SSSU 76
ISSN 0140 3818

# UNIVERSITY OF SOUTHAMPTON

## DEPARTMENT OF SHIP SCIENCE

## FACULTY OF ENGINEERING AND APPLIED SCIENCE

**WIND TUNNEL TESTS ON THE EFFECT OF A SHIP HULL ON RUDDER-PROPELLER PERFORMANCE AT DIFFERENT ANGLES OF DRIFT**

**by A.F. Molland and S.R. Turnock**

**Ship Science Report No. 76**
**May 1995**

# Wind Tunnel Tests on the effect of a ship hull on rudder-propeller performance at different angles of drift

by

A.F. Molland and S.R. Turnock

Ship Science Report No. 76

University of Southampton

May 1995

## SUMMARY

This report presents the experimental results from a series of wind tunnel tests. The tests investigated the influence of various upstream bodies on the performance of a representative ship rudder-propeller combination for different angles of drift. All the tests were carried in the 3.5m x 2.5m low-speed wind tunnel at the University of Southampton and are an extension to basic rudder-propeller tests which have already been carried out and are reported elsewhere. The model rudders tested were all-movable and the model propeller used was based on a Wageningen B4.40. Rudder forces and moments and propeller thrust, torque and revolutions were measured for all conditions tested. A standard series of flow conditions were used. These were free-stream flow (no propeller present) and tests at propeller open-water advance ratio of J of 0.94, 0.51 and 0.36. For these conditions, forces were measured at rudder angles between -40° and +40°. In addition, a select sample of tests were carried out for both larger rudder incidence and for tests in the second quadrant and at a low advance ratio J of 0.17.

Three types of test were carried out:

1) the rudder-propeller combination alone was tested at drift angles of -15°, -7.5°, +7.5°, and +15°;
2) at two angles of drift of -15° and +7.5°, three different lengths of centre-board were placed upstream of the rudder-propeller combination to simulate the effect of a thin upstream hull on performance;
3) at two angles of drift of -15° and -7.5° a representative ship hull form based on the stern of the Mariner class of vessels was mounted upstream of the rudder-propeller combination to assess the influence of hull thickness.

Pressures were measured at 200 locations distributed over the rudder surface for the rudder-propeller combination alone and the results are given as both chordwise pressure distribution for eight spanwise locations and as distributions of spanwise sectional load distributions.

The results give an essential insight into the behaviour of flow around the stern of a vessel providing rudder force data for use in more realistic manoeuvring simulations and detailed data for the validation of numerical models of the ship rudder-propeller-hull interaction problem.

# TABLE OF CONTENTS

## LIST OF FIGURES

## LIST OF TABLES



## NOMENCLATURE

The notation of angles and forces is further depicted in Fig. 15.

| | |
|---|---|
| A | Rudder area (S.c) |
| $AR_G$ | Geometric Aspect Ratio |
| c | Rudder chord |
| CPc | Centre of pressure chordwise, %c, measured from leading edge |
| CPs | Centre of pressure spanwise, %S, measured from root |
| $C_D$ | Drag coefficient ($d/0.5\rho AV^2$) |
| $C_{D_o}$ | Drag coefficient at zero rudder incidence ($d/0.5\rho AV^2$) |
| $C_D'$ | Drag coefficient - Bollard pull - ($d/0.5\rho AK_T n^2 D^2$) |
| $C_L$ | Lift coefficient ($L/0.5\rho AV^2$) |
| $C_L'$ | Lift coefficient - Bollard Pull - ($L/0.5\rho AK_T n^2 D^2$) |

| | |
|---|---|
| $C_N$ | Normal force coefficient ($N/0.5\rho AV^2 = C_L\cos\alpha + C_D\sin\alpha$) |
| $C_{Mz}$ | Torque coefficient (Moment about Z axis) |
| $C_{Mx}$ | Lift coefficient moment about X axis |
| $C_{My}$ | Drag coefficient moment about Y axis |
| $C_{Mn}$ | Normal coefficient moment about rudder transverse axis |
| $C_{Ma}$ | Axial coefficient moment about rudder longitudinal axis |
| d | Rudder drag force, in direction of free-stream airflow |
| $dC_L/d\alpha$ | Rudder lift-curve slope at zero rudder incidence |
| D | Propeller diameter |
| L | Rudder lift force, normal to rudder free-stream airflow |
| N | Normal force, normal to centre-line of rudder |
| n | Propeller revs per sec. |
| V | Wind speed (free-stream) |
| Q | Propeller torque |
| T | Propeller thrust |
| J | Propeller advance ratio ($V/nD$) |
| $K_D$ | Rudder Drag coefficient ($d/\rho n^2D^4$) |
| $K_L$ | Rudder Lift coefficient ($L/\rho n^2D^4$) |
| $K_T$ | Propeller thrust coefficient ($T/\rho n^2D^4$) |
| $K_Q$ | Propeller torque coefficient ($Q/\rho n^2D^5$) |
| Rn | Reynolds number ($Vc/\upsilon$) |
| S | Rudder span |
| t | Rudder section thickness |
| X | Distance between propeller plane and leading edge of rudder (Fig. 1) |
| $\alpha$ | Net movable rudder incidence relative to the free-stream inflow direction |
| $\alpha_o$ | Rudder incidence for zero sideforce |
| $\beta$ | Angle of yaw between ship axis and wind tunnel centre-line |
| $\gamma$ | Flow straightening ratio, $(\delta - \alpha_o)/\beta$ |
| $\delta$ | Set rudder incidence relative to the ship axis |
| $\rho$ | Mass density |
| $\upsilon$ | Kinematic viscosity |

# 1. INTRODUCTION

The aim of the investigation presented in this report has been to determine the flow straightening influence of the propeller and hull on the effective angle of drift at the stern, and how this alters the performance of the rudder and propeller. Whenever a vessel is moving with a velocity which is not aligned with it centre line of symmetry it is said to be operating at an angle of drift equal to the angular difference between its direction of motion and its centre-line. The yaw of the vessel is likely to alter the flow around the vessel and hence the distribution of forces. This in turn will change the manoeuvring characteristics of the vessel. In particular, at the stern of the vessel the angle of drift will alter flow onto and through the rudder and propeller which control both the propulsion of the vessel and its direction.

The influence of the hull on the rudder-propeller combination at drift was considered by separating the investigation into three separate stages. Firstly, tests were carried out on the rudder-propeller combination on its own at various angles of drift to investigate the straightening effect of the propeller. Secondly, a centre-board with only small thickness was placed upstream of the rudder-propeller combination to investigate the effect of a flat plate on the straightening of the flow into the rudder-propeller combination. Three different lengths of centre-board were used to determine the effect of vessel length. Thirdly, a representative hull stern form was used to simulate the influence of upstream thickness and curvature on the performance of the rudder-propeller combination.

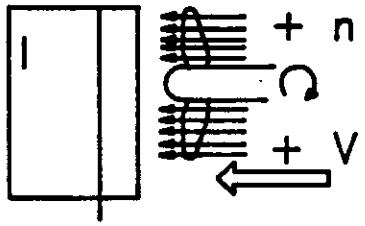
By isolating the possible geometrical influences on rudder-propeller performance it should be possible to understand the physical mechanisms and hence derive improved mathematical models for manoeuvring simulations and design more effective vessel stern arrangements.

This report presents results derived from a detailed wind tunnel investigation into the performance of a ship rudder working in the proximity of a propeller. Details of previous test results are reported in Refs. 1, 2, 3, and 4.

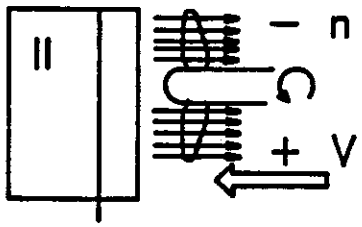
A presentation is made of the results obtained from three wind tunnel sessions of two weeks duration (30 working days in total). The first session took place in July 1992, the second in March 1993 and the final session was in June 1993. All the tests were carried out in the 3.5m x 2.5m low-speed wind tunnel at the University of Southampton. As part of the investigation into the effect of drift, hull surface pressure measurements and Laser Doppler Anemometry measurements were made. The results of these investigations are reported in Refs, 5 and 6. In addition an investigation was carried out into the effect of low-speed, zero-speed and four quadrant operation of the rudder-propeller combination and these results are reported in Ref. 7. For a limited number of cases, the sideforce on the propeller was also measured using specially design strain gauge dynamometers and the results obtained will be the subject of a separate report at a later date.

As the hull is unlikely to have a significant influence on the performance of the rudder-propeller combination when the vessel is moving astern, tests were mainly conducted for the first quadrant of operation with a few representative tests in the second quadrant. These are defined as (where V is ship velocity and n propeller rate of revolution):

Quadrant I: Ship ahead, propeller ahead ( + V, + n)




Quadrant II Ship ahead, propeller astern ( + V, - n)




## 2. DESCRIPTION OF MODELS

### 2.1 Rudders

Two rectangular rudders were used for these tests , designated Rudder No. 2 and Rudder No. 3 (using the same designations as in Refs. 1 - 4). These rudders have a chord of 667mm, a NACA0020 section, and spans of 1000mm and 1200mm respectively. A detailed description of the method of manufacture of the rudder models is given in Ref. 8. Table I presents the particulars of the rudders used in the current investigation and Fig. 1 their overall dimensions. The rudders had pressure tappings to give complete coverage of the rudder surface, as detailed in Fig. 1. The manufacturing technique for the pressure tappings is outlined in Ref. 2.

For the tests carried out, each rudder had a roughness strip attached with its leading edge 5.7% chord from the leading edge on both sides of the rudder. The roughness strips were manufactured from 12mm wide double-sided tape densely covered with 100 grade carborundum grit (0.15mm diameter).

## 2.2 Propeller

A representative propeller design based on the Wageningen B4.40 was used. The propeller has four blades, a diameter of 800mm and a blade area ratio of 0.40. Modifications made to the basic Wageningen design are detailed in Ref. 9 and consisted of altering the blade root shape to allow an adjustable pitch design with four separate blades and a split hub, removing rake and decreasing blade sweep to reduce centripetal loading moments at the root, and increasing the hub/diameter ratio from 0,167 to 0.25. Overall propeller details are summarised in Table II.

The split hub was manufactured from aluminium alloy and a positive clamping action allowed the four blades to be rotated to the desired pitch ratio setting. The four blades were manufactured using hybrid carbon/glass fibre laid up in the same split female mould to produce identical blades. The production of the composite blades is detailed in Ref. 10 and the machining of the split female mould in Ref. 11. In appearance the hub/blade root region is very similar to that of a typical controllable pitch propeller.

## 2.3 Centre-board

The centre-board was designed so that three different lengths could be tested. The three different configurations are shown in Fig. 2. To allow this flexibility five sections were manufactured.

The dimensions of the tail fairing and propeller fairing are shown in Fig. 3. These sections were designed to fit exactly around the propeller rig but without contacting it so that all the sideforce applied to the propeller would be measured through the sideforce dynamometers. The original aerofoil fairing around the drive belt was not used with the centre-board but the cylindrical fairing around the instrumentation framework was retained. Therefore, the sideforce dynamometers measure the sideforce on the propeller, hub and cylindrical fairing only. The stern profile was based on the stern profile of Mariner hull form (see next section) for reasons of compatibility with the hull model. The overall thickness of the centre-board was chosen to be 110mm as this was the minimum which gave adequate clearance around the propeller drive belt and support tubes. The thickness of all the centre-board sections was constant apart from at the trailing edge where a constant taper with an angle of 10° was used to reduce the thickness to a trailing edge thickness of 5mm. When installed the propeller and tail fairing were attached to the floor and a sheet of thin plywood was joined between them on either side to cover the propeller drive belt and support tubes. The height of the centre-boards was chosen at 1018mm as this gave a realistic clearance between the keel line and the propeller tip of 18mm which corresponds at a scale factor of 8.4 to a clearance of 150mm or 6".

Figure 4 shows the dimensions of the identical end and mid centre-board and that of the nose section. All three sections can be attached to each other and the propeller fairing thus allowing the three different lengths of model to be produced. The leading edge of the nose has a constant radius of 55mm and was formed from

standard plastic section.

All the centre-board section sides were manufactured from 20mm thick plywood sheet attached via 70mm thick wood blocks both to each other and to a 1200mm wide 25mm thick base plate, again of plywood. A rigid structure was obtained which allowed rapid assembly and change of configuration. The top of all the centreboard sections had square edges

All five sections were pressure tapped with the locations of the pressure tappings illustrated in Figs. 3 and 4 and tabulated in Table III. The pressure taps were manufactured from 1mm internal diameter tube and attached as shown in Fig. 5 with the end of the tube flush with the surface. PVC tubing with an average run length of 2m was used to join the tappings to a series of six rotary scanivalves.

### 2.4 Mariner stern form

It was decided to use the Mariner form (Ref . 13) as the representative ship stern. This allows the results to be used in conjunction with those from the rest of the MTD/MOSES managed research programme. A scale factor of 8.4 matches the existing rudder-propeller rig to that of the Mariner stern geometry. If the whole Mariner form was represented this would give a model length of 19m. Obviously this would not be practical and this is illustrated in Fig. 6 for the inverted hull form. The outline of the wind tunnel working section is shown for comparison. Vertically, the floor of the working section is aligned with the design waterline. Physically, of primary importance with regard to rudder-propeller-hull interaction, is the direction imparted to the flow by the stern and the velocity profile within the hull wake. A physically representative stern flow can be achieved through the use of an exact stern shape upstream of the propeller for a proportion of the ship length and correct thickening of the model wake through the use of boundary layer stimulation.

The stern and centre-board extend from the propeller plane to Section 17. A total model length of 2.69m from propeller plane to model leading edge will allow drift angles of up to ± 15° to be achieved without undue tunnel blockage effects. The final stern design uses the exact Mariner form to Section 18 and then fairs using elliptical sections to the front of the model. The shape of the resulting model waterlines is similar to that of an aerofoil and should not cause undue problems with flow separation for drift angles up to 15°. Calculations, based on the typical tunnel speed of 10m/s, showed that the thickness of the boundary layer on the Mariner stern model needed to be doubled to achieve approximate similitude with full-scale. This can be achieved through the use of surface mounted studs. Schematics of the rudder, propeller and stern model arrangement are shown in Figs. 7 and 8. It should be noted that the side elevation of the hull stern model is identical to that of the maximum length centre-board arrangement.

Table IV gives the table of offsets used in the construction of the stern form. It was decided to use the centre-board model as central spine to which the hull model

would be attached. For ease of handling of the model in the wind tunnel, each half of the stern form was further divided in two to give four units in total. To ensure fair curves, each half of the stern was manufactured and then sub-divided. A frame structure which was then strip planked with 25mm wide 6mm thick wood to produce the model. Figure 9 shows an isometric view of the frames, the model was sub-divided between frames 8 and 9. Fig. 10 shows an isometric view of the final hull surface; also shown are the propeller plane, cylindrical fairing and the centre-board spine. Both halves of the model are attached by studding which passes through the centre-board model and thus rigidly locks the model together.

The more complex curves at the leading and trailing edge where formed from modelling foam. Again, the hull model was kept clear of the propeller rig and a gap of approximately 10mm was left between the hull and the cylindrical fairing.

## 3. APPARATUS

### 3.1 General

All the tests were carried out in the 3.5m x 2.5m low-speed wind tunnel at the University of Southampton. The zero wind speed tests were conducted in a laboratory. The overall rig for testing the interaction of ship rudders and propellers is shown in Fig. 11. The rig consists of two independent units which allow free-stream (open water) tests to be carried out independently on rudders and propellers as well as the investigation of their interaction.

### 3.2 Rudder Rig/dynamometer

For these tests a new rudder stand was manufactured as shown in Fig. 12. This is of tubular steel construction and its design facilitated the rapid aligning and levelling of the rudder rig relative to the propeller rig. A welded steel extension attached to the rudder stand supports a five-component strain gauge dynamometer below the tunnel working section. A description of the design and calibration of the dynamometer is given in Ref. 11. The rudder is bolted directly to the dynamometer. The dynamometer is levelled and adjusted vertically so that there is only a small gap of approximately 2.5mm (0.004c) between the rudder root and the floor of the tunnel working section.

### 3.3 Propeller Rig

Full details of the propeller rig are given in Ref. 8. The rig is designed in such a way that the propeller can be adjusted vertically, longitudinally and at an angle of attack to the flow if required. The tests reported on were carried out with the propeller's axis of rotation 600mm above the wind tunnel floor. The propeller rotates anti-clockwise when viewed from aft (looking up-stream).

An in-line strain gauge dynamometer mounted in the propeller shaft close to the propeller measures the delivered thrust and torque. The design and static calibration of this dynamometer is detailed in Ref. 12. The two measurement components of the dynamometer are connected via a slip-ring assembly to Fylde Bridge balance units with a built in stabilised power supply. The bridge balance output voltage is measured directly (without amplification) using a Schlumberger Minate Digital Voltmeter.

A variable frequency inverter is used to control the 30kw electric drive motor and the propeller rpm can be continuously varied in small discrete steps between 0 and 3000 rpm. An optical shaft encoder was used to measure propeller revolutions and gives a voltage proportional to shaft rpm.

### 3.4 Data Acquisition system

The large number of individual data readings required the use of an automated system for data acquisition. Bridge output signals from the five-component rudder dynamometer, the rudder pressure transducers and the propeller thrust/torque dynamometer are measured using a digital voltmeter. The volmeter and input channels, together with the measurement of revolutions rate, are controlled by software running on an RM personal computer and the results stored on floppy discs for subsequent analysis. More details of the data acquisition system are provided in Refs. 1 and 2.

## 4 TESTS

### 4.1 General

Based on experience and for consistency with previous work a standard matrix of test conditions were used. Rudder force/moment and propeller thrust/torque/rpm data were acquired for rudder incidence in the range of -40° to +40° and generally at 5° increments. These measurements were made for a constant wind speed of 10m/s and propeller revolutions of 800rpm, 1460rpm, and 2100rpm. These correspond to propeller advance ratios J of 0.94, 0.51 and 0.36 which covers the typical range of operation of most vessels. For some cases low advance ratio tests were carried out. The procedure used was as described in Ref. 12 with the wind tunnel fan is switched off and the propeller run at 1460rpm. As the tunnel is closed this results in a small flow which lead to an advance ratio J of 0.17. As discussed in ref. 2, the combination of propeller characteristics and chosen rpm would generally avoid any propeller scaling problems. Some tests were conducted at higher wind speeds and increased propeller revolutions to confirm this assumption.

For all the tests the propeller pitch ratio setting was constant at a P/D of 0.95 and the rudder-propeller separation was fixed at X/D of 0.39. The rudder was mounted on the centreline of the propeller (Y/D=0.0) and with the maximum height of the propeller tip coincident with the rudder tip (1000mm).

### 4.2 Rudder-Propeller Alone

The rudder-propeller combination, using Rudder No. 2, was tested at four angles of drift of -15°. -7.5°, +7.5° and +15° for the standard set of flow conditions. Pressure measurements were made for rudder angles of -30°, -20°, -10°, 0°, +10°, +20°, +30° for a wind speed of 10m/s and propeller revolutions of 1460rpm and all four angles of drift.

Rudder No. 3 was tested at two angles of drift of -7.5° and -15° for the standard conditions

The experimental drift angle was set by rotating the rudder on the skeg dynamometer to the desired angle of drift. The propeller rig was then shifted so that its centre-line was aligned to that of the rudder.

The results for the test of Rudder No. 2 at zero drift angle are detailed in Ref. 12 and are used for comparison in this report.

### 4.3 Rudder-Propeller-Centreboard

For a drift angle of 0° and for the full length centre-board (all five sections) the standard tests were carried out. In addition, Quadrant II tests at a wind speed of +10m/s and negative propeller revolutions of -800rpm and -1200rpm were carried out.

For drift angles of -7.5° and +15° the standard tests were carried out for the short centre-board (three sections), the mid length centre-board (four sections) and the full length centre-board.

Drift angle was set as for the rudder-propeller alone tests by changing the rudder dynamometer skeg angle and moving the propeller rig and associated centre-board arrangement.

### 4.4 Rudder-Propeller-Mariner stern form

After installation of the hull in the wind tunnel at a drift angle of 0° studs were added at 5% of the full length of the hull (2.69m) which was 135mm from the leading edge. The studs were manufactured from 37mm diameter circular section and were 25mm long. They were attached using a single steel pin so that their cylindrical axis was normal to the model surface. The studs were evenly distributed around the model. The number was adjusted to give a representative boundary layer thickness at the propeller plane for a wind speed of 10m/s. This was achieved using an arrangement of pitot-static probes as shown in Fig. 13. It was found that 40 studs gave the desired wake distribution This arrangement was kept constant for the tests at different drift angles.

The hull arrangement was tested at zero drift angle for the standard test conditions,

in the free-stream at 10m/s only with the propeller blades removed, at the low advance ratio J of 0.17, and in the second quadrant with a wind speed of 10m/s and negative propeller revolutions of -800rpm and -1279rpm.

The hull arrangement was tested for the standard conditions for two drift angles of -7.5° and -15°.

The drift angle of the hull at -7.5° was set in the same manner as described previously. However, for a drift angle of -15° the rudder stand had to be shifted sideways prior to setting the skeg angle to -15°. This was required so that the hull model was centrally located in the tunnel. Views of both the full centre-board and hull form located in the tunnel are given in Fig. 14.

## 5. DATA REDUCTIONS AND CORRECTIONS

A computer program, described in Ref. 1, was used to provide the data in coefficient form. The program incorporates the rudder dynamometer five-component interaction matrix and correction formulae and the resolution of forces and moments from instrument axes to stream axes as necessary. A cross-plot of raw rudder data yielded the angular misalignment of the rudder rig to be less than 0.1° for the tests without the hull and therefore no corrections were made but for the tests with the hull the angular misalignment was found to be 0.7° and this correction was applied to all measured angles before insertion in the program.

The acquisition of rudder surface pressures, together with reference static and dynamic pressures from the tunnel, allowed direct calculation of the local static pressure coefficient Cp. Chordwise integration of Cp is carried out to give the normal force coefficient $C_n$ for each span position.

The analysis program incorporates the propeller dynamometer calibrations hence allowing direct calculation of the propeller coefficients.

Tunnel boundary conditions were investigated for the rudder-propeller combination alone but found to be unnecessary, as effects such as tunnel blockage for the 3.5m x 2.5m working section were found to have a negligible effect for the rudder size and propeller diameter tested. However, it is expected that there will some influence for both the centre-board and hull although it is expected to be small. It is hoped that a theoretical study at a later date might quantify the effect.

## 6. PRESENTATION OF DATA

The notation of drift angle, rudder incidence and coefficients used in the presentation is given in Fig. 15, noting that the propeller rotates in an anti-clockwise direction when viewed from aft.

It should be noted that the rudder forces are measured relative to the body (or ship) axis not the wind tunnel centre-line for non-zero angles of drift.

The propeller advance ratio is defined as:

$$J = \frac{V}{n\,D}$$

where n is the rate of propeller revolution, and D the propeller diameter. The propeller thrust and torque coefficients $K_T$, $K_Q$, and efficiency $\eta$ are defined as follows:

$$K_T = \frac{T}{\rho\, n^2\, D^4} \qquad K_Q = \frac{Q}{\rho\, n^2\, D^5} \qquad \eta = \frac{J}{2\,\pi}\,\frac{K_T}{K_Q}$$

For the free-stream tests and the advance ratios J of 0.94, 0.51 and 0.36 the rudder force coefficientsgiven in Fig. 15onalised with respect to the free-stream velocity V. That is, the rudder sideforce $C_L$, drag $C_D$, torque $C_{Mz}$, and rudder root bending moments $C_{Mx}$, $C_{My}$ are defined as follows:

$$C_L = \frac{L}{\frac{1}{2}\,\rho\, A\, V^2} \qquad C_D = \frac{d}{\frac{1}{2}\,\rho\, A\, V^2}$$

$$C_{Mz} = \frac{Mz}{\frac{1}{2}\,\rho\, A\, c\, V^2} \qquad C_{Mx} = \frac{Mx}{\frac{1}{2}\,\rho\, A\, s\, V^2} \qquad C_{My} = \frac{My}{\frac{1}{2}\,\rho\, A\, s\, V^2}$$

For the nominal bollard pull case where the advance ratio J=0.17, the coefficients are non-dimensionalised using $K_T n^2 D^2$ which is based on the theoretical velocity at J=0. These non-dimensional coefficients are designated by $C_L'$, $C_D'$ etc. and are defined as follows:

$$C'_L = \frac{L}{\frac{1}{2}\,\rho\, A\, K_T\, n^2\, D^2} \qquad C'_D = \frac{d}{\frac{1}{2}\,\rho\, A\, K_T\, n^2\, D^2}$$

$$C'_{Mz} = \frac{Mz}{\frac{1}{2}\,\rho\, A\, c\, K_T\, n^2\, D^2} \qquad C'_{Mx} = \frac{Mx}{\frac{1}{2}\,\rho\, A\, s\, K_T\, n^2\, D^2} \qquad C'_{My} = \frac{My}{\frac{1}{2}\,\rho\, A\, s\, K_T}.$$

The centre of action of the total rudder force is defined in terms of a spanwise and chordwise centre of pressure, CPs and CPc respectively. These are specified in terms of rudder forces and moments as:

$$CPS = \left( \frac{C_{Mn}}{C_N} - \frac{W}{S} \right) \times 100$$

$$CPC = \left( \frac{C_{Mz}}{C_N} + \frac{V}{C} \right) \times 100$$

In comparing the propulsive effect of the two rudders, two effective propeller thrust coefficients are defined. The net thrust of the propeller and rudder combination $K_{T(R+P)}$ is defined as:

$$K_{T(R+P)} = K_T - K_D$$

and the net thrust excluding the free-stream drag of the rudder $K_{T(st)}$ defined as:

$$K_{T(st)} = K_T - (K_D - K_{Do})$$

where $K_D$ is the drag of the rudder and $K_{Do}$ the free-stream drag of the rudder. $K_D$ is defined as:

$$K_D = \frac{d}{\rho\, n^2\, D^4} = \frac{1}{2}\,\frac{A}{D^2}\, J^2\, C_D$$

Useful measures of the performance of rudders are its lift-curve slope at zero incidence $dC_L/d\alpha$ and the corresponding drag at zero incidence $C_{Do}$. These values are obtained directly from the rudder performance data. The influence of upstream body on the effective angle of drift seen by the rudder is defined as a flow straightening factor $\gamma$:

$$\gamma = \frac{(\delta - \alpha_o)}{\beta}$$

where $\beta$ is the yaw (or drift) angle and $\alpha_o$ the angle of rudder incidence for zero sideforce.

The results of the tests are presented graphically and tabulated. Appendices A and B list, respectively, the rudder and propeller force data. The distribution of local sectional force data obtained by pressure integration from the tests on the rudder-propeller combination alone are given in Appendix C. Appendix D gives all the corresponding rudder surface pressure in coefficient form.

The main types of graphical presentation used in this report are:

1) Rudder performance:

Rudder sideforce, drag, CPc and CPs are plotted against rudder incidence.

2) Propeller performance

Propeller thrust and thrust augment (the difference between actual and open-water propeller thrust) are plotted against rudder incidence.

3) Sectional rudder performance

Integration of rudder surface pressure measurement allows the spanwise variation in rudder sideforce to be obtained. The sectional force coefficient Cn is presented to a base of rudder span for different rudder incidence.

4) Chordwise pressure distributions

The surface pressure coefficients are presented in terms of chordwise pressure distributions with the solid line representing the positive y side of the rudder and the dotted line the negative y side of the rudder.

Additional forms of presentation are described within the discussion.

## 7. DISCUSSION OF RESULTS

### 7.1 Effect of Drift on Rudder-propeller Combination

#### 7.1.1 Performance of Rudder No. 2

Figures 16, showw the effect of advance ratio on the performance of Rudder No. 2 for the four angles of drift tested of -15°, -7.5°, +7.5° and +15° respectively.

The overall shape of the rudder sideforce characteristic remains constant. Although the rudder incidence for zero sideforce is offset from zero. The amount and sign of the offset is dependent on the magnitude and direction of the drift angle. The magnitude of the zero sideforce incidence is always less than the applied drift angle. At higher propeller thrust loadings (lower J) the magnitude of the zero sideforce angle is increased.

The drag characteristic is affected by the angle of drift. The rudder angle for minimum drag moves away from zero incidence by a greater amount for the larger drift angles and for higher advance ratios. It is interesting to note that minumum drag is no longer coincident with zero sideforce and that the movement in rudder angle is in the opposite sense to that for zero sideforce.

In Figures 20, 21 and 22 the performance of the rudder is compared for constant advance ratios and different drift angles. Generally it can be seen that for constant applied rudder angle there can be large changes for different drift angles for sideforce, drag, centre of pressure chordwise and spanwise. These changes are as a result of the shift in effective inflow into the rudder-propeller combination. This gives rise to a shift in the sideforce characteristic with implications on the induced drag and position of the centre of pressure.

#### 7.1.2 Performance of Rudder No. 3

The effect of advance ratio on the performance of Rudder No.3 is shown in Figs. 23 and 24 for drift angles of +7.5° and +15° respectively. The behaviour of the increased span of Rudder No.3 is very similat to that for Rudder No. 2.

#### 7.1.3 Effect on Propeller Performance

The influence of the rudder on propeller thrust performance for different angles of drift is plotted in Figs. 25, 26 and 27 for advance ratios of 0.94, 0.51 and 0.36 respectively. Drift angle has a marked change on propeller thrust. At all advance ratios a positive drift angle has the minimum propeller thrust and a negative drift angle the maximum propeller thrust. At a drift angle of between -7.5° and -15° the propeller thrust is the same as for the zero drift case.

### 7.1.4 Lift-curve slope

Figure 28 compares the effect of drift angle on the lift-curve slope of Rudder No.'s 2 and 3 for advance ratio J of 0.94, 0.51 and 0.36. It can be seen that for low thrust loading (high J) the lift curve slope increases when the rig is yawed whereas at high thrust loading the lift-curve slope reduces with increasing drift angle.

### 7.1.5 Rudder Angle for Zero sideforce

The effect on the rudder angle for net zero sideforce of drift angle is given in Figure 29 for both rudders tested by plotting to a base of drift angle the flow straightening factor $\gamma$. The effect of propeller thrust loading is to increase the flow straightening factor for a given drift angle. This follows from the greater energy of the propeller race effectively forcing the race to flow along the ship's axis. The behaviour with positive and negative drift angle is similar although at higher drift angles a positive drift angle has a reduced flow straightening effect. It is also noted that the flow straightening factors for Rudder No. 3 are greater than those for Rudder No. 2 this reflects the greater coverage, or percentage of rudder span in way of the propeller race , for Rudder No. 2.

### 7.1.6 Net propulsive force

Rudder drag at zero incidence is shown in Figure 30. This compares the effect of advance ratio to a base of drift angle. It is interesting to note that the drag of Rudder No. 2 increases for the higher thrust loadings (J=0.51 and 0.36) for drift angles of -7.5° and +7.5° and then decreases again. This effect is not observed for Rudder No. 3.

Figure 31 plots the net efficiency of the rudder propeller combination to a base of drift angle. The values for Rudder No.'s 2 and 3 lie close together. For the highest thrust loading (J=0.36) the net efficiency shows a slight decrease for both negative and positive drift angle. At an advance ratio of 0.51 the net efficiency increases for negative drift angles and decreases for positive drift angles. Values are not shown for a J of 0.94 only small propeller thrust occurs.

### 7.1.7 Spanwise distribution of sideforce

Figures 32, 33, 34 and 35 show for an advance ratio J of 0.51 the spanwise distribution of sideforce across Rudder No. 2 for drift angles of -15°, -7.5°, +7.5° and +15° respectively. The assymetry of force distibution due to the span-wise variation in effective inflow angle is clearly seen.

### 7.1.8 Chordwise pressure distribution

The chordwise distribution of surface pressure for eight spanwise locations and rudder incidence of -30°, -20°, -10°, 0°, +10°, +20°, +30° at J of 0.51 are shown in Figures 36, 37, 38 and 39.

### 7.1.9 Summary

The magnitude of the effect of an imposed drift angle is dependent on the advance ratio J. The lower the value of J, the higher the propeller thrust loading, the greater the flow straightening due to the propeller. The effect of drift is to shift but not change greatly the shape of the rudder's sideforce, drag, and centre of pressure characteristics.

## 7.2 Effect of drift on rudder-propeller combination of centre-board

### 7.2.1 Rudder performance

The influence of the full centre-board combination at zero drift on the performance of Rudder No. 2 for Quadrants I and II is shown in Figure 40. The overall characteristic of the rudder is similar to that for the rudder-propeller combination alone; increasing propeller thrust loading increasing rudder sideforce, moving the chordwise position of the centre of pressure forward, and increasing drag for a given rudder incidence. Likewise, the performance in Quadrant II where the greater the negative rate of revolution of the propeller the greater the braking effect on the flow over the rudder until a positive sideforce is developed for a negative incidence and vice-versa.

Figures 41, 42, and 43 show the effect of the short, mid and full centre-board on the performance of Rudder No. 2 at a drift angle of +15°. Likewise, Figs. 44, 45, and 46 show the effect of advance ratio on the performance of Rudder No. 2 at a drift angle of -7.5°. Each of these six graphs demonstrates, as found for the rudder-propeller alone case at drift, that the overall shape of the rudder force characteristics are not changed but simply shifted laterally by an amount dependent on the sign and magnitude of the drift angle and the propeller thrust loading and flow straightening effect of the upstream centre-board..

Figures 47, 48 and 49 compare the performance at drift angles of -7.5°, +15° with the rudder performance at zero drift angle for the full centre-board at advance ratios of 0.94, 0.51 and 0.36 respectively. again the influence of drift angle is seen to be similar to that for the case of the rudder-propeller alone.

The variation in performance with different lengths of centre-board for a given advance ratio are shown in Figs. 50, 51 and 52 for a drift angle of -7.5°. At low and medium thrust loadings (J=0.94 and J=0.51) there is very little variation in performance for the three lengths of centre-board. However, at the highest thrust loading there is a slight lateral shift in the sideforce curve. The greater the length of the board the smaller the rudder incidence for zero sideforce.

### 7.2.2 Propeller performance

Figures 53, 54 and 55 show the influence of centre-board length on propeller performance for a drift angle of -7.5° and in Figs. 56, 57, and 58 for a drift angle of +15°. It can be seen that at -7.5° that the length of upstream board has little effect on the propeller thrust and hence propeller thrust augment. However, for +15° the thrust augment increases with increasing board length for advance ratios of J of 0.51 and 0.36 and decreases for a J of 0.94.

The effect of drift angle on propeller performance is compared in Figs. 59, 60 and 61 for advance ratios of 0.94, 0.51 and 0.36 respectively. In these plots it can be seen that positive drift angle decreases propeller thrust and negative drift increase propeller thrust when compared to the thrust at zero drift angle and that there are only small variations for changes in applied rudder incidence..

### 7.2.3 Lift-curve slope

The variation in rudder lift-curve slope with drift angle is shown in Fig. 62 for the full centre-board combination. The lift-curve slope is found to increase for positive drift angle and decrease for negative drift angle apart from the J=0.94 case where there is a slight rise for negative drift angle.

### 7.2.4 Rudder angle for zero sideforce

The effect of advance ratio on flow straightening for the full centre-board is shown in Figure 63. There is a distinct assymetry with J=0.94 and J=0.36 reversing their relative positions for -7.5° and +15°.

### 7.2.5 Net propulsive force

Rudder drag at zero incidence is plotted in Fig. 64 for the full centre-board to a base of drift angle for the three advance ratio tested. The zero drag varies with drift angle. For high thrust loadings it increases for a drift angle of -7.5° and decrease for a drift angle of +15° as was found for the rudder-propeller alone case.

### 7.2.6 Summary

Figurs 65 and 66 compare the effect of different centre-board length on the lift-curve slope, flow straightening and rudder drag at zero incidence to a base of advance ratio for drift angles of -7.5° and +15°. In both lift-curve slope graphs there is virtually no change in slope for all three advance ratio tested. However, the flow straightening factor $\gamma$ is stongly influenced with the maximum occuring for the longest length of centre-board. The influence on drag at zero incidence is interesting with only the J=0.36 having much effect at -7.5° whereas +15° it is at J=0.51 and J=0.94 where the increase in centre-board length causes a decrease in rudder drag.

## 7.3 Effect of drift on rudder-propeller combination with Mariner stern form

### 7.3.1 Rudder Performance

#### 7.3.1.1 Free-stream

Figure 67 compares the free-stream performance of Rudder No. 2 at a free-stream speed of 10m/s with and without the Mariner hull form at zero drift angle. The influence of the hull's wake is to reduce the average wind speed over the rudder and this is reflected in the reduction in lift-curve slope of the rudder behind the hull. The increased turbulence in the wake is probably the cause of the increase in rudder stall angle observed. The lift-curve slope behind the hull is 72% of that in the free-stream implying a Taylor wake fraction $W_T$ of 0.15. The rudder drag at zero incidence is increased when behind the hull. The effect of the hull is to move the spanwise centre of pressure towards the rudder tip and the position of the chordswise centre of pressure aft.

#### 7.3.1.2 Low speed

The performance of Rudder No. 2 at low speed (J=0.17) is shown in Fig. 68 with and without the Mariner stern form. In this case there is very little difference in performance although there appears to be a small angular offset of approximately 2°. Although, with the hull present the rudder develops a thust at low incidence.

#### 7.3.1.3 Zero drift angle

The effect of advance ratio on Rudder No. 2 for Quadrants I and II is shown in Figure 69 with the Mariner stern form at zero drift angle. As in the case of the rudder-propeller-centre-board combination the overall shape of the rudder force characteristics remains essentially the same. In Quadrant II the influence of negative propeller revolutions is not as straightforward as for the rudder-propeller alone or rudder-propeller-centreboard combination.

#### 7.3.1.4 Drift angle of -7.5°

Figure 70 show the effect of advance ratio on rudder performance downstream of the Mariner stern form at a drift angle of -7.5°. Again, the primary influence of drift angle is a shift in the sideforce and centre of pressure characteristics. The minimum drag for all advance ratio does not correspond to the rudder incidence for zero sideforce.

#### 7.3.1.5 Drift angle of -15°

Figure 71 show the effect of advance ratio on rudder performance downstream of the Mariner stern form at a drift angle of -15°. The results are the same as those for a drift angle of -7.5° except that there is a larger angular offset.

#### 7.3.1.6 General

The effect of drift angle on rudder performance behind the hull for advance ratios of 0.94, 0.51 and 0.36 is shown in Figs. 72, 73 and 74 respectively. The comparison indicates that at low thrust loading (J=0.94) there is little difference in the position of centre of pressure and drag but the rudder sideforce is offset by an amount dependent on the hull drift angle. These effects are repeated for the medium and high thrust loadings , J=0.51 and J=0.36.

### 7.3.2 Propeller performance

Propeller performance for different drift angles is given in Figs 75, 76 and 77 for advance ratio J of 0.94, 0.51 and 0.36 respectively. The influence of the hull on propeller thrust is pronounced especially at J=0.94. The effect of the hull wake is to slow the flow though the propeller and hence reduce the effective advance ratio seen by the propeller. This gives rise to the increase in propeller thrust. This effect is larger for the hull at zero incidence and reduces slightly when the hull is at a drift angle. At medium and high thrust loadings the increase in propeller thrust is less pronounced, (propeller thrust characteristic shallower at these advance ratio) and there is little difference between zero and the two drift angles tested.

### 7.3.3 Lift-curve slope

Figure 78 compares the rudder lift-curve slope for the different drift angles tested. It shows that at low thrust loading drift angle has no influence on the lift-curve slope, at service thrust loading (J=0.51) there is a maximum thrust loading at a drift angle of -7.5°, and at high thrust loading (J=0.36) the lift-curve slope increase with the magnitude of drift angle.

### 7.3.4 Rudder angle for zero sideforce

Flow straightening influence of the hull is shown in Fig. 79. The effect of hull drift angle is marked. Most of the change in flow straightening occurs between 0 and -7.5°. The effect of different advance ratios is not as pronounced as for the rudder-propeller alone case with the curve for high thrust loading (J=0.36) crossing over the other two at a drift angle of -7.5°.

### 7.3.5 Net propulsive force

The influence of the stern form on drag at zero incidence is plotted in Fig. 80. Drift angle reduces the rudder drag for all advance ratio and the magnitude of the reduction increases with the magnitude of the drift angle. The effect is most pronounced for a high thrust loading where at -15° a drag $C_D$ (net thrust) of -0.086 is generated compared to a drag of 0.022 at zero hull drift angle.

### 7.3.6 Summary

Figure 81 compares the lift-curve slope and zero incidence drag for different advance ratio for Rudder No. 2 with and without the stern form. The presence of the hull strongly influences the performance of the rudder. The hull reduces the lift-curve slope by 15% at J = 0.94 to 23% at J = 0.36. This is consistent with the free-stream results at zero drift. Similarily rudder drag with the hull present is reduced so that for the highest thrust loading (J=0.36) a net-thrust is generated.

Figures 82 compares, to a base of advance ratio, the effect of hull drift angle on the lift-curve slope, flow straightening and rudder drag. It can be seen that drift angle causes only small changes in lift-curve slope with the maximum variation occuring at J=0.51 and being of the order of 10%. The effect of drift angle on flow-straightening is not clear cut although advance ratio appears to have little influence. At all but the highest thrust loading (J=0.36) the highest drift angle gives rise to the highest flow straightening factor. On the otherhand the rudder drag is stongly influenced both by advance ratio and hull drift angle with there being a pronounced reduction occuring as drift angle increases.

## 7.4 Comparison of performance at drift angle of -7.5°

Figure 83 compares the performance of Rudder No. 2 for the rudder-propeller combination alone, the full centre-board, and the Mariner stern form at a drift angle of -7.5° at a J of 0.94. Likewise, Figs. 84 and 85 compare rudder performance at advance ratio of 0.51 and 0.36. The most pronounced effect of the various upstream bodies is on the rudder sideforce characteristic. For all advance ratios tested there are only small changes in the spanwise and chordwise position of centre of pressure and in the rudder drag. Whereas, there is a reduction in lift-curve slope when there is an upstream body (centre-board or hull). In addition, the shift in rudder incidence for with the different uptream bodies can also be clearly seen.

Figure 86 compares the lift-curve slope, flow straightening, rudder drag for zero incidence for the influence of the differnt upstream bodies at a drift angle of -7.5°. It is interesting to note that the centre-board has a more pronounced effect on lift-curve slope than the fuller hull form for all advance ratio. It is likely that it is the change in the operating condition of the propeller that controls the thrust loading and hence the rudder sideforce. Again, it appears that the centre-board has the strongest influence on flow straightening. This is likely to be due to the thin centre-board more strongly altering the overall flow and hence the effective incidence seen by both the propeller and the rudder. The presence of the upstream body has less influence on rudder drag except at high thrust loading (J=0.36) with the hull giving the greatest reduction in drag.

## 8. CONCLUSION AND RECOMMENDATIONS

8.1 A detailed set of experimental data, especially with regard to rudder and propeller forces has been obtained. The results demonstrate the importance of the effective angle of drift and hence the flow straightening influence of the upstream hull form on the performance of the rudder-propeller combination.

8.2 The greatest flow straightening occurred due to the presence of the longest upstream centre-board. However, the difference obtained when the centre-board was lengthened from 1.49 m to 2.69 m was far smaller than that obtained with and without a centre-board at all.

8.3 The curved Mariner hull form had a smaller flow straightening effect than the straight centre-board and this demonstrated the importance of the overall flow direction in the stern region. Open stern forms, such as in twin screw vessels where the propeller shaft is supported by a P or A bracket, are likely to have similar characteristics at drift to those obtained with the rudder-propeller combination alone. The results obtained with the centre-board are likely to have application to vessels with a thin sharply delineated skeg.

8.4 A key parameter in determining the manoeuvring effectiveness of a rudder is its lift-curve slope. The results provide information which will allow straightforward manoeuvring rudder force prediction methods to be developed which will include the effect of drift angle and the upstream hull geometry.

## 9. ACKNOWLEDGEMENTS

The work described in this report covers part of the MOSES (Manoeuvring Of Ships and Estimation Schemes) research project funded by the SERC through the Marine Technology Directorate Ltd under SERC Research Grant Ref. No. GR/H28189, MTD Ref. No. SHP 118.

## REFERENCES


1. Molland, A.F. and Turnock, S.R. *Wind Tunnel Investigation of the influence of Propeller Loading on Ship Rudder Performance,* University of Southampton, Ship Science Report No. 46, 1991.

2. Molland, A.F. and Turnock, S.R. *Further wind tunnel tests on the influence of propeller loading on ship rudder performance,* University of Southampton, Ship Science Report No. 52, 1992.

3. Molland, A.F. and Turnock, S.R. *Wind Tunnel Investigation of the influence of Propeller Loading on Ship Rudder Performance,* RINA Transactions 1992.

4. Molland, A.F. and Turnock, S.R. *The prediction of ship rudder performance characteristics in the presence of a propeller,* Proc. of Conf. Manoeuvring and Control of Marine Craft, MCMC92, University of Southampton, 1992.

5. Molland, A.F. and Turnock, S.R. *Pressure measurements on a hull form upstream of a model ship rudder-propeller combination,* University of Southampton, Ship Science Report No. 77, 1994.

6. Molland, A.F. and Turnock, S.R. *LDA measurements in a wind tunnel of flow around a propeller, rudder-propeller combination and rudder-propeller-hull form,* University of Southampton, Ship Science Report No. 78, 1994.

7. Molland, A.F. and Turnock, S.R., *Wind tunnel tests on the influence of propeller loading on ship rudder performance: four quadrant operation, low and zero speed operation.* Ship Science Report No. 64, University of Southampton, 1993.

8 Molland, A.F. and Turnock, S.R., *A test rig for the investigation of Propeller/Rudder Interactions.* Ship Science Report No. 45, University of Southampton, 1990.

9 Turnock, S.R., *Computer Aided Design and Numerically Controlled Manufacture of a Split Mould for a Composite Model Ship Propeller.* Ship Science Report No. 42, University of Southampton, 1990.

10 Molland, A.F. and Turnock, S.R., *The design and construction of propeller blades in composite materials for a wind tunnel model* Ship Science Report No. 41, University of Southampton, 1990.

11 Molland, A.F., *The design, construction and calibration of a five-component strain gauge wind tunnel dynamometer.* Ship Science Report No. 1/77, University of Southampton, 1976.

12. Molland, A.F. and Turnock, S.R., *The design, construction and calibration of a thrust and torque dynamometer for a wind tunnel propeller model,* Ship Science Report No. 40, University of Southampton, 1990.

13. Russo, V.L. and Sullivan, E.K., *Design of the Mariner-Type* ship, SNAME Transactions, Vol. 61, 1953.

# Appendix A Rudder Dynamometer Data

RUDDER DYNAMOMETER
epop2j114.rud Rudder and Propeller Alone: RNo.2 J=0.94 Drift Angle =+15deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.40 | 10.00 | 800.00 | -1.0000 | -1.187 | 0.656 | -0.039 | -0.6470 | 0.3130 | 33.303 | 41.132 |
| -35.40 | 10.00 | 800.00 | -1.2710 | -1.384 | 0.600 | 0.039 | -0.8280 | 0.3110 | 27.169 | 44.307 |
| -30.40 | 10.00 | 800.00 | -1.0760 | -1.142 | 0.424 | 0.063 | -0.6780 | 0.2130 | 24.483 | 43.157 |
| -25.40 | 10.00 | 800.00 | -0.8250 | -0.873 | 0.298 | 0.052 | -0.5030 | 0.1440 | 24.017 | 41.598 |
| -20.40 | 10.00 | 800.00 | -0.5410 | -0.572 | 0.185 | 0.033 | -0.3140 | 0.0830 | 24.265 | 39.027 |
| -15.40 | 10.00 | 800.00 | -0.2330 | -0.251 | 0.097 | 0.012 | -0.1230 | 0.0340 | 25.205 | 33.525 |
| -10.40 | 10.00 | 800.00 | 0.0730 | 0.067 | 0.027 | -0.010 | 0.0780 | -0.0030 | 15.079 | 98.132 |
| -5.40 | 10.00 | 800.00 | 0.4040 | 0.404 | -0.023 | -0.025 | 0.2940 | -0.0300 | 23.911 | 55.582 |
| -0.40 | 10.00 | 800.00 | 0.7580 | 0.758 | -0.048 | -0.032 | 0.5290 | -0.0460 | 25.819 | 52.344 |
| 4.60 | 10.00 | 800.00 | 1.1270 | 1.121 | -0.035 | -0.031 | 0.7830 | -0.0480 | 27.211 | 51.809 |
| 9.60 | 10.00 | 800.00 | 1.4940 | 1.476 | 0.016 | -0.020 | 1.0430 | -0.0220 | 28.629 | 51.929 |
| 14.60 | 10.00 | 800.00 | 1.7680 | 1.740 | 0.114 | 0.002 | 1.2490 | 0.0310 | 30.074 | 52.392 |
| 19.60 | 10.00 | 800.00 | 1.8510 | 1.833 | 0.265 | 0.045 | 1.3360 | 0.1150 | 32.448 | 53.237 |
| 24.60 | 10.00 | 800.00 | 1.5750 | 1.668 | 0.567 | 0.110 | 1.0580 | 0.3280 | 36.572 | 48.363 |
| 29.60 | 10.00 | 800.00 | 1.5050 | 1.658 | 0.707 | 0.134 | 0.9420 | 0.4060 | 38.063 | 44.010 |
| 34.60 | 10.00 | 800.00 | 1.4160 | 1.652 | 0.856 | 0.167 | 0.9280 | 0.4770 | 40.096 | 45.116 |

RUDDER DYNAMOMETER
epop2j2.rud Rudder and Propeller Alone: RNo.2 J=0.51 Drift Angle =+15deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.40 | 10.00 | 1460.00 | -2.7930 | -2.994 | 1.338 | 0.119 | -1.7940 | 0.7790 | 26.013 | 45.001 |
| -35.40 | 10.00 | 1460.00 | -2.4860 | -2.650 | 1.076 | 0.132 | -1.5720 | 0.6170 | 25.006 | 44.335 |
| -30.40 | 10.00 | 1461.79 | -1.9490 | -2.045 | 0.719 | 0.138 | -1.1997 | 0.4090 | 23.264 | 43.232 |
| -25.40 | 10.00 | 1460.00 | -1.4510 | -1.519 | 0.486 | 0.129 | -0.8630 | 0.2650 | 21.503 | 41.276 |
| -20.40 | 10.00 | 1461.79 | -0.9397 | -0.982 | 0.290 | 0.107 | -0.5257 | 0.1543 | 19.055 | 38.155 |
| -15.40 | 10.00 | 1460.00 | -0.4350 | -0.460 | 0.156 | 0.077 | -0.2100 | 0.0720 | 13.355 | 30.633 |
| -10.40 | 10.00 | 1461.79 | 0.0593 | 0.049 | 0.055 | 0.055 | 0.1277 | 0.0127 | 146.327 | 241.766 |
| -5.40 | 10.00 | 1460.00 | 0.5900 | 0.588 | 0.000 | 0.027 | 0.4790 | -0.0230 | 34.595 | 64.052 |
| -0.40 | 10.00 | 1461.78 | 1.0910 | 1.091 | -0.001 | 0.015 | 0.8273 | -0.0267 | 31.328 | 58.325 |
| 4.60 | 10.00 | 1460.00 | 1.6060 | 1.604 | 0.050 | 0.000 | 1.1910 | -0.0010 | 29.961 | 56.496 |
| 9.60 | 10.00 | 1461.79 | 2.1147 | 2.110 | 0.151 | -0.004 | 1.5637 | 0.0667 | 29.811 | 56.083 |
| 14.60 | 10.00 | 1460.00 | 2.5850 | 2.583 | 0.323 | 0.005 | 1.8960 | 0.1720 | 30.165 | 55.207 |
| 19.60 | 10.00 | 1461.79 | 2.9773 | 2.988 | 0.544 | 0.027 | 2.1970 | 0.3313 | 30.893 | 55.506 |
| 24.60 | 10.00 | 1460.00 | 3.2160 | 3.275 | 0.843 | 0.065 | 2.3230 | 0.5080 | 31.974 | 53.460 |
| 29.60 | 10.00 | 1461.79 | 3.1933 | 3.412 | 1.288 | 0.158 | 2.2223 | 0.8173 | 34.648 | 50.803 |
| 34.60 | 10.00 | 1460.00 | 2.6590 | 3.071 | 1.553 | 0.203 | 1.7730 | 0.9810 | 36.581 | 48.155 |

RUDDER DYNAMOMETER
epop2j314.rud Rudder and Propeller Alone: RNo.2 J=0.36 Drift Angle =+15deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.40 | 10.00 | 2100.00 | -4.2890 | -4.607 | 2.069 | 0.263 | -2.7450 | 1.2260 | 24.279 | 45.132 |
| -35.40 | 10.00 | 2100.00 | -3.7700 | -4.018 | 1.631 | 0.281 | -2.3710 | 0.9650 | 22.996 | 44.529 |
| -30.40 | 10.00 | 2100.00 | -2.9490 | -3.081 | 1.063 | 0.294 | -1.7860 | 0.6160 | 20.456 | 42.597 |
| -25.40 | 10.00 | 2100.00 | -2.2100 | -2.290 | 0.685 | 0.279 | -1.2730 | 0.3840 | 17.821 | 39.907 |
| -20.40 | 10.00 | 2100.00 | -1.4830 | -1.529 | 0.400 | 0.244 | -0.8030 | 0.2150 | 14.045 | 36.610 |
| -15.40 | 10.00 | 2100.00 | -0.7680 | -0.796 | 0.207 | 0.198 | -0.3300 | 0.0950 | 5.105 | 25.703 |
| -10.40 | 10.00 | 2100.00 | -0.0560 | -0.068 | 0.072 | 0.142 | 0.1560 | 0.0130 | -179.373 | -239.261 |
| -5.40 | 10.00 | 2100.00 | 0.6280 | 0.625 | 0.004 | 0.090 | 0.6430 | -0.0310 | 44.432 | 85.418 |
| -0.40 | 10.00 | 2100.00 | 1.3000 | 1.300 | 0.011 | 0.043 | 1.1130 | -0.0260 | 33.299 | 68.114 |
| 4.60 | 10.00 | 2100.00 | 1.9690 | 1.969 | 0.086 | 0.002 | 1.6080 | 0.0280 | 30.109 | 64.016 |
| 9.60 | 10.00 | 2100.00 | 2.5010 | 2.505 | 0.239 | -0.003 | 2.0120 | 0.1490 | 29.882 | 62.670 |
| 14.60 | 10.00 | 2100.00 | 3.0700 | 3.098 | 0.505 | -0.011 | 2.4490 | 0.3140 | 29.621 | 61.562 |
| 19.60 | 10.00 | 2100.00 | 3.5610 | 3.639 | 0.846 | 0.026 | 2.7310 | 0.5650 | 30.695 | 58.398 |
| 24.60 | 10.00 | 2100.00 | 3.9650 | 4.205 | 1.441 | 0.182 | 3.0110 | 0.9770 | 34.309 | 57.270 |
| 29.60 | 10.00 | 2100.00 | 4.5040 | 4.901 | 1.993 | 0.244 | 3.3020 | 1.3680 | 34.963 | 54.873 |

RUDDER DYNAMOMETER
epop2j618.rud Rudder and Propeller Alone: RNo.2 J=0.51 (V=15m/s) Drift Angle =+15deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|
| -35.40 | 15.00 | 2100.65 | -2.2860 | -2.413 | 0.949 | 0.121 | -1.4360 | 0.5890 | 24.967 | 45.155 |
| -30.40 | 15.00 | 2100.65 | -1.8610 | -1.946 | 0.673 | 0.127 | -1.1380 | 0.4140 | 23.479 | 43.726 |
| -20.40 | 15.00 | 2100.65 | -0.9180 | -0.953 | 0.267 | 0.099 | -0.5100 | 0.1570 | 19.557 | 38.368 |
| -10.40 | 15.00 | 2100.65 | 0.0320 | 0.023 | 0.048 | 0.048 | 0.1050 | 0.0140 | 238.858 | 418.871 |
| -0.40 | 15.00 | 2100.65 | 1.0170 | 1.017 | -0.003 | 0.007 | 0.7790 | -0.0290 | 30.689 | 59.146 |
| 9.60 | 15.00 | 2100.65 | 1.9630 | 1.958 | 0.135 | -0.015 | 1.4570 | 0.0590 | 29.222 | 56.390 |
| 19.60 | 15.00 | 2100.65 | 2.8400 | 2.841 | 0.493 | 0.005 | 2.0650 | 0.3100 | 30.178 | 54.628 |
| 29.60 | 15.00 | 2100.65 | 3.2420 | 3.343 | 1.060 | 0.085 | 2.4260 | 0.6980 | 32.521 | 55.910 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 34.60 | 15.00 | 2100.65 | 3.0910 | 3.406 | 1.518 | 0.193 | 2.0460 | 0.9870 | 35.643 | 48.407 |

RUDDER DYNAMOMETER
epop1j119.rud Rudder and Propeller Alone: RNo.2 J=0.94 Drift Angle =+7.5deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|
| -35.40 | 10.00 | 801.96 | -1.1720 | -1.327 | 0.642 | -0.048 | -0.8090 | 0.3540 | 33.621 | 47.637 |
| -30.40 | 10.00 | 801.96 | -1.3310 | -1.393 | 0.484 | 0.030 | -0.8850 | 0.2680 | 27.865 | 47.040 |
| -25.40 | 10.00 | 801.96 | -1.1450 | -1.180 | 0.339 | 0.055 | -0.7490 | 0.1910 | 25.311 | 46.791 |
| -20.40 | 10.00 | 801.96 | -0.8790 | -0.905 | 0.233 | 0.050 | -0.5560 | 0.1290 | 24.419 | 45.051 |
| -15.40 | 10.00 | 801.96 | -0.5810 | -0.600 | 0.151 | 0.036 | -0.3610 | 0.0840 | 24.063 | 44.156 |
| -10.40 | 10.00 | 801.96 | -0.2740 | -0.286 | 0.088 | 0.013 | -0.1660 | 0.0490 | 25.265 | 42.805 |
| -5.40 | 10.00 | 801.96 | 0.0390 | 0.034 | 0.050 | -0.010 | 0.0310 | 0.0260 | 1.090 | 66.668 |
| -0.40 | 10.00 | 801.96 | 0.3510 | 0.351 | 0.031 | -0.030 | 0.2400 | 0.0130 | 21.420 | 50.733 |
| 4.60 | 10.00 | 801.96 | 0.7120 | 0.713 | 0.037 | -0.046 | 0.4650 | 0.0150 | 23.571 | 47.721 |
| 9.60 | 10.00 | 801.96 | 1.0630 | 1.061 | 0.075 | -0.048 | 0.7040 | 0.0320 | 25.464 | 48.467 |
| 14.60 | 10.00 | 801.96 | 1.4040 | 1.396 | 0.149 | -0.038 | 0.9410 | 0.0740 | 27.251 | 49.073 |
| 19.60 | 10.00 | 801.96 | 1.6600 | 1.655 | 0.271 | -0.012 | 1.1320 | 0.1430 | 29.259 | 49.799 |
| 24.60 | 10.00 | 801.96 | 1.8580 | 1.863 | 0.417 | 0.019 | 1.2780 | 0.2330 | 30.988 | 50.079 |
| 29.60 | 10.00 | 801.96 | 1.5800 | 1.670 | 0.599 | 0.081 | 1.1210 | 0.3090 | 34.831 | 50.019 |
| 34.60 | 10.00 | 801.96 | 1.3670 | 1.567 | 0.778 | 0.122 | 0.9260 | 0.4410 | 37.743 | 47.095 |

RUDDER DYNAMOMETER
epop1j219.rud Rudder and Propeller Alone: RNo.2 J=0.51 Drift Angle =+7.5deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.40 | 10.00 | 1462.84 | -2.0590 | -2.486 | 1.416 | -0.185 | -1.3070 | 0.8110 | 37.438 | 43.692 |
| -35.40 | 10.00 | 1462.84 | -2.9300 | -3.065 | 1.168 | 0.077 | -1.9070 | 0.7210 | 27.469 | 46.842 |
| -30.40 | 10.00 | 1462.75 | -2.4645 | -2.533 | 0.806 | 0.103 | -1.5640 | 0.5005 | 25.924 | 45.745 |
| -25.40 | 10.00 | 1462.84 | -1.9940 | -2.045 | 0.567 | 0.118 | -1.2400 | 0.3410 | 24.232 | 44.452 |
| -20.40 | 10.00 | 1462.75 | -1.4895 | -1.519 | 0.353 | 0.100 | -0.8955 | 0.2190 | 23.405 | 42.768 |
| -15.40 | 10.00 | 1462.84 | -0.9630 | -0.986 | 0.220 | 0.088 | -0.5620 | 0.1330 | 21.015 | 40.988 |
| -10.40 | 10.00 | 1462.75 | -0.4790 | -0.493 | 0.120 | 0.053 | -0.2370 | 0.0785 | 19.315 | 32.698 |
| -5.40 | 10.00 | 1462.84 | 0.0360 | 0.029 | 0.070 | 0.024 | 0.0870 | 0.0420 | 112.038 | 264.488 |
| -0.40 | 10.00 | 1462.84 | 0.5540 | 0.553 | 0.055 | -0.006 | 0.4330 | 0.0280 | 28.895 | 60.804 |
| 4.60 | 10.00 | 1462.84 | 1.0440 | 1.047 | 0.083 | -0.034 | 0.7840 | 0.0410 | 26.698 | 57.440 |
| 9.60 | 10.00 | 1462.75 | 1.5435 | 1.549 | 0.160 | -0.058 | 1.1440 | 0.0925 | 26.237 | 56.340 |
| 14.60 | 10.00 | 1462.84 | 2.0570 | 2.067 | 0.306 | -0.052 | 1.4960 | 0.1840 | 27.484 | 54.775 |
| 19.60 | 10.00 | 1462.75 | 2.3845 | 2.426 | 0.533 | -0.027 | 1.7150 | 0.3470 | 28.880 | 53.937 |
| 24.60 | 10.00 | 1462.84 | 2.6120 | 2.732 | 0.857 | 0.063 | 1.8320 | 0.5450 | 32.297 | 51.794 |
| 29.60 | 10.00 | 1462.75 | 2.8205 | 3.043 | 1.196 | 0.130 | 1.9515 | 0.7705 | 34.276 | 50.763 |
| 34.60 | 10.00 | 1462.84 | 2.9450 | 3.330 | 1.595 | 0.207 | 1.9890 | 1.0410 | 36.203 | 49.434 |
| 39.60 | 10.00 | 1462.84 | 2.9120 | 3.476 | 1.934 | 0.252 | 1.9620 | 1.2590 | 37.237 | 49.070 |

RUDDER DYNAMOMETER
epop1j319.rud Rudder and Propeller Alone: RNo.2 J=0.36 Drift Angle =+7.5deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.40 | 10.00 | 2106.96 | -4.8650 | -5.140 | 2.215 | 0.168 | -3.2000 | 1.4000 | 26.718 | 47.575 |
| -35.40 | 10.00 | 2106.96 | -4.5010 | -4.691 | 1.765 | 0.226 | -2.8990 | 1.1080 | 25.159 | 46.553 |
| -30.40 | 10.00 | 2106.96 | -3.6900 | -3.795 | 1.211 | 0.251 | -2.3270 | 0.7570 | 23.372 | 45.464 |
| -25.40 | 10.00 | 2106.96 | -2.9180 | -2.984 | 0.810 | 0.252 | -1.7950 | 0.5110 | 21.544 | 44.183 |
| -20.40 | 10.00 | 2106.96 | -2.1590 | -2.201 | 0.509 | 0.224 | -1.2750 | 0.3240 | 19.800 | 41.923 |
| -15.40 | 10.00 | 2106.96 | -1.4280 | -1.453 | 0.287 | 0.181 | -0.7880 | 0.1850 | 17.529 | 38.149 |
| -10.40 | 10.00 | 2106.96 | -0.7080 | -0.723 | 0.145 | 0.124 | -0.3070 | 0.0930 | 12.868 | 26.562 |
| -5.40 | 10.00 | 2106.96 | 0.0260 | 0.019 | 0.066 | 0.064 | 0.1760 | 0.0410 | 362.369 | 873.388 |
| -0.40 | 10.00 | 2106.96 | 0.7230 | 0.722 | 0.042 | 0.003 | 0.6790 | 0.0260 | 30.448 | 76.539 |
| 4.60 | 10.00 | 2106.96 | 1.4000 | 1.403 | 0.093 | -0.057 | 1.1850 | 0.0570 | 25.944 | 67.010 |
| 9.60 | 10.00 | 2106.96 | 2.1040 | 2.114 | 0.236 | -0.088 | 1.6910 | 0.1570 | 25.819 | 62.612 |
| 14.60 | 10.00 | 2106.96 | 2.6830 | 2.709 | 0.446 | -0.118 | 2.1260 | 0.3010 | 25.643 | 61.262 |
| 19.60 | 10.00 | 2106.96 | 3.3090 | 3.344 | 0.674 | -0.128 | 2.5930 | 0.4600 | 26.161 | 60.162 |
| 24.60 | 10.00 | 2106.96 | 3.8110 | 3.914 | 1.079 | -0.078 | 2.9890 | 0.7460 | 27.988 | 59.865 |
| 29.60 | 10.00 | 2106.96 | 4.1760 | 4.414 | 1.585 | 0.037 | 3.2610 | 1.1150 | 30.815 | 59.211 |
| 34.60 | 10.00 | 2106.96 | 4.6230 | 5.114 | 2.304 | 0.204 | 3.4470 | 1.6300 | 33.976 | 56.079 |

RUDDER DYNAMOMETER
epop1j220.rud Rudder and Propeller Alone: RNo.2 J=0.51 (V=15m/s) Drift Angle =+7.5deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|
| -30.40 | 10.00 | 1462.30 | -2.4140 | -2.494 | 0.814 | 0.110 | -1.5480 | 0.4850 | 25.590 | 45.858 |
| -20.40 | 10.00 | 1462.30 | -1.4640 | -1.498 | 0.360 | 0.113 | -0.8890 | 0.2120 | 22.414 | 43.076 |
| -10.40 | 10.00 | 1462.30 | -0.4560 | -0.470 | 0.119 | 0.063 | -0.2330 | 0.0690 | 16.667 | 33.891 |
| -0.40 | 10.00 | 1462.30 | 0.5200 | 0.519 | 0.055 | -0.002 | 0.4250 | 0.0230 | 29.655 | 64.214 |
| 9.60 | 10.00 | 1462.30 | 1.5710 | 1.578 | 0.175 | -0.050 | 1.1340 | 0.0840 | 26.830 | 54.266 |
| 19.60 | 10.00 | 1462.30 | 2.4410 | 2.481 | 0.542 | -0.006 | 1.7250 | 0.3320 | 29.757 | 52.467 |
| 29.60 | 10.00 | 1462.30 | 2.8260 | 3.055 | 1.211 | 0.139 | 1.8880 | 0.7660 | 34.529 | 48.613 |

RUDDER DYNAMOMETER

epom1j121.rud Rudder and Propeller Alone: RNo.2 J=0.94 Drift Angle =-7.5deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|
| -30.40 | 10.00 | 814.91 | -1.1920 | -1.383 | 0.702 | -0.099 | -0.8920 | 0.4120 | 37.134 | 53.181 |
| -25.40 | 10.00 | 814.91 | -1.5020 | -1.570 | 0.496 | -0.056 | -1.0200 | 0.2940 | 33.559 | 49.215 |
| -20.40 | 10.00 | 814.91 | -1.7260 | -1.712 | 0.270 | 0.025 | -1.1990 | 0.1770 | 28.524 | 51.762 |
| -15.40 | 10.00 | 814.91 | -1.4640 | -1.452 | 0.156 | 0.050 | -0.9880 | 0.1020 | 26.560 | 49.927 |
| -10.40 | 10.00 | 814.91 | -1.1520 | -1.145 | 0.067 | 0.063 | -0.7680 | 0.0500 | 24.497 | 49.192 |
| -5.40 | 10.00 | 814.91 | -0.7850 | -0.783 | 0.024 | 0.056 | -0.5110 | 0.0260 | 22.881 | 47.751 |
| -0.40 | 10.00 | 814.91 | -0.4350 | -0.435 | 0.024 | 0.038 | -0.2740 | 0.0200 | 21.186 | 45.651 |
| 4.60 | 10.00 | 814.91 | -0.1110 | -0.107 | 0.042 | 0.012 | -0.0570 | 0.0280 | 18.653 | 33.053 |
| 9.60 | 10.00 | 814.91 | 0.2120 | 0.224 | 0.086 | -0.015 | 0.1570 | 0.0490 | 23.125 | 55.239 |
| 14.60 | 10.00 | 814.91 | 0.5510 | 0.573 | 0.155 | -0.038 | 0.3760 | 0.0850 | 23.315 | 49.837 |
| 19.60 | 10.00 | 814.91 | 0.8800 | 0.915 | 0.256 | -0.056 | 0.5960 | 0.1370 | 23.826 | 48.860 |
| 24.60 | 10.00 | 814.91 | 1.2080 | 1.257 | 0.381 | -0.065 | 0.8260 | 0.2090 | 24.785 | 49.171 |
| 29.60 | 10.00 | 814.91 | 1.5000 | 1.567 | 0.531 | -0.062 | 1.0280 | 0.2960 | 26.006 | 48.865 |
| 34.60 | 10.00 | 814.91 | 1.6990 | 1.803 | 0.712 | -0.032 | 1.1860 | 0.4070 | 28.184 | 49.466 |
| 39.60 | 10.00 | 814.91 | 1.3650 | 1.618 | 0.890 | 0.068 | 1.0510 | 0.5100 | 34.187 | 52.619 |

RUDDER DYNAMOMETER
epom1j221.rud Rudder and Propeller Alone: RNo.2 J=0.51 Drift Angle =-7.5deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|
| -35.40 | 10.00 | 1462.28 | -2.2820 | -2.748 | 1.534 | -0.187 | -1.5560 | 0.9670 | 36.776 | 49.049 |
| -30.40 | 10.00 | 1463.22 | -3.4835 | -3.529 | 1.035 | 0.002 | -2.4380 | 0.7495 | 29.948 | 52.849 |
| -25.40 | 10.00 | 1462.28 | -3.0750 | -3.099 | 0.748 | 0.038 | -2.1130 | 0.5430 | 28.758 | 51.610 |
| -20.40 | 10.00 | 1463.22 | -2.5765 | -2.587 | 0.494 | 0.060 | -1.7435 | 0.3695 | 27.682 | 50.654 |
| -15.40 | 10.00 | 1462.28 | -2.2230 | -2.218 | 0.282 | 0.093 | -1.4270 | 0.2230 | 25.775 | 47.191 |
| -10.40 | 10.00 | 1463.22 | -1.7175 | -1.712 | 0.128 | 0.098 | -1.0595 | 0.1285 | 24.212 | 44.723 |
| -5.40 | 10.00 | 1462.28 | -1.1730 | -1.174 | 0.069 | 0.077 | -0.6940 | 0.0780 | 23.450 | 41.961 |
| -0.40 | 10.00 | 1463.22 | -0.6430 | -0.643 | 0.044 | 0.032 | -0.3390 | 0.0615 | 25.016 | 35.210 |
| 4.60 | 10.00 | 1462.28 | -0.1650 | -0.159 | 0.075 | -0.015 | -0.0020 | 0.0660 | 39.701 | -19.303 |
| 9.60 | 10.00 | 1463.22 | 0.3360 | 0.354 | 0.135 | -0.067 | 0.3360 | 0.1015 | 11.044 | 80.979 |
| 14.60 | 10.00 | 1462.28 | 0.8430 | 0.878 | 0.245 | -0.100 | 0.6860 | 0.1620 | 18.559 | 62.807 |
| 19.60 | 10.00 | 1463.22 | 1.3675 | 1.423 | 0.400 | -0.129 | 1.0620 | 0.2640 | 20.941 | 59.075 |
| 24.60 | 10.00 | 1462.28 | 1.9140 | 2.003 | 0.630 | -0.131 | 1.4520 | 0.4030 | 23.430 | 56.783 |
| 29.60 | 10.00 | 1463.22 | 2.4240 | 2.553 | 0.901 | -0.123 | 1.8300 | 0.5905 | 25.166 | 56.267 |
| 34.60 | 10.00 | 1462.28 | 2.8820 | 3.069 | 1.227 | -0.089 | 2.1630 | 0.7990 | 27.073 | 55.302 |
| 39.60 | 10.00 | 1462.28 | 3.2020 | 3.497 | 1.615 | 0.003 | 2.4010 | 1.0730 | 30.083 | 54.966 |

RUDDER DYNAMOMETER
epom1j321.rud Rudder and Propeller Alone: RNo.2 J=0.36 Drift Angle =-7.5deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|
| -35.40 | 10.00 | 2109.26 | -4.1370 | -4.851 | 2.552 | -0.326 | -2.6060 | 1.6120 | 36.699 | 45.537 |
| -30.40 | 10.00 | 2109.26 | -4.7470 | -4.991 | 1.773 | 0.018 | -3.1210 | 1.1900 | 29.633 | 48.488 |
| -25.40 | 10.00 | 2109.26 | -4.3810 | -4.469 | 1.193 | 0.132 | -2.8660 | 0.8400 | 27.026 | 48.496 |
| -20.40 | 10.00 | 2109.26 | -3.7950 | -3.817 | 0.744 | 0.196 | -2.4530 | 0.5520 | 24.844 | 47.770 |
| -15.40 | 10.00 | 2109.26 | -3.0820 | -3.086 | 0.431 | 0.189 | -1.9320 | 0.3440 | 23.868 | 45.825 |
| -10.40 | 10.00 | 2109.26 | -2.3320 | -2.334 | 0.225 | 0.147 | -1.4080 | 0.2040 | 23.705 | 43.410 |
| -5.40 | 10.00 | 2109.26 | -1.5770 | -1.581 | 0.120 | 0.087 | -0.8940 | 0.1230 | 24.462 | 39.502 |
| -0.40 | 10.00 | 2109.26 | -0.8510 | -0.851 | 0.083 | 0.011 | -0.4020 | 0.0960 | 28.707 | 29.804 |
| 4.60 | 10.00 | 2109.26 | -0.1280 | -0.118 | 0.116 | -0.077 | 0.1130 | 0.1020 | 95.187 | -119.576 |
| 9.60 | 10.00 | 2109.26 | 0.5830 | 0.609 | 0.200 | -0.152 | 0.6280 | 0.1560 | 4.965 | 88.605 |
| 14.60 | 10.00 | 2109.26 | 1.2670 | 1.313 | 0.345 | -0.223 | 1.1220 | 0.2540 | 13.020 | 70.080 |
| 19.60 | 10.00 | 2109.26 | 2.0120 | 2.088 | 0.574 | -0.267 | 1.6620 | 0.4050 | 17.189 | 63.991 |
| 24.60 | 10.00 | 2109.26 | 2.7530 | 2.871 | 0.883 | -0.292 | 2.2070 | 0.6100 | 19.826 | 61.257 |
| 29.60 | 10.00 | 2109.26 | 3.4970 | 3.677 | 1.288 | -0.293 | 2.7630 | 0.8890 | 22.015 | 59.788 |
| 34.60 | 10.00 | 2109.26 | 4.2270 | 4.493 | 1.785 | -0.255 | 3.3010 | 1.2380 | 24.309 | 58.620 |
| 39.60 | 10.00 | 2109.26 | 4.8630 | 5.233 | 2.331 | -0.200 | 3.7870 | 1.6280 | 26.156 | 58.094 |

RUDDER DYNAMOMETER
epom1j622.rud Rudder and Propeller Alone: RNo.2 J=0.51 (15m/s) Drift Angle =-7.5deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|
| -30.40 | 15.00 | 2106.84 | -3.3240 | -3.372 | 0.998 | 0.011 | -2.3450 | 0.7350 | 29.664 | 53.496 |
| -20.40 | 15.00 | 2106.84 | -2.4870 | -2.492 | 0.463 | 0.073 | -1.7090 | 0.3560 | 27.074 | 51.758 |
| -10.40 | 15.00 | 2106.84 | -1.6230 | -1.618 | 0.119 | 0.101 | -1.0210 | 0.1180 | 23.747 | 45.862 |
| -0.40 | 15.00 | 2106.84 | -0.6090 | -0.609 | 0.043 | 0.037 | -0.3280 | 0.0530 | 23.882 | 36.376 |
| 9.60 | 15.00 | 2106.84 | 0.3450 | 0.363 | 0.134 | -0.051 | 0.3160 | 0.0990 | 15.878 | 72.996 |
| 19.60 | 15.00 | 2106.84 | 1.3390 | 1.391 | 0.386 | -0.112 | 1.0070 | 0.2620 | 21.925 | 57.035 |
| 29.60 | 15.00 | 2106.84 | 2.3450 | 2.466 | 0.864 | -0.109 | 1.7380 | 0.5870 | 25.582 | 55.546 |

RUDDER DYNAMOMETER
epsm1j123.rud Rudder and Propeller Alone: RNo.3 J=0.94 Drift Angle =-7.5deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| -30.40 | 10.00 | 810.16 | -1.4440 | -1.599 | 0.698 | -0.102 | -1.0050 | 0.3990 | 36.387 | 52.282 |
| -25.40 | 10.00 | 810.16 | -1.5480 | -1.604 | 0.480 | -0.047 | -1.1200 | 0.2840 | 32.937 | 56.057 |
| -20.40 | 10.00 | 810.16 | -1.9070 | -1.871 | 0.240 | 0.035 | -1.2570 | 0.1580 | 28.090 | 51.340 |
| -15.40 | 10.00 | 810.16 | -1.6230 | -1.598 | 0.124 | 0.058 | -1.0500 | 0.0850 | 26.355 | 50.195 |
| -10.40 | 10.00 | 810.16 | -1.3140 | -1.299 | 0.034 | 0.074 | -0.8300 | 0.0320 | 24.317 | 48.726 |
| -5.40 | 10.00 | 810.16 | -0.9120 | -0.908 | 0.007 | 0.064 | -0.5720 | 0.0110 | 22.911 | 48.263 |
| -0.40 | 10.00 | 810.16 | -0.5170 | -0.517 | 0.005 | 0.043 | -0.3230 | 0.0080 | 21.675 | 47.780 |
| 4.60 | 10.00 | 810.16 | -0.1370 | -0.135 | 0.028 | 0.015 | -0.0900 | 0.0190 | 19.155 | 50.718 |
| 9.60 | 10.00 | 810.16 | 0.2410 | 0.250 | 0.076 | -0.017 | 0.1410 | 0.0440 | 23.109 | 43.873 |
| 14.60 | 10.00 | 810.16 | 0.6180 | 0.636 | 0.150 | -0.045 | 0.3720 | 0.0840 | 22.883 | 45.272 |
| 19.60 | 10.00 | 810.16 | 0.9870 | 1.014 | 0.249 | -0.066 | 0.6020 | 0.1370 | 23.509 | 45.914 |
| 24.60 | 10.00 | 810.16 | 1.3480 | 1.349 | 0.296 | -0.077 | 0.8320 | 0.2090 | 24.241 | 47.954 |
| 29.60 | 10.00 | 810.16 | 1.5380 | 1.558 | 0.447 | -0.044 | 0.9510 | 0.2890 | 27.132 | 47.675 |
| 34.60 | 10.00 | 810.16 | 1.4930 | 1.573 | 0.607 | 0.033 | 0.8550 | 0.3530 | 32.063 | 42.908 |
| 39.60 | 10.00 | 810.16 | 1.5150 | 1.684 | 0.811 | 0.068 | 1.0600 | 0.5090 | 34.047 | 53.196 |

RUDDER DYNAMOMETER
epsm1j223.rud Rudder and Propeller Alone: RNo.3 J=0.51 Drift Angle =-7.5deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|
| -35.40 | 10.00 | 1466.66 | -2.5140 | -2.895 | 1.461 | -0.185 | -1.6590 | 0.9190 | 36.378 | 50.496 |
| -30.40 | 10.00 | 1466.66 | -2.5910 | -2.777 | 1.072 | -0.152 | -1.6920 | 0.7000 | 35.458 | 50.720 |
| -25.40 | 10.00 | 1466.66 | -3.2610 | -3.230 | 0.664 | 0.034 | -2.1120 | 0.5010 | 28.919 | 51.128 |
| -20.40 | 10.00 | 1466.66 | -2.7650 | -2.735 | 0.410 | 0.056 | -1.7740 | 0.3360 | 27.937 | 50.504 |
| -15.40 | 10.00 | 1466.66 | -2.2730 | -2.248 | 0.213 | 0.065 | -1.4130 | 0.2050 | 27.102 | 48.454 |
| -10.40 | 10.00 | 1466.66 | -1.8450 | -1.823 | 0.044 | 0.092 | -1.0980 | 0.1060 | 24.931 | 45.730 |
| -5.40 | 10.00 | 1466.66 | -1.2770 | -1.269 | -0.020 | 0.070 | -0.7410 | 0.0590 | 24.432 | 43.969 |
| -0.40 | 10.00 | 1466.66 | -0.7180 | -0.718 | -0.040 | 0.032 | -0.3940 | 0.0420 | 25.488 | 40.312 |
| 4.60 | 10.00 | 1466.66 | -0.1880 | -0.188 | -0.008 | -0.017 | -0.0690 | 0.0480 | 38.759 | 19.724 |
| 9.60 | 10.00 | 1466.66 | 0.3120 | 0.317 | 0.053 | -0.064 | 0.2420 | 0.0780 | 9.809 | 64.936 |
| 14.60 | 10.00 | 1466.66 | 0.8370 | 0.848 | 0.150 | -0.101 | 0.5690 | 0.1340 | 18.070 | 54.330 |
| 19.60 | 10.00 | 1466.66 | 1.4070 | 1.429 | 0.309 | -0.124 | 0.9360 | 0.2250 | 21.289 | 52.388 |
| 24.60 | 10.00 | 1466.66 | 1.9730 | 2.010 | 0.520 | -0.134 | 1.3090 | 0.3520 | 23.338 | 51.943 |
| 29.60 | 10.00 | 1466.66 | 2.4670 | 2.530 | 0.780 | -0.119 | 1.6550 | 0.5100 | 25.264 | 52.234 |
| 34.60 | 10.00 | 1466.66 | 2.9380 | 3.040 | 1.095 | -0.081 | 1.9840 | 0.7090 | 27.336 | 52.374 |
| 39.60 | 10.00 | 1466.66 | 2.8270 | 3.157 | 1.536 | 0.135 | 1.8310 | 0.9780 | 34.270 | 49.869 |

RUDDER DYNAMOMETER
epsm1j323.rud Rudder and Propeller Alone: RNo.3 J=0.36 Drift Angle =-7.5deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|
| -30.40 | 10.00 | 2104.09 | -4.4690 | -4.683 | 1.638 | -0.065 | -2.7330 | 1.0820 | 31.378 | 47.436 |
| -25.40 | 10.00 | 2104.09 | -4.1460 | -4.239 | 1.151 | 0.022 | -2.4870 | 0.7870 | 29.462 | 46.371 |
| -20.40 | 10.00 | 2104.09 | -3.7140 | -3.709 | 0.654 | 0.162 | -2.2230 | 0.4940 | 25.625 | 46.236 |
| -15.40 | 10.00 | 2104.09 | -3.0320 | -3.014 | 0.342 | 0.158 | -1.7860 | 0.3000 | 24.757 | 45.194 |
| -10.40 | 10.00 | 2104.09 | -2.3220 | -2.310 | 0.148 | 0.121 | -1.3360 | 0.1790 | 24.768 | 43.704 |
| -5.40 | 10.00 | 2104.09 | -1.5680 | -1.565 | 0.041 | 0.067 | -0.8710 | 0.1060 | 25.686 | 41.490 |
| -0.40 | 10.00 | 2104.09 | -0.8580 | -0.858 | 0.010 | 0.004 | -0.4390 | 0.0760 | 29.567 | 36.660 |
| 4.60 | 10.00 | 2104.09 | -0.1850 | -0.182 | 0.034 | -0.078 | -0.0170 | 0.0780 | 72.807 | -8.757 |
| 9.60 | 10.00 | 2104.09 | 0.4770 | 0.490 | 0.114 | -0.150 | 0.3970 | 0.1210 | -0.672 | 69.541 |
| 14.60 | 10.00 | 2104.09 | 1.1570 | 1.181 | 0.246 | -0.206 | 0.8420 | 0.2000 | 12.534 | 58.640 |
| 19.60 | 10.00 | 2104.09 | 1.8990 | 1.943 | 0.460 | -0.246 | 1.3230 | 0.3280 | 17.352 | 55.225 |
| 24.60 | 10.00 | 2104.09 | 2.6430 | 2.720 | 0.761 | -0.265 | 1.8290 | 0.5080 | 20.257 | 54.337 |
| 29.60 | 10.00 | 2104.09 | 3.3830 | 3.498 | 1.127 | -0.265 | 2.3300 | 0.7430 | 22.416 | 53.816 |
| 34.60 | 10.00 | 2104.09 | 4.1040 | 4.273 | 1.575 | -0.238 | 2.8170 | 1.0270 | 24.424 | 53.331 |
| 39.60 | 10.00 | 2104.09 | 4.7660 | 5.015 | 2.106 | -0.184 | 3.2600 | 1.3710 | 26.313 | 52.929 |

RUDDER DYNAMOMETER
epsm2j124.rud Rudder and Propeller Alone: RNo.3 J=0.94 Drift Angle =-15deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|
| -25.40 | 10.00 | 806.24 | -1.6030 | -1.686 | 0.555 | -0.090 | -1.1320 | 0.3140 | 35.328 | 54.061 |
| -20.40 | 10.00 | 806.24 | -1.7420 | -1.755 | 0.351 | -0.048 | -1.2450 | 0.1870 | 32.732 | 55.634 |
| -15.40 | 10.00 | 806.24 | -1.8040 | -1.791 | 0.192 | -0.009 | -1.2370 | 0.0980 | 30.492 | 53.485 |
| -10.40 | 10.00 | 806.24 | -1.8160 | -1.781 | -0.028 | 0.059 | -1.2110 | -0.0210 | 26.673 | 52.068 |
| -5.40 | 10.00 | 806.24 | -1.4710 | -1.456 | -0.093 | 0.072 | -0.9750 | -0.0590 | 25.007 | 51.713 |
| -0.40 | 10.00 | 806.24 | -1.0680 | -1.067 | -0.099 | 0.069 | -0.7060 | -0.0640 | 23.478 | 51.519 |
| 4.60 | 10.00 | 806.24 | -0.6520 | -0.656 | -0.070 | 0.053 | -0.4350 | -0.0490 | 21.866 | 52.087 |
| 9.60 | 10.00 | 806.24 | -0.2310 | -0.228 | 0.000 | 0.024 | -0.1700 | -0.0130 | 19.512 | 60.021 |
| 14.60 | 10.00 | 806.24 | 0.1350 | 0.153 | 0.090 | -0.009 | 0.0590 | 0.0320 | 24.001 | 28.110 |
| 19.60 | 10.00 | 806.24 | 0.4780 | 0.516 | 0.194 | -0.040 | 0.2790 | 0.0900 | 22.322 | 42.172 |
| 24.60 | 10.00 | 806.24 | 0.8350 | 0.892 | 0.319 | -0.065 | 0.4990 | 0.1610 | 22.716 | 43.805 |
| 29.60 | 10.00 | 806.24 | 1.1560 | 1.239 | 0.475 | -0.078 | 0.7130 | 0.2480 | 23.715 | 45.294 |
| 34.60 | 10.00 | 806.24 | 1.4260 | 1.546 | 0.654 | -0.061 | 0.8960 | 0.3520 | 26.038 | 46.050 |
| 39.60 | 10.00 | 806.24 | 1.2870 | 1.502 | 0.800 | 0.028 | 0.8260 | 0.4440 | 31.865 | 46.654 |

RUDDER DYNAMOMETER
epsm2j224.rud Rudder and Propeller Alone: RNo.3 J=0.51 Drift Angle =-15deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|
| -30.40 | 10.00 | 1468.06 | -2.6790 | -2.940 | 1.243 | -0.134 | -1.8660 | 0.7660 | 34.557 | 53.328 |
| -25.40 | 10.00 | 1468.06 | -3.7130 | -3.675 | 0.750 | 0.024 | -2.4830 | 0.5150 | 29.327 | 52.453 |
| -20.40 | 10.00 | 1468.06 | -3.3100 | -3.279 | 0.508 | 0.032 | -2.2150 | 0.3550 | 28.998 | 52.510 |
| -15.40 | 10.00 | 1468.06 | -2.8610 | -2.838 | 0.299 | 0.042 | -1.8780 | 0.2130 | 28.496 | 51.214 |
| -10.40 | 10.00 | 1468.06 | -2.3880 | -2.373 | 0.130 | 0.051 | -1.5390 | 0.1070 | 27.818 | 50.014 |
| -5.40 | 10.00 | 1468.06 | -1.9240 | -1.914 | -0.019 | 0.077 | -1.2010 | 0.0220 | 25.975 | 47.992 |
| -0.40 | 10.00 | 1468.06 | -1.3785 | -1.378 | -0.055 | 0.061 | -0.8435 | -0.0075 | 25.533 | 46.658 |
| 4.60 | 10.00 | 1468.06 | -0.8140 | -0.814 | -0.031 | 0.021 | -0.4930 | 0.0000 | 27.436 | 45.790 |
| 9.60 | 10.00 | 1468.06 | -0.2980 | -0.287 | 0.041 | -0.023 | -0.1580 | 0.0340 | 38.054 | 37.809 |
| 14.60 | 10.00 | 1468.06 | 0.2040 | 0.234 | 0.144 | -0.074 | 0.1520 | 0.0890 | -1.714 | 58.023 |
| 19.60 | 10.00 | 1468.06 | 0.7110 | 0.768 | 0.292 | -0.117 | 0.4610 | 0.1690 | 14.686 | 49.405 |
| 24.60 | 10.00 | 1468.06 | 1.2750 | 1.367 | 0.498 | -0.144 | 0.8180 | 0.2890 | 19.438 | 48.645 |
| 29.60 | 10.00 | 1468.06 | 1.8350 | 1.974 | 0.766 | -0.157 | 1.1910 | 0.4480 | 22.044 | 49.065 |
| 34.60 | 10.00 | 1468.06 | 2.3850 | 2.580 | 1.085 | -0.153 | 1.5550 | 0.6420 | 24.054 | 49.168 |
| 39.60 | 10.00 | 1468.06 | 2.8570 | 3.121 | 1.443 | -0.133 | 1.8820 | 0.8660 | 25.724 | 49.577 |

RUDDER DYNAMOMETER
epsm2j324.rud Rudder and Propeller Alone: RNo.3 J=0.36 Drift Angle =-15deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|
| -30.40 | 10.00 | 2107.19 | -4.3090 | -4.666 | 1.877 | -0.198 | -2.7560 | 1.1510 | 34.231 | 48.844 |
| -25.40 | 10.00 | 2107.19 | -5.3320 | -5.270 | 1.058 | 0.181 | -3.3650 | 0.7570 | 26.552 | 49.269 |
| -20.40 | 10.00 | 2107.19 | -4.6070 | -4.563 | 0.704 | 0.165 | -2.9130 | 0.5230 | 26.365 | 49.251 |
| -15.40 | 10.00 | 2107.19 | -3.8050 | -3.786 | 0.445 | 0.122 | -2.3840 | 0.3360 | 26.754 | 48.488 |
| -10.40 | 10.00 | 2107.19 | -3.1150 | -3.097 | 0.183 | 0.121 | -1.9170 | 0.1790 | 26.070 | 47.328 |
| -5.40 | 10.00 | 2107.19 | -2.3820 | -2.376 | 0.050 | 0.079 | -1.4520 | 0.0860 | 26.639 | 46.584 |
| -0.40 | 10.00 | 2107.19 | -1.6460 | -1.646 | -0.007 | 0.026 | -0.9850 | 0.0450 | 28.390 | 45.267 |
| 4.60 | 10.00 | 2107.19 | -0.9220 | -0.917 | 0.014 | -0.047 | -0.5070 | 0.0430 | 35.121 | 40.166 |
| 9.60 | 10.00 | 2107.19 | -0.2340 | -0.216 | 0.090 | -0.119 | -0.0700 | 0.0830 | 85.116 | 11.047 |
| 14.60 | 10.00 | 2107.19 | 0.4370 | 0.479 | 0.222 | -0.191 | 0.3480 | 0.1560 | -9.925 | 63.845 |
| 19.60 | 10.00 | 2107.19 | 1.1390 | 1.216 | 0.426 | -0.251 | 0.7930 | 0.2770 | 9.352 | 54.492 |
| 24.60 | 10.00 | 2107.19 | 1.8960 | 2.023 | 0.718 | -0.284 | 1.2880 | 0.4510 | 15.962 | 52.568 |
| 29.60 | 10.00 | 2107.19 | 2.6830 | 2.875 | 1.098 | -0.304 | 1.7950 | 0.6790 | 19.428 | 51.359 |
| 34.60 | 10.00 | 2107.19 | 3.4310 | 3.695 | 1.533 | -0.301 | 2.2800 | 0.9590 | 21.846 | 50.950 |
| 39.60 | 10.00 | 2107.19 | 4.1200 | 4.507 | 2.090 | -0.275 | 2.7360 | 1.2840 | 23.878 | 50.354 |

RUDDER DYNAMOMETER
epom2j126.rud Rudder and Propeller Alone: RNo.2 J=0.94 Drift Angle =-15deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|
| -30.40 | 10.00 | 804.53 | -1.3060 | -1.482 | 0.703 | -0.118 | -0.9510 | 0.4350 | 37.933 | 52.682 |
| -25.40 | 10.00 | 804.53 | -1.2900 | -1.406 | 0.560 | -0.087 | -0.9490 | 0.3320 | 36.139 | 53.586 |
| -20.40 | 10.00 | 804.53 | -1.4630 | -1.498 | 0.363 | -0.050 | -1.1110 | 0.2190 | 33.313 | 57.099 |
| -15.40 | 10.00 | 804.53 | -1.4170 | -1.426 | 0.227 | -0.018 | -1.0770 | 0.1490 | 31.258 | 58.053 |
| -10.40 | 10.00 | 804.53 | -1.5420 | -1.522 | 0.027 | 0.047 | -1.0850 | 0.0220 | 26.903 | 52.871 |
| -5.40 | 10.00 | 804.53 | -1.2170 | -1.208 | -0.035 | 0.059 | -0.8360 | -0.0170 | 25.121 | 51.277 |
| -0.40 | 10.00 | 804.53 | -0.8600 | -0.860 | -0.053 | 0.058 | -0.5850 | -0.0280 | 23.278 | 50.568 |
| 4.60 | 10.00 | 804.53 | -0.5130 | -0.514 | -0.028 | 0.042 | -0.3420 | -0.0180 | 21.803 | 49.063 |
| 9.60 | 10.00 | 804.53 | -0.1500 | -0.144 | 0.022 | 0.018 | -0.1020 | 0.0090 | 17.725 | 51.000 |
| 14.60 | 10.00 | 804.53 | 0.1710 | 0.189 | 0.097 | -0.011 | 0.1130 | 0.0470 | 24.182 | 46.419 |
| 19.60 | 10.00 | 804.53 | 0.4820 | 0.517 | 0.189 | -0.038 | 0.3240 | 0.0990 | 22.638 | 47.990 |
| 24.60 | 10.00 | 804.53 | 0.8080 | 0.866 | 0.314 | -0.059 | 0.5430 | 0.1690 | 23.181 | 47.711 |
| 29.60 | 10.00 | 804.53 | 1.1090 | 1.192 | 0.462 | -0.071 | 0.7560 | 0.2540 | 24.056 | 48.146 |
| 34.60 | 10.00 | 804.53 | 1.3900 | 1.509 | 0.641 | -0.063 | 0.9570 | 0.3610 | 25.809 | 48.336 |
| 39.60 | 10.00 | 804.53 | 1.2660 | 1.482 | 0.795 | 0.031 | 0.9040 | 0.4490 | 32.093 | 48.817 |

RUDDER DYNAMOMETER
epom2j2.rud Rudder and Propeller Alone: RNo.2 J=0.51 Drift Angle =-15deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|
| -30.40 | 10.00 | 1464.97 | -2.4933 | -2.818 | 1.318 | -0.133 | -1.8063 | 0.8653 | 34.709 | 53.358 |
| -25.40 | 10.00 | 1464.09 | -3.5200 | -3.526 | 0.807 | 0.017 | -2.5740 | 0.6080 | 29.507 | 55.842 |
| -20.40 | 10.00 | 1464.97 | -3.1253 | -3.122 | 0.551 | 0.043 | -2.2443 | 0.4240 | 28.606 | 54.622 |
| -15.40 | 10.00 | 1464.09 | -2.6120 | -2.606 | 0.329 | 0.056 | -1.8380 | 0.2690 | 27.846 | 53.238 |
| -10.40 | 10.00 | 1464.97 | -2.1460 | -2.140 | 0.161 | 0.071 | -1.4690 | 0.1500 | 26.649 | 51.285 |
| -5.40 | 10.00 | 1464.09 | -1.6880 | -1.682 | 0.019 | 0.093 | -1.1210 | 0.0600 | 24.447 | 49.211 |
| -0.40 | 10.00 | 1464.97 | -1.1930 | -1.193 | -0.019 | 0.072 | -0.7477 | 0.0273 | 23.919 | 45.214 |
| 4.60 | 10.00 | 1464.09 | -0.6840 | -0.682 | 0.002 | 0.022 | -0.3750 | 0.0360 | 26.770 | 36.955 |
| 9.60 | 10.00 | 1464.97 | -0.1920 | -0.177 | 0.076 | -0.026 | -0.0350 | 0.0697 | 44.798 | -4.500 |
| 14.60 | 10.00 | 1464.09 | 0.3040 | 0.338 | 0.176 | -0.079 | 0.3050 | 0.1310 | 6.617 | 79.393 |
| 19.60 | 10.00 | 1464.97 | 0.7757 | 0.839 | 0.325 | -0.120 | 0.6507 | 0.2240 | 15.671 | 64.461 |
| 24.60 | 10.00 | 1464.09 | 1.2980 | 1.399 | 0.525 | -0.149 | 1.0200 | 0.3540 | 19.345 | 59.332 |
| 29.60 | 10.00 | 1464.97 | 1.8453 | 1.999 | 0.799 | -0.158 | 1.4140 | 0.5280 | 22.093 | 57.044 |
| 34.60 | 10.00 | 1464.09 | 2.3450 | 2.568 | 1.122 | -0.151 | 1.7960 | 0.7470 | 24.096 | 56.598 |
| 39.60 | 10.00 | 1464.09 | 2.8150 | 3.123 | 1.497 | -0.128 | 2.1410 | 1.0000 | 25.882 | 55.706 |

RUDDER DYNAMOMETER

epom2j326.rud  Rudder and Propeller Alone: RNo.2 J=0.36 Drift Angle =-15deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|
| -30.40 | 10.00 | 2110.21 | -4.2440 | -4.641 | 1.937 | -0.191 | -2.9170 | 1.3080 | 34.097 | 50.971 |
| -25.40 | 10.00 | 2110.21 | -5.1350 | -5.121 | 1.126 | 0.205 | -3.5510 | 0.8830 | 25.987 | 52.532 |
| -20.40 | 10.00 | 2110.21 | -4.4860 | -4.463 | 0.741 | 0.205 | -3.0650 | 0.6060 | 25.384 | 51.591 |
| -15.40 | 10.00 | 2110.21 | -3.7260 | -3.705 | 0.428 | 0.192 | -2.4900 | 0.3830 | 24.804 | 50.025 |
| -10.40 | 10.00 | 2110.21 | -2.9850 | -2.974 | 0.207 | 0.157 | -1.9480 | 0.2250 | 24.701 | 48.299 |
| -5.40 | 10.00 | 2110.21 | -2.2250 | -2.222 | 0.073 | 0.104 | -1.3940 | 0.1260 | 25.313 | 45.495 |
| -0.40 | 10.00 | 2110.21 | -1.4760 | -1.476 | 0.019 | 0.041 | -0.8690 | 0.0840 | 27.225 | 41.425 |
| 4.60 | 10.00 | 2110.21 | -0.7970 | -0.791 | 0.046 | -0.044 | -0.3590 | 0.0850 | 35.543 | 26.871 |
| 9.60 | 10.00 | 2110.21 | -0.0800 | -0.057 | 0.129 | -0.128 | 0.1610 | 0.1380 | 253.087 | -334.425 |
| 14.60 | 10.00 | 2110.21 | 0.6090 | 0.656 | 0.267 | -0.204 | 0.6780 | 0.2330 | -1.132 | 91.418 |
| 19.60 | 10.00 | 2110.21 | 1.3180 | 1.405 | 0.486 | -0.269 | 1.2040 | 0.3850 | 10.813 | 72.420 |
| 24.60 | 10.00 | 2110.21 | 2.0810 | 2.225 | 0.799 | -0.314 | 1.7590 | 0.5940 | 15.853 | 65.488 |
| 29.60 | 10.00 | 2110.21 | 2.8650 | 3.080 | 1.192 | -0.334 | 2.3220 | 0.8610 | 19.152 | 61.866 |
| 34.60 | 10.00 | 2110.21 | 3.6030 | 3.919 | 1.678 | -0.329 | 2.8690 | 1.1850 | 21.601 | 59.939 |
| 39.60 | 10.00 | 2110.21 | 4.3020 | 4.753 | 2.256 | -0.290 | 3.3750 | 1.5780 | 23.881 | 58.381 |

RUDDER DYNAMOMETER

epom2j626.rud  Rudder and Propeller Alone: RNo.2 J=0.51 (V=15m/s) Drift Angle =-15deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|
| -30.40 | 15.00 | 2110.21 | -2.3750 | -2.604 | 1.097 | -0.121 | -1.7450 | 0.7640 | 34.636 | 55.171 |
| -20.40 | 15.00 | 2110.21 | -2.8810 | -2.874 | 0.499 | 0.040 | -2.0700 | 0.3990 | 28.592 | 54.861 |
| -10.40 | 15.00 | 2110.21 | -1.9880 | -1.981 | 0.145 | 0.061 | -1.3640 | 0.1410 | 26.919 | 51.500 |
| -0.40 | 15.00 | 2110.21 | -1.1270 | -1.126 | -0.031 | 0.065 | -0.7000 | 0.0230 | 24.247 | 44.667 |
| 9.60 | 15.00 | 2110.21 | -0.1870 | -0.176 | 0.054 | -0.024 | -0.0310 | 0.0680 | 43.746 | -6.780 |
| 19.60 | 15.00 | 2110.21 | 0.7190 | 0.773 | 0.287 | -0.110 | 0.6030 | 0.2200 | 15.791 | 65.493 |
| 29.60 | 15.00 | 2110.21 | 1.7130 | 1.853 | 0.736 | -0.148 | 1.3110 | 0.5170 | 21.995 | 57.790 |

RUDDER DYNAMOMETER

epb30j1.rud  Three boards: RNo.2 V=+10m/s n = +800rpm Drift Angle = 0 deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.00 | 10.00 | 804.68 | -0.8820 | -1.146 | 0.731 | -0.115 | -0.6250 | 0.4010 | 40.035 | 46.776 |
| -35.00 | 10.00 | 804.68 | -1.0940 | -1.209 | 0.545 | -0.074 | -0.7520 | 0.3080 | 36.073 | 48.092 |
| -30.00 | 10.00 | 802.84 | -1.3495 | -1.392 | 0.447 | -0.023 | -0.9535 | 0.2770 | 31.619 | 51.737 |
| -25.00 | 10.00 | 804.68 | -1.2720 | -1.292 | 0.329 | 0.025 | -0.8500 | 0.2000 | 28.030 | 48.678 |
| -20.00 | 10.00 | 802.84 | -1.0255 | -1.035 | 0.210 | 0.031 | -0.6715 | 0.1335 | 26.922 | 47.862 |
| -15.00 | 10.00 | 804.68 | -0.7650 | -0.775 | 0.139 | 0.036 | -0.4840 | 0.0850 | 25.333 | 45.638 |
| -10.00 | 10.00 | 805.84 | -0.4920 | -0.497 | 0.073 | 0.028 | -0.3055 | 0.0520 | 24.390 | 44.869 |
| -5.00 | 10.00 | 804.68 | -0.2450 | -0.248 | 0.051 | 0.017 | -0.1390 | 0.0350 | 22.981 | 39.601 |
| 0.00 | 10.00 | 805.15 | -0.0206 | -0.021 | 0.051 | -0.001 | 0.0162 | 0.0306 | 71.128 | -203.381 |
| 5.00 | 10.00 | 804.68 | 0.2140 | 0.224 | 0.127 | -0.021 | 0.1750 | 0.0380 | 20.816 | 61.869 |
| 10.00 | 10.00 | 802.84 | 0.4565 | 0.539 | 0.517 | -0.024 | 0.3445 | 0.0565 | 24.908 | 48.661 |
| 15.00 | 10.00 | 804.68 | 0.6650 | 0.686 | 0.169 | -0.031 | 0.5230 | 0.0870 | 25.398 | 59.463 |
| 20.00 | 10.00 | 802.84 | 0.9075 | 0.930 | 0.226 | -0.034 | 0.6960 | 0.1360 | 26.346 | 57.805 |
| 25.00 | 10.00 | 804.68 | 1.1990 | 1.243 | 0.370 | -0.021 | 0.9040 | 0.2060 | 28.272 | 55.396 |
| 30.00 | 10.00 | 802.84 | 1.3980 | 1.448 | 0.476 | -0.000 | 1.0620 | 0.2935 | 29.948 | 56.138 |
| 35.00 | 10.00 | 804.68 | 1.4650 | 1.589 | 0.679 | 0.055 | 1.1540 | 0.3980 | 33.436 | 56.346 |
| 40.00 | 10.00 | 804.68 | 1.5380 | 1.732 | 0.862 | 0.088 | 1.2070 | 0.4970 | 35.054 | 54.287 |
| 45.00 | 10.00 | 804.68 | 1.1820 | 1.557 | 1.020 | 0.149 | 0.8200 | 0.5790 | 39.541 | 46.019 |

RUDDER DYNAMOMETER

epb30j2.rud  Three boards: RNo.2 V=+10m/s n = +1460rpm Drift Angle = 0 deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.00 | 10.00 | 1456.69 | -2.0140 | -2.570 | 1.598 | -0.200 | -1.3170 | 0.9870 | 37.752 | 46.448 |
| -35.00 | 10.00 | 1456.69 | -2.6780 | -2.909 | 1.246 | -0.074 | -1.7240 | 0.7950 | 32.519 | 46.709 |
| -30.00 | 10.00 | 1457.67 | -2.6260 | -2.656 | 0.764 | 0.090 | -1.7120 | 0.5230 | 26.599 | 48.187 |
| -25.00 | 10.00 | 1456.69 | -2.2620 | -2.277 | 0.537 | 0.117 | -1.4290 | 0.3640 | 24.864 | 46.142 |
| -20.00 | 10.00 | 1457.67 | -1.7950 | -1.800 | 0.332 | 0.098 | -1.1105 | 0.2435 | 24.565 | 45.083 |
| -15.00 | 10.00 | 1456.69 | -1.3760 | -1.380 | 0.196 | 0.099 | -0.8070 | 0.1480 | 22.785 | 41.730 |
| -10.00 | 10.00 | 1457.67 | -0.9085 | -0.904 | 0.057 | 0.058 | -0.5020 | 0.0865 | 23.622 | 38.849 |
| -5.00 | 10.00 | 1456.69 | -0.5140 | -0.517 | 0.048 | 0.039 | -0.2210 | 0.0490 | 22.431 | 25.968 |
| 0.00 | 10.00 | 1457.75 | -0.0786 | -0.079 | 0.028 | -0.003 | 0.0564 | 0.0314 | 40.719 | -101.164 |
| 5.00 | 10.00 | 1456.69 | 0.3320 | 0.335 | 0.052 | -0.033 | 0.3810 | 0.0480 | 20.150 | 96.998 |
| 10.00 | 10.00 | 1457.67 | 0.7895 | 0.796 | 0.103 | -0.077 | 0.7000 | 0.0860 | 20.331 | 71.070 |
| 15.00 | 10.00 | 1456.69 | 1.2020 | 1.217 | 0.215 | -0.079 | 1.0170 | 0.1470 | 23.477 | 66.394 |
| 20.00 | 10.00 | 1457.67 | 1.6355 | 1.655 | 0.344 | -0.103 | 1.3325 | 0.2480 | 23.766 | 63.296 |
| 25.00 | 10.00 | 1456.69 | 2.0290 | 2.077 | 0.564 | -0.079 | 1.6500 | 0.3840 | 26.171 | 62.306 |
| 30.00 | 10.00 | 1457.67 | 2.3855 | 2.465 | 0.800 | -0.062 | 1.9130 | 0.5675 | 27.462 | 61.200 |
| 35.00 | 10.00 | 1456.69 | 2.5900 | 2.819 | 1.216 | 0.064 | 2.0840 | 0.8380 | 32.239 | 60.130 |
| 40.00 | 10.00 | 1456.69 | 2.5460 | 3.043 | 1.700 | 0.220 | 1.8930 | 1.1430 | 37.224 | 54.314 |
| 45.00 | 10.00 | 1456.69 | 2.4080 | 3.131 | 2.019 | 0.285 | 1.7400 | 1.3520 | 39.101 | 52.349 |
| 50.00 | 10.00 | 1456.69 | 2.1480 | 3.028 | 2.151 | 0.321 | 1.5640 | 1.4600 | 40.578 | 52.639 |

RUDDER DYNAMOMETER
epb30j3.rud Three boards: RNo.2 V=+10m/s n = +2100rpm Drift Angle = 0 deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.00 | 10.00 | 2103.69 | -4.4910 | -5.027 | 2.469 | -0.001 | -3.0260 | 1.5530 | 30.001 | 48.463 |
| -35.00 | 10.00 | 2103.69 | -4.2830 | -4.500 | 1.729 | 0.215 | -2.9020 | 1.1230 | 25.211 | 49.629 |
| -30.00 | 10.00 | 2104.72 | -3.8090 | -3.945 | 1.292 | 0.253 | -2.5505 | 0.8370 | 23.584 | 49.096 |
| -25.00 | 10.00 | 2103.69 | -3.2220 | -3.296 | 0.889 | 0.253 | -2.0870 | 0.5760 | 22.314 | 47.264 |
| -20.00 | 10.00 | 2104.72 | -2.5905 | -2.627 | 0.566 | 0.230 | -1.6325 | 0.3710 | 21.204 | 45.719 |
| -15.00 | 10.00 | 2103.69 | -1.9540 | -1.967 | 0.307 | 0.188 | -1.1820 | 0.2050 | 20.411 | 43.221 |
| -10.00 | 10.00 | 2104.72 | -1.3190 | -1.323 | 0.137 | 0.133 | -0.7385 | 0.0935 | 19.922 | 38.719 |
| -5.00 | 10.00 | 2103.69 | -0.6670 | -0.669 | 0.046 | 0.066 | -0.3000 | 0.0290 | 20.121 | 27.565 |
| 0.00 | 10.00 | 2104.44 | -0.0258 | -0.026 | 0.029 | -0.006 | 0.1616 | 0.0066 | 54.734 | -666.584 |
| 5.00 | 10.00 | 2103.69 | 0.5910 | 0.593 | 0.054 | -0.071 | 0.6220 | 0.0170 | 17.939 | 87.221 |
| 10.00 | 10.00 | 2104.72 | 1.1880 | 1.194 | 0.142 | -0.131 | 1.0825 | 0.0715 | 18.999 | 72.820 |
| 15.00 | 10.00 | 2103.69 | 1.8030 | 1.813 | 0.279 | -0.181 | 1.5500 | 0.1780 | 20.010 | 67.630 |
| 20.00 | 10.00 | 2104.72 | 2.4260 | 2.453 | 0.509 | -0.205 | 2.0385 | 0.3355 | 21.668 | 65.242 |
| 25.00 | 10.00 | 2103.69 | 3.0230 | 3.073 | 0.788 | -0.212 | 2.5050 | 0.5410 | 23.095 | 63.813 |
| 30.00 | 10.00 | 2104.25 | 3.6743 | 3.789 | 1.214 | -0.187 | 3.0210 | 0.8383 | 25.058 | 62.616 |
| 35.00 | 10.00 | 2103.32 | 4.1980 | 4.405 | 1.684 | -0.140 | 3.4380 | 1.1820 | 26.801 | 61.823 |
| 40.00 | 10.00 | 2103.32 | 4.4120 | 4.868 | 2.315 | 0.034 | 3.5790 | 1.6570 | 30.676 | 60.703 |
| 45.00 | 10.00 | 2103.32 | 3.7950 | 4.923 | 3.168 | 0.349 | 2.8260 | 2.2170 | 37.069 | 54.932 |

RUDDER DYNAMOMETER
epb30j428.rud Three boards: RNo.2 V=+10m/s n = -800rpm Drift Angle = 0 deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|
| -30.00 | 10.00 | -803.30 | 0.0840 | 0.230 | -0.314 | -0.050 | 0.0090 | -0.2540 | 8.037 | 41.170 |
| -20.00 | 10.00 | -803.30 | 0.1710 | 0.260 | -0.289 | -0.010 | 0.0320 | -0.2180 | 26.193 | 22.868 |
| -10.00 | 10.00 | -803.30 | 0.1090 | 0.147 | -0.223 | 0.008 | 0.0290 | -0.1630 | 35.490 | 21.230 |
| 0.00 | 10.00 | -803.30 | 0.0110 | 0.011 | -0.195 | 0.013 | -0.0350 | -0.1420 | 142.311 | -333.448 |
| 10.00 | 10.00 | -803.30 | -0.0110 | -0.046 | -0.201 | 0.011 | -0.0440 | -0.1670 | 6.578 | 138.735 |
| 20.00 | 10.00 | -803.30 | -0.0820 | -0.156 | -0.232 | 0.009 | -0.0890 | -0.2020 | 24.289 | 80.657 |
| 30.00 | 10.00 | -803.30 | -0.0640 | -0.161 | -0.212 | 0.030 | -0.0530 | -0.2370 | 11.273 | 84.548 |

RUDDER DYNAMOMETER
epb30j528.rud Three boards: RNo.2 V=+10m/s n = -1280rpm Drift Angle = 0 deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|
| -30.00 | 10.00 | -1203.54 | 0.0920 | 0.316 | -0.473 | -0.123 | -0.0610 | -0.3270 | -9.028 | 17.469 |
| -20.00 | 10.00 | -1203.54 | 0.1390 | 0.300 | -0.496 | -0.063 | 0.0250 | -0.3350 | 9.020 | 28.535 |
| -10.00 | 10.00 | -1203.54 | 0.1300 | 0.206 | -0.454 | -0.013 | -0.0010 | -0.3110 | 23.911 | 8.033 |
| 0.00 | 10.00 | -1203.54 | 0.0860 | 0.086 | -0.394 | 0.034 | -0.0080 | -0.2860 | 69.004 | -26.503 |
| 10.00 | 10.00 | -1203.54 | 0.1920 | 0.131 | -0.333 | 0.077 | 0.0030 | -0.2830 | 88.617 | -52.646 |
| 20.00 | 10.00 | -1203.54 | 0.1730 | 0.066 | -0.281 | 0.112 | 0.1000 | -0.2890 | 198.151 | -24.455 |
| 30.00 | 10.00 | -1203.54 | 0.1010 | -0.081 | -0.338 | 0.136 | 0.0620 | -0.3030 | -137.369 | 102.521 |

RUDDER DYNAMOMETER
epb1p2j129.rud One board: RNo.2 V=+10m/s n = +800rpm Drift Angle = +15 deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.00 | 10.00 | 806.83 | -1.1960 | -1.347 | 0.670 | -0.033 | -0.7150 | 0.3540 | 32.453 | 40.036 |
| -30.00 | 10.00 | 806.83 | -1.0530 | -1.125 | 0.425 | 0.015 | -0.5470 | 0.2180 | 28.684 | 34.268 |
| -20.00 | 10.00 | 806.83 | -0.7070 | -0.743 | 0.229 | 0.014 | -0.3110 | 0.1210 | 28.125 | 27.340 |
| -10.00 | 10.00 | 806.83 | -0.2200 | -0.233 | 0.095 | -0.013 | 0.0000 | 0.0540 | 35.633 | -13.387 |
| 0.00 | 10.00 | 806.83 | 0.3313 | 0.331 | 0.042 | -0.035 | 0.3697 | 0.0247 | 19.346 | 93.935 |
| 10.00 | 10.00 | 806.83 | 0.9390 | 0.941 | 0.092 | -0.034 | 0.7920 | 0.0490 | 26.354 | 66.229 |
| 20.00 | 10.00 | 806.83 | 1.6010 | 1.597 | 0.270 | -0.008 | 1.2570 | 0.1560 | 29.484 | 59.775 |
| 30.00 | 10.00 | 806.83 | 1.8220 | 1.872 | 0.590 | 0.064 | 1.4910 | 0.3440 | 33.394 | 60.669 |
| 40.00 | 10.00 | 806.83 | 1.5390 | 1.826 | 1.006 | 0.171 | 1.1280 | 0.5790 | 39.372 | 50.216 |

RUDDER DYNAMOMETER
epb1p2j229.rud One board: RNo.2 V=+10m/s n = +1460rpm Drift Angle = +15 deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.00 | 10.00 | 1462.76 | -2.2600 | -2.665 | 1.452 | -0.167 | -1.2100 | 0.8350 | 36.254 | 37.432 |
| -30.00 | 10.00 | 1462.76 | -2.2080 | -2.290 | 0.755 | 0.079 | -1.2390 | 0.4380 | 26.518 | 38.922 |
| -20.00 | 10.00 | 1462.76 | -1.3940 | -1.429 | 0.349 | 0.051 | -0.6860 | 0.2030 | 26.433 | 32.463 |
| -10.00 | 10.00 | 1462.76 | -0.4990 | -0.509 | 0.104 | 0.012 | -0.0930 | 0.0560 | 27.613 | 2.306 |
| 0.00 | 10.00 | 1462.76 | 0.4380 | 0.438 | 0.027 | -0.024 | 0.5517 | 0.0043 | 24.544 | 108.457 |
| 10.00 | 10.00 | 1462.76 | 1.3760 | 1.379 | 0.139 | -0.037 | 1.2310 | 0.0710 | 27.298 | 71.298 |
| 20.00 | 10.00 | 1462.76 | 2.2970 | 2.324 | 0.482 | -0.023 | 1.9080 | 0.2960 | 28.993 | 64.009 |
| 30.00 | 10.00 | 1462.76 | 2.9190 | 3.160 | 1.264 | 0.167 | 2.2560 | 0.8540 | 35.273 | 57.826 |
| 40.00 | 10.00 | 1462.76 | 2.7150 | 3.280 | 1.867 | 0.283 | 1.9920 | 1.1940 | 38.622 | 52.423 |

RUDDER DYNAMOMETER
epb1p2j329.rud One board: RNo.2 V=+10m/s n = +2100rpm Drift Angle = +15 deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.00 | 10.00 | 2102.02 | -4.3170 | -4.598 | 2.009 | 0.175 | -2.6380 | 1.2140 | 26.179 | 43.418 |
| -30.00 | 10.00 | 2102.02 | -3.3330 | -3.453 | 1.134 | 0.234 | -1.8950 | 0.6660 | 23.198 | 39.690 |
| -20.00 | 10.00 | 2102.02 | -2.0450 | -2.077 | 0.455 | 0.182 | -1.0030 | 0.2585 | 21.234 | 32.154 |
| -10.00 | 10.00 | 2102.02 | -0.6820 | -0.683 | 0.069 | 0.098 | -0.0750 | 0.0220 | 15.697 | -6.062 |
| 0.00 | 10.00 | 2102.02 | 0.6570 | 0.657 | -0.054 | 0.010 | 0.8777 | -0.0600 | 31.507 | 116.199 |
| 10.00 | 10.00 | 2102.02 | 1.9660 | 1.951 | 0.085 | -0.049 | 1.8630 | 0.0140 | 27.481 | 76.634 |
| 20.00 | 10.00 | 2102.02 | 3.2620 | 3.270 | 0.597 | -0.065 | 2.8920 | 0.3720 | 28.004 | 69.505 |
| 30.00 | 10.00 | 2102.02 | 4.4550 | 4.577 | 1.437 | -0.049 | 3.8160 | 0.9630 | 28.924 | 65.241 |
| 40.00 | 10.00 | 2102.02 | 4.2720 | 5.207 | 3.010 | 0.385 | 3.2820 | 2.0510 | 37.379 | 56.101 |

RUDDER DYNAMOMETER
epb2p2j130.rud Two boards: RNo.2 V=+10m/s n = +800rpm Drift Angle = +15 deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.00 | 10.00 | 802.59 | -0.9700 | -1.145 | 0.626 | -0.083 | -0.6120 | 0.3060 | 37.269 | 40.573 |
| -30.00 | 10.00 | 802.59 | -1.1290 | -1.166 | 0.377 | 0.032 | -0.7100 | 0.1890 | 27.215 | 43.290 |
| -20.00 | 10.00 | 802.59 | -0.7320 | -0.752 | 0.186 | 0.023 | -0.4360 | 0.0950 | 26.911 | 41.376 |
| -10.00 | 10.00 | 802.59 | -0.2660 | -0.273 | 0.063 | -0.003 | -0.1250 | 0.0330 | 30.930 | 29.865 |
| 0.00 | 10.00 | 802.59 | 0.2637 | 0.264 | 0.018 | -0.023 | 0.2257 | 0.0060 | 21.250 | 68.032 |
| 10.00 | 10.00 | 802.59 | 0.8640 | 0.863 | 0.071 | -0.024 | 0.6380 | 0.0280 | 27.230 | 55.944 |
| 20.00 | 10.00 | 802.59 | 1.5160 | 1.510 | 0.250 | -0.005 | 1.0860 | 0.1310 | 29.681 | 53.063 |
| 30.00 | 10.00 | 802.59 | 1.7380 | 1.800 | 0.590 | 0.078 | 1.2790 | 0.3300 | 34.298 | 53.228 |
| 40.00 | 10.00 | 802.59 | 1.5400 | 1.820 | 0.995 | 0.187 | 1.0350 | 0.5520 | 40.287 | 45.572 |

RUDDER DYNAMOMETER
epb2p2j230.rud Two boards: RNo.2 V=+10m/s n = +1460rpm Drift Angle = +15 deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.00 | 10.00 | 1458.67 | -2.6970 | -2.871 | 1.253 | 0.051 | -1.7320 | 0.7350 | 28.196 | 45.170 |
| -30.00 | 10.00 | 1458.67 | -2.1740 | -2.251 | 0.736 | 0.089 | -1.3420 | 0.4170 | 26.021 | 43.417 |
| -20.00 | 10.00 | 1458.67 | -1.4010 | -1.430 | 0.332 | 0.060 | -0.8010 | 0.1850 | 25.759 | 39.536 |
| -10.00 | 10.00 | 1458.67 | -0.5310 | -0.535 | 0.072 | 0.026 | -0.2170 | 0.0350 | 25.187 | 23.567 |
| 0.00 | 10.00 | 1458.67 | 0.3710 | 0.371 | -0.001 | -0.008 | 0.4073 | -0.0160 | 27.919 | 92.244 |
| 10.00 | 10.00 | 1458.67 | 1.2880 | 1.288 | 0.113 | -0.028 | 1.0750 | 0.0470 | 27.800 | 65.343 |
| 20.00 | 10.00 | 1458.67 | 2.2100 | 2.227 | 0.441 | -0.021 | 1.7480 | 0.2590 | 29.029 | 60.218 |
| 30.00 | 10.00 | 1458.67 | 3.1050 | 3.195 | 1.013 | 0.021 | 2.3890 | 0.6190 | 30.651 | 56.922 |
| 40.00 | 10.00 | 1458.67 | 2.8420 | 3.396 | 1.896 | 0.289 | 1.9820 | 1.2180 | 38.510 | 50.276 |

RUDDER DYNAMOMETER
epb2p2j330.rud Two boards: RNo.2 V=+10m/s n = +2100rpm Drift Angle = +15 deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.00 | 10.00 | 2103.32 | -4.3420 | -4.621 | 2.014 | 0.152 | -2.7570 | 1.2260 | 26.699 | 45.266 |
| -30.00 | 10.00 | 2103.32 | -3.4060 | -3.535 | 1.172 | 0.199 | -2.0400 | 0.6820 | 24.358 | 42.127 |
| -20.00 | 10.00 | 2103.32 | -2.1990 | -2.229 | 0.476 | 0.163 | -1.2050 | 0.2700 | 22.681 | 37.459 |
| -10.00 | 10.00 | 2103.32 | -0.8680 | -0.868 | 0.076 | 0.085 | -0.2910 | 0.0210 | 20.188 | 15.948 |
| 0.00 | 10.00 | 2103.32 | 0.4753 | 0.475 | -0.066 | 0.004 | 0.6467 | -0.0857 | 30.827 | 118.565 |
| 10.00 | 10.00 | 2103.32 | 1.8110 | 1.802 | 0.105 | -0.053 | 1.6470 | 0.0040 | 27.061 | 72.544 |
| 20.00 | 10.00 | 2103.32 | 3.1020 | 3.124 | 0.609 | -0.084 | 2.6730 | 0.3520 | 27.282 | 66.780 |
| 30.00 | 10.00 | 2103.32 | 4.3220 | 4.451 | 1.416 | -0.077 | 3.6140 | 0.9270 | 28.258 | 63.221 |
| 40.00 | 10.00 | 2103.32 | 4.1730 | 5.101 | 2.962 | 0.379 | 3.0800 | 1.9830 | 37.416 | 53.750 |

RUDDER DYNAMOMETER
epb3p2j131.rud Three boards: RNo.2 V=+10m/s n = +800rpm Drift Angle = +15 deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.00 | 10.00 | 801.00 | -0.9440 | -1.143 | 0.654 | -0.100 | -0.6200 | 0.3240 | 38.690 | 42.246 |
| -30.00 | 10.00 | 801.00 | -1.0695 | -1.102 | 0.351 | 0.041 | -0.7260 | 0.1825 | 26.220 | 48.143 |
| -20.00 | 10.00 | 801.00 | -0.7520 | -0.771 | 0.187 | 0.032 | -0.4570 | 0.0960 | 25.862 | 42.433 |
| -10.00 | 10.00 | 801.00 | -0.2840 | -0.291 | 0.068 | 0.007 | -0.1470 | 0.0370 | 27.454 | 34.314 |
| 0.00 | 10.00 | 801.00 | 0.2460 | 0.246 | 0.032 | -0.015 | 0.2067 | 0.0127 | 23.848 | 66.549 |
| 10.00 | 10.00 | 801.00 | 0.8680 | 0.871 | 0.089 | -0.020 | 0.6240 | 0.0360 | 27.732 | 53.830 |
| 20.00 | 10.00 | 801.00 | 1.5320 | 1.532 | 0.270 | -0.006 | 1.0830 | 0.1340 | 29.591 | 51.916 |
| 30.00 | 10.00 | 801.00 | 1.6510 | 1.738 | 0.616 | 0.081 | 1.2440 | 0.3340 | 34.646 | 54.070 |
| 40.00 | 10.00 | 801.00 | 1.4760 | 1.793 | 1.030 | 0.194 | 0.9930 | 0.5620 | 40.831 | 45.066 |

RUDDER DYNAMOMETER
epb3p2j231.rud Three boards: RNo.2 V=+10m/s n = +1460rpm Drift Angle = +15 deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.00 | 10.00 | 1462.40 | -2.6430 | -2.890 | 1.346 | -0.006 | -1.6940 | 0.7840 | 30.195 | 44.841 |
| -30.00 | 10.00 | 1462.40 | -2.1940 | -2.273 | 0.745 | 0.094 | -1.3840 | 0.4310 | 25.844 | 44.700 |
| -20.00 | 10.00 | 1462.40 | -1.4490 | -1.480 | 0.344 | 0.075 | -0.8710 | 0.1990 | 24.911 | 42.425 |
| -10.00 | 10.00 | 1462.40 | -0.5980 | -0.606 | 0.095 | 0.042 | -0.2850 | 0.0450 | 23.130 | 30.176 |
| 0.00 | 10.00 | 1462.40 | 0.3330 | 0.333 | 0.024 | 0.004 | 0.3533 | -0.0053 | 31.232 | 88.579 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 10.00 | 10.00 | 1462.40 | 1.2790 | 1.285 | 0.142 | -0.021 | 1.0440 | 0.0570 | 28.337 | 63.313 |
| 20.00 | 10.00 | 1462.40 | 2.2140 | 2.244 | 0.479 | -0.023 | 1.7320 | 0.2690 | 28.969 | 59.136 |
| 30.00 | 10.00 | 1462.40 | 3.1060 | 3.264 | 1.149 | 0.067 | 2.3770 | 0.7450 | 32.037 | 56.975 |
| 40.00 | 10.00 | 1462.40 | 3.0080 | 3.559 | 1.951 | 0.278 | 2.0790 | 1.2510 | 37.787 | 49.855 |

RUDDER DYNAMOMETER
epb3p2j331.rud Three boards: RNo.2 V=+10m/s n = +2100rpm Drift Angle = +15 deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.00 | 10.00 | 2103.77 | -4.4010 | -4.707 | 2.078 | 0.132 | -2.8170 | 1.2760 | 27.184 | 45.773 |
| -30.00 | 10.00 | 2103.77 | -3.4990 | -3.637 | 1.213 | 0.173 | -2.1170 | 0.7200 | 25.215 | 42.812 |
| -20.00 | 10.00 | 2103.77 | -2.3500 | -2.393 | 0.541 | 0.160 | -1.3510 | 0.3170 | 23.304 | 40.087 |
| -10.00 | 10.00 | 2103.77 | -0.9850 | -0.989 | 0.109 | 0.083 | -0.4340 | 0.0400 | 21.624 | 26.387 |
| 0.00 | 10.00 | 2103.77 | 0.3447 | 0.345 | -0.050 | 0.011 | 0.5313 | -0.0763 | 33.321 | 136.495 |
| 10.00 | 10.00 | 2103.77 | 1.7240 | 1.719 | 0.121 | -0.047 | 1.5730 | 0.0290 | 27.235 | 72.949 |
| 20.00 | 10.00 | 2103.77 | 3.0790 | 3.112 | 0.641 | -0.086 | 2.6320 | 0.3860 | 27.214 | 66.215 |
| 30.00 | 10.00 | 2103.77 | 4.3450 | 4.496 | 1.465 | -0.091 | 3.6180 | 0.9680 | 27.954 | 62.974 |
| 40.00 | 10.00 | 2103.77 | 4.3600 | 5.303 | 3.054 | 0.378 | 3.2190 | 2.0580 | 37.119 | 53.943 |

RUDDER DYNAMOMETER
epb1m1j132.rud One board: RNo.2 V=+10m/s n = +800rpm Drift Angle = -7.5 deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.00 | 10.00 | 804.63 | -0.8980 | -1.196 | 0.790 | -0.123 | -0.6660 | 0.4290 | 40.283 | 48.222 |
| -30.00 | 10.00 | 804.63 | -1.1300 | -1.220 | 0.483 | -0.062 | -0.7880 | 0.2840 | 35.096 | 50.077 |
| -20.00 | 10.00 | 804.63 | -1.2410 | -1.246 | 0.231 | 0.030 | -0.8580 | 0.1510 | 27.559 | 51.365 |
| -10.00 | 10.00 | 804.63 | -0.7050 | -0.709 | 0.084 | 0.036 | -0.4630 | 0.0590 | 24.961 | 48.235 |
| 0.00 | 10.00 | 804.63 | -0.1473 | -0.147 | 0.034 | 0.017 | -0.0817 | 0.0310 | 18.153 | 37.860 |
| 10.00 | 10.00 | 804.63 | 0.3500 | 0.358 | 0.080 | -0.015 | 0.2630 | 0.0490 | 25.918 | 57.267 |
| 20.00 | 10.00 | 804.63 | 0.8190 | 0.840 | 0.204 | -0.040 | 0.5940 | 0.1160 | 25.193 | 53.661 |
| 30.00 | 10.00 | 804.63 | 1.2600 | 1.303 | 0.424 | -0.029 | 0.9190 | 0.2440 | 27.732 | 52.933 |
| 40.00 | 10.00 | 804.63 | 1.1920 | 1.370 | 0.712 | 0.084 | 0.8230 | 0.4020 | 36.117 | 47.372 |

RUDDER DYNAMOMETER
epb1m1j232.rud One board: RNo.2 V=+10m/s n = +1460rpm Drift Angle = -7.5 deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.00 | 10.00 | 1464.07 | -2.0440 | -2.680 | 1.733 | -0.246 | -1.4330 | 1.0430 | 39.156 | 48.471 |
| -30.00 | 10.00 | 1464.07 | -2.8840 | -2.940 | 0.885 | 0.057 | -1.9700 | 0.6130 | 28.060 | 50.976 |
| -20.00 | 10.00 | 1464.07 | -2.0570 | -2.067 | 0.392 | 0.099 | -1.3810 | 0.2850 | 25.171 | 50.032 |
| -10.00 | 10.00 | 1464.07 | -1.1190 | -1.122 | 0.120 | 0.077 | -0.7080 | 0.0960 | 23.117 | 46.113 |
| 0.00 | 10.00 | 1464.07 | -0.2620 | -0.262 | 0.042 | 0.015 | -0.0930 | 0.0370 | 24.381 | 18.176 |
| 10.00 | 10.00 | 1464.07 | 0.5150 | 0.527 | 0.116 | -0.065 | 0.4740 | 0.0750 | 17.612 | 73.482 |
| 20.00 | 10.00 | 1464.07 | 1.3400 | 1.373 | 0.332 | -0.114 | 1.0800 | 0.2160 | 21.701 | 61.752 |
| 30.00 | 10.00 | 1464.07 | 2.1870 | 2.265 | 0.741 | -0.103 | 1.7150 | 0.4990 | 25.426 | 59.105 |
| 40.00 | 10.00 | 1464.07 | 2.6630 | 2.973 | 1.451 | 0.053 | 2.1150 | 0.9970 | 31.752 | 58.564 |

RUDDER DYNAMOMETER
epb1m1j332.rud One board: RNo.2 V=+10m/s n = +2100rpm Drift Angle = -7.5 deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.00 | 10.00 | 2104.96 | -4.5110 | -5.198 | 2.710 | -0.103 | -3.0700 | 1.7640 | 31.964 | 49.564 |
| -30.00 | 10.00 | 2104.96 | -4.2080 | -4.300 | 1.312 | 0.236 | -2.9120 | 0.8980 | 24.506 | 51.573 |
| -20.00 | 10.00 | 2104.96 | -3.0250 | -3.041 | 0.580 | 0.232 | -1.9920 | 0.4170 | 22.370 | 48.728 |
| -10.00 | 10.00 | 2104.96 | -1.7260 | -1.726 | 0.152 | 0.145 | -1.0570 | 0.1260 | 21.556 | 44.053 |
| 0.00 | 10.00 | 2104.96 | -0.4970 | -0.497 | 0.029 | 0.007 | -0.1760 | 0.0310 | 28.500 | 17.882 |
| 10.00 | 10.00 | 2104.96 | 0.6880 | 0.701 | 0.135 | -0.150 | 0.7230 | 0.1010 | 8.557 | 86.629 |
| 20.00 | 10.00 | 2104.96 | 1.9240 | 1.972 | 0.481 | -0.255 | 1.6570 | 0.3410 | 17.032 | 67.374 |
| 30.00 | 10.00 | 2104.96 | 3.1760 | 3.303 | 1.104 | -0.272 | 2.6010 | 0.7850 | 21.738 | 62.589 |
| 40.00 | 10.00 | 2104.96 | 4.4170 | 4.725 | 2.088 | -0.169 | 3.5420 | 1.4990 | 26.414 | 60.310 |

RUDDER DYNAMOMETER
epb2m1j133.rud Two boards: RNo.2 V=+10m/s n = +800rpm Drift Angle = -7.5 deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.00 | 10.00 | 802.51 | -0.9060 | -1.195 | 0.779 | -0.120 | -0.6520 | 0.4250 | 40.046 | 47.169 |
| -30.00 | 10.00 | 802.51 | -1.1620 | -1.253 | 0.494 | -0.067 | -0.8270 | 0.2940 | 35.295 | 51.382 |
| -20.00 | 10.00 | 802.51 | -1.2250 | -1.230 | 0.232 | 0.034 | -0.8330 | 0.1460 | 27.181 | 50.166 |
| -10.00 | 10.00 | 802.51 | -0.6640 | -0.668 | 0.079 | 0.036 | -0.4360 | 0.0570 | 24.654 | 48.312 |
| 0.00 | 10.00 | 802.51 | -0.0702 | -0.070 | 0.039 | 0.017 | -0.0610 | 0.0295 | -0.984 | 93.959 |
| 10.00 | 10.00 | 802.51 | 0.4070 | 0.414 | 0.080 | -0.016 | 0.2770 | 0.0470 | 26.121 | 50.307 |
| 20.00 | 10.00 | 802.51 | 0.8680 | 0.885 | 0.204 | -0.039 | 0.6020 | 0.1130 | 25.603 | 50.801 |
| 30.00 | 10.00 | 802.51 | 1.2840 | 1.318 | 0.411 | -0.015 | 0.8940 | 0.2410 | 28.834 | 50.422 |
| 40.00 | 10.00 | 802.51 | 1.2860 | 1.447 | 0.719 | 0.092 | 0.8750 | 0.4360 | 36.312 | 48.190 |

RUDDER DYNAMOMETER
epb2m1j233.rud Two boards: RNo.2 V=+10m/s n = +1460rpm Drift Angle = -7.5 deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.00 | 10.00 | 1463.73 | -1.9940 | -2.611 | 1.686 | -0.239 | -1.4010 | 1.0310 | 39.120 | 48.987 |
| -30.00 | 10.00 | 1463.73 | -2.7840 | -2.851 | 0.880 | 0.079 | -1.9470 | 0.5980 | 27.206 | 52.108 |
| -20.00 | 10.00 | 1463.73 | -1.9830 | -2.002 | 0.405 | 0.101 | -1.3550 | 0.2880 | 24.945 | 51.048 |
| -10.00 | 10.00 | 1463.73 | -1.0700 | -1.076 | 0.132 | 0.078 | -0.6920 | 0.1000 | 22.693 | 47.411 |
| 0.00 | 10.00 | 1463.73 | -0.1970 | -0.197 | 0.046 | 0.016 | -0.0727 | 0.0363 | 21.804 | 19.468 |
| 10.00 | 10.00 | 1463.73 | 0.5710 | 0.583 | 0.116 | -0.064 | 0.4980 | 0.0750 | 19.055 | 68.863 |
| 20.00 | 10.00 | 1463.73 | 1.4120 | 1.443 | 0.339 | -0.111 | 1.1090 | 0.2220 | 22.315 | 60.009 |
| 30.00 | 10.00 | 1463.73 | 2.2500 | 2.326 | 0.754 | -0.103 | 1.7470 | 0.5060 | 25.557 | 58.423 |
| 40.00 | 10.00 | 1463.73 | 2.7280 | 3.018 | 1.444 | 0.078 | 2.0690 | 0.9940 | 32.569 | 56.175 |

RUDDER DYNAMOMETER
epb2m1j333.rud Two boards: RNo.2 V=+10m/s n = +2100rpm Drift Angle = -7.5 deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.00 | 10.00 | 2106.71 | -4.5370 | -5.198 | 2.680 | -0.062 | -3.1200 | 1.7120 | 31.178 | 49.654 |
| -30.00 | 10.00 | 2106.71 | -3.7115 | -3.745 | 1.060 | 0.241 | -2.6005 | 0.7480 | 23.441 | 52.823 |
| -20.00 | 10.00 | 2106.71 | -2.9350 | -2.961 | 0.594 | 0.236 | -1.9570 | 0.4180 | 22.024 | 49.448 |
| -10.00 | 10.00 | 2106.71 | -1.6360 | -1.640 | 0.165 | 0.151 | -1.0200 | 0.1290 | 20.769 | 45.137 |
| 0.00 | 10.00 | 2106.71 | -0.3910 | -0.391 | 0.025 | 0.014 | -0.1260 | 0.0220 | 26.398 | 14.795 |
| 10.00 | 10.00 | 2106.71 | 0.7520 | 0.765 | 0.142 | -0.143 | 0.7500 | 0.0990 | 11.324 | 81.191 |
| 20.00 | 10.00 | 2106.71 | 1.9950 | 2.042 | 0.488 | -0.257 | 1.6820 | 0.3440 | 17.421 | 65.657 |
| 30.00 | 10.00 | 2106.71 | 3.2390 | 3.360 | 1.111 | -0.273 | 2.6350 | 0.7900 | 21.850 | 62.168 |
| 40.00 | 10.00 | 2106.71 | 4.4300 | 4.733 | 2.083 | -0.180 | 3.5760 | 1.4910 | 26.183 | 60.623 |

RUDDER DYNAMOMETER
epb3m1j134.rud Three boards: RNo.2 V=+10m/s n = +800rpm Drift Angle = -7.5 deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.00 | 10.00 | 804.41 | -0.8750 | -1.167 | 0.773 | -0.131 | -0.6400 | 0.4220 | 41.251 | 47.717 |
| -30.00 | 10.00 | 804.41 | -1.3520 | -1.411 | 0.480 | -0.040 | -0.9680 | 0.2960 | 32.833 | 52.452 |
| -20.00 | 10.00 | 804.41 | -1.1700 | -1.179 | 0.232 | 0.027 | -0.7930 | 0.1450 | 27.709 | 49.964 |
| -10.00 | 10.00 | 804.41 | -0.6240 | -0.630 | 0.089 | 0.029 | -0.4050 | 0.0590 | 25.328 | 47.517 |
| 0.00 | 10.00 | 804.41 | -0.0943 | -0.094 | 0.046 | 0.006 | -0.0403 | 0.0330 | 23.759 | 25.342 |
| 10.00 | 10.00 | 804.41 | 0.3720 | 0.381 | 0.084 | -0.030 | 0.2870 | 0.0500 | 22.230 | 59.005 |
| 20.00 | 10.00 | 804.41 | 0.8290 | 0.847 | 0.199 | -0.048 | 0.6080 | 0.1170 | 24.362 | 54.659 |
| 30.00 | 10.00 | 804.41 | 1.2100 | 1.251 | 0.406 | -0.026 | 0.8960 | 0.2430 | 27.919 | 54.270 |
| 40.00 | 10.00 | 804.41 | 1.1960 | 1.393 | 0.743 | 0.090 | 0.8110 | 0.4510 | 36.426 | 47.869 |

RUDDER DYNAMOMETER
epb3m1j234.rud Three boards: RNo.2 V=+10m/s n = +1460rpm Drift Angle = -7.5 deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.00 | 10.00 | 1462.25 | -2.0860 | -2.710 | 1.730 | -0.251 | -1.3810 | 1.0140 | 39.255 | 45.591 |
| -30.00 | 10.00 | 1462.25 | -2.7360 | -2.788 | 0.836 | 0.072 | -1.8730 | 0.5830 | 27.404 | 51.130 |
| -20.00 | 10.00 | 1462.25 | -1.9240 | -1.941 | 0.388 | 0.083 | -1.2890 | 0.2780 | 25.689 | 49.825 |
| -10.00 | 10.00 | 1462.25 | -1.0270 | -1.034 | 0.129 | 0.057 | -0.6460 | 0.1000 | 24.441 | 45.699 |
| 0.00 | 10.00 | 1462.25 | -0.1717 | -0.172 | 0.046 | -0.001 | -0.0297 | 0.0403 | 30.483 | -0.264 |
| 10.00 | 10.00 | 1462.25 | 0.5870 | 0.598 | 0.114 | -0.078 | 0.5300 | 0.0800 | 17.020 | 72.133 |
| 20.00 | 10.00 | 1462.25 | 1.4060 | 1.436 | 0.336 | -0.129 | 1.1310 | 0.2270 | 21.001 | 61.936 |
| 30.00 | 10.00 | 1462.25 | 2.2220 | 2.291 | 0.733 | -0.120 | 1.7360 | 0.5030 | 24.740 | 59.084 |
| 40.00 | 10.00 | 1462.25 | 2.6150 | 2.918 | 1.424 | 0.064 | 2.0250 | 1.0070 | 32.181 | 57.810 |

RUDDER DYNAMOMETER
epb3m1j334.rud Three boards: RNo.2 V=+10m/s n = +2100rpm Drift Angle = -7.5 deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.00 | 10.00 | 2103.47 | -4.5270 | -5.114 | 2.561 | -0.070 | -3.1380 | 1.6510 | 31.345 | 50.253 |
| -30.00 | 10.00 | 2103.47 | -3.9480 | -4.054 | 1.270 | 0.204 | -2.7240 | 0.8730 | 24.957 | 51.448 |
| -20.00 | 10.00 | 2103.47 | -2.8280 | -2.851 | 0.565 | 0.205 | -1.8730 | 0.4120 | 22.776 | 49.183 |
| -10.00 | 10.00 | 2103.47 | -1.5640 | -1.568 | 0.161 | 0.124 | -0.9580 | 0.1340 | 22.059 | 44.158 |
| 0.00 | 10.00 | 2103.47 | -0.3450 | -0.345 | 0.019 | -0.012 | -0.0773 | 0.0307 | 33.384 | 4.940 |
| 10.00 | 10.00 | 2103.47 | 0.7790 | 0.790 | 0.133 | -0.167 | 0.7820 | 0.1080 | 8.790 | 82.294 |
| 20.00 | 10.00 | 2103.47 | 1.9580 | 2.000 | 0.469 | -0.277 | 1.6920 | 0.3450 | 16.123 | 67.884 |
| 30.00 | 10.00 | 2103.47 | 3.1930 | 3.305 | 1.080 | -0.295 | 2.6340 | 0.7830 | 21.055 | 63.363 |
| 40.00 | 10.00 | 2103.47 | 4.3060 | 4.591 | 2.010 | -0.205 | 3.5210 | 1.4680 | 25.514 | 61.799 |

RUDDER DYNAMOMETER
eph0j1.rud Hull+Rudder+Propeller: RNo.2 V=+10m/s n = +800rpm Drift Angle = 0 deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.70 | 10.00 | 802.54 | -0.9920 | -1.244 | 0.756 | -0.120 | -0.3930 | 0.4030 | 39.658 | 27.525 |
| -35.70 | 10.00 | 802.54 | -1.0380 | -1.207 | 0.624 | -0.096 | -0.4080 | 0.3450 | 37.925 | 26.611 |
| -30.70 | 10.00 | 803.72 | -1.2315 | -1.314 | 0.499 | -0.055 | -0.6790 | 0.2950 | 34.128 | 38.308 |
| -25.70 | 10.00 | 802.54 | -1.2720 | -1.296 | 0.345 | 0.000 | -0.5490 | 0.2120 | 29.348 | 27.799 |
| -20.70 | 10.00 | 803.72 | -1.0735 | -1.083 | 0.222 | 0.023 | -0.5500 | 0.1385 | 27.896 | 34.487 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| -15.70 | 10.00 | 802.54 | -0.8110 | -0.820 | 0.144 | 0.023 | -0.2060 | 0.0880 | 27.124 | 9.599 |
| -10.70 | 10.00 | 803.72 | -0.5695 | -0.575 | 0.083 | 0.020 | -0.1950 | 0.0550 | 26.501 | 17.034 |
| -5.70 | 10.00 | 802.54 | -0.3040 | -0.310 | 0.069 | 0.010 | 0.1330 | 0.0390 | 26.722 | -59.100 |
| -2.70 | 10.00 | 802.54 | -0.1610 | -0.164 | 0.058 | 0.003 | 0.2320 | 0.0330 | 28.289 | -158.212 |
| -1.70 | 10.00 | 802.54 | -0.1110 | -0.113 | 0.059 | 0.001 | 0.2620 | 0.0330 | 28.793 | -249.425 |
| -0.70 | 10.00 | 803.13 | -0.0670 | -0.068 | 0.053 | -0.002 | 0.2152 | 0.0295 | 32.940 | -358.076 |
| 0.30 | 10.00 | 802.54 | -0.0180 | -0.018 | 0.054 | -0.005 | 0.3300 | 0.0270 | 55.255 | -1851.155 |
| 1.30 | 10.00 | 802.54 | 0.0240 | 0.025 | 0.055 | -0.006 | 0.3610 | 0.0280 | 5.893 | 1444.926 |
| 4.30 | 10.00 | 802.54 | 0.1660 | 0.170 | 0.064 | -0.013 | 0.4530 | 0.0320 | 22.243 | 249.031 |
| 9.30 | 10.00 | 803.72 | 0.4100 | 0.420 | 0.095 | -0.023 | 0.4605 | 0.0500 | 24.690 | 92.780 |
| 14.30 | 10.00 | 802.54 | 0.6660 | 0.683 | 0.152 | -0.027 | 0.7940 | 0.0780 | 26.057 | 98.083 |
| 19.30 | 10.00 | 803.72 | 0.9355 | 0.959 | 0.228 | -0.025 | 0.8270 | 0.1295 | 27.299 | 68.484 |
| 24.30 | 10.00 | 802.54 | 1.1940 | 1.227 | 0.338 | -0.016 | 1.1650 | 0.1930 | 28.706 | 75.522 |
| 29.30 | 10.00 | 803.72 | 1.4885 | 1.535 | 0.485 | 0.000 | 1.2245 | 0.2900 | 30.006 | 61.301 |
| 34.30 | 10.00 | 802.54 | 1.7060 | 1.781 | 0.660 | 0.029 | 1.5460 | 0.3940 | 31.632 | 66.642 |
| 39.30 | 10.00 | 802.54 | 1.6790 | 1.838 | 0.850 | 0.076 | 1.5890 | 0.5040 | 34.098 | 66.785 |

RUDDER DYNAMOMETER
eph0j2.rud Hull+Rudder+Propeller: RNo.2 V=+10m/s n = +1460rpm Drift Angle = 0 deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.70 | 10.00 | 1460.60 | -2.1350 | -2.720 | 1.690 | -0.220 | -1.2805 | 1.0080 | 38.064 | 42.402 |
| -35.70 | 10.00 | 1464.36 | -2.6260 | -2.915 | 1.341 | -0.074 | -1.4020 | 0.8140 | 32.523 | 37.851 |
| -30.70 | 10.00 | 1460.60 | -2.6200 | -2.695 | 0.865 | 0.086 | -1.6030 | 0.5645 | 26.799 | 44.285 |
| -25.70 | 10.00 | 1464.36 | -2.2180 | -2.262 | 0.608 | 0.094 | -1.1440 | 0.3910 | 25.832 | 35.549 |
| -20.70 | 10.00 | 1460.60 | -1.8100 | -1.831 | 0.390 | 0.087 | -0.9995 | 0.2595 | 25.190 | 38.569 |
| -15.70 | 10.00 | 1464.36 | -1.3800 | -1.395 | 0.246 | 0.073 | -0.5340 | 0.1570 | 24.758 | 22.399 |
| -10.70 | 10.00 | 1460.60 | -0.9580 | -0.965 | 0.127 | 0.048 | -0.4000 | 0.0900 | 24.945 | 24.798 |
| -5.70 | 10.00 | 1464.36 | -0.5160 | -0.521 | 0.079 | 0.021 | 0.0440 | 0.0460 | 26.048 | -25.102 |
| -2.70 | 10.00 | 1464.36 | -0.2630 | -0.266 | 0.065 | 0.001 | 0.2210 | 0.0330 | 29.479 | -99.933 |
| -1.70 | 10.00 | 1464.36 | -0.1790 | -0.181 | 0.060 | -0.003 | 0.2750 | 0.0320 | 31.667 | -168.990 |
| -0.70 | 10.00 | 1462.48 | -0.1002 | -0.101 | 0.054 | -0.012 | 0.2570 | 0.0325 | 42.008 | -284.824 |
| 0.30 | 10.00 | 1464.36 | -0.0030 | -0.003 | 0.050 | -0.016 | 0.4030 | 0.0310 | 591.016 | -13953.325 |
| 1.30 | 10.00 | 1464.36 | 0.0640 | 0.065 | 0.051 | -0.022 | 0.4620 | 0.0320 | -4.044 | 696.239 |
| 4.30 | 10.00 | 1464.36 | 0.3230 | 0.327 | 0.063 | -0.039 | 0.6380 | 0.0400 | 17.911 | 178.100 |
| 9.30 | 10.00 | 1460.60 | 0.7270 | 0.736 | 0.120 | -0.069 | 0.7830 | 0.0720 | 20.582 | 88.613 |
| 14.30 | 10.00 | 1464.36 | 1.1370 | 1.155 | 0.216 | -0.085 | 1.2510 | 0.1310 | 22.652 | 90.213 |
| 19.30 | 10.00 | 1460.60 | 1.5325 | 1.565 | 0.359 | -0.087 | 1.4095 | 0.2305 | 24.429 | 72.392 |
| 24.30 | 10.00 | 1464.36 | 1.9490 | 2.008 | 0.565 | -0.075 | 1.8750 | 0.3630 | 26.271 | 75.037 |
| 29.30 | 10.00 | 1460.60 | 2.3175 | 2.428 | 0.830 | -0.046 | 2.0065 | 0.5430 | 28.066 | 65.545 |
| 34.30 | 10.00 | 1464.36 | 2.6220 | 2.833 | 1.183 | 0.036 | 2.3670 | 0.7680 | 31.247 | 66.813 |
| 39.30 | 10.00 | 1460.60 | 2.5980 | 3.039 | 1.624 | 0.156 | 2.1415 | 1.0945 | 35.124 | 59.809 |

RUDDER DYNAMOMETER
eph0j3.rud Hull+Rudder+Propeller: RNo.2 V=+10m/s n = +2100rpm Drift Angle = 0 deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.70 | 10.00 | 2104.55 | -4.5435 | -5.166 | 2.639 | -0.000 | -2.8990 | 1.6650 | 29.991 | 46.051 |
| -35.70 | 10.00 | 2105.90 | -4.4780 | -4.754 | 1.915 | 0.209 | -2.7230 | 1.2530 | 25.594 | 44.403 |
| -30.70 | 10.00 | 2104.55 | -4.0260 | -4.206 | 1.458 | 0.225 | -2.5175 | 0.9570 | 24.642 | 45.558 |
| -25.70 | 10.00 | 2105.90 | -3.3550 | -3.453 | 0.992 | 0.218 | -1.8610 | 0.6550 | 23.671 | 39.293 |
| -20.70 | 10.00 | 2104.55 | -2.7090 | -2.747 | 0.600 | 0.210 | -1.5365 | 0.4040 | 22.334 | 39.982 |
| -15.70 | 10.00 | 2105.90 | -2.0080 | -2.029 | 0.353 | 0.164 | -0.8900 | 0.2340 | 21.896 | 27.856 |
| -10.70 | 10.00 | 2104.55 | -1.3890 | -1.397 | 0.173 | 0.104 | -0.6215 | 0.1285 | 22.522 | 27.738 |
| -5.70 | 10.00 | 2105.90 | -0.7620 | -0.767 | 0.083 | 0.035 | -0.0350 | 0.0580 | 25.355 | -12.191 |
| -2.70 | 10.00 | 2105.90 | -0.3910 | -0.393 | 0.045 | -0.005 | 0.2260 | 0.0300 | 31.147 | -74.657 |
| -1.70 | 10.00 | 2105.90 | -0.2650 | -0.266 | 0.041 | -0.016 | 0.3140 | 0.0240 | 36.143 | -135.349 |
| -0.70 | 10.00 | 2105.23 | -0.1650 | -0.166 | 0.023 | -0.033 | 0.3270 | 0.0213 | 49.977 | -226.068 |
| 0.30 | 10.00 | 2105.90 | -0.0380 | -0.038 | 0.020 | -0.047 | 0.4990 | 0.0150 | 155.020 | -1333.156 |
| 1.30 | 10.00 | 2105.90 | 0.0880 | 0.088 | 0.023 | -0.059 | 0.5960 | 0.0140 | -37.099 | 659.435 |
| 4.30 | 10.00 | 2105.90 | 0.4650 | 0.466 | 0.037 | -0.094 | 0.8640 | 0.0170 | 9.763 | 167.497 |
| 9.30 | 10.00 | 2104.55 | 1.0160 | 1.016 | 0.084 | -0.148 | 1.1555 | 0.0515 | 15.477 | 95.137 |
| 14.30 | 10.00 | 2105.90 | 1.6020 | 1.600 | 0.191 | -0.180 | 1.7750 | 0.1410 | 18.718 | 92.184 |
| 19.30 | 10.00 | 2105.00 | 2.2017 | 2.214 | 0.411 | -0.178 | 2.1623 | 0.2947 | 21.946 | 79.105 |
| 24.30 | 10.00 | 2105.90 | 2.8310 | 2.868 | 0.698 | -0.177 | 2.7430 | 0.4960 | 23.819 | 76.795 |
| 29.30 | 10.00 | 2104.55 | 3.5055 | 3.604 | 1.118 | -0.161 | 3.1105 | 0.7870 | 25.513 | 68.482 |
| 34.30 | 10.00 | 2105.90 | 4.0500 | 4.245 | 1.595 | -0.114 | 3.6820 | 1.1070 | 27.307 | 68.853 |
| 39.30 | 10.00 | 2104.55 | 4.6615 | 5.022 | 2.233 | -0.033 | 3.9625 | 1.5645 | 29.330 | 63.296 |

RUDDER DYNAMOMETER
eph0j47.rud Hull+Rudder+Propeller: RNo.2 V=+10m/s n = -800rpm Drift Angle = 0 deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.70 | 10.00 | -803.90 | -0.2020 | -0.037 | -0.179 | -0.129 | -0.1840 | -0.2230 | 383.216 | -33.250 |
| -35.70 | 10.00 | -803.90 | -0.1850 | -0.022 | -0.219 | -0.120 | -0.1850 | -0.2250 | 571.593 | 70.147 |
| -30.70 | 10.00 | -803.90 | -0.1360 | 0.005 | -0.239 | -0.102 | -0.1400 | -0.2080 | -1907.966 | -288.947 |
| -25.70 | 10.00 | -803.90 | -0.0850 | 0.041 | -0.273 | -0.093 | -0.1420 | -0.1870 | -194.191 | -131.372 |
| -20.70 | 10.00 | -803.90 | 0.0010 | 0.102 | -0.285 | -0.066 | -0.1130 | -0.1990 | -34.922 | -52.661 |
| -15.70 | 10.00 | -803.90 | -0.0210 | 0.049 | -0.255 | -0.040 | 0.0310 | -0.1940 | -50.882 | 150.149 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| -10.70 | 10.00 | -803.90 | 0.1270 | 0.176 | -0.277 | -0.036 | -0.0320 | -0.1900 | 9.779 | -15.315 |
| -5.70 | 10.00 | -803.90 | 0.1010 | 0.124 | -0.243 | -0.017 | -0.0170 | -0.1950 | 15.934 | -15.843 |
| -0.70 | 10.00 | -803.90 | 0.1473 | 0.151 | -0.267 | 0.014 | 0.0487 | -0.1853 | 39.200 | 16.545 |
| 4.30 | 10.00 | -803.90 | 0.1760 | 0.157 | -0.250 | 0.041 | 0.0240 | -0.1800 | 56.366 | -10.983 |
| 9.30 | 10.00 | -803.90 | 0.1830 | 0.140 | -0.248 | 0.058 | 0.0870 | -0.1820 | 71.318 | 22.648 |
| 14.30 | 10.00 | -803.90 | 0.2090 | 0.151 | -0.208 | 0.070 | 0.0920 | -0.1940 | 76.244 | 9.897 |
| 19.30 | 10.00 | -803.90 | 0.3020 | 0.225 | -0.181 | 0.103 | 0.1290 | -0.1810 | 75.899 | 10.028 |
| 24.30 | 10.00 | -803.90 | 0.2410 | 0.152 | -0.166 | 0.126 | 0.1690 | -0.2000 | 112.905 | 29.548 |
| 29.30 | 10.00 | -803.90 | 0.3170 | 0.221 | -0.113 | 0.135 | 0.1940 | -0.1830 | 91.044 | 18.403 |
| 34.30 | 10.00 | -803.90 | 0.3260 | 0.214 | -0.099 | 0.142 | 0.2030 | -0.1950 | 96.710 | 9.311 |
| 39.30 | 10.00 | -803.90 | 0.3100 | 0.190 | -0.079 | 0.162 | 0.1820 | -0.2090 | 115.368 | -13.101 |

RUDDER DYNAMOMETER
eph0j57.rud Hull+Rudder+Propeller: RNo.2 V=+10m/s n = -1460rpm Drift Angle = 0 deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|
| -30.70 | 10.00 | -1279.33 | -0.0140 | 0.102 | -0.223 | -0.111 | -0.0850 | -0.2400 | -79.406 | 31.487 |
| -20.70 | 10.00 | -1279.33 | 0.0850 | 0.208 | -0.362 | -0.069 | 0.0000 | -0.2110 | -3.156 | 18.220 |
| -15.70 | 10.00 | -1279.33 | 0.1620 | 0.230 | -0.272 | -0.087 | 0.1050 | -0.2450 | -7.809 | 55.284 |
| -10.70 | 10.00 | -1279.33 | 0.1770 | 0.224 | -0.268 | -0.008 | 0.0490 | -0.2030 | 26.215 | 20.652 |
| -5.70 | 10.00 | -1279.33 | 0.3290 | 0.354 | -0.265 | 0.004 | 0.1900 | -0.2090 | 31.069 | 41.713 |
| -0.70 | 10.00 | -1279.33 | 0.2463 | 0.250 | -0.264 | 0.019 | 0.1440 | -0.2023 | 39.434 | 110.897 |
| 4.30 | 10.00 | -1279.33 | 0.2770 | 0.257 | -0.258 | 0.010 | 0.1750 | -0.1990 | 33.859 | 44.803 |
| 9.30 | 10.00 | -1279.33 | 0.3290 | 0.281 | -0.272 | 0.026 | 0.1710 | -0.2060 | 39.363 | 30.762 |
| 19.30 | 10.00 | -1279.33 | 0.2470 | 0.164 | -0.210 | 0.119 | 0.2840 | -0.1890 | 102.546 | 108.264 |
| 29.30 | 10.00 | -1279.33 | 0.4670 | 0.317 | -0.183 | 0.188 | 0.2520 | -0.2620 | 89.307 | 11.272 |

RUDDER DYNAMOMETER
eph0zj9.rud Hull+Rudder+Propeller: RNo.2 V=0m/s(Nom.) n = 1460rpm Drift Angle = 0 deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.70 | 11.61 | 1461.44 | -1.2120 | -1.303 | 0.590 | 0.081 | -0.8000 | 0.3060 | 23.770 | 44.319 |
| -30.70 | 11.61 | 1461.44 | -0.9810 | -1.014 | 0.333 | 0.089 | -0.6190 | 0.1680 | 21.247 | 43.513 |
| -20.70 | 11.61 | 1461.44 | -0.6900 | -0.699 | 0.152 | 0.072 | -0.3960 | 0.0770 | 19.673 | 39.385 |
| -10.70 | 11.61 | 1461.44 | -0.3880 | -0.386 | 0.024 | 0.034 | -0.1950 | 0.0120 | 21.299 | 32.664 |
| -5.70 | 11.61 | 1461.44 | -0.2350 | -0.233 | -0.012 | 0.013 | -0.0870 | -0.0080 | 24.275 | 19.212 |
| -0.70 | 11.61 | 1461.44 | -0.0820 | -0.082 | -0.039 | -0.008 | 0.0233 | -0.0243 | 39.412 | -46.645 |
| 4.30 | 11.61 | 1461.44 | 0.0820 | 0.079 | -0.030 | -0.027 | 0.1510 | -0.0260 | -3.762 | 170.098 |
| 9.30 | 11.61 | 1461.44 | 0.2390 | 0.233 | -0.017 | -0.046 | 0.2750 | -0.0220 | 10.469 | 97.342 |
| 19.30 | 11.61 | 1461.44 | 0.5560 | 0.554 | 0.088 | -0.079 | 0.5150 | 0.0450 | 15.729 | 72.828 |
| 29.30 | 11.61 | 1461.44 | 0.8580 | 0.874 | 0.257 | -0.096 | 0.7460 | 0.1520 | 18.964 | 65.483 |
| 39.30 | 11.61 | 1461.44 | 1.1380 | 1.187 | 0.483 | -0.063 | 0.9420 | 0.2860 | 24.695 | 59.184 |

RUDDER DYNAMOMETER
eph0fs10.rud Hull+Rudder+Propeller: FREE-STREAM RNo.2 V=10m/s Drift Angle = 0 deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|
| -30.70 | 10.00 | 0.00 | -0.8015 | -0.854 | 0.323 | -0.068 | -0.5815 | 0.1785 | 37.966 | 51.698 |
| -25.70 | 10.00 | 0.00 | -0.8740 | -0.881 | 0.215 | -0.022 | -0.6330 | 0.1230 | 32.519 | 53.352 |
| -20.70 | 10.00 | 0.00 | -0.7525 | -0.755 | 0.141 | -0.003 | -0.5305 | 0.0830 | 30.285 | 52.209 |
| -15.70 | 10.00 | 0.00 | -0.5640 | -0.565 | 0.082 | 0.007 | -0.3950 | 0.0500 | 28.679 | 52.164 |
| -10.70 | 10.00 | 0.00 | -0.3760 | -0.379 | 0.053 | 0.011 | -0.2595 | 0.0320 | 27.032 | 51.284 |
| -5.70 | 10.00 | 0.00 | -0.1970 | -0.199 | 0.029 | 0.012 | -0.1380 | 0.0220 | 23.925 | 52.799 |
| -2.70 | 10.00 | 0.00 | -0.0860 | -0.088 | 0.031 | 0.009 | -0.0610 | 0.0190 | 19.539 | 52.847 |
| -0.70 | 10.00 | 0.00 | -0.0210 | -0.022 | 0.028 | 0.008 | -0.0147 | 0.0200 | -6.985 | 56.105 |
| 1.30 | 10.00 | 0.00 | 0.0410 | 0.042 | 0.034 | 0.006 | 0.0320 | 0.0200 | 45.241 | 60.469 |
| 4.30 | 10.00 | 0.00 | 0.1250 | 0.128 | 0.035 | 0.002 | 0.0950 | 0.0230 | 31.544 | 57.945 |
| 9.30 | 10.00 | 0.00 | 0.2860 | 0.292 | 0.062 | -0.002 | 0.2110 | 0.0350 | 29.253 | 55.649 |
| 14.30 | 10.00 | 0.00 | 0.4450 | 0.457 | 0.101 | 0.000 | 0.3260 | 0.0540 | 29.955 | 54.647 |
| 19.30 | 10.00 | 0.00 | 0.6290 | 0.646 | 0.158 | 0.008 | 0.4660 | 0.0875 | 31.128 | 55.147 |
| 24.30 | 10.00 | 0.00 | 0.8040 | 0.826 | 0.227 | 0.021 | 0.5820 | 0.1310 | 32.519 | 53.232 |
| 29.30 | 10.00 | 0.00 | 0.8720 | 0.921 | 0.328 | 0.049 | 0.6535 | 0.1830 | 35.300 | 54.133 |
| 34.30 | 10.00 | 0.00 | 0.8370 | 0.929 | 0.421 | 0.077 | 0.6790 | 0.2330 | 38.258 | 57.070 |

RUDDER DYNAMOMETER
ephm1j1.rud Hull+Rudder+Propeller: RNo.2 V=+10m/s n = +800rpm Drift Angle = -7.5 deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.00 | 10.00 | 800.76 | -1.0050 | -1.308 | 0.836 | -0.136 | -0.7450 | 0.4640 | 40.390 | 48.977 |
| -35.00 | 10.00 | 800.76 | -1.0270 | -1.253 | 0.718 | -0.114 | -0.7330 | 0.4160 | 39.123 | 49.429 |
| -30.00 | 10.00 | 803.81 | -1.5295 | -1.598 | 0.547 | -0.050 | -1.1610 | 0.3420 | 33.118 | 56.115 |
| -25.00 | 10.00 | 800.76 | -1.4560 | -1.490 | 0.403 | -0.015 | -1.0290 | 0.2540 | 31.002 | 52.311 |
| -20.00 | 10.00 | 803.81 | -1.3110 | -1.318 | 0.253 | 0.024 | -0.9120 | 0.1705 | 28.222 | 51.880 |
| -15.00 | 10.00 | 800.76 | -1.0060 | -1.012 | 0.156 | 0.030 | -0.7010 | 0.1090 | 27.068 | 52.237 |
| -10.00 | 10.00 | 803.81 | -0.7500 | -0.755 | 0.089 | 0.029 | -0.5080 | 0.0660 | 26.182 | 50.312 |
| -5.00 | 10.00 | 800.76 | -0.4690 | -0.472 | 0.060 | 0.022 | -0.3190 | 0.0430 | 25.312 | 50.494 |
| -2.00 | 10.00 | 800.76 | -0.3020 | -0.303 | 0.044 | 0.018 | -0.2030 | 0.0350 | 24.130 | 49.749 |
| -1.00 | 10.00 | 800.76 | -0.2520 | -0.253 | 0.045 | 0.018 | -0.1640 | 0.0340 | 22.934 | 47.533 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.00 | 10.00 | 802.29 | -0.1920 | -0.192 | 0.040 | 0.012 | -0.1250 | 0.0350 | 23.757 | 47.743 |
| 1.00 | 10.00 | 800.76 | -0.1440 | -0.144 | 0.041 | 0.008 | -0.0840 | 0.0380 | 24.635 | 40.265 |
| 2.00 | 10.00 | 800.76 | -0.0860 | -0.085 | 0.042 | 0.006 | -0.0490 | 0.0390 | 22.564 | 39.113 |
| 5.00 | 10.00 | 800.76 | 0.0630 | 0.068 | 0.051 | -0.004 | 0.0540 | 0.0410 | 24.321 | 67.479 |
| 10.00 | 10.00 | 803.81 | 0.2915 | 0.301 | 0.081 | -0.018 | 0.2190 | 0.0520 | 23.920 | 57.182 |
| 15.00 | 10.00 | 800.76 | 0.5510 | 0.567 | 0.135 | -0.028 | 0.3840 | 0.0800 | 25.086 | 51.492 |
| 20.00 | 10.00 | 804.83 | 0.9100 | 0.949 | 0.273 | -0.036 | 0.6423 | 0.1593 | 26.052 | 52.279 |
| 25.00 | 10.00 | 800.76 | 1.0260 | 1.062 | 0.312 | -0.033 | 0.7260 | 0.1760 | 26.854 | 51.463 |
| 30.00 | 10.00 | 800.76 | 1.2120 | 1.261 | 0.422 | -0.028 | 0.8800 | 0.2420 | 27.792 | 52.545 |
| 35.00 | 10.00 | 800.76 | 1.2970 | 1.395 | 0.579 | 0.022 | 0.9130 | 0.3270 | 31.583 | 49.622 |
| 40.00 | 10.00 | 800.76 | 1.1740 | 1.362 | 0.719 | 0.079 | 0.8260 | 0.4080 | 35.809 | 48.207 |

RUDDER DYNAMOMETER
ephm1j2.rud Hull+Rudder+Propeller: RNo.2 V=+10m/s n = +1460rpm Drift Angle = -7.5 deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.00 | 10.00 | 1458.03 | -2.9623 | -3.390 | 1.744 | -0.109 | -2.1233 | 1.1257 | 33.211 | 51.842 |
| -35.00 | 10.00 | 1462.23 | -3.1900 | -3.363 | 1.308 | 0.042 | -2.3080 | 0.9040 | 28.740 | 54.143 |
| -30.00 | 10.00 | 1459.08 | -2.8455 | -2.942 | 0.957 | 0.062 | -2.0445 | 0.6740 | 27.879 | 54.152 |
| -25.00 | 10.00 | 1462.23 | -2.6140 | -2.653 | 0.673 | 0.072 | -1.8110 | 0.4970 | 27.274 | 52.268 |
| -20.00 | 10.00 | 1459.08 | -2.1045 | -2.125 | 0.429 | 0.068 | -1.4445 | 0.3240 | 26.796 | 51.630 |
| -15.00 | 10.00 | 1462.23 | -1.7040 | -1.712 | 0.255 | 0.065 | -1.1400 | 0.2110 | 26.168 | 50.006 |
| -10.00 | 10.00 | 1459.08 | -1.1725 | -1.176 | 0.123 | 0.049 | -0.7575 | 0.1080 | 25.836 | 47.634 |
| -5.00 | 10.00 | 1462.23 | -0.7550 | -0.757 | 0.056 | 0.031 | -0.4420 | 0.0660 | 25.887 | 41.397 |
| -2.00 | 10.00 | 1462.23 | -0.4540 | -0.455 | 0.037 | 0.013 | -0.2440 | 0.0480 | 27.030 | 36.501 |
| -1.00 | 10.00 | 1462.23 | -0.3620 | -0.363 | 0.038 | 0.008 | -0.1870 | 0.0460 | 27.887 | 34.338 |
| 0.00 | 10.00 | 1460.66 | -0.2553 | -0.250 | 0.034 | -0.002 | -0.0593 | 0.0398 | 30.636 | -2.146 |
| 1.00 | 10.00 | 1462.23 | -0.1960 | -0.196 | 0.036 | -0.010 | -0.0380 | 0.0430 | 35.008 | 1.731 |
| 2.00 | 10.00 | 1462.23 | -0.1130 | -0.112 | 0.031 | -0.017 | 0.0140 | 0.0440 | 45.285 | -31.187 |
| 5.00 | 10.00 | 1462.23 | 0.1610 | 0.165 | 0.049 | -0.039 | 0.1970 | 0.0520 | 6.383 | 104.806 |
| 10.00 | 10.00 | 1459.08 | 0.6025 | 0.609 | 0.092 | -0.077 | 0.5105 | 0.0700 | 17.356 | 67.110 |
| 15.00 | 10.00 | 1462.23 | 0.9610 | 0.979 | 0.195 | -0.106 | 0.7800 | 0.1410 | 19.150 | 63.180 |
| 20.00 | 10.00 | 1459.08 | 1.4045 | 1.428 | 0.317 | -0.130 | 1.1005 | 0.2105 | 20.929 | 59.949 |
| 25.00 | 10.00 | 1462.23 | 1.7510 | 1.802 | 0.511 | -0.132 | 1.3970 | 0.3500 | 22.677 | 60.944 |
| 30.00 | 10.00 | 1459.02 | 2.1790 | 2.257 | 0.740 | -0.131 | 1.7035 | 0.4995 | 24.182 | 58.931 |
| 35.00 | 10.00 | 1462.23 | 2.5150 | 2.647 | 1.023 | -0.101 | 1.9660 | 0.6870 | 26.160 | 58.236 |
| 40.00 | 10.00 | 1459.02 | 2.7710 | 2.995 | 1.358 | -0.052 | 2.2060 | 0.9060 | 28.234 | 58.400 |

RUDDER DYNAMOMETER
ephm1j3.rud Hull+Rudder+Propeller: RNo.2 V=+10m/s n = +2100rpm Drift Angle = -7.5 deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.00 | 10.00 | 2106.73 | -5.2920 | -5.739 | 2.620 | 0.115 | -3.7410 | 1.7940 | 27.979 | 52.526 |
| -35.00 | 10.00 | 2106.73 | -4.8400 | -5.122 | 2.018 | 0.198 | -3.4270 | 1.3960 | 26.119 | 52.935 |
| -30.00 | 10.00 | 2106.57 | -4.2535 | -4.444 | 1.522 | 0.214 | -2.9705 | 1.0660 | 25.175 | 52.380 |
| -25.00 | 10.00 | 2106.73 | -3.5730 | -3.675 | 1.034 | 0.232 | -2.4750 | 0.7500 | 23.674 | 52.179 |
| -20.00 | 10.00 | 2106.57 | -2.9020 | -2.948 | 0.648 | 0.219 | -1.9370 | 0.4800 | 22.554 | 49.809 |
| -15.00 | 10.00 | 2106.73 | -2.1860 | -2.213 | 0.389 | 0.186 | -1.4420 | 0.3000 | 21.594 | 48.979 |
| -10.00 | 10.00 | 2106.57 | -1.7105 | -1.713 | 0.170 | 0.125 | -1.0225 | 0.1625 | 22.721 | 42.897 |
| -5.00 | 10.00 | 2106.73 | -1.1140 | -1.112 | 0.026 | 0.054 | -0.6290 | 0.0700 | 25.097 | 39.414 |
| -2.00 | 10.00 | 2106.73 | -0.7380 | -0.738 | -0.010 | 0.013 | -0.3430 | 0.0440 | 28.190 | 29.186 |
| -1.00 | 10.00 | 2106.73 | -0.6130 | -0.613 | -0.008 | -0.003 | -0.2550 | 0.0390 | 30.457 | 24.265 |
| 0.00 | 10.00 | 2106.66 | -0.5020 | -0.502 | -0.012 | -0.020 | -0.1582 | 0.0320 | 34.021 | 14.274 |
| 1.00 | 10.00 | 2106.73 | -0.3880 | -0.389 | -0.021 | -0.035 | -0.0710 | 0.0270 | 39.031 | 0.563 |
| 2.00 | 10.00 | 2106.73 | -0.2730 | -0.273 | -0.005 | -0.050 | 0.0440 | 0.0340 | 48.132 | -33.960 |
| 5.00 | 10.00 | 2106.73 | 0.1770 | 0.177 | 0.015 | -0.092 | 0.3240 | 0.0340 | -21.857 | 166.225 |
| 10.00 | 10.00 | 2106.57 | 0.7235 | 0.721 | 0.055 | -0.162 | 0.7495 | 0.0685 | 7.293 | 87.892 |
| 15.00 | 10.00 | 2106.73 | 1.3210 | 1.330 | 0.208 | -0.224 | 1.2220 | 0.1700 | 13.110 | 74.556 |
| 20.00 | 10.00 | 2106.57 | 1.8525 | 1.868 | 0.372 | -0.251 | 1.6640 | 0.3050 | 16.578 | 71.817 |
| 25.00 | 10.00 | 2106.73 | 2.5660 | 2.611 | 0.674 | -0.286 | 2.1690 | 0.5200 | 19.022 | 66.210 |
| 30.00 | 10.00 | 2106.57 | 3.1580 | 3.261 | 1.052 | -0.275 | 2.6335 | 0.7680 | 21.543 | 64.221 |
| 35.00 | 10.00 | 2106.73 | 3.7870 | 3.980 | 1.531 | -0.223 | 3.0800 | 1.0880 | 24.393 | 61.560 |
| 40.00 | 10.00 | 2106.73 | 4.3480 | 4.666 | 2.076 | -0.173 | 3.4920 | 1.4730 | 26.284 | 60.129 |

RUDDER DYNAMOMETER
ephm2j1.rud Hull+Rudder+Propeller: RNo.2 V=+10m/s n = +800rpm Drift Angle = -15 deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.00 | 10.00 | 806.60 | -1.1280 | -1.447 | 0.907 | -0.181 | -0.7910 | 0.5100 | 42.461 | 47.047 |
| -35.00 | 10.00 | 806.60 | -1.1240 | -1.380 | 0.800 | -0.163 | -0.7980 | 0.4540 | 41.836 | 48.744 |
| -30.00 | 10.00 | 805.68 | -1.4135 | -1.514 | 0.580 | -0.107 | -0.9695 | 0.3455 | 37.447 | 49.672 |
| -25.00 | 10.00 | 806.60 | -1.5990 | -1.603 | 0.364 | -0.020 | -1.1460 | 0.2170 | 31.255 | 53.015 |
| -20.00 | 10.00 | 805.68 | -1.4975 | -1.482 | 0.218 | 0.018 | -1.0660 | 0.1420 | 28.712 | 53.378 |
| -15.00 | 10.00 | 806.60 | -1.2650 | -1.251 | 0.114 | 0.038 | -0.8910 | 0.0840 | 26.963 | 53.012 |
| -10.00 | 10.00 | 805.68 | -0.9875 | -0.981 | 0.050 | 0.045 | -0.6985 | 0.0400 | 25.407 | 53.273 |
| -5.00 | 10.00 | 806.60 | -0.7100 | -0.708 | 0.005 | 0.044 | -0.4950 | 0.0190 | 23.808 | 52.407 |
| -2.00 | 10.00 | 806.60 | -0.5350 | -0.534 | -0.004 | 0.042 | -0.3780 | 0.0120 | 22.048 | 53.230 |
| -1.00 | 10.00 | 806.60 | -0.4930 | -0.493 | -0.003 | 0.041 | -0.3380 | 0.0100 | 21.670 | 51.175 |
| 0.00 | 10.00 | 806.14 | -0.4307 | -0.414 | 0.003 | 0.039 | -0.2483 | 0.0088 | 20.568 | 39.913 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 1.00 | 10.00 | 806.60 | -0.3760 | -0.376 | -0.007 | 0.035 | -0.2530 | 0.0070 | 20.631 | 49.790 |
| 2.00 | 10.00 | 806.60 | -0.3260 | -0.326 | 0.000 | 0.032 | -0.2170 | 0.0110 | 20.070 | 48.916 |
| 5.00 | 10.00 | 806.60 | -0.1600 | -0.158 | 0.009 | 0.028 | -0.1140 | 0.0160 | 12.205 | 53.117 |
| 10.00 | 10.00 | 805.68 | 0.0890 | 0.096 | 0.048 | 0.014 | 0.0540 | 0.0355 | 44.540 | 45.880 |
| 15.00 | 10.00 | 806.60 | 0.3120 | 0.329 | 0.106 | -0.002 | 0.2110 | 0.0610 | 29.445 | 49.377 |
| 20.00 | 10.00 | 805.68 | 0.5295 | 0.557 | 0.175 | -0.018 | 0.3510 | 0.0960 | 26.750 | 47.516 |
| 25.00 | 10.00 | 806.60 | 0.7150 | 0.757 | 0.257 | -0.031 | 0.5020 | 0.1400 | 25.847 | 50.400 |
| 30.00 | 10.00 | 805.68 | 0.9120 | 0.973 | 0.367 | -0.041 | 0.6465 | 0.1975 | 25.821 | 50.201 |
| 35.00 | 10.00 | 806.60 | 1.0730 | 1.160 | 0.490 | -0.038 | 0.7560 | 0.2610 | 26.696 | 48.790 |
| 40.00 | 10.00 | 806.60 | 1.1090 | 1.253 | 0.627 | 0.022 | 0.7540 | 0.3330 | 31.752 | 45.693 |

RUDDER DYNAMOMETER
ephm2j2.rud Hull+Rudder+Propeller: RNo.2 V=+10m/s n = +1460rpm Drift Angle = -15 deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.00 | 10.00 | 1458.97 | -3.8825 | -4.033 | 1.647 | 0.055 | -2.8660 | 1.1580 | 28.642 | 55.406 |
| -35.00 | 10.00 | 1455.92 | -3.6350 | -3.742 | 1.334 | 0.079 | -2.6440 | 0.9480 | 27.877 | 54.904 |
| -30.00 | 10.00 | 1458.97 | -3.2185 | -3.257 | 0.940 | 0.093 | -2.3120 | 0.6845 | 27.126 | 54.479 |
| -25.00 | 10.00 | 1455.92 | -2.8540 | -2.872 | 0.675 | 0.100 | -2.0450 | 0.5060 | 26.505 | 54.499 |
| -20.00 | 10.00 | 1458.97 | -2.4475 | -2.451 | 0.444 | 0.094 | -1.7420 | 0.3555 | 26.155 | 54.216 |
| -15.00 | 10.00 | 1455.92 | -1.9750 | -1.974 | 0.255 | 0.081 | -1.3890 | 0.2230 | 25.858 | 53.399 |
| -10.00 | 10.00 | 1458.97 | -1.5470 | -1.546 | 0.126 | 0.065 | -1.0710 | 0.1310 | 25.766 | 52.219 |
| -5.00 | 10.00 | 1455.92 | -1.0980 | -1.097 | 0.036 | 0.045 | -0.7340 | 0.0670 | 25.855 | 49.747 |
| -2.00 | 10.00 | 1455.92 | -0.8300 | -0.829 | 0.010 | 0.032 | -0.5370 | 0.0440 | 26.117 | 47.338 |
| -1.00 | 10.00 | 1455.92 | -0.7380 | -0.738 | -0.001 | 0.029 | -0.4620 | 0.0400 | 26.024 | 45.238 |
| 0.00 | 10.00 | 1457.44 | -0.6578 | -0.658 | 0.003 | 0.022 | -0.3925 | 0.0385 | 26.653 | 42.254 |
| 1.00 | 10.00 | 1455.92 | -0.5710 | -0.571 | -0.003 | 0.015 | -0.3110 | 0.0340 | 27.419 | 36.872 |
| 2.00 | 10.00 | 1455.92 | -0.4790 | -0.479 | -0.001 | 0.009 | -0.2510 | 0.0340 | 28.141 | 34.596 |
| 5.00 | 10.00 | 1455.92 | -0.2220 | -0.220 | 0.010 | -0.007 | -0.0610 | 0.0420 | 33.170 | 8.349 |
| 10.00 | 10.00 | 1458.97 | 0.1800 | 0.188 | 0.058 | -0.043 | 0.2270 | 0.0670 | 7.425 | 107.713 |
| 15.00 | 10.00 | 1455.92 | 0.5730 | 0.592 | 0.151 | -0.067 | 0.5170 | 0.1230 | 18.650 | 72.177 |
| 20.00 | 10.00 | 1458.97 | 0.9640 | 1.002 | 0.279 | -0.089 | 0.7825 | 0.2020 | 21.090 | 62.851 |
| 25.00 | 10.00 | 1455.92 | 1.3920 | 1.456 | 0.460 | -0.096 | 1.0850 | 0.3170 | 23.377 | 59.226 |
| 30.00 | 10.00 | 1458.97 | 1.8090 | 1.910 | 0.688 | -0.097 | 1.4030 | 0.4590 | 24.861 | 58.128 |
| 35.00 | 10.00 | 1455.92 | 2.2170 | 2.383 | 0.988 | -0.083 | 1.7030 | 0.6480 | 26.486 | 56.620 |
| 40.00 | 10.00 | 1458.97 | 2.5220 | 2.746 | 1.265 | -0.071 | 1.9750 | 0.8490 | 27.394 | 57.503 |

RUDDER DYNAMOMETER
ephm2j3.rud Hull+Rudder+Propeller: RNo.2 V=+10m/s n = +2100rpm Drift Angle = -15 deg

| Angle | V | RPM | Cl | Cn | Cd | Cmz | Cmx | Cmy | Cpc | Cps |
|---|---|---|---|---|---|---|---|---|---|---|
| -30.00 | 10.00 | 2100.24 | -4.4830 | -4.618 | 1.472 | 0.205 | -3.2940 | 1.0920 | 25.537 | 56.089 |
| -20.00 | 10.00 | 2100.24 | -3.2680 | -3.292 | 0.648 | 0.187 | -2.3510 | 0.5240 | 24.299 | 55.040 |
| -10.00 | 10.00 | 2100.24 | -2.0760 | -2.069 | 0.141 | 0.113 | -1.4050 | 0.1680 | 24.541 | 50.763 |
| 0.00 | 10.00 | 2100.24 | -0.8650 | -0.865 | -0.087 | 0.007 | -0.4340 | 0.0050 | 29.221 | 32.600 |
| 10.00 | 10.00 | 2100.24 | 0.3630 | 0.361 | 0.019 | -0.122 | 0.4860 | 0.0760 | -3.760 | 118.817 |
| 20.00 | 10.00 | 2100.24 | 1.6450 | 1.680 | 0.392 | -0.221 | 1.4340 | 0.3280 | 16.803 | 69.399 |
| 30.00 | 10.00 | 2100.24 | 3.0520 | 3.190 | 1.095 | -0.305 | 2.4530 | 0.7920 | 20.427 | 61.486 |

# Appendix B Propeller Dynamometer Data

PROPELLER DYNAMOMETER
epop2j114.pro Rudder and Propeller Alone: RNo.2 J=0.94 Drift Angle =+15deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.40 | 10.00 | 800.00 | 23.09 | 0.9375 | -0.019 | 0.012 | -1.000 | -0.0221 | -0.0276 | -0.009 |
| -35.40 | 10.00 | 800.00 | 23.09 | 0.9375 | -0.008 | 0.008 | -1.000 | -0.0093 | -0.0116 | -0.004 |
| -30.40 | 10.00 | 800.00 | 23.09 | 0.9375 | -0.022 | 0.008 | -1.000 | -0.0255 | -0.0319 | -0.010 |
| -25.40 | 10.00 | 800.00 | 23.09 | 0.9375 | -0.061 | 0.008 | -1.000 | -0.0697 | -0.0871 | -0.027 |
| -20.40 | 10.00 | 800.00 | 23.09 | 0.9375 | -0.014 | 0.004 | -1.000 | -0.0163 | -0.0203 | -0.006 |
| -15.40 | 10.00 | 800.00 | 23.09 | 0.9375 | -0.040 | 0.006 | -1.000 | -0.0453 | -0.0566 | -0.018 |
| -10.40 | 10.00 | 800.00 | 23.09 | 0.9375 | -0.064 | 0.006 | -1.000 | -0.0731 | -0.0914 | -0.029 |
| -5.40 | 10.00 | 800.00 | 23.09 | 0.9375 | -0.035 | 0.004 | -1.000 | -0.0395 | -0.0493 | -0.016 |
| -0.40 | 10.00 | 800.00 | 23.09 | 0.9375 | -0.071 | 0.006 | -1.000 | -0.0813 | -0.1016 | -0.032 |
| 4.60 | 10.00 | 800.00 | 23.09 | 0.9375 | -0.040 | 0.004 | -1.000 | -0.0453 | -0.0566 | -0.018 |
| 9.60 | 10.00 | 800.00 | 23.09 | 0.9375 | -0.078 | 0.005 | -1.000 | -0.0882 | -0.1103 | -0.034 |
| 14.60 | 10.00 | 800.00 | 23.09 | 0.9375 | -0.043 | 0.006 | -1.000 | -0.0487 | -0.0609 | -0.019 |
| 19.60 | 10.00 | 800.00 | 23.09 | 0.9375 | -0.036 | 0.006 | -1.000 | -0.0406 | -0.0508 | -0.016 |
| 24.60 | 10.00 | 800.00 | 23.09 | 0.9375 | -0.040 | 0.009 | -1.000 | -0.0453 | -0.0566 | -0.018 |
| 29.60 | 10.00 | 800.00 | 23.09 | 0.9375 | 0.011 | 0.012 | 0.145 | 0.0128 | 0.0160 | 0.005 |
| 34.60 | 10.00 | 800.00 | 23.09 | 0.9375 | 0.013 | 0.015 | 0.132 | 0.0151 | 0.0189 | 0.006 |

PROPELLER DYNAMOMETER
epop2j2.pro Rudder and Propeller Alone: RNo.2 J=0.51 Drift Angle =+15deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.40 | 10.00 | 1460.00 | 13.15 | 0.5137 | 0.238 | 0.035 | 0.551 | 0.9020 | 1.1274 | 0.119 |
| -35.40 | 10.00 | 1460.00 | 13.15 | 0.5137 | 0.166 | 0.035 | 0.391 | 0.6292 | 0.7864 | 0.083 |
| -30.40 | 10.00 | 1461.30 | 13.14 | 0.5132 | 0.213 | 0.034 | 0.516 | 0.8073 | 1.0092 | 0.106 |
| -25.40 | 10.00 | 1460.00 | 13.15 | 0.5137 | 0.153 | 0.034 | 0.367 | 0.5804 | 0.7255 | 0.077 |
| -20.40 | 10.00 | 1461.30 | 13.14 | 0.5132 | 0.214 | 0.033 | 0.527 | 0.8120 | 1.0150 | 0.107 |
| -15.40 | 10.00 | 1460.00 | 13.15 | 0.5137 | 0.161 | 0.033 | 0.395 | 0.6083 | 0.7603 | 0.080 |
| -10.40 | 10.00 | 1461.30 | 13.14 | 0.5132 | 0.219 | 0.033 | 0.547 | 0.8311 | 1.0389 | 0.109 |
| -5.40 | 10.00 | 1460.00 | 13.15 | 0.5137 | 0.210 | 0.033 | 0.524 | 0.7951 | 0.9939 | 0.105 |
| -0.27 | 6.67 | 973.33 | 8.77 | 0.3425 | 0.138 | 0.022 | 0.344 | 0.5247 | 0.6559 | 0.069 |
| 4.60 | 10.00 | 1460.00 | 13.15 | 0.5137 | 0.151 | 0.033 | 0.370 | 0.5734 | 0.7168 | 0.076 |
| 9.60 | 10.00 | 1461.30 | 13.14 | 0.5132 | 0.206 | 0.033 | 0.517 | 0.7830 | 0.9787 | 0.103 |
| 14.60 | 10.00 | 1460.00 | 13.15 | 0.5137 | 0.154 | 0.034 | 0.374 | 0.5850 | 0.7313 | 0.077 |
| 19.60 | 10.00 | 1461.30 | 13.14 | 0.5132 | 0.219 | 0.033 | 0.534 | 0.8300 | 1.0375 | 0.109 |
| 24.60 | 10.00 | 1460.00 | 13.15 | 0.5137 | 0.191 | 0.034 | 0.453 | 0.7232 | 0.9040 | 0.095 |
| 29.60 | 10.00 | 1461.30 | 13.14 | 0.5132 | 0.210 | 0.035 | 0.490 | 0.7975 | 0.9968 | 0.105 |
| 34.60 | 10.00 | 1460.00 | 13.15 | 0.5137 | 0.190 | 0.037 | 0.422 | 0.7197 | 0.8996 | 0.095 |

PROPELLER DYNAMOMETER
epop2j314.pro Rudder and Propeller Alone: RNo.2 J=0.36 Drift Angle =+15deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.40 | 10.00 | 2100.00 | 9.22 | 0.3571 | 0.301 | 0.043 | 0.397 | 2.3622 | 2.9528 | 0.155 |
| -35.40 | 10.00 | 2100.00 | 9.22 | 0.3571 | 0.299 | 0.043 | 0.395 | 2.3413 | 2.9267 | 0.153 |
| -30.40 | 10.00 | 2100.00 | 9.22 | 0.3571 | 0.295 | 0.043 | 0.389 | 2.3100 | 2.8875 | 0.151 |
| -25.40 | 10.00 | 2100.00 | 9.22 | 0.3571 | 0.293 | 0.043 | 0.389 | 2.2984 | 2.8730 | 0.150 |
| -20.40 | 10.00 | 2100.00 | 9.22 | 0.3571 | 0.291 | 0.043 | 0.389 | 2.2787 | 2.8483 | 0.149 |
| -15.40 | 10.00 | 2100.00 | 9.22 | 0.3571 | 0.289 | 0.042 | 0.387 | 2.2636 | 2.8295 | 0.148 |
| -10.40 | 10.00 | 2100.00 | 9.22 | 0.3571 | 0.286 | 0.042 | 0.384 | 2.2438 | 2.8048 | 0.147 |
| -5.40 | 10.00 | 2100.00 | 9.22 | 0.3571 | 0.289 | 0.042 | 0.388 | 2.2636 | 2.8295 | 0.148 |
| -0.40 | 10.00 | 2100.00 | 9.22 | 0.3571 | 0.287 | 0.042 | 0.385 | 2.2497 | 2.8121 | 0.147 |
| 4.60 | 10.00 | 2100.00 | 9.22 | 0.3571 | 0.283 | 0.042 | 0.382 | 2.2183 | 2.7729 | 0.145 |
| 9.60 | 10.00 | 2100.00 | 9.22 | 0.3571 | 0.285 | 0.042 | 0.383 | 2.2357 | 2.7946 | 0.146 |
| 14.60 | 10.00 | 2100.00 | 9.22 | 0.3571 | 0.290 | 0.042 | 0.389 | 2.2729 | 2.8411 | 0.149 |
| 19.60 | 10.00 | 2100.00 | 9.22 | 0.3571 | 0.285 | 0.042 | 0.382 | 2.2369 | 2.7961 | 0.146 |
| 24.60 | 10.00 | 2100.00 | 9.22 | 0.3571 | 0.291 | 0.042 | 0.390 | 2.2798 | 2.8498 | 0.149 |
| 29.60 | 10.00 | 2100.00 | 9.22 | 0.3571 | 0.293 | 0.042 | 0.393 | 2.2984 | 2.8730 | 0.150 |

PROPELLER DYNAMOMETER
epop2j6i8.pro Rudder and Propeller Alone: RNo.2 J=0.51 (V=15m/s) Drift Angle =+15deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|
| -35.40 | 15.00 | 2100.65 | 13.69 | 0.5355 | 0.196 | 0.034 | 0.487 | 0.6848 | 0.8560 | 0.098 |
| -30.40 | 15.00 | 2100.65 | 13.69 | 0.5355 | 0.188 | 0.034 | 0.472 | 0.6540 | 0.8175 | 0.093 |
| -20.40 | 15.00 | 2100.65 | 13.69 | 0.5355 | 0.182 | 0.033 | 0.466 | 0.6350 | 0.7938 | 0.091 |
| -10.40 | 15.00 | 2100.65 | 13.69 | 0.5355 | 0.182 | 0.033 | 0.471 | 0.6360 | 0.7951 | 0.091 |
| 9.60 | 15.00 | 2100.65 | 13.69 | 0.5355 | 0.185 | 0.033 | 0.474 | 0.6463 | 0.8079 | 0.092 |
| 19.60 | 15.00 | 2100.65 | 13.69 | 0.5355 | 0.187 | 0.033 | 0.477 | 0.6530 | 0.8162 | 0.093 |
| 29.60 | 15.00 | 2100.65 | 13.69 | 0.5355 | 0.190 | 0.034 | 0.479 | 0.6627 | 0.8284 | 0.095 |
| 34.60 | 15.00 | 2100.65 | 13.69 | 0.5355 | 0.195 | 0.034 | 0.489 | 0.6797 | 0.8496 | 0.097 |

PROPELLER DYNAMOMETER
epop1j119.pro Rudder and Propeller Alone: RNo.2 J=0.94 Drift Angle =+7.5deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|
| -35.40 | 10.00 | 801.96 | 23.04 | 0.9352 | 0.005 | 0.012 | 0.062 | 0.0058 | 0.0073 | 0.002 |
| -30.40 | 10.00 | 801.96 | 23.04 | 0.9352 | 0.006 | 0.013 | 0.072 | 0.0070 | 0.0087 | 0.003 |
| -25.40 | 10.00 | 801.96 | 23.04 | 0.9352 | -0.012 | 0.010 | -1.000 | -0.0140 | -0.0174 | -0.005 |
| -20.40 | 10.00 | 801.96 | 23.04 | 0.9352 | -0.052 | 0.005 | -1.000 | -0.0593 | -0.0742 | -0.023 |
| -15.40 | 10.00 | 801.96 | 23.04 | 0.9352 | -0.050 | 0.007 | -1.000 | -0.0570 | -0.0713 | -0.022 |
| -10.40 | 10.00 | 801.96 | 23.04 | 0.9352 | -0.006 | 0.010 | -1.000 | -0.0070 | -0.0087 | -0.003 |
| -5.40 | 10.00 | 801.96 | 23.04 | 0.9352 | -0.019 | 0.008 | -1.000 | -0.0221 | -0.0276 | -0.009 |
| -0.40 | 10.00 | 801.96 | 23.04 | 0.9352 | -0.074 | 0.008 | -1.000 | -0.0849 | -0.1062 | -0.033 |
| 4.60 | 10.00 | 801.96 | 23.04 | 0.9352 | -0.074 | 0.005 | -1.000 | -0.0849 | -0.1062 | -0.033 |
| 9.60 | 10.00 | 801.96 | 23.04 | 0.9352 | -0.061 | 0.006 | -1.000 | -0.0698 | -0.0873 | -0.027 |
| 14.60 | 10.00 | 801.96 | 23.04 | 0.9352 | -0.035 | 0.006 | -1.000 | -0.0396 | -0.0494 | -0.015 |
| 19.60 | 10.00 | 801.96 | 23.04 | 0.9352 | -0.006 | 0.008 | -1.000 | -0.0070 | -0.0087 | -0.003 |
| 24.60 | 10.00 | 801.96 | 23.04 | 0.9352 | -0.036 | 0.009 | -1.000 | -0.0407 | -0.0509 | -0.016 |
| 29.60 | 10.00 | 801.96 | 23.04 | 0.9352 | -0.059 | 0.010 | -1.000 | -0.0675 | -0.0843 | -0.026 |
| 34.60 | 10.00 | 801.96 | 23.04 | 0.9352 | -0.010 | 0.011 | -1.000 | -0.0116 | -0.0145 | -0.005 |

PROPELLER DYNAMOMETER
epop1j219.pro Rudder and Propeller Alone: RNo.2 J=0.51 Drift Angle =+7.5deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.40 | 10.00 | 1462.84 | 13.12 | 0.5127 | 0.274 | 0.039 | 0.576 | 1.0424 | 1.3030 | 0.137 |
| -35.40 | 10.00 | 1462.84 | 13.12 | 0.5127 | 0.239 | 0.038 | 0.512 | 0.9098 | 1.1372 | 0.119 |
| -30.40 | 10.00 | 1462.75 | 13.12 | 0.5127 | 0.237 | 0.037 | 0.523 | 0.9016 | 1.1270 | 0.118 |
| -25.40 | 10.00 | 1462.84 | 13.12 | 0.5127 | 0.256 | 0.037 | 0.562 | 0.9726 | 1.2157 | 0.128 |
| -20.40 | 10.00 | 1462.75 | 13.12 | 0.5127 | 0.224 | 0.036 | 0.508 | 0.8510 | 1.0638 | 0.112 |
| -15.40 | 10.00 | 1462.84 | 13.12 | 0.5127 | 0.170 | 0.037 | 0.379 | 0.6457 | 0.8071 | 0.085 |
| -10.40 | 10.00 | 1462.75 | 13.12 | 0.5127 | 0.219 | 0.036 | 0.500 | 0.8347 | 1.0434 | 0.110 |
| -5.40 | 10.00 | 1462.84 | 13.12 | 0.5127 | 0.242 | 0.036 | 0.547 | 0.9202 | 1.1503 | 0.121 |
| -0.40 | 10.00 | 1462.84 | 13.12 | 0.5127 | 0.159 | 0.036 | 0.363 | 0.6061 | 0.7576 | 0.080 |
| 4.60 | 10.00 | 1462.84 | 13.12 | 0.5127 | 0.206 | 0.036 | 0.464 | 0.7830 | 0.9787 | 0.103 |
| 9.60 | 10.00 | 1462.75 | 13.12 | 0.5127 | 0.204 | 0.036 | 0.466 | 0.7742 | 0.9678 | 0.102 |
| 14.60 | 10.00 | 1462.84 | 13.12 | 0.5127 | 0.243 | 0.036 | 0.552 | 0.9237 | 1.1547 | 0.121 |
| 19.60 | 10.00 | 1462.75 | 13.12 | 0.5127 | 0.228 | 0.036 | 0.516 | 0.8656 | 1.0819 | 0.114 |
| 24.60 | 10.00 | 1462.84 | 13.12 | 0.5127 | 0.252 | 0.037 | 0.554 | 0.9575 | 1.1968 | 0.126 |
| 29.60 | 10.00 | 1462.75 | 13.12 | 0.5127 | 0.244 | 0.037 | 0.542 | 0.9278 | 1.1598 | 0.122 |
| 34.60 | 10.00 | 1462.84 | 13.12 | 0.5127 | 0.247 | 0.038 | 0.525 | 0.9412 | 1.1765 | 0.124 |
| 39.60 | 10.00 | 1462.84 | 13.12 | 0.5127 | 0.278 | 0.039 | 0.583 | 1.0564 | 1.3204 | 0.139 |

PROPELLER DYNAMOMETER
epop1j319.pro Rudder and Propeller Alone: RNo.2 J=0.36 Drift Angle =+7.5deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.40 | 10.00 | 2106.96 | 9.19 | 0.3560 | 0.331 | 0.045 | 0.420 | 2.6130 | 3.2662 | 0.170 |
| -35.40 | 10.00 | 2106.96 | 9.19 | 0.3560 | 0.327 | 0.045 | 0.416 | 2.5839 | 3.2298 | 0.168 |
| -30.40 | 10.00 | 2106.96 | 9.19 | 0.3560 | 0.326 | 0.045 | 0.415 | 2.5757 | 3.2197 | 0.168 |
| -25.40 | 10.00 | 2106.96 | 9.19 | 0.3560 | 0.323 | 0.044 | 0.413 | 2.5490 | 3.1862 | 0.166 |
| -20.40 | 10.00 | 2106.96 | 9.19 | 0.3560 | 0.320 | 0.044 | 0.409 | 2.5222 | 3.1528 | 0.164 |
| -15.40 | 10.00 | 2106.96 | 9.19 | 0.3560 | 0.317 | 0.044 | 0.407 | 2.4990 | 3.1237 | 0.162 |
| -10.40 | 10.00 | 2106.96 | 9.19 | 0.3560 | 0.316 | 0.044 | 0.408 | 2.4908 | 3.1135 | 0.162 |
| -5.40 | 10.00 | 2106.96 | 9.19 | 0.3560 | 0.316 | 0.044 | 0.405 | 2.4955 | 3.1193 | 0.162 |
| -0.40 | 10.00 | 2106.96 | 9.19 | 0.3560 | 0.315 | 0.044 | 0.405 | 2.4885 | 3.1106 | 0.162 |
| 4.60 | 10.00 | 2106.96 | 9.19 | 0.3560 | 0.313 | 0.043 | 0.408 | 2.4664 | 3.0830 | 0.160 |
| 9.60 | 10.00 | 2106.96 | 9.19 | 0.3560 | 0.313 | 0.043 | 0.407 | 2.4675 | 3.0844 | 0.160 |
| 14.60 | 10.00 | 2106.96 | 9.19 | 0.3560 | 0.316 | 0.044 | 0.407 | 2.4931 | 3.1164 | 0.162 |
| 19.60 | 10.00 | 2106.96 | 9.19 | 0.3560 | 0.319 | 0.044 | 0.411 | 2.5210 | 3.1513 | 0.164 |
| 24.60 | 10.00 | 2106.96 | 9.19 | 0.3560 | 0.325 | 0.044 | 0.417 | 2.5618 | 3.2022 | 0.167 |
| 29.60 | 10.00 | 2106.96 | 9.19 | 0.3560 | 0.325 | 0.044 | 0.416 | 2.5664 | 3.2080 | 0.167 |
| 34.60 | 10.00 | 2106.96 | 9.19 | 0.3560 | 0.325 | 0.044 | 0.416 | 2.5687 | 3.2109 | 0.167 |

PROPELLER DYNAMOMETER
epop1j220.pro Rudder and Propeller Alone: RNo.2 J=0.51 (V=15m/s) Drift Angle =+7.5deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|
| -30.40 | 10.00 | 1462.30 | 13.13 | 0.5129 | 0.235 | 0.037 | 0.512 | 0.8922 | 1.1152 | 0.117 |
| -20.40 | 10.00 | 1462.30 | 13.13 | 0.5129 | 0.229 | 0.037 | 0.511 | 0.8722 | 1.0902 | 0.115 |
| -10.40 | 10.00 | 1462.30 | 13.13 | 0.5129 | 0.230 | 0.036 | 0.522 | 0.8734 | 1.0917 | 0.115 |
| -0.40 | 10.00 | 1462.30 | 13.13 | 0.5129 | 0.235 | 0.036 | 0.532 | 0.8945 | 1.1182 | 0.117 |
| 9.60 | 10.00 | 1462.30 | 13.13 | 0.5129 | 0.226 | 0.036 | 0.515 | 0.8604 | 1.0755 | 0.113 |
| 19.60 | 10.00 | 1462.30 | 13.13 | 0.5129 | 0.249 | 0.036 | 0.562 | 0.9451 | 1.1813 | 0.124 |
| 29.60 | 10.00 | 1462.30 | 13.13 | 0.5129 | 0.242 | 0.037 | 0.540 | 0.9216 | 1.1520 | 0.121 |

PROPELLER DYNAMOMETER
epom1j121.pro Rudder and Propeller Alone: RNo.2 J=0.94 Drift Angle =-7.5deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|
| -30.40 | 10.00 | 814.91 | 22.71 | 0.9204 | 0.146 | 0.018 | 1.171 | 0.1722 | 0.2152 | 0.065 |
| -25.40 | 10.00 | 814.91 | 22.71 | 0.9204 | 0.133 | 0.016 | 1.182 | 0.1568 | 0.1961 | 0.060 |
| -20.40 | 10.00 | 814.91 | 22.71 | 0.9204 | 0.114 | 0.015 | 1.095 | 0.1344 | 0.1680 | 0.051 |
| -15.40 | 10.00 | 814.91 | 22.71 | 0.9204 | 0.095 | 0.015 | 0.957 | 0.1120 | 0.1400 | 0.043 |
| -10.40 | 10.00 | 814.91 | 22.71 | 0.9204 | 0.091 | 0.013 | 0.989 | 0.1073 | 0.1341 | 0.041 |
| -5.40 | 10.00 | 814.91 | 22.71 | 0.9204 | 0.105 | 0.014 | 1.085 | 0.1238 | 0.1548 | 0.047 |
| -0.40 | 10.00 | 814.91 | 22.71 | 0.9204 | 0.092 | 0.013 | 1.000 | 0.1085 | 0.1356 | 0.041 |
| 4.60 | 10.00 | 814.91 | 22.71 | 0.9204 | 0.073 | 0.010 | 1.022 | 0.0861 | 0.1076 | 0.033 |
| 9.60 | 10.00 | 814.91 | 22.71 | 0.9204 | 0.111 | 0.013 | 1.223 | 0.1309 | 0.1636 | 0.050 |
| 14.60 | 10.00 | 814.91 | 22.71 | 0.9204 | 0.108 | 0.013 | 1.257 | 0.1274 | 0.1592 | 0.048 |
| 19.60 | 10.00 | 814.91 | 22.71 | 0.9204 | 0.110 | 0.013 | 1.245 | 0.1297 | 0.1622 | 0.049 |
| 24.60 | 10.00 | 814.91 | 22.71 | 0.9204 | 0.090 | 0.012 | 1.078 | 0.1061 | 0.1327 | 0.040 |
| 29.60 | 10.00 | 814.91 | 22.71 | 0.9204 | 0.097 | 0.013 | 1.098 | 0.1144 | 0.1430 | 0.043 |
| 34.60 | 10.00 | 814.91 | 22.71 | 0.9204 | 0.133 | 0.014 | 1.427 | 0.1568 | 0.1961 | 0.060 |
| 39.60 | 10.00 | 814.91 | 22.71 | 0.9204 | 0.130 | 0.016 | 1.181 | 0.1533 | 0.1916 | 0.058 |

PROPELLER DYNAMOMETER
epom1j221.pro Rudder and Propeller Alone: RNo.2 J=0.51 Drift Angle =-7.5deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|
| -35.40 | 10.00 | 1462.28 | 13.13 | 0.5129 | 0.299 | 0.041 | 0.589 | 1.1356 | 1.4195 | 0.149 |
| -30.40 | 10.00 | 1463.22 | 13.12 | 0.5126 | 0.264 | 0.040 | 0.541 | 1.0065 | 1.2581 | 0.132 |
| -25.40 | 10.00 | 1462.28 | 13.13 | 0.5129 | 0.289 | 0.040 | 0.591 | 1.1002 | 1.3753 | 0.145 |
| -20.40 | 10.00 | 1463.22 | 13.12 | 0.5126 | 0.283 | 0.039 | 0.584 | 1.0755 | 1.3444 | 0.141 |
| -15.40 | 10.00 | 1462.28 | 13.13 | 0.5129 | 0.275 | 0.040 | 0.569 | 1.0472 | 1.3090 | 0.138 |
| -10.40 | 10.00 | 1463.22 | 13.12 | 0.5126 | 0.226 | 0.039 | 0.472 | 0.8591 | 1.0739 | 0.113 |
| -5.40 | 10.00 | 1462.28 | 13.13 | 0.5129 | 0.205 | 0.039 | 0.427 | 0.7795 | 0.9744 | 0.102 |
| -0.40 | 10.00 | 1463.22 | 13.12 | 0.5126 | 0.251 | 0.039 | 0.529 | 0.9552 | 1.1940 | 0.125 |
| 4.60 | 10.00 | 1462.28 | 13.13 | 0.5129 | 0.226 | 0.039 | 0.476 | 0.8609 | 1.0761 | 0.113 |
| 9.60 | 10.00 | 1463.22 | 13.12 | 0.5126 | 0.217 | 0.038 | 0.460 | 0.8243 | 1.0304 | 0.108 |
| 14.60 | 10.00 | 1462.28 | 13.13 | 0.5129 | 0.276 | 0.039 | 0.580 | 1.0484 | 1.3105 | 0.138 |
| 19.60 | 10.00 | 1463.22 | 13.12 | 0.5126 | 0.258 | 0.038 | 0.551 | 0.9835 | 1.2294 | 0.129 |
| 24.60 | 10.00 | 1462.28 | 13.13 | 0.5129 | 0.261 | 0.039 | 0.549 | 0.9918 | 1.2397 | 0.130 |
| 29.60 | 10.00 | 1463.22 | 13.12 | 0.5126 | 0.225 | 0.039 | 0.477 | 0.8579 | 1.0724 | 0.113 |
| 34.60 | 10.00 | 1462.28 | 13.13 | 0.5129 | 0.278 | 0.039 | 0.578 | 1.0554 | 1.3193 | 0.139 |
| 39.60 | 10.00 | 1462.28 | 13.13 | 0.5129 | 0.293 | 0.039 | 0.611 | 1.1156 | 1.3945 | 0.147 |

PROPELLER DYNAMOMETER
epom1j321.pro Rudder and Propeller Alone: RNo.2 J=0.36 Drift Angle =-7.5deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|
| -35.40 | 10.00 | 2109.26 | 9.18 | 0.3556 | 0.350 | 0.047 | 0.417 | 2.7677 | 3.4597 | 0.180 |
| -30.40 | 10.00 | 2109.26 | 9.18 | 0.3556 | 0.349 | 0.047 | 0.416 | 2.7595 | 3.4493 | 0.179 |
| -25.40 | 10.00 | 2109.26 | 9.18 | 0.3556 | 0.343 | 0.047 | 0.412 | 2.7147 | 3.3933 | 0.176 |
| -20.40 | 10.00 | 2109.26 | 9.18 | 0.3556 | 0.342 | 0.047 | 0.412 | 2.7076 | 3.3845 | 0.176 |
| -15.40 | 10.00 | 2109.26 | 9.18 | 0.3556 | 0.341 | 0.047 | 0.412 | 2.6958 | 3.3697 | 0.175 |
| -10.40 | 10.00 | 2109.26 | 9.18 | 0.3556 | 0.339 | 0.047 | 0.412 | 2.6816 | 3.3521 | 0.174 |
| -5.40 | 10.00 | 2109.26 | 9.18 | 0.3556 | 0.334 | 0.046 | 0.407 | 2.6416 | 3.3019 | 0.171 |
| -0.40 | 10.00 | 2109.26 | 9.18 | 0.3556 | 0.334 | 0.046 | 0.408 | 2.6439 | 3.3049 | 0.171 |
| 4.60 | 10.00 | 2109.26 | 9.18 | 0.3556 | 0.334 | 0.046 | 0.407 | 2.6380 | 3.2975 | 0.171 |
| 9.60 | 10.00 | 2109.26 | 9.18 | 0.3556 | 0.333 | 0.046 | 0.409 | 2.6368 | 3.2960 | 0.171 |
| 14.60 | 10.00 | 2109.26 | 9.18 | 0.3556 | 0.332 | 0.046 | 0.407 | 2.6274 | 3.2843 | 0.170 |
| 19.60 | 10.00 | 2109.26 | 9.18 | 0.3556 | 0.335 | 0.046 | 0.410 | 2.6463 | 3.3078 | 0.172 |
| 24.60 | 10.00 | 2109.26 | 9.18 | 0.3556 | 0.335 | 0.046 | 0.410 | 2.6533 | 3.3167 | 0.172 |
| 29.60 | 10.00 | 2109.26 | 9.18 | 0.3556 | 0.334 | 0.046 | 0.408 | 2.6404 | 3.3005 | 0.171 |
| 34.60 | 10.00 | 2109.26 | 9.18 | 0.3556 | 0.342 | 0.046 | 0.419 | 2.7088 | 3.3860 | 0.176 |
| 39.60 | 10.00 | 2109.26 | 9.18 | 0.3556 | 0.337 | 0.046 | 0.413 | 2.6687 | 3.3358 | 0.173 |

PROPELLER DYNAMOMETER
epom1j622.pro Rudder and Propeller Alone: RNo.2 J=0.51 (15m/s) Drift Angle =-7.5deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|
| -30.40 | 15.00 | 2106.84 | 13.65 | 0.5340 | 0.275 | 0.040 | 0.583 | 0.9656 | 1.2070 | 0.137 |
| -20.40 | 15.00 | 2106.84 | 13.65 | 0.5340 | 0.272 | 0.040 | 0.586 | 0.9555 | 1.1944 | 0.136 |
| -10.40 | 15.00 | 2106.84 | 13.65 | 0.5340 | 0.269 | 0.039 | 0.582 | 0.9429 | 1.1786 | 0.134 |
| -0.40 | 15.00 | 2106.84 | 13.65 | 0.5340 | 0.267 | 0.039 | 0.585 | 0.9355 | 1.1694 | 0.133 |
| 9.60 | 15.00 | 2106.84 | 13.65 | 0.5340 | 0.265 | 0.039 | 0.583 | 0.9286 | 1.1608 | 0.132 |
| 19.60 | 15.00 | 2106.84 | 13.65 | 0.5340 | 0.266 | 0.038 | 0.589 | 0.9329 | 1.1661 | 0.132 |
| 29.60 | 15.00 | 2106.84 | 13.65 | 0.5340 | 0.272 | 0.039 | 0.594 | 0.9534 | 1.1918 | 0.135 |

PROPELLER DYNAMOMETER
epsm1j123.pro Rudder and Propeller Alone: RNo.3 J=0.94 Drift Angle =-7.5deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|
| -30.40 | 10.00 | 810.16 | 22.83 | 0.9258 | 0.073 | 0.019 | 0.575 | 0.0857 | 0.1071 | 0.033 |
| -25.40 | 10.00 | 810.16 | 22.83 | 0.9258 | 0.056 | 0.017 | 0.495 | 0.0648 | 0.0811 | 0.025 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| -20.40 | 10.00 | 810.16 | 22.83 | 0.9258 | 0.035 | 0.015 | 0.351 | 0.0405 | 0.0507 | 0.016 |
| -15.40 | 10.00 | 810.16 | 22.83 | 0.9258 | 0.013 | 0.014 | 0.137 | 0.0151 | 0.0188 | 0.006 |
| -10.40 | 10.00 | 810.16 | 22.83 | 0.9258 | -0.017 | 0.013 | -1.000 | -0.0197 | -0.0246 | -0.008 |
| -5.40 | 10.00 | 810.16 | 22.83 | 0.9258 | -0.037 | 0.013 | -1.000 | -0.0428 | -0.0536 | -0.016 |
| -0.40 | 10.00 | 810.16 | 22.83 | 0.9258 | -0.041 | 0.013 | -1.000 | -0.0475 | -0.0593 | -0.018 |
| 4.60 | 10.00 | 810.16 | 22.83 | 0.9258 | -0.066 | 0.010 | -1.000 | -0.0764 | -0.0955 | -0.029 |
| 9.60 | 10.00 | 810.16 | 22.83 | 0.9258 | -0.057 | 0.011 | -1.000 | -0.0660 | -0.0825 | -0.025 |
| 14.60 | 10.00 | 810.16 | 22.83 | 0.9258 | -0.027 | 0.011 | -1.000 | -0.0313 | -0.0391 | -0.012 |
| 19.60 | 10.00 | 810.16 | 22.83 | 0.9258 | -0.001 | 0.011 | -1.000 | -0.0012 | -0.0015 | -0.000 |
| 24.60 | 10.00 | 810.16 | 22.83 | 0.9258 | 0.009 | 0.011 | 0.121 | 0.0104 | 0.0130 | 0.004 |
| 29.60 | 10.00 | 810.16 | 22.83 | 0.9258 | 0.021 | 0.012 | 0.264 | 0.0243 | 0.0304 | 0.009 |
| 34.60 | 10.00 | 810.16 | 22.83 | 0.9258 | 0.019 | 0.013 | 0.208 | 0.0220 | 0.0275 | 0.008 |
| 39.60 | 10.00 | 810.16 | 22.83 | 0.9258 | -0.010 | 0.015 | -1.000 | -0.0116 | -0.0145 | -0.004 |

PROPELLER DYNAMOMETER
epsm1j223.pro Rudder and Propeller Alone: RNo.3 J=0.51 Drift Angle =-7.5deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|
| -35.40 | 10.00 | 1466.66 | 13.09 | 0.5114 | 0.263 | 0.041 | 0.522 | 1.0063 | 1.2579 | 0.131 |
| -30.40 | 10.00 | 1466.66 | 13.09 | 0.5114 | 0.268 | 0.041 | 0.538 | 1.0237 | 1.2796 | 0.134 |
| -25.40 | 10.00 | 1466.66 | 13.09 | 0.5114 | 0.259 | 0.040 | 0.529 | 0.9901 | 1.2376 | 0.129 |
| -20.40 | 10.00 | 1466.66 | 13.09 | 0.5114 | 0.258 | 0.040 | 0.531 | 0.9855 | 1.2319 | 0.129 |
| -15.40 | 10.00 | 1466.66 | 13.09 | 0.5114 | 0.255 | 0.039 | 0.528 | 0.9739 | 1.2174 | 0.127 |
| -10.40 | 10.00 | 1466.66 | 13.09 | 0.5114 | 0.252 | 0.039 | 0.526 | 0.9623 | 1.2029 | 0.126 |
| -5.40 | 10.00 | 1466.66 | 13.09 | 0.5114 | 0.246 | 0.039 | 0.517 | 0.9403 | 1.1754 | 0.123 |
| -0.40 | 10.00 | 1466.66 | 13.09 | 0.5114 | 0.232 | 0.039 | 0.490 | 0.8882 | 1.1103 | 0.116 |
| 4.60 | 10.00 | 1466.66 | 13.09 | 0.5114 | 0.192 | 0.039 | 0.405 | 0.7353 | 0.9192 | 0.096 |
| 9.60 | 10.00 | 1466.66 | 13.09 | 0.5114 | 0.179 | 0.038 | 0.382 | 0.6856 | 0.8569 | 0.090 |
| 14.60 | 10.00 | 1466.66 | 13.09 | 0.5114 | 0.181 | 0.038 | 0.384 | 0.6914 | 0.8642 | 0.090 |
| 19.60 | 10.00 | 1466.66 | 13.09 | 0.5114 | 0.207 | 0.038 | 0.443 | 0.7932 | 0.9916 | 0.104 |
| 24.60 | 10.00 | 1466.66 | 13.09 | 0.5114 | 0.248 | 0.038 | 0.528 | 0.9496 | 1.1870 | 0.124 |
| 29.60 | 10.00 | 1466.66 | 13.09 | 0.5114 | 0.261 | 0.038 | 0.554 | 0.9994 | 1.2492 | 0.130 |
| 34.60 | 10.00 | 1466.66 | 13.09 | 0.5114 | 0.246 | 0.039 | 0.521 | 0.9426 | 1.1783 | 0.123 |
| 39.60 | 10.00 | 1466.66 | 13.09 | 0.5114 | 0.210 | 0.039 | 0.439 | 0.8014 | 1.0017 | 0.105 |

PROPELLER DYNAMOMETER
epsm1j323.pro Rudder and Propeller Alone: RNo.3 J=0.36 Drift Angle =-7.5deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|
| -30.40 | 10.00 | 2104.09 | 9.21 | 0.3565 | 0.333 | 0.048 | 0.395 | 2.6171 | 3.2714 | 0.171 |
| -25.40 | 10.00 | 2104.09 | 9.21 | 0.3565 | 0.329 | 0.048 | 0.393 | 2.5894 | 3.2367 | 0.169 |
| -20.40 | 10.00 | 2104.09 | 9.21 | 0.3565 | 0.322 | 0.047 | 0.387 | 2.5361 | 3.1701 | 0.165 |
| -15.40 | 10.00 | 2104.09 | 9.21 | 0.3565 | 0.321 | 0.047 | 0.387 | 2.5257 | 3.1571 | 0.165 |
| -10.40 | 10.00 | 2104.09 | 9.21 | 0.3565 | 0.320 | 0.047 | 0.387 | 2.5153 | 3.1441 | 0.164 |
| -5.40 | 10.00 | 2104.09 | 9.21 | 0.3565 | 0.315 | 0.047 | 0.383 | 2.4759 | 3.0948 | 0.161 |
| -0.40 | 10.00 | 2104.09 | 9.21 | 0.3565 | 0.316 | 0.046 | 0.386 | 2.4898 | 3.1122 | 0.162 |
| 4.60 | 10.00 | 2104.09 | 9.21 | 0.3565 | 0.320 | 0.046 | 0.391 | 2.5187 | 3.1484 | 0.164 |
| 9.60 | 10.00 | 2104.09 | 9.21 | 0.3565 | 0.313 | 0.046 | 0.387 | 2.4654 | 3.0818 | 0.161 |
| 14.60 | 10.00 | 2104.09 | 9.21 | 0.3565 | 0.321 | 0.046 | 0.394 | 2.5233 | 3.1542 | 0.165 |
| 19.60 | 10.00 | 2104.09 | 9.21 | 0.3565 | 0.321 | 0.046 | 0.393 | 2.5268 | 3.1585 | 0.165 |
| 24.60 | 10.00 | 2104.09 | 9.21 | 0.3565 | 0.320 | 0.046 | 0.392 | 2.5187 | 3.1484 | 0.164 |
| 29.60 | 10.00 | 2104.09 | 9.21 | 0.3565 | 0.324 | 0.046 | 0.398 | 2.5465 | 3.1831 | 0.166 |
| 34.60 | 10.00 | 2104.09 | 9.21 | 0.3565 | 0.324 | 0.046 | 0.397 | 2.5500 | 3.1875 | 0.166 |
| 39.60 | 10.00 | 2104.09 | 9.21 | 0.3565 | 0.328 | 0.046 | 0.403 | 2.5812 | 3.2266 | 0.168 |

PROPELLER DYNAMOMETER
epsm2j124.pro Rudder and Propeller Alone: RNo.3 J=0.94 Drift Angle =-15deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|
| -25.40 | 10.00 | 806.24 | 22.93 | 0.9302 | 0.118 | 0.026 | 0.669 | 0.1366 | 0.1707 | 0.053 |
| -20.40 | 10.00 | 806.24 | 22.93 | 0.9302 | 0.087 | 0.023 | 0.561 | 0.1004 | 0.1255 | 0.039 |
| -15.40 | 10.00 | 806.24 | 22.93 | 0.9302 | 0.064 | 0.022 | 0.424 | 0.0735 | 0.0919 | 0.028 |
| -10.40 | 10.00 | 806.24 | 22.93 | 0.9302 | 0.018 | 0.021 | 0.130 | 0.0210 | 0.0263 | 0.008 |
| -5.40 | 10.00 | 806.24 | 22.93 | 0.9302 | 0.024 | 0.020 | 0.184 | 0.0280 | 0.0350 | 0.011 |
| -0.40 | 10.00 | 806.24 | 22.93 | 0.9302 | 0.031 | 0.019 | 0.247 | 0.0362 | 0.0452 | 0.014 |
| 4.60 | 10.00 | 806.24 | 22.93 | 0.9302 | 0.034 | 0.017 | 0.293 | 0.0397 | 0.0496 | 0.015 |
| 9.60 | 10.00 | 806.24 | 22.93 | 0.9302 | 0.029 | 0.018 | 0.237 | 0.0338 | 0.0423 | 0.013 |
| 14.60 | 10.00 | 806.24 | 22.93 | 0.9302 | 0.008 | 0.018 | 0.065 | 0.0093 | 0.0117 | 0.004 |
| 19.60 | 10.00 | 806.24 | 22.93 | 0.9302 | 0.043 | 0.017 | 0.374 | 0.0502 | 0.0627 | 0.019 |
| 24.60 | 10.00 | 806.24 | 22.93 | 0.9302 | 0.066 | 0.018 | 0.538 | 0.0759 | 0.0948 | 0.029 |
| 29.60 | 10.00 | 806.24 | 22.93 | 0.9302 | 0.084 | 0.018 | 0.686 | 0.0969 | 0.1211 | 0.037 |
| 34.60 | 10.00 | 806.24 | 22.93 | 0.9302 | 0.054 | 0.019 | 0.426 | 0.0619 | 0.0773 | 0.024 |
| 39.60 | 10.00 | 806.24 | 22.93 | 0.9302 | 0.053 | 0.021 | 0.378 | 0.0607 | 0.0759 | 0.024 |

PROPELLER DYNAMOMETER
epsm2j224.pro Rudder and Propeller Alone: RNo.3 J=0.51 Drift Angle =-15deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| -30.40 | 10.00 | 1468.06 | 13.08 | 0.5109 | 0.310 | 0.045 | 0.567 | 1.1883 | 1.4853 | 0.155 |
| -25.40 | 10.00 | 1468.06 | 13.08 | 0.5109 | 0.291 | 0.044 | 0.540 | 1.1136 | 1.3919 | 0.145 |
| -20.40 | 10.00 | 1468.06 | 13.08 | 0.5109 | 0.283 | 0.043 | 0.530 | 1.0844 | 1.3555 | 0.141 |
| -15.40 | 10.00 | 1468.06 | 13.08 | 0.5109 | 0.275 | 0.043 | 0.522 | 1.0540 | 1.3175 | 0.137 |
| -10.40 | 10.00 | 1468.06 | 13.08 | 0.5109 | 0.266 | 0.043 | 0.506 | 1.0190 | 1.2738 | 0.133 |
| -5.40 | 10.00 | 1468.06 | 13.08 | 0.5109 | 0.252 | 0.043 | 0.483 | 0.9665 | 1.2081 | 0.126 |
| -0.40 | 10.00 | 1468.06 | 13.08 | 0.5109 | 0.224 | 0.043 | 0.428 | 0.8579 | 1.0724 | 0.112 |
| 4.60 | 10.00 | 1468.06 | 13.08 | 0.5109 | 0.278 | 0.041 | 0.546 | 1.0645 | 1.3307 | 0.139 |
| 9.60 | 10.00 | 1468.06 | 13.08 | 0.5109 | 0.279 | 0.041 | 0.553 | 1.0680 | 1.3350 | 0.139 |
| 14.60 | 10.00 | 1468.06 | 13.08 | 0.5109 | 0.282 | 0.041 | 0.561 | 1.0820 | 1.3525 | 0.141 |
| 19.60 | 10.00 | 1468.06 | 13.08 | 0.5109 | 0.282 | 0.041 | 0.560 | 1.0797 | 1.3496 | 0.141 |
| 24.60 | 10.00 | 1468.06 | 13.08 | 0.5109 | 0.275 | 0.041 | 0.541 | 1.0552 | 1.3190 | 0.138 |
| 29.60 | 10.00 | 1468.06 | 13.08 | 0.5109 | 0.245 | 0.041 | 0.481 | 0.9396 | 1.1745 | 0.122 |
| 34.60 | 10.00 | 1468.06 | 13.08 | 0.5109 | 0.222 | 0.041 | 0.435 | 0.8498 | 1.0622 | 0.111 |
| 39.60 | 10.00 | 1468.06 | 13.08 | 0.5109 | 0.223 | 0.041 | 0.439 | 0.8556 | 1.0695 | 0.112 |

PROPELLER DYNAMOMETER
epsm2j324.pro Rudder and Propeller Alone: RNo.3 J=0.36 Drift Angle =-15deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|
| -30.40 | 10.00 | 2107.19 | 9.19 | 0.3559 | 0.336 | 0.050 | 0.383 | 2.6543 | 3.3179 | 0.172 |
| -25.40 | 10.00 | 2107.19 | 9.19 | 0.3559 | 0.336 | 0.050 | 0.382 | 2.6496 | 3.3121 | 0.172 |
| -20.40 | 10.00 | 2107.19 | 9.19 | 0.3559 | 0.333 | 0.049 | 0.381 | 2.6286 | 3.2858 | 0.171 |
| -15.40 | 10.00 | 2107.19 | 9.19 | 0.3559 | 0.334 | 0.049 | 0.384 | 2.6391 | 3.2989 | 0.172 |
| -10.40 | 10.00 | 2107.19 | 9.19 | 0.3559 | 0.329 | 0.049 | 0.380 | 2.6006 | 3.2508 | 0.169 |
| -5.40 | 10.00 | 2107.19 | 9.19 | 0.3559 | 0.327 | 0.049 | 0.379 | 2.5843 | 3.2304 | 0.168 |
| -0.40 | 10.00 | 2107.19 | 9.19 | 0.3559 | 0.325 | 0.049 | 0.378 | 2.5679 | 3.2099 | 0.167 |
| 4.60 | 10.00 | 2107.19 | 9.19 | 0.3559 | 0.326 | 0.048 | 0.381 | 2.5703 | 3.2128 | 0.167 |
| 9.60 | 10.00 | 2107.19 | 9.19 | 0.3559 | 0.326 | 0.048 | 0.383 | 2.5761 | 3.2201 | 0.168 |
| 14.60 | 10.00 | 2107.19 | 9.19 | 0.3559 | 0.325 | 0.048 | 0.383 | 2.5679 | 3.2099 | 0.167 |
| 19.60 | 10.00 | 2107.19 | 9.19 | 0.3559 | 0.326 | 0.048 | 0.382 | 2.5714 | 3.2143 | 0.167 |
| 24.60 | 10.00 | 2107.19 | 9.19 | 0.3559 | 0.328 | 0.048 | 0.385 | 2.5854 | 3.2318 | 0.168 |
| 29.60 | 10.00 | 2107.19 | 9.19 | 0.3559 | 0.330 | 0.048 | 0.386 | 2.6065 | 3.2581 | 0.169 |
| 34.60 | 10.00 | 2107.19 | 9.19 | 0.3559 | 0.327 | 0.048 | 0.384 | 2.5831 | 3.2289 | 0.168 |
| 39.60 | 10.00 | 2107.19 | 9.19 | 0.3559 | 0.325 | 0.048 | 0.382 | 2.5668 | 3.2085 | 0.167 |

PROPELLER DYNAMOMETER
epom2j126.pro Rudder and Propeller Alone: RNo.2 J=0.94 Drift Angle =-15deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|
| -30.40 | 10.00 | 804.53 | 22.97 | 0.9322 | 0.107 | 0.028 | 0.563 | 0.1235 | 0.1544 | 0.048 |
| -25.40 | 10.00 | 804.53 | 22.97 | 0.9322 | 0.078 | 0.027 | 0.433 | 0.0894 | 0.1118 | 0.035 |
| -20.40 | 10.00 | 804.53 | 22.97 | 0.9322 | 0.025 | 0.025 | 0.147 | 0.0282 | 0.0353 | 0.011 |
| -15.40 | 10.00 | 804.53 | 22.97 | 0.9322 | 0.036 | 0.025 | 0.215 | 0.0412 | 0.0515 | 0.016 |
| -10.40 | 10.00 | 804.53 | 22.97 | 0.9322 | 0.068 | 0.022 | 0.460 | 0.0788 | 0.0985 | 0.031 |
| -5.40 | 10.00 | 804.53 | 22.97 | 0.9322 | 0.055 | 0.022 | 0.370 | 0.0635 | 0.0794 | 0.025 |
| 4.60 | 10.00 | 804.53 | 22.97 | 0.9322 | -0.004 | 0.020 | -1.000 | -0.0047 | -0.0059 | -0.002 |
| 9.60 | 10.00 | 804.53 | 22.97 | 0.9322 | -0.013 | 0.020 | -1.000 | -0.0153 | -0.0191 | -0.006 |
| 14.60 | 10.00 | 804.53 | 22.97 | 0.9322 | 0.026 | 0.022 | 0.176 | 0.0294 | 0.0368 | 0.011 |
| 19.60 | 10.00 | 804.53 | 22.97 | 0.9322 | 0.052 | 0.022 | 0.359 | 0.0600 | 0.0750 | 0.023 |
| 24.60 | 10.00 | 804.53 | 22.97 | 0.9322 | 0.035 | 0.021 | 0.247 | 0.0400 | 0.0500 | 0.016 |
| 29.60 | 10.00 | 804.53 | 22.97 | 0.9322 | 0.012 | 0.022 | 0.084 | 0.0141 | 0.0177 | 0.005 |
| 34.60 | 10.00 | 804.53 | 22.97 | 0.9322 | 0.029 | 0.021 | 0.199 | 0.0329 | 0.0412 | 0.013 |
| 39.60 | 10.00 | 804.53 | 22.97 | 0.9322 | 0.056 | 0.023 | 0.368 | 0.0647 | 0.0809 | 0.025 |

PROPELLER DYNAMOMETER
epom2j2.pro Rudder and Propeller Alone: RNo.2 J=0.51 Drift Angle =-15deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|
| -30.40 | 10.00 | 1464.97 | 13.11 | 0.5120 | 0.259 | 0.044 | 0.476 | 0.9882 | 1.2352 | 0.129 |
| -25.40 | 10.00 | 1464.09 | 13.11 | 0.5123 | 0.257 | 0.044 | 0.471 | 0.9800 | 1.2250 | 0.128 |
| -20.40 | 10.00 | 1464.97 | 13.11 | 0.5120 | 0.255 | 0.043 | 0.480 | 0.9740 | 1.2175 | 0.128 |
| -15.40 | 10.00 | 1464.09 | 13.11 | 0.5123 | 0.224 | 0.044 | 0.417 | 0.8541 | 1.0677 | 0.112 |
| -10.40 | 10.00 | 1464.97 | 13.11 | 0.5120 | 0.259 | 0.043 | 0.492 | 0.9897 | 1.2372 | 0.130 |
| -5.40 | 10.00 | 1464.09 | 13.11 | 0.5123 | 0.262 | 0.043 | 0.494 | 0.9988 | 1.2486 | 0.131 |
| -0.40 | 10.00 | 1464.97 | 13.11 | 0.5120 | 0.239 | 0.043 | 0.453 | 0.9104 | 1.1380 | 0.119 |
| 4.60 | 10.00 | 1464.09 | 13.11 | 0.5123 | 0.278 | 0.043 | 0.525 | 1.0588 | 1.3236 | 0.139 |
| 9.60 | 10.00 | 1464.97 | 13.11 | 0.5120 | 0.276 | 0.042 | 0.530 | 1.0529 | 1.3161 | 0.138 |
| 14.60 | 10.00 | 1464.09 | 13.11 | 0.5123 | 0.273 | 0.043 | 0.517 | 1.0400 | 1.3000 | 0.136 |
| 19.60 | 10.00 | 1464.97 | 13.11 | 0.5120 | 0.243 | 0.042 | 0.469 | 0.9284 | 1.1605 | 0.121 |
| 24.60 | 10.00 | 1464.09 | 13.11 | 0.5123 | 0.219 | 0.043 | 0.415 | 0.8341 | 1.0427 | 0.109 |
| 29.60 | 10.00 | 1464.97 | 13.11 | 0.5120 | 0.272 | 0.042 | 0.524 | 1.0381 | 1.2976 | 0.136 |
| 39.60 | 10.00 | 1464.09 | 13.11 | 0.5123 | 0.237 | 0.043 | 0.448 | 0.9024 | 1.1280 | 0.118 |

PROPELLER DYNAMOMETER
epom2j326.pro Rudder and Propeller Alone: RNo.2 J=0.36 Drift Angle =-15deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| -30.40 | 10.00 | 2110.21 | 9.18 | 0.3554 | 0.339 | 0.050 | 0.384 | 2.6859 | 3.3574 | 0.174 |
| -25.40 | 10.00 | 2110.21 | 9.18 | 0.3554 | 0.335 | 0.050 | 0.377 | 2.6495 | 3.3118 | 0.172 |
| -20.40 | 10.00 | 2110.21 | 9.18 | 0.3554 | 0.336 | 0.050 | 0.381 | 2.6636 | 3.3295 | 0.173 |
| -15.40 | 10.00 | 2110.21 | 9.18 | 0.3554 | 0.335 | 0.050 | 0.381 | 2.6530 | 3.3163 | 0.172 |
| -10.40 | 10.00 | 2110.21 | 9.18 | 0.3554 | 0.329 | 0.050 | 0.375 | 2.6036 | 3.2545 | 0.169 |
| -5.40 | 10.00 | 2110.21 | 9.18 | 0.3554 | 0.332 | 0.049 | 0.380 | 2.6260 | 3.2824 | 0.170 |
| -0.40 | 10.00 | 2110.21 | 9.18 | 0.3554 | 0.326 | 0.049 | 0.375 | 2.5812 | 3.2265 | 0.167 |
| 4.60 | 10.00 | 2110.21 | 9.18 | 0.3554 | 0.324 | 0.049 | 0.374 | 2.5636 | 3.2045 | 0.166 |
| 9.60 | 10.00 | 2110.21 | 9.18 | 0.3554 | 0.328 | 0.049 | 0.380 | 2.5989 | 3.2486 | 0.168 |
| 14.60 | 10.00 | 2110.21 | 9.18 | 0.3554 | 0.330 | 0.049 | 0.384 | 2.6154 | 3.2692 | 0.169 |
| 19.60 | 10.00 | 2110.21 | 9.18 | 0.3554 | 0.323 | 0.049 | 0.376 | 2.5577 | 3.1971 | 0.166 |
| 24.60 | 10.00 | 2110.21 | 9.18 | 0.3554 | 0.333 | 0.049 | 0.387 | 2.6389 | 3.2986 | 0.171 |
| 29.60 | 10.00 | 2110.21 | 9.18 | 0.3554 | 0.330 | 0.049 | 0.383 | 2.6142 | 3.2677 | 0.169 |
| 34.60 | 10.00 | 2110.21 | 9.18 | 0.3554 | 0.329 | 0.049 | 0.382 | 2.6083 | 3.2604 | 0.169 |
| 39.60 | 10.00 | 2110.21 | 9.18 | 0.3554 | 0.333 | 0.049 | 0.386 | 2.6377 | 3.2971 | 0.171 |

PROPELLER DYNAMOMETER
epom2j626.pro Rudder and Propeller Alone: RNo.2 J=0.51 (V=15m/s) Drift Angle =-15deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|
| -30.40 | 15.00 | 2110.21 | 13.63 | 0.5331 | 0.300 | 0.044 | 0.576 | 1.0547 | 1.3183 | 0.149 |
| -20.40 | 15.00 | 2110.21 | 13.63 | 0.5331 | 0.289 | 0.043 | 0.565 | 1.0165 | 1.2706 | 0.144 |
| -10.40 | 15.00 | 2110.21 | 13.63 | 0.5331 | 0.287 | 0.043 | 0.565 | 1.0092 | 1.2615 | 0.143 |
| -0.40 | 15.00 | 2110.21 | 13.63 | 0.5331 | 0.281 | 0.043 | 0.560 | 0.9888 | 1.2360 | 0.140 |
| 9.60 | 15.00 | 2110.21 | 13.63 | 0.5331 | 0.279 | 0.042 | 0.566 | 0.9825 | 1.2281 | 0.139 |
| 19.60 | 15.00 | 2110.21 | 13.63 | 0.5331 | 0.283 | 0.042 | 0.572 | 0.9956 | 1.2445 | 0.141 |
| 29.60 | 15.00 | 2110.21 | 13.63 | 0.5331 | 0.282 | 0.042 | 0.571 | 0.9935 | 1.2419 | 0.140 |

PROPELLER DYNAMOMETER
epb30j1.pro Three boards: RNo.2 V=+10m/s n = +800rpm Drift Angle = 0 deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.00 | 10.00 | 804.68 | 22.97 | 0.9320 | 0.059 | 0.029 | 0.302 | 0.0684 | 0.0855 | 0.026 |
| -35.00 | 10.00 | 804.68 | 22.97 | 0.9320 | 0.100 | 0.027 | 0.547 | 0.1151 | 0.1439 | 0.045 |
| -30.00 | 10.00 | 802.84 | 23.02 | 0.9342 | 0.087 | 0.025 | 0.520 | 0.0995 | 0.1243 | 0.039 |
| -25.00 | 10.00 | 804.68 | 22.97 | 0.9320 | 0.033 | 0.025 | 0.194 | 0.0376 | 0.0470 | 0.015 |
| -20.00 | 10.00 | 802.84 | 23.02 | 0.9342 | 0.092 | 0.024 | 0.568 | 0.1051 | 0.1314 | 0.041 |
| -15.00 | 10.00 | 804.68 | 22.97 | 0.9320 | 0.105 | 0.024 | 0.636 | 0.1208 | 0.1510 | 0.047 |
| -10.00 | 10.00 | 805.84 | 22.94 | 0.9307 | 0.061 | 0.023 | 0.391 | 0.0707 | 0.0883 | 0.027 |
| -5.00 | 10.00 | 804.68 | 22.97 | 0.9320 | 0.020 | 0.024 | 0.123 | 0.0228 | 0.0285 | 0.009 |
| 0.00 | 10.00 | 805.26 | 22.95 | 0.9314 | 0.057 | 0.023 | 0.359 | 0.0653 | 0.0816 | 0.025 |
| 5.00 | 10.00 | 804.68 | 22.97 | 0.9320 | 0.083 | 0.023 | 0.527 | 0.0957 | 0.1197 | 0.037 |
| 10.00 | 10.00 | 802.84 | 23.02 | 0.9342 | 0.052 | 0.023 | 0.350 | 0.0597 | 0.0747 | 0.023 |
| 15.00 | 10.00 | 804.68 | 22.97 | 0.9320 | 0.056 | 0.023 | 0.360 | 0.0650 | 0.0812 | 0.025 |
| 20.00 | 10.00 | 802.84 | 23.02 | 0.9342 | 0.083 | 0.022 | 0.558 | 0.0956 | 0.1195 | 0.037 |
| 25.00 | 10.00 | 804.68 | 22.97 | 0.9320 | 0.013 | 0.023 | 0.083 | 0.0148 | 0.0185 | 0.006 |
| 30.00 | 10.00 | 802.84 | 23.02 | 0.9342 | 0.063 | 0.023 | 0.415 | 0.0723 | 0.0904 | 0.028 |
| 35.00 | 10.00 | 804.68 | 22.97 | 0.9320 | 0.095 | 0.024 | 0.585 | 0.1094 | 0.1368 | 0.042 |
| 40.00 | 10.00 | 804.68 | 22.97 | 0.9320 | 0.087 | 0.025 | 0.517 | 0.1003 | 0.1254 | 0.039 |
| 45.00 | 10.00 | 804.68 | 22.97 | 0.9320 | 0.054 | 0.028 | 0.290 | 0.0627 | 0.0784 | 0.024 |

PROPELLER DYNAMOMETER
epb30j2.pro Three boards: RNo.2 V=+10m/s n = +1460rpm Drift Angle = 0 deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.00 | 10.00 | 1456.69 | 13.18 | 0.5149 | 0.301 | 0.046 | 0.541 | 1.1354 | 1.4192 | 0.150 |
| -35.00 | 10.00 | 1456.69 | 13.18 | 0.5149 | 0.252 | 0.045 | 0.456 | 0.9518 | 1.1898 | 0.126 |
| -30.00 | 10.00 | 1457.67 | 13.17 | 0.5145 | 0.275 | 0.044 | 0.509 | 1.0386 | 1.2982 | 0.137 |
| -25.00 | 10.00 | 1456.69 | 13.18 | 0.5149 | 0.217 | 0.044 | 0.401 | 0.8196 | 1.0245 | 0.109 |
| -20.00 | 10.00 | 1457.67 | 13.17 | 0.5145 | 0.262 | 0.044 | 0.492 | 0.9882 | 1.2353 | 0.131 |
| -15.00 | 10.00 | 1456.69 | 13.18 | 0.5149 | 0.213 | 0.044 | 0.401 | 0.8036 | 1.0046 | 0.106 |
| -10.00 | 10.00 | 1457.67 | 13.17 | 0.5145 | 0.243 | 0.043 | 0.463 | 0.9185 | 1.1481 | 0.121 |
| -5.00 | 10.00 | 1456.69 | 13.18 | 0.5149 | 0.210 | 0.043 | 0.400 | 0.7934 | 0.9917 | 0.105 |
| 0.00 | 10.00 | 1458.02 | 13.17 | 0.5144 | 0.235 | 0.043 | 0.449 | 0.8886 | 1.1107 | 0.117 |
| 5.00 | 10.00 | 1456.69 | 13.18 | 0.5149 | 0.273 | 0.043 | 0.523 | 1.0294 | 1.2867 | 0.136 |
| 10.00 | 10.00 | 1457.67 | 13.17 | 0.5145 | 0.251 | 0.042 | 0.488 | 0.9486 | 1.1857 | 0.125 |
| 15.00 | 10.00 | 1456.69 | 13.18 | 0.5149 | 0.274 | 0.043 | 0.529 | 1.0351 | 1.2938 | 0.137 |
| 20.00 | 10.00 | 1457.67 | 13.17 | 0.5145 | 0.209 | 0.042 | 0.407 | 0.7887 | 0.9858 | 0.104 |
| 25.00 | 10.00 | 1456.69 | 13.18 | 0.5149 | 0.225 | 0.042 | 0.436 | 0.8470 | 1.0587 | 0.112 |
| 30.00 | 10.00 | 1457.67 | 13.17 | 0.5145 | 0.257 | 0.042 | 0.504 | 0.9704 | 1.2130 | 0.128 |
| 35.00 | 10.00 | 1456.69 | 13.18 | 0.5149 | 0.203 | 0.042 | 0.392 | 0.7649 | 0.9561 | 0.101 |
| 40.00 | 10.00 | 1456.69 | 13.18 | 0.5149 | 0.272 | 0.043 | 0.520 | 1.0271 | 1.2838 | 0.136 |
| 45.00 | 10.00 | 1456.69 | 13.18 | 0.5149 | 0.238 | 0.043 | 0.453 | 0.8994 | 1.1243 | 0.119 |
| 50.00 | 10.00 | 1456.69 | 13.18 | 0.5149 | 0.221 | 0.043 | 0.418 | 0.8333 | 1.0416 | 0.110 |

PROPELLER DYNAMOMETER
epb30j3.pro Three boards: RNo.2 V=+10m/s n = +2100rpm Drift Angle = 0 deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.00 | 10.00 | 2103.69 | 9.21 | 0.3565 | 0.314 | 0.050 | 0.354 | 2.4683 | 3.0854 | 0.161 |
| -35.00 | 10.00 | 2103.69 | 9.21 | 0.3565 | 0.319 | 0.051 | 0.357 | 2.5082 | 3.1353 | 0.164 |
| -30.00 | 10.00 | 2104.72 | 9.20 | 0.3563 | 0.320 | 0.051 | 0.356 | 2.5200 | 3.1501 | 0.164 |
| -25.00 | 10.00 | 2103.69 | 9.21 | 0.3565 | 0.316 | 0.051 | 0.353 | 2.4843 | 3.1054 | 0.162 |
| -20.00 | 10.00 | 2104.72 | 9.20 | 0.3563 | 0.314 | 0.050 | 0.355 | 2.4751 | 3.0939 | 0.161 |
| -15.00 | 10.00 | 2103.69 | 9.21 | 0.3565 | 0.305 | 0.050 | 0.347 | 2.3999 | 2.9999 | 0.157 |
| -10.00 | 10.00 | 2104.72 | 9.20 | 0.3563 | 0.306 | 0.050 | 0.350 | 2.4131 | 3.0164 | 0.157 |
| -5.00 | 10.00 | 2103.69 | 9.21 | 0.3565 | 0.306 | 0.050 | 0.351 | 2.4102 | 3.0127 | 0.157 |
| 0.00 | 10.00 | 2104.44 | 9.21 | 0.3564 | 0.304 | 0.049 | 0.351 | 2.3956 | 2.9945 | 0.156 |
| 5.00 | 10.00 | 2103.69 | 9.21 | 0.3565 | 0.301 | 0.049 | 0.347 | 2.3668 | 2.9586 | 0.154 |
| 10.00 | 10.00 | 2104.72 | 9.20 | 0.3563 | 0.305 | 0.049 | 0.353 | 2.4046 | 3.0057 | 0.157 |
| 15.00 | 10.00 | 2103.69 | 9.21 | 0.3565 | 0.307 | 0.049 | 0.356 | 2.4170 | 3.0213 | 0.158 |
| 20.00 | 10.00 | 2104.72 | 9.20 | 0.3563 | 0.301 | 0.049 | 0.349 | 2.3687 | 2.9609 | 0.154 |
| 25.00 | 10.00 | 2103.69 | 9.21 | 0.3565 | 0.310 | 0.049 | 0.360 | 2.4421 | 3.0526 | 0.159 |
| 30.00 | 10.00 | 2104.72 | 9.20 | 0.3563 | 0.304 | 0.049 | 0.354 | 2.3920 | 2.9900 | 0.156 |
| 35.00 | 10.00 | 2103.32 | 9.21 | 0.3566 | 0.299 | 0.049 | 0.350 | 2.3543 | 2.9429 | 0.154 |
| 40.00 | 10.00 | 2103.32 | 9.21 | 0.3566 | 0.310 | 0.049 | 0.361 | 2.4387 | 3.0483 | 0.159 |
| 45.00 | 10.00 | 2103.32 | 9.21 | 0.3566 | 0.304 | 0.049 | 0.356 | 2.3942 | 2.9928 | 0.156 |

PROPELLER DYNAMOMETER
epb30j428.pro Three boards: RNo.2 V=+10m/s n = -800rpm Drift Angle = 0 deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|
| -30.00 | 10.00 | -803.30 | 157.00 | 0.9336 | -0.632 | -0.105 | 0.892 | -0.7251 | -0.9064 | -0.282 |
| -20.00 | 10.00 | -803.30 | 157.00 | 0.9336 | -0.549 | -0.101 | 0.806 | -0.6293 | -0.7867 | -0.245 |
| -10.00 | 10.00 | -803.30 | 157.00 | 0.9336 | -0.518 | -0.097 | 0.795 | -0.5940 | -0.7425 | -0.231 |
| 0.00 | 10.00 | -803.30 | 157.00 | 0.9336 | -0.549 | -0.096 | 0.845 | -0.6293 | -0.7867 | -0.245 |
| 10.00 | 10.00 | -803.30 | 157.00 | 0.9336 | -0.626 | -0.101 | 0.924 | -0.7183 | -0.8978 | -0.279 |
| 20.00 | 10.00 | -803.30 | 157.00 | 0.9336 | -0.599 | -0.101 | 0.884 | -0.6875 | -0.8593 | -0.267 |
| 30.00 | 10.00 | -803.30 | 157.00 | 0.9336 | -0.550 | -0.101 | 0.808 | -0.6305 | -0.7881 | -0.245 |

PROPELLER DYNAMOMETER
epb30j528.pro Three boards: RNo.2 V=+10m/s n = -1280rpm Drift Angle = 0 deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|
| -30.00 | 10.00 | -1203.54 | 164.18 | 0.6232 | -0.367 | -0.066 | 0.553 | -0.9440 | -1.1800 | -0.179 |
| -20.00 | 10.00 | -1203.54 | 164.18 | 0.6232 | -0.348 | -0.065 | 0.533 | -0.8961 | -1.1202 | -0.170 |
| -10.00 | 10.00 | -1203.54 | 164.18 | 0.6232 | -0.334 | -0.063 | 0.526 | -0.8596 | -1.0745 | -0.163 |
| 0.00 | 10.00 | -1203.54 | 164.18 | 0.6232 | -0.340 | -0.060 | 0.564 | -0.8767 | -1.0959 | -0.166 |
| 10.00 | 10.00 | -1203.54 | 164.18 | 0.6232 | -0.304 | -0.063 | 0.482 | -0.7821 | -0.9776 | -0.148 |
| 20.00 | 10.00 | -1203.54 | 164.18 | 0.6232 | -0.325 | -0.063 | 0.516 | -0.8368 | -1.0460 | -0.158 |
| 30.00 | 10.00 | -1203.54 | 164.18 | 0.6232 | -0.336 | -0.059 | 0.565 | -0.8653 | -1.0817 | -0.164 |

PROPELLER DYNAMOMETER
epb1p2j129.pro One board: RNo.2 V=+10m/s n = +800rpm Drift Angle = +15 deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.00 | 10.00 | 806.83 | 22.91 | 0.9296 | 0.127 | 0.027 | 0.691 | 0.1473 | 0.1841 | 0.057 |
| -30.00 | 10.00 | 806.83 | 22.91 | 0.9296 | 0.077 | 0.026 | 0.444 | 0.0893 | 0.1116 | 0.034 |
| -20.00 | 10.00 | 806.83 | 22.91 | 0.9296 | 0.049 | 0.025 | 0.295 | 0.0569 | 0.0711 | 0.022 |
| -10.00 | 10.00 | 806.83 | 22.91 | 0.9296 | 0.016 | 0.024 | 0.102 | 0.0190 | 0.0237 | 0.007 |
| 0.00 | 10.00 | 806.83 | 22.91 | 0.9296 | 0.054 | 0.022 | 0.366 | 0.0625 | 0.0781 | 0.024 |
| 10.00 | 10.00 | 806.83 | 22.91 | 0.9296 | -0.005 | 0.020 | -1.000 | -0.0056 | -0.0070 | -0.002 |
| 20.00 | 10.00 | 806.83 | 22.91 | 0.9296 | 0.047 | 0.020 | 0.351 | 0.0547 | 0.0684 | 0.021 |
| 30.00 | 10.00 | 806.83 | 22.91 | 0.9296 | 0.073 | 0.021 | 0.518 | 0.0848 | 0.1060 | 0.033 |
| 40.00 | 10.00 | 806.83 | 22.91 | 0.9296 | 0.013 | 0.022 | 0.089 | 0.0156 | 0.0195 | 0.006 |

PROPELLER DYNAMOMETER
epb1p2j229.pro One board: RNo.2 V=+10m/s n = +1460rpm Drift Angle = +15 deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.00 | 10.00 | 1462.76 | 13.12 | 0.5127 | 0.228 | 0.041 | 0.450 | 0.8671 | 1.0839 | 0.114 |
| -30.00 | 10.00 | 1462.76 | 13.12 | 0.5127 | 0.206 | 0.041 | 0.411 | 0.7845 | 0.9806 | 0.103 |
| -20.00 | 10.00 | 1462.76 | 13.12 | 0.5127 | 0.251 | 0.040 | 0.508 | 0.9541 | 1.1927 | 0.125 |
| -10.00 | 10.00 | 1462.76 | 13.12 | 0.5127 | 0.202 | 0.040 | 0.411 | 0.7700 | 0.9625 | 0.101 |
| 0.00 | 10.00 | 1462.76 | 13.12 | 0.5127 | 0.200 | 0.040 | 0.410 | 0.7611 | 0.9513 | 0.100 |
| 10.00 | 10.00 | 1462.76 | 13.12 | 0.5127 | 0.177 | 0.040 | 0.365 | 0.6740 | 0.8425 | 0.088 |
| 20.00 | 10.00 | 1462.76 | 13.12 | 0.5127 | 0.243 | 0.039 | 0.506 | 0.9229 | 1.1536 | 0.121 |
| 30.00 | 10.00 | 1462.76 | 13.12 | 0.5127 | 0.179 | 0.039 | 0.374 | 0.6796 | 0.8495 | 0.089 |
| 40.00 | 10.00 | 1462.76 | 13.12 | 0.5127 | 0.252 | 0.040 | 0.521 | 0.9597 | 1.1996 | 0.126 |

PROPELLER DYNAMOMETER
epb1p2j329.pro One board: RNo.2 V=+10m/s n = +2100rpm Drift Angle = +15 deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.00 | 10.00 | 2102.02 | 9.22 | 0.3568 | 0.276 | 0.046 | 0.341 | 2.1672 | 2.7090 | 0.141 |
| -30.00 | 10.00 | 2102.02 | 9.22 | 0.3568 | 0.280 | 0.047 | 0.341 | 2.1995 | 2.7494 | 0.144 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| -20.00 | 10.00 | 2102.02 | 9.22 | 0.3568 | 0.279 | 0.046 | 0.343 | 2.1884 | 2.7355 | 0.143 |
| -10.00 | 10.00 | 2102.02 | 9.22 | 0.3568 | 0.272 | 0.046 | 0.336 | 2.1370 | 2.6713 | 0.140 |
| 0.00 | 10.00 | 2102.02 | 9.22 | 0.3568 | 0.270 | 0.046 | 0.335 | 2.1203 | 2.6504 | 0.139 |
| 10.00 | 10.00 | 2102.02 | 9.22 | 0.3568 | 0.275 | 0.046 | 0.342 | 2.1582 | 2.6978 | 0.141 |
| 20.00 | 10.00 | 2102.02 | 9.22 | 0.3568 | 0.269 | 0.045 | 0.338 | 2.1147 | 2.6434 | 0.138 |
| 30.00 | 10.00 | 2102.02 | 9.22 | 0.3568 | 0.269 | 0.045 | 0.339 | 2.1158 | 2.6448 | 0.138 |
| 40.00 | 10.00 | 2102.02 | 9.22 | 0.3568 | 0.282 | 0.045 | 0.353 | 2.2163 | 2.7703 | 0.145 |

PROPELLER DYNAMOMETER
epb2p2j130.pro Two boards: RNo.2 V=+10m/s n = +800rpm Drift Angle = +15 deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.00 | 10.00 | 802.59 | 23.02 | 0.9345 | 0.106 | 0.026 | 0.615 | 0.1214 | 0.1518 | 0.047 |
| -30.00 | 10.00 | 802.59 | 23.02 | 0.9345 | 0.051 | 0.024 | 0.313 | 0.0585 | 0.0731 | 0.023 |
| -20.00 | 10.00 | 802.59 | 23.02 | 0.9345 | 0.028 | 0.023 | 0.188 | 0.0326 | 0.0408 | 0.013 |
| -10.00 | 10.00 | 802.59 | 23.02 | 0.9345 | 0.050 | 0.021 | 0.356 | 0.0573 | 0.0717 | 0.022 |
| 0.00 | 10.00 | 802.59 | 23.02 | 0.9345 | 0.045 | 0.020 | 0.340 | 0.0517 | 0.0646 | 0.020 |
| 10.00 | 10.00 | 802.59 | 23.02 | 0.9345 | 0.006 | 0.019 | 0.046 | 0.0067 | 0.0084 | 0.003 |
| 20.00 | 10.00 | 802.59 | 23.02 | 0.9345 | -0.005 | 0.018 | -1.000 | -0.0056 | -0.0070 | -0.002 |
| 30.00 | 10.00 | 802.59 | 23.02 | 0.9345 | 0.014 | 0.019 | 0.107 | 0.0157 | 0.0197 | 0.006 |
| 40.00 | 10.00 | 802.59 | 23.02 | 0.9345 | 0.072 | 0.022 | 0.489 | 0.0821 | 0.1026 | 0.032 |

PROPELLER DYNAMOMETER
epb2p2j230.pro Two boards: RNo.2 V=+10m/s n = +1460rpm Drift Angle = +15 deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.00 | 10.00 | 1458.67 | 13.16 | 0.5142 | 0.218 | 0.042 | 0.428 | 0.8240 | 1.0300 | 0.109 |
| -30.00 | 10.00 | 1458.67 | 13.16 | 0.5142 | 0.229 | 0.042 | 0.452 | 0.8678 | 1.0848 | 0.115 |
| -20.00 | 10.00 | 1458.67 | 13.16 | 0.5142 | 0.217 | 0.041 | 0.429 | 0.8195 | 1.0244 | 0.108 |
| -10.00 | 10.00 | 1458.67 | 13.16 | 0.5142 | 0.247 | 0.041 | 0.496 | 0.9330 | 1.1663 | 0.123 |
| 0.00 | 10.00 | 1458.67 | 13.16 | 0.5142 | 0.225 | 0.040 | 0.459 | 0.8514 | 1.0642 | 0.112 |
| 10.00 | 10.00 | 1458.67 | 13.16 | 0.5142 | 0.184 | 0.040 | 0.376 | 0.6947 | 0.8684 | 0.092 |
| 20.00 | 10.00 | 1458.67 | 13.16 | 0.5142 | 0.242 | 0.039 | 0.503 | 0.9151 | 1.1438 | 0.121 |
| 30.00 | 10.00 | 1458.67 | 13.16 | 0.5142 | 0.186 | 0.039 | 0.391 | 0.7049 | 0.8811 | 0.093 |
| 40.00 | 10.00 | 1458.67 | 13.16 | 0.5142 | 0.250 | 0.040 | 0.515 | 0.9465 | 1.1832 | 0.125 |

PROPELLER DYNAMOMETER
epb2p2j330.pro Two boards: RNo.2 V=+10m/s n = +2100rpm Drift Angle = +15 deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.00 | 10.00 | 2103.32 | 9.21 | 0.3566 | 0.266 | 0.045 | 0.334 | 2.0921 | 2.6151 | 0.137 |
| -30.00 | 10.00 | 2103.32 | 9.21 | 0.3566 | 0.273 | 0.046 | 0.334 | 2.1449 | 2.6811 | 0.140 |
| -20.00 | 10.00 | 2103.32 | 9.21 | 0.3566 | 0.280 | 0.047 | 0.340 | 2.2045 | 2.7556 | 0.144 |
| -10.00 | 10.00 | 2103.32 | 9.21 | 0.3566 | 0.282 | 0.047 | 0.343 | 2.2168 | 2.7710 | 0.145 |
| 0.00 | 10.00 | 2103.32 | 9.21 | 0.3566 | 0.276 | 0.046 | 0.338 | 2.1719 | 2.7148 | 0.142 |
| 10.00 | 10.00 | 2103.32 | 9.21 | 0.3566 | 0.274 | 0.046 | 0.339 | 2.1584 | 2.6980 | 0.141 |
| 20.00 | 10.00 | 2103.32 | 9.21 | 0.3566 | 0.271 | 0.046 | 0.336 | 2.1336 | 2.6671 | 0.139 |
| 30.00 | 10.00 | 2103.32 | 9.21 | 0.3566 | 0.280 | 0.045 | 0.349 | 2.1989 | 2.7486 | 0.143 |
| 40.00 | 10.00 | 2103.32 | 9.21 | 0.3566 | 0.280 | 0.045 | 0.351 | 2.2033 | 2.7542 | 0.144 |

PROPELLER DYNAMOMETER
epb3p2j131.pro Three boards: RNo.2 V=+10m/s n = +800rpm Drift Angle = +15 deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.00 | 10.00 | 801.00 | 23.06 | 0.9363 | 0.103 | 0.025 | 0.614 | 0.1178 | 0.1472 | 0.046 |
| -30.00 | 10.00 | 801.00 | 23.06 | 0.9363 | 0.088 | 0.024 | 0.557 | 0.1008 | 0.1260 | 0.039 |
| -20.00 | 10.00 | 801.00 | 23.06 | 0.9363 | 0.033 | 0.023 | 0.210 | 0.0374 | 0.0467 | 0.015 |
| -10.00 | 10.00 | 801.00 | 23.06 | 0.9363 | 0.082 | 0.022 | 0.570 | 0.0940 | 0.1175 | 0.037 |
| 0.00 | 10.00 | 801.00 | 23.06 | 0.9363 | 0.012 | 0.020 | -0.559 | 0.0140 | 0.0175 | 0.005 |
| 10.00 | 10.00 | 801.00 | 23.06 | 0.9363 | 0.011 | 0.019 | 0.087 | 0.0125 | 0.0156 | 0.005 |
| 20.00 | 10.00 | 801.00 | 23.06 | 0.9363 | 0.036 | 0.018 | 0.296 | 0.0408 | 0.0510 | 0.016 |
| 30.00 | 10.00 | 801.00 | 23.06 | 0.9363 | 0.065 | 0.020 | 0.486 | 0.0736 | 0.0920 | 0.029 |
| 40.00 | 10.00 | 801.00 | 23.06 | 0.9363 | 0.063 | 0.023 | 0.413 | 0.0713 | 0.0892 | 0.028 |

PROPELLER DYNAMOMETER
epb3p2j231.pro Three boards: RNo.2 V=+10m/s n = +1460rpm Drift Angle = +15 deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.00 | 10.00 | 1462.40 | 13.13 | 0.5129 | 0.227 | 0.042 | 0.437 | 0.8627 | 1.0784 | 0.113 |
| -30.00 | 10.00 | 1462.40 | 13.13 | 0.5129 | 0.268 | 0.043 | 0.508 | 1.0178 | 1.2723 | 0.134 |
| -20.00 | 10.00 | 1462.40 | 13.13 | 0.5129 | 0.239 | 0.043 | 0.460 | 0.9103 | 1.1378 | 0.120 |
| -10.00 | 10.00 | 1462.40 | 13.13 | 0.5129 | 0.247 | 0.042 | 0.481 | 0.9386 | 1.1732 | 0.123 |
| 0.00 | 10.00 | 1462.40 | 13.13 | 0.5129 | 0.240 | 0.042 | 0.471 | 0.9106 | 1.1383 | 0.120 |
| 10.00 | 10.00 | 1462.40 | 13.13 | 0.5129 | 0.197 | 0.041 | 0.392 | 0.7506 | 0.9383 | 0.099 |
| 20.00 | 10.00 | 1462.40 | 13.13 | 0.5129 | 0.255 | 0.041 | 0.512 | 0.9680 | 1.2100 | 0.127 |
| 30.00 | 10.00 | 1462.40 | 13.13 | 0.5129 | 0.242 | 0.040 | 0.490 | 0.9216 | 1.1520 | 0.121 |
| 40.00 | 10.00 | 1462.40 | 13.13 | 0.5129 | 0.206 | 0.041 | 0.410 | 0.7835 | 0.9793 | 0.103 |

PROPELLER DYNAMOMETER
epb3p2j331.pro Three boards: RNo.2 V=+10m/s n = +2100rpm Drift Angle = +15 deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.00 | 10.00 | 2103.77 | 9.21 | 0.3565 | 0.276 | 0.045 | 0.347 | 2.1726 | 2.7158 | 0.142 |
| -30.00 | 10.00 | 2103.77 | 9.21 | 0.3565 | 0.297 | 0.047 | 0.359 | 2.3334 | 2.9168 | 0.152 |
| -20.00 | 10.00 | 2103.77 | 9.21 | 0.3565 | 0.290 | 0.048 | 0.346 | 2.2847 | 2.8559 | 0.149 |
| -10.00 | 10.00 | 2103.77 | 9.21 | 0.3565 | 0.298 | 0.048 | 0.355 | 2.3459 | 2.9323 | 0.153 |
| 0.00 | 10.00 | 2103.77 | 9.21 | 0.3565 | 0.292 | 0.048 | 0.348 | 2.2953 | 2.8691 | 0.150 |
| 10.00 | 10.00 | 2103.77 | 9.21 | 0.3565 | 0.288 | 0.047 | 0.346 | 2.2655 | 2.8318 | 0.148 |
| 20.00 | 10.00 | 2103.77 | 9.21 | 0.3565 | 0.292 | 0.047 | 0.353 | 2.2938 | 2.8672 | 0.150 |
| 30.00 | 10.00 | 2103.77 | 9.21 | 0.3565 | 0.291 | 0.047 | 0.354 | 2.2904 | 2.8630 | 0.149 |
| 40.00 | 10.00 | 2103.77 | 9.21 | 0.3565 | 0.294 | 0.047 | 0.358 | 2.3096 | 2.8870 | 0.151 |

PROPELLER DYNAMOMETER
epb1m1j132.pro One board: RNo.2 V=+10m/s n = +800rpm Drift Angle = -7.5 deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.00 | 10.00 | 804.63 | 22.97 | 0.9321 | 0.077 | 0.033 | 0.350 | 0.0887 | 0.1108 | 0.034 |
| -30.00 | 10.00 | 804.63 | 22.97 | 0.9321 | 0.130 | 0.030 | 0.652 | 0.1500 | 0.1876 | 0.058 |
| -20.00 | 10.00 | 804.63 | 22.97 | 0.9321 | 0.123 | 0.028 | 0.648 | 0.1421 | 0.1776 | 0.055 |
| -10.00 | 10.00 | 804.63 | 22.97 | 0.9321 | 0.078 | 0.027 | 0.431 | 0.0898 | 0.1123 | 0.035 |
| 0.00 | 10.00 | 804.63 | 22.97 | 0.9321 | 0.045 | 0.027 | 0.251 | 0.0523 | 0.0654 | 0.020 |
| 10.00 | 10.00 | 804.63 | 22.97 | 0.9321 | 0.087 | 0.027 | 0.486 | 0.1000 | 0.1250 | 0.039 |
| 20.00 | 10.00 | 804.63 | 22.97 | 0.9321 | 0.128 | 0.027 | 0.704 | 0.1478 | 0.1847 | 0.057 |
| 30.00 | 10.00 | 804.63 | 22.97 | 0.9321 | 0.126 | 0.027 | 0.707 | 0.1455 | 0.1819 | 0.056 |
| 40.00 | 10.00 | 804.63 | 22.97 | 0.9321 | 0.048 | 0.029 | 0.251 | 0.0557 | 0.0696 | 0.022 |

PROPELLER DYNAMOMETER
epb1m1j232.pro One board: RNo.2 V=+10m/s n = +1460rpm Drift Angle = -7.5 deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.00 | 10.00 | 1464.07 | 13.11 | 0.5123 | 0.253 | 0.048 | 0.431 | 0.9651 | 1.2064 | 0.127 |
| -30.00 | 10.00 | 1464.07 | 13.11 | 0.5123 | 0.297 | 0.047 | 0.517 | 1.1299 | 1.4124 | 0.148 |
| -20.00 | 10.00 | 1464.07 | 13.11 | 0.5123 | 0.298 | 0.046 | 0.526 | 1.1356 | 1.4195 | 0.149 |
| -10.00 | 10.00 | 1464.07 | 13.11 | 0.5123 | 0.248 | 0.046 | 0.443 | 0.9446 | 1.1808 | 0.124 |
| 0.00 | 10.00 | 1464.07 | 13.11 | 0.5123 | 0.257 | 0.045 | 0.464 | 0.9799 | 1.2248 | 0.128 |
| 10.00 | 10.00 | 1464.07 | 13.11 | 0.5123 | 0.292 | 0.045 | 0.532 | 1.1129 | 1.3911 | 0.146 |
| 20.00 | 10.00 | 1464.07 | 13.11 | 0.5123 | 0.257 | 0.045 | 0.472 | 0.9810 | 1.2263 | 0.129 |
| 30.00 | 10.00 | 1464.07 | 13.11 | 0.5123 | 0.224 | 0.044 | 0.410 | 0.8526 | 1.0657 | 0.112 |
| 40.00 | 10.00 | 1464.07 | 13.11 | 0.5123 | 0.285 | 0.044 | 0.527 | 1.0879 | 1.3598 | 0.143 |

PROPELLER DYNAMOMETER
epb1m1j332.pro One board: RNo.2 V=+10m/s n = +2100rpm Drift Angle = -7.5 deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.00 | 10.00 | 2104.96 | 9.20 | 0.3563 | 0.319 | 0.052 | 0.346 | 2.5156 | 3.1445 | 0.164 |
| -30.00 | 10.00 | 2104.96 | 9.20 | 0.3563 | 0.322 | 0.052 | 0.349 | 2.5361 | 3.1701 | 0.165 |
| -20.00 | 10.00 | 2104.96 | 9.20 | 0.3563 | 0.316 | 0.052 | 0.345 | 2.4861 | 3.1076 | 0.162 |
| -10.00 | 10.00 | 2104.96 | 9.20 | 0.3563 | 0.309 | 0.052 | 0.339 | 2.4304 | 3.0380 | 0.158 |
| 0.00 | 10.00 | 2104.96 | 9.20 | 0.3563 | 0.306 | 0.051 | 0.341 | 2.4133 | 3.0166 | 0.157 |
| 10.00 | 10.00 | 2104.96 | 9.20 | 0.3563 | 0.302 | 0.051 | 0.338 | 2.3781 | 2.9726 | 0.155 |
| 20.00 | 10.00 | 2104.96 | 9.20 | 0.3563 | 0.306 | 0.051 | 0.343 | 2.4122 | 3.0152 | 0.157 |
| 30.00 | 10.00 | 2104.96 | 9.20 | 0.3563 | 0.304 | 0.050 | 0.342 | 2.3929 | 2.9911 | 0.156 |
| 40.00 | 10.00 | 2104.96 | 9.20 | 0.3563 | 0.314 | 0.050 | 0.353 | 2.4702 | 3.0877 | 0.161 |

PROPELLER DYNAMOMETER
epb2m1j133.pro Two boards: RNo.2 V=+10m/s n = +800rpm Drift Angle = -7.5 deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.00 | 10.00 | 802.51 | 23.02 | 0.9346 | 0.138 | 0.032 | 0.650 | 0.1579 | 0.1973 | 0.062 |
| -30.00 | 10.00 | 802.51 | 23.02 | 0.9346 | 0.112 | 0.029 | 0.566 | 0.1283 | 0.1604 | 0.050 |
| -20.00 | 10.00 | 802.51 | 23.02 | 0.9346 | 0.083 | 0.028 | 0.436 | 0.0954 | 0.1192 | 0.037 |
| -10.00 | 10.00 | 802.51 | 23.02 | 0.9346 | 0.018 | 0.027 | 0.099 | 0.0204 | 0.0256 | 0.008 |
| 0.00 | 10.00 | 802.51 | 23.02 | 0.9346 | 0.013 | 0.027 | -0.249 | 0.0151 | 0.0189 | 0.006 |
| 10.00 | 10.00 | 802.51 | 23.02 | 0.9346 | 0.091 | 0.027 | 0.510 | 0.1045 | 0.1306 | 0.041 |
| 20.00 | 10.00 | 802.51 | 23.02 | 0.9346 | 0.122 | 0.026 | 0.695 | 0.1397 | 0.1746 | 0.054 |
| 30.00 | 10.00 | 802.51 | 23.02 | 0.9346 | 0.093 | 0.027 | 0.517 | 0.1068 | 0.1334 | 0.042 |
| 40.00 | 10.00 | 802.51 | 23.02 | 0.9346 | 0.033 | 0.029 | 0.170 | 0.0375 | 0.0468 | 0.015 |

PROPELLER DYNAMOMETER
epb2m1j233.pro Two boards: RNo.2 V=+10m/s n = +1460rpm Drift Angle = -7.5 deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.00 | 10.00 | 1463.73 | 13.12 | 0.5124 | 0.244 | 0.048 | 0.417 | 0.9301 | 1.1626 | 0.122 |
| -30.00 | 10.00 | 1463.73 | 13.12 | 0.5124 | 0.295 | 0.047 | 0.517 | 1.1254 | 1.4068 | 0.148 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| -20.00 | 10.00 | 1463.73 | 13.12 | 0.5124 | 0.303 | 0.046 | 0.536 | 1.1538 | 1.4422 | 0.151 |
| -10.00 | 10.00 | 1463.73 | 13.12 | 0.5124 | 0.279 | 0.046 | 0.498 | 1.0641 | 1.3301 | 0.139 |
| 0.00 | 10.00 | 1463.73 | 13.12 | 0.5124 | 0.256 | 0.045 | 0.461 | 0.9763 | 1.2203 | 0.128 |
| 10.00 | 10.00 | 1463.73 | 13.12 | 0.5124 | 0.296 | 0.045 | 0.537 | 1.1265 | 1.4082 | 0.148 |
| 20.00 | 10.00 | 1463.73 | 13.12 | 0.5124 | 0.256 | 0.045 | 0.465 | 0.9732 | 1.2165 | 0.128 |
| 30.00 | 10.00 | 1463.73 | 13.12 | 0.5124 | 0.224 | 0.045 | 0.404 | 0.8517 | 1.0647 | 0.112 |
| 40.00 | 10.00 | 1463.73 | 13.12 | 0.5124 | 0.296 | 0.045 | 0.539 | 1.1277 | 1.4096 | 0.148 |

PROPELLER DYNAMOMETER
epb2m1j333.pro Two boards: RNo.2 V=+10m/s n = +2100rpm Drift Angle = -7.5 deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.00 | 10.00 | 2106.71 | 9.20 | 0.3560 | 0.334 | 0.052 | 0.363 | 2.6346 | 3.2933 | 0.171 |
| -30.00 | 10.00 | 2106.71 | 9.20 | 0.3560 | 0.336 | 0.052 | 0.364 | 2.6517 | 3.3146 | 0.172 |
| -20.00 | 10.00 | 2106.71 | 9.20 | 0.3560 | 0.331 | 0.052 | 0.360 | 2.6097 | 3.2621 | 0.170 |
| -10.00 | 10.00 | 2106.71 | 9.20 | 0.3560 | 0.333 | 0.052 | 0.366 | 2.6278 | 3.2848 | 0.171 |
| 0.00 | 10.00 | 2106.71 | 9.20 | 0.3560 | 0.324 | 0.051 | 0.359 | 2.5586 | 3.1982 | 0.166 |
| 10.00 | 10.00 | 2106.71 | 9.20 | 0.3560 | 0.319 | 0.051 | 0.356 | 2.5200 | 3.1499 | 0.164 |
| 20.00 | 10.00 | 2106.71 | 9.20 | 0.3560 | 0.319 | 0.051 | 0.355 | 2.5154 | 3.1443 | 0.164 |
| 30.00 | 10.00 | 2106.71 | 9.20 | 0.3560 | 0.324 | 0.051 | 0.363 | 2.5597 | 3.1996 | 0.167 |
| 40.00 | 10.00 | 2106.71 | 9.20 | 0.3560 | 0.322 | 0.051 | 0.360 | 2.5393 | 3.1741 | 0.165 |

PROPELLER DYNAMOMETER
epb3m1j134.pro Three boards: RNo.2 V=+10m/s n = +800rpm Drift Angle = -7.5 deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.00 | 10.00 | 804.41 | 22.98 | 0.9324 | 0.111 | 0.034 | 0.487 | 0.1277 | 0.1596 | 0.050 |
| -30.00 | 10.00 | 804.41 | 22.98 | 0.9324 | 0.131 | 0.030 | 0.649 | 0.1510 | 0.1888 | 0.059 |
| -20.00 | 10.00 | 804.41 | 22.98 | 0.9324 | 0.091 | 0.029 | 0.464 | 0.1044 | 0.1305 | 0.041 |
| -10.00 | 10.00 | 804.41 | 22.98 | 0.9324 | 0.024 | 0.028 | 0.127 | 0.0278 | 0.0347 | 0.011 |
| 0.00 | 10.00 | 804.41 | 22.98 | 0.9324 | 0.050 | 0.028 | 0.266 | 0.0574 | 0.0717 | 0.022 |
| 10.00 | 10.00 | 804.41 | 22.98 | 0.9324 | 0.057 | 0.028 | 0.302 | 0.0655 | 0.0819 | 0.025 |
| 20.00 | 10.00 | 804.41 | 22.98 | 0.9324 | 0.102 | 0.028 | 0.543 | 0.1177 | 0.1471 | 0.046 |
| 30.00 | 10.00 | 804.41 | 22.98 | 0.9324 | 0.132 | 0.028 | 0.689 | 0.1521 | 0.1901 | 0.059 |
| 40.00 | 10.00 | 804.41 | 22.98 | 0.9324 | 0.077 | 0.031 | 0.369 | 0.0888 | 0.1110 | 0.034 |

PROPELLER DYNAMOMETER
epb3m1j234.pro Three boards: RNo.2 V=+10m/s n = +1460rpm Drift Angle = -7.5 deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.00 | 10.00 | 1462.25 | 13.13 | 0.5129 | 0.304 | 0.048 | 0.519 | 1.1558 | 1.4448 | 0.152 |
| -30.00 | 10.00 | 1462.25 | 13.13 | 0.5129 | 0.297 | 0.047 | 0.520 | 1.1303 | 1.4129 | 0.149 |
| -20.00 | 10.00 | 1462.25 | 13.13 | 0.5129 | 0.222 | 0.046 | 0.392 | 0.8449 | 1.0562 | 0.111 |
| -10.00 | 10.00 | 1462.25 | 13.13 | 0.5129 | 0.237 | 0.046 | 0.422 | 0.9016 | 1.1270 | 0.118 |
| 0.00 | 10.00 | 1462.25 | 13.13 | 0.5129 | 0.258 | 0.046 | 0.463 | 0.9826 | 1.2283 | 0.129 |
| 10.00 | 10.00 | 1462.25 | 13.13 | 0.5129 | 0.243 | 0.045 | 0.437 | 0.9227 | 1.1533 | 0.121 |
| 20.00 | 10.00 | 1462.25 | 13.13 | 0.5129 | 0.299 | 0.045 | 0.538 | 1.1381 | 1.4226 | 0.149 |
| 30.00 | 10.00 | 1462.25 | 13.13 | 0.5129 | 0.227 | 0.045 | 0.410 | 0.8638 | 1.0798 | 0.114 |
| 40.00 | 10.00 | 1462.25 | 13.13 | 0.5129 | 0.274 | 0.045 | 0.493 | 1.0404 | 1.3005 | 0.137 |

PROPELLER DYNAMOMETER
epb3m1j334.pro Three boards: RNo.2 V=+10m/s n = +2100rpm Drift Angle = -7.5 deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.00 | 10.00 | 2103.47 | 9.21 | 0.3565 | 0.318 | 0.052 | 0.350 | 2.5026 | 3.1283 | 0.163 |
| -30.00 | 10.00 | 2103.47 | 9.21 | 0.3565 | 0.324 | 0.052 | 0.353 | 2.5493 | 3.1866 | 0.166 |
| -20.00 | 10.00 | 2103.47 | 9.21 | 0.3565 | 0.323 | 0.052 | 0.355 | 2.5370 | 3.1713 | 0.166 |
| -10.00 | 10.00 | 2103.47 | 9.21 | 0.3565 | 0.321 | 0.051 | 0.355 | 2.5248 | 3.1561 | 0.165 |
| 0.00 | 10.00 | 2103.47 | 9.21 | 0.3565 | 0.315 | 0.051 | 0.352 | 2.4808 | 3.1010 | 0.162 |
| 10.00 | 10.00 | 2103.47 | 9.21 | 0.3565 | 0.310 | 0.051 | 0.347 | 2.4349 | 3.0436 | 0.159 |
| 20.00 | 10.00 | 2103.47 | 9.21 | 0.3565 | 0.315 | 0.051 | 0.352 | 2.4749 | 3.0936 | 0.161 |
| 30.00 | 10.00 | 2103.47 | 9.21 | 0.3565 | 0.317 | 0.051 | 0.355 | 2.4926 | 3.1158 | 0.163 |
| 40.00 | 10.00 | 2103.47 | 9.21 | 0.3565 | 0.314 | 0.050 | 0.354 | 2.4726 | 3.0908 | 0.161 |

PROPELLER DYNAMOMETER
eph0j1.pro Hull+Rudder+Propeller: RNo.2 V=+10m/s n = +800rpm Drift Angle = 0 deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.70 | 10.00 | 802.54 | 23.02 | 0.9345 | 0.170 | 0.067 | 0.375 | 0.1942 | 0.2427 | 0.076 |
| -35.70 | 10.00 | 802.54 | 23.02 | 0.9345 | 0.145 | 0.067 | 0.324 | 0.1657 | 0.2072 | 0.065 |
| -30.70 | 10.00 | 803.72 | 22.99 | 0.9332 | 0.101 | 0.048 | 0.319 | 0.1154 | 0.1442 | 0.045 |
| -25.70 | 10.00 | 802.54 | 23.02 | 0.9345 | 0.153 | 0.066 | 0.347 | 0.1752 | 0.2190 | 0.068 |
| -20.70 | 10.00 | 803.72 | 22.99 | 0.9332 | 0.100 | 0.047 | 0.304 | 0.1147 | 0.1433 | 0.045 |
| -15.70 | 10.00 | 802.54 | 23.02 | 0.9345 | 0.138 | 0.066 | 0.312 | 0.1575 | 0.1968 | 0.061 |
| -10.70 | 10.00 | 803.72 | 22.99 | 0.9332 | 0.063 | 0.046 | 0.173 | 0.0724 | 0.0904 | 0.028 |
| -5.70 | 10.00 | 802.54 | 23.02 | 0.9345 | 0.115 | 0.065 | 0.262 | 0.1314 | 0.1643 | 0.051 |
| -2.70 | 10.00 | 802.54 | 23.02 | 0.9345 | 0.130 | 0.065 | 0.298 | 0.1492 | 0.1865 | 0.058 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| -1.70 | 10.00 | 802.54 | 23.02 | 0.9345 | 0.143 | 0.065 | 0.328 | 0.1634 | 0.2042 | 0.064 |
| -0.70 | 10.00 | 803.13 | 23.01 | 0.9339 | 0.112 | 0.055 | 0.301 | 0.1286 | 0.1608 | 0.050 |
| 0.30 | 10.00 | 802.54 | 23.02 | 0.9345 | 0.141 | 0.064 | 0.329 | 0.1610 | 0.2013 | 0.063 |
| 1.30 | 10.00 | 802.54 | 23.02 | 0.9345 | 0.124 | 0.063 | 0.294 | 0.1421 | 0.1776 | 0.055 |
| 4.30 | 10.00 | 802.54 | 23.02 | 0.9345 | 0.113 | 0.064 | 0.263 | 0.1290 | 0.1613 | 0.050 |
| 9.30 | 10.00 | 803.72 | 22.99 | 0.9332 | 0.077 | 0.045 | 0.211 | 0.0883 | 0.1104 | 0.034 |
| 14.30 | 10.00 | 802.54 | 23.02 | 0.9345 | 0.135 | 0.063 | 0.321 | 0.1551 | 0.1939 | 0.060 |
| 19.30 | 10.00 | 803.72 | 22.99 | 0.9332 | 0.080 | 0.046 | 0.215 | 0.0913 | 0.1141 | 0.036 |
| 24.30 | 10.00 | 802.54 | 23.02 | 0.9345 | 0.145 | 0.063 | 0.340 | 0.1657 | 0.2072 | 0.065 |
| 29.30 | 10.00 | 803.72 | 22.99 | 0.9332 | 0.083 | 0.044 | 0.279 | 0.0957 | 0.1196 | 0.037 |
| 34.30 | 10.00 | 802.54 | 23.02 | 0.9345 | 0.108 | 0.063 | 0.255 | 0.1231 | 0.1539 | 0.048 |
| 39.30 | 10.00 | 802.54 | 23.02 | 0.9345 | 0.147 | 0.065 | 0.337 | 0.1681 | 0.2101 | 0.066 |

PROPELLER DYNAMOMETER
eph0j2.pro Hull+Rudder+Propeller: RNo.2 V=+10m/s n = +1460rpm Drift Angle = 0 deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.70 | 10.00 | 1460.60 | 13.14 | 0.5135 | 0.290 | 0.051 | 0.465 | 1.0995 | 1.3743 | 0.145 |
| -35.70 | 10.00 | 1464.36 | 13.11 | 0.5122 | 0.280 | 0.057 | 0.398 | 1.0655 | 1.3319 | 0.140 |
| -30.70 | 10.00 | 1460.60 | 13.14 | 0.5135 | 0.289 | 0.051 | 0.461 | 1.0976 | 1.3720 | 0.144 |
| -25.70 | 10.00 | 1464.36 | 13.11 | 0.5122 | 0.299 | 0.057 | 0.431 | 1.1401 | 1.4251 | 0.149 |
| -20.70 | 10.00 | 1460.60 | 13.14 | 0.5135 | 0.273 | 0.051 | 0.447 | 1.0337 | 1.2922 | 0.136 |
| -15.70 | 10.00 | 1464.36 | 13.11 | 0.5122 | 0.309 | 0.056 | 0.451 | 1.1791 | 1.4739 | 0.155 |
| -10.70 | 10.00 | 1460.60 | 13.14 | 0.5135 | 0.289 | 0.050 | 0.476 | 1.0947 | 1.3684 | 0.144 |
| -5.70 | 10.00 | 1464.36 | 13.11 | 0.5122 | 0.250 | 0.056 | 0.366 | 0.9530 | 1.1913 | 0.125 |
| -2.70 | 10.00 | 1464.36 | 13.11 | 0.5122 | 0.293 | 0.056 | 0.430 | 1.1176 | 1.3970 | 0.146 |
| -1.70 | 10.00 | 1464.36 | 13.11 | 0.5122 | 0.295 | 0.056 | 0.431 | 1.1247 | 1.4058 | 0.147 |
| -0.70 | 10.00 | 1462.48 | 13.13 | 0.5128 | 0.271 | 0.053 | 0.421 | 1.0291 | 1.2863 | 0.135 |
| 0.30 | 10.00 | 1464.36 | 13.11 | 0.5122 | 0.299 | 0.056 | 0.439 | 1.1413 | 1.4266 | 0.149 |
| 1.30 | 10.00 | 1464.36 | 13.11 | 0.5122 | 0.254 | 0.055 | 0.376 | 0.9696 | 1.2120 | 0.127 |
| 4.30 | 10.00 | 1464.36 | 13.11 | 0.5122 | 0.261 | 0.055 | 0.386 | 0.9956 | 1.2445 | 0.130 |
| 9.30 | 10.00 | 1460.60 | 13.14 | 0.5135 | 0.263 | 0.049 | 0.442 | 0.9961 | 1.2451 | 0.131 |
| 14.30 | 10.00 | 1464.36 | 13.11 | 0.5122 | 0.291 | 0.054 | 0.437 | 1.1081 | 1.3851 | 0.145 |
| 19.30 | 10.00 | 1460.60 | 13.14 | 0.5135 | 0.285 | 0.048 | 0.485 | 1.0802 | 1.3503 | 0.142 |
| 24.30 | 10.00 | 1464.36 | 13.11 | 0.5122 | 0.246 | 0.054 | 0.373 | 0.9388 | 1.1735 | 0.123 |
| 29.30 | 10.00 | 1460.60 | 13.14 | 0.5135 | 0.244 | 0.048 | 0.416 | 0.9264 | 1.1580 | 0.122 |
| 34.30 | 10.00 | 1464.36 | 13.11 | 0.5122 | 0.294 | 0.053 | 0.448 | 1.1200 | 1.3999 | 0.147 |
| 39.30 | 10.00 | 1460.60 | 13.14 | 0.5135 | 0.238 | 0.048 | 0.402 | 0.9012 | 1.1265 | 0.119 |

PROPELLER DYNAMOMETER
eph0j3.pro Hull+Rudder+Propeller: RNo.2 V=+10m/s n = +2100rpm Drift Angle = 0 deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.70 | 10.00 | 2104.55 | 9.20 | 0.3564 | 0.341 | 0.047 | 0.416 | 2.6866 | 3.3583 | 0.175 |
| -35.70 | 10.00 | 2105.90 | 9.20 | 0.3561 | 0.348 | 0.043 | 0.460 | 2.7407 | 3.4258 | 0.178 |
| -30.70 | 10.00 | 2104.55 | 9.20 | 0.3564 | 0.342 | 0.047 | 0.413 | 2.6944 | 3.3680 | 0.176 |
| -25.70 | 10.00 | 2105.90 | 9.20 | 0.3561 | 0.341 | 0.043 | 0.454 | 2.6862 | 3.3578 | 0.175 |
| -20.70 | 10.00 | 2104.55 | 9.20 | 0.3564 | 0.332 | 0.046 | 0.411 | 2.6181 | 3.2726 | 0.171 |
| -15.70 | 10.00 | 2105.90 | 9.20 | 0.3561 | 0.330 | 0.041 | 0.451 | 2.6034 | 3.2542 | 0.169 |
| -10.70 | 10.00 | 2104.55 | 9.20 | 0.3564 | 0.328 | 0.046 | 0.410 | 2.5854 | 3.2317 | 0.168 |
| -5.70 | 10.00 | 2105.90 | 9.20 | 0.3561 | 0.329 | 0.041 | 0.454 | 2.5903 | 3.2379 | 0.169 |
| -2.70 | 10.00 | 2105.90 | 9.20 | 0.3561 | 0.324 | 0.041 | 0.448 | 2.5572 | 3.1965 | 0.166 |
| -1.70 | 10.00 | 2105.90 | 9.20 | 0.3561 | 0.327 | 0.041 | 0.453 | 2.5785 | 3.2231 | 0.168 |
| -0.70 | 10.00 | 2105.23 | 9.20 | 0.3563 | 0.322 | 0.043 | 0.427 | 2.5359 | 3.1699 | 0.165 |
| 0.30 | 10.00 | 2105.90 | 9.20 | 0.3561 | 0.322 | 0.041 | 0.447 | 2.5370 | 3.1713 | 0.165 |
| 1.30 | 10.00 | 2105.90 | 9.20 | 0.3561 | 0.328 | 0.041 | 0.457 | 2.5844 | 3.2305 | 0.168 |
| 4.30 | 10.00 | 2105.90 | 9.20 | 0.3561 | 0.322 | 0.041 | 0.450 | 2.5382 | 3.1728 | 0.165 |
| 9.30 | 10.00 | 2104.55 | 9.20 | 0.3564 | 0.318 | 0.045 | 0.410 | 2.5060 | 3.1326 | 0.163 |
| 14.30 | 10.00 | 2105.90 | 9.20 | 0.3561 | 0.313 | 0.039 | 0.450 | 2.4660 | 3.0825 | 0.160 |
| 19.30 | 10.00 | 2105.00 | 9.20 | 0.3563 | 0.312 | 0.042 | 0.427 | 2.4553 | 3.0691 | 0.160 |
| 24.30 | 10.00 | 2105.90 | 9.20 | 0.3561 | 0.310 | 0.038 | 0.458 | 2.4423 | 3.0529 | 0.159 |
| 29.30 | 10.00 | 2104.55 | 9.20 | 0.3564 | 0.303 | 0.042 | 0.414 | 2.3890 | 2.9862 | 0.156 |
| 34.30 | 10.00 | 2105.90 | 9.20 | 0.3561 | 0.308 | 0.038 | 0.463 | 2.4317 | 3.0396 | 0.158 |
| 39.30 | 10.00 | 2104.55 | 9.20 | 0.3564 | 0.297 | 0.041 | 0.412 | 2.3350 | 2.9187 | 0.152 |

PROPELLER DYNAMOMETER
eph0j47.pro Hull+Rudder+Propeller: RNo.2 V=+10m/s n = -800rpm Drift Angle = 0 deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.70 | 10.00 | -803.90 | 157.01 | 0.9330 | -0.502 | -0.091 | 0.823 | -0.5765 | -0.7207 | -0.224 |
| -35.70 | 10.00 | -803.90 | 157.01 | 0.9330 | -0.497 | -0.093 | 0.795 | -0.5706 | -0.7132 | -0.222 |
| -30.70 | 10.00 | -803.90 | 157.01 | 0.9330 | -0.484 | -0.087 | 0.823 | -0.5562 | -0.6953 | -0.216 |
| -25.70 | 10.00 | -803.90 | 157.01 | 0.9330 | -0.486 | -0.088 | 0.818 | -0.5586 | -0.6983 | -0.217 |
| -20.70 | 10.00 | -803.90 | 157.01 | 0.9330 | -0.485 | -0.084 | 0.859 | -0.5575 | -0.6968 | -0.216 |
| -15.70 | 10.00 | -803.90 | 157.01 | 0.9330 | -0.459 | -0.085 | 0.799 | -0.5276 | -0.6595 | -0.205 |
| -10.70 | 10.00 | -803.90 | 157.01 | 0.9330 | -0.454 | -0.086 | 0.787 | -0.5216 | -0.6520 | -0.203 |
| -5.70 | 10.00 | -803.90 | 157.01 | 0.9330 | -0.463 | -0.083 | 0.832 | -0.5324 | -0.6655 | -0.207 |
| -0.70 | 10.00 | -803.90 | 157.01 | 0.9330 | -0.463 | -0.088 | 0.784 | -0.5320 | -0.6650 | -0.207 |
| 4.30 | 10.00 | -803.90 | 157.01 | 0.9330 | -0.408 | -0.077 | 0.791 | -0.4691 | -0.5864 | -0.182 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 9.30 | 10.00 | -803.90 | 157.01 | 0.9330 | -0.435 | -0.081 | 0.801 | -0.5001 | -0.6252 | -0.194 |
| 14.30 | 10.00 | -803.90 | 157.01 | 0.9330 | -0.399 | -0.077 | 0.771 | -0.4584 | -0.5730 | -0.178 |
| 19.30 | 10.00 | -803.90 | 157.01 | 0.9330 | -0.393 | -0.078 | 0.752 | -0.4512 | -0.5640 | -0.175 |
| 24.30 | 10.00 | -803.90 | 157.01 | 0.9330 | -0.400 | -0.077 | 0.771 | -0.4596 | -0.5745 | -0.178 |
| 29.30 | 10.00 | -803.90 | 157.01 | 0.9330 | -0.416 | -0.079 | 0.779 | -0.4775 | -0.5968 | -0.186 |
| 34.30 | 10.00 | -803.90 | 157.01 | 0.9330 | -0.426 | -0.077 | 0.821 | -0.4894 | -0.6118 | -0.190 |
| 39.30 | 10.00 | -803.90 | 157.01 | 0.9330 | -0.416 | -0.080 | 0.772 | -0.4775 | -0.5968 | -0.186 |

PROPELLER DYNAMOMETER
eph0j57.pro Hull+Rudder+Propeller: RNo.2 V=+10m/s n = -1460rpm Drift Angle = 0 deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|
| -30.70 | 10.00 | -1279.33 | 165.07 | 0.5863 | -0.309 | -0.063 | 0.459 | -0.9000 | -1.1250 | -0.152 |
| -20.70 | 10.00 | -1279.33 | 165.07 | 0.5863 | -0.266 | -0.054 | 0.455 | -0.7735 | -0.9669 | -0.131 |
| -15.70 | 10.00 | -1279.33 | 165.07 | 0.5863 | -0.253 | -0.055 | 0.429 | -0.7353 | -0.9191 | -0.124 |
| -10.70 | 10.00 | -1279.33 | 165.07 | 0.5863 | -0.311 | -0.052 | 0.556 | -0.9048 | -1.1310 | -0.153 |
| -5.70 | 10.00 | -1279.33 | 165.07 | 0.5863 | -0.261 | -0.057 | 0.425 | -0.7580 | -0.9475 | -0.128 |
| -0.70 | 10.00 | -1279.33 | 165.07 | 0.5863 | -0.247 | -0.054 | 0.425 | -0.7190 | -0.8987 | -0.121 |
| 4.30 | 10.00 | -1279.33 | 165.07 | 0.5863 | -0.272 | -0.053 | 0.474 | -0.7902 | -0.9878 | -0.133 |
| 9.30 | 10.00 | -1279.33 | 165.07 | 0.5863 | -0.262 | -0.052 | 0.466 | -0.7616 | -0.9519 | -0.129 |
| 19.30 | 10.00 | -1279.33 | 165.07 | 0.5863 | -0.269 | -0.056 | 0.448 | -0.7819 | -0.9773 | -0.132 |
| 29.30 | 10.00 | -1279.33 | 165.07 | 0.5863 | -0.314 | -0.054 | 0.538 | -0.9132 | -1.1414 | -0.154 |

PROPELLER DYNAMOMETER
eph0zj9.pro Hull+Rudder+Propeller: RNo.2 V=0m/s(Nom.) n = 1460rpm Drift Angle = 0 deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.70 | 0.00 | 1461.44 | 0.00 | 0.0000 | 0.412 | 0.057 | 0.000 | -1.0000 | -1.0000 | 0.217 |
| -30.70 | 0.00 | 1461.44 | 0.00 | 0.0000 | 0.397 | 0.057 | 0.000 | -1.0000 | -1.0000 | 0.209 |
| -20.70 | 0.00 | 1461.44 | 0.00 | 0.0000 | 0.357 | 0.057 | 0.000 | -1.0000 | -1.0000 | 0.188 |
| -10.70 | 0.00 | 1461.44 | 0.00 | 0.0000 | 0.399 | 0.057 | 0.000 | -1.0000 | -1.0000 | 0.210 |
| -5.70 | 0.00 | 1461.44 | 0.00 | 0.0000 | 0.396 | 0.057 | 0.000 | -1.0000 | -1.0000 | 0.208 |
| -0.70 | 0.00 | 1461.44 | 0.00 | 0.0000 | 0.369 | 0.056 | 0.000 | -1.0000 | -1.0000 | 0.194 |
| 4.30 | 0.00 | 1461.44 | 0.00 | 0.0000 | 0.369 | 0.055 | 0.000 | -1.0000 | -1.0000 | 0.194 |
| 9.30 | 0.00 | 1461.44 | 0.00 | 0.0000 | 0.390 | 0.055 | 0.000 | -1.0000 | -1.0000 | 0.206 |
| 19.30 | 0.00 | 1461.44 | 0.00 | 0.0000 | 0.402 | 0.057 | 0.000 | -1.0000 | -1.0000 | 0.212 |
| 29.30 | 0.00 | 1461.44 | 0.00 | 0.0000 | 0.355 | 0.057 | 0.000 | -1.0000 | -1.0000 | 0.187 |
| 39.30 | 0.00 | 1461.44 | 0.00 | 0.0000 | 0.351 | 0.054 | 0.000 | -1.0000 | -1.0000 | 0.185 |

PROPELLER DYNAMOMETER
eph0fs10.pro Hull+Rudder+Propeller: FREE-STREAM RNo.2 V=10m/s Drift Angle = 0 deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|
| -25.70 | 10.00 | 0.00 | 0.00 | -1.0000 | -1.000 | -1.000 | -0.159 | -0.1366 | -0.1707 | -0.410 |

PROPELLER DYNAMOMETER
ephm1j1.pro Hull+Rudder+Propeller: RNo.2 V=+10m/s n = +800rpm Drift Angle = -7.5 deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.00 | 10.00 | 800.76 | 23.07 | 0.9366 | 6.320 | 0.039 | 24.032 | 7.2047 | 9.0059 | 2.817 |
| -35.00 | 10.00 | 800.76 | 23.07 | 0.9366 | 6.469 | 0.039 | 24.712 | 7.3738 | 9.2173 | 2.883 |
| -30.00 | 10.00 | 803.81 | 22.99 | 0.9331 | 1.070 | 0.037 | 12.661 | 1.1812 | 1.4764 | 0.475 |
| -25.00 | 10.00 | 800.76 | 23.07 | 0.9366 | 6.592 | 0.037 | 26.556 | 7.5148 | 9.3935 | 2.938 |
| -20.00 | 10.00 | 803.81 | 22.99 | 0.9331 | 2.044 | 0.036 | 13.294 | 2.3065 | 2.8832 | 0.910 |
| -15.00 | 10.00 | 800.76 | 23.07 | 0.9366 | 6.835 | -0.002 | 13.162 | 7.7914 | 9.7392 | 3.046 |
| -10.00 | 10.00 | 803.81 | 22.99 | 0.9331 | 3.013 | 0.037 | 12.977 | 3.4282 | 4.2852 | 1.343 |
| -5.00 | 10.00 | 800.76 | 23.07 | 0.9366 | 6.653 | 0.037 | 26.801 | 7.5841 | 9.4801 | 2.965 |
| -2.00 | 10.00 | 800.76 | 23.07 | 0.9366 | 6.861 | 0.037 | 27.777 | 7.8213 | 9.7766 | 3.058 |
| -1.00 | 10.00 | 800.76 | 23.07 | 0.9366 | 7.186 | 0.037 | 28.804 | 8.1913 | 10.2391 | 3.203 |
| 0.00 | 10.00 | 802.29 | 23.03 | 0.9348 | 4.939 | 0.036 | 20.303 | 5.6333 | 7.0416 | 2.201 |
| 1.00 | 10.00 | 800.76 | 23.07 | 0.9366 | 5.998 | 0.036 | 24.900 | 6.8371 | 8.5463 | 2.673 |
| 2.00 | 10.00 | 800.76 | 23.07 | 0.9366 | 5.806 | 0.036 | 24.105 | 6.6186 | 8.2732 | 2.588 |
| 5.00 | 10.00 | 800.76 | 23.07 | 0.9366 | 5.691 | 0.035 | 23.993 | 6.4870 | 8.1088 | 2.536 |
| 10.00 | 10.00 | 803.81 | 22.99 | 0.9331 | -1.216 | 0.036 | 11.214 | -1.4562 | -1.8202 | -0.546 |
| 15.00 | 10.00 | 800.76 | 23.07 | 0.9366 | 5.372 | 0.036 | 22.304 | 6.1241 | 7.6551 | 2.394 |
| 20.00 | 10.00 | 804.83 | 22.96 | 0.9319 | -4.518 | 0.036 | 6.492 | -5.2586 | -6.5733 | -2.020 |
| 25.00 | 10.00 | 800.76 | 23.07 | 0.9366 | 4.991 | 0.036 | 20.827 | 5.6895 | 7.1119 | 2.225 |
| 30.00 | 10.00 | 800.76 | 23.07 | 0.9366 | 4.802 | 0.037 | 19.540 | 5.4746 | 6.8432 | 2.141 |
| 35.00 | 10.00 | 800.76 | 23.07 | 0.9366 | 4.610 | 0.037 | 18.756 | 5.2549 | 6.5687 | 2.055 |
| 40.00 | 10.00 | 800.76 | 23.07 | 0.9366 | 4.552 | 0.037 | 18.337 | 5.1891 | 6.4864 | 2.029 |

PROPELLER DYNAMOMETER
ephm1j2.pro Hull+Rudder+Propeller: RNo.2 V=+10m/s n = +1460rpm Drift Angle = -7.5 deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.00 | 10.00 | 1459.08 | 13.16 | 0.5140 | 1.757 | 0.052 | 2.746 | 6.6340 | 8.2926 | 0.877 |
| -35.00 | 10.00 | 1462.23 | 13.13 | 0.5129 | 0.936 | 0.051 | 1.492 | 3.5565 | 4.4457 | 0.467 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| -30.00 | 10.00 | 1459.08 | 13.16 | 0.5140 | 1.850 | 0.051 | 2.942 | 6.9882 | 8.7352 | 0.924 |
| -25.00 | 10.00 | 1462.23 | 13.13 | 0.5129 | 1.107 | 0.050 | 1.797 | 4.2061 | 5.2576 | 0.553 |
| -20.00 | 10.00 | 1459.08 | 13.16 | 0.5140 | -3.073 | 0.050 | 0.426 | -11.5629 | -14.4536 | -1.534 |
| -15.00 | 10.00 | 1462.23 | 13.13 | 0.5129 | 1.237 | 0.050 | 2.029 | 4.7029 | 5.8786 | 0.618 |
| -10.00 | 10.00 | 1459.08 | 13.16 | 0.5140 | -2.609 | 0.050 | 0.581 | -9.8105 | -12.2632 | -1.302 |
| -5.00 | 10.00 | 1462.23 | 13.13 | 0.5129 | 1.335 | 0.050 | 2.202 | 5.0752 | 6.3440 | 0.667 |
| -2.00 | 10.00 | 1462.23 | 13.13 | 0.5129 | 1.422 | 0.050 | 2.345 | 5.4041 | 6.7551 | 0.710 |
| -1.00 | 10.00 | 1462.23 | 13.13 | 0.5129 | 1.476 | 0.049 | 2.437 | 5.6096 | 7.0120 | 0.737 |
| 0.00 | 10.00 | 1460.66 | 13.14 | 0.5135 | -0.413 | 0.050 | 1.136 | -1.5304 | -1.9130 | -0.206 |
| 1.00 | 10.00 | 1462.23 | 13.13 | 0.5129 | 1.339 | 0.049 | 2.215 | 5.0881 | 6.3602 | 0.668 |
| 2.00 | 10.00 | 1462.23 | 13.13 | 0.5129 | 1.368 | 0.049 | 2.267 | 5.2009 | 6.5011 | 0.683 |
| 5.00 | 10.00 | 1462.23 | 13.13 | 0.5129 | 1.347 | 0.049 | 2.234 | 5.1210 | 6.4013 | 0.673 |
| 10.00 | 10.00 | 1459.08 | 13.16 | 0.5140 | 2.000 | 0.050 | 3.285 | 7.5602 | 9.4502 | 0.999 |
| 15.00 | 10.00 | 1462.23 | 13.13 | 0.5129 | 1.313 | 0.049 | 2.187 | 4.9907 | 6.2383 | 0.656 |
| 20.00 | 10.00 | 1459.08 | 13.16 | 0.5140 | 1.985 | 0.049 | 3.297 | 7.5020 | 9.3776 | 0.991 |
| 25.00 | 10.00 | 1462.23 | 13.13 | 0.5129 | 1.236 | 0.048 | 2.083 | 4.6994 | 5.8742 | 0.617 |
| 30.00 | 10.00 | 1459.02 | 13.16 | 0.5140 | 0.891 | 0.049 | 1.498 | 3.3783 | 4.2228 | 0.445 |
| 35.00 | 10.00 | 1462.23 | 13.13 | 0.5129 | 1.193 | 0.048 | 2.013 | 4.5361 | 5.6701 | 0.596 |
| 40.00 | 10.00 | 1459.02 | 13.16 | 0.5140 | -3.281 | 0.048 | 0.460 | -12.3427 | -15.4284 | -1.638 |

PROPELLER DYNAMOMETER
ephm1j3.pro Hull+Rudder+Propeller: RNo.2 V=+10m/s n = +2100rpm Drift Angle = -7.5 deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.00 | 10.00 | 2106.73 | 9.20 | 0.3560 | -1.279 | 0.056 | -1.000 | -10.0929 | -12.6161 | -0.656 |
| -35.00 | 10.00 | 2106.73 | 9.20 | 0.3560 | -1.193 | 0.056 | -1.000 | -9.4117 | -11.7646 | -0.612 |
| -30.00 | 10.00 | 2106.57 | 9.20 | 0.3560 | 0.169 | 0.057 | 0.482 | 1.3329 | 1.6662 | 0.087 |
| -25.00 | 10.00 | 2106.73 | 9.20 | 0.3560 | -1.611 | 0.056 | -1.000 | -12.7074 | -15.8843 | -0.826 |
| -20.00 | 10.00 | 2106.57 | 9.20 | 0.3560 | 0.320 | 0.056 | 0.510 | 2.5226 | 3.1533 | 0.164 |
| -15.00 | 10.00 | 2106.73 | 9.20 | 0.3560 | -0.899 | 0.055 | -1.000 | -7.0919 | -8.8649 | -0.461 |
| -10.00 | 10.00 | 2106.57 | 9.20 | 0.3560 | 0.388 | 0.055 | 0.305 | 3.0570 | 3.8212 | 0.199 |
| -5.00 | 10.00 | 2106.73 | 9.20 | 0.3560 | -0.495 | 0.054 | -1.000 | -3.9054 | -4.8817 | -0.254 |
| -2.00 | 10.00 | 2106.73 | 9.20 | 0.3560 | -0.246 | 0.054 | -1.000 | -1.9392 | -2.4240 | -0.126 |
| -1.00 | 10.00 | 2106.73 | 9.20 | 0.3560 | -0.191 | 0.054 | -1.000 | -1.5058 | -1.8822 | -0.098 |
| 0.00 | 10.00 | 2106.65 | 9.20 | 0.3560 | 0.136 | 0.054 | -0.364 | 1.0683 | 1.3353 | 0.070 |
| 1.00 | 10.00 | 2106.73 | 9.20 | 0.3560 | -0.912 | 0.054 | -1.000 | -7.1953 | -8.9941 | -0.468 |
| 2.00 | 10.00 | 2106.73 | 9.20 | 0.3560 | -0.129 | 0.054 | -1.000 | -1.0207 | -1.2758 | -0.066 |
| 5.00 | 10.00 | 2106.73 | 9.20 | 0.3560 | -0.117 | 0.054 | -1.000 | -0.9255 | -1.1569 | -0.060 |
| 10.00 | 10.00 | 2106.57 | 9.20 | 0.3560 | 1.072 | 0.053 | 0.741 | 8.4524 | 10.5655 | 0.550 |
| 15.00 | 10.00 | 2106.73 | 9.20 | 0.3560 | -0.106 | -0.080 | -0.486 | -0.8333 | -1.0417 | -0.054 |
| 20.00 | 10.00 | 2106.57 | 9.20 | 0.3560 | 1.042 | 0.053 | 0.717 | 8.2187 | 10.2734 | 0.535 |
| 25.00 | 10.00 | 2106.73 | 9.20 | 0.3560 | -0.216 | 0.053 | -1.000 | -1.7031 | -2.1289 | -0.111 |
| 30.00 | 10.00 | 2106.57 | 9.20 | 0.3560 | 0.901 | 0.052 | 0.627 | 7.1052 | 8.8814 | 0.462 |
| 35.00 | 10.00 | 2106.73 | 9.20 | 0.3560 | 0.142 | 0.052 | 0.155 | 1.1193 | 1.3992 | 0.073 |
| 40.00 | 10.00 | 2106.73 | 9.20 | 0.3560 | -0.480 | 0.051 | -1.000 | -3.7891 | -4.7364 | -0.246 |

PROPELLER DYNAMOMETER
ephm2j1.pro Hull+Rudder+Propeller: RNo.2 V=+10m/s n = +800rpm Drift Angle = -15 deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.00 | 10.00 | 806.60 | 22.92 | 0.9298 | 0.208 | 0.042 | 0.741 | 0.2405 | 0.3006 | 0.093 |
| -35.00 | 10.00 | 806.60 | 22.92 | 0.9298 | 0.199 | 0.040 | 0.734 | 0.2299 | 0.2874 | 0.089 |
| -30.00 | 10.00 | 805.68 | 22.94 | 0.9309 | 0.182 | 0.039 | 0.700 | 0.2102 | 0.2628 | 0.081 |
| -25.00 | 10.00 | 806.60 | 22.92 | 0.9298 | 0.113 | 0.037 | 0.448 | 0.1309 | 0.1636 | 0.050 |
| -20.00 | 10.00 | 805.68 | 22.94 | 0.9309 | 0.142 | 0.036 | 0.591 | 0.1643 | 0.2054 | 0.064 |
| -15.00 | 10.00 | 806.60 | 22.92 | 0.9298 | 0.156 | 0.037 | 0.630 | 0.1804 | 0.2255 | 0.070 |
| -10.00 | 10.00 | 805.68 | 22.94 | 0.9309 | 0.182 | 0.036 | 0.751 | 0.2102 | 0.2628 | 0.081 |
| -5.00 | 10.00 | 806.60 | 22.92 | 0.9298 | 0.143 | 0.036 | 0.591 | 0.1651 | 0.2063 | 0.064 |
| -2.00 | 10.00 | 806.60 | 22.92 | 0.9298 | 0.120 | 0.037 | 0.481 | 0.1391 | 0.1739 | 0.054 |
| -1.00 | 10.00 | 806.60 | 22.92 | 0.9298 | 0.090 | 0.035 | 0.381 | 0.1037 | 0.1297 | 0.040 |
| 0.00 | 10.00 | 806.14 | 22.93 | 0.9304 | 0.132 | 0.036 | 0.535 | 0.1523 | 0.1904 | 0.059 |
| 1.00 | 10.00 | 806.60 | 22.92 | 0.9298 | 0.134 | 0.036 | 0.545 | 0.1544 | 0.1931 | 0.060 |
| 2.00 | 10.00 | 806.60 | 22.92 | 0.9298 | 0.159 | 0.036 | 0.649 | 0.1839 | 0.2299 | 0.071 |
| 5.00 | 10.00 | 806.60 | 22.92 | 0.9298 | 0.170 | 0.037 | 0.675 | 0.1969 | 0.2461 | 0.076 |
| 10.00 | 10.00 | 805.68 | 22.94 | 0.9309 | 0.146 | 0.035 | 0.623 | 0.1680 | 0.2101 | 0.065 |
| 15.00 | 10.00 | 806.60 | 22.92 | 0.9298 | 0.118 | 0.036 | 0.485 | 0.1368 | 0.1709 | 0.053 |
| 20.00 | 10.00 | 805.68 | 22.94 | 0.9309 | 0.144 | 0.036 | 0.596 | 0.1660 | 0.2076 | 0.064 |
| 25.00 | 10.00 | 806.60 | 22.92 | 0.9298 | 0.148 | 0.036 | 0.600 | 0.1709 | 0.2137 | 0.066 |
| 30.00 | 10.00 | 805.68 | 22.94 | 0.9309 | 0.198 | 0.036 | 0.821 | 0.2284 | 0.2855 | 0.088 |
| 35.00 | 10.00 | 806.60 | 22.92 | 0.9298 | 0.195 | 0.036 | 0.791 | 0.2252 | 0.2815 | 0.087 |
| 40.00 | 10.00 | 806.60 | 22.92 | 0.9298 | 0.172 | 0.037 | 0.683 | 0.1992 | 0.2491 | 0.077 |

PROPELLER DYNAMOMETER
ephm2j2.pro Hull+Rudder+Propeller: RNo.2 V=+10m/s n = +1460rpm Drift Angle = -15 deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|
| -40.00 | 10.00 | 1458.97 | 13.16 | 0.5141 | 0.326 | 0.053 | 0.498 | 1.2327 | 1.5408 | 0.163 |
| -35.00 | 10.00 | 1455.92 | 13.18 | 0.5151 | 0.358 | 0.054 | 0.543 | 1.3487 | 1.6859 | 0.179 |
| -30.00 | 10.00 | 1458.97 | 13.16 | 0.5141 | 0.332 | 0.054 | 0.508 | 1.2583 | 1.5728 | 0.166 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| -25.00 | 10.00 | 1455.92 | 13.18 | 0.5151 | 0.314 | 0.054 | 0.481 | 1.1825 | 1.4781 | 0.157 |
| -20.00 | 10.00 | 1458.97 | 13.16 | 0.5141 | 0.324 | 0.053 | 0.503 | 1.2250 | 1.5313 | 0.162 |
| -15.00 | 10.00 | 1455.92 | 13.18 | 0.5151 | 0.311 | 0.053 | 0.485 | 1.1707 | 1.4634 | 0.155 |
| -10.00 | 10.00 | 1458.97 | 13.16 | 0.5141 | 0.311 | 0.052 | 0.487 | 1.1780 | 1.4724 | 0.155 |
| -5.00 | 10.00 | 1455.92 | 13.18 | 0.5151 | 0.344 | 0.052 | 0.540 | 1.2969 | 1.6211 | 0.172 |
| -2.00 | 10.00 | 1455.92 | 13.18 | 0.5151 | 0.334 | 0.052 | 0.528 | 1.2603 | 1.5754 | 0.167 |
| -1.00 | 10.00 | 1455.92 | 13.18 | 0.5151 | 0.283 | 0.052 | 0.449 | 1.0681 | 1.3352 | 0.141 |
| 0.00 | 10.00 | 1457.44 | 13.17 | 0.5146 | 0.326 | 0.052 | 0.516 | 1.2317 | 1.5396 | 0.163 |
| 1.00 | 10.00 | 1455.92 | 13.18 | 0.5151 | 0.344 | 0.052 | 0.546 | 1.2980 | 1.6225 | 0.172 |
| 2.00 | 10.00 | 1455.92 | 13.18 | 0.5151 | 0.292 | 0.052 | 0.462 | 1.1000 | 1.3750 | 0.146 |
| 5.00 | 10.00 | 1455.92 | 13.18 | 0.5151 | 0.288 | 0.052 | 0.455 | 1.0835 | 1.3543 | 0.143 |
| 10.00 | 10.00 | 1458.97 | 13.16 | 0.5141 | 0.305 | 0.051 | 0.489 | 1.1545 | 1.4432 | 0.152 |
| 15.00 | 10.00 | 1455.92 | 13.18 | 0.5151 | 0.341 | 0.052 | 0.543 | 1.2851 | 1.6063 | 0.170 |
| 20.00 | 10.00 | 1458.97 | 13.16 | 0.5141 | 0.310 | 0.051 | 0.500 | 1.1725 | 1.4656 | 0.155 |
| 25.00 | 10.00 | 1455.92 | 13.18 | 0.5151 | 0.305 | 0.051 | 0.490 | 1.1483 | 1.4354 | 0.152 |
| 30.00 | 10.00 | 1458.97 | 13.16 | 0.5141 | 0.310 | 0.051 | 0.501 | 1.1733 | 1.4667 | 0.155 |
| 35.00 | 10.00 | 1455.92 | 13.18 | 0.5151 | 0.314 | 0.051 | 0.505 | 1.1848 | 1.4811 | 0.157 |
| 40.00 | 10.00 | 1458.97 | 13.16 | 0.5141 | 0.328 | 0.051 | 0.528 | 1.2413 | 1.5516 | 0.164 |

PROPELLER DYNAMOMETER
ephm2j3.pro Hull+Rudder+Propeller: RNo.2 V=+10m/s n = +2100rpm Drift Angle = -15 deg

| Angle | V | RPM | Beta | J | Kt | Kq | n | Kt/J2 | Kq/J2 | Ct |
|---|---|---|---|---|---|---|---|---|---|---|
| -30.00 | 10.00 | 2100.24 | 9.22 | 0.3571 | 0.383 | 0.058 | 0.378 | 3.0070 | 3.7588 | 0.197 |
| -20.00 | 10.00 | 2100.24 | 9.22 | 0.3571 | 0.384 | 0.057 | 0.380 | 3.0082 | 3.7602 | 0.197 |
| -10.00 | 10.00 | 2100.24 | 9.22 | 0.3571 | 0.368 | 0.057 | 0.369 | 2.8853 | 3.6066 | 0.189 |
| 0.00 | 10.00 | 2100.24 | 9.22 | 0.3571 | 0.361 | 0.056 | 0.369 | 2.8303 | 3.5378 | 0.185 |
| 10.00 | 10.00 | 2100.24 | 9.22 | 0.3571 | 0.354 | 0.055 | 0.366 | 2.7776 | 3.4720 | 0.182 |
| 20.00 | 10.00 | 2100.24 | 9.22 | 0.3571 | 0.350 | 0.055 | 0.364 | 2.7425 | 3.4281 | 0.179 |
| 30.00 | 10.00 | 2100.24 | 9.22 | 0.3571 | 0.370 | 0.056 | 0.374 | 2.9040 | 3.6300 | 0.190 |

## Appendix C Local Cn Data

Local Distribution
1pom2.d Drift Angle Br=-15, +10m/s +1460rpm J=0.51 -30 deg

| Angle | V | RPM | Span | Cn | Cmz | Cmx | Cpc |
|---|---|---|---|---|---|---|---|
| -30.40 | 10.00 | 1460.00 | 0.0000 | -1.536 | -0.118 | -0.1075 | 41.483 |
| -30.40 | 10.00 | 1460.00 | 0.0700 | -1.536 | -0.118 | -0.1075 | 41.483 |
| -30.40 | 10.00 | 1460.00 | 0.2300 | -1.585 | -0.075 | -0.3646 | 37.041 |
| -30.40 | 10.00 | 1460.00 | 0.4000 | -1.952 | -0.060 | -0.7810 | 34.559 |
| -30.40 | 10.00 | 1460.00 | 0.5300 | -1.917 | -0.084 | -1.0159 | 36.578 |
| -30.40 | 10.00 | 1460.00 | 0.7000 | -2.039 | -0.016 | -1.4274 | 31.194 |
| -30.40 | 10.00 | 1460.00 | 0.8300 | -2.192 | 0.034 | -1.8190 | 27.673 |
| -30.40 | 10.00 | 1460.00 | 0.9400 | -2.053 | -0.075 | -1.9298 | 35.466 |
| -30.40 | 10.00 | 1460.00 | 0.9700 | -1.771 | -0.136 | -1.7183 | 41.492 |
| -30.40 | 10.00 | 1460.00 | 1.0000 | 0.000 | 0.000 | 0.0000 | 0.000 |

Local Distribution
2pom2.d Drift Angle Br=-15, +10m/s +1460rpm J=0.51 -20 deg

| Angle | V | RPM | Span | Cn | Cmz | Cmx | Cpc |
|---|---|---|---|---|---|---|---|
| -20.40 | 10.00 | 1460.00 | 0.0000 | -1.054 | -0.093 | -0.0737 | 43.261 |
| -20.40 | 10.00 | 1460.00 | 0.0700 | -1.054 | -0.093 | -0.0737 | 43.261 |
| -20.40 | 10.00 | 1460.00 | 0.2300 | -1.624 | 0.007 | -0.3736 | 29.372 |
| -20.40 | 10.00 | 1460.00 | 0.4000 | -2.467 | 0.110 | -0.9869 | 23.287 |
| -20.40 | 10.00 | 1460.00 | 0.5300 | -2.729 | 0.075 | -1.4465 | 25.857 |
| -20.40 | 10.00 | 1460.00 | 0.7000 | -2.314 | 0.072 | -1.6197 | 25.332 |
| -20.40 | 10.00 | 1460.00 | 0.8300 | -2.185 | 0.040 | -1.8140 | 27.242 |
| -20.40 | 10.00 | 1460.00 | 0.9400 | -2.033 | -0.154 | -1.9112 | 41.337 |
| -20.40 | 10.00 | 1460.00 | 0.9700 | -1.952 | -0.220 | -1.8930 | 46.904 |
| -20.40 | 10.00 | 1460.00 | 1.0000 | 0.000 | 0.000 | 0.0000 | 0.000 |

Local Distribution
3pom2.d Drift Angle Br=-15, +10m/s +1460rpm J=0.51 -10 deg

| Angle | V | RPM | Span | Cn | Cmz | Cmx | Cpc |
|---|---|---|---|---|---|---|---|
| -10.40 | 10.00 | 1460.00 | 0.0000 | -0.936 | -0.049 | -0.0655 | 37.757 |
| -10.40 | 10.00 | 1460.00 | 0.0700 | -0.936 | -0.049 | -0.0655 | 37.757 |
| -10.40 | 10.00 | 1460.00 | 0.2300 | -1.278 | 0.027 | -0.2940 | 26.805 |
| -10.40 | 10.00 | 1460.00 | 0.4000 | -1.834 | 0.130 | -0.7335 | 19.329 |
| -10.40 | 10.00 | 1460.00 | 0.5300 | -2.128 | 0.056 | -1.1276 | 26.026 |
| -10.40 | 10.00 | 1460.00 | 0.7000 | -1.334 | 0.051 | -0.9337 | 24.218 |
| -10.40 | 10.00 | 1460.00 | 0.8300 | -1.218 | 0.035 | -1.0113 | 25.623 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| -10.40 | 10.00 | 1460.00 | 0.9400 | -1.090 | -0.059 | -1.0241 | 38.065 |
| -10.40 | 10.00 | 1460.00 | 0.9700 | -1.030 | -0.108 | -0.9991 | 45.754 |
| -10.40 | 10.00 | 1460.00 | 1.0000 | 0.000 | 0.000 | 0.0000 | 0.000 |

Local Distribution
4pom2.d Drift Angle Br=-15, +10m/s +1460rpm J=0.51 0 deg

| Angle | V | RPM | Span | Cn | Cmz | Cmx | Cpc |
|---|---|---|---|---|---|---|---|
| -0.40 | 10.00 | 1460.00 | 0.0000 | -0.727 | 0.026 | -0.0509 | 24.554 |
| -0.40 | 10.00 | 1460.00 | 0.0700 | -0.727 | 0.026 | -0.0509 | 24.554 |
| -0.40 | 10.00 | 1460.00 | 0.2300 | -0.913 | 0.064 | -0.2101 | 19.549 |
| -0.40 | 10.00 | 1460.00 | 0.4000 | -1.123 | 0.104 | -0.4490 | 16.082 |
| -0.40 | 10.00 | 1460.00 | 0.5300 | -1.325 | 0.033 | -0.7020 | 26.279 |
| -0.40 | 10.00 | 1460.00 | 0.7000 | -0.591 | 0.001 | -0.4136 | 29.758 |
| -0.40 | 10.00 | 1460.00 | 0.8300 | -0.431 | -0.007 | -0.3573 | 32.351 |
| -0.40 | 10.00 | 1460.00 | 0.9400 | -0.426 | -0.023 | -0.4002 | 38.081 |
| -0.40 | 10.00 | 1460.00 | 0.9700 | -0.432 | -0.042 | -0.4187 | 44.650 |
| -0.40 | 10.00 | 1460.00 | 1.0000 | 0.000 | 0.000 | 0.0000 | 0.000 |

Local Distribution
5pom2.d Drift Angle Br=-15, +10m/s +1460rpm J=0.51 +10 deg

| Angle | V | RPM | Span | Cn | Cmz | Cmx | Cpc |
|---|---|---|---|---|---|---|---|
| 9.60 | 10.00 | 1460.00 | 0.0000 | -0.276 | 0.020 | -0.0194 | 19.362 |
| 9.60 | 10.00 | 1460.00 | 0.0700 | -0.276 | 0.020 | -0.0194 | 19.362 |
| 9.60 | 10.00 | 1460.00 | 0.2300 | -0.331 | 0.032 | -0.0760 | 15.607 |
| 9.60 | 10.00 | 1460.00 | 0.4000 | -0.313 | 0.042 | -0.1250 | 9.697 |
| 9.60 | 10.00 | 1460.00 | 0.5300 | -0.482 | -0.028 | -0.2553 | 38.794 |
| 9.60 | 10.00 | 1460.00 | 0.7000 | 0.384 | -0.062 | 0.2691 | 5.735 |
| 9.60 | 10.00 | 1460.00 | 0.8300 | 0.363 | -0.058 | 0.3015 | 6.015 |
| 9.60 | 10.00 | 1460.00 | 0.9400 | 0.031 | -0.035 | 0.0292 | -136.604 |
| 9.60 | 10.00 | 1460.00 | 0.9700 | -0.093 | -0.023 | -0.0902 | 66.321 |
| 9.60 | 10.00 | 1460.00 | 1.0000 | 0.000 | 0.000 | 0.0000 | 0.000 |

Local Distribution
6pom2.d Drift Angle Br=-15, +10m/s +1460rpm J=0.51 +20 deg

| Angle | V | RPM | Span | Cn | Cmz | Cmx | Cpc |
|---|---|---|---|---|---|---|---|
| 19.60 | 10.00 | 1460.00 | 0.0000 | 0.183 | -0.000 | 0.0128 | 29.832 |
| 19.60 | 10.00 | 1460.00 | 0.0700 | 0.183 | -0.000 | 0.0128 | 29.832 |
| 19.60 | 10.00 | 1460.00 | 0.2300 | 0.303 | 0.004 | 0.0697 | 32.187 |
| 19.60 | 10.00 | 1460.00 | 0.4000 | 0.476 | -0.038 | 0.1904 | 18.023 |
| 19.60 | 10.00 | 1460.00 | 0.5300 | 0.317 | -0.098 | 0.1682 | -16.320 |
| 19.60 | 10.00 | 1460.00 | 0.7000 | 1.184 | -0.099 | 0.8285 | 17.399 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 19.60 | 10.00 | 1460.00 | 0.8300 | 1.035 | -0.110 | 0.8592 | 14.030 |
| 19.60 | 10.00 | 1460.00 | 0.9400 | 0.469 | -0.056 | 0.4406 | 12.012 |
| 19.60 | 10.00 | 1460.00 | 0.9700 | 0.367 | -0.000 | 0.3560 | 29.909 |
| 19.60 | 10.00 | 1460.00 | 1.0000 | 0.000 | 0.000 | 0.0000 | 0.000 |

Local Distribution
7pom2.d Drift Angle Br=-15, +10m/s +1460rpm J=0.51 +30 deg

| Angle | V | RPM | Span | Cn | Cmz | Cmx | Cpc |
|---|---|---|---|---|---|---|---|
| 29.60 | 10.00 | 1460.00 | 0.0000 | 0.669 | -0.005 | 0.0468 | 28.855 |
| 29.60 | 10.00 | 1460.00 | 0.0700 | 0.669 | -0.005 | 0.0468 | 28.855 |
| 29.60 | 10.00 | 1460.00 | 0.2300 | 0.920 | -0.031 | 0.2116 | 24.897 |
| 29.60 | 10.00 | 1460.00 | 0.4000 | 1.338 | -0.095 | 0.5351 | 19.378 |
| 29.60 | 10.00 | 1460.00 | 0.5300 | 1.151 | -0.155 | 0.6100 | 9.850 |
| 29.60 | 10.00 | 1460.00 | 0.7000 | 2.010 | -0.113 | 1.4068 | 21.585 |
| 29.60 | 10.00 | 1460.00 | 0.8300 | 1.885 | -0.111 | 1.5647 | 21.142 |
| 29.60 | 10.00 | 1460.00 | 0.9400 | 1.225 | -0.005 | 1.1520 | 29.417 |
| 29.60 | 10.00 | 1460.00 | 0.9700 | 1.167 | 0.088 | 1.1322 | 41.226 |
| 29.60 | 10.00 | 1460.00 | 1.0000 | 0.000 | 0.000 | 0.0000 | 0.000 |

Local Distribution
1pom1.d Drift Angle Br=-7.5 +10m/s +1460rpm J=0.51 -30 deg

| Angle | V | RPM | Span | Cn | Cmz | Cmx | Cpc |
|---|---|---|---|---|---|---|---|
| -30.40 | 10.00 | 1460.00 | 0.0000 | -1.239 | -0.120 | -0.0868 | 44.467 |
| -30.40 | 10.00 | 1460.00 | 0.0700 | -1.239 | -0.120 | -0.0868 | 44.467 |
| -30.40 | 10.00 | 1460.00 | 0.2300 | -2.183 | -0.021 | -0.5020 | 31.398 |
| -30.40 | 10.00 | 1460.00 | 0.4000 | -2.858 | 0.084 | -1.1431 | 25.553 |
| -30.40 | 10.00 | 1460.00 | 0.5300 | -2.507 | 0.008 | -1.3288 | 29.478 |
| -30.40 | 10.00 | 1460.00 | 0.7000 | -2.587 | 0.066 | -1.8106 | 26.132 |
| -30.40 | 10.00 | 1460.00 | 0.8300 | -2.185 | 0.044 | -1.8132 | 26.977 |
| -30.40 | 10.00 | 1460.00 | 0.9400 | -2.417 | -0.183 | -2.2715 | 41.354 |
| -30.40 | 10.00 | 1460.00 | 0.9700 | -1.839 | -0.125 | -1.7843 | 40.145 |
| -30.40 | 10.00 | 1460.00 | 1.0000 | 0.000 | 0.000 | 0.0000 | 0.000 |

Local Distribution
2pom1.d Drift Angle Br=-7.5 +10m/s +1460rpm J=0.51 -20 deg

| Angle | V | RPM | Span | Cn | Cmz | Cmx | Cpc |
|---|---|---|---|---|---|---|---|
| -20.40 | 10.00 | 1460.00 | 0.0000 | -1.069 | -0.056 | -0.0748 | 37.799 |
| -20.40 | 10.00 | 1460.00 | 0.0700 | -1.069 | -0.056 | -0.0748 | 37.799 |
| -20.40 | 10.00 | 1460.00 | 0.2300 | -1.593 | 0.038 | -0.3663 | 26.371 |
| -20.40 | 10.00 | 1460.00 | 0.4000 | -2.232 | 0.124 | -0.8929 | 21.664 |
| -20.40 | 10.00 | 1460.00 | 0.5300 | -2.111 | 0.035 | -1.1188 | 27.473 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| -20.40 | 10.00 | 1460.00 | 0.7000 | -1.750 | 0.061 | -1.2248 | 24.772 |
| -20.40 | 10.00 | 1460.00 | 0.8300 | -1.474 | 0.047 | -1.2238 | 25.249 |
| -20.40 | 10.00 | 1460.00 | 0.9400 | -1.371 | -0.074 | -1.2890 | 38.057 |
| -20.40 | 10.00 | 1460.00 | 0.9700 | -1.302 | -0.127 | -1.2629 | 44.574 |
| -20.40 | 10.00 | 1460.00 | 1.0000 | 0.000 | 0.000 | 0.0000 | 0.000 |

Local Distribution
3pom1.d Drift Angle Br=-7.5 +10m/s +1460rpm J=0.51 -10 deg

| Angle | V | RPM | Span | Cn | Cmz | Cmx | Cpc |
|---|---|---|---|---|---|---|---|
| -10.40 | 10.00 | 1460.00 | 0.0000 | -0.946 | 0.017 | -0.0662 | 27.334 |
| -10.40 | 10.00 | 1460.00 | 0.0700 | -0.946 | 0.017 | -0.0662 | 27.334 |
| -10.40 | 10.00 | 1460.00 | 0.2300 | -1.237 | 0.079 | -0.2845 | 20.463 |
| -10.40 | 10.00 | 1460.00 | 0.4000 | -1.603 | 0.134 | -0.6412 | 17.500 |
| -10.40 | 10.00 | 1460.00 | 0.5300 | -1.579 | 0.040 | -0.8367 | 26.160 |
| -10.40 | 10.00 | 1460.00 | 0.7000 | -0.859 | 0.021 | -0.6013 | 26.364 |
| -10.40 | 10.00 | 1460.00 | 0.8300 | -0.686 | 0.026 | -0.5696 | 24.383 |
| -10.40 | 10.00 | 1460.00 | 0.9400 | -0.622 | -0.020 | -0.5844 | 34.859 |
| -10.40 | 10.00 | 1460.00 | 0.9700 | -0.590 | -0.047 | -0.5725 | 41.879 |
| -10.40 | 10.00 | 1460.00 | 1.0000 | 0.000 | 0.000 | 0.0000 | 0.000 |

Local Distribution
4pom1.d Drift Angle Br=-7.5 +10m/s +1460rpm J=0.51 0 deg

| Angle | V | RPM | Span | Cn | Cmz | Cmx | Cpc |
|---|---|---|---|---|---|---|---|
| -0.40 | 10.00 | 1460.00 | 0.0000 | -0.455 | 0.022 | -0.0318 | 22.719 |
| -0.40 | 10.00 | 1460.00 | 0.0700 | -0.455 | 0.022 | -0.0318 | 22.719 |
| -0.40 | 10.00 | 1460.00 | 0.2300 | -0.599 | 0.050 | -0.1377 | 17.522 |
| -0.40 | 10.00 | 1460.00 | 0.4000 | -0.766 | 0.086 | -0.3064 | 13.077 |
| -0.40 | 10.00 | 1460.00 | 0.5300 | -0.856 | 0.006 | -0.4538 | 28.960 |
| -0.40 | 10.00 | 1460.00 | 0.7000 | 0.004 | -0.039 | 0.0027 | -1501.192 |
| -0.40 | 10.00 | 1460.00 | 0.8300 | 0.039 | -0.033 | 0.0324 | -96.214 |
| -0.40 | 10.00 | 1460.00 | 0.9400 | -0.089 | -0.020 | -0.0833 | 64.373 |
| -0.40 | 10.00 | 1460.00 | 0.9700 | -0.115 | -0.022 | -0.1118 | 58.053 |
| -0.40 | 10.00 | 1460.00 | 1.0000 | 0.000 | 0.000 | 0.0000 | 0.000 |

Local Distribution
5pom1.d Drift Angle Br=-7.5 +10m/s +1460rpm J=0.51 +10 deg

| Angle | V | RPM | Span | Cn | Cmz | Cmx | Cpc |
|---|---|---|---|---|---|---|---|
| 9.60 | 10.00 | 1460.00 | 0.0000 | 0.007 | 0.007 | 0.0005 | 173.935 |
| 9.60 | 10.00 | 1460.00 | 0.0700 | 0.007 | 0.007 | 0.0005 | 173.935 |
| 9.60 | 10.00 | 1460.00 | 0.2300 | -0.007 | 0.015 | -0.0015 | -308.698 |
| 9.60 | 10.00 | 1460.00 | 0.4000 | 0.052 | 0.024 | 0.0206 | 98.486 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 9.60 | 10.00 | 1460.00 | 0.5300 | -0.101 | -0.046 | -0.0537 | 97.511 |
| 9.60 | 10.00 | 1460.00 | 0.7000 | 0.733 | -0.080 | 0.5132 | 13.574 |
| 9.60 | 10.00 | 1460.00 | 0.8300 | 0.707 | -0.079 | 0.5864 | 13.299 |
| 9.60 | 10.00 | 1460.00 | 0.9400 | 0.337 | -0.048 | 0.3170 | 8.431 |
| 9.60 | 10.00 | 1460.00 | 0.9700 | 0.275 | -0.003 | 0.2666 | 28.504 |
| 9.60 | 10.00 | 1460.00 | 1.0000 | 0.000 | 0.000 | 0.0000 | 0.000 |

Local Distribution
6pom1.d Drift Angle Br=-7.5 +10m/s +1460rpm J=0.51 +20 deg

| Angle | V | RPM | Span | Cn | Cmz | Cmx | Cpc |
|---|---|---|---|---|---|---|---|
| 19.60 | 10.00 | 1460.00 | 0.0000 | 0.485 | -0.007 | 0.0340 | 27.712 |
| 19.60 | 10.00 | 1460.00 | 0.0700 | 0.485 | -0.007 | 0.0340 | 27.712 |
| 19.60 | 10.00 | 1460.00 | 0.2300 | 0.630 | -0.014 | 0.1449 | 26.587 |
| 19.60 | 10.00 | 1460.00 | 0.4000 | 0.862 | -0.042 | 0.3447 | 22.689 |
| 19.60 | 10.00 | 1460.00 | 0.5300 | 0.698 | -0.095 | 0.3701 | 9.626 |
| 19.60 | 10.00 | 1460.00 | 0.7000 | 1.564 | -0.114 | 1.0949 | 19.017 |
| 19.60 | 10.00 | 1460.00 | 0.8300 | 1.436 | -0.105 | 1.1921 | 19.002 |
| 19.60 | 10.00 | 1460.00 | 0.9400 | 1.013 | -0.013 | 0.9523 | 28.086 |
| 19.60 | 10.00 | 1460.00 | 0.9700 | 0.926 | 0.047 | 0.8984 | 37.624 |
| 19.60 | 10.00 | 1460.00 | 1.0000 | 0.000 | 0.000 | 0.0000 | 0.000 |

Local Distribution
7pom1.d Drift Angle Br=-7.5 +10m/s +1460rpm J=0.51 +30 deg

| Angle | V | RPM | Span | Cn | Cmz | Cmx | Cpc |
|---|---|---|---|---|---|---|---|
| 29.60 | 10.00 | 1460.00 | 0.0000 | 0.904 | 0.004 | 0.0633 | 30.606 |
| 29.60 | 10.00 | 1460.00 | 0.0700 | 0.904 | 0.004 | 0.0633 | 30.606 |
| 29.60 | 10.00 | 1460.00 | 0.2300 | 1.168 | -0.034 | 0.2686 | 25.641 |
| 29.60 | 10.00 | 1460.00 | 0.4000 | 1.675 | -0.098 | 0.6701 | 21.223 |
| 29.60 | 10.00 | 1460.00 | 0.5300 | 1.466 | -0.131 | 0.7767 | 16.573 |
| 29.60 | 10.00 | 1460.00 | 0.7000 | 2.213 | -0.107 | 1.5489 | 22.727 |
| 29.60 | 10.00 | 1460.00 | 0.8300 | 2.208 | -0.096 | 1.8327 | 23.489 |
| 29.60 | 10.00 | 1460.00 | 0.9400 | 2.145 | 0.146 | 2.0160 | 40.196 |
| 29.60 | 10.00 | 1460.00 | 0.9700 | 1.972 | 0.181 | 1.9129 | 43.762 |
| 29.60 | 10.00 | 1460.00 | 1.0000 | 0.000 | 0.000 | 0.0000 | 0.000 |

Local Distribution
1pop1.d Drift Angle Br=7.5, +10m/s +1460rpm J=0.51 -30 deg

| Angle | V | RPM | Span | Cn | Cmz | Cmx | Cpc |
|---|---|---|---|---|---|---|---|
| -30.40 | 10.00 | 1460.00 | 0.0000 | -1.348 | -0.047 | -0.0944 | 35.187 |
| -30.40 | 10.00 | 1460.00 | 0.0700 | -1.348 | -0.047 | -0.0944 | 35.187 |
| -30.40 | 10.00 | 1460.00 | 0.2300 | -1.759 | 0.060 | -0.4045 | 24.908 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| -30.40 | 10.00 | 1460.00 | 0.4000 | -2.656 | 0.137 | -1.0625 | 22.280 |
| -30.40 | 10.00 | 1460.00 | 0.5300 | -2.112 | 0.102 | -1.1193 | 22.716 |
| -30.40 | 10.00 | 1460.00 | 0.7000 | -1.332 | 0.116 | -0.9327 | 16.986 |
| -30.40 | 10.00 | 1460.00 | 0.8300 | -1.384 | 0.054 | -1.1490 | 24.101 |
| -30.40 | 10.00 | 1460.00 | 0.9400 | -1.090 | -0.038 | -1.0244 | 35.187 |
| -30.40 | 10.00 | 1460.00 | 0.9700 | -1.017 | -0.081 | -0.9863 | 41.967 |
| -30.40 | 10.00 | 1460.00 | 1.0000 | 0.000 | 0.000 | 0.0000 | 0.000 |

Local Distribution
2pop1.d Drift Angle Br=7.5, +10m/s +1460rpm J=0.51 -20 deg

| Angle | V | RPM | Span | Cn | Cmz | Cmx | Cpc |
|---|---|---|---|---|---|---|---|
| -20.40 | 10.00 | 1460.00 | 0.0000 | -0.850 | -0.009 | -0.0595 | 31.581 |
| -20.40 | 10.00 | 1460.00 | 0.0700 | -0.850 | -0.009 | -0.0595 | 31.581 |
| -20.40 | 10.00 | 1460.00 | 0.2300 | -1.112 | 0.070 | -0.2558 | 20.585 |
| -20.40 | 10.00 | 1460.00 | 0.4000 | -1.912 | 0.133 | -0.7647 | 19.536 |
| -20.40 | 10.00 | 1460.00 | 0.5300 | -1.388 | 0.099 | -0.7357 | 19.250 |
| -20.40 | 10.00 | 1460.00 | 0.7000 | -0.616 | 0.079 | -0.4315 | 10.741 |
| -20.40 | 10.00 | 1460.00 | 0.8300 | -0.587 | 0.020 | -0.4870 | 24.863 |
| -20.40 | 10.00 | 1460.00 | 0.9400 | -0.387 | 0.000 | -0.3635 | 29.882 |
| -20.40 | 10.00 | 1460.00 | 0.9700 | -0.334 | -0.017 | -0.3244 | 37.431 |
| -20.40 | 10.00 | 1460.00 | 1.0000 | 0.000 | 0.000 | 0.0000 | 0.000 |

Local Distribution
3pop1.d Drift Angle Br=7.5, +10m/s +1460rpm J=0.51 -10 deg

| Angle | V | RPM | Span | Cn | Cmz | Cmx | Cpc |
|---|---|---|---|---|---|---|---|
| -10.40 | 10.00 | 1460.00 | 0.0000 | -0.276 | 0.005 | -0.0193 | 27.213 |
| -10.40 | 10.00 | 1460.00 | 0.0700 | -0.276 | 0.005 | -0.0193 | 27.213 |
| -10.40 | 10.00 | 1460.00 | 0.2300 | -0.423 | 0.055 | -0.0972 | 10.646 |
| -10.40 | 10.00 | 1460.00 | 0.4000 | -0.997 | 0.105 | -0.3988 | 14.215 |
| -10.40 | 10.00 | 1460.00 | 0.5300 | -0.653 | 0.068 | -0.3462 | 14.433 |
| -10.40 | 10.00 | 1460.00 | 0.7000 | 0.037 | 0.019 | 0.0260 | 108.255 |
| -10.40 | 10.00 | 1460.00 | 0.8300 | -0.007 | -0.037 | -0.0061 | 780.820 |
| -10.40 | 10.00 | 1460.00 | 0.9400 | 0.086 | -0.008 | 0.0804 | 15.976 |
| -10.40 | 10.00 | 1460.00 | 0.9700 | 0.025 | -0.009 | 0.0245 | -21.470 |
| -10.40 | 10.00 | 1460.00 | 1.0000 | 0.000 | 0.000 | 0.0000 | 0.000 |

Local Distribution
4pop1.d Drift Angle Br=7.5, +10m/s +1460rpm J=0.51 0 deg

| Angle | V | RPM | Span | Cn | Cmz | Cmx | Cpc |
|---|---|---|---|---|---|---|---|
| -0.40 | 10.00 | 1460.00 | 0.0000 | 0.314 | 0.006 | 0.0220 | 32.917 |
| -0.40 | 10.00 | 1460.00 | 0.0700 | 0.314 | 0.006 | 0.0220 | 32.917 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| -0.40 | 10.00 | 1460.00 | 0.2300 | 0.231 | 0.028 | 0.0530 | 48.332 |
| -0.40 | 10.00 | 1460.00 | 0.4000 | -0.071 | 0.047 | -0.0283 | -69.426 |
| -0.40 | 10.00 | 1460.00 | 0.5300 | 0.132 | 0.030 | 0.0697 | 63.620 |
| -0.40 | 10.00 | 1460.00 | 0.7000 | 2.045 | -0.102 | 1.4318 | 22.526 |
| -0.40 | 10.00 | 1460.00 | 0.8300 | 0.635 | -0.091 | 0.5270 | 8.536 |
| -0.40 | 10.00 | 1460.00 | 0.9400 | 0.647 | -0.042 | 0.6083 | 20.328 |
| -0.40 | 10.00 | 1460.00 | 0.9700 | 0.454 | 0.011 | 0.4408 | 33.751 |
| -0.40 | 10.00 | 1460.00 | 1.0000 | 0.000 | 0.000 | 0.0000 | 0.000 |

Local Distribution
5pop1.d Drift Angle Br=7.5, +10m/s +1460rpm J=0.51 +10 deg

| Angle | V | RPM | Span | Cn | Cmz | Cmx | Cpc |
|---|---|---|---|---|---|---|---|
| 9.60 | 10.00 | 1460.00 | 0.0000 | 0.730 | -0.001 | 0.0511 | 29.706 |
| 9.60 | 10.00 | 1460.00 | 0.0700 | 0.730 | -0.001 | 0.0511 | 29.706 |
| 9.60 | 10.00 | 1460.00 | 0.2300 | 0.922 | -0.010 | 0.2120 | 28.413 |
| 9.60 | 10.00 | 1460.00 | 0.4000 | 0.815 | -0.002 | 0.3259 | 29.609 |
| 9.60 | 10.00 | 1460.00 | 0.5300 | 0.965 | -0.007 | 0.5116 | 28.860 |
| 9.60 | 10.00 | 1460.00 | 0.7000 | 1.346 | -0.057 | 0.9422 | 23.611 |
| 9.60 | 10.00 | 1460.00 | 0.8300 | 1.332 | -0.098 | 1.1052 | 18.923 |
| 9.60 | 10.00 | 1460.00 | 0.9400 | 1.255 | 0.027 | 1.1795 | 33.220 |
| 9.60 | 10.00 | 1460.00 | 0.9700 | 1.209 | 0.076 | 1.1730 | 39.381 |
| 9.60 | 10.00 | 1460.00 | 1.0000 | 0.000 | 0.000 | 0.0000 | 0.000 |

Local Distribution
6pop1.d Drift Angle Br=7.5, +10m/s +1460rpm J=0.51 +20 deg

| Angle | V | RPM | Span | Cn | Cmz | Cmx | Cpc |
|---|---|---|---|---|---|---|---|
| 19.60 | 10.00 | 1460.00 | 0.0000 | 1.123 | 0.005 | 0.0786 | 30.592 |
| 19.60 | 10.00 | 1460.00 | 0.0700 | 1.123 | 0.005 | 0.0786 | 30.592 |
| 19.60 | 10.00 | 1460.00 | 0.2300 | 1.527 | -0.038 | 0.3512 | 26.238 |
| 19.60 | 10.00 | 1460.00 | 0.4000 | 1.707 | -0.033 | 0.6830 | 27.054 |
| 19.60 | 10.00 | 1460.00 | 0.5300 | 1.663 | -0.012 | 0.8813 | 28.900 |
| 19.60 | 10.00 | 1460.00 | 0.7000 | 1.665 | -0.012 | 1.1657 | 28.892 |
| 19.60 | 10.00 | 1460.00 | 0.8300 | 2.099 | -0.040 | 1.7420 | 27.093 |
| 19.60 | 10.00 | 1460.00 | 0.9400 | 2.169 | 0.136 | 2.0392 | 39.379 |
| 19.60 | 10.00 | 1460.00 | 0.9700 | 2.048 | 0.168 | 1.9868 | 42.275 |
| 19.60 | 10.00 | 1460.00 | 1.0000 | 0.000 | 0.000 | 0.0000 | 0.000 |

Local Distribution
7pop1.d Drift Angle Br=7.5, +10m/s +1460rpm J=0.51 +30 deg

| Angle | V | RPM | Span | Cn | Cmz | Cmx | Cpc |
|---|---|---|---|---|---|---|---|
| 29.60 | 10.00 | 1460.00 | 0.0000 | 1.462 | 0.029 | 0.1023 | 32.936 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 29.60 | 10.00 | 1460.00 | 0.0700 | 1.462 | 0.029 | 0.1023 | 32.936 |
| 29.60 | 10.00 | 1460.00 | 0.2300 | 2.415 | 0.013 | 0.5554 | 30.768 |
| 29.60 | 10.00 | 1460.00 | 0.4000 | 2.463 | 0.025 | 0.9850 | 31.489 |
| 29.60 | 10.00 | 1460.00 | 0.5300 | 2.090 | 0.105 | 1.1079 | 37.502 |
| 29.60 | 10.00 | 1460.00 | 0.7000 | 2.127 | 0.133 | 1.4892 | 39.327 |
| 29.60 | 10.00 | 1460.00 | 0.8300 | 2.288 | 0.122 | 1.8990 | 37.978 |
| 29.60 | 10.00 | 1460.00 | 0.9400 | 2.051 | 0.082 | 1.9284 | 35.981 |
| 29.60 | 10.00 | 1460.00 | 0.9700 | 1.661 | 0.078 | 1.6116 | 37.026 |
| 29.60 | 10.00 | 1460.00 | 1.0000 | 0.000 | 0.000 | 0.0000 | 0.000 |

Local Distribution
1pop2.d Drift Angle Br= 15, +10m/s +1460rpm J=0.51 -30 deg

| Angle | V | RPM | Span | Cn | Cmz | Cmx | Cpc |
|---|---|---|---|---|---|---|---|
| -30.40 | 10.00 | 1460.00 | 0.0000 | -1.155 | -0.031 | -0.0809 | 33.955 |
| -30.40 | 10.00 | 1460.00 | 0.0700 | -1.155 | -0.031 | -0.0809 | 33.955 |
| -30.40 | 10.00 | 1460.00 | 0.2300 | -1.568 | 0.073 | -0.3607 | 22.961 |
| -30.40 | 10.00 | 1460.00 | 0.4000 | -2.468 | 0.119 | -0.9872 | 22.779 |
| -30.40 | 10.00 | 1460.00 | 0.5300 | -1.705 | 0.097 | -0.9038 | 21.448 |
| -30.40 | 10.00 | 1460.00 | 0.7000 | -0.828 | 0.159 | -0.5795 | 1.157 |
| -30.40 | 10.00 | 1460.00 | 0.8300 | -0.893 | 0.050 | -0.7416 | 21.600 |
| -30.40 | 10.00 | 1460.00 | 0.9400 | -0.623 | -0.005 | -0.5861 | 31.176 |
| -30.40 | 10.00 | 1460.00 | 0.9700 | -0.524 | -0.036 | -0.5078 | 40.195 |
| -30.40 | 10.00 | 1460.00 | 1.0000 | 0.000 | 0.000 | 0.0000 | 0.000 |

Local Distribution
2pop2.d Drift Angle Br= 15, +10m/s +1460rpm J=0.51 -20 deg

| Angle | V | RPM | Span | Cn | Cmz | Cmx | Cpc |
|---|---|---|---|---|---|---|---|
| -20.40 | 10.00 | 1460.00 | 0.0000 | -0.574 | -0.003 | -0.0401 | 30.864 |
| -20.40 | 10.00 | 1460.00 | 0.0700 | -0.574 | -0.003 | -0.0401 | 30.864 |
| -20.40 | 10.00 | 1460.00 | 0.2300 | -0.808 | 0.068 | -0.1858 | 17.382 |
| -20.40 | 10.00 | 1460.00 | 0.4000 | -1.613 | 0.110 | -0.6452 | 19.776 |
| -20.40 | 10.00 | 1460.00 | 0.5300 | -1.013 | 0.078 | -0.5371 | 18.452 |
| -20.40 | 10.00 | 1460.00 | 0.7000 | -0.117 | 0.108 | -0.0819 | -107.727 |
| -20.40 | 10.00 | 1460.00 | 0.8300 | -0.252 | 0.015 | -0.2091 | 21.144 |
| -20.40 | 10.00 | 1460.00 | 0.9400 | -0.114 | -0.010 | -0.1068 | 43.748 |
| -20.40 | 10.00 | 1460.00 | 0.9700 | -0.098 | -0.014 | -0.0950 | 50.873 |
| -20.40 | 10.00 | 1460.00 | 1.0000 | 0.000 | 0.000 | 0.0000 | 0.000 |

Local Distribution
3pop2.d Drift Angle Br= 15, +10m/s +1460rpm J=0.51 -10 deg

| Angle | V | RPM | Span | Cn | Cmz | Cmx | Cpc |
|---|---|---|---|---|---|---|---|

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| -10.40 | 10.00 | 1460.00 | 0.0000 | 0.013 | 0.009 | 0.0009 | 135.794 |
| -10.40 | 10.00 | 1460.00 | 0.0700 | 0.013 | 0.009 | 0.0009 | 135.794 |
| -10.40 | 10.00 | 1460.00 | 0.2300 | -0.084 | 0.057 | -0.0192 | -72.334 |
| -10.40 | 10.00 | 1460.00 | 0.4000 | -0.682 | 0.085 | -0.2726 | 11.185 |
| -10.40 | 10.00 | 1460.00 | 0.5300 | -0.239 | 0.051 | -0.1265 | -1.881 |
| -10.40 | 10.00 | 1460.00 | 0.7000 | 0.515 | 0.026 | 0.3607 | 37.496 |
| -10.40 | 10.00 | 1460.00 | 0.8300 | 0.298 | -0.047 | 0.2471 | 6.491 |
| -10.40 | 10.00 | 1460.00 | 0.9400 | 0.301 | -0.021 | 0.2829 | 19.355 |
| -10.40 | 10.00 | 1460.00 | 0.9700 | 0.251 | -0.004 | 0.2433 | 27.836 |
| -10.40 | 10.00 | 1460.00 | 1.0000 | 0.000 | 0.000 | 0.0000 | 0.000 |

Local Distribution
4pop2.d Drift Angle Br= 15, +10m/s +1460rpm J=0.51 0 deg

| Angle | V | RPM | Span | Cn | Cmz | Cmx | Cpc |
|---|---|---|---|---|---|---|---|
| -0.40 | 10.00 | 1460.00 | 0.0000 | 0.512 | 0.008 | 0.0358 | 32.279 |
| -0.40 | 10.00 | 1460.00 | 0.0700 | 0.512 | 0.008 | 0.0358 | 32.279 |
| -0.40 | 10.00 | 1460.00 | 0.2300 | 0.567 | 0.026 | 0.1305 | 36.826 |
| -0.40 | 10.00 | 1460.00 | 0.4000 | 0.278 | 0.044 | 0.1110 | 53.785 |
| -0.40 | 10.00 | 1460.00 | 0.5300 | 0.581 | 0.022 | 0.3081 | 35.619 |
| -0.40 | 10.00 | 1460.00 | 0.7000 | 1.197 | -0.016 | 0.8380 | 27.954 |
| -0.40 | 10.00 | 1460.00 | 0.8300 | 1.060 | -0.048 | 0.8795 | 23.171 |
| -0.40 | 10.00 | 1460.00 | 0.9400 | 0.877 | -0.003 | 0.8240 | 29.458 |
| -0.40 | 10.00 | 1460.00 | 0.9700 | 0.811 | 0.042 | 0.7863 | 37.818 |
| -0.40 | 10.00 | 1460.00 | 1.0000 | 0.000 | 0.000 | 0.0000 | 0.000 |

Local Distribution
5pop2.d Drift Angle Br= 15, +10m/s +1460rpm J=0.51 +10 deg

| Angle | V | RPM | Span | Cn | Cmz | Cmx | Cpc |
|---|---|---|---|---|---|---|---|
| 9.60 | 10.00 | 1460.00 | 0.0000 | 1.023 | 0.007 | 0.0716 | 31.028 |
| 9.60 | 10.00 | 1460.00 | 0.0700 | 1.023 | 0.007 | 0.0716 | 31.028 |
| 9.60 | 10.00 | 1460.00 | 0.2300 | 1.273 | -0.008 | 0.2929 | 29.073 |
| 9.60 | 10.00 | 1460.00 | 0.4000 | 1.222 | -0.006 | 0.4890 | 29.201 |
| 9.60 | 10.00 | 1460.00 | 0.5300 | 1.415 | -0.011 | 0.7499 | 28.846 |
| 9.60 | 10.00 | 1460.00 | 0.7000 | 1.532 | -0.032 | 1.0727 | 26.841 |
| 9.60 | 10.00 | 1460.00 | 0.8300 | 1.897 | -0.049 | 1.5743 | 26.134 |
| 9.60 | 10.00 | 1460.00 | 0.9400 | 1.717 | 0.085 | 1.6144 | 37.410 |
| 9.60 | 10.00 | 1460.00 | 0.9700 | 1.538 | 0.111 | 1.4917 | 40.787 |
| 9.60 | 10.00 | 1460.00 | 1.0000 | 0.000 | 0.000 | 0.0000 | 0.000 |

Local Distribution
6pop2.d Drift Angle Br= 15, +10m/s +1460rpm J=0.51 +20 deg

| Angle | V | RPM | Span | Cn | Cmz | Cmx | Cpc |
|---|---|---|---|---|---|---|---|

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 19.60 | 10.00 | 1460.00 | 0.0000 | 1.398 | 0.024 | 0.0978 | 32.537 |
| 19.60 | 10.00 | 1460.00 | 0.0700 | 1.398 | 0.024 | 0.0978 | 32.537 |
| 19.60 | 10.00 | 1460.00 | 0.2300 | 1.938 | -0.037 | 0.4457 | 27.122 |
| 19.60 | 10.00 | 1460.00 | 0.4000 | 2.242 | -0.044 | 0.8966 | 27.046 |
| 19.60 | 10.00 | 1460.00 | 0.5300 | 2.345 | -0.012 | 1.2426 | 29.193 |
| 19.60 | 10.00 | 1460.00 | 0.7000 | 2.138 | 0.002 | 1.4967 | 30.112 |
| 19.60 | 10.00 | 1460.00 | 0.8300 | 2.414 | 0.008 | 2.0037 | 30.473 |
| 19.60 | 10.00 | 1460.00 | 0.9400 | 2.597 | 0.169 | 2.4414 | 39.743 |
| 19.60 | 10.00 | 1460.00 | 0.9700 | 2.239 | 0.172 | 2.1722 | 41.530 |
| 19.60 | 10.00 | 1460.00 | 1.0000 | 0.000 | 0.000 | 0.0000 | 0.000 |

Local Distribution
7pop2.d Drift Angle Br= 15, +10m/s +1460rpm J=0.51 +30 deg

| Angle | V | RPM | Span | Cn | Cmz | Cmx | Cpc |
|---|---|---|---|---|---|---|---|
| 29.60 | 10.00 | 1460.00 | 0.0000 | 1.208 | 0.100 | 0.0846 | 42.336 |
| 29.60 | 10.00 | 1460.00 | 0.0700 | 1.208 | 0.100 | 0.0846 | 42.336 |
| 29.60 | 10.00 | 1460.00 | 0.2300 | 2.819 | 0.011 | 0.6484 | 30.558 |
| 29.60 | 10.00 | 1460.00 | 0.4000 | 3.078 | -0.052 | 1.2314 | 27.470 |
| 29.60 | 10.00 | 1460.00 | 0.5300 | 3.148 | 0.061 | 1.6686 | 32.870 |
| 29.60 | 10.00 | 1460.00 | 0.7000 | 2.603 | 0.098 | 1.8223 | 35.650 |
| 29.60 | 10.00 | 1460.00 | 0.8300 | 3.059 | 0.097 | 2.5392 | 34.751 |
| 29.60 | 10.00 | 1460.00 | 0.9400 | 2.772 | 0.146 | 2.6054 | 37.887 |
| 29.60 | 10.00 | 1460.00 | 0.9700 | 2.150 | 0.077 | 2.0858 | 35.388 |
| 29.60 | 10.00 | 1460.00 | 1.0000 | 0.000 | 0.000 | 0.0000 | 0.000 |

# Appendix D Pressure Coefficient Data

DRIFT ANGLE Br = - 15 deg File: pom2p3.dat Span is : 0.07 m No: 1

| Incidence | | -30 | -20 | -10 | 0 | 10 | 20 | 30 |
|---|---|---|---|---|---|---|---|---|
| %c | %t/c | | | | | | | |
| 0.0 | 0.00 | -4.507 | -5.149 | -4.535 | -2.137 | 0.486 | 1.232 | -0.556 |
| 2.5 | 4.36 | -2.603 | -1.851 | -3.465 | -3.466 | -1.222 | 0.377 | 0.833 |
| 5.0 | 5.93 | -1.918 | -1.311 | -1.972 | -2.918 | -1.167 | 0.087 | 0.764 |
| 10.0 | 7.81 | -2.110 | -1.041 | -0.944 | -2.055 | -1.083 | -0.145 | 0.569 |
| 20.0 | 9.57 | -2.205 | -1.054 | -0.944 | -1.370 | -0.806 | -0.188 | 0.403 |
| 30.0 | 10.01 | -2.315 | -1.068 | -0.915 | -1.014 | -0.639 | -0.217 | 0.250 |
| 40.0 | 9.68 | -1.452 | -1.027 | -0.915 | -0.726 | -0.444 | -0.159 | 0.167 |
| 50.0 | 8.83 | -1.096 | -0.986 | -0.873 | -0.548 | -0.347 | -0.116 | 0.139 |
| 60.0 | 7.61 | -1.219 | -0.973 | -0.887 | -0.370 | -0.236 | -0.087 | 0.097 |
| 70.0 | 6.11 | -1.219 | -0.946 | -0.803 | -0.219 | -0.097 | 0.000 | 0.125 |
| 80.0 | 4.37 | -1.205 | -0.919 | -0.732 | -0.110 | -0.028 | 0.058 | 0.194 |
| 90.0 | 2.41 | -0.918 | -0.797 | -0.662 | 0.014 | 0.111 | 0.130 | 0.181 |
| 95.0 | 1.35 | -0.918 | -0.824 | -0.648 | 0.082 | 0.167 | 0.217 | 0.167 |
| 95.0 | -1.35 | -0.110 | -0.135 | -0.113 | 0.137 | 0.194 | 0.217 | 0.125 |
| 90.0 | -2.41 | 0.164 | 0.068 | 0.014 | 0.110 | 0.125 | 0.116 | 0.000 |
| 80.0 | -4.37 | 0.589 | 0.378 | 0.169 | 0.137 | 0.000 | 0.000 | -0.167 |
| 70.0 | -6.11 | 0.836 | 0.514 | 0.225 | 0.110 | -0.056 | -0.159 | -0.319 |
| 60.0 | -7.61 | 0.932 | 0.608 | 0.310 | 0.123 | -0.125 | -0.261 | -0.472 |
| 50.0 | -8.83 | 1.055 | 0.730 | 0.437 | 0.137 | -0.167 | -0.377 | -0.653 |
| 40.0 | -9.68 | 1.151 | 0.851 | 0.577 | 0.247 | -0.181 | -0.507 | -0.833 |
| 30.0 | -10.01 | 1.233 | 0.946 | 0.746 | 0.356 | -0.097 | -0.594 | -1.014 |
| 20.0 | -9.57 | 1.192 | 1.041 | 0.887 | 0.548 | -0.042 | -0.710 | -1.389 |
| 10.0 | -7.81 | 1.123 | 1.000 | 1.225 | 0.849 | 0.278 | -0.623 | -1.708 |
| 5.0 | -5.93 | 0.575 | 0.635 | 1.000 | 1.096 | 0.583 | -0.667 | -2.278 |
| 2.5 | -4.36 | -0.233 | -0.270 | 0.465 | 0.918 | 0.847 | -0.348 | -2.222 |

DRIFT ANGLE Br = - 15 deg File: pom2p3.dat Span is : 0.23 m No: 2

| Incidence | | -30 | -20 | -10 | 0 | 10 | 20 | 30 |
|---|---|---|---|---|---|---|---|---|
| %c | %t/c | | | | | | | |
| 0.0 | 0.00 | -3.292 | -8.845 | -3.914 | -0.500 | 1.789 | 1.817 | -0.465 |
| 2.5 | 4.36 | -2.403 | -10.183 | -7.843 | -5.157 | -1.775 | 0.746 | 2.183 |
| 5.0 | 5.93 | -2.139 | -6.634 | -5.771 | -4.514 | -2.028 | 0.085 | 1.690 |
| 10.0 | 7.81 | -1.556 | -4.127 | -4.114 | -3.543 | -2.056 | -0.563 | 0.915 |
| 20.0 | 9.57 | -1.500 | -1.972 | -2.086 | -2.371 | -1.606 | -0.732 | 0.183 |
| 30.0 | 10.01 | -1.861 | -1.366 | -1.257 | -1.657 | -1.183 | -0.676 | 0.028 |
| 40.0 | 9.68 | -1.708 | -1.127 | -0.986 | -1.171 | -0.845 | -0.507 | 0.000 |
| 50.0 | 8.83 | -1.458 | -1.056 | -0.971 | -0.771 | -0.577 | -0.310 | 0.042 |
| 60.0 | 7.61 | -1.389 | -0.859 | -0.729 | -0.514 | -0.408 | -0.169 | 0.070 |
| 70.0 | 6.11 | -1.306 | -0.845 | -0.800 | -0.286 | -0.239 | -0.070 | 0.085 |
| 80.0 | 4.37 | -1.264 | -0.845 | -0.600 | -0.057 | 0.014 | 0.155 | 0.211 |
| 90.0 | 2.41 | -1.042 | -0.859 | -0.686 | 0.229 | 0.282 | 0.338 | 0.324 |
| 95.0 | 1.35 | -0.986 | -0.887 | -0.671 | 0.457 | 0.535 | 0.549 | 0.479 |
| 95.0 | -1.35 | -0.208 | -0.099 | -0.100 | 0.429 | 0.465 | 0.408 | 0.366 |
| 90.0 | -2.41 | -0.097 | 0.028 | -0.043 | 0.171 | 0.169 | 0.169 | 0.155 |
| 80.0 | -4.37 | 0.222 | 0.268 | 0.043 | 0.071 | -0.042 | -0.099 | -0.127 |
| 70.0 | -6.11 | 0.403 | 0.380 | 0.114 | 0.000 | -0.155 | -0.268 | -0.324 |
| 60.0 | -7.61 | 0.500 | 0.437 | 0.100 | -0.129 | -0.268 | -0.493 | -0.606 |
| 50.0 | -8.83 | 0.681 | 0.577 | 0.171 | -0.129 | -0.380 | -0.662 | -0.859 |
| 40.0 | -9.68 | 0.944 | 0.732 | 0.243 | -0.100 | -0.535 | -0.915 | -1.155 |
| 30.0 | -10.01 | 1.278 | 0.915 | 0.429 | -0.129 | -0.690 | -1.282 | -1.704 |
| 20.0 | -9.57 | 1.917 | 1.352 | 0.771 | 0.200 | -0.535 | -1.338 | -2.014 |
| 10.0 | -7.81 | 2.528 | 1.549 | 0.843 | 0.671 | 0.000 | -1.155 | -2.803 |
| 5.0 | -5.93 | 2.889 | 2.169 | 1.929 | 1.286 | 0.197 | -1.380 | -3.338 |
| 2.5 | -4.36 | 2.333 | 1.408 | 1.843 | 2.043 | 0.239 | -1.479 | -3.873 |

DRIFT ANGLE Br = - 15 deg File: pom2p3.dat Span is : 0.40 m No: 3

| Incidence | | -30 | -20 | -10 | 0 | 10 | 20 | 30 |
|---|---|---|---|---|---|---|---|---|
| %c | %t/c | | | | | | | |
| 0.0 | 0.00 | -3.732 | -15.583 | -7.366 | -0.792 | 3.571 | 4.457 | 1.662 |
| 2.5 | 4.36 | -2.014 | -16.542 | -11.620 | -7.139 | -2.671 | 1.114 | 3.634 |
| 5.0 | 5.93 | -1.704 | -10.431 | -8.408 | -5.833 | -2.700 | 0.171 | 2.493 |
| 10.0 | 7.81 | -1.408 | -7.000 | -6.127 | -4.528 | -2.614 | -0.657 | 1.197 |
| 20.0 | 9.57 | -1.451 | -3.236 | -3.296 | -2.736 | -1.800 | -0.757 | 0.451 |
| 30.0 | 10.01 | -1.408 | -2.111 | -1.930 | -1.833 | -1.329 | -0.657 | 0.239 |
| 40.0 | 9.68 | -1.437 | -1.486 | -1.296 | -1.264 | -0.943 | -0.500 | 0.197 |
| 50.0 | 8.83 | -1.563 | -1.153 | -0.944 | -0.958 | -0.800 | -0.500 | 0.056 |
| 60.0 | 7.61 | -1.507 | -0.944 | -0.732 | -0.694 | -0.600 | -0.457 | -0.056 |
| 70.0 | 6.11 | -1.423 | -0.917 | -0.606 | -0.431 | -0.400 | -0.329 | -0.070 |
| 80.0 | 4.37 | -1.338 | -0.833 | -0.394 | -0.097 | -0.086 | -0.071 | 0.085 |
| 90.0 | 2.41 | -1.254 | -0.611 | -0.113 | 0.292 | 0.286 | 0.200 | 0.296 |
| 95.0 | 1.35 | -1.197 | -0.542 | 0.127 | 0.528 | 0.529 | 0.443 | 0.437 |
| 95.0 | -1.35 | -0.352 | 0.125 | 0.296 | 0.486 | 0.500 | 0.543 | 0.521 |
| 90.0 | -2.41 | -0.282 | 0.083 | 0.169 | 0.236 | 0.257 | 0.343 | 0.380 |
| 80.0 | -4.37 | 0.113 | 0.208 | 0.056 | 0.000 | -0.057 | 0.014 | 0.056 |
| 70.0 | -6.11 | 0.380 | 0.292 | 0.028 | -0.139 | -0.286 | -0.271 | -0.254 |
| 60.0 | -7.61 | 0.606 | 0.361 | 0.014 | -0.264 | -0.500 | -0.557 | -0.620 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 50.0 | -8.83 | 0.986 | 0.528 | 0.028 | -0.389 | -0.743 | -0.914 | -1.056 |
| 40.0 | -9.68 | 1.563 | 0.861 | 0.155 | -0.431 | -0.971 | -1.300 | -1.563 |
| 30.0 | -10.01 | 2.451 | 1.472 | 0.408 | -0.611 | -1.457 | -2.043 | -2.493 |
| 20.0 | -9.57 | 3.676 | 2.722 | 1.408 | 0.028 | -1.257 | -2.329 | -3.225 |
| 10.0 | -7.81 | 4.746 | 4.375 | 3.254 | 1.458 | -0.686 | -2.871 | -4.859 |
| 5.0 | -5.93 | 4.352 | 4.514 | 4.535 | 3.222 | 0.943 | -2.214 | -5.803 |
| 2.5 | -4.36 | 2.915 | 2.833 | 4.493 | 4.236 | 2.314 | -1.371 | -6.197 |

DRIFT ANGLE Br = - 15 deg File: pom2p3.dat Span is : 0.53 m No: 4

| Incidence | | -30 | -20 | -10 | 0 | 10 | 20 | 30 |
|---|---|---|---|---|---|---|---|---|
| %c | %t/c | | | | | | | |
| 0.0 | 0.00 | -0.623 | -5.221 | -2.022 | -0.116 | 0.522 | -0.196 | -2.007 |
| 2.5 | 4.36 | -1.971 | -11.588 | -7.696 | -4.391 | -1.203 | 1.319 | 3.058 |
| 5.0 | 5.93 | -1.681 | -8.265 | -5.725 | -3.478 | -1.130 | 0.797 | 2.391 |
| 10.0 | 7.81 | -1.623 | -6.500 | -5.043 | -3.348 | -1.464 | 0.130 | 1.493 |
| 20.0 | 9.57 | -1.464 | -4.971 | -4.348 | -3.435 | -2.087 | -0.797 | 0.478 |
| 30.0 | 10.01 | -1.333 | -3.912 | -3.681 | -3.087 | -2.275 | -1.304 | -0.217 |
| 40.0 | 9.68 | -1.478 | -2.897 | -2.797 | -2.449 | -2.000 | -1.449 | -0.638 |
| 50.0 | 8.83 | -1.478 | -2.132 | -2.188 | -1.884 | -1.652 | -1.377 | -0.884 |
| 60.0 | 7.61 | -1.493 | -1.588 | -1.565 | -1.377 | -1.217 | -1.058 | -0.826 |
| 70.0 | 6.11 | -1.464 | -1.118 | -1.188 | -0.942 | -0.826 | -0.710 | -0.580 |
| 80.0 | 4.37 | -1.580 | -0.588 | -0.623 | -0.449 | -0.406 | -0.290 | -0.159 |
| 90.0 | 2.41 | -1.464 | -0.059 | -0.116 | 0.058 | 0.087 | 0.116 | 0.217 |
| 95.0 | 1.35 | -1.493 | 0.324 | 0.348 | 0.464 | 0.464 | 0.449 | 0.464 |
| 95.0 | -1.35 | -0.551 | 0.471 | 0.522 | 0.638 | 0.710 | 0.754 | 0.638 |
| 90.0 | -2.41 | -0.304 | 0.368 | 0.348 | 0.406 | 0.478 | 0.565 | 0.536 |
| 80.0 | -4.37 | 0.043 | 0.265 | 0.101 | 0.043 | 0.058 | 0.145 | 0.188 |
| 70.0 | -6.11 | 0.333 | 0.309 | 0.014 | -0.159 | -0.232 | -0.174 | -0.145 |
| 60.0 | -7.61 | 0.638 | 0.382 | -0.029 | -0.348 | -0.507 | -0.522 | -0.536 |
| 50.0 | -8.83 | 0.986 | 0.471 | -0.116 | -0.594 | -0.870 | -0.986 | -1.058 |
| 40.0 | -9.68 | 1.696 | 0.897 | 0.029 | -0.681 | -1.174 | -1.464 | -1.681 |
| 30.0 | -10.01 | 2.710 | 1.750 | 0.464 | -0.696 | -1.536 | -2.116 | -2.551 |
| 20.0 | -9.57 | 3.884 | 3.103 | 1.536 | -0.043 | -1.464 | -2.594 | -3.565 |
| 10.0 | -7.81 | 4.116 | 4.588 | 3.449 | 1.478 | -0.899 | -3.261 | -5.507 |
| 5.0 | -5.93 | 2.855 | 3.912 | 4.377 | 3.246 | 0.681 | -2.725 | -6.507 |
| 2.5 | -4.36 | 0.725 | 1.147 | 3.652 | 4.159 | 2.246 | -1.710 | -7.072 |

DRIFT ANGLE Br = - 15 deg File: pom2p3.dat Span is : 0.70 m No: 5

| Incidence | | -30 | -20 | -10 | 0 | 10 | 20 | 30 |
|---|---|---|---|---|---|---|---|---|
| %c | %t/c | | | | | | | |
| 0.0 | 0.00 | -1.164 | -2.507 | 2.414 | 5.298 | 4.167 | 1.465 | -4.264 |
| 2.5 | 4.36 | -6.137 | -8.268 | -3.643 | -0.263 | 2.708 | 4.282 | 4.528 |
| 5.0 | 5.93 | -4.726 | -7.127 | -3.757 | -1.193 | 1.708 | 3.465 | 4.292 |
| 10.0 | 7.81 | -2.959 | -5.732 | -3.671 | -2.123 | 0.569 | 2.310 | 3.514 |
| 20.0 | 9.57 | -1.616 | -3.859 | -2.829 | -2.368 | -0.153 | 1.113 | 2.389 |
| 30.0 | 10.01 | -1.205 | -2.563 | -1.957 | -2.000 | -0.278 | 0.662 | 1.861 |
| 40.0 | 9.68 | -0.822 | -1.718 | -1.314 | -1.351 | -0.097 | 0.592 | 1.556 |
| 50.0 | 8.83 | -0.699 | -1.169 | -0.814 | -0.842 | -0.028 | 0.577 | 1.278 |
| 60.0 | 7.61 | -0.795 | -0.958 | -0.643 | -0.702 | -0.056 | 0.394 | 0.917 |
| 70.0 | 6.11 | -0.603 | -0.577 | -0.471 | -0.579 | 0.083 | 0.254 | 0.458 |
| 80.0 | 4.37 | -1.219 | -0.521 | -0.229 | -0.333 | 0.111 | 0.225 | 0.528 |
| 90.0 | 2.41 | -1.329 | 0.085 | 0.343 | 0.193 | 0.417 | 0.437 | 0.556 |
| 95.0 | 1.35 | -1.342 | 0.577 | 0.786 | 0.789 | 0.792 | 0.690 | 0.722 |
| 95.0 | -1.35 | -0.425 | 0.831 | 0.914 | 0.947 | 1.000 | 0.831 | 0.667 |
| 90.0 | -2.41 | -0.055 | 0.690 | 0.614 | 0.632 | 0.722 | 0.634 | 0.403 |
| 80.0 | -4.37 | 0.288 | 0.563 | 0.286 | 0.088 | 0.417 | 0.324 | 0.139 |
| 70.0 | -6.11 | 0.562 | 0.507 | 0.171 | -0.175 | 0.208 | 0.113 | 0.014 |
| 60.0 | -7.61 | 0.863 | 0.577 | 0.157 | -0.298 | 0.042 | -0.099 | -0.222 |
| 50.0 | -8.83 | 1.274 | 0.732 | 0.171 | -0.474 | -0.236 | -0.394 | -0.500 |
| 40.0 | -9.68 | 1.904 | 1.028 | 0.314 | -0.614 | -0.528 | -0.775 | -0.944 |
| 30.0 | -10.01 | 2.753 | 1.592 | 0.314 | -1.070 | -1.208 | -1.521 | -1.875 |
| 20.0 | -9.57 | 3.726 | 2.592 | 1.000 | -0.614 | -1.319 | -2.127 | -2.847 |
| 10.0 | -7.81 | 4.274 | 4.000 | 2.200 | 0.123 | -1.792 | -3.493 | -5.250 |
| 5.0 | -5.93 | 3.356 | 4.831 | 3.371 | 1.439 | -1.611 | -4.577 | -8.042 |
| 2.5 | -4.36 | 2.712 | 4.944 | 4.186 | 2.509 | -1.000 | -5.085 | -9.736 |

DRIFT ANGLE Br = - 15 deg File: pom2p3.dat Span is : 0.83 m No: 6

| Incidence | | -30 | -20 | -10 | 0 | 10 | 20 | 30 |
|---|---|---|---|---|---|---|---|---|
| %c | %t/c | | | | | | | |
| 0.0 | 0.00 | -4.162 | -0.754 | 3.718 | 5.606 | 4.761 | 1.588 | -4.071 |
| 2.5 | 4.36 | -9.635 | -8.884 | -4.028 | 0.127 | 3.225 | 5.235 | 5.414 |
| 5.0 | 5.93 | -7.649 | -7.797 | -4.324 | -1.042 | 1.761 | 4.074 | 5.214 |
| 10.0 | 7.81 | -5.014 | -5.696 | -3.986 | -1.901 | 0.225 | 2.368 | 4.057 |
| 20.0 | 9.57 | -2.378 | -3.594 | -2.704 | -1.690 | -0.380 | 0.971 | 2.586 |
| 30.0 | 10.01 | -1.338 | -2.333 | -1.845 | -1.296 | -0.423 | 0.500 | 1.800 |
| 40.0 | 9.68 | -0.973 | -1.580 | -1.183 | -0.761 | -0.268 | 0.441 | 1.429 |
| 50.0 | 8.83 | -0.838 | -1.290 | -0.789 | -0.465 | -0.211 | 0.412 | 1.100 |
| 60.0 | 7.61 | -0.905 | -1.203 | -0.648 | -0.380 | -0.211 | 0.221 | 0.757 |
| 70.0 | 6.11 | -0.568 | -0.580 | -0.352 | -0.099 | 0.070 | 0.147 | 0.357 |
| 80.0 | 4.37 | -1.432 | -1.188 | -0.592 | -0.141 | 0.000 | 0.059 | 0.343 |
| 90.0 | 2.41 | -1.419 | -0.696 | -0.197 | 0.197 | 0.211 | 0.147 | 0.371 |
| 95.0 | 1.35 | -1.230 | 0.000 | 0.338 | 0.634 | 0.507 | 0.397 | 0.457 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 95.0 | -1.35 | -0.108 | 0.580 | 0.620 | 0.704 | 0.606 | 0.559 | 0.429 |
| 90.0 | -2.41 | 0.027 | 0.464 | 0.380 | 0.507 | 0.408 | 0.426 | 0.243 |
| 80.0 | -4.37 | 0.243 | 0.391 | 0.169 | 0.282 | 0.113 | 0.206 | 0.000 |
| 70.0 | -6.11 | 0.405 | 0.435 | 0.113 | 0.127 | 0.014 | 0.044 | -0.143 |
| 60.0 | -7.61 | 0.500 | 0.449 | 0.056 | 0.028 | -0.070 | -0.132 | -0.343 |
| 50.0 | -8.83 | 0.784 | 0.536 | 0.127 | -0.042 | -0.197 | -0.250 | -0.543 |
| 40.0 | -9.68 | 1.135 | 0.609 | 0.127 | -0.197 | -0.465 | -0.456 | -0.771 |
| 30.0 | -10.01 | 1.703 | 0.855 | 0.000 | -0.563 | -0.958 | -1.059 | -1.429 |
| 20.0 | -9.57 | 2.649 | 1.652 | 0.437 | -0.423 | -1.197 | -1.588 | -2.157 |
| 10.0 | -7.81 | 4.054 | 3.072 | 1.183 | -0.394 | -2.028 | -3.103 | -4.329 |
| 5.0 | -5.93 | 0.716 | 0.623 | 0.493 | 0.662 | 0.380 | 0.750 | 0.643 |
| 2.5 | -4.36 | 5.500 | 5.696 | 4.042 | 1.563 | -1.845 | -5.397 | -9.100 |

DRIFT ANGLE Br = - 15 deg File: pom2p3.dat Span is : 0.94 m No: 7

| Incidence | | -30 | -20 | -10 | 0 | 10 | 20 | 30 |
|---|---|---|---|---|---|---|---|---|
| %c | %t/c | | | | | | | |
| 0.0 | 0.00 | -3.070 | -0.863 | 1.342 | 2.178 | 1.931 | 0.833 | -1.069 |
| 2.5 | 4.36 | -8.845 | -6.726 | -3.589 | -0.945 | 1.361 | 3.000 | 3.639 |
| 5.0 | 5.93 | -6.535 | -5.562 | -3.534 | -1.630 | 0.292 | 2.097 | 3.347 |
| 10.0 | 7.81 | -3.873 | -3.740 | -2.767 | -1.781 | -0.569 | 0.903 | 2.250 |
| 20.0 | 9.57 | -2.239 | -2.658 | -2.041 | -1.521 | -0.889 | 0.056 | 1.139 |
| 30.0 | 10.01 | -1.901 | -2.315 | -1.616 | -1.137 | -0.778 | -0.194 | 0.556 |
| 40.0 | 9.68 | -0.986 | -1.192 | -0.767 | -0.466 | -0.319 | -0.111 | 0.167 |
| 50.0 | 8.83 | -2.000 | -2.425 | -1.342 | -0.753 | -0.472 | -0.181 | 0.181 |
| 60.0 | 7.61 | -2.465 | -2.945 | -1.425 | -0.712 | -0.389 | -0.194 | 0.028 |
| 70.0 | 6.11 | -2.704 | -3.342 | -1.658 | -0.658 | -0.278 | -0.153 | -0.028 |
| 80.0 | 4.37 | -2.676 | -3.384 | -1.671 | -0.575 | -0.125 | -0.028 | 0.000 |
| 90.0 | 2.41 | -2.000 | -2.658 | -1.356 | -0.452 | 0.028 | 0.097 | 0.042 |
| 95.0 | 1.35 | -1.380 | -1.808 | -0.904 | -0.192 | 0.194 | 0.222 | 0.111 |
| 95.0 | -1.35 | -0.113 | -0.041 | 0.096 | 0.288 | 0.361 | 0.333 | -0.347 |
| 90.0 | -2.41 | -0.310 | -0.315 | -0.233 | 0.027 | 0.181 | 0.167 | -0.806 |
| 80.0 | -4.37 | -0.070 | -0.151 | -0.151 | -0.068 | 0.056 | 0.000 | -1.042 |
| 70.0 | -6.11 | -0.056 | -0.192 | -0.192 | -0.137 | -0.042 | -0.111 | -0.917 |
| 60.0 | -7.61 | -0.070 | -0.192 | -0.233 | -0.233 | -0.167 | -0.264 | -0.806 |
| 50.0 | -8.83 | 0.056 | -0.110 | -0.233 | -0.315 | -0.292 | -0.375 | -0.833 |
| 40.0 | -9.68 | 0.197 | -0.055 | -0.233 | -0.397 | -0.431 | -0.500 | -1.000 |
| 30.0 | -10.01 | 0.451 | -0.041 | -0.329 | -0.589 | -0.736 | -0.819 | -1.292 |
| 20.0 | -9.57 | 1.197 | 0.466 | -0.027 | -0.452 | -0.847 | -1.056 | -1.500 |
| 10.0 | -7.81 | 2.620 | 1.562 | 0.562 | -0.247 | -0.917 | -1.486 | -2.222 |
| 5.0 | -5.93 | 3.901 | 2.808 | 1.479 | 0.151 | -1.028 | -1.958 | -3.250 |
| 2.5 | -4.36 | 4.282 | 3.397 | 2.041 | 0.301 | -1.403 | -2.972 | -4.931 |

DRIFT ANGLE Br = - 15 deg File: pom2p3.dat Span is : 0.97 m No: 8

| Incidence | | -30 | -20 | -10 | 0 | 10 | 20 | 30 |
|---|---|---|---|---|---|---|---|---|
| %c | %t/c | | | | | | | |
| 0.0 | 0.00 | -2.556 | -1.435 | 0.014 | 0.648 | 0.803 | 0.400 | -0.814 |
| 2.5 | 4.36 | -6.458 | -5.174 | -3.042 | -1.380 | 0.056 | 1.229 | 1.957 |
| 5.0 | 5.93 | -4.417 | -3.957 | -2.662 | -1.493 | -0.310 | 0.914 | 1.929 |
| 10.0 | 7.81 | -2.681 | -2.725 | -1.958 | -1.352 | -0.620 | 0.300 | 1.286 |
| 20.0 | 9.57 | -2.042 | -2.493 | -1.577 | -1.042 | -0.634 | -0.114 | 0.586 |
| 30.0 | 10.01 | -2.222 | -2.725 | -1.662 | -0.915 | -0.577 | -0.271 | 0.186 |
| 40.0 | 9.68 | -1.528 | -2.232 | -1.127 | -0.577 | -0.254 | -0.129 | 0.071 |
| 50.0 | 8.83 | -2.625 | -3.464 | -1.761 | -0.817 | -0.310 | -0.229 | -0.029 |
| 60.0 | 7.61 | -2.792 | -3.812 | -1.845 | -0.775 | -0.310 | -0.200 | -0.143 |
| 70.0 | 6.11 | -3.431 | -3.942 | -2.042 | -0.761 | -0.268 | -0.114 | -0.157 |
| 80.0 | 4.37 | -3.056 | -3.870 | -2.099 | -0.718 | -0.211 | -0.029 | -0.143 |
| 90.0 | 2.41 | -2.125 | -2.986 | -1.704 | -0.662 | -0.070 | 0.029 | -0.086 |
| 95.0 | 1.35 | -1.389 | -2.087 | -1.197 | -0.507 | 0.056 | 0.157 | -0.043 |
| 95.0 | -1.35 | -0.222 | -0.377 | -0.141 | 0.127 | 0.268 | 0.071 | -1.043 |
| 90.0 | -2.41 | -0.111 | -0.261 | -0.113 | 0.070 | 0.197 | -0.143 | -1.343 |
| 80.0 | -4.37 | -0.458 | -0.594 | -0.394 | -0.113 | 0.000 | -0.443 | -1.600 |
| 70.0 | -6.11 | -0.403 | -0.551 | -0.324 | -0.141 | -0.042 | -0.529 | -1.629 |
| 60.0 | -7.61 | -0.444 | -0.522 | -0.366 | -0.211 | -0.099 | -0.443 | -1.943 |
| 50.0 | -8.83 | -0.292 | -0.435 | -0.338 | -0.239 | -0.141 | -0.443 | -1.771 |
| 40.0 | -9.68 | -0.236 | -0.420 | -0.408 | -0.324 | -0.254 | -0.543 | -1.214 |
| 30.0 | -10.01 | -0.139 | -0.406 | -0.479 | -0.479 | -0.423 | -0.743 | -1.229 |
| 20.0 | -9.57 | 0.444 | 0.029 | -0.169 | -0.366 | -0.451 | -0.771 | -1.229 |
| 10.0 | -7.81 | 1.486 | 0.681 | 0.141 | -0.380 | -0.634 | -1.143 | -1.700 |
| 5.0 | -5.93 | 2.528 | 1.580 | 0.746 | 0.113 | -0.408 | -1.200 | -2.171 |
| 2.5 | -4.36 | 2.875 | 1.913 | 1.183 | 0.479 | -0.169 | -1.286 | -2.771 |

DRIFT ANGLE Br = - 7.5 deg File: pom1p3.dat Span is : 0.07 m No: 1

| Incidence | | -30 | -20 | -10 | 0 | 10 | 20 | 30 |
|---|---|---|---|---|---|---|---|---|
| %c | %t/c | | | | | | | |
| 0.0 | 0.00 | -6.746 | -5.700 | -3.507 | -0.162 | 1.243 | 0.222 | -2.437 |
| 2.5 | 4.36 | -2.563 | -3.843 | -4.563 | -1.905 | -0.071 | 0.833 | 0.930 |
| 5.0 | 5.93 | -1.563 | -2.171 | -3.437 | -1.730 | -0.371 | 0.681 | 0.887 |
| 10.0 | 7.81 | -1.225 | -1.957 | -2.521 | -1.392 | -0.500 | 0.389 | 0.803 |
| 20.0 | 9.57 | -1.127 | -0.943 | -1.521 | -1.041 | -0.486 | 0.153 | 0.563 |
| 30.0 | 10.01 | -1.197 | -0.914 | -1.225 | -0.797 | -0.386 | 0.056 | 0.451 |
| 40.0 | 9.68 | -1.141 | -0.986 | -0.873 | -0.554 | -0.329 | 0.028 | 0.380 |
| 50.0 | 8.83 | -1.056 | -0.971 | -0.718 | -0.432 | -0.257 | 0.028 | 0.338 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 60.0 | 7.61 | -1.042 | -0.914 | -0.521 | -0.297 | -0.200 | 0.014 | 0.296 |
| 70.0 | 6.11 | -0.930 | -0.814 | -0.380 | -0.162 | -0.100 | 0.056 | 0.268 |
| 80.0 | 4.37 | -0.887 | -0.814 | -0.268 | -0.068 | 0.000 | 0.097 | 0.282 |
| 90.0 | 2.41 | -0.831 | -0.714 | -0.127 | 0.054 | 0.100 | 0.069 | 0.211 |
| 95.0 | 1.35 | -0.803 | -0.629 | -0.056 | 0.135 | 0.200 | 0.111 | 0.141 |
| 95.0 | -1.35 | 0.056 | -0.086 | 0.056 | 0.162 | 0.200 | 0.097 | -0.085 |
| 90.0 | -2.41 | 0.296 | 0.057 | 0.141 | 0.081 | 0.114 | 0.000 | -0.169 |
| 80.0 | -4.37 | 0.648 | 0.286 | 0.197 | 0.041 | -0.029 | -0.153 | -0.296 |
| 70.0 | -6.11 | 0.845 | 0.371 | 0.197 | 0.014 | -0.171 | -0.236 | -0.380 |
| 60.0 | -7.61 | 0.901 | 0.429 | 0.183 | -0.041 | -0.257 | -0.361 | -0.549 |
| 50.0 | -8.83 | 1.028 | 0.543 | 0.268 | -0.054 | -0.357 | -0.556 | -0.718 |
| 40.0 | -9.68 | 1.127 | 0.700 | 0.408 | 0.014 | -0.443 | -0.722 | -0.958 |
| 30.0 | -10.01 | 1.183 | 0.886 | 0.606 | 0.081 | -0.443 | -0.889 | -1.169 |
| 20.0 | -9.57 | 1.183 | 1.071 | 0.817 | 0.243 | -0.429 | -1.139 | -1.648 |
| 10.0 | -7.81 | 1.169 | 1.157 | 1.000 | 0.514 | -0.329 | -1.389 | -2.127 |
| 5.0 | -5.93 | 0.282 | 0.886 | 1.141 | 0.905 | -0.143 | -1.528 | -3.141 |
| 2.5 | -4.36 | -1.000 | 0.043 | 0.803 | 0.946 | 0.114 | -1.417 | -3.437 |

DRIFT ANGLE Br = - 7.5 deg File: pom1p3.dat Span is : 0.23 m No: 2

| Incidence | | -30 | -20 | -10 | 0 | 10 | 20 | 30 |
|---|---|---|---|---|---|---|---|---|
| %c | %t/c | | | | | | | |
| 0.0 | 0.00 | -12.918 | -7.096 | -2.338 | 1.380 | 2.764 | 1.685 | -1.697 |
| 2.5 | 4.36 | -12.219 | -9.630 | -7.014 | -3.507 | -0.431 | 1.658 | 2.579 |
| 5.0 | 5.93 | -7.671 | -6.836 | -5.649 | -3.296 | -0.958 | 0.918 | 2.105 |
| 10.0 | 7.81 | -4.630 | -4.288 | -4.054 | -2.732 | -1.250 | 0.164 | 1.303 |
| 20.0 | 9.57 | -1.986 | -2.068 | -2.932 | -1.930 | -1.097 | -0.247 | 0.553 |
| 30.0 | 10.01 | -1.493 | -1.288 | -1.811 | -1.437 | -0.875 | -0.301 | 0.329 |
| 40.0 | 9.68 | -1.849 | -1.055 | -1.216 | -1.014 | -0.625 | -0.274 | 0.250 |
| 50.0 | 8.83 | -1.630 | -1.082 | -0.838 | -0.732 | -0.431 | -0.178 | 0.211 |
| 60.0 | 7.61 | -1.740 | -0.959 | -0.554 | -0.507 | -0.319 | -0.096 | 0.211 |
| 70.0 | 6.11 | -1.781 | -0.781 | -0.311 | -0.296 | -0.167 | -0.014 | 0.237 |
| 80.0 | 4.37 | -1.603 | -0.836 | -0.135 | -0.085 | 0.000 | 0.110 | 0.289 |
| 90.0 | 2.41 | -1.425 | -0.767 | 0.122 | 0.169 | 0.264 | 0.260 | 0.355 |
| 95.0 | 1.35 | -1.164 | -0.767 | 0.351 | 0.380 | 0.514 | 0.493 | 0.461 |
| 95.0 | -1.35 | -0.342 | -0.151 | 0.351 | 0.437 | 0.500 | 0.425 | 0.355 |
| 90.0 | -2.41 | -0.192 | -0.110 | 0.176 | 0.141 | 0.208 | 0.164 | 0.053 |
| 80.0 | -4.37 | 0.123 | 0.082 | 0.108 | -0.056 | -0.042 | -0.151 | -0.171 |
| 70.0 | -6.11 | 0.301 | 0.192 | 0.108 | -0.183 | -0.208 | -0.356 | -0.368 |
| 60.0 | -7.61 | 0.452 | 0.205 | 0.000 | -0.324 | -0.431 | -0.603 | -0.618 |
| 50.0 | -8.83 | 0.671 | 0.356 | 0.041 | -0.394 | -0.583 | -0.877 | -0.908 |
| 40.0 | -9.68 | 0.945 | 0.493 | 0.122 | -0.437 | -0.778 | -1.192 | -1.276 |
| 30.0 | -10.01 | 1.411 | 0.849 | 0.270 | -0.507 | -1.056 | -1.575 | -1.868 |
| 20.0 | -9.57 | 1.973 | 1.274 | 0.581 | -0.239 | -0.986 | -1.767 | -2.303 |
| 10.0 | -7.81 | 2.767 | 2.205 | 1.378 | 0.268 | -0.764 | -1.918 | -3.132 |
| 5.0 | -5.93 | 3.137 | 2.767 | 2.230 | 1.099 | -0.569 | -2.616 | -4.645 |
| 2.5 | -4.36 | 2.548 | 2.562 | 2.649 | 1.423 | 0.431 | -2.014 | -4.461 |

DRIFT ANGLE Br = - 7.5 deg File: pom1p3.dat Span is : 0.40 m No: 3

| Incidence | | -30 | -20 | -10 | 0 | 10 | 20 | 30 |
|---|---|---|---|---|---|---|---|---|
| %c | %t/c | | | | | | | |
| 0.0 | 0.00 | -20.686 | -11.958 | -4.814 | 1.113 | 4.000 | 3.746 | 0.099 |
| 2.5 | 4.36 | -18.357 | -14.225 | -9.871 | -5.056 | -1.056 | 2.014 | 3.901 |
| 5.0 | 5.93 | -11.371 | -9.338 | -7.843 | -4.310 | -1.437 | 1.042 | 2.944 |
| 10.0 | 7.81 | -6.614 | -6.873 | -5.629 | -3.577 | -1.690 | 0.085 | 1.704 |
| 20.0 | 9.57 | -3.686 | -3.239 | -3.086 | -2.197 | -1.282 | -0.225 | 0.915 |
| 30.0 | 10.01 | -2.629 | -1.930 | -1.929 | -1.521 | -0.972 | -0.282 | 0.563 |
| 40.0 | 9.68 | -1.643 | -1.324 | -1.314 | -1.014 | -0.704 | -0.239 | 0.408 |
| 50.0 | 8.83 | -1.271 | -1.028 | -0.957 | -0.775 | -0.592 | -0.239 | 0.254 |
| 60.0 | 7.61 | -1.086 | -0.775 | -0.643 | -0.507 | -0.437 | -0.183 | 0.183 |
| 70.0 | 6.11 | -1.000 | -0.746 | -0.414 | -0.310 | -0.282 | -0.113 | 0.113 |
| 80.0 | 4.37 | -0.857 | -0.592 | -0.129 | -0.028 | -0.028 | 0.085 | 0.225 |
| 90.0 | 2.41 | -0.743 | -0.324 | 0.186 | 0.282 | 0.310 | 0.352 | 0.394 |
| 95.0 | 1.35 | -0.629 | -0.127 | 0.371 | 0.493 | 0.493 | 0.535 | 0.507 |
| 95.0 | -1.35 | 0.100 | 0.211 | 0.400 | 0.451 | 0.479 | 0.507 | 0.479 |
| 90.0 | -2.41 | 0.143 | 0.099 | 0.200 | 0.225 | 0.239 | 0.310 | 0.338 |
| 80.0 | -4.37 | 0.357 | 0.141 | 0.071 | -0.014 | -0.070 | -0.014 | 0.000 |
| 70.0 | -6.11 | 0.529 | 0.197 | -0.014 | -0.197 | -0.310 | -0.296 | -0.310 |
| 60.0 | -7.61 | 0.743 | 0.296 | -0.057 | -0.352 | -0.577 | -0.634 | -0.676 |
| 50.0 | -8.83 | 1.086 | 0.437 | -0.086 | -0.507 | -0.873 | -1.028 | -1.141 |
| 40.0 | -9.68 | 1.657 | 0.775 | 0.014 | -0.620 | -1.155 | -1.493 | -1.718 |
| 30.0 | -10.01 | 2.486 | 1.310 | 0.186 | -0.859 | -1.718 | -2.324 | -2.746 |
| 20.0 | -9.57 | 3.700 | 2.451 | 1.100 | -0.324 | -1.662 | -2.732 | -3.662 |
| 10.0 | -7.81 | 4.629 | 4.028 | 2.800 | 0.873 | -1.338 | -3.577 | -5.592 |
| 5.0 | -5.93 | 3.757 | 4.437 | 4.143 | 2.592 | 0.028 | -3.268 | -7.014 |
| 2.5 | -4.36 | 0.943 | 3.366 | 4.400 | 3.690 | 1.239 | -2.690 | -7.803 |

DRIFT ANGLE Br = - 7.5 deg File: pom1p3.dat Span is : 0.53 m No: 4

| Incidence | | -30 | -20 | -10 | 0 | 10 | 20 | 30 |
|---|---|---|---|---|---|---|---|---|
| %c | %t/c | | | | | | | |
| 0.0 | 0.00 | -5.363 | -3.924 | -1.451 | 0.236 | 0.549 | -0.521 | -2.658 |
| 2.5 | 4.36 | -11.192 | -8.569 | -5.437 | -2.222 | 0.268 | 1.875 | 2.205 |
| 5.0 | 5.93 | -7.425 | -6.014 | -4.113 | -1.875 | 0.042 | 1.611 | 2.397 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 10.0 | 7.81 | -5.493 | -4.792 | -3.746 | -2.056 | -0.521 | 0.889 | 2.164 |
| 20.0 | 9.57 | -4.014 | -3.764 | -3.528 | -2.500 | -1.352 | -0.167 | 1.329 |
| 30.0 | 10.01 | -3.164 | -3.208 | -3.310 | -2.750 | -1.986 | -0.903 | 0.534 |
| 40.0 | 9.68 | -1.904 | -2.597 | -2.535 | -2.236 | -1.944 | -1.056 | 0.027 |
| 50.0 | 8.83 | -1.288 | -1.972 | -1.817 | -1.639 | -1.451 | -0.917 | -0.384 |
| 60.0 | 7.61 | -1.356 | -1.431 | -1.254 | -1.111 | -0.986 | -0.639 | -0.384 |
| 70.0 | 6.11 | -1.521 | -1.069 | -0.873 | -0.750 | -0.648 | -0.444 | -0.205 |
| 80.0 | 4.37 | -1.370 | -0.625 | -0.451 | -0.375 | -0.296 | -0.139 | 0.014 |
| 90.0 | 2.41 | -1.370 | -0.194 | -0.028 | 0.000 | 0.014 | 0.125 | 0.137 |
| 95.0 | 1.35 | -1.438 | 0.167 | 0.338 | 0.319 | 0.296 | 0.319 | 0.260 |
| 95.0 | -1.35 | -0.562 | 0.347 | 0.479 | 0.514 | 0.549 | 0.528 | 0.288 |
| 90.0 | -2.41 | -0.370 | 0.250 | 0.310 | 0.333 | 0.366 | 0.431 | 0.247 |
| 80.0 | -4.37 | 0.000 | 0.153 | 0.042 | 0.000 | 0.000 | 0.097 | 0.068 |
| 70.0 | -6.11 | 0.274 | 0.153 | -0.070 | -0.222 | -0.282 | -0.208 | -0.178 |
| 60.0 | -7.61 | 0.562 | 0.208 | -0.183 | -0.417 | -0.592 | -0.569 | -0.507 |
| 50.0 | -8.83 | 0.877 | 0.278 | -0.296 | -0.694 | -0.972 | -1.056 | -1.000 |
| 40.0 | -9.68 | 1.397 | 0.625 | -0.197 | -0.833 | -1.324 | -1.569 | -1.616 |
| 30.0 | -10.01 | 2.260 | 1.236 | 0.056 | -1.000 | -1.817 | -2.347 | -2.575 |
| 20.0 | -9.57 | 3.096 | 2.250 | 0.944 | -0.472 | -1.831 | -2.889 | -3.616 |
| 10.0 | -7.81 | 3.233 | 3.181 | 2.310 | 0.653 | -1.549 | -3.750 | -5.630 |
| 5.0 | -5.93 | 2.329 | 2.694 | 3.014 | 1.944 | -0.408 | -3.528 | -6.863 |
| 2.5 | -4.36 | 0.466 | 0.722 | 2.535 | 2.694 | 0.831 | -2.917 | -7.521 |

DRIFT ANGLE Br = - 7.5 deg File: pom1p3.dat Span is : 0.70 m No: 5

| Incidence | | -30 | -20 | -10 | 0 | 10 | 20 | 30 |
|---|---|---|---|---|---|---|---|---|
| %c | %t/c | | | | | | | |
| 0.0 | 0.00 | -3.861 | 0.971 | 3.366 | 3.493 | 1.603 | -2.557 | -8.915 |
| 2.5 | 4.36 | -10.306 | -5.623 | -1.211 | 1.831 | 3.315 | 3.771 | 2.901 |
| 5.0 | 5.93 | -8.722 | -5.478 | -1.915 | 0.831 | 2.575 | 3.643 | 3.549 |
| 10.0 | 7.81 | -6.542 | -4.928 | -2.535 | -0.268 | 1.438 | 2.900 | 3.423 |
| 20.0 | 9.57 | -4.097 | -3.391 | -2.239 | -0.831 | 0.397 | 1.771 | 2.746 |
| 30.0 | 10.01 | -2.625 | -2.319 | -1.648 | -0.732 | 0.041 | 1.143 | 2.056 |
| 40.0 | 9.68 | -1.681 | -1.551 | -1.085 | -0.493 | 0.041 | 0.843 | 1.634 |
| 50.0 | 8.83 | -1.194 | -1.000 | -0.662 | -0.366 | 0.137 | 0.600 | 1.366 |
| 60.0 | 7.61 | -0.931 | -0.710 | -0.465 | -0.268 | 0.082 | 0.343 | 0.915 |
| 70.0 | 6.11 | -0.264 | -0.362 | -0.155 | -0.042 | 0.014 | 0.229 | 0.408 |
| 80.0 | 4.37 | -0.569 | -0.377 | -0.113 | 0.028 | 0.027 | 0.200 | 0.465 |
| 90.0 | 2.41 | -0.028 | 0.101 | 0.310 | 0.338 | 0.274 | 0.343 | 0.507 |
| 95.0 | 1.35 | 0.500 | 0.594 | 0.704 | 0.746 | 0.589 | 0.586 | 0.620 |
| 95.0 | -1.35 | 0.750 | 0.696 | 0.845 | 0.930 | 0.753 | 0.629 | 0.479 |
| 90.0 | -2.41 | 0.708 | 0.522 | 0.606 | 0.690 | 0.548 | 0.429 | 0.282 |
| 80.0 | -4.37 | 0.653 | 0.333 | 0.324 | 0.310 | 0.260 | 0.157 | -0.014 |
| 70.0 | -6.11 | 0.778 | 0.275 | 0.127 | 0.127 | 0.014 | -0.029 | -0.211 |
| 60.0 | -7.61 | 0.944 | 0.261 | 0.085 | -0.042 | -0.151 | -0.243 | -0.465 |
| 50.0 | -8.83 | 1.250 | 0.493 | 0.042 | -0.197 | -0.411 | -0.586 | -0.718 |
| 40.0 | -9.68 | 1.653 | 0.754 | 0.085 | -0.394 | -0.658 | -1.029 | -1.183 |
| 30.0 | -10.01 | 2.306 | 1.058 | -0.056 | -0.887 | -1.342 | -1.900 | -2.085 |
| 20.0 | -9.57 | 3.125 | 1.783 | 0.451 | -0.746 | -1.671 | -2.714 | -3.183 |
| 10.0 | -7.81 | 3.736 | 2.580 | 1.197 | -0.803 | -2.521 | -4.500 | -5.972 |
| 5.0 | -5.93 | 3.861 | 3.159 | 1.901 | -0.451 | -2.945 | -6.300 | -9.070 |
| 2.5 | -4.36 | 3.653 | 3.493 | 2.408 | -0.014 | -3.068 | -7.471 | -11.803 |

DRIFT ANGLE Br = - 7.5 deg File: pom1p3.dat Span is : 0.83 m No: 6

| Incidence | | -30 | -20 | -10 | 0 | 10 | 20 | 30 |
|---|---|---|---|---|---|---|---|---|
| %c | %t/c | | | | | | | |
| 0.0 | 0.00 | -4.027 | 1.438 | 4.444 | 4.792 | 2.644 | -1.689 | -8.082 |
| 2.5 | 4.36 | -10.189 | -5.767 | -1.681 | 1.764 | 3.932 | 4.784 | 4.233 |
| 5.0 | 5.93 | -8.432 | -5.425 | -2.347 | 0.444 | 2.658 | 4.243 | 4.822 |
| 10.0 | 7.81 | -5.770 | -4.342 | -2.681 | -0.750 | 1.151 | 2.946 | 4.260 |
| 20.0 | 9.57 | -3.392 | -2.822 | -2.069 | -1.014 | 0.164 | 1.811 | 2.904 |
| 30.0 | 10.01 | -2.135 | -1.726 | -1.458 | -0.806 | -0.068 | 1.000 | 2.068 |
| 40.0 | 9.68 | -1.041 | -1.096 | -0.819 | -0.458 | 0.014 | 0.757 | 1.589 |
| 50.0 | 8.83 | -0.703 | -0.767 | -0.389 | -0.292 | 0.055 | 0.568 | 1.315 |
| 60.0 | 7.61 | -0.878 | -0.740 | -0.292 | -0.250 | 0.027 | 0.378 | 0.904 |
| 70.0 | 6.11 | -0.554 | -0.411 | -0.153 | -0.042 | -0.027 | 0.284 | 0.370 |
| 80.0 | 4.37 | -1.419 | -0.644 | -0.236 | -0.069 | -0.068 | 0.108 | 0.370 |
| 90.0 | 2.41 | -1.243 | -0.288 | 0.097 | 0.236 | 0.110 | 0.203 | 0.370 |
| 95.0 | 1.35 | -1.014 | 0.205 | 0.514 | 0.569 | 0.342 | 0.365 | 0.425 |
| 95.0 | -1.35 | -0.081 | 0.589 | 0.694 | 0.639 | 0.411 | 0.378 | 0.247 |
| 90.0 | -2.41 | 0.068 | 0.356 | 0.431 | 0.389 | 0.288 | 0.203 | 0.014 |
| 80.0 | -4.37 | 0.243 | 0.205 | 0.181 | 0.153 | 0.041 | 0.027 | -0.301 |
| 70.0 | -6.11 | 0.365 | 0.164 | 0.042 | 0.111 | -0.096 | -0.122 | -0.425 |
| 60.0 | -7.61 | 0.486 | 0.178 | -0.028 | -0.042 | -0.205 | -0.270 | -0.658 |
| 50.0 | -8.83 | 0.730 | 0.315 | -0.042 | -0.153 | -0.301 | -0.446 | -0.795 |
| 40.0 | -9.68 | 0.932 | 0.411 | -0.083 | -0.375 | -0.507 | -0.757 | -1.027 |
| 30.0 | -10.01 | 1.257 | 0.438 | -0.431 | -0.931 | -1.110 | -1.378 | -1.753 |
| 20.0 | -9.57 | 1.932 | 1.027 | 0.028 | -0.917 | -1.493 | -1.973 | -2.507 |
| 10.0 | -7.81 | 3.108 | 1.932 | 0.431 | -1.375 | -2.753 | -3.811 | -5.055 |
| 5.0 | -5.93 | 0.797 | 0.836 | 0.764 | 0.111 | 0.082 | 0.324 | 0.329 |
| 2.5 | -4.36 | 4.919 | 4.288 | 2.542 | -0.472 | -3.699 | -7.203 | -11.288 |

DRIFT ANGLE Br = - 7.5 deg File: pom1p3.dat Span is : 0.94 m No: 7

| Incidence | | -30 | -20 | -10 | 0 | 10 | 20 | 30 |
|---|---|---|---|---|---|---|---|---|
| %c | %t/c | | | | | | | |
| 0.0 | 0.00 | -0.408 | 0.083 | 0.400 | 0.408 | 0.319 | 0.014 | -0.444 |
| 2.5 | 4.36 | -7.803 | -4.694 | -2.043 | 0.465 | 2.444 | 3.676 | 3.750 |
| 5.0 | 5.93 | -5.986 | -4.167 | -2.386 | -0.479 | 1.306 | 2.845 | 3.694 |
| 10.0 | 7.81 | -3.901 | -2.944 | -2.100 | -1.028 | 0.194 | 1.563 | 2.708 |
| 20.0 | 9.57 | -2.803 | -2.083 | -1.600 | -1.070 | -0.403 | 0.493 | 1.528 |
| 30.0 | 10.01 | -2.451 | -1.722 | -1.229 | -0.845 | -0.486 | 0.113 | 0.833 |
| 40.0 | 9.68 | -1.310 | -0.792 | -0.543 | -0.338 | -0.208 | 0.000 | 0.264 |
| 50.0 | 8.83 | -2.803 | -1.444 | -0.900 | -0.521 | -0.347 | -0.113 | 0.236 |
| 60.0 | 7.61 | -3.465 | -1.694 | -0.871 | -0.408 | -0.306 | -0.169 | 0.042 |
| 70.0 | 6.11 | -3.873 | -1.986 | -0.871 | -0.310 | -0.236 | -0.155 | -0.056 |
| 80.0 | 4.37 | -3.831 | -2.069 | -0.843 | -0.197 | -0.111 | -0.056 | -0.056 |
| 90.0 | 2.41 | -2.915 | -1.653 | -0.671 | -0.028 | 0.042 | 0.000 | -0.097 |
| 95.0 | 1.35 | -1.986 | -1.097 | -0.343 | 0.155 | 0.208 | 0.070 | -0.153 |
| 95.0 | -1.35 | -0.042 | 0.097 | 0.229 | 0.366 | 0.292 | -0.451 | -1.917 |
| 90.0 | -2.41 | -0.239 | -0.208 | -0.129 | 0.169 | 0.097 | -0.803 | -2.722 |
| 80.0 | -4.37 | -0.085 | -0.111 | -0.114 | 0.014 | -0.028 | -0.915 | -3.319 |
| 70.0 | -6.11 | -0.099 | -0.125 | -0.157 | -0.113 | -0.125 | -0.775 | -3.069 |
| 60.0 | -7.61 | -0.070 | -0.153 | -0.229 | -0.225 | -0.264 | -0.704 | -2.403 |
| 50.0 | -8.83 | 0.056 | -0.097 | -0.271 | -0.310 | -0.389 | -0.761 | -1.694 |
| 40.0 | -9.68 | 0.155 | -0.111 | -0.329 | -0.437 | -0.583 | -0.887 | -1.542 |
| 30.0 | -10.01 | 0.380 | -0.139 | -0.557 | -0.718 | -0.944 | -1.268 | -1.861 |
| 20.0 | -9.57 | 1.014 | 0.264 | -0.329 | -0.704 | -1.139 | -1.549 | -2.097 |
| 10.0 | -7.81 | 2.310 | 1.167 | 0.086 | -0.775 | -1.472 | -2.225 | -3.083 |
| 5.0 | -5.93 | 3.451 | 2.306 | 0.886 | -0.606 | -1.986 | -3.282 | -4.736 |
| 2.5 | -4.36 | 3.831 | 3.028 | 1.414 | -0.606 | -2.611 | -4.775 | -7.181 |

DRIFT ANGLE Br = - 7.5 deg File: pom1p3.dat Span is : 0.97 m No: 8

| Incidence | | -30 | -20 | -10 | 0 | 10 | 20 | 30 |
|---|---|---|---|---|---|---|---|---|
| %c | %t/c | | | | | | | |
| 0.0 | 0.00 | -0.417 | -0.027 | 0.167 | 0.227 | 0.141 | -0.028 | -0.347 |
| 2.5 | 4.36 | -5.931 | -3.635 | -1.917 | -0.227 | 1.169 | 2.222 | 2.453 |
| 5.0 | 5.93 | -4.208 | -2.932 | -1.889 | -0.587 | 0.592 | 1.736 | 2.413 |
| 10.0 | 7.81 | -2.903 | -2.027 | -1.514 | -0.787 | -0.085 | 0.819 | 1.600 |
| 20.0 | 9.57 | -2.681 | -1.689 | -1.326 | -0.680 | -0.394 | 0.153 | 0.733 |
| 30.0 | 10.01 | -3.181 | -1.757 | -1.139 | -0.573 | -0.451 | -0.125 | 0.213 |
| 40.0 | 9.68 | -2.014 | -1.446 | -0.736 | -0.307 | -0.239 | -0.111 | 0.013 |
| 50.0 | 8.83 | -2.458 | -2.351 | -1.069 | -0.427 | -0.282 | -0.208 | -0.187 |
| 60.0 | 7.61 | -2.528 | -2.297 | -1.125 | -0.373 | -0.254 | -0.278 | -0.360 |
| 70.0 | 6.11 | -2.819 | -2.351 | -1.083 | -0.280 | -0.197 | -0.250 | -0.427 |
| 80.0 | 4.37 | -2.903 | -2.338 | -1.028 | -0.213 | -0.113 | -0.222 | -0.387 |
| 90.0 | 2.41 | -2.194 | -1.865 | -0.861 | -0.133 | 0.014 | -0.153 | -0.347 |
| 95.0 | 1.35 | -1.486 | -1.297 | -0.542 | 0.013 | 0.127 | -0.083 | -0.427 |
| 95.0 | -1.35 | -0.222 | -0.176 | 0.056 | 0.267 | 0.014 | -0.653 | -2.173 |
| 90.0 | -2.41 | -0.153 | -0.095 | 0.014 | 0.200 | -0.155 | -0.861 | -2.680 |
| 80.0 | -4.37 | -0.444 | -0.392 | -0.250 | 0.040 | -0.465 | -1.139 | -3.267 |
| 70.0 | -6.11 | -0.333 | -0.297 | -0.250 | -0.040 | -0.465 | -1.389 | -2.787 |
| 60.0 | -7.61 | -0.319 | -0.284 | -0.306 | -0.147 | -0.366 | -1.750 | -2.933 |
| 50.0 | -8.83 | -0.236 | -0.243 | -0.333 | -0.240 | -0.394 | -1.625 | -3.613 |
| 40.0 | -9.68 | -0.181 | -0.243 | -0.375 | -0.360 | -0.465 | -1.097 | -3.440 |
| 30.0 | -10.01 | -0.222 | -0.432 | -0.625 | -0.627 | -0.789 | -1.236 | -2.320 |
| 20.0 | -9.57 | 0.458 | 0.068 | -0.278 | -0.467 | -0.789 | -1.194 | -1.867 |
| 10.0 | -7.81 | 1.333 | 0.595 | -0.111 | -0.613 | -1.197 | -1.736 | -2.427 |
| 5.0 | -5.93 | 2.403 | 1.459 | 0.500 | -0.307 | -1.225 | -2.181 | -3.280 |
| 2.5 | -4.36 | 2.792 | 1.986 | 1.056 | 0.027 | -1.296 | -2.722 | -4.467 |

DRIFT ANGLE Br = + 7.5 deg File: pop1p3.dat Span is : 0.07 m No: 1

| Incidence | | -30 | -20 | -10 | 0 | 10 | 20 | 30 |
|---|---|---|---|---|---|---|---|---|
| %c | %t/c | | | | | | | |
| 0.0 | 0.00 | -3.775 | -1.000 | 1.000 | 0.903 | -1.361 | -5.029 | -8.186 |
| 2.5 | 4.36 | -5.310 | -3.111 | -0.771 | 0.565 | 0.972 | 0.250 | -0.829 |
| 5.0 | 5.93 | -4.028 | -2.625 | -0.886 | 0.274 | 0.931 | 0.735 | 0.386 |
| 10.0 | 7.81 | -3.085 | -2.181 | -0.986 | -0.048 | 0.792 | 1.015 | 0.929 |
| 20.0 | 9.57 | -1.901 | -1.611 | -0.900 | -0.339 | 0.486 | 1.000 | 1.057 |
| 30.0 | 10.01 | -1.465 | -1.208 | -0.714 | -0.339 | 0.347 | 0.809 | 0.943 |
| 40.0 | 9.68 | -1.056 | -0.931 | -0.543 | -0.323 | 0.250 | 0.618 | 0.814 |
| 50.0 | 8.83 | -0.831 | -0.736 | -0.457 | -0.306 | 0.250 | 0.529 | 0.686 |
| 60.0 | 7.61 | -0.634 | -0.514 | -0.286 | -0.242 | 0.194 | 0.441 | 0.571 |
| 70.0 | 6.11 | -0.521 | -0.347 | -0.186 | -0.161 | 0.194 | 0.368 | 0.514 |
| 80.0 | 4.37 | -0.408 | -0.194 | -0.057 | -0.016 | 0.250 | 0.368 | 0.429 |
| 90.0 | 2.41 | -0.268 | -0.042 | 0.100 | 0.145 | 0.319 | 0.382 | 0.329 |
| 95.0 | 1.35 | -0.296 | 0.014 | 0.186 | 0.210 | 0.375 | 0.426 | 0.300 |
| 95.0 | -1.35 | 0.394 | 0.361 | 0.257 | 0.210 | 0.264 | 0.191 | 0.014 |
| 90.0 | -2.41 | 0.535 | 0.347 | 0.171 | -0.048 | 0.097 | 0.029 | -0.200 |
| 80.0 | -4.37 | 0.803 | 0.417 | 0.071 | -0.242 | -0.125 | -0.235 | -0.557 |
| 70.0 | -6.11 | 0.887 | 0.375 | 0.000 | -0.452 | -0.347 | -0.456 | -0.900 |
| 60.0 | -7.61 | 0.859 | 0.292 | -0.143 | -0.597 | -0.486 | -0.676 | -1.071 |
| 50.0 | -8.83 | 0.887 | 0.236 | -0.200 | -0.758 | -0.694 | -0.868 | -1.300 |
| 40.0 | -9.68 | 0.915 | 0.222 | -0.214 | -0.855 | -0.833 | -1.103 | -1.471 |
| 30.0 | -10.01 | 0.873 | 0.194 | -0.100 | -0.774 | -1.000 | -1.382 | -1.786 |
| 20.0 | -9.57 | 0.746 | 0.403 | -0.100 | -0.903 | -1.292 | -1.956 | -2.514 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 10.0 | -7.81 | 1.127 | 0.722 | 0.114 | -1.129 | -1.653 | -2.603 | -3.200 |
| 5.0 | -5.93 | 0.901 | 0.986 | 0.343 | -1.145 | -2.431 | -3.897 | -5.300 |
| 2.5 | -4.36 | 0.338 | 1.000 | 0.443 | -0.871 | -2.458 | -4.279 | -6.571 |

DRIFT ANGLE Br = + 7.5 deg File: poplp3.dat Span is : 0.23 m No: 2

| Incidence | | -30 | -20 | -10 | 0 | 10 | 20 | 30 |
|---|---|---|---|---|---|---|---|---|
| %c | %t/c | | | | | | | |
| 0.0 | 0.00 | -6.944 | -1.900 | 2.014 | 3.609 | 2.691 | -0.441 | -5.456 |
| 2.5 | 4.36 | -9.211 | -6.129 | -2.957 | -0.217 | 1.897 | 3.250 | 3.809 |
| 5.0 | 5.93 | -6.732 | -4.686 | -2.638 | -0.667 | 1.015 | 2.382 | 3.456 |
| 10.0 | 7.81 | -4.845 | -3.543 | -2.217 | -0.899 | 0.279 | 1.368 | 2.426 |
| 20.0 | 9.57 | -2.915 | -2.314 | -1.652 | -0.841 | -0.059 | 0.676 | 1.338 |
| 30.0 | 10.01 | -1.887 | -1.586 | -1.188 | -0.696 | -0.074 | 0.426 | 0.971 |
| 40.0 | 9.68 | -1.338 | -1.129 | -0.855 | -0.507 | -0.103 | 0.368 | 0.765 |
| 50.0 | 8.83 | -0.972 | -0.771 | -0.623 | -0.333 | -0.015 | 0.309 | 0.618 |
| 60.0 | 7.61 | -0.648 | -0.514 | -0.377 | -0.203 | 0.044 | 0.235 | 0.529 |
| 70.0 | 6.11 | -0.451 | -0.300 | -0.188 | -0.101 | 0.074 | 0.235 | 0.426 |
| 80.0 | 4.37 | -0.380 | -0.086 | -0.029 | 0.072 | 0.191 | 0.279 | 0.353 |
| 90.0 | 2.41 | -0.141 | 0.157 | 0.203 | 0.290 | 0.382 | 0.338 | 0.176 |
| 95.0 | 1.35 | -0.113 | 0.329 | 0.391 | 0.464 | 0.588 | 0.544 | 0.147 |
| 95.0 | -1.35 | 0.296 | 0.357 | 0.304 | 0.333 | 0.485 | 0.485 | -0.824 |
| 90.0 | -2.41 | 0.254 | 0.171 | 0.058 | 0.058 | 0.103 | 0.103 | -1.088 |
| 80.0 | -4.37 | 0.338 | 0.129 | -0.101 | -0.203 | -0.221 | -0.324 | -1.485 |
| 70.0 | -6.11 | 0.394 | 0.100 | -0.232 | -0.362 | -0.515 | -0.618 | -1.544 |
| 60.0 | -7.61 | 0.423 | 0.000 | -0.391 | -0.652 | -0.794 | -1.015 | -1.603 |
| 50.0 | -8.83 | 0.592 | 0.071 | -0.435 | -0.783 | -1.044 | -1.338 | -1.735 |
| 40.0 | -9.68 | 0.803 | 0.157 | -0.507 | -1.029 | -1.426 | -1.794 | -2.279 |
| 30.0 | -10.01 | 1.197 | 0.286 | -0.623 | -1.435 | -2.059 | -2.588 | -3.015 |
| 20.0 | -9.57 | 1.606 | 0.686 | -0.319 | -1.275 | -2.162 | -3.029 | -3.897 |
| 10.0 | -7.81 | 2.225 | 1.071 | -0.304 | -1.058 | -2.838 | -4.044 | -5.912 |
| 5.0 | -5.93 | 3.042 | 2.614 | 1.391 | -0.754 | -3.250 | -5.971 | -8.750 |
| 2.5 | -4.36 | 2.423 | 3.029 | 1.971 | 0.174 | -3.279 | -5.676 | -9.353 |

DRIFT ANGLE Br = + 7.5 deg File: poplp3.dat Span is : 0.40 m No: 3

| Incidence | | -30 | -20 | -10 | 0 | 10 | 20 | 30 |
|---|---|---|---|---|---|---|---|---|
| %c | %t/c | | | | | | | |
| 0.0 | 0.00 | -13.296 | -5.366 | 0.408 | 3.259 | 4.314 | 2.500 | -0.594 |
| 2.5 | 4.36 | -15.606 | -10.535 | -5.831 | -1.318 | 1.357 | 3.426 | 4.159 |
| 5.0 | 5.93 | -10.451 | -8.394 | -4.915 | -1.424 | 0.557 | 2.382 | 3.377 |
| 10.0 | 7.81 | -7.831 | -6.155 | -4.099 | -1.600 | -0.257 | 1.353 | 2.507 |
| 20.0 | 9.57 | -4.127 | -3.493 | -2.606 | -1.153 | -0.457 | 0.721 | 1.797 |
| 30.0 | 10.01 | -2.634 | -2.338 | -1.845 | -0.871 | -0.486 | 0.368 | 1.275 |
| 40.0 | 9.68 | -1.676 | -1.549 | -1.254 | -0.565 | -0.357 | 0.250 | 0.942 |
| 50.0 | 8.83 | -1.113 | -1.056 | -0.887 | -0.376 | -0.300 | 0.132 | 0.638 |
| 60.0 | 7.61 | -0.704 | -0.662 | -0.563 | -0.188 | -0.200 | 0.118 | 0.435 |
| 70.0 | 6.11 | -0.437 | -0.408 | -0.338 | -0.047 | -0.143 | 0.059 | 0.232 |
| 80.0 | 4.37 | -0.141 | -0.085 | -0.042 | 0.188 | 0.071 | 0.132 | 0.130 |
| 90.0 | 2.41 | 0.127 | 0.282 | 0.324 | 0.494 | 0.400 | 0.206 | -0.087 |
| 95.0 | 1.35 | 0.380 | 0.521 | 0.549 | 0.694 | 0.657 | 0.206 | -0.261 |
| 95.0 | -1.35 | 0.577 | 0.549 | 0.493 | 0.694 | 0.614 | 0.029 | -1.072 |
| 90.0 | -2.41 | 0.437 | 0.324 | 0.183 | 0.318 | 0.243 | -0.279 | -1.304 |
| 80.0 | -4.37 | 0.493 | 0.211 | -0.070 | 0.000 | -0.243 | -0.559 | -1.652 |
| 70.0 | -6.11 | 0.592 | 0.155 | -0.225 | -0.224 | -0.600 | -0.809 | -1.710 |
| 60.0 | -7.61 | 0.761 | 0.169 | -0.352 | -0.424 | -0.929 | -1.118 | -1.870 |
| 50.0 | -8.83 | 1.000 | 0.225 | -0.451 | -0.635 | -1.329 | -1.632 | -2.188 |
| 40.0 | -9.68 | 1.408 | 0.423 | -0.465 | -0.812 | -1.729 | -2.132 | -2.580 |
| 30.0 | -10.01 | 1.986 | 0.704 | -0.676 | -1.365 | -2.729 | -3.382 | -3.145 |
| 20.0 | -9.57 | 3.014 | 1.690 | 0.183 | -0.929 | -2.686 | -3.721 | -3.594 |
| 10.0 | -7.81 | 4.282 | 3.197 | 1.507 | -0.365 | -2.986 | -5.250 | -5.710 |
| 5.0 | -5.93 | 4.437 | 4.268 | 3.070 | 0.906 | -2.086 | -5.176 | -7.406 |
| 2.5 | -4.36 | 3.197 | 4.352 | 3.972 | 1.929 | -1.171 | -5.206 | -8.159 |

DRIFT ANGLE Br = + 7.5 deg File: poplp3.dat Span is : 0.53 m No: 4

| Incidence | | -30 | -20 | -10 | 0 | 10 | 20 | 30 |
|---|---|---|---|---|---|---|---|---|
| %c | %t/c | | | | | | | |
| 0.0 | 0.00 | -5.794 | -2.765 | -0.662 | 0.377 | 2.797 | 3.456 | -2.080 |
| 2.5 | 4.36 | -12.750 | -7.544 | -3.176 | -0.174 | 1.406 | 1.647 | -0.435 |
| 5.0 | 5.93 | -9.426 | -6.221 | -2.956 | -0.333 | 1.304 | 1.985 | 1.174 |
| 10.0 | 7.81 | -6.941 | -4.985 | -2.853 | -0.812 | 0.870 | 2.103 | 2.391 |
| 20.0 | 9.57 | -4.015 | -3.294 | -2.250 | -1.014 | 0.261 | 1.485 | 2.580 |
| 30.0 | 10.01 | -2.500 | -2.265 | -1.721 | -0.986 | -0.087 | 0.868 | 1.957 |
| 40.0 | 9.68 | -1.588 | -1.515 | -1.265 | -0.812 | -0.203 | 0.500 | 1.362 |
| 50.0 | 8.83 | -0.985 | -1.015 | -0.926 | -0.667 | -0.246 | 0.235 | 0.884 |
| 60.0 | 7.61 | -0.544 | -0.588 | -0.603 | -0.464 | -0.203 | 0.118 | 0.551 |
| 70.0 | 6.11 | -0.221 | -0.235 | -0.309 | -0.290 | -0.145 | 0.044 | 0.290 |
| 80.0 | 4.37 | 0.015 | 0.132 | 0.059 | 0.014 | 0.058 | 0.059 | 0.145 |
| 90.0 | 2.41 | 0.176 | 0.426 | 0.412 | 0.348 | 0.275 | -0.044 | -0.188 |
| 95.0 | 1.35 | 0.206 | 0.529 | 0.603 | 0.565 | 0.464 | -0.044 | -0.319 |
| 95.0 | -1.35 | 0.456 | 0.456 | 0.397 | 0.406 | 0.362 | -0.279 | -0.870 |
| 90.0 | -2.41 | 0.426 | 0.309 | 0.191 | 0.116 | 0.072 | -0.471 | -1.145 |
| 80.0 | -4.37 | 0.426 | 0.132 | -0.088 | -0.232 | -0.333 | -0.603 | -1.594 |
| 70.0 | -6.11 | 0.529 | 0.088 | -0.265 | -0.478 | -0.652 | -0.941 | -1.928 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 60.0 | -7.61 | 0.647 | 0.044 | -0.382 | -0.710 | -0.957 | -1.338 | -2.261 |
| 50.0 | -8.83 | 0.765 | -0.015 | -0.559 | -1.014 | -1.391 | -1.676 | -2.580 |
| 40.0 | -9.68 | 1.059 | 0.118 | -0.544 | -1.188 | -1.797 | -2.132 | -2.391 |
| 30.0 | -10.01 | 1.441 | 0.368 | -0.632 | -1.565 | -2.449 | -2.706 | -2.420 |
| 20.0 | -9.57 | 1.882 | 0.971 | -0.029 | -1.232 | -2.565 | -3.176 | -2.609 |
| 10.0 | -7.81 | 2.265 | 1.618 | 0.691 | -0.754 | -2.739 | -4.279 | -2.986 |
| 5.0 | -5.93 | 2.132 | 2.088 | 1.456 | 0.174 | -2.116 | -4.412 | -3.638 |
| 2.5 | -4.36 | 1.162 | 2.015 | 1.853 | 0.928 | -1.319 | -3.926 | -3.725 |

DRIFT ANGLE Br = + 7.5 deg File: poplp3.dat Span is : 0.70 m No: 5

| Incidence | | -30 | -20 | -10 | 0 | 10 | 20 | 30 |
|---|---|---|---|---|---|---|---|---|
| %c | %t/c | | | | | | | |
| 0.0 | 0.00 | 0.432 | 3.225 | 2.694 | -3.923 | -6.211 | -10.194 | -10.771 |
| 2.5 | 4.36 | -6.149 | -1.761 | 1.764 | 8.077 | 3.070 | 1.403 | 0.086 |
| 5.0 | 5.93 | -5.527 | -2.380 | 0.583 | 6.154 | 3.535 | 3.167 | 2.400 |
| 10.0 | 7.81 | -4.500 | -2.718 | -0.611 | 2.423 | 2.958 | 3.653 | 3.700 |
| 20.0 | 9.57 | -2.770 | -2.070 | -1.111 | -0.808 | 1.549 | 2.736 | 3.657 |
| 30.0 | 10.01 | -1.676 | -1.296 | -0.833 | -1.654 | 0.930 | 1.861 | 2.900 |
| 40.0 | 9.68 | -0.811 | -0.620 | -0.444 | -1.462 | 0.634 | 1.319 | 2.314 |
| 50.0 | 8.83 | -0.257 | -0.296 | -0.069 | -1.346 | 0.549 | 0.958 | 1.757 |
| 60.0 | 7.61 | -0.054 | -0.141 | -0.069 | -1.346 | 0.366 | 0.653 | 1.171 |
| 70.0 | 6.11 | 0.081 | 0.099 | -0.083 | -1.462 | 0.042 | 0.361 | 0.429 |
| 80.0 | 4.37 | 0.149 | 0.099 | -0.028 | -1.385 | 0.042 | 0.181 | 0.171 |
| 90.0 | 2.41 | 0.284 | 0.324 | 0.181 | -1.308 | 0.127 | 0.028 | -0.186 |
| 95.0 | 1.35 | 0.500 | 0.563 | 0.333 | -1.000 | 0.169 | 0.000 | -0.414 |
| 95.0 | -1.35 | 0.405 | 0.254 | 0.264 | -1.000 | 0.085 | -0.375 | -1.271 |
| 90.0 | -2.41 | 0.243 | 0.028 | 0.069 | -1.538 | -0.042 | -0.361 | -1.529 |
| 80.0 | -4.37 | 0.041 | -0.155 | -0.181 | -2.000 | -0.225 | -0.597 | -1.671 |
| 70.0 | -6.11 | -0.041 | -0.296 | -0.417 | -2.462 | -0.437 | -0.681 | -1.800 |
| 60.0 | -7.61 | 0.014 | -0.211 | -0.569 | -2.923 | -0.704 | -0.875 | -1.929 |
| 50.0 | -8.83 | 0.405 | -0.042 | -0.528 | -3.500 | -0.873 | -1.042 | -1.900 |
| 40.0 | -9.68 | 0.946 | 0.197 | -0.417 | -4.192 | -1.113 | -1.069 | -1.657 |
| 30.0 | -10.01 | 1.311 | 0.268 | -0.417 | -4.346 | -1.577 | -1.361 | -1.386 |
| 20.0 | -9.57 | 1.919 | 0.831 | 0.125 | -3.808 | -1.507 | -1.819 | -1.271 |
| 10.0 | -7.81 | 2.162 | 0.986 | -0.097 | -5.769 | -2.563 | -2.306 | -1.586 |
| 5.0 | -5.93 | 2.230 | 1.000 | -0.528 | -8.923 | -4.211 | -3.431 | -1.729 |
| 2.5 | -4.36 | 2.595 | 1.310 | -0.847 | -11.769 | -6.549 | -6.389 | -2.929 |

DRIFT ANGLE Br = + 7.5 deg File: poplp3.dat Span is : 0.83 m No: 6

| Incidence | | -30 | -20 | -10 | 0 | 10 | 20 | 30 |
|---|---|---|---|---|---|---|---|---|
| %c | %t/c | | | | | | | |
| 0.0 | 0.00 | 1.149 | 4.221 | 4.183 | 1.652 | -3.394 | -9.232 | -11.090 |
| 2.5 | 4.36 | -5.925 | -1.676 | 1.761 | 3.957 | 4.380 | 3.710 | 2.045 |
| 5.0 | 5.93 | -5.373 | -2.324 | 0.493 | 2.841 | 4.014 | 4.609 | 4.134 |
| 10.0 | 7.81 | -4.090 | -2.500 | -0.620 | 1.275 | 2.803 | 4.130 | 4.567 |
| 20.0 | 9.57 | -2.403 | -1.676 | -0.817 | 0.232 | 1.507 | 2.754 | 3.612 |
| 30.0 | 10.01 | -1.448 | -1.029 | -0.662 | 0.087 | 0.789 | 1.783 | 2.672 |
| 40.0 | 9.68 | -0.776 | -0.426 | -0.254 | 0.188 | 0.606 | 1.333 | 2.015 |
| 50.0 | 8.83 | -0.299 | -0.147 | 0.042 | 0.174 | 0.479 | 1.029 | 1.522 |
| 60.0 | 7.61 | -0.194 | -0.088 | -0.056 | 0.072 | 0.324 | 0.594 | 0.925 |
| 70.0 | 6.11 | -0.045 | 0.029 | 0.042 | 0.130 | 0.056 | 0.348 | 0.343 |
| 80.0 | 4.37 | -0.299 | -0.044 | 0.014 | -0.058 | -0.028 | 0.116 | 0.015 |
| 90.0 | 2.41 | -0.164 | 0.162 | 0.197 | 0.174 | 0.042 | 0.014 | -0.269 |
| 95.0 | 1.35 | 0.194 | 0.426 | 0.493 | 0.406 | 0.183 | 0.116 | -0.657 |
| 95.0 | -1.35 | 0.567 | 0.603 | 0.507 | 0.449 | 0.056 | -0.348 | -1.970 |
| 90.0 | -2.41 | 0.463 | 0.441 | 0.437 | 0.261 | -0.099 | -0.565 | -1.985 |
| 80.0 | -4.37 | 0.478 | 0.294 | 0.296 | 0.130 | -0.324 | -0.928 | -2.030 |
| 70.0 | -6.11 | 0.418 | 0.221 | 0.239 | 0.203 | -0.338 | -0.971 | -1.955 |
| 60.0 | -7.61 | 0.403 | 0.221 | 0.141 | 0.174 | -0.338 | -1.203 | -1.866 |
| 50.0 | -8.83 | 0.582 | 0.206 | 0.113 | 0.101 | -0.310 | -1.391 | -1.955 |
| 40.0 | -9.68 | 0.657 | 0.176 | 0.042 | -0.130 | -0.366 | -1.522 | -1.881 |
| 30.0 | -10.01 | 0.642 | -0.176 | -0.493 | -0.768 | -0.930 | -1.391 | -1.493 |
| 20.0 | -9.57 | 1.149 | 0.000 | -0.549 | -1.174 | -1.676 | -1.304 | -1.328 |
| 10.0 | -7.81 | 1.955 | 0.118 | -1.141 | -2.609 | -3.859 | -3.783 | -1.403 |
| 5.0 | -5.93 | 1.239 | 0.794 | 0.887 | 0.609 | 0.563 | 0.739 | 0.731 |
| 2.5 | -4.36 | 4.224 | 2.000 | -0.845 | -4.348 | -7.972 | -11.014 | -4.015 |

DRIFT ANGLE Br = + 7.5 deg File: poplp3.dat Span is : 0.94 m No: 7

| Incidence | | -30 | -20 | -10 | 0 | 10 | 20 | 30 |
|---|---|---|---|---|---|---|---|---|
| %c | %t/c | | | | | | | |
| 0.0 | 0.00 | 0.099 | 0.370 | 0.406 | 0.089 | -0.070 | -0.588 | -1.043 |
| 2.5 | 4.36 | -4.169 | -1.699 | 0.362 | 2.571 | 3.437 | 3.735 | 2.942 |
| 5.0 | 5.93 | -3.465 | -1.890 | -0.493 | 1.179 | 2.521 | 3.544 | 3.681 |
| 10.0 | 7.81 | -2.451 | -1.603 | -0.913 | -0.107 | 1.254 | 2.426 | 3.159 |
| 20.0 | 9.57 | -1.746 | -1.219 | -0.957 | -0.750 | 0.282 | 1.103 | 1.971 |
| 30.0 | 10.01 | -1.366 | -0.890 | -0.768 | -0.821 | -0.085 | 0.412 | 1.159 |
| 40.0 | 9.68 | -0.577 | -0.342 | -0.333 | -0.536 | -0.113 | 0.029 | 0.304 |
| 50.0 | 8.83 | -1.000 | -0.575 | -0.507 | -0.714 | -0.239 | -0.088 | 0.304 |
| 60.0 | 7.61 | -1.099 | -0.521 | -0.406 | -0.696 | -0.324 | -0.250 | 0.043 |
| 70.0 | 6.11 | -1.282 | -0.479 | -0.304 | -0.607 | -0.310 | -0.324 | -0.116 |
| 80.0 | 4.37 | -1.394 | -0.370 | -0.188 | -0.446 | -0.211 | -0.294 | -0.246 |
| 90.0 | 2.41 | -1.155 | -0.247 | -0.014 | -0.321 | -0.169 | -0.324 | -0.551 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 95.0 | 1.35 | -0.775 | -0.068 | 0.174 | -0.143 | -0.141 | -0.397 | -0.884 |
| 95.0 | -1.35 | 0.169 | 0.342 | 0.217 | -0.143 | -0.901 | -2.059 | -2.188 |
| 90.0 | -2.41 | -0.042 | 0.055 | -0.072 | -0.679 | -1.366 | -2.721 | -2.362 |
| 80.0 | -4.37 | 0.000 | -0.041 | -0.174 | -0.750 | -1.746 | -3.441 | -2.275 |
| 70.0 | -6.11 | -0.042 | -0.123 | -0.290 | -0.732 | -1.648 | -3.412 | -2.087 |
| 60.0 | -7.61 | -0.070 | -0.192 | -0.420 | -0.786 | -1.324 | -2.926 | -2.101 |
| 50.0 | -8.83 | -0.056 | -0.247 | -0.449 | -0.982 | -1.070 | -2.265 | -2.319 |
| 40.0 | -9.68 | -0.070 | -0.329 | -0.580 | -1.268 | -1.155 | -1.794 | -2.406 |
| 30.0 | -10.01 | -0.197 | -0.616 | -1.000 | -1.786 | -1.592 | -2.029 | -2.101 |
| 20.0 | -9.57 | 0.310 | -0.356 | -0.971 | -1.929 | -1.803 | -2.147 | -1.826 |
| 10.0 | -7.81 | 1.113 | -0.110 | -1.304 | -2.946 | -2.958 | -3.588 | -2.087 |
| 5.0 | -5.93 | 2.268 | 0.753 | -1.029 | -3.661 | -4.324 | -5.735 | -4.406 |
| 2.5 | -4.36 | 2.915 | 1.288 | -0.957 | -4.518 | -5.944 | -8.529 | -8.884 |

DRIFT ANGLE Br = + 7.5 deg File: pop1p3.dat Span is : 0.97 m No: 8

| Incidence %c | %t/c | -30 | -20 | -10 | 0 | 10 | 20 | 30 |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00 | 0.043 | 0.203 | 0.275 | 0.129 | -0.087 | -0.493 | -0.941 |
| 2.5 | 4.36 | -3.130 | -1.493 | -0.116 | 1.100 | 2.203 | 2.657 | 2.353 |
| 5.0 | 5.93 | -2.420 | -1.420 | -0.493 | 0.500 | 1.565 | 2.358 | 2.735 |
| 10.0 | 7.81 | -1.725 | -1.203 | -0.710 | -0.129 | 0.594 | 1.269 | 2.000 |
| 20.0 | 9.57 | -1.333 | -0.942 | -0.667 | -0.371 | -0.058 | 0.299 | 1.000 |
| 30.0 | 10.01 | -1.275 | -0.768 | -0.594 | -0.443 | -0.304 | -0.209 | 0.353 |
| 40.0 | 9.68 | -0.971 | -0.435 | -0.319 | -0.214 | -0.232 | -0.284 | 0.015 |
| 50.0 | 8.83 | -1.768 | -0.667 | -0.391 | -0.343 | -0.406 | -0.552 | -0.176 |
| 60.0 | 7.61 | -1.754 | -0.739 | -0.319 | -0.314 | -0.464 | -0.701 | -0.368 |
| 70.0 | 6.11 | -1.507 | -0.696 | -0.232 | -0.257 | -0.435 | -0.716 | -0.441 |
| 80.0 | 4.37 | -1.565 | -0.565 | -0.145 | -0.171 | -0.348 | -0.627 | -0.544 |
| 90.0 | 2.41 | -1.348 | -0.377 | 0.000 | -0.071 | -0.261 | -0.597 | -0.735 |
| 95.0 | 1.35 | -0.928 | -0.188 | 0.116 | 0.029 | -0.203 | -0.687 | -0.971 |
| 95.0 | -1.35 | -0.014 | 0.145 | 0.203 | -0.100 | -0.986 | -2.313 | -2.191 |
| 90.0 | -2.41 | 0.029 | 0.058 | 0.101 | -0.286 | -1.333 | -2.791 | -2.309 |
| 80.0 | -4.37 | -0.246 | -0.203 | -0.101 | -0.614 | -1.768 | -3.627 | -2.279 |
| 70.0 | -6.11 | -0.174 | -0.188 | -0.159 | -0.900 | -1.754 | -3.328 | -2.103 |
| 60.0 | -7.61 | -0.188 | -0.275 | -0.261 | -0.957 | -2.072 | -3.269 | -2.059 |
| 50.0 | -8.83 | -0.159 | -0.304 | -0.377 | -0.771 | -2.580 | -3.567 | -2.324 |
| 40.0 | -9.68 | -0.159 | -0.391 | -0.507 | -0.714 | -2.130 | -3.851 | -2.338 |
| 30.0 | -10.01 | -0.420 | -0.710 | -0.841 | -1.029 | -1.754 | -3.000 | -2.338 |
| 20.0 | -9.57 | 0.145 | -0.348 | -0.652 | -1.014 | -1.580 | -2.179 | -1.779 |
| 10.0 | -7.81 | 0.710 | -0.217 | -0.913 | -1.543 | -2.275 | -3.045 | -2.088 |
| 5.0 | -5.93 | 1.609 | 0.449 | -0.710 | -1.814 | -3.058 | -4.328 | -3.863 |
| 2.5 | -4.36 | 2.029 | 1.043 | -0.333 | -1.943 | -4.000 | -6.373 | -6.868 |

DRIFT ANGLE Br = + 15 deg File: pop2p3.dat Span is : 0.07 m No: 1

| Incidence %c | %t/c | -30 | -20 | -10 | 0 | 10 | 20 | 30 |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00 | -2.685 | 0.203 | 1.236 | 0.099 | -3.130 | -7.667 | -5.623 |
| 2.5 | 4.36 | -4.438 | -1.739 | 0.069 | 0.958 | 0.406 | -0.623 | -0.884 |
| 5.0 | 5.93 | -3.603 | -1.783 | -0.125 | 0.718 | 0.928 | 0.493 | 0.464 |
| 10.0 | 7.81 | -2.753 | -1.609 | -0.347 | 0.437 | 0.913 | 0.986 | 0.928 |
| 20.0 | 9.57 | -1.877 | -1.232 | -0.403 | 0.183 | 0.725 | 0.971 | 1.217 |
| 30.0 | 10.01 | -1.356 | -1.014 | -0.375 | 0.085 | 0.565 | 0.957 | 1.101 |
| 40.0 | 9.68 | -1.000 | -0.797 | -0.319 | 0.056 | 0.464 | 0.812 | 0.986 |
| 50.0 | 8.83 | -0.767 | -0.551 | -0.236 | 0.070 | 0.391 | 0.696 | 0.841 |
| 60.0 | 7.61 | -0.589 | -0.420 | -0.181 | 0.085 | 0.304 | 0.551 | 0.681 |
| 70.0 | 6.11 | -0.411 | -0.275 | -0.042 | 0.155 | 0.348 | 0.536 | 0.594 |
| 80.0 | 4.37 | -0.233 | -0.159 | 0.083 | 0.239 | 0.333 | 0.478 | 0.435 |
| 90.0 | 2.41 | -0.055 | 0.014 | 0.181 | 0.310 | 0.362 | 0.435 | 0.246 |
| 95.0 | 1.35 | 0.014 | 0.087 | 0.292 | 0.380 | 0.391 | 0.391 | 0.043 |
| 95.0 | -1.35 | 0.534 | 0.304 | 0.250 | 0.268 | 0.203 | 0.058 | -0.725 |
| 90.0 | -2.41 | 0.630 | 0.304 | 0.139 | 0.127 | -0.014 | -0.159 | -0.739 |
| 80.0 | -4.37 | 0.685 | 0.275 | 0.000 | -0.127 | -0.217 | -0.420 | -0.928 |
| 70.0 | -6.11 | 0.795 | 0.203 | -0.125 | -0.296 | -0.478 | -0.696 | -0.942 |
| 60.0 | -7.61 | 0.699 | 0.072 | -0.264 | -0.465 | -0.725 | -0.899 | -1.014 |
| 50.0 | -8.83 | 0.616 | 0.000 | -0.347 | -0.620 | -0.899 | -1.188 | -1.174 |
| 40.0 | -9.68 | 0.534 | -0.072 | -0.403 | -0.746 | -1.116 | -1.449 | -1.246 |
| 30.0 | -10.01 | 0.507 | 0.014 | -0.319 | -0.831 | -1.377 | -1.681 | -1.377 |
| 20.0 | -9.57 | 0.658 | -0.029 | -0.278 | -0.972 | -1.841 | -2.188 | -1.174 |
| 10.0 | -7.81 | 0.644 | 0.667 | -0.153 | -1.085 | -2.362 | -3.435 | -1.507 |
| 5.0 | -5.93 | 1.123 | 0.797 | -0.139 | -1.577 | -3.435 | -4.797 | -1.739 |
| 2.5 | -4.36 | 1.178 | 1.000 | 0.028 | -1.183 | -3.710 | -6.406 | -2.884 |

DRIFT ANGLE Br = + 15 deg File: pop2p3.dat Span is : 0.23 m No: 2

| Incidence %c | %t/c | -30 | -20 | -10 | 0 | 10 | 20 | 30 |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00 | -5.529 | -0.431 | 2.559 | 3.219 | 1.814 | -2.043 | -8.738 |
| 2.5 | 4.36 | -7.957 | -4.375 | -1.750 | 0.466 | 1.929 | 2.929 | 3.646 |
| 5.0 | 5.93 | -5.943 | -3.375 | -1.647 | 0.027 | 1.271 | 2.300 | 3.646 |
| 10.0 | 7.81 | -4.214 | -2.653 | -1.500 | -0.274 | 0.643 | 1.429 | 2.738 |
| 20.0 | 9.57 | -2.657 | -1.847 | -1.206 | -0.342 | 0.271 | 0.829 | 1.585 |
| 30.0 | 10.01 | -1.843 | -1.319 | -0.897 | -0.301 | 0.129 | 0.643 | 1.185 |
| 40.0 | 9.68 | -1.286 | -0.958 | -0.632 | -0.205 | 0.114 | 0.500 | 0.892 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 50.0 | 8.83 | -0.900 | -0.653 | -0.412 | -0.082 | 0.186 | 0.486 | 0.831 |
| 60.0 | 7.61 | -0.643 | -0.458 | -0.235 | 0.014 | 0.171 | 0.429 | 0.692 |
| 70.0 | 6.11 | -0.429 | -0.306 | -0.103 | 0.110 | 0.229 | 0.400 | 0.585 |
| 80.0 | 4.37 | -0.186 | -0.111 | 0.059 | 0.219 | 0.300 | 0.429 | 0.446 |
| 90.0 | 2.41 | 0.129 | 0.111 | 0.235 | 0.329 | 0.471 | 0.471 | 0.308 |
| 95.0 | 1.35 | 0.343 | 0.292 | 0.397 | 0.507 | 0.657 | 0.629 | 0.185 |
| 95.0 | -1.35 | 0.414 | 0.264 | 0.250 | 0.356 | 0.429 | 0.414 | -0.385 |
| 90.0 | -2.41 | 0.271 | 0.069 | 0.015 | 0.027 | 0.086 | 0.014 | -0.985 |
| 80.0 | -4.37 | 0.286 | -0.056 | -0.206 | -0.219 | -0.279 | -0.457 | -1.415 |
| 70.0 | -6.11 | 0.329 | -0.069 | -0.368 | -0.452 | -0.643 | -0.843 | -1.646 |
| 60.0 | -7.61 | 0.343 | -0.153 | -0.559 | -0.699 | -0.971 | -1.157 | -2.031 |
| 50.0 | -8.83 | 0.400 | -0.167 | -0.691 | -0.932 | -1.343 | -1.571 | -2.354 |
| 40.0 | -9.68 | 0.586 | -0.167 | -0.794 | -1.151 | -1.686 | -2.114 | -2.969 |
| 30.0 | -10.01 | 0.886 | -0.222 | -1.294 | -1.795 | -2.629 | -3.086 | -4.092 |
| 20.0 | -9.57 | 1.271 | 0.194 | -0.779 | -1.630 | -2.657 | -3.671 | -4.415 |
| 10.0 | -7.81 | 2.371 | 1.306 | -0.265 | -1.712 | -3.786 | -5.600 | -6.154 |
| 5.0 | -5.93 | 3.486 | 2.486 | 0.912 | -1.370 | -4.314 | -7.586 | -9.154 |
| 2.5 | -4.36 | 3.386 | 3.542 | 1.824 | -0.630 | -4.543 | -8.857 | -13.062 |

DRIFT ANGLE Br = + 15 deg File: pop2p3.dat Span is : 0.40 m No: 3

| Incidence | | -30 | -20 | -10 | 0 | 10 | 20 | 30 |
|---|---|---|---|---|---|---|---|---|
| %c | %t/c | | | | | | | |
| 0.0 | 0.00 | -9.028 | -2.200 | 2.159 | 4.145 | 3.771 | 1.029 | -3.882 |
| 2.5 | 4.36 | -13.183 | -8.257 | -3.957 | -0.275 | 2.329 | 3.956 | 4.441 |
| 5.0 | 5.93 | -9.479 | -6.743 | -3.609 | -0.841 | 1.471 | 3.103 | 4.088 |
| 10.0 | 7.81 | -7.028 | -5.243 | -3.319 | -1.362 | 0.471 | 2.118 | 3.294 |
| 20.0 | 9.57 | -3.845 | -3.029 | -2.159 | -1.130 | 0.014 | 1.221 | 2.397 |
| 30.0 | 10.01 | -2.535 | -2.086 | -1.565 | -0.928 | -0.157 | 0.765 | 1.691 |
| 40.0 | 9.68 | -1.676 | -1.400 | -1.058 | -0.652 | -0.100 | 0.574 | 1.235 |
| 50.0 | 8.83 | -1.155 | -1.000 | -0.754 | -0.493 | -0.071 | 0.397 | 0.868 |
| 60.0 | 7.61 | -0.746 | -0.657 | -0.478 | -0.304 | -0.014 | 0.353 | 0.676 |
| 70.0 | 6.11 | -0.451 | -0.414 | -0.319 | -0.217 | -0.014 | 0.265 | 0.500 |
| 80.0 | 4.37 | -0.155 | -0.143 | -0.043 | 0.029 | 0.157 | 0.279 | 0.456 |
| 90.0 | 2.41 | 0.254 | 0.243 | 0.304 | 0.377 | 0.414 | 0.485 | 0.397 |
| 95.0 | 1.35 | 0.507 | 0.486 | 0.536 | 0.623 | 0.643 | 0.647 | 0.368 |
| 95.0 | -1.35 | 0.690 | 0.529 | 0.493 | 0.536 | 0.586 | 0.500 | -0.191 |
| 90.0 | -2.41 | 0.535 | 0.300 | 0.159 | 0.130 | 0.171 | 0.074 | -0.382 |
| 80.0 | -4.37 | 0.521 | 0.157 | -0.101 | -0.290 | -0.329 | -0.559 | -0.985 |
| 70.0 | -6.11 | 0.577 | 0.100 | -0.275 | -0.580 | -0.743 | -1.029 | -1.353 |
| 60.0 | -7.61 | 0.704 | 0.071 | -0.435 | -0.870 | -1.186 | -1.471 | -1.706 |
| 50.0 | -8.83 | 0.887 | 0.100 | -0.565 | -1.159 | -1.571 | -1.985 | -2.206 |
| 40.0 | -9.68 | 1.239 | 0.229 | -0.638 | -1.420 | -2.057 | -2.647 | -3.103 |
| 30.0 | -10.01 | 1.732 | 0.343 | -1.130 | -2.348 | -3.257 | -4.162 | -4.500 |
| 20.0 | -9.57 | 2.718 | 1.300 | -0.203 | -1.710 | -3.129 | -4.544 | -5.309 |
| 10.0 | -7.81 | 3.972 | 2.714 | 0.957 | -1.275 | -3.671 | -6.338 | -8.235 |
| 5.0 | -5.93 | 4.465 | 3.957 | 2.507 | 0.116 | -3.029 | -6.897 | -10.324 |
| 2.5 | -4.36 | 3.831 | 4.329 | 3.536 | 1.246 | -2.429 | -7.324 | -12.191 |

DRIFT ANGLE Br = + 15 deg File: pop2p3.dat Span is : 0.53 m No: 4

| Incidence | | -30 | -20 | -10 | 0 | 10 | 20 | 30 |
|---|---|---|---|---|---|---|---|---|
| %c | %t/c | | | | | | | |
| 0.0 | 0.00 | -3.894 | -1.579 | -0.186 | 0.043 | -0.664 | -2.448 | -6.375 |
| 2.5 | 4.36 | -10.324 | -5.600 | -1.800 | 0.739 | 2.086 | 2.448 | 0.359 |
| 5.0 | 5.93 | -8.239 | -4.886 | -1.914 | 0.377 | 1.871 | 2.627 | 2.063 |
| 10.0 | 7.81 | -6.099 | -4.214 | -2.171 | -0.261 | 1.343 | 2.552 | 3.219 |
| 20.0 | 9.57 | -3.718 | -2.914 | -1.857 | -0.667 | 0.629 | 1.896 | 3.031 |
| 30.0 | 10.01 | -2.423 | -2.043 | -1.457 | -0.725 | 0.214 | 1.269 | 2.422 |
| 40.0 | 9.68 | -1.606 | -1.414 | -1.086 | -0.638 | 0.014 | 0.791 | 1.781 |
| 50.0 | 8.83 | -1.056 | -1.000 | -0.814 | -0.536 | -0.086 | 0.507 | 1.172 |
| 60.0 | 7.61 | -0.606 | -0.629 | -0.557 | -0.391 | -0.071 | 0.343 | 0.797 |
| 70.0 | 6.11 | -0.239 | -0.329 | -0.329 | -0.261 | -0.043 | 0.269 | 0.453 |
| 80.0 | 4.37 | 0.127 | 0.029 | 0.000 | 0.000 | 0.071 | 0.313 | 0.203 |
| 90.0 | 2.41 | 0.451 | 0.386 | 0.329 | 0.261 | 0.257 | 0.299 | -0.219 |
| 95.0 | 1.35 | 0.620 | 0.600 | 0.557 | 0.493 | 0.457 | 0.299 | -0.656 |
| 95.0 | -1.35 | 0.620 | 0.471 | 0.357 | 0.304 | 0.243 | -0.060 | -1.594 |
| 90.0 | -2.41 | 0.521 | 0.286 | 0.071 | -0.058 | -0.114 | -0.478 | -1.859 |
| 80.0 | -4.37 | 0.423 | 0.057 | -0.229 | -0.464 | -0.493 | -0.866 | -2.109 |
| 70.0 | -6.11 | 0.437 | -0.071 | -0.400 | -0.725 | -0.871 | -1.045 | -2.281 |
| 60.0 | -7.61 | 0.451 | -0.143 | -0.586 | -1.043 | -1.243 | -1.627 | -2.484 |
| 50.0 | -8.83 | 0.408 | -0.257 | -0.857 | -1.377 | -1.757 | -2.284 | -2.609 |
| 40.0 | -9.68 | 0.338 | -0.329 | -1.000 | -1.667 | -2.157 | -2.627 | -3.063 |
| 30.0 | -10.01 | 0.352 | -0.386 | -1.257 | -2.159 | -3.071 | -3.881 | -3.500 |
| 20.0 | -9.57 | 0.676 | 0.043 | -0.829 | -1.928 | -3.200 | -4.299 | -3.906 |
| 10.0 | -7.81 | 1.465 | 0.657 | -0.471 | -1.870 | -3.771 | -5.821 | -6.375 |
| 5.0 | -5.93 | 2.479 | 1.657 | 0.371 | -1.362 | -3.571 | -6.806 | -11.125 |
| 2.5 | -4.36 | 2.535 | 2.443 | 1.429 | -0.652 | -3.414 | -7.343 | -13.109 |

DRIFT ANGLE Br = + 15 deg File: pop2p3.dat Span is : 0.70 m No: 5

| Incidence | | -30 | -20 | -10 | 0 | 10 | 20 | 30 |
|---|---|---|---|---|---|---|---|---|
| %c | %t/c | | | | | | | |
| 0.0 | 0.00 | 1.667 | 3.812 | 1.722 | -3.296 | -8.753 | -15.286 | -19.775 |
| 2.5 | 4.36 | -4.694 | -0.217 | 2.931 | 3.775 | 2.714 | 0.257 | -3.324 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 5.0 | 5.93 | -4.569 | -1.188 | 1.667 | 3.423 | 3.727 | 3.171 | 1.085 |
| 10.0 | 7.81 | -3.903 | -1.971 | 0.208 | 2.127 | 3.351 | 4.157 | 3.662 |
| 20.0 | 9.57 | -2.472 | -1.696 | -0.431 | 0.775 | 1.870 | 3.314 | 3.986 |
| 30.0 | 10.01 | -1.458 | -1.058 | -0.431 | 0.352 | 1.130 | 2.271 | 3.310 |
| 40.0 | 9.68 | -0.736 | -0.565 | -0.167 | 0.282 | 0.883 | 1.614 | 2.563 |
| 50.0 | 8.83 | -0.347 | -0.072 | -0.042 | 0.239 | 0.714 | 1.300 | 2.000 |
| 60.0 | 7.61 | -0.076 | 0.101 | -0.014 | 0.155 | 0.455 | 0.800 | 1.366 |
| 70.0 | 6.11 | 0.194 | 0.217 | 0.194 | -0.056 | 0.351 | 0.371 | 0.648 |
| 80.0 | 4.37 | 0.139 | 0.203 | 0.069 | 0.056 | 0.195 | 0.214 | 0.648 |
| 90.0 | 2.41 | 0.389 | 0.348 | 0.208 | 0.099 | 0.039 | 0.157 | 0.324 |
| 95.0 | 1.35 | 0.639 | 0.493 | 0.431 | 0.211 | 0.117 | 0.029 | 0.014 |
| 95.0 | -1.35 | -0.014 | -0.072 | 0.014 | -0.085 | -0.052 | -0.371 | -0.817 |
| 90.0 | -2.41 | -0.403 | -0.304 | -0.222 | -0.211 | -0.208 | -0.614 | -0.831 |
| 80.0 | -4.37 | -0.583 | -0.507 | -0.375 | -0.620 | -0.364 | -0.714 | -1.338 |
| 70.0 | -6.11 | -0.667 | -0.870 | -0.597 | -0.803 | -0.636 | -0.986 | -1.451 |
| 60.0 | -7.61 | -0.569 | -0.870 | -0.694 | -1.014 | -0.909 | -1.329 | -1.789 |
| 50.0 | -8.83 | -0.028 | -0.580 | -0.931 | -1.211 | -1.104 | -1.229 | -1.915 |
| 40.0 | -9.68 | 0.347 | -0.304 | -0.958 | -1.366 | -1.221 | -1.700 | -2.113 |
| 30.0 | -10.01 | 0.458 | -0.203 | -0.958 | -1.676 | -1.584 | -2.186 | -2.606 |
| 20.0 | -9.57 | 1.361 | 0.551 | -0.389 | -1.254 | -1.818 | -2.486 | -2.704 |
| 10.0 | -7.81 | 1.556 | 0.377 | -0.597 | -1.859 | -2.325 | -3.514 | -3.746 |
| 5.0 | -5.93 | 1.875 | 0.232 | -1.514 | -3.352 | -3.896 | -4.857 | -6.000 |
| 2.5 | -4.36 | 2.500 | 0.507 | -2.139 | -5.282 | -6.545 | -7.343 | -7.282 |

DRIFT ANGLE Br = + 15 deg File: pop2p3.dat Span is : 0.83 m No: 6

| Incidence | | -30 | -20 | -10 | 0 | 10 | 20 | 30 |
|---|---|---|---|---|---|---|---|---|
| %c | %t/c | | | | | | | |
| 0.0 | 0.00 | 2.671 | 4.120 | 2.878 | -1.235 | -8.108 | -13.718 | -6.955 |
| 2.5 | 4.36 | -3.438 | 0.133 | 2.797 | 4.324 | 4.246 | 2.042 | 1.197 |
| 5.0 | 5.93 | -3.356 | -0.853 | 1.568 | 3.500 | 4.585 | 4.070 | 3.742 |
| 10.0 | 7.81 | -2.767 | -1.387 | 0.270 | 2.059 | 3.662 | 4.282 | 4.803 |
| 20.0 | 9.57 | -1.644 | -1.013 | -0.257 | 0.662 | 1.969 | 3.056 | 4.227 |
| 30.0 | 10.01 | -0.863 | -0.613 | -0.230 | 0.412 | 1.092 | 2.014 | 3.182 |
| 40.0 | 9.68 | -0.329 | -0.093 | -0.041 | 0.412 | 0.923 | 1.563 | 2.485 |
| 50.0 | 8.83 | -0.041 | 0.213 | 0.095 | 0.368 | 0.769 | 1.141 | 1.864 |
| 60.0 | 7.61 | -0.027 | 0.173 | 0.027 | 0.265 | 0.462 | 0.831 | 1.288 |
| 70.0 | 6.11 | 0.068 | 0.053 | 0.081 | -0.059 | 0.138 | 0.549 | 0.667 |
| 80.0 | 4.37 | 0.000 | 0.013 | 0.014 | 0.044 | 0.031 | 0.254 | 0.394 |
| 90.0 | 2.41 | 0.068 | 0.200 | 0.081 | 0.132 | -0.123 | 0.000 | -0.136 |
| 95.0 | 1.35 | 0.110 | 0.347 | 0.297 | 0.235 | -0.369 | -0.056 | -0.515 |
| 95.0 | -1.35 | 0.068 | 0.307 | -0.068 | -0.441 | -0.615 | -0.746 | -1.788 |
| 90.0 | -2.41 | 0.068 | -0.040 | 0.054 | -0.368 | -0.754 | -0.915 | -1.955 |
| 80.0 | -4.37 | 0.219 | 0.133 | 0.081 | -0.721 | -1.015 | -1.282 | -1.955 |
| 70.0 | -6.11 | 0.397 | 0.187 | 0.149 | -0.515 | -1.154 | -1.437 | -2.015 |
| 60.0 | -7.61 | 0.562 | 0.253 | 0.122 | -0.426 | -1.415 | -1.746 | -2.152 |
| 50.0 | -8.83 | 0.726 | 0.360 | 0.176 | -0.088 | -1.123 | -1.901 | -1.909 |
| 40.0 | -9.68 | 0.712 | 0.347 | 0.135 | -0.059 | -0.969 | -1.592 | -2.227 |
| 30.0 | -10.01 | 0.521 | 0.053 | -0.432 | -0.574 | -1.123 | -1.901 | -2.803 |
| 20.0 | -9.57 | 0.822 | 0.067 | -0.635 | -1.029 | -1.446 | -1.859 | -3.742 |
| 10.0 | -7.81 | 1.137 | -0.293 | -1.689 | -3.088 | -4.169 | -3.268 | -4.167 |
| 5.0 | -5.93 | 0.603 | 0.653 | 0.892 | 0.750 | 1.077 | 0.930 | 1.030 |
| 2.5 | -4.36 | 3.096 | 0.667 | -2.581 | -6.544 | -10.908 | -12.803 | -7.955 |

DRIFT ANGLE Br = + 15 deg File: pop2p3.dat Span is : 0.94 m No: 7

| Incidence | | -30 | -20 | -10 | 0 | 10 | 20 | 30 |
|---|---|---|---|---|---|---|---|---|
| %c | %t/c | | | | | | | |
| 0.0 | 0.00 | 0.208 | 0.361 | 0.338 | 0.043 | -0.408 | -1.087 | -1.855 |
| 2.5 | 4.36 | -2.611 | -0.625 | 1.099 | 2.643 | 3.310 | 2.928 | 1.377 |
| 5.0 | 5.93 | -2.333 | -1.000 | 0.296 | 1.643 | 2.732 | 3.319 | 3.000 |
| 10.0 | 7.81 | -1.819 | -1.069 | -0.324 | 0.571 | 1.563 | 2.522 | 3.043 |
| 20.0 | 9.57 | -1.375 | -0.944 | -0.577 | -0.100 | 0.521 | 1.217 | 2.000 |
| 30.0 | 10.01 | -1.014 | -0.708 | -0.535 | -0.257 | 0.042 | 0.507 | 1.087 |
| 40.0 | 9.68 | -0.375 | -0.250 | -0.197 | -0.129 | -0.070 | 0.014 | 0.217 |
| 50.0 | 8.83 | -0.653 | -0.389 | -0.380 | -0.286 | -0.225 | -0.072 | 0.246 |
| 60.0 | 7.61 | -0.597 | -0.319 | -0.338 | -0.314 | -0.282 | -0.188 | 0.029 |
| 70.0 | 6.11 | -0.618 | -0.236 | -0.254 | -0.300 | -0.324 | -0.246 | -0.072 |
| 80.0 | 4.37 | -0.639 | -0.181 | -0.155 | -0.200 | -0.254 | -0.246 | -0.116 |
| 90.0 | 2.41 | -0.597 | -0.056 | 0.000 | -0.100 | -0.268 | -0.348 | -0.377 |
| 95.0 | 1.35 | -0.431 | 0.083 | 0.183 | -0.029 | -0.324 | -0.623 | -0.638 |
| 95.0 | -1.35 | 0.069 | 0.347 | 0.155 | -0.500 | -1.352 | -2.246 | -2.362 |
| 90.0 | -2.41 | -0.083 | 0.083 | -0.169 | -0.886 | -2.042 | -2.594 | -2.580 |
| 80.0 | -4.37 | -0.069 | 0.042 | -0.268 | -1.029 | -2.662 | -3.754 | -2.812 |
| 70.0 | -6.11 | -0.014 | -0.042 | -0.296 | -0.971 | -2.606 | -4.406 | -3.391 |
| 60.0 | -7.61 | -0.042 | -0.125 | -0.380 | -0.857 | -2.254 | -3.768 | -3.594 |
| 50.0 | -8.83 | -0.083 | -0.222 | -0.437 | -0.800 | -1.831 | -3.319 | -3.464 |
| 40.0 | -9.68 | -0.167 | -0.375 | -0.549 | -0.900 | -1.549 | -2.667 | -3.652 |
| 30.0 | -10.01 | -0.444 | -0.819 | -1.000 | -1.386 | -1.859 | -2.464 | -3.536 |
| 20.0 | -9.57 | -0.042 | -0.681 | -1.070 | -1.543 | -2.042 | -2.623 | -3.174 |
| 10.0 | -7.81 | 0.444 | -0.792 | -1.789 | -2.629 | -3.465 | -4.188 | -3.348 |
| 5.0 | -5.93 | 1.431 | -0.236 | -1.972 | -3.771 | -5.296 | -6.870 | -6.841 |
| 2.5 | -4.36 | 1.972 | 0.028 | -2.268 | -4.957 | -7.592 | -10.609 | -11.478 |

DRIFT ANGLE Br = + 15 deg File: pop2p3.dat Span is : 0.97 m No: 8

| Incidence | | -30 | -20 | -10 | 0 | 10 | 20 | 30 |
|---|---|---|---|---|---|---|---|---|
| %c | %t/c | | | | | | | |
| 0.0 | 0.00 | 0.135 | 0.194 | 0.143 | -0.043 | -0.315 | -0.884 | -1.046 |
| 2.5 | 4.36 | -1.716 | -0.500 | 0.443 | 1.300 | 1.932 | 1.971 | 1.846 |
| 5.0 | 5.93 | -1.473 | -0.694 | 0.029 | 0.786 | 1.562 | 2.116 | 2.723 |
| 10.0 | 7.81 | -1.216 | -0.806 | -0.357 | 0.071 | 0.671 | 1.217 | 2.354 |
| 20.0 | 9.57 | -0.878 | -0.722 | -0.500 | -0.257 | 0.000 | 0.261 | 1.400 |
| 30.0 | 10.01 | -0.730 | -0.583 | -0.514 | -0.414 | -0.329 | -0.232 | 0.646 |
| 40.0 | 9.68 | -0.432 | -0.319 | -0.271 | -0.257 | -0.260 | -0.348 | 0.123 |
| 50.0 | 8.83 | -0.797 | -0.375 | -0.371 | -0.386 | -0.479 | -0.594 | -0.077 |
| 60.0 | 7.61 | -0.919 | -0.319 | -0.329 | -0.414 | -0.575 | -0.696 | -0.354 |
| 70.0 | 6.11 | -0.838 | -0.306 | -0.271 | -0.386 | -0.562 | -0.681 | -0.508 |
| 80.0 | 4.37 | -0.703 | -0.208 | -0.157 | -0.300 | -0.452 | -0.638 | -0.631 |
| 90.0 | 2.41 | -0.689 | -0.139 | -0.057 | -0.214 | -0.384 | -0.623 | -0.785 |
| 95.0 | 1.35 | -0.527 | -0.014 | 0.071 | -0.143 | -0.425 | -0.754 | -0.938 |
| 95.0 | -1.35 | 0.000 | 0.194 | 0.014 | -0.657 | -1.548 | -2.536 | -2.369 |
| 90.0 | -2.41 | 0.014 | 0.139 | -0.100 | -0.929 | -1.904 | -2.884 | -2.431 |
| 80.0 | -4.37 | -0.162 | -0.111 | -0.400 | -1.271 | -2.233 | -3.435 | -2.738 |
| 70.0 | -6.11 | -0.095 | -0.069 | -0.471 | -1.186 | -2.562 | -3.971 | -2.738 |
| 60.0 | -7.61 | -0.081 | -0.139 | -0.543 | -1.457 | -2.534 | -3.710 | -2.662 |
| 50.0 | -8.83 | -0.095 | -0.250 | -0.543 | -1.629 | -2.822 | -3.551 | -2.708 |
| 40.0 | -9.68 | -0.135 | -0.347 | -0.614 | -1.414 | -3.082 | -3.667 | -2.492 |
| 30.0 | -10.01 | -0.405 | -0.708 | -0.900 | -1.357 | -2.452 | -3.667 | -2.415 |
| 20.0 | -9.57 | -0.041 | -0.514 | -0.886 | -1.400 | -1.890 | -2.870 | -3.015 |
| 10.0 | -7.81 | 0.230 | -0.653 | -1.357 | -2.000 | -2.630 | -3.609 | -3.215 |
| 5.0 | -5.93 | 0.851 | -0.264 | -1.457 | -2.643 | -3.712 | -5.145 | -6.646 |
| 2.5 | -4.36 | 1.243 | 0.069 | -1.414 | -3.286 | -5.329 | -7.826 | -10.092 |

Table 1: Particulars of the two all-movable rudder models

| **Rudder No.** | **2** | **3** |
|---|---|---|
| Chord c mm | 667 | 667 |
| Span S mm | 1000 | 1200 |
| Geometric Aspect Ratio $AR_G$ | 3.0 | 3.6 |
| Taper Ratio $C_T/C_R$ | 1.0 | 1.0 |
| Thickness/chord Ratio t/c | 0.20 | 0.20 |
| Section | NACA 0020 constant section with square tip | |

Table II: Propeller details - Modified Wageningen B4.40 series

| | |
|---|---|
| Number of Blades | 4 |
| Range of revolutions rpm | 0 to 3000 |
| Diameter mm | 800 |
| Boss Diameter (max) mm | 200 |
| Mean Pitch Ratio | 0.95 (set for tests) |
| Blade Area Ratio | 0.40 |
| Rake (deg) | 0 |
| Blade thickness ratio t/D | 0.050 |
| Sections shape | Based on Wageningen B series |
| Blade outline shape | Based on Wageningen but with reduced skew |

Table III Location of Pressure Tappings on Hull and Centre-board

| X(mm) | Height above bottom Datum (mm) 66 | 157 | 243 | 329 | 421 | 505 | 589 | 672 | 756 | 839 | 935 | 988 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 327 | × | × | × | × | × | × | × | × | × | × | × | × | G-19 |
| 470 | | × | | | × | | | | × | | × | | |
| 800 | × | × | × | × | × | × | × | × | × | × | × | × | G-19 |
| 1030 | | × | | | × | | | | × | | × | | |
| 1273 | × | × | × | × | × | × | × | × | × | × | × | × | G-18.5 |
| 1411 | | × | | | × | | | | × | | × | | |
| 1496 | | × | | | × | | | | × | | × | | |
| 1621 | | × | | | × | | | | × | | × | | |
| 1746 | × | × | × | × | × | × | × | × | × | × | × | × | G-18 |
| 2011 | | × | | | × | | | | × | | × | | |
| 2096 | | × | | | × | | | | × | | × | | |
| 2221 | | × | | | × | | | | × | | × | | |
| 2346 | × | × | × | × | × | × | × | × | × | × | × | × | |
| 2600 | | × | | | × | | | | × | | × | | |
| 2645 | | × | | | × | | | | × | | × | | |
| 2667 | | × | | | × | | | | × | | × | | |
| 2691 | | × | | | × | | | | × | | × | | LEADING EDGE |

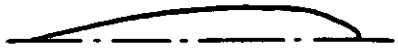
Pressure Tappings ×, (both sides)

G = Glasgow

## Table IV Mariner Stern Model Offsets

Data Supplied as Waterlines for half model starting at stern:

| x (m) | y (m) | z (m) |
|---|---|---|
| 0.3581 | 0.0000 | 1.0182 |
| 0.8000 | -0.0446 | 1.0182 |
| 1.2727 | -0.0507 | 1.0182 |
| 1.7455 | -0.0548 | 1.0182 |
| 2.1073 | -0.0506 | 1.0182 |
| 2.4140 | -0.0387 | 1.0182 |
| 2.6189 | -0.0210 | 1.0182 |
| 2.6909 | 0.0000 | 1.0182 |
| | | |
| 0.3395 | 0.0000 | 0.9818 |
| 0.8000 | -0.0661 | 0.9818 |
| 1.2727 | -0.0974 | 0.9818 |
| 1.7455 | -0.1359 | 0.9818 |
| 2.1073 | -0.1256 | 0.9818 |
| 2.4140 | -0.0961 | 0.9818 |
| 2.6189 | -0.0520 | 0.9818 |
| 2.6909 | 0.0000 | 0.9818 |
| | | |
| 0.3216 | 0.0000 | 0.9454 |
| 0.3273 | -0.0020 | 0.9454 |
| 0.8000 | -0.0814 | 0.9454 |
| 1.2727 | -0.1284 | 0.9454 |
| 1.7455 | -0.1779 | 0.9454 |
| 2.1073 | -0.1644 | 0.9454 |
| 2.4140 | -0.1258 | 0.9454 |
| 2.6189 | -0.0681 | 0.9454 |
| 2.6909 | 0.0000 | 0.9454 |
| | | |
| 0.3046 | 0.0000 | 0.9091 |
| 0.3273 | -0.0092 | 0.9091 |
| 0.8000 | -0.0935 | 0.9091 |
| 1.2727 | -0.1487 | 0.9091 |
| 1.7455 | -0.2051 | 0.9091 |
| 2.1073 | -0.1895 | 0.9091 |
| 2.4140 | -0.1450 | 0.9091 |
| 2.6189 | -0.0785 | 0.9091 |
| 2.6909 | 0.0000 | 0.9091 |
| | | |
| 0.2892 | 0.0000 | 0.8727 |
| 0.3273 | -0.0138 | 0.8727 |
| 0.8000 | -0.1026 | 0.8727 |
| 1.2727 | -0.1657 | 0.8727 |
| 1.7455 | -0.2267 | 0.8727 |
| 2.1073 | -0.2094 | 0.8727 |
| 2.4140 | -0.1603 | 0.8727 |
| 2.6189 | -0.0868 | 0.8727 |
| 2.6909 | 0.0000 | 0.8727 |
| | | |
| 0.2624 | 0.0000 | 0.8000 |
| 0.3273 | -0.0223 | 0.8000 |
| 0.8000 | -0.1162 | 0.8000 |
| 1.2727 | -0.1892 | 0.8000 |
| 1.7455 | -0.2586 | 0.8000 |
| 2.1073 | -0.2389 | 0.8000 |
| 2.4140 | -0.1829 | 0.8000 |
| 2.6189 | -0.0990 | 0.8000 |
| 2.6909 | 0.0000 | 0.8000 |
| | | |
| 0.2202 | 0.0000 | 0.7273 |
| 0.3273 | -0.0351 | 0.7273 |
| 0.8000 | -0.1260 | 0.7273 |
| 1.2727 | -0.2059 | 0.7273 |
| 1.7455 | -0.2874 | 0.7273 |
| 2.1073 | -0.2655 | 0.7273 |
| 2.4140 | -0.2032 | 0.7273 |
| 2.6189 | -0.1100 | 0.7273 |
| 2.6909 | 0.0000 | 0.7273 |
| | | |
| 0.0985 | 0.0000 | 0.6545 |
| 0.3273 | -0.0846 | 0.6545 |
| 0.8000 | -0.1341 | 0.6545 |
| 1.2727 | -0.2213 | 0.6545 |
| 1.7455 | -0.3149 | 0.6545 |
| 2.1073 | -0.2909 | 0.6545 |
| 2.4140 | -0.2227 | 0.6545 |
| 2.6189 | -0.1205 | 0.6545 |
| 2.6909 | 0.0000 | 0.6545 |
| | | |
| 0.0985 | 0.0000 | 0.5818 |
| 0.3273 | -0.0953 | 0.5818 |
| 0.8000 | -0.1391 | 0.5818 |
| 1.2727 | -0.2372 | 0.5818 |
| 1.7455 | -0.3434 | 0.5818 |
| 2.1073 | -0.3173 | 0.5818 |
| 2.4140 | -0.2428 | 0.5818 |
| 2.6189 | -0.1314 | 0.5818 |
| 2.6909 | 0.0000 | 0.5818 |
| | | |
| 0.1715 | 0.0000 | 0.5091 |
| 0.3273 | -0.0538 | 0.5091 |
| 0.8000 | -0.1487 | 0.5091 |
| 1.2727 | -0.2549 | 0.5091 |
| 1.7455 | -0.3751 | 0.5091 |
| 2.1073 | -0.3465 | 0.5091 |
| 2.4140 | -0.2652 | 0.5091 |
| 2.6189 | -0.1435 | 0.5091 |
| 2.6909 | 0.0000 | 0.5091 |
| | | |
| 0.2259 | 0.0000 | 0.4363 |
| 0.3273 | -0.0363 | 0.4363 |
| 0.8000 | -0.1584 | 0.4363 |
| 1.2727 | -0.2818 | 0.4363 |
| 1.7455 | -0.4128 | 0.4363 |
| 2.1073 | -0.3814 | 0.4363 |
| 2.4140 | -0.2919 | 0.4363 |
| 2.6189 | -0.1580 | 0.4363 |
| 2.6909 | 0.0000 | 0.4363 |
| | | |
| 0.2226 | 0.0000 | 0.3636 |
| 0.3273 | -0.0432 | 0.3636 |
| 0.8000 | -0.1767 | 0.3636 |
| 1.2727 | -0.3154 | 0.3636 |
| 1.7455 | -0.4598 | 0.3636 |
| 2.1073 | -0.4248 | 0.3636 |
| 2.4140 | -0.3251 | 0.3636 |
| 2.6189 | -0.1760 | 0.3636 |
| 2.6909 | 0.0000 | 0.3636 |
| | | |
| 0.1991 | 0.0000 | 0.2909 |
| 0.3273 | -0.0538 | 0.2909 |
| 0.8000 | -0.2039 | 0.2909 |
| 1.2727 | -0.3604 | 0.2909 |
| 1.7455 | -0.5169 | 0.2909 |
| 2.1073 | -0.4776 | 0.2909 |
| 2.4140 | -0.3655 | 0.2909 |
| 2.6189 | -0.1978 | 0.2909 |
| 2.6909 | 0.0000 | 0.2909 |
| | | |
| 0.0742 | 0.0000 | 0.1455 |
| 0.3273 | -0.1312 | 0.1455 |
| 0.8000 | -0.3231 | 0.1455 |
| 1.2727 | -0.4980 | 0.1455 |
| 1.7455 | -0.6602 | 0.1455 |
| 2.1073 | -0.6099 | 0.1455 |
| 2.4140 | -0.4668 | 0.1455 |
| 2.6189 | -0.2526 | 0.1455 |
| 2.6909 | 0.0000 | 0.1455 |
| | | |
| -0.3881 | 0.0000 | 0.0000 |
| -0.1454 | -0.1244 | 0.0000 |
| 0.3273 | -0.3126 | 0.0000 |
| 0.8000 | -0.4931 | 0.0000 |
| 1.2727 | -0.6590 | 0.0000 |
| 1.7455 | -0.8054 | 0.0000 |
| 2.1073 | -0.7441 | 0.0000 |
| 2.4140 | -0.5695 | 0.0000 |
| 2.6189 | -0.3082 | 0.0000 |
| 2.6909 | 0.0000 | 0.0000 |



SECTION: NACA 0020 For All Rudders

Chordwise position of tappings (%c from L.E.):
0, 2.5, 5, 10, 20, 30, 40, 50, 60, 70, 80, 90, 95

All dimensions in mm

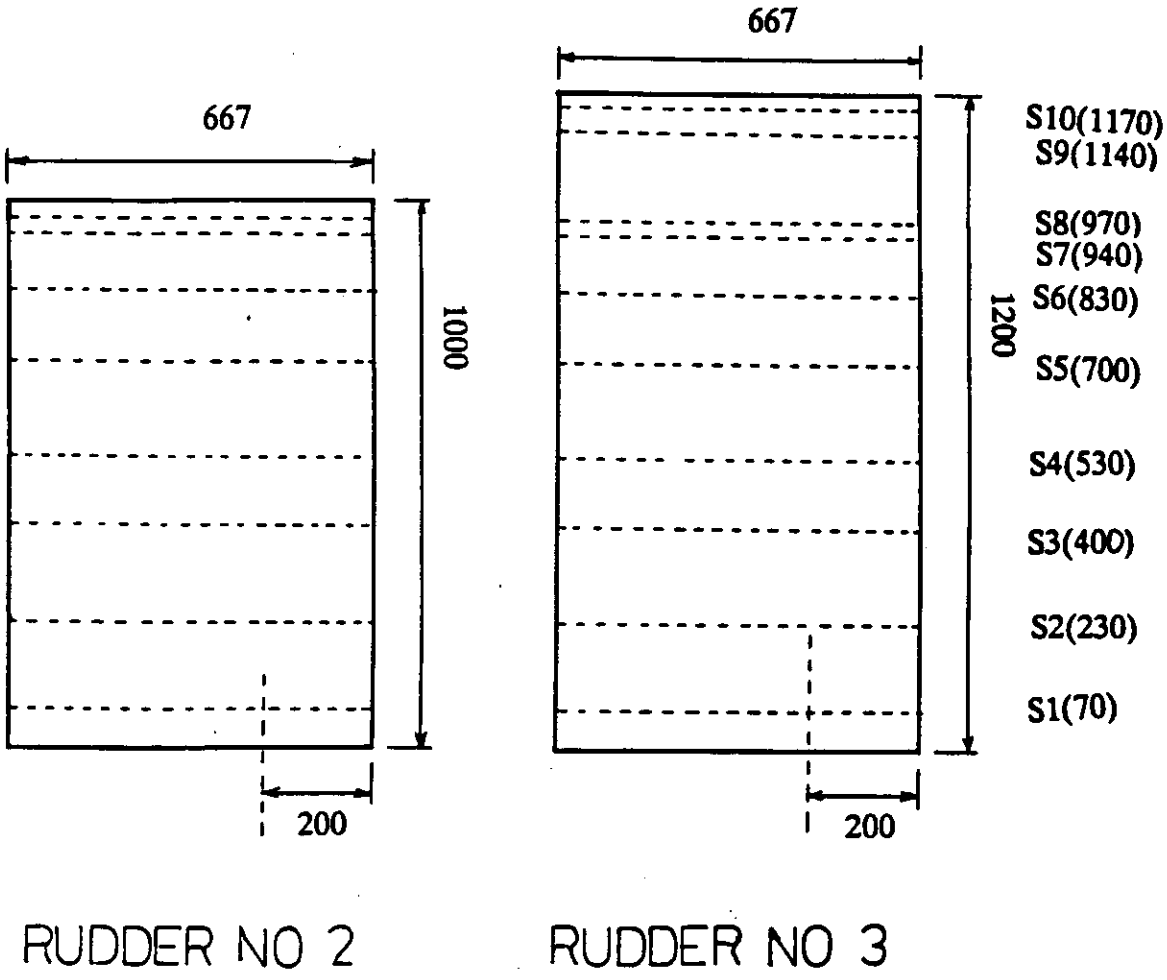



Figure 1 Overall Dimensions of rudder models

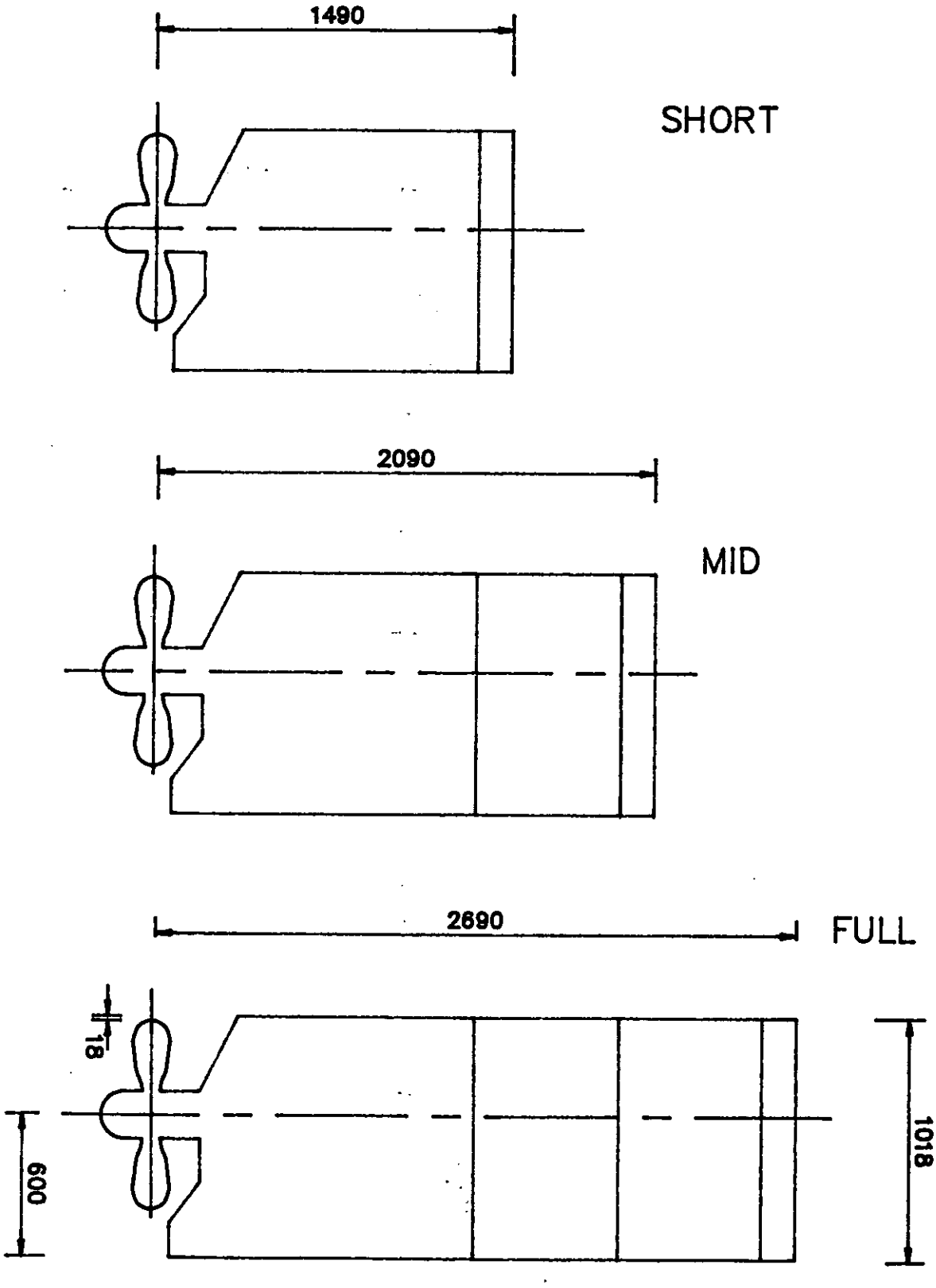



Figure 2 Overall Dimensions of Three Rudder Centre-board Configurations

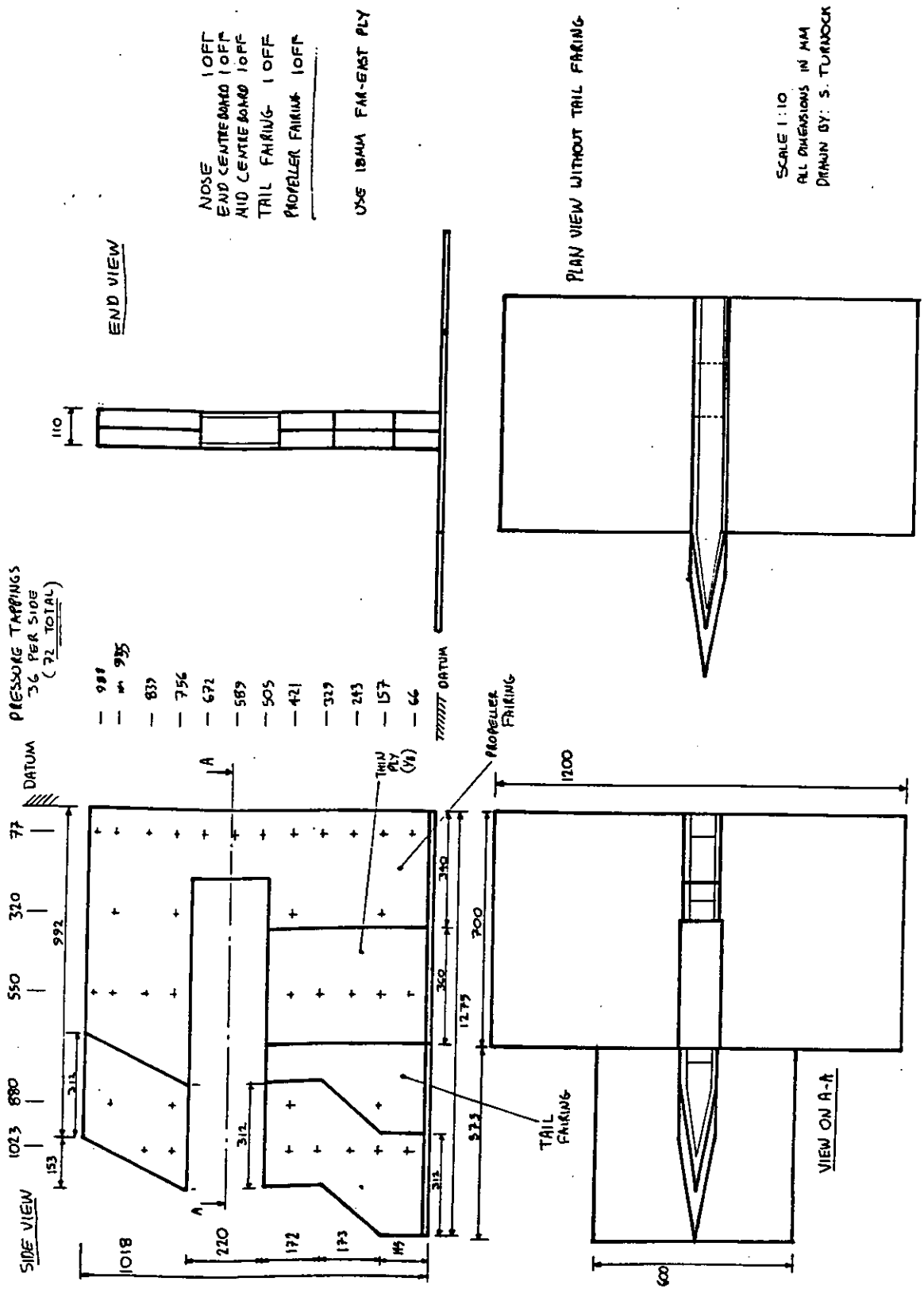



Figure 3 Detail drawing of tail and propeller centre-board model

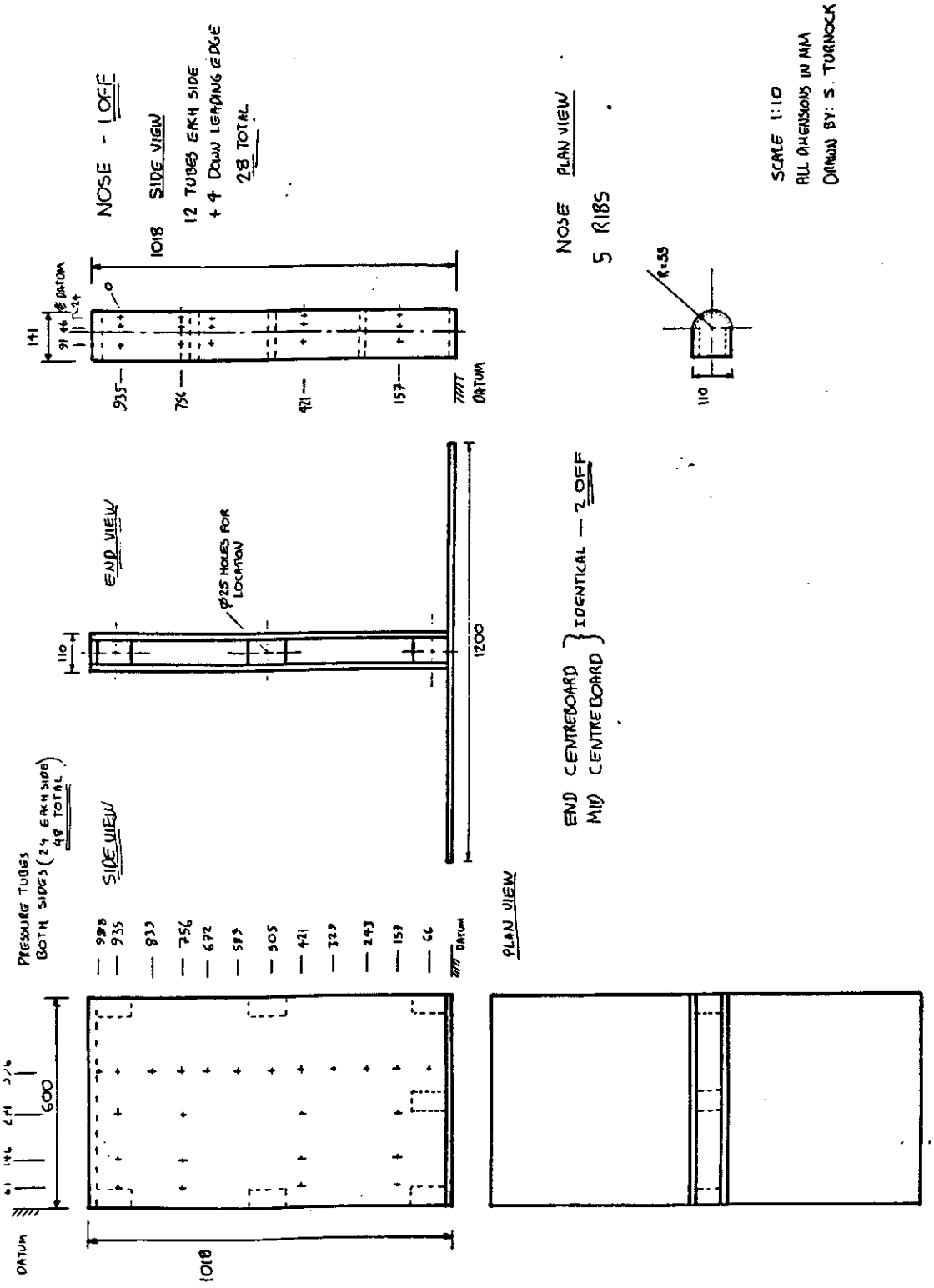



Figure 4 Detail drawing of middle/end and nose centre-board

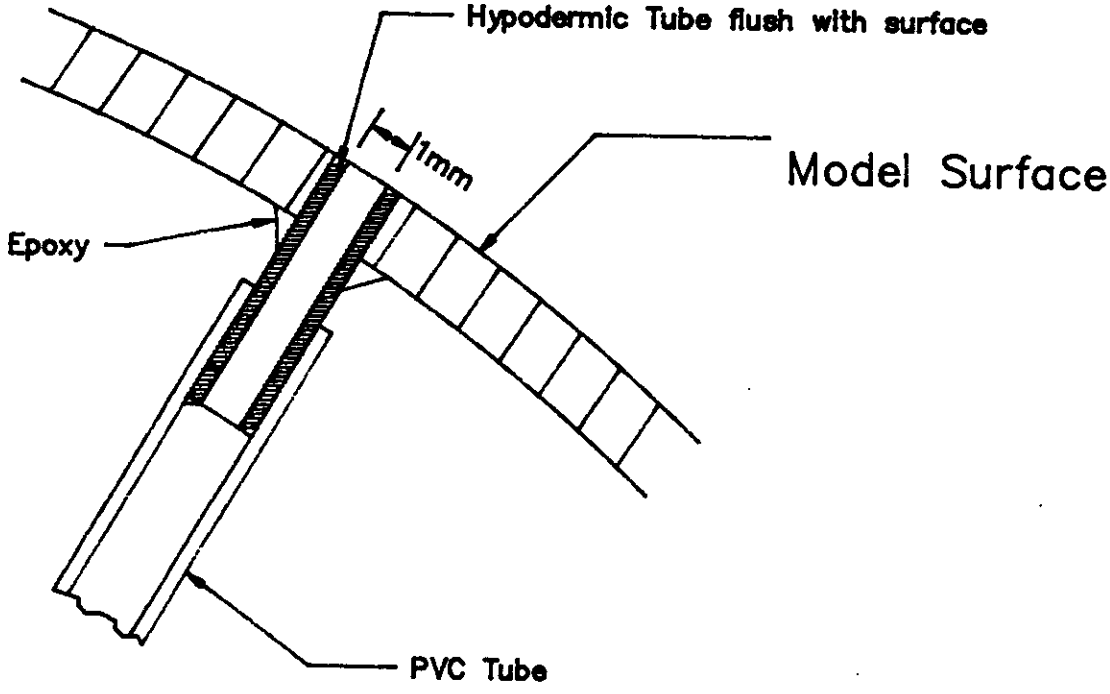



Figure 5 Construction detail of hull and centre-board pressure tapping

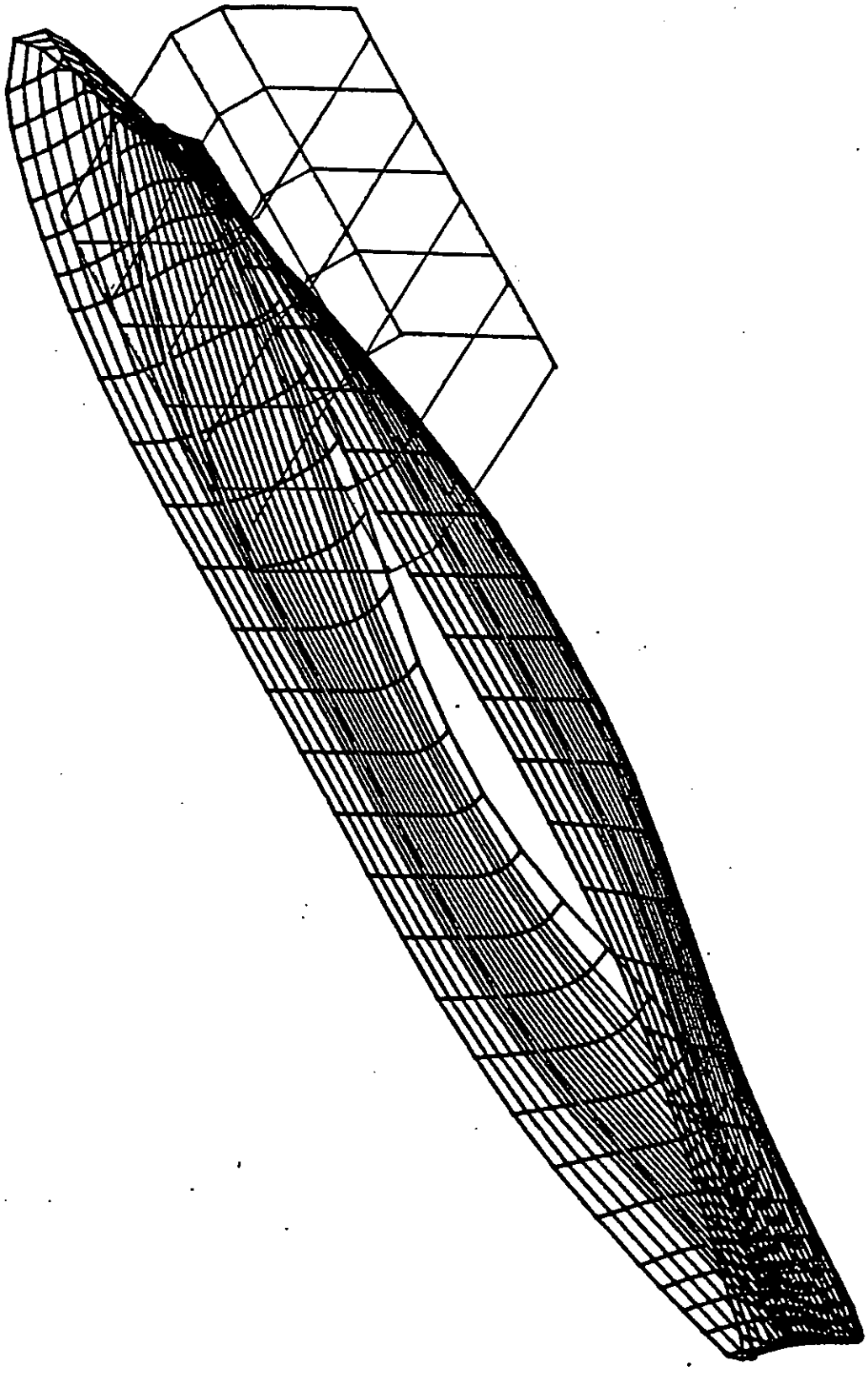


Figure 6 Schematic showing tunnel working section and scaled mariner hull

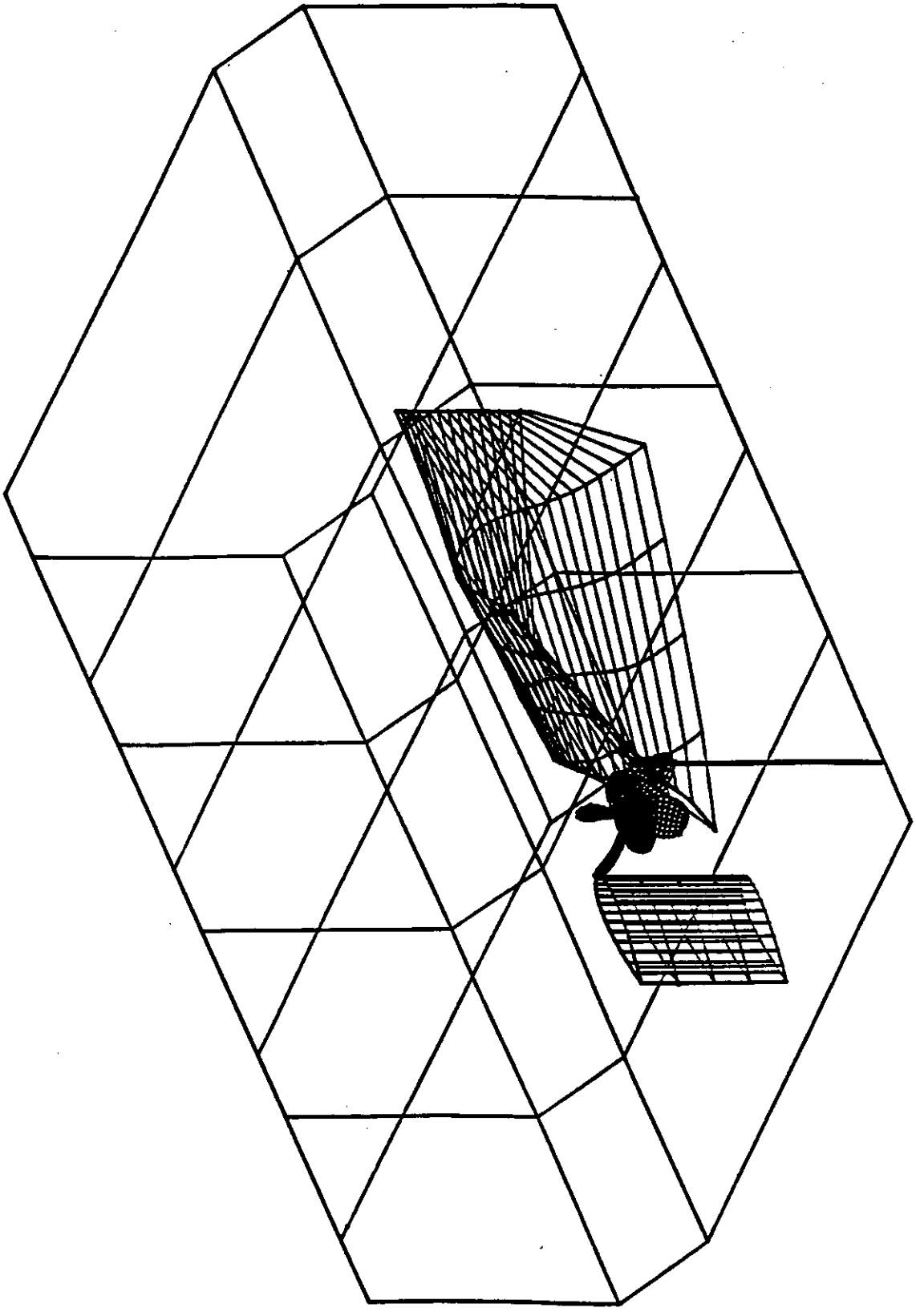
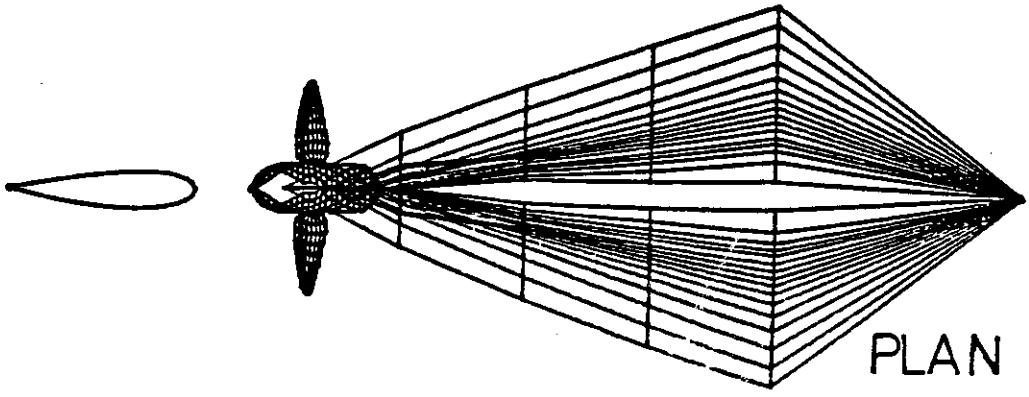
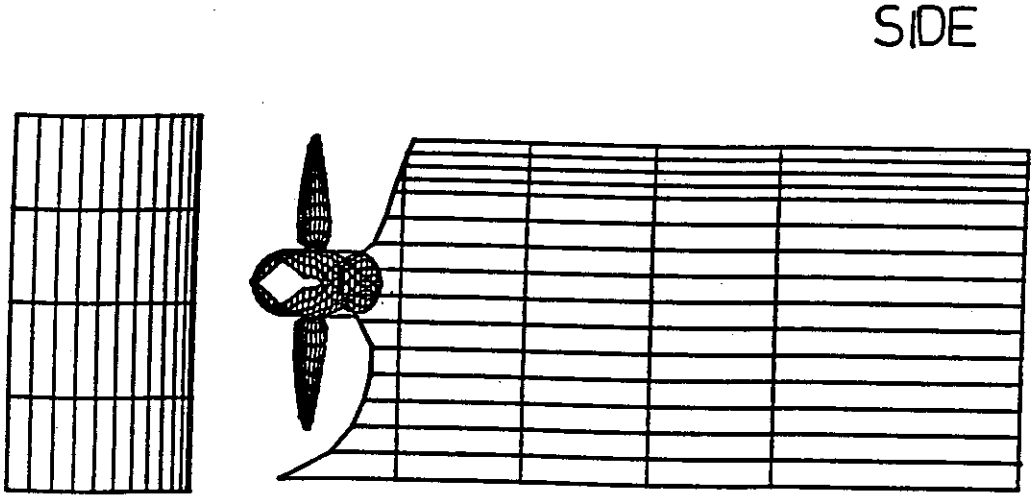


Figure 7 Isometric View of Rudder, Propeller, and Hull in Wind Tunnel



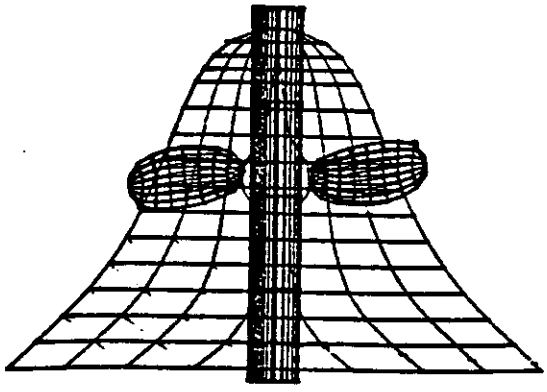




Figure 8 Plan, side and end elevations of Mariner stern form

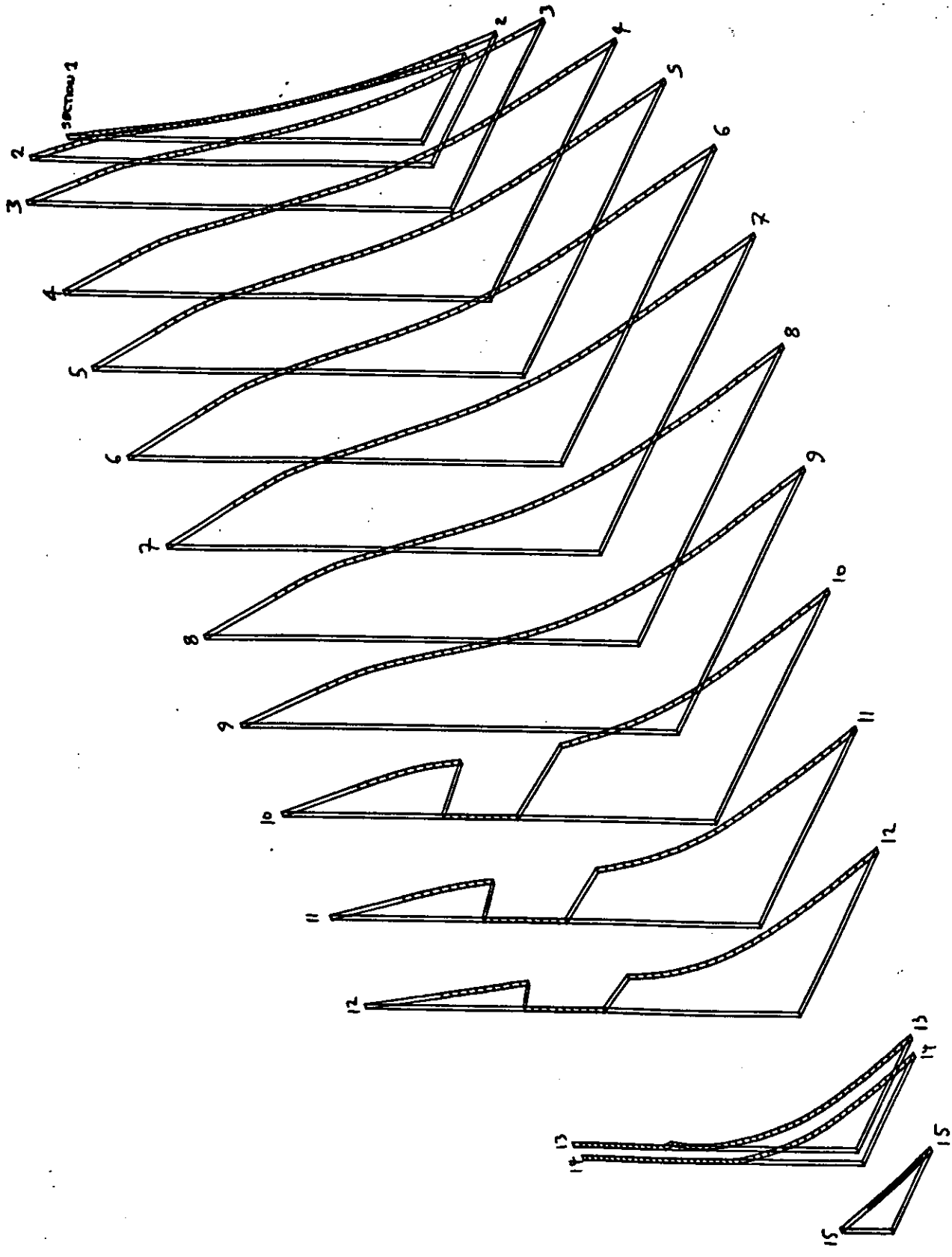


Figure 9 Isometric view of stern frames

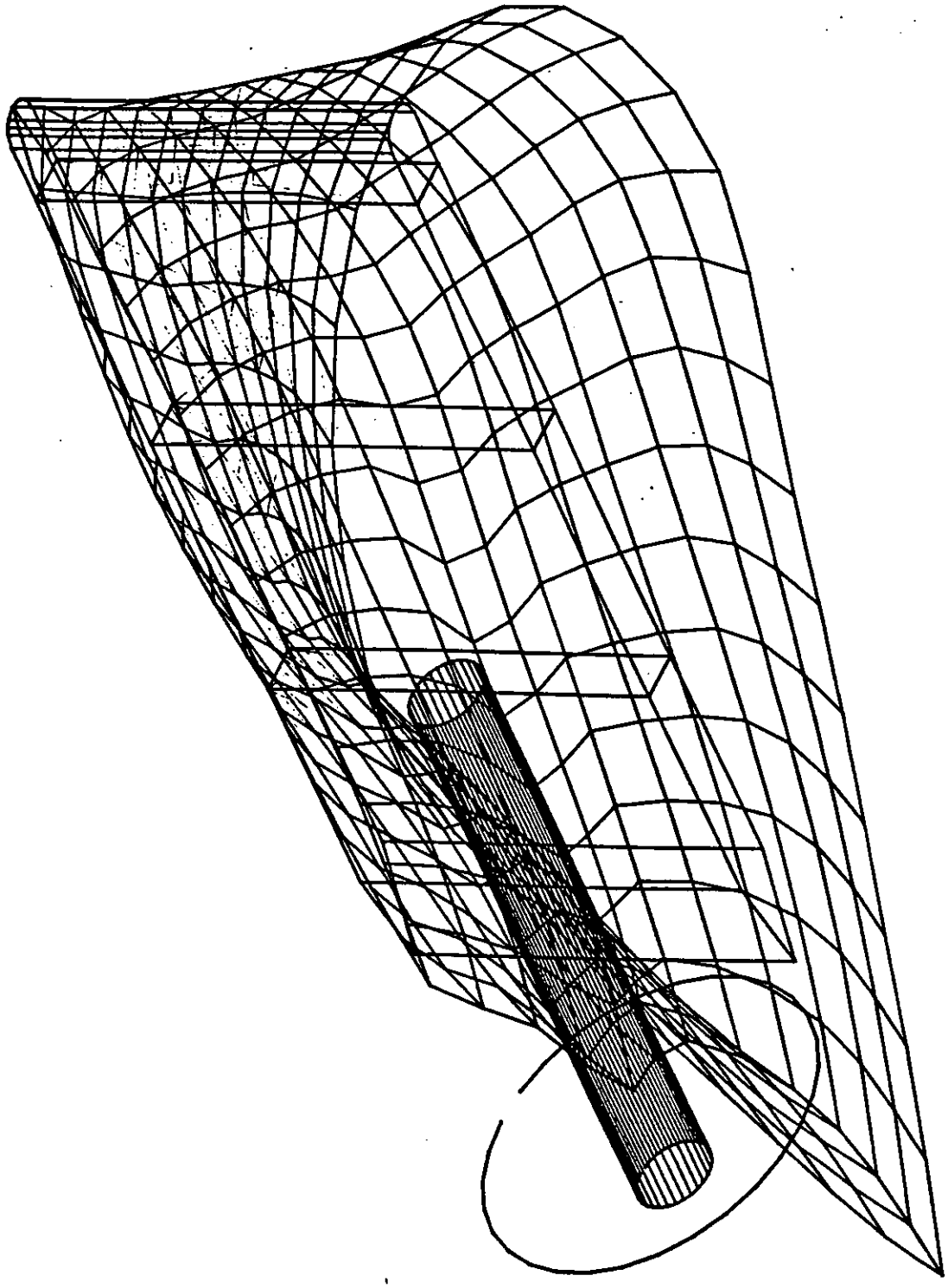
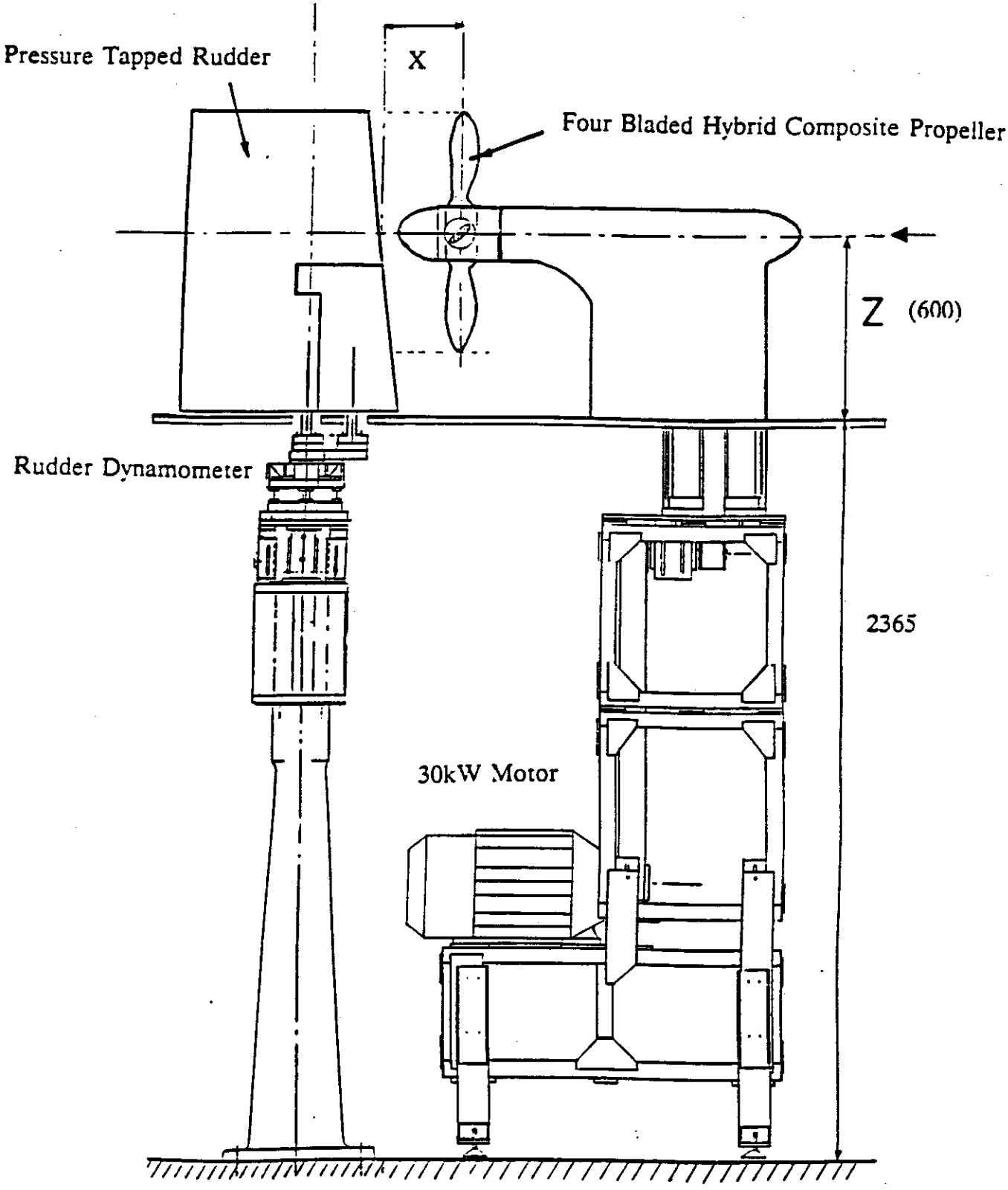


Figure 10 View of Hull Model




All dimensions in mm

Figure 11 Side view of overall rudder (old stand) and propeller rigs

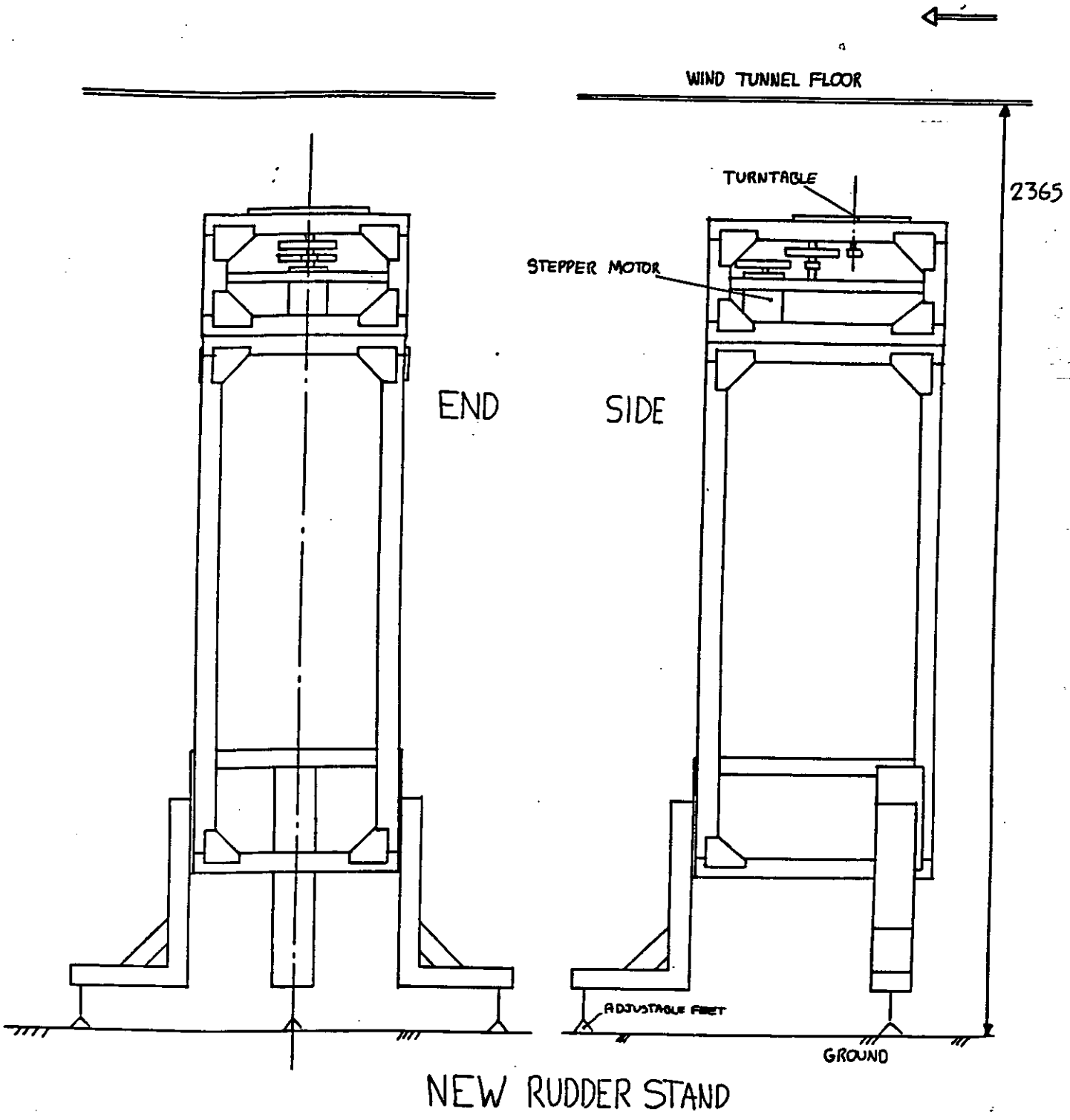



Figure 12 View of new rudder stand

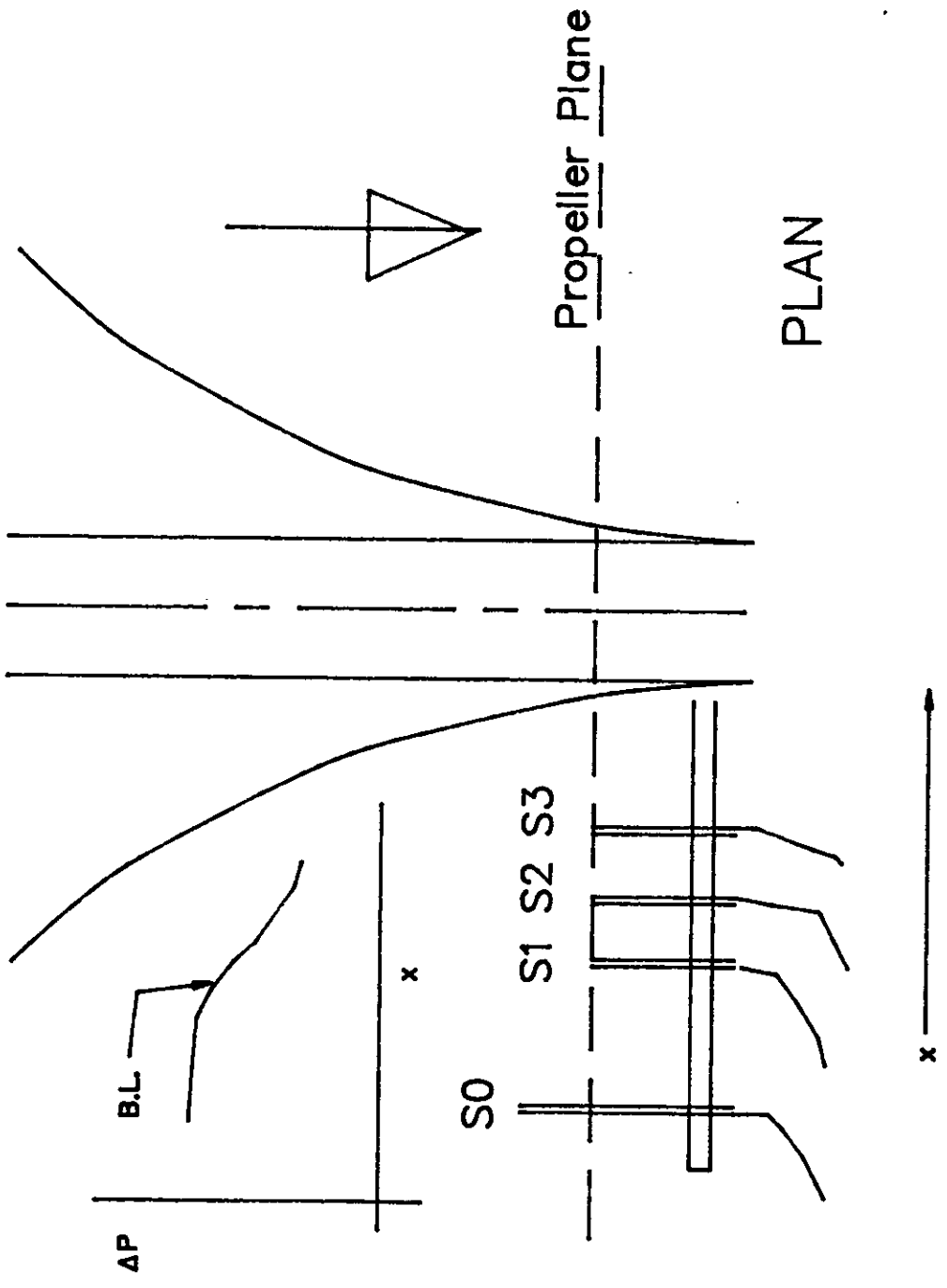



Figure 13 Pitot probe arrangement for measuring hull wake

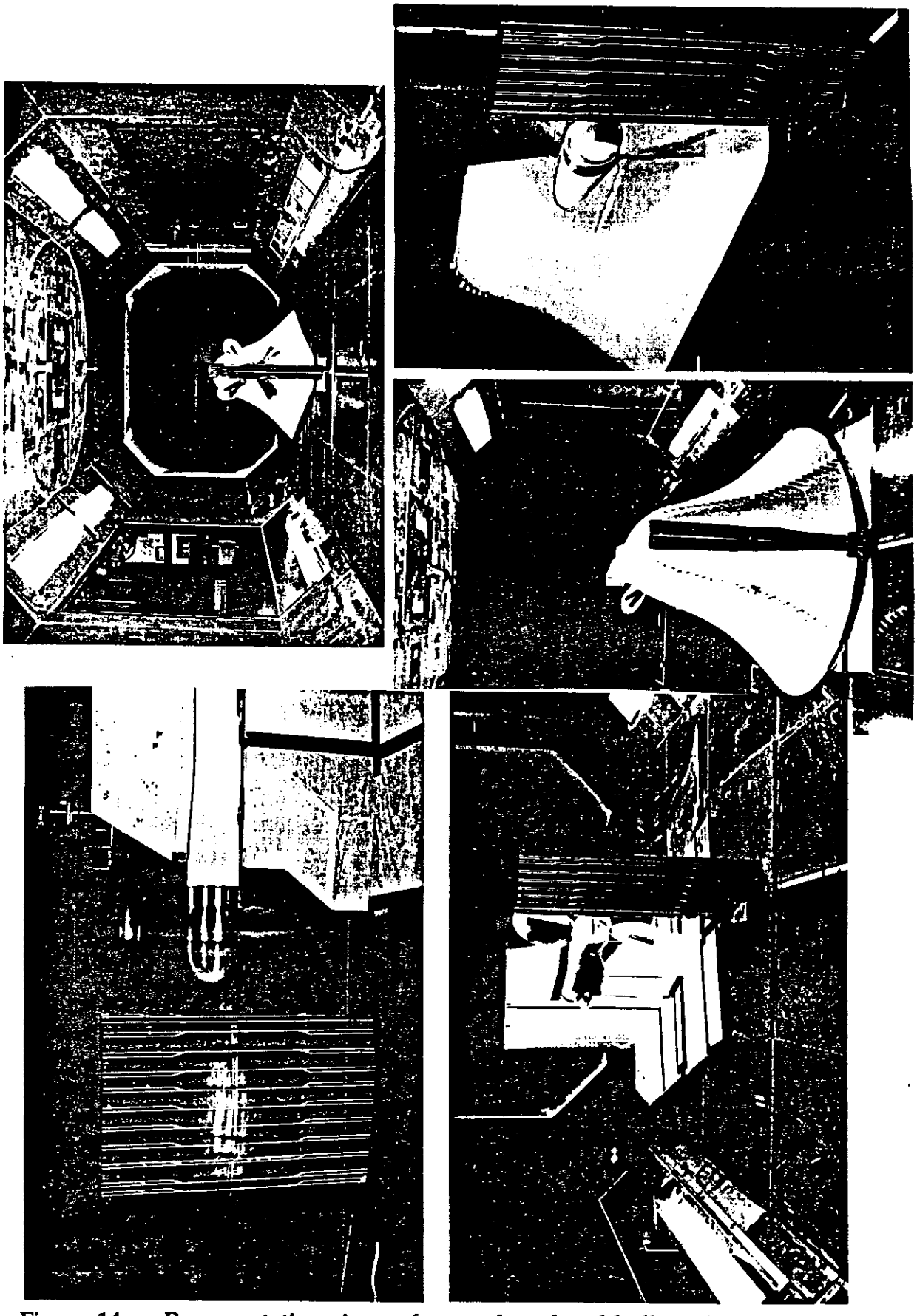


Figure 14 Representative views of centre-board and hull models

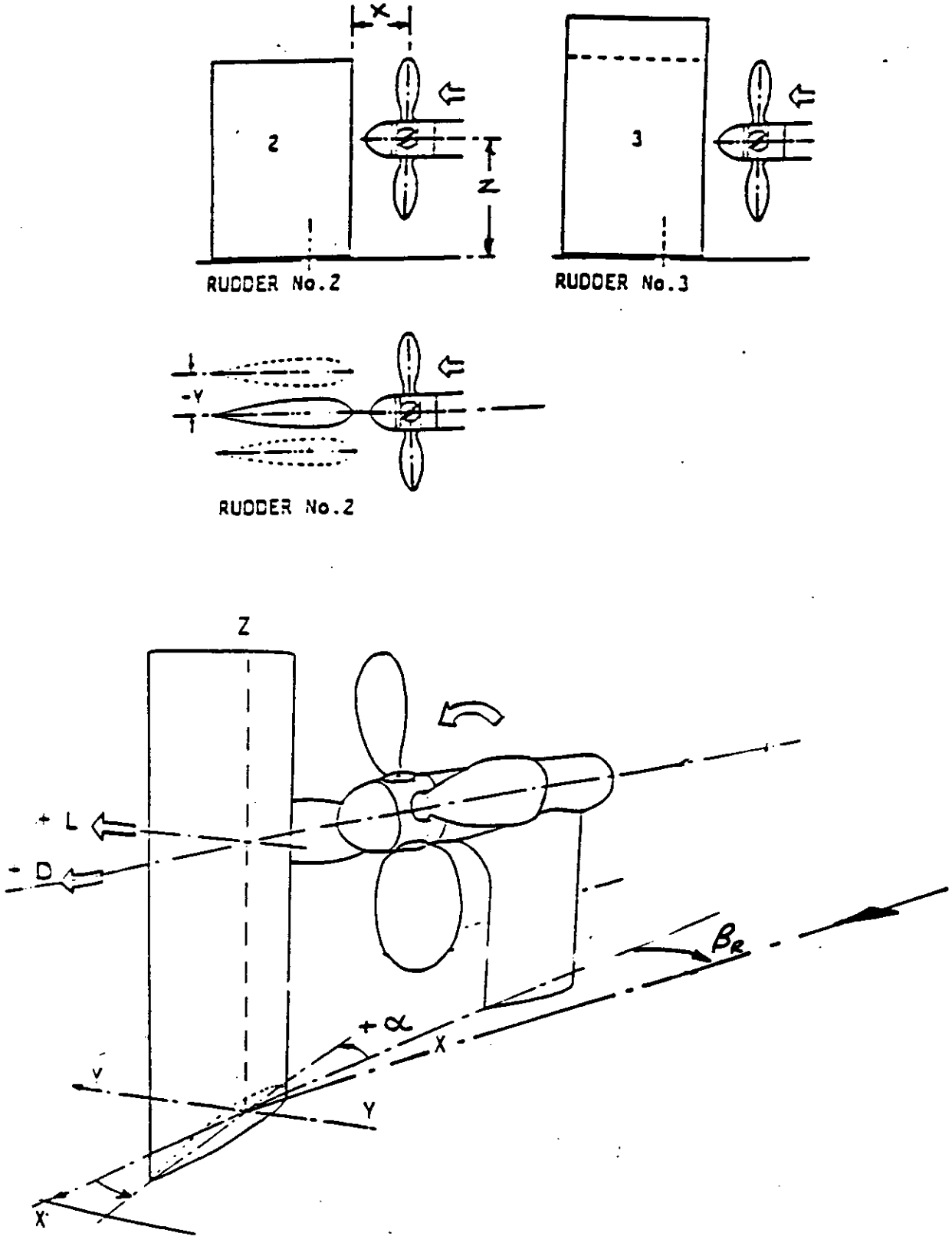



Figure 15 Schematic view of wind tunnel arrangement

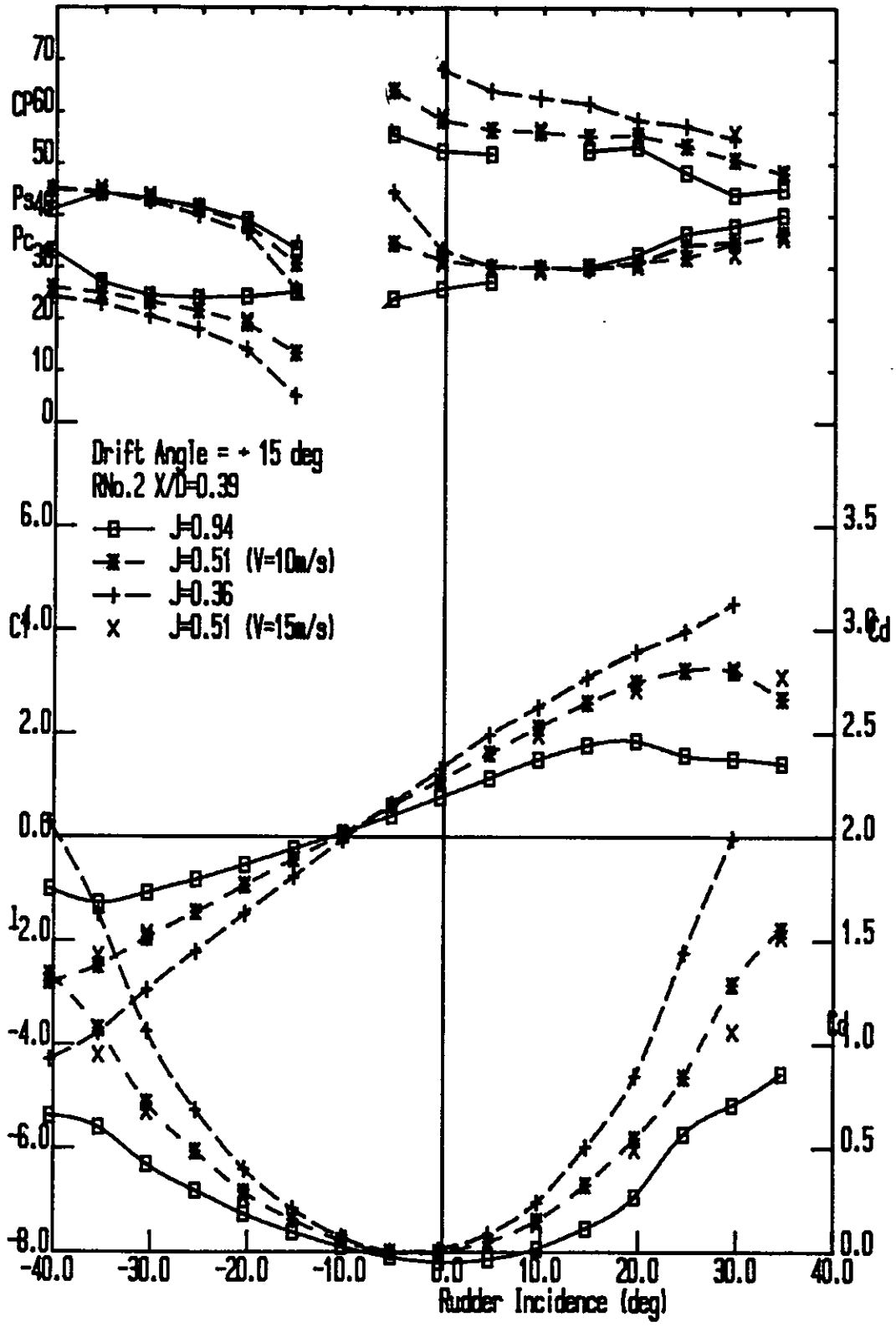



Figure 16 Effect of advance ratio on the performance of Rudder No.2 at drift angle of -15°

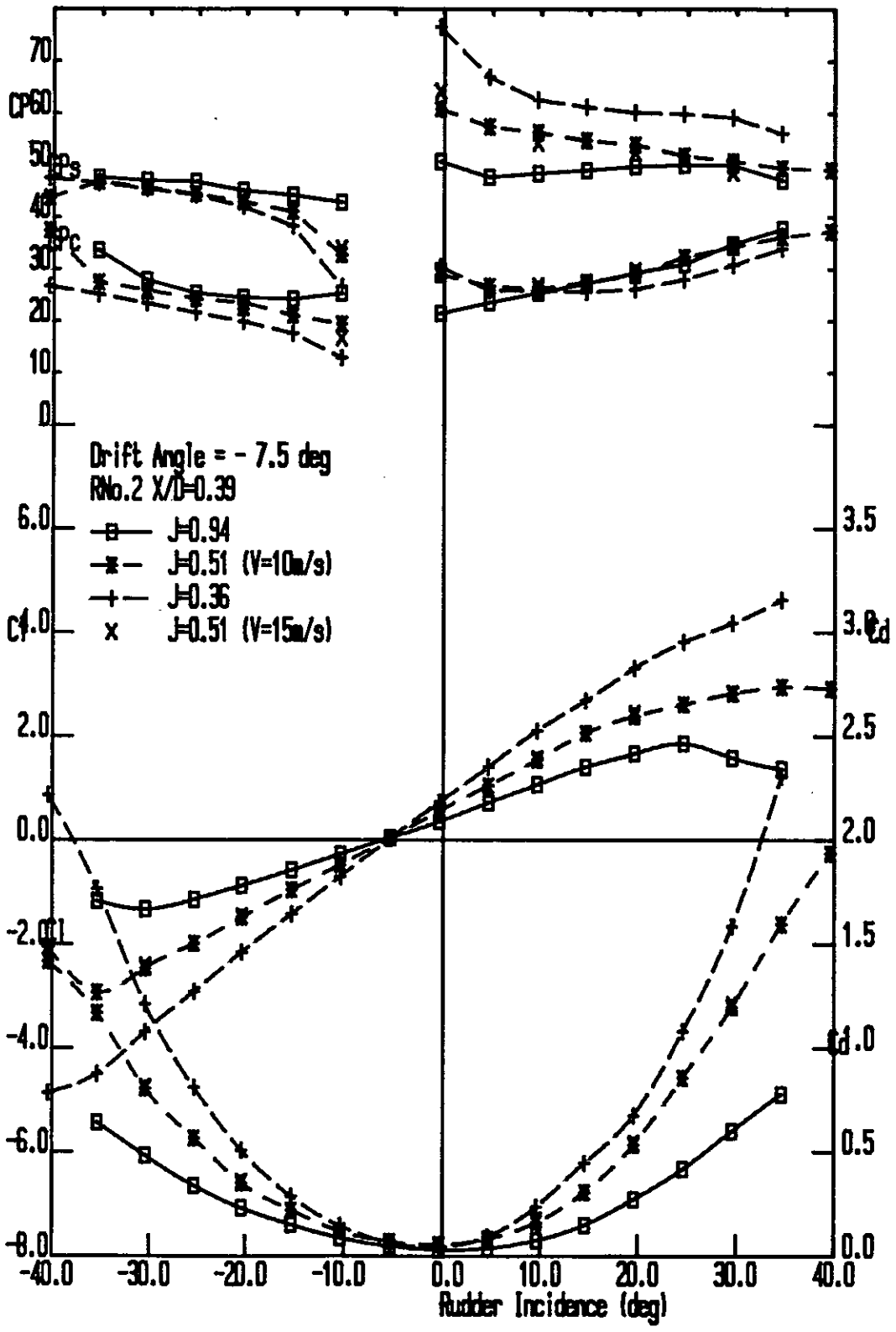



Figure 17 Effect of advance ratio on the performance of Rudder No.2 at drift angle of -7.5°

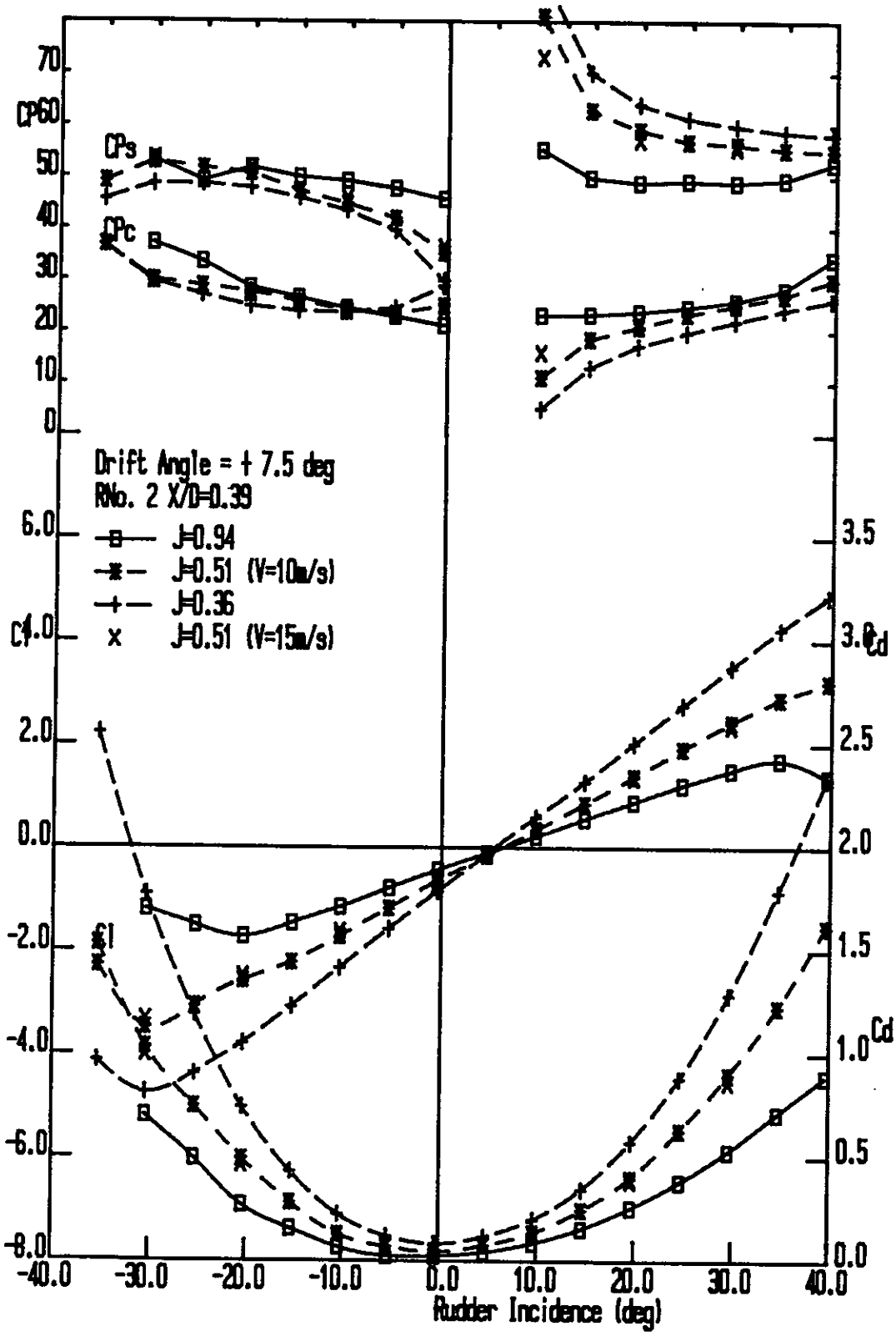



Figure 18 Effect of advance ratio on the performance of Rudder No.2 at drift angle of +7.5°

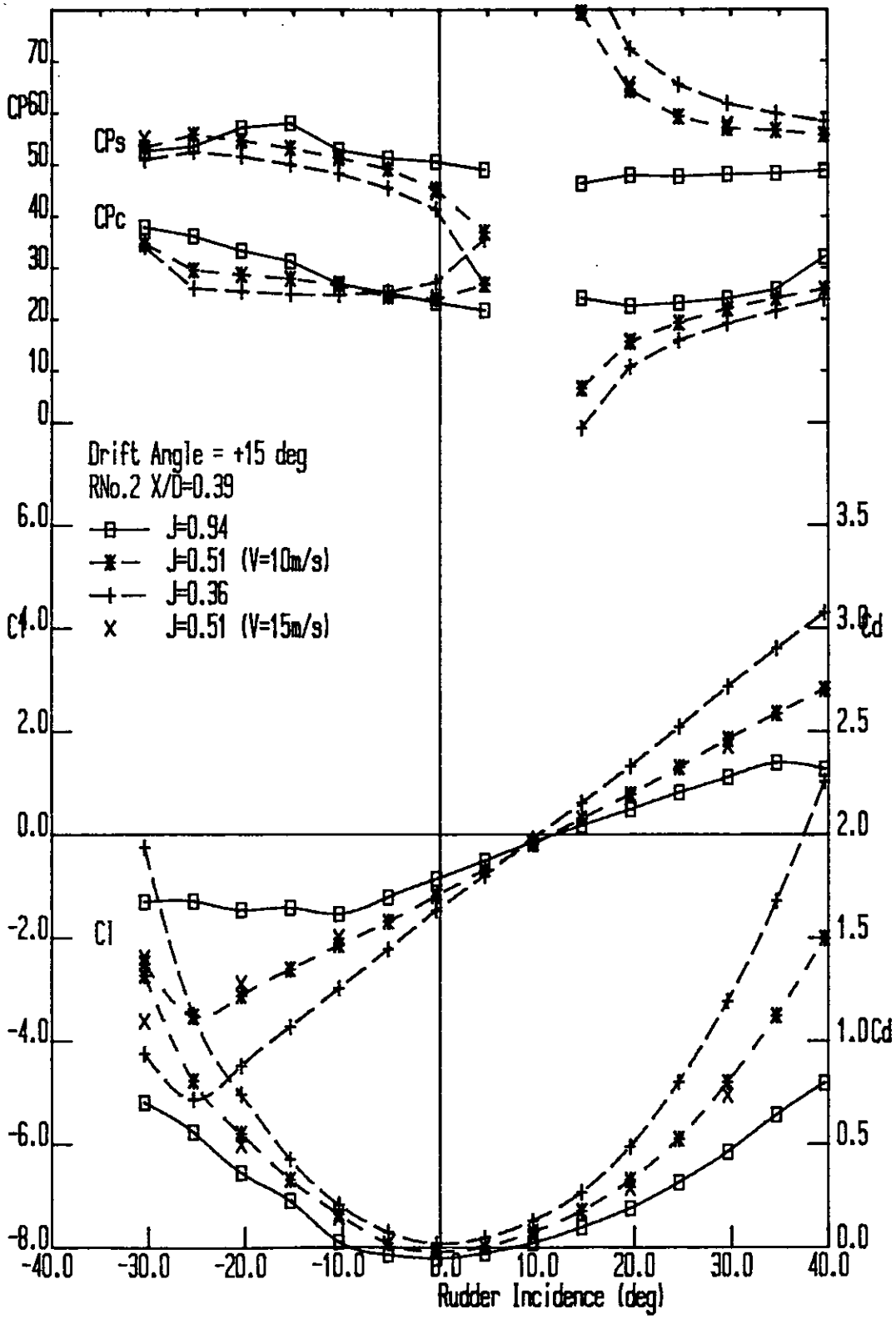



Figure 19 Effect of advance ratio on the performance of Rudder No.2 at drift angle of +15°

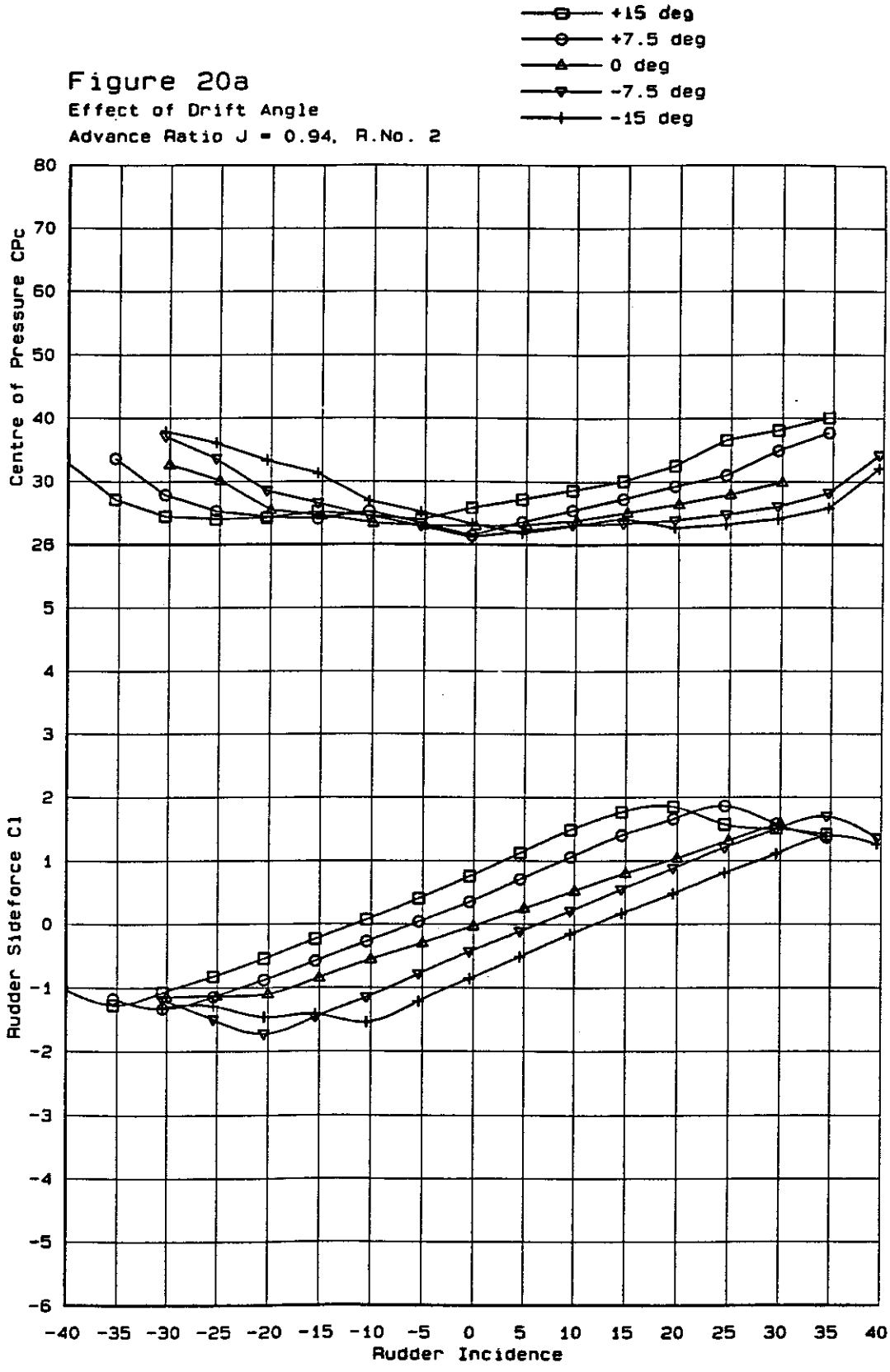



Figure 20 Effect of drift angle on the performance of Rudder No.2 at an Advance Ratio J of 0.94: Lift and CPc

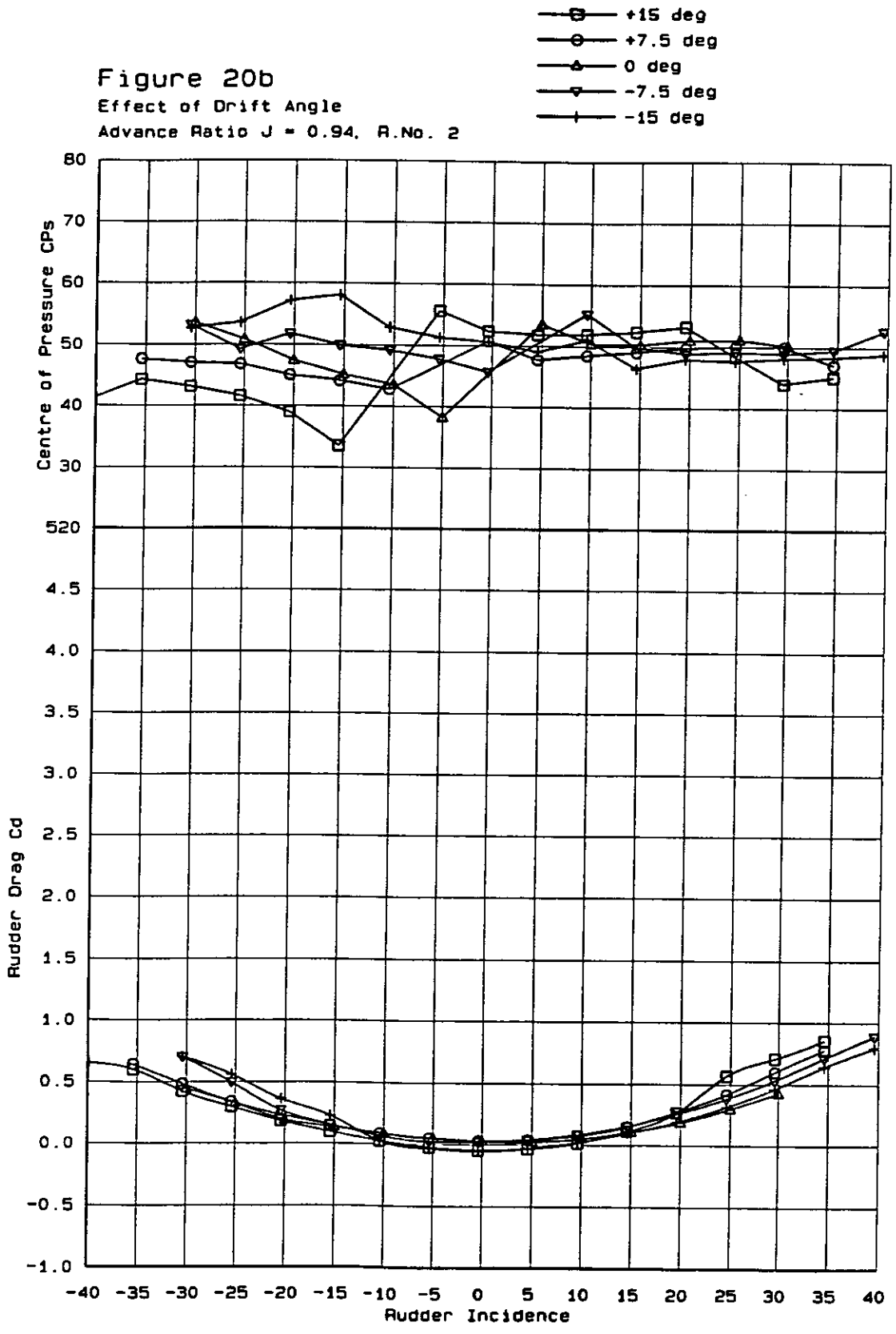



Figure 20b Effect of drift angle on the performance of Rudder No.2 at an Advance Ratio J of 0.94: Drag and CPs

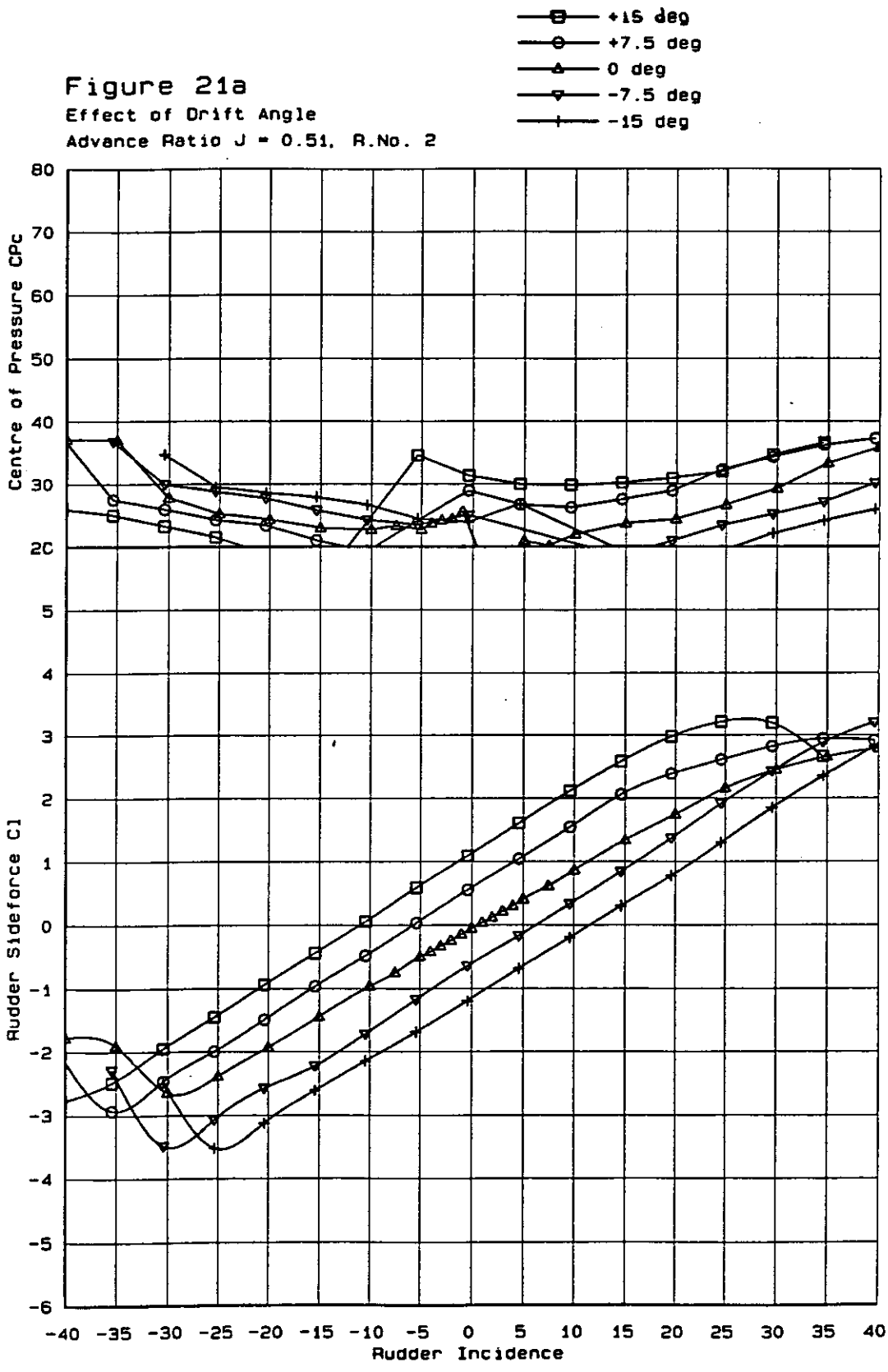



Figure 21a Effect of drift angle on the performance of Rudder No.2 at an Advance Ratio J of 0.51: Lift and CPc

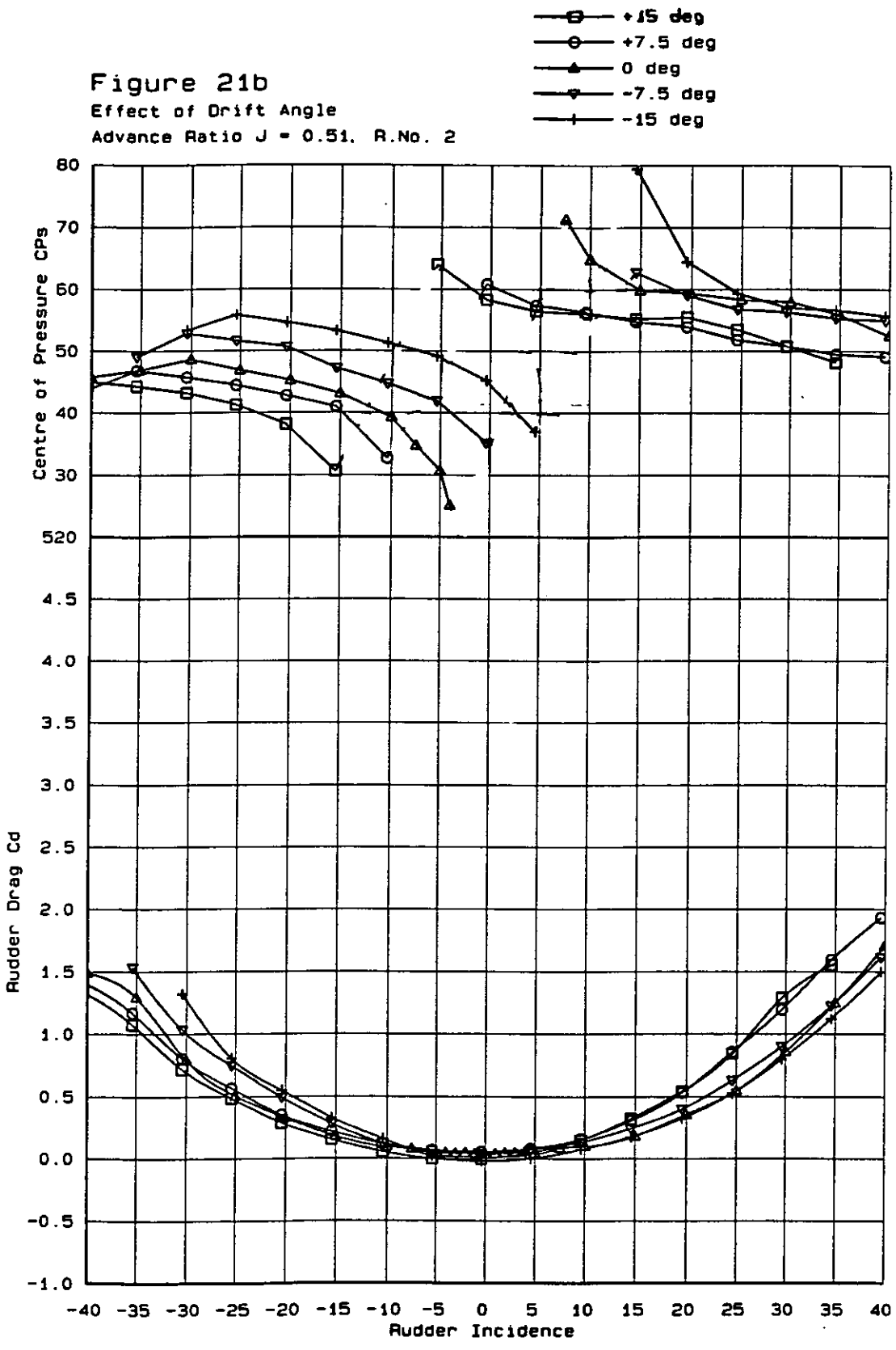



Figure 21b Effect of drift angle on the performance of Rudder No.2 at an Advance Ratio J of 0.51: Drag and CPs

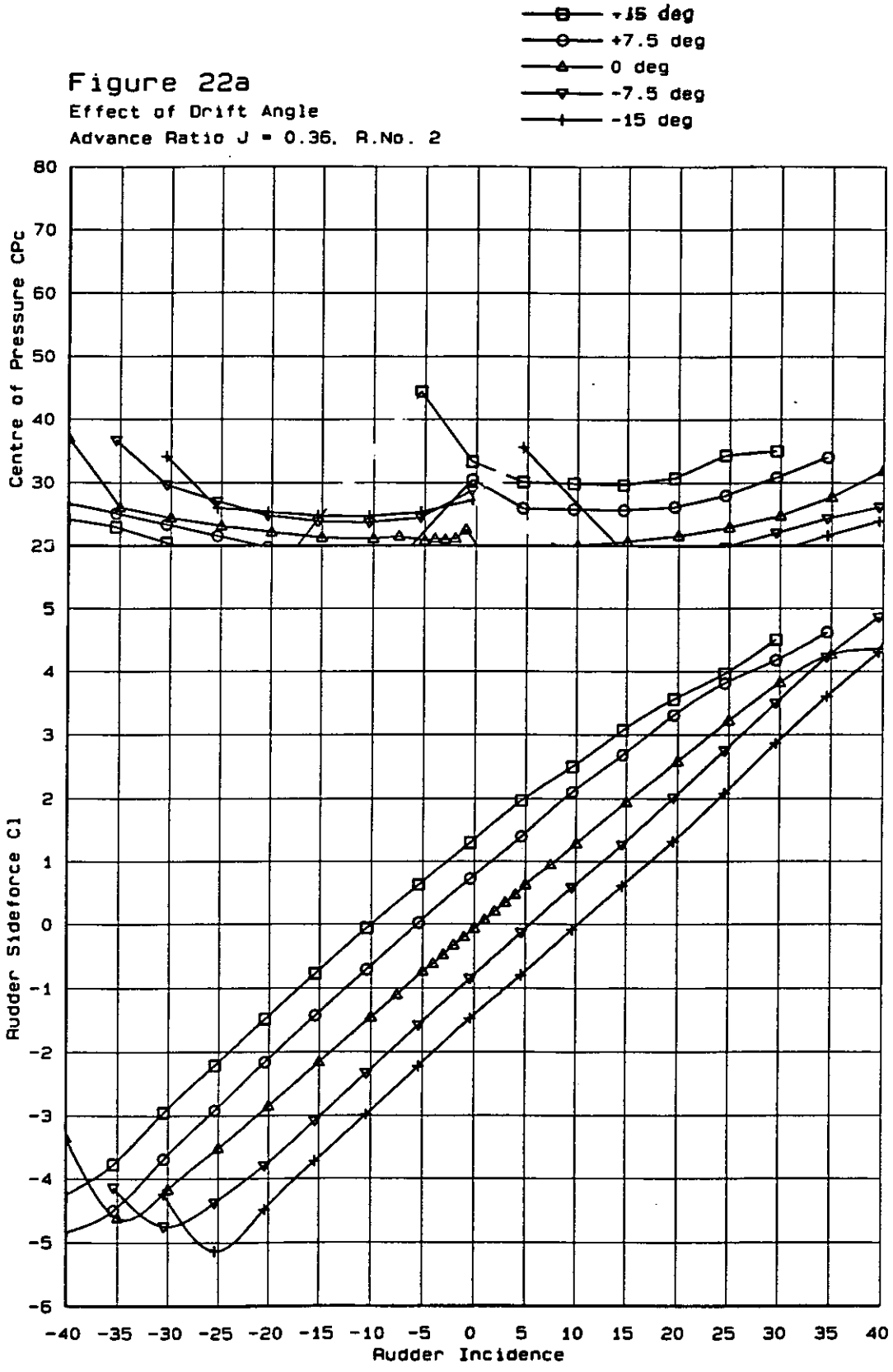



Figure 22a Effect of drift angle on the performance of Rudder No.2 at an Advance Ratio J of 0.36: Lift and CPc

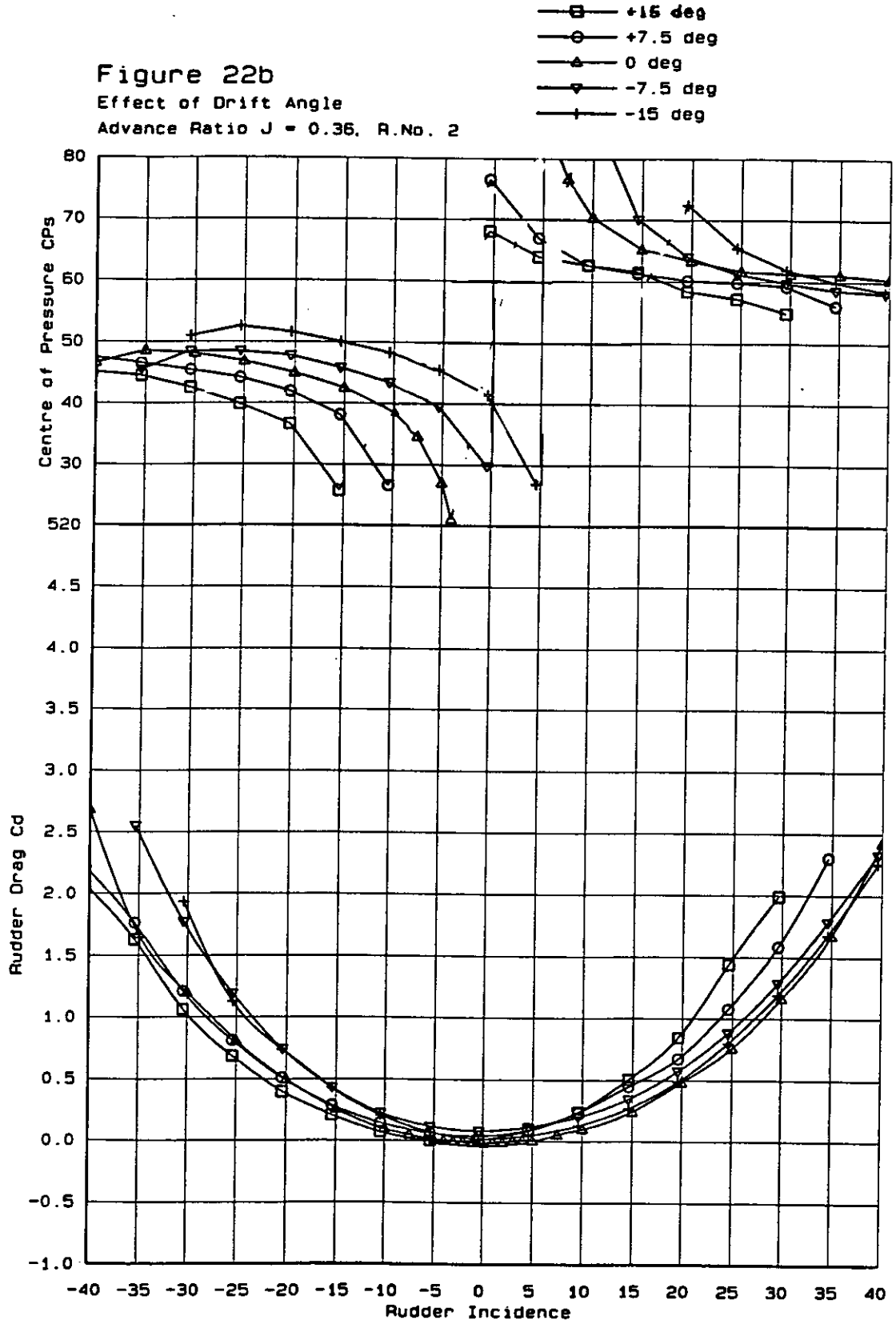



Figure 22b Effect of drift angle on the performance of Rudder No.2 at an Advance Ratio J of 0.36: Drag and CPs

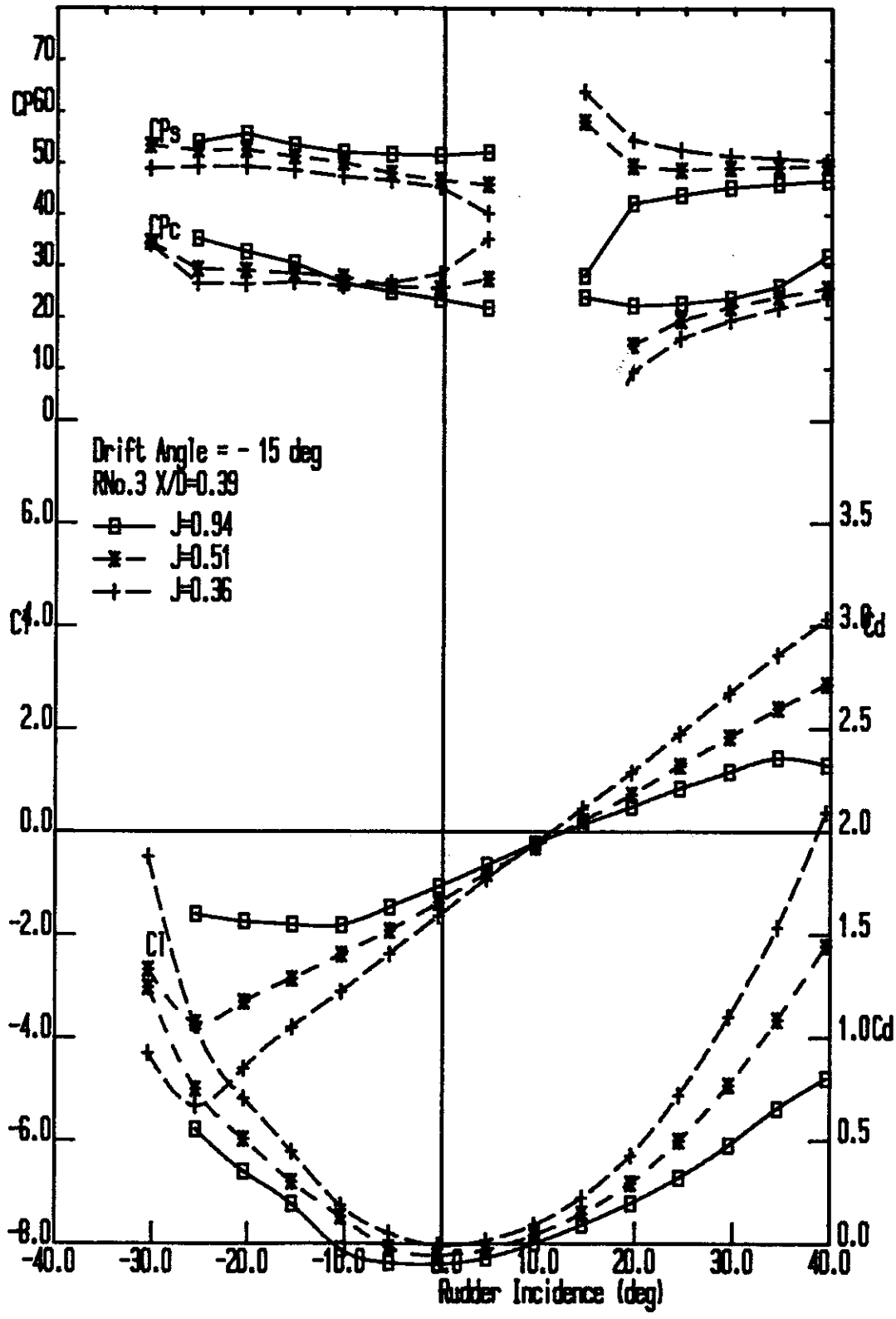



Figure 23 Effect of advance ratio on the performance of Rudder No.3 at a drift angle of -15°

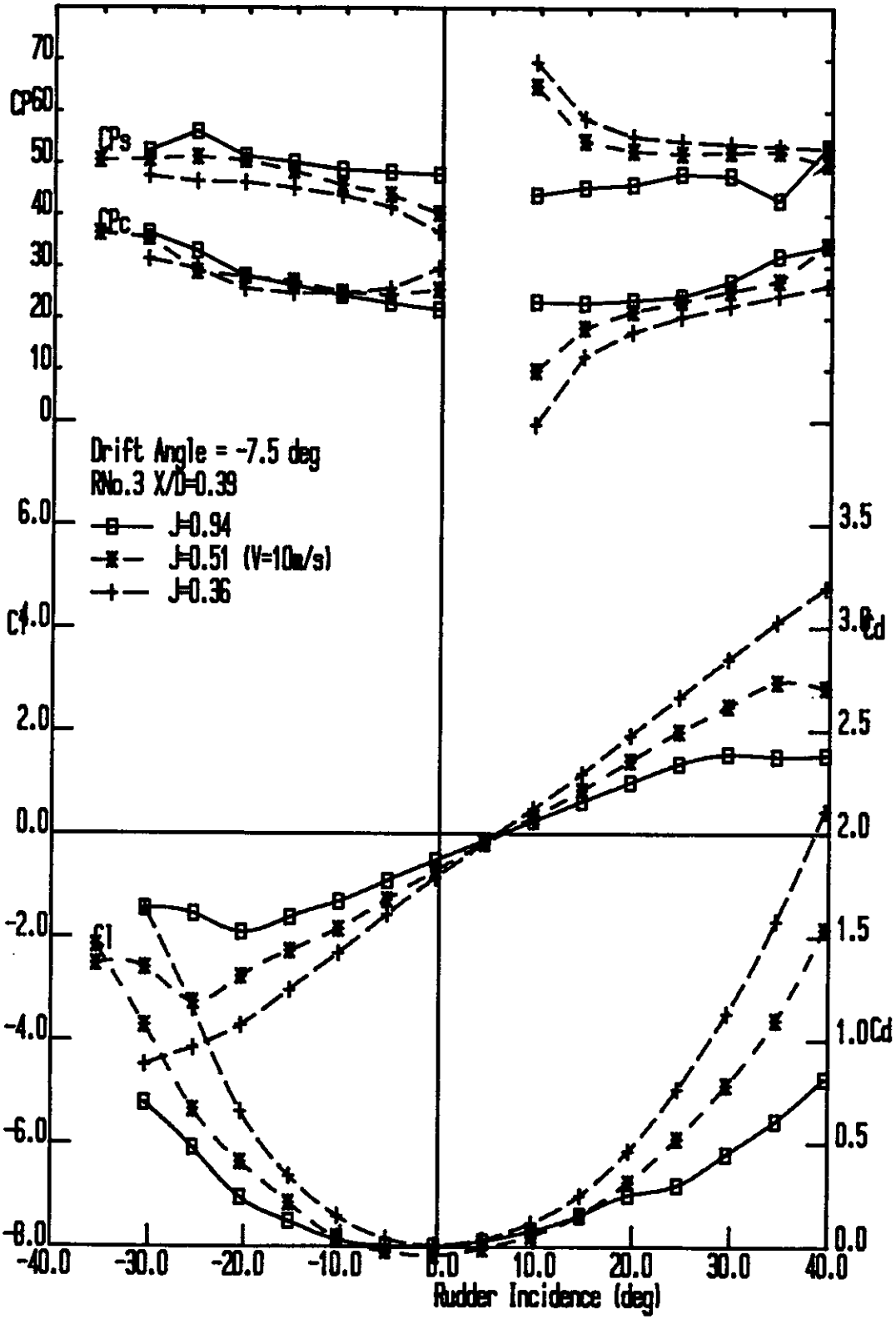



Figure 24 Effect of advance ratio on the performance of Rudder No.3 at a drift angle of -7.5°

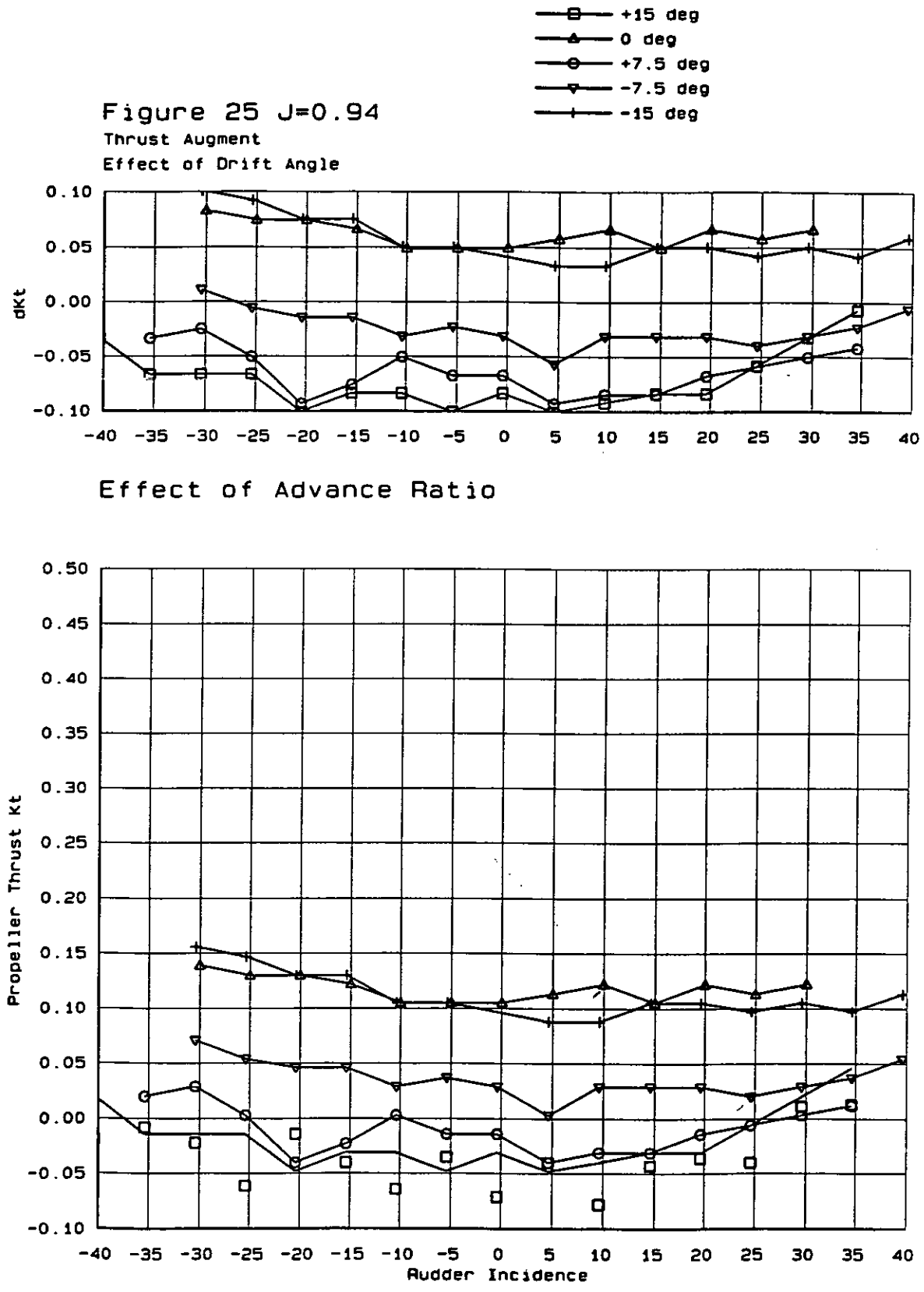



Figure 25 Effect of drift angle on propeller thrust and thrust augment for an Advance Ratio J of 0.94

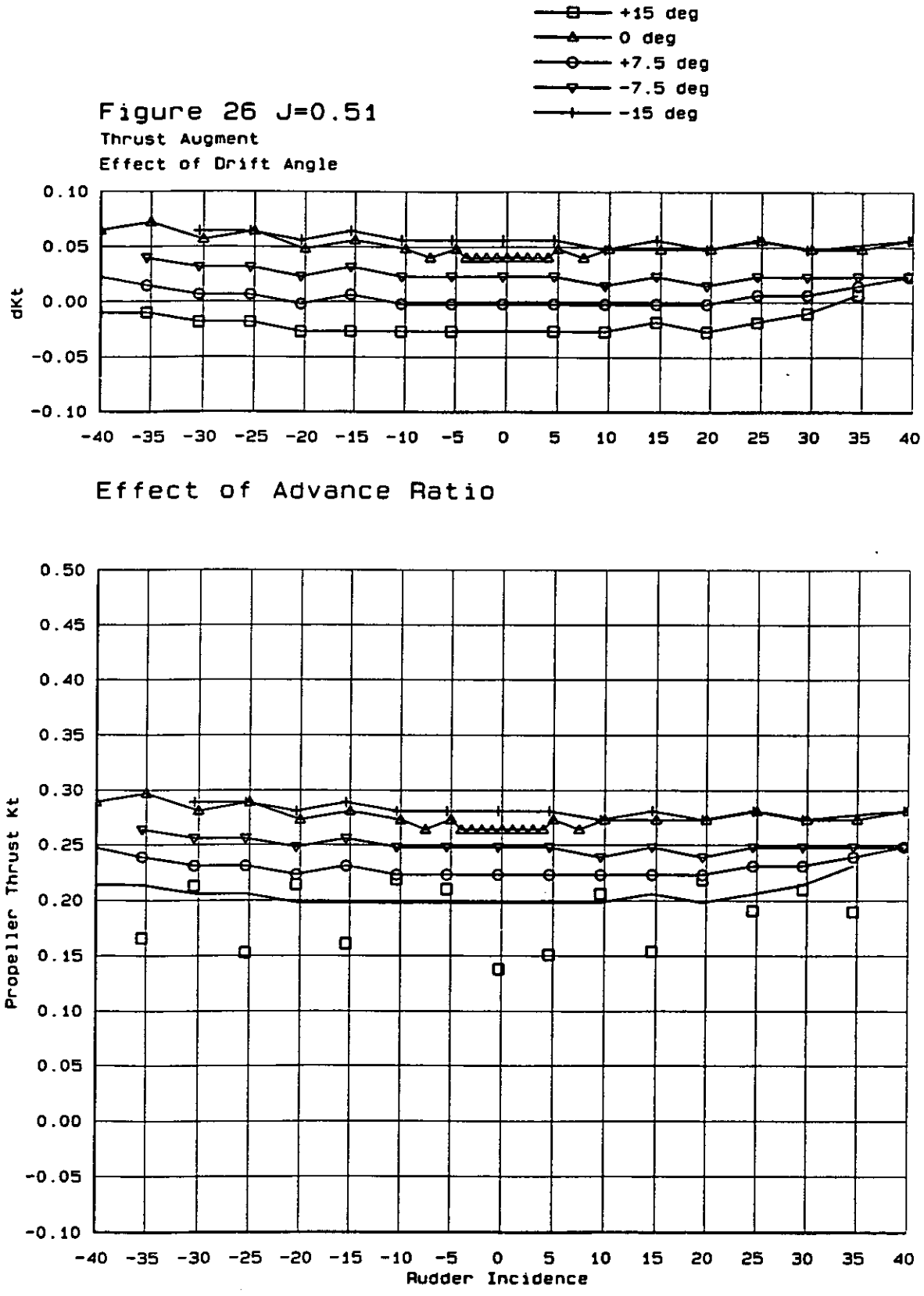



Figure 26 Effect of drift angle on propeller thrust and thrust augment for an Advance Ratio J of 0.51

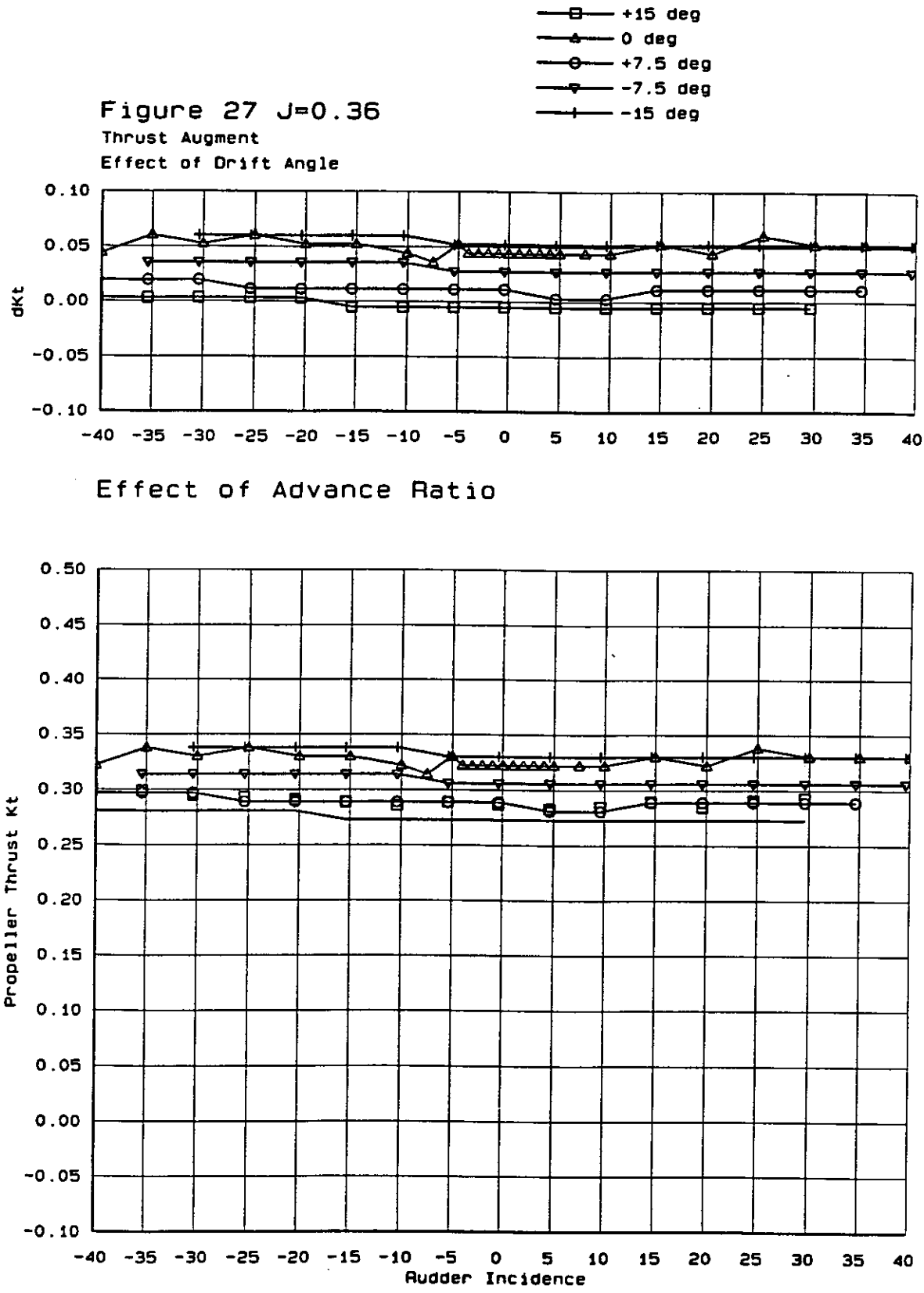



Figure 27 Effect of drift angle on propeller thrust and thrust augment for an Advance Ratio J of 0.36

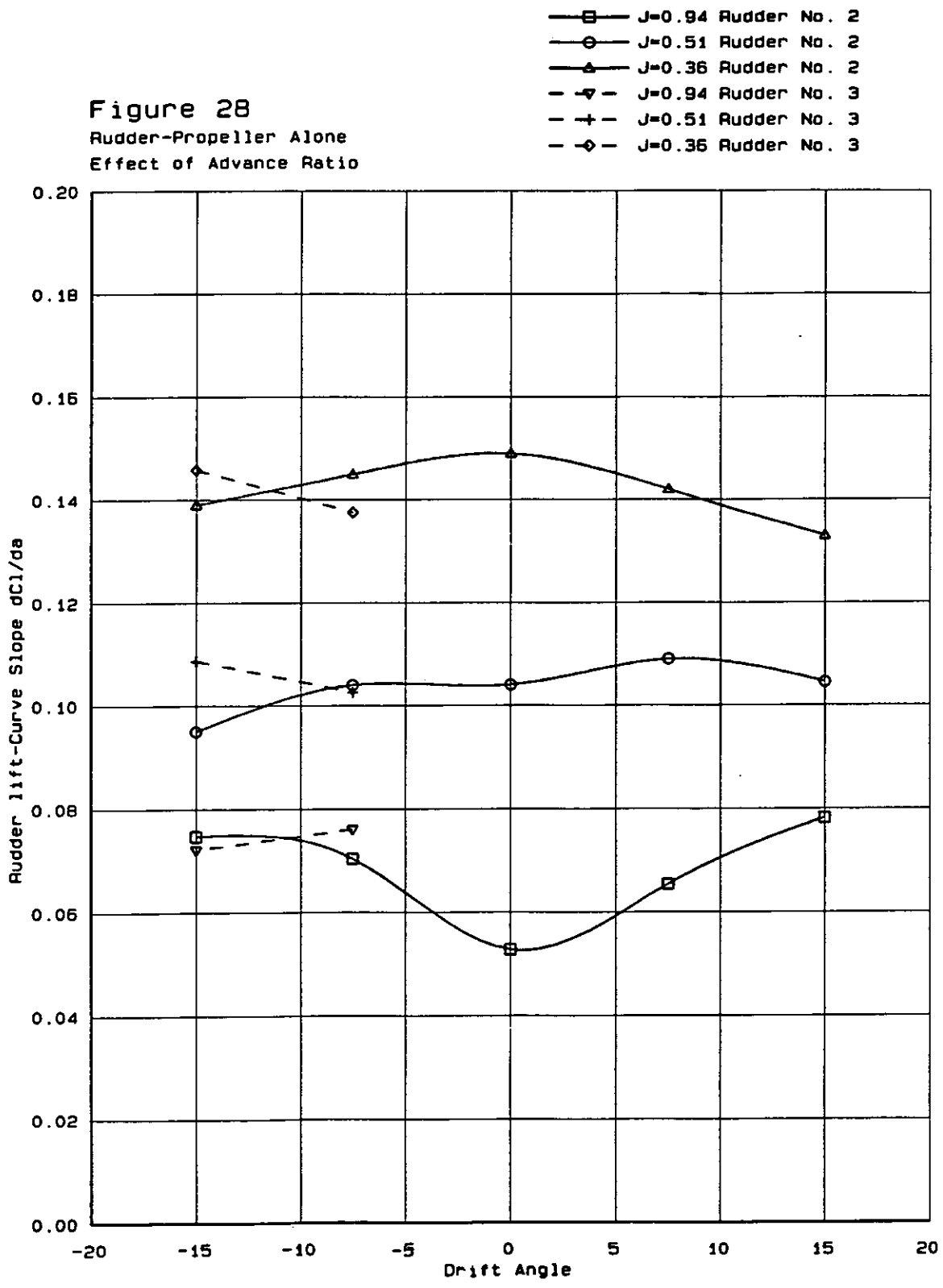



Figure 28 Effect of drift angle on the lift-curve slope of Rudder No. 2

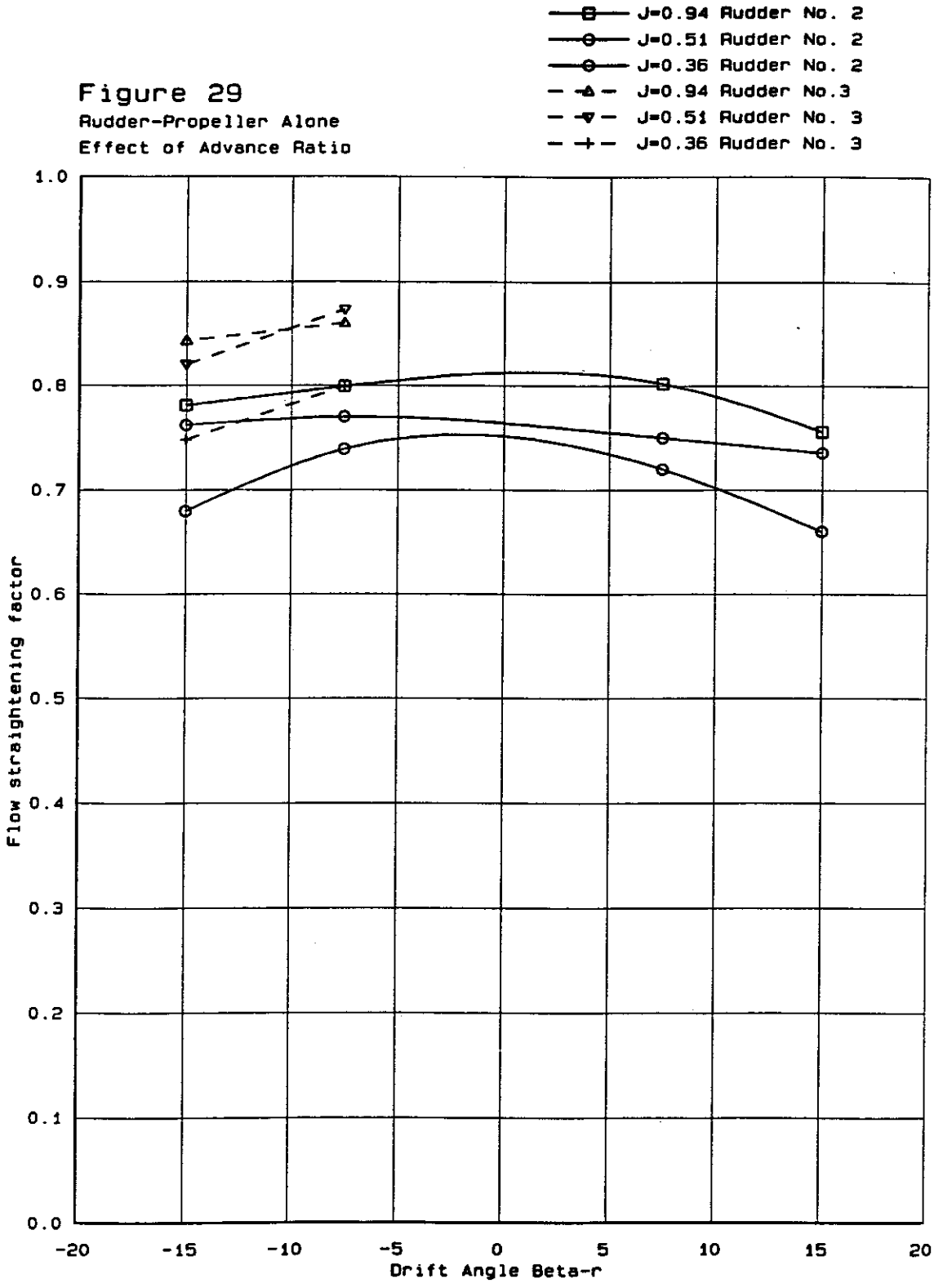



Figure 29 Effect of advance ratio on flow straightening for different drift angles

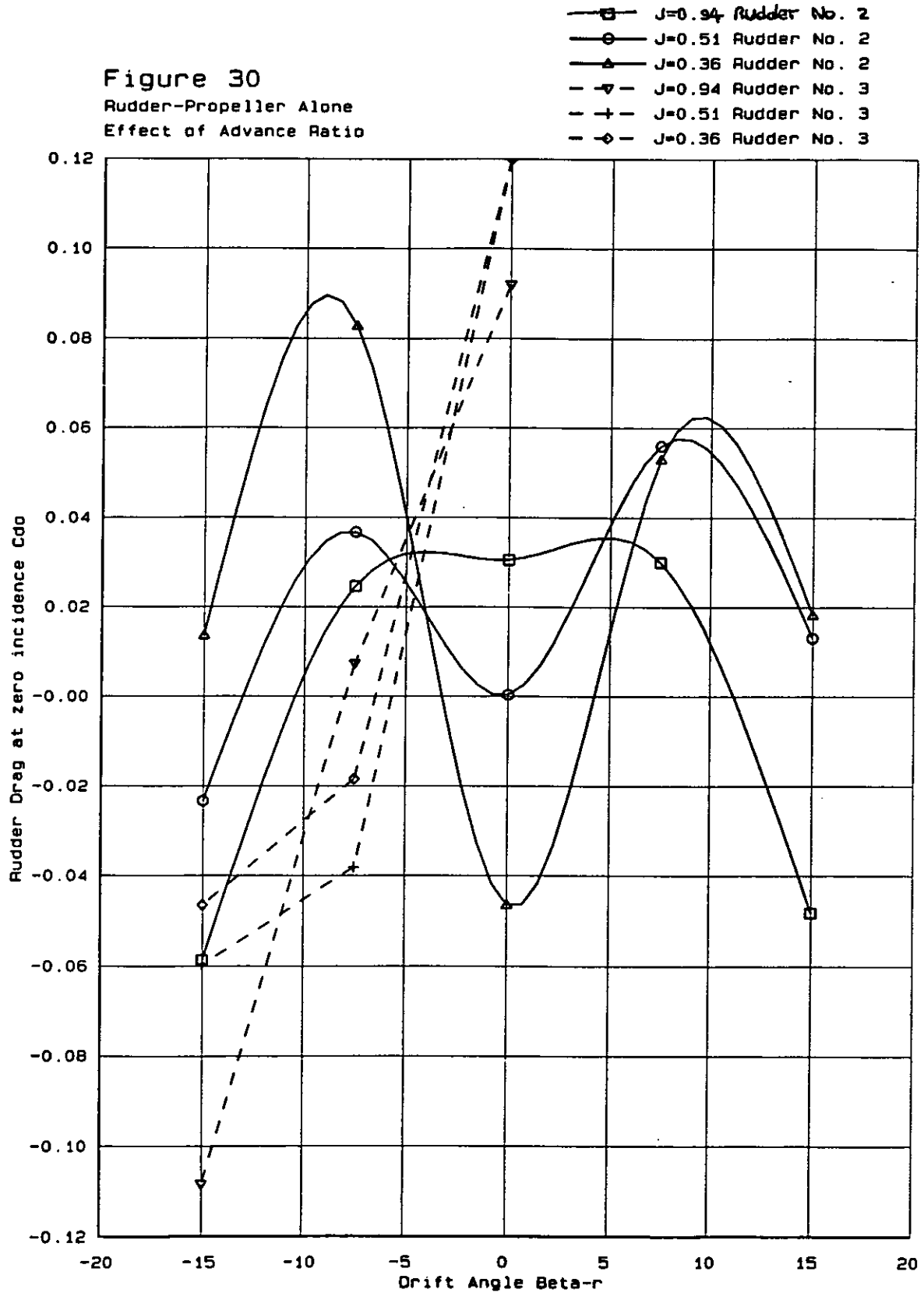



Figure 30 Effect of drift angles on rudder drag at zero incidence

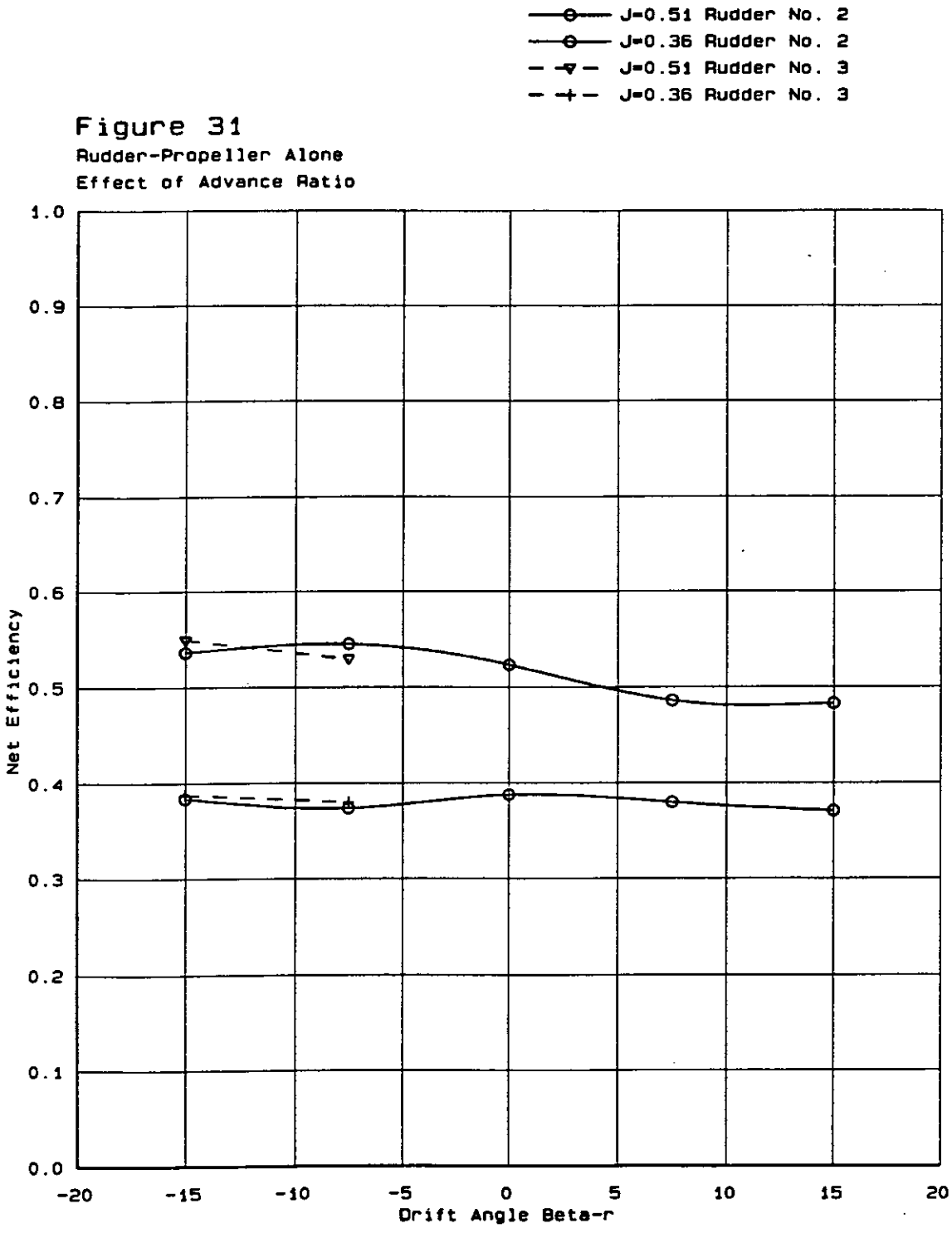



Figure 31 Effect of drift angle on net propeller efficiency

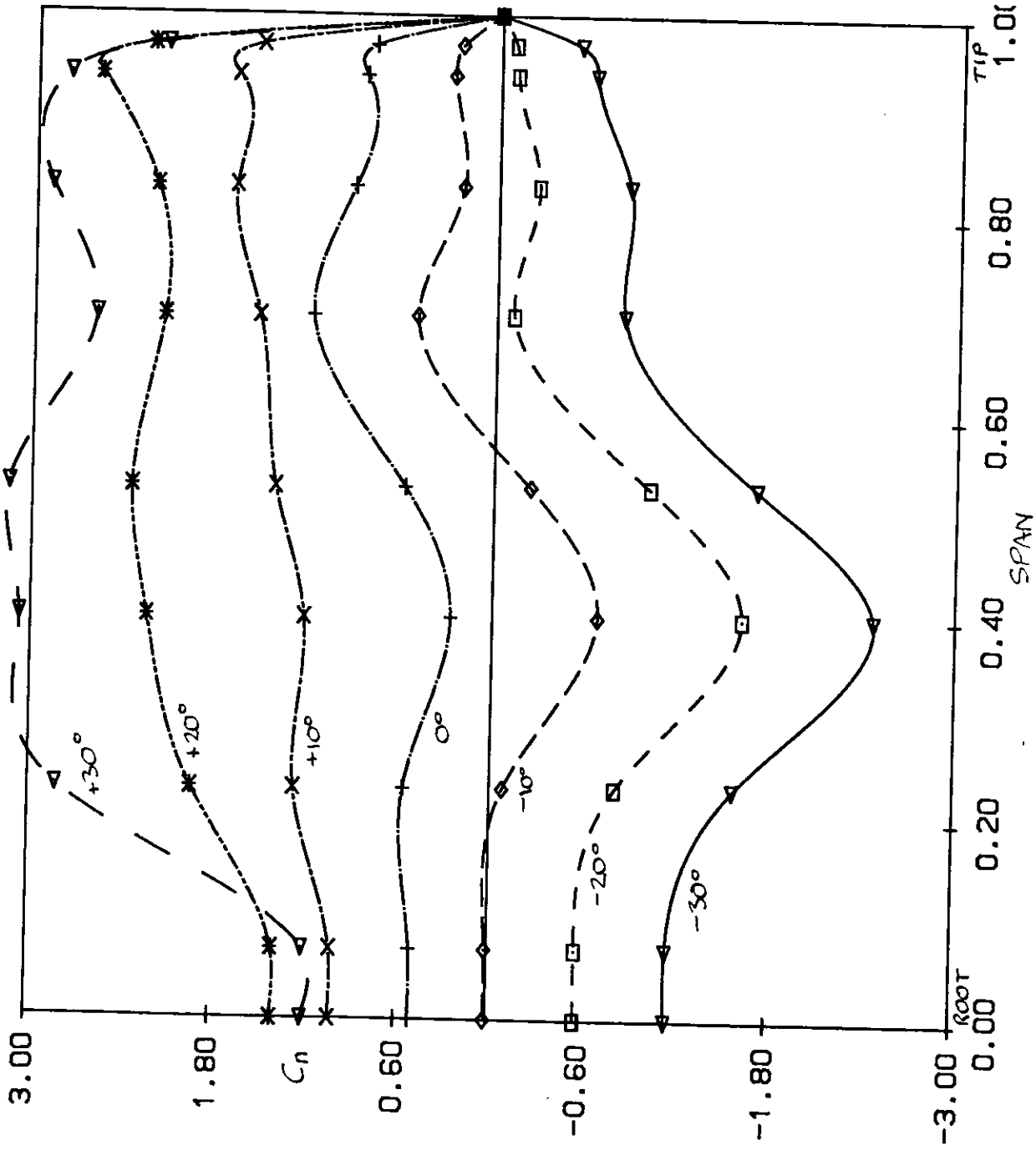



Figure 32 Variation with rudder incidence of the spanwise distribution of local section Cn of Rudder No. 2 at a drift angle of -15° and J of 0.51

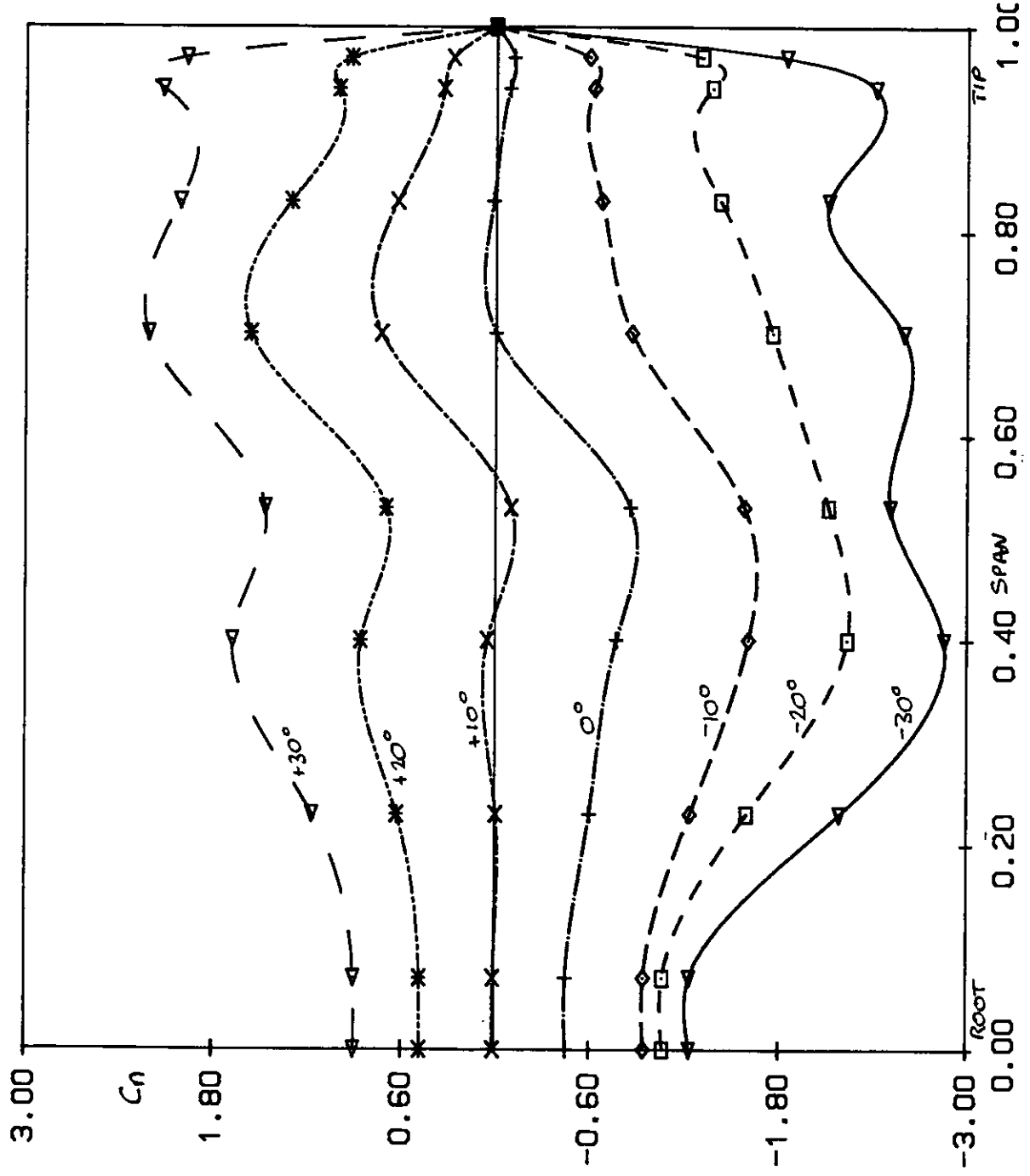



Figure 33 Variation with rudder incidence of the spanwise distribution of local section Cn of Rudder No. 2 at a drift angle of -7.5° and J of 0.51

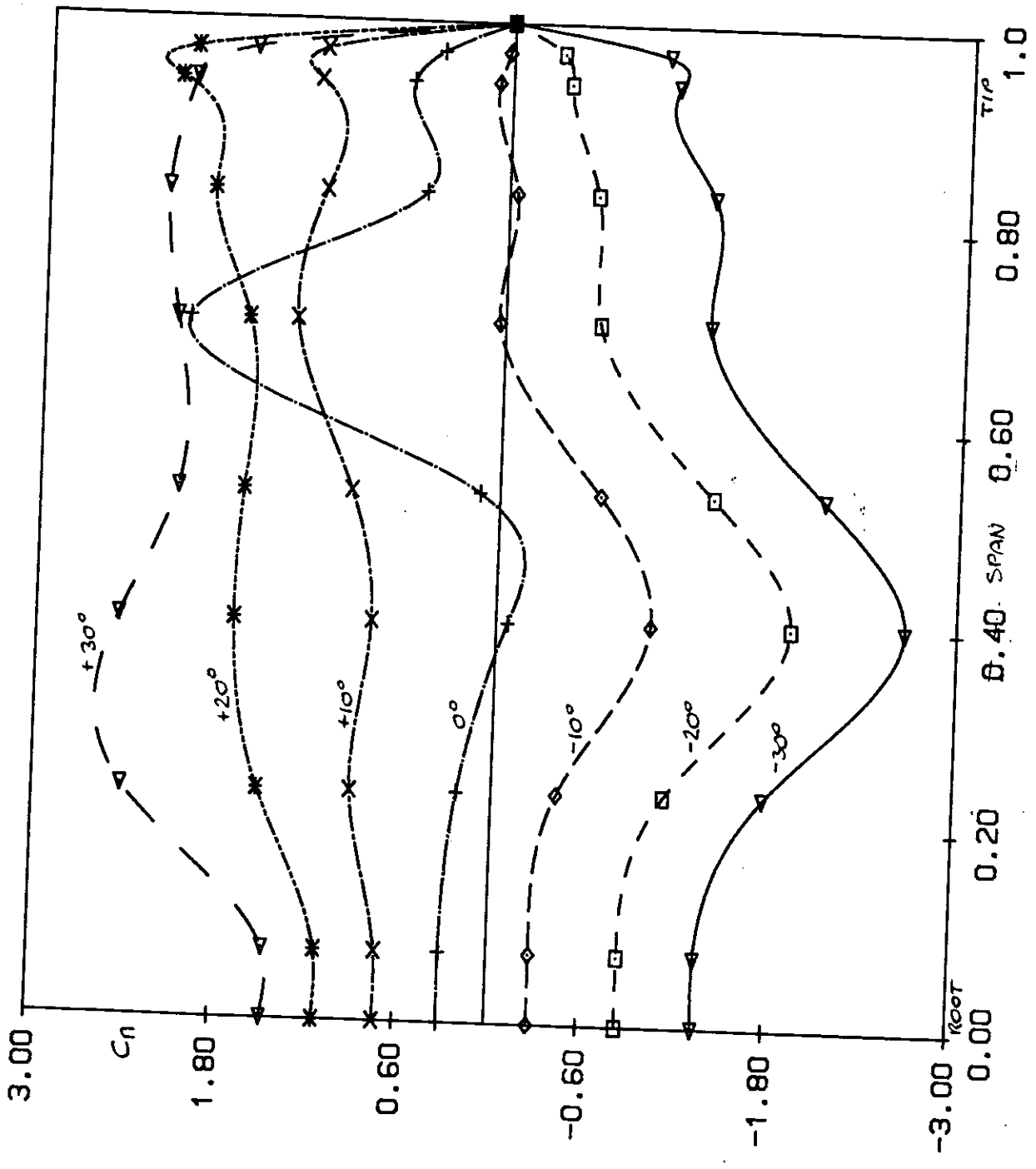



Figure 34 Variation with rudder incidence of the spanwise distribution of local section Cn of Rudder No. 2 at a drift angle of +7.5° and J of 0.51

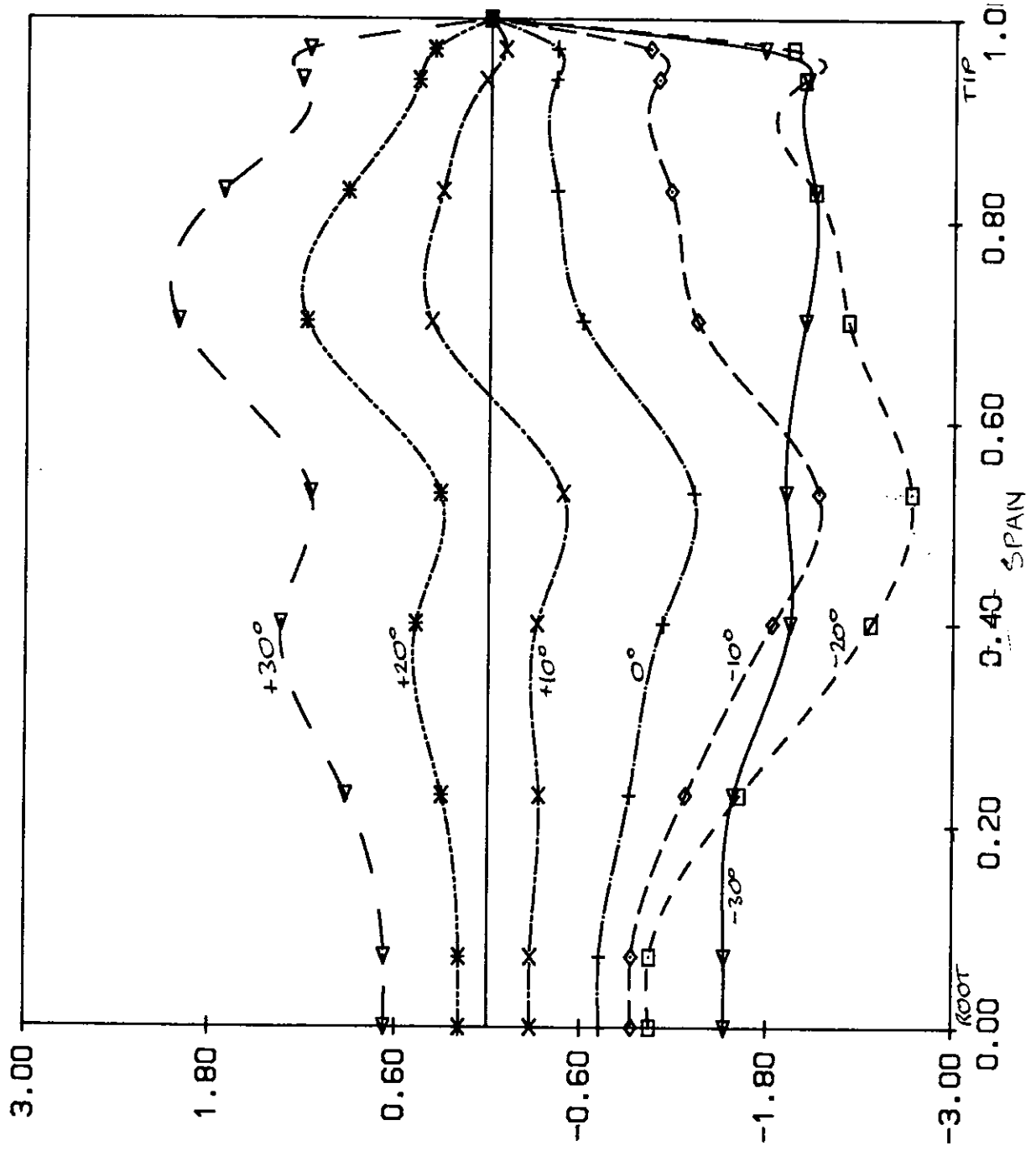



Figure 35 Variation with rudder incidence of the spanwise distribution of local section Cn of Rudder No. 2 at a drift angle of +15° and J of 0.51

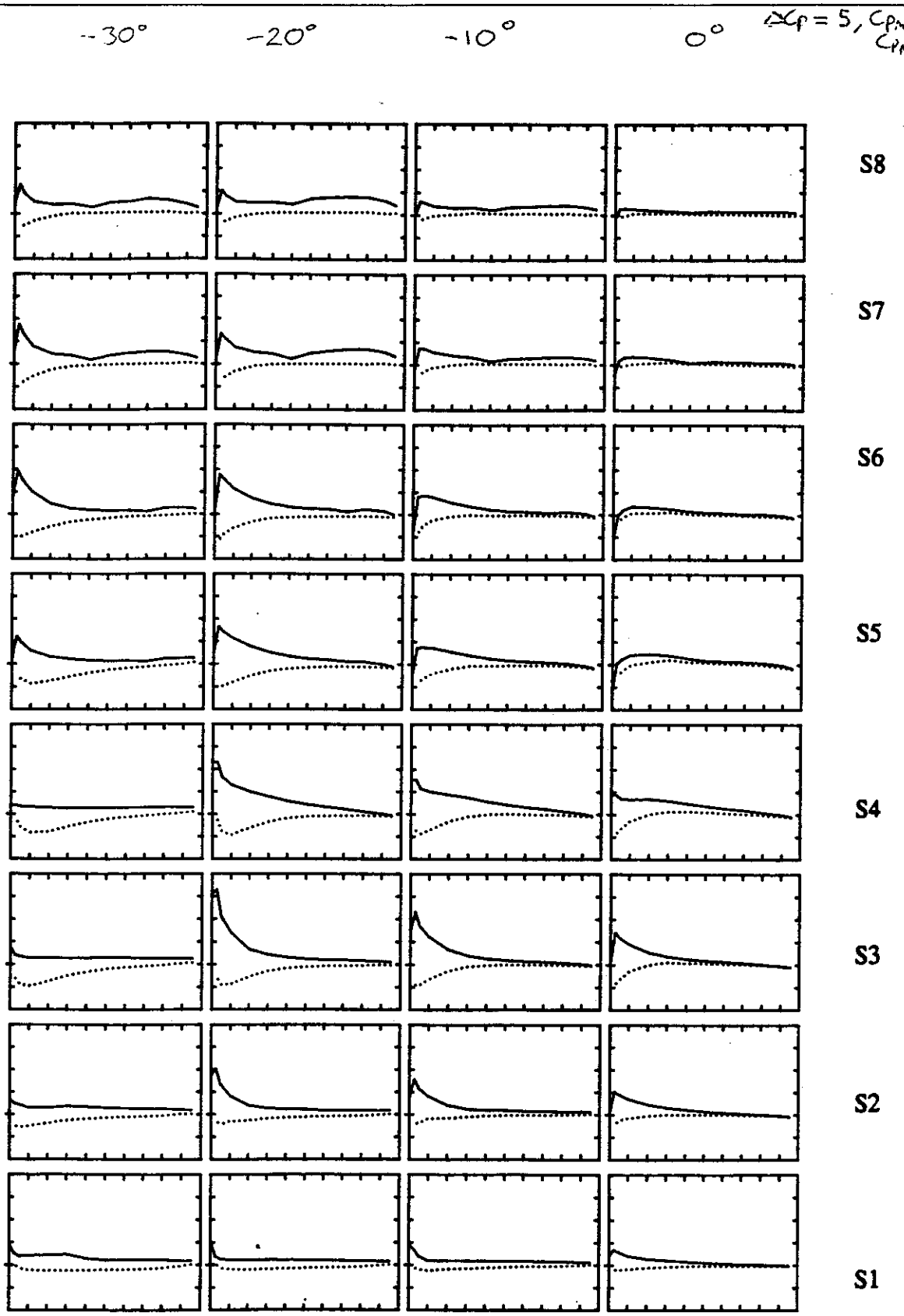



Figure 36a Chordwise pressure distribution at 8 spanwise positions for Rudder No. 2 at a drift angle of -15° and J of 0.51

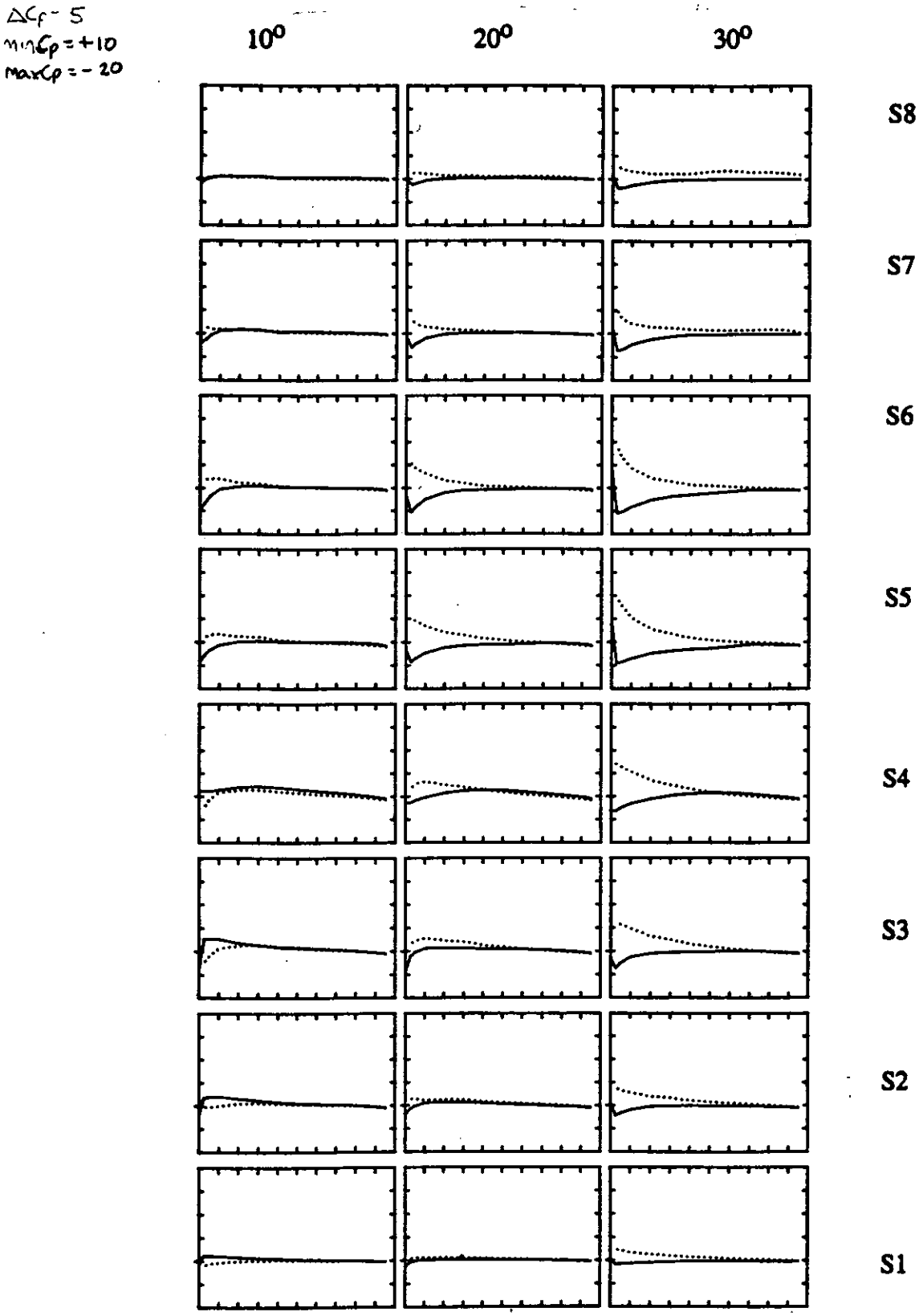



Figure 36b Chordwise pressure distribution at 8 spanwise positions for Rudder No. 2 at a drift angle of -15° and J of 0.51

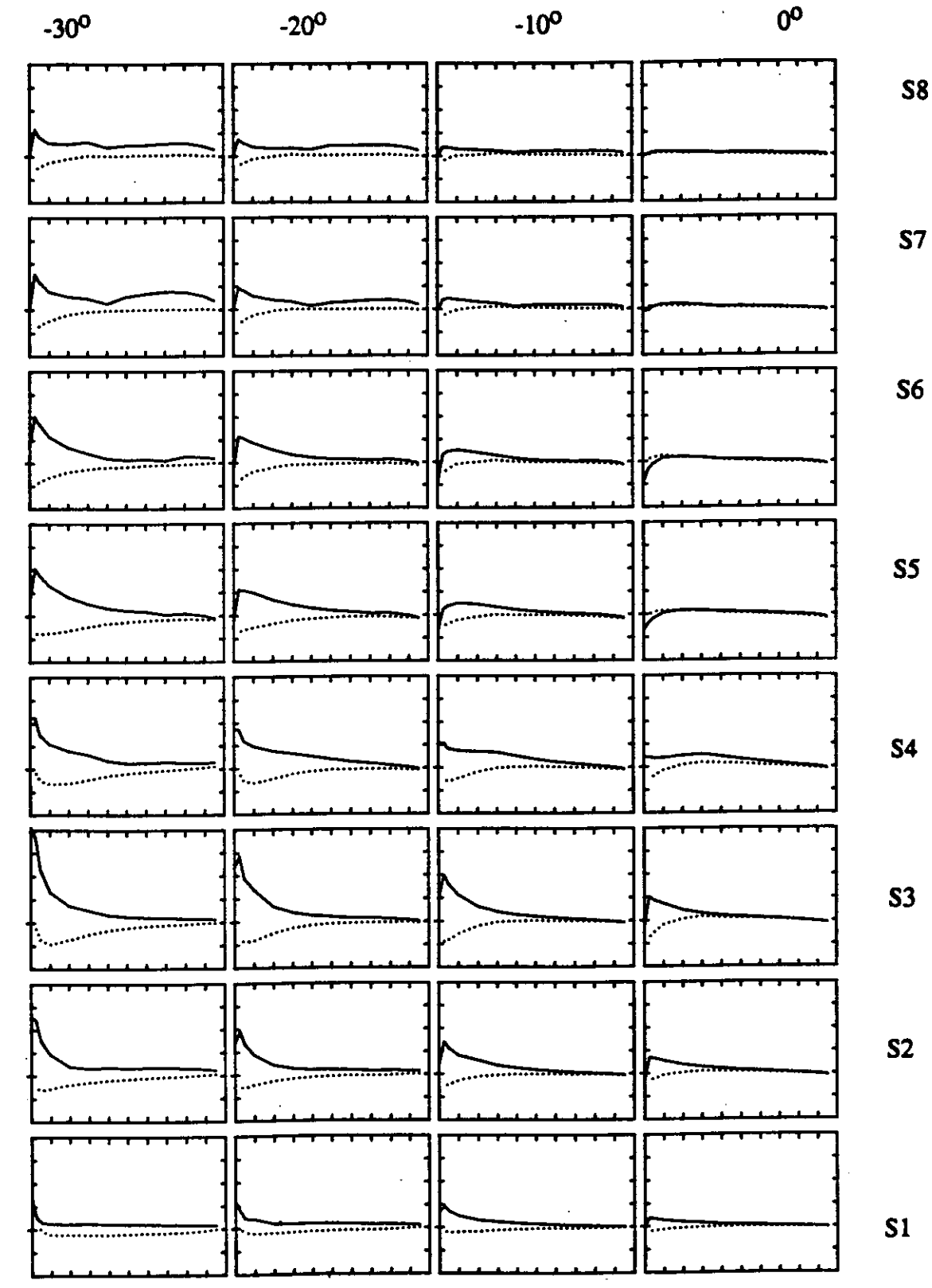



Figure 37a Chordwise pressure distribution at 8 spanwise positions for Rudder No. 2 at a drift angle of -7.5° and J of 0.51

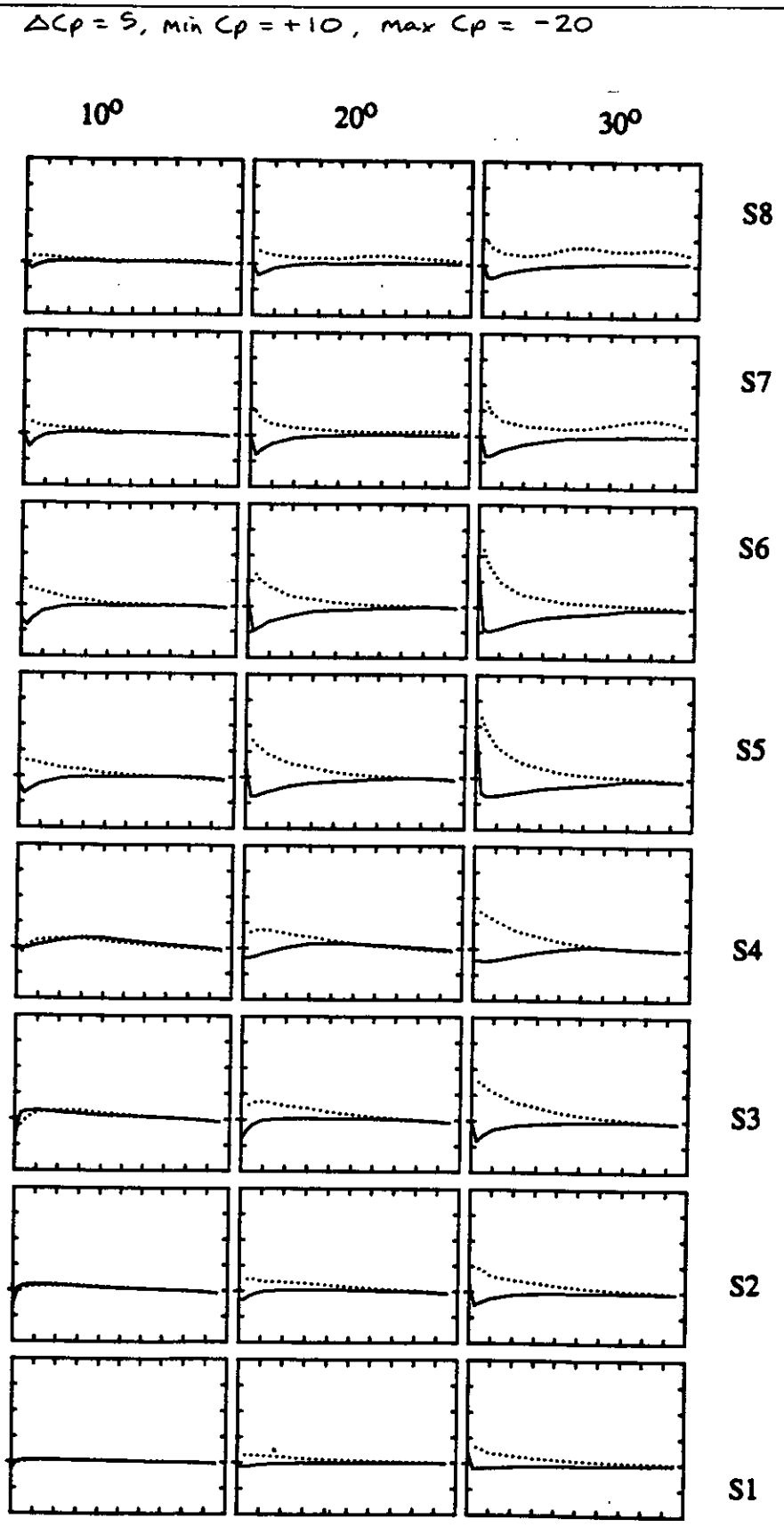



Figure 37b Chordwise pressure distribution at 8 spanwise positions for Rudder No. 2 at a drift angle of -7.5° and J of 0.51

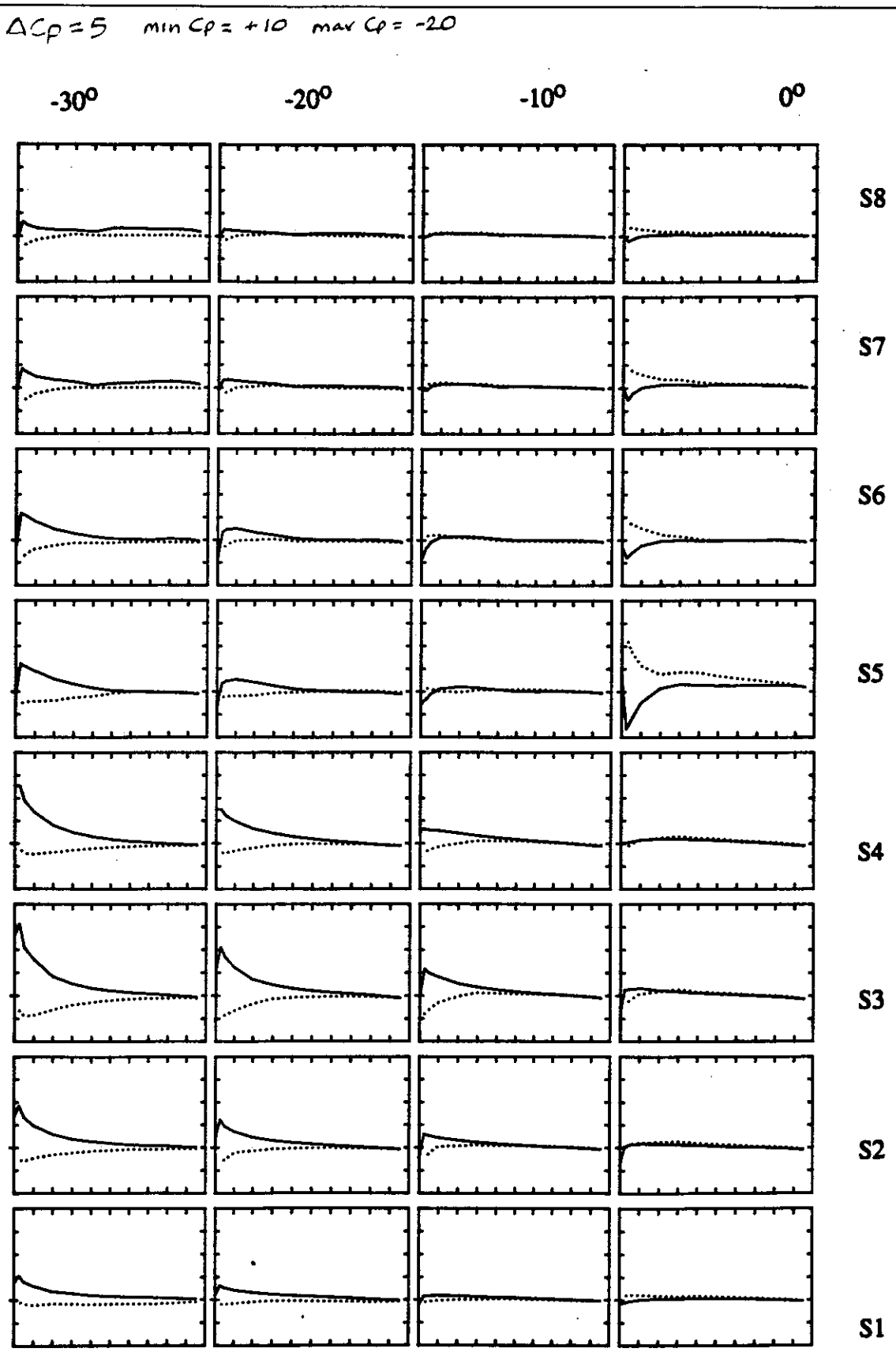



Figure 38a Chordwise pressure distribution at 8 spanwise positions for Rudder No. 2 at a drift angle of +7.5° and J of 0.51

ΔCp = 5, min Cp = +10, max Cp = -20

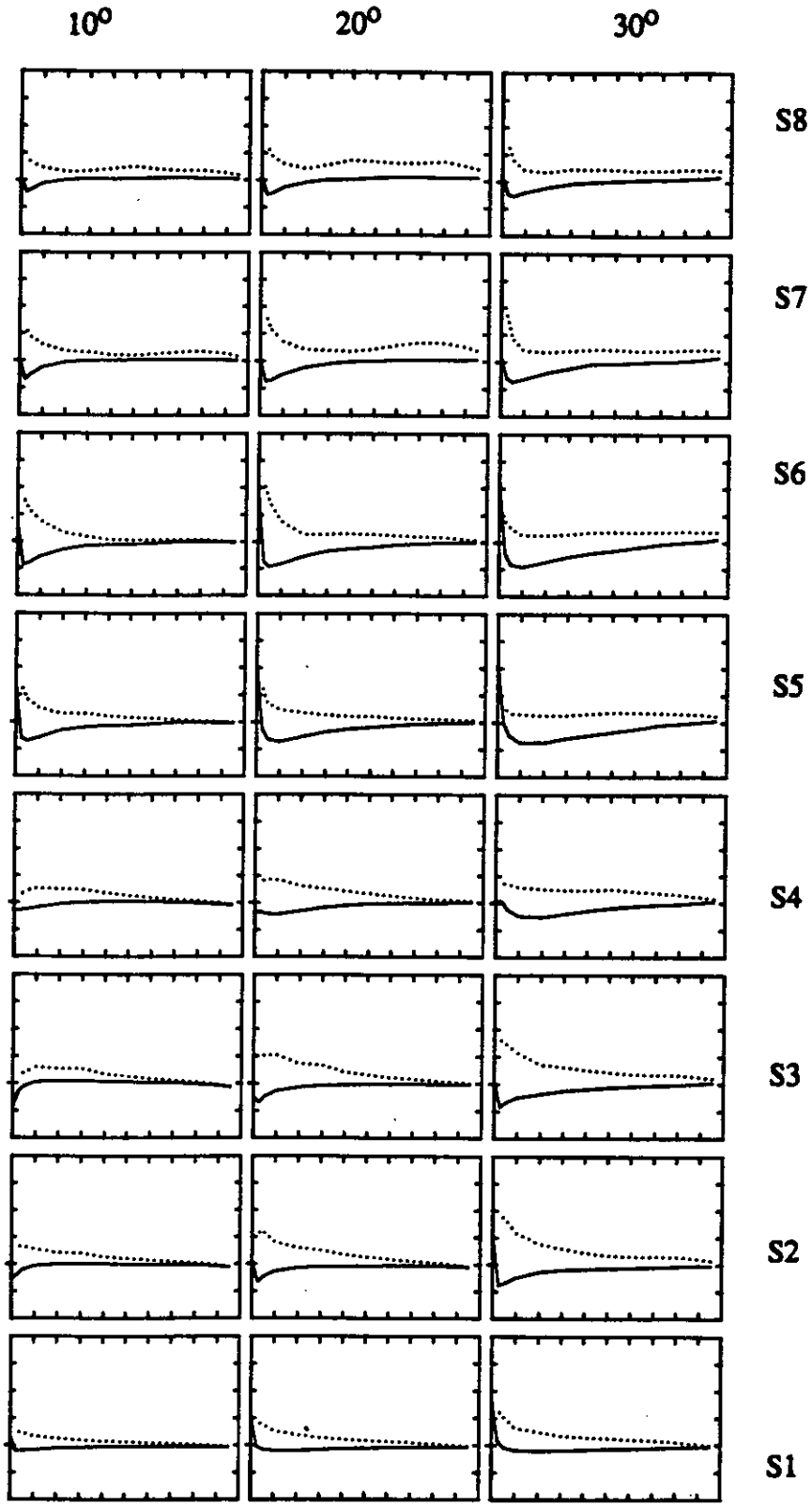



Figure 38b Chordwise pressure distribution at 8 spanwise positions for Rudder No. 2 at a drift angle of +7.5° and J of 0.51

ΔCp = 5, min Cp = +10, max Cp = -20

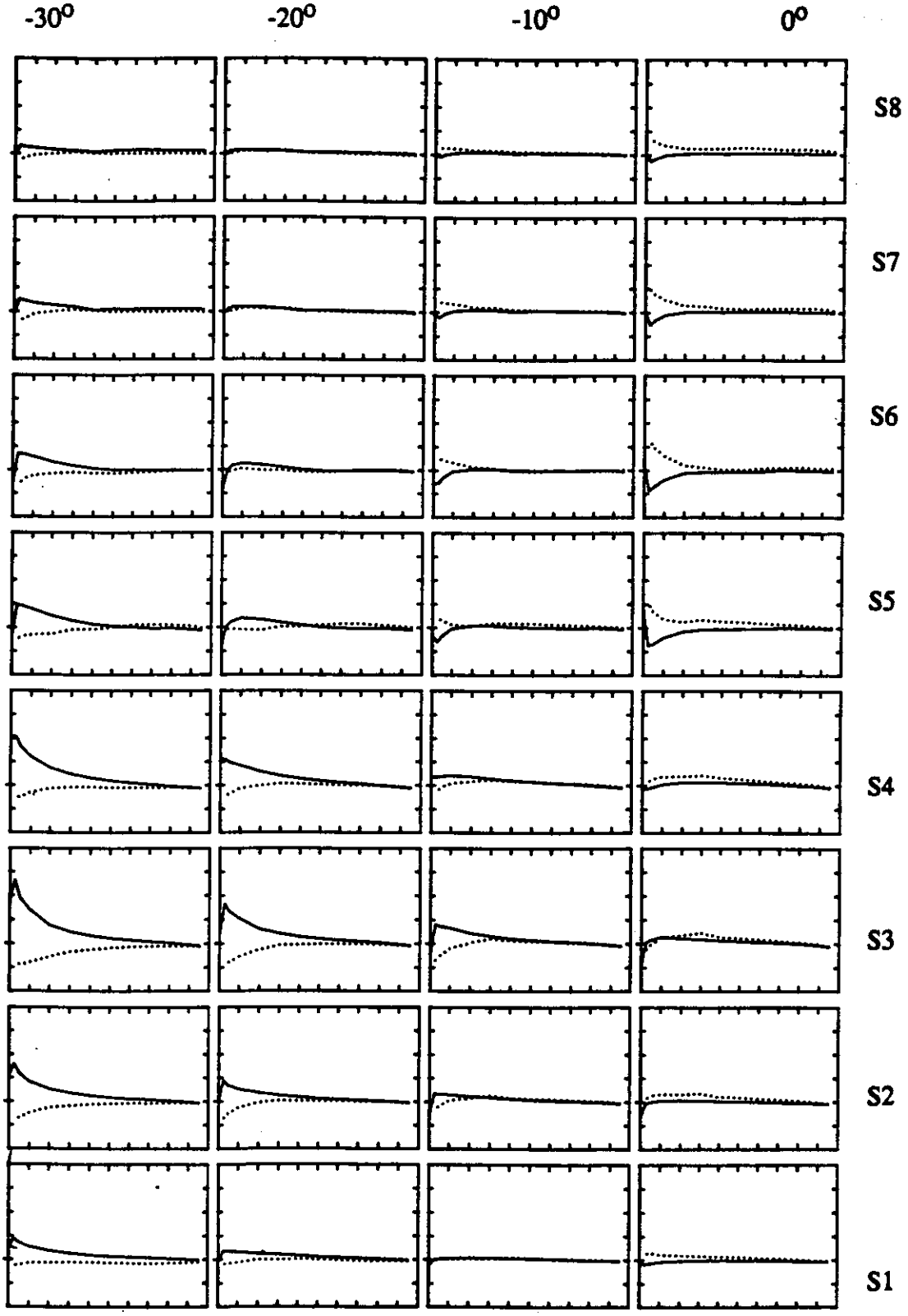



Figure 39a Chordwise pressure distribution at 8 spanwise positions for Rudder No. 2 at a drift angle of +15° and J of 0.51

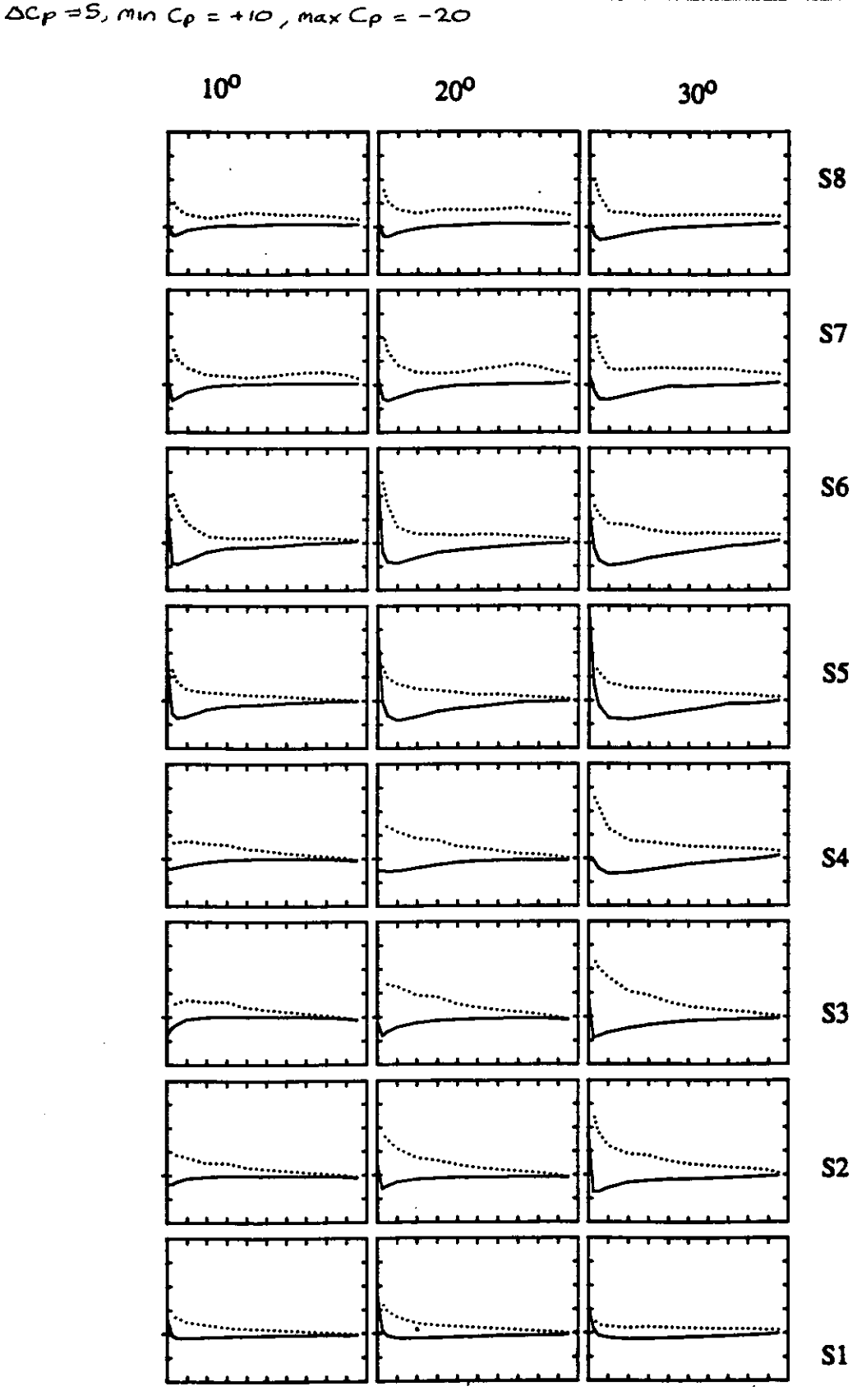



Figure 39b Chordwise pressure distribution at 8 spanwise positions for Rudder No. 2 at a drift angle of +15° and J of 0.51

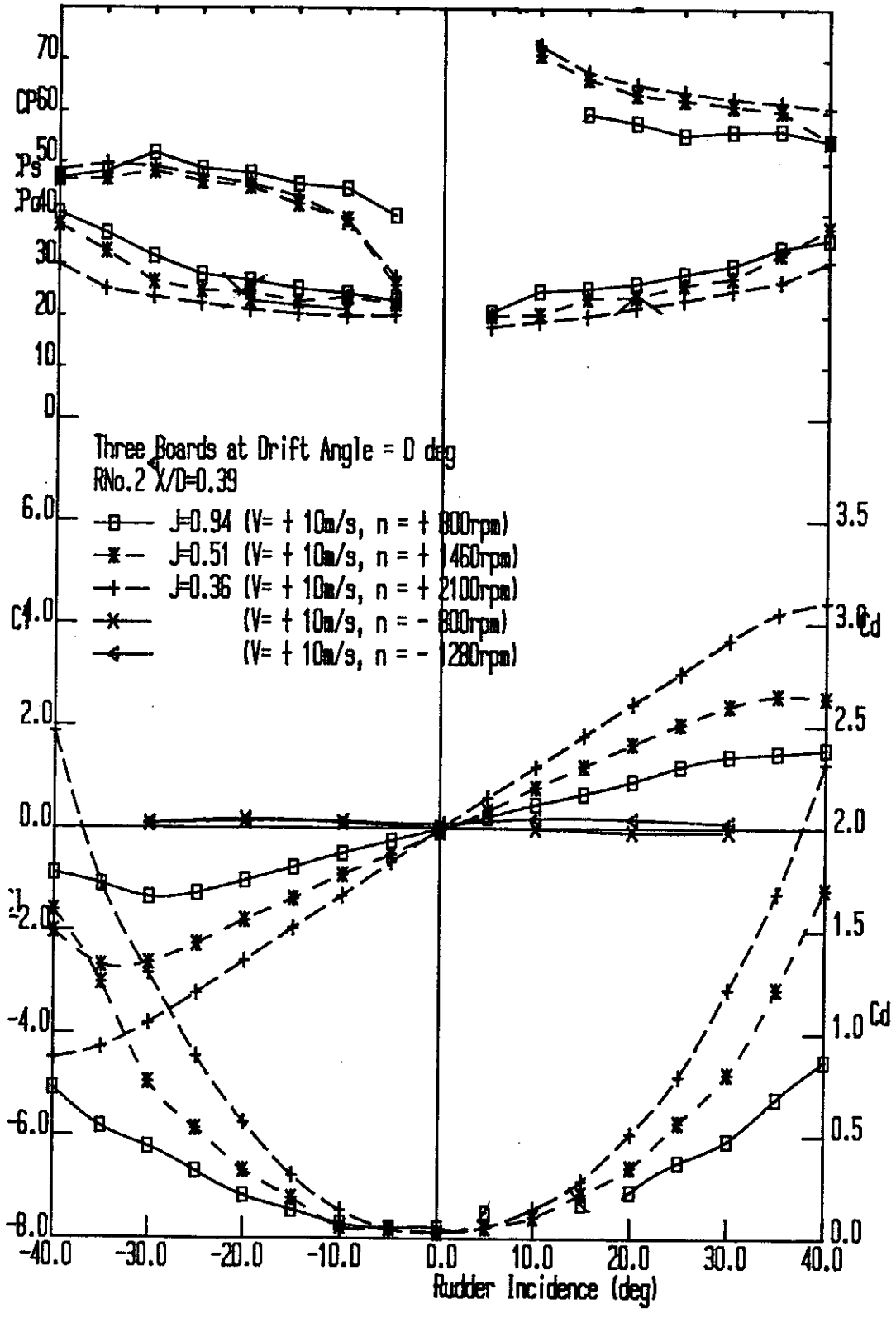



Figure 40 Effect of Advance ratio on the performance of Rudder No. 2 downstream of full centre-board at zero drift angle

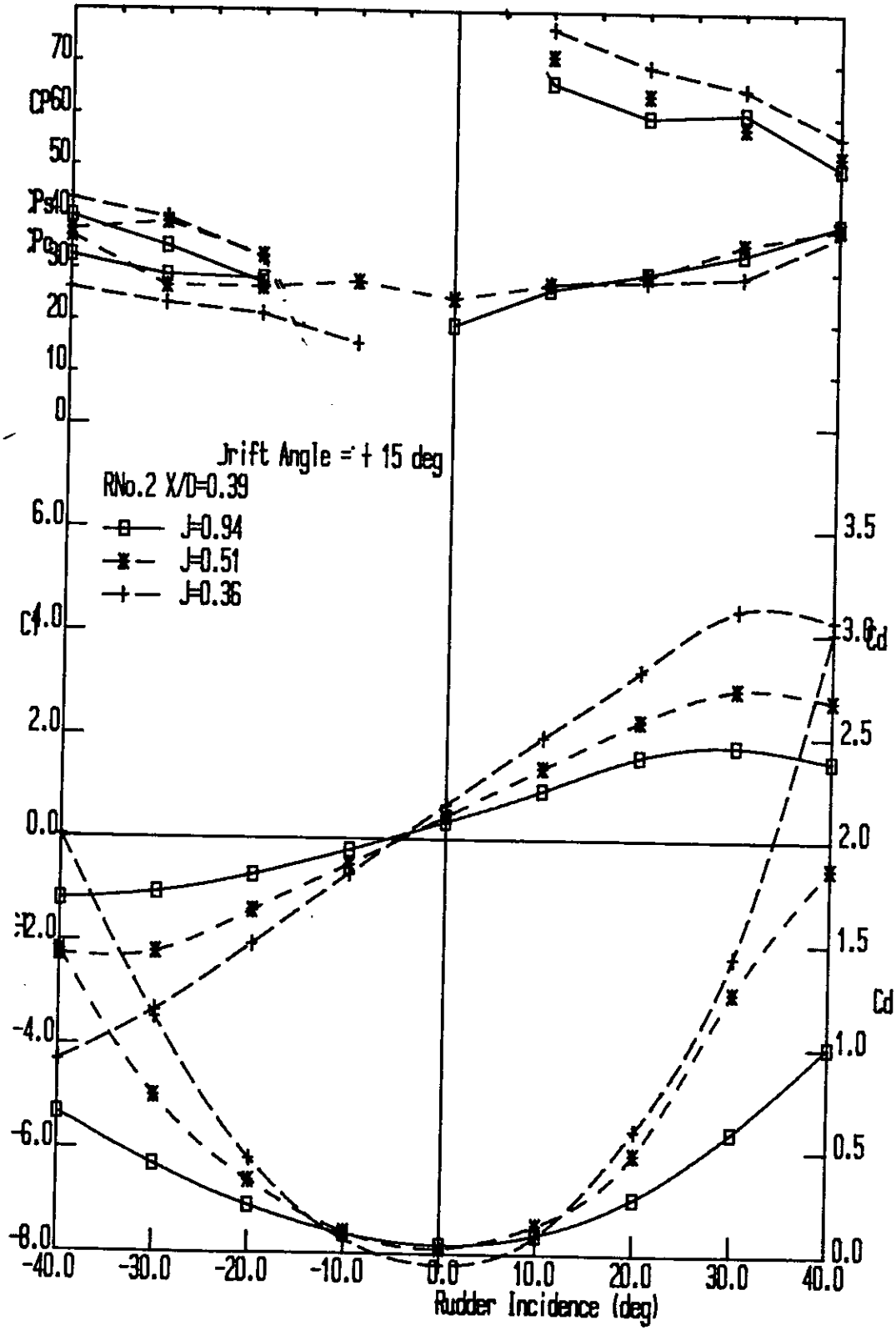



Figure 41 Effect of Advance ratio on the performance of Rudder No. 2 downstream of short centre-board at a drift angle of +15°

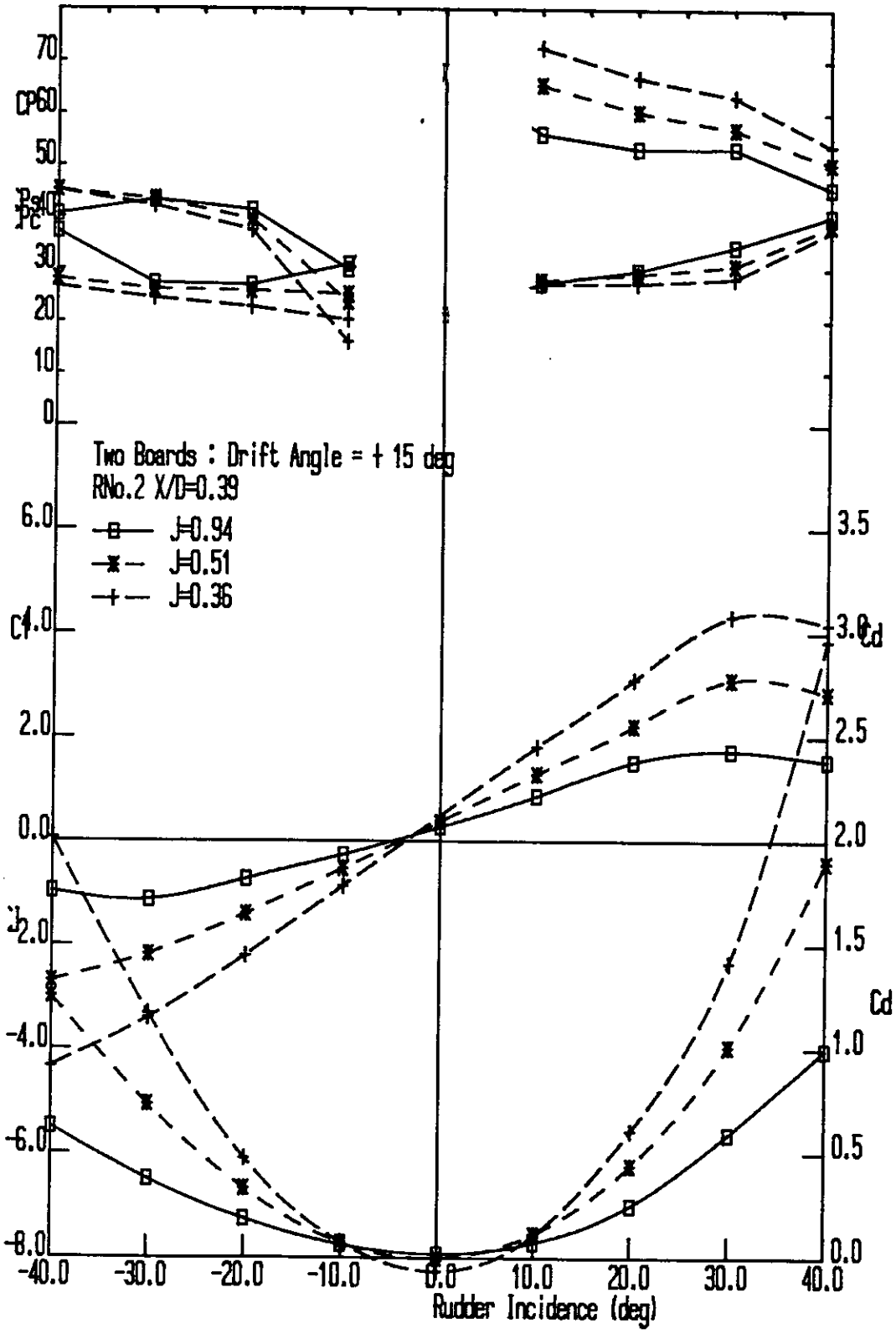



Figure 42 Effect of Advance ratio on the performance of Rudder No. 2 downstream of mid centre-board at a drift angle of +15°

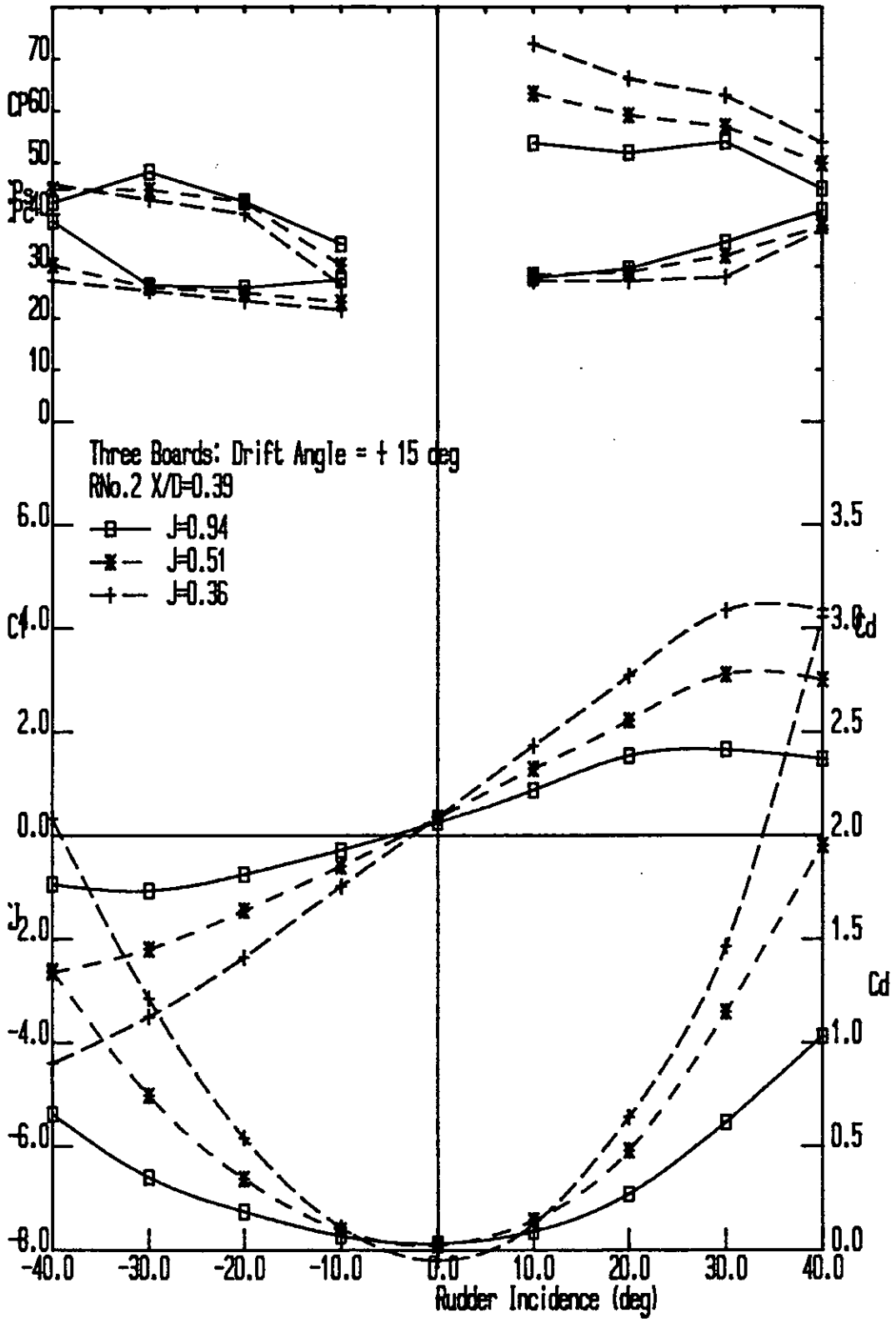



Figure 43 Effect of Advance ratio on the performance of Rudder No. 2 downstream of full centre-board at a drift angle of +15°

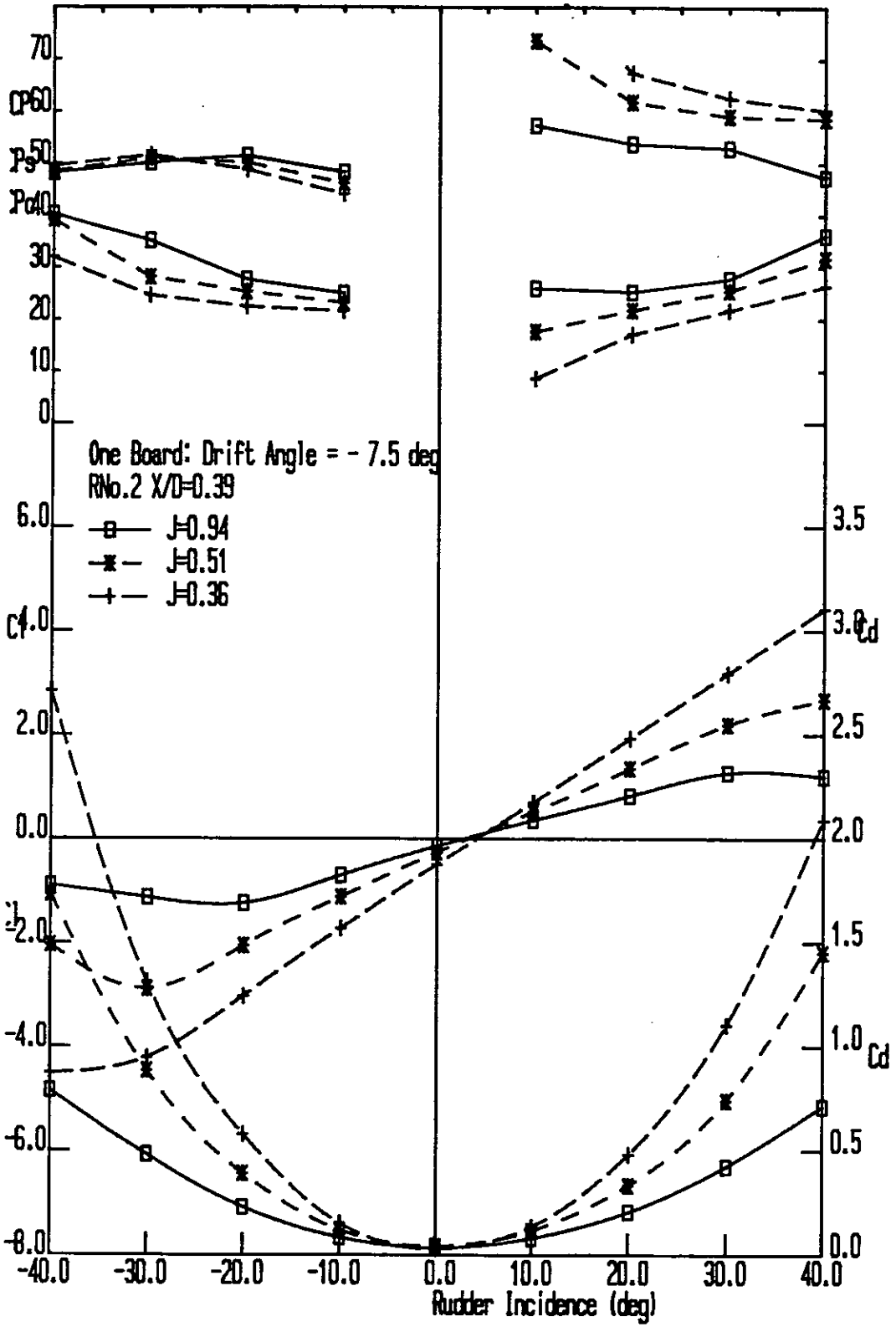



Figure 44 Effect of Advance ratio on the performance of Rudder No. 2 downstream of short centre-board at a drift angle of -7.5°

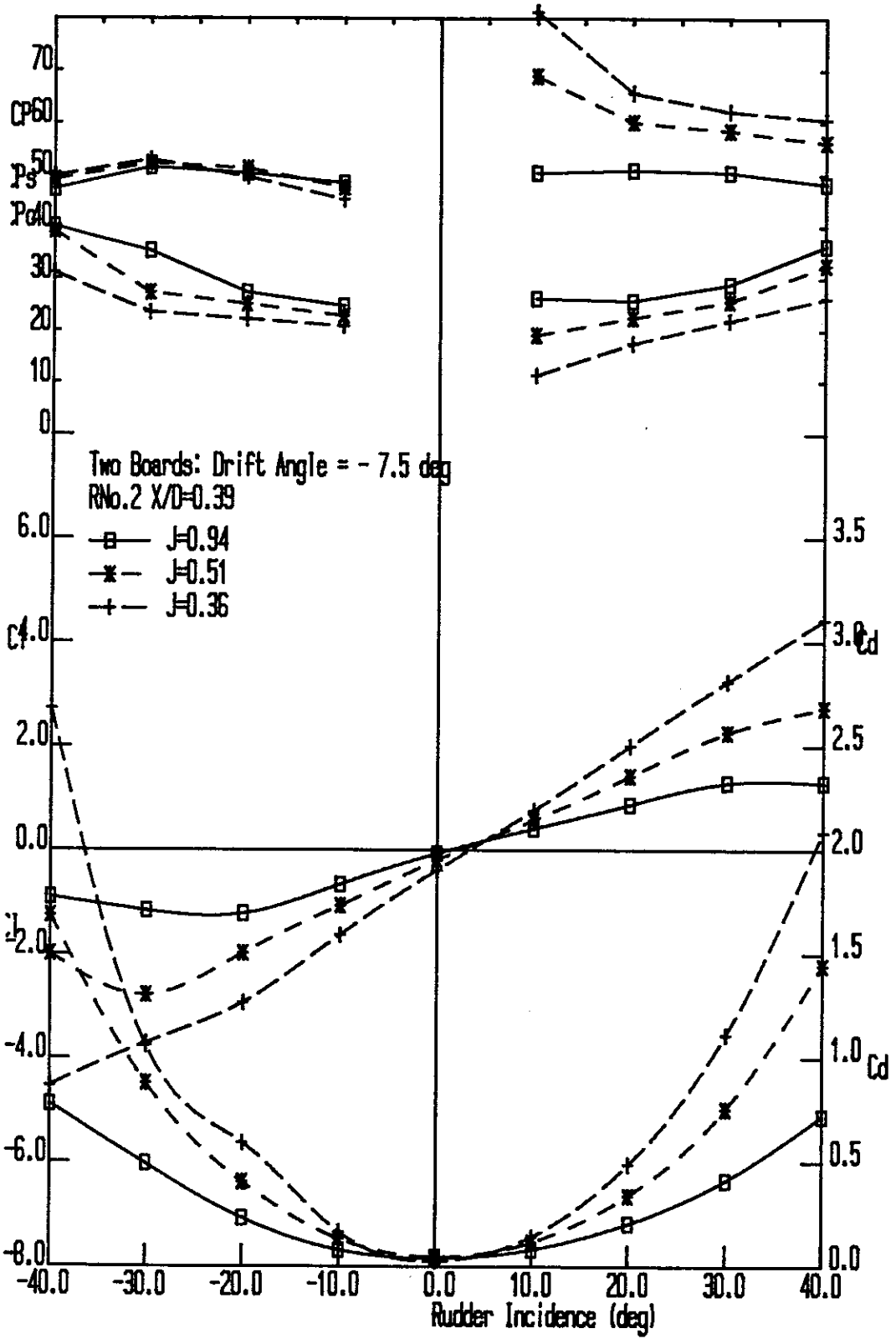



Figure 45 Effect of Advance ratio on the performance of Rudder No. 2 downstream of mid centre-board at a drift angle of -7.5°

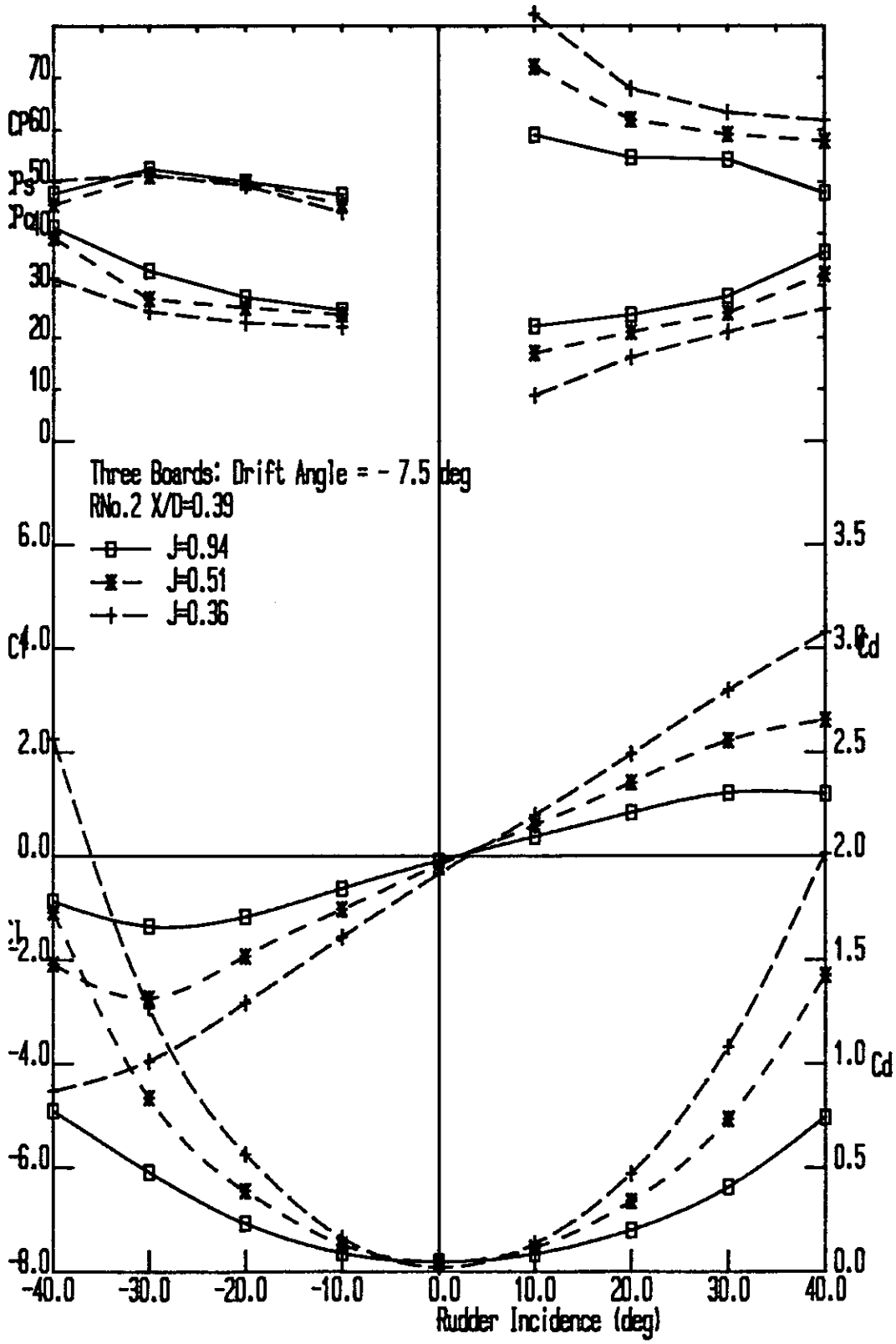



Figure 46 Effect of Advance ratio on the performance of Rudder No. 2 downstream of full centre-board at a drift angle of -7.5°

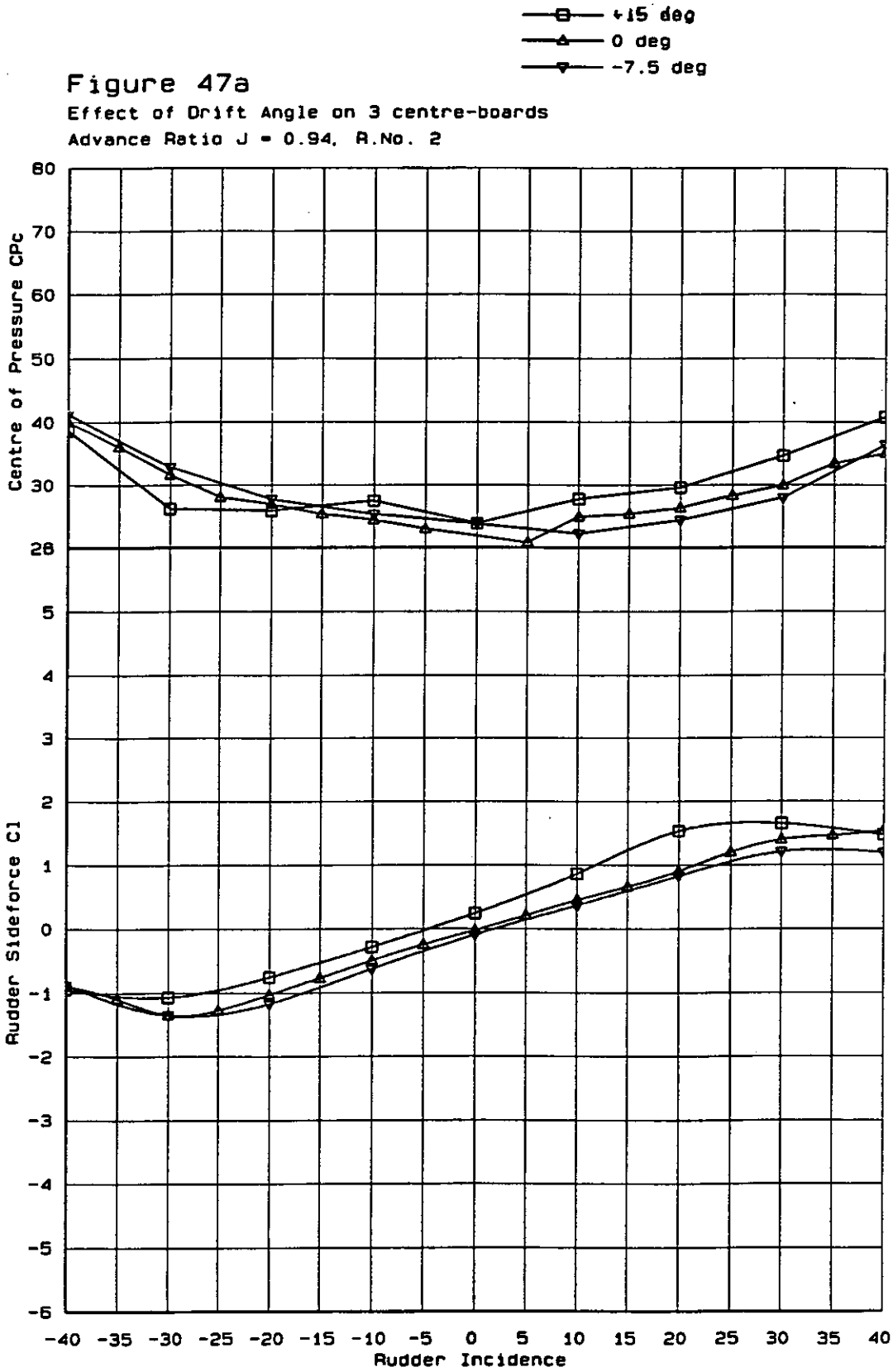



Figure 47a Effect of drift angle on the performance of Rudder No.2 at an advance ratio J of 0.94 downstream of full centre-board: Lift and CPc

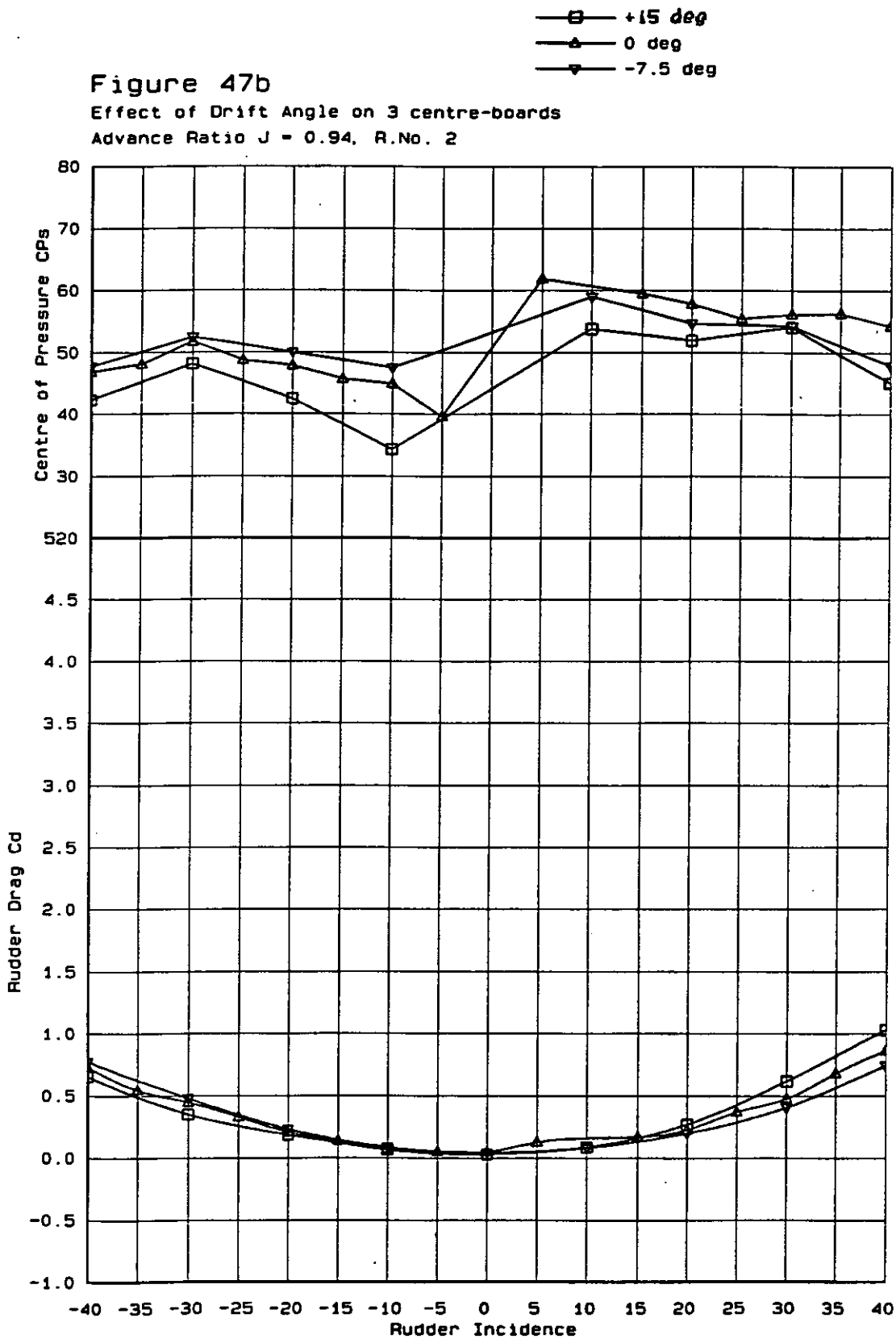



Figure 47b Effect of drift angle on the performance of Rudder No.2 at an advance ratio J of 0.94 downstream of full centre-board: Drag and CPs

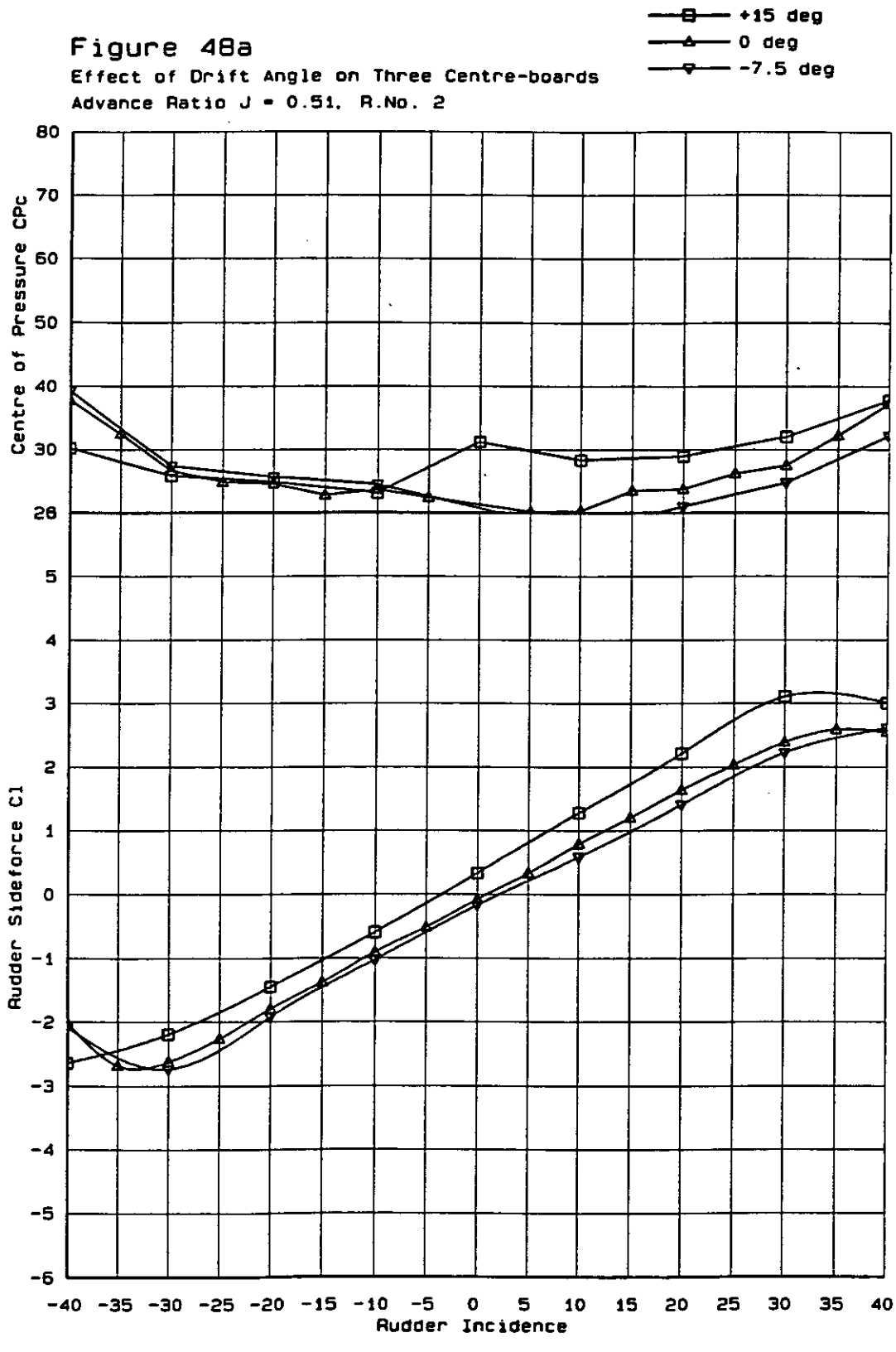



Figure 48a Effect of drift angle on the performance of Rudder No.2 at an advance ratio J of 0.51 downstream of full centre-board: Lift and CPc

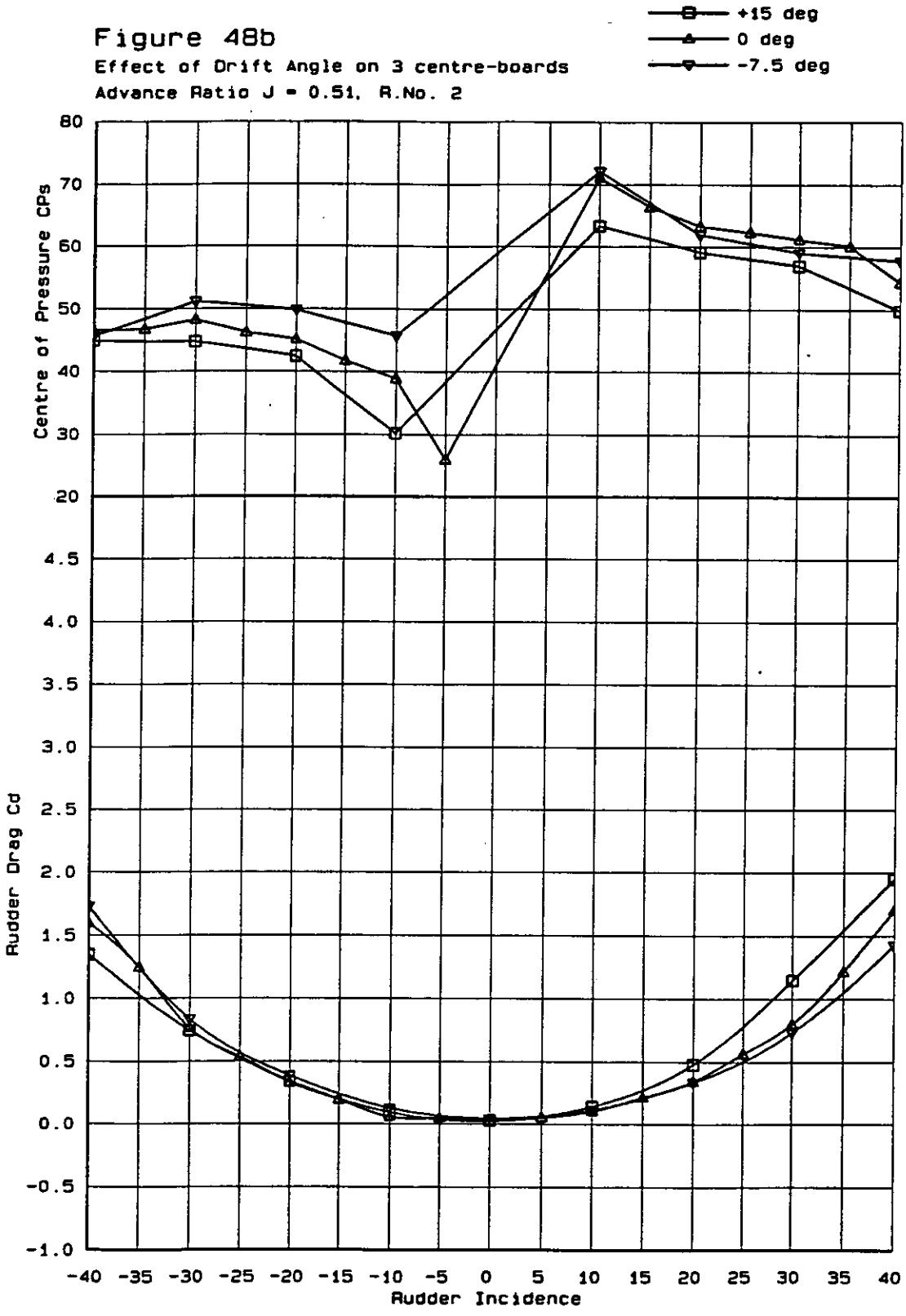



Figure 48b Effect of drift angle on the performance of Rudder No.2 at an advance ratio J of 0.51 downstream of full centre-board: Drag and CPs

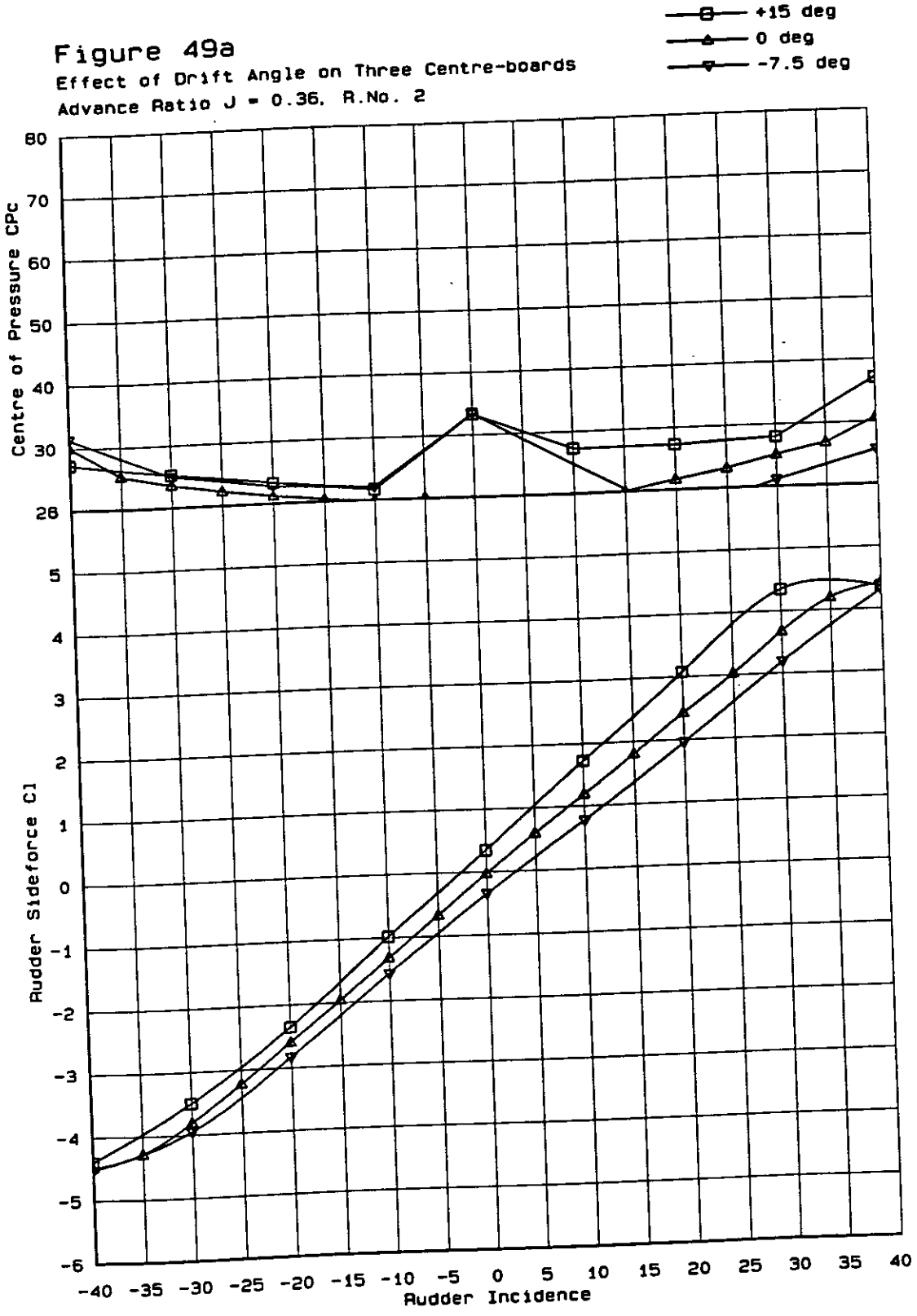



Figure 49a Effect of drift angle on the performance of Rudder No.2 at an advance ratio J of 0.36 downstream of full centre-board: Lift and CPc

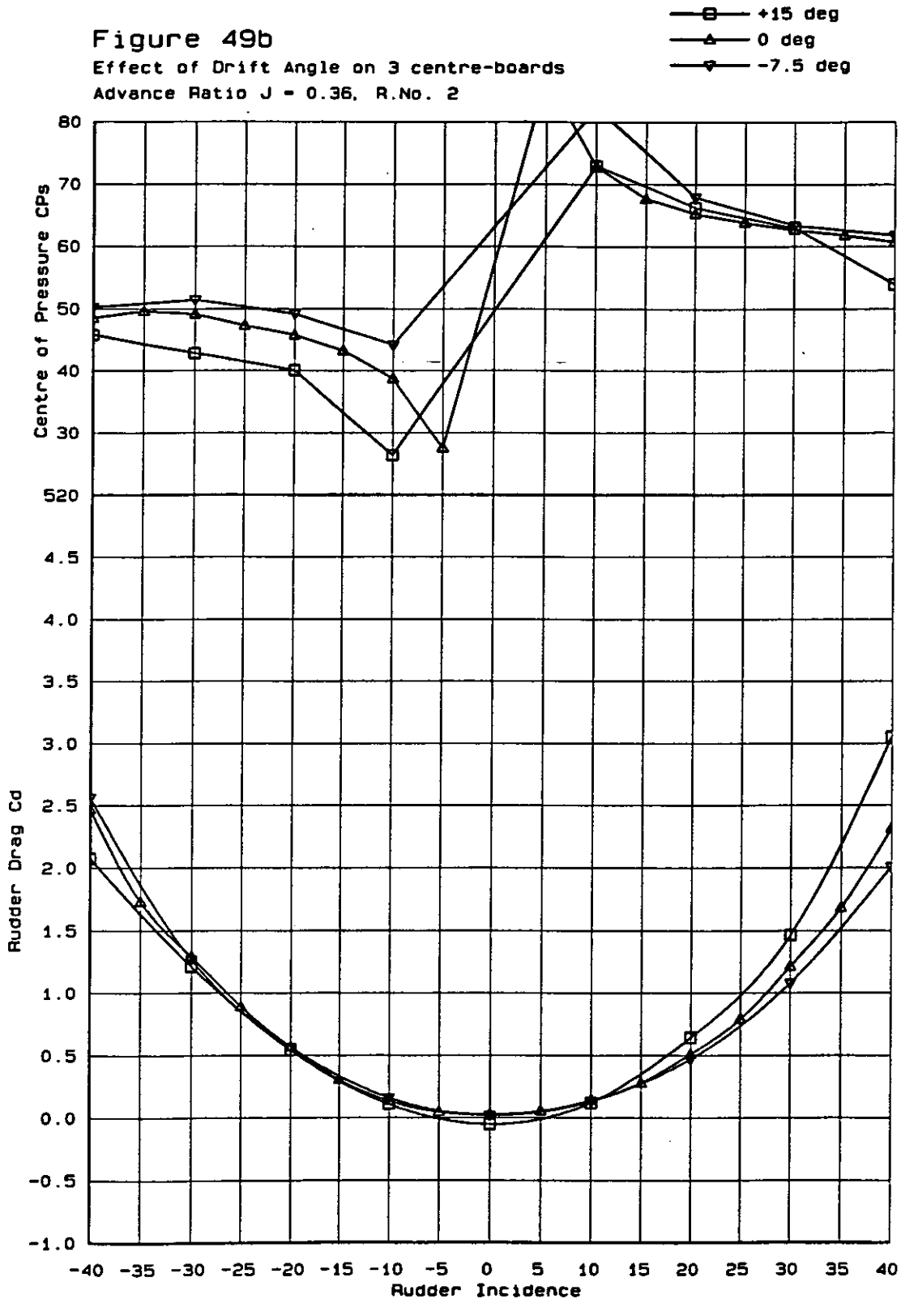



Figure 49b Effect of drift angle on the performance of Rudder No.2 at an advance ratio J of 0.36 downstream of full centre-board: Drag and CPs

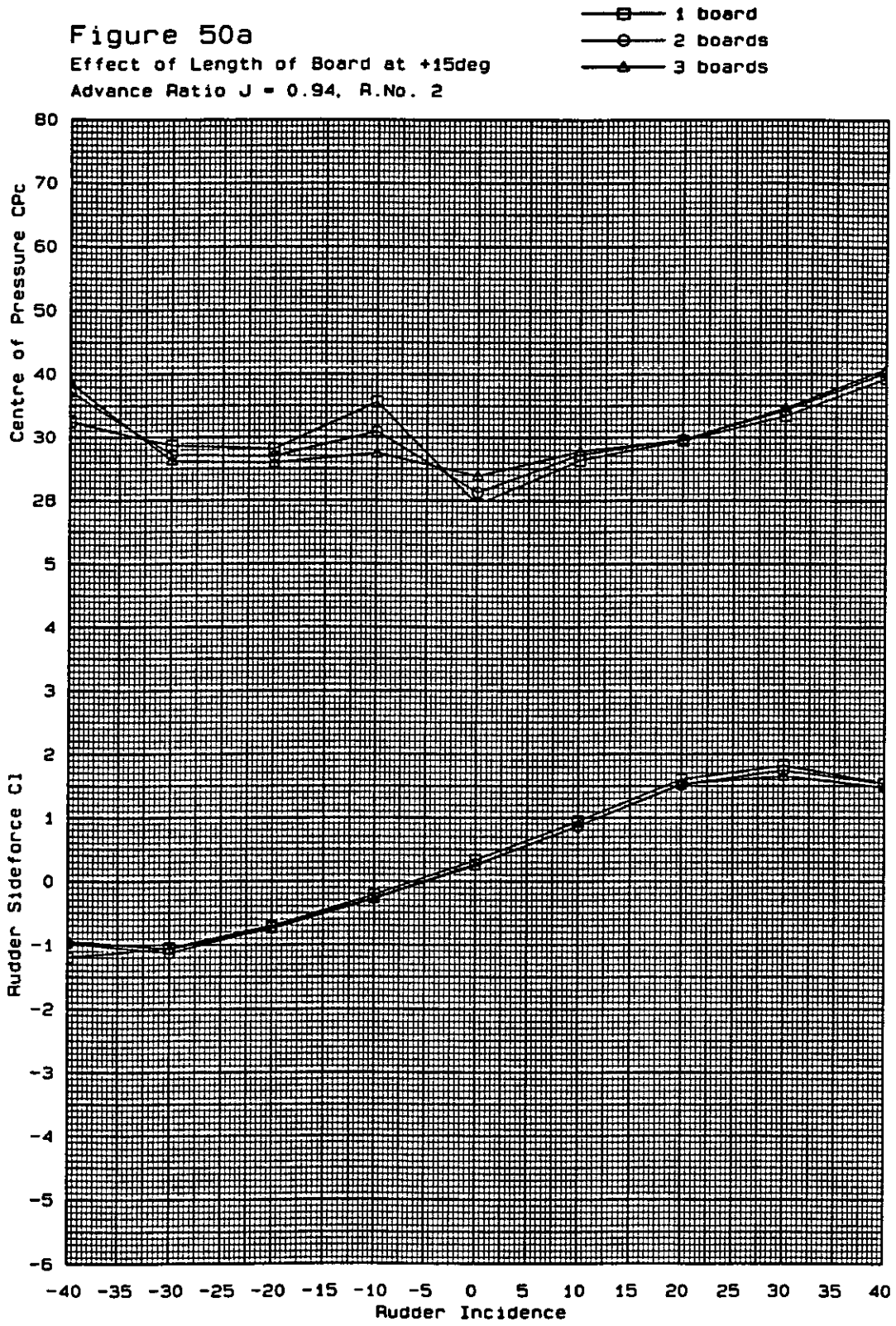



Figure 50a Effect of length of centre-board on the performance of Rudder No.2 at an advance ratio J of 0.94 at a drift angle of -7.5°: Lift and CPc

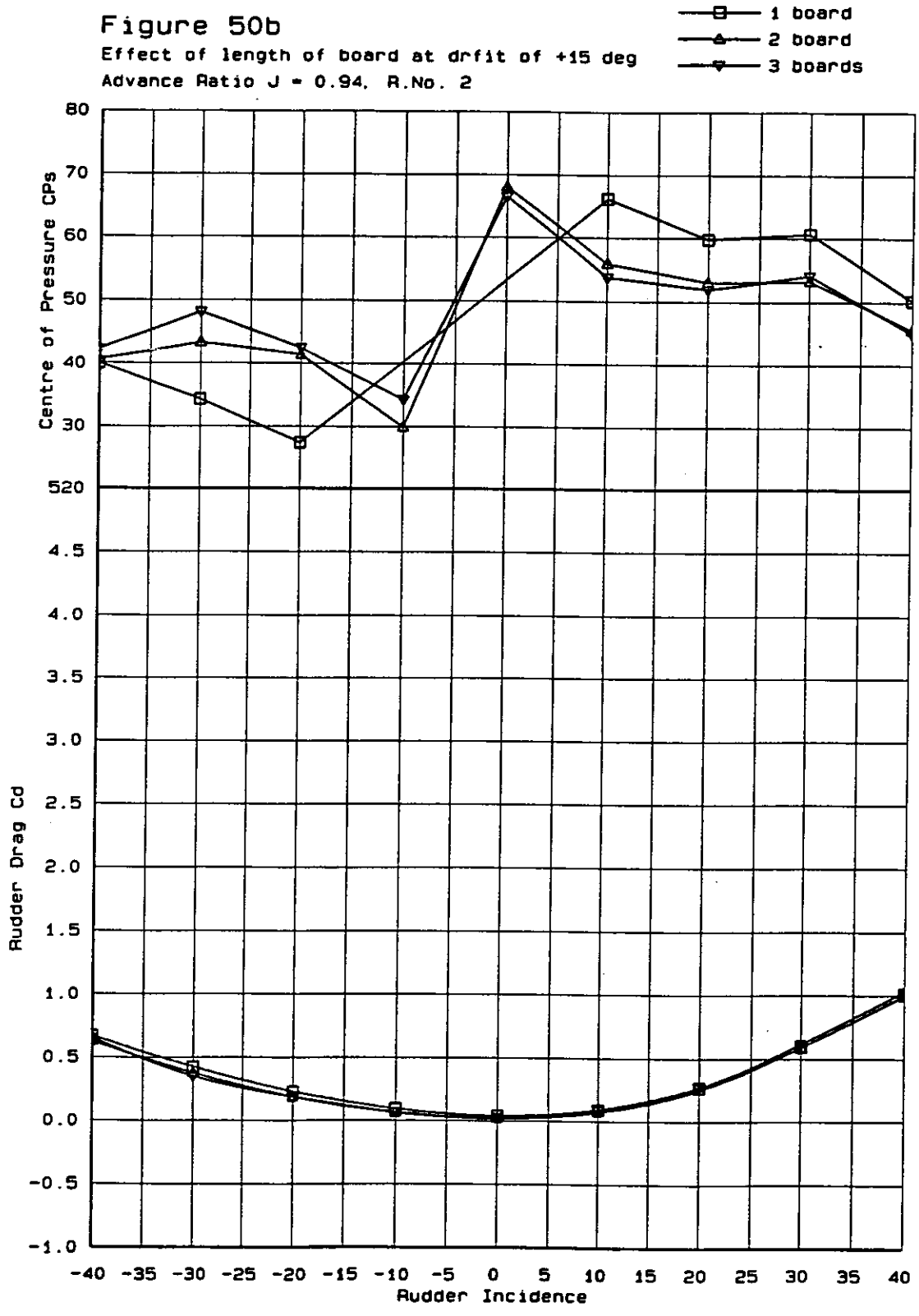



Figure 50b Effect of length of centre-board on the performance of Rudder No.2 at an advance ratio J of 0.94 at a drift angle of -7.5°: Drag and CPs

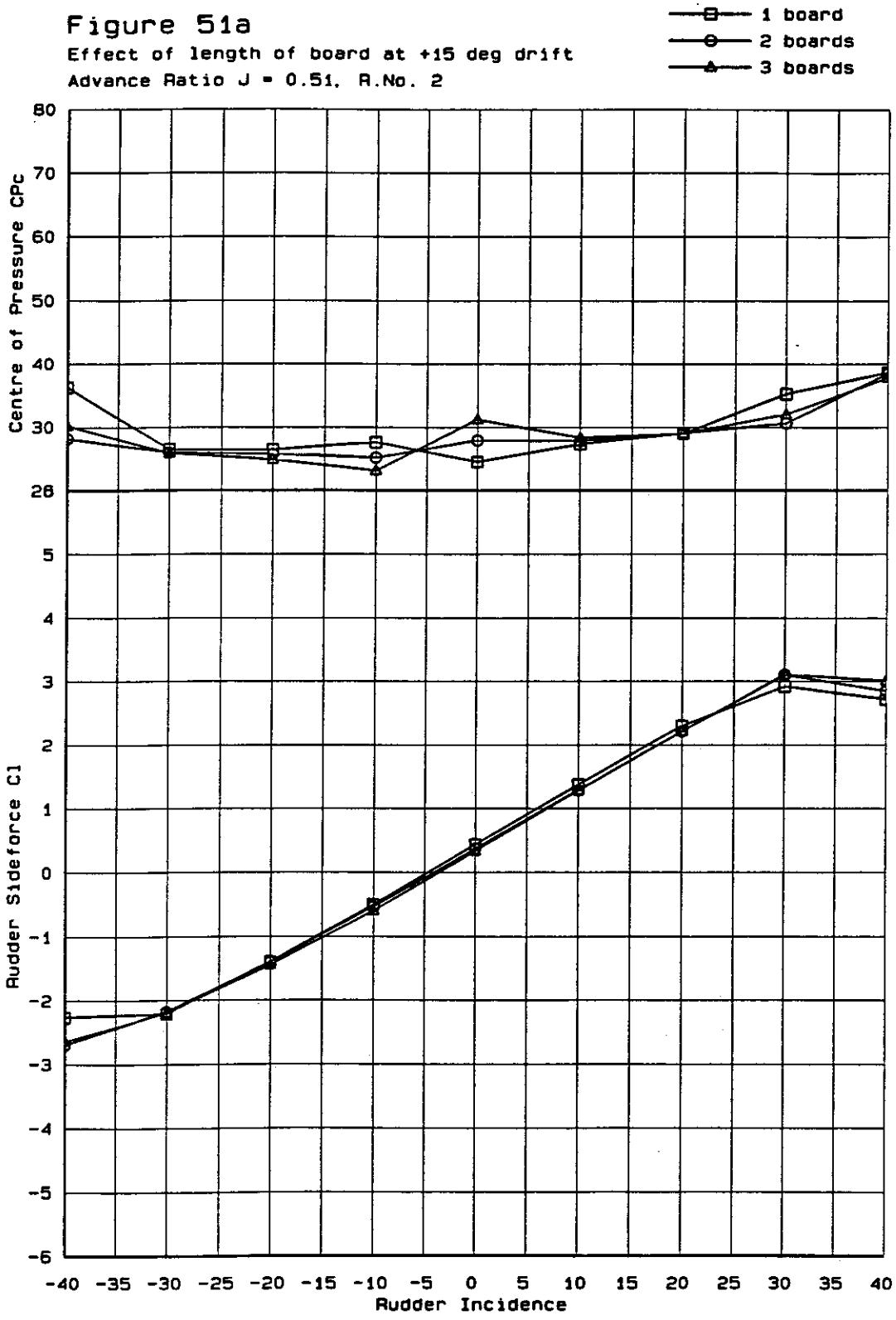



Figure 51a Effect of length of centre-board on the performance of Rudder No.2 at an advance ratio J of 0.51 at a drift angle of -7.5°: Lift and CPc

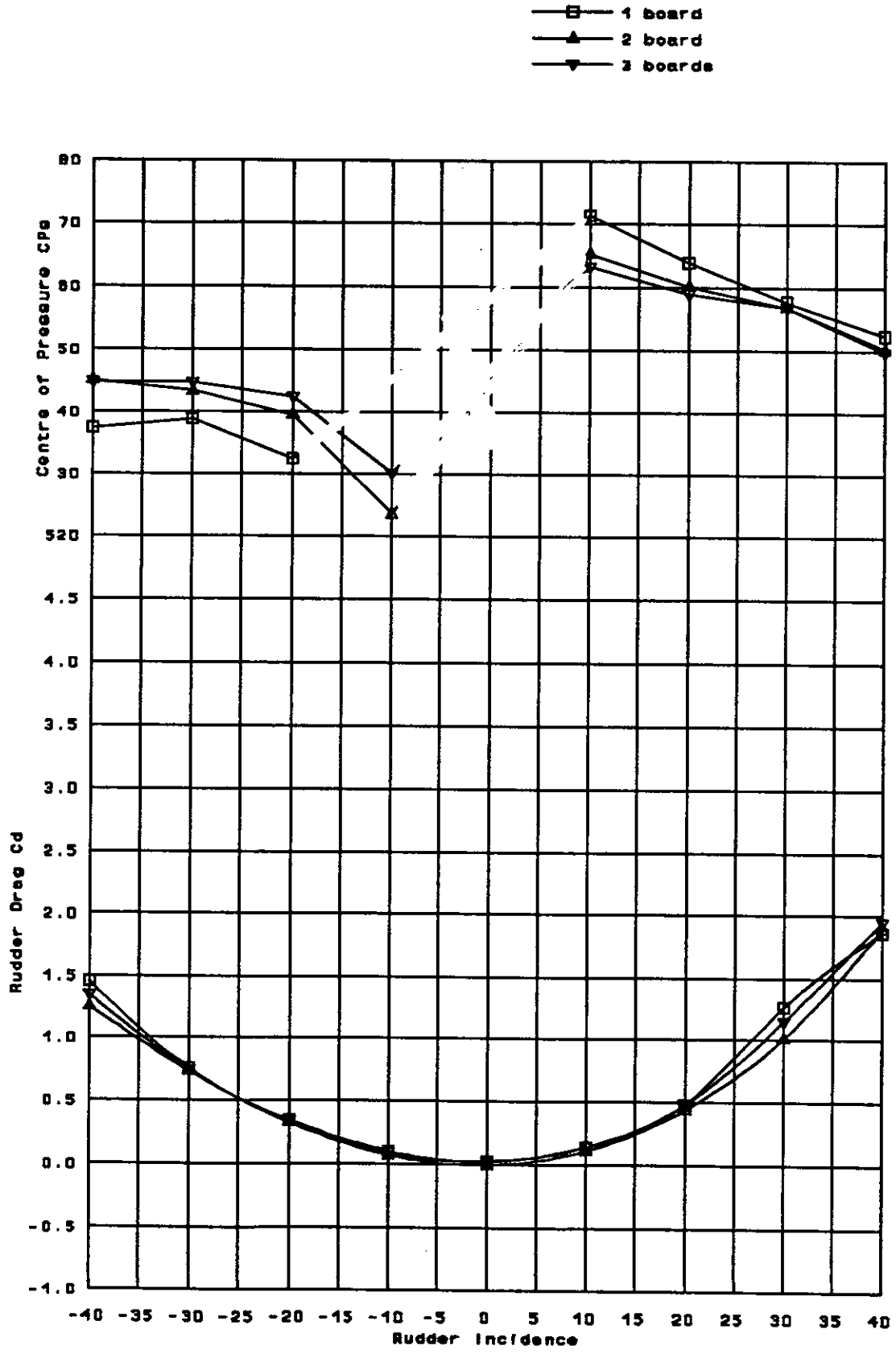



Figure 51b Effect of length of centre-board on the performance of Rudder No.2 at an advance ratio J of 0.51 at a drift angle of -7.5°: Drag and CPs

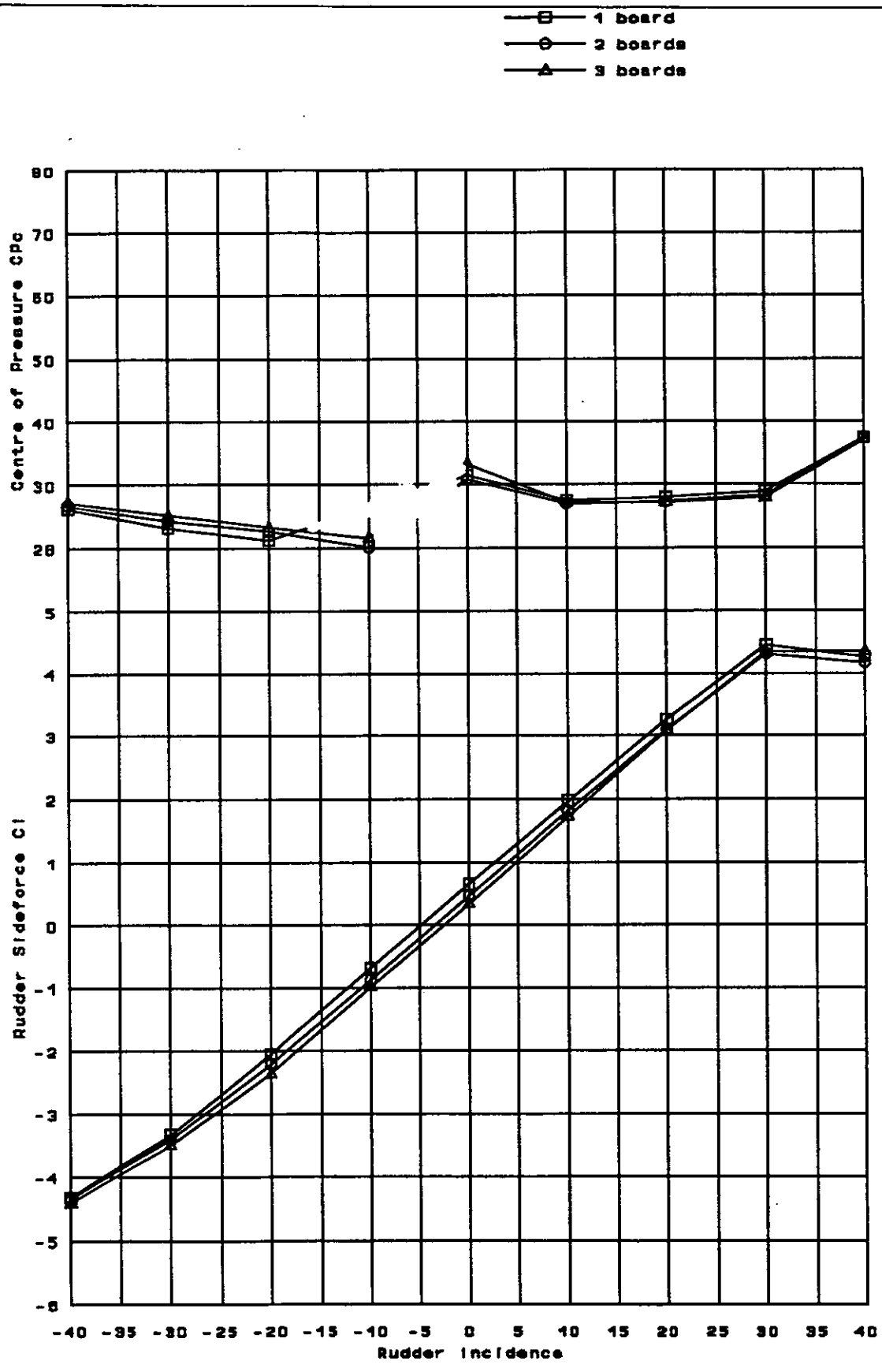



Figure 52a Effect of length of centre-board on the performance of Rudder No.2 at an advance ratio J of 0.36 at a drift angle of -7.5°: lift and CPc

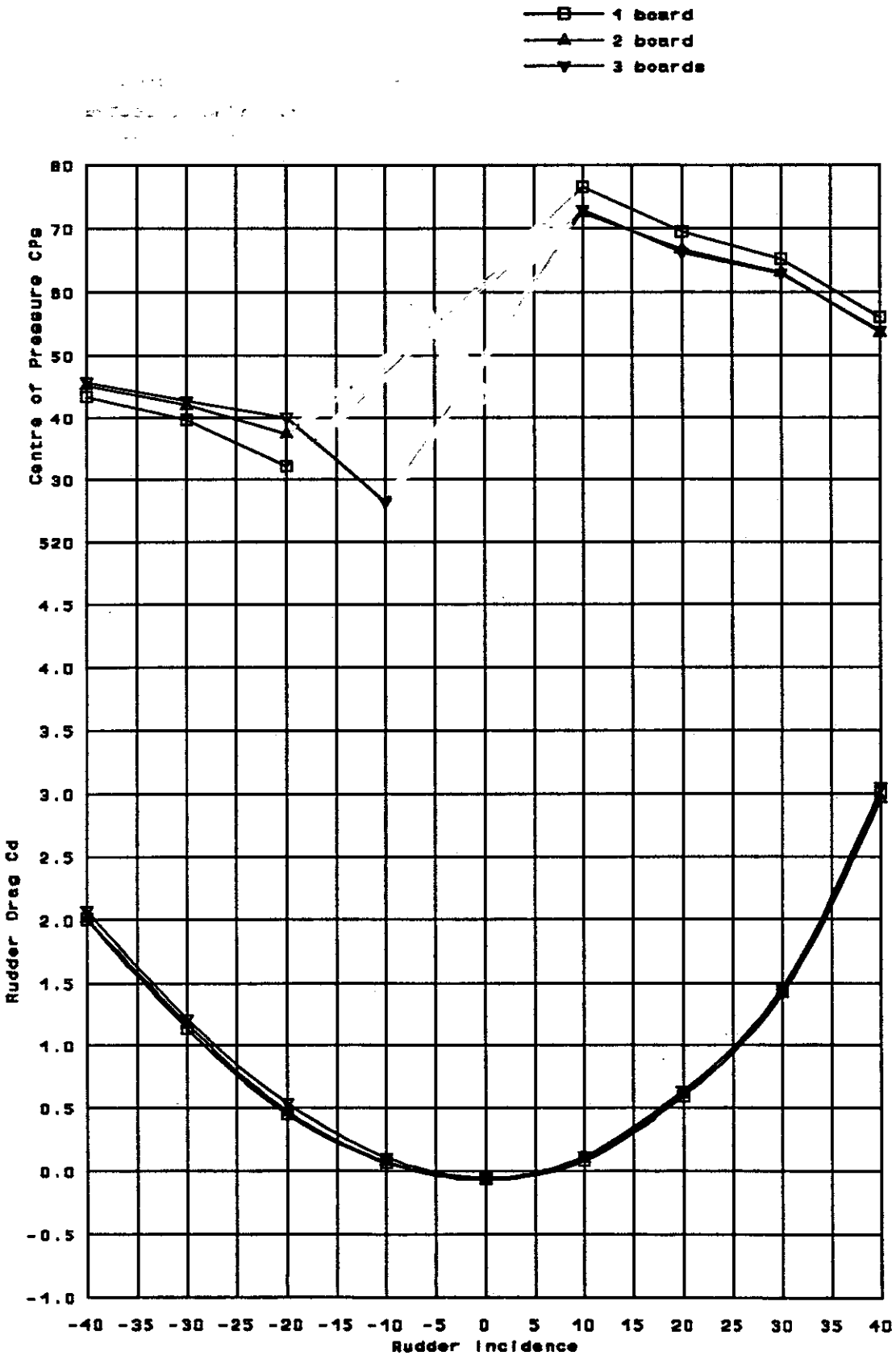



Figure 52b Effect of length of centre-board on the performance of Rudder No.2 at an advance ratio J of 0.36 at a drift angle of -7.5°: Drag and CPs

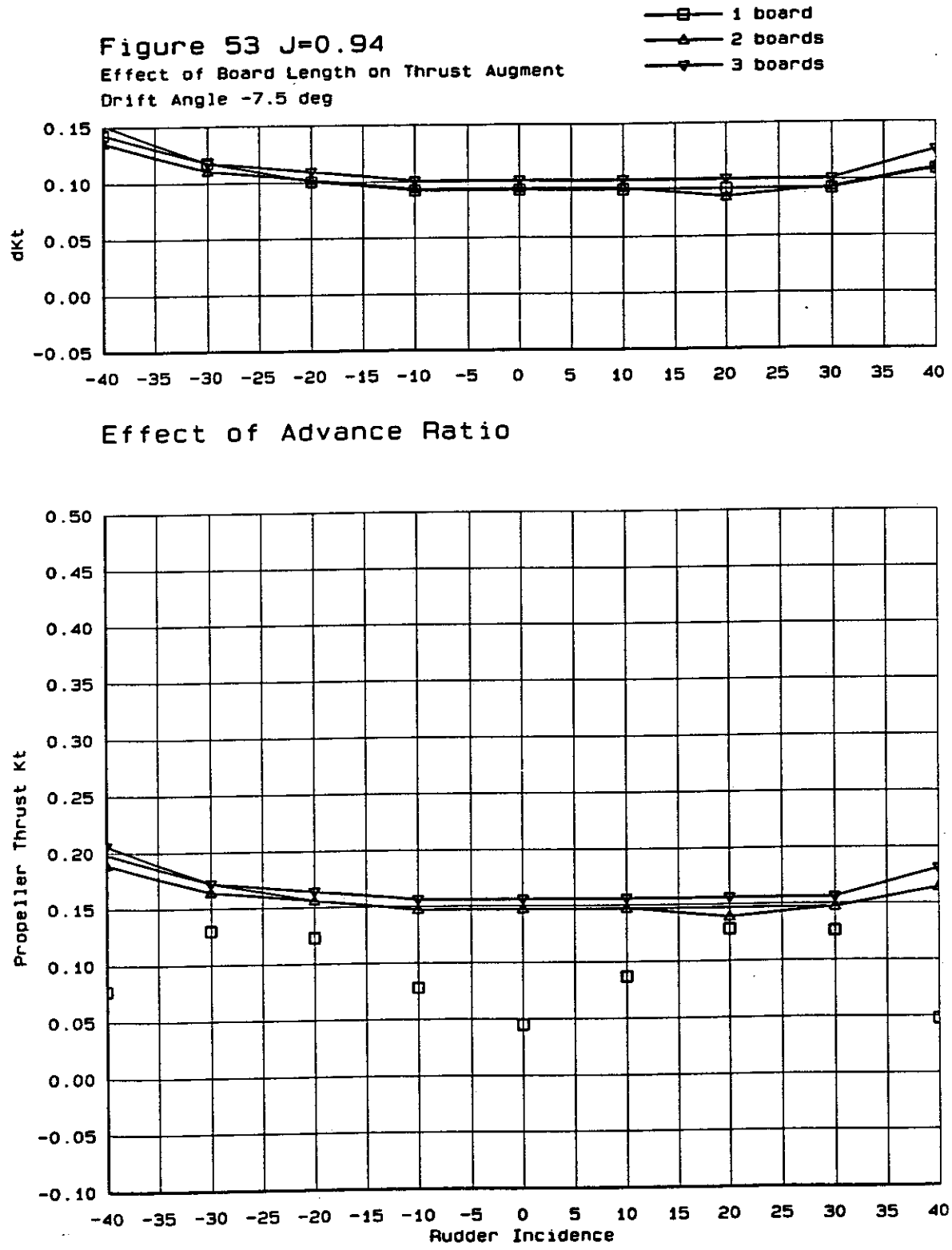



Figure 53 Effect of length of centre board on propeller thrust and thrust augment at an advance ratio J of 0.94 and drift angle of -7.5°

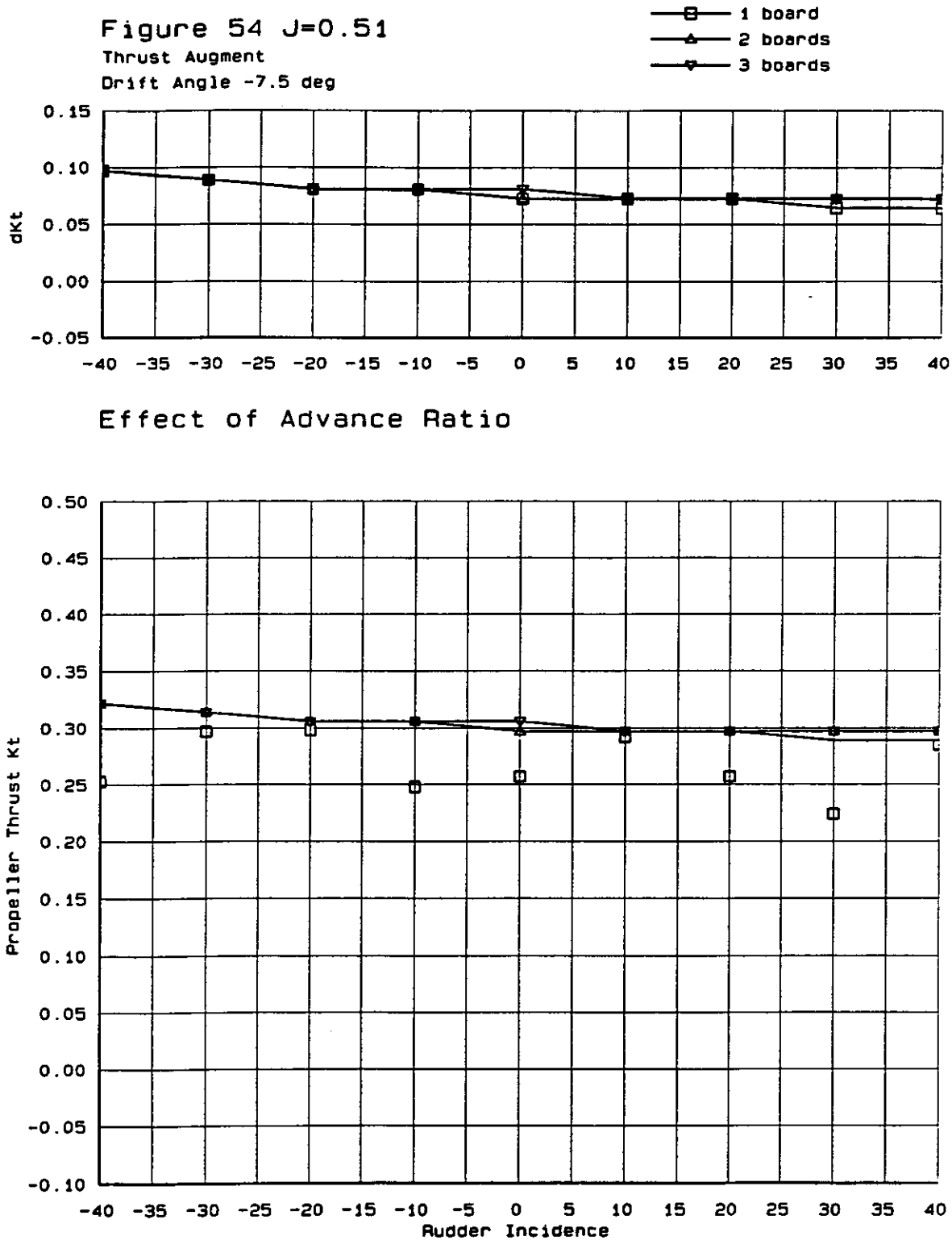



Figure 54 Effect of length of centre board on propeller thrust and thrust augment at an advance ratio J of 0.51 and drift angle of -7.5°

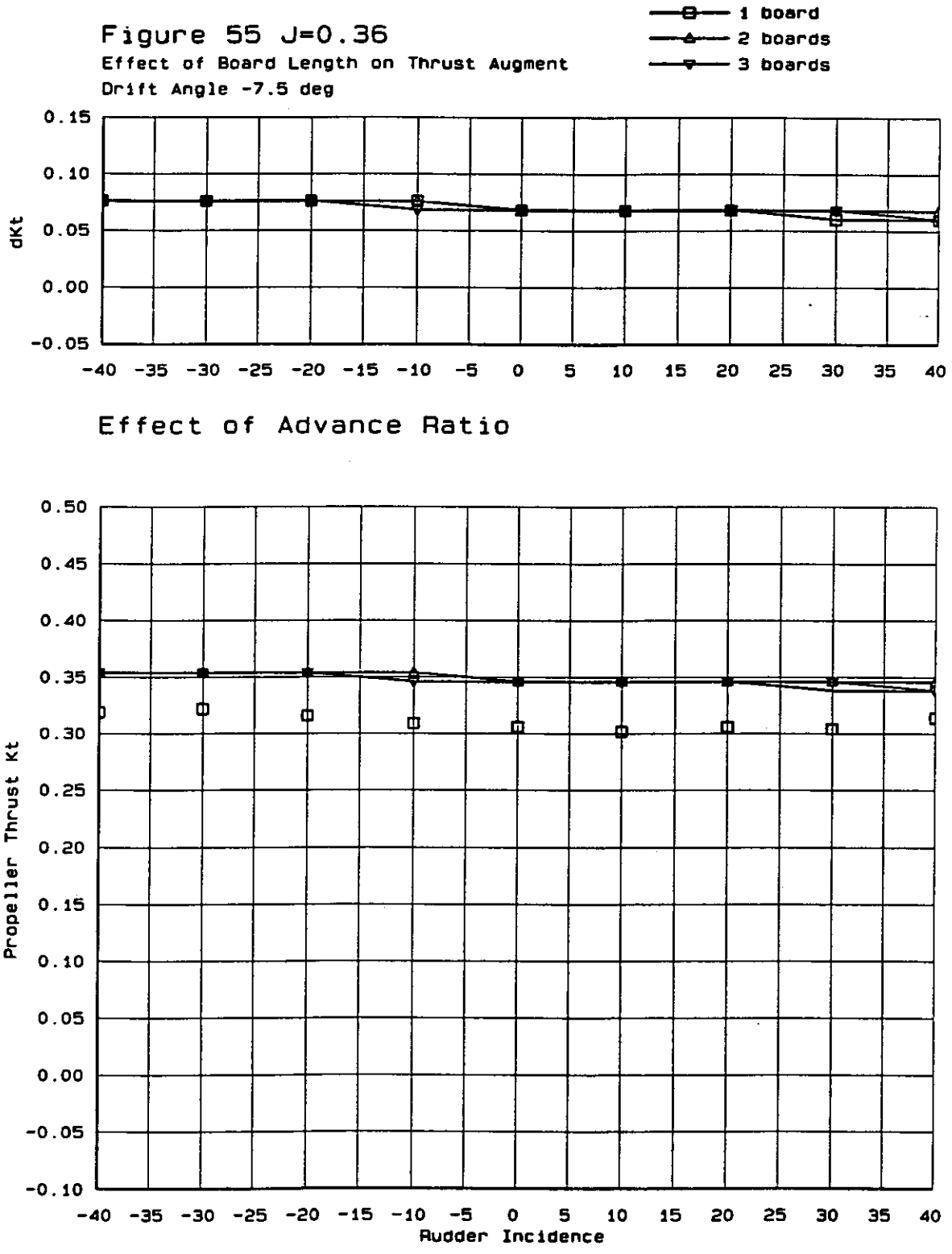



Figure 55 Effect of length of centre board on propeller thrust and thrust augment at an advance ratio J of 0.36 and drift angle of -7.5°

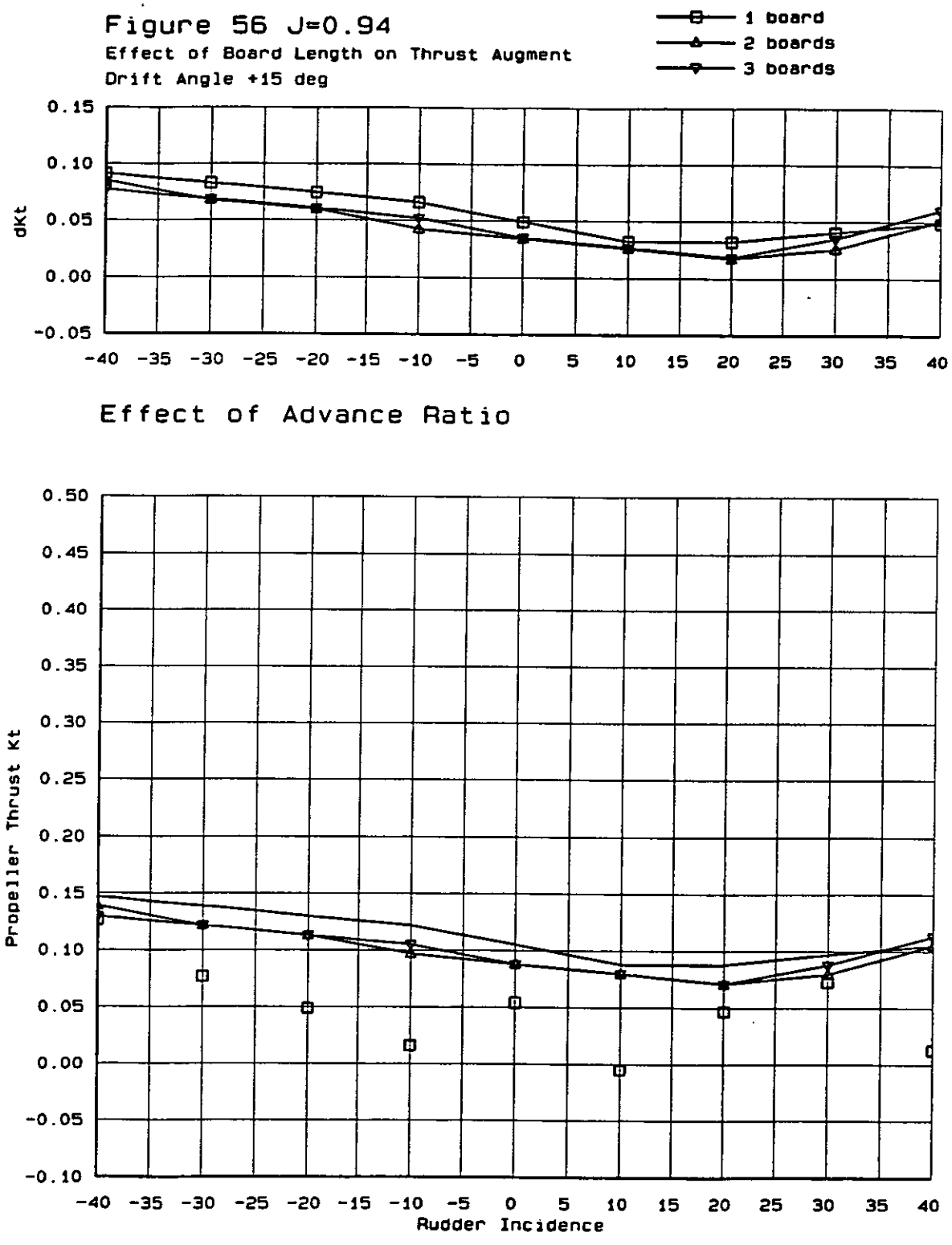
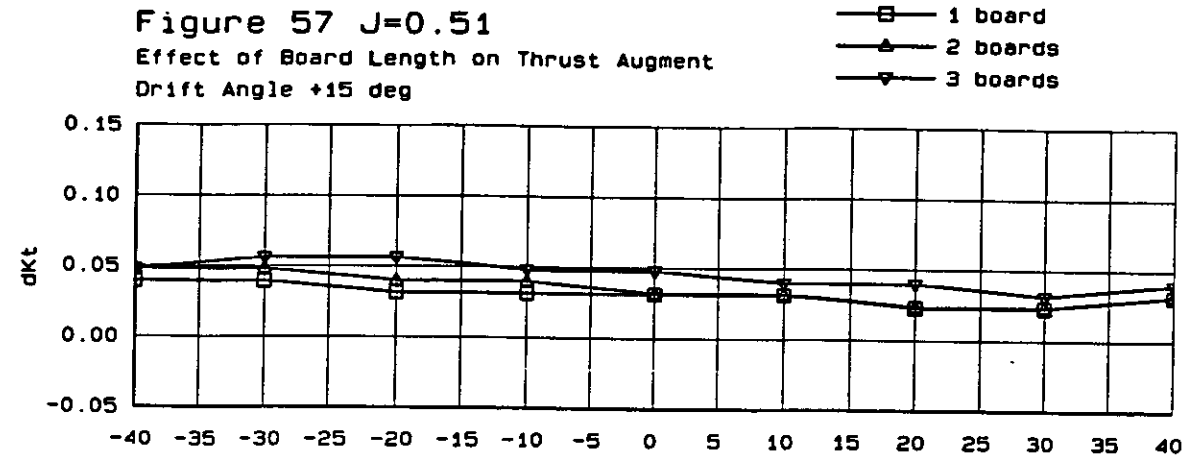



Figure 56 Effect of length of centre board on propeller thrust and thrust augment at an advance ratio J of 0.94 and drift angle of +15°



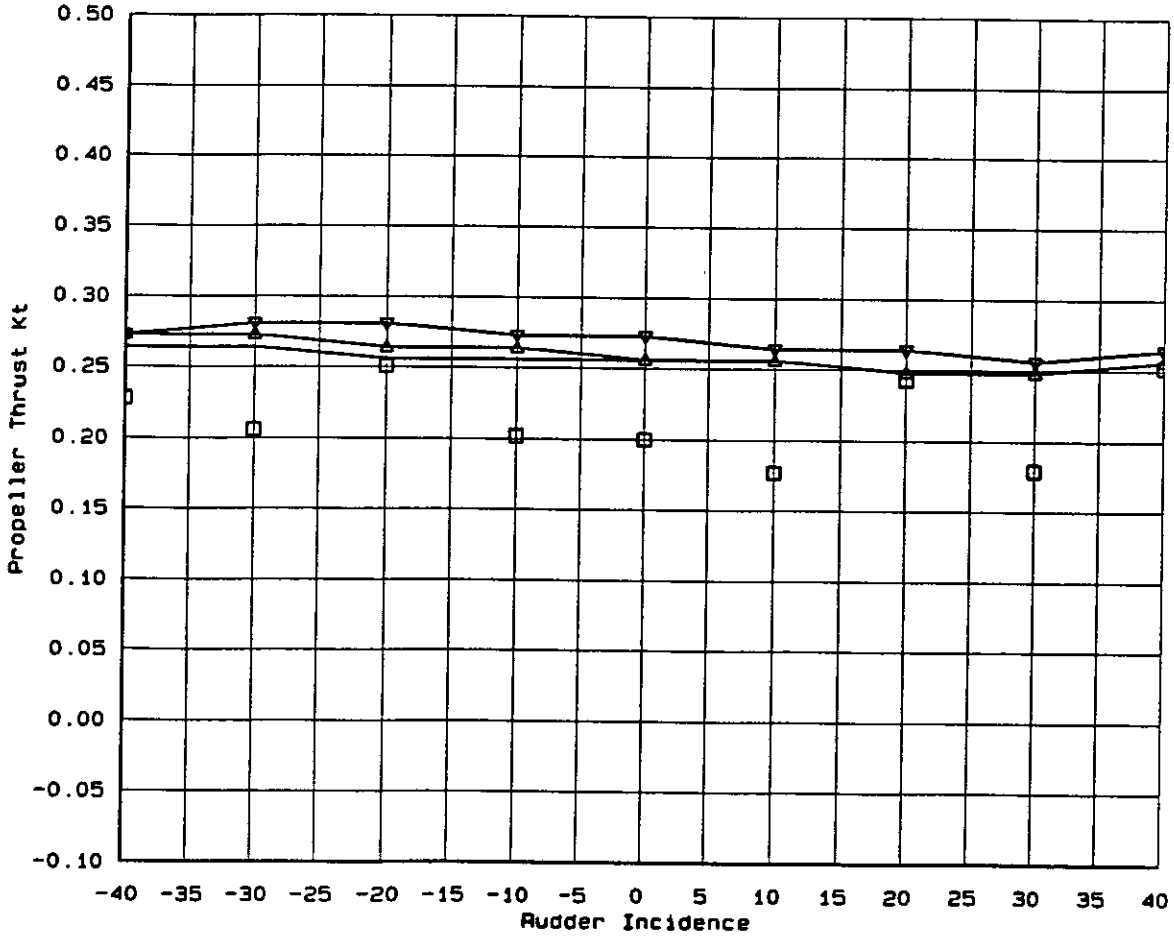




Figure 57 Effect of length of centre board on propeller thrust and thrust augment at an advance ratio J of 0.51 and drift angle of +15°

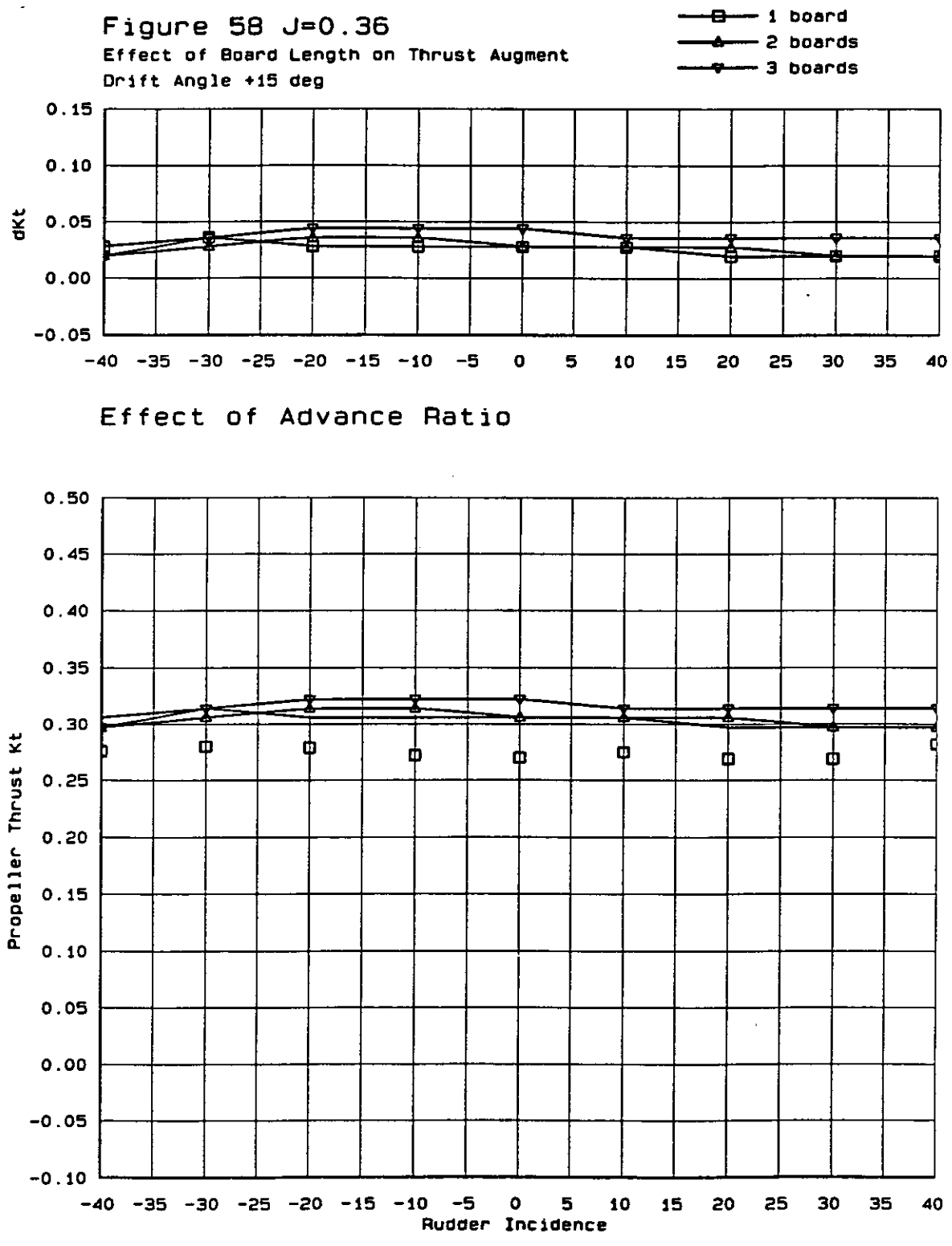



Figure 58 Effect of length of centre board on propeller thrust and thrust augment at an advance ratio J of 0.36 and drift angle of +15°

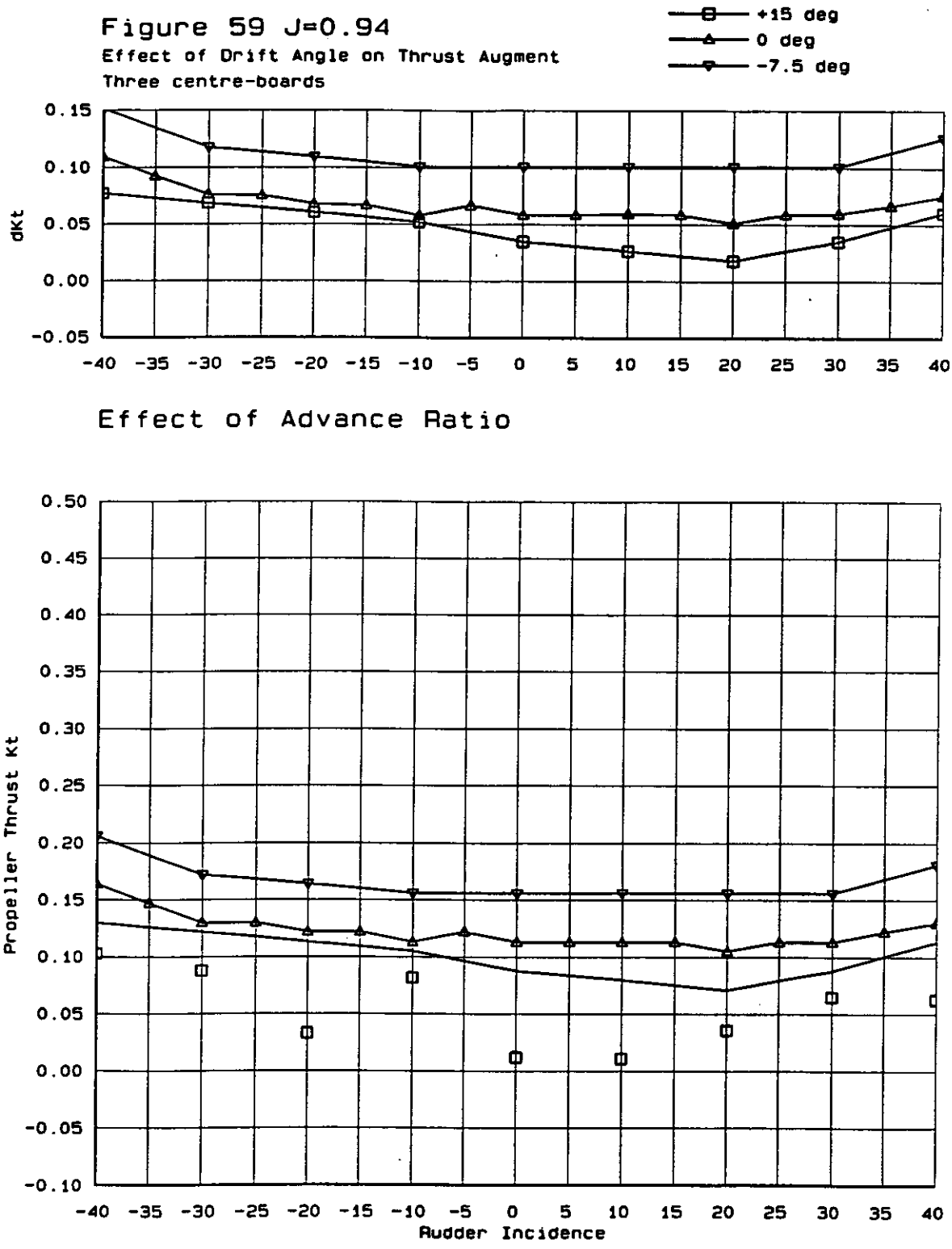



Figure 59 Effect of drift angle on propeller thrust and thrust augment at an advance ratio J of 0.94 with full centre-board

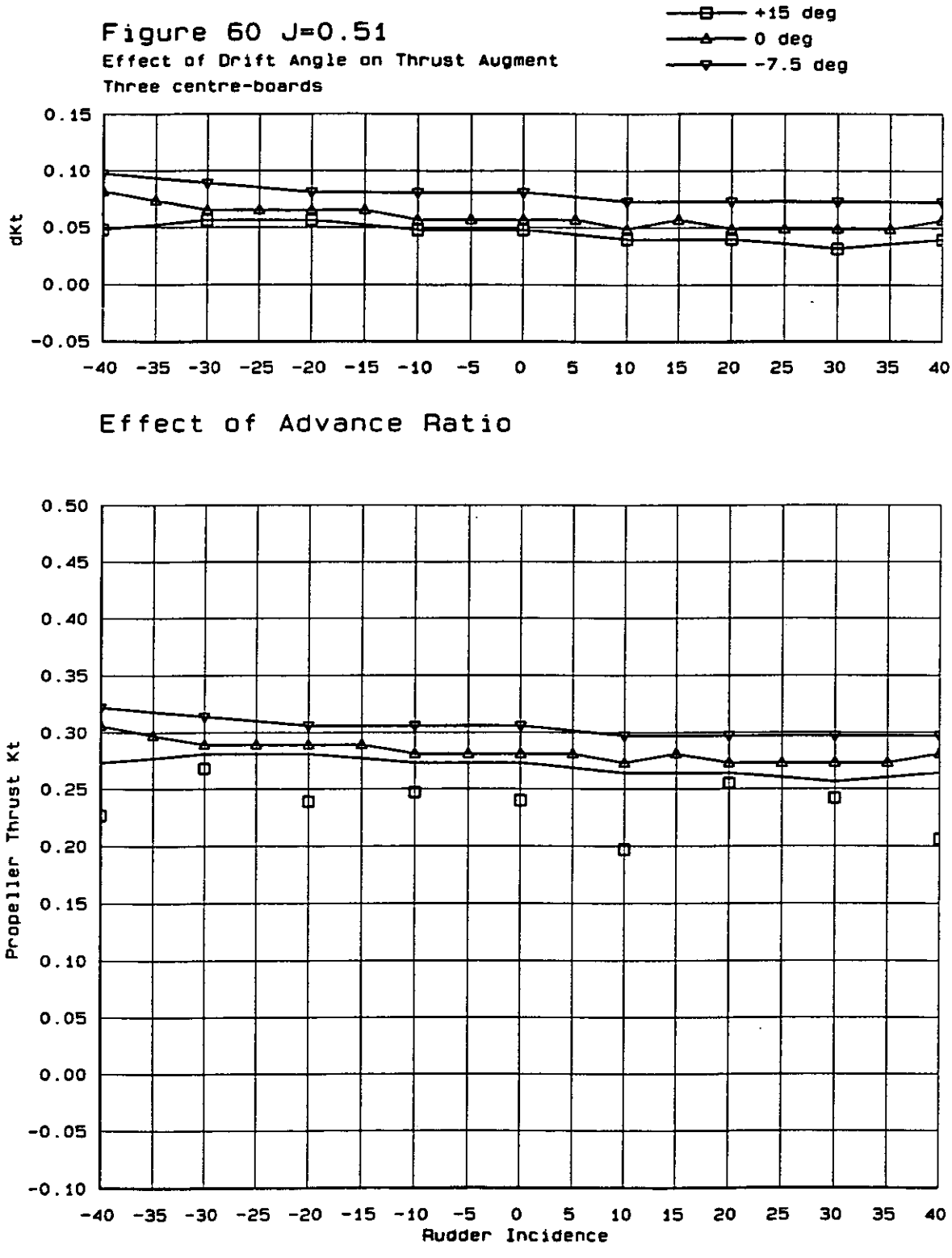



Figure 60 Effect of drift angle on propeller thrust and thrust augment at an advance ratio J of 0.51 with full centre-board

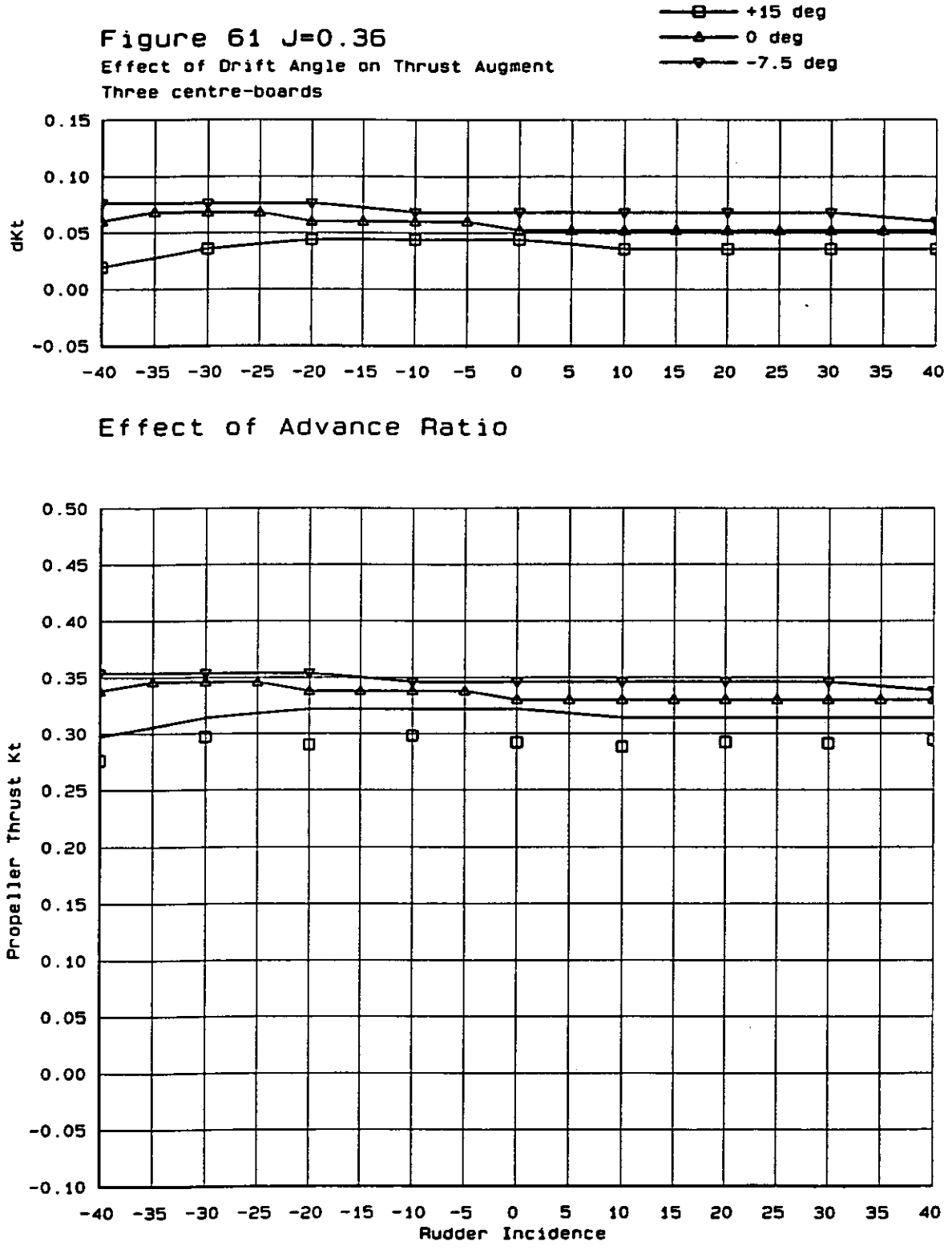



Figure 61 Effect of drift angle on propeller thrust and thrust augment at an advance ratio J of 0.36 with full centre-board

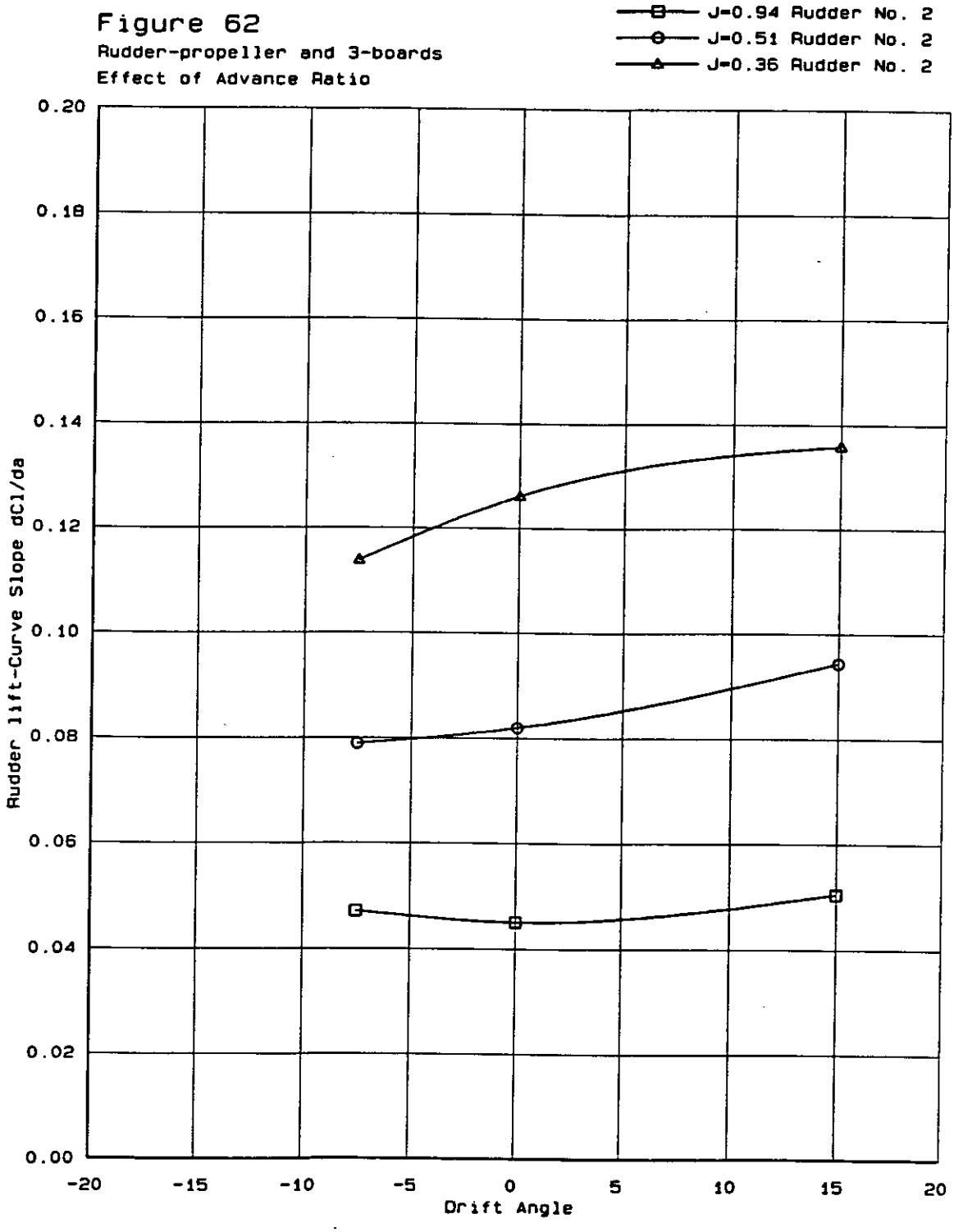



Figure 62 Effect of drift angle on lift-curve slope of Rudder No. 2 with full centre-board

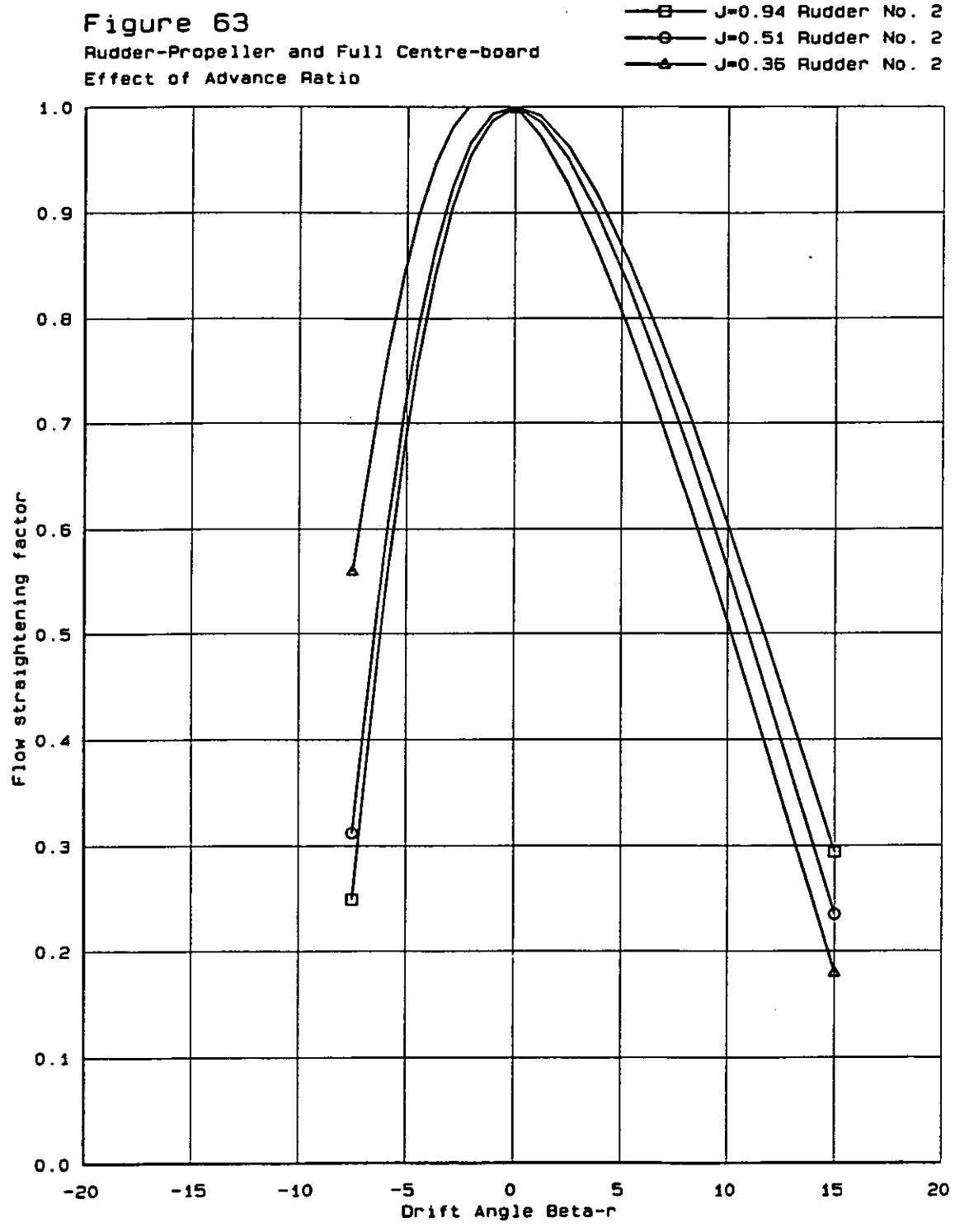



Figure 63 Effect of drift angle on flow straightening with full centre-board

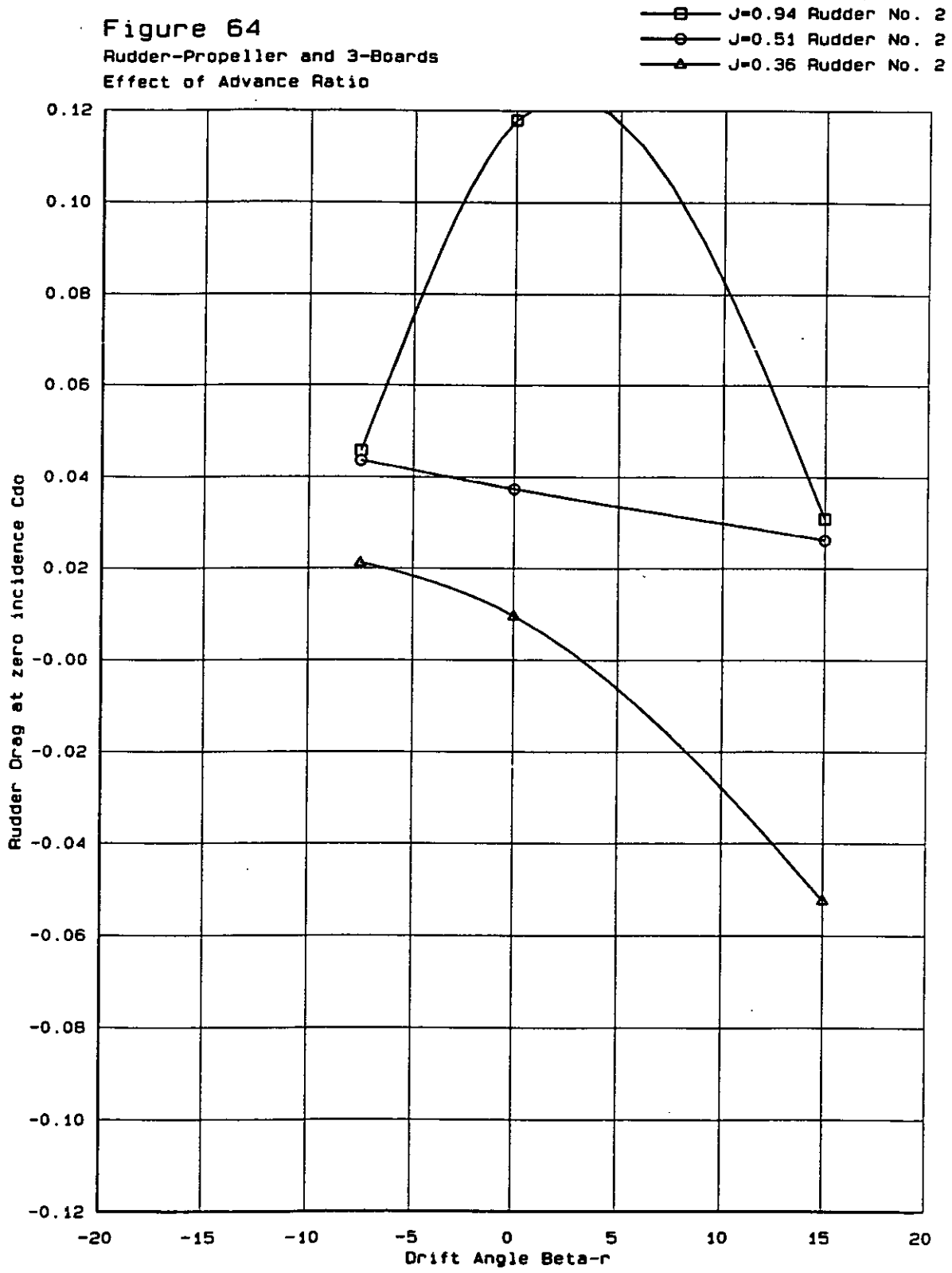



Figure 64 Effect of drift angle on the drag of Rudder No. 2 at zero incidence

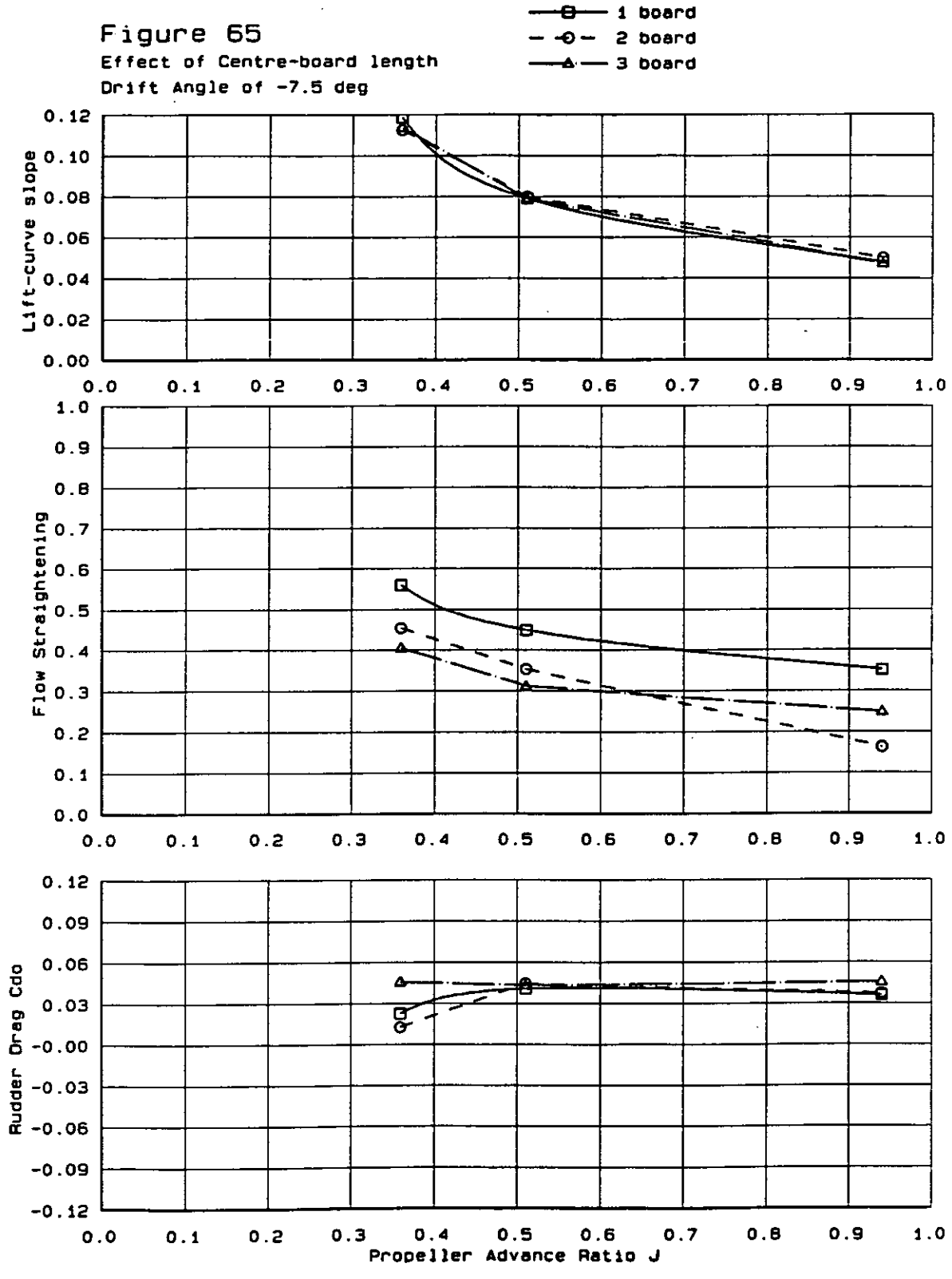



Figure 65 Effect of centre-board length on the lift-curve slope, flow straightening and rudder drag at zero incidence at a drift angle of -7.5°

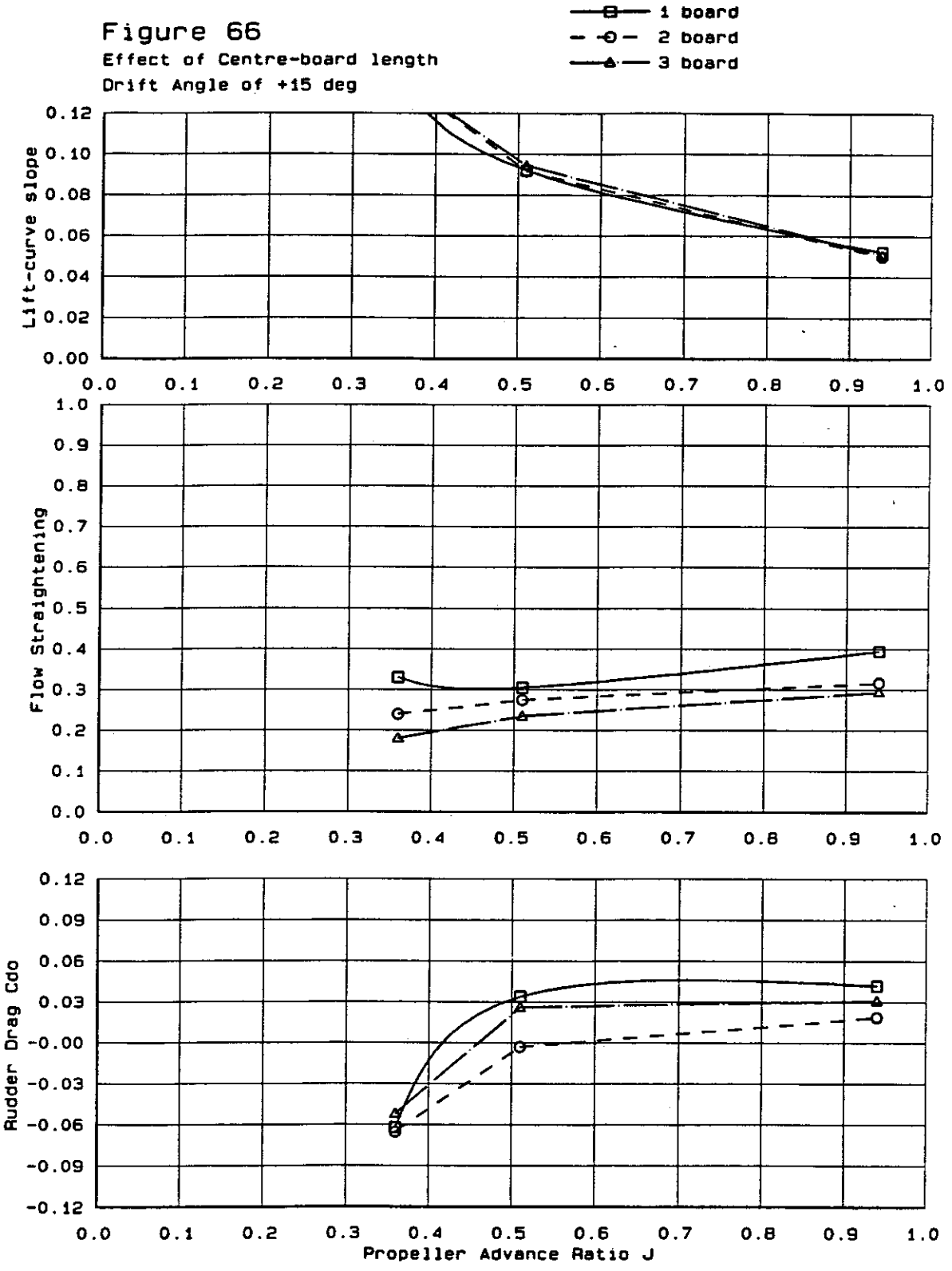



Figure 66 Effect of centre-board length on the lift-curve slope, flow straightening and rudder drag at zero incidence at a drift angle of +15°

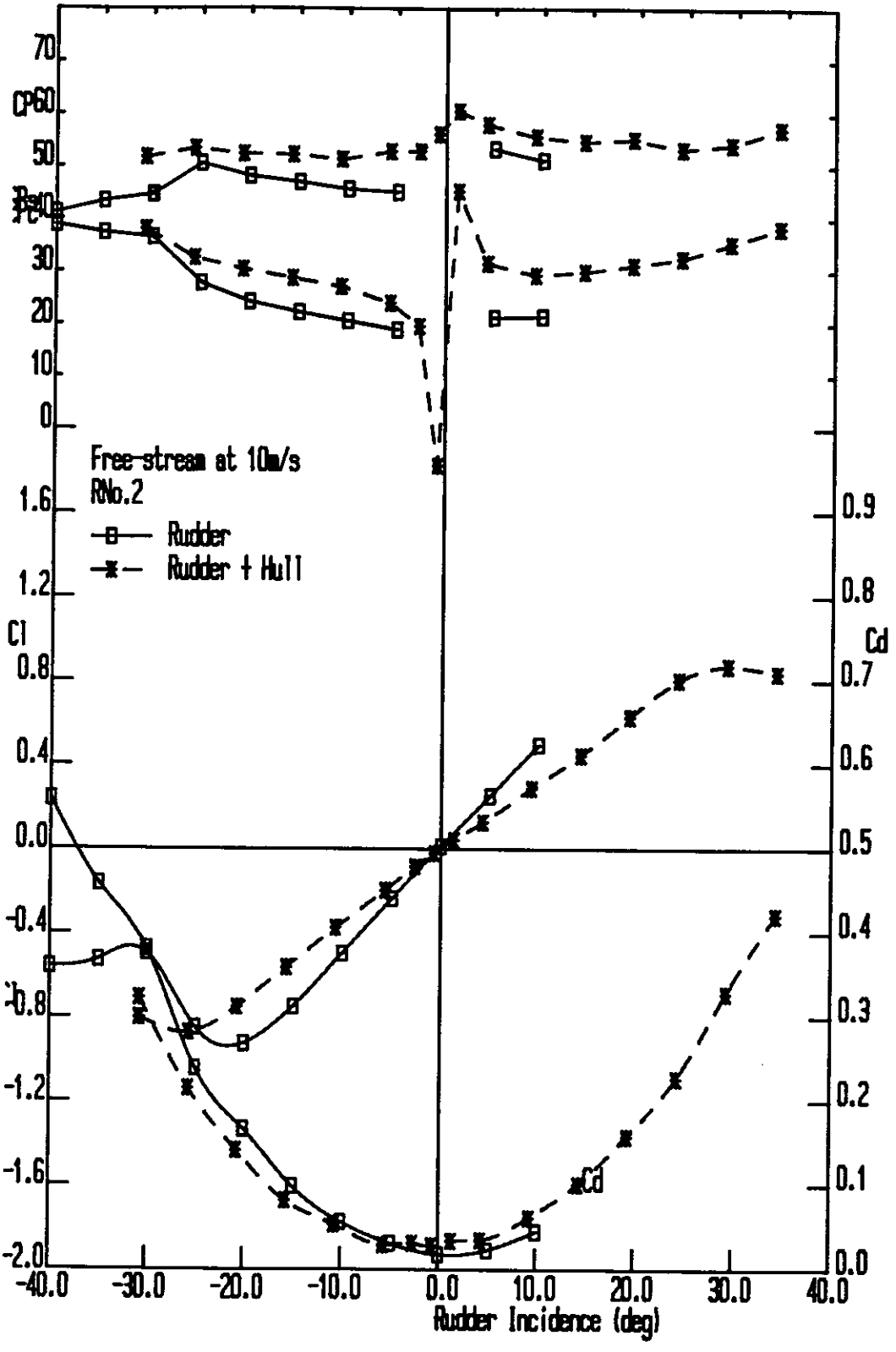



Figure 67 Free-stream performance of Rudder No. 2 with and without Mariner stern form at zero drift

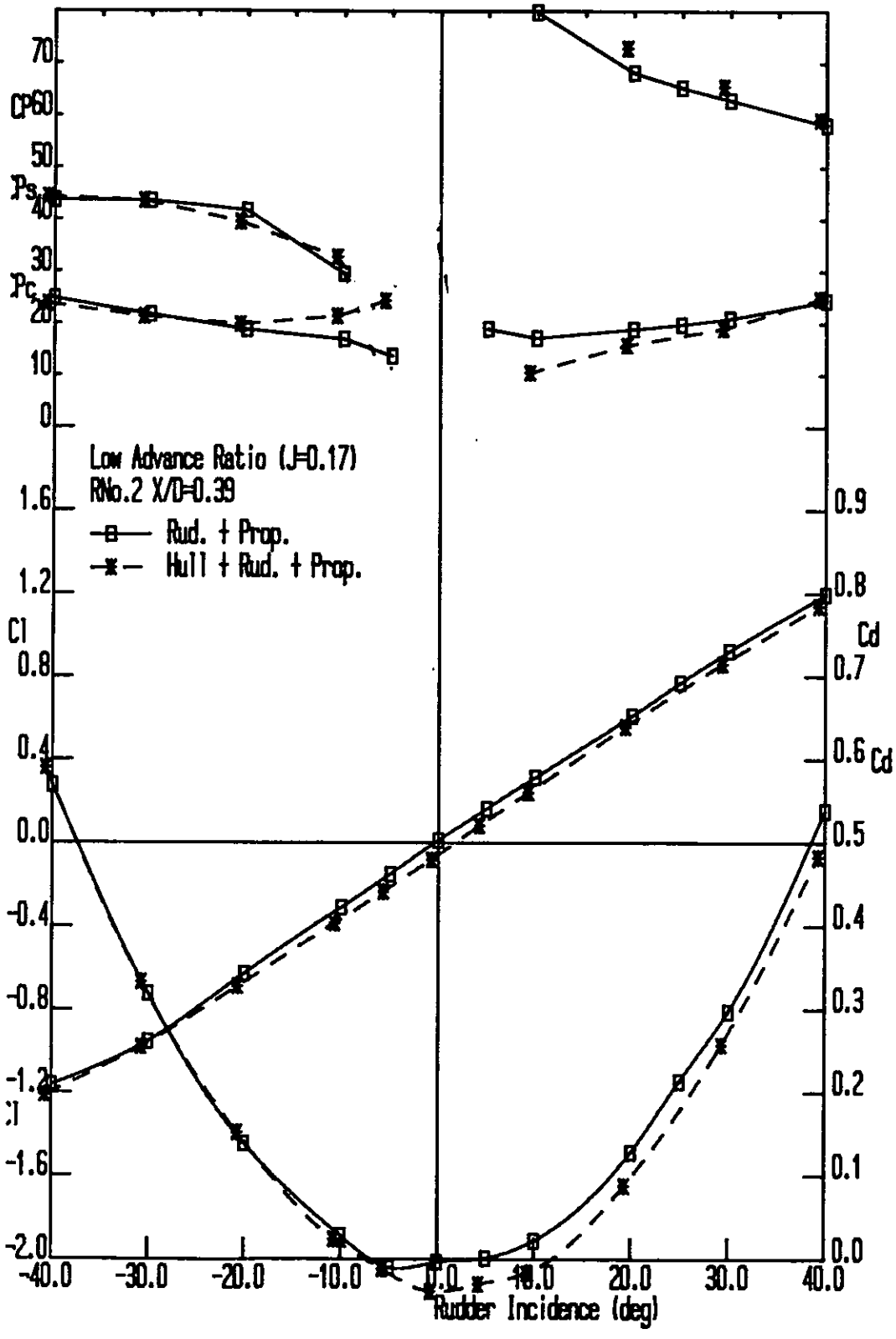



Figure 68 Low-speed performance of Rudder No. 2 with and without Mariner stern form at an advance ratio J of 0.17 at zero drift

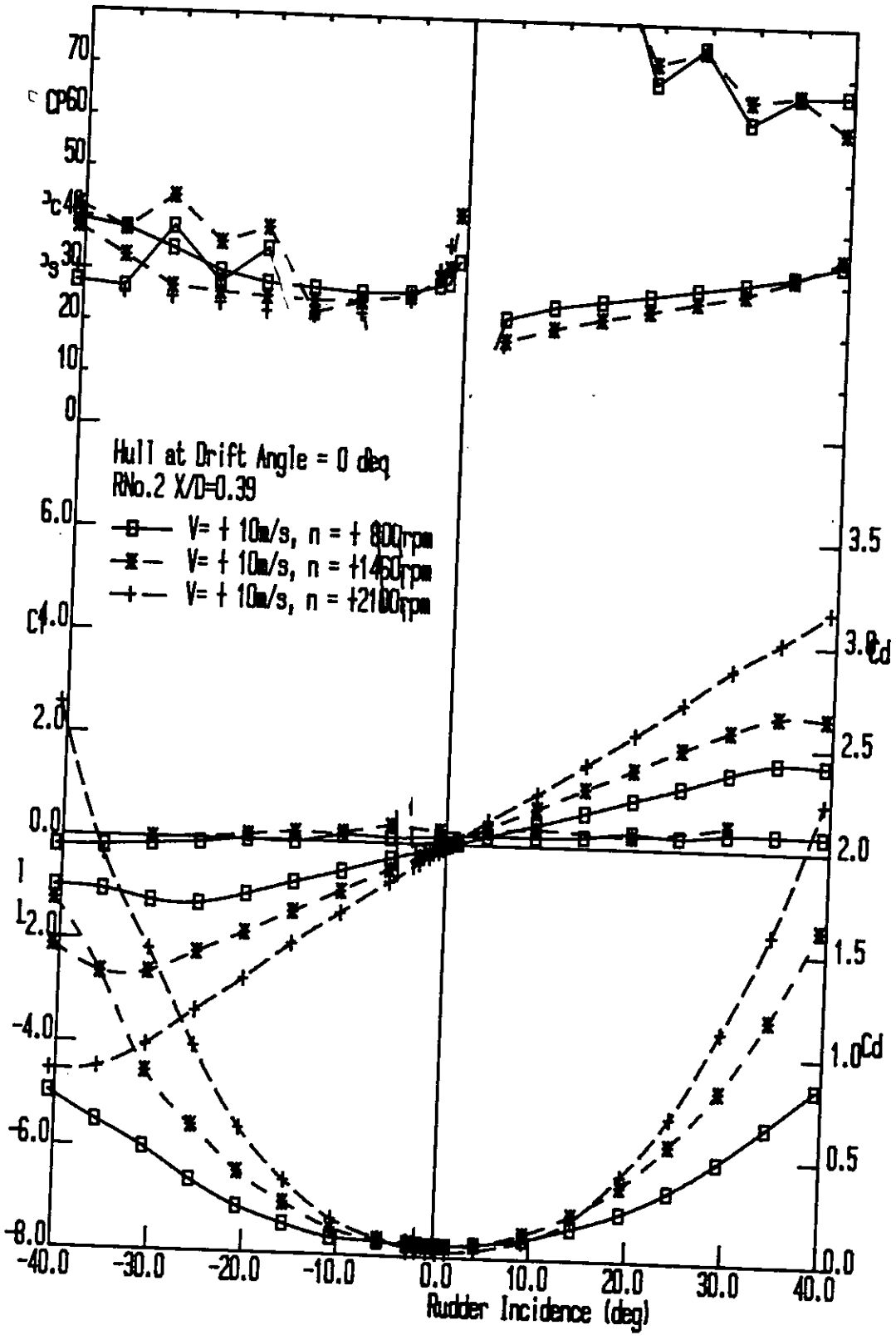



Figure 69 Effect of advance ratio on the performance of Rudder No. 2 with an upstream Mariner stern form at zero drift

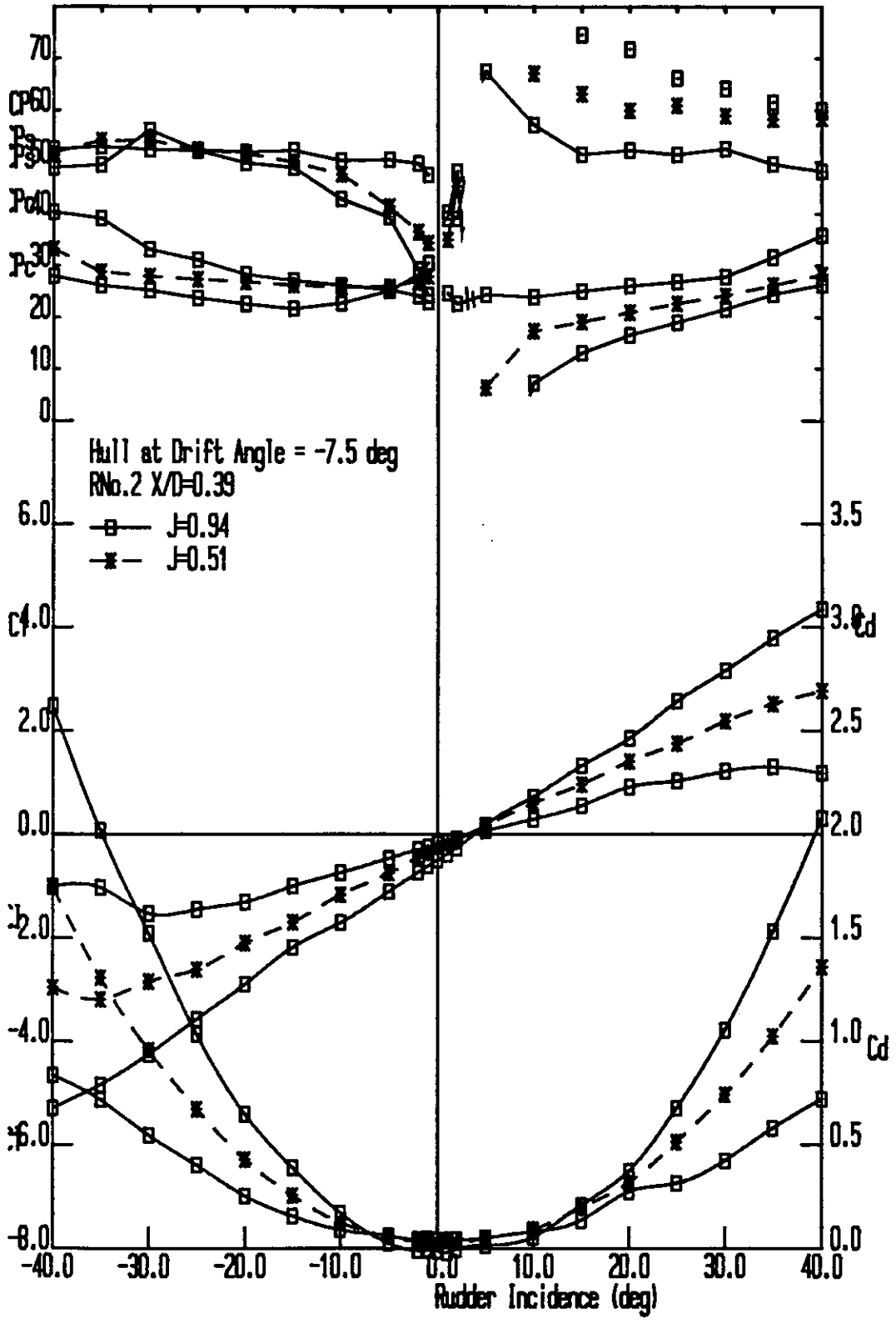



Figure 70 Effect of adavnce ratio on the performance of Rudder No. 2 with an upstream Mariner stern form at a drift angle of -7.5°

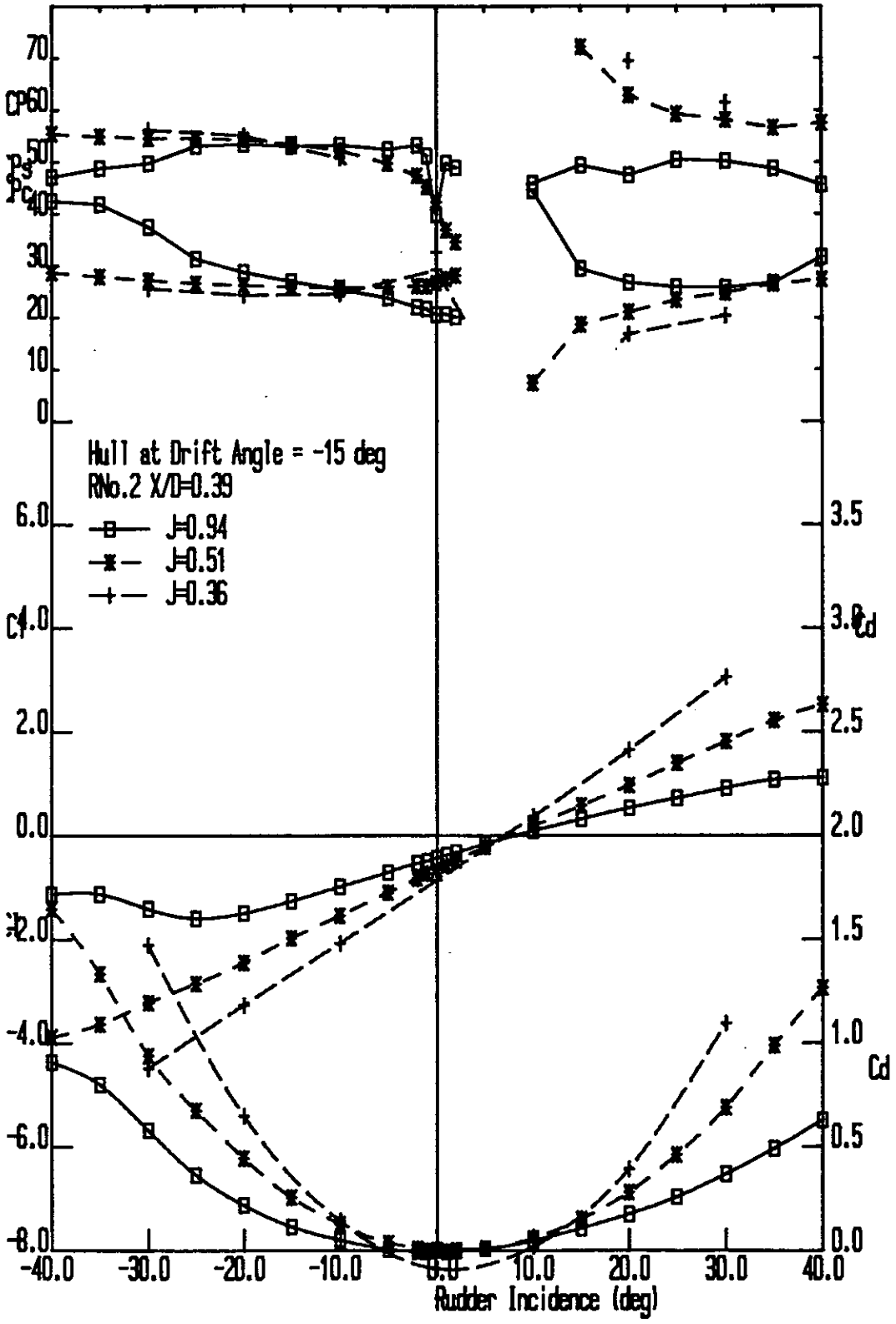



Figure 71 Effect of adavnce ratio on the performance of Rudder No. 2 with an upstream Mariner stern form at a drift angle of -15°

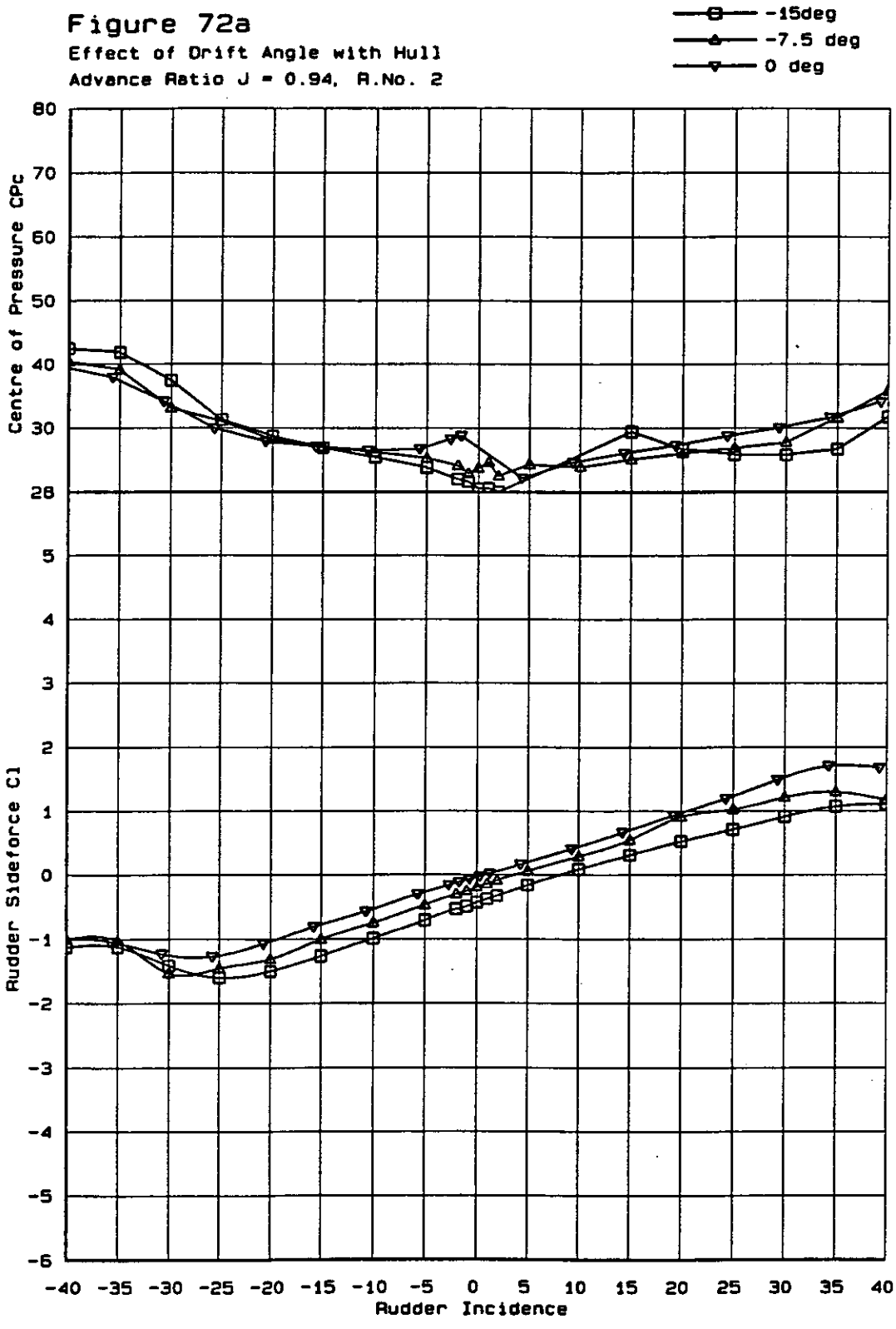



Figure 72a Effect of drift angle on the performance of Rudder No. 2 downstream of a Mariner stern form at an advance ratio of 0.94: Lift and CPc

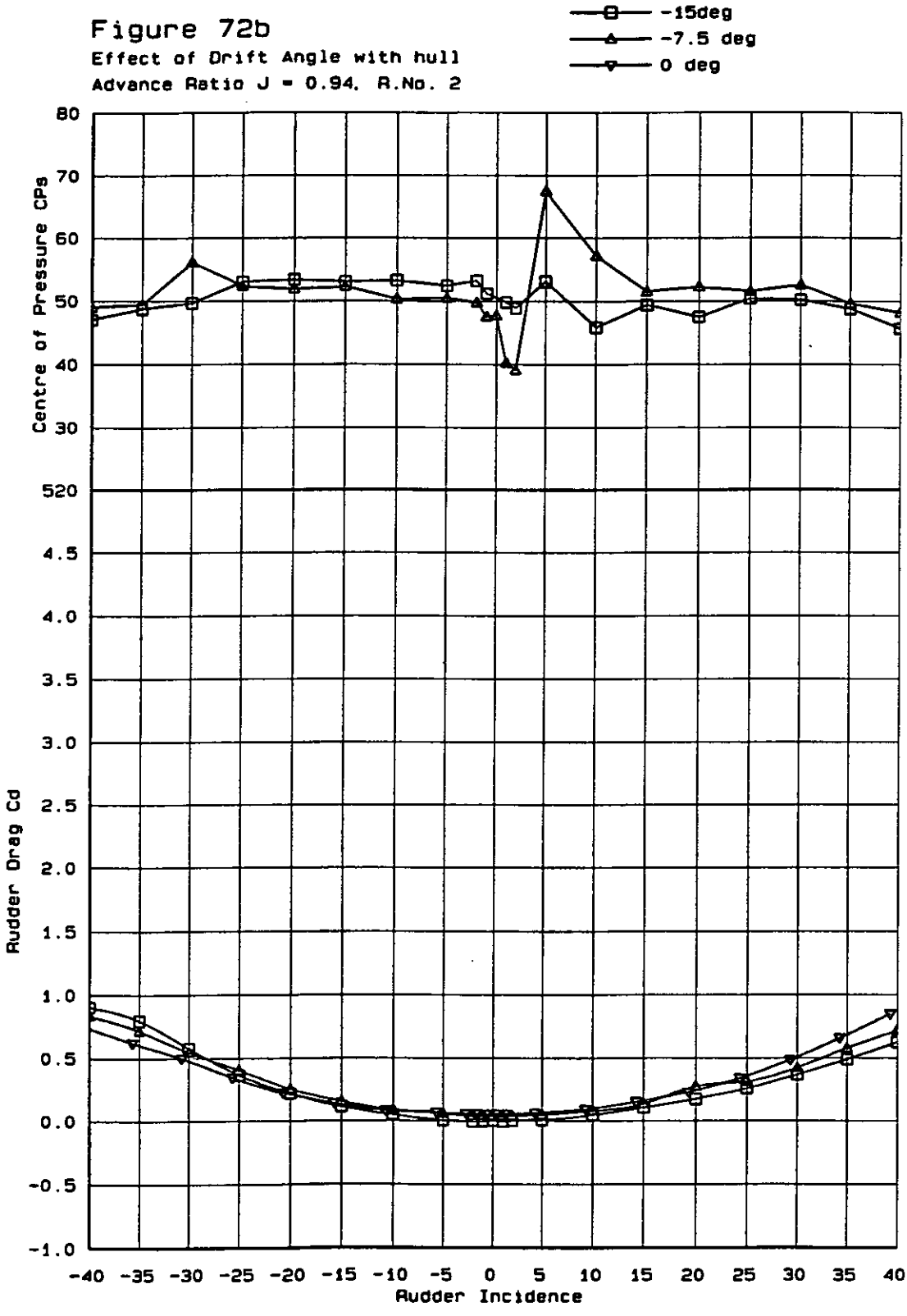



Figure 72b Effect of drift angle on the performance of Rudder No. 2 downstream of a Mariner stern form at an advance ratio of 0.94: Drag and CPs

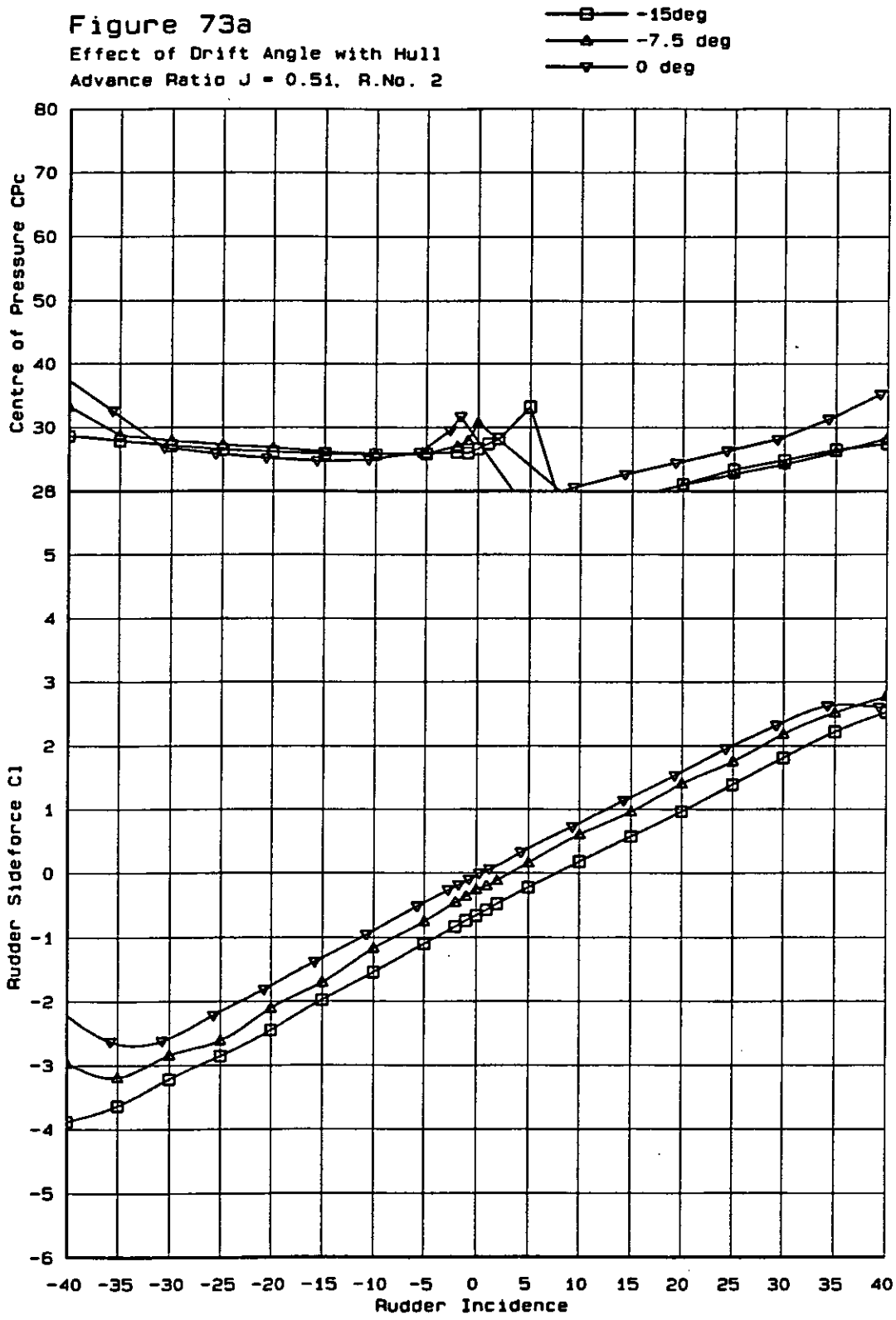



Figure 73a Effect of drift angle on the performance of Rudder No. 2 downstream of a Mariner stern form at an advance ratio of 0.51: Lift and CPc

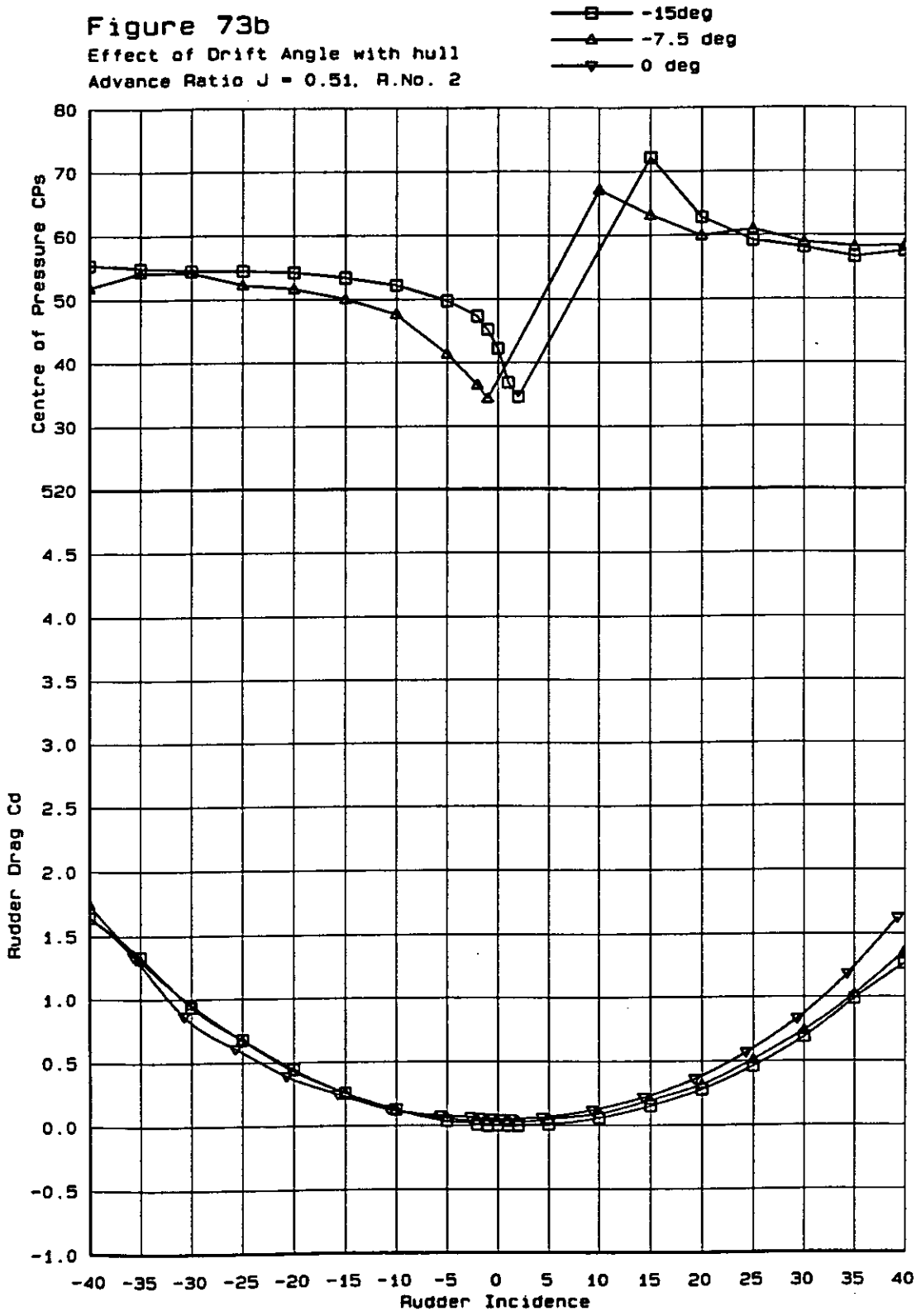



Figure 73b Effect of drift angle on the performance of Rudder No. 2 downstream of a Mariner stern form at an advance ratio of 0.51: Drag and CPs

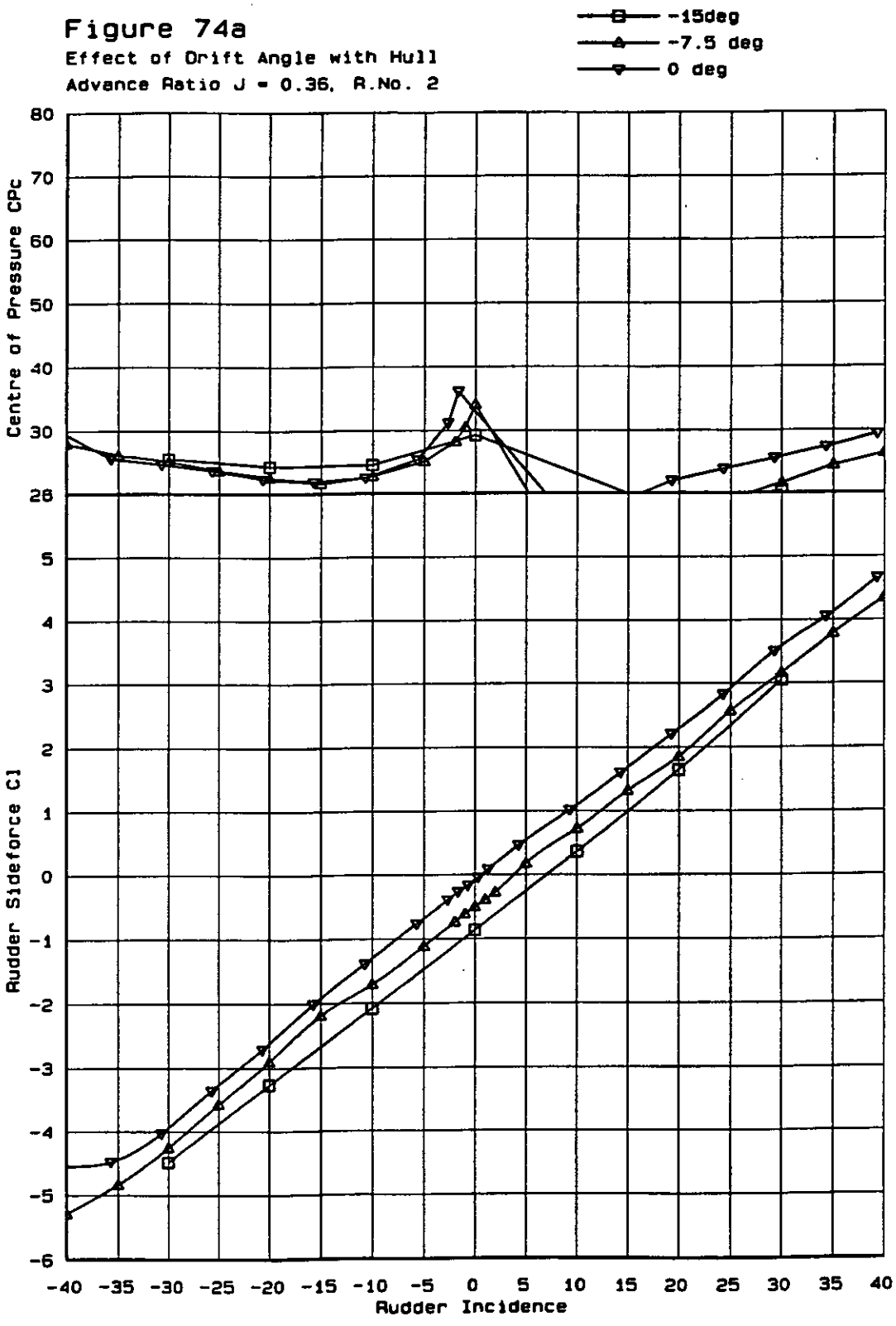



Figure 74a Effect of drift angle on the performance of Rudder No. 2 downstream of a Mariner stern form at an advance ratio of 0.36: Lift and CPc

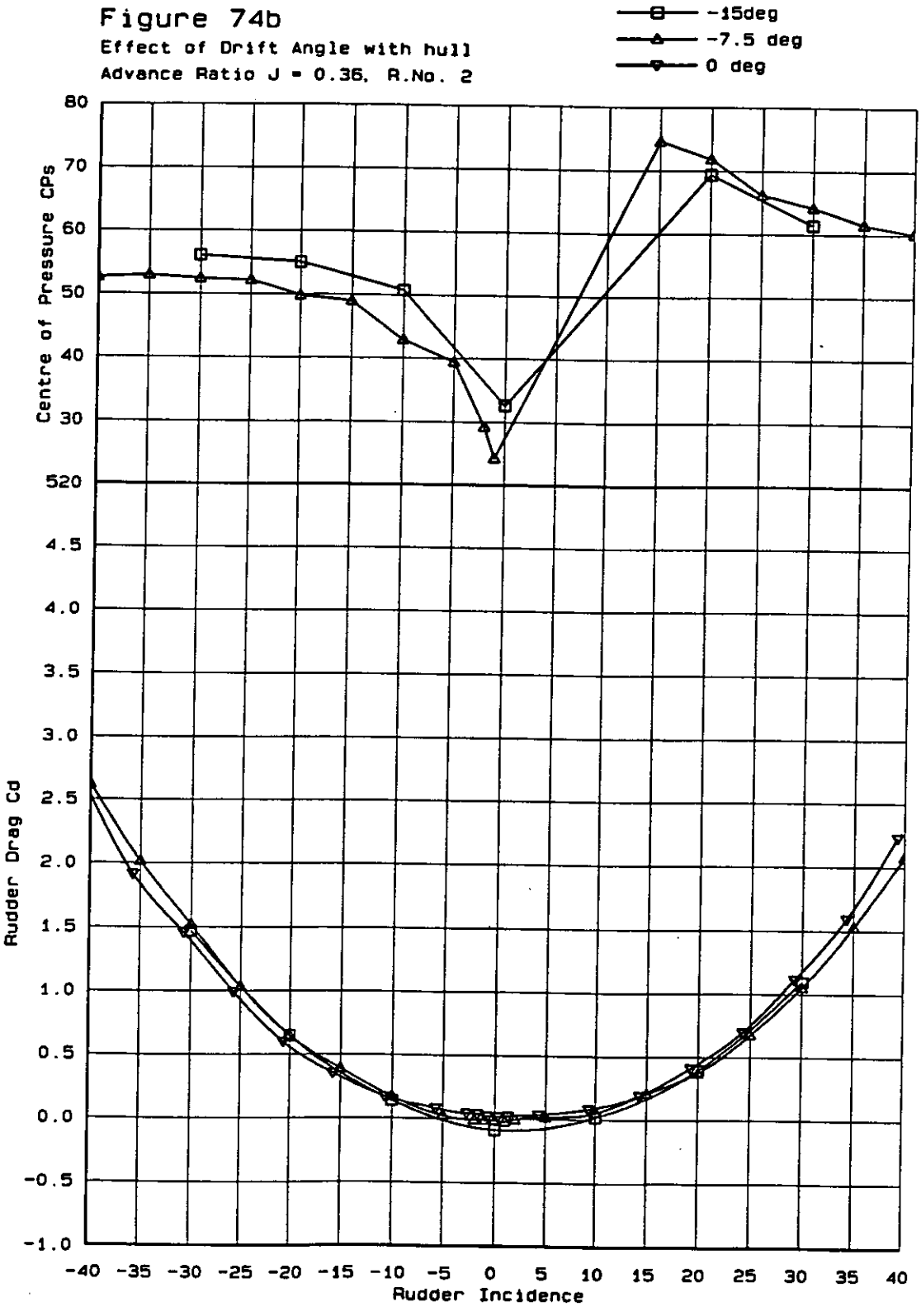



Figure 74b Effect of drift angle on the performance of Rudder No. 2 downstream of a Mariner stern form at an advance ratio of 0.36: Drag and CPs

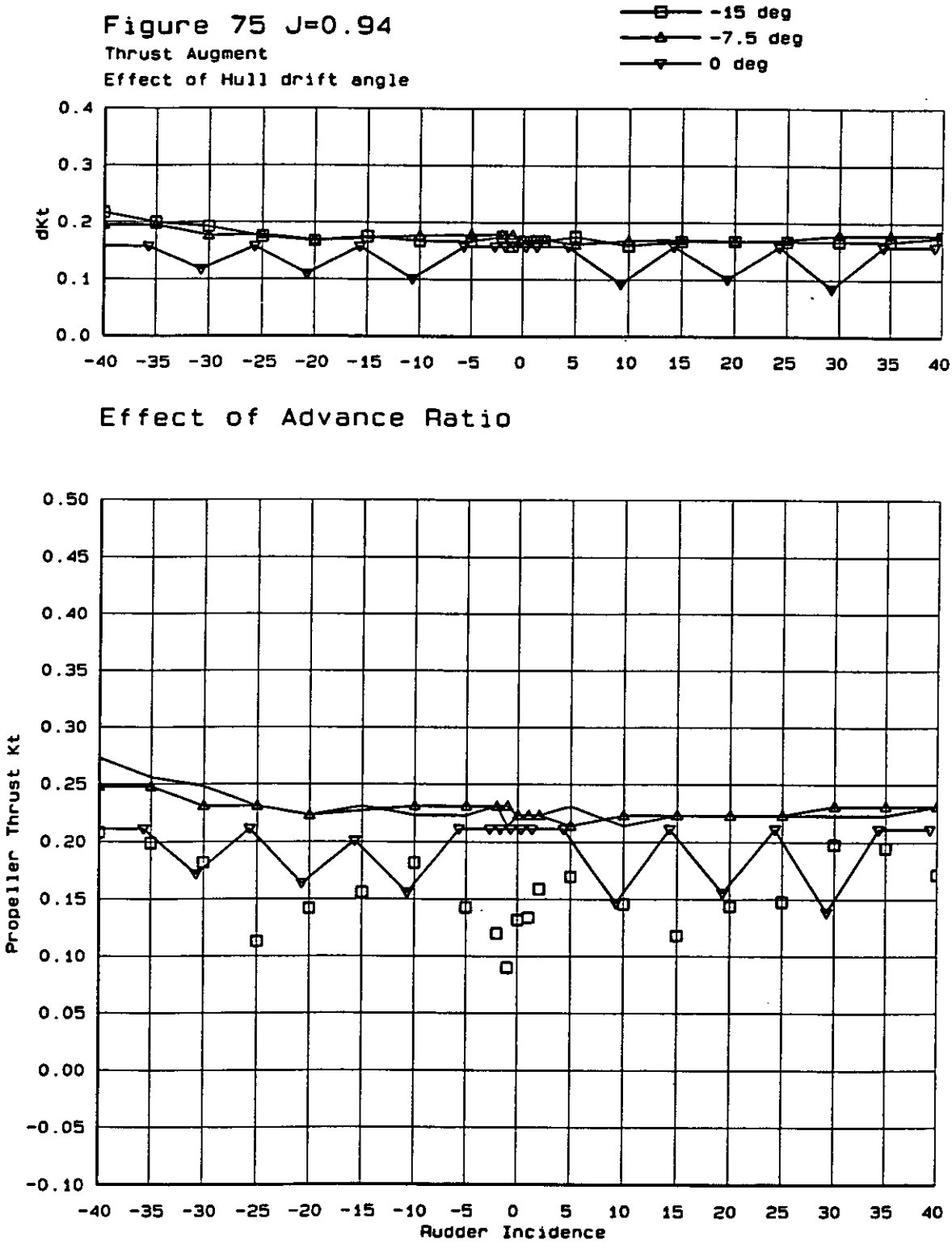



Figure 75 Effect of drift angle on propeller thrust and thrust augment with an upstream Mariner stern form at J = 0.94

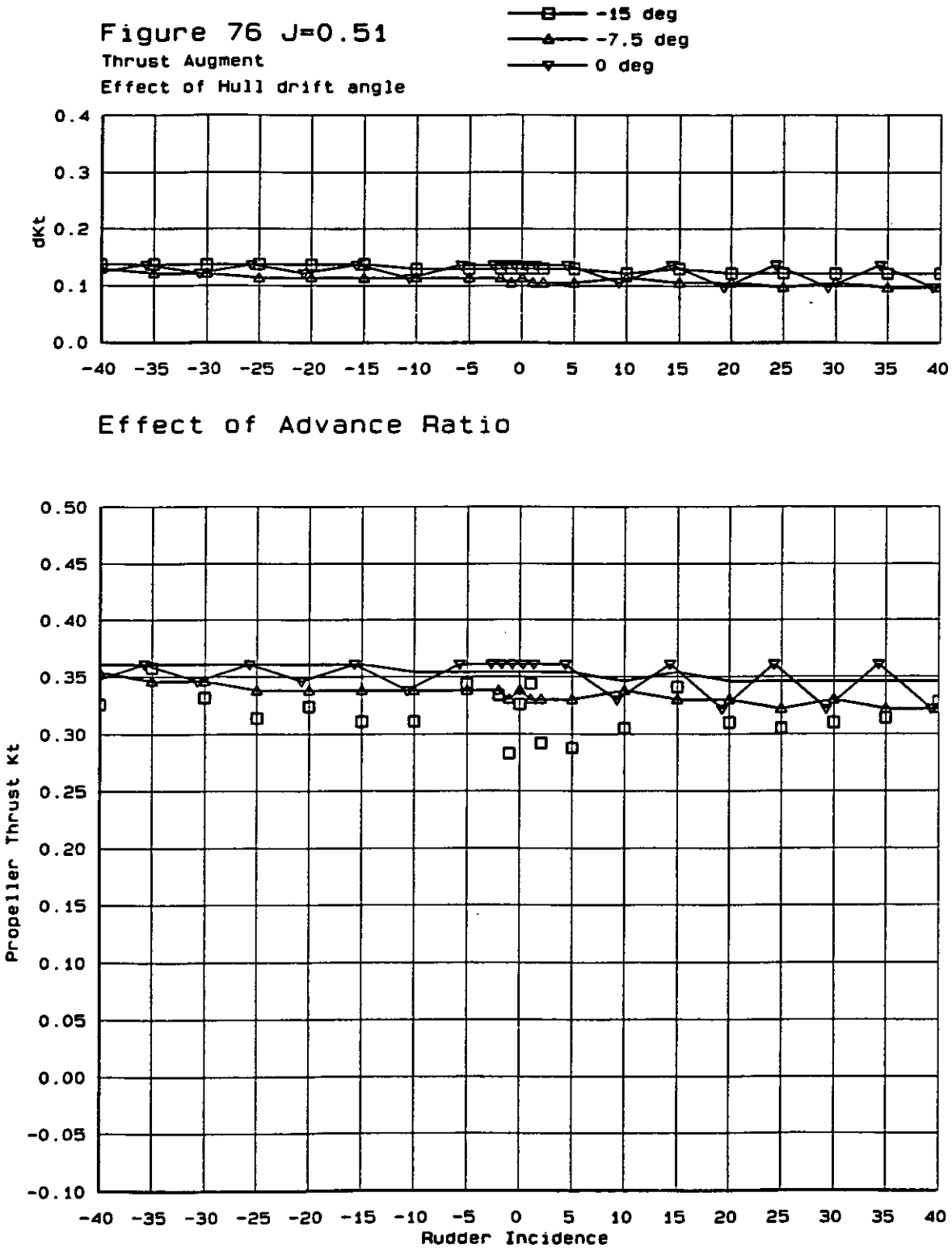



Figure 76 Effect of drift angle on propeller thrust and thrust augment with an upstream Mariner stern form at J = 0.51

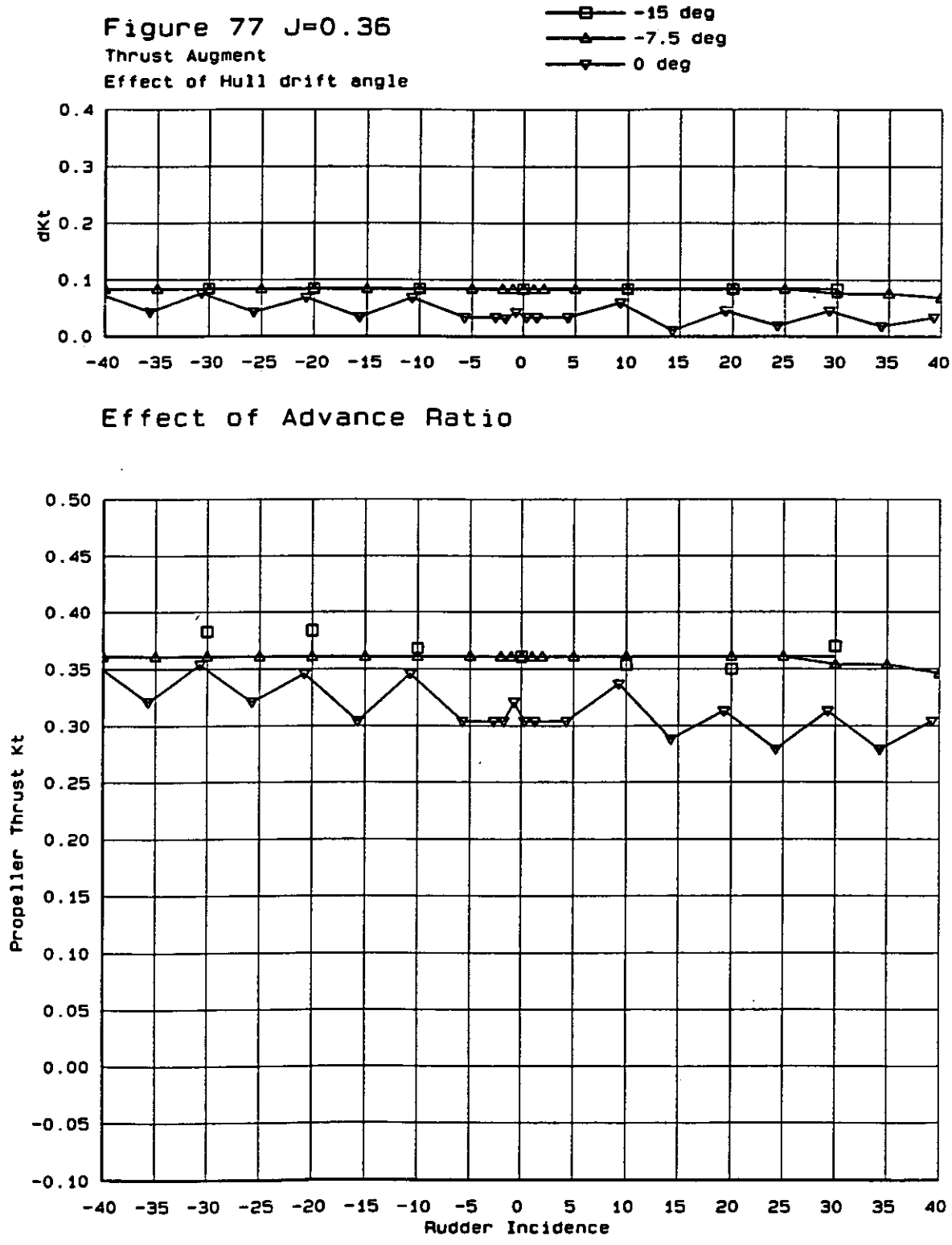



Figure 77 Effect of drift angle on propeller thrust and thrust augment with an upstream Mariner stern form at J = 0.36

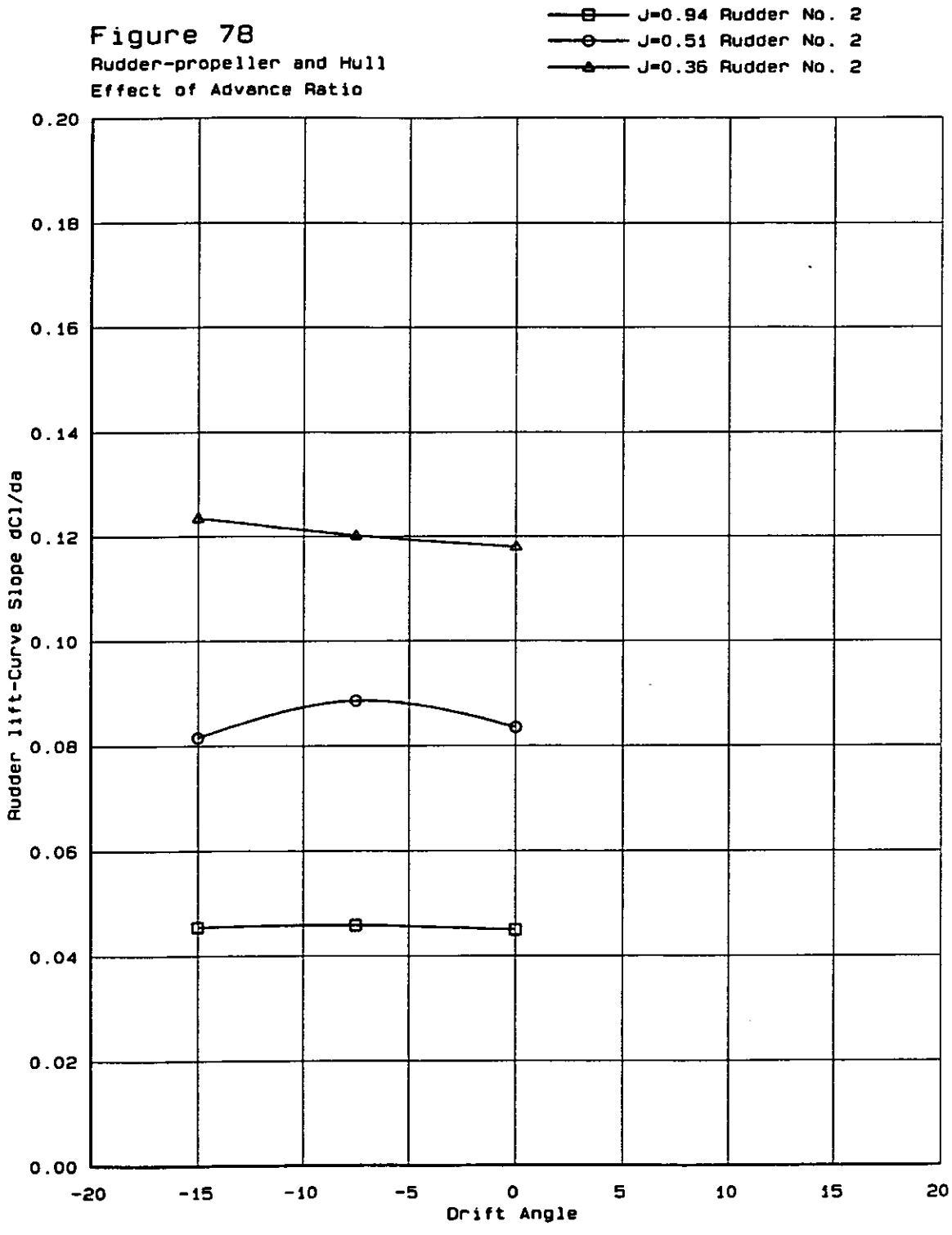



Figure 78 Effect of advance ratio on the lift-curve slope of Rudder No. 2 with an upstream Mariner stern form

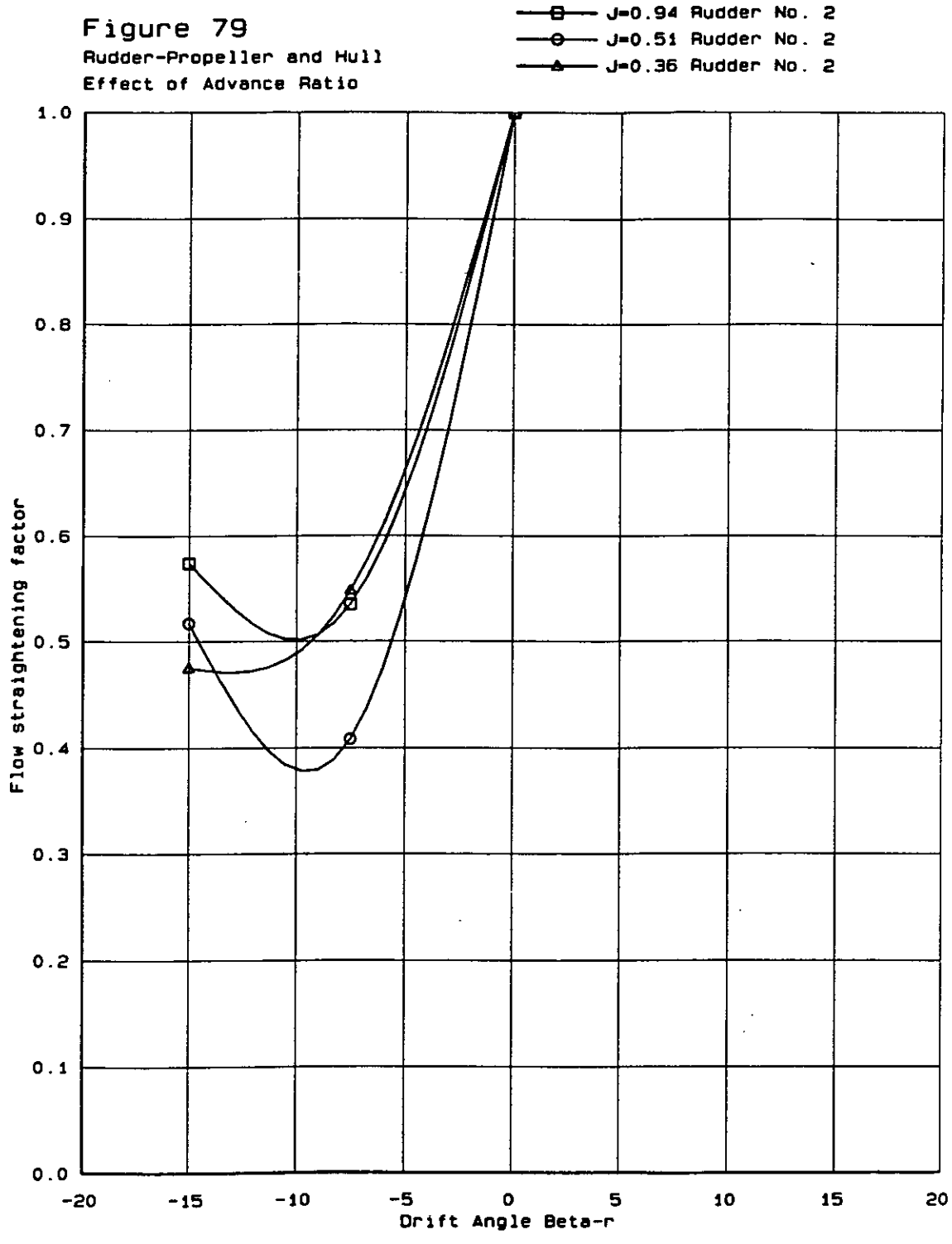



Figure 79 Effect of advance ratio on flow straightening with an upstream Mariner stern form

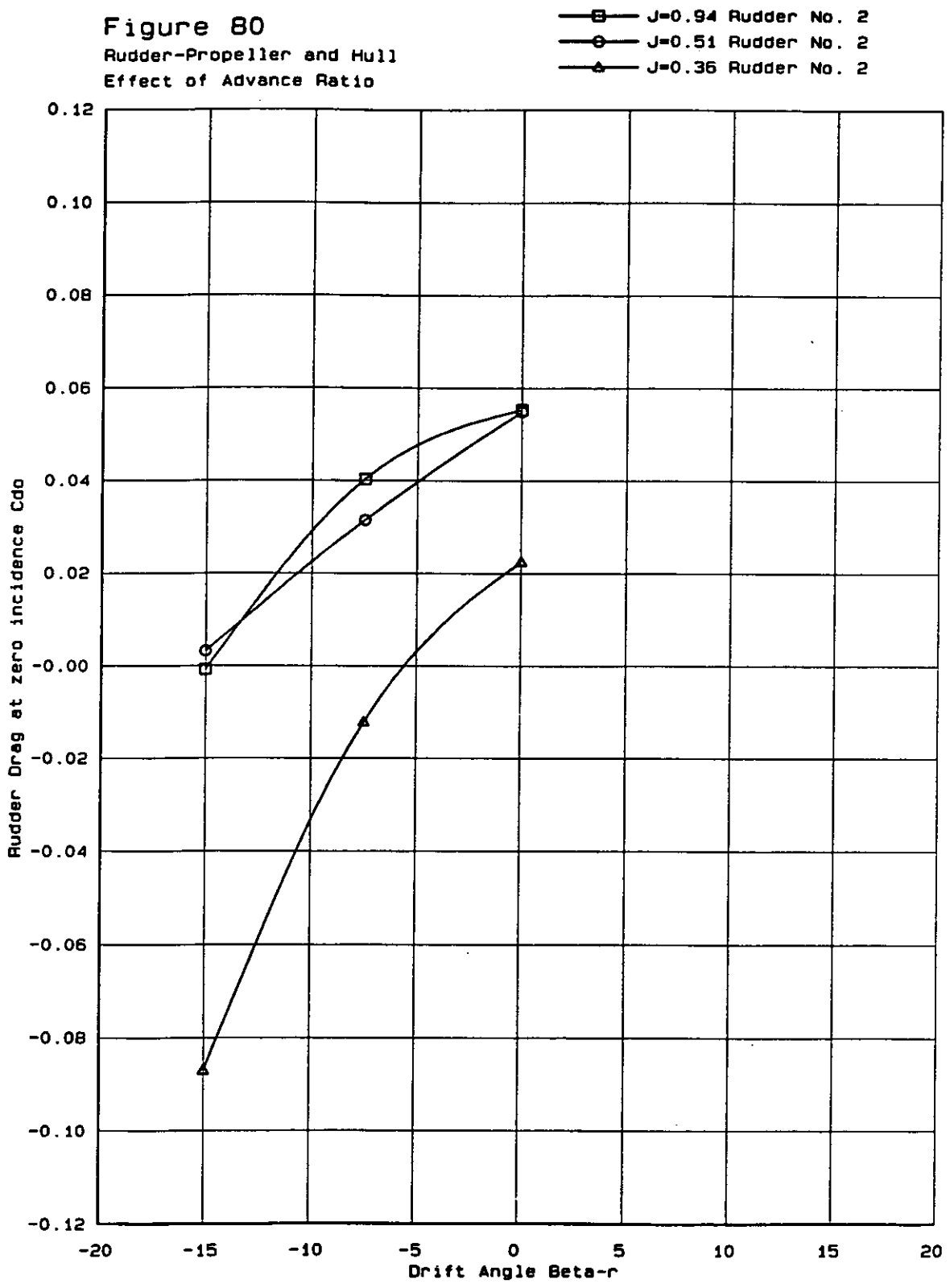



Figure 80 Effect of advance ratio on rudder drag at zero incidence with an upstream Mariner stern form

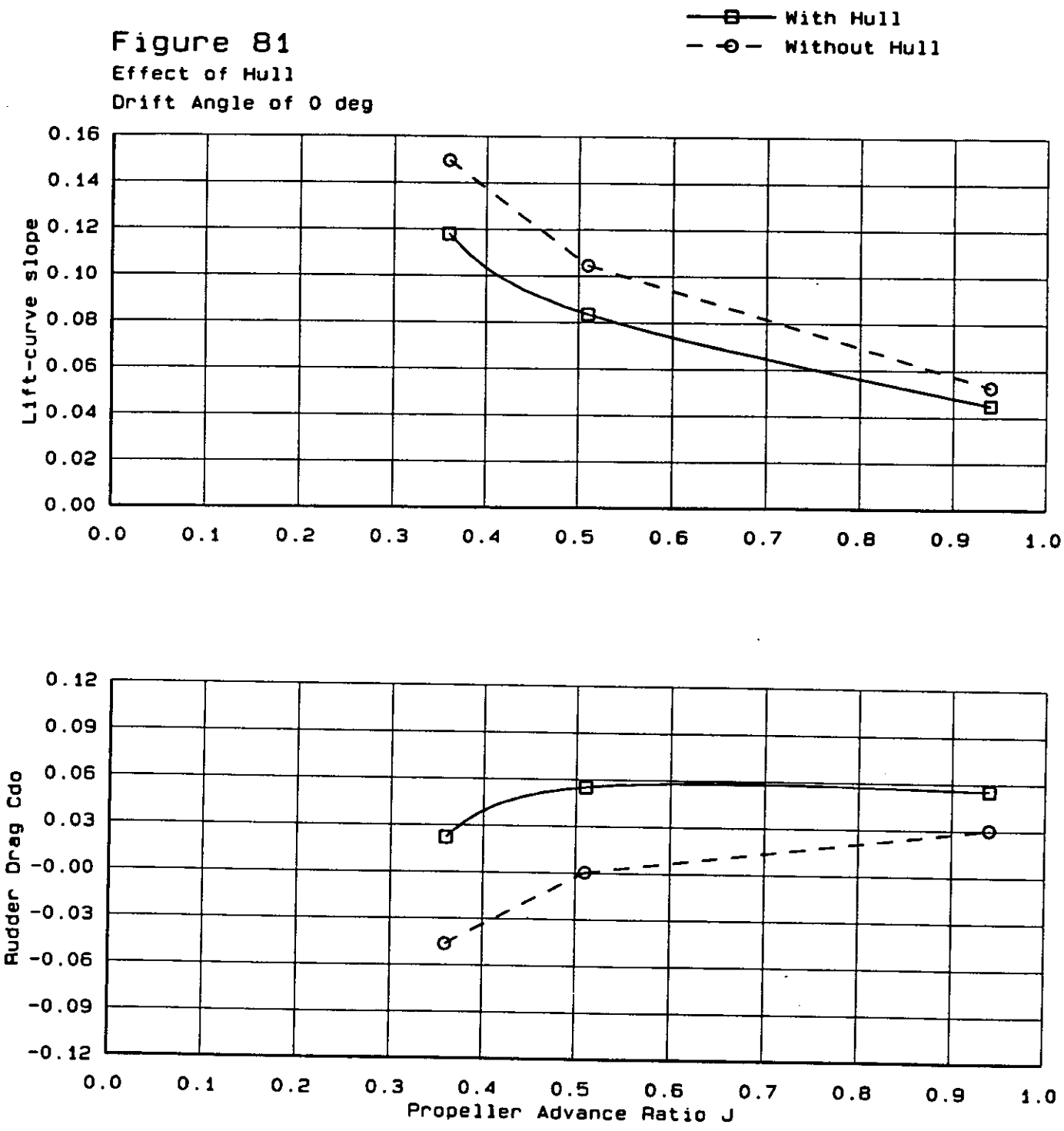



Figure 81 Comparsion of Rudder No. 2 lift-curve slope at drag at zero incidence with and without upstream Mariner stern form

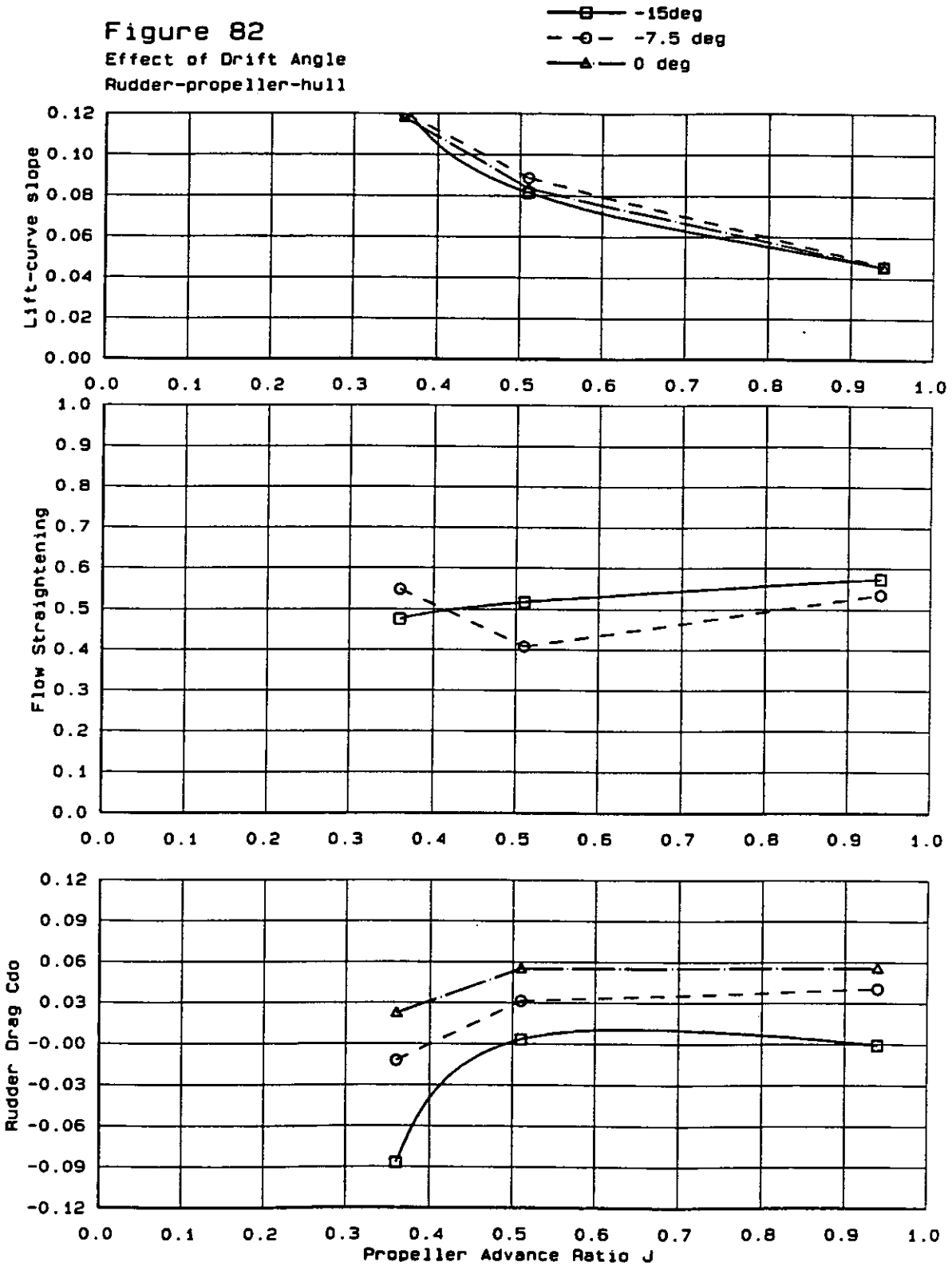



Figure 82 Effect of drift angle on the lift-curve slope, flow straightening, and zero drag for Rudder No. 2 with an upstream Mariner stern form

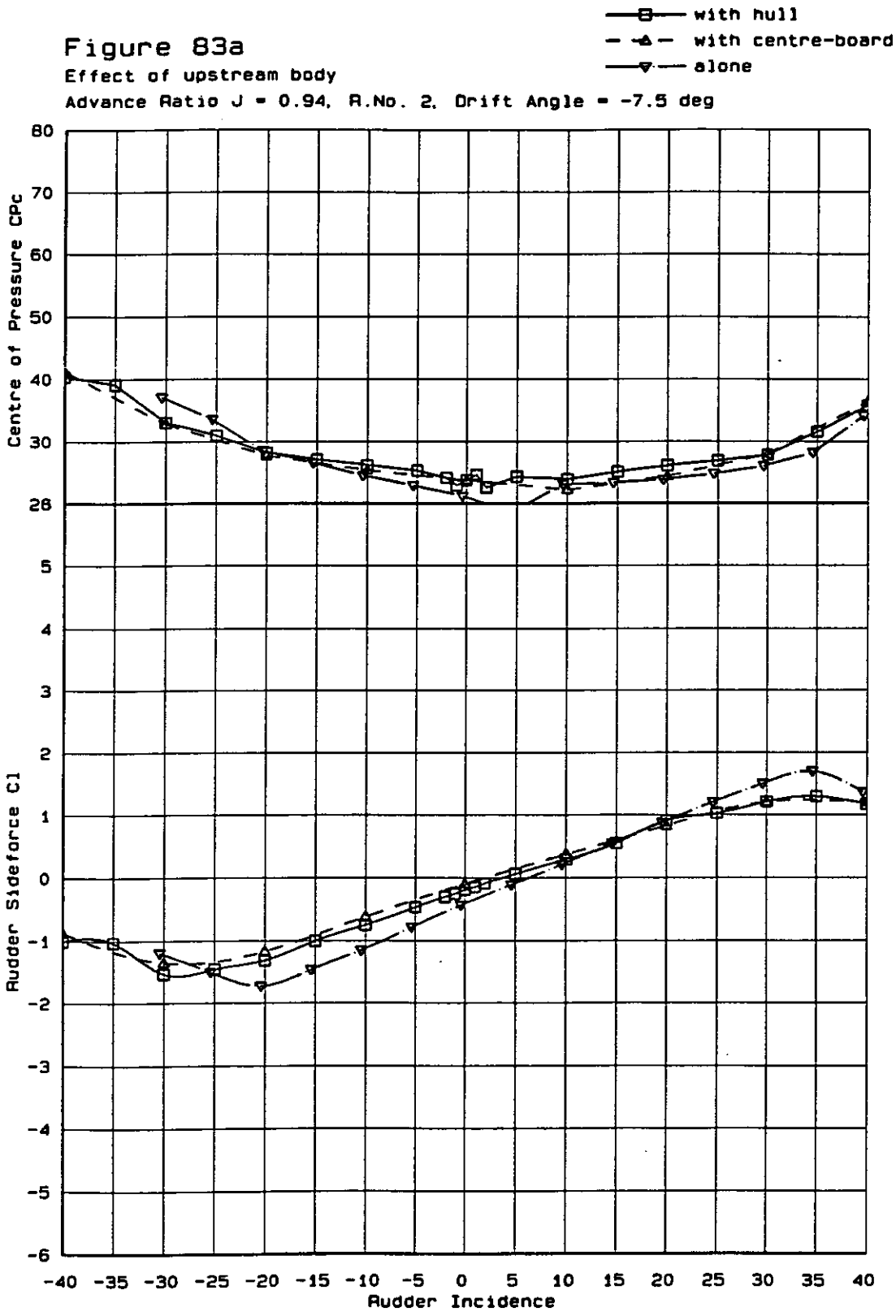



Figure 83a Comparison of the performance of Rudder No. 2 at J of 0.94, drift angle of -7.5° with full centre-board, with hull and alone : Lift and CPc

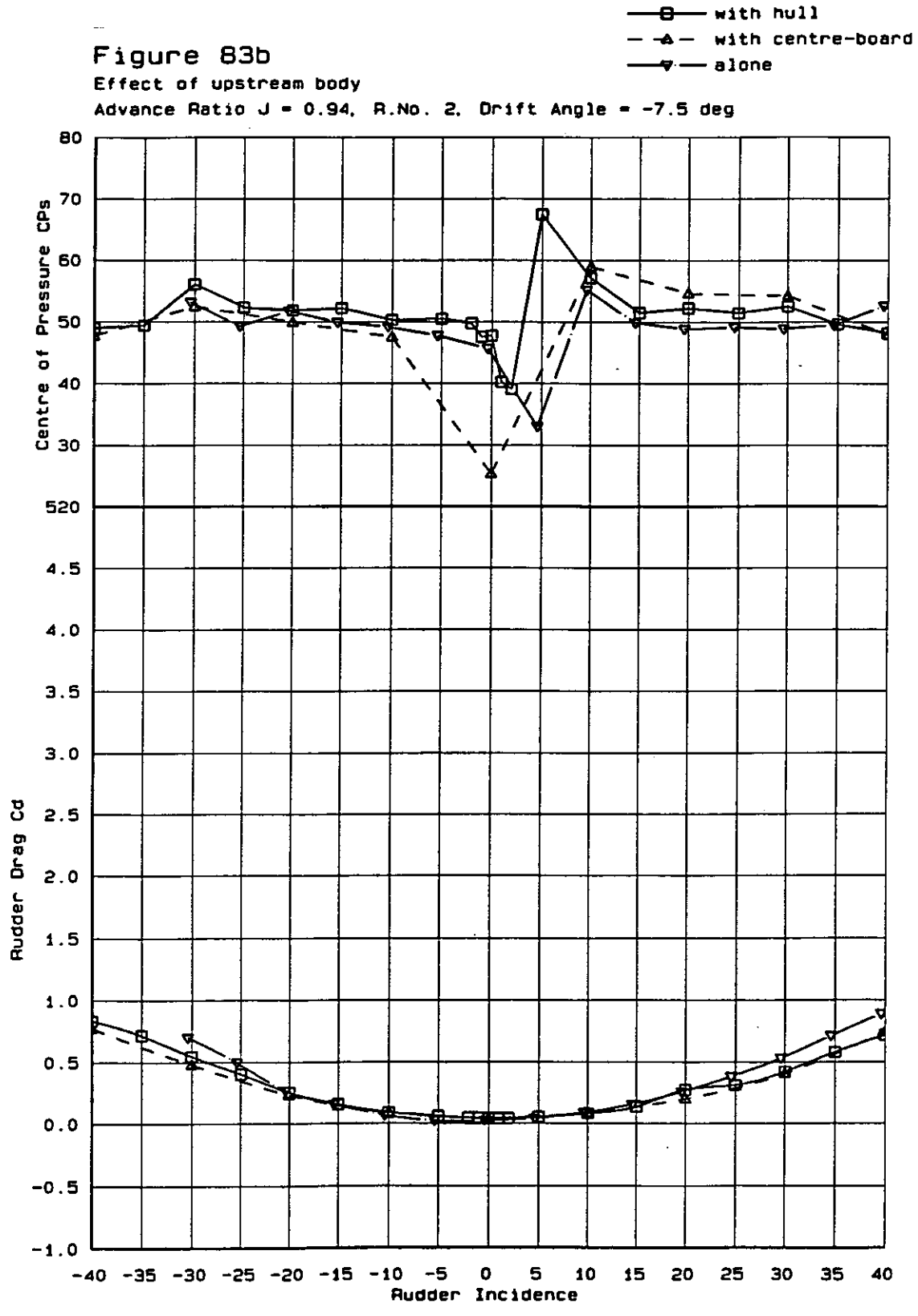



Figure 83b Comparison of the performance of Rudder No. 2 at J of 0.94, drift angle of -7.5° with full centre-board, with hull and alone: Drag and CPs

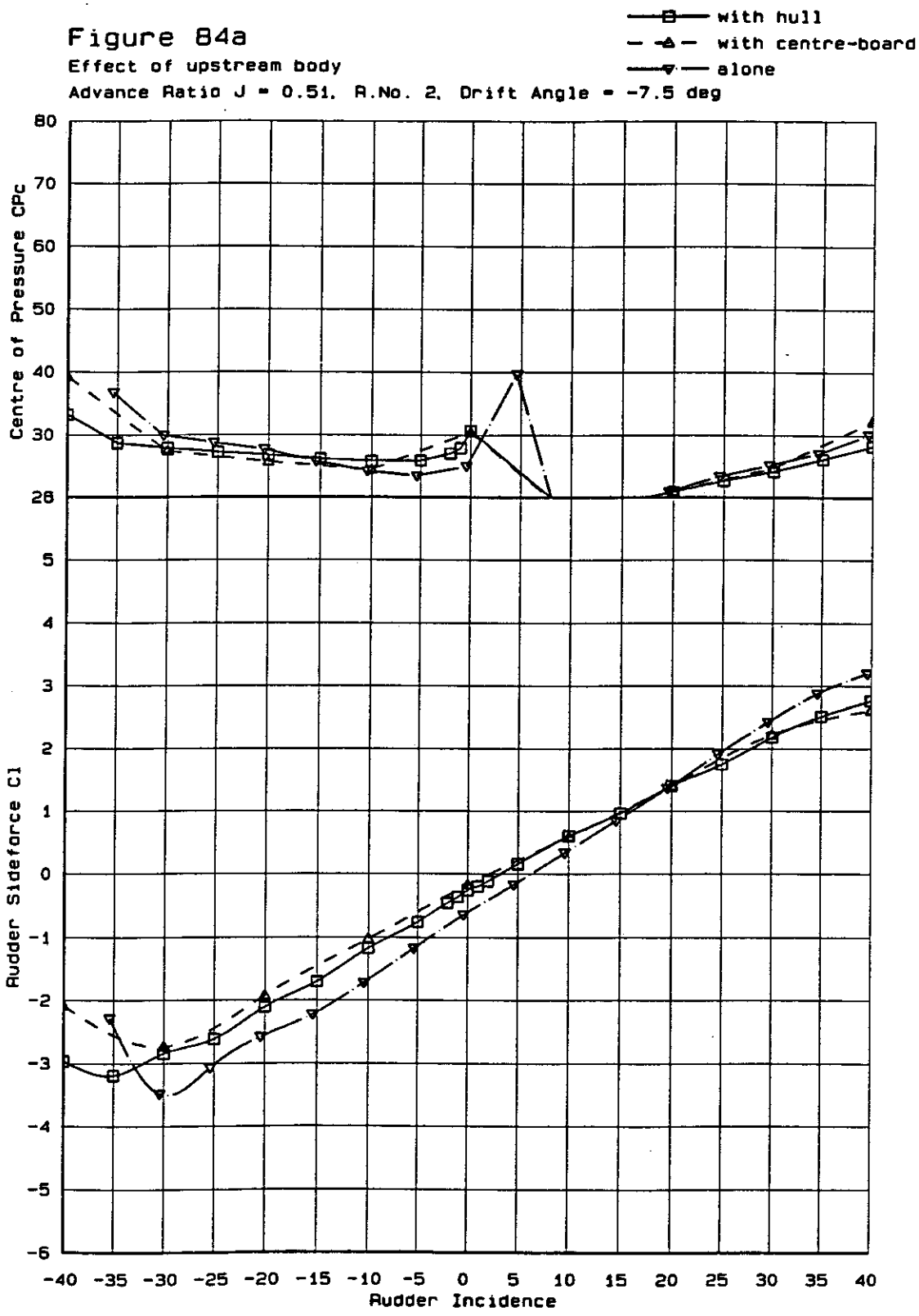



Figure 84a Comparison of the performance of Rudder No. 2 at J of 0.51, drift angle of -7.5° with full centre-board, with hull and alone: Lift and CPc

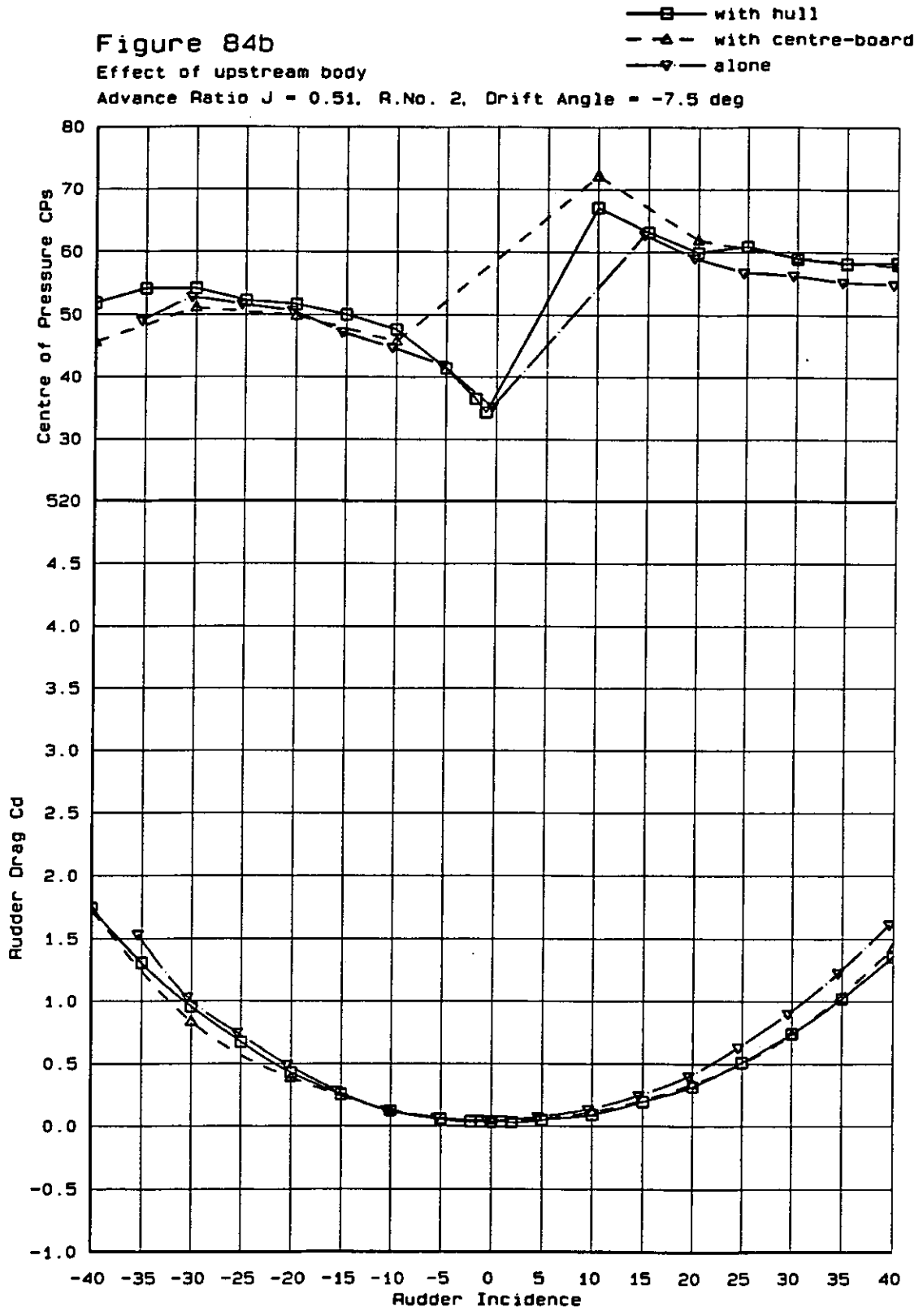



Figure 84b Comparison of the performance of Rudder No. 2 at J of 0.51, drift angle of -7.5° with full centre-board, with hull and alone: Drag and CPs

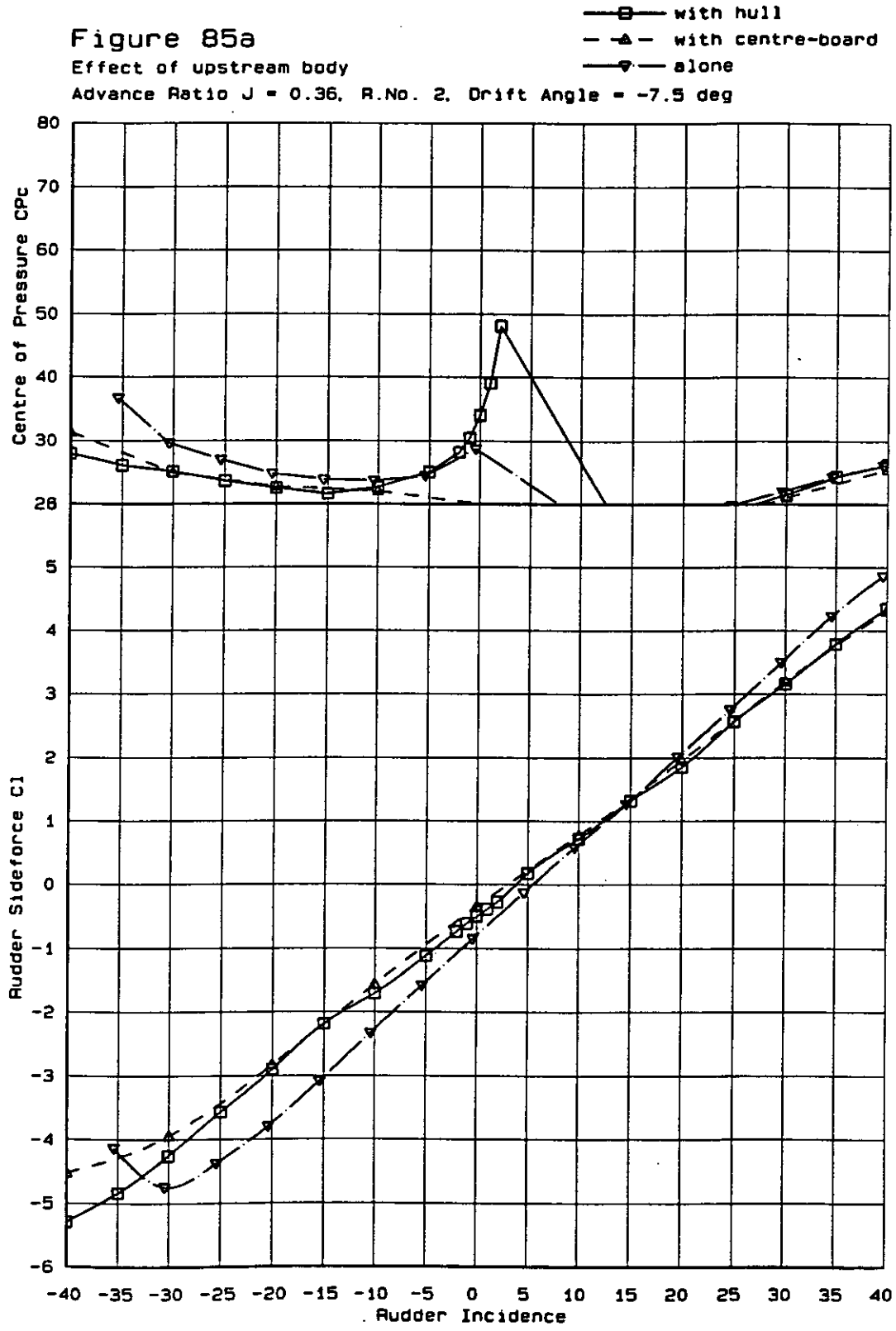



Figure 85a Comparison of the performance of Rudder No. 2 at J of 0.36, drift angle of -7.5° with full centre-board, with hull and alone:Lifta and CPc

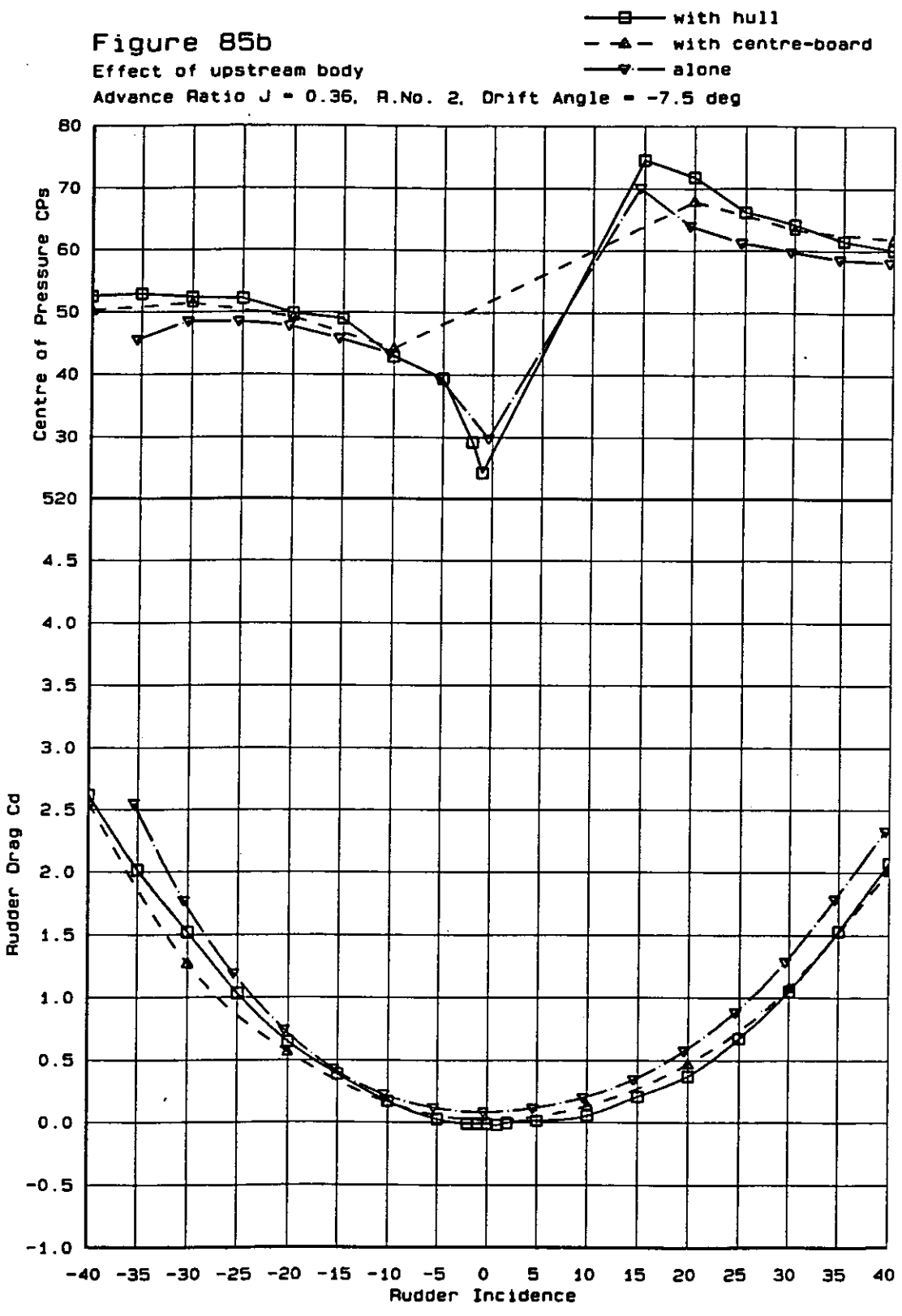



Figure 85b Comparison of the performance of Rudder No. 2 at J of 0.36, drift angle of -7.5° with full centre-board, with hull and alone: Drag and CPs

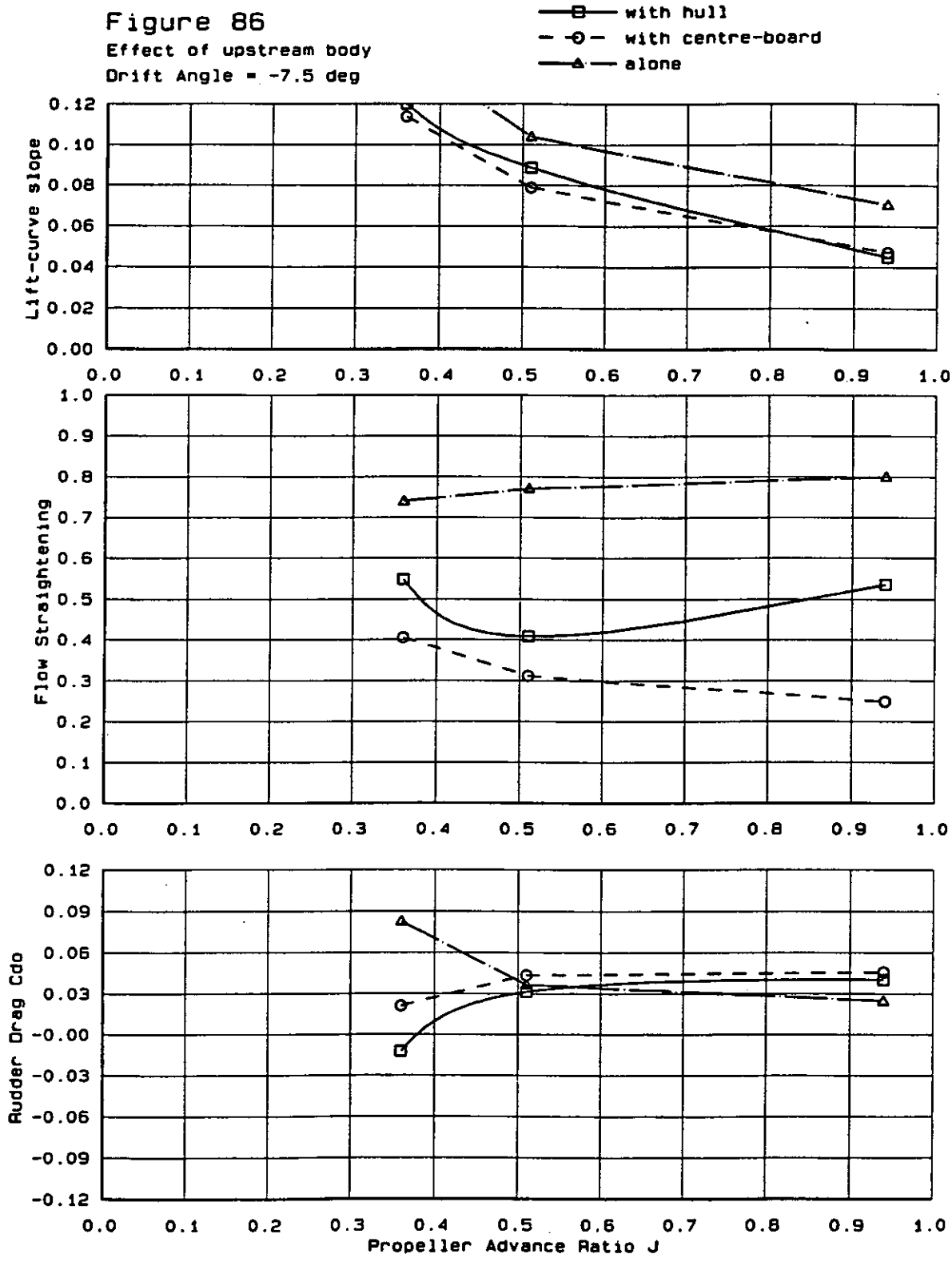



Figure 86 Effect of type of upstream body on the lift-curve slope, flow straightening, and rudder drag zt zero incience of Rudder No. 2

Table 1: Particulars of the two all-movable rudder models

| **Rudder No.** | **2** | **3** |
|---|---|---|
| Chord c mm | 667 | 667 |
| Span S mm | 1000 | 1200 |
| Geometric Aspect Ratio $AR_G$ | 3.0 | 3.6 |
| Taper Ratio $C_T/C_R$ | 1.0 | 1.0 |
| Thickness/chord Ratio t/c | 0.20 | 0.20 |
| Section | NACA 0020 constant section with square tip | |

Table II: Propeller details - Modified Wageningen B4.40 series

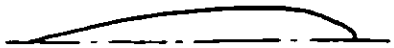
| | |
|---|---|
| Number of Blades | 4 |
| Range of revolutions rpm | 0 to 3000 |
| Diameter mm | 800 |
| Boss Diameter (max) mm | 200 |
| Mean Pitch Ratio | 0.95 (set for tests) |
| Blade Area Ratio | 0.40 |
| Rake (deg) | 0 |
| Blade thickness ratio t/D | 0.050 |
| Sections shape | Based on Wageningen B series |
| Blade outline shape | Based on Wageningen but with reduced skew |

Table III Location of Pressure Tappings on Hull and Centre-board

| X(mm) | Height above bottom Datum (mm) 66 | 157 | 243 | 329 | 421 | 505 | 589 | 672 | 756 | 839 | 935 | 988 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 327 | × | × | × | × | × | × | × | × | × | × | × | × | G-19 |
| 470 | | × | | | × | | | | × | | × | | |
| 800 | × | × | × | × | × | × | × | × | × | × | × | × | G19 |
| 1030 | | × | | | × | | | | × | | × | | |
| 1273 | × | × | × | × | × | × | × | × | × | × | × | × | G18 |
| 1411 | | × | | | × | | | | × | | × | | |
| 1496 | | × | | | × | | | | × | | × | | |
| 1621 | | × | | | × | | | | × | | × | | |
| 1746 | × | × | × | × | × | × | × | × | × | × | × | × | G18 |
| 2011 | | × | | | × | | | | × | | × | | |
| 2096 | | × | | | × | | | | × | | × | | |
| 2221 | | × | | | × | | | | × | | × | | |
| 2346 | × | × | × | × | × | × | × | × | × | × | × | × | |
| 2600 | | × | | | × | | | | × | | × | | |
| 2645 | | × | | | × | | | | × | | × | | |
| 2667 | | × | | | × | | | | × | | × | | |
| 2691 | | × | | | × | | | | × | | × | | LEADING EDGE |

Pressure Tappings ×, (both sides)

G = Glasgow



SECTION: NACA 0020 For All Rudders

Chordwise position of tappings (%c from L.E.):
0, 2.5, 5, 10, 20, 30, 40, 50, 60, 70, 80, 90, 95

All dimensions in mm

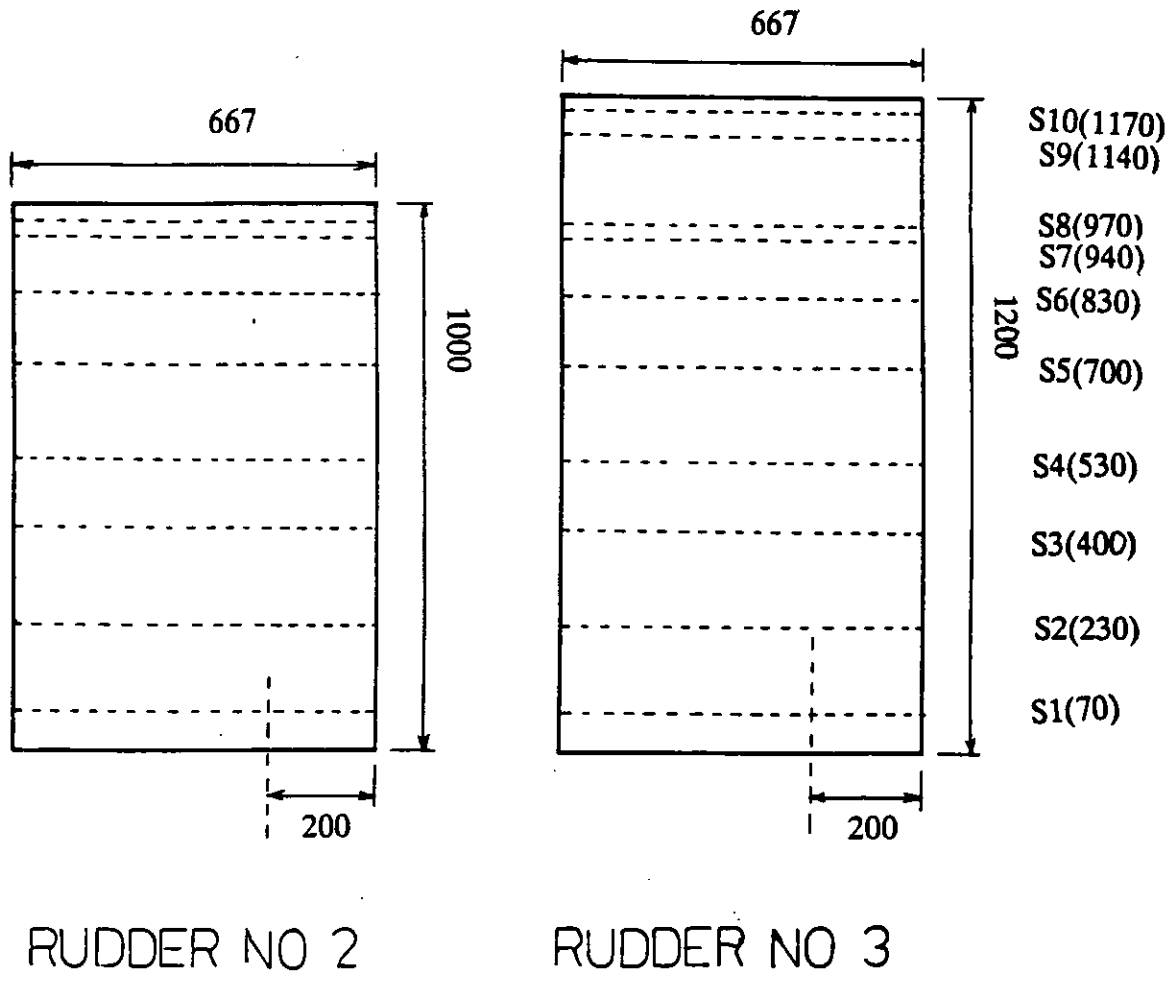



Figure 1 Overall Dimensions of rudder models

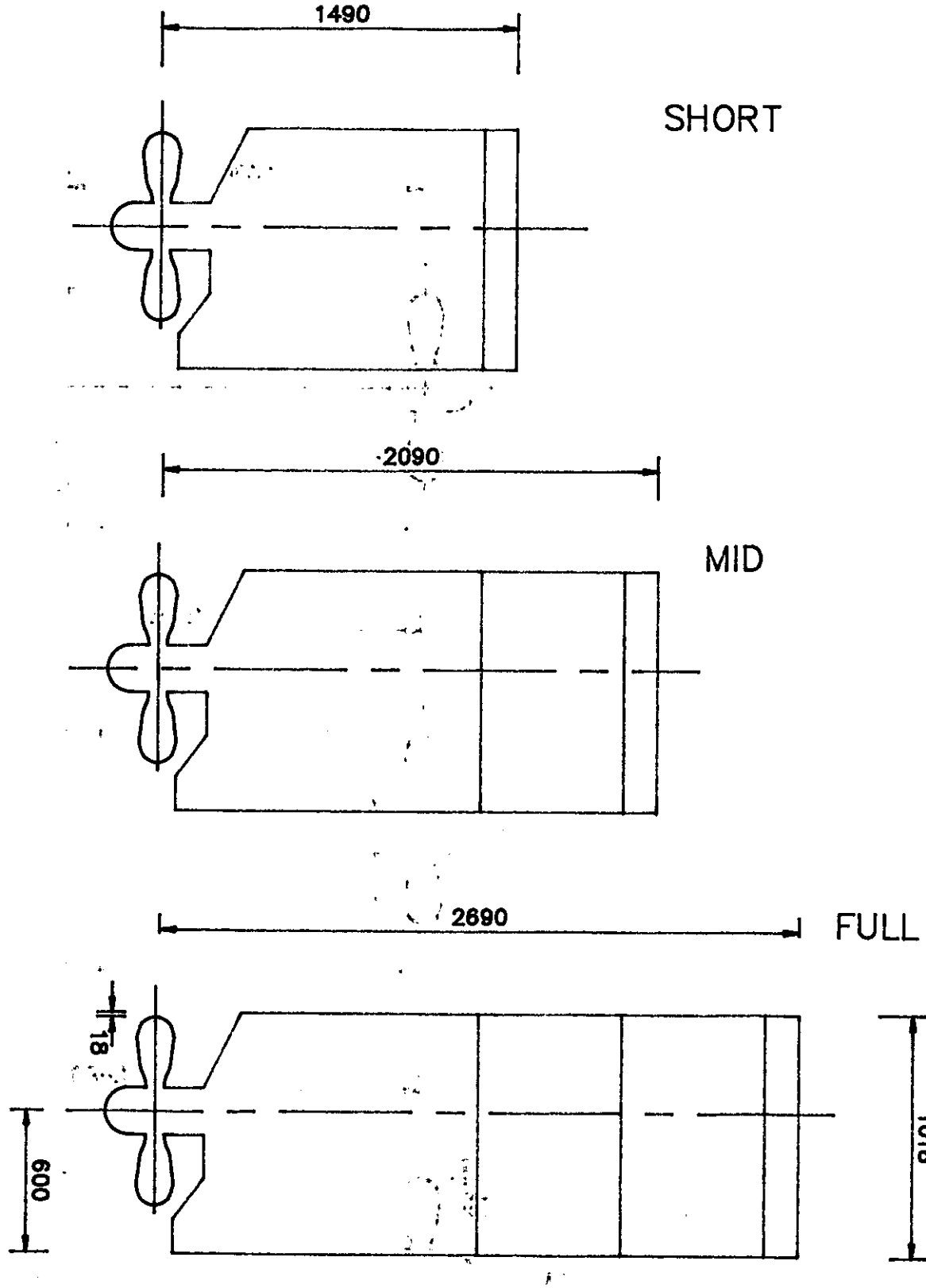



Figure 2 Overall Dimensions of Three Rudder Centre-board Configurations

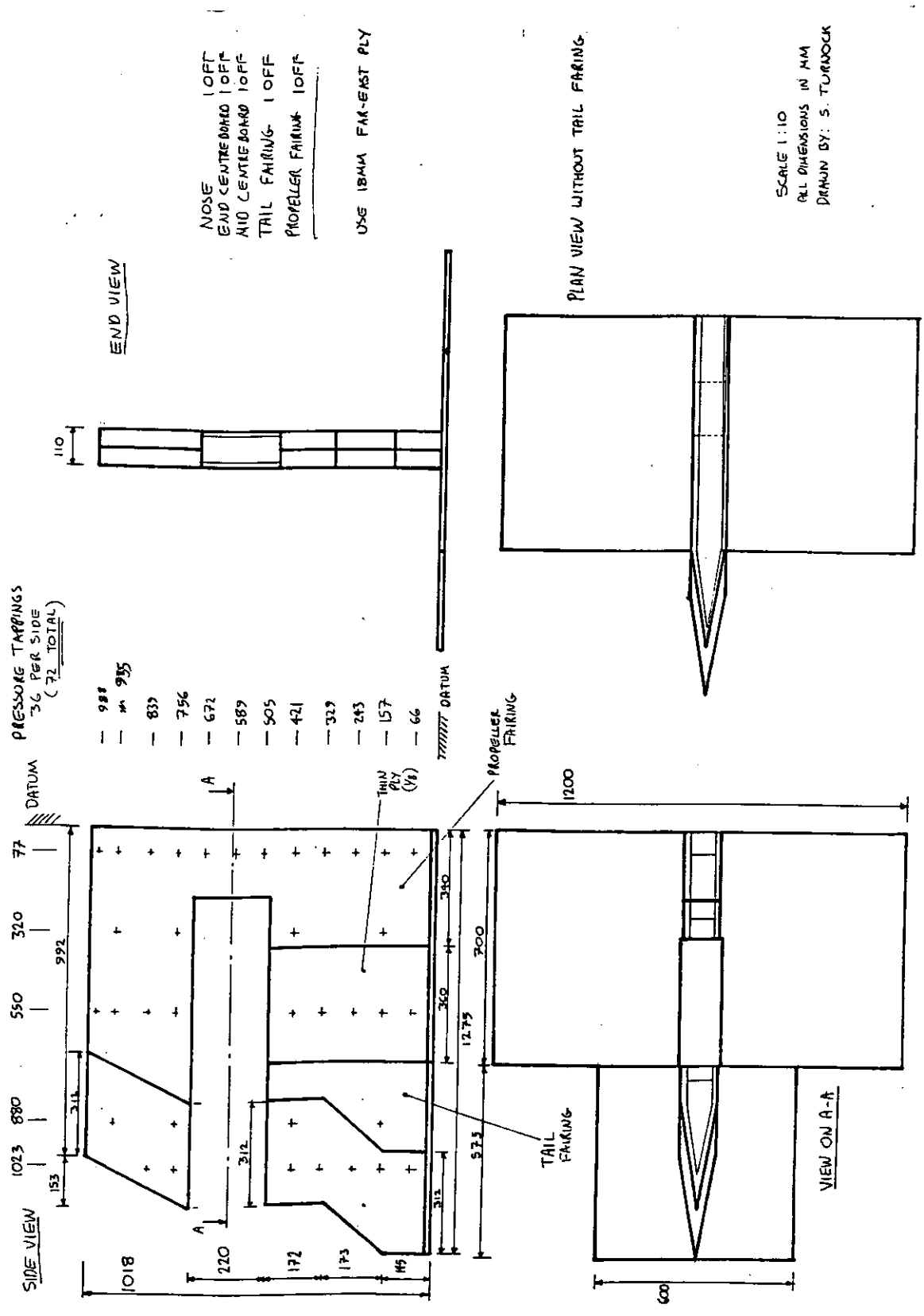



Figure 3 Detail drawing of tail and propeller centre-board model

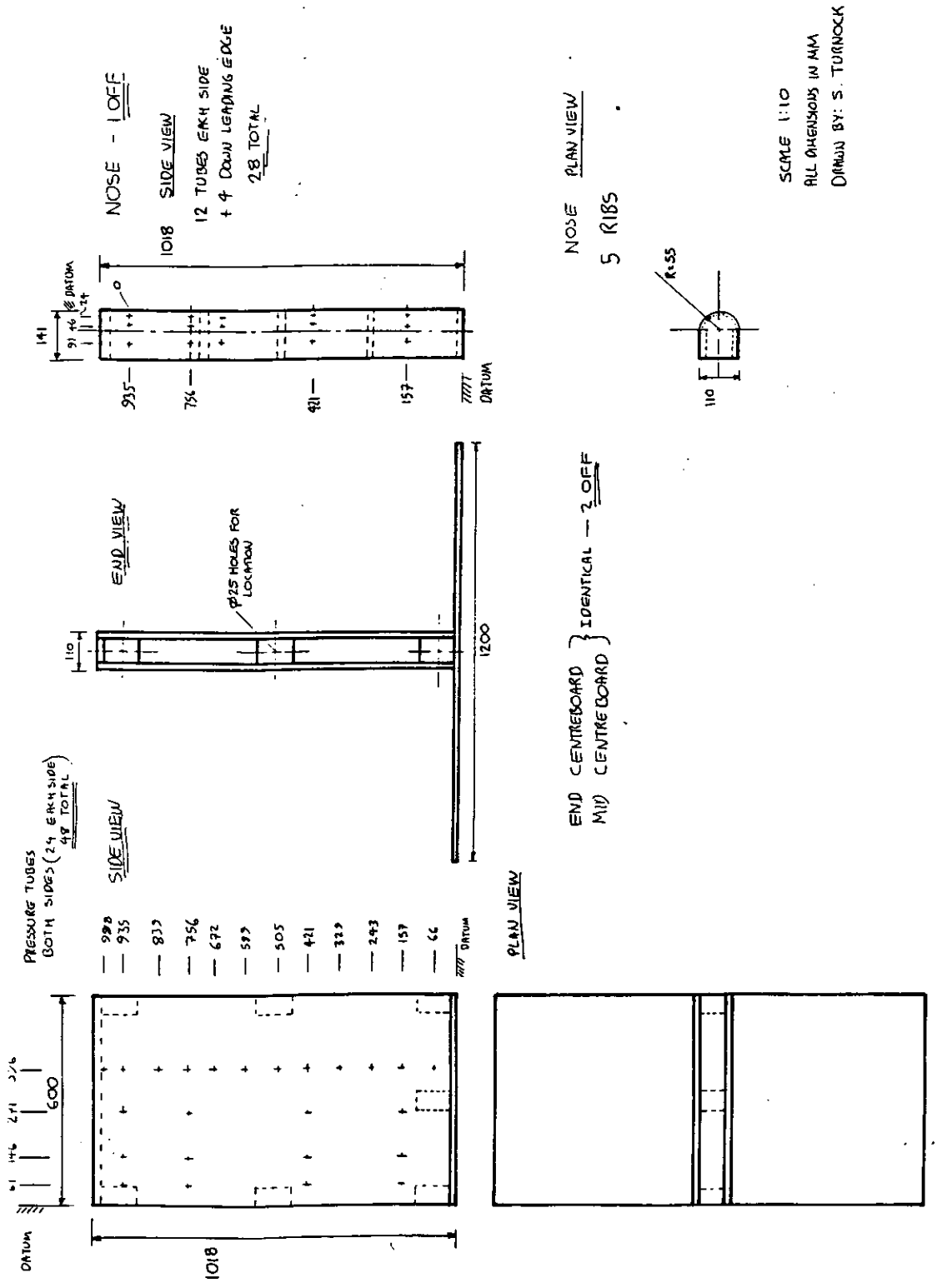



Figure 4 Detail drawing of middle/end and nose centre-board

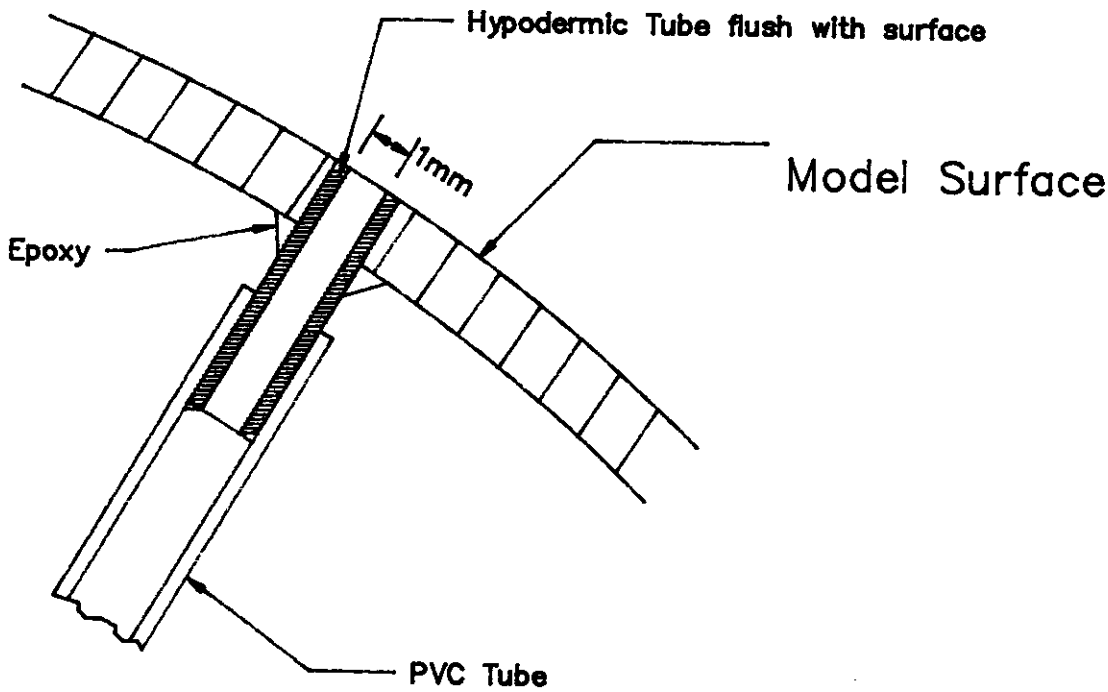



Figure 5 Construction detail of hull and centre-board pressure tapping

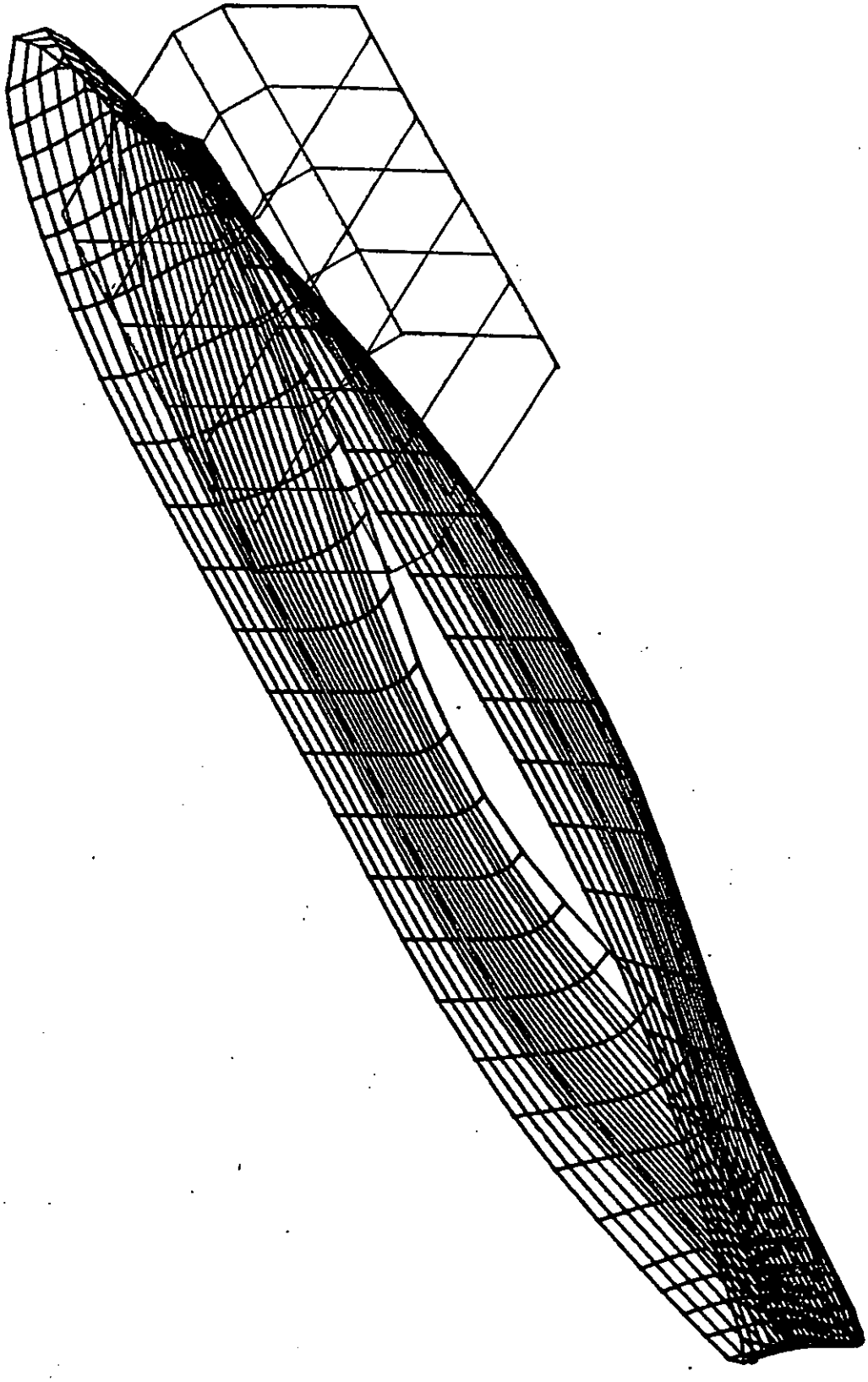


Figure 6 Schematic showing tunnel working section and scaled mariner hull

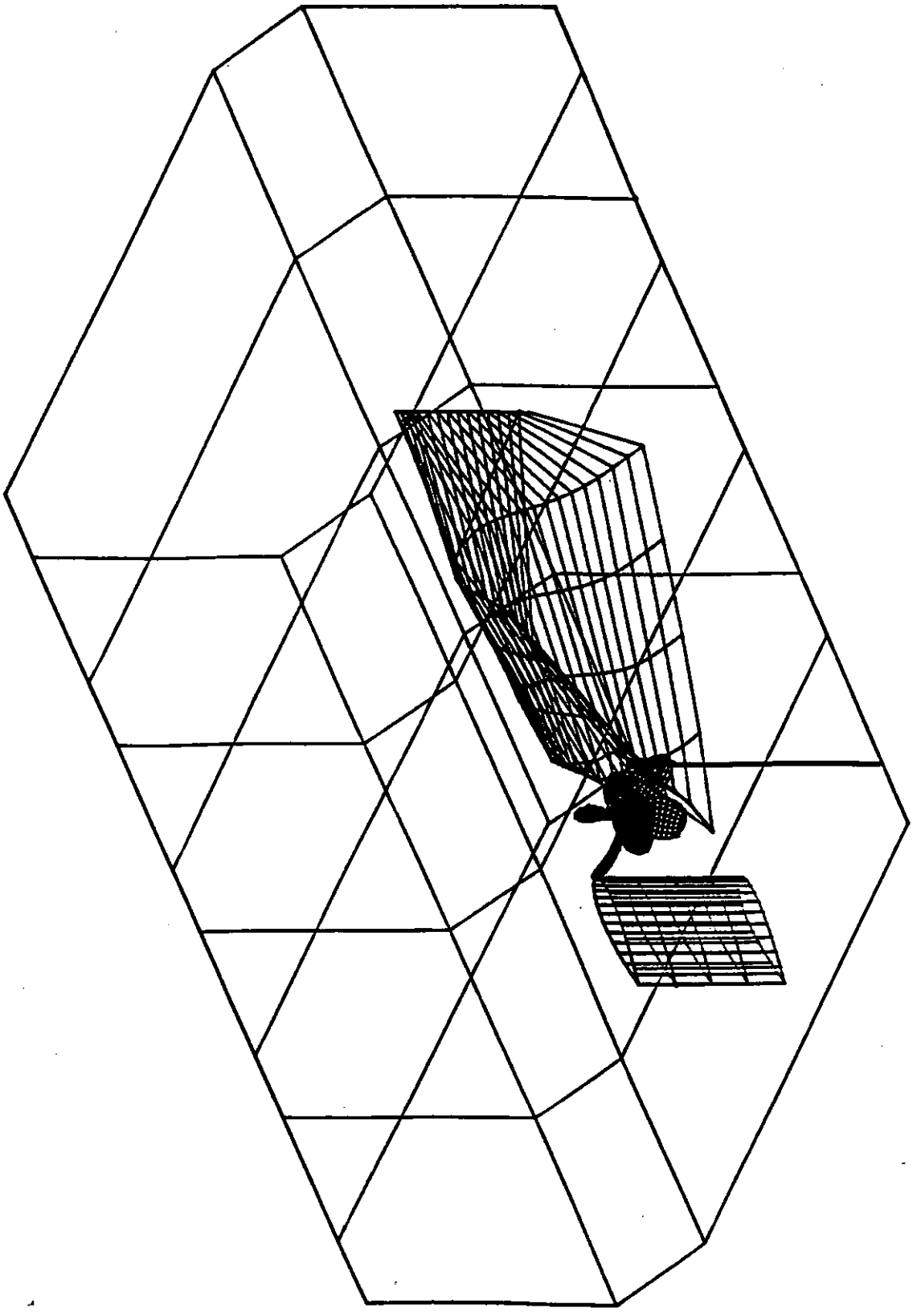


Figure 7 Isometric View of Rudder, Propeller, and Hull in Wind Tunnel

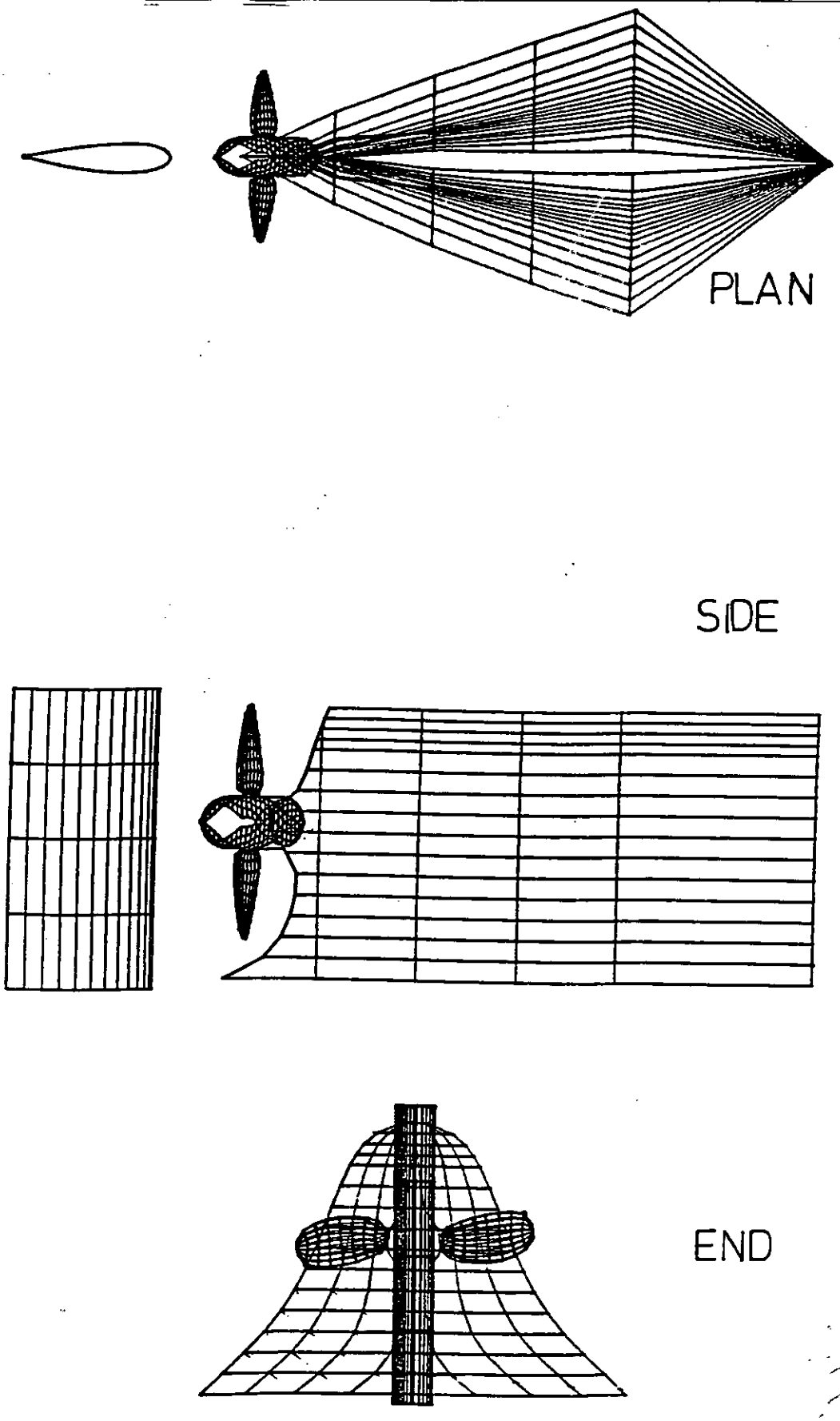



Figure 8 Plan, side and end elevations of Mariner stern form

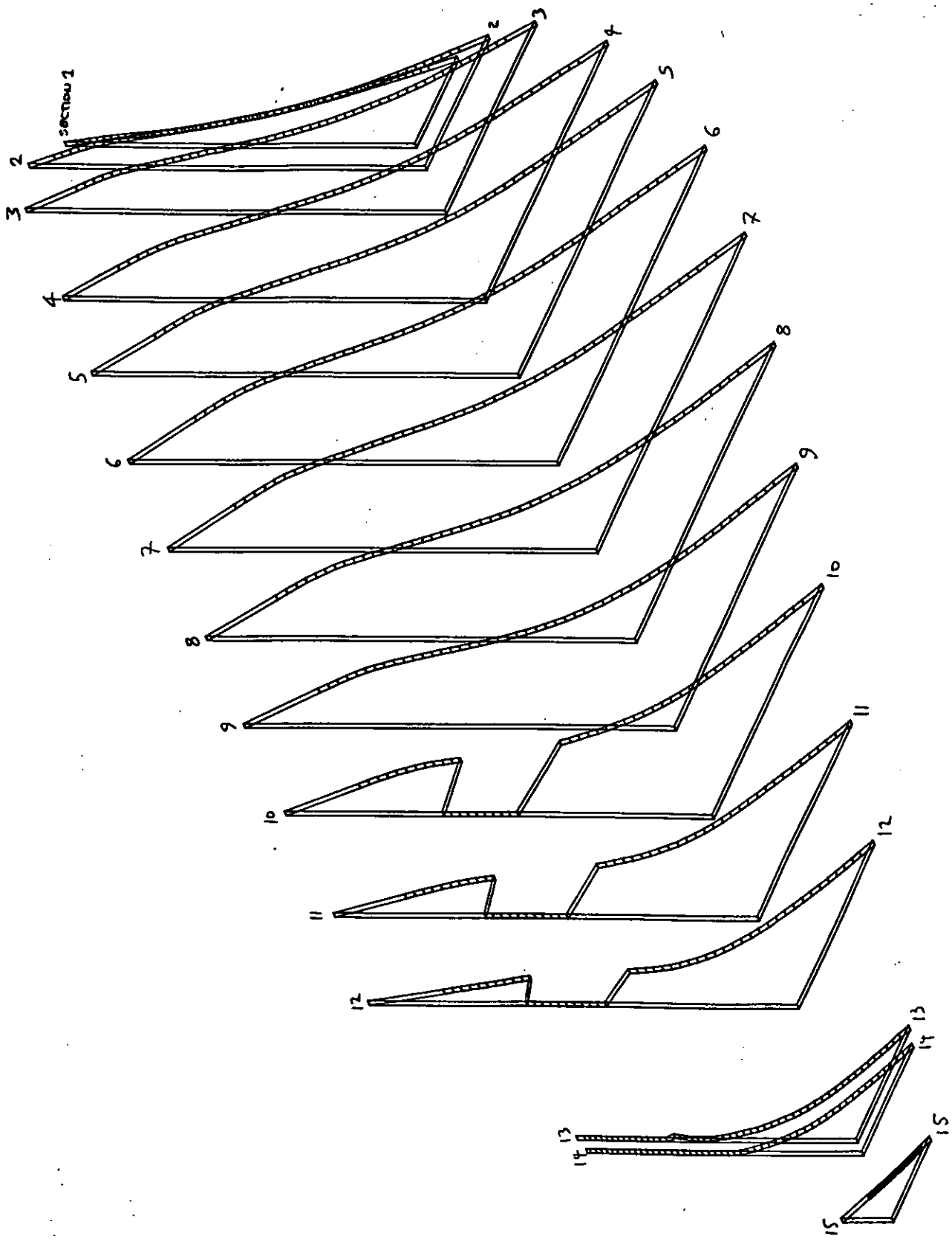



Figure 9 Isometric view of stern frames

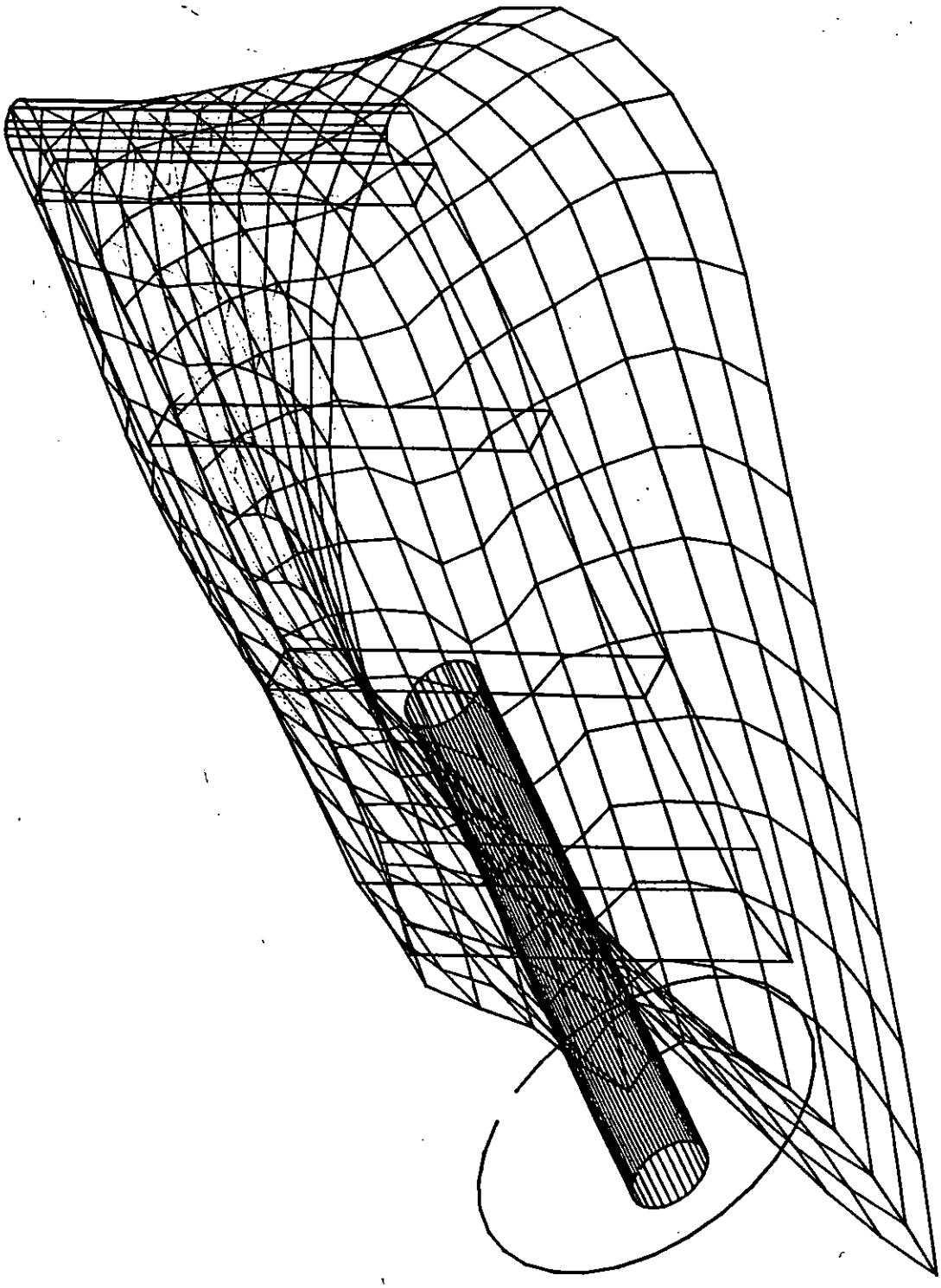


Figure 10 View of Hull Model

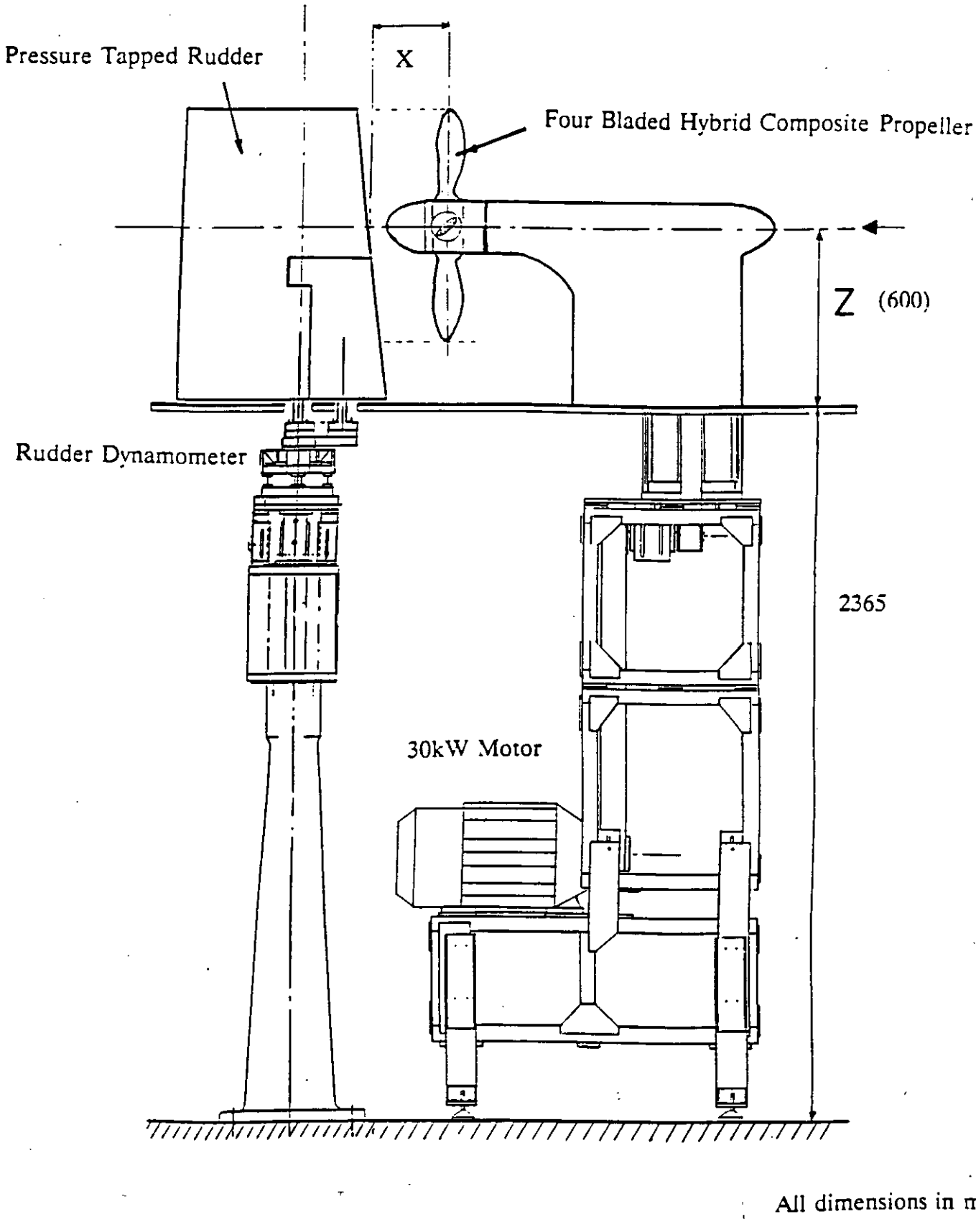



Figure 11 Side view of overall rudder (old stand) and propeller rigs

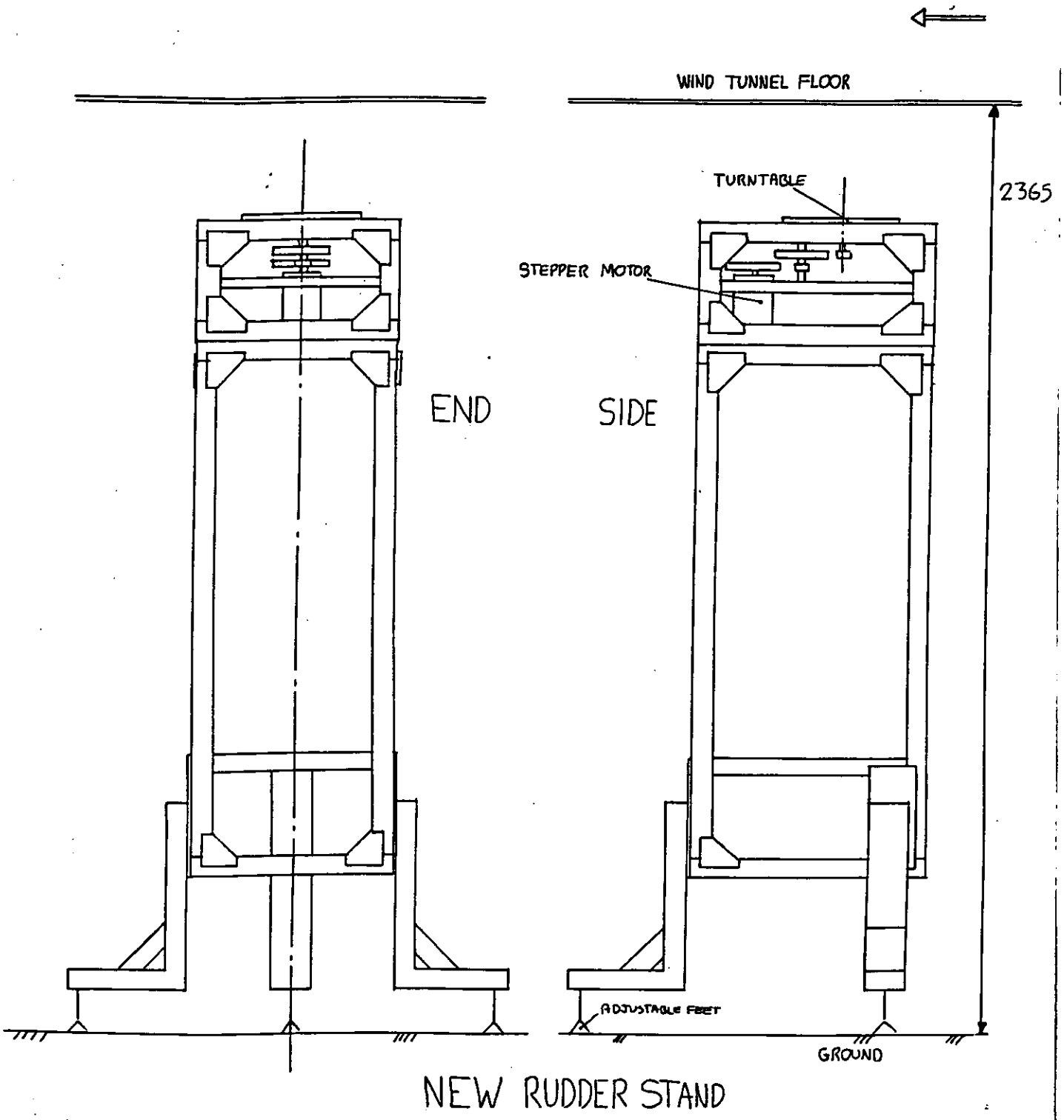



Figure 12 View of new rudder stand

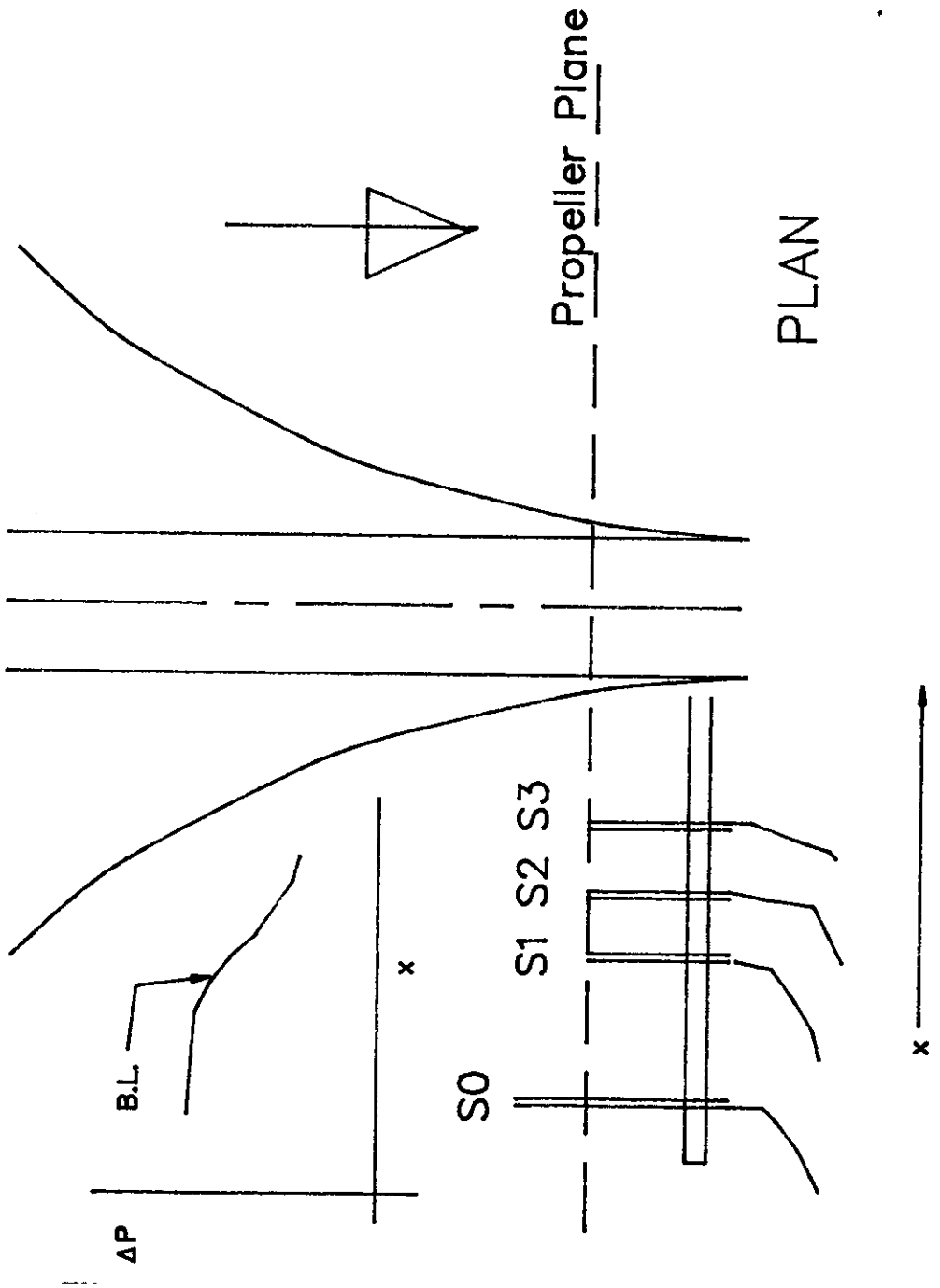



Figure 13 Pitot probe arrangement for measuring hull wake

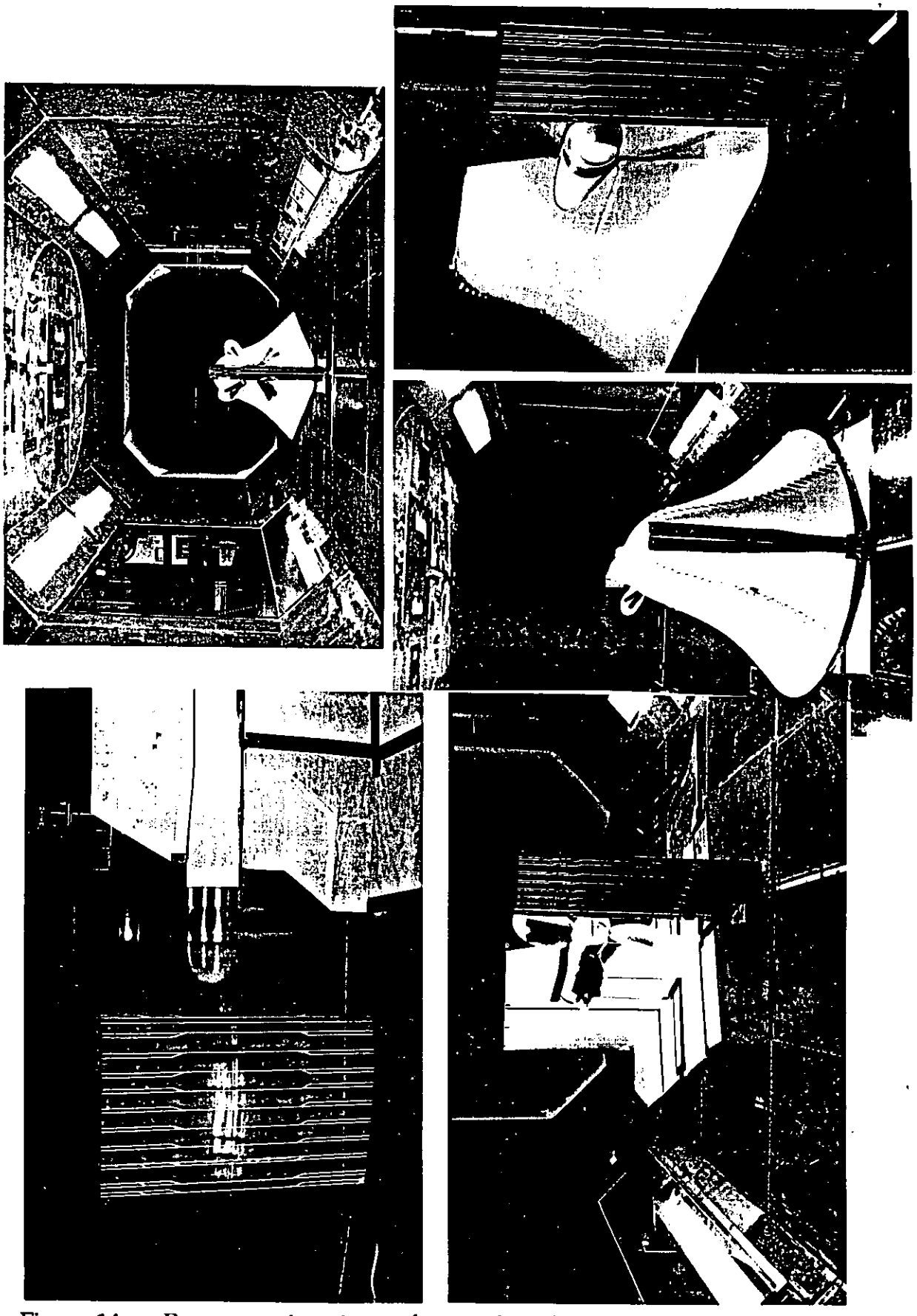


Figure 14 Representative views of centre-board and hull models

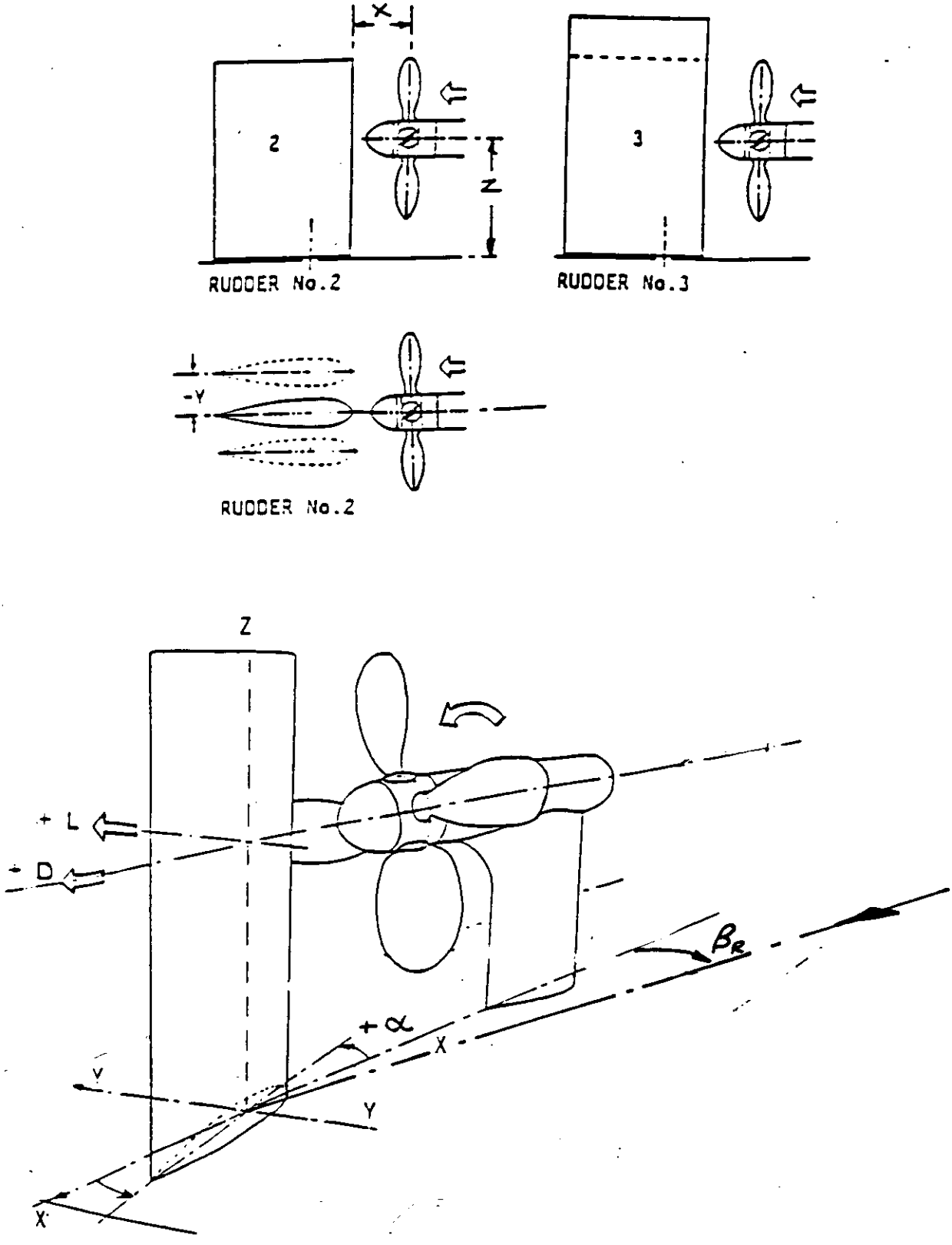



Figure 15 Schematic view of wind tunnel arrangement

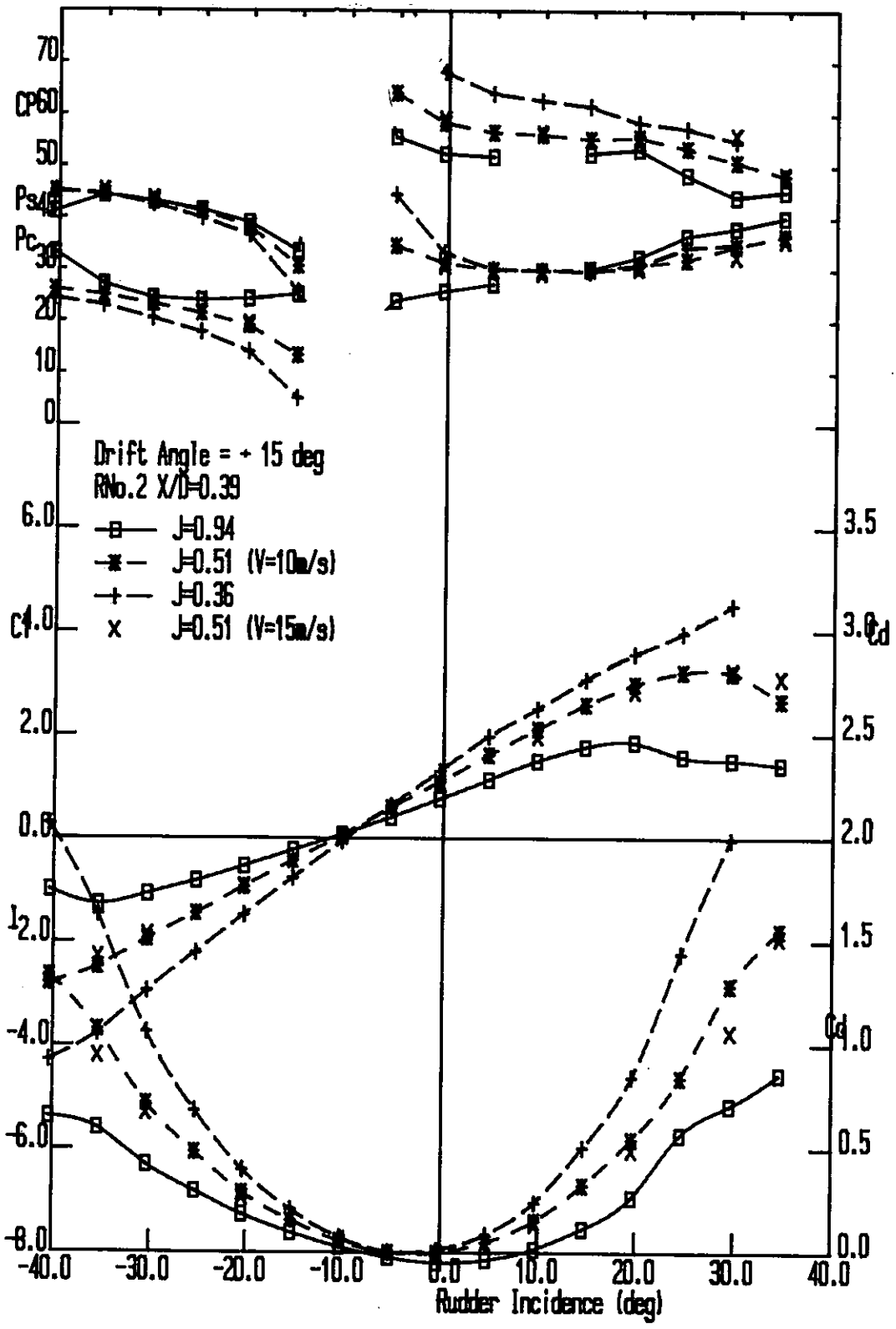



Figure 16 Effect of advance ratio on the performance of Rudder No.2 at drift angle of -15°

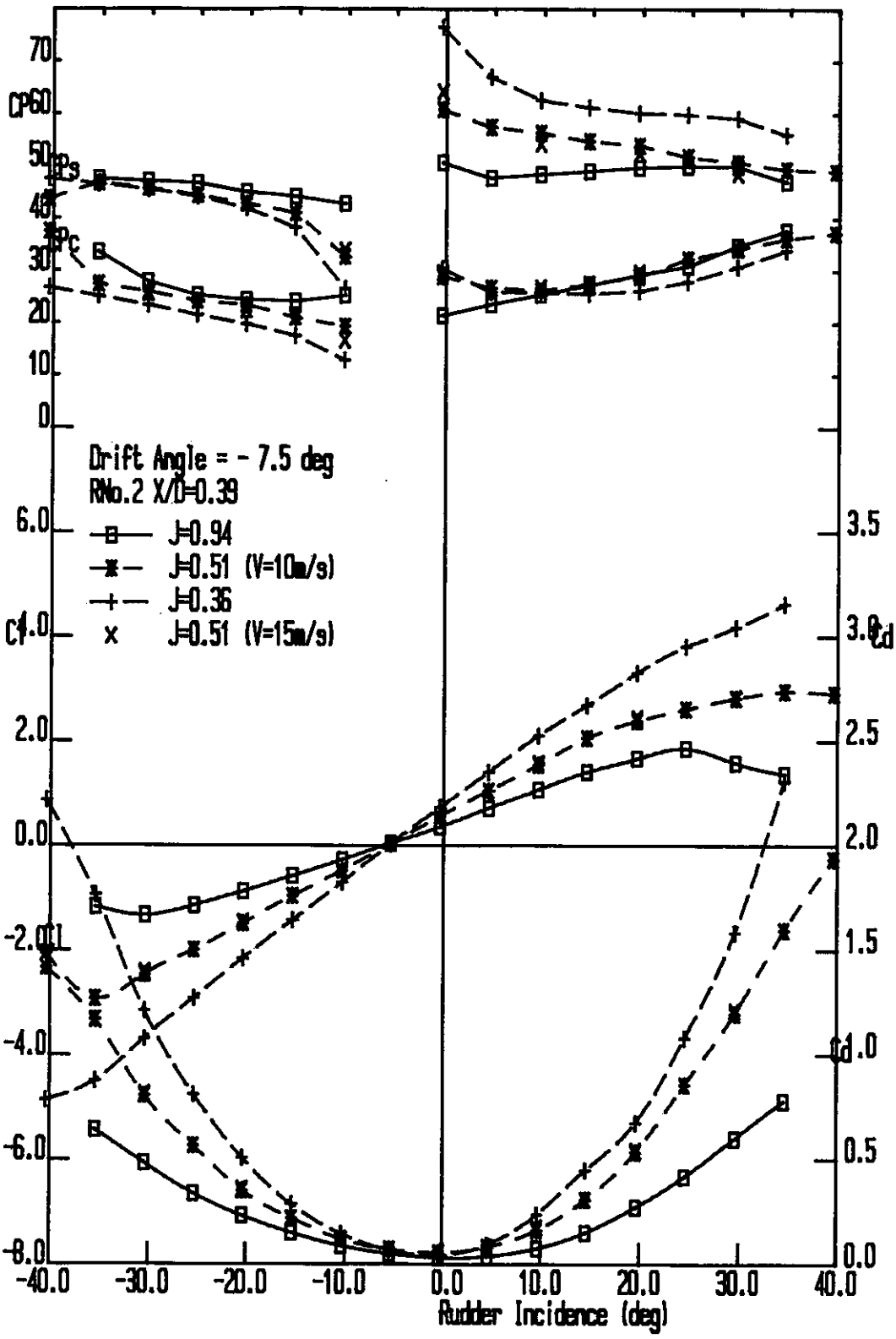



Figure 17 Effect of advance ratio on the performance of Rudder No.2 at drift angle of -7.5°

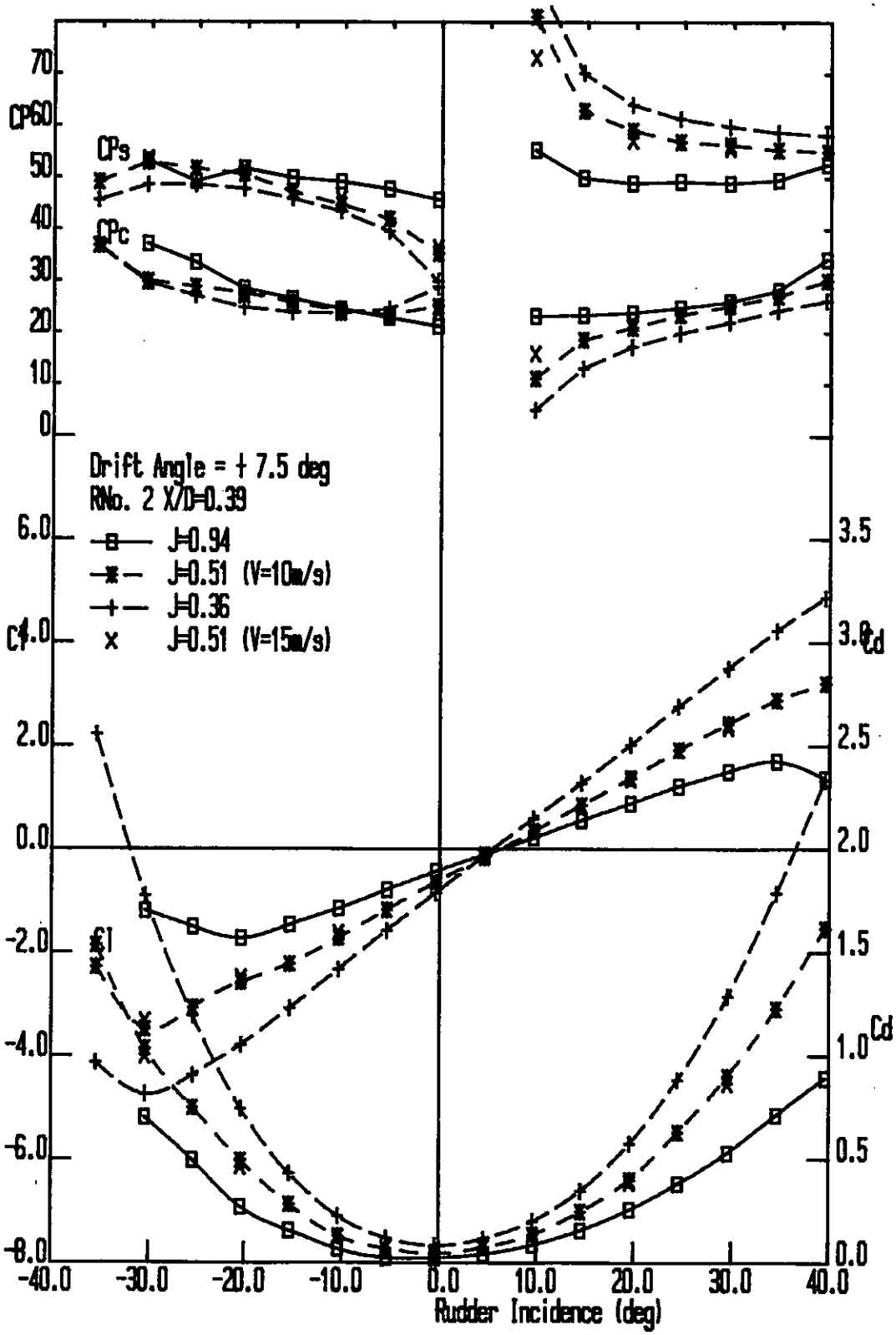



Figure 18 Effect of advance ratio on the performance of Rudder No.2 at drift angle of +7.5°

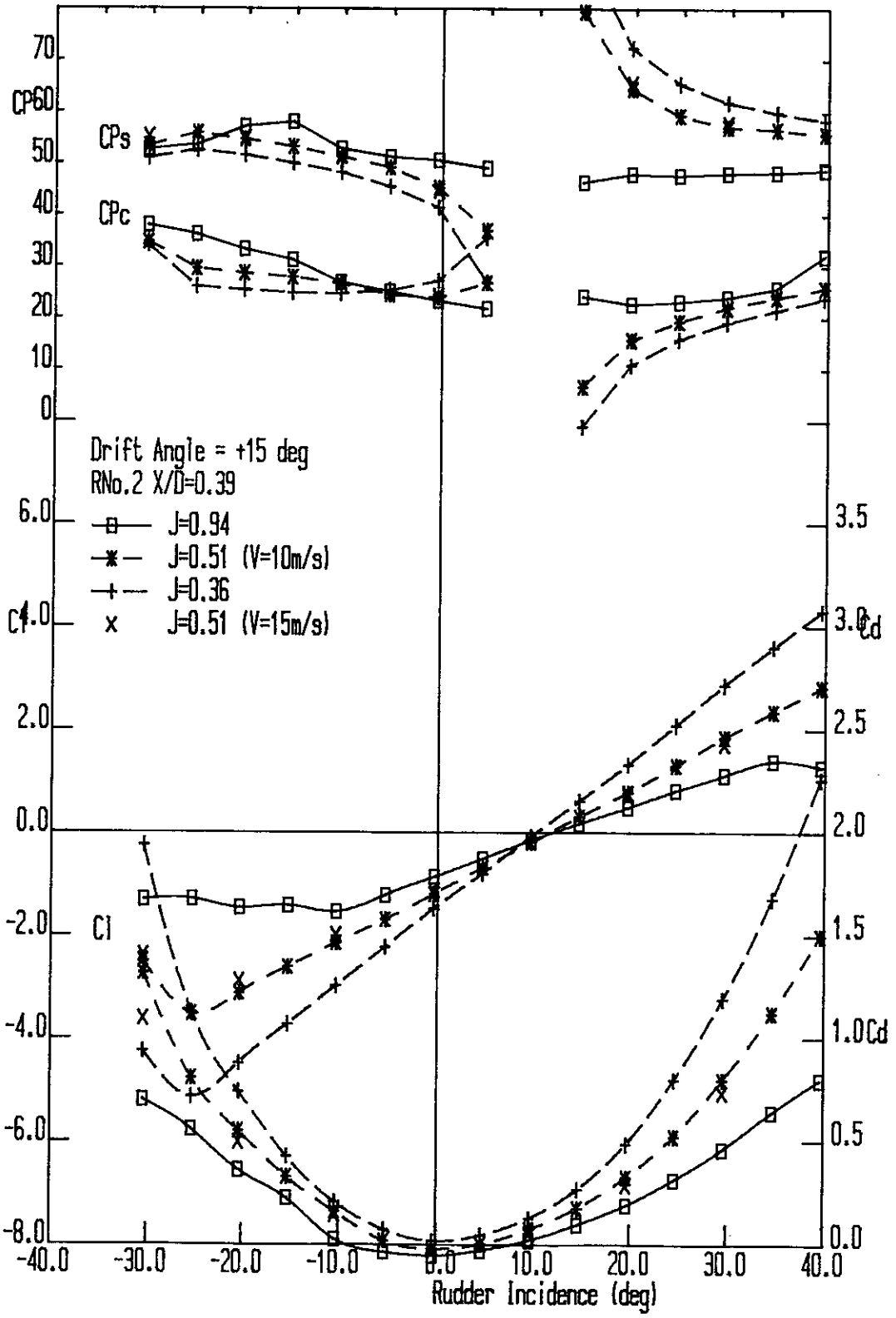



Figure 19 Effect of advance ratio on the performance of Rudder No.2 at drift angle of +15°

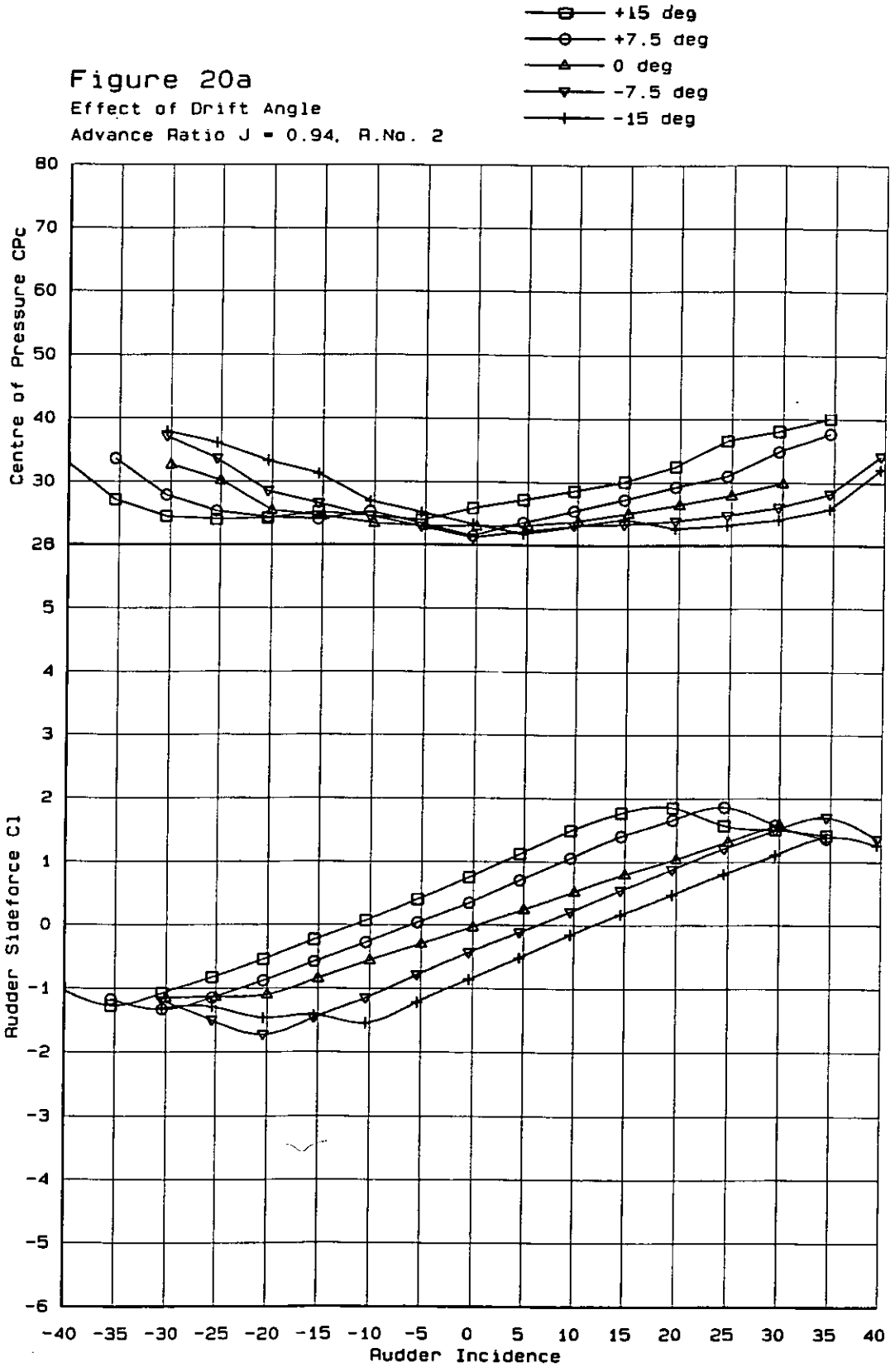



Figure 20 Effect of drift angle on the performance of Rudder No.2 at an Advance Ratio J of 0.94: Lift and CPc

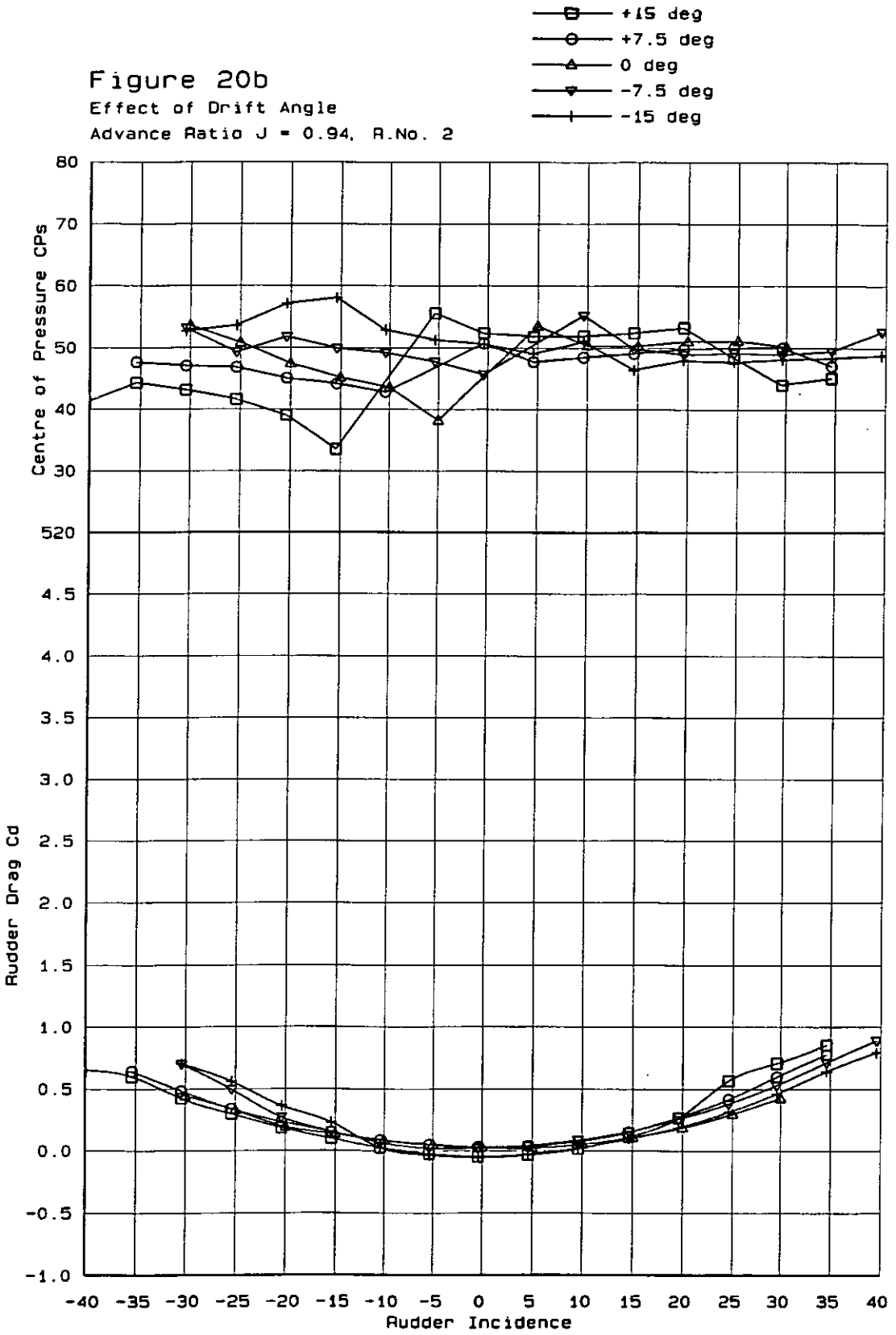



Figure 20b Effect of drift angle on the performance of Rudder No.2 at an Advance Ratio J of 0.94: Drag and CPs

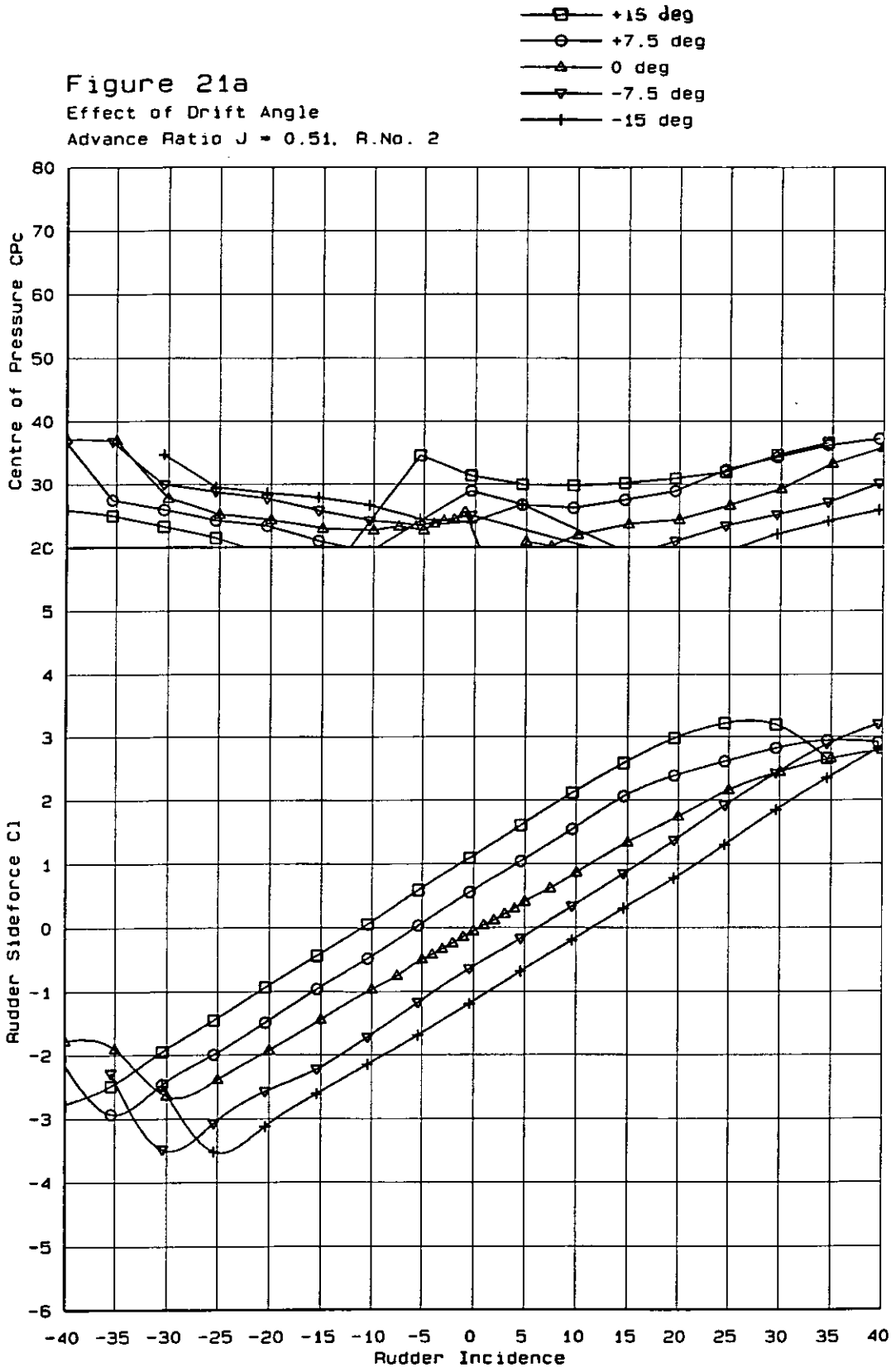



Figure 21a Effect of drift angle on the performance of Rudder No.2 at an Advance Ratio J of 0.51: Lift and CPc

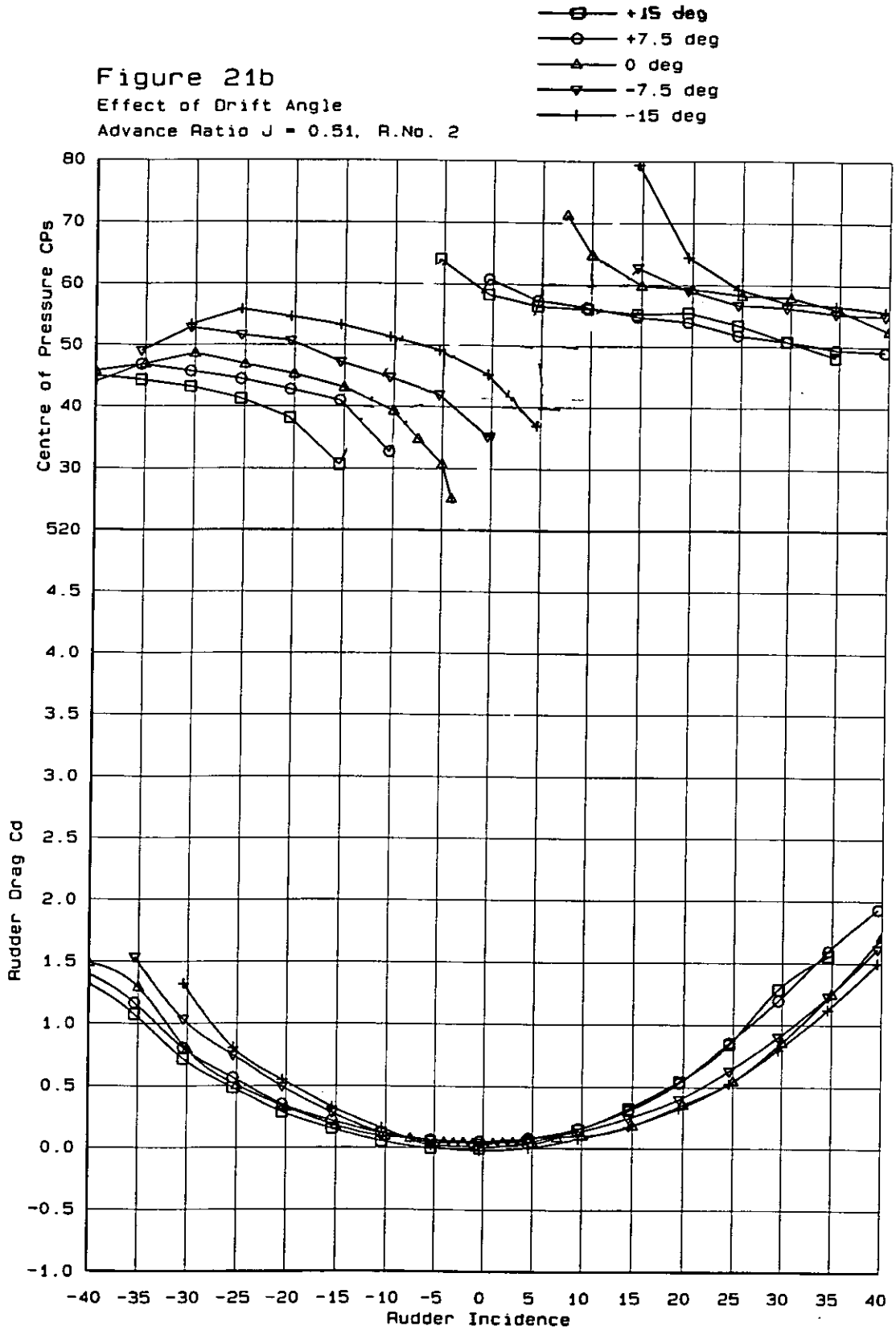



Figure 21b Effect of drift angle on the performance of Rudder No.2 at an Advance Ratio J of 0.51: Drag and CPs

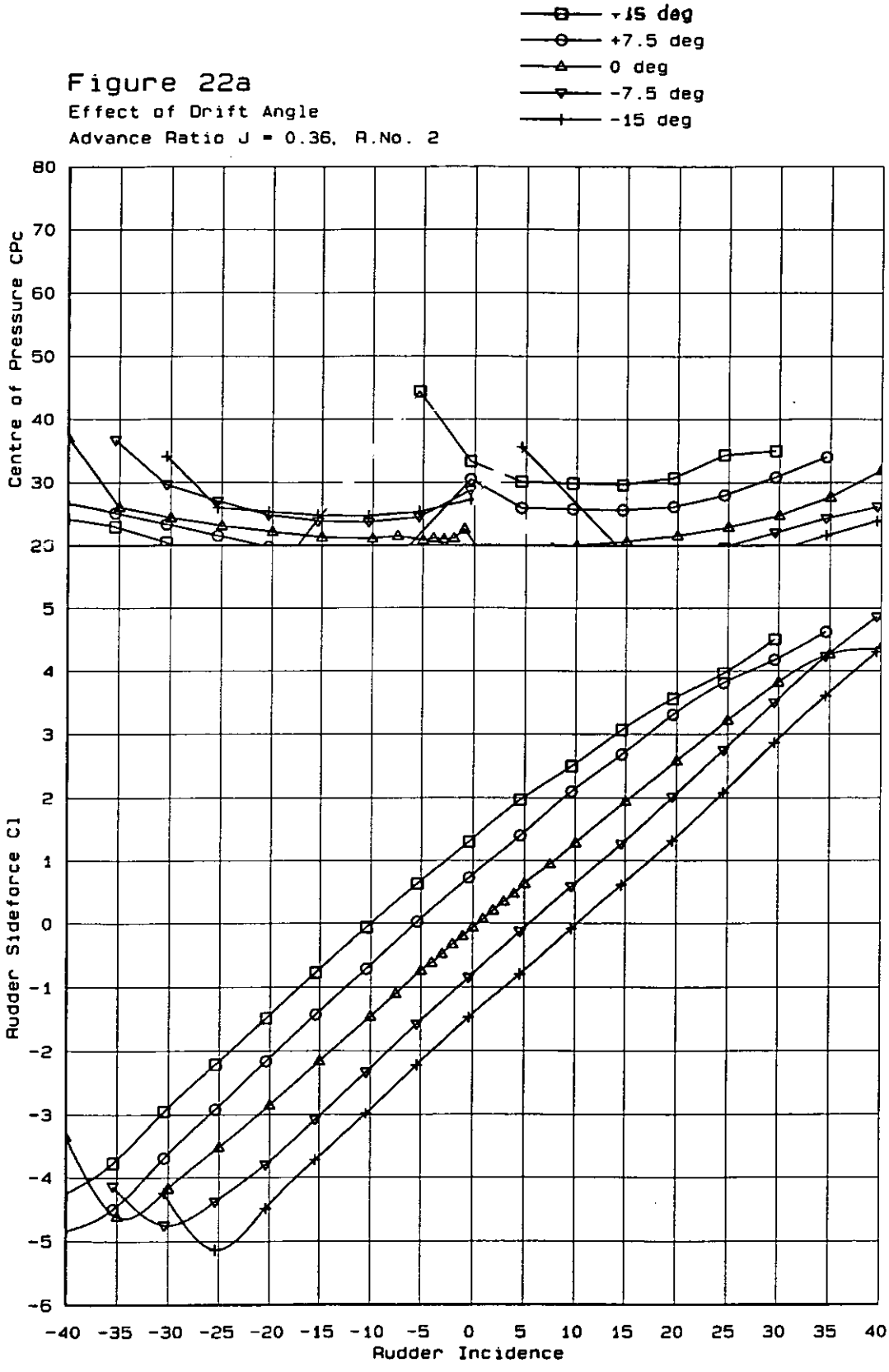



Figure 22a Effect of drift angle on the performance of Rudder No.2 at an Advance Ratio J of 0.36: Lift and CPc

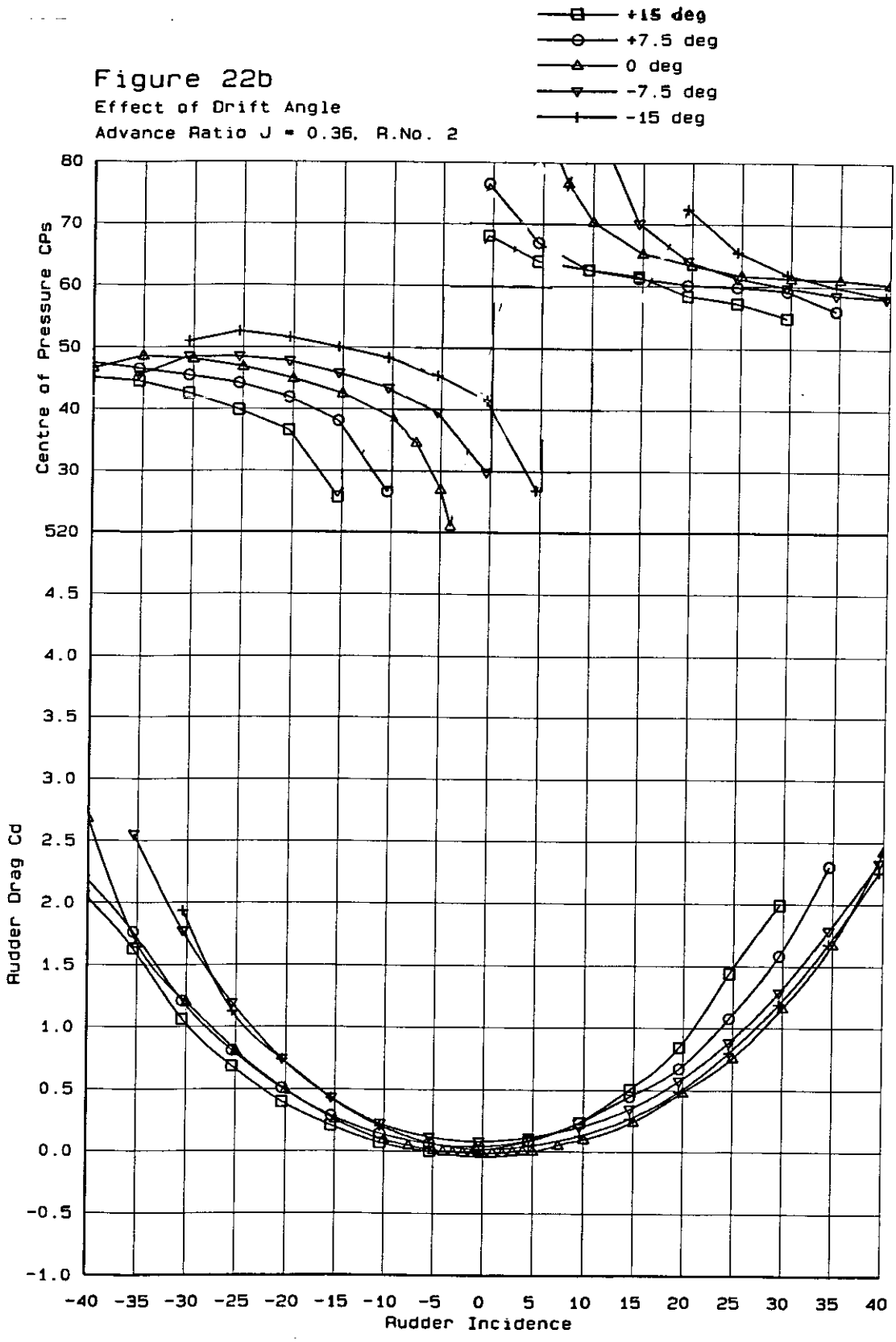



Figure 22b Effect of drift angle on the performance of Rudder No.2 at an Advance Ratio J of 0.36: Drag and CPs

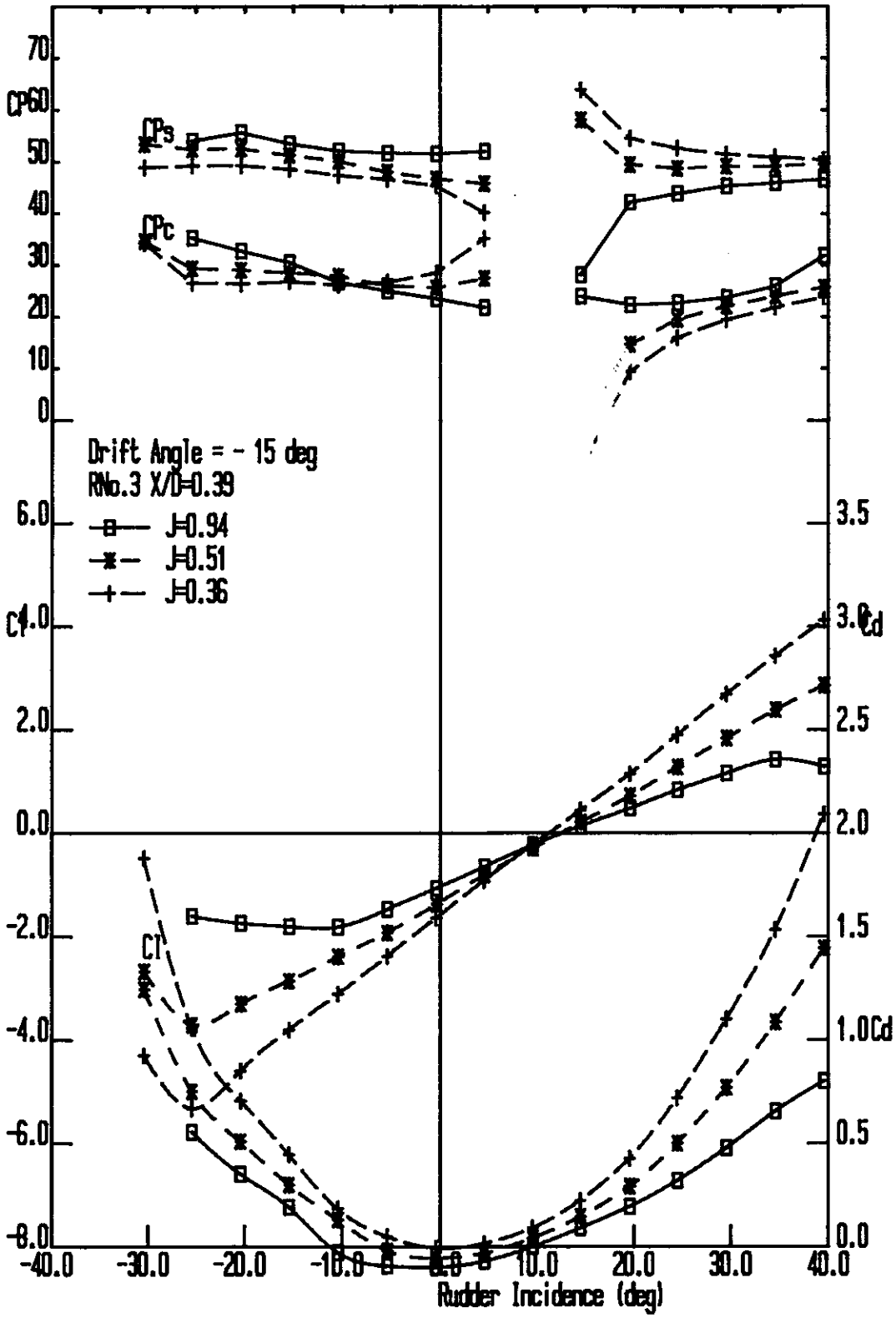



Figure 23 Effect of advance ratio on the performance of Rudder No.3 at a drift angle of -15°

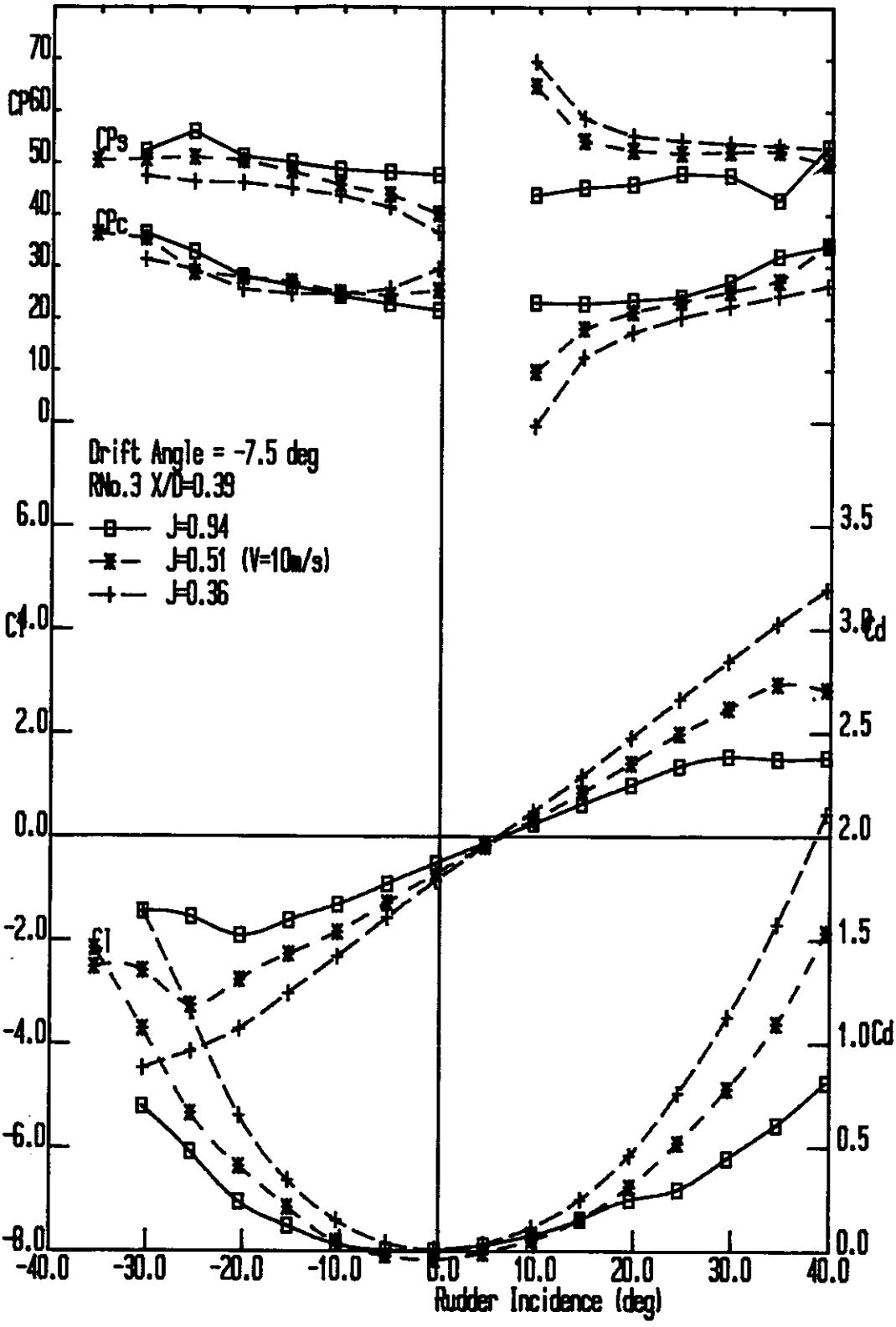



Figure 24 Effect of advance ratio on the performance of Rudder No.3 at a drift angle of -7.5°

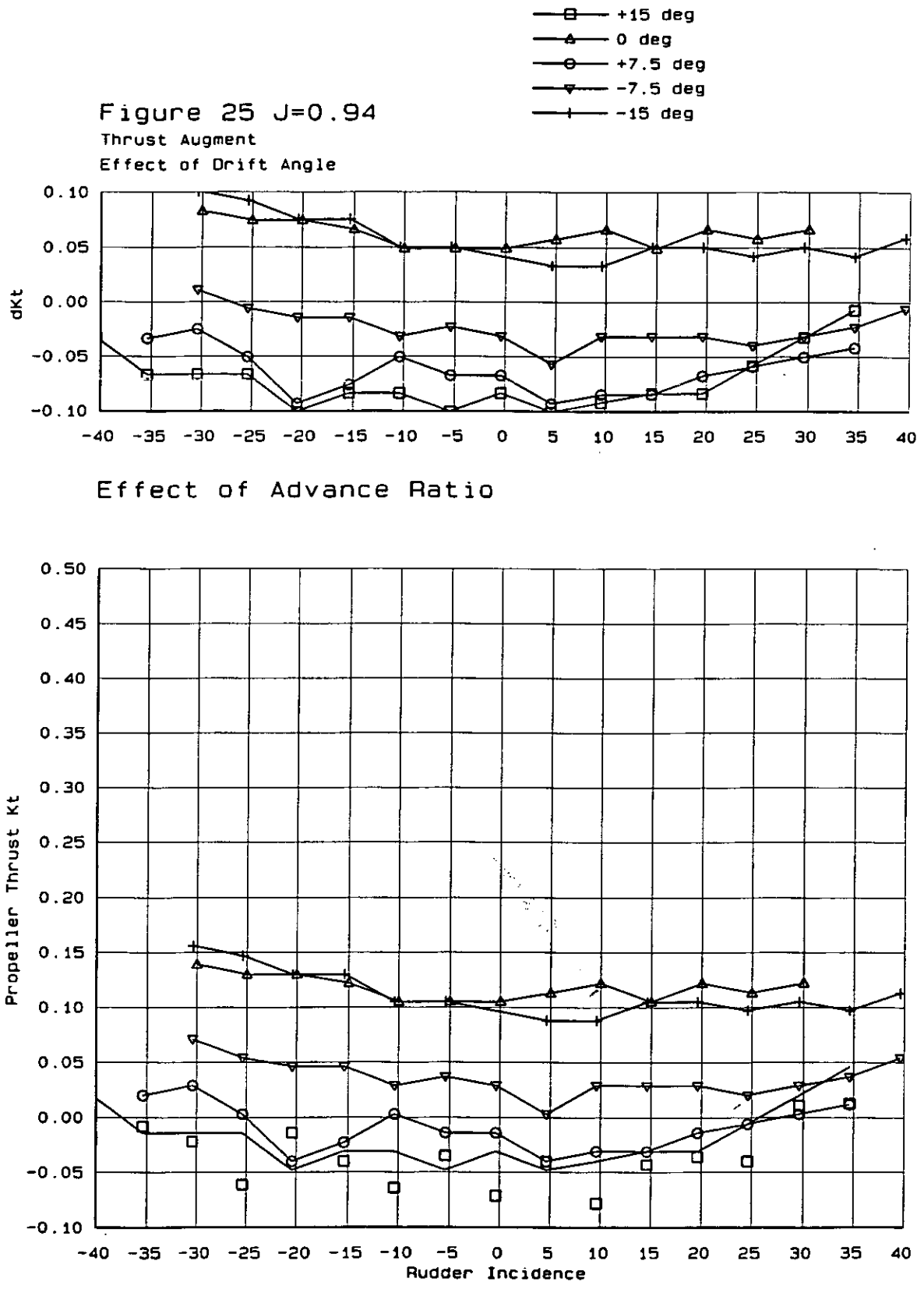



Figure 25 Effect of drift angle on propeller thrust and thrust augment for an Advance Ratio J of 0.94

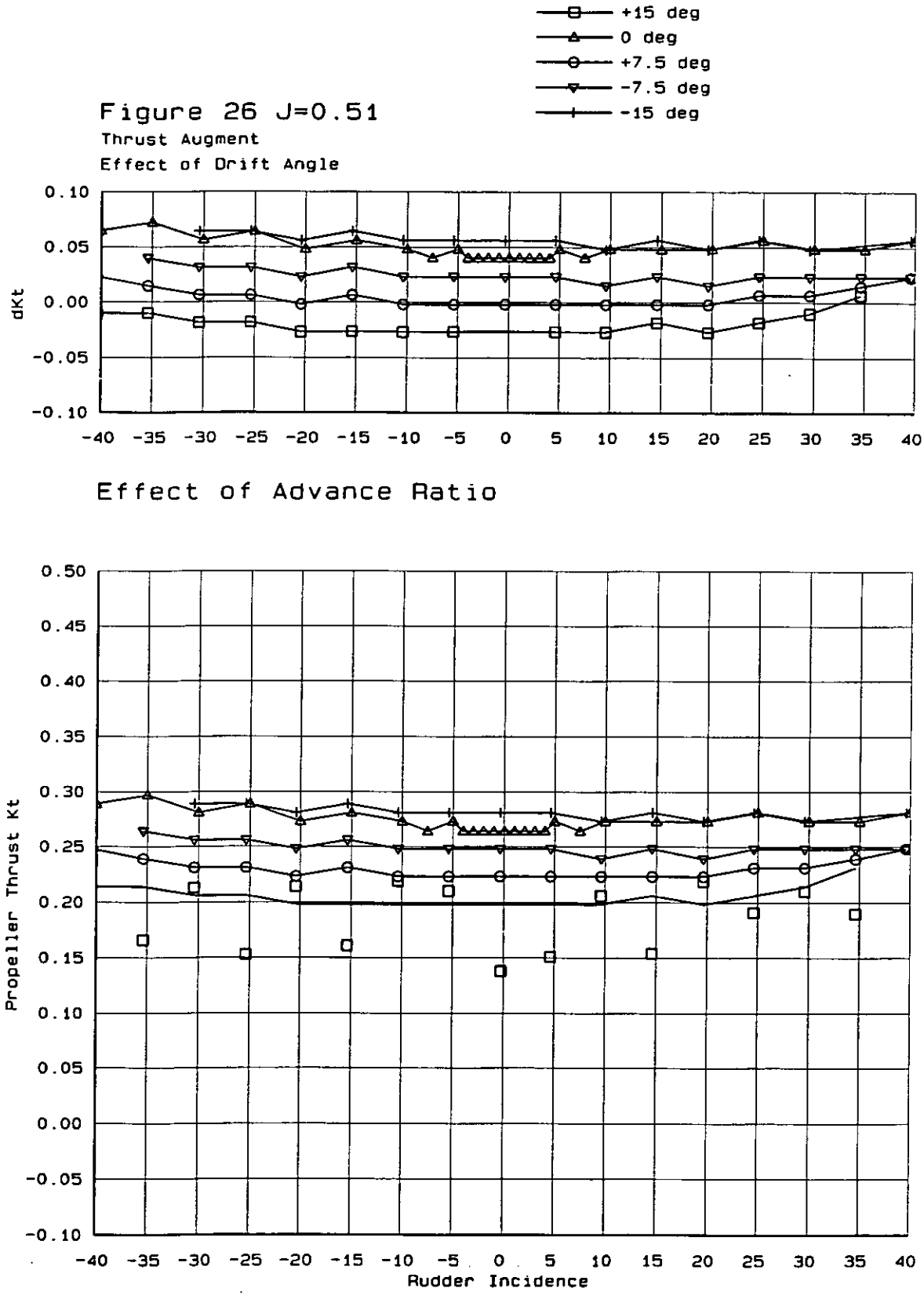



Figure 26 Effect of drift angle on propeller thrust and thrust augment for an Advance Ratio J of 0.51

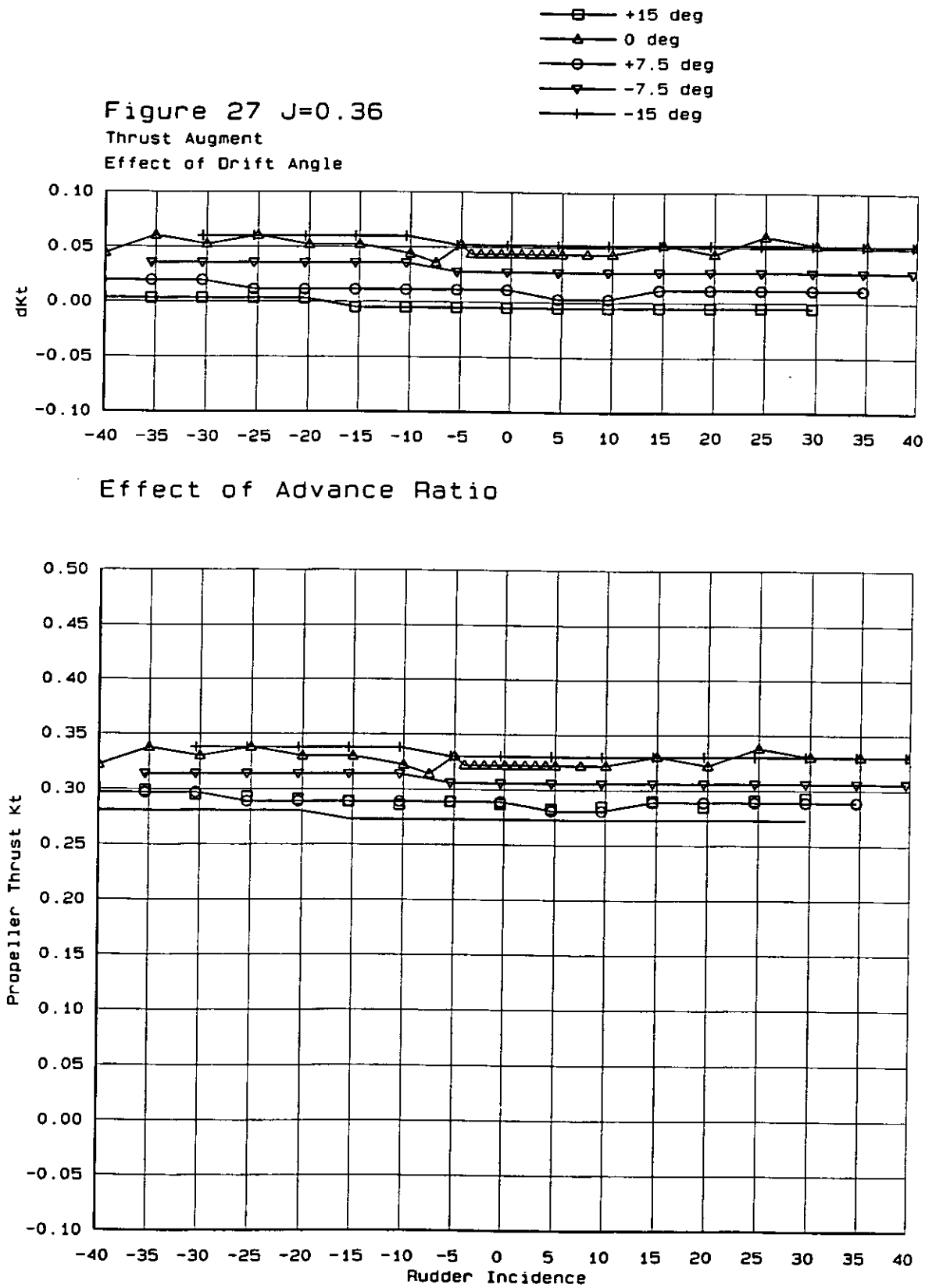



Figure 27 Effect of drift angle on propeller thrust and thrust augment for an Advance Ratio J of 0.36

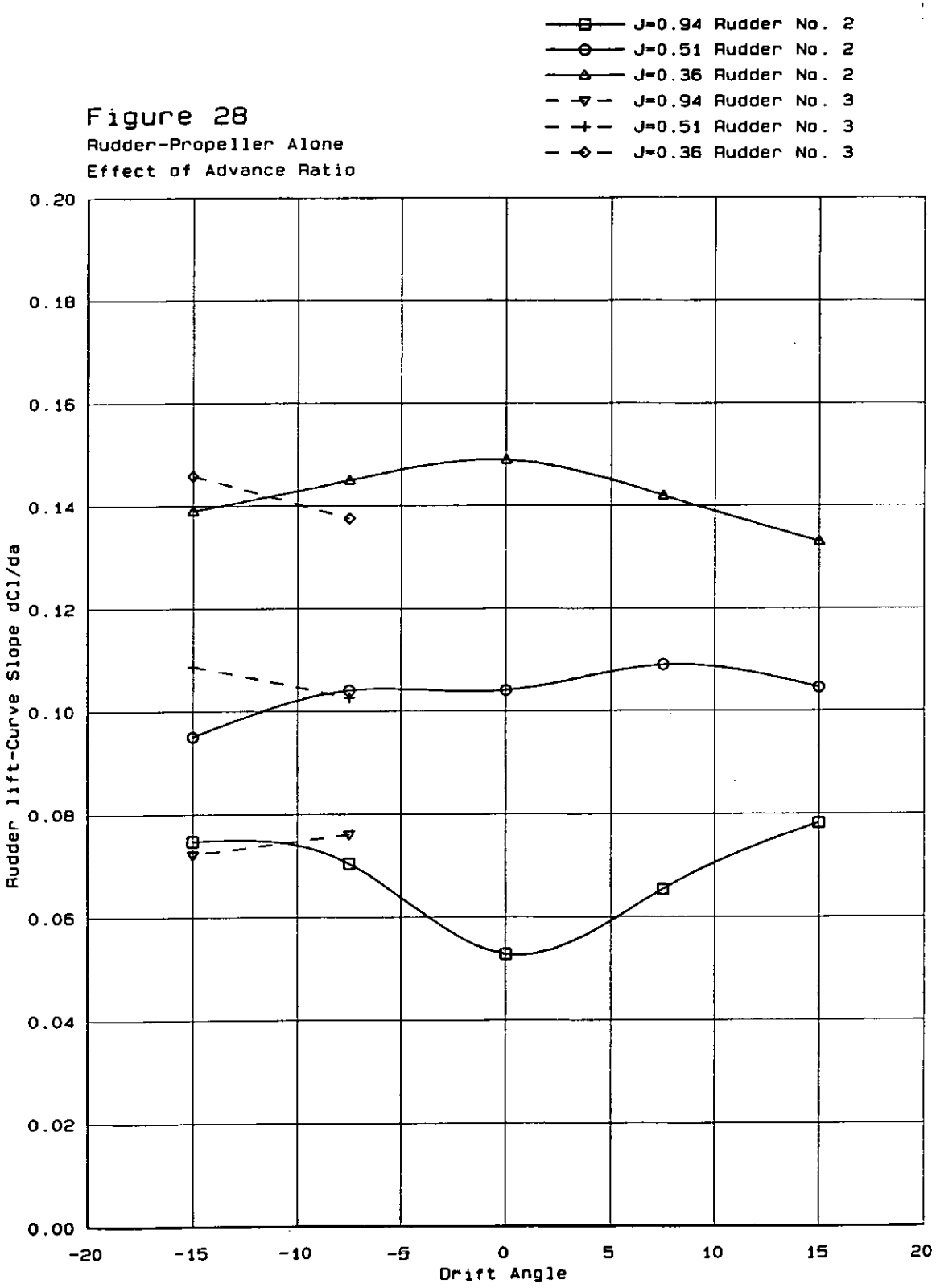



Figure 28 Effect of drift angle on the lift-curve slope of Rudder No. 2

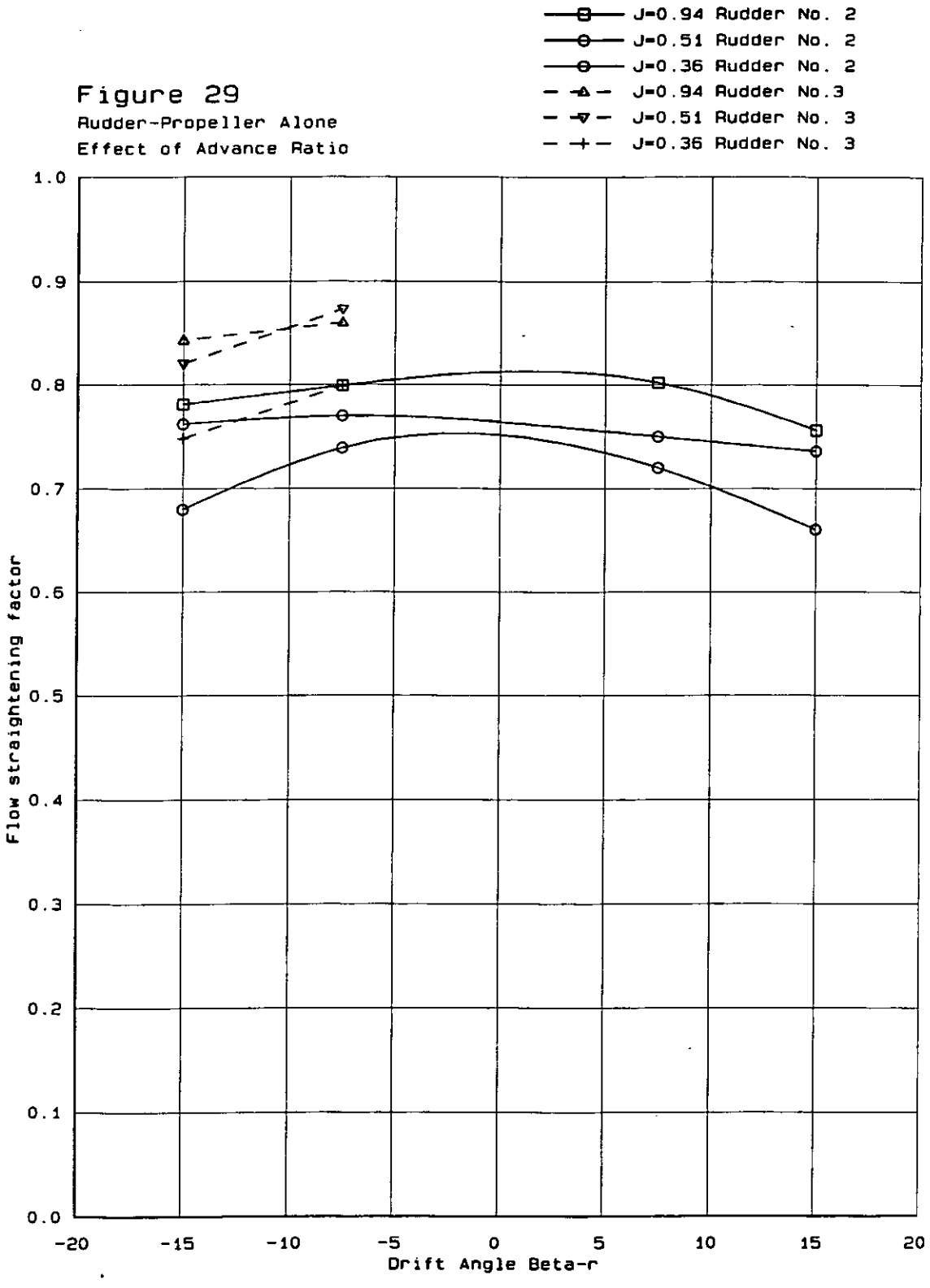



Figure 29 Effect of advance ratio on flow straightening for different drift angles

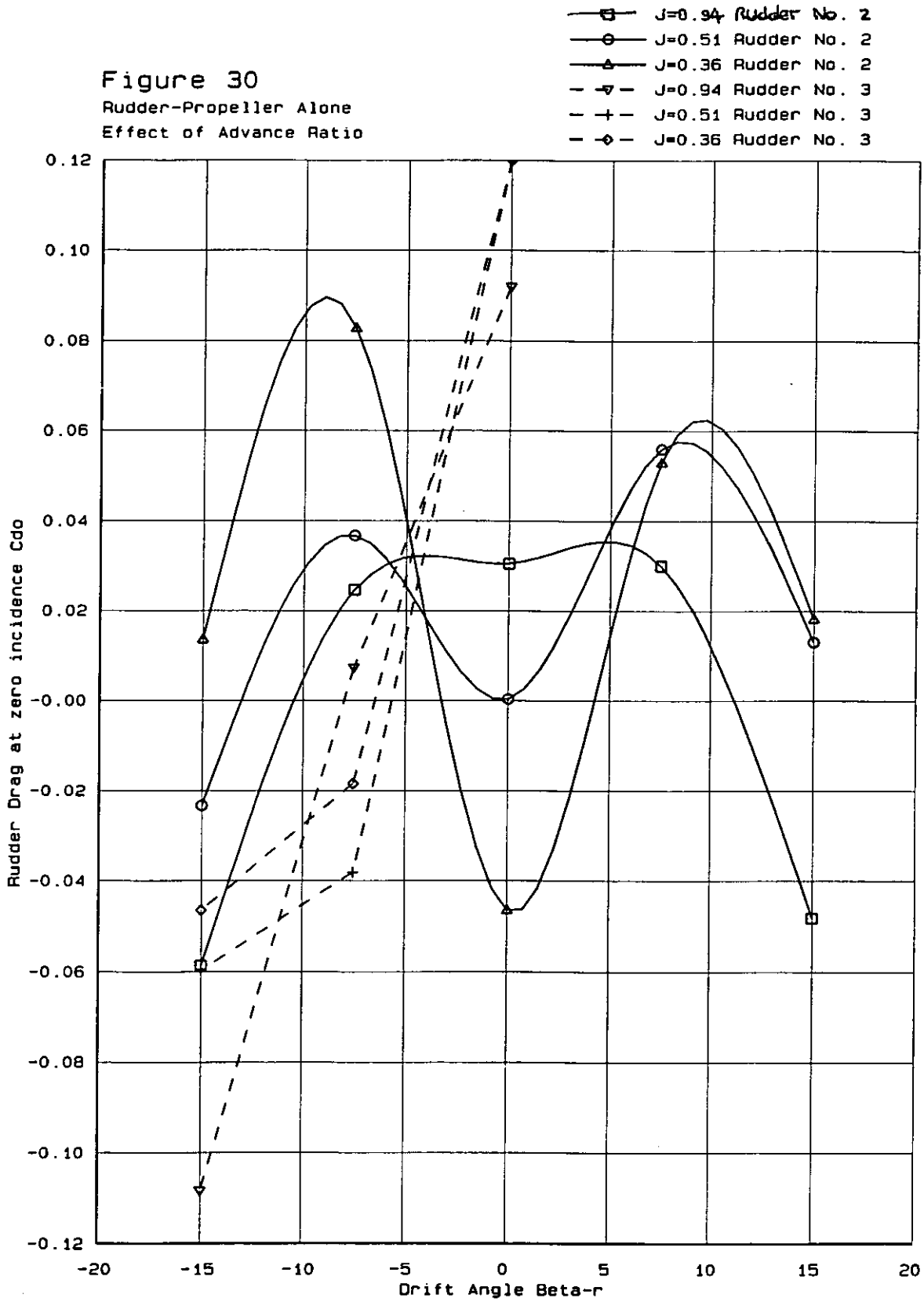



Figure 30 Effect of drift angles on rudder drag at zero incidence

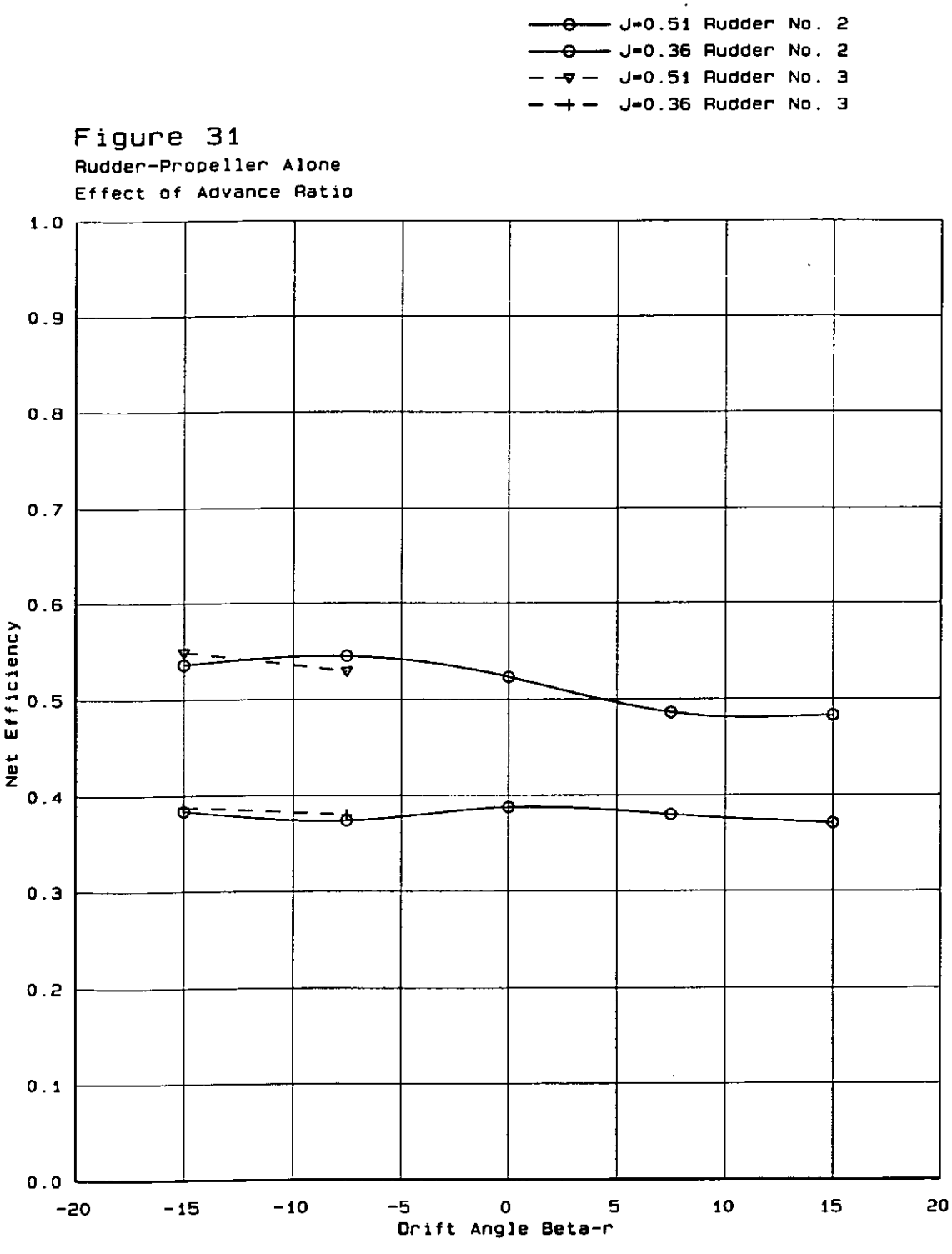



Figure 31 Effect of drift angle on net propeller efficiency

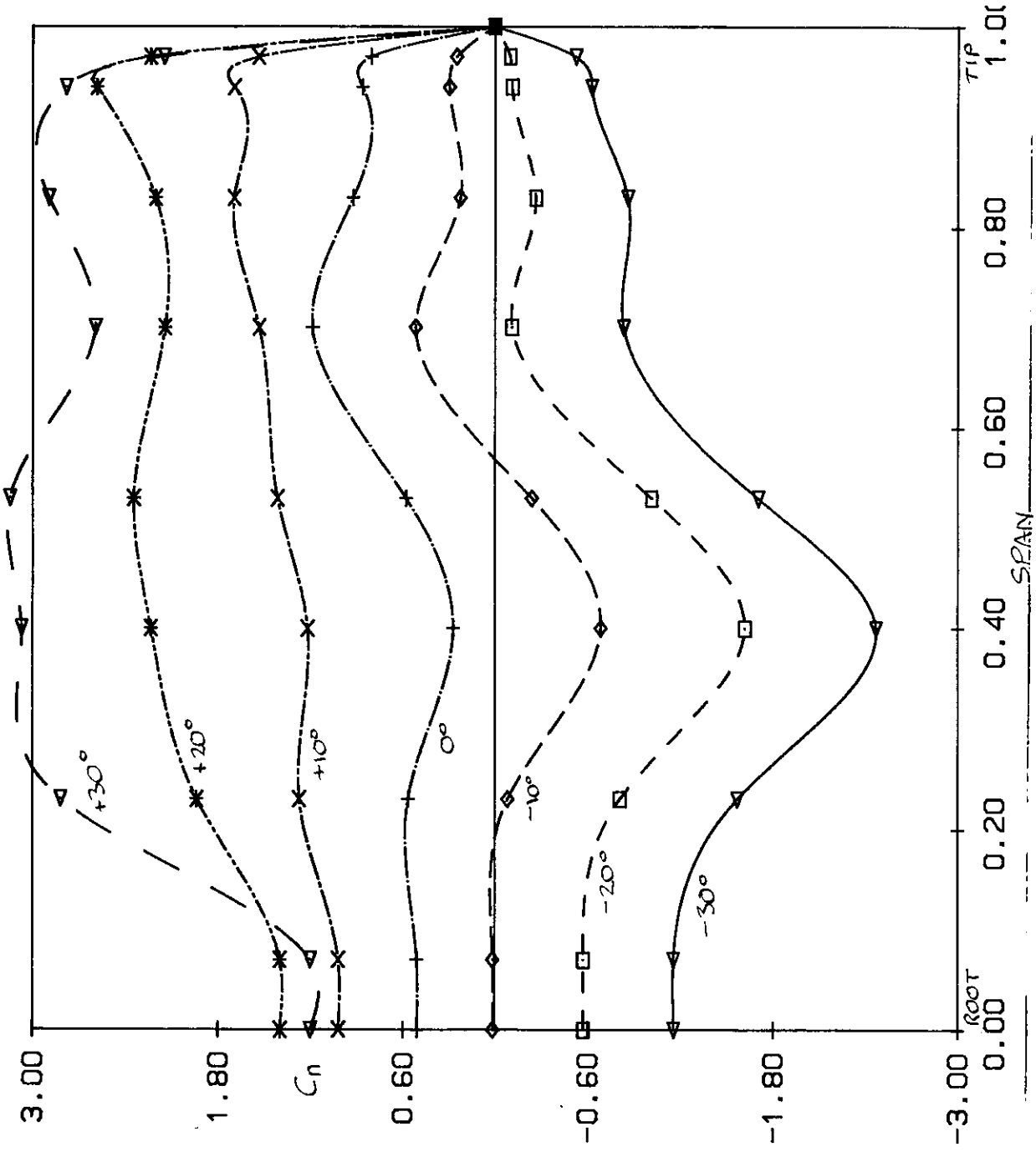



Figure 32 Variation with rudder incidence of the spanwise distribution of local section Cn of Rudder No. 2 at a drift angle of -15° and J of 0.51

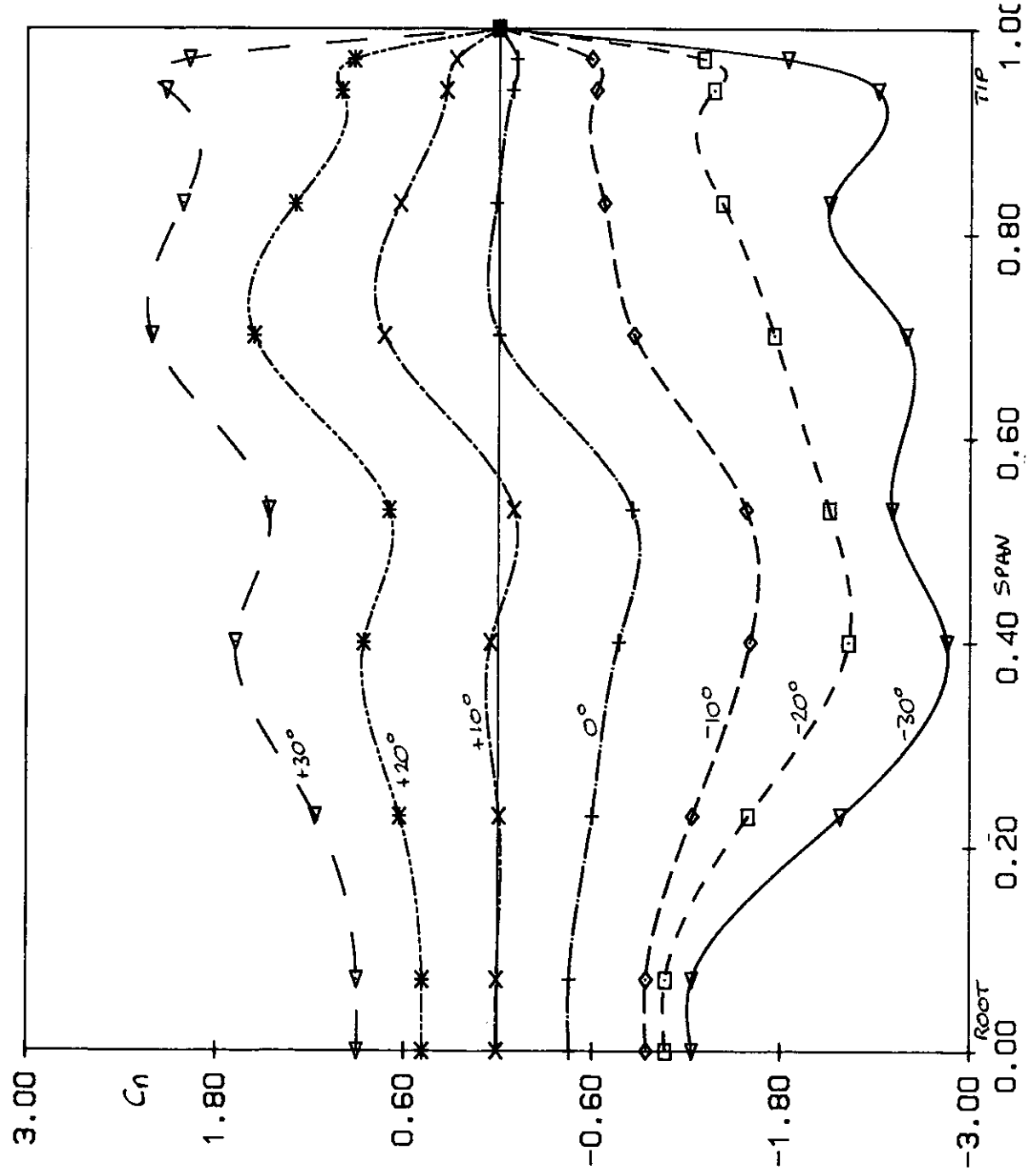



Figure 33 Variation with rudder incidence of the spanwise distribution of local section Cn of Rudder No. 2 at a drift angle of -7.5° and J of 0.51

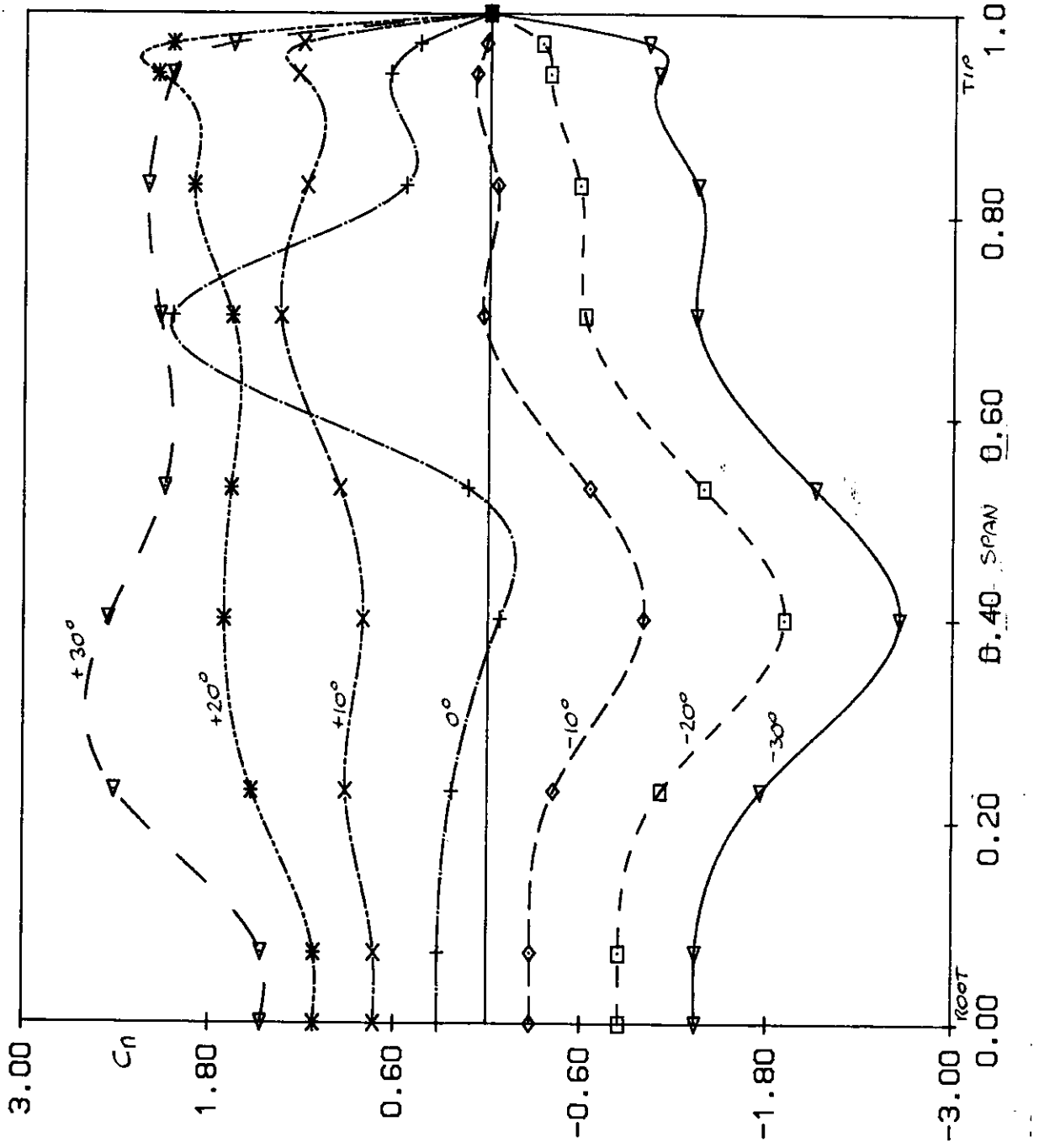



Figure 34 Variation with rudder incidence of the spanwise distribution of local section Cn of Rudder No. 2 at a drift angle of +7.5° and J of 0.51

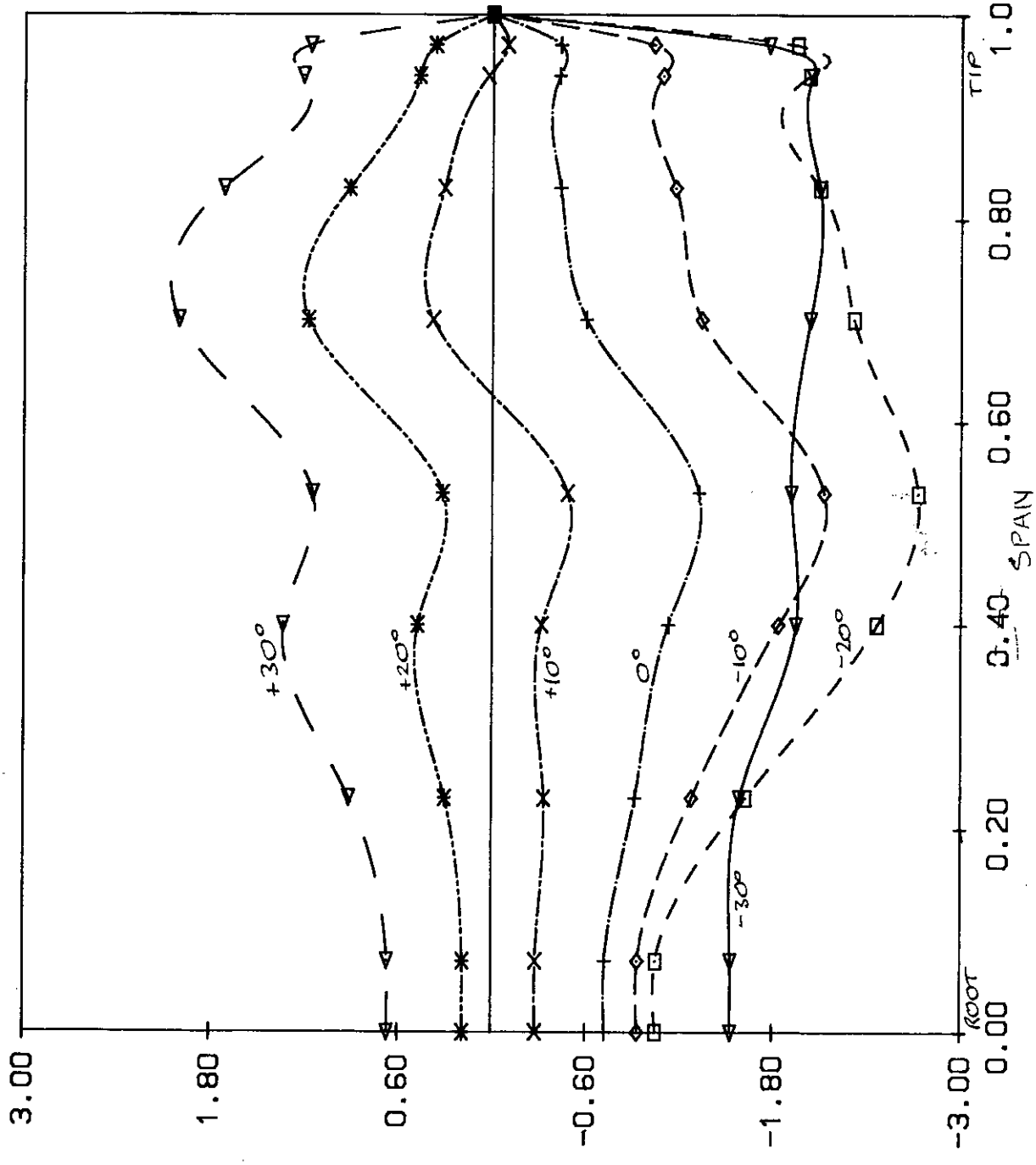



Figure 35 Variation with rudder incidence of the spanwise distribution of local section Cn of Rudder No. 2 at a drift angle of +15° and J of 0.51

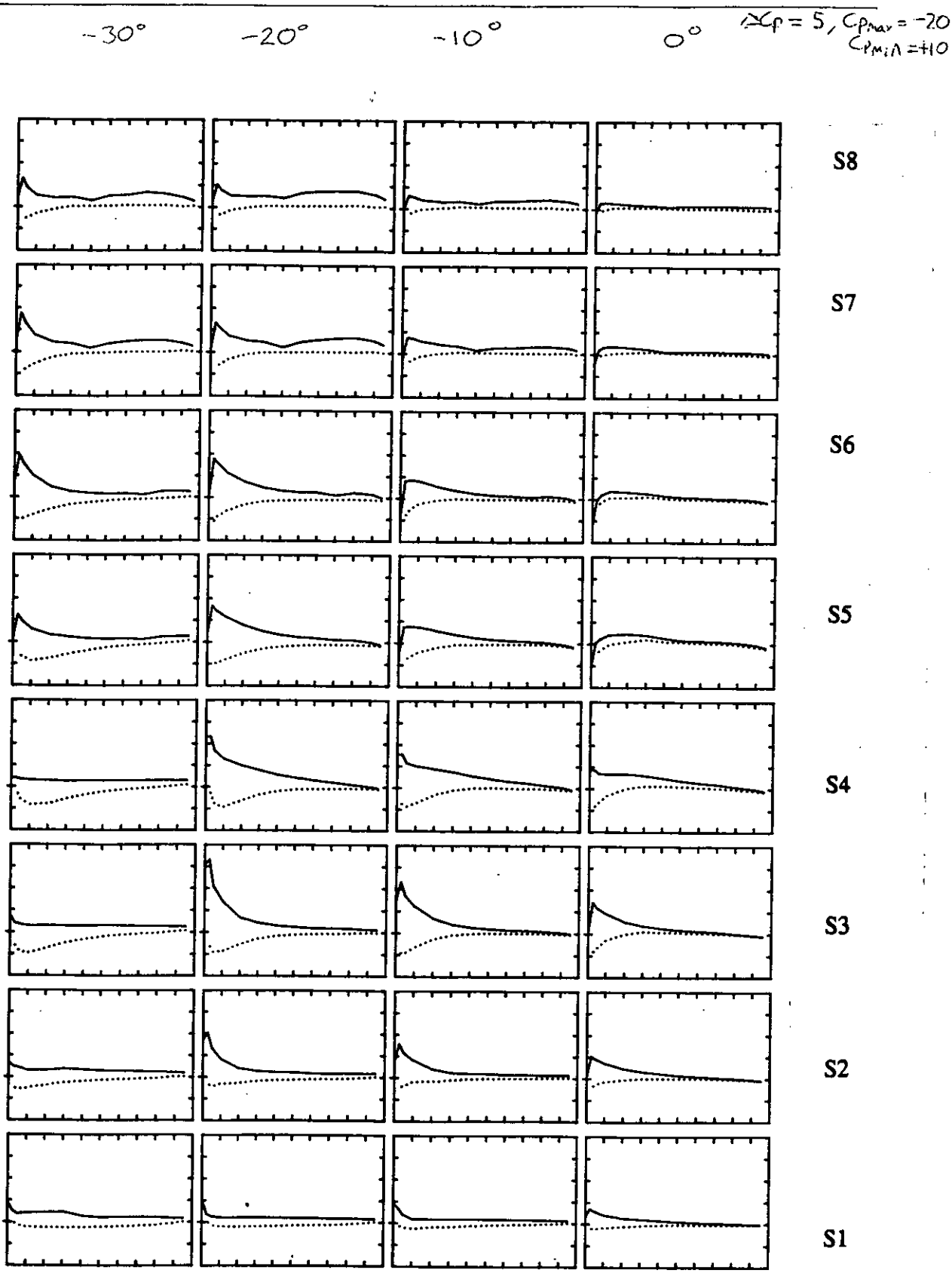



Figure 36a Chordwise pressure distribution at 8 spanwise positions for Rudder No. 2 at a drift angle of -15° and J of 0.51

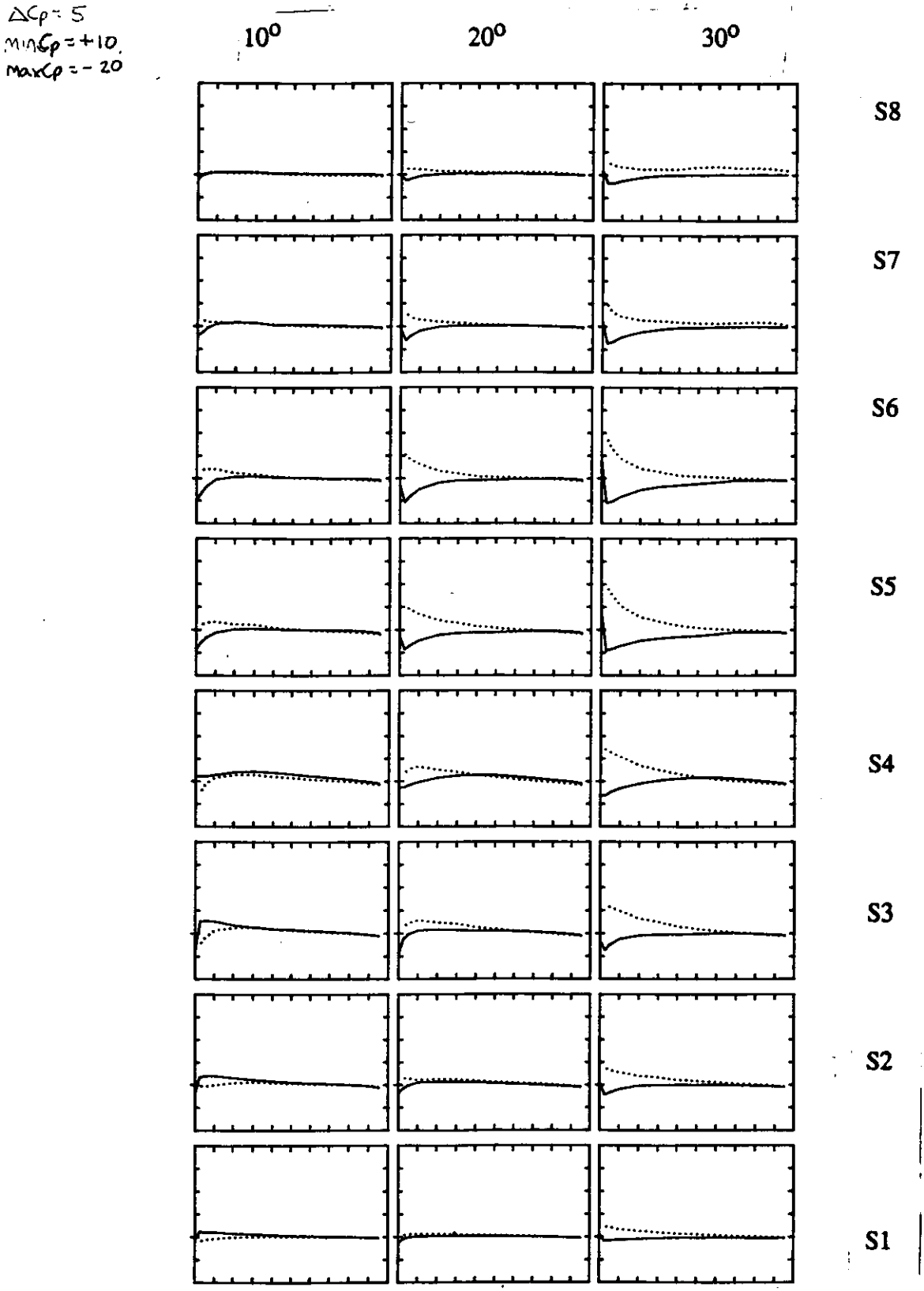



Figure 36b Chordwise pressure distribution at 8 spanwise positions for Rudder No. 2 at a drift angle of -15° and J of 0.51

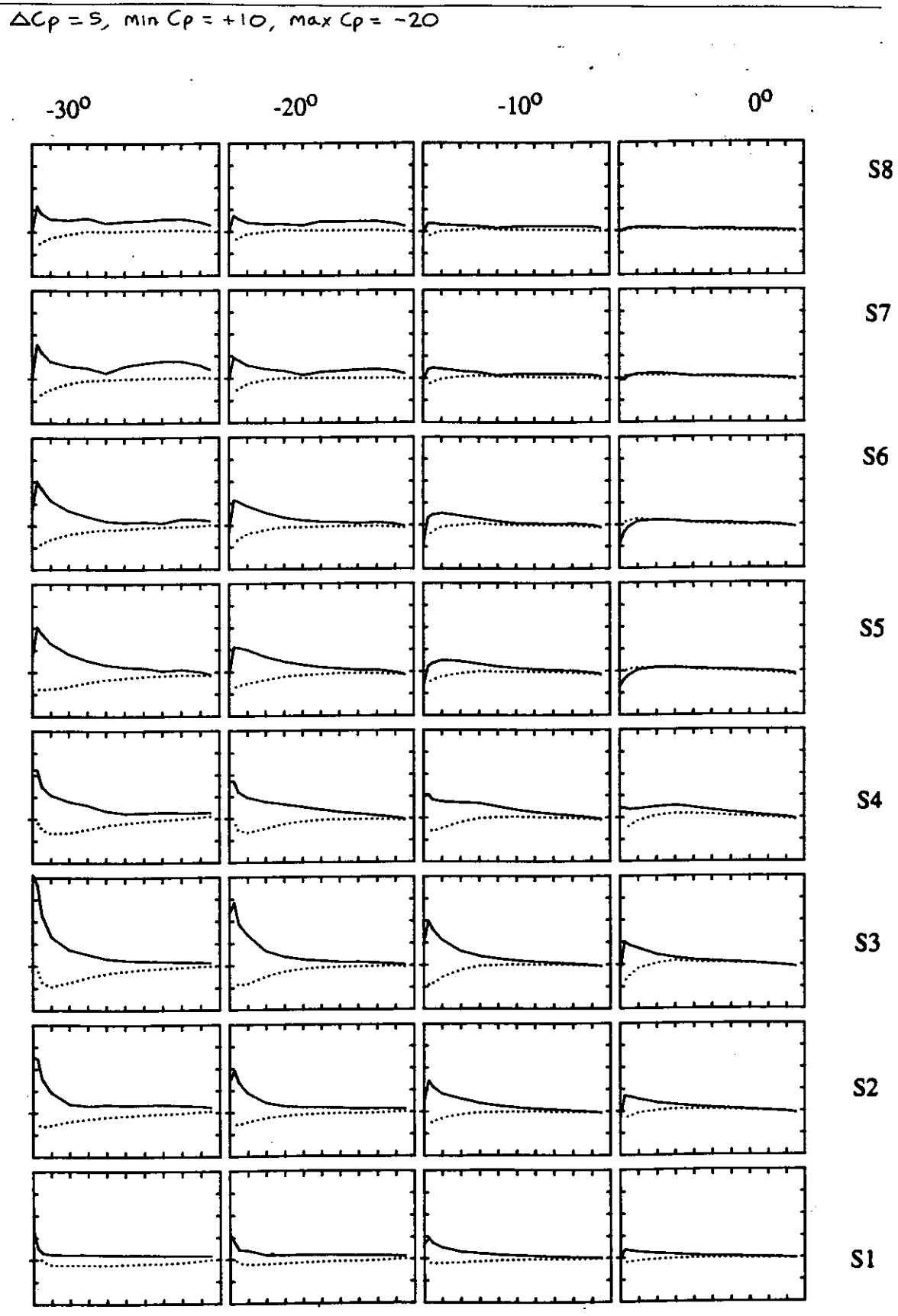



Figure 37a Chordwise pressure distribution at 8 spanwise positions for Rudder No. 2 at a drift angle of -7.5° and J of 0.51

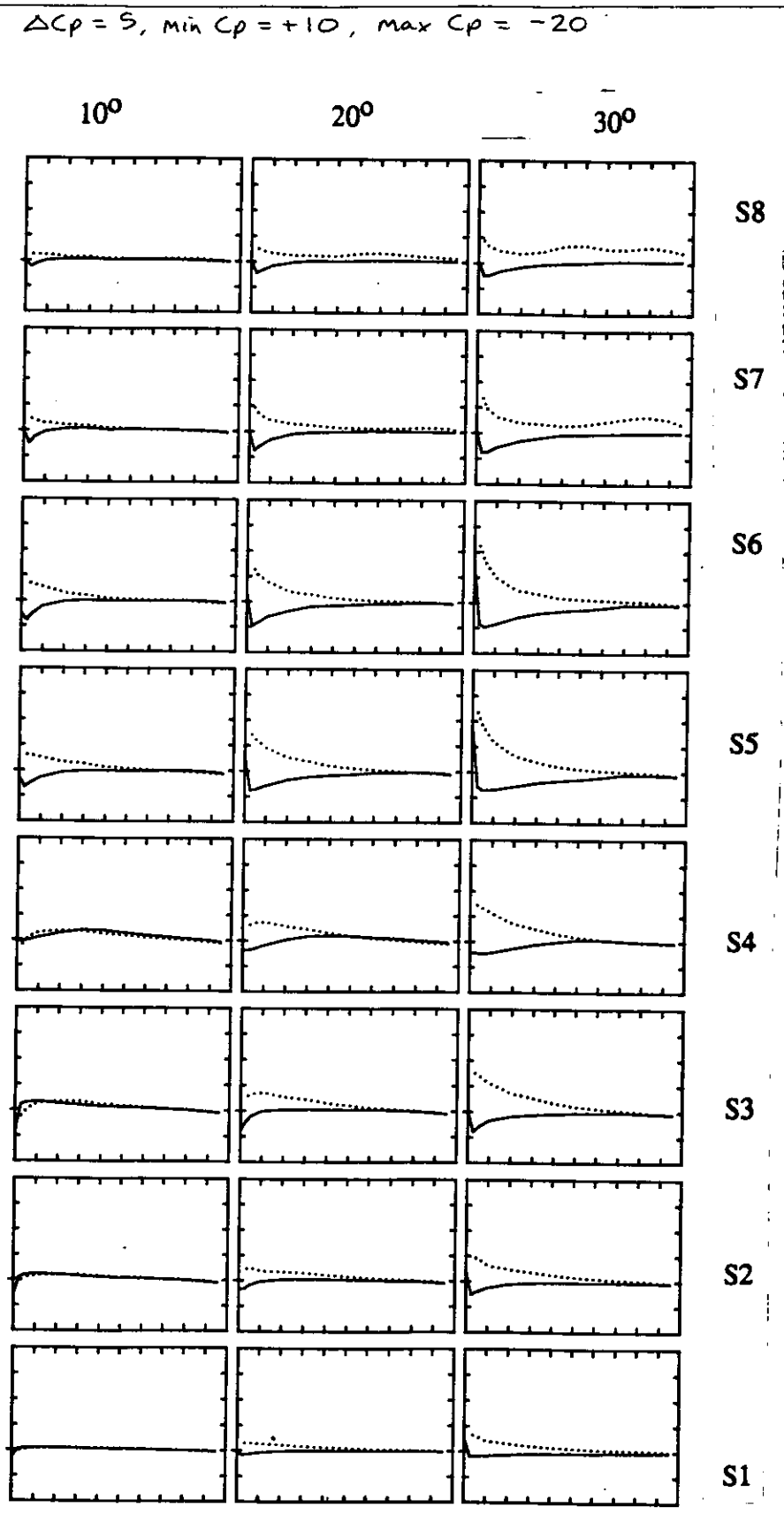



Figure 37b Chordwise pressure distribution at 8 spanwise positions for Rudder No. 2 at a drift angle of -7.5° and J of 0.51

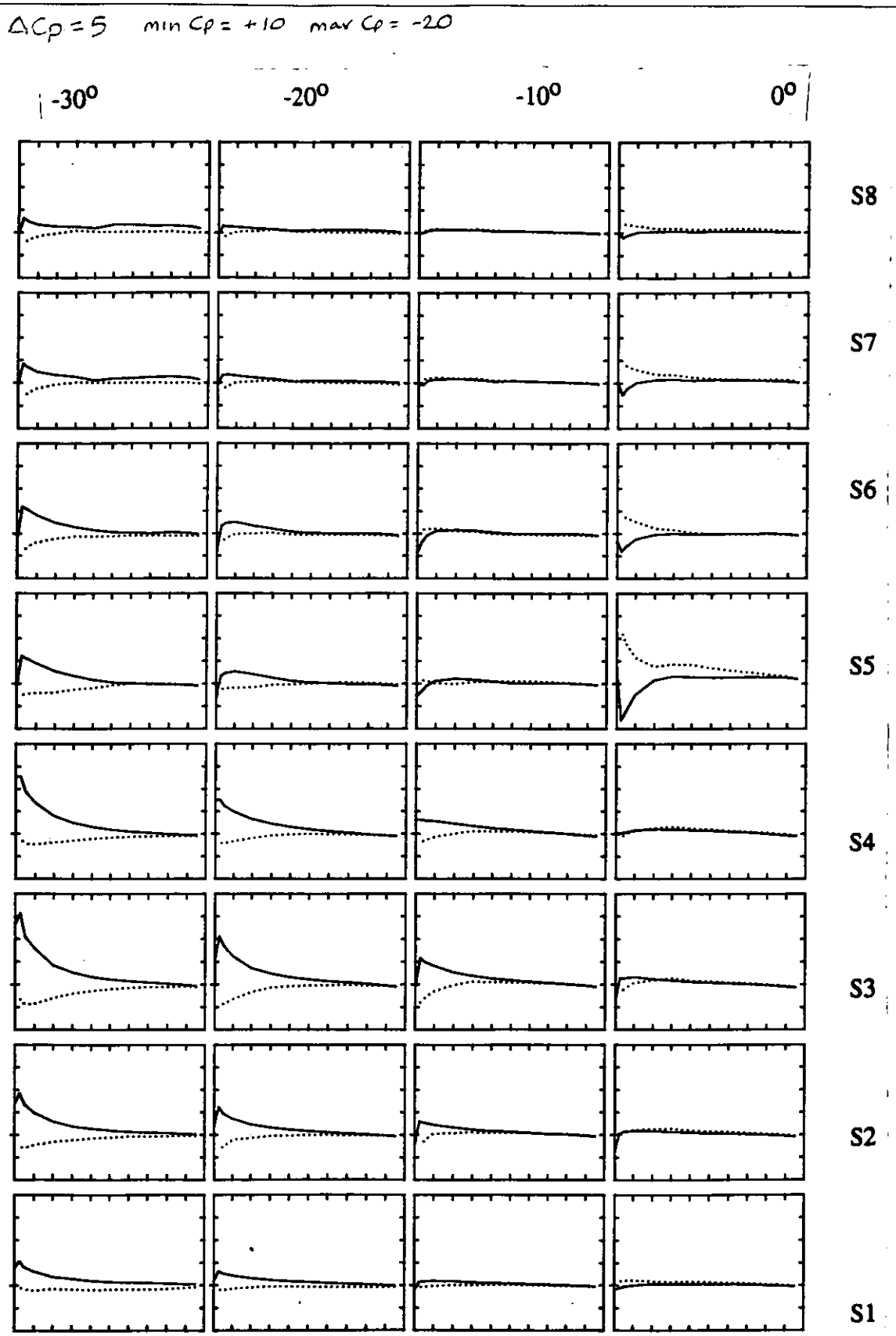



Figure 38a Chordwise pressure distribution at 8 spanwise positions for Rudder No. 2 at a drift angle of +7.5° and J of 0.51

ΔCp = 5, min Cp = +10, max Cp = -20

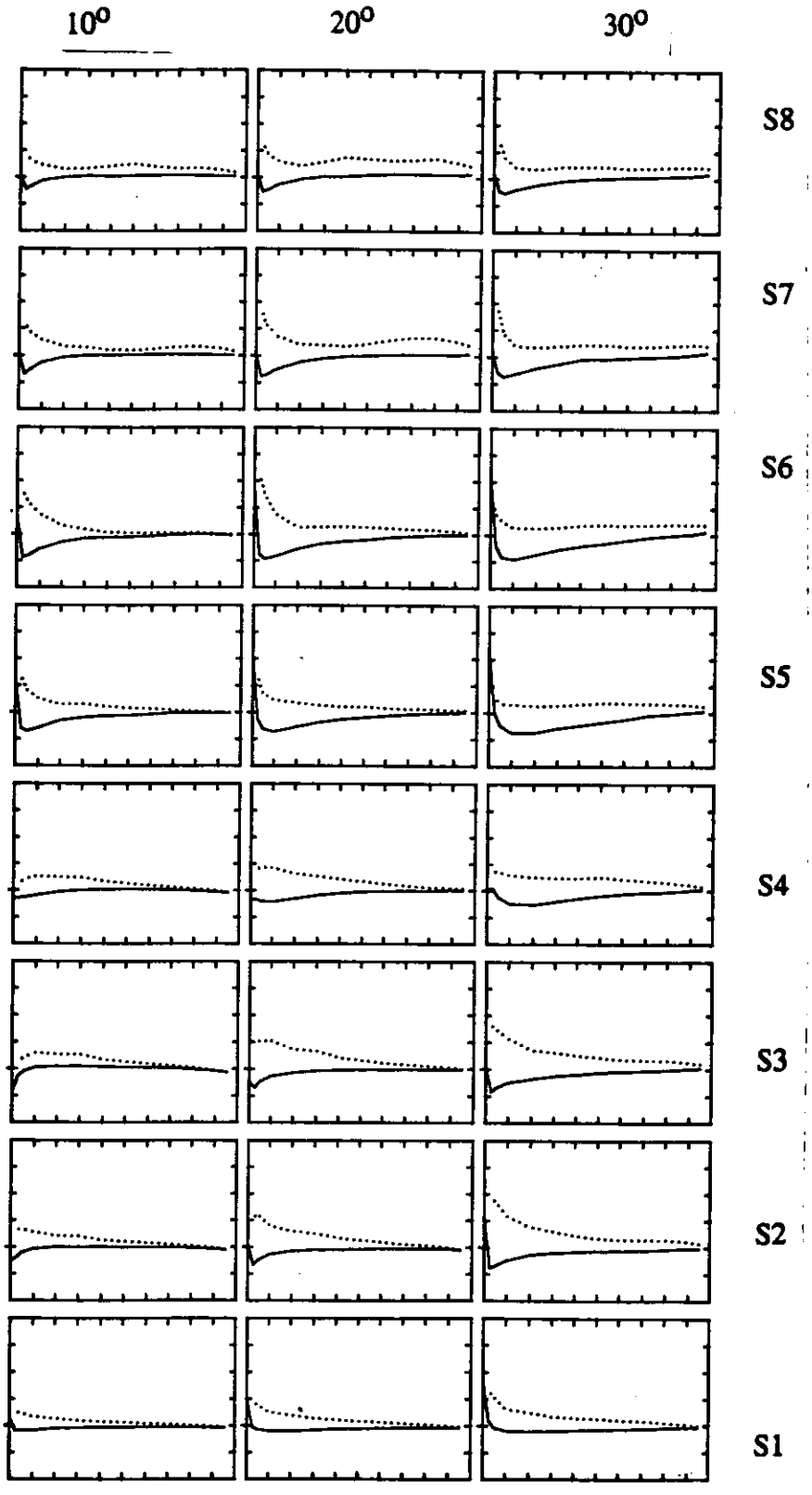



Figure 38b Chordwise pressure distribution at 8 spanwise positions for Rudder No. 2 at a drift angle of +7.5° and J of 0.51

$\Delta C_p = 5$, min $C_p = +10$, max $C_p = -20$

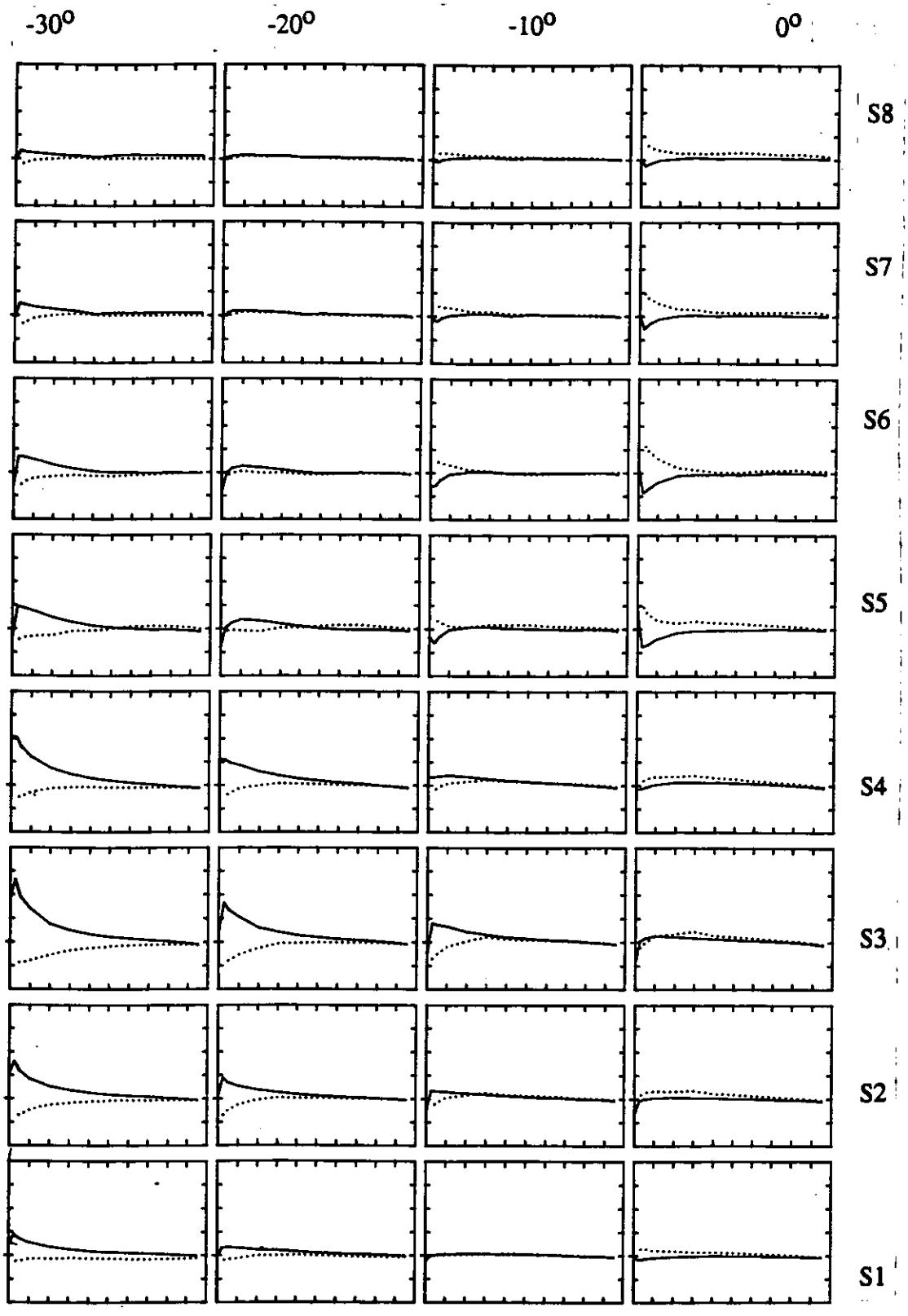



Figure 39a Chordwise pressure distribution at 8 spanwise positions for Rudder No. 2 at a drift angle of +15° and J of 0.51

$\Delta C_p = 5$, min $C_p = +10$, max $C_p = -20$

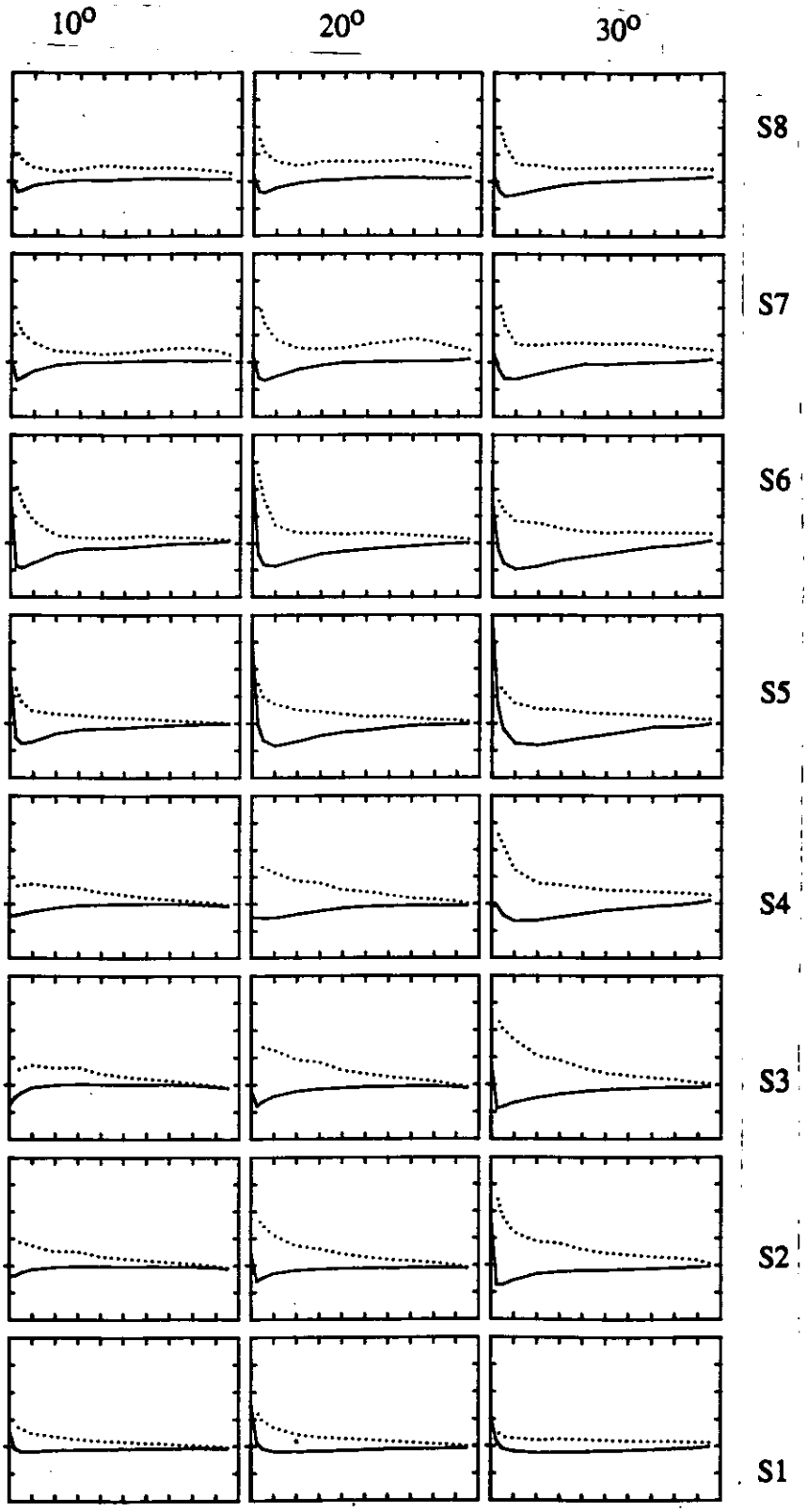



Figure 39b Chordwise pressure distribution at 8 spanwise positions for Rudder No. 2 at a drift angle of +15° and J of 0.51

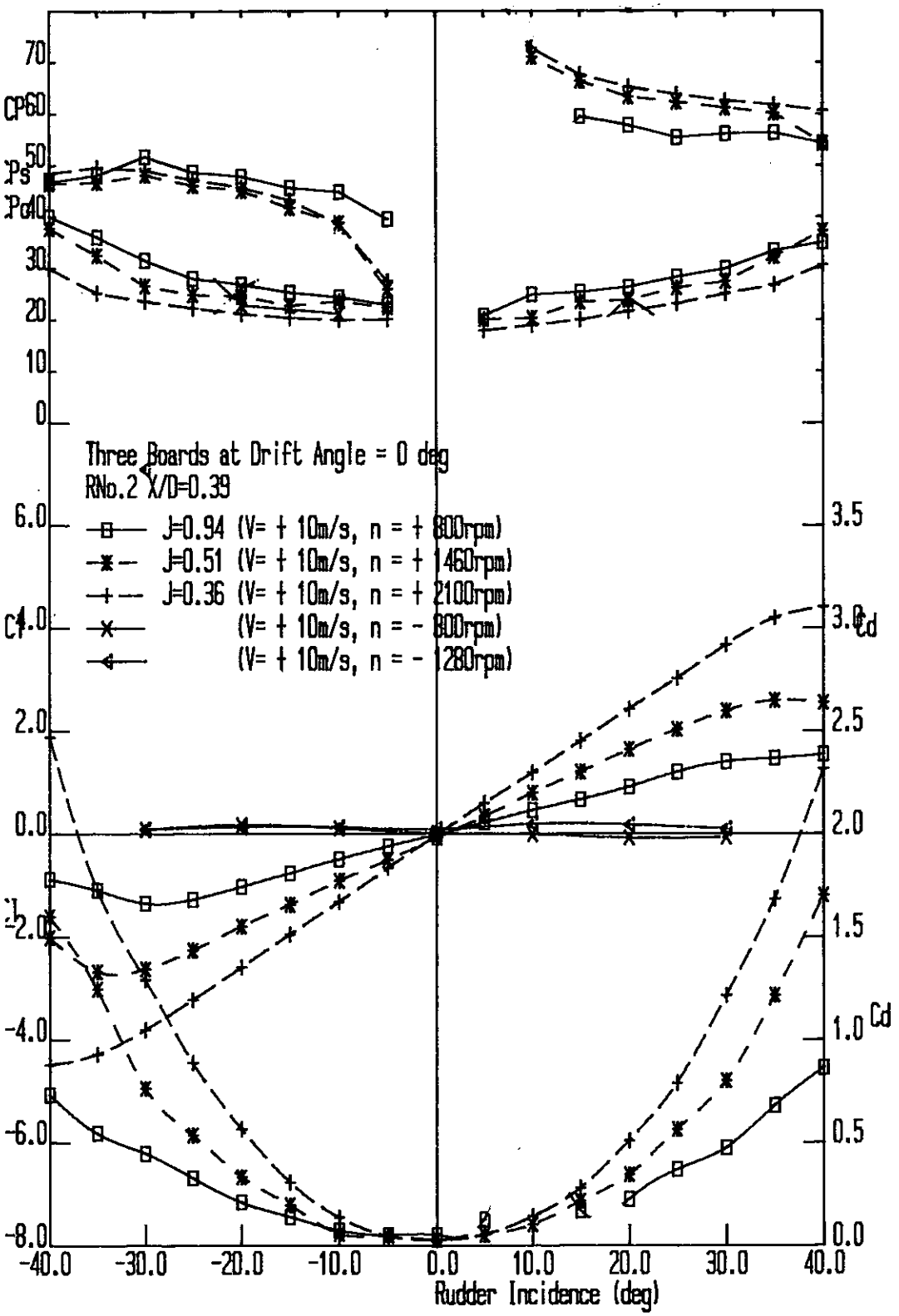



Figure 40 Effect of Advance ratio on the performance of Rudder No. 2 downstream of full centre-board at zero drift angle

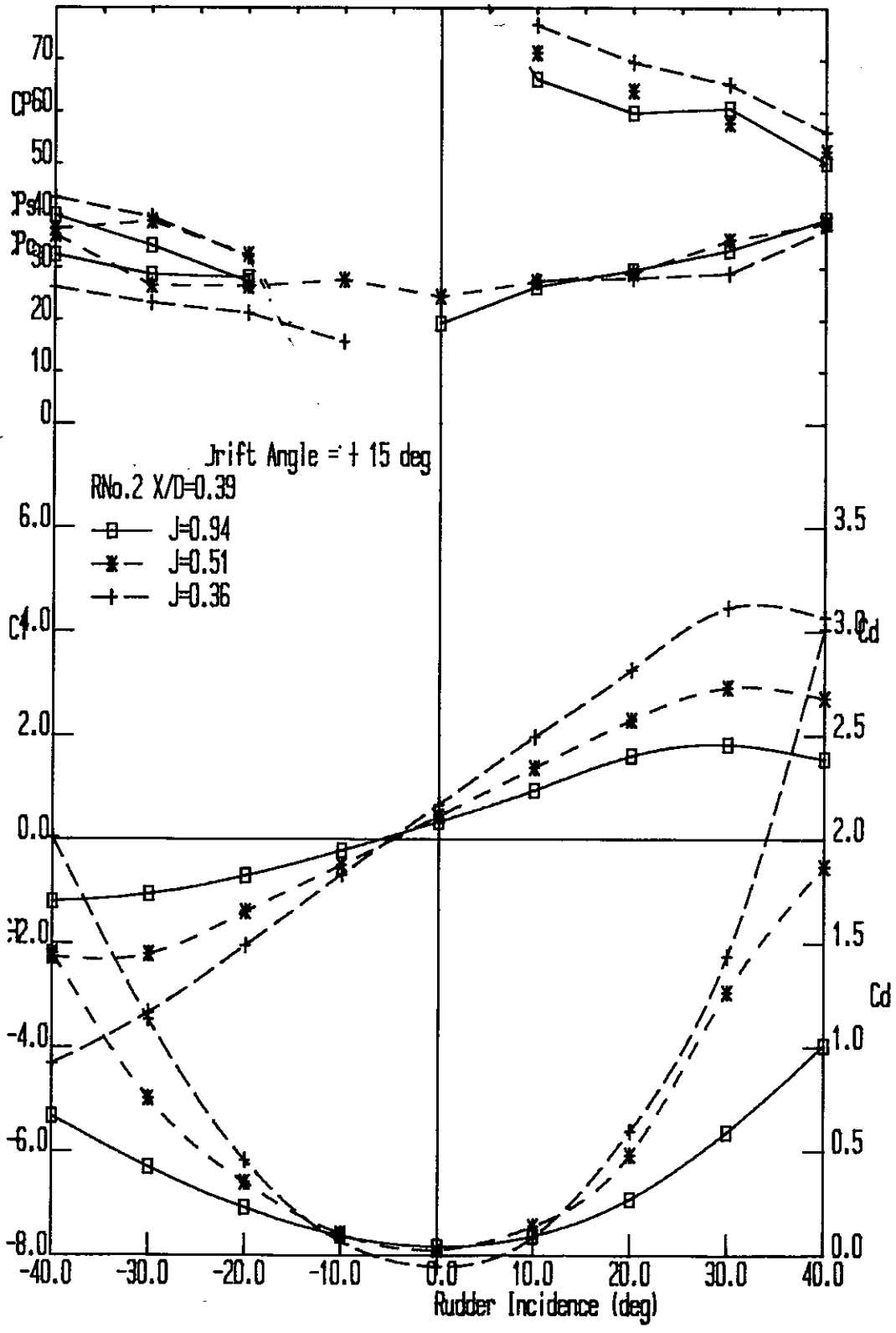



Figure 41 Effect of Advance ratio on the performance of Rudder No. 2 downstream of short centre-board at a drift angle of +15°

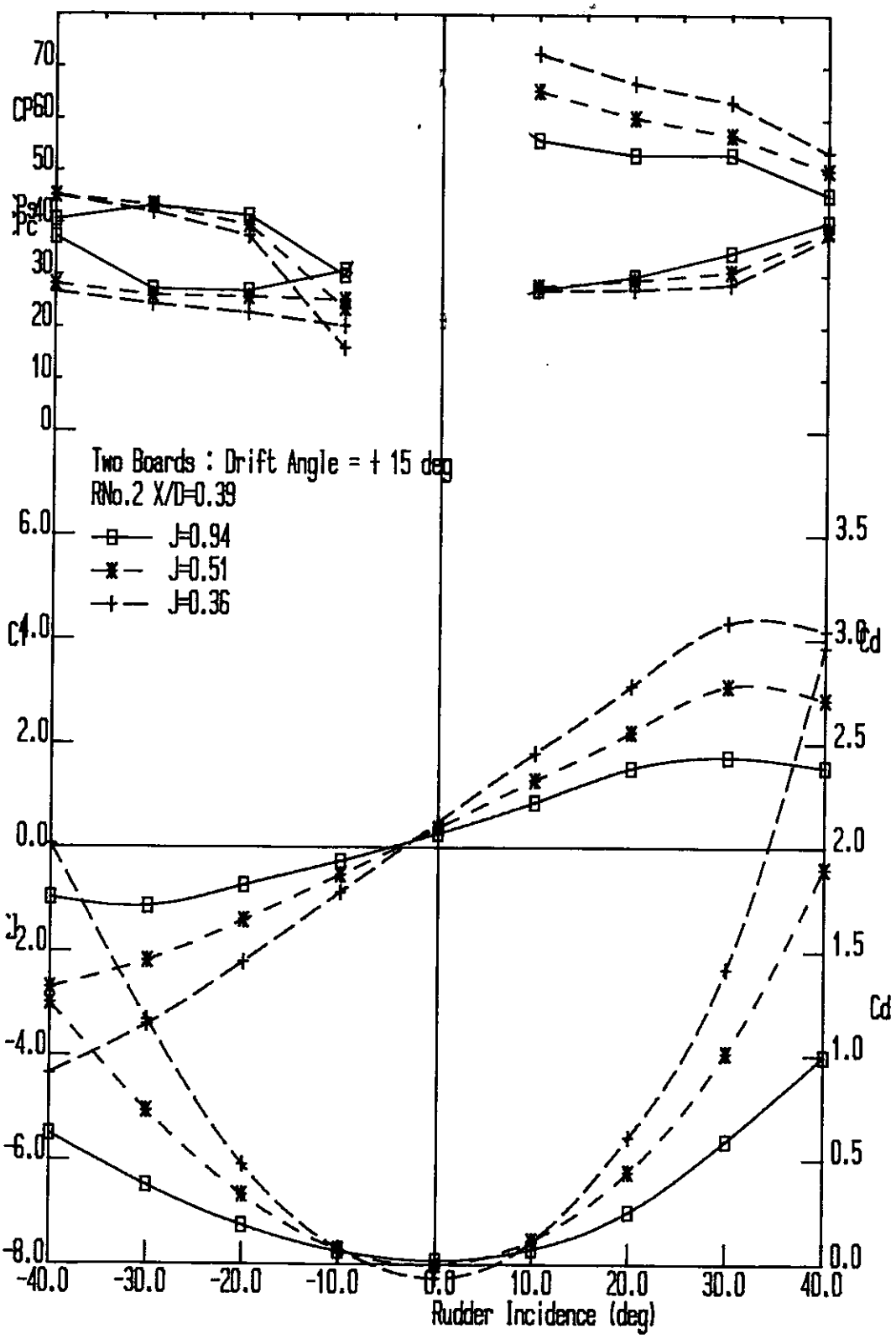



Figure 42 Effect of Advance ratio on the performance of Rudder No. 2 downstream of mid centre-board at a drift angle of +15°

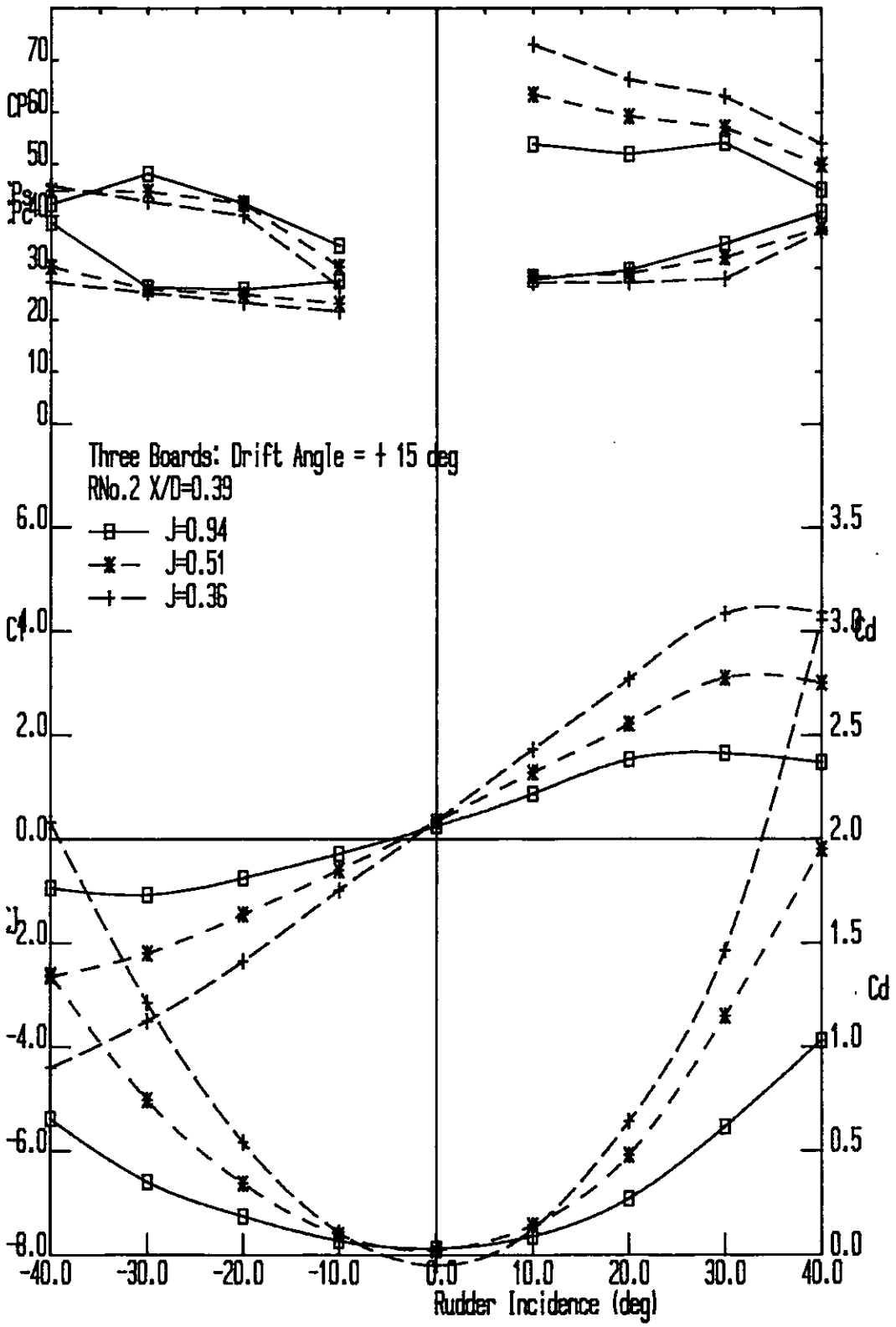



Figure 43 Effect of Advance ratio on the performance of Rudder No. 2 downstream of full centre-board at a drift angle of +15°

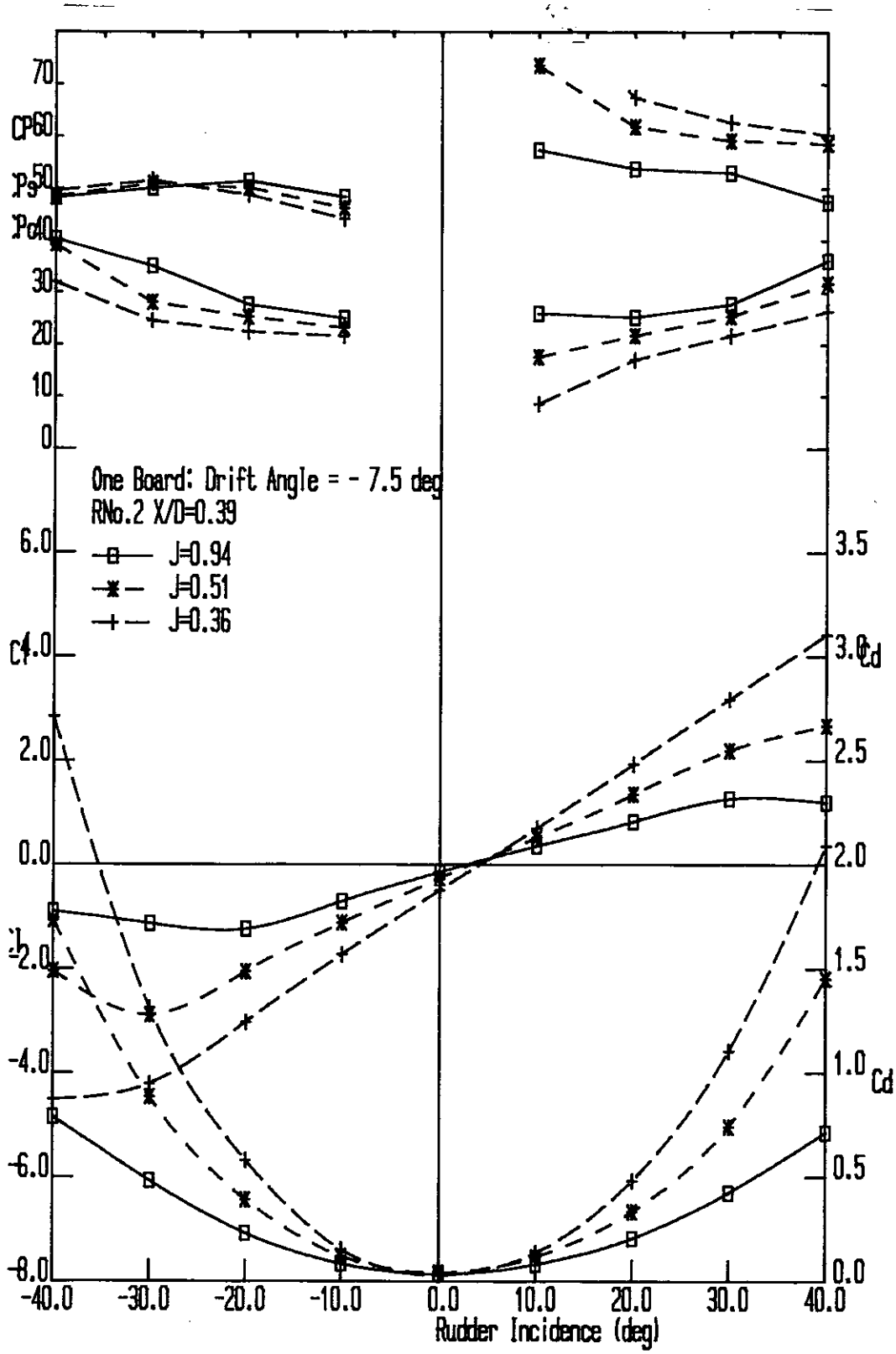



Figure 44 Effect of Advance ratio on the performance of Rudder No. 2 downstream of short centre-board at a drift angle of -7.5°

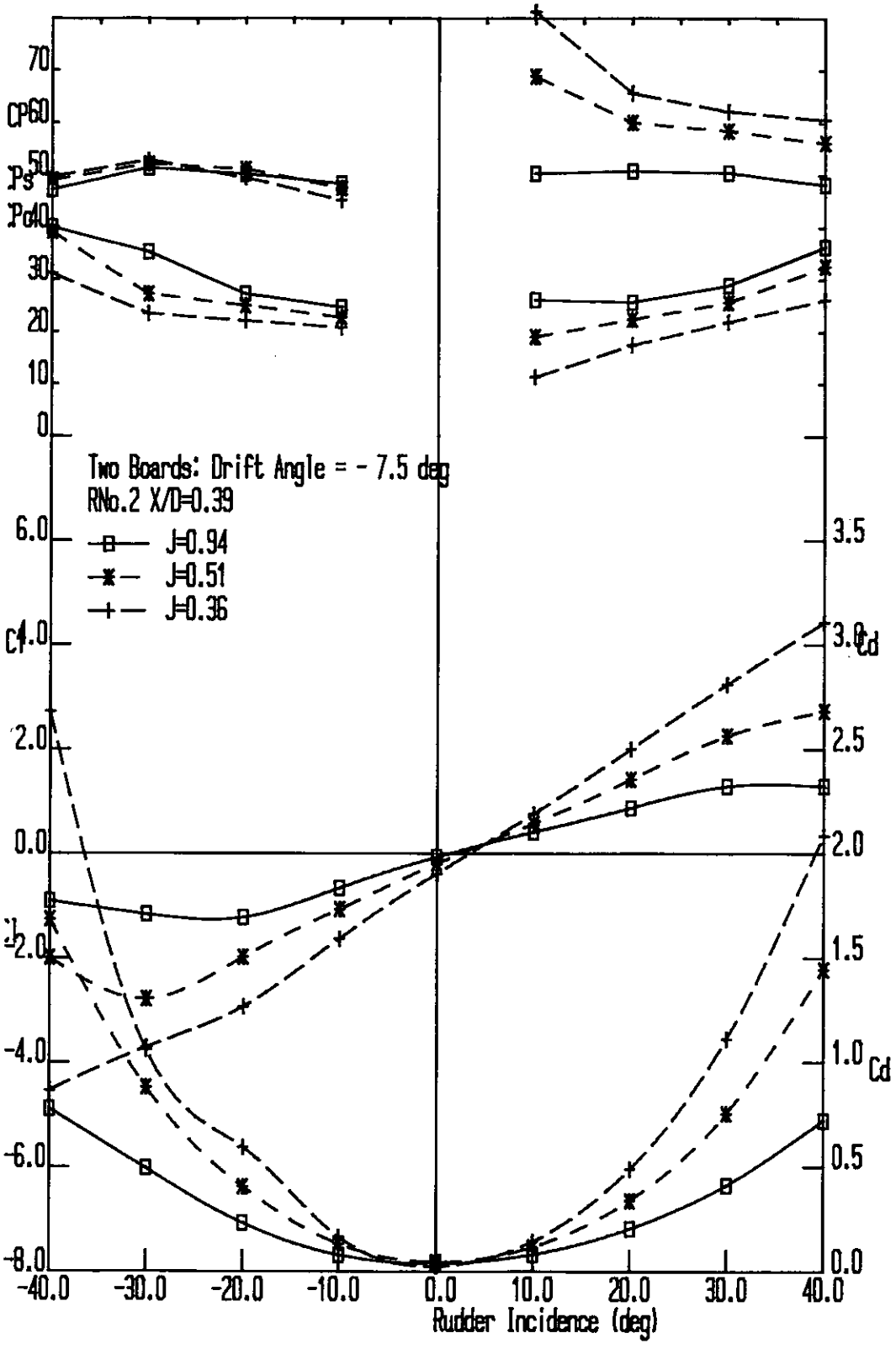



Figure 45 Effect of Advance ratio on the performance of Rudder No. 2 downstream of mid centre-board at a drift angle of -7.5°

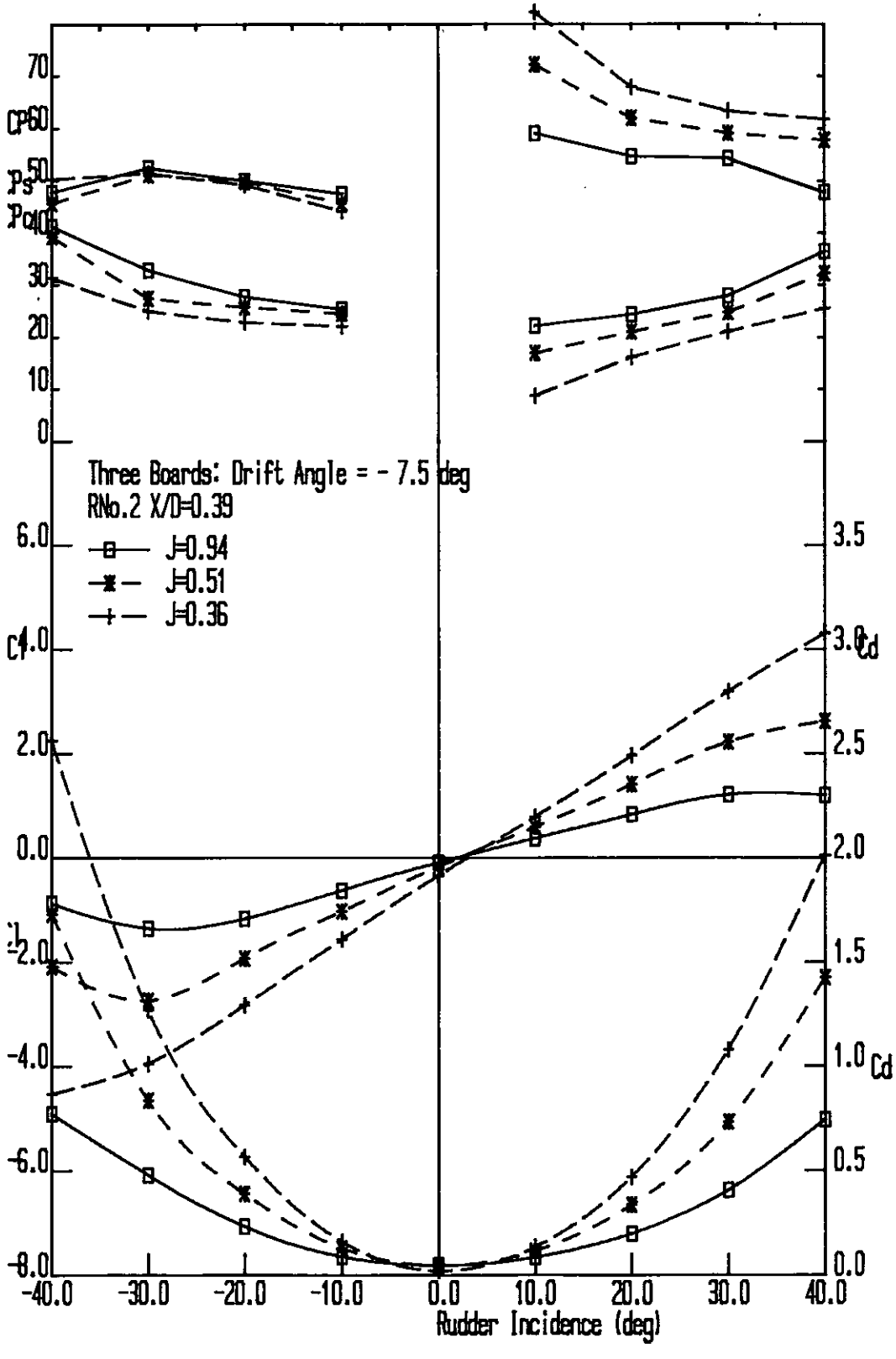



Figure 46 Effect of Advance ratio on the performance of Rudder No. 2 downstream of full centre-board at a drift angle of -7.5°

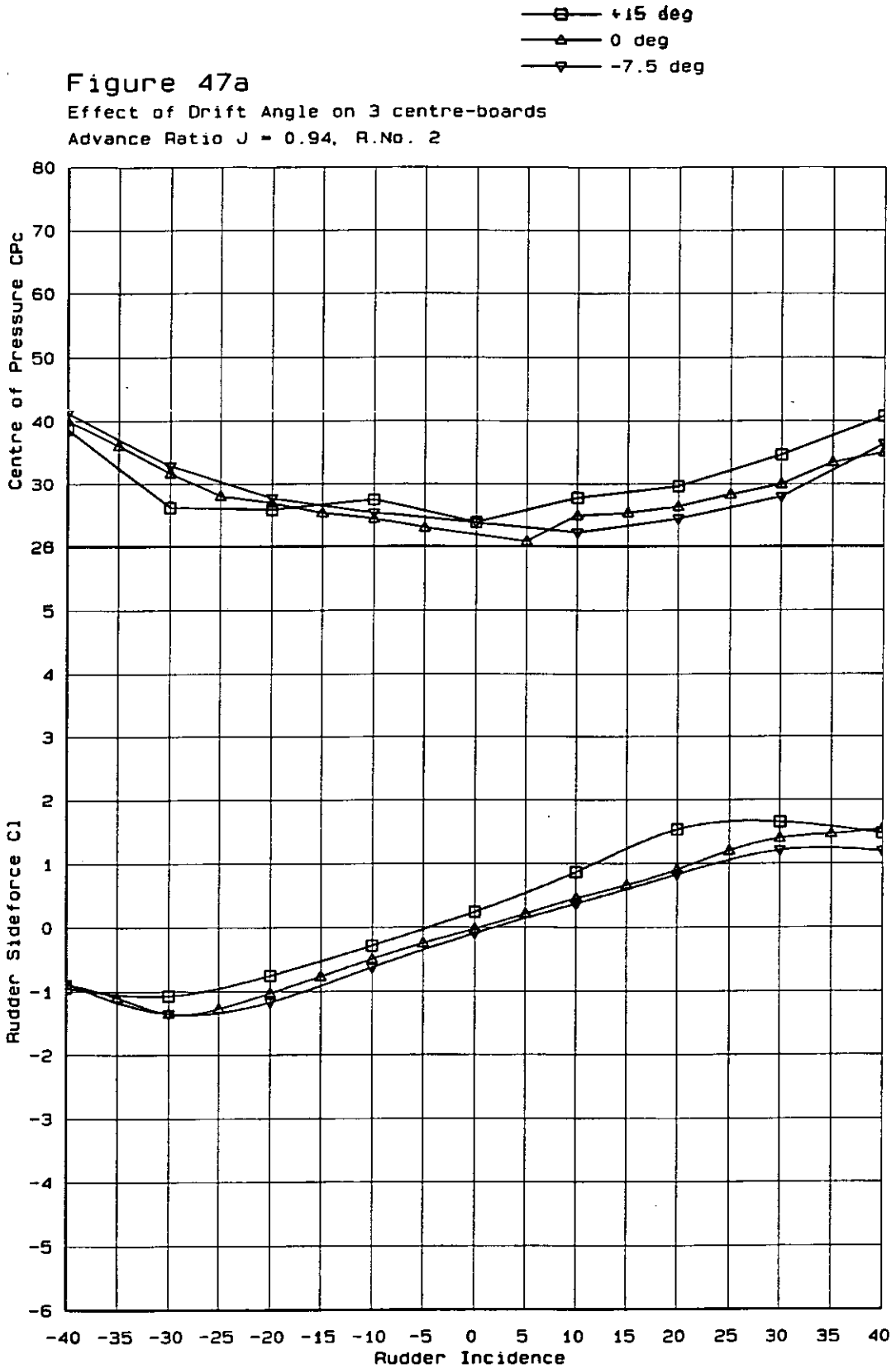



Figure 47a Effect of drift angle on the performance of Rudder No.2 at an advance ratio J of 0.94 downstream of full centre-board: Lift and CPc

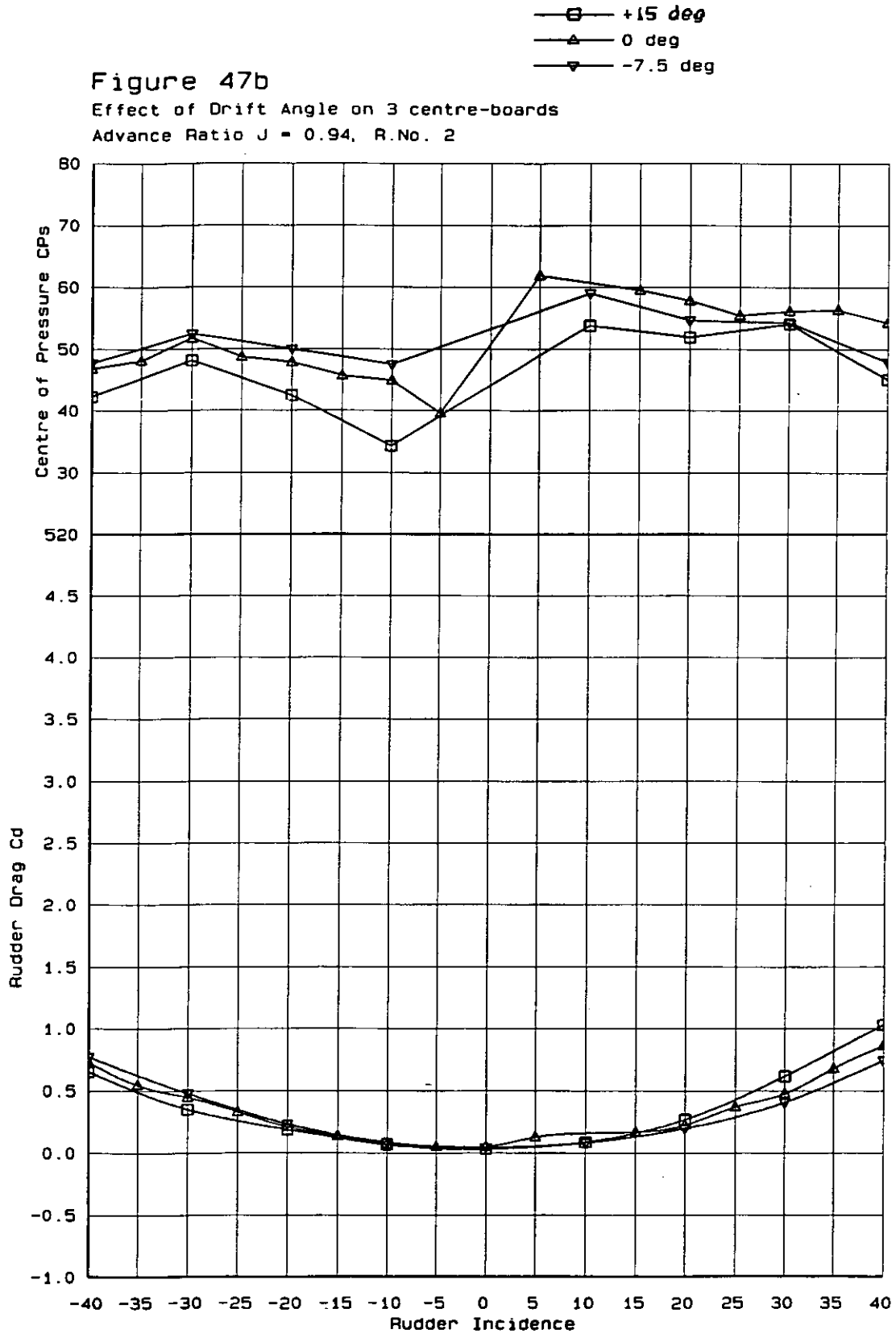



Figure 47b Effect of drift angle on the performance of Rudder No.2 at an advance ratio J of 0.94 downstream of full centre-board: Drag and CPs

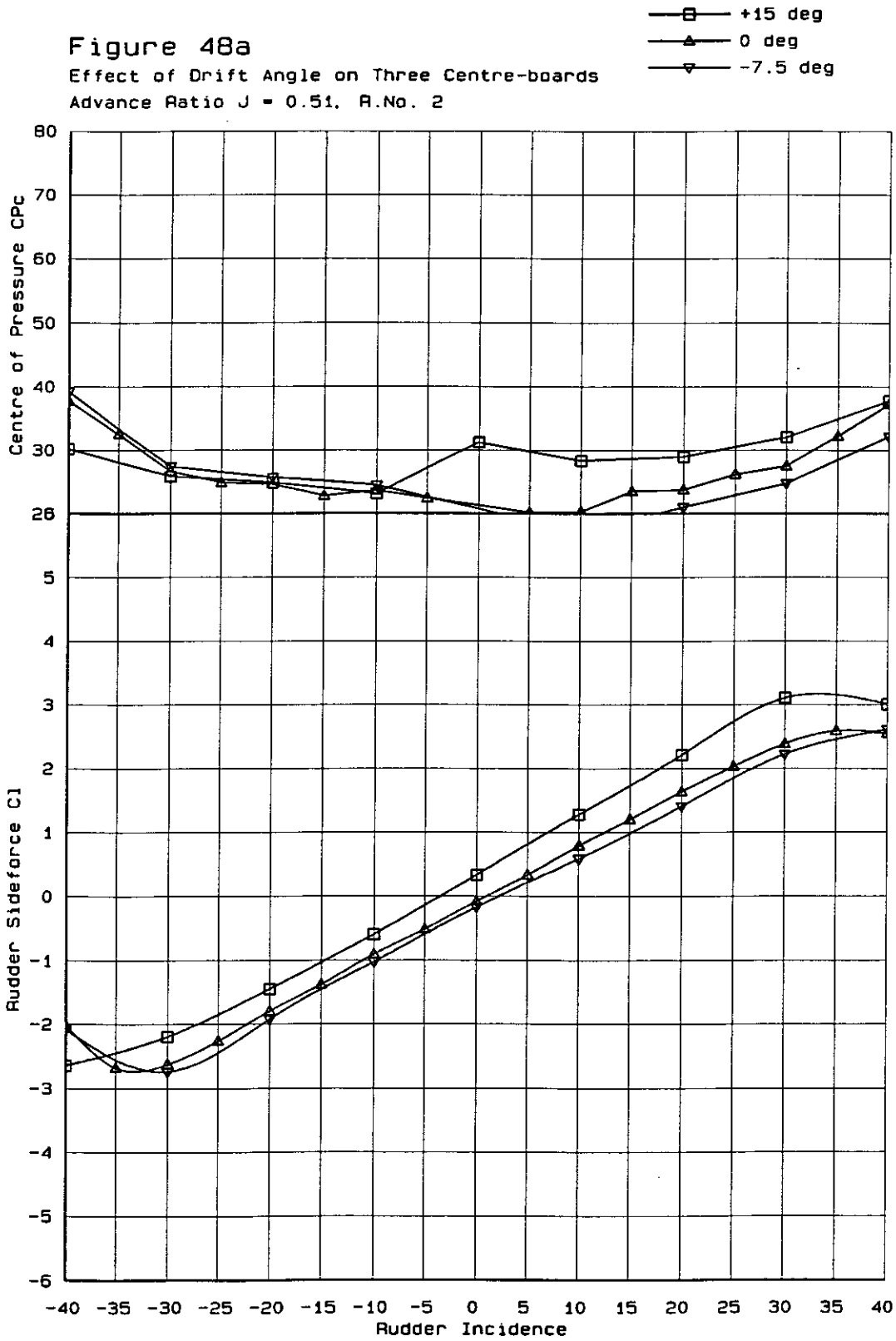



Figure 48a Effect of drift angle on the performance of Rudder No.2 at an advance ratio J of 0.51 downstream of full centre-board: Lift and CPc

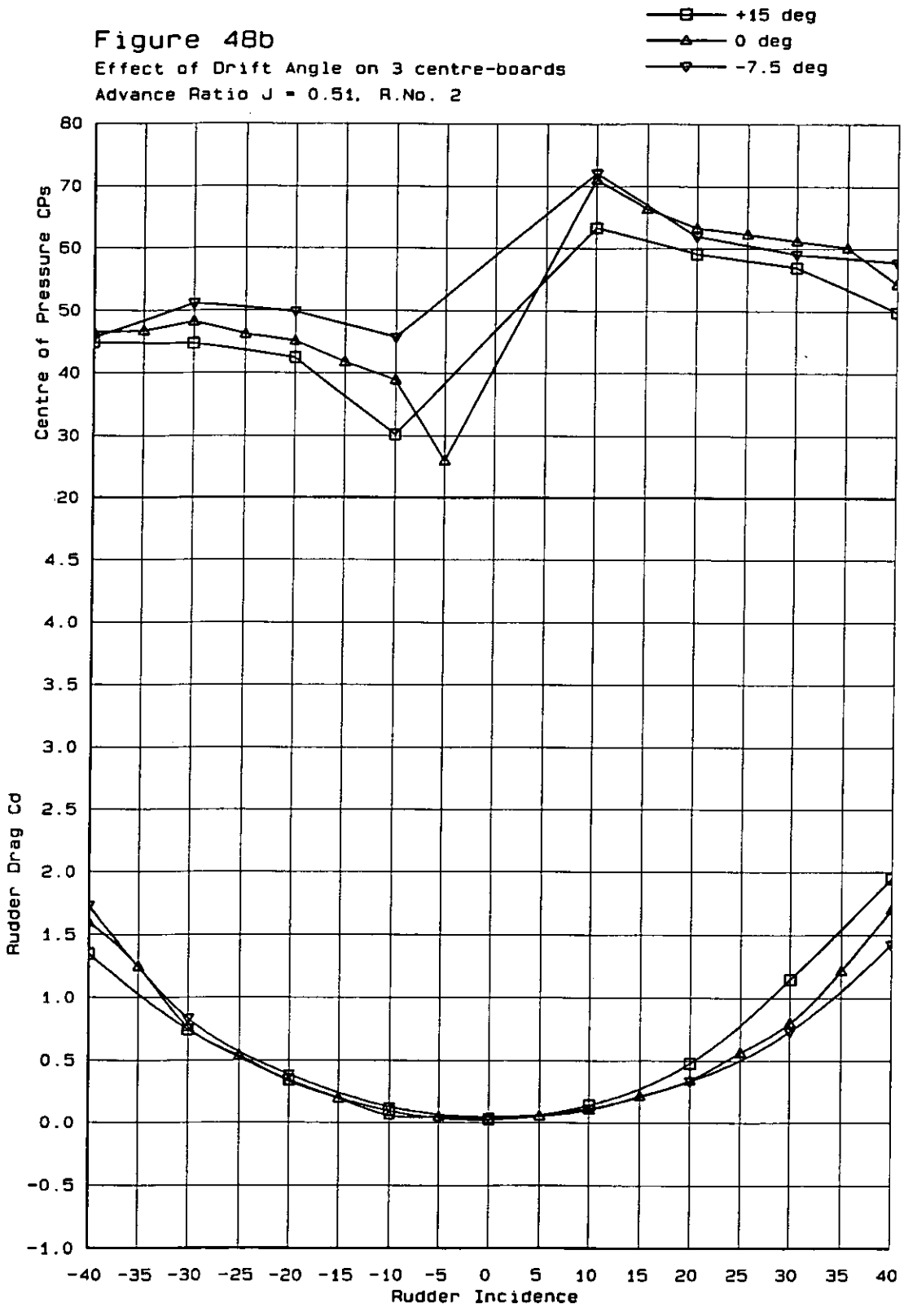



Figure 48b Effect of drift angle on the performance of Rudder No.2 at an advance ratio J of 0.51 downstream of full centre-board: Drag and CPs

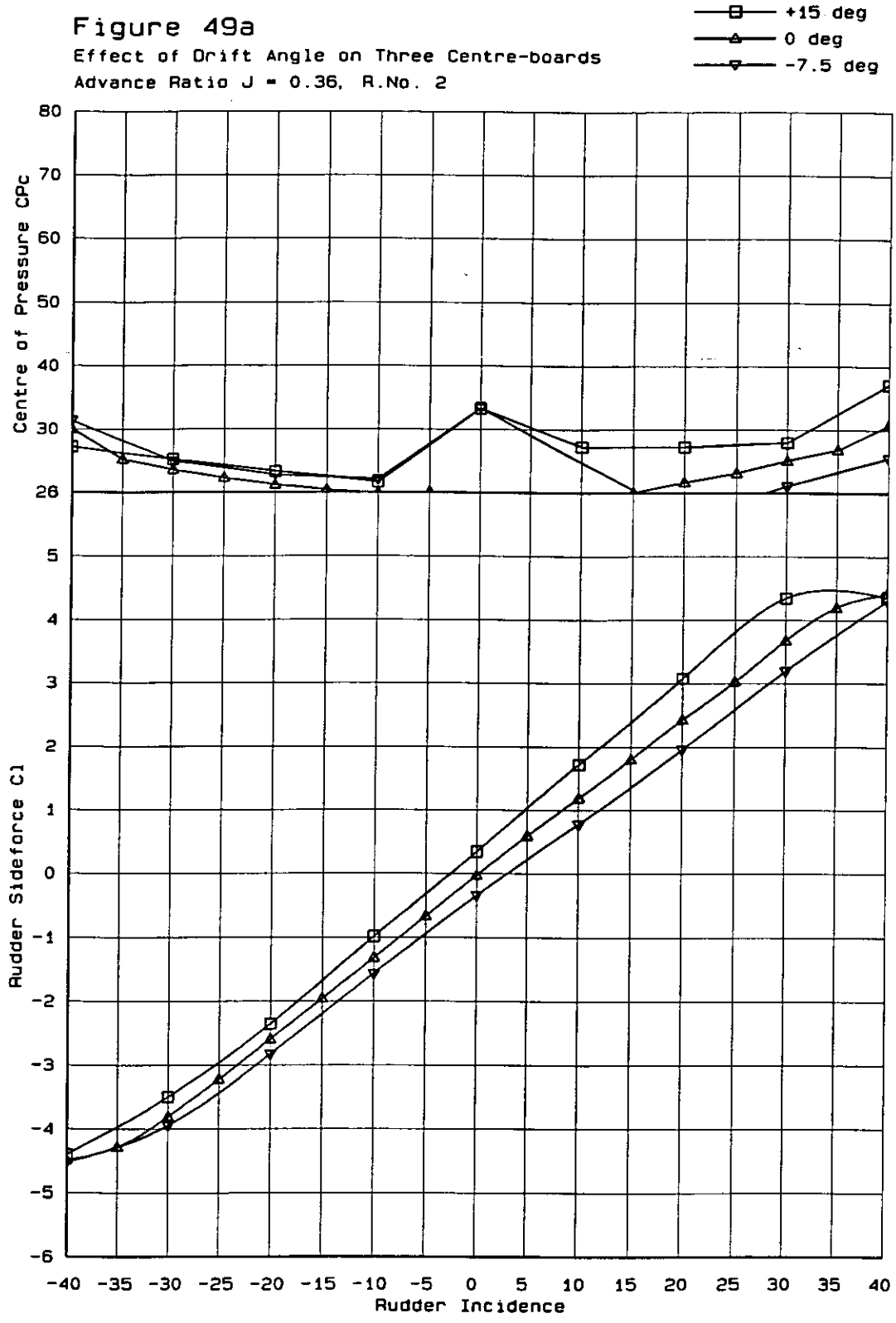



Figure 49a Effect of drift angle on the performance of Rudder No.2 at an advance ratio J of 0.36 downstream of full centre-board: Lift and CPc

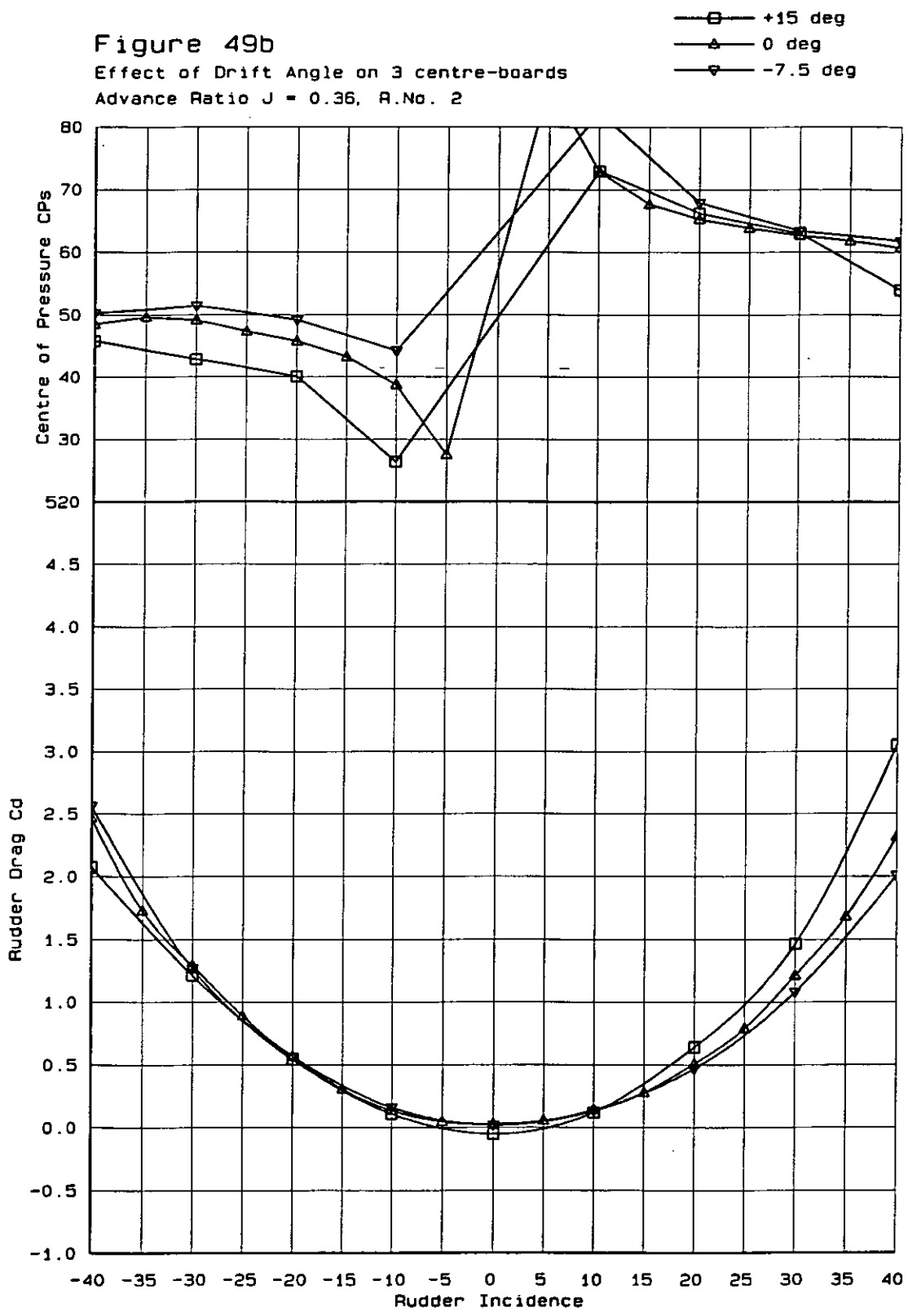



Figure 49b Effect of drift angle on the performance of Rudder No.2 at an advance ratio J of 0.36 downstream of full centre-board: Drag and CPs

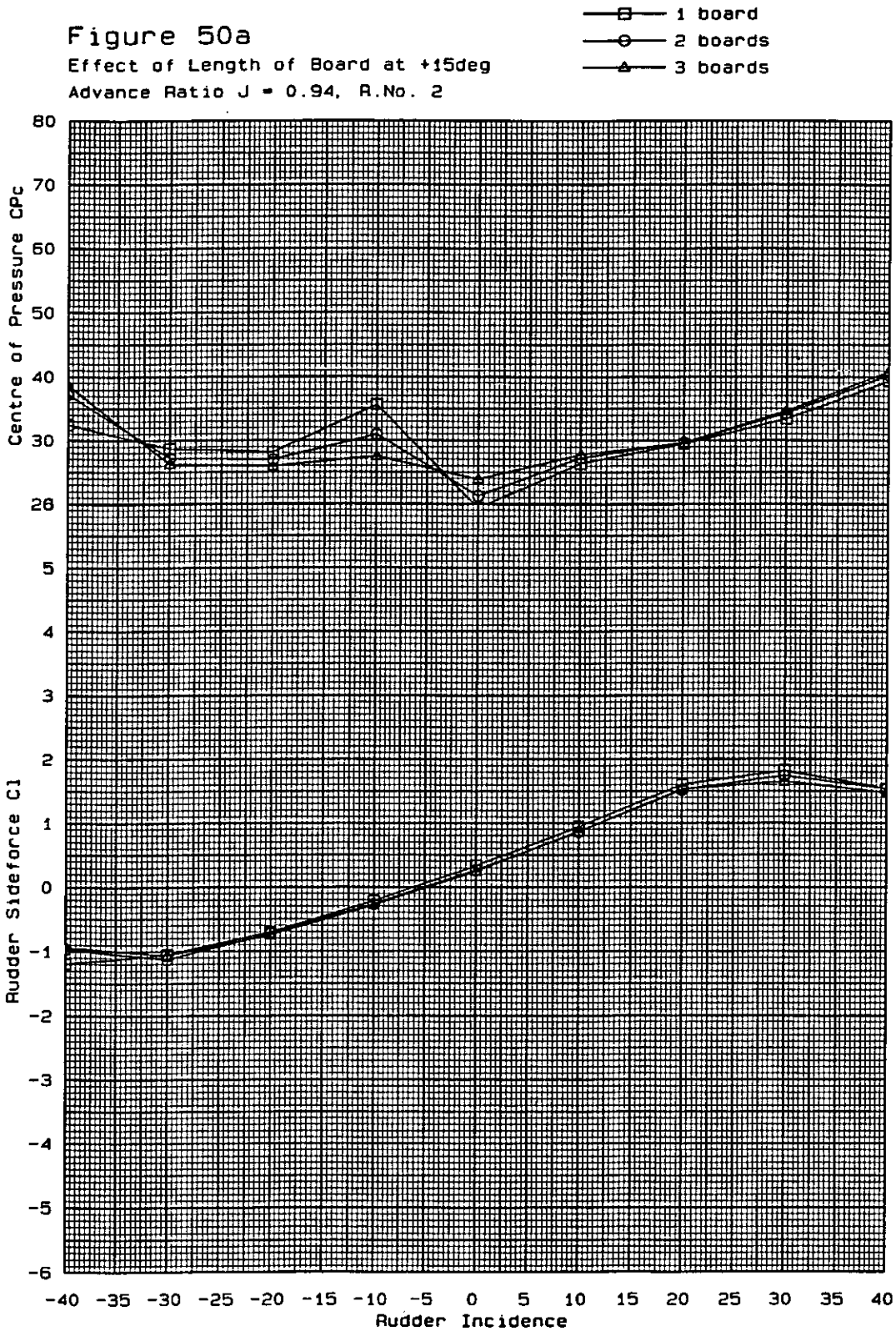



Figure 50a Effect of length of centre-board on the performance of Rudder No.2 at an advance ratio J of 0.94 at a drift angle of -7.5°: Lift and CPc

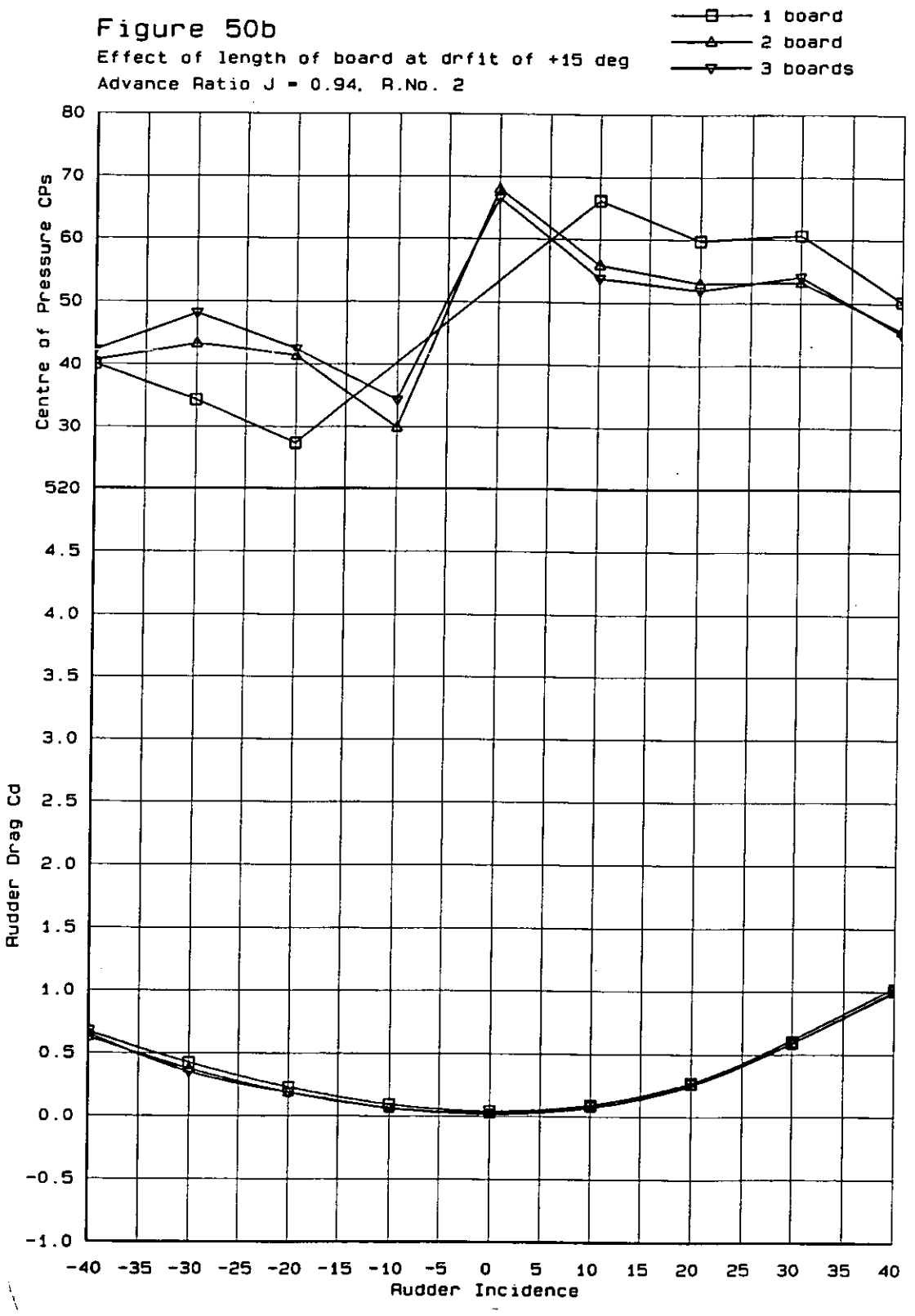



Figure 50b Effect of length of centre-board on the performance of Rudder No.2 at an advance ratio J of 0.94 at a drift angle of -7.5°: Drag and CPs

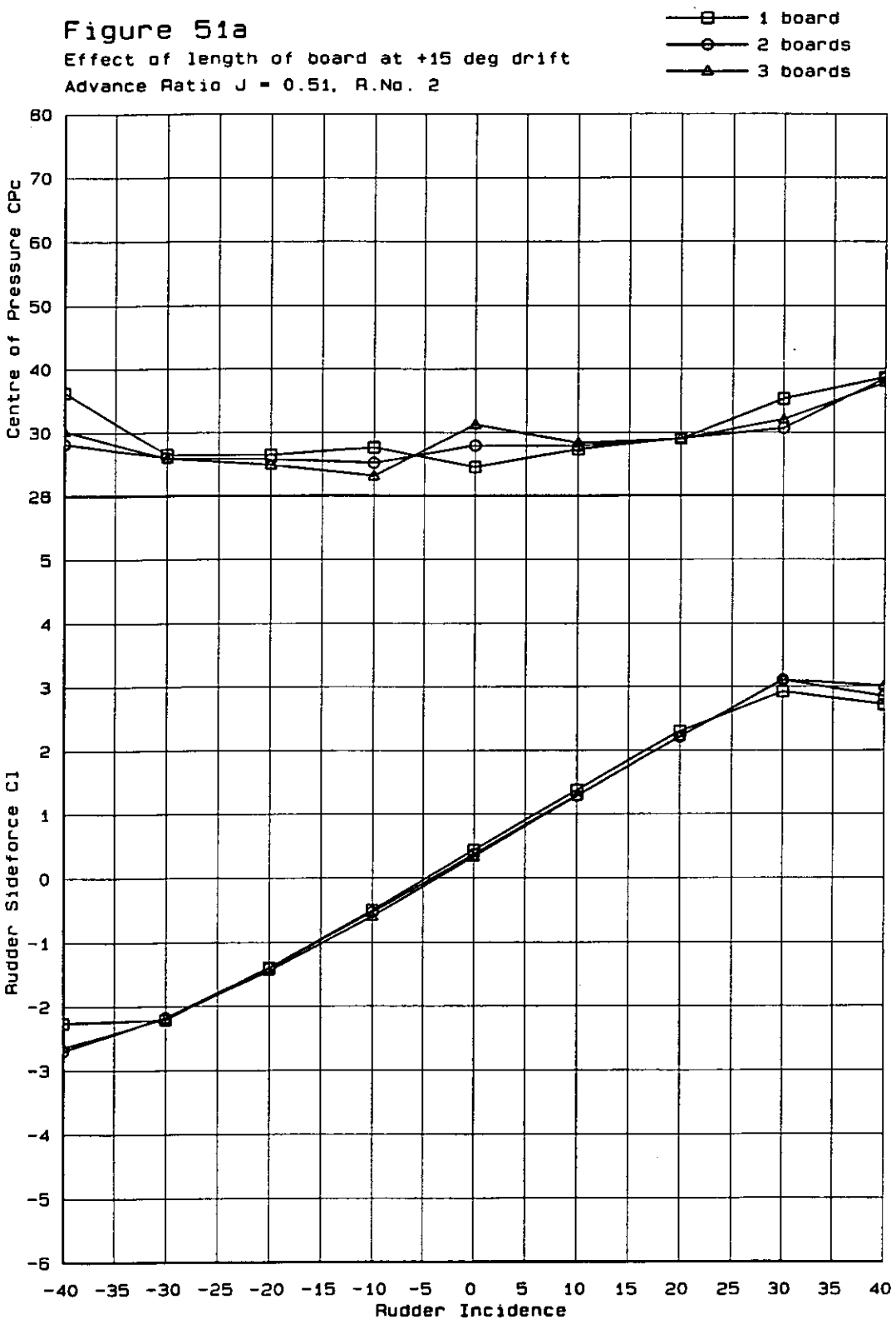



Figure 51a Effect of length of centre-board on the performance of Rudder No.2 at an advance ratio J of 0.51 at a drift angle of -7.5°: Lift and CPc

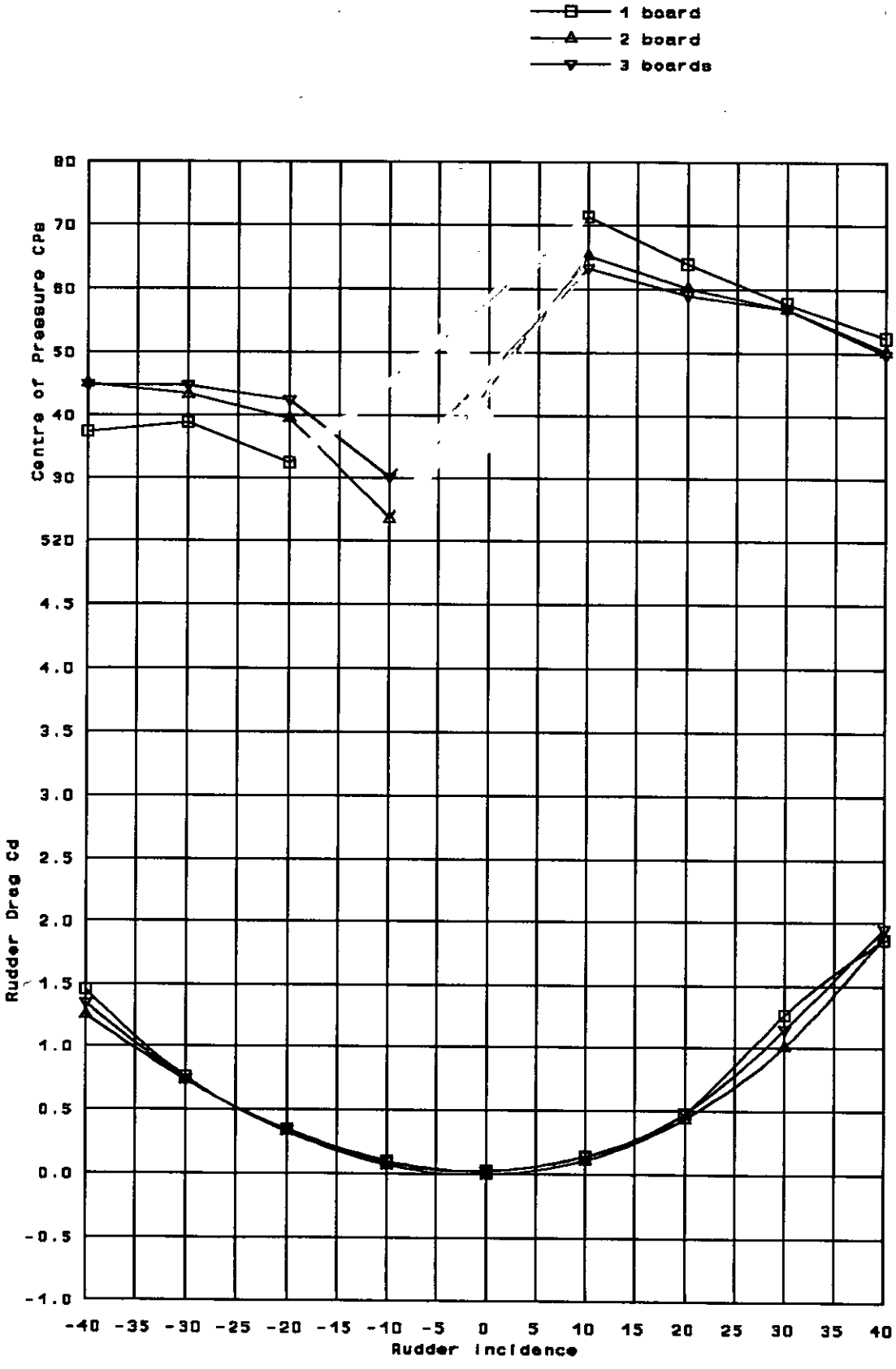



Figure 51b Effect of length of centre-board on the performance of Rudder No.2 at an advance ratio J of 0.51 at a drift angle of -7.5°: Drag and CPs

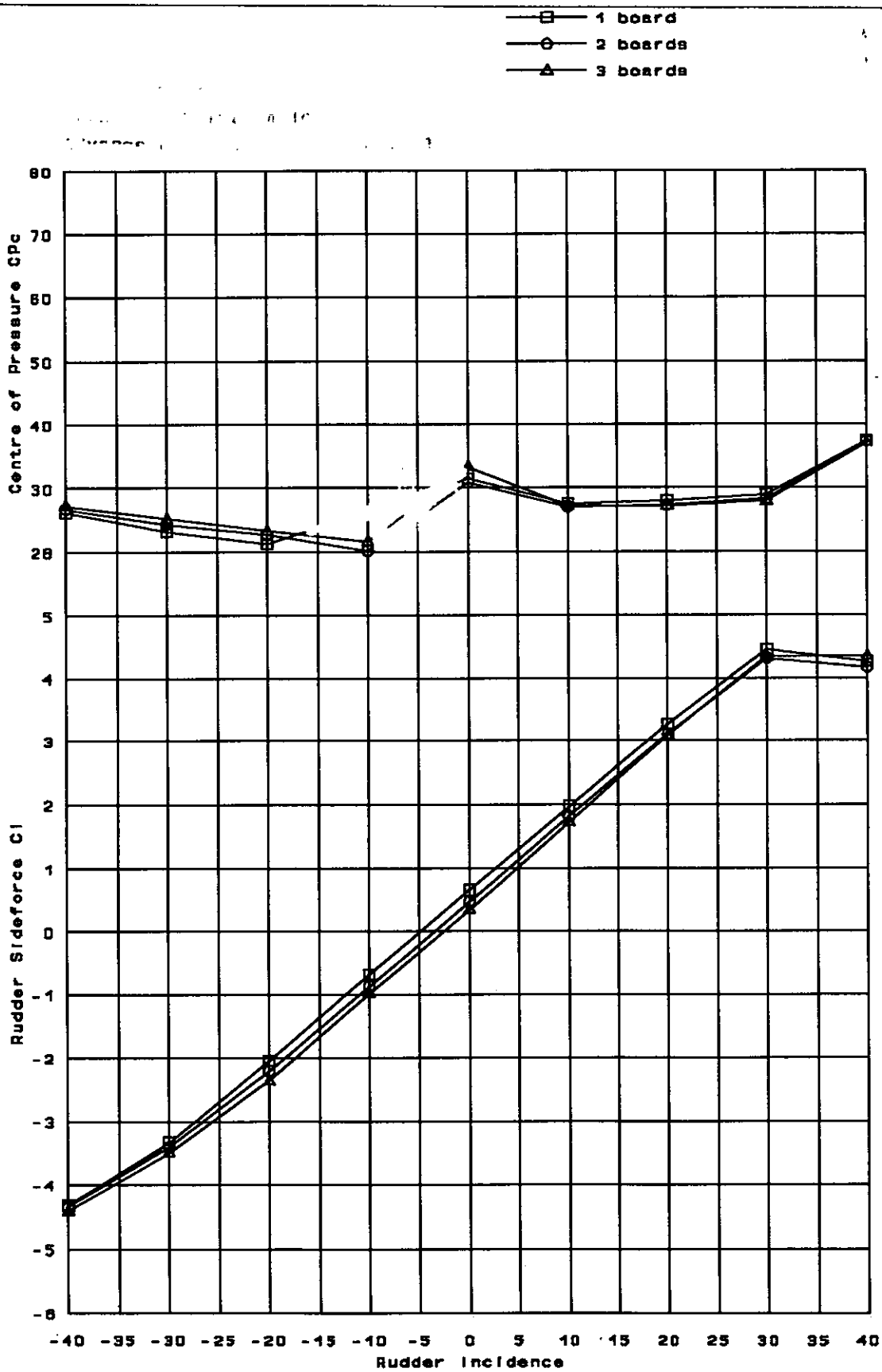



Figure 52a Effect of length of centre-board on the performance of Rudder No.2 at an advance ratio J of 0.36 at a drift angle of -7.5°: lift and CPc

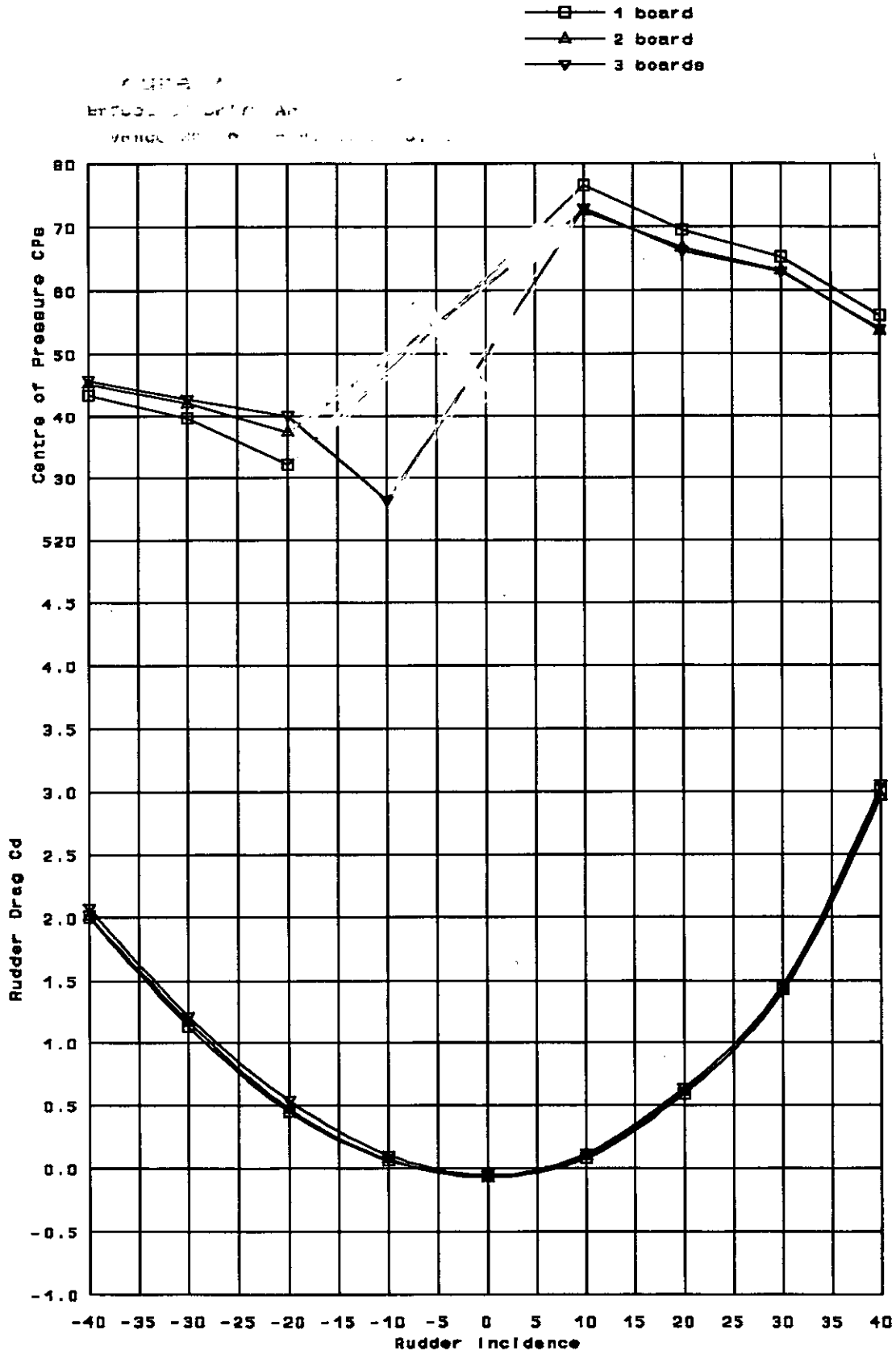



Figure 52b Effect of length of centre-board on the performance of Rudder No.2 at an advance ratio J of 0.36 at a drift angle of -7.5°: Drag and CPs

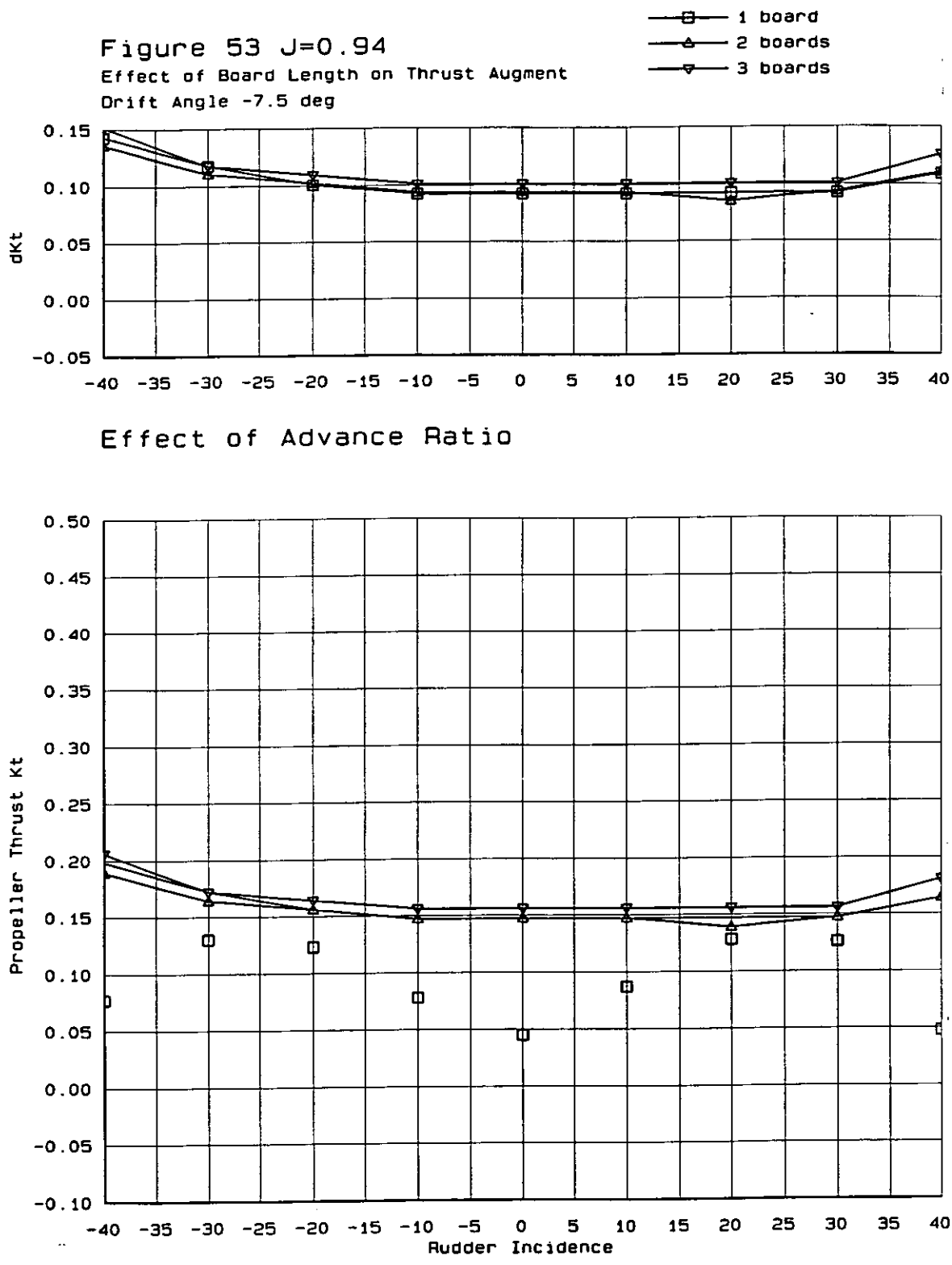
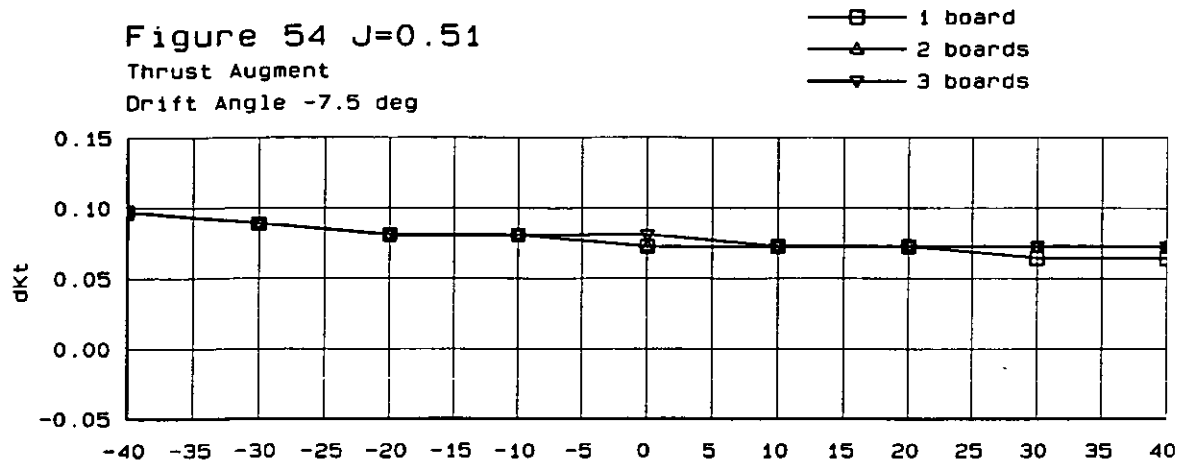



Figure 53 Effect of length of centre board on propeller thrust and thrust augment at an advance ratio J of 0.94 and drift angle of -7.5°



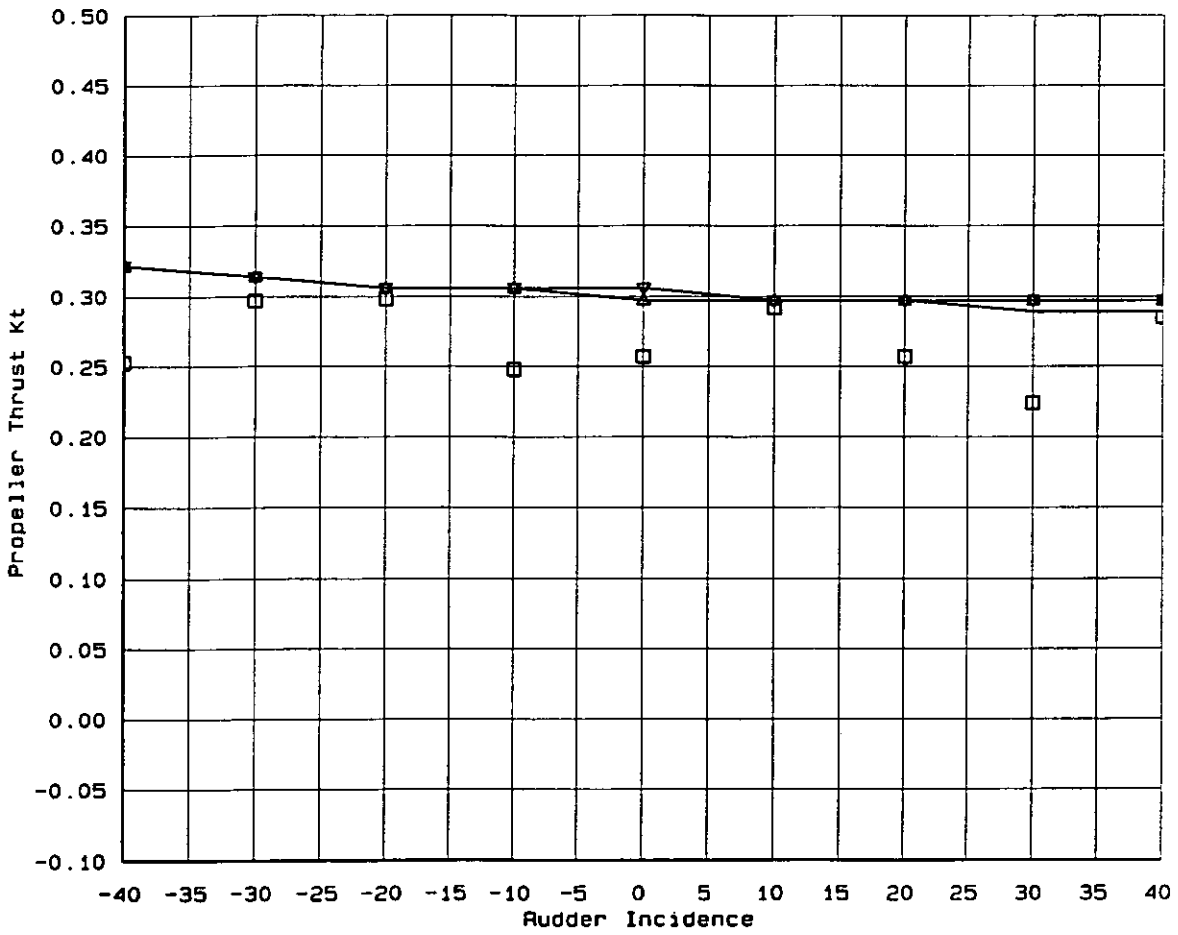




Figure 54 Effect of length of centre board on propeller thrust and thrust augment at an advance ratio J of 0.51 and drift angle of -7.5°

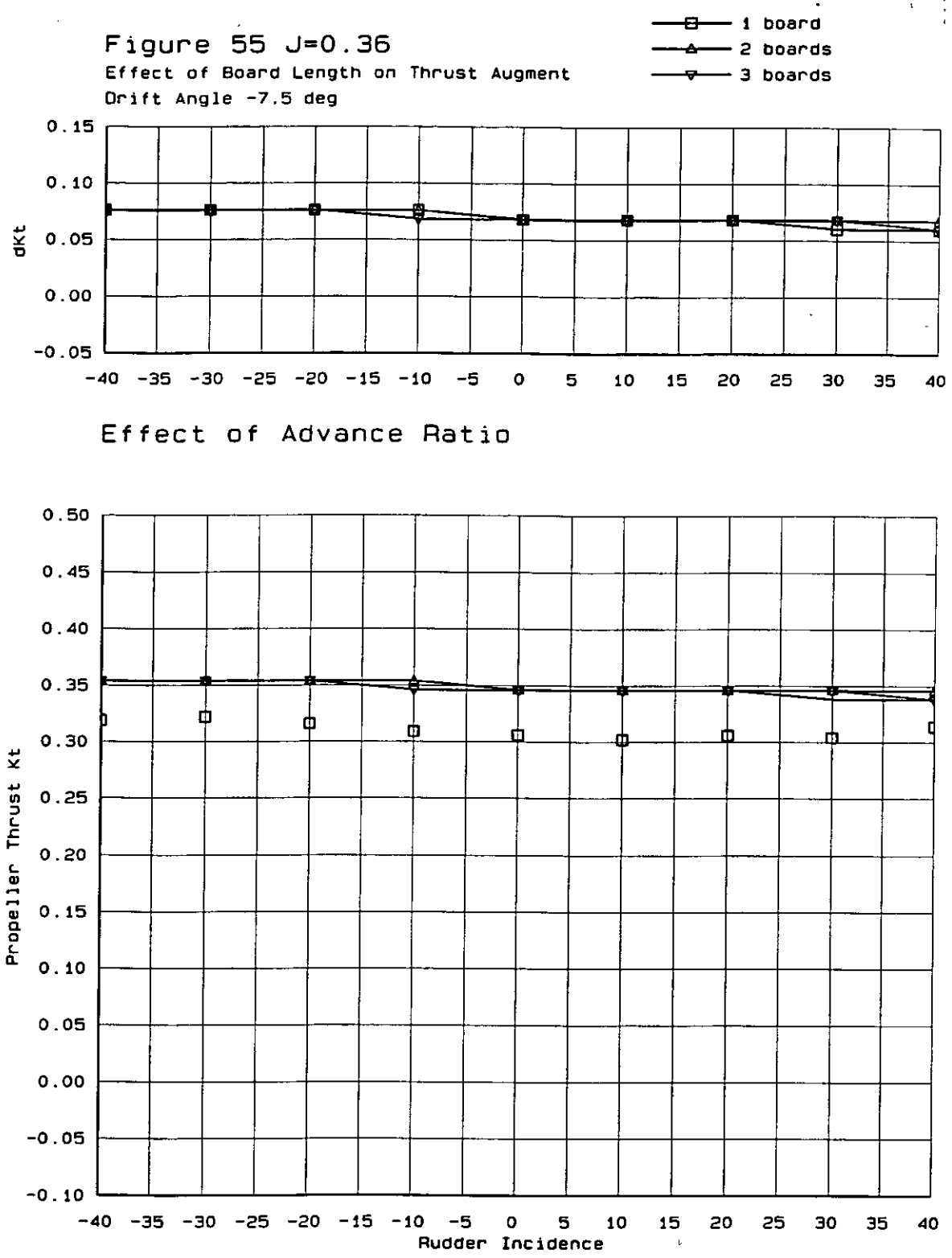



Figure 55 Effect of length of centre board on propeller thrust and thrust augment at an advance ratio J of 0.36 and drift angle of -7.5°

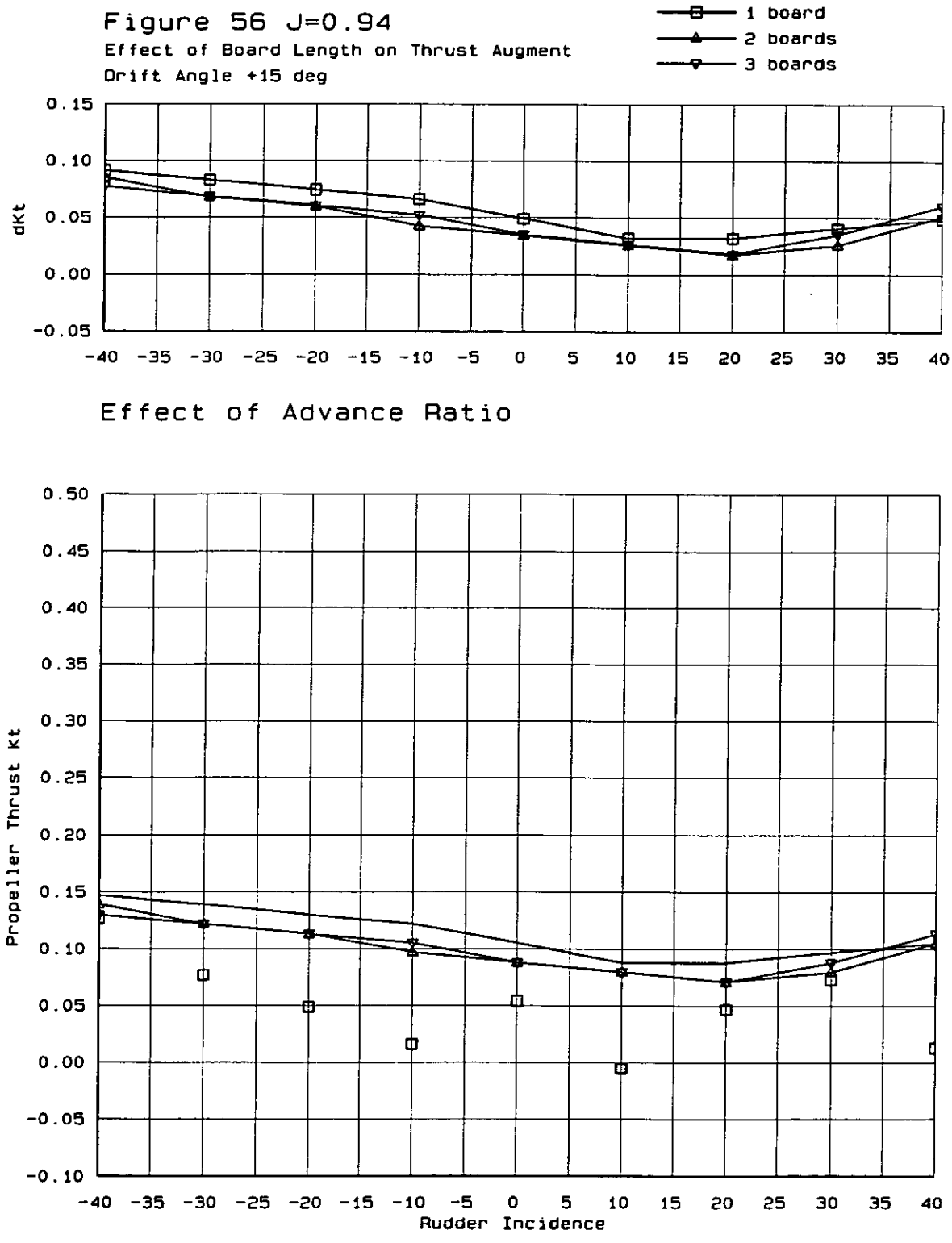



Figure 56 Effect of length of centre board on propeller thrust and thrust augment at an advance ratio J of 0.94 and drift angle of +15°

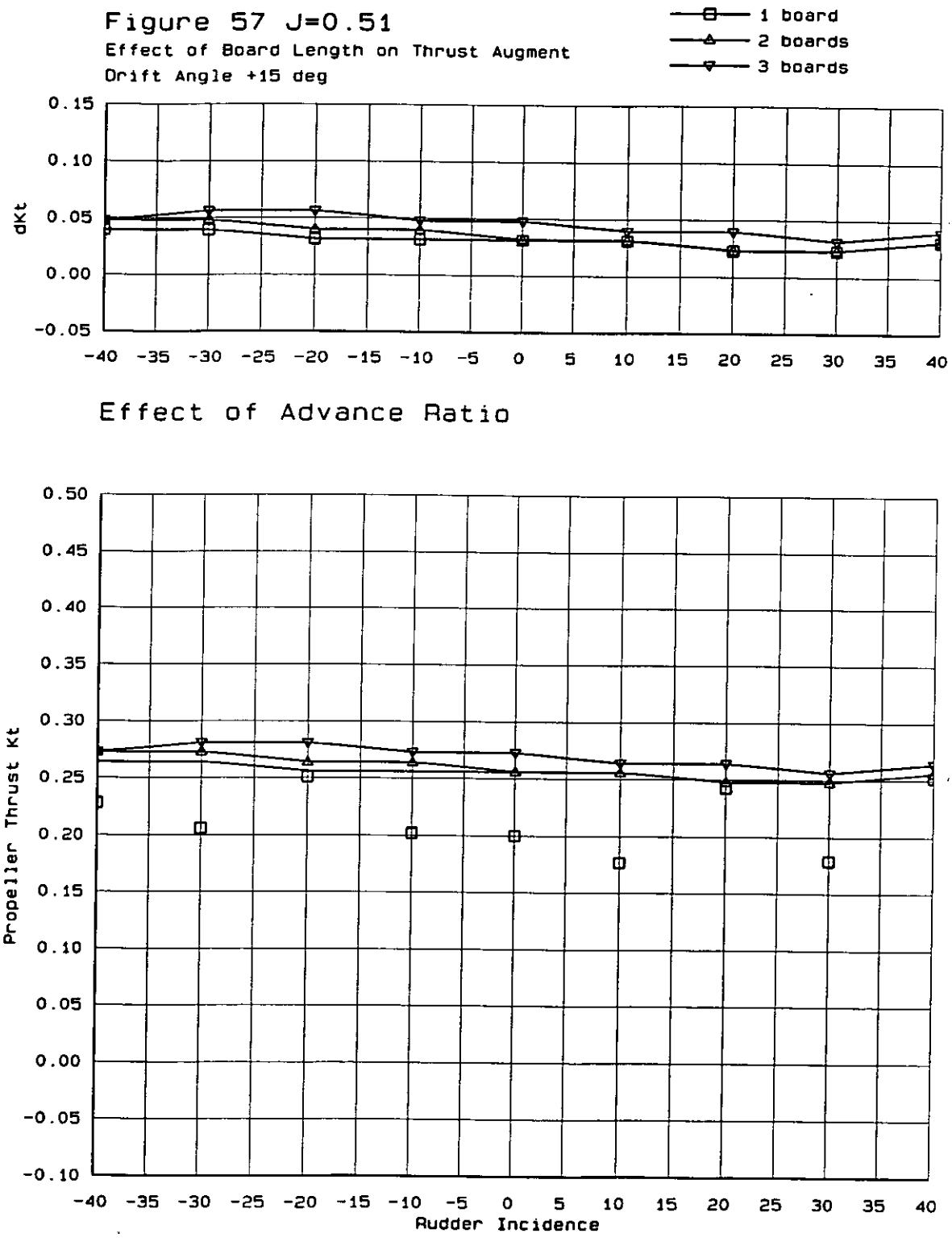



Figure 57 Effect of length of centre board on propeller thrust and thrust augment at an advance ratio J of 0.51 and drift angle of +15°

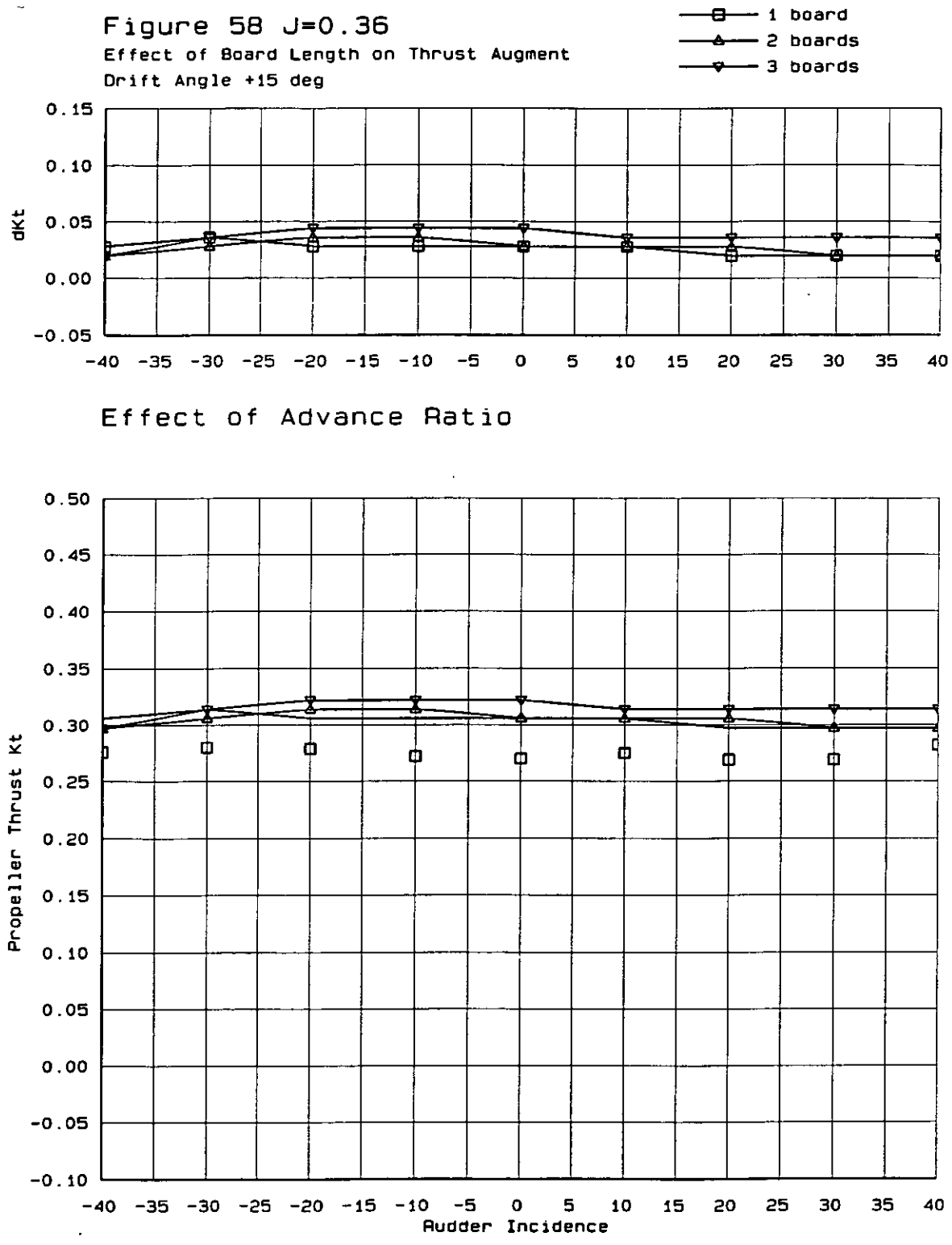



Figure 58 Effect of length of centre board on propeller thrust and thrust augment at an advance ratio J of 0.36 and drift angle of +15°

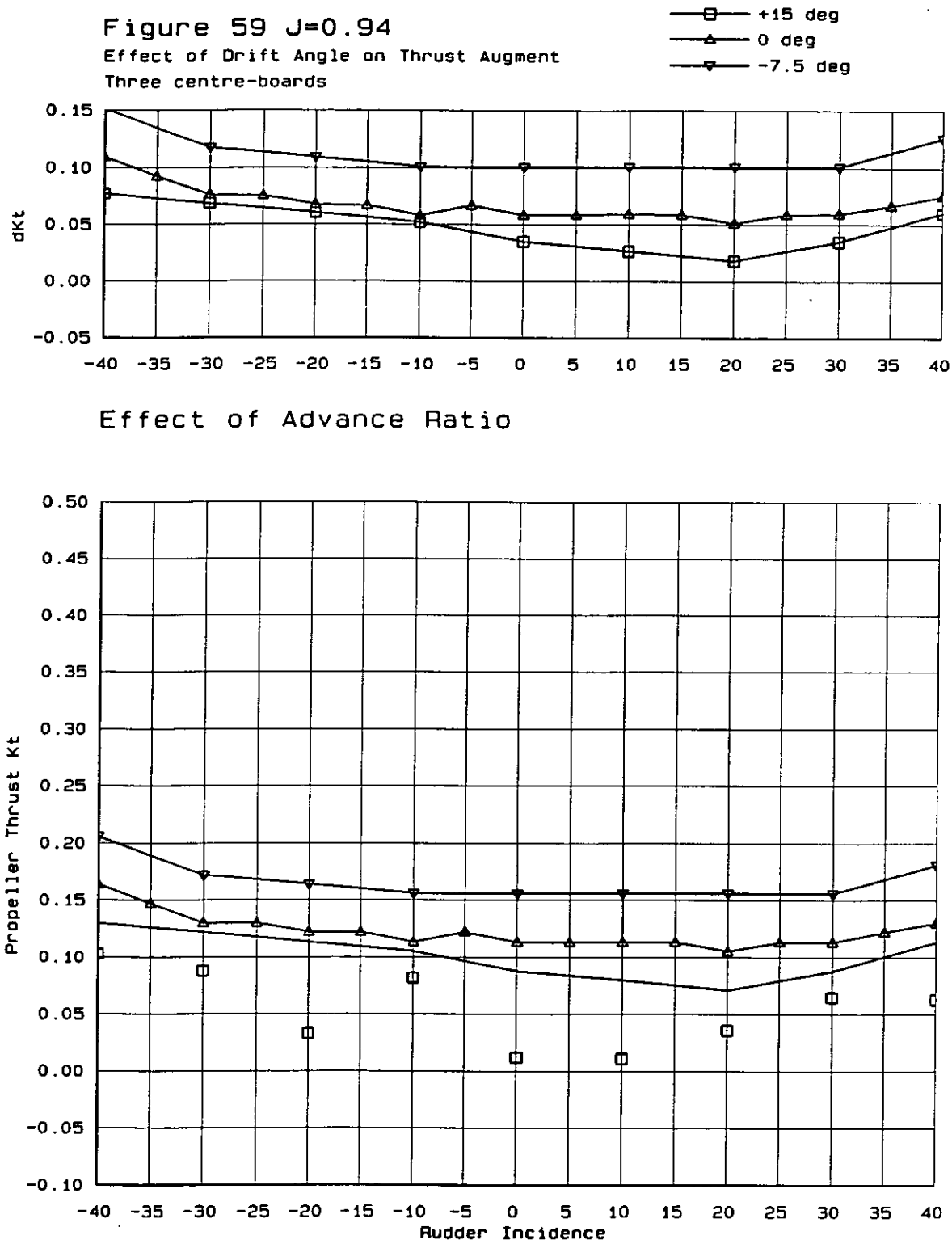



Figure 59 Effect of drift angle on propeller thrust and thrust augment at an advance ratio J of 0.94 with full centre-board

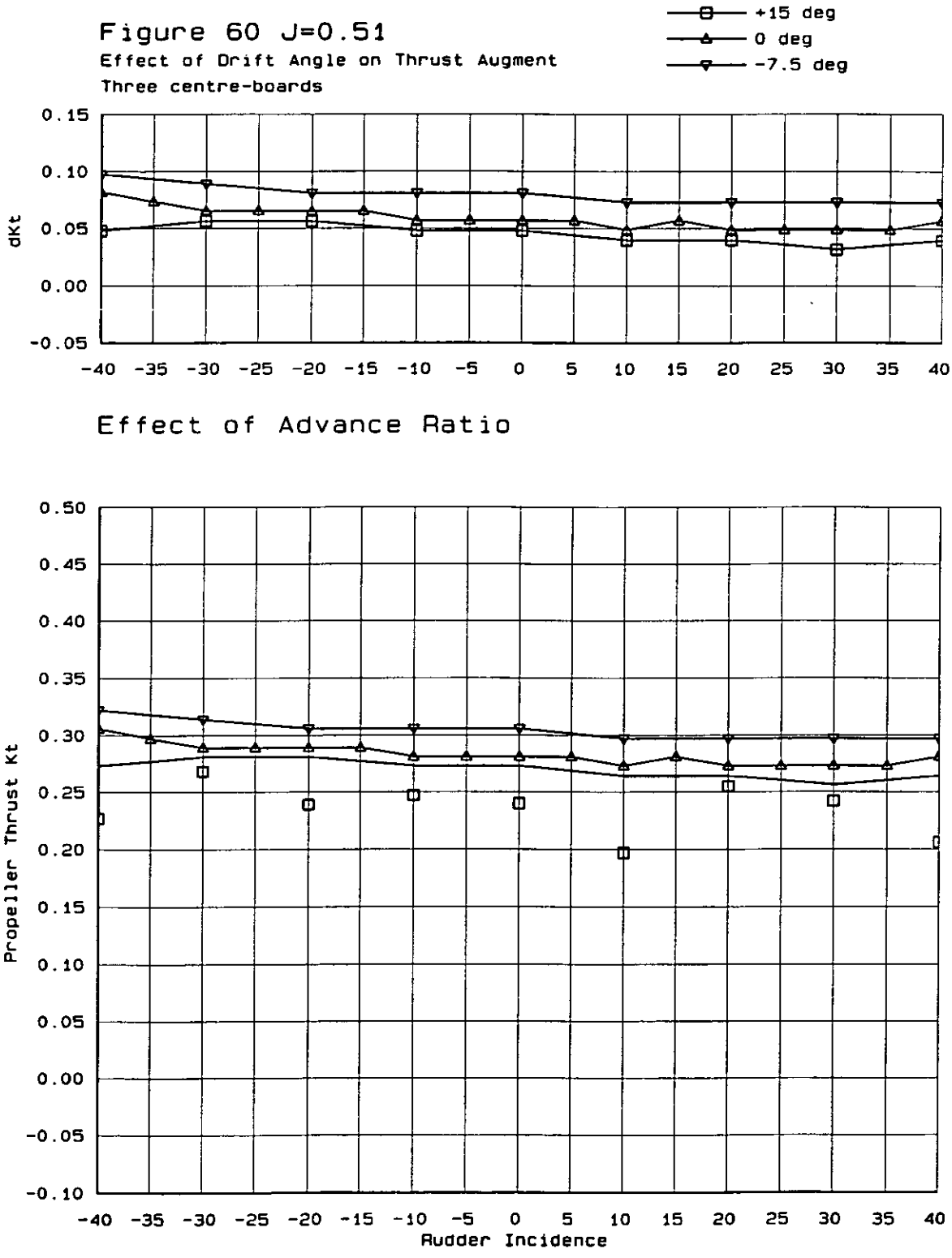



Figure 60 Effect of drift angle on propeller thrust and thrust augment at an advance ratio J of 0.51 with full centre-board

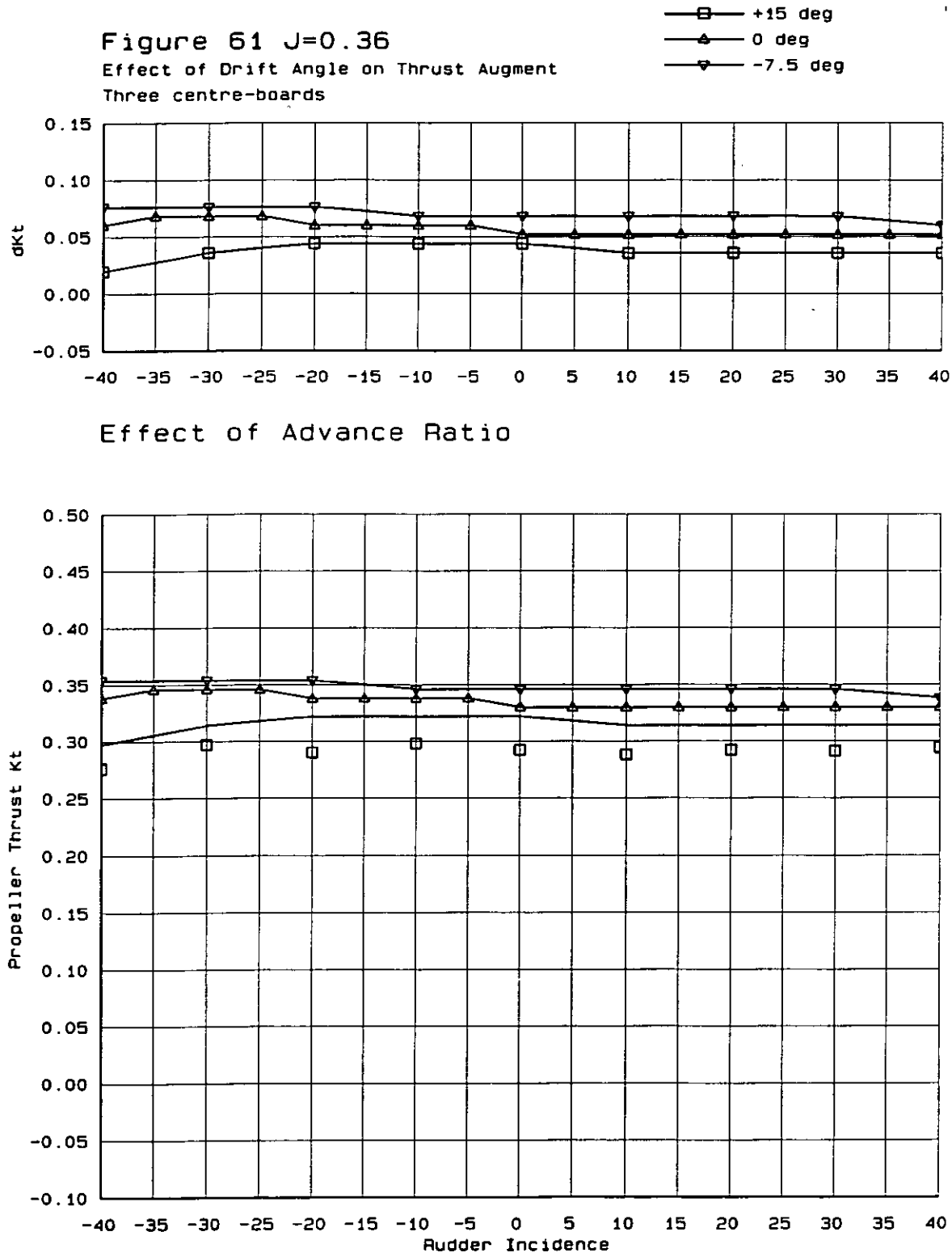



Figure 61 Effect of drift angle on propeller thrust and thrust augment at an advance ratio J of 0.36 with full centre-board

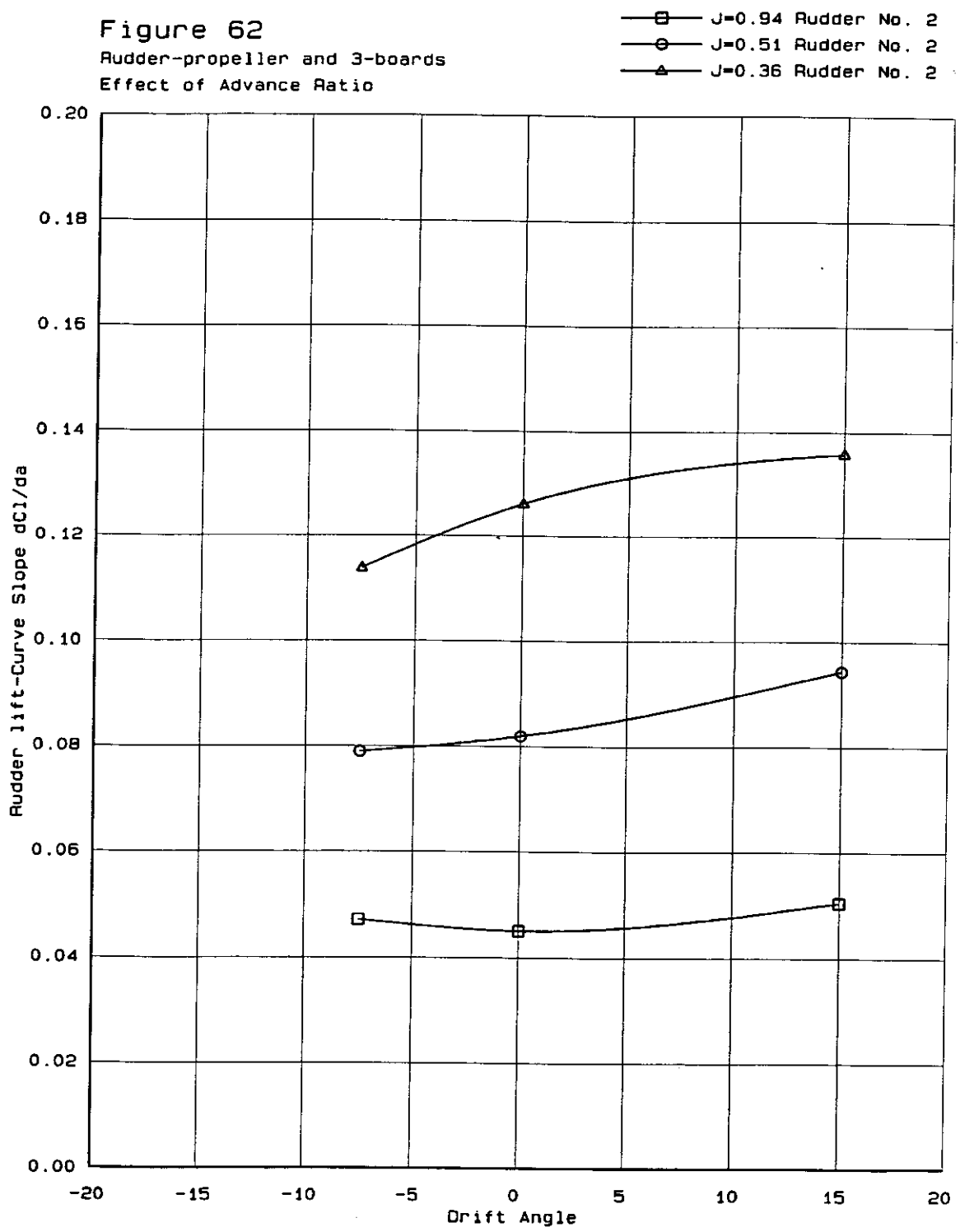



Figure 62 Effect of drift angle on lift-curve slope of Rudder No. 2 with full centre-board

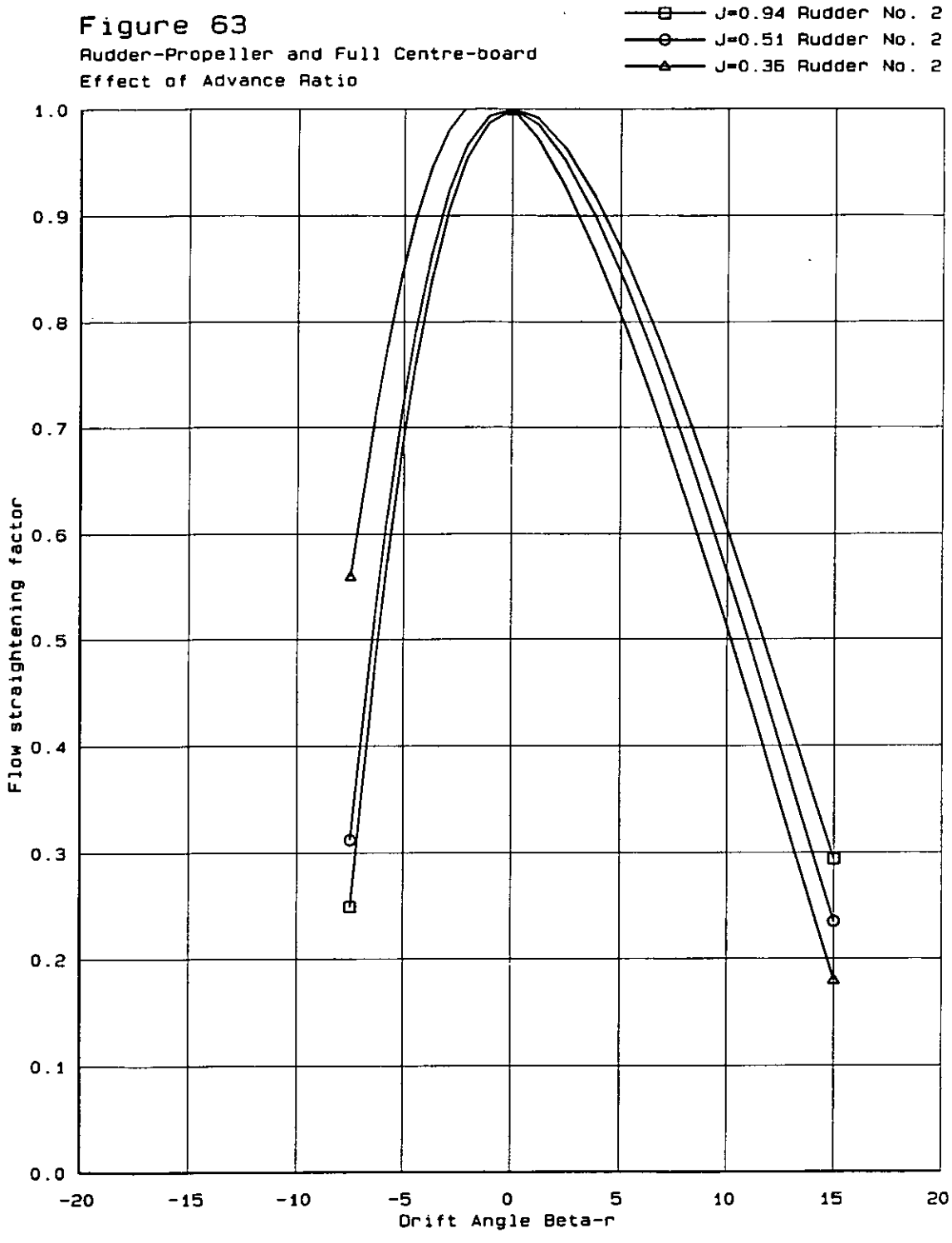



Figure 63 Effect of drift angle on flow straightening with full centre-board

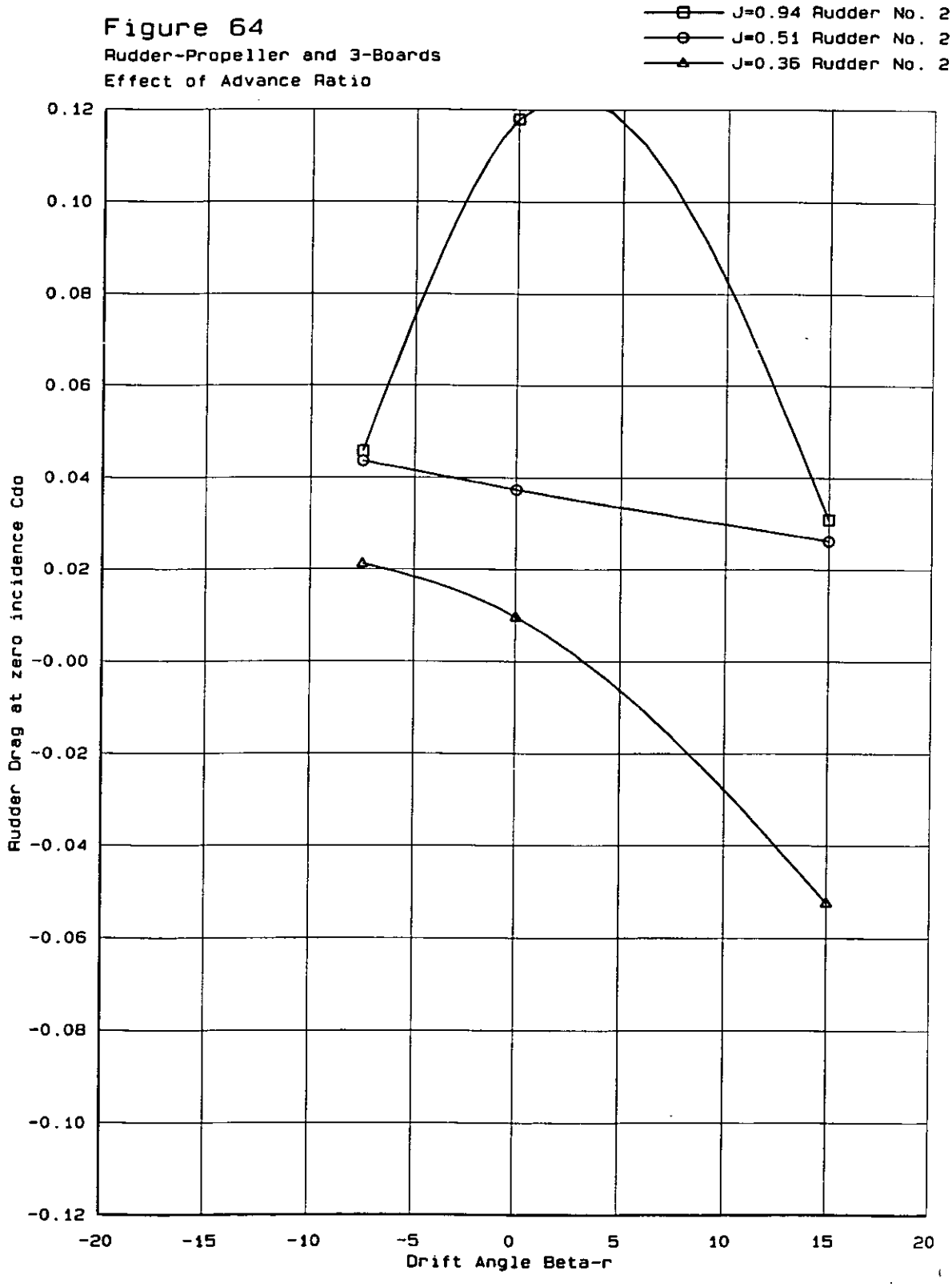



Figure 64 Effect of drift angle on the drag of Rudder No. 2 at zero incidence

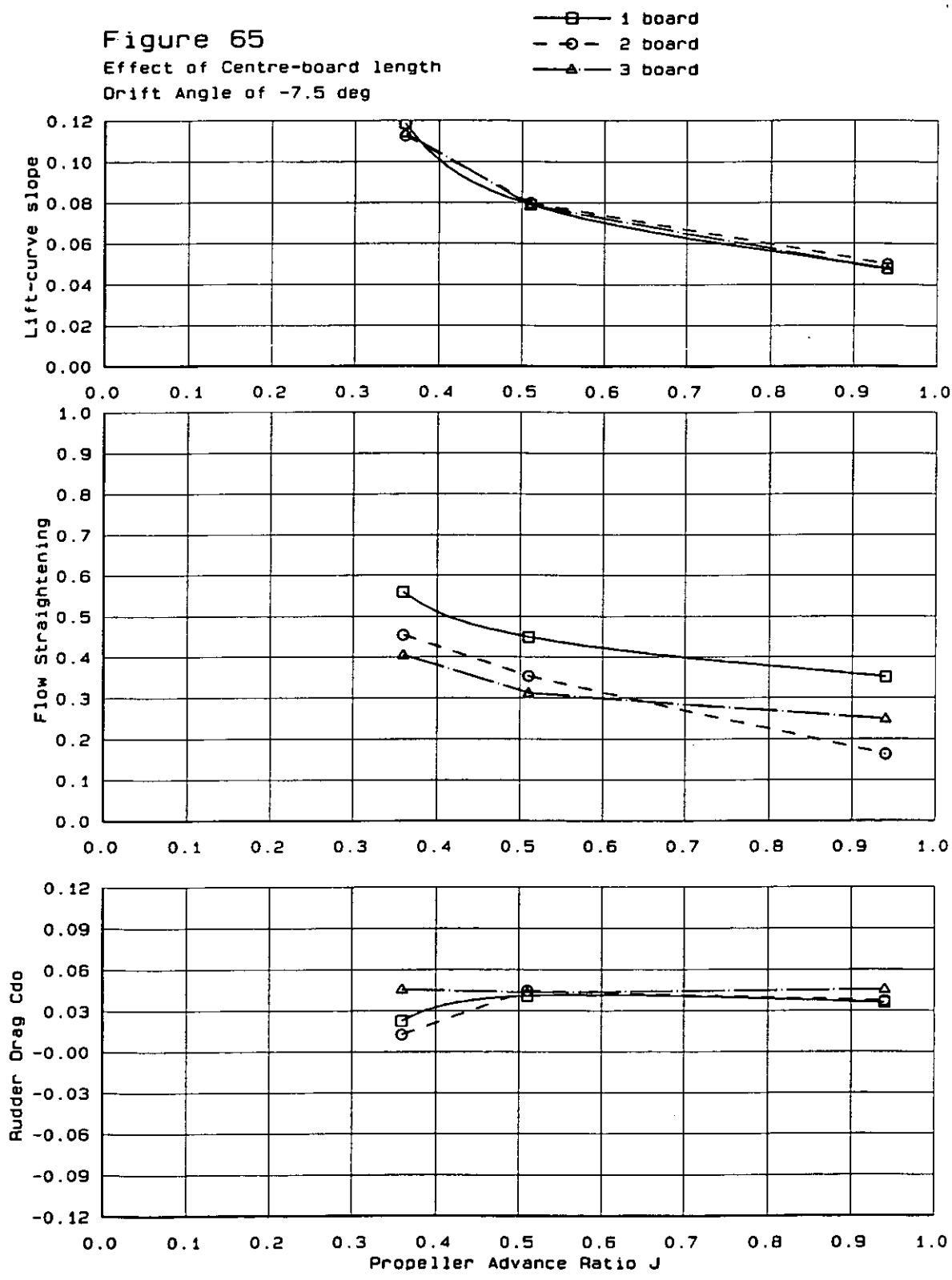



Figure 65 Effect of centre-board length on the lift-curve slope, flow straightening and rudder drag at zero incidence at a drift angle of -7.5°

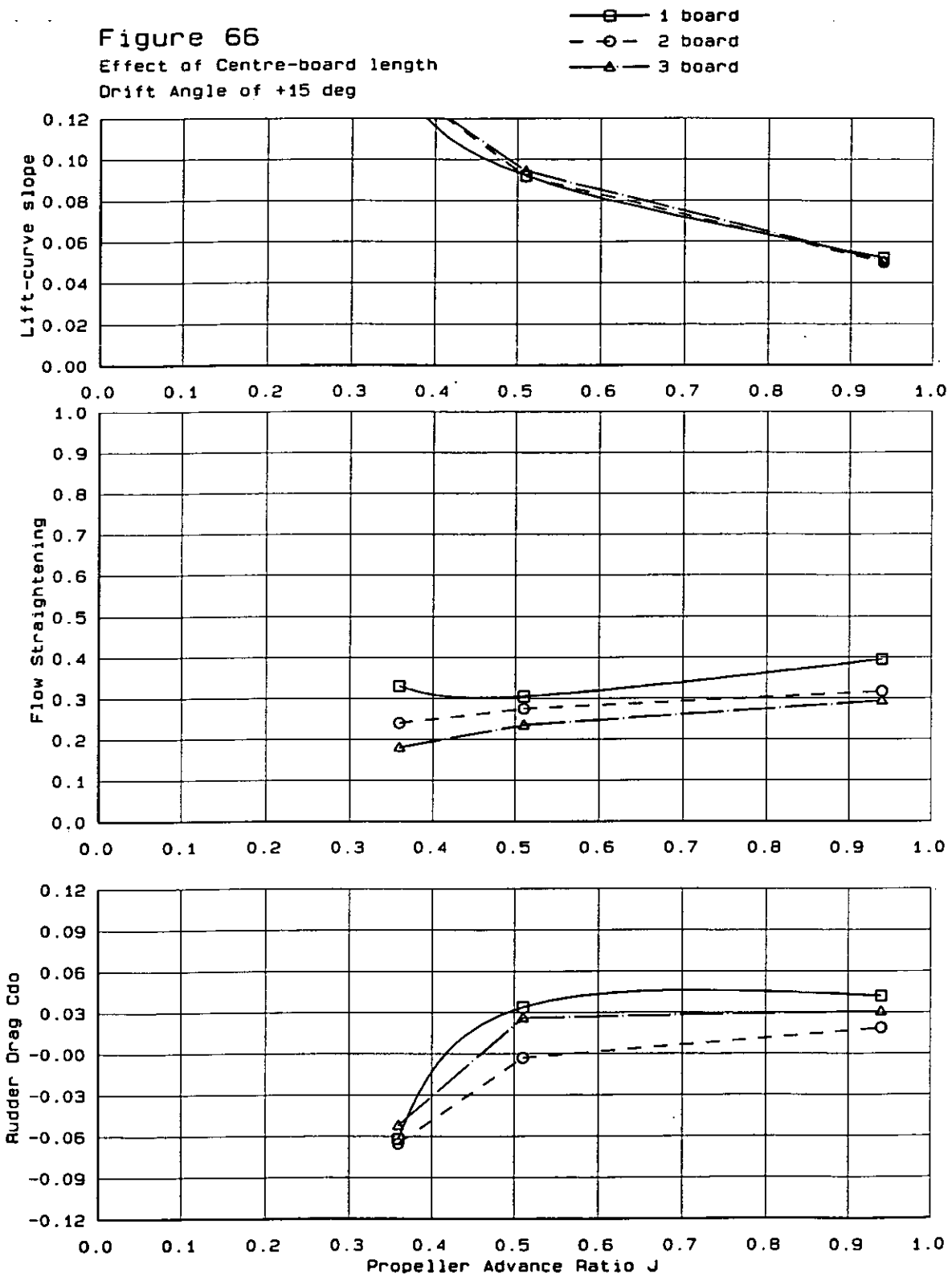



Figure 66 Effect of centre-board length on the lift-curve slope, flow straightening and rudder drag at zero incidence at a drift angle of +15°

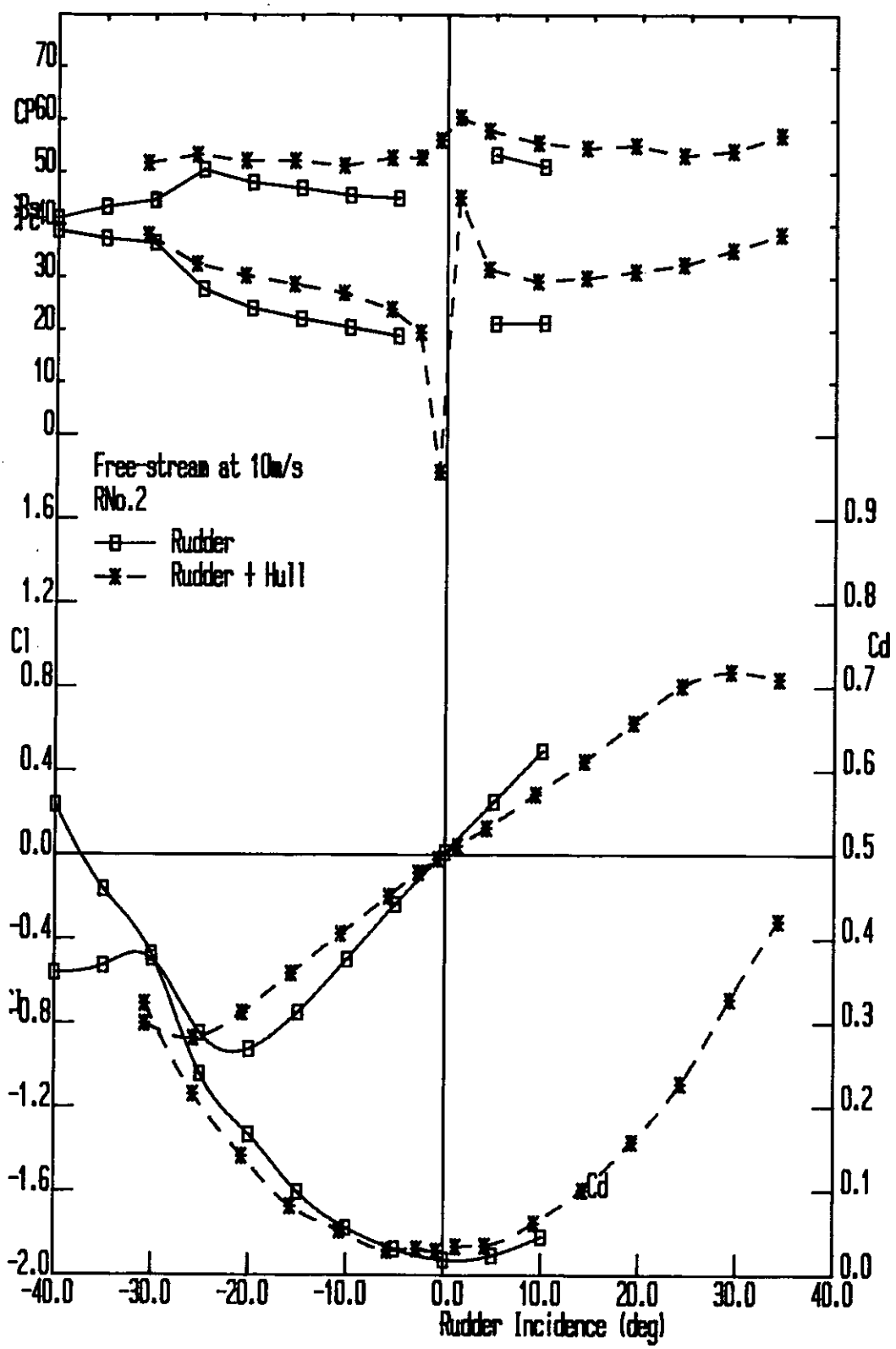



Figure 67 Free-stream performance of Rudder No. 2 with and without Mariner stern form at zero drift

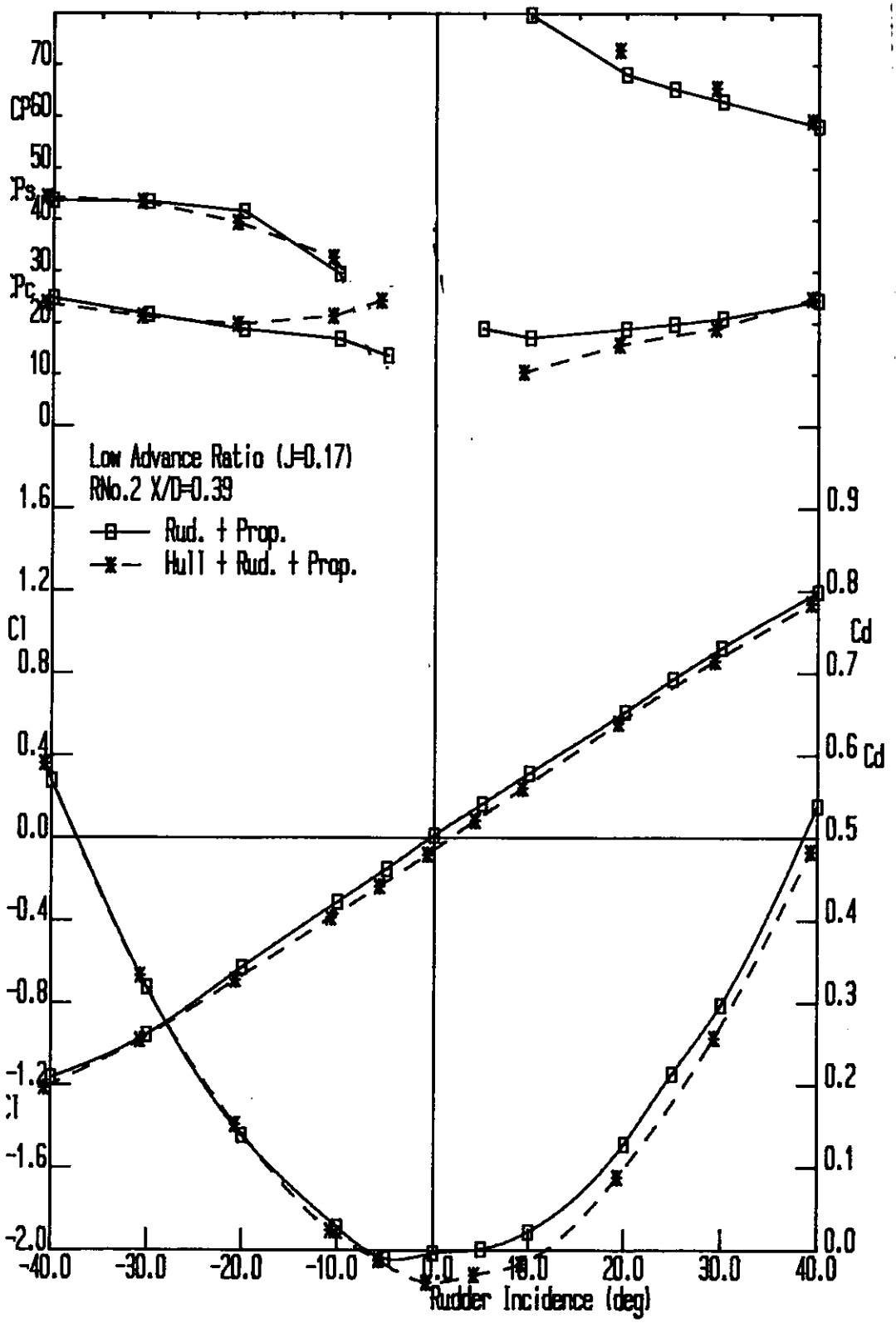



Figure 68 Low-speed performance of Rudder No. 2 with and without Mariner stern form at an advance ratio J of 0.17 at zero drift

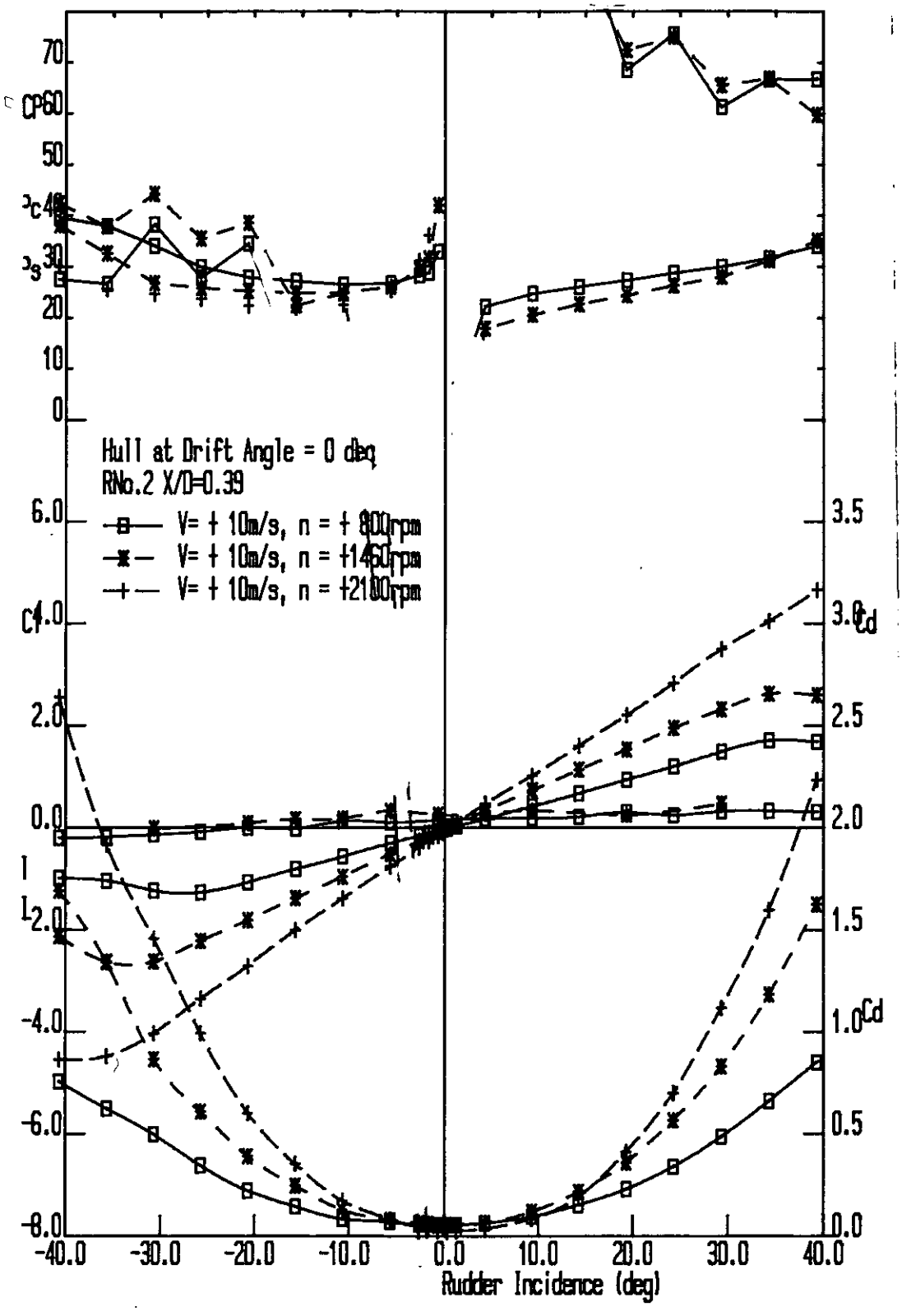



Figure 69 Effect of advance ratio on the performance of Rudder No. 2 with an upstream Mariner stern form at zero drift

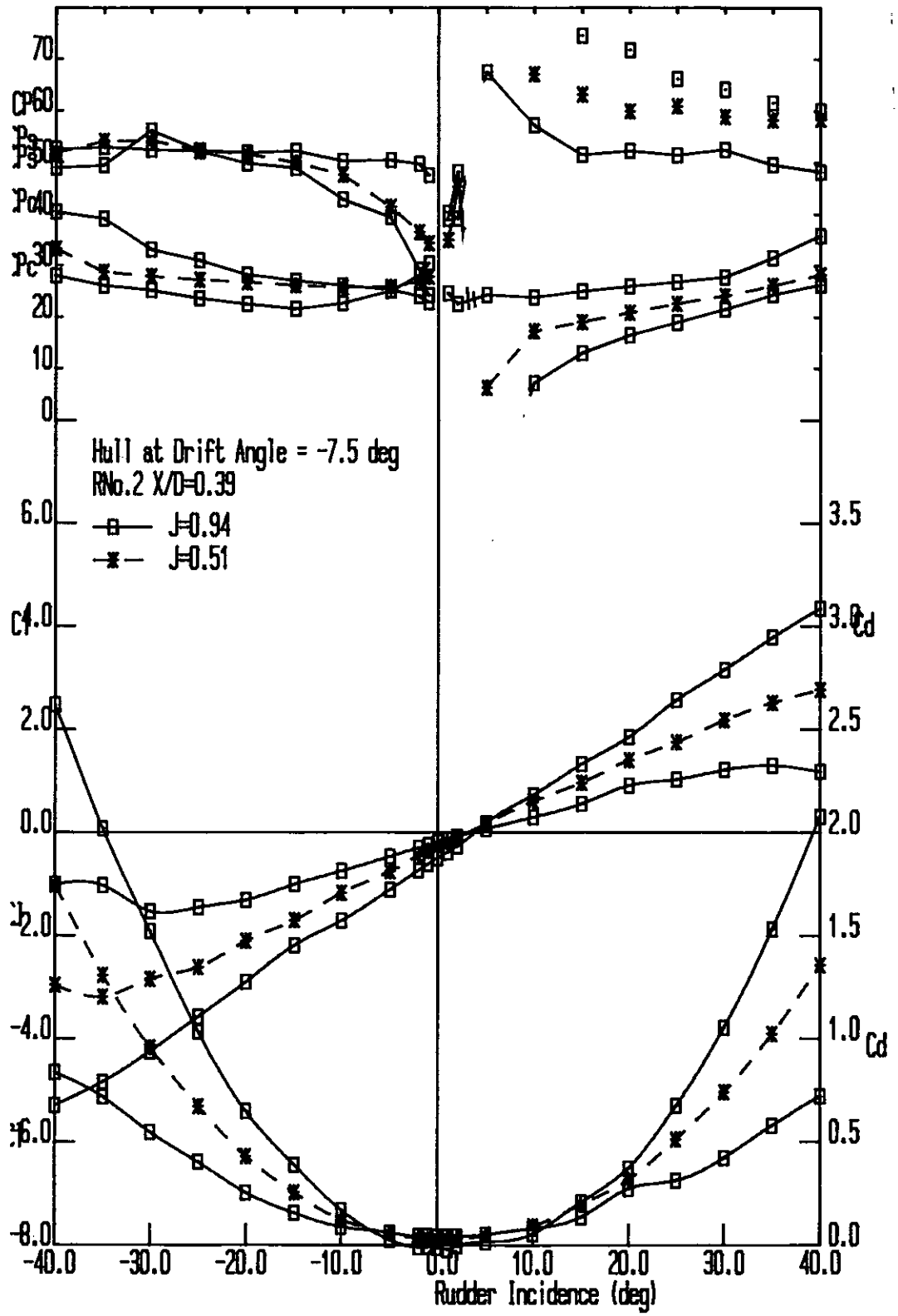



Figure 70 Effect of adavnce ratio on the performance of Rudder No. 2 with an upstream Mariner stern form at a drift angle of -7.5°

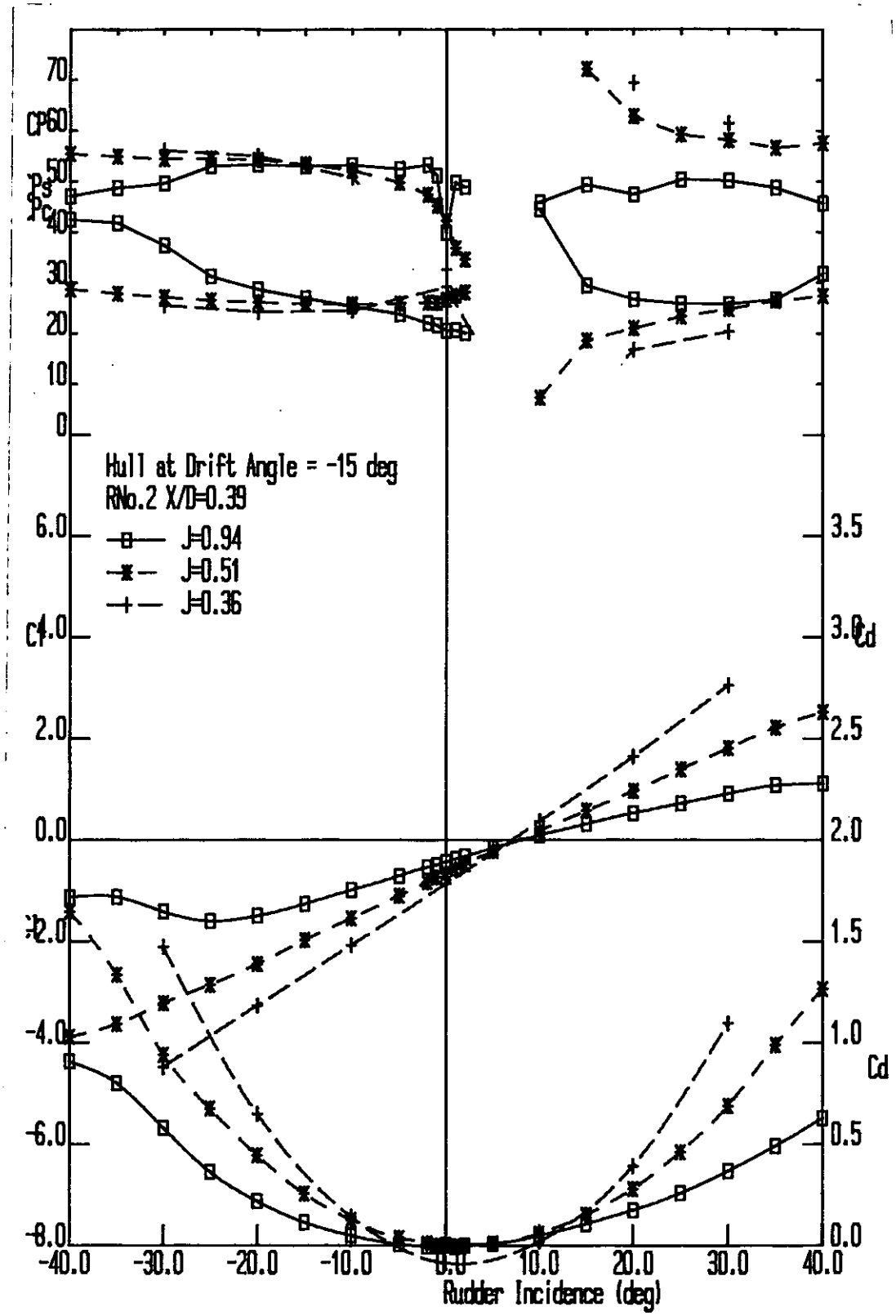



Figure 71 Effect of adavnce ratio on the performance of Rudder No. 2 with an upstream Mariner stern form at a drift angle of -15°

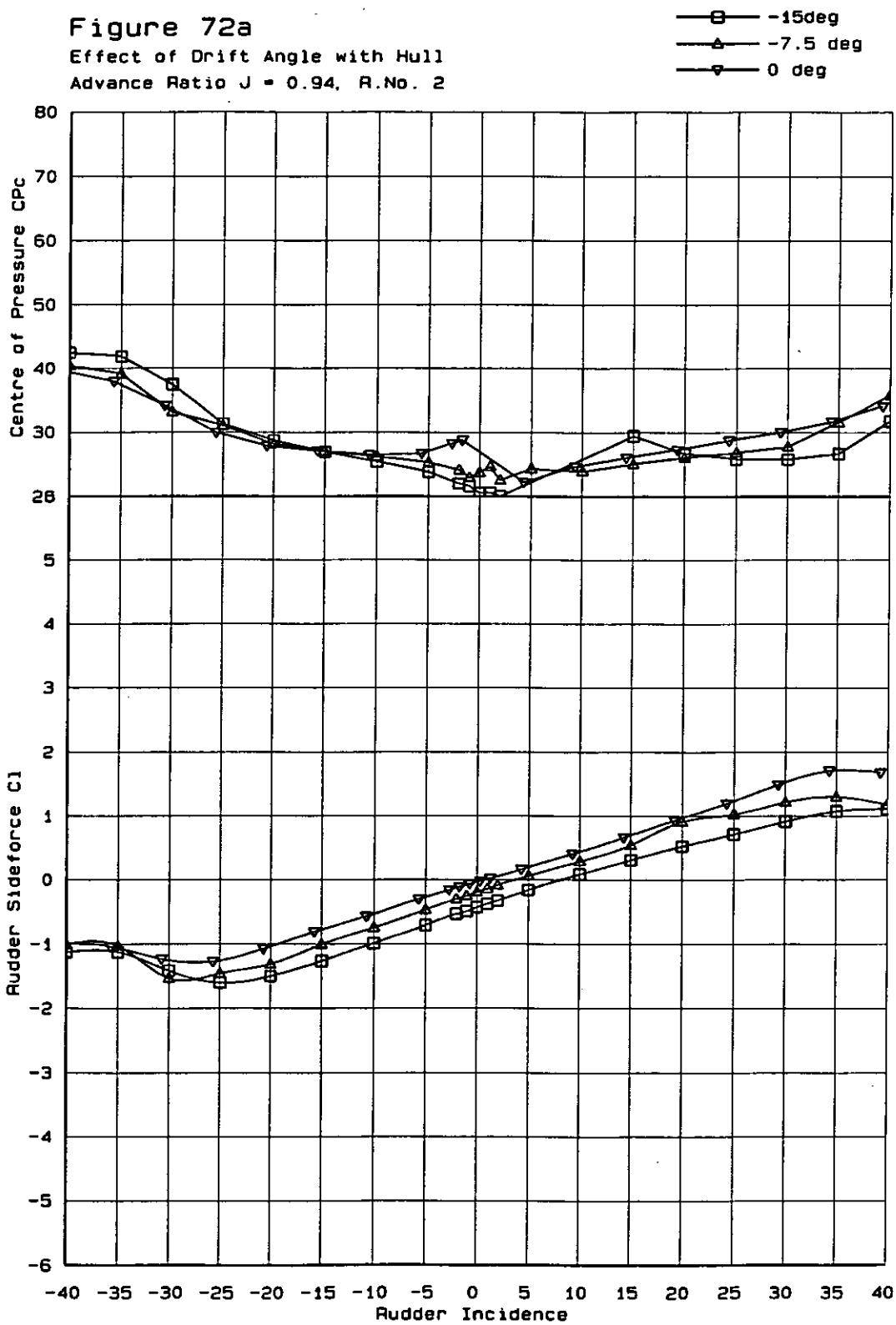



Figure 72a Effect of drift angle on the performance of Rudder No. 2 downstream of a Mariner stern form at an advance ratio of 0.94: Lift and CPc

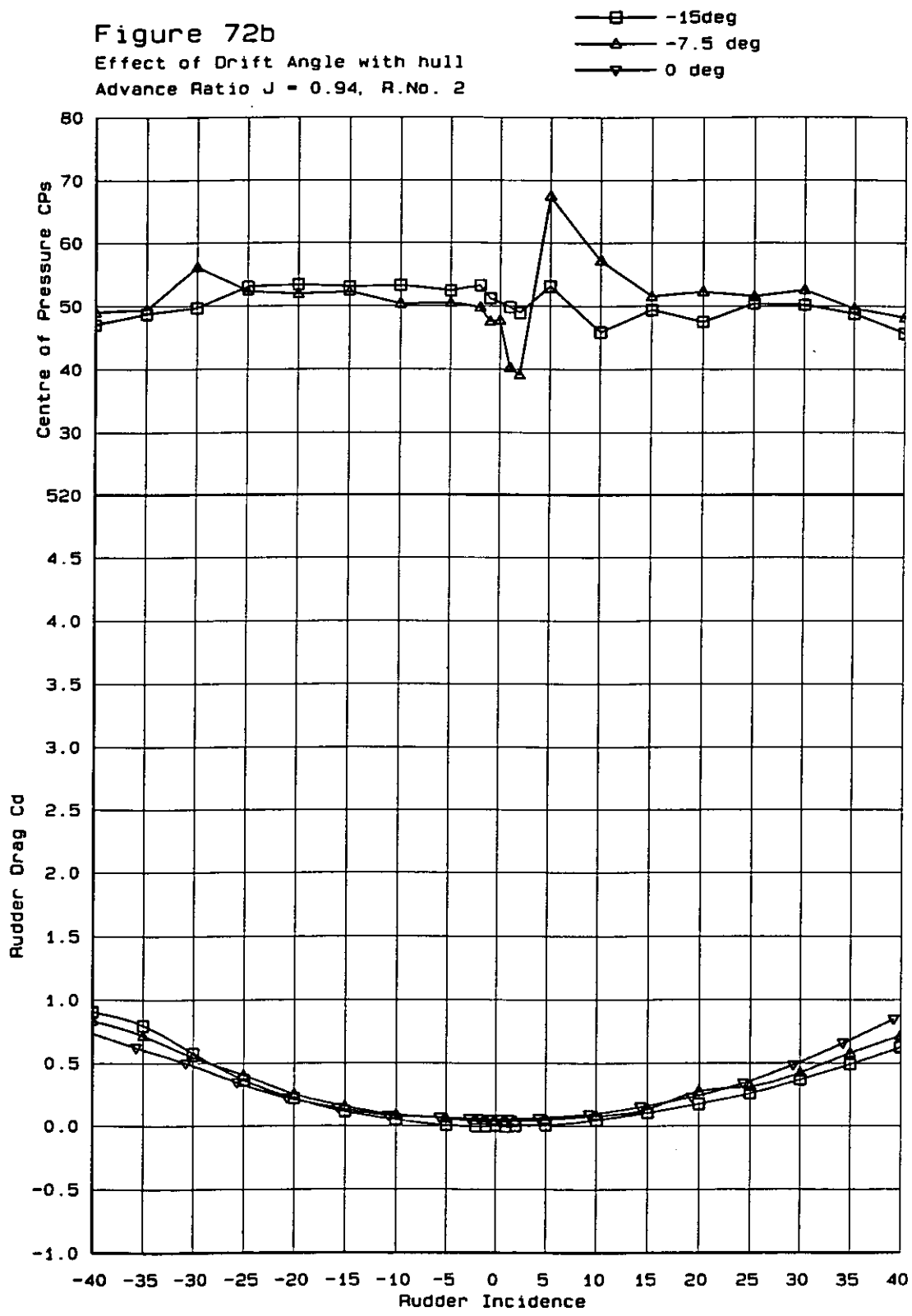



Figure 72b Effect of drift angle on the performance of Rudder No. 2 downstream of a Mariner stern form at an advance ratio of 0.94: Drag and CPs

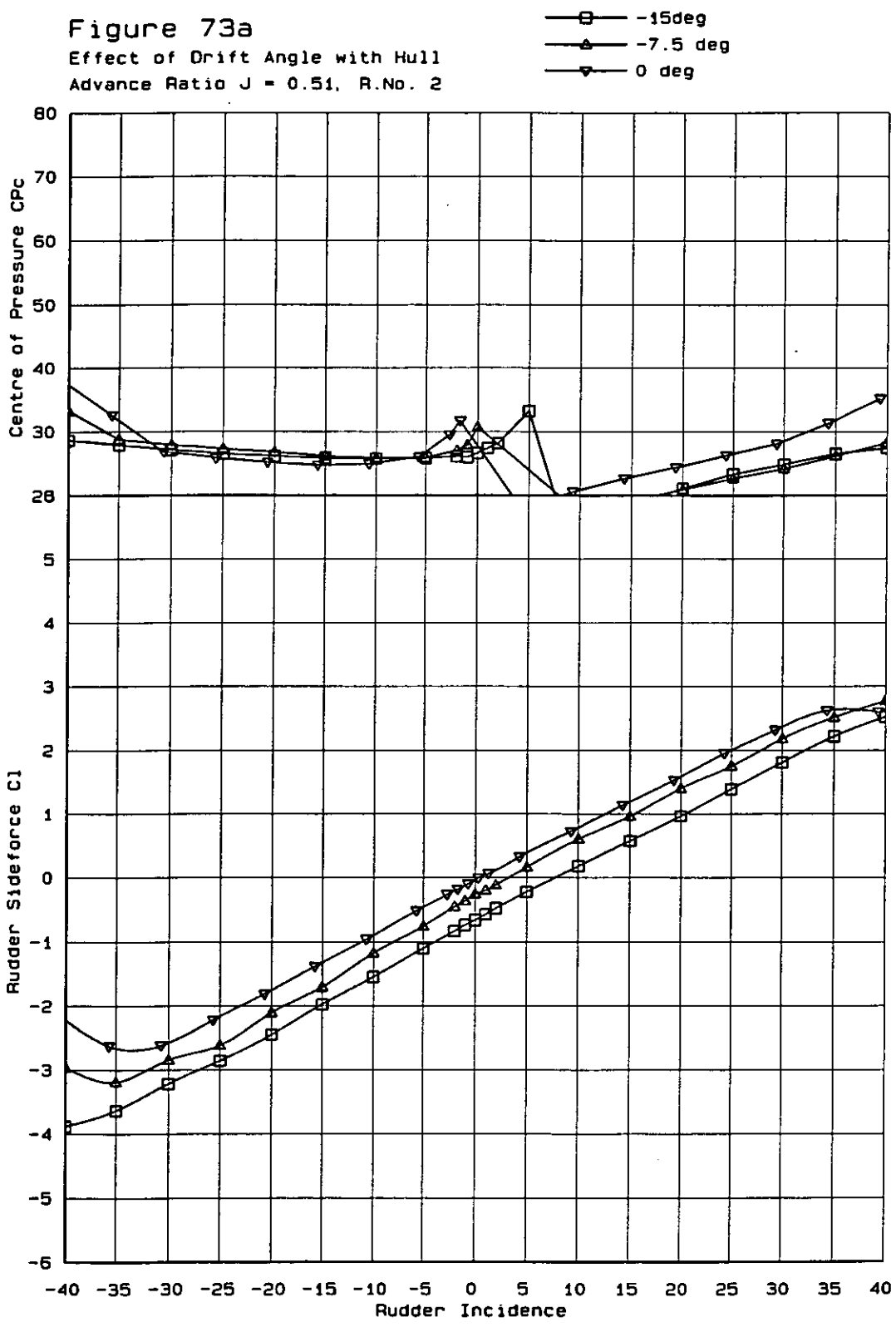



Figure 73a Effect of drift angle on the performance of Rudder No. 2 downstream of a Mariner stern form at an advance ratio of 0.51: Lift and CPc

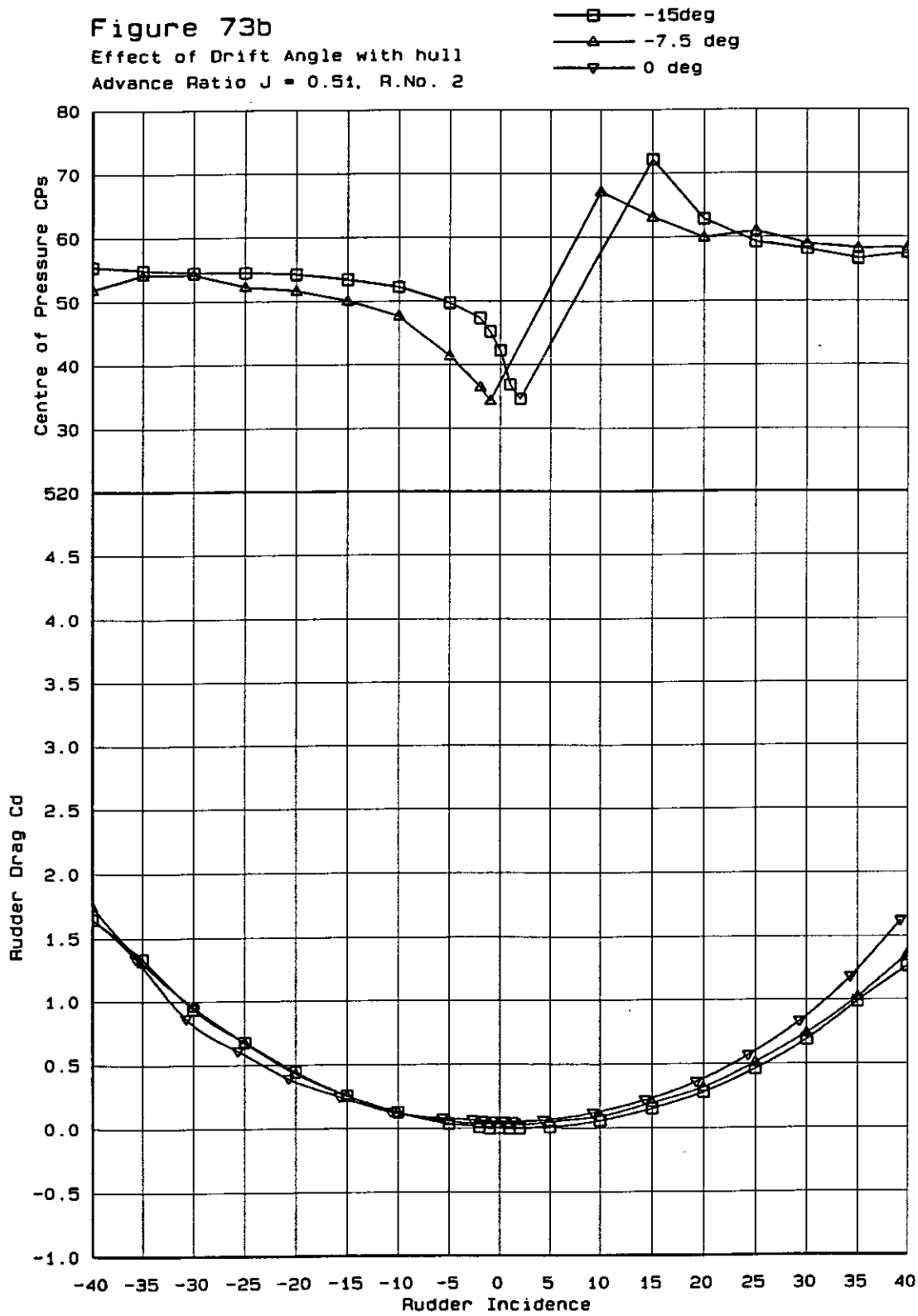



Figure 73b Effect of drift angle on the performance of Rudder No. 2 downstream of a Mariner stern form at an advance ratio of 0.51: Drag and CPs

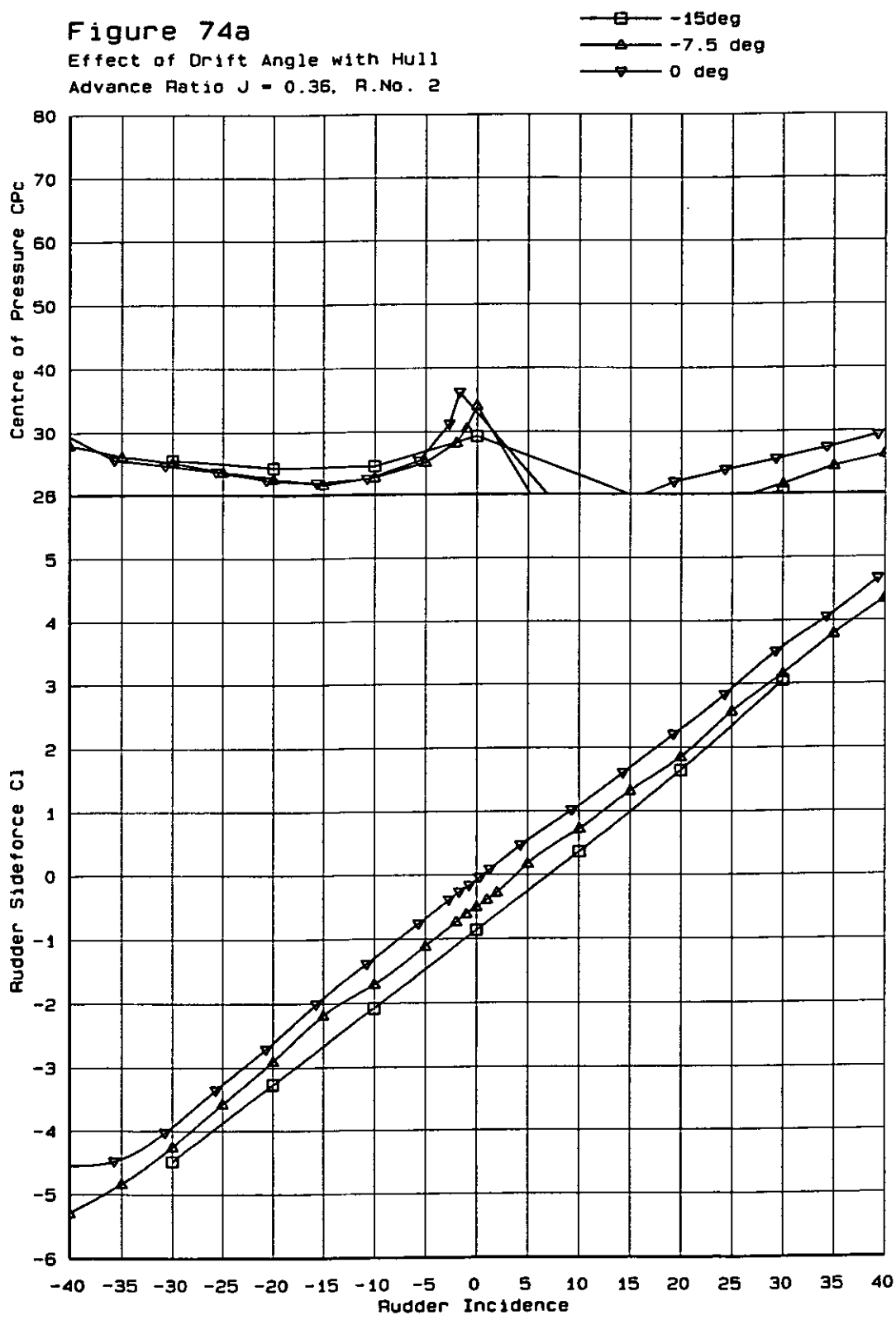



Figure 74a Effect of drift angle on the performance of Rudder No. 2 downstream of a Mariner stern form at an advance ratio of 0.36: Lift and CPc

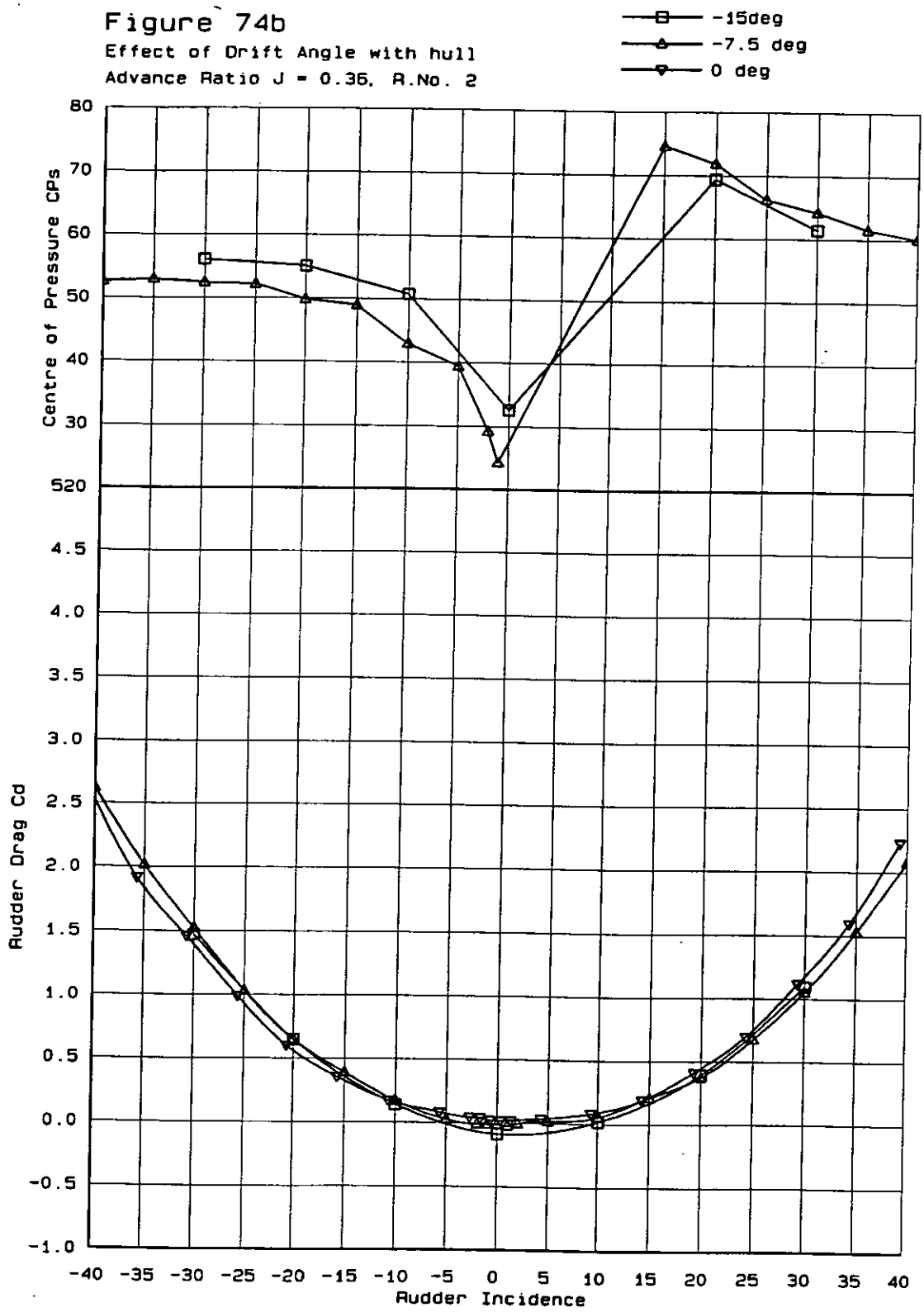



Figure 74b Effect of drift angle on the performance of Rudder No. 2 downstream of a Mariner stern form at an advance ratio of 0.36: Drag and CPs

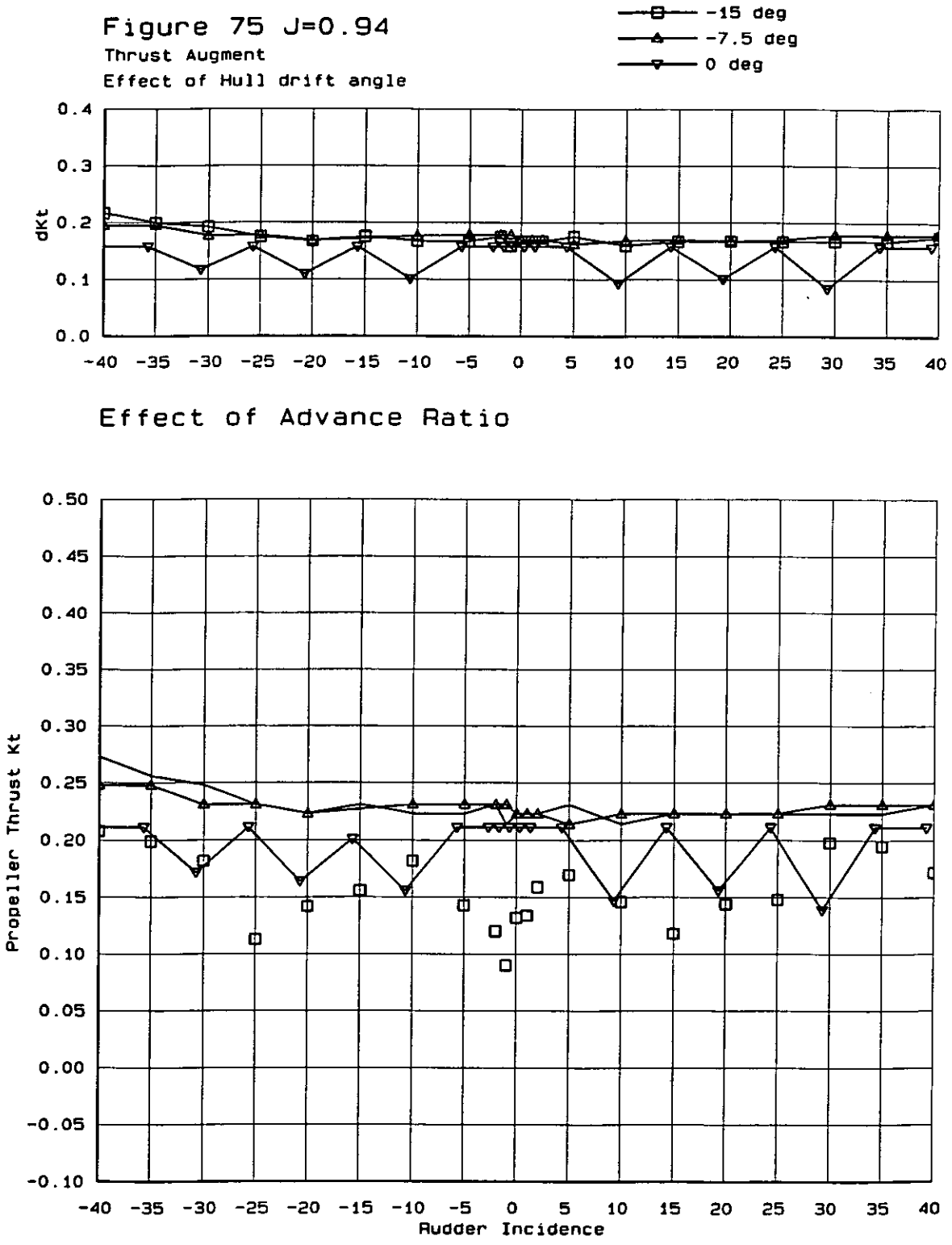



Figure 75 Effect of drift angle on propeller thrust and thrust augment with an upstream Mariner stern form at J = 0.94

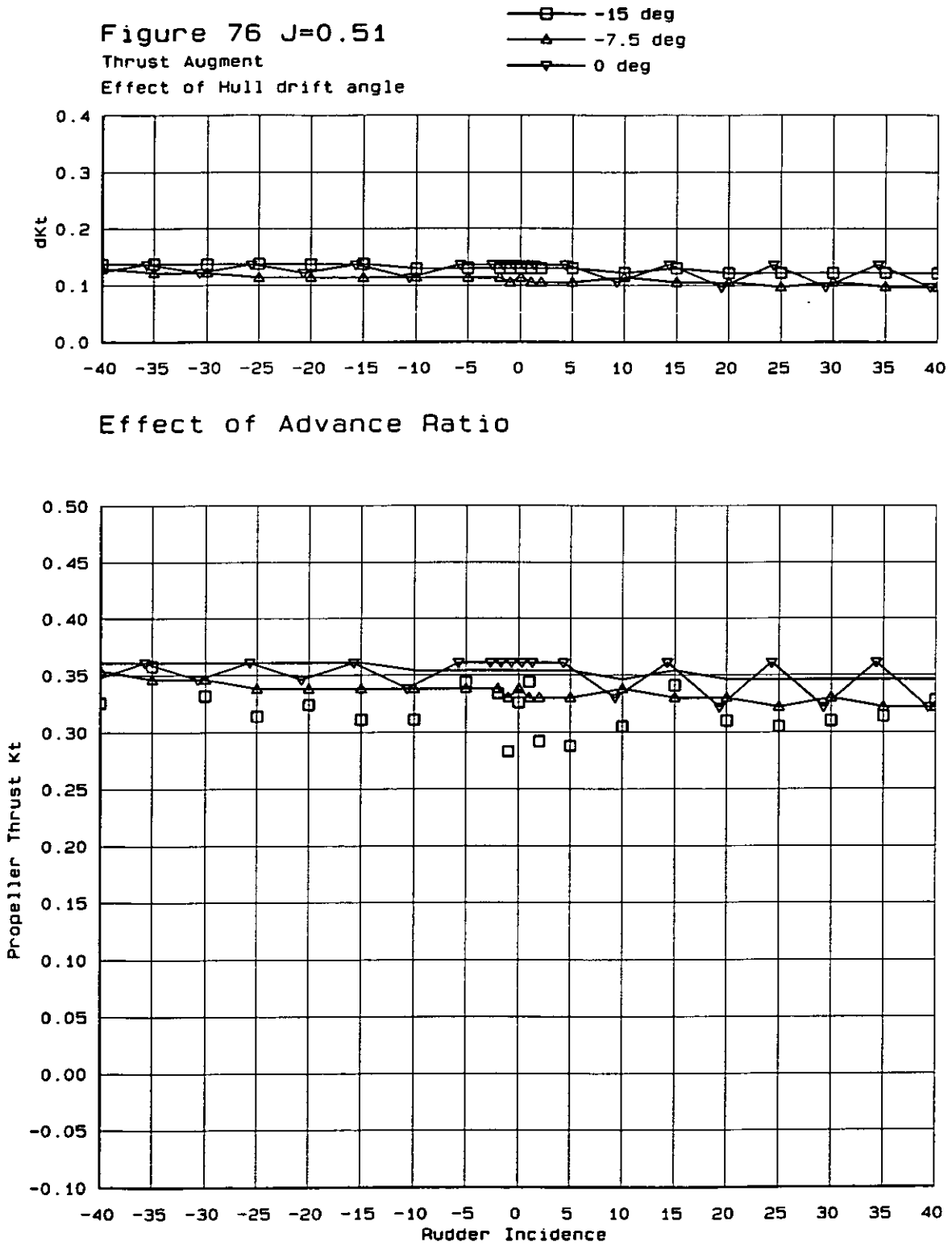



Figure 76 Effect of drift angle on propeller thrust and thrust augment with an upstream Mariner stern form at J = 0.51

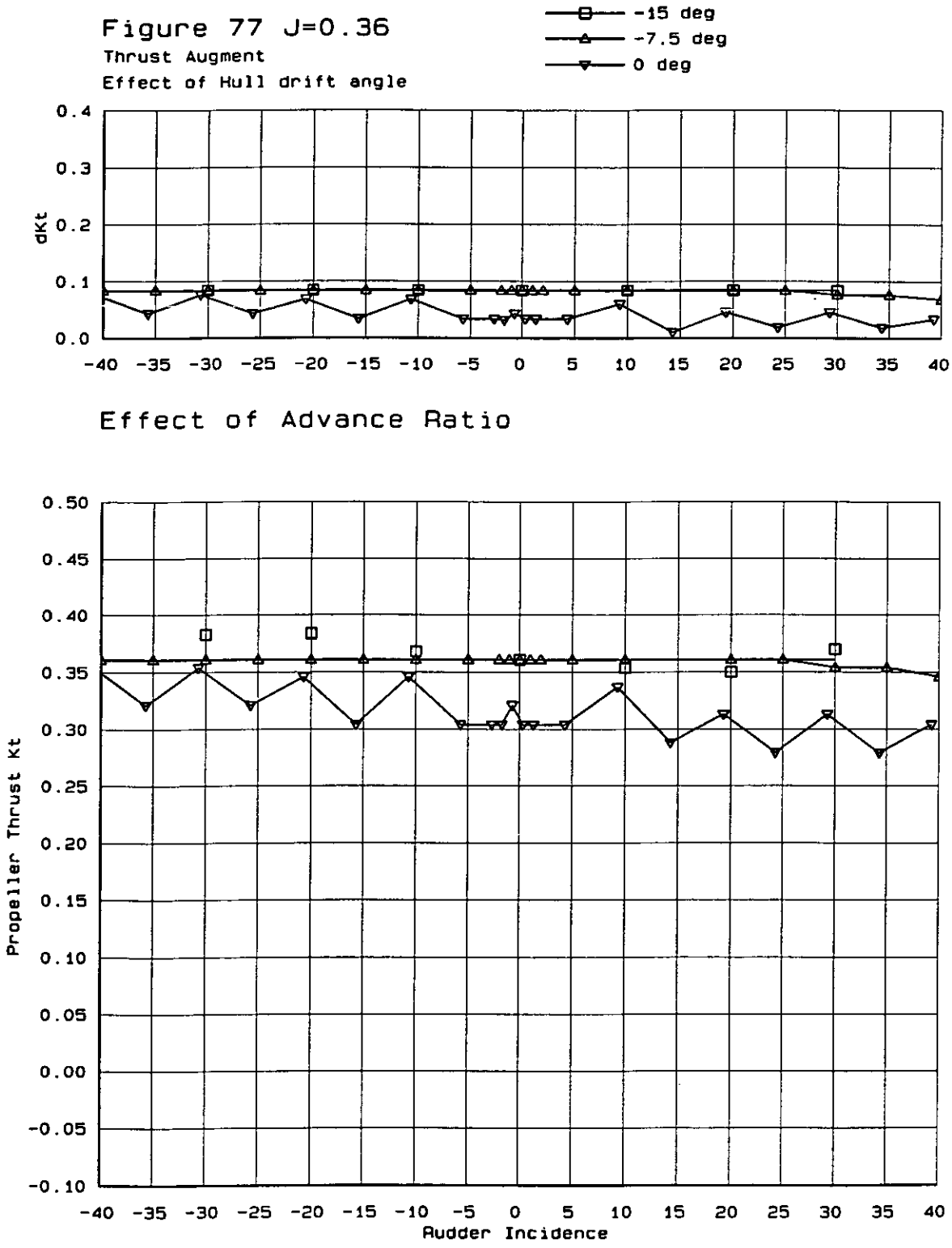



Figure 77 Effect of drift angle on propeller thrust and thrust augment with an upstream Mariner stern form at J = 0.36

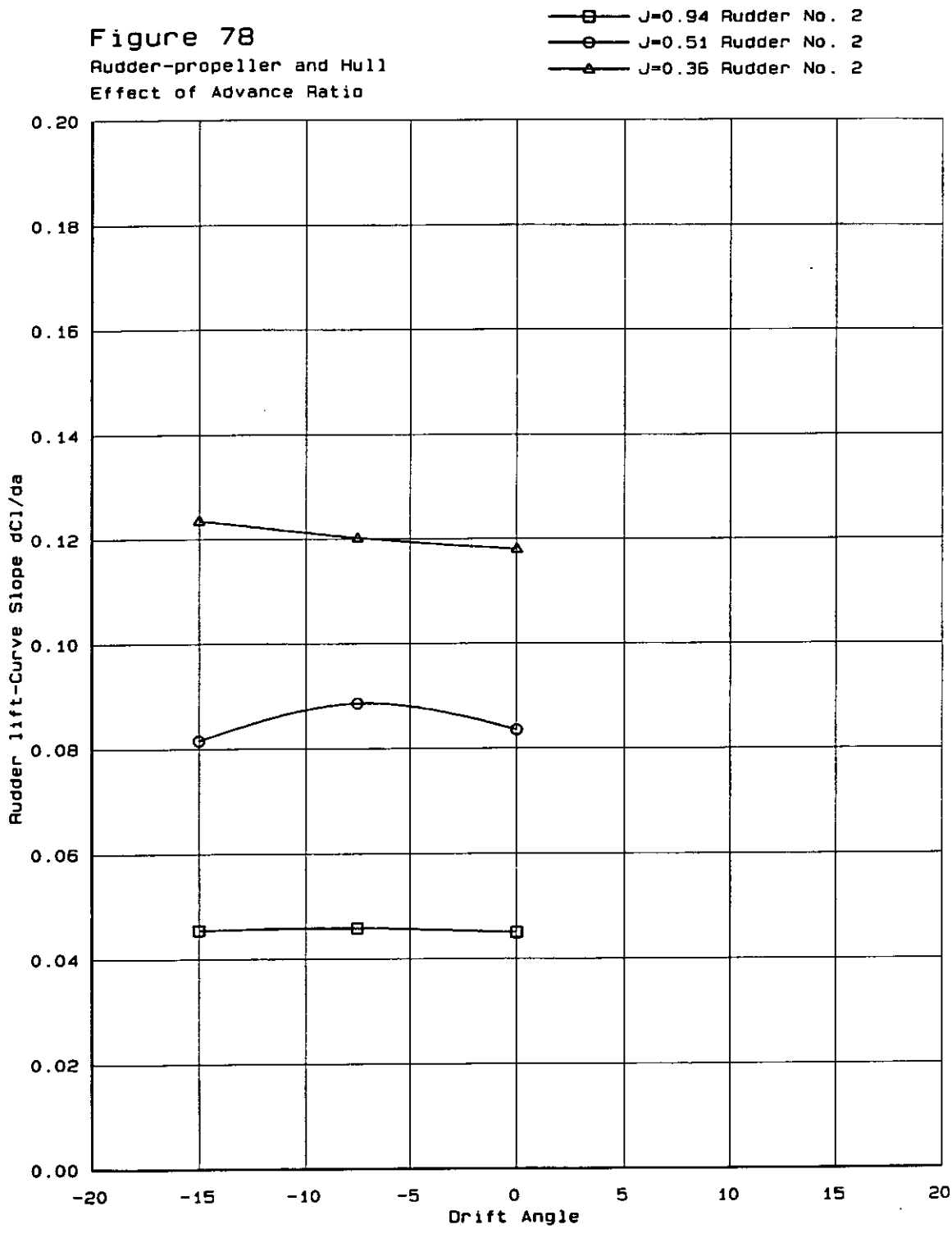



Figure 78 Effect of advance ratio on the lift-curve slope of Rudder No. 2 with an upstream Mariner stern form

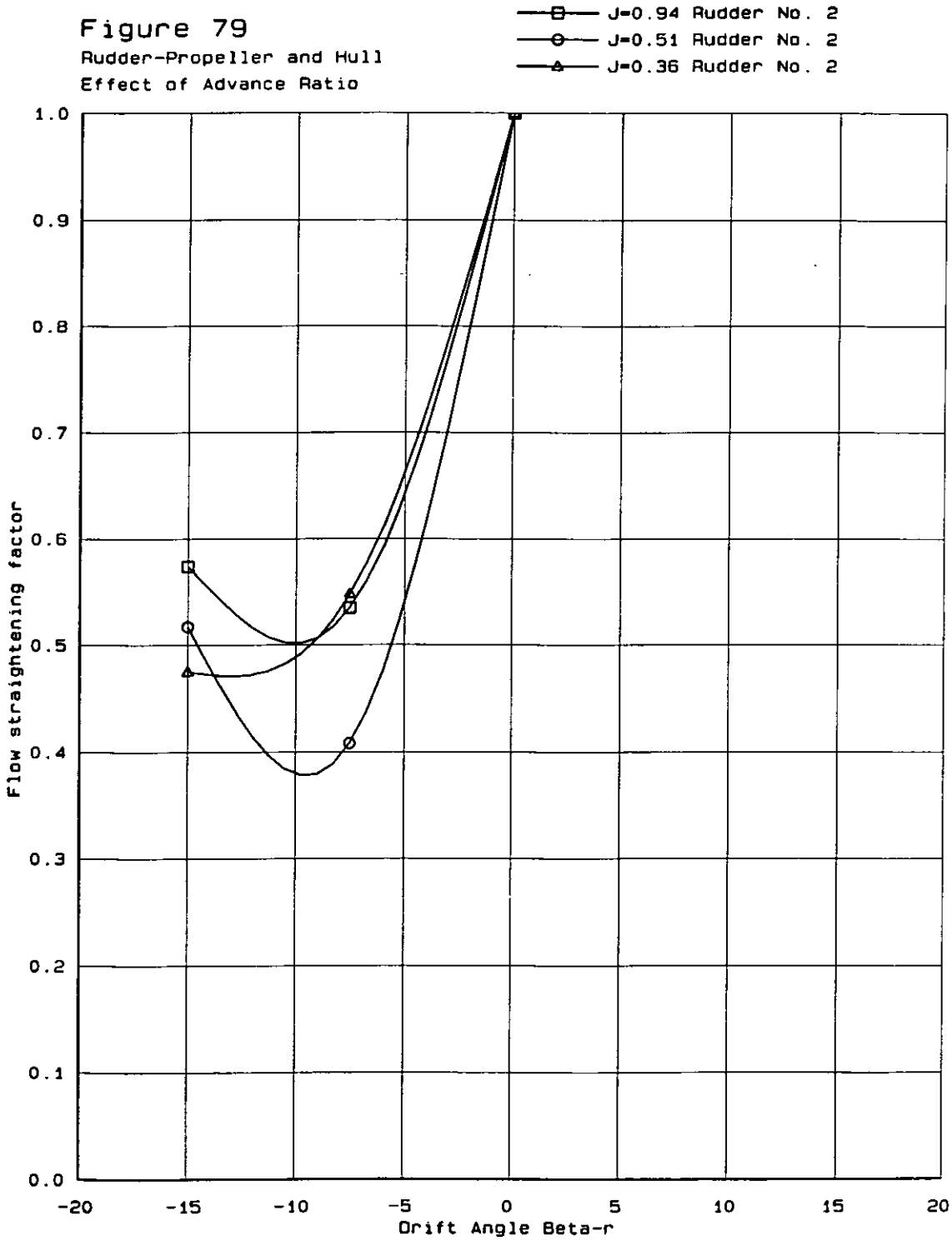



Figure 79 Effect of advance ratio on flow straightening with an upstream Mariner stern form

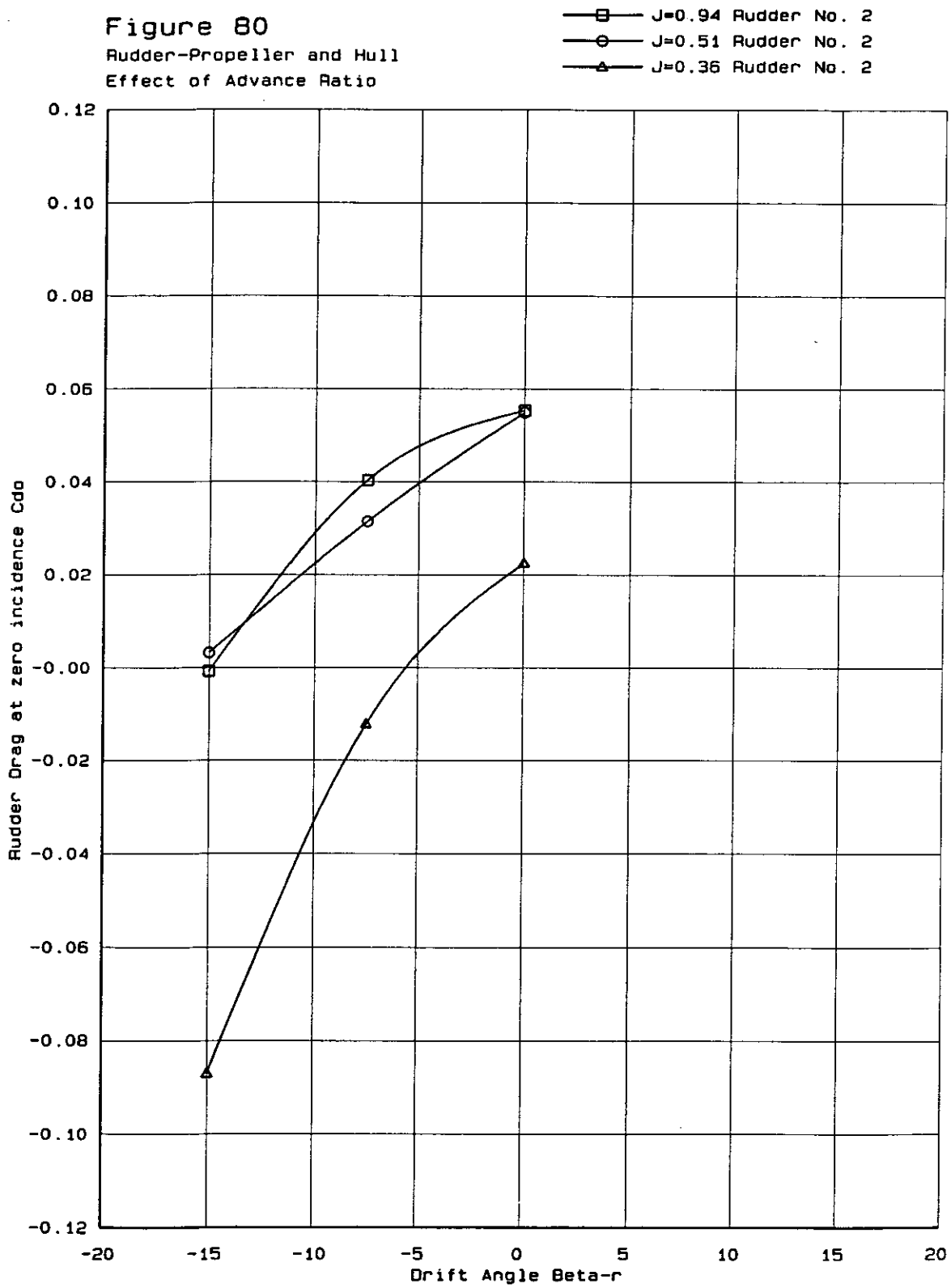



Figure 80 Effect of advance ratio on rudder drag at zero incidence with an upstream Mariner stern form

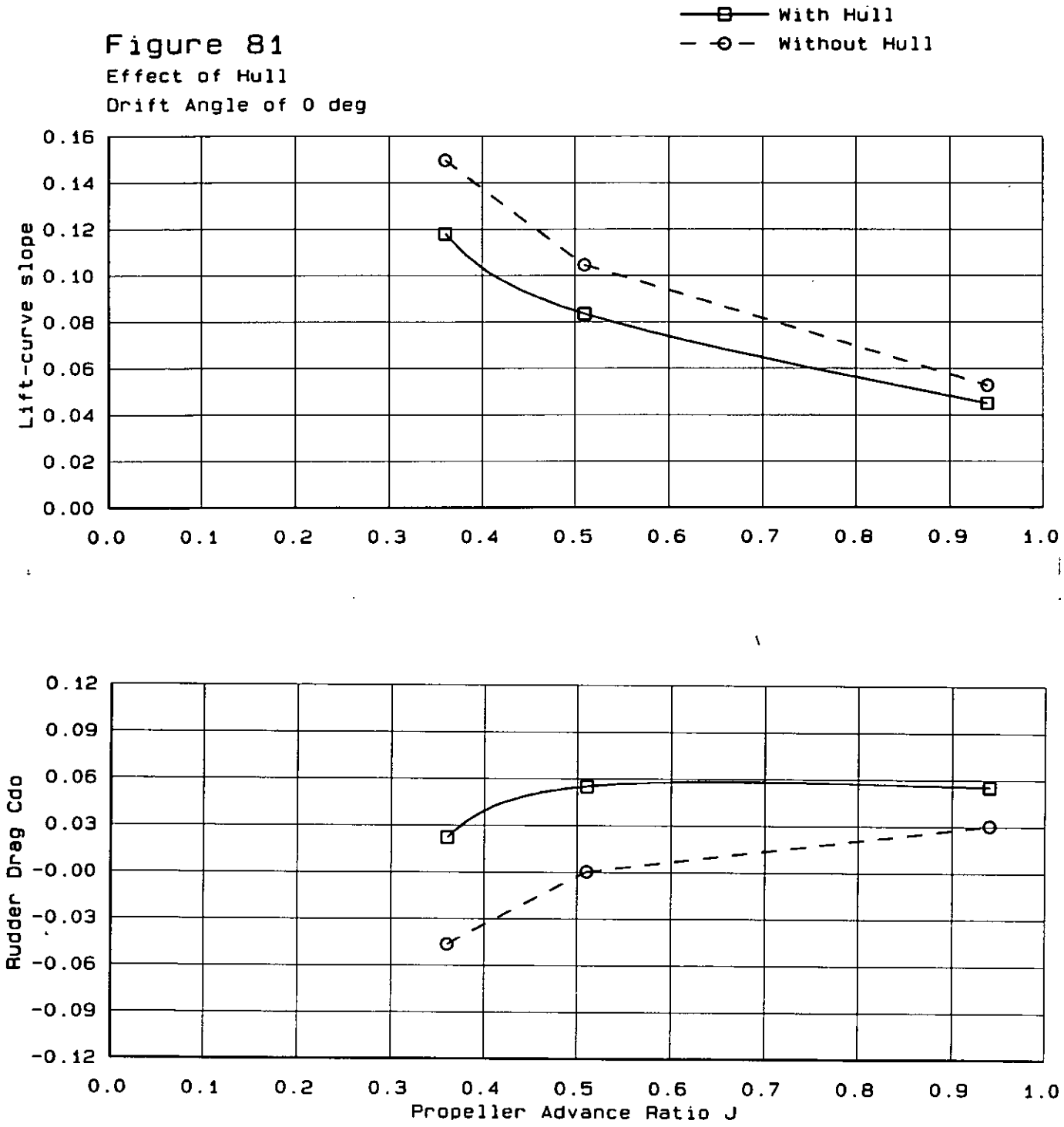



Figure 81 Comparsion of Rudder No. 2 lift-curve slope at drag at zero incidence with and without upstream Mariner stern form

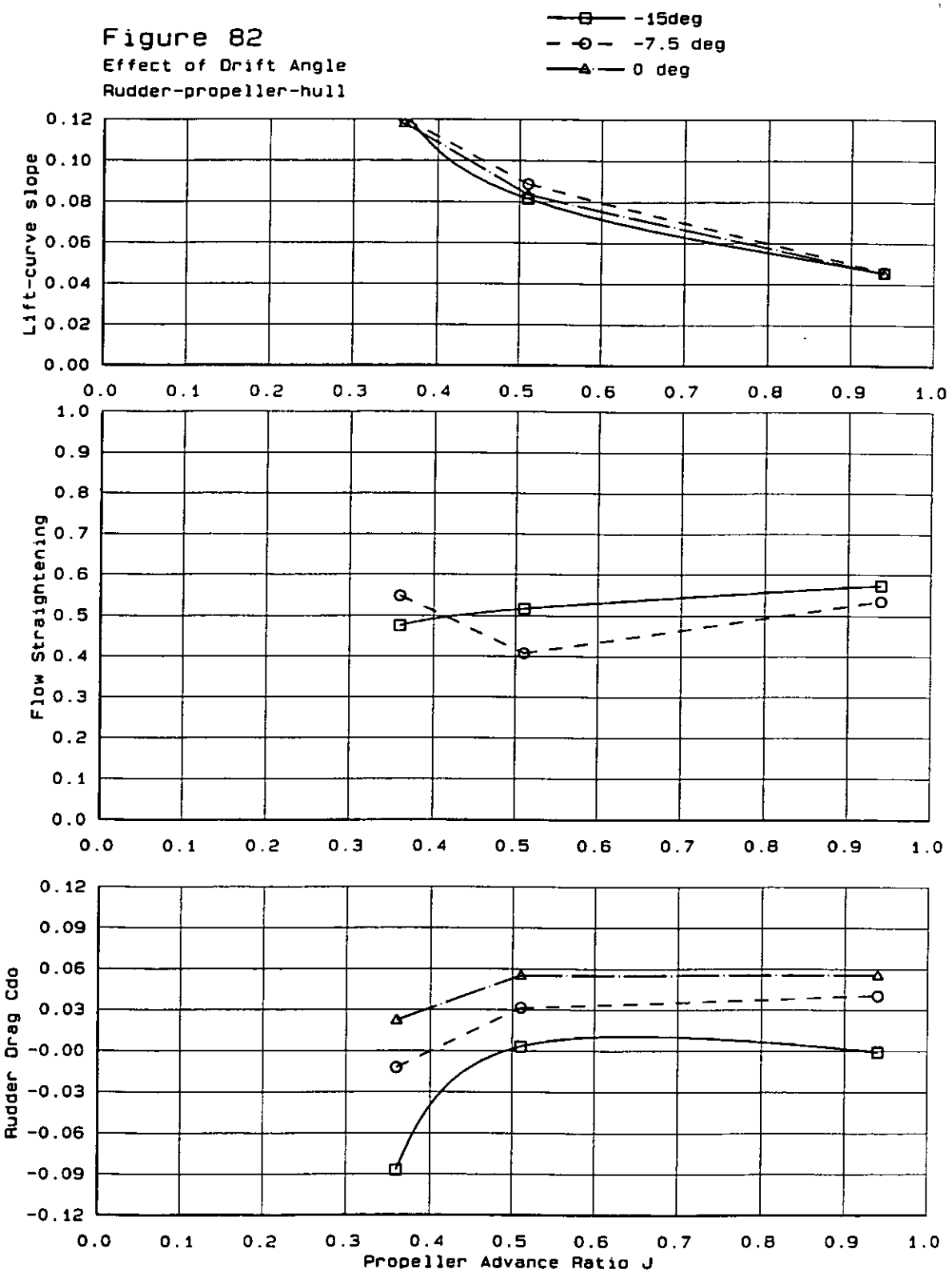



Figure 82 Effect of drift angle on the lift-curve slope, flow straightening, and zero drag for Rudder No. 2 with an upstream Mariner stern form

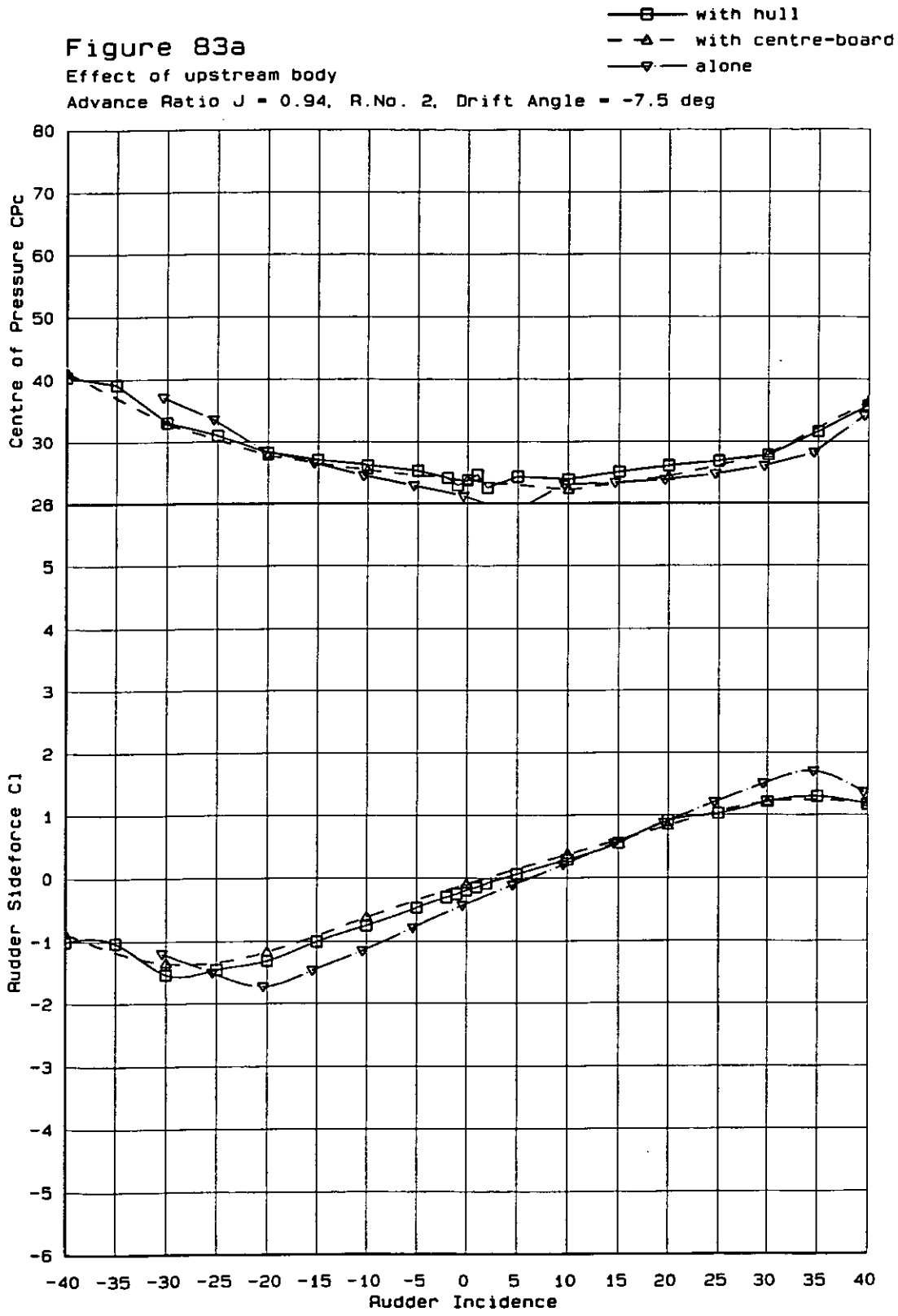



Figure 83a Comparison of the performance of Rudder No. 2 at J of 0.94, drift angle of -7.5° with full centre-board, with hull and alone : Lift and CPc

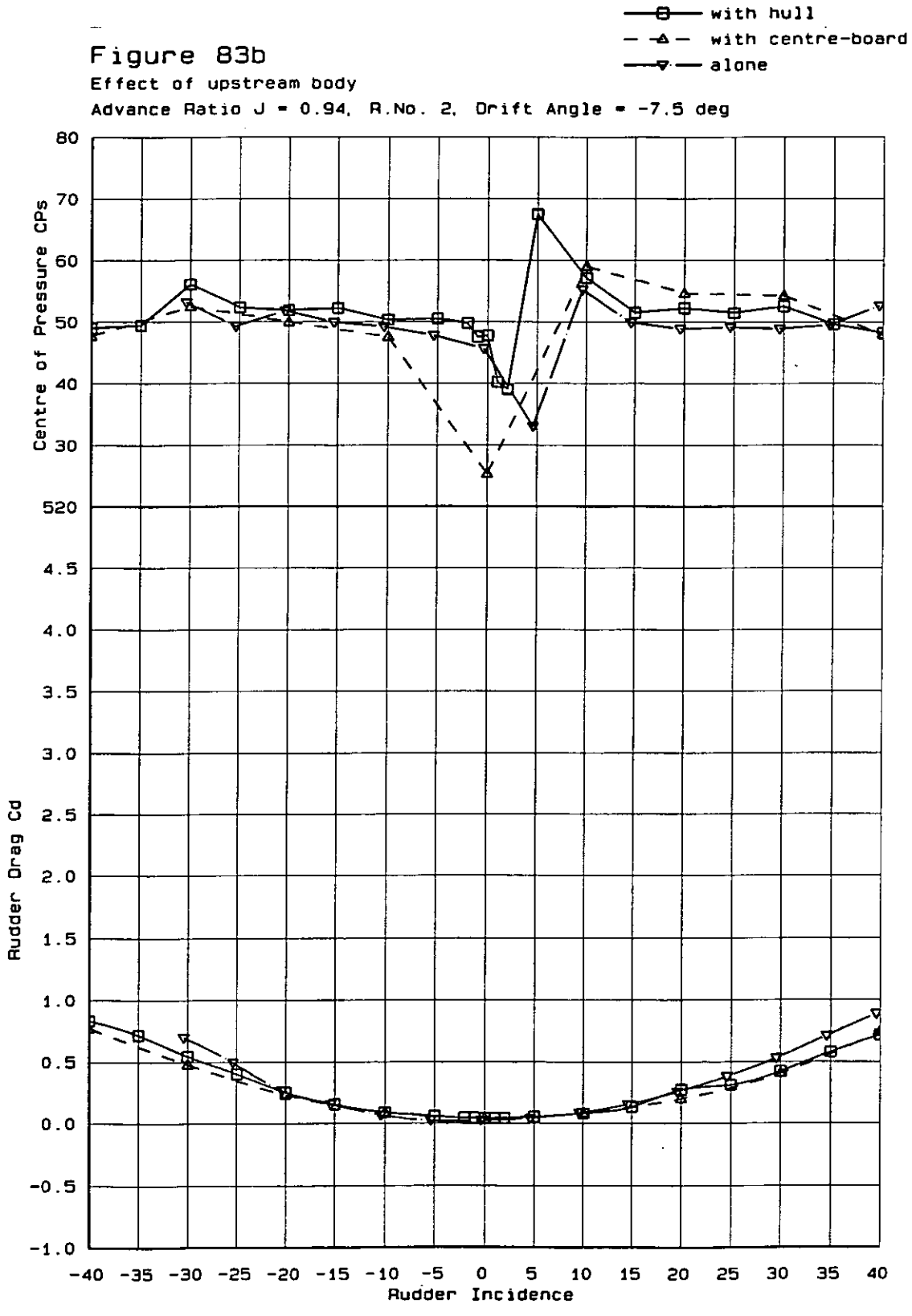



Figure 83b Comparison of the performance of Rudder No. 2 at J of 0.94, drift angle of -7.5° with full centre-board, with hull and alone: Drag and CPs

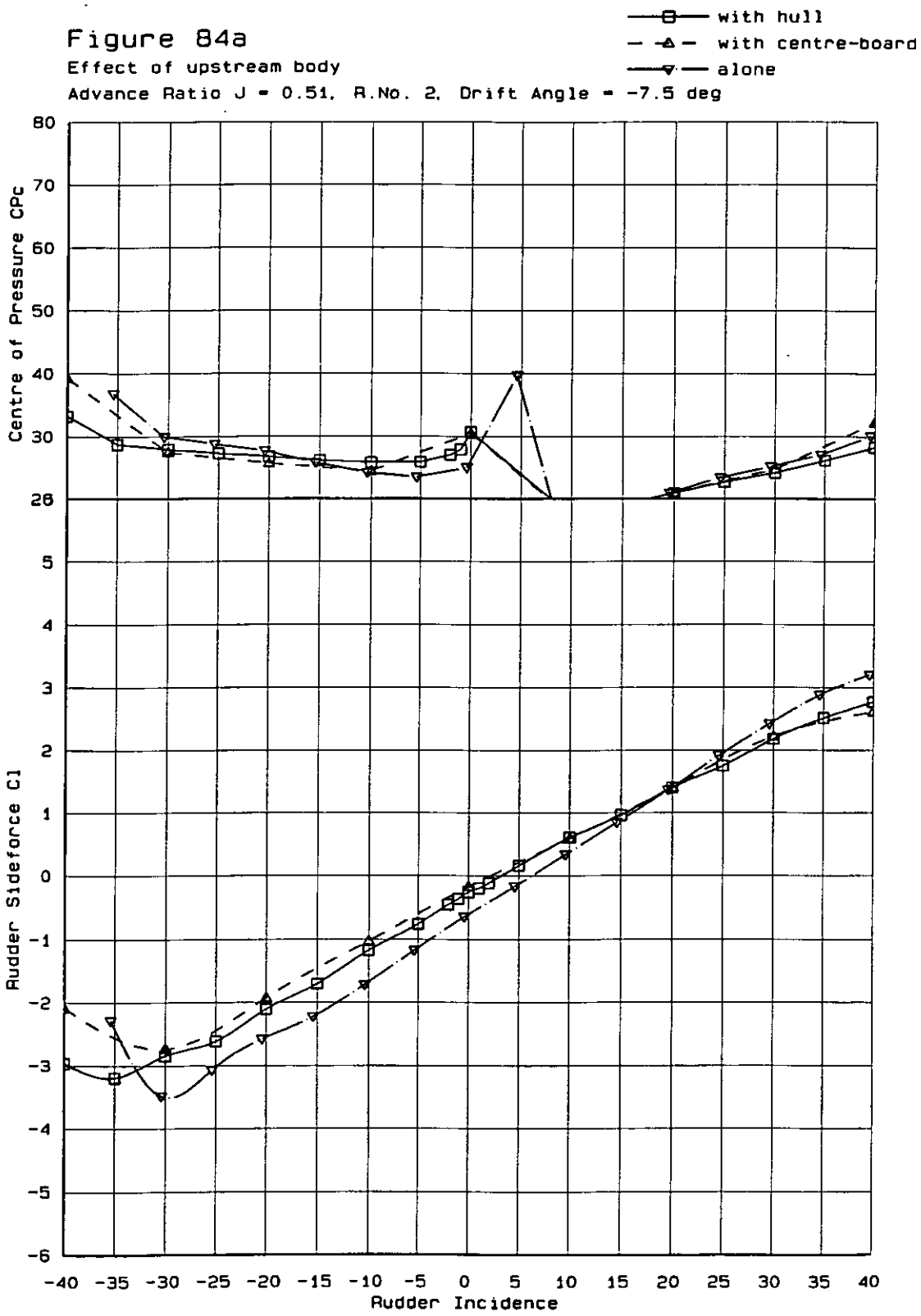



Figure 84a Comparison of the performance of Rudder No. 2 at J of 0.51, drift angle of -7.5° with full centre-board, with hull and alone: Lift and CPc

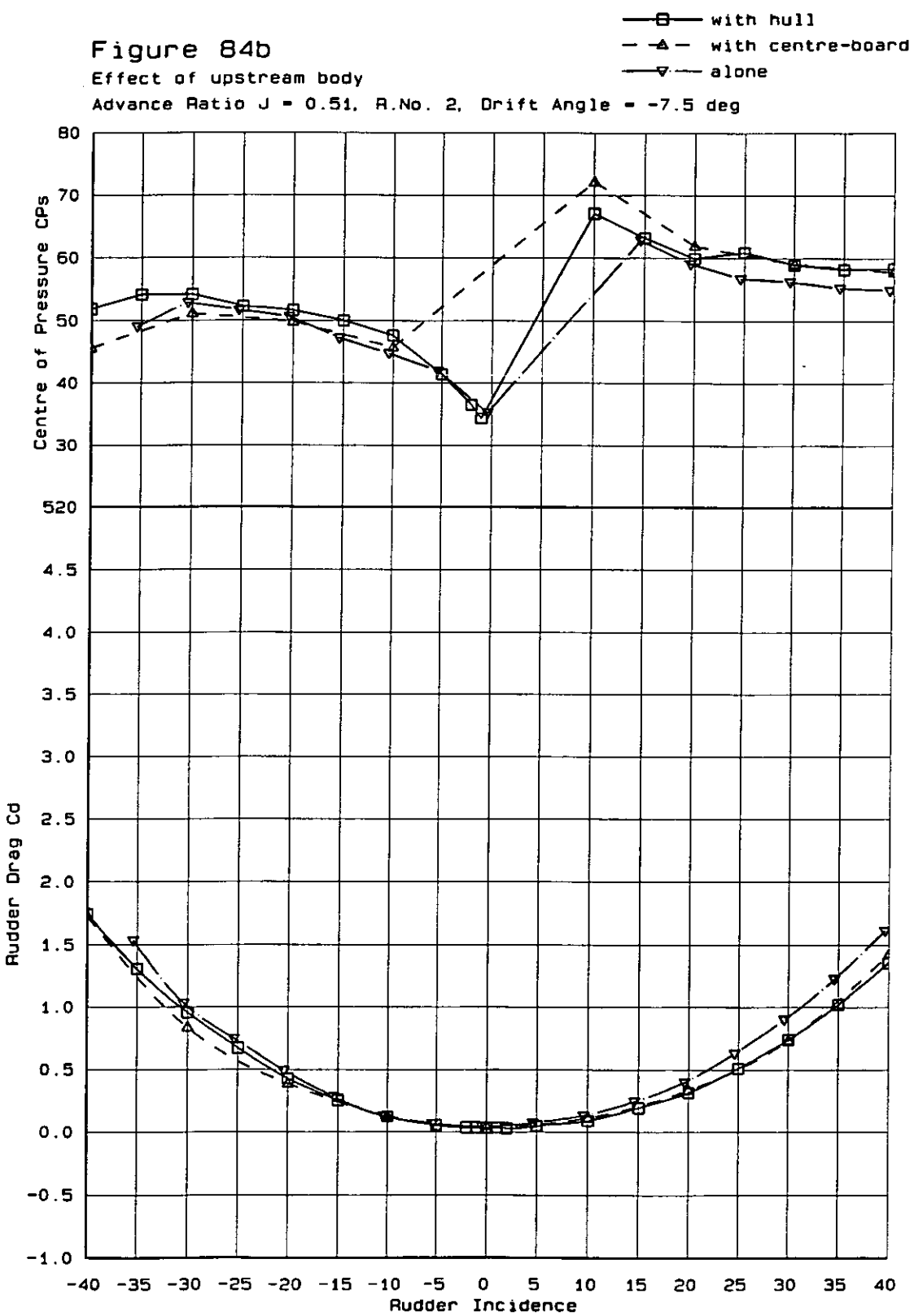



Figure 84b Comparison of the performance of Rudder No. 2 at J of 0.51, drift angle of -7.5° with full centre-board, with hull and alone: Drag and CPs

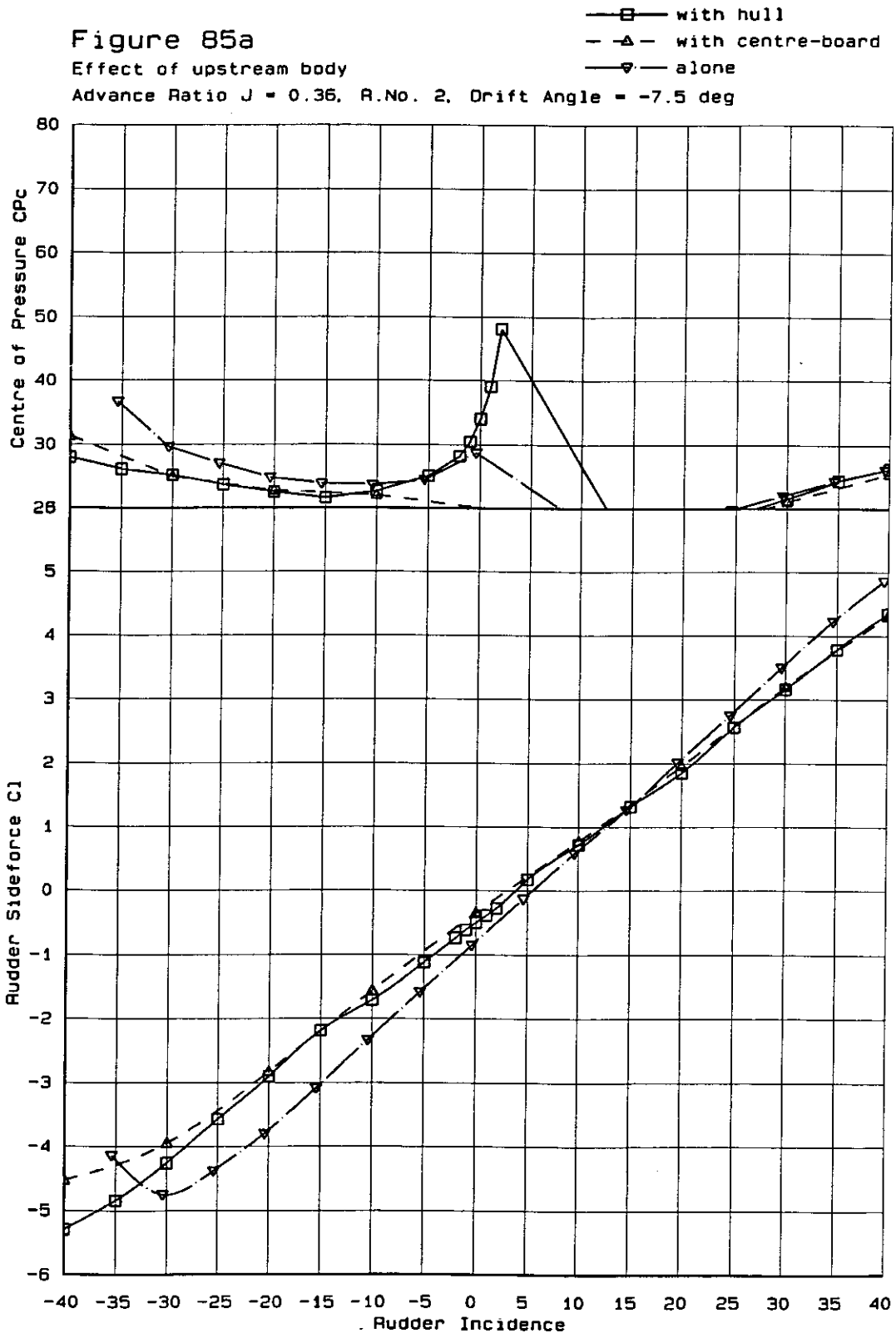



Figure 85a Comparison of the performance of Rudder No. 2 at J of 0.36, drift angle of -7.5° with full centre-board, with hull and alone:Lifta and CPc

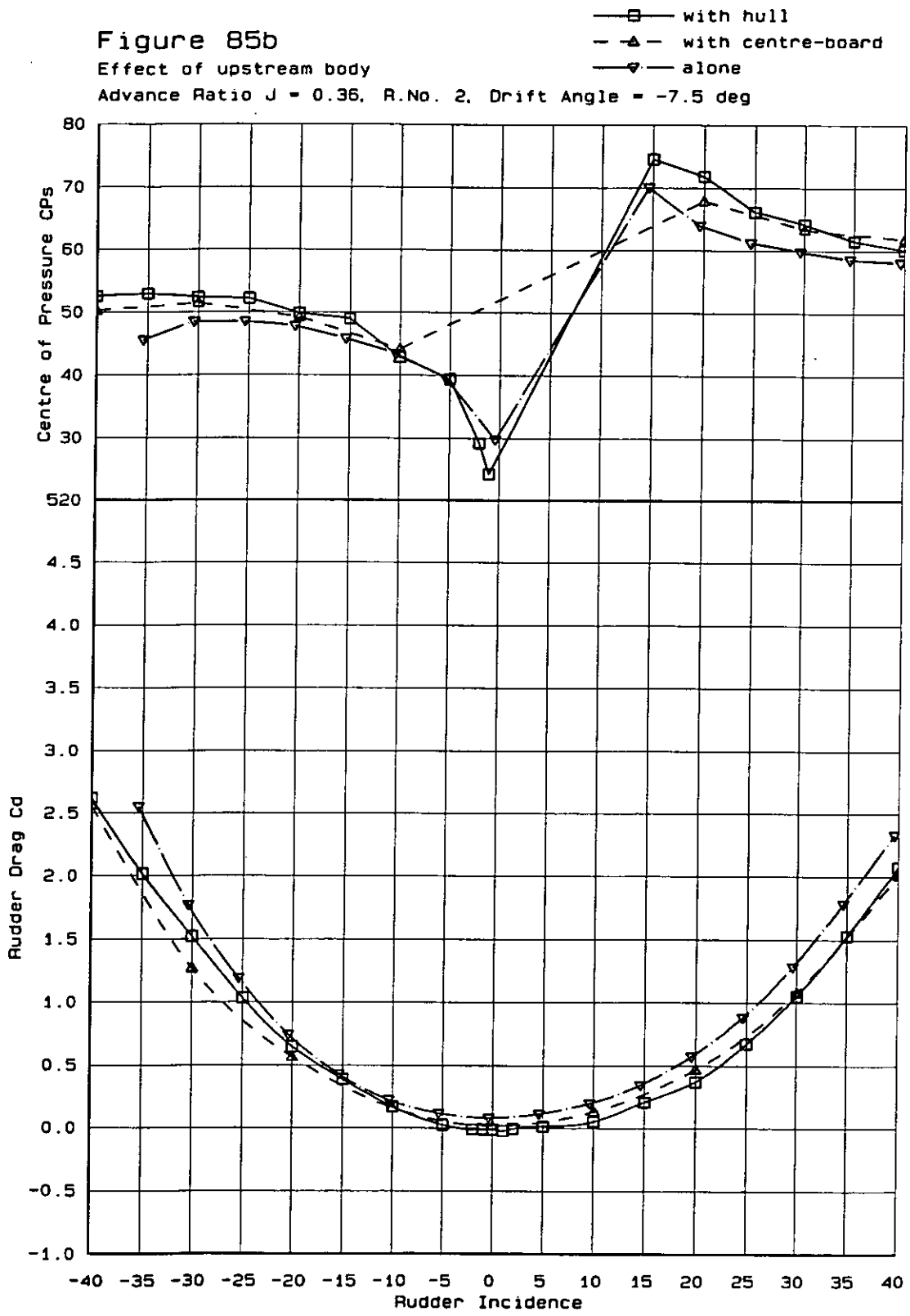



Figure 85b Comparison of the performance of Rudder No. 2 at J of 0.36, drift angle of -7.5° with full centre-board, with hull and alone: Drag and CPs

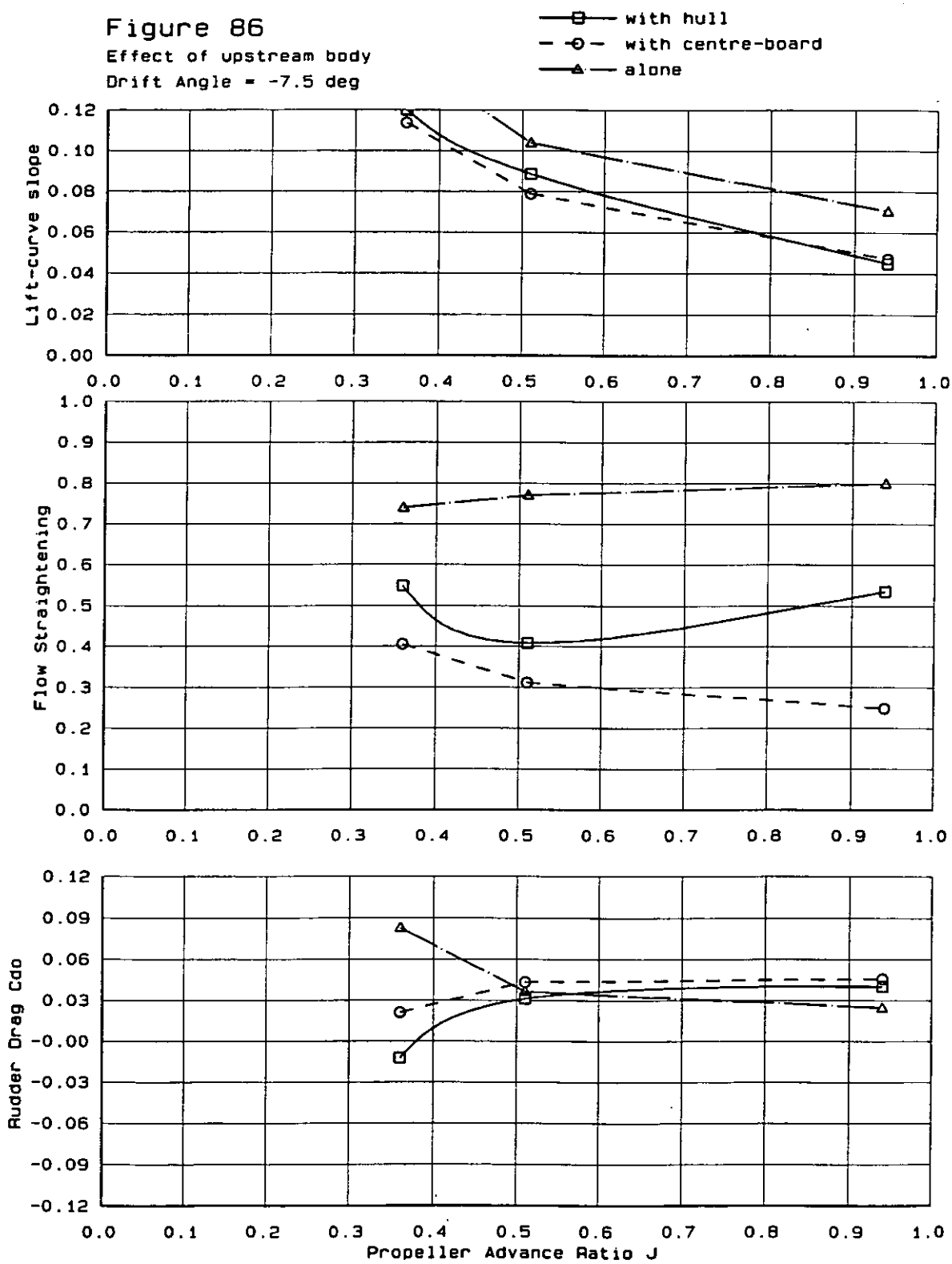



Figure 86 Effect of type of upstream body on the lift-curve slope, flow straightening, and rudder drag zt zero incience of Rudder No. 2