

# UNIVERSITY OF SOUTHAMPTON



DEPARTMENT OF SHIP SCIENCE

FACULTY OF ENGINEERING

AND APPLIED SCIENCE

PRESSURE-DISTRIBUTION INVESTIGATION  
OF A SEMI-BALANCED SHIP SKEG-RUDDER

by A. F. Molland

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## SUMMARY

The results of free stream wind tunnel experiments on a semi-balanced ship skeg-rudder are presented. Tests were carried out to derive the distribution of pressures over the rudder; these tests form an extension to earlier force measurements which were the subject of separate reports.

The chordwise distributions of pressure indicate the regions of separation occurring on the rudder, and the influence of the transition strip and sealed gaps is demonstrated by changes in the pressure distributions.

Spanwise distributions of load show that changes in skeg angle (for a particular rudder angle) have an influence on both the skeg and all-movable portions of the rudder. Total forces and spanwise centres of pressure derived from the integration of the spanwise pressure loadings are in reasonable agreement with the earlier dynamometer measurements.

It is concluded that the chordwise and spanwise pressure distributions obtained from the experiments provide a satisfactory account of the detailed load distribution over a skeg-rudder for various skeg and rudder angles.

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## 1. INTRODUCTION

Tests were carried out to derive the distribution of pressures over a skeg rudder, and in the gap between the movable rudder and the skeg. The principal objectives of the tests were to provide physical explanations for the skeg rudder force characteristics derived in earlier experiments and reported in Refs. 1 and 2, and to give an insight into the distribution of forces over the rudder.

## 2. DESCRIPTION OF MODEL

Tests were carried out on Rudder No. 1 for which force and moment measurements had been carried out and reported in Refs. 1 and 2. The principal dimensions of the model rudder are given in Fig. 1.

The pressure tapings were arranged over the rudder as shown in Figs. 2 and 3 and comprised a chordwise line of tapings at eight span positions. For span positions S1 to S4 on the all-movable portion of the rudder the tapings were located at the fore end and on both sides of the rudder at 2.5%, 5%, 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, 90%, and 95% of the chord from the leading edge. For span positions S5 to S8 in way of the skeg the tapings were located at the fore end and on both sides of the rudder at 2.5%, 5%, 10%, 15%, 20%, 25%, 30%, 35%, 40%, 50%, 60%, 70%, 80%, 90% and 95% of the total chord from the leading edge. Tapings were also located (at span positions S5 to S8) in the gap between the movable rudder and skeg as shown in Fig. 3.

The tapings were achieved by embedding nylon tubes (0.058" I.D. and 0.125" O.D.) in the rudder surface (Fig. 4). The tubes were a push fit into grooves which had been accurately milled by machine in the surface of the (wooden) rudder. The surface was levelled with epoxy resin and 1.0 mm diameter orifices drilled at the required chordwise and spanwise locations.

In order to obtain the pressure measurements at each span location, the tapings at the remaining seven span positions were sealed by means of clear adhesive tape.

Leading edge roughness (a turbulence strip) was applied to both sides of the rudder, and consisted of 0.15 mm diameter carborundum grit (No. 100) spread evenly over double-sided adhesive tape of 10 mm width; the leading edge of the roughness strip was located approximately 5.7% aft of the leading edge of the rudder, this being chosen as a compromise between the tapings at 5% and 10%. (The transition strip was 5.0% aft of the L.E. for the earlier force tests.)

### 3. APPARATUS AND TESTS

The tests were carried out in the 7' x 5' low-speed wind tunnel at Southampton University.

The rudder was mounted through the tunnel floor and the gap between the rudder and the floor was approximately 2.5 mm (0.0055c̄).

The pressure tubes from theappings on the rudder, together with the tunnel free stream total and static pressure tubes were led to a 'Scanivalve' unit, thereafter to a digital voltmeter, a data transfer unit and digital recording.

All the tests were carried out at a nominal Reynolds No. of  $1.2 \times 10^6$ .

Skeg angles ( $\beta$ ) tested were  $0^\circ$ ,  $+5^\circ$ ,  $-5^\circ$  and  $-0.25^\circ$ . (Skeg angles  $\beta = 0^\circ$  and  $-0.25^\circ$  were repeated without the transition strips). Skeg angle  $\beta = -0.25^\circ$  was repeated for span position S7 with the vertical gap between rudder and skeg sealed on the high pressure side.

For each skeg angle, rudder angle  $\delta$  (Fig. 5) was varied to give rudder angles  $\alpha$  (relative to the wind direction) of  $0^\circ$ ,  $5^\circ$ ,  $10^\circ$ ,  $20^\circ$  and  $30^\circ$  ( $0.25^\circ$  less than these values in the case of  $\beta = -0.25^\circ$ ).

During test runs, after changing the rudder angle, a minimum time of one minute was allowed for the pressures to fully respond before starting to scan the readings.

#### 4. DATA REDUCTION AND CORRECTIONS

##### 4.1 Pressure Coefficients :

The difference between the rudder static pressure and the tunnel free stream static pressure divided by the tunnel free stream total minus static pressures gave the appropriate pressure coefficient at each orifice

$$\text{i.e. } C_p = \frac{P_R - P_O}{P_T - P_O} = \frac{P_R - P_O}{\frac{1}{2} \rho V^2}$$

where  $P_R$  = the pressure recorded at the rudder orifice  
 $P_T$  = the tunnel total pressure in the free stream  
 $P_O$  = the tunnel static pressure in the free stream

##### 4.2 Pressure Coefficient Analysis Program :

A computer program was written to provide the final data in coefficient form; a listing of the program is given in APPENDIX A1.

The program analyses  $C_p = \frac{P_R - P_O}{P_T - P_O}$  for each orifice.

$P_O$  is derived from the 5th data line (I=4)

$P_T$  is derived from the average of the values on lines I=1,3,5,7 ....  
for each column J=0,1,2,3.

$P_R$  is obtained from lines I=0,2,6,8,10 .....

Chordwise integration is carried out to give the mean  $C_p$  for each span position; this was carried out for the complete chord for the all-movable span stations S1 to S4. For stations S5 to S8 (in way of skeg) the integration is divided into the skeg (i.e. from L.E. to 30% chord), and from 30% aft to the aft end of chord for the movable part of the rudder. In each case the coefficient derived is based on total chord length. It is to be noted that the integration assumes spacings of the tappings at the aft end of the skeg of 25%, 30% and 35% aft of L.E. whereas practical considerations led to small modifications to these locations as shown in Fig. 2. Inspection of the pressure plottings indicates that this assumption is likely to lead to only



very small errors in the overall integration.

For span position S5 there were no tappings and hence no readings available at 35% and 40% from the L.E. The pressure curves are reasonably flat in this area and for the purposes of the chordwise pressure diagrams and chordwise integration, therefore, the 40% station is assumed to have the same pressure value as the 30% station. Errors brought about by the lack of this reading, and the assumption made, is unlikely to have a significant effect on the total mean  $C_p$  for the chord.

The pressure data was recorded on paper tape which was read into the computer as a data file. The analysis program inputs each line of data as a string (G\$), the prompt at the end of each line being the carriage return / line feed functions. The components of the string are then extracted and converted to their numerical values, these being used in the analysis. The program outputs  $C_p$  values for the numbered tappings, and the chordwise integration of pressures, for each span position.

#### 4.3 Malfunction of Pressure Tappings :

Tube Nos. 15, 43 and 53 were known to be faulty prior to the experiments and were not connected to the rudder.

Preliminary plottings of chordwise pressure distributions yielded reasonably fair curves and indicated that all the tappings had operated satisfactorily except for No. 48, i.e. the tapping at 20% chord from L.E. for span positions S5 to S8. A detailed analysis was made for  $\beta = 0$  for various span positions and angle of attack and this indicated that the  $C_p$  obtained from this orifice was consistently low by between about 14% and 30%. An approximate mean correction of 22% was chosen and the values of  $C_p$  for orifice 48 were multiplied by 1.22 in the analysis program. Hence chordwise plottings show errors of up to about  $\pm 8\%$  at orifice No. 48. The integration for mean  $C_p$  of total chord results in negligible errors.

The malfunction of orifice No. 48 has not been subsequently investigated. Since a change in pressure (albeit deficient in magnitude) was recorded

for change in angle of attack, it is assumed that the tube was partially blocked or had a small leak.

#### 4.4 Pressure Plottings Program :

Because of the quantity involved the pressure plottings were produced by machine using a Calcomp 925/1036 plotting system. This entailed writing a short program in Fortran which called the relevant Calcomp subroutines. The analysed pressure coefficients to be plotted were read from prepared punched data cards. A listing of the program is given in APPENDIX A3.

Local chordwise centres of pressure  $C_{Pc}$  had not been included in the original pressure analysis program; these were later considered to be desirable, and a short program was therefore written (APPENDIX A4) which utilised the plotting program data cards. The results for local  $C_{Pc}$  at  $\beta = -0.25^\circ$  and  $\pm 5^\circ$ , for rudder plus skeg and rudder alone, for the eight span positions are given in APPENDIX A5.

## 5. PRESENTATION OF DATA

The notation of the angles used in the presentation is given in Fig. 5.

The results of the tests are tabulated in non-dimensional form in APPENDIX A2 and are presented graphically in Figs. 6 to 9. These plots show the pressure distributions to a base of the percentage chord from the leading edge for each rudder angle  $\alpha$  and the eight span positions. The values for  $\beta = \pm 5.0^\circ$  were plotted together with  $\beta = -0.25^\circ$ , which corresponds to the  $\beta$  value used in the force measurements. The plotting of the  $\beta = 0^\circ$  condition was omitted since it yielded results almost identical to those for  $\beta = -0.25^\circ$ .

## 6. DISCUSSION OF RESULTS

### 6.1 Pressure Distributions - General Comments :-

Figs. 6 to 9 present pressure distributions which are reasonably typical for all-movable sections (span positions S1 - S4) and flapped sections (span positions S5 - S8).

#### 6.1.1 All-Movable Portion - Span Positions S1 - S4

In Figs. 6(i), 7(i) and 8(i) at  $\alpha = 30^\circ$  it is seen that there is a local dip (increase) in pressure near the leading edge (approx. 5% aft of L.E.) on the L.P. side. Fig. 6(i) indicates a similar result without transition strip, hence the local pressure change would not appear to be due to the transition strip which is located in that area. It is therefore likely that some local flow separation is occurring near the leading edge at  $\alpha = 30^\circ$ , the flow re-attaching again aft of this.

At span position S1 and  $\alpha = 20^\circ$  and  $30^\circ$  there is a significant decrease in pressure aft of 50 - 60% from L.E., as shown in Fig. 6(i); the effect is more pronounced for  $\beta = \pm 5^\circ$ , Figs. 7(i) and 8(i). The tip of the rudder is square (with relatively sharp corners) and it is likely that a strong tip vortex is being formed on the L.P. side at these higher angles of attack; the tuft studies shown in Fig. 12 of Ref. 1 tend to substantiate this. (the occurrence of such a tip vortex has, for example, also been reported in Ref. 3) The vortex induces a strong cross flow velocity component leading to decreased pressure in this area, with a net increase in section lift coefficient. This increase in lift is apparent in the spanwise distribution, discussed later.

#### 6.1.2 Flapped Portion - Span Positions S5 - S8 :

For rudder angles  $\alpha$  up to about  $10^\circ$  pressure peaks, which are characteristic of flapped sections, exist at the hinge axis (approximately  $35^\circ$  aft of L.E.)

As discussed in Ref. 2, above about  $\delta = 15^\circ$  ( $\alpha = 14.75^\circ$  when  $\beta = -0.25^\circ$ ,  $\alpha = 10^\circ$  when  $\beta = -5^\circ$  (Fig. 7(f)),  $\alpha = 20^\circ$  when  $\beta = +5^\circ$  (Fig. 8(h)) flow through the gap tends to reduce or eliminate the pressure peaks on the L.P. side which existed at the hinge axis, and precipitate separation on the flap. Hence for  $\delta > 15^\circ$  (approx) it is seen in Figs. 6(h), 7(f) and 8(h) that the pressure on the upper (suction) side becomes nearly constant aft of the hinge indicating the region of separation aft of the skeg. These findings are in general agreement with Refs. 1 and 2 in which force and tuft studies indicated complete separation aft of the skeg by about  $\delta = 15^\circ$

Obvious errors exist in the data plotted in Figs. 6(j) and 7(j) where the 35% orifice on the H.P. side has entered the gap in the  $30^\circ$  case; these errors were carried through due to the automated nature of the analysis and plotting programs. Suitable corrections were made when evaluating the spanwise distributions, discussed later.

## 6.2 Transition Strip :

It is seen from Figs. 6(a) to 6(i) that the removal of the transition strips has a small effect on the pressure characteristics of the all-movable portion (span positions S1 - S4) for the rudder angles tested. The effect in way of the skeg (span positions S5 - S8) is also small except at  $\alpha = 9.75^\circ$  (Fig. 6(f)) where it is seen that the influence of removing the turbulence strips has been to delay the separation aft of the skeg. This is consistent with the findings of Refs. 1 and 2 where, without transition strips, a significant improvement in lift was obtained between  $\alpha = 10^\circ$  and  $20^\circ$  (approximately). As suggested in Ref. 1, extended laminar flow is likely without the use of roughness and, with the thin turbulent boundary layer which then develops downstream, separation is likely to be delayed.

### 6.3 Influence of Sealed Gaps :

Fig. 9 illustrates, for one characteristic span position S7, that with the vertical gap on the H.P. side sealed, separation is delayed in the region  $\alpha = 10^\circ$  to  $20^\circ$  with consequent increase in lift. This is in accordance with the force measurements and conclusions of Ref. 2, confirming that the gap flow from the high pressure side to the low pressure side (with gaps open) is a contributory cause in the development of separation aft of the skeg.

### 6.4 Skeg Forces :

In order to check the order of magnitude of the pressures on the skeg the lift coefficient (normal to the air flow) for the skeg alone ( $C_{L_S}$ ) was derived by resolving and integrating the pressures over the skeg. Whilst  $C_{L_S} = C_{N_S} \cos\beta + C_{A_S} \sin\beta$ , the correction  $C_{A_S} \sin\beta$  was omitted since  $C_{A_S}$  is very small and  $\beta$  values of up to only  $\pm 5^\circ$  are considered.

The values obtained are given in Fig. 10 where they are compared directly with the force measurements reproduced from Fig. 7 of Ref. 1.

It is seen that there is reasonable agreement between the pressure and direct force measurements, the lift coefficients from the pressure measurements being generally (except for  $\alpha = 10^\circ$ ) within 0.02 of the force measurement results. It was shown in Refs. 1 and 2 that the lift coefficient in the region of  $\alpha = 10^\circ$  is very sensitive to flow conditions, and the pressure results suggest that, for  $\beta = -0.25^\circ$  and  $-5.25^\circ$ , in this particular rudder angle range the precise flow conditions may not have been reproduced.

Taking into account the approximations involved in the integration of the pressures over the skeg and the small size of the coefficients involved, it is considered that the agreement between the pressure and force measurements is very satisfactory.

## 6.5 Total Normal Force and Centre of Pressure :

In order to provide a check on the overall magnitude and distribution of the pressures, the spanwise distributions of mean  $C_p$  for  $\beta = -0.25^\circ$  and  $\pm 5.0^\circ$  were integrated to yield the total normal force coefficient  $C_N$  and chordwise and spanwise centres of pressure,  $C_{Pc}$  and  $C_{Ps}$ , for each rudder angle.

### 6.5.1 Rudder Plus Skeg :

For span positions S5 to S8 the normal force coefficient for the whole chord comprised the normal coefficient on the movable portion together with the resolution of the normal and axial forces on the skeg.

$$\text{i.e. } C_{N(\text{skeg})} = C_{N_S} \cos \delta + C_{A_S} \sin \delta$$

$C_{A_S}$  values were typically between  $-0.05$  and  $+0.014$  depending on skeg and rudder angles, and span location. The absence (for practical reasons) of a pressure tapping at 1.25% from the L.E. precluded the accurate derivation of  $C_{A_S}$ ; however the correction due to  $C_{A_S}$  is relatively small, being up to about 1% of the overall  $C_N$ . Corrections were also made to the integrations of the data shown plotted in Figs. 6(j) and 7(j) where the 35% orifice on the H.P. side has entered the gap in the  $30^\circ$  case, resulting in erroneous readings which were used in both the analysis and plotting programs.

Since the chordwise plottings and integrations were all based on a chord length of unity, each span position was multiplied by a suitable factor (derived from Fig. 2) to take account of the taper of the rudder. The resulting values at each span position for each angle were plotted giving the spanwise distribution of loadings shown in Fig. 11.

The spanwise distributions of local chordwise centre of pressure  $C_{Pc}$  are given in Figs. 12a to c. The values plotted are based on a chord length of unity; for the purposes of deriving the total  $C_{Pc}$  (from L.E. of mean chord), each span position was corrected for taper ratio and L.E. sweep in the integration process.

Tunnel boundary corrections, as described in Ref. 1, were applied to the total values derived from the integration of the spanwise loadings although, in this case, the lift correction was assumed to similarly apply to the normal force. Hence the corrections used were :

$$C_{N_c} = 0.9956 C_{N_u}$$
$$\alpha_c = \alpha_u + 0.7710 C_{N_c},$$

where suffixes 'u' and 'c' indicate the uncorrected and corrected values respectively.

The values yielded from the integration of the spanwise loadings and centres of pressure are shown in Figs. 13a to c together with the direct force measurements obtained by dynamometer in the earlier experiments (Ref. 1).

Fig. 11 shows the spanwise loadings for  $\beta = -0.25, +5^\circ$  and  $-5^\circ$ . In general terms these loadings are as would be expected, with the changes in skeg angle having a marked influence on local lift in way of the skeg and at the same time having some effect on the all-movable portion. However, two features which deserve further attention are the high loadings maintained near the tip at large angles, and the undulating nature of the load distribution in the transition area between the skeg and all-movable parts. Since the rudder is of relatively small effective aspect ratio ( $AR_E \doteq 3$ ) and has a square tip shape, it is considered that the increased tip loading is due to the formation of a strong tip vortex, particularly at the higher angles of attack as discussed in SECTION 6.1.1.

The reasons for the undulations in the load distributions at span positions S5 and S6 are not altogether clear. It is possible that there is a small deficiency in the integrated load value at S5 since there were no pressure tappings at 35% and 40% from the L.E. and the 35% and 40% stations were assumed to have the same values as the 30% station, as explained in SECTION 4.2. The orifices at 35% and 40% from the L.E. for span position S6 are situated very close to the lower horizontal (pintle) gap and it is possible that local high flow velocities at the aft end of the skeg due to any small misalignment between skeg and rudder, and flow through the horizontal gap, could be contributing to the peaking of the pressures and hence local load which occurred for all skeg and rudder angles at position S6. Based on these comments, it is possible that the actual load distribution in way of the all-movable to skeg transition area is slightly less undulating than that derived in Fig. 11. The orders of magnitude of error being discussed are, however, unlikely to have a significant influence on the overall integration of the spanwise distributions for total force coefficients.



Also, it is possible that a particular local vortex is being generated at the break between the skeg and all-movable parts, although the earlier tuft studies do not give a clear indication of this. The change in load at the break together with flow leakage through the horizontal gap would lead to a vortex with rotation in an opposite sense to that of the tip vortex and result in undulations of the general form derived in the load distributions.

In Figs. 12a to c it is interesting to observe that the position and movement of CPC for the movable part (e.g. span positions S2 and S3) is similar to that for an all-movable rudder of  $AR_E = 3$  (Ref. 1, Fig. 4.), whilst CPC for the skeg or flapped part is similar to a 2-dimensional flapped foil with the same proportion of movable chord (Ref. 1, Fig. 11a). It can also be noted that CPC for the flapped part is reasonably constant across the whole of the flap at each angle. Nearly all the transition of CPC between the all-movable and skeg parts takes place over the adjacent 10% of the all-movable part. CPC is also displaced aft near the tip due to vortex and cross-flow effects.

Figs. 13a to c show the results of the integration of the spanwise loadings and CPC to derive total normal force coefficients, CPs and  $C\bar{P}$ . The pressure normal force results for all three skeg angles agree very well with the dynamometer force measurements up to about  $\alpha = 10^\circ$ ; for  $\alpha = 20^\circ$  and  $30^\circ$  the pressure results are up to about 5% low. The spanwise centres of pressure derived from the pressure measurements are about 4% low for  $\beta = -0.25$ , 2½% low for  $\beta = +5.0^\circ$  and about 3% low for  $\beta = -5.0^\circ$  (concerning the 7-8% error for  $5^\circ$  and  $10^\circ$  it should be noted that the CPs values from the force measurements for  $\beta = -5.0^\circ$  at low  $\alpha$  angles are irregular and unreliable, as mentioned in Ref. 1.) The differences between the  $C\bar{P}$  results from the pressure and dynamometer measurements are small.

The differences between the pressure and dynamometer normal force results at the higher angles are not readily accountable; the following possible reasons are however put forward. The dynamometer results are considered to be correct within  $\pm 1\%$ , and it is therefore likely that the errors are mostly within the pressure readings and their analysis. Pressure peaks could exist at high angles between the tappings near the leading edge of the all-movable part, and the integrations for Cp were necessarily approximate in this area (e.g. the 2.5% tapping was omitted in the analysis, leading to a small deficiency on the H.P. side

at  $20^\circ$  and  $30^\circ$ ); it is estimated that a deficiency of up to 2% in the local normal force could have occurred due to these reasons. Pressure peaks on the H.P. side near the hinge axis in way of the skeg could have been present at higher angles but not recorded, due to the limited number of tappings in this area; estimates suggest that, for this case also, a deficiency of up to 2% could have occurred. Hence a net deficiency in normal force of up to about 2% over the skeg and all-movable parts could have been due to the exclusion of some local pressure peaks. Similarly at the tip, the presence of strong vortex is likely to have led to higher suction peaks than those derived solely at span position S1. Tuft studies (Ref. 1) would suggest that span position S1 is approximately at the edge of the vortex, hence minimum pressures due to the vortex would lie approximately between S1 and the tip.

An intuitive example of this effect (based on pressure distributions for a swept wing with tip vortex, Ref. 3, and delta wings with a strong L.E. vortex, Ref. 4) is superimposed on Fig. 11. Pressure peaks of this order could lead to an increase in overall normal force of up to about 2% and a shift in CPs (towards tip) of about 1%. The above reasoning still leaves some deficiency in CPs, although this could be partly accounted for if, for example, the deficiencies in the measurement of the pressure peaks on the all-movable portion are greater than those in way of the skeg.

The overall accuracy of the pressure readings at the higher angles was considered and in particular the possibility of erroneous readings from the tunnel total and static pressures used to non-dimensionalise the pressure coefficients. Consideration had been given during testing to the extensive separation for  $\alpha > 10^\circ$  and the fact that the standard wall-mounted total and static pressure tubes used in the pressure analysis were close to the rudder whereas the Betz manometer Pitôt-static tube used for wind speed (and non-dimensionalising the dynamometer results) was further upstream. A specific test was run in which the rudder angle was increased up to  $30^\circ$  and the Betz manometer and separate total / static tubes for the analysis read at each angle. This demonstrated that up to  $30^\circ$  the Betz readings deviated by no more than 1%, the separate total reading deviated by up to 1% whilst the static reading showed insignificant changes. It is seen that these deviations are within the general order of experimental error.

### 6.5.2 Rudder Alone :

Figs. 13a - c also include the integrated results for  $C_N$  and  $C_{Pc}$  for the rudder alone (i.e. excluding skeg). These were derived from the results for the local  $C_p$  for movable rudder only (APPENDICES A2 and A5), and  $C_{Pc}$  for the movable part (APPENDIX A5). Spanwise distributions of load and  $C_{Pc}$  were prepared and integrated to give total  $C_N$  and  $C_{Pc}$ , in a similar manner to that described for rudder plus skeg in SECTION 6.5.1

Again, the correlation between  $C_N$  from the pressure and dynamometer measurements up to  $\alpha = 10^\circ$  is good; for  $\alpha = 20^\circ$  and  $30^\circ$  the deficiencies are of the same order of magnitude as for rudder plus skeg. This is to be expected since the results for skeg along (Fig. 10) indicate reasonable agreement between the two sets of measurements. The implication of this is that the deficiencies at  $\alpha = 20^\circ$  and  $30^\circ$  are on the movable part of the rudder, and this would be consistent with the discussion in SECTION 6.5.1.

$C_{Pc}$  from pressure measurements for the rudder alone correlates well with that derived by dynamometer up to  $\alpha = 10^\circ$ , whilst for  $\alpha = 20^\circ$  and  $30^\circ$  it is up to 2% aft of the dynamometer result. The possible deficiencies suggested in SECTION 6.5.1 would lead to some forward movement in  $C_{Pc}$ , the effect being proportionately greater for the rudder alone case (as is seen to be required from Fig. 13).

### 6.6 Gap Pressures :

The gap pressures for  $\beta = -0.25^\circ$  are plotted in Fig. 14. (The values at tapping No. 14 were obviously in error and were therefore not included).

The plottings in Fig. 14 have to be considered in conjunction with Fig. 3 which gives the locations of the tappings and from which it can be seen that the end of the gap is approximately at tapping No. 33 on the high pressure side and No. 20 on the low pressure side. The tappings in the gap are located at  $15^\circ$  intervals about the rudder stock axis. As rudder angle is increased tapping No. 33 moves into the gap whilst No. 20 emerges,

and this accounts for some of the peculiarities in the pressure readings near the entrance to and exit from the gap.

The pressure is seen to be reasonably constant in the gap (say between tapping Nos. 18 and 31) for rudder angles  $\alpha = -0.25^\circ$ ,  $4.75^\circ$ , and  $9.75^\circ$ ,  $C_p$  being approximately  $-0.30$ ,  $-0.35$  and  $-0.40$  at rudder angles of  $-0.25^\circ$ ,  $4.75^\circ$  and  $9.75^\circ$  respectively. Changes in pressure along the gap are more pronounced for rudder angles  $19.75^\circ$  and  $29.75^\circ$ . The pressure peaks maintained at the 35% chord station by span position S6 for larger angles (as discussed in SECTION 6.5) are also reflected in the gap pressures which are lower for S6 at  $19.75^\circ$  and  $29.75^\circ$ . As mentioned in SECTION 6.5.1, span station S6 is located close to the horizontal skeg gap and complex flows in this region are to be expected.

It should also be noted that any small errors in manufacture and alignment, and hence in gap size, will cause some variation in gap flow velocity and hence pressure.

The low pressures recorded at tapping No. 32 (which is located just inside the gap on the H.P. side) indicates the presence of gap flow, this tapping being situated approximately where the flow accelerates into the gap on the H.P. side. The results suggest the start of some gap flow at an angle as low as  $4.75^\circ$ .

Some cavitation erosion has occurred in the past on ship skeg-rudders in the skeg gap area, and Okada in his discussion to Ref. 5 raises this point. The data presented would suggest that, for the gap design tested (Figs. 1 and 3), the pressures obtained near the entrance to / exit from the gap were not low enough to promote cavitation in those areas, except for high speed vessels with speeds upwards of about 30 knots. The peaking of the low pressures at tapping No. 32 does however illustrate the vulnerability of the gap to cavitation. Finally it should be noted that the limited number of tappings used in that area (e.g. 60, 32, 33, 34 on the H.P. side, Fig. 3) restricts the depth of local study required for this particular problem.

## 7. CONCLUSIONS

The pressure measurements obtained provided confirmation of a number of characteristics of the skeg rudder which had been predicted by earlier dynamometer force measurements.

Above a rudder angle of about  $\delta = 15^\circ$  the pressure on the upper (suction) side became nearly constant aft of the skeg indicating separation in this region, as observed in earlier tuft studies.

Delayed separation aft of the skeg due to the removal of the transition strip, or preventing gap flow by sealing the vertical gap between the skeg and the rudder, was confirmed by the resulting modifications to the chordwise pressure distributions.

For the gap design tested, the results suggest that the pressures obtained near the entrance to / exit from the gap were not low enough to promote cavitation in these areas.

The spanwise distributions of load for three skeg angles showed that changes in skeg angle (for a particular rudder angle) have a marked influence on local lift in way of the skeg and at the same time have an effect on the all-movable portion of the rudder.

The chordwise and spanwise pressure distributions show a high tip loading, particularly at higher rudder angles of attack; the pressure results, together with the evidence from earlier tuft studies, indicate the development of a strong tip vortex as angle of attack is increased.

Total force coefficients, derived from the integration of the spanwise pressure loadings, are in close agreement with the dynamometer force measurements up to a rudder angle of about  $10^\circ$ ; at higher rudder angles of attack the force coefficients derived from the pressure measurements are about 5% lower than the dynamometer results.

The spanwise centre of pressure (CPs) derived from the integration of the pressure distributions was between 2% and 4% less than the dynamometer results, although a similar change in CPs with change in rudder angle was obtained.

The differences between the chordwise centres of pressure ( $C_{P\bar{c}}$ ) obtained from the pressure and dynamometer measurements were generally small.

It was concluded that the deficiencies in the pressure data were likely to have been due principally to practical constraints on the recording and analysis of the pressure peaks at the rudder tip, leading edge and hinge axis.

Taken overall, it is considered that the chordwise and spanwise pressure distributions obtained from the experiments provide a satisfactory account of the detailed load distribution over a skeg-rudder for various skeg and rudder angles.

## NOMENCLATURE

|                |   |
|----------------|---|
| $\bar{c}$      | Rudder mean chord   |
| $C_{N_s}$      | Skeg normal force coefficient, normal to skeg axis  |
| $C_{A_s}$      | Skeg axial force coefficient, along skeg axis   |
| $C_{L_s}$      | Skeg lift coefficient, normal to air flow   |
| $C_N$          | Total normal force coefficient, normal to rudder  |
| $C_p$          | Pressure coefficient, normal to rudder or skeg  |
| $CP_c$         | Local (or section) chordwise centre of pressure as a percentage of local chord from L.E. of local chord |
| $CP_{\bar{c}}$ | Total chordwise centre of pressure as a percentage of mean chord from L.E. of mean chord)               |
| $CP_s$         | Spanwise centre of pressure, measured from root   |
| $P_R$          | Static pressure at rudder orifice   |
| $P_T$          | Tunnel total pressure in the free stream  |
| $P_O$          | Tunnel static pressure in the free stream   |
| $R_n$          | Reynold's Number (Based on rudder mean chord)   |
| $V$            | Wind tunnel air speed   |
| $\alpha$       | Rudder angle relative to flow   |
| $\beta$        | Skeg angle relative to flow   |
| $\delta$       | Rudder angle relative to skeg.  |

## REFERENCES

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APPENDIX A1 - LISTING OF PRESSURE ANALYSIS PROGRAM

```

10 OPEN "DAFM.BAS" AS FILE #1
40 DIM S$(2)
42 DIM B$(5)
44 DIM N$(2)
50 DIM X(8)
60 DIM T$(3)
70 DIM R$(2)
80 DIM A(50,4)
90 DIM B(50,4)
100 DIM G$(21)
110 INPUT LINE #1, G$
120 T$=LEFT$(G$, 8)
130 R$=MID$(G$, 10, 2)
135 S$=MID$(G$, 13, 1)
140 S=VAL(S$)
145 B$=MID$(G$, 15, 4)
150 B=VAL(B$)
155 N$=RIGHT$(G$, 20)
160 N=VAL(N$)
164 PRINT
166 PRINT
168 PRINT
170 PRINT "RUDDER PRESSURE COEFFICIENTS"
175 PRINT
180 PRINT "RUDDER NUMBER="; N
190 PRINT "DATE OF TEST="; T$
200 PRINT "RUN NUMBER="; R$
210 PRINT
220 PRINT "SPAN POSITION="; S
230 PRINT
240 PRINT "SKEG ANGLE, BETA( DEG)="; B
250 PRINT
270 Y=0
280 Y=Y+1
290 Z=0
300 FOR I=0 TO N-1
310 DIM G$(63)
320 INPUT LINE #1, G$
330 H=0
340 FOR J=0 TO 4
344 DIM H$(10)
345 H$=MID$(G$, 4+J, 5)
350 H=VAL(H$)
354 DIM K$(12)
355 K$=MID$(G$, 11+J, 1)
360 K=VAL(K$)
370 A(I, J) = H+10*(K-5)
380 H=H+13
390 NEXT J
400 NEXT I
410 FOR J=0 TO 3
420 X(J) = 0
430 FOR I=1 TO ((INT(N/2))+2)-1 STEP 2
440 X(I, J) = X(J)+A(I, J)
450 NEXT I
460 X(J)=X(J)+2/((INT(N/2))+2)
470 NEXT J
480 IF Y=1 THEN D=0
490 IF Y=2 THEN D=5
500 IF Y=3 THEN D=10
510 IF Y=4 THEN D=20
520 IF Y=5 THEN D=30
530 IF B=-0.25 THEN D=D-0.25
540 PRINT
550 PRINT "RUDDER ANGLE, ALPHA( DEG)="; D
555 P$="## ##.### ## ##.### ## ##.### ## ##.###"
560 FOR I=0 TO 2 STEP 2
570 FOR J=0 TO 3
580 B(I, J) = (A(I, J)-A(4, J))/(X(J)-A(4, J))
590 B(I, J) = INT((1000*B(I, J))+0.5)/1000
600 NEXT J
610 PRINT USING P$; Z+1, B(I, 0), Z+2, B(I, 1), Z+3, B(I, 2), Z+4, B(I, 3)
620 Z=Z+4
630 NEXT I
640 FOR I=6 TO (INT((N-0.5)/2))+2 STEP 2
650 FOR J=0 TO 3
660 B(I, J) = (A(I, J)-A(4, J))/(X(J)-A(4, J))
670 B(I, J) = INT((1000*B(I, J))+0.5)/1000
680 NEXT J
692 IF I=24 THEN 696
694 GOTO 690
696 B(24, 3)=INT((1000+1.22*B(24, 3))+0.5)/1000
690 PRINT USING P$; Z+1, B(I, 0), Z+2, B(I, 1), Z+3, B(I, 2), Z+4, B(I, 3)
700 Z=Z+4
710 NEXT I
720 IF S>4 THEN 810
730 S1 = 1.5*(B(0, 3)-B(6, 1)+B(14, 2)-B(20, 3))
740 S2 = 2*(B(0, 2)-B(6, 0)+B(12, 1)-B(18, 3)+B(24, 2))
750 S3 = 2*(B(18, 3)+B(14, 0)-B(20, 1)+B(14, 3)-B(22, 0))
760 S4 = 4*(B(2, 0)-B(6, 2)+B(2, 2)-B(8, 0))
770 S5 = 4*(B(12, 3)-B(20, 0)+B(14, 1)-B(20, 2))
780 S6 = 0.1*(S1+S2+S3+S4+S5)/3
790 PRINT "TOTAL MEAN PRESSURE COEFFICIENT="; INT((1000+S6)+0.5)/1000
800 GOTO 930
810 S1 = 0.5*(B(26, 1)-B(30, 3))+2*(B(24, 0)-B(28, 2))
820 S2 = 2*(B(24, 2)-B(30, 0)+B(26, 0)-B(30, 2))
830 S3 = (B(24, 1)-B(28, 3)+B(24, 3)-B(30, 1))
840 S4 = 0.1*(S1+S2+S3)/3
845 IF S=5 THEN 892
850 S5 = 1.5*(B(12, 1)-B(18, 2))+2*(B(12, 0)-B(18, 1))
860 S6 = 2*(B(12, 3)-B(20, 0)+B(14, 1)-B(20, 2))
870 S7 = 4*(B(12, 2)-B(18, 3)+B(14, 0)-B(20, 1))
880 S8 = 4*(B(14, 2)-B(20, 3))+0.5*(B(26, 1)-B(30, 3))
890 GOTO 890
892 S5 = 5*(B(26, 1)-B(30, 3))+1.5*(B(14, 2)-B(20, 3))
893 S6 = 2*(B(12, 2)-B(18, 3)+B(14, 0)-B(20, 1))
894 S7 = 2*(B(14, 3)-B(22, 0))
895 S8 = 4*(B(12, 3)-B(20, 0)+B(14, 1)-B(20, 2))
899 S9 = 0.1*(S5+S6+S7+S8)/3
900 PRINT "MEAN PRESSURE COEFFICIENT(SKEG)="; INT((1000+S4)+0.5)/1000
910 PRINT "MEAN PRESSURE COEFFICIENT(RUDDER)="; INT((1000+S9)+0.5)/1000
930 IF Y=5 THEN 9999
940 GOTO 290
9900 CLOSE 1
9999 END

```

APPENDIX A2 - TABULATED TEST RESULTS

RUDDER PRESSURE COEFFICIENTS

RUDDER NUMBER=1  
DATE OF TEST =09/08/79  
RUN NUMBER =16

SPAN POSITION= 1

SKEG ANGLE, BETA(DEG)=-. 25

RUDDER ANGLE, ALPHA(DEG)=-. 25

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.943  | 2  | 0.028  | 3  | -0.301 | 4  | -0.687 |
| 5  | -0.504 | 6  | -0.424 | 7  | -0.331 | 8  | -0.271 |
| 9  | -0.490 | 10 | -0.537 | 11 | -0.498 | 12 | -0.413 |
| 13 | -0.372 | 14 | 0.049  | 15 | 1.524  | 16 | 0.020  |
| 17 | -0.249 | 18 | -0.259 | 19 | -0.230 | 20 | -0.236 |
| 21 | -0.042 | 22 | 0.041  | 23 | -0.272 | 24 | -0.194 |
| 25 | -0.147 | 26 | -0.079 | 27 | 0.023  | 28 | 0.105  |
| 29 | -0.172 | 30 | 0.027  | 31 | -0.147 | 32 | -0.272 |
| 33 | 0.035  | 34 | 0.021  | 35 | 0.043  | 36 | -0.271 |
| 37 | -0.192 | 38 | -0.162 | 39 | -0.092 | 40 | 0.019  |
| 41 | 0.092  | 42 | 0.987  | 43 | 0.019  | 44 | -0.209 |

TOTAL MEAN PRESSURE COEFFICIENT= .011

RUDDER ANGLE, ALPHA(DEG)= 4.75

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.859  | 2  | -0.166 | 3  | -0.715 | 4  | -1.015 |
| 5  | -0.661 | 6  | -0.515 | 7  | -0.395 | 8  | 0.199  |
| 9  | -0.116 | 10 | -0.302 | 11 | -0.378 | 12 | -0.343 |
| 13 | -0.342 | 14 | 0.042  | 15 | 1.537  | 16 | 0.035  |
| 17 | -0.255 | 18 | -0.374 | 19 | -0.301 | 20 | -0.309 |
| 21 | 0.039  | 22 | 0.042  | 23 | -0.326 | 24 | -0.242 |
| 25 | -0.194 | 26 | -0.112 | 27 | -0.015 | 28 | 0.071  |
| 29 | -0.174 | 30 | 0.017  | 31 | -0.113 | 32 | -0.173 |
| 33 | 0.042  | 34 | 0.035  | 35 | 0.047  | 36 | -0.255 |
| 37 | -0.197 | 38 | -0.176 | 39 | -0.109 | 40 | -0.014 |
| 41 | 0.064  | 42 | 0.975  | 43 | 0.040  | 44 | -0.409 |

TOTAL MEAN PRESSURE COEFFICIENT=-. 144

RUDDER ANGLE, ALPHA(DEG)= 9.75

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.554  | 2  | -0.463 | 3  | -1.186 | 4  | -1.352 |
| 5  | -0.821 | 6  | -0.622 | 7  | -0.486 | 8  | 0.566  |
| 9  | 0.216  | 10 | -0.055 | 11 | -0.248 | 12 | -0.265 |
| 13 | -0.278 | 14 | 0.035  | 15 | 1.558  | 16 | 0.028  |
| 17 | -0.423 | 18 | -0.450 | 19 | -0.362 | 20 | -0.329 |
| 21 | 0.031  | 22 | 0.023  | 23 | -0.411 | 24 | -0.320 |
| 25 | -0.272 | 26 | -0.197 | 27 | -0.110 | 28 | -0.014 |
| 29 | -0.188 | 30 | 0.007  | 31 | -0.107 | 32 | -0.021 |
| 33 | 0.028  | 34 | 0.022  | 35 | 0.030  | 36 | -0.238 |
| 37 | -0.190 | 38 | -0.194 | 39 | -0.142 | 40 | -0.066 |
| 41 | 0.005  | 42 | 0.946  | 43 | 0.035  | 44 | -0.601 |

TOTAL MEAN PRESSURE COEFFICIENT=-. 331

RUDDER ANGLE, ALPHA(DEG)= 19.75

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | -0.530 | 2  | -1.135 | 3  | -1.556 | 4  | -1.886 |
| 5  | -1.055 | 6  | -0.786 | 7  | -0.628 | 8  | 0.500  |
| 9  | 0.673  | 10 | 0.354  | 11 | 0.013  | 12 | -0.092 |
| 13 | -0.147 | 14 | 0.020  | 15 | 1.565  | 16 | 0.020  |
| 17 | -0.355 | 18 | -0.369 | 19 | -0.335 | 20 | -0.337 |
| 21 | 0.019  | 22 | 0.017  | 23 | -0.556 | 24 | -0.506 |
| 25 | -0.536 | 26 | -0.577 | 27 | -0.529 | 28 | -0.341 |
| 29 | -0.142 | 30 | 0.023  | 31 | -0.056 | 32 | 0.001  |
| 33 | 0.012  | 34 | 0.004  | 35 | 0.018  | 36 | -0.171 |
| 37 | -0.165 | 38 | -0.182 | 39 | -0.175 | 40 | -0.131 |
| 41 | -0.095 | 42 | 0.901  | 43 | 0.026  | 44 | -0.607 |

TOTAL MEAN PRESSURE COEFFICIENT=-. 701

RUDDER ANGLE, ALPHA(DEG)= 29.75

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | -2.113 | 2  | -1.661 | 3  | -1.554 | 4  | -1.731 |
| 5  | -0.957 | 6  | -0.877 | 7  | -0.849 | 8  | 0.793  |
| 9  | 0.858  | 10 | 0.649  | 11 | 0.259  | 12 | 0.129  |
| 13 | 0.023  | 14 | 0.016  | 15 | 1.563  | 16 | 0.003  |
| 17 | -0.417 | 18 | -0.452 | 19 | -0.414 | 20 | -0.413 |
| 21 | 0.010  | 22 | -0.002 | 23 | -0.892 | 24 | -0.935 |
| 25 | -1.043 | 26 | -1.043 | 27 | -0.958 | 28 | -0.715 |
| 29 | -0.147 | 30 | 0.017  | 31 | -0.035 | 32 | 0.033  |
| 33 | -0.002 | 34 | -0.015 | 35 | 0.012  | 36 | -0.042 |
| 37 | -0.070 | 38 | -0.128 | 39 | -0.177 | 40 | -0.241 |
| 41 | -0.330 | 42 | 0.884  | 43 | 0.017  | 44 | -0.199 |

TOTAL MEAN PRESSURE COEFFICIENT=-1.029

RUDDER PRESSURE COEFFICIENTS

RUDDER NUMBER=1  
DATE OF TEST =09/08/79  
RUN NUMBER =8

SPAN POSITION= 2

SKEG ANGLE, BETA(DEG)=-. 25

RUDDER ANGLE, ALPHA(DEG)=-. 25

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.972  | 2  | 0.011  | 3  | -0.362 | 4  | -0.702 |
| 5  | -0.551 | 6  | -0.517 | 7  | -0.383 | 8  | -0.344 |
| 9  | -0.525 | 10 | -0.750 | 11 | -0.537 | 12 | -0.462 |
| 13 | -0.386 | 14 | 0.046  | 15 | 1.052  | 16 | 0.068  |
| 17 | -0.250 | 18 | -0.258 | 19 | -0.224 | 20 | -0.226 |
| 21 | 0.059  | 22 | 0.059  | 23 | -0.323 | 24 | -0.217 |
| 25 | -0.139 | 26 | -0.056 | 27 | 0.052  | 28 | 0.127  |
| 29 | -0.175 | 30 | 0.024  | 31 | -0.095 | 32 | -0.270 |
| 33 | 0.063  | 34 | 0.006  | 35 | 0.055  | 36 | -0.317 |
| 37 | -0.221 | 38 | -0.169 | 39 | -0.060 | 40 | 0.052  |
| 41 | 0.121  | 42 | 0.990  | 43 | 0.046  | 44 | -0.211 |
| 45 | -0.451 | 46 | -0.711 | 47 | -0.718 | 48 | -0.537 |
| 49 | -0.514 | 50 | -0.519 | 51 | -0.135 | 52 | -0.224 |
| 53 | 0.046  | 54 | -0.417 | 55 | -0.528 | 56 | -0.744 |
| 57 | -0.647 | 58 | -0.548 | 59 | -0.315 | 60 | -0.541 |
| 61 | -0.295 | 62 | 0.046  | 63 | 0.046  | 64 | 0.040  |

TOTAL MEAN PRESSURE COEFFICIENT= .012

RUDDER ANGLE, ALPHA(DEG)= 4.75

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.859  | 2  | -0.242 | 3  | -0.939 | 4  | -1.138 |
| 5  | -0.751 | 6  | -0.643 | 7  | -0.460 | 8  | 0.207  |
| 9  | -0.105 | 10 | -0.445 | 11 | -0.378 | 12 | -0.361 |
| 13 | -0.326 | 14 | 0.039  | 15 | 1.058  | 16 | 0.061  |
| 17 | -0.358 | 18 | -0.366 | 19 | -0.290 | 20 | -0.298 |
| 21 | 0.043  | 22 | 0.049  | 23 | -0.372 | 24 | -0.251 |
| 25 | -0.159 | 26 | -0.061 | 27 | 0.061  | 28 | 0.133  |
| 29 | -0.169 | 30 | 0.014  | 31 | -0.079 | 32 | -0.106 |
| 33 | 0.055  | 34 | 0.077  | 35 | 0.042  | 36 | -0.288 |
| 37 | -0.214 | 38 | -0.182 | 39 | -0.098 | 40 | 0.005  |
| 41 | 0.062  | 42 | 0.976  | 43 | 0.038  | 44 | -0.411 |
| 45 | -0.685 | 46 | -0.962 | 47 | -0.923 | 48 | -0.699 |
| 49 | -0.646 | 50 | -0.648 | 51 | -0.201 | 52 | -0.026 |
| 53 | 0.040  | 54 | -0.189 | 55 | -0.709 | 56 | -0.505 |
| 57 | -0.445 | 58 | -0.378 | 59 | -0.350 | 60 | -0.373 |
| 61 | -0.227 | 62 | 0.039  | 63 | 0.038  | 64 | 0.038  |

TOTAL MEAN PRESSURE COEFFICIENT=-. 173

RUDDER ANGLE, ALPHA(DEG)= 9.75

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.510  | 2  | -0.574 | 3  | -1.397 | 4  | -1.466 |
| 5  | -0.927 | 6  | -0.751 | 7  | -0.535 | 8  | 0.610  |
| 9  | 0.259  | 10 | -0.130 | 11 | -0.221 | 12 | -0.251 |
| 13 | -0.254 | 14 | 0.033  | 15 | 1.072  | 16 | 0.051  |
| 17 | -0.413 | 18 | -0.430 | 19 | -0.338 | 20 | -0.345 |
| 21 | 0.023  | 22 | 0.038  | 23 | -0.429 | 24 | -0.300 |
| 25 | -0.201 | 26 | -0.101 | 27 | 0.028  | 28 | 0.102  |
| 29 | -0.174 | 30 | 0.003  | 31 | -0.064 | 32 | -0.079 |
| 33 | 0.046  | 34 | 0.071  | 35 | 0.017  | 36 | -0.250 |
| 37 | -0.197 | 38 | -0.189 | 39 | -0.124 | 40 | -0.042 |
| 41 | 0.001  | 42 | 0.949  | 43 | 0.031  | 44 | -0.589 |

TOTAL MEAN PRESSURE COEFFICIENT=-. 355

RUDDER ANGLE, ALPHA(DEG)= 19.75

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | -0.746 | 2  | -1.346 | 3  | -1.560 | 4  | -2.068 |
| 5  | -1.153 | 6  | -0.857 | 7  | -0.612 | 8  | 0.354  |
| 9  | 0.744  | 10 | 0.389  | 11 | 0.083  | 12 | -0.013 |
| 13 | -0.078 | 14 | 0.027  | 15 | 1.082  | 16 | 0.049  |
| 17 | -0.334 | 18 | -0.342 | 19 | -0.301 | 20 | -0.304 |
| 21 | 0.039  | 22 | 0.039  | 23 | -0.499 | 24 | -0.389 |
| 25 | -0.312 | 26 | -0.237 | 27 | -0.110 | 28 | -0.018 |
| 29 | -0.125 | 30 | 0.014  | 31 | -0.024 | 32 | 0.000  |
| 33 | 0.046  | 34 | 0.073  | 35 | 0.031  | 36 | -0.136 |
| 37 | -0.126 | 38 | -0.154 | 39 | -0.141 | 40 | -0.098 |
| 41 | -0.073 | 42 | 0.903  | 43 | 0.025  | 44 | -0.596 |

TOTAL MEAN PRESSURE COEFFICIENT=-. 648

RUDDER ANGLE, ALPHA(DEG)= 29.75

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | -2.494 | 2  | -2.038 | 3  | -1.568 | 4  | -2.225 |
| 5  | -0.961 | 6  | -0.951 | 7  | -0.896 | 8  | 0.795  |
| 9  | 0.921  | 10 | 0.732  | 11 | 0.268  | 12 | 0.248  |
| 13 | 0.134  | 14 | 0.019  | 15 | 1.083  | 16 | 0.044  |
| 17 | -0.395 | 18 | -0.413 | 19 | -0.364 | 20 | -0.365 |
| 21 | 0.025  | 22 | 0.034  | 23 | -0.829 | 24 | -0.769 |
| 25 | -0.715 | 26 | -0.651 | 27 | -0.549 | 28 | -0.456 |
| 29 | -0.132 | 30 | 0.007  | 31 | -0.048 | 32 | 0.009  |
| 33 | 0.034  | 34 | 0.064  | 35 | 0.017  | 36 | 0.035  |
| 37 | -0.007 | 38 | -0.004 | 39 | -0.140 | 40 | -0.206 |
| 41 | -0.285 | 42 | 0.893  | 43 | 0.013  | 44 | -0.186 |

TOTAL MEAN PRESSURE COEFFICIENT=-1.006

APPENDIX A2 (Cont.)

RUDDER PRESSURE COEFFICIENTS

RUDDER NUMBER=1  
DATE OF TEST =09/08/79  
RUN NUMBER =17

SPAN POSITION= 3

SKEG ANGLE, BETA( DEG)=-. 25

RUDDER ANGLE, ALPHA( DEG)=-. 25

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.990  | 2  | 0.027  | 3  | -0.448 | 4  | -0.741 |
| 5  | -0.566 | 6  | -0.529 | 7  | -0.423 | 8  | -0.324 |
| 9  | -0.585 | 10 | -0.720 | 11 | -0.539 | 12 | -0.462 |
| 13 | -0.449 | 14 | 0.050  | 15 | 1.517  | 16 | -0.041 |
| 17 | -0.259 | 18 | -0.267 | 19 | -0.244 | 20 | -0.252 |
| 21 | 0.009  | 22 | -0.006 | 23 | -0.381 | 24 | -0.225 |
| 25 | -0.145 | 26 | -0.047 | 27 | 0.070  | 28 | 0.144  |
| 29 | -0.176 | 30 | 0.027  | 31 | -0.146 | 32 | -0.277 |
| 33 | -0.021 | 34 | -0.099 | 35 | 0.041  | 36 | 0.357  |
| 37 | -0.244 | 38 | -0.162 | 39 | -0.066 | 40 | 0.057  |
| 41 | 0.142  | 42 | 0.988  | 43 | 0.049  | 44 | -0.208 |

TOTAL MEAN PRESSURE COEFFICIENT= .01

RUDDER ANGLE, ALPHA( DEG)= 4.75

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.875  | 2  | -0.205 | 3  | -0.985 | 4  | -1.136 |
| 5  | -0.786 | 6  | -0.679 | 7  | -0.521 | 8  | 0.250  |
| 9  | -0.140 | 10 | -0.382 | 11 | -0.369 | 12 | -0.336 |
| 13 | -0.368 | 14 | 0.041  | 15 | 1.540  | 16 | -0.049 |
| 17 | -0.359 | 18 | -0.376 | 19 | -0.311 | 20 | -0.318 |
| 21 | 0.012  | 22 | -0.004 | 23 | -0.426 | 24 | -0.262 |
| 25 | -0.161 | 26 | -0.043 | 27 | 0.088  | 28 | 0.155  |
| 29 | -0.181 | 30 | 0.014  | 31 | -0.125 | 32 | -0.150 |
| 33 | -0.038 | 34 | -0.117 | 35 | 0.022  | 36 | -0.311 |
| 37 | -0.224 | 38 | -0.166 | 39 | -0.095 | 40 | 0.003  |
| 41 | 0.086  | 42 | 0.974  | 43 | 0.041  | 44 | -0.401 |

TOTAL MEAN PRESSURE COEFFICIENT=-. 189

RUDDER ANGLE, ALPHA( DEG)= 9.75

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.492  | 2  | -0.552 | 3  | -1.530 | 4  | -1.509 |
| 5  | -0.971 | 6  | -0.786 | 7  | -0.599 | 8  | 0.668  |
| 9  | 0.253  | 10 | -0.063 | 11 | -0.188 | 12 | -0.204 |
| 13 | -0.257 | 14 | 0.033  | 15 | 1.551  | 16 | -0.051 |
| 17 | -0.421 | 18 | -0.448 | 19 | -0.362 | 20 | -0.370 |
| 21 | 0.004  | 22 | -0.012 | 23 | -0.482 | 24 | -0.307 |
| 25 | -0.192 | 26 | -0.064 | 27 | 0.067  | 28 | 0.119  |
| 29 | -0.184 | 30 | 0.007  | 31 | -0.103 | 32 | -0.080 |
| 33 | -0.031 | 34 | -0.110 | 35 | 0.025  | 36 | -0.249 |
| 37 | -0.191 | 38 | -0.157 | 39 | -0.116 | 40 | -0.046 |
| 41 | 0.019  | 42 | 0.942  | 43 | 0.034  | 44 | -0.603 |

TOTAL MEAN PRESSURE COEFFICIENT=-. 394

RUDDER ANGLE, ALPHA( DEG)= 19.75

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | -0.769 | 2  | -1.305 | 3  | -1.555 | 4  | -2.002 |
| 5  | -1.106 | 6  | -0.788 | 7  | -0.570 | 8  | 0.992  |
| 9  | 0.761  | 10 | 0.452  | 11 | 0.144  | 12 | 0.064  |
| 13 | -0.050 | 14 | 0.028  | 15 | 1.564  | 16 | -0.042 |
| 17 | -0.342 | 18 | -0.356 | 19 | -0.314 | 20 | -0.315 |
| 21 | 0.003  | 22 | -0.003 | 23 | -0.471 | 24 | -0.360 |
| 25 | -0.322 | 26 | -0.255 | 27 | -0.154 | 28 | -0.106 |
| 29 | -0.132 | 30 | 0.024  | 31 | -0.049 | 32 | 0.011  |
| 33 | -0.029 | 34 | -0.103 | 35 | 0.019  | 36 | -0.100 |
| 37 | -0.101 | 38 | -0.119 | 39 | -0.129 | 40 | -0.109 |
| 41 | 0.087  | 42 | 0.900  | 43 | 0.028  | 44 | -0.605 |

TOTAL MEAN PRESSURE COEFFICIENT=-. 664

RUDDER ANGLE, ALPHA( DEG)= 29.75

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | -2.294 | 2  | -1.831 | 3  | -1.559 | 4  | -1.442 |
| 5  | -1.016 | 6  | -1.107 | 7  | -0.915 | 8  | 0.004  |
| 9  | 0.933  | 10 | 0.007  | 11 | 0.444  | 12 | 0.344  |
| 13 | 0.196  | 14 | 0.020  | 15 | 1.559  | 16 | -0.053 |
| 17 | -0.403 | 18 | -0.432 | 19 | -0.370 | 20 | -0.372 |
| 21 | -0.005 | 22 | -0.013 | 23 | -0.725 | 24 | -0.601 |
| 25 | -0.655 | 26 | -0.642 | 27 | -0.599 | 28 | -0.549 |
| 29 | -0.138 | 30 | 0.019  | 31 | -0.007 | 32 | 0.043  |
| 33 | -0.025 | 34 | -0.105 | 35 | 0.007  | 36 | 0.096  |
| 37 | 0.026  | 38 | -0.038 | 39 | -0.124 | 40 | -0.220 |
| 41 | -0.322 | 42 | 0.894  | 43 | 0.019  | 44 | -0.203 |

TOTAL MEAN PRESSURE COEFFICIENT=-1. 012

RUDDER PRESSURE COEFFICIENTS

RUDDER NUMBER=1  
DATE OF TEST =10/08/79  
RUN NUMBER =25

SPAN POSITION= 4

SKEG ANGLE, BETA( DEG)=-. 25

RUDDER ANGLE, ALPHA( DEG)=-. 25

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 1.003  | 2  | 0.011  | 3  | -0.464 | 4  | -0.649 |
| 5  | -0.547 | 6  | -0.471 | 7  | -0.449 | 8  | -0.240 |
| 9  | -0.489 | 10 | -0.660 | 11 | -0.497 | 12 | -0.468 |
| 13 | -0.475 | 14 | 0.049  | 15 | 0.176  | 16 | 0.080  |
| 17 | -0.239 | 18 | -0.251 | 19 | -0.238 | 20 | -0.243 |
| 21 | 0.063  | 22 | 0.070  | 23 | -0.387 | 24 | -0.242 |
| 25 | -0.140 | 26 | -0.029 | 27 | 0.083  | 28 | 0.151  |
| 29 | -0.170 | 30 | 0.027  | 31 | -0.124 | 32 | -0.274 |
| 33 | 0.077  | 34 | 0.105  | 35 | 0.057  | 36 | -0.381 |
| 37 | -0.257 | 38 | -0.157 | 39 | -0.064 | 40 | 0.063  |
| 41 | 0.135  | 42 | 0.991  | 43 | 0.048  | 44 | -0.209 |

TOTAL MEAN PRESSURE COEFFICIENT= .008

RUDDER ANGLE, ALPHA( DEG)= 4.75

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.871  | 2  | -0.206 | 3  | -0.913 | 4  | -0.940 |
| 5  | -0.699 | 6  | -0.592 | 7  | -0.638 | 8  | 0.305  |
| 9  | -0.087 | 10 | -0.372 | 11 | -0.344 | 12 | -0.334 |
| 13 | -0.350 | 14 | 0.041  | 15 | 0.180  | 16 | 0.073  |
| 17 | -0.350 | 18 | -0.370 | 19 | -0.314 | 20 | -0.323 |
| 21 | 0.051  | 22 | 0.058  | 23 | -0.504 | 24 | -0.296 |
| 25 | -0.161 | 26 | -0.032 | 27 | 0.079  | 28 | 0.135  |
| 29 | -0.173 | 30 | 0.016  | 31 | -0.096 | 32 | -0.171 |
| 33 | 0.063  | 34 | 0.096  | 35 | 0.046  | 36 | -0.309 |
| 37 | -0.228 | 38 | -0.151 | 39 | -0.092 | 40 | 0.007  |
| 41 | 0.064  | 42 | 0.972  | 43 | 0.041  | 44 | -0.410 |

TOTAL MEAN PRESSURE COEFFICIENT=-. 193

RUDDER ANGLE, ALPHA( DEG)= 9.75

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.505  | 2  | -0.487 | 3  | -1.347 | 4  | -1.205 |
| 5  | -0.847 | 6  | -0.683 | 7  | -0.700 | 8  | 0.708  |
| 9  | 0.276  | 10 | -0.080 | 11 | -0.183 | 12 | -0.195 |
| 13 | -0.216 | 14 | 0.035  | 15 | 0.187  | 16 | 0.065  |
| 17 | -0.417 | 18 | -0.448 | 19 | -0.375 | 20 | -0.382 |
| 21 | 0.042  | 22 | 0.050  | 23 | -0.619 | 24 | -0.374 |
| 25 | -0.244 | 26 | -0.121 | 27 | -0.008 | 28 | 0.047  |
| 29 | -0.184 | 30 | 0.005  | 31 | -0.079 | 32 | -0.078 |
| 33 | 0.054  | 34 | 0.091  | 35 | 0.041  | 36 | -0.220 |
| 37 | -0.184 | 38 | -0.141 | 39 | -0.114 | 40 | -0.048 |
| 41 | -0.020 | 42 | 0.945  | 43 | 0.034  | 44 | -0.604 |

TOTAL MEAN PRESSURE COEFFICIENT=-. 403

RUDDER ANGLE, ALPHA( DEG)= 19.75

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | -0.439 | 2  | -0.956 | 3  | -1.535 | 4  | -1.397 |
| 5  | -0.805 | 6  | -0.467 | 7  | -0.408 | 8  | 1.025  |
| 9  | 0.771  | 10 | 0.440  | 11 | 0.142  | 12 | 0.076  |
| 13 | 0.032  | 14 | 0.029  | 15 | 0.194  | 16 | 0.066  |
| 17 | -0.340 | 18 | -0.353 | 19 | -0.315 | 20 | -0.320 |
| 21 | 0.037  | 22 | 0.047  | 23 | -0.506 | 24 | -0.477 |
| 25 | -0.484 | 26 | -0.482 | 27 | -0.472 | 28 | -0.451 |
| 29 | -0.127 | 30 | 0.024  | 31 | -0.028 | 32 | 0.015  |
| 33 | 0.058  | 34 | 0.095  | 35 | 0.035  | 36 | -0.050 |
| 37 | -0.090 | 38 | -0.114 | 39 | -0.179 | 40 | -0.229 |
| 41 | -0.307 | 42 | 0.902  | 43 | 0.027  | 44 | -0.601 |

TOTAL MEAN PRESSURE COEFFICIENT=-. 636

RUDDER ANGLE, ALPHA( DEG)= 29.75

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | -1.628 | 2  | -1.188 | 3  | -1.540 | 4  | -1.020 |
| 5  | -0.724 | 6  | -0.629 | 7  | -0.594 | 8  | 0.876  |
| 9  | 0.953  | 10 | 0.832  | 11 | 0.469  | 12 | 0.376  |
| 13 | 0.306  | 14 | 0.015  | 15 | 0.194  | 16 | 0.058  |
| 17 | -0.389 | 18 | -0.410 | 19 | -0.338 | 20 | -0.340 |
| 21 | 0.028  | 22 | 0.035  | 23 | -0.593 | 24 | -0.607 |
| 25 | -0.629 | 26 | -0.632 | 27 | -0.632 | 28 | -0.617 |
| 29 | -0.129 | 30 | 0.010  | 31 | -0.056 | 32 | 0.049  |
| 33 | 0.046  | 34 | 0.081  | 35 | 0.020  | 36 | 0.190  |
| 37 | 0.095  | 38 | 0.006  | 39 | -0.116 | 40 | -0.251 |
| 41 | -0.388 | 42 | 0.967  | 43 | 0.014  | 44 | -0.286 |

TOTAL MEAN PRESSURE COEFFICIENT=-. 696

RUDDER PRESSURE COEFFICIENTS

RUDDER PRESSURE COEFFICIENTS

RUDDER NUMBER=1
DATE OF TEST =10/08/79
RUN NUMBER =30

APPENDIX A2 (Cont.)

RUDDER NUMBER=1
DATE OF TEST =10/08/79
RUN NUMBER =38

SPAN POSITION= 5

SPAN POSITION= 6

SKEG ANGLE, BETA( DEG)=-. 25

SKEG ANGLE, BETA( DEG)=-. 25

RUDDER ANGLE, ALPHA( DEG)=-. 25

RUDDER ANGLE, ALPHA( DEG)=-. 25

Table with 4 columns of data for Rudder Angle Alpha = -25 degrees. Values range from 0.291 to -0.265.

Table with 4 columns of data for Rudder Angle Alpha = -25 degrees. Values range from 0.234 to -0.303.

MEAN PRESSURE COEFFICIENT(SKEG) = .084
MEAN PRESSURE COEFFICIENT(RUDDER) = .02

MEAN PRESSURE COEFFICIENT(SKEG) = .087
MEAN PRESSURE COEFFICIENT(RUDDER) = .027

RUDDER ANGLE, ALPHA( DEG) = 4. 75

RUDDER ANGLE, ALPHA( DEG) = 4. 75

Table with 4 columns of data for Rudder Angle Alpha = 4.75 degrees. Values range from 0.294 to -0.139.

Table with 4 columns of data for Rudder Angle Alpha = 4.75 degrees. Values range from 0.239 to -0.367.

MEAN PRESSURE COEFFICIENT(SKEG) = -.185
MEAN PRESSURE COEFFICIENT(RUDDER) = -.062

MEAN PRESSURE COEFFICIENT(SKEG) = -.081
MEAN PRESSURE COEFFICIENT(RUDDER) = -.111

RUDDER ANGLE, ALPHA( DEG) = 9. 75

RUDDER ANGLE, ALPHA( DEG) = 9. 75

Table with 4 columns of data for Rudder Angle Alpha = 9.75 degrees. Values range from 0.298 to -0.015.

Table with 4 columns of data for Rudder Angle Alpha = 9.75 degrees. Values range from 0.246 to -0.459.

MEAN PRESSURE COEFFICIENT(SKEG) = -.213
MEAN PRESSURE COEFFICIENT(RUDDER) = -.184

MEAN PRESSURE COEFFICIENT(SKEG) = -.156
MEAN PRESSURE COEFFICIENT(RUDDER) = -.245

RUDDER ANGLE, ALPHA( DEG) = 19. 75

RUDDER ANGLE, ALPHA( DEG) = 19. 75

Table with 4 columns of data for Rudder Angle Alpha = 19.75 degrees. Values range from 0.292 to -0.173.

Table with 4 columns of data for Rudder Angle Alpha = 19.75 degrees. Values range from 0.249 to -0.395.

MEAN PRESSURE COEFFICIENT(SKEG) = -.302
MEAN PRESSURE COEFFICIENT(RUDDER) = -.295

MEAN PRESSURE COEFFICIENT(SKEG) = -.237
MEAN PRESSURE COEFFICIENT(RUDDER) = -.369

RUDDER ANGLE, ALPHA( DEG) = 29. 75

RUDDER ANGLE, ALPHA( DEG) = 29. 75

Table with 4 columns of data for Rudder Angle Alpha = 29.75 degrees. Values range from 0.304 to -0.109.

Table with 4 columns of data for Rudder Angle Alpha = 29.75 degrees. Values range from 0.251 to -0.396.

MEAN PRESSURE COEFFICIENT(SKEG) = -.326
MEAN PRESSURE COEFFICIENT(RUDDER) = -.495

MEAN PRESSURE COEFFICIENT(SKEG) = -.301
MEAN PRESSURE COEFFICIENT(RUDDER) = -.551

RUDDER PRESSURE COEFFICIENTS

APPENDIX A2 (Cont.)

RUDDER NUMBER=1  
DATE OF TEST =14/08/79  
RUN NUMBER =44

SPAN POSITION= 7

SKEG ANGLE, BETA( DEG )= - . 25

RUDDER ANGLE, ALPHA( DEG )= - . 25

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 1.487  | 2  | 0.054  | 3  | -0.205 | 4  | 0.552  |
| 5  | 1.331  | 6  | 0.327  | 7  | 1.465  | 8  | 0.647  |
| 9  | -0.192 | 10 | -0.178 | 11 | 0.051  | 12 | 0.049  |
| 13 | -0.085 | 14 | -0.158 | 15 | 1.511  | 16 | -0.291 |
| 17 | -0.294 | 18 | -0.310 | 19 | -0.317 | 20 | -0.385 |
| 21 | -0.475 | 22 | -0.437 | 23 | -0.549 | 24 | -0.229 |
| 25 | -0.116 | 26 | -0.018 | 27 | 0.095  | 28 | 0.157  |
| 29 | -0.266 | 30 | -0.265 | 31 | -0.264 | 32 | -0.261 |
| 33 | -0.419 | 34 | -0.503 | 35 | -0.454 | 36 | -0.347 |
| 37 | -0.243 | 38 | -0.150 | 39 | -0.050 | 40 | 0.054  |
| 41 | 0.126  | 42 | 0.994  | 43 | 0.051  | 44 | -0.209 |
| 45 | -0.464 | 46 | -0.658 | 47 | -0.624 | 48 | -0.532 |
| 49 | -0.521 | 50 | -0.496 | 51 | -0.290 | 52 | -0.277 |
| 53 | 0.052  | 54 | -0.168 | 55 | -0.491 | 56 | -0.720 |
| 57 | -0.583 | 58 | -0.496 | 59 | -0.501 | 60 | -0.470 |
| 61 | -0.266 | 62 | 0.048  | 63 | 0.051  | 64 | 0.049  |

MEAN PRESSURE COEFFICIENT(SKEG) = - . 002  
MEAN PRESSURE COEFFICIENT(RUDDER) = . 015

RUDDER ANGLE, ALPHA( DEG )= 4. 75

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 1.510  | 2  | 0.046  | 3  | -0.237 | 4  | 0.554  |
| 5  | 1.355  | 6  | 0.337  | 7  | 1.489  | 8  | 0.656  |
| 9  | -0.192 | 10 | -0.191 | 11 | 0.044  | 12 | 0.042  |
| 13 | -0.139 | 14 | -0.233 | 15 | 1.529  | 16 | -0.372 |
| 17 | -0.352 | 18 | -0.417 | 19 | -0.454 | 20 | -0.855 |
| 21 | -0.805 | 22 | -0.670 | 23 | -0.449 | 24 | -0.262 |
| 25 | -0.110 | 26 | -0.004 | 27 | 0.069  | 28 | 0.095  |
| 29 | -0.384 | 30 | -0.375 | 31 | -0.456 | 32 | -0.928 |
| 33 | 0.246  | 34 | -0.162 | 35 | -0.207 | 36 | -0.236 |
| 37 | -0.197 | 38 | -0.143 | 39 | -0.083 | 40 | -0.037 |
| 41 | 0.002  | 42 | 0.980  | 43 | 0.043  | 44 | -0.385 |
| 45 | -0.644 | 46 | -0.824 | 47 | -0.783 | 48 | -0.656 |
| 49 | -0.675 | 50 | -0.638 | 51 | -0.357 | 52 | -0.384 |
| 53 | 0.040  | 54 | 0.005  | 55 | -0.333 | 56 | -0.565 |
| 57 | -0.448 | 58 | -0.367 | 59 | -0.370 | 60 | -0.361 |
| 61 | -0.367 | 62 | 0.041  | 63 | 0.043  | 64 | 0.042  |

MEAN PRESSURE COEFFICIENT(SKEG) = - . 087  
MEAN PRESSURE COEFFICIENT(RUDDER) = - . 079

RUDDER ANGLE, ALPHA( DEG )= 9. 75

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 1.537  | 2  | 0.037  | 3  | -0.277 | 4  | 0.563  |
| 5  | 1.358  | 6  | 0.327  | 7  | 1.488  | 8  | 0.648  |
| 9  | -0.204 | 10 | -0.219 | 11 | 0.040  | 12 | 0.042  |
| 13 | -0.153 | 14 | -0.265 | 15 | 1.541  | 16 | -0.760 |
| 17 | -0.378 | 18 | -0.502 | 19 | -0.676 | 20 | -1.063 |
| 21 | -0.809 | 22 | -0.591 | 23 | -0.353 | 24 | -0.329 |
| 25 | -0.314 | 26 | -0.234 | 27 | -0.120 | 28 | -0.077 |
| 29 | -0.445 | 30 | -0.451 | 31 | -0.574 | 32 | -1.067 |
| 33 | 0.692  | 34 | 0.164  | 35 | 0.016  | 36 | -0.126 |
| 37 | -0.135 | 38 | -0.125 | 39 | -0.101 | 40 | -0.105 |
| 41 | -0.097 | 42 | 0.958  | 43 | 0.035  | 44 | -0.543 |
| 45 | -0.787 | 46 | -0.952 | 47 | -0.886 | 48 | -0.784 |
| 49 | -0.754 | 50 | -0.702 | 51 | -0.372 | 52 | -0.439 |
| 53 | 0.035  | 54 | 0.149  | 55 | -0.187 | 56 | -0.414 |
| 57 | -0.310 | 58 | -0.233 | 59 | -0.220 | 60 | -0.214 |
| 61 | -0.458 | 62 | 0.033  | 63 | 0.035  | 64 | 0.035  |

MEAN PRESSURE COEFFICIENT(SKEG) = - . 158  
MEAN PRESSURE COEFFICIENT(RUDDER) = - . 183

RUDDER ANGLE, ALPHA( DEG )= 19. 75

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 1.546  | 2  | 0.031  | 3  | -0.297 | 4  | 0.557  |
| 5  | 1.386  | 6  | 0.344  | 7  | 1.522  | 8  | 0.668  |
| 9  | -0.171 | 10 | -0.180 | 11 | 0.026  | 12 | 0.024  |
| 13 | -0.173 | 14 | -0.133 | 15 | 1.557  | 16 | -0.178 |
| 17 | -0.213 | 18 | -0.276 | 19 | -0.614 | 20 | -0.446 |
| 21 | -0.339 | 22 | -0.334 | 23 | -0.354 | 24 | -0.391 |
| 25 | -0.417 | 26 | -0.425 | 27 | -0.416 | 28 | -0.392 |
| 29 | -0.304 | 30 | -0.361 | 31 | -0.533 | 32 | -0.774 |
| 33 | -0.516 | 34 | 0.795  | 35 | 0.435  | 36 | 0.082  |
| 37 | -0.026 | 38 | -0.096 | 39 | -0.157 | 40 | -0.268 |
| 41 | -0.335 | 42 | 0.915  | 43 | 0.028  | 44 | -0.642 |
| 45 | -0.838 | 46 | -0.950 | 47 | -0.851 | 48 | -0.708 |
| 49 | -0.627 | 50 | -0.486 | 51 | -0.193 | 52 | -0.296 |
| 53 | 0.028  | 54 | 0.329  | 55 | 0.016  | 56 | -0.189 |
| 57 | -0.093 | 58 | -0.003 | 59 | 0.043  | 60 | 0.106  |
| 61 | -0.439 | 62 | 0.028  | 63 | 0.027  | 64 | 0.026  |

MEAN PRESSURE COEFFICIENT(SKEG) = - . 211  
MEAN PRESSURE COEFFICIENT(RUDDER) = - . 287

RUDDER ANGLE, ALPHA( DEG )= 29. 75

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 1.530  | 2  | 0.022  | 3  | -0.296 | 4  | 0.526  |
| 5  | 1.369  | 6  | 0.326  | 7  | 1.509  | 8  | 0.648  |
| 9  | -0.145 | 10 | -0.158 | 11 | 0.013  | 12 | 0.011  |
| 13 | -0.145 | 14 | -0.149 | 15 | 1.564  | 16 | -0.237 |
| 17 | -0.309 | 18 | -0.369 | 19 | -0.620 | 20 | -0.438 |
| 21 | -0.422 | 22 | -0.425 | 23 | -0.466 | 24 | -0.506 |
| 25 | -0.520 | 26 | -0.523 | 27 | -0.513 | 28 | -0.483 |
| 29 | -0.347 | 30 | -0.525 | 31 | -1.006 | 32 | -1.098 |
| 33 | -0.470 | 34 | -0.001 | 35 | 0.832  | 36 | 0.335  |
| 37 | 0.163  | 38 | 0.028  | 39 | -0.070 | 40 | -0.239 |
| 41 | -0.350 | 42 | 0.844  | 43 | 0.017  | 44 | -0.761 |
| 45 | -0.941 | 46 | -1.025 | 47 | -0.914 | 48 | -0.764 |
| 49 | -0.667 | 50 | -0.509 | 51 | -0.248 | 52 | -0.485 |
| 53 | 0.021  | 54 | 0.516  | 55 | 0.225  | 56 | 0.054  |
| 57 | 0.143  | 58 | 0.236  | 59 | 0.309  | 60 | 0.409  |
| 61 | -0.793 | 62 | 0.017  | 63 | 0.020  | 64 | 0.010  |

MEAN PRESSURE COEFFICIENT(SKEG) = - . 299  
MEAN PRESSURE COEFFICIENT(RUDDER) = - . 399

RUDDER PRESSURE COEFFICIENTS

RUDDER NUMBER=1  
DATE OF TEST =14/08/79  
RUN NUMBER =50

SPAN POSITION= 8

SKEG ANGLE, BETA( DEG )= - . 25

RUDDER ANGLE, ALPHA( DEG )= - . 25

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 1.264  | 2  | 0.053  | 3  | -0.219 | 4  | 0.217  |
| 5  | 1.182  | 6  | 0.117  | 7  | 1.271  | 8  | 0.334  |
| 9  | -0.204 | 10 | -0.191 | 11 | 0.048  | 12 | 0.045  |
| 13 | -0.046 | 14 | -0.144 | 15 | 1.514  | 16 | -0.249 |
| 17 | -0.243 | 18 | -0.244 | 19 | -0.258 | 20 | -0.295 |
| 21 | -0.432 | 22 | -0.415 | 23 | -0.325 | 24 | -0.243 |
| 25 | -0.118 | 26 | -0.027 | 27 | 0.062  | 28 | 0.124  |
| 29 | -0.248 | 30 | -0.242 | 31 | -0.250 | 32 | -0.289 |
| 33 | -0.141 | 34 | -0.544 | 35 | -0.445 | 36 | -0.326 |
| 37 | -0.235 | 38 | -0.131 | 39 | -0.043 | 40 | 0.028  |
| 41 | 0.086  | 42 | 0.985  | 43 | 0.049  | 44 | -0.189 |
| 45 | -0.412 | 46 | -0.553 | 47 | -0.479 | 48 | -0.470 |
| 49 | -0.396 | 50 | -0.420 | 51 | -0.247 | 52 | -0.251 |
| 53 | 0.050  | 54 | -0.022 | 55 | -0.356 | 56 | -0.613 |
| 57 | -0.424 | 58 | -0.416 | 59 | -0.440 | 60 | -0.515 |
| 61 | -0.246 | 62 | 0.047  | 63 | 0.046  | 64 | 0.047  |

MEAN PRESSURE COEFFICIENT(SKEG) = - . 003  
MEAN PRESSURE COEFFICIENT(RUDDER) = . 016

RUDDER ANGLE, ALPHA( DEG )= 4. 75

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 1.282  | 2  | 0.045  | 3  | -0.250 | 4  | 0.218  |
| 5  | 1.188  | 6  | 0.116  | 7  | 1.285  | 8  | 0.337  |
| 9  | -0.189 | 10 | -0.189 | 11 | 0.040  | 12 | 0.035  |
| 13 | -0.105 | 14 | -0.228 | 15 | 1.523  | 16 | -0.349 |
| 17 | -0.331 | 18 | -0.350 | 19 | -0.386 | 20 | -0.661 |
| 21 | -0.735 | 22 | -0.624 | 23 | -0.433 | 24 | -0.296 |
| 25 | -0.132 | 26 | -0.025 | 27 | 0.063  | 28 | 0.102  |
| 29 | -0.344 | 30 | -0.289 | 31 | -0.323 | 32 | -0.586 |
| 33 | 0.416  | 34 | -0.205 | 35 | -0.229 | 36 | -0.326 |
| 37 | -0.182 | 38 | -0.126 | 39 | -0.063 | 40 | -0.009 |
| 41 | 0.012  | 42 | 0.980  | 43 | 0.042  | 44 | -0.351 |
| 45 | -0.573 | 46 | -0.701 | 47 | -0.614 | 48 | -0.605 |
| 49 | -0.529 | 50 | -0.568 | 51 | -0.329 | 52 | -0.361 |
| 53 | 0.045  | 54 | 0.096  | 55 | -0.233 | 56 | -0.486 |
| 57 | -0.317 | 58 | -0.304 | 59 | -0.307 | 60 | -0.362 |
| 61 | -0.293 | 62 | 0.040  | 63 | 0.041  | 64 | 0.041  |

MEAN PRESSURE COEFFICIENT(SKEG) = - . 078  
MEAN PRESSURE COEFFICIENT(RUDDER) = - . 082

RUDDER ANGLE, ALPHA( DEG )= 9. 75

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 1.297  | 2  | 0.039  | 3  | -0.277 | 4  | 0.226  |
| 5  | 1.200  | 6  | 0.121  | 7  | 1.305  | 8  | 0.342  |
| 9  | -0.197 | 10 | -0.206 | 11 | 0.034  | 12 | 0.034  |
| 13 | -0.154 | 14 | -0.257 | 15 | 1.554  | 16 | -0.358 |
| 17 | -0.345 | 18 | -0.421 | 19 | -0.523 | 20 | -0.950 |
| 21 | -0.843 | 22 | -0.637 | 23 | -0.356 | 24 | -0.318 |
| 25 | -0.265 | 26 | -0.174 | 27 | -0.074 | 28 | -0.035 |
| 29 | -0.390 | 30 | -0.321 | 31 | -0.303 | 32 | -0.382 |
| 33 | 0.323  | 34 | 0.164  | 35 | 0.009  | 36 | -0.110 |
| 37 | -0.125 | 38 | -0.109 | 39 | -0.090 | 40 | -0.085 |
| 41 | -0.113 | 42 | 0.960  | 43 | 0.035  | 44 | -0.493 |
| 45 | -0.715 | 46 | -0.822 | 47 | -0.709 | 48 | -0.693 |
| 49 | -0.682 | 50 | -0.636 | 51 | -0.339 | 52 | -0.396 |
| 53 | 0.030  | 54 | 0.221  | 55 | -0.117 | 56 | -0.366 |
| 57 | -0.216 | 58 | -0.192 | 59 | -0.174 | 60 | -0.180 |
| 61 | -0.325 | 62 | 0.033  | 63 | 0.032  | 64 | 0.032  |

MEAN PRESSURE COEFFICIENT(SKEG) = - . 141  
MEAN PRESSURE COEFFICIENT(RUDDER) = - . 18

RUDDER ANGLE, ALPHA( DEG )= 19. 75

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 1.297  | 2  | 0.029  | 3  | -0.292 | 4  | 0.213  |
| 5  | 1.207  | 6  | 0.110  | 7  | 1.302  | 8  | 0.332  |
| 9  | -0.141 | 10 | -0.143 | 11 | 0.022  | 12 | -0.020 |
| 13 | -0.162 | 14 | -0.166 | 15 | 1.559  | 16 | -0.239 |
| 17 | -0.244 | 18 | -0.273 | 19 | -0.553 | 20 | -0.527 |
| 21 | -0.353 | 22 | -0.341 | 23 | -0.347 | 24 | -0.376 |
| 25 | -0.382 | 26 | -0.360 | 27 | -0.330 | 28 | -0.304 |
| 29 | -0.349 | 30 | -0.277 | 31 | -0.238 | 32 | -0.323 |
| 33 | -0.380 | 34 | 0.715  | 35 | 0.438  | 36 | 0.091  |
| 37 | -0.019 | 38 | -0.078 | 39 | -0.135 | 40 | -0.221 |
| 41 | -0.325 | 42 | 0.927  | 43 | 0.026  | 44 | -0.569 |
| 45 | -0.752 | 46 | -0.812 | 47 | -0.677 | 48 | -0.636 |
| 49 | -0.508 | 50 | -0.452 | 51 | -0.208 | 52 | -0.298 |
| 53 | 0.025  | 54 | 0.366  | 55 | 0.054  | 56 | -0.165 |
| 57 | -0.039 | 58 | -0.001 | 59 | 0.053  | 60 | 0.137  |
| 61 | -0.255 | 62 | 0.027  | 63 | 0.024  | 64 | 0.023  |

MEAN PRESSURE COEFFICIENT(SKEG) = - . 186  
MEAN PRESSURE COEFFICIENT(RUDDER) = - . 2

APPENDIX A2 (Cont.)

RUDDER PRESSURE COEFFICIENTS

RUDDER NUMBER=1  
DATE OF TEST =09/08/79  
RUN NUMBER =13

SPAN POSITION= 1

SKGK ANGLE, BETA( DEG )=-. 25 WITHOUT TRANSITION STRIP

RUDDER ANGLE, ALPHA( DEG )=-. 25

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.950  | 2  | 0.024  | 3  | -0.379 | 4  | -0.722 |
| 5  | -0.529 | 6  | -0.439 | 7  | -0.323 | 8  | -0.280 |
| 9  | -0.563 | 10 | -0.609 | 11 | -0.498 | 12 | -0.434 |
| 13 | -0.387 | 14 | 0.048  | 15 | 1.512  | 16 | 0.080  |
| 17 | -0.242 | 18 | -0.258 | 19 | -0.223 | 20 | -0.227 |
| 21 | 0.054  | 22 | 0.054  | 23 | -0.268 | 24 | -0.191 |
| 25 | -0.154 | 26 | -0.079 | 27 | 0.024  | 28 | 0.112  |
| 29 | -0.177 | 30 | 0.028  | 31 | -0.136 | 32 | -0.268 |
| 33 | 0.066  | 34 | 0.101  | 35 | 0.052  | 36 | -0.270 |
| 37 | -0.197 | 38 | -0.168 | 39 | -0.084 | 40 | 0.016  |
| 41 | 0.093  | 42 | 0.991  | 43 | 0.048  | 44 | -0.219 |

TOTAL MEAN PRESSURE COEFFICIENT= .015

RUDDER ANGLE, ALPHA( DEG )= 4. 75

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.861  | 2  | -0.181 | 3  | -0.820 | 4  | -1.071 |
| 5  | -0.683 | 6  | -0.520 | 7  | -0.397 | 8  | 0.280  |
| 9  | -0.162 | 10 | -0.342 | 11 | -0.377 | 12 | -0.341 |
| 13 | -0.310 | 14 | 0.041  | 15 | 1.534  | 16 | 0.083  |
| 17 | -0.333 | 18 | -0.362 | 19 | -0.294 | 20 | -0.300 |
| 21 | 0.060  | 22 | 0.070  | 23 | -0.328 | 24 | -0.241 |
| 25 | -0.192 | 26 | -0.112 | 27 | -0.010 | 28 | 0.081  |
| 29 | -0.167 | 30 | 0.020  | 31 | -0.096 | 32 | -0.107 |
| 33 | 0.074  | 34 | 0.107  | 35 | 0.047  | 36 | -0.257 |
| 37 | -0.190 | 38 | -0.177 | 39 | -0.109 | 40 | -0.019 |
| 41 | 0.062  | 42 | 0.973  | 43 | 0.039  | 44 | -0.433 |

TOTAL MEAN PRESSURE COEFFICIENT=-. 156

RUDDER ANGLE, ALPHA( DEG )= 9. 75

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.531  | 2  | -0.496 | 3  | -1.327 | 4  | -1.451 |
| 5  | -0.830 | 6  | -0.636 | 7  | -0.494 | 8  | 0.573  |
| 9  | 0.193  | 10 | -0.077 | 11 | -0.242 | 12 | -0.260 |
| 13 | -0.256 | 14 | 0.032  | 15 | 1.556  | 16 | 0.055  |
| 17 | -0.462 | 18 | -0.500 | 19 | -0.389 | 20 | -0.398 |
| 21 | 0.028  | 22 | 0.036  | 23 | -0.418 | 24 | -0.327 |
| 25 | -0.280 | 26 | -0.203 | 27 | -0.109 | 28 | 0.000  |
| 29 | -0.198 | 30 | 0.007  | 31 | -0.100 | 32 | -0.081 |
| 33 | 0.045  | 34 | 0.076  | 35 | 0.028  | 36 | -0.240 |
| 37 | -0.196 | 38 | -0.186 | 39 | -0.153 | 40 | -0.072 |
| 41 | -0.004 | 42 | 0.936  | 43 | 0.033  | 44 | -0.676 |

TOTAL MEAN PRESSURE COEFFICIENT=-. 349

RUDDER ANGLE, ALPHA( DEG )= 19. 75

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | -0.721 | 2  | -1.262 | 3  | -1.573 | 4  | -2.182 |
| 5  | -1.120 | 6  | -0.855 | 7  | -0.701 | 8  | 0.908  |
| 9  | 0.684  | 10 | 0.367  | 11 | 0.026  | 12 | -0.071 |
| 13 | -0.138 | 14 | 0.019  | 15 | 1.587  | 16 | 0.047  |
| 17 | -0.603 | 18 | -0.653 | 19 | -0.534 | 20 | -0.543 |
| 21 | 0.025  | 22 | 0.031  | 23 | -0.633 | 24 | -0.577 |
| 25 | -0.614 | 26 | -0.684 | 27 | -0.652 | 28 | -0.443 |
| 29 | -0.238 | 30 | 0.005  | 31 | -0.096 | 32 | -0.030 |
| 33 | 0.037  | 34 | 0.067  | 35 | 0.025  | 36 | -0.169 |
| 37 | -0.163 | 38 | -0.185 | 39 | -0.180 | 40 | -0.140 |
| 41 | -0.108 | 42 | 0.849  | 43 | 0.017  | 44 | -0.812 |

TOTAL MEAN PRESSURE COEFFICIENT=-. 784

RUDDER ANGLE, ALPHA( DEG )= 29. 75

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | -2.216 | 2  | -1.840 | 3  | -1.559 | 4  | -2.160 |
| 5  | -0.393 | 6  | -0.705 | 7  | -0.672 | 8  | 0.785  |
| 9  | 0.856  | 10 | 0.649  | 11 | 0.261  | 12 | 0.127  |
| 13 | 0.020  | 14 | 0.019  | 15 | 1.571  | 16 | 0.040  |
| 17 | -0.381 | 18 | -0.428 | 19 | -0.402 | 20 | -0.400 |
| 21 | 0.023  | 22 | 0.032  | 23 | -0.760 | 24 | -0.916 |
| 25 | -1.067 | 26 | -1.053 | 27 | -0.679 | 28 | -0.723 |
| 29 | -0.133 | 30 | 0.012  | 31 | -0.078 | 32 | 0.025  |
| 33 | 0.030  | 34 | 0.063  | 35 | 0.017  | 36 | -0.047 |
| 37 | -0.076 | 38 | -0.132 | 39 | -0.104 | 40 | -0.243 |
| 41 | -0.328 | 42 | 0.882  | 43 | 0.016  | 44 | -0.202 |

TOTAL MEAN PRESSURE COEFFICIENT=-1.012

RUDDER PRESSURE COEFFICIENTS

RUDDER NUMBER=1  
DATE OF TEST =08/08/79  
RUN NUMBER =09

SPAN POSITION= 2

SKGK ANGLE, BETA( DEG )=-. 25 WITHOUT TRANSITION STRIP

RUDDER ANGLE, ALPHA( DEG )=-. 25

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.970  | 2  | 0.010  | 3  | -0.421 | 4  | -0.746 |
| 5  | -0.568 | 6  | -0.501 | 7  | -0.370 | 8  | -0.356 |
| 9  | -0.597 | 10 | -0.787 | 11 | -0.540 | 12 | -0.471 |
| 13 | -0.385 | 14 | 0.048  | 15 | 1.197  | 16 | 0.080  |
| 17 | -0.255 | 18 | -0.258 | 19 | -0.223 | 20 | -0.227 |
| 21 | 0.066  | 22 | 0.072  | 23 | -0.320 | 24 | -0.218 |
| 25 | -0.142 | 26 | -0.059 | 27 | 0.049  | 28 | 0.132  |
| 29 | -0.181 | 30 | 0.022  | 31 | -0.091 | 32 | -0.272 |
| 33 | 0.071  | 34 | 0.095  | 35 | 0.054  | 36 | -0.318 |
| 37 | -0.222 | 38 | -0.174 | 39 | -0.070 | 40 | 0.052  |
| 41 | 0.126  | 42 | 0.987  | 43 | 0.047  | 44 | -0.220 |

TOTAL MEAN PRESSURE COEFFICIENT= .014

RUDDER ANGLE, ALPHA( DEG )= 4. 75

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.864  | 2  | -0.239 | 3  | -0.943 | 4  | -1.137 |
| 5  | -0.801 | 6  | -0.648 | 7  | -0.462 | 8  | 0.202  |
| 9  | -0.152 | 10 | -0.455 | 11 | -0.383 | 12 | -0.367 |
| 13 | -0.331 | 14 | 0.040  | 15 | 1.210  | 16 | 0.067  |
| 17 | -0.367 | 18 | -0.371 | 19 | -0.298 | 20 | -0.304 |
| 21 | 0.049  | 22 | 0.054  | 23 | -0.378 | 24 | -0.253 |
| 25 | -0.161 | 26 | -0.064 | 27 | 0.061  | 28 | 0.143  |
| 29 | -0.173 | 30 | 0.010  | 31 | -0.076 | 32 | -0.100 |
| 33 | 0.064  | 34 | 0.088  | 35 | 0.045  | 36 | -0.293 |
| 37 | -0.214 | 38 | -0.184 | 39 | -0.100 | 40 | 0.003  |
| 41 | 0.065  | 42 | 0.972  | 43 | 0.039  | 44 | -0.432 |

TOTAL MEAN PRESSURE COEFFICIENT=-. 175

RUDDER ANGLE, ALPHA( DEG )= 9. 75

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.491  | 2  | -0.598 | 3  | -1.525 | 4  | -1.571 |
| 5  | -0.944 | 6  | -0.771 | 7  | -0.548 | 8  | 0.624  |
| 9  | 0.241  | 10 | -0.133 | 11 | -0.218 | 12 | -0.245 |
| 13 | -0.248 | 14 | 0.033  | 15 | 1.234  | 16 | 0.064  |
| 17 | -0.486 | 18 | -0.500 | 19 | -0.386 | 20 | -0.396 |
| 21 | 0.046  | 22 | 0.054  | 23 | -0.443 | 24 | -0.309 |
| 25 | -0.208 | 26 | -0.107 | 27 | 0.025  | 28 | 0.114  |
| 29 | -0.207 | 30 | -0.005 | 31 | -0.067 | 32 | -0.081 |
| 33 | 0.064  | 34 | 0.091  | 35 | 0.041  | 36 | -0.250 |
| 37 | -0.198 | 38 | -0.191 | 39 | -0.123 | 40 | -0.037 |
| 41 | 0.009  | 42 | 0.934  | 43 | 0.033  | 44 | -0.671 |

TOTAL MEAN PRESSURE COEFFICIENT=-. 378

RUDDER ANGLE, ALPHA( DEG )= 19. 75

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | -0.931 | 2  | -1.470 | 3  | -1.581 | 4  | -2.317 |
| 5  | -1.241 | 6  | -0.940 | 7  | -0.676 | 8  | 0.955  |
| 9  | 0.758  | 10 | 0.388  | 11 | 0.104  | 12 | 0.007  |
| 13 | -0.061 | 14 | 0.019  | 15 | 1.246  | 16 | 0.054  |
| 17 | -0.654 | 18 | -0.649 | 19 | -0.508 | 20 | -0.519 |
| 21 | 0.027  | 22 | 0.036  | 23 | -0.565 | 24 | -0.448 |
| 25 | -0.375 | 26 | -0.300 | 27 | -0.160 | 28 | -0.056 |
| 29 | -0.254 | 30 | 0.000  | 31 | -0.070 | 32 | -0.026 |
| 33 | 0.046  | 34 | 0.080  | 35 | 0.022  | 36 | -0.119 |
| 37 | -0.112 | 38 | -0.139 | 39 | -0.122 | 40 | -0.068 |
| 41 | -0.028 | 42 | 0.856  | 43 | 0.018  | 44 | -0.806 |

TOTAL MEAN PRESSURE COEFFICIENT=-. 737

RUDDER ANGLE, ALPHA( DEG )= 29. 75

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | -2.499 | 2  | -2.032 | 3  | -1.565 | 4  | -2.222 |
| 5  | -0.901 | 6  | -0.670 | 7  | -0.666 | 8  | 0.783  |
| 9  | 0.922  | 10 | 0.728  | 11 | 0.368  | 12 | 0.246  |
| 13 | 0.135  | 14 | 0.019  | 15 | 1.246  | 16 | 0.060  |
| 17 | -0.394 | 18 | -0.406 | 19 | -0.351 | 20 | -0.352 |
| 21 | 0.033  | 22 | 0.041  | 23 | -0.693 | 24 | -0.697 |
| 25 | -0.682 | 26 | -0.659 | 27 | -0.576 | 28 | -0.504 |
| 29 | -0.135 | 30 | 0.009  | 31 | -0.047 | 32 | 0.035  |
| 33 | 0.048  | 34 | 0.081  | 35 | 0.021  | 36 | 0.032  |
| 37 | -0.011 | 38 | -0.088 | 39 | -0.142 | 40 | -0.202 |
| 41 | -0.298 | 42 | 0.986  | 43 | 0.018  | 44 | -0.180 |

TOTAL MEAN PRESSURE COEFFICIENT=-. 932

APPENDIX A2 (Cont.)

RUDDER PRESSURE COEFFICIENTS

RUDDER NUMBER=1  
DATE OF TEST =09/08/79  
RUN NUMBER =21

SPAN POSITION= 3

SKEG ANGLE, BETA( DEG)=-.25 WITHOUT TRANSITION STRIP

RUDDER ANGLE, ALPHA( DEG)=-.25

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.990  | 2  | 0.029  | 3  | -0.501 | 4  | -0.754 |
| 5  | -0.583 | 6  | -0.530 | 7  | -0.411 | 8  | -0.329 |
| 9  | -0.655 | 10 | -0.747 | 11 | -0.547 | 12 | -0.460 |
| 13 | -0.450 | 14 | 0.049  | 15 | 1.106  | 16 | 0.011  |
| 17 | -0.344 | 18 | -0.250 | 19 | -0.239 | 20 | -0.245 |
| 21 | 0.045  | 22 | 0.041  | 23 | -0.362 | 24 | -0.221 |
| 25 | -0.147 | 26 | -0.050 | 27 | 0.070  | 28 | 0.150  |
| 29 | -0.179 | 30 | 0.025  | 31 | -0.134 | 32 | -0.281 |
| 33 | 0.029  | 34 | -0.086 | 35 | 0.044  | 36 | -0.358 |
| 37 | -0.246 | 38 | -0.164 | 39 | -0.068 | 40 | 0.059  |
| 41 | 0.153  | 42 | 0.991  | 43 | 0.048  | 44 | -0.211 |

TOTAL MEAN PRESSURE COEFFICIENT= .013

RUDDER ANGLE, ALPHA( DEG)= 4.75

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.872  | 2  | -0.212 | 3  | -1.071 | 4  | -1.177 |
| 5  | -0.822 | 6  | -0.673 | 7  | -0.522 | 8  | 0.255  |
| 9  | -0.181 | 10 | -0.397 | 11 | -0.369 | 12 | -0.342 |
| 13 | -0.359 | 14 | 0.040  | 15 | 1.102  | 16 | 0.007  |
| 17 | -0.366 | 18 | -0.382 | 19 | -0.319 | 20 | -0.328 |
| 21 | 0.027  | 22 | 0.025  | 23 | -0.432 | 24 | -0.264 |
| 25 | -0.161 | 26 | -0.043 | 27 | 0.095  | 28 | 0.175  |
| 29 | -0.175 | 30 | 0.013  | 31 | -0.099 | 32 | -0.177 |
| 33 | 0.035  | 34 | 0.009  | 35 | 0.048  | 36 | -0.318 |
| 37 | -0.221 | 38 | -0.160 | 39 | -0.097 | 40 | 0.001  |
| 41 | 0.086  | 42 | 0.971  | 43 | 0.041  | 44 | -0.429 |

TOTAL MEAN PRESSURE COEFFICIENT=-.198

RUDDER ANGLE, ALPHA( DEG)= 9.75

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.463  | 2  | -0.583 | 3  | -1.541 | 4  | -1.597 |
| 5  | -0.990 | 6  | -0.808 | 7  | -0.614 | 8  | 0.683  |
| 9  | 0.243  | 10 | -0.059 | 11 | -0.180 | 12 | -0.198 |
| 13 | -0.253 | 14 | 0.023  | 15 | 1.107  | 16 | 0.066  |
| 17 | -0.487 | 18 | -0.518 | 19 | -0.410 | 20 | -0.421 |
| 21 | 0.024  | 22 | 0.025  | 23 | -0.495 | 24 | -0.313 |
| 25 | -0.196 | 26 | -0.062 | 27 | 0.082  | 28 | 0.151  |
| 29 | -0.214 | 30 | -0.003 | 31 | -0.099 | 32 | -0.081 |
| 33 | 0.018  | 34 | -0.005 | 35 | 0.027  | 36 | -0.242 |
| 37 | -0.189 | 38 | -0.159 | 39 | -0.115 | 40 | -0.037 |
| 41 | 0.033  | 42 | 0.926  | 43 | 0.033  | 44 | -0.656 |

TOTAL MEAN PRESSURE COEFFICIENT=-.488

RUDDER ANGLE, ALPHA( DEG)= 19.75

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | -0.964 | 2  | -1.468 | 3  | -1.579 | 4  | -2.227 |
| 5  | -1.207 | 6  | -0.870 | 7  | -0.643 | 8  | 0.991  |
| 9  | 0.788  | 10 | 0.487  | 11 | 0.172  | 12 | 0.090  |
| 13 | -0.024 | 14 | 0.019  | 15 | 1.110  | 16 | -0.002 |
| 17 | -0.653 | 18 | -0.662 | 19 | -0.527 | 20 | -0.535 |
| 21 | 0.019  | 22 | 0.019  | 23 | -0.538 | 24 | -0.418 |
| 25 | -0.367 | 26 | -0.293 | 27 | -0.180 | 28 | -0.115 |
| 29 | -0.252 | 30 | 0.016  | 31 | -0.089 | 32 | -0.014 |
| 33 | 0.025  | 34 | 0.010  | 35 | 0.026  | 36 | -0.074 |
| 37 | -0.079 | 38 | 0.952  | 39 | -0.108 | 40 | -0.091 |
| 41 | -0.069 | 42 | 0.854  | 43 | 0.016  | 44 | -0.802 |

TOTAL MEAN PRESSURE COEFFICIENT=-.92

RUDDER ANGLE, ALPHA( DEG)= 29.75

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | -2.396 | 2  | -1.926 | 3  | -1.561 | 4  | -1.720 |
| 5  | -0.727 | 6  | -0.758 | 7  | -0.806 | 8  | 0.799  |
| 9  | 0.934  | 10 | 0.808  | 11 | 0.445  | 12 | 0.347  |
| 13 | 0.196  | 14 | 0.020  | 15 | 1.114  | 16 | 0.019  |
| 17 | -0.399 | 18 | -0.427 | 19 | -0.372 | 20 | -0.371 |
| 21 | 0.030  | 22 | 0.036  | 23 | -0.741 | 24 | -0.638 |
| 25 | -0.672 | 26 | -0.647 | 27 | -0.614 | 28 | -0.568 |
| 29 | -0.127 | 30 | 0.022  | 31 | -0.068 | 32 | 0.047  |
| 33 | 0.029  | 34 | 0.021  | 35 | 0.019  | 36 | 0.094  |
| 37 | 0.035  | 38 | -0.045 | 39 | -0.134 | 40 | -0.239 |
| 41 | -0.324 | 42 | 0.882  | 43 | 0.017  | 44 | -0.288 |

TOTAL MEAN PRESSURE COEFFICIENT=-.955

RUDDER PRESSURE COEFFICIENTS

RUDDER NUMBER=1  
DATE OF TEST =10/08/79  
RUN NUMBER =24

SPAN POSITION= 4

SKEG ANGLE, BETA( DEG)=-.25 WITHOUT TRANSITION STRIP

RUDDER ANGLE, ALPHA( DEG)=-.25

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 1.001  | 2  | 0.009  | 3  | -0.523 | 4  | -0.681 |
| 5  | -0.550 | 6  | -0.458 | 7  | -0.460 | 8  | -0.248 |
| 9  | -0.553 | 10 | -0.687 | 11 | -0.493 | 12 | -0.461 |
| 13 | -0.502 | 14 | 0.049  | 15 | -0.127 | 16 | 0.088  |
| 17 | -0.247 | 18 | -0.254 | 19 | -0.239 | 20 | -0.245 |
| 21 | 0.064  | 22 | 0.071  | 23 | -0.384 | 24 | -0.242 |
| 25 | -0.146 | 26 | -0.031 | 27 | 0.081  | 28 | 0.150  |
| 29 | -0.178 | 30 | 0.028  | 31 | -0.128 | 32 | -0.273 |
| 33 | 0.076  | 34 | 0.106  | 35 | 0.055  | 36 | -0.393 |
| 37 | -0.257 | 38 | -0.155 | 39 | -0.068 | 40 | 0.059  |
| 41 | 0.132  | 42 | 0.988  | 43 | 0.048  | 44 | -0.215 |

TOTAL MEAN PRESSURE COEFFICIENT= .01

RUDDER ANGLE, ALPHA( DEG)= 4.75

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.866  | 2  | -0.217 | 3  | -1.001 | 4  | -0.983 |
| 5  | -0.704 | 6  | -0.613 | 7  | -0.642 | 8  | 0.302  |
| 9  | -0.134 | 10 | -0.394 | 11 | -0.341 | 12 | -0.328 |
| 13 | -0.333 | 14 | 0.041  | 15 | -0.124 | 16 | 0.080  |
| 17 | -0.349 | 18 | -0.376 | 19 | -0.317 | 20 | -0.324 |
| 21 | 0.052  | 22 | 0.061  | 23 | -0.497 | 24 | -0.294 |
| 25 | -0.157 | 26 | -0.029 | 27 | 0.088  | 28 | 0.148  |
| 29 | -0.164 | 30 | 0.019  | 31 | -0.094 | 32 | -0.118 |
| 33 | 0.072  | 34 | 0.106  | 35 | 0.049  | 36 | -0.310 |
| 37 | -0.222 | 38 | -0.147 | 39 | -0.093 | 40 | 0.008  |
| 41 | 0.068  | 42 | 0.976  | 43 | 0.041  | 44 | -0.426 |

TOTAL MEAN PRESSURE COEFFICIENT=-.201

RUDDER ANGLE, ALPHA( DEG)= 9.75

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.473  | 2  | -0.529 | 3  | -1.465 | 4  | -1.301 |
| 5  | -0.877 | 6  | -0.742 | 7  | -0.731 | 8  | 0.722  |
| 9  | 0.261  | 10 | -0.077 | 11 | -0.179 | 12 | -0.181 |
| 13 | -0.181 | 14 | 0.034  | 15 | -0.123 | 16 | 0.067  |
| 17 | -0.475 | 18 | -0.512 | 19 | -0.447 | 20 | -0.426 |
| 21 | 0.044  | 22 | 0.052  | 23 | -0.654 | 24 | -0.389 |
| 25 | -0.214 | 26 | -0.080 | 27 | 0.031  | 28 | 0.091  |
| 29 | -0.192 | 30 | 0.004  | 31 | -0.084 | 32 | -0.075 |
| 33 | 0.063  | 34 | 0.098  | 35 | 0.038  | 36 | -0.211 |
| 37 | -0.169 | 38 | -0.128 | 39 | -0.104 | 40 | -0.030 |
| 41 | 0.007  | 42 | 0.933  | 43 | 0.032  | 44 | -0.666 |

TOTAL MEAN PRESSURE COEFFICIENT=-.433

RUDDER ANGLE, ALPHA( DEG)= 19.75

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | -0.531 | 2  | -1.008 | 3  | -1.532 | 4  | -1.457 |
| 5  | -0.831 | 6  | -0.499 | 7  | -0.440 | 8  | 1.025  |
| 9  | 0.772  | 10 | 0.448  | 11 | 0.149  | 12 | 0.083  |
| 13 | 0.043  | 14 | 0.027  | 15 | -0.111 | 16 | 0.069  |
| 17 | -0.345 | 18 | -0.365 | 19 | -0.326 | 20 | -0.330 |
| 21 | 0.042  | 22 | 0.049  | 23 | -0.525 | 24 | -0.498 |
| 25 | -0.497 | 26 | -0.490 | 27 | -0.466 | 28 | -0.442 |
| 29 | -0.128 | 30 | 0.021  | 31 | -0.033 | 32 | 0.013  |
| 33 | 0.061  | 34 | 0.100  | 35 | 0.035  | 36 | -0.040 |
| 37 | -0.077 | 38 | -0.101 | 39 | -0.162 | 40 | -0.202 |
| 41 | -0.277 | 42 | 0.892  | 43 | 0.026  | 44 | -0.637 |

TOTAL MEAN PRESSURE COEFFICIENT=-.666

RUDDER ANGLE, ALPHA( DEG)= 29.75

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | -1.536 | 2  | -1.122 | 3  | -1.528 | 4  | -0.938 |
| 5  | -0.774 | 6  | -0.833 | 7  | -0.628 | 8  | 0.891  |
| 9  | 0.946  | 10 | 0.821  | 11 | 0.450  | 12 | 0.367  |
| 13 | 0.295  | 14 | 0.019  | 15 | -0.185 | 16 | 0.067  |
| 17 | -0.377 | 18 | -0.404 | 19 | -0.340 | 20 | -0.341 |
| 21 | 0.037  | 22 | 0.048  | 23 | -0.635 | 24 | -0.547 |
| 25 | -0.631 | 26 | -0.632 | 27 | -0.620 | 28 | -0.589 |
| 29 | -0.117 | 30 | 0.014  | 31 | -0.055 | 32 | 0.050  |
| 33 | 0.056  | 34 | 0.099  | 35 | 0.025  | 36 | 0.179  |
| 37 | 0.083  | 38 | -0.007 | 39 | -0.135 | 40 | -0.265 |
| 41 | -0.307 | 42 | 0.884  | 43 | 0.017  | 44 | -0.202 |

TOTAL MEAN PRESSURE COEFFICIENT=-.899

RUDDER PRESSURE COEFFICIENTS

APPENDIX A2 (Cont.)

RUDDER PRESSURE COEFFICIENTS

RUDDER NUMBER=1  
DATE OF TEST =13/08/79  
RUN NUMBER =34

RUDDER NUMBER=1  
DATE OF TEST =13/08/79  
RUN NUMBER =35

SPAN POSITION= 5

SPAN POSITION= 6

SKEG ANGLE, BETA( DEG ) = - .25 WITHOUT TRANSITION STRIP

SKEG ANGLE, BETA( DEG ) = - .25 WITHOUT TRANSITION STRIP

RUDDER ANGLE, ALPHA( DEG ) = - .25

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.133  | 2  | 0.054  | 3  | -0.209 | 4  | -0.077 |
| 5  | 0.195  | 6  | 0.006  | 7  | 0.156  | 8  | -0.046 |
| 9  | -0.189 | 10 | -0.171 | 11 | 0.049  | 12 | 0.048  |
| 13 | -0.081 | 14 | 0.049  | 15 | 0.757  | 16 | 0.052  |
| 17 | -0.238 | 18 | -0.255 | 19 | -0.234 | 20 | -0.238 |
| 21 | 0.053  | 22 | 0.054  | 23 | -0.413 | 24 | -0.228 |
| 25 | -0.130 | 26 | -0.020 | 27 | 0.086  | 28 | 0.154  |
| 29 | -0.166 | 30 | 0.032  | 31 | -0.125 | 32 | -0.255 |
| 33 | 0.051  | 34 | 0.058  | 35 | 0.053  | 36 | -0.356 |
| 37 | -0.266 | 38 | -0.169 | 39 | -0.069 | 40 | 0.047  |
| 41 | 0.098  | 42 | 0.988  | 43 | 0.049  | 44 | -0.224 |
| 45 | -0.517 | 46 | -0.701 | 47 | -0.647 | 48 | -0.554 |
| 49 | -0.496 | 50 | -0.488 | 51 | -0.053 | 52 | -0.125 |
| 53 | 0.049  | 54 | -0.416 | 55 | -0.597 | 56 | -0.770 |
| 57 | -0.654 | 58 | -0.554 | 59 | -0.502 | 60 | -0.528 |
| 61 | -0.280 | 62 | 0.048  | 63 | 0.048  | 64 | 0.049  |

MEAN PRESSURE COEFFICIENT(SKEG) = .009  
MEAN PRESSURE COEFFICIENT(RUDDER) = .023

RUDDER ANGLE, ALPHA( DEG ) = - .25

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.042  | 2  | 0.048  | 3  | -0.220 | 4  | 0.047  |
| 5  | 0.060  | 6  | 0.057  | 7  | 0.054  | 8  | 0.054  |
| 9  | -0.207 | 10 | -0.181 | 11 | 0.046  | 12 | 0.044  |
| 13 | -0.016 | 14 | -0.271 | 15 | 0.704  | 16 | -0.517 |
| 17 | -0.511 | 18 | -0.527 | 19 | -0.520 | 20 | -0.508 |
| 21 | -0.267 | 22 | -0.549 | 23 | -0.381 | 24 | -0.239 |
| 25 | -0.128 | 26 | -0.013 | 27 | 0.098  | 28 | 0.162  |
| 29 | -0.414 | 30 | -0.347 | 31 | -0.349 | 32 | -0.381 |
| 33 | -0.609 | 34 | -0.545 | 35 | -0.473 | 36 | -0.344 |
| 37 | -0.264 | 38 | -0.168 | 39 | -0.066 | 40 | 0.045  |
| 41 | 0.129  | 42 | 0.993  | 43 | 0.046  | 44 | -0.225 |
| 45 | -0.494 | 46 | -0.684 | 47 | -0.624 | 48 | -0.581 |
| 49 | -0.545 | 50 | -0.580 | 51 | -0.487 | 52 | -0.444 |
| 53 | 0.043  | 54 | -0.271 | 55 | -0.624 | 56 | -0.770 |
| 57 | -0.637 | 58 | -0.561 | 59 | -0.525 | 60 | -0.523 |
| 61 | -0.369 | 62 | 0.044  | 63 | 0.046  | 64 | 0.045  |

MEAN PRESSURE COEFFICIENT(SKEG) = .01  
MEAN PRESSURE COEFFICIENT(RUDDER) = .027

RUDDER ANGLE, ALPHA( DEG ) = 4.75

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.150  | 2  | 0.045  | 3  | -0.251 | 4  | -0.065 |
| 5  | 0.217  | 6  | 0.023  | 7  | 0.174  | 8  | -0.031 |
| 9  | -0.166 | 10 | -0.160 | 11 | 0.042  | 12 | 0.043  |
| 13 | -0.105 | 14 | 0.040  | 15 | 0.778  | 16 | 0.059  |
| 17 | -0.338 | 18 | -0.371 | 19 | -0.315 | 20 | -0.322 |
| 21 | 0.052  | 22 | 0.054  | 23 | -0.687 | 24 | -0.289 |
| 25 | -0.140 | 26 | -0.034 | 27 | 0.078  | 28 | 0.130  |
| 29 | -0.158 | 30 | 0.021  | 31 | -0.030 | 32 | -0.097 |
| 33 | 0.059  | 34 | 0.068  | 35 | 0.049  | 36 | -0.262 |
| 37 | -0.223 | 38 | -0.160 | 39 | -0.091 | 40 | -0.006 |
| 41 | 0.024  | 42 | 0.971  | 43 | 0.041  | 44 | -0.443 |
| 45 | -0.772 | 46 | -0.965 | 47 | -0.871 | 48 | -0.719 |
| 49 | -0.655 | 50 | -0.665 | 51 | -0.158 | 52 | 0.147  |
| 53 | 0.042  | 54 | -0.185 | 55 | -0.365 | 56 | -0.529 |
| 57 | -0.442 | 58 | -0.378 | 59 | -0.347 | 60 | -0.360 |
| 61 | -0.127 | 62 | 0.040  | 63 | 0.041  | 64 | 0.039  |

MEAN PRESSURE COEFFICIENT(SKEG) = -.107  
MEAN PRESSURE COEFFICIENT(RUDDER) = -.066

RUDDER ANGLE, ALPHA( DEG ) = 4.75

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.044  | 2  | 0.042  | 3  | -0.252 | 4  | 0.044  |
| 5  | 0.063  | 6  | 0.060  | 7  | 0.056  | 8  | 0.056  |
| 9  | -0.181 | 10 | -0.175 | 11 | 0.038  | 12 | 0.037  |
| 13 | -0.073 | 14 | -0.181 | 15 | 0.793  | 16 | -0.322 |
| 17 | -0.426 | 18 | -0.679 | 19 | -0.545 | 20 | -0.520 |
| 21 | -0.319 | 22 | -1.343 | 23 | -0.546 | 24 | -0.296 |
| 25 | -0.145 | 26 | -0.024 | 27 | 0.083  | 28 | 0.129  |
| 29 | -0.321 | 30 | -0.329 | 31 | -0.331 | 32 | -0.380 |
| 33 | -0.025 | 34 | -0.231 | 35 | -0.200 | 36 | -0.238 |
| 37 | -0.214 | 38 | -0.158 | 39 | -0.089 | 40 | -0.015 |
| 41 | 0.052  | 42 | 0.982  | 43 | 0.027  | 44 | -0.435 |
| 45 | -0.698 | 46 | -0.891 | 47 | -0.806 | 48 | -0.761 |
| 49 | -0.705 | 50 | -0.765 | 51 | -0.334 | 52 | -0.312 |
| 53 | 0.040  | 54 | -0.071 | 55 | -0.427 | 56 | -0.581 |
| 57 | -0.474 | 58 | -0.409 | 59 | -0.376 | 60 | -0.407 |
| 61 | -0.330 | 62 | 0.036  | 63 | 0.038  | 64 | 0.038  |

MEAN PRESSURE COEFFICIENT(SKEG) = -.09  
MEAN PRESSURE COEFFICIENT(RUDDER) = -.056

RUDDER ANGLE, ALPHA( DEG ) = 9.75

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.145  | 2  | 0.035  | 3  | -0.321 | 4  | -0.074 |
| 5  | 0.217  | 6  | 0.021  | 7  | 0.173  | 8  | -0.034 |
| 9  | -0.181 | 10 | -0.184 | 11 | 0.032  | 12 | 0.032  |
| 13 | -0.141 | 14 | 0.032  | 15 | 0.779  | 16 | 0.044  |
| 17 | -0.460 | 18 | -0.502 | 19 | -0.422 | 20 | -0.431 |
| 21 | 0.027  | 22 | 0.032  | 23 | -0.889 | 24 | -0.462 |
| 25 | -0.240 | 26 | -0.109 | 27 | -0.012 | 28 | 0.032  |
| 29 | -0.194 | 30 | 0.005  | 31 | -0.094 | 32 | -0.084 |
| 33 | 0.038  | 34 | 0.049  | 35 | 0.028  | 36 | -0.153 |
| 37 | -0.161 | 38 | -0.135 | 39 | -0.096 | 40 | -0.054 |
| 41 | -0.044 | 42 | 0.935  | 43 | 0.028  | 44 | -0.691 |
| 45 | -1.055 | 46 | -1.247 | 47 | -1.110 | 48 | -0.916 |
| 49 | -0.850 | 50 | -0.842 | 51 | -0.291 | 52 | 0.416  |
| 53 | 0.030  | 54 | 0.030  | 55 | -0.166 | 56 | -0.316 |
| 57 | -0.255 | 58 | -0.207 | 59 | -0.180 | 60 | -0.179 |
| 61 | 0.081  | 62 | 0.029  | 63 | 0.029  | 64 | 0.027  |

MEAN PRESSURE COEFFICIENT(SKEG) = -.227  
MEAN PRESSURE COEFFICIENT(RUDDER) = -.201

RUDDER ANGLE, ALPHA( DEG ) = 9.75

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.041  | 2  | 0.032  | 3  | -0.326 | 4  | 0.040  |
| 5  | 0.064  | 6  | 0.060  | 7  | 0.056  | 8  | 0.056  |
| 9  | -0.205 | 10 | -0.214 | 11 | 0.030  | 12 | 0.029  |
| 13 | -0.120 | 14 | -0.291 | 15 | 0.796  | 16 | -0.465 |
| 17 | -0.488 | 18 | -0.660 | 19 | -0.260 | 20 | -0.485 |
| 21 | -0.786 | 22 | -1.409 | 23 | -0.738 | 24 | -0.417 |
| 25 | -0.222 | 26 | -0.103 | 27 | -0.011 | 28 | 0.027  |
| 29 | -0.486 | 30 | -0.481 | 31 | -0.490 | 32 | -0.615 |
| 33 | 0.796  | 34 | 0.083  | 35 | 0.060  | 36 | -0.121 |
| 37 | -0.150 | 38 | -0.131 | 39 | -0.095 | 40 | -0.060 |
| 41 | -0.024 | 42 | 0.938  | 43 | 0.028  | 44 | -0.664 |
| 45 | -0.922 | 46 | -1.099 | 47 | -0.991 | 48 | -0.937 |
| 49 | -0.854 | 50 | -0.867 | 51 | -0.467 | 52 | -0.492 |
| 53 | 0.026  | 54 | 0.125  | 55 | -0.239 | 56 | -0.396 |
| 57 | -0.310 | 58 | -0.246 | 59 | -0.215 | 60 | -0.260 |
| 61 | -0.486 | 62 | 0.029  | 63 | 0.030  | 64 | 0.030  |

MEAN PRESSURE COEFFICIENT(SKEG) = -.19  
MEAN PRESSURE COEFFICIENT(RUDDER) = -.248

RUDDER ANGLE, ALPHA( DEG ) = 19.75

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.140  | 2  | 0.026  | 3  | -0.293 | 4  | -0.090 |
| 5  | 0.212  | 6  | 0.012  | 7  | 0.165  | 8  | -0.043 |
| 9  | -0.123 | 10 | -0.123 | 11 | 0.023  | 12 | 0.022  |
| 13 | -0.149 | 14 | 0.023  | 15 | 0.774  | 16 | 0.032  |
| 17 | -0.315 | 18 | -0.342 | 19 | -0.304 | 20 | -0.307 |
| 21 | 0.024  | 22 | 0.025  | 23 | -0.584 | 24 | -0.488 |
| 25 | -0.504 | 26 | -0.504 | 27 | -0.475 | 28 | -0.448 |
| 29 | -0.128 | 30 | 0.019  | 31 | -0.047 | 32 | -0.012 |
| 33 | 0.031  | 34 | 0.042  | 35 | 0.024  | 36 | 0.053  |
| 37 | -0.062 | 38 | -0.120 | 39 | -0.174 | 40 | -0.249 |
| 41 | -0.389 | 42 | 0.894  | 43 | 0.021  | 44 | -0.665 |
| 45 | -1.184 | 46 | -1.398 | 47 | -1.201 | 48 | -0.980 |
| 49 | -0.860 | 50 | -0.769 | 51 | -0.261 | 52 | 0.430  |
| 53 | 0.021  | 54 | 0.247  | 55 | 0.070  | 56 | -0.044 |
| 57 | 0.001  | 58 | 0.046  | 59 | 0.078  | 60 | 0.095  |
| 61 | 0.177  | 62 | 0.022  | 63 | 0.022  | 64 | 0.022  |

MEAN PRESSURE COEFFICIENT(SKEG) = -.32  
MEAN PRESSURE COEFFICIENT(RUDDER) = -.323

RUDDER ANGLE, ALPHA( DEG ) = 19.75

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.027  | 2  | 0.026  | 3  | -0.316 | 4  | 0.030  |
| 5  | 0.063  | 6  | 0.055  | 7  | 0.052  | 8  | 0.053  |
| 9  | -0.146 | 10 | -0.153 | 11 | 0.024  | 12 | 0.024  |
| 13 | -0.125 | 14 | -0.244 | 15 | 0.794  | 16 | -0.391 |
| 17 | -0.370 | 18 | -0.390 | 19 | -0.431 | 20 | -0.466 |
| 21 | -0.930 | 22 | -1.011 | 23 | -0.453 | 24 | -0.457 |
| 25 | -0.473 | 26 | -0.483 | 27 | -0.466 | 28 | -0.440 |
| 29 | -0.403 | 30 | -0.401 | 31 | -0.421 | 32 | -0.452 |
| 33 | -0.770 | 34 | 0.662  | 35 | 0.417  | 36 | 0.083  |
| 37 | -0.048 | 38 | -0.116 | 39 | -0.176 | 40 | -0.266 |
| 41 | -0.317 | 42 | 0.885  | 43 | 0.024  | 44 | -0.750 |
| 45 | -0.977 | 46 | -1.129 | 47 | -0.992 | 48 | -0.878 |
| 49 | -0.749 | 50 | -0.642 | 51 | -0.385 | 52 | -0.402 |
| 53 | 0.021  | 54 | 0.308  | 55 | -0.019 | 56 | -0.152 |
| 57 | -0.072 | 58 | -0.005 | 59 | 0.047  | 60 | 0.058  |
| 61 | -0.372 | 62 | 0.023  | 63 | 0.023  | 64 | 0.023  |

MEAN PRESSURE COEFFICIENT(SKEG) = -.252  
MEAN PRESSURE COEFFICIENT(RUDDER) = -.383

RUDDER ANGLE, ALPHA( DEG ) = 29.75

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.139  | 2  | 0.017  | 3  | -0.283 | 4  | -0.094 |
| 5  | 0.216  | 6  | 0.013  | 7  | 0.165  | 8  | -0.043 |
| 9  | -0.076 | 10 | -0.081 | 11 | 0.015  | 12 | 0.011  |
| 13 | -0.134 | 14 | 0.014  | 15 | 0.766  | 16 | 0.028  |
| 17 | -0.345 | 18 | -0.386 | 19 | -0.323 | 20 | -0.327 |
| 21 | 0.017  | 22 | 0.021  | 23 | -0.636 | 24 | -0.622 |
| 25 | -0.622 | 26 | -0.621 | 27 | -0.599 | 28 | -0.565 |
| 29 | -0.119 | 30 | 0.014  | 31 | -0.065 | 32 | 0.018  |
| 33 | 0.020  | 34 | 0.035  | 35 | 0.013  | 36 | 0.291  |
| 37 | 0.113  | 38 | -0.006 | 39 | -0.117 | 40 | -0.260 |
| 41 | -0.447 | 42 | 0.884  | 43 | 0.014  | 44 | -0.214 |
| 45 | -0.465 | 46 | -0.372 | 47 | -1.038 | 48 | -1.038 |
| 49 | -0.939 | 50 | -0.874 | 51 | -0.610 | 52 | 0.192  |
| 53 | 0.010  | 54 | 0.425  | 55 | 0.266  | 56 | 0.194  |
| 57 | 0.232  | 58 | 0.284  | 59 | 0.315  | 60 | 0.346  |
| 61 | 0.107  | 62 | 0.014  | 63 | 0.014  | 64 | 0.013  |

MEAN PRESSURE COEFFICIENT(SKEG) = -.32  
MEAN PRESSURE COEFFICIENT(RUDDER) = -.496



RUDDER PRESSURE COEFFICIENTS

APPENDIX A2 (Cont.)

RUDDER PRESSURE COEFFICIENTS

RUDDER NUMBER=1  
DATE OF TEST =14/08/79  
RUN NUMBER =46

RUDDER NUMBER=1  
DATE OF TEST =14/08/79  
RUN NUMBER =49

SPAN POSITION= 7

SPAN POSITION= 8

SKEG ANGLE, BETA( DEG )= - .25 WITHOUT TRANSITION STRIP

SKEG ANGLE, BETA( DEG )= - .25 WITHOUT TRANSITION STRIP

RUDDER ANGLE, ALPHA( DEG )= - .25

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 1.248  | 2  | 0.055  | 3  | -0.211 | 4  | 0.268  |
| 5  | 1.192  | 6  | 0.081  | 7  | 1.267  | 8  | 0.398  |
| 9  | -0.212 | 10 | -0.188 | 11 | 0.048  | 12 | 0.046  |
| 13 | -0.084 | 14 | -0.190 | 15 | 1.513  | 16 | -0.325 |
| 17 | -0.334 | 18 | -0.352 | 19 | -0.359 | 20 | -0.352 |
| 21 | -0.483 | 22 | -0.437 | 23 | -0.354 | 24 | -0.232 |
| 25 | -0.121 | 26 | -0.022 | 27 | 0.091  | 28 | 0.159  |
| 29 | -0.298 | 30 | -0.282 | 31 | -0.271 | 32 | -0.272 |
| 33 | -0.415 | 34 | -0.502 | 35 | -0.451 | 36 | -0.348 |
| 37 | -0.245 | 38 | -0.149 | 39 | -0.050 | 40 | 0.055  |
| 41 | 0.132  | 42 | 0.993  | 43 | 0.050  | 44 | -0.214 |
| 45 | -0.529 | 46 | -0.665 | 47 | -0.605 | 48 | -0.542 |
| 49 | -0.521 | 50 | -0.484 | 51 | -0.318 | 52 | -0.312 |
| 53 | 0.048  | 54 | -0.170 | 55 | -0.550 | 56 | -0.738 |
| 57 | -0.588 | 58 | -0.503 | 59 | -0.498 | 60 | -0.479 |
| 61 | -0.280 | 62 | 0.048  | 63 | 0.049  | 64 | 0.049  |

MEAN PRESSURE COEFFICIENT(SKEG) = 0  
MEAN PRESSURE COEFFICIENT(RUDDER) = .012

RUDDER ANGLE, ALPHA( DEG )= - .25

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 1.271  | 2  | 0.054  | 3  | -0.208 | 4  | 0.217  |
| 5  | 1.189  | 6  | 0.108  | 7  | 1.271  | 8  | 0.339  |
| 9  | -0.207 | 10 | -0.187 | 11 | 0.047  | 12 | 0.045  |
| 13 | -0.067 | 14 | -0.153 | 15 | 1.517  | 16 | -0.257 |
| 17 | -0.247 | 18 | -0.249 | 19 | -0.263 | 20 | -0.266 |
| 21 | -0.426 | 22 | -0.416 | 23 | -0.323 | 24 | -0.243 |
| 25 | -0.115 | 26 | -0.028 | 27 | 0.058  | 28 | 0.126  |
| 29 | -0.258 | 30 | -0.244 | 31 | -0.273 | 32 | -0.322 |
| 33 | -0.128 | 34 | -0.556 | 35 | -0.446 | 36 | -0.325 |
| 37 | -0.236 | 38 | -0.133 | 39 | -0.041 | 40 | 0.041  |
| 41 | 0.095  | 42 | 0.982  | 43 | 0.048  | 44 | -0.195 |
| 45 | -0.494 | 46 | -0.573 | 47 | -0.497 | 48 | -0.481 |
| 49 | -0.402 | 50 | -0.427 | 51 | -0.252 | 52 | -0.264 |
| 53 | 0.049  | 54 | -0.034 | 55 | -0.423 | 56 | -0.627 |
| 57 | -0.449 | 58 | -0.418 | 59 | -0.440 | 60 | -0.529 |
| 61 | -0.242 | 62 | 0.048  | 63 | 0.052  | 64 | 0.052  |

MEAN PRESSURE COEFFICIENT(SKEG) = -.004  
MEAN PRESSURE COEFFICIENT(RUDDER) = .017

RUDDER ANGLE, ALPHA( DEG )= 4.75

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 1.250  | 2  | 0.045  | 3  | -0.259 | 4  | 0.245  |
| 5  | 1.183  | 6  | 0.052  | 7  | 1.255  | 8  | 0.373  |
| 9  | -0.210 | 10 | -0.204 | 11 | 0.044  | 12 | 0.044  |
| 13 | -0.139 | 14 | -0.233 | 15 | 1.531  | 16 | -0.359 |
| 17 | -0.345 | 18 | -0.434 | 19 | -0.459 | 20 | -0.910 |
| 21 | -0.841 | 22 | -0.694 | 23 | -0.467 | 24 | -0.282 |
| 25 | -0.135 | 26 | -0.012 | 27 | 0.105  | 28 | 0.155  |
| 29 | -0.374 | 30 | -0.369 | 31 | -0.474 | 32 | -1.127 |
| 33 | 0.272  | 34 | -0.167 | 35 | -0.211 | 36 | -0.235 |
| 37 | -0.192 | 38 | -0.137 | 39 | -0.072 | 40 | -0.015 |
| 41 | 0.036  | 42 | 0.982  | 43 | 0.039  | 44 | -0.401 |
| 45 | -0.727 | 46 | -0.846 | 47 | -0.771 | 48 | -0.703 |
| 49 | -0.671 | 50 | -0.640 | 51 | -0.339 | 52 | -0.382 |
| 53 | 0.042  | 54 | 0.001  | 55 | -0.384 | 56 | -0.578 |
| 57 | -0.451 | 58 | -0.374 | 59 | -0.367 | 60 | -0.390 |
| 61 | -0.353 | 62 | 0.039  | 63 | 0.041  | 64 | 0.042  |

MEAN PRESSURE COEFFICIENT(SKEG) = -.089  
MEAN PRESSURE COEFFICIENT(RUDDER) = -.09

RUDDER ANGLE, ALPHA( DEG )= 4.75

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 1.288  | 2  | 0.045  | 3  | -0.253 | 4  | 0.212  |
| 5  | 1.198  | 6  | 0.105  | 7  | 1.283  | 8  | 0.338  |
| 9  | -0.193 | 10 | -0.188 | 11 | 0.042  | 12 | 0.041  |
| 13 | -0.119 | 14 | -0.233 | 15 | 1.537  | 16 | -0.352 |
| 17 | -0.335 | 18 | -0.355 | 19 | -0.396 | 20 | -0.678 |
| 21 | -0.758 | 22 | -0.639 | 23 | -0.438 | 24 | -0.307 |
| 25 | -0.149 | 26 | -0.040 | 27 | 0.056  | 28 | 0.114  |
| 29 | -0.356 | 30 | -0.287 | 31 | -0.330 | 32 | -0.551 |
| 33 | 0.518  | 34 | -0.209 | 35 | -0.227 | 36 | -0.220 |
| 37 | -0.182 | 38 | -0.119 | 39 | -0.054 | 40 | 0.006  |
| 41 | 0.037  | 42 | 0.988  | 43 | 0.041  | 44 | -0.367 |
| 45 | -0.666 | 46 | -0.732 | 47 | -0.642 | 48 | -0.626 |
| 49 | -0.546 | 50 | -0.578 | 51 | -0.326 | 52 | -0.367 |
| 53 | 0.035  | 54 | 0.105  | 55 | -0.286 | 56 | -0.487 |
| 57 | -0.345 | 58 | -0.305 | 59 | -0.307 | 60 | -0.370 |
| 61 | -0.294 | 62 | 0.040  | 63 | 0.044  | 64 | 0.044  |

MEAN PRESSURE COEFFICIENT(SKEG) = -.083  
MEAN PRESSURE COEFFICIENT(RUDDER) = -.094

RUDDER ANGLE, ALPHA( DEG )= 9.75

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 1.248  | 2  | 0.036  | 3  | -0.323 | 4  | 0.234  |
| 5  | 1.196  | 6  | 0.051  | 7  | 1.269  | 8  | 0.375  |
| 9  | -0.252 | 10 | -0.260 | 11 | 0.033  | 12 | 0.033  |
| 13 | -0.182 | 14 | -0.314 | 15 | 1.550  | 16 | -0.432 |
| 17 | -0.434 | 18 | -0.615 | 19 | -0.835 | 20 | -1.383 |
| 21 | -1.114 | 22 | -0.994 | 23 | -0.525 | 24 | -0.300 |
| 25 | -0.145 | 26 | -0.054 | 27 | 0.001  | 28 | 0.025  |
| 29 | -0.515 | 30 | -0.523 | 31 | -0.693 | 32 | -1.417 |
| 33 | 0.926  | 34 | 0.172  | 35 | 0.024  | 36 | -0.117 |
| 37 | -0.121 | 38 | -0.107 | 39 | -0.079 | 40 | -0.071 |
| 41 | -0.054 | 42 | 0.950  | 43 | 0.027  | 44 | -0.615 |
| 45 | -0.927 | 46 | -1.028 | 47 | -0.936 | 48 | -0.858 |
| 49 | -0.833 | 50 | -0.813 | 51 | -0.419 | 52 | -0.513 |
| 53 | 0.032  | 54 | 0.172  | 55 | -0.214 | 56 | -0.410 |
| 57 | -0.301 | 58 | -0.227 | 59 | -0.210 | 60 | -0.215 |
| 61 | -0.522 | 62 | 0.031  | 63 | 0.031  | 64 | 0.031  |

MEAN PRESSURE COEFFICIENT(SKEG) = -.183  
MEAN PRESSURE COEFFICIENT(RUDDER) = -.203

RUDDER ANGLE, ALPHA( DEG )= 9.75

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 1.284  | 2  | 0.035  | 3  | -0.312 | 4  | 0.203  |
| 5  | 1.203  | 6  | 0.102  | 7  | 1.291  | 8  | 0.334  |
| 9  | -0.206 | 10 | -0.217 | 11 | 0.032  | 12 | 0.031  |
| 13 | -0.162 | 14 | -0.311 | 15 | 1.553  | 16 | -0.421 |
| 17 | -0.410 | 18 | -0.495 | 19 | -0.605 | 20 | -1.124 |
| 21 | -1.038 | 22 | -0.822 | 23 | -0.532 | 24 | -0.340 |
| 25 | -0.177 | 26 | -0.077 | 27 | 0.001  | 28 | 0.040  |
| 29 | -0.468 | 30 | -0.385 | 31 | -0.359 | 32 | -0.467 |
| 33 | 0.451  | 34 | 0.173  | 35 | 0.028  | 36 | -0.093 |
| 37 | -0.103 | 38 | -0.087 | 39 | -0.061 | 40 | -0.042 |
| 41 | -0.039 | 42 | 0.958  | 43 | 0.033  | 44 | -0.550 |
| 45 | -0.841 | 46 | -0.892 | 47 | -0.781 | 48 | -0.767 |
| 49 | -0.675 | 50 | -0.734 | 51 | -0.393 | 52 | -0.472 |
| 53 | 0.031  | 54 | 0.237  | 55 | -0.146 | 56 | -0.354 |
| 57 | -0.220 | 58 | -0.189 | 59 | -0.168 | 60 | -0.182 |
| 61 | -0.365 | 62 | 0.031  | 63 | 0.032  | 64 | 0.033  |

MEAN PRESSURE COEFFICIENT(SKEG) = -.164  
MEAN PRESSURE COEFFICIENT(RUDDER) = -.214

RUDDER ANGLE, ALPHA( DEG )= 19.75

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 1.275  | 2  | 0.030  | 3  | -0.317 | 4  | 0.249  |
| 5  | 1.220  | 6  | 0.066  | 7  | 1.287  | 8  | 0.392  |
| 9  | -0.182 | 10 | -0.187 | 11 | 0.025  | 12 | 0.024  |
| 13 | -0.177 | 14 | -0.125 | 15 | 1.559  | 16 | -0.165 |
| 17 | -0.199 | 18 | -0.269 | 19 | -0.678 | 20 | -0.474 |
| 21 | -0.347 | 22 | -0.336 | 23 | -0.758 | 24 | -0.395 |
| 25 | -0.420 | 26 | -0.424 | 27 | -0.417 | 28 | -0.388 |
| 29 | -0.291 | 30 | -0.350 | 31 | -0.533 | 32 | -0.798 |
| 33 | -0.565 | 34 | 0.808  | 35 | 0.429  | 36 | 0.082  |
| 37 | -0.025 | 38 | -0.091 | 39 | -0.153 | 40 | -0.265 |
| 41 | -0.340 | 42 | 0.907  | 43 | 0.029  | 44 | -0.667 |
| 45 | -0.943 | 46 | -0.992 | 47 | -0.872 | 48 | -0.726 |
| 49 | -0.655 | 50 | -0.516 | 51 | -0.177 | 52 | -0.287 |
| 53 | 0.018  | 54 | 0.340  | 55 | -0.016 | 56 | -0.192 |
| 57 | -0.093 | 58 | -0.010 | 59 | 0.050  | 60 | 0.111  |
| 61 | -0.448 | 62 | 0.025  | 63 | 0.024  | 64 | 0.024  |

MEAN PRESSURE COEFFICIENT(SKEG) = -.222  
MEAN PRESSURE COEFFICIENT(RUDDER) = -.291

RUDDER ANGLE, ALPHA( DEG )= 19.75

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 1.273  | 2  | 0.028  | 3  | -0.302 | 4  | 0.164  |
| 5  | 1.197  | 6  | 0.096  | 7  | 1.289  | 8  | 0.328  |
| 9  | -0.134 | 10 | -0.139 | 11 | 0.025  | 12 | 0.023  |
| 13 | -0.166 | 14 | -0.170 | 15 | 1.560  | 16 | -0.244 |
| 17 | -0.245 | 18 | -0.280 | 19 | -0.604 | 20 | -0.575 |
| 21 | -0.372 | 22 | -0.357 | 23 | -0.365 | 24 | -0.382 |
| 25 | -0.382 | 26 | -0.367 | 27 | -0.337 | 28 | -0.314 |
| 29 | -0.361 | 30 | -0.286 | 31 | -0.242 | 32 | -0.333 |
| 33 | -0.383 | 34 | 0.831  | 35 | 0.436  | 36 | 0.094  |
| 37 | -0.010 | 38 | -0.072 | 39 | -0.132 | 40 | -0.220 |
| 41 | -0.311 | 42 | 0.923  | 43 | 0.025  | 44 | -0.607 |
| 45 | -0.851 | 46 | -0.859 | 47 | -0.721 | 48 | -0.658 |
| 49 | -0.521 | 50 | -0.488 | 51 | -0.209 | 52 | -0.307 |
| 53 | 0.025  | 54 | 0.373  | 55 | 0.013  | 56 | -0.173 |
| 57 | -0.040 | 58 | 0.003  | 59 | 0.061  | 60 | 0.135  |
| 61 | -0.259 | 62 | 0.026  | 63 | 0.026  | 64 | 0.026  |

MEAN PRESSURE COEFFICIENT(SKEG) = -.197  
MEAN PRESSURE COEFFICIENT(RUDDER) = -.289

RUDDER ANGLE, ALPHA( DEG )= 29.75

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 1.266  | 2  | 0.024  | 3  | -0.308 | 4  | 0.237  |
| 5  | 1.202  | 6  | 0.064  | 7  | 1.283  | 8  | 0.395  |
| 9  | -0.142 | 10 | -0.155 | 11 | 0.018  | 12 | 0.014  |
| 13 | -0.147 | 14 | -0.121 | 15 | 1.559  | 16 | -0.206 |
| 17 | -0.274 | 18 | -0.368 | 19 | -0.645 | 20 | -0.443 |
| 21 | -0.411 | 22 | -0.414 | 23 | -0.451 | 24 | -0.493 |
| 25 | -0.509 | 26 | -0.513 | 27 | -0.497 | 28 | -0.472 |
| 29 | -0.320 | 30 | -0.492 | 31 | -0.949 | 32 | -1.053 |
| 33 | -0.440 | 34 | 0.003  | 35 | 0.821  | 36 | 0.330  |
| 37 | -0.159 | 38 | 0.036  | 39 | -0.070 | 40 | -0.239 |
| 41 | -0.347 | 42 | 0.844  | 43 | 0.018  | 44 | -0.783 |
| 45 | -1.009 | 46 | -1.026 | 47 | -0.899 | 48 | -0.747 |
| 49 | -0.655 | 50 | -0.516 | 51 | -0.214 | 52 | -0.438 |
| 53 | 0.021  | 54 | 0.507  | 55 | 0.193  | 56 | 0.045  |
| 57 | -0.139 | 58 | 0.219  | 59 | 0.310  | 60 | 0.411  |
| 61 | -0.750 | 62 | 0.017  | 63 | 0.018  | 64 | 0.017  |

MEAN PRESSURE COEFFICIENT(SKEG) = -.298  
MEAN PRESSURE COEFFICIENT(RUDDER) = -.389

RUBBER PRESSURE COEFFICIENTS

RUBBER NUMBER=1  
DATE OF TEST =09/08/79  
RUN NUMBER =13

APPENDIX A2 (Cont.)

SPAN POSITION= 1

SKEG ANGLE,BETA(DEG)= 0

RUBBER ANGLE,ALPHA(DEG)= 0

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.944  | 2  | 0.018  | 3  | -0.323 | 4  | -0.700 |
| 5  | -0.515 | 6  | -0.430 | 7  | -0.333 | 8  | -0.242 |
| 9  | -0.476 | 10 | -0.533 | 11 | -0.493 | 12 | -0.408 |
| 13 | -0.372 | 14 | 0.045  | 15 | 1.523  | 16 | 0.055  |
| 17 | -0.261 | 18 | -0.279 | 19 | -0.232 | 20 | -0.233 |
| 21 | 0.052  | 22 | 0.054  | 23 | -0.274 | 24 | -0.194 |
| 25 | -0.150 | 26 | -0.078 | 27 | 0.021  | 28 | 0.103  |
| 29 | -0.170 | 30 | 0.025  | 31 | -0.141 | 32 | -0.263 |
| 33 | 0.051  | 34 | 0.073  | 35 | 0.046  | 36 | -0.269 |
| 37 | -0.195 | 38 | -0.162 | 39 | -0.083 | 40 | 0.018  |
| 41 | 0.092  | 42 | 0.993  | 43 | 0.044  | 44 | -0.238 |

TOTAL MEAN PRESSURE COEFFICIENT= .005

RUBBER ANGLE,ALPHA(DEG)= 5

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.947  | 2  | -0.189 | 3  | -0.746 | 4  | -1.039 |
| 5  | -0.670 | 6  | -0.525 | 7  | -0.400 | 8  | 0.227  |
| 9  | -0.096 | 10 | -0.289 | 11 | -0.371 | 12 | -0.341 |
| 13 | -0.337 | 14 | 0.037  | 15 | 1.538  | 16 | 0.052  |
| 17 | -0.350 | 18 | -0.379 | 19 | -0.296 | 20 | -0.302 |
| 21 | 0.041  | 22 | 0.043  | 23 | -0.330 | 24 | -0.247 |
| 25 | -0.197 | 26 | -0.116 | 27 | -0.018 | 28 | 0.068  |
| 29 | -0.171 | 30 | 0.014  | 31 | -0.110 | 32 | -0.158 |
| 33 | 0.044  | 34 | 0.066  | 35 | 0.040  | 36 | -0.256 |
| 37 | -0.195 | 38 | -0.176 | 39 | -0.109 | 40 | -0.016 |
| 41 | 0.063  | 42 | 0.972  | 43 | 0.038  | 44 | -0.449 |

TOTAL MEAN PRESSURE COEFFICIENT=-.155

RUBBER ANGLE,ALPHA(DEG)= 10

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.531  | 2  | -0.483 | 3  | -1.202 | 4  | -1.367 |
| 5  | -0.829 | 6  | -0.624 | 7  | -0.484 | 8  | 0.579  |
| 9  | 0.231  | 10 | -0.043 | 11 | -0.239 | 12 | -0.259 |
| 13 | -0.267 | 14 | 0.032  | 15 | 1.549  | 16 | 0.054  |
| 17 | -0.389 | 18 | -0.421 | 19 | -0.343 | 20 | -0.351 |
| 21 | 0.037  | 22 | 0.042  | 23 | -0.413 | 24 | -0.325 |
| 25 | -0.278 | 26 | -0.201 | 27 | -0.118 | 28 | -0.019 |
| 29 | -0.178 | 30 | 0.006  | 31 | -0.092 | 32 | -0.079 |
| 33 | 0.041  | 34 | 0.064  | 35 | 0.033  | 36 | -0.237 |
| 37 | -0.193 | 38 | -0.192 | 39 | -0.143 | 40 | -0.071 |
| 41 | 0.000  | 42 | 0.933  | 43 | 0.030  | 44 | -0.632 |

TOTAL MEAN PRESSURE COEFFICIENT=-.34

RUBBER ANGLE,ALPHA(DEG)= 20

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | -0.630 | 2  | -1.171 | 3  | -1.552 | 4  | -1.903 |
| 5  | -1.060 | 6  | -0.791 | 7  | -0.643 | 8  | 0.901  |
| 9  | 0.691  | 10 | 0.365  | 11 | 0.019  | 12 | -0.075 |
| 13 | -0.141 | 14 | 0.024  | 15 | 1.564  | 16 | 0.054  |
| 17 | -0.327 | 18 | -0.353 | 19 | -0.333 | 20 | -0.335 |
| 21 | 0.028  | 22 | 0.032  | 23 | -0.575 | 24 | -0.520 |
| 25 | -0.546 | 26 | -0.598 | 27 | -0.551 | 28 | -0.358 |
| 29 | -0.136 | 30 | 0.021  | 31 | -0.050 | 32 | -0.002 |
| 33 | 0.039  | 34 | 0.062  | 35 | 0.027  | 36 | -0.168 |
| 37 | -0.159 | 38 | -0.180 | 39 | -0.174 | 40 | -0.133 |
| 41 | -0.093 | 42 | 0.894  | 43 | 0.022  | 44 | -0.642 |

TOTAL MEAN PRESSURE COEFFICIENT=-.716

RUBBER ANGLE,ALPHA(DEG)= 30

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | -2.095 | 2  | -1.650 | 3  | -1.562 | 4  | -1.590 |
| 5  | -0.926 | 6  | -0.876 | 7  | -0.870 | 8  | 0.790  |
| 9  | 0.860  | 10 | 0.659  | 11 | 0.269  | 12 | 0.141  |
| 13 | 0.030  | 14 | 0.016  | 15 | 1.573  | 16 | 0.047  |
| 17 | -0.387 | 18 | -0.434 | 19 | -0.407 | 20 | -0.407 |
| 21 | 0.034  | 22 | 0.041  | 23 | -0.878 | 24 | -0.918 |
| 25 | -1.029 | 26 | -1.015 | 27 | -0.863 | 28 | -0.710 |
| 29 | -0.138 | 30 | 0.006  | 31 | -0.075 | 32 | 0.023  |
| 33 | 0.039  | 34 | 0.067  | 35 | 0.020  | 36 | -0.049 |
| 37 | -0.079 | 38 | -0.128 | 39 | -0.168 | 40 | -0.215 |
| 41 | -0.287 | 42 | 0.860  | 43 | 0.010  | 44 | -0.303 |

TOTAL MEAN PRESSURE COEFFICIENT=-1.022

RUBBER PRESSURE COEFFICIENTS

RUBBER NUMBER=1  
DATE OF TEST =08/08/79  
RUN NUMBER =06

SPAN POSITION= 2

SKEG ANGLE,BETA(DEG)= 0

RUBBER ANGLE,ALPHA(DEG)= 0

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.975  | 2  | -0.002 | 3  | -0.379 | 4  | -0.712 |
| 5  | -0.553 | 6  | -0.516 | 7  | -0.380 | 8  | -0.311 |
| 9  | -0.497 | 10 | -0.732 | 11 | -0.521 | 12 | -0.451 |
| 13 | -0.377 | 14 | 0.047  | 15 | 0.718  | 16 | 0.054  |
| 17 | -0.237 | 18 | -0.260 | 19 | -0.226 | 20 | -0.231 |
| 21 | 0.055  | 22 | 0.056  | 23 | -0.319 | 24 | -0.216 |
| 25 | -0.138 | 26 | -0.053 | 27 | 0.056  | 28 | 0.130  |
| 29 | -0.174 | 30 | 0.031  | 31 | -0.118 | 32 | -0.268 |
| 33 | 0.053  | 34 | 0.059  | 35 | 0.051  | 36 | -0.311 |
| 37 | -0.216 | 38 | -0.168 | 39 | -0.064 | 40 | 0.053  |
| 41 | 0.119  | 42 | 0.987  | 43 | 0.048  | 44 | -0.235 |
| 45 | -0.473 | 46 | -0.728 | 47 | -0.724 | 48 | -0.440 |
| 49 | -0.516 | 50 | -0.516 | 51 | -0.130 | 52 | -0.221 |
| 53 | 0.047  | 54 | -0.376 | 55 | -0.493 | 56 | -0.718 |
| 57 | -0.626 | 58 | -0.533 | 59 | -0.502 | 60 | -0.533 |
| 61 | -0.292 | 62 | 0.047  | 63 | 0.047  | 64 | 0.047  |

TOTAL MEAN PRESSURE COEFFICIENT= .004

RUBBER ANGLE,ALPHA(DEG)= 5

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.860  | 2  | -0.271 | 3  | -0.875 | 4  | -1.078 |
| 5  | -0.755 | 6  | -0.641 | 7  | -0.460 | 8  | 0.231  |
| 9  | -0.084 | 10 | -0.414 | 11 | -0.358 | 12 | -0.352 |
| 13 | -0.319 | 14 | 0.040  | 15 | 0.715  | 16 | 0.047  |
| 17 | -0.329 | 18 | -0.361 | 19 | -0.291 | 20 | -0.298 |
| 21 | 0.041  | 22 | 0.044  | 23 | -0.371 | 24 | -0.250 |
| 25 | -0.159 | 26 | -0.059 | 27 | 0.063  | 28 | 0.135  |
| 29 | -0.153 | 30 | 0.023  | 31 | -0.085 | 32 | -0.097 |
| 33 | 0.043  | 34 | 0.053  | 35 | 0.040  | 36 | -0.283 |
| 37 | -0.211 | 38 | -0.179 | 39 | -0.097 | 40 | 0.005  |
| 41 | 0.060  | 42 | 0.970  | 43 | 0.038  | 44 | -0.440 |
| 45 | -0.707 | 46 | -0.978 | 47 | -0.938 | 48 | -0.579 |
| 49 | -0.655 | 50 | -0.645 | 51 | -0.192 | 52 | 0.046  |
| 53 | 0.041  | 54 | -0.153 | 55 | -0.285 | 56 | -0.485 |
| 57 | -0.429 | 58 | -0.361 | 59 | -0.339 | 60 | -0.364 |
| 61 | -0.206 | 62 | 0.040  | 63 | 0.039  | 64 | 0.040  |

TOTAL MEAN PRESSURE COEFFICIENT=-.172

RUBBER ANGLE,ALPHA(DEG)= 10

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.493  | 2  | -0.632 | 3  | -1.402 | 4  | -1.475 |
| 5  | -0.936 | 6  | -0.748 | 7  | -0.532 | 8  | 0.630  |
| 9  | 0.271  | 10 | -0.122 | 11 | -0.212 | 12 | -0.242 |
| 13 | -0.249 | 14 | 0.033  | 15 | 0.714  | 16 | 0.039  |
| 17 | -0.369 | 18 | -0.406 | 19 | -0.326 | 20 | -0.333 |
| 21 | 0.032  | 22 | 0.037  | 23 | -0.423 | 24 | -0.296 |
| 25 | -0.204 | 26 | -0.100 | 27 | 0.029  | 28 | 0.102  |
| 29 | -0.159 | 30 | 0.017  | 31 | -0.067 | 32 | -0.072 |
| 33 | 0.035  | 34 | 0.047  | 35 | 0.035  | 36 | -0.243 |
| 37 | -0.197 | 38 | -0.184 | 39 | -0.121 | 40 | -0.039 |
| 41 | 0.001  | 42 | 0.943  | 43 | 0.034  | 44 | -0.595 |
| 45 | -0.898 | 46 | -1.184 | 47 | -1.111 | 48 | -0.703 |
| 49 | -0.793 | 50 | -0.763 | 51 | -0.252 | 52 | 0.337  |
| 53 | 0.031  | 54 | 0.020  | 55 | -0.116 | 56 | -0.294 |
| 57 | -0.262 | 58 | -0.209 | 59 | -0.187 | 60 | -0.172 |
| 61 | 0.032  | 62 | 0.034  | 63 | 0.033  | 64 | 0.032  |

TOTAL MEAN PRESSURE COEFFICIENT=-.361

RUBBER ANGLE,ALPHA(DEG)= 20

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | -0.803 | 2  | -1.408 | 3  | -1.562 | 4  | -2.088 |
| 5  | -1.155 | 6  | -0.857 | 7  | -0.617 | 8  | 0.960  |
| 9  | 0.755  | 10 | 0.398  | 11 | 0.095  | 12 | -0.002 |
| 13 | -0.071 | 14 | 0.028  | 15 | 0.717  | 16 | 0.034  |
| 17 | -0.300 | 18 | -0.330 | 19 | -0.297 | 20 | -0.300 |
| 21 | 0.031  | 22 | 0.034  | 23 | -0.501 | 24 | -0.590 |
| 25 | -0.316 | 26 | -0.239 | 27 | -0.114 | 28 | -0.021 |
| 29 | -0.109 | 30 | 0.020  | 31 | -0.020 | 32 | 0.002  |
| 33 | 0.039  | 34 | 0.052  | 35 | 0.031  | 36 | -0.126 |
| 37 | -0.120 | 38 | -0.144 | 39 | -0.133 | 40 | -0.092 |
| 41 | -0.069 | 42 | 0.894  | 43 | 0.026  | 44 | -0.620 |
| 45 | -1.067 | 46 | -1.393 | 47 | -1.203 | 48 | -0.769 |
| 49 | -0.817 | 50 | -0.701 | 51 | -0.264 | 52 | 0.393  |
| 53 | 0.026  | 54 | 0.256  | 55 | 0.119  | 56 | -0.022 |
| 57 | 0.015  | 58 | 0.054  | 59 | 0.078  | 60 | 0.093  |
| 61 | 0.161  | 62 | 0.027  | 63 | 0.026  | 64 | 0.026  |

TOTAL MEAN PRESSURE COEFFICIENT=-.661

RUBBER ANGLE,ALPHA(DEG)= 30

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | -2.383 | 2  | -1.841 | 3  | -1.561 | 4  | -1.421 |
| 5  | -0.982 | 6  | -0.961 | 7  | -0.902 | 8  | 0.782  |
| 9  | 0.921  | 10 | 0.733  | 11 | 0.375  | 12 | 0.257  |
| 13 | 0.145  | 14 | 0.019  | 15 | 0.713  | 16 | 0.033  |
| 17 | -0.366 | 18 | -0.404 | 19 | -0.368 | 20 | -0.371 |
| 21 | 0.023  | 22 | 0.031  | 23 | -0.829 | 24 | -0.772 |
| 25 | -0.720 | 26 | -0.652 | 27 | -0.541 | 28 | -0.466 |
| 29 | -0.112 | 30 | 0.010  | 31 | -0.049 | 32 | 0.033  |
| 33 | 0.029  | 34 | 0.047  | 35 | 0.017  | 36 | 0.044  |
| 37 | -0.001 | 38 | -0.078 | 39 | -0.138 | 40 | -0.212 |
| 41 | -0.289 | 42 | 0.883  | 43 | 0.015  | 44 | -0.182 |
| 45 | -0.372 | 46 | -0.934 | 47 | -1.009 | 48 | -0.840 |
| 49 | -0.960 | 50 | -0.875 | 51 | -0.353 | 52 | 0.150  |
| 53 | 0.018  | 54 | 0.433  | 55 | 0.306  | 56 | 0.214  |
| 57 | 0.251  | 58 | 0.287  | 59 | 0.315  | 60 | 0.344  |
| 61 | 0.084  | 62 | 0.019  | 63 | 0.014  | 64 | 0.017  |

TOTAL MEAN PRESSURE COEFFICIENT=-.976

APPENDIX A2 (Cont.)

RUDDER PRESSURE COEFFICIENTS

RUDDER NUMBER=1  
DATE OF TEST =09/08/79  
RUN NUMBER =18

SPAN POSITION= 3

SKEG ANGLE,BETA(DEG)= 0

RUDDER ANGLE,ALPHA(DEG)= 0

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.992  | 2  | 0.016  | 3  | -0.475 | 4  | -0.758 |
| 5  | -0.576 | 6  | -0.537 | 7  | -0.427 | 8  | -0.288 |
| 9  | -0.556 | 10 | -0.697 | 11 | -0.529 | 12 | -0.446 |
| 13 | -0.446 | 14 | 0.047  | 15 | 1.524  | 16 | -0.023 |
| 17 | -0.249 | 18 | -0.257 | 19 | -0.242 | 20 | -0.248 |
| 21 | 0.032  | 22 | 0.020  | 23 | -0.366 | 24 | -0.226 |
| 25 | -0.144 | 26 | -0.048 | 27 | 0.073  | 28 | 0.147  |
| 29 | -0.173 | 30 | 0.026  | 31 | -0.133 | 32 | -0.275 |
| 33 | -0.001 | 34 | -0.066 | 35 | 0.041  | 36 | -0.355 |
| 37 | -0.242 | 38 | -0.162 | 39 | -0.066 | 40 | 0.056  |
| 41 | 0.142  | 42 | 0.988  | 43 | 0.050  | 44 | -0.235 |

TOTAL MEAN PRESSURE COEFFICIENT=-.002

RUDDER ANGLE,ALPHA(DEG)= 5

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.853  | 2  | -0.226 | 3  | -1.020 | 4  | -1.159 |
| 5  | -0.801 | 6  | -0.681 | 7  | -0.526 | 8  | 0.280  |
| 9  | -0.111 | 10 | -0.363 | 11 | -0.357 | 12 | -0.327 |
| 13 | -0.360 | 14 | 0.041  | 15 | 1.542  | 16 | -0.026 |
| 17 | -0.360 | 18 | -0.379 | 19 | -0.314 | 20 | -0.322 |
| 21 | 0.026  | 22 | 0.016  | 23 | -0.429 | 24 | -0.263 |
| 25 | -0.159 | 26 | -0.041 | 27 | 0.090  | 28 | 0.158  |
| 29 | -0.174 | 30 | 0.015  | 31 | -0.109 | 32 | -0.113 |
| 33 | -0.003 | 34 | -0.067 | 35 | 0.033  | 36 | -0.306 |
| 37 | -0.224 | 38 | -0.165 | 39 | -0.097 | 40 | 0.002  |
| 41 | 0.080  | 42 | 0.971  | 43 | 0.041  | 44 | -0.444 |

TOTAL MEAN PRESSURE COEFFICIENT=-.201

RUDDER ANGLE,ALPHA(DEG)= 10

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.464  | 2  | -0.570 | 3  | -1.541 | 4  | -1.524 |
| 5  | -0.986 | 6  | -0.791 | 7  | -0.602 | 8  | 0.688  |
| 9  | 0.276  | 10 | -0.043 | 11 | -0.179 | 12 | -0.195 |
| 13 | -0.257 | 14 | 0.034  | 15 | 1.560  | 16 | -0.037 |
| 17 | -0.418 | 18 | -0.443 | 19 | -0.359 | 20 | -0.366 |
| 21 | 0.005  | 22 | -0.005 | 23 | -0.483 | 24 | -0.309 |
| 25 | -0.195 | 26 | -0.066 | 27 | 0.065  | 28 | 0.115  |
| 29 | -0.182 | 30 | 0.007  | 31 | -0.094 | 32 | -0.077 |
| 33 | -0.018 | 34 | -0.081 | 35 | 0.024  | 36 | -0.246 |
| 37 | -0.193 | 38 | -0.158 | 39 | -0.119 | 40 | -0.050 |
| 41 | 0.010  | 42 | 0.941  | 43 | 0.032  | 44 | -0.628 |

TOTAL MEAN PRESSURE COEFFICIENT=-.403

RUDDER ANGLE,ALPHA(DEG)= 20

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | -0.814 | 2  | -1.324 | 3  | -1.556 | 4  | -2.022 |
| 5  | -1.115 | 6  | -0.788 | 7  | -0.574 | 8  | 0.989  |
| 9  | 0.771  | 10 | 0.462  | 11 | 0.153  | 12 | 0.070  |
| 13 | -0.042 | 14 | 0.029  | 15 | 1.565  | 16 | -0.037 |
| 17 | -0.344 | 18 | -0.357 | 19 | -0.315 | 20 | -0.318 |
| 21 | 0.013  | 22 | 0.002  | 23 | -0.474 | 24 | -0.373 |
| 25 | -0.326 | 26 | -0.256 | 27 | -0.157 | 28 | -0.110 |
| 29 | -0.137 | 30 | 0.025  | 31 | -0.052 | 32 | 0.010  |
| 33 | -0.020 | 34 | -0.077 | 35 | 0.020  | 36 | -0.095 |
| 37 | -0.098 | 38 | -0.114 | 39 | -0.126 | 40 | -0.110 |
| 41 | -0.088 | 42 | 0.891  | 43 | 0.025  | 44 | -0.631 |

TOTAL MEAN PRESSURE COEFFICIENT=-.674

RUDDER ANGLE,ALPHA(DEG)= 30

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | -2.562 | 2  | -2.049 | 3  | -1.564 | 4  | -1.971 |
| 5  | -1.055 | 6  | -1.020 | 7  | -0.709 | 8  | 0.765  |
| 9  | 0.934  | 10 | 0.817  | 11 | 0.457  | 12 | 0.359  |
| 13 | 0.213  | 14 | 0.016  | 15 | 1.573  | 16 | -0.047 |
| 17 | -0.408 | 18 | -0.432 | 19 | -0.368 | 20 | -0.368 |
| 21 | -0.002 | 22 | -0.009 | 23 | -0.629 | 24 | -0.656 |
| 25 | -0.687 | 26 | -0.694 | 27 | -0.667 | 28 | -0.600 |
| 29 | -0.137 | 30 | 0.016  | 31 | -0.079 | 32 | 0.044  |
| 33 | -0.025 | 34 | -0.081 | 35 | 0.007  | 36 | 0.111  |
| 37 | 0.056  | 38 | -0.018 | 39 | -0.096 | 40 | -0.181 |
| 41 | -0.263 | 42 | 0.858  | 43 | 0.013  | 44 | -0.289 |

TOTAL MEAN PRESSURE COEFFICIENT=-1.038

RUDDER PRESSURE COEFFICIENTS

RUDDER NUMBER=1  
DATE OF TEST =10/08/79  
RUN NUMBER =26

SPAN POSITION= 4

SKEG ANGLE,BETA(DEG)= 0

RUDDER ANGLE,ALPHA(DEG)= 0

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 1.003  | 2  | 0.005  | 3  | -0.488 | 4  | -0.671 |
| 5  | -0.554 | 6  | -0.472 | 7  | -0.465 | 8  | -0.214 |
| 9  | -0.469 | 10 | -0.642 | 11 | -0.491 | 12 | -0.467 |
| 13 | -0.477 | 14 | 0.048  | 15 | 0.271  | 16 | 0.092  |
| 17 | -0.245 | 18 | -0.254 | 19 | -0.241 | 20 | -0.247 |
| 21 | 0.066  | 22 | 0.076  | 23 | -0.391 | 24 | -0.242 |
| 25 | -0.140 | 26 | -0.029 | 27 | 0.084  | 28 | 0.151  |
| 29 | -0.173 | 30 | 0.023  | 31 | -0.104 | 32 | -0.270 |
| 33 | 0.081  | 34 | 0.117  | 35 | 0.061  | 36 | -0.378 |
| 37 | -0.255 | 38 | -0.157 | 39 | -0.068 | 40 | 0.009  |
| 41 | 0.131  | 42 | 0.990  | 43 | 0.048  | 44 | -0.239 |

TOTAL MEAN PRESSURE COEFFICIENT= 0

RUDDER ANGLE,ALPHA(DEG)= 5

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.853  | 2  | -0.217 | 3  | -0.940 | 4  | -0.960 |
| 5  | -0.719 | 6  | -0.607 | 7  | -0.631 | 8  | 0.327  |
| 9  | -0.069 | 10 | -0.360 | 11 | -0.340 | 12 | -0.333 |
| 13 | -0.339 | 14 | 0.041  | 15 | 0.284  | 16 | 0.087  |
| 17 | -0.355 | 18 | -0.376 | 19 | -0.316 | 20 | -0.325 |
| 21 | 0.054  | 22 | 0.066  | 23 | -0.500 | 24 | -0.295 |
| 25 | -0.161 | 26 | -0.034 | 27 | 0.081  | 28 | 0.136  |
| 29 | -0.176 | 30 | 0.008  | 31 | -0.088 | 32 | -0.172 |
| 33 | 0.070  | 34 | 0.110  | 35 | 0.046  | 36 | -0.303 |
| 37 | -0.226 | 38 | -0.153 | 39 | -0.094 | 40 | 0.005  |
| 41 | 0.066  | 42 | 0.972  | 43 | 0.041  | 44 | -0.442 |

TOTAL MEAN PRESSURE COEFFICIENT=-.202

RUDDER ANGLE,ALPHA(DEG)= 10

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.482  | 2  | -0.501 | 3  | -1.374 | 4  | -1.226 |
| 5  | -0.856 | 6  | -0.688 | 7  | -0.704 | 8  | 0.731  |
| 9  | 0.294  | 10 | -0.065 | 11 | -0.174 | 12 | -0.190 |
| 13 | -0.212 | 14 | 0.034  | 15 | -0.282 | 16 | -0.065 |
| 17 | -0.422 | 18 | -0.448 | 19 | -0.371 | 20 | -0.379 |
| 21 | 0.036  | 22 | 0.044  | 23 | -0.617 | 24 | -0.378 |
| 25 | -0.244 | 26 | -0.134 | 27 | -0.019 | 28 | 0.037  |
| 29 | -0.182 | 30 | -0.002 | 31 | -0.073 | 32 | -0.075 |
| 33 | 0.052  | 34 | 0.091  | 35 | 0.037  | 36 | -0.219 |
| 37 | -0.178 | 38 | -0.139 | 39 | -0.116 | 40 | -0.055 |
| 41 | -0.025 | 42 | 0.937  | 43 | 0.033  | 44 | -0.636 |

TOTAL MEAN PRESSURE COEFFICIENT=-.416

RUDDER ANGLE,ALPHA(DEG)= 20

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | -0.539 | 2  | -0.980 | 3  | -1.535 | 4  | -1.407 |
| 5  | -0.805 | 6  | -0.466 | 7  | -0.419 | 8  | 1.024  |
| 9  | 0.786  | 10 | 0.457  | 11 | 0.153  | 12 | 0.086  |
| 13 | 0.041  | 14 | 0.028  | 15 | 0.293  | 16 | 0.069  |
| 17 | -0.336 | 18 | -0.351 | 19 | -0.312 | 20 | -0.315 |
| 21 | 0.039  | 22 | 0.049  | 23 | -0.501 | 24 | -0.477 |
| 25 | -0.488 | 26 | -0.487 | 27 | -0.469 | 28 | -0.450 |
| 29 | -0.124 | 30 | 0.028  | 31 | -0.022 | 32 | 0.017  |
| 33 | 0.060  | 34 | 0.103  | 35 | 0.037  | 36 | -0.043 |
| 37 | -0.084 | 38 | -0.110 | 39 | -0.173 | 40 | -0.226 |
| 41 | -0.304 | 42 | 0.895  | 43 | 0.027  | 44 | -0.626 |

TOTAL MEAN PRESSURE COEFFICIENT=-.645

RUDDER ANGLE,ALPHA(DEG)= 30

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | -1.650 | 2  | -1.188 | 3  | -1.547 | 4  | -1.052 |
| 5  | -0.718 | 6  | -0.626 | 7  | -0.600 | 8  | 0.371  |
| 9  | 0.953  | 10 | 0.841  | 11 | 0.478  | 12 | 0.387  |
| 13 | 0.316  | 14 | 0.016  | 15 | 0.304  | 16 | 0.068  |
| 17 | -0.390 | 18 | -0.413 | 19 | -0.337 | 20 | -0.342 |
| 21 | 0.038  | 22 | 0.048  | 23 | -0.606 | 24 | -0.618 |
| 25 | -0.629 | 26 | -0.633 | 27 | -0.635 | 28 | -0.616 |
| 29 | -0.133 | 30 | 0.012  | 31 | -0.048 | 32 | 0.049  |
| 33 | 0.055  | 34 | 0.101  | 35 | 0.023  | 36 | 0.196  |
| 37 | 0.100  | 38 | 0.011  | 39 | -0.113 | 40 | -0.251 |
| 41 | -0.384 | 42 | 0.858  | 43 | 0.014  | 44 | -0.287 |

TOTAL MEAN PRESSURE COEFFICIENT=-.706

RUBBER NUMBER=1  
DATE OF TEST =10/00/79  
RUN NUMBER =29

APPENDIX A2 (Cont.)

RUBBER NUMBER=1  
DATE OF TEST =10/00/79  
RUN NUMBER =37

SPAN POSITION= 5

SKEG ANGLE,BETA( DEG)= 0

RUBBER ANGLE,ALPHA( DEG)= 0

Table with 4 columns of data for Rudder Angle Alpha = 0, Skew Angle Beta = 0, Span Position = 5. Values range from 0.217 to -0.531.

MEAN PRESSURE COEFFICIENT(SKEG) =-.005  
MEAN PRESSURE COEFFICIENT(RUDDER) =-.019

RUBBER ANGLE,ALPHA( DEG)= 5

Table with 4 columns of data for Rudder Angle Alpha = 5, Skew Angle Beta = 0, Span Position = 5. Values range from 0.224 to -0.435.

MEAN PRESSURE COEFFICIENT(SKEG) =-.117  
MEAN PRESSURE COEFFICIENT(RUDDER) =-.066

RUBBER ANGLE,ALPHA( DEG)= 10

Table with 4 columns of data for Rudder Angle Alpha = 10, Skew Angle Beta = 0, Span Position = 5. Values range from 0.237 to -0.258.

MEAN PRESSURE COEFFICIENT(SKEG) =-.219  
MEAN PRESSURE COEFFICIENT(RUDDER) =-.184

RUBBER ANGLE,ALPHA( DEG)= 20

Table with 4 columns of data for Rudder Angle Alpha = 20, Skew Angle Beta = 0, Span Position = 5. Values range from 0.249 to -0.173.

MEAN PRESSURE COEFFICIENT(SKEG) =-.31  
MEAN PRESSURE COEFFICIENT(RUDDER) =-.302

RUBBER ANGLE,ALPHA( DEG)= 30

Table with 4 columns of data for Rudder Angle Alpha = 30, Skew Angle Beta = 0, Span Position = 5. Values range from 0.249 to -0.123.

MEAN PRESSURE COEFFICIENT(SKEG) =-.322  
MEAN PRESSURE COEFFICIENT(RUDDER) =-.483

SPAN POSITION= 6

SKEG ANGLE,BETA( DEG)= 0

RUBBER ANGLE,ALPHA( DEG)= 0

Table with 4 columns of data for Rudder Angle Alpha = 0, Skew Angle Beta = 0, Span Position = 6. Values range from 0.162 to -0.618.

MEAN PRESSURE COEFFICIENT(SKEG) =-.002  
MEAN PRESSURE COEFFICIENT(RUDDER) =.024

RUBBER ANGLE,ALPHA( DEG)= 5

Table with 4 columns of data for Rudder Angle Alpha = 5, Skew Angle Beta = 0, Span Position = 6. Values range from 0.164 to -0.456.

MEAN PRESSURE COEFFICIENT(SKEG) =-.09  
MEAN PRESSURE COEFFICIENT(RUDDER) =-.113

RUBBER ANGLE,ALPHA( DEG)= 10

Table with 4 columns of data for Rudder Angle Alpha = 10, Skew Angle Beta = 0, Span Position = 6. Values range from 0.163 to -0.458.

MEAN PRESSURE COEFFICIENT(SKEG) =-.172  
MEAN PRESSURE COEFFICIENT(RUDDER) =-.247

RUBBER ANGLE,ALPHA( DEG)= 20

Table with 4 columns of data for Rudder Angle Alpha = 20, Skew Angle Beta = 0, Span Position = 6. Values range from 0.159 to -0.360.

MEAN PRESSURE COEFFICIENT(SKEG) =-.245  
MEAN PRESSURE COEFFICIENT(RUDDER) =-.37

RUBBER ANGLE,ALPHA( DEG)= 30

Table with 4 columns of data for Rudder Angle Alpha = 30, Skew Angle Beta = 0, Span Position = 6. Values range from 0.155 to -0.449.

MEAN PRESSURE COEFFICIENT(SKEG) =-.3  
MEAN PRESSURE COEFFICIENT(RUDDER) =-.548

RUDDER NUMBER=1  
DATE OF TEST =14/08/77  
RUN NUMBER =43

APPENDIX A2 (Cont.)

RUDDER NUMBER=1  
DATE OF TEST =14/08/77  
RUN NUMBER =51

SPAN POSITION= 7

SPAN POSITION= 8

SKED ANGLE,BETA(DEC)= 0

SKED ANGLE,BETA(DEC)= 0

RUDDER ANGLE,ALPHA(DEC)= 0

RUDDER ANGLE,ALPHA(DEC)= 0

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 1.442  | 2  | 0.052  | 3  | -0.215 | 4  | 0.544  |
| 5  | 1.278  | 6  | 1.149  | 7  | 1.421  | 8  | 0.619  |
| 9  | -0.194 | 10 | -0.177 | 11 | 0.050  | 12 | 0.049  |
| 13 | -0.083 | 14 | -0.163 | 15 | 1.510  | 16 | -0.297 |
| 17 | -0.304 | 18 | -0.318 | 19 | -0.324 | 20 | -0.391 |
| 21 | -0.405 | 22 | -0.443 | 23 | -0.353 | 24 | -0.230 |
| 25 | -0.119 | 26 | -0.018 | 27 | 0.096  | 28 | 0.160  |
| 29 | -0.274 | 30 | -0.270 | 31 | -0.268 | 32 | -0.279 |
| 33 | -0.410 | 34 | -0.494 | 35 | -0.447 | 36 | -0.344 |
| 37 | -0.243 | 38 | -0.149 | 39 | -0.051 | 40 | 0.052  |
| 41 | 0.126  | 42 | 0.993  | 43 | 0.049  | 44 | -0.234 |
| 45 | -0.488 | 46 | -0.673 | 47 | -0.635 | 48 | -0.539 |
| 49 | -0.531 | 50 | -0.495 | 51 | -0.299 | 52 | -0.285 |
| 53 | 0.048  | 54 | -0.134 | 55 | -0.464 | 56 | -0.699 |
| 57 | -0.571 | 58 | -0.488 | 59 | -0.493 | 60 | -0.465 |
| 61 | -0.274 | 62 | 0.048  | 63 | 0.050  | 64 | 0.050  |

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 1.299  | 2  | 0.051  | 3  | -0.220 | 4  | 0.249  |
| 5  | 1.201  | 6  | 0.105  | 7  | 1.299  | 8  | 0.357  |
| 9  | -0.196 | 10 | -0.187 | 11 | 0.053  | 12 | 0.051  |
| 13 | -0.092 | 14 | -0.147 | 15 | 1.516  | 16 | -0.256 |
| 17 | -0.246 | 18 | -0.246 | 19 | -0.259 | 20 | -0.299 |
| 21 | -0.434 | 22 | -0.415 | 23 | -0.324 | 24 | -0.244 |
| 25 | -0.120 | 26 | -0.031 | 27 | 0.061  | 28 | 0.124  |
| 29 | -0.253 | 30 | -0.244 | 31 | -0.262 | 32 | -0.302 |
| 33 | -0.136 | 34 | -0.540 | 35 | -0.441 | 36 | -0.327 |
| 37 | -0.234 | 38 | -0.130 | 39 | -0.042 | 40 | 0.030  |
| 41 | 0.087  | 42 | 0.986  | 43 | 0.040  | 44 | -0.216 |
| 45 | -0.446 | 46 | -0.578 | 47 | -0.496 | 48 | -0.487 |
| 49 | -0.404 | 50 | -0.425 | 51 | -0.248 | 52 | -0.257 |
| 53 | 0.049  | 54 | 0.002  | 55 | -0.335 | 56 | -0.601 |
| 57 | -0.416 | 58 | -0.400 | 59 | -0.429 | 60 | -0.509 |
| 61 | -0.246 | 62 | 0.047  | 63 | 0.050  | 64 | 0.050  |

MEAN PRESSURE COEFFICIENT(SKEG) = -.01  
MEAN PRESSURE COEFFICIENT(RUDDER) = .012

MEAN PRESSURE COEFFICIENT(SKEG) = -.012  
MEAN PRESSURE COEFFICIENT(RUDDER) = .015

RUDDER ANGLE,ALPHA(DEC)= 5

RUDDER ANGLE,ALPHA(DEC)= 5

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 1.460  | 2  | 0.045  | 3  | -0.243 | 4  | 0.546  |
| 5  | 1.304  | 6  | 1.161  | 7  | 1.445  | 8  | 0.628  |
| 9  | -0.192 | 10 | -0.194 | 11 | 0.041  | 12 | 0.040  |
| 13 | -0.134 | 14 | -0.246 | 15 | 1.530  | 16 | -0.389 |
| 17 | -0.367 | 18 | -0.431 | 19 | -0.464 | 20 | -0.864 |
| 21 | -0.812 | 22 | -0.679 | 23 | -0.450 | 24 | -0.263 |
| 25 | -0.115 | 26 | -0.006 | 27 | 0.070  | 28 | 0.077  |
| 29 | -0.400 | 30 | -0.396 | 31 | -0.484 | 32 | -1.006 |
| 33 | 0.257  | 34 | -0.159 | 35 | -0.203 | 36 | -0.233 |
| 37 | -0.193 | 38 | -0.141 | 39 | -0.082 | 40 | -0.037 |
| 41 | 0.001  | 42 | 0.979  | 43 | 0.042  | 44 | -0.420 |
| 45 | -0.675 | 46 | -0.850 | 47 | -0.800 | 48 | -0.701 |
| 49 | -0.685 | 50 | -0.651 | 51 | -0.349 | 52 | -0.403 |
| 53 | 0.041  | 54 | 0.031  | 55 | -0.309 | 56 | -0.545 |
| 57 | -0.436 | 58 | -0.358 | 59 | -0.361 | 60 | -0.378 |
| 61 | -0.387 | 62 | 0.041  | 63 | 0.042  | 64 | 0.041  |

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 1.319  | 2  | 0.045  | 3  | -0.251 | 4  | 0.256  |
| 5  | 1.229  | 6  | 0.123  | 7  | 1.332  | 8  | 0.375  |
| 9  | -0.189 | 10 | -0.187 | 11 | 0.041  | 12 | 0.040  |
| 13 | -0.122 | 14 | -0.230 | 15 | 1.534  | 16 | -0.350 |
| 17 | -0.338 | 18 | -0.358 | 19 | -0.395 | 20 | -0.668 |
| 21 | -0.746 | 22 | -0.632 | 23 | -0.438 | 24 | -0.301 |
| 25 | -0.138 | 26 | -0.027 | 27 | 0.058  | 28 | 0.096  |
| 29 | -0.341 | 30 | -0.276 | 31 | -0.309 | 32 | -0.489 |
| 33 | 0.417  | 34 | -0.195 | 35 | -0.221 | 36 | -0.222 |
| 37 | -0.187 | 38 | -0.126 | 39 | -0.063 | 40 | -0.011 |
| 41 | 0.009  | 42 | 0.981  | 43 | 0.039  | 44 | -0.384 |
| 45 | -0.608 | 46 | -0.724 | 47 | -0.627 | 48 | -0.625 |
| 49 | -0.542 | 50 | -0.575 | 51 | -0.327 | 52 | -0.359 |
| 53 | 0.038  | 54 | 0.136  | 55 | -0.206 | 56 | -0.467 |
| 57 | -0.309 | 58 | -0.292 | 59 | -0.295 | 60 | -0.348 |
| 61 | -0.294 | 62 | 0.040  | 63 | 0.040  | 64 | 0.039  |

MEAN PRESSURE COEFFICIENT(SKEG) = -.096  
MEAN PRESSURE COEFFICIENT(RUDDER) = -.083

MEAN PRESSURE COEFFICIENT(SKEG) = -.088  
MEAN PRESSURE COEFFICIENT(RUDDER) = -.087

RUDDER ANGLE,ALPHA(DEC)= 10

RUDDER ANGLE,ALPHA(DEC)= 10

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 1.474  | 2  | 0.036  | 3  | -0.281 | 4  | 0.544  |
| 5  | 1.316  | 6  | 1.160  | 7  | 1.454  | 8  | 0.629  |
| 9  | -0.208 | 10 | -0.223 | 11 | 0.031  | 12 | 0.029  |
| 13 | -0.171 | 14 | -0.265 | 15 | 1.543  | 16 | -0.371 |
| 17 | -0.371 | 18 | -0.492 | 19 | -0.650 | 20 | -1.007 |
| 21 | -0.721 | 22 | -0.527 | 23 | -0.354 | 24 | -0.356 |
| 25 | -0.329 | 26 | -0.250 | 27 | -0.154 | 28 | -0.111 |
| 29 | -0.442 | 30 | -0.453 | 31 | -0.572 | 32 | -1.061 |
| 33 | 0.687  | 34 | 0.170  | 35 | 0.022  | 36 | -0.122 |
| 37 | -0.140 | 38 | -0.127 | 39 | -0.108 | 40 | -0.118 |
| 41 | -0.119 | 42 | 0.955  | 43 | 0.037  | 44 | -0.570 |
| 45 | -0.798 | 46 | -0.950 | 47 | -0.886 | 48 | -0.781 |
| 49 | -0.737 | 50 | -0.684 | 51 | -0.367 | 52 | -0.430 |
| 53 | 0.032  | 54 | 0.172  | 55 | -0.170 | 56 | -0.399 |
| 57 | -0.301 | 58 | -0.225 | 59 | -0.213 | 60 | -0.210 |
| 61 | -0.445 | 62 | 0.033  | 63 | 0.036  | 64 | 0.036  |

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 1.330  | 2  | 0.038  | 3  | -0.279 | 4  | 0.253  |
| 5  | 1.235  | 6  | 0.114  | 7  | 1.335  | 8  | 0.369  |
| 9  | -0.201 | 10 | -0.208 | 11 | 0.029  | 12 | 0.028  |
| 13 | -0.179 | 14 | -0.254 | 15 | 1.552  | 16 | -0.348 |
| 17 | -0.334 | 18 | -0.407 | 19 | -0.502 | 20 | -0.919 |
| 21 | -0.833 | 22 | -0.624 | 23 | -0.354 | 24 | -0.317 |
| 25 | -0.299 | 26 | -0.195 | 27 | -0.090 | 28 | -0.053 |
| 29 | -0.386 | 30 | -0.316 | 31 | -0.253 | 32 | -0.373 |
| 33 | 0.337  | 34 | 0.172  | 35 | 0.016  | 36 | -0.107 |
| 37 | -0.124 | 38 | -0.112 | 39 | -0.095 | 40 | -0.094 |
| 41 | -0.126 | 42 | 0.961  | 43 | 0.031  | 44 | -0.519 |
| 45 | -0.726 | 46 | -0.828 | 47 | -0.712 | 48 | -0.703 |
| 49 | -0.599 | 50 | -0.625 | 51 | -0.331 | 52 | -0.397 |
| 53 | 0.032  | 54 | 0.245  | 55 | -0.095 | 56 | -0.351 |
| 57 | -0.209 | 58 | -0.186 | 59 | -0.170 | 60 | -0.171 |
| 61 | -0.315 | 62 | 0.032  | 63 | 0.034  | 64 | 0.034  |

MEAN PRESSURE COEFFICIENT(SKEG) = -.161  
MEAN PRESSURE COEFFICIENT(RUDDER) = -.181

MEAN PRESSURE COEFFICIENT(SKEG) = -.145  
MEAN PRESSURE COEFFICIENT(RUDDER) = -.183

RUDDER ANGLE,ALPHA(DEC)= 20

RUDDER ANGLE,ALPHA(DEC)= 20

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 1.482  | 2  | 0.030  | 3  | -0.301 | 4  | 0.539  |
| 5  | 1.323  | 6  | 1.156  | 7  | 1.466  | 8  | 0.630  |
| 9  | -0.162 | 10 | -0.177 | 11 | 0.029  | 12 | 0.029  |
| 13 | -0.169 | 14 | -0.139 | 15 | 1.556  | 16 | -0.181 |
| 17 | -0.211 | 18 | -0.276 | 19 | -0.609 | 20 | -0.437 |
| 21 | -0.337 | 22 | -0.337 | 23 | -0.354 | 24 | -0.392 |
| 25 | -0.413 | 26 | -0.425 | 27 | -0.415 | 28 | -0.390 |
| 29 | -0.305 | 30 | -0.366 | 31 | -0.545 | 32 | -0.766 |
| 33 | -0.519 | 34 | 0.798  | 35 | 0.435  | 36 | 0.086  |
| 37 | -0.019 | 38 | -0.095 | 39 | -0.155 | 40 | -0.267 |
| 41 | -0.330 | 42 | 0.901  | 43 | 0.030  | 44 | -0.673 |
| 45 | -0.866 | 46 | -0.972 | 47 | -0.864 | 48 | -0.714 |
| 49 | -0.627 | 50 | -0.481 | 51 | -0.190 | 52 | -0.295 |
| 53 | 0.028  | 54 | 0.350  | 55 | 0.035  | 56 | -0.169 |
| 57 | -0.081 | 58 | 0.004  | 59 | 0.049  | 60 | 0.110  |
| 61 | -0.448 | 62 | 0.026  | 63 | 0.028  | 64 | 0.028  |

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 1.331  | 2  | 0.031  | 3  | -0.286 | 4  | 0.252  |
| 5  | 1.233  | 6  | 0.109  | 7  | 1.334  | 8  | 0.361  |
| 9  | -0.142 | 10 | -0.142 | 11 | 0.025  | 12 | 0.023  |
| 13 | -0.174 | 14 | -0.164 | 15 | 1.558  | 16 | -0.234 |
| 17 | -0.244 | 18 | -0.275 | 19 | -0.547 | 20 | -0.523 |
| 21 | -0.355 | 22 | -0.339 | 23 | -0.348 | 24 | -0.372 |
| 25 | -0.378 | 26 | -0.361 | 27 | -0.334 | 28 | -0.306 |
| 29 | -0.358 | 30 | -0.282 | 31 | -0.239 | 32 | -0.328 |
| 33 | -0.388 | 34 | 0.727  | 35 | 0.444  | 36 | 0.096  |
| 37 | -0.015 | 38 | -0.073 | 39 | -0.133 | 40 | -0.220 |
| 41 | -0.325 | 42 | 0.918  | 43 | 0.027  | 44 | -0.593 |
| 45 | -0.774 | 46 | -0.828 | 47 | -0.687 | 48 | -0.645 |
| 49 | -0.513 | 50 | -0.454 | 51 | -0.205 | 52 | -0.291 |
| 53 | 0.026  | 54 | 0.382  | 55 | 0.074  | 56 | -0.155 |
| 57 | -0.024 | 58 | 0.010  | 59 | 0.062  | 60 | 0.145  |
| 61 | -0.253 | 62 | 0.026  | 63 | 0.028  | 64 | 0.027  |

MEAN PRESSURE COEFFICIENT(SKEG) = -.218  
MEAN PRESSURE COEFFICIENT(RUDDER) = -.288

MEAN PRESSURE COEFFICIENT(SKEG) = -.193  
MEAN PRESSURE COEFFICIENT(RUDDER) = -.275

RUDDER ANGLE,ALPHA(DEC)= 30

RUDDER ANGLE,ALPHA(DEC)= 30

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 1.483  | 2  | 0.021  | 3  | -0.293 | 4  | 0.529  |
| 5  | 1.323  | 6  | 1.147  | 7  | 1.462  | 8  | 0.625  |
| 9  | -0.134 | 10 | -0.155 | 11 | 0.014  | 12 | 0.011  |
| 13 | -0.142 | 14 | -0.157 | 15 | 1.557  | 16 | -0.248 |
| 17 | -0.311 | 18 | -0.569 | 19 | -0.618 | 20 | -0.440 |
| 21 | -0.423 | 22 | -0.426 | 23 | -0.467 | 24 | -0.506 |
| 25 | -0.519 | 26 | -0.524 | 27 | -0.504 | 28 | -0.484 |
| 29 | -0.353 | 30 | -0.539 | 31 | -1.011 | 32 | -1.120 |
| 33 | -0.478 | 34 | -0.005 | 35 | 0.029  | 36 | 0.337  |
| 37 | 0.166  | 38 | 0.038  | 39 | -0.066 | 40 | -0.237 |
| 41 | -0.339 | 42 | 0.833  | 43 | 0.015  | 44 | -0.806 |
| 45 | -0.957 | 46 | -1.039 | 47 | -0.915 | 48 | -0.760 |
| 49 | -0.667 | 50 | -0.511 | 51 | -0.246 | 52 | -0.484 |
| 53 | 0.022  | 54 | 0.531  | 55 | 0.242  | 56 | 0.070  |
| 57 | 0.152  | 58 | 0.241  | 59 | 0.313  | 60 | 0.411  |
| 61 | -0.804 | 62 | 0.017  | 63 | 0.017  | 64 | 0.016  |

|   |       |   |       |   |        |   |       |
|---|-------|---|-------|---|--------|---|-------|
| 1 | 1.327 | 2 | 0.021 | 3 | -0.294 | 4 | 0.246 |
| 5 | 1.212 | 6 | 0.097 | 7 | 1.328  | 8 | 0.351 |

APPENDIX A2 (Cont.)

RUDDER PRESSURE COEFFICIENTS

RUDDER NUMBER=1  
DATE OF TEST =09/08/79  
RUN NUMBER =11

SPAN POSITION= 1

SKEG ANGLE, BETA(DEG)= 0 WITHOUT TRANSITION STRIP

RUDDER ANGLE, ALPHA(DEG)= 0

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.947  | 2  | 0.018  | 3  | -0.402 | 4  | -0.739 |
| 5  | -0.536 | 6  | -0.432 | 7  | -0.327 | 8  | -0.252 |
| 9  | -0.538 | 10 | -0.591 | 11 | -0.494 | 12 | -0.428 |
| 13 | -0.382 | 14 | 0.047  | 15 | 1.523  | 16 | 0.078  |
| 17 | -0.244 | 18 | -0.265 | 19 | -0.225 | 20 | -0.227 |
| 21 | 0.057  | 22 | 0.070  | 23 | -0.272 | 24 | -0.193 |
| 25 | -0.152 | 26 | -0.079 | 27 | 0.023  | 28 | 0.112  |
| 29 | -0.177 | 30 | 0.028  | 31 | -0.159 | 32 | -0.265 |
| 33 | 0.071  | 34 | 0.089  | 35 | 0.056  | 36 | -0.269 |
| 37 | -0.194 | 38 | -0.167 | 39 | -0.084 | 40 | 0.017  |
| 41 | 0.095  | 42 | 0.985  | 43 | 0.047  | 44 | -0.244 |

TOTAL MEAN PRESSURE COEFFICIENT= .086

RUDDER ANGLE, ALPHA(DEG)= 5

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.846  | 2  | -0.193 | 3  | -0.843 | 4  | -1.101 |
| 5  | -0.681 | 6  | -0.524 | 7  | -0.400 | 8  | 0.222  |
| 9  | -0.142 | 10 | -0.327 | 11 | -0.369 | 12 | -0.334 |
| 13 | -0.303 | 14 | 0.040  | 15 | 1.533  | 16 | 0.076  |
| 17 | -0.337 | 18 | -0.375 | 19 | -0.297 | 20 | -0.302 |
| 21 | 0.056  | 22 | 0.065  | 23 | -0.329 | 24 | -0.243 |
| 25 | -0.192 | 26 | -0.115 | 27 | -0.012 | 28 | 0.081  |
| 29 | -0.163 | 30 | 0.019  | 31 | -0.109 | 32 | -0.109 |
| 33 | 0.070  | 34 | 0.092  | 35 | 0.049  | 36 | -0.253 |
| 37 | -0.190 | 38 | -0.178 | 39 | -0.111 | 40 | -0.020 |
| 41 | 0.058  | 42 | 0.965  | 43 | 0.039  | 44 | -0.458 |

TOTAL MEAN PRESSURE COEFFICIENT=-.164

RUDDER ANGLE, ALPHA(DEG)= 10

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.511  | 2  | -0.502 | 3  | -1.344 | 4  | -1.463 |
| 5  | -0.833 | 6  | -0.639 | 7  | -0.496 | 8  | 0.588  |
| 9  | 0.210  | 10 | -0.063 | 11 | -0.234 | 12 | -0.252 |
| 13 | -0.250 | 14 | 0.032  | 15 | 1.556  | 16 | -0.071 |
| 17 | -0.452 | 18 | -0.498 | 19 | -0.390 | 20 | -0.398 |
| 21 | 0.048  | 22 | 0.057  | 23 | -0.423 | 24 | -0.333 |
| 25 | -0.280 | 26 | -0.209 | 27 | -0.116 | 28 | -0.004 |
| 29 | -0.194 | 30 | 0.007  | 31 | -0.102 | 32 | -0.082 |
| 33 | 0.063  | 34 | 0.086  | 35 | 0.035  | 36 | -0.238 |
| 37 | -0.192 | 38 | -0.185 | 39 | -0.154 | 40 | -0.075 |
| 41 | -0.003 | 42 | 0.922  | 43 | 0.030  | 44 | -0.702 |

TOTAL MEAN PRESSURE COEFFICIENT=-.359

RUDDER ANGLE, ALPHA(DEG)= 20

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | -0.778 | 2  | -1.288 | 3  | -1.568 | 4  | -2.116 |
| 5  | -1.136 | 6  | -0.865 | 7  | -0.705 | 8  | 0.907  |
| 9  | 0.693  | 10 | 0.377  | 11 | 0.034  | 12 | -0.065 |
| 13 | -0.137 | 14 | 0.016  | 15 | 1.581  | 16 | 0.054  |
| 17 | -0.609 | 18 | -0.665 | 19 | -0.538 | 20 | -0.548 |
| 21 | 0.025  | 22 | 0.035  | 23 | -0.642 | 24 | -0.588 |
| 25 | -0.632 | 26 | -0.707 | 27 | -0.672 | 28 | -0.459 |
| 29 | -0.243 | 30 | 0.007  | 31 | -0.105 | 32 | -0.029 |
| 33 | 0.040  | 34 | 0.074  | 35 | 0.020  | 36 | -0.166 |
| 37 | -0.163 | 38 | -0.184 | 39 | -0.180 | 40 | -0.140 |
| 41 | -0.110 | 42 | 0.840  | 43 | 0.015  | 44 | -0.846 |

TOTAL MEAN PRESSURE COEFFICIENT=-.799

RUDDER ANGLE, ALPHA(DEG)= 30

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | -2.243 | 2  | -1.845 | 3  | -1.549 | 4  | -2.144 |
| 5  | -0.986 | 6  | -0.697 | 7  | -0.673 | 8  | 0.775  |
| 9  | 0.858  | 10 | 0.657  | 11 | 0.268  | 12 | 0.133  |
| 13 | 0.027  | 14 | 0.020  | 15 | 1.563  | 16 | 0.056  |
| 17 | -0.380 | 18 | -0.430 | 19 | -0.404 | 20 | -0.405 |
| 21 | 0.032  | 22 | 0.042  | 23 | -0.774 | 24 | -0.936 |
| 25 | -1.066 | 26 | -1.044 | 27 | -0.874 | 28 | -0.731 |
| 29 | -0.134 | 30 | 0.012  | 31 | -0.080 | 32 | 0.024  |
| 33 | 0.043  | 34 | 0.076  | 35 | 0.019  | 36 | -0.043 |
| 37 | -0.073 | 38 | -0.131 | 39 | -0.102 | 40 | -0.242 |
| 41 | -0.337 | 42 | 0.879  | 43 | 0.017  | 44 | -0.209 |

TOTAL MEAN PRESSURE COEFFICIENT=-1.015

RUDDER PRESSURE COEFFICIENTS

RUDDER NUMBER=1  
DATE OF TEST =08/08/79  
RUN NUMBER =10

SPAN POSITION= 2

SKEG ANGLE, BETA(DEG)= 0 WITHOUT TRANSITION STRIP

RUDDER ANGLE, ALPHA(DEG)= 0

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.969  | 2  | 0.004  | 3  | -0.445 | 4  | -0.767 |
| 5  | -0.579 | 6  | -0.514 | 7  | -0.373 | 8  | -0.322 |
| 9  | -0.565 | 10 | -0.770 | 11 | -0.528 | 12 | -0.464 |
| 13 | -0.378 | 14 | 0.048  | 15 | 1.327  | 16 | 0.054  |
| 17 | -0.269 | 18 | -0.274 | 19 | -0.228 | 20 | -0.233 |
| 21 | 0.051  | 22 | 0.048  | 23 | -0.321 | 24 | -0.218 |
| 25 | -0.141 | 26 | -0.058 | 27 | 0.051  | 28 | 0.134  |
| 29 | -0.179 | 30 | 0.024  | 31 | -0.110 | 32 | -0.269 |
| 33 | 0.052  | 34 | 0.064  | 35 | 0.052  | 36 | -0.317 |
| 37 | -0.221 | 38 | -0.174 | 39 | -0.071 | 40 | 0.049  |
| 41 | 0.121  | 42 | 0.987  | 43 | 0.049  | 44 | -0.250 |

TOTAL MEAN PRESSURE COEFFICIENT= .084

RUDDER ANGLE, ALPHA(DEG)= 5

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.852  | 2  | -0.236 | 3  | -0.964 | 4  | -1.157 |
| 5  | -0.813 | 6  | -0.654 | 7  | -0.465 | 8  | 0.230  |
| 9  | -0.130 | 10 | -0.440 | 11 | -0.373 | 12 | -0.360 |
| 13 | -0.323 | 14 | 0.041  | 15 | 1.345  | 16 | 0.051  |
| 17 | -0.377 | 18 | -0.386 | 19 | -0.304 | 20 | -0.312 |
| 21 | 0.041  | 22 | 0.044  | 23 | -0.379 | 24 | -0.255 |
| 25 | -0.162 | 26 | -0.065 | 27 | 0.061  | 28 | 0.144  |
| 29 | -0.181 | 30 | 0.012  | 31 | -0.091 | 32 | -0.112 |
| 33 | 0.044  | 34 | 0.055  | 35 | 0.042  | 36 | -0.291 |
| 37 | -0.211 | 38 | -0.183 | 39 | -0.099 | 40 | 0.003  |
| 41 | 0.062  | 42 | 0.967  | 43 | 0.041  | 44 | -0.470 |

TOTAL MEAN PRESSURE COEFFICIENT=-.186

RUDDER ANGLE, ALPHA(DEG)= 10

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.462  | 2  | -0.586 | 3  | -1.537 | 4  | -1.594 |
| 5  | -0.956 | 6  | -0.776 | 7  | -0.553 | 8  | 0.643  |
| 9  | 0.254  | 10 | -0.120 | 11 | -0.210 | 12 | -0.238 |
| 13 | -0.243 | 14 | 0.033  | 15 | 1.354  | 16 | 0.044  |
| 17 | -0.506 | 18 | -0.517 | 19 | -0.392 | 20 | -0.403 |
| 21 | 0.029  | 22 | 0.032  | 23 | -0.444 | 24 | -0.312 |
| 25 | -0.211 | 26 | -0.109 | 27 | 0.024  | 28 | 0.112  |
| 29 | -0.218 | 30 | -0.001 | 31 | -0.080 | 32 | -0.080 |
| 33 | 0.039  | 34 | 0.048  | 35 | 0.035  | 36 | -0.245 |
| 37 | -0.195 | 38 | -0.189 | 39 | -0.123 | 40 | -0.039 |
| 41 | 0.006  | 42 | 0.923  | 43 | 0.033  | 44 | -0.713 |

TOTAL MEAN PRESSURE COEFFICIENT=-.388

RUDDER ANGLE, ALPHA(DEG)= 20

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | -0.973 | 2  | -1.441 | 3  | -1.592 | 4  | -2.335 |
| 5  | -1.252 | 6  | -0.943 | 7  | -0.681 | 8  | 0.959  |
| 9  | 0.773  | 10 | 0.402  | 11 | 0.113  | 12 | 0.014  |
| 13 | -0.056 | 14 | 0.019  | 15 | 1.373  | 16 | 0.033  |
| 17 | -0.671 | 18 | -0.671 | 19 | -0.518 | 20 | -0.529 |
| 21 | 0.025  | 22 | 0.025  | 23 | -0.568 | 24 | -0.452 |
| 25 | -0.383 | 26 | -0.308 | 27 | -0.175 | 28 | -0.062 |
| 29 | -0.272 | 30 | 0.003  | 31 | -0.083 | 32 | -0.022 |
| 33 | 0.027  | 34 | 0.036  | 35 | 0.020  | 36 | -0.118 |
| 37 | -0.108 | 38 | -0.137 | 39 | -0.120 | 40 | -0.069 |
| 41 | -0.027 | 42 | 0.846  | 43 | 0.018  | 44 | -0.821 |

TOTAL MEAN PRESSURE COEFFICIENT=-.749

RUDDER ANGLE, ALPHA(DEG)= 30

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | -2.544 | 2  | -1.961 | 3  | -1.574 | 4  | -2.206 |
| 5  | -0.880 | 6  | -0.677 | 7  | -0.678 | 8  | 0.770  |
| 9  | 0.919  | 10 | 0.736  | 11 | 0.377  | 12 | 0.252  |
| 13 | 0.140  | 14 | 0.019  | 15 | 1.356  | 16 | 0.032  |
| 17 | -0.405 | 18 | -0.422 | 19 | -0.363 | 20 | -0.364 |
| 21 | 0.022  | 22 | 0.029  | 23 | -0.696 | 24 | -0.705 |
| 25 | -0.706 | 26 | -0.681 | 27 | -0.609 | 28 | -0.553 |
| 29 | -0.145 | 30 | 0.012  | 31 | -0.059 | 32 | 0.041  |
| 33 | 0.029  | 34 | 0.041  | 35 | 0.018  | 36 | 0.038  |
| 37 | -0.006 | 38 | -0.005 | 39 | -0.140 | 40 | -0.215 |
| 41 | -0.322 | 42 | 0.881  | 43 | 0.017  | 44 | -0.191 |

TOTAL MEAN PRESSURE COEFFICIENT=-.943

APPENDIX A2 (Cont.)

RUDDER PRESSURE COEFFICIENTS

RUDDER NUMBER=1  
DATE OF TEST =10/08/79  
RUN NUMBER =23

SPAN POSITION= 4

SKAG ANGLE, BETA(DEG)= 0 WITHOUT TRANSITION STRIP

RUDDER ANGLE, ALPHA(DEG)= 0

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.998  | 2  | 0.000  | 3  | -0.546 | 4  | -0.694 |
| 5  | -0.556 | 6  | -0.457 | 7  | -0.468 | 8  | -0.215 |
| 9  | -0.527 | 10 | -0.674 | 11 | -0.483 | 12 | -0.453 |
| 13 | -0.495 | 14 | 0.047  | 15 | -0.230 | 16 | 0.075  |
| 17 | -0.241 | 18 | -0.259 | 19 | -0.244 | 20 | -0.248 |
| 21 | 0.061  | 22 | 0.067  | 23 | -0.387 | 24 | -0.242 |
| 25 | -0.144 | 26 | -0.031 | 27 | 0.083  | 28 | 0.150  |
| 29 | -0.172 | 30 | 0.030  | 31 | -0.140 | 32 | -0.271 |
| 33 | 0.072  | 34 | 0.096  | 35 | 0.056  | 36 | -0.376 |
| 37 | -0.250 | 38 | -0.156 | 39 | -0.069 | 40 | 0.057  |
| 41 | 0.131  | 42 | 0.989  | 43 | 0.048  | 44 | -0.241 |

TOTAL MEAN PRESSURE COEFFICIENT= 0

RUDDER ANGLE, ALPHA(DEG)= 5

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.848  | 2  | -0.271 | 3  | -1.025 | 4  | -1.006 |
| 5  | -0.724 | 6  | -0.604 | 7  | -0.641 | 8  | 0.330  |
| 9  | -0.110 | 10 | -0.372 | 11 | -0.332 | 12 | -0.324 |
| 13 | -0.318 | 14 | 0.041  | 15 | -0.228 | 16 | 0.074  |
| 17 | -0.356 | 18 | -0.384 | 19 | -0.321 | 20 | -0.329 |
| 21 | 0.052  | 22 | 0.060  | 23 | -0.501 | 24 | -0.296 |
| 25 | -0.160 | 26 | -0.030 | 27 | 0.088  | 28 | 0.151  |
| 29 | -0.167 | 30 | 0.020  | 31 | -0.108 | 32 | -0.102 |
| 33 | 0.066  | 34 | 0.094  | 35 | 0.046  | 36 | -0.302 |
| 37 | -0.225 | 38 | -0.148 | 39 | -0.095 | 40 | 0.007  |
| 41 | 0.064  | 42 | 0.963  | 43 | 0.041  | 44 | -0.456 |

TOTAL MEAN PRESSURE COEFFICIENT=-.212

RUDDER ANGLE, ALPHA(DEG)= 10

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.444  | 2  | -0.554 | 3  | -1.500 | 4  | -1.322 |
| 5  | -0.885 | 6  | -0.706 | 7  | -0.728 | 8  | 0.744  |
| 9  | 0.283  | 10 | -0.056 | 11 | -0.159 | 12 | -0.171 |
| 13 | -0.175 | 14 | 0.032  | 15 | -0.227 | 16 | 0.065  |
| 17 | -0.483 | 18 | -0.519 | 19 | -0.419 | 20 | -0.428 |
| 21 | 0.042  | 22 | 0.052  | 23 | -0.665 | 24 | -0.403 |
| 25 | -0.226 | 26 | -0.092 | 27 | 0.025  | 28 | 0.072  |
| 29 | -0.196 | 30 | 0.008  | 31 | -0.094 | 32 | -0.073 |
| 33 | 0.064  | 34 | 0.092  | 35 | 0.039  | 36 | -0.204 |
| 37 | -0.165 | 38 | -0.125 | 39 | -0.103 | 40 | -0.031 |
| 41 | 0.001  | 42 | 0.921  | 43 | 0.032  | 44 | -0.695 |

TOTAL MEAN PRESSURE COEFFICIENT=-.449

RUDDER ANGLE, ALPHA(DEG)= 20

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | -0.575 | 2  | -1.040 | 3  | -1.528 | 4  | -1.467 |
| 5  | -0.840 | 6  | -0.503 | 7  | -0.444 | 8  | 1.028  |
| 9  | 0.784  | 10 | 0.461  | 11 | -0.159 | 12 | 0.094  |
| 13 | 0.049  | 14 | 0.027  | 15 | -0.217 | 16 | 0.065  |
| 17 | -0.348 | 18 | -0.365 | 19 | -0.327 | 20 | -0.330 |
| 21 | 0.039  | 22 | 0.046  | 23 | -0.527 | 24 | -0.508 |
| 25 | -0.510 | 26 | -0.502 | 27 | -0.473 | 28 | -0.439 |
| 29 | -0.129 | 30 | 0.021  | 31 | -0.040 | 32 | 0.014  |
| 33 | 0.054  | 34 | 0.089  | 35 | 0.031  | 36 | -0.033 |
| 37 | -0.073 | 38 | -0.099 | 39 | -0.160 | 40 | -0.201 |
| 41 | -0.282 | 42 | 0.884  | 43 | 0.026  | 44 | -0.674 |

TOTAL MEAN PRESSURE COEFFICIENT=-.677

RUDDER ANGLE, ALPHA(DEG)= 30

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | -1.550 | 2  | -1.112 | 3  | -1.509 | 4  | -0.923 |
| 5  | -0.767 | 6  | -0.635 | 7  | -0.633 | 8  | 0.889  |
| 9  | 0.946  | 10 | 0.825  | 11 | -0.466 | 12 | 0.376  |
| 13 | 0.304  | 14 | 0.019  | 15 | -0.223 | 16 | 0.052  |
| 17 | -0.373 | 18 | -0.404 | 19 | -0.346 | 20 | -0.350 |
| 21 | 0.026  | 22 | 0.025  | 23 | -0.638 | 24 | -0.648 |
| 25 | -0.650 | 26 | -0.649 | 27 | -0.627 | 28 | -0.598 |
| 29 | -0.120 | 30 | 0.015  | 31 | -0.067 | 32 | 0.052  |
| 33 | 0.040  | 34 | 0.079  | 35 | 0.020  | 36 | 0.186  |
| 37 | 0.085  | 38 | -0.002 | 39 | -0.130 | 40 | -0.265 |
| 41 | -0.392 | 42 | 0.878  | 43 | 0.018  | 44 | -0.196 |

TOTAL MEAN PRESSURE COEFFICIENT=-.905

RUDDER PRESSURE COEFFICIENTS

RUDDER NUMBER=1  
DATE OF TEST =10/08/79  
RUN NUMBER =22

SPAN POSITION= 3

SKAG ANGLE, BETA(DEG)= 0 WITHOUT TRANSITION STRIP

RUDDER ANGLE, ALPHA(DEG)= 0

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.993  | 2  | 0.016  | 3  | -0.537 | 4  | -0.782 |
| 5  | -0.598 | 6  | -0.541 | 7  | -0.417 | 8  | -0.294 |
| 9  | -0.623 | 10 | -0.717 | 11 | -0.551 | 12 | -0.451 |
| 13 | -0.441 | 14 | 0.049  | 15 | -0.348 | 16 | 0.062  |
| 17 | -0.244 | 18 | -0.265 | 19 | -0.244 | 20 | -0.248 |
| 21 | 0.055  | 22 | 0.059  | 23 | -0.365 | 24 | -0.224 |
| 25 | -0.148 | 26 | -0.050 | 27 | 0.072  | 28 | 0.153  |
| 29 | -0.179 | 30 | 0.033  | 31 | -0.176 | 32 | -0.276 |
| 33 | 0.059  | 34 | 0.069  | 35 | 0.052  | 36 | -0.353 |
| 37 | -0.244 | 38 | -0.163 | 39 | -0.069 | 40 | 0.057  |
| 41 | 0.148  | 42 | 0.989  | 43 | 0.049  | 44 | -0.237 |

TOTAL MEAN PRESSURE COEFFICIENT=-.003

RUDDER ANGLE, ALPHA(DEG)= 5

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.854  | 2  | -0.241 | 3  | -1.101 | 4  | -1.198 |
| 5  | -0.805 | 6  | -0.679 | 7  | -0.526 | 8  | 0.280  |
| 9  | -0.154 | 10 | -0.374 | 11 | -0.355 | 12 | -0.331 |
| 13 | -0.347 | 14 | 0.042  | 15 | -0.361 | 16 | 0.052  |
| 17 | -0.351 | 18 | -0.385 | 19 | -0.318 | 20 | -0.326 |
| 21 | 0.043  | 22 | 0.047  | 23 | -0.432 | 24 | -0.265 |
| 25 | -0.162 | 26 | -0.044 | 27 | 0.095  | 28 | 0.175  |
| 29 | -0.165 | 30 | 0.025  | 31 | -0.130 | 32 | -0.102 |
| 33 | 0.047  | 34 | 0.058  | 35 | 0.042  | 36 | -0.312 |
| 37 | -0.214 | 38 | -0.157 | 39 | -0.095 | 40 | 0.001  |
| 41 | 0.086  | 42 | 0.965  | 43 | 0.041  | 44 | -0.454 |

TOTAL MEAN PRESSURE COEFFICIENT=-.209

RUDDER ANGLE, ALPHA(DEG)= 10

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.435  | 2  | -0.631 | 3  | -1.510 | 4  | -1.622 |
| 5  | -1.005 | 6  | -0.817 | 7  | -0.619 | 8  | 0.700  |
| 9  | 0.261  | 10 | -0.040 | 11 | -0.167 | 12 | -0.181 |
| 13 | -0.244 | 14 | 0.033  | 15 | -0.366 | 16 | 0.048  |
| 17 | -0.473 | 18 | -0.514 | 19 | -0.405 | 20 | -0.414 |
| 21 | 0.039  | 22 | 0.044  | 23 | -0.501 | 24 | -0.320 |
| 25 | -0.201 | 26 | -0.066 | 27 | 0.078  | 28 | 0.147  |
| 29 | -0.197 | 30 | 0.013  | 31 | -0.113 | 32 | -0.077 |
| 33 | 0.048  | 34 | 0.061  | 35 | 0.037  | 36 | -0.237 |
| 37 | -0.186 | 38 | -0.156 | 39 | -0.114 | 40 | -0.036 |
| 41 | 0.034  | 42 | 0.929  | 43 | 0.031  | 44 | -0.691 |

TOTAL MEAN PRESSURE COEFFICIENT=-.42

RUDDER ANGLE, ALPHA(DEG)= 20

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | -0.861 | 2  | -1.427 | 3  | -1.526 | 4  | -2.129 |
| 5  | -1.138 | 6  | -0.818 | 7  | -0.598 | 8  | 0.991  |
| 9  | 0.770  | 10 | 0.470  | 11 | 0.158  | 12 | 0.078  |
| 13 | -0.037 | 14 | 0.027  | 15 | -0.369 | 16 | 0.042  |
| 17 | -0.339 | 18 | -0.366 | 19 | -0.322 | 20 | -0.326 |
| 21 | 0.031  | 22 | 0.038  | 23 | -0.496 | 24 | -0.386 |
| 25 | -0.341 | 26 | -0.269 | 27 | -0.158 | 28 | -0.097 |
| 29 | -0.126 | 30 | 0.021  | 31 | -0.052 | 32 | 0.013  |
| 33 | 0.040  | 34 | 0.059  | 35 | 0.031  | 36 | -0.088 |
| 37 | -0.092 | 38 | -0.107 | 39 | -0.117 | 40 | -0.095 |
| 41 | -0.067 | 42 | 0.886  | 43 | 0.025  | 44 | -0.665 |

TOTAL MEAN PRESSURE COEFFICIENT=-.698

RUDDER ANGLE, ALPHA(DEG)= 30

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | -2.413 | 2  | -1.975 | 3  | -1.522 | 4  | -1.714 |
| 5  | -0.734 | 6  | -0.765 | 7  | -0.802 | 8  | 0.787  |
| 9  | 0.929  | 10 | 0.810  | 11 | 0.451  | 12 | 0.354  |
| 13 | 0.204  | 14 | 0.019  | 15 | -0.359 | 16 | 0.047  |
| 17 | -0.381 | 18 | -0.423 | 19 | -0.375 | 20 | -0.376 |
| 21 | 0.030  | 22 | 0.039  | 23 | -0.749 | 24 | -0.686 |
| 25 | -0.670 | 26 | -0.651 | 27 | -0.621 | 28 | -0.582 |
| 29 | -0.119 | 30 | 0.016  | 31 | -0.094 | 32 | 0.048  |
| 33 | 0.041  | 34 | 0.064  | 35 | 0.020  | 36 | 0.099  |
| 37 | 0.039  | 38 | -0.035 | 39 | -0.120 | 40 | -0.234 |
| 41 | -0.324 | 42 | 0.875  | 43 | 0.016  | 44 | -0.210 |

TOTAL MEAN PRESSURE COEFFICIENT=-.958

RUDDER PRESSURE COEFFICIENTS

RUDDER NUMBER=1  
DATE OF TEST =13/08/79  
RUN NUMBER =33

APPENDIX A2 (Cont.)

SPAN POSITION= 5

SKEG ANGLE, BETA(DEG)= 0 WITHOUT TRANSITION STRIP

RUDDER ANGLE, ALPHA(DEG)= 0

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.100  | 2  | 0.050  | 3  | -0.217 | 4  | -0.090 |
| 5  | 0.151  | 6  | -0.050 | 7  | 0.126  | 8  | -0.083 |
| 9  | -0.199 | 10 | -0.172 | 11 | 0.049  | 12 | 0.048  |
| 13 | -0.044 | 14 | 0.048  | 15 | 0.748  | 16 | 0.053  |
| 17 | -0.246 | 18 | -0.263 | 19 | -0.236 | 20 | -0.242 |
| 21 | 0.051  | 22 | 0.054  | 23 | -0.420 | 24 | -0.225 |
| 25 | -0.125 | 26 | -0.016 | 27 | 0.087  | 28 | 0.153  |
| 29 | -0.166 | 30 | 0.031  | 31 | -0.142 | 32 | -0.255 |
| 33 | 0.052  | 34 | 0.055  | 35 | 0.054  | 36 | -0.351 |
| 37 | -0.263 | 38 | -0.167 | 39 | -0.070 | 40 | 0.045  |
| 41 | 0.099  | 42 | 0.986  | 43 | 0.049  | 44 | -0.248 |
| 45 | -0.537 | 46 | -0.712 | 47 | -0.652 | 48 | -0.556 |
| 49 | -0.495 | 50 | -0.485 | 51 | -0.064 | 52 | -0.147 |
| 53 | 0.051  | 54 | -0.380 | 55 | -0.569 | 56 | -0.753 |
| 57 | -0.637 | 58 | -0.544 | 59 | -0.496 | 60 | -0.523 |
| 61 | -0.291 | 62 | 0.048  | 63 | 0.049  | 64 | 0.049  |

MEAN PRESSURE COEFFICIENT(SKEG) = .003  
MEAN PRESSURE COEFFICIENT(RUDDER) = .023

RUDDER ANGLE, ALPHA(DEG)= 5

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.103  | 2  | 0.045  | 3  | -0.261 | 4  | -0.093 |
| 5  | 0.156  | 6  | -0.027 | 7  | 0.129  | 8  | -0.082 |
| 9  | -0.170 | 10 | -0.159 | 11 | 0.041  | 12 | 0.041  |
| 13 | -0.095 | 14 | 0.041  | 15 | 0.757  | 16 | 0.049  |
| 17 | -0.347 | 18 | -0.378 | 19 | -0.317 | 20 | -0.324 |
| 21 | 0.043  | 22 | 0.045  | 23 | -0.657 | 24 | -0.295 |
| 25 | -0.144 | 26 | -0.024 | 27 | 0.076  | 28 | 0.124  |
| 29 | -0.161 | 30 | 0.022  | 31 | -0.106 | 32 | -0.099 |
| 33 | 0.048  | 34 | 0.052  | 35 | 0.043  | 36 | -0.262 |
| 37 | -0.227 | 38 | -0.159 | 39 | -0.091 | 40 | -0.008 |
| 41 | 0.021  | 42 | 0.972  | 43 | 0.042  | 44 | -0.472 |
| 45 | -0.798 | 46 | -0.985 | 47 | -0.890 | 48 | -0.732 |
| 49 | -0.674 | 50 | -0.677 | 51 | -0.137 | 52 | 0.191  |
| 53 | 0.041  | 54 | -0.161 | 55 | -0.351 | 56 | -0.520 |
| 57 | -0.440 | 58 | -0.374 | 59 | -0.344 | 60 | -0.356 |
| 61 | -0.037 | 62 | 0.040  | 63 | 0.040  | 64 | 0.040  |

MEAN PRESSURE COEFFICIENT(SKEG) = -.115  
MEAN PRESSURE COEFFICIENT(RUDDER) = -.068

RUDDER ANGLE, ALPHA(DEG)= 10

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.109  | 2  | 0.036  | 3  | -0.336 | 4  | -0.097 |
| 5  | 0.164  | 6  | -0.026 | 7  | 0.131  | 8  | -0.081 |
| 9  | -0.174 | 10 | -0.182 | 11 | 0.032  | 12 | 0.032  |
| 13 | -0.125 | 14 | 0.031  | 15 | 0.762  | 16 | 0.045  |
| 17 | -0.460 | 18 | -0.509 | 19 | -0.426 | 20 | -0.436 |
| 21 | 0.038  | 22 | 0.030  | 23 | -0.892 | 24 | -0.472 |
| 25 | -0.243 | 26 | -0.109 | 27 | -0.010 | 28 | 0.036  |
| 29 | -0.189 | 30 | 0.010  | 31 | -0.097 | 32 | -0.082 |
| 33 | 0.045  | 34 | 0.050  | 35 | 0.036  | 36 | -0.148 |
| 37 | -0.161 | 38 | -0.133 | 39 | -0.097 | 40 | -0.047 |
| 41 | -0.048 | 42 | 0.924  | 43 | 0.031  | 44 | -0.716 |
| 45 | -1.081 | 46 | -1.259 | 47 | -1.130 | 48 | -0.931 |
| 49 | -0.854 | 50 | -0.833 | 51 | -0.280 | 52 | 0.425  |
| 53 | 0.032  | 54 | 0.055  | 55 | -0.147 | 56 | -0.303 |
| 57 | -0.246 | 58 | -0.194 | 59 | -0.168 | 60 | -0.171 |
| 61 | 0.084  | 62 | 0.032  | 63 | 0.031  | 64 | 0.030  |

MEAN PRESSURE COEFFICIENT(SKEG) = -.234  
MEAN PRESSURE COEFFICIENT(RUDDER) = -.203

RUDDER ANGLE, ALPHA(DEG)= 20

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.114  | 2  | 0.029  | 3  | -0.299 | 4  | -0.097 |
| 5  | 0.176  | 6  | -0.018 | 7  | 0.138  | 8  | -0.075 |
| 9  | -0.117 | 10 | -0.120 | 11 | 0.025  | 12 | 0.025  |
| 13 | -0.136 | 14 | 0.025  | 15 | 0.762  | 16 | 0.039  |
| 17 | -0.322 | 18 | -0.346 | 19 | -0.308 | 20 | -0.311 |
| 21 | 0.028  | 22 | 0.031  | 23 | -0.504 | 24 | -0.490 |
| 25 | -0.507 | 26 | -0.502 | 27 | -0.482 | 28 | -0.454 |
| 29 | -0.131 | 30 | 0.024  | 31 | -0.050 | 32 | -0.009 |
| 33 | 0.032  | 34 | 0.046  | 35 | 0.026  | 36 | 0.058  |
| 37 | -0.061 | 38 | -0.115 | 39 | -0.171 | 40 | -0.247 |
| 41 | -0.391 | 42 | 0.884  | 43 | 0.027  | 44 | -0.688 |
| 45 | -1.214 | 46 | -1.412 | 47 | -1.217 | 48 | -0.992 |
| 49 | -0.873 | 50 | -0.770 | 51 | -0.264 | 52 | 0.432  |
| 53 | 0.020  | 54 | 0.261  | 55 | 0.083  | 56 | -0.032 |
| 57 | 0.007  | 58 | 0.055  | 59 | 0.086  | 60 | 0.102  |
| 61 | 0.175  | 62 | 0.026  | 63 | 0.025  | 64 | 0.024  |

MEAN PRESSURE COEFFICIENT(SKEG) = -.327  
MEAN PRESSURE COEFFICIENT(RUDDER) = -.326

RUDDER ANGLE, ALPHA(DEG)= 30

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.108  | 2  | 0.020  | 3  | -0.292 | 4  | -0.107 |
| 5  | 0.168  | 6  | -0.021 | 7  | 0.133  | 8  | -0.078 |
| 9  | -0.069 | 10 | -0.077 | 11 | 0.018  | 12 | 0.013  |
| 13 | -0.123 | 14 | 0.017  | 15 | 0.754  | 16 | 0.032  |
| 17 | -0.350 | 18 | -0.392 | 19 | -0.333 | 20 | -0.336 |
| 21 | 0.020  | 22 | 0.022  | 23 | -0.630 | 24 | -0.615 |
| 25 | -0.632 | 26 | -0.628 | 27 | -0.595 | 28 | -0.566 |
| 29 | -0.120 | 30 | 0.019  | 31 | -0.070 | 32 | 0.020  |
| 33 | 0.023  | 34 | 0.036  | 35 | 0.016  | 36 | 0.293  |
| 37 | 0.115  | 38 | -0.003 | 39 | -0.114 | 40 | -0.256 |
| 41 | -0.449 | 42 | 0.872  | 43 | 0.017  | 44 | -0.231 |
| 45 | -0.457 | 46 | -0.969 | 47 | -1.037 | 48 | -1.059 |
| 49 | -0.952 | 50 | -0.871 | 51 | -0.615 | 52 | 0.200  |
| 53 | 0.014  | 54 | 0.435  | 55 | 0.272  | 56 | 0.202  |
| 57 | 0.238  | 58 | 0.289  | 59 | 0.320  | 60 | 0.351  |
| 61 | 0.107  | 62 | 0.017  | 63 | 0.017  | 64 | 0.017  |

MEAN PRESSURE COEFFICIENT(SKEG) = -.323  
MEAN PRESSURE COEFFICIENT(RUDDER) = -.498

RUDDER PRESSURE COEFFICIENTS

RUDDER NUMBER=1  
DATE OF TEST =13/08/79  
RUN NUMBER =36

SPAN POSITION= 6

SKEG ANGLE, BETA(DEG)= 0 WITHOUT TRANSITION STRIP

RUDDER ANGLE, ALPHA(DEG)= 0

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.086  | 2  | 0.049  | 3  | -0.215 | 4  | 0.070  |
| 5  | 0.111  | 6  | 0.103  | 7  | 0.097  | 8  | 0.097  |
| 9  | -0.197 | 10 | -0.178 | 11 | 0.046  | 12 | 0.045  |
| 13 | -0.075 | 14 | -0.282 | 15 | 0.814  | 16 | -0.529 |
| 17 | -0.522 | 18 | -0.536 | 19 | -0.530 | 20 | -0.333 |
| 21 | -0.284 | 22 | -0.550 | 23 | -0.388 | 24 | -0.241 |
| 25 | -0.131 | 26 | -0.013 | 27 | 0.097  | 28 | 0.163  |
| 29 | -0.440 | 30 | -0.362 | 31 | -0.351 | 32 | -0.381 |
| 33 | -0.609 | 34 | -0.545 | 35 | -0.472 | 36 | -0.342 |
| 37 | -0.263 | 38 | -0.167 | 39 | -0.069 | 40 | 0.042  |
| 41 | 0.126  | 42 | 0.995  | 43 | 0.046  | 44 | -0.253 |
| 45 | -0.522 | 46 | -0.705 | 47 | -0.638 | 48 | -0.594 |
| 49 | -0.555 | 50 | -0.596 | 51 | -0.487 | 52 | -0.457 |
| 53 | 0.046  | 54 | -0.238 | 55 | -0.591 | 56 | -0.745 |
| 57 | -0.625 | 58 | -0.548 | 59 | -0.517 | 60 | -0.522 |
| 61 | -0.383 | 62 | 0.045  | 63 | 0.045  | 64 | 0.045  |

MEAN PRESSURE COEFFICIENT(SKEG) = 0  
MEAN PRESSURE COEFFICIENT(RUDDER) = .023

RUDDER ANGLE, ALPHA(DEG)= 5

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.089  | 2  | 0.043  | 3  | -0.245 | 4  | 0.070  |
| 5  | 0.116  | 6  | 0.108  | 7  | 0.101  | 8  | 0.101  |
| 9  | -0.182 | 10 | -0.174 | 11 | 0.039  | 12 | 0.037  |
| 13 | -0.114 | 14 | -0.189 | 15 | 0.823  | 16 | -0.323 |
| 17 | -0.390 | 18 | -0.640 | 19 | -0.303 | 20 | -0.471 |
| 21 | -0.321 | 22 | -1.390 | 23 | -0.539 | 24 | -0.293 |
| 25 | -0.147 | 26 | -0.024 | 27 | 0.082  | 28 | 0.126  |
| 29 | -0.336 | 30 | -0.335 | 31 | -0.328 | 32 | -0.388 |
| 33 | -0.020 | 34 | -0.226 | 35 | -0.187 | 36 | -0.236 |
| 37 | -0.214 | 38 | -0.158 | 39 | -0.091 | 40 | -0.018 |
| 41 | 0.045  | 42 | 0.975  | 43 | 0.039  | 44 | -0.470 |
| 45 | -0.729 | 46 | -0.909 | 47 | -0.820 | 48 | -0.775 |
| 49 | -0.717 | 50 | -0.766 | 51 | -0.332 | 52 | -0.322 |
| 53 | 0.041  | 54 | -0.044 | 55 | -0.405 | 56 | -0.566 |
| 57 | -0.465 | 58 | -0.398 | 59 | -0.369 | 60 | -0.405 |
| 61 | -0.340 | 62 | 0.041  | 63 | 0.042  | 64 | 0.040  |

MEAN PRESSURE COEFFICIENT(SKEG) = -.098  
MEAN PRESSURE COEFFICIENT(RUDDER) = -.099

RUDDER ANGLE, ALPHA(DEG)= 10

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.111  | 2  | 0.035  | 3  | -0.320 | 4  | 0.083  |
| 5  | 0.138  | 6  | 0.120  | 7  | 0.124  | 8  | 0.124  |
| 9  | -0.209 | 10 | -0.214 | 11 | 0.032  | 12 | 0.033  |
| 13 | -0.158 | 14 | -0.292 | 15 | 0.851  | 16 | -0.466 |
| 17 | -0.482 | 18 | -0.638 | 19 | -0.274 | 20 | -0.466 |
| 21 | -0.840 | 22 | -1.336 | 23 | -0.746 | 24 | -0.423 |
| 25 | -0.236 | 26 | -0.108 | 27 | -0.019 | 28 | 0.020  |
| 29 | -0.484 | 30 | -0.475 | 31 | -0.489 | 32 | -0.616 |
| 33 | 0.815  | 34 | 0.083  | 35 | 0.063  | 36 | -0.118 |
| 37 | -0.149 | 38 | -0.130 | 39 | -0.097 | 40 | -0.064 |
| 41 | -0.026 | 42 | 0.925  | 43 | 0.032  | 44 | -0.699 |
| 45 | -0.951 | 46 | -1.117 | 47 | -1.005 | 48 | -0.950 |
| 49 | -0.861 | 50 | -0.860 | 51 | -0.468 | 52 | -0.494 |
| 53 | 0.030  | 54 | 0.150  | 55 | -0.219 | 56 | -0.382 |
| 57 | -0.299 | 58 | -0.234 | 59 | -0.206 | 60 | -0.253 |
| 61 | -0.470 | 62 | 0.032  | 63 | 0.031  | 64 | 0.032  |

MEAN PRESSURE COEFFICIENT(SKEG) = -.198  
MEAN PRESSURE COEFFICIENT(RUDDER) = -.252

RUDDER ANGLE, ALPHA(DEG)= 20

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.117  | 2  | 0.030  | 3  | -0.306 | 4  | 0.083  |
| 5  | 0.148  | 6  | 0.135  | 7  | 0.133  | 8  | 0.131  |
| 9  | -0.155 | 10 | -0.154 | 11 | 0.027  | 12 | 0.026  |
| 13 | -0.154 | 14 | -0.246 | 15 | 0.861  | 16 | -0.398 |
| 17 | -0.376 | 18 | -0.336 | 19 | -0.434 | 20 | -0.473 |
| 21 | -0.933 | 22 | -1.011 | 23 | -0.452 | 24 | -0.463 |
| 25 | -0.476 | 26 | -0.482 | 27 | -0.469 | 28 | -0.439 |
| 29 | -0.412 | 30 | -0.406 | 31 | -0.422 | 32 | -0.457 |
| 33 | -0.769 | 34 | 0.663  | 35 | 0.422  | 36 | 0.086  |
| 37 | -0.046 | 38 | -0.110 | 39 | -0.173 | 40 | -0.266 |
| 41 | -0.319 | 42 | 0.872  | 43 | 0.026  | 44 | -0.783 |
| 45 | -1.003 | 46 | -1.144 | 47 | -1.003 | 48 | -0.891 |
| 49 | -0.756 | 50 | -0.643 | 51 | -0.385 | 52 | -0.407 |
| 53 | 0.022  | 54 | 0.329  | 55 | -0.002 | 56 | -0.141 |
| 57 | -0.064 | 58 | 0.004  | 59 | 0.049  | 60 | 0.061  |
| 61 | -0.375 | 62 | 0.025  | 63 | 0.025  | 64 | 0.025  |

MEAN PRESSURE COEFFICIENT(SKEG) = -.258  
MEAN PRESSURE COEFFICIENT(RUDDER) = -.386

RUDDER ANGLE, ALPHA(DEG)= 30



RUDDER PRESSURE COEFFICIENTS

RUDDER NUMBER=1  
DATE OF TEST =14/08/79  
RUN NUMBER =47

APPENDIX A2 (Cont.)

SPAN POSITION= 7

SKEG ANGLE, BETA( DEG )= 0 WITHOUT TRANSITION STRIP

RUDDER ANGLE, ALPHA( DEG )= 0

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 1.239  | 2  | 0.053  | 3  | -0.217 | 4  | 0.234  |
| 5  | 1.178  | 6  | 0.076  | 7  | 1.262  | 8  | 0.386  |
| 9  | -0.199 | 10 | -0.182 | 11 | 0.051  | 12 | 0.049  |
| 13 | -0.128 | 14 | -0.190 | 15 | 1.519  | 16 | -0.335 |
| 17 | -0.330 | 18 | -0.341 | 19 | -0.354 | 20 | -0.350 |
| 21 | -0.491 | 22 | -0.444 | 23 | -0.361 | 24 | -0.235 |
| 25 | -0.122 | 26 | -0.022 | 27 | 0.092  | 28 | 0.159  |
| 29 | -0.302 | 30 | -0.286 | 31 | -0.276 | 32 | -0.272 |
| 33 | -0.408 | 34 | -0.497 | 35 | -0.448 | 36 | -0.344 |
| 37 | -0.243 | 38 | -0.149 | 39 | -0.052 | 40 | 0.051  |
| 41 | 0.126  | 42 | 0.989  | 43 | 0.048  | 44 | -0.246 |
| 45 | -0.560 | 46 | -0.886 | 47 | -0.626 | 48 | -0.556 |
| 49 | -0.532 | 50 | -0.493 | 51 | -0.326 | 52 | -0.327 |
| 53 | 0.047  | 54 | -0.144 | 55 | -0.528 | 56 | -0.717 |
| 57 | -0.575 | 58 | -0.492 | 59 | -0.494 | 60 | -0.475 |
| 61 | -0.283 | 62 | 0.049  | 63 | 0.049  | 64 | 0.048  |

MEAN PRESSURE COEFFICIENT(SKEG) = -.009  
MEAN PRESSURE COEFFICIENT(RUDDER) = .01

RUDDER ANGLE, ALPHA( DEG )= 5

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 1.254  | 2  | 0.045  | 3  | -0.255 | 4  | 0.227  |
| 5  | 1.191  | 6  | 0.068  | 7  | 1.263  | 8  | 0.380  |
| 9  | -0.214 | 10 | -0.208 | 11 | 0.078  | 12 | 0.030  |
| 13 | -0.181 | 14 | -0.232 | 15 | 1.532  | 16 | -0.357 |
| 17 | -0.340 | 18 | -0.425 | 19 | -0.457 | 20 | -0.913 |
| 21 | -0.849 | 22 | -0.697 | 23 | -0.472 | 24 | -0.285 |
| 25 | -0.134 | 26 | -0.009 | 27 | 0.105  | 28 | 0.153  |
| 29 | -0.379 | 30 | -0.371 | 31 | -0.496 | 32 | -1.261 |
| 33 | 0.276  | 34 | -0.160 | 35 | -0.208 | 36 | -0.233 |
| 37 | -0.189 | 38 | -0.136 | 39 | -0.075 | 40 | -0.020 |
| 41 | 0.029  | 42 | 0.978  | 43 | 0.042  | 44 | -0.432 |
| 45 | -0.751 | 46 | -0.861 | 47 | -0.785 | 48 | -0.715 |
| 49 | -0.685 | 50 | -0.648 | 51 | -0.339 | 52 | -0.381 |
| 53 | 0.037  | 54 | 0.032  | 55 | -0.360 | 56 | -0.561 |
| 57 | -0.437 | 58 | -0.360 | 59 | -0.364 | 60 | -0.389 |
| 61 | -0.357 | 62 | 0.040  | 63 | 0.043  | 64 | 0.043  |

MEAN PRESSURE COEFFICIENT(SKEG) = -.097  
MEAN PRESSURE COEFFICIENT(RUDDER) = -.092

RUDDER ANGLE, ALPHA( DEG )= 10

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 1.252  | 2  | 0.036  | 3  | -0.323 | 4  | 0.210  |
| 5  | 1.197  | 6  | 0.054  | 7  | 1.276  | 8  | 0.366  |
| 9  | -0.252 | 10 | -0.259 | 11 | 0.032  | 12 | 0.031  |
| 13 | -0.217 | 14 | -0.308 | 15 | 1.560  | 16 | -0.426 |
| 17 | -0.424 | 18 | -0.610 | 19 | -0.851 | 20 | -1.393 |
| 21 | -1.118 | 22 | -0.883 | 23 | -0.536 | 24 | -0.299 |
| 25 | -0.150 | 26 | -0.066 | 27 | -0.012 | 28 | 0.014  |
| 29 | -0.515 | 30 | -0.522 | 31 | -0.694 | 32 | -1.428 |
| 33 | 0.926  | 34 | 0.176  | 35 | 0.030  | 36 | -0.113 |
| 37 | -0.119 | 38 | -0.105 | 39 | -0.078 | 40 | -0.071 |
| 41 | -0.055 | 42 | 0.942  | 43 | 0.033  | 44 | -0.645 |
| 45 | -0.958 | 46 | -1.050 | 47 | -0.958 | 48 | -0.871 |
| 49 | -0.843 | 50 | -0.819 | 51 | -0.416 | 52 | -0.504 |
| 53 | 0.031  | 54 | 0.201  | 55 | -0.191 | 56 | -0.391 |
| 57 | -0.289 | 58 | -0.215 | 59 | -0.203 | 60 | -0.200 |
| 61 | -0.515 | 62 | 0.032  | 63 | 0.029  | 64 | 0.030  |

MEAN PRESSURE COEFFICIENT(SKEG) = -.192  
MEAN PRESSURE COEFFICIENT(RUDDER) = -.208

RUDDER ANGLE, ALPHA( DEG )= 20

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 1.247  | 2  | 0.029  | 3  | -0.319 | 4  | 0.199  |
| 5  | 1.201  | 6  | 0.054  | 7  | 1.274  | 8  | 0.369  |
| 9  | -0.188 | 10 | -0.191 | 11 | 0.023  | 12 | 0.022  |
| 13 | -0.208 | 14 | -0.127 | 15 | 1.539  | 16 | -0.167 |
| 17 | -0.198 | 18 | -0.271 | 19 | -0.676 | 20 | -0.473 |
| 21 | -0.348 | 22 | -0.340 | 23 | -0.360 | 24 | -0.398 |
| 25 | -0.420 | 26 | -0.426 | 27 | -0.418 | 28 | -0.394 |
| 29 | -0.301 | 30 | -0.357 | 31 | -0.540 | 32 | -0.812 |
| 33 | -0.583 | 34 | 0.812  | 35 | 0.433  | 36 | 0.098  |
| 37 | -0.024 | 38 | -0.091 | 39 | -0.154 | 40 | -0.265 |
| 41 | -0.340 | 42 | 0.893  | 43 | 0.026  | 44 | -0.697 |
| 45 | -0.968 | 46 | -1.008 | 47 | -0.882 | 48 | -0.731 |
| 49 | -0.657 | 50 | -0.519 | 51 | -0.183 | 52 | -0.288 |
| 53 | 0.023  | 54 | 0.354  | 55 | -0.001 | 56 | -0.180 |
| 57 | -0.078 | 58 | 0.000  | 59 | 0.055  | 60 | 0.117  |
| 61 | -0.452 | 62 | 0.025  | 63 | 0.025  | 64 | 0.026  |

MEAN PRESSURE COEFFICIENT(SKEG) = -.228  
MEAN PRESSURE COEFFICIENT(RUDDER) = -.294

RUDDER ANGLE, ALPHA( DEG )= 30

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 1.267  | 2  | 0.021  | 3  | -0.306 | 4  | 0.213  |
| 5  | 1.200  | 6  | 0.055  | 7  | 1.274  | 8  | 0.367  |
| 9  | -0.141 | 10 | -0.153 | 11 | 0.024  | 12 | 0.020  |
| 13 | -0.161 | 14 | -0.132 | 15 | 1.561  | 16 | -0.210 |
| 17 | -0.277 | 18 | -0.572 | 19 | -0.646 | 20 | -0.441 |
| 21 | -0.416 | 22 | -0.417 | 23 | -0.457 | 24 | -0.502 |
| 25 | -0.515 | 26 | -0.517 | 27 | -0.498 | 28 | -0.473 |
| 29 | -0.320 | 30 | -0.490 | 31 | -0.958 | 32 | -1.065 |
| 33 | -0.459 | 34 | -0.010 | 35 | 0.823  | 36 | 0.335  |
| 37 | 0.162  | 38 | 0.040  | 39 | -0.067 | 40 | -0.236 |
| 41 | -0.349 | 42 | 0.836  | 43 | 0.020  | 44 | -0.796 |
| 45 | -1.043 | 46 | -1.054 | 47 | -0.917 | 48 | -0.762 |
| 49 | -0.668 | 50 | -0.523 | 51 | -0.220 | 52 | -0.453 |
| 53 | 0.020  | 54 | 0.526  | 55 | 0.207  | 56 | 0.057  |
| 57 | 0.149  | 58 | 0.227  | 59 | 0.319  | 60 | 0.418  |
| 61 | -0.760 | 62 | 0.018  | 63 | 0.018  | 64 | 0.017  |

MEAN PRESSURE COEFFICIENT(SKEG) = -.306  
MEAN PRESSURE COEFFICIENT(RUDDER) = -.394

RUDDER PRESSURE COEFFICIENTS

RUDDER NUMBER=1  
DATE OF TEST =14/08/79  
RUN NUMBER =48

SPAN POSITION= 8

SKEG ANGLE, BETA( DEG )= 0 WITHOUT TRANSITION STRIP

RUDDER ANGLE, ALPHA( DEG )= 0

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 1.186  | 2  | 0.053  | 3  | -0.226 | 4  | 0.137  |
| 5  | 1.123  | 6  | 0.040  | 7  | 1.205  | 8  | 0.280  |
| 9  | -0.215 | 10 | -0.186 | 11 | 0.050  | 12 | 0.048  |
| 13 | -0.037 | 14 | -0.156 | 15 | 1.515  | 16 | -0.265 |
| 17 | -0.249 | 18 | -0.250 | 19 | -0.266 | 20 | -0.297 |
| 21 | -0.436 | 22 | -0.420 | 23 | -0.327 | 24 | -0.248 |
| 25 | -0.118 | 26 | -0.030 | 27 | 0.050  | 28 | 0.127  |
| 29 | -0.266 | 30 | -0.245 | 31 | -0.277 | 32 | -0.337 |
| 33 | -0.116 | 34 | -0.546 | 35 | -0.439 | 36 | -0.325 |
| 37 | -0.236 | 38 | -0.133 | 39 | -0.042 | 40 | 0.039  |
| 41 | 0.091  | 42 | 1.001  | 43 | 0.049  | 44 | -0.230 |
| 45 | -0.515 | 46 | -0.590 | 47 | -0.510 | 48 | -0.498 |
| 49 | -0.411 | 50 | -0.433 | 51 | -0.253 | 52 | -0.270 |
| 53 | 0.049  | 54 | -0.006 | 55 | -0.396 | 56 | -0.602 |
| 57 | -0.433 | 58 | -0.406 | 59 | -0.429 | 60 | -0.532 |
| 61 | -0.247 | 62 | 0.048  | 63 | 0.049  | 64 | 0.047  |

MEAN PRESSURE COEFFICIENT(SKEG) = -.013  
MEAN PRESSURE COEFFICIENT(RUDDER) = .014

RUDDER ANGLE, ALPHA( DEG )= 5

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 1.203  | 2  | 0.042  | 3  | -0.259 | 4  | 0.139  |
| 5  | 1.132  | 6  | 0.039  | 7  | 1.224  | 8  | 0.283  |
| 9  | -0.182 | 10 | -0.178 | 11 | 0.041  | 12 | 0.040  |
| 13 | -0.113 | 14 | -0.236 | 15 | 1.540  | 16 | -0.353 |
| 17 | -0.336 | 18 | -0.363 | 19 | -0.403 | 20 | -0.692 |
| 21 | -0.767 | 22 | -0.652 | 23 | -0.445 | 24 | -0.311 |
| 25 | -0.145 | 26 | -0.037 | 27 | 0.056  | 28 | 0.115  |
| 29 | -0.350 | 30 | -0.283 | 31 | -0.322 | 32 | -0.531 |
| 33 | 0.542  | 34 | -0.198 | 35 | -0.218 | 36 | -0.216 |
| 37 | -0.179 | 38 | -0.121 | 39 | -0.054 | 40 | 0.004  |
| 41 | 0.039  | 42 | 0.979  | 43 | 0.041  | 44 | -0.402 |
| 45 | -0.677 | 46 | -0.746 | 47 | -0.654 | 48 | -0.638 |
| 49 | -0.545 | 50 | -0.591 | 51 | -0.329 | 52 | -0.371 |
| 53 | 0.040  | 54 | 0.137  | 55 | -0.261 | 56 | -0.471 |
| 57 | -0.320 | 58 | -0.294 | 59 | -0.295 | 60 | -0.357 |
| 61 | -0.280 | 62 | 0.040  | 63 | 0.041  | 64 | 0.040  |

MEAN PRESSURE COEFFICIENT(SKEG) = -.091  
MEAN PRESSURE COEFFICIENT(RUDDER) = -.098

RUDDER ANGLE, ALPHA( DEG )= 10

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 1.221  | 2  | 0.035  | 3  | -0.309 | 4  | 0.136  |
| 5  | 1.147  | 6  | 0.026  | 7  | 1.222  | 8  | 0.270  |
| 9  | -0.180 | 10 | -0.150 | 11 | 0.035  | 12 | 0.035  |
| 13 | -0.161 | 14 | -0.312 | 15 | 1.555  | 16 | -0.430 |
| 17 | -0.415 | 18 | -0.496 | 19 | -0.618 | 20 | -1.132 |
| 21 | -1.048 | 22 | -0.828 | 23 | -0.536 | 24 | -0.343 |
| 25 | -0.177 | 26 | -0.076 | 27 | -0.003 | 28 | 0.034  |
| 29 | -0.471 | 30 | -0.383 | 31 | -0.350 | 32 | -0.455 |
| 33 | 0.445  | 34 | 0.184  | 35 | 0.033  | 36 | -0.087 |
| 37 | -0.102 | 38 | -0.087 | 39 | -0.060 | 40 | -0.045 |
| 41 | -0.047 | 42 | 0.945  | 43 | 0.031  | 44 | -0.577 |
| 45 | -0.876 | 46 | -0.910 | 47 | -0.799 | 48 | -0.780 |
| 49 | -0.689 | 50 | -0.742 | 51 | -0.407 | 52 | -0.493 |
| 53 | 0.032  | 54 | 0.263  | 55 | -0.129 | 56 | -0.338 |
| 57 | -0.207 | 58 | -0.177 | 59 | -0.159 | 60 | -0.170 |
| 61 | -0.361 | 62 | 0.031  | 63 | 0.031  | 64 | 0.031  |

MEAN PRESSURE COEFFICIENT(SKEG) = -.173  
MEAN PRESSURE COEFFICIENT(RUDDER) = -.218

RUDDER ANGLE, ALPHA( DEG )= 20

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 1.247  | 2  | 0.028  | 3  | -0.288 | 4  | 0.160  |
| 5  | 1.176  | 6  | 0.051  | 7  | 1.253  | 8  | 0.292  |
| 9  | -0.114 | 10 | -0.120 | 11 | 0.026  | 12 | 0.021  |
| 13 | -0.180 | 14 | -0.173 | 15 | 1.560  | 16 | -0.248 |
| 17 | -0.249 | 18 | -0.279 | 19 | -0.590 | 20 | -0.561 |
| 21 | -0.365 | 22 | -0.346 | 23 | -0.354 | 24 | -0.382 |
| 25 | -0.388 | 26 | -0.367 | 27 | -0.342 | 28 | -0.313 |
| 29 | -0.375 | 30 | -0.294 | 31 | -0.250 | 32 | -0.336 |
| 33 | -0.387 | 34 | 0.943  | 35 | 0.443  | 36 | 0.097  |
| 37 | -0.010 | 38 | -0.071 | 39 | -0.130 | 40 | -0.217 |
| 41 | -0.317 | 42 | 0.915  | 43 | 0.025  | 44 | -0.647 |
| 45 | -0.887 | 46 | -0.885 | 47 | -0.731 | 48 | -0.658 |
| 49 | -0.528 | 50 | -0.484 | 51 | -0.213 | 52 | -0.312 |
| 53 | 0.023  | 54 | 0.391  | 55 | 0.039  | 56 | -0.153 |
| 57 | -0.032 | 58 | 0.012  | 59 | 0.060  | 60 | 0.139  |
| 61 | -0.267 | 62 | 0.025  | 63 | 0.026  | 64 | 0.026  |

MEAN PRESSURE COEFFICIENT(SKEG) = -.205  
MEAN PRESSURE COEFFICIENT(RUDDER) = -.29

RUDDER ANGLE, ALPHA( DEG )= 30

RUDDER PRESSURE COEFFICIENTS

APPENDIX A2 (Cont.)

RUDDER NUMBER=1  
DATE OF TEST =09/08/79  
RUN NUMBER =14

SPAN POSITION= 1

SKEG ANGLE, BETA(DEG)= 5

RUDDER ANGLE, ALPHA(DEG)= 0

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.941  | 2  | 0.008  | 3  | -0.348 | 4  | -0.726 |
| 5  | -0.530 | 6  | -0.440 | 7  | -0.340 | 8  | -0.216 |
| 9  | -0.454 | 10 | -0.530 | 11 | -0.485 | 12 | -0.406 |
| 13 | -0.367 | 14 | 0.043  | 15 | 1.519  | 16 | 0.051  |
| 17 | -0.250 | 18 | -0.260 | 19 | -0.206 | 20 | -0.209 |
| 21 | 0.034  | 22 | 0.036  | 23 | -0.282 | 24 | -0.202 |
| 25 | -0.153 | 26 | -0.082 | 27 | 0.018  | 28 | 0.099  |
| 29 | -0.179 | 30 | 0.026  | 31 | -0.139 | 32 | -0.345 |
| 33 | 0.055  | 34 | 0.075  | 35 | 0.048  | 36 | -0.269 |
| 37 | -0.194 | 38 | -0.163 | 39 | -0.083 | 40 | 0.018  |
| 41 | 0.095  | 42 | 0.853  | 43 | 0.044  | 44 | -0.622 |

TOTAL MEAN PRESSURE COEFFICIENT=-.008

RUDDER ANGLE, ALPHA(DEG)= 5

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.838  | 2  | -0.199 | 3  | -0.770 | 4  | -1.064 |
| 5  | -0.682 | 6  | -0.535 | 7  | -0.409 | 8  | 0.242  |
| 9  | -0.064 | 10 | -0.279 | 11 | -0.367 | 12 | -0.336 |
| 13 | -0.338 | 14 | 0.036  | 15 | 1.544  | 16 | 0.057  |
| 17 | -0.312 | 18 | -0.332 | 19 | -0.266 | 20 | -0.273 |
| 21 | 0.052  | 22 | 0.057  | 23 | -0.337 | 24 | -0.255 |
| 25 | -0.204 | 26 | -0.122 | 27 | -0.023 | 28 | 0.063  |
| 29 | -0.161 | 30 | 0.015  | 31 | -0.078 | 32 | -0.180 |
| 33 | 0.049  | 34 | 0.070  | 35 | 0.040  | 36 | -0.259 |
| 37 | -0.196 | 38 | -0.179 | 39 | -0.112 | 40 | -0.020 |
| 41 | 0.061  | 42 | 0.783  | 43 | 0.036  | 44 | -0.885 |

TOTAL MEAN PRESSURE COEFFICIENT=-.166

RUDDER ANGLE, ALPHA(DEG)= 10

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.499  | 2  | -0.505 | 3  | -1.245 | 4  | -1.399 |
| 5  | -0.848 | 6  | -0.647 | 7  | -0.505 | 8  | 0.595  |
| 9  | 0.249  | 10 | -0.032 | 11 | -0.233 | 12 | -0.254 |
| 13 | -0.256 | 14 | 0.029  | 15 | 1.556  | 16 | 0.044  |
| 17 | -0.439 | 18 | -0.463 | 19 | -0.356 | 20 | -0.363 |
| 21 | 0.023  | 22 | 0.029  | 23 | -0.430 | 24 | -0.338 |
| 25 | -0.288 | 26 | -0.215 | 27 | -0.131 | 28 | -0.030 |
| 29 | -0.172 | 30 | 0.011  | 31 | -0.068 | 32 | -0.076 |
| 33 | 0.057  | 34 | 0.075  | 35 | 0.044  | 36 | -0.237 |
| 37 | -0.188 | 38 | -0.196 | 39 | -0.146 | 40 | -0.075 |
| 41 | -0.004 | 42 | 0.693  | 43 | 0.029  | 44 | -1.172 |

TOTAL MEAN PRESSURE COEFFICIENT=-.362

RUDDER ANGLE, ALPHA(DEG)= 20

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | -0.700 | 2  | -1.214 | 3  | -1.561 | 4  | -1.963 |
| 5  | -1.101 | 6  | -0.831 | 7  | -0.679 | 8  | 0.986  |
| 9  | 0.693  | 10 | 0.376  | 11 | 0.026  | 12 | -0.076 |
| 13 | -0.140 | 14 | 0.021  | 15 | 1.574  | 16 | 0.021  |
| 17 | -0.339 | 18 | -0.363 | 19 | -0.322 | 20 | -0.322 |
| 21 | 0.018  | 22 | 0.020  | 23 | -0.603 | 24 | -0.544 |
| 25 | -0.575 | 26 | -0.636 | 27 | -0.592 | 28 | -0.391 |
| 29 | -0.129 | 30 | 0.042  | 31 | -0.023 | 32 | -0.003 |
| 33 | 0.031  | 34 | 0.052  | 35 | 0.023  | 36 | -0.169 |
| 37 | -0.160 | 38 | -0.183 | 39 | -0.177 | 40 | -0.135 |
| 41 | -0.101 | 42 | 0.620  | 43 | 0.016  | 44 | -1.367 |

TOTAL MEAN PRESSURE COEFFICIENT=-.749

RUDDER ANGLE, ALPHA(DEG)= 30

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | -2.464 | 2  | -1.894 | 3  | -1.569 | 4  | -2.334 |
| 5  | -1.245 | 6  | -0.946 | 7  | -0.836 | 8  | 0.752  |
| 9  | 0.856  | 10 | 0.663  | 11 | 0.263  | 12 | 0.125  |
| 13 | 0.011  | 14 | 0.011  | 15 | 1.580  | 16 | 0.030  |
| 17 | -0.400 | 18 | -0.429 | 19 | -0.409 | 20 | -0.409 |
| 21 | 0.018  | 22 | 0.024  | 23 | -0.844 | 24 | -0.984 |
| 25 | -1.211 | 26 | -1.274 | 27 | -0.974 | 28 | -0.678 |
| 29 | -0.154 | 30 | 0.021  | 31 | -0.075 | 32 | 0.020  |
| 33 | 0.018  | 34 | 0.042  | 35 | 0.006  | 36 | -0.059 |
| 37 | -0.087 | 38 | -0.138 | 39 | -0.175 | 40 | -0.221 |
| 41 | -0.291 | 42 | 0.640  | 43 | 0.008  | 44 | -0.621 |

TOTAL MEAN PRESSURE COEFFICIENT=-1.15

RUDDER PRESSURE COEFFICIENTS

RUDDER NUMBER=1  
DATE OF TEST =09/08/79  
RUN NUMBER =06

SPAN POSITION= 2

SKEG ANGLE, BETA(DEG)= 5

RUDDER ANGLE, ALPHA(DEG)= 0

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.968  | 2  | -0.012 | 3  | -0.419 | 4  | -0.749 |
| 5  | -0.583 | 6  | -0.538 | 7  | -0.395 | 8  | -0.273 |
| 9  | -0.471 | 10 | -0.719 | 11 | -0.514 | 12 | -0.446 |
| 13 | -0.375 | 14 | 0.044  | 15 | 0.900  | 16 | 0.056  |
| 17 | -0.245 | 18 | -0.254 | 19 | -0.207 | 20 | -0.210 |
| 21 | 0.054  | 22 | 0.061  | 23 | -0.331 | 24 | -0.225 |
| 25 | -0.145 | 26 | -0.059 | 27 | 0.052  | 28 | 0.127  |
| 29 | -0.190 | 30 | 0.027  | 31 | -0.137 | 32 | -0.356 |
| 33 | 0.065  | 34 | 0.086  | 35 | 0.048  | 36 | -0.312 |
| 37 | -0.217 | 38 | -0.171 | 39 | -0.068 | 40 | 0.049  |
| 41 | 0.114  | 42 | 0.852  | 43 | 0.043  | 44 | -0.620 |
| 45 | -0.755 | 46 | -0.890 | 47 | -0.830 | 48 | -0.515 |
| 49 | -0.576 | 50 | -0.577 | 51 | -0.262 | 52 | -0.152 |
| 53 | 0.046  | 54 | 0.075  | 55 | -0.184 | 56 | -0.538 |
| 57 | -0.528 | 58 | -0.475 | 59 | -0.459 | 60 | -0.497 |
| 61 | -0.190 | 62 | 0.044  | 63 | 0.043  | 64 | 0.043  |

TOTAL MEAN PRESSURE COEFFICIENT=-.014

RUDDER ANGLE, ALPHA(DEG)= 5

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.843  | 2  | -0.266 | 3  | -0.914 | 4  | -1.114 |
| 5  | -0.775 | 6  | -0.654 | 7  | -0.473 | 8  | 0.253  |
| 9  | -0.065 | 10 | -0.405 | 11 | -0.362 | 12 | -0.359 |
| 13 | -0.320 | 14 | 0.037  | 15 | 0.910  | 16 | 0.060  |
| 17 | -0.323 | 18 | -0.338 | 19 | -0.269 | 20 | -0.275 |
| 21 | 0.045  | 22 | 0.051  | 23 | -0.380 | 24 | -0.257 |
| 25 | -0.162 | 26 | -0.063 | 27 | 0.059  | 28 | 0.131  |
| 29 | -0.160 | 30 | 0.020  | 31 | -0.082 | 32 | -0.182 |
| 33 | 0.055  | 34 | 0.078  | 35 | 0.037  | 36 | -0.285 |
| 37 | -0.214 | 38 | -0.183 | 39 | -0.100 | 40 | -0.001 |
| 41 | 0.055  | 42 | 0.782  | 43 | 0.037  | 44 | -0.875 |
| 45 | -1.008 | 46 | -1.136 | 47 | -1.033 | 48 | -0.771 |
| 49 | -0.692 | 50 | -0.647 | 51 | -0.110 | 52 | 0.967  |
| 53 | 0.036  | 54 | 0.220  | 55 | -0.024 | 56 | -0.345 |
| 57 | -0.360 | 58 | -0.330 | 59 | -0.334 | 60 | -0.391 |
| 61 | -0.120 | 62 | 0.037  | 63 | 0.036  | 64 | 0.036  |

TOTAL MEAN PRESSURE COEFFICIENT=-.185

RUDDER ANGLE, ALPHA(DEG)= 10

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.450  | 2  | -0.632 | 3  | -1.492 | 4  | -1.541 |
| 5  | -0.970 | 6  | -0.777 | 7  | -0.557 | 8  | 0.652  |
| 9  | 0.299  | 10 | -0.098 | 11 | -0.201 | 12 | -0.236 |
| 13 | -0.244 | 14 | 0.030  | 15 | 0.928  | 16 | 0.059  |
| 17 | -0.425 | 18 | -0.449 | 19 | -0.337 | 20 | -0.345 |
| 21 | 0.039  | 22 | 0.049  | 23 | -0.444 | 24 | -0.313 |
| 25 | -0.213 | 26 | -0.107 | 27 | 0.021  | 28 | 0.097  |
| 29 | -0.169 | 30 | 0.011  | 31 | -0.065 | 32 | -0.078 |
| 33 | 0.057  | 34 | 0.084  | 35 | 0.036  | 36 | -0.242 |
| 37 | -0.192 | 38 | -0.185 | 39 | -0.123 | 40 | -0.044 |
| 41 | -0.001 | 42 | 0.693  | 43 | 0.028  | 44 | -1.170 |
| 45 | -1.309 | 46 | -1.438 | 47 | -1.274 | 48 | -0.967 |
| 49 | -0.853 | 50 | -0.775 | 51 | -0.165 | 52 | 0.312  |
| 53 | 0.028  | 54 | 0.372  | 55 | 0.139  | 56 | -0.144 |
| 57 | -0.170 | 58 | -0.155 | 59 | -0.161 | 60 | -0.202 |
| 61 | 0.004  | 62 | 0.030  | 63 | 0.029  | 64 | 0.028  |

TOTAL MEAN PRESSURE COEFFICIENT=-.391

RUDDER ANGLE, ALPHA(DEG)= 20

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | -0.902 | 2  | -1.454 | 3  | -1.568 | 4  | -2.166 |
| 5  | -1.217 | 6  | -0.899 | 7  | -0.645 | 8  | 0.959  |
| 9  | 0.770  | 10 | 0.416  | 11 | 0.103  | 12 | 0.005  |
| 13 | -0.066 | 14 | 0.023  | 15 | 0.949  | 16 | 0.060  |
| 17 | -0.340 | 18 | -0.359 | 19 | -0.303 | 20 | -0.306 |
| 21 | 0.040  | 22 | 0.045  | 23 | -0.528 | 24 | -0.412 |
| 25 | -0.335 | 26 | -0.252 | 27 | -0.118 | 28 | -0.020 |
| 29 | -0.129 | 30 | 0.025  | 31 | -0.024 | 32 | -0.004 |
| 33 | 0.055  | 34 | 0.087  | 35 | 0.030  | 36 | -0.125 |
| 37 | -0.120 | 38 | -0.148 | 39 | -0.136 | 40 | -0.101 |
| 41 | -0.092 | 42 | 0.623  | 43 | 0.021  | 44 | -1.353 |
| 45 | -1.605 | 46 | -1.649 | 47 | -1.364 | 48 | -1.020 |
| 49 | -0.862 | 50 | -0.729 | 51 | -0.213 | 52 | 0.462  |
| 53 | 0.022  | 54 | 0.547  | 55 | 0.337  | 56 | 0.119  |
| 57 | 0.096  | 58 | 0.103  | 59 | 0.100  | 60 | 0.064  |
| 61 | 0.163  | 62 | 0.021  | 63 | 0.021  | 64 | 0.019  |

TOTAL MEAN PRESSURE COEFFICIENT=-.688

RUDDER ANGLE, ALPHA(DEG)= 30

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | -2.834 | 2  | -2.278 | 3  | -1.561 | 4  | -2.470 |
| 5  | -1.216 | 6  | -0.877 | 7  | -0.763 | 8  | 0.728  |
| 9  | 0.919  | 10 | 0.754  | 11 | 0.385  | 12 | 0.260  |
| 13 | 0.146  | 14 | 0.010  | 15 | 0.955  | 16 | 0.047  |
| 17 | -0.389 | 18 | -0.400 | 19 | -0.349 | 20 | -0.352 |
| 21 | 0.017  | 22 | 0.029  | 23 | -0.688 | 24 | -0.644 |
| 25 | -0.626 | 26 | -0.588 | 27 | -0.445 | 28 | -0.315 |
| 29 | -0.134 | 30 | 0.010  | 31 | -0.057 | 32 | 0.023  |
| 33 | 0.035  | 34 | 0.071  | 35 | 0.012  | 36 | 0.045  |
| 37 | 0.003  | 38 | -0.065 | 39 | -0.100 | 40 | -0.130 |
| 41 | -0.165 | 42 | 0.649  | 43 | 0.007  | 44 | -0.590 |
| 45 | -0.719 | 46 | -0.962 | 47 | -0.936 | 48 | -0.887 |
| 49 | -0.805 | 50 | -0.739 | 51 | -0.653 | 52 | 0.226  |
| 53 | 0.005  | 54 | 0.664  | 55 | 0.484  | 56 | 0.329  |
| 57 | 0.312  | 58 | 0.322  | 59 | 0.328  | 60 | 0.328  |
| 61 | 0.042  | 62 | 0.008  | 63 | 0.009  | 64 | 0.007  |

TOTAL MEAN PRESSURE COEFFICIENT=-1.002

APPENDIX A2 (Cont.)

RUDDER PRESSURE COEFFICIENTS

RUDDER NUMBER=1  
DATE OF TEST =09/08/79  
RUN NUMBER =19

SPAN POSITION= 3

SKEG ANGLE, BETA(DEG)= 5

RUDDER ANGLE, ALPHA(DEG)= 0

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.991  | 2  | 0.001  | 3  | -0.532 | 4  | -0.812 |
| 5  | -0.612 | 6  | -0.561 | 7  | -0.441 | 8  | -0.224 |
| 9  | -0.515 | 10 | -0.663 | 11 | -0.507 | 12 | -0.439 |
| 13 | -0.441 | 14 | 0.048  | 15 | 1.521  | 16 | -0.013 |
| 17 | -0.260 | 18 | -0.263 | 19 | -0.220 | 20 | -0.225 |
| 21 | 0.037  | 22 | 0.024  | 23 | -0.371 | 24 | -0.231 |
| 25 | -0.147 | 26 | -0.049 | 27 | 0.072  | 28 | 0.146  |
| 29 | -0.194 | 30 | 0.021  | 31 | -0.143 | 32 | -0.357 |
| 33 | 0.009  | 34 | -0.044 | 35 | 0.043  | 36 | -0.354 |
| 37 | -0.244 | 38 | -0.165 | 39 | -0.070 | 40 | 0.050  |
| 41 | 0.138  | 42 | 0.851  | 43 | 0.046  | 44 | -0.619 |

TOTAL MEAN PRESSURE COEFFICIENT=-.024

RUDDER ANGLE, ALPHA(DEG)= 5

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.834  | 2  | -0.248 | 3  | -1.073 | 4  | -1.207 |
| 5  | -0.825 | 6  | -0.695 | 7  | -0.532 | 8  | 0.317  |
| 9  | -0.080 | 10 | -0.337 | 11 | -0.343 | 12 | -0.323 |
| 13 | -0.353 | 14 | 0.040  | 15 | 1.541  | 16 | -0.022 |
| 17 | -0.348 | 18 | -0.354 | 19 | -0.289 | 20 | -0.295 |
| 21 | 0.020  | 22 | 0.011  | 23 | -0.430 | 24 | -0.263 |
| 25 | -0.159 | 26 | -0.039 | 27 | 0.093  | 28 | 0.158  |
| 29 | -0.163 | 30 | 0.017  | 31 | -0.088 | 32 | -0.201 |
| 33 | 0.000  | 34 | -0.052 | 35 | 0.032  | 36 | -0.306 |
| 37 | -0.224 | 38 | -0.167 | 39 | 0.100  | 40 | -0.002 |
| 41 | 0.079  | 42 | 0.782  | 43 | 0.058  | 44 | -0.867 |

TOTAL MEAN PRESSURE COEFFICIENT=-.217

RUDDER ANGLE, ALPHA(DEG)= 10

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.401  | 2  | -0.625 | 3  | -1.547 | 4  | -1.606 |
| 5  | -1.033 | 6  | -0.823 | 7  | -0.625 | 8  | 0.716  |
| 9  | 0.309  | 10 | -0.014 | 11 | -0.160 | 12 | -0.183 |
| 13 | -0.246 | 14 | 0.033  | 15 | 1.553  | 16 | -0.029 |
| 17 | -0.470 | 18 | -0.482 | 19 | -0.365 | 20 | -0.371 |
| 21 | 0.015  | 22 | 0.007  | 23 | -0.494 | 24 | -0.310 |
| 25 | -0.187 | 26 | -0.054 | 27 | 0.071  | 28 | 0.119  |
| 29 | -0.189 | 30 | 0.009  | 31 | -0.088 | 32 | -0.083 |
| 33 | 0.002  | 34 | -0.052 | 35 | 0.031  | 36 | -0.238 |
| 37 | -0.183 | 38 | -0.153 | 39 | -0.115 | 40 | -0.048 |
| 41 | 0.018  | 42 | 0.688  | 43 | 0.032  | 44 | -1.162 |

TOTAL MEAN PRESSURE COEFFICIENT=-.428

RUDDER ANGLE, ALPHA(DEG)= 20

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | -0.969 | 2  | -1.445 | 3  | -1.570 | 4  | -2.140 |
| 5  | -1.187 | 6  | -0.843 | 7  | -0.689 | 8  | 0.992  |
| 9  | 0.794  | 10 | 0.495  | 11 | 0.174  | 12 | 0.088  |
| 13 | -0.035 | 14 | 0.025  | 15 | 1.545  | 16 | -0.027 |
| 17 | -0.348 | 18 | -0.372 | 19 | -0.314 | 20 | -0.316 |
| 21 | 0.007  | 22 | 0.001  | 23 | -0.493 | 24 | -0.381 |
| 25 | -0.325 | 26 | -0.244 | 27 | -0.147 | 28 | -0.107 |
| 29 | -0.144 | 30 | 0.053  | 31 | -0.039 | 32 | 0.006  |
| 33 | -0.003 | 34 | -0.049 | 35 | 0.024  | 36 | -0.087 |
| 37 | -0.091 | 38 | -0.109 | 39 | -0.119 | 40 | -0.103 |
| 41 | -0.085 | 42 | 0.621  | 43 | 0.022  | 44 | -1.356 |

TOTAL MEAN PRESSURE COEFFICIENT=-.71

RUDDER ANGLE, ALPHA(DEG)= 30

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | -2.671 | 2  | -2.159 | 3  | -1.569 | 4  | -2.126 |
| 5  | -1.086 | 6  | -1.036 | 7  | -0.717 | 8  | 0.746  |
| 9  | 0.925  | 10 | 0.831  | 11 | 0.461  | 12 | 0.365  |
| 13 | 0.217  | 14 | 0.014  | 15 | 1.508  | 16 | -0.039 |
| 17 | -0.417 | 18 | -0.437 | 19 | -0.372 | 20 | -0.374 |
| 21 | -0.010 | 22 | -0.017 | 23 | -0.703 | 24 | -0.736 |
| 25 | -0.742 | 26 | -0.739 | 27 | -0.676 | 28 | -0.594 |
| 29 | -0.150 | 30 | 0.044  | 31 | -0.079 | 32 | 0.040  |
| 33 | -0.020 | 34 | -0.069 | 35 | 0.002  | 36 | 0.114  |
| 37 | 0.056  | 38 | -0.014 | 39 | -0.090 | 40 | -0.168 |
| 41 | -0.229 | 42 | 0.643  | 43 | 0.012  | 44 | -0.622 |

TOTAL MEAN PRESSURE COEFFICIENT=-1.083

RUDDER PRESSURE COEFFICIENTS

RUDDER NUMBER=1  
DATE OF TEST =10/08/79  
RUN NUMBER =27

SPAN POSITION= 4

SKEG ANGLE, BETA(DEG)= 5

RUDDER ANGLE, ALPHA(DEG)= 0

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 1.004  | 2  | -0.025 | 3  | -0.596 | 4  | -0.782 |
| 5  | -0.635 | 6  | -0.527 | 7  | -0.456 | 8  | -0.125 |
| 9  | -0.380 | 10 | -0.548 | 11 | -0.449 | 12 | -0.451 |
| 13 | -0.482 | 14 | 0.043  | 15 | 0.368  | 16 | 0.078  |
| 17 | -0.271 | 18 | -0.267 | 19 | -0.221 | 20 | -0.225 |
| 21 | 0.055  | 22 | 0.062  | 23 | -0.364 | 24 | -0.235 |
| 25 | -0.143 | 26 | -0.035 | 27 | 0.079  | 28 | 0.149  |
| 29 | -0.193 | 30 | 0.016  | 31 | -0.119 | 32 | -0.358 |
| 33 | 0.068  | 34 | 0.102  | 35 | 0.050  | 36 | -0.411 |
| 37 | -0.276 | 38 | -0.161 | 39 | -0.065 | 40 | 0.064  |
| 41 | 0.135  | 42 | 0.848  | 43 | 0.043  | 44 | -0.619 |

TOTAL MEAN PRESSURE COEFFICIENT=-.037

RUDDER ANGLE, ALPHA(DEG)= 5

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.834  | 2  | -0.272 | 3  | -1.001 | 4  | -1.086 |
| 5  | -0.796 | 6  | -0.633 | 7  | -0.590 | 8  | 0.362  |
| 9  | -0.017 | 10 | -0.294 | 11 | -0.309 | 12 | -0.331 |
| 13 | -0.353 | 14 | 0.036  | 15 | 0.390  | 16 | 0.087  |
| 17 | -0.344 | 18 | -0.352 | 19 | -0.284 | 20 | -0.289 |
| 21 | 0.055  | 22 | 0.065  | 23 | -0.476 | 24 | -0.282 |
| 25 | -0.153 | 26 | -0.024 | 27 | 0.094  | 28 | 0.149  |
| 29 | -0.165 | 30 | 0.007  | 31 | -0.061 | 32 | -0.191 |
| 33 | 0.074  | 34 | 0.112  | 35 | 0.048  | 36 | -0.312 |
| 37 | -0.237 | 38 | -0.156 | 39 | -0.094 | 40 | 0.009  |
| 41 | 0.068  | 42 | 0.779  | 43 | 0.036  | 44 | -0.867 |

TOTAL MEAN PRESSURE COEFFICIENT=-.225

RUDDER ANGLE, ALPHA(DEG)= 10

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.392  | 2  | -0.604 | 3  | -1.521 | 4  | -1.371 |
| 5  | -0.931 | 6  | -0.724 | 7  | -0.698 | 8  | 0.754  |
| 9  | 0.325  | 10 | -0.008 | 11 | -0.137 | 12 | -0.174 |
| 13 | -0.219 | 14 | 0.030  | 15 | 0.409  | 16 | 0.085  |
| 17 | -0.478 | 18 | -0.484 | 19 | -0.373 | 20 | -0.379 |
| 21 | 0.045  | 22 | 0.061  | 23 | -0.625 | 24 | -0.369 |
| 25 | -0.201 | 26 | -0.070 | 27 | 0.039  | 28 | 0.083  |
| 29 | -0.195 | 30 | 0.001  | 31 | -0.056 | 32 | -0.080 |
| 33 | 0.074  | 34 | 0.122  | 35 | 0.037  | 36 | -0.226 |
| 37 | -0.185 | 38 | -0.136 | 39 | -0.107 | 40 | -0.040 |
| 41 | -0.001 | 42 | 0.691  | 43 | 0.028  | 44 | -1.167 |

TOTAL MEAN PRESSURE COEFFICIENT=-.439

RUDDER ANGLE, ALPHA(DEG)= 20

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | -0.723 | 2  | -1.112 | 3  | -1.547 | 4  | -1.536 |
| 5  | -0.945 | 6  | -0.530 | 7  | -0.441 | 8  | 1.021  |
| 9  | 0.800  | 10 | 0.484  | 11 | 0.178  | 12 | 0.187  |
| 13 | 0.041  | 14 | 0.021  | 15 | 0.411  | 16 | 0.071  |
| 17 | -0.334 | 18 | -0.353 | 19 | -0.306 | 20 | -0.309 |
| 21 | 0.032  | 22 | 0.047  | 23 | -0.477 | 24 | -0.478 |
| 25 | -0.439 | 26 | -0.486 | 27 | -0.452 | 28 | -0.419 |
| 29 | -0.143 | 30 | 0.053  | 31 | -0.019 | 32 | 0.006  |
| 33 | 0.058  | 34 | 0.110  | 35 | 0.025  | 36 | -0.047 |
| 37 | -0.084 | 38 | -0.110 | 39 | -0.166 | 40 | -0.202 |
| 41 | -0.272 | 42 | 0.623  | 43 | 0.021  | 44 | -1.346 |

TOTAL MEAN PRESSURE COEFFICIENT=-.673

RUDDER ANGLE, ALPHA(DEG)= 30

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | -1.733 | 2  | -1.201 | 3  | -1.555 | 4  | -1.111 |
| 5  | -0.731 | 6  | -0.661 | 7  | -0.655 | 8  | 0.840  |
| 9  | 0.953  | 10 | 0.837  | 11 | 0.480  | 12 | 0.397  |
| 13 | 0.316  | 14 | 0.011  | 15 | 0.424  | 16 | 0.060  |
| 17 | -0.393 | 18 | -0.400 | 19 | -0.335 | 20 | -0.337 |
| 21 | 0.026  | 22 | 0.040  | 23 | -0.655 | 24 | -0.671 |
| 25 | -0.660 | 26 | -0.659 | 27 | -0.636 | 28 | -0.601 |
| 29 | -0.155 | 30 | 0.033  | 31 | -0.046 | 32 | 0.045  |
| 33 | 0.050  | 34 | 0.100  | 35 | 0.017  | 36 | 0.190  |
| 37 | 0.097  | 38 | 0.012  | 39 | -0.105 | 40 | -0.231 |
| 41 | -0.359 | 42 | 0.638  | 43 | 0.008  | 44 | -0.621 |

TOTAL MEAN PRESSURE COEFFICIENT=-.54

RUDDER PRESSURE COEFFICIENTS

RUDDER NUMBER=1  
DATE OF TEST =10/08/79  
RUN NUMBER =31

APPENDIX A2 (Cont.)

SPAN POSITION= 5

SKEG ANGLE, BETA( DEG)= 5

RUDDER ANGLE, ALPHA( DEG)= 0

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.344  | 2  | 0.052  | 3  | -0.214 | 4  | 0.328  |
| 5  | 0.260  | 6  | 0.179  | 7  | 0.357  | 8  | 0.335  |
| 9  | -0.197 | 10 | -0.188 | 11 | 0.049  | 12 | 0.047  |
| 13 | -0.016 | 14 | 0.948  | 15 | 0.909  | 16 | 0.065  |
| 17 | -0.263 | 18 | -0.262 | 19 | -0.215 | 20 | -0.218 |
| 21 | 0.053  | 22 | 0.059  | 23 | -0.334 | 24 | -0.211 |
| 25 | -0.135 | 26 | -0.029 | 27 | 0.066  | 28 | 0.130  |
| 29 | -0.188 | 30 | 0.014  | 31 | -0.106 | 32 | -0.348 |
| 33 | 0.057  | 34 | 0.078  | 35 | 0.052  | 36 | -0.438 |
| 37 | -0.281 | 38 | -0.166 | 39 | -0.059 | 40 | 0.064  |
| 41 | 0.129  | 42 | 0.851  | 43 | 0.040  | 44 | -0.624 |
| 45 | -0.757 | 46 | -0.864 | 47 | -0.011 | 48 | -0.608 |
| 49 | -0.553 | 50 | -0.560 | 51 | -0.218 | 52 | -0.143 |
| 53 | 0.048  | 54 | 0.070  | 55 | -0.203 | 56 | -0.549 |
| 57 | -0.538 | 58 | -0.491 | 59 | -0.462 | 60 | -0.507 |
| 61 | -0.185 | 62 | 0.047  | 63 | 0.048  | 64 | 0.047  |

MEAN PRESSURE COEFFICIENT(SKEG) =-.077  
MEAN PRESSURE COEFFICIENT(RUDDER) =-.014

RUDDER ANGLE, ALPHA( DEG)= 5

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.351  | 2  | 0.044  | 3  | -0.254 | 4  | 0.328  |
| 5  | 0.262  | 6  | 0.180  | 7  | 0.363  | 8  | 0.338  |
| 9  | -0.185 | 10 | -0.132 | 11 | 0.040  | 12 | 0.039  |
| 13 | -0.046 | 14 | 0.040  | 15 | 0.914  | 16 | 0.054  |
| 17 | -0.356 | 18 | -0.361 | 19 | -0.284 | 20 | -0.290 |
| 21 | 0.039  | 22 | 0.043  | 23 | -0.528 | 24 | -0.272 |
| 25 | -0.142 | 26 | -0.023 | 27 | 0.080  | 28 | 0.133  |
| 29 | -0.171 | 30 | 0.003  | 31 | -0.067 | 32 | -0.179 |
| 33 | 0.044  | 34 | 0.062  | 35 | 0.039  | 36 | -0.298 |
| 37 | -0.245 | 38 | -0.171 | 39 | -0.098 | 40 | -0.009 |
| 41 | 0.019  | 42 | 0.782  | 43 | 0.040  | 44 | -0.882 |
| 45 | -1.020 | 46 | -1.131 | 47 | -1.017 | 48 | -0.767 |
| 49 | -0.677 | 50 | -0.648 | 51 | -0.090 | 52 | 0.184  |
| 53 | 0.040  | 54 | 0.216  | 55 | -0.039 | 56 | -0.349 |
| 57 | -0.389 | 58 | -0.334 | 59 | -0.331 | 60 | -0.389 |
| 61 | -0.063 | 62 | 0.039  | 63 | 0.039  | 64 | 0.039  |

MEAN PRESSURE COEFFICIENT(SKEG) =-.176  
MEAN PRESSURE COEFFICIENT(RUDDER) =-.038

RUDDER ANGLE, ALPHA( DEG)= 10

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.343  | 2  | 0.036  | 3  | -0.338 | 4  | 0.316  |
| 5  | 0.246  | 6  | 0.172  | 7  | 0.359  | 8  | 0.329  |
| 9  | -0.208 | 10 | -0.209 | 11 | 0.032  | 12 | 0.031  |
| 13 | -0.070 | 14 | 0.032  | 15 | 0.919  | 16 | 0.044  |
| 17 | -0.500 | 18 | -0.491 | 19 | -0.383 | 20 | -0.392 |
| 21 | 0.031  | 22 | 0.034  | 23 | -0.910 | 24 | -0.423 |
| 25 | -0.214 | 26 | -0.030 | 27 | 0.002  | 28 | 0.044  |
| 29 | -0.222 | 30 | 0.008  | 31 | -0.062 | 32 | -0.097 |
| 33 | 0.043  | 34 | 0.060  | 35 | 0.038  | 36 | -0.190 |
| 37 | -0.185 | 38 | -0.144 | 39 | -0.105 | 40 | -0.052 |
| 41 | -0.055 | 42 | 0.589  | 43 | 0.032  | 44 | -1.133 |
| 45 | -1.337 | 46 | -1.443 | 47 | -1.264 | 48 | -0.965 |
| 49 | -0.845 | 50 | -0.780 | 51 | -0.179 | 52 | 0.158  |
| 53 | 0.028  | 54 | 0.376  | 55 | 0.130  | 56 | -0.144 |
| 57 | -0.174 | 58 | -0.154 | 59 | -0.157 | 60 | -0.194 |
| 61 | 0.011  | 62 | 0.032  | 63 | 0.032  | 64 | 0.031  |

MEAN PRESSURE COEFFICIENT(SKEG) =-.296  
MEAN PRESSURE COEFFICIENT(RUDDER) =-.127

RUDDER ANGLE, ALPHA( DEG)= 20

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.357  | 2  | 0.038  | 3  | -0.333 | 4  | 0.326  |
| 5  | 0.258  | 6  | 0.182  | 7  | 0.372  | 8  | 0.342  |
| 9  | -0.160 | 10 | -0.155 | 11 | 0.025  | 12 | 0.024  |
| 13 | -0.070 | 14 | 0.024  | 15 | 0.929  | 16 | 0.049  |
| 17 | -0.337 | 18 | -0.361 | 19 | -0.307 | 20 | -0.308 |
| 21 | 0.032  | 22 | 0.036  | 23 | -0.494 | 24 | -0.475 |
| 25 | -0.492 | 26 | -0.493 | 27 | -0.461 | 28 | -0.425 |
| 29 | -0.169 | 30 | 0.068  | 31 | -0.024 | 32 | -0.019 |
| 33 | 0.040  | 34 | 0.057  | 35 | 0.028  | 36 | 0.013  |
| 37 | -0.075 | 38 | -0.119 | 39 | -0.166 | 40 | -0.240 |
| 41 | -0.354 | 42 | 0.623  | 43 | 0.024  | 44 | -1.358 |
| 45 | -1.609 | 46 | -1.630 | 47 | -1.334 | 48 | -0.988 |
| 49 | -0.815 | 50 | -0.703 | 51 | -0.217 | 52 | 0.498  |
| 53 | 0.026  | 54 | 0.541  | 55 | 0.326  | 56 | 0.117  |
| 57 | 0.096  | 58 | 0.104  | 59 | 0.100  | 60 | 0.093  |
| 61 | 0.174  | 62 | 0.023  | 63 | 0.024  | 64 | 0.024  |

MEAN PRESSURE COEFFICIENT(SKEG) =-.394  
MEAN PRESSURE COEFFICIENT(RUDDER) =-.383

RUDDER ANGLE, ALPHA( DEG)= 30

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.352  | 2  | 0.014  | 3  | -0.353 | 4  | 0.315  |
| 5  | 0.253  | 6  | 0.178  | 7  | 0.368  | 8  | 0.335  |
| 9  | -0.123 | 10 | -0.125 | 11 | 0.012  | 12 | 0.005  |
| 13 | -0.070 | 14 | 0.012  | 15 | 0.927  | 16 | 0.038  |
| 17 | -0.403 | 18 | -0.415 | 19 | -0.339 | 20 | -0.340 |
| 21 | 0.023  | 22 | 0.026  | 23 | -0.653 | 24 | -0.650 |
| 25 | -0.647 | 26 | -0.617 | 27 | -0.587 | 28 | -0.560 |
| 29 | -0.191 | 30 | 0.037  | 31 | -0.060 | 32 | -0.016 |
| 33 | 0.030  | 34 | 0.051  | 35 | 0.017  | 36 | 0.029  |
| 37 | 0.103  | 38 | 0.081  | 39 | -0.104 | 40 | -0.244 |
| 41 | -0.403 | 42 | 0.640  | 43 | 0.011  | 44 | -0.629 |
| 45 | -0.791 | 46 | -1.067 | 47 | -0.893 | 48 | -0.671 |
| 49 | -0.790 | 50 | -0.733 | 51 | -0.599 | 52 | 0.293  |
| 53 | 0.011  | 54 | 0.664  | 55 | 0.475  | 56 | 0.329  |
| 57 | 0.316  | 58 | 0.324  | 59 | 0.334  | 60 | 0.337  |
| 61 | 0.091  | 62 | 0.011  | 63 | 0.010  | 64 | 0.011  |

MEAN PRESSURE COEFFICIENT(SKEG) =-.344  
MEAN PRESSURE COEFFICIENT(RUDDER) =-.362

RUDDER PRESSURE COEFFICIENTS

RUDDER NUMBER=1  
DATE OF TEST =12/08/79  
RUN NUMBER =39

SPAN POSITION= 6

SKEG ANGLE, BETA( DEG)= 5

RUDDER ANGLE, ALPHA( DEG)= 0

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.301  | 2  | 0.051  | 3  | -0.212 | 4  | 0.212  |
| 5  | 0.345  | 6  | 0.106  | 7  | 0.321  | 8  | 0.293  |
| 9  | -0.189 | 10 | -0.180 | 11 | 0.048  | 12 | 0.047  |
| 13 | -0.043 | 14 | -0.181 | 15 | 1.026  | 16 | -0.317 |
| 17 | -0.313 | 18 | -0.321 | 19 | -0.319 | 20 | -0.317 |
| 21 | -0.302 | 22 | -0.328 | 23 | -0.321 | 24 | -0.227 |
| 25 | -0.132 | 26 | -0.028 | 27 | 0.070  | 28 | 0.130  |
| 29 | -0.310 | 30 | -0.309 | 31 | -0.326 | 32 | -0.149 |
| 33 | -0.652 | 34 | -0.672 | 35 | -0.637 | 36 | -0.405 |
| 37 | -0.268 | 38 | -0.159 | 39 | -0.051 | 40 | 0.068  |
| 41 | 0.146  | 42 | 0.891  | 43 | 0.047  | 44 | -0.667 |
| 45 | -0.780 | 46 | -0.869 | 47 | -0.751 | 48 | -0.664 |
| 49 | -0.581 | 50 | -0.542 | 51 | -0.216 | 52 | -0.317 |
| 53 | 0.049  | 54 | 0.175  | 55 | -0.197 | 56 | -0.495 |
| 57 | -0.472 | 58 | -0.437 | 59 | -0.441 | 60 | -0.451 |
| 61 | -0.309 | 62 | 0.046  | 63 | 0.049  | 64 | 0.049  |

MEAN PRESSURE COEFFICIENT(SKEG) =-.088  
MEAN PRESSURE COEFFICIENT(RUDDER) =-.058

RUDDER ANGLE, ALPHA( DEG)= 5

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.309  | 2  | 0.044  | 3  | -0.247 | 4  | 0.219  |
| 5  | 0.352  | 6  | 0.117  | 7  | 0.330  | 8  | 0.303  |
| 9  | -0.191 | 10 | -0.191 | 11 | 0.040  | 12 | 0.039  |
| 13 | -0.093 | 14 | -0.113 | 15 | 1.036  | 16 | -0.309 |
| 17 | -0.236 | 18 | -0.289 | 19 | -0.387 | 20 | -0.687 |
| 21 | -0.538 | 22 | -0.988 | 23 | -0.447 | 24 | -0.262 |
| 25 | -0.136 | 26 | -0.019 | 27 | 0.002  | 28 | 0.128  |
| 29 | -0.210 | 30 | -0.217 | 31 | -0.246 | 32 | -0.332 |
| 33 | -0.437 | 34 | -0.371 | 35 | -0.362 | 36 | -0.284 |
| 37 | -0.236 | 38 | -0.169 | 39 | -0.096 | 40 | -0.015 |
| 41 | 0.055  | 42 | 0.812  | 43 | 0.040  | 44 | -0.895 |
| 45 | -0.987 | 46 | -1.058 | 47 | -0.911 | 48 | -0.805 |
| 49 | -0.682 | 50 | -0.539 | 51 | -0.231 | 52 | -0.204 |
| 53 | 0.041  | 54 | 0.324  | 55 | -0.047 | 56 | -0.344 |
| 57 | -0.342 | 58 | -0.320 | 59 | -0.336 | 60 | -0.400 |
| 61 | -0.216 | 62 | 0.039  | 63 | 0.039  | 64 | 0.040  |

MEAN PRESSURE COEFFICIENT(SKEG) =-.165  
MEAN PRESSURE COEFFICIENT(RUDDER) =-.041

RUDDER ANGLE, ALPHA( DEG)= 10

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.303  | 2  | 0.035  | 3  | -0.330 | 4  | 0.207  |
| 5  | 0.345  | 6  | 0.108  | 7  | 0.325  | 8  | 0.296  |
| 9  | -0.224 | 10 | -0.232 | 11 | 0.032  | 12 | 0.032  |
| 13 | -0.135 | 14 | -0.258 | 15 | 1.038  | 16 | -0.415 |
| 17 | -0.394 | 18 | -0.437 | 19 | -0.402 | 20 | -0.359 |
| 21 | -0.735 | 22 | -1.224 | 23 | -0.696 | 24 | -0.351 |
| 25 | -0.208 | 26 | -0.185 | 27 | -0.006 | 28 | 0.030  |
| 29 | -0.421 | 30 | -0.416 | 31 | -0.477 | 32 | -0.607 |
| 33 | 0.087  | 34 | -0.085 | 35 | -0.058 | 36 | -0.163 |
| 37 | -0.169 | 38 | -0.142 | 39 | -0.104 | 40 | -0.065 |
| 41 | -0.022 | 42 | 0.691  | 43 | 0.031  | 44 | -1.161 |
| 45 | -1.224 | 46 | -1.274 | 47 | -1.107 | 48 | -0.987 |
| 49 | -0.835 | 50 | -0.738 | 51 | -0.416 | 52 | -0.426 |
| 53 | 0.034  | 54 | 0.469  | 55 | 0.102  | 56 | -0.182 |
| 57 | -0.186 | 58 | -0.171 | 59 | -0.187 | 60 | -0.281 |
| 61 | -0.416 | 62 | 0.032  | 63 | 0.031  | 64 | 0.031  |

MEAN PRESSURE COEFFICIENT(SKEG) =-.264  
MEAN PRESSURE COEFFICIENT(RUDDER) =-.194

RUDDER ANGLE, ALPHA( DEG)= 20

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.296  | 2  | 0.038  | 3  | -0.325 | 4  | 0.191  |
| 5  | 0.336  | 6  | 0.098  | 7  | 0.317  | 8  | 0.285  |
| 9  | -0.180 | 10 | -0.181 | 11 | 0.024  | 12 | 0.021  |
| 13 | -0.156 | 14 | -0.227 | 15 | 1.033  | 16 | -0.399 |
| 17 | -0.389 | 18 | -0.356 | 19 | -0.367 | 20 | -0.378 |
| 21 | -0.874 | 22 | -1.028 | 23 | -0.433 | 24 | -0.444 |
| 25 | -0.464 | 26 | -0.479 | 27 | -0.452 | 28 | -0.419 |
| 29 | -0.400 | 30 | -0.399 | 31 | -0.410 | 32 | -0.460 |
| 33 | -0.180 | 34 | 0.418  | 35 | 0.312  | 36 | 0.047  |
| 37 | -0.064 | 38 | -0.119 | 39 | -0.170 | 40 | -0.253 |
| 41 | -0.296 | 42 | 0.577  | 43 | 0.023  | 44 | -1.325 |
| 45 | -1.356 | 46 | -1.362 | 47 | -1.151 | 48 | -0.986 |
| 49 | -0.795 | 50 | -0.616 | 51 | -0.394 | 52 | -0.401 |
| 53 | 0.024  | 54 | 0.622  | 55 | 0.292  | 56 | 0.045  |
| 57 | 0.035  | 58 | 0.061  | 59 | 0.068  | 60 | 0.013  |
| 61 | -0.384 | 62 | 0.023  | 63 | 0.023  | 64 | 0.022  |

MEAN PRESSURE COEFFICIENT(SKEG) =-.339  
MEAN PRESSURE COEFFICIENT(RUDDER) =-.346

RUDDER ANGLE, ALPHA( DEG)= 30

RUDDER PRESSURE COEFFICIENTS

APPENDIX A2 (Cont.)

RUDDER NUMBER=1  
DATE OF TEST =13/03/79  
RUN NUMBER =42

SPAN POSITION= 7

SKEG ANGLE, BETA( DEG)= 5

RUDDER ANGLE, ALPHA( DEG)= 0

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.352  | 2  | 0.050  | 3  | -0.210 | 4  | 0.198  |
| 5  | 0.410  | 6  | 0.122  | 7  | 0.350  | 8  | 0.319  |
| 9  | -0.198 | 10 | -0.187 | 11 | 0.048  | 12 | 0.046  |
| 13 | -0.072 | 14 | -0.163 | 15 | 1.079  | 16 | -0.280 |
| 17 | -0.276 | 18 | -0.277 | 19 | -0.277 | 20 | -0.220 |
| 21 | -0.256 | 22 | -0.303 | 23 | -0.310 | 24 | -0.216 |
| 25 | -0.119 | 26 | -0.029 | 27 | 0.076  | 28 | 0.142  |
| 29 | -0.281 | 30 | -0.284 | 31 | -0.289 | 32 | -0.287 |
| 33 | -0.926 | 34 | -0.669 | 35 | -0.558 | 36 | -0.384 |
| 37 | -0.257 | 38 | -0.150 | 39 | -0.044 | 40 | 0.069  |
| 41 | 0.141  | 42 | 0.908  | 43 | 0.046  | 44 | -0.652 |
| 45 | -0.821 | 46 | -0.886 | 47 | -0.768 | 48 | -0.616 |
| 49 | -0.546 | 50 | -0.457 | 51 | -0.281 | 52 | -0.282 |
| 53 | 0.047  | 54 | 0.248  | 55 | -0.126 | 56 | -0.459 |
| 57 | -0.421 | 58 | -0.297 | 59 | -0.459 | 60 | -0.493 |
| 61 | -0.281 | 62 | 0.048  | 63 | 0.046  | 64 | 0.048  |

MEAN PRESSURE COEFFICIENT(SKEG) = -.086  
MEAN PRESSURE COEFFICIENT(RUDDER) = .06

RUDDER ANGLE, ALPHA( DEG)= 5

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.365  | 2  | 0.044  | 3  | -0.241 | 4  | 0.207  |
| 5  | 0.423  | 6  | 0.132  | 7  | 0.402  | 8  | 0.334  |
| 9  | -0.188 | 10 | -0.189 | 11 | 0.041  | 12 | 0.041  |
| 13 | -0.108 | 14 | -0.174 | 15 | 1.098  | 16 | -0.289 |
| 17 | -0.273 | 18 | -0.317 | 19 | -0.378 | 20 | -0.565 |
| 21 | -0.621 | 22 | -0.556 | 23 | -0.407 | 24 | -0.248 |
| 25 | -0.110 | 26 | -0.007 | 27 | 0.069  | 28 | 0.099  |
| 29 | -0.275 | 30 | -0.268 | 31 | -0.337 | 32 | -0.444 |
| 33 | -0.286 | 34 | -0.372 | 35 | -0.332 | 36 | -0.285 |
| 37 | -0.216 | 38 | -0.151 | 39 | -0.084 | 40 | -0.026 |
| 41 | 0.022  | 42 | 0.940  | 43 | 0.041  | 44 | -0.858 |
| 45 | -1.009 | 46 | -1.057 | 47 | -0.921 | 48 | -0.767 |
| 49 | -0.680 | 50 | -0.577 | 51 | -0.274 | 52 | -0.286 |
| 53 | 0.041  | 54 | 0.377  | 55 | -0.006 | 56 | -0.332 |
| 57 | -0.303 | 58 | -0.284 | 59 | -0.340 | 60 | -0.407 |
| 61 | -0.251 | 62 | 0.040  | 63 | 0.040  | 64 | 0.036  |

MEAN PRESSURE COEFFICIENT(SKEG) = -.174  
MEAN PRESSURE COEFFICIENT(RUDDER) = -.026

RUDDER ANGLE, ALPHA( DEG)= 10

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.372  | 2  | 0.035  | 3  | -0.306 | 4  | 0.213  |
| 5  | 0.435  | 6  | 0.141  | 7  | 0.416  | 8  | 0.342  |
| 9  | -0.249 | 10 | -0.255 | 11 | 0.032  | 12 | 0.033  |
| 13 | -0.139 | 14 | -0.277 | 15 | 1.121  | 16 | -0.404 |
| 17 | -0.381 | 18 | -0.492 | 19 | -0.550 | 20 | -0.953 |
| 21 | -0.866 | 22 | -0.712 | 23 | -0.423 | 24 | -0.258 |
| 25 | -0.199 | 26 | -0.147 | 27 | 0.075  | 28 | 0.024  |
| 29 | -0.433 | 30 | -0.423 | 31 | -0.561 | 32 | -1.386 |
| 33 | 0.364  | 34 | -0.050 | 35 | -0.183 | 36 | -0.159 |
| 37 | -0.147 | 38 | -0.122 | 39 | -0.090 | 40 | -0.078 |
| 41 | -0.060 | 42 | 0.743  | 43 | 0.031  | 44 | -1.092 |
| 45 | -1.227 | 46 | -1.250 | 47 | -1.057 | 48 | -0.931 |
| 49 | -0.833 | 50 | -0.749 | 51 | -0.381 | 52 | -0.436 |
| 53 | 0.033  | 54 | 0.585  | 55 | 0.133  | 56 | -0.182 |
| 57 | -0.168 | 58 | -0.150 | 59 | -0.193 | 60 | -0.251 |
| 61 | -0.406 | 62 | 0.031  | 63 | 0.031  | 64 | 0.032  |

MEAN PRESSURE COEFFICIENT(SKEG) = -.266  
MEAN PRESSURE COEFFICIENT(RUDDER) = -.149

RUDDER ANGLE, ALPHA( DEG)= 20

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.394  | 2  | 0.027  | 3  | -0.315 | 4  | 0.215  |
| 5  | 0.452  | 6  | 0.151  | 7  | 0.431  | 8  | 0.356  |
| 9  | -0.194 | 10 | -0.196 | 11 | 0.025  | 12 | 0.023  |
| 13 | -0.160 | 14 | -0.164 | 15 | 1.130  | 16 | -0.201 |
| 17 | -0.208 | 18 | -0.328 | 19 | -0.522 | 20 | -0.496 |
| 21 | -0.345 | 22 | -0.330 | 23 | -0.341 | 24 | -0.371 |
| 25 | -0.396 | 26 | -0.408 | 27 | -0.399 | 28 | -0.369 |
| 29 | -0.313 | 30 | -0.379 | 31 | -0.492 | 32 | -0.849 |
| 33 | -0.419 | 34 | 0.535  | 35 | 0.297  | 36 | 0.042  |
| 37 | -0.040 | 38 | -0.098 | 39 | -0.149 | 40 | -0.253 |
| 41 | -0.313 | 42 | 0.634  | 43 | 0.024  | 44 | -1.219 |
| 45 | -1.302 | 46 | -1.259 | 47 | -1.067 | 48 | -0.863 |
| 49 | -0.711 | 50 | -0.522 | 51 | -0.205 | 52 | -0.296 |
| 53 | 0.027  | 54 | 0.636  | 55 | 0.302  | 56 | 0.019  |
| 57 | 0.031  | 58 | 0.061  | 59 | 0.056  | 60 | 0.055  |
| 61 | -0.390 | 62 | 0.024  | 63 | 0.024  | 64 | 0.023  |

MEAN PRESSURE COEFFICIENT(SKEG) = -.314  
MEAN PRESSURE COEFFICIENT(RUDDER) = -.249

RUDDER ANGLE, ALPHA( DEG)= 30

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.386  | 2  | 0.016  | 3  | -0.318 | 4  | 0.207  |
| 5  | 0.445  | 6  | 0.146  | 7  | 0.427  | 8  | 0.351  |
| 9  | -0.169 | 10 | -0.173 | 11 | 0.010  | 12 | 0.007  |
| 13 | -0.154 | 14 | -0.178 | 15 | 1.120  | 16 | -0.250 |
| 17 | -0.352 | 18 | -0.471 | 19 | -0.698 | 20 | -0.477 |
| 21 | -0.428 | 22 | -0.431 | 23 | -0.459 | 24 | -0.498 |
| 25 | -0.512 | 26 | -0.586 | 27 | -0.482 | 28 | -0.456 |
| 29 | -0.431 | 30 | -0.569 | 31 | -0.996 | 32 | -1.169 |
| 33 | -0.829 | 34 | 1.004  | 35 | 0.690  | 36 | 0.299  |
| 37 | 0.147  | 38 | 0.039  | 39 | -0.065 | 40 | -0.219 |
| 41 | -0.312 | 42 | 0.510  | 43 | 0.011  | 44 | -1.332 |
| 45 | -1.380 | 46 | -1.288 | 47 | -1.082 | 48 | -0.878 |
| 49 | -0.740 | 50 | -0.553 | 51 | -0.269 | 52 | -0.471 |
| 53 | 0.010  | 54 | 0.759  | 55 | 0.468  | 56 | 0.227  |
| 57 | 0.235  | 58 | 0.275  | 59 | 0.305  | 60 | 0.352  |
| 61 | -0.773 | 62 | 0.011  | 63 | 0.011  | 64 | 0.011  |

MEAN PRESSURE COEFFICIENT(SKEG) = -.385  
MEAN PRESSURE COEFFICIENT(RUDDER) = -.449

RUDDER PRESSURE COEFFICIENTS

RUDDER NUMBER=1  
DATE OF TEST =14/08/79  
RUN NUMBER =52

SPAN POSITION= 8

SKEG ANGLE, BETA( DEG)= 5

RUDDER ANGLE, ALPHA( DEG)= 0

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 1.252  | 2  | 0.050  | 3  | -0.222 | 4  | 0.241  |
| 5  | 1.196  | 6  | 0.095  | 7  | 1.290  | 8  | 0.336  |
| 9  | -0.210 | 10 | -0.197 | 11 | 0.047  | 12 | 0.045  |
| 13 | -0.056 | 14 | -0.148 | 15 | 1.519  | 16 | -0.256 |
| 17 | -0.243 | 18 | -0.241 | 19 | -0.239 | 20 | -0.228 |
| 21 | -0.239 | 22 | -0.304 | 23 | -0.283 | 24 | -0.221 |
| 25 | -0.110 | 26 | -0.050 | 27 | 0.053  | 28 | 0.117  |
| 29 | -0.251 | 30 | -0.240 | 31 | -0.259 | 32 | -0.372 |
| 33 | -0.548 | 34 | -0.727 | 35 | -0.537 | 36 | -0.368 |
| 37 | -0.257 | 38 | -0.139 | 39 | -0.046 | 40 | 0.042  |
| 41 | 0.096  | 42 | 0.903  | 43 | 0.049  | 44 | -0.597 |
| 45 | -0.757 | 46 | -0.760 | 47 | -0.599 | 48 | -0.538 |
| 49 | -0.421 | 50 | -0.398 | 51 | -0.246 | 52 | -0.255 |
| 53 | 0.046  | 54 | 0.335  | 55 | -0.047 | 56 | -0.387 |
| 57 | -0.289 | 58 | -0.318 | 59 | -0.379 | 60 | -0.504 |
| 61 | -0.240 | 62 | 0.047  | 63 | 0.047  | 64 | 0.046  |

MEAN PRESSURE COEFFICIENT(SKEG) = -.089  
MEAN PRESSURE COEFFICIENT(RUDDER) = .066

RUDDER ANGLE, ALPHA( DEG)= 5

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 1.291  | 2  | 0.043  | 3  | -0.264 | 4  | 0.237  |
| 5  | 1.207  | 6  | 0.093  | 7  | 1.303  | 8  | 0.337  |
| 9  | -0.189 | 10 | -0.192 | 11 | 0.041  | 12 | 0.040  |
| 13 | -0.126 | 14 | -0.192 | 15 | 1.537  | 16 | -0.325 |
| 17 | -0.217 | 18 | -0.329 | 19 | -0.359 | 20 | -0.437 |
| 21 | -0.572 | 22 | -0.536 | 23 | -0.383 | 24 | -0.264 |
| 25 | -0.116 | 26 | -0.020 | 27 | 0.058  | 28 | 0.108  |
| 29 | -0.290 | 30 | -0.237 | 31 | -0.207 | 32 | -0.155 |
| 33 | -0.010 | 34 | -0.395 | 35 | -0.317 | 36 | -0.262 |
| 37 | -0.216 | 38 | -0.137 | 39 | -0.063 | 40 | -0.006 |
| 41 | 0.024  | 42 | 0.845  | 43 | 0.040  | 44 | -0.783 |
| 45 | -0.935 | 46 | -0.916 | 47 | -0.739 | 48 | -0.680 |
| 49 | -0.549 | 50 | -0.540 | 51 | -0.312 | 52 | -0.319 |
| 53 | 0.041  | 54 | 0.436  | 55 | -0.062 | 56 | -0.279 |
| 57 | -0.197 | 58 | -0.225 | 59 | -0.266 | 60 | -0.324 |
| 61 | -0.241 | 62 | 0.039  | 63 | 0.042  | 64 | 0.041  |

MEAN PRESSURE COEFFICIENT(SKEG) = -.162  
MEAN PRESSURE COEFFICIENT(RUDDER) = -.03

RUDDER ANGLE, ALPHA( DEG)= 10

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 1.303  | 2  | 0.034  | 3  | -0.306 | 4  | 0.233  |
| 5  | 1.216  | 6  | 0.084  | 7  | 1.307  | 8  | 0.325  |
| 9  | -0.196 | 10 | -0.202 | 11 | 0.033  | 12 | 0.032  |
| 13 | -0.169 | 14 | -0.308 | 15 | 1.556  | 16 | -0.495 |
| 17 | -0.495 | 18 | -0.499 | 19 | -0.512 | 20 | -0.737 |
| 21 | -0.823 | 22 | -0.706 | 23 | -0.457 | 24 | -0.235 |
| 25 | -0.153 | 26 | -0.072 | 27 | -0.005 | 28 | 0.019  |
| 29 | -0.432 | 30 | -0.297 | 31 | -0.238 | 32 | -0.255 |
| 33 | 0.503  | 34 | -0.072 | 35 | -0.096 | 36 | -0.128 |
| 37 | -0.122 | 38 | -0.098 | 39 | -0.067 | 40 | -0.047 |
| 41 | -0.061 | 42 | 0.773  | 43 | 0.029  | 44 | -1.012 |
| 45 | -1.143 | 46 | -1.094 | 47 | -0.899 | 48 | -0.843 |
| 49 | -0.698 | 50 | -0.702 | 51 | -0.487 | 52 | -0.472 |
| 53 | 0.029  | 54 | 0.537  | 55 | 0.179  | 56 | -0.151 |
| 57 | -0.094 | 58 | -0.111 | 59 | -0.139 | 60 | -0.176 |
| 61 | -0.311 | 62 | 0.031  | 63 | 0.030  | 64 | 0.032  |

MEAN PRESSURE COEFFICIENT(SKEG) = -.244  
MEAN PRESSURE COEFFICIENT(RUDDER) = -.147

RUDDER ANGLE, ALPHA( DEG)= 20

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 1.294  | 2  | 0.028  | 3  | -0.303 | 4  | 0.221  |
| 5  | 1.207  | 6  | 0.073  | 7  | 1.308  | 8  | 0.318  |
| 9  | -0.139 | 10 | -0.143 | 11 | 0.026  | 12 | 0.025  |
| 13 | -0.178 | 14 | -0.221 | 15 | 1.569  | 16 | -0.289 |
| 17 | -0.277 | 18 | -0.355 | 19 | -0.492 | 20 | -0.601 |
| 21 | -0.384 | 22 | -0.345 | 23 | -0.339 | 24 | -0.351 |
| 25 | -0.361 | 26 | -0.342 | 27 | -0.308 | 28 | -0.289 |
| 29 | -0.373 | 30 | -0.283 | 31 | -0.199 | 32 | -0.314 |
| 33 | -0.132 | 34 | 0.579  | 35 | 0.303  | 36 | 0.062  |
| 37 | -0.024 | 38 | -0.076 | 39 | -0.126 | 40 | -0.207 |
| 41 | -0.301 | 42 | 0.690  | 43 | 0.024  | 44 | -1.122 |
| 45 | -1.196 | 46 | -1.105 | 47 | -0.865 | 48 | -0.775 |
| 49 | -0.592 | 50 | -0.507 | 51 | -0.252 | 52 | -0.351 |
| 53 | 0.026  | 54 | 0.659  | 55 | 0.329  | 56 | 0.028  |
| 57 | 0.078  | 58 | 0.073  | 59 | 0.074  | 60 | 0.084  |
| 61 | -0.252 | 62 | 0.024  | 63 | 0.024  | 64 | 0.024  |

MEAN PRESSURE COEFFICIENT(SKEG) = -.285  
MEAN PRESSURE COEFFICIENT(RUDDER) = -.248

RUDDER ANGLE, ALPHA( DEG)= 30

RUDDER PRESSURE COEFFICIENTS

RUDDER NUMBER=1  
DATE OF TEST =08/08/79  
RUN NUMBER =15

APPENDIX A2 (Cont.)

SPAN POSITION= 4

SKAG ANGLE, BETA( DEG ) = -5

RUDDER ANGLE, ALPHA( DEG ) = 0

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.947  | 2  | 0.025  | 3  | -0.305 | 4  | -0.685 |
| 5  | -0.508 | 6  | -0.426 | 7  | -0.328 | 8  | -0.265 |
| 9  | -0.493 | 10 | -0.557 | 11 | -0.497 | 12 | -0.412 |
| 13 | -0.378 | 14 | 0.049  | 15 | 1.515  | 16 | 0.851  |
| 17 | -0.254 | 18 | -0.267 | 19 | -0.245 | 20 | -0.252 |
| 21 | 0.047  | 22 | 0.051  | 23 | -0.270 | 24 | -0.193 |
| 25 | -0.147 | 26 | -0.076 | 27 | 0.023  | 28 | 0.184  |
| 29 | -0.171 | 30 | 0.025  | 31 | -0.187 | 32 | -0.220 |
| 33 | 0.045  | 34 | 0.058  | 35 | 0.050  | 36 | -0.272 |
| 37 | -0.196 | 38 | -0.163 | 39 | -0.084 | 40 | 0.017  |
| 41 | 0.089  | 42 | 0.952  | 43 | 0.050  | 44 | 0.123  |

TOTAL MEAN PRESSURE COEFFICIENT = .015

RUDDER ANGLE, ALPHA( DEG ) = 5

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.857  | 2  | -0.172 | 3  | -0.723 | 4  | -1.017 |
| 5  | -0.662 | 6  | -0.517 | 7  | -0.394 | 8  | 0.206  |
| 9  | -0.111 | 10 | -0.300 | 11 | -0.377 | 12 | -0.344 |
| 13 | -0.341 | 14 | 0.043  | 15 | 1.534  | 16 | 0.040  |
| 17 | -0.351 | 18 | -0.372 | 19 | -0.319 | 20 | -0.327 |
| 21 | 0.045  | 22 | 0.046  | 23 | -0.325 | 24 | -0.242 |
| 25 | -0.189 | 26 | -0.113 | 27 | 0.014  | 28 | 0.071  |
| 29 | -0.174 | 30 | 0.016  | 31 | -0.087 | 32 | -0.181 |
| 33 | 0.047  | 34 | 0.058  | 35 | 0.049  | 36 | -0.250 |
| 37 | -0.195 | 38 | -0.177 | 39 | -0.109 | 40 | -0.014 |
| 41 | 0.065  | 42 | 0.971  | 43 | 0.043  | 44 | -0.021 |

TOTAL MEAN PRESSURE COEFFICIENT = -.145

RUDDER ANGLE, ALPHA( DEG ) = 10

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.580  | 2  | -0.427 | 3  | -1.127 | 4  | -1.292 |
| 5  | -0.787 | 6  | -0.596 | 7  | -0.458 | 8  | 0.543  |
| 9  | 0.198  | 10 | -0.072 | 11 | -0.258 | 12 | -0.272 |
| 13 | -0.288 | 14 | 0.039  | 15 | 1.530  | 16 | 0.041  |
| 17 | -0.309 | 18 | -0.342 | 19 | -0.314 | 20 | -0.319 |
| 21 | 0.044  | 22 | 0.047  | 23 | -0.386 | 24 | -0.300 |
| 25 | -0.256 | 26 | -0.185 | 27 | -0.098 | 28 | -0.081 |
| 29 | -0.151 | 30 | 0.089  | 31 | -0.064 | 32 | -0.080 |
| 33 | 0.042  | 34 | 0.052  | 35 | 0.040  | 36 | -0.242 |
| 37 | -0.193 | 38 | -0.196 | 39 | -0.143 | 40 | -0.065 |
| 41 | 0.088  | 42 | 0.976  | 43 | 0.037  | 44 | -0.068 |

TOTAL MEAN PRESSURE COEFFICIENT = -.3

RUDDER ANGLE, ALPHA( DEG ) = 20

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | -0.572 | 2  | -1.118 | 3  | -1.543 | 4  | -1.057 |
| 5  | -1.037 | 6  | -0.773 | 7  | -0.625 | 8  | 0.896  |
| 9  | 0.672  | 10 | 0.354  | 11 | 0.012  | 12 | -0.082 |
| 13 | -0.144 | 14 | 0.031  | 15 | 1.553  | 16 | 0.038  |
| 17 | -0.304 | 18 | -0.333 | 19 | -0.324 | 20 | -0.325 |
| 21 | 0.025  | 22 | 0.031  | 23 | -0.554 | 24 | -0.496 |
| 25 | -0.522 | 26 | -0.565 | 27 | -0.509 | 28 | -0.326 |
| 29 | -0.124 | 30 | 0.086  | 31 | -0.046 | 32 | -0.010 |
| 33 | 0.027  | 34 | 0.042  | 35 | 0.026  | 36 | -0.169 |
| 37 | -0.164 | 38 | -0.181 | 39 | -0.172 | 40 | -0.128 |
| 41 | -0.092 | 42 | 0.977  | 43 | 0.028  | 44 | -0.093 |

TOTAL MEAN PRESSURE COEFFICIENT = -.688

RUDDER ANGLE, ALPHA( DEG ) = 30

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | -2.270 | 2  | -1.047 | 3  | -1.552 | 4  | -2.182 |
| 5  | -1.168 | 6  | -0.885 | 7  | -0.767 | 8  | 0.773  |
| 9  | 0.061  | 10 | 0.660  | 11 | 0.261  | 12 | 0.127  |
| 13 | 0.010  | 14 | 0.219  | 15 | 1.562  | 16 | 0.011  |
| 17 | -0.391 | 18 | -0.448 | 19 | -0.410 | 20 | -0.412 |
| 21 | 0.011  | 22 | 0.012  | 23 | -0.775 | 24 | -0.912 |
| 25 | -1.125 | 26 | -1.160 | 27 | -0.890 | 28 | -0.630 |
| 29 | -0.128 | 30 | 0.004  | 31 | -0.063 | 32 | 0.028  |
| 33 | 0.015  | 34 | 0.025  | 35 | 0.016  | 36 | -0.043 |
| 37 | -0.068 | 38 | -0.122 | 39 | -0.161 | 40 | -0.209 |
| 41 | 0.277  | 42 | 0.968  | 43 | 0.015  | 44 | 0.014  |

TOTAL MEAN PRESSURE COEFFICIENT = -1.064

RUDDER PRESSURE COEFFICIENTS

RUDDER NUMBER=1  
DATE OF TEST =08/08/79  
RUN NUMBER =07

SPAN POSITION= 2

SKAG ANGLE, BETA( DEG ) = -5

RUDDER ANGLE, ALPHA( DEG ) = 0

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.970  | 2  | 0.012  | 3  | -0.358 | 4  | -0.701 |
| 5  | -0.546 | 6  | -0.510 | 7  | -0.376 | 8  | -0.352 |
| 9  | -0.524 | 10 | -0.746 | 11 | -0.533 | 12 | -0.464 |
| 13 | -0.385 | 14 | 0.046  | 15 | 0.976  | 16 | 0.070  |
| 17 | -0.240 | 18 | -0.251 | 19 | -0.243 | 20 | -0.253 |
| 21 | 0.050  | 22 | 0.055  | 23 | -0.317 | 24 | -0.217 |
| 25 | -0.138 | 26 | -0.054 | 27 | 0.054  | 28 | 0.128  |
| 29 | -0.164 | 30 | 0.028  | 31 | -0.090 | 32 | -0.224 |
| 33 | 0.062  | 34 | 0.028  | 35 | 0.053  | 36 | -0.319 |
| 37 | -0.220 | 38 | -0.169 | 39 | -0.067 | 40 | 0.052  |
| 41 | 0.119  | 42 | 0.949  | 43 | 0.047  | 44 | 0.123  |
| 45 | -0.194 | 46 | -0.567 | 47 | -0.631 | 48 | -0.494 |
| 49 | -0.496 | 50 | -0.536 | 51 | -0.177 | 52 | -0.143 |
| 53 | 0.045  | 54 | -0.821 | 55 | -0.776 | 56 | -0.856 |
| 57 | -0.692 | 58 | -0.565 | 59 | -0.503 | 60 | -0.498 |
| 61 | -0.274 | 62 | 0.046  | 63 | 0.046  | 64 | 0.046  |

TOTAL MEAN PRESSURE COEFFICIENT = .015

RUDDER ANGLE, ALPHA( DEG ) = 5

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.868  | 2  | -0.230 | 3  | -0.851 | 4  | -1.053 |
| 5  | -0.746 | 6  | -0.636 | 7  | -0.457 | 8  | 0.206  |
| 9  | -0.105 | 10 | -0.443 | 11 | -0.380 | 12 | -0.364 |
| 13 | -0.327 | 14 | 0.039  | 15 | 0.990  | 16 | 0.060  |
| 17 | -0.339 | 18 | -0.359 | 19 | -0.320 | 20 | -0.328 |
| 21 | 0.045  | 22 | 0.050  | 23 | -0.371 | 24 | -0.250 |
| 25 | -0.160 | 26 | -0.052 | 27 | 0.060  | 28 | 0.132  |
| 29 | -0.167 | 30 | 0.016  | 31 | -0.078 | 32 | -0.092 |
| 33 | 0.052  | 34 | 0.077  | 35 | 0.043  | 36 | -0.288 |
| 37 | -0.217 | 38 | -0.184 | 39 | -0.100 | 40 | 0.002  |
| 41 | 0.058  | 42 | 0.971  | 43 | 0.039  | 44 | -0.022 |
| 45 | -0.380 | 46 | -0.774 | 47 | -0.814 | 48 | -0.638 |
| 49 | -0.617 | 50 | -0.635 | 51 | -0.276 | 52 | 0.269  |
| 53 | 0.035  | 54 | -0.556 | 55 | -0.548 | 56 | -0.623 |
| 57 | -0.504 | 58 | -0.402 | 59 | -0.354 | 60 | -0.345 |
| 61 | -0.065 | 62 | 0.039  | 63 | 0.040  | 64 | 0.039  |

TOTAL MEAN PRESSURE COEFFICIENT = -.16

RUDDER ANGLE, ALPHA( DEG ) = 10

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.565  | 2  | -0.518 | 3  | -1.305 | 4  | -1.390 |
| 5  | -0.884 | 6  | -0.706 | 7  | -0.566 | 8  | 0.578  |
| 9  | 0.228  | 10 | -0.157 | 11 | -0.236 | 12 | -0.266 |
| 13 | -0.269 | 14 | 0.035  | 15 | 0.991  | 16 | 0.051  |
| 17 | -0.284 | 18 | -0.311 | 19 | -0.298 | 20 | -0.304 |
| 21 | 0.037  | 22 | 0.042  | 23 | -0.404 | 24 | -0.285 |
| 25 | -0.196 | 26 | -0.100 | 27 | 0.025  | 28 | 0.097  |
| 29 | -0.145 | 30 | 0.014  | 31 | -0.057 | 32 | -0.078 |
| 33 | 0.043  | 34 | 0.069  | 35 | 0.035  | 36 | -0.260 |
| 37 | -0.210 | 38 | -0.194 | 39 | -0.131 | 40 | -0.047 |
| 41 | -0.003 | 42 | 0.973  | 43 | 0.035  | 44 | -0.052 |
| 45 | -0.433 | 46 | -0.839 | 47 | -0.860 | 48 | -0.691 |
| 49 | -0.656 | 50 | -0.652 | 51 | -0.164 | 52 | 0.334  |
| 53 | 0.032  | 54 | -0.395 | 55 | -0.339 | 56 | -0.465 |
| 57 | -0.361 | 58 | -0.268 | 59 | -0.217 | 60 | -0.191 |
| 61 | 0.054  | 62 | 0.034  | 63 | 0.035  | 64 | 0.034  |

TOTAL MEAN PRESSURE COEFFICIENT = -.317

RUDDER ANGLE, ALPHA( DEG ) = 20

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | -0.729 | 2  | -1.315 | 3  | -1.554 | 4  | -2.030 |
| 5  | -1.138 | 6  | -0.834 | 7  | -0.600 | 8  | 0.951  |
| 9  | 0.742  | 10 | 0.381  | 11 | 0.081  | 12 | -0.012 |
| 13 | -0.081 | 14 | 0.028  | 15 | 1.007  | 16 | 0.050  |
| 17 | -0.276 | 18 | -0.305 | 19 | -0.301 | 20 | -0.304 |
| 21 | 0.034  | 22 | 0.040  | 23 | -0.488 | 24 | -0.378 |
| 25 | -0.310 | 26 | -0.230 | 27 | -0.104 | 28 | -0.012 |
| 29 | -0.109 | 30 | 0.009  | 31 | -0.027 | 32 | -0.011 |
| 33 | 0.049  | 34 | 0.074  | 35 | 0.034  | 36 | -0.173 |
| 37 | -0.128 | 38 | -0.151 | 39 | -0.138 | 40 | -0.093 |
| 41 | -0.070 | 42 | 0.979  | 43 | 0.020  | 44 | -0.079 |
| 45 | -0.508 | 46 | -1.184 | 47 | -1.090 | 48 | -0.850 |
| 49 | -0.811 | 50 | -0.763 | 51 | -0.221 | 52 | 0.358  |
| 53 | 0.026  | 54 | -0.064 | 55 | -0.099 | 56 | -0.146 |
| 57 | -0.061 | 58 | 0.013  | 59 | 0.062  | 60 | 0.197  |
| 61 | 0.158  | 62 | 0.028  | 63 | 0.026  | 64 | 0.026  |

TOTAL MEAN PRESSURE COEFFICIENT = -.637

RUDDER ANGLE, ALPHA( DEG ) = 30

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | -2.642 | 2  | -2.148 | 3  | -1.567 | 4  | -2.373 |
| 5  | -1.158 | 6  | -0.820 | 7  | -0.695 | 8  | 0.760  |
| 9  | 0.921  | 10 | 0.730  | 11 | 0.375  | 12 | 0.254  |
| 13 | 0.145  | 14 | 0.016  | 15 | 1.013  | 16 | 0.044  |
| 17 | -0.359 | 18 | -0.407 | 19 | -0.357 | 20 | -0.358 |
| 21 | 0.025  | 22 | 0.036  | 23 | -0.653 | 24 | -0.630 |
| 25 | -0.623 | 26 | -0.584 | 27 | -0.451 | 28 | -0.312 |
| 29 | -0.112 | 30 | -0.082 | 31 | -0.046 | 32 | 0.030  |
| 33 | 0.038  | 34 | 0.066  | 35 | 0.020  | 36 | 0.046  |
| 37 | 0.009  | 38 | -0.060 | 39 | -0.096 | 40 | -0.119 |
| 41 | -0.158 | 42 | 0.967  | 43 | 0.015  | 44 | 0.028  |
| 45 | -0.209 | 46 | -0.900 | 47 | -1.311 | 48 | -1.203 |
| 49 | -0.914 | 50 | -0.731 | 51 | -0.560 | 52 | 0.024  |
| 53 | 0.013  | 54 | 0.203  | 55 | 0.154  | 56 | 0.127  |
| 57 | 0.209  | 58 | 0.274  | 59 | 0.325  | 60 | 0.377  |
| 61 | 0.067  | 62 | 0.017  | 63 | 0.016  | 64 | 0.015  |

TOTAL MEAN PRESSURE COEFFICIENT = -.971

APPENDIX A2 (Cont.)

RUDDER PRESSURE COEFFICIENTS

RUDDER NUMBER=1  
DATE OF TEST =09/08/79  
RUN NUMBER =20

SPAN POSITION= 3

SKEG ANGLE, BETA(DEG)=-5

RUDDER ANGLE, ALPHA(DEG)= 0

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.999  | 2  | 0.034  | 3  | -0.426 | 4  | -0.720 |
| 5  | -0.559 | 6  | -0.522 | 7  | -0.421 | 8  | -0.336 |
| 9  | -0.600 | 10 | -0.730 | 11 | -0.547 | 12 | -0.462 |
| 13 | -0.454 | 14 | 0.048  | 15 | 1.234  | 16 | 0.007  |
| 17 | -0.272 | 18 | -0.281 | 19 | -0.268 | 20 | -0.277 |
| 21 | 0.023  | 22 | 0.025  | 23 | -0.361 | 24 | -0.226 |
| 25 | -0.146 | 26 | -0.048 | 27 | 0.070  | 28 | 0.143  |
| 29 | -0.178 | 30 | 0.026  | 31 | -0.138 | 32 | -0.235 |
| 33 | 0.016  | 34 | -0.023 | 35 | 0.044  | 36 | -0.356 |
| 37 | -0.243 | 38 | -0.160 | 39 | -0.064 | 40 | 0.059  |
| 41 | 0.145  | 42 | 0.948  | 43 | 0.050  | 44 | 0.129  |

TOTAL MEAN PRESSURE COEFFICIENT= .016

RUDDER ANGLE, ALPHA(DEG)= 5

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.877  | 2  | -0.194 | 3  | -0.957 | 4  | -1.122 |
| 5  | -0.767 | 6  | -0.657 | 7  | -0.517 | 8  | 0.235  |
| 9  | -0.148 | 10 | -0.390 | 11 | -0.373 | 12 | -0.343 |
| 13 | -0.369 | 14 | 0.042  | 15 | 1.207  | 16 | -0.019 |
| 17 | -0.389 | 18 | -0.499 | 19 | -0.343 | 20 | -0.356 |
| 21 | 0.018  | 22 | 0.009  | 23 | -0.427 | 24 | -0.269 |
| 25 | -0.165 | 26 | -0.047 | 27 | 0.006  | 28 | 0.154  |
| 29 | -0.185 | 30 | 0.016  | 31 | -0.119 | 32 | -0.107 |
| 33 | 0.008  | 34 | -0.032 | 35 | 0.036  | 36 | -0.313 |
| 37 | -0.224 | 38 | -0.166 | 39 | -0.097 | 40 | 0.001  |
| 41 | 0.084  | 42 | 0.970  | 43 | 0.041  | 44 | -0.022 |

TOTAL MEAN PRESSURE COEFFICIENT=-.182

RUDDER ANGLE, ALPHA(DEG)= 10

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.565  | 2  | -0.475 | 3  | -1.446 | 4  | -1.390 |
| 5  | -0.899 | 6  | -0.719 | 7  | -0.551 | 8  | 0.625  |
| 9  | 0.213  | 10 | -0.099 | 11 | -0.211 | 12 | -0.224 |
| 13 | -0.278 | 14 | 0.038  | 15 | 1.204  | 16 | -0.011 |
| 17 | -0.342 | 18 | -0.375 | 19 | -0.336 | 20 | -0.345 |
| 21 | 0.022  | 22 | 0.016  | 23 | -0.455 | 24 | -0.308 |
| 25 | -0.219 | 26 | -0.106 | 27 | 0.031  | 28 | 0.093  |
| 29 | -0.169 | 30 | 0.010  | 31 | -0.099 | 32 | -0.091 |
| 33 | 0.003  | 34 | -0.036 | 35 | 0.031  | 36 | -0.262 |
| 37 | -0.207 | 38 | -0.172 | 39 | -0.134 | 40 | -0.067 |
| 41 | -0.004 | 42 | 0.972  | 43 | 0.037  | 44 | -0.063 |

TOTAL MEAN PRESSURE COEFFICIENT=-.351

RUDDER ANGLE, ALPHA(DEG)= 20

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | -0.715 | 2  | -1.263 | 3  | -1.552 | 4  | -1.951 |
| 5  | -1.087 | 6  | -0.771 | 7  | -0.566 | 8  | 0.988  |
| 9  | 0.753  | 10 | 0.441  | 11 | 0.136  | 12 | 0.057  |
| 13 | -0.054 | 14 | 0.028  | 15 | 1.176  | 16 | -0.035 |
| 17 | -0.330 | 18 | -0.348 | 19 | -0.314 | 20 | -0.314 |
| 21 | 0.013  | 22 | 0.007  | 23 | -0.476 | 24 | -0.372 |
| 25 | -0.324 | 26 | -0.256 | 27 | -0.153 | 28 | -0.099 |
| 29 | -0.125 | 30 | 0.008  | 31 | -0.061 | 32 | 0.003  |
| 33 | -0.009 | 34 | 0.048  | 35 | 0.020  | 36 | -0.101 |
| 37 | -0.102 | 38 | -0.117 | 39 | -0.129 | 40 | -0.109 |
| 41 | -0.084 | 42 | 0.977  | 43 | 0.029  | 44 | -0.088 |

TOTAL MEAN PRESSURE COEFFICIENT=-.655

RUDDER ANGLE, ALPHA(DEG)= 30

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | -2.463 | 2  | -2.007 | 3  | -1.558 | 4  | -2.000 |
| 5  | -1.039 | 6  | -0.955 | 7  | -0.780 | 8  | 0.786  |
| 9  | 0.932  | 10 | 0.013  | 11 | 0.450  | 12 | 0.353  |
| 13 | 0.211  | 14 | 0.020  | 15 | 1.165  | 16 | -0.022 |
| 17 | -0.397 | 18 | -0.444 | 19 | -0.362 | 20 | -0.363 |
| 21 | 0.011  | 22 | 0.009  | 23 | -0.558 | 24 | -0.573 |
| 25 | -0.638 | 26 | -0.652 | 27 | -0.646 | 28 | -0.601 |
| 29 | -0.129 | 30 | 0.004  | 31 | -0.080 | 32 | 0.043  |
| 33 | -0.006 | 34 | -0.042 | 35 | 0.011  | 36 | 0.111  |
| 37 | 0.051  | 38 | -0.020 | 39 | -0.098 | 40 | -0.186 |
| 41 | -0.261 | 42 | 0.972  | 43 | 0.016  | 44 | 0.023  |

TOTAL MEAN PRESSURE COEFFICIENT=-1.013

RUDDER PRESSURE COEFFICIENTS

RUDDER NUMBER=1  
DATE OF TEST =10/08/79  
RUN NUMBER =20

SPAN POSITION= 4

SKEG ANGLE, BETA(DEG)=-5

RUDDER ANGLE, ALPHA(DEG)= 0

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.999  | 2  | 0.021  | 3  | -0.489 | 4  | -0.592 |
| 5  | -0.512 | 6  | -0.469 | 7  | -0.489 | 8  | -0.273 |
| 9  | -0.544 | 10 | -0.724 | 11 | -0.524 | 12 | -0.468 |
| 13 | -0.465 | 14 | 0.050  | 15 | 0.494  | 16 | 0.089  |
| 17 | -0.248 | 18 | -0.255 | 19 | -0.258 | 20 | -0.266 |
| 21 | 0.063  | 22 | 0.068  | 23 | -0.489 | 24 | -0.251 |
| 25 | -0.143 | 26 | -0.051 | 27 | 0.000  | 28 | 0.144  |
| 29 | -0.170 | 30 | 0.020  | 31 | -0.076 | 32 | -0.239 |
| 33 | 0.073  | 34 | 0.113  | 35 | 0.057  | 36 | -0.362 |
| 37 | -0.244 | 38 | -0.150 | 39 | -0.054 | 40 | 0.059  |
| 41 | 0.129  | 42 | 0.949  | 43 | 0.050  | 44 | 0.119  |

TOTAL MEAN PRESSURE COEFFICIENT= .017

RUDDER ANGLE, ALPHA(DEG)= 5

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.879  | 2  | -0.171 | 3  | -0.828 | 4  | -0.854 |
| 5  | -0.659 | 6  | -0.582 | 7  | -0.653 | 8  | 0.291  |
| 9  | -0.122 | 10 | -0.423 | 11 | -0.375 | 12 | -0.343 |
| 13 | -0.348 | 14 | 0.043  | 15 | 0.506  | 16 | 0.080  |
| 17 | -0.340 | 18 | -0.361 | 19 | -0.342 | 20 | -0.352 |
| 21 | 0.051  | 22 | 0.059  | 23 | -0.550 | 24 | -0.321 |
| 25 | -0.175 | 26 | -0.047 | 27 | 0.056  | 28 | 0.111  |
| 29 | -0.187 | 30 | 0.004  | 31 | -0.073 | 32 | -0.145 |
| 33 | 0.064  | 34 | 0.105  | 35 | 0.048  | 36 | -0.288 |
| 37 | -0.217 | 38 | -0.150 | 39 | -0.097 | 40 | -0.004 |
| 41 | 0.053  | 42 | 0.973  | 43 | 0.043  | 44 | -0.027 |

TOTAL MEAN PRESSURE COEFFICIENT=-.183

RUDDER ANGLE, ALPHA(DEG)= 10

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 0.603  | 2  | -0.375 | 3  | -1.137 | 4  | -1.018 |
| 5  | -0.718 | 6  | -0.541 | 7  | -0.503 | 8  | 0.658  |
| 9  | 0.222  | 10 | -0.147 | 11 | -0.233 | 12 | -0.239 |
| 13 | -0.232 | 14 | 0.038  | 15 | 0.513  | 16 | 0.066  |
| 17 | -0.315 | 18 | -0.348 | 19 | -0.341 | 20 | -0.349 |
| 21 | 0.040  | 22 | 0.045  | 23 | -0.519 | 24 | -0.467 |
| 25 | -0.410 | 26 | -0.331 | 27 | -0.210 | 28 | -0.129 |
| 29 | -0.158 | 30 | 0.004  | 31 | -0.056 | 32 | -0.076 |
| 33 | 0.051  | 34 | 0.089  | 35 | 0.040  | 36 | -0.231 |
| 37 | -0.199 | 38 | -0.165 | 39 | -0.154 | 40 | -0.113 |
| 41 | -0.098 | 42 | 0.977  | 43 | 0.037  | 44 | -0.057 |

TOTAL MEAN PRESSURE COEFFICIENT=-.357

RUDDER ANGLE, ALPHA(DEG)= 20

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | -0.380 | 2  | -0.866 | 3  | -1.530 | 4  | -1.330 |
| 5  | -0.828 | 6  | -0.511 | 7  | -0.469 | 8  | 1.024  |
| 9  | 0.768  | 10 | 0.431  | 11 | 0.124  | 12 | 0.059  |
| 13 | 0.036  | 14 | 0.030  | 15 | 0.521  | 16 | 0.061  |
| 17 | -0.297 | 18 | -0.321 | 19 | -0.310 | 20 | -0.322 |
| 21 | 0.037  | 22 | 0.041  | 23 | -0.526 | 24 | -0.485 |
| 25 | -0.486 | 26 | -0.488 | 27 | -0.476 | 28 | -0.458 |
| 29 | -0.111 | 30 | 0.002  | 31 | -0.023 | 32 | 0.009  |
| 33 | 0.053  | 34 | 0.006  | 35 | 0.037  | 36 | -0.036 |
| 37 | -0.078 | 38 | -0.111 | 39 | -0.103 | 40 | -0.237 |
| 41 | -0.310 | 42 | 0.974  | 43 | 0.029  | 44 | -0.091 |

TOTAL MEAN PRESSURE COEFFICIENT=-.648

RUDDER ANGLE, ALPHA(DEG)= 30

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | -1.598 | 2  | -1.194 | 3  | -1.544 | 4  | -1.166 |
| 5  | -0.648 | 6  | -0.560 | 7  | -0.527 | 8  | 0.893  |
| 9  | 0.951  | 10 | 0.832  | 11 | 0.468  | 12 | 0.365  |
| 13 | 0.304  | 14 | 0.021  | 15 | 0.534  | 16 | 0.065  |
| 17 | -0.361 | 18 | -0.405 | 19 | -0.341 | 20 | -0.345 |
| 21 | 0.035  | 22 | 0.043  | 23 | -0.545 | 24 | -0.566 |
| 25 | -0.587 | 26 | -0.613 | 27 | -0.630 | 28 | -0.622 |
| 29 | -0.117 | 30 | 0.005  | 31 | -0.031 | 32 | 0.057  |
| 33 | 0.055  | 34 | 0.088  | 35 | 0.025  | 36 | 0.205  |
| 37 | 0.104  | 38 | 0.015  | 39 | -0.121 | 40 | -0.268 |
| 41 | -0.403 | 42 | 0.970  | 43 | 0.019  | 44 | 0.027  |

TOTAL MEAN PRESSURE COEFFICIENT=-.862



RUDDER NUMBER=1  
DATE OF TEST =10/08/79  
RUN NUMBER =32

APPENDIX A2 (Cont.)

RUDDER NUMBER=1  
DATE OF TEST =10/08/79  
RUN NUMBER =40

SPAN POSITION= 5

SPAN POSITION= 6

SKED ANGLE, BETA( DEG )=-5

SKED ANGLE, BETA( DEG )=-5

RUDDER ANGLE, ALPHA( DEG )= 0

Table with 4 columns of data for Rudder Angle Alpha = 0, Span Position = 5, Sked Angle = -5. Values range from 0.495 to 0.048.

MEAN PRESSURE COEFFICIENT(SKEG) = .057  
MEAN PRESSURE COEFFICIENT(RUDDER)=-.001

RUDDER ANGLE, ALPHA( DEG )= 0

Table with 4 columns of data for Rudder Angle Alpha = 0, Span Position = 6, Sked Angle = -5. Values range from 0.348 to 0.049.

MEAN PRESSURE COEFFICIENT(SKEG) = .061  
MEAN PRESSURE COEFFICIENT(RUDDER)=-.05

RUDDER ANGLE, ALPHA( DEG )= 5

Table with 4 columns of data for Rudder Angle Alpha = 5, Span Position = 5, Sked Angle = -5. Values range from 0.503 to 0.040.

MEAN PRESSURE COEFFICIENT(SKEG) =-.043  
MEAN PRESSURE COEFFICIENT(RUDDER)=-.093

RUDDER ANGLE, ALPHA( DEG )= 5

Table with 4 columns of data for Rudder Angle Alpha = 5, Span Position = 6, Sked Angle = -5. Values range from 0.350 to 0.040.

MEAN PRESSURE COEFFICIENT(SKEG) =-.008  
MEAN PRESSURE COEFFICIENT(RUDDER)=-.16

RUDDER ANGLE, ALPHA( DEG )= 10

Table with 4 columns of data for Rudder Angle Alpha = 10, Span Position = 5, Sked Angle = -5. Values range from 0.585 to 0.037.

MEAN PRESSURE COEFFICIENT(SKEG) =-.107  
MEAN PRESSURE COEFFICIENT(RUDDER)=-.206

RUDDER ANGLE, ALPHA( DEG )= 10

Table with 4 columns of data for Rudder Angle Alpha = 10, Span Position = 6, Sked Angle = -5. Values range from 0.353 to 0.037.

MEAN PRESSURE COEFFICIENT(SKEG) =-.053  
MEAN PRESSURE COEFFICIENT(RUDDER)=-.266

RUDDER ANGLE, ALPHA( DEG )= 20

Table with 4 columns of data for Rudder Angle Alpha = 20, Span Position = 5, Sked Angle = -5. Values range from 0.507 to 0.029.

MEAN PRESSURE COEFFICIENT(SKEG) =-.231  
MEAN PRESSURE COEFFICIENT(RUDDER)=-.324

RUDDER ANGLE, ALPHA( DEG )= 20

Table with 4 columns of data for Rudder Angle Alpha = 20, Span Position = 6, Sked Angle = -5. Values range from 0.351 to 0.029.

MEAN PRESSURE COEFFICIENT(SKEG) =-.162  
MEAN PRESSURE COEFFICIENT(RUDDER)=-.388

RUDDER ANGLE, ALPHA( DEG )= 30

Table with 4 columns of data for Rudder Angle Alpha = 30, Span Position = 5, Sked Angle = -5. Values range from 0.525 to 0.019.

MEAN PRESSURE COEFFICIENT(SKEG) =-.3  
MEAN PRESSURE COEFFICIENT(RUDDER)=-.471

RUDDER ANGLE, ALPHA( DEG )= 30

Table with 4 columns of data for Rudder Angle Alpha = 30, Span Position = 6, Sked Angle = -5. Values range from 0.355 to 0.019.

MEAN PRESSURE COEFFICIENT(SKEG) =-.248  
MEAN PRESSURE COEFFICIENT(RUDDER)=-.476



RUDDER PRESSURE COEFFICIENTS

RUDDER NUMBER=1  
DATE OF TEST=11/03/79  
RUN NUMBER =41

APPENDIX A2 (Cont.)

RUDDER PRESSURE COEFFICIENTS

RUDDER NUMBER=1  
DATE OF TEST=11/03/79  
RUN NUMBER =53

SPAN POSITION= 7

SKEG ANGLE, BETA( DEG )=-5

SPAN POSITION= 8

SKEG ANGLE, BETA( DEG )=-5

RUDDER ANGLE, ALPHA( DEG )= 0

Table with 4 columns of data for Rudder Angle Alpha = 0, Span Position = 7. Values range from 0.314 to -0.910.

MEAN PRESSURE COEFFICIENT(SKEG) = .074  
MEAN PRESSURE COEFFICIENT(RUDDER)=-.038

RUDDER ANGLE, ALPHA( DEG )= 0

Table with 4 columns of data for Rudder Angle Alpha = 0, Span Position = 8. Values range from 0.293 to -0.910.

MEAN PRESSURE COEFFICIENT(SKEG) = .064  
MEAN PRESSURE COEFFICIENT(RUDDER)=-.041

RUDDER ANGLE, ALPHA( DEG )= 5

Table with 4 columns of data for Rudder Angle Alpha = 5, Span Position = 7. Values range from 0.309 to -0.910.

MEAN PRESSURE COEFFICIENT(SKEG) = .011  
MEAN PRESSURE COEFFICIENT(RUDDER)=-.141

RUDDER ANGLE, ALPHA( DEG )= 5

Table with 4 columns of data for Rudder Angle Alpha = 5, Span Position = 8. Values range from 0.291 to -0.910.

MEAN PRESSURE COEFFICIENT(SKEG) = .011  
MEAN PRESSURE COEFFICIENT(RUDDER)=-.142

RUDDER ANGLE, ALPHA( DEG )= 10

Table with 4 columns of data for Rudder Angle Alpha = 10, Span Position = 7. Values range from 0.304 to -0.910.

MEAN PRESSURE COEFFICIENT(SKEG) = .039  
MEAN PRESSURE COEFFICIENT(RUDDER)=-.192

RUDDER ANGLE, ALPHA( DEG )= 10

Table with 4 columns of data for Rudder Angle Alpha = 10, Span Position = 8. Values range from 0.295 to -0.910.

MEAN PRESSURE COEFFICIENT(SKEG) = .034  
MEAN PRESSURE COEFFICIENT(RUDDER)=-.19

RUDDER ANGLE, ALPHA( DEG )= 20

Table with 4 columns of data for Rudder Angle Alpha = 20, Span Position = 7. Values range from 0.310 to -0.910.

MEAN PRESSURE COEFFICIENT(SKEG) = .13  
MEAN PRESSURE COEFFICIENT(RUDDER)=-.317

RUDDER ANGLE, ALPHA( DEG )= 20

Table with 4 columns of data for Rudder Angle Alpha = 20, Span Position = 8. Values range from 0.289 to -0.910.

MEAN PRESSURE COEFFICIENT(SKEG) = .112  
MEAN PRESSURE COEFFICIENT(RUDDER)=-.271

RUDDER ANGLE, ALPHA( DEG )= 30

Table with 4 columns of data for Rudder Angle Alpha = 30, Span Position = 7. Values range from 0.320 to -0.910.

MEAN PRESSURE COEFFICIENT(SKEG) = .228  
MEAN PRESSURE COEFFICIENT(RUDDER)=-.404

RUDDER ANGLE, ALPHA( DEG )= 30

Table with 4 columns of data for Rudder Angle Alpha = 30, Span Position = 8. Values range from 0.304 to -0.910.

MEAN PRESSURE COEFFICIENT(SKEG) = .21  
MEAN PRESSURE COEFFICIENT(RUDDER)=-.368

APPENDIX A2 (Cont.)

RUDDER PRESSURE COEFFICIENTS

RUDDER NUMBER=1  
 DATE OF TEST =14/08/79  
 RUN NUMBER =45

SPAN POSITION= 7

SKEG ANGLE, BETA(DEG)=-. 25 H. P. VERTICAL GAP SEALED

RUDDER ANGLE, ALPHA(DEG)=-. 25

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 1.432  | 2  | 0.051  | 3  | -0.216 | 4  | 0.483  |
| 5  | 1.302  | 6  | 0.279  | 7  | 1.432  | 8  | 0.592  |
| 9  | -0.195 | 10 | -0.181 | 11 | 0.051  | 12 | 0.051  |
| 13 | -0.095 | 14 | -0.160 | 15 | 1.511  | 16 | -0.287 |
| 17 | -0.294 | 18 | -0.309 | 19 | -0.316 | 20 | -0.392 |
| 21 | -0.483 | 22 | -0.442 | 23 | -0.352 | 24 | -0.230 |
| 25 | -0.121 | 26 | -0.020 | 27 | 0.093  | 28 | 0.157  |
| 29 | -0.269 | 30 | -0.256 | 31 | -0.264 | 32 | -0.263 |
| 33 | 0.029  | 34 | -0.411 | 35 | -0.442 | 36 | -0.347 |
| 37 | -0.243 | 38 | -0.149 | 39 | -0.052 | 40 | 0.052  |
| 41 | 0.123  | 42 | 0.993  | 43 | 0.048  | 44 | -0.210 |
| 45 | -0.469 | 46 | -0.662 | 47 | -0.628 | 48 | -0.534 |
| 49 | -0.524 | 50 | -0.489 | 51 | -0.290 | 52 | -0.279 |
| 53 | 0.046  | 54 | -0.164 | 55 | -0.490 | 56 | -0.716 |
| 57 | -0.579 | 58 | -0.494 | 59 | -0.498 | 60 | -0.426 |
| 61 | -0.267 | 62 | 0.047  | 63 | 0.046  | 64 | 0.044  |

MEAN PRESSURE COEFFICIENT(SKEG) =-.004  
 MEAN PRESSURE COEFFICIENT(RUDDER) =.006

RUDDER ANGLE, ALPHA(DEG)= 4.75

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 1.385  | 2  | 0.044  | 3  | -0.253 | 4  | 0.432  |
| 5  | 1.284  | 6  | 0.227  | 7  | 1.401  | 8  | 0.551  |
| 9  | -0.187 | 10 | -0.187 | 11 | 0.042  | 12 | 0.042  |
| 13 | -0.120 | 14 | -0.255 | 15 | 1.528  | 16 | -0.444 |
| 17 | -0.445 | 18 | -0.470 | 19 | -0.486 | 20 | -0.846 |
| 21 | -0.806 | 22 | -0.679 | 23 | -0.462 | 24 | -0.281 |
| 25 | -0.130 | 26 | -0.008 | 27 | 0.093  | 28 | 0.131  |
| 29 | -0.437 | 30 | -0.435 | 31 | -0.432 | 32 | -0.430 |
| 33 | 0.019  | 34 | -0.147 | 35 | -0.218 | 36 | -0.236 |
| 37 | -0.192 | 38 | -0.136 | 39 | -0.073 | 40 | -0.015 |
| 41 | 0.033  | 42 | 0.983  | 43 | 0.041  | 44 | -0.413 |
| 45 | -0.666 | 46 | -0.848 | 47 | -0.803 | 48 | -0.710 |
| 49 | -0.702 | 50 | -0.680 | 51 | -0.443 | 52 | -0.441 |
| 53 | 0.040  | 54 | 0.014  | 55 | -0.323 | 56 | -0.552 |
| 57 | -0.429 | 58 | -0.348 | 59 | -0.335 | 60 | -0.248 |
| 61 | -0.428 | 62 | 0.040  | 63 | 0.039  | 64 | 0.041  |

MEAN PRESSURE COEFFICIENT(SKEG) =-.101  
 MEAN PRESSURE COEFFICIENT(RUDDER)=-.091

RUDDER ANGLE, ALPHA(DEG)= 9.75

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 1.361  | 2  | 0.035  | 3  | -0.304 | 4  | 0.395  |
| 5  | 1.270  | 6  | 0.192  | 7  | 1.394  | 8  | 0.526  |
| 9  | -0.209 | 10 | -0.224 | 11 | 0.033  | 12 | 0.032  |
| 13 | -0.148 | 14 | -0.375 | 15 | 1.550  | 16 | -0.606 |
| 17 | -0.603 | 18 | -0.642 | 19 | -0.753 | 20 | -1.277 |
| 21 | -1.041 | 22 | -0.836 | 23 | -0.482 | 24 | -0.269 |
| 25 | -0.184 | 26 | -0.117 | 27 | -0.052 | 28 | -0.017 |
| 29 | -0.589 | 30 | -0.576 | 31 | -0.575 | 32 | -0.569 |
| 33 | 0.017  | 34 | 0.094  | 35 | 0.008  | 36 | -0.119 |
| 37 | -0.125 | 38 | -0.110 | 39 | -0.082 | 40 | -0.073 |
| 41 | -0.059 | 42 | 0.945  | 43 | 0.032  | 44 | -0.609 |
| 45 | -0.863 | 46 | -1.025 | 47 | -0.971 | 48 | -0.871 |
| 49 | -0.852 | 50 | -0.847 | 51 | -0.606 | 52 | -0.600 |
| 53 | 0.033  | 54 | 0.178  | 55 | -0.163 | 56 | -0.384 |
| 57 | -0.284 | 58 | -0.201 | 59 | -0.174 | 60 | -0.055 |
| 61 | -0.563 | 62 | 0.031  | 63 | 0.033  | 64 | 0.033  |

MEAN PRESSURE COEFFICIENT(SKEG) =-.195  
 MEAN PRESSURE COEFFICIENT(RUDDER)=-.198

RUDDER ANGLE, ALPHA(DEG)= 19.75

|    |        |    |        |    |        |    |        |
|----|--------|----|--------|----|--------|----|--------|
| 1  | 1.346  | 2  | 0.018  | 3  | -0.443 | 4  | 0.352  |
| 5  | 1.261  | 6  | 0.138  | 7  | 1.380  | 8  | 0.494  |
| 9  | -0.234 | 10 | -0.252 | 11 | 0.021  | 12 | 0.021  |
| 13 | -0.121 | 14 | -0.454 | 15 | 1.579  | 16 | -0.737 |
| 17 | -0.725 | 18 | -0.773 | 19 | -1.554 | 20 | -1.727 |
| 21 | -1.128 | 22 | -0.905 | 23 | -0.752 | 24 | -0.516 |
| 25 | -0.515 | 26 | -0.489 | 27 | -0.427 | 28 | -0.357 |
| 29 | -0.630 | 30 | -0.672 | 31 | -0.659 | 32 | -0.648 |
| 33 | 0.005  | 34 | -0.052 | 35 | 0.422  | 36 | 0.118  |
| 37 | 0.023  | 38 | -0.034 | 39 | -0.072 | 40 | -0.145 |
| 41 | -0.191 | 42 | 0.844  | 43 | 0.016  | 44 | -0.920 |
| 45 | -1.145 | 46 | -1.255 | 47 | -1.189 | 48 | -1.054 |
| 49 | -1.023 | 50 | -1.011 | 51 | -0.721 | 52 | -0.681 |
| 53 | 0.018  | 54 | 0.434  | 55 | 0.109  | 56 | -0.104 |
| 57 | -0.021 | 58 | 0.064  | 59 | 0.124  | 60 | 0.274  |
| 61 | -0.642 | 62 | 0.017  | 63 | 0.015  | 64 | 0.016  |

MEAN PRESSURE COEFFICIENT(SKEG) =-.334  
 MEAN PRESSURE COEFFICIENT(RUDDER)=-.442

APPENDIX A3 - LISTING OF PRESSURE PLOTTING PROGRAM

```

NE ORTRAN TEXT
1 PROGRAM PLOT1
2 INTEGER XTITL(2),YTITL(5),ATITL(1)
3 INTEGER BTITL(1),CIITL(1),DTITL(1),ETITL(9)
4 INTEGER T
5 INTEGER XHOL(11),YHOL(7),XAXIS(1),YAXIS(1)
6 INTEGER FTITL(6)
7 INTEGER GTITL(1)
8 DIMENSION X(15),Y(15),Z(15)
9 DATA XTITL/20HPRESSURE COEFFICIENT/
10 DATA YTITL/2HS4/
11 DATA ATITL/2HS3/
12 DATA BTITL/2HS2/
13 DATA CIITL/2HS1/
14 DATA DTITL/24HWWITHOUT TRANSITION STRIP/
15 DATA XHOL/44H 0 10 20 30 40 50 60 70 80 90 100 /
16 DATA YHOL/28H+1.0+0.5 0 -0.5-1.0-1.5-2.0/
17 CALL PLOTS(0,0,8)
18 CALL PLOT(0,0,1.5,-3)
19 READ(1,30)N,T
20 FORMAT(11,11)
21 DO 200 K=1,N
22 READ(1,35)(ETITL(I),I=1,9)
23 FORMAT(9A4)
24 DO 100 J=1,4
25 X(14)=0.0
26 X(15)=10.0
27 Y(14)=1.0
28 Y(15)=-0.50
29 Z(14)=1.0
30 Z(15)=-0.50
31 CALL GRID(0.0,0.0,1.0,1.0,10,6)
32 XX=-0.2
33 DO 40 M=1,11
34 XAXIS(1)=XHOL(M)
35 CALL SYMBOL(XX,-0.28,0.21,XAXIS,0.0,3)
36 XX=XX+1.0
37 40 CONTINUE
38 CALL SYMBOL(4.0,-0.60,0.21,XTITL,0.0,7)
39 YY=0.0
40 DO 45 N=1,7
41 YAXIS(1)=YHOL(N)
42 CALL SYMBOL(-0.90,YY,0.21,YAXIS,0.0,4)
43 YY=YY+1.0
44 45 CONTINUE
45 CALL SYMBOL(-1.0,1.0,0.21,YTITL,90.0,20)
46
50 DO 70 L=1,T
51 READ(1,50)(X(I),Y(I),Z(I),I=1,13)
52 FORMAT(5F4.1,F6.3,F6.3)
53 IF(L.EQ.2) GO TO 60
54 CALL FLINE(X,Y,13,1,1,1)
55 CALL FLINE(X,Z,13,1,1,5)
56 IF(L.EQ.1) GO TO 70
57 CALL DASHL(X,Y,13,1)
58 CALL DASHL(X,Z,13,1)
59 70 CONTINUE
60 IF(J.EQ.1)GTITL(1)=ATITL(1)
61 IF(J.EQ.2)GTITL(1)=BTITL(1)
62 IF(J.EQ.3)GTITL(1)=CIITL(1)
63 IF(J.EQ.4)GTITL(1)=DTITL(1)
64 CALL SYMBOL(11.0,4.0,0.42,6TITL,0.0,2)
65 CALL PLOT(0.0,6.9,-3)
66 100 CONTINUE
67 CALL SYMBOL(-0.8,-0.4,0.42,ETITL,0.0,36)
68 CALL PLOT(2.5,-0.75,-3)
69 IF(T.EQ.1) GO TO 150
70 CALL DASHP(2.5,0.0,0.2)
71 CALL SYMBOL(2.6,-0.1,0.21,FTITL,0.0,24)
72 CALL PLOT(18.5,-26.85,-3)
73 200 CONTINUE
74 CALL PLOT(5.0,0.0,999)
75 STOP
76 END

```

APPENDIX A4 - LISTING OF CPC PROGRAM

EDINBURGH FORTRAN(G) COMPILER VERSION 50

```

1 PROGRAM CENPRESS1
2 INTEGER TITL(9)
3 DIMENSION X(13),Y(13),Z(13)
4 DO 100 K=1,5
5 READ(5,10)(TITL(I),I=1,9)
6 FORMAT(9A4)
7 WRITE(6,11)(TITL(I),I=1,9)
8
9 FORMAT(3X,9A4)
10 WRITE(6,15)
11
12 FORMAT(6X,'SPAN: ')
13
14 FORMAT(4X,'POSITION',4X,'CP',3X,'CPC %C')
15 L=5
16 DO 60 J=1,4
17 L=L+1
18 READ(5,50)(X(I),Y(I),Z(I),I=1,13)
19 FORMAT(5F4,1,F6,3,F6,3)
20
21 P1=1.5*(Y(4)-Z(4))+Y(12)-Z(12)
22 P2=2*(Y(3)-Z(3))+Y(6)-Z(6)+Y(8)-Z(8)+Y(10)-Z(10)+Y(13)-Z(13)
23 P3=4*(Y(5)-Z(5))+Y(7)-Z(7)+Y(9)-Z(9)+Y(11)-Z(11)
24 P=(P1+P2+P3)/30
25
26 C1=1.5*((Y(4)-Z(4))-X(4)+(Y(12)-Z(12))*X(12))
27 C2=2*((Y(3)-Z(3))*X(3)+(Y(6)-Z(6))*X(6)+(Y(8)-Z(8))*X(8))
28 C3=2*((Y(10)-Z(10))*X(10)+(Y(13)-Z(13))*X(13))
29 C4=4*((Y(5)-Z(5))*X(5)+(Y(7)-Z(7))*X(7))
30 C5=4*((Y(9)-Z(9))*X(9)+(Y(11)-Z(11))*X(11))
31 CPC=(C1+C2+C3+C4+C5)/(P1+P2+P3)
32 WRITE(6,70) L,P,CPC
33
34 CONTINUE
35
36 FORMAT(9X,11,2X,F6,3,2X,F5,1)
37
38 CONTINUE
39
40 STOP
41 END

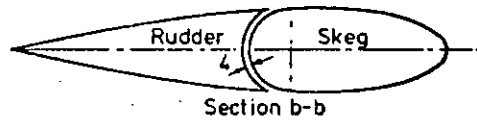
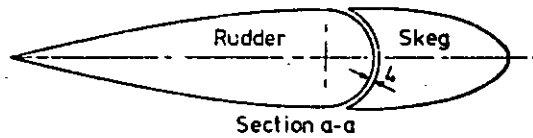
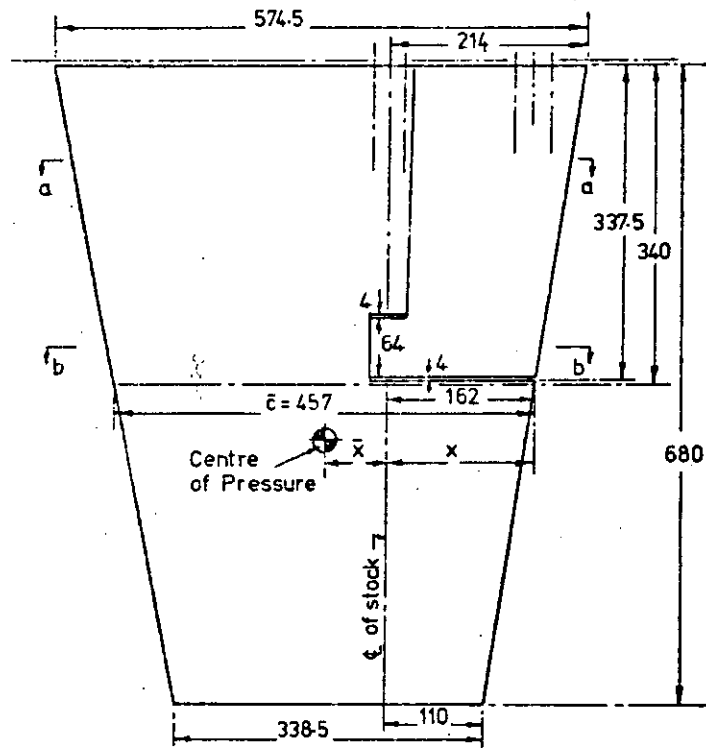
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APPENDIX A5 - TABULATED TEST RESULTS

|                                      |        |        |           |         |         |         |        |        |  |
|--------------------------------------|--------|--------|-----------|---------|---------|---------|--------|--------|--|
| //RUN                                |        |        |           |         |         |         |        |        |  |
| SKEG ANGLE=-0.25, RUDDER ANGLE=-0.25 |        |        |           |         |         |         |        |        |  |
| SPAN                                 |        |        |           |         |         |         |        |        |  |
| POSITION                             | CP(S)  | CP(R)  | CPC(R+S)% | CPC(R)% | CPC(R)% | CPC(R)% | CP     | CPC %C |  |
| 8                                    | -0.003 | 0.017  | 65.2      | 52.9    | 52.9    | 52.9    | 0.008  | 91.4   |  |
| 7                                    | -0.002 | 0.015  | 76.6      | 73.3    | 73.3    | 73.3    | 0.010  | 45.1   |  |
| 6                                    | 0.007  | 0.027  | 48.3      | 62.0    | 62.0    | 62.0    | 0.012  | 21.6   |  |
| 5                                    | 0.004  | 0.014  | 63.8      | 79.9    | 79.9    | 79.9    | 0.011  | 32.1   |  |
| SKEG ANGLE=-0.25, RUDDER ANGLE=4.75  |        |        |           |         |         |         |        |        |  |
| SPAN                                 |        |        |           |         |         |         |        |        |  |
| POSITION                             | CP(S)  | CP(R)  | CPC(R+S)% | CPC(R)% | CPC(R)% | CPC(R)% | CP     | CPC %C |  |
| 8                                    | -0.078 | -0.082 | 26.0      | 36.6    | 36.6    | 36.6    | -0.193 | 17.6   |  |
| 7                                    | -0.087 | -0.079 | 22.1      | 29.1    | 29.1    | 29.1    | -0.189 | 13.4   |  |
| 6                                    | -0.081 | -0.111 | 27.4      | 35.5    | 35.5    | 35.5    | -0.173 | 13.1   |  |
| 5                                    | -0.105 | -0.078 | 24.3      | 37.0    | 37.0    | 37.0    | -0.144 | 18.2   |  |
| SKEG ANGLE=-0.25, RUDDER ANGLE=9.75  |        |        |           |         |         |         |        |        |  |
| SPAN                                 |        |        |           |         |         |         |        |        |  |
| POSITION                             | CP(S)  | CP(R)  | CPC(R+S)% | CPC(R)% | CPC(R)% | CPC(R)% | CP     | CPC %C |  |
| 8                                    | -0.141 | -0.180 | 32.6      | 46.3    | 46.3    | 46.3    | -0.403 | 22.9   |  |
| 7                                    | -0.158 | -0.183 | 33.0      | 48.1    | 48.1    | 48.1    | -0.394 | 16.6   |  |
| 6                                    | -0.166 | -0.245 | 33.9      | 46.2    | 46.2    | 46.2    | -0.355 | 16.5   |  |
| 5                                    | -0.213 | -0.199 | 30.7      | 47.5    | 47.5    | 47.5    | -0.331 | 22.2   |  |
| SKEG ANGLE=-0.25, RUDDER ANGLE=19.75 |        |        |           |         |         |         |        |        |  |
| SPAN                                 |        |        |           |         |         |         |        |        |  |
| POSITION                             | CP(S)  | CP(R)  | CPC(R+S)% | CPC(R)% | CPC(R)% | CPC(R)% | CP     | CPC %C |  |
| 8                                    | -0.186 | -0.272 | 36.9      | 52.0    | 52.0    | 52.0    | -0.636 | 30.3   |  |
| 7                                    | -0.211 | -0.287 | 36.9      | 52.9    | 52.9    | 52.9    | -0.664 | 23.8   |  |
| 6                                    | -0.237 | -0.369 | 37.4      | 51.7    | 51.7    | 51.7    | -0.648 | 22.5   |  |
| 5                                    | -0.302 | -0.294 | 34.7      | 55.1    | 55.1    | 55.1    | -0.701 | 31.5   |  |
| SKEG ANGLE=-0.25, RUDDER ANGLE=29.75 |        |        |           |         |         |         |        |        |  |
| SPAN                                 |        |        |           |         |         |         |        |        |  |
| POSITION                             | CP(S)  | CP(R)  | CPC(R+S)% | CPC(R)% | CPC(R)% | CPC(R)% | CP     | CPC %C |  |
| 8                                    | -0.274 | -0.426 | 38.7      | 53.9    | 53.9    | 53.9    | -0.896 | 35.3   |  |
| 7                                    | -0.298 | -0.454 | 39.2      | 55.0    | 55.0    | 55.0    | -1.012 | 34.2   |  |
| 6                                    | -0.301 | -0.551 | 40.2      | 53.6    | 53.6    | 53.6    | -1.006 | 33.5   |  |
| 5                                    | -0.326 | -0.495 | 40.2      | 55.5    | 55.5    | 55.5    | -1.029 | 39.2   |  |
| STOP                                 |        |        |           |         |         |         |        |        |  |

|                                  |        |        |           |         |         |        |        |        |        |
|----------------------------------|--------|--------|-----------|---------|---------|--------|--------|--------|--------|
| //RUN                            |        |        |           |         |         |        |        |        |        |
| SKEG ANGLE=+5.0, RUDDER ANGLE=0  |        |        |           |         |         |        |        |        |        |
| SPAN                             |        |        |           |         |         |        |        |        |        |
| POSITION                         | CP(S)  | CP(R)  | CPC(R+S)% | CPC(R)% | CPC(S)% | CP     | CPC %C | CP     | CPC %C |
| 8                                | -0.089 | 0.066  | -91.4     | 44.1    | 44.1    | -0.037 | -9.4   | -0.037 | -9.4   |
| 7                                | -0.096 | 0.060  | -46.1     | 44.5    | 44.5    | -0.024 | 4.1    | -0.024 | 4.1    |
| 6                                | -0.088 | 0.058  | -51.8     | 44.9    | 44.9    | -0.014 | 19.9   | -0.014 | 19.9   |
| 5                                | -0.077 | 0.018  | -6.1      | 66.3    | 66.3    | -0.008 | 15.9   | -0.008 | 15.9   |
| SKEG ANGLE=+5.0, RUDDER ANGLE=5  |        |        |           |         |         |        |        |        |        |
| SPAN                             |        |        |           |         |         |        |        |        |        |
| POSITION                         | CP(S)  | CP(R)  | CPC(R+S)% | CPC(R)% | CPC(S)% | CP     | CPC %C | CP     | CPC %C |
| 8                                | -0.162 | -0.030 | 13.7      | 22.0    | 22.0    | -0.225 | 14.1   | -0.225 | 14.1   |
| 7                                | -0.174 | -0.026 | 11.6      | 5.8     | 5.8     | -0.217 | 13.2   | -0.217 | 13.2   |
| 6                                | -0.166 | -0.041 | 14.1      | 20.5    | 20.5    | -0.185 | 13.9   | -0.185 | 13.9   |
| 5                                | -0.176 | -0.046 | 15.3      | 25.5    | 25.5    | -0.166 | 19.3   | -0.166 | 19.3   |
| SKEG ANGLE=+5.0, RUDDER ANGLE=10 |        |        |           |         |         |        |        |        |        |
| SPAN                             |        |        |           |         |         |        |        |        |        |
| POSITION                         | CP(S)  | CP(R)  | CPC(R+S)% | CPC(R)% | CPC(S)% | CP     | CPC %C | CP     | CPC %C |
| 8                                | -0.244 | -0.147 | 24.3      | 42.5    | 42.5    | -0.439 | 20.3   | -0.439 | 20.3   |
| 7                                | -0.266 | -0.149 | 24.6      | 44.5    | 44.5    | -0.428 | 16.9   | -0.428 | 16.9   |
| 6                                | -0.264 | -0.194 | 26.1      | 43.2    | 43.2    | -0.391 | 17.4   | -0.391 | 17.4   |
| 5                                | -0.296 | -0.178 | 25.1      | 44.4    | 44.4    | -0.362 | 23.1   | -0.362 | 23.1   |
| SKEG ANGLE=+5.0, RUDDER ANGLE=20 |        |        |           |         |         |        |        |        |        |
| SPAN                             |        |        |           |         |         |        |        |        |        |
| POSITION                         | CP(S)  | CP(R)  | CPC(R+S)% | CPC(R)% | CPC(S)% | CP     | CPC %C | CP     | CPC %C |
| 8                                | -0.285 | -0.248 | 31.4      | 52.3    | 52.3    | -0.673 | 30.1   | -0.673 | 30.1   |
| 7                                | -0.314 | -0.249 | 31.4      | 54.1    | 54.1    | -0.710 | 24.0   | -0.710 | 24.0   |
| 6                                | -0.339 | -0.346 | 33.3      | 52.4    | 52.4    | -0.688 | 23.1   | -0.688 | 23.1   |
| 5                                | -0.394 | -0.300 | 31.8      | 55.7    | 55.7    | -0.749 | 32.6   | -0.749 | 32.6   |
| SKEG ANGLE=+5.0, RUDDER ANGLE=30 |        |        |           |         |         |        |        |        |        |
| SPAN                             |        |        |           |         |         |        |        |        |        |
| POSITION                         | CP(S)  | CP(R)  | CPC(R+S)% | CPC(R)% | CPC(S)% | CP     | CPC %C | CP     | CPC %C |
| 8                                | -0.358 | -0.377 | 35.4      | 55.7    | 55.7    | -0.940 | 35.9   | -0.940 | 35.9   |
| 7                                | -0.385 | -0.449 | 35.8      | 54.6    | 54.6    | -1.083 | 35.3   | -1.083 | 35.3   |
| 6                                | -0.353 | -0.569 | 38.4      | 53.4    | 53.4    | -1.002 | 31.6   | -1.002 | 31.6   |
| 5                                | -0.344 | -0.481 | 39.5      | 56.7    | 56.7    | -1.150 | 39.4   | -1.150 | 39.4   |
| STOP                             |        |        |           |         |         |        |        |        |        |

|                                 |        |        |           |         |         |           |         |        |        |
|---------------------------------|--------|--------|-----------|---------|---------|-----------|---------|--------|--------|
| //RUN                           |        |        |           |         |         |           |         |        |        |
| SKEG ANGLE=-5.0/RUDDER ANGLE=0  |        |        |           |         |         |           |         |        |        |
| SPAN                            |        |        |           |         |         |           |         |        |        |
| POSITION                        | CP(S)  | CP(R)  | CPC(R+S)% | CPC(R)% | CPC(R)% | CPC(R+S)% | CPC(R)% | CP     | CPC %C |
| 8                               | 0.065  | -0.041 | -39.6     | 36.4    |         |           |         | 0.017  | 22.3   |
| 7                               | 0.074  | -0.038 | -4.3      | 20.0    |         |           |         | 0.016  | 29.4   |
| 6                               | 0.081  | -0.050 | -23.3     | 27.2    |         |           |         | 0.015  | 25.7   |
| 5                               | 0.057  | -0.011 | 6.7       | 10.3    |         |           |         | 0.015  | 36.7   |
| SKEG ANGLE=-5.0/RUDDER ANGLE=5  |        |        |           |         |         |           |         |        |        |
| SPAN                            |        |        |           |         |         |           |         |        |        |
| POSITION                        | CP(S)  | CP(R)  | CPC(R+S)% | CPC(R)% | CPC(R)% | CPC(R+S)% | CPC(R)% | CP     | CPC %C |
| 8                               | -0.011 | -0.142 | 40.6      | 39.8    |         |           |         | -0.183 | 21.7   |
| 7                               | -0.011 | -0.141 | 38.3      | 36.4    |         |           |         | -0.182 | 13.6   |
| 6                               | -0.008 | -0.160 | 42.5      | 40.5    |         |           |         | -0.160 | 12.9   |
| 5                               | -0.043 | -0.112 | 38.3      | 43.7    |         |           |         | -0.145 | 18.0   |
| SKEG ANGLE=-5.0/RUDDER ANGLE=10 |        |        |           |         |         |           |         |        |        |
| SPAN                            |        |        |           |         |         |           |         |        |        |
| POSITION                        | CP(S)  | CP(R)  | CPC(R+S)% | CPC(R)% | CPC(R)% | CPC(R+S)% | CPC(R)% | CP     | CPC %C |
| 8                               | -0.034 | -0.190 | 44.8      | 48.2    |         |           |         | -0.357 | 30.8   |
| 7                               | -0.039 | -0.192 | 47.6      | 51.7    |         |           |         | -0.351 | 16.5   |
| 6                               | -0.053 | -0.266 | 46.6      | 50.9    |         |           |         | -0.317 | 15.2   |
| 5                               | -0.107 | -0.214 | 43.0      | 55.1    |         |           |         | -0.300 | 21.0   |
| SKEG ANGLE=-5.0/RUDDER ANGLE=20 |        |        |           |         |         |           |         |        |        |
| SPAN                            |        |        |           |         |         |           |         |        |        |
| POSITION                        | CP(S)  | CP(R)  | CPC(R+S)% | CPC(R)% | CPC(R)% | CPC(R+S)% | CPC(R)% | CP     | CPC %C |
| 8                               | -0.112 | -0.271 | 43.6      | 54.0    |         |           |         | -0.648 | 30.8   |
| 7                               | -0.130 | -0.317 | 43.1      | 53.2    |         |           |         | -0.655 | 23.9   |
| 6                               | -0.162 | -0.388 | 41.6      | 51.4    |         |           |         | -0.637 | 22.3   |
| 5                               | -0.231 | -0.318 | 38.8      | 54.6    |         |           |         | -0.688 | 31.3   |
| SKEG ANGLE=-5.0/RUDDER ANGLE=30 |        |        |           |         |         |           |         |        |        |
| SPAN                            |        |        |           |         |         |           |         |        |        |
| POSITION                        | CP(S)  | CP(R)  | CPC(R+S)% | CPC(R)% | CPC(R)% | CPC(R+S)% | CPC(R)% | CP     | CPC %C |
| 8                               | -0.210 | -0.435 | 42.3      | 54.5    |         |           |         | -0.862 | 34.8   |
| 7                               | -0.228 | -0.486 | 42.8      | 54.8    |         |           |         | -1.013 | 33.9   |
| 6                               | -0.248 | -0.580 | 42.5      | 53.2    |         |           |         | -0.971 | 31.8   |
| 5                               | -0.300 | -0.475 | 41.5      | 56.3    |         |           |         | -1.084 | 38.8   |
| STOP                            |        |        |           |         |         |           |         |        |        |



Rudder No. 1

( ALL DIMENSIONS IN mm )

GEOMETRIC ASPECT RATIO ... 1.49

TAPER RATIO ... 0.59

THICKNESS RATIO ... 0.20

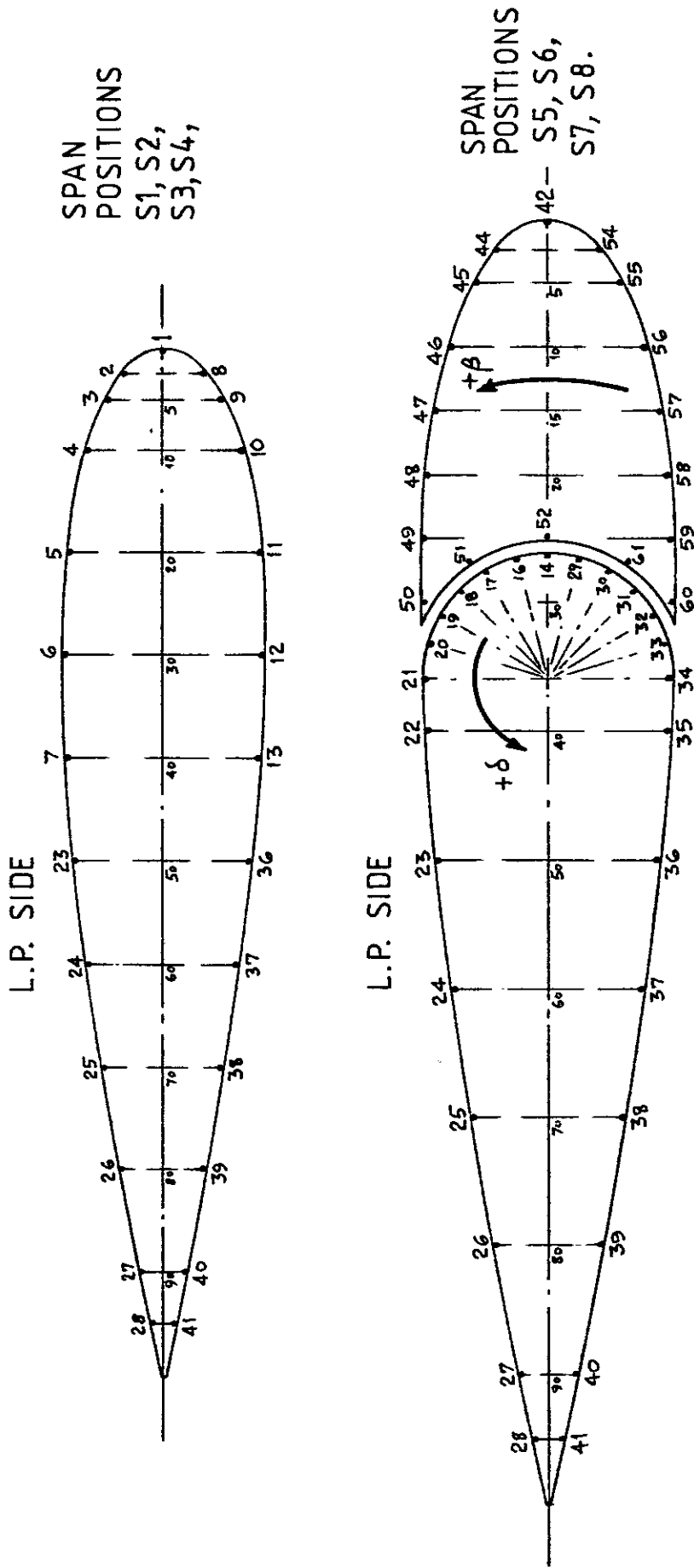
SECTION ... NACA 0020

SWEEP OF QUARTER CHORD ... 3.8°

Fig.1 MODEL RUDDER DIMENSIONS







( Tube Nos 15,43 and 53 faulty and not connected to rudder )

Fig. 3 CHORDWISE NUMBERING OF PRESSURE TAPPINGS

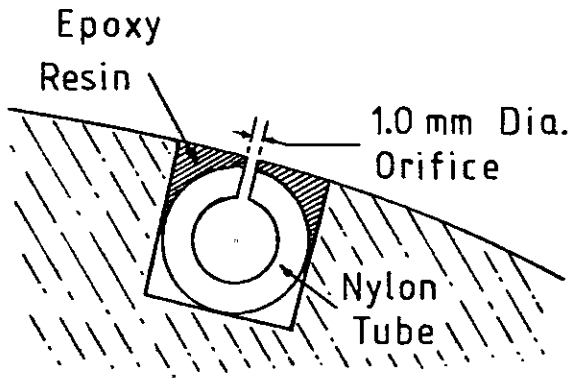


Fig. 4 SECTION IN WAY OF TAPPINGS

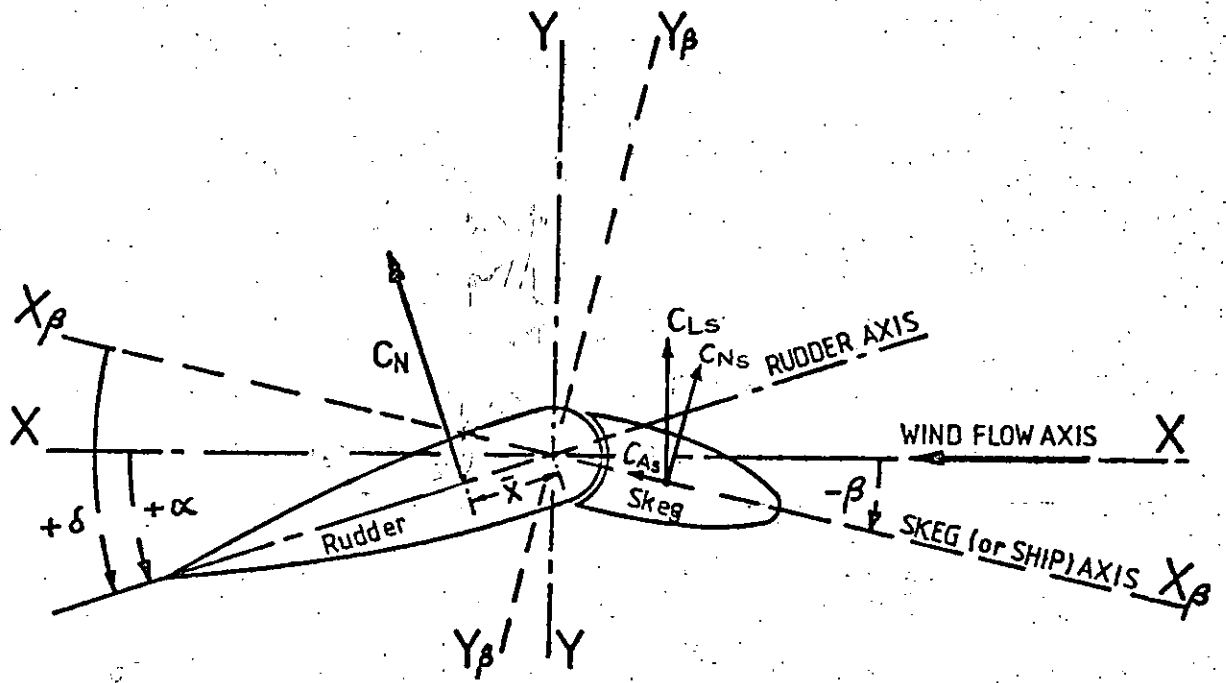
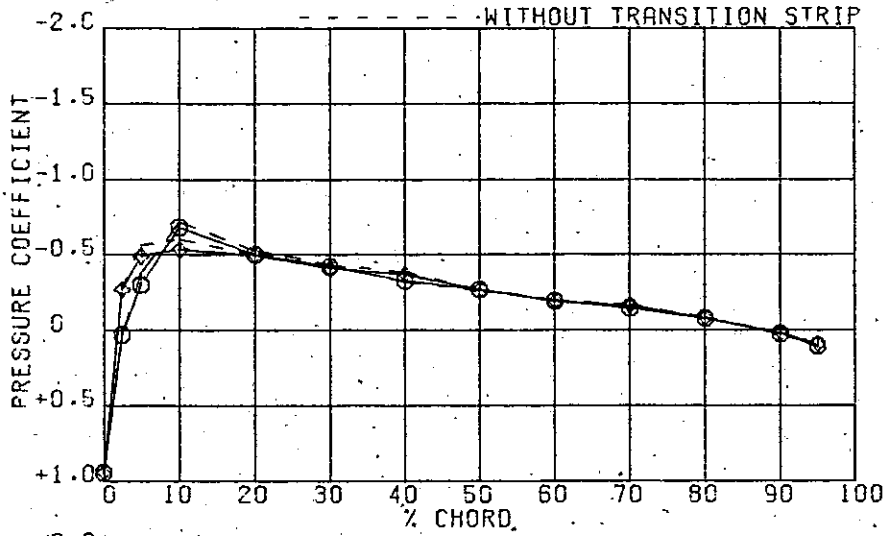
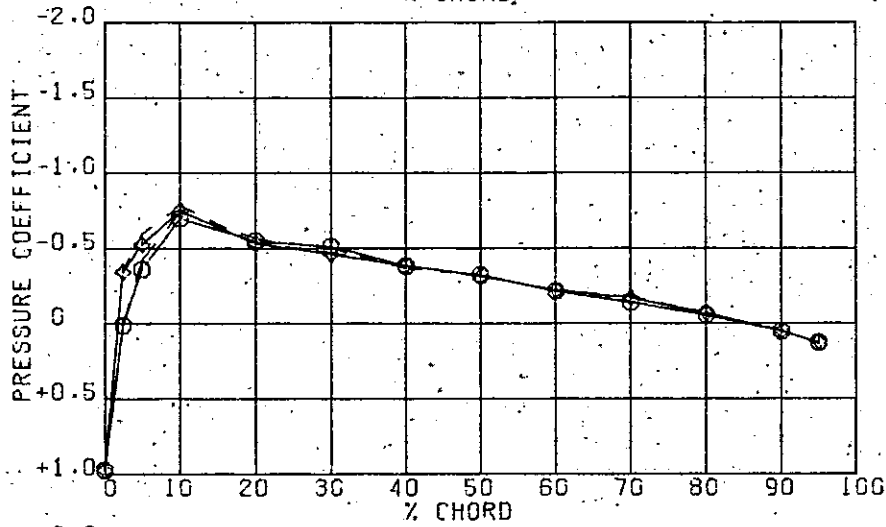


Fig. 5 NOTATION OF ANGLES AND COEFFICIENTS

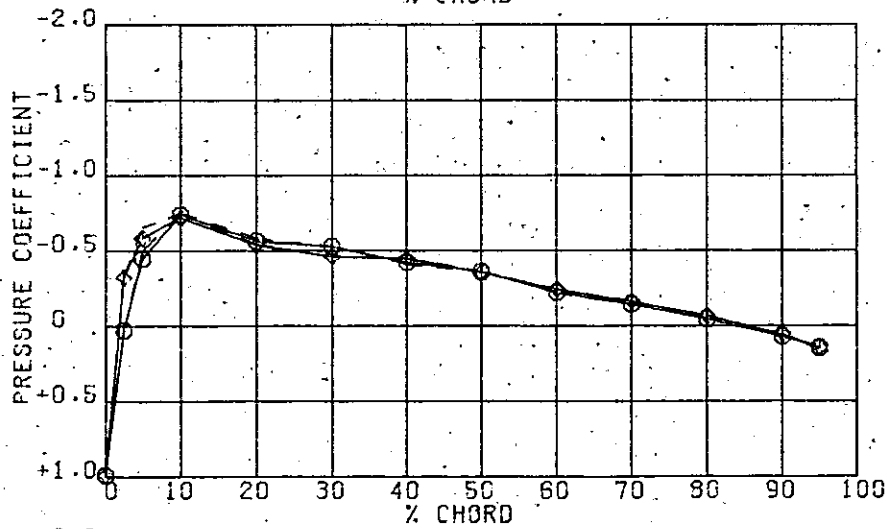
SKEG ANGLE = -0.25; RUDDER ANGLE = -0.25



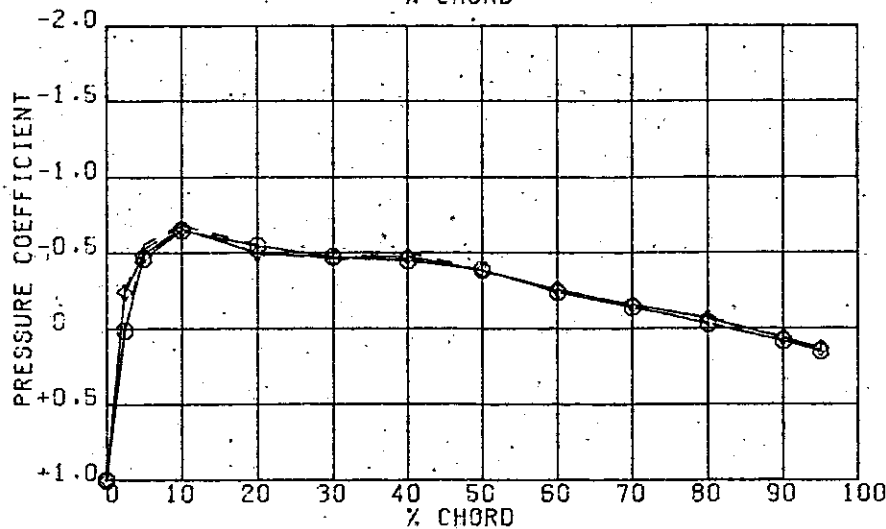
S1



S2



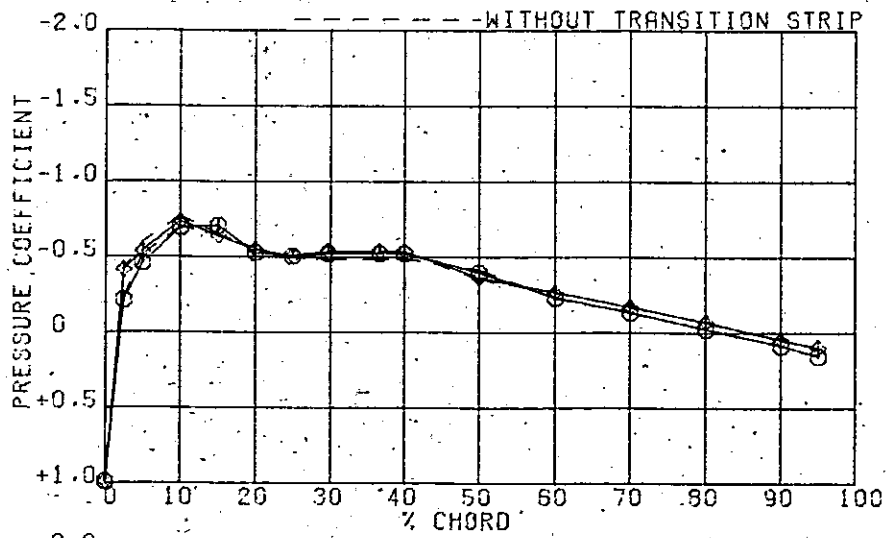
S3



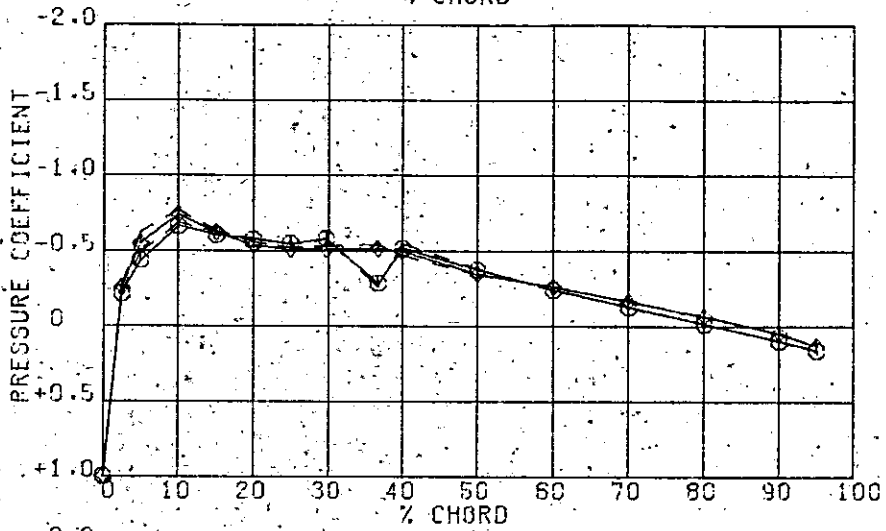
S4

Fig. 6(a)

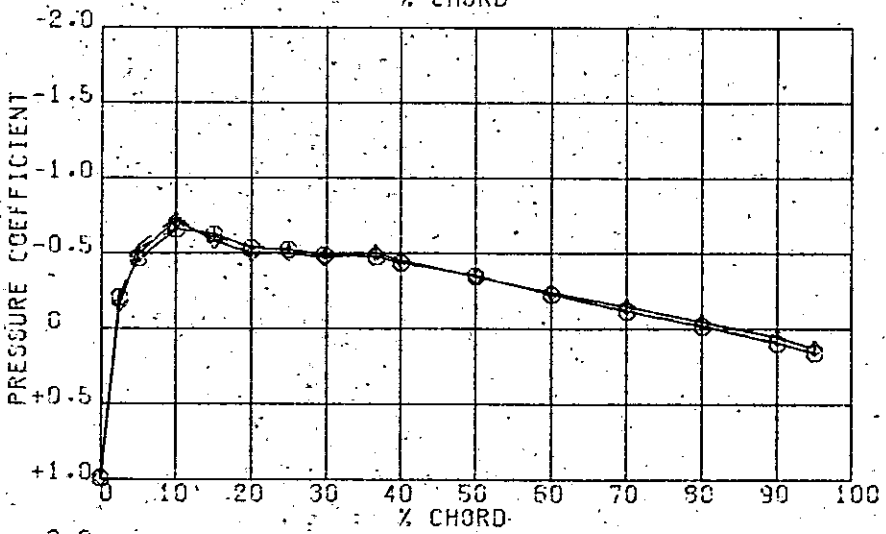
SKEG ANGLE = -0.25, RUDDER ANGLE = -0.25



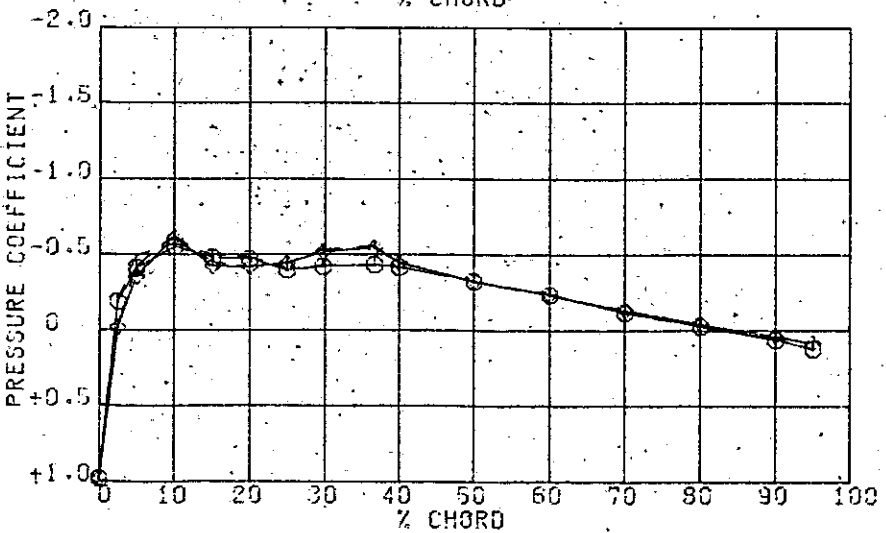
S5



S6



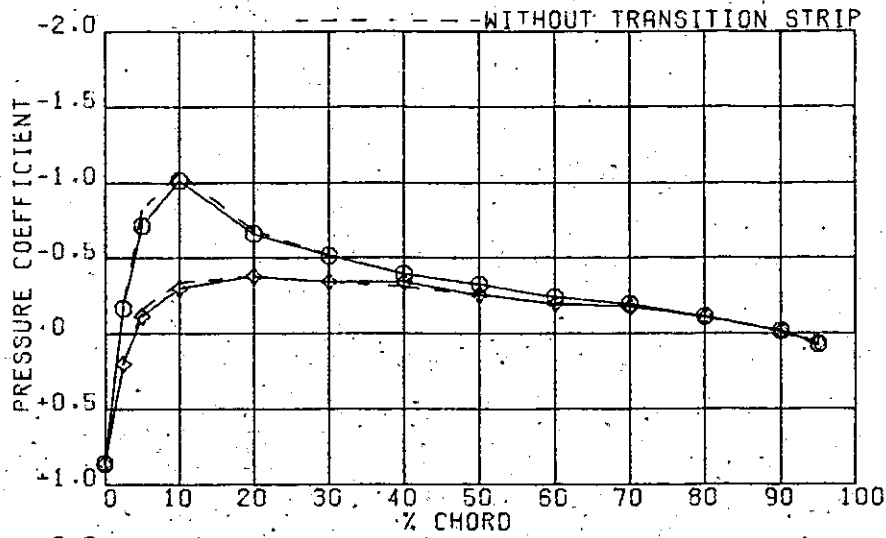
S7



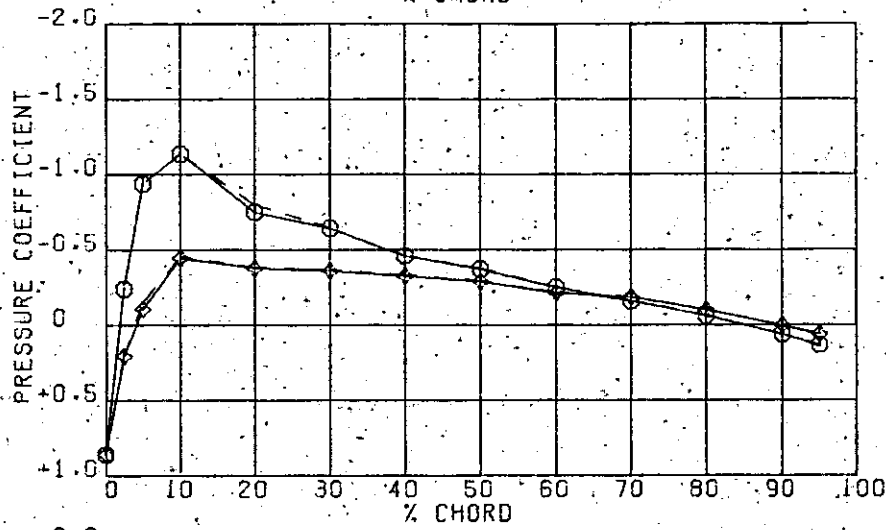
S8

Fig. 6(b)

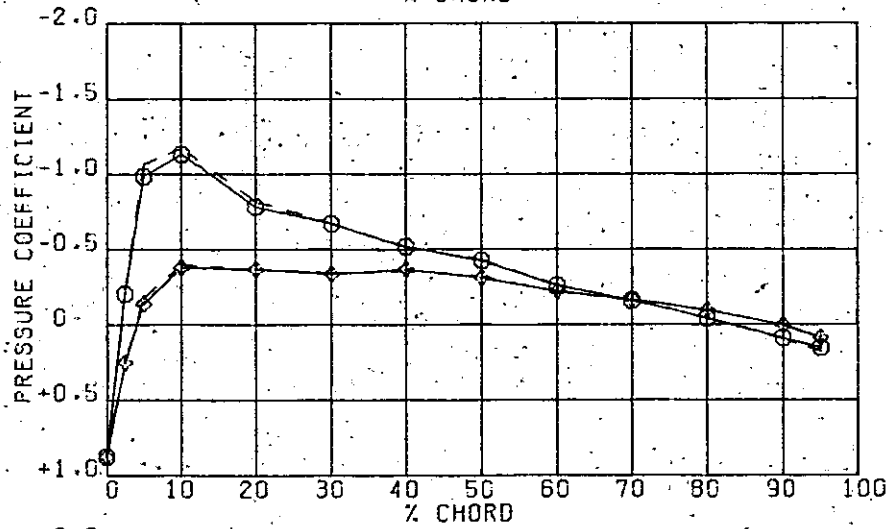
SKEG ANGLE = -0.25, RUDDER ANGLE = 4.75



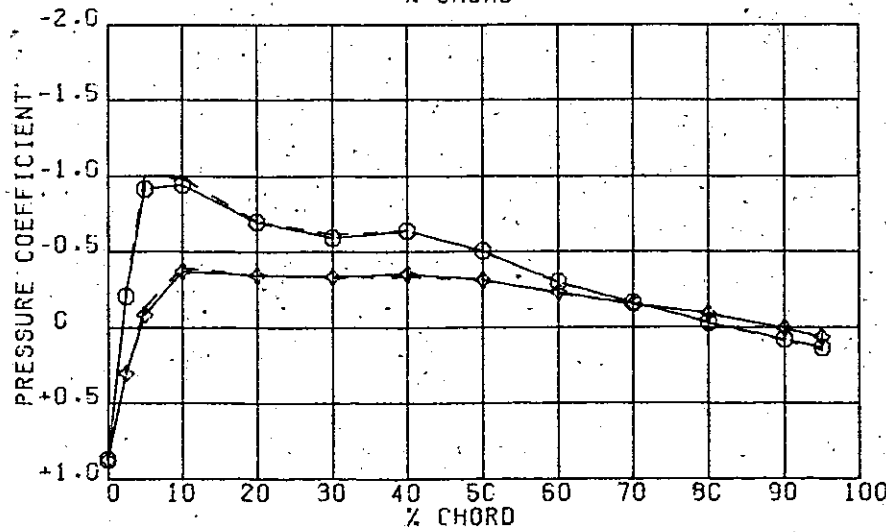
S1



S2



S3



S4

Fig. 6 (c)

SKEG ANGLE = -0.25, RUDDER ANGLE = 4.75

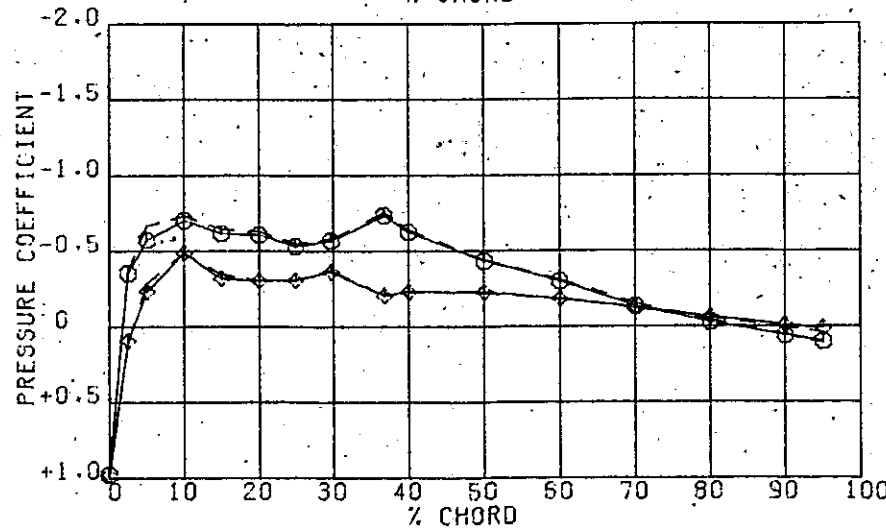
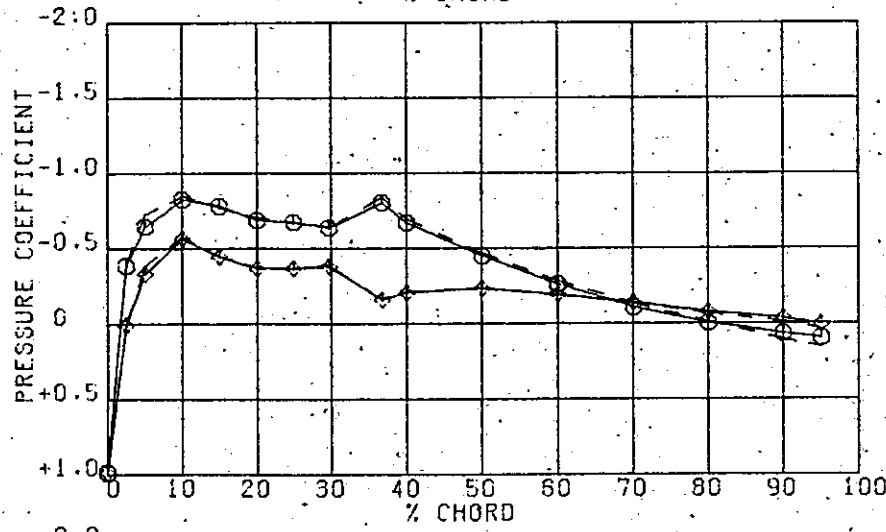
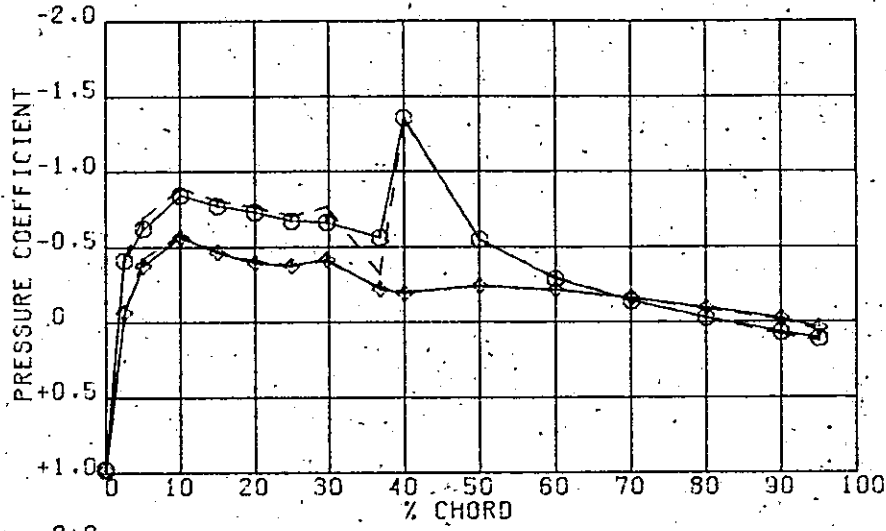
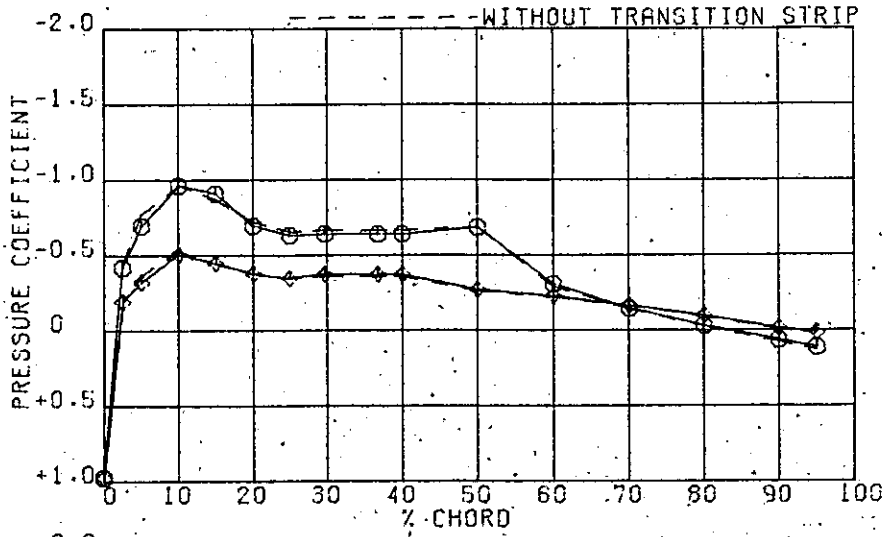
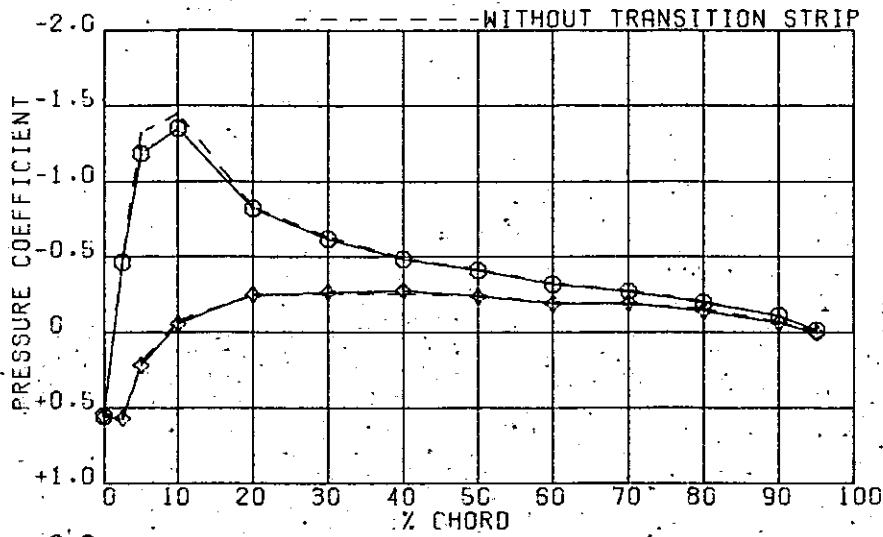
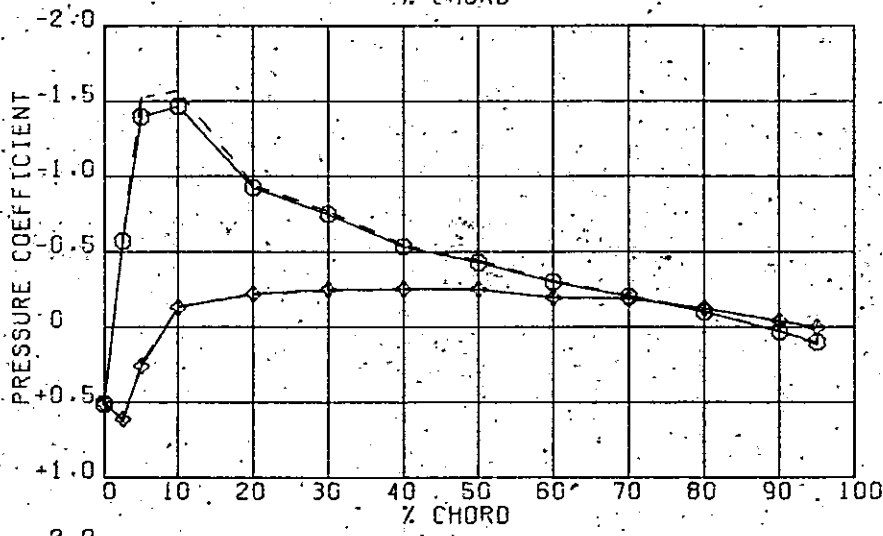


Fig. 6(d)

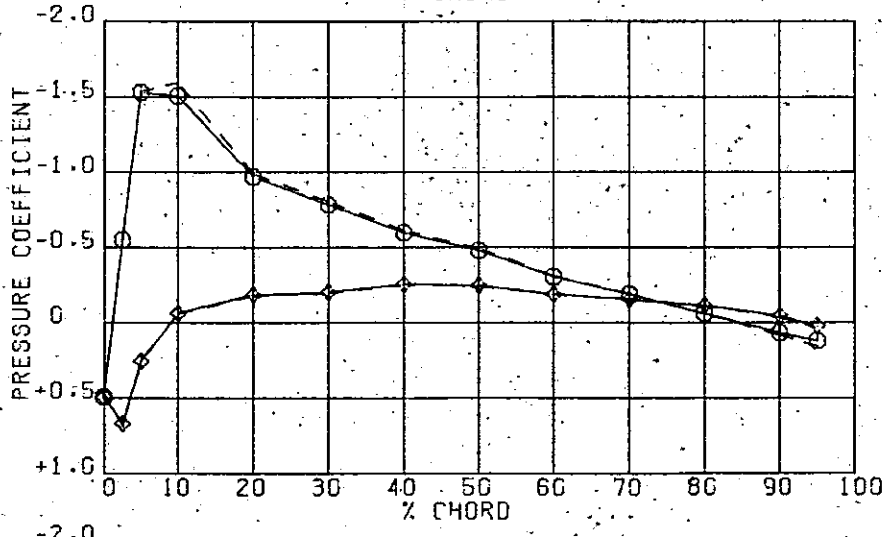
SKEG ANGLE = -0.25, RUDDER ANGLE = 9.75



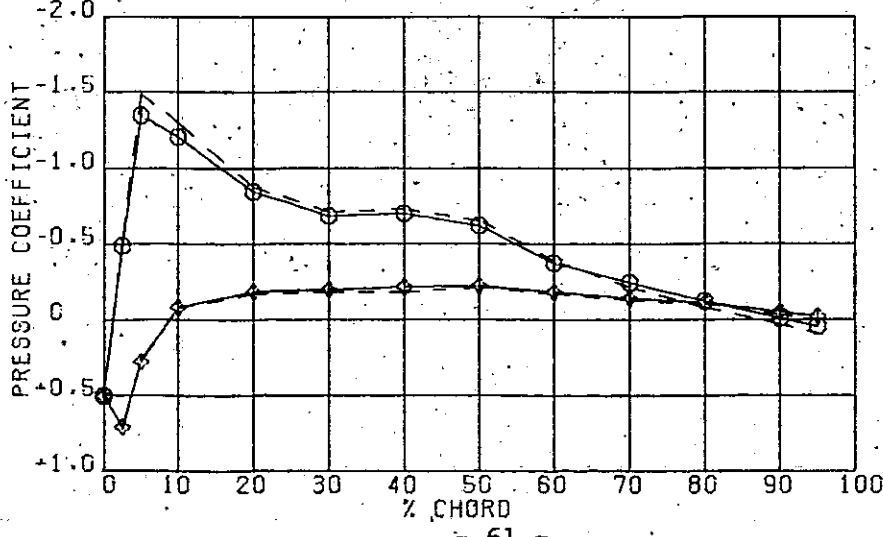
S1



S2



S3

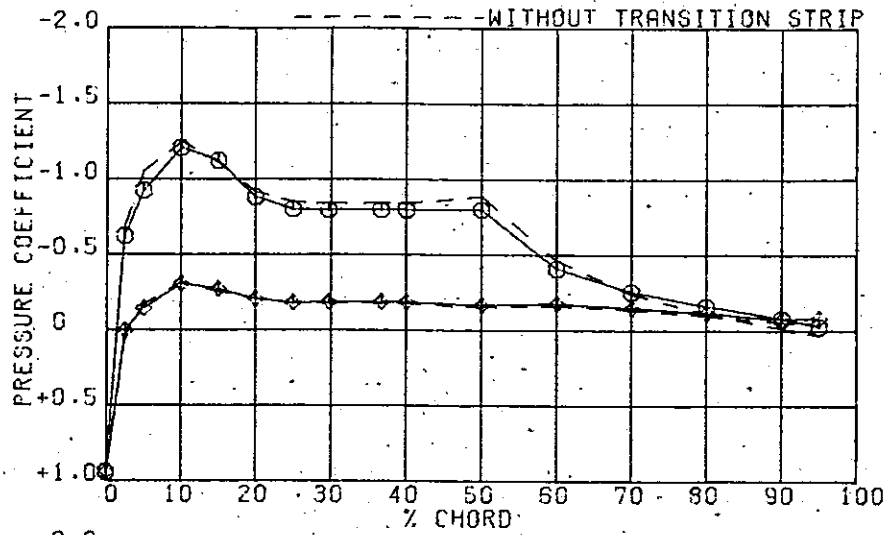


S4

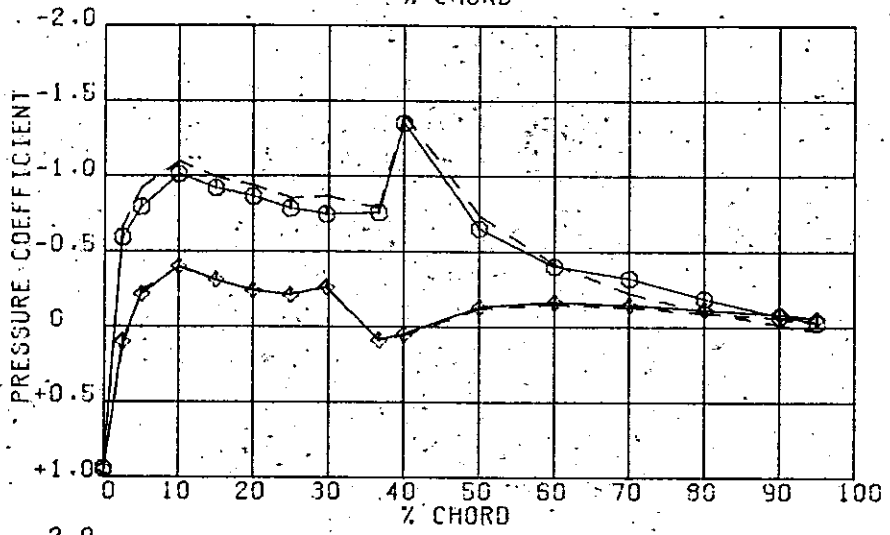
Fig. 6 (e)



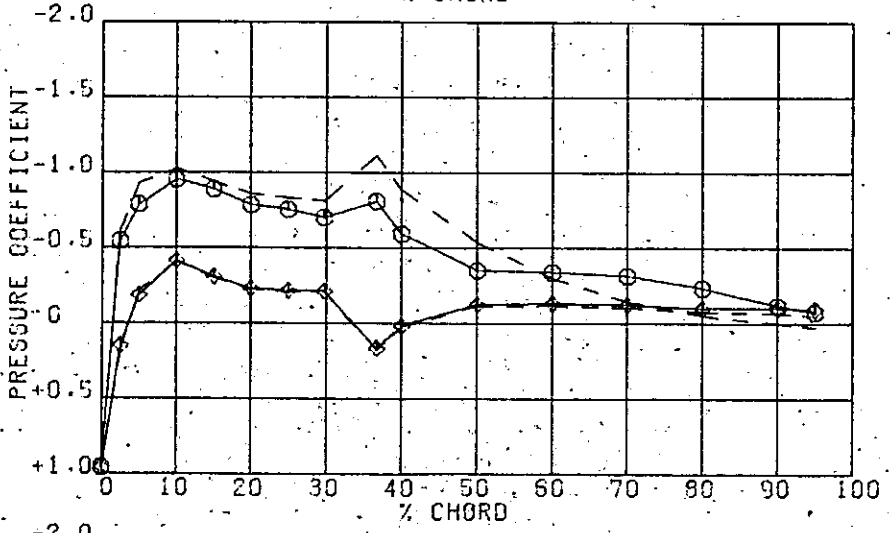
SKEG ANGLE = -0.25, RUDDER ANGLE = 9.75



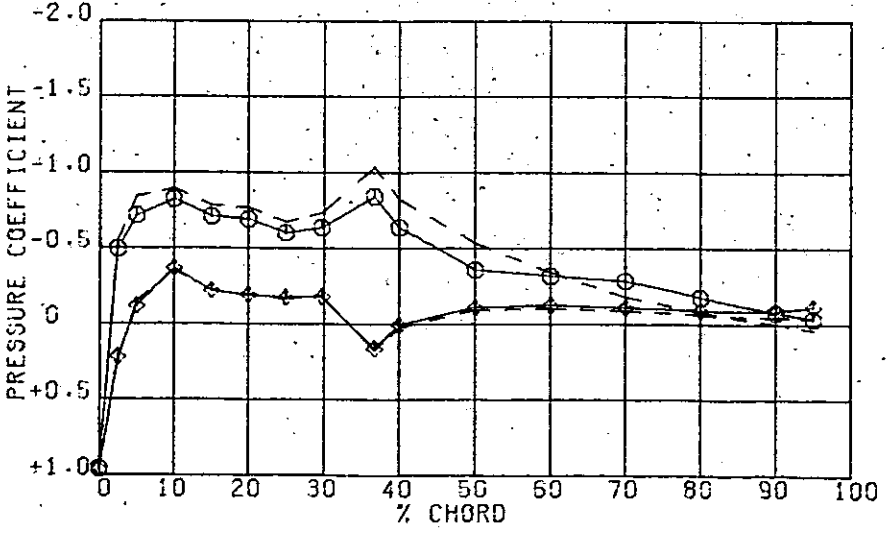
S5



S6



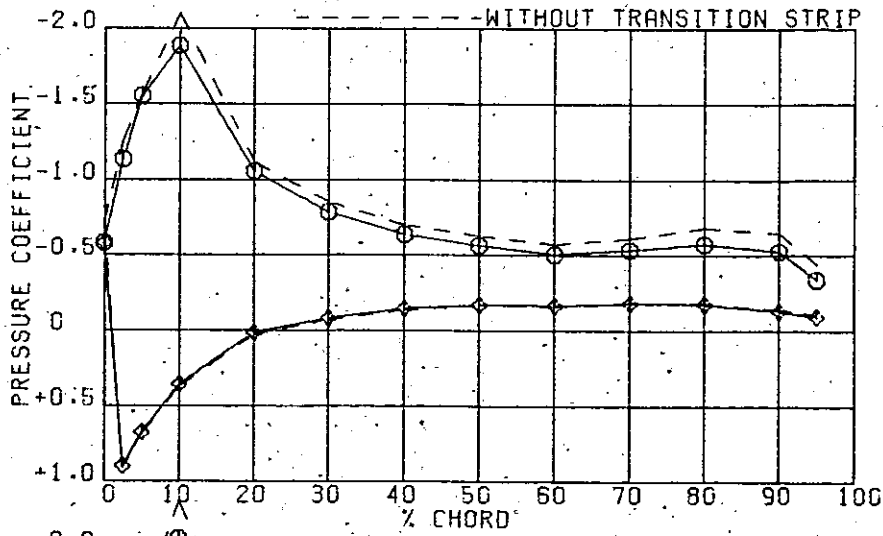
S7



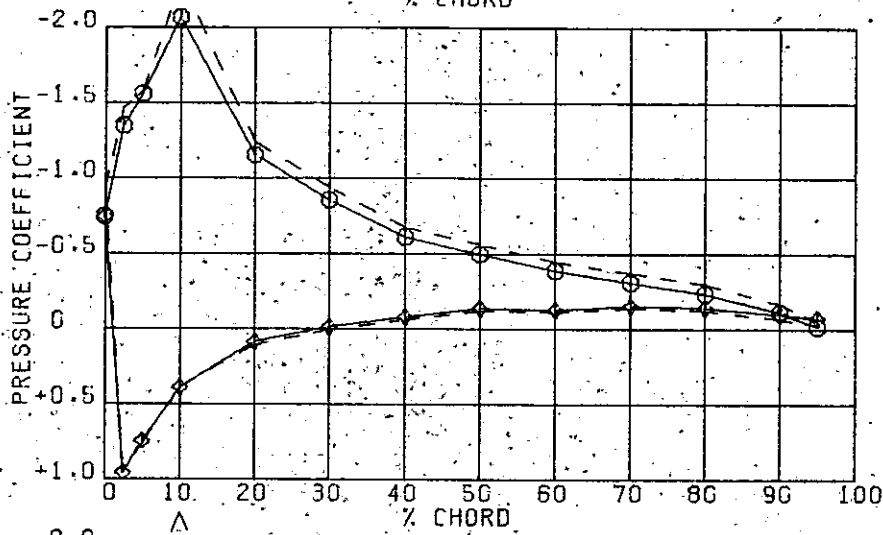
S8

Fig. 6(f)

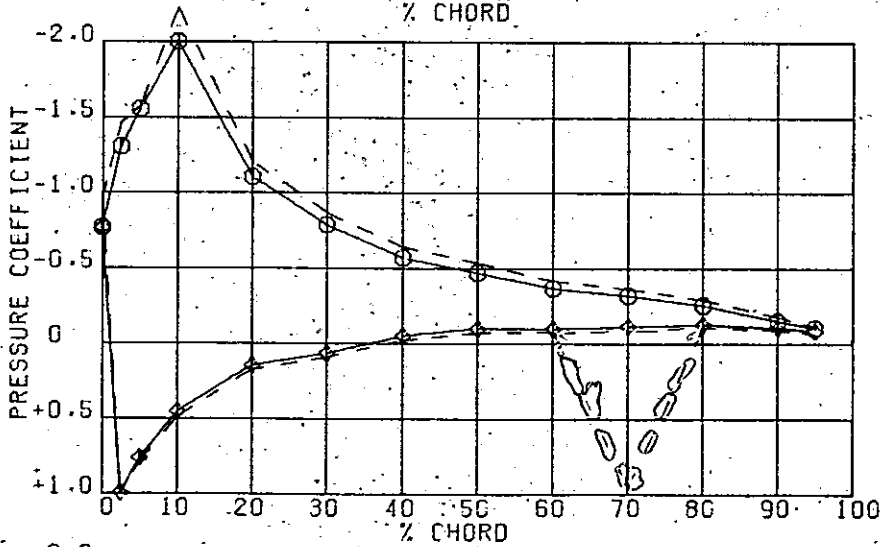
SKEG ANGLE = -0.25, RUDDER ANGLE = 19.75



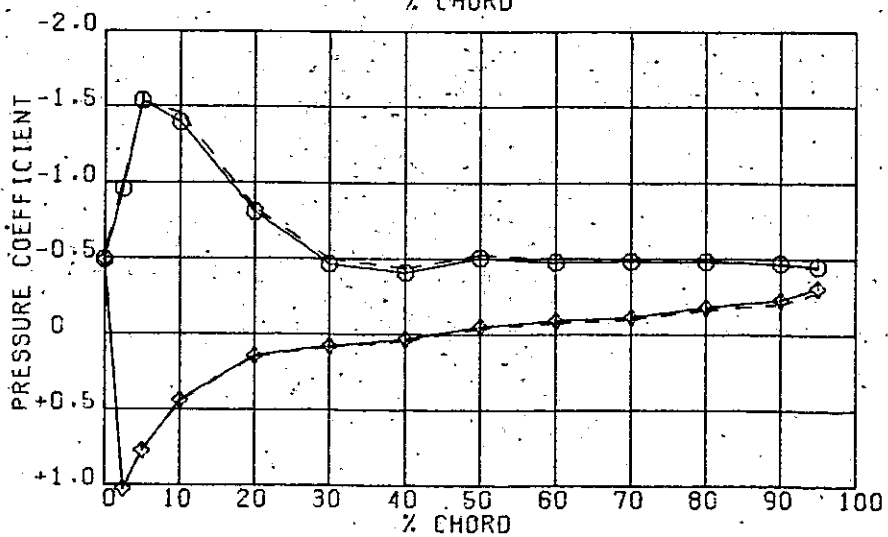
S1



S2



S3

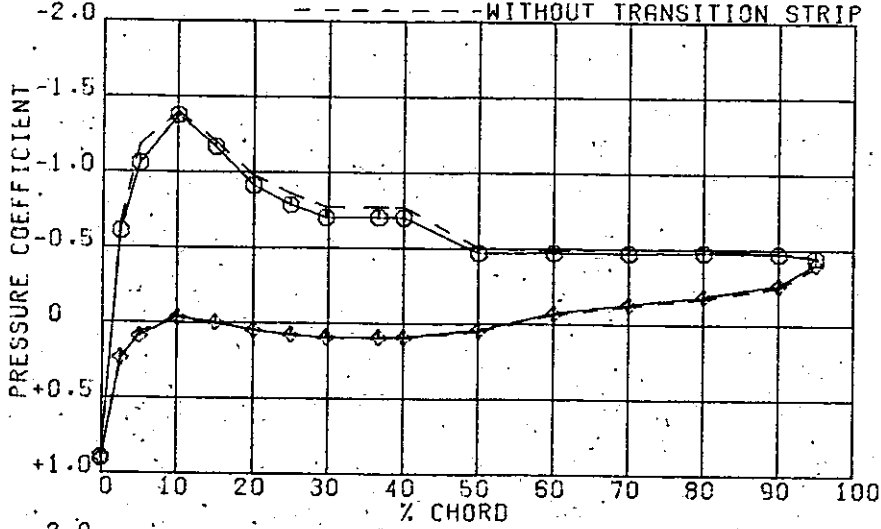


S4

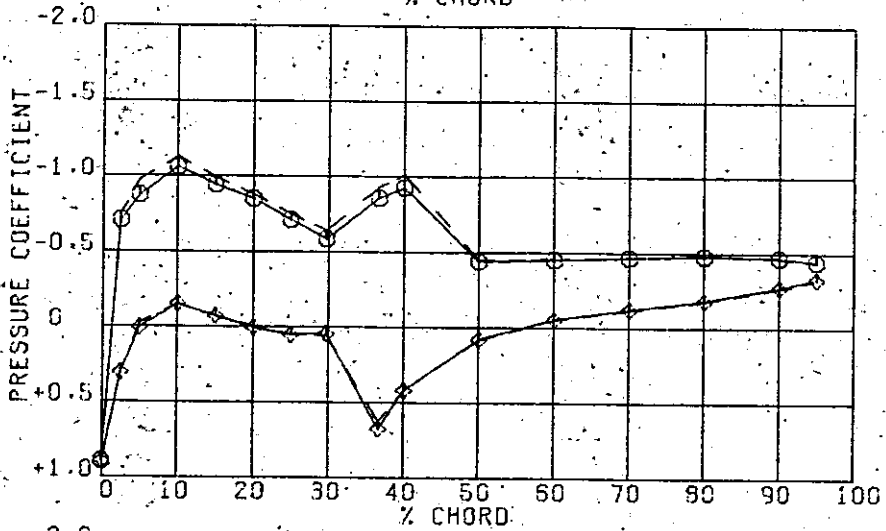
Fig. 6 (g)

SKEG ANGLE = -0.25, RUDDER ANGLE = 19.75

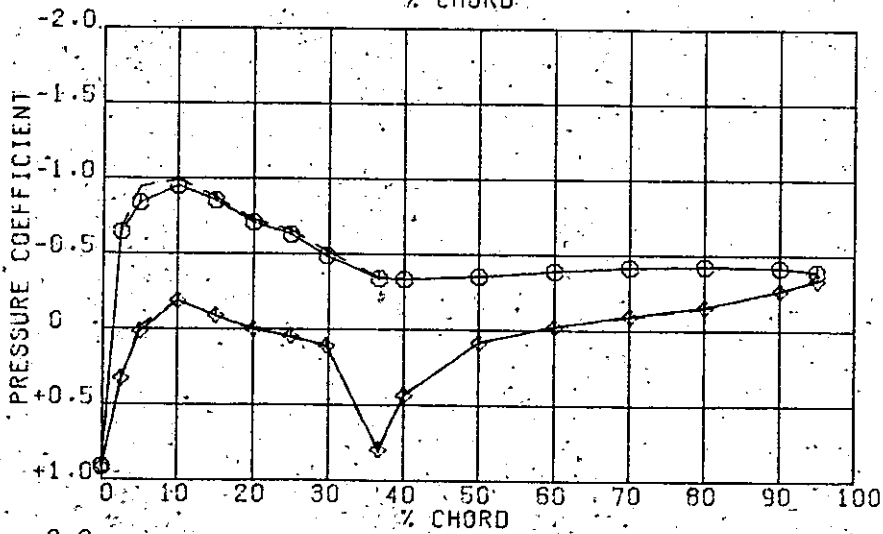
----- WITHOUT TRANSITION STRIP



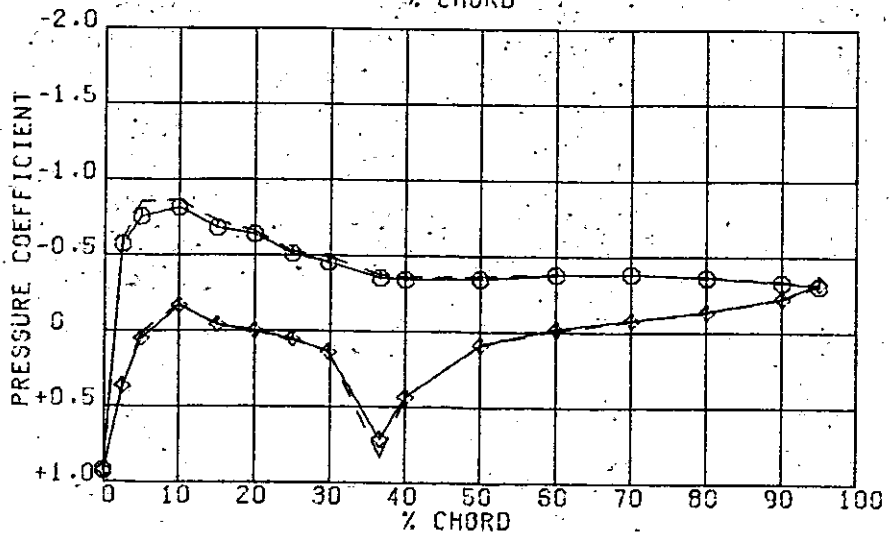
S5



S6



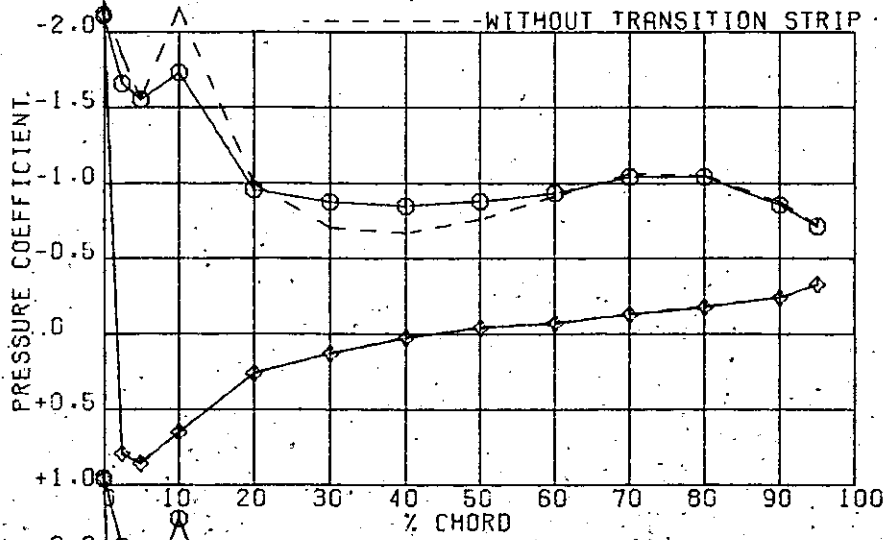
S7



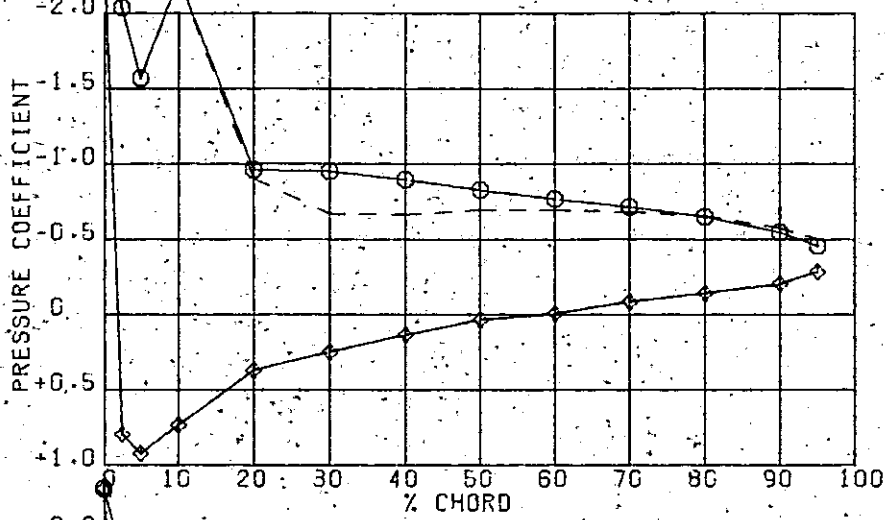
S8

Fig. 6(h)

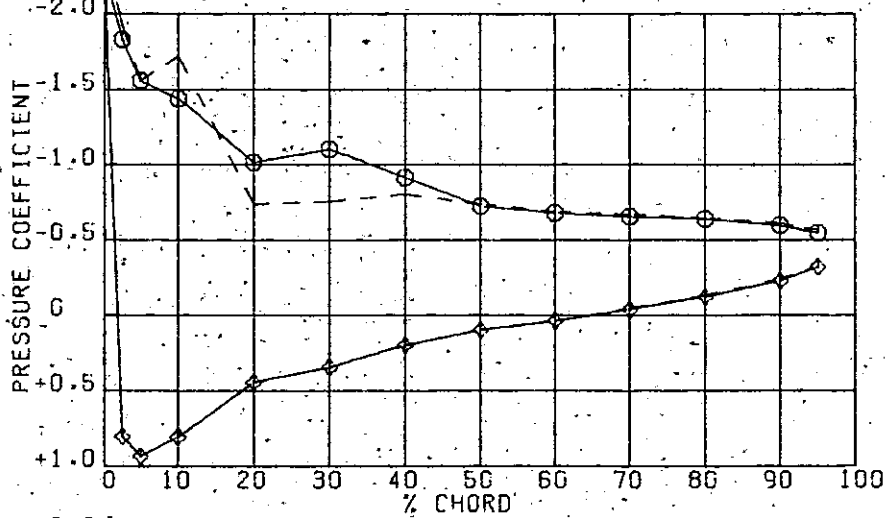
SKEG ANGLE = -0.25, RUDDER ANGLE = 29.75



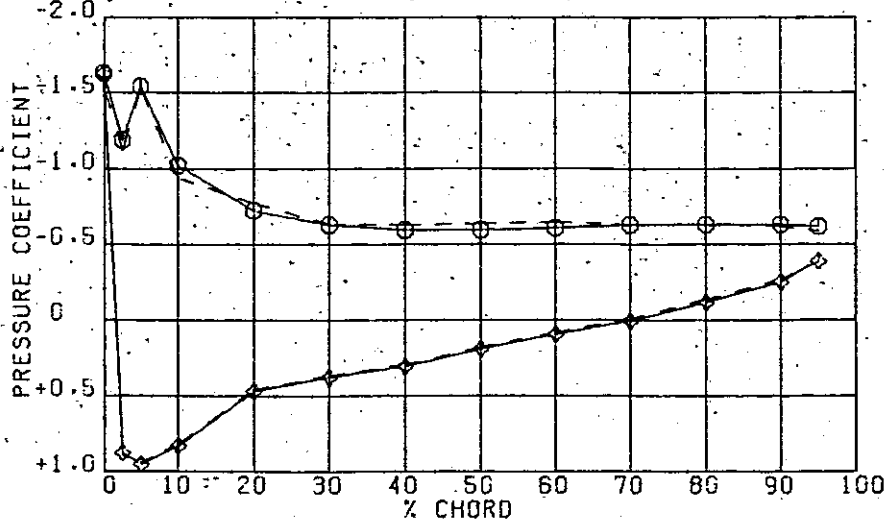
S1



S2



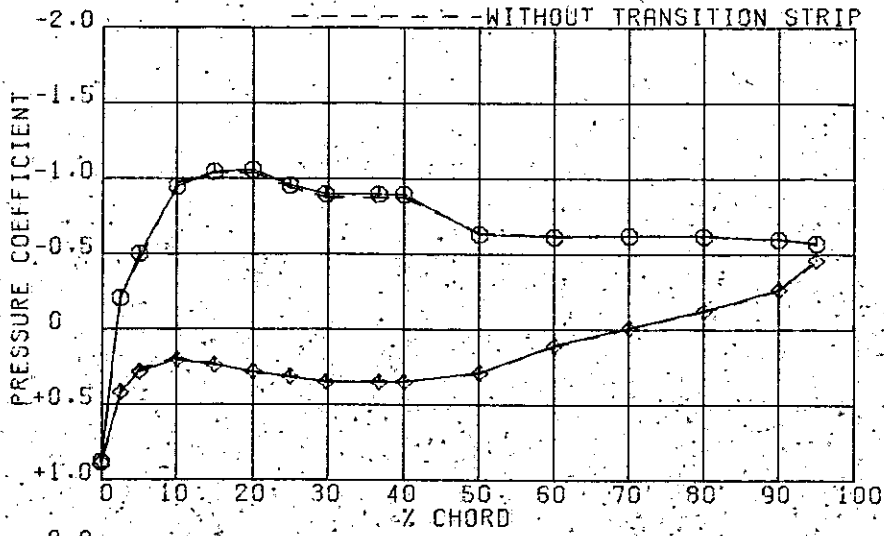
S3



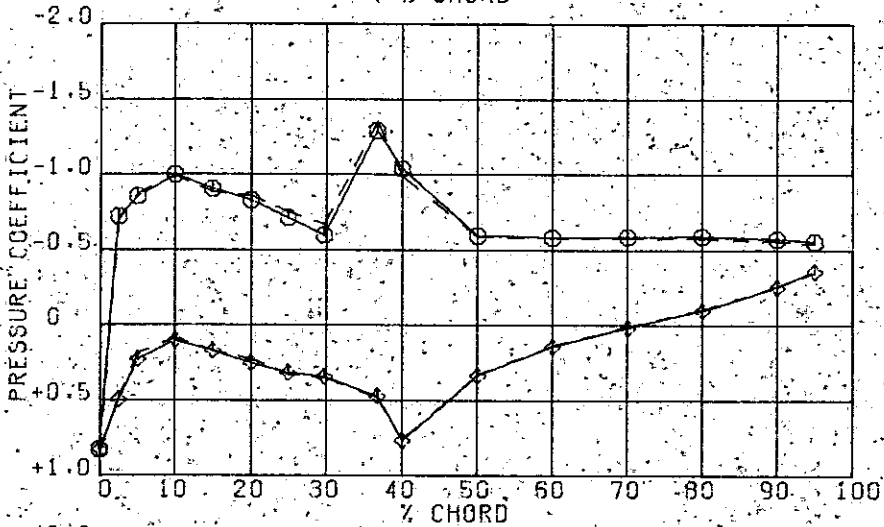
S4

Fig. 6(i)

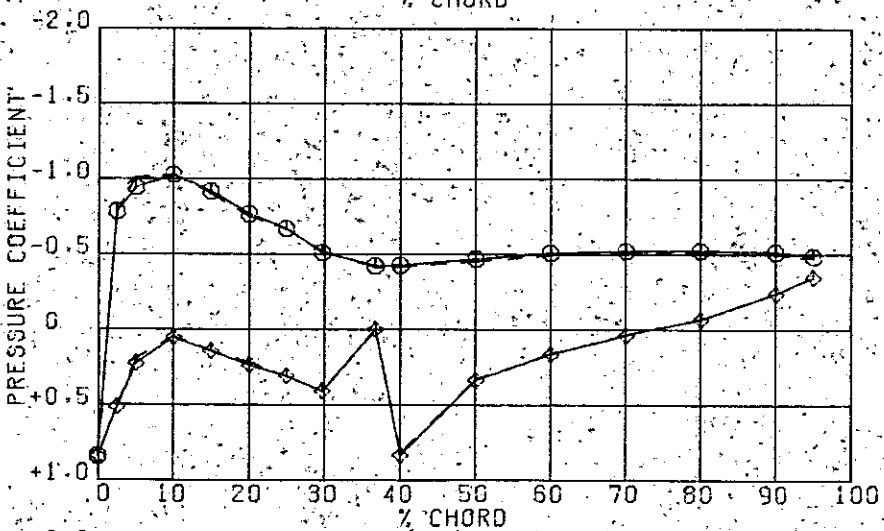
SKEG ANGLE = -0.25, RUDDER ANGLE = 29.75



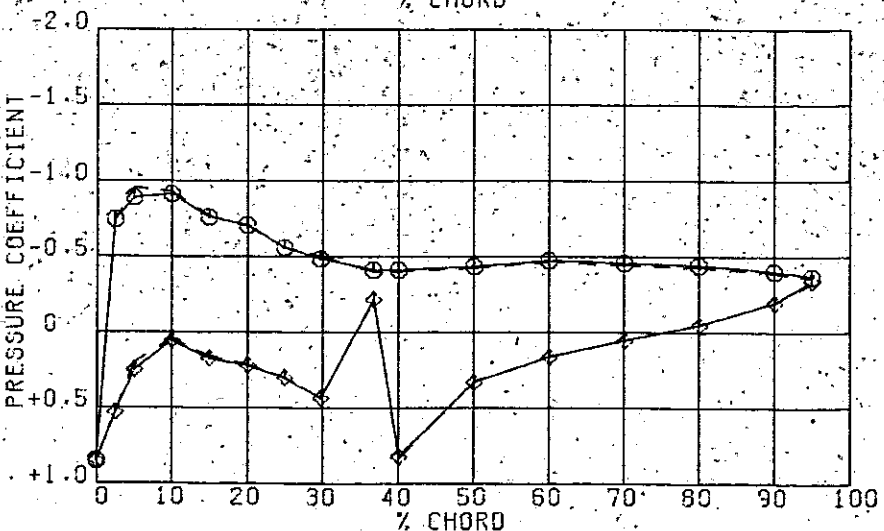
S5



S6



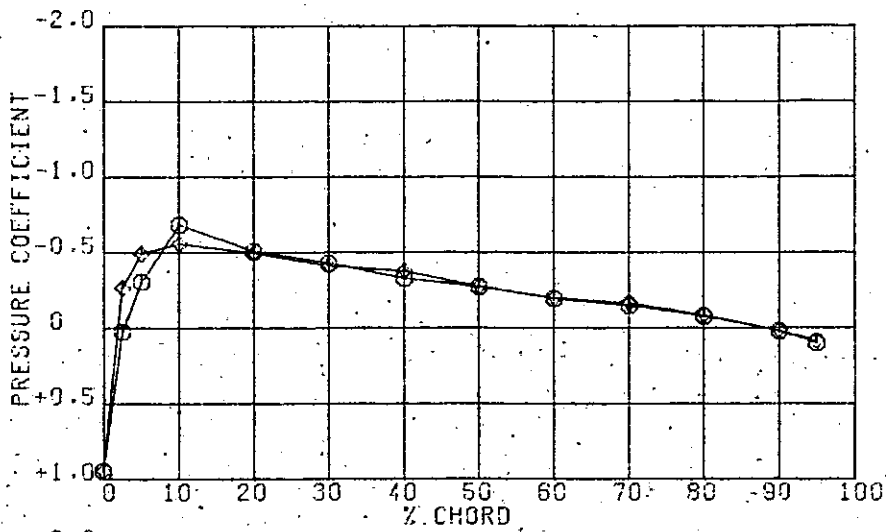
S7



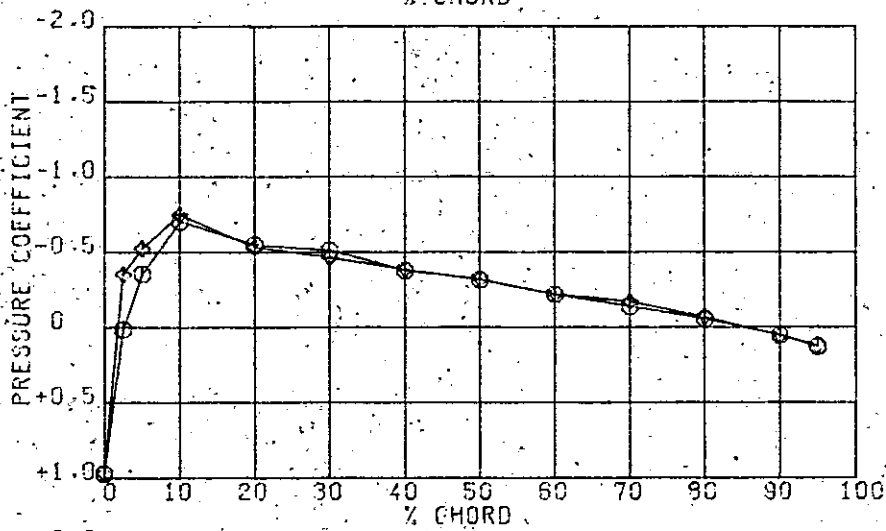
S8

Fig. 6(j)

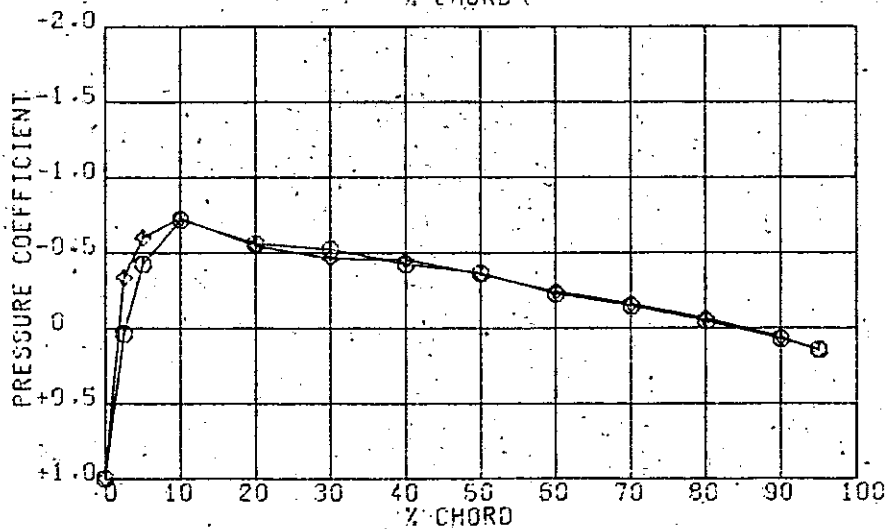
SKEG ANGLE=-5.0, RUDDER ANGLE=0



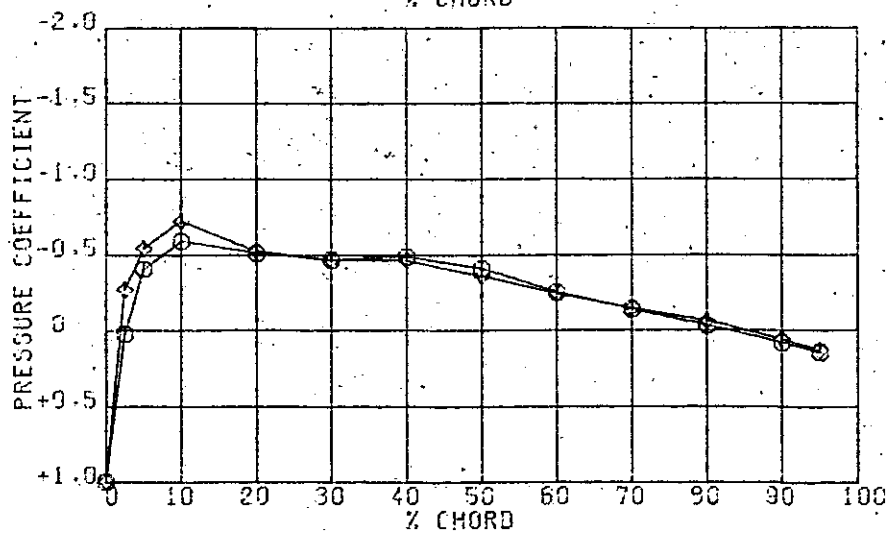
S1



S2



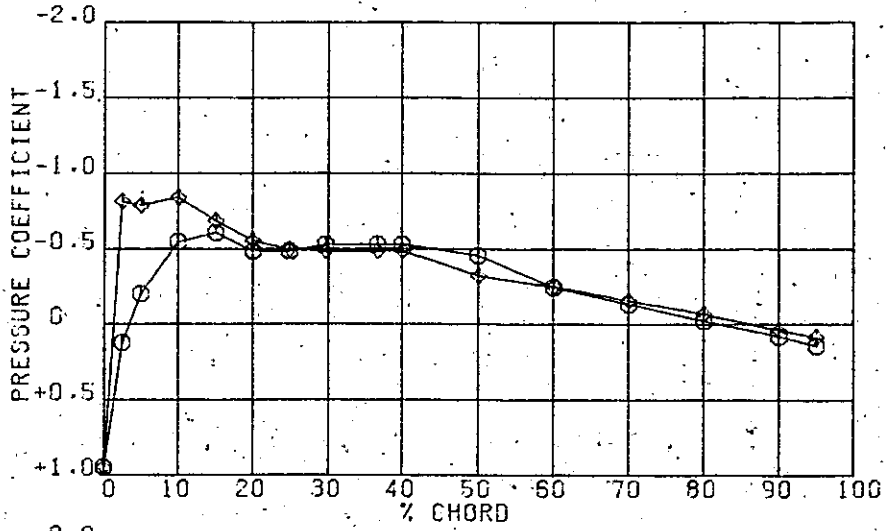
S3



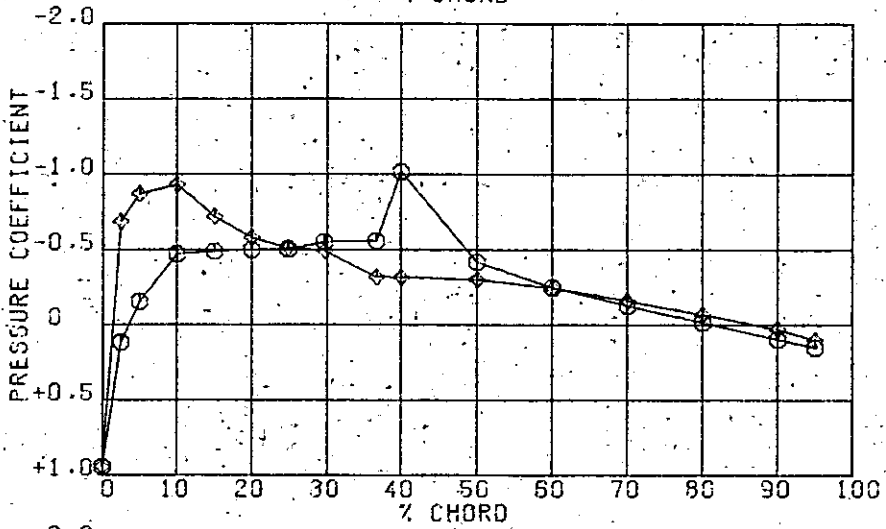
S4

Fig. 7(a)

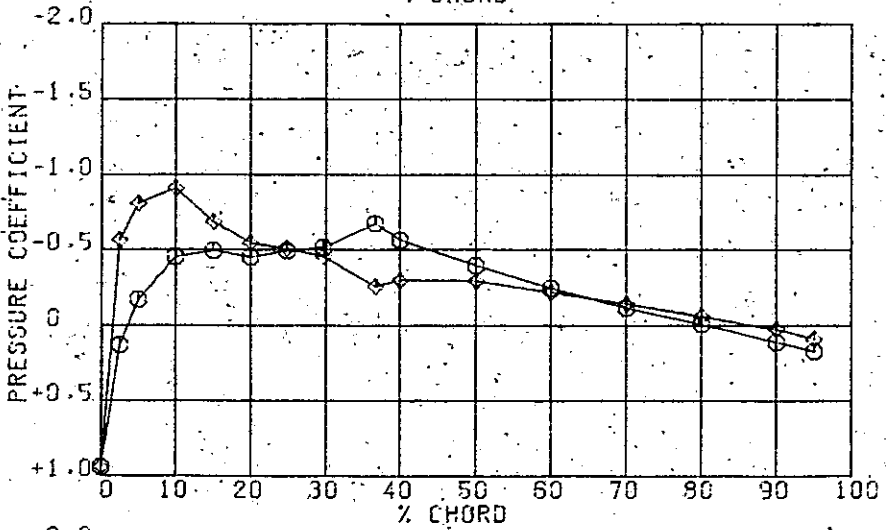
SKEG ANGLE = -5.0, RUDDER ANGLE = 0



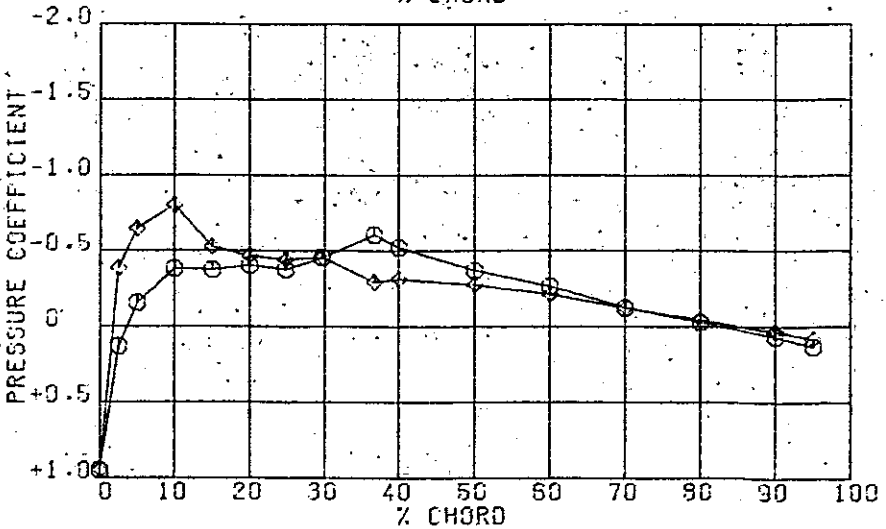
S5



S6



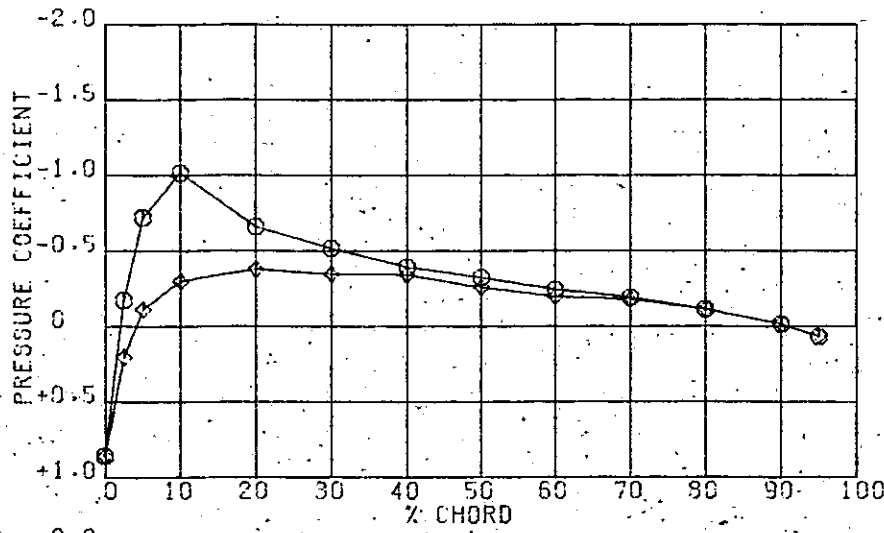
S7



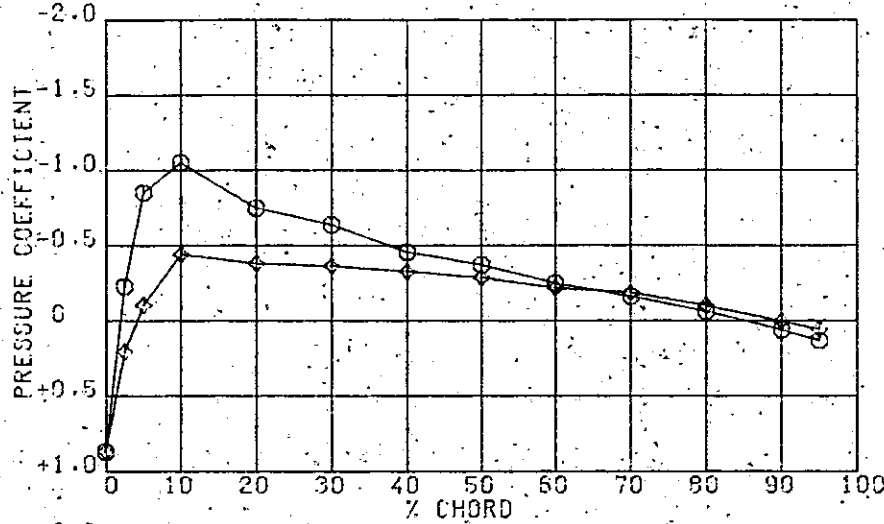
S8

Fig. 7(b)

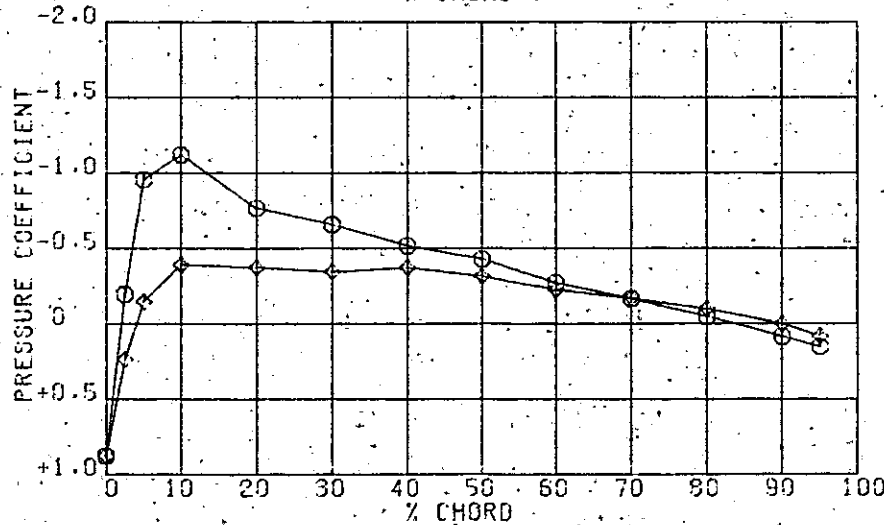
SKEG ANGLE=-5.0, RUDDER ANGLE=5



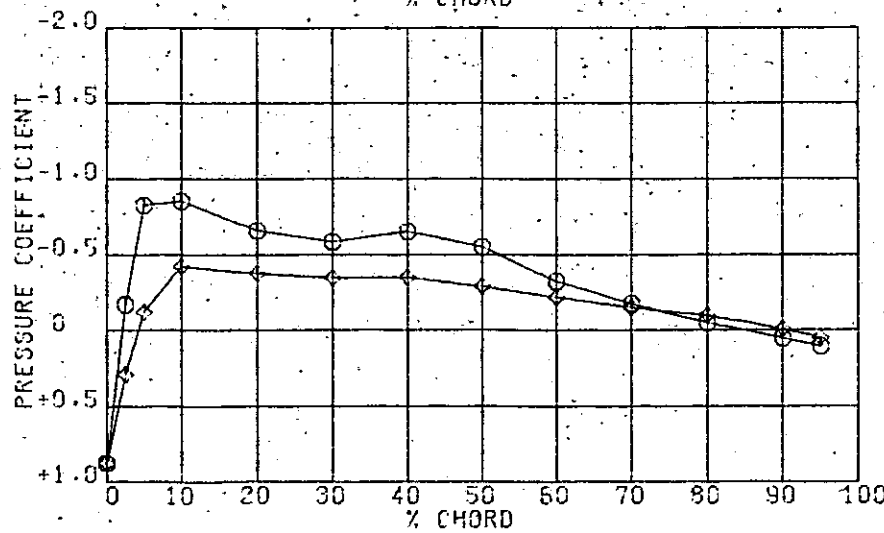
S1



S2



S3

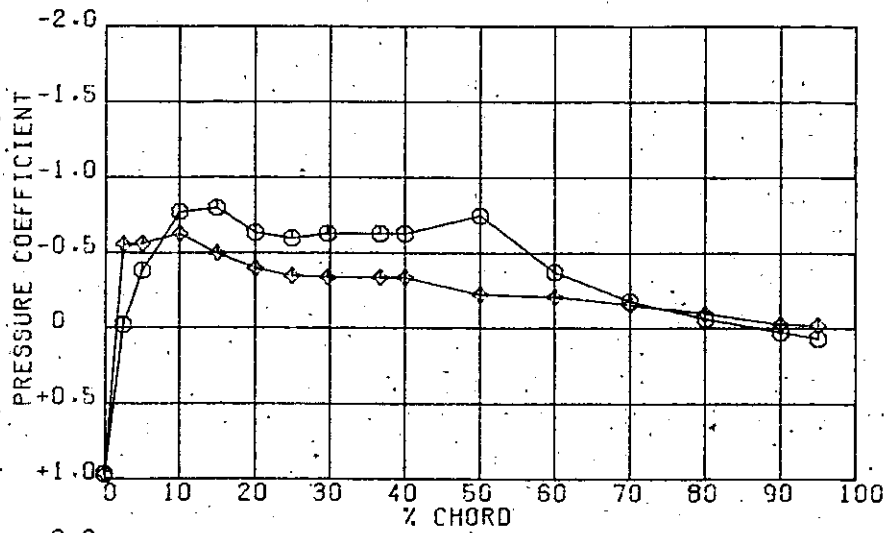


S4

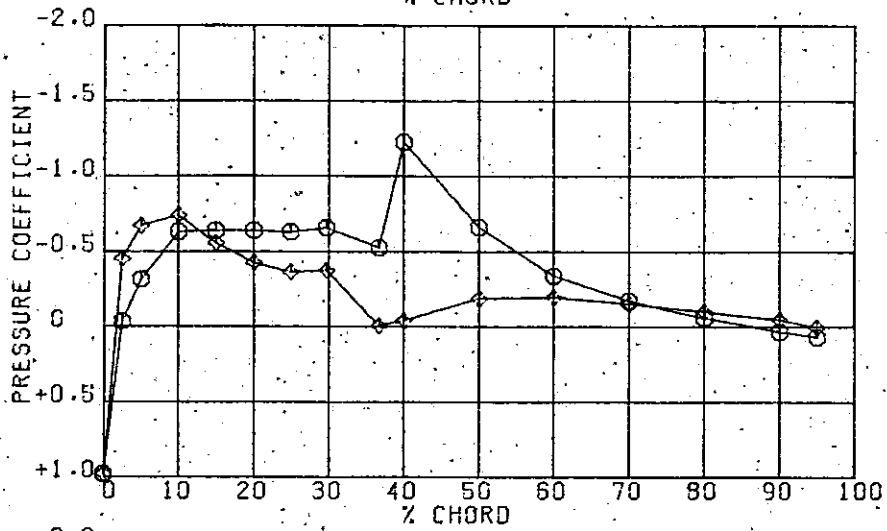
Fig. 7(c)



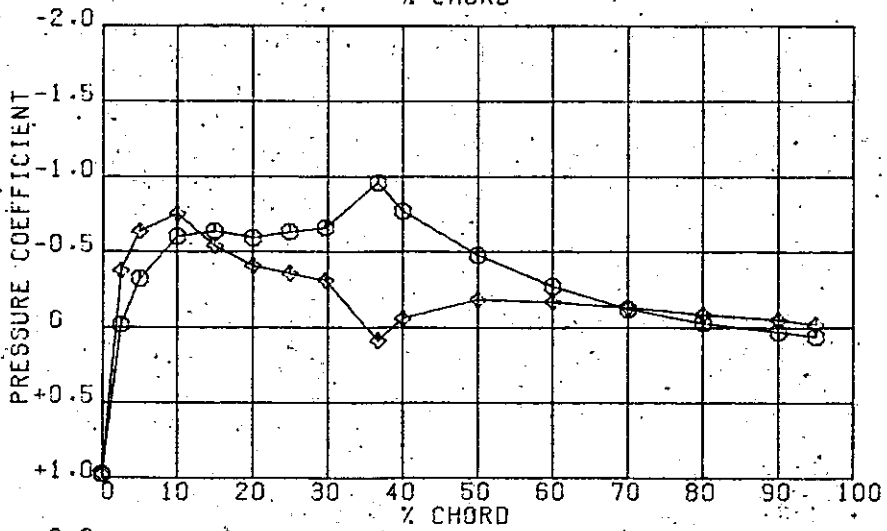
SKEG ANGLE = -5.0, RUDDER ANGLE = 5



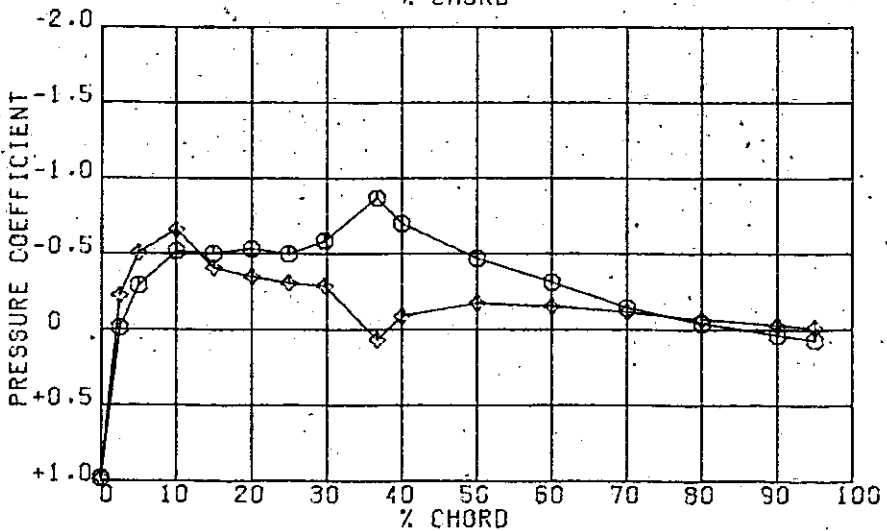
S5



S6



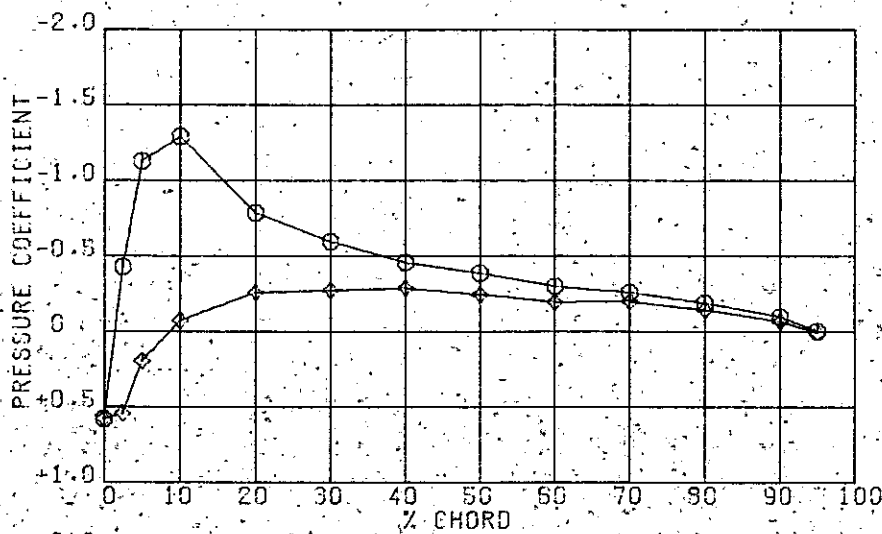
S7



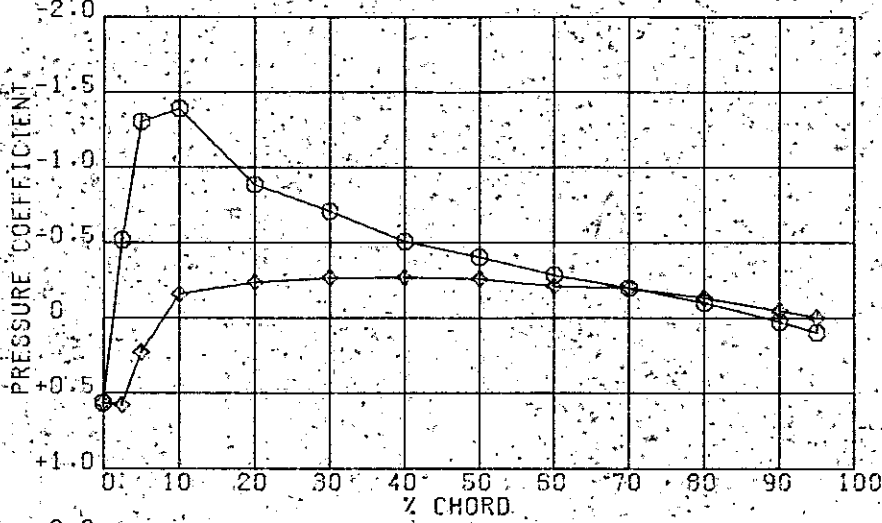
S8

Fig. 7(d)

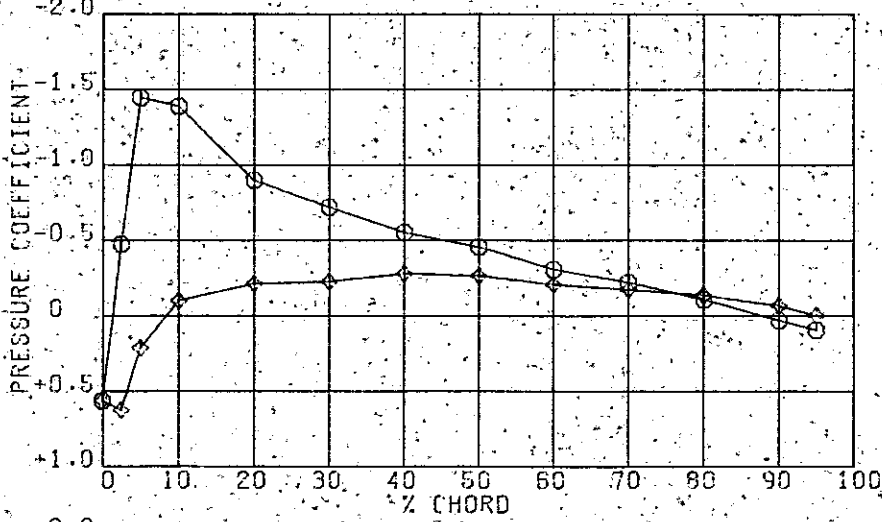
SKEG ANGLE = -5.0, RUDDER ANGLE = 10



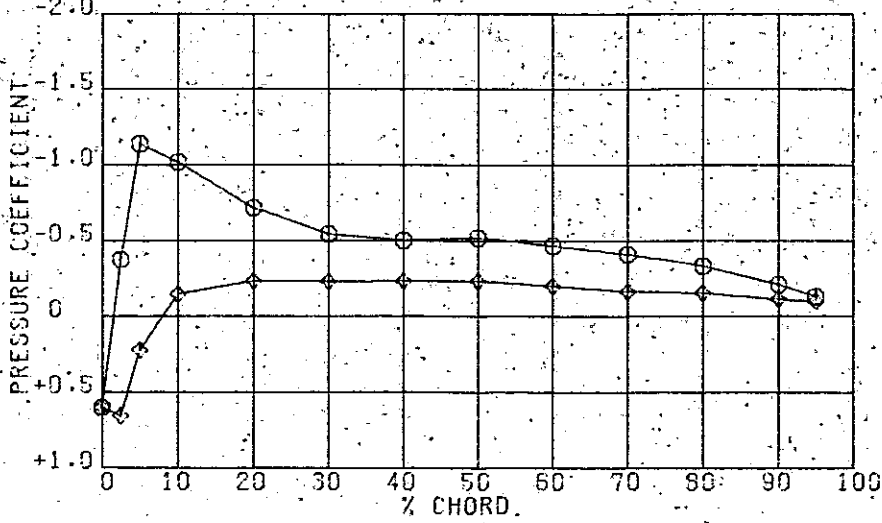
S1



S2



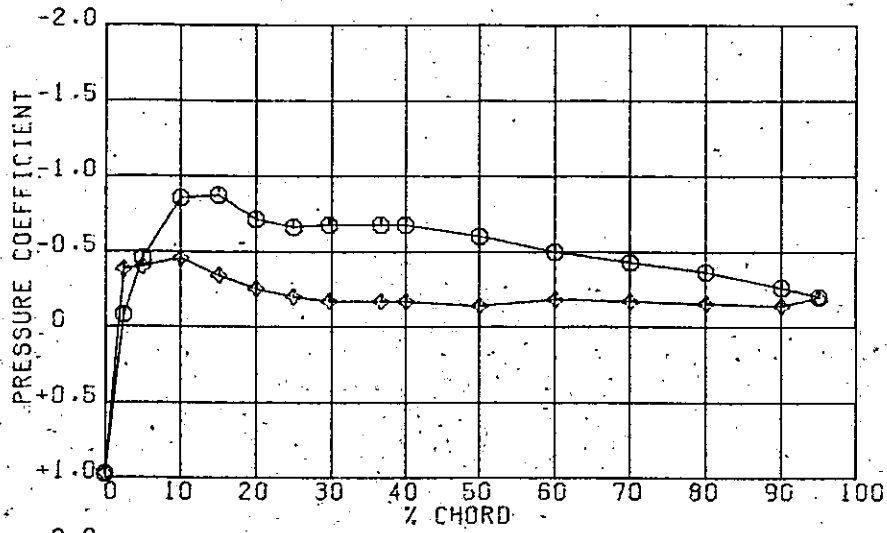
S3



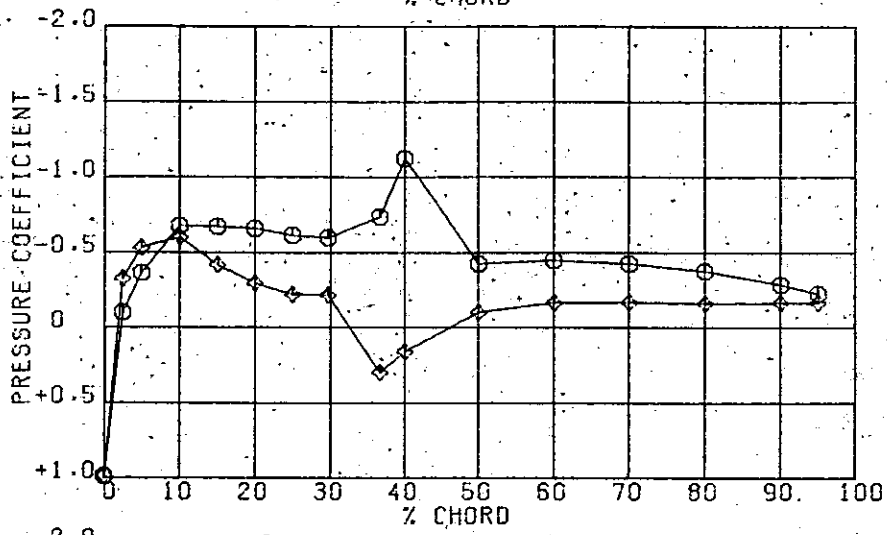
S4

Fig. 7 (e)

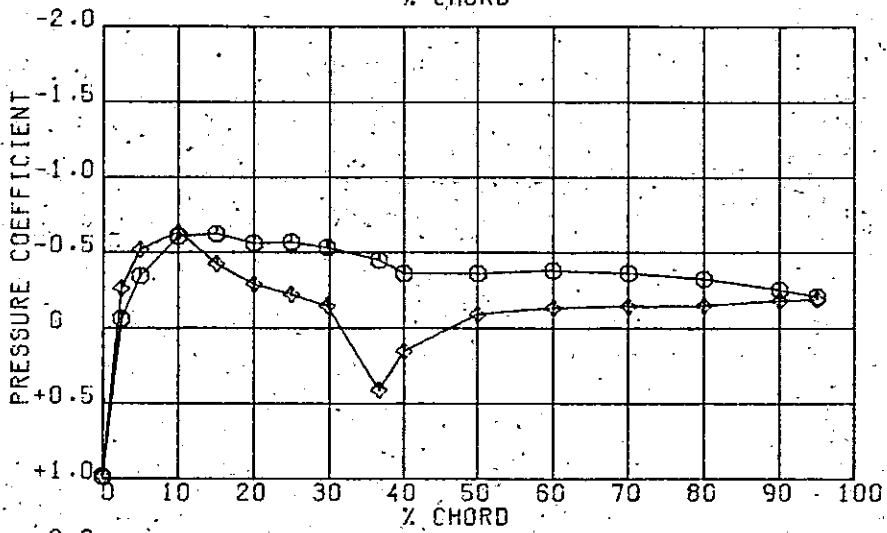
SKEG ANGLE=-5.0, RUDDER ANGLE=10



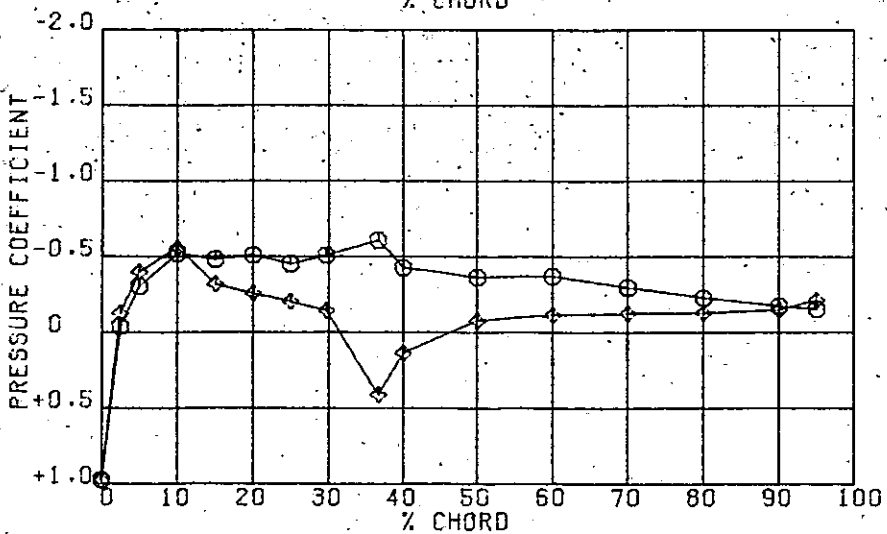
S5



S6



S7



S8

Fig. 7(f)

SKEG ANGLE=-5.0, RUDDER ANGLE=20

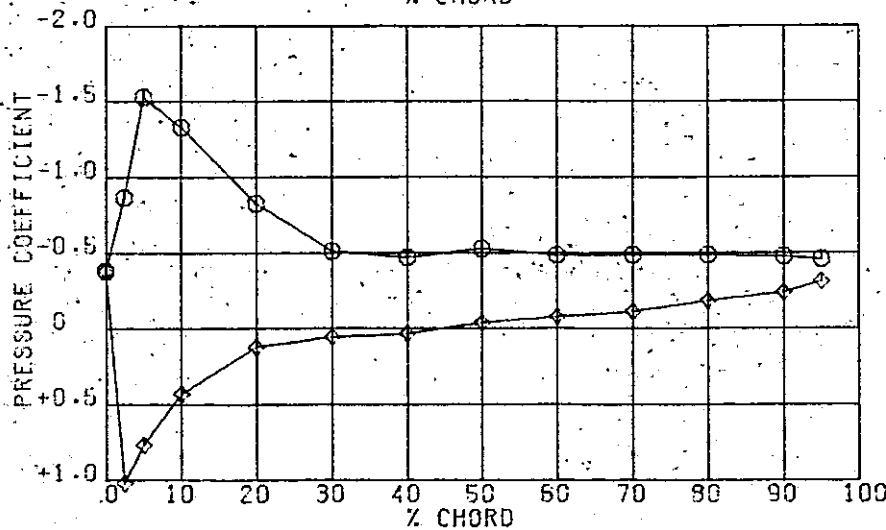
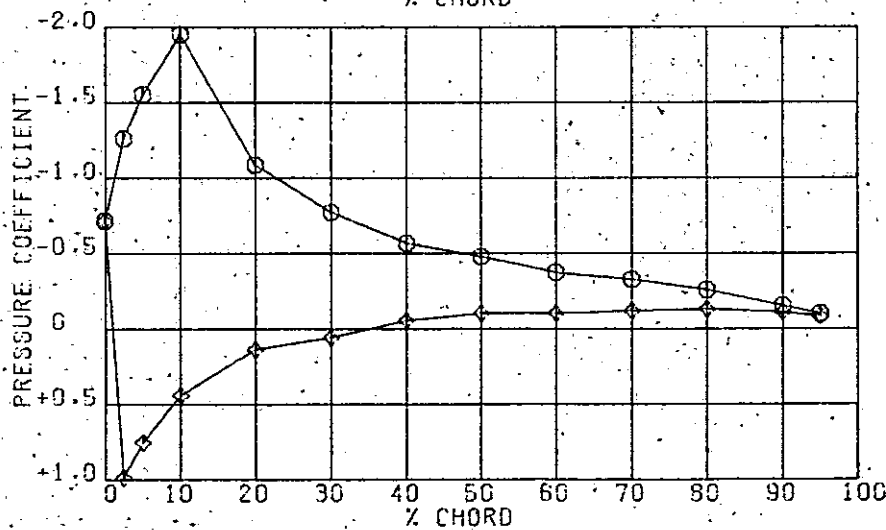
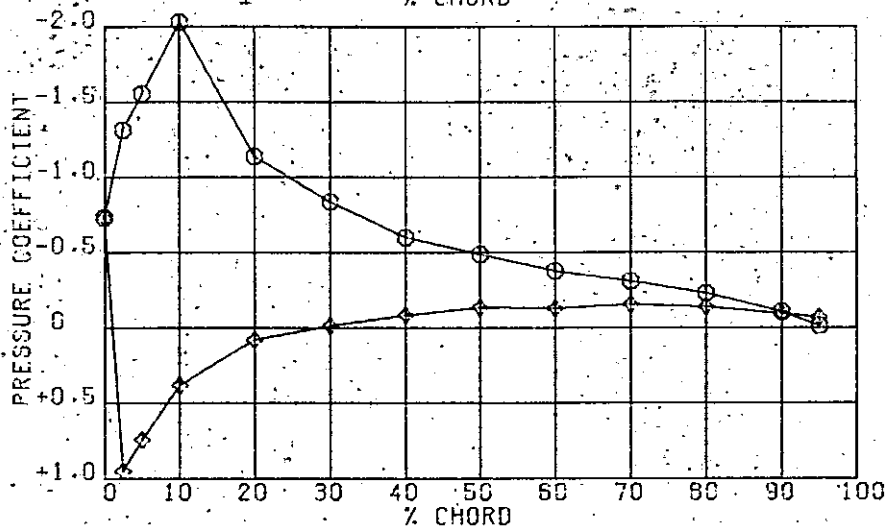
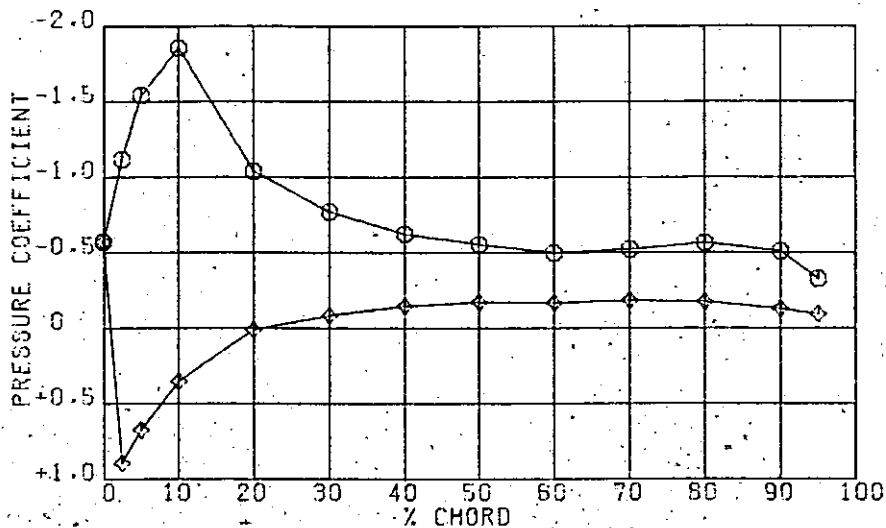
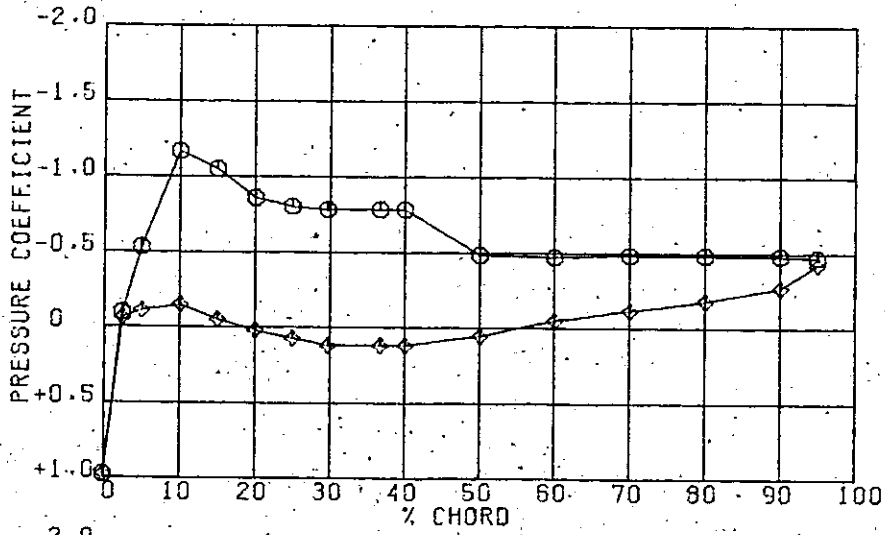
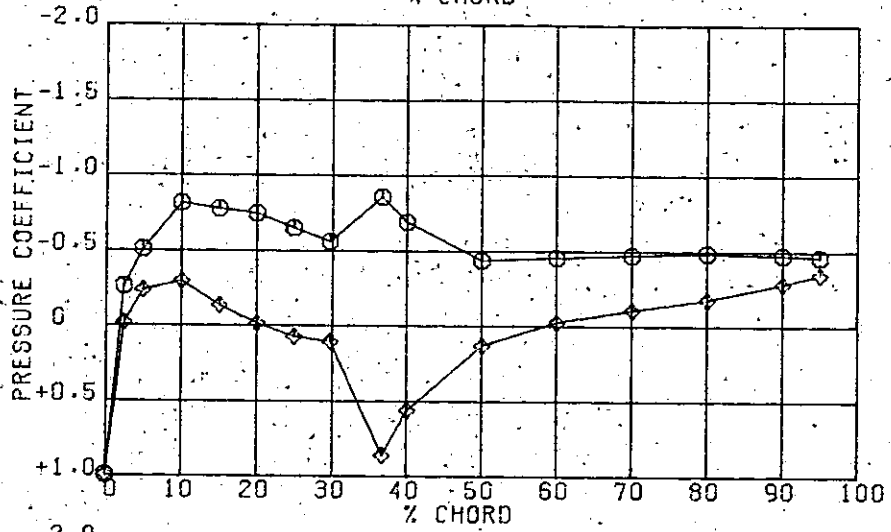


Fig. 7(g)

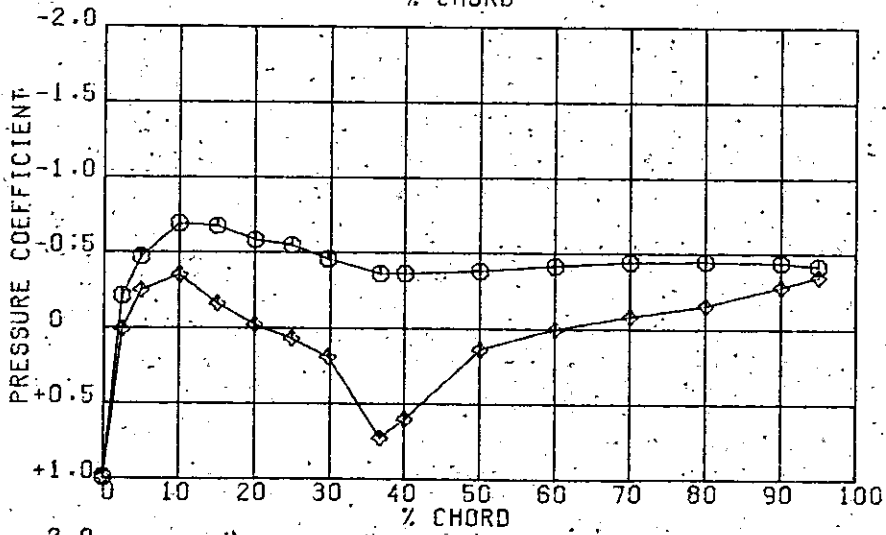
SKEG ANGLE=-5.0, RUDDER ANGLE=20



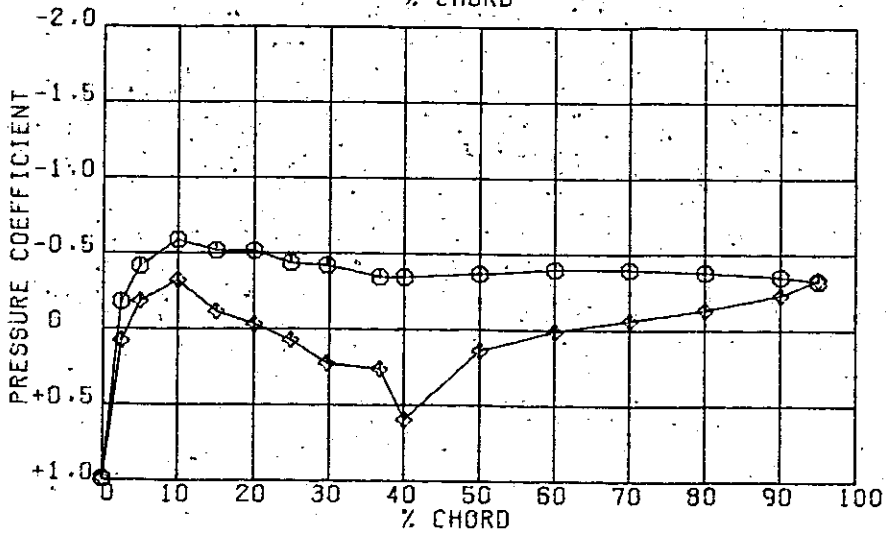
S5



S6



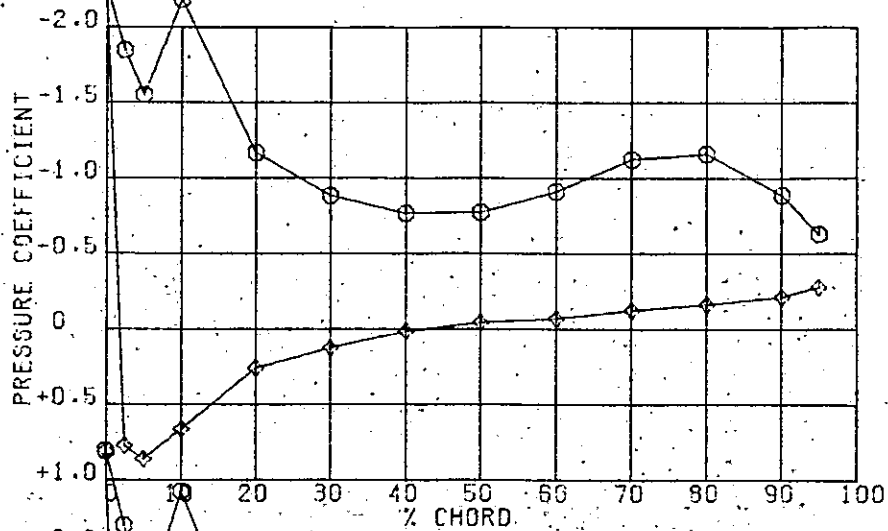
S7



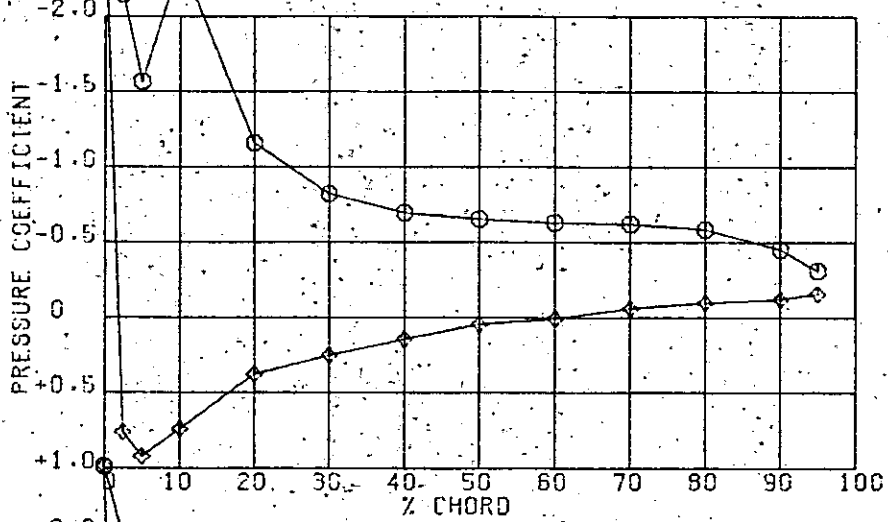
S8

Fig. 7(h)

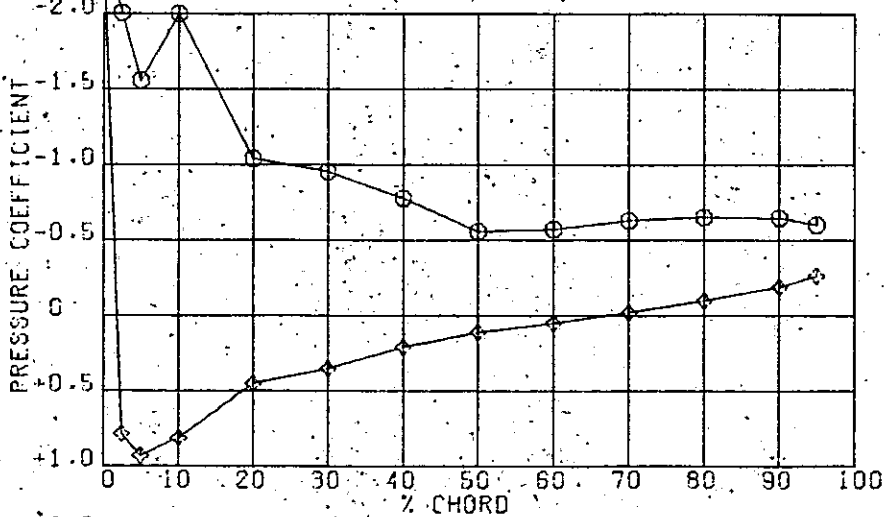
SKEG ANGLE = -5.0, RUDDER ANGLE = 30



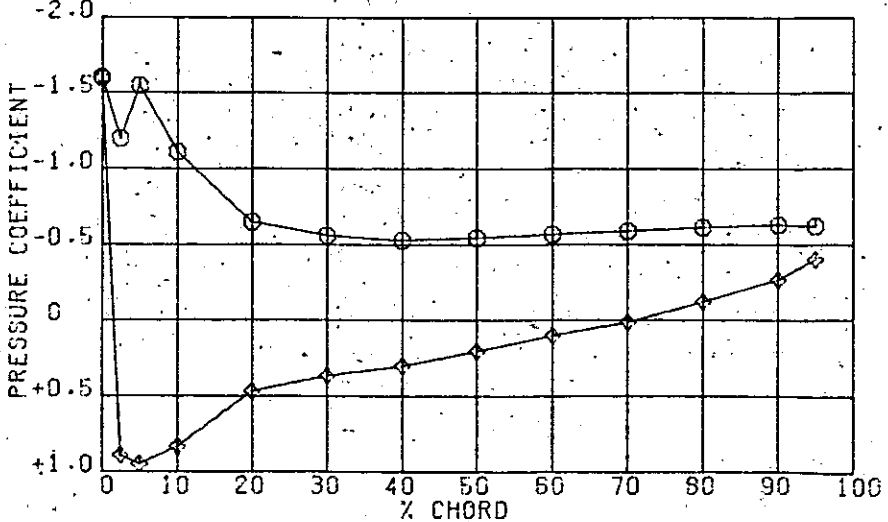
S1



S2



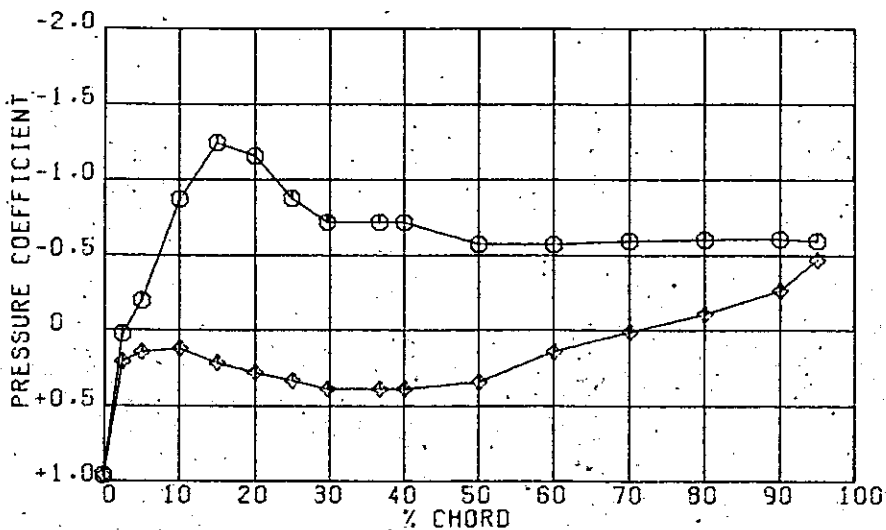
S3



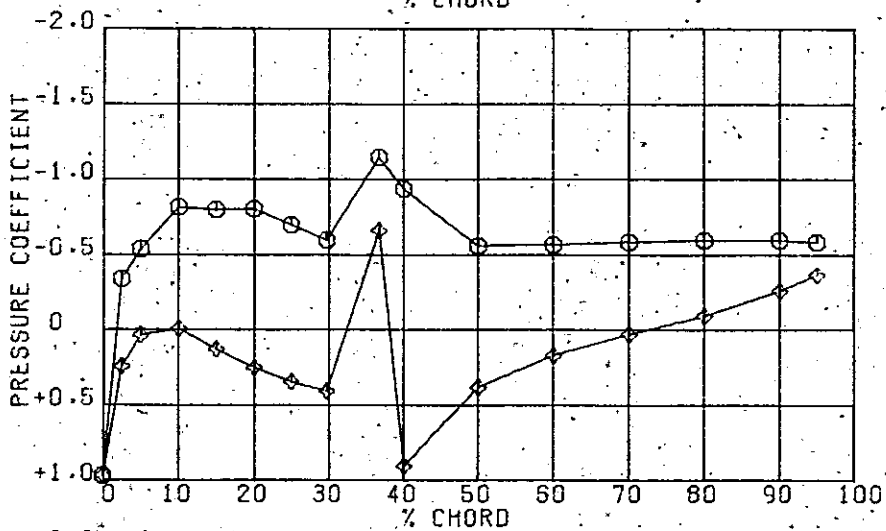
S4

Fig. 7 (i)

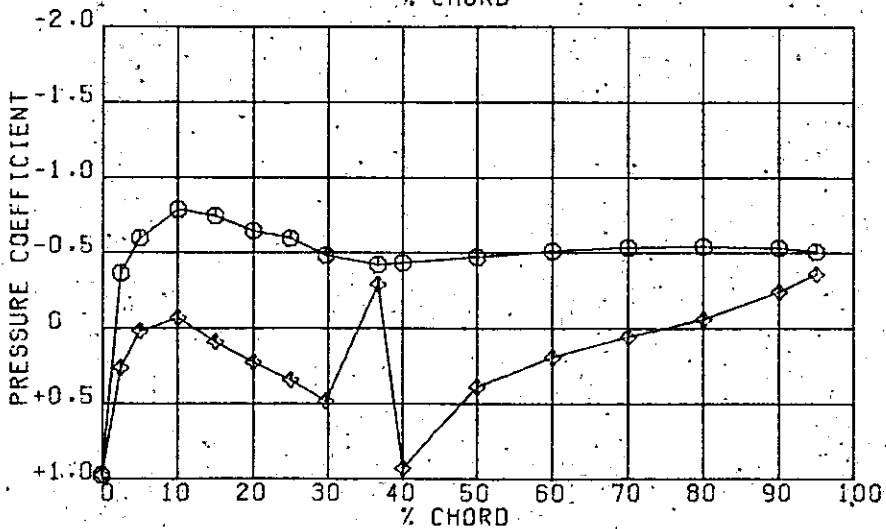
SKEG ANGLE=-5.0, RUDDER ANGLE=30



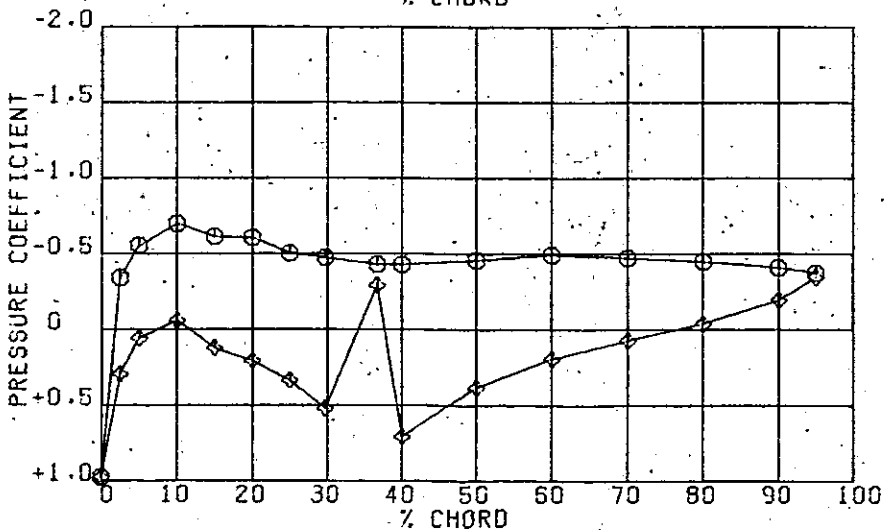
S5



S6



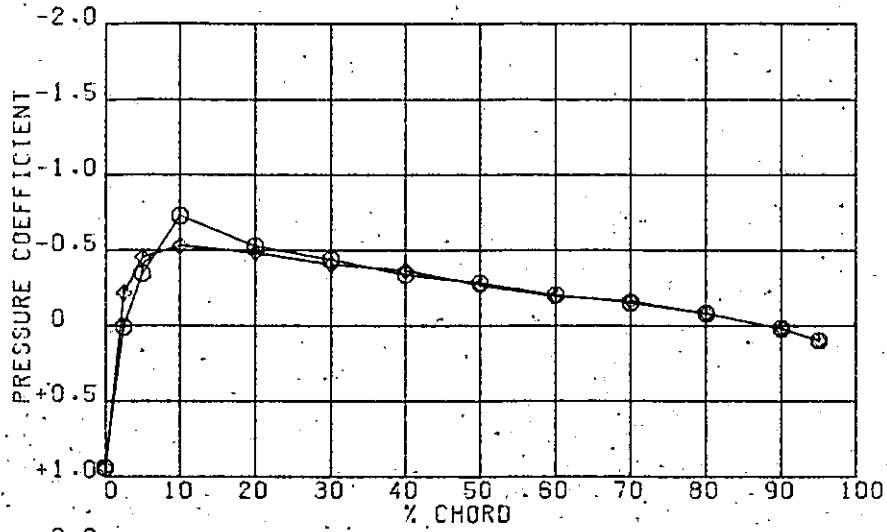
S7



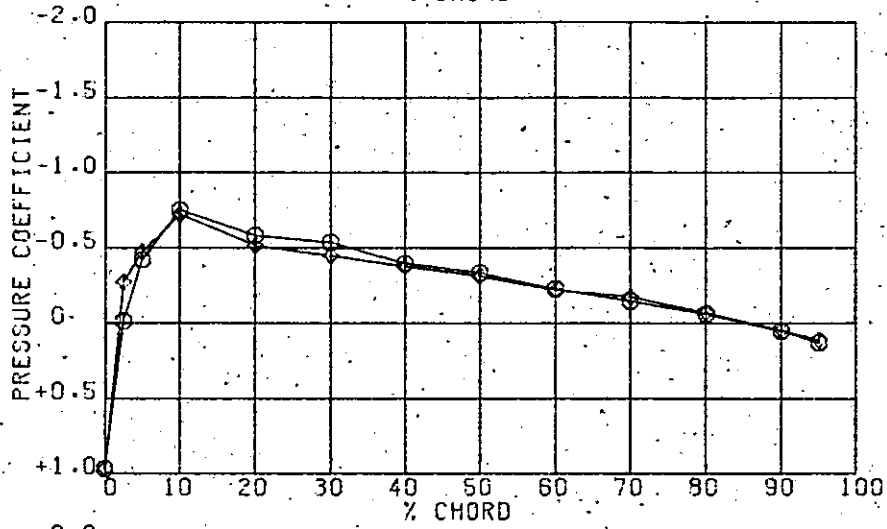
S8

Fig.7(j)

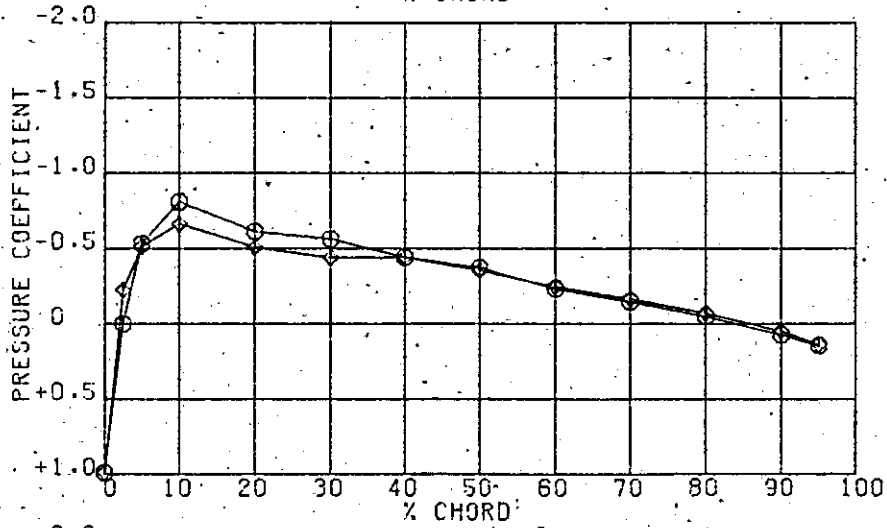
SKEG ANGLE = +5.0, RUDDER ANGLE = 0



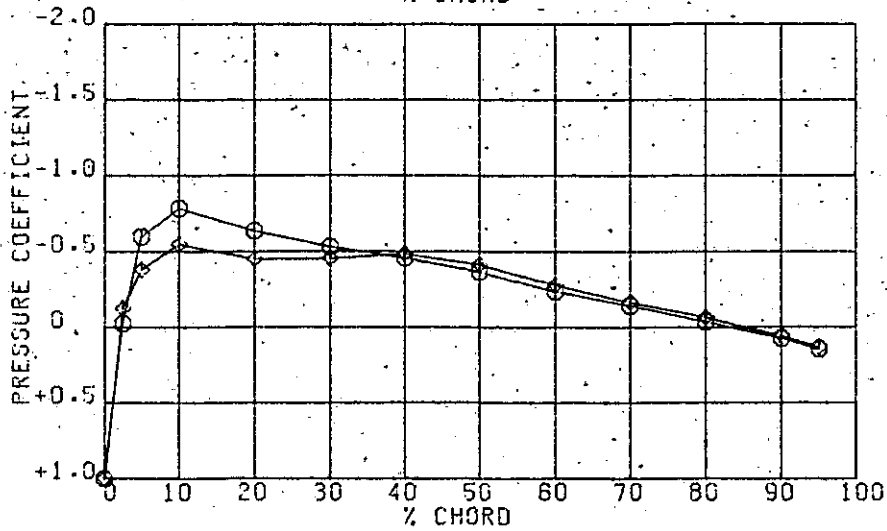
S1



S2



S3

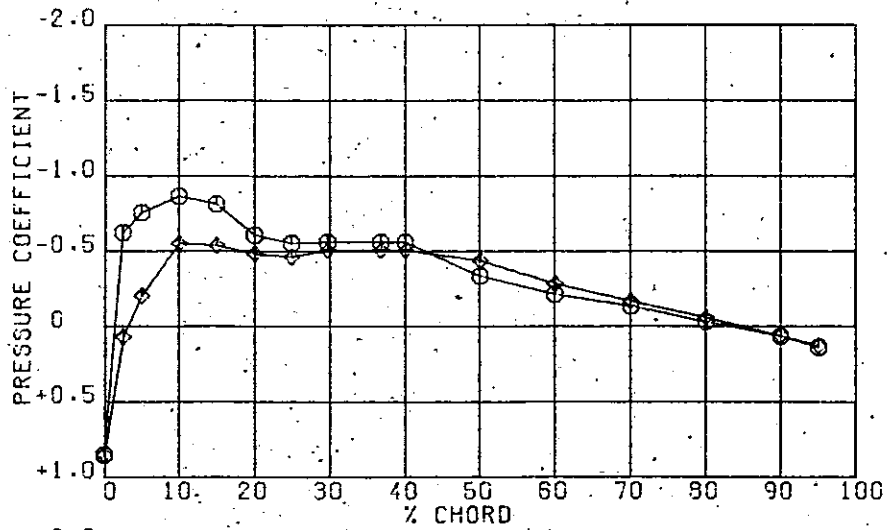


S4

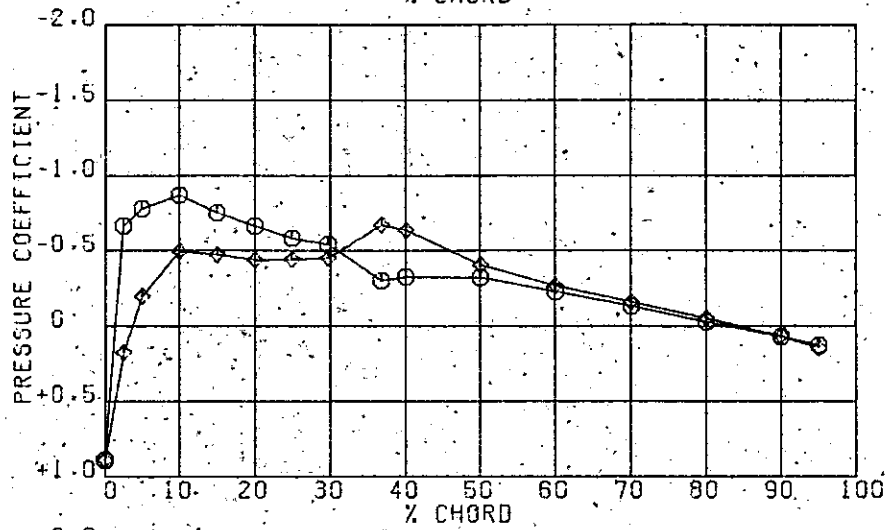
Fig. 8 (a)



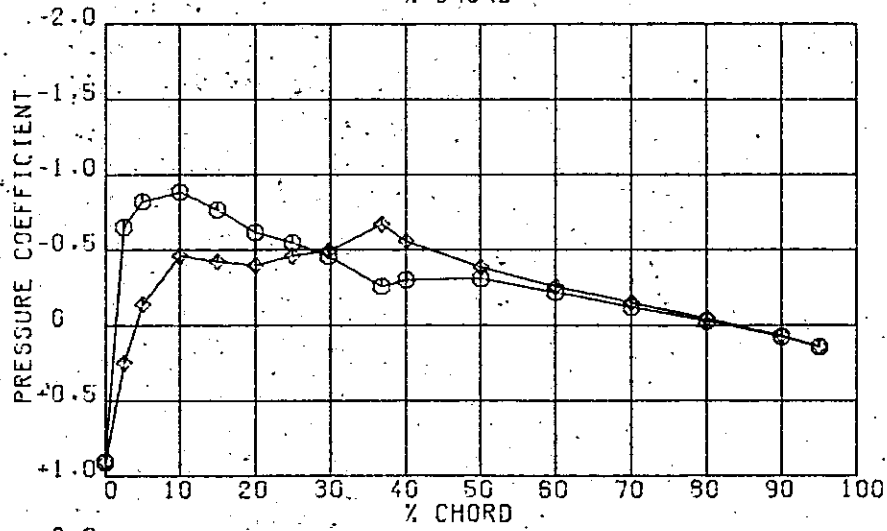
SKEG ANGLE = +5.0, RUDDER ANGLE = 0



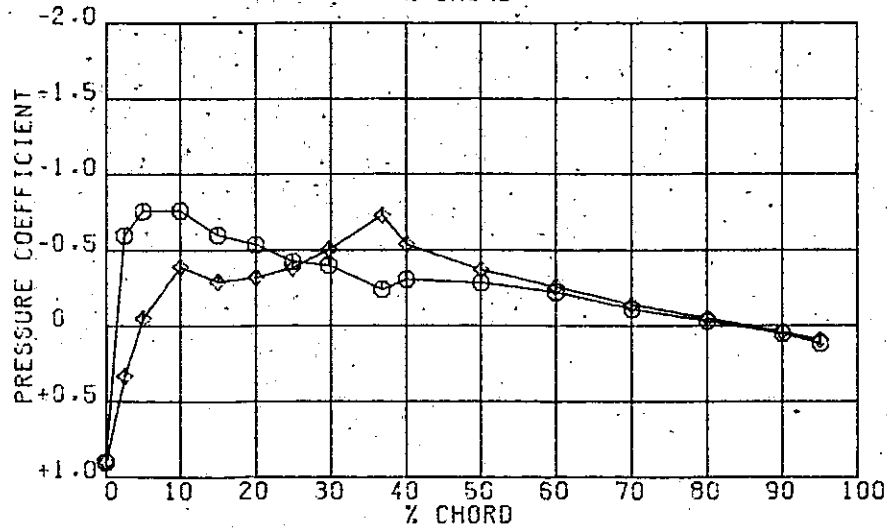
S5



S6



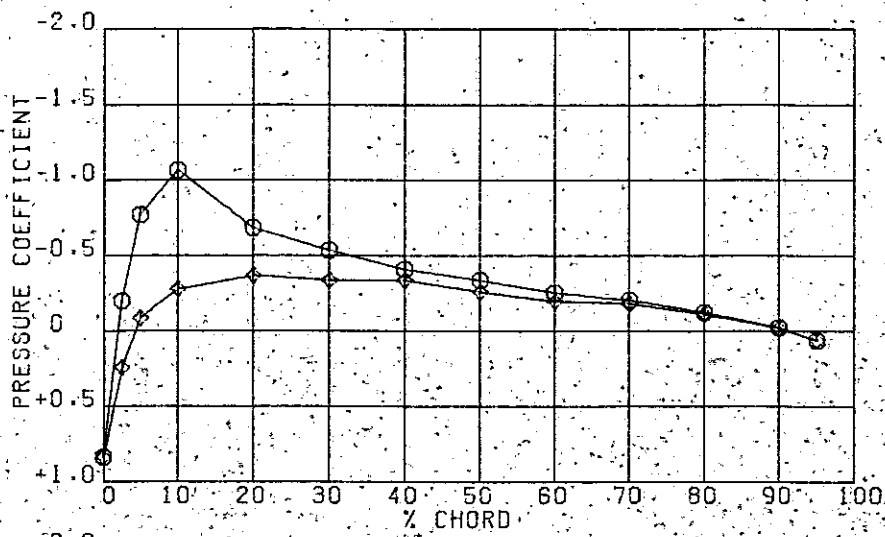
S7



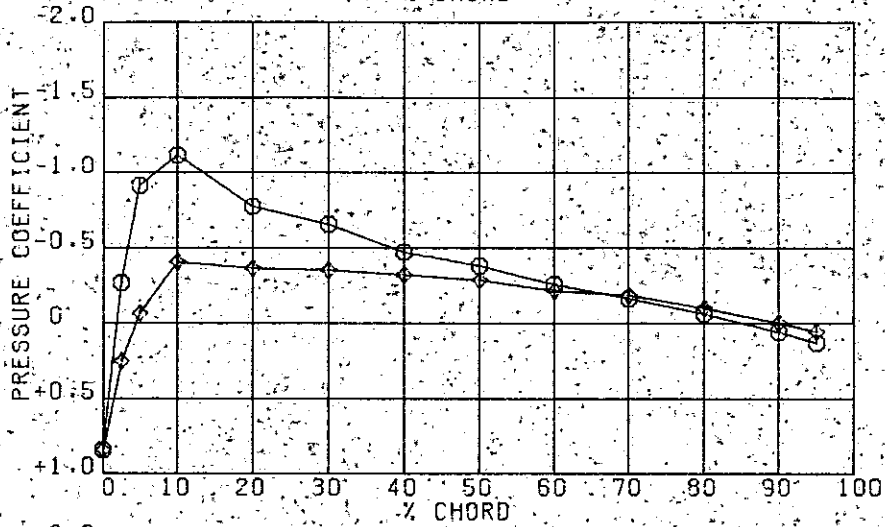
S8

Fig. 8(b)

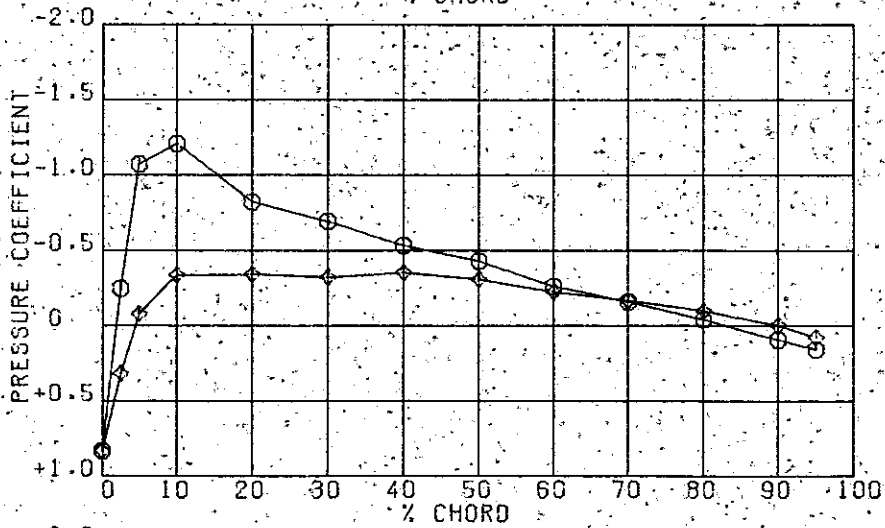
SKEG ANGLE = +5.0, RUDDER ANGLE = 5



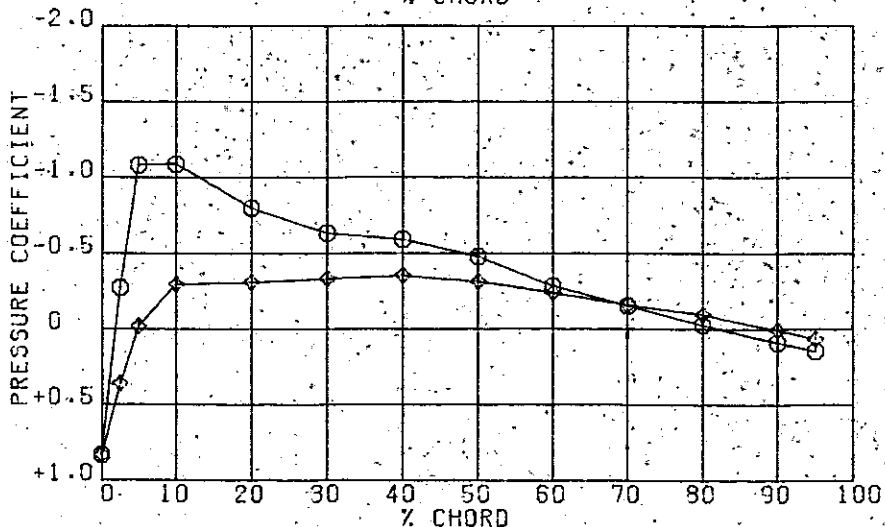
S1



S2



S3



S4

Fig. 8(c)

SKEG ANGLE = +5.0, RUDDER ANGLE = 5

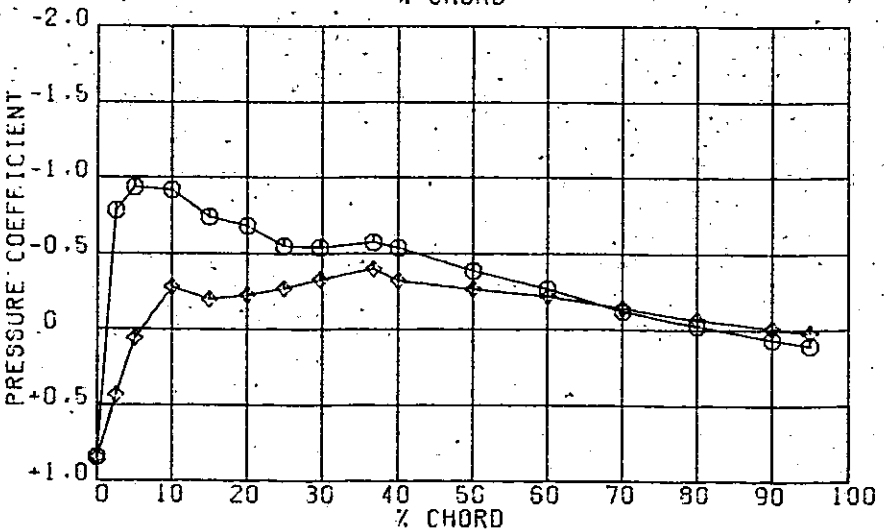
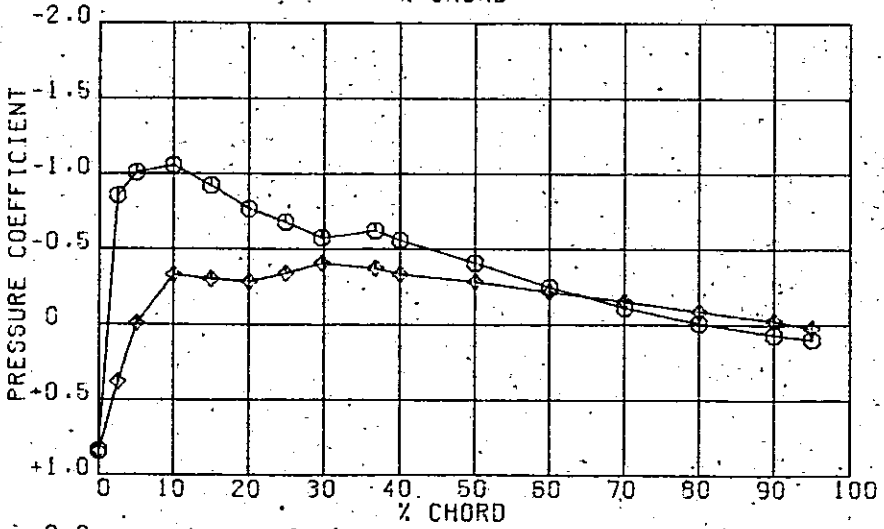
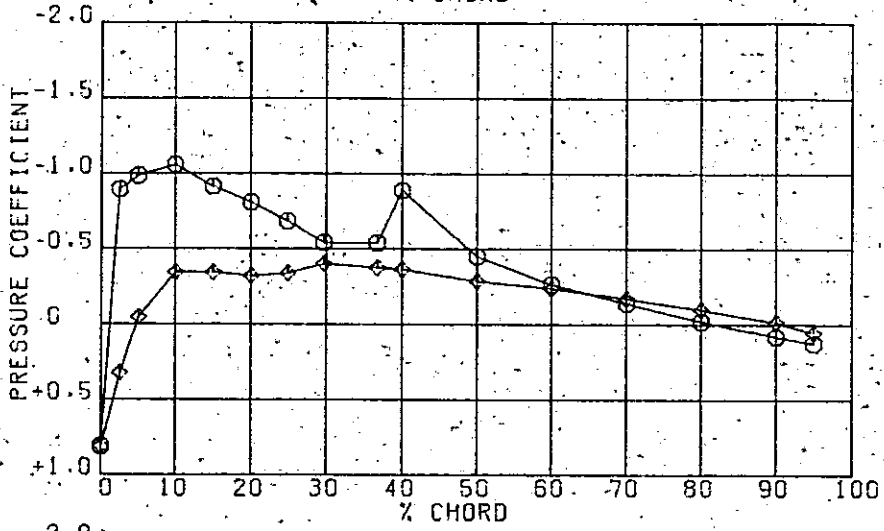
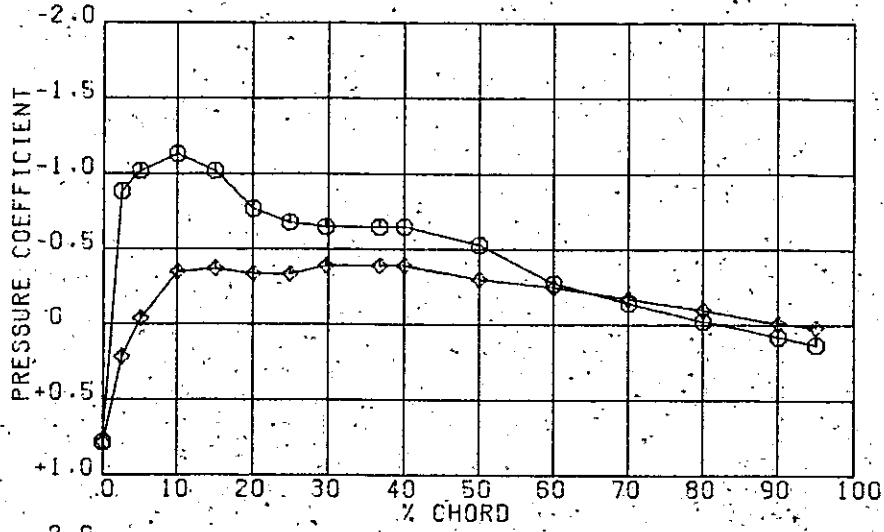
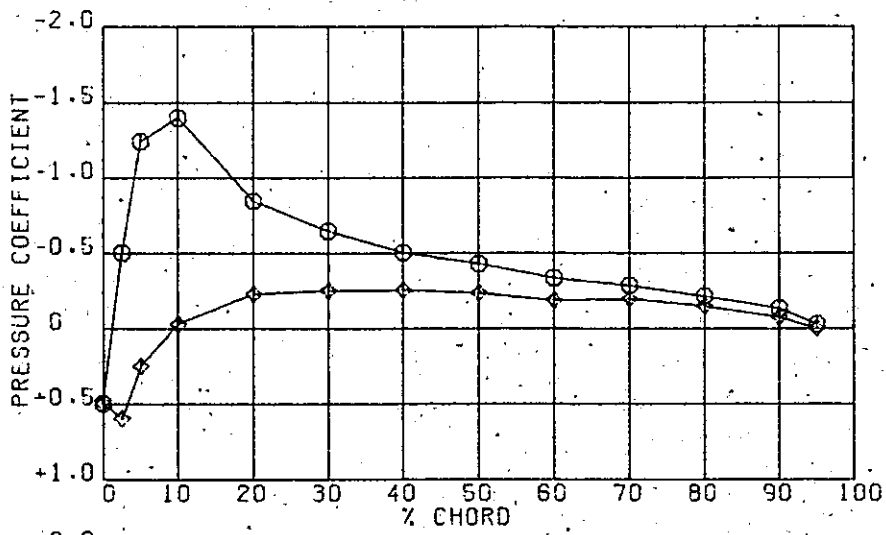
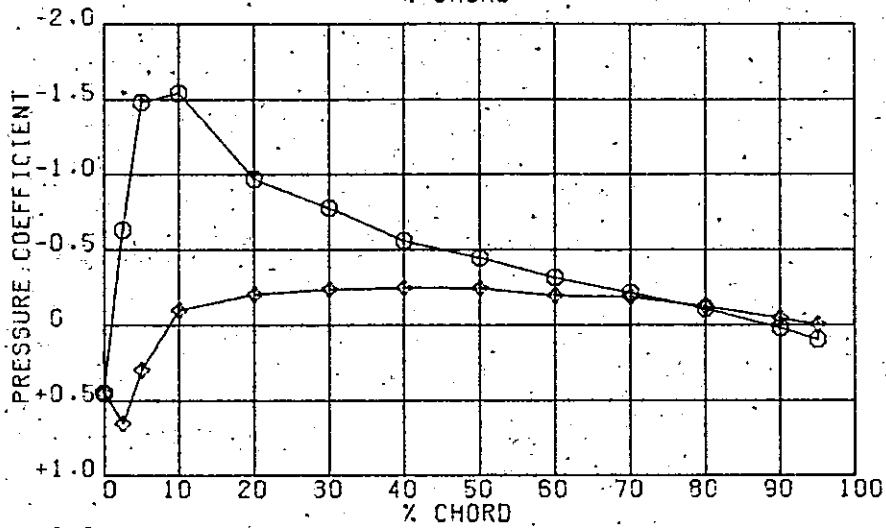


Fig. 8(d)

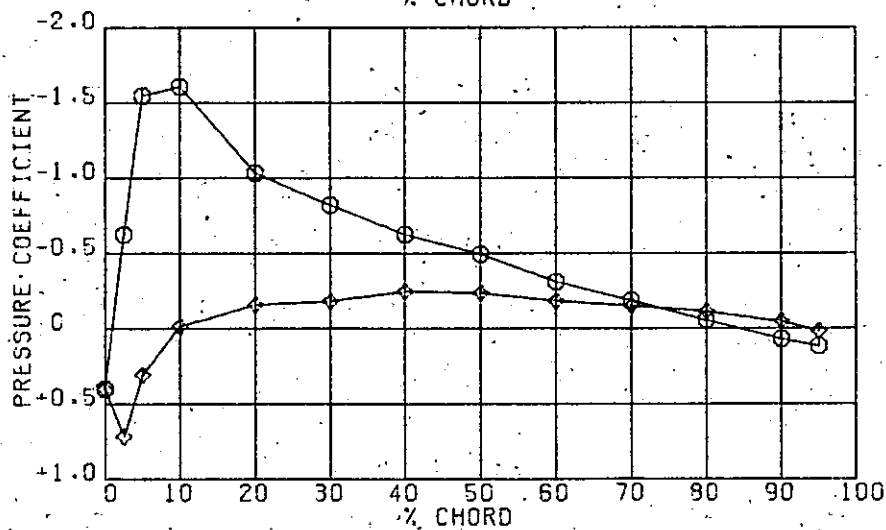
SKEG ANGLE = +5.0, RUDDER ANGLE = 10



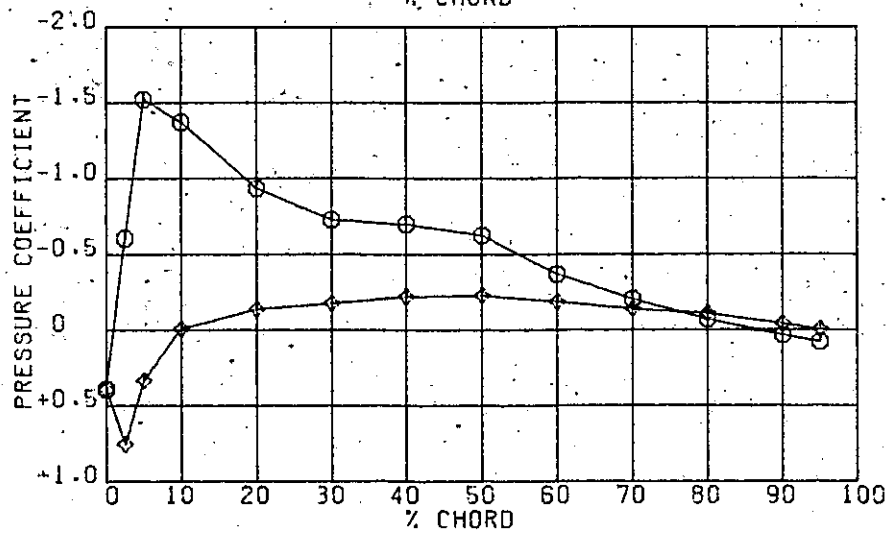
S1



S2



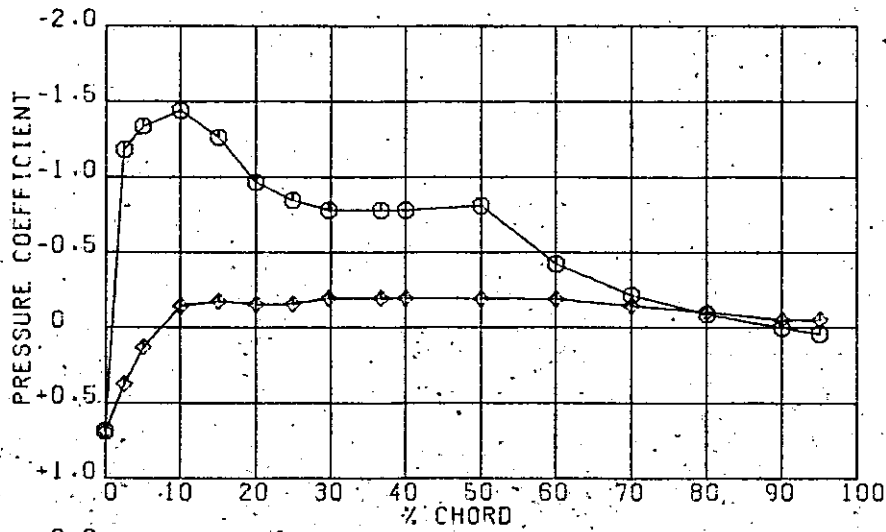
S3



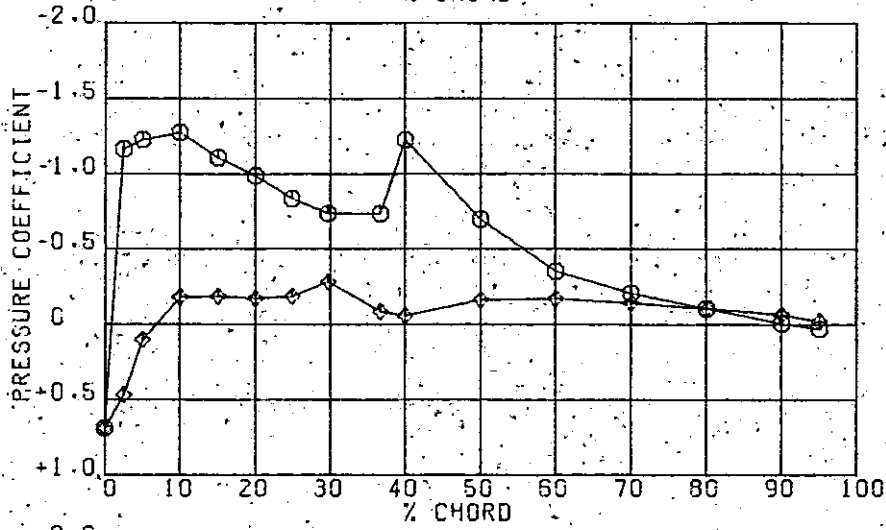
S4

Fig. 8(e)

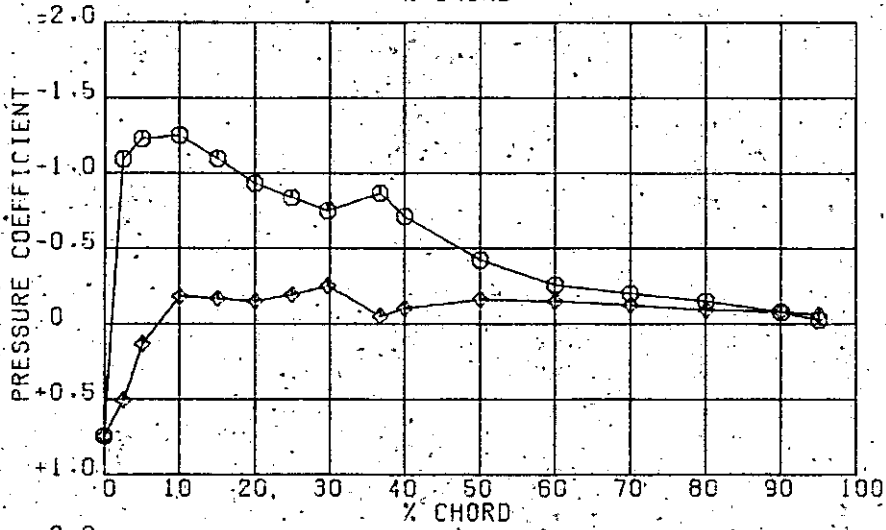
SKEG ANGLE=+5.0, RUDDER ANGLE=10



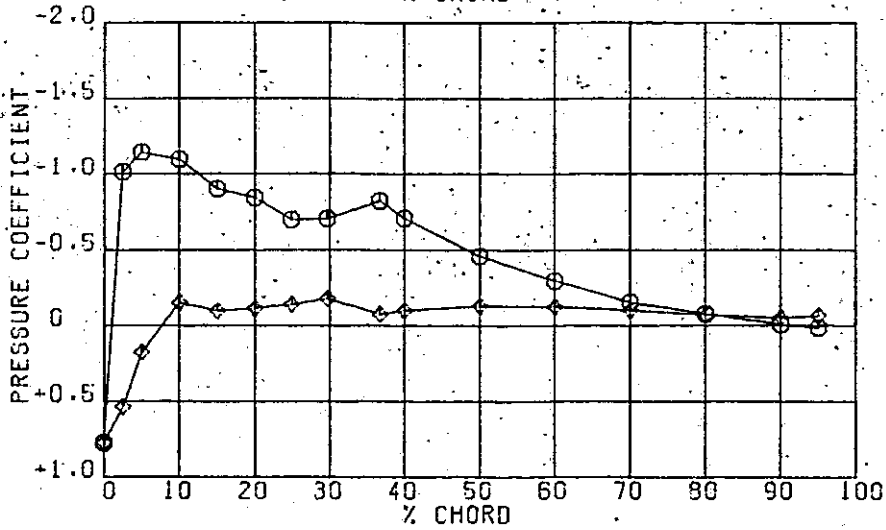
S5



S6



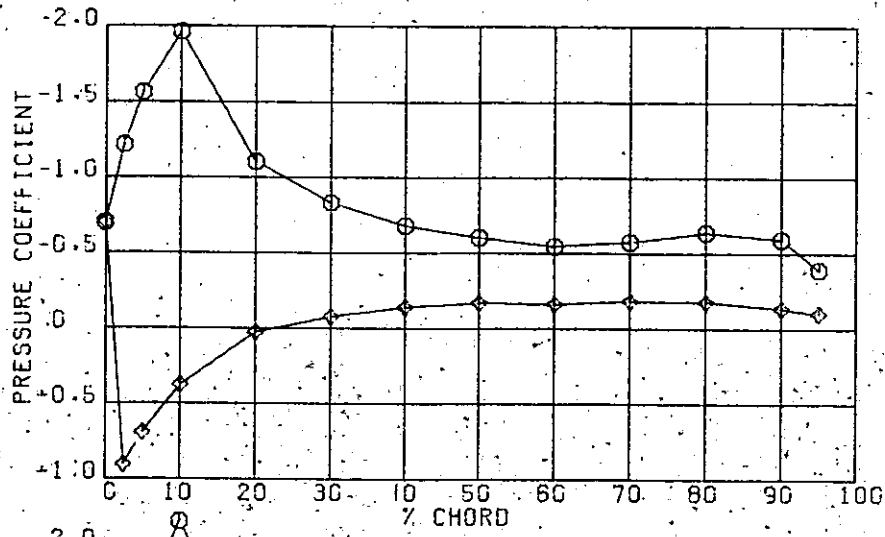
S7



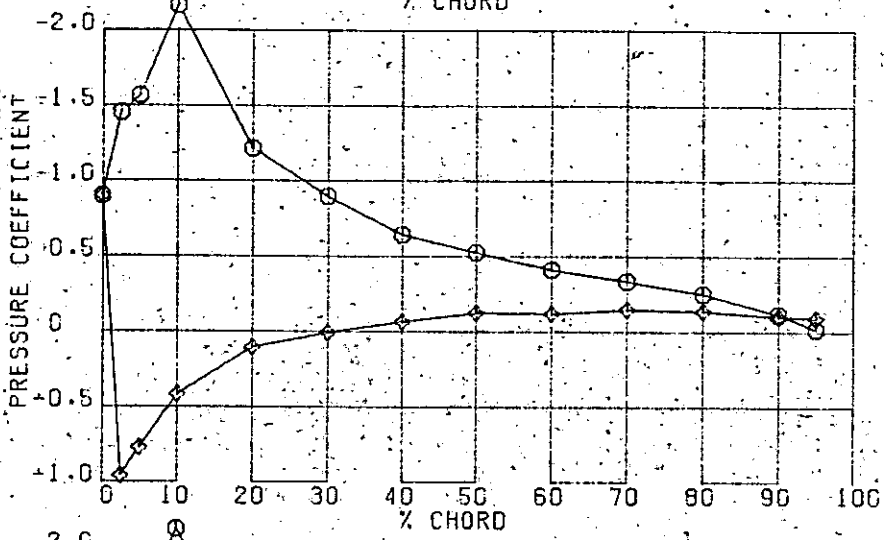
S8

Fig. 8(f)

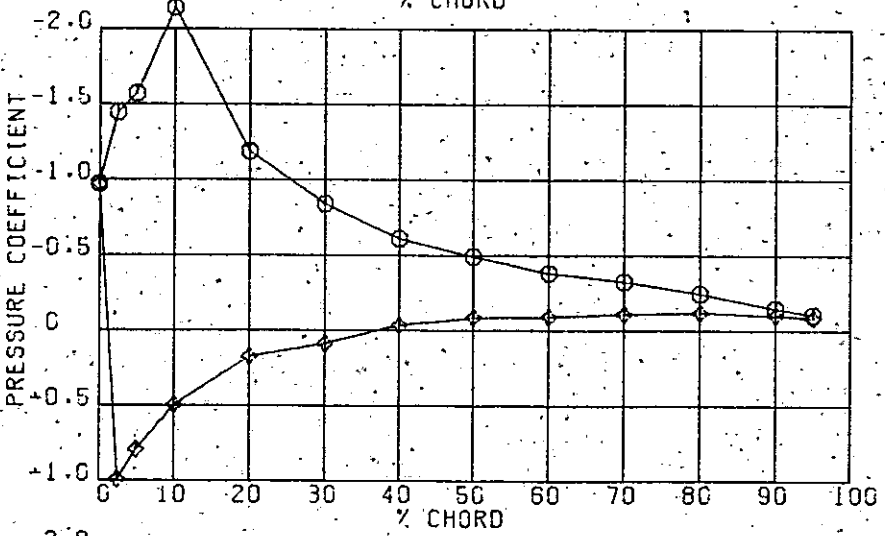
SKEG ANGLE = +5 0. RUDDER ANGLE = -20



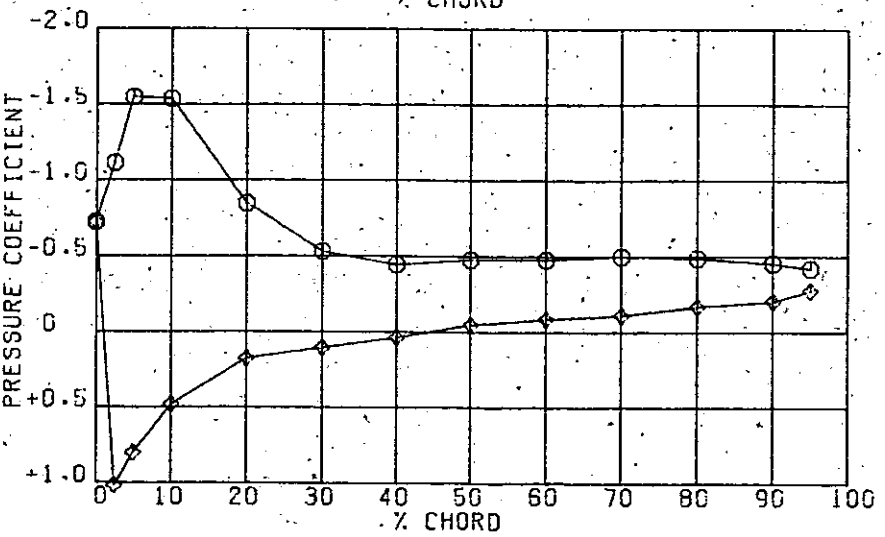
S1



S2



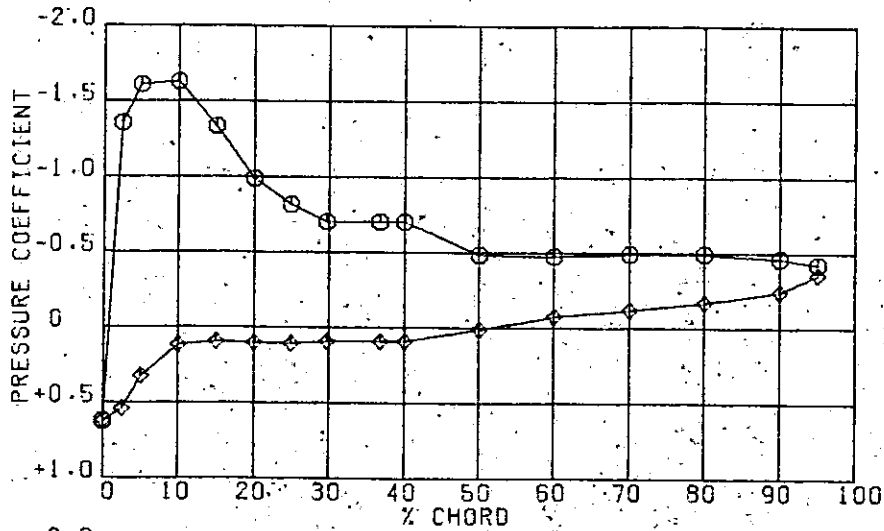
S3



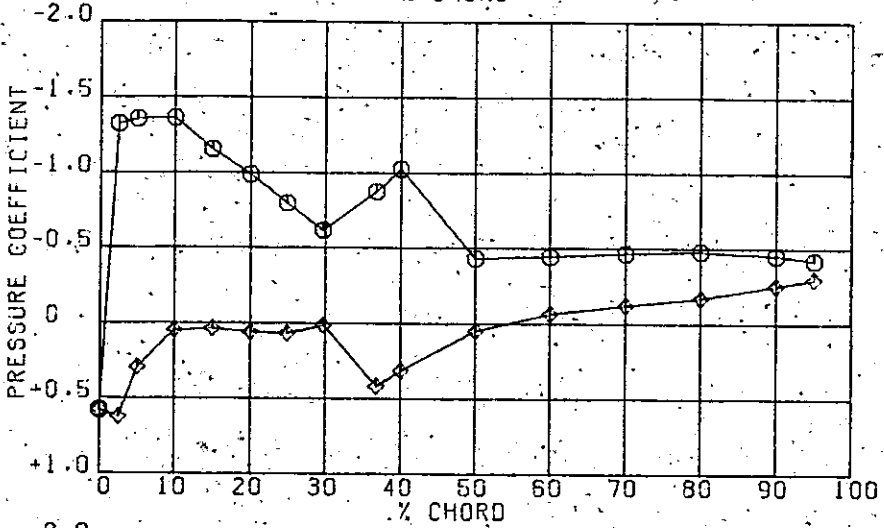
S4

Fig. 8(g)

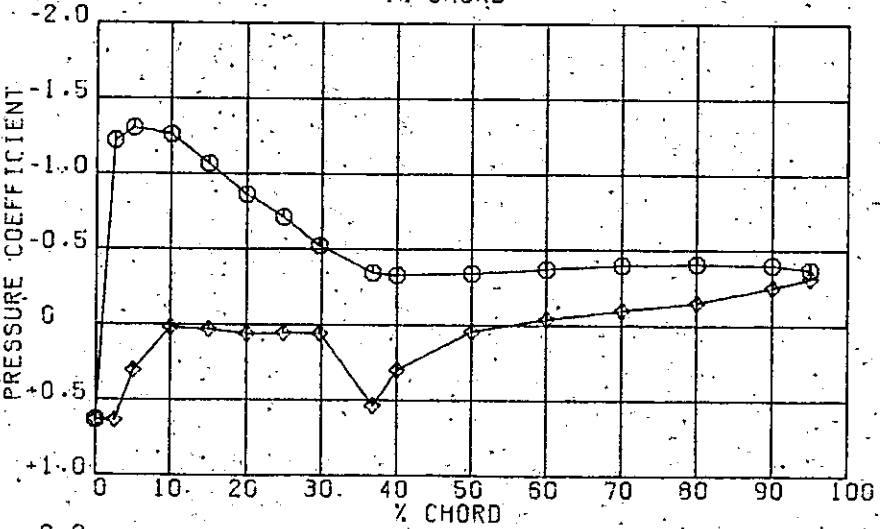
SKEG ANGLE = +5.0, RUDDER ANGLE = 20



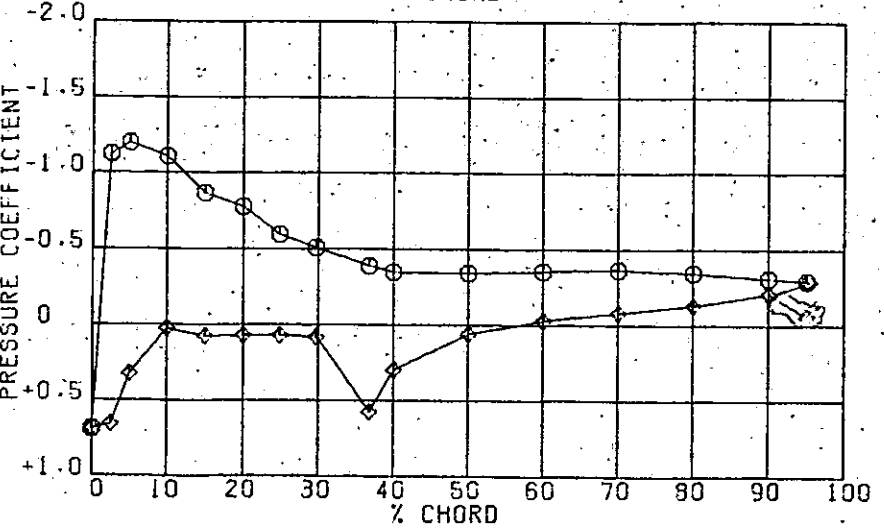
S5



S6



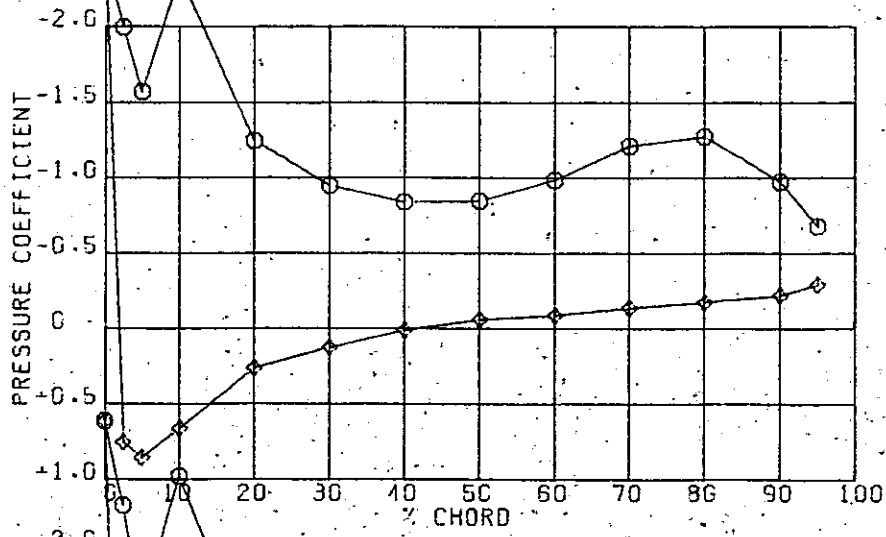
S7



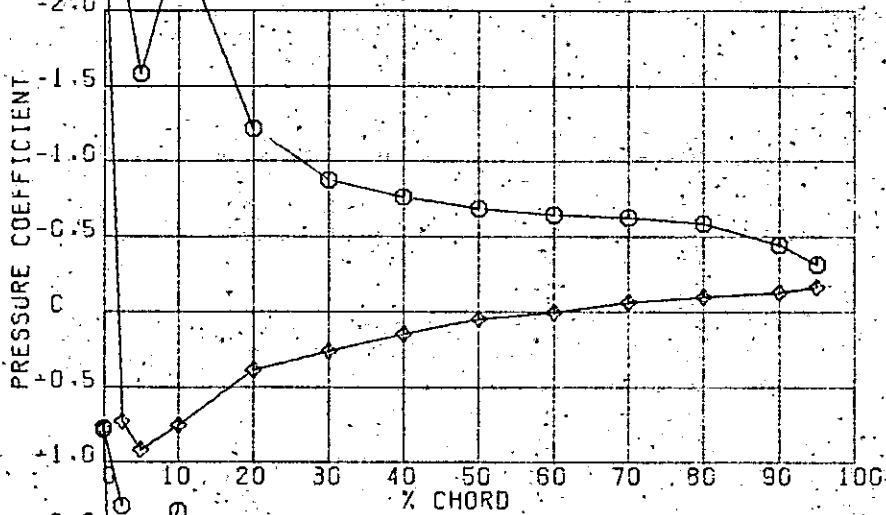
S8

Fig. 8(h)

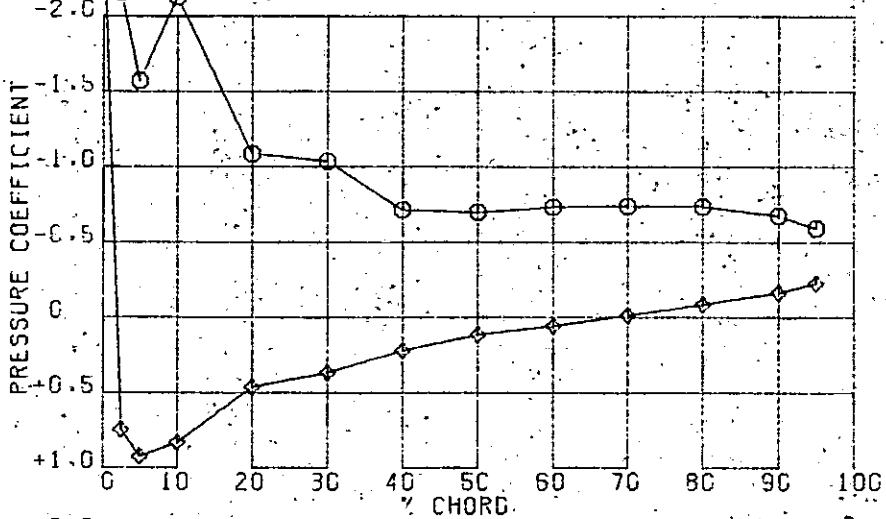
SKEG ANGLE = +5.0, RUDDER ANGLE = 30



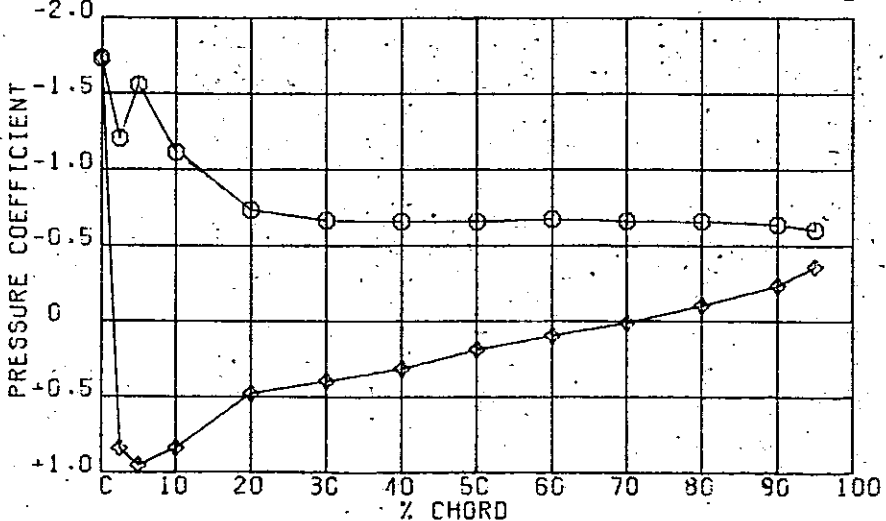
S1



S2



S3



S4

Fig. 8(i)



SKEG ANGLE = +5.0, RUDDER ANGLE = 30

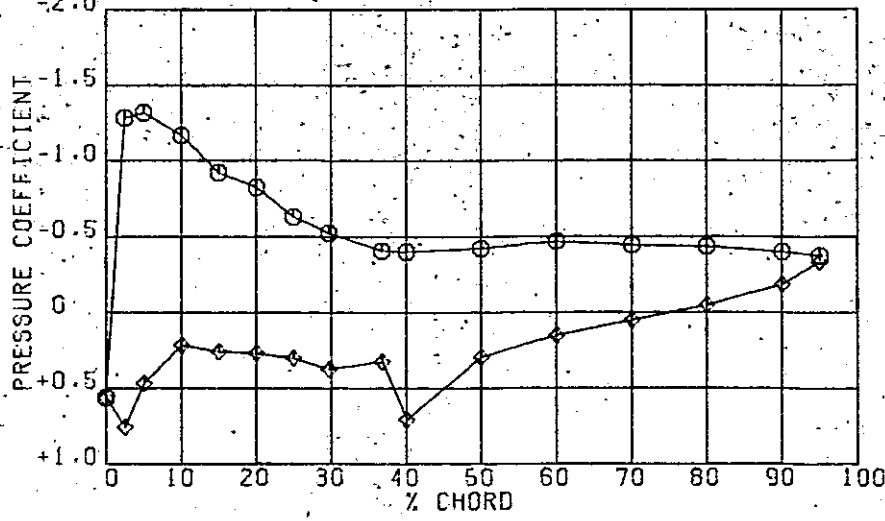
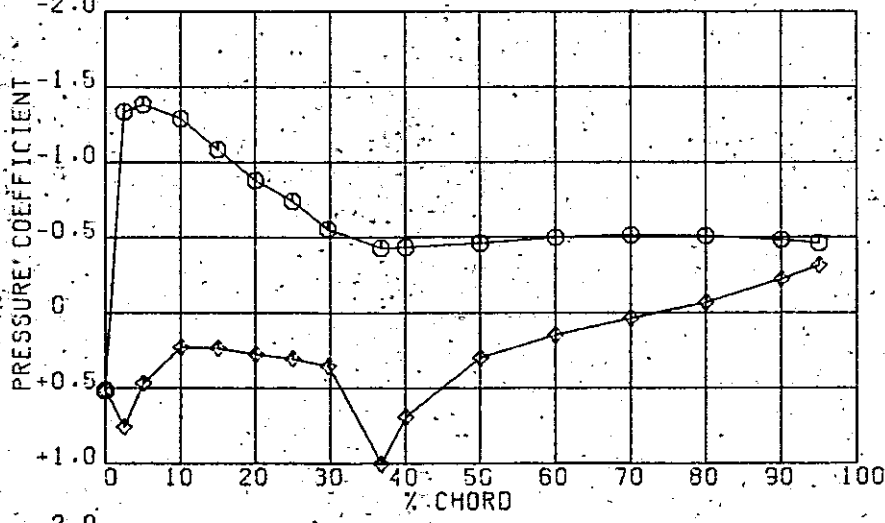
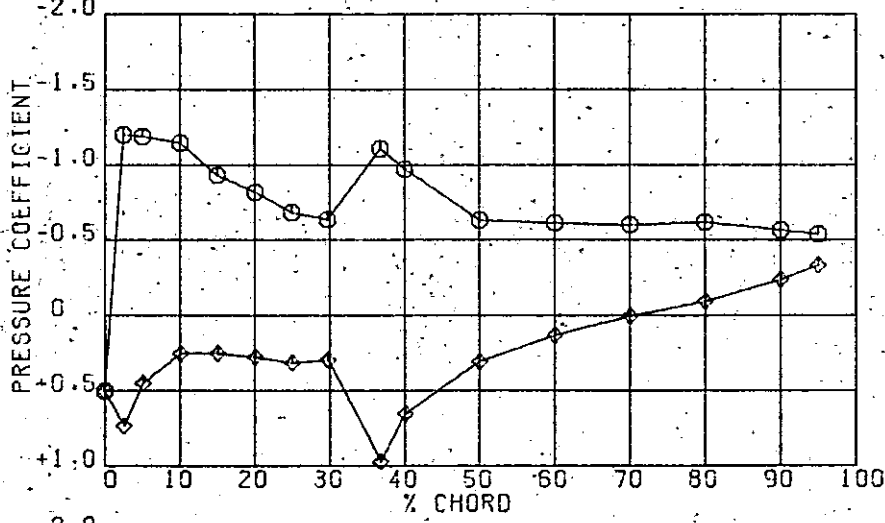
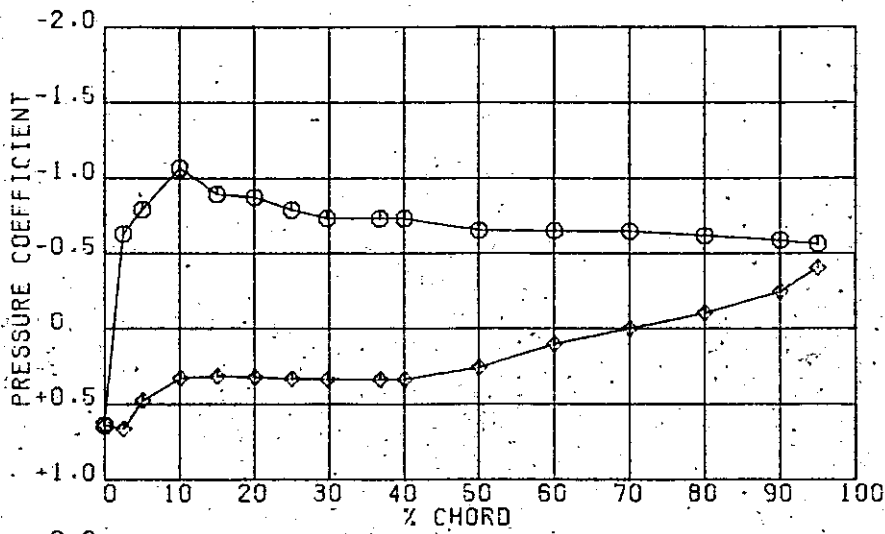
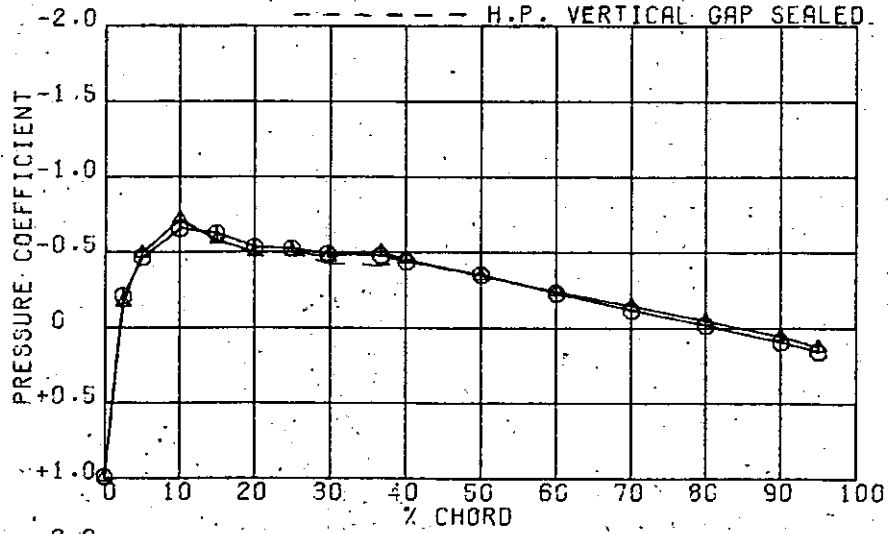
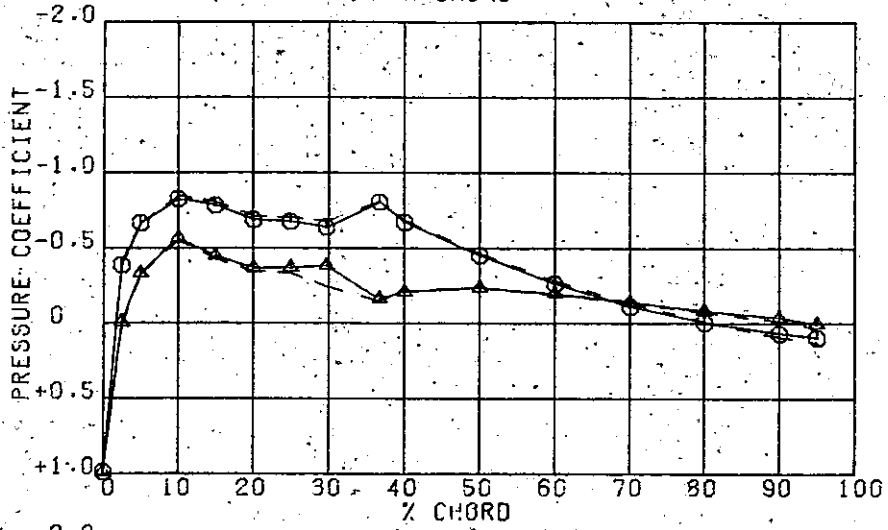


Fig. 8(j)

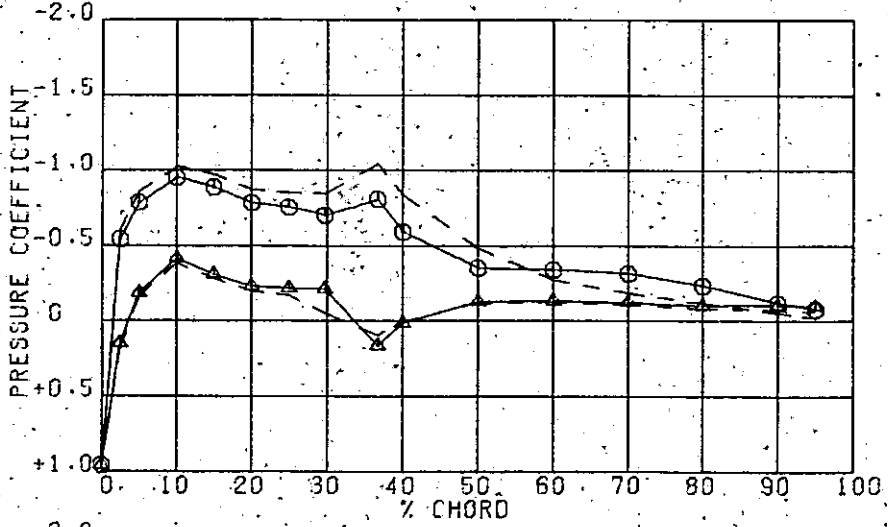
SKEG ANGLE = -0.25, SPAN POSITION = S7



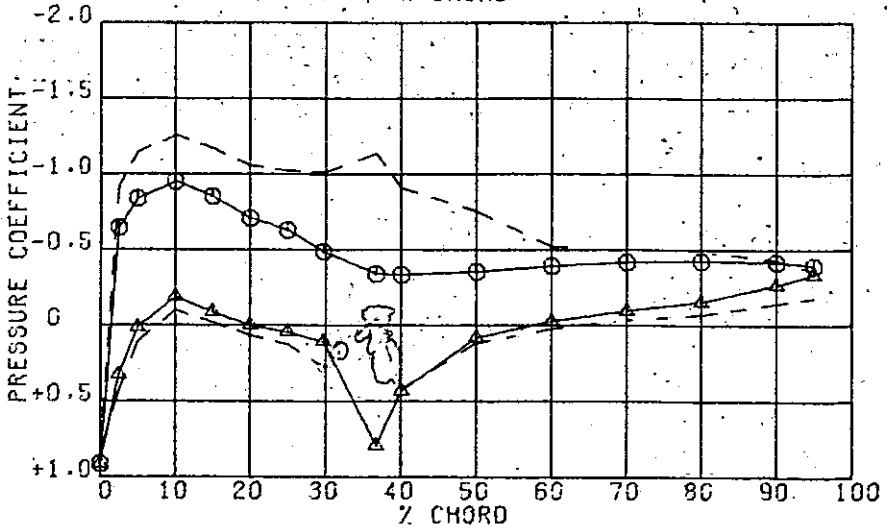
-0.25 DEG



+4.75 DEG



+9.75 DEG



19.75 DEG

Fig. 9

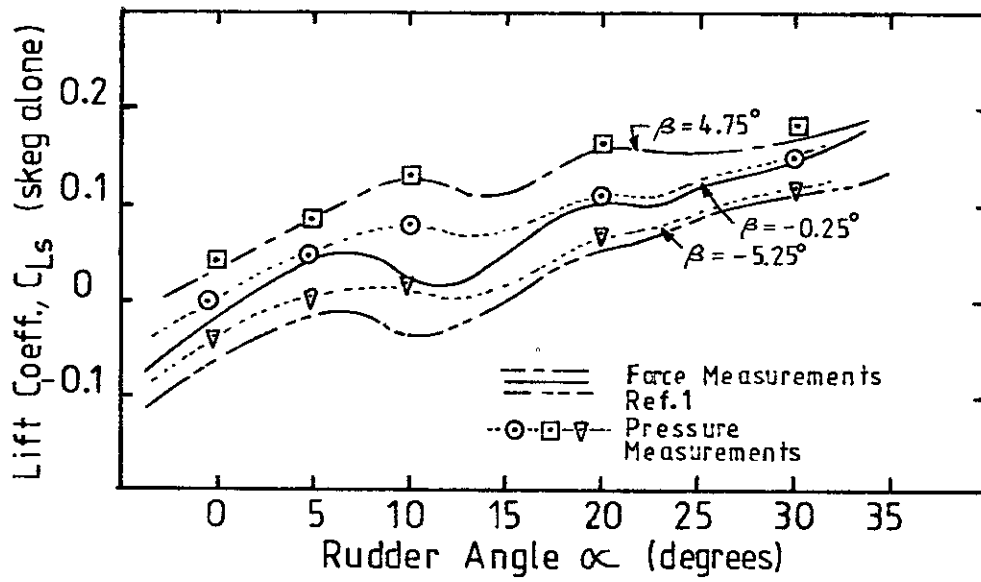


Fig. 10 LIFT CHARACTERISTICS FOR SKEG ALONE

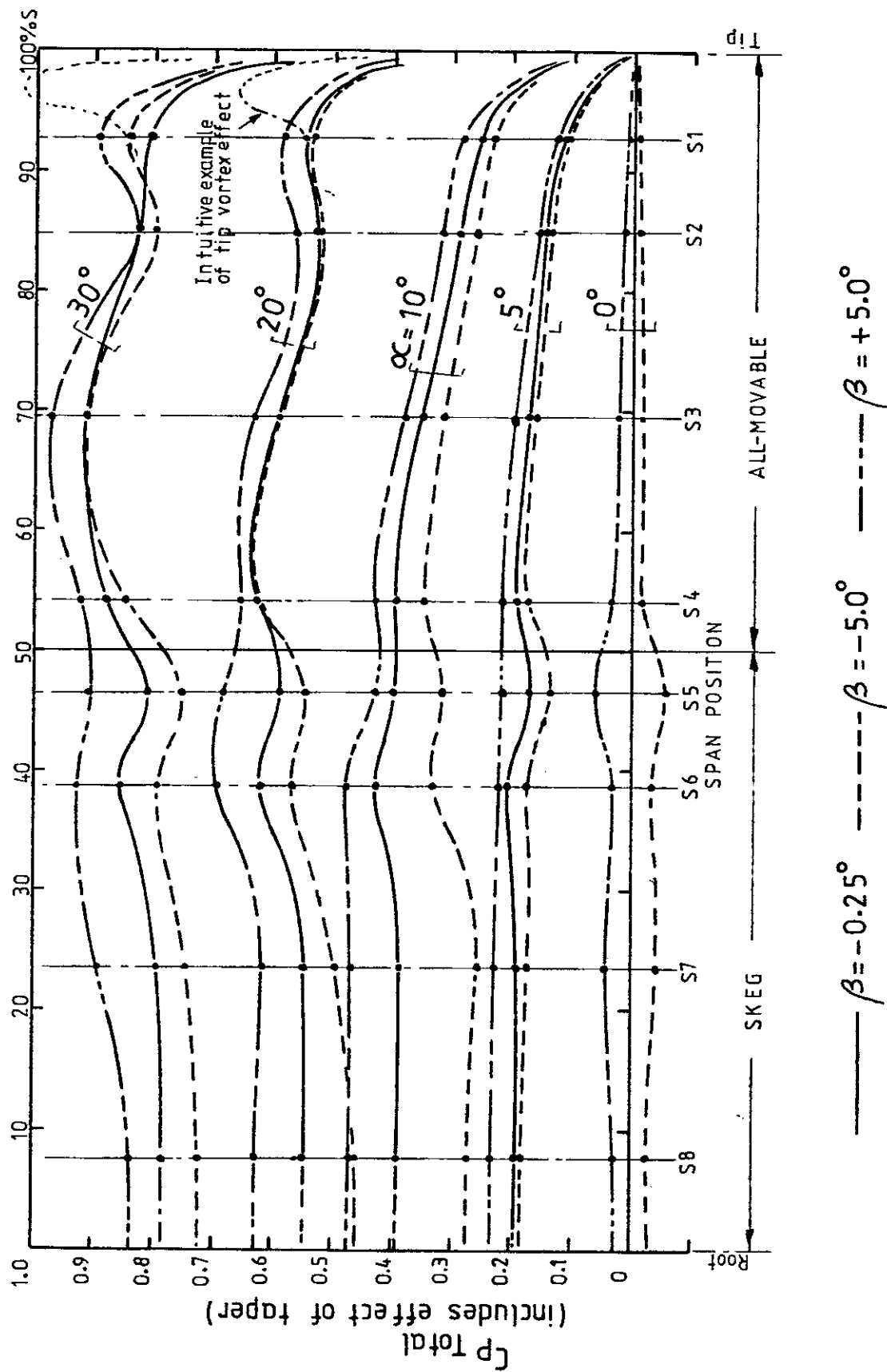


Fig. 11 SPANWISE LOADINGS

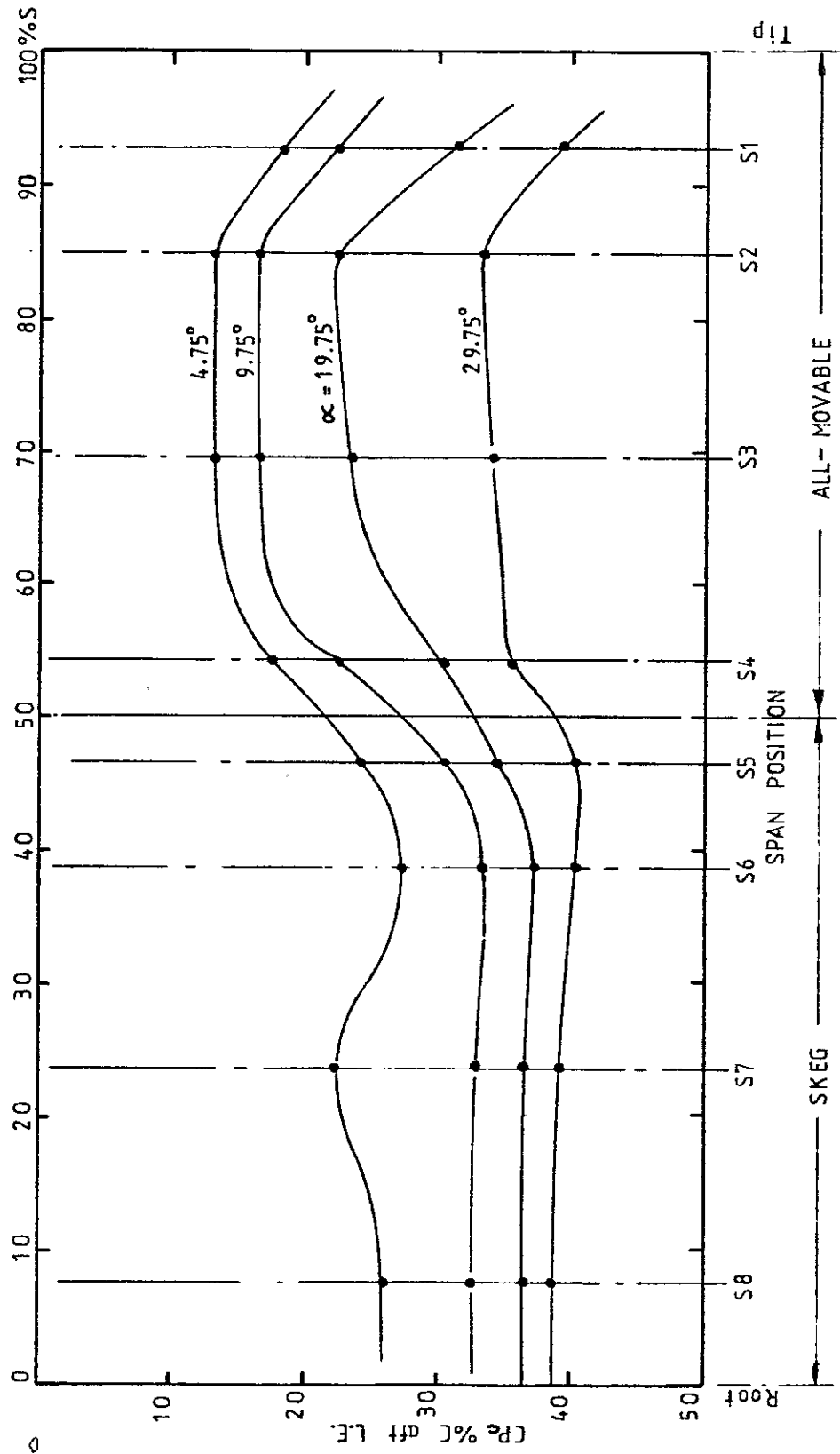


Fig. 12 a SPANWISE DISTRIBUTION OF  $C_p$   
Rudder plus Skeg,  $\beta = -0.25^\circ$

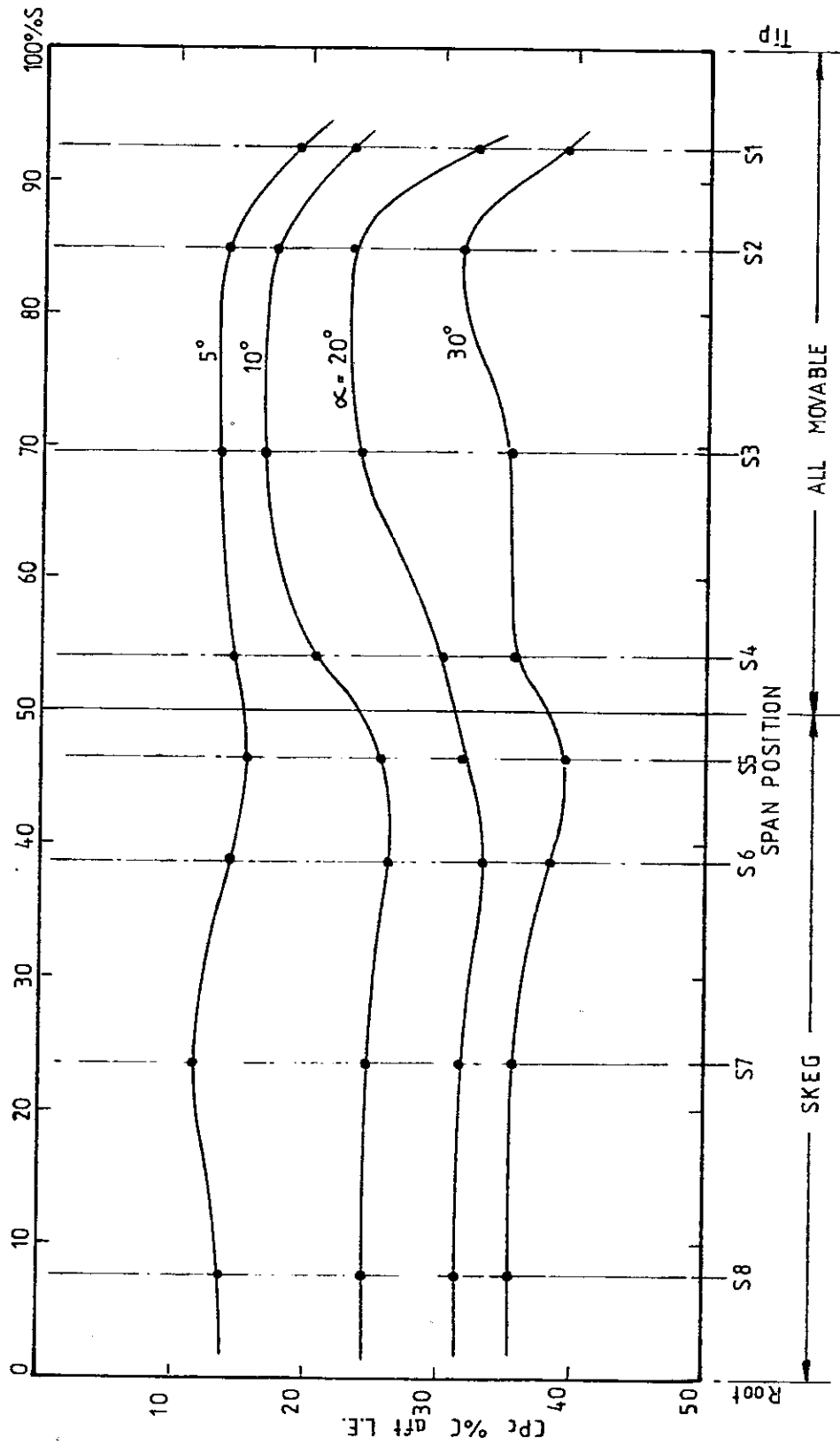


Fig. 12b SPANWISE DISTRIBUTION OF  $C_{p_c}$   
Rudder plus Skog  $\beta = +5^\circ$

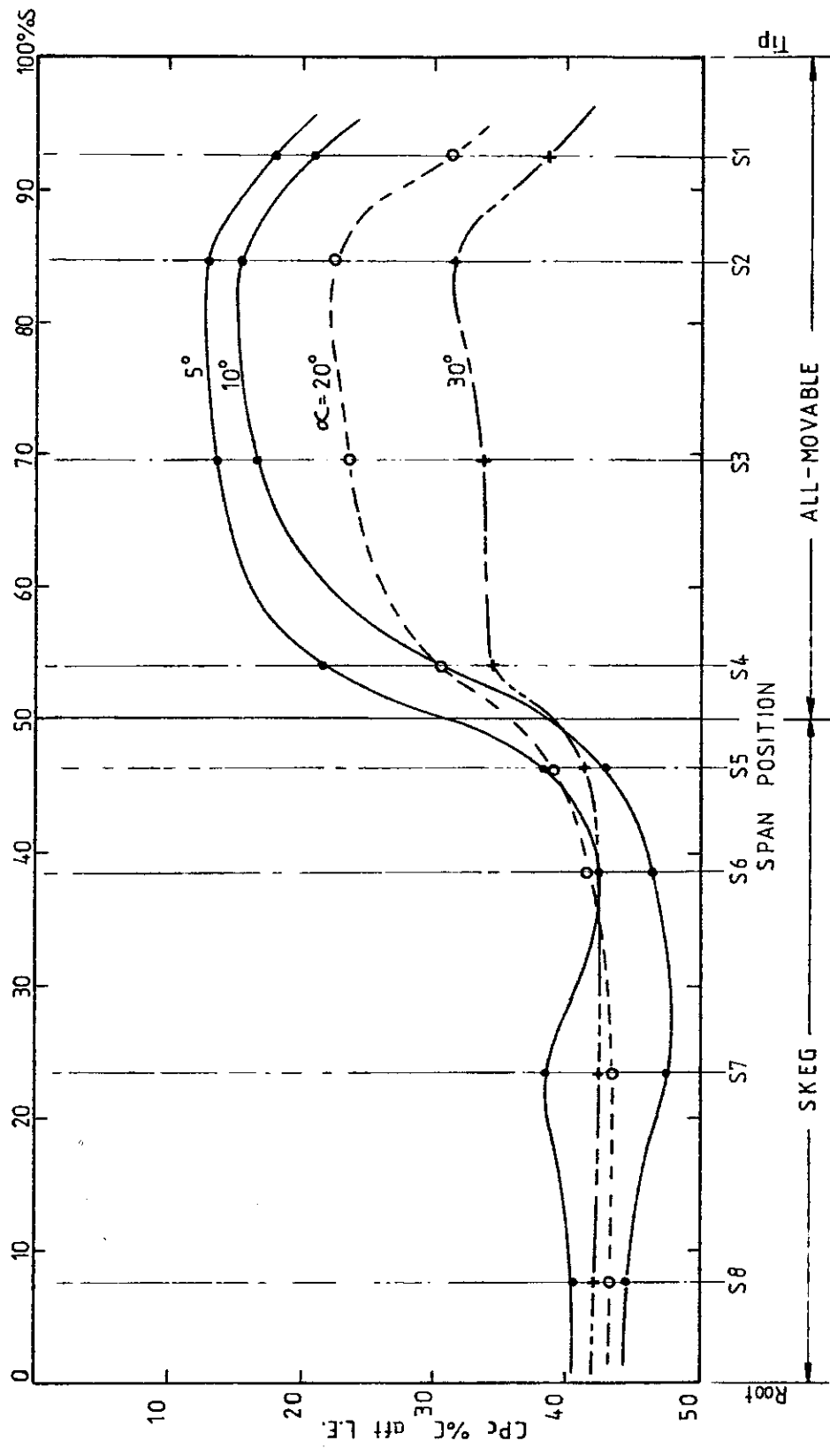


Fig. 12c SPANWISE DISTRIBUTION OF  $C_{pC}$   
Rudder plus Skeg  $\beta = -5^\circ$

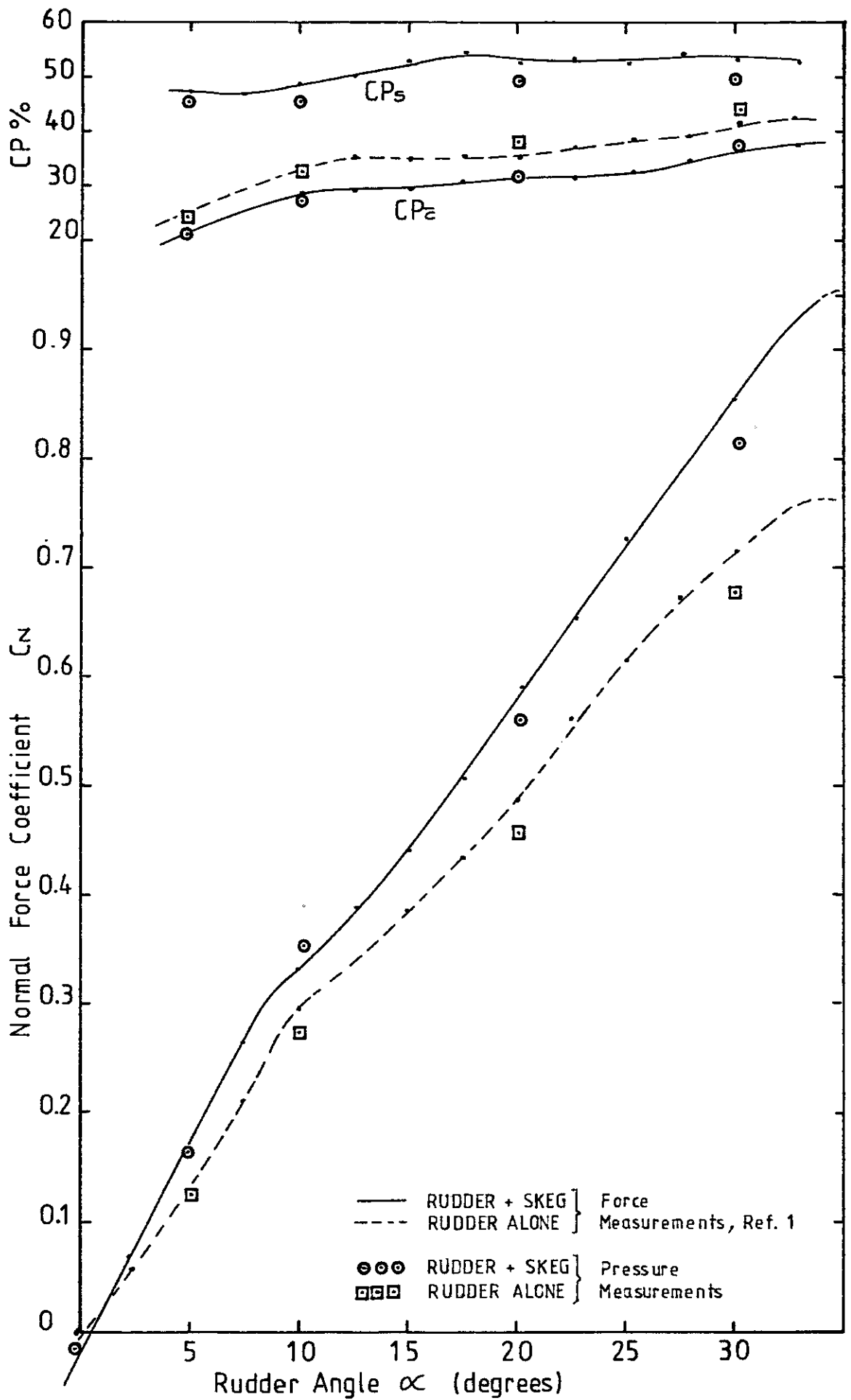


Fig. 13a NORMAL FORCE AND CENTRE OF PRESSURE CHARACTERISTICS  $\beta = -0.25^\circ$



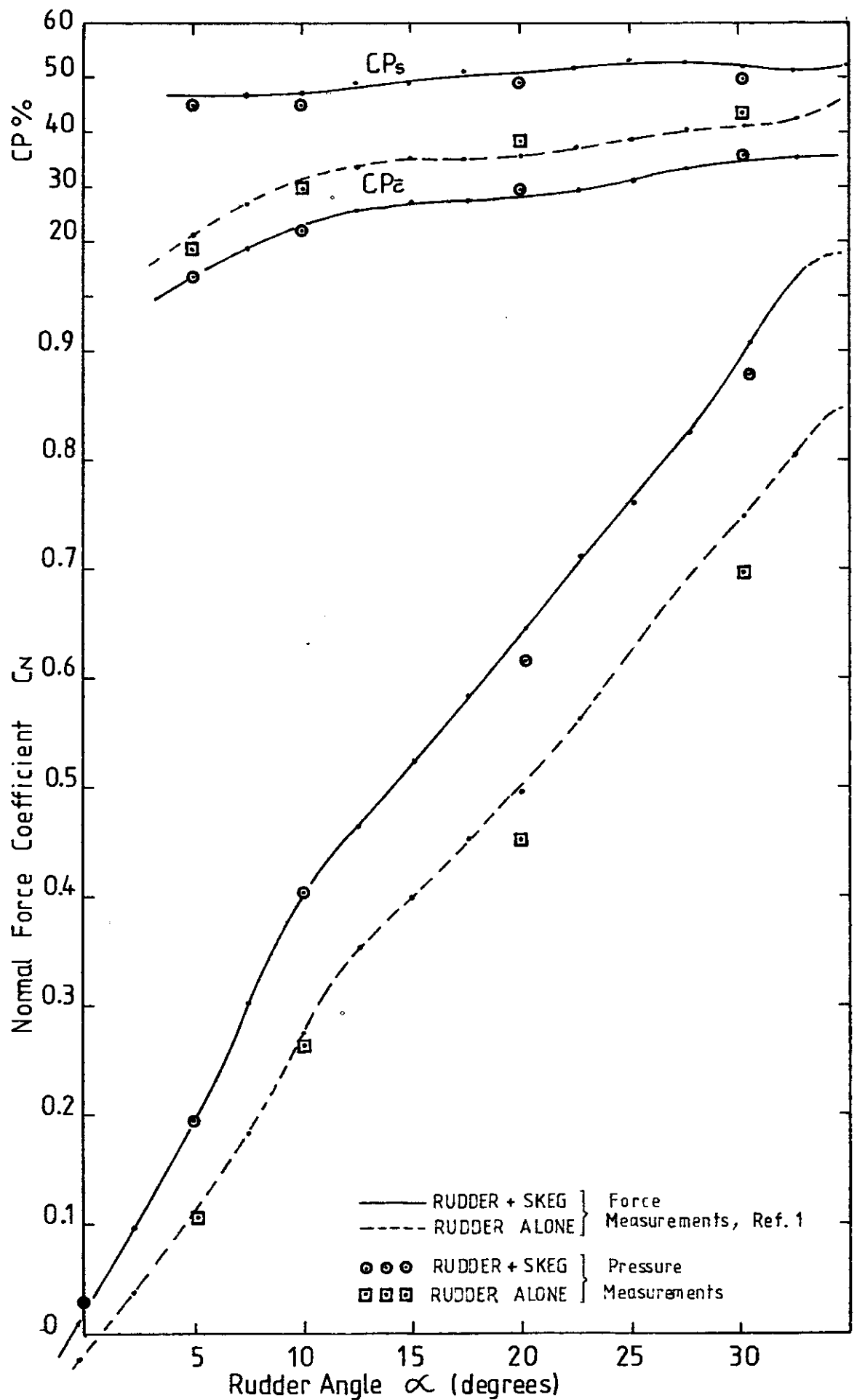


Fig. 13b

NORMAL FORCE AND CENTRE OF PRESSURE CHARACTERISTICS  $\beta = +5^\circ$

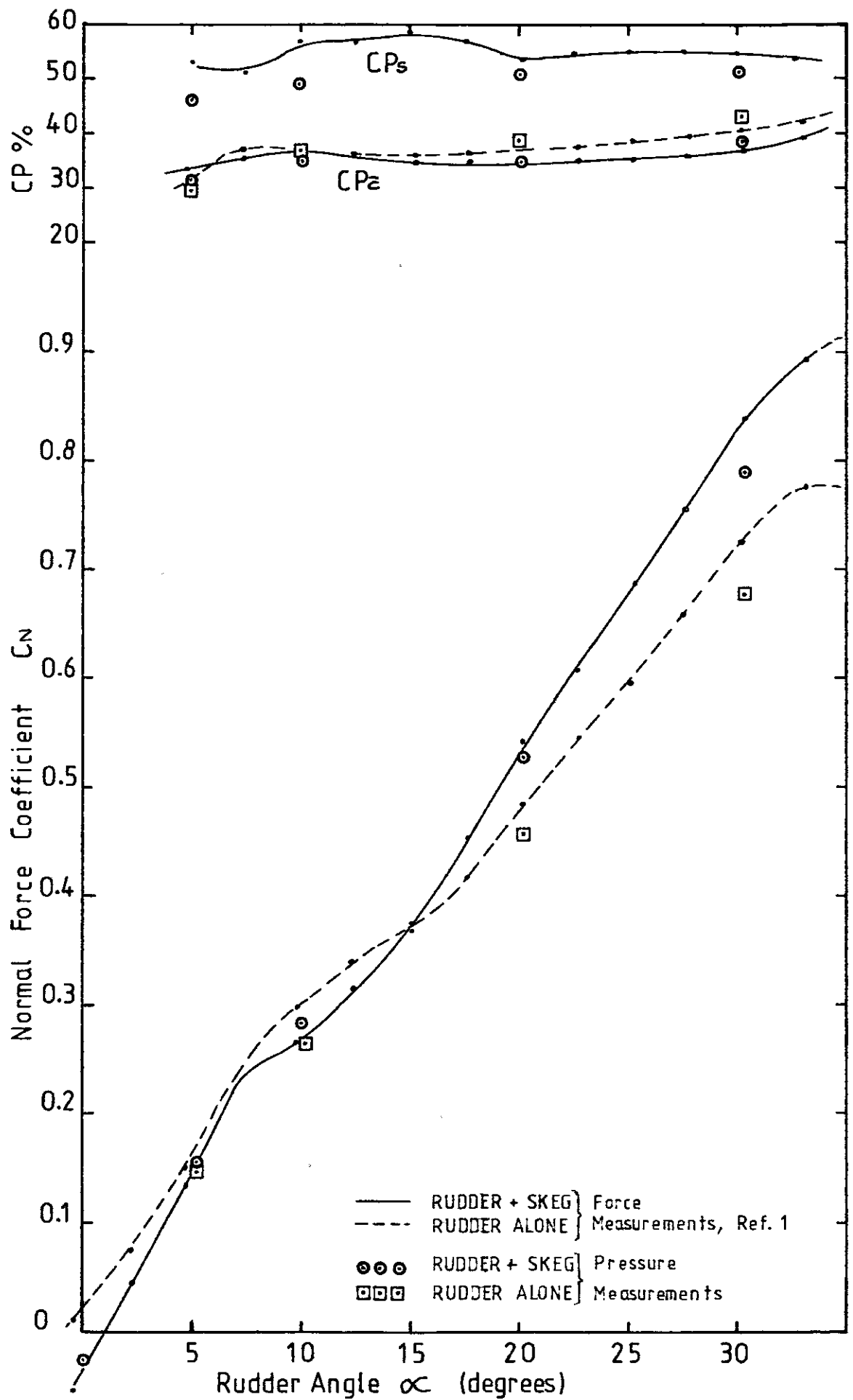


Fig. 13c NORMAL FORCE AND CENTRE OF PRESSURE CHARACTERISTICS  $\beta = -5^\circ$

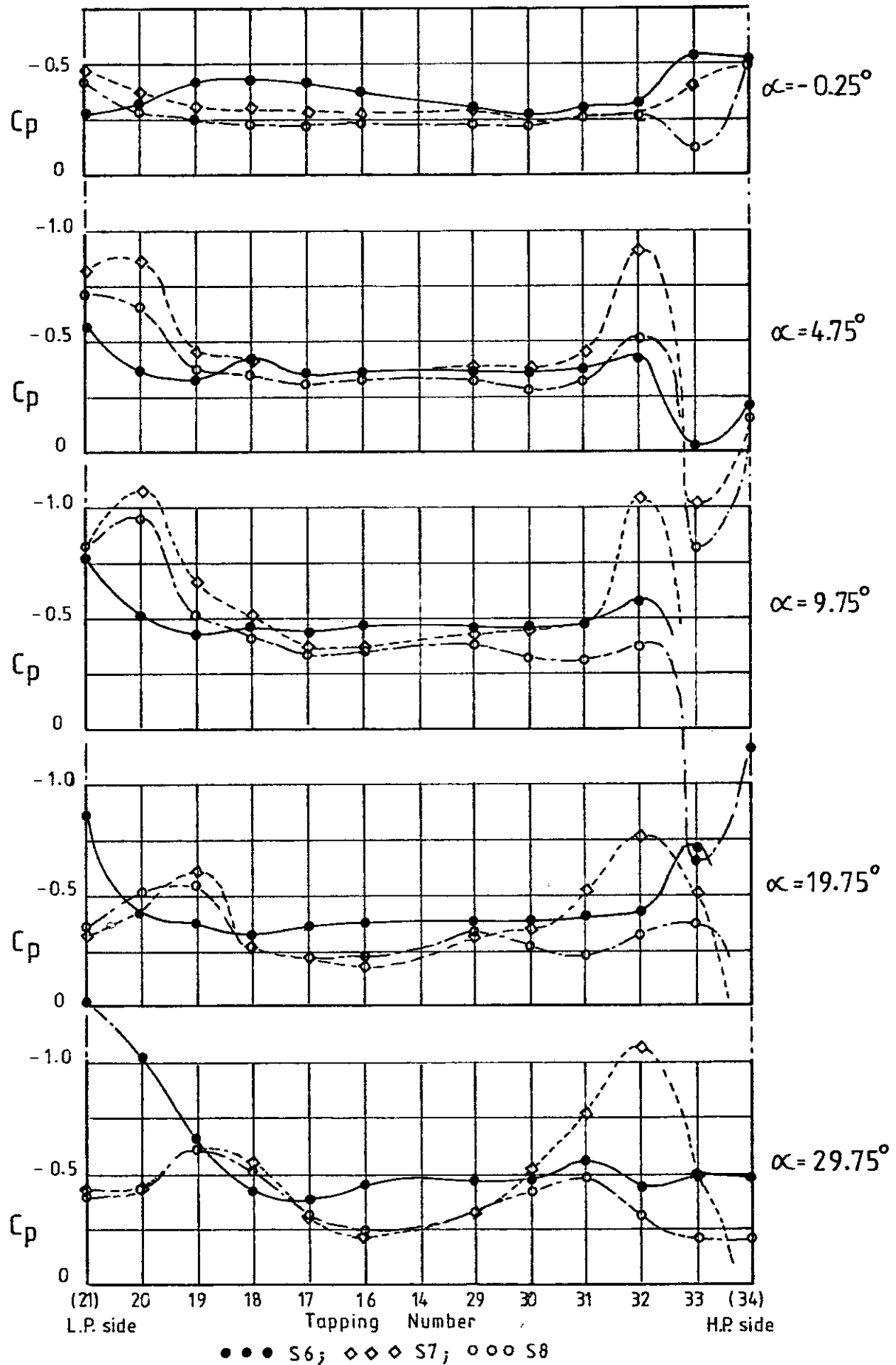


Fig. 14 GAP PRESSURES :  $\beta = -0.25^\circ$