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SYMBOLS

C	chord, m
CM	moment coefficient
CN	normal force coefficient
FR	flow reversal
HF	hot-film
HW	hot-wire
k	reduced frequency
LS	lift stall
M	free-stream Mach number
MS	moment stall
NFR	no flow reversal detected
R	reattachment
T1	transition from turbulent to laminar flow
T2	transition from laminar to turbulent flow
t	time, sec
u	local velocity, m/sec
x	distance along the chord, m
α	angle of incidence, deg
ω	rotational frequency, rad/sec

AN EXPERIMENTAL STUDY OF DYNAMIC STALL ON ADVANCED AIRFOIL SECTIONS

VOLUME 3. HOT-WIRE AND HOT-FILM MEASUREMENTS

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SUMMARY

Detailed unsteady boundary-layer measurements are presented for eight airfoils oscillated in pitch through the dynamic-stall regime. The present report (the third of three volumes) describes the techniques developed for analysis and evaluation of the hot-film and hot-wire signals, offers some interpretation of the results, and tabulates all the cases in which flow reversal has been recorded.

INTRODUCTION

The study of dynamic stall of oscillating airfoils has demonstrated the need for obtaining detailed boundary-layer data during the stall process. Results from the present experiment show that boundary-layer characteristics can be significantly altered by airfoil shape, and that the boundary-layer behavior is sensitive to many parameters associated with the airfoil motion. These conclusions are based on analysis of signals from hot-wire and hot-film probes mounted near or at the surface of the various airfoils. However, evaluation of hot-wire data is very subjective, and presents a formidable analytical task. The present report describes the techniques developed for analysis and evaluation of the hot-film and hot-wire signals, offers some interpretations of the results, and tabulates all the cases in which flow-reversal data have been recorded. An overview of the experiment has been presented in reference 1; a detailed summary of this test and the experimental conditions that were studied is presented in volume 1 of the present report; details of the pressure distribution results, along with lift and moment data are presented in volume 2. The present report presents the corresponding details of the viscous flow measurements that were obtained.

DESCRIPTION OF EXPERIMENTAL PROCEDURES

The experiment was designed to allow accurate testing of various airfoils under virtually identical operating conditions. Therefore each airfoil profile was machined into a shell which could be attached to the metal spar that contained all the instrumentation. After each airfoil profile was tested, the instrumentation was removed from the shell; it then remained with the spar, ready for installation of the next shell. In this way, the various profiles could be tested using identical instrumentation and oscillation mechanisms; details of this system are presented in reference 1; figure 1 is a diagram of the spar with a shell installed. Instantaneous single-surface pressure measurements were obtained for a wide range of test conditions. Hot-wire, hot-film measurements, or both, were made near the airfoil surface to determine the flow-reversal characteristics for each test condition. Three different types of hot-wire anemometer sensors were used during the oscillating airfoil test: hot-film surface skin-friction gages, dual hot-wire probes, and triple-wire flow-reversal sensors. The most common configurations had either six hot-films along the airfoil upper surface, or one hot-film at the leading edge ($x/C = 0.025$) and five hot-wires distributed along the upper surface. The data were recorded on 32-channel analog tape, with a timing code that allowed comparison of hot-wire data and the pressure data, which were recorded separately for each test condition.

DATA ANALYSIS AND INTERPRETATION

Skin-Friction Gage

The skin-friction gage that was used during a major portion of the test program consisted of an alumina-coated platinum surface element epoxied into a metal sleeve (see fig. 2). This sensor, which was very resistant to damage, was used for much of the oscillating airfoil test program. However, the characteristics of this probe design must be taken into account when analyzing the output signals.

The output from the hot-film probe is related to the shear stress; when flow reversal occurs, the instantaneous value of shear stress passes through zero, and there is a local minimum in the resultant signal. Unfortunately, a significant part of the energy supplied to the probe element is transmitted from the element to the substrate of the gage. This heat transfer results in a relatively high dc-offset in the output voltage of the probe. In addition, this heat transfer causes the minimum value of the hot-film signal to decrease slowly with time, even when the flow is fully separated (with a nominal shear-stress value = 0). These effects can make the interpretation of the signal somewhat difficult.

Figure 3 presents an example of the output from skin-friction gages mounted near the leading edge of the Ames A-01 airfoil during oscillation. At the marker "T1," the flow has passed through transition from turbulent to laminar flow, with a resultant reduction in shear stress and decrease in fluctuation intensity. The flow remains laminar during the low-angle portion of the cycle; as the angle increases, transition to turbulent flow occurs (at "T2"), and the skin-friction gage shows a corresponding increase in signal magnitude, as well as an increase in fluctuation amplitude. The next major event, marked by "FR," is the occurrence of flow reversal; this results in a drop in the magnitude of the shear stress. Note that the signal does not remain constant, even though the airfoil flow has separated; this continuing decrease is associated with the heat-transfer effects outlined earlier. Finally, marker "R" indicates the point when flow reattaches to the airfoil (during the downstroke), beginning the oscillation cycle once more.

Unfortunately, the relatively crisp delineation of flow conditions that appears in figure 3 is not always present. Figure 4 shows an example of a less clear case of leading-edge flow: here, the development of flow reversal is relatively slow, and the decreasing of the signal to its minimum is difficult to separate from the decreasing of the minimum itself. The estimated flow-reversal points are marked by "FR."

Hot-Wire Probe

Hot-wire anemometer measurements were performed using a dual-wire probe (see fig. 5); this dual-wire approach was chosen to reduce the chance of interruption of the test as a result of wire breakage; since both wires were being recorded, the loss of either wire would not mean the loss of flow-reversal information at that x-station. The output signal from a hot-wire probe is a nonlinear function of the local velocity; therefore, the signals were linearized and scaled such that the resultant signal was approximately proportional to the associated velocity. Figure 6 shows a representative example of hot-wire data for flow near the leading edge of the FX-098 airfoil.

As the angle of attack increases, transition to turbulent flow occurs at $x/C = 0.025$; this is observed at "T2" in figure 6 for hot-wire probe HW1. Note that there is no dramatic change in the output signal magnitude. Transition on airfoils occurs at low angles of attack, for conditions where the boundary layer is thin. In these conditions, the hot-wire probe is often near or at the edge of the boundary layer. Therefore, the change of the velocity profile during transition has little or no effect on the value of U; transition will mainly be marked by changes in the fluctuation level. The next major flow phenomenon is marked by "FR"; at this point the flow has separated from the airfoil, causing an abrupt decrease in the local velocity. Note that the hot-wire signal changes abruptly to zero, and then continues at a well-defined constant value (compare with the hot-film output of fig. 3). Later, reattachment occurs (at "R"); as the minimum angle is approached, the flow becomes laminar again, and the cycle repeats.

As was noted for the hot-film, the hot-wire results are not always clearly delineated. Figure 7 shows a hot-wire signal measured near the trailing edge of the VR-7 airfoil which was difficult to evaluate. The turbulence level in this signal is very high, and is masking the development of the periodic component of the signal. Because this turbulent component is superimposed on the periodic part of the signal, the instantaneous value of the signal reaches zero long before and after flow reversal of the ensemble-averaged flow (marked as "FR" in the figure) would have occurred. Therefore, the error band for signals measured near the trailing edge is significantly larger than those associated with leading-edge, or midchord locations.

Reverse-Flow Sensors

A specially designed hot-wire probe was developed for evaluation of the flow reversal on the VR-7 airfoil. This airfoil has trailing-edge flow reversal during almost all unsteady flow conditions, and a better method was needed for determining the reversal point under these conditions. The probe is described in detail in reference 2; operation is based on the use of a highly heated center wire, with two additional wires, one upstream and one downstream of this heater, operated at low overheat ratio. These additional wires detect the heated wake of the center wire, and a comparison circuit is used to determine the instantaneous flow direction. This probe system can detect both the magnitude and the direction of the local flow, and is especially effective in regions of high-turbulence, low-velocity flow. Examples of the output from this probe are presented in figure 8; a diagram of the probe is presented in figure 9.

Averaging Techniques

Ensemble-averaging is often used to extract determinate signals from unsteady turbulent flow data, and this approach was applied to the present hot-wire data. Figure 10 presents the results of an ensemble-average of 100 cycles of the hot-wire signals on the VR-7 airfoil. It is evident in this figure that cyclic averaging smears the flow-reversal signal (to the point where no approach to zero voltage is observable in the averaged signal). In contrast, note the data for the last cycle digitized (shown as dotted in fig. 10). In this case, there are several instances of zero velocity; there are also indications of vortex motion on the airfoil (in the 40, 60, and 80 percent x/C wire outputs), which cannot be observed in the averaged data. There were small but significant variations in the angle at which flow reversal occurred between one cycle and the next; therefore, averages based on mechanical timing marks were not always able to capture the flow phenomena. In fact, this variation was sufficient in the present case to completely obscure the flow-reversal point in the data (in order to properly correlate these data, a true conditional ensemble-averaging technique would be needed, possibly triggered by a change in the character of the leading-edge pressure). Therefore, although some of the hot-wire and hot-film data were digitized and cyclically averaged, the analysis presented in this report has been based on visual evaluation of the analog signals for each of several cycles, after which the values of ωt associated with flow reversal for a given sensor were averaged.

Example of Signal Analysis

Figure 11 shows an example of a set of hot-wire and hot-film analog signals obtained during one period of oscillation. The first three signals are the angle of attack, the lift coefficient, and the moment coefficient, showing the lift stall (LS) and the moment stall (MS). The next six signals come from anemometer sensors: one hot-film near the leading edge (HF1), and five hot-wire probes (HW1 to HW6). The markers on these signals refer to the various events that have an effect on the hot-wire and hot-film readings: FR — initiation of reversed flow; R — reattachment of flow; T1 — transition from turbulent to laminar flow; T2 — transition from laminar to turbulent flow (as determined from hot-film signals).

RESULTS

Results similar to these have been analyzed for all eight airfoils. In particular, the phase angle ωt, at which flow reversal first appears at the x/C location of each hot-wire or hot-film probe, has been documented for a range of Mach numbers, frequencies, and stall severity for each airfoil. These phase angles, determined by the techniques outlined earlier, have been recorded in degrees measured through the oscillation cycle, referenced to the mean angle, for $d\alpha/dt > 0$. Table 1 presents a summary of the analyzed flow-reversal data. The Mach number studies were performed for $\alpha = 15° + 10° \sin \omega t$, $k = 0.1$, and cover Mach number conditions that range from incompressible values ($M_\infty = 0.035$) to ones that include small regions of supersonic flow near the leading edge ($M_\infty = 0.30$). The "light-stall" frequency studies present data for a range of frequencies at $M = 0.30$, where the amplitude and mean angle have been chosen to cause a slight overshoot of the static stall angle associated with each airfoil during the oscillatory motion. The "deep-stall" study presents data for a range of frequencies at $M_\infty = 0.30$, $\alpha = 15° + 10° \sin \omega t$ (deep stall has been defined in ref. 1 as a condition in which a fully developed vortex is formed during the oscillation cycle). The experimental data in deep stall were less amenable to analysis — the results were more subjective and in some cases inconclusive. Therefore, the results for only three airfoils are reported.

The results of these surveys are presented graphically in figures 12 to 31. Figures 12 to 19 present Mach number effects for deep-stall conditions; figures 20 to 27 present frequency effects for light-stall conditions; and figures 28 to 31 present frequency effects for deep-stall conditions. These data are also presented in tabular form in tables 2 to 9. The error bounds for these surveys are presented in tables 10 to 16. Finally, a catalog of all the hot-film and hot-wire data that were recorded is presented in tables 17 to 25, tabulated according to the corresponding pressure data (stored in digital form, as explained in vols. 1 and 2).

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1. McCroskey, W. J.; McAlister, K. W.; Carr, L. W.; Pucci, S. L.; Lambert, O.; and Indergand, R. F.: "Dynamic Stall on Advanced Airfoil Sections," J. of the American Helicopter Society, July 1981.

2. Carr, L. W.; and McCroskey, W. J.: "A Directionally Sensitive Hot-Wire Probe for Detection of Flow Reversal in Highly Unsteady Flows," in International Congress on Instrumentation in Aerospace Facilities 1979 Record, Sept. 1979, pp. 154-162.

TABLE 1.- SUMMARY OF ANALYZED FLOW-REVERSAL DATA

Airfoil	Mach No.[a]	Light stall[c]	Deep stall[b]
NACA 0012	Film[d]	Film[d]	
A-01	Film[d]	Film[d]	Comb.[e]
FX-098	Wire[g]	Comb.[e]	Wire[g]
SC-1095	Film[d]	Film[d]	
HH-02	Film[d]	Comb.[e]	
VR-7	Comb.[e]	Comb.[e]	Comb.[f]
NLR-1	Film[d]	Film[d]	
NLR-7301	Film[d]	Film[d]	

[a]Mach number sweep $\alpha = 15° + 10° \sin \omega t$, $k = 0.1$.
[b]Frequency sweep, $\alpha = 15° + 10° \sin \omega t$, $M = 0.295$.
[c]Frequency sweep, $\alpha = \alpha_0 + \alpha_1 \sin \omega t$, $M = 0.29$.
[d]Hot-film shear-stress gage.
[e]Hot film at $x/c = 0.025$; hot wire at all other locations.
[f]Hot wire at 0.025, 0.10, 0.25; reverse-flow sensors at $x/c = 0.4, 0.6, 0.8$
[g]Hot-wire velocity probe.

TABLE 2.- PHASE ANGLE OF FLOW REVERSAL: NACA 0012 AIRFOIL

Mach No.	x/c						Ref. frame
	0.025	0.100	0.250	0.400	0.600	0.800	
	$\alpha = 15° + 10° \sin \omega t$, $k = 0.1$						
0.036	10.0	0.0	1.0	3.0	6.0	12.5	8013
.076	50.0	46.5	40.0	35.5	23.0	15.0	8115
.110	59.5	54.5	44.5	40.0	35.5	19.5	2320
.145	67.0	61.5	50.5	50.5	47.0	35.0	2314
.185	60.5	53.0	45.0	41.5	36.5	30.0	2310
.220	43.5	39.0	38.0	36.5	35.5	27.5	2208
.250	21.5	24.5	26.0	29.0	29.5	33.5	2204
.270	14.5	16.5	18.0	21.0	28.0	28.5	2202
.280	10.5	15.0	21.0	21.5	23.0	24.0	2200
.290	8.0	13.0	16.0	20.5	24.0	20.5	2103
.295	8.5	10.5	13.5	16.5	22.0	20.5	2101
Reduced freq.	x/c						Ref. frame
	0.025	0.100	0.250	0.400	0.600	0.800	
	$\alpha = 12° + 5° \sin \omega t$, $M = 0.295$						
0.025	NFR	55.5	48.0	37.0	32.5	26.5	7201
.050	NFR	32.5	37.0	38.0	33.0	31.0	7204
.100	NFR	34.0	42.5	45.0	47.5	41.0	7206
.200	35.5	44.0	54.0	59.0	64.0	71.0	7208

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TABLE 3.- PHASE ANGLE OF FLOW REVERSAL: Ames A-01 AIRFOIL

Mach No.	x/c						Ref. frame
	0.025	0.100	0.250	0.400	0.600	0.800	
$\alpha = 15° + 10° \sin \omega t$, $k = 0.1$							
0.076	48.5	48.5	32.5	26.5	25.5	22.5	24400
.110	56.5	47.5	35.5	33.5	37.5	43.5	24316
.185	56.5	53.0	31.5	34.0	38.0	44.5	24219
.220	53.5	46.5	32.5	33.0	39.0	28.5	24210
.250	29.5	29.0	26.0	29.5	32.0	33.5	24202
.280	18.0	19.5	19.5	23.0	27.0	31.5	24118
.295	12.0	16.0	17.5	19.5	23.0	28.5	24108
Reduced freq.	x/c						Ref. frame
	0.025	0.100	0.250	0.400	0.600	0.800	
$\alpha = 11° + 5° \sin \omega t$, $M = 0.295$							
0.010	NFR	63.5	59.5	59.5	59.0	55.5	30202
.050	NFR	96.0	72.0	68.5	65.5	56.5	25215
.010	Data too irregular to be analyzed						25217
$\alpha = 15° + 10° \sin \omega t$, $M = 0.295$							
0.010	NFR	12.0	6.5	5.0	5.0	2.0	30021
.025	12.5	15.5	11.5	11.0	11.0	11.0	31016
.05	12.0	16.0	12.0	14.5	18.5	24.5	31018
.100	14.5	17.5	17.5	19.0	27.5	31.0	31019
.150	23.0	28.5	23.5	28.0	33.5	38.5	31020

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TABLE 4.- PHASE ANGLE OF FLOW REVERSAL: Wortmann FX-098 AIRFOIL

Mach No.	x/c						Ref. frame
	0.025	0.100	0.250	0.400	0.600	0.800	
$\alpha = 15° + 10° \sin \omega t$, k = 0.1							
0.036	2.5	-1.2	-3.6	-2.0	-4.6	-8.6	16022
.076	36.5	34.5	27.0	18.5	14.5	4.5	16106
.110	43.0	39.5	32.5	24.5	16.5	10.5	16115
.185	37.0	37.0	36.5	33.5	31.0	24.0	16201
.220	22.5	24.5	25.0	26.5	24.0	21.5	16301
.250	14.5	15.5	18.0	18.0	17.5	21.5	16309
.280	9.0	12.0	18.0	20.0	17.5	15.5	22209
.295	6.5	12.5	15.5	16.5	18.5	21.0	22202
Reduced freq.	x/c						Ref. frame
	0.25	0.100	0.250	0.400	0.600	0.800	
$\alpha = 10° + 5° \sin \omega t$, M = 0.295							
0.010	NFR	NFR	67.0	67.0	66.5	63.0	21201
.025	NFR	NFR	95.0	93.5	82.0	49.0	22223
.050	NFR	NFR	69.0	66.0	61.5	57.0	22300
.100	NFR	72.0	77.5	75.5	70.0	66.0	22301
.150	68.0	76.0	82.0	76.0	81.0	85.0	22302
.200	64.0	69.5	79.0	68.5	75.0	83.0	22303
$\alpha = 15° + 10° \sin \omega t$, M = 0.295							
0.010	-99.9	37.5	4.5	2.5	2.5	0.0	21102
.025	0.0	3.5	3.5	3.5	3.5	5.5	17118
.050	0.5	1.5	4.5	6.5	8.0	9.5	17123
.100	10.0	12.5	14.5	15.0	19.0	20.5	17201
$\alpha = 15° + 10° \sin \omega t$, M = 0.185							
0.050	14.0	15.5	17.5	16.0	10.0	6.5	17102
.100	20.5	21.5	25.0	24.0	21.0	19.0	17108
.150	28.0	30.0	32.0	32.0	33.5	26.5	17110

TABLE 5.- PHASE ANGLE OF FLOW REVERSAL: Sikorsky SC-1 AIRFOIL

Mach No.	x/c						Ref. frame
	0.025	0.100	0.250	0.400	0.600	0.800	
$\alpha = 15° + 10° \sin \omega t$, $k = 0.1$							
0.076	33.5	30.5	24.5	21.0	15.5	23.5	33023
.110	43.5	41.0	28.0	28.0	36.5	42.5	33107
.185	42.0	38.0	33.0	35.0	36.5	48.5	33111
.220	32.0	28.5	26.5	24.5	28.5	35.5	33206
.250	22.0	18.5	22.5	26.0	29.5	34.5	33208
.280	15.0	14.5	18.5	20.5	23.5	27.5	33216
.295	9.0	12.0	15.0	18.0	22.5	16.5	33303
Reduced freq.	x/c						Ref. frame
	0.025	0.100	0.250	0.400	0.600	0.800	
$\alpha = 11° + 5° \sin \omega t$, $M = 0.295$							
0.050	-99.9	70.0	61.0	52.0	65.0	67.5	37220
.100	66.0	62.5	61.5	63.5	65.5	67.0	37222

TABLE 6.- PHASE ANGLE OF FLOW REVERSAL: Hughes HH-02 AIRFOIL

Mach No.	x/c						Ref. frame
	0.030	0.120	0.250	0.380	0.560	0.750	
$\alpha = 15° + 10° \sin \omega t$, $k = 0.1$							
0.076	40.0	40.0	32.5	28.0	17.5	11.5	42112
.110	48.5	45.0	40.5	36.5	30.5	13.5	42322
.185	52.5	42.0	40.0	38.5	37.0	32.4	42303
.220	25.0	25.0	28.0	31.5	36.0	15.5	42310
.250	15.0	16.0	17.0	19.5	24.5	18.0	42314
.280	7.0	9.0	11.5	13.0	14.5	5.8	42319
.295	5.0	9.5	15.1	18.5	13.0	13.0	42211
Reduced freq.	x/c						Ref. frame
	0.025	0.100	0.250	0.400	0.600	0.800	
$\alpha = 10° + 5° \sin \omega t$, $M = 0.295$							
0.010	NFR	72.0	68.5	59.0	47.5	20.5	44020
.025	NFR	78.5	74.5	60.0	49.0	33.0	44022
.050	53.5	60.0	64.5	62.5	57.0	36.5	44100
.100	58.5	67.0	78.0	79.0	84.0	50.0	44105
.150	56.0	67.0	80.0	83.5	94.0	54.0	44107
.200	57.5	67.0	79.0	86.0	94.0	58.0	44113

TABLE 7.- PHASE ANGLE OF FLOW REVERSAL: Vertol VR-7 AIRFOIL

Mach No.	x/c						Ref. frame
	0.025	0.100	0.250	0.400	0.600	0.800	
$\alpha = 15° + 10° \sin \omega t$, $k = 0.1$							
0.076	48.0	46.0	37.0	30.0	10.5	-4.0	47200
.110	51.5	49.0	44.0	32.5	15.0	-6.0	47207
.185	54.0	49.5	45.5	37.8	25.0	3.5	47214
.220	38.0	40.5	39.5	36.0	25.0	4.5	47218
.250	26.0	26.5	29.0	29.5	25.5	7.0	47302
.280	24.5	25.5	30.0	33.0	23.5	7.0	47306
.295	16.5	19.0	26.5	26.0	19.0	2.0	45100
Reduced freq.	x/c						Ref. frame
	0.025	0.010	0.250	0.400	0.600	0.800	
$\alpha = 15° + 5° \sin \omega t$, $M = 0.295$							
0.100	NFR	NFR	-3.0	-11.0	-14.0	-63.0	45204
.025	NFR	NFR	15.0	8.0	-11.0	-39.0	45206
.050	NFR	31.0	26.5	23.0	2.5	-35.0	45208
.100	NFR	36.0	36.0	30.0	17.5	-23.0	45210
.150	41.5	44.5	49.5	41.5	39.5	2.0	45212
.200	27.5	32.5	48.0	44.0	30.0	9.5	45214
$\alpha = 15° + 10° \sin \omega t$, $M = 0.295$							
0.025	NFR		14.5	18.0	6.5	-4.5	50021
.050	17.5		18.5	20.0	14.0	0.0	50019
.100	22.0		28.0	30.5	27.0	8.0	50017
.150	26.0		37.0	43.0	29.0	9.5	50015

TABLE 8.- PHASE ANGLE OF FLOW REVERSAL: NLR-1 AIRFOIL

Mach No.	x/c 0.025	0.100	0.250	0.400	0.600	0.800	Ref. frame
$\alpha = 15° + 10° \sin \omega t$, k = 0.1							
0.076	17.0	17.5	18.0	21.5	25.5	32.5	62021
.110	29.0	26.0	23.0	26.0	30.0	36.0	62105
.185	36.0	32.0	26.0	28.5	33.0	38.0	62113
.200	30.5	30.5	27.0	33.5	41.0	41.0	62115
.220	20.5	17.5	18.5	21.0	21.5	29.5	62209
.250	9.5	12.5	15.5	21.0	24.0	24.5	62211
.280	1.5	11.0	14.5	18.0	21.5	27.0	62218
.295	0.0	6.0	9.5	12.5	17.5	24.0	62308
Reduced freq.	x/c 0.025	0.100	0.250	0.400	0.600	0.800	Ref. frame
$\alpha = 10° + 5° \sin \omega t$, M = 0.295							
0.025	NFR	43.5	44.0	42.0	36.5	35.5	63109
.100	45.0	50.0	47.0	49.0	55.0	59.0	63113
.200	52.0	55.0	54.5	55.0	61.0	66.5	63115

TABLE 9.- PHASE ANGLE OF FLOW REVERSAL: NLR-7301 AIRFOIL

Mach No.	x/c 0.025	0.100	0.250	0.400	0.600	0.800	Ref. frame
$\alpha = 15° + 10° \sin \omega t$, k = 0.1							
0.110	84.0	78.5	75.0	66.5	56.0	24.0	62105
.185	98.5	93.5	82.5	76.0	50.5	35.0	62113
.250	69.5	58.5	55.0	52.5	48.0	38.5	62211
Reduced freq.	x/c 0.025	0.100	0.250	0.400	0.600	0.800	Ref. frame
$\alpha = 15° + 5° \sin \omega t$, M = 0.295							
0.010	NFR	56.5	54.5	51.0	48.5	40.5	68020
.025	NFR	64.0	57.5	53.5	48.0	16.0	68101
.050	NFR	68.5	60.0	56.5	43.5	2.0	68103
.100	NFR	34.0	43.0	44.5	43.0	11.0	68105
.150	NFR	37.5	46.0	51.0	61.0	24.0	68110
.200	NFR	35.0	53.0	64.5	44.0	23.0	68112

TABLE 10.- ERROR-BOUND FOR FLOW-REVERSAL MEASUREMENTS (deg): NACA 0012 AIRFOIL

Mach No.	x/c						Ref. frame
	0.025	0.100	0.250	0.400	0.600	0.800	
Corresponds to table 2: $\alpha = 15° + 10° \sin \omega t$, k = 0.1							
0.035	4.0	0.0	1.5	1.0	1.5	2.0	8103
.073	2.0	0.0	1.5	2.5	5.0	3.0	8115
.110	1.5	0.5	0.5	1.0	3.0	3.0	2320
.145	5.0	2.5	4.0	3.5	3.5	3.5	2314
.185	0.5	2.0	1.0	1.0	3.5	2.0	8221
.185	2.5	3.0	2.5	1.5	4.0	9.0	2310
.220	3.0	1.0	0.5	2.5	2.5	3.0	2208
.250	0.0	0.0	1.5	2.0	0.5	1.5	2204
.270	2.0	2.0	2.0	2.5	1.5	0.0	2202
.280	2.0	2.0	1.0	2.0	2.0	3.0	2200
.290	0.5	2.5	1.5	2.5	1.0	1.5	2103
.295	0.5	1.5	1.5	0.0	0.0	2.5	2101
Reduced freq.	x/c						Ref. frame
	0.025	0.100	0.250	0.400	0.600	0.800	
Corresponds to table 2: $\alpha = 12° + 5° \sin \omega t$, M = 0.295							
0.025	NFR	5.0	4.0	2.0	2.0	1.5	7201
.050	NFR	0.0	2.0	5.0	2.0	2.0	7204
.100	NFR	2.0	2.0	2.5	4.0	4.6	7206
.200	5.0	1.0	3.5	5.0	2.0	1.5	7208

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TABLE 11.- ERROR-BOUND FOR FLOW-REVERSAL MEASUREMENTS (deg): Ames A-01 AIRFOIL

Mach No.	x/c						Ref. frame
	0.025	0.100	0.250	0.400	0.600	0.800	
Corresponds to table 3: $\alpha = 15° + 10° \sin \omega t$, k = 0.1							
0.076	1.5	1.5	6.0	3.0	0.5	6.0	24400
.110	1.0	0.5	2.0	2.0	2.0	3.0	24316
.185	1.5	2.5	5.0	4.0	1.2	3.0	24219
.220	2.0	3.0	3.0	3.5	6.5	5.0	24210
.250	1.0	1.5	1.0	0.0	4.0	2.0	24202
.280	0.0	1.5	1.5	1.5	2.0	4.0	24118
.295	0.5	1.5	0.5	1.5	1.5	3.0	24108
Reduced freq.	x/c						Ref. frame
	0.025	0.100	0.250	0.400	0.600	0.800	
Corresponds to table 3: $\alpha = 11° + 5° \sin \omega t$, M = 0.295							
0.010	NFR	3.0	4.0	4.0	3.5	2.5	30202
.050	NFR	6.5	2.5	2.5	2.0	5.5	25215
.100	Data too irregular to be analyzed						25217
Corresponds to table 3: $\alpha = 15° + 10° \sin \omega t$, M = 0.295							
0.010	NFR	3.0	2.0	3.0	1.0	1.5	30021
.025	2.0	2.5	3.0	1.0	1.0	1.0	31016
.050	1.0	1.0	0.5	0.0	2.5	3.5	31018
.100	1.3	1.0	1.0	1.5	4.0	2.0	31019
.150	1.5	3.0	2.5	1.0	1.5	0.5	31020

TABLE 12.- ERROR-BOUND FOR FLOW-REVERSAL MEASUREMENTS (deg): Wortmann FX-098 AIRFOIL

Mach No.	x/c						Ref. frame
	0.025	0.100	0.250	0.400	0.600	0.800	
Corresponds to table 4: $\alpha = 15° + 10° \sin \omega t$, k = 0.1							
0.036	0.5	1.5	0.0	1.5	1.0	1.0	16022
.076	2.0	3.0	1.5	1.0	1.0	2.0	16106
.110	1.0	2.0	3.0	1.0	1.0	1.0	16115
.185	1.0	1.0	1.0	3.0	3.0	2.0	16201
.220	1.0	1.0	1.5	2.0	2.0	3.0	16301
.250	1.5	1.0	1.0	0.5	1.5	2.0	16309
Reduced freq.	x/c						Ref. frame
	0.025	0.100	0.250	0.400	0.600	0.800	
Corresponds to table 4: $\alpha = 10° + 5° \sin \omega t$, M = 0.295							
0.025	NFR	NFR	3.0	3.5	7.0	2.5	22223
.050	NFR	NFR	2.0	2.0	2.0	2.0	22300
.100	NFR	2.0	3.0	1.0	1.0	1.0	22301
.150	2.5	0.5	1.0	1.5	1.0	1.0	22302
.200	3.0	1.5	0.0	0.0	1.0	3.5	22303
Corresponds to table 4: $\alpha = 15° + 10° \sin \omega t$, M = 0.295							
0.010	NFR	2.0	1.0	2.0	2.0	2.5	22102
.025	0.0	0.0	0.0	0.0	0.0	0.0	17118
.050	1.0	1.5	1.0	0.5	1.5	0.5	17123
.100	1.0	2.0	0.5	2.0	2.0	5.0	17201
Corresponds to table 4: $\alpha = 15° + 10° \sin \omega t$, M = 0.295							
0.050	14.0	15.5	17.5	16.0	10.0	6.5	17102
.100	20.5	21.5	25.0	24.0	21.0	19.0	17108
.150	28.0	30.0	32.0	32.0	33.5	26.5	17110

TABLE 13.- ERROR-BOUND FOR FLOW-REVERSAL MEASUREMENTS (deg): Hughes HH-02 AIRFOIL

Mach No.	x/c						Ref. frame
	0.030	0.120	0.250	0.380	0.560	0.750	
Corresponds to table 6: $\alpha = 15° + 10° \sin \omega t$, k = 0.1							
0.076	1.0	1.0	3.0	1.5	3.0	4.0	42122
.110	1.5	2.0	3.0	7.0	8.0	2.0	42322
.185	3.0	2.0	3.0	2.0	3.0	3.0	42303
.220	1.0	1.0	1.0	1.0	1.5	4.0	42310
.250	1.0	1.5	2.0	1.5	1.0	4.0	42314
.280	0.0	3.0	2.0	2.0	3.0	1.0	42319
.295	1.0	1.0	7.0	1.0	1.0	1.0	42211
Reduced freq.	x/c						Ref. frame
	0.050	0.100	0.250	0.400	0.600	0.800	
Corresponds to table 6: $\alpha = 10° + 5° \sin \omega t$, M = 0.295							
0.010	NFR	3.5	5.0	4.5	2.5	2.0	44020
.025	NFR	6.5	6.5	3.5	3.0	3.0	44022
.050	1.0	1.5	1.5	1.5	2.0	2.0	44100
.100	2.0	0.5	2.5	2.0	2.0	2.0	44105
.150	1.0	3.0	3.0	3.0	6.5	0.0	44107
.200	1.0	1.0	0.0	1.0	2.0	5.5	44113

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TABLE 15.- ERROR-BOUND FOR FLOW-REVERSAL MEASUREMENTS (deg):
NLR-1 AIRFOIL

Mach No.	x/c						Ref. frame
	0.025	0.100	0.250	0.400	0.600	0.800	
Corresponds to table 8: $\alpha = 15° + 10° \sin \omega t$, k = 0.1							
0.076	0.5	2.0	1.0	2.0	2.5	5.0	62021
.110	0.5	4.0	2.0	2.5	4.0	1.0	62105
.185	1.0	3.0	3.0	1.0	3.0	2.0	62113
.200	1.0	1.0	2.0	2.0	2.0	2.0	62115
.220	1.0	0.0	0.5	1.0	3.0	1.0	62209
.250	0.5	1.0	1.5	1.0	1.5	1.0	62211
.280	1.0	2.0	1.0	0.0	0.5	1.0	62218
.295	0.0	1.0	2.0	1.0	3.0	1.5	62308
Reduced freq.	x/c						Ref. frame
	0.025	0.100	0.250	0.400	0.600	0.800	
Corresponds to table 8: $\alpha = 10° + 5° \sin \omega t$, M = 0.295							
0.025	NFR	3.5	3.0	3.5	0.5	0.5	63109
.100	0.0	0.5	5.0	2.0	2.5	2.0	63113
.200	2.0	0.5	5.5	2.0	0.0	2.5	63115

TABLE 16.- ERROR-BOUND FOR FLOW-REVERSAL MEASUREMENTS (deg):
NLR-7301 AIRFOIL

Mach No.	x/c						Ref. frame
	0.025	0.100	0.250	0.400	0.600	0.800	
Corresponds to table 9: $\alpha = 15° + 10° \sin \omega t$, k = 0.1							
0.110	4.0	4.0	10.0	13.0	11.0	6.0	67121
.185	5.0	6.0	7.0	7.0	4.0	1.5	67221
.250	2.5	2.5	1.0	2.0	5.0	1.1	67306
Reduced freq.	x/c						Ref. frame
	0.025	0.100	0.250	0.400	0.600	0.800	
Corresponds to table 9: $\alpha = 15° + 5° \sin \omega t$, M = 0.295							
0.010	NFR	1.0	1.5	0.5	1.5	2.0	68020
.025	NFR	2.0	3.0	2.0	1.5	4.0	68101
.050	NFR	3.5	3.5	5.5	0.5	2.5	68103
.100	NFR	1.0	1.0	2.0	0.5	5.0	68105
.150	NFR	1.5	1.0	4.5	2.5	5.5	68110
.200	NFR	0.5	4.0	4.0	11.0	9.0	68112

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TABLE 17.- NOTES PERTAINING TO TABLES 18 TO 25

DATA LISTED IN ORDER A FRAMES STORED ON DIGITAL TAPE
B FRAMES ARE ON ANALOG TAPE ONLY

A FRAME - CATALOG ENTRY FOR PRESSURE DATA
TRIP - TRIP IS PRESENT - (Y)ES, OR (N)O
TYPE - TEST CONDITIONS (ST)EADY, OR (UN)STEADY
A0 - MEAN ANGLE OF OSCILLATION, DEGREES
A1 - AMPLITUDE OF OSCILLATION, DEGREES
Q - FREE STREAM DYNAMIC PRESSURE, PSI
M - FREE STREAM MACH NUMBER
RE - FREE STREAM REYNOLDS NUMBER
FREQ - DIMENSIONAL FREQUENCY, HERTZ
B FRAME - CATALOG ENTRY FOR HOT-FILM AND HOT-WIRE DATA

TABLE 18.- CATALOG OF RECORDED DATA: NACA 0012 AIRFOIL

A FRAME	TRIP	TYPE	AO	A1	Q	M	RE	K	FREQ	B FRAME
4019	N	ST	-5.0	0.0	.875	.301	3957803.	0.0000	0.00	4020
4100	N	ST	-2.0	0.0	.877	.301	3932537.	0.0000	0.00	4101
4102	N	ST	0.0	0.0	.877	.301	3923848.	0.0000	0.00	4103
4109	N	ST	2.0	0.0	.877	.302	3910221.	0.0000	0.00	4110
4111	N	ST	4.0	0.0	.885	.299	3931136.	0.0000	0.00	4112
4113	N	ST	8.0	0.0	.877	.302	3898235.	0.0000	0.00	4114
4119	N	ST	10.0	0.0	.877	.301	3900622.	0.0000	0.00	4120
4123	N	ST	12.0	0.0	.877	.302	3876047.	0.0000	0.00	4200
4201	N	ST	13.0	0.0	.877	.302	3870568.	0.0000	0.00	4202
4203	N	ST	13.5	0.0	.879	.301	3867132.	0.0000	0.00	4204
4209	N	ST	14.0	0.0	.877	.302	3861326.	0.0000	0.00	4210
4211	N	ST	14.5	0.0	.868	.305	3822671.	0.0000	0.00	4212
4213	N	ST	15.0	0.0	.877	.302	3843407.	0.0000	0.00	4214
4215	N	ST	15.5	0.0	.784	.284	3628769.	0.0000	0.00	4216
4217	N	ST	16.0	0.0	.688	.266	3398340.	0.0000	0.00	4218
4219	N	ST	17.8	0.0	.717	.271	3462550.	0.0000	0.00	4220
4301	N	ST	20.0	0.0	.700	.266	3448278.	0.0000	0.00	4302
4401	N	ST	13.0	0.0	.877	.302	3795037.	0.0000	0.00	4402
4403	N	ST	11.0	0.0	.877	.302	3783629.	0.0000	0.00	
4404	N	ST	8.0	0.0	.877	.302	3780176.	0.0000	0.00	
4405	N	ST	5.0	0.0	.877	.302	3781319.	0.0000	0.00	
4410	N	ST	2.0	0.0	.877	.302	3783016.	0.0000	0.00	
4411	N	ST	0.0	0.0	.877	.302	3781623.	0.0000	0.00	
4412	N	ST	-2.0	0.0	.877	.302	3778643.	0.0000	0.00	
11018	N	ST	-5.0	0.0	.875	.302	3998937.	0.0000	0.00	
11019	N	ST	-2.0	0.0	.875	.301	3989548.	0.0000	0.00	
11020	N	ST	0.0	0.0	.875	.302	3978589.	0.0000	0.00	
11101	N	ST	2.0	0.0	.875	.302	3974780.	0.0000	0.00	
11102	N	ST	4.0	0.0	.875	.301	3958541.	0.0000	0.00	
11105	N	ST	8.1	0.0	.876	.301	3938660.	0.0000	0.00	
11110	N	ST	10.0	0.0	.875	.301	3936424.	0.0000	0.00	
11111	N	ST	12.3	0.0	.875	.301	3921945.	0.0000	0.00	
11112	N	ST	13.4	0.0	.875	.301	3912483.	0.0000	0.00	
11113	N	ST	13.8	0.0	.875	.301	3904607.	0.0000	0.00	
11118	N	ST	14.0	0.0	.875	.301	3913072.	0.0000	0.00	
11121	N	ST	14.6	0.0	.875	.302	3929975.	0.0000	0.00	
11122	N	ST	15.0	0.0	.887	.304	3925323.	0.0000	0.00	
11123	N	ST	15.5	0.0	.811	.289	3745403.	0.0000	0.00	
11200	N	ST	16.0	0.0	.811	.290	3733699.	0.0000	0.00	
11201	N	ST	17.0	0.0	.841	.295	3793167.	0.0000	0.00	
11204	N	ST	17.9	0.0	.803	.288	3725491.	0.0000	0.00	
11205	N	ST	20.0	0.0	.764	.280	3616412.	0.0000	0.00	
11208	N	ST	24.9	0.0	.610	.249	3252565.	0.0000	0.00	
11209	N	ST	30.0	0.0	.561	.239	3105558.	0.0000	0.00	
11210	N	ST	25.0	0.0	.619	.251	3254780.	0.0000	0.00	
11211	N	ST	20.0	0.0	.725	.273	3515071.	0.0000	0.00	
11213	N	ST	18.0	0.0	.764	.280	3628495.	0.0000	0.00	
11214	N	ST	16.0	0.0	.875	.302	3866108.	0.0000	0.00	
11215	N	ST	15.0	0.0	.875	.302	3861556.	0.0000	0.00	
11216	N	ST	14.0	0.0	.869	.301	3846733.	0.0000	0.00	
11221	N	ST	13.1	0.0	.875	.302	3884818.	0.0000	0.00	
11222	N	ST	11.0	0.0	.875	.302	3876254.	0.0000	0.00	
11223	N	ST	8.0	0.0	.875	.302	3870718.	0.0000	0.00	
11304	N	ST	5.0	0.0	.875	.302	3896492.	0.0000	0.00	
11305	N	ST	2.0	0.0	.875	.302	3886782.	0.0000	0.00	
11308	N	ST	0.0	0.0	.875	.301	3870607.	0.0000	0.00	
11309	N	ST	-2.0	0.0	.875	.301	3870953.	0.0000	0.00	
7019	N	US	9.0	5.0	.878	.297	3894008.	.0538	2.70	7020
7021	N	US	9.0	5.0	.886	.299	3962010.	.1004	5.40	7022
7023	N	US	9.0	5.0	.886	.299	3944777.	.2005	10.80	7100

A FRAME	TRIP	TYPE	AO	A1	Q	M	RE	K	FREQ	B FRAME
7101	N	US	9.0	5.0	.878	.301	3909814.	.1496	8.10	7102
7104	N	US	9.0	5.0	.878	.301	3901884.	.0249	1.35	7105
7108	N	US	8.0	5.0	.878	.301	3920784.	.0250	1.35	
7110	N	US	8.0	5.0	.878	.301	3903187.	.0997	5.40	
7111	N	US	8.0	5.0	.877	.301	3894727.	.1992	10.80	
7112	N	US	10.0	5.0	.877	.301	3879891.	.0252	1.37	
7113	N	US	10.0	5.0	.877	.301	3877295.	.0994	5.40	
7114	N	US	10.0	5.0	.877	.301	3869051.	.1987	10.80	
7117	N	US	11.0	5.0	.878	.301	3891815.	.0249	1.35	
7118	N	US	11.0	5.0	.878	.301	3875085.	.0497	2.70	
7119	N	US	11.0	5.0	.877	.301	3865664.	.0993	5.40	
7120	N	US	11.0	5.0	.877	.301	3860258.	.1488	8.10	
7121	N	US	11.0	5.0	.878	.301	3852461.	.1983	10.80	
7200	N	US	12.0	5.0	.878	.301	3878632.	.0249	1.35	7201
7205	N	US	12.0	5.0	.877	.302	3853339.	.0991	5.40	7206
7207	N	US	12.0	5.0	.877	.302	3845471.	.1981	10.80	7208
7212	N	US	8.8	5.0	.877	.302	3864684.	.1488	8.10	7213
7214	N	US	8.8	5.0	.877	.302	3859691.	.0992	5.40	7215
7216	N	US	8.8	5.0	.877	.302	3856685.	.0496	2.70	7217
7300	N	US	10.0	5.0	.877	.300	3986300.	.1513	8.10	7301
7302	N	US	10.0	5.0	.877	.300	3957627.	.0745	4.00	
7305	N	US	12.0	5.0	.877	.300	3966326.	.1510	8.10	
8019	N	US	10.0	10.0	.013	.035	486897.	.1038	.66	8020
8021	N	US	10.0	10.0	.013	.035	486001.	.1515	.97	8022
8023	N	US	10.0	10.0	.013	.035	485755.	.2529	1.62	8024
8102	N	US	15.0	10.0	.013	.036	485630.	.1032	.66	8103
8104	N	US	15.0	10.0	.013	.036	484039.	.1529	.98	8105
8106	N	US	15.0	14.0	.013	.036	483453.	.1039	.67	8107
8114	N	US	15.0	10.0	.054	.072	980395.	.0992	1.30	8115
8116	N	US	15.0	10.0	.054	.072	979893.	.1487	1.95	8117
8118	N	US	15.0	10.0	.054	.072	978493.	.2477	3.25	8119
8123	N	US	15.0	14.0	.054	.072	980066.	.0991	1.30	8200
8203	N	US	10.0	10.0	.054	.072	978307.	.2476	3.25	8204
8210	N	US	10.0	10.0	.122	.109	1491495.	.2497	4.90	
8214	N	US	15.0	10.0	.122	.109	1480389.	.0996	1.96	
8220	N	US	15.0	10.0	.339	.184	2432854.	.0993	3.30	8221
8222	N	US	15.0	10.0	.339	.184	2423357.	.1487	4.95	8223
8306	N	US	15.0	14.0	.339	.184	2404523.	.0988	3.30	8307
9022	N	US	15.0	6.0	.339	.184	2358259.	.2352	7.92	
9101	N	US	15.0	5.0	.339	.184	2358620.	.2842	9.57	
9106	N	US	10.0	10.0	.339	.184	2365336.	.2453	8.25	
9110	N	US	8.0	10.0	.339	.184	2476299.	.0100	.33	9111
9112	N	US	8.0	10.0	.341	.183	2475104.	.0500	1.65	9113
9118	N	US	8.0	10.0	.339	.184	2449160.	.1990	6.60	9119
9202	N	US	15.0	10.0	.479	.220	2847551.	.0985	3.93	
9203	N	US	15.0	10.0	.610	.249	3187113.	.0984	4.46	
9208	N	US	15.0	10.0	.762	.280	3520275.	.0975	4.98	
9210	N	US	15.0	10.0	.842	.295	3672459.	.0098	.53	
9213	N	US	15.0	10.0	.831	.294	3596380.	.0243	1.31	
9214	N	US	15.0	10.0	.821	.292	3566725.	.0488	2.62	
9217	N	US	15.0	10.0	.812	.290	3549571.	.0983	5.24	
9218	N	US	15.0	10.0	.773	.283	3450727.	.1509	7.86	
9221	N	US	10.0	10.0	.876	.302	3672528.	.0098	.54	
9222	N	US	10.0	10.0	.876	.302	3660134.	.0241	1.34	
9223	N	US	10.0	10.0	.876	.302	3652176.	.0481	2.68	
9302	N	US	10.0	10.0	.876	.302	3659205.	.0963	5.36	
9307	N	US	10.0	10.0	.877	.302	3670847.	.1447	8.04	
10022	N	US	12.0	10.0	.878	.301	3769502.	.0976	5.36	
10101	N	US	20.0	10.0	.688	.265	3303441.	.1102	5.36	
10104	N	US	12.0	8.0	.877	.302	3711352.	.0485	2.68	

TABLE 18.- Concluded.

A FRAME	TRIP	TYPE	AO	A1	Q	M	RE	K	FREQ	B FRAME
10105	N	US	12.0	8.0	.878	.302	3694271.	.0968	5.36	
10108	N	US	12.0	8.0	.847	.296	3635889.	.1253	6.81	
10113	N	US	15.0	5.0	.876	.302	3896846.	.0098	.53	
10114	N	US	15.0	5.0	.841	.295	3801337.	.0252	1.34	
10118	N	US	15.0	5.0	.823	.291	3748526.	.1020	5.36	
10120	N	US	15.0	5.0	.843	.294	3785165.	.1511	8.04	
10123	N	US	15.0	5.0	.832	.293	3758528.	.2024	10.72	
10202	N	US	10.0	5.0	.877	.301	3858103.	.0098	.54	
10203	N	US	10.0	5.0	.877	.301	3847481.	.0246	1.34	
10204	N	US	10.0	5.0	.870	.300	3826614.	.0493	2.68	
10207	N	US	10.0	5.0	.877	.302	3884629.	.0740	4.02	
10208	N	US	10.0	5.0	.870	.300	3859785.	.0990	5.36	
10211	N	US	10.0	5.0	.870	.300	3863353.	.1486	8.04	
10212	N	US	10.0	5.0	.870	.300	3850737.	.1979	10.72	
10218	N	US	5.0	5.0	.880	.300	3933484.	.0098	.53	
10221	N	US	5.0	5.0	.878	.301	3925387.	.0993	5.36	
10222	N	US	5.0	5.0	.878	.301	3912114.	.1983	10.72	
10303	N	US	5.0	10.0	.877	.301	3910580.	.0991	5.36	
10305	N	US	3.8	10.0	.877	.301	3911328.	.0991	5.36	
10309	N	US	2.8	10.0	.877	.301	3896361.	.0989	5.36	
12020	N	US	20.0	10.0	.718	.270	3490909.	.0010	.05	12023
12102	N	US	5.0	10.0	.882	.302	3820000.	.0009	.05	12105
12109	N	US	6.0	10.0	.756	.279	3485785.	.0010	.05	12112
12118	N	US	20.0	10.0	.676	.262	3246704.	.0010	.05	12121
12203	N	US	20.0	10.0	.531	.231	2887477.	.0011	.05	12121
12208	N	US	7.0	10.0	.587	.244	3269975.	.0010	.05	12212
12300	N	US	20.0	10.0	.421	.204	2706734.	.0011	.04	12301
12305	N	US	20.0	10.0	.292	.169	2252844.	.0011	.03	12306
12310	N	US	7.0	10.0	.350	.186	2469266.	.0010	.03	
13021	N	US	7.0	10.0	.120	.108	1502757.	.0017	.03	13104
13107	N	US	20.0	10.0	.113	.105	1421201.	.0017	.03	13108
13115	N	US	20.0	10.0	.048	.068	918563.	.0027	.03	13116
13120	N	US	5.0	10.0	.053	.072	962303.	.0025	.03	13202
13205	N	US	5.0	10.0	.014	.036	488772.	.0025	.02	13213
13217	N	US	20.0	10.0	.013	.036	485631.	.0026	.02	
13222	N	US	20.0	10.0	.749	.276	3656957.	.0010	.05	
13303	N	US	7.0	10.0	.603	.247	3298109.	.0010	.05	
13308	N	US	7.0	10.0	.461	.215	2884310.	.0010	.04	
13310	N	US	7.0	10.0	.466	.216	2884723.	.0010	.04	
13313	Y	US	7.0	10.0	.332	.181	2404990.	.0010	.03	13316
13321	Y	US	7.0	10.0	.839	.294	3740954.	.0009	.05	13405
14019	Y	US	15.0	10.0	.339	.183	2453890.	.0499	1.65	14020
14021	Y	US	15.0	10.0	.336	.182	2434182.	.1001	3.30	14022
14023	Y	US	15.0	10.0	.335	.182	2426579.	.1504	4.95	14100
14104	Y	US	15.0	10.0	.338	.183	2448651.	.0499	1.65	14105
14106	Y	US	15.0	10.0	.340	.184	2449389.	.0994	3.30	14107
14108	Y	US	15.0	10.0	.339	.183	2443079.	.1493	4.95	14109
14117	Y	US	15.0	10.0	.837	.293	3843264.	.0257	1.35	14118
14119	Y	US	15.0	10.0	.836	.293	3818432.	.0509	2.68	14120
14200	Y	US	15.0	10.0	.843	.294	3822179.	.0253	1.34	14201
14202	Y	US	15.0	10.0	.839	.293	3792702.	.0506	2.68	14203
14208	Y	US	15.0	10.0	.828	.291	3764396.	.1019	5.36	14209
14210	Y	US	15.0	10.0	.832	.292	3760353.	.1014	5.36	14211
14218	N	US	15.0	10.0	.830	.292	3762798.	.0254	1.34	
14219	N	US	15.0	10.0	.824	.291	3735990.	.0509	2.68	
14220	N	US	15.0	10.0	.805	.287	3683317.	.1031	5.36	14221
15218	N	US	15.0	10.0	.818	.290	3678973.	.0994	5.24	
10117	N	US	15.0	5.0	.843	.295	3802563.	.0504	2.68	
7202	N	US	12.0	5.0	.877	.302	3861194.	.0496	2.70	7201
7222	N	US	10.0	5.0	.876	.298	3975490.	.0509	2.70	7223

TABLE 19.- CATALOG OF RECORDED DATA: Ames A-01 AIRFOIL

A FRAME	TRIP	TYPE	AO	A1	Q	M	RE	K	FREQ	B FRAME
26020	N	ST	-5.0	0.0	.880	.301	3921512.	0.0000	0.00	26021
26022	N	ST	-2.0	0.0	.881	.302	3907918.	0.0000	0.00	
26023	N	ST	0.0	0.0	.882	.302	3900668.	0.0000	0.00	26100
26101	N	ST	2.0	0.0	.878	.302	3878703.	0.0000	0.00	
26107	N	ST	4.0	0.0	.879	.302	3839303.	0.0000	0.00	
26108	N	ST	8.0	0.0	.880	.302	3839762.	0.0000	0.00	
26109	N	ST	10.0	0.0	.879	.302	3826626.	0.0000	0.00	26113
26114	N	ST	12.0	0.0	.884	.303	3832104.	0.0000	0.00	26115
26122	N	ST	13.0	0.0	.857	.298	3737465.	0.0000	0.00	26123
26200	N	ST	13.5	0.0	.833	.293	3667954.	0.0000	0.00	26201
26205	N	ST	14.0	0.0	.857	.298	3720572.	0.0000	0.00	26206
26207	N	ST	15.0	0.0	.882	.302	3754105.	0.0000	0.00	26208
26209	N	ST	16.0	0.0	.870	.300	3715585.	0.0000	0.00	26210
26215	N	ST	18.0	0.0	.815	.290	3589962.	0.0000	0.00	
26216	N	ST	20.0	0.0	.778	.282	3497091.	0.0000	0.00	26217
26218	N	ST	25.0	0.0	.626	.252	3129086.	0.0000	0.00	
26219	N	ST	20.0	0.0	.773	.281	3465882.	0.0000	0.00	
26220	N	ST	16.0	0.0	.832	.293	3591634.	0.0000	0.00	26222
26300	N	ST	14.0	0.0	.878	.302	3703082.	0.0000	0.00	
26301	N	ST	13.0	0.0	.828	.293	3590546.	0.0000	0.00	
26302	N	ST	11.0	0.0	.879	.302	3693921.	0.0000	0.00	
26306	N	ST	5.0	0.0	.883	.303	3706075.	0.0000	0.00	
26307	N	ST	0.0	0.0	.878	.302	3693264.	0.0000	0.00	
26313	N	ST	-5.0	0.0	.614	.250	3126375.	0.0000	0.00	26314
26315	N	ST	-2.0	0.0	.612	.250	3113134.	0.0000	0.00	
26318	N	ST	0.0	0.0	.616	.250	3132011.	0.0000	0.00	26319
26320	N	ST	2.0	0.0	.614	.249	3118900.	0.0000	0.00	
26321	N	ST	4.0	0.0	.612	.250	3112889.	0.0000	0.00	
26414	N	ST	8.0	0.0	.618	.250	3371063.	0.0000	0.00	
26415	N	ST	10.0	0.0	.612	.249	3345903.	0.0000	0.00	26416
26417	N	ST	12.0	0.0	.614	.249	3336283.	0.0000	0.00	26418
26419	N	ST	13.0	0.0	.621	.251	3344961.	0.0000	0.00	26420
26421	N	ST	14.0	0.0	.615	.249	3327823.	0.0000	0.00	26422
27020	N	ST	15.0	0.0	.617	.250	3308153.	0.0000	0.00	27021
27022	N	ST	16.0	0.0	.616	.250	3293220.	0.0000	0.00	27023
27100	N	ST	18.0	0.0	.616	.250	3281426.	0.0000	0.00	
27101	N	ST	20.0	0.0	.618	.250	3281356.	0.0000	0.00	27102
27103	N	ST	25.0	0.0	.613	.249	3256106.	0.0000	0.00	
27107	N	ST	20.0	0.0	.630	.252	3304196.	0.0000	0.00	
27108	N	ST	16.0	0.0	.615	.249	3259565.	0.0000	0.00	
27109	N	ST	14.0	0.0	.617	.250	3265185.	0.0000	0.00	
27110	N	ST	13.0	0.0	.611	.249	3248047.	0.0000	0.00	
27111	N	ST	11.1	0.0	.612	.249	3246751.	0.0000	0.00	
27116	N	ST	5.0	0.0	.607	.248	3241861.	0.0000	0.00	
27117	N	ST	0.0	0.0	.615	.249	3258729.	0.0000	0.00	
27123	N	ST	-5.0	0.0	.344	.185	2448549.	0.0000	0.00	27200
27201	N	ST	-2.0	0.0	.343	.184	2440864.	0.0000	0.00	
27202	N	ST	0.0	0.0	.340	.184	2428683.	0.0000	0.00	27203
27204	N	ST	2.0	0.0	.343	.184	2436687.	0.0000	0.00	
27205	N	ST	4.0	0.0	.343	.185	2438037.	0.0000	0.00	
27211	N	ST	8.0	0.0	.347	.185	2460290.	0.0000	0.00	
27212	N	ST	10.0	0.0	.344	.185	2444426.	0.0000	0.00	27213
27214	N	ST	12.0	0.0	.345	.185	2441417.	0.0000	0.00	27215
27216	N	ST	13.0	0.0	.342	.184	2429710.	0.0000	0.00	27217
27218	N	ST	14.0	0.0	.340	.184	2418565.	0.0000	0.00	27219
27220	N	ST	14.9	0.0	.347	.186	2445054.	0.0000	0.00	27221
27301	N	ST	16.0	0.0	.344	.185	2441091.	0.0000	0.00	27302
27303	N	ST	18.0	0.0	.343	.184	2429869.	0.0000	0.00	
27304	N	ST	20.0	0.0	.343	.185	2429178.	0.0000	0.00	27305
27306	N	ST	25.0	0.0	.342	.184	2422378.	0.0000	0.00	

A FRAME	TRIP	TYPE	AO	A1	Q	M	RE	K	FREQ	B FRAME
27307	N	ST	20.0	0.0	.342	.184	2418525.	0.0000	0.00	
27308	N	ST	16.0	0.0	.342	.184	2422139.	0.0000	0.00	
27309	N	ST	14.0	0.0	.342	.184	2422443.	0.0000	0.00	
27310	N	ST	13.0	0.0	.343	.185	2426821.	0.0000	0.00	
27311	N	ST	11.0	0.0	.341	.184	2422433.	0.0000	0.00	
27317	N	ST	5.0	0.0	.339	.184	2432586.	0.0000	0.00	
27318	N	ST	0.0	0.0	.342	.184	2434809.	0.0000	0.00	
27400	N	ST	-5.0	0.0	.121	.109	1538531.	0.0000	0.00	27401
27402	N	ST	-2.0	0.0	.123	.110	1550354.	0.0000	0.00	
27403	N	ST	0.0	0.0	.121	.108	1533751.	0.0000	0.00	27404
27405	N	ST	2.0	0.0	.122	.109	1536087.	0.0000	0.00	
27406	N	ST	4.0	0.0	.122	.109	1532038.	0.0000	0.00	
27413	N	ST	8.0	0.0	.122	.110	1527387.	0.0000	0.00	
27414	N	ST	10.0	0.0	.121	.109	1522167.	0.0000	0.00	27415
27416	N	ST	12.0	0.0	.122	.110	1525614.	0.0000	0.00	27417
28019	N	ST	13.0	0.0	.121	.109	1491021.	0.0000	0.00	28020
28021	N	ST	14.0	0.0	.121	.109	1485106.	0.0000	0.00	28020
28023	N	ST	15.0	0.0	.132	.114	1541856.	0.0000	0.00	28100
28101	N	ST	16.0	0.0	.129	.112	1526677.	0.0000	0.00	28102
28106	N	ST	18.0	0.0	.124	.110	1498052.	0.0000	0.00	
28107	N	ST	20.0	0.0	.124	.110	1492163.	0.0000	0.00	28108
28109	N	ST	25.0	0.0	.122	.109	1479403.	0.0000	0.00	
28110	N	ST	20.0	0.0	.124	.109	1487571.	0.0000	0.00	
28115	N	ST	14.0	0.0	.122	.109	1476171.	0.0000	0.00	
28116	N	ST	13.0	0.0	.123	.110	1474187.	0.0000	0.00	
28117	N	ST	11.0	0.0	.121	.109	1466536.	0.0000	0.00	
28119	N	ST	0.0	0.0	.123	.110	1476082.	0.0000	0.00	
28120	N	ST	14.5	0.0	.121	.108	1459583.	0.0000	0.00	
28207	Y	ST	0.0	0.0	.341	.184	2441392.	0.0000	0.00	28208
28209	Y	ST	5.0	0.0	.338	.183	2424855.	0.0000	0.00	28210
28211	Y	ST	10.0	0.0	.342	.184	2439422.	0.0000	0.00	28212
28213	Y	ST	12.0	0.0	.343	.185	2439577.	0.0000	0.00	28214
28215	Y	ST	13.0	0.0	.343	.185	2439192.	0.0000	0.00	28216
28217	Y	ST	14.0	0.0	.342	.184	2432247.	0.0000	0.00	28218
28222	Y	ST	15.0	0.0	.341	.185	2427824.	0.0000	0.00	28223
28300	Y	ST	16.0	0.0	.342	.184	2426509.	0.0000	0.00	28301
28302	Y	ST	20.0	0.0	.342	.184	2423535.	0.0000	0.00	28303
28304	Y	ST	0.0	0.0	.343	.185	2426376.	0.0000	0.00	28305
28312	Y	ST	0.0	0.0	.878	.301	3956685.	0.0000	0.00	28313
28314	Y	ST	5.0	0.0	.886	.303	3959734.	0.0000	0.00	28315
28316	Y	ST	10.0	0.0	.884	.302	3939559.	0.0000	0.00	28320
28321	Y	ST	12.0	0.0	.878	.301	3913926.	0.0000	0.00	28322
28323	Y	ST	13.0	0.0	.860	.298	3863673.	0.0000	0.00	28400
28401	Y	ST	14.0	0.0	.827	.292	3779496.	0.0000	0.00	28402
28403	Y	ST	15.0	0.0	.859	.298	3837643.	0.0000	0.00	28404
28408	Y	ST	16.0	0.0	.857	.298	3842021.	0.0000	0.00	28409
28410	Y	ST	0.0	0.0	.882	.302	3886732.	0.0000	0.00	28411
24022	N	US	15.0	10.0	.850	.296	3840159.	.0246	1.31	24023
24100	N	US	15.0	10.0	.814	.290	3732983.	.0501	2.62	24104
24105	N	US	15.0	10.0	.813	.289	3714780.	.1002	5.24	24108
24109	N	US	15.0	10.0	.779	.283	3625374.	.1534	7.86	24110
24117	N	US	15.0	10.0	.765	.280	3598067.	.0982	4.98	24118
24201	N	US	15.0	10.0	.609	.248	3211200.	.0990	4.46	24202
24209	N	US	15.0	10.0	.480	.220	2846350.	.0984	3.93	24210
24217	N	US	15.0	10.0	.340	.184	2396118.	.0986	3.30	24219
24302	N	US	7.5	10.0	.340	.184	2396387.	.0493	1.65	24304
24306	N	US	7.5	10.0	.341	.184	2394970.	.1966	6.60	24307
24314	N	US	15.0	10.0	.123	.110	1504089.	.0994	1.96	24316
24323	N	US	15.0	10.0	.054	.073	994952.	.0992	1.30	24400
25022	N	US	10.0	10.0	.881	.302	3844899.	.0245	1.34	25023

ORIGINAL PAGE IS OF POOR QUALITY

TABLE 19.- Concluded.

A FRAME	TRIP	TYPE	AO	A1	Q	M	RE	K	FREQ	B FRAME
25102	N	US	10.0	10.0	.881	.302	3831527.	.0489	2.68	25103
25104	N	US	10.0	10.0	.880	.302	3816708.	.0978	5.36	25108
25109	N	US	10.0	10.0	.879	.302	3810775.	.1468	8.04	25110
25117	N	US	10.0	5.0	.884	.303	3829075.	.0244	1.34	
25118	N	US	10.0	5.0	.879	.302	3803407.	.0489	2.68	
25119	N	US	10.0	5.0	.883	.303	3805390.	.0975	5.36	
25121	N	US	10.0	5.0	.881	.302	3813088.	.1465	8.04	
25122	N	US	10.0	5.0	.884	.303	3819823.	.1462	8.04	
25123	N	US	10.0	5.0	.885	.303	3816827.	.1947	10.72	
29023	Y	US	15.0	10.0	.820	.291	3697799.	.0248	1.31	29100
29101	Y	US	15.0	10.0	.805	.288	3639654.	.0500	2.62	29102
29106	Y	US	15.0	10.0	.806	.288	3646183.	.1001	5.24	29107
29115	Y	US	15.0	10.0	.340	.184	2418131.	.0494	1.65	29116
29117	Y	US	15.0	10.0	.341	.184	2418248.	.0987	3.30	29118
29119	Y	US	15.0	10.0	.341	.184	2417060.	.1481	4.95	29121
29205	N	US	5.0	10.0	.876	.301	3947215.	.0098	.53	29206
29207	N	US	5.0	10.0	.877	.301	3918856.	.0496	2.68	29210
29211	N	US	5.0	10.0	.877	.301	3902857.	.0991	5.36	29212
29213	N	US	5.0	10.0	.879	.301	3896095.	.1483	8.04	29214
29215	N	US	5.0	10.0	.879	.301	3891313.	.1481	8.04	
29223	N	US	13.5	2.0	.876	.301	3811877.	.1965	10.72	29300
29304	N	US	14.5	2.0	.870	.300	3777473.	.1967	10.72	29306
29309	N	US	16.5	2.0	.852	.296	3722411.	.1986	10.72	29310
29317	N	US	15.0	10.0	.013	.035	472349.	.1021	.65	29318
30019	N	US	15.0	10.0	.865	.298	3856941.	.0097	.52	30021
30020	N	US	15.0	10.0	.864	.298	3828146.	.0096	.52	30021
30105	N	US	10.0	10.0	.880	.301	3844592.	.0097	.53	30106
30110	N	US	15.0	5.0	.877	.301	3817844.	.0097	.53	30111
30119	N	US	10.0	5.0	.874	.300	3819252.	.0097	.53	30120
30201	N	US	11.0	5.0	.877	.301	3814196.	.0099	.54	30202
30206	N	US	14.0	2.0	.876	.301	3818960.	.0097	.53	30208
30215	N	US	7.5	10.0	.338	.183	2415733.	.0099	.33	30216
31102	N	US	10.0	10.0	.877	.302	3880208.	.0247	1.34	31103
31104	N	US	10.0	10.0	.878	.302	3859857.	.0492	2.68	31105
31110	N	US	10.0	10.0	.880	.302	3841535.	.1471	8.04	31111
31112	N	US	10.0	10.0	.880	.302	3832051.	.1469	8.04	31111
31119	N	US	5.0	10.0	.884	.303	3856266.	.0245	1.34	31120
31121	N	US	5.0	10.0	.880	.302	3826984.	.0489	2.68	31122
31123	N	US	5.0	10.0	.884	.303	3823741.	.0975	5.36	31200
31201	N	US	5.0	10.0	.883	.303	3816823.	.1463	8.04	31202
31209	N	US	15.0	10.0	.341	.184	2421425.	.0987	3.30	31210
31215	N	US	7.5	10.0	.341	.184	2425489.	.0494	1.65	31216
31217	N	US	7.5	10.0	.341	.185	2423083.	.1972	6.60	31218
31302	N	US	14.5	2.0	.852	.297	3765532.	.1990	10.72	31304
31310	N	US	14.5	2.0	.854	.298	3731989.	.1485	8.04	31312
25204	N	US	15.0	5.0	.877	.301	3973275.	.0249	1.34	
25205	N	US	15.0	5.0	.878	.301	3952662.	.0497	2.68	
25208	N	US	15.0	5.0	.878	.301	3950602.	.0994	5.36	
25209	N	US	15.0	5.0	.857	.298	3887313.	.1506	8.04	
25210	N	US	15.0	5.0	.852	.297	3865306.	.2013	10.72	
25214	N	US	11.0	5.0	.880	.302	3926436.	.0495	2.68	25215
25216	N	US	11.0	5.0	.883	.302	3909711.	.0986	5.36	25217
25301	N	US	5.0	5.0	.884	.302	3903998.	.0984	5.36	25302
25303	N	US	5.0	5.0	.885	.303	3878688.	.1962	10.72	25304
25311	N	US	5.0	10.1	.881	.302	3852707.	.0982	5.36	25312
25319	N	US	5.5	10.0	.881	.302	3833693.	.0980	5.36	25320

TABLE 20.- CATALOG OF RECORDED DATA: Wortmann FX-098 AIRFOIL

A FRAME	TRIP	TYPE	AO	A1	Q	M	RE	K	FREQ	B FRAME
17208	Y	ST	0.0	0.0	.877	.301	3975279.	0.0000	0.00	17209
17212	Y	ST	5.0	0.0	.880	.301	3928557.	0.0000	0.00	17213
17220	Y	ST	10.0	0.0	.879	.302	3911481.	0.0000	0.00	17221
17303	Y	ST	12.0	0.0	.847	.296	3802285.	0.0000	0.00	17304
17305	Y	ST	13.0	0.0	.870	.300	3835772.	0.0000	0.00	17306
17310	Y	ST	14.0	0.0	.866	.299	3820036.	0.0000	0.00	17311
17312	Y	ST	15.0	0.0	.866	.299	3805980.	0.0000	0.00	17313
17314	Y	ST	16.0	0.0	.828	.292	3710084.	0.0000	0.00	17315
18019	Y	ST	0.0	0.0	.341	.184	2398709.	0.0000	0.00	18020
18102	Y	ST	5.0	0.0	.343	.185	2400750.	0.0000	0.00	18103
18106	Y	ST	10.0	0.0	.339	.184	2378846.	0.0000	0.00	18107
18108	Y	ST	12.0	0.0	.343	.185	2388927.	0.0000	0.00	18109
18115	Y	ST	13.0	0.0	.346	.185	2394744.	0.0000	0.00	18116
18117	Y	ST	14.0	0.0	.345	.185	2388872.	0.0000	0.00	18118
18119	Y	ST	15.0	0.0	.341	.184	2374587.	0.0000	0.00	18120
18121	Y	ST	16.0	0.0	.340	.184	2368089.	0.0000	0.00	18122
18123	Y	ST	19.9	0.0	.342	.184	2370588.	0.0000	0.00	18200
18206	Y	ST	0.0	0.0	.341	.184	2379635.	0.0000	0.00	18207
18215	N	ST	-5.0	0.0	.122	.110	1500031.	0.0000	0.00	18216
18217	N	ST	-2.0	0.0	.123	.110	1502458.	0.0000	0.00	
18218	N	ST	0.0	0.0	.121	.109	1487692.	0.0000	0.00	18219
18220	N	ST	2.0	0.0	.122	.110	1494149.	0.0000	0.00	
18221	N	ST	4.0	0.0	.121	.109	1486754.	0.0000	0.00	
18304	N	ST	8.0	0.0	.121	.109	1480425.	0.0000	0.00	
18305	N	ST	10.0	0.0	.122	.110	1483466.	0.0000	0.00	18306
18307	N	ST	12.0	0.0	.122	.109	1476483.	0.0000	0.00	18308
18312	N	ST	13.0	0.0	.121	.109	1466753.	0.0000	0.00	18313
18319	N	ST	13.5	0.0	.123	.109	1469738.	0.0000	0.00	18320
18321	N	ST	14.0	0.0	.124	.110	1474082.	0.0000	0.00	18322
18323	N	ST	15.0	0.0	.122	.110	1463922.	0.0000	0.00	18400
18401	N	ST	16.0	0.0	.122	.109	1461183.	0.0000	0.00	18402
18410	N	ST	18.0	0.0	.124	.111	1459953.	0.0000	0.00	18412
18411	N	ST	20.0	0.0	.123	.110	1447617.	0.0000	0.00	18412
18413	N	ST	25.0	0.0	.123	.109	1445110.	0.0000	0.00	
18414	N	ST	20.0	0.0	.122	.110	1439675.	0.0000	0.00	
18421	N	ST	16.0	0.0	.123	.109	1445948.	0.0000	0.00	
18422	N	ST	14.0	0.0	.122	.110	1438216.	0.0000	0.00	
18423	N	ST	13.0	0.0	.122	.109	1439933.	0.0000	0.00	
18500	N	ST	11.0	0.0	.122	.110	1437504.	0.0000	0.00	
18501	N	ST	5.0	0.0	.122	.109	1436482.	0.0000	0.00	
18502	N	ST	0.0	0.0	.122	.110	1439616.	0.0000	0.00	
19020	N	ST	-5.0	0.0	.342	.185	2454849.	0.0000	0.00	19021
19022	N	ST	-2.0	0.0	.342	.184	2447610.	0.0000	0.00	
19023	N	ST	0.0	0.0	.340	.185	2441467.	0.0000	0.00	19100
19101	N	ST	2.0	0.0	.341	.185	2443653.	0.0000	0.00	
19110	N	ST	4.0	0.0	.340	.185	2399877.	0.0000	0.00	
19116	N	ST	8.0	0.0	.341	.185	2378719.	0.0000	0.00	
19117	N	ST	10.0	0.0	.340	.185	2372613.	0.0000	0.00	19118
19119	N	ST	12.0	0.0	.343	.185	2379520.	0.0000	0.00	19120
19121	N	ST	13.0	0.0	.338	.183	2355087.	0.0000	0.00	19122
19123	N	ST	13.5	0.0	.343	.185	2370521.	0.0000	0.00	19200
19204	N	ST	14.0	0.0	.340	.185	2361633.	0.0000	0.00	19205
19206	N	ST	15.0	0.0	.342	.185	2364851.	0.0000	0.00	19207
19208	N	ST	16.0	0.0	.342	.185	2361273.	0.0000	0.00	19209
19213	N	ST	18.0	0.0	.341	.185	2365586.	0.0000	0.00	
19214	N	ST	20.0	0.0	.340	.185	2358408.	0.0000	0.00	19215
19216	N	ST	25.0	0.0	.341	.184	2351317.	0.0000	0.00	
19217	N	ST	20.0	0.0	.340	.185	2348131.	0.0000	0.00	
19221	N	ST	16.0	0.0	.341	.185	2359002.	0.0000	0.00	
19222	N	ST	14.0	0.0	.343	.186	2364589.	0.0000	0.00	

A FRAME	TRIP	TYPE	AO	A1	Q	M	RE	K	FREQ	B FRAME
19223	N	ST	13.0	0.0	.340	.185	2353097.	0.0000	0.00	
19300	N	ST	11.0	0.0	.341	.185	2354186.	0.0000	0.00	
19305	N	ST	5.0	0.0	.340	.185	2357348.	0.0000	0.00	
19308	N	ST	0.0	0.0	.340	.185	2354786.	0.0000	0.00	
19314	N	ST	-5.0	0.0	.614	.250	3151118.	0.0000	0.00	19315
19316	N	ST	-2.0	0.0	.611	.250	3138172.	0.0000	0.00	
19317	N	ST	0.0	0.0	.612	.250	3137611.	0.0000	0.00	19318
19401	N	ST	2.0	0.0	.616	.251	3300956.	0.0000	0.00	
19402	N	ST	4.0	0.0	.616	.251	3297074.	0.0000	0.00	
19405	N	ST	8.0	0.0	.617	.251	3287867.	0.0000	0.00	
19406	N	ST	10.0	0.0	.614	.250	3275608.	0.0000	0.00	19407
19411	N	ST	12.0	0.0	.617	.251	3278455.	0.0000	0.00	19412
19413	N	ST	13.0	0.0	.618	.251	3268218.	0.0000	0.00	19414
19415	N	ST	13.5	0.0	.620	.251	3264994.	0.0000	0.00	19416
19423	N	ST	14.0	0.0	.613	.250	3235583.	0.0000	0.00	19500
19504	N	ST	15.0	0.0	.613	.250	3233310.	0.0000	0.00	19505
19506	N	ST	16.0	0.0	.613	.250	3228546.	0.0000	0.00	19507
19508	N	ST	18.0	0.0	.602	.248	3194789.	0.0000	0.00	
20019	N	ST	25.0	0.0	.610	.249	3162267.	0.0000	0.00	
20020	N	ST	20.0	0.0	.612	.250	3158666.	0.0000	0.00	
20021	N	ST	16.0	0.0	.614	.250	3163174.	0.0000	0.00	
20022	N	ST	14.0	0.0	.614	.250	3163970.	0.0000	0.00	
20103	N	ST	13.0	0.0	.610	.249	3155282.	0.0000	0.00	
20104	N	ST	11.0	0.0	.609	.249	3150506.	0.0000	0.00	
20109	N	ST	5.0	0.0	.613	.250	3157103.	0.0000	0.00	
20112	N	ST	0.0	0.0	.615	.250	3152218.	0.0000	0.00	
20118	N	ST	-5.0	0.0	.883	.304	3774892.	0.0000	0.00	20119
20122	N	ST	-2.0	0.0	.883	.303	3776701.	0.0000	0.00	
20123	N	ST	0.0	0.0	.877	.302	3758789.	0.0000	0.00	20200
20203	N	ST	2.0	0.0	.879	.303	3748627.	0.0000	0.00	
20204	N	ST	4.0	0.0	.876	.302	3741653.	0.0000	0.00	
20210	N	ST	8.0	0.0	.878	.303	3768915.	0.0000	0.00	
20211	N	ST	10.0	0.0	.880	.302	3764181.	0.0000	0.00	20212
20213	N	ST	12.0	0.0	.860	.299	3709078.	0.0000	0.00	20214
20222	N	ST	13.0	0.0	.821	.291	3820534.	0.0000	0.00	20223
20300	N	ST	13.5	0.0	.841	.295	3848559.	0.0000	0.00	20301
20302	N	ST	14.0	0.0	.875	.301	3916076.	0.0000	0.00	20303
20307	N	ST	15.0	0.0	.866	.299	3903574.	0.0000	0.00	20308
20309	N	ST	16.0	0.0	.877	.302	3913381.	0.0000	0.00	20310
20311	N	ST	18.0	0.0	.835	.294	3811625.	0.0000	0.00	
20312	N	ST	20.0	0.0	.737	.275	3577136.	0.0000	0.00	20313
20317	N	ST	25.0	0.0	.668	.261	3411407.	0.0000	0.00	
20318	N	ST	20.0	0.0	.740	.275	3578432.	0.0000	0.00	
20319	N	ST	16.0	0.0	.881	.302	3892367.	0.0000	0.00	
20320	N	ST	14.0	0.0	.882	.302	3888966.	0.0000	0.00	
20321	N	ST	13.0	0.0	.867	.300	3850481.	0.0000	0.00	
20322	N	ST	11.0	0.0	.879	.302	3875469.	0.0000	0.00	
16019	N	UN	15.0	10.0	.013	.036	488137.	.1007	.66	16022
16105	N	UN	15.0	10.0	.056	.074	986067.	.0972	1.30	16106
16114	N	UN	15.0	10.0	.123	.110	1463255.	.0982	1.96	16115
16200	N	UN	15.0	10.0	.343	.185	2429922.	.0983	3.30	16201
16213	N	UN	6.5	10.0	.340	.184	2502119.	.0500	1.65	16217
16215	N	UN	6.5	10.0	.340	.184	2494598.	.1999	6.60	16216
16300	N	UN	15.0	10.0	.481	.220	2890556.	.0988	3.93	16301
16308	N	UN	15.0	10.0	.612	.249	3229332.	.0988	4.46	16309
17100	Y	UN	15.0	10.0	.340	.184	2457108.	.0497	1.65	17102
17103	Y	UN	15.0	10.0	.341	.184	2452721.	.0992	3.30	17108
17109	Y	UN	15.0	10.0	.342	.184	2452926.	.1486	4.95	17110
17117	Y	UN	15.0	10.0	.830	.293	3772247.	.0248	1.31	17118
17119	Y	UN	15.0	10.0	.823	.291	3724643.	.0497	2.62	17123

TABLE 20.- Concluded.

A FRAME	TRIP	TYPE	AO	A1	Q	M	RE	K	FREQ	B FRAME
17200	Y	UN	15.0	10.0	.814	.290	3702477.	.0999	5.24	17201
21100	N	UN	15.0	10.0	.823	.291	3718613.	.0099	.52	21102
21107	N	UN	10.0	10.0	.867	.299	3792469.	.0098	.53	
21200	N	UN	10.0	5.0	.875	.301	3932117.	.0098	.53	21201
21208	N	UN	3.3	10.0	.882	.302	3898549.	.0097	.53	21209
21219	N	UN	6.5	10.0	.339	.184	2455459.	.0098	.33	21220
22023	N	UN	15.0	10.0	.827	.293	3727983.	.0247	1.31	22100
22103	N	UN	15.0	10.0	.837	.294	3749080.	.0492	2.62	22104
22201	N	UN	15.0	10.0	.785	.285	3554419.	.1008	5.24	22202
22206	N	UN	15.0	10.0	.754	.279	3477029.	.1542	7.86	22207
22208	N	UN	15.0	10.0	.763	.281	3483672.	.0969	4.98	22209
22216	N	UN	10.0	10.0	.875	.302	3732111.	.0243	1.34	
22217	N	UN	10.0	10.0	.875	.302	3720266.	.0485	2.68	
22218	N	UN	10.0	10.0	.862	.300	3684571.	.0977	5.36	
22219	N	UN	10.0	10.0	.835	.294	3618609.	.1490	8.04	
22307	N	UN	10.0	5.0	.875	.301	3854387.	.0246	1.34	22223
22308	N	UN	10.0	5.0	.880	.303	3857324.	.0491	2.68	22300
22309	N	UN	10.0	5.0	.881	.303	3853461.	.0980	5.36	22301
22311	N	UN	10.0	5.0	.877	.302	3849798.	.1475	8.04	22302
22312	N	UN	10.0	5.0	.882	.303	3849072.	.1957	10.72	22303
23021	N	UN	15.0	5.0	.858	.298	3792196.	.0248	1.34	
23022	N	UN	15.0	5.0	.851	.297	3750472.	.0497	2.68	
23023	N	UN	15.0	5.0	.840	.295	3716891.	.1000	5.36	
23100	N	UN	15.0	5.0	.822	.292	3670934.	.1516	8.04	
23107	N	UN	5.0	5.0	.867	.300	3802836.	.0986	5.36	23108
23109	N	UN	5.0	5.0	.867	.300	3769174.	.1970	10.72	23110
23117	N	UN	5.0	10.0	.869	.300	3803440.	.0985	5.36	23118
23201	N	UN	3.8	10.0	.866	.299	3948210.	.1003	5.36	23202
23206	N	UN	3.3	10.0	.866	.299	3924045.	.0500	2.68	23207
23208	N	UN	3.3	10.0	.871	.300	3914485.	.0996	5.36	23210
23211	N	UN	3.3	10.0	.870	.300	3896319.	.1492	8.04	23212
23219	N	UN	12.0	2.0	.864	.299	3865609.	.1994	10.72	23220
23305	N	UN	14.0	2.0	.858	.298	3831711.	.1995	10.72	23306
23310	N	UN	16.0	2.0	.839	.294	3768762.	.2014	10.72	23311
21112	N	UN	15.0	5.0	.873	.301	3940131.	.0099	.53	
23101	N	UN	15.0	5.0	.800	.287	3617353.	.2049	10.72	

TABLE 21.- CATALOG OF RECORDED DATA: Sikorsky SC-1095 AIRFOIL

A FRAME	TRIP	TYPE	AO	A1	Q	M	RE	K	FREQ	B FRAME
34022	Y	ST	0.0	0.0	.878	.301	3985083.	0.0000	0.00	34023
34100	Y	ST	5.0	0.0	.880	.301	3976998.	0.0000	0.00	34101
34102	Y	ST	10.0	0.0	.884	.303	3969476.	0.0000	0.00	34103
34107	Y	ST	12.0	0.0	.879	.302	3961576.	0.0000	0.00	34108
34109	Y	ST	13.0	0.0	.883	.302	3946692.	0.0000	0.00	34110
34111	Y	ST	14.0	0.0	.856	.297	3868254.	0.0000	0.00	34112
34113	Y	ST	16.0	0.0	.806	.287	3735389.	0.0000	0.00	34114
34115	Y	ST	0.0	0.0	.880	.301	3902976.	0.0000	0.00	34116
34200	Y	ST	0.0	0.0	.341	.184	2464109.	0.0000	0.00	34201
34202	Y	ST	5.0	0.0	.342	.184	2463733.	0.0000	0.00	34203
34204	Y	ST	10.0	0.0	.342	.184	2455124.	0.0000	0.00	34205
34208	Y	ST	13.0	0.0	.342	.184	2449358.	0.0000	0.00	34209
34210	Y	ST	14.0	0.0	.342	.184	2447969.	0.0000	0.00	34211
34212	Y	ST	16.0	0.0	.341	.184	2441097.	0.0000	0.00	34213
34214	Y	ST	0.0	0.0	.341	.184	2444858.	0.0000	0.00	34215
35021	N	ST	-5.0	0.0	.880	.301	3835776.	0.0000	0.00	35022
35023	N	ST	-2.0	0.0	.878	.301	3819752.	0.0000	0.00	
35100	N	ST	0.0	0.0	.877	.301	3816485.	0.0000	0.00	35101
35102	N	ST	2.0	0.0	.880	.301	3819991.	0.0000	0.00	
35103	N	ST	5.0	0.0	.877	.301	3811571.	0.0000	0.00	35104
35111	N	ST	8.0	0.0	.881	.302	4009328.	0.0000	0.00	
35112	N	ST	10.0	0.0	.879	.302	3991392.	0.0000	0.00	35113
35114	N	ST	12.0	0.0	.877	.301	3960357.	0.0000	0.00	35115
35116	N	ST	13.0	0.0	.845	.295	3867672.	0.0000	0.00	35117
35118	N	ST	13.5	0.0	.836	.293	3835999.	0.0000	0.00	35119
35123	N	ST	14.0	0.0	.879	.302	3927789.	0.0000	0.00	
35200	N	ST	16.0	0.0	.832	.293	3808814.	0.0000	0.00	35201
35206	N	ST	14.0	0.0	.874	.301	3893325.	0.0000	0.00	
35207	N	ST	13.0	0.0	.822	.291	3760893.	0.0000	0.00	
35208	N	ST	12.5	0.0	.845	.295	3802021.	0.0000	0.00	
35213	N	ST	5.0	0.0	.878	.302	3894699.	0.0000	0.00	
35214	N	ST	0.0	0.0	.883	.302	3894747.	0.0000	0.00	
35220	N	ST	-5.0	0.0	.610	.249	3240465.	0.0000	0.00	
35221	N	ST	-2.0	0.0	.611	.249	3231739.	0.0000	0.00	
35222	N	ST	0.0	0.0	.613	.250	3233853.	0.0000	0.00	
35223	N	ST	2.0	0.0	.612	.249	3228312.	0.0000	0.00	
35300	N	ST	5.0	0.0	.613	.250	3228749.	0.0000	0.00	
35305	N	ST	8.0	0.0	.612	.249	3194450.	0.0000	0.00	
35306	N	ST	10.0	0.0	.614	.249	3194632.	0.0000	0.00	
35307	N	ST	12.0	0.0	.610	.249	3176162.	0.0000	0.00	
35308	N	ST	13.0	0.0	.609	.248	3167812.	0.0000	0.00	
35309	N	ST	13.5	0.0	.605	.247	3151475.	0.0000	0.00	
35310	N	ST	14.1	0.0	.615	.250	3175031.	0.0000	0.00	
35313	N	ST	16.0	0.0	.614	.249	3171847.	0.0000	0.00	
35314	N	ST	18.0	0.0	.611	.249	3155127.	0.0000	0.00	
35315	N	ST	20.0	0.0	.609	.248	3138860.	0.0000	0.00	
35316	N	ST	25.0	0.0	.612	.250	3135933.	0.0000	0.00	
35317	N	ST	14.0	0.0	.611	.249	3142583.	0.0000	0.00	
35318	N	ST	13.0	0.0	.612	.250	3143100.	0.0000	0.00	
35319	N	ST	12.5	0.0	.611	.249	3139723.	0.0000	0.00	
35400	N	ST	5.0	0.0	.614	.249	3166450.	0.0000	0.00	
35401	N	ST	0.0	0.0	.611	.249	3153505.	0.0000	0.00	
36019	N	ST	-5.0	0.0	.342	.184	2509809.	0.0000	0.00	
36020	N	ST	0.0	0.0	.341	.185	2503010.	0.0000	0.00	36021
36022	N	ST	5.0	0.0	.341	.185	2493947.	0.0000	0.00	36023
36106	N	ST	10.0	0.0	.341	.185	2467697.	0.0000	0.00	36107
36108	N	ST	12.0	0.0	.341	.185	2461702.	0.0000	0.00	36109
36110	N	ST	13.5	0.0	.340	.184	2452406.	0.0000	0.00	36111
36112	N	ST	14.0	0.0	.341	.185	2447787.	0.0000	0.00	36113
36117	N	ST	15.0	0.0	.338	.183	2428196.	0.0000	0.00	

A FRAME	TRIP	TYPE	AO	A1	Q	M	RE	K	FREQ	B FRAME
36118	N	ST	16.0	0.0	.340	.184	2432059.	0.0000	0.00	36119
36120	N	ST	20.0	0.0	.341	.185	2424852.	0.0000	0.00	
36202	N	ST	-5.0	0.0	.123	.110	1457009.	0.0000	0.00	
36203	N	ST	0.0	0.0	.124	.111	1461763.	0.0000	0.00	
36204	N	ST	5.0	0.0	.123	.110	1455304.	0.0000	0.00	
36209	N	ST	10.0	0.0	.122	.110	1429342.	0.0000	0.00	
36210	N	ST	12.0	0.0	.121	.109	1420840.	0.0000	0.00	
36211	N	ST	13.5	0.0	.122	.110	1428033.	0.0000	0.00	
36212	N	ST	14.0	0.0	.124	.110	1430614.	0.0000	0.00	
36213	N	ST	15.0	0.0	.122	.110	1421260.	0.0000	0.00	
36216	N	ST	15.5	0.0	.123	.110	1425215.	0.0000	0.00	
36217	N	ST	16.0	0.0	.121	.109	1413387.	0.0000	0.00	
36218	N	ST	20.0	0.0	.120	.109	1408711.	0.0000	0.00	
33022	N	UN	15.0	10.0	.054	.073	975044.	.0987	1.30	33023
33106	N	UN	15.0	10.0	.124	.110	1462074.	.0979	1.96	33107
33110	N	UN	15.0	10.0	.339	.183	2400379.	.0990	3.30	33111
33118	N	UN	6.2	10.0	.334	.182	2390916.	.0499	1.65	33120
33121	N	UN	6.2	10.0	.340	.184	2409037.	.1975	6.60	33122
33205	N	UN	15.0	10.0	.479	.219	2837984.	.0985	3.93	33206
33207	N	UN	15.0	10.0	.612	.249	3185055.	.0984	4.46	33208
33215	N	UN	15.0	10.0	.762	.279	3744973.	.1002	4.98	33216
33217	N	UN	15.0	10.0	.855	.297	3920520.	.0247	1.31	33218
33222	N	UN	15.0	10.0	.852	.296	3886915.	.0494	2.62	33223
33300	N	UN	15.0	10.0	.832	.292	3816743.	.0997	5.24	33303
34306	Y	UN	15.0	10.0	.828	.292	3875513.	.0503	2.62	34307
34308	Y	UN	15.0	10.0	.807	.288	3800453.	.1017	5.24	34309
34318	Y	UN	15.0	10.0	.340	.184	2482077.	.0500	1.65	34319
34321	Y	UN	15.0	10.0	.341	.184	2476494.	.0998	3.30	34322
34323	Y	UN	15.0	10.0	.341	.184	2472265.	.1495	4.95	34400
34409	N	UN	15.0	10.0	.762	.279	3601340.	.1557	7.86	34410
34418	N	UN	4.4	10.0	.881	.302	3864557.	.0983	5.36	34419
37023	N	UN	10.0	10.0	.866	.300	3936295.	.0252	1.35	37100
37101	N	UN	10.0	10.0	.876	.301	3928667.	.0496	2.68	37102
37107	N	UN	10.0	10.0	.880	.302	3915346.	.0987	5.36	37108
37109	N	UN	10.0	10.0	.879	.302	3894279.	.1480	8.04	37113
37119	N	UN	4.1	10.0	.879	.302	3866563.	.0492	2.68	37120
37121	N	UN	4.1	10.0	.886	.303	3859634.	.0978	5.36	37122
37123	N	UN	4.1	10.0	.879	.302	3836077.	.1471	8.04	37201
37207	N	UN	10.0	5.0	.879	.302	3784178.	.0244	1.34	
37208	N	UN	10.0	5.0	.871	.301	3750400.	.0489	2.68	
37210	N	UN	10.0	5.0	.879	.302	3760364.	.0972	5.36	
37213	N	UN	10.0	5.0	.885	.303	3780389.	.1454	8.04	
37215	N	UN	10.0	5.0	.883	.303	3763997.	.1939	10.72	
37219	N	UN	11.0	5.0	.871	.301	3752512.	.0489	2.68	37220
37221	N	UN	11.0	5.0	.878	.302	3752961.	.0972	5.36	37222
37304	N	UN	12.0	8.0	.878	.301	4001117.	.0499	2.68	
37305	N	UN	12.0	8.0	.878	.301	3984111.	.0997	5.36	
37306	N	UN	12.0	8.0	.876	.301	3969804.	.1266	6.81	
38021	N	UN	15.0	5.0	.879	.302	3954977.	.0248	1.34	
38022	N	UN	15.0	5.0	.865	.299	3893850.	.0499	2.68	
38102	N	UN	15.0	5.0	.840	.294	3784856.	.1008	5.36	
38103	N	UN	15.0	5.0	.830	.293	3747172.	.1519	8.04	
38104	N	UN	15.0	5.0	.808	.289	3688250.	.2053	10.72	
38119	N	UN	14.0	2.0	.870	.300	3853545.	.1980	10.72	38121
38201	N	UN	12.3	2.0	.876	.301	3876423.	.1975	10.72	38204
38216	N	UN	6.2	10.0	.339	.183	2468863.	.0100	.33	38217
38300	N	UN	15.0	10.0	.862	.298	3951336.	.0102	.54	38302
38306	N	UN	10.0	10.0	.869	.299	3931609.	.0099	.53	38307
39021	N	UN	4.1	10.0	.875	.300	3811898.	.0097	.53	39022
39104	N	UN	15.0	5.0	.856	.297	3926571.	.0100	.53	

TABLE 21.- Concluded.

A FRAME	TRIP	TYPE	AO	A1	Q	M	RE	K	FREQ	B FRAME
39110	N	UN	11.0	5.0	.869	.299	3896687.	.0099	.53	
39115	N	UN	14.0	2.0	.865	.298	3838622.	.0100	.54	
38110	N	UN	16.0	2.0	.832	.293	3754517.	.2023	10.72	38111
39107	N	UN	10.0	5.0	.876	.300	3939495.	.0098	.53	

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TABLE 22.- CATALOG OF RECORDED DATA: Hughes HH-02 AIRFOIL

A FRAME	TRIP	TYPE	AO	A1	Q	M	RE	K	FREQ	B FRAME
40018	N	ST	-5.0	0.0	.122	.110	1508746.	0.0000	0.00	
40019	N	ST	0.0	0.0	.121	.109	1502749.	0.0000	0.00	
40020	N	ST	5.0	0.0	.123	.110	1511661.	0.0000	0.00	
40101	N	ST	10.0	0.0	.123	.110	1511504.	0.0000	0.00	
40102	N	ST	12.0	0.0	.120	.109	1490668.	0.0000	0.00	
40103	N	ST	14.0	0.0	.125	.111	1514773.	0.0000	0.00	
40104	N	ST	14.5	0.0	.123	.109	1502336.	0.0000	0.00	
40105	N	ST	15.0	0.0	.122	.110	1499223.	0.0000	0.00	
40106	N	ST	15.5	0.0	.121	.109	1494155.	0.0000	0.00	
40107	N	ST	16.0	0.0	.121	.109	1487366.	0.0000	0.00	
40108	N	ST	20.0	0.0	.122	.110	1497097.	0.0000	0.00	
40114	N	ST	-5.0	0.0	.342	.185	2477234.	0.0000	0.00	
40115	N	ST	0.0	0.0	.341	.185	2468667.	0.0000	0.00	40116
40117	N	ST	4.9	0.0	.341	.185	2469822.	0.0000	0.00	40118
40201	N	ST	10.0	0.0	.341	.185	2478173.	0.0000	0.00	40202
40203	N	ST	12.0	0.0	.343	.185	2480399.	0.0000	0.00	40204
40205	N	ST	14.0	0.0	.341	.185	2474050.	0.0000	0.00	40206
40207	N	ST	14.5	0.0	.344	.186	2483787.	0.0000	0.00	40208
40212	N	ST	15.0	0.0	.340	.185	2474314.	0.0000	0.00	
40213	N	ST	16.0	0.0	.340	.185	2473125.	0.0000	0.00	40214
40215	N	ST	20.0	0.0	.342	.185	2473995.	0.0000	0.00	
40222	N	ST	8.0	0.0	.879	.302	4129994.	0.0000	0.00	
40223	N	ST	10.0	0.0	.874	.301	4103323.	0.0000	0.00	40300
40301	N	ST	12.0	0.0	.875	.300	4085502.	0.0000	0.00	40302
40303	N	ST	13.0	0.0	.869	.299	4051531.	0.0000	0.00	40304
40308	N	ST	13.5	0.0	.878	.301	4059676.	0.0000	0.00	40309
40310	N	ST	14.0	0.0	.878	.301	4041789.	0.0000	0.00	40311
40312	N	ST	14.5	0.0	.883	.302	4039947.	0.0000	0.00	40313
40314	N	ST	15.0	0.0	.884	.303	4032069.	0.0000	0.00	40315
40319	N	ST	18.0	0.0	.806	.288	3854130.	0.0000	0.00	40320
40321	N	ST	20.0	0.0	.715	.270	3619314.	0.0000	0.00	
40322	N	ST	14.0	0.0	.881	.301	4009498.	0.0000	0.00	
40323	N	ST	13.0	0.0	.869	.299	3980164.	0.0000	0.00	
40400	N	ST	12.5	0.0	.871	.300	3981021.	0.0000	0.00	
40406	N	ST	5.0	0.0	.877	.301	4024289.	0.0000	0.00	
40407	N	ST	0.0	0.0	.878	.301	4023056.	0.0000	0.00	
41019	N	ST	-5.0	0.0	.874	.300	4148783.	0.0000	0.00	41020
41021	N	ST	-2.0	0.0	.874	.300	4123880.	0.0000	0.00	
41100	N	ST	0.0	0.0	.872	.300	4107145.	0.0000	0.00	41101
41102	N	ST	2.0	0.0	.875	.300	4097393.	0.0000	0.00	•
41103	N	ST	5.0	0.0	.877	.301	4090950.	0.0000	0.00	41104
41110	N	ST	-5.0	0.0	.610	.248	3409824.	0.0000	0.00	
41111	N	ST	-2.0	0.0	.610	.248	3397141.	0.0000	0.00	
41112	N	ST	0.0	0.0	.610	.248	3393868.	0.0000	0.00	
41113	N	ST	2.0	0.0	.611	.248	3391537.	0.0000	0.00	
41114	N	ST	5.0	0.0	.609	.248	3381054.	0.0000	0.00	
41119	N	ST	8.0	0.0	.610	.248	3361029.	0.0000	0.00	
41120	N	ST	10.0	0.0	.609	.248	3342575.	0.0000	0.00	
41121	N	ST	12.0	0.0	.609	.248	3337152.	0.0000	0.00	
41122	N	ST	13.0	0.0	.612	.249	3337882.	0.0000	0.00	
41123	N	ST	13.5	0.0	.614	.249	3341019.	0.0000	0.00	
41200	N	ST	14.0	0.0	.611	.249	3329347.	0.0000	0.00	
41201	N	ST	14.5	0.0	.610	.248	3321682.	0.0000	0.00	
41202	N	ST	15.0	0.0	.609	.248	3315976.	0.0000	0.00	
41205	N	ST	18.0	0.0	.608	.248	3317288.	0.0000	0.00	
41206	N	ST	20.0	0.0	.608	.248	3306068.	0.0000	0.00	
41207	N	ST	14.0	0.0	.614	.249	3321536.	0.0000	0.00	
41208	N	ST	13.0	0.0	.609	.248	3310470.	0.0000	0.00	
41209	N	ST	12.5	0.0	.613	.249	3319411.	0.0000	0.00	
41214	N	ST	5.0	0.0	.613	.249	3342074.	0.0000	0.00	

A FRAME	TRIP	TYPE	AO	A1	Q	M	RE	K	FREQ	B FRAME
41215	N	ST	0.0	0.0	.611	.249	3331668.	0.0000	0.00	
41221	Y	ST	0.0	0.0	.875	.299	4054062.	0.0000	0.00	41222
41223	Y	ST	5.0	0.0	.874	.300	4025612.	0.0000	0.00	41300
41301	Y	ST	10.0	0.0	.877	.300	4012119.	0.0000	0.00	41302
41303	Y	ST	12.0	0.0	.873	.300	3995297.	0.0000	0.00	41304
41305	Y	ST	13.0	0.0	.858	.296	3950234.	0.0000	0.00	41306
41307	Y	ST	13.5	0.0	.879	.300	3987094.	0.0000	0.00	41308
41312	Y	ST	14.0	0.0	.876	.300	3990589.	0.0000	0.00	41313
41314	Y	ST	16.0	0.0	.811	.287	3822102.	0.0000	0.00	41315
41401	Y	ST	0.0	0.0	.336	.182	2505262.	0.0000	0.00	41402
41403	Y	ST	5.0	0.0	.340	.184	2516822.	0.0000	0.00	41404
41405	Y	ST	10.0	0.0	.339	.183	2509654.	0.0000	0.00	41406
41407	Y	ST	12.0	0.0	.336	.182	2495906.	0.0000	0.00	41408
41409	Y	ST	13.0	0.0	.337	.183	2499130.	0.0000	0.00	41410
41411	Y	ST	13.5	0.0	.333	.182	2498901.	0.0000	0.00	41412
41413	Y	ST	14.0	0.0	.334	.181	2488812.	0.0000	0.00	41414
41415	Y	ST	14.5	0.0	.339	.183	2503241.	0.0000	0.00	41416
41417	Y	ST	16.0	0.0	.338	.182	2496014.	0.0000	0.00	41418
41419	Y	ST	0.0	0.0	.338	.182	2495914.	0.0000	0.00	
42019	Y	US	15.0	10.0	.836	.292	3955253.	.0252	1.31	42020
42021	Y	US	15.0	10.0	.821	.289	3884045.	.0508	2.62	42022
42100	Y	US	15.0	10.0	.788	.283	3786236.	.1035	5.24	42101
42108	Y	US	15.0	10.0	.339	.183	2530006.	.0506	1.65	42109
42110	Y	US	15.0	10.0	.338	.183	2526566.	.1013	3.30	42112
42113	Y	US	15.0	10.0	.340	.183	2532492.	.1516	4.95	42114
42121	N	US	15.0	10.0	.054	.072	1027532.	.1011	1.30	42122
42206	N	US	15.0	10.0	.823	.290	3980979.	.0256	1.31	42207
42208	N	US	15.0	10.0	.834	.292	3977572.	.0507	2.62	42209
42210	N	US	15.0	10.0	.813	.288	3911977.	.1025	5.24	42211
42212	N	US	15.0	10.0	.786	.283	3830288.	.1561	7.85	42213
42217	N	US	15.0	10.0	.786	.283	3833375.	.1564	7.86	
42218	N	US	15.0	10.0	.759	.278	3756013.	.1008	4.98	42219
42302	N	US	15.0	10.0	.339	.183	2526382.	.1011	3.30	42303
42309	N	US	15.0	10.0	.476	.218	2981460.	.1011	3.93	42310
42313	N	US	15.0	10.0	.604	.246	3327957.	.1013	4.46	42314
42321	N	US	15.0	10.0	.120	.108	1510607.	.1013	1.96	42322
43019	N	US	10.0	10.0	.858	.297	3898111.	.0101	.54	43020
43106	N	US	10.0	10.0	.870	.301	3930420.	.0249	1.34	43107
43108	N	US	10.0	10.0	.876	.302	3927336.	.0496	2.68	43109
43114	N	US	10.0	10.0	.861	.299	3899487.	.1502	8.04	
43117	N	US	10.0	10.0	.849	.297	3886604.	.1514	8.04	43118
43202	N	US	3.8	10.0	.874	.301	3968134.	.0249	1.34	43203
43112	N	US	10.0	10.0	.876	.302	3945527.	.0993	5.36	43113
43204	N	US	3.8	10.0	.877	.302	3962955.	.0497	2.68	43205
43206	N	US	3.8	10.0	.876	.302	3955351.	.0994	5.36	43208
43209	N	US	3.8	10.0	.878	.302	3955884.	.1489	8.04	43210
43215	N	US	3.8	10.0	.876	.302	4060507.	.0101	.54	43216
43219	N	US	4.0	10.0	.879	.303	4045704.	.0999	5.36	43221
43303	N	US	15.0	5.0	.845	.296	3918196.	.0254	1.34	
43304	N	US	15.0	5.0	.821	.292	3841831.	.0515	2.68	
43305	N	US	15.0	5.0	.817	.291	3822850.	.1030	5.36	
43309	N	US	15.0	5.0	.805	.289	3776817.	.2073	10.72	
43314	N	US	11.0	5.0	.876	.302	3934345.	.0248	1.34	
43315	N	US	11.0	5.0	.877	.302	3922072.	.0489	2.65	
43316	N	US	11.0	5.0	.875	.302	3909299.	.0990	5.36	
44019	N	US	10.0	5.0	.869	.301	3960458.	.0101	.54	44020
44021	N	US	10.0	5.0	.876	.302	3950518.	.0248	1.34	44022
44023	N	US	10.0	5.0	.876	.302	3943793.	.0496	2.68	44100
44104	N	US	10.0	5.0	.881	.303	3996291.	.0993	5.36	44105
44106	N	US	10.0	5.0	.880	.303	3991389.	.1490	8.04	44107

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TABLE 22.- Concluded.

A FRAME	TRIP	TYPE	AO	A1	Q	M	RE	K	FREQ	B FRAME
44112	N	US	10.0	5.0	.880	.303	4003278.	.1989	10.72	44113
44118	N	US	10.0	5.0	.880	.302	4037890.	.0999	5.36	
44119	N	US	10.0	5.0	.876	.302	4019097.	.0250	1.34	
44120	N	US	10.0	5.0	.878	.302	4007236.	.1997	10.72	
44202	N	US	14.0	2.0	.875	.301	4004232.	.1001	5.36	44203
44204	N	US	14.0	2.0	.872	.301	3987136.	.2002	10.72	44205
44209	N	US	17.5	2.0	.773	.282	3756572.	.2132	10.72	
44212	N	US	15.5	2.0	.854	.297	3961107.	.0102	.54	
44214	N	US	15.5	2.0	.851	.297	3917470.	.0253	1.34	
44215	N	US	15.5	2.0	.849	.296	3904494.	.0506	2.68	
44216	N	US	15.5	2.0	.829	.293	3854681.	.1024	5.36	
44217	N	US	15.5	2.0	.820	.291	3826794.	.1545	8.04	
44218	N	US	15.5	2.0	.824	.292	3832243.	.2054	10.72	
44221	N	US	12.5	2.0	.871	.301	3956805.	.0101	.54	
44222	N	US	12.5	2.0	.877	.302	3946321.	.0248	1.34	
44223	N	US	12.5	2.0	.871	.301	3926080.	.0498	2.68	
44300	N	US	12.5	2.0	.874	.301	3929775.	.0994	5.36	
44303	N	US	12.5	2.0	.877	.302	3952217.	.1490	8.04	
44304	N	US	12.5	2.0	.878	.302	3945918.	.1984	10.72	
43308	N	US	15.0	5.0	.813	.290	3809287.	.1549	8.04	

TABLE 23.- CATALOG OF RECORDED DATA: Vertol VR-7 AIRFOIL

A FRAME	TRIP	TYPE	AO	A1	Q	M	RE	K	FREQ	B FRAME
46018	N	ST	-5.0	0.0	.121	.108	1551001.	0.0000	0.00	
46019	N	ST	0.0	0.0	.121	.108	1546271.	0.0000	0.00	
46020	N	ST	5.0	0.0	.123	.109	1557517.	0.0000	0.00	
46101	N	ST	10.0	0.0	.118	.107	1512690.	0.0000	0.00	
46102	N	ST	12.0	0.0	.122	.109	1540066.	0.0000	0.00	
46103	N	ST	12.5	0.0	.123	.109	1547844.	0.0000	0.00	
46104	N	ST	13.0	0.0	.123	.109	1543789.	0.0000	0.00	
46105	N	ST	13.5	0.0	.123	.109	1542255.	0.0000	0.00	
46106	N	ST	14.0	0.0	.122	.109	1535872.	0.0000	0.00	
46107	N	ST	15.0	0.0	.122	.109	1537932.	0.0000	0.00	
46108	N	ST	17.0	0.0	.123	.109	1541148.	0.0000	0.00	
46109	N	ST	20.0	0.0	.122	.109	1534206.	0.0000	0.00	
46110	N	ST	25.0	0.0	.120	.108	1523001.	0.0000	0.00	
46116	N	ST	-5.0	0.0	.341	.184	2550698.	0.0000	0.00	
46117	N	ST	0.0	0.0	.342	.183	2552563.	0.0000	0.00	46118
46119	N	ST	5.0	0.0	.341	.183	2546869.	0.0000	0.00	46120
46203	N	ST	10.0	0.0	.343	.184	2562110.	0.0000	0.00	46204
46205	N	ST	12.0	0.0	.341	.183	2551368.	0.0000	0.00	46206
46207	N	ST	12.5	0.0	.342	.183	2553262.	0.0000	0.00	46208
46209	N	ST	13.0	0.0	.342	.184	2553793.	0.0000	0.00	46210
46211	N	ST	13.5	0.0	.341	.183	2550511.	0.0000	0.00	46212
46217	N	ST	14.0	0.0	.342	.183	2637541.	0.0000	0.00	46218
46219	N	ST	15.0	0.0	.341	.183	2630320.	0.0000	0.00	46220
46221	N	ST	17.0	0.0	.340	.183	2624424.	0.0000	0.00	46222
46223	N	ST	20.0	0.0	.340	.183	2622591.	0.0000	0.00	46300
46301	N	ST	25.0	0.0	.340	.183	2614669.	0.0000	0.00	
46307	N	ST	-5.0	0.0	.612	.248	3482182.	0.0000	0.00	
46308	N	ST	-2.0	0.0	.613	.249	3476509.	0.0000	0.00	
46309	N	ST	0.0	0.0	.612	.248	3468801.	0.0000	0.00	
46310	N	ST	2.0	0.0	.611	.248	3461144.	0.0000	0.00	
46311	N	ST	5.0	0.0	.614	.248	3462655.	0.0000	0.00	
46317	N	ST	8.0	0.0	.615	.249	3457898.	0.0000	0.00	
46318	N	ST	10.0	0.0	.611	.248	3435015.	0.0000	0.00	
46319	N	ST	12.0	0.0	.613	.248	3433344.	0.0000	0.00	
46320	N	ST	12.5	0.0	.615	.249	3429825.	0.0000	0.00	
46321	N	ST	13.0	0.0	.612	.248	3419429.	0.0000	0.00	
46322	N	ST	13.5	0.0	.610	.248	3409796.	0.0000	0.00	
46323	N	ST	14.0	0.0	.613	.249	3417715.	0.0000	0.00	
46400	N	ST	15.0	0.0	.613	.249	3413348.	0.0000	0.00	
46403	N	ST	17.0	0.0	.616	.249	3427697.	0.0000	0.00	
46404	N	ST	20.0	0.0	.615	.249	3412222.	0.0000	0.00	
46405	N	ST	25.0	0.0	.614	.248	3396768.	0.0000	0.00	
46406	N	ST	13.0	0.0	.613	.249	3398737.	0.0000	0.00	
46407	N	ST	12.0	0.0	.610	.248	3391942.	0.0000	0.00	
46412	N	ST	0.0	0.0	.614	.248	3394265.	0.0000	0.00	
46418	N	ST	-5.0	0.0	.877	.300	3996105.	0.0000	0.00	46419
46420	N	ST	-2.0	0.0	.878	.301	3986471.	0.0000	0.00	
46423	N	ST	2.0	0.0	.875	.300	3966864.	0.0000	0.00	
46500	N	ST	5.0	0.0	.877	.300	3965878.	0.0000	0.00	46501
46508	N	ST	8.0	0.0	.878	.300	4161706.	0.0000	0.00	
46509	N	ST	10.0	0.0	.870	.298	4126333.	0.0000	0.00	46510
46511	N	ST	12.0	0.0	.876	.299	4119351.	0.0000	0.00	46512
46513	N	ST	12.5	0.0	.874	.299	4099803.	0.0000	0.00	46514
46515	N	ST	13.0	0.0	.867	.298	4070743.	0.0000	0.00	46516
46517	N	ST	13.5	0.0	.879	.300	4087558.	0.0000	0.00	46518
46519	N	ST	14.0	0.0	.878	.300	4077474.	0.0000	0.00	46520
46600	N	ST	15.0	0.0	.873	.299	4089463.	0.0000	0.00	46601
46602	N	ST	17.0	0.0	.878	.300	4078318.	0.0000	0.00	46603
46604	N	ST	20.0	0.0	.831	.291	3955770.	0.0000	0.00	
46608	N	ST	25.0	0.0	.690	.265	3626593.	0.0000	0.00	

A FRAME	TRIP	TYPE	AO	A1	Q	M	RE	K	FREQ	B FRAME
46609	N	ST	13.0	0.0	.876	.299	4071175.	0.0000	0.00	
46610	N	ST	12.0	0.0	.872	.299	4055190.	0.0000	0.00	
46615	N	ST	0.0	0.0	.881	.300	4097411.	0.0000	0.00	
46621	Y	ST	0.0	0.0	.340	.183	2522757.	0.0000	0.00	46622
46623	Y	ST	5.0	0.0	.340	.183	2514978.	0.0000	0.00	46700
46701	Y	ST	10.0	0.0	.340	.183	2513421.	0.0000	0.00	46702
46703	Y	ST	12.0	0.0	.341	.183	2515138.	0.0000	0.00	46704
46705	Y	ST	13.0	0.0	.340	.183	2506104.	0.0000	0.00	46706
46707	Y	ST	14.0	0.0	.338	.182	2501582.	0.0000	0.00	46708
46712	Y	ST	15.0	0.0	.340	.183	2518275.	0.0000	0.00	46713
46714	Y	ST	16.0	0.0	.341	.184	2516975.	0.0000	0.00	46715
46716	Y	ST	20.0	0.0	.343	.184	2517610.	0.0000	0.00	46717
46718	Y	ST	0.0	0.0	.342	.183	2519323.	0.0000	0.00	46719
46802	Y	ST	0.0	0.0	.881	.300	4204772.	0.0000	0.00	46803
46804	Y	ST	5.0	0.0	.881	.300	4185103.	0.0000	0.00	46805
46806	Y	ST	10.0	0.0	.886	.301	4170536.	0.0000	0.00	46807
46808	Y	ST	12.0	0.0	.882	.300	4148330.	0.0000	0.00	46809
46810	Y	ST	13.0	0.0	.883	.301	4139718.	0.0000	0.00	46811
46815	Y	ST	14.0	0.0	.881	.300	4137342.	0.0000	0.00	46816
46817	Y	ST	15.0	0.0	.877	.300	4108330.	0.0000	0.00	46818
46819	Y	ST	16.0	0.0	.877	.299	4091352.	0.0000	0.00	46820
46821	Y	ST	20.0	0.0	.806	.287	3898404.	0.0000	0.00	46822
46823	Y	ST	0.0	0.0	.881	.300	4085157.	0.0000	0.00	46900
45019	N	UN	15.0	10.0	.873	.300	4062142.	.0247	1.31	45020
45021	N	UN	15.0	10.0	.830	.292	3937973.	.0505	2.62	45022
45023	N	UN	15.0	10.0	.835	.293	3931111.	.1005	5.24	45100
45101	N	UN	15.0	10.0	.793	.285	3824874.	.1549	7.86	45102
45109	N	UN	10.0	10.0	.873	.301	4033486.	.0101	.54	45110
45111	N	UN	10.0	10.0	.875	.301	4010614.	.0251	1.34	45112
45113	N	UN	10.0	10.0	.878	.301	4010372.	.0500	2.68	
45117	N	UN	10.0	10.0	.875	.301	4019136.	.1003	5.36	48118
45119	N	UN	10.0	10.0	.879	.302	4015256.	.1498	8.04	45120
45203	N	UN	15.0	5.0	.869	.300	4019028.	.0102	.54	45204
45205	N	UN	15.0	5.0	.876	.301	4008473.	.0250	1.34	45206
45207	N	UN	15.0	5.0	.877	.301	4005939.	.0500	2.68	45208
45209	N	UN	15.0	5.0	.871	.300	3986080.	.1002	5.36	45210
45211	N	UN	15.0	5.0	.860	.298	3957187.	.1513	8.04	45212
45213	N	UN	15.0	5.0	.841	.295	3908733.	.2041	10.72	45214
45221	N	UN	10.0	5.0	.878	.302	4054475.	.0251	1.34	45222
45223	N	UN	10.0	5.0	.877	.301	4032781.	.0501	2.68	
45300	N	UN	10.0	5.0	.878	.301	4031948.	.1001	5.36	45301
45302	N	UN	10.0	5.0	.879	.302	4030474.	.1500	8.04	
45303	N	UN	10.0	5.0	.878	.301	4026973.	.2002	10.72	45304
47020	Y	UN	15.0	10.0	.859	.299	4059175.	.0249	1.31	47021
47100	Y	UN	15.0	10.0	.820	.292	3928981.	.1014	5.24	47101
47110	Y	UN	15.0	10.0	.338	.184	2577907.	.0508	1.65	47111
47112	Y	UN	15.0	10.0	.342	.185	2586091.	.1008	3.30	47113
47114	Y	UN	15.0	10.0	.342	.185	2580642.	.1512	4.95	47115
47123	N	UN	15.0	10.0	.054	.073	1030887.	.1007	1.30	47200
47206	N	UN	15.0	10.0	.123	.110	1553432.	.1006	1.96	47207
47213	N	UN	15.0	10.0	.340	.185	2606965.	.1016	3.30	47214
47217	N	UN	15.0	10.0	.479	.221	3036397.	.1008	3.93	47218
47301	N	UN	15.0	10.0	.610	.250	3408483.	.1009	4.46	47302
47305	N	UN	15.0	10.0	.760	.281	3783711.	.1003	4.98	47306
54019	N	UN	10.0	10.0	.340	.183	2632968.	.0258	.83	54020
54022	N	UN	10.0	10.0	.340	.183	2616265.	.0511	1.65	54023
54101	N	UN	10.0	10.0	.339	.183	2607326.	.1021	3.30	54102
54110	N	UN	10.0	10.0	.341	.184	2597940.	.1526	4.95	54111
54113	N	UN	10.0	10.0	.341	.184	2588267.	.2030	6.60	54114
54116	N	UN	10.0	10.0	.341	.184	2581336.	.2535	8.25	54117

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TABLE 23.- Concluded.

A FRAME	TRIP	TYPE	A0	A1	Q	M	RE	K	FREQ	B FRAME
54216	N	UN	15.0	10.0	.340	.184	2547606.	.1514	4.95	54217
48019	N	UN	4.1	10.0	.874	.299	4215503.	.0103	.54	48020
48023	N	UN	4.1	10.0	.880	.300	4189985.	.0255	1.34	48100
48101	N	UN	4.1	10.0	.877	.299	4160141.	.0509	2.68	48102
48103	N	UN	4.1	10.0	.879	.300	4154411.	.1016	5.36	48104
48116	N	UN	13.0	2.0	.878	.299	4084662.	.0253	1.34	48117
48118	N	UN	13.0	2.0	.878	.299	4059323.	.0504	2.68	48119
48122	N	UN	13.0	2.0	.876	.299	4057706.	.1010	5.36	48123
48209	N	UN	16.0	2.0	.870	.298	4058728.	.2028	10.72	48211
48215	N	UN	14.0	2.0	.877	.300	4057579.	.0504	2.68	
48216	N	UN	14.0	2.0	.879	.300	4047826.	.1005	5.36	
48217	N	UN	14.0	2.0	.879	.300	4038080.	.2009	10.72	48218
48300	N	UN	12.5	2.0	.878	.300	4033369.	.0101	.54	
48301	N	UN	12.5	2.0	.878	.300	4011900.	.0251	1.34	
48302	N	UN	12.5	2.0	.881	.301	4009055.	.0500	2.68	
48303	N	UN	12.5	2.0	.874	.299	3986169.	.1004	5.36	
48304	N	UN	12.5	2.0	.873	.299	3980450.	.1505	8.04	
48308	N	UN	12.5	2.0	.875	.300	3998448.	.2007	10.72	48309
49110	N	UN	15.0	10.0	.339	.184	2634248.	.0257	.83	49111
49117	N	UN	15.0	10.0	.342	.185	2619856.	.0507	1.65	49118
49120	N	UN	15.0	10.0	.340	.185	2599912.	.1014	3.30	49121
49203	N	UN	15.0	10.0	.341	.185	2592737.	.1518	4.95	49204
49206	N	UN	15.0	10.0	.341	.185	2584616.	.2020	6.60	49207
49216	N	UN	4.7	10.0	.340	.184	2550438.	.0254	.83	49217
49300	N	UN	4.7	10.0	.338	.184	2535655.	.1009	3.30	49301
49307	N	UN	4.7	10.0	.342	.185	2548693.	.2005	6.60	49308
49310	N	UN	4.7	10.0	.343	.185	2543519.	.2503	8.25	49311
49023	N	UN	15.0	10.0	.338	.184	2543127.	.0101	.33	49100
50116	N	UN	4.7	10.0	.339	.183	2531156.	.0101	.33	50117
57018	N	UN	15.0	10.0	.340	.184	2555187.	.1516	4.95	57019
58018	N	UN	15.0	10.0	.338	.183	2437793.	.1495	4.95	58019
58102	N	UN	15.0	10.0	.014	.037	496703.	.0983	.65	58103
58111	N	UN	15.0	10.0	.121	.109	1528745.	.1010	1.96	58112
58120	N	UN	15.0	10.0	.340	.184	2536174.	.1511	4.95	
58121	N	UN	15.0	10.0	.340	.184	2532230.	.1007	3.30	
47022	Y	UN	15.0	10.0	.841	.296	3990015.	.0501	2.62	47023
48200	N	UN	13.0	2.0	.884	.301	4062447.	.2006	10.72	48201

TABLE 24.- CATALOG OF RECORDED DATA: NLR-1 AIRFOIL

A FRAME	TRIP	TYPE	AO	A1	Q	M	RE	K	FREQ	B FRAME
61018	N	ST	-5.0	0.0	.122	.109	1524150.	0.0000	0.00	
61019	N	ST	0.0	0.0	.123	.110	1534313.	0.0000	0.00	
61020	N	ST	5.0	0.0	.122	.110	1529480.	0.0000	0.00	
61101	N	ST	10.0	0.0	.125	.111	1537127.	0.0000	0.00	
61102	N	ST	12.0	0.0	.122	.109	1517792.	0.0000	0.00	
61103	N	ST	14.0	0.0	.122	.110	1522421.	0.0000	0.00	
61104	N	ST	15.0	0.0	.122	.110	1517668.	0.0000	0.00	
61105	N	ST	14.6	0.0	.122	.110	1511515.	0.0000	0.00	
61106	N	ST	16.5	0.0	.121	.109	1502456.	0.0000	0.00	
61107	N	ST	18.0	0.0	.123	.110	1511233.	0.0000	0.00	
61108	N	ST	20.0	0.0	.122	.110	1509433.	0.0000	0.00	
61114	N	ST	-5.0	0.0	.341	.185	2466730.	0.0000	0.00	
61115	N	ST	0.0	0.0	.342	.185	2469459.	0.0000	0.00	61116
61117	N	ST	5.0	0.0	.341	.184	2461681.	0.0000	0.00	61118
61201	N	ST	10.0	0.0	.341	.184	2434057.	0.0000	0.00	61202
61203	N	ST	12.0	0.0	.345	.185	2440090.	0.0000	0.00	61204
61205	N	ST	14.0	0.0	.344	.186	2430259.	0.0000	0.00	61206
61208	N	ST	15.4	0.0	.338	.184	2407482.	0.0000	0.00	
61212	N	ST	16.5	0.0	.342	.185	2420407.	0.0000	0.00	
61213	N	ST	18.0	0.0	.341	.184	2413757.	0.0000	0.00	61214
61215	N	ST	20.0	0.0	.342	.184	2407546.	0.0000	0.00	
61221	N	ST	-5.0	0.0	.612	.250	3195467.	0.0000	0.00	
61222	N	ST	-2.0	0.0	.614	.250	3197744.	0.0000	0.00	
61223	N	ST	0.0	0.0	.613	.250	3194392.	0.0000	0.00	
61300	N	ST	2.0	0.0	.612	.250	3191078.	0.0000	0.00	
61301	N	ST	5.0	0.0	.612	.250	3188268.	0.0000	0.00	
61306	N	ST	8.0	0.0	.616	.251	3401485.	0.0000	0.00	
61307	N	ST	10.0	0.0	.619	.251	3402068.	0.0000	0.00	
61308	N	ST	12.0	0.0	.613	.249	3381325.	0.0000	0.00	
61309	N	ST	12.5	0.0	.614	.250	3381216.	0.0000	0.00	
61310	N	ST	13.0	0.0	.610	.249	3364760.	0.0000	0.00	
61311	N	ST	14.0	0.0	.619	.251	3385628.	0.0000	0.00	
61312	N	ST	15.0	0.0	.611	.249	3361196.	0.0000	0.00	
61315	N	ST	16.0	0.0	.611	.249	3363498.	0.0000	0.00	
61316	N	ST	20.0	0.0	.612	.250	3357544.	0.0000	0.00	
61317	N	ST	25.0	0.0	.612	.250	3344638.	0.0000	0.00	
61318	N	ST	14.0	0.0	.612	.250	3349019.	0.0000	0.00	
61319	N	ST	12.5	0.0	.614	.250	3357487.	0.0000	0.00	
61400	N	ST	5.0	0.0	.613	.249	3372794.	0.0000	0.00	
61401	N	ST	0.0	0.0	.612	.250	3364756.	0.0000	0.00	
61407	N	ST	-5.0	0.0	.876	.301	3981952.	0.0000	0.00	61408
61409	N	ST	-2.0	0.0	.878	.302	3970720.	0.0000	0.00	
61410	N	ST	0.0	0.0	.877	.302	3963168.	0.0000	0.00	61411
61412	N	ST	2.0	0.0	.877	.302	3954548.	0.0000	0.00	
61413	N	ST	5.0	0.0	.879	.303	3954345.	0.0000	0.00	61414
61421	N	ST	8.0	0.0	.878	.302	3953659.	0.0000	0.00	
61422	N	ST	10.0	0.0	.869	.300	3921408.	0.0000	0.00	61423
61500	N	ST	12.0	0.0	.872	.301	3911370.	0.0000	0.00	61501
61502	N	ST	12.5	0.0	.879	.302	3915401.	0.0000	0.00	61503
61508	N	ST	12.5	0.0	.882	.302	4029504.	0.0000	0.00	61509
61510	N	ST	13.0	0.0	.882	.302	4003007.	0.0000	0.00	61511
61512	N	ST	14.0	0.0	.879	.302	3982342.	0.0000	0.00	
61513	N	ST	16.0	0.0	.877	.302	3968711.	0.0000	0.00	61514
61519	N	ST	20.0	0.0	.736	.275	3622389.	0.0000	0.00	61520
61521	N	ST	25.0	0.0	.677	.263	3459893.	0.0000	0.00	
61522	N	ST	14.0	0.0	.880	.302	3939697.	0.0000	0.00	
61523	N	ST	12.5	0.0	.870	.300	3913953.	0.0000	0.00	
61605	N	ST	5.0	0.0	.879	.302	3966363.	0.0000	0.00	
61606	N	ST	0.0	0.0	.880	.302	3960830.	0.0000	0.00	
64221	Y	ST	0.0	0.0	.341	.185	2352861.	0.0000	0.00	64222

A FRAME	TRIP	TYPE	AO	A1	Q	M	RE	K	FREQ	B FRAME
64223	Y	ST	5.0	0.0	.339	.184	2345411.	0.0000	0.00	64300
64301	Y	ST	10.0	0.0	.342	.185	2349991.	0.0000	0.00	64302
64303	Y	ST	12.0	0.0	.341	.185	2346533.	0.0000	0.00	64304
64305	Y	ST	13.0	0.0	.341	.185	2344262.	0.0000	0.00	64306
64307	Y	ST	14.0	0.0	.348	.187	2370314.	0.0000	0.00	64308
64309	Y	ST	16.0	0.0	.342	.185	2345780.	0.0000	0.00	64310
64311	Y	ST	0.0	0.0	.344	.186	2355621.	0.0000	0.00	64312
65019	Y	ST	-11.0	0.0	.875	.301	3814433.	0.0000	0.00	
65020	Y	ST	-9.0	0.0	.876	.301	3804399.	0.0000	0.00	
65021	Y	ST	-7.0	0.0	.875	.301	3798094.	0.0000	0.00	
65022	Y	ST	-6.0	0.0	.874	.301	3790531.	0.0000	0.00	
65023	Y	ST	-5.0	0.0	.876	.301	3792112.	0.0000	0.00	
65100	Y	ST	0.0	0.0	.875	.301	3786607.	0.0000	0.00	
65101	Y	ST	5.0	0.0	.878	.302	3783080.	0.0000	0.00	65102
65103	Y	ST	10.0	0.0	.875	.301	3764580.	0.0000	0.00	65104
65107	Y	ST	11.8	0.0	.842	.295	3697279.	0.0000	0.00	65108
65109	Y	ST	13.0	0.0	.858	.298	3722261.	0.0000	0.00	65110
65112	Y	ST	14.0	0.0	.839	.294	3665290.	0.0000	0.00	65111
65113	Y	ST	16.0	0.0	.800	.288	3574574.	0.0000	0.00	65114
65115	Y	ST	0.0	0.0	.879	.302	3745601.	0.0000	0.00	
62020	N	US	15.0	10.0	.054	.073	968160.	.0985	1.30	62021
62104	N	US	15.0	10.0	.121	.109	1446202.	.0987	1.96	62105
62112	N	US	15.0	10.0	.340	.184	2513401.	.1003	3.30	62113
62114	N	US	15.0	10.0	.396	.199	2698892.	.1002	3.57	62115
62121	N	US	10.0	10.0	.398	.200	2557024.	.1712	6.25	
62201	N	US	15.0	5.0	.398	.200	2540409.	.2826	10.35	
62202	N	US	15.0	5.0	.396	.199	2534183.	.1710	6.25	
62208	N	US	15.0	10.0	.480	.220	2777505.	.0974	3.93	62209
62210	N	US	15.0	10.0	.612	.250	3113246.	.0972	4.46	62211
62218	N	US	15.0	10.0	.760	.280	3441981.	.0967	4.98	62219
62302	N	US	15.0	10.0	.838	.295	3859287.	.0248	1.31	62303
62304	N	US	15.0	10.0	.834	.294	3816841.	.0496	2.62	62305
62307	N	US	15.0	10.0	.835	.294	3810660.	.0991	5.24	62308
62309	N	US	15.0	10.0	.796	.287	3699269.	.1521	7.86	62310
62317	N	US	10.0	10.0	.872	.301	3725580.	.0098	.54	62318
62320	N	US	10.0	10.0	.874	.302	3704354.	.0243	1.34	62321
62322	N	US	10.0	10.0	.873	.301	3685360.	.0484	2.68	62323
62400	N	US	10.0	10.0	.878	.302	3685928.	.0965	5.36	62401
62403	N	US	10.0	10.0	.881	.303	3701055.	.1156	6.43	62404
62405	N	US	10.0	10.0	.866	.300	3656986.	.1457	8.04	62406
63018	N	US	15.0	5.0	.855	.297	3912793.	.0102	.54	
63019	N	US	15.0	5.0	.862	.299	3885789.	.0250	1.34	
63020	N	US	15.0	5.0	.862	.299	3871332.	.0499	2.68	
63021	N	US	15.0	5.0	.850	.297	3836177.	.1004	5.36	
63100	N	US	15.0	5.0	.848	.296	3831403.	.1206	6.43	
63101	N	US	15.0	5.0	.839	.295	3800952.	.1515	8.04	
63102	N	US	15.0	5.0	.812	.289	3730364.	.2054	10.72	
63108	N	US	10.0	5.0	.881	.303	3797137.	.0244	1.34	63109
63112	N	US	10.0	5.0	.873	.301	3755339.	.0976	5.36	63113
63114	N	US	10.0	5.0	.876	.302	3748040.	.1946	10.72	63115
63122	N	US	12.0	8.0	.868	.300	3740346.	.1175	6.43	63123
63208	N	US	16.4	2.0	.789	.286	3674699.	.2081	10.72	63209
63213	N	US	17.0	2.0	.790	.286	3652598.	.0519	2.68	63214
63215	N	US	17.0	2.0	.780	.284	3610518.	.1867	9.60	63216
63220	N	US	15.0	2.0	.833	.294	3728964.	.0503	2.68	63221
63302	N	US	11.1	2.0	.866	.300	3788588.	.0493	2.68	63303
63304	N	US	11.1	2.0	.876	.302	3790896.	.1955	10.72	63305
63312	N	US	2.5	10.0	.874	.302	3763317.	.0098	.54	63313
63314	N	US	2.5	10.0	.877	.302	3741348.	.0243	1.34	63315
63318	N	US	2.5	10.0	.879	.303	3756218.	.0485	2.68	63319

TABLE 24.- Concluded.

A FRAME	TRIP	TYPE	AO	A1	Q	M	RE	K	FREQ	B FRAME
63320	N	US	2.5	10.0	.878	.303	3739575.	.0969	5.36	63321
63323	N	US	2.7	10.0	.880	.303	3746774.	.0969	5.36	63400
64019	Y	US	15.0	10.0	.844	.296	3865490.	.0247	1.31	64020
64021	Y	US	15.0	10.0	.840	.295	3813567.	.0493	2.62	64022
64023	Y	US	15.0	10.0	.821	.292	3752005.	.0997	5.24	64100
64107	Y	US	15.0	10.0	.340	.185	2448919.	.0496	1.65	64108
64109	Y	US	15.0	10.0	.340	.184	2439010.	.0991	3.30	64110
64111	Y	US	15.0	10.0	.341	.185	2439626.	.1481	4.95	64112
64119	Y	US	2.5	10.0	.876	.302	3823417.	.0099	.54	64120
64121	Y	US	2.5	10.0	.875	.302	3785081.	.0244	1.34	64122
64202	Y	US	2.5	10.0	.879	.303	3794515.	.0487	2.68	64203
64204	Y	US	2.5	10.0	.878	.302	3774318.	.0974	5.36	64205
64212	Y	US	-2.0	10.0	.877	.302	3717936.	.0098	.54	
64213	Y	US	-2.0	10.0	.878	.303	3695424.	.0241	1.34	
64214	Y	US	-2.0	10.0	.878	.302	3685179.	.0482	2.68	
64215	Y	US	-2.0	10.0	.880	.303	3683703.	.0963	5.36	
65121	N	US	-2.0	10.0	.869	.300	3717371.	.0098	.54	
65122	N	US	-2.0	10.0	.873	.301	3700235.	.0243	1.34	
65123	N	US	-2.0	10.0	.874	.301	3694893.	.0485	2.68	
65200	N	US	-2.0	10.0	.877	.302	3694943.	.0968	5.36	
65207	N	US	15.0	10.0	.395	.199	2646668.	.0997	3.57	
65209	N	US	15.0	10.0	.828	.292	3779170.	.1019	5.36	
65223	N	US	7.0	5.0	.121	.109	1475396.	.0249	.49	
65300	N	US	7.0	5.0	.121	.109	1472656.	.1996	3.92	
65311	N	US	7.0	5.0	.879	.301	3862901.	.1969	10.72	
65309	N	US	7.0	5.0	.876	.301	3889117.	.0100	.54	
63222	N	US	15.0	2.0	.818	.291	3675798.	.2028	10.72	63223

TABLE 25.- CATALOG OF RECORDED DATA: NLR-7301 AIRFOIL

A FRAME	TRIP	TYPE	AO	A1	Q	M	RE	K	FREQ	B FRAME
66019	N	ST	-5.0	0.0	.872	.300	4003817.	0.0000	0.00	66020
66021	N	ST	-2.0	0.0	.876	.300	3999020.	0.0000	0.00	
66022	N	ST	0.0	0.0	.874	.301	3992026.	0.0000	0.00	66023
66100	N	ST	2.0	0.0	.883	.302	3999963.	0.0000	0.00	
66101	N	ST	5.0	0.0	.881	.301	3987844.	0.0000	0.00	66103
66109	N	ST	8.0	0.0	.877	.300	3982368.	0.0000	0.00	
66110	N	ST	10.0	0.0	.876	.300	3968075.	0.0000	0.00	66111
66112	N	ST	12.0	0.0	.867	.299	3933468.	0.0000	0.00	66113
66114	N	ST	14.0	0.0	.772	.281	3704260.	0.0000	0.00	66115
66116	N	ST	16.0	0.0	.717	.270	3564317.	0.0000	0.00	66117
66118	N	ST	17.6	0.0	.701	.267	3518002.	0.0000	0.00	66119
66120	N	ST	18.3	0.0	.733	.274	3588933.	0.0000	0.00	66121
66122	N	ST	20.0	0.0	.737	.274	3591274.	0.0000	0.00	66123
66200	N	ST	17.0	0.0	.702	.267	3499749.	0.0000	0.00	
66201	N	ST	16.0	0.0	.709	.269	3515184.	0.0000	0.00	
66208	N	ST	5.0	0.0	.877	.300	3932765.	0.0000	0.00	
66209	N	ST	0.0	0.0	.875	.300	3922572.	0.0000	0.00	
66214	N	ST	-5.0	0.0	.609	.248	3280711.	0.0000	0.00	
66215	N	ST	0.0	0.0	.609	.248	3274639.	0.0000	0.00	
66216	N	ST	5.0	0.0	.608	.248	3269675.	0.0000	0.00	
66221	N	ST	8.0	0.0	.608	.248	3271957.	0.0000	0.00	
66222	N	ST	10.0	0.0	.610	.248	3268436.	0.0000	0.00	
66223	N	ST	12.0	0.0	.606	.247	3251575.	0.0000	0.00	
66300	N	ST	14.0	0.0	.607	.248	3245841.	0.0000	0.00	
66301	N	ST	16.0	0.0	.608	.247	3236014.	0.0000	0.00	
66302	N	ST	17.2	0.0	.610	.248	3235888.	0.0000	0.00	
66303	N	ST	20.0	0.0	.612	.249	3234835.	0.0000	0.00	
66304	N	ST	25.0	0.0	.602	.247	3196460.	0.0000	0.00	
66305	N	ST	17.0	0.0	.608	.248	3218130.	0.0000	0.00	
66306	N	ST	15.0	0.0	.612	.249	3228516.	0.0000	0.00	
66307	N	ST	14.0	0.0	.612	.249	3229433.	0.0000	0.00	
66308	N	ST	12.0	0.0	.610	.248	3226538.	0.0000	0.00	
66313	N	ST	5.0	0.0	.608	.248	3256298.	0.0000	0.00	
66314	N	ST	0.0	0.0	.606	.247	3249961.	0.0000	0.00	
66320	N	ST	-5.0	0.0	.340	.184	2469188.	0.0000	0.00	
66321	N	ST	0.0	0.0	.339	.183	2461096.	0.0000	0.00	66322
66323	N	ST	5.0	0.0	.341	.184	2463521.	0.0000	0.00	66400
66405	N	ST	8.0	0.0	.339	.183	2464083.	0.0000	0.00	
66406	N	ST	10.0	0.0	.339	.183	2457896.	0.0000	0.00	66407
66408	N	ST	12.0	0.0	.340	.184	2459029.	0.0000	0.00	66409
66410	N	ST	14.0	0.0	.340	.184	2457291.	0.0000	0.00	66411
66412	N	ST	16.0	0.0	.339	.183	2452670.	0.0000	0.00	66413
66414	N	ST	17.4	0.0	.341	.184	2455643.	0.0000	0.00	66415
66421	N	ST	20.0	0.0	.338	.183	2455801.	0.0000	0.00	66422
66423	N	ST	25.0	0.0	.338	.183	2447905.	0.0000	0.00	66500
66500	N	ST	17.0	0.0	.339	.183	2450544.	0.0000	0.00	
66501	N	ST	15.0	0.0	.339	.183	2452240.	0.0000	0.00	
66502	N	ST	14.0	0.0	.337	.183	2448905.	0.0000	0.00	
66503	N	ST	13.0	0.0	.338	.183	2449911.	0.0000	0.00	
66504	N	ST	12.0	0.0	.339	.183	2451875.	0.0000	0.00	
66510	N	ST	5.0	0.0	.338	.183	2553873.	0.0000	0.00	
66511	N	ST	0.0	0.0	.339	.183	2555680.	0.0000	0.00	
66516	N	ST	-5.0	0.0	.121	.108	1534072.	0.0000	0.00	
66517	N	ST	0.0	0.0	.122	.109	1535757.	0.0000	0.00	
66518	N	ST	5.0	0.0	.121	.109	1534265.	0.0000	0.00	
66600	N	ST	10.0	0.0	.122	.109	1527646.	0.0000	0.00	
66601	N	ST	12.0	0.0	.120	.109	1519094.	0.0000	0.00	
66602	N	ST	14.0	0.0	.120	.109	1516730.	0.0000	0.00	
66603	N	ST	16.0	0.0	.121	.108	1516123.	0.0000	0.00	
66604	N	ST	16.5	0.0	.121	.109	1517915.	0.0000	0.00	

A FRAME	TRIP	TYPE	AO	A1	Q	M	RE	K	FREQ	B FRAME
66605	N	ST	20.0	0.0	.122	.109	1517157.	0.0000	0.00	
66606	N	ST	25.0	0.0	.122	.109	1520439.	0.0000	0.00	
66607	N	ST	17.0	0.0	.122	.109	1519469.	0.0000	0.00	
66608	N	ST	15.0	0.0	.121	.108	1513500.	0.0000	0.00	
66609	N	ST	13.0	0.0	.121	.109	1513362.	0.0000	0.00	
66610	N	ST	12.0	0.0	.122	.109	1519732.	0.0000	0.00	
66611	N	ST	11.5	0.0	.122	.109	1517895.	0.0000	0.00	
66616	N	ST	5.0	0.0	.121	.109	1516191.	0.0000	0.00	
66617	N	ST	0.0	0.0	.124	.110	1528781.	0.0000	0.00	
66623	Y	ST	0.0	0.0	.337	.183	2468560.	0.0000	0.00	66700
66701	Y	ST	5.0	0.0	.338	.183	2463488.	0.0000	0.00	66702
66703	Y	ST	10.0	0.0	.338	.182	2456240.	0.0000	0.00	66704
66705	Y	ST	12.0	0.0	.338	.182	2456043.	0.0000	0.00	66706
66707	Y	ST	14.7	0.0	.338	.182	2454470.	0.0000	0.00	66708
66709	Y	ST	15.5	0.0	.343	.184	2472156.	0.0000	0.00	66710
66711	Y	ST	17.0	0.0	.337	.183	2450276.	0.0000	0.00	66712
66716	Y	ST	18.0	0.0	.338	.183	2456445.	0.0000	0.00	66717
66718	Y	ST	20.0	0.0	.338	.183	2453475.	0.0000	0.00	66719
66720	Y	ST	25.0	0.0	.337	.183	2446074.	0.0000	0.00	66721
66722	Y	ST	17.0	0.0	.343	.184	2464989.	0.0000	0.00	66723
66800	Y	ST	14.7	0.0	.339	.183	2452952.	0.0000	0.00	66801
66802	Y	ST	0.0	0.0	.341	.184	2459672.	0.0000	0.00	66803
66810	Y	ST	0.0	0.0	.871	.299	3978550.	0.0000	0.00	66811
66812	Y	ST	5.0	0.0	.873	.300	3962919.	0.0000	0.00	66813
66814	Y	ST	8.0	0.0	.875	.300	3952795.	0.0000	0.00	66815
66818	Y	ST	12.0	0.0	.845	.294	3862413.	0.0000	0.00	66819
66820	Y	ST	13.0	0.0	.820	.290	3795900.	0.0000	0.00	66821
66822	Y	ST	0.0	0.0	.874	.300	3915017.	0.0000	0.00	
67019	Y	US	15.0	10.0	.339	.183	2438650.	.0250	.83	67020
67021	Y	US	15.0	10.0	.340	.184	2433341.	.0992	3.30	67022
67023	Y	US	15.0	10.0	.340	.183	2428420.	.1985	6.60	67100
67108	Y	US	10.0	5.0	.880	.301	3808875.	.0245	1.34	67109
67110	Y	US	10.0	5.0	.862	.298	3754299.	.0494	2.68	67111
67112	Y	US	10.0	5.0	.860	.298	3743871.	.0988	5.36	67113
67120	N	US	15.0	10.0	.122	.110	1481685.	.0991	1.96	67121
67201	N	US	10.0	10.0	.122	.110	1483308.	.0992	1.96	67202
67208	N	US	10.0	10.0	.341	.184	2461921.	.0250	.83	67209
67210	N	US	10.0	10.0	.343	.185	2458942.	.0990	3.30	67211
67212	N	US	10.0	10.0	.341	.184	2452737.	.1983	6.60	67213
67218	N	US	15.0	10.0	.341	.184	2458480.	.0250	.83	67219
67220	N	US	15.0	10.0	.342	.184	2454782.	.0991	3.30	67221
67222	N	US	15.0	10.0	.342	.184	2453910.	.1981	6.60	67223
67305	N	US	15.0	10.0	.609	.248	3254400.	.0995	4.46	67306
67310	N	US	10.0	10.0	.613	.250	3264300.	.0991	4.46	67311
68019	N	US	15.0	5.0	.803	.287	3792076.	.0105	.54	68020
68100	N	US	15.0	5.0	.806	.288	3774246.	.0259	1.34	68101
68102	N	US	15.0	5.0	.796	.286	3726319.	.0521	2.68	68103
68104	N	US	15.0	5.0	.803	.287	3729996.	.1037	5.36	68105
68109	N	US	15.0	5.0	.822	.291	3787615.	.1537	8.04	68110
68111	N	US	15.0	5.0	.833	.293	3793358.	.2031	10.72	68112
68119	N	US	10.0	5.0	.853	.297	3813741.	.0101	.54	68120
68121	N	US	10.0	5.0	.860	.298	3792628.	.0248	1.34	68122
68123	N	US	10.0	5.0	.863	.299	3791082.	.0495	2.68	68200
68201	N	US	10.0	5.0	.872	.300	3805465.	.0985	5.36	68202
68203	N	US	10.0	5.0	.882	.302	3824398.	.1956	10.72	68204
68211	N	US	5.0	5.0	.869	.299	3842765.	.1981	10.72	68212
68219	N	US	12.0	2.0	.843	.295	3766519.	.0502	2.68	68220
68221	N	US	12.0	2.0	.834	.293	3725832.	.1007	5.36	68303
68304	N	US	12.0	2.0	.835	.293	3722222.	.2012	10.72	68305
69019	N	US	10.0	10.0	.871	.299	3949663.	.0101	.54	69020

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TABLE 25.- Concluded.

A FRAME	TRIP	TYPE	A0	A1	Q	M	RE	K	FREQ	B FRAME
69100	N	US	10.0	10.0	.873	.300	3918788.	.0249	1.34	69101
69102	N	US	10.0	10.0	.876	.300	3900063.	.0496	2.68	69103
69105	N	US	10.0	10.0	.877	.301	3904003.	.0991	5.36	69106
69107	N	US	10.0	10.0	.876	.300	3884160.	.1484	8.04	69108
69119	N	US	16.8	2.0	.727	.273	3492462.	.0270	1.34	69120
69121	N	US	16.8	2.0	.710	.270	3430737.	.0546	2.68	69122
69123	N	US	16.8	2.0	.700	.268	3396634.	.1100	5.36	69200
69201	N	US	16.8	2.0	.692	.267	3366783.	.2208	10.72	69202
69206	N	US	17.2	2.0	.734	.275	3460551.	.0268	1.34	69207
69208	N	US	17.2	2.0	.745	.277	3469110.	.0530	2.68	69209
69211	N	US	17.2	2.0	.709	.270	3370669.	.1086	5.36	69212
69213	N	US	17.2	2.0	.719	.272	3387722.	.1616	8.04	69214
69215	N	US	17.2	2.0	.755	.279	3459727.	.2098	10.72	69216
69221	N	US	17.5	2.0	.726	.273	3404711.	.0536	2.68	69222
69223	N	US	17.5	2.0	.684	.265	3286912.	.2205	10.72	69300
69304	N	US	18.5	2.0	.688	.266	3288767.	.0549	2.68	69305
69310	N	US	16.5	2.0	.671	.262	3218013.	.0554	2.68	69311
70019	N	US	9.4	10.0	.341	.185	2344007.	.0245	.83	70020
70021	N	US	9.4	10.0	.340	.185	2338519.	.0973	3.30	70022
70023	N	US	9.4	10.0	.340	.185	2336677.	.1948	6.60	70100
70107	N	US	5.7	10.0	.875	.301	3916444.	.0104	.56	70108
70109	N	US	5.7	10.0	.876	.301	3876178.	.0247	1.34	70110
70113	N	US	5.7	10.0	.872	.300	3861569.	.0495	2.68	70114
70115	N	US	5.7	10.0	.875	.301	3854654.	.0986	5.36	70116
70117	N	US	5.7	10.0	.874	.301	3843662.	.1479	8.04	70118

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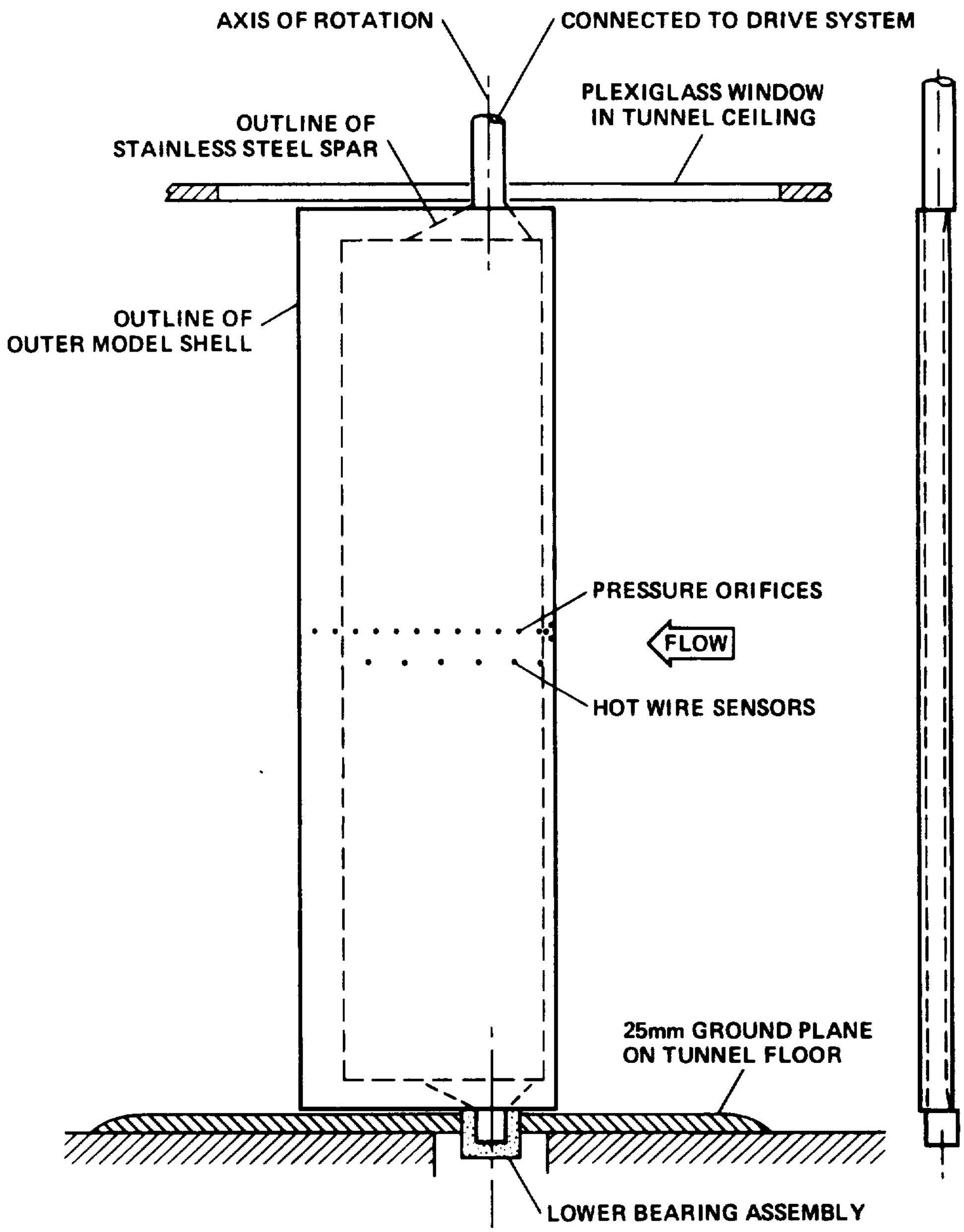

Figure 1.- Diagram showing installation of spar and airfoil shell in tunnel.

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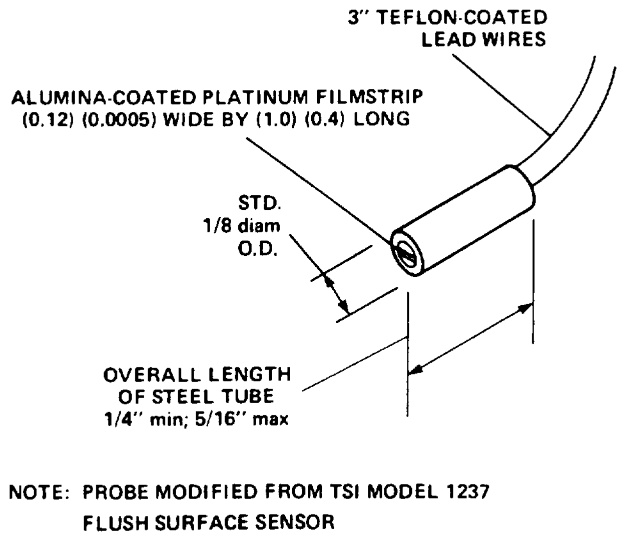

Figure 2.- Diagram of hot-film skin-friction gage.

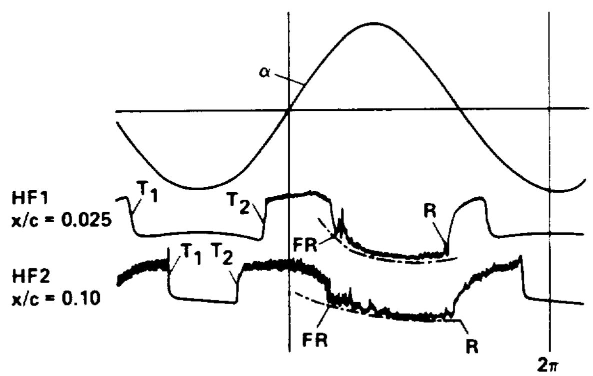

Figure 3.- Response of hot-film skin-friction gages mounted on Ames A-01 airfoil during airfoil oscillation in pitch ($\alpha = 15° + 10° \sin \omega t$, $k = 0.10$, $M_\infty = 0.22$).

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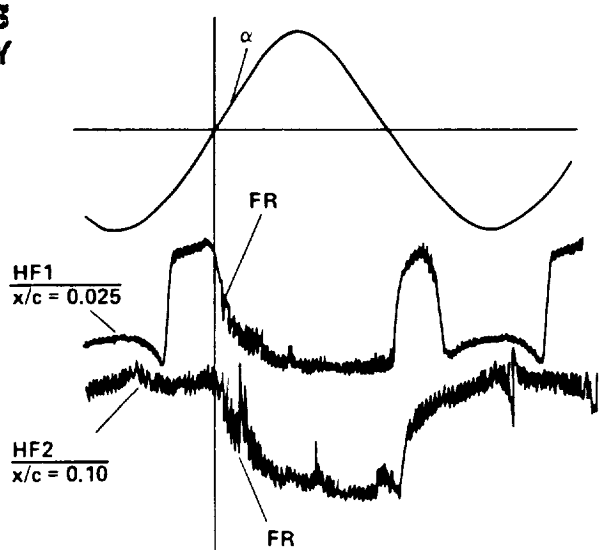

Figure 4.- Response of hot-film skin-friction gages at surface of NACA 0012 airfoil during airfoil oscillation in pitch ($\alpha = 15° + 10° \sin \omega t$, $k = 0.10$, $M_\infty = 0.295$).

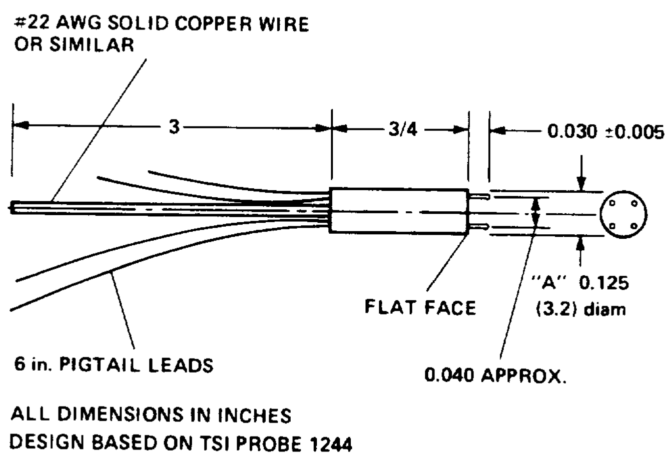

Figure 5.- Diagram of dual-element hot-wire probe.

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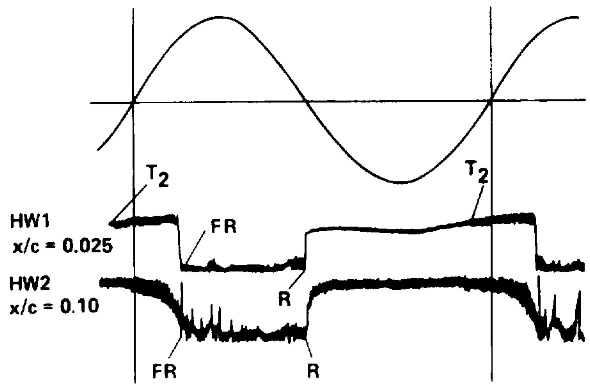

Figure 6.- Response of hot-wire anemometer probes on Wortmann FX-098 airfoil during airfoil oscillation in pitch ($\alpha = 15° + 10° \sin \omega t$, $k = 0.10$, $M_\infty = 0.11$).

Figure 7.- Response of hot-wire anemometer probe installed near trailing edge of the Vertol VR-7 airfoil during oscillation in pitch.

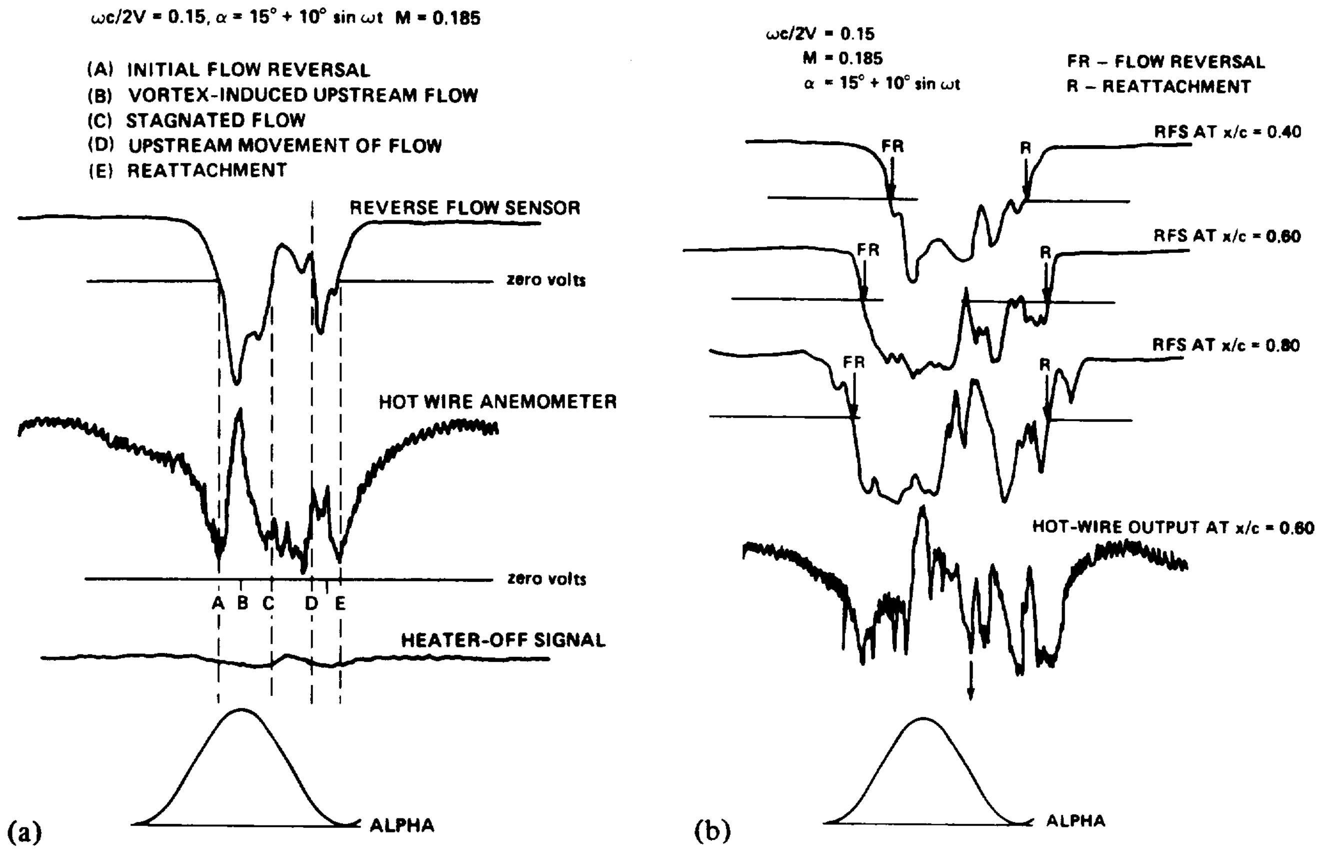

Figure 8.- Results obtained using triple-wire flow-reversal sensor: (a) Typical comparison of flow-reversal sensor and hot-wire anemometer signal (from ref. 2); (b) Progression of flow reversal up airfoil during dynamic stall (from ref. 2).

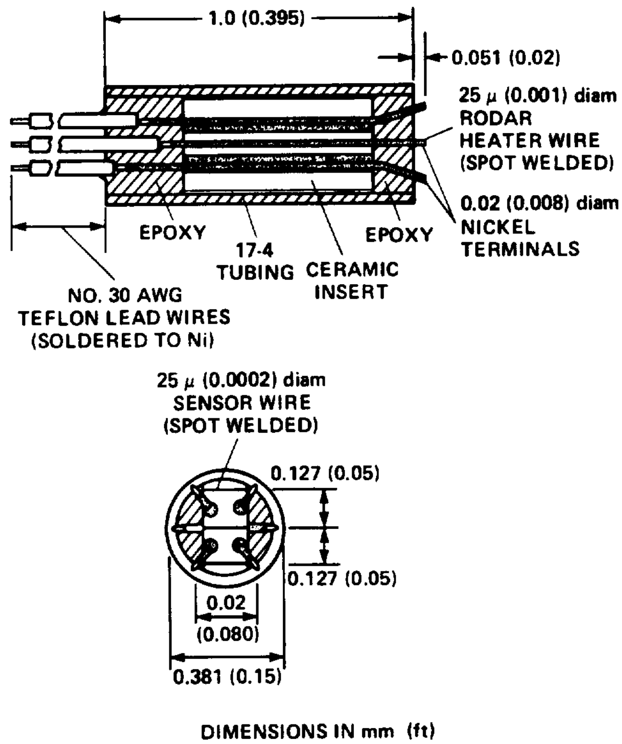

Figure 9.- Diagram of three-element, directionally sensitive hot-wire probe (from ref. 2).

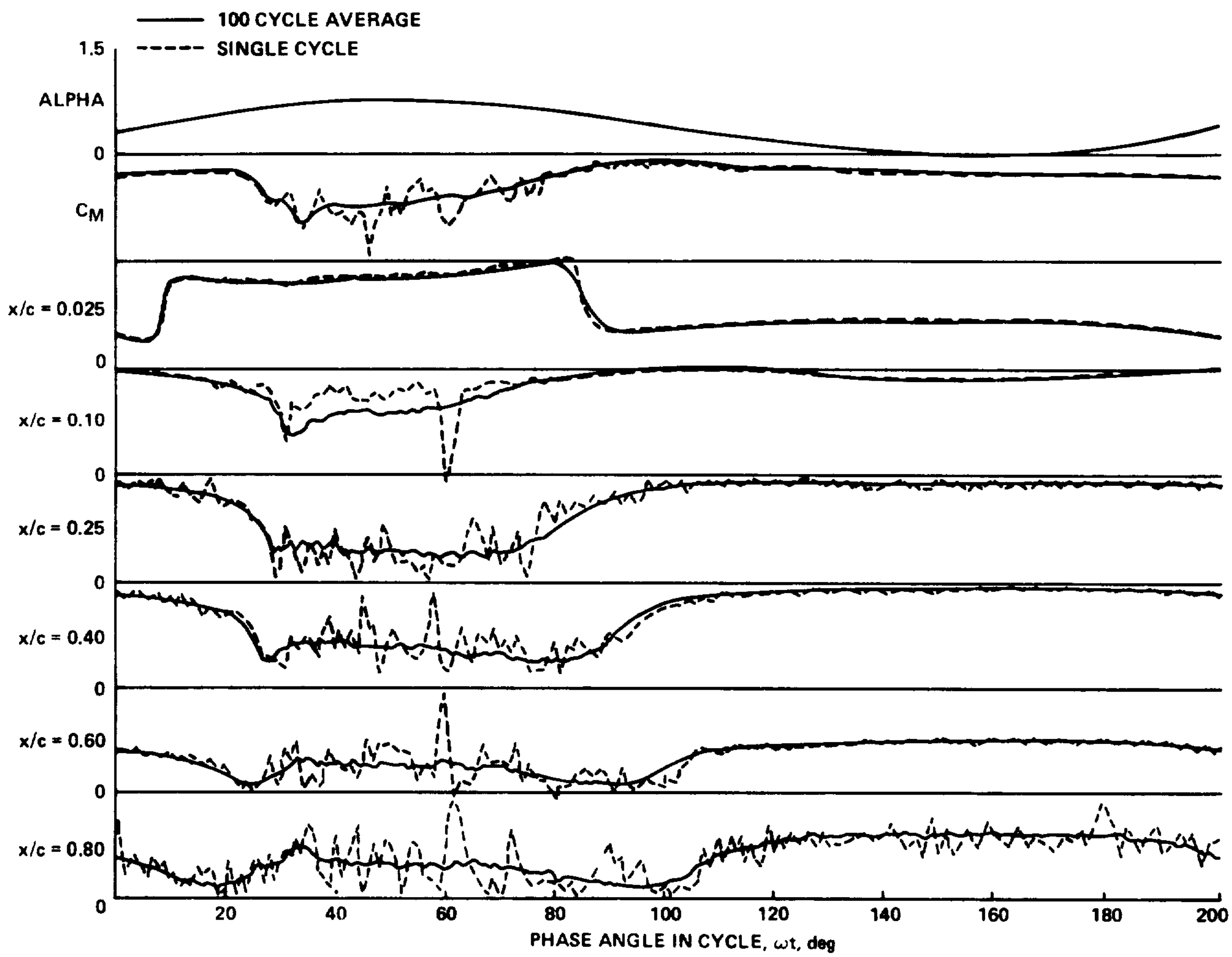

Figure 10.- Comparison of 100-cycle ensemble average and single-cycle signals from hot-wire anemometers for Vertol VR-7 airfoil during oscillation in pitch: ———, 100 cycle average; ------, single cycle.

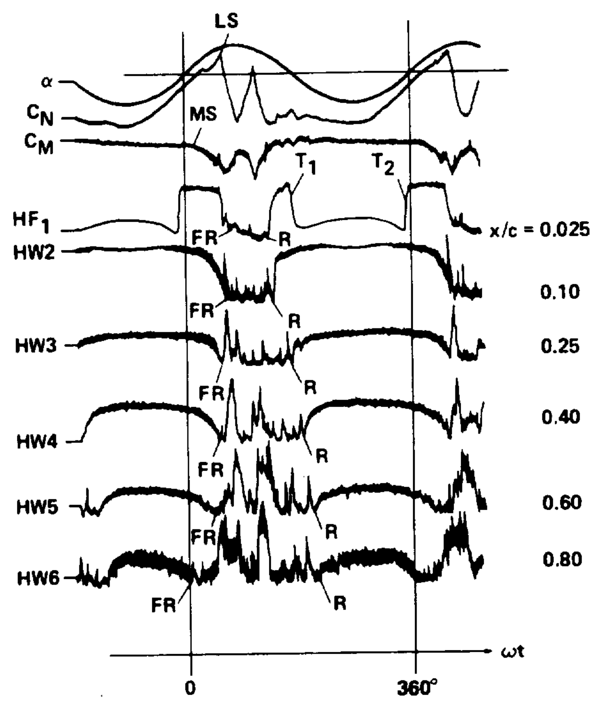

Figure 11.- Response of hot-film skin-friction gage and hot-wire anemometer probes on Vertol VR-7 during oscillation in pitch ($\alpha = 15° + 10° \sin \omega t$, $k = 0.10$, $M_\infty = 0.185$).

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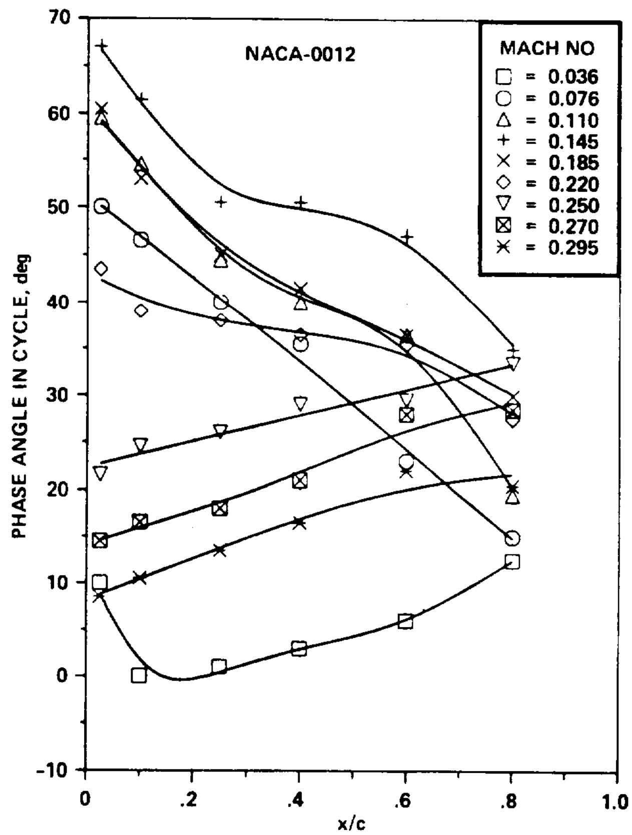

Figure 12.- Phase angle, ωt, of flow reversal on NACA 0012 airfoil vs chord location for a range of Mach numbers at $k = 0.1$, $\alpha = 15° + 10° \sin \omega t$ — Mach number effects.

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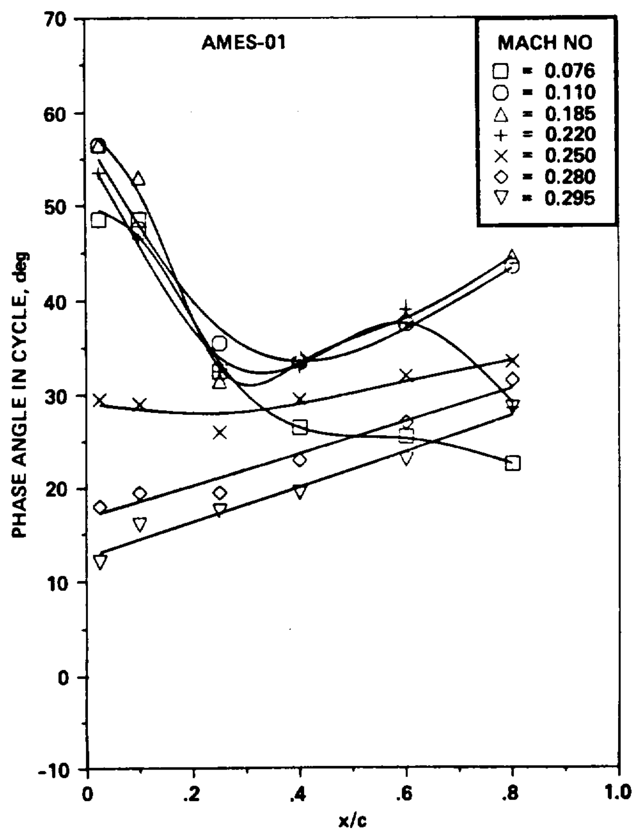

Figure 13.- Phase angle, ωt, of flow reversal on Ames A-01 airfoil vs chord location for a range of Mach numbers at $k = 0.1$, $\alpha = 15° + 10° \sin \omega t$ — Mach number effects.

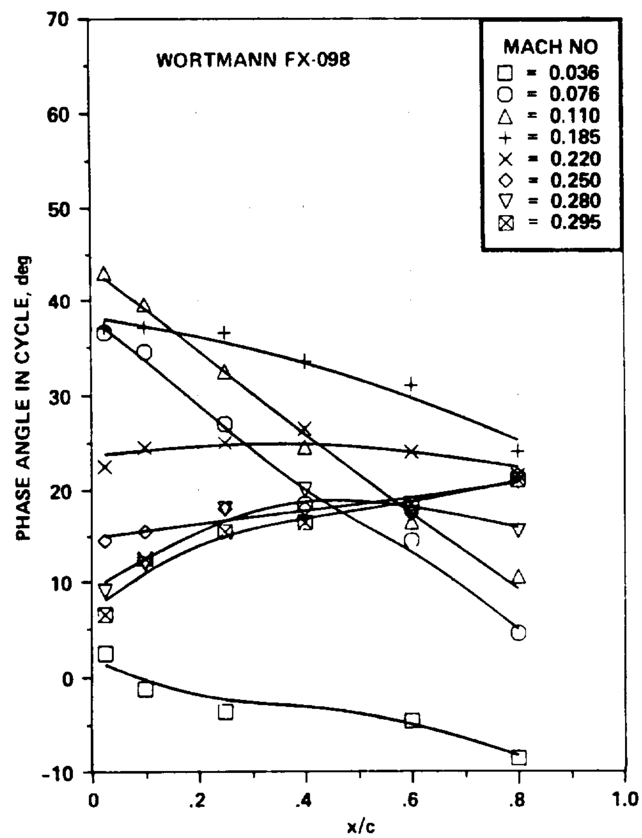

Figure 14.- Phase angle, ωt, of flow reversal on Wortmann FX-098 airfoil vs chord location for a range of Mach numbers at $k = 0.1$, $\alpha = 15° + 10° \sin \omega t$ — Mach number effects.

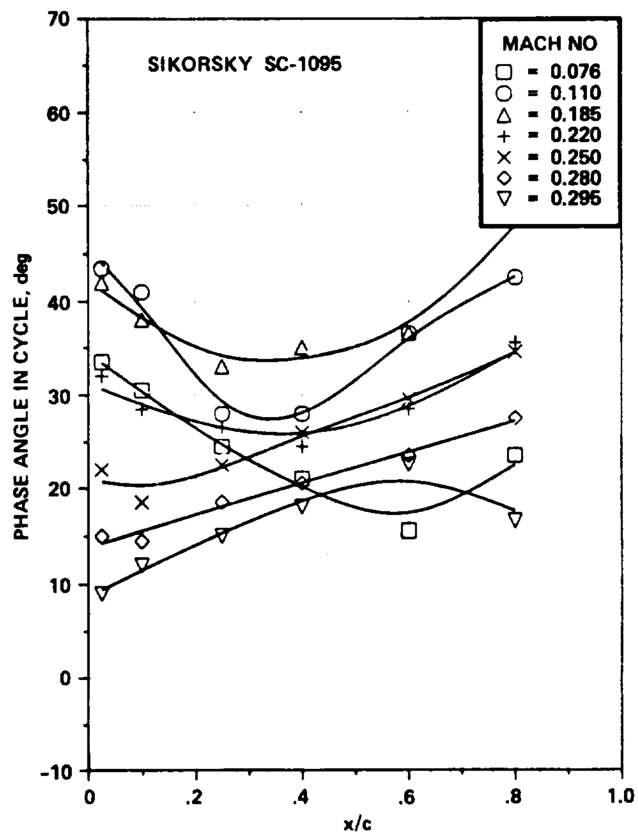

Figure 15.- Phase angle, ωt, of flow reversal on Sikorsky SC-1095 airfoil vs chord location for a range of Mach numbers at $k = 0.1$, $\alpha = 15° + 10° \sin \omega t$ — Mach number effects.

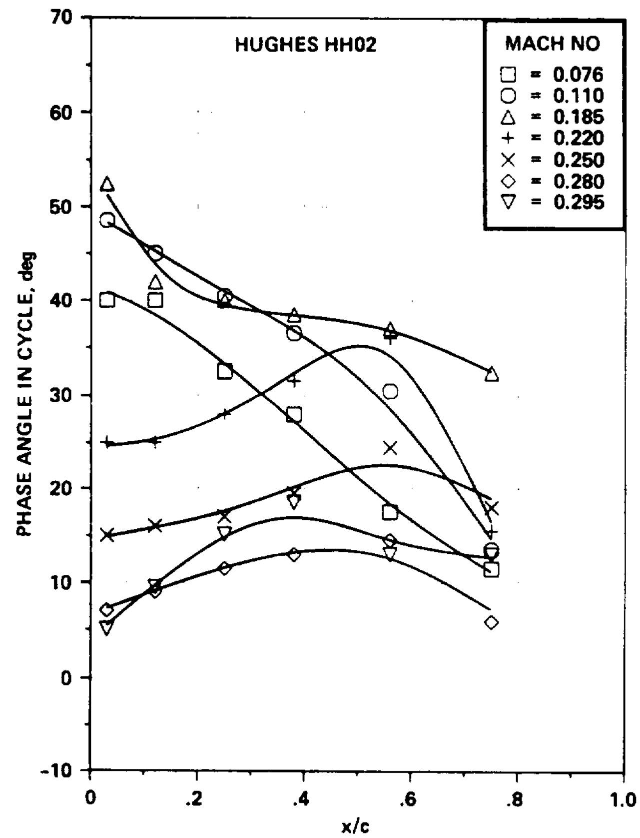

Figure 16.- Phase angle, ωt, of flow reversal on Hughes HH-02 airfoil vs chord location for a range of Mach numbers at $k = 0.1$, $\alpha = 15° + 10° \sin \omega t$ – Mach number effects.

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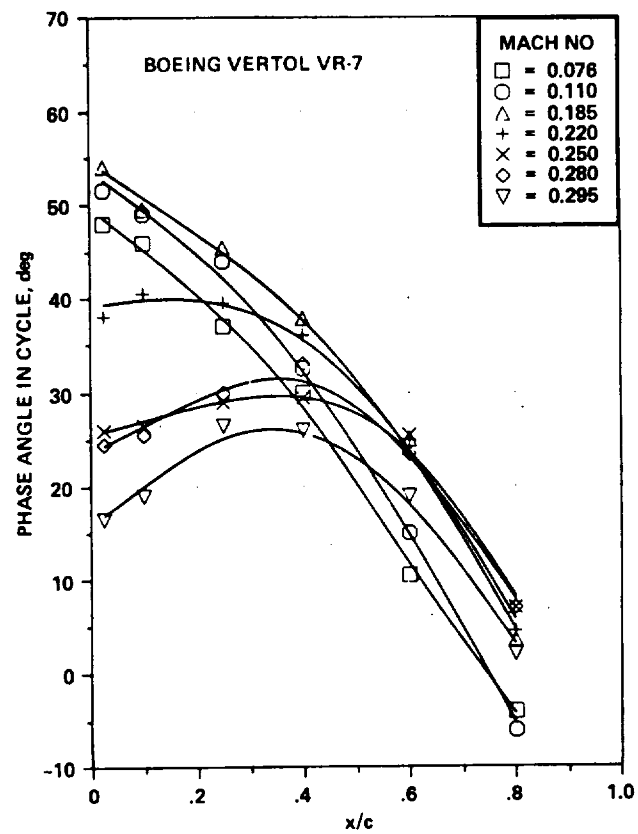

Figure 17.- Phase angle, ωt, of flow reversal on Vertol VR-7 airfoil vs chord location for a range of Mach numbers at $k = 0.1$, $\alpha = 15° + 10° \sin \omega t$ – Mach number effects.

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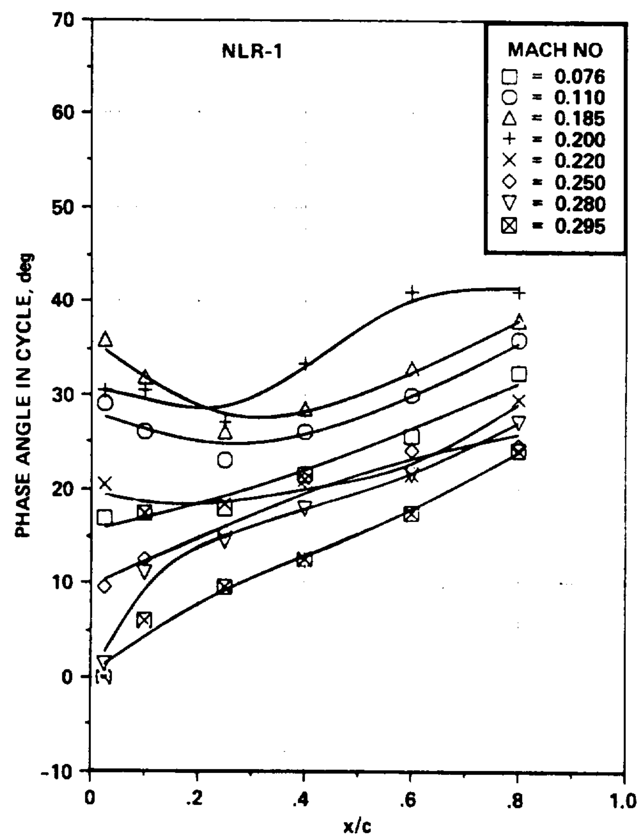

Figure 18.- Phase angle, ωt, of flow reversal on NLR-1 airfoil vs chord location for a range of Mach numbers at $k = 0.1$, $\alpha = 15° + 10° \sin \omega t$ — Mach number effects.

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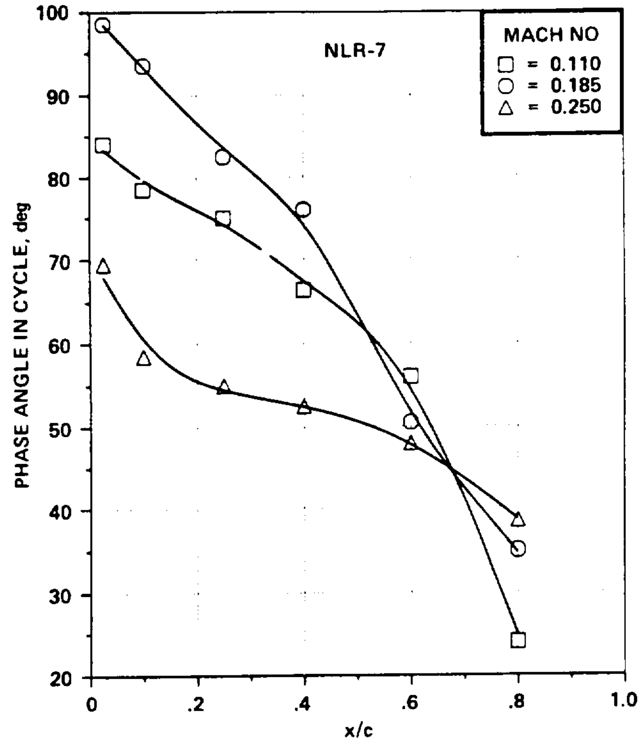

Figure 19.- Phase angle, ωt, of flow reversal on NLR-7 airfoil vs chord location for a range of Mach numbers at k = 0.1, $\alpha = 15° + 10° \sin \omega t$ — Mach number effects.

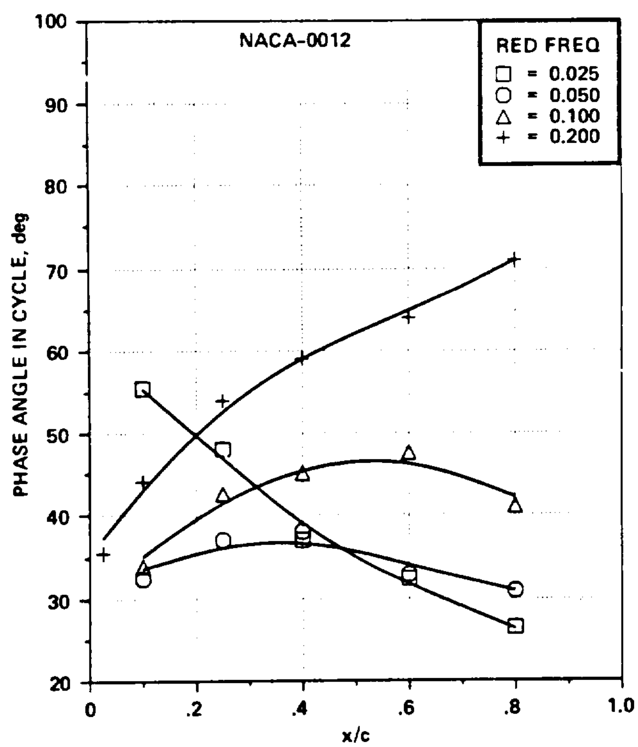

Figure 20.- Phase angle, ωt, of flow reversal on NACA 0012 airfoil vs chord location for a range of frequencies at $M_\infty = 0.295$, $\alpha = 12° + 5° \sin \omega t$ — light-stall conditions.

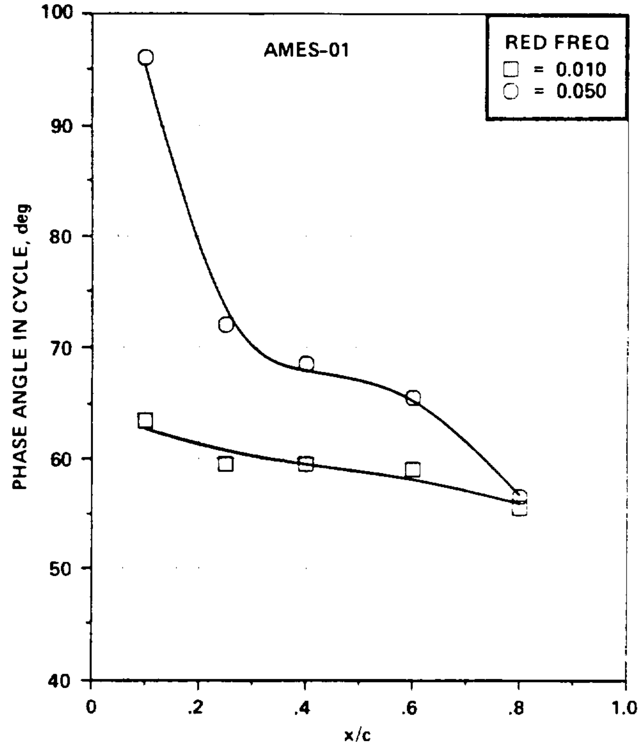

Figure 21.- Phase angle, ωt, of flow reversal on Ames A-01 airfoil vs chord location for a range of frequencies at $M_\infty = 0.295$, $\alpha = 11° + 5° \sin \omega t$ — light-stall conditions.

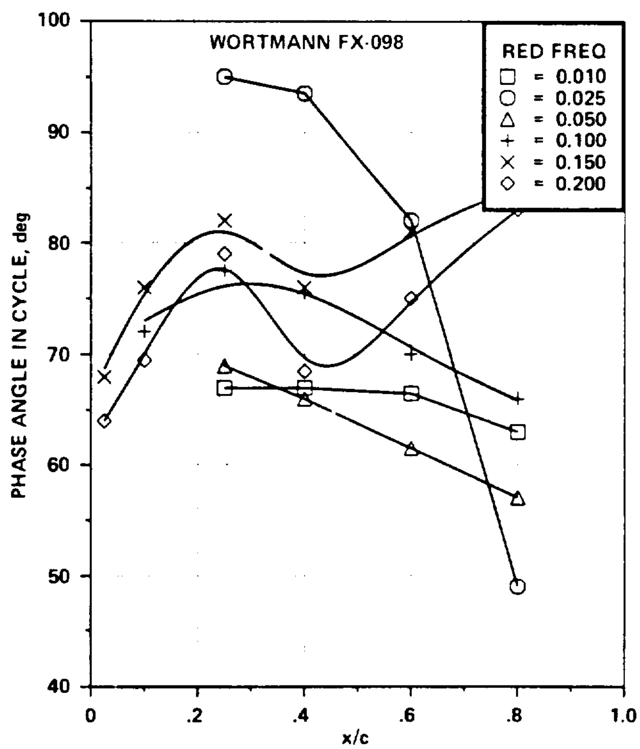

Figure 22.- Phase angle, ωt, of flow reversal on Wortmann FX-098 airfoil vs chord location for a range of frequencies at $M_\infty = 0.295$, $\alpha = 10° + 5° \sin \omega t$ — light-stall conditions.

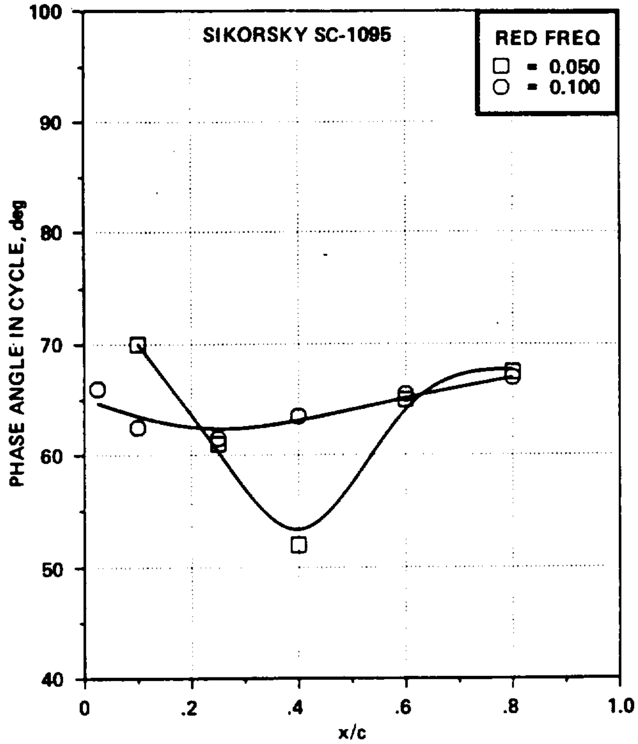

Figure 23.- Phase angle, ωt, of flow reversal on Sikorsky SC-1095 airfoil vs chord location for a range of frequencies at $M_\infty = 0.295$, $\alpha = 11° + 5° \sin \omega t$ — light-stall conditions.

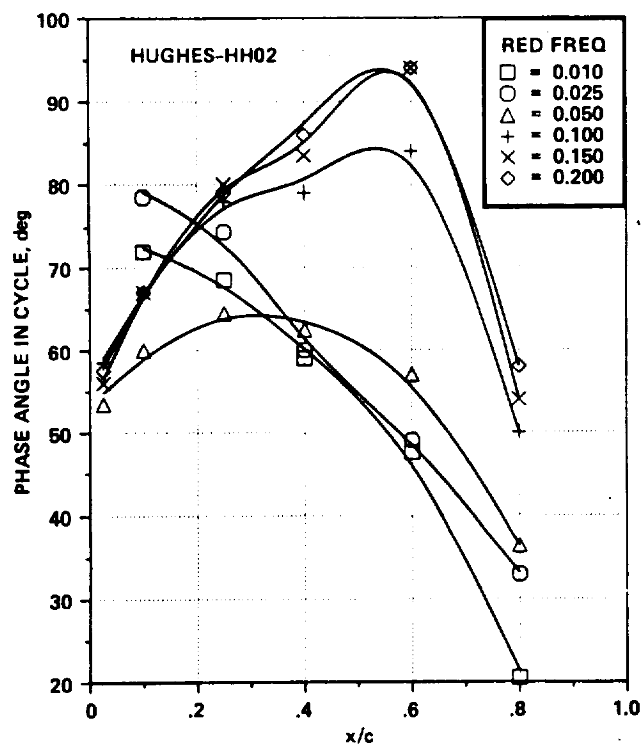

Figure 24.- Phase angle, ωt, of flow reversal on Hughes HH-02 airfoil vs chord location for a range of frequencies at $M_\infty = 0.295$, $\alpha = 10° + 5° \sin \omega t$ — light-stall conditions.

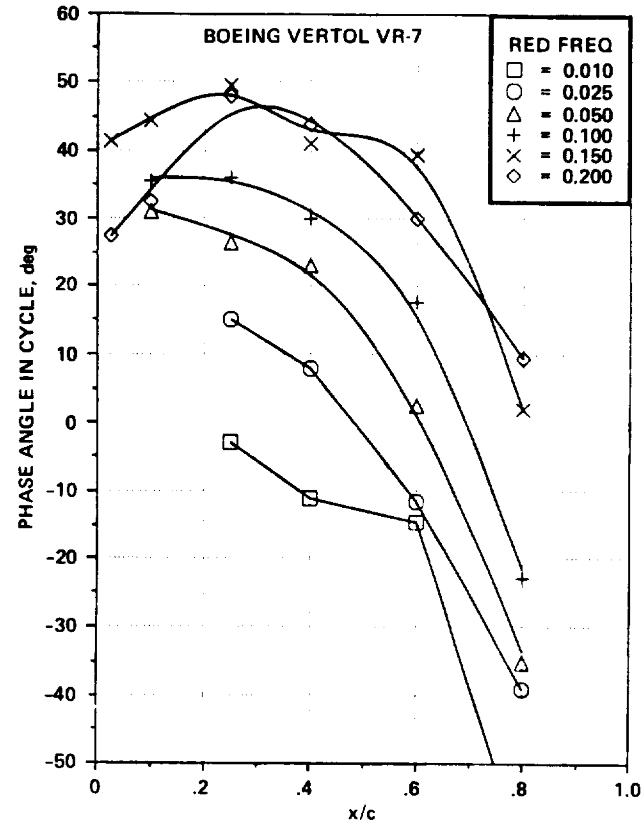

Figure 25.- Phase angle, ωt, of flow reversal on Vertol VR-7 airfoil vs chord location for a range of frequencies at $M_\infty = 0.295$, $\alpha = 15° + 5° \sin \omega t$ — light-stall conditions.

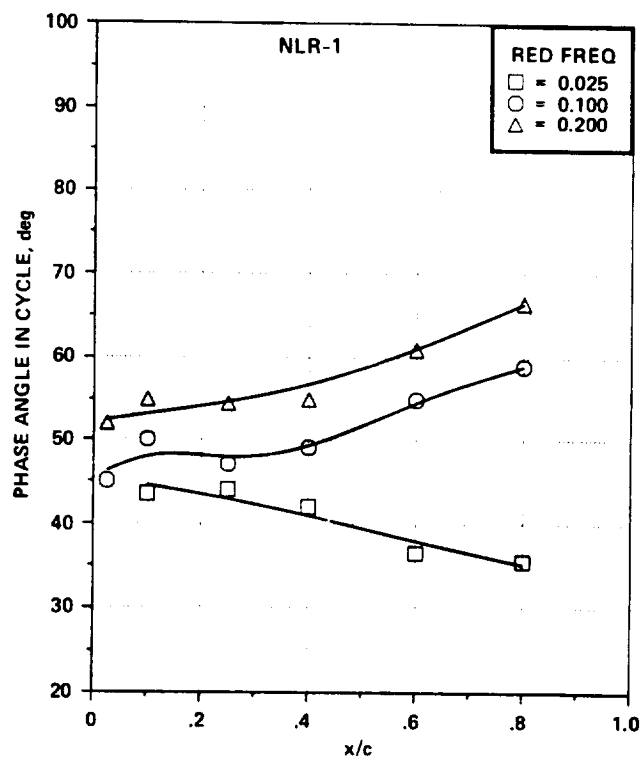

Figure 26.- Phase angle, ωt, of flow reversal on NLR-1 airfoil vs chord location for a range of frequencies at $M_\infty = 0.295$, $\alpha = 10° + 5° \sin \omega t$ — light-stall conditions.

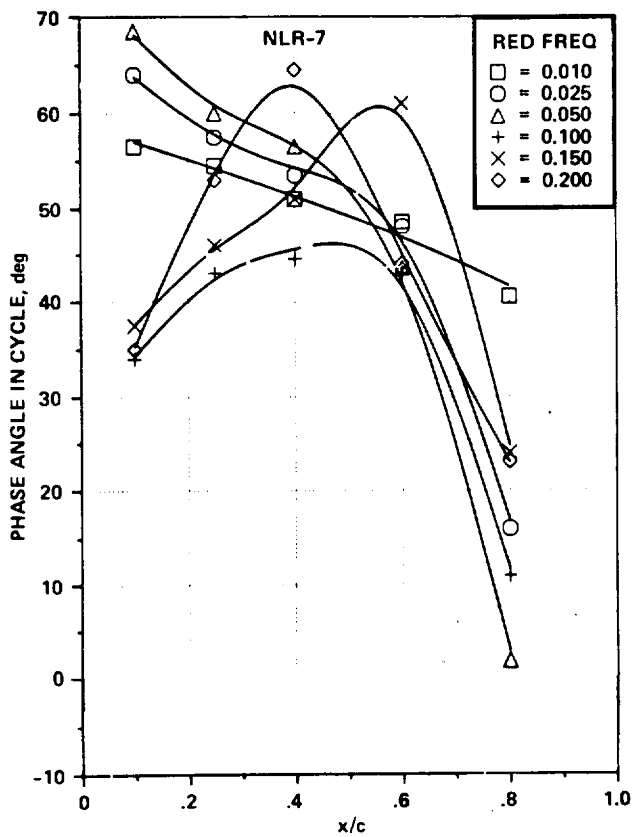

Figure 27.- Phase angle, ωt, of flow reversal on NLR-7 airfoil vs chord location for a range of frequencies at $M_\infty = 0.295$, $\alpha = 15° + 5° \sin \omega t$ — light-stall conditions.

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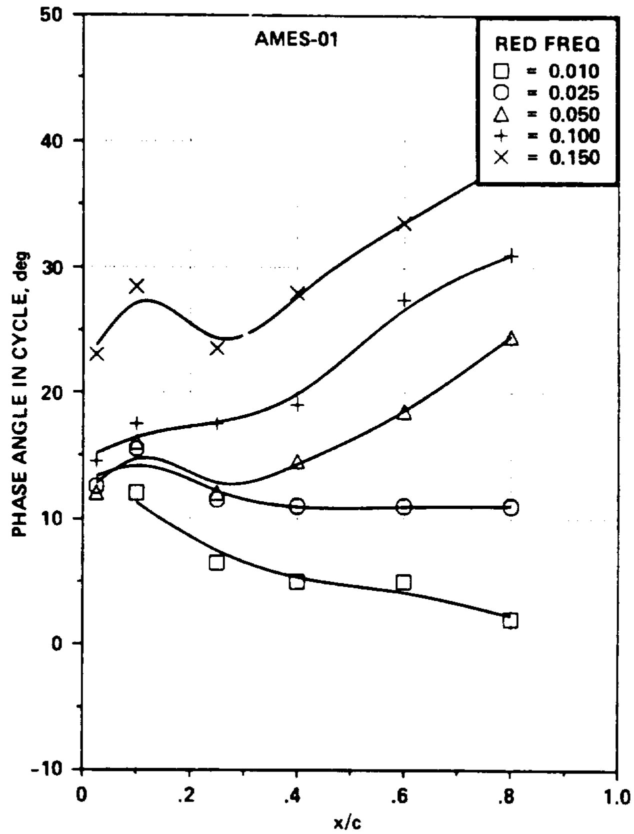

Figure 28.- Phase angle, ωt, of flow reversal on Ames A-01 airfoil vs chord for a range of frequencies at $M_\infty = 0.295$, $\alpha = 15° + 10° \sin \omega t$ – deep-stall conditions.

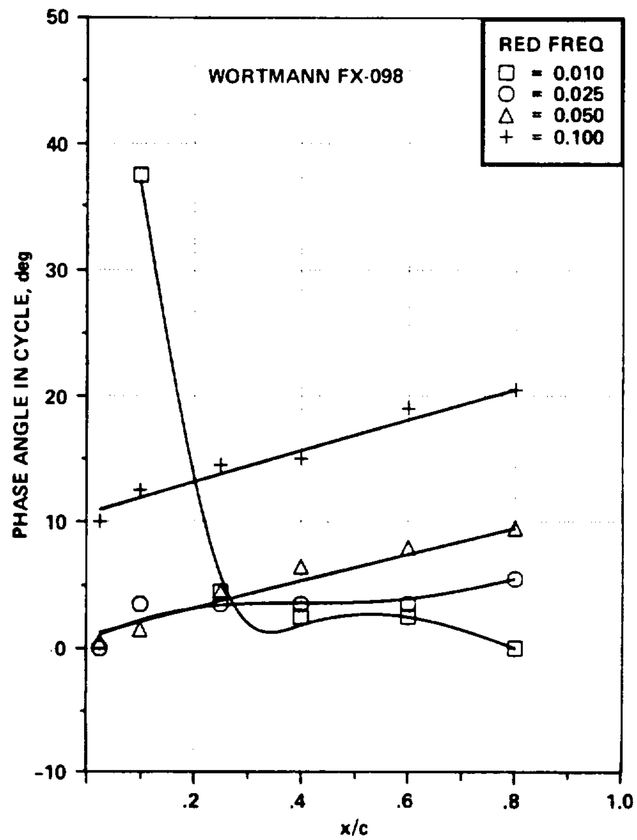

Figure 29.- Phase angle, ωt, of flow reversal on Wortmann W-98 airfoil vs chord for a range of frequencies at $M_\infty = 0.295$, $\alpha = 15° + 10° \sin \omega t$ – deep-stall conditions.

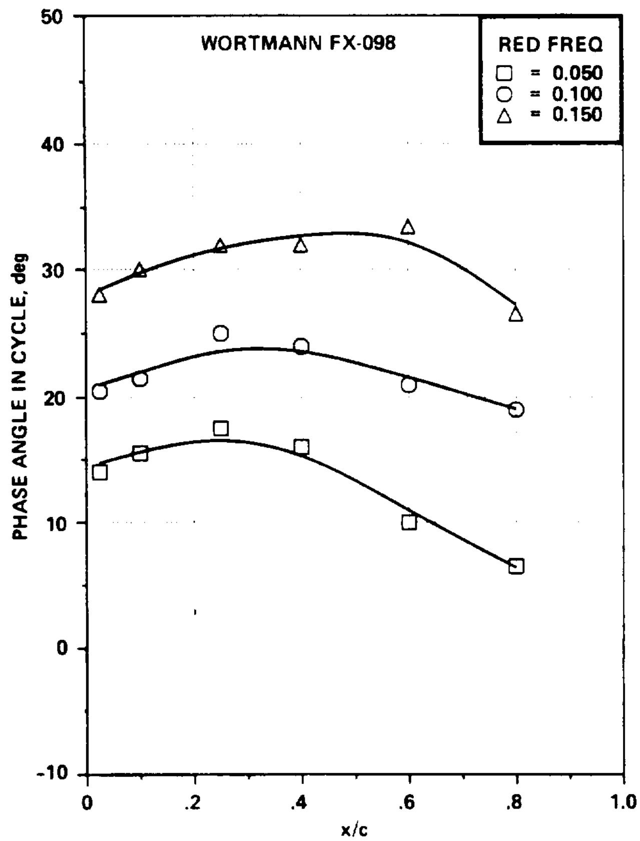

Figure 30.- Phase angle, ωt, of flow reversal on Wortmann FX-098 airfoil vs chord for a range of frequencies at $M_\infty = 0.185$, $\alpha = 15° + 10° \sin \omega t$ — deep-stall conditions.

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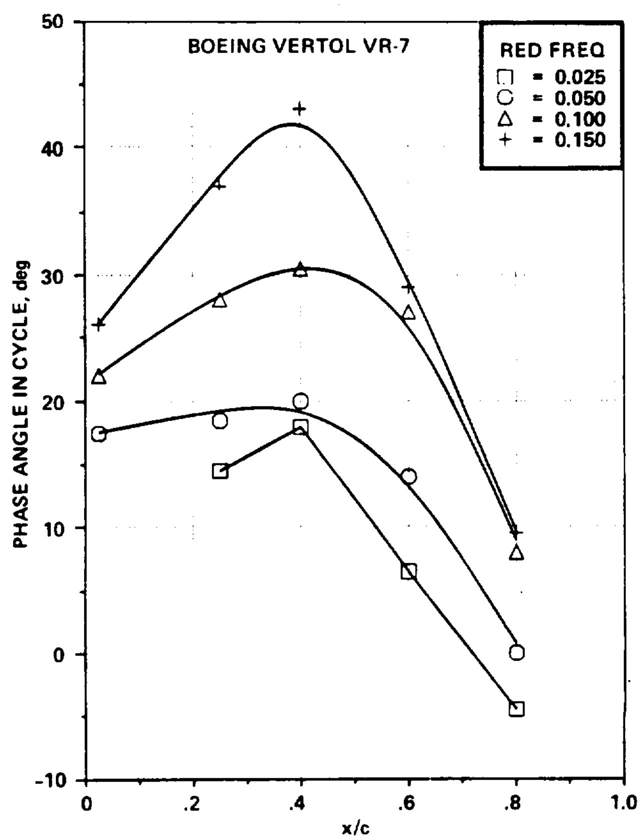

Figure 31.- Phase angle, ωt, of flow reversal on Vertol VR-7 airfoil vs chord for a range of frequencies at $M_\infty = 0.295$, $\alpha = 15° + 10° \sin \omega t$ — deep-stall conditions.

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7. Author(s) L. W. Carr, W. J. McCroskey, K. W. McAlister, S. L. Pucci, and O. Lambert*		8. Performing Organization Report No. A-8938
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15. Supplementary Notes
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16. Abstract

Detailed unsteady boundary-layer measurements are presented for eight airfoils oscillated in pitch through the dynamic-stall regime. The present report (the third of three volumes) describes the techniques developed for analysis and evaluation of the hot-film and hot-wire signals, offers some interpretation of the results, and tabulates all the cases in which flow reversal has been recorded.

17. Key Words (Suggested by Author(s))		18. Distribution Statement
Dynamic stall	Maximum lift	Unlimited
Oscillating airfoils	Airfoil data	
Boundary layer measurements		
Unsteady pressure distributions		Subject Category - 02

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