.00	394.00	35.07	0.7994
C	88.00	59.00	394.00	35.07	0.7812
M	125.00	59.00	394.00	35.07	0.8372
N	74.00	59.00	394.00	35.07	0.7600

TEMPERATURE 77 degrees F (25 degrees C)

SERIES	IAS	TEMP (F)	ROTOR RPM	BLADE DIAM.	ADVM #
A	113.00	77.00	394.00	35.07	0.8052
B	100.00	77.00	394.00	35.07	0.7859
C	88.00	77.00	394.00	35.07	0.7680
M	125.00	77.00	394.00	35.07	0.8230
N	74.00	77.00	394.00	35.07	0.7472

TARGET CONDITIONS

SERIES	DESCRIPTION
A	500 FT. LFO IAS = 113 KTS.
B	500 FT. LFO IAS = 100 KTS.
C	500 FT. LFO IAS = 88 KTS.
M	500 FT. LFO IAS = 125 KTS.
N	500 FT. LFO IAS = 74 KTS.

* 394.00 RPM = 100% ROTOR SPEED

TABLE C2-2

ACTUAL TEST CONDITIONS ANAL. DATE: 10-Mar-86

AEROSPATIALE AS 355F TWINSTAR

EVENT	IAS	TEMP (F)	ROTOR RPM	BLADE DIAM.	ADVM #
A1	114.63	65.00	390.00	35.07	0.8103
A2	114.63	65.00	390.00	35.07	0.8103
A3	114.63	65.00	390.00	35.07	0.8103
A4	116.37	66.00	390.00	35.07	0.8121
A5	116.37	66.00	390.00	35.07	0.8121
A6	115.50	66.00	390.00	35.07	0.8108
B8	102.47	66.00	390.00	35.07	0.7912
B9	99.87	66.00	390.00	35.07	0.7873
B10	99.00	66.00	390.00	35.07	0.7860
B11	97.26	66.00	390.00	35.07	0.7834
B12	101.60	66.00	390.00	35.07	0.7899
B13	97.26	66.00	390.00	35.07	0.7834
C14	87.71	66.00	390.00	35.07	0.7690
C15	86.84	66.00	390.00	35.07	0.7677
C16	88.58	66.00	390.00	35.07	0.7703
C17	88.58	66.00	390.00	35.07	0.7703
C18	88.58	66.00	390.00	35.07	0.7703
M49	128.52	71.00	385.00	35.07	0.8183
M50	123.31	71.00	385.00	35.07	0.8105
M51	118.10	72.00	385.00	35.07	0.8020
M52	124.18	72.00	385.00	35.07	0.8111
M53	121.58	73.00	385.00	35.07	0.8064
N54	69.47	72.00	385.00	35.07	0.7293
N55	76.42	73.00	385.00	35.07	0.7390
N56	78.16	73.00	385.00	35.07	0.7416

TABLE C2-3

ACTUAL TEST NOISE DATA
ANAL. DATE: 10-Mar-86

AEROSPATIALE AS 355F TWINSTAR

EVENT	TEST ALT	---- AS MEAS. PNLTM ---- LEFT	CENTER	RIGHT	-- PNLTM 492 FOOT NORM. -- LEFT	CENTER	RIGHT
A1	511.20	87.90	91.40	90.50	88.07	91.74	90.67
A2	459.50	88.40	92.10	89.60	88.11	91.50	89.31
A3	467.30	88.50	92.40	90.30	88.28	91.95	90.08
A4	478.80	88.80	91.90	89.90	88.68	91.66	89.78
A5	510.00	88.00	91.10	90.70	88.16	91.42	90.86
A6	479.00	89.60	92.10	89.30	89.48	91.86	89.18
B8	479.90	87.10	89.80	87.60	86.99	89.58	87.49
B9	519.80	86.00	90.20	88.50	86.25	90.68	88.75
B10	497.80	86.40	89.20	87.50	86.45	89.30	87.55
B11	503.70	87.00	89.20	87.70	87.10	89.41	87.80
B12	530.60	87.10	88.80	87.30	87.44	89.46	87.64
B13	554.40	86.00	88.80	87.30	86.56	89.85	87.86
C14	526.20	85.80	88.80	85.90	86.10	89.39	86.20
C15	456.70	86.90	89.60	87.20	86.59	88.95	86.89
C16	486.10	86.40	90.10	85.60	86.35	89.99	85.55
C17	462.70	87.20	89.30	87.70	86.94	88.76	87.44
C18	488.20	86.60	89.40	87.00	86.57	89.33	86.97
M49	483.70	89.50	91.80	92.80	89.43	91.65	92.73
M50	476.70	89.90	94.20	91.30	89.76	93.92	91.16
M51	474.70	89.50	92.60	91.50	89.35	92.29	91.35
M52	500.20	89.30	93.40	93.30	89.37	93.55	93.37
M53	490.30	89.20	93.10	90.40	89.18	93.07	90.38
N54	488.60	85.40	88.10	NA	85.37	88.04	NA
N55	475.70	85.20	89.50	87.50	85.05	89.20	87.35
N56	495.50	85.10	88.00	85.60	85.13	88.06	85.63

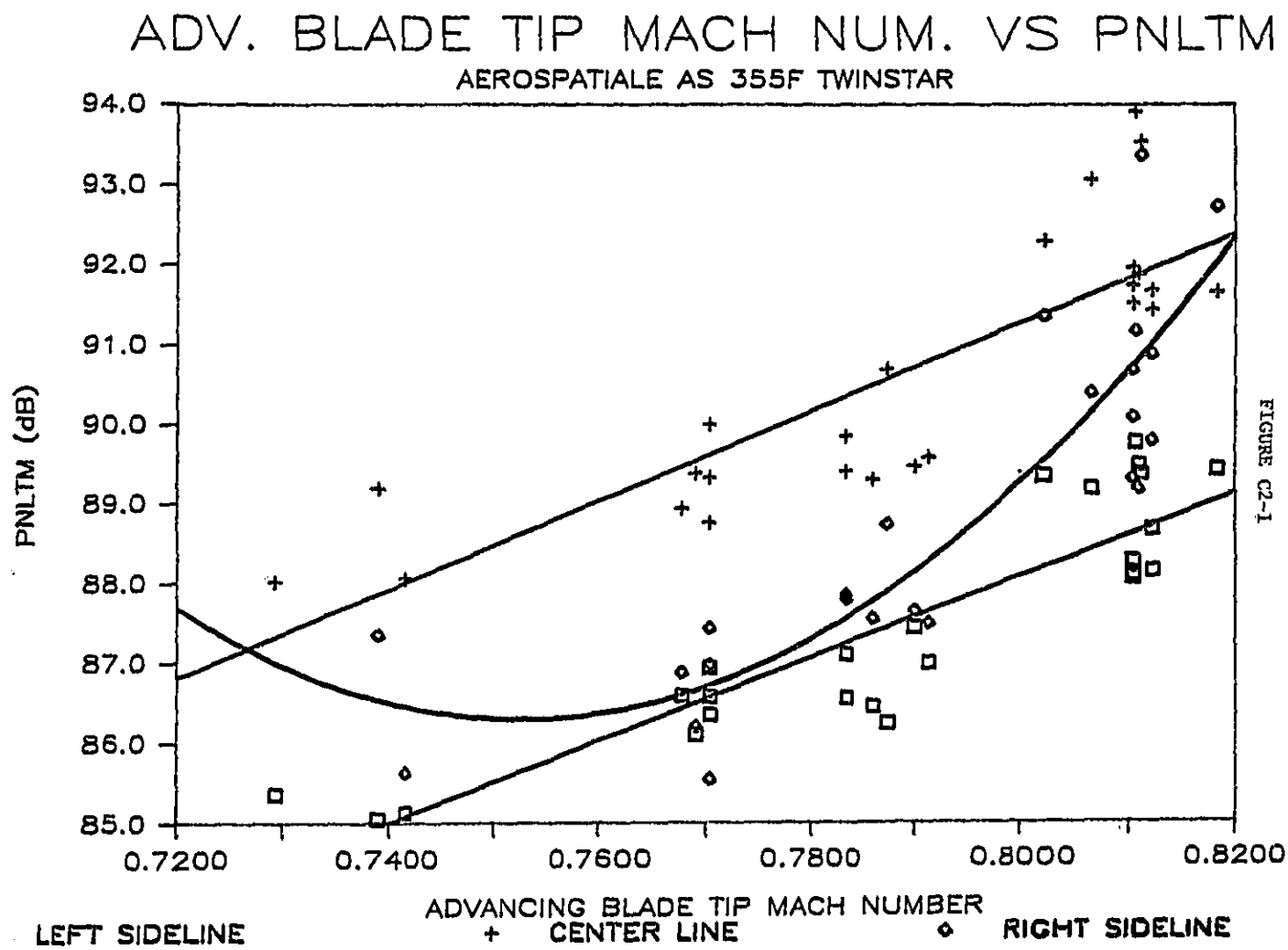

ADV. BLADE TIP MACH NUM. VS PNLTM
AEROSPATIALE AS 355F TWINSTAR
PNLTM (dB)
94.0
93.0
92.0
91.0
90.0
89.0
88.0
87.0
86.0
85.0
0.7200
0.7400
0.7600
0.7800
0.8000
0.8200
ADVANCING BLADE TIP MACH NUMBER
LEFT SIDELINE
+ CENTER LINE
◇ RIGHT SIDELINE

FIGURE C2-1

TABLE C2-4

AEROSPATIALE AS 355F TWINSTAR
LEFT SIDELINE

ANAL. DATE: 10-Mar-86

EVENT	X INPUT	Y INPUT
A1	0.8103	88.07
A2	0.8103	88.11
A3	0.8103	88.28
A4	0.8121	88.68
A5	0.8121	88.16
A6	0.8108	89.48
B8	0.7912	86.99
B9	0.7873	86.25
B10	0.7860	86.45
B11	0.7834	87.10
B12	0.7899	87.44
B13	0.7834	86.56
C14	0.7690	86.10
C15	0.7677	86.59
C16	0.7703	86.35
C17	0.7703	86.94
C18	0.7703	86.57
M49	0.8183	89.43
M50	0.8105	89.76
M51	0.8020	89.35
M52	0.8111	89.37
M53	0.8064	89.18
N54	0.7293	85.37
N55	0.7390	85.05
N56	0.7416	85.13

LINEAR REGRESSION EQUATION

Y =	SLOPE	* X +	INTERCEPT	
=	51.63		46.80	
R SQ. =	0.806	MEAN X =	0.7877	
R =	0.898	S.D. X =	0.0254	
STD.ERR =	0.657	MEAN Y =	87.47	
CORREL =	0.898	S.D. Y =	1.46	
SAMPLE =	25	TOT VAR =	2.13	

TABLE C2-5

LINEAR REGRESSION EQUATION

Y =	SLOPE	* X +	INTERCEPT		
=	51.63		46.80		
R SQ. =	0.806	MEAN X =	0.7877		
R =	0.898	S.D. X =	0.0254		
STD.ERR =	0.657	MEAN Y =	87.47		
CORREL =	0.898	S.D. Y =	1.46		
SAMPLE =	25	TOT VAR =	2.13		

SECOND ORDER EQUATION

Y =	A	+	B1	* X +	B2	*X'	
Y =	314.98	+	-638.74	* X +	443.78	*X'	
R SQ. =	0.718	MEAN X =	0.7877				
R =	0.847	S.D. X =	0.0254				
STD.ERR =	0.600	MEAN Y =	87.47				
SAMPLE =	25	S.D. Y =	1.46				

ADV. BLADE TIP MACH NUM. VS PNLTM

AEROSPATIALE AS 355F TWINSTAR

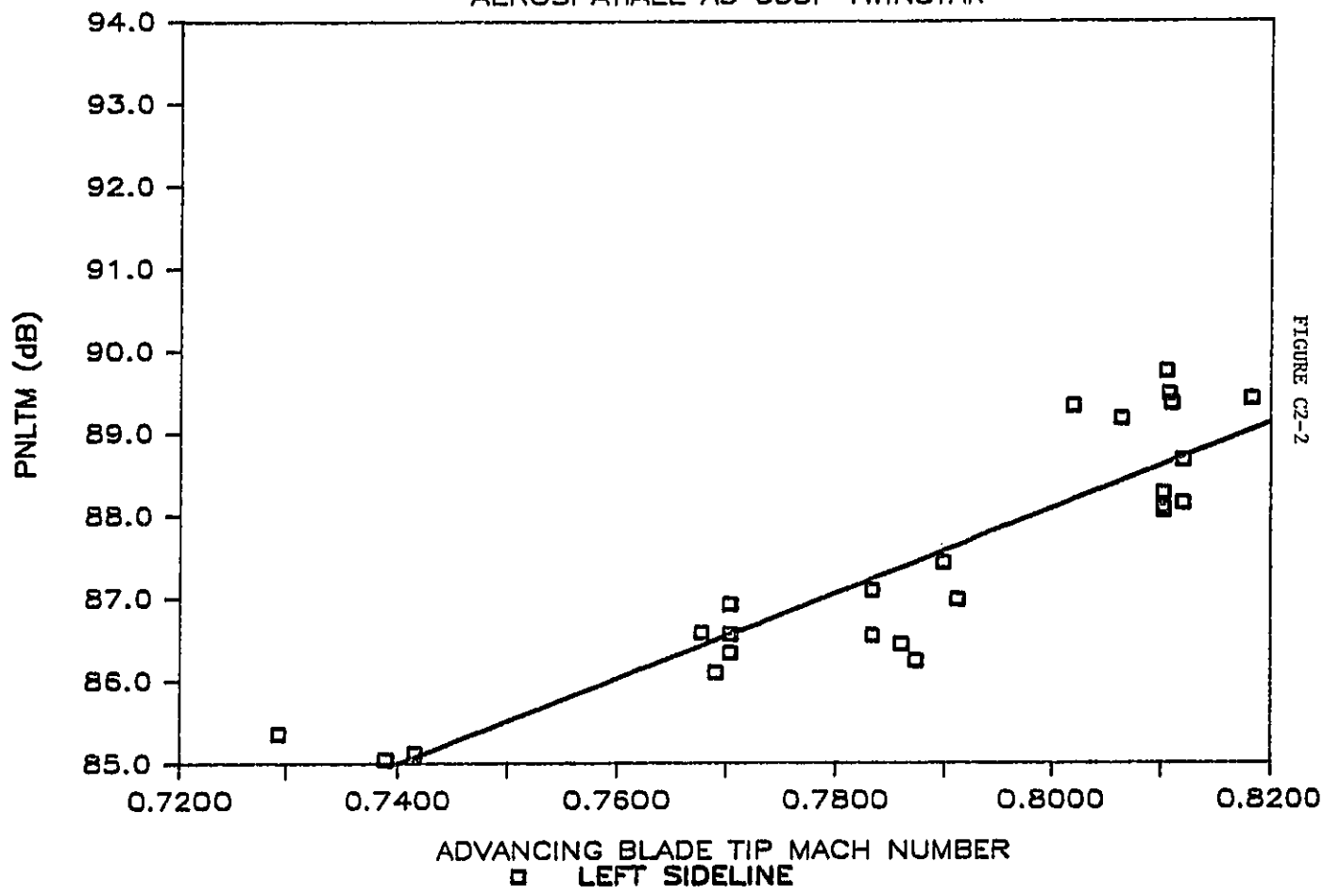


FIGURE C2-2

TABLE C2-6

AEROSPATIALE AS 355F TWINSTAR
CENTER LINE

ANAL. DATE: 10-Mar-86

EVENT	X INPUT	Y INPUT
A1	0.8103	91.74
A2	0.8103	91.50
A3	0.8103	91.95
A4	0.8121	91.66
A5	0.8121	91.42
A6	0.8108	91.86
B8	0.7912	89.58
B9	0.7873	90.68
B10	0.7860	89.30
B11	0.7834	89.41
B12	0.7899	89.46
B13	0.7834	89.85
C14	0.7690	89.39
C15	0.7677	88.95
C16	0.7703	89.99
C17	0.7703	88.76
C18	0.7703	89.33
M49	0.8183	91.65
M50	0.8105	93.92
M51	0.8020	92.29
M52	0.8111	93.55
M53	0.8064	93.07
N54	0.7293	88.04
N55	0.7390	89.20
N56	0.7416	88.06

LINEAR REGRESSION EQUATION

Y =	SLOPE	* X +	INTERCEPT
=	55.59		46.80

R SQ.	=	0.705	MEAN X =	0.7877
R	=	0.840	S.D. X =	0.0254
STD.ERR	=	0.930	MEAN Y =	90.58
CORREL	=	0.840	S.D. Y =	1.68
SAMPLE	=	25	TOT VAR =	2.82

TABLE C2-7

LINEAR REGRESSION EQUATION

Y =	SLOPE	* X	+	INTERCEPT	
=	55.59			46.80	

R SQ. =	0.705	MEAN X =	0.7877
R =	0.840	S.D. X =	0.0254
STD.ERR =	0.930	MEAN Y =	90.58
CORREL =	0.840	S.D. Y =	1.68
SAMPLE =	25	TOT VAR =	2.82

SECOND ORDER EQUATION

Y =	A	+	B1	* X	+	B2	*X'
Y =	433.95	+	-941.08	* X	+	640.68	*X'

R SQ. =	0.700	MEAN X =	0.7877
R =	0.836	S.D. X =	0.0254
STD.ERR =	0.846	MEAN Y =	90.58
SAMPLE =	25	S.D. Y =	1.68

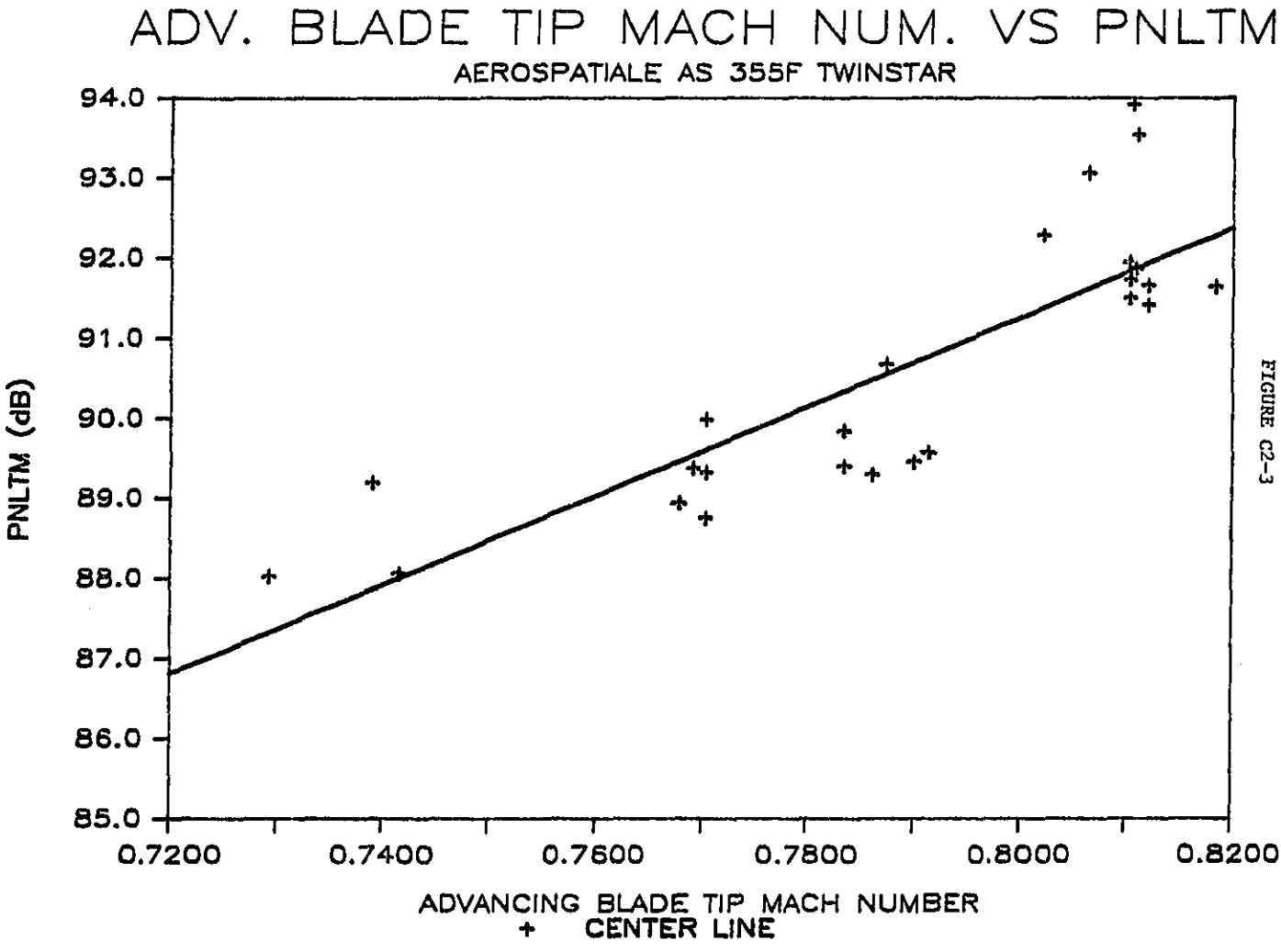

ADV. BLADE TIP MACH NUM. VS PNLTM
AEROSPATIALE AS 355F TWINSTAR
PNLTM (dB)
94.0
93.0
92.0
91.0
90.0
89.0
88.0
87.0
86.0
85.0
0.7200
0.7400
0.7600
0.7800
0.8000
0.8200
ADVANCING BLADE TIP MACH NUMBER
+ CENTER LINE

FIGURE C2-3

TABLE C2-8

AEROSPATIALE AS 355F TWINSTAR
RIGHT SIDELINE

ANAL. DATE: 10-Mar-86

EVENT	X INPUT	Y INPUT
A1	0.8103	90.67
A2	0.8103	89.31
A3	0.8103	90.08
A4	0.8121	89.78
A5	0.8121	90.86
A6	0.8108	89.18
B8	0.7912	87.49
B9	0.7873	88.75
B10	0.7860	87.55
B11	0.7834	87.80
B12	0.7899	87.64
B13	0.7834	87.86
C14	0.7690	86.20
C15	0.7677	86.89
C16	0.7703	85.55
C17	0.7703	87.44
C18	0.7703	86.97
M49	0.8183	92.73
M50	0.8105	91.16
M51	0.8020	91.35
M52	0.8111	93.37
M53	0.8064	90.38
N54	0.7293	NA
N55	0.7390	87.35
N56	0.7416	85.63

SECOND ORDER EQUATION

Y =	A	+	B1	* X	+	B2	*X'
Y =	836.11	+-	1992.93	* X	+	1324.26	*X'

R SQ. =	0.778	MEAN X =	0.7901
R =	0.882	S.D. X =	0.0227
STD.ERR =	1.030	MEAN Y =	88.83
SAMPLE =	24	S.D. Y =	2.15

TABLE C2-9

LINEAR REGRESSION EQUATION

Y =	SLOPE	* X +	INTERCEPT		
=	78.26		26.99		
R SQ.	=	0.683	MEAN X =	0.7901	
R	=	0.827	S.D. X =	0.0227	
STD.ERR	=	1.238	MEAN Y =	88.83	
CORREL	=	0.827	S.D. Y =	2.15	
SAMPLE	=	24	TOT VAR =	4.63	

SECOND ORDER EQUATION

Y =	A	+	B1	* X	+	B2	*X'
Y =	836.11	+-	1992.93	* X	+	1324.26	*X'
R SQ.	=	0.778	MEAN X =	0.7901			
R	=	0.882	S.D. X =	0.0227			
STD.ERR	=	1.030	MEAN Y =	88.83			
SAMPLE	=	24	S.D. Y =	2.15			

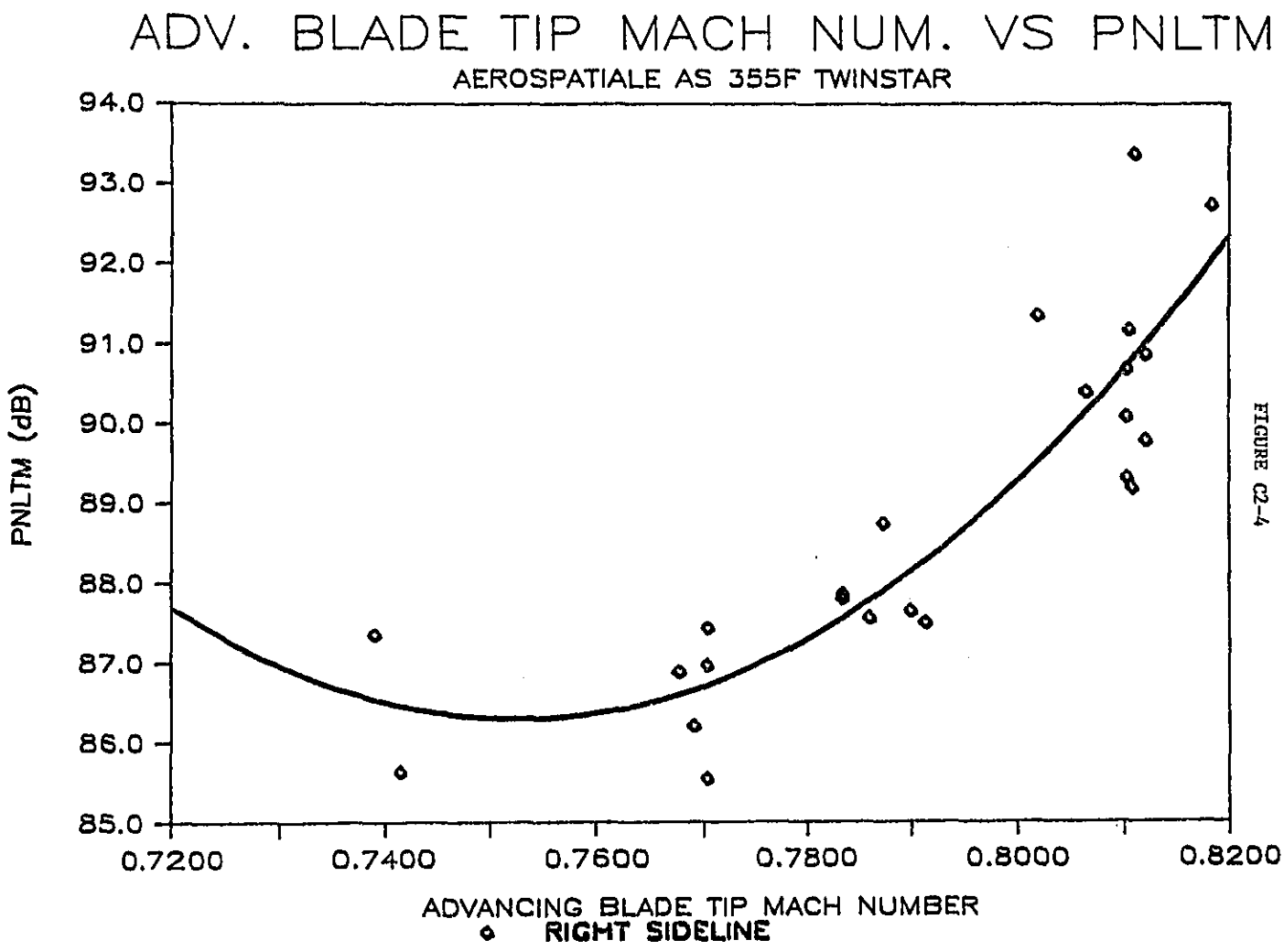

ADV. BLADE TIP MACH NUM. VS PNLTM
AEROSPATIALE AS 355F TWINSTAR
PNLTM (dB)
94.0
93.0
92.0
91.0
90.0
89.0
88.0
87.0
86.0
85.0
0.7200
0.7400
0.7600
0.7800
0.8000
0.8200
ADVANCING BLADE TIP MACH NUMBER
RIGHT SIDELINE

FIGURE C2-4

A: 10-Mar-86

TABLE C3-1

SUMMARY EPNL LEVELS (dB)
DATA PROCESSED PER ICAO CERTIFICATION PROCEDURES

HELICOPTER: AEROSPATIALE SA-355F TWINSTAR
OPERATION: ICAO TAKEOFF

EVENT NUMBER	LEFT SIDELINE	CENTER LINE CENTER	RIGHT SIDELINE	3 MIC AVERAGE
SITE	2	1	3	
E26	87.60	86.10	91.00	88.23
E27	87.90	86.70	88.30	87.63
E28	88.10	87.70	88.00	87.93
E29	87.80	86.80	88.50	87.70
E30	87.20	85.60	87.00	86.60
E31	87.60	85.90	90.20	87.90
E32	87.30	86.80	87.90	87.33
E33	87.60	86.90	87.70	87.40
AVERAGE	87.64	86.56	88.58	87.59
STD. DEV.	0.30	0.67	1.34	0.50
90% C.I.	0.20	0.45	0.90	0.33

TABLE C3-2

SUMMARY EPNL LEVELS (dB)
DATA PROCESSED PER ICAO CERTIFICATION PROCEDURES

HELICOPTER: AEROSPATIALE SA-355F TWINSTAR
OPERATION: ICAO LFO

EVENT NUMBER	LEFT SIDELINE	CENTER LINE CENTER	RIGHT SIDELINE	3 MIC AVERAGE
SITE	2/3	1	3/2	
A1	87.00	88.80	89.50	88.43
A2	87.30	89.20	89.30	88.60
A3	86.70	88.80	89.10	88.20
A4	87.90	89.40	89.20	88.83
A5	86.30	88.20	89.40	87.97
A6	88.30	89.10	89.20	88.87
AVERAGE	87.25	88.92	89.28	88.48
STD. DEV.	0.75	0.42	0.15	0.36
90% C.I.	0.62	0.35	0.12	0.29

A: 10-Mar-86

TABLE C3-3

SUMMARY EPNL LEVELS (dB)
DATA PROCESSED PER ICAO CERTIFICATION PROCEDURES

HELICOPTER: AEROSPATIALE SA-355F TWINSTAR
OPERATION: ICAO APPROACH

EVENT NUMBER	LEFT SIDELINE	CENTER LINE CENTER	RIGHT SIDELINE	3 MIC AVERAGE
SITE	3	1	2	
F42	92.00	93.70	89.00	91.57
F43	90.80	94.90	88.60	91.43
F44	93.50	94.10	88.50	92.03
F45	92.10	94.60	88.40	91.70
F46	92.50	94.60	88.70	91.93
F47	92.60	93.60	88.60	91.60
F48	92.30	93.90	88.70	91.63
AVERAGE	92.26	94.20	88.64	91.70
STD. DEV.	0.81	0.50	0.19	0.21
90% C.I.	0.59	0.37	0.14	0.16

APPENDIX D (D1-D3)

AEROSPATIALE SA 365N, DAUPHIN

TABLE D1-1

TABLE NO. J.1-1.1 (REV.1)

AEROSPATIALE SA-365N HELICOPTER (DAUPHIN)

DOT/TSC
2/3/86

CORRECTION DATA*

SITE: 1 CENTERLINE - CENTER JUNE 6,1983

	CORRECTED				CORRECTIONS (dB)				ACOUSTIC ANGLE	TRACKING DATA (Meters) (ACTUAL)		(REFERENCE)		SPEED(m/sec)	
Ev	EPNL	SEL	PNLTm	ALm	/\1(P)	/\1(A)	/\2	/\3	(Deg)	CPA	SR	CPAR	SRR	GRND	REF
6 DEGREE APPROACH -- TARGET IAS 75 KTS. (ICAO)															
F35										NO TRACKING DATA					
F36	94.4	90.6	97.4	82.9	-0.36	-0.33	0.10	-	112.3	115.9	125.2	119.3	129.0	38.6	38.6
F46	95.7	91.9	98.6	84.0	-1.08	-1.04	0.35	-	81.1	107.1	108.4	119.3	120.8	38.6	38.6
F47	95.6	92.0	98.4	84.6	-1.37	-1.33	0.46	-	101.1	103.5	105.4	119.3	121.6	38.6	38.6
F48	96.3	92.4	99.1	84.4	-1.07	-1.05	0.35	-	106.0	107.0	111.4	119.3	124.2	38.6	38.6
F49	96.4	92.2	98.7	84.0	-0.88	-0.87	0.30	-	106.8	108.9	113.7	119.3	124.6	38.6	38.6
F50	96.6	92.8	99.1	84.8	-0.75	-0.73	0.25	-	113.0	110.6	120.2	119.3	129.6	38.6	38.6
F51	96.0	92.5	99.9	86.4	-1.52	-1.45	0.51	-	120.3	102.0	118.2	119.3	138.2	38.6	38.6
Avg.	95.9	92.1	98.7	84.4	-1.00	-0.97	0.33	-	105.8	107.9	114.6	119.3	126.9	38.6	38.6
Std Dv	0.7	0.7	0.8	1.0	0.39	0.38	0.14	-	12.5	4.6	7.0	0.0	6.0	0.0	0.0
90% CI	0.6	0.5	0.6	0.8	0.29	0.28	0.10	-	9.2	3.4	5.1	0.0	4.4	0.0	0.0
TAKEOFF -- TARGET IAS 75 KTS. (ICAO)															
E26	96.3	91.3	99.1	83.6	-3.58	-3.50	1.09	-	78.6	89.6	91.4	125.2	127.7	38.6	38.6
E27	96.8	91.7	99.4	84.0	-2.10	-1.95	0.58	-	85.1	104.9	105.2	125.2	125.6	38.6	38.6
E28	97.1	91.8	100.6	85.0	-2.14	-2.01	0.60	-	92.2	104.1	104.2	125.2	125.3	38.6	38.6
E29	95.7	90.7	97.6	82.8	-2.33	-2.20	0.67	-	76.4	101.8	104.7	125.2	128.8	38.6	38.6
E30	96.7	91.0	99.9	83.8	-2.82	-2.66	0.81	-	88.8	97.5	97.6	125.2	125.2	38.6	38.6
E31	96.4	91.1	99.0	83.7	-2.21	-2.16	0.66	-	80.7	102.3	103.7	125.2	126.9	38.6	38.6
E32	96.0	90.8	97.9	82.7	-2.85	-2.75	0.86	-	98.2	96.1	97.1	125.2	126.5	38.6	38.6
E33	96.0	90.8	97.9	82.5	-3.34	-3.21	1.00	-	81.7	92.1	93.1	125.2	126.5	38.6	38.6
Avg.	96.4	91.1	98.9	83.5	-2.67	-2.55	0.78	-	85.2	98.5	99.6	125.2	126.6	38.6	38.6
Std Dv	0.5	0.4	1.1	0.8	0.57	0.58	0.19	-	7.4	5.7	5.6	0.0	1.2	0.0	0.0
90% CI	0.3	0.3	0.7	0.6	0.38	0.39	0.13	-	4.9	3.8	3.7	0.0	0.8	0.0	0.0

*- Data Corrected Using 'Simplified Procedure'

TABLE D1-2

TABLE NO. J.1-1.2 (REV.1)

AEROSPATIALE SA-365N HELICOPTER (DAUPHIN)

DOT/TSC
2/ 3/86

CORRECTION DATA*

SITE: 1 CENTERLINE - CENTER JUNE 6,1983

	CORRECTED				CORRECTIONS (dB)				ACOUSTIC ANGLE	TRACKING DATA (Meters) (ACTUAL)		(REFERENCE)		SPEED(m/sec)	
Ev	EPNL	SEL	PNLTm	ALm	/\1(P)	/\1(A)	/\2	/\3	(Deg)	CPA	SR	CPAR	SRR	GRND	REF
500 FT. FLYOVER -- TARGET IAS 135 KTS.															
A3										NO TRACKING DATA					
A4	92.7	87.5	95.4	80.8	-2.17	-2.04	0.05	1.08	91.1	126.2	126.2	150.0	150.0	61.7	69.4
A5	90.3	84.9	92.4	78.2	-0.80	-0.57	-0.02	0.61	122.4	146.5	173.6	150.0	177.6	67.9	69.4
A6	90.5	85.2	93.4	78.7	-0.08	-0.09	-0.17	0.61	103.8	153.2	157.7	150.0	154.4	67.9	69.4
A7	90.3	84.6	92.2	77.9	-0.70	-0.63	0.01	0.61	84.6	144.9	145.5	150.0	150.7	67.9	69.4
A8	90.1	84.8	92.7	78.2	-0.42	-0.33	-0.08	0.61	97.8	149.2	150.6	150.0	151.4	67.9	69.4
A9	89.6	84.4	91.9	78.0	-0.85	-0.50	-0.05	0.65	110.6	146.5	156.6	150.0	160.3	67.4	69.4
A10	89.5	84.5	92.4	77.9	-0.18	0.05	-0.27	0.69	109.5	154.9	164.4	150.0	159.2	66.9	69.4
Avg.	90.4	85.1	92.9	78.5	-0.74	-0.59	-0.08	0.69	102.8	145.9	153.5	150.0	157.7	66.8	69.4
Std Dv	1.1	1.1	1.2	1.0	0.70	0.69	0.11	0.17	12.8	9.4	15.1	0.0	9.7	2.3	0.0
90% CI	0.8	0.8	0.9	0.8	0.51	0.51	0.08	0.13	9.4	6.9	11.1	0.0	7.1	1.7	0.0
500 FT. FLYOVER -- TARGET IAS 120 KTS.															
B11	88.7	84.4	91.5	77.5	-0.61	-0.51	0.03	0.53	127.0	147.1	184.2	150.0	187.8	61.2	61.7
B12	89.1	84.2	91.2	77.1	-1.28	-1.14	0.13	0.65	103.5	137.6	141.5	150.0	154.3	59.7	61.7
B13	88.8	84.4	91.7	77.6	-0.57	-0.50	-0.08	0.67	123.4	147.1	176.2	150.0	179.7	59.7	61.7
B14	89.6	84.6	93.2	78.1	-1.36	-1.20	0.16	0.91	103.6	136.4	140.3	150.0	154.3	59.7	61.7
Avg.	89.1	84.4	91.9	77.6	-0.95	-0.84	0.06	0.69	114.4	142.1	160.6	150.0	169.0	60.1	61.7
Std Dv	0.4	0.1	0.9	0.4	0.42	0.38	0.11	0.16	12.6	5.8	22.9	0.0	17.3	0.8	0.0
90% CI	0.5	0.2	1.0	0.5	0.50	0.45	0.13	0.19	14.8	6.9	27.0	0.0	20.4	0.9	0.0
500 FT. FLYOVER -- TARGET IAS 105 KTS.															
C15	89.1	84.5	92.2	76.9	-0.17	-0.11	-0.22	0.90	100.7	152.2	154.9	150.0	152.7	52.0	54.0
C16	88.7	84.4	91.3	77.4	-0.62	-0.58	-0.10	0.94	101.1	145.0	147.7	150.0	152.9	51.4	54.0
C17	88.9	84.4	91.5	77.4	-0.47	-0.38	-0.17	0.94	100.9	147.9	150.6	150.0	152.7	51.4	54.0
C18	88.4	84.4	91.0	76.8	-0.24	-0.17	-0.24	0.94	105.4	151.2	156.9	150.0	155.6	51.4	54.0
C19	88.4	84.3	91.0	77.1	-1.18	-1.03	0.04	0.94	101.6	138.8	141.7	150.0	153.1	51.4	54.0
C20	88.6	84.4	91.2	77.0	-0.85	-0.73	-0.06	0.94	111.0	143.1	153.3	150.0	160.7	51.4	54.0
Avg.	88.7	84.4	91.4	77.1	-0.59	-0.50	-0.12	0.93	103.5	146.4	150.8	150.0	154.6	51.5	54.0
Std Dv	0.3	0.1	0.4	0.3	0.38	0.35	0.11	0.02	4.1	5.1	5.5	0.0	3.2	0.2	0.0
90% CI	0.2	0.1	0.4	0.2	0.31	0.29	0.09	0.01	3.4	4.2	4.5	0.0	2.6	0.2	0.0
1000 FT. FLYOVER -- TARGET IAS 135 KTS.															
D21	83.6	79.0	84.7	70.6	-1.20	-1.03	0.08	-	94.0	284.2	284.9	300.0	300.7	67.9	69.4
D22	83.8	79.5	83.9	70.7	0.04	0.16	-0.30	-	108.8	316.3	334.1	300.0	316.9	67.4	69.4
D23	83.7	79.5	86.2	72.4	-0.50	-0.33	-0.15	-	97.0	301.9	304.2	300.0	302.3	67.4	69.4
D24	84.0	79.4	84.3	70.3	-0.72	-0.61	-0.08	-	93.9	295.7	296.3	300.0	300.7	67.4	69.4
D25										NO TRACKING DATA					
Avg.	83.8	79.3	84.8	71.0	-0.59	-0.45	-0.11	-	98.4	299.5	304.9	300.0	305.2	67.5	69.4
Std Dv	0.2	0.2	1.0	1.0	0.51	0.50	0.16	-	7.1	13.4	21.0	0.0	7.9	0.3	0.0
90% CI	0.2	0.3	1.2	1.1	0.61	0.59	0.19	-	8.3	15.7	24.8	0.0	9.3	0.3	0.0

*- Data Corrected Using 'Simplified Procedure'

TABLE D1-3

TABLE NO. J.1-1.3 (REV.1)

AEROSPATIALE SA-365N HELICOPTER (DAUPHIN)

DOT/TSC
2/3/86

CORRECTION DATA*

SITE: 1 CENTERLINE - CENTER JUNE 6,1983

	CORRECTED				CORRECTIONS (dB)				ACOUSTIC ANGLE	TRACKING DATA (Meters) (ACTUAL)		(REFERENCE)		SPEED(m/sec)	
Ev	EPNL	SEL	PNLTm	ALm	/\1(P)	/\1(A)	/\2	/\3	(Deg)	CPA	SR	CPAR	SRR	GRND	REF
TAKEOFF -- TARGET IAS 75 KTS. (T/O FROM HOVER)															
NO TRACKING DATA															
TAKEOFF -- TARGET IAS 75 KTS. (T/O FROM GROUND)															
NO TRACKING DATA															
9 DEGREE APPROACH -- TARGET IAS 75 KTS.															
M52										NO TRACKING DATA					
M53	94.1	90.2	95.8	81.9	-0.40	-0.44	0.14	-	121.5	113.6	133.2	118.5	139.0	38.6	38.6
M54	94.7	91.1	97.0	82.9	-0.22	-0.24	0.08	-	81.3	115.6	116.9	118.5	119.9	38.6	38.6
M55	96.8	92.9	99.9	85.6	0.12	0.12	-0.04	-	95.0	120.1	120.5	118.5	119.0	38.6	38.6
M56	96.4	92.4	100.2	85.6	-0.37	-0.33	0.11	-	97.1	114.5	115.4	118.5	119.4	38.6	38.6
Avg.	95.5	91.6	98.2	84.0	-0.22	-0.22	0.07	-	98.7	115.9	121.5	118.5	124.3	38.6	38.6
Std Dv	1.3	1.2	2.2	1.9	0.24	0.24	0.08	-	16.7	2.9	8.1	0.0	9.8	0.0	0.0
90% CI	1.5	1.5	2.5	2.2	0.28	0.29	0.09	-	19.6	3.4	9.5	0.0	11.5	0.0	0.0

*- Data Corrected Using 'Simplified Procedure'

TABLE D1.-4

TABLE NO. J.1-2.1 (REV.1)

AEROSPATIALE SA-365N HELICOPTER (DAUPHIN)

CORRECTION DATA*

DOT/TSC
2/3/86

SITE: 2 SIDELINE - 150 M. SOUTH JUNE 6,1983

Ev	CORRECTED EPNL	SEL	PNLTm	ALm	CORRECTIONS (dB) /\1(P)	/\1(A)	/\2	/\3	ACOUSTIC ANGLE (Deg)	TRACKING DATA (Meters) (ACTUAL) CPA	SR	(REFERENCE) CPAR	SRR	SPEED(m/sec) GRND	REF
6 DEGREE APPROACH -- TARGET IAS 75 KTS. (ICAO)															
*** NO DATA ***															
TAKEOFF -- TARGET IAS 75 KTS. (ICAO)															
E26	94.4	89.6	94.6	80.4	-1.52	-1.37	0.37	-	75.9	174.3	179.7	195.4	201.4	38.6	38.6
E27	93.0	88.2	93.1	78.9	-1.14	-1.03	0.22	-	127.7	182.5	230.6	195.4	246.9	38.6	38.6
E28	93.5	88.8	93.4	78.8	-1.19	-1.04	0.23	-	128.2	182.1	231.8	195.4	248.7	38.6	38.6
E29	93.6	88.7	93.7	79.0	-1.21	-1.09	0.25	-	123.7	180.8	217.4	195.4	234.9	38.6	38.6
E30	93.8	88.9	93.4	78.9	-1.37	-1.21	0.29	-	125.5	178.5	219.3	195.4	240.1	38.6	38.6
E31	-	88.8	94.5	78.4	-1.53	-1.34	-	-	149.8	181.1	360.4	195.4	388.8	38.6	38.6
E32	93.8	89.1	93.6	79.2	-1.44	-1.30	0.31	-	125.6	177.7	218.5	195.4	240.2	38.6	38.6
E33	94.7	89.7	95.4	80.0	-1.64	-1.44	0.35	-	133.4	175.6	241.8	195.4	269.0	38.6	38.6
Avg.	93.8	89.0	93.9	79.2	-1.38	-1.23	0.29	-	123.7	179.1	237.4	195.4	258.7	38.6	38.6
Std Dv	0.6	0.5	0.8	0.7	0.18	0.16	0.06	-	21.1	3.1	53.0	0.0	55.8	0.0	0.0
90% CI	0.4	0.3	0.5	0.5	0.12	0.11	0.04	-	14.1	2.1	35.5	0.0	37.4	0.0	0.0

*- Data Corrected Using 'Simplified Procedure'

TABLE D1-5

TABLE NO. J.1-2.2 (REV.1)

AEROSPATIALE SA-365N HELICOPTER (DAUPHIN)

DOT/TSC
2/ 3/86

CORRECTION DATA*

SITE: 2 SIDELINE - 150 M. SOUTH JUNE 6,1983

	CORRECTED				CORRECTIONS (dB)				ACOUSTIC ANGLE	TRACKING DATA (Meters) (ACTUAL)		(REFERENCE)		SPEED(m/sec)	
Ev	EPNL	SEL	PNLTm	ALm	/\1(P)	/\1(A)	/\2	/\3	(Deg)	CPA	SR	CPAR	SRR	GRND	REF
500 FT. FLYOVER -- TARGET IAS 135 KTS.															
A3										ND TRACKING DATA					
A4	94.2	89.2	96.8	81.9	-1.45	-1.36	-0.25	2.20	124.4	195.5	236.8	212.1	257.0	61.7	69.4
A5	90.9	85.2	93.4	78.0	-0.68	-0.58	-0.05	1.37	125.3	209.1	256.3	212.1	260.0	67.9	69.4
A6	91.6	87.0	94.0	80.0	-0.37	-0.30	-0.12	1.24	117.3	213.8	240.6	212.1	238.7	67.9	69.4
A7	-	85.6	92.9	78.0	-0.72	-0.61	-	1.37	121.8	208.0	244.7	212.1	249.6	67.9	69.4
A8	91.7	87.1	94.0	80.2	-0.62	-0.41	-0.08	1.24	109.3	211.0	223.5	212.1	224.7	67.9	69.4
A9	-	85.3	93.0	77.7	-0.63	-0.67	-	1.46	117.6	209.1	236.0	212.1	239.4	67.4	69.4
A10	92.2	87.0	94.8	80.1	-0.27	-0.27	-0.21	1.40	112.7	215.0	233.0	212.1	229.9	66.9	69.4
Avg.	92.1	86.6	94.1	79.4	-0.68	-0.60	-0.14	1.47	118.3	208.8	238.7	212.1	242.8	66.8	69.4
Std Dv	1.3	1.4	1.4	1.6	0.38	0.37	0.09	0.33	6.0	6.4	10.2	0.0	13.3	2.3	0.0
90% CI	1.2	1.0	1.0	1.2	0.28	0.27	0.08	0.24	4.4	4.7	7.5	0.0	9.8	1.7	0.0
500 FT. FLYOVER -- TARGET IAS 120 KTS.															
B11	89.6	84.6	91.9	77.4	-0.58	-0.50	0.00	1.20	109.8	209.5	222.7	212.1	225.5	61.2	61.7
B12	89.6	85.3	91.5	77.5	-0.81	-0.79	0.00	1.32	82.5	203.0	204.7	212.1	214.0	59.7	61.7
B13	89.5	84.5	91.0	76.5	-0.67	-0.54	-0.11	1.50	118.1	209.5	237.6	212.1	240.5	59.7	61.7
B14	91.3	86.5	93.1	78.7	-1.02	-0.88	0.01	1.85	115.4	202.2	223.8	212.1	234.8	59.7	61.7
Avg.	90.0	85.2	91.9	77.5	-0.77	-0.68	-0.02	1.47	106.4	206.1	222.2	212.1	228.7	60.1	61.7
Std Dv	0.9	0.9	0.9	0.9	0.19	0.19	0.06	0.28	16.3	4.0	13.5	0.0	11.6	0.8	0.0
90% CI	1.0	1.1	1.1	1.0	0.23	0.22	0.07	0.33	19.2	4.7	15.8	0.0	13.7	0.9	0.0
500 FT. FLYOVER -- TARGET IAS 105 KTS.															
C15	88.6	84.1	89.7	75.1	-0.42	-0.37	-0.18	2.03	120.3	213.1	246.7	212.1	245.6	52.0	54.0
C16	90.2	86.1	92.0	77.8	-0.66	-0.57	-0.15	1.92	114.6	208.0	228.8	212.1	233.3	51.4	54.0
C17	89.4	84.6	90.3	76.0	-0.48	-0.42	-0.18	2.11	77.1	210.1	215.5	212.1	217.6	51.4	54.0
C18	89.9	85.5	90.9	76.9	-0.35	-0.36	-0.22	1.92	101.0	212.4	216.4	212.1	216.1	51.4	54.0
C19	88.9	84.1	89.8	75.6	-0.93	-0.87	-0.08	2.11	121.2	203.8	238.2	212.1	248.0	51.4	54.0
C20	89.5	85.4	91.0	77.0	-0.65	-0.58	-0.13	1.92	108.3	206.8	217.8	212.1	223.4	51.4	54.0
Avg.	89.4	85.0	90.6	76.4	-0.58	-0.53	-0.16	2.00	107.1	209.0	227.2	212.1	230.7	51.5	54.0
Std Dv	0.6	0.8	0.9	1.0	0.21	0.19	0.05	0.09	16.5	3.5	13.0	0.0	13.9	0.2	0.0
90% CI	0.5	0.7	0.7	0.8	0.17	0.16	0.04	0.08	13.6	2.9	10.7	0.0	11.4	0.2	0.0
1000 FT. FLYOVER -- TARGET IAS 135 KTS.															
D21	84.1	79.5	84.5	71.3	-0.91	-0.85	0.05	-	86.4	320.6	321.3	335.4	336.1	67.9	69.4
D22	85.2	81.0	86.4	73.1	-0.08	0.02	-0.26	-	107.1	349.3	365.4	335.4	350.9	67.4	69.4
D23	84.3	79.6	84.7	71.4	-0.38	-0.35	-0.14	-	87.7	336.4	336.7	335.4	335.7	67.4	69.4
D24	84.3	80.1	85.6	71.9	-0.74	-0.61	-0.09	-	113.4	330.8	360.5	335.4	365.5	67.4	69.4
D25										ND TRACKING DATA					
Avg.	84.5	80.1	85.3	71.9	-0.53	-0.45	-0.11	-	98.6	334.3	346.0	335.4	347.0	67.5	69.4
Std Dv	0.5	0.7	0.9	0.8	0.37	0.37	0.13	-	13.7	11.9	20.7	0.0	14.2	0.3	0.0
90% CI	0.6	0.8	1.0	1.0	0.44	0.44	0.15	-	16.1	14.1	24.3	0.0	16.7	0.3	0.0

*- Data Corrected Using 'Simplified Procedure'

TABLE D1-6

TABLE NO. J.1-2.3 (REV.1)

AEROSPATIALE SA-365N HELICOPTER (DAUPHIN) DOT/TSC 2/3/86

CORRECTION DATA*

SITE: 2 SIDELINE - 150 M. SOUTH JUNE 6,1983

	CORRECTED				CORRECTIONS (dB)				ACOUSTIC ANGLE	TRACKING DATA (Meters) (ACTUAL)		(REFERENCE)		SPEED(m/sec)	
Ev	EPNL	SEL	PNLTm	ALm	/\1(P)	/\1(A)	/\2	/\3	(Deg)	CPA	SR	CPAR	SRR	GRND	REF

TAKEOFF -- TARGET IAS 75 KTS. (T/O FROM HOVER)

*** NO DATA ***

TAKEOFF -- TARGET IAS 75 KTS. (T/O FROM GROUND)

*** NO DATA ***

9 DEGREE APPROACH -- TARGET IAS 75 KTS.

*** NO DATA ***

TABLE D1-7

TABLE NO. J.1-3.1 (REV.1)

AEROSPATIALE SA-365N HELICOPTER (DAUPHIN)

DOT/TSC
2/3/86

CORRECTION DATA*

SITE: 3 SIDELINE - 150 M. NORTH JUNE 6,1983

Ev	CORRECTED EPNL	CORRECTED SEL	CORRECTED PNLTm	CORRECTED ALm	CORRECTIONS (dB) /\1(P)	/\1(A)	/\2	/\3	ACOUSTIC ANGLE (Deg)	TRACKING DATA (Meters) (ACTUAL) CPA	SR	(REFERENCE) CPAR	SRR	SPEED(m/sec) GRND	REF
6 DEGREE APPROACH -- TARGET IAS 75 KTS. (ICAO)															
F35										NO TRACKING DATA					
F36	96.1	92.3	98.8	85.1	-0.12	-0.11	0.01	-	102.8	191.1	196.0	191.7	196.5	38.6	38.6
F46	96.6	93.1	98.6	84.7	-0.51	-0.46	0.09	-	125.5	186.7	229.4	191.7	235.5	38.6	38.6
F47	95.8	92.4	97.5	84.2	-0.45	-0.47	0.12	-	118.3	184.6	209.7	191.7	217.8	38.6	38.6
F48	95.4	92.1	96.5	83.1	-0.43	-0.36	0.09	-	106.3	186.7	194.5	191.7	199.7	38.6	38.6
F49	96.0	92.4	98.0	83.6	-0.28	-0.28	0.07	-	122.9	187.8	223.6	191.7	228.3	38.6	38.6
F50	94.2	90.9	95.9	82.0	-0.26	-0.25	0.05	-	106.6	188.8	196.9	191.7	200.0	38.6	38.6
F51	94.7	90.8	96.3	81.9	-0.65	-0.54	0.14	-	110.5	183.7	196.1	191.7	204.6	38.6	38.6
Avg.	95.6	92.0	97.4	83.5	-0.39	-0.35	0.08	-	113.3	187.1	206.6	191.7	211.9	38.6	38.6
Std Dv	0.8	0.9	1.2	1.2	0.18	0.15	0.04	-	8.9	2.5	14.6	0.0	15.5	0.0	0.0
90% CI	0.6	0.6	0.9	0.9	0.13	0.11	0.03	-	6.6	1.8	10.7	0.0	11.4	0.0	0.0
TAKEOFF -- TARGET IAS 75 KTS. (ICAO)															
E26	88.6	84.9	90.3	76.6	-1.36	-1.21	0.32	-	88.0	177.1	177.2	195.4	195.5	38.6	38.6
E27	87.4	83.1	88.2	73.7	-0.81	-0.81	0.17	-	99.7	185.6	188.4	195.4	198.2	38.6	38.6
E28	87.7	83.6	89.8	75.3	-0.90	-0.74	0.17	-	94.7	185.2	185.8	195.4	196.1	38.6	38.6
E29	87.8	83.5	89.1	74.6	-0.92	-0.86	0.20	-	91.6	183.9	183.9	195.4	195.5	38.6	38.6
E30	87.6	83.1	89.0	74.3	-0.95	-0.94	0.24	-	87.5	181.4	181.6	195.4	195.6	38.6	38.6
E31	87.6	83.7	88.6	74.4	-0.93	-0.82	0.19	-	100.5	184.2	187.3	195.4	198.7	38.6	38.6
E32	87.6	83.6	89.8	75.9	-1.28	-1.03	0.29	-	91.2	179.0	179.0	195.4	195.4	38.6	38.6
E33	87.9	83.8	89.9	76.0	-1.22	-1.12	0.30	-	93.4	178.4	178.7	195.4	195.7	38.6	38.6
Avg.	87.8	83.7	89.3	75.1	-1.05	-0.94	0.23	-	93.3	181.8	182.7	195.4	196.3	38.6	38.6
Std Dv	0.4	0.6	0.7	1.0	0.21	0.17	0.06	-	4.9	3.3	4.2	0.0	1.3	0.0	0.0
90% CI	0.2	0.4	0.5	0.7	0.14	0.11	0.04	-	3.3	2.2	2.8	0.0	0.9	0.0	0.0

*- Data Corrected Using 'Simplified Procedure'

TABLE D1-8

TABLE NO. J.1-3.2 (REV.1)

AEROSPATIALE SA-365N HELICOPTER (DAUPHIN)

DOT/TSC
2/ 3/86

CORRECTION DATA*

SITE: 3 SIDELINE - 150 M. NORTH JUNE 6,1983

	CORRECTED				CORRECTIONS (dB)				ACOUSTIC ANGLE	TRACKING DATA (Meters) (ACTUAL)		(REFERENCE)		SPEED(m/sec)	
Ev	EPNL	SEL	PNLTm	ALm	/\1(P)	/\1(A)	/\2	/\3	(Deg)	CPA	SR	CPAR	SRR	GRND	REF
500 FT. FLYOVER -- TARGET IAS 135 KTS.															
A3										NO TRACKING DATA					
A4	91.8	86.4	95.2	80.0	-1.36	-1.23	-0.27	2.42	99.7	196.8	199.6	212.1	215.2	61.7	69.4
A5	91.1	86.1	93.6	79.0	-0.57	-0.49	-0.07	1.24	117.7	210.5	237.7	212.1	239.6	67.9	69.4
A6	89.6	84.3	92.6	77.2	-0.32	-0.33	-0.14	1.37	124.5	215.2	261.1	212.1	257.3	67.9	69.4
A7	91.3	86.2	93.9	79.4	-0.62	-0.55	-0.05	1.24	121.7	209.3	246.0	212.1	249.2	67.9	69.4
A8	88.1	82.8	91.3	75.9	-0.48	-0.44	-0.10	0.03	128.2	212.4	270.3	212.1	270.0	67.9	69.4
A9	91.2	86.2	93.7	79.3	-0.55	-0.48	-0.11	1.32	117.5	210.5	237.3	212.1	239.2	67.4	69.4
A10	89.5	84.4	92.9	77.4	-0.26	-0.19	-0.23	1.54	120.4	216.4	250.8	212.1	245.9	66.9	69.4
Avg.	90.4	85.2	93.3	78.3	-0.59	-0.53	-0.14	1.31	118.5	210.2	243.3	212.1	245.2	66.8	69.4
Std Dv	1.3	1.4	1.2	1.5	0.36	0.33	0.08	0.70	9.1	6.5	22.7	0.0	17.1	2.3	0.0
90% CI	1.0	1.0	0.9	1.1	0.27	0.24	0.06	0.51	6.7	4.7	16.6	0.0	12.5	1.7	0.0
500 FT. FLYOVER -- TARGET IAS 120 KTS.															
B11	88.9	84.4	90.6	76.7	-0.50	-0.42	-0.02	1.09	105.8	210.9	219.1	212.1	220.4	61.2	61.7
B12	88.4	83.6	90.2	75.9	-0.94	-0.84	-0.02	1.46	125.4	204.3	250.7	212.1	260.3	59.7	61.7
B13	89.5	84.9	91.2	77.2	-0.49	-0.42	-0.13	1.37	110.8	210.9	225.6	212.1	226.9	59.7	61.7
B14	89.2	84.4	91.9	77.2	-1.02	-0.87	-0.01	2.03	125.5	203.5	250.0	212.1	260.6	59.7	61.7
Avg.	89.0	84.3	90.9	76.8	-0.74	-0.64	-0.04	1.49	116.9	207.4	236.4	212.1	242.1	60.1	61.7
Std Dv	0.5	0.5	0.7	0.6	0.28	0.25	0.06	0.39	10.1	4.0	16.4	0.0	21.4	0.8	0.0
90% CI	0.5	0.6	0.9	0.7	0.33	0.30	0.07	0.46	11.9	4.7	19.3	0.0	25.2	0.9	0.0
500 FT. FLYOVER -- TARGET IAS 105 KTS.															
C15	89.9	85.3	91.9	77.6	-0.30	-0.19	-0.20	1.84	94.0	214.5	215.0	212.1	212.6	52.0	54.0
C16	88.6	84.4	89.9	76.0	-0.69	-0.52	-0.16	2.11	101.2	209.0	213.0	212.1	216.2	51.4	54.0
C17	90.0	85.4	91.5	77.9	-0.32	-0.34	-0.20	1.92	101.2	211.4	215.5	212.1	216.2	51.4	54.0
C18										NO TRACKING DATA					
C19	89.7	85.2	91.3	77.6	-0.80	-0.70	-0.10	1.92	108.5	205.1	216.3	212.1	223.7	51.4	54.0
C20	89.4	85.1	91.0	76.9	-0.66	-0.55	-0.15	2.16	90.6	208.1	208.1	212.1	212.1	51.4	54.0
Avg.	89.5	85.1	91.1	77.2	-0.55	-0.46	-0.16	1.99	99.1	209.6	213.6	212.1	216.2	51.5	54.0
Std Dv	0.5	0.4	0.8	0.8	0.23	0.20	0.04	0.14	7.0	3.5	3.3	0.0	4.6	0.2	0.0
90% CI	0.5	0.4	0.7	0.7	0.22	0.19	0.04	0.13	6.7	3.4	3.1	0.0	4.4	0.2	0.0
1000 FT. FLYOVER -- TARGET IAS 135 KTS.															
D21	84.0	80.7	85.6	72.6	-1.19	-0.91	0.03	-	124.4	322.4	390.5	335.4	406.2	67.9	69.4
D22	84.9	80.9	86.8	74.1	0.08	0.11	-0.28	-	101.6	351.1	358.4	335.4	342.4	67.4	69.4
D23	85.2	81.1	86.3	72.6	-0.52	-0.34	-0.16	-	115.5	338.1	374.8	335.4	371.7	67.4	69.4
D24	84.7	80.3	84.7	71.6	-0.76	-0.53	-0.10	-	118.5	332.5	378.4	335.4	381.6	67.4	69.4
D25										NO TRACKING DATA					
Avg.	84.7	80.7	85.9	72.7	-0.60	-0.42	-0.13	-	115.0	336.0	375.5	335.4	375.5	67.5	69.4
Std Dv	0.5	0.3	0.9	1.0	0.53	0.42	0.13	-	9.6	12.0	13.2	0.0	26.4	0.3	0.0
90% CI	0.6	0.4	1.0	1.2	0.62	0.50	0.15	-	11.3	14.1	15.6	0.0	31.1	0.3	0.0

*- Data Corrected Using 'Simplified Procedure'

TABLE D1-9

TABLE NO. J.1-3.3 (REV.1)

AEROSPATIALE SA-365N HELICOPTER (DAUPHIN)

DOT/TSC
2/3/86

CORRECTION DATA*

SITE: 3 SIDELINE - 150 M. NORTH JUNE 6,1983

	CORRECTED				CORRECTIONS (dB).				ACOUSTIC ANGLE	TRACKING DATA (Meters) (ACTUAL)		(REFERENCE)		SPEED(m/sec)	
Ev	EPNL	SEL	PNLTm	ALm	/\1(P)	/\1(A)	/\2	/\3	(Deg)	CPA	SR	CPAR	SRR	GRND	REF

TAKEOFF -- TARGET IAS 75 KTS. (T/O FROM HOVER)

NO TRACKING DATA

TAKEOFF -- TARGET IAS 75 KTS. (T/O FROM GROUND)

NO TRACKING DATA

9 DEGREE APPROACH -- TARGET IAS 75 KTS.

H52										NO TRACKING DATA					
H53	93.5	90.0	94.8	81.1	-0.05	-0.09	0.02	-	113.4	190.2	207.1	191.2	208.2	38.6	38.6
H54	94.2	90.6	96.4	82.7	0.04	-0.02	0.00	-	123.3	191.4	228.9	191.2	228.7	38.6	38.6
H55	95.6	91.8	98.1	83.8	0.14	0.13	-0.05	-	100.4	194.2	197.4	191.2	194.3	38.6	38.6
H56	95.6	91.9	98.1	83.8	-0.03	-0.06	0.01	-	109.3	190.7	202.2	191.2	202.6	38.6	38.6
Avg.	94.7	91.1	96.8	82.8	0.02	-0.01	-0.00	-	111.6	191.6	208.9	191.2	208.5	38.6	38.6
Std Dv	1.0	0.9	1.6	1.3	0.09	0.10	0.03	-	9.5	1.8	13.9	0.0	14.6	0.0	0.0
90% CI	1.2	1.1	1.9	1.5	0.10	0.11	0.04	-	11.2	2.1	16.4	0.0	17.2	0.0	0.0

*- Data Corrected Using 'Simplified Procedure'

TABLE D2-1

ADV. MACH FOR TARGET CONDITIONS ANAL. DATE: 11-Mar-86

AEROSPATIALE SA 365N DAUPHIN 2
ADV. MACH SERIES REFERENCE NUMBERS

TEMPERATURE 59 degrees F (15 degrees C)

SERIES	IAS	TEMP (F)	ROTOR RPM	BLADE DIAM.	ADVM #
A	135.00	59.00	365.00	39.17	0.8748
B	120.00	59.00	365.00	39.17	0.8521
C	105.00	59.00	365.00	39.17	0.8294

TEMPERATURE 77 degrees F (25 degrees C)

SERIES	IAS	TEMP (F)	ROTOR RPM	BLADE DIAM.	ADVM #
A	135.00	77.00	365.00	39.17	0.8600
B	120.00	77.00	365.00	39.17	0.8377
C	105.00	77.00	365.00	39.17	0.8154

TARGET CONDITIONS

SERIES	DESCRIPTION
A	500 FT. LFO IAS = 135 KTS.
B	500 FT. LFO IAS = 120 KTS.
C	500 FT. LFO IAS = 105 KTS.

* 365.00 RPM = 100% ROTOR SPEED

TABLE D2-2

ACTUAL TEST CONDITIONS ANAL. DATE: 11-Mar-86

AEROSPATIALE SA 365N DAUPHIN 2

EVENT	IAS	TEMP (F)	ROTOR RPM	BLADE DIAM.	ADVM #
A1	135.00	60.00	355.00	39.17	0.8556
A2	130.00	60.00	355.00	39.17	0.8481
A3	132.00	60.00	355.00	39.17	0.8511
A4	120.00	60.00	355.00	39.17	0.8329
A5	132.00	60.00	355.00	39.17	0.8511
A6	132.00	60.00	355.00	39.17	0.8511
A7	132.00	60.00	355.00	39.17	0.8511
A8	132.00	60.00	355.00	39.17	0.8511
A9	131.00	60.00	355.00	39.17	0.8496
A10	130.00	60.00	355.00	39.17	0.8481
B11	119.00	60.00	355.00	39.17	0.8314
B12	116.00	60.00	355.00	39.17	0.8269
B13	116.00	61.00	355.00	39.17	0.8261
B14	116.00	61.00	350.00	39.17	0.8169
C15	101.00	61.00	350.00	39.17	0.7943
C16	100.00	61.00	350.00	39.17	0.7928
C17	100.00	61.00	350.00	39.17	0.7928
C18	100.00	61.00	350.00	39.17	0.7928
C19	100.00	61.00	350.00	39.17	0.7928
C20	100.00	61.00	350.00	39.17	0.7928

TABLE D2-3

ACTUAL TEST NOISE DATA
ANAL. DATE: 11-Mar-86

AEROSPATTALE SA 365N DAUPHIN 2

EVENT	TEST ALT	---- AS MEAS. PNLTM ---- LEFT	CENTER	RIGHT	-- PNLTM 492 FOOT NORM. -- LEFT	CENTER	RIGHT
A1	NA	NA	NA	NA	NA	NA	NA
A2	NA	NA	NA	NA	NA	NA	NA
A3	420.00	92.90	93.60	94.40	92.15	91.98	93.65
A4	423.00	NA	NA	94.10	NA	NA	93.38
A5	484.80	92.90	92.60	92.70	92.83	92.45	92.63
A6	506.60	93.10	92.90	91.60	93.25	93.20	91.75
A7	479.40	93.30	92.30	92.30	93.17	92.03	92.17
A8	496.30	93.40	92.60	91.70	93.44	92.69	91.74
A9	484.80	93.00	92.10	92.20	92.93	91.95	92.13
A10	505.40	93.70	91.90	91.60	93.84	92.18	91.74
B11	486.60	90.00	91.60	91.30	89.94	91.49	91.24
B12	459.90	91.00	91.90	89.60	90.67	91.21	89.27
B13	486.60	90.30	91.60	90.10	90.24	91.49	90.04
B14	445.10	92.30	93.60	90.80	91.81	92.57	90.31
C15	503.30	90.30	91.40	88.10	90.42	91.63	88.22
C16	476.00	90.70	91.00	88.40	90.53	90.66	88.23
C17	489.20	89.90	91.10	88.70	89.87	91.04	88.67
C18	489.60	89.30	90.30	91.40	89.28	90.25	91.38
C19	459.30	90.20	91.20	88.60	89.86	90.50	88.26
C20	475.00	89.80	91.20	89.50	89.62	90.84	89.32

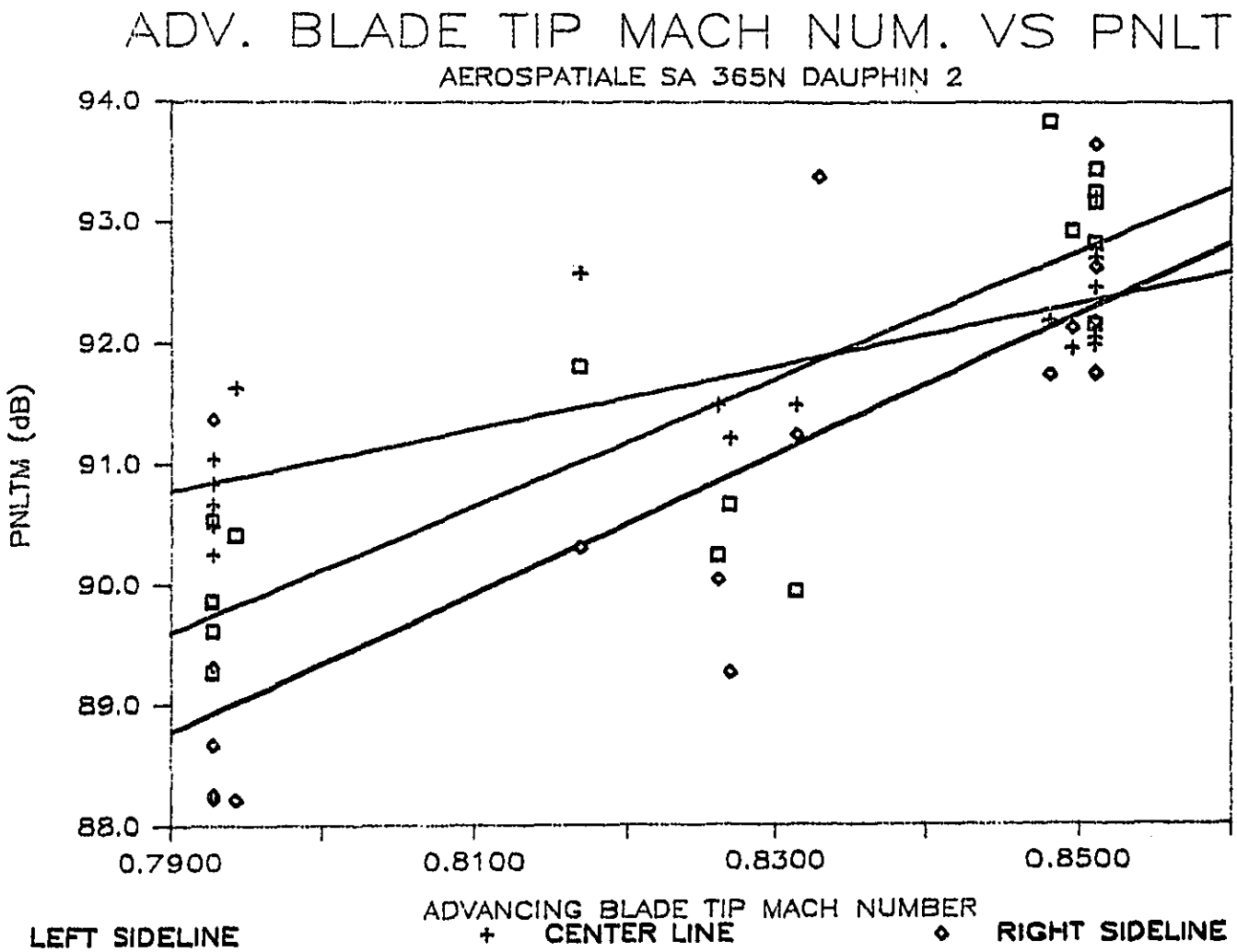

ADV. BLADE TIP MACH NUM. VS PNLTM
AEROSPATIALE SA 365N DAUPHIN 2
94.0
93.0
92.0
91.0
90.0
89.0
88.0
PNLTM (dB)
0.7900
0.8100
0.8300
0.8500
ADVANCING BLADE TIP MACH NUMBER
LEFT SIDELINE
CENTER LINE
RIGHT SIDELINE

FIGURE D2-1

TABLE D2-4

AEROSPATIALE SA 365N DAUPHIN 2
LEFT SIDELINE

ANAL. DATE: 11-Mar-86

EVENT	X INPUT	Y INPUT
A1	0.8556	NA
A2	0.8481	NA
A3	0.8511	92.15
A4	0.8329	NA
A5	0.8511	92.83
A6	0.8511	93.25
A7	0.8511	93.17
A8	0.8511	93.44
A9	0.8496	92.93
A10	0.8481	93.84
B11	0.8314	89.94
B12	0.8269	90.67
B13	0.8261	90.24
B14	0.8169	91.81
C15	0.7943	90.42
C16	0.7928	90.53
C17	0.7928	89.87
C18	0.7928	89.28
C19	0.7928	89.86
C20	0.7928	89.62

LINEAR REGRESSION EQUATION

Y =	SLOPE	* X +	INTERCEPT	
=	52.51		48.12	
R SQ. =	0.745	MEAN X =	0.8243	
R =	0.863	S.D. X =	0.0260	
STD.ERR =	0.824	MEAN Y =	91.40	
CORREL =	0.863	S.D. Y =	1.58	
SAMPLE =	17	TOT VAR =	2.49	

TABLE D2-5

LINEAR REGRESSION EQUATION

Y =	SLOPE	* X +	INTERCEPT		
=	52.51		48.12		
R SQ.	=	0.745	MEAN X =	0.8243	
R	=	0.863	S.D. X =	0.0260	
STD.ERR	=	0.824	MEAN Y =	91.40	
CORREL	=	0.863	S.D. Y =	1.58	
SAMPLE	=	17	TOT VAR =	2.49	

SECOND ORDER EQUATION

Y =	A	+	B1	* X +	B2		*X'
Y =	837.09	+	-1869.82	* X +	1169.83		*X'
R SQ.	=	0.705	MEAN X =	0.8243			
R	=	0.840	S.D. X =	0.0260			
STD.ERR	=	0.735	MEAN Y =	91.40			
SAMPLE	=	17	S.D. Y =	1.58			

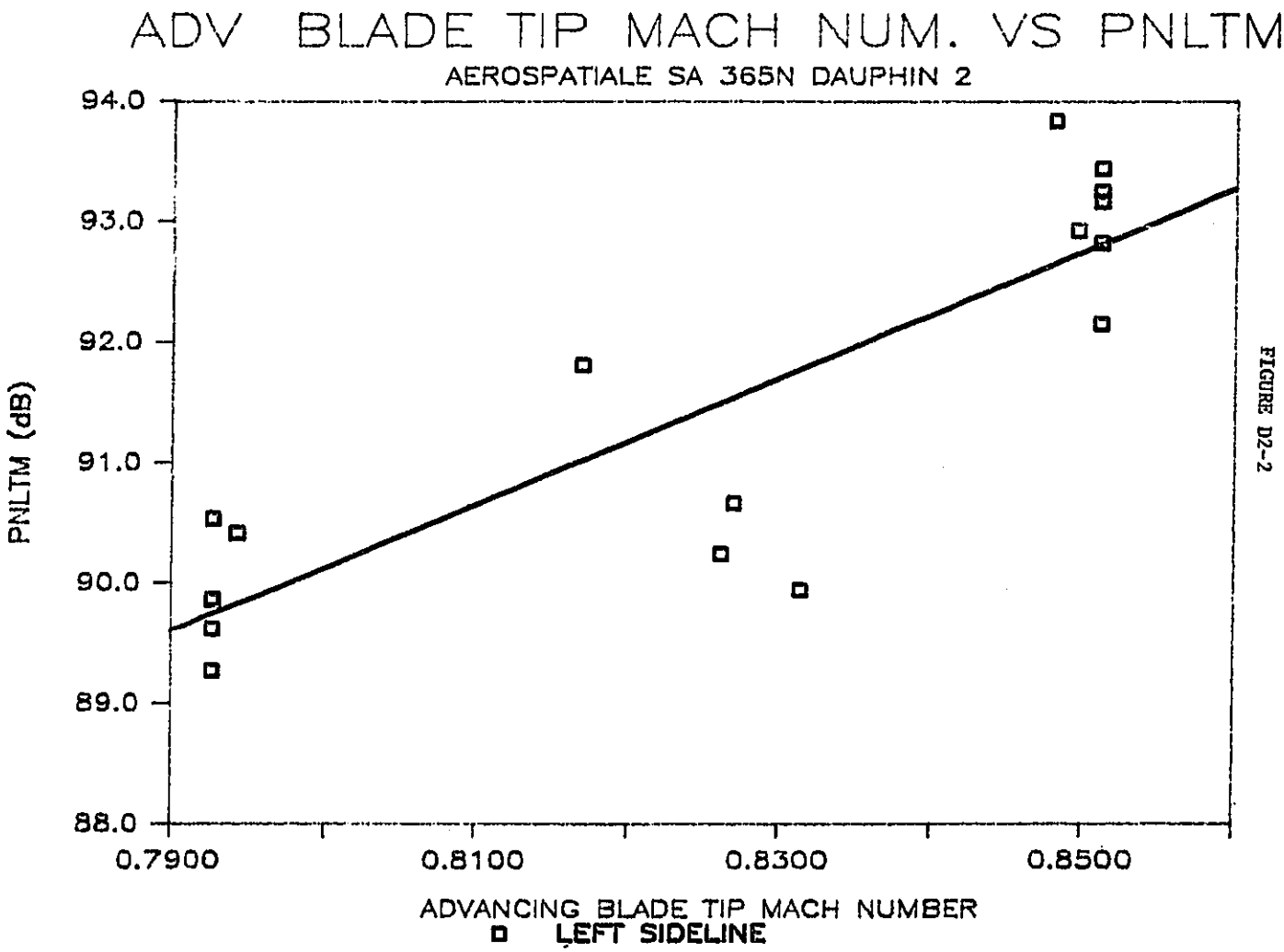

ADV BLADE TIP MACH NUM. VS PNLTM
AEROSPATIALE SA 365N DAUPHIN 2
94.0
93.0
92.0
91.0
90.0
89.0
88.0
PNLTM (dB)
0.7900
0.8100
0.8300
0.8500
ADVANCING BLADE TIP MACH NUMBER
LEFT SIDELINE

FIGURE D2-2

TABLE D2-6

AEROSPATIALE SA 365N DAUPHIN 2
CENTER LINE

ANAL. DATE: 11-Mar-86

EVENT	X INPUT	Y INPUT
A1	0.8556	NA
A2	0.8481	NA
A3	0.8511	91.98
A4	0.8329	NA
A5	0.8511	92.45
A6	0.8511	93.20
A7	0.8511	92.03
A8	0.8511	92.69
A9	0.8496	91.95
A10	0.8481	92.18
B11	0.8314	91.49
B12	0.8269	91.21
B13	0.8261	91.49
B14	0.8169	92.57
C15	0.7943	91.63
C16	0.7928	90.66
C17	0.7928	91.04
C18	0.7928	90.25
C19	0.7928	90.50
C20	0.7928	90.84

LINEAR REGRESSION EQUATION

Y =	SLOPE	* X +	INTERCEPT	
=	25.75		70.43	

R SQ. =	0.641	MEAN X =	0.8243
R =	0.801	S.D. X =	0.0260
STD.ERR =	0.516	MEAN Y =	91.66
CORREL =	0.801	S.D. Y =	0.83
SAMPLE =	17	TOT VAR =	0.70

TABLE D2-7

LINEAR REGRESSION EQUATION

Y =	SLOPE	* X +	INTERCEPT		
=	25.75		70.43		
R SQ. =	0.641	MEAN X =	0.8243		
R =	0.801	S.D. X =	0.0260		
STD.ERR =	0.516	MEAN Y =	91.66		
CORREL =	0.801	S.D. Y =	0.83		
SAMPLE =	17	TOT VAR =	0.70		

SECOND ORDER EQUATION

Y =	A	+	B1	* X +	B2		*X'
Y =	50.40	+	74.57	* X +	-29.71		*X'
R SQ. =	0.233	MEAN X =	0.8243				
R =	0.482	S.D. X =	0.0260				
STD.ERR =	0.534	MEAN Y =	91.66				
SAMPLE =	17	S.D. Y =	0.83				

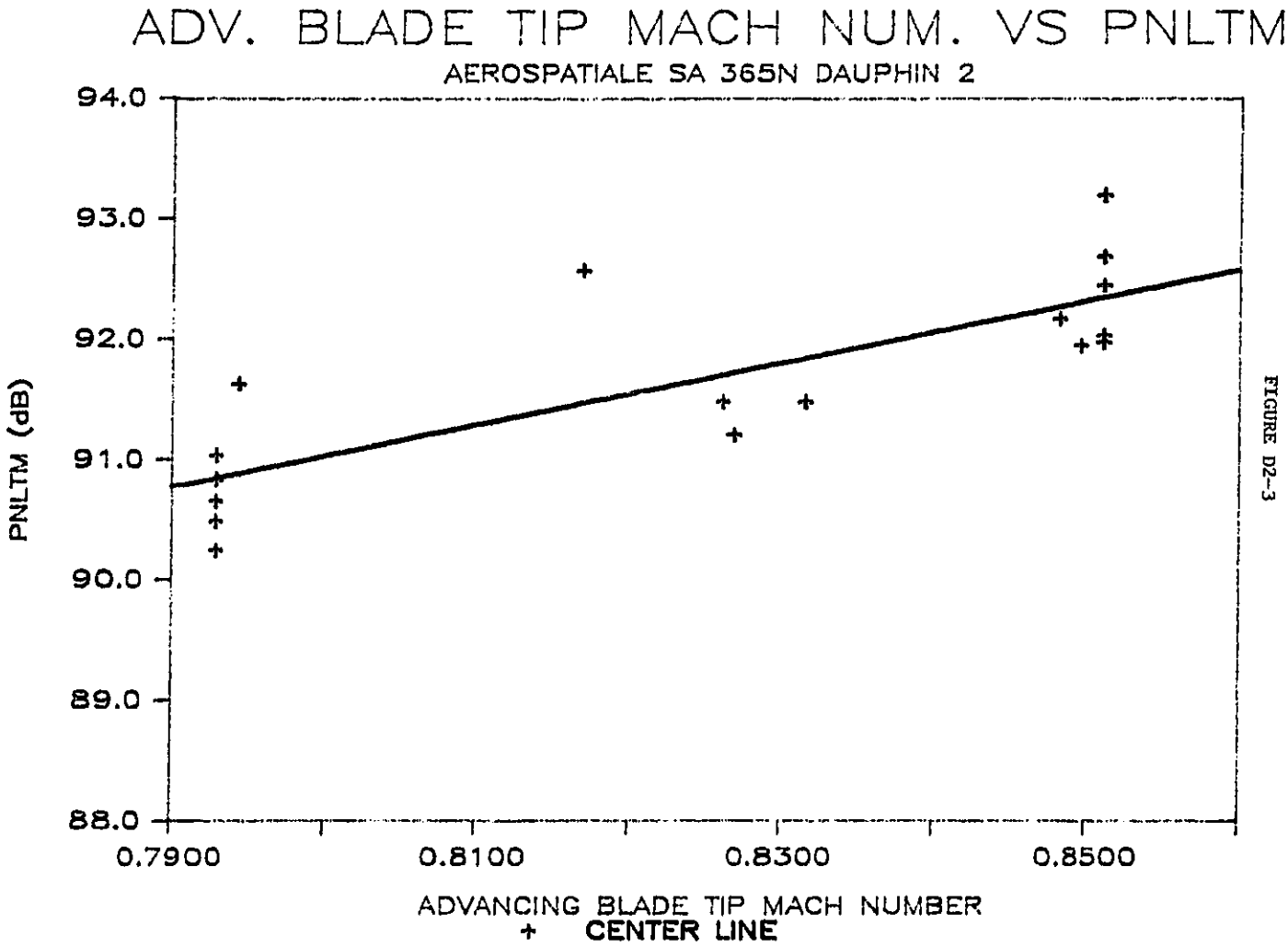

ADV. BLADE TIP MACH NUM. VS PNLTM
AEROSPATIALE SA 365N DAUPHIN 2
94.0
93.0
92.0
91.0
90.0
89.0
88.0
PNLTM (dB)
0.7900
0.8100
0.8300
0.8500
ADVANCING BLADE TIP MACH NUMBER
+ CENTER LINE

FIGURE D2-3

TABLE D2-8

AEROSPATIALE SA 365N DAUPHIN 2
RIGHT SIDELINE

ANAL. DATE: 11-Mar-86

EVENT	X INPUT	Y INPUT
A1	0.8556	NA
A2	0.8481	NA
A3	0.8511	93.65
A4	0.8329	93.38
A5	0.8511	92.63
A6	0.8511	91.75
A7	0.8511	92.17
A8	0.8511	91.74
A9	0.8496	92.13
A10	0.8481	91.74
B11	0.8314	91.24
B12	0.8269	89.27
B13	0.8261	90.04
B14	0.8169	90.31
C15	0.7943	88.22
C16	0.7928	88.23
C17	0.7928	88.67
C18	0.7928	91.38
C19	0.7928	88.26
C20	0.7928	89.32

LINEAR REGRESSION EQUATION

Y =	SLOPE	* X +	INTERCEPT	
=	57.76		43.15	
R SQ. =	0.663	MEAN X =	0.8248	
R =	0.814	S.D. X =	0.0253	
STD.ERR =	1.072	MEAN Y =	90.79	
CORREL =	0.814	S.D. Y =	1.79	
SAMPLE =	18	TOT VAR =	3.21	

TABLE D2-9

LINEAR REGRESSION EQUATION

Y =	SLOPE	* X +	INTERCEPT		
=	57.76		43.15		
R SQ.	=	0.663	MEAN X =	0.8248	
R	=	0.814	S.D. X =	0.0253	
STD.ERR	=	1.072	MEAN Y =	90.79	
CORREL	=	0.814	S.D. Y =	1.79	
SAMPLE	=	18	TOT VAR =	3.21	

SECOND ORDER EQUATION

Y =	A	+	B1	* X +	B2	*X'	
Y =	229.02	+	-395.21	* X +	275.72	*X'	
R SQ.	=	0.657	MEAN X =	0.8248			
R	=	0.810	S.D. X =	0.0253			
STD.ERR	=	1.102	MEAN Y =	90.79			
SAMPLE	=	18	S.D. Y =	1.79			

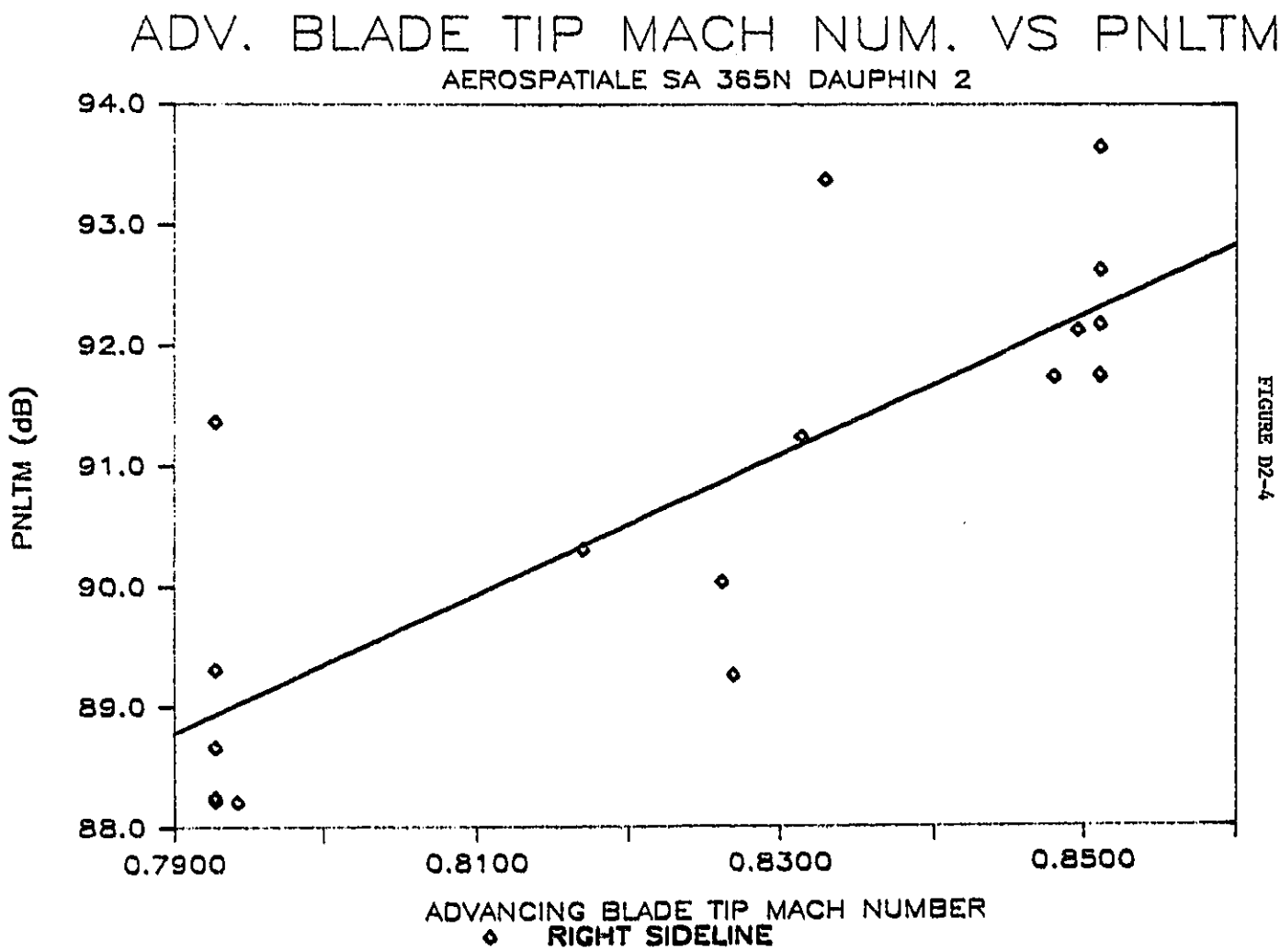

ADV. BLADE TIP MACH NUM. VS PNLTM
AEROSPATIALE SA 365N DAUPHIN 2
94.0
93.0
92.0
91.0
90.0
89.0
88.0
PNLTM (dB)
0.7900
0.8100
0.8300
0.8500
ADVANCING BLADE TIP MACH NUMBER
RIGHT SIDELINE

FIGURE D2-4

A: 10-Mar-86

TABLE D3-1

SUMMARY EPNL LEVELS (dB)
DATA PROCESSED PER ICAO CERTIFICATION PROCEDURES

HELICOPTER: AEROSPATIALE SA-365N DAUPHIN
OPERATION: ICAO TAKEOFF

EVENT NUMBER	LEFT SIDELINE	CENTER LINE CENTER	RIGHT SIDELINE	3 MIC AVERAGE
SITE	2	1	3	
E26	94.40	96.30	88.60	93.10
E27	93.00	96.80	87.40	92.40
E28	93.50	97.10	87.70	92.77
E29	93.60	95.70	87.80	92.37
E30	93.80	96.70	87.60	92.70
E31	NA	96.40	87.60	0.00
E32	93.80	96.00	87.60	92.47
E33	94.70	96.00	87.90	92.87
AVERAGE	93.83	96.38	87.78	92.67
STD. DEV.	0.57	0.47	0.37	0.27
90% C.I.	0.42	0.32	0.24	0.20

A: 10-Mar-86

TABLE D3-2

SUMMARY EPNL LEVELS (dB)
DATA PROCESSED PER ICAO CERTIFICATION PROCEDURES

HELICOPTER: AEROSPATIALE SA-365N DAUPHIN
OPERATION: ICAO LFO

EVENT NUMBER	LEFT SIDELINE	CENTER LINE CENTER	RIGHT SIDELINE	3 MIC AVERAGE
SITE	2/3	1	3/2	
A3	NA	NA	NA	0.00
A4	94.20	92.70	91.80	92.90
A5	91.10	90.30	90.90	90.77
A6	91.60	90.50	89.60	90.57
A7	91.30	90.30	NA	0.00
A8	91.70	90.10	89.40	90.40
A9	91.20	89.60	NA	0.00
A10	92.20	89.50	89.60	90.43
AVERAGE	91.90	90.43	90.26	91.01
STD. DEV.	1.08	1.07	1.05	1.06
90% C.I.	0.79	0.79	1.00	1.01

TABLE D3-3

SUMMARY EPNL LEVELS (dB)
DATA PROCESSED PER ICAO CERTIFICATION PROCEDURES

HELICOPTER: AEROSPATIALE SA-365N DAUPHIN
OPERATION: ICAO APPROACH

EVENT NUMBER	LEFT SIDELINE	CENTER LINE CENTER	RIGHT SIDELINE	3 MIC AVERAGE
SITE	3	1	2	
F35	NA	NA	NA	0.00
F36	96.10	94.40	93.28	94.59
F46	96.60	95.70	93.78	95.36
F47	95.80	95.60	92.98	94.79
F48	95.40	96.30	92.58	94.76
F49	96.00	96.40	93.18	95.19
F50	94.20	96.60	91.38	94.06
F51	94.70	96.00	91.88	94.19
AVERAGE	95.54	95.86	92.72	94.71
STD. DEV.	0.84	0.74	0.84	0.48
90% C.I.	0.62	0.54	0.62	0.35

APPENDIX E (E1-E3)

BELL 222 TWIN JET

TABLE E1-1

TABLE NO. K.5-1.1 (REV.1)

BELL 222 HELICOPTER

DOT/TSC
1/31/86

CORRECTION DATA*

SITE: 1 CENTERLINE - CENTER JUNE 14,1983

	CORRECTED				CORRECTIONS (dB)				ACOUSTIC ANGLE	TRACKING DATA (Meters) (ACTUAL)		(REFERENCE)		SPEED(m/sec)	
Ev	EPNL	SEL	PNLTm	ALm	/\1(P)	/\1(A)	/\2	/\3	(Deg)	CPA	SR	CPAR	SRR	GRND	REF
12 DEGRE APPROACH -- TARGET IAS 45 KTS.															
T27	97.6	93.3	99.9	85.9	0.52	0.46	-0.08	-	107.1	122.7	128.3	117.4	122.8	23.5	23.1
T28	95.9	91.7	99.5	85.2	-0.04	-0.07	-0.07	-	110.4	115.7	123.5	117.4	125.2	22.5	23.1
T29	97.3	93.0	98.7	84.4	0.00	-0.03	-0.08	-	122.1	116.2	137.2	117.4	138.6	22.5	23.1
Avg.	96.9	92.7	99.4	85.2	0.16	0.12	-0.08	-	113.2	118.2	129.7	117.4	128.9	22.9	23.1
Std Dv	0.9	0.8	0.6	0.7	0.31	0.30	0.01	-	7.9	3.9	6.9	0.0	8.5	0.6	0.0
90% CI	1.5	1.4	1.1	1.3	0.53	0.50	0.01	-	13.3	6.6	11.7	0.0	14.3	1.0	0.0
12 DEGREE APPROACH -- TARGET IAS 55 KTS.															
U30	92.9	87.7	95.2	79.5	-0.03	-0.06	-0.30	-	110.4	115.7	123.4	117.4	125.2	26.1	28.3
U31	95.0	89.9	95.5	80.1	0.16	0.11	-0.27	-	109.4	117.9	125.0	117.4	124.4	26.7	28.3
U32	95.1	89.8	98.3	82.5	-0.07	-0.11	-0.02	-	115.9	115.3	128.1	117.4	130.4	27.8	28.3
Avg.	94.3	89.2	96.3	80.7	0.02	-0.02	-0.20	-	111.9	116.3	125.5	117.4	126.7	26.9	28.3
Std Dv	1.2	1.3	1.7	1.6	0.12	0.12	0.15	-	3.5	1.4	2.4	0.0	3.3	0.8	0.0
90% CI	2.1	2.1	2.9	2.7	0.21	0.19	0.26	-	5.9	2.4	4.0	0.0	5.5	1.4	0.0
12 DEGREE APPROACH -- TARGET IAS 65 KTS.															
V33	93.1	88.1	95.8	80.1	-0.05	-0.13	-0.06	-	118.4	115.4	131.2	117.4	133.5	32.6	33.4
V34	93.2	87.7	95.4	79.7	-0.10	-0.14	-0.09	-	121.9	114.6	134.9	117.4	138.3	32.1	33.4
V35	93.9	88.7	96.8	81.2	-0.13	-0.15	-0.23	-	118.0	114.6	129.7	117.4	132.9	31.2	33.4
Avg.	93.4	88.2	96.0	80.3	-0.09	-0.14	-0.13	-	119.4	114.8	131.9	117.4	134.9	32.0	33.4
Std Dv	0.4	0.5	0.7	0.8	0.04	0.01	0.09	-	2.2	0.5	2.7	0.0	2.9	0.7	0.0
90% CI	0.7	0.9	1.3	1.3	0.07	0.02	0.15	-	3.6	0.8	4.6	0.0	5.0	1.2	0.0
12 DEGREE APPROACH -- TARGET IAS 75 KTS.															
W36	93.2	88.5	95.6	80.1	0.57	0.56	0.03	-	117.0	123.0	138.1	117.4	131.7	37.6	36.0
W37	93.5	88.2	96.4	80.5	0.06	0.03	0.04	-	104.1	116.7	120.4	117.4	121.0	36.2	36.0
W38	93.3	88.1	96.2	80.2	0.17	0.13	0.04	-	117.6	117.8	132.9	117.4	132.5	36.5	36.0
W40	92.5	87.8	94.9	79.9	0.27	0.24	-0.14	-	119.1	118.8	136.0	117.4	134.4	35.2	36.0
Avg.	93.1	88.2	95.8	80.2	0.27	0.24	-0.01	-	114.5	119.1	131.8	117.4	129.9	36.4	36.0
Std Dv	0.4	0.3	0.7	0.3	0.22	0.23	0.09	-	6.9	2.8	7.9	0.0	6.0	1.0	0.0
90% CI	0.5	0.4	0.8	0.3	0.26	0.27	0.10	-	8.2	3.3	9.3	0.0	7.1	1.1	0.0

*- Data Corrected Using 'Simplified Procedure'

TABLE E1-2

TABLE NO. K.5-1.2 (REV.1)

BELL 222 HELICOPTER

DOT/TSC
1/31/86

CORRECTION DATA*

SITE: 1 CENTERLINE - CENTER JUNE 14,1983

Ev	CORRECTED EPNL	SEL	PNLTm	ALm	CORRECTIONS (dB) /\1(P)	/\1(A)	/\2	/\3	ACOUSTIC ANGLE (Deg)	TRACKING DATA (Meters) (ACTUAL) CPA	SR	(REFERENCE) CPAR	SRR	SPEED(m/sec) GRND	REF
6 DEGREE APPROACH -- TARGET IAS 45 KTS.															
N7	95.5	91.0	97.1	83.1	-1.05	-1.01	0.25	-	150.9	106.4	218.6	119.3	245.1	22.5	23.1
N8	92.3	87.8	92.4	77.9	-1.12	-1.07	0.48	-	108.3	105.8	111.4	119.3	125.7	23.6	23.1
N9	93.8	89.5	94.0	79.1	-0.93	-0.86	0.30	-	124.2	108.0	130.6	119.3	144.4	23.0	23.1
Avg.	93.9	89.4	94.5	80.0	-1.03	-0.98	0.34	-	127.8	106.7	153.5	119.3	171.7	23.0	23.1
Std Dv	1.8	1.6	2.4	2.8	0.10	0.11	0.12	-	21.5	1.1	57.1	0.0	64.2	0.6	0.0
90% CI	2.7	2.7	4.1	4.7	0.16	0.18	0.20	-	36.2	1.9	96.3	0.0	108.3	1.0	0.0
6 DEGREE APPROACH -- TARGET IAS 55 KTS.															
N10	96.8	91.8	98.9	84.0	-0.59	-0.60	-0.40	-	121.4	111.2	130.4	119.3	139.9	24.5	28.3
N11	94.9	90.8	96.6	82.3	-1.08	-1.03	-0.22	-	127.8	106.0	134.1	119.3	150.9	24.6	28.3
N12	98.0	93.4	100.8	87.0	-0.18	-0.19	-0.40	-	135.3	116.1	165.0	119.3	169.6	25.3	28.3
N13	97.6	92.7	99.1	83.7	-1.04	-1.00	0.43	-	134.3	106.5	148.9	119.3	166.9	28.6	28.3
Avg.	96.8	92.2	98.8	84.3	-0.72	-0.70	-0.15	-	129.7	110.0	144.6	119.3	156.8	25.8	28.3
Std Dv	1.4	1.2	1.7	2.0	0.42	0.40	0.39	-	6.5	4.7	15.8	0.0	14.0	2.0	0.0
90% CI	1.6	1.4	2.1	2.3	0.50	0.47	0.46	-	7.6	5.6	18.6	0.0	16.5	2.3	0.0
6 DEGREE APPROACH -- TARGET IAS 75 KTS.															
O14	96.7	92.4	98.2	83.9	-1.10	-1.06	0.30	-	107.1	106.5	111.4	119.3	124.9	37.9	38.6
O15	96.3	91.9	98.3	83.7	-0.62	-0.62	0.21	-	124.0	111.0	133.9	119.3	143.9	38.4	38.6
O16	96.0	91.7	97.8	83.2	-1.28	-1.19	0.41	-	107.9	104.4	109.7	119.3	125.4	38.4	38.6
Avg.	96.3	92.0	98.1	83.6	-1.00	-0.96	0.31	-	113.0	107.3	118.3	119.3	131.4	38.2	38.6
Std Dv	0.4	0.3	0.3	0.4	0.34	0.30	0.10	-	9.5	3.4	13.5	0.0	10.8	0.3	0.0
90% CI	0.6	0.6	0.5	0.6	0.58	0.50	0.17	-	16.0	5.7	22.7	0.0	18.3	0.5	0.0
6 DEGREE APPROACH -- TARGET IAS 85 KTS.															
P17	94.2	89.9	96.4	81.4	-1.16	-1.08	0.37	-	128.7	105.6	135.2	119.3	152.9	43.5	43.7
P18	94.5	90.5	96.6	82.6	-0.46	-0.46	-0.11	-	125.7	112.8	138.9	119.3	146.9	40.9	43.7
P19	95.2	91.4	97.3	84.0	-0.48	-0.47	0.12	-	136.5	112.4	163.1	119.3	173.3	42.9	43.7
Avg.	94.6	90.6	96.8	82.6	-0.70	-0.67	0.13	-	130.3	110.2	145.7	119.3	157.7	42.4	43.7
Std Dv	0.5	0.8	0.5	1.3	0.40	0.36	0.24	-	5.6	4.1	15.2	0.0	13.8	1.4	0.0
90% CI	0.8	1.3	0.8	2.2	0.67	0.60	0.40	-	9.4	6.8	25.6	0.0	23.3	2.3	0.0

*- Data Corrected Using 'Simplified Procedure'

TABLE E1-3

TABLE NO. K.5-1.3 (REV.1)

BELL 222 HELICOPTER

CORRECTION DATA*

DOT/TSC
1/31/86

SITE: 1 CENTERLINE - CENTER JUNE 14,1983

Ev	CORRECTED EPNL	SEL	PNLTm	ALm	CORRECTIONS (dB) /\1(P)	/\1(A)	/\2	/\3	ACOUSTIC ANGLE (Deg)	TRACKING DATA (ACTUAL) CPA	SR	(REFERENCE) CPAR	SRR	SPEED(m/sec) GRND	REF
6 DEGREE APPROACH -- TARGET IAS 65 KTS. (ICAO)															
L1	97.0	92.6	98.8	83.9	-0.30	-0.36	0.12	-	124.2	113.9	137.8	119.3	144.4	33.2	33.4
L2	98.4	93.9	100.7	85.9	-0.12	-0.12	0.21	-	122.0	117.5	138.6	119.3	140.8	34.7	33.4
L3	98.0	93.4	100.4	85.5	-1.10	-1.08	0.37	-	117.8	105.9	119.6	119.3	134.9	33.3	33.4
L4	97.6	93.0	100.2	85.5	-0.74	-0.76	0.33	-	118.9	108.9	124.5	119.3	136.4	33.7	33.4
L5	97.6	93.2	100.2	85.3	-0.88	-0.87	0.38	-	107.0	107.4	112.4	119.3	124.8	33.7	33.4
L6	98.7	94.2	101.1	86.5	-0.57	-0.57	0.17	-	119.4	111.6	128.1	119.3	137.0	33.0	33.4
Avg.	97.9	93.4	100.2	85.4	-0.62	-0.63	0.26	-	118.2	110.9	126.8	119.3	136.4	33.6	33.4
Std Dv	0.6	0.6	0.8	0.9	0.37	0.35	0.11	-	6.0	4.4	10.3	0.0	6.6	0.6	0.0
90% CI	0.5	0.5	0.6	0.7	0.30	0.29	0.09	-	4.9	3.6	8.5	0.0	5.5	0.5	0.0
TAKEOFF -- TARGET IAS 65 KTS. (ICAO)															
K20										NO TRACKING DATA					
K21	90.1	85.4	92.6	76.4	2.77	2.62	-0.95	-	116.3	182.1	203.1	141.2	157.6	32.5	33.4
K22	90.8	86.1	93.0	76.9	4.47	4.19	-1.50	-	111.9	213.0	229.5	141.2	152.2	32.2	33.4
K23	90.8	86.6	93.9	78.9	4.53	4.38	-1.36	-	114.1	213.8	234.3	141.2	154.7	33.4	33.4
K24	90.5	86.4	93.3	77.8	4.46	4.31	-1.88	-	108.6	213.1	224.9	141.2	149.0	29.5	33.4
K25	91.5	86.7	94.0	78.4	5.97	5.16	-1.95	-	99.9	228.0	231.5	141.2	143.3	30.6	33.4
Avg.	90.7	86.3	93.4	77.7	4.44	4.13	-1.53	-	110.2	210.0	224.7	141.2	151.4	31.7	33.4
Std Dv	0.5	0.5	0.6	1.0	1.13	0.93	0.41	-	6.4	16.9	12.5	0.0	5.5	1.6	0.0
90% CI	0.5	0.5	0.6	1.0	1.08	0.88	0.39	-	6.1	16.1	11.9	0.0	5.2	1.5	0.0

*- Data Corrected Using 'Simplified Procedure'

TABLE E1-4

TABLE NO. K.5-1.4 (REV.1)

BELL 222 HELICOPTER

DOT/TSC
2/10/86

CORRECTION DATA*

SITE: 1 CENTERLINE - CENTER JUNE 15,1983

	CORRECTED				CORRECTIONS (dB)				ACOUSTIC ANGLE	TRACKING DATA (Meters) (ACTUAL)		(REFERENCE)		SPEED(m/sec)	
Ev	EPNL	SEL	PNLTm	ALm	/\1(P)	/\1(A)	/\2	/\3	(Deg)	CPA	SR	CPAR	SRR	GRND	REF
500 FT. FLYOVER -- TARGET IAS 137KTS.															
B7	91.4	86.8	93.7	79.3	-0.57	-0.56	0.31	0.57	128.6	140.4	179.6	150.0	191.8	72.0	70.5
B8	92.0	87.4	93.7	79.8	-2.70	-2.50	1.15	0.32	132.6	114.8	156.1	150.0	203.8	75.1	70.5
B9	91.9	87.5	93.6	79.3	-3.09	-2.86	1.08	0.68	132.5	110.8	150.3	150.0	203.4	72.0	70.5
Avg.	91.8	87.2	93.6	79.5	-2.12	-1.97	0.85	0.52	131.2	122.0	162.0	150.0	199.7	73.0	70.5
Std Dv	0.3	0.4	0.1	0.3	1.36	1.24	0.47	0.18	2.3	16.1	15.6	0.0	6.8	1.8	0.0
90% CI	0.5	0.6	0.1	0.5	2.29	2.09	0.79	0.31	3.9	27.1	26.2	0.0	11.5	3.0	0.0
500 FT. FLYOVER -- TARGET IAS 127 KTS.															
C10	91.1	86.5	93.0	78.6	-2.11	-2.01	0.71	0.82	146.9	120.7	220.9	150.0	274.4	65.3	65.3
C11	92.1	87.6	94.6	80.2	-0.43	-0.38	0.18	0.82	142.2	141.8	231.5	150.0	244.9	65.3	65.3
C12	92.2	87.5	93.4	79.1	-1.60	-1.58	0.56	0.84	139.1	126.1	192.7	150.0	229.2	65.3	65.3
C13	90.9	86.3	93.2	78.7	-3.42	-3.26	1.17	0.79	131.1	105.7	140.2	150.0	199.0	65.8	65.3
C14	90.6	86.1	92.7	78.3	-2.23	-2.21	0.77	0.90	132.6	118.4	161.0	150.0	203.8	65.3	65.3
C15	91.1	86.6	94.0	79.7	-0.26	-0.23	0.12	1.00	135.2	142.9	202.6	150.0	212.7	64.8	65.3
Avg.	91.3	86.8	93.5	79.1	-1.67	-1.61	0.58	0.86	137.8	125.9	191.5	150.0	227.3	65.3	65.3
Std Dv	0.6	0.6	0.7	0.7	1.19	1.15	0.39	0.08	6.0	14.3	35.1	0.0	28.6	0.3	0.0
90% CI	0.5	0.5	0.6	0.6	0.98	0.95	0.32	0.06	5.0	11.8	28.8	0.0	23.5	0.3	0.0
500 FT. FLYOVER -- TARGET IAS 110 KTS.															
D16	90.8	86.5	93.1	78.9	-0.73	-0.72	0.46	0.74	133.3	136.5	187.5	150.0	206.1	58.6	56.6
D17	90.6	86.4	92.9	78.6	-0.77	-0.72	0.51	0.69	140.3	136.0	212.7	150.0	234.6	59.2	56.6
D18	91.2	86.7	93.2	78.6	-0.66	-0.62	0.48	0.69	129.5	137.5	178.2	150.0	194.4	59.2	56.6
Avg.	90.8	86.5	93.1	78.7	-0.72	-0.69	0.48	0.71	134.3	136.7	192.8	150.0	211.7	59.0	56.6
Std Dv	0.3	0.2	0.1	0.2	0.06	0.06	0.03	0.03	5.5	0.8	17.8	0.0	20.7	0.3	0.0
90% CI	0.5	0.3	0.2	0.3	0.09	0.10	0.04	0.05	9.2	1.3	30.1	0.0	34.9	0.5	0.0
500 FT. FLYOVER -- TARGET IAS 96 KTS.															
E19	90.6	85.9	94.5	79.1	-0.41	-0.43	0.26	0.87	133.7	140.5	194.4	150.0	207.5	49.9	49.4
Avg.	90.6	85.9	94.5	79.1	-0.41	-0.43	0.26	0.87	133.7	140.5	194.4	150.0	207.5	49.9	49.4
Std Dv	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
90% CI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*- Data Corrected Using 'Simplified Procedure'

TABLE E1-5

TABLE NO. K.5-1.5 (REV.1)

BELL 222 HELICOPTER

CORRECTION DATA*

DOT/TSC
1/31/84

SITE: 1

CENTERLINE - CENTER

JUNE 15,1983

Ev	CORRECTED EPNL	SEL	PNLTm	ALm	CORRECTIONS (dB) /\1(P)	/\1(A)	/\2	/\3	ACOUSTIC ANGLE (Deg)	TRACKING DATA (Meters) (ACTUAL) CPA	SR	(REFERENCE) CPAR	SRR	SPEED(m/sec) GRND	REF
1000 FT. FLYOVER -- TARGET IAS 123 KTS.															
A1	86.6	82.6	86.4	71.9	-0.73	-0.78	0.40	-	136.1	274.0	395.1	300.0	432.6	64.8	63.3
A2	86.4	82.3	86.0	71.3	0.65	0.50	0.04	-	134.5	309.6	433.9	300.0	420.5	65.3	63.3
A3	85.9	81.9	85.9	71.4	0.06	-0.02	0.12	-	133.6	295.2	407.5	300.0	414.1	64.3	63.3
A4	85.7	81.9	86.4	71.9	0.51	0.47	-0.03	-	135.7	309.6	443.2	300.0	429.5	64.3	63.3
A5	85.9	82.0	86.0	71.5	0.57	0.49	-0.03	-	130.2	309.7	405.7	300.0	393.0	64.3	63.3
A6	-	82.5	86.0	72.1	-0.65	-0.52	-	-	129.5	282.1	365.5	300.0	388.7	65.8	63.3
Avg.	86.1	82.2	86.1	71.7	0.07	0.02	0.10	-	133.3	296.7	408.5	300.0	413.1	64.8	63.3
Std Dv	0.4	0.3	0.2	0.3	0.62	0.56	0.18	-	2.8	15.7	27.9	0.0	18.5	0.6	0.0
90% CI	0.4	0.3	0.2	0.3	0.51	0.46	0.17	-	2.3	12.9	22.9	0.0	15.2	0.5	0.0
APPROACH -- MULTI-SEG.1															
Q21	93.5	88.6	95.4	80.2	-4.76	-4.59	2.81	-	118.5	71.5	81.4	119.3	135.8	43.5	33.4
Avg.	93.5	88.6	95.4	80.2	-4.76	-4.59	2.81	-	118.5	71.5	81.4	119.3	135.8	43.5	33.4
Std Dv	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
90% CI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
APPROACH -- MULTI-SEG.2															
R22	92.6	87.2	94.6	78.7	-4.83	-4.65	1.59	-	111.9	69.9	75.4	117.4	126.5	32.7	33.4
Avg.	92.6	87.2	94.6	78.7	-4.83	-4.65	1.59	-	111.9	69.9	75.4	117.4	126.5	32.7	33.4
Std Dv	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
90% CI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
APPROACH -- MULTI-SEG.3															
S23	95.6	90.9	99.3	84.6	-3.38	-3.28	-0.57	-	111.2	81.3	87.2	117.4	125.9	22.3	33.4
Avg.	95.6	90.9	99.3	84.6	-3.38	-3.28	-0.57	-	111.2	81.3	87.2	117.4	125.9	22.3	33.4
Std Dv	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
90% CI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*- Data Corrected Using 'Simplified Procedure'

TABLE E1-6

TABLE NO. K.5-2.1 (REV.1)

BELL 222 HELICOPTER

CORRECTION DATA*

DOT/TSC
1/31/86

SITE: 2 SIDELINE - 150 M. SOUTH JUNE 14,1983

Ev	CORRECTED EPNL	CORRECTED SEL	CORRECTED PNLTa	CORRECTED ALa	CORRECTIONS (dB) /\1(P)	/\1(A)	/\2	/\3	ACOUSTIC ANGLE (Deg)	TRACKING DATA (Meters) (ACTUAL) CPA	SR	(REFERENCE) CPAR	SRR	SPEED(m/sec) GRND	REF
12 DEGREE APPROACH -- TARGET IAS 45 KTS.															
T27	95.5	91.2	97.3	82.8	0.22	0.16	0.03	-	104.4	192.5	198.8	190.5	196.6	23.5	23.1
T28	94.2	89.9	96.4	82.0	0.04	-0.03	-0.08	-	104.3	188.3	194.3	190.5	196.6	22.5	23.1
T29	95.8	91.6	97.4	83.0	0.06	-0.01	-0.08	-	108.6	188.5	198.9	190.5	201.0	22.5	23.1
Avg.	95.2	90.9	97.0	82.6	0.11	0.04	-0.04	-	105.8	189.8	197.3	190.5	198.1	22.9	23.1
Std Dv	0.9	0.9	0.6	0.6	0.10	0.10	0.06	-	2.5	2.4	2.6	0.0	2.5	0.6	0.0
90% CI	1.5	1.6	0.9	0.9	0.17	0.18	0.11	-	4.1	4.0	4.4	0.0	4.2	1.0	0.0
12 DEGREE APPROACH -- TARGET IAS 55 KTS.															
U30	94.4	89.8	95.9	80.8	0.05	-0.07	-0.31	-	112.4	188.2	203.6	190.5	206.0	26.1	28.3
U31	95.2	90.9	95.5	81.6	0.14	0.07	-0.24	-	134.0	189.6	263.7	190.5	264.9	26.7	28.3
U32	94.4	90.1	97.1	82.6	0.00	-0.04	-0.04	-	116.2	187.9	209.5	190.5	212.3	27.8	28.3
Avg.	94.7	90.3	96.2	81.7	0.06	-0.01	-0.20	-	120.9	188.6	225.6	190.5	227.7	26.9	28.3
Std Dv	0.4	0.6	0.8	0.9	0.07	0.07	0.14	-	11.6	0.9	33.1	0.0	32.4	0.8	0.0
90% CI	0.7	0.9	1.4	1.6	0.12	0.12	0.24	-	19.5	1.5	55.9	0.0	54.6	1.4	0.0
12 DEGREE APPROACH -- TARGET IAS 65 KTS.															
V33	93.4	88.8	96.1	81.2	0.06	-0.02	-0.09	-	113.8	188.7	206.2	190.5	208.1	32.6	33.4
V34	93.1	88.6	95.6	81.1	0.01	-0.01	-0.13	-	122.6	188.3	223.5	190.5	226.1	32.1	33.4
V35	93.3	88.8	95.9	81.3	0.05	-0.01	-0.27	-	123.1	188.3	224.7	190.5	227.4	31.2	33.4
Avg.	93.3	88.7	95.9	81.2	0.04	-0.01	-0.16	-	119.8	188.4	218.2	190.5	220.5	32.0	33.4
Std Dv	0.1	0.1	0.2	0.1	0.03	0.01	0.09	-	5.3	0.3	10.4	0.0	10.8	0.7	0.0
90% CI	0.2	0.2	0.4	0.2	0.04	0.01	0.16	-	8.9	0.5	17.5	0.0	18.2	1.2	0.0
12 DEGREE APPROACH -- TARGET IAS 75 KTS.															
W36	93.2	88.9	95.3	80.6	0.36	0.26	0.13	-	123.3	193.5	231.7	190.5	228.0	37.6	36.0
W37	93.1	88.5	95.6	80.9	0.13	0.09	0.04	-	114.1	189.6	207.6	190.5	208.6	36.2	36.0
W38	92.9	88.6	95.9	81.1	0.17	0.10	0.06	-	126.8	190.2	237.6	190.5	237.9	36.5	36.0
W40	92.9	88.5	95.4	80.3	0.27	0.11	-0.11	-	129.3	190.9	246.6	190.5	246.0	35.2	36.0
Avg.	93.0	88.6	95.6	80.7	0.23	0.14	0.03	-	123.4	191.0	230.8	190.5	230.1	36.4	36.0
Std Dv	0.2	0.2	0.3	0.3	0.10	0.08	0.10	-	6.7	1.7	16.7	0.0	16.1	1.0	0.0
90% CI	0.2	0.3	0.3	0.4	0.12	0.09	0.12	-	7.8	2.0	19.6	0.0	19.0	1.1	0.0

*- Data Corrected Using 'Simplified Procedure'

TABLE E1-7

TABLE NO. K.5-2.2 (REV.1)

BELL 222 HELICOPTER

CORRECTION DATA*

DOT/TSC
1/31/86

SITE: 2 LINE - 150 M. SOUTH JUNE 14,1983

Ev	CORRECTED EPNL	CORRECTED SEL	CORRECTED PNLTm	CORRECTED ALm	CORRECTIONS (dB) /\1(P)	/\1(A)	/\2	/\3	ACOUSTIC ANGLE (Deg)	TRACKING DATA (Meters) (ACTUAL) CPA	SR	(REFERENCE) CPAR	SRR	SPEED(m/sec) GRND	REF
6 DEGREE APPROACH -- TARGET IAS 45 KTS.															
N7	90.0	86.1	89.3	74.8	-0.33	-0.34	0.02	-	130.1	183.4	239.8	191.7	250.6	22.5	23.1
N8	88.2	84.9	87.7	73.7	-0.37	-0.35	0.24	-	96.7	183.1	184.3	191.7	193.0	23.6	23.1
N9	89.1	85.4	88.8	74.3	-0.46	-0.28	0.10	-	116.2	184.3	205.4	191.7	213.6	23.0	23.1
Avg.	89.1	85.5	88.6	74.3	-0.39	-0.32	0.12	-	114.3	183.6	209.8	191.7	219.0	23.0	23.1
Std Dv	0.9	0.6	0.8	0.6	0.07	0.04	0.11	-	16.8	0.6	28.0	0.0	29.2	0.6	0.0
90% CI	1.5	1.0	1.4	0.9	0.11	0.06	0.19	-	28.3	1.1	47.2	0.0	49.2	1.0	0.0
6 DEGREE APPROACH -- TARGET IAS 55 KTS.															
N10	91.0	86.4	93.3	77.8	-0.22	-0.19	-0.53	-	99.9	186.3	189.1	191.7	194.6	24.5	28.3
N11	89.2	84.7	90.7	75.5	-0.34	-0.34	-0.46	-	92.9	183.2	183.5	191.7	191.9	24.6	28.3
N12	93.7	89.0	95.8	80.7	-0.02	-0.04	-0.44	-	122.8	189.2	225.0	191.7	228.0	25.3	28.3
N13	90.6	85.8	91.0	75.2	-0.32	-0.33	0.20	-	128.2	183.5	233.4	191.7	243.9	28.6	28.3
Avg.	91.1	86.5	92.7	77.3	-0.22	-0.22	-0.31	-	111.0	185.5	207.7	191.7	214.6	25.8	28.3
Std Dv	1.9	1.8	2.4	2.5	0.15	0.14	0.34	-	17.2	2.8	25.1	0.0	25.5	2.0	0.0
90% CI	2.2	2.1	2.8	3.0	0.17	0.17	0.40	-	20.2	3.3	29.6	0.0	30.0	2.3	0.0
6 DEGREE APPROACH -- TARGET IAS 75 KTS.															
O14	94.8	90.3	96.7	82.3	-0.28	-0.32	0.07	-	128.8	183.5	235.4	191.7	246.0	37.9	38.6
O15	93.9	89.1	95.8	80.8	-0.17	-0.19	0.07	-	122.6	186.1	220.9	191.7	227.5	38.4	38.6
O16	94.0	89.2	95.9	80.6	-0.37	-0.38	0.14	-	122.2	182.3	215.4	191.7	226.4	38.4	38.6
Avg.	94.2	89.5	96.1	81.2	-0.27	-0.30	0.09	-	124.5	184.0	223.9	191.7	233.3	38.2	38.6
Std Dv	0.5	0.7	0.5	0.9	0.10	0.10	0.04	-	3.7	1.9	10.4	0.0	11.0	0.3	0.0
90% CI	0.8	1.1	0.8	1.6	0.17	0.16	0.07	-	6.3	3.3	17.5	0.0	18.5	0.5	0.0
6 DEGREE APPROACH -- TARGET IAS 85 KTS.															
P17	92.8	88.6	95.6	80.7	-0.33	-0.36	0.13	-	121.0	182.9	213.4	191.7	223.6	43.5	43.7
P18	92.2	88.1	95.0	80.7	-0.10	-0.14	-0.21	-	108.2	187.2	197.0	191.7	201.7	40.9	43.7
P19	92.1	88.0	94.7	80.2	-0.13	-0.20	0.01	-	109.1	186.8	197.6	191.7	202.8	42.9	43.7
Avg.	92.4	88.2	95.1	80.5	-0.19	-0.23	-0.02	-	112.7	185.6	202.7	191.7	209.4	42.4	43.7
Std Dv	0.4	0.3	0.4	0.3	0.13	0.11	0.17	-	7.2	2.3	9.3	0.0	12.4	1.4	0.0
90% CI	0.7	0.5	0.8	0.5	0.21	0.19	0.29	-	12.1	3.9	15.7	0.0	20.8	2.3	0.0

*- Data Corrected Using 'Simplified Procedure'

TABLE E1-8

TABLE NO. K.5-2.3 (REV.1)

BELL 222 HELICOPTER

CORRECTION DATA*

DOT/TSC
1/31/86

SITE: 2 SIDELINE - 150 M. SOUTH JUNE 14,1983

Ev	CORRECTED EPNL	SEL	PNLTm	ALm	CORRECTIONS (dB) /\1(P)	/\1(A)	/\2	/\3	ACOUSTIC ANGLE (Deg)	TRACKING DATA (Meters) (ACTUAL) CPA	SR	(REFERENCE) CPAR	SRR	SPEED(m/sec) GRND	REF
6 DEGREE APPROACH -- TARGET IAS 65 KTS. (ICAO)															
L1	94.1	89.9	95.0	79.9	-0.11	-0.14	0.03	-	116.2	187.9	209.3	191.7	213.6	33.2	33.4
L2	93.4	88.9	93.3	78.8	0.03	0.02	0.19	-	137.5	190.0	281.2	191.7	283.6	34.7	33.4
L3	92.0	87.5	93.3	79.8	-0.32	-0.33	0.13	-	140.2	183.1	286.3	191.7	299.6	33.3	33.4
L4	93.3	88.9	94.2	79.7	-0.22	-0.25	0.15	-	133.3	184.9	254.2	191.7	263.6	33.7	33.4
L5	92.6	88.1	93.4	78.1	-0.33	-0.33	0.17	-	85.9	184.0	184.5	191.7	192.2	33.7	33.4
L6	93.2	88.6	94.0	78.8	-0.22	-0.19	0.04	-	123.9	186.5	224.5	191.7	230.8	33.0	33.4
Avg.	93.1	88.7	93.9	79.2	-0.19	-0.20	0.12	-	122.8	186.1	240.0	191.7	247.2	33.6	33.4
Std Dv	0.7	0.8	0.7	0.7	0.14	0.13	0.07	-	20.2	2.6	40.7	0.0	41.9	0.6	0.0
90% CI	0.6	0.7	0.6	0.6	0.11	0.11	0.06	-	16.6	2.1	33.5	0.0	34.4	0.5	0.0
TAKEOFF -- TARGET IAS 65 KTS. (ICAO)															
K20										NO TRACKING DATA					
K21	89.1	84.1	90.4	74.5	1.59	1.48	-0.55	-	96.3	235.3	236.7	206.0	207.3	32.5	33.4
K22	89.4	84.1	90.8	74.8	2.66	2.54	-0.91	-	96.5	259.8	261.5	206.0	207.3	32.2	33.4
K23	89.8	84.4	91.8	74.9	2.69	2.48	-0.77	-	83.4	260.6	262.3	206.0	207.4	33.4	33.4
K24	89.0	83.6	90.9	74.4	2.60	2.49	-1.30	-	88.7	259.9	260.0	206.0	206.1	29.5	33.4
K25	89.0	83.4	91.0	74.4	3.18	2.94	-1.29	-	89.4	272.3	272.3	206.0	206.0	30.6	33.4
Avg.	89.3	83.9	91.0	74.6	2.54	2.39	-0.96	-	90.9	257.6	258.6	206.0	206.8	31.7	33.4
Std Dv	0.3	0.4	0.5	0.2	0.58	0.54	0.33	-	5.5	13.5	13.1	0.0	0.7	1.6	0.0
90% CI	0.3	0.4	0.5	0.2	0.55	0.52	0.31	-	5.3	12.9	12.5	0.0	0.7	1.5	0.0

*- Data Corrected Using 'Simplified Procedure'

TABLE E1-9

TABLE NO. K.5-2.4 (REV.1)

BELL 222 HELICOPTER

CORRECTION DATA*

DOT/TSC
2/10/86

SITE: 2 SIDELINE - 150 M. SOUTH JUNE 15,1983

	CORRECTED				CORRECTIONS (dB)				ACOUSTIC ANGLE	TRACKING DATA (Meters) (ACTUAL)		(REFERENCE)		SPEED(m/sec)	
Ev	EPNL	SEL	PNLTm	ALm	/\1(P)	/\1(A)	/\2	/\3	(Deg)	CPA	SR	CPAR	SRR	GRND	REF
500 FT. FLYOVER -- TARGET IAS 137 KTS.															
B7	93.5	89.0	94.1	80.4	-0.28	-0.23	0.21	1.81	139.8	204.9	317.7	212.1	328.9	72.0	70.5
B8	93.6	89.0	94.7	80.5	-1.33	-1.07	0.66	1.00	148.1	188.4	356.6	212.1	401.5	75.1	70.5
B9	94.3	89.5	94.9	80.6	-1.39	-1.18	0.52	2.14	154.9	186.0	439.3	212.1	501.0	72.0	70.5
Avg.	93.8	89.2	94.5	80.5	-1.00	-0.83	0.46	1.65	147.6	193.1	371.2	212.1	410.5	73.0	70.5
Std Dv	0.4	0.3	0.4	0.1	0.62	0.52	0.23	0.59	7.6	10.3	62.1	0.0	86.4	1.8	0.0
90% CI	0.7	0.5	0.7	0.2	1.05	0.88	0.39	0.99	12.8	17.4	104.7	0.0	145.7	3.0	0.0
500 FT. FLYOVER -- TARGET IAS 127 KTS.															
C10	92.7	88.3	93.9	80.4	-0.85	-0.83	0.32	2.58	95.9	192.0	193.0	212.1	213.2	65.3	65.3
C11	93.4	88.9	94.3	80.8	-0.04	-0.02	0.10	2.58	149.6	203.6	406.8	212.1	419.3	65.3	65.3
C12	93.3	88.6	93.8	80.6	-0.67	-0.65	0.27	2.66	100.5	195.4	198.8	212.1	215.8	65.3	65.3
C13	93.5	89.1	94.7	81.0	-1.32	-1.27	0.51	2.50	124.5	183.0	222.2	212.1	257.5	65.8	65.3
C14	92.5	88.6	94.1	80.9	-0.91	-0.86	0.35	2.83	119.0	190.6	218.1	212.1	242.7	65.3	65.3
C15	93.9	89.5	94.4	81.1	-0.06	-0.03	0.05	3.15	104.4	206.6	213.2	212.1	219.0	64.8	65.3
Avg.	93.2	88.9	94.2	80.8	-0.64	-0.61	0.27	2.72	115.7	195.6	242.0	212.1	261.2	65.3	65.3
Std Dv	0.5	0.4	0.3	0.3	0.51	0.50	0.17	0.24	20.0	9.2	81.5	0.0	79.4	0.3	0.0
90% CI	0.4	0.4	0.3	0.2	0.42	0.41	0.14	0.20	16.4	7.5	67.1	0.0	65.3	0.3	0.0
500 FT. FLYOVER -- TARGET IAS 110 KTS.															
D16	90.9	87.0	90.2	77.6	-0.06	-0.18	0.31	2.33	118.5	202.2	230.2	212.1	241.4	58.6	56.6
D17	90.9	87.0	90.8	77.7	-0.17	-0.23	0.35	2.17	107.4	201.9	211.6	212.1	222.3	59.2	56.6
D18	90.6	86.8	90.9	78.2	-0.19	-0.18	0.34	2.17	103.3	202.9	208.5	212.1	218.0	59.2	56.6
Avg.	90.8	86.9	90.6	77.8	-0.14	-0.20	0.33	2.22	109.8	202.4	216.8	212.1	227.2	59.0	56.6
Std Dv	0.2	0.1	0.4	0.3	0.07	0.03	0.02	0.09	7.9	0.5	11.7	0.0	12.5	0.3	0.0
90% CI	0.3	0.2	0.7	0.5	0.12	0.05	0.04	0.16	13.2	0.9	19.7	0.0	21.0	0.5	0.0
500 FT. FLYOVER -- TARGET IAS 96 KTS.															
E19	89.8	85.9	89.5	76.6	0.07	-0.07	0.16	2.74	107.8	205.0	215.3	212.1	222.8	49.9	49.4
Avg.	89.8	85.9	89.5	76.6	0.07	-0.07	0.16	2.74	107.8	205.0	215.3	212.1	222.8	49.9	49.4
Std Dv	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
90% CI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*- Data Corrected Using "Simplified Procedure"

TABLE E1-10

TABLE NO. K.5-2.5 (REV.1)

BELL 222 HELICOPTER

CORRECTION DATA*

DOT/TSC
1/31/86

SITE: 2 SIDELINE - 150 M. SOUTH JUNE 15,1983

Ev	CORRECTED EPNL	SEL	PNLTm	ALm	CORRECTIONS (dB) /\1(P)	/\1(A)	/\2	/\3	ACOUSTIC ANGLE (Deg)	TRACKING DATA (Meters) (ACTUAL) CPA	SR	(REFERENCE) CPAR	SRR	SPEED(m/sec) GRND	REF
1000 FT. FLYOVER -- TARGET IAS 123 KTS.															
A1	87.2	83.2	86.5	72.4	-0.85	-0.64	0.34	-	96.5	311.7	313.7	335.4	337.6	64.8	63.3
A2	87.0	83.0	86.6	72.2	0.42	0.37	0.06	-	90.5	343.2	343.2	335.4	335.4	65.3	63.3
A3	86.8	82.6	86.3	72.3	-0.01	-0.03	0.12	-	107.2	330.4	345.9	335.4	351.1	64.3	63.3
A4	86.3	82.4	85.9	72.2	0.34	0.34	-0.01	-	101.3	343.2	350.0	335.4	342.0	64.3	63.3
A5	87.5	83.4	86.5	72.3	0.31	0.36	-0.01	-	109.1	343.4	363.5	335.4	355.1	64.3	63.3
A6	88.2	83.7	86.5	72.3	-0.23	-0.35	0.34	-	160.4	318.8	951.4	335.4	1000.9	65.8	63.3
Avg.	87.2	83.0	86.4	72.3	-0.00	0.01	0.14	-	110.8	331.8	444.6	335.4	453.7	64.8	63.3
Std Dv	0.7	0.5	0.2	0.1	0.48	0.43	0.16	-	25.2	13.9	102.7	0.0	109.7	0.6	0.0
90% CI	0.5	0.4	0.2	0.1	0.40	0.35	0.13	-	20.8	11.5	84.4	0.0	90.3	0.5	0.0
APPROACH -- MULTI-SEG.1															
B21	92.2	88.2	92.7	78.0	-1.32	-1.24	1.62	-	106.7	165.8	173.1	191.7	200.1	43.5	33.4
Avg.	92.2	88.2	92.7	78.0	-1.32	-1.24	1.62	-	106.7	165.8	173.1	191.7	200.1	43.5	33.4
Std Dv	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
90% CI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
APPROACH -- MULTI-SEG.2															
B22	91.2	87.3	92.3	78.5	-1.30	-1.23	0.37	-	135.6	165.2	235.9	190.5	272.1	32.7	33.4
Avg.	91.2	87.3	92.3	78.5	-1.30	-1.23	0.37	-	135.6	165.2	235.9	190.5	272.1	32.7	33.4
Std Dv	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
90% CI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
APPROACH -- MULTI-SEG.3															
S23										NO TRACKING DATA					
Avg.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Std Dv	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
90% CI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*- Data Corrected Using "Simplified Procedure"

TABLE E1-11

TABLE NO. K.5-3.1 (REV.1)

BELL 222 HELICOPTER

CORRECTION DATA*

DOT/TSC
1/31/86

SITE: 3 SIDELINE - 150 M. NORTH JUNE 14,1983

Ev	CORRECTED EPNL	SEL	PNLTm	ALm	CORRECTIONS (dB) /\1(P)	/\1(A)	/\2	/\3	ACOUSTIC ANGLE (Deg)	TRACKING DATA (Meters) (ACTUAL) CPA	SR	(REFERENCE) CPAR	SRR	SPEED(m/sec) GRND	REF
12 DEGREE APPROACH -- TARGET IAS 45 KTS.															
T27	89.8	85.5	90.5	75.6	0.47	0.38	-0.02	-	103.1	195.6	200.8	190.5	195.5	23.5	23.1
T28	88.4	84.5	88.5	73.9	0.20	0.09	-0.13	-	87.8	191.2	191.3	190.5	190.6	22.5	23.1
T29	91.5	87.5	90.6	76.4	0.31	0.17	-0.13	-	129.0	191.5	246.3	190.5	245.0	22.5	23.1
Avg.	89.9	85.8	89.9	75.3	0.33	0.21	-0.09	-	106.6	192.7	212.8	190.5	210.4	22.9	23.1
Std Dv	1.6	1.5	1.2	1.3	0.14	0.15	0.06	-	20.8	2.5	29.4	0.0	30.1	0.6	0.0
90% CI	2.7	2.6	2.0	2.1	0.23	0.25	0.11	-	35.1	4.1	49.6	0.0	50.7	1.0	0.0
12 DEGREE APPROACH -- TARGET IAS 55 KTS.															
U30	87.6	83.8	86.7	74.0	0.25	0.25	-0.36	-	114.7	191.2	210.5	190.5	209.7	26.1	28.3
U31	87.6	83.8	87.1	73.8	0.34	0.38	-0.29	-	133.7	192.6	266.3	190.5	263.4	26.7	28.3
U32	87.3	83.0	87.0	73.4	0.24	0.22	-0.09	-	73.8	190.9	198.8	190.5	198.3	27.8	28.3
Avg.	87.5	83.5	86.9	73.7	0.28	0.28	-0.25	-	107.4	191.6	225.2	190.5	223.8	26.9	28.3
Std Dv	0.2	0.4	0.2	0.3	0.06	0.09	0.14	-	30.6	0.9	36.1	0.0	34.8	0.8	0.0
90% CI	0.3	0.7	0.4	0.5	0.09	0.14	0.24	-	51.6	1.5	60.9	0.0	58.6	1.4	0.0
12 DEGREE APPROACH -- TARGET IAS 65 KTS.															
V33	86.7	83.1	86.8	73.4	0.31	0.25	-0.14	-	96.4	191.7	192.9	190.5	191.7	32.6	33.4
V34	-	82.4	86.7	73.9	0.27	0.26	-	-	115.3	191.2	211.6	190.5	210.7	32.1	33.4
V35	86.9	83.2	87.7	75.1	0.28	0.23	-0.32	-	117.5	191.2	215.5	190.5	214.7	31.2	33.4
Avg.	86.8	82.9	87.1	74.1	0.29	0.25	-0.23	-	109.7	191.4	206.7	190.5	205.7	32.0	33.4
Std Dv	0.1	0.4	0.5	0.8	0.02	0.02	0.13	-	11.6	0.3	12.1	0.0	12.3	0.7	0.0
90% CI	0.7	0.8	0.9	1.4	0.04	0.03	0.57	-	19.5	0.5	20.4	0.0	20.7	1.2	0.0
12 DEGREE APPROACH -- TARGET IAS 75 KTS.															
W36	87.2	83.9	88.2	75.2	0.57	0.53	0.08	-	120.1	196.6	227.3	190.5	220.2	37.6	36.0
W37	87.6	83.9	88.5	75.1	0.37	0.27	-0.01	-	90.6	192.6	192.6	190.5	190.5	36.2	36.0
W38	87.3	83.5	88.1	75.3	0.37	0.35	0.01	-	112.6	193.2	209.3	190.5	206.3	36.5	36.0
W40	86.8	83.5	88.5	76.4	0.47	0.40	-0.16	-	109.8	193.9	206.1	190.5	202.5	35.2	36.0
Avg.	87.2	83.7	88.3	75.5	0.44	0.39	-0.02	-	108.3	194.1	208.8	190.5	204.9	36.4	36.0
Std Dv	0.3	0.2	0.2	0.6	0.10	0.11	0.10	-	12.6	1.8	14.3	0.0	12.3	1.0	0.0
90% CI	0.4	0.3	0.2	0.7	0.11	0.13	0.12	-	14.8	2.1	16.8	0.0	14.4	1.1	0.0

*- Data Corrected Using 'Simplified Procedure'

TABLE E1-12

TABLE NO. K.5-3.2 (REV.1)

BELL 222 HELICOPTER

DOT/TSC
1/31/86

CORRECTION DATA*

SITE: 3 SIDELINE - 150 M. NORTH JUNE 14,1983

Ev	CORRECTED EPNL	SEL	PNLTM	ALM	CORRECTIONS (dB) /\1(P)	/\1(A)	/\2	/\3	ACOUSTIC ANGLE (Deg)	TRACKING DATA (Meters) (ACTUAL) CPA	SR	(REFERENCE) CPAR	SRR	SPEED(M/sec) GRND	REF
6 DEGREE APPROACH -- TARGET IAS 45 KTS.															
N7	92.0	88.0	93.6	80.0	-0.20	-0.23	-0.02	-	136.2	185.4	267.8	191.7	276.9	22.5	23.1
N8	89.8	86.0	87.8	73.8	-0.25	-0.24	0.20	-	84.6	185.0	185.9	191.7	192.5	23.6	23.1
N9	92.0	88.1	90.7	76.6	-0.21	-0.18	0.06	-	128.9	186.3	239.6	191.7	246.5	23.0	23.1
Avg.	91.3	87.3	90.7	76.8	-0.22	-0.22	0.08	-	116.6	185.6	231.1	191.7	238.6	23.0	23.1
Std Dv	1.3	1.2	2.9	3.1	0.03	0.03	0.11	-	27.9	0.7	41.6	0.0	42.7	0.6	0.0
90% CI	2.2	2.0	4.9	5.2	0.04	0.05	0.19	-	47.1	1.1	70.2	0.0	72.0	1.0	0.0
6 DEGREE APPROACH -- TARGET IAS 55 KTS.															
N10	92.9	88.4	93.1	77.9	-0.07	-0.10	-0.57	-	106.8	188.3	196.7	191.7	200.2	24.5	28.3
N11	90.7	86.4	91.8	76.9	-0.22	-0.23	-0.50	-	113.8	185.2	202.4	191.7	209.5	24.6	28.3
N12	90.4	85.7	92.1	75.8	0.09	0.08	-0.48	-	103.3	191.3	196.6	191.7	197.0	25.3	28.3
N13	91.2	87.0	90.2	74.9	-0.22	-0.20	0.16	-	99.2	185.8	188.2	191.7	194.2	28.6	28.3
Avg.	91.3	86.9	91.8	76.4	-0.11	-0.11	-0.35	-	105.8	187.6	196.0	191.7	200.2	25.8	28.3
Std Dv	1.1	1.2	1.2	1.3	0.15	0.14	0.34	-	6.2	2.8	5.8	0.0	6.7	2.0	0.0
90% CI	1.3	1.4	1.4	1.5	0.17	0.16	0.40	-	7.3	3.3	6.9	0.0	7.9	2.3	0.0
6 DEGREE APPROACH -- TARGET IAS 75 KTS.															
O14	90.7	86.7	91.4	76.7	-0.21	-0.23	0.03	-	124.6	185.5	225.4	191.7	233.0	37.9	38.6
O15	-	-	92.6	78.2	-0.05	-0.09	-	-	120.4	188.1	218.3	191.7	222.4	38.4	38.6
O16	89.9	85.9	89.9	76.2	-0.26	-0.30	0.11	-	131.6	184.3	246.4	191.7	256.3	38.4	38.6
Avg.	90.3	86.3	91.3	77.0	-0.17	-0.21	0.07	-	125.6	186.0	230.0	191.7	237.2	38.2	38.6
Std Dv	0.6	0.6	1.4	1.0	0.11	0.11	0.06	-	5.6	2.0	14.6	0.0	17.4	0.3	0.0
90% CI	2.6	2.5	2.3	1.8	0.18	0.18	.0.25	-	9.5	3.3	24.7	0.0	29.3	0.5	0.0
6 DEGREE APPROACH -- TARGET IAS 85 KTS.															
P17	88.0	83.9	89.6	75.2	-0.26	-0.22	0.09	-	120.6	184.9	214.7	191.7	222.6	43.5	43.7
P18	88.9	84.6	91.4	76.9	0.02	0.00	-0.25	-	133.1	189.3	259.4	191.7	262.7	40.9	43.7
P19	87.9	83.7	90.6	75.9	0.02	0.00	-0.03	-	121.5	189.0	221.6	191.7	224.8	42.9	43.7
Avg.	88.3	84.1	90.5	76.0	-0.07	-0.07	-0.06	-	125.1	187.7	231.9	191.7	236.7	42.4	43.7
Std Dv	0.6	0.5	0.9	0.9	0.16	0.13	0.17	-	7.0	2.4	24.0	0.0	22.5	1.4	0.0
90% CI	1.0	0.8	1.5	1.5	0.27	0.21	0.29	-	11.8	4.1	40.5	0.0	38.0	2.3	0.0

*- Data Corrected Using 'Simplified Procedure'

TABLE E1-13

TABLE NO. K.5-3.3 (REV.1)

BELL 222 HELICOPTER

DOT/TSC
1/31/86

CORRECTION DATA*

SITE: 3 SIDELINE - 150 M. NORTH JUNE 14,1983

	CORRECTED				CORRECTIONS (dB)				ACOUSTIC ANGLE	TRACKING DATA (Meters) (ACTUAL)		(REFERENCE)		SPEED(m/sec)	
Ev	EPNL	SEL	PNLTm	ALm	/\1(P)	/\1(A)	/\2	/\3	(Deg)	CPA	SR	CPAR	SRR	GRND	REF
6 DEGREE APPROACH -- TARGET IAS 65 KTS. (ICAO)															
L1	89.7	85.5	90.8	75.9	-0.03	-0.06	0.00	-	120.9	189.9	221.3	191.7	223.3	33.2	33.4
L2	91.6	87.4	90.7	76.9	0.11	0.06	0.15	-	105.4	192.1	199.3	191.7	198.9	34.7	33.4
L3	91.3	87.0	91.0	76.9	-0.22	-0.26	0.09	-	142.3	185.1	302.5	191.7	313.3	33.3	33.4
L4	90.2	85.6	91.6	76.9	-0.13	-0.17	0.12	-	120.7	186.9	239.5	191.7	245.6	33.7	33.4
L5	90.4	86.4	90.8	76.2	-0.19	-0.21	0.13	-	124.0	186.0	224.4	191.7	231.2	33.7	33.4
L6	90.7	86.4	91.4	76.0	-0.06	-0.08	0.00	-	112.4	190.5	203.8	191.7	207.3	33.0	33.4
Avg.	90.7	86.4	91.0	76.5	-0.09	-0.12	0.08	-	122.3	180.1	231.8	191.7	236.6	33.6	33.4
Std Dv	0.7	0.7	0.3	0.5	0.12	0.12	0.07	-	12.9	2.6	37.6	0.0	41.1	0.6	0.0
90% CI	0.6	0.6	0.3	0.4	0.10	0.10	0.05	-	10.6	2.2	30.9	0.0	33.8	0.5	0.0
TAKEOFF -- TARGET IAS 65 KTS. (ICAO)															
K20										NO TRACKING DATA					
K21	87.4	83.4	88.7	74.2	1.87	1.66	-0.61	-	96.2	239.4	240.8	206.0	207.2	32.5	33.4
K22	87.3	83.1	88.9	73.6	1.91	1.63	-0.66	-	95.8	240.6	241.8	206.0	207.1	32.2	33.4
K23	88.5	84.1	89.6	74.9	2.95	2.62	-0.82	-	98.9	264.7	268.0	206.0	208.5	33.4	33.4
K24	88.0	83.8	89.8	75.0	3.05	2.75	-1.35	-	90.7	264.3	264.3	206.0	206.0	29.5	33.4
K25	88.3	84.1	90.1	75.2	3.44	3.14	-1.34	-	100.1	276.6	281.0	206.0	209.2	30.6	33.4
Avg.	87.9	83.7	89.4	74.6	2.64	2.36	-0.96	-	96.4	257.1	259.2	206.0	207.6	31.7	33.4
Std Dv	0.5	0.5	0.6	0.7	0.71	0.68	0.36	-	3.6	16.4	17.4	0.0	1.3	1.6	0.0
90% CI	0.5	0.4	0.6	0.7	0.68	0.65	0.35	-	3.5	15.7	16.6	0.0	1.2	1.5	0.0

*- Data Corrected Using 'Simplified Procedure'

TABLE E1-14

TABLE NO. K.5-3.4 (REV.1)

BELL 222 HELICOPTER

DOT/TSC
2/10/86

CORRECTION DATA*

SITE: 3 SIDELINE - 150 M. NORTH JUNE 15,1983

	CORRECTED				CORRECTIONS (dB)				ACOUSTIC ANGLE	TRACKING DATA (Meters) (ACTUAL)		(REFERENCE)		SPEED(m/sec)	
Ev	EPNL	SEL	PNLTm	ALm	/\1(P)	/\1(A)	/\2	/\3	(Deg)	CPA	SR	CPAR	SRR	GRND	REF
500 FT. FLYOVER -- TARGET IAS 137 KTS.															
B7	90.7	86.7	91.6	78.7	-0.13	-0.17	0.17	1.06	119.6	207.3	238.3	212.1	243.9	72.0	70.5
B8	90.6	86.8	92.3	79.0	-1.00	-0.95	0.63	0.59	113.3	190.5	207.5	212.1	231.0	75.1	70.5
B9	90.9	87.0	92.3	79.4	-1.13	-1.05	0.49	1.26	112.7	188.0	203.8	212.1	230.0	72.0	70.5
Avg.	90.7	86.8	92.1	79.1	-0.75	-0.72	0.43	0.97	115.2	195.3	216.5	212.1	235.0	73.0	70.5
Std Dv	0.1	0.2	0.4	0.4	0.54	0.48	0.24	0.34	3.8	10.5	19.0	0.0	7.8	1.8	0.0
90% CI	0.2	0.3	0.7	0.6	0.92	0.81	0.40	0.58	6.4	17.6	32.0	0.0	13.1	3.0	0.0
500 FT. FLYOVER -- TARGET IAS 127 KTS.															
C10	90.5	86.5	91.9	78.5	-0.73	-0.71	0.29	1.52	110.0	194.2	206.6	212.1	225.7	65.3	65.3
C11	90.3	86.6	93.0	79.2	0.02	-0.02	0.06	1.52	116.9	208.2	233.4	212.1	237.9	65.3	65.3
C12	91.5	87.1	91.1	77.9	-0.54	-0.53	0.23	1.57	118.2	197.6	224.2	212.1	240.6	65.3	65.3
C13	89.7	86.0	89.6	77.6	-1.37	-1.16	0.48	1.47	124.2	185.0	223.6	212.1	256.4	65.8	65.3
C14	90.9	86.8	92.6	79.0	-0.77	-0.75	0.31	1.67	114.6	192.7	212.1	212.1	233.4	65.3	65.3
C15	91.0	87.1	92.2	79.0	0.15	0.08	0.02	1.86	112.6	208.9	226.4	212.1	229.8	64.8	65.3
Avg.	90.7	86.7	91.8	78.5	-0.54	-0.51	0.23	1.60	116.1	197.8	221.0	212.1	237.3	65.3	65.3
Std Dv	0.6	0.4	1.2	0.7	0.56	0.47	0.17	0.14	4.9	9.3	9.9	0.0	10.8	0.3	0.0
90% CI	0.5	0.4	1.0	0.6	0.46	0.39	0.14	0.12	4.1	7.7	8.1	0.0	8.9	0.3	0.0
500 FT. FLYOVER -- TARGET IAS 110 KTS.															
D16	89.4	85.7	89.9	76.6	-0.08	-0.10	0.27	1.37	118.2	204.5	232.1	212.1	240.7	58.6	56.6
D17	89.3	85.3	89.9	77.0	-0.10	-0.11	0.32	1.28	114.9	204.2	225.1	212.1	233.8	59.2	56.6
D18	89.2	85.5	89.6	76.6	-0.03	-0.05	0.30	1.28	114.8	205.2	226.1	212.1	233.7	59.2	56.6
Avg.	89.3	85.5	89.8	76.7	-0.07	-0.09	0.30	1.31	115.9	204.7	227.7	212.1	236.0	59.0	56.6
Std Dv	0.1	0.2	0.2	0.2	0.04	0.03	0.03	0.05	1.9	0.5	3.8	0.0	4.0	0.3	0.0
90% CI	0.2	0.3	0.3	0.4	0.06	0.05	0.04	0.09	3.3	0.9	6.4	0.0	6.8	0.5	0.0
500 FT. FLYOVER -- TARGET IAS 96 KTS.															
E19	88.9	85.0	89.2	75.7	0.08	0.03	0.12	1.61	110.9	207.3	222.0	212.1	227.1	49.9	49.4
Avg.	88.9	85.0	89.2	75.7	0.08	0.03	0.12	1.61	110.9	207.3	222.0	212.1	227.1	49.9	49.4
Std Dv	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
90% CI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*- Data Corrected Using 'Simplified Procedure'

TABLE E1-15

TABLE NO. K.5-3.5 (REV.1)

BELL 222 HELICOPTER

DOT/TSC
1/31/86

CORRECTION DATA*

SITE: 3 SIDELINE - 150 M. NORTH JUNE 15,1983

	CORRECTED				CORRECTIONS (dB)				ACOUSTIC ANGLE	TRACKING DATA (Meters) (ACTUAL)		(REFERENCE)		SPEED(m/sec)	
Ev	EPNL	SEL	PNLTm	ALm	/\1(P)	/\1(A)	/\2	/\3	(Deg)	CPA	SR	CPAR	SRR	GRND	REF
1000 FT. FLYOVER -- TARGET IAS 123 KTS.															
A1	86.4	82.3	85.2	72.0	-0.51	-0.50	0.31	-	93.4	314.7	315.2	335.4	336.0	64.8	63.3
A2	86.1	82.1	85.4	72.1	0.51	0.46	0.03	-	87.8	346.3	346.6	335.4	335.7	65.3	63.3
A3	86.1	82.2	85.4	71.8	0.09	0.06	0.09	-	93.3	333.4	334.0	335.4	336.0	64.3	63.3
A4	86.0	81.9	86.5	72.7	0.47	0.41	-0.03	-	93.1	346.3	346.8	335.4	335.9	64.3	63.3
A5	-	82.4	85.5	71.6	0.51	0.42	-	-	93.2	346.4	347.0	335.4	335.9	64.3	63.3
A6	86.8	82.9	85.8	71.9	-0.33	-0.37	0.31	-	113.5	321.8	351.0	335.4	365.8	65.8	63.3
Avg.	86.3	82.3	85.6	72.0	0.12	0.08	0.14	-	95.7	334.8	340.1	335.4	340.9	64.8	63.3
Std Dv	0.3	0.3	0.5	0.4	0.45	0.43	0.16	-	9.0	14.0	13.5	0.0	12.2	0.6	0.0
90% CI	0.3	0.3	0.4	0.3	0.37	0.35	0.15	-	7.4	11.5	11.1	0.0	10.1	0.5	0.0
APPROACH -- MULTI-SEG.1															
021	88.6	85.2	89.4	76.2	-1.24	-1.15	1.59	-	102.1	167.3	171.1	191.7	196.0	43.5	33.4
Avg.	88.6	85.2	89.4	76.2	-1.24	-1.15	1.59	-	102.1	167.3	171.1	191.7	196.0	43.5	33.4
Std Dv	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
90% CI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
APPROACH -- MULTI-SEG.2															
R22	86.9	83.5	87.0	74.0	-1.13	-1.09	0.34	-	100.7	166.6	169.6	190.5	193.9	32.7	33.4
Avg.	86.9	83.5	87.0	74.0	-1.13	-1.09	0.34	-	100.7	166.6	169.6	190.5	193.9	32.7	33.4
Std Dv	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
90% CI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
APPROACH -- MULTI-SEG.3															
S23										NO TRACKING DATA					
Avg.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Std Dv	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
90% CI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*- Data Corrected Using 'Simplified Procedure'

TABLE E2-1

ADV. MACH FOR TARGET CONDITIONS ANAL. DATE: 11-Mar-86

BELL 222 TWIN JET
ADV. MACH SERIES REFERENCE NUMBERS

TEMPERATURE 59 degrees F (15 degrees C)

SERIES	IAS	TEMP (F)	ROTOR RPM	BLADE DIAM.	ADVM #
B	137.00	59.00	348.00	39.75	0.8561
C	123.00	59.00	348.00	39.75	0.8349
D	110.00	59.00	348.00	39.75	0.8152

TEMPERATURE 77 degrees F (25 degrees C)

SERIES	IAS	TEMP (F)	ROTOR RPM	BLADE DIAM.	ADVM #
B	137.00	77.00	348.00	39.75	0.8416
C	123.00	77.00	348.00	39.75	0.8208
D	110.00	77.00	348.00	39.75	0.8014

TARGET CONDITIONS

SERIES	DESCRIPTION
B	500 FT. LFO IAS = 137 KTS.
C	500 FT. LFO IAS = 123 KTS.
D	500 FT. LFO IAS = 110 KTS.

* 348.00 RPM = 100% ROTOR SPEED

TABLE E2-2

ACTUAL TEST CONDITIONS ANAL. DATE: 11-Mar-86

BELL 222 TWIN JET

EVENT	IAS	TEMP (F)	ROTOR RPM	BLADE DIAM.	ADVM #
B7	140.00	85.00	348.00	39.75	0.8398
B8	146.00	87.00	348.00	39.75	0.8471
B9	140.00	89.00	348.00	39.75	0.8368
C10	127.00	89.00	348.00	39.75	0.8176
C11	127.00	89.00	348.00	39.75	0.8176
C12	127.00	90.00	348.00	39.75	0.8169
C13	128.00	90.00	348.00	39.75	0.8184
C14	127.00	92.00	348.00	39.75	0.8154
C15	126.00	94.00	348.00	39.75	0.8125
D16	114.00	95.00	348.00	39.75	0.7942
D17	115.00	95.00	348.00	39.75	0.7956
D18	115.00	95.00	348.00	39.75	0.7956

FIGURE E2-3

ACTUAL TEST NOISE DATA
ANAL. DATE: 11-Mar-86

BELL 222 TWIN JET

EVENT	TEST ALT	---- AS MEAS. PNLTM ---- LEFT	CENTER	RIGHT	-- PNLTM 492 FOOT NORM. -- LEFT	CENTER	RIGHT
B7	454.40	90.70	93.70	92.60	90.34	92.96	92.24
B8	384.00	92.70	96.00	95.00	91.69	93.69	93.99
B9	374.10	92.20	96.00	94.10	91.10	93.45	93.00
C10	393.80	91.20	94.30	92.20	90.28	92.23	91.28
C11	451.50	91.50	94.30	91.70	91.12	93.50	91.32
C12	392.40	90.10	94.10	91.80	89.17	92.00	90.87
C13	343.80	89.50	95.80	93.50	88.13	92.47	92.13
C14	382.80	91.70	94.00	92.20	90.68	91.67	91.18
C15	446.60	90.20	93.30	91.30	89.77	92.40	90.87
D16	421.00	88.70	93.10	87.90	88.03	91.65	87.23
D17	428.60	88.70	93.00	88.80	88.10	91.72	88.20
D18	430.80	88.30	93.20	88.90	87.72	91.96	88.32

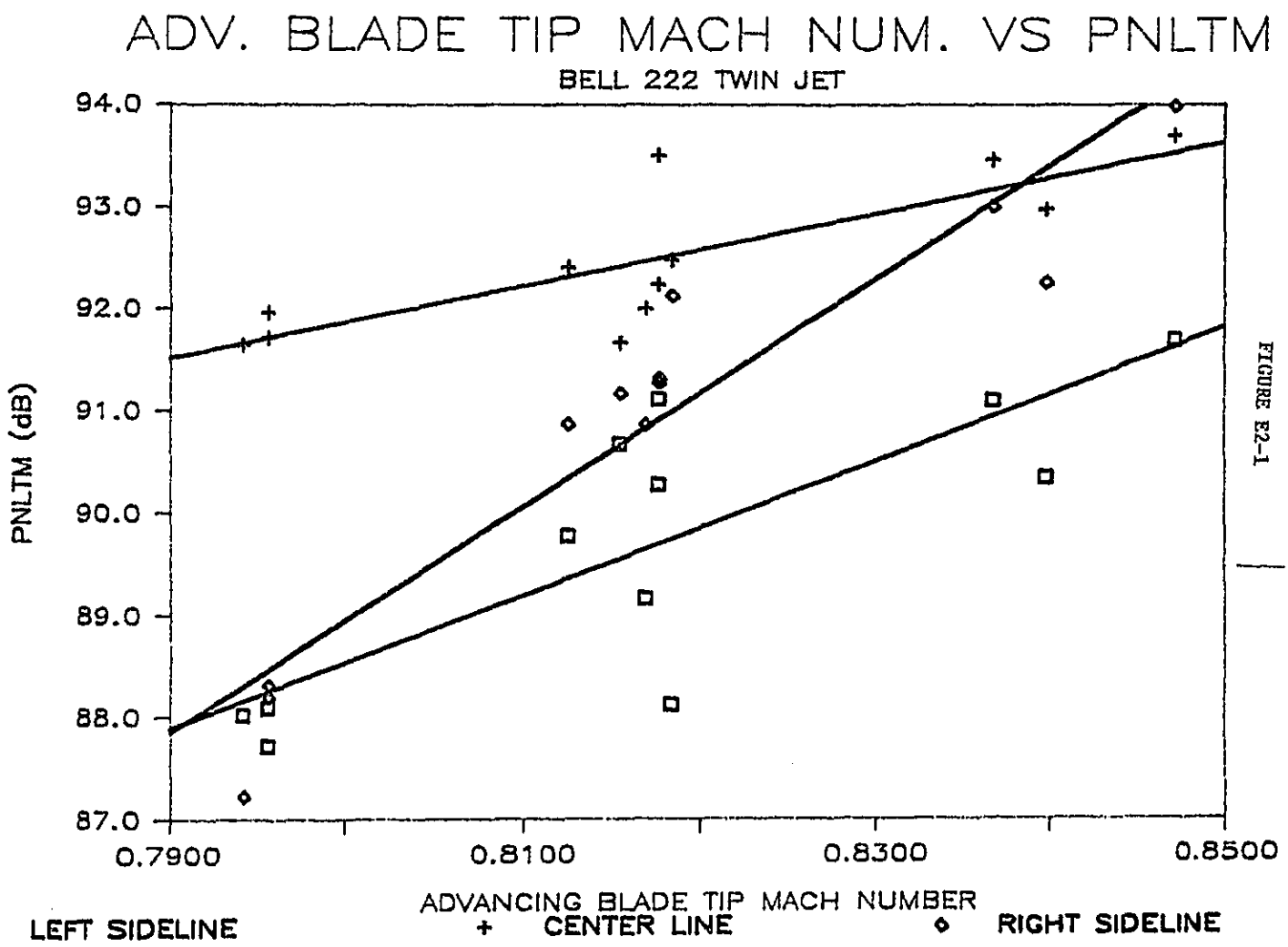

ADV. BLADE TIP MACH NUM. VS PNLTM
BELL 222 TWIN JET
94.0
93.0
92.0
91.0
90.0
89.0
88.0
87.0
PNLTM (dB)
0.7900
0.8100
0.8300
0.8500
ADVANCING BLADE TIP MACH NUMBER
LEFT SIDELINE
+ CENTER LINE
◇ RIGHT SIDELINE

FIGURE E2-1

TABLE E2-4

BELL 222 TWIN JET
LEFT SIDELINE

ANAL. DATE: 11-Mar-86

EVENT	X INPUT	Y INPUT
B7	0.8398	90.34
B8	0.8471	91.69
B9	0.8368	91.10
C10	0.8176	90.28
C11	0.8176	91.12
C12	0.8169	89.17
C13	0.8184	88.13
C14	0.8154	90.68
C15	0.8125	89.77
D16	0.7942	88.03
D17	0.7956	88.10
D18	0.7956	87.72

LINEAR REGRESSION EQUATION

Y =	SLOPE	* X +	INTERCEPT
=	65.33		36.28

R SQ. =	0.646	MEAN X =	0.8173
R =	0.804	S.D. X =	0.0173
STD.ERR =	0.875	MEAN Y =	89.68
CORREL =	0.804	S.D. Y =	1.40
SAMPLE =	12	TOT VAR =	1.97

TABLE E2-5

LINEAR REGRESSION EQUATION

Y =	SLOPE	* X +	INTERCEPT		
=	65.33		36.28		
R SQ. =	0.646	MEAN X =	0.8173		
R =	0.804	S.D. X =	0.0173		
STD.ERR =	0.875	MEAN Y =	89.68		
CORREL =	0.804	S.D. Y =	1.40		
SAMPLE =	12	TOT VAR =	1.97		

SECOND ORDER EQUATION

Y =	A	+	B1	* X +	B2	*X'	
Y =	-433.86	+	1213.59	* X +	-700.83	*X'	
R SQ. =	0.546	MEAN X =	0.8173				
R =	0.739	S.D. X =	0.0173				
STD.ERR =	0.893	MEAN Y =	89.68				
SAMPLE =	12	S.D. Y =	1.40				

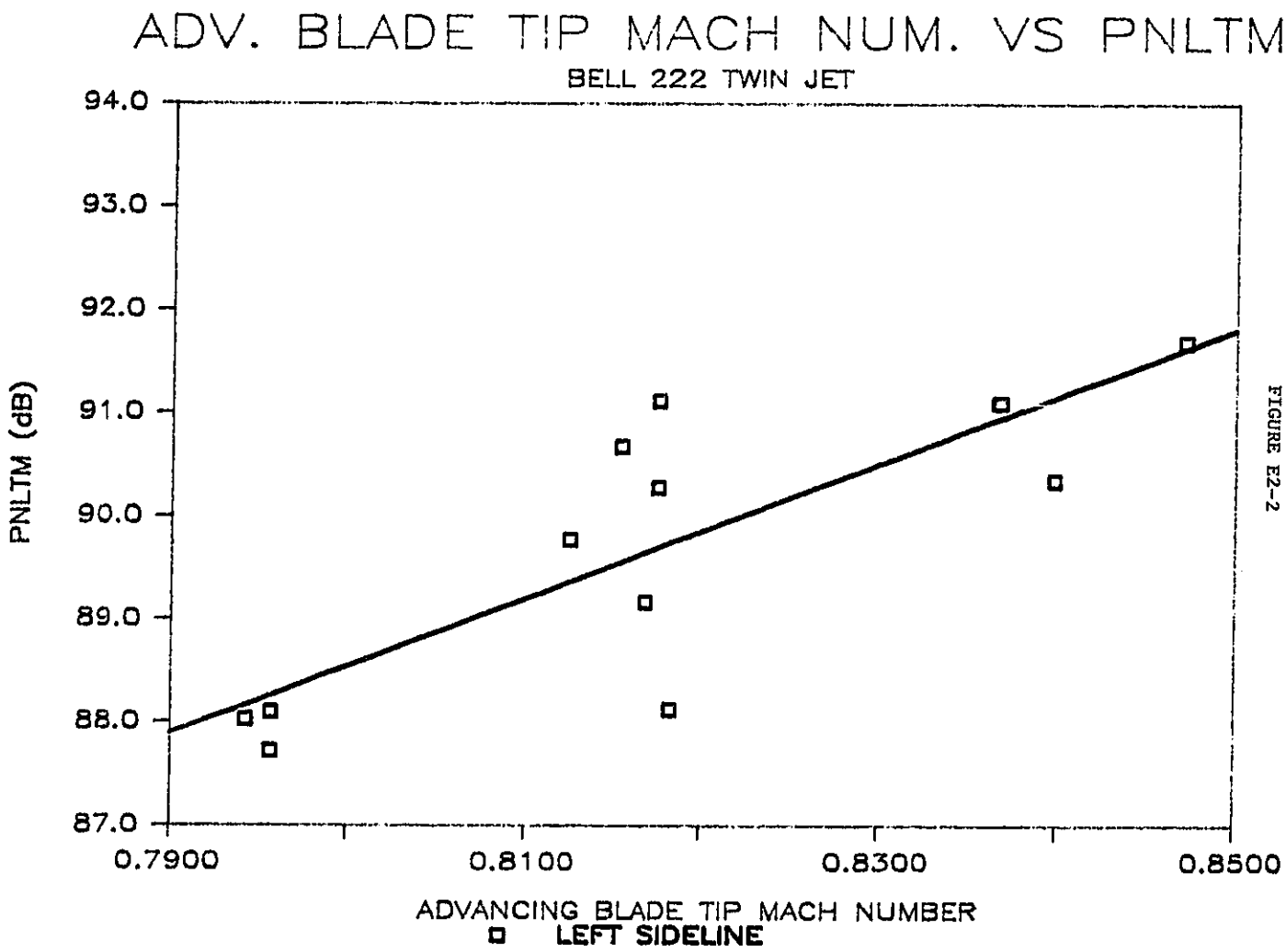

ADV. BLADE TIP MACH NUM. VS PNLTM
BELL 222 TWIN JET
94.0
93.0
92.0
91.0
90.0
89.0
88.0
87.0
PNLTM (dB)
0.7900
0.8100
0.8300
0.8500
ADVANCING BLADE TIP MACH NUMBER
LEFT SIDELINE

FIGURE E2-2

TABLE E2-6

BELL 222 TWIN JET
CENTER LINE

ANAL. DATE: 11-Mar-86

EVENT	X INPUT	Y INPUT
B7	0.8398	92.96
B8	0.8471	93.69
B9	0.8368	93.45
C10	0.8176	92.23
C11	0.8176	93.50
C12	0.8169	92.00
C13	0.8184	92.47
C14	0.8154	91.67
C15	0.8125	92.40
D16	0.7942	91.65
D17	0.7956	91.72
D18	0.7956	91.96

LINEAR REGRESSION EQUATION

Y =	SLOPE	* X +	INTERCEPT	
=	35.16		63.74	

R SQ.	=	0.654	MEAN X =	0.8173
R	=	0.809	S.D. X =	0.0173
STD.ERR	=	0.463	MEAN Y =	92.47
CORREL	=	0.809	S.D. Y =	0.75
SAMPLE	=	12	TOT VAR =	0.56

TABLE E2-7

LINEAR REGRESSION EQUATION

Y =	SLOPE	* X +	INTERCEPT		
=	35.16		63.74		
R SQ. =	0.654	MEAN X =	0.8173		
R =	0.809	S.D. X =	0.0173		
STD.ERR =	0.463	MEAN Y =	92.47		
CORREL =	0.809	S.D. Y =	0.75		
SAMPLE =	12	TOT VAR =	0.56		

SECOND ORDER EQUATION

Y =	A	+	B1	* X +	B2	*X'	
Y =	215.48	+	-335.45	* X +	226.20	*X'	
R SQ. =	0.143	MEAN X =	0.8173				
R =	0.379	S.D. X =	0.0173				
STD.ERR =	0.483	MEAN Y =	92.47				
SAMPLE =	12	S.D. Y =	0.75				

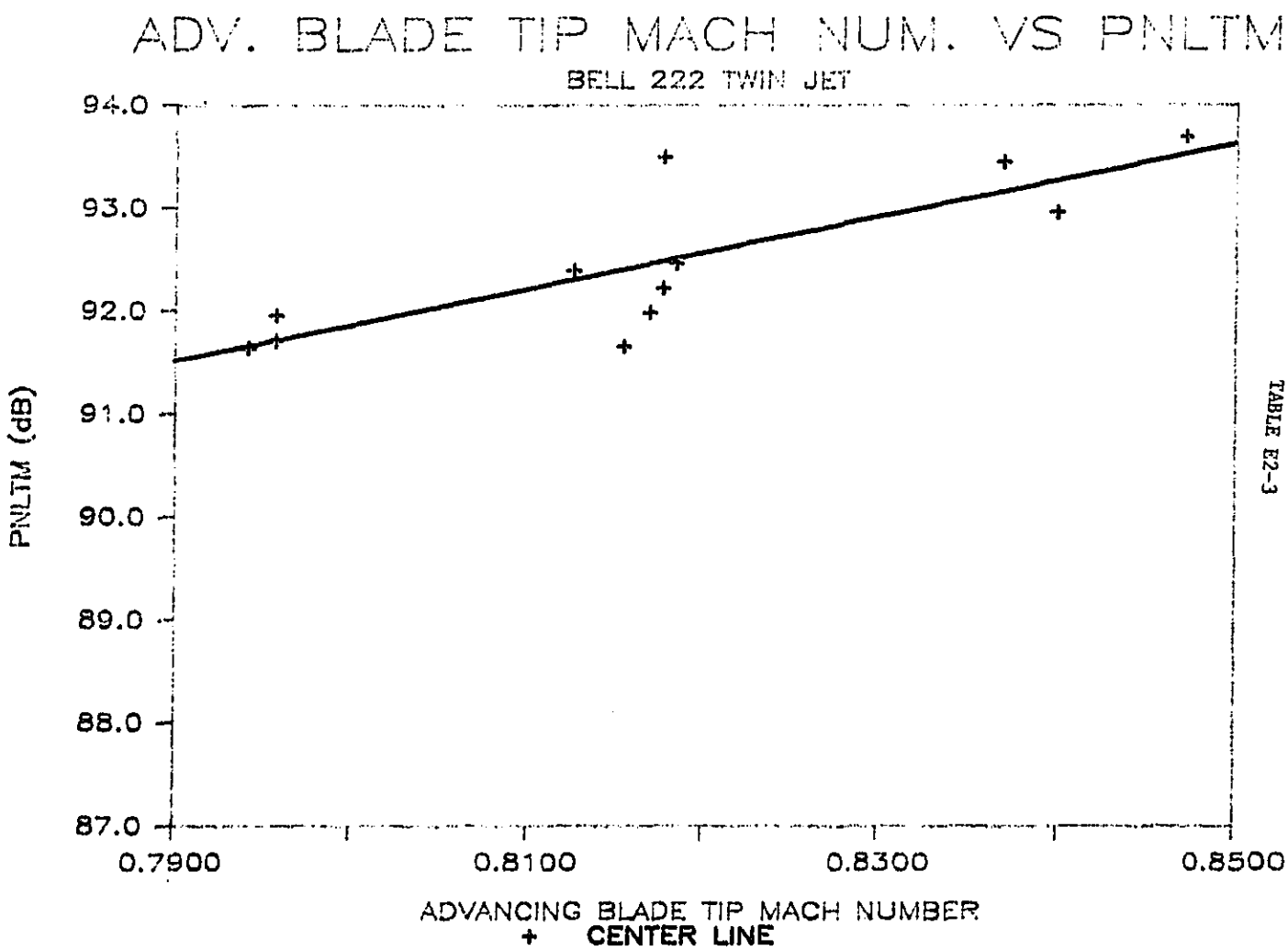

ADV. BLADE TIP MACH NUM. VS PNLTM
BELL 222 TWIN JET
94.0
93.0
92.0
91.0
90.0
89.0
88.0
87.0
PNLTM (dB)
0.7900
0.8100
0.8300
0.8500
ADVANCING BLADE TIP MACH NUMBER
+ CENTER LINE
TABLE E2-3

TABLE E2-8

BELL 222 TWIN JET
RIGHT SIDELINE

ANAL. DATE: 11-Mar-86

EVENT	X INPUT	Y INPUT
B7	0.8398	92.24
B8	0.8471	93.99
B9	0.8368	93.00
C10	0.8176	91.28
C11	0.8176	91.32
C12	0.8169	90.87
C13	0.8184	92.13
C14	0.8154	91.18
C15	0.8125	90.87
D16	0.7942	87.23
D17	0.7956	88.20
D18	0.7956	88.32

LINEAR REGRESSION EQUATION

Y =	SLOPE	* X +	INTERCEPT	
=	110.93		0.22	

R SQ.	=	0.896	MEAN X =	0.8173
R	=	0.946	S.D. X =	0.0173
STD.ERR	=	0.686	MEAN Y =	90.89
CORREL	=	0.946	S.D. Y =	2.02
SAMPLE	=	12	TOT VAR =	4.09

TABLE E2-9

LINEAR REGRESSION EQUATION

Y =	SLOPE	* X	+	INTERCEPT	
=	110.93			0.22	

R SQ. =	0.896	MEAN X =	0.8173
R =	0.946	S.D. X =	0.0173
STD.ERR =	0.686	MEAN Y =	90.89
CORREL =	0.946	S.D. Y =	2.02
SAMPLE =	12	TOT VAR =	4.09

SECOND ORDER EQUATION

Y =	A	+	B1	* X	+	B2	*X'
Y =	-1067.23	+	2718.04	* X	+	-1591.23	*X'

R SQ. =	0.878	MEAN X =	0.8173
R =	0.937	S.D. X =	0.0173
STD.ERR =	0.498	MEAN Y =	90.89
SAMPLE =	12	S.D. Y =	2.02

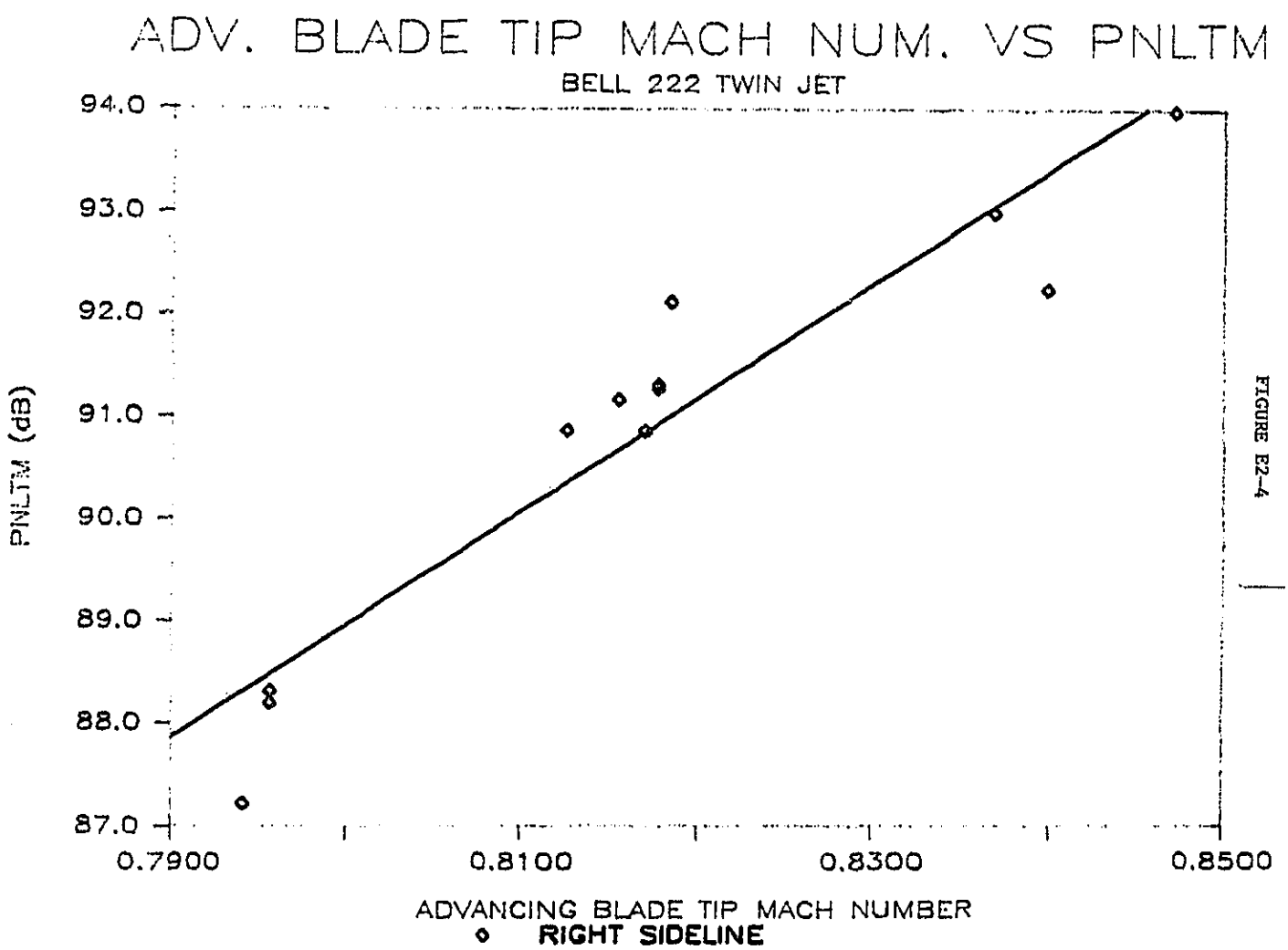

ADV. BLADE TIP MACH NUM. VS PNLTM
BELL 222 TWIN JET
94.0
93.0
92.0
91.0
90.0
89.0
88.0
87.0
PNLTM (dB)
0.7900
0.8100
0.8300
0.8500
ADVANCING BLADE TIP MACH NUMBER
◇ RIGHT SIDELINE

FIGURE E2-4

A: 10-Mar-86

TABLE E3-1

SUMMARY EPNL LEVELS (dB)
DATA PROCESSED PER ICAO CERTIFICATION PROCEDURES

HELICOPTER: BELL 222 TWIN JET
OPERATION: ICAO TAKEOFF

EVENT NUMBER	LEFT SIDELINE	CENTER LINE CENTER	RIGHT SIDELINE	3 MIC AVERAGE
SITE	2	1	3	
K20	NA	NA	NA	0.00
K21	89.10	90.20	87.40	88.90
K22	89.40	90.80	87.30	89.17
K23	89.80	90.90	88.50	89.73
K24	89.10	90.60	88.00	89.23
K25	89.10	91.60	88.40	89.70
AVERAGE	89.30	90.82	87.92	89.35
STD. DEV.	0.31	0.51	0.55	0.36
90% C.I.	0.29	0.49	0.53	0.34

A: 10-Mar-86

TABLE E3-2

SUMMARY EPNL LEVELS (dB)
DATA PROCESSED PER ICAO CERTIFICATION PROCEDURES

HELICOPTER: BELL 222 TWIN JET
OPERATION: ICAO LFO

EVENT NUMBER	LEFT SIDELINE	CENTER LINE CENTER	RIGHT SIDELINE	3 MIC AVERAGE
SITE	2/3	1	3/2	
C10	90.40	91.30	92.30	91.33
C11	90.10	92.40	93.00	91.83
C12	91.40	92.40	92.90	92.23
C13	89.70	91.10	93.00	91.27
C14	90.80	90.90	92.10	91.27
C15	90.80	91.40	93.50	91.90
AVERAGE	90.53	91.58	92.80	91.64
STD. DEV.	0.60	0.66	0.51	0.41
90% C.I.	0.49	0.54	0.42	0.34

TABLE E3-3

SUMMARY EPNL LEVELS (dB)
DATA PROCESSED PER ICAO CERTIFICATION PROCEDURES

HELICOPTER: BELL 222 TWIN JET
OPERATION: ICAO APPROACH

EVENT NUMBER	LEFT SIDELINE	CENTER LINE CENTER	RIGHT SIDELINE	3 MIC AVERAGE
SITE	3	1	2	
L1	89.80	97.00	94.20	93.67
L2	91.60	98.40	93.50	94.50
L3	91.30	98.10	92.00	93.80
L4	90.20	97.60	93.30	93.70
L5	90.40	97.60	92.60	93.53
L6	90.70	98.80	93.20	94.23
AVERAGE	90.67	97.92	93.13	93.91
STD. DEV.	0.68	0.65	0.76	0.38
90% C.I.	0.56	0.53	0.62	0.31

APPENDIX F (F1-F3)

BOEING VERTOL 234/CH-47D

TABLE F1-1

TABLE NO. J.7-1.1

BOEING VERTOL CH-47D HELICOPTER (CHINOOK)

DOT/TSC
2/13/86

CORRECTION DATA*

SITE: 1 CENTERLINE - CENTER JULY 12,1983

	CORRECTED				CORRECTIONS (dB)				ACOUSTIC ANGLE	TRACKING DATA (Meters) (ACTUAL)		(REFERENCE)		SPEED(m/sec)	
Ev	EPNL	SEL	PNLTm	ALm	/\1(P)	/\1(A)	/\2	/\3	(Deg)	CPA	SR	CPAR	SRR	GRND	REF
TAKEOFF -- TARGET IAS 85 KTS.															
J47	97.7	92.7	101.3	87.2	10.82	9.99	-3.14	-	66.3	222.5	242.9	84.9	92.7	43.7	43.7
J49	96.9	92.1	101.5	87.4	9.66	8.98	-3.09	-	70.5	202.3	214.6	84.9	90.1	41.1	43.7
J51	97.6	92.7	101.4	87.1	8.72	8.10	-2.64	-	65.9	184.7	202.4	84.9	93.0	42.7	43.7
Avg.	97.4	92.5	101.4	87.2	9.73	9.02	-2.96	-	67.6	203.2	220.0	84.9	91.9	42.5	43.7
Std Dv	0.4	0.3	0.1	0.2	1.05	0.95	0.28	-	2.5	18.9	20.8	0.0	1.6	1.3	0.0
90% CI	0.8	0.6	0.2	0.3	1.77	1.59	0.46	-	4.3	31.9	35.1	0.0	2.7	2.2	0.0
TAKEOFF -- TARGET IAS 70 KTS. (MILITARY)															
L53	-	91.2	99.5	85.1	2.07	2.02	-	-	73.6	103.0	107.4	84.9	88.5	36.0	36.0
L54	97.5	92.2	100.3	85.5	2.65	2.50	-0.59	-	117.2	107.6	121.1	84.9	95.5	37.6	36.0
L55	96.6	91.5	98.8	85.1	2.02	1.89	-0.58	-	74.8	101.4	105.1	84.9	88.0	36.0	36.0
Avg.	97.0	91.6	99.5	85.2	2.25	2.14	-0.58	-	88.5	104.0	111.2	84.9	90.7	36.5	36.0
Std Dv	0.6	0.5	0.8	0.2	0.35	0.32	0.01	-	24.9	3.2	8.6	0.0	4.2	0.9	0.0
90% CI	2.8	0.8	1.3	0.4	0.59	0.54	0.03	-	41.9	5.4	14.5	0.0	7.1	1.5	0.0
APPROACH -- TARGET IAS 100 KTS.															
K46	102.0	97.5	106.5	92.0	1.49	1.31	-1.57	-	121.5	137.0	160.6	119.8	140.5	39.6	51.4
K48	101.3	97.1	105.7	91.5	1.68	1.53	-0.98	-	109.0	140.7	148.8	119.8	126.7	46.3	51.4
K50	101.6	97.4	106.4	92.0	1.66	1.46	-0.71	-	114.4	139.4	153.0	119.8	131.6	48.9	51.4
K52	101.8	97.6	106.6	92.1	1.22	1.08	-0.36	-	116.1	133.7	148.8	119.8	133.4	51.4	51.4
Avg.	101.7	97.4	106.3	91.9	1.51	1.34	-0.90	-	115.2	137.7	152.8	119.8	133.1	46.6	51.4
Std Dv	0.3	0.2	0.4	0.3	0.21	0.20	0.51	-	5.1	3.1	5.5	0.0	5.7	5.1	0.0
90% CI	0.4	0.2	0.5	0.3	0.25	0.23	0.60	-	6.0	3.6	6.5	0.0	6.7	6.0	0.0
APPROACH -- TARGET IAS 70 KTS. (MILITARY)															
I36	104.8	100.8	106.6	93.8	1.60	1.45	0.08	-	108.4	138.1	145.6	118.5	124.9	41.1	36.0
I37	103.2	99.1	105.1	90.9	1.48	1.32	0.14	-	128.4	135.7	173.2	118.5	151.3	41.1	36.0
I38	104.7	100.3	107.9	93.3	1.67	1.56	-0.71	-	135.8	139.1	199.5	118.5	170.0	34.5	36.0
I39	104.2	100.0	106.0	91.6	1.51	1.33	0.07	-	136.2	136.1	196.5	118.5	171.1	40.6	36.0
Avg.	104.2	100.0	106.4	92.4	1.56	1.41	-0.10	-	127.2	137.3	178.7	118.5	154.3	39.4	36.0
Std Dv	0.7	0.7	1.2	1.4	0.09	0.11	0.40	-	13.0	1.6	25.0	0.0	21.6	3.3	0.0
90% CI	0.9	0.9	1.4	1.6	0.10	0.13	0.48	-	15.3	1.9	29.5	0.0	25.5	3.8	0.0

*- Data Corrected Using 'Simplified Procedure'

TABLE F1-2

TABLE NO. J.7-1.2

BOEING VERTOL CH-47D HELICOPTER (CHINOOK)

CORRECTION DATA*

DOT/TSC
2/13/86

SITE: 1

CENTERLINE - CENTER

JULY 12,1983

Ev	CORRECTED EPNL	CORRECTED SEL	CORRECTED PNLTm	CORRECTED ALm	CORRECTIONS (dB) /\1(P)	/\1(A)	/\2	/\3	ACOUSTIC ANGLE (Deg)	TRACKING DATA (Meters) (ACTUAL) CPA	SR	(REFERENCE) CPAR	SRR	SPEED(m/sec) GRND	REF
500 FT. FLYOVER -- TARGET IAS 135 KTS.															
C11	92.0	87.5	95.2	80.5	0.21	0.26	-0.09	-	116.3	154.2	172.0	150.0	167.4	69.4	69.4
C12	95.4	90.7	99.2	84.0	0.88	0.74	-0.24	1.27	125.4	161.6	198.3	150.0	184.0	69.4	69.4
C13	93.1	88.4	94.9	80.0	-0.23	-0.26	0.08	-	117.5	146.2	164.9	150.0	169.1	69.4	69.4
C14	94.3	89.5	97.6	82.5	0.39	0.31	-0.10	1.31	110.4	154.4	164.7	150.0	160.0	69.4	69.4
Avg.	93.7	89.0	96.7	81.8	0.31	0.26	-0.09	1.29	117.4	154.1	175.0	150.0	170.1	69.4	69.4
Std Dv	1.4	1.4	2.0	1.8	0.46	0.41	0.13	0.03	6.2	6.3	15.9	0.0	10.1	0.0	0.0
90% CI	1.7	1.6	2.4	2.2	0.54	0.48	0.15	0.13	7.3	7.4	18.7	0.0	11.8	0.0	0.0
500 FT. FLYOVER -- TARGET IAS 135 KTS. (ICAO)															
A1	92.3	87.4	96.4	80.8	0.65	0.56	-0.19	0.22	115.7	158.9	176.4	150.0	166.5	69.4	69.4
A2	93.1	88.0	96.4	81.1	0.73	0.77	-0.42	0.64	102.8	162.4	166.6	150.0	153.8	66.9	69.4
A3	93.9	88.7	95.4	80.1	0.31	0.37	-0.12	1.17	121.4	155.8	182.6	150.0	175.7	69.4	69.4
A4	93.1	88.0	95.5	80.1	0.31	0.36	-0.13	-	121.4	156.3	183.0	150.0	175.6	69.4	69.4
A5	92.6	87.3	95.0	79.5	0.63	0.66	-0.22	0.33	115.4	160.3	177.4	150.0	166.0	69.4	69.4
A6	92.8	87.9	95.6	79.9	1.47	1.40	-0.45	-	127.9	172.4	218.5	150.0	190.2	69.4	69.4
Avg.	93.0	87.9	95.7	80.2	0.68	0.69	-0.25	0.59	117.4	161.0	184.1	150.0	171.3	69.0	69.4
Std Dv	0.6	0.5	0.6	0.6	0.43	0.38	0.14	0.43	8.5	6.1	17.9	0.0	12.2	1.1	0.0
90% CI	0.5	0.4	0.5	0.5	0.35	0.32	0.12	0.50	7.0	5.0	14.7	0.0	10.1	0.9	0.0
500 FT. FLYOVER -- TARGET IAS 135 KTS. (MILITARY)															
B7	93.9	88.5	97.0	80.7	-0.25	-0.29	-0.08	-	97.8	146.3	147.7	150.0	151.4	66.9	69.4
B8	95.9	90.0	99.0	82.7	0.70	0.64	-0.22	-	115.4	160.6	177.7	150.0	166.0	69.4	69.4
B9	95.3	89.6	100.2	84.2	0.12	0.18	-0.07	-	110.5	153.0	163.4	150.0	160.1	69.4	69.4
B10	94.6	89.1	97.1	81.4	0.26	0.35	0.04	-	136.2	155.4	224.6	150.0	216.8	72.0	69.4
Avg.	94.9	89.3	98.3	82.3	0.21	0.22	-0.08	-	115.0	153.9	178.4	150.0	173.6	69.4	69.4
Std Dv	0.9	0.6	1.5	1.5	0.39	0.39	0.11	-	16.0	5.9	33.2	0.0	29.4	2.1	0.0
90% CI	1.0	0.7	1.8	1.8	0.46	0.46	0.13	-	18.8	7.0	39.0	0.0	34.6	2.5	0.0
500 FT. FLYOVER -- TARGET IAS 120 KTS.															
D15	91.9	87.3	94.4	80.5	-0.45	-0.38	0.13	1.29	85.0	144.0	144.5	150.0	150.6	61.7	61.7
D16	93.1	88.4	95.3	80.1	0.21	0.11	0.16	0.94	55.5	150.7	183.0	150.0	182.1	64.3	61.7
D17	90.5	86.1	92.3	78.3	-0.05	0.10	-0.01	-	128.1	150.4	191.2	150.0	190.6	61.7	61.7
D18	92.8	88.3	94.9	80.7	-0.07	-0.08	0.04	1.33	103.1	148.1	152.1	150.0	154.0	61.7	61.7
D19	91.3	87.4	94.0	79.7	-0.64	-0.41	0.15	1.33	120.4	143.2	165.9	150.0	173.8	61.7	61.7
Avg.	91.9	87.5	94.2	79.8	-0.20	-0.13	0.09	1.22	98.4	147.3	167.3	150.0	170.2	62.2	61.7
Std Dv	1.1	0.9	1.2	1.0	0.34	0.25	0.08	0.19	29.2	3.6	19.8	0.0	17.4	1.1	0.0
90% CI	1.0	0.9	1.1	0.9	0.32	0.24	0.07	0.22	27.8	3.4	18.9	0.0	16.6	1.1	0.0

*- Data Corrected Using 'Simplified Procedure'

TABLE F1-3

TABLE NO. J.7-1.3

BOEING VERTOL CH-47D HELICOPTER (CHINOOK)

CORRECTION DATA*

DOT/TSC
2/13/86

SITE: 1

CENTERLINE - CENTER

JULY 12,1983

Ev	CORRECTED EPNL	SEL	PNLTm	ALm	CORRECTIONS (dB) /\1(P)	/\1(A)	/\2	/\3	ACOUSTIC ANGLE (Deg)	TRACKING DATA (Meters) (ACTUAL) CPA	SR	(REFERENCE) CPAR	SRR	SPEED(m/sec) GRND	REF
500 FT. FLYOVER -- TARGET IAS 105 KTS.															
E20	93.6	89.3	94.7	80.6	-1.76	-1.65	0.76	0.96	110.1	126.3	134.5	150.0	159.7	56.6	54.0
E21	91.0	87.3	94.2	79.4	0.36	0.27	-0.07	1.30	119.5	153.4	176.3	150.0	172.4	54.0	54.0
E22	91.2	86.9	92.6	78.2	0.83	0.71	-0.41	-	136.4	159.2	231.1	150.0	217.7	51.4	54.0
E23	91.8	87.6	93.9	79.8	0.36	0.63	-0.39	1.68	117.5	158.6	178.8	150.0	169.1	51.4	54.0
E24	93.1	88.3	94.8	79.8	1.19	1.00	-0.31	1.33	81.6	165.0	166.7	150.0	151.6	54.0	54.0
E25	92.3	87.9	94.9	80.2	0.83	0.79	-0.47	1.98	132.4	157.9	213.9	150.0	203.2	50.4	54.0
Avg.	92.3	87.9	94.2	79.7	0.30	0.29	-0.15	1.45	116.3	153.4	183.6	150.0	179.0	53.0	54.0
Std Dv	0.9	0.8	0.9	0.8	1.06	0.98	0.47	0.39	19.6	13.8	34.5	0.0	25.9	2.3	0.0
90% CI	0.7	0.7	0.7	0.7	0.87	0.81	0.38	0.37	16.1	11.3	28.4	0.0	21.3	1.9	0.0
1000 FT. FLYOVER -- TARGET IAS 135 KTS.															
F26	87.5	83.7	88.1	73.6	-0.28	-0.30	0.16	-	114.6	285.3	313.7	300.0	329.9	69.4	69.4
F27	86.6	82.9	88.6	74.7	-1.09	-0.75	0.30	-	90.6	273.9	274.0	300.0	300.0	69.4	69.4
F28	86.4	82.6	88.4	73.6	-0.22	-0.34	0.15	-	97.7	286.1	288.7	300.0	302.7	69.4	69.4
F29	86.4	82.8	88.3	74.2	-0.35	-0.34	0.08	-	104.3	284.4	293.5	300.0	309.6	67.9	69.4
Avg.	86.7	83.0	88.4	74.0	-0.48	-0.43	0.17	-	101.8	282.4	292.5	300.0	310.6	69.1	69.4
Std Dv	0.5	0.5	0.2	0.5	0.41	0.21	0.09	-	10.2	5.7	16.4	0.0	13.5	0.8	0.0
90% CI	0.6	0.6	0.2	0.6	0.48	0.25	0.11	-	12.0	6.7	19.3	0.0	15.9	0.9	0.0
TAKEOFF -- TARGET IAS 85 KTS. (ICAO)															
G40	-	91.9	100.5	86.8	3.31	3.12	-	-	75.1	115.1	119.1	84.9	87.9	41.1	43.7
G41	96.3	91.5	99.9	86.2	2.84	2.61	-1.09	-	69.9	109.3	116.4	84.9	90.4	41.1	43.7
G42	95.5	90.7	98.6	84.7	0.94	0.74	-0.54	-	81.5	90.9	91.9	84.9	85.9	40.6	43.7
G43	-	92.0	99.8	85.6	2.90	2.63	-	-	97.3	109.8	110.7	84.9	85.6	46.3	43.7
G44	95.1	90.4	99.0	84.8	-1.01	-1.01	0.13	-	96.6	75.2	75.7	84.9	85.5	41.1	43.7
G45	95.7	90.7	99.4	85.4	-0.27	-0.47	-0.22	-	82.7	79.6	80.3	84.9	85.6	39.6	43.7
Avg.	95.7	91.2	99.5	85.6	1.45	1.27	-0.43	-	83.9	96.6	99.0	84.9	86.8	41.7	43.7
Std Dv	0.5	0.7	0.7	0.8	1.83	1.76	0.52	-	11.2	17.1	18.9	0.0	2.0	2.3	0.0
90% CI	0.6	0.6	0.6	0.7	1.51	1.45	0.61	-	9.2	14.0	15.6	0.0	1.6	1.9	0.0
APPROACH -- TARGET IAS 85 KTS. (ICAO)															
H30	102.2	97.9	105.8	91.6	0.88	0.75	-0.51	-	133.0	128.8	176.2	119.3	163.3	41.1	43.7
H31	101.9	97.8	105.6	91.1	1.17	1.12	-0.63	-	125.3	133.6	163.7	119.3	146.2	41.1	43.7
H32	102.6	98.2	106.2	91.7	0.73	0.61	-0.46	-	135.0	126.7	179.2	119.3	168.7	41.1	43.7
H33	103.5	99.0	106.6	92.1	1.07	0.93	-0.58	-	119.4	131.4	150.8	119.3	136.9	41.1	43.7
H34	102.7	98.3	105.8	91.6	0.34	0.27	-0.39	-	121.7	122.1	143.6	119.3	140.3	40.6	43.7
H35	102.2	98.2	106.1	91.9	1.12	0.98	-0.07	-	135.4	131.5	187.2	119.3	169.8	46.3	43.7
Avg.	102.5	98.2	106.0	91.7	0.88	0.78	-0.44	-	128.3	129.0	166.8	119.3	154.2	41.9	43.7
Std Dv	0.6	0.4	0.4	0.3	0.31	0.31	0.20	-	7.1	4.2	17.1	0.0	14.8	2.2	0.0
90% CI	0.5	0.4	0.3	0.3	0.26	0.25	0.16	-	5.8	3.4	14.1	0.0	12.2	1.8	0.0

*- Data Corrected Using "Simplified Procedure"

TABLE F1-4

TABLE NO. J.7-2.1

BOEING VERTOL CH-47D HELICOPTER (CHINOOK)

DOT/TSC
2/13/86

CORRECTION DATA*

SITE: 2 SIDELINE - 150 M. SOUTH JULY 12,1983

	CORRECTED				CORRECTIONS (dB)				ACOUSTIC ANGLE	TRACKING DATA (Meters) (ACTUAL)		(REFERENCE)		SPEED(m/sec)	
Ev	EPNL	SEL	PNLTm	ALm	/\1(P)	/\1(A)	/\2	/\3	(Deg)	CPA	SR	CPAR	SRR	GRND	REF
TAKEOFF -- TARGET IAS 85 KTS.															
J47	95.0	89.6	96.0	81.1	4.95	3.91	-1.09	-	110.8	267.7	286.4	191.4	204.8	43.7	43.7
J49	94.3	88.9	95.8	80.0	4.59	3.42	-1.15	-	124.7	251.2	305.6	191.4	233.0	41.1	43.7
J51	93.4	88.6	95.0	79.4	3.30	2.84	-0.80	-	107.9	237.3	249.4	191.4	201.2	42.7	43.7
Avg.	94.2	89.0	95.6	80.2	4.28	3.39	-1.01	-	114.5	252.1	280.5	191.4	213.0	42.5	43.7
Std Dv	0.8	0.5	0.5	0.9	0.87	0.54	0.19	-	9.0	15.2	28.6	0.0	17.4	1.3	0.0
90% CI	1.3	0.8	0.9	1.5	1.46	0.90	0.32	-	15.2	25.6	48.2	0.0	29.3	2.2	0.0
TAKEOFF -- TARGET IAS 70 KTS. (MILITARY)															
L53	93.2	88.3	94.4	78.9	1.17	1.03	-0.17	-	119.0	181.5	207.5	172.4	197.1	36.0	36.0
L54	93.6	88.7	94.7	78.8	1.33	1.26	-0.03	-	107.5	184.1	193.1	172.4	180.7	37.6	36.0
L55	93.9	88.6	94.7	78.8	1.22	0.83	-0.15	-	128.5	180.6	230.7	172.4	220.2	36.0	36.0
Avg.	93.6	88.5	94.6	78.8	1.24	1.04	-0.12	-	118.3	182.1	210.4	172.4	199.3	36.5	36.0
Std Dv	0.3	0.2	0.2	0.0	0.08	0.22	0.08	-	10.5	1.8	19.0	0.0	19.8	0.9	0.0
90% CI	0.6	0.3	0.3	0.1	0.14	0.36	0.13	-	17.7	3.1	32.0	0.0	33.4	1.5	0.0
APPROACH -- TARGET IAS 100 KTS.															
K46	95.6	90.9	98.4	82.2	1.63	1.42	-1.54	-	121.2	195.4	228.3	172.7	201.8	39.6	51.4
K48	96.6	91.3	99.0	83.6	2.09	1.90	-1.02	-	101.6	205.1	209.4	172.7	176.2	46.3	51.4
K50	97.4	92.1	99.6	84.0	2.16	1.82	-0.77	-	137.4	204.2	301.8	172.7	255.2	48.9	51.4
K52	97.0	91.7	99.6	83.2	2.04	1.72	-0.48	-	124.8	200.4	243.9	172.7	210.2	51.4	51.4
Avg.	96.6	91.5	99.1	83.3	1.98	1.71	-0.95	-	121.2	201.3	245.9	172.7	210.9	46.6	51.4
Std Dv	0.8	0.5	0.6	0.8	0.24	0.21	0.45	-	14.8	4.4	39.9	0.0	32.9	5.1	0.0
90% CI	0.9	0.6	0.7	0.9	0.28	0.25	0.53	-	17.5	5.2	46.9	0.0	38.7	6.0	0.0
APPROACH -- TARGET IAS 70 KTS. (MILITARY)															
I36	97.6	93.3	99.2	84.6	0.87	0.70	0.38	-	137.6	203.4	301.4	191.2	283.4	41.1	36.0
I37	96.2	91.9	95.7	80.6	0.84	0.67	0.40	-	140.1	201.7	314.6	191.2	298.2	41.1	36.0
I38	98.8	93.6	100.3	84.4	0.93	0.76	-0.40	-	135.3	204.0	290.1	191.2	271.9	34.5	36.0
I39	99.7	94.5	100.1	83.7	0.83	0.63	0.35	-	125.7	202.0	248.9	191.2	235.5	40.6	36.0
Avg.	98.1	93.3	98.9	83.4	0.87	0.69	0.18	-	134.7	202.8	288.8	191.2	272.2	39.4	36.0
Std Dv	1.5	1.0	2.1	1.9	0.04	0.05	0.39	-	6.3	1.1	28.4	0.0	26.7	3.3	0.0
90% CI	1.8	1.2	2.5	2.2	0.05	0.06	0.46	-	7.4	1.3	33.4	0.0	31.5	3.8	0.0

*- Data Corrected Using "Simplified Procedure"

TABLE F1-5

TABLE NO. J.7-2.2

BOEING VERTOL CH-47D HELICOPTER (CHINOOK)

DOT/TSC
2/13/86

CORRECTION DATA*

SITE: 2 SIDELINE - 150 M. SOUTH JULY 12,1983

	CORRECTED				CORRECTIONS (dB)				ACOUSTIC ANGLE	TRACKING DATA (Meters) (ACTUAL)		(REFERENCE)		SPEED(m/sec)	
Ev	EPNL	SEL	PNLTm	ALm	/\1(P)	/\1(A)	/\2	/\3	(Deg)	CPA	SR	CPAR	SRR	GRND	REF
500 FT. FLYOVER -- TARGET IAS 135 KTS.															
C11	90.5	85.5	93.1	77.5	0.26	0.18	-0.04	-	125.4	214.5	263.1	212.1	260.1	69.4	69.4
C12	94.1	89.1	97.3	82.1	0.47	0.41	-0.12	0.81	104.5	219.9	227.1	212.1	219.1	69.4	69.4
C13	90.7	86.0	92.9	77.6	-0.11	-0.21	0.05	-	114.4	208.9	229.3	212.1	232.9	69.4	69.4
C14	92.5	88.0	95.0	79.9	0.19	0.15	-0.04	0.84	109.4	214.7	227.6	212.1	224.9	69.4	69.4
Avg.	92.0	87.2	94.6	79.3	0.20	0.13	-0.04	0.82	113.4	214.5	236.8	212.1	234.2	69.4	69.4
Std Dv	1.7	1.7	2.0	2.2	0.24	0.26	0.07	0.02	8.9	4.5	17.5	0.0	18.2	0.0	0.0
90% CI	2.0	2.0	2.4	2.6	0.28	0.30	0.08	0.09	10.5	5.3	20.6	0.0	21.4	0.0	0.0
500 FT. FLYOVER -- TARGET IAS 135 KTS. (ICAO)															
A1	92.8	87.1	95.1	78.5	0.45	0.31	-0.09	0.25	143.4	218.0	365.2	212.1	355.4	69.4	69.4
A2	92.6	87.0	94.1	78.3	0.65	0.46	-0.29	0.41	139.8	220.5	341.6	212.1	328.6	66.9	69.4
A3	93.5	88.3	94.6	78.7	0.09	0.27	-0.05	1.33	143.7	215.7	364.3	212.1	358.3	69.4	69.4
A4	92.8	86.7	93.9	78.2	0.44	0.20	-0.06	-	139.4	216.1	332.2	212.1	326.2	69.4	69.4
A5	93.0	86.9	95.1	77.8	0.55	0.30	-0.10	0.37	141.2	218.9	349.6	212.1	330.7	69.4	69.4
A6	92.4	87.0	93.9	78.3	0.92	0.87	-0.23	-	140.1	227.9	355.0	212.1	330.5	69.4	69.4
Avg.	92.9	87.2	94.4	78.3	0.52	0.40	-0.14	0.59	141.3	219.5	351.3	212.1	339.6	69.0	69.4
Std Dv	0.4	0.6	0.6	0.3	0.27	0.24	0.10	0.50	1.9	4.5	12.9	0.0	14.0	1.1	0.0
90% CI	0.3	0.5	0.5	0.3	0.22	0.20	0.08	0.59	1.5	3.7	10.6	0.0	11.5	0.9	0.0
500 FT. FLYOVER -- TARGET IAS 135 KTS. (MILITARY)															
B7	92.9	87.3	95.4	78.9	-0.06	-0.09	-0.12	-	141.4	209.0	334.8	212.1	339.9	66.9	69.4
B8	94.2	87.8	96.4	79.9	0.50	0.36	-0.11	-	143.2	219.2	366.1	212.1	354.3	69.4	69.4
B9	94.1	87.9	97.0	80.5	0.14	0.07	-0.02	-	100.3	213.7	217.2	212.1	215.6	69.4	69.4
B10	93.4	87.8	95.2	78.9	0.37	0.20	0.11	-	143.0	215.4	357.9	212.1	352.4	72.0	69.4
Avg.	93.6	87.7	96.0	79.5	0.24	0.13	-0.03	-	132.0	214.3	319.0	212.1	315.5	69.4	69.4
Std Dv	0.6	0.3	0.8	0.8	0.25	0.19	0.11	-	21.1	4.2	69.1	0.0	66.9	2.1	0.0
90% CI	0.7	0.3	1.0	1.0	0.29	0.22	0.13	-	24.8	5.0	81.3	0.0	78.7	2.5	0.0
500 FT. FLYOVER -- TARGET IAS 120 KTS.															
D15	91.7	86.8	92.6	78.3	-0.13	-0.18	0.07	1.46	119.3	207.4	237.8	212.1	243.3	61.7	61.7
D16	91.1	87.1	91.6	77.6	0.16	0.10	0.18	0.60	132.4	212.1	287.0	212.1	287.0	64.3	61.7
D17	89.8	84.8	91.0	76.3	0.16	0.06	0.00	-	122.2	211.9	250.4	212.1	250.7	61.7	61.7
D18	91.6	87.4	93.2	78.5	0.05	0.00	0.03	0.84	115.3	210.2	232.5	212.1	234.6	61.7	61.7
D19	-	86.5	93.2	78.2	-0.08	-0.16	-	1.50	122.8	206.8	246.0	212.1	252.4	61.7	61.7
Avg.	91.1	86.5	92.3	77.8	0.03	-0.04	0.07	1.10	122.4	209.7	250.7	212.1	253.6	62.2	61.7
Std Dv	0.9	1.0	1.0	0.9	0.13	0.13	0.08	0.45	6.3	2.5	21.4	0.0	20.0	1.1	0.0
90% CI	1.1	1.0	0.9	0.8	0.13	0.12	0.09	0.53	6.0	2.4	20.4	0.0	19.0	1.1	0.0

*- Data Corrected Using 'Simplified Procedure'

TABLE F1-6

TABLE NO. J.7-2.3

BOEING VERTOL CH-47D HELICOPTER (CHINOOK)

DOT/TSC
2/13/86

CORRECTION DATA*

SITE: 2 SIDELINE - 150 M. SOUTH JULY 12,1983

	CORRECTED				CORRECTIONS (dB)				ACOUSTIC ANGLE	TRACKING DATA (Meters) (ACTUAL)		(REFERENCE)		SPEED(m/sec)	
Ev	EPNL	SEL	PNLTm	ALm	/\1(P)	/\1(A)	/\2	/\3	(Deg)	CPA	SR	CPAR	SRR	GRND	REF
500 FT. FLYOVER -- TARGET IAS 105 KTS.															
E20	91.2	87.0	92.1	77.5	-0.75	-0.76	0.47	0.61	94.9	195.6	196.3	212.1	212.9	56.6	54.0
E21	-	85.9	92.2	76.6	0.41	0.24	-	1.47	135.7	214.0	306.5	212.1	303.9	54.0	54.0
E22	89.6	85.5	91.2	76.3	0.52	0.41	-0.30	-	116.6	218.1	244.0	212.1	237.2	51.4	54.0
E23	90.8	86.0	93.1	77.6	0.57	0.44	-0.30	1.91	127.2	217.7	273.2	212.1	266.2	51.4	54.0
E24	90.9	86.7	91.4	77.5	0.74	0.57	-0.15	0.85	97.7	222.4	224.4	212.1	214.1	54.0	54.0
E25	92.1	87.4	93.1	78.1	0.70	0.51	-0.38	2.24	76.6	217.2	223.4	212.1	218.1	50.4	54.0
Avg.	90.9	86.4	92.2	77.2	0.36	0.23	-0.13	1.42	108.1	214.2	244.6	212.1	242.1	53.0	54.0
Std Dv	0.9	0.7	0.8	0.7	0.56	0.50	0.35	0.69	22.3	9.5	39.6	0.0	36.4	2.3	0.0
90% CI	0.8	0.6	0.7	0.5	0.46	0.41	0.33	0.66	18.3	7.8	32.6	0.0	30.0	1.9	0.0
1000 FT. FLYOVER -- TARGET IAS 135 KTS.															
F26	88.2	83.9	89.5	74.4	-0.15	-0.23	0.14	-	117.5	321.6	362.4	335.4	378.0	69.4	69.4
F27	88.4	84.4	88.8	75.1	-0.35	-0.53	0.24	-	142.6	311.6	513.1	335.4	552.3	69.4	69.4
F28	88.5	84.3	89.1	75.0	-0.02	-0.18	0.13	-	106.0	322.3	335.3	335.4	348.9	69.4	69.4
F29	88.1	83.8	88.9	74.0	-0.12	-0.18	0.05	-	128.8	320.8	411.6	335.4	430.3	67.9	69.4
Avg.	88.3	84.1	89.0	74.6	-0.16	-0.28	0.14	-	123.7	319.1	405.6	335.4	427.4	69.1	69.4
Std Dv	0.2	0.3	0.3	0.5	0.14	0.17	0.08	-	15.7	5.0	78.3	0.0	89.8	0.8	0.0
90% CI	0.2	0.4	0.4	0.6	0.16	0.20	0.09	-	18.4	5.9	92.1	0.0	105.7	0.9	0.0
TAKEOFF -- TARGET IAS 85 KTS. (ICAO)															
G40	93.5	88.9	95.0	80.1	1.64	1.21	-0.56	-	113.0	188.6	204.8	172.4	187.2	41.1	43.7
G41	93.6	88.9	95.1	79.9	1.43	1.01	-0.50	-	119.8	185.1	213.4	172.4	198.7	41.1	43.7
G42	91.9	87.6	94.2	78.9	0.62	0.39	-0.37	-	119.2	174.9	200.5	172.4	197.5	40.6	43.7
G43	94.0	89.4	95.7	80.2	1.42	1.18	0.01	-	122.1	185.4	219.0	172.4	203.6	46.3	43.7
G44	92.9	88.1	94.4	78.7	0.31	0.16	-0.17	-	128.8	167.4	214.8	172.4	221.1	41.1	43.7
G45	92.0	87.3	93.8	78.4	0.28	0.03	-0.37	-	117.0	169.4	190.2	172.4	193.5	39.6	43.7
Avg.	93.0	88.3	94.7	79.4	0.95	0.66	-0.33	-	120.0	178.5	207.1	172.4	200.3	41.7	43.7
Std Dv	0.9	0.8	0.7	0.8	0.82	0.53	0.21	-	5.3	9.1	10.7	0.0	11.6	2.3	0.0
90% CI	0.7	0.7	0.6	0.6	0.51	0.44	0.17	-	4.4	7.5	8.8	0.0	9.5	1.9	0.0
APPROACH -- TARGET IAS 85 KTS. (ICAO)															
H30	96.9	91.8	99.5	83.1	0.52	0.41	-0.36	-	126.6	197.2	245.4	191.7	238.6	41.1	43.7
H31	95.5	90.8	96.8	81.2	0.52	0.62	-0.41	-	144.7	200.3	346.7	191.7	331.8	41.1	43.7
H32	96.6	91.4	98.2	82.3	0.47	0.32	-0.33	-	128.2	195.8	249.1	191.7	243.8	41.1	43.7
H33	97.7	92.6	100.5	84.7	0.65	0.47	-0.38	-	127.4	198.9	250.3	191.7	241.2	41.1	43.7
H34	96.1	91.1	99.2	82.9	0.25	0.17	-0.34	-	135.5	192.9	275.3	191.7	273.5	40.6	43.7
H35	96.7	91.9	98.9	82.5	0.75	0.56	0.13	-	150.9	199.0	409.2	191.7	394.2	46.3	43.7
Avg.	96.6	91.6	98.8	82.8	0.53	0.42	-0.28	-	135.5	197.3	296.0	191.7	287.2	41.9	43.7
Std Dv	0.7	0.7	1.3	1.1	0.17	0.16	0.20	-	10.2	2.7	67.3	0.0	63.2	2.2	0.0
90% CI	0.6	0.5	1.0	0.9	0.14	0.13	0.17	-	8.4	2.2	55.4	0.0	52.0	1.8	0.0

*- Data Corrected Using 'Simplified Procedure'

TABLE F1-7

TABLE NO. J.7-3.1

BOEING VERTOL CH-47D HELICOPTER (CHINOOK)

DOT/TSC
2/13/86

CORRECTION DATA*

SITE: 3 SIDELINE - 150 M. NORTH JULY 12,1983

	CORRECTED				CORRECTIONS (dB)				ACOUSTIC ANGLE	TRACKING DATA (Meters) (ACTUAL)		(REFERENCE)		SPEED(m/sec)	
Ev	EPNL	SEL	PNLTm	ALm	/\1(P)	/\1(A)	/\2	/\3	(Deg)	CPA	SR	CPAR	SRR	GRND	REF
TAKEOFF -- TARGET IAS 85 KTS.															
J47	-	87.8	93.3	80.1	5.03	4.14	-	-	65.8	270.8	296.9	191.4	209.9	43.7	43.7
J49	93.1	87.9	94.6	80.5	3.86	3.34	-1.19	-	80.4	254.2	257.8	191.4	194.1	41.1	43.7
J51	96.7	90.1	98.2	82.1	7.39	5.43	-0.84	-	157.1	240.2	617.2	191.4	491.9	42.7	43.7
Avg.	94.9	88.6	95.4	80.9	5.43	4.30	-1.01	-	101.1	255.1	390.6	191.4	298.7	42.5	43.7
Std Dv	2.6	1.3	2.6	1.1	1.80	1.05	0.25	-	49.0	15.3	197.2	0.0	167.5	1.3	0.0
90% CI	11.6	2.2	4.3	1.8	3.03	1.78	1.10	-	82.7	25.8	332.4	0.0	282.4	2.2	0.0
TAKEOFF -- TARGET IAS 70 KTS. (MILITARY)															
L53	92.5	87.1	94.7	79.6	1.12	0.96	-0.21	-	115.6	183.7	203.7	172.4	191.2	36.0	36.0
L54	92.7	87.4	94.5	78.8	1.14	1.09	-0.07	-	111.1	186.3	199.7	172.4	184.7	37.6	36.0
L55	92.9	87.6	94.2	79.3	0.85	0.65	-0.19	-	125.1	182.7	223.3	172.4	210.6	36.0	36.0
Avg.	92.7	87.4	94.5	79.3	1.04	0.90	-0.16	-	117.3	184.2	208.9	172.4	195.5	36.5	36.0
Std Dv	0.2	0.2	0.2	0.4	0.16	0.23	0.08	-	7.1	1.9	12.6	0.0	13.5	0.9	0.0
90% CI	0.4	0.4	0.4	0.7	0.27	0.38	0.13	-	12.0	3.2	21.3	0.0	22.7	1.5	0.0
APPROACH -- TARGET IAS 100 KTS.															
K46	98.2	93.6	102.4	87.8	1.91	1.73	-1.68	-	127.6	204.4	257.9	172.7	217.9	39.6	51.4
K48	97.5	93.2	101.4	86.4	2.24	1.92	-1.05	-	120.6	206.9	240.5	172.7	200.6	46.3	51.4
K50	97.7	93.5	100.6	86.7	2.31	1.88	-0.80	-	135.0	206.0	291.5	172.7	244.4	48.9	51.4
K52	98.3	94.1	100.8	86.5	2.02	1.68	-0.51	-	125.1	202.1	247.2	172.7	211.2	51.4	51.4
Avg.	97.9	93.6	101.3	86.8	2.12	1.80	-1.01	-	127.1	204.9	259.3	172.7	218.5	46.6	51.4
Std Dv	0.3	0.3	0.8	0.6	0.19	0.12	0.50	-	6.0	2.1	22.7	0.0	18.6	5.1	0.0
90% CI	0.4	0.4	1.0	0.8	0.22	0.14	0.59	-	7.1	2.5	26.7	0.0	21.9	6.0	0.0
APPROACH -- TARGET IAS 70 KTS. (MILITARY)															
I36	100.5	95.9	102.7	88.0	0.92	0.81	0.33	-	125.3	206.2	252.6	191.2	234.2	41.1	36.0
I37	100.7	96.4	102.4	87.9	0.91	0.79	0.36	-	137.4	204.5	302.1	191.2	282.4	41.1	36.0
I38	100.1	95.7	102.9	87.6	0.98	0.83	-0.45	-	130.1	206.8	270.4	191.2	250.0	34.5	36.0
I39	-	94.5	100.8	85.0	0.99	0.77		-	134.8	204.8	288.6	191.2	269.3	40.6	36.0
Avg.	100.5	95.6	102.2	87.2	0.95	0.80	0.08	-	131.9	205.6	278.4	191.2	259.0	39.4	36.0
Std Dv	0.3	0.8	0.9	1.4	0.04	0.03	0.46	-	5.3	1.1	21.6	0.0	21.2	3.3	0.0
90% CI	0.5	0.9	1.1	1.7	0.05	0.03	0.77	-	6.3	1.3	25.4	0.0	25.0	3.8	0.0

*- Data Corrected Using "Simplified Procedure"

TABLE F1-8

TABLE NO. J.7-3.2

BOEING VERTOL CH-47D HELICOPTER (CHINOOK)

DOT/TSC
2/13/86

CORRECTION DATA*

SITE: 3 SIDELINE - 150 M. NORTH JULY 12,1983

Ev	CORRECTED EPNL	CORRECTED SEL	CORRECTED PNLTm	CORRECTED ALm	CORRECTIONS (dB) /\1(P)	/\1(A)	/\2	/\3	ACOUSTIC ANGLE (Deg)	TRACKING DATA (Meters) (ACTUAL) CPA	SR	(REFERENCE) CPAR	SRR	SPEED(m/sec) GRND	REF
500 FT. FLYOVER -- TARGET IAS 135 KTS.															
C11	91.3	86.7	94.5	79.4	0.30	0.22	-0.06	-	117.6	215.9	243.7	212.1	239.4	69.4	69.4
C12	92.8	88.2	95.7	80.4	0.56	0.48	-0.14	1.44	120.9	221.3	257.9	212.1	247.2	69.4	69.4
C13	91.7	86.8	94.1	79.0	-0.02	-0.04	0.03	-	105.1	210.3	217.8	212.1	219.8	69.4	69.4
C14	93.6	88.8	95.9	81.1	0.30	0.24	-0.06	1.48	109.1	216.1	228.8	212.1	224.6	69.4	69.4
Avg.	92.3	87.7	95.1	80.0	0.28	0.22	-0.06	1.46	113.2	215.9	237.0	212.1	232.7	69.4	69.4
Std Dv	1.0	1.0	0.9	1.0	0.24	0.21	0.07	0.03	7.3	4.5	17.5	0.0	12.8	0.0	0.0
90% CI	1.2	1.2	1.0	1.1	0.28	0.25	0.08	0.13	8.6	5.3	20.6	0.0	15.0	0.0	0.0
500 FT. FLYOVER -- TARGET IAS 135 KTS. (ICAO)															
A1	91.3	86.4	93.3	78.5	0.43	0.35	-0.11	0.14	104.5	219.4	226.6	212.1	219.1	69.4	69.4
A2	93.4	88.0	95.0	79.7	0.58	0.50	-0.31	0.73	116.0	221.9	246.8	212.1	235.9	66.9	69.4
A3	93.6	88.6	94.7	79.8	0.37	0.32	-0.08	0.75	148.6	217.1	417.2	212.1	407.7	69.4	69.4
A4	92.6	87.3	93.9	78.2	0.30	0.26	-0.08	-	117.5	217.5	245.2	212.1	239.2	69.4	69.4
A5	92.2	87.0	93.2	78.4	0.49	0.41	-0.12	0.21	108.9	220.4	232.9	212.1	224.2	69.4	69.4
A6	92.1	87.0	93.1	77.9	1.02	0.81	-0.25	-	119.9	229.3	264.5	212.1	244.6	69.4	69.4
Avg.	92.5	87.4	93.9	78.7	0.53	0.44	-0.16	0.46	119.2	220.9	272.2	212.1	261.8	69.0	69.4
Std Dv	0.8	0.8	0.8	0.8	0.26	0.20	0.10	0.33	15.5	4.5	72.2	0.0	72.1	1.1	0.0
90% CI	0.7	0.7	0.7	0.7	0.21	0.16	0.08	0.39	12.8	3.7	59.4	0.0	59.3	0.9	0.0
500 FT. FLYOVER -- TARGET IAS 135 KTS. (MILITARY)															
B7	92.0	87.2	94.3	78.9	0.00	-0.07	-0.14	-	109.0	210.3	222.5	212.1	224.4	66.9	69.4
B8	95.9	90.1	98.1	81.6	0.45	0.38	-0.13	-	113.1	220.6	239.9	212.1	230.6	69.4	69.4
B9	94.1	88.1	97.4	81.4	0.23	0.15	-0.05	-	104.9	215.1	222.6	212.1	219.5	69.4	69.4
B10	94.4	89.1	95.4	80.3	0.40	0.25	0.09	-	118.5	216.8	246.7	212.1	241.4	72.0	69.4
Avg.	94.1	88.6	96.3	80.5	0.27	0.18	-0.06	-	111.4	215.7	232.9	212.1	229.0	69.4	69.4
Std Dv	1.6	1.2	1.8	1.2	0.20	0.19	0.11	-	5.8	4.3	12.3	0.0	9.4	2.1	0.0
90% CI	1.9	1.4	2.1	1.5	0.24	0.22	0.13	-	6.8	5.0	14.5	0.0	11.1	2.5	0.0
500 FT. FLYOVER -- TARGET IAS 120 KTS.															
D15	89.8	85.6	91.9	77.4	-0.08	-0.13	0.05	0.82	103.6	208.7	214.7	212.1	218.3	61.7	61.7
D16	92.3	87.6	93.6	79.2	0.21	0.15	0.16	1.07	99.5	213.5	216.4	212.1	215.0	64.3	61.7
D17	89.6	85.5	91.7	76.9	0.25	0.18	-0.02	-	115.0	213.2	235.2	212.1	234.0	61.7	61.7
D18	91.6	87.2	93.9	78.8	0.12	0.07	0.01	1.50	107.5	211.6	221.9	212.1	222.4	61.7	61.7
D19	91.1	86.9	94.1	79.3	-0.03	-0.11	0.06	1.28	111.8	208.1	224.1	212.1	228.4	61.7	61.7
Avg.	90.9	86.6	93.1	78.3	0.09	0.03	0.05	1.17	107.5	211.0	222.5	212.1	223.6	62.2	61.7
Std Dv	1.1	1.0	1.1	1.1	0.15	0.14	0.07	0.29	6.2	2.5	8.1	0.0	7.6	1.1	0.0
90% CI	1.1	0.9	1.1	1.0	0.14	0.14	0.07	0.34	5.9	2.4	7.7	0.0	7.3	1.1	0.0

*- Data Corrected Using 'Simplified Procedure'

TABLE F1-9

TABLE NO. J.7-3.3

BOEING VERTOL CH-47D HELICOPTER (CHINOOK)

DOT/TSC
2/13/86

CORRECTION DATA*

SITE: 3 SIDELINE - 150 M. NORTH JULY 12,1983

	CORRECTED				CORRECTIONS (dB)				ACOUSTIC ANGLE	TRACKING DATA (Meters) (ACTUAL)		(REFERENCE)		SPEED(m/sec)	
Ev	EPNL	SEL	PNLTm	ALm	/\1(P)	/\1(A)	/\2	/\3	(Deg)	CPA	SR	CPAR	SRR	GRND	REF
500 FT. FLYOVER -- TARGET IAS 105 KTS.															
E20	91.5	87.2	93.0	77.5	-0.70	-0.70	0.45	1.08	124.8	196.8	239.8	212.1	258.5	56.6	54.0
E21	90.8	86.6	93.5	78.2	0.33	0.27	-0.05	0.83	111.9	215.4	232.0	212.1	220.5	54.0	54.0
E22	89.7	85.3	91.2	76.4	0.62	0.49	-0.32	-	113.4	219.6	239.3	212.1	231.2	51.4	54.0
E23	90.5	86.2	93.2	78.2	0.53	0.44	-0.32	1.07	104.0	219.1	225.8	212.1	218.6	51.4	54.0
E24	91.7	87.3	93.9	78.8	1.07	0.88	-0.17	1.51	132.3	223.8	302.7	212.1	286.9	54.0	54.0
E25	91.1	86.7	93.9	79.0	0.79	0.60	-0.40	1.26	105.7	218.6	227.1	212.1	220.4	50.4	54.0
Avg.	90.9	86.6	93.1	78.0	0.44	0.33	-0.13	1.15	115.4	215.6	244.5	212.1	240.7	53.0	54.0
Std Dv	0.7	0.7	1.0	0.9	0.61	0.54	0.31	0.25	11.1	9.6	29.1	0.0	26.8	2.3	0.0
90% CI	0.6	0.6	0.8	0.8	0.50	0.45	0.26	0.24	9.1	7.9	24.0	0.0	22.0	1.9	0.0
1000 FT. FLYOVER -- TARGET IAS 135 KTS.															
F26	89.9	85.7	92.0	77.4	-0.19	-0.22	0.12	-	81.5	323.3	326.9	335.4	339.1	69.4	69.4
F27	89.5	85.5	92.6	77.9	-0.58	-0.54	0.22	-	84.3	313.3	314.9	335.4	337.1	69.4	69.4
F28	89.4	85.1	91.9	76.9	-0.06	-0.22	0.11	-	78.7	324.0	330.4	335.4	342.1	69.4	69.4
F29	88.4	84.3	90.4	75.4	-0.11	-0.22	0.03	-	105.6	322.5	334.9	335.4	348.3	67.9	69.4
Avg.	89.3	85.1	91.7	76.9	-0.23	-0.30	0.12	-	87.5	320.8	326.8	335.4	341.6	69.1	69.4
Std Dv	0.7	0.6	0.9	1.1	0.24	0.16	0.08	-	12.3	5.0	8.6	0.0	4.9	0.8	0.0
90% CI	0.8	0.7	1.1	1.3	0.28	0.19	0.09	-	14.4	5.9	10.1	0.0	5.7	0.9	0.0
TAKEOFF -- TARGET IAS 85 KTS. (ICAO)															
G40	-	88.6	95.9	80.8	3.22	2.40	-	-	162.7	190.9	642.6	172.4	580.4	41.1	43.7
G41	92.8	87.5	95.0	80.0	1.43	1.24	-0.53	-	134.1	187.3	261.0	172.4	240.2	41.1	43.7
G42	93.0	87.8	95.8	80.4	0.66	0.52	-0.40	-	120.5	176.9	205.3	172.4	200.0	40.6	43.7
G43	93.0	87.8	95.1	79.7	1.25	1.17	-0.03	-	114.7	187.6	206.5	172.4	189.7	46.3	43.7
G44	92.7	87.6	95.0	79.7	0.35	0.07	-0.20	-	127.5	169.1	213.3	172.4	217.4	41.1	43.7
G45	91.8	87.0	94.2	79.0	0.14	0.16	-0.41	-	109.9	171.2	182.0	172.4	183.3	39.6	43.7
Avg.	92.7	87.7	95.2	79.9	1.17	0.93	-0.31	-	128.2	180.5	285.1	172.4	268.5	41.7	43.7
Std Dv	0.5	0.5	0.6	0.6	1.12	0.87	0.20	-	19.0	9.3	177.1	0.0	154.2	2.3	0.0
90% CI	0.5	0.4	0.5	0.5	0.92	0.72	0.19	-	15.6	7.7	145.6	0.0	126.8	1.9	0.0
APPROACH -- TARGET IAS 85 KTS. (ICAO)															
H30	99.6	95.3	102.3	87.3	0.73	0.55	-0.39	-	152.9	199.4	437.4	191.7	420.5	41.1	43.7
H31	99.7	95.2	101.8	86.9	0.78	0.66	-0.44	-	139.7	202.6	313.2	191.7	296.3	41.1	43.7
H32	99.2	94.3	102.8	88.3	0.87	0.57	-0.37	-	156.0	198.0	487.4	191.7	471.7	41.1	43.7
H33	99.4	94.9	103.3	88.3	0.68	0.55	-0.42	-	124.0	201.1	242.6	191.7	231.2	41.1	43.7
H34	98.8	94.1	101.6	86.4	0.35	0.28	-0.37	-	127.3	195.0	245.2	191.7	241.0	40.6	43.7
H35	100.4	95.8	104.1	88.9	0.90	0.64	0.09	-	150.4	201.2	407.2	191.7	387.9	46.3	43.7
Avg.	99.5	94.9	102.7	87.7	0.72	0.54	-0.32	-	141.7	199.6	355.5	191.7	341.4	41.9	43.7
Std Dv	0.5	0.6	0.9	1.0	0.20	0.14	0.20	-	13.6	2.7	103.4	0.0	99.7	2.2	0.0
90% CI	0.4	0.5	0.8	0.8	0.16	0.11	0.17	-	11.2	2.2	85.1	0.0	82.0	1.8	0.0

*- Data Corrected Using "Simplified Procedure"

TABLE F2-1

ADV. MACH FOR TARGET CONDITIONS ANAL. DATE: 11-Mar-86

BOEING VERTOL 234/CH 47-D
ADV. MACH SERIES REFERENCE NUMBERS

TEMPERATURE 59 degrees F (15 degrees C)

SERIES	IAS	TEMP (F)	ROTOR RPM	BLADE DIAM.	ADVM #
A	135.00	59.00	225.00	60.00	0.8374
C	135.00	59.00	225.00	60.00	0.8374
D	120.00	59.00	225.00	60.00	0.8147
E	105.00	59.00	225.00	60.00	0.7920

TEMPERATURE 77 degrees F (25 degrees C)

SERIES	IAS	TEMP (F)	ROTOR RPM	BLADE DIAM.	ADVM #
A	135.00	77.00	225.00	60.00	0.8233
C	135.00	77.00	225.00	60.00	0.8233
D	120.00	77.00	225.00	60.00	0.8010
E	105.00	77.00	225.00	60.00	0.7786

TARGET CONDITIONS

SERIES	DESCRIPTION
A	500 FT. LFO IAS = 135 KTS.
C	500 FT. LFO IAS = 135 KTS.
D	500 FT. LFO IAS = 120 KTS.
E	500 FT. LFO IAS = 105 KTS.

* 225.00 RPM = 100% ROTOR SPEED

FIGURE F2-2

ACTUAL TEST CONDITIONS ANAL. DATE: 11-Mar-86

BOEING VERTOL 234/CH 47-D

EVENT	IAS	TEMP (F)	ROTOR RPM	BLADE DIAM.	ADVM #
A1	135.00	73.00	227.25	60.00	0.8326
A2	130.00	75.00	227.25	60.00	0.8236
A3	135.00	75.00	220.50	60.00	0.8123
A4	NA	75.00	220.50	60.00	NA
A5	135.00	76.00	227.25	60.00	0.8303
A6	NA	76.00	227.25	60.00	NA
C11	NA	78.00	220.50	60.00	NA
C12	135.00	78.00	220.50	60.00	0.8101
C13	NA	78.00	220.50	60.00	NA
C14	135.00	79.00	220.50	60.00	0.8093
D15	120.00	79.00	220.50	60.00	0.7870
D16	125.00	79.00	220.50	60.00	0.7945
D17	NA	79.00	220.50	60.00	NA
D18	120.00	80.00	220.50	60.00	0.7863
D19	120.00	80.00	220.50	60.00	0.7863
E20	110.00	80.00	220.50	60.00	0.7715
E21	105.00	80.00	220.50	60.00	0.7641
E22	NA	81.00	220.50	60.00	NA
E23	100.00	81.00	220.50	60.00	0.7559
E24	105.00	81.00	220.50	60.00	0.7634
E25	98.00	86.00	220.50	60.00	0.7495

TABLE F2-3

ACTUAL TEST NOISE DATA
ANAL. DATE: 11-Mar-86

BOEING VERTOL 234/CH 47-D

EVENT	TEST ALT	---- AS MEAS. PNLTM ---- LEFT	CENTER	RIGHT	-- PNLTM 492 FOOT NORM. -- LEFT	CENTER	RIGHT
A1	525.50	92.70	95.60	94.40	93.10	96.37	94.80
A2	536.80	93.00	95.00	93.70	93.53	96.01	94.23
A3	515.20	93.50	93.90	93.10	93.77	94.44	93.37
A4	516.90	93.40	95.20	93.60	93.69	95.77	93.89
A5	530.00	92.50	94.00	94.10	92.95	94.87	94.55
A6	569.50	93.00	94.10	92.10	93.91	95.80	93.01
C11	509.90	94.20	94.90	92.80	94.41	95.32	93.01
C12	534.30	96.10	97.00	93.70	96.60	97.96	94.20
C13	483.70	94.20	95.10	93.10	94.10	94.90	93.00
C14	510.70	93.90	95.90	94.10	94.12	96.33	94.32
D15	476.40	91.20	93.60	91.30	91.02	93.22	91.12
D16	498.60	90.90	94.10	92.30	90.98	94.26	92.38
D17	497.60	91.50	92.40	90.90	91.57	92.53	90.97
D18	490.00	92.30	93.70	92.30	92.28	93.65	92.28
D19	473.70	92.90	93.30	91.80	92.68	92.86	91.58
E20	418.40	NA	NA	NA	NA	NA	NA
E21	507.30	92.30	92.60	90.30	92.48	92.96	90.48
E22	526.40	90.60	91.70	90.60	91.01	92.49	91.01
E23	524.40	91.60	91.90	90.60	91.98	92.64	90.98
E24	545.20	89.80	92.30	91.40	90.43	93.50	92.03
E25	522.20	91.80	92.10	90.20	92.16	92.79	90.56

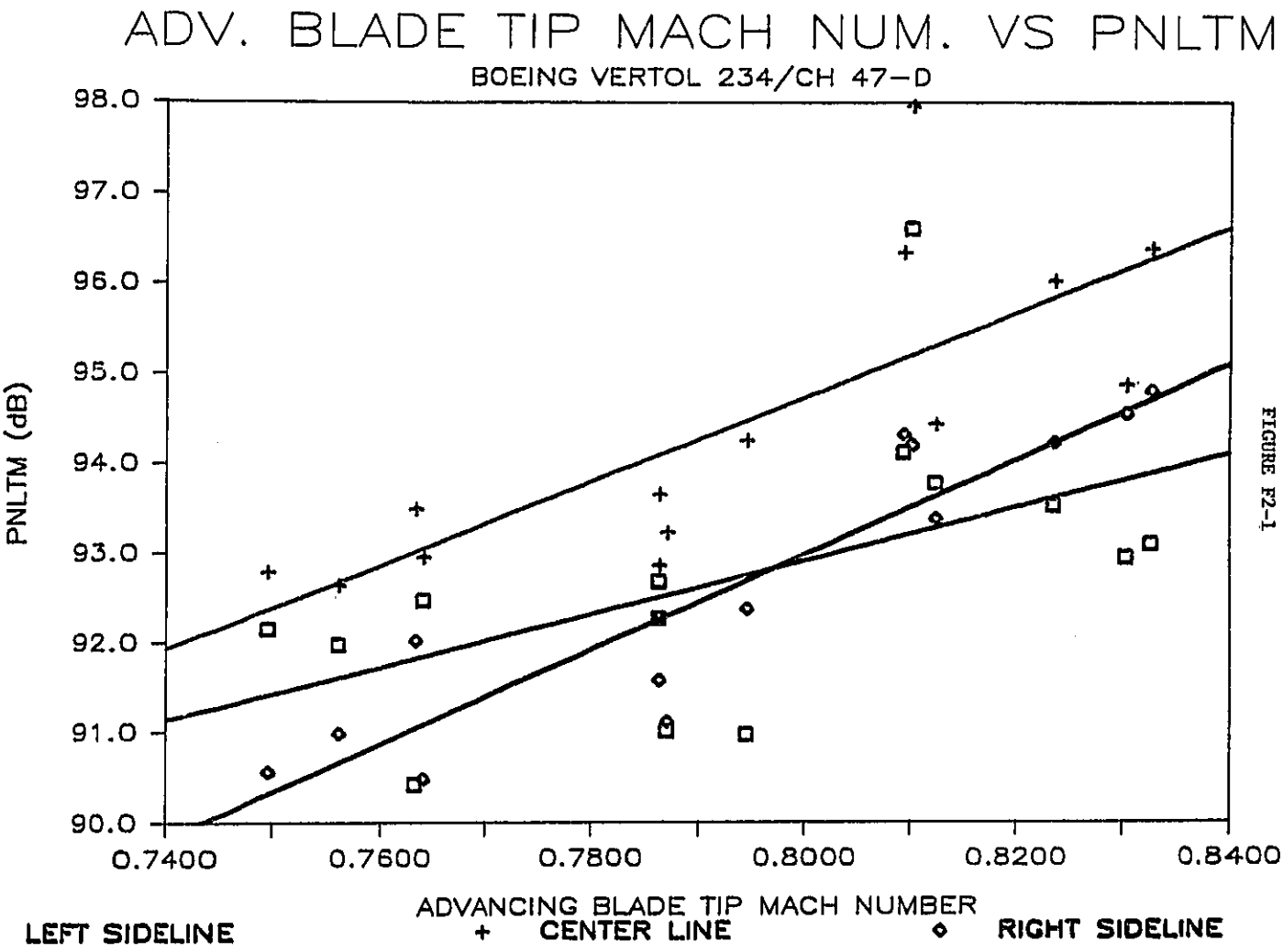

ADV. BLADE TIP MACH NUM. VS PNLTM
BOEING VERTOL 234/CH 47-D
98.0
97.0
96.0
95.0
94.0
93.0
92.0
91.0
90.0
PNLTM (dB)
0.7400
0.7600
0.7800
0.8000
0.8200
0.8400
ADVANCING BLADE TIP MACH NUMBER
LEFT SIDELINE
CENTER LINE
RIGHT SIDELINE

FIGURE F2-1

TABLE F2-4

BOEING VERTOL 234/CH 47-D
LEFT SIDELINE

ANAL. DATE: 11-Mar-86

EVENT	X INPUT	Y INPUT
A1	0.8326	93.10
A2	0.8236	93.53
A3	0.8123	93.77
A4	NA	93.69
A5	0.8303	92.95
A6	NA	93.91
C11	NA	94.41
C12	0.8101	96.60
C13	NA	94.10
C14	0.8093	94.12
D15	0.7870	91.02
D16	0.7945	90.98
D17	NA	91.57
D18	0.7863	92.28
D19	0.7863	92.68
E20	0.7715	NA
E21	0.7641	92.48
E22	NA	91.01
E23	0.7559	91.98
E24	0.7634	90.43
E25	0.7495	92.16

SECOND ORDER EQUATION

Y =	A	+	B1	* X	+	B2	*X'
Y =	69.74	+	28.21	* X	+	0.95	*X'

R SQ. =	0.405	MEAN X =	0.7932
R =	0.637	S.D. X =	0.0276
STD.ERR =	1.431	MEAN Y =	92.72
SAMPLE =	14	S.D. Y =	1.55

TABLE F2-5

LINEAR REGRESSION EQUATION

Y =	SLOPE	* X +	INTERCEPT		
=	29.72		69.15		
R SQ. =	0.280	MEAN X =	0.7932		
R =	0.529	S.D. X =	0.0276		
STD.ERR =	1.370	MEAN Y =	92.72		
CORREL =	0.529	S.D. Y =	1.55		
SAMPLE =	14	TOT VAR =	2.41		

SECOND ORDER EQUATION

Y =	A	+	B1	* X +	B2	*X'	
Y =	69.74	+	28.21	* X +	0.95	*X'	
R SQ. =	0.405	MEAN X =	0.7932				
R =	0.637	S.D. X =	0.0276				
STD.ERR =	1.431	MEAN Y =	92.72				
SAMPLE =	14	S.D. Y =	1.55				

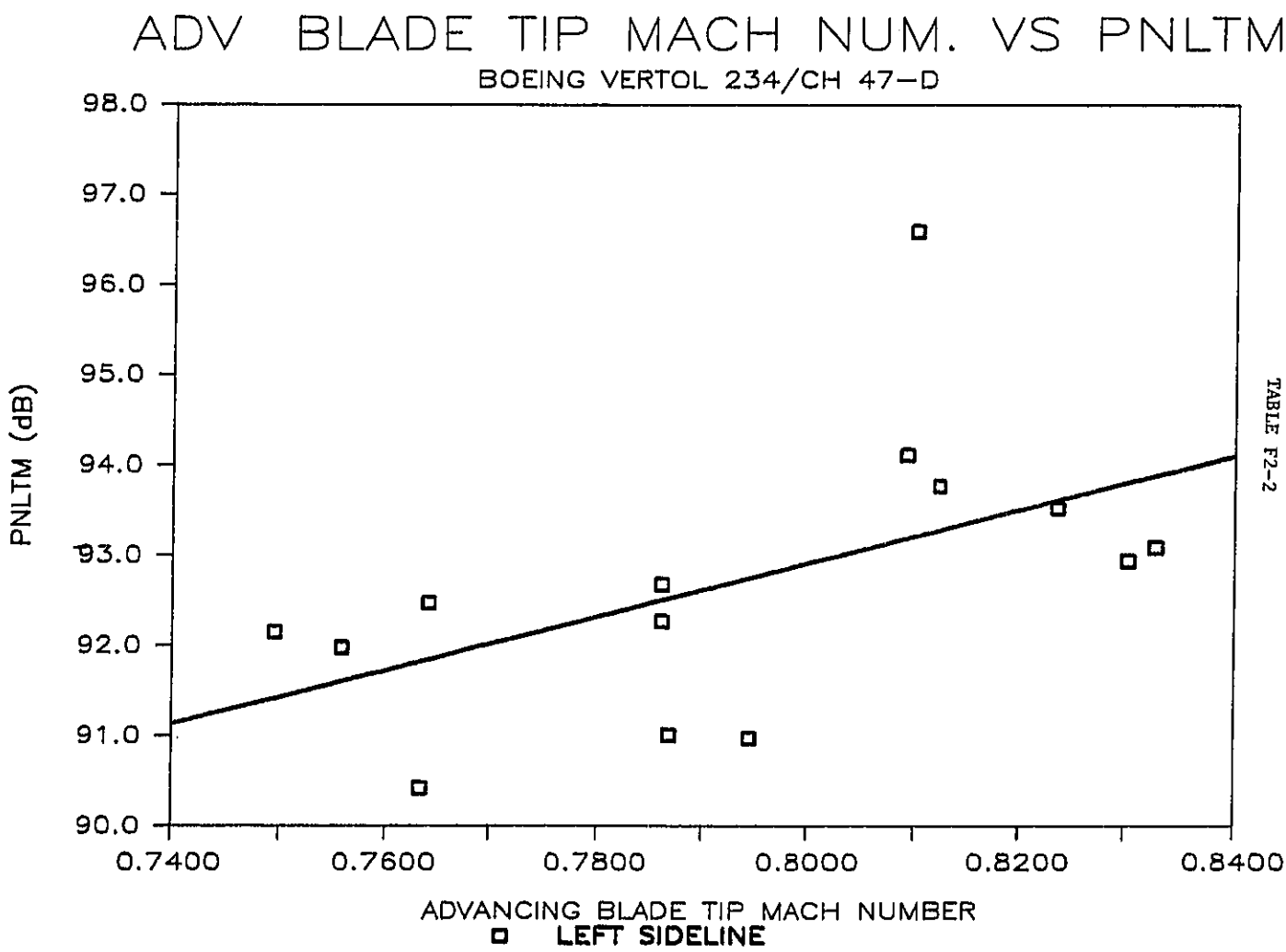

ADV BLADE TIP MACH NUM. VS PNLTM
BOEING VERTOL 234/CH 47-D
98.0
97.0
96.0
95.0
94.0
93.0
92.0
91.0
90.0
PNLTM (dB)
0.7400
0.7600
0.7800
0.8000
0.8200
0.8400
ADVANCING BLADE TIP MACH NUMBER
LEFT SIDELINE

TABLE F2-2

TABLE F2-6

BOEING VERTOL 234/CH 47-D
CENTER LINE

ANAL. DATE: 11-Mar-86

EVENT	X INPUT	Y INPUT
A1	0.8326	96.37
A2	0.8236	96.01
A3	0.8123	94.44
A4	NA	95.77
A5	0.8303	94.87
A6	NA	95.80
C11	NA	95.32
C12	0.8101	97.96
C13	NA	94.90
C14	0.8093	96.33
D15	0.7870	93.22
D16	0.7945	94.26
D17	NA	92.53
D18	0.7863	93.65
D19	0.7863	92.86
E20	0.7715	NA
E21	0.7641	92.96
E22	NA	92.49
E23	0.7559	92.64
E24	0.7634	93.50
E25	0.7495	92.79

LINEAR REGRESSION EQUATION

Y	=	SLOPE	* X +	INTERCEPT	
	=	46.66		57.41	
R SQ.	=	0.600	MEAN X =	0.7932	
R	=	0.775	S.D. X =	0.0276	
STD.ERR	=	1.096	MEAN Y =	94.42	
CORREL	=	0.775	S.D. Y =	1.66	
SAMPLE	=	14	TOT VAR =	2.77	

TABLE F2-7

LINEAR REGRESSION EQUATION

Y =	SLOPE	* X +	INTERCEPT	
=	46.66		57.41	

R SQ.	= 0.600	MEAN X =	0.7932
R	= 0.775	S.D. X =	0.0276
STD.ERR	= 1.096	MEAN Y =	94.42
CORREL	= 0.775	S.D. Y =	1.66
SAMPLE	= 14	TOT VAR =	2.77

SECOND ORDER EQUATION

Y =	A	+	B1	* X +	B2	*X'
Y =	92.89	+	-43.10	* X +	56.69	*X'

R SQ.	= 0.587	MEAN X =	0.7932
R	= 0.766	S.D. X =	0.0276
STD.ERR	= 1.144	MEAN Y =	94.42
SAMPLE	= 14	S.D. Y =	1.66

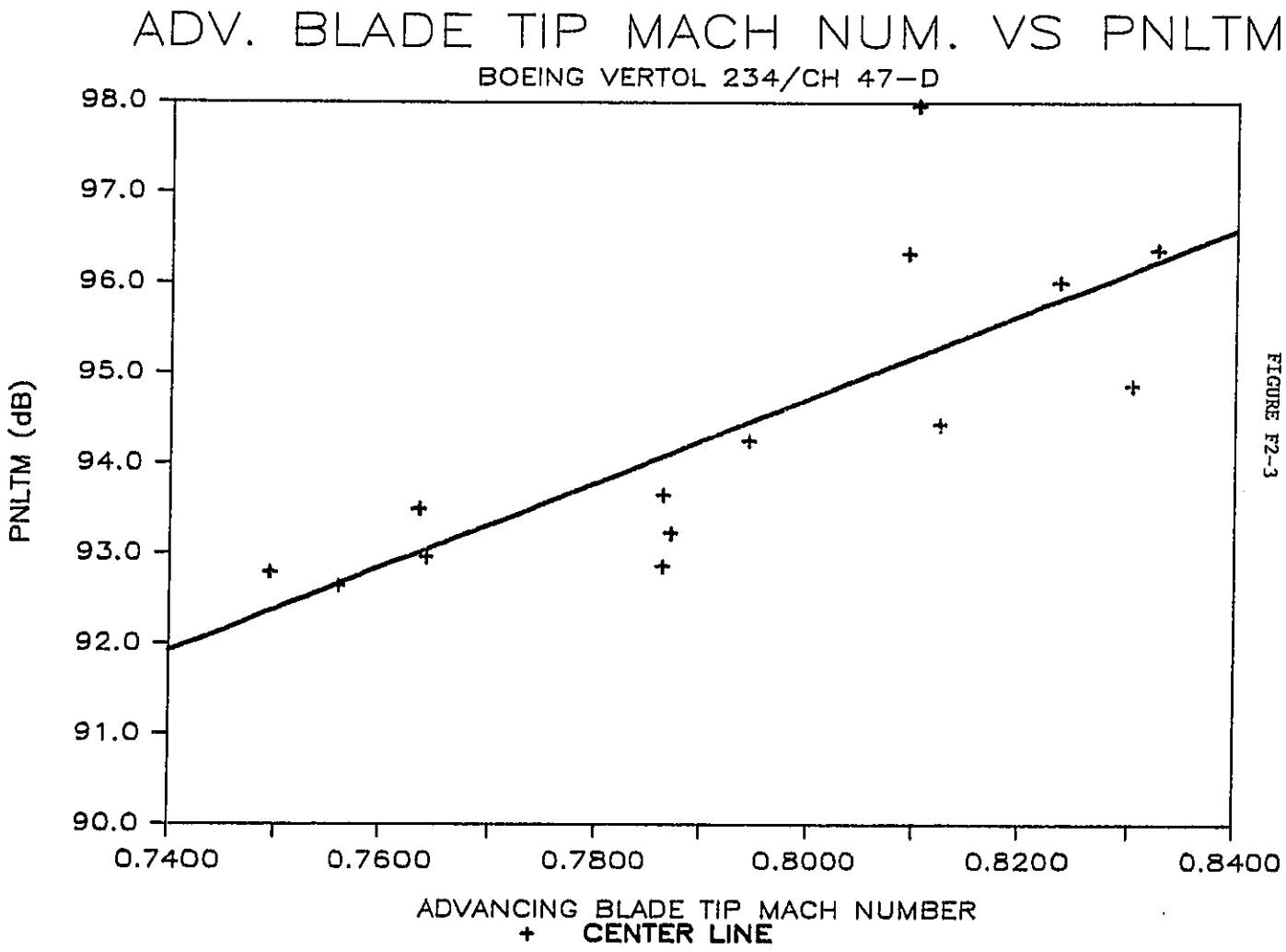

ADV. BLADE TIP MACH NUM. VS PNLTM
BOEING VERTOL 234/CH 47-D
98.0
97.0
96.0
95.0
94.0
93.0
92.0
91.0
90.0
PNLTM (dB)
0.7400
0.7600
0.7800
0.8000
0.8200
0.8400
ADVANCING BLADE TIP MACH NUMBER
+ CENTER LINE

FIGURE F2-3

TABLE F2-8

BOEING VERTOL 234/CH 47-D
RIGHT SIDELINE

ANAL. DATE: 11-Mar-86

EVENT	X INPUT	Y INPUT
A1	0.8326	94.80
A2	0.8236	94.23
A3	0.8123	93.37
A4	NA	93.89
A5	0.8303	94.55
A6	NA	93.01
C11	NA	93.01
C12	0.8101	94.20
C13	NA	93.00
C14	0.8093	94.32
D15	0.7870	91.12
D16	0.7945	92.38
D17	NA	90.97
D18	0.7863	92.28
D19	0.7863	91.58
E20	0.7715	NA
E21	0.7641	90.48
E22	NA	91.01
E23	0.7559	90.98
E24	0.7634	92.03
E25	0.7495	90.56

LINEAR REGRESSION EQUATION

Y =	SLOPE	* X +	INTERCEPT	
=	52.79		50.76	
R SQ. =	0.855	MEAN X =	0.7932	
R =	0.924	S.D. X =	0.0276	
STD.ERR =	0.626	MEAN Y =	92.63	
CORREL =	0.924	S.D. Y =	1.58	
SAMPLE =	14	TOT VAR =	2.49	

TABLE F2-9

LINEAR REGRESSION EQUATION

Y =	SLOPE	* X +	INTERCEPT		
=	52.79		50.76		
R SQ. =	0.855	MEAN X =	0.7932		
R =	0.924	S.D. X =	0.0276		
STD.ERR =	0.626	MEAN Y =	92.63		
CORREL =	0.924	S.D. Y =	1.58		
SAMPLE =	14	TOT VAR =	2.49		

SECOND ORDER EQUATION

Y =	A	+ B1	* X +	B2	*X'	
Y =	228.59	+ -397.01	* X +	284.10	*X'	
R SQ. =	0.750	MEAN X =	0.7932			
R =	0.866	S.D. X =	0.0276			
STD.ERR =	0.623	MEAN Y =	92.63			
SAMPLE =	14	S.D. Y =	1.58			

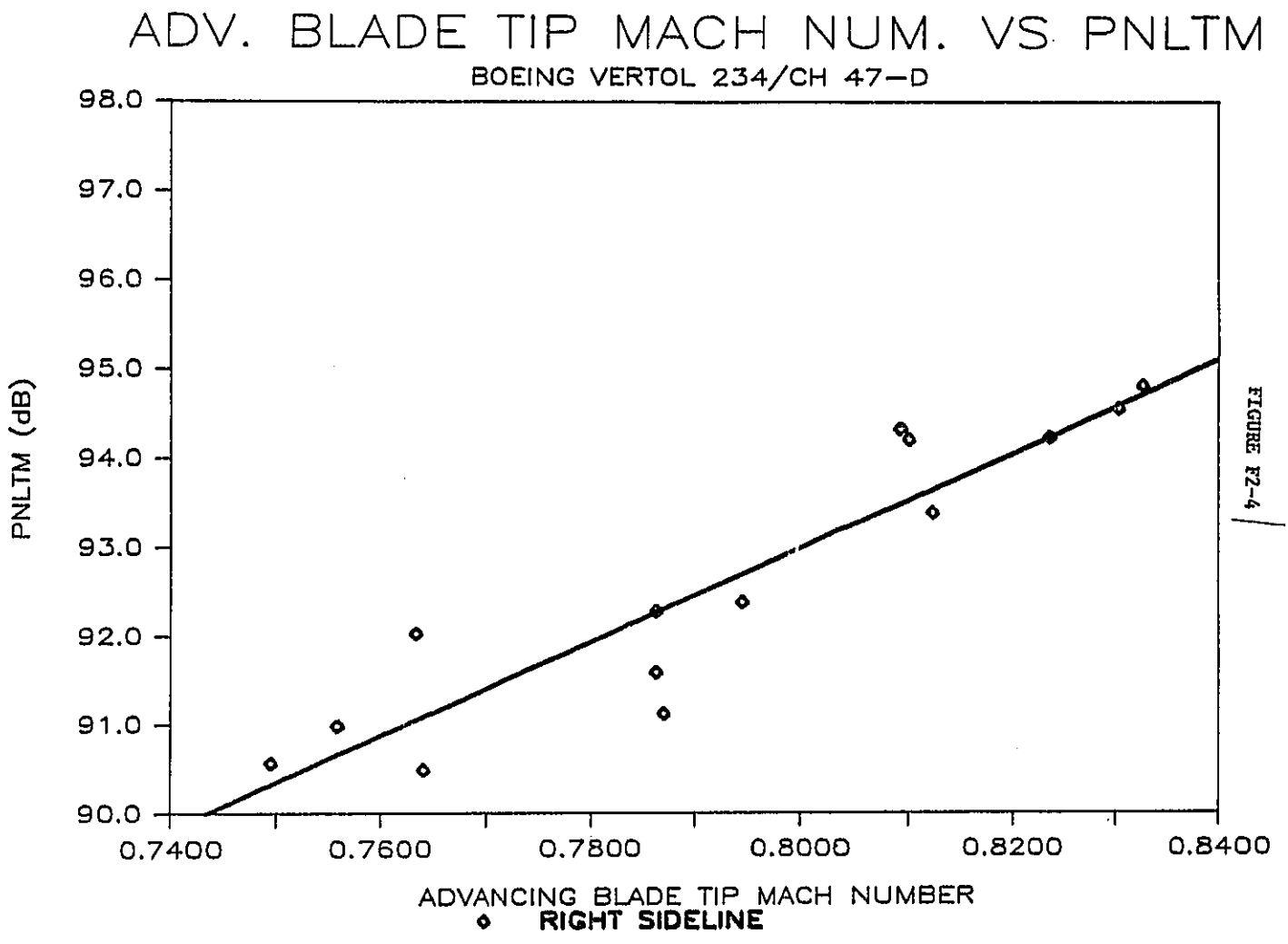

ADV. BLADE TIP MACH NUM. VS PNLTM
BOEING VERTOL 234/CH 47-D
PNLTM (dB)
98.0
97.0
96.0
95.0
94.0
93.0
92.0
91.0
90.0
0.7400
0.7600
0.7800
0.8000
0.8200
0.8400
ADVANCING BLADE TIP MACH NUMBER
◇ RIGHT SIDELINE

FIGURE F2-4

TABLE F3-1

SUMMARY EPNL LEVELS (dB)
DATA PROCESSED PER ICAO CERTIFICATION PROCEDURES

HELICOPTER: BOEING VERTOL 234/CH 47-D
OPERATION: ICAO TAKEOFF

EVENT NUMBER	LEFT SIDELINE	CENTER LINE CENTER	RIGHT SIDELINE	3 MIC AVERAGE
SITE	2	1	3	
G40	93.50	NA	NA	0.00
G41	93.60	96.30	92.80	94.23
G42	91.90	95.50	93.00	93.47
G43	94.00	NA	93.00	0.00
G44	92.90	95.10	92.70	93.57
G45	92.00	95.70	91.80	93.17
AVERAGE	92.98	95.65	92.66	93.61
STD. DEV.	0.88	0.50	0.50	0.45
90% C.I.	0.72	0.59	0.47	0.53

TABLE F3-2

SUMMARY EPNL LEVELS (dB)
DATA PROCESSED PER ICAO CERTIFICATION PROCEDURES

HELICOPTER: BOEING VERTOL 234/CH 47-D
OPERATION: ICAO LFO

EVENT NUMBER	LEFT SIDELINE	CENTER LINE CENTER	RIGHT SIDELINE	3 MIC AVERAGE
SITE	2/3	1	3/2	
A1	91.30	92.30	92.80	92.13
A2	92.60	93.10	93.40	93.03
A3	93.60	93.90	93.50	93.67
A4	92.80	93.10	92.60	92.83
A5	92.20	92.60	93.00	92.60
A6	92.40	92.80	92.10	92.43
AVERAGE	92.48	92.97	92.90	92.78
STD. DEV.	0.75	0.55	0.52	0.53
90% C.I.	0.62	0.45	0.43	0.44

A: 10-Mar-86

TABLE F3-3

SUMMARY EPNL LEVELS (dB)
DATA PROCESSED PER ICAO CERTIFICATION PROCEDURES

HELICOPTER: BOEING VERTOL 234/CH 47-D
OPERATION: ICAO APPROACH

EVENT NUMBER	LEFT SIDELINE	CENTER LINE CENTER	RIGHT SIDELINE	3 MIC AVERAGE
SITE	3	1	2	
H30	99.60	102.20	96.90	99.57
H31	99.70	101.90	95.50	99.03
H32	99.20	102.60	96.60	99.47
H33	99.40	103.50	97.70	100.20
H34	98.80	102.70	96.10	99.20
H35	100.40	102.20	96.70	99.77
AVERAGE	99.52	102.52	96.58	99.54
STD. DEV.	0.54	0.56	0.74	0.42
90% C.I.	0.44	0.46	0.61	0.34

APPENDIX G (G1-G3)

SIKORSKY S-76

TABLE G1-1

TABLE NO. J.4-1.1

SIKORSKY S-76 SPIRIT HELICOPTER

DOT/TSC
1/29/86

CORRECTION DATA

SITE: 1 CENTERLINE - CENTER JUNE 13,1983

	CORRECTED				CORRECTIONS (dB)				ACOUSTIC ANGLE	TRACKING DATA (Meters) (ACTUAL)		(REFERENCE)		SPEED(m/sec)	
Ev	EPNL	SEL	PNLTm	ALm	/\1(P)	/\1(A)	/\2	/\3	(Deg)	CPA	SR	CPAR	SRR	GRND	REF
TAKEOFF -- TARGET IAS 74 KTS (ICAO)															
F29	90.9	86.9	94.3	80.0	1.47	1.39	-0.25	-	106.7	127.3	132.9	109.8	114.6	40.1	38.1
F30	92.0	88.1	95.3	80.9	1.69	1.59	-0.33	-	92.7	130.4	130.6	109.8	109.9	40.1	38.1
F31	92.7	89.0	96.1	81.6	1.90	1.78	-0.39	-	102.0	132.7	135.7	109.8	112.2	40.1	38.1
F32	91.3	87.4	94.3	80.0	1.55	1.48	-0.28	-	77.5	128.2	131.3	109.8	112.4	40.1	38.1
F33	91.0	86.9	94.3	79.7	0.12	0.14	0.16	-	86.3	111.9	112.2	109.8	110.0	40.1	38.1
F34	90.6	86.4	93.9	79.3	0.40	0.42	0.07	-	72.9	115.3	120.7	109.8	114.8	40.1	38.1
F35	89.9	85.8	92.9	78.6	-1.27	-1.18	0.71	-	69.4	97.9	104.6	109.8	117.3	41.1	38.1
F36	90.3	86.1	93.1	78.4	-0.32	-0.32	0.31	-	74.6	107.0	111.0	109.8	113.8	40.1	38.1
Avg.	91.1	87.1	94.3	79.8	0.69	0.66	0.00	-	85.3	118.8	122.4	109.8	113.1	40.2	38.1
Std Dv	0.9	1.1	1.1	1.1	1.14	1.07	0.38	-	14.0	12.7	11.9	0.0	2.5	0.4	0.0
90% CI	0.6	0.7	0.7	0.7	0.76	0.72	0.26	-	9.4	8.5	8.0	0.0	1.7	0.2	0.0
TAKEOFF -- CATERGORY B (SEE TEXT)															
H44	92.1	88.4	96.4	82.6	0.77	0.68	-0.78	-	113.8	117.3	128.2	109.8	120.0	33.4	38.1
H45	93.2	89.7	97.8	83.7	2.36	2.18	-0.93	-	110.1	135.5	144.3	109.8	116.9	36.0	38.1
H46	93.4	89.5	97.5	83.5	1.22	1.14	-0.28	-	127.0	121.9	152.6	109.8	137.4	38.6	38.1
H47	91.7	87.9	95.9	81.5	3.47	3.22	-2.31	-	101.5	150.2	153.2	109.8	112.0	28.3	38.1
H48	91.6	87.7	94.9	80.4	2.17	1.98	-0.87	-	102.7	133.0	136.3	109.8	112.5	36.0	38.1
H49	91.3	87.6	96.0	81.7	2.77	2.74	-1.78	-	108.5	143.3	151.1	109.8	115.7	30.9	38.1
Avg.	92.2	88.5	96.4	82.2	2.13	1.99	-1.16	-	110.6	133.5	144.3	109.8	119.1	33.9	38.1
Std Dv	0.9	0.9	1.1	1.3	0.99	0.95	0.74	-	9.3	12.5	10.2	0.0	9.4	3.8	0.0
90% CI	0.7	0.8	0.9	1.0	0.82	0.78	0.61	-	7.6	10.2	8.4	0.0	7.8	3.1	0.0
TAKEOFF (WITH TURN) -- TARGET IAS 74 KTS															
J56										NO TRACKING DATA					
J57										NO TRACKING DATA					
J58										NO TRACKING DATA					
J59										NO TRACKING DATA					
J60										NO TRACKING DATA					

*- Data Corrected Using 'Simplified Procedure'

TABLE G1-2

TABLE NO. J.4-1.2

SIKORSKY S-76 SPIRIT HELICOPTER

CORRECTION DATA

DOT/TSC
1/29/86

SITE: 1

CENTERLINE - CENTER

JUNE 13,1983

Ev	CORRECTED EPNL	CORRECTED SEL	CORRECTED PNLTa	CORRECTED ALn	CORRECTIONS (dB) /\1(P)	/\1(A)	/\2	/\3	ACOUSTIC ANGLE (Deg)	TRACKING DATA (Meters) (ACTUAL) CPA	SR	(REFERENCE) CPAR	SRR	SPEED(m/sec) GRND	REF
3 DEGREE APPROACH -- TARGET IAS 74 KTS															
G37	97.1	93.7	100.5	87.0	-0.63	-0.58	0.33	-	119.1	112.2	128.4	119.8	137.1	39.1	38.1
G38	97.1	94.5	101.0	88.1	-0.77	-0.74	0.61	-	119.0	110.4	126.2	119.8	137.0	41.1	38.1
G39	95.4	91.8	99.0	85.8	-0.62	-0.62	0.28	-	125.3	112.1	137.3	119.8	146.8	38.6	38.1
G40	-	91.2	99.6	85.8	0.05	0.05	-	-	129.5	120.3	155.9	119.8	155.3	38.6	38.1
G41	97.4	94.8	100.5	87.5	-1.47	-1.40	0.74	-	118.6	102.5	116.7	119.8	136.4	40.1	38.1
G42	96.0	92.9	98.9	85.3	-0.02	0.00	0.29	-	99.5	119.6	121.3	119.8	121.5	40.6	38.1
G43	93.0	90.1	94.8	81.9	-0.25	-0.23	0.26	-	124.3	116.6	141.1	119.8	145.0	39.6	38.1
Avg.	96.0	92.7	99.2	85.9	-0.53	-0.50	0.42	-	119.3	113.4	132.4	119.8	139.9	39.7	38.1
Std Dv	1.6	1.8	2.1	2.0	0.52	0.50	0.20	-	9.6	6.1	13.4	0.0	10.6	1.0	0.0
90% CI	1.4	1.3	1.5	1.5	0.38	0.37	0.17	-	7.1	4.5	9.8	0.0	7.8	0.7	0.0
6 DEGREE APPROACH -- TARGET IAS 74 KTS															
150	96.1	93.4	100.0	86.9	-0.98	-0.84	0.37	-	113.8	108.3	118.3	119.3	130.4	38.6	38.1
151	94.6	91.3	98.9	82.9	-0.82	-0.77	0.17	-	91.6	109.4	109.4	119.3	119.4	37.0	38.1
152	94.9	92.1	97.7	85.5	-1.09	-0.85	0.26	-	123.1	108.3	129.3	119.3	142.4	37.6	38.1
153	96.2	92.9	99.8	85.8	-1.02	-0.98	0.30	-	116.6	107.0	119.7	119.3	133.5	37.6	38.1
154	95.5	92.0	100.1	86.0	-0.40	-0.39	0.21	-	119.7	113.9	131.1	119.3	137.4	38.6	38.1
155	95.7	92.5	98.1	84.8	-0.87	-0.83	0.36	-	120.5	108.6	126.1	119.3	138.5	38.6	38.1
Avg.	95.5	92.4	98.8	85.3	-0.86	-0.78	0.28	-	114.2	109.3	122.3	119.3	133.6	38.0	38.1
Std Dv	0.6	0.8	1.4	1.4	0.25	0.20	0.08	-	11.5	2.4	8.1	0.0	8.1	0.7	0.0
90% CI	0.5	0.6	1.1	1.1	0.20	0.17	0.07	-	9.5	2.0	6.7	0.0	6.7	0.6	0.0
9 DEGREE APPROACH -- TARGET IAS 74 KTS															
K61	-	84.2	90.0	77.1	-0.03	-0.04	-	-	110.2	117.3	125.0	118.5	126.3	38.6	38.1
K62	93.2	90.3	94.6	81.0	-0.09	-0.11	0.11	-	108.5	116.7	123.1	118.5	125.0	38.6	38.1
K63	91.7	88.0	94.2	79.3	0.21	0.19	-0.16	-	93.2	120.2	120.4	118.5	118.7	37.0	38.1
K64	89.8	86.2	91.3	78.1	0.39	0.34	-0.03	-	98.1	122.0	123.2	118.5	119.7	38.6	38.1
K65	91.6	88.1	95.2	81.3	0.91	0.83	-0.27	-	130.5	128.6	169.1	118.5	155.8	38.1	38.1
K66	90.7	87.0	92.6	78.5	0.33	0.31	-0.08	-	124.7	121.4	147.7	118.5	144.1	38.1	38.1
Avg.	91.4	87.3	93.0	79.2	0.29	0.25	-0.09	-	110.9	121.0	134.7	118.5	131.6	38.2	38.1
Std Dv	1.3	2.0	2.0	1.6	0.36	0.34	0.14	-	14.5	4.3	19.6	0.0	15.0	0.6	0.0
90% CI	1.2	1.7	1.7	1.4	0.30	0.28	0.14	-	11.9	3.5	16.1	0.0	12.3	0.5	0.0

*- Data Corrected Using "Simplified Procedure"

TABLE G1-3

TABLE NO. J.4-1.3

SIKORSKY S-76 SPIRIT HELICOPTER

DOT/TSC
1/29/86

CORRECTION DATA

SITE: 1 CENTERLINE - CENTER JUNE 13,1983

Ev	CORRECTED EPNL	SEL	PNLT*	AL*	CORRECTIONS (dB) /\1(P)	/\1(A)	/\2	/\3	ACOUSTIC ANGLE (Deg)	TRACKING DATA (Meters) (ACTUAL) CPA	SR	(REFERENCE) CPAR	SRR	SPEED(m/sec) GRND	REF
500 FT. FLYOVER -- TARGET IAS 143 KTS															
A1	92.4	89.5	96.8	83.8	-1.10	-1.00	0.13	0.91	125.9	137.4	169.7	150.0	185.3	72.0	74.6
A2	92.9	90.0	97.3	84.1	-0.32	-0.24	-0.07	0.56	129.3	148.9	192.5	150.0	194.0	73.1	74.6
A3	92.2	89.2	96.3	83.5	-0.40	-0.27	0.02	0.00	124.9	148.9	181.4	150.0	182.8	74.6	74.6
A5	91.5	88.5	95.5	82.3	-1.01	-0.90	0.21	0.00	126.4	140.8	175.0	150.0	186.4	74.6	74.6
A6	91.6	89.4	94.9	83.1	-0.97	-0.90	0.21	0.00	136.4	140.7	203.8	150.0	217.4	74.6	74.6
Avg.	92.1	89.3	96.2	83.4	-0.76	-0.66	0.10	0.73	128.6	143.3	184.5	150.0	193.2	73.8	74.6
Std Dv	0.6	0.5	1.0	0.7	0.37	0.37	0.12	0.25	4.7	5.2	13.7	0.0	14.2	1.2	0.0
90% CI	0.5	0.5	0.9	0.7	0.35	0.36	0.12	1.10	4.4	5.0	13.1	0.0	13.5	1.1	0.0
500 FT. FLYOVER -- TARGET IAS 130 KTS															
B7	-	85.9	92.8	79.7	-1.66	-1.45	-	1.34	132.0	132.4	178.2	150.0	201.9	61.7	66.9
B8	91.0	88.6	94.5	82.1	-1.15	-0.99	-0.11	1.34	134.4	139.3	195.0	150.0	210.1	61.7	66.9
B9	89.5	86.7	93.1	80.1	-0.38	-0.27	-0.14	0.75	120.6	148.6	172.6	150.0	174.2	64.3	66.9
B10	89.7	87.2	93.4	80.6	-0.25	-0.18	-0.01	0.08	126.4	150.3	186.8	150.0	186.4	66.9	66.9
B11	89.2	86.5	93.0	80.2	-1.45	-1.28	0.34	0.08	129.5	135.0	174.9	150.0	194.3	66.9	66.9
B12	90.5	88.0	94.4	81.9	-0.50	-0.42	0.07	0.08	127.1	146.8	184.0	150.0	188.0	66.9	66.9
B13	88.8	85.9	92.7	79.7	0.49	0.51	-0.23	0.15	124.3	161.0	194.8	150.0	181.5	66.9	66.9
Avg.	89.8	87.0	93.4	80.6	-0.70	-0.58	-0.01	0.55	127.7	144.8	183.8	150.0	190.9	65.0	66.9
Std Dv	0.8	1.0	0.8	1.0	0.76	0.69	0.20	0.59	4.7	9.9	9.0	0.0	12.2	2.4	0.0
90% CI	0.7	0.8	0.6	0.7	0.56	0.51	0.17	0.44	3.4	7.3	6.6	0.0	9.0	1.8	0.0
500 FT. FLYOVER -- TARGET IAS 115 KTS															
C14	88.9	86.4	91.9	79.4	-0.12	-0.07	-0.05	0.09	130.3	152.2	199.7	150.0	196.7	59.2	59.2
C15	88.0	85.2	91.7	78.6	-1.06	-0.82	0.20	0.09	124.4	140.9	170.7	150.0	181.7	59.2	59.2
C17	87.3	84.4	90.7	77.7	-0.79	-0.67	0.16	0.14	130.8	142.7	188.5	150.0	198.0	59.2	59.2
C18	89.2	86.5	92.4	79.5	-0.62	-0.48	0.09	0.14	138.2	145.8	218.8	150.0	225.2	59.2	59.2
Avg.	88.3	85.6	91.7	78.8	-0.65	-0.51	0.10	0.11	130.9	145.4	194.4	150.0	200.4	59.2	59.2
Std Dv	0.9	1.0	0.7	0.9	0.40	0.32	0.11	0.03	5.7	5.0	20.2	0.0	18.1	0.0	0.0
90% CI	1.0	1.2	0.8	1.0	0.47	0.38	0.13	0.03	6.7	5.8	23.7	0.0	21.3	0.0	0.0
500 FT. FLYOVER -- TARGET IAS 100 KTS															
D19	88.4	85.9	89.1	76.6	-1.00	-0.76	0.24	0.09	120.8	139.3	162.1	150.0	174.6	51.4	51.4
D20	89.0	86.3	91.1	78.4	-0.94	-0.92	0.27	0.09	111.8	138.2	148.8	150.0	161.5	51.4	51.4
D21	87.3	84.5	90.4	77.2	-0.75	-0.62	0.17	0.11	101.3	142.5	145.3	150.0	153.0	51.4	51.4
D22	88.3	85.5	90.6	77.5	-1.26	-1.20	0.34	0.13	132.8	135.3	184.5	150.0	204.5	51.4	51.4
D23	89.2	86.1	92.8	79.6	-1.19	-1.06	0.33	0.13	121.4	135.7	159.1	150.0	175.8	51.4	51.4
Avg.	88.4	85.7	90.8	77.9	-1.03	-0.91	0.27	0.11	117.6	138.2	160.0	150.0	173.9	51.4	51.4
Std Dv	0.7	0.7	1.3	1.2	0.20	0.23	0.07	0.02	11.8	2.9	15.4	0.0	19.6	0.0	0.0
90% CI	0.7	0.7	1.3	1.1	0.19	0.22	0.07	0.02	11.2	2.8	14.7	0.0	18.7	0.0	0.0
1000 FT. FLYOVER -- TARGET IAS 145 KTS															
E24	87.1	84.6	88.0	75.8	0.67	0.64	-0.08	-	111.1	321.9	345.1	300.0	321.6	77.2	74.6
E25	86.3	84.1	86.3	74.6	0.61	0.59	-0.37	-	93.9	320.2	321.0	300.0	300.7	72.0	74.6
E26	86.5	84.0	87.0	75.1	0.75	0.68	-0.23	-	129.6	322.3	418.3	300.0	389.3	74.6	74.6
E27	87.2	85.1	88.6	76.5	-0.39	-0.29	0.04	-	133.5	296.4	409.0	300.0	413.9	74.6	74.6
E28	86.9	84.2	88.1	75.4	0.46	0.40	-0.15	-	140.2	314.6	491.1	300.0	468.3	74.6	74.6
Avg.	86.8	84.4	87.6	75.5	0.42	0.40	-0.16	-	121.7	315.1	396.9	300.0	378.8	74.6	74.6
Std Dv	0.4	0.4	0.9	0.8	0.47	0.40	0.15	-	18.9	10.9	66.9	0.0	68.4	1.8	0.0
90% CI	0.4	0.4	0.9	0.7	0.44	0.38	0.15	-	18.0	10.4	63.8	0.0	65.2	1.7	0.0

*- Data Corrected Using 'Simplified Procedure'

TABLE G1-4

TABLE NO. J.4-2.1

SIKORSKY S-76 SPIRIT HELICOPTER

CORRECTION DATA

DOT/TSC
1/29/86

SITE: 2 SIDELINE - 150 M. SOUTH JUNE 13,1983

Ev	CORRECTED EPNL	CORRECTED SEL	CORRECTED PNLTm	CORRECTED ALm	CORRECTIONS (dB) /\1(P)	/\1(A)	/\2	/\3	ACOUSTIC ANGLE (Deg)	TRACKING DATA (Meters) (ACTUAL) CPA	SR	(REFERENCE) CPAR	SRR	SPEED(m/sec) GRND	REF
TAKEOFF -- TARGET IAS 74 KTS (ICAO)															
F29	92.0	89.8	94.0	82.3	0.47	0.47	0.05	-	99.4	196.2	198.8	185.9	189.4	40.1	38.1
F30	92.3	90.1	94.0	82.4	0.57	0.56	0.02	-	97.3	198.2	199.9	185.9	187.4	40.1	38.1
F31	92.6	90.1	94.0	81.8	0.64	0.57	-0.01	-	86.1	199.8	200.2	185.9	186.3	40.1	38.1
F32	91.6	89.5	92.9	81.4	0.48	0.48	0.04	-	91.8	196.8	196.9	185.9	185.9	40.1	38.1
F33	91.7	89.5	93.3	81.9	-0.04	-0.01	0.21	-	76.8	186.7	191.8	185.9	190.9	40.1	38.1
F34	91.1	88.9	91.6	80.0	0.04	0.08	0.18	-	77.3	188.7	193.5	185.9	190.5	40.1	38.1
F35	91.5	88.9	92.6	80.7	-0.56	-0.46	0.47	-	79.1	178.7	182.0	185.9	189.3	41.1	38.1
F36	-	88.2	91.0	79.2	-0.23	-0.18	-	-	100.4	183.8	186.9	185.9	189.0	40.1	38.1
Avg.	91.8	89.4	92.9	81.2	0.17	0.19	0.14	-	88.5	191.1	193.7	185.9	188.5	40.2	38.1
Std Dv	0.5	0.7	1.1	1.2	0.43	0.39	0.17	-	10.0	7.7	6.6	0.0	1.8	0.4	0.0
90% CI	0.4	0.4	0.8	0.8	0.29	0.26	0.12	-	6.7	5.2	4.4	0.0	1.2	0.2	0.0
TAKEOFF -- CATERGORY B (SEE TEXT)															
H44	92.1	90.1	94.0	83.1	0.30	0.26	-0.63	-	81.9	189.9	191.8	185.9	187.7	33.4	38.1
H45	92.2	90.1	94.0	82.1	0.89	0.85	-0.51	-	80.6	201.6	204.3	185.9	188.4	36.0	38.1
H46	92.6	90.4	93.7	82.5	0.43	0.41	-0.06	-	79.0	192.8	196.4	185.9	189.4	38.6	38.1
H47	91.7	89.1	94.9	81.8	1.57	1.37	-1.71	-	84.1	211.7	212.8	185.9	186.9	28.3	38.1
H48	93.2	90.8	96.1	83.1	0.91	0.77	-0.48	-	99.7	199.9	202.8	185.9	188.6	36.0	38.1
H49	91.9	89.2	94.4	81.7	1.29	1.13	-1.26	-	90.7	206.9	206.9	185.9	185.9	30.9	38.1
Avg.	92.3	89.9	94.5	82.4	0.90	0.80	-0.77	-	86.0	200.5	202.5	185.9	187.8	33.9	38.1
Std Dv	0.5	0.7	0.9	0.6	0.49	0.42	0.60	-	7.8	8.2	7.5	0.0	1.3	3.8	0.0
90% CI	0.4	0.5	0.7	0.5	0.40	0.35	0.49	-	6.5	6.8	6.2	0.0	1.0	3.1	0.0
TAKEOFF (WITH TURN) -- TARGET IAS 74 KTS															
J56										NO TRACKING DATA					
J57										NO TRACKING DATA					
J58										NO TRACKING DATA					
J59										NO TRACKING DATA					
J60										NO TRACKING DATA					
Avg.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Std Dv	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
90% CI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*- Data Corrected Using "Simplified Procedure"

TABLE G1-5

TABLE NO. J.4-2.2

SIKORSKY S-76 SPIRIT HELICOPTER

CORRECTION DATA

DOT/TSC
1/29/86

SITE: 2 SIDELINE - 150 M. SOUTH JUNE 13,1983

Ev	CORRECTED EPNL	SEL	PNLTm	ALm	CORRECTIONS (dB) /\1(P)	/\1(A)	/\2	/\3	ACOUSTIC ANGLE (Deg)	TRACKING DATA (Meters) (ACTUAL) CPA	SR	(REFERENCE) CPAR	SRR	SPEED(m/sec) GRND	REF
3 DEGREE APPROACH -- TARGET IAS 74 KTS															
G37	91.2	87.5	93.9	79.5	-0.28	-0.25	0.20	-	126.5	186.9	232.5	192.0	238.9	39.1	38.1
G38	92.5	89.1	94.3	80.5	-0.30	-0.30	0.45	-	128.7	185.7	238.1	192.0	246.1	41.1	38.1
G39	90.1	86.9	92.0	78.2	-0.26	-0.25	0.15	-	113.5	186.8	203.7	192.0	209.4	38.6	38.1
G40	90.9	87.4	93.6	78.9	0.01	0.01	0.06	-	113.7	191.8	209.4	192.0	209.7	38.6	38.1
G41	87.8	84.9	91.3	78.7	-0.55	-0.52	0.42	-	126.4	181.2	225.2	192.0	238.6	40.1	38.1
G42	91.9	88.5	94.0	79.8	-0.02	-0.02	0.30	-	102.9	191.3	196.3	192.0	197.0	40.6	38.1
G43	90.7	87.5	92.4	77.9	-0.10	-0.09	0.22	-	111.1	189.5	203.1	192.0	205.8	39.6	38.1
Avg.	90.7	87.4	93.1	79.1	-0.21	-0.20	0.26	-	117.6	187.6	215.5	192.0	220.8	39.7	38.1
Std Dv	1.5	1.4	1.2	0.9	0.19	0.19	0.14	-	9.8	3.6	16.3	0.0	19.7	1.0	0.0
90% CI	1.1	1.0	0.8	0.7	0.14	0.14	0.10	-	7.2	2.7	12.0	0.0	14.5	0.7	0.0
6 DEGREE APPROACH -- TARGET IAS 74 KTS															
150	93.3	90.1	93.8	81.1	-0.32	-0.32	0.18	-	88.1	184.5	184.6	191.7	191.8	38.6	38.1
151	94.2	90.7	97.3	83.7	-0.31	-0.28	-0.01	-	122.0	185.2	218.3	191.7	226.0	37.0	38.1
152										NO TRACKING DATA					
153	94.3	91.4	97.0	83.0	-0.37	-0.36	0.08	-	116.6	183.8	205.5	191.7	214.3	37.6	38.1
154	94.3	91.2	96.4	82.5	-0.11	-0.15	0.12	-	118.5	187.9	213.8	191.7	218.1	38.6	38.1
155	93.9	90.7	95.0	81.5	-0.31	-0.31	0.18	-	118.0	184.7	209.3	191.7	217.2	38.6	38.1
Avg.	94.0	90.8	95.9	82.4	-0.28	-0.28	0.11	-	112.7	185.2	206.3	191.7	213.5	38.1	38.1
Std Dv	0.4	0.5	1.5	1.1	0.10	0.08	0.08	-	13.8	1.6	13.0	0.0	12.9	0.7	0.0
90% CI	0.4	0.5	1.4	1.0	0.10	0.08	0.08	-	13.2	1.5	12.4	0.0	12.3	0.7	0.0
9 DEGREE APPROACH -- TARGET IAS 74 KTS															
K61	90.7	87.2	92.6	78.7	0.05	0.02	0.08	-	116.9	189.9	213.0	191.2	214.5	38.6	38.1
K62	93.6	90.5	95.6	81.8	0.02	-0.02	0.09	-	116.7	189.6	212.1	191.2	213.9	38.6	38.1
K63	90.9	87.6	92.3	78.4	0.12	0.11	-0.13	-	120.5	191.7	222.4	191.2	221.8	37.0	38.1
K64	90.9	88.0	92.3	78.6	0.18	0.18	0.03	-	98.7	192.8	195.1	191.2	193.4	38.6	38.1
K65	92.5	89.4	96.2	82.9	0.40	0.35	-0.10	-	123.9	197.1	237.3	191.2	230.2	38.1	38.1
K66	91.4	88.1	93.3	79.3	0.22	0.16	-0.02	-	123.2	192.5	230.2	191.2	228.6	38.1	38.1
Avg.	91.7	88.5	93.7	80.0	0.16	0.13	-0.01	-	116.7	192.3	218.4	191.2	217.1	38.2	38.1
Std Dv	1.1	1.2	1.7	1.9	0.14	0.13	0.09	-	9.3	2.7	15.0	0.0	13.4	0.6	0.0
90% CI	0.9	1.0	1.4	1.6	0.11	0.11	0.08	-	7.6	2.2	12.3	0.0	11.1	0.5	0.0

*- Data Corrected Using 'Simplified Procedure'

TABLE G1-6

TABLE NO. J.4-2.3

SIKORSKY S-76 SPIRIT HELICOPTER

CORRECTION DATA

DOT/TSC
1/29/86

SITE: 2 SIDELINE - 150 M. SOUTH JUNE 13,1983

Ev	CORRECTED EPNL	SEL	PNLT*	AL*	CORRECTIONS (dB) /\1(P)	/\1(A)	/\2	/\3	ACOUSTIC ANGLE (Deg)	TRACKING DATA (Meters) (ACTUAL) CPA	SR	(REFERENCE) CPAR	SRR	SPEED(m/sec) GRND	REF
500 FT. FLYOVER -- TARGET IAS 145 KTS															
A1	93.3	89.7	96.4	83.6	-0.61	-0.65	-0.01	0.73	134.6	202.9	284.9	212.1	298.0	72.0	74.6
A2	93.0	90.7	95.8	83.4	-0.32	-0.25	-0.07	0.36	127.4	210.7	265.1	212.1	266.9	73.1	74.6
A3	92.8	89.2	96.1	83.1	-0.24	-0.31	0.02	0.00	134.7	210.7	296.5	212.1	298.5	74.6	74.6
A5	-	88.7	95.1	82.5	-0.60	-0.66	-	0.00	135.6	205.2	293.3	212.1	303.3	74.6	74.6
A6	92.7	90.6	95.1	83.1	-0.69	-0.68	0.11	0.00	129.0	205.1	263.7	212.1	272.8	74.6	74.6
Avg.	93.0	89.8	95.7	83.1	-0.49	-0.51	0.01	0.54	132.3	206.9	280.7	212.1	287.9	73.8	74.6
Std Dv	0.3	0.8	0.6	0.4	0.20	0.21	0.07	0.26	3.8	3.6	15.5	0.0	16.7	1.2	0.0
90% CI	0.3	0.8	0.6	0.4	0.19	0.20	0.09	1.17	3.6	3.4	14.8	0.0	15.9	1.1	0.0
500 FT. FLYOVER -- TARGET IAS 130 KTS															
B7	90.3	87.6	93.5	81.1	-0.95	-0.84	-0.15	1.54	112.6	199.6	216.1	212.1	229.7	61.7	66.9
B8	91.2	89.4	93.3	81.5	-0.71	-0.62	-0.22	1.25	103.9	204.1	210.2	212.1	218.5	61.7	66.9
B9	89.1	86.6	92.5	79.9	-0.37	-0.28	-0.15	0.82	104.0	210.6	217.0	212.1	218.6	64.3	66.9
B10	90.2	88.1	92.3	79.9	-0.31	-0.25	0.01	0.06	113.2	211.8	230.4	212.1	230.7	66.9	66.9
B11	89.0	86.8	92.0	80.1	-0.97	-0.78	0.17	0.08	126.0	201.2	248.9	212.1	262.3	66.9	66.9
B12	90.5	88.4	92.6	80.5	-0.41	-0.34	0.04	0.06	109.0	209.3	221.4	212.1	224.4	66.9	66.9
B13	88.9	86.2	92.3	79.4	0.04	0.13	-0.11	0.16	112.4	219.4	237.4	212.1	229.5	66.9	66.9
Avg.	89.9	87.6	92.6	80.3	-0.53	-0.43	-0.06	0.57	111.6	208.0	225.9	212.1	230.5	65.0	66.9
Std Dv	0.9	1.1	0.5	0.7	0.37	0.34	0.14	0.63	7.5	6.9	13.7	0.0	14.9	2.4	0.0
90% CI	0.7	0.8	0.4	0.5	0.27	0.25	0.10	0.46	5.5	5.1	10.0	0.0	11.0	1.8	0.0
500 FT. FLYOVER -- TARGET IAS 115 KTS															
C14	88.7	86.8	90.6	78.2	-0.23	-0.15	-0.02	0.12	114.0	213.1	233.2	212.1	232.2	59.2	59.2
C15	87.5	85.3	90.5	78.2	-0.62	-0.54	0.11	0.15	107.3	205.3	214.9	212.1	222.1	59.2	59.2
C17	87.7	85.1	91.0	78.6	-0.55	-0.45	0.09	0.22	105.5	206.5	214.2	212.1	220.1	59.2	59.2
C18	88.6	86.7	90.3	78.2	-0.48	-0.36	0.05	0.18	121.4	208.6	244.4	212.1	248.6	59.2	59.2
Avg.	88.1	86.0	90.6	78.3	-0.47	-0.37	0.06	0.17	112.0	208.4	226.7	212.1	230.7	59.2	59.2
Std Dv	0.6	0.9	0.3	0.2	0.17	0.17	0.06	0.04	7.2	3.5	14.7	0.0	13.0	0.0	0.0
90% CI	0.7	1.1	0.3	0.2	0.20	0.20	0.07	0.05	8.5	4.1	17.3	0.0	15.3	0.0	0.0
500 FT. FLYOVER -- TARGET IAS 100 KTS															
D19	86.7	84.6	87.9	75.9	-0.68	-0.55	0.13	0.28	108.5	204.1	215.3	212.1	223.7	51.4	51.4
D20	87.6	86.1	88.3	76.9	-0.67	-0.56	0.14	0.23	101.5	203.4	207.6	212.1	216.5	51.4	51.4
D21	86.1	84.0	88.4	76.5	-0.57	-0.45	0.09	0.27	108.4	206.3	217.4	212.1	223.6	51.4	51.4
D22	87.9	86.3	89.1	77.7	-0.75	-0.66	0.17	0.35	108.8	201.5	212.8	212.1	224.0	51.4	51.4
D23	87.8	85.2	90.6	77.9	-0.73	-0.64	0.16	0.43	101.7	201.7	206.0	212.1	216.6	51.4	51.4
Avg.	87.2	85.2	88.9	77.0	-0.68	-0.57	0.14	0.31	105.8	203.4	211.8	212.1	220.9	51.4	51.4
Std Dv	0.8	1.0	1.1	0.9	0.07	0.08	0.03	0.08	3.8	2.0	4.9	0.0	4.0	0.0	0.0
90% CI	0.8	0.9	1.0	0.8	0.07	0.08	0.03	0.08	3.6	1.9	4.7	0.0	3.8	0.0	0.0
1000 FT. FLYOVER -- TARGET IAS 145 KTS															
E24	88.4	85.2	90.3	76.3	0.51	0.46	-0.03	-	136.0	354.4	509.9	335.4	482.6	77.2	74.6
E25	-	85.3	87.7	75.7	0.51	0.44	-	-	99.4	352.9	357.7	335.4	339.9	72.0	74.6
E26	86.7	83.9	87.4	75.3	0.51	0.49	-0.18	-	111.5	354.8	381.4	335.4	360.6	74.6	74.6
E27	89.2	86.5	90.3	77.4	-0.24	-0.28	0.04	-	134.2	331.5	462.4	335.4	467.9	74.6	74.6
E28	-	84.2	88.0	75.9	0.31	0.28	-	-	106.0	347.8	361.9	335.4	349.0	74.6	74.6
Avg.	88.1	85.0	88.7	76.0	0.32	0.28	-0.06	-	117.4	348.3	414.6	335.4	400.0	74.6	74.6
Std Dv	1.3	1.0	1.4	0.9	0.32	0.32	0.11	-	16.7	9.8	68.0	0.0	69.3	1.8	0.0
90% CI	2.2	1.0	1.4	0.8	0.31	0.31	0.19	-	15.9	9.3	64.8	0.0	66.0	1.7	0.0

*- Data Corrected Using "Simplified Procedure"

TABLE G1-7

TABLE NO. J.4-3.1

SIKORSKY S-76 SPIRIT HELICOPTER

DOT/TSC
1/29/86

CORRECTION DATA

SITE: 3 SIDELINE - 150 M. NORTH JUNE 13,1983

	CORRECTED				CORRECTIONS (dB)				ACOUSTIC ANGLE	TRACKING DATA (Meters) (ACTUAL)		(REFERENCE)		SPEED(m/sec)	
Ev	EPNL	SEL	PNLTm	ALm	/\1(P)	/\1(A)	/\2	/\3	(Deg)	CPA	SR	CPAR	SRR	GRND	REF
TAKEOFF -- TARGET IAS 74 KTS (ICAO)															
F29	89.8	88.1	90.7	79.4	0.63	0.53	0.00	-	96.9	199.1	200.5	185.9	187.2	40.1	38.1
F30	90.7	88.9	91.7	80.9	0.73	0.69	-0.03	-	92.7	201.2	201.4	185.9	186.1	40.1	38.1
F31	90.8	89.2	92.5	81.6	0.83	0.79	-0.05	-	100.7	202.7	206.3	185.9	189.1	40.1	38.1
F32	89.8	88.2	90.9	79.9	0.62	0.63	0.00	-	74.0	199.7	207.7	185.9	193.4	40.1	38.1
F33	90.1	88.2	91.5	79.9	0.09	0.11	0.17	-	84.5	189.4	190.3	185.9	186.7	40.1	38.1
F34	89.2	87.2	89.8	78.4	0.23	0.23	0.13	-	72.4	191.4	200.8	185.9	194.9	40.1	38.1
F35	89.5	87.2	91.7	78.9	-0.31	-0.28	0.42	-	94.5	181.1	181.7	185.9	186.4	41.1	38.1
F36	88.2	86.1	89.2	77.6	-0.05	-0.04	0.22	-	71.7	186.4	196.4	185.9	195.8	40.1	38.1
Avg.	89.8	87.9	91.0	79.6	0.35	0.33	0.11	-	85.9	193.9	198.1	185.9	190.0	40.2	38.1
Std Dv	0.8	1.0	1.1	1.3	0.41	0.39	0.16	-	11.9	7.9	8.6	0.0	4.1	0.4	0.0
90% CI	0.6	0.7	0.7	0.9	0.28	0.26	0.11	-	8.0	5.3	5.8	0.0	2.7	0.2	0.0
TAKEOFF -- CATERGORY B (SEE TEXT)															
H44	90.2	88.4	92.4	81.2	0.25	0.39	-0.68	-	88.0	192.7	192.8	185.9	186.0	33.4	38.1
H45	91.2	89.0	93.2	81.4	1.04	0.98	-0.55	-	88.0	204.6	204.7	185.9	186.0	36.0	38.1
H46	91.6	89.2	93.7	81.7	0.64	0.53	-0.11	-	81.7	195.6	197.7	185.9	187.8	38.6	38.1
H47	90.1	87.6	93.0	80.8	1.58	1.47	-1.76	-	86.2	214.9	215.4	185.9	186.3	28.3	38.1
H48	90.4	88.1	92.2	79.9	1.02	0.92	-0.53	-	113.6	202.9	221.4	185.9	202.8	36.0	38.1
H49	-	87.7	93.1	81.1	1.34	1.28	-	-	85.1	210.0	210.7	185.9	186.5	30.9	38.1
Avg.	90.7	88.3	92.9	81.0	0.98	0.93	-0.73	-	90.4	203.4	207.1	185.9	189.2	33.9	38.1
Std Dv	0.7	0.7	0.6	0.6	0.48	0.42	0.62	-	11.6	8.4	10.8	0.0	6.7	3.8	0.0
90% CI	0.6	0.5	0.5	0.5	0.39	0.34	0.59	-	9.5	6.9	8.9	0.0	5.5	3.1	0.0
TAKEOFF (WITH TURN) -- TARGET IAS 74 KTS															
J56										NO TRACKING DATA					
J57										NO TRACKING DATA					
J58										NO TRACKING DATA					
J59										NO TRACKING DATA					
J60										NO TRACKING DATA					
Avg.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Std Dv	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
90% CI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*- Data Corrected Using 'Simplified Procedure'

TABLE G1-8

TABLE NO. J.4-3.2

SIKORSKY S-76 SPIRIT HELICOPTER

CORRECTION DATA*

DOT/TSC
2/ 3/86

SITE: 3 SIDELINE - 150 M. NORTH JUNE 13,1983

Ev	CORRECTED EPNL	CORRECTED SEL	CORRECTED PNLTm	CORRECTED ALm	CORRECTIONS (dB) /\1(P)	/\1(A)	/\2	/\3	ACOUSTIC ANGLE (Deg)	TRACKING DATA (Meters) (ACTUAL) CPA	SR	(REFERENCE) CPAR	SRR	SPEED(m/sec) GRND	REF
3 DEGREE APPROACH -- TARGET IAS 74 KTS.															
G37	90.2	86.9	91.8	77.8	-0.17	-0.15	0.18	-	112.9	188.5	204.6	192.0	208.4	39.1	38.1
G38	90.5	87.2	90.8	76.5	-0.26	-0.25	0.42	-	113.0	187.4	203.5	192.0	208.6	41.1	38.1
G39	89.2	85.9	90.6	77.1	-0.17	-0.18	0.12	-	115.2	188.4	208.1	192.0	212.1	38.6	38.1
G40	89.4	86.8	90.6	77.0	0.12	0.09	0.03	-	113.4	193.4	210.8	192.0	209.2	38.6	38.1
G41	89.0	86.7	89.7	76.5	-0.48	-0.46	0.39	-	105.4	182.8	189.5	192.0	199.1	40.1	38.1
G42	91.2	88.6	91.7	79.1	0.09	0.09	0.27	-	100.4	193.0	196.2	192.0	195.2	40.6	38.1
G43	90.2	87.9	90.6	77.6	-0.01	-0.02	0.19	-	137.9	191.1	285.3	192.0	286.6	39.6	38.1
Avg.	90.0	87.1	90.8	77.4	-0.13	-0.13	0.23	-	114.0	189.2	214.0	192.0	217.0	39.7	38.1
Std Dv	0.8	0.9	0.7	0.9	0.21	0.20	0.14	-	11.8	3.7	32.3	0.0	31.3	1.0	0.0
90% CI	0.6	0.6	0.5	0.7	0.16	0.15	0.10	-	8.7	2.7	23.7	0.0	23.0	0.7	0.0
6 DEGREE APPROACH -- TARGET IAS 74 KTS.															
150										NO TRACKING DATA					
151										NO TRACKING DATA					
152										NO TRACKING DATA					
153	87.4	83.5	91.0	76.7	-0.26	-0.33	0.04	-	86.5	185.8	186.1	191.7	192.0	37.6	38.1
154	90.8	87.0	91.9	77.2	0.02	-0.01	0.09	-	127.5	189.9	239.5	191.7	241.7	38.6	38.1
155	89.7	85.6	90.8	76.6	-0.18	-0.18	0.14	-	125.4	186.7	229.1	191.7	235.2	38.6	38.1
Avg.	89.3	85.4	91.2	76.9	-0.14	-0.17	0.09	-	113.1	187.5	218.2	191.7	223.0	38.2	38.1
Std Dv	1.8	1.8	0.6	0.3	0.14	0.16	0.05	-	23.1	2.2	28.3	0.0	27.0	0.6	0.0
90% CI	3.0	3.0	1.0	0.6	0.24	0.27	0.08	-	38.9	3.7	47.7	0.0	45.5	1.0	0.0
9 DEGREE APPROACH -- TARGET IAS 74 KTS.															
K61	86.8	82.9	88.9	73.8	0.24	0.19	0.04	-	96.3	192.5	193.6	191.2	192.3	38.6	38.1
K62	88.4	84.8	89.6	74.2	0.17	0.17	0.04	-	112.3	192.1	207.7	191.2	206.7	38.6	38.1
K63	88.2	85.0	88.5	75.7	0.60	0.20	-0.17	-	114.8	194.3	214.0	191.2	210.5	37.0	38.1
K64	87.1	83.7	87.3	73.9	0.46	0.38	-0.01	-	137.3	195.4	288.4	191.2	282.1	38.6	38.1
K65	88.4	85.1	90.5	76.4	0.63	0.57	-0.14	-	123.7	199.7	240.1	191.2	229.8	38.1	38.1
K66	86.4	83.8	88.0	74.9	0.48	0.36	-0.07	-	111.1	195.1	209.1	191.2	204.9	38.1	38.1
Avg.	87.6	84.2	88.8	74.8	0.43	0.31	-0.05	-	115.9	194.9	225.5	191.2	221.1	38.2	38.1
Std Dv	0.9	0.9	1.1	1.1	0.19	0.16	0.09	-	13.7	2.7	34.4	0.0	32.3	0.6	0.0
90% CI	0.7	0.7	0.9	0.9	0.15	0.13	0.07	-	11.3	2.3	28.3	0.0	26.6	0.5	0.0

*- Data Corrected Using "Simplified Procedure"

TABLE G1-9

TABLE NO. J.4-3.3

SIKORSKY S-76 SPIRIT HELICOPTER

CORRECTION DATA

DOT/TSC
1/30/86

SITE: 3 SIDELINE - 150 M. NORTH JUNE 13,1983

Ev	CORRECTED EPNL	SEL	PNLTm	ALm	CORRECTIONS (dB) /\1(P)	/\1(A)	/\2	/\3	ACOUSTIC ANGLE (Deg)	TRACKING DATA (Meters) (ACTUAL) CPA	SR	(REFERENCE) CPAR	SRR	SPEED(m/sec) GRND	REF
500 FT. FLYOVER -- TARGET IAS 145 KTS															
A1	91.6	90.3	94.1	82.6	-0.71	-0.51	-0.03	0.59	131.3	204.2	271.8	212.1	282.3	72.0	74.6
A2	-	89.2	95.2	82.8	-0.11	-0.16	-	0.44	133.7	212.1	293.4	212.1	293.4	73.1	74.6
A3	91.9	90.1	94.1	82.6	-0.20	-0.23	0.00	0.00	137.3	212.1	312.9	212.1	312.9	74.6	74.6
A5	-	90.0	93.5	82.4	-0.60	-0.49	-	0.00	120.7	206.5	240.2	212.1	246.7	74.6	74.6
A6	92.6	89.2	95.6	83.1	-0.50	-0.53	0.09	0.00	135.4	206.4	293.7	212.1	301.9	74.6	74.6
Avg.	92.0	89.8	94.5	82.7	-0.42	-0.38	0.02	0.51	131.7	208.3	282.4	212.1	287.5	73.8	74.6
Std Dv	0.5	0.5	0.9	0.3	0.26	0.17	0.06	0.11	6.5	3.6	27.7	0.0	25.4	1.2	0.0
90% CI	0.9	0.5	0.8	0.2	0.25	0.17	0.11	0.47	6.2	3.5	26.4	0.0	24.2	1.1	0.0
500 FT. FLYOVER -- TARGET IAS 130 KTS															
B7	89.1	87.9	91.5	80.3	-0.90	-0.82	-0.17	1.25	123.7	200.8	241.3	212.1	254.9	61.7	66.9
B8	90.1	88.0	93.7	81.7	-0.50	-0.54	-0.24	1.54	123.1	205.4	245.2	212.1	253.2	61.7	66.9
B9	89.3	88.0	91.3	79.9	-0.26	-0.20	-0.17	0.66	112.3	211.9	229.1	212.1	229.3	64.3	66.9
B10	89.1	86.8	92.3	79.9	-0.16	-0.17	-0.02	0.08	130.7	213.2	281.3	212.1	279.9	66.9	66.9
B11	89.5	88.2	91.6	80.3	-0.76	-0.66	0.15	0.06	118.2	202.5	229.8	212.1	240.7	66.9	66.9
B12	89.7	87.2	93.1	80.6	-0.29	-0.29	0.02	0.08	131.1	210.7	279.6	212.1	281.5	66.9	66.9
B13	88.8	87.3	90.7	79.2	0.23	0.22	-0.13	0.13	108.1	220.9	232.4	212.1	223.2	66.9	66.9
Avg.	89.4	87.6	92.0	80.3	-0.38	-0.35	-0.08	0.54	121.0	209.4	248.4	212.1	251.8	65.0	66.9
Std Dv	0.4	0.5	1.1	0.8	0.38	0.35	0.14	0.62	8.7	6.9	22.7	0.0	22.9	2.4	0.0
90% CI	0.3	0.4	0.8	0.6	0.28	0.26	0.10	0.46	6.4	5.1	16.7	0.0	16.8	1.8	0.0
500 FT. FLYOVER -- TARGET IAS 115 KTS															
C14	87.8	85.9	89.9	78.2	-0.07	-0.08	-0.04	0.15	126.7	214.5	267.5	212.1	264.6	59.2	59.2
C15	87.1	86.1	89.5	78.4	-0.45	-0.40	0.09	0.12	107.1	206.6	216.1	212.1	221.9	59.2	59.2
C17	86.9	85.5	89.8	78.4	-0.35	-0.35	0.07	0.18	107.0	207.8	217.3	212.1	221.8	59.2	59.2
C18	87.3	85.6	89.5	78.0	-0.30	-0.29	0.03	0.22	130.0	209.9	274.1	212.1	277.0	59.2	59.2
Avg.	87.3	85.8	89.7	78.3	-0.29	-0.28	0.04	0.17	117.7	209.7	243.8	212.1	246.3	59.2	59.2
Std Dv	0.4	0.3	0.2	0.2	0.16	0.14	0.06	0.04	12.4	3.5	31.4	0.0	28.7	0.0	0.0
90% CI	0.4	0.4	0.3	0.2	0.19	0.17	0.07	0.05	14.6	4.1	36.9	0.0	33.8	0.0	0.0
500 FT. FLYOVER -- TARGET IAS 100 KTS															
D19	87.9	86.8	90.1	78.9	-0.53	-0.50	0.10	0.23	143.8	205.5	348.3	212.1	359.6	51.4	51.4
D20	87.2	85.2	89.1	77.2	-0.55	-0.55	0.12	0.28	133.5	204.7	282.1	212.1	292.3	51.4	51.4
D21	86.4	85.1	88.7	77.4	-0.44	-0.36	0.07	0.29	111.5	207.7	223.2	212.1	228.0	51.4	51.4
D22	87.2	85.5	88.9	77.5	-0.63	-0.57	0.15	0.43	94.4	202.8	203.4	212.1	212.8	51.4	51.4
D23	87.4	86.1	89.6	78.2	-0.66	-0.56	0.14	0.35	124.1	203.0	245.3	212.1	256.3	51.4	51.4
Avg.	87.2	85.7	89.3	77.8	-0.56	-0.51	0.12	0.32	121.5	204.7	260.5	212.1	269.8	51.4	51.4
Std Dv	0.5	0.7	0.5	0.7	0.09	0.09	0.03	0.08	19.3	2.0	57.1	0.0	58.6	0.0	0.0
90% CI	0.5	0.7	0.5	0.7	0.08	0.08	0.03	0.07	18.4	1.9	54.5	0.0	55.9	0.0	0.0
1000 FT. FLYOVER -- TARGET IAS 145 KTS															
E24	87.7	85.4	88.4	75.9	0.56	0.52	-0.05	-	133.9	356.1	494.5	335.4	465.7	77.2	74.6
E25	-	84.5	87.9	76.7	0.51	0.47	-	-	105.2	354.7	367.5	335.4	347.5	72.0	74.6
E26	88.2	85.9	89.4	76.5	0.60	0.53	-0.20	-	132.7	356.5	485.6	335.4	456.8	74.6	74.6
E27	88.1	85.5	89.6	78.0	-0.19	-0.16	0.02	-	102.2	333.2	341.0	335.4	343.2	74.6	74.6
E28	88.3	85.9	89.6	76.6	0.25	0.17	-0.13	-	138.6	349.5	528.5	335.4	507.1	74.6	74.6
Avg.	88.1	85.4	89.0	76.7	0.35	0.31	-0.09	-	122.5	350.0	443.4	335.4	424.1	74.6	74.6
Std Dv	0.3	0.6	0.8	0.8	0.33	0.30	0.10	-	17.4	9.8	83.5	0.0	74.3	1.8	0.0
90% CI	0.3	0.5	0.7	0.7	0.31	0.29	0.11	-	16.5	9.3	79.6	0.0	70.9	1.7	0.0

*- Data Corrected Using 'Simplified Procedure'

TABLE G2-1

ADV. MACH FOR TARGET CONDITIONS ANAL. DATE: 11-Mar-86

SIKORSKY S-76A
ADV. MACH SERIES REFERENCE NUMBERS

TEMPERATURE 59 degrees F (15 degrees C)

SERIES	IAS	TEMP (F)	ROTOR RPM	BLADE DIAM.	ADVM #
A	145.00	59.00	293.00	44.00	0.8240
B	130.00	59.00	293.00	44.00	0.8014
C	115.00	59.00	293.00	44.00	0.7787
D	100.00	59.00	293.00	44.00	0.7560

TEMPERATURE 77 degrees F (25 degrees C)

SERIES	IAS	TEMP (F)	ROTOR RPM	BLADE DIAM.	ADVM #
A	145.00	77.00	293.00	44.00	0.8101
B	130.00	77.00	293.00	44.00	0.7878
C	115.00	77.00	293.00	44.00	0.7655
D	100.00	77.00	293.00	44.00	0.7432

TARGET CONDITIONS

SERIES	DESCRIPTION
A	500 FT. LFO IAS = 145 KTS.
B	500 FT. LFO IAS = 130 KTS.
C	500 FT. LFO IAS = 115 KTS.
D	500 FT. LFO IAS = 100 KTS.

* 293.00 RPM = 100% ROTOR SPEED

TABLE G2-2

ACTUAL TEST CONDITIONS ANAL. DATE: 11-Mar-86

SIKORSKY S-76A

EVENT	IAS	TEMP (F)	ROTOR RPM	BLADE DIAM.	ADVM #
A1	140.00	59.00	293.00	44.00	0.8165
A2	142.00	59.00	293.00	44.00	0.8195
A3	145.00	59.00	293.00	44.00	0.8240
A4	142.00	59.00	293.00	44.00	0.8195
A5	145.00	59.00	293.00	44.00	0.8240
A6	145.00	59.00	293.00	44.00	0.8240
B7	120.00	60.00	293.00	44.00	0.7855
B8	120.00	60.00	293.00	44.00	0.7855
B9	125.00	60.00	293.00	44.00	0.7930
B10	130.00	60.00	293.00	44.00	0.8006
B11	130.00	60.00	293.00	44.00	0.8006
B12	130.00	60.00	293.00	44.00	0.8006
B13	130.00	61.00	293.00	44.00	0.7998
C14	115.00	61.00	293.00	44.00	0.7772
C15	115.00	61.00	293.00	44.00	0.7772
C16	115.00	62.00	293.00	44.00	0.7764
C17	115.00	62.00	293.00	44.00	0.7764
C18	115.00	62.00	293.00	44.00	0.7764
D19	100.00	63.00	293.00	44.00	0.7531
D20	100.00	63.00	293.00	44.00	0.7531
D21	100.00	64.00	293.00	44.00	0.7523
D22	100.00	65.00	293.00	44.00	0.7516
D23	100.00	65.00	293.00	44.00	0.7516

TABLE G2-3

ACTUAL TEST NOISE DATA
ANAL. DATE: 11-Mar-86

SIKORSKY S-76A

EVENT	TEST ALT	---- AS MEAS. PNLTM ---- LEFT	CENTER	RIGHT	-- PNLTM 492 FOOT NORM. -- LEFT	CENTER	RIGHT
A1	454.80	94.20	97.00	96.20	93.74	96.05	95.74
A2	492.40	95.80	97.00	94.90	95.80	97.01	94.90
A3	492.50	94.30	96.70	96.40	94.31	96.71	96.41
A4	435.20	NA	NA	NA	NA	NA	NA
A5	466.00	94.10	96.50	95.70	93.78	95.84	95.38
A6	465.50	95.80	95.80	96.10	95.48	95.13	95.78
B7	438.50	91.10	93.10	92.90	90.45	91.71	92.25
B8	460.90	92.70	94.30	92.60	92.32	93.51	92.22
B9	491.60	90.90	92.70	92.00	90.90	92.69	92.00
B10	497.20	92.50	93.60	92.30	92.56	93.73	92.36
B11	446.90	92.30	94.40	92.90	91.75	93.24	92.35
B12	485.70	93.00	94.90	93.30	92.92	94.74	93.22
B13	532.10	90.30	92.10	92.10	90.79	93.05	92.59
C14	503.40	90.70	92.00	89.90	90.84	92.28	90.04
C15	466.40	89.80	92.70	90.90	89.49	92.06	90.59
C16	503.90	NA	NA	NA	NA	NA	NA
C17	472.30	90.00	91.30	91.30	89.76	90.81	91.06
C18	482.20	90.60	92.80	89.60	90.48	92.56	89.48
D19	461.00	90.40	90.00	88.30	90.02	89.21	87.92
D20	457.40	88.80	91.90	89.30	88.38	91.02	88.88
D21	471.50	88.90	91.10	88.70	88.65	90.59	88.45
D22	448.00	89.50	91.70	89.10	88.96	90.57	88.56
D23	449.30	89.90	93.90	90.90	89.38	92.80	90.38

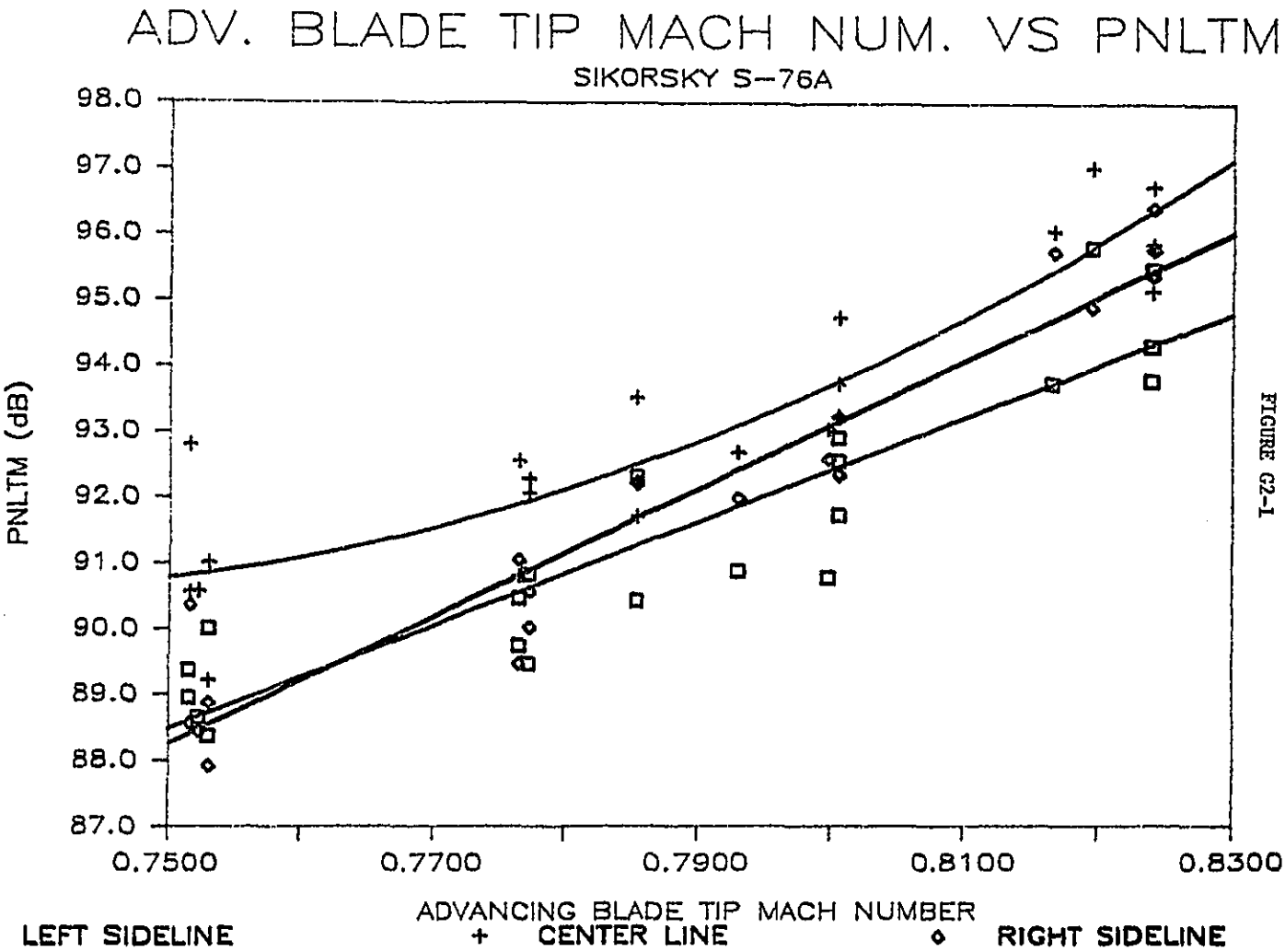

ADV. BLADE TIP MACH NUM. VS PNLTM
SIKORSKY S-76A
98.0
97.0
96.0
95.0
94.0
93.0
92.0
91.0
90.0
89.0
88.0
87.0
PNLTM (dB)
0.7500
0.7700
0.7900
0.8100
0.8300
ADVANCING BLADE TIP MACH NUMBER
LEFT SIDELINE
+ CENTER LINE
RIGHT SIDELINE

FIGURE C2-1

TABLE G2-4

SIKORSKY S-76A
LEFT SIDELINE

ANAL. DATE: 11-Mar-86

EVENT	X INPUT	Y INPUT
A1	0.8165	93.74
A2	0.8195	95.80
A3	0.8240	94.31
A4	0.8195	NA
A5	0.8240	93.78
A6	0.8240	95.48
B7	0.7855	90.45
B8	0.7855	92.32
B9	0.7930	90.90
B10	0.8006	92.56
B11	0.8006	91.75
B12	0.8006	92.92
B13	0.7998	90.79
C14	0.7772	90.84
C15	0.7772	89.49
C16	0.7764	NA
C17	0.7764	89.76
C18	0.7764	90.48
D19	0.7531	90.02
D20	0.7531	88.38
D21	0.7523	88.65
D22	0.7516	88.96
D23	0.7516	89.38

LINEAR REGRESSION EQUATION

Y =	SLOPE	* X +	INTERCEPT	
=	78.90		29.31	
R SQ. =	0.840	MEAN X =	0.7877	
R =	0.917	S.D. X =	0.0257	
STD.ERR =	0.907	MEAN Y =	91.46	
CORREL =	0.917	S.D. Y =	2.21	
SAMPLE =	21	TOT VAR =	4.89	

TABLE G2-5

LINEAR REGRESSION EQUATION

Y =	SLOPE	* X	+	INTERCEPT	
=	78.90			29.31	

R SQ.	=	0.840	MEAN X = 0.7877
R	=	0.917	S.D. X = 0.0257
STD.ERR	=	0.907	MEAN Y = 91.46
CORREL	=	0.917	S.D. Y = 2.21
SAMPLE	=	21	TOT VAR = 4.89

SECOND ORDER EQUATION

Y =	A	+	B1	* X	+	B2	*X'
Y =	465.94	+	-1031.84	* X	+	705.69	*X'

R SQ.	=	0.831	MEAN X = 0.7877
R	=	0.912	S.D. X = 0.0257
STD.ERR	=	0.828	MEAN Y = 91.46
SAMPLE	=	21	S.D. Y = 2.21

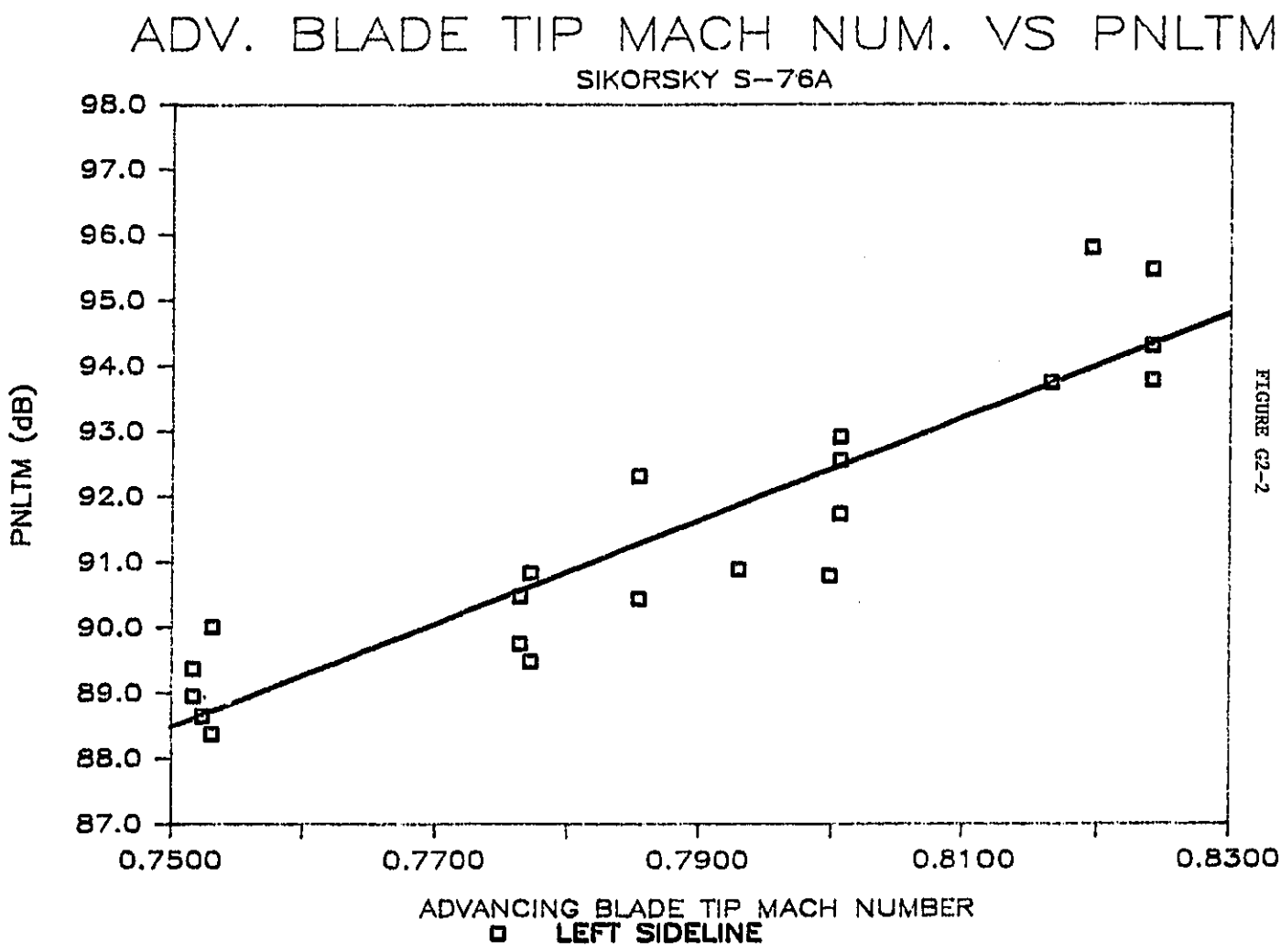

ADV. BLADE TIP MACH NUM. VS PNLTM
SIKORSKY S-76A
98.0
97.0
96.0
95.0
94.0
93.0
92.0
91.0
90.0
89.0
88.0
87.0
PNLTM (dB)
0.7500
0.7700
0.7900
0.8100
0.8300
ADVANCING BLADE TIP MACH NUMBER
LEFT SIDELINE

FIGURE G2-2

TABLE G2-6

SIKORSKY S-76A
CENTER LINE

ANAL. DATE: 11-Mar-86

EVENT	X INPUT	Y INPUT
A1	0.8165	96.05
A2	0.8195	97.01
A3	0.8240	96.71
A4	0.8195	NA
A5	0.8240	95.84
A6	0.8240	95.13
B7	0.7855	91.71
B8	0.7855	93.51
B9	0.7930	92.69
B10	0.8006	93.73
B11	0.8006	93.24
B12	0.8006	94.74
B13	0.7998	93.05
C14	0.7772	92.28
C15	0.7772	92.06
C16	0.7764	NA
C17	0.7764	90.81
C18	0.7764	92.56
D19	0.7531	89.21
D20	0.7531	91.02
D21	0.7523	90.59
D22	0.7516	90.57
D23	0.7516	92.80

SECOND ORDER EQUATION

Y =	A	+	B1	* X	+	B2	*X'
Y =	463.08	+-	1016.66	* X	+	693.69	*X'

R SQ. =	0.800	MEAN X =	0.7877
R =	0.895	S.D. X =	0.0257
STD.ERR =	0.935	MEAN Y =	93.11
SAMPLE =	21	S.D. Y =	2.16

TABLE G2-7

LINEAR REGRESSION EQUATION

Y =	SLOPE	* X +	INTERCEPT		
=	75.20		33.87		
R SQ. =	0.798	MEAN X =	0.7877		
R =	0.893	S.D. X =	0.0257		
STD.ERR =	0.998	MEAN Y =	93.11		
CORREL =	0.893	S.D. Y =	2.16		
SAMPLE =	21	TOT VAR =	4.68		

SECOND ORDER EQUATION

Y =	A	+	B1	* X +	B2	*X'
Y =	463.08	+	-1016.66	* X +	693.69	*X'

R SQ. =	0.800	MEAN X =	0.7877
R =	0.895	S.D. X =	0.0257
STD.ERR =	0.935	MEAN Y =	93.11
SAMPLE =	21	S.D. Y =	2.16

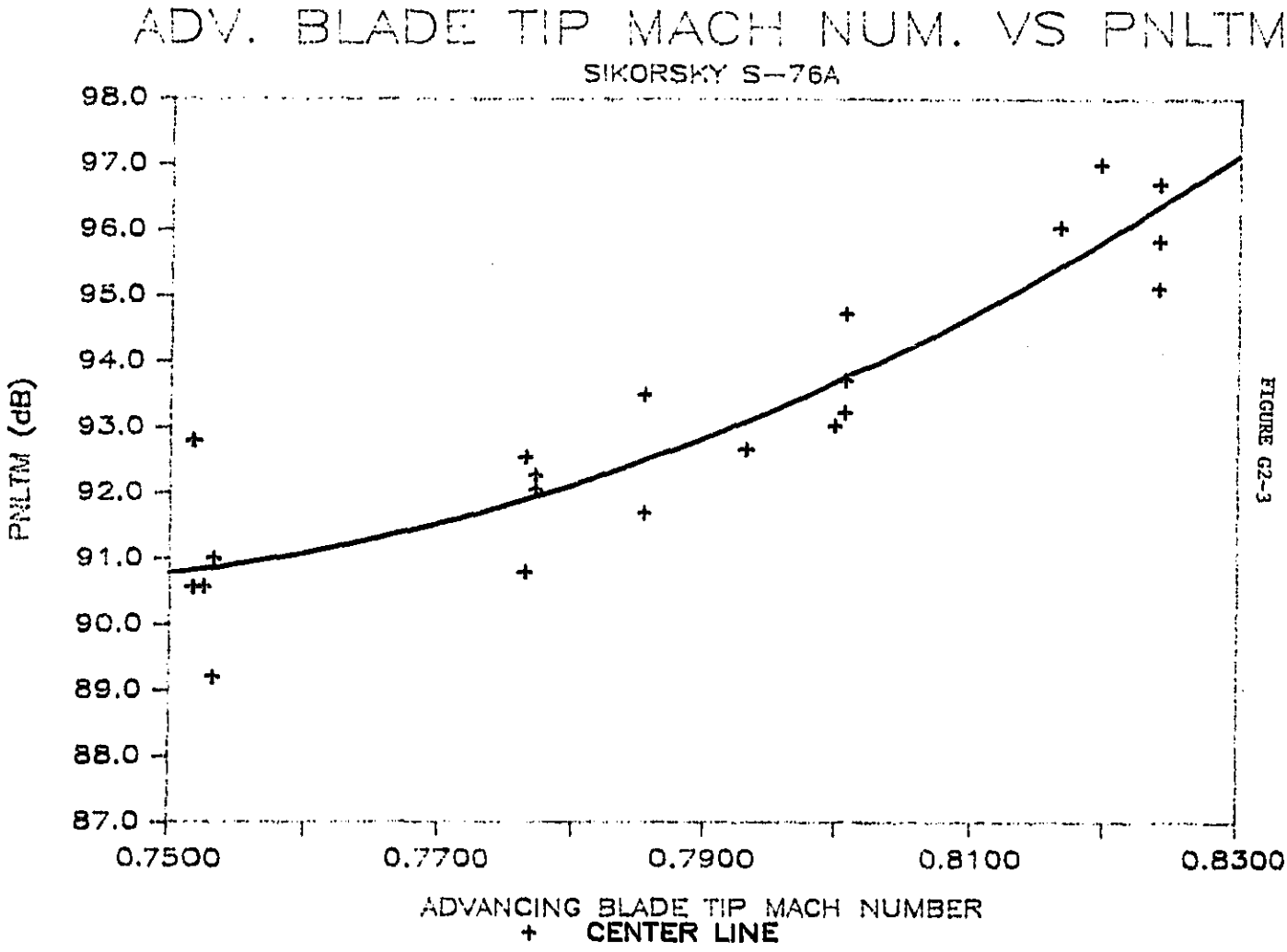

ADV. BLADE TIP MACH NUM. VS PNLTM
SIKORSKY S-76A
98.0
97.0
96.0
95.0
94.0
93.0
92.0
91.0
90.0
89.0
88.0
87.0
PNLTM (dB)
0.7500
0.7700
0.7900
0.8100
0.8300
ADVANCING BLADE TIP MACH NUMBER
+ CENTER LINE

FIGURE G2-3

TABLE G2-8

SIKORSKY S-76A
RIGHT SIDELINE

ANAL. DATE: 11-Mar-86

EVENT	X INPUT	Y INPUT
A1	0.8165	95.74
A2	0.8195	94.90
A3	0.8240	96.41
A4	0.8195	NA
A5	0.8240	95.38
A6	0.8240	95.78
B7	0.7855	92.25
B8	0.7855	92.22
B9	0.7930	92.00
B10	0.8006	92.36
B11	0.8006	92.35
B12	0.8006	93.22
B13	0.7998	92.59
C14	0.7772	90.04
C15	0.7772	90.59
C16	0.7764	NA
C17	0.7764	91.06
C18	0.7764	89.48
D19	0.7531	87.92
D20	0.7531	88.88
D21	0.7523	88.45
D22	0.7516	88.56
D23	0.7516	90.38

LINEAR REGRESSION EQUATION

Y =	SLOPE	* X +	INTERCEPT		
=	97.15		15.40		
R SQ.	=	0.916	MEAN X =	0.7877	
R	=	0.957	S.D. X =	0.0257	
STD.ERR	=	0.778	MEAN Y =	91.93	
CORREL	=	0.957	S.D. Y =	2.61	
SAMPLE	=	21	TOT VAR =	6.81	

TABLE G2-9

LINEAR REGRESSION EQUATION

Y =	SLOPE	* X	+	INTERCEPT	
=	97.15			15.40	

R SQ.	= 0.916	MEAN X =	0.7877
R	= 0.957	S.D. X =	0.0257
STD.ERR	= 0.778	MEAN Y =	91.93
CORREL	= 0.957	S.D. Y =	2.61
SAMPLE	= 21	TOT VAR =	6.81

SECOND ORDER EQUATION

Y =	A	+	B1	* X	+	B2	*X'
Y =	386.73	+	-847.46	* X	+	600.14	*X'

R SQ.	= 0.895	MEAN X =	0.7877
R	= 0.946	S.D. X =	0.0257
STD.ERR	= 0.712	MEAN Y =	91.93
SAMPLE	= 21	S.D. Y =	2.61

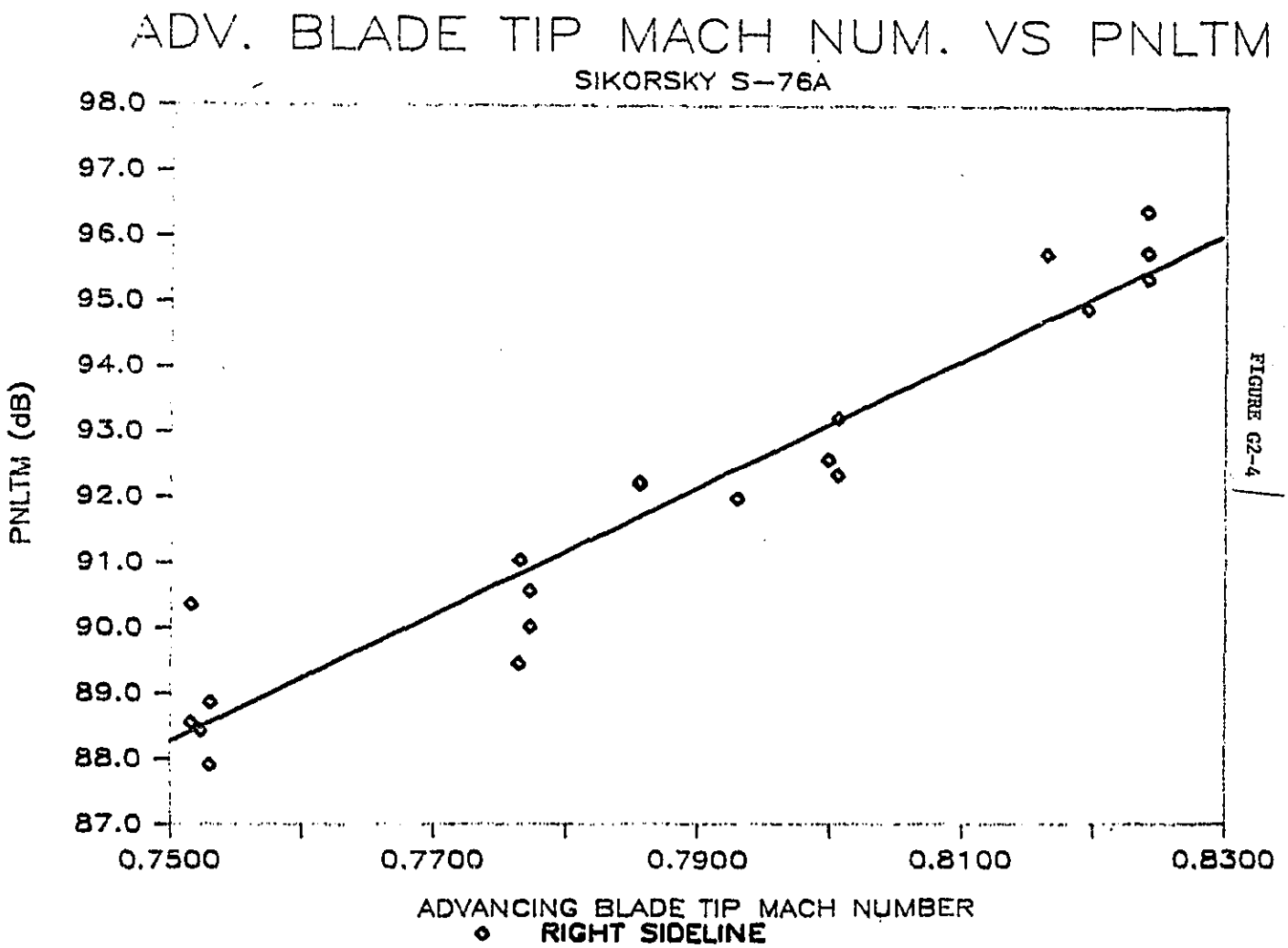

ADV. BLADE TIP MACH NUM. VS PNLTM
SIKORSKY S-76A
98.0
97.0
96.0
95.0
94.0
93.0
92.0
91.0
90.0
89.0
88.0
87.0
PNLTM (dB)
0.7500
0.7700
0.7900
0.8100
0.8300
ADVANCING BLADE TIP MACH NUMBER
RIGHT SIDELINE

FIGURE C2-4

A: 10-Mar-86

TABLE G3-1

SUMMARY EPNL LEVELS (dB)
DATA PROCESSED PER ICAO CERTIFICATION PROCEDURES

HELICOPTER: SIKORSKY S-76A
OPERATION: ICAO TAKEOFF

EVENT NUMBER	LEFT SIDELINE	CENTER LINE CENTER	RIGHT SIDELINE	3 MIC AVERAGE
SITE	2	1	3	
F29	92.00	90.90	89.80	90.90
F30	92.30	92.00	90.70	91.67
F31	92.60	92.70	90.80	92.03
F32	91.60	91.30	89.80	90.90
F33	91.70	91.00	90.10	90.93
F34	91.10	90.60	89.20	90.30
F35	91.50	89.90	89.50	90.30
F36	NA	90.30	88.20	0.00
AVERAGE	91.83	91.09	89.76	91.00
STD. DEV.	0.51	0.91	0.84	0.65
90% C.I.	0.37	0.61	0.56	0.48

A: 10-Mar-86

TABLE G3-2

SUMMARY EPNL LEVELS (dB)
DATA PROCESSED PER ICAO CERTIFICATION PROCEDURES

HELICOPTER: SIKORSKY S-76A
OPERATION: ICAO LFO

EVENT NUMBER	LEFT SIDELINE	CENTER LINE CENTER	RIGHT SIDELINE	3 MIC AVERAGE
SITE	2/3	1	3/2	
B7	89.10	NA	90.30	0.00
B8	91.20	91.00	90.10	90.77
B9	89.30	89.50	89.10	89.30
B10	90.20	89.70	89.10	89.67
B11	89.50	89.20	89.00	89.23
B12	90.50	90.50	89.70	90.23
B13	88.80	88.80	88.90	88.83
AVERAGE	89.80	89.78	89.46	89.67
STD. DEV.	0.86	0.82	0.57	0.71
90% C.I.	0.63	0.68	0.42	0.59

A: 10-Mar-86

TABLE G3-3

SUMMARY EPNL LEVELS (dB)
DATA PROCESSED PER ICAO CERTIFICATION PROCEDURES

HELICOPTER: SIKORSKY S-76A
OPERATION: ICAO APPROACH

EVENT NUMBER	LEFT SIDELINE	CENTER LINE CENTER	RIGHT SIDELINE	3 MIC AVERAGE
SITE	3	1	2	
I50	NA	96.10	93.30	0.00
I51	NA	94.60	94.20	0.00
I52	NA	94.90	NA	0.00
I53	87.40	96.20	94.30	92.63
I54	90.80	95.50	94.30	93.53
I55	89.70	95.70	93.90	93.10
AVERAGE	89.30	95.50	94.00	93.09
STD. DEV.	1.73	0.64	0.42	0.45
90% C.I.	2.92	0.53	0.40	0.76

APPENDIX H

HELICOPTER PERFORMANCE AND GEOMETRIC CHARACTERISTICS: (UNITS: KNOTS/LBS./FEET/SECONDS)

TABLE H PART A

Helicopter Characteristics
knots/lbs/feet/seconds/F

B		MANUFACTURER	Hughes	Aerospatiale	Aerospatiale	Aerospatiale	BELL Heli TEXTR	Sikorsky Aircra	Boeing Vertol
A		TYPE	Single Rotor	Single Rotor	Single Rotor	Single Rotor	Single Rotor	Single Rotor	Tandem Rotor
C		MODEL	500D	AS 350D ASter	AS 355F Twinste	SA 365N Daup 2	BELL 222	S-76A	234
K		YEAR OF 1ST C.A.	1976	1978	1981	1981	1979	1978	1981
G		DATA SOURCE	Hughes	Aerospatiale	Aerospatiale	Aerospatiale	BELL Heli TEXTR	Sikorsky Aircra	Boeing Vertol
R		MAX T/O MASS (MTOM) lbs.	3001	4302	5072	8489	7850	3667	46500
O		LOG(MTOM)	3.48	3.63	3.71	3.93	3.89	3.57	4.67
U									
N									
D									
P	P	MODEL	Det Die Allison	Lycoming LTS	Allison	Turbomeca	Lycoming LTS	Detroi Die All	Lycoming
O	L		250-C20B	101-600A2	250C20f	ARRIEL 1C	101-650C-3	250-C30	T55-L-712
W	A	NO. OF ENGINES	1	1	2	2	2	2	2
E	N	MTOP (kw)/ENGINE	280	459	313	529	429	504	3039
R	T	TOTAL POWER (kw)	280	459	626	1058	858	1008	6078
M		NO.OF BLADES	5	3	3	4	2	4	3
O		DIAMETER (ft)	26.41	35.11	35.07	39.14	39.77	44.00	60.01
T	M	RPM	492	386	394	365	348	293	225
O	A	RPS	8.20	6.43	6.57	6.08	5.80	4.88	3.75
R	I	ROT TIP SPEED (f/s)	680.41	709.55	723.54	748.07	724.58	675.00	706.96
	N	15C R-TIP MACH #	0.6094	0.6355	0.6481	0.6701	0.6490	0.6044	0.6331
		Fund BPF (Hz)	41.00	19.30	19.70	24.53	11.60	19.33	11.25
		ROTATION DIR (Note 1)	CCW	CW	CW	CW	CCW	CCW	FRONTAL - CCW REAR - CW (Note 2)
		**********							
S		NO. OF BLADES	4	2	2	13	2	4	*
Y		DIAMETER (ft)	4.59	6.56	6.56	3.28	6.56	4.56	*
S	T	RPM	2210	2043	2088	4704	1881	1611	*
T	A	RPS	36.83	34.05	34.80	78.43	31.35	26.85	*
E	I	ROT TIP SPEED (f/s)	530.34	652.82	667.19	727.43	639.83	475.30	
M	L	15C R-TIP MACH #	0.4751	0.5847	0.5976	0.6517	0.5731	0.4049	*
		Fund BPF (Hz)	147.33	68.10	69.60	1019.43	62.70	107.40	*
		ROTATION DIR (Note 3)	R/F	F/R	F/R	F/R	F/R	F/R	*
		MOUNTING SIDE	LEFT	RIGHT	RIGHT	MIDDLE (Note 4)	LEFT	LEFT	*

(continued)

Helicopter Characteristics
knots/lbs/feet/seconds/F

TABLE H PART B

		Hughes Single Rotor 500D	Aerospatiale Single Rotor AS 350D	Aerospatiale Single Rotor AStar	Aerospatiale Single Rotor AS 355F Twinsta	Aerospatiale Single Rotor SA 365N Daup 2	BELL Heli TEXTR Single Rotor BELL 222	Sikorsky Aircra Single Rotor S-76A	Boeing Vertol Tandem Rotor 234
TAKEOFF									
A	TEST SERIES	I	E	E	E	E	K	F	G
K	AVG TEST TEMP (F)	82.4	78.8	68.0	61.3	83.3	71.4	88.0	88.0
E	AVG TEST IAS (knots)	59.00	32.80	55.33	75.00	44.83	78.00	82.00	82.00
O	AVG TEST ROC (f/s)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
F	AVG TEST CLIMB ANGLE (degrees)	13.15	16.41	18.55	8.15	15.65	9.69	9.43	9.43
F	TEST CLC AVG ALTITUDE (f)	394	587	600	331	732	400	325	325
	REFERENCE VALUES								
	REF Vy (knots)	62	55	55	75	65	74	85	85
	REF ROC (f/m)	1900	1750	1870	1400	1600	1350	1120	1120
	REF CLIMB ANGLE (degrees)	17.4	16.3	19.6	12.2	14.1	10.3	7.5	7.5
	REF. ALT. CLC (ft)	586	608	649	420	477	366	281	281
APPROACH									
A	TEST SERIES	F	F	F	F	L	I	H	H
P	AVG TEST TEMP (F)	78.80	82.00	69.80	68.34	77.70	82.40	90.00	90.00
P	AVG TEST IAS (knots)	61.3	56.9	62.1	75.8	65.8	74.0	82.3	82.3
R	AVG APPROACH ANGLE (degrees)	5.58	5.87	6.10	5.37	6.98	5.63	7.36	7.36
O									
A	REFERENCE VALUES								
C	REF AIRSPEED (knots)	62	55	55	75	65	74	85	85
H	REF APPROACH ANGLE (degrees)	6	6	6	6	6	6	6	6
	REF ALTITUDE CLC (ft)	394	394	394	394	394	394	394	394

(continued)

Helicopter Characteristics
knots/lbs/feet/seconds/F

TABLE H PART C

		Hughes Single Rotor 500D	Aerospatiale Single Rotor AS 350D AStar	Aerospatiale Single Rotor AS 355F Twinsta	Aerospatiale Single Rotor SA 365N Daup 2	BELL Heli TEXTR Single Rotor BELL 222	Sikorsky Aircra Single Rotor S-76A	Boeing Vertol Tandom Rotor 234
L								
E	TEST SERIES	A	A	A	A	C	B	A
V	AVG TEST RPM	490	385	390	335	348	293	225
E	AVG TEST IAS (knots)	108.10	112.85	115.00	130.42	127.03	127.03	133.75
L	AVG TEST TEMP (F)	87.80	82.40	64.20	66.20	84.00	42.40	71.96
	AVG TEST ADV MACH NO.	0.7498	0.7870	0.8098	0.8434	0.8201	0.7940	0.8252
F								
L	REFERENCE VALUES							
Y	REF RPM	(Note 5) 492	384	394	365	348	293	225
O	REF AIRSPEED (knots)	125.1	113.0	113.0	135.0	127.0	130.0	135.0
V	REF TEMP (F)	59	59	59	59	59	59	59
E	REF ADV MACH NO	0.7986	0.8064	0.8190	0.8748	0.8409	0.8014	0.8374
R								

Note 1 - Main rotor observations taken from looking down on helicopter. Main rotor abreviations: CW - clockwise, CCW - counter clockwise.
Note 2 - BV-234 has 2 main rotors. Observations taken by looking down on helicopter.
Note 3 - Tail rotor observations taken from left side of helicopter. Tail rotor abreviations: R/F -rear to front, F/R - front to rear.
Note 4 - Dauphin 2 has a fenestron shrouded tail rotor.
Note 5 - Hughes 500D, 492 RPM is defined as 103%.

(End Table H)

APPENDIX I

AIR TO GROUND ACOUSTIC PROPAGATION TABLES

TABLE I-I

PNLTm PROPAGATION CONSTANT SUMMARY TABLE

RAINBOW HELICOPTER	PROPAGATION CONSTANT (K)
AEROSPATIALE AS 350D ASTAR	19.94
AEROSPATIALE AS 355F TWINSTAR	20.21
AEROSPATIALE SA 365N DAUPHIN	23.60
BELL 222 TWINJET	21.42
BOEING VERTOL 234/CH 47-D	26.81
HUGHES 500 D/E	23.17
SIKORSKY S-76A	27.79
AVERAGE =	23.28

THE PROPAGATION CONSTANT (K) FOR EACH HELICOPTER WAS USED IN COMPUTING ALTITUDE NORMALIZED (492 ft.) PNLTm. IN MOST CASES ALTITUDE/PNLTm ADJUSTMENTS WERE SMALL.

APPENDIX J

RAINBOW REPORT ERRATA

Errata
(Applicable to all Rainbow reports)
FAA-EE-84-01 through FAA-EE-84-07

Clarificaiton of Tone Correction Section, 6.1.5.

Tone corrections were computed initiating the adjustment procedure at 50 Hz (Band 17) two bands prior to the initiation point used for fixed wing aircraft (80 Hz, Band 19).

Errata
Noise Measurement Flight Test: Data Analyses
Hughes 500 D/E Helicopter
Report No. FAA-EE-84-03, May 1984
Test Date 06/22/83

Table 2.2 - ICAO Reference Parameters, page 7

	Takeoff	Approach	Level Flyover
Airspeed (KTS)	62	62	125

	Takeoff	Approach	Level Flyover
Altitude/CPA (feet)			
Site 5	390/410	328/340	492

Appendix F

Est. ANG should be Elv. ANG

Errata
Noise Measurement Flight Test: Data Analyses
Aerospatiale AS 350D AStar Helicopter
Report No. FAA-EE-84-05, September 1984
Test Date 06/08/83

Table 2.2 - ICAO Reference Parameters, page 7

	Takeoff	Approach	Level Flyover
Altitude/CPA (feet) Site 5	404/423	328/340	492

Table D.1.2 - Static Operations, Direct Read Data

Site 5H (Hard Site)

HIGE		FLT.IDLE		GRN.IDLE	
I-90	NA	J-90A	68.80	J-90B	55.20
I-45	76.70	J-45A	66.70	J-45B	NA
I-0	73.70	J-0A	64.70	J-0B	NA
I-315	74.40	J-315A	69.00	J-315B	NA
I-270	78.00	J-270A	74.40	J-270B	56.00
I-225	83.50	J-225A	69.20	J-225B	NA
I-180	83.50	J-180A	NA	J-180B	NA
I-135	77.00	J-135A	NA	J-135B	NA

Site 7H (Hard Site)

HIGE		FLT.IDLE		GND.IDLE	
I-90	71.49	J-90A	59.67	J-90B	51.12
I-45	70.61	J-45A	59.54	J-45B	NA
I-0	66.03	J-0A	58.46	J-0B	NA
I-315	67.78	J-315A	62.97	J-315B	49.79
I-270	69.85	J-270A	67.50	J-270B	NA
I-225	74.99	J-225A	60.69	J-225B	NA
I-180	77.36	J-180A	62.48	J-180B	NA
I-135	70.14	J-135A	60.60	J-135B	NA

Table E-1 and Table E-2, Cockpit Photo Data

IAS (KTS) should be IAS (MPH)

Appendix F

Est. ANG should be Elv. ANG

Errata
Noise Measurement Flight Test: Data Analyses
Aerospatiale AS 355F TwinStar Helicopter
Report No. FAA-EE-84-04, June 1984
Test Date 06/07/83

Table 2.2 - ICAO Reference Parameters, page 7

	Takeoff	Approach	Level Flyover
Altitude/CPA (feet)			
Site 5	429/447	328/340	492
Site 1	649/612	394/392	492
Site 4	824/778	446/443	492

Table E.1 - Cockpit Photo Data

IAS (KTS) should be IAS (MPH)

Event No.	Time of Photo	Heading (Degrees)
A1	7:55	120
A2	7:57	300
A3	8:00	120
A4	8:02	300
A5	8:04	120
	8:05	300
A6	8:09	120

Table E.2 - Cockpit Photo Data

IAS (KTS) should be IAS (MPH)

Event No.	Time of Photo	Heading (Degrees)
M49	11:41	300
M50	11:43	120
M51	11:45	300
M52	11:47	120
M53	11:49	300
N54	11:34	300
N55	11:54	120
N56	11:59	300

Appendix F

Est. ANG should be Elv. ANG

Errata
Noise Measurement Flight Test: Data Analyses
Aerospatiale SA 365N Dauphin 2 Helicopter
Report No. FAA-EE-84-02, April 1984
Test Date 06/06/83

Table 2.2 - ICAO Reference Parameters, page 5

	Takeoff	Approach	Level Flyover
Altitude/CPA (feet)			
Site 5	286/216	329/327	492
Site 1	420/347	394/392	492
Site 4	526/451	446/443	492

Table D.1 - Static Operations Direct Read Data

Site 2 (Soft Site)

HIGE		HOGE		FLT. IDLE	
I-0	73.30	K-0	77.70	J-0	69.90
I-315	73.70	K-315	80.10	J-315	78.10

Site 4 (Soft Site)

HIGE		HOGE		FLT. IDLE	
I-0	66.90	K-0	70.10	J-0	63.00
I-315	70.00	K-315	71.80	J-315	71.20

Appendix F

Est. ANG should be Elv. ANG

Errata
Noise Measurement Flight Test: Data Analyses
Bell 222 Twin Jet Helicopter
Report No. FAA-EE-84-01, February 1984
Test Date 06/14/83 - 06/15/83

Table 2.2 - ICAO Reference Parameters, page 5

Altitude/CPA (feet)	Takeoff	Approach	Level Flyover
Site 5	322/312	328/318	492
Site 1	477/463	394/392	492
Site 4	601/583	446/443	492

Table E.1 - Static Operations, Direct Read Data

Site 2 (Soft Site)

HIGE

Y-0	64.2
Y-315	68.4
Y-270	64.6
Y-225	66.9
Y-180	65.8
Y-135A	66.8
Y-90A	67.4
Y-45	64.8

Site 4H (Soft Site)

HIGE		HOGE		FLT. IDLE		GND. IDLE	
Y-0	57.6	Z-0	70.9	X-0A	55.4	X-0B	45.8
Y-315	60.6	Z-315	72.0	X-315A	52.7	X-270B	45.1
Y-270	57.7	Z-270	66.9	X-270A	53.4	X-180B	44.6
Y-225	60.4	Z-225	70.2	X-225A	53.9	X-90B	47.2
Y-180	58.2	Z-180	-	X-180A	57.2		
Y-135	58.5	Z-135	72.4	X-135A	56.0		
Y-90	58.9	Z-90	70.8	X-90A	54.7		
Y-45	56.4	Z-45	70.5	X-45A	55.9		

Appendix G

Est. ANG should be Elv. ANG

Errata
Noise Measurement Flight Test: Data Analyses
Boeing Vertol 234/CH 47-D Helicopter
Report No. FAA-EE-84-07, September 1984
Test Date 07-12-83

Table 2.1 - Helicopter Characteristics, page 7

Max Speed in level flight with Max Continous Power (V_H): 150 KTS

Table 2.2 - ICAO Reference Parameters, page 8

	Takeoff	Approach	Level Flyover
Airspeed (KTS)	85	85	135
Altitude/CPA (feet)			
Site 5	199/361	328/340	492
Site 1	281/393	394/392	492
Site 4	346/419	446/443	492

Table D.1 - Static Operations, Direct Read Data

Site 4H

HIGE		FLT.IDLE		GRN.IDLE		HOGE	
M-0	75.90	N-0A	58.80	N-0B	51.00	O-0	73.20
M-315	76.50	N-315A	53.90	N-315B	47.70	O-315	75.90
M-270	62.00	N-270A	56.00	N-270B	48.10	O-270	76.70
M-225	69.20	N-225A	56.30	N-225B	52.00	O-225	78.00
M-180	74.50	N-180A	56.60	N-180B	49.40	O-180	76.00
M-135	77.30	N-135A	56.80	N-135B	49.30	O-135	79.00
M-90	68.50	N-90A	57.20	N-90B	49.40	O-90	79.00
M-45	75.30	N-45A	55.50	N-45B	48.50	O-45	78.70

Site 2

HIGE		FLT.IDLE		GRN.IDLE		HOGE	
M-0	76.60	N-0A	70.80	N-0B	64.60	O-0	80.20
M-315	77.50	N-315A	72.80	N-315B	65.60	O-315	82.50
M-270	67.20	N-270A	69.90	N-270B	64.60	O-270	82.80
M-225	77.60	N-225A	73.40	N-225B	66.60	O-225	84.20
M-180	77.70	N-180A	71.10	N-180B	64.10	O-180	82.70
M-135	80.80	N-135A	70.80	N-135B	61.20	O-135	86.20
M-90	73.90	N-90A	70.50	N-90B	58.70	O-90	86.10
M-45	84.80	N-45A	70.20	N-45B	66.20	O-45	86.40

Appendix F

Est. ANG should be Elv. ANG

Errata
Noise Measurement Flight Test: Data Analyses
Sikorsky S-76A Helicopter
Report No. FAA-EE-84-06, September 1984
Test Date 06/13/83

Table 2.2 - ICAO Reference Parameters, page 7

	Takeoff	Appraoch	Level Flyover
Altitude/CPA (feet)			
Site 5	253/272	328/340	492

Appendix F

Est. ANG should be ELV. ANG