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Introduction

The mission requirements for the next generation fighter aircraft may dictate a highly versatile vehicle capable of operating over a wide range of flight conditions. This aircraft will most likely be designed for high maneuverability and agility, will operate in a hostile environment, and will possess short take-off and landing (STOL) characteristics to operate from bomb-damaged airfields. One means of achieving the latter requirement is through the use of thrust reversing during approach and ground roll wherein landing distances of 1000 ft are possible (refs. 1 to 4). Higher sortie rates attributable to STOL capability (refs. 3 and 5) will also enhance the overall effectiveness of the aircraft. In addition, use of thrust reversing at other flight conditions has the potential to provide rapid aircraft deceleration, maneuver enhancement, and improved weapons delivery (refs. 1 and 5).

In recent years, many studies (refs. 2, 4, and 6 to 15) have been conducted to determine reverser static, low-speed (approach and landing), and in-flight performance. Both axisymmetric- and nonaxisymmetric-nozzle concepts have been investigated. One primary benefit of the nonaxisymmetric nozzle is its versatile geometry which allows inclusion of thrust vectoring and reversing capabilities with less weight penalty than on a conventional axisymmetric nozzle (refs. 1 and 4).

Integration of thrust reversers into fighter aircraft must be done carefully in order to minimize adverse interference effects of reverser operation on aircraft stability and control (refs. 6, 9, and 12 to 14) and tail loads (ref. 16). The design criteria necessary to minimize adverse interference effects are often conflicting (ref. 12). For example, vertical tails that are located to minimize lateral control interference may be subjected to adverse loading. The location of tail surfaces can have significant impact on control surface effectiveness for both single- and twin-engine aircraft.

Most of the data on twin-engine aircraft with integrated thrust reversers have been obtained for specific aircraft with fixed empennage arrangements (refs. 2, 4, 7, 9, and 14) or at low speeds (ref. 13). In these earlier studies, no attempt was made at systematically varying the location of tail surfaces with respect to reverser location. This paper details the aerodynamic interference effects of thrust reversing on horizontal tail effectiveness of a twin-engine, general-research fighter model at approach and in-flight speeds. Twin vertical tails were tested at three positions relative to the reverser. Two nonaxisymmetric-nozzle reverser concepts were tested. This investigation was conducted in the Langley 16-Foot Transonic Tunnel at Mach numbers from 0.15 to 0.90, at angles of attack from −3° to 9°, and at nozzle pressure ratios from jet off to 7.0. A summary of the results from this study is contained in reference 17.

Symbols

Model forces and moments are referred to the stability axis system, with the model moment reference center (fig. 1) located 4.45 cm above the model centerline at fuselage station 91.6 cm which corresponds to $0.25\bar{c}$. All coefficients are nondimensionalized with respect to $q_\infty S$ or $q_\infty S\bar{c}$. A discussion of the data reduction procedure and definitions of the aerodynamic force and moment terms and the propulsion relationships are presented in the appendix. The symbols used in the computer-generated tables are given in parentheses.

$A_{mb,1}$		model cross-sectional area at FS 113.67 and 122.56, cm^2
$A_{mb,2}$		model cross-sectional area at FS 168.28, cm^2
$A_{seal,1}$		cross-sectional area enclosed by seal strip at FS 113.67 and 122.56, cm^2
$A_{seal,2}$		cross-sectional area enclosed by seal strip at FS 168.28, cm^2
C_D	(CD)	total aft-end drag coefficient
$C_{D,aft}$	(CDAFT)	afterbody (plus tails) drag coefficient
$C_{D,n}$	(CDN)	nozzle drag coefficient
$C_{(D-F)}$	(C(D-F))	drag-minus-thrust coefficient ($C_{(D-F)} \equiv C_D$ at NPR = 1.0 (jet off))
C_L	(CL)	total aft-end aerodynamic lift coefficient
$C_{L,aft}$	(CLAFT)	afterbody (plus tails) lift coefficient
$C_{L,n}$	(CLN)	nozzle lift coefficient
$C_{L,t}$	(CLT)	total aft-end lift coefficient, including thrust component ($C_{L,t} \equiv C_L$ at NPR = 1.0)
C_m	(CM)	total aft-end aerodynamic pitching-moment coefficient
$C_{m,aft}$	(CMAFT)	afterbody (plus tails) pitching-moment coefficient

$(C_{m,\mathrm{aft}})_o$		$C_{m,\mathrm{aft}}$ at $C_{L,\mathrm{aft}} = 0$
$C_{m,n}$	(CMN)	nozzle pitching-moment coefficient
$C_{m,t}$	(CMT)	total aft-end pitching-moment coefficient, including thrust component ($C_{m,t} \equiv C_m$ at NPR = 1.0)
$C_{m_{\delta_h}}$		horizontal tail effectiveness parameter, $\Delta C_{m,\mathrm{aft}}/\Delta\delta_h$, per degree
$\bar{c}$		wing mean geometric chord, 44.42 cm
D_f		friction drag, N
F_A		total aft-end axial force, N
$F_{A,\mathrm{Mbal}}$		axial force measured by main balance, N
$F_{A,\mathrm{mom}}$		momentum tare axial force due to bellows, N
$F_{A,\mathrm{Sbal}}$		axial force measured by afterbody shell balance, N
F_{aft}		afterbody (plus tails) axial force, N
F_j		thrust along body axis, N
h_b		vertical distance from nozzle centerline to upstream edge of reverser port (fig. 11)
M	(MACH)	free-stream Mach number
NPR	(NPR)	nozzle pressure ratio, $p_{t,j}/p_\infty$
$\bar{p}_{es,1}$		average static pressure at external seal at FS 113.67, Pa
$\bar{p}_{es,2}$		average static pressure at external seal at FS 122.56, Pa
$\bar{p}_{es,3}$		average static pressure at external seal at FS 168.28, Pa
$\bar{p}_i$		average internal static pressure, Pa
$p_{t,j}$		average jet total pressure, Pa
p_∞		free-stream static pressure, Pa
q_∞		free-stream dynamic pressure, Pa
S		wing reference area, 4290.00 cm^2
s		thrust reverser port passage uncontained length, cm (fig. 11)
v		thrust reverser port passage contained length, cm (fig. 11)
w_v		width of reverser ports, cm (fig. 11)
α	(ALPHA)	angle of attack, deg
δ_h		horizontal tail deflection, positive leading edge up, deg
θ		reverser port angle, deg (fig. 11)
Λ_{le}		leading-edge sweep angle, deg
ϕ_t		vertical tail cant angle, deg

Abbreviations:

ASME	American Society of Mechanical Engineers
BL	buttock line, cm
C-D	convergent-divergent
FS	fuselage station (axial location described by distance in centimeters from model nose)
FWD	forward
WL	water line, cm
2-D	two-dimensional

Apparatus and Procedure

Wind Tunnel

This investigation was conducted in the Langley 16-Foot Transonic Tunnel, a single-return atmospheric wind tunnel with a slotted octagonal test section and continuous air exchange. The wind tunnel has continuously variable airspeed up to a Mach number of 1.30. Test-section plenum suction is used for speeds above a

Mach number of 1.05. A complete description of this facility and operating characteristics can be found in reference 18.

Model and Support System

Details of the general-research, twin-engine fighter afterbody model and wing-tip-mounted support system used in this investigation are presented in figure 1. A photograph of the model and support system installed in the Langley 16-Foot Transonic Tunnel is shown in figure 2. A sketch of the wing planform geometry is presented in figure 3.

The wing-tip model support system shown in figure 1 consisted of three major portions: the twin support booms, the forebody (nose), and the wing-centerbody combination. These pieces made up the nonmetric portion (that portion of model not mounted on force balance) of the twin-engine fighter model. The fuselage centerbody was essentially rectangular in cross section and had a constant width and height of 25.40 cm and 12.70 cm, respectively. The four corners were rounded by a radius of 2.54 cm. Maximum cross-sectional area of the centerbody (fuselage) was 317.04 cm^2. The support system forebody (or nose) was typical of a powered model in that the inlets were faired over. The wings were mounted above the model centerline or in a high position which is typical of many current fighter designs. The wing had a 45° leading-edge sweep, a taper ratio of 0.5, an aspect ratio of 2.4, and a cranked trailing edge (fig. 3). The NACA 64-series airfoil had a thickness ratio of 0.067 near the wing root to provide a realistic wake on the afterbody. From BL 27.94 to the support booms, however, wing thickness ratio increased from 0.077 to 0.10 to provide adequate structural support for the model and to permit transfer of compressed air from the booms to the model propulsion system.

The metric portion of the model aft of FS 113.67, supported by the main force balance, consisted of the internal propulsion system, afterbody, tails (not shown in fig. 1), and nozzles. The afterbody lines (boattail) were chosen to provide a length of constant cross section aft of the nonmetric centerbody and to enclose the force balance and jet simulation system while fairing smoothly downstream into the closely spaced nozzles. The afterbody shell and tail surfaces from FS 122.56 to 168.28 were attached to an afterbody (tandem shell) force balance which was attached to the main force balance (fig. 1). The main force balance in turn was grounded to the nonmetric wing-centerbody section. The nozzles were attached directly to the main force balance through the propulsion system piping. Three clearance gaps (metric breaks) were provided between the nonmetric and individual metric portions (afterbody and nozzles) of the model at FS 113.67, FS 122.56, and FS 168.28 to prevent fouling of the components upon each other. A flexible plastic strip inserted into circumferentially machined grooves in each component impeded flow into or out of the internal model cavity (fig. 1).

In this report, that section of the model aft of FS 122.56 is referred to as the total aft end (includes afterbody, tails when installed, and nozzles). That section of the model from FS 122.56 to FS 168.28 is referred to as the afterbody, and that section aft of FS 168.28 is considered the nozzles. An adjustment to the drag results of the main balance was made for the section of the model from FS 113.67 to FS 122.56. (See the appendix.)

The afterbody had provisions for mounting the twin vertical tails in three axial positions. The vertical tails at a cant angle of 0°, were tested in three positions—forward, mid, and aft—as shown in figure 4. With the vertical tails in the mid position, an outboard cant angle of 20° was also tested. The vertical tails have smaller tail spans when installed in the aft position than when installed in the other positions.

Sketches of the horizontal and vertical tails are presented in figures 5 and 6, respectively. These tail surfaces were sized to be representative of current twin-engine fighter aircraft. Individual root fairings (fillers) contoured the tails to the afterbody at each tail location. Clearance gaps were provided between the nozzles and the horizontal and vertical tails (aft location) in order to prevent fouling between the main and afterbody balances (fig. 4).

Twin-Jet Propulsion Simulation System

The twin-jet propulsion simulation system is shown in figure 1. An external high-pressure air system provides a continuous flow of clean, dry air at a controlled temperature of about 306 K at the nozzles. This high-pressure air is brought into the wind-tunnel main support strut where it is divided into two separate flows and passed through remotely operated flow-control valves. These valves are used to balance the total pressure in each nozzle.

The divided compressed airflows are piped through the wing-tip support booms, through the wings, and into the flow-transfer (bellows) assemblies (fig. 1). A sketch of a single flow-transfer bellows assembly is shown in figure 7. The air in each supply pipe is discharged perpendicularly to the model axis through eight sonic nozzles equally spaced around the supply pipe. This method is designed to eliminate any transfer of axial momentum as the air is passed from the nonmetric to the metric portion of the model. Two flexible metal bellows are used as seals and serve to compensate the axial forces caused by pressurization. The cavity between the supply pipe and the bellows is vented to model internal pressure. The airflow is then passed through the tailpipes into the transition sections, through choke plates (30-percent open) to the instrumentation or charging sections, and then to the exhaust nozzles. (See fig. 1.)

Exhaust Nozzles

Forward-thrust nozzle. The nonaxisymmetric (two-dimensional convergent-divergent) nozzle used in this investigation is shown in figure 8. This baseline nozzle simulated a dry power or cruise operating mode with a design NPR of about 3.5 and will be referred to as the reverser-stowed nozzle. The nozzle throat area (17.48 cm^2) and expansion ratio (1.15) were sized to be consistent with advanced mixed flow turbofan cycles. The ratio of total throat area to maximum body cross section was 0.11, and the nozzle throat aspect ratio was 3.45. This nozzle was one of a series of nozzles tested in the study reported in reference 19, and its aeropropulsive performance characteristics are presented in reference 15.

Reverse-thrust nozzles. Thrust reversing for 2-D C-D nozzles is usually accomplished by using the convergent flaps as an exhaust flow blocker. Reverser A, shown in figures 9 and 10, was based on the full-scale nozzle design of reference 20. This reverser is formed by individual upstream doors which, in conjunction with the convergent flap, opened up to form the reverser flow path. This nozzle was designed such that reverser deployment could be varied from 0 to 100 percent, which represents conditions from forward cruise flight (0 percent deployment) through various amounts of thrust modulation to full thrust reversing (100 percent deployment). Only the thrust reverser at 100 percent deployment (reverser deployed) was used for this investigation because it was assumed that this configuration would have maximum interference effects on horizontal tail effectiveness. Aeropropulsive characteristics for this thrust reverser as well as reverser configurations simulating 25, 50, and 75 percent deployments are presented in reference 15.

Reverser B, shown in figures 11 and 12, represented a generic-type reverser, which was used to investigate the effects of port exit angle θ (110°, 120°, and 130°). Three port-angle configurations shown in figure 11 were designed to have ideal static reverse-thrust levels of 34 percent reverse thrust for $\theta = 110°$, 50 percent reverse thrust for $\theta = 120°$, and 64 percent reverse thrust for $\theta = 130°$. The magnitude of static reverse thrust obtained is primarily a function of cos θ. The top and bottom port areas were each equal to half of the throat area of the baseline dry power nozzle. The aeropropulsive characteristics of these three reverser configurations can be found in reference 15.

Instrumentation

Forces and moments on the metric portions of the model were measured by two six-component strain-gauge balances. The main balance measured forces and moments resulting from nozzle gross thrust and the external flow field over that portion of the model aft of FS 113.67. The afterbody balance measured forces and moments resulting from the external flow field over the afterbody and empennage surfaces from FS 122.56 to FS 168.28. The twin balance arrangement permits the separation of model component forces for data analysis.

Eight external seal static pressures were measured in the seal gap at the first metric break (FS 113.67). All orifices were located on the nonmetric centerbody and spaced symmetrically about the model perimeter. An additional five orifices, positioned symmetrically about the right side of the model, measured seal gap pressures at the second metric break (FS 122.56). The final external seal pressures were measured by two sets of surface taps, both consisting of two orifices, each an equal distance fore and aft of the third metric break (FS 168.28).

In addition to these external pressures, two internal pressures were measured at each metric seal. These pressure measurements were then used to correct measured axial force and pitching moment for pressure-area tares as discussed in the appendix.

Chamber pressure measurements, made in each supply pipe upstream of the eight sonic nozzles (fig. 7), were used to compute tare forces. Instrumentation in each charging section consisted of a stagnation-temperature probe and a total-pressure rake. Each rake contained four total-pressure probes. (See fig. 8.) Nozzle total pressure is determined from these measurements.

All pressures were measured with individual pressure transducers. Data obtained during each tunnel run were recorded on magnetic tape. Typically, for each data point, 50 frames of data were taken over a period of 5 sec and the average was used for computational purposes.

Tests

This investigation was conducted in the Langley 16-Foot Transonic Tunnel at Mach numbers of 0.15, 0.60, and 0.90 and at angles of attack from −3° to 9°. Nozzle pressure ratio varied from 1.0 (jet off) to 7.0, depending upon Mach number. At $M = 0.15$, the range of nozzle pressure ratio was such that the ratio of jet to free-stream dynamic pressure varied linearly from 45.2 at NPR = 2.0 to 87.1 at NPR = 3.8. Values for this ratio at landing approach conditions normally lie in the range of 40 to 70. Basic data were obtained by varying nozzle pressure ratio at zero angle of attack and by varying angle of attack at fixed nozzle pressure ratio. Horizontal tail incidence was varied for selected configurations from 0° to −10°. Reynolds number based on the wing mean geometric chord varied from 4.4×10^6 to 5.28×10^6.

All tests were conducted with 0.26-cm-wide boundary-layer transition strips consisting of No. 120 silicon carbide grit sparsely distributed in a thin film of lacquer. These strips were located 2.54 cm from the tip of the forebody nose and on both upper and lower surfaces of the wings and empennage at 5 percent of the root chord to 10 percent of the tip chord.

Presentation of Results

The results of this investigation are presented in both tabular and plotted form. Table 1 is an index to the tabular results contained in tables 2 to 29. The computer symbols appearing in these tables are defined in the section "Symbols" with their corresponding mathematical symbols. Only data measured by the afterbody balance is presented in plotted form in this report. The effects of thrust reversing on horizontal tail effectiveness are measured directly by this balance. Basic and summary data are presented in figures 13 to 27 as follows:

	Figure
Afterbody lift and pitching-moment coefficients for—	
Reverser A, vertical tails forward, and $\phi_t = 0°$	13
Reverser A, vertical tails mid, and $\phi_t = 0°$	14
Reverser A, vertical tails mid, and $\phi_t = 20°$	15
Reverser A, vertical tails aft, and $\phi_t = 0°$	16
Reverser B, vertical tails mid, and $\phi_t = 0°$	17
Variation of pitching-moment coefficient with δ_h for reverser A	18
Variation of pitching-moment coefficient with δ_h for reverser B	19
Horizontal tail effectiveness for reverser A	20
Horizontal tail effectiveness for reverser B	21
Effect of vertical tail location on tail effectiveness for reverser A and $\alpha = 0°$	22
Effect of vertical tail location on tail effectiveness for reverser A and variable α	23
Effect of vertical tail cant angle on tail effectiveness for reverser A and $\alpha = 0°$	24
Effect of vertical tail cant angle on tail effectiveness for reverser A and variable α	25
Effect of reverser port angle on tail effectiveness for reverser B and $\alpha = 0°$	26
Effect of reverser port angle on tail effectiveness for reverser B and variable α	27
Effect of Mach number on tail effectiveness with reverser A and $\alpha = 0°$	28

Discussion

Basic Longitudinal Characteristics

Effect of nozzle pressure ratio. The effects of nozzle pressure ratio and thrust reverser operation on the afterbody/empennage (excluding nozzles) longitudinal characteristics can be seen in figure 14 for the configuration with the vertical tails in the mid position at $\phi_t = 0°$. These results are typical as well for the other configurations tested. There is little effect of NPR at $\alpha = 0°$ on either $C_{L,\mathrm{aft}}$ or $C_{m,\mathrm{aft}}$ at $\delta_h = 0°$ at $M = 0.15$ (approach speed) with the baseline dry power nozzle in the forward thrust mode (represents reverser A or B stowed). However, at both $\delta_h = -5°$ and $-10°$ (fig. 14(a)), there is a decrease in lift coefficient with initial jet operation followed by $C_{L,\mathrm{aft}}$ returning to nearly jet-off levels as NPR increases. It is unclear as to why this effect occurs for the baseline nozzle configuration (reverser stowed) at these tail settings. However, there is, typically, a base bleed effect that occurs with initial jet operations which could result in an increase in local velocity over the horizontal tails. Similar results were also noted at these conditions with the vertical tails in the forward position (fig. 13(a)), mid position with $\phi_t = 20°$ (fig. 15(a)), or in the aft position (fig. 16(a)).

The effects of nozzle pressure ratio on reverser deployed lift and pitching-moment coefficients at $M = 0.15$ generally follow reverser-stowed trends up to about NPR = 2.0 but depart from these trends at higher NPR (fig. 14). Again, these results are for the configuration with the vertical tails in the mid position with $\phi_t = 0°$. Similar results were noted for the other configurations tested. In general, increasing NPR with the reversers deployed resulted in an increase in afterbody/empennage pitching-moment coefficient.

As shown in figures 13 to 17, there is little or no effect of nozzle pressure ratio on afterbody/empennage lift and pitching-moment coefficients with reverser A or B stowed or deployed at $M = 0.60$ and 0.90. At these Mach numbers, thrust reverser operation results in essentially a positive $(C_{m,\text{aft}})_o$ shift at $\delta_h = 0°$ and a negative $(C_{m,\text{aft}})_o$ shift at $\delta_h < 0°$. The effects on horizontal tail effectiveness are discussed later.

Effect of angle of attack. The effects of angle of attack and thrust reverser operation on the afterbody/empennage longitudinal characteristics with the vertical tails in the forward and mid positions and $\phi_t = 0°$ are presented in figures 13 and 14. Shown are lift and pitching-moment coefficients as a function of angle of attack at constant nozzle pressure ratio representative of typical operating NPR at $M = 0.15$, 0.60, and 0.90.

With the reverser stowed at $M = 0.15$, lift curves at $\delta_h = 0°$ and $-5°$ are nearly linear (fig. 14(b)). However, at $\delta_h = -10°$, there is an increase in afterbody/empennage lift-curve slope that occurs between angles of attack of 3° and 6°. This will result, of course, in an increase in stability. With the reverser deployed at $\delta_h = 0°$, there is a similar increase in lift-curve slope which, for this case, occurs between angles of attack of 0° and 3° (fig. 14(b)). As a result, the afterbody/empennage stability (slope of $C_{m,\text{aft}}$) in figure 14(b) increases from -0.0067 between α of $-3°$ and 0° to -0.0250 between α of 0° and 3°. A decrease in stability occurs at $\alpha > 3°$, with a value approximately equal to that for $\alpha < 0°$. Similar results were found with the vertical tails in the forward (fig. 13(b)) or mid position at $\phi_t = 20°$ (fig. 15(b)), except the increase in stability occurred at angles of attack between 3° and 6° rather than between 0° and 3°. With the vertical tails in the aft position, however, the lift curve for the reverser deployed is nearly linear. At $M = 0.15$, reverser operation at all tail deflections resulted in a positive $(C_{m,\text{aft}})_o$ shift with respect to the reverser stowed. This occurred only with the vertical tails in the forward or mid positions.

At $M = 0.60$ and 0.90, both the lift and pitching-moment curves are nearly linear over the test angle-of-attack range for the configurations with the reverser stowed or deployed (figs. 13 to 17). There is a positive shift in $(C_{m,\text{aft}})_o$ due to reversing at $\delta_h = 0°$ (except for vertical tails in the aft position) and, opposite to trends found at $M = 0.15$, a negative shift in $(C_{m,\text{aft}})_o$ at $\delta_h < 0°$.

Horizontal tail effectiveness. The data presented in figures 13 to 17 can be used to determine the horizontal tail effectiveness parameter $C_{m_{\delta_h}}$. For convenience, cross plots of afterbody/empennage pitching-moment coefficient as a function of δ_h are presented in figures 18 and 19 for the various configurations tested. These data are shown at two angles of attack (0° and 8°) and at constant nozzle pressure ratios representative of typical operating NPR at Mach numbers from 0.15 to 0.90. The resulting values of horizontal tail effectiveness for the various configurations investigated are presented in figures 20 and 21 for thrust reversers A and B, respectively. Note that $C_{m_{\delta_h}}$ was determined by using only data between $\delta_h = 0°$ and $-5°$ since all configurations were tested at these two horizontal tail deflection angles. Similar values of horizontal tail effectiveness can be obtained by using the results for $\delta_h = -10°$.

With the reverser stowed, the nonlinear pitching-moment curves that occurred as NPR was increased at $\delta_h = -5°$ and $M = 0.15$ (fig. 14(a)), of course, affect tail effectiveness in a similar fashion, as can be seen in figure 20. This highly nonlinear characteristic of horizontal tail effectiveness is independent of vertical tail location. At $M = 0.60$ and 0.90, there is a small increase in effectiveness with increasing NPR at $\alpha = 0°$. With the reverser stowed, the effect of angle of attack on horizontal tail effectiveness is small (fig. 20) over the test Mach number range.

With the reverser deployed, there are large variations in tail effectiveness at $M = 0.15$ as NPR = 2.6 (figs. 20 and 21). For example, effectiveness increased 15 to 70 percent between $\alpha = 0°$ and 6°, depending upon vertical tail location. At $M = 0.60$ and 0.90, there is a decrease in tail effectiveness as NPR increases at $\alpha = 0°$; tail effectiveness is relatively insensitive to varying angle of attack at these Mach numbers.

Configuration Comparisons

The effects of varying model geometric parameters on horizontal tail effectiveness are summarized in figures 22 to 27 at Mach numbers from 0.15 to 0.90. These summary figures show the percent change in tail effectiveness $C_{m_{\delta_h}}$ as a function of either nozzle pressure ratio or angle of attack where the percent change in tail effectiveness is relative to the reverser stowed or the baseline nozzle configuration. Thus, a positive percent change represents an increase in $C_{m_{\delta_h}}$ for the configuration with the reverser deployed relative to the value of $C_{m_{\delta_h}}$ for the reverser-stowed configuration.

Effect of vertical tail location. The effects of vertical tail ($\phi_t = 0°$) longitudinal location on horizontal tail effectiveness for the configuration with reverser A are summarized in figures 22 and 23. Figure 22 shows the percent change in effectiveness as a function of nozzle pressure ratio. It should be noted that two effects seem to be present. First, there is an apparent jet-off effect (NPR = 1) in which deployment of reverser A caused a decrease in $C_{m_{\delta_h}}$ (except for vertical tail in the aft position at $M = 0.15$). This decrease in tail effectiveness may be due to interference effects of the reverser panels feeding forward in the subsonic flow or from the wake shed by the reverser panels onto the horizontal tails.

The reverser ports are located upstream of the horizontal tail trailing edge (fig. 4). Part of the reverser panels (for reverser A) extend beyond the baseline (reverser-stowed) nozzle external lines (figs. 4 and 9). The second effect of reverser deployment is caused by an interaction of the reverser plume (NPR > 1) with the external flow field.

Operation of the reverser results in reverse flow plume blockage of the free-stream flow between the twin vertical tails. The extent that the reverser plume will penetrate forward is a function of the reverser effective port angle, nozzle pressure ratio, and Mach number. For the F-18 (ref. 16), reverser plume blockage was such that a decrease in velocity was measured on both the inner and outer surfaces of the vertical tails. In addition, there may be some effect due to lateral spreading of the reverse flow plumes. Thus, the location of the twin vertical tails relative to the horizontal tails can have a large impact on the interference effects of reverser plume blockage on horizontal tail effectiveness. Some of these effects are illustrated in figures 22 and 23.

At $M = 0.15$, there is an increase in horizontal tail effectiveness due to reverser operation (up to 67 percent at NPR = 3.0) with the vertical tails in the aft position. (See fig. 22.) The combination of the shielding effect from the aft-located vertical tails and reverser plume blockage probably reduces the external flow between the twin vertical tails causing an increase in flow around the outside of the vertical tails. The net effect may then be an increase in velocity around the outside of the vertical tails and over the horizontal tails, which would increase local dynamic pressure and horizontal tail lift. As the vertical tails are moved to either the mid or forward position at $M = 0.15$ (fig. 22), horizontal tail effectiveness is decreased over the test range of NPR. The major contributor to this loss of tail effectiveness is deployment of the reverser, not reverser plume interactions. (See results at NPR = 1.0.)

At $M = 0.60$, there is essentially no effect of NPR on tail effectiveness for the configuration with the vertical tails in the aft position. With the vertical tails at the other two positions, there is a 20- to 45-percent decrease in horizontal tail effectiveness with reverser A (relative to the reverser stowed) as NPR increases (fig. 22). This reduction is probably caused by a lateral spreading of the reverse flow plume onto the horizontal tails since shielding by the vertical tails is not present. Similar results were obtained at $M = 0.90$.

The effects of thrust reversing at angle of attack for constant nozzle pressure ratio are shown in figure 23 for the three vertical tail locations. At $M = 0.15$, large variations in horizontal tail effectiveness occur with varying angle of attack. These results also show the influence of tail location on horizontal tail effectiveness due to reverser operation. For the configuration with the vertical tails in either the forward or mid position, the increase in $C_{m_{\delta_h}}$ due to reverser operation remains nearly constant at angles of attack above 6°. If this result were to remain up to typical landing approach angles of attack of 10° to 15°, the configuration would then require 15 to 20 percent less tail deflection for trim.

At $M = 0.60$ and 0.90, there is little or no effect of angle of attack on tail effectiveness for the configuration with the vertical tails in the aft position. The 14-percent decrease in tail effectiveness shown is essentially the jet-off reverser deployment effect previously discussed.

Because of the similarity of the effects to horizontal tail effectiveness from reverser operation for the configuration with either the mid or forward tail positions, locating the vertical tails in the forward position is not necessary from consideration of reverser interference. Minimum interference effects due to reverser operation probably occur with the vertical tails located between the mid and aft positions at $M = 0.15$ and at a farther aft position at $M > 0.15$. Another method to possibly reduce reverser plume interference effects is to cant the reverser plumes inward on the top of the vehicle.

Effect of vertical tail cant angle. The effects of canting the vertical tails outward from 0° to 20° in the mid longitudinal position are summarized in figures 24 and 25. At $M = 0.15$, the large loss in horizontal tail effectiveness at NPR = 1.0 (reverser panel deployment effect) noted previously for $\phi_t = 0°$ configurations is essentially eliminated by canting the vertical tails outward 20°. In general, canting the vertical tails outward tended to increase tail effectiveness during reverse thrust operation (NPR > 1) except at isolated test conditions. At $M = 0.60$ and 0.90, the trends of horizontal tail effectiveness changes due to reverser operation with nozzle pressure ratio and angle of attack are similar for both vertical tail cant angles of 0° and 20°. (See figs. 24 and 25.)

Effect of port angle. The effect of reverser B port angle on horizontal tail effectiveness is presented in figures 26 and 27. Reverser port angles of 110°, 120°, and 130° (fig. 11) were tested only with the vertical tails in the mid position and $\phi_t = 0°$. With reverser B deployed at jet-off conditions (NPR = 1.0), there is essentially no change in horizontal tail effectiveness since no part of the reverser panels extend beyond the baseline (reverser-stowed) nozzle external lines. The effect of reverser operation on horizontal tail effectiveness at $M = 0.15$ shows strong dependence upon reverser port angle, nozzle pressure ratio, and angle of attack. (See figs. 26 and 27.)

At $M = 0.60$ and 0.90, increasing reverser port angle reduces horizontal tail effectiveness at most test conditions. The reduction in tail effectiveness due to reverser operation is not as severe for the reverser B design as for reverser A design. (Compare fig. 26 with fig. 22 or fig. 27 with fig. 23.) However, both reverser designs exhibit similar trends in the variation of tail effectiveness due to reverser operation with varying nozzle pressure ratio or angle of attack.

Effect of Mach number. The effect of Mach number and thrust reverser operation on horizontal tail effectiveness is illustrated in figure 28 for the configuration with the three longitudinal vertical tail positions. Also shown are results from reference 6 for the F-11A with an axisymmetric-nozzle thrust reverser (single engine and vertical tail) and from reference 9 for the F-18 with either 2-D C-D or wedge nozzle thrust reversers (twin engine and vertical tails). These results are shown as a function of Mach number at a typical operating pressure ratio for the particular configuration presented. In all cases, the thrust reversers were fully deployed.

The results from the present investigation illustrate the strong dependence of horizontal tail effectiveness on Mach number with reverser operation when the vertical tails are installed in an aft position. With the vertical tails in either the mid or forward position, there is only a mild dependence on Mach number. The loss in tail effectiveness due to thrust reverser operation at $M > 0.60$ is about double that for the configuration with the aft located vertical tails.

From a longitudinal control standpoint, locating the vertical tails in the aft position may be desirable because this configuration always exhibited an increase in horizontal tail effectiveness at $M = 0.15$. At $M > 0.60$, the aft-located vertical tails resulted in a smaller decrease in horizontal tail effectiveness than did the other two tail positions. An increase in horizontal tail effectiveness ($M = 0.15$) relative to the configuration with the reverser stowed would require less horizontal tail deflection for trim during landing approach flight. The maximum trimmed angle of attack for the configuration with either the vertical tails in the forward or mid position could be reduced because larger horizontal tail deflections would be required to compensate for the loss in tail effectiveness at $M = 0.60$ and 0.90 between $\alpha = 0°$ and 9° (fig. 23). The reduction in maximum trimmed angle of attack would occur, for example, if the required tail deflection exceeded the maximum obtainable mechanical deflection.

However, the aft position of the vertical tails may be undesirable because it imposes high loadings on the vertical tails during reverse thrust operation (ref. 16) and increases the potential for losses in rudder effectiveness when the vertical tails are in proximity to the reverser exhaust ports (ref. 12). There are, however, means by which longitudinal control can be augmented to offset losses in horizontal tail effectiveness during reverse thrust operation. Thrust vectoring (one function of 2-D C-D or multifunction nozzles) can augment both longitudinal and lateral control or, in some cases, can become the primary flight control system. (See refs. 1 and 5.) Reference 15, for example, contains pitch effectiveness of reverser A deployed 50 percent with ±15° vectoring. The aerodynamic interference effects of thrust reversing on tail surfaces can be minimized by directing the reverser plumes away from these surfaces (ref. 21).

The axisymmetric-nozzle thrust reverser installed on the single-engine F-11A (ref. 6) was designed to minimize reverser plume interference effects on the aircraft longitudinal stability and control by providing three reverser ports in a Y-orientation around the nozzle longitudinal axis. One reverser port was located on the bottom of the aircraft. The other two were located above the horizontal tail and were canted out 67.5° from the vertical centerline. As shown in figure 28, there was a large effect of Mach number on horizontal tail effectiveness during reverser operation. At $M > 0.50$, losses of 28 to 45 percent occurred. During flight tests, problems were found in the handling qualities of the airplane during approach, which were attributable to unacceptable pitching moments that resulted from reverser plume interference effects on the horizontal tail (ref. 21).

Significant reductions in horizontal tail effectiveness during reverser operation were found for the F-18 (ref. 9) with either a 2-D C-D or wedge nozzle thrust reverser (fig. 28). The differences in the reduction of tail effectiveness due to nozzle type probably results from the reverser ports being at different longitudinal locations. The empennage arrangement for the configuration with the mid-located vertical tails (including reverser port location) was very similar to the F-18 with the 2-D C-D reverser. However, losses in horizontal tail effectiveness due to reverser operation for the F-18 were approximately double those for the configuration of the present investigation at $M > 0.70$ (fig. 28). This is probably due to the reverser ports of the F-18 being toed out 3° because the engine centerline and, consequently, the nozzle in the forward thrust mode were toed in 3°. As a result, the reverser plumes for the F-18 were directed out over the horizontal tails causing more interference.

Conclusions

An investigation has been conducted in the Langley 16-Foot Transonic Tunnel to determine the interference effects of thrust reversing on horizontal tail effectiveness of a twin-engine, general-research fighter model at approach and in-flight speeds. Twin vertical tails at three longitudinal positions at a cant angle of 0° were tested. One configuration (mid longitudinal position) was also tested at a cant angle of 20°. Two nonaxisymmetric-nozzle reverser concepts were studied. Test data were obtained at Mach numbers of 0.15, 0.60, and 0.90, and at angles of attack from −3° to 9°. Nozzle pressure ratios varied from jet off to 7.0, depending upon Mach number. Although the effects of thrust reversing on horizontal tail effectiveness were found to be very configuration dependent, the following observations can be made:

1. At landing approach speed (Mach number 0.15), thrust reverser operation usually resulted in large variations (up to a 70-percent increase) in horizontal tail effectiveness as nozzle pressure ratio was varied at zero angle of attack or as angle of attack was varied at constant nozzle pressure ratio.

2. A decrease in horizontal tail effectiveness was caused by reverser deployment at jet-off conditions. It is believed that most of this degradation is caused by a wake from reverser panels which extend into the free stream. This wake may wash the inboard trailing edge of the horizontal tails.

3. With the vertical tail in the aft position, there was an increase in horizontal tail effectiveness at approach speed due to reverser operation (relative to reverser stowed). At in-flight speeds (Mach numbers 0.60 and 0.90), there was a decrease in tail effectiveness at all test conditions caused primarily by the jet-off decrease in tail effectiveness.

4. At approach speeds, moving the vertical tails to a mid or forward longitudinal position resulted in either an increase or a decrease in tail effectiveness depending upon nozzle pressure ratio or angle of attack. There was always a 20- to 45-percent decrease in tail effectiveness because of reversing at in-flight conditions.

5. At in-flight speeds, increasing reverser port angle forward resulted in additional decreases in horizontal tail effectiveness.

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July 23, 1984

Appendix

Data Reduction and Calibration Procedure

Calibration Procedure

The main balance measured the combined forces and moments due to nozzle gross thrust and the external flow field of that portion of the model aft of FS 113.67. The afterbody balance measured forces and moments due to the external flow field exerted over the afterbody and tails between FS 122.56 and FS 168.28. For this paper, only force and pitching-moment coefficients measured by the afterbody balance are presented in plotted form. However, because results measured by both force balances are presented in tabular form, a discussion of the data reduction procedures is included in this appendix.

Force and moment interactions exist between the flow-transfer bellows system (fig. 7) and the main force balance because the centerline of this balance is below the jet centerline (fig. 1). Consequently, single and combined loadings of normal and axial force and pitching moment were made with and without the jets operating with ASME calibration nozzles (ref. 18). These calibrations are performed with the jets operating because this condition gives a more realistic effect of pressurizing the bellows than does capping off the nozzles and pressurizing the flow system. Thus, in addition to the usual balance-interaction corrections applied for a single force balance under combined loads, another set of interactions were made to the data to account for the combined loading effect of the main balance with the bellows system. These calibrations were performed over a range of expected normal forces and pitching moments. Note that this procedure is not necessary for the afterbody balance because the flow system is not bridged by the balance.

Data Adjustments

In order to achieve desired axial-force terms, the axial forces measured by both force balances must also be corrected for pressure-area tare forces acting on the model and the main balance corrected for momentum tare forces caused by flow in the bellows. The external seal and internal pressure forces on the model were obtained by multiplying the difference between the average pressure (external seal or internal pressures) and free-stream static pressure by the affected projected area normal to model axis. The momentum tare force was determined from calibrations with the ASME nozzle prior to the wind-tunnel investigation.

Axial force minus thrust was computed from the main balance axial force from the following relationship:

$$F_A - F_j = F_{A,\mathrm{Mbal}} + (\bar{p}_{es,1} - p_\infty)(A_{mb,1} - A_{\mathrm{seal},1}) + (\bar{p}_i - p_\infty)A_{\mathrm{seal},1} - F_{A,\mathrm{mom}} + D_f \tag{A1}$$

where $F_{A,\mathrm{Mbal}}$ includes all pressure and viscous forces, internal and external, on both the afterbody and thrust system. The second and third terms of equation (A1) account for the forward seal rim and interior pressure forces, respectively. In terms of an axial-force coefficient, the second term ranges from −0.0001 to −0.0007 and the third term varies ±0.0075, depending upon Mach number and pressure ratio. The internal pressure at any given set of test conditions was uniform throughout the inside of the model; thus, no cavity flow was indicated. The momentum tare force $F_{A,\mathrm{mom}}$ is a momentum tare correction with jets operating and is a function of the average bellows internal pressure that is a function of the internal chamber pressure in the supply pipes just ahead of the sonic nozzles (fig. 7). Although the bellows were designed to minimize momentum and pressurization tares, small bellows tares still exist with the jet on. These tares result from small pressure differences between the ends of the bellows when internal velocities are high and also from small differences in the forward and aft bellows spring constants when the bellows are pressurized. The last term of equation (A1) D_f is the friction drag of the section from FS 113.67 to FS 122.68. A friction drag coefficient of 0.0004 was applied at all Mach numbers.

Afterbody axial force is computed from the following relationship:

$$F_{\mathrm{aft}} = F_{A,\mathrm{Sbal}} + (\bar{p}_{es,2} - p_\infty)(A_{mb,1} - A_{\mathrm{seal},1}) + (\bar{p}_i - p_\infty)A_{\mathrm{seal},2} + (\bar{p}_{es,3} - p_\infty)(A_{mb,2} - A_{\mathrm{seal},2}) \tag{A2}$$

Since both balances are offset from the model centerline, similar adjustments are made to the pitching moments measured by both balances. These adjustments are necessary because both the pressure area and bellows momentum tare forces are assumed to act along the model centerline. The pitching-moment tare is determined by multiplying the tare force by the appropriate moment arm and subtracting the value from the measured pitching moments.

Model Attitude

The adjusted forces and moments measured by both balances were transferred from the body axis (which lies in the horizontal tail chord plane) of the metric portion of the model to the stability axis. Attitude of the nonmetric forebody relative to gravity was determined from a calibrated attitude indicator located in the model nose. Angle of attack α, which is the angle between the afterbody centerline and the relative wind, was determined by applying terms for afterbody deflection when the model and balance bent under aerodynamic load and by a flow angularity term to the angle measured by the attitude indicator. The flow angularity adjustment was 0.1°, which is the average angle measured in the Langley 16-Foot Transonic Tunnel.

Thrust-Removed Characteristics

The resulting external and internal thrust force and moment coefficients from the main balance include total lift coefficient $C_{L,t}$, drag-minus-thrust coefficient $C_{(D-F)}$, and total pitching-moment coefficient $C_{m,t}$. Force and moment coefficients from the afterbody balance are afterbody (plus tails) lift coefficient $C_{L,\mathrm{aft}}$, afterbody drag $C_{D,\mathrm{aft}}$, and afterbody pitching-moment coefficient $C_{m,\mathrm{aft}}$.

Thrust-removed aerodynamic force and moment coefficients for the entire model were obtained by determining the components of thrust in axial force, normal force, and pitching moment and by subtracting these values from the measured total (aerodynamic plus thrust) forces and moments. These thrust components at forward speeds were determined from measured static data and were a function of the free-stream static and dynamic pressures. Thrust-removed aerodynamic coefficients are:

$$C_L = C_{L,t} - \text{Jet lift coefficient} \quad \text{(A3)}$$

$$C_D = C_{(D-F)} + \text{Thrust coefficient} \quad \text{(A4)}$$

$$C_m = C_{m,t} - \text{Jet pitching-moment coefficient} \quad \text{(A5)}$$

Nozzle coefficients are obtained by simply combining the measured results from both force balances as follows:

$$C_{L,n} = C_L - C_{L,\mathrm{aft}} \quad \text{(A6)}$$

$$C_{D,n} = C_D - C_{D,\mathrm{aft}} \quad \text{(A7)}$$

$$C_{m,n} = C_m - C_{m,\mathrm{aft}} \quad \text{(A8)}$$

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TABLE 1. INDEX TO DATA TABLES

Table	Reverser	Deployment	Vertical tail position	ϕ_t, deg	δ_h, deg
2	A	Stowed	Forward	0	0
3					-5
4					-10
5	A	Deployed	Forward	0	0
6					-5
7					-10
8	A	Stowed	Mid	0	0
9					-5
10					-10
11	A	Deployed	Mid	0	0
12					-5
13					-10
14	A	Stowed	Mid	20	0
15					-5
16					-10
17	A	Deployed	Mid	20	0
18					-5
19					-10
20	A	Stowed	Aft	0	0
21					-5
22	A	Deployed	Aft	0	0
23					-5
24	B($\theta = 110°$)	Deployed	Mid	0	0
25					-5
26	B($\theta = 120°$)	Deployed	Mid	0	0
27					-5
28	B($\theta = 130°$)	Deployed	Mid	0	0
29					-5

TABLE 2. AERODYNAMIC CHARACTERISTICS FOR REVERSER A STOWED, VERTICAL TAILS IN FORWARD POSITION, $\phi_t = 0°$, AND $\delta_h = 0°$

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLN	CDN	CMN
.900	1.10	-.08	.0094	.0095	-.0203	.0094	.0091	-.0203	.0117	.0117	-.0197	-.0023	-.0027	-.0005
.900	1.99	-.09	.0071	-.0110	-.0150	.0082	.0087	-.0176	.0106	.0115	-.0176	-.0025	-.0028	.0000
.901	3.01	-.09	.0058	-.0295	-.0117	.0072	.0085	-.0161	.0103	.0115	-.0171	-.0031	-.0030	.0010
.902	5.02	-.08	.0041	-.0671	-.0065	.0061	.0088	-.0143	.0096	.0113	-.0161	-.0034	-.0025	.0018
.900	7.01	-.10	.0030	-.1051	-.0020	.0058	.0084	-.0132	.0092	.0113	-.0152	-.0034	-.0029	.0020
.900	1.10	-3.09	-.0028	.0086	-.0040	-.0028	.0082	-.0040	.0016	.0112	-.0045	-.0044	-.0029	.0006
.902	1.10	-.12	.0103	.0099	-.0204	.0103	.0095	-.0204	.0116	.0118	-.0196	-.0013	-.0022	-.0007
.900	1.10	2.92	.0227	.0115	-.0354	.0227	.0111	-.0354	.0230	.0132	-.0371	-.0003	-.0021	.0017
.897	1.10	5.90	.0419	.0152	-.0626	.0419	.0148	-.0626	.0388	.0154	-.0632	.0030	-.0006	.0006
.896	1.11	8.89	.0782	.0237	-.1128	.0782	.0233	-.1128	.0655	.0213	-.1065	.0128	.0020	-.0062
.900	5.03	-3.09	-.0127	-.0679	.0098	-.0067	.0082	.0020	-.0007	.0108	-.0008	-.0060	-.0026	.0028
.899	4.99	-.09	.0046	-.0670	-.0068	.0067	.0087	-.0146	.0100	.0114	-.0165	-.0033	-.0027	.0019
.899	4.98	2.91	.0241	-.0650	-.0267	.0222	.0107	-.0345	.0221	.0124	-.0357	.0001	-.0017	.0012
.897	4.97	5.90	.0475	-.0616	-.0540	.0416	.0140	-.0618	.0389	.0148	-.0627	.0028	-.0008	.0009
.897	4.99	8.91	.0851	-.0535	-.0994	.0751	.0220	-.1072	.0636	.0206	-.1031	.0115	.0014	-.0041
.600	1.05	-.09	.0046	.0067	-.0119	.0046	.0063	-.0119	.0105	.0087	-.0146	-.0058	-.0024	.0027
.602	2.01	-.09	.0024	-.0396	-.0046	.0048	.0056	-.0106	.0096	.0085	-.0132	-.0048	-.0029	.0026
.600	3.01	-.09	.0040	-.0809	-.0038	.0071	.0053	-.0137	.0103	.0086	-.0143	-.0031	-.0033	.0006
.602	3.50	-.10	.0041	-.1006	-.0023	.0076	.0060	-.0140	.0105	.0087	-.0146	-.0029	-.0027	.0006
.602	4.99	-.10	.0029	-.1631	.0040	.0075	.0064	-.0134	.0104	.0086	-.0144	-.0029	-.0022	.0010
.601	1.04	-3.10	-.0108	.0068	.0104	-.0108	.0064	.0104	-.0065	.0092	.0095	-.0043	-.0028	.0009
.602	1.05	-.10	.0079	.0080	-.0131	.0079	.0076	-.0131	.0106	.0089	-.0148	-.0027	-.0013	.0017
.601	1.04	2.89	.0278	.0107	-.0374	.0278	.0103	-.0374	.0286	.0101	-.0403	-.0008	.0002	.0029
.600	1.05	5.91	.0587	.0168	-.0764	.0587	.0164	-.0764	.0520	.0136	-.0757	.0067	.0029	-.0007
.601	1.05	8.89	.0876	.0254	-.1166	.0876	.0250	-.1166	.0752	.0193	-.1123	.0125	.0058	-.0043
.598	3.50	-3.08	-.0235	-.1021	.0271	-.0143	.0058	.0152	-.0105	.0093	.0151	-.0038	-.0035	.0001
.599	3.49	-.09	.0058	-.1003	-.0030	.0094	.0069	-.0147	.0109	.0087	-.0151	-.0015	-.0018	.0004
.599	3.49	2.89	.0366	-.0971	-.0348	.0345	.0103	-.0465	.0311	.0100	-.0444	.0034	.0003	-.0022
.600	3.50	5.90	.0741	-.0905	-.0740	.0663	.0167	-.0857	.0547	.0137	-.0798	.0116	.0030	-.0059
.602	3.50	8.88	.1077	-.0808	-.1144	.0945	.0248	-.1261	.0785	.0195	-.1175	.0160	.0053	-.0086
.151	1.00	-.10	-.0031	-.0215	-.0077	-.0031	-.0219	-.0077	.0183	-.0018	-.0235	-.0214	-.0201	.0158
.151	2.02	-.10	-.0356	-.7468	.0936	.0026	-.0213	-.0016	.0179	.0012	-.0228	-.0154	-.0225	.0212
.152	2.60	-.09	-.0279	-1.1151	.1025	.0168	-.0214	-.0275	.0202	.0021	-.0260	-.0034	-.0234	-.0015
.152	3.02	-.10	-.0301	-1.3798	.1251	.0195	-.0252	-.0295	.0212	.0026	-.0272	-.0018	-.0278	-.0024
.153	3.81	-.10	-.0376	-1.8638	.1720	.0204	-.0066	-.0272	.0208	.0033	-.0269	-.0005	-.0099	-.0003
.151	1.00	-3.10	-.0100	-.0268	.0182	-.0100	-.0272	.0182	.0004	.0229	.0003	-.0104	-.0500	.0179
.152	1.00	-.11	.0170	-.0111	-.0133	.0170	-.0115	-.0133	.0191	.0007	-.0246	-.0021	-.0122	.0113
.151	1.00	2.90	.0381	-.0013	-.0431	.0381	-.0017	-.0431	.0404	.0028	-.0552	-.0023	-.0046	.0120
.151	1.00	5.90	.0700	.0104	-.0780	.0700	.0100	-.0780	.0625	.0070	-.0871	.0075	.0029	.0092
.151	1.00	8.91	.1039	.0260	-.1210	.1039	.0256	-.1210	.0868	.0136	-.1242	.0172	.0120	.0032
.151	2.61	-3.09	-.0930	-1.1182	.1296	.0095	-.0203	-.0013	.0016	.0251	-.0009	.0079	-.0454	-.0004
.152	2.60	-.11	-.0049	-1.0988	.0913	.0399	-.0119	-.0380	.0204	.0047	-.0262	.0195	-.0166	-.0118
.152	2.59	2.90	.0711	-1.0930	.0604	.0588	-.0042	-.0691	.0435	.0069	-.0599	.0153	-.0111	-.0091
.151	2.61	5.91	.1663	-1.0919	.0203	.0958	.0073	-.1104	.0665	.0112	-.0942	.0293	-.0039	-.0162
.153	2.60	8.91	.2572	-1.0538	-.0276	.1314	.0229	-.1563	.0922	.0177	-.1343	.0392	.0053	-.0221

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TABLE 3. AERODYNAMIC CHARACTERISTICS FOR REVERSER A STOWED, VERTICAL TAILS IN FORWARD POSITION, $\phi_t = 0°$, AND $\delta_h = -5°$

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLN	CDN	CMN
.897	1.09	.01	-.0418	.0122	.0677	-.0418	.0118	.0677	-.0406	.0154	.0680	-.0012	-.0036	-.0003
.896	2.00	-.01	-.0475	-.0091	.0753	-.0464	.0109	.0726	-.0424	.0149	.0709	-.0041	-.0041	.0017
.898	3.01	-.02	-.0522	-.0273	.0834	-.0508	.0109	.0790	-.0442	.0152	.0738	-.0066	-.0043	.0052
.899	4.99	-.00	-.0564	-.0646	.0914	-.0545	.0112	.0836	-.0462	.0152	.0768	-.0083	-.0041	.0068
.899	7.00	-.00	-.0593	-.1030	.0974	-.0568	.0107	.0862	-.0471	.0151	.0781	-.0097	-.0044	.0080
.897	1.08	-3.02	-.0547	.0154	.0848	-.0547	.0150	.0848	-.0512	.0178	.0843	-.0035	-.0028	.0005
.899	1.08	-.02	-.0453	.0130	.0691	-.0453	.0126	.0691	-.0406	.0154	.0681	-.0046	-.0028	.0010
.898	1.08	2.99	-.0314	.0107	.0498	-.0314	.0103	.0498	-.0288	.0136	.0497	-.0026	-.0033	.0001
.897	1.09	5.98	-.0162	.0094	.0230	-.0162	.0090	.0230	-.0123	.0127	.0224	-.0039	-.0037	.0006
.901	1.10	8.99	.0100	.0115	-.0153	.0100	.0111	-.0153	.0082	.0137	-.0111	.0017	-.0025	-.0042
.901	5.02	-3.02	-.0719	-.0614	.1086	-.0659	.0145	.1008	-.0568	.0182	.0932	-.0092	-.0037	.0075
.902	5.01	-.02	-.0582	-.0640	.0923	-.0563	.0115	.0845	-.0462	.0154	.0768	-.0100	-.0039	.0077
.898	5.00	2.97	-.0394	-.0672	.0726	-.0414	.0088	.0648	-.0340	.0133	.0582	-.0073	-.0045	.0065
.899	5.01	5.98	-.0204	-.0690	.0471	-.0265	.0068	.0393	-.0188	.0119	.0327	-.0077	-.0051	.0066
.900	5.01	8.99	.0094	-.0674	.0085	-.0006	.0079	.0007	.0048	.0129	-.0044	-.0054	-.0050	.0051
.599	1.04	-.01	-.0499	.0100	.0751	-.0499	.0096	.0751	-.0413	.0130	.0696	-.0086	-.0034	.0055
.601	2.01	-.02	-.0547	-.0372	.0871	-.0524	.0082	.0811	-.0447	.0129	.0745	-.0077	-.0047	.0066
.601	3.00	-.02	-.0555	-.0780	.0911	-.0525	.0075	.0813	-.0456	.0130	.0758	-.0069	-.0055	.0055
.601	3.52	-.00	-.0559	-.0996	.0933	-.0525	.0081	.0815	-.0460	.0130	.0763	-.0065	-.0049	.0052
.600	5.02	-.03	-.0576	-.1634	.0996	-.0531	.0081	.0820	-.0471	.0129	.0775	-.0060	-.0049	.0045
.600	1.04	-3.02	-.0638	.0129	.0992	-.0638	.0125	.0992	-.0586	.0164	.0948	-.0052	-.0039	.0044
.601	1.04	-.01	-.0452	.0103	.0737	-.0452	.0099	.0737	-.0414	.0130	.0699	-.0038	-.0031	.0039
.601	1.04	2.97	-.0277	.0089	.0490	-.0277	.0085	.0490	-.0232	.0113	.0435	-.0045	-.0028	.0055
.600	1.04	5.98	-.0041	.0100	.0136	-.0041	.0096	.0136	-.0009	.0114	.0099	-.0032	-.0018	.0037
.600	1.05	9.01	.0189	.0129	-.0207	.0189	.0125	-.0207	.0197	.0126	-.0221	-.0008	-.0001	.0014
.599	3.51	-3.02	-.0803	-.0962	.1216	-.0712	.0120	.1098	-.0646	.0167	.1036	-.0066	-.0048	.0061
.601	3.52	-.03	-.0540	-.0991	.0927	-.0506	.0086	.0809	-.0463	.0129	.0766	-.0044	-.0043	.0043
.602	3.51	2.99	-.0267	-.1008	.0615	-.0290	.0066	.0497	-.0260	.0109	.0470	-.0030	-.0043	.0028
.600	3.51	5.98	.0025	-.1002	.0265	-.0054	.0073	.0147	-.0031	.0109	.0128	-.0023	-.0036	.0019
.597	3.50	8.98	.0348	-.0961	-.0116	.0211	.0115	-.0235	.0202	.0124	-.0228	.0010	-.0009	-.0007
.150	1.00	-.02	-.0643	.0463	.0729	-.0643	.0459	.0729	-.0377	.0102	.0638	-.0266	.0357	.0091
.150	2.00	-.03	-.1020	-.7044	.1858	-.0643	.0198	.0904	-.0647	.0124	.0999	.0005	.0075	-.0095
.151	2.61	-.04	-.0978	-1.1014	.2017	-.0536	.0091	.0698	-.0482	.0113	.0794	-.0054	-.0022	-.0096
.151	3.00	-.02	-.1026	-1.3533	.2248	-.0544	.0039	.0695	-.0493	.0114	.0806	-.0052	-.0074	-.0111
.151	3.80	-.02	-.1126	-1.8797	.2763	-.0562	.0137	.0732	-.0488	.0116	.0798	-.0074	.0020	-.0066
.150	1.00	-3.03	-.0653	.0030	.1027	-.0653	.0026	.1027	-.0599	.0326	.0946	-.0054	-.0300	.0081
.150	1.00	-.02	-.0404	.0070	.0710	-.0404	.0066	.0710	-.0410	.0098	.0684	.0006	-.0032	.0026
.150	1.00	2.97	-.0228	.0200	.0442	-.0228	.0196	.0442	-.0226	.0082	.0413	-.0002	.0114	.0029
.150	1.00	5.99	.0023	.0270	.0144	.0023	.0266	.0144	-.0020	.0083	.0116	.0043	.0182	.0027
.149	1.00	8.99	.0285	.0392	-.0257	.0285	.0388	-.0257	.0210	.0099	-.0234	.0074	.0289	-.0023
.151	2.62	-3.02	-.1673	-1.1170	.2327	-.0643	.0028	.0994	-.0681	.0312	.1070	.0038	-.0283	-.0076
.151	2.61	-.00	-.0765	-1.1089	.1948	-.0330	.0037	.0628	-.0476	.0107	.0782	.0146	-.0069	-.0155
.151	2.61	2.98	.0018	-1.1027	.1612	-.0125	.0098	.0293	-.0267	.0090	.0473	.0142	.0008	-.0181
.151	2.62	5.98	.0903	-1.1062	.1263	.0171	.0122	-.0066	-.0011	.0093	.0102	.0182	.0029	-.0168
.150	2.62	8.97	.1768	-1.0975	.0867	.0447	.0226	-.0470	.0254	.0123	-.0295	.0193	.0103	-.0175

TABLE 4. AERODYNAMIC CHARACTERISTICS FOR REVERSER A STOWED, VERTICAL TAILS IN FORWARD POSITION, $\phi_t = 0°$, AND $\delta_h = -10°$

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLN	CDN	CMN
.601	1.04	-.01	-.1016	.0169	.1713	-.1016	.0165	.1713	-.0969	.0240	.1587	-.0047	-.0075	.0125
.599	2.00	.00	-.1074	-.0294	.1806	-.1051	.0158	.1745	-.0994	.0236	.1621	-.0057	-.0078	.0124
.598	3.00	.00	-.1117	-.0706	.1886	-.1087	.0154	.1787	-.1013	.0238	.1649	-.0074	-.0084	.0138
.597	3.51	-.00	-.1134	-.0924	.1913	-.1100	.0165	.1794	-.1017	.0239	.1654	-.0083	-.0074	.0140
.600	4.99	-.01	-.1159	-.1539	.1972	-.1115	.0170	.1797	-.1025	.0237	.1664	-.0090	-.0068	.0133
.598	1.03	-2.99	-.1181	.0255	.1915	-.1181	.0251	.1915	-.1109	.0306	.1790	-.0071	-.0056	.0125
.599	1.04	.01	-.1035	.0190	.1714	-.1035	.0186	.1714	-.0969	.0238	.1590	-.0066	-.0052	.0125
.600	1.04	3.00	-.0854	.0134	.1459	-.0854	.0130	.1459	-.0795	.0181	.1339	-.0058	-.0050	.0121
.598	1.04	6.00	-.0602	.0111	.1085	-.0602	.0107	.1085	-.0566	.0138	.0998	-.0036	-.0031	.0087
.600	1.05	9.01	-.0367	.0094	.0725	-.0367	.0090	.0725	-.0340	.0120	.0647	-.0027	-.0030	.0078
.599	3.50	-3.00	-.1375	-.0829	.2150	-.1284	.0244	.2033	-.1167	.0310	.1871	-.0117	-.0066	.0161
.599	3.51	.01	-.1145	-.0906	.1912	-.1111	.0173	.1794	-.1016	.0236	.1653	-.0096	-.0063	.0140
.600	3.51	3.01	-.0889	-.0966	.1629	-.0912	.0111	.1511	-.0833	.0176	.1389	-.0079	-.0064	.0123
.597	3.50	6.00	-.0584	-.1004	.1267	-.0664	.0077	.1148	-.0608	.0132	.1055	-.0056	-.0055	.0093
.599	3.51	9.00	-.0255	-.1009	.0848	-.0392	.0064	.0730	-.0349	.0114	.0655	-.0043	-.0050	.0075
.152	1.00	-.01	-.1173	.0716	.1651	-.1173	.0712	.1651	-.0956	.0173	.1549	-.0218	.0540	.0102
.152	2.02	-.02	-.1695	-.6977	.2880	-.1325	.0265	.1930	-.1224	.0206	.1912	-.0100	.0059	.0018
.152	2.62	-.02	-.1682	-1.0814	.3035	-.1250	.0161	.1733	-.1292	.0212	.1998	.0042	-.0052	-.0265
.152	3.01	-.01	-.1733	-1.3389	.3279	-.1261	.0065	.1741	-.1340	.0219	.2062	.0079	-.0154	-.0321
.152	3.82	-.02	-.1858	-1.8889	.3829	-.1294	.0102	.1795	-.1126	.0188	.1798	-.0168	-.0086	-.0003
.150	1.00	-3.02	-.1207	.0045	.1917	-.1207	.0041	.1917	-.1127	.0362	.1791	-.0080	-.0321	.0125
.150	1.00	.00	-.0965	.0057	.1616	-.0965	.0053	.1616	-.0943	.0186	.1532	-.0021	-.0133	.0084
.152	1.00	3.00	-.0795	.0118	.1355	-.0795	.0114	.1355	-.0748	.0138	.1250	-.0047	-.0023	.0105
.152	1.00	5.98	-.0513	.0178	.0994	-.0513	.0174	.0994	-.0528	.0103	.0920	.0015	.0070	.0074
.152	1.00	8.97	-.0259	.0250	.0605	-.0259	.0246	.0605	-.0289	.0100	.0558	.0030	.0145	.0047
.153	2.60	-3.01	-.2275	-1.0701	.3231	-.1283	.0065	.1947	-.1457	.0380	.2236	.0174	-.0315	-.0289
.148	2.61	-.01	-.1518	-1.1478	.3030	-.1065	.0016	.1665	-.1296	.0227	.2003	.0231	-.0210	-.0338
.149	2.61	2.99	-.0713	-1.1413	.2704	-.0861	-.0012	.1351	-.1099	.0156	.1710	.0238	-.0169	-.0359
.149	2.61	5.99	.0233	-1.1464	.2330	-.0516	-.0024	.0970	-.0857	.0109	.1351	.0341	-.0133	-.0382
.148	2.61	8.97	.1152	-1.1368	.1869	-.0198	.0062	.0504	-.0379	.0093	.0685	.0181	-.0031	-.0181

TABLE 5. AERODYNAMIC CHARACTERISTICS FOR REVERSER A DEPLOYED, VERTICAL TAILS IN FORWARD POSITION, $\phi_t = 0°$, AND $\delta_h = 0°$

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLN	CDN	CMN
.902	1.15	.01	.0108	.0142	-.0170	.0108	.0138	-.0170	.0103	.0105	-.0171	.0005	.0034	.0000
.899	2.03	-.01	.0128	.0216	-.0232	.0135	.0150	-.0232	.0130	.0025	-.0206	.0005	.0125	-.0026
.898	3.01	-.02	.0094	.0277	-.0210	.0118	.0144	-.0210	.0120	-.0005	-.0190	-.0002	.0149	-.0021
.898	5.01	.00	.0019	.0399	-.0160	.0076	.0128	-.0186	.0089	-.0028	-.0152	-.0013	.0156	-.0034
.896	7.01	-.03	-.0036	.0523	-.0126	.0014	.0111	-.0120	.0066	-.0047	-.0127	-.0052	.0158	.0007
.900	5.00	-2.99	-.0152	.0405	.0114	-.0110	.0133	.0088	-.0081	-.0023	.0099	-.0029	.0156	-.0011
.899	5.01	-.02	.0008	.0398	-.0154	.0064	.0127	-.0181	.0085	-.0028	-.0147	-.0020	.0155	-.0034
.900	5.01	3.02	.0172	.0425	-.0403	.0243	.0159	-.0430	.0210	-.0013	-.0351	.0033	.0171	-.0079
.898	5.01	5.99	.0350	.0464	-.0656	.0434	.0200	-.0683	.0398	.0016	-.0613	.0036	.0184	-.0070
.901	5.01	8.99	.0696	.0528	-.1128	.0793	.0271	-.1155	.0677	.0070	-.1041	.0116	.0200	-.0113
.598	1.06	-.01	.0014	.0114	-.0104	.0014	.0110	-.0104	.0094	.0084	-.0133	-.0080	.0027	.0030
.603	2.00	-.01	-.0012	.0288	-.0119	.0004	.0148	-.0119	.0084	.0008	-.0131	-.0079	.0140	.0011
.598	3.01	-.01	-.0049	.0466	-.0109	.0005	.0170	-.0109	.0061	-.0003	-.0107	-.0056	.0173	-.0002
.601	3.52	.01	-.0058	.0561	-.0113	.0014	.0192	-.0109	.0051	-.0005	-.0096	-.0037	.0197	-.0013
.601	5.02	.01	-.0101	.0841	-.0111	.0026	.0238	-.0170	.0043	-.0011	-.0092	-.0017	.0249	-.0078
.601	3.50	-2.99	-.0250	.0562	.0208	-.0197	.0193	.0212	-.0177	.0002	.0231	-.0020	.0191	-.0018
.602	3.50	-.01	-.0039	.0564	-.0115	.0032	.0198	-.0111	.0048	-.0004	-.0091	-.0016	.0202	-.0021
.600	3.50	3.01	.0213	.0585	-.0468	.0303	.0221	-.0463	.0282	.0007	-.0432	.0022	.0213	-.0032
.598	3.50	5.99	.0418	.0618	-.0741	.0528	.0258	-.0741	.0451	.0035	-.0668	.0077	.0223	-.0073
.602	3.51	9.01	.0613	.0660	-.1019	.0740	.0309	-.1015	.0635	.0074	-.0948	.0105	.0234	-.0067
.151	1.00	-.01	-.0209	-.0344	.0010	-.0209	-.0348	.0010	.0097	.0036	-.0133	-.0306	-.0385	.0144
.150	2.00	-.02	-.0599	.3013	-.0224	-.0326	.0809	-.0224	-.0175	.0031	.0158	-.0151	.0778	-.0381
.150	2.61	.01	-.0791	.4771	-.0327	-.0162	.1096	-.0327	-.0258	.0052	.0236	.0096	.1044	-.0563
.150	3.02	.00	-.0861	.5879	-.0406	.0009	.1206	-.0406	-.0302	.0077	.0304	.0310	.1128	-.0710
.149	3.81	-.00	-.1103	.7975	-.0499	.0246	.1287	-.0641	-.0383	.0093	.0385	.0629	.1194	-.1026
.150	2.62	-3.00	-.0635	.4909	-.0132	-.0196	.1192	-.0132	-.0432	.0084	.0488	.0236	.1108	-.0620
.150	2.61	.02	-.0649	.4850	-.0346	-.0021	.1191	-.0346	-.0283	.0065	.0287	.0262	.1126	-.0633
.150	2.61	2.99	-.0715	.4868	-.0590	.0103	.1239	-.0590	-.0115	.0047	.0044	.0218	.1192	-.0634
.150	2.61	5.99	-.0648	.4951	-.0994	.0370	.1333	-.0994	.0336	.0111	-.0565	.0035	.1222	-.0429
.150	2.61	8.99	-.0654	.4896	-.1289	.0538	.1374	-.1289	.0537	.0148	-.0873	.0000	.1226	-.0416

TABLE 6. AERODYNAMIC CHARACTERISTICS FOR REVERSER A DEPLOYED, VERTICAL TAILS IN FORWARD POSITION, $\phi_t = 0°$, AND $\delta_h = -5°$

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLN	CDN	CMN
.900	1.12	-.03	-.0373	.0162	.0606	-.0373	.0158	.0606	-.0356	.0131	.0598	-.0017	.0027	.0008
.900	2.02	-.00	-.0361	.0226	.0535	-.0354	.0160	.0535	-.0314	.0049	.0536	-.0040	.0110	-.0000
.898	3.00	-.02	-.0357	.0293	.0497	-.0333	.0160	.0497	-.0303	.0019	.0513	-.0029	.0141	-.0017
.897	4.99	.00	-.0367	.0415	.0464	-.0310	.0145	.0438	-.0303	-.0005	.0499	-.0007	.0151	-.0061
.898	7.01	-.00	-.0382	.0541	.0439	-.0332	.0131	.0444	-.0300	-.0025	.0482	-.0032	.0156	-.0039
.900	5.03	-3.03	-.0524	.0455	.0747	-.0482	.0181	.0721	-.0453	.0028	.0731	-.0029	.0153	-.0010
.901	5.01	-.00	-.0374	.0418	.0466	-.0317	.0149	.0440	-.0297	-.0007	.0489	-.0020	.0156	-.0049
.903	5.03	3.00	-.0272	.0401	.0265	-.0203	.0136	.0239	-.0187	-.0020	.0319	-.0016	.0155	-.0080
.897	5.00	5.99	-.0096	.0413	-.0035	-.0012	.0150	-.0062	.0015	-.0011	.0024	-.0027	.0161	-.0086
.900	5.00	8.99	.0240	.0446	-.0464	.0337	.0188	-.0491	.0283	.0009	-.0373	.0054	.0180	-.0118
.598	1.05	-.02	-.0373	.0165	.0521	-.0373	.0161	.0521	-.0303	.0105	.0520	-.0069	.0056	.0001
.600	2.01	-.02	-.0385	.0328	.0489	-.0367	.0185	.0489	-.0311	.0032	.0517	-.0056	.0153	-.0028
.599	3.01	-.02	-.0392	.0486	.0464	-.0338	.0191	.0464	-.0313	.0016	.0508	-.0025	.0175	-.0045
.598	3.49	-.02	-.0408	.0575	.0476	-.0336	.0206	.0476	-.0332	.0015	.0535	-.0004	.0192	-.0059
.598	5.01	-.02	-.0453	.0852	.0481	-.0326	.0247	.0422	-.0365	.0009	.0575	.0039	.0238	-.0153
.600	3.49	-3.00	-.0590	.0604	.0793	-.0538	.0235	.0793	-.0538	.0049	.0835	-.0000	.0186	-.0042
.601	3.51	-.02	-.0385	.0572	.0458	-.0313	.0205	.0462	-.0324	.0014	.0524	.0011	.0191	-.0062
.602	3.51	2.99	-.0166	.0559	.0091	-.0076	.0196	.0095	-.0101	.0001	.0190	.0025	.0195	-.0095
.600	3.50	5.99	.0018	.0564	-.0187	.0128	.0206	-.0187	.0102	.0007	-.0085	.0026	.0199	-.0102
.601	3.50	8.97	.0253	.0593	-.0522	.0381	.0242	-.0518	.0315	.0028	-.0408	.0066	.0213	-.0110
.150	1.00	-.02	-.0643	.0332	.0664	-.0643	.0328	.0664	-.0324	.0058	.0561	-.0319	.0270	.0103
.149	2.00	-.03	-.0967	.3285	.0480	-.0691	.1053	.0480	-.0649	.0057	.0954	-.0043	.0996	-.0474
.149	2.60	-.01	-.1166	.4960	.0409	-.0531	.1238	.0409	-.0781	.0103	.1131	.0250	.1135	-.0722
.148	3.01	-.01	-.1304	.6057	.0414	-.0424	.1319	.0414	-.0854	.0121	.1221	.0429	.1198	-.0806
.148	3.80	-.01	-.1610	.8126	.0447	-.0251	.1383	.0306	-.1006	.0121	.1403	.0754	.1262	-.1096
.149	2.61	-3.02	-.1030	.5028	.0630	-.0591	.1292	.0630	-.0923	.0141	.1330	.0332	.1152	-.0699
.149	2.60	-.02	-.1053	.4999	.0379	-.0422	.1300	.0379	-.0729	.0093	.1064	.0307	.1206	-.0685
.149	2.61	2.99	-.1085	.4948	.0125	-.0260	.1284	.0125	-.0612	.0077	.0882	.0353	.1207	-.0756
.149	2.60	5.98	-.1113	.4962	-.0169	-.0098	.1343	-.0169	-.0432	.0059	.0627	.0334	.1284	-.0796
.149	2.61	8.97	-.1152	.4922	-.0495	.0048	.1370	-.0495	-.0244	.0045	.0327	.0291	.1325	-.0823

TABLE 7. AERODYNAMIC CHARACTERISTICS FOR REVERSER A DEPLOYED, VERTICAL TAILS IN FORWARD POSITION, $\phi_t = 0°$, AND $\delta_h = -10°$

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLN	CDN	CMN
.509	1.04	.03	-.0781	.0241	.1316	-.0781	.0237	.1316	-.0795	.0205	.1318	.0014	.0032	-.0001
.598	2.00	.01	-.0792	.0407	.1254	-.0775	.0264	.1254	-.0771	.0127	.1272	-.0004	.0137	-.0018
.599	3.01	.01	-.0778	.0560	.1168	-.0724	.0265	.1168	-.0741	.0103	.1217	.0017	.0162	-.0049
.598	3.50	-.00	-.0775	.0634	.1138	-.0703	.0264	.1142	-.0731	.0095	.1198	.0028	.0169	-.0055
.598	5.00	-.01	-.0770	.0863	.1048	-.0643	.0258	.0988	-.0723	.0080	.1172	.0080	.0178	-.0184
.599	3.51	-2.99	-.0989	.0709	.1479	-.0935	.0334	.1483	-.0951	.0165	.1528	.0016	.0169	-.0044
.598	3.51	.03	-.0778	.0644	.1130	-.0706	.0273	.1134	-.0729	.0094	.1194	.0023	.0179	-.0060
.599	3.51	3.00	-.0566	.0606	.0764	-.0474	.0240	.0768	-.0513	.0047	.0868	.0039	.0192	-.0100
.598	3.51	5.99	-.0385	.0589	.0470	-.0274	.0226	.0474	-.0314	.0029	.0590	.0040	.0197	-.0116
.597	3.51	9.01	-.0164	.0578	.0086	-.0034	.0221	.0090	-.0075	.0021	.0223	.0041	.0199	-.0134
.150	1.00	.00	-.0934	.0744	.1309	-.0934	.0740	.1309	-.0797	.0167	.1314	-.0137	.0573	-.0004
.150	2.01	.01	-.1335	.3409	.1171	-.1058	.1196	.1171	-.1133	.0179	.1757	.0075	.1017	-.0586
.149	2.61	.01	-.1656	.5062	.1313	-.1021	.1353	.1313	-.1368	.0244	.2103	.0346	.1108	-.0790
.150	3.01	.00	-.1788	.6056	.1286	-.0919	.1385	.1286	-.1382	.0254	.2112	.0463	.1131	-.0826
.149	3.81	.00	-.2139	.8125	.1398	-.0784	.1416	.1256	-.1570	.0253	.2349	.0785	.1162	-.1093
.149	2.60	-3.01	-.1489	.5053	.1500	-.1052	.1328	.1500	-.1450	.0297	.2209	.0398	.1032	-.0708
.150	2.60	.02	-.1470	.4982	.1187	-.0842	.1315	.1187	-.1304	.0237	.2001	.0462	.1078	-.0815
.150	2.60	3.02	-.1565	.4912	.0990	-.0747	.1289	.0990	-.1168	.0166	.1802	.0420	.1123	-.0812
.150	2.60	6.00	-.1514	.4833	.0600	-.0511	.1265	.0600	-.0928	.0116	.1444	.0417	.1149	-.0844
.150	2.60	8.99	-.1593	.4771	.0316	-.0403	.1249	.0316	-.0765	.0086	.1191	.0362	.1163	-.0875

TABLE 8. AERODYNAMIC CHARACTERISTICS FOR REVERSER A STOWED, VERTICAL TAILS IN MID POSITION, $\phi_t = 0°$, AND $\delta_h = 0°$

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLN	CDN	CMN
.901	1.09	-.04	.0125	.0129	-.0226	.0125	.0125	-.0226	.0136	.0149	-.0260	-.0011	-.0025	.0034
.896	1.99	-.03	.0091	-.0079	-.0170	.0102	.0119	-.0197	.0126	.0142	-.0241	-.0024	-.0023	.0044
.900	3.00	-.05	.0095	-.0257	-.0169	.0109	.0121	-.0212	.0128	.0143	-.0246	-.0020	-.0023	.0034
.902	5.03	-.03	.0095	-.0633	-.0142	.0115	.0127	-.0220	.0132	.0144	-.0253	-.0017	-.0017	.0033
.897	7.01	-.04	.0094	-.1025	-.0111	.0121	.0120	-.0224	.0130	.0139	-.0249	-.0010	-.0018	.0025
.899	1.10	-3.02	.0010	.0114	-.0085	.0010	.0110	-.0085	.0058	.0135	-.0130	-.0048	-.0024	.0045
.901	1.09	-.04	.0114	.0128	-.0224	.0114	.0124	-.0224	.0138	.0148	-.0263	-.0024	-.0024	.0039
.897	1.09	2.96	.0200	.0143	-.0335	.0200	.0139	-.0335	.0220	.0161	-.0396	-.0021	-.0023	.0061
.898	1.08	5.95	.0315	.0170	-.0500	.0315	.0166	-.0500	.0325	.0180	-.0574	-.0010	-.0014	.0073
.900	1.10	8.96	.0702	.0253	-.1013	.0702	.0249	-.1013	.0620	.0242	-.1042	.0082	.0006	.0029
.899	5.00	-3.03	-.0064	-.0646	.0004	-.0004	.0111	-.0074	.0053	.0128	-.0122	-.0057	-.0017	.0047
.901	5.00	-.03	.0085	-.0633	-.0137	.0105	.0123	-.0215	.0130	.0142	-.0251	-.0025	-.0020	.0036
.901	5.01	2.97	.0260	-.0617	-.0307	.0240	.0141	-.0385	.0224	.0157	-.0410	.0015	-.0016	.0025
.899	5.00	5.97	.0461	-.0587	-.0557	.0401	.0171	-.0636	.0376	.0180	-.0657	.0025	-.0010	.0021
.900	5.02	8.93	.0886	-.0494	-.1051	.0787	.0260	-.1129	.0661	.0245	-.1108	.0126	.0015	-.0021
.601	1.05	-.03	.0080	.0073	-.0154	.0080	.0069	-.0154	.0115	.0091	-.0177	-.0035	-.0022	.0024
.600	2.01	-.05	.0066	-.0389	-.0092	.0089	.0066	-.0152	.0113	.0090	-.0174	-.0023	-.0024	.0022
.598	3.02	-.04	.0096	-.0805	-.0104	.0127	.0066	-.0204	.0127	.0092	-.0194	.0001	-.0026	-.0010
.601	3.51	-.04	.0098	-.1003	-.0091	.0133	.0075	-.0209	.0128	.0092	-.0197	.0005	-.0017	-.0012
.600	5.02	-.04	.0087	-.1634	-.0029	.0132	.0082	-.0205	.0125	.0093	-.0193	.0007	-.0010	-.0012
.600	1.04	-3.03	-.0072	.0077	.0066	-.0072	.0073	.0066	-.0046	.0090	.0056	-.0026	-.0017	.0010
.601	1.05	-.03	.0104	.0088	-.0158	.0104	.0084	-.0158	.0114	.0095	-.0176	-.0010	-.0011	.0018
.601	1.04	2.98	.0291	.0119	-.0394	.0291	.0115	-.0394	.0285	.0114	-.0425	.0006	.0001	.0031
.602	1.04	5.97	.0592	.0164	-.0763	.0592	.0160	-.0763	.0501	.0152	-.0757	.0091	.0008	-.0005
.599	1.05	8.97	.0886	.0264	-.1183	.0886	.0260	-.1183	.0747	.0217	-.1151	.0139	.0043	-.0032
.602	3.49	-3.04	-.0180	-.0986	.0202	-.0091	.0071	.0085	-.0064	.0089	.0083	-.0026	-.0018	.0002
.603	3.51	-.03	.0110	-.0979	-.0100	.0144	.0087	-.0217	.0126	.0094	-.0194	.0017	-.0006	-.0022
.601	3.52	2.96	.0414	-.0955	-.0411	.0391	.0124	-.0529	.0322	.0115	-.0484	.0069	.0009	-.0045
.598	3.51	5.95	.0791	-.0895	-.0808	.0711	.0187	-.0926	.0552	.0157	-.0838	.0159	.0030	-.0089
.600	3.52	8.97	.1136	-.0798	-.1227	.1000	.0277	-.1346	.0792	.0222	-.1223	.0208	.0055	-.0123
.149	1.00	-.03	.0169	-.0090	-.0173	.0169	-.0094	-.0173	.0111	-.0032	-.0178	.0058	-.0063	.0005
.150	2.00	-.03	-.0221	-.7360	.0836	.0159	-.0049	-.0127	.0124	.0028	-.0192	.0035	-.0077	.0065
.150	2.61	-.04	-.0062	-1.1270	.0876	.0386	-.0039	-.0457	.0145	.0045	-.0222	.0241	-.0084	-.0236
.151	3.01	-.05	-.0041	-1.3771	.1025	.0450	-.0054	-.0542	.0135	.0056	-.0209	.0315	-.0110	-.0333
.150	3.79	-.03	-.0154	-1.9008	.1517	.0420	.0133	-.0538	.0161	.0070	-.0243	.0259	.0063	-.0295
.150	1.00	-3.02	.0111	-.0094	.0051	.0111	-.0098	.0051	-.0088	.0194	.0072	.0199	-.0292	-.0021
.149	1.00	-.08	.0344	-.0044	-.0231	.0344	-.0048	-.0231	.0111	.0021	-.0175	.0234	-.0069	-.0056
.149	1.00	2.92	.0591	.0107	-.0538	.0591	.0103	-.0538	.0291	.0104	-.0434	.0300	-.0001	-.0103
.150	1.00	5.92	.1044	.0227	-.0921	.1044	.0223	-.0921	.0471	.0202	-.0715	.0573	.0020	-.0206
.149	1.00	8.96	.1326	.0381	-.1380	.1326	.0377	-.1380	.0744	.0351	-.1158	.0582	.0027	-.0222
.150	2.61	-2.99	-.0708	-1.1218	.1113	.0321	.0016	-.0225	-.0081	.0202	.0069	.0402	-.0185	-.0293
.150	2.61	.14	.0219	-1.1121	.0739	.0631	.0084	-.0592	.0132	.0072	-.0210	.0499	.0012	-.0382
.150	2.62	2.99	.1027	-1.1161	.0417	.0878	.0144	-.0923	.0329	.0155	-.0501	.0549	-.0011	-.0423
.151	2.62	5.97	.1992	-1.0879	.0012	.1264	.0250	-.1310	.0549	.0265	-.0841	.0715	-.0015	-.0469
.150	2.62	8.95	.2871	-1.0816	-.0431	.1550	.0407	-.1770	.0800	.0400	-.1259	.0749	.0007	-.0511

TABLE 9. AERODYNAMIC CHARACTERISTICS FOR REVERSER A STOWED, VERTICAL TAILS IN MID POSITION, $\phi_t = 0°$, AND $\delta_h = -5°$

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLN	CDN	CMN
.901	1.08	-.00	-.0411	.0137	.0614	-.0411	.0133	.0614	-.0369	.0182	.0580	-.0042	-.0049	.0034
.899	2.01	-.01	-.0454	-.0074	.0664	-.0444	.0126	.0637	-.0379	.0172	.0597	-.0064	-.0046	.0040
.898	3.02	-.01	-.0495	-.0257	.0728	-.0481	.0126	.0684	-.0389	.0172	.0613	-.0093	-.0046	.0070
.901	4.99	-.00	-.0530	-.0628	.0801	-.0510	.0127	.0723	-.0411	.0173	.0647	-.0099	-.0046	.0076
.901	7.01	.02	-.0556	-.1018	.0859	-.0531	.0117	.0747	-.0424	.0171	.0666	-.0107	-.0054	.0081
.898	1.08	-2.98	-.0514	.0162	.0751	-.0514	.0158	.0751	-.0443	.0197	.0710	-.0071	-.0040	.0041
.900	1.08	-.01	-.0453	.0137	.0631	-.0453	.0133	.0631	-.0363	.0176	.0574	-.0090	-.0043	.0058
.898	1.08	2.99	-.0345	.0114	.0487	-.0345	.0110	.0487	-.0277	.0157	.0433	-.0068	-.0048	.0054
.897	1.08	6.03	-.0242	.0096	.0304	-.0242	.0092	.0304	-.0154	.0144	.0224	-.0088	-.0052	.0080
.897	1.09	9.03	.0082	.0119	-.0171	.0082	.0115	-.0171	.0101	.0163	-.0186	-.0019	-.0047	.0015
.899	5.01	-2.99	-.0656	-.0607	.0948	-.0597	.0154	.0870	-.0496	.0194	.0793	-.0101	-.0040	.0076
.901	5.00	.03	-.0541	-.0633	.0805	-.0522	.0123	.0727	-.0407	.0170	.0642	-.0115	-.0048	.0085
.901	5.02	3.01	-.0379	-.0665	.0642	-.0400	.0096	.0564	-.0319	.0150	.0497	-.0081	-.0054	.0067
.898	5.02	6.01	-.0213	-.0683	.0417	-.0274	.0078	.0339	-.0182	.0134	.0264	-.0093	-.0056	.0075
.899	5.01	9.00	.0121	-.0658	-.0011	.0021	.0098	-.0090	.0072	.0151	-.0136	-.0051	-.0053	.0046
.597	1.04	-.00	-.0505	.0086	.0696	-.0505	.0082	.0696	-.0378	.0122	.0629	-.0127	-.0041	.0067
.600	1.99	.01	-.0543	-.0375	.0803	-.0520	.0073	.0744	-.0414	.0124	.0679	-.0106	-.0050	.0064
.601	3.00	.02	-.0544	-.0789	.0836	-.0514	.0065	.0738	-.0416	.0125	.0682	-.0098	-.0060	.0055
.601	3.51	.01	-.0546	-.1001	.0855	-.0512	.0072	.0738	-.0422	.0125	.0690	-.0091	-.0053	.0047
.601	5.00	.00	-.0558	-.1635	.0914	-.0515	.0071	.0739	-.0429	.0124	.0699	-.0086	-.0054	.0040
.601	1.04	-3.01	-.0631	.0121	.0928	-.0631	.0117	.0928	-.0544	.0157	.0877	-.0087	-.0040	.0051
.597	1.04	.01	-.0451	.0093	.0679	-.0451	.0089	.0679	-.0378	.0126	.0629	-.0074	-.0037	.0050
.598	1.04	3.00	-.0288	.0077	.0449	-.0288	.0073	.0449	-.0211	.0110	.0380	-.0077	-.0037	.0068
.603	1.04	5.98	-.0070	.0083	.0118	-.0070	.0079	.0118	-.0001	.0111	.0058	-.0069	-.0032	.0059
.601	1.05	9.01	.0185	.0115	-.0259	.0185	.0111	-.0259	.0217	.0128	-.0285	-.0031	-.0017	.0026
.601	3.50	-2.99	-.0784	-.0953	.1143	-.0695	.0113	.1025	-.0606	.0161	.0967	-.0089	-.0048	.0058
.601	3.51	.00	-.0517	-.0996	.0844	-.0484	.0077	.0727	-.0423	.0126	.0693	-.0061	-.0049	.0034
.602	3.51	2.99	-.0250	-.1011	.0534	-.0273	.0058	.0417	-.0227	.0107	.0398	-.0046	-.0049	.0019
.601	3.50	6.00	.0028	-.1010	.0192	-.0051	.0060	.0075	-.0008	.0100	.0066	-.0043	-.0040	.0009
.597	3.52	9.00	.0364	-.0979	-.0197	.0226	.0105	-.0317	.0226	.0127	-.0300	.0000	-.0022	-.0016
.151	1.00	-.00	-.0790	.0401	.0716	-.0790	.0397	.0716	-.0381	.0055	.0630	-.0408	.0342	.0086
.153	1.99	.01	-.1209	-.6854	.1857	-.0849	.0134	.0935	-.0610	.0083	.0935	-.0239	.0051	.0000
.153	2.61	-.01	-.1098	-1.0798	.1920	-.0671	.0045	.0632	-.0449	.0073	.0732	-.0222	-.0028	-.0100
.153	3.00	.01	-.1101	-1.3349	.2108	-.0638	-.0036	.0586	-.0447	.0078	.0728	-.0191	-.0114	-.0143
.153	3.82	.00	-.1202	-1.8665	.2618	-.0652	.0045	.0612	-.0435	.0076	.0716	-.0217	-.0031	-.0103
.152	1.00	-3.01	-.0797	-.0079	.0986	-.0797	-.0083	.0986	-.0550	.0274	.0872	-.0247	-.0357	.0115
.152	1.00	.02	-.0516	-.0059	.0641	-.0516	-.0063	.0641	-.0359	.0072	.0596	-.0157	-.0135	.0044
.152	1.00	2.99	-.0371	.0033	.0410	-.0371	.0029	.0410	-.0174	.0062	.0325	-.0196	-.0033	.0084
.151	1.00	5.99	-.0152	.0084	.0138	-.0152	.0080	.0138	.0017	.0072	.0039	-.0169	.0008	.0099
.151	1.00	9.01	.0130	.0192	-.0276	.0130	.0188	-.0276	.0250	.0094	-.0322	-.0120	.0095	.0046
.152	2.60	-2.98	-.1692	-1.0793	.2179	-.0702	.0023	.0889	-.0619	.0274	.0982	-.0083	-.0251	-.0093
.151	2.61	.01	-.0789	-1.1065	.1836	-.0360	-.0055	.0528	-.0427	.0085	.0701	.0067	-.0140	-.0173
.151	2.61	3.00	.0065	-1.1069	.1460	-.0080	-.0016	.0148	-.0216	.0073	.0383	.0136	-.0089	-.0234
.151	2.61	6.02	.0945	-1.0988	.1088	.0215	.0066	-.0227	-.0007	.0079	.0062	.0222	-.0013	-.0289
.151	2.61	9.00	.1838	-1.0921	.0731	.0531	.0103	-.0586	.0246	.0111	-.0324	.0285	-.0009	-.0262

TABLE 10. AERODYNAMIC CHARACTERISTICS FOR REVERSER A STOWED, VERTICAL TAILS IN MID POSITION, $\phi_t = 0°$, AND $\delta_h = -10°$

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLN	CDN	CMN
.509	1.04	-.00	-.0927	.0176	.1603	-.0927	.0172	.1603	-.0917	.0248	.1502	-.0010	-.0076	.0100
.600	1.99	.01	-.0983	-.0289	.1704	-.0960	.0161	.1644	-.0945	.0242	.1541	-.0015	-.0081	.0104
.509	2.99	.01	-.1026	-.0702	.1784	-.0996	.0155	.1686	-.0965	.0244	.1571	-.0031	-.0089	.0115
.598	3.50	.01	-.1043	-.0918	.1813	-.1009	.0165	.1694	-.0971	.0244	.1578	-.0038	-.0079	.0116
.600	5.01	-.00	-.1070	-.1547	.1877	-.1026	.0167	.1701	-.0983	.0243	.1593	-.0043	-.0076	.0108
.509	1.03	-3.00	-.1082	.0256	.1804	-.1082	.0252	.1804	-.1053	.0310	.1705	-.0029	-.0058	.0099
.601	1.04	.01	-.0928	.0193	.1593	-.0928	.0189	.1593	-.0912	.0242	.1496	-.0017	-.0053	.0097
.601	1.04	3.01	-.0763	.0141	.1363	-.0763	.0137	.1363	-.0757	.0187	.1268	-.0007	-.0050	.0096
.509	1.04	6.01	-.0510	.0115	.0986	-.0510	.0111	.0986	-.0532	.0144	.0927	.0022	-.0033	.0059
.509	1.04	9.00	-.0292	.0101	.0634	-.0292	.0097	.0634	-.0301	.0129	.0564	.0008	-.0031	.0070
.600	3.50	-3.00	-.1282	-.0821	.2056	-.1192	.0249	.1939	-.1121	.0314	.1802	-.0072	-.0065	.0136
.508	3.49	-.01	-.1061	-.0901	.1816	-.1027	.0177	.1697	-.0973	.0241	.1582	-.0054	-.0064	.0115
.509	3.50	3.01	-.0811	-.0961	.1542	-.0834	.0119	.1424	-.0801	.0182	.1328	-.0034	-.0063	.0096
.601	3.50	6.00	-.0507	-.0985	.1177	-.0586	.0084	.1060	-.0575	.0139	.0987	-.0011	-.0054	.0073
.598	3.50	9.00	-.0184	-.0997	.0757	-.0320	.0072	.0639	-.0323	.0120	.0592	.0003	-.0048	.0047
.152	1.00	-.00	-.1451	.0622	.1676	-.1451	.0618	.1676	-.0934	.0162	.1510	-.0517	.0456	.0166
.150	2.00	-.01	-.1873	-.6970	.2882	-.1499	.0285	.1926	-.1202	.0204	.1873	-.0296	.0081	.0054
.152	2.62	.01	-.1804	-1.0928	.2979	-.1375	.0101	.1670	-.1240	.0207	.1916	-.0135	-.0106	-.0246
.151	3.01	-.01	-.1870	-1.3708	.3214	-.1389	-.0002	.1648	-.1283	.0205	.1971	-.0106	-.0207	-.0323
.151	3.82	-.01	-.1969	-1.9128	.3741	-.1400	.0084	.1682	-.1089	.0176	.1736	-.0311	-.0091	-.0054
.149	1.00	-2.99	-.1309	.0028	.1880	-.1309	.0024	.1880	-.1139	.0356	.1793	-.0170	-.0333	.0087
.149	1.00	-.01	-.1083	.0034	.1595	-.1083	.0030	.1595	-.0952	.0183	.1528	-.0131	-.0152	.0066
.150	1.00	2.98	-.0893	.0051	.1324	-.0893	.0047	.1324	-.0745	.0135	.1228	-.0148	-.0088	.0096
.149	1.00	6.01	-.0668	.0063	.1000	-.0668	.0059	.1000	-.0533	.0109	.0903	-.0134	-.0050	.0096
.149	1.00	8.99	-.0390	.0085	.0616	-.0390	.0081	.0616	-.0290	.0108	.0531	-.0099	-.0027	.0086
.150	2.62	-2.99	-.2396	-1.1170	.3229	-.1366	.0080	.1890	-.1416	.0382	.2174	.0050	-.0302	-.0285
.151	2.61	.02	-.1544	-1.1115	.2904	-.1112	.0012	.1583	-.1258	.0225	.1939	.0146	-.0213	-.0355
.151	2.61	2.98	-.0736	-1.1247	.2603	-.0880	-.0079	.1278	-.1041	.0150	.1616	.0160	-.0229	-.0338
.151	2.61	5.99	.0085	-1.1178	.2229	-.0643	-.0059	.0906	-.0635	.0091	.1059	-.0008	-.0150	-.0153
.150	2.61	9.01	.0995	-1.1094	.1789	-.0321	-.0007	.0464	-.0363	.0079	.0642	.0043	-.0086	-.0178

TABLE 11. AERODYNAMIC CHARACTERISTICS FOR REVERSER A DEPLOYED, VERTICAL TAILS IN MID POSITION, $\phi_t = 0°$, AND $\delta_h = 0°$

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLN	CDN	CMN
.902	2.03	-.01	.0107	.0201	-.0269	.0115	.0135	-.0269	.0116	.0014	-.0225	-.0001	.0121	-.0044
.903	3.01	.01	.0042	.0251	-.0187	.0066	.0119	-.0187	.0079	-.0016	-.0163	-.0012	.0135	-.0023
.903	5.01	.00	-.0030	.0366	-.0126	.0026	.0098	-.0152	.0031	-.0042	-.0101	-.0005	.0140	-.0052
.903	7.06	.02	-.0075	.0487	-.0106	-.0026	.0078	-.0100	.0005	-.0066	-.0073	-.0031	.0144	-.0027
.901	5.03	-3.03	-.0182	.0383	.0138	-.0140	.0110	.0112	-.0131	-.0036	.0149	-.0009	.0145	-.0037
.904	5.02	-.01	-.0022	.0371	-.0132	.0034	.0102	-.0158	.0029	-.0042	-.0098	.0005	.0143	-.0060
.903	5.05	3.02	.0095	.0391	-.0326	.0165	.0124	-.0352	.0126	-.0032	-.0259	.0039	.0155	-.0092
.900	5.03	5.98	.0269	.0430	-.0581	.0353	.0166	-.0607	.0302	-.0004	-.0514	.0051	.0169	-.0093
.902	5.02	8.99	.0621	.0492	-.1047	.0717	.0234	-.1073	.0583	.0044	-.0938	.0134	.0191	-.0135
.603	1.05	-.01	.0018	.0119	-.0097	.0018	.0115	-.0097	.0064	.0077	-.0104	-.0046	.0038	.0007
.603	2.01	.01	.0006	.0279	-.0139	.0023	.0138	-.0139	.0050	-.0002	-.0111	-.0027	.0140	-.0028
.602	3.04	.00	-.0047	.0443	-.0110	.0008	.0147	-.0110	.0011	-.0017	-.0065	-.0003	.0164	-.0044
.601	3.53	.01	-.0065	.0538	-.0106	.0007	.0166	-.0103	.0003	-.0023	-.0059	.0005	.0189	-.0044
.601	5.03	.01	-.0109	.0807	-.0108	.0017	.0203	-.0167	-.0017	-.0036	-.0043	.0034	.0238	-.0124
.603	3.52	-2.99	-.0256	.0533	.0212	-.0203	.0162	.0216	-.0223	-.0016	.0266	.0020	.0178	-.0051
.604	3.52	.00	-.0039	.0540	-.0121	.0033	.0174	-.0117	.0025	-.0024	-.0088	.0008	.0198	-.0030
.605	3.52	3.01	.0200	.0553	-.0463	.0290	.0192	-.0459	.0215	-.0011	-.0374	.0075	.0202	-.0086
.603	3.52	9.00	.0570	.0628	-.0989	.0698	.0276	-.0985	.0557	.0052	-.0879	.0141	.0224	-.0106
.153	1.00	-.01	-.0100	-.0339	-.0089	-.0100	-.0343	-.0089	-.0033	.0015	.0012	-.0066	-.0358	-.0101
.152	2.01	.00	-.0475	.2866	-.0359	-.0204	.0696	-.0359	-.0073	-.0014	-.0029	-.0130	.0710	-.0330
.152	2.62	-.00	-.0681	.4575	-.0428	-.0059	.0951	-.0428	-.0425	.0007	.0409	.0367	.0945	-.0837
.151	3.01	-.01	-.0814	.5612	-.0408	.0034	.1049	-.0408	-.0480	.0014	.0478	.0513	.1035	-.0886
.151	3.82	-.01	-.1099	.7641	-.0459	.0220	.1108	-.0604	-.0606	.0040	.0618	.0826	.1067	-.1222
.152	2.60	-3.00	-.0529	.4576	-.0245	-.0109	.1004	-.0245	-.0548	.0047	.0585	.0439	.0958	-.0829
.152	2.60	-.02	-.0559	.4556	-.0442	.0044	.1019	-.0442	-.0412	.0023	.0392	.0455	.0996	-.0834
.152	2.60	3.00	-.0578	.4550	-.0723	.0214	.1037	-.0723	.0117	.0020	-.0335	.0097	.1017	-.0388
.152	2.60	5.98	-.0485	.4581	-.1082	.0488	.1112	-.1082	.0247	.0058	-.0523	.0242	.1054	-.0559
.152	2.60	9.01	-.0467	.4590	-.1380	.0682	.1193	-.1380	.0396	.0097	-.0764	.0286	.1095	-.0616

TABLE 12. AERODYNAMIC CHARACTERISTICS FOR REVERSER A DEPLOYED, VERTICAL TAILS IN MID POSITION, $\phi_t = 0°$, AND $\delta_h = -5°$

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLN	CDN	CMN
.900	1.11	.64							-.0393	.0152	.0633			
.900	2.00	-.01							-.0306	.0046	.0485			
.900	2.99	-.01							-.0314	.0042	.0493			
.897	5.01	.03							-.0326	.0036	.0497			
.898	7.02	.01							-.0345	.0029	.0510			
.901	5.01	-2.99							-.0456	.0077	.0714			
.898	5.01	.01							-.0324	.0035	.0495			
.897	5.00	3.02							-.0219	.0004	.0318			
.898	5.00	6.02							-.0047	-.0005	.0072			
.896	4.99	8.99							.0244	.0026	-.0361			
.599	1.05	-.01							-.0338	.0107	.0569			
.600	1.99	.04							-.0294	.0024	.0469			
.602	3.00	-.02							-.0315	.0020	.0484			
.602	3.51	-.02							-.0330	.0019	.0500			
.600	4.99	-.03							-.0366	.0014	.0531			
.601	3.52	-2.99							-.0523	.0073	.0787			
.600	3.49	-.01							-.0335	.0019	.0504			
.600	3.50	3.02							-.0113	-.0016	.0174			
.599	3.49	6.02							.0078	-.0009	-.0095			
.600	3.49	9.01							.0284	.0008	-.0405			
.152	1.00	-.01							-.0321	.0054	.0535			
.151	1.99	-.00							-.0580	.0024	.0802			
.150	2.60	.00							-.0725	.0054	.0997			
.151	3.01	.00							-.0845	.0076	.1169			
.150	3.80	.00							-.0940	.0092	.1277			
.151	2.61	-2.99							-.0856	.0309	.1184			
.150	2.61	-.01							-.0723	.0080	.1000			
.151	2.61	3.00							-.0568	.0057	.0767			
.151	2.61	6.02							-.0378	.0033	.0483			
.151	2.61	9.03							-.0258	.0025	.0303			

TABLE 13. AERODYNAMIC CHARACTERISTICS FOR REVERSER A DEPLOYED, VERTICAL TAILS IN MID POSITION, $\phi_t = 0°$, AND $\delta_h = -10°$

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLN	CDN	CMN
.598	1.05	.01							-.0792	.0222	.1304			
.598	2.01	.01							-.0771	.0125	.1254			
.601	3.00	.01							-.0753	.0096	.1213			
.599	3.51	.00							-.0756	.0084	.1211			
.598	5.00	.00							-.0726	.0048	.1143			
.599	3.51	-3.00							-.0950	.0148	.1503			
.600	3.52	.01							-.0748	.0082	.1198			
.599	3.51	3.01							-.0557	.0036	.0904			
.598	3.50	6.01							-.0370	.0017	.0635			
.597	3.50	8.99							-.0129	.0006	.0264			
.152	1.00	.01							-.0874	.0155	.1419			
.150	2.00	.02							-.1120	.0128	.1684			
.150	2.60	.00							-.1391	.0193	.2086			
.150	3.02	.00							-.1471	.0218	.2210			
.150	3.82	-.00							-.1588	.0239	.2335			
.151	2.61	-3.00							-.1472	.0378	.2219			
.152	2.61	.01							-.1335	.0215	.2009			
.151	2.61	2.99							-.1164	.0144	.1741			
.151	2.61	6.03							-.0991	.0083	.1479			
.151	2.61	9.00							-.0721	.0037	.1059			

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TABLE 14. AERODYNAMIC CHARACTERISTICS FOR REVERSER A STOWED, VERTICAL TAILS IN MID POSITION, $\phi_t = 20°$, AND $\delta_h = 0°$

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLN	CDN	CMN
.900	1.10	.04	.0122	.0108	-.0252	.0122	.0104	-.0252	.0156	.0135	-.0285	-.0034	-.0031	.0033
.901	2.02	.03	.0099	-.0103	-.0201	.0109	.0098	-.0228	.0145	.0128	-.0266	-.0036	-.0030	.0038
.900	2.98	.03	.0106	-.0276	-.0198	.0119	.0099	-.0242	.0149	.0129	-.0271	-.0030	-.0030	.0030
.898	5.02	.01	.0109	-.0663	-.0169	.0128	.0101	-.0248	.0152	.0126	-.0275	-.0024	-.0026	.0027
.902	6.99	.04	.0099	-.1027	-.0128	.0123	.0099	-.0239	.0144	.0125	-.0266	-.0021	-.0026	.0027
.897	1.10	-2.98	-.0011	.0093	-.0072	-.0011	.0089	-.0072	.0032	.0121	-.0095	-.0043	-.0032	.0023
.902	1.10	.02	.0134	.0111	-.0256	.0134	.0107	-.0256	.0155	.0135	-.0283	-.0021	-.0028	.0027
.900	1.09	3.04	.0271	.0135	-.0423	.0271	.0131	-.0423	.0269	.0149	-.0462	.0003	-.0018	.0040
.902	1.09	6.02	.0402	.0166	-.0610	.0402	.0162	-.0610	.0393	.0172	-.0669	.0009	-.0010	.0059
.900	1.10	9.00	.0791	.0253	-.1145	.0791	.0249	-.1145	.0691	.0235	-.1151	.0100	.0014	.0006
.905	5.02	-2.97	-.0092	-.0663	.0031	-.0033	.0090	-.0047	.0026	.0119	-.0084	-.0059	-.0029	.0037
.900	5.01	.03	.0121	-.0656	-.0177	.0140	.0104	-.0255	.0149	.0126	-.0273	-.0009	-.0023	.0018
.901	5.04	6.04	.0535	-.0596	-.0647	.0474	.0164	-.0725	.0435	.0173	-.0740	.0038	-.0009	.0015
.898	4.99	9.03	.0956	-.0497	-.1156	.0856	.0255	-.1234	.0729	.0236	-.1209	.0127	.0019	-.0025
.599	1.05	.03	.0059	.0067	-.0143	.0059	.0063	-.0143	.0104	.0088	-.0161	-.0045	-.0024	.0018
.599	2.01	.03	.0038	-.0394	-.0075	.0062	.0063	-.0136	.0097	.0086	-.0150	-.0035	-.0023	.0014
.601	3.01	.04	.0064	-.0799	-.0077	.0094	.0059	-.0176	.0109	.0088	-.0168	-.0015	-.0029	-.0008
.601	3.52	.03	.0067	-.1011	-.0064	.0100	.0067	-.0182	.0109	.0088	-.0169	-.0009	-.0020	-.0013
.602	4.99	.03	.0061	-.1624	-.0005	.0103	.0072	-.0179	.0113	.0087	-.0174	-.0010	-.0015	-.0005
.600	1.05	-2.98	-.0119	.0068	.0108	-.0119	.0064	.0108	-.0090	.0092	.0113	-.0029	-.0028	-.0005
.601	1.05	.04	.0089	.0081	-.0155	.0089	.0077	-.0155	.0106	.0091	-.0163	-.0017	-.0014	.0008
.600	1.04	3.04	.0316	.0112	-.0434	.0316	.0108	-.0434	.0309	.0104	-.0454	.0007	.0004	.0019
.599	1.04	6.02	.0641	.0175	-.0840	.0641	.0171	-.0840	.0561	.0141	-.0832	.0080	.0029	-.0008
.599	1.05	9.02	.0949	.0264	-.1282	.0949	.0260	-.1282	.0826	.0206	-.1251	.0123	.0054	-.0031
.602	3.53	-2.95	-.0233	-.1018	.0265	-.0144	.0058	.0146	-.0132	.0095	.0171	-.0012	-.0037	-.0025
.602	3.52	.06	.0089	-.1002	-.0075	.0121	.0072	-.0193	.0110	.0090	-.0170	.0011	-.0018	-.0023
.601	3.52	3.03	.0428	-.0965	-.0433	.0405	.0112	-.0551	.0343	.0105	-.0506	.0062	.0007	-.0045
.598	3.51	6.04	.0834	-.0904	-.0868	.0753	.0178	-.0987	.0605	.0145	-.0901	.0148	.0034	-.0085
.601	3.52	9.04	.1184	-.0799	-.1298	.1047	.0270	-.1416	.0853	.0208	-.1298	.0194	.0062	-.0118
.150	1.00	.02	-.0016	-.0256	-.0147	-.0016	-.0260	-.0147	.0117	-.0016	-.0179	-.0133	-.0244	.0032
.152	2.01	.05	-.0397	-.7417	.0923	-.0036	-.0241	-.0021	.0106	.0018	-.0160	-.0142	-.0259	.0139
.152	2.62	.03	-.0281	-1.1121	.0974	.0140	-.0203	-.0322	.0105	.0028	-.0163	.0035	-.0231	-.0159
.152	3.01	.02	-.0288	-1.3631	.1162	.0175	-.0260	-.0366	.0105	.0034	-.0163	.0070	-.0294	-.0203
.153	3.81	.03	-.0303	-1.8734	.1613	.0236	-.0096	-.0385	.0117	.0038	-.0179	.0119	-.0134	-.0205
.151	1.00	-2.97	-.0201	-.0295	.0188	-.0201	-.0299	.0188	-.0091	.0209	.0102	-.0111	-.0508	.0086
.151	1.00	.02	.0114	-.0226	-.0161	.0114	-.0230	-.0161	.0127	.0021	-.0194	-.0013	-.0252	.0033
.151	1.00	3.04	.0392	.0024	-.0513	.0392	.0020	-.0513	.0374	.0044	-.0544	.0018	-.0024	.0031
.150	1.00	6.03	.0750	.0164	-.0900	.0750	.0160	-.0900	.0611	.0090	-.0890	.0140	.0070	-.0009
.150	1.00	9.04	.1057	.0326	-.1354	.1057	.0322	-.1354	.0893	.0161	-.1321	.0164	.0161	-.0034
.152	2.62	-2.97	-.0965	-1.1080	.1256	.0034	-.0125	-.0048	-.0069	.0234	.0084	.0104	-.0359	-.0132
.152	2.60	.03	-.0108	-1.0977	.0868	.0314	-.0057	-.0430	.0163	.0062	-.0238	.0152	-.0120	-.0192
.152	2.60	3.01	.0755	-1.0940	.0484	.0609	-.0006	-.0815	.0419	.0082	-.0612	.0190	-.0088	-.0203
.151	2.61	6.05	.1684	-1.0942	.0055	.0949	.0118	-.1261	.0688	.0126	-.1012	.0261	-.0008	-.0249
.151	2.61	9.02	.2596	-1.0710	-.0407	.1294	.0245	-.1716	.0973	.0199	-.1449	.0321	.0046	-.0267

TABLE 15. AERODYNAMIC CHARACTERISTICS FOR REVERSER A STOWED, VERTICAL TAILS IN MID POSITION, $\phi_t = 20°$, AND $\delta_h = -5°$

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLN	CDN	CMN
.901	1.09	.00	-.0325	.0124	.0519	-.0325	.0120	.0519	-.0309	.0168	.0501	-.0016	-.0048	.0018
.900	2.04	-.01	-.0375	-.0096	.0587	-.0365	.0109	.0559	-.0330	.0161	.0533	-.0035	-.0052	.0026
.900	3.00	-.00	-.0418	-.0267	.0653	-.0405	.0112	.0609	-.0338	.0162	.0549	-.0067	-.0050	.0060
.898	5.02	.00	-.0457	-.0651	.0732	-.0438	.0114	.0653	-.0359	.0161	.0581	-.0079	-.0047	.0072
.898	7.02	-.01	-.0489	-.1037	.0791	-.0464	.0105	.0678	-.0372	.0158	.0601	-.0092	-.0053	.0078
.897	1.09	-2.98	-.0486	.0145	.0726	-.0486	.0141	.0726	-.0436	.0180	.0702	-.0049	-.0038	.0024
.901	1.09	-.04	-.0376	.0129	.0545	-.0376	.0125	.0545	-.0314	.0165	.0508	-.0062	-.0040	.0037
.901	1.09	2.99	-.0238	.0111	.0348	-.0238	.0107	.0348	-.0185	.0151	.0307	-.0053	-.0044	.0042
.899	1.08	5.99	-.0108	.0102	.0118	-.0108	.0098	.0118	-.0032	.0147	.0053	-.0075	-.0049	.0065
.899	1.10	8.99	.0250	.0151	-.0372	.0250	.0147	-.0372	.0235	.0176	-.0375	.0016	-.0029	.0003
.899	4.99	-3.01	-.0649	-.0622	.0959	-.0589	.0135	.0881	-.0501	.0179	.0805	-.0089	-.0043	.0076
.899	5.02	.00	-.0471	-.0651	.0737	-.0452	.0111	.0658	-.0358	.0158	.0581	-.0093	-.0046	.0077
.900	5.00	2.99	-.0281	-.0666	.0523	-.0301	.0092	.0445	-.0229	.0144	.0380	-.0072	-.0051	.0066
.899	5.04	6.02	-.0082	-.0685	.0249	-.0143	.0079	.0171	-.0062	.0137	.0101	-.0081	-.0058	.0070
.898	5.04	9.00	.0279	-.0635	-.0190	.0178	.0126	-.0269	.0203	.0163	-.0315	-.0025	-.0037	.0046
.600	1.04	.00	-.0459	.0082	.0665	-.0459	.0078	.0665	-.0359	.0118	.0603	-.0100	-.0040	.0063
.601	2.00	.00	-.0505	-.0382	.0780	-.0481	.0068	.0720	-.0394	.0118	.0654	-.0087	-.0050	.0067
.598	3.02	-.01	-.0518	-.0810	.0830	-.0487	.0059	.0730	-.0409	.0120	.0673	-.0078	-.0061	.0057
.599	3.52	.01	-.0516	-.1016	.0844	-.0483	.0066	.0725	-.0408	.0120	.0672	-.0075	-.0054	.0054
.599	5.03	-.01	-.0535	-.1661	.0911	-.0491	.0065	.0734	-.0421	.0120	.0688	-.0070	-.0055	.0046
.600	1.04	-3.00	-.0624	.0111	.0946	-.0624	.0107	.0946	-.0566	.0154	.0903	-.0058	-.0046	.0043
.600	1.04	.02	-.0411	.0088	.0654	-.0411	.0084	.0654	-.0361	.0121	.0606	-.0050	-.0037	.0049
.602	1.04	3.01	-.0211	.0077	.0376	-.0211	.0073	.0376	-.0159	.0107	.0314	-.0052	-.0034	.0063
.600	1.04	5.99	.0040	.0090	.0001	.0040	.0086	.0001	.0088	.0113	-.0056	-.0047	-.0027	.0057
.601	1.05	8.99	.0331	.0140	-.0412	.0331	.0136	-.0412	.0330	.0138	-.0433	.0001	-.0002	.0021
.600	3.50	-3.01	-.0792	-.0969	.1179	-.0702	.0102	.1061	-.0632	.0158	.0998	-.0070	-.0055	.0063
.601	3.52	-.02	-.0495	-.1009	.0841	-.0461	.0070	.0723	-.0412	.0122	.0678	-.0049	-.0052	.0045
.601	3.52	3.00	-.0188	-.1023	.0482	-.0211	.0055	.0364	-.0177	.0105	.0334	-.0034	-.0050	.0030
.599	3.52	6.00	.0143	-.1008	.0082	.0063	.0073	-.0037	.0086	.0104	-.0056	-.0024	-.0031	.0019
.601	3.51	9.00	.0507	-.0932	-.0343	.0372	.0133	-.0461	.0337	.0138	-.0445	.0034	-.0004	-.0015
.150	1.00	-.00	-.0658	.0174	.0688	-.0658	.0170	.0688	-.0326	.0023	.0555	-.0332	.0147	.0133
.151	2.00	-.02	-.1055	-.7133	.1773	-.0686	-.0003	.0833	-.0567	.0070	.0872	-.0118	-.0073	-.0039
.152	2.60	-.03	-.0930	-1.0933	.1867	-.0498	-.0060	.0574	-.0378	.0064	.0633	-.0120	-.0124	-.0059
.152	3.00	-.01	-.0974	-1.3547	.2120	-.0502	-.0152	.0589	-.0366	.0068	.0618	-.0137	-.0220	-.0029
.152	3.81	-.00	-.1012	-1.8714	.2614	-.0460	-.0035	.0610	-.0395	.0075	.0657	-.0064	-.0110	-.0047
.151	1.00	-3.01	-.0635	-.0159	.0961	-.0635	-.0163	.0961	-.0538	.0277	.0847	-.0098	-.0440	.0114
.152	1.00	-.01	-.0376	-.0090	.0605	-.0376	-.0094	.0605	-.0325	.0062	.0548	-.0051	-.0157	.0057
.152	1.00	2.98	-.0160	.0049	.0303	-.0160	.0045	.0303	-.0121	.0056	.0252	-.0039	-.0010	.0050
.152	1.00	6.00	.0163	.0116	-.0040	.0163	.0112	-.0040	.0107	.0071	-.0074	.0056	.0041	.0034
.151	1.00	8.99	.0458	.0244	-.0494	.0458	.0240	-.0494	.0353	.0098	-.0454	.0106	.0142	-.0040
.152	2.60	-3.00	-.1611	-1.0959	.2207	-.0613	-.0106	.0913	-.0623	.0282	.0977	.0010	-.0389	-.0065
.152	2.60	-.02	-.0723	-1.0942	.1808	-.0293	-.0079	.0518	-.0391	.0089	.0648	.0098	-.0168	-.0131
.152	2.61	2.99	.0108	-1.0975	.1421	-.0034	-.0048	.0124	-.0135	.0080	.0273	.0101	-.0128	-.0149
.151	2.61	5.99	.1026	-1.1013	.1024	.0304	.0008	-.0286	.0117	.0094	-.0098	.0187	-.0086	-.0188
.151	2.61	9.00	.1981	-1.0823	.0553	.0684	.0132	-.0757	.0401	.0135	-.0523	.0283	-.0003	-.0234

TABLE 16. AERODYNAMIC CHARACTERISTICS FOR REVERSER A STOWED, VERTICAL TAILS IN MID POSITION, $\phi_t = 20°$, AND $\delta_h = -10°$

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLN	CDN	CMN
.598	1.04	.00	-.0958	.0185	.1608	-.0958	.0181	.1608	-.0896	.0245	.1472	-.0062	-.0064	.0136
.602	2.01	.00	-.1024	-.0273	.1709	-.1000	.0178	.1649	-.0925	.0242	.1511	-.0076	-.0064	.0137
.600	3.01	.00	-.1064	-.0687	.1789	-.1034	.0173	.1691	-.0943	.0243	.1539	-.0090	-.0070	.0152
.600	3.51	-.00	-.1081	-.0896	.1820	-.1047	.0183	.1702	-.0950	.0244	.1548	-.0097	-.0061	.0155
.599	5.01	.01	-.1101	-.1537	.1877	-.1057	.0182	.1700	-.0957	.0242	.1555	-.0101	-.0060	.0146
.598	1.03	-3.01	-.1142	.0269	.1851	-.1142	.0265	.1851	-.1061	.0308	.1710	-.0081	-.0043	.0140
.599	1.04	-.00	-.0970	.0205	.1609	-.0970	.0201	.1609	-.0898	.0243	.1476	-.0072	-.0041	.0134
.599	1.04	3.02	-.0773	.0152	.1331	-.0773	.0148	.1331	-.0701	.0191	.1193	-.0072	-.0043	.0138
.597	1.04	6.01	-.0511	.0127	.0937	-.0511	.0123	.0937	-.0456	.0153	.0830	-.0055	-.0031	.0107
.597	1.05	9.00	-.0259	.0115	.0548	-.0259	.0111	.0548	-.0210	.0141	.0446	-.0049	-.0030	.0103
.600	3.52	-2.99	-.1341	-.0823	.2098	-.1250	.0256	.1980	-.1127	.0310	.1804	-.0124	-.0055	.0176
.600	3.50	-.01	-.1087	-.0886	.1817	-.1053	.0189	.1699	-.0948	.0242	.1546	-.0104	-.0053	.0153
.600	3.52	3.01	-.0812	-.0951	.1503	-.0835	.0130	.1385	-.0742	.0186	.1250	-.0093	-.0056	.0136
.598	3.50	6.01	-.0487	-.0984	.1114	-.0567	.0096	.0995	-.0496	.0148	.0884	-.0072	-.0051	.0111
.598	3.51	9.01	-.0138	-.0992	.0661	-.0275	.0085	.0542	-.0224	.0135	.0462	-.0051	-.0050	.0080
.151	1.00	-.01	-.1131	.0812	.1564	-.1131	.0808	.1564	-.0901	.0125	.1475	-.0230	.0683	.0090
.151	2.01	-.02	-.1693	-.6884	.2811	-.1318	.0395	.1855	-.1187	.0186	.1855	-.0130	.0209	-.0000
.151	2.61	-.02	-.1661	-1.0906	.2958	-.1223	.0196	.1639	-.1250	.0203	.1931	.0027	-.0007	-.0292
.152	3.00	.02	-.1706	-1.3333	.3191	-.1239	.0096	.1655	-.1254	.0212	.1934	.0015	-.0116	-.0279
.152	3.82	-.01	-.1784	-1.8795	.3724	-.1225	.0125	.1696	-.1037	.0189	.1667	-.0187	-.0064	.0029
.150	1.00	-3.01	-.1179	.0107	.1862	-.1179	.0103	.1862	-.1085	.0346	.1724	-.0094	-.0243	.0138
.150	1.00	-.01	-.0902	.0113	.1528	-.0902	.0109	.1528	-.0898	.0190	.1459	-.0004	-.0081	.0070
.151	1.00	3.00	-.0684	.0200	.1215	-.0684	.0196	.1215	-.0662	.0143	.1118	-.0022	.0052	.0098
.151	1.00	5.99	-.0331	.0238	.0829	-.0331	.0234	.0829	-.0443	.0117	.0794	.0112	.0117	.0035
.150	1.00	8.99	-.0069	.0297	.0395	-.0069	.0293	.0395	-.0164	.0119	.0372	.0095	.0174	.0023
.151	2.61	-3.01	-.2202	-1.0933	.3189	-.1185	.0120	.1872	-.1429	.0379	.2190	.0244	-.0259	-.0318
.152	2.60	.00	-.1360	-1.0797	.2836	-.0932	.0088	.1541	-.1219	.0232	.1885	.0287	-.0143	-.0344
.152	2.60	3.01	-.0573	-1.0858	.2488	-.0718	.0071	.1190	-.0989	.0165	.1547	.0272	-.0094	-.0357
.151	2.60	6.01	.0413	-1.0946	.2058	-.0311	.0065	.0747	-.0529	.0114	.0920	.0218	-.0050	-.0172
.151	2.61	8.98	.1341	-1.0829	.1579	.0044	.0149	.0267	-.0231	.0116	.0468	.0275	.0033	-.0201

TABLE 17. AERODYNAMIC CHARACTERISTICS FOR REVERSER A DEPLOYED, VERTICAL TAILS IN MID POSITION, $\phi_t = 20°$, AND $\delta_h = 0°$

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLN	CDN	CMN
.900	1.11	-.03	.0027	.0140	-.0073	.0027	.0136	-.0073	.0053	.0111	-.0109	-.0027	.0025	.0036
.900	2.06	.01	.0105	.0212	-.0225	.0113	.0143	-.0225	.0104	.0016	-.0189	.0010	.0127	-.0036
.809	2.98	-.02	.0038	.0264	-.0154	.0062	.0133	-.0154	.0066	-.0008	-.0134	-.0004	.0141	-.0019
.899	5.02	-.04	-.0048	.0386	-.0080	.0009	.0115	-.0106	.0007	-.0033	-.0057	.0002	.0148	-.0049
.808	6.98	.01	-.0119	.0510	-.0028	-.0069	.0102	-.0023	-.0075	-.0057	.0047	.0006	.0159	-.0070
.808	4.99	-3.03	-.0233	.0407	.0233	-.0191	.0135	.0207	-.0195	-.0020	.0246	.0005	.0154	-.0039
.899	5.00	.01	-.0047	.0390	-.0086	.0010	.0120	-.0113	.0008	-.0033	-.0058	.0001	.0154	-.0054
.899	5.01	2.98	.0091	.0410	-.0305	.0161	.0143	-.0332	.0124	-.0022	-.0243	.0038	.0165	-.0088
.897	4.99	5.98	.0304	.0453	-.0606	.0388	.0189	-.0633	.0331	.0004	-.0541	.0057	.0185	-.0092
.896	5.02	8.98	.0643	.0516	-.1062	.0741	.0256	-.1089	.0606	.0053	-.0956	.0134	.0203	-.0133
.599	1.06	.00	.0028	.0128	-.0110	.0028	.0124	-.0110	.0087	.0080	-.0136	-.0059	.0044	.0026
.602	2.01	-.01	-.0037	.0290	-.0083	-.0020	.0148	-.0083	.0030	.0004	-.0073	-.0049	.0144	-.0010
.600	3.01	-.02	-.0107	.0457	-.0032	-.0053	.0164	-.0032	-.0018	-.0011	-.0015	-.0035	.0175	-.0017
.601	3.54	-.01	-.0138	.0556	-.0010	-.0064	.0183	-.0008	-.0072	-.0018	.0050	.0007	.0201	-.0058
.600	4.99	-.01	-.0214	.0827	.0036	-.0088	.0229	-.0023	-.0138	-.0027	.0132	.0050	.0256	-.0154
.601	3.51	-3.04	-.0346	.0563	.0342	-.0294	.0191	.0346	-.0303	-.0002	.0383	.0009	.0193	-.0037
.601	3.51	-.01	-.0117	.0558	-.0024	-.0046	.0189	-.0020	-.0069	-.0016	.0047	.0023	.0205	-.0068
.602	3.51	3.00	.0143	.0562	-.0394	.0234	.0199	-.0391	.0191	-.0003	-.0326	.0043	.0202	-.0065
.602	3.51	5.96	.0366	.0596	-.0692	.0475	.0238	-.0688	.0397	.0021	-.0614	.0078	.0216	-.0074
.599	3.50	8.97	.0567	.0647	-.0983	.0695	.0293	-.0979	.0578	.0061	-.0895	.0117	.0232	-.0084
.151	1.00	-.03	-.0243	-.0249	.0034	-.0243	-.0253	.0034	.0095	.0006	-.0135	-.0337	-.0259	.0169
.150	2.00	-.02	-.0816	.3091	.0037	-.0543	.0886	.0037	-.0386	-.0005	.0415	-.0156	.0890	-.0378
.150	2.60	.01	-.1012	.4837	-.0017	-.0383	.1158	-.0017	-.0543	.0032	.0616	.0160	.1127	-.0633
.149	2.99	-.03	-.1187	.5897	-.0007	-.0331	.1264	-.0007	-.0663	.0047	.0774	.0332	.1216	-.0782
.149	3.80	-.01	-.1329	.8010	-.0193	.0014	.1351	-.0331	-.0729	.0070	.0838	.0743	.1281	-.1169
.150	2.61	-3.02	-.0889	.4964	.0256	-.0456	.1273	.0256	-.0752	.0086	.0916	.0295	.1187	-.0660
.150	2.61	-.03	-.0863	.4916	-.0071	-.0238	.1254	-.0071	-.0588	.0061	.0689	.0350	.1192	-.0760
.150	2.60	3.02	-.0907	.4908	-.0390	-.0087	.1277	-.0390	-.0358	.0037	.0350	.0271	.1239	-.0740
.150	2.61	6.01	-.0810	.4911	-.0773	.0195	.1338	-.0773	.0177	.0069	-.0371	.0018	.1269	-.0402
.150	2.61	8.99	-.0873	.4922	-.1055	.0322	.1390	-.1055	.0358	.0111	-.0642	-.0036	.1279	-.0414

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TABLE 18. AERODYNAMIC CHARACTERISTICS FOR REVERSER A DEPLOYED, VERTICAL TAILS IN MID POSITION, $\phi_t = 20°$, AND $\delta_h = -5°$

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLN	CDN	CMN
.899	1.13	-.02	-.0389	.0164	.0599	-.0389	.0160	.0599	-.0339	.0144	.0554	-.0050	.0015	.0045
.898	2.01	-.03	-.0361	.0221	.0509	-.0353	.0155	.0509	-.0312	.0043	.0510	-.0041	.0112	-.0002
.900	3.01	-.02	-.0384	.0283	.0515	-.0360	.0151	.0515	-.0328	.0015	.0527	-.0032	.0135	-.0012
.900	5.00	-.00	-.0417	.0406	.0518	-.0361	.0137	.0492	-.0349	-.0012	.0547	-.0012	.0149	-.0055
.898	7.00	.00	-.0455	.0533	.0526	-.0406	.0124	.0532	-.0382	-.0034	.0582	-.0023	.0158	-.0051
.896	5.01	-3.01	-.0597	.0451	.0839	-.0554	.0176	.0813	-.0529	.0023	.0822	-.0025	.0153	-.0009
.899	5.02	-.00	-.0415	.0414	.0512	-.0359	.0142	.0486	-.0344	-.0013	.0537	-.0015	.0155	-.0051
.901	5.04	3.00	-.0315	.0396	.0317	-.0245	.0128	.0291	-.0238	-.0029	.0376	-.0007	.0157	-.0085
.900	5.03	6.00	-.0151	.0401	.0016	-.0067	.0137	-.0010	-.0036	-.0023	.0074	-.0031	.0160	-.0084
.898	5.02	8.98	.0221	.0437	-.0447	.0319	.0177	-.0474	.0255	.0000	-.0348	.0064	.0177	-.0126
.600	1.05	.02	-.0393	.0163	.0573	-.0393	.0159	.0573	-.0325	.0107	.0547	-.0068	.0052	.0026
.599	2.01	-.00	-.0389	.0330	.0500	-.0372	.0187	.0500	-.0331	.0025	.0527	-.0041	.0162	-.0028
.599	3.01	.00	-.0424	.0483	.0502	-.0370	.0188	.0502	-.0357	.0006	.0550	-.0013	.0181	-.0048
.598	3.50	-.03	-.0456	.0563	.0531	-.0383	.0193	.0535	-.0386	.0004	.0591	.0003	.0189	-.0055
.598	5.00	.02	-.0537	.0817	.0575	-.0409	.0212	.0515	-.0449	-.0013	.0664	.0040	.0225	-.0149
.602	3.51	-3.01	-.0668	.0596	.0892	-.0615	.0225	.0896	-.0625	.0039	.0936	.0009	.0185	-.0040
.602	3.50	.02	-.0433	.0567	.0514	-.0361	.0200	.0519	-.0389	.0005	.0594	.0029	.0195	-.0075
.601	3.51	3.00	-.0203	.0548	.0126	-.0112	.0183	.0130	-.0148	-.0011	.0237	.0037	.0194	-.0107
.598	3.50	6.00	.0018	.0560	-.0208	.0128	.0199	-.0208	.0078	-.0003	-.0077	.0050	.0203	-.0131
.597	3.49	9.00	.0252	.0586	-.0540	.0380	.0232	-.0540	.0290	.0017	-.0398	.0090	.0215	-.0141
.153	1.00	-.01	-.0415	.0339	.0608	-.0415	.0335	.0608	-.0347	.0057	.0581	-.0068	.0278	.0027
.151	2.00	-.02	-.0871	.3219	.0549	-.0602	.1056	.0549	-.0829	.0043	.1174	.0226	.1013	-.0625
.151	2.58	-.01	-.1205	.4787	.0657	-.0602	.1233	.0657	-.1066	.0079	.1501	.0465	.1153	-.0845
.151	3.00	-.01	-.1404	.5829	.0723	-.0564	.1298	.0723	-.1164	.0101	.1646	.0601	.1197	-.0923
.150	3.80	-.01	-.1703	.7882	.0652	-.0389	.1362	.0521	-.1275	.0109	.1770	.0886	.1252	-.1250
.152	2.61	-2.99	-.1191	.4896	.0966	-.0763	.1268	.0966	-.1233	.0138	.1737	.0470	.1129	-.0772
.149	2.61	.01	-.1285	.5019	.0731	-.0642	.1269	.0731	-.1114	.0083	.1554	.0472	.1186	-.0823
.152	2.62	2.99	-.1238	.4842	.0363	-.0431	.1265	.0363	-.0886	.0058	.1246	.0455	.1207	-.0883
.152	2.62	5.99	-.1257	.4786	.0041	-.0264	.1258	.0041	-.0635	.0008	.0872	.0371	.1250	-.0831
.151	2.61	9.00	-.1347	.4752	-.0186	-.0171	.1279	-.0186	-.0467	-.0006	.0627	.0296	.1285	-.0813

TABLE 19. AERODYNAMIC CHARACTERISTICS FOR REVERSER A DEPLOYED, VERTICAL TAILS IN MID POSITION, $\phi_t = 20°$, AND $\delta_h = -10°$

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLN	CDN	CMN
.598	1.05	-.01	-.0778	.0252	.1308	-.0778	.0248	.1308	-.0769	.0219	.1275	-.0008	.0030	.0033
.598	2.01	-.01	-.0816	.0419	.1259	-.0798	.0276	.1259	-.0768	.0128	.1256	-.0030	.0148	.0003
.599	3.00	-.00	-.0828	.0567	.1211	-.0775	.0274	.1211	-.0763	.0101	.1235	-.0012	.0173	-.0024
.598	3.52	-.01	-.0845	.0648	.1196	-.0772	.0274	.1200	-.0770	.0089	.1238	-.0002	.0184	-.0038
.601	5.00	.00	-.0868	.0858	.1147	-.0741	.0258	.1087	-.0795	.0063	.1253	.0054	.0196	-.0166
.600	3.52	-2.98	-.1070	.0714	.1568	-.1017	.0339	.1571	-.1001	.0155	.1579	-.0016	.0184	-.0008
.601	3.51	.01	-.0844	.0652	.1196	-.0772	.0283	.1200	-.0769	.0090	.1237	-.0003	.0193	-.0036
.601	3.52	3.01	-.0625	.0606	.0818	-.0534	.0242	.0822	-.0546	.0043	.0902	.0012	.0198	-.0081
.601	3.51	6.02	-.0421	.0584	.0481	-.0311	.0225	.0485	-.0328	.0026	.0592	.0017	.0199	-.0107
.599	3.50	8.99	-.0181	.0573	.0073	-.0052	.0219	.0077	-.0084	.0017	.0216	.0032	.0202	-.0139
.151	1.00	-.01	-.1033	.0824	.1397	-.1033	.0820	.1397	-.0781	.0159	.1300	-.0252	.0661	.0097
.150	2.00	.01	-.1594	.3421	.1396	-.1320	.1214	.1396	-.1272	.0173	.1926	-.0048	.1042	-.0530
.150	2.61	.01	-.1983	.5122	.1653	-.1348	.1420	.1653	-.1568	.0234	.2368	.0220	.1186	-.0715
.149	3.01	.00	-.2128	.6158	.1707	-.1260	.1487	.1707	-.1695	.0247	.2544	.0435	.1240	-.0837
.149	3.82	.00	-.2404	.8231	.1732	-.1044	.1497	.1582	-.1829	.0277	.2719	.0785	.1220	-.1136
.150	2.60	-3.00	-.1809	.5121	.1892	-.1376	.1435	.1892	-.1693	.0315	.2559	.0317	.1120	-.0666
.149	2.60	.02	-.1800	.5069	.1552	-.1167	.1376	.1552	-.1511	.0218	.2268	.0344	.1158	-.0716
.149	2.61	3.01	-.1771	.4996	.1255	-.0940	.1316	.1255	-.1336	.0151	.2018	.0396	.1165	-.0763
.149	2.61	5.99	-.1732	.4946	.0878	-.0709	.1307	.0878	-.1120	.0093	.1689	.0411	.1214	-.0811
.149	2.60	9.01	-.1718	.4826	.0474	-.0516	.1274	.0474	-.0870	.0058	.1309	.0354	.1216	-.0835

TABLE 20. AERODYNAMIC CHARACTERISTICS FOR REVERSER A STOWED, VERTICAL TAILS IN AFT POSITION, $\phi_t = 0°$, AND $\delta_h = 0°$

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLN	CDN	CMN
.900	1.06	-.04	-.0081	.0102	.0018	-.0081	.0098	.0018	-.0000	.0109	-.0056	-.0081	-.0011	.0075
.899	2.01	-.04	-.0067	-.0114	.0021	-.0057	.0087	-.0006	.0015	.0105	-.0081	-.0072	-.0018	.0075
.899	2.99	-.05	-.0034	-.0285	-.0020	-.0020	.0092	-.0063	.0025	.0108	-.0099	-.0045	-.0016	.0035
.900	5.01	-.05	-.0011	-.0659	-.0026	.0009	.0100	-.0104	.0035	.0107	-.0118	-.0026	-.0007	.0014
.901	7.00	-.03	.0024	-.1035	-.0046	.0050	.0099	-.0158	.0053	.0107	-.0147	-.0003	-.0007	-.0011
.900	5.01	-3.03	-.0137	-.0664	.0101	-.0077	.0093	.0023	-.0037	.0108	.0011	-.0040	-.0015	.0012
.898	5.00	-.05	-.0002	-.0660	-.0034	.0019	.0100	-.0113	.0039	.0107	-.0123	-.0020	-.0007	.0010
.899	5.00	2.95	.0183	-.0643	-.0228	.0163	.0117	-.0306	.0140	.0113	-.0295	.0023	.0004	-.0011
.898	5.03	5.95	.0393	-.0620	-.0469	.0333	.0144	-.0548	.0284	.0132	-.0536	.0049	.0012	-.0012
.898	5.03	8.95	.0778	-.0537	-.0934	.0678	.0223	-.1012	.0551	.0183	-.0949	.0127	.0040	-.0063
.598	1.04	-.05	-.0017	.0070	-.0063	-.0017	.0066	-.0063	.0056	.0082	-.0106	-.0073	-.0015	.0043
.599	2.01	-.04	.0039	-.0391	-.0098	.0062	.0066	-.0158	.0091	.0082	-.0161	-.0029	-.0016	.0003
.600	3.02	-.03	.0076	-.0800	-.0119	.0107	.0064	-.0218	.0108	.0085	-.0188	-.0001	-.0021	-.0030
.602	3.52	-.05	.0082	-.1002	-.0111	.0116	.0072	-.0229	.0115	.0085	-.0200	.0001	-.0013	-.0029
.601	5.01	-.02	.0078	-.1633	-.0055	.0122	.0076	-.0231	.0113	.0086	-.0196	.0009	-.0009	-.0035
.601	3.52	-3.03	-.0194	-.1016	.0177	-.0103	.0058	.0059	-.0072	.0091	.0081	-.0031	-.0033	-.0022
.602	3.52	-.06	.0090	-.0997	-.0115	.0125	.0076	-.0232	.0113	.0088	-.0196	.0012	-.0012	-.0036
.602	3.52	2.97	.0380	-.0960	-.0412	.0358	.0113	-.0530	.0299	.0102	-.0475	.0059	.0012	-.0055
.601	3.50	5.94	.0748	-.0893	-.0803	.0670	.0176	-.0920	.0523	.0133	-.0825	.0148	.0042	-.0095
.598	3.50	8.96	.1089	-.0811	-.1218	.0954	.0261	-.1336	.0764	.0192	-.1211	.0190	.0069	-.0125
.152	1.00	-.05	-.0218	-.0317	-.0020	-.0218	-.0321	-.0020	.0037	-.0073	-.0068	-.0255	-.0248	.0048
.152	2.00	-.04	-.0357	-.7370	.0733	.0013	-.0273	-.0201	.0100	-.0017	-.0165	-.0087	-.0256	-.0036
.152	2.61	-.04	-.0310	-1.1280	.0974	.0128	-.0298	-.0329	.0086	.0008	-.0153	.0041	-.0305	-.0176
.152	3.01	-.05	-.0326	-1.3774	.1204	.0157	-.0325	-.0333	.0106	.0017	-.0178	.0051	-.0342	-.0155
.153	3.81	-.04	-.0425	-1.8884	.1724	.0141	-.0178	-.0282	.0096	.0030	-.0166	.0044	-.0208	-.0116
.149	2.60	-3.05	-.1070	-1.1640	.1296	-.0023	-.0364	-.0048	-.0092	.0233	.0116	.0069	-.0597	-.0164
.150	2.60	-.04	-.0103	-1.1480	.0909	.0344	-.0292	-.0422	.0097	.0057	-.0172	.0248	-.0349	-.0250
.159	2.61	2.95	.0641	-1.0079	.0467	.0519	-.0148	-.0712	.0317	.0081	-.0503	.0202	-.0229	-.0209
.151	2.60	5.96	.1604	-1.1103	.0180	.0888	-.0067	-.1134	.0540	.0117	-.0843	.0347	-.0184	-.0291
.151	2.60	8.94	.2568	-1.0930	-.0289	.1274	.0093	-.1607	.0798	.0180	-.1240	.0476	-.0087	-.0367

TABLE 21. AERODYNAMIC CHARACTERISTICS FOR REVERSER A STOWED, VERTICAL TAILS IN AFT POSITION, $\phi_t = 0°$, AND $\delta_h = -5°$

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLN	CDN	CMN
.900	1.06	-.03	-.0543	.0144	.0851	-.0543	.0140	.0851	-.0501	.0164	.0785	-.0042	-.0023	.0065
.898	2.03	-.02	-.0556	-.0073	.0854	-.0546	.0132	.0827	-.0497	.0158	.0775	-.0048	-.0026	.0052
.898	3.01	-.02	-.0574	-.0250	.0880	-.0561	.0132	.0836	-.0503	.0158	.0784	-.0057	-.0026	.0052
.899	5.02	-.03	-.0594	-.0629	.0918	-.0574	.0134	.0839	-.0504	.0157	.0782	-.0070	-.0022	.0057
.901	7.01	-.03	-.0602	-.1006	.0938	-.0576	.0128	.0826	-.0510	.0156	.0788	-.0066	-.0028	.0038
.899	4.99	-3.04	-.0696	-.0588	.1043	-.0636	.0167	.0965	-.0577	.0191	.0919	-.0059	-.0024	.0046
.899	4.99	-.03	-.0597	-.0620	.0919	-.0577	.0137	.0842	-.0513	.0158	.0795	-.0064	-.0021	.0046
.899	4.99	2.98	-.0432	-.0650	.0744	-.0452	.0107	.0666	-.0411	.0130	.0627	-.0041	-.0023	.0039
.898	5.02	5.98	-.0261	-.0681	.0506	-.0322	.0082	.0427	-.0261	.0110	.0374	-.0061	-.0028	.0054
.901	5.01	9.00	.0030	-.0664	.0133	-.0070	.0088	.0055	-.0023	.0117	.0009	-.0047	-.0029	.0046
.600	1.04	-.02	-.0533	.0118	.0780	-.0533	.0114	.0780	-.0438	.0130	.0707	-.0095	-.0016	.0072
.602	2.00	-.02	-.0526	-.0346	.0804	-.0502	.0101	.0745	-.0437	.0127	.0700	-.0065	-.0026	.0045
.601	3.02	-.03	-.0504	-.0766	.0800	-.0474	.0095	.0701	-.0434	.0128	.0692	-.0040	-.0033	.0008
.601	3.51	-.03	-.0508	-.0975	.0818	-.0474	.0097	.0700	-.0433	.0128	.0691	-.0040	-.0030	.0009
.600	5.02	-.03	-.0526	-.1618	.0881	-.0482	.0098	.0705	-.0442	.0126	.0701	-.0039	-.0028	.0004
.601	3.52	-3.01	-.0747	-.0945	.1099	-.0657	.0130	.0981	-.0610	.0165	.0962	-.0047	-.0035	.0018
.601	3.51	-.03	-.0491	-.0972	.0807	-.0457	.0100	.0689	-.0432	.0127	.0688	-.0025	-.0026	.0001
.601	3.51	2.96	-.0237	-.0989	.0518	-.0260	.0083	.0401	-.0248	.0106	.0407	-.0012	-.0023	-.0006
.599	3.50	5.98	.0043	-.0986	.0172	-.0036	.0091	.0053	-.0021	.0099	.0060	-.0015	-.0008	-.0006
.597	3.50	8.97	.0374	-.0939	-.0215	.0238	.0135	-.0334	.0202	.0124	-.0290	.0037	.0011	-.0044
.152	1.00	-.03	-.0602	.0390	.0734	-.0602	.0386	.0734	-.0427	.0070	.0694	-.0175	.0316	.0040
.150	2.01	-.02	-.0983	-.7139	.1717	-.0605	.0201	.0752	-.0596	.0091	.0907	-.0008	.0110	-.0155
.150	2.61	-.04	-.0948	-1.1066	.1936	-.0501	.0132	.0606	-.0433	.0087	.0703	-.0069	.0045	-.0097
.150	3.01	-.02	-.0960	-1.3688	.2176	-.0474	.0065	.0605	-.0430	.0091	.0698	-.0044	-.0026	-.0093
.152	3.81	-.04	-.1054	-1.8726	.2685	-.0486	.0150	.0661	-.0438	.0095	.0709	-.0048	.0055	-.0048
.150	2.59	-3.03	-.1694	-1.1023	.2228	-.0673	.0006	.0911	-.0620	.0286	.0991	-.0053	-.0280	-.0080
.151	2.60	-.02	-.0825	-1.0995	.1883	-.0389	-.0000	.0575	-.0439	.0090	.0709	.0050	-.0090	-.0134
.150	2.60	2.98	.0001	-1.1055	.1547	-.0140	.0068	.0225	-.0219	.0076	.0371	.0079	-.0009	-.0146
.150	2.61	5.98	.0922	-1.1058	.1159	.0191	.0128	-.0171	.0019	.0081	.0014	.0172	.0046	-.0185
.150	2.61	8.98	.1828	-1.0955	.0726	.0502	.0264	-.0614	.0267	.0113	-.0358	.0235	.0151	-.0257

TABLE 22. AERODYNAMIC CHARACTERISTICS FOR REVERSER A DEPLOYED, VERTICAL TAILS IN AFT POSITION, $\phi_t = 0°$, AND $\delta_h = 0°$

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLN	CDN	CMN
.901	1.00	.00	-.0054	.0131	.0036	-.0054	.0127	.0036	-.0031	.0092	-.0001	-.0023	.0035	.0037
.899	2.00	.01	.0098	.0195	-.0242	.0105	.0130	-.0242	.0103	.0017	-.0237	.0003	.0113	-.0005
.899	3.01	.01	.0119	.0265	-.0299	.0143	.0132	-.0299	.0120	-.0009	-.0285	.0023	.0141	-.0015
.899	4.99	.02	.0222	.0397	-.0484	.0278	.0128	-.0511	.0186	-.0043	-.0418	.0092	.0171	-.0092
.897	7.03	.03	.0291	.0536	-.0633	.0341	.0124	-.0627	.0234	-.0069	-.0511	.0107	.0193	-.0117
.899	5.00	-2.98	.0039	.0381	-.0216	.0081	.0108	-.0243	.0054	-.0047	-.0204	.0028	.0155	-.0038
.901	5.01	.00	.0213	.0396	-.0477	.0269	.0127	-.0504	.0179	-.0041	-.0407	.0090	.0168	-.0097
.898	5.00	3.00	.0341	.0430	-.0701	.0411	.0163	-.0727	.0311	-.0019	-.0617	.0100	.0182	-.0111
.900	5.01	6.02	.0459	.0468	-.0912	.0543	.0205	-.0938	.0454	.0016	-.0828	.0089	.0190	-.0110
.900	5.00	9.02	.0784	.0533	-.1335	.0881	.0276	-.1361	.0707	.0066	-.1209	.0174	.0210	-.0152
.603	1.05	.01	-.0128	.0115	.0083	-.0128	.0111	.0083	-.0028	.0082	.0018	-.0100	.0028	.0065
.601	2.01	.01	.0101	.0290	-.0325	.0118	.0147	-.0325	.0153	.0002	-.0318	-.0034	.0145	-.0007
.601	3.00	.03	.0235	.0455	-.0548	.0289	.0163	-.0548	.0251	-.0027	-.0495	.0038	.0190	-.0053
.601	3.51	.01	.0295	.0541	-.0639	.0367	.0172	-.0635	.0286	-.0036	-.0560	.0081	.0209	-.0076
.601	5.04	.00	.0447	.0791	-.0900	.0574	.0185	-.0958	.0382	-.0055	-.0729	.0192	.0240	-.0229
.602	3.50	-3.00	.0059	.0513	-.0305	.0111	.0143	-.0301	.0081	-.0038	-.0254	.0030	.0181	-.0047
.602	3.51	.02	.0311	.0538	-.0647	.0383	.0171	-.0643	.0281	-.0036	-.0552	.0102	.0206	-.0091
.601	3.50	3.01	.0545	.0586	-.0984	.0636	.0223	-.0984	.0471	-.0007	-.0835	.0165	.0230	-.0148
.599	3.50	5.99	.0731	.0646	-.1275	.0841	.0287	-.1275	.0660	.0035	-.1113	.0180	.0252	-.0163
.602	3.51	9.01	.0919	.0705	-.1579	.1047	.0354	-.1575	.0846	.0088	-.1402	.0201	.0266	-.0173
.151	1.00	.01	-.0436	-.0308	.0182	-.0436	-.0312	.0182	.0035	.0036	-.0063	-.0471	-.0348	.0246
.150	2.00	.02	-.0215	.2994	-.0894	.0055	.0818	-.0894	.0479	.0017	-.0842	-.0424	.0801	-.0052
.150	2.59	.02	-.0552	.4697	-.0799	.0067	.1070	-.0799	.0425	.0061	-.0748	-.0358	.1009	-.0051
.150	3.01	.01	-.0751	.5874	-.0742	.0116	.1219	-.0742	.0401	.0060	-.0735	-.0285	.1159	-.0007
.149	3.80	.01	-.0949	.7940	-.0778	.0389	.1313	-.0915	-.0074	.0064	-.0144	.0463	.1249	-.0771
.151	2.62	-2.99	-.0412	.4859	-.0551	.0025	.1164	-.0551	.0271	.0036	-.0538	-.0245	.1128	-.0013
.150	2.62	.02	-.0415	.4901	-.0848	.0221	.1207	-.0848	.0408	.0055	-.0735	-.0187	.1152	-.0113
.150	2.62	3.00	-.0376	.4942	-.1244	.0448	.1296	-.1244	.0639	.0079	-.1086	-.0191	.1217	-.0158
.150	2.62	6.01	-.0340	.4999	-.1604	.0680	.1384	-.1604	.0848	.0128	-.1411	-.0168	.1255	-.0193
.150	2.61	9.02	-.0315	.5037	-.1969	.0888	.1490	-.1969	.1032	.0205	-.1704	-.0143	.1285	-.0265

TABLE 23. AERODYNAMIC CHARACTERISTICS FOR REVERSER A DEPLOYED, VERTICAL TAILS IN AFT POSITION, $\phi_t = 0°$, AND $\delta_h = -5°$

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLN	CDN	CMN
.901	1.09	.05	-.0519	.0164	.0807	-.0519	.0160	.0807	-.0489	.0140	.0765	-.0031	.0020	.0042
.900	1.99	.04	-.0408	.0211	.0568	-.0400	.0146	.0568	-.0380	.0036	.0569	-.0021	.0110	-.0001
.898	3.01	.00	-.0393	.0275	.0490	-.0369	.0141	.0490	-.0345	.0000	.0493	-.0025	.0141	-.0003
.898	4.99	.02	-.0319	.0394	.0301	-.0262	.0124	.0275	-.0292	-.0041	.0379	.0030	.0165	-.0105
.898	7.00	.01	-.0270	.0518	.0160	-.0220	.0108	.0165	-.0245	-.0077	.0284	.0025	.0185	-.0118
.900	5.03	-2.97	-.0442	.0420	.0544	-.0399	.0146	.0518	-.0405	-.0016	.0567	.0006	.0162	-.0049
.899	5.03	.03	-.0330	.0396	.0307	-.0274	.0124	.0281	-.0290	-.0043	.0375	.0016	.0167	-.0095
.900	5.02	3.02	-.0242	.0385	.0132	-.0172	.0118	.0105	-.0181	-.0050	.0212	.0009	.0168	-.0107
.900	5.02	6.02	-.0119	.0387	-.0087	-.0035	.0124	-.0113	-.0024	-.0038	-.0019	-.0012	.0161	-.0095
.899	5.02	9.00	.0219	.0418	-.0502	.0317	.0159	-.0529	.0228	-.0024	-.0389	.0089	.0183	-.0140
.600	1.05	.00	-.0526	.0165	.0754	-.0526	.0161	.0754	-.0444	.0116	.0711	-.0082	.0045	.0043
.602	2.00	.02	-.0370	.0314	.0417	-.0353	.0175	.0417	-.0305	.0013	.0437	-.0048	.0162	-.0019
.601	3.01	.01	-.0285	.0459	.0219	-.0231	.0166	.0219	-.0238	-.0025	.0302	.0007	.0191	-.0082
.601	3.51	.02	-.0241	.0533	.0127	-.0169	.0164	.0131	-.0201	-.0038	.0235	.0032	.0202	-.0104
.601	4.98	.01	-.0139	.0758	-.0101	-.0013	.0162	-.0159	-.0083	-.0059	.0038	.0070	.0221	-.0197
.601	3.52	-2.99	-.0411	.0544	.0430	-.0358	.0172	.0434	-.0396	-.0011	.0525	.0037	.0183	-.0091
.601	3.52	-.02	-.0227	.0531	.0122	-.0155	.0162	.0125	-.0202	-.0037	.0238	.0047	.0199	-.0113
.602	3.52	3.03	-.0031	.0543	-.0200	.0060	.0179	-.0196	.0007	-.0031	-.0069	.0053	.0210	-.0128
.509	3.51	6.02	.0152	.0567	-.0454	.0262	.0206	-.0450	.0174	-.0020	-.0302	.0088	.0226	-.0147
.598	3.50	9.00	.0366	.0597	-.0750	.0495	.0242	-.0750	.0360	-.0001	-.0580	.0135	.0243	-.0171
.148	1.00	-.00	-.0729	-.0138	.0825	-.0729	-.0142	.0825	-.0432	.0073	.0692	-.0297	-.0215	.0133
.150	2.01	.02	-.0670	.3148	-.0056	-.0390	.0920	-.0056	-.0355	.0033	.0437	-.0036	.0887	-.0493
.149	2.59	.02	-.0904	.4811	.0007	-.0274	.1121	.0007	-.0462	.0075	.0589	.0188	.1046	-.0582
.148	3.00	.01	-.1089	.5986	.0050	-.0212	.1267	.0050	-.0558	.0096	.0727	.0346	.1171	-.0677
.148	3.81	.01	-.1320	.8062	.0046	.0048	.1297	-.0101	-.0652	.0089	.0830	.0699	.1208	-.0931
.150	2.60	-2.99	-.0790	.4887	.0300	-.0358	.1210	.0300	-.0614	.0093	.0806	.0255	.1117	-.0506
.150	2.60	.00	-.0824	.4877	.0003	-.0198	.1212	.0003	-.0426	.0056	.0540	.0228	.1155	-.0537
.150	2.60	3.01	-.0858	.4834	-.0289	-.0044	.1222	-.0289	-.0298	.0030	.0335	.0254	.1191	-.0624
.150	2.60	6.01	-.0873	.4816	-.0590	.0127	.1258	-.0590	-.0141	.0031	.0112	.0268	.1228	-.0702
.150	2.60	9.01	-.0889	.4808	-.0957	.0301	.1296	-.0957	.0335	.0086	-.0546	-.0034	.1209	-.0411

TABLE 24. AERODYNAMIC CHARACTERISTICS FOR REVERSER B DEPLOYED, $\theta = 110°$, VERTICAL TAILS IN MID POSITION, $\phi_t = 0°$, AND $\delta_h = 0°$

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLN	CDN	CMN
.900	1.05	-.01	.0099	.0116	-.0238	.0099	.0112	-.0238	.0150	.0143	-.0285	-.0050	-.0031	.0047
.899	2.01	-.00	.0136	.0171	-.0299	.0146	.0105	-.0296	.0141	.0065	-.0265	.0005	.0040	-.0031
.901	3.01	.00	.0109	.0235	-.0271	.0125	.0137	-.0267	.0123	.0009	-.0232	.0002	.0128	-.0034
.902	5.01	.03	.0029	.0287	-.0176	.0055	.0109	-.0171	.0072	-.0017	-.0155	-.0017	.0126	-.0016
.901	7.03	-.01	-.0009	.0333	-.0143	.0028	.0107	-.0136	.0047	-.0030	-.0123	-.0019	.0137	-.0013
.900	5.01	-3.00	-.0104	.0292	.0046	-.0087	.0112	.0052	-.0070	-.0015	.0063	-.0017	.0128	-.0012
.898	5.00	-.00	.0037	.0295	-.0181	.0064	.0116	-.0175	.0072	-.0017	-.0156	-.0008	.0133	-.0019
.897	4.99	3.00	.0181	.0312	-.0392	.0216	.0135	-.0387	.0183	-.0006	-.0336	.0033	.0141	-.0051
.899	5.01	6.00	.0379	.0354	-.0690	.0424	.0179	-.0685	.0374	.0022	-.0622	.0050	.0157	-.0063
.898	5.01	8.98	.0731	.0428	-.1158	.0784	.0255	-.1152	.0644	.0076	-.1040	.0140	.0179	-.0113
.601	1.01	-.02	.0070	.0084	-.0162	.0070	.0080	-.0162	.0118	.0092	-.0181	-.0048	-.0012	.0018
.598	2.01	-.00	.0046	.0222	-.0168	.0068	.0078	-.0160	.0081	.0024	-.0144	-.0013	.0054	-.0016
.599	3.02	.01	.0009	.0347	-.0143	.0043	.0132	-.0134	.0055	-.0006	-.0121	-.0012	.0137	-.0013
.600	3.50	.01	-.0018	.0429	-.0125	.0022	.0180	-.0116	.0029	-.0011	-.0087	-.0007	.0190	-.0028
.600	5.02	.01	-.0045	.0534	-.0122	.0014	.0136	-.0109	.0017	-.0022	-.0077	-.0003	.0158	-.0032
.600	3.52	-3.01	-.0243	.0447	.0240	-.0216	.0194	.0250	-.0209	-.0001	.0263	-.0006	.0195	-.0012
.601	3.51	-.01	-.0001	.0439	-.0133	.0039	.0190	-.0124	.0032	-.0011	-.0093	.0007	.0202	-.0031
.598	3.50	2.98	.0255	.0470	-.0501	.0308	.0222	-.0491	.0252	.0003	-.0423	.0057	.0219	-.0068
.598	3.50	6.01	.0441	.0510	-.0745	.0507	.0264	-.0735	.0417	.0029	-.0652	.0090	.0235	-.0084
.601	3.52	8.99	.0678	.0572	-.1082	.0756	.0332	-.1072	.0601	.0075	-.0943	.0155	.0257	-.0129
.152	1.00	-.00	-.0155	-.0444	-.0081	-.0155	-.0448	-.0081	.0081	.0017	-.0134	-.0236	-.0465	.0053
.151	2.00	-.02	-.0290	.2474	-.0578	.0051	.0279	-.0466	.0109	-.0051	-.0275	-.0058	.0330	-.0191
.151	2.61	-.02	-.0381	.3479	-.0582	.0078	.0609	-.0453	.0102	-.0032	-.0273	-.0024	.0641	-.0180
.151	3.02	.01	-.0575	.3984	-.0446	-.0032	.0634	-.0304	.0026	-.0017	-.0169	-.0058	.0651	-.0135
.150	3.81	.00	-.0677	.5784	-.0632	.0023	.0998	-.0467	-.0253	-.0017	.0161	.0276	.1015	-.0629
.151	2.61	-3.01	-.0356	.3554	-.0291	-.0048	.0667	-.0162	-.0278	-.0019	.0228	.0230	.0686	-.0389
.151	2.61	-.01	-.0317	.3562	-.0573	.0143	.0687	-.0443	.0060	-.0001	-.0207	.0083	.0688	-.0236
.152	2.61	2.98	-.0221	.3563	-.0904	.0381	.0747	-.0776	.0286	-.0006	-.0545	.0095	.0753	-.0231
.152	2.61	6.00	-.0116	.3573	-.1232	.0632	.0797	-.1105	.0452	.0024	-.0794	.0180	.0773	-.0311
.155	2.62	9.01	.0047	.3496	-.1611	.0903	.0875	-.1489	.0677	.0078	-.1131	.0225	.0797	-.0357

TABLE 25. AERODYNAMIC CHARACTERISTICS FOR REVERSER B DEPLOYED, $\theta = 110°$, VERTICAL TAILS IN MID POSITION, $\phi_t = 0°$, AND $\delta_h = -5°$

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLN	CDN	CMN
.901	1.05	.00	-.0396	.0142	.0622	-.0396	.0138	.0622	-.0369	.0181	.0584	-.0027	-.0044	.0037
.897	1.99	-.03	-.0368	.0191	.0528	-.0358	.0126	.0531	-.0340	.0095	.0540	-.0018	.0030	-.0009
.900	3.00	-.02	-.0344	.0262	.0463	-.0329	.0165	.0467	-.0310	.0038	.0494	-.0019	.0128	-.0026
.898	5.01	-.02	-.0394	.0321	.0513	-.0368	.0141	.0519	-.0343	.0010	.0541	-.0025	.0131	-.0022
.898	7.01	.00	-.0418	.0370	.0517	-.0381	.0143	.0524	-.0350	-.0002	.0547	-.0031	.0145	-.0024
.898	4.99	-3.00	-.0535	.0355	.0773	-.0518	.0175	.0779	-.0469	.0044	.0749	-.0050	.0132	.0030
.900	5.00	-.01	-.0403	.0324	.0518	-.0377	.0145	.0523	-.0342	.0009	.0539	-.0036	.0136	-.0016
.900	5.00	2.99	-.0303	.0301	.0328	-.0267	.0124	.0333	-.0226	-.0007	.0360	-.0042	.0131	-.0026
.897	5.00	5.99	-.0130	.0307	.0012	-.0086	.0132	.0018	-.0042	-.0007	.0072	-.0044	.0139	-.0055
.903	5.03	9.01	.0240	.0349	-.0455	.0293	.0177	-.0449	.0236	.0016	-.0347	.0057	.0161	-.0102
.600	1.01	-.02	-.0439	.0086	.0661	-.0439	.0082	.0661	-.0367	.0124	.0615	-.0073	-.0041	.0047
.600	2.01	-.00	-.0391	.0248	.0525	-.0369	.0105	.0532	-.0326	.0049	.0531	-.0043	.0056	.0001
.599	3.02	.00	-.0416	.0375	.0525	-.0382	.0160	.0534	-.0352	.0020	.0552	-.0030	.0140	-.0019
.599	3.52	-.01	-.0410	.0462	.0493	-.0369	.0210	.0503	-.0345	.0010	.0535	-.0024	.0200	-.0032
.599	5.00	.00	-.0426	.0558	.0483	-.0367	.0161	.0495	-.0364	.0003	.0557	-.0003	.0158	-.0062
.599	3.51	-3.01	-.0612	.0497	.0847	-.0585	.0245	.0857	-.0566	.0050	.0870	-.0019	.0195	-.0013
.600	3.49	-.01	-.0394	.0466	.0487	-.0354	.0217	.0497	-.0351	.0013	.0545	-.0003	.0204	-.0048
.601	3.50	3.01	-.0189	.0458	.0139	-.0136	.0212	.0148	-.0146	.0000	.0233	.0011	.0212	-.0084
.600	3.49	5.99	-.0015	.0471	-.0131	.0050	.0227	-.0121	.0050	.0005	-.0041	.0000	.0223	-.0081
.600	3.49	8.99	.0233	.0503	-.0488	.0311	.0264	-.0478	.0265	.0027	-.0367	.0046	.0236	-.0111
.152	1.00	-.01	-.0601	.0031	.0678	-.0601	.0027	.0678	-.0335	.0045	.0569	-.0266	-.0018	.0108
.152	2.01	-.01	-.0645	.2734	.0139	-.0306	.0554	.0250	-.0440	-.0029	.0597	.0134	.0583	-.0347
.151	2.60	-.01	-.0867	.3623	.0283	-.0412	.0778	.0411	-.0570	-.0001	.0782	.0158	.0779	-.0371
.151	3.00	-.01	-.1004	.4093	.0388	-.0471	.0795	.0527	-.0644	.0020	.0892	.0174	.0775	-.0364
.151	3.81	-.01	-.1176	.5828	.0263	-.0485	.1092	.0425	-.0675	.0020	.0903	.0190	.1073	-.0478
.151	2.61	-3.00	-.0747	.3662	.0523	-.0440	.0787	.0652	-.0698	.0036	.0961	.0258	.0750	-.0309
.152	2.61	-.00	-.0651	.3640	.0163	-.0197	.0804	.0290	-.0544	.0010	.0742	.0347	.0793	-.0451
.152	2.61	3.00	-.0621	.3618	-.0123	-.0019	.0809	.0004	-.0356	-.0016	.0466	.0337	.0825	-.0461
.152	2.61	6.00	-.0572	.3582	-.0453	.0173	.0818	-.0326	-.0159	-.0022	.0173	.0331	.0840	-.0499
.152	2.61	9.00	-.0546	.3591	-.0751	.0348	.0851	-.0623	.0194	.0008	-.0308	.0154	.0842	-.0315

TABLE 26. AERODYNAMIC CHARACTERISTICS FOR REVERSER B DEPLOYED, $\theta = 120°$, VERTICAL TAILS IN MID POSITION, $\phi_t = 0°$, AND $\delta_h = 0°$

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLN	CDN	CMN
.904	1.06	-.01	.0104	.0123	-.0243	.0104	.0119	-.0243	.0150	.0146	-.0285	-.0046	-.0027	.0041
.899	2.01	.00	.0135	.0190	-.0298	.0143	.0087	-.0299	.0137	.0059	-.0258	.0007	.0027	-.0041
.899	3.00	-.01	.0094	.0264	-.0248	.0107	.0136	-.0244	.0119	.0003	-.0223	-.0012	.0133	-.0021
.900	5.02	.02	.0008	.0361	-.0159	.0031	.0103	-.0146	.0057	-.0022	-.0138	-.0026	.0125	-.0008
.899	6.98	.01	-.0028	.0434	-.0135	.0006	.0103	-.0113	.0039	-.0036	-.0115	-.0033	.0139	.0002
.900	5.01	-3.00	-.0131	.0368	.0079	-.0121	.0108	.0093	-.0090	-.0020	.0090	-.0032	.0128	.0003
.901	5.02	-.01	.0013	.0366	-.0163	.0036	.0108	-.0149	.0057	-.0022	-.0138	-.0021	.0130	-.0011
.897	5.00	2.99	.0144	.0385	-.0367	.0180	.0127	-.0354	.0166	-.0011	-.0316	.0014	.0138	-.0038
.898	5.00	5.98	.0331	.0424	-.0642	.0381	.0168	-.0629	.0344	.0016	-.0578	.0037	.0152	-.0051
.899	5.02	8.98	.0668	.0494	-.1091	.0731	.0242	-.1077	.0612	.0065	-.0984	.0119	.0177	-.0093
.599	1.01	-.02	.0075	.0086	-.0166	.0075	.0082	-.0166	.0124	.0091	-.0189	-.0050	-.0009	.0023
.601	2.00	-.00	.0008	.0291	-.0129	.0026	.0066	-.0130	.0050	.0011	-.0103	-.0024	.0055	-.0027
.602	3.02	.00	-.0014	.0417	-.0125	.0016	.0135	-.0116	.0043	-.0012	-.0105	-.0027	.0146	-.0010
.599	3.50	.00	-.0032	.0500	-.0117	.0003	.0169	-.0103	.0030	-.0018	-.0092	-.0026	.0187	-.0011
.599	5.01	-.00	-.0049	.0711	-.0147	.0004	.0133	-.0116	.0012	-.0033	-.0080	-.0008	.0165	-.0036
.600	3.50	-3.00	-.0212	.0506	.0186	-.0194	.0175	.0201	-.0185	-.0012	.0217	-.0009	.0187	-.0017
.601	3.50	.01	-.0009	.0507	-.0131	.0026	.0178	-.0116	.0034	-.0018	-.0098	-.0008	.0196	-.0018
.602	3.50	2.98	.0220	.0528	-.0463	.0272	.0202	-.0448	.0230	-.0005	-.0391	.0042	.0207	-.0057
.600	3.50	6.00	.0414	.0561	-.0724	.0483	.0237	-.0709	.0394	.0020	-.0619	.0089	.0217	-.0091
.602	3.51	8.99	.0610	.0620	-.1004	.0696	.0299	-.0990	.0586	.0061	-.0912	.0110	.0239	-.0077
.152	1.00	-.01	-.0074	-.0368	-.0086	-.0074	-.0372	-.0086	.0112	.0008	-.0164	-.0186	-.0381	.0078
.151	2.00	-.01	.0014	.3195	-.0927	.0302	-.0302	-.0944	.0254	-.0068	-.0522	.0048	-.0234	-.0422
.152	2.60	.01	-.0094	.4465	-.1025	.0300	.0680	-.0944	.0272	-.0056	-.0554	.0028	.0736	-.0390
.151	3.00	-.00	-.0239	.5254	-.0985	.0230	.0840	-.0837	.0220	-.0039	-.0472	.0010	.0879	-.0365
.151	3.80	-.00	-.0532	.6816	-.0841	.0082	.1008	-.0558	-.0155	-.0017	.0022	.0237	.1025	-.0581
.152	2.61	-3.00	.0126	.4509	-.0832	.0321	.0706	-.0750	.0141	-.0041	-.0372	.0179	.0747	-.0379
.152	2.60	.01	.0124	.4563	-.1161	.0519	.0769	-.1079	.0287	-.0028	-.0578	.0233	.0797	-.0501
.152	2.60	2.99	.0241	.4584	-.1520	.0833	.0813	-.1438	.0492	-.0014	-.0885	.0341	.0827	-.0554
.152	2.60	5.98	.0255	.4633	-.1839	.1039	.0914	-.1758	.0659	.0035	-.1137	.0380	.0879	-.0620
.151	2.60	9.01	.0208	.4749	-.2159	.1195	.1047	-.2077	.0820	.0097	-.1387	.0375	.0950	-.0690

TABLE 27. AERODYNAMIC CHARACTERISTICS FOR REVERSER B DEPLOYED, $\theta = 120°$, VERTICAL TAILS IN MID POSITION, $\phi_t = 0°$, AND $\delta_h = -5°$

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLN	CDN	CMN
.806	1.04	-.01	-.0386	.0133	.0621	-.0386	.0129	.0621	-.0367	.0179	.0584	-.0019	-.0050	.0037
.808	1.97	-.05	-.0337	.0195	.0501	-.0329	.0093	.0501	-.0331	.0093	.0526	.0002	-.0000	-.0025
.808	3.01	-.04	-.0322	.0285	.0448	-.0308	.0156	.0452	-.0307	.0032	.0490	-.0002	.0124	-.0038
.900	5.00	-.04	-.0366	.0385	.0475	-.0343	.0127	.0488	-.0336	.0006	.0527	-.0007	.0120	-.0038
.807	7.01	-.03	-.0385	.0463	.0472	-.0352	.0131	.0495	-.0346	-.0006	.0536	-.0006	.0137	-.0041
.900	5.01	-3.03	-.0506	.0421	.0744	-.0497	.0162	.0758	-.0466	.0041	.0745	-.0030	.0120	.0012
.808	4.98	-.03	-.0368	.0391	.0469	-.0345	.0133	.0483	-.0327	.0007	.0512	-.0018	.0127	-.0030
.900	4.99	2.97	-.0283	.0369	.0302	-.0246	.0114	.0315	-.0229	-.0009	.0361	-.0017	.0123	-.0046
.809	4.98	5.96	-.0125	.0375	.0001	-.0075	.0121	.0014	-.0048	-.0008	.0077	-.0027	.0129	-.0063
.900	5.03	8.98	.0225	.0415	-.0440	.0288	.0163	-.0426	.0228	.0014	-.0327	.0060	.0149	-.0099
.601	1.01	-.02	-.0436	.0089	.0662	-.0436	.0085	.0662	-.0369	.0130	.0620	-.0067	-.0045	.0043
.602	2.00	-.02	-.0378	.0301	.0508	-.0360	.0077	.0507	-.0338	.0044	.0543	-.0022	.0032	-.0036
.602	3.00	-.03	-.0382	.0433	.0480	-.0353	.0152	.0490	-.0335	.0020	.0522	-.0019	.0133	-.0033
.598	3.49	-.04	-.0397	.0513	.0483	-.0361	.0181	.0498	-.0354	.0011	.0544	-.0007	.0170	-.0046
.600	4.99	-.04	-.0368	.0708	.0377	-.0316	.0134	.0407	-.0330	-.0008	.0492	.0014	.0143	-.0085
.600	3.51	-3.02	-.0559	.0541	.0768	-.0540	.0208	.0783	-.0534	.0042	.0811	-.0007	.0166	-.0028
.601	3.52	-.02	-.0379	.0520	.0469	-.0344	.0189	.0483	-.0348	.0012	.0536	.0005	.0177	-.0053
.601	3.52	2.96	-.0177	.0512	.0123	-.0124	.0183	.0138	-.0150	-.0002	.0234	.0026	.0185	-.0097
.600	3.51	5.97	.0005	.0523	-.0162	.0074	.0197	-.0147	.0042	.0002	-.0036	.0032	.0194	-.0111
.598	3.50	8.95	.0235	.0556	-.0492	.0322	.0232	-.0477	.0255	.0023	-.0355	.0067	.0209	-.0122
.152	1.00	-.02	-.0551	-.0003	.0663	-.0551	-.0007	.0663	-.0340	.0085	.0574	-.0211	-.0093	.0089
.151	1.98	-.03	-.0279	.2968	-.0382	.0003	-.0520	-.0403	-.0063	-.0033	.0014	.0066	-.0487	-.0417
.151	2.59	-.04	-.0494	.4309	-.0334	-.0101	.0503	-.0253	-.0340	-.0021	.0387	.0239	.0525	-.0640
.151	3.01	-.03	-.0703	.5109	-.0142	-.0234	.0673	.0009	-.0495	-.0002	.0626	.0261	.0675	-.0617
.150	3.80	-.02	-.1044	.6699	.0057	-.0430	.0873	.0339	-.0654	.0033	.0863	.0224	.0840	-.0524
.152	2.61	-3.04	-.0331	.4356	-.0136	-.0137	.0536	-.0053	-.0477	.0010	.0584	.0340	.0527	-.0637
.151	2.61	-.04	-.0350	.4376	-.0407	.0043	.0563	-.0323	-.0346	-.0020	.0394	.0389	.0583	-.0718
.151	2.61	2.95	-.0279	.4348	-.0757	.0314	.0556	-.0674	.0042	-.0020	-.0137	.0272	.0576	-.0537
.152	2.61	5.97	-.0242	.4336	-.1096	.0544	.0605	-.1013	.0225	-.0017	-.0410	.0319	.0622	-.0603
.151	2.61	8.97	-.0358	.4367	-.1280	.0628	.0662	-.1197	.0282	.0005	-.0490	.0346	.0657	-.0707

TABLE 28. AERODYNAMIC CHARACTERISTICS FOR REVERSER B DEPLOYED, $\theta = 130°$, VERTICAL TAILS IN MID POSITION, $\phi_t = 0°$, AND $\delta_h = 0°$

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLN	CDN	CMN
.902	1.05	-.00	.0111	.0121	-.0257	.0111	.0117	-.0257	.0155	.0145	-.0295	-.0045	-.0029	.0037
.902	2.01	-.06	.0081	.0194	-.0232	.0077	.0093	-.0209	.0095	.0053	-.0194	-.0018	.0040	-.0014
.899	3.01	-.04	.0067	.0291	-.0216	.0077	.0124	-.0193	.0099	.0003	-.0194	-.0022	.0121	.0001
.902	4.99	.02	-.0004	.0411	-.0149	.0022	.0124	-.0140	.0053	-.0025	-.0133	-.0030	.0148	-.0007
.900	7.01	.04	-.0045	.0512	-.0123	-.0007	.0097	-.0100	.0022	-.0038	-.0094	-.0029	.0135	-.0006
.901	5.01	-2.99	-.0139	.0426	.0098	-.0127	.0135	.0107	-.0103	-.0020	.0108	-.0024	.0155	-.0002
.899	5.01	.02	.0003	.0421	-.0152	.0029	.0131	-.0143	.0048	-.0024	-.0127	-.0019	.0154	-.0017
.900	5.01	2.99	.0114	.0435	-.0338	.0155	.0146	-.0330	.0144	-.0014	-.0286	.0012	.0160	-.0044
.897	4.99	5.99	.0287	.0471	-.0592	.0343	.0185	-.0584	.0315	.0011	-.0534	.0028	.0174	-.0050
.899	5.01	9.01	.0611	.0531	-.1019	.0682	.0248	-.1010	.0574	.0058	-.0926	.0108	.0190	-.0084
.603	1.00	-.00	.0075	.0070	-.0172	.0075	.0066	-.0172	.0123	.0091	-.0189	-.0048	-.0025	.0017
.602	2.00	-.00	.0028	.0325	-.0155	.0020	.0104	-.0104	.0067	.0009	-.0134	-.0047	.0095	.0030
.598	3.00	.00	-.0027	.0485	-.0118	-.0005	.0115	-.0065	.0026	-.0015	-.0089	-.0032	.0129	.0023
.598	3.52	.00	-.0040	.0559	-.0116	.0019	.0135	-.0140	.0003	-.0017	-.0058	.0016	.0151	-.0081
.598	4.99	.01	-.0044	.0839	-.0174	.0016	.0191	-.0155	-.0001	-.0037	-.0076	.0016	.0228	-.0079
.599	3.50	-2.98	-.0224	.0565	.0193	-.0186	.0141	.0170	-.0211	-.0014	.0247	.0025	.0155	-.0078
.601	3.51	-.02	-.0023	.0560	-.0125	.0037	.0141	-.0148	.0009	-.0018	-.0068	.0028	.0159	-.0080
.601	3.51	3.00	.0186	.0578	-.0434	.0266	.0163	-.0458	.0201	-.0010	-.0355	.0065	.0173	-.0102
.600	3.50	5.98	.0395	.0613	-.0720	.0498	.0201	-.0744	.0388	.0013	-.0616	.0110	.0189	-.0128
.602	3.51	9.00	.0527	.0646	-.0909	.0650	.0243	-.0933	.0526	.0049	-.0825	.0123	.0194	-.0108
.152	1.00	.01	-.0168	-.0415	-.0097	-.0168	-.0419	-.0097	.0094	.0005	-.0155	-.0261	-.0424	.0058
.150	2.01	-.02	.0405	.3765	-.1267	.0274	.0257	-.0438	.0850	.0112	-.1037	-.0576	.0145	.0600
.151	2.61	-.01	-.0021	.4962	-.1200	-.0155	-.0161	-.0032	.0351	-.0050	-.0699	-.0506	-.0110	.0668
.150	3.02	-.01	-.0165	.6256	-.1229	.0193	.0387	-.0408	.0339	-.0010	-.0660	-.0145	.0396	.0252
.150	3.80	.00	-.0616	.7941	-.0870	.0231	.0745	-.1115	-.0157	-.0002	.0011	.0388	.0747	-.1126
.151	2.62	-3.02	.0121	.5071	-.0982	-.0277	-.0060	.0185	.0193	-.0037	-.0471	-.0470	-.0023	.0656
.151	2.61	.02	.0159	.5023	-.1319	.0031	-.0089	-.0157	.0361	-.0027	-.0714	-.0330	-.0062	.0558
.151	2.61	3.02	.0107	.5044	-.1628	.0241	-.0076	-.0459	.0513	-.0002	-.0947	-.0272	-.0074	.0488
.151	2.62	5.98	.0066	.5077	-.1931	.0472	-.0036	-.0766	.0706	.0041	-.1233	-.0234	-.0077	.0468
.150	2.61	8.99	.0028	.5138	-.2207	.0701	.0014	-.1027	.0835	.0095	-.1449	-.0134	-.0081	.0422

TABLE 29. AERODYNAMIC CHARACTERISTICS FOR REVERSER B DEPLOYED, $\theta = 130°$, VERTICAL TAILS IN MID POSITION, $\phi_t = 0°$, AND $\delta_h = -5°$

MACH	NPR	ALPHA	CLT	C(D-F)	CMT	CL	CD	CM	CLAFT	CDAFT	CMAFT	CLN	CDN	CMN
.903	1.04	-.00	-.0407	.0142	.0642	-.0407	.0138	.0642	-.0379	.0183	.0601	-.0028	-.0045	.0042
.898	2.00	-.02	-.0368	.0216	.0531	-.0372	.0114	.0554	-.0346	.0085	.0549	-.0025	.0029	.0005
.898	3.01	.01	-.0334	.0321	.0448	-.0324	.0154	.0471	-.0306	.0029	.0488	-.0018	.0125	-.0018
.899	5.01	-.00	-.0377	.0451	.0469	-.0350	.0160	.0478	-.0330	.0003	.0515	-.0020	.0157	-.0036
.897	7.00	-.01	-.0410	.0555	.0482	-.0373	.0137	.0505	-.0344	-.0011	.0530	-.0029	.0148	-.0026
.899	5.00	-2.99	-.0516	.0491	.0745	-.0505	.0200	.0754	-.0462	.0037	.0736	-.0043	.0163	.0018
.899	5.02	-.01	-.0383	.0456	.0473	-.0356	.0164	.0482	-.0326	.0002	.0509	-.0030	.0162	-.0028
.900	5.02	3.00	-.0303	.0432	.0305	-.0262	.0144	.0313	-.0232	-.0014	.0363	-.0030	.0158	-.0050
.898	5.00	6.01	-.0159	.0436	.0024	-.0103	.0150	.0033	-.0063	-.0013	.0102	-.0039	.0162	-.0069
.898	5.01	8.99	.0171	.0463	-.0396	.0242	.0180	-.0388	.0212	.0008	-.0302	.0030	.0172	-.0085
.601	1.00	.00	-.0445	.0105	.0659	-.0445	.0101	.0659	-.0363	.0124	.0610	-.0082	-.0023	.0049
.601	2.02	-.01	-.0379	.0365	.0471	-.0388	.0140	.0524	-.0313	.0035	.0500	-.0075	.0105	.0024
.601	3.00	.00	-.0396	.0517	.0465	-.0375	.0150	.0517	-.0338	.0012	.0520	-.0037	.0139	-.0003
.602	3.51	.00	-.0406	.0581	.0472	-.0347	.0163	.0448	-.0348	.0004	.0530	.0001	.0160	-.0082
.601	5.01	-.01	-.0360	.0848	.0318	-.0300	.0203	.0338	-.0313	-.0023	.0451	.0013	.0226	-.0113
.602	3.51	-3.01	-.0565	.0608	.0754	-.0528	.0188	.0730	-.0536	.0032	.0804	.0007	.0156	-.0074
.600	3.51	-.03	-.0393	.0586	.0467	-.0334	.0165	.0443	-.0351	.0004	.0534	.0017	.0161	-.0091
.601	3.51	3.00	-.0200	.0575	.0127	-.0119	.0159	.0104	-.0157	-.0010	.0240	.0038	.0168	-.0136
.599	3.50	5.99	-.0013	.0584	-.0168	.0090	.0171	-.0192	.0048	-.0004	-.0044	.0042	.0175	-.0148
.603	3.51	9.00	.0197	.0600	-.0464	.0319	.0197	-.0487	.0245	.0014	-.0337	.0074	.0183	-.0150
.151	1.00	-.01	-.0640	.0200	.0651	-.0640	.0196	.0651	-.0319	.0049	.0546	-.0321	.0147	.0105
.152	2.00	-.01	.0012	.3653	-.0667	-.0113	.0237	.0140	.0406	.0120	-.0365	-.0518	.0117	.0505
.152	2.60	-.01	-.0446	.4822	-.0505	-.0590	-.0196	.0652	-.0231	-.0030	.0215	-.0359	-.0167	.0437
.152	3.00	.01	-.0529	.6010	-.0552	-.0191	.0311	.0259	-.0287	-.0000	.0307	.0096	.0311	-.0049
.152	3.80	-.01	-.0973	.7714	-.0150	-.0151	.0729	-.0388	-.0588	.0047	.0765	.0436	.0682	-.1153
.152	2.61	-3.01	-.0256	.4911	-.0275	-.0653	-.0089	.0873	-.0399	.0015	.0469	-.0254	-.0104	.0404
.152	2.61	-.01	-.0307	.4888	-.0553	-.0445	-.0154	.0603	-.0223	-.0029	.0197	-.0222	-.0124	.0406
.152	2.61	3.01	-.0338	.4875	-.0843	-.0209	-.0183	.0316	.0094	-.0013	-.0228	-.0303	-.0170	.0543
.152	2.61	6.00	-.0364	.4869	-.1203	.0029	-.0177	-.0045	.0314	-.0004	-.0555	-.0285	-.0173	.0510
.152	2.60	8.99	-.0472	.4838	-.1359	.0173	-.0157	-.0199	.0377	.0009	-.0656	-.0204	-.0166	.0458

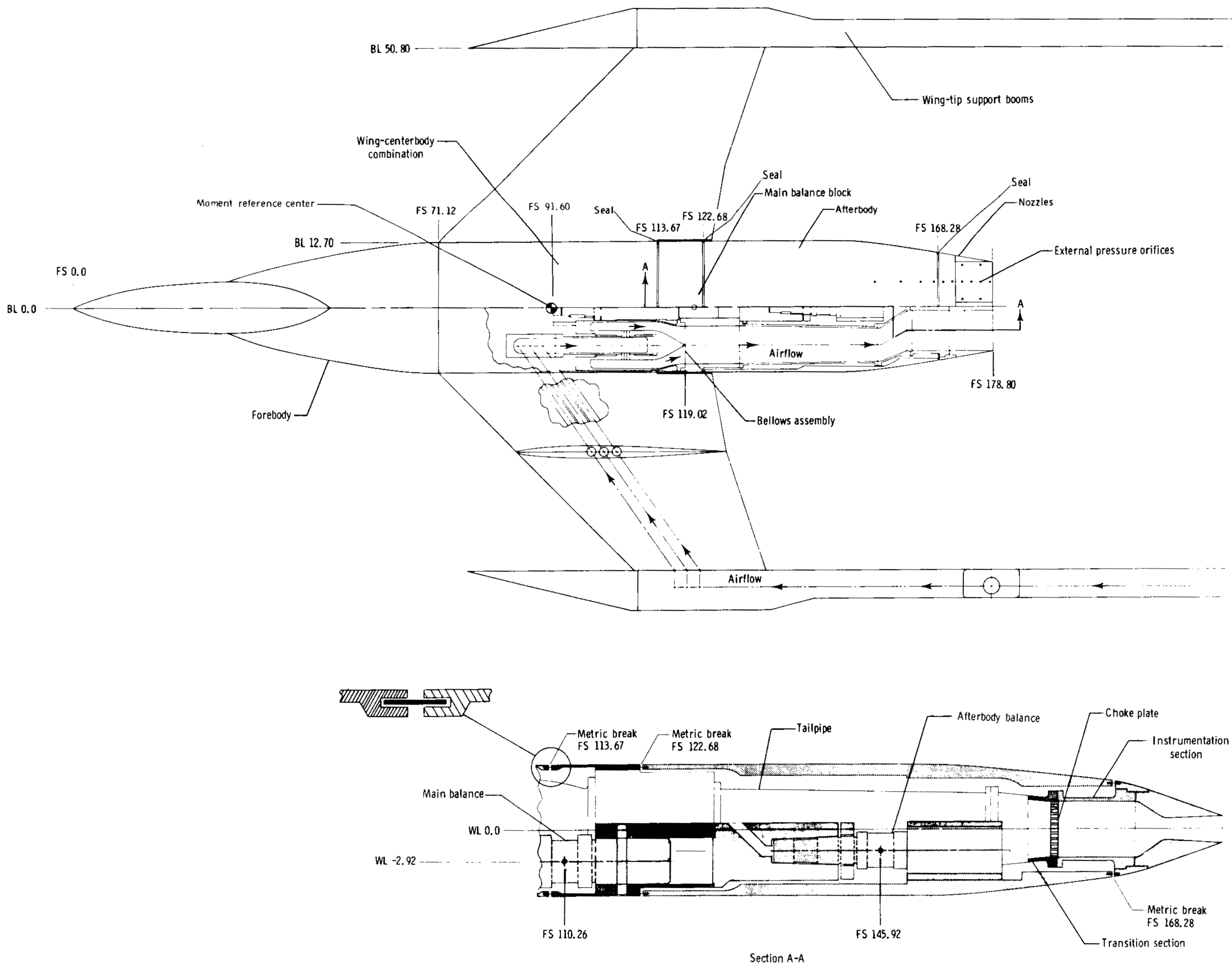

Figure 1. Air-powered, twin-engine wing-tip-supported model with nonaxisymmetric convergent-divergent dry power nozzle showing jet simulation system and balance arrangement.

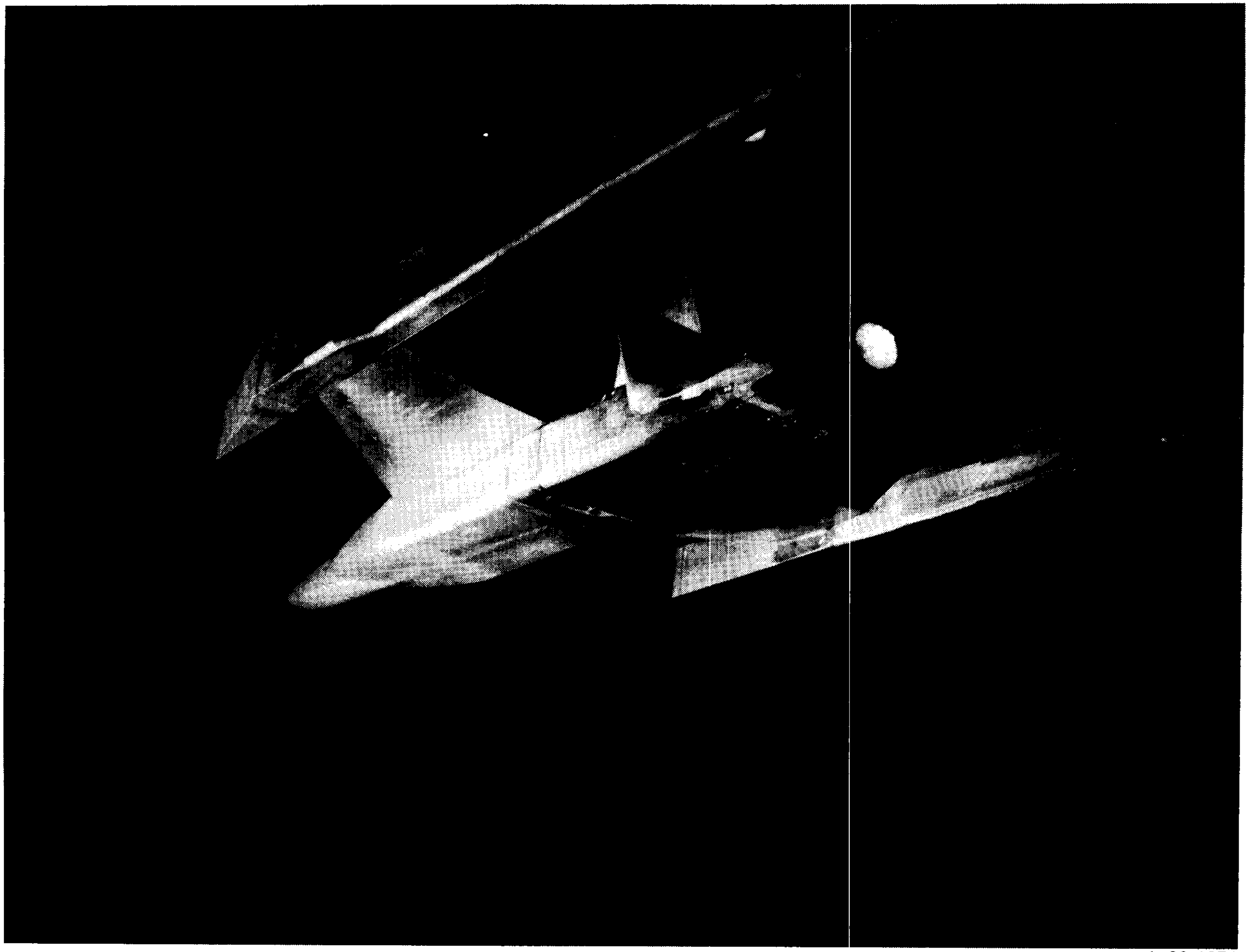

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Figure 2. Model with baseline (forward-thrust) nozzle installed in Langley 16-Foot Transonic Tunnel.

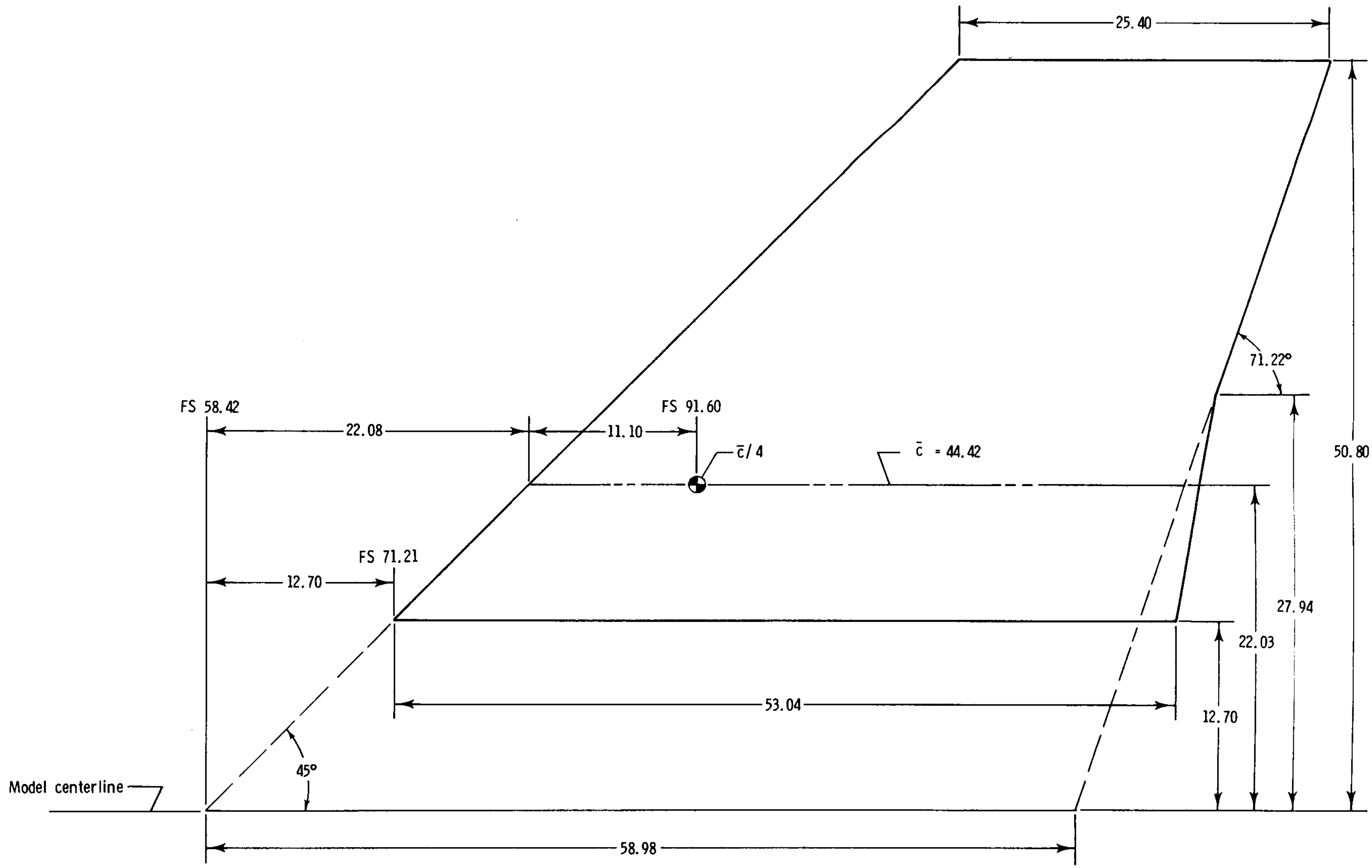

Figure 3. Wing planform geometry. All linear dimensions are in centimeters.

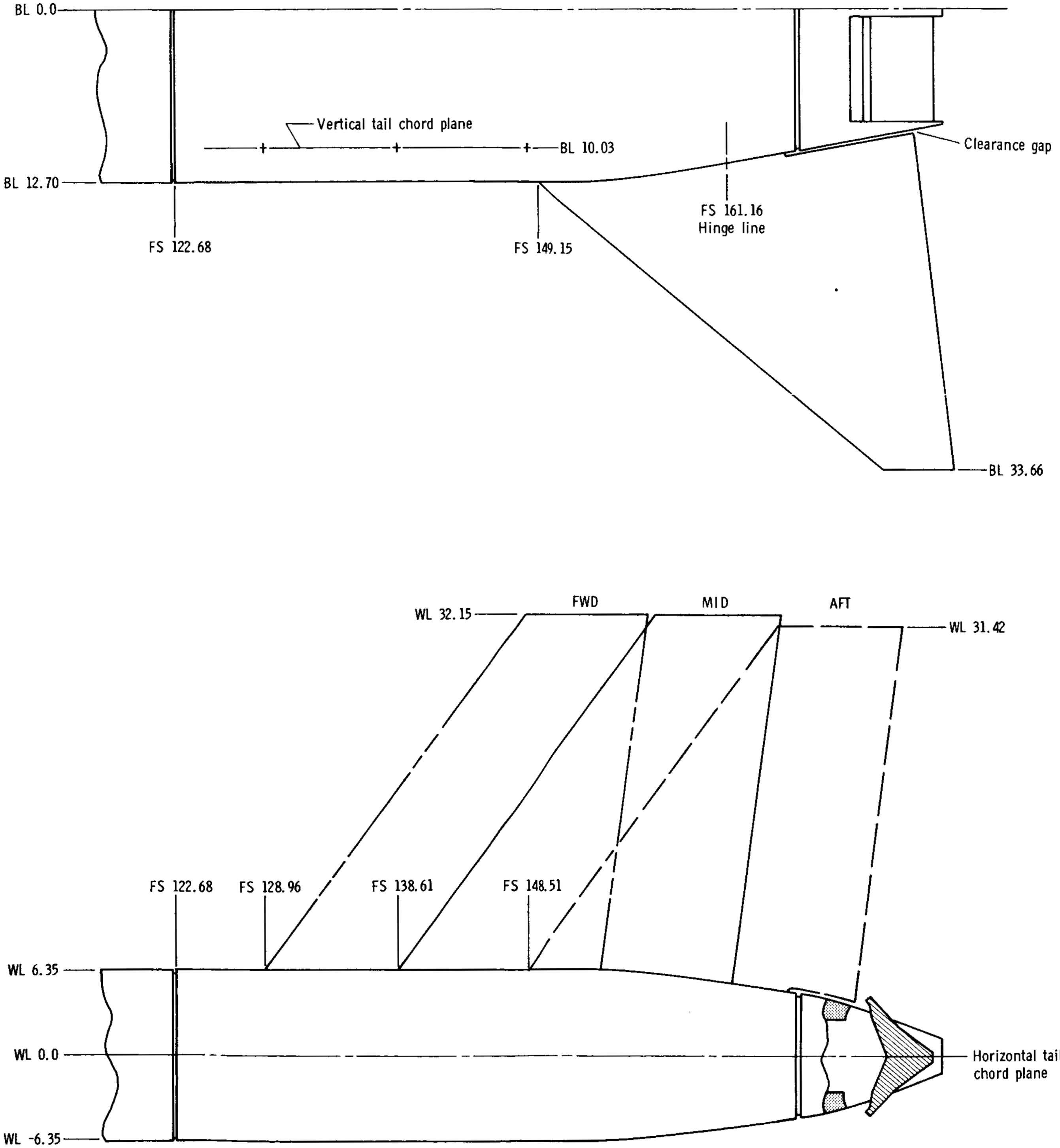

Figure 4. Location of horizontal and vertical tails.

Horizontal Tail Geometry

Airfoil sections:	
Tip	NACA 64-002.5
Root	NACA 64-005.5
Tip chord, cm	5.08
Root chord, cm	28.96
Taper ratio	.175
Span, cm	67.51
Planform area (one side exposed, filler excluded), m^2	.0372
Aspect ratio (exposed, filler excluded)	2.564
Λ_{le}, deg	50.0

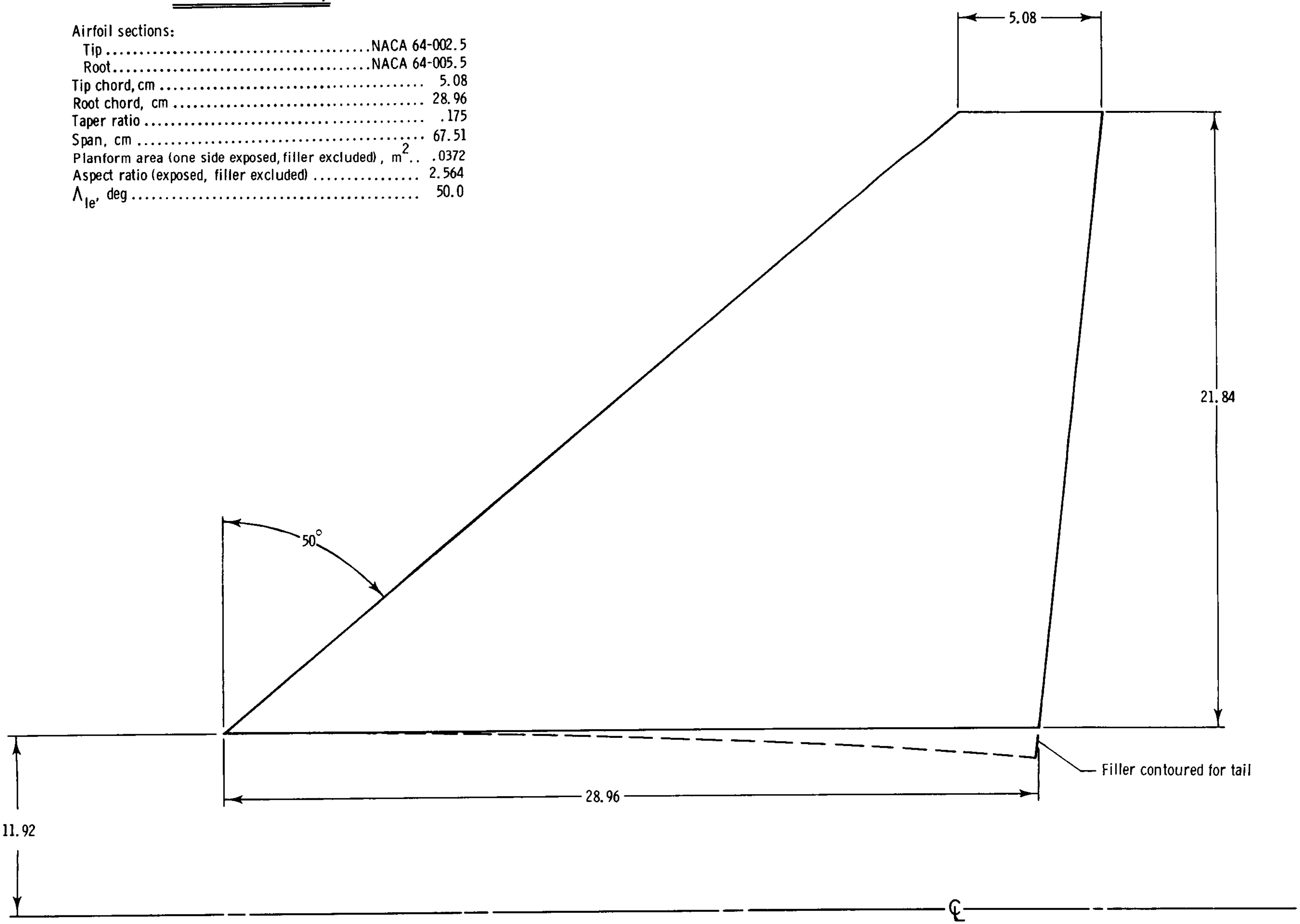

Figure 5. Horizontal tail geometry. All linear dimensions are in centimeters.

Twin Vertical Tail Geometry

Airfoil sections:	
Tip	NACA 64-003.5
Root	NACA 64-005
Tip chord, cm	9.14
Root chord, cm	24.38
Taper ratio	.375
Tail height (root to tip), cm	25.40
Planform area (one side exposed, filler excluded), m^2	.0426
Aspect ratio (exposed, filler excluded)	1.514
Λ_{le}, deg	36.52

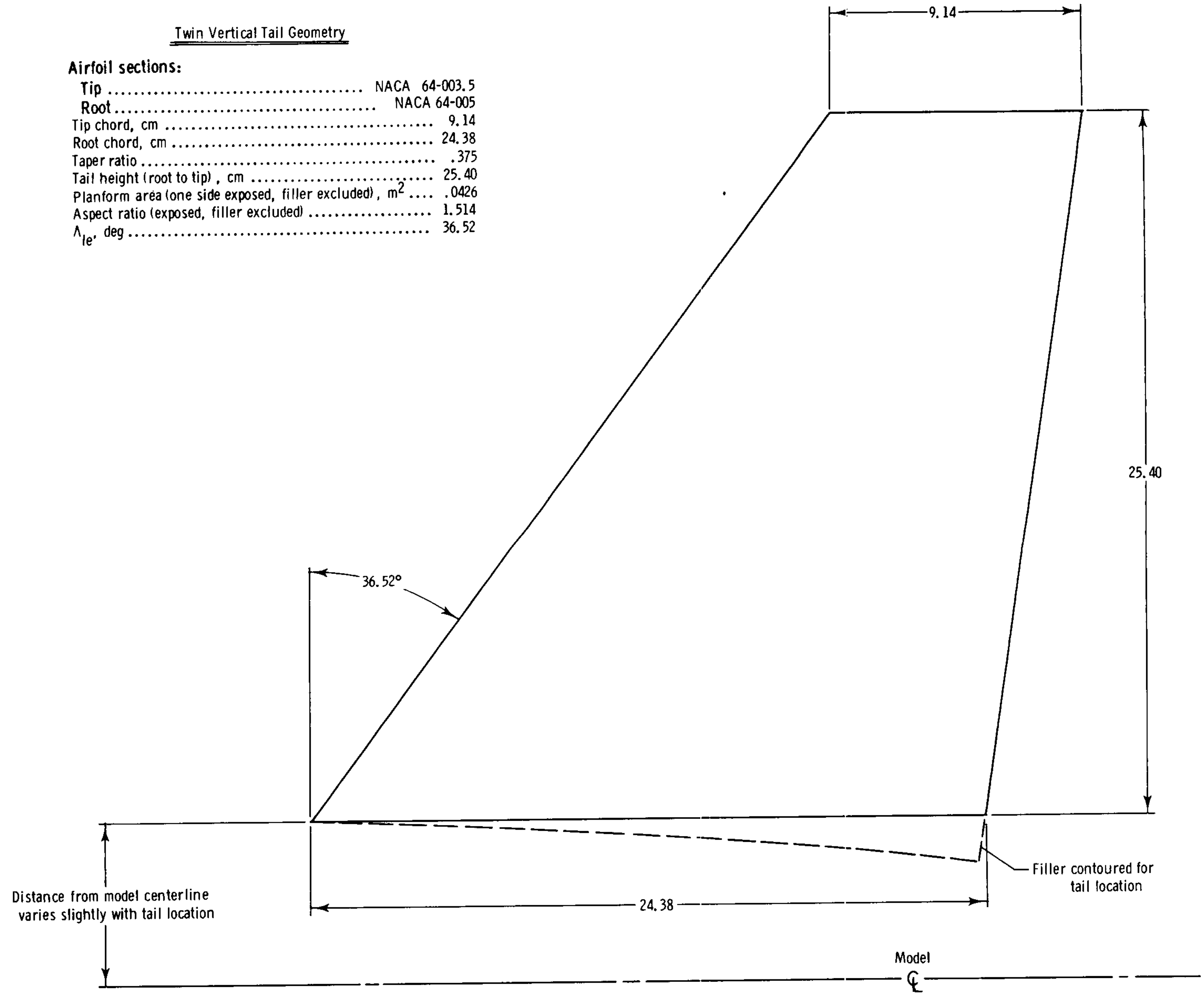

Figure 6. Vertical tail geometry. All linear dimensions are in centimeters.

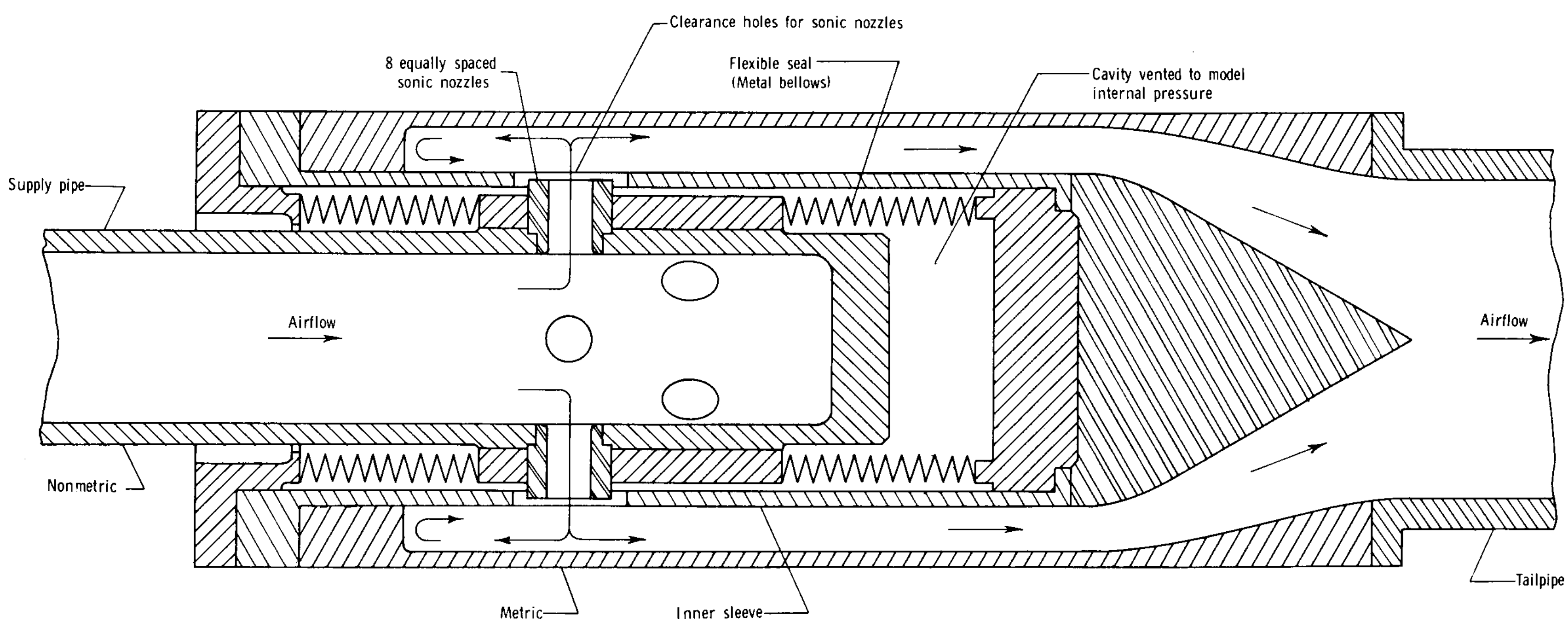

Figure 7. Details of bellows arrangement used to transfer air from nonmetric to metric portions of model.

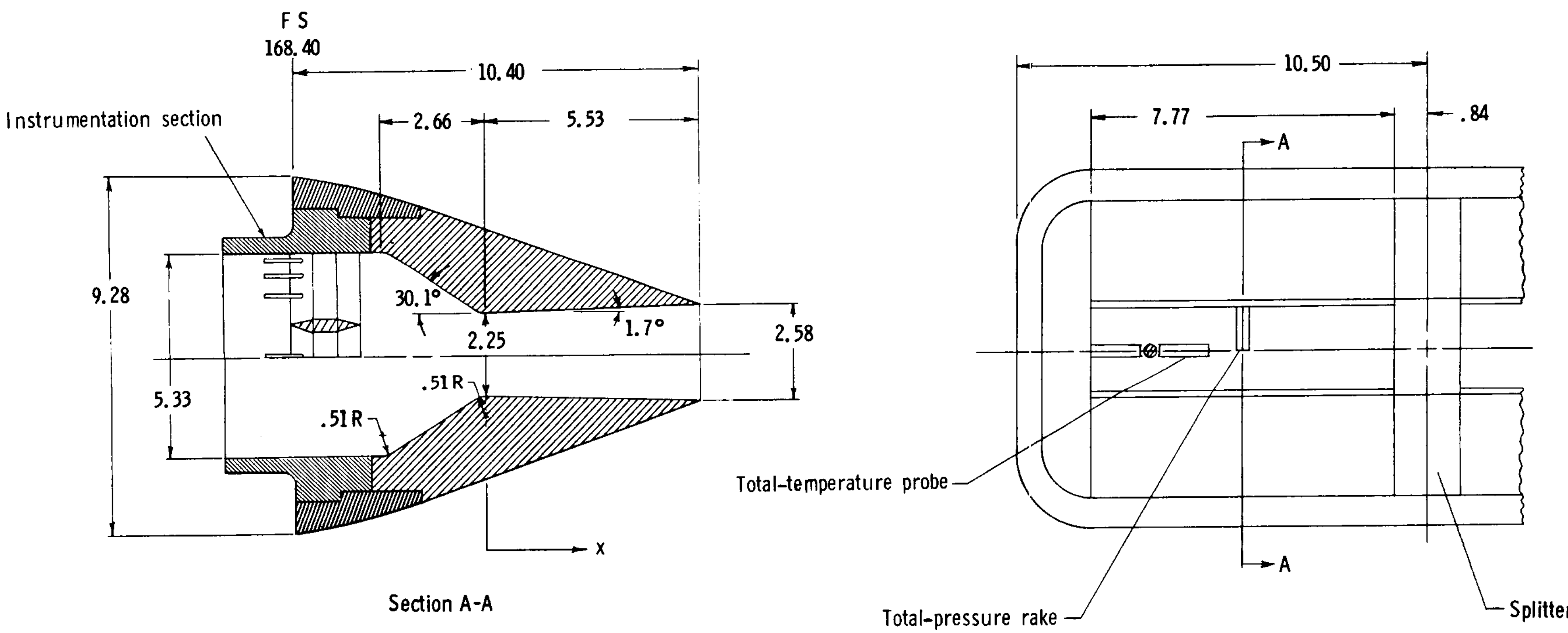

Figure 8. Baseline (forward-thrust) nozzle. All linear dimensions are in centimeters.

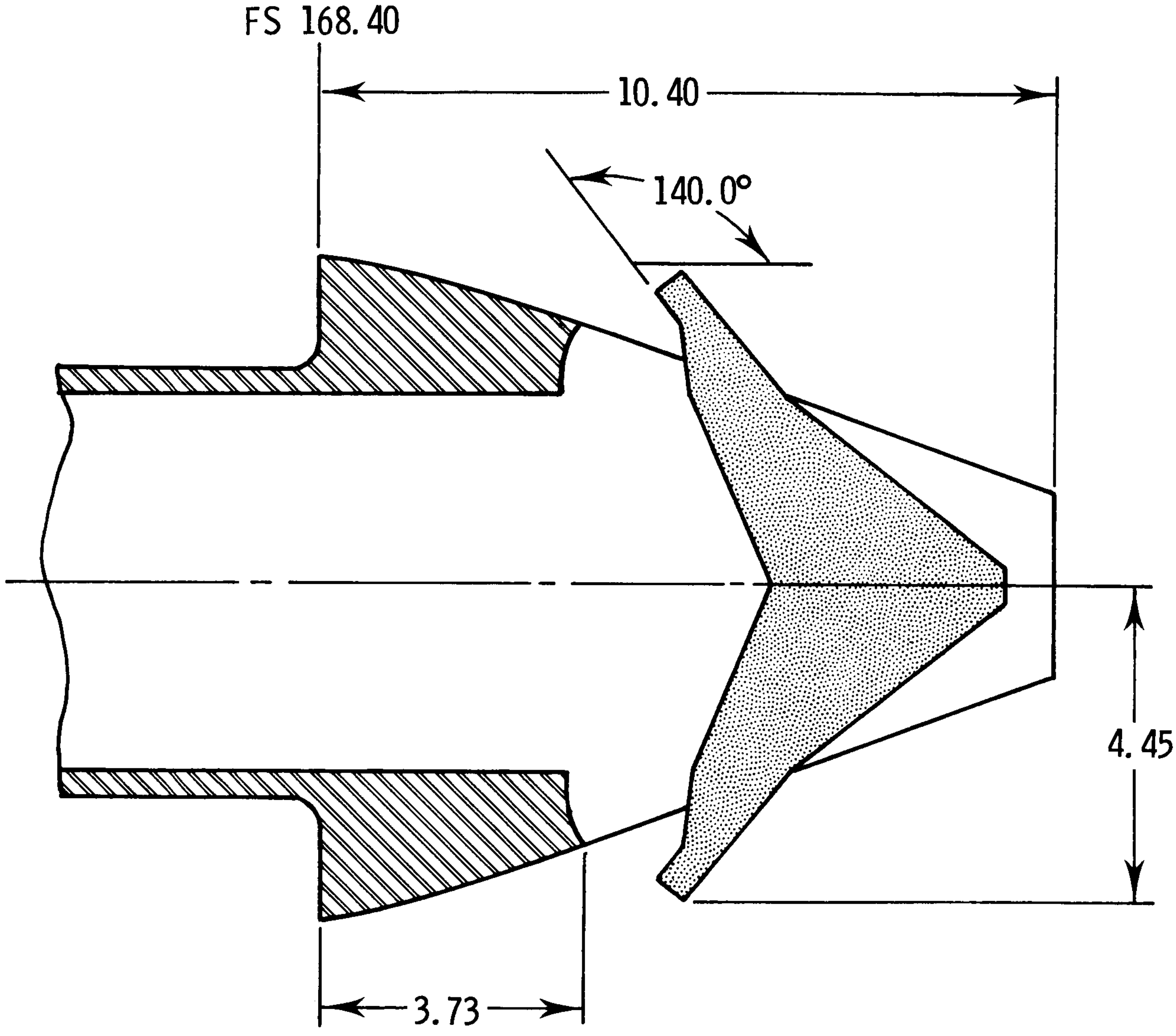

Figure 9. Reverser A. Nozzle width is 7.77 cm; all linear dimensions are in centimeters.

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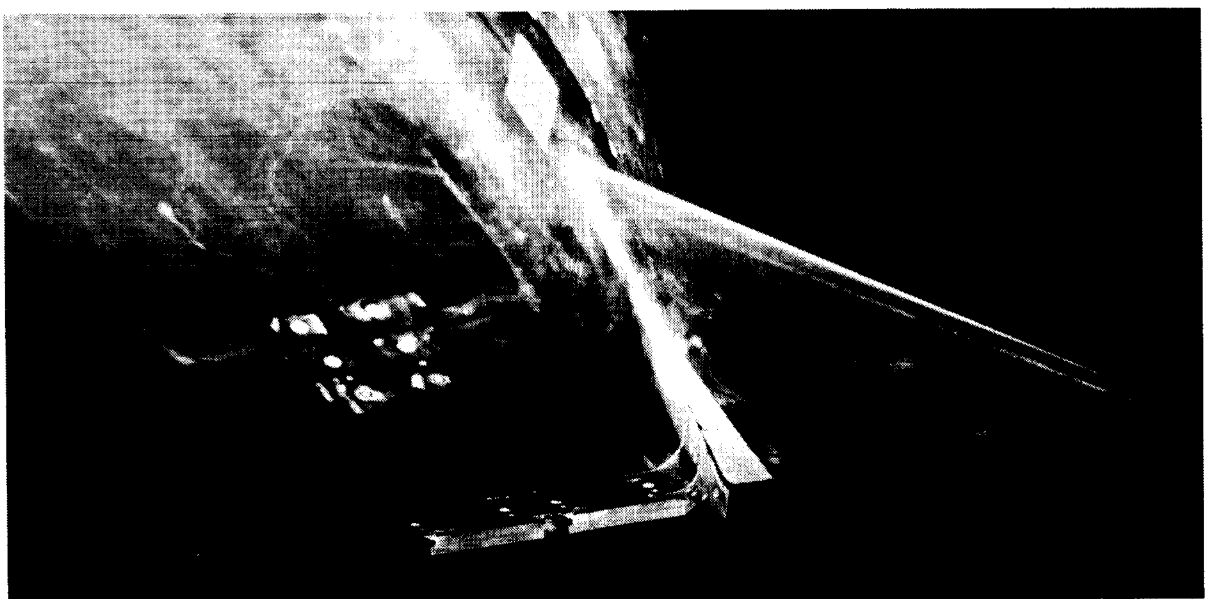
(a) View upstream.



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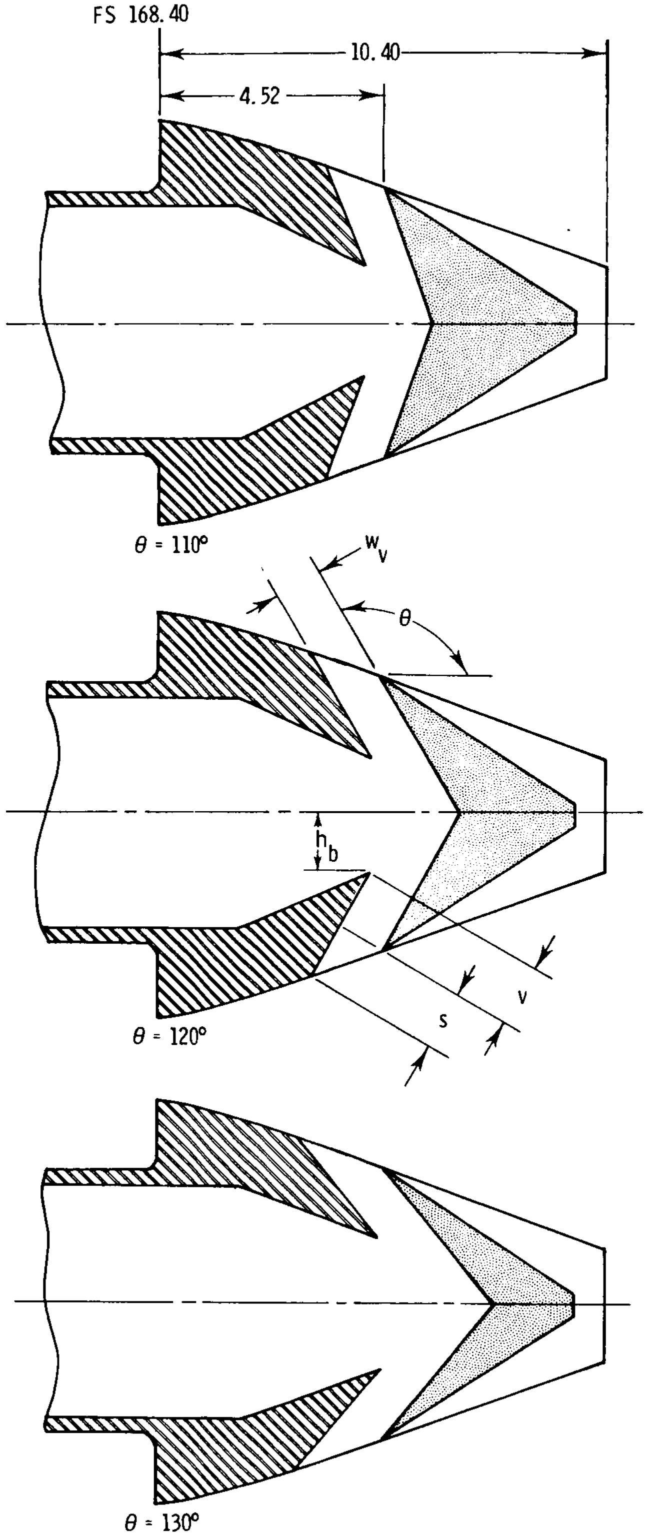
(b) View downstream.

Figure 10. Reverser A installed on model.



θ, deg	v	s	w_v	h_b	v/w_v	s/w_v
110	1.61	0.92	1.13	1.43	1.42	0.81
120	1.42	1.30	↓	1.35	1.26	1.15
130	1.22	1.88	↓	1.23	1.08	1.66

Figure 11. Reverser B port angles. Nozzle width is 7.77 cm; all linear dimensions are in centimeters.

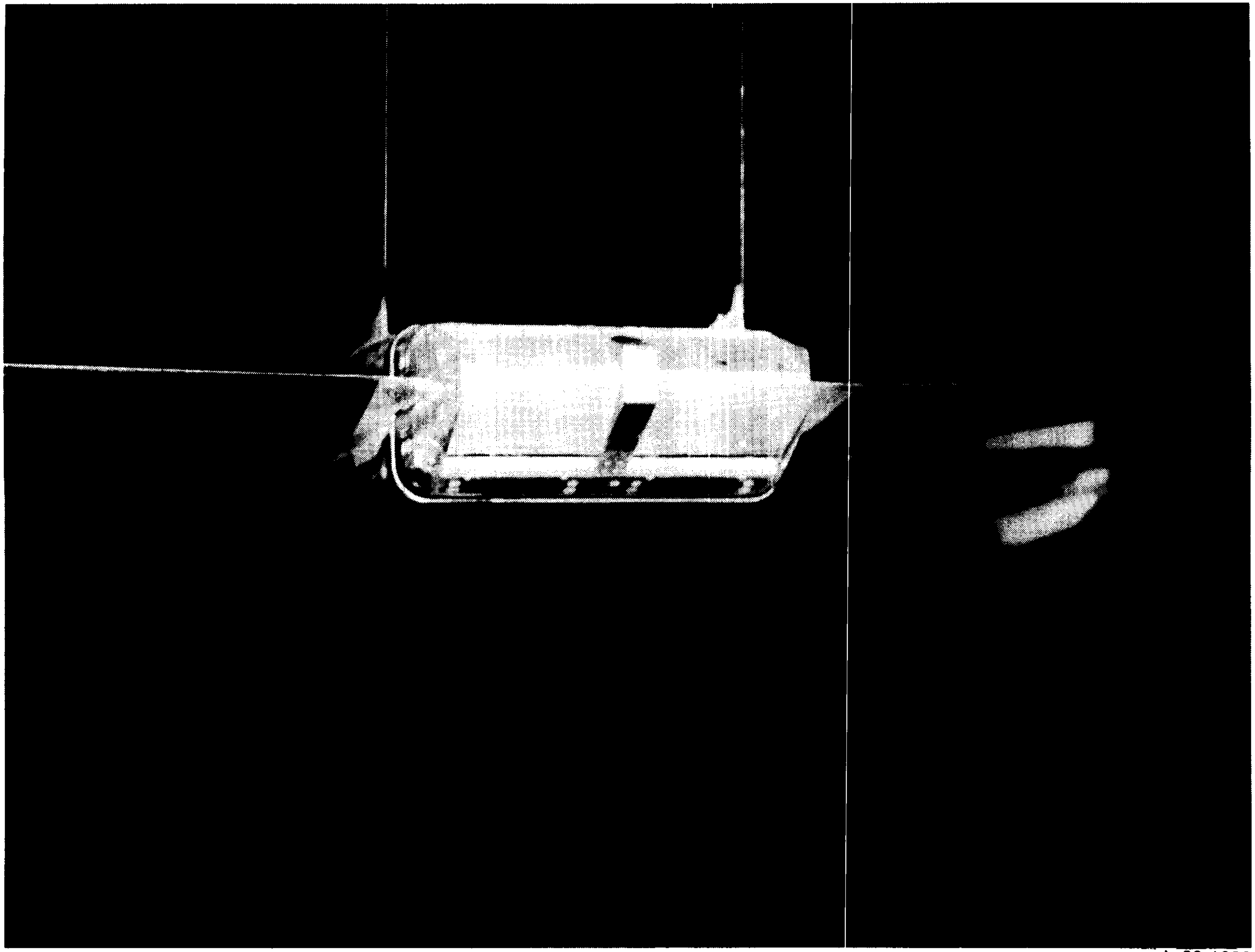


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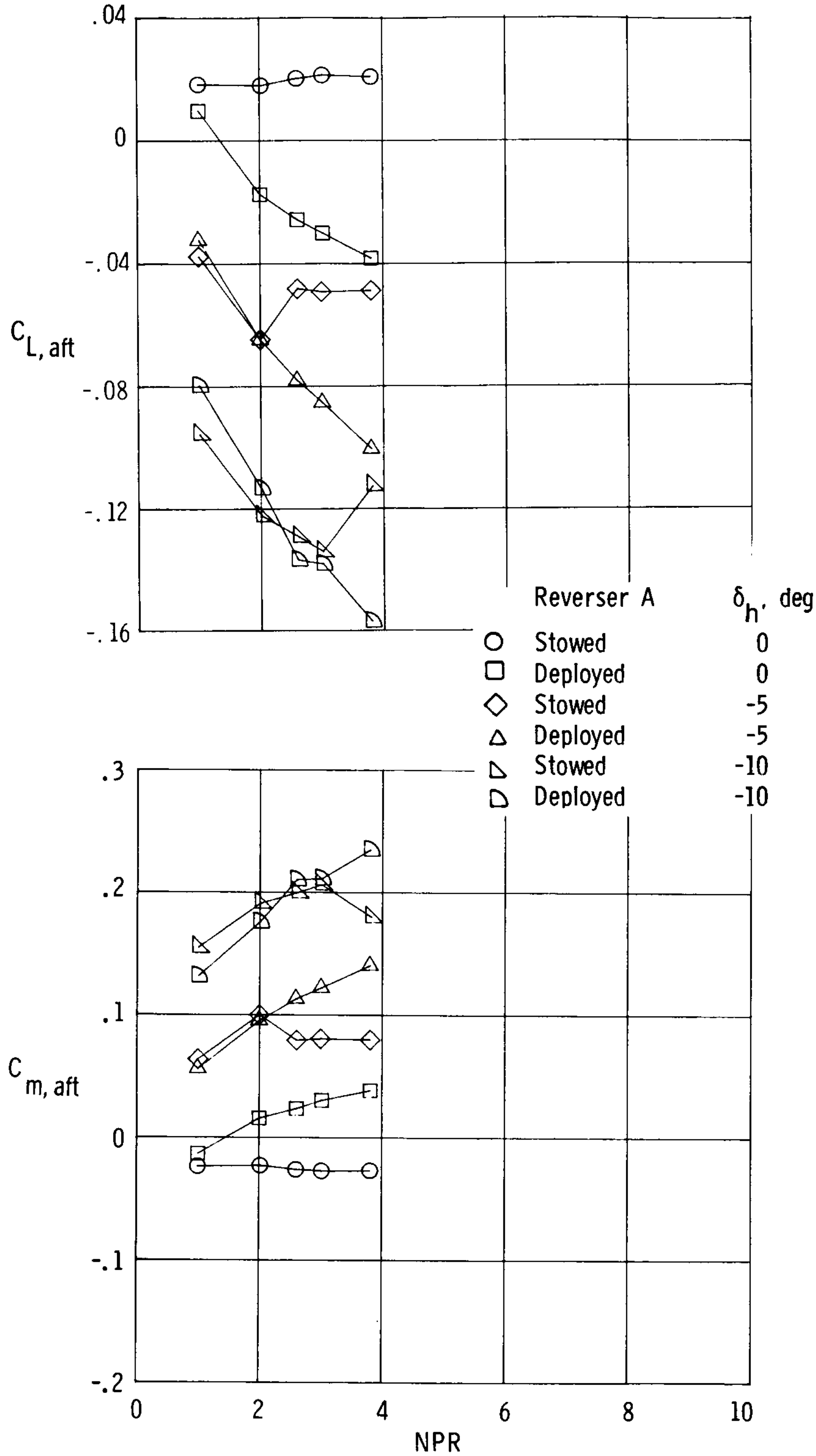
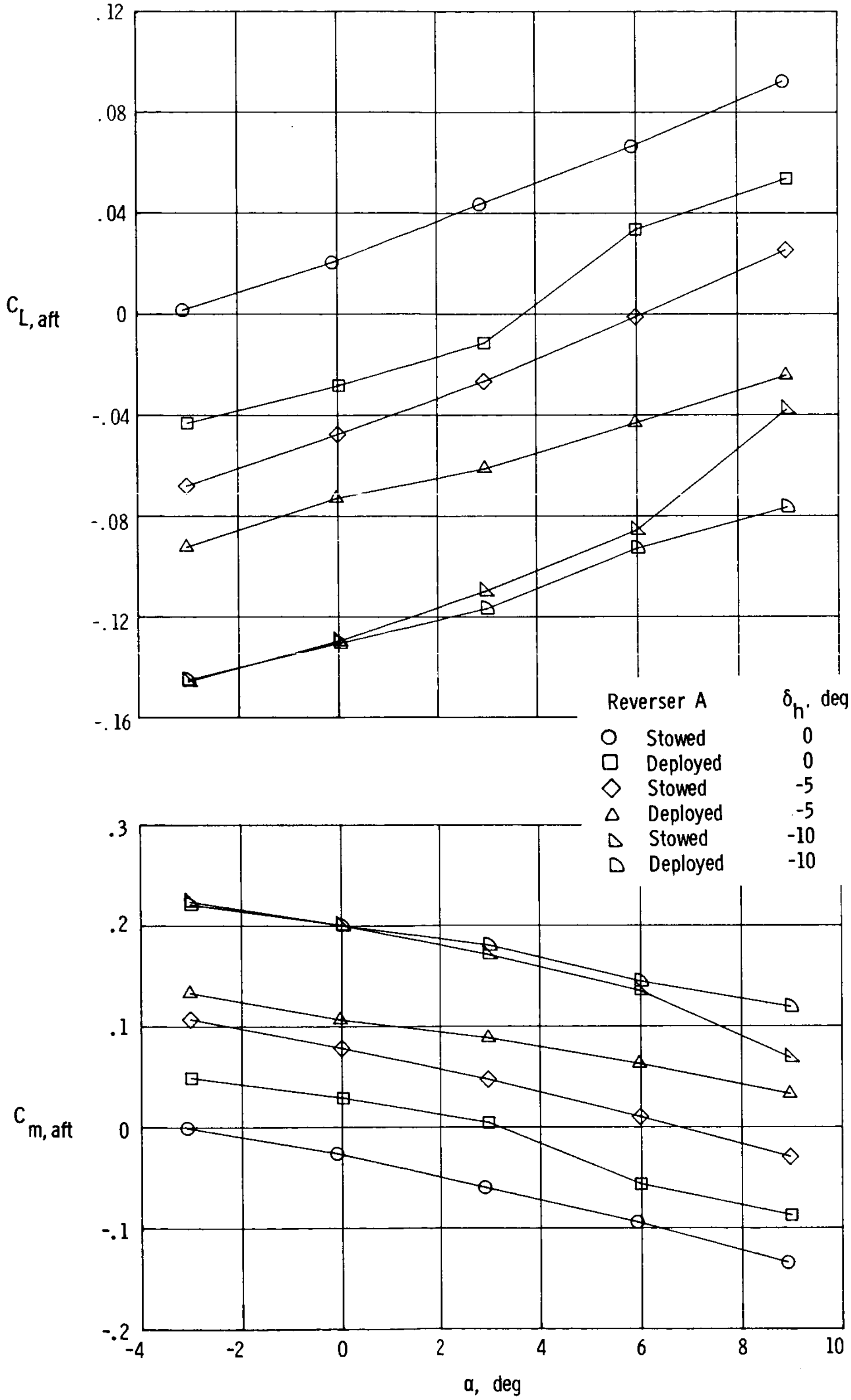
Figure 12. Reverser B with 110° port angle installed on model.



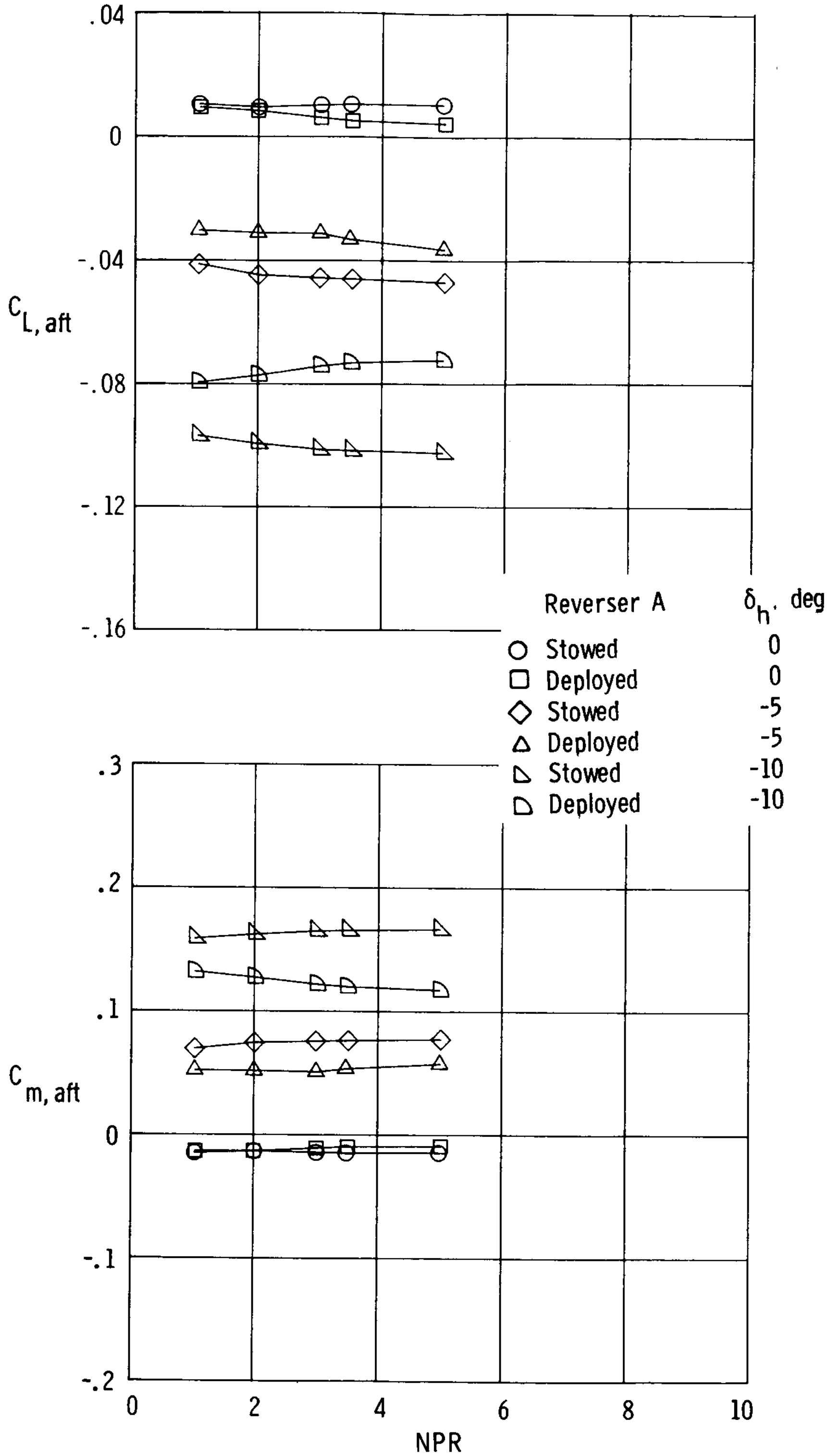
(a) $M = 0.15$; $\alpha = 0°$.

Figure 13. Afterbody lift and pitching-moment coefficients for reverser A, vertical tails forward, and $\phi_t = 0°$.



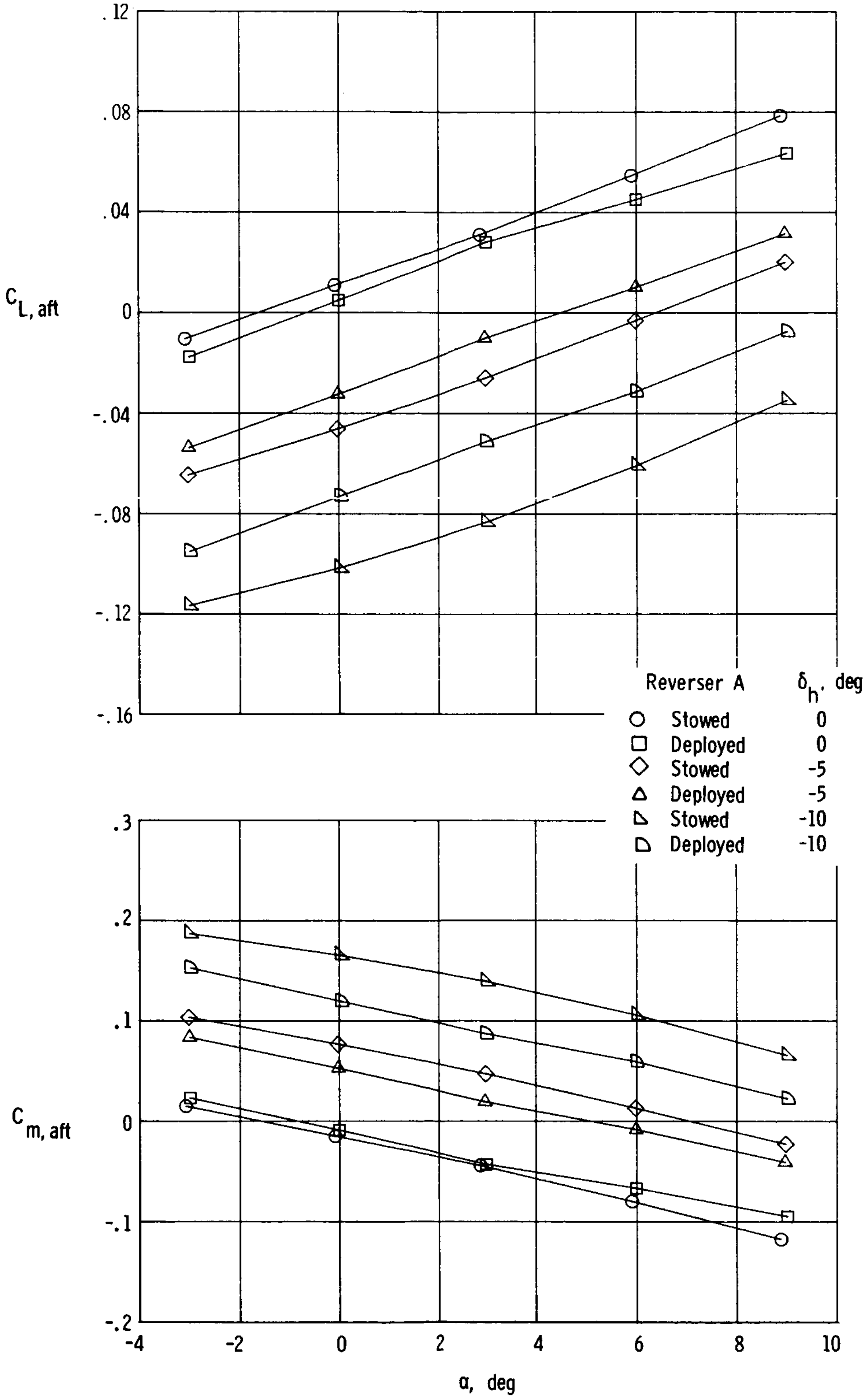
(b) $M = 0.15$; NPR = 2.6.

Figure 13. Continued.



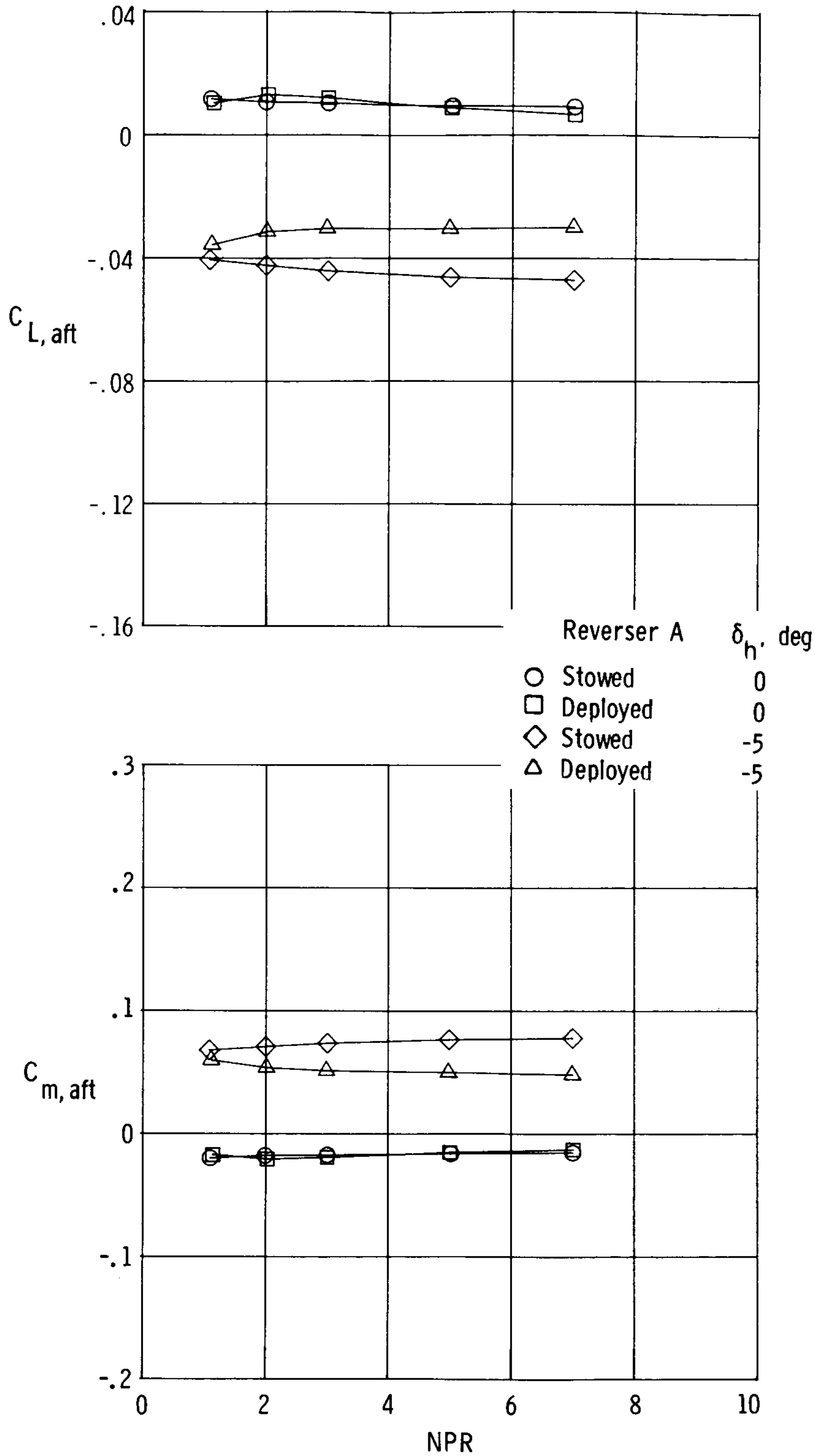
(c) $M = 0.60$; $\alpha = 0°$.

Figure 13. Continued.



(d) $M = 0.60$; NPR = 3.5.

Figure 13. Continued.



(e) $M = 0.90$; $\alpha = 0°$.

Figure 13. Continued.

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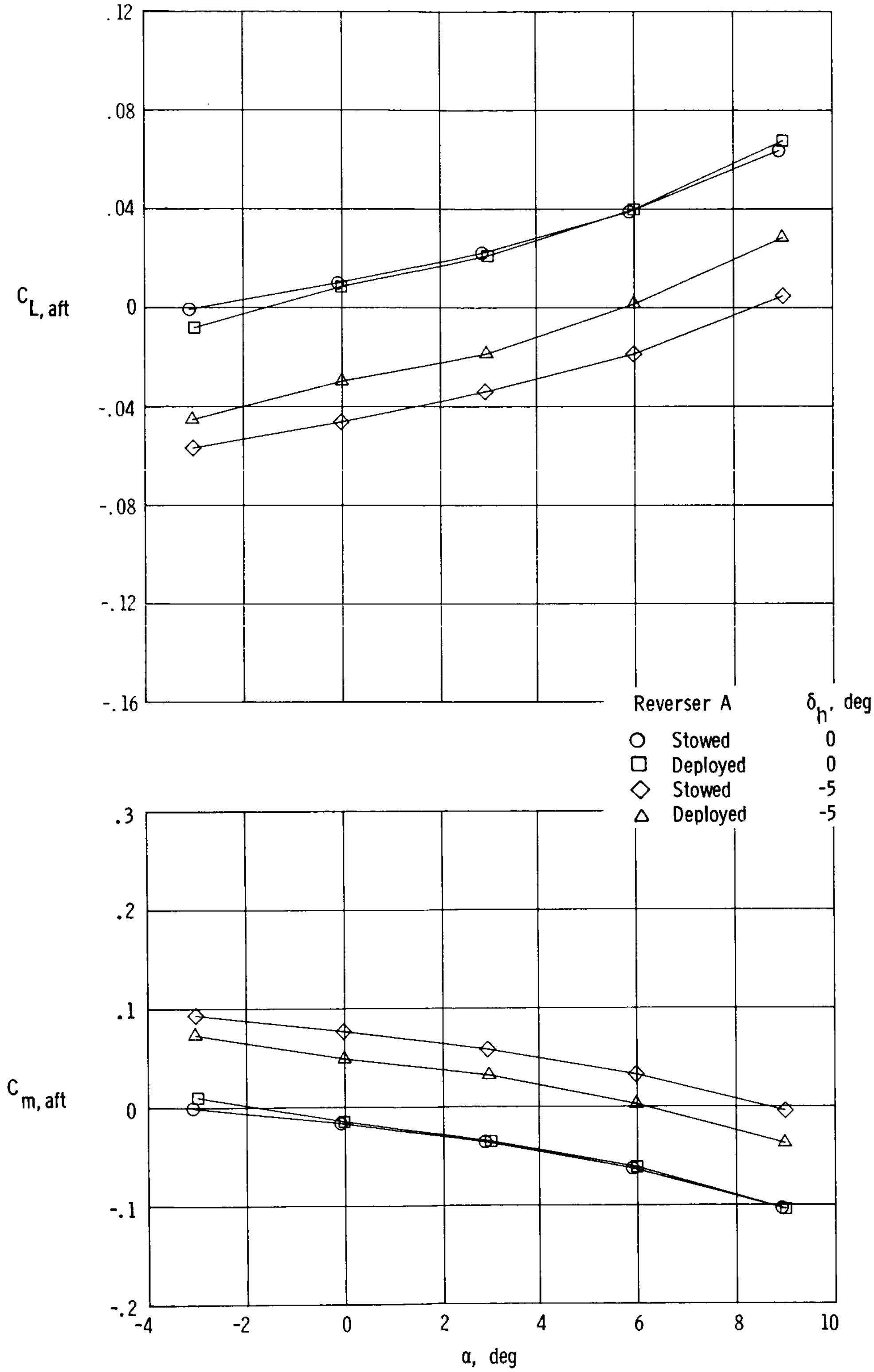
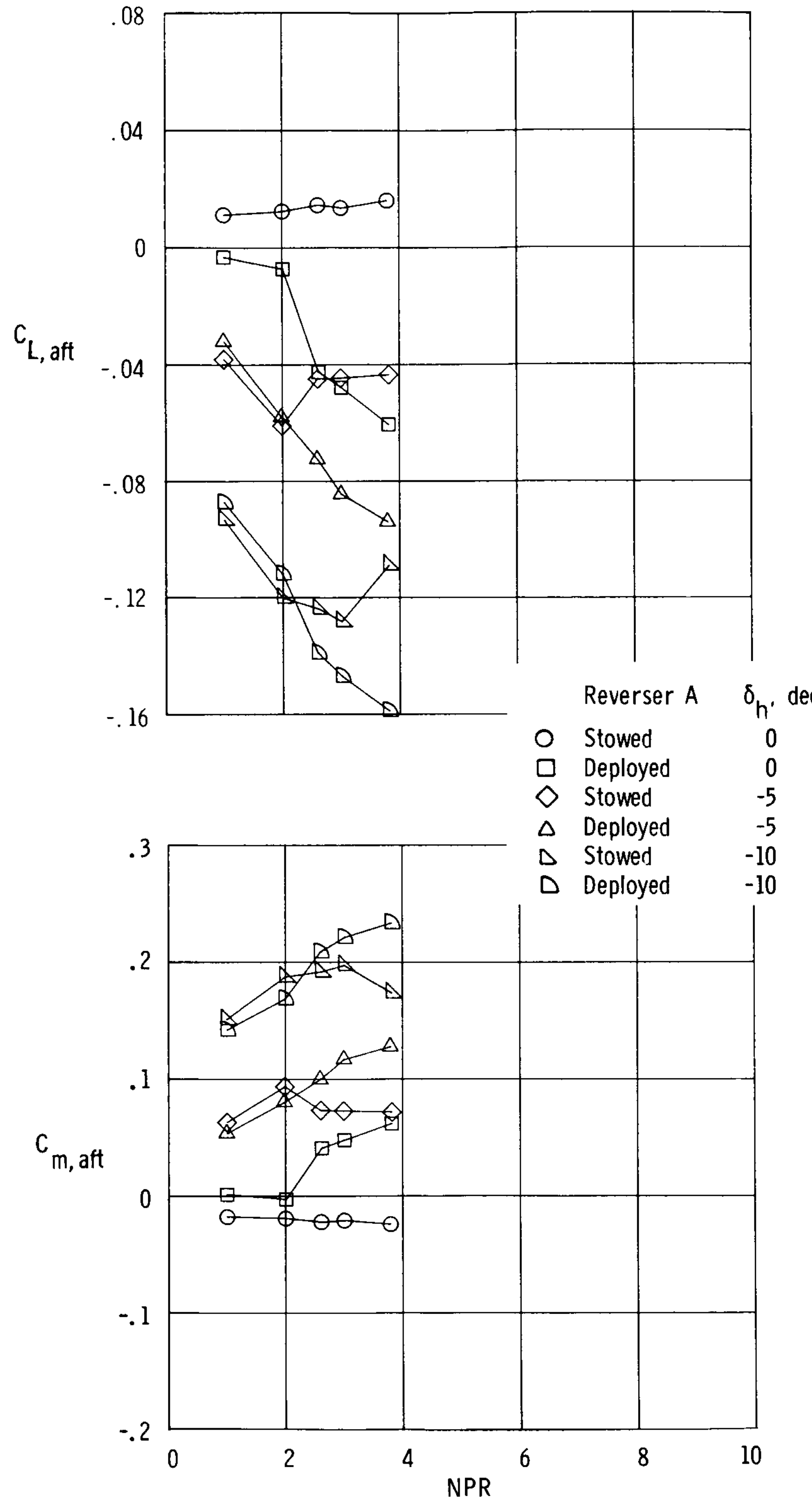


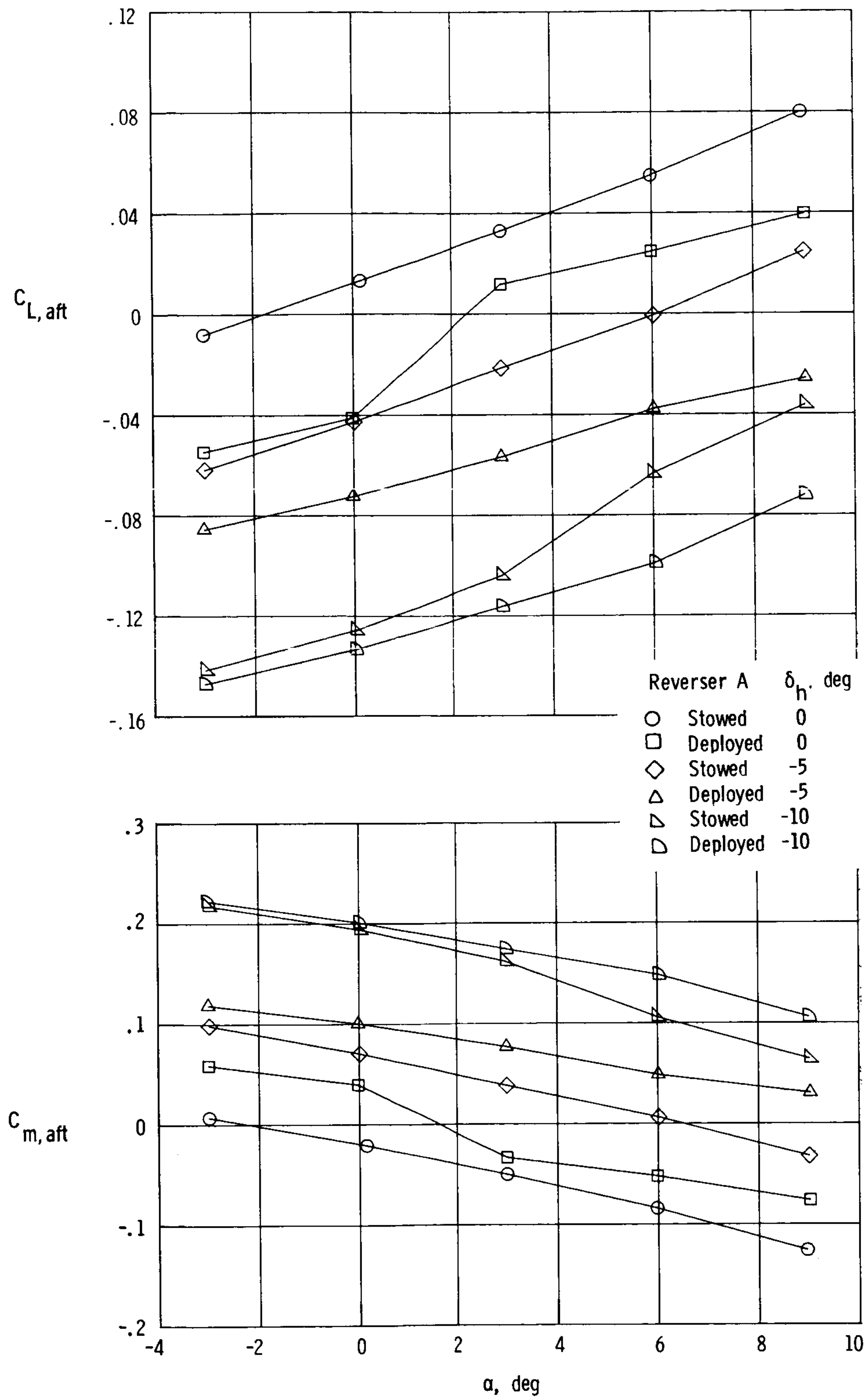
(f) $M = 0.90$; NPR = 5.0.

Figure 13. Concluded.



(a) $M = 0.15$; $\alpha = 0°$.

Figure 14. Afterbody lift and pitching-moment coefficients for reverser A, vertical tails mid, and $\phi_t = 0°$.



(b) $M = 0.15$; NPR = 2.6.

Figure 14. Continued.

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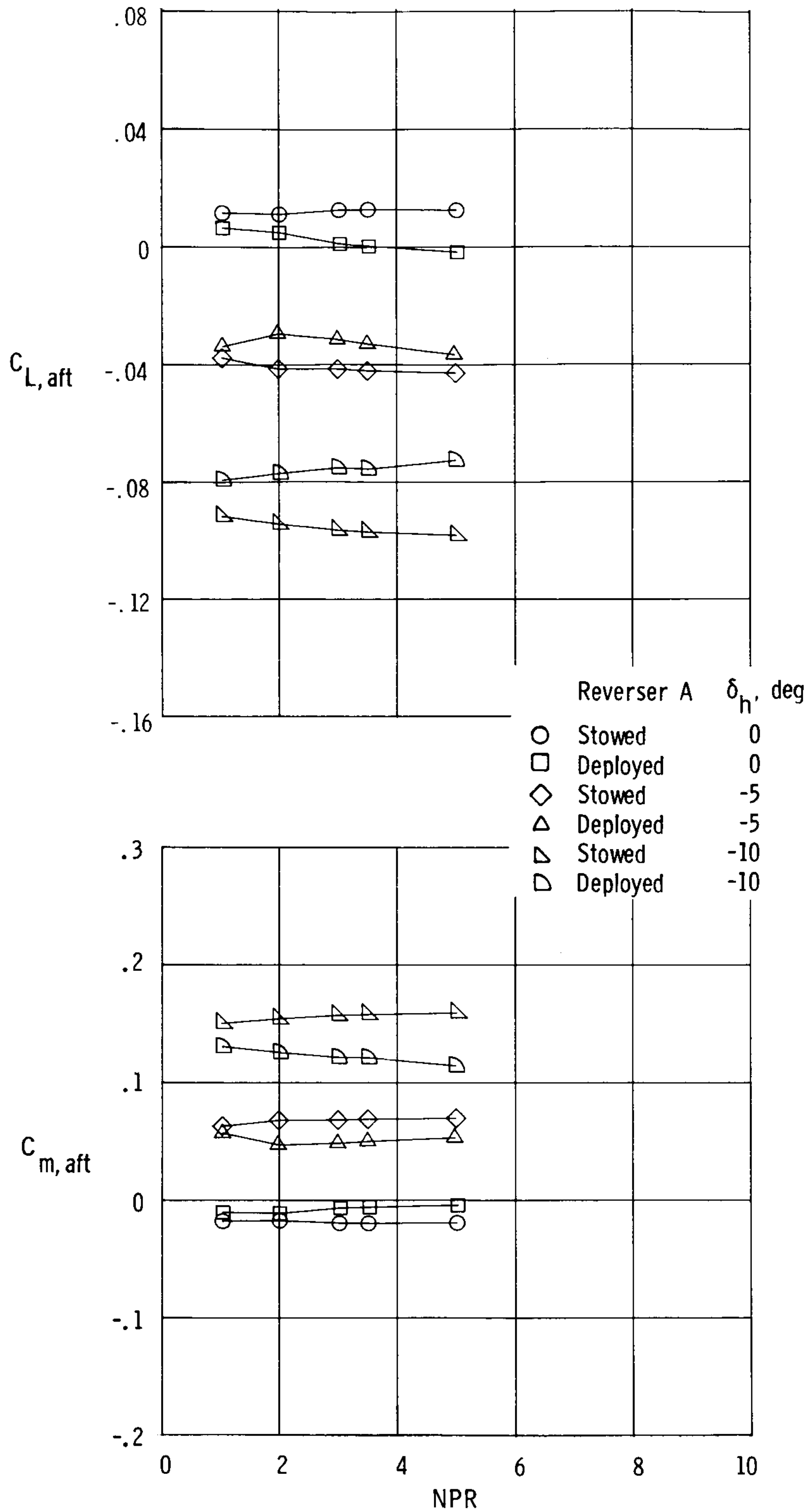

(c) $M = 0.60$; $\alpha = 0°$.

Figure 14. Continued.

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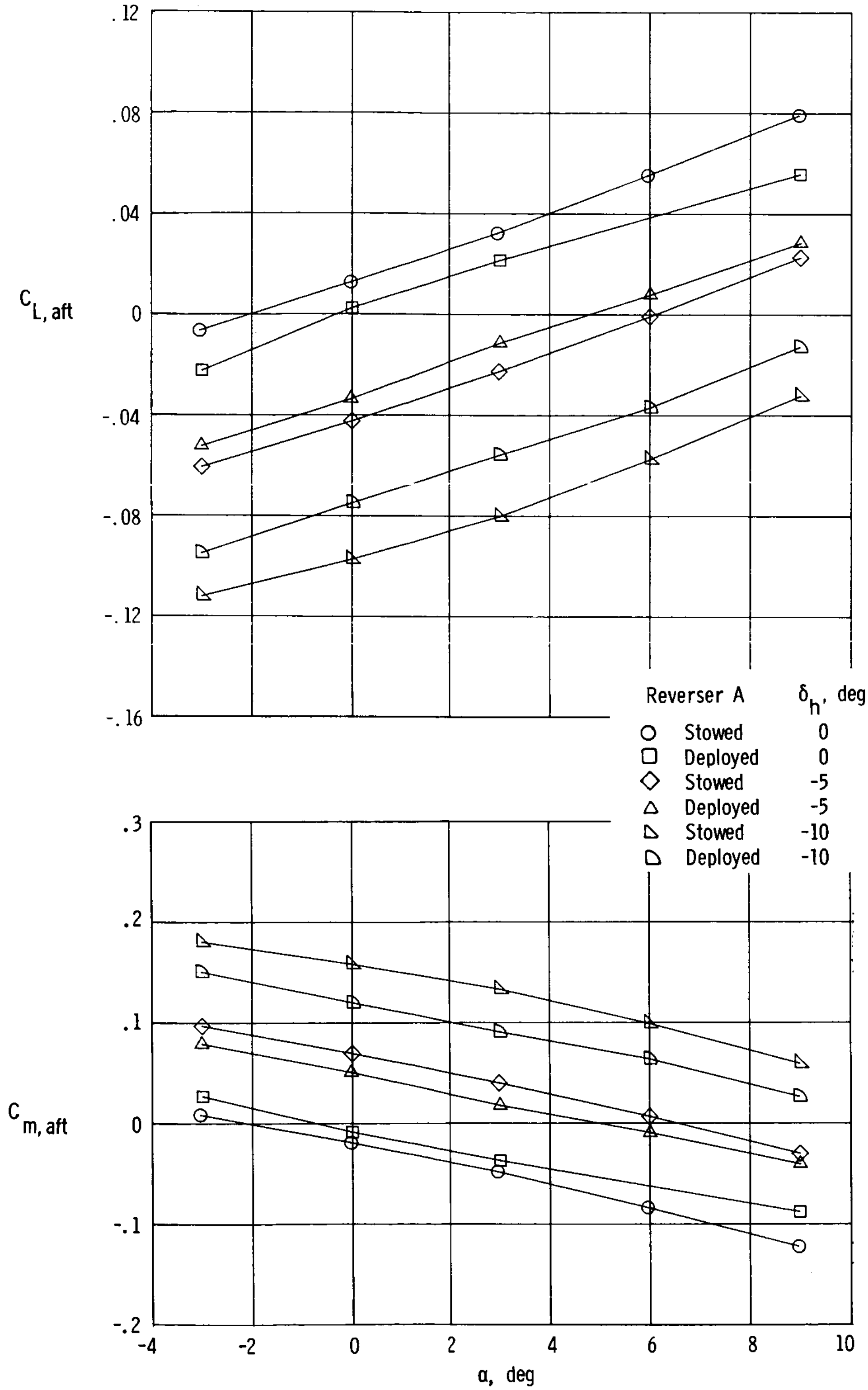

(d) $M = 0.60$; NPR = 3.5.

Figure 14. Continued.

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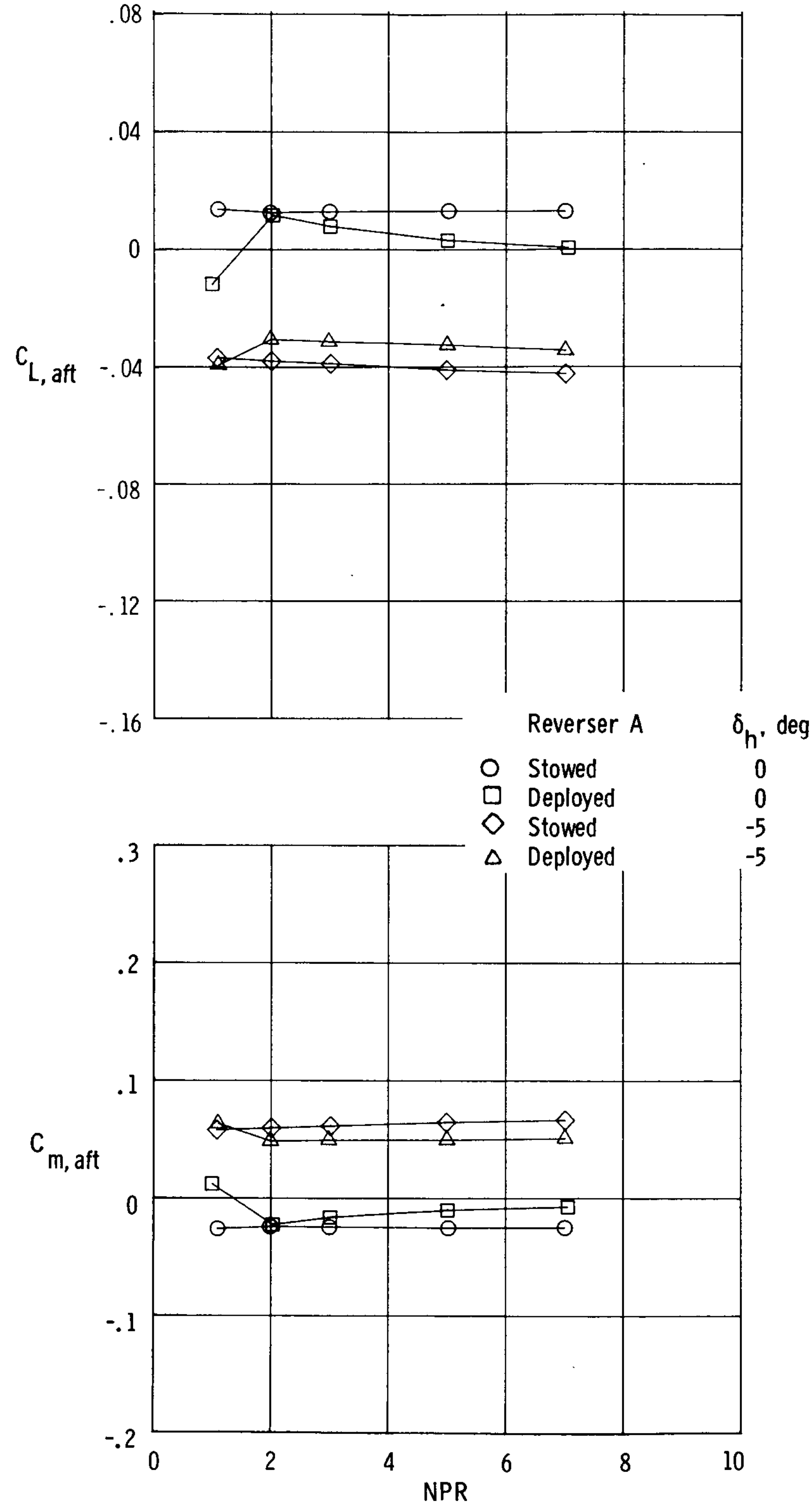
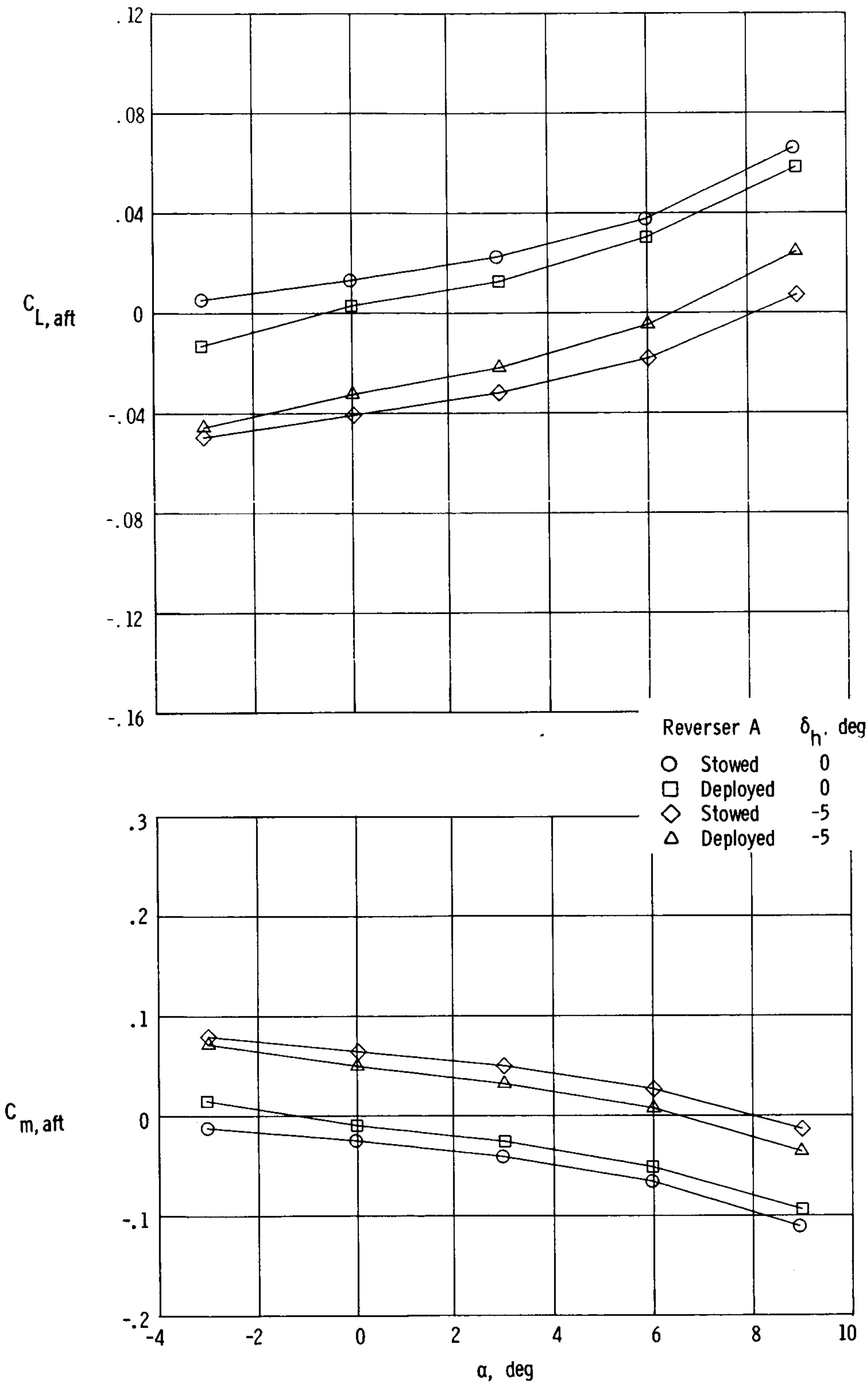


(e) $M = 0.90$; $\alpha = 0°$.

Figure 14. Continued.



(f) $M = 0.90$; NPR = 5.0.

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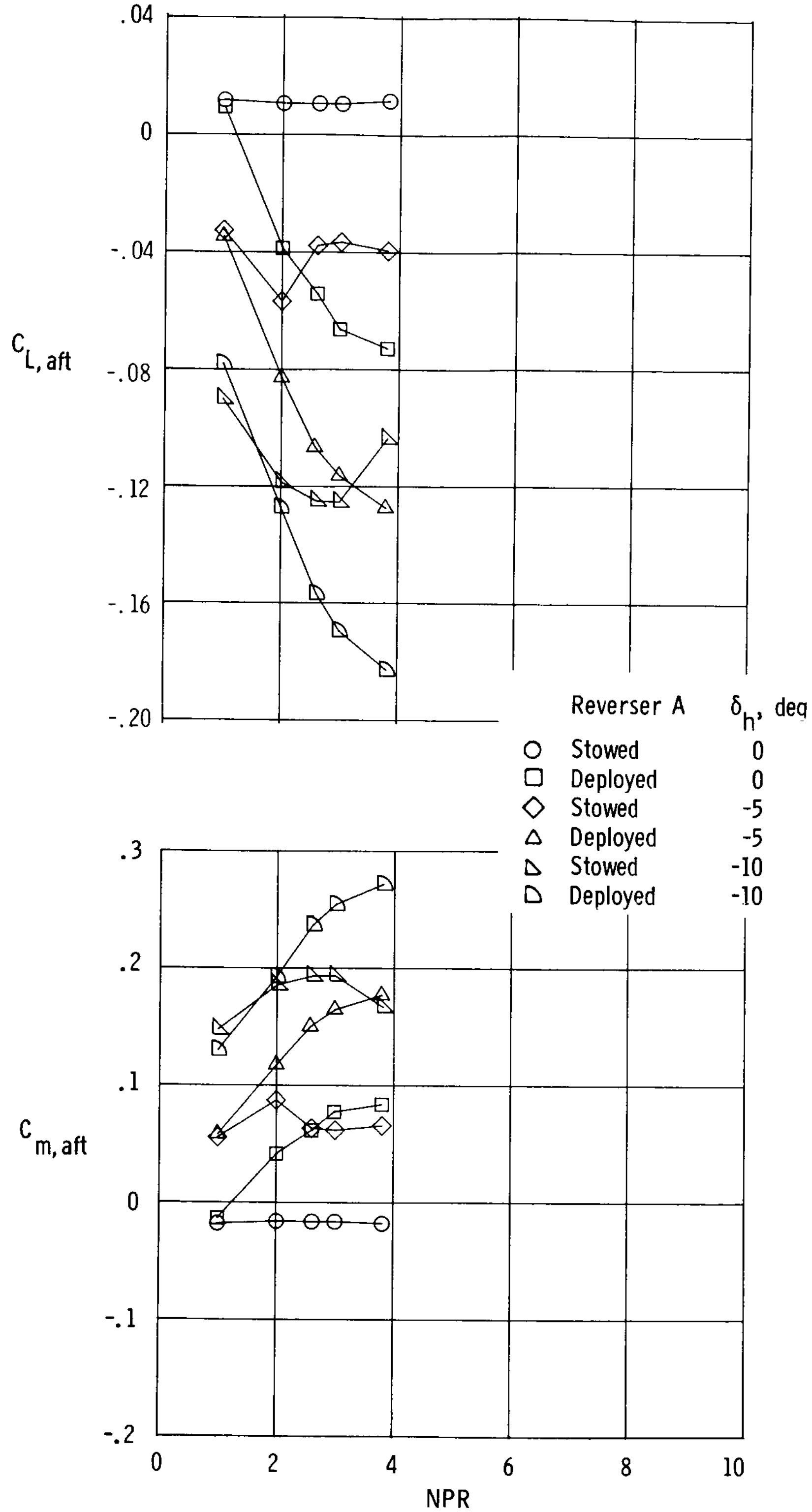
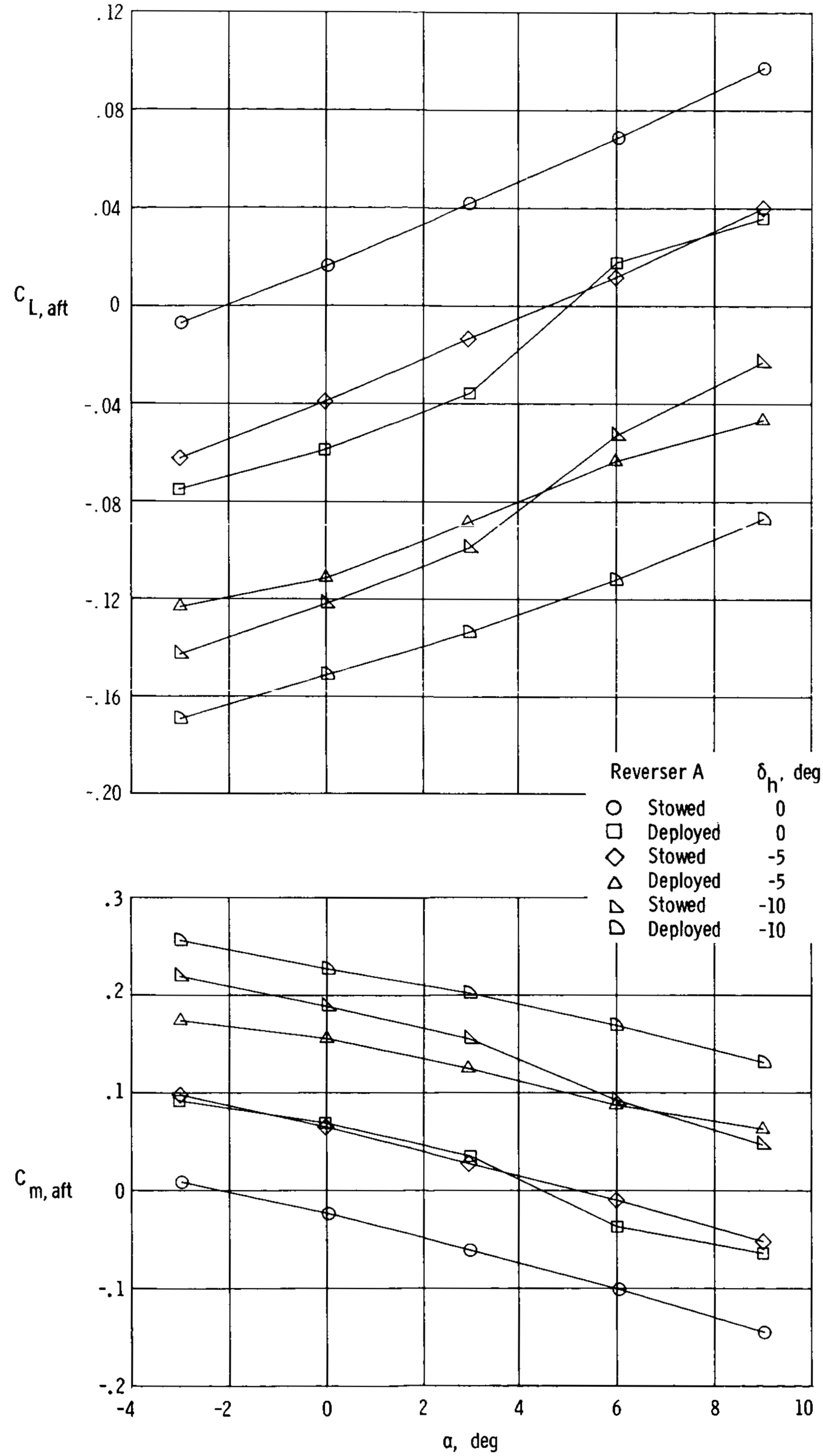


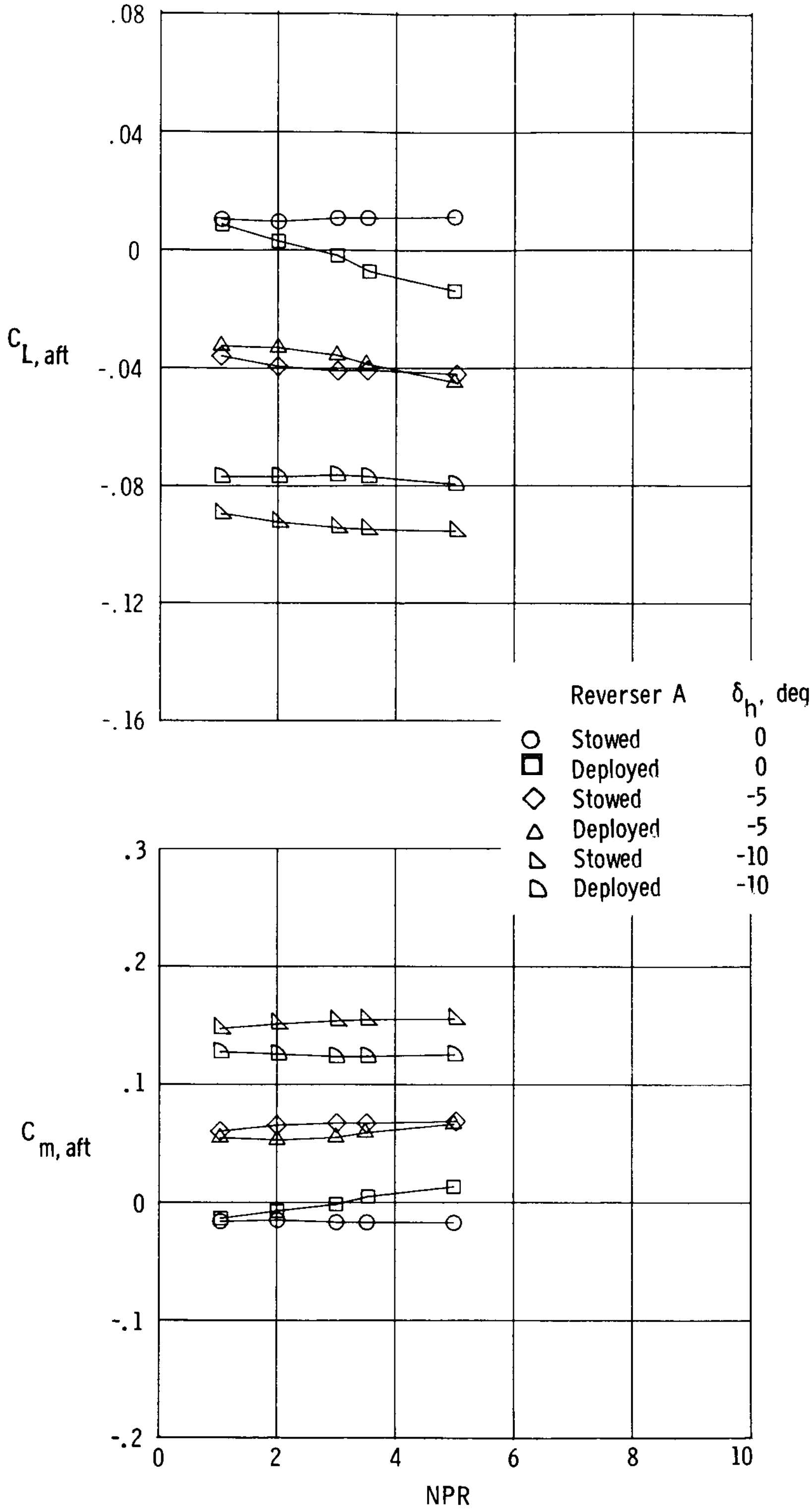
(a) $M = 0.15$; $\alpha = 0°$.

Figure 15. Afterbody lift and pitching-moment coefficients for reverser A, vertical tails mid, and $\phi_t = 20°$.



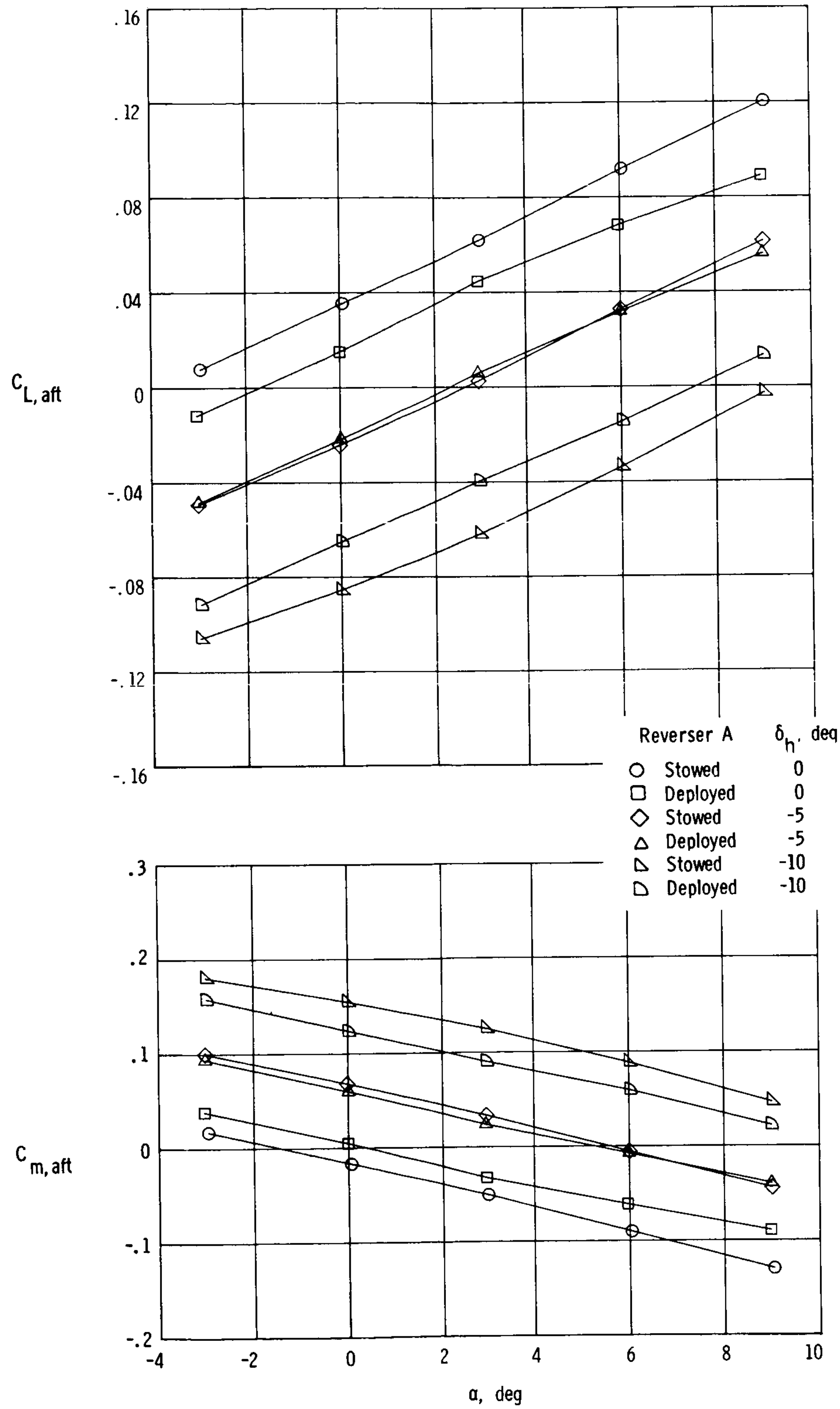
(b) $M = 0.15$; NPR = 2.6.

Figure 15. Continued.



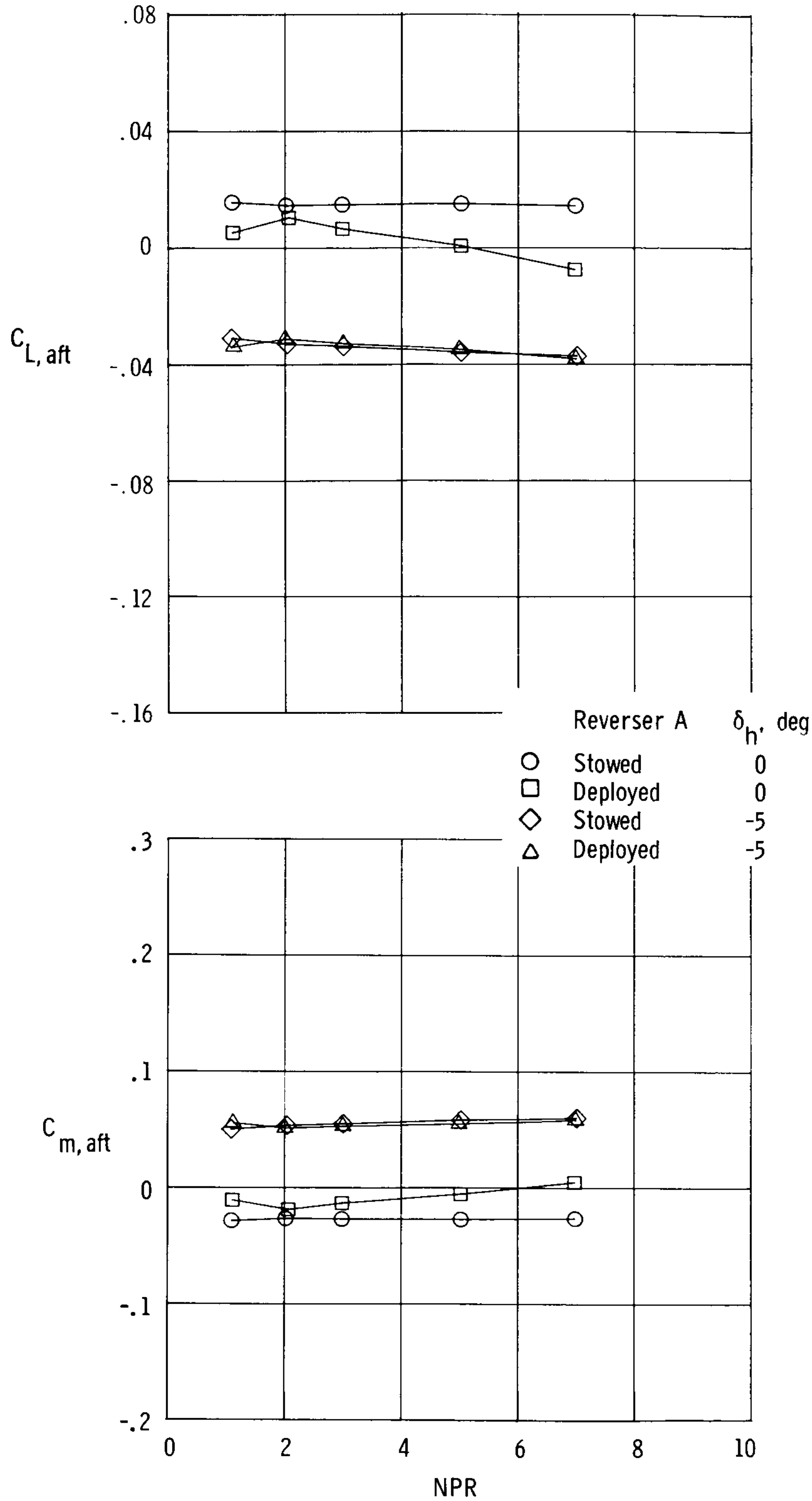
(c) $M = 0.60$; $\alpha = 0°$.

Figure 15. Continued.



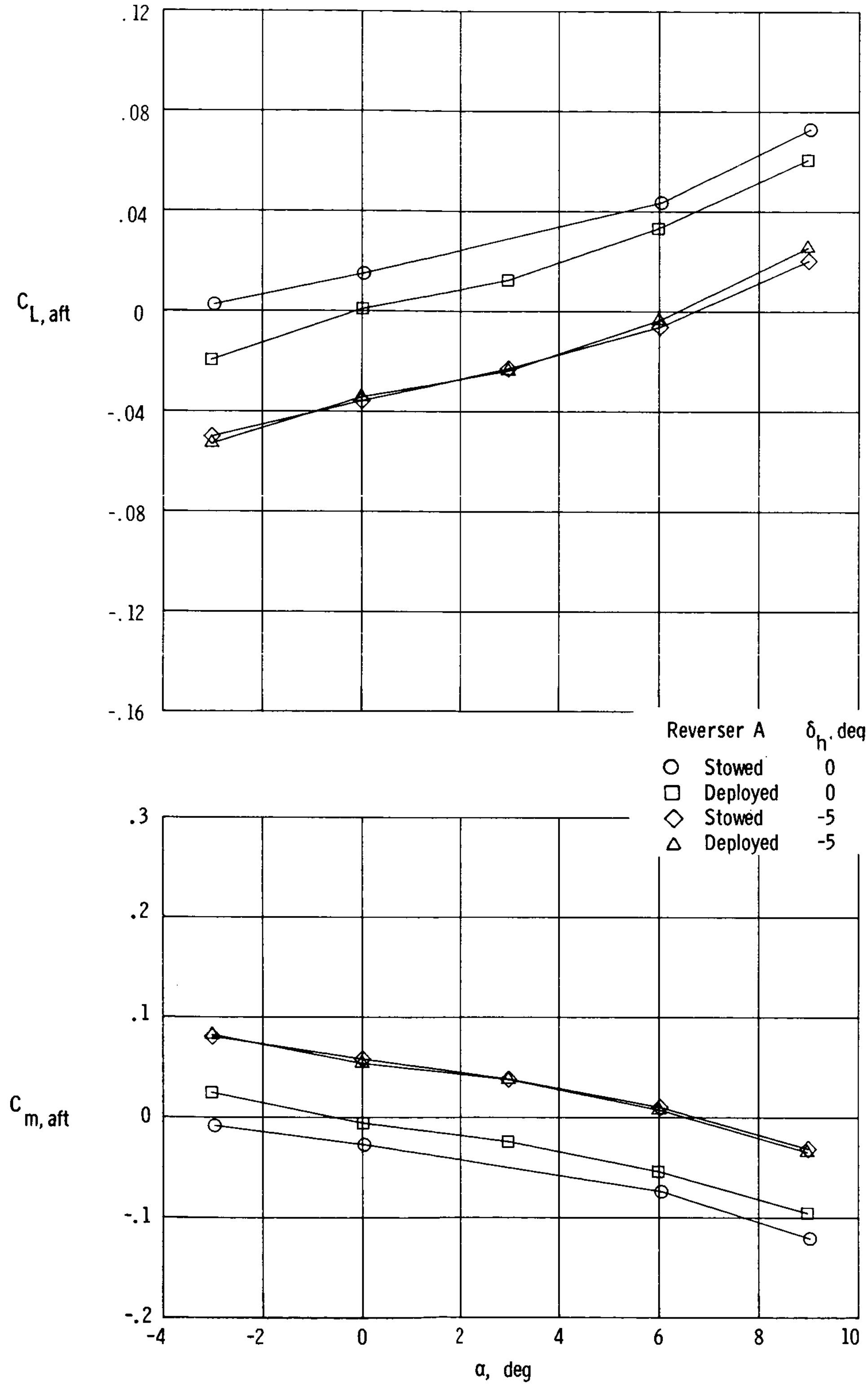
(d) $M = 0.60$; NPR = 3.5.

Figure 15. Continued.



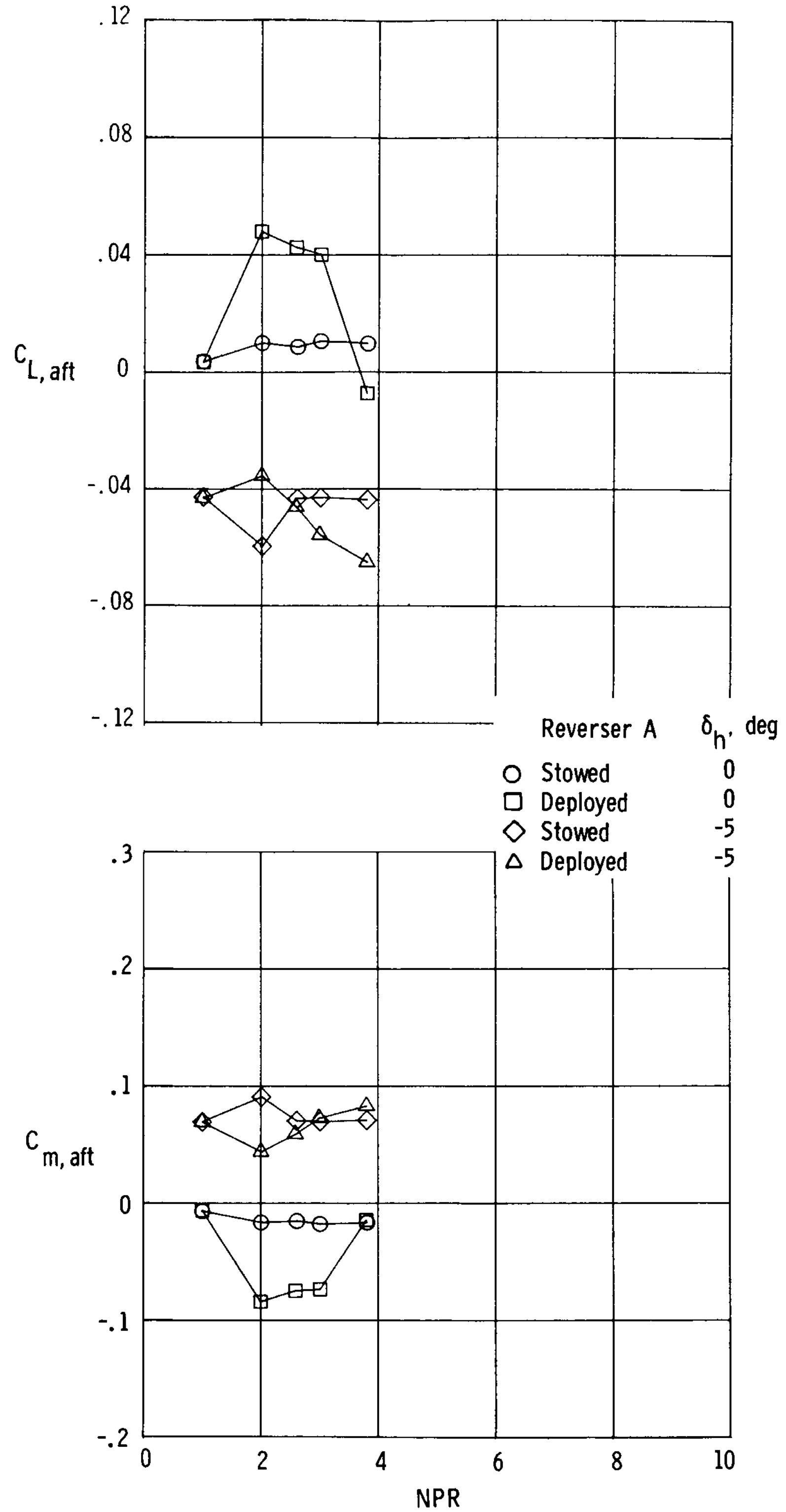
(e) $M = 0.90$; $\alpha = 0°$.

Figure 15. Continued.



(f) $M = 0.90$; NPR = 5.0.

Figure 15. Concluded.



(a) $M = 0.15$; $\alpha = 0°$.

Figure 16. Afterbody lift and pitching-moment coefficients for reverser A, vertical tails aft, and $\phi_t = 0°$.

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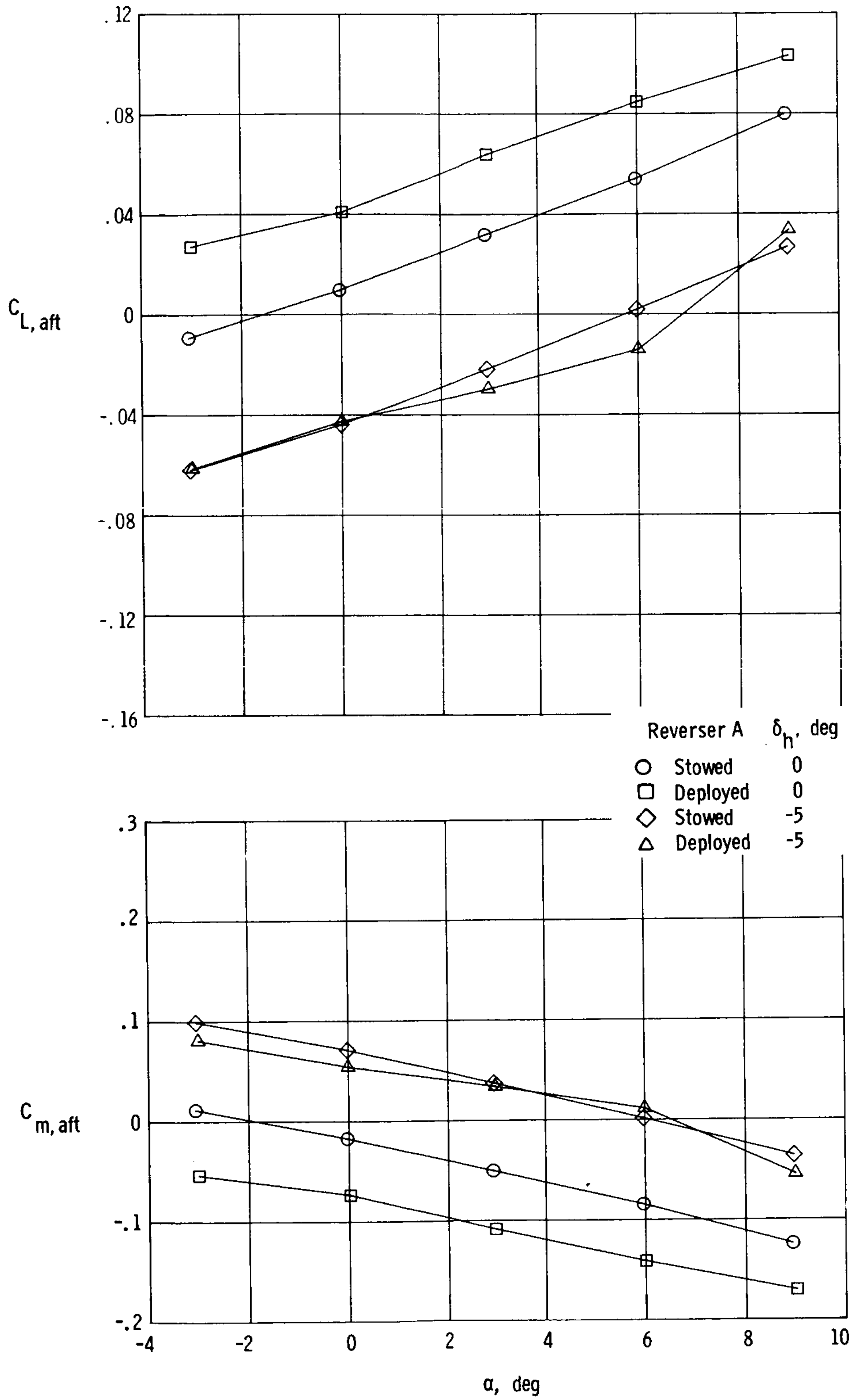
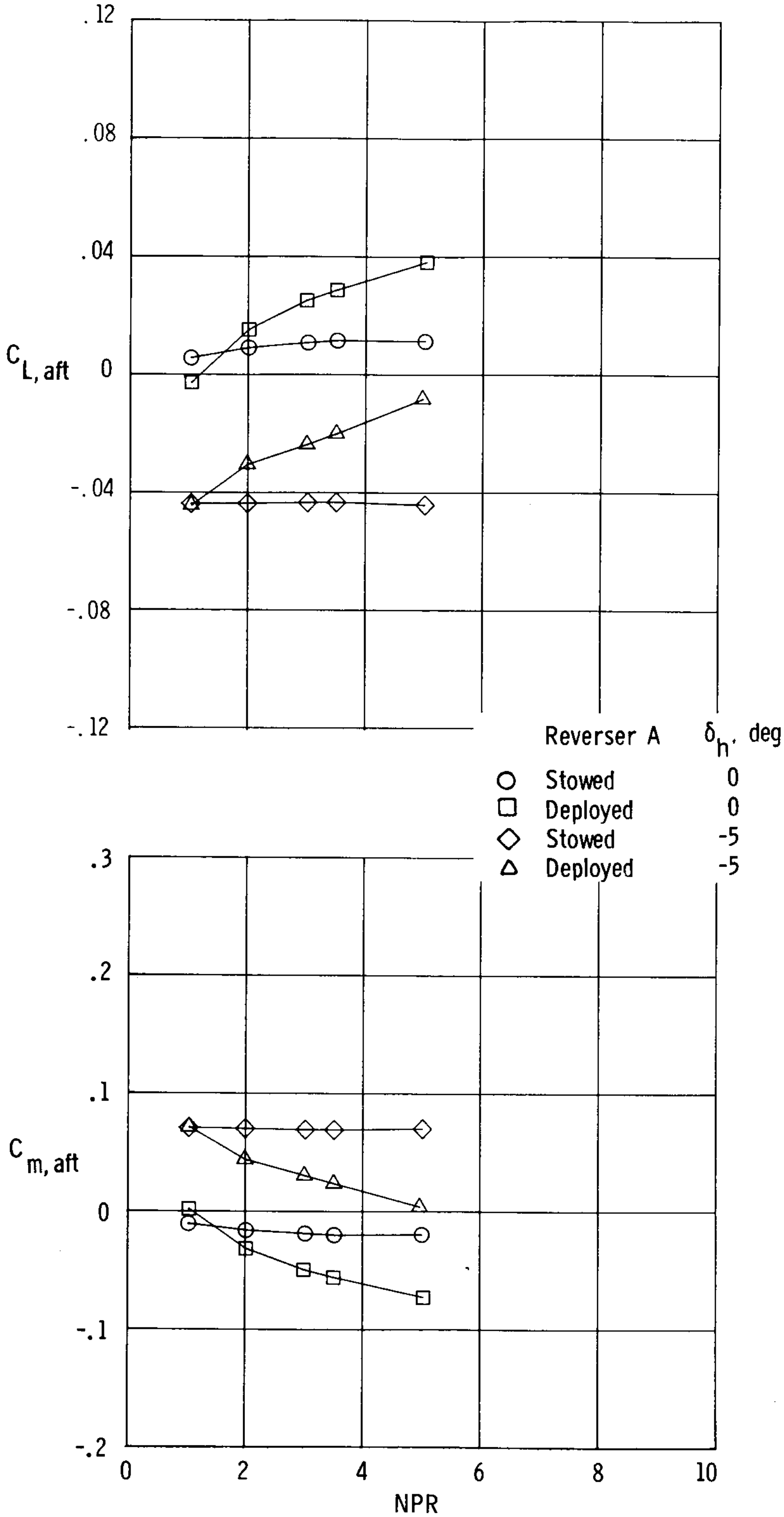


(b) $M = 0.15$; NPR = 2.6.

Figure 16. Continued.



(c) $M = 0.60$; $\alpha = 0°$.

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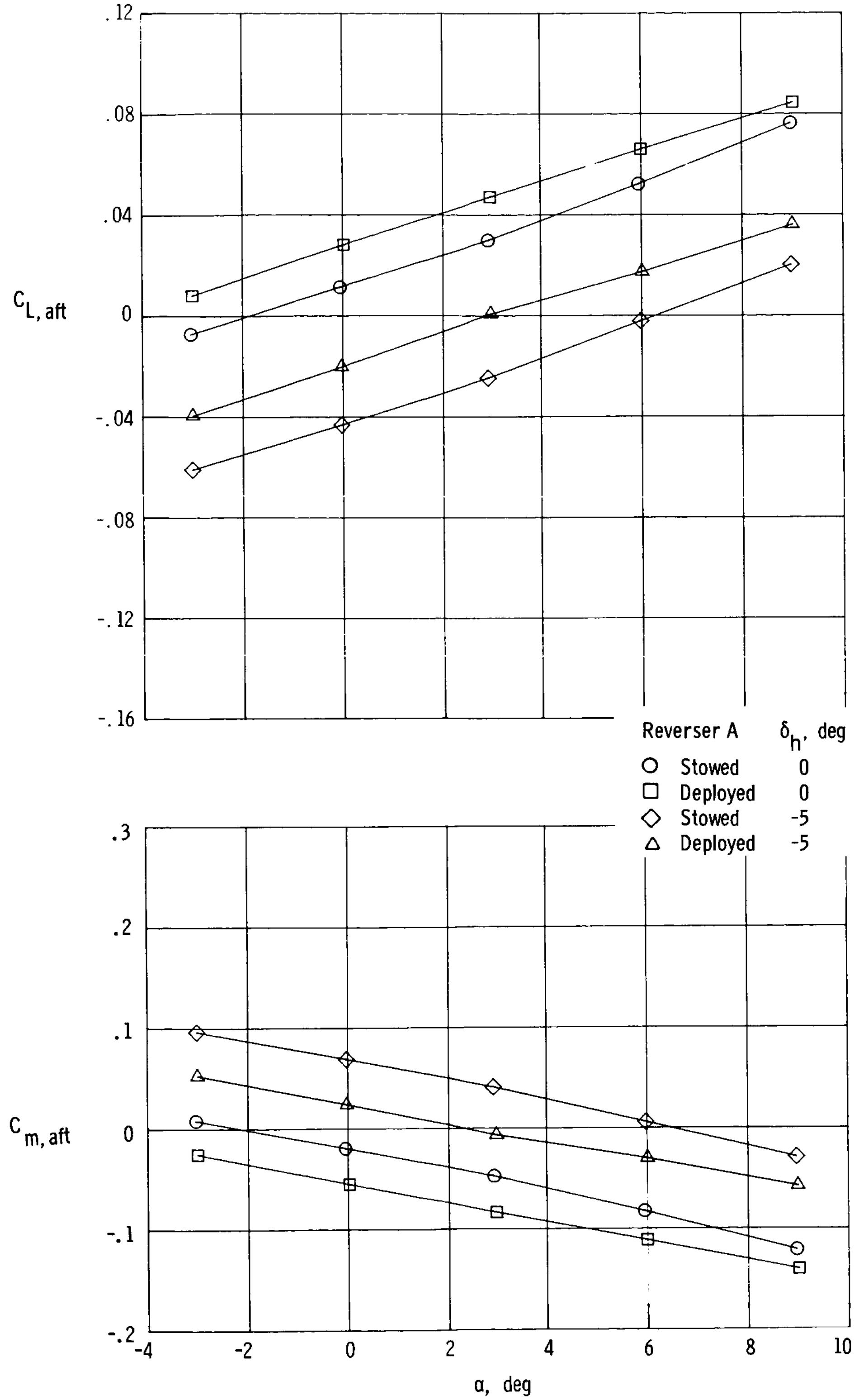
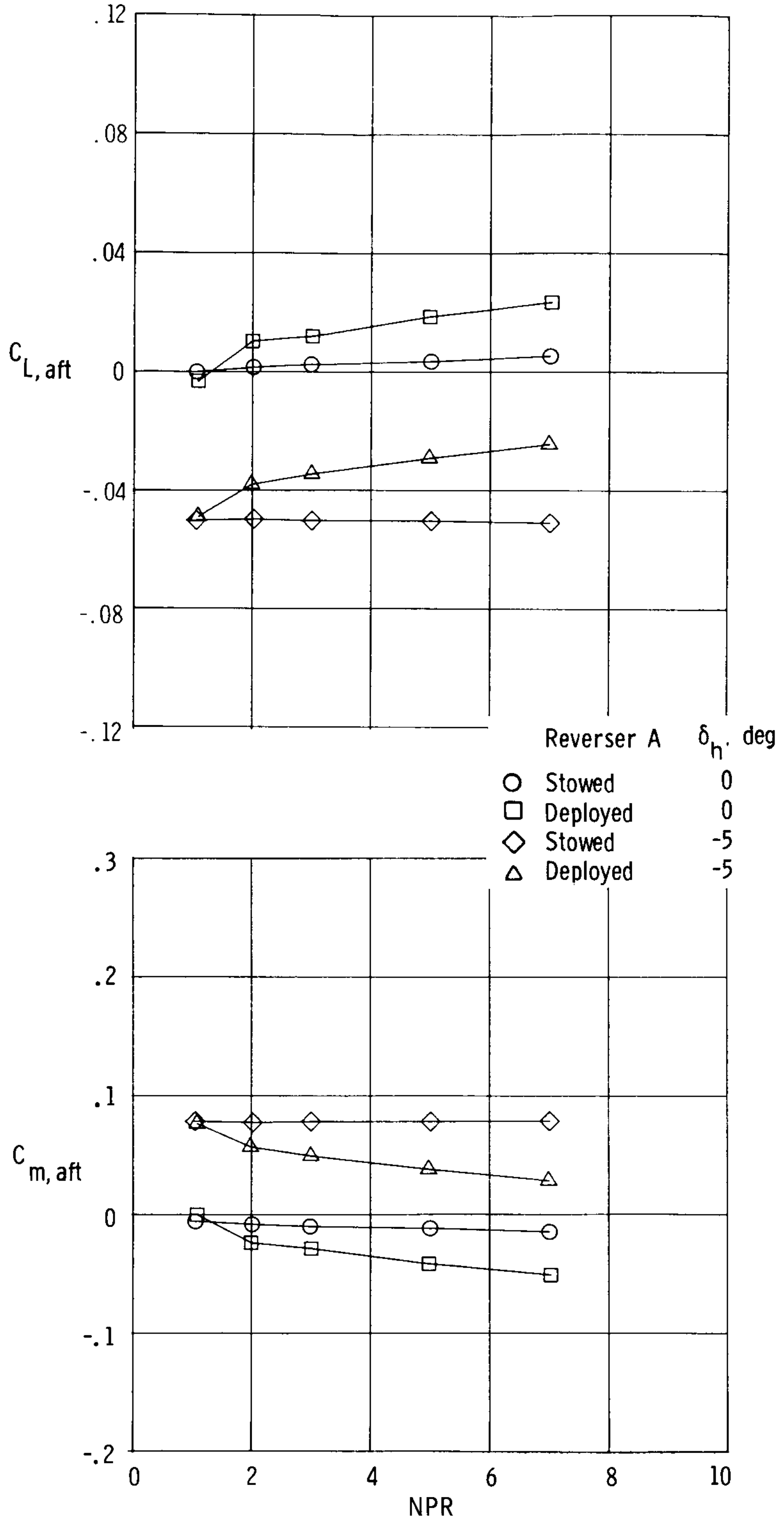


(d) $M = 0.60$; NPR = 3.5.

Figure 16. Continued.



(e) $M = 0.90$; $\alpha = 0°$.

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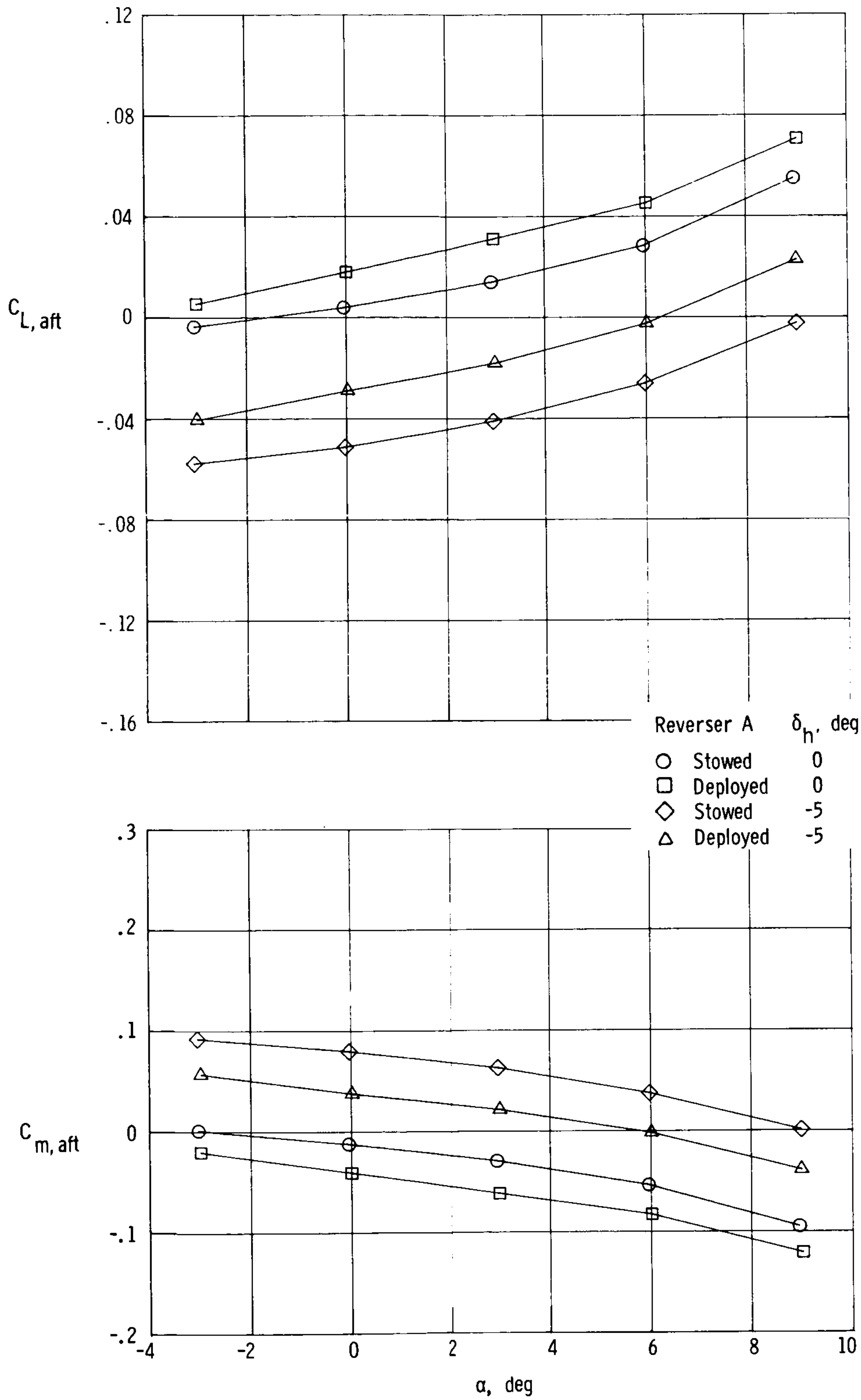

(f) $M = 0.90$; NPR = 5.0.

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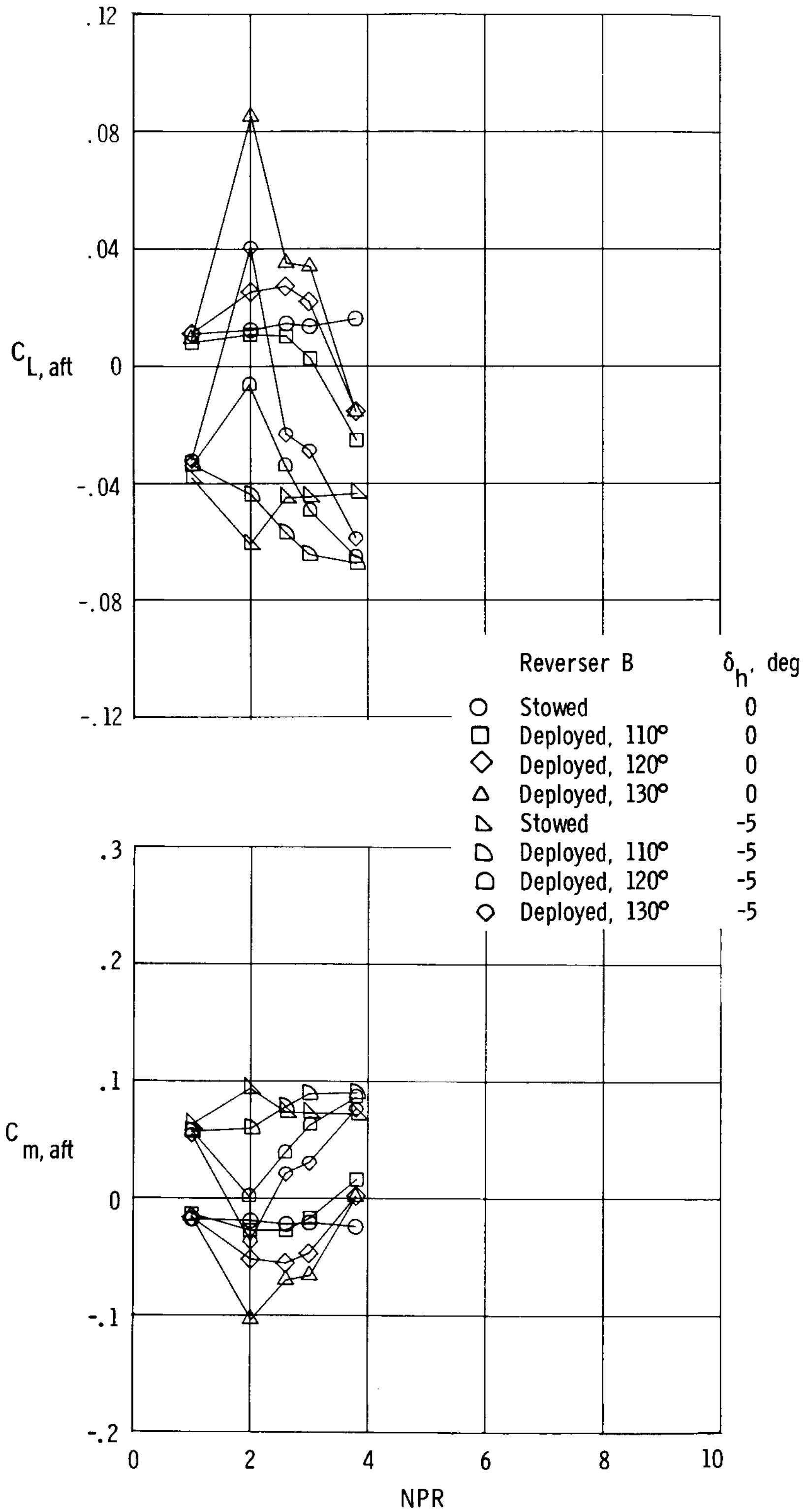
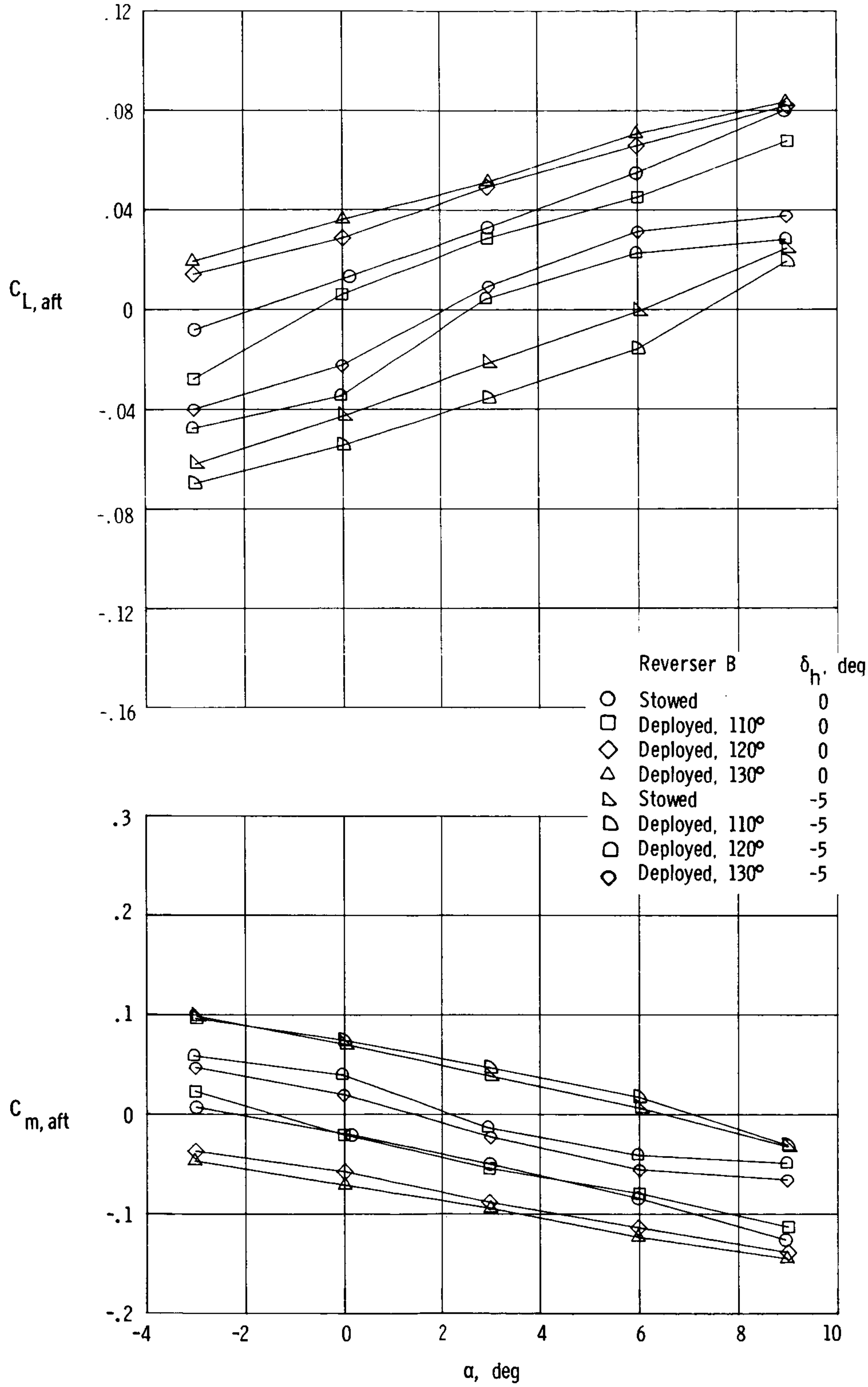


(a) $M = 0.15$; $\alpha = 0°$.

Figure 17. Afterbody lift and pitching-moment coefficients for reverser B, vertical tails mid, and $\phi_t = 0°$



(b) $M = 0.15$; NPR = 2.6.

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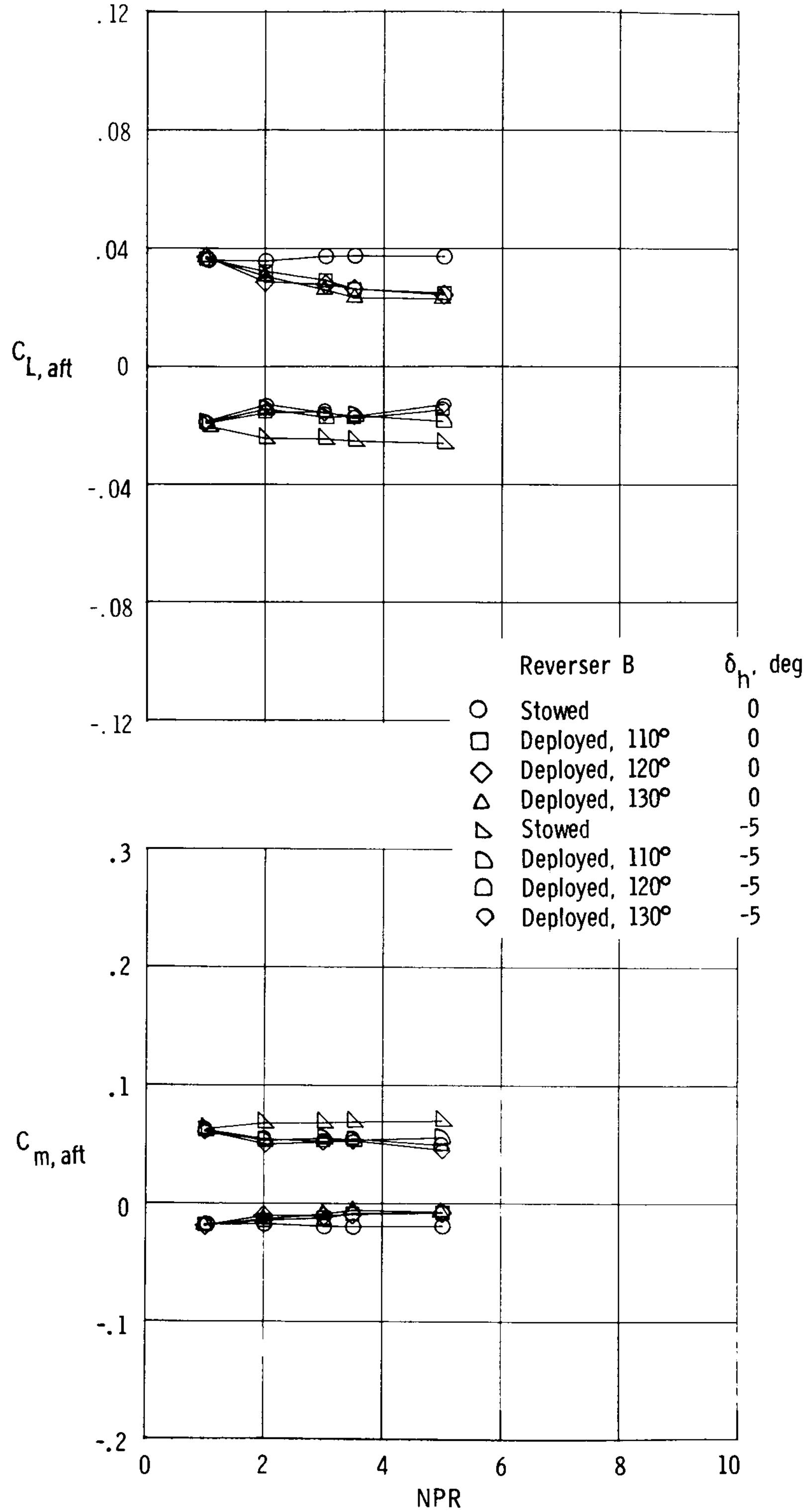

(c) $M = 0.60$; $\alpha = 0°$.

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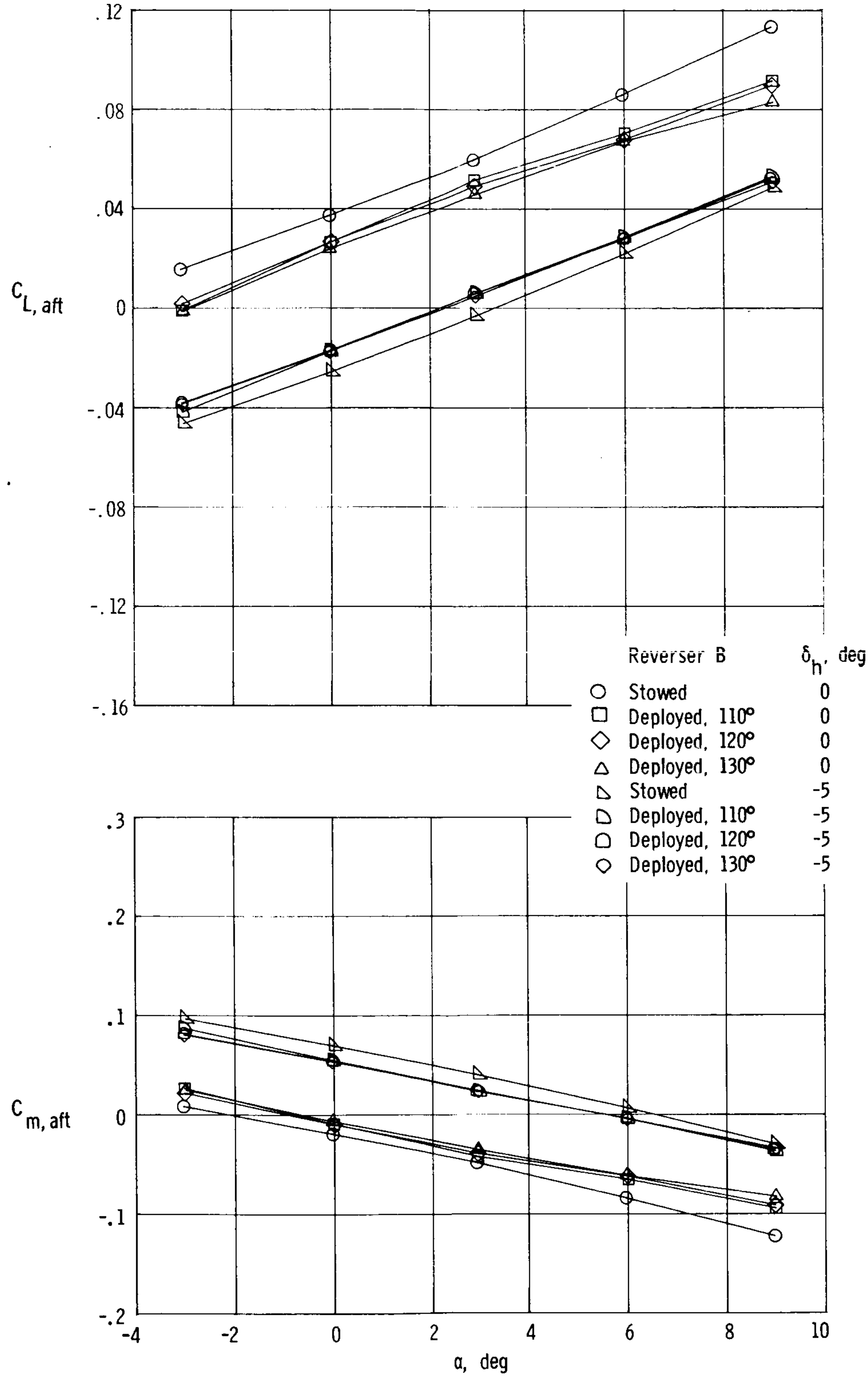
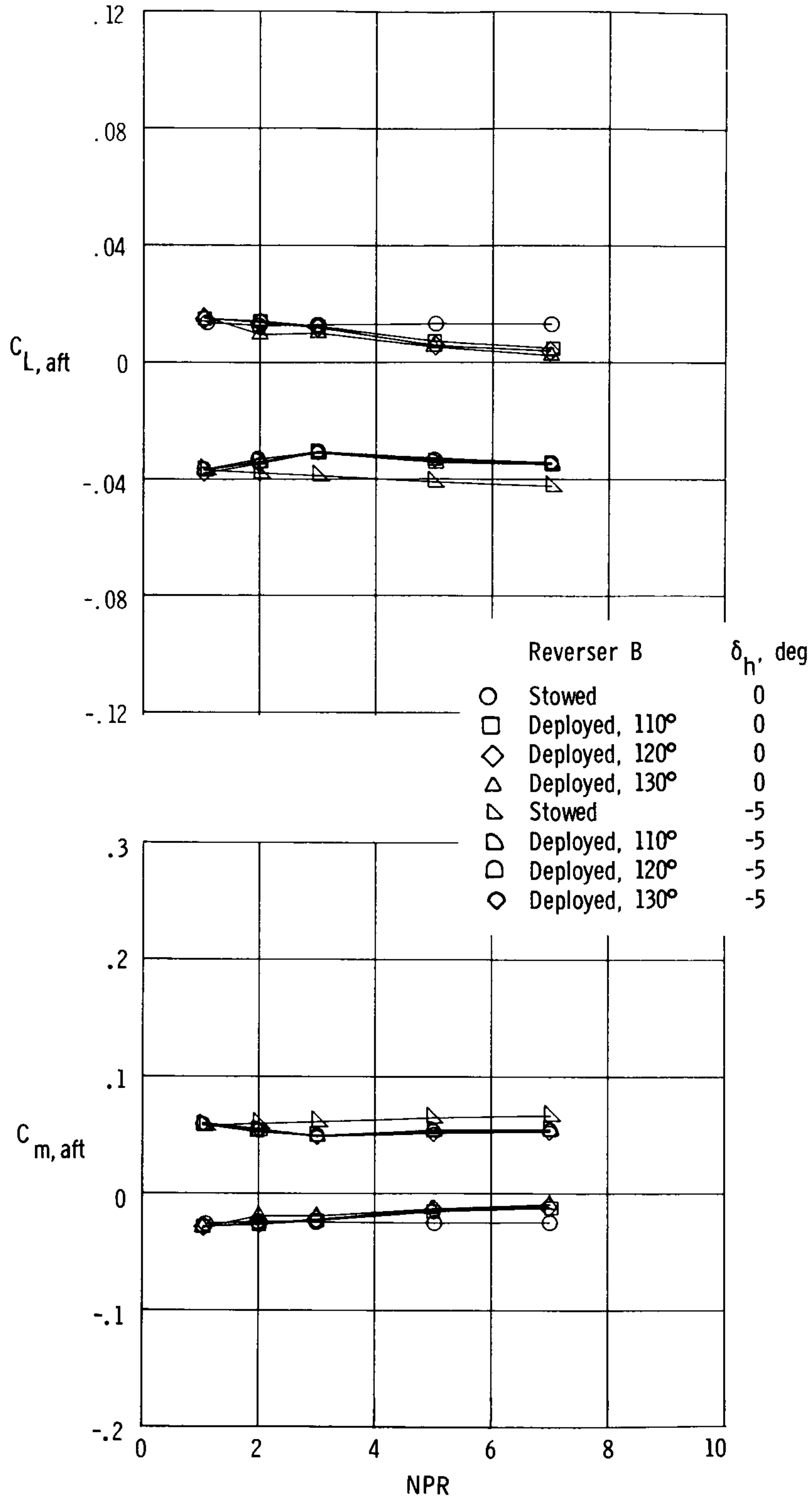


(d) $M = 0.60$; NPR = 3.5.

Figure 17. Continued.



(e) $M = 0.90$; $\alpha = 0°$.

Figure 17. Continued.

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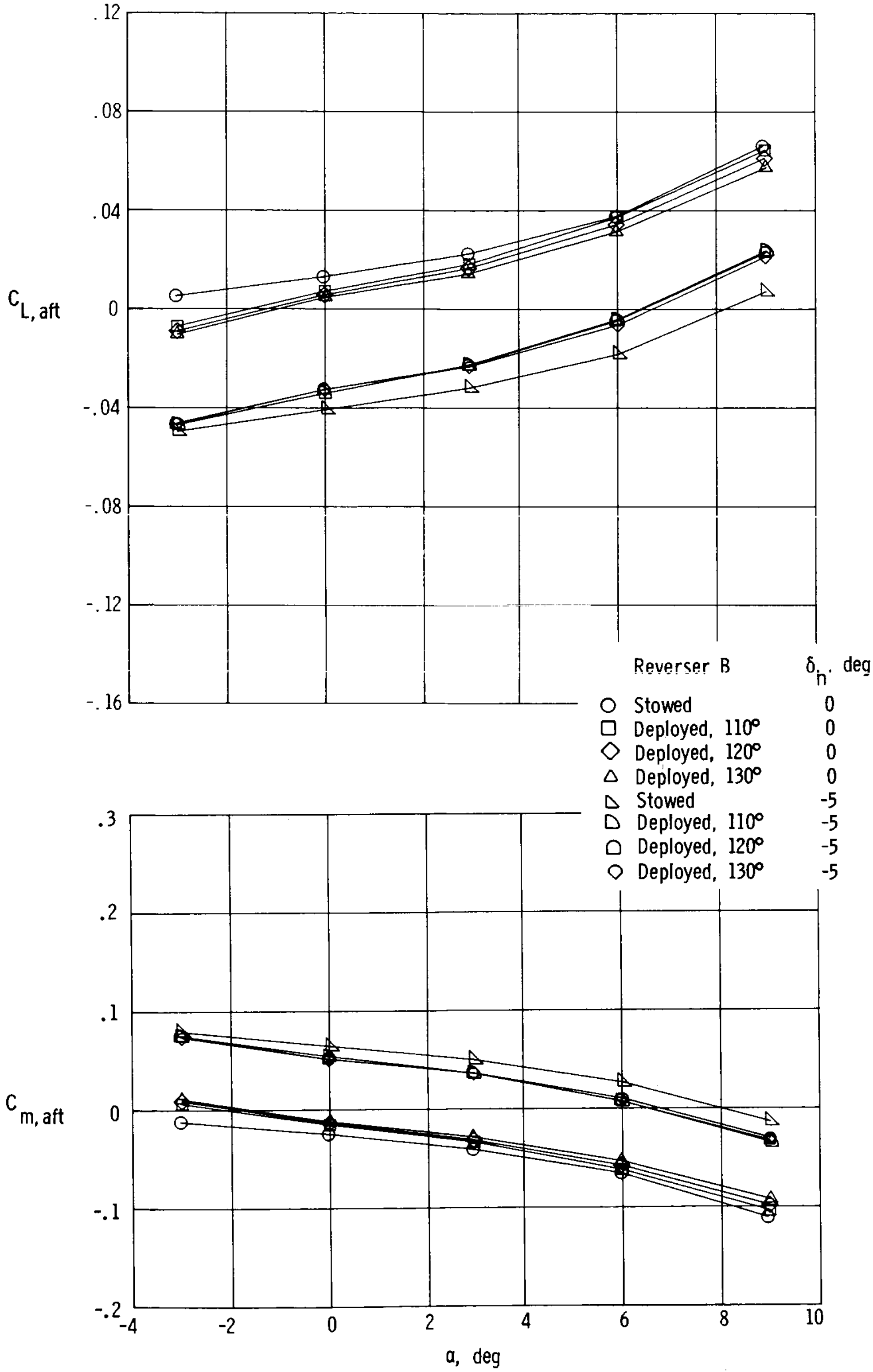
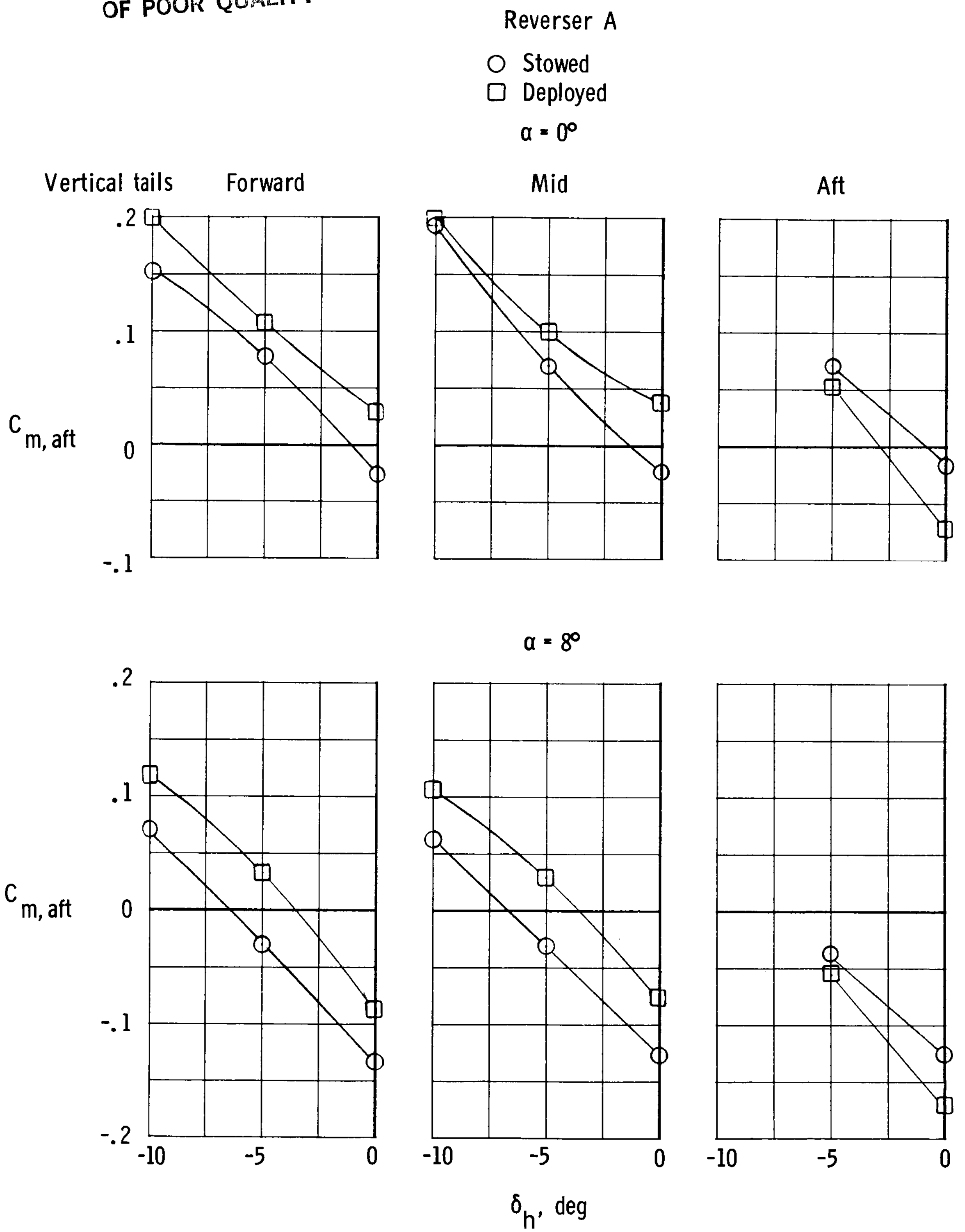


(f) $M = 0.90$; NPR = 5.0.

Figure 17. Concluded.



(a) $M = 0.15$; NPR = 2.6.

Figure 18. Effect of reversing on variation of pitching-moment coefficient with δ_h for reverser A and $\phi_t = 0°$.

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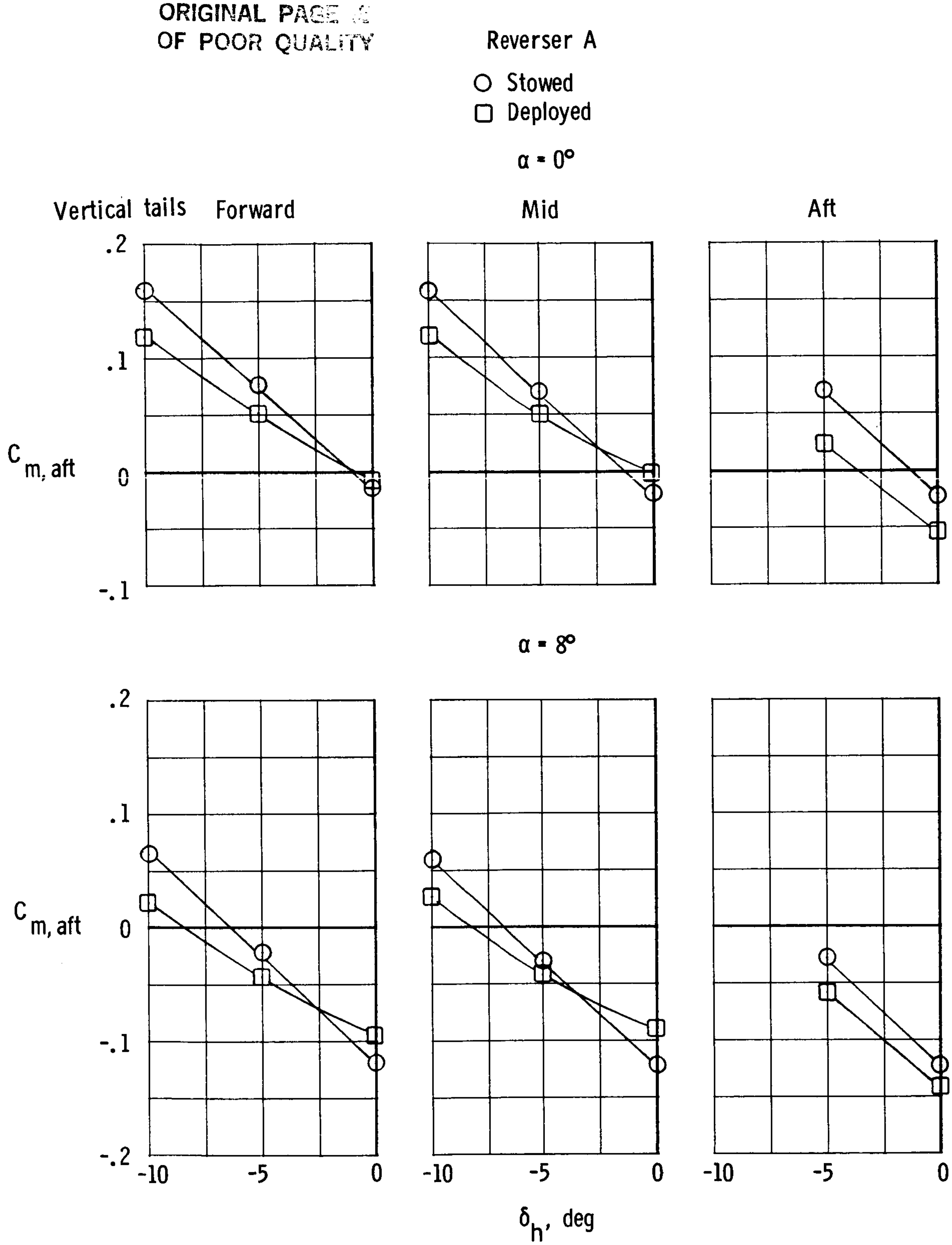
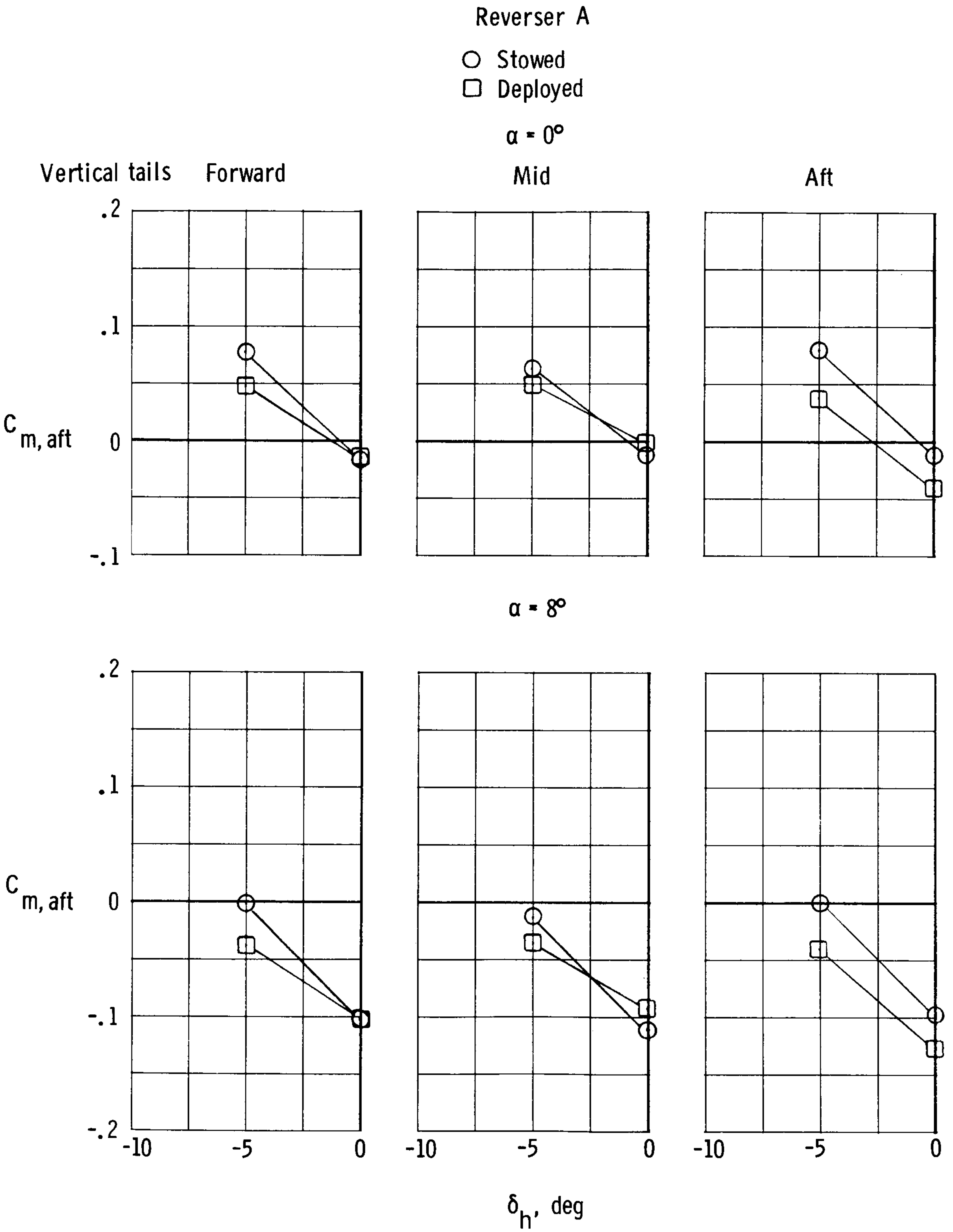


(b) $M = 0.60$; NPR = 3.5.

Figure 18. Continued.



(c) $M = 0.90$; NPR = 5.0.

Figure 18. Concluded.

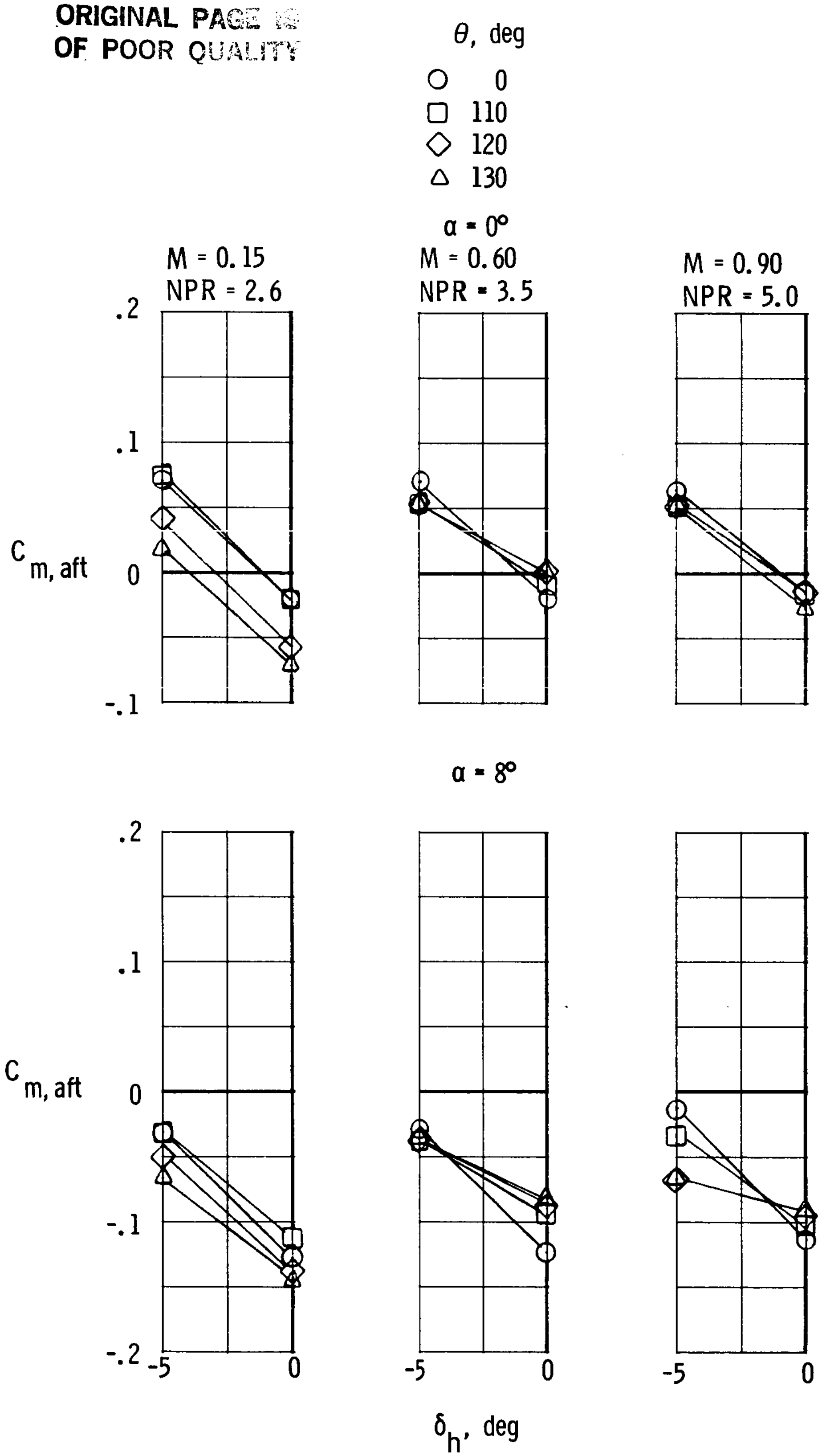
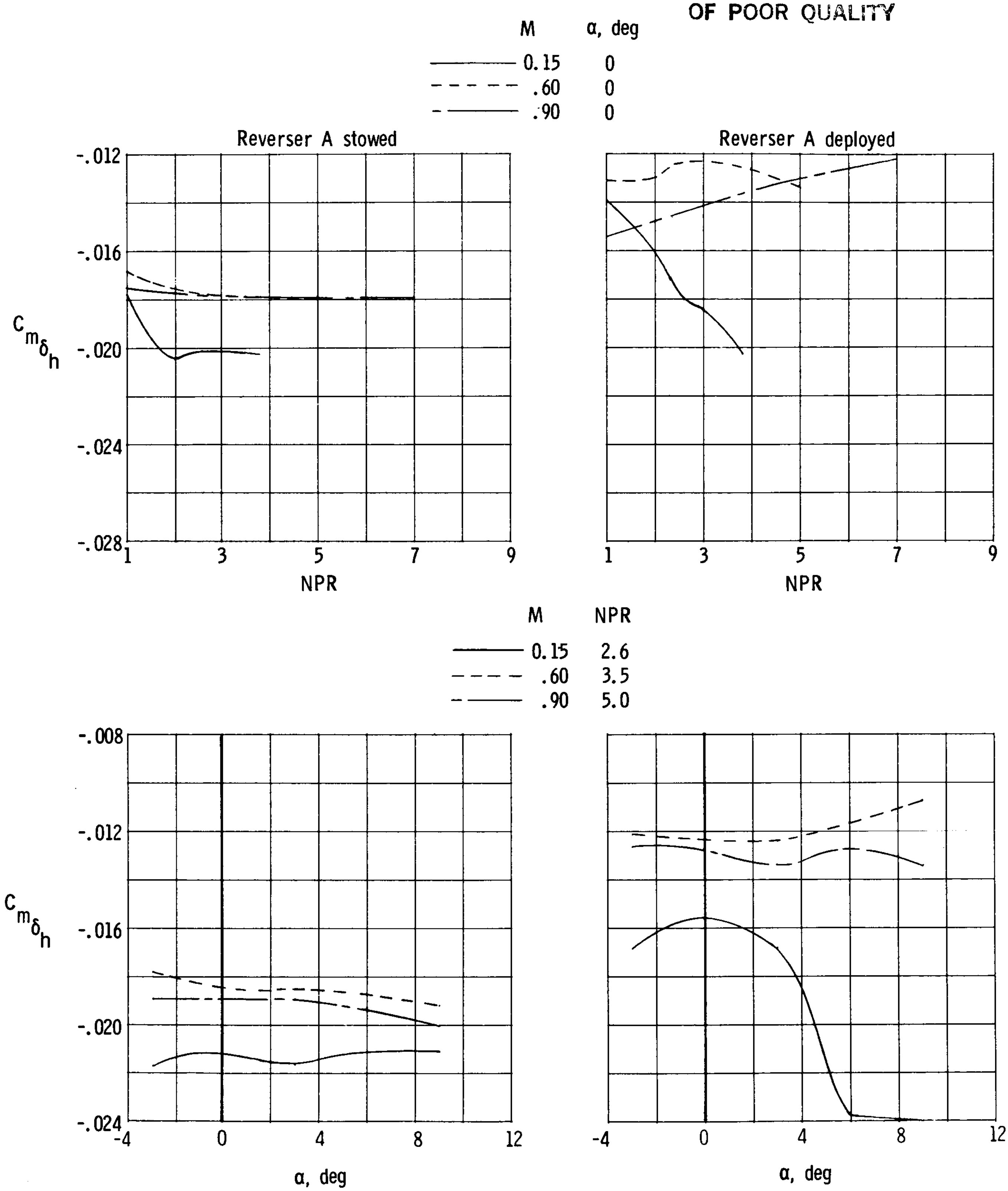
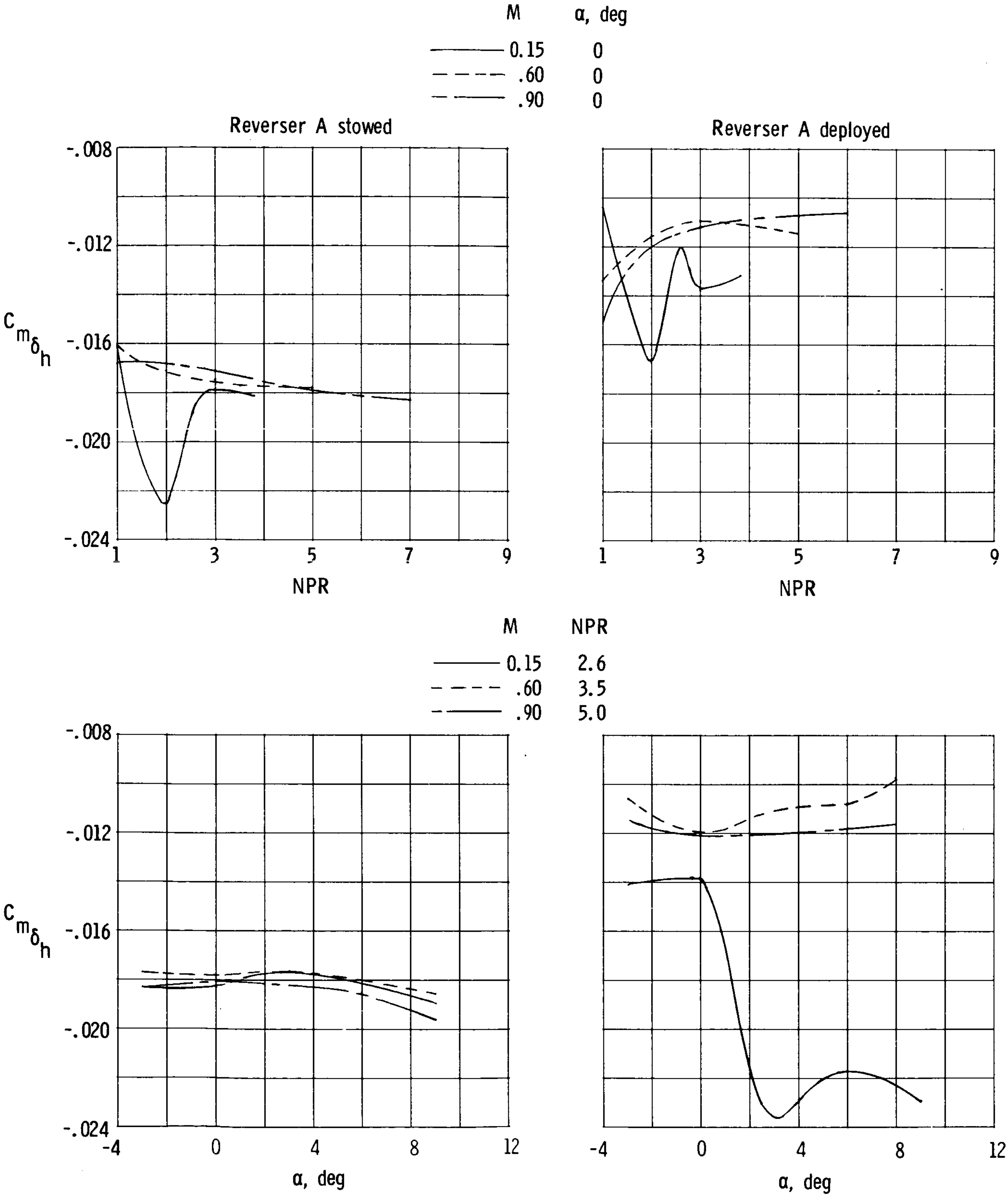


Figure 19. Effect of reversing on variation of pitching-moment coefficient with δ_h for reverser B, vertical tails mid, and $\phi_t = 0°$.



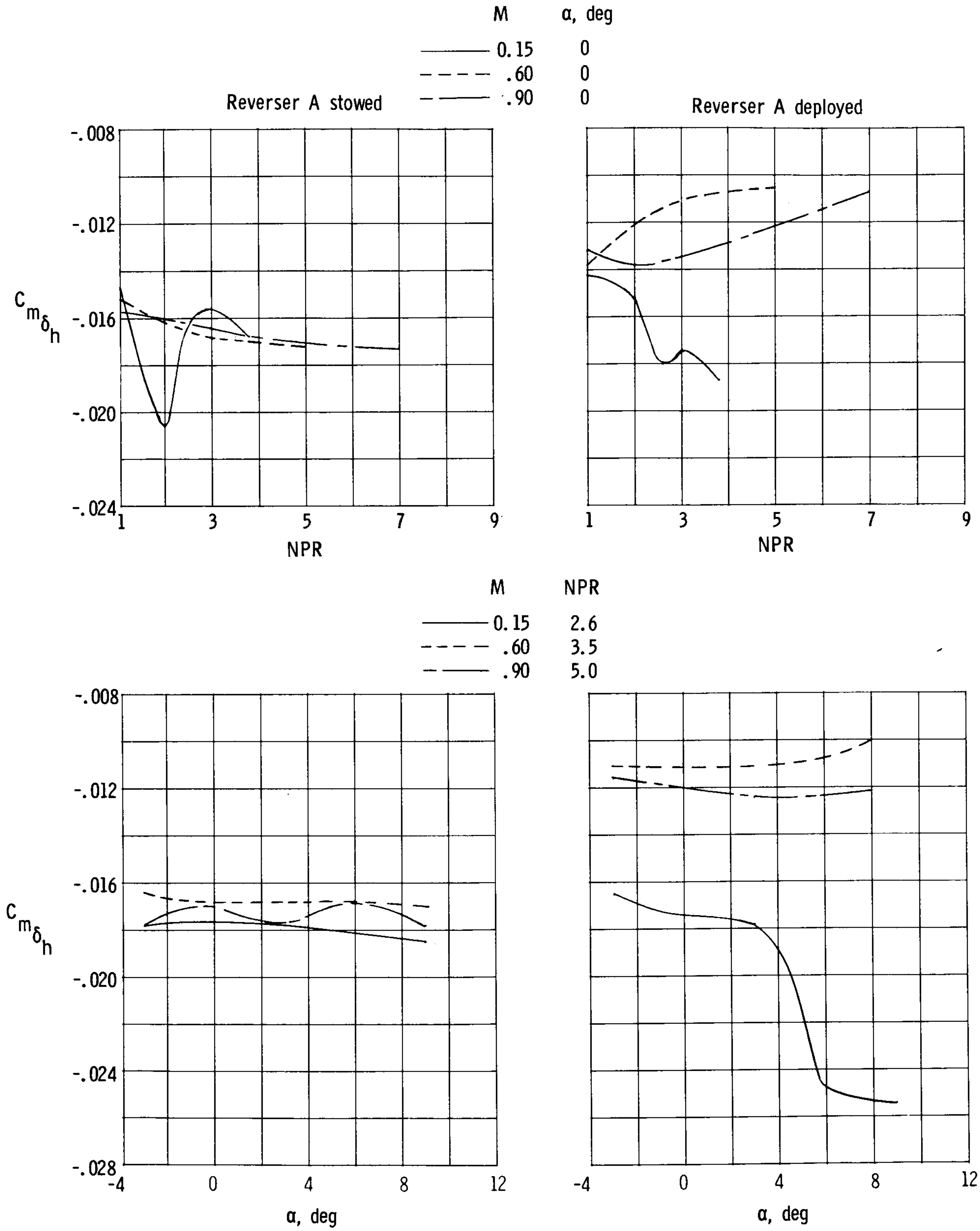
(a) Vertical tails forward; $\phi_t = 0°$

Figure 20. Horizontal tail effectiveness for configurations with reverser A.



(b) Vertical tails mid; $\phi_t = 0°$.

Figure 20. Continued.



(c) Vertical tails mid: $\phi_t = 20°$.

Figure 20. Continued.

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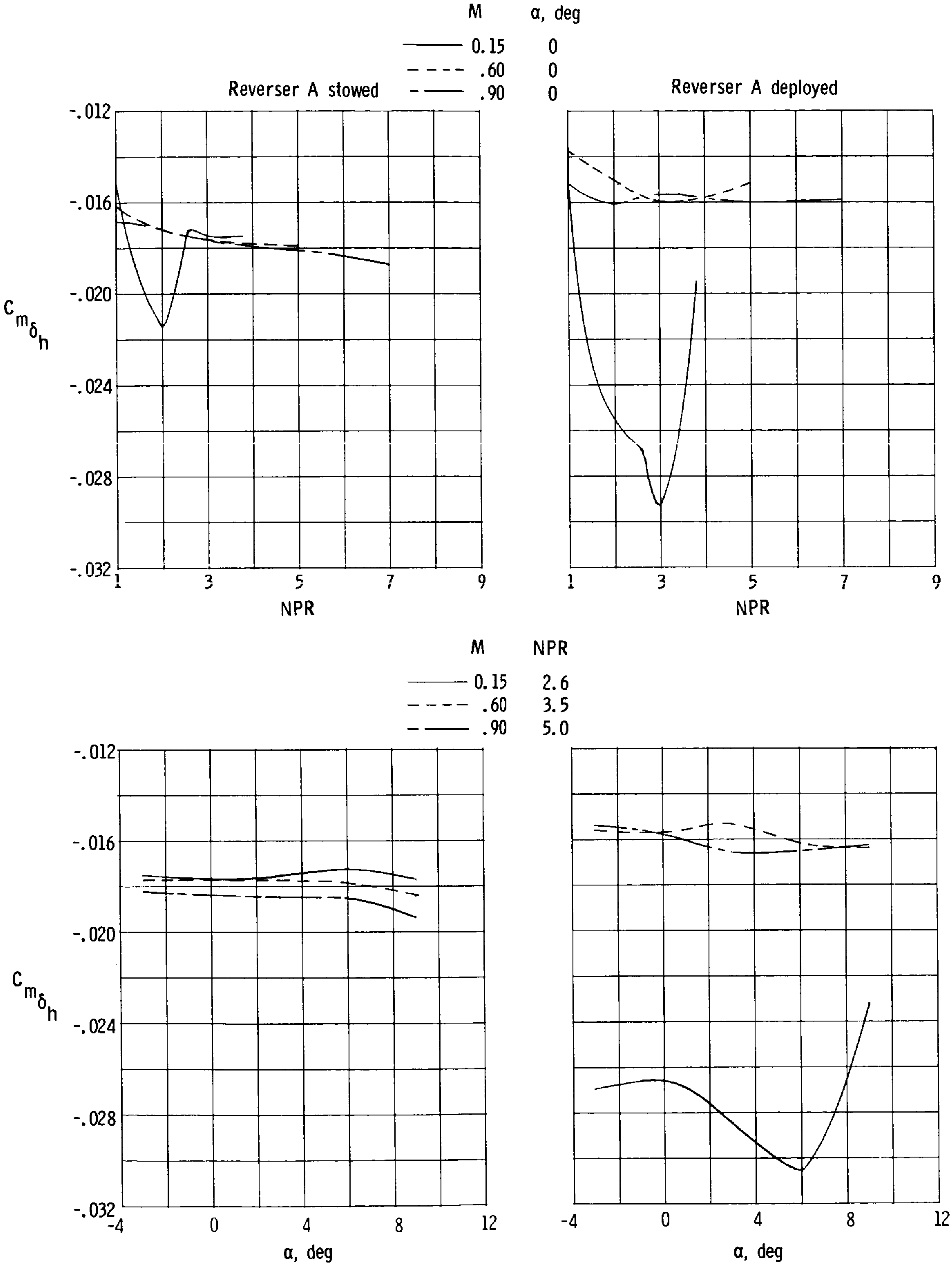
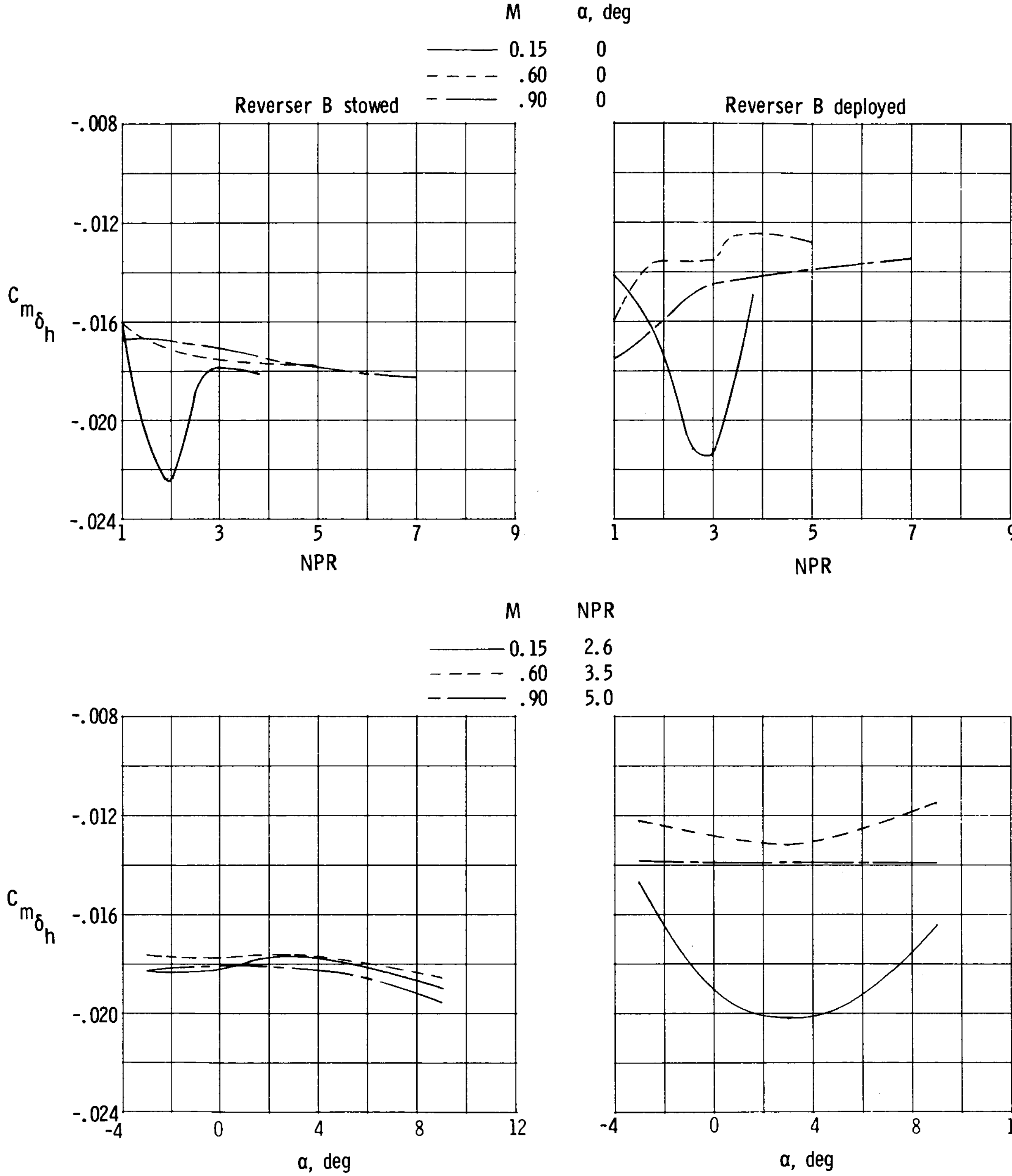


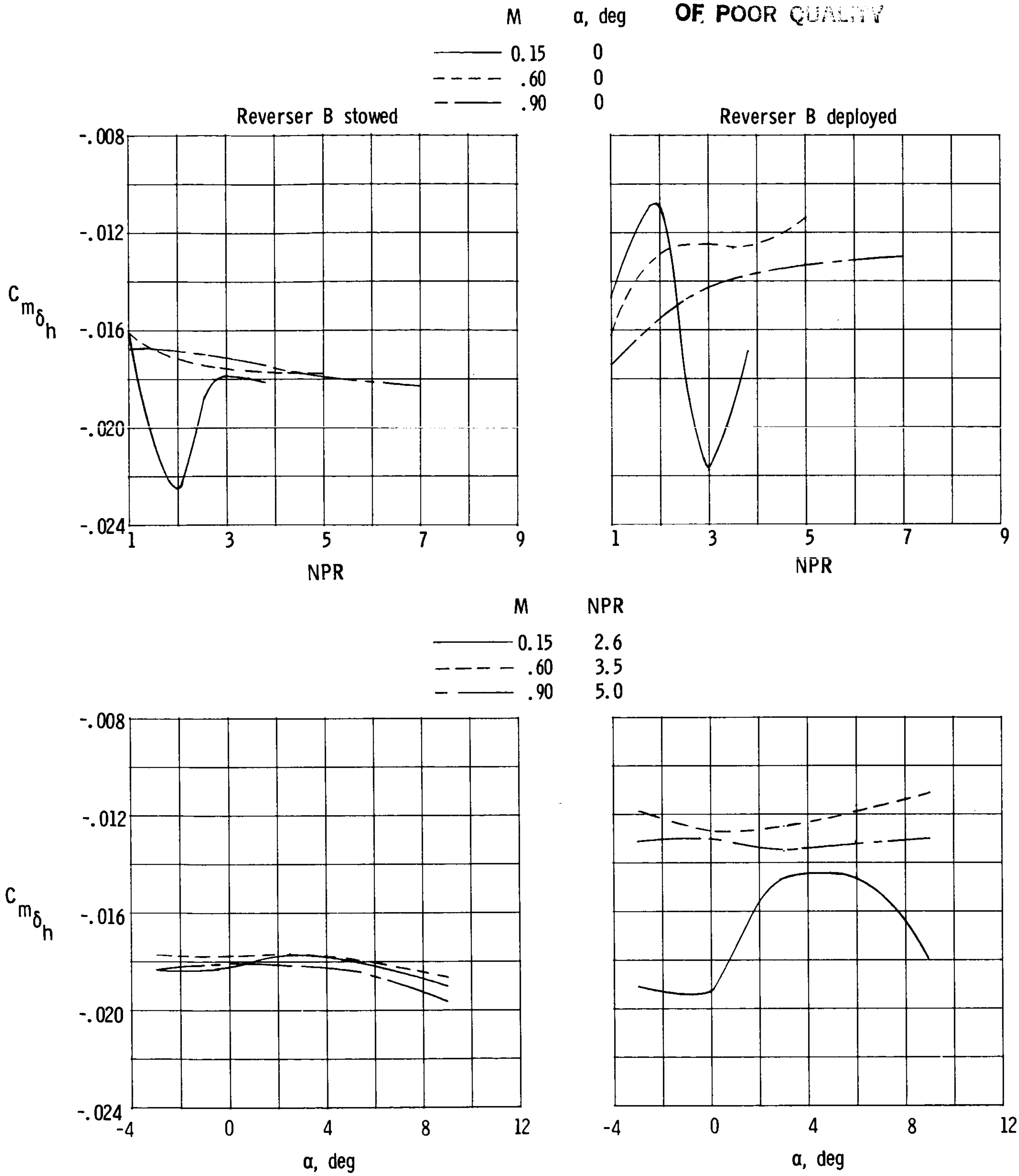
(d) Vertical tails aft; $\phi_t = 0°$.

Figure 20. Concluded.



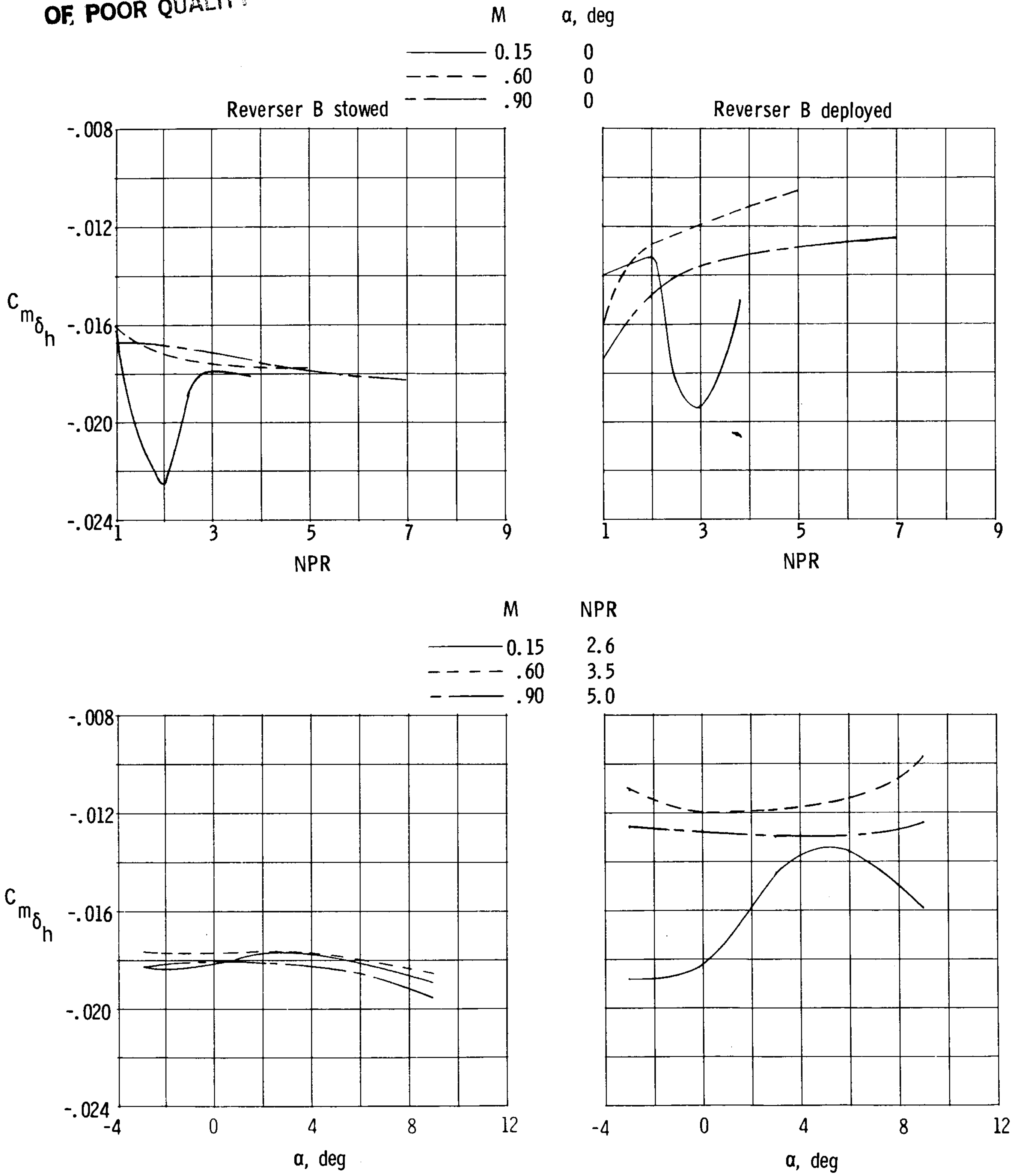
(a) $\theta = 110°$

Figure 21. Horizontal tail effectiveness for configurations with reverser B, vertical tails mid, and $\phi_t = 0°$



(b) $\theta = 120°$.

Figure 21. Continued.



(c) $\theta = 130°$.

Figure 21. Concluded.

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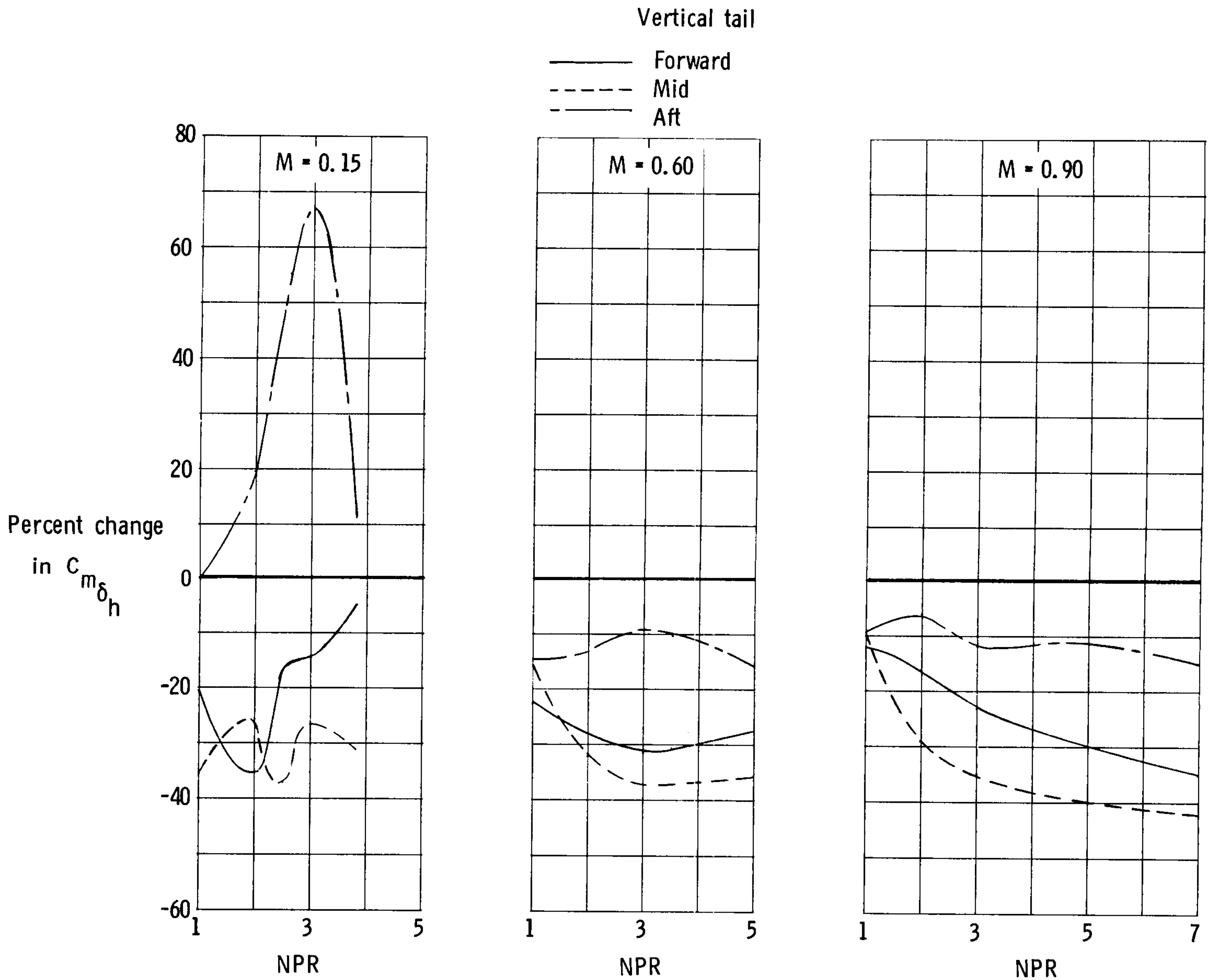

Figure 22. Effect of vertical tail location on tail effectiveness for reverser A, $\alpha = 0°$, and $\phi_t = 0°$. Percent change relative to reverser stowed.

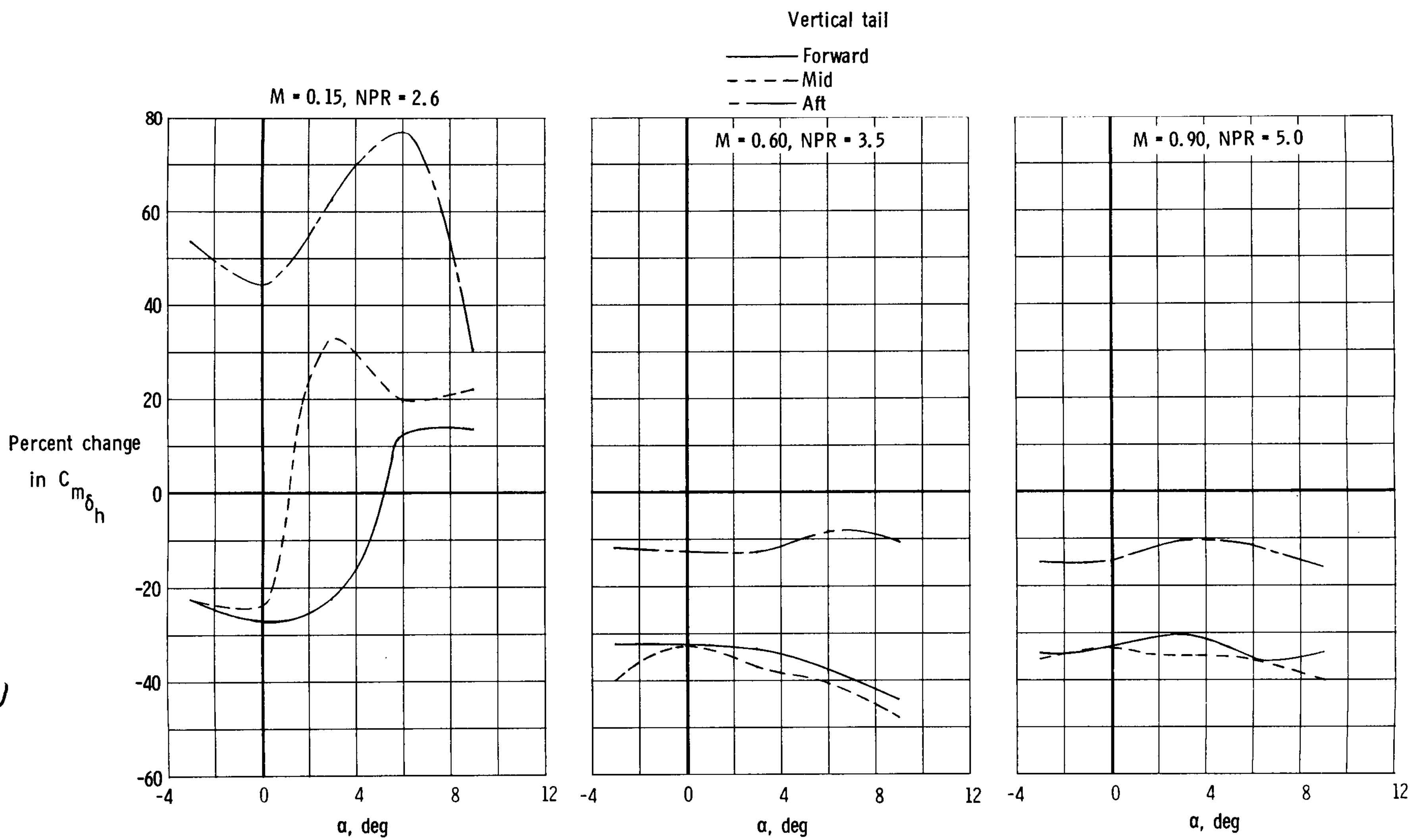

Figure 23. Effect of vertical tail location on tail effectiveness for reverser A and $\phi_t = 0°$. Percent change relative to reverser stowed.

C-2

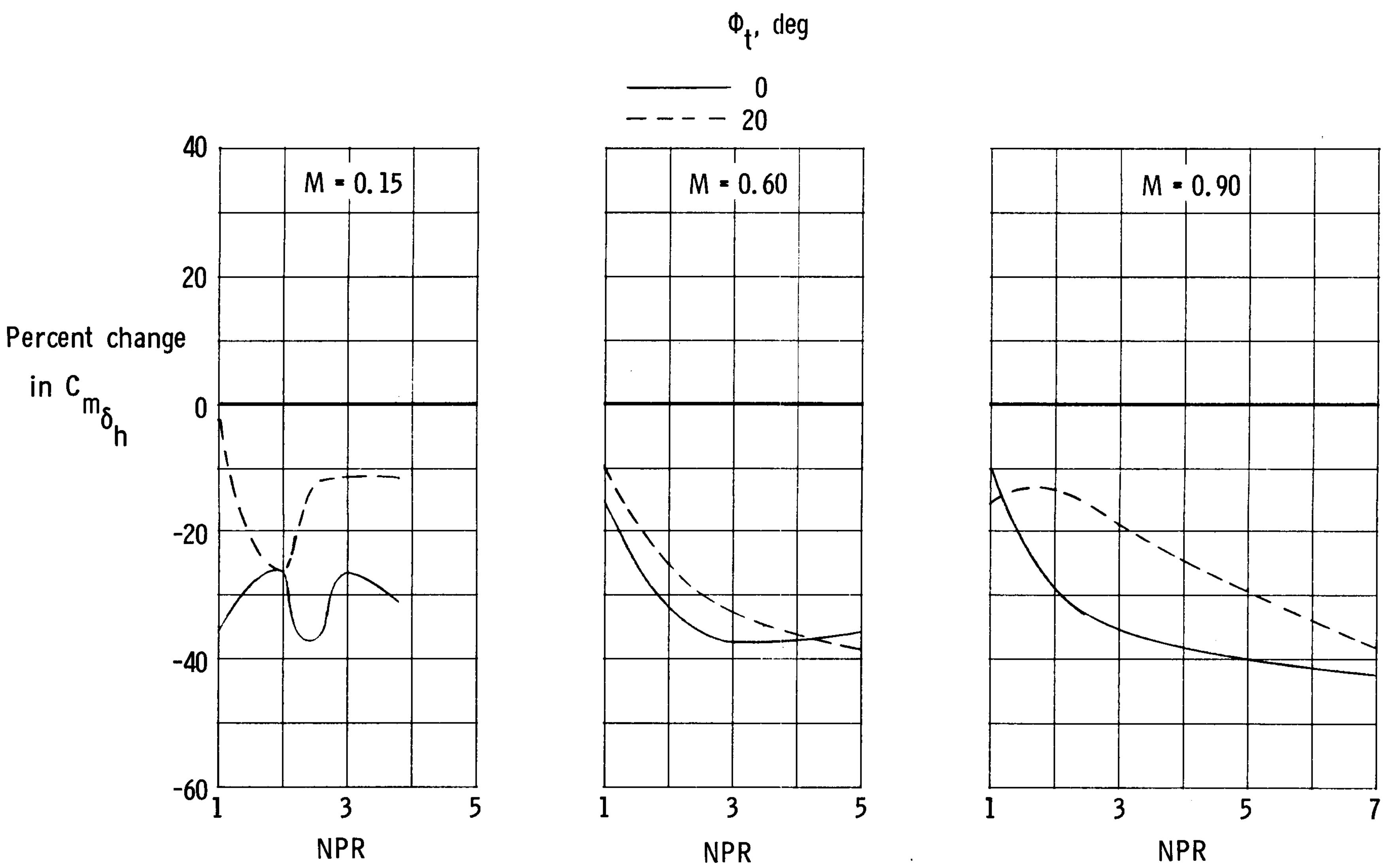

Figure 24. Effect of vertical tail cant angle on tail effectiveness for reverser A, vertical tails mid, and $\alpha = 0°$. Percent change relative to reverser stowed.

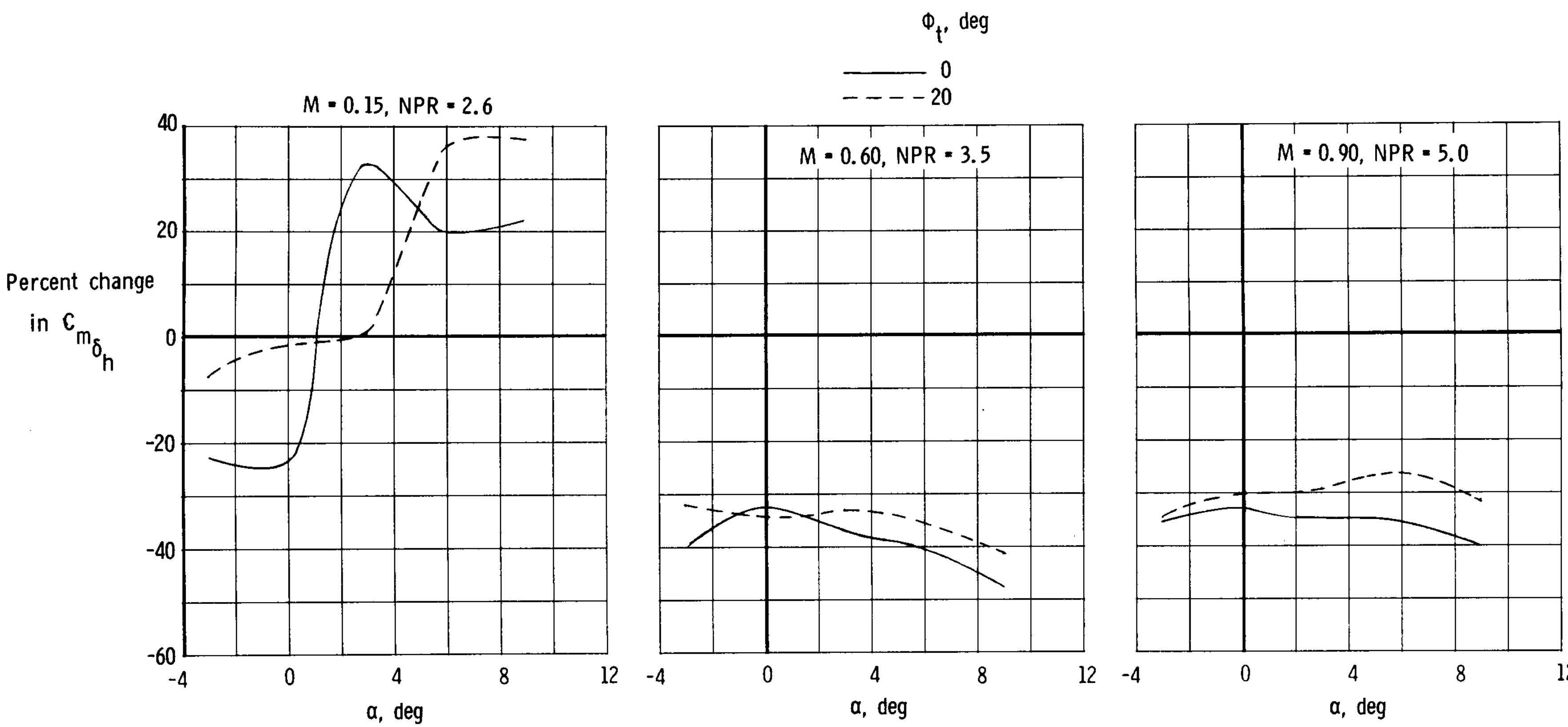

Figure 25. Effect of vertical tail cant angle on tail effectiveness for reverser A and vertical tails mid. Percent change relative to reverser stowed.

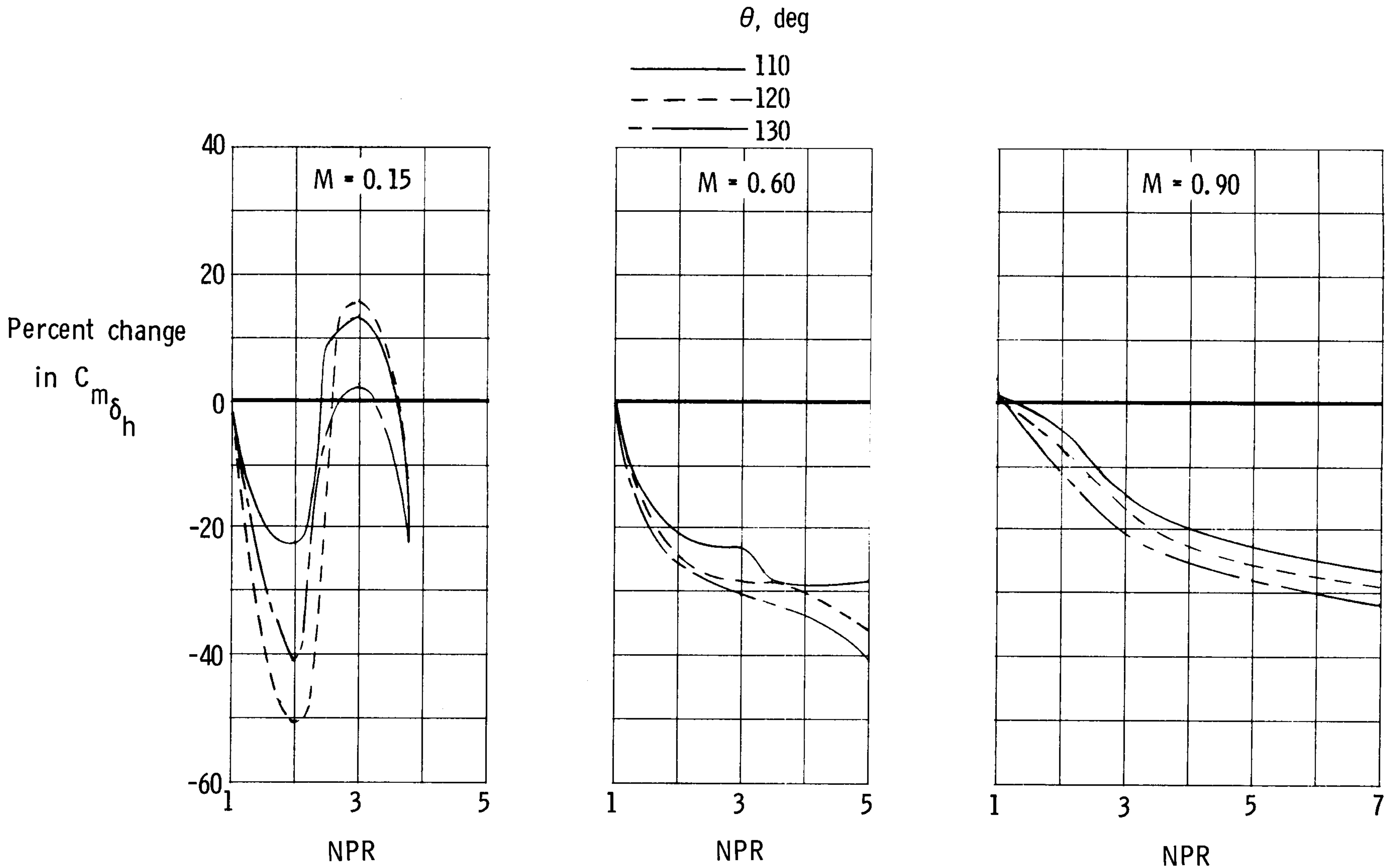

Figure 26. Effect of reverser port angle on tail effectiveness for reverser B, vertical tails mid, and $\alpha = 0°$. Percent change relative to reverser stowed.

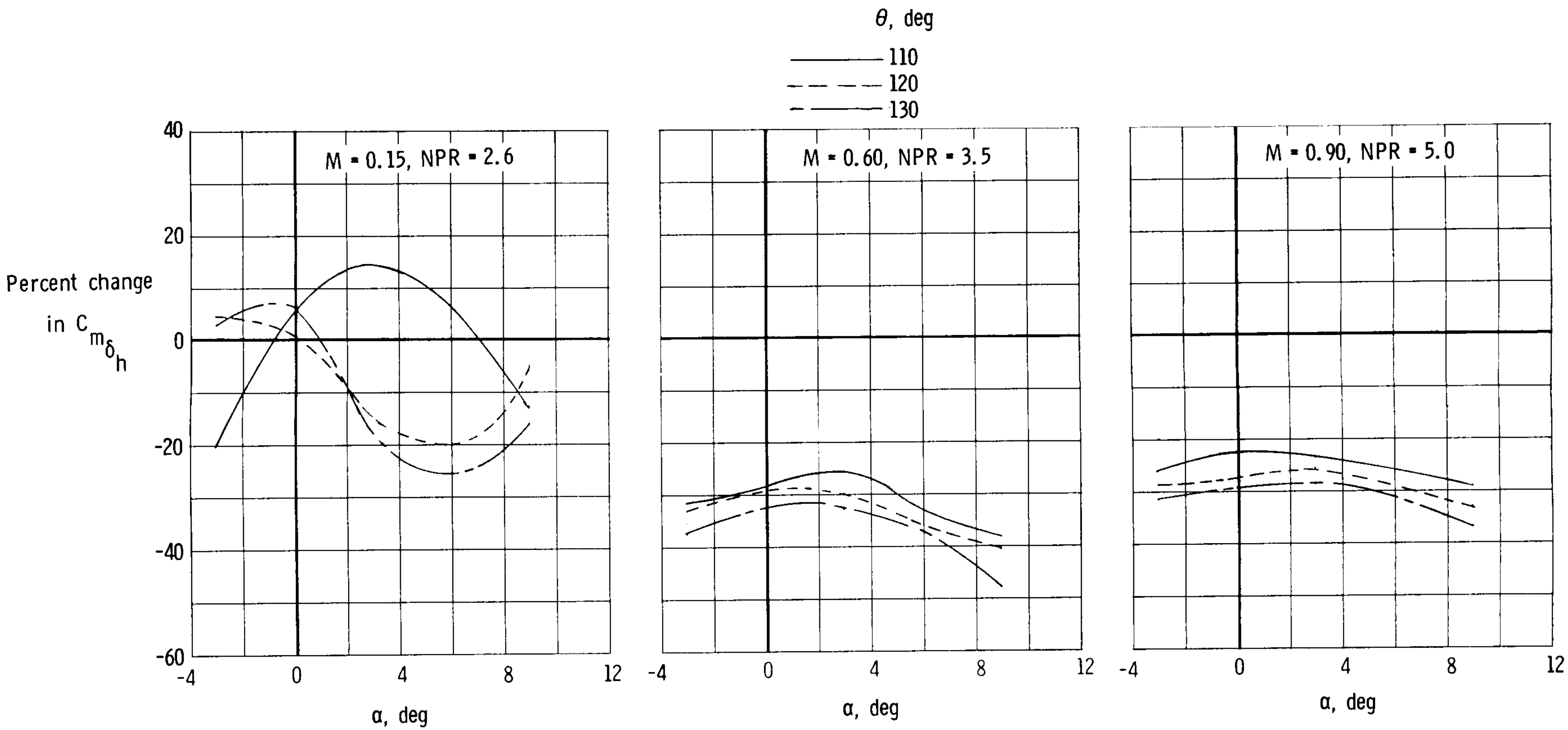

Figure 27. Effect of reverser port angle on tail effectiveness for reverser B and vertical tails mid. Percent change relative to reverser stowed.