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SAMSO TR 69-383

AN EXPERIMENTAL INVESTIGATION OF BOUNDARY LAYER TRANSITION ON A CONE AT ANGLE OF ATTACK

Prepared for

Space and Missile System Organization

Norton Air Force Base, California

SAMSO TR 69-383

AN EXPERIMENTAL INVESTIGATION OF BOUNDARY LAYER TRANSITION ON A CONE AT ANGLE OF ATTACK

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SEPTEMBER 1969

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FOREWORD

This report presents the results of work performed by the General Electric Re-entry and Environmental Systems Division during the second half of CY 1969 under Contract F04701-69-C-0116 which is jointly supported by SAMSO and ARPA. The work was accomplished under Task 7.8.2 (Asymmetric Transition Effects on Vehicle Trim) of the STREET G Program and was monitored by Lt. R. Padfield (U.S. Air Force, SAMSO) and K. Kresa (ARPA).

This report has been reviewed and is approved.

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ABSTRACT

As the first part of the Strategic Re-entry Technology (STREET G) task to determine the effect of asymmetric transition on static stability, an experimental investigation of the influence of angle of attack on boundary layer transition front location and shape has been conducted at AEDC Tunnel B at Mach 8. The model was a stainless steel 7.2 degree half-angle cone with three bluntness ratios (R_N/R_B = 0.0.01, 0.02). For each of the bluntness ratios, heat transfer data were obtained for four values of the free stream Reynolds number and for four angles of attack, that is, α = 0 degree, 1 degree, 2 degree, and 4 degree. Comparisons of the measured heat transfer at α = 0 degree were made with theory and good agreement resulted.

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ILLUSTRATIONS

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NOMENCLATURE

SYMBOLS	DEFINITION
A_B	Model base area, in.^{2}
C_m	Pitching moment coefficient based on diameter
C_p	Specific heat BTU/lb^{o}F
d_B	Model base diameter (11.00 in.)
h	Enthalpy
k	Thermal conductivity
L	Model length, in.
M	Mach number
P	Pressure, psia
Pr	Prandtl Number, $C_p\mu/k$
q	Dynamic pressure, psia
q	Heat transfer flux, BTU/ft^2 sec.
r_o	Local model outer radius
R	Universal gas constant, 1545. 43 ft. $lb._f/^o$ R lb_m mole
R_e	Reynolds number
R_N/R_B	Model nose bluntness ratio
S_T	Stanton number, $\dot{q}/(h_o - h_w)(\rho u)_\infty$
s	Model wetted length
T	Temperature
t	Time, seconds
u	Velocity component parallel to flow direction, fps.
X	Model axial distance, in.

Greek Symbols

α	angle of attack, degrees
γ	ratio of specific heats
μ	absolute viscosity
ρ	density, lb_m/ft^3
τ	model wall thickness (inches)

Subscripts

e	edge conditions
o	stagnation conditions
w	wall conditions
∞	free stream conditions

Superscripts

*	reference conditions

SECTION I

INTRODUCTION

As part of the Strategic Re-entry Technology Program (STREET G), experimental studies are being conducted to investigate the effects that asymmetric transition can have on the static stability and resulting trim angle of attack of an ablating re-entry vehicle. The experimental investigation is composed of two phases: the first, to map the transition front location and shape on a no-blowing conical model at angle of attack; the second, to measure the forces and moments on a porous model configured to simulate ablation in the asymmetric turbulent region determined in the first phase. From this test series, the objective is to establish whether the trim angles of attack that are observed in flight, beginning at the point of transition onset at the base, can be attributed to the effets of asymmetric transition progression along the body. The investigation will not duplicate the many phenomena that occur in flight but does represent a reasonable facsimile of the flow processes.

This report presents the experimental data obtained on the first phase, i.e., transition mapping on an impervious conical model, of the test program. The tests were conducted at Mach 8 in Tunnel B of the van Karman Facility at AEDC. Thermocouples have been utilized to establish the shape and location of the transition front as a function of angle of attack, Reynolds number, and nose bluntness.

SECTION II

MODEL DESCRIPTION AND TEST PROCEDURE

The model used in the heat transfer test was a 7.2 degree half-angle cone, 43.54 inches long, with a removable nose section, Figure 1. Three nose bluntness ratios were utilized for the model (i.e., R_N/R_B = 0, 0.01, 0.02). One hundred thermocouples were installed on the inside of the model wall. The concentration of thermocouples was on one-half the model with several installed on the opposite half to check the yaw symmetry of the heat transfer. Table I details the location and wall thickness at each thermocouple.

Data were obtained at Mach 8 for four (4) Reynolds numbers with the model pitched at angles of attack of 0 degree, 1 degree, 2 degree, 4 degree. A summary of the test conditions is presented in Table II. The four Reynolds numbers were chosen to place the end of the transition region at prescribed axial locations on the model at zero angle of attack. The desired end of transition locations were to span the model, from near the aft end to a point as far forward as possible. The sharp cone (R_N/R_B = 0) and R_N/R_B = 0.02 configurations were tested at each of the four Reynolds numbers while the 1 percent bluntness model was tested at the two lowest Reynolds numbers only.

The model was mounted on the tunnel injection mechanism and at each test condition was inserted into the tunnel at the desired angle of attack. Data were recorded on magnetic tape at a rate of two hundred samples per second per thermocouple. The model was withdrawn from the tunnel and cooled in the dump tank after obtaining data for each test condition.

TABLE 1. LOCATION AND WALL THICKNESS AT 100 THERMOCOUPLES

"X" Dim.	T/C No. on Each Ray and Wall Thk. in Inches															
	0° Ray	Wall Thk.	45° Ray	Wall Thk.	90° Ray	Wall Thk.	135° Ray	Wall Thk.	180° Ray	Wall Thk.	225° Ray	Wall Thk.	270° Ray	Wall Thk.	315° Ray	Wall Thk.
6.560	1	.049														
8.130	2	.0495														
10.988	3	.059	21	.059	39	.059	57	.059	75	.058						
12.841	4	.063	22	.064	40	.064	58	.064	76	.064						
14.694	5	.063	23	.060	41	.063	59	.063	77	.059						
16.547	6	.060	24	.060	42	.063	60	.062	78	.060						
18.400	7	.058	25	.058	43	.059	61	.060	79	.059						
20.253	8	.055	26	.056	44	.062	62	.058	80	.057						
22.106	9	.054	27	.053	45	.055	63	.051	81	.050						
23.959	10	.056	28	.054	46	.057	64	.053	82	.053						
25.812	11	.055	29	.055	47	.056	65	.053	83	.053						
27.665	12	.054	30	.054	48	.055	66	.053	84	.053						
29.518	13	.050	31	.049	49	.050	67	.048	85	.048						
31.523	14	.048	32	.047	50	.047	68	.047	86	.047			95	.045		
33.306	15	.048	33	.055	51	.052	69	.056	87	.048						
35.089	16	.056	34	.056	52	.052	70	.058	88	.052			96	.053		
36.872	17	.051	35	.054	53	.050	71	.055	89	.051						
38.655	18	.050	36	.0525	54	.049	72	.054	90	.046	93	.051	97	.051	99	.052
40.438	19	.050	37	.051	55	.048	73	.049	91	.049						
42.221	20	.048	38	.048	56	.048	74	.048	92	.046	94	.048	98	.048	100	.048

TABLE II. SUMMARY OF TEST CONDITIONS

$M_\infty = 8$

$Re_{\infty} \times 10^{-6}$/ft	P_o PSIA	T_o (^oR)	R_N/R_B	α (Degrees)
3.79	860	1332.0	0, 0.02	0, 1, 2, 4
3.02	670	1310.0	0, 0.02	0, 1, 2, 4
2.20	470	1300.0	0, 0.01, 0.02	0, 1, 2, 4
1.32	280	1260.0	0, 0.01, 0.02	0, 1, 2, 4

SECTION III

TEST FACILITY DESCRIPTION

AEDC's hypersonic wind tunnel B is equipped with an axisymmetric contoured nozzle which provides Mach 6 and 8 flow through the 50-inch diameter test section. The tunnel is closed circuit which operates over a range of pressures with air supplied by a main compressor system. Stagnation temperatures sufficient to avoid liquefaction in the test section are obtained through the use of a natural-gas-fired combustion heater. The tunnel is equipped with a model injection system which facilitates model changes or cooling without requiring the tunnel to shut down.

Reynolds number variations from 0.30 to 3.8 x 10^6 per foot correspond to dynamic pressure variations from 0.30 to 4.1 psi for a Mach number of 8.0. The stagnation temperature in the tunnel is approximately 900 degrees F. The model may be rolled 180 degrees and pitched a total of 30 degrees on a straight sting arrangement.

A more detailed description of the facility can be found in Reference 1.

SECTION IV

DATA REDUCTION

Data were recorded from the model sensors during the entire tunnel entry time period. That is, the temperature versus time history of each thermocouple was recorded at the rate of 200 samples per second. An initial time, t_o was established when the model reached the tunnel centerline. Injection of the model from the dump tank below the tunnel to the centerline takes approximately 2 seconds. The data printout is based on this time as being zero. Since the aerodynamic heat transfer to the model is proportional to the slope of the temperature-time history at a prescribed time, a least square curve was fit to the ± 10 points in the vicinity of this time. The slope was then obtained from the curve fit. The data were calculated at four time intervals, 0.00, 0.25, 0.50, and 1.00 seconds from time zero. The graphical and tabulated data presented in this report are the t = 0 data. A complete listing of all the available data may be obtained from the authors. The equations and curve fits employed at AEDC in reducing the Tunnel B and C thermocouple data may be found in Appendix A.

Some typical variations of the Stanton number (~ heat transfer) with time for several thermocouples at three axial stations may be found in Figures 2 through 5. The relative accuracy of the heat transfer as calculated by the one-dimensional heat conduction equation

$$\dot{q} = \rho C_p \tau \frac{dT}{dt}$$

which assumes that there is no conduction within the model and that there is no convection, is approximately ~ 6 percent. Roughly ± 1 percent can be attributed to the uncertainty in the specific heat of the material. The error bars shown in Figures 2-5 were drawn consistent with the aforementioned accuracy. Since the accuracy of the one-dimensional heat conduction equation degrades as the model wall is heated, due to conduction errors, the most accurate data are obtained as soon as the model responds to the sensible aerodynamic heating. For the model wall thickness of 50 to 60 mils, the most accurate time interval is during the first second from time zero. It can be noted from Figures 2-5 that the time dependency of the Stanton number is generally within the accuracy of the heat transfer measurement and consequently, only the data at time zero were plotted. The stated accuracy of the data refers to "good" thermocouple installations. There were several thermocouples on the model that were damaged prior to and during the test. These gages will show up in the axial plots as the spurious points which obviously do not agree with the data trends. No attempt was made to screen out these points.

The Stanton number variation with axial length is plotted in Figures 6 through 57. The corresponding tabulated data are listed before each figure. The data are grouped by model bluntness ratio (R_N/R_B = 0, 0.01, and 0.02) and within each bluntness set are grouped with the Reynolds number in a decreasing order.

SECTION V

RESULTS

The heat transfer distribution on the cone model was obtained along several conical rays, as was noted earlier. The data were obtained at Mach 8 for four values of the free stream Reynolds number. For each Reynolds number, data were obtained at four angles of attack, namely 0 degree, 1 degree, 2 degree, and 4 degree. A limited investigation on the effects of nose bluntness on the transition front location and shape with angle of attack was also obtained.

DATA COMPARISONS WITH THEORY

Comparisons of the data obtained at zero angle of attack were made with the results of the Viscous Interaction Zero Angle of Attack Drag (VIZAAD) Program.(2) For laminar flow, the heat transfer is calculated from Lee's laminar flow equation(3) modified by reference enthalpy conditions to account for the variation of flow properties across the boundary layer:

$$\dot{q}_{LAM} = \frac{0.354\ \rho^*\mu^*\ u_e\ r_o(h_r - h_w)}{(Pr)^{2/3}\left[\int_o^s \rho^*\mu^* u_e r_o^2 ds\right]^{1/2}}$$

For turbulent flow, Walker(4) obtained a solution for the combined momentum and energy integral equations. This solution provides the following relation for the local turbulent heat transfer in terms of boundary layer outer edge properties and reference enthalpy conditions:

$$\dot{q}_{TURB} = \frac{0.0296\ \rho_e^{0.2}\ \mu_e^{0.05}\ (\mu_*)^{0.2}\ (\rho_*)^{0.8}\ u_e\ r_o^{0.25}\ (h_r - h_w)}{\left[\int_o^s \rho_e\mu_e\ \mu_e^{0.25}\ r_o^{1.25}\ ds\right]^{0.2}}$$

In general, solutions were obtained wherein the state of the boundary layer was either all laminar or all turbulent. The data comparisons with theory in terms of the Stanton number, $S_T = \dot{q}/(\rho u_\infty (h_o - h_w)$, for the sharp cone model are presented in Figures 58 and 59; for $R_N/R_B = 0.01$ in Figure 60; for $R_N/R_B = 0.02$ in Figures 61 and 62. From these figures, it can be noted that there is excellent agreement between the data and the theory in the laminar region. The data exhibits an increase through the transitional flow region to a peak which is higher than the "all turbulent" theory. The heat transfer then decays at a rate somewhat faster than the "all turbulent" theory. At sufficiently large distances from the end of transition, the theory and data are in good agreement. In summary, it can be stated that for a non-ablating body, the heat transfer predicted by the VIZAAD program is in good agreement with data for laminar flows and for turbulent flows in the region far removed from the end of transition.

A summary of the deduced transition onset and end points for α = 0 degree is tabulated in Table III. Also listed in this table are the local wetted length Reynolds number $R_{e_{ST}}$, the local momentum thickness Reynolds number, Re_{θ_T}, and the edge Mach number at the beginning and end of transition obtained from the laminar VIZAAD theory. The data are plotted in Figure 63. As R_{e_∞} is reduced, the transitional flow region enlarges for both R_N/R_B = 0 and 0.02. A summary of the deduced end of transition points on the cone for R_N = 0 may be found in Table IV, for R_N/R_B = 0.01 in Table V, and for R_N/R_B = 0.02 in Table VI. Graphical representations of the data for ϕ = 0 degree (leeward ray), ϕ = 90 degree, and ϕ = 180 degree (windward ray) may be found in Figures 64, 65, and 66 for R_B = 0, 0.01, and 0.02, respectively. The spatial distribution of the end of transition for each of the bluntness ratios investigated may be found in Figures 67-69.

For the sharp cone, the end of transition at angle of attack tends to move slightly rearward from the zero alpha location on the windward ray, and forward on the leeward ray. In particular, the forward movement on the leeward ray is more pronounced than is the aft movement on the wind side (Figure 67). This trend is similar to the sharp cone phenomena experienced by other experimenters(5-9). It should be pointed out that this trend implies that transition occurs at a significantly lower local Reynolds number on the lee side than the windward rays. This forward movement on the lee side has classically been attributed to the destabilizing influences of cross flow.

As the cone is blunted to a value of R_N/R_B = 0.01 (R_N = 0.055"), the transition point moves forward on both the windward and leeward rays, from the zero alpha point (Figure 68). However, the forward movement is greater on the lee side than on the windward side. This trend with bluntness is identical to that noted by Stetson and Rushton(7) for bluntness ratios of R_N/R_B = 0.04 and 0.08 (R_N = 1/8" and 1/4"). Furthermore, this lee side forward - wind side aft was noted in flight for blunt vehicles. On the lateral side (ϕ = 90 degrees), the transition location is slightly aft of the zero angle of attack value.

In addition to the data obtained at a one percent bluntness ratio, data were also obtained for R_N/R_B = 0.02 (Figure 69). For this bluntness ratio, a reversal occurs. Namely, the transition point moves further forward on the windward ray than on the leeward ray. In addition, the end of transition was noted to be furthest aft on the ϕ = 45 degree ray. To the author's knowledge, the data reported by Maddalon and Henderson(10) are the only other source of data that indicate a similar phenomena. It should be pointed out that the data attributed to this source by many authors does not actually appear in this reference (i.e., Reference 10) but may be found in the paper by Bertram and Beckwith(11). These data are for a sharp 2.87 degree half angle at a 2 degree angle of attack cone at M = 20 in helium. The definition of transition was obtained with a pitot tube recording impact pressures near the model surface. It is not clear at this time why this apparent reversal occurs.

The prediction of the heat transfer in the transitional and the ensuing turbulent flow regions is out of scope for the current effort and should be the subject of future study. However, the one case (R_e = 3.79 x 10^6 per foot and R_N/R_B = 0.02), comparisons were made using the VIZAAD theory for mixed laminar-turbulent solutions. That is, for a prescribed "transition" point, the momentum thickness from the laminar solution, θ_L, is set equal to the turbulent momentum thickness, θ_T. Then, using the turbulent flow relations, the remaining viscous properties δ^*, δ C_f $\dot{q}$, etc. are computed. The implication here is that the turbulent solution has an "effective" origin consistent with θ_T. Two such solutions were made for $(X_T/_L)$ = 0.5 (transition onset) and for $X_T/_L$ = 0.72 (end of transition). The results are shown in Figure 61. The magnitude of the "heat transfer overshoot" is accurately predicted by this simple approach. Furthermore, the two solutions tend to bracket the experimentally measured heat transfer values in the turbulent flow region.

TRANSITION REGION DEFINITION

As stated earlier, the objective of the first test phase was to establish, quantitatively, the shape of the transition front as dedued from the surface heat transfer measurements. This was performed for several values of the free stream Reynolds number, angle of attack, and the nose bluntness. Based on these results, the second phase of testing (i.e., the force phase) will employ a porous model with the blowing schedule tailored to conform to the transition front shape. That is, the surface mass transfer will be zero in the laminar-transitional region and will be non-zero in the turbulent region. The blowing rate will be varied during the test so as to encompass vehicles with refractory heat shields as well as vehicles with teflon heat shields. The forces and moments that are attributed to the asymmetric transition front will therefore be determined experimentally. Although in an actual flight case the blowing (i.e., ablation) schedule is non-zero everywhere, the aforementioned configuration was deemed a reasonable facsimile of flight.

The physical locations of the transition onset and end points were deduced from the data in the following manner:

The onset point was established to be the point where the heat transfer (i.e., the Stanton number) is a minimum (e.g., see Figures 58 - 62). The end of transition was deduced to be the point where the heat transfer is a maximum. There is some question as to exactly where the end of transition actually occurs because the peak heat transfer overshoots the "all turbulent" theory. For this investigation, however, the maximum heat transfer point was chosen consistently. Since the blowing schedule will be tailored to the end of transition points, emphasis was placed on this data.

As is evident in the data plots of Section IV, the exact location where transition begins or ends is not always clear. Consequently, from the first estimates deduced from the data, a smoothing process was employed wherein the transition points were cross plotted with the angle of attack, α meridian angle, ϕ, free stream unit Reynolds number, R_{e_∞}/ft., and nose bluntness R_N. The faired values resulting from this smoothing process were then rechecked against the heat transfer data. In all cases the resultant transition points actually reflect, to within the accuracy of the data, the trends deduced from the heat transfer measurements. It was felt that this process eliminates only the inherent data scatter that can be attributed to experimental uncertainties. Since the basic data are reported, the reader can draw independent conclusions if desired.

TABLE III. SUMMARY OF DEDUCED TRANSITION ONSET AND END POINTS FOR $a = 0^o$

$a = 0^o$
$M_\infty = 8$
$\theta_c = 7.2^o$ $L = 3.628'$

				Onset				End			
				Lam. VIZAAD				Lam. VIZAAD			
GP.	Re_∞ (x 10^{-6})	R_N/R_B	T_W/T_G	X_{TR}/L	Re_{ST} (x 10^{-6})	Re_{θ_T}	M_e	X_{TR}/L	Re_{ST} (x 10^{-6})	Re_{θ_T}	M_e
1	3.79	0	.405	.19	3.93	726	6.76	.38	7.86	1065	6.76
11	3.02	0	.40	.264	4.36	784	6.76	.447	7.38	1039	6.76
22	2.18	0	.40	.36	4.29	790	6.75	.595	7.11	1028	6.76
32	1.35	0	.425	.504	3.63	730	6.74	.885	6.40	978	6.74
47	2.15	.01	.42	.504	5.867	968	6.77	.758	8.97	1181	6.81
42	1.36	.01	.432	.63	4.73	864	6.79	– –	– –	– –	– –
6	3.79	.02	.390	.504	8.25	1231	6.44	.72	13.36	1524	6.64
17	3.05	.02	.40	.504	6.85	1116	6.49	{ .76	11.69	1415	6.68
								{ .80	12.45	1456	6.69
27	2.20	.02	.40	.588	6.32	1053	6.62	.88	10.24	1309	6.74
37	1.35	.02	.432	.724	5.116	925	6.71	– –	– –		– –

TABLE IV. END OF TRANSITION (X/L)

$R_N = 0$

ϕ L = 43.54"

$R_{e_\infty} \times 10^{-6}$/ft	a	0°	45°	90°	135°	180°
3.79	0°	.380	.380	.380	.380	.380
↓	1	.338	.358	.390	.41	.415
	2	.295	.338	.415	.420	.425
	4	.252	.335	.420	.431	.431
3.05	0	.447	.447	.447	.447	.447
↓	1	.380	.41	.457	.479	.480
	2	.315	.380	.485	.495	.500
	4	.260	.465	.510	.515	.520
2.20	0	.595	.595	.595	.595	.595
↓	1	.465	.550	.605	.630	.635
	2	.375	.508	.635	.650	.660
	4	.330	.507	.678	.685	.690
1.35	0	.885	.885	.885	.885	.885
↓	1	.650	.847	.900	.940	.960
	2	.540	.847	.960	— —	— —
	4	.470	.929	— —	— —	— —

TABLE V. END OF TRANSITION (X/L)

R_N/R_B = 0.01   L = 43.54"

R_{e_∞} x 10^{-6}/ft	a	φ 0°	45	90	135	180
2.20	0°	.758	.758	.758	.758	.758
↓	1	.624	.765	.78	.765	.715
	2	.55	.678	.765	.724	.678
	4	.46	.635	.724	.724	.678
1.35	0	1.03				
↓	1	.80	.924			
	2	.635	.888			
	4	.58	.847			

TABLE VI. END OF TRANSITION (X/L)

R_N/R_B = 0.02   L = 43.54"

R_{e_∞} x 10^{-6}/ft	a	φ 0°	45	90	135	180
3.79	0°	.724	.724	.724	.724	.724
↓	1	.712	.78	.69	.635	.60
	2	.635	.76	.67	.59	.55
	4	.508	.593	.55	.49	.465
3.05	0	.785	.785	.785	.785	.785
↓	1	.765	.847	.75	.712	.705
	2	.678	.806	.70	.65	.64
	4	.55	.635	.635	.56	.53
2.20	0	.88	.88	.88	.88	.88
↓	1	.85	.929	.889	.82	.80
	2	.765	.889	.806	.74	.724
	4	.624	.765	.730	.62	.580

SECTION VI

CONCLUSIONS

An experimental investigation was conducted at Mach 8 in Tunnel B of the von Karman Facility at AEDC. The o ,ective of these tests was to establish the asymmetric shape of the transition front on a cone at angle of attack. The model, instrumented with 100 thermocouples was a 7.2 degree half angle stainless steel cone with three nose configurations (i.e., R_N/R_B = 0, 0.01, and 0.02). For each configuration, data were obtained at four Reynolds numbers and for four angles of attack.

The transition front locations determined from this heat transfer phase indicated that the beginning of the turbulent region moved forward on the leeward side and aft on the windward meridian from the $\alpha = 0$ degree locations for the sharp cone model. On the side meridian, a slight rearward shift occurred. For $R_N/R_B = 0.01$, the turbulent front moved forward of the $\alpha = 0$ degree location on both the wind and lee meridians with the leeward side moving most forward. The side meridian location moved aft of the $\alpha = 0$ degree value. For $R_N/R_B = 0.02$, an apparent reversal occurred. The leeward transition front was aft of the $\alpha = 0$ degree location while the windward front was forward of this point. The maximum aft transition location occurred at $\phi = 45$ degrees. This reversal is not presently explained. However, other available ground test data at larger bluntness ratios typical of current R/Vs ($R_N > 0.25$") indicate trends similar to the sharp cone data obtained on the current test.

Comparisons of the $\alpha = 0$ degree heat transfer data were made with the GE-VIZAAD theory. In general, the data in the laminar region agrees well with the theory. In the turbulent regime, good agreement was noted between an all turbulent VIZAAD theory and the data for a region far downstream of the end of transition. A heat transfer overshoot (over the all turbulent theory) was noted in the vicinity of the end of transition. An instantaneous jump from a laminar to a turbulent theory, matching momentum thicknesses at the "transition" onset or end point, results in good agreement between prediction of the maximum heat transfer and the data.

SECTION VII

RECOMMENDATIONS

The objective of this phase of the STREET G task "Asymmetric Transition Effects on Vehicle Trim" is to establish, through experimental measurements, characteristic transition front shapes for a vehicle at small angle of attack. The results of these measurements will then be used to pattern the blowing schedule on a porous model (i.e., simulated ablation). Force and moment measurements are then to be obtained for several values of the blowing parameter, free stream Reynolds number, and angle of attack.

With the exception of the $R_N/R_B = 0.02$ results, the data obtained in this investigation agree with trends noted in available ground and flight test experiments. Furthermore, it was concluded that the sharp cone data will provide transition front shapes that will tend to maximize the incremental moment coefficient due to a skewed front. The force and moment data that will be obtained in Phase 2 of the current task will be used to establish whether the variations in static stability obtained in the wind tunnel are in agreement with trends measured in flight. That is, does the traversal of a skewed transition front produce a ΔC_m variation with axial station similar to that shown in Figure 70? Therefore, it is recommended that data be obtained for the Reynolds numbers and transition front shapes noted in Figure 71. The lower three Reynolds numbers were selected to establish the shape of the ΔC_m curve when the front lies aft of the center of gravity. The high Reynolds number case establishes the effect forward of the center of gravity.

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APPENDIX A. GENERAL HEAT TRANSFER PROGRAM TUNNELS A, B, AND C VON KARMAN FACILITY, AEDC

GENERAL

The program computations and print-out outlined in this memo will be used to reduce Tunnels A, B, and C heat transfer data, effective this date. Future program changes will be distributed to all recipients of this memo.

NOMENCLATURE

A	Constant
b	Model skin thickness, ft
c	Model skin specific heat, Btu/lb-^{o}R
D	Model characteristic length, ft
E	Thermocouple output, mvolts
h_T	Heat transfer coefficient, Btu/ft^2-sec-^{o}R
h_H	Heat transfer coefficient, $\frac{\text{Btu/ft}^2\text{-sec}}{\text{Btu/lb}}$
H	Air enthalpy, Btu/lb
k	Model skin conductivity coefficient, Btu/ft-sec-^{o}R
M	Mach number
p	Pressure, psia
q	Dynamic pressure, psia
Q	Heat transfer rate per unit area, Btu/ft^2-sec
r	Model nose radius, ft
Re	Free-stream unit Reynolds number, ft^{-1}
Re_D	Reynolds number based on D
St	Stanton number
t	Time, sec.
T	Temperature, ^{o}R or ^{o}F
V	Velocity, ft/sec
w	Model skin density, lb/ft^3
α	Angle of attack, deg
β	Sideslip angle, deg
ϕ	Roll angle, deg
ψ	Yaw angle, deg
μ	Air viscosity, lb-sec/ft^2
ρ	Air density, slug/ft^3

Subscripts

FR	Computed from Fay-Riddell theory
m	Model angle
o	Tunnel stagnation conditions
p	Sting prebend angle
s	Sector angle
w	Model wall conditions
∞	Tunnel free-stream conditions

Superscript

'	Conditions downstream of a normal shock

IMPUTS

1. Program Inputs

   a. Listed for each project number
      Project number
      Project engineer
      Data reduction times (maximum of 5 times, listed relative to centerline time)

   b. Listed for each model configuration
      Model configuration number

$$\left.\begin{matrix} A_0 \\ A_1 \\ A_2 \\ A_3 \end{matrix}\right\} \text{where } c_1 = A_0 + A_1 T_w + A_2 T_w^2 + A_3 T_w^3 \text{ (model material 1)}$$

$$\left.\begin{matrix} A_0^* \\ A_1 \\ A_2 \\ A_3 \end{matrix}\right\} \text{where } c_2 = A_0 + A_1 T_w + A_2 T_w^2 + A_3 T_w^3 \text{ (model material 2)}$$

Note: *Zero indicates entire model is one material

$$\left.\begin{array}{l}A_0\\A_1\\A_2\end{array}\right\}\text{where } k_1 = A_0 + A_1T_w + A_2T_w^2$$

$$\left.\begin{array}{l}A_0\\A_1\\A_2\end{array}\right\}\text{where } k_2 = A_0 + A_1T_w + A_2T_w^2$$

r, ft*

$$\left.\begin{array}{l}A_0\\A_1\end{array}\right\}\text{Where } w_1 = A_0 + A_1T_w$$

$$\left.\begin{array}{l}A_0\\A_1\end{array}\right\}\text{where } w_2 = A_0 + A_1T_w$$

c. Listed for each thermocouple
Thermocouple number
Model material (1 or 2)

b, ft
D, ft**

Notes: *Zero indicates do not compute or tabulate St_{FR} or or tabulate St/St_{FR}
**Zero indicates do not compute Re_D or tabulate $St\sqrt{Re_D}$

2. Tape Inputs

Position	Channel	Input
00	100	Gp. no.
01	101	Run no.
02	102	Mach no.
03	103	α_p
04	104	Date
05	105	Config.
06	119	℄ indicate bit
07	107	Time accumulator input, high
08	108	Time accumulator input, low

Position	Channel	Input
09	115	α_s input, high
10	116	α_s input, low
11	117	ϕ_s input, high
12	118	ϕ_s input, low
13	114	p_o range indicate
14	106	Thermocouple switch position indicate
15	109	Spare
16	110	Spare
17	111	Spare
18	112	Spare
19	113	Spare
20	00	p_o input
21	01	Model thermocouple
.	.	.
.	.	.
.	.	.
118	98	Model thermocouple
119	99	T_o input

DATA REDUCTION PROCEDURE

1. Compute for Each Data Reduction Time

$$\alpha_s^* = (\alpha_{reading} - \alpha_{zero})(1/300), \text{ deg}$$

$$\phi_s = (\phi_{reading} - \phi_{zero})(1/64), \text{ deg}$$

$$\alpha_m = \tan^{-1}(\tan\alpha_s \cos\phi_s) + \alpha_p, \text{ deg}$$

$$\psi_m = -\beta_m = -\sin^{-1}(\sin\alpha_s \sin\phi_s), \text{ deg}$$

$$p_o = (p_{o_{reading}} - p_{o_{zero}}) \text{ (scale factor), psia}$$

$$T_o^{**} = 128.485 + 44.8278E + 0.0811857E^2 - 0.0170464E^3 + 0.000632876E^4 - 0.00000710569E^5 + 460, \text{ }^oR$$

$$H_o = 4.875 + 0.2235\, T_o + 0.0000135\, T_o^2, \text{ Btu/lb}$$

$$\mu_o = 2.270\, T_o^{1.5}(T_o + 198.6)^{-1} \times 10^{-8}, \text{ lb-sec/ft}^2$$

M_∞ = manual input, scan position 02, xx, xx

$$T_\infty / T_o{}^{***} = (1 + 0.2\, M_\infty^2)^{-1}$$

$$p_\infty / p_o{}^{***} = (1 + 0.2\, M_\infty^2)^{-3.5}$$

$$p_o{}' / p_o{}^{***} = \left(\frac{6\, M_\infty^2}{M_\infty^2 + 5} \right)^{3.5} \left(\frac{6}{7\, M_\infty^2 - 1} \right)^{2.5}$$

$$T_\infty = \left(\frac{T_\infty}{T_o} \right) (T_o), \ {}^\circ R$$

$$p_\infty = \left(\frac{p_\infty}{p_o} \right) (p_o), \ \text{psia}$$

$$p_o{}' = \left(\frac{p_o{}'}{p_o} \right) (p_o), \ \text{psia}$$

$$q_\infty = 0.7\, M_\infty^2\, p_\infty, \ \text{psia}$$

$$V_\infty = 49\, M_\infty^{2'}\, (T_\infty)^{0.5}, \ \text{ft/sec}$$

$$\rho_\infty = 0.0839\, p_\infty\, (T_\infty)^{-1}, \ \text{slugs/ft}^3$$

$$\mu_\infty = 8.051 \times 10^{-10}\, T_\infty, \ \text{lb-sec/ft}^2$$

$$Re_\infty = \rho_\infty V_\infty (\mu_\infty)^{-1}, \ \text{ft}^{-1}$$

$$St_{FR} = \frac{0.254}{\rho_\infty V_\infty r^{0.5}} \ \frac{\mu_o{}^{0.4}}{T_o{}^{0.15}} \ (p_o{}')^{0.5}$$

$$\text{Wall temperature} = A_0 + A_1 E + A_2 E^2 + A_3 E^3$$

where, for Chromel-Alumel thermocouples

T_w, °F	A_0	A_1	A_2	A_3
0 to 270	132.159	43.5164	-0.295017	0.08131300
270 to 1000	122.453	47.1061	-0.237774	0.00377667
1000 to 1500	145.669	44.4543	-0.144298	0.00284639

or, for Iron-Constantan thermocouples

0 to 238	132.065	33.8251	-0.2213290	0.027791600
238 to 786	134.831	32.6871	-0.0250407	-0.000894075
786 to 1200	120.596	32.8380	0.0638280	-0.002162250

Notes: *For Tunnel A

$$\alpha_s = (\alpha_{reading} - \alpha_{zero})\,(1/100),\ \text{deg}$$

**For Tunnel A

$$T_o = -64.4605 + 141.503E - 38.2537E^2 + 7.18724E^3 - 0.680267E^4 + 0.0256285E^5 + 460,\ ^oR$$

***For Tunnel C

$$T_\infty/T_o = (1 + 0.2\,M_\infty^2)^{-1}\,[0.9378 - 3.900 \times 10^{-6}\,p_o + (6533 + 0.6547\,p_o - 0.4137\,T_o - 0.0001354\,p_o T_o)(10^{-8})\,T_o]$$

$$p_\infty/p_o = (1 + 0.2\,M_\infty^2)^{-3.5}\,[1.0562 + 49.57 \times 10^{-6}\,p_o - (3523 + 1.8300\,p_o + 1.3839\,T_o - 0.0002196\,p_o T_o)(10^{-8})\,T_o]$$

$$p_o'/p_o = \left(\frac{6 M_\infty^2}{M_\infty^2 + 5}\right)^{3.5} \left(\frac{6}{7 M_\infty^2 - 1}\right)^{2.5} [1.0419 + 38.31 \times 10^{-6} p_o$$

$$- (1968 + 0.7925\, p_o + 1.6905\, T_o)(10^{-8})\, T_o]$$

2. Computed for Each Thermocouple at Each Data Reduction Time

T_w, ^oR, and $\frac{dT_w}{dt}$, ^oR/sec, are computed from the center of a least-squares parabola through 21 consecutive wall temperature points.

$$Q = wbc \frac{dT_w}{dt}, \text{ Btu/ft}^2\text{-sec}$$

$$h_T = \frac{Q}{T_o - T_w}, \text{ Btu/ft}^2\text{-sec-}^oR$$

$$H_w = 4.875 + 0.2235\, T_w + 0.0000135\, T_w^2, \text{ Btu/lb}$$

$$h_H = \frac{Q}{H_o - H_w}, \frac{\text{Btu/ft}^2 - \text{sec}}{\text{Btu/lb}}$$

$$St = \frac{h_H}{\rho_\infty V_\infty} \left(\frac{1}{32.17}\right)$$

$$\frac{St}{St_{FR}}$$

$$Re_D = Re_\infty D$$

$$St\sqrt{Re_D}$$

TABULATED DATA

1. Tabulated for Each Data Reduction Time

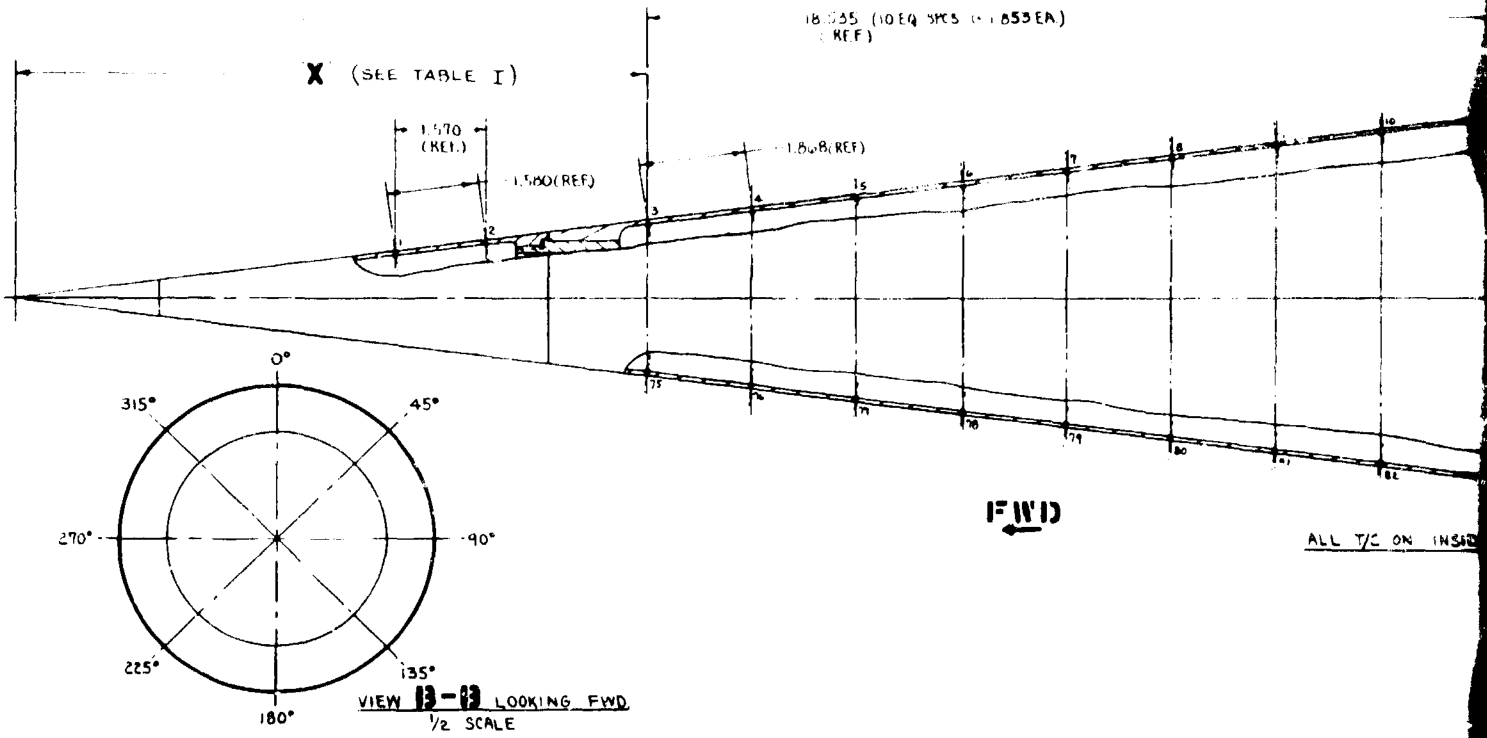
Gp. No.	α_s, deg	α_m, deg	ϕ_s, deg	ψ_m, deg	Date	Config.	Time, sec.	Mach No.	p_o, psia	T_o, ^oR

T_∞, ^oR	p_∞, psia	q_∞, psia	V_∞, ft/sec	ρ_∞, slug/ft^3	μ_∞, lb-sec/ft^2	Re_∞, ft^{-1}	St_{FR}

2. Tabulated for Each Thermocouple at Each Data Reduction Time

TC No.	T_w, ^oR	$\frac{dT_w}{dt}$, ^oR/sec	Q, $\frac{Btu}{ft^2 - sec}$	H_T, $\frac{Btu}{ft^2 - sec - {}^oR}$	h_H, Btu/ft^2-sec Btu/lb	H_w, Btu/lb

St	$\frac{St}{St_{FR}}$	$St\sqrt{Re_D}$


X (SEE TABLE I)
(REF)
1.570
(REF.)
1.580(REF)
1.868(REF)
FWD
0°
45°
90°
135°
180°
225°
270°
315°
VIEW B-B LOOKING FWD
1/2 SCALE
ALL T/C ON

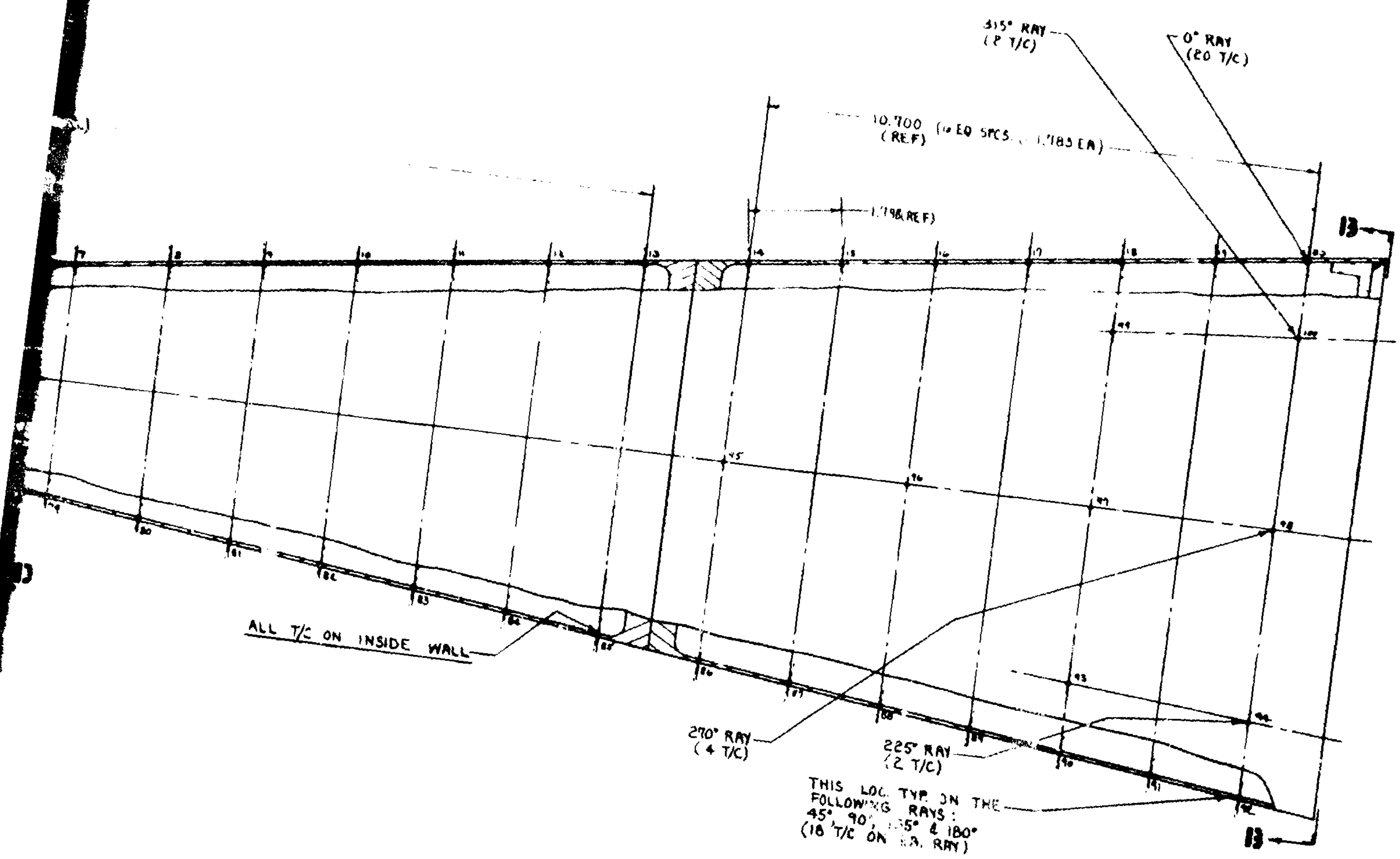


Figure 1. Model Used in Heat Transfer Test

2

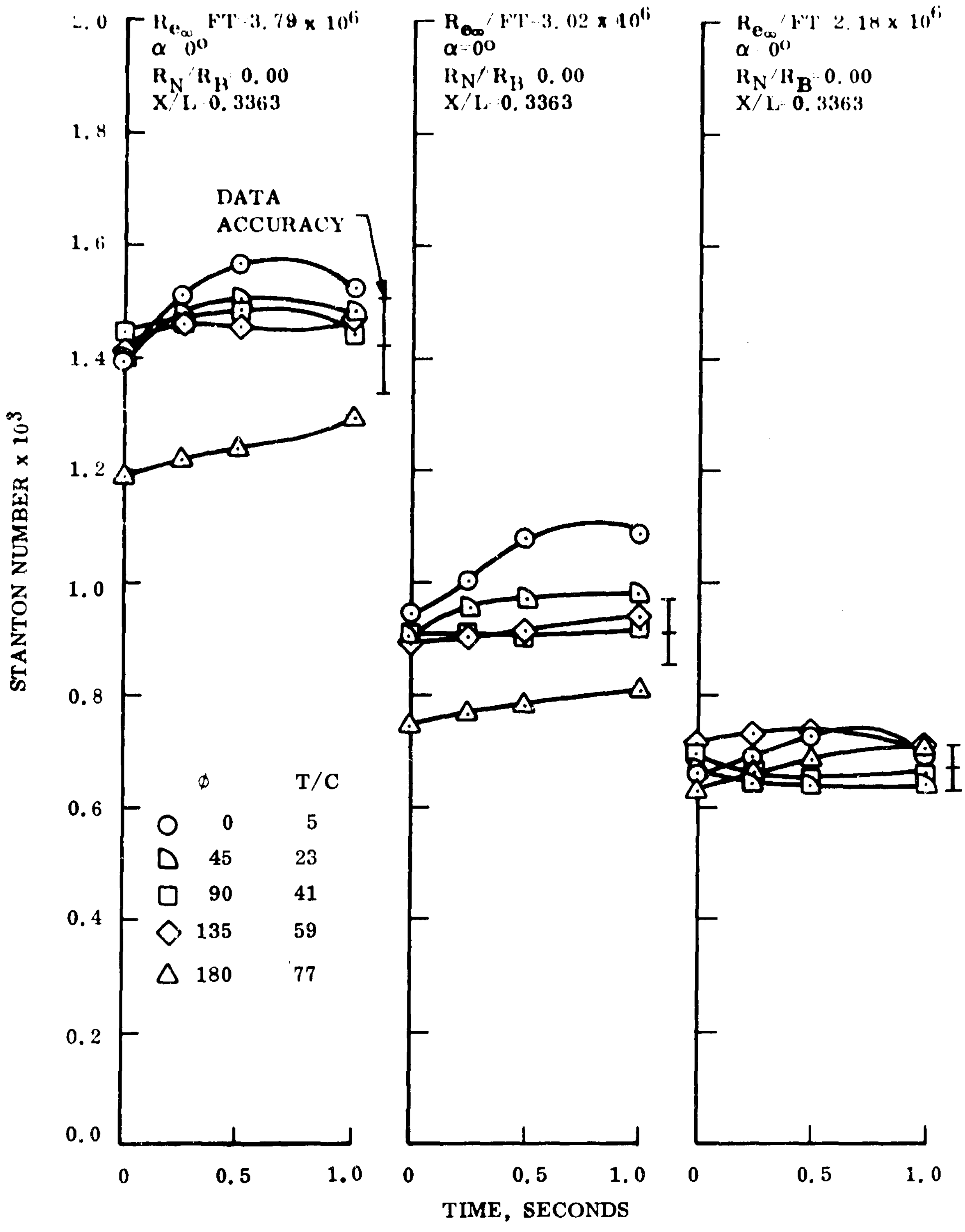


Figure 2. Stanton Number vs. Time for Selected X/L Locations, X/L = .3363

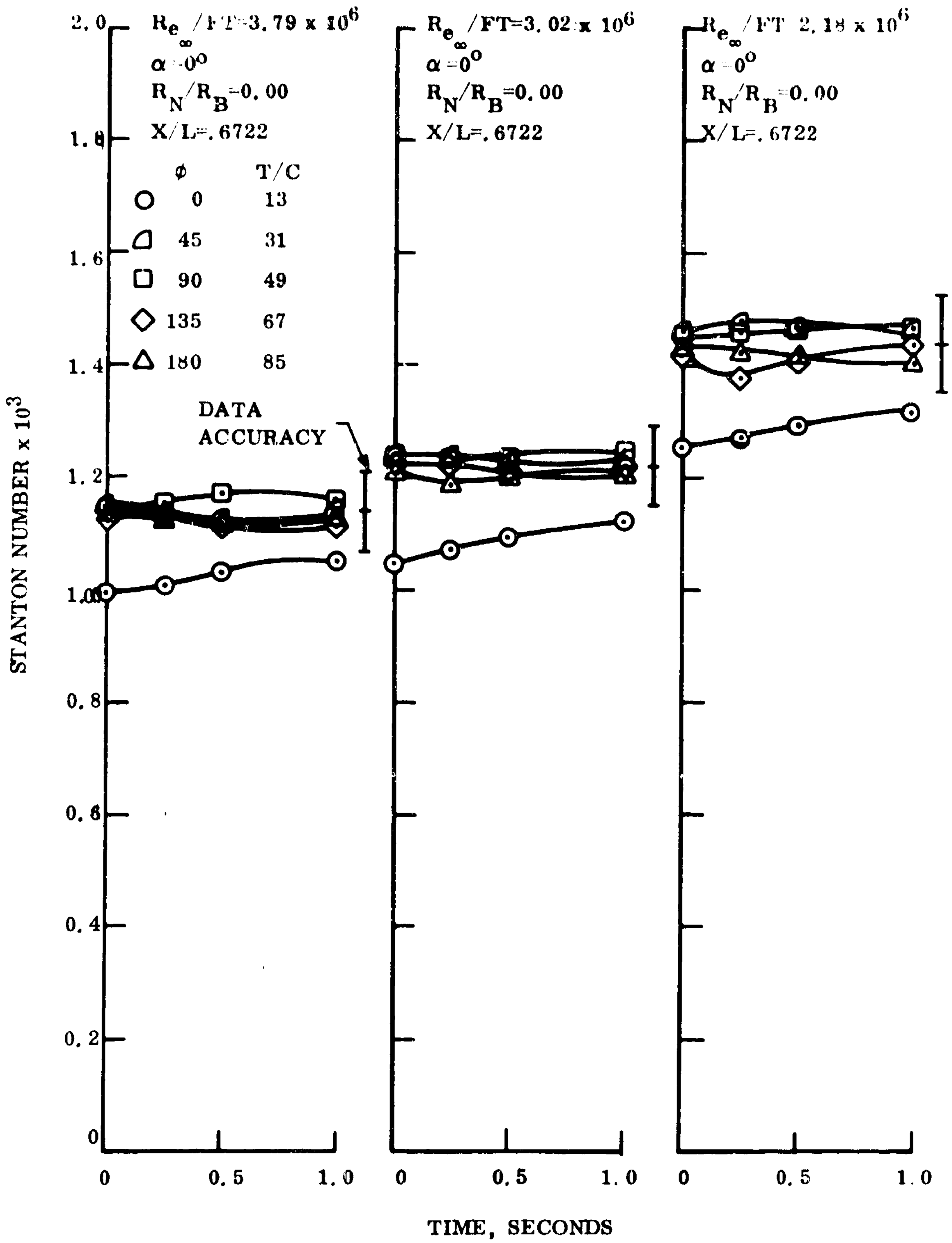


Figure 3. Stanton Number vs. Time for Selected X/L Locations, X/L = .6722

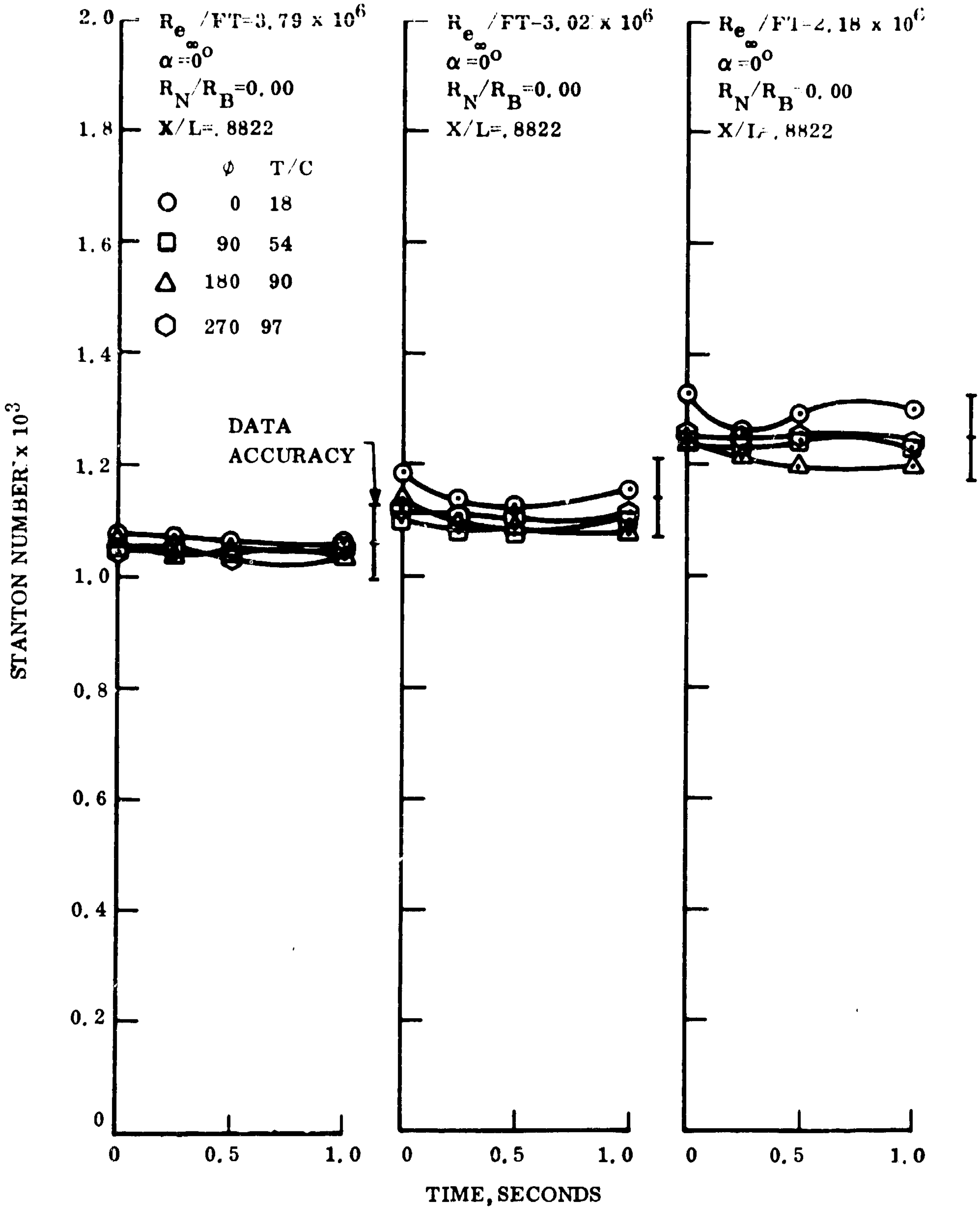


Figure 4. Stanton Number vs. Time for Selected X/L Locations, X/L = .8822

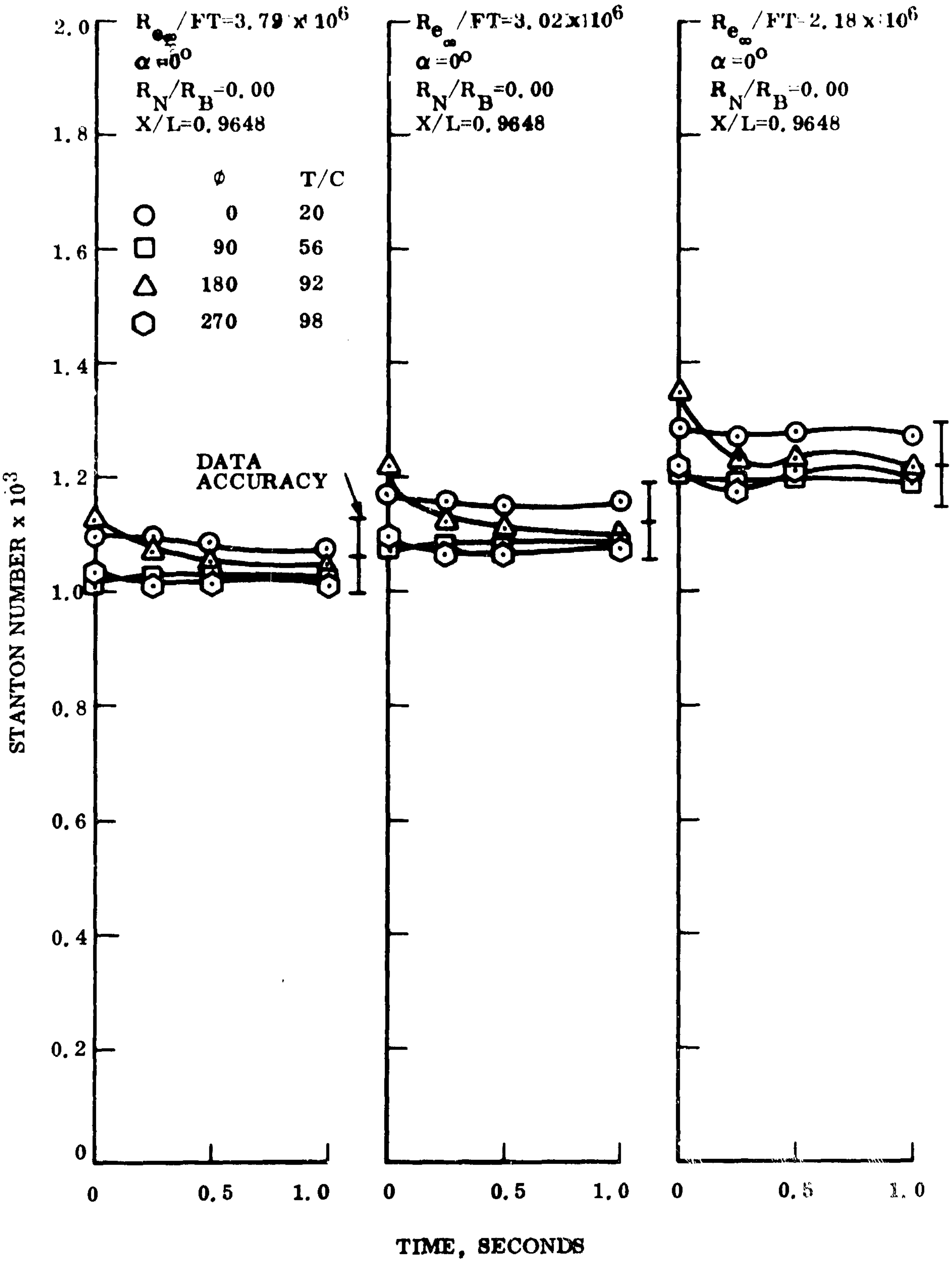


Figure 5. Stanton Number vs. Time for Selected X/L Locations. X/L = .9648

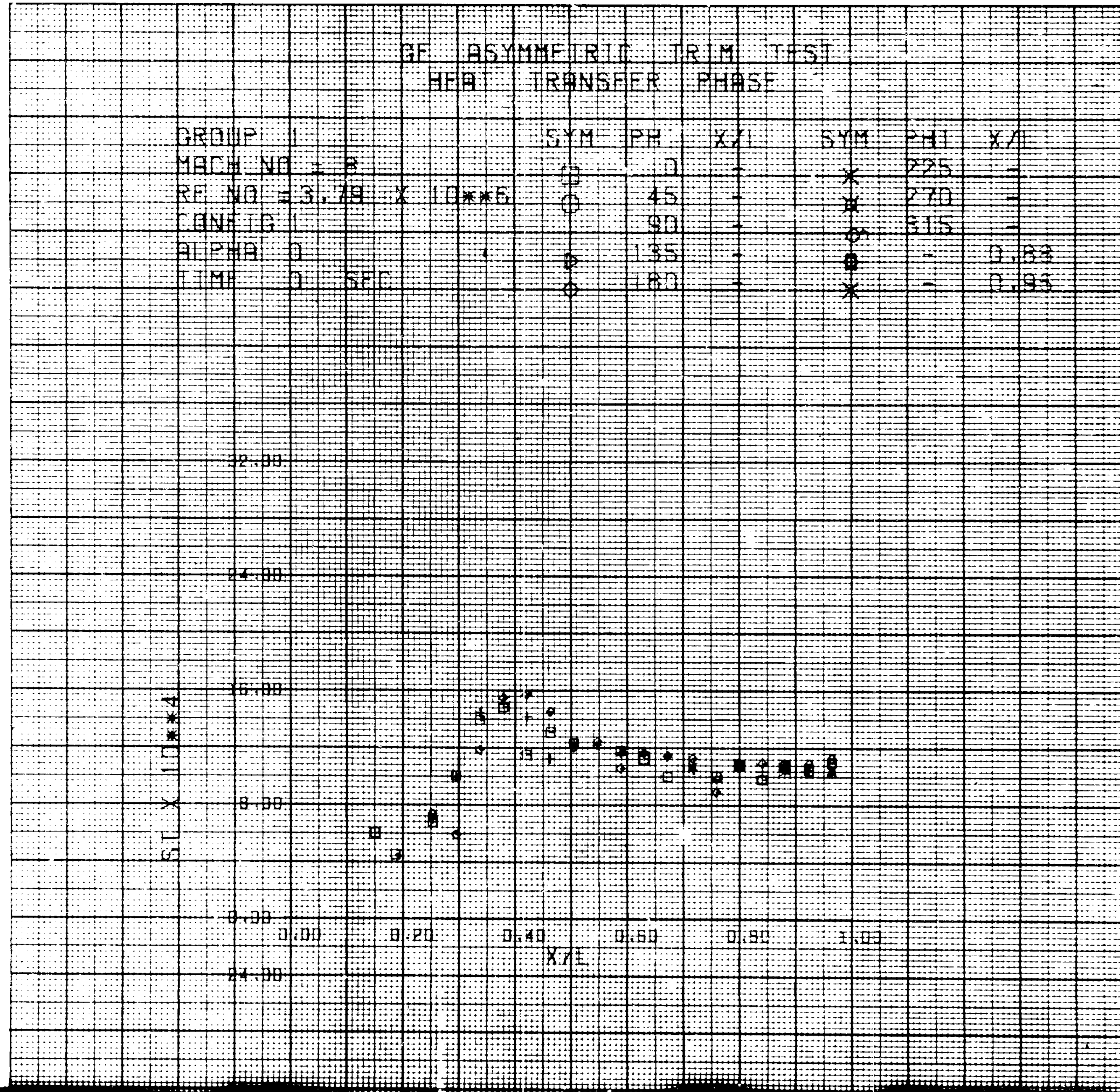
AEDC(ARO,INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
VT0967-000

GROUP	CONFIG	ALPHA-N	BETA-N	ALPHA-S	ROLL	ALP-P	DATE	MACH NO	PO	TO	TIME
1	1	.05	0	.05	0	0	716	8.00	850.19	1332.35	-.00

T-INF	P-INF	Q-INF	V-INF	RHO-INF	MU-INF	RE/FT	RE/D	MU
9.0847E 01	8.0264E-02	3.9435E 00	3.8517E 03	7.6495E-05	7.7730E-08	3.7905E 06	3.4766E 06	3.2359E 02

TC NO	X/L	PHI	TEMP	SLOPE	Q-STOR	HT	HM	HW	ST
1	.1900	0	535.00	3.1972E 00	1.1290F 00	1.0180E-03	5.7020E-03	1.2851E 02	6.0150E-04
2	.1047	0	537.37	3.4220E 00	8.3936F-01	1.0558E-03	4.2467E-03	1.2808F 02	4.4776E-04
3	.2524	0	539.67	4.2690E 00	1.2622F 00	1.5923E-03	6.4000E-03	1.2942F 02	6.7519F-04
4	.2943	0	537.34	5.9632E 00	1.8822F 00	2.3675E-03	9.5179E-03	1.2887E 02	1.0040F-03
5	.3363	0	538.70	8.2614E 00	2.6075F 00	3.2855E-03	1.3208E-02	1.2919E 02	1.3932E-03
6	.3783	0	540.51	9.2169E 00	2.7706F 00	3.4989E-03	1.4064E-02	1.2962F 02	1.4836E-03
7	.4203	0	537.62	7.4635E 00	2.1511F 00	2.7061E-03	1.0879E-02	1.2889E 02	1.1476F-03
8	.4623	0	540.64	8.8036E 00	2.4422F 00	3.0847E-03	1.2309E-02	1.2965E 02	1.3079E-03
9	.5043	0	538.75	8.5079E 00	2.3017F 00	2.9040E-03	1.1673E-02	1.2944E 02	1.2314F-03
10	.5463	0	538.09	-1.4131E-02	-4.2455F-03	-5.2972E-06	-2.1309E-05	1.2733E 02	-2.2473F-06
11	.5882	0	541.50	7.9552E 00	2.1919F 00	2.7719E-03	1.1141E-02	1.2988E 02	1.1752F-03
12	.6302	0	542.60	7.7051E 00	2.0845F 00	2.6398E-03	1.0610E-02	1.3014E 02	1.1192E-03
13	.6722	0	545.89	7.1814E 00	1.8492F 00	2.3489E-03	9.4391E-03	1.3071E 02	9.9571E-04
14	.8822	315.0	[illegible]	5.5298E 00	1.4405F 00	1.8261E-03	7.3389E-03	1.3034E 02	7.7417E-04
15	.7583	0	547.63	7.7089E 00	1.8538F 00	2.3624E-03	9.4922E-03	1.3132F 02	1.0013F-03
16	[illegible]	0	547.88	7.1019E 00	1.9926F 00	2.5401E-03	1.0206E-02	1.3138E 02	1.0766F-03
17	.8409	0	547.09	7.0772E 00	1.8083F 00	2.3028E-03	9.2529E-03	1.3119E 02	9.7607F-04
18	.8822	0	549.92	7.8990E 00	1.9791F 00	2.5294E-03	1.0166E-02	1.3186F 02	1.0719E-03
19	.9235	0	550.80	7.8669E 00	[illegible]	2.4550E-03	9.8631E-03	1.3188E 02	1.0404E-03
20	.9648	0	552.09	8.4136E 00	2.0233F 00	2.5931E-03	1.0417E-02	1.3238E 02	1.0988E-03
21	.2524	45.0	537.61	2.1177E 00	6.2601F-01	7.8769E-04	3.1667E-03	1.2893F 02	3.3405E-04
22	.2943	45.0	536.66	5.8024E 00	1.8860F 00	2.3703E-03	9.5290E-03	1.2871F 02	1.0053E-03
23	.3363	45.0	539.05	8.6863E 00	2.6111F 00	3.2914E-03	1.3231E-02	1.2928E 02	1.3957E-03
24	.3783	45.0	541.97	9.2904E 00	2.7927F 00	3.5334E-03	1.4201E-02	1.2997F 02	1.4981E-03
25	.4203	45.0	540.27	8.6749E 00	2.3461F 00	2.9618E-03	1.1905E-02	1.2956F 02	1.2559E-03
26	.4623	45.0	543.18	8.5576E 00	2.4011F 00	3.0425E-03	1.2220E-02	1.3026E 02	1.2899E-03
27	.5043	45.0	545.20	8.7744E 00	2.3301F 00	2.9601E-03	1.1895E-02	1.3074E 02	1.2548F-03
100	.9648	315.0	554.14	7.7246E 00	1.8576F 00	2.3871E-03	9.5880E-03	1.3288E 02	1.0114E-03
29	.5882	45.0	545.48	8.1383E 00	2.2423F 00	2.8497E-03	1.1451E-02	1.3081E 02	1.2080E-03
30	.6302	45.0	546.82	7.8807E 00	2.1321F 00	2.7141E-03	1.0906E-02	1.3112E 02	1.1504E-03
31	.6722	45.0	550.09	8.6262E 00	2.1175F 00	2.7096E-03	1.0885E-02	1.3210E 02	1.1483E-03
32	.7170	45.0	552.57	8.1818E 00	1.9267F 00	2.4709E-03	9.9243E-03	1.3250E 02	1.0470E-03
33	.7583	45.0	551.27	7.1774E 00	1.9776F 00	2.5319E-03	1.0171E-02	1.3219E 02	1.0729E-03
34	.7996	45.0	551.85	7.8164E 00	1.9607F 00	2.5223E-03	1.0132E-02	1.3232E 02	1.0688E-03
35	.8409	45.0	553.37	7.0860E 00	1.9173F 00	2.4613E-03	9.8863E-03	1.3269E 02	1.0429E-03
36	.8822	45.0	550.07	7.0992E 00	1.8673F 00	2.3992E-03	9.6368E-03	1.3285E 02	1.0166E-03
37	.9235	45.0	554.18	7.3667E 00	1.8669F 00	2.3989E-03	9.6353E-03	1.3286E 02	1.0164E-03
38	.9648	45.0	555.86	7.2957E 00	1.7545F 00	2.2595E-03	9.0746E-03	1.3328F 02	9.5726F-04
39	.2524	90.0	541.42	4.3875E 00	1.2970F 00	1.6399E-03	6.5912E-03	1.2986F 02	6.9529F-04
40	.2943	90.0	541.49	5.7774E 00	1.8524F 00	2.3422E-03	9.4141E-03	1.2986E 02	9.9307E-04
41	.3363	90.0	543.50	8.5271E 00	2.6914F 00	3.4118E-03	1.3712E-02	1.3034F 02	1.4464E-03
42	.3783	90.0	543.82	8.8977E 00	2.8044F 00	3.5615E-03	1.4313E-02	1.3041E 02	1.5099E-03
43	.4203	90.0	546.79	8.9032E 00	2.6319F 00	3.3418E-03	1.3429E-02	1.3064F 02	1.4167E-03
44	.4623	90.0	541.77	6.7250E 00	2.0892F 00	2.6426E-03	1.3022E-02	1.2942E 02	1.1206E-03
45	.5043	90.0	545.49	8.2620E 00	2.2764F 00	2.8931E-03	1.1626E-02	1.3081E 02	1.2264E-03
46	.5463	90.0	545.31	7.9427E 00	2.2682F 00	2.8819E-03	1.1581E-02	1.3077E 02	1.2217E-03
47	.5882	90.0	546.72	7.7035E 00	2.1615F 00	2.7512E-03	1.1055E-02	1.3110F 02	1.1662E-03
48	.6302	90.0	547.79	7.8418E 00	2.1606F 00	2.7539E-03	1.1065E-02	1.3136E 02	1.1672E-03
49	.6722	90.0	553.33	3.6158E 00	2.1083F 00	2.6960E-03	1.0831E-02	1.3196E 02	1.1425E-03
50	.7170	90.0	552.34	8.2068E 00	1.9326F 00	2.4777E-03	9.9527E-03	1.3244E 02	1.0499E-03
51	.7583	90.0	548.40	7.0039E 00	1.8245F 00	2.3273E-03	9.3508E-03	1.3150E 02	9.8646E-04
52	.7996	90.0	549.79	7.6214E 00	1.9880F 00	2.5406E-03	1.0206E-02	1.3183E 02	1.0766E-03
53	.8409	90.0	549.54	7.6559E 00	1.9179F [illegible]	[illegible]	9.8434E-03	1.3177E 02	1.0384E-03
54	.8822	90.0	550.39	7.8758E 00	1.9333F [illegible]	[illegible]	9.9374E-03	1.3198E 02	1.0477E-03
55	.9235	90.0	550.15	8.6149E 00	[illegible]	[illegible]	9.8904E-03	1.3192E 02	1.0443E-03
56	.9648	90.0	550.82	7.8393E 00	[illegible]	[illegible]	9.6905E-03	1.3208E 02	1.0222E-03
57	.2524	135.0	533.79	1.3500E 00	[illegible]	[illegible]	2.0094E-03	1.2802F 02	2.1197E-04
58	.2943	135.0	536.49	5.4527E 00	[illegible]	2.1966E-03	8.8314E-03	1.2866E 02	9.3161E-04
59	.3363	135.0	537.82	8.6020E 00	2.6519F 00	3.3369E-03	1.3415E-02	1.2893E 02	1.4151E-03
60	.3783	135.0	538.15	9.2536E 00	2.8745F 00	3.6194E-03	1.4550E-02	1.2906E 02	1.5349E-03
61	.4203	135.0	538.22	9.3904E 00	2.8228F 00	3.5545E-03	1.4209E-02	1.2900F 02	1.5074E-03
62	.4623	135.0	538.02	9.1924E 00	2.4385F 00	3.0699E-03	1.2341E-02	1.2903E 02	1.3018E-03
63	.5043	135.0	539.50	8.9741E 00	2.2930F 00	2.8924E-03	1.1677E-02	1.2940F 02	1.2265E-03
64	.5463	135.0	539.85	8.7168E 00	2.3148F 00	2.9208E-03	1.1741E-02	1.2947F 02	1.2385E-03
65	.5882	135.0	541.26	8.3381E 00	2.2120F 00	2.7962E-03	1.1239E-02	1.2980E 02	1.1856E-03
66	.6302	135.0	541.08	8.2635E 00	2.1944F 00	2.7729E-03	1.1140E-02	1.2974E 02	1.1757E-03
67	.6722	135.0	545.89	8.6924E 00	2.0903F 00	2.6579E-03	1.0680E-02	1.3090E 02	1.1267E-03
68	.7170	135.0	546.39	8.4036E 00	1.9790F 00	2.5179E-03	1.0118E-02	1.3102E 02	1.0673E-03
69	.7583	135.0	539.43	5.2823E 00	1.4821F 00	1.8692E-03	7.5137E-03	1.2937E 02	7.9260E-04
70	.7996	135.0	543.12	7.4374E 00	2.1610F 00	2.7381E-03	1.1005E-02	1.3025F 02	1.1608F-03
71	.8409	135.0	543.35	7.0816E 00	1.9512F 00	2.4730E-03	9.9380E-03	1.3030E 02	1.0484E-03
72	.8822	135.0	543.90	7.4262E 00	2.0091F 00	2.5481E-03	1.0240E-02	1.3043E 02	1.0802E-03
73	.9235	135.0	545.82	7.8557E 00	1.9283F 00	2.4492E-03	9.8424E-03	1.3070F 02	1.0383E-03
74	.9648	135.0	547.01	8.2667E 00	1.9880F 00	2.5314E-03	1.0171E-02	1.3117E 02	1.0730F-03
75	.2524	180.0	535.00	4.7300E 00	1.3743F 00	1.7312E-03	6.9595E-03	1.2914E 02	7.3415E-04
76	.2943	180.0	536.61	3.4480E 00	1.1055F 00	1.3893E-03	5.5854E-03	1.2870E 02	5.8919E-04
77	.3363	180.0	539.14	7.5042E 00	2.2189F 00	2.7974E-03	1.1245E-02	1.2930F 02	1.1862F-03
78	.3783	180.0	541.36	8.6147E 00	2.8902F 00	3.6539E-03	1.4680E-02	1.2983E 02	1.5492F-03
79	.4203	180.0	543.29	[illegible]	[illegible]	3.7096E-03	1.4909E-02	1.3028E 02	1.5727E-03
80	.4623	180.0	544.19	[illegible]	2.7007F 00	3.4263E-03	1.3770E-02	1.3049E 02	1.4525E-03
81	.5043	180.0	544.17	[illegible]	2.2315F 00	2.8312E-03	1.1378E-02	1.3050E 02	1.2002E-03
82	.5463	180.0	544.37	[illegible]	2.3196F 00	2.9374E-03	1.1405E-02	1.3054F 02	1.2452E-03
83	.5882	180.0	544.21	[illegible]	1.9877F 00	[illegible]	1.0033E-02	1.3050F 02	1.0584E-03
84	.6302	180.0	547.18	[illegible]	[illegible]	[illegible]	1.1007E-02	1.3121E 02	1.1611E-03
85	.6722	180.0	551.36	8.7500E 00	[illegible]	[illegible]	1.0824E-02	1.3220E 02	1.1418E-03
86	.7170	180.0	552.45	8.7957E 00	[illegible]	2.6558E-03	1.0648E-02	1.3247F 02	1.1254E-03
87	.7583	180.0	545.37	6.8680E 00	[illegible]	[illegible]	[illegible]	1.3078E 02	8.8963F-04
88	.7996	180.0	547.87	7.4130E 00	[illegible]	2.5283E-03	[illegible]	1.3138F 02	1.0716E-03
89	.8409	180.0	548.28	7.4107E 00	2.0213F 00	2.5779E-03	1.0368E-02	1.3147F 02	1.0926E-03
90	.8822	180.0	548.95	8.5863E 00	1.9780F 00	2.5256E-03	[illegible]	1.3163E 02	1.0704E-03
91	.9235	180.0	549.38	8.7833E 00	2.0137F 00	2.5709E-03	[illegible]	1.3167F 02	1.0896F-03
92	.9648	180.0	552.36	8.9837E 00	2.0702F 00	2.6541E-03	[illegible]	1.3245F 02	1.1247F-03
93	.8822	225.0	548.89	7.5315E 00	1.9244F 00	2.4562E-03	[illegible]	1.3162F 02	1.0410E-03
94	.9648	225.0	551.58	7.9724E 00	1.9172F 00	2.4555E-03	[illegible]	1.3226F 02	1.0406E-03
95	.7170	270.0	554.45	6.6078E 00	1.9587F 00	2.5179E-03	1.0113E-02	1.3295E 02	1.0668E-03
96	.7996	270.0	552.11	7.8810E 00	1.9866F 00	2.5462E-03	1.0228E-02	[illegible]	1.0789F-03
97	.8822	270.0	551.49	[illegible]	1.9265F 00	2.4472E-03	9.9111E-03	1.3224F 02	1.0455E-03
98	.9648	270.0	[illegible]	[illegible]	1.9180F 00	[illegible]	9.8430E-03	1.3259F 02	1.0384E-03

GROUP 1
AF ASYMMETRIC IR M TEST
HEAT TRANSFER PHASE
SYM PHI X/L
SYM PHI X/L


GF ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 1
MACH NO = 8
RE NO = 3.79 X 10**6
CONFIG 1
ALPHA 0
TIME 0 SEC
SYM PH X/L
0 -
45 -
90 -
135 -
180 -
SYM PHI X/L
225 -
270 -
315 -
- 0.83
- 0.95
32.00
24.00
16.00
8.00
0.00
24.00
0.00
0.20
0.40
0.60
0.80
1.00
X/L
ST X 10**4

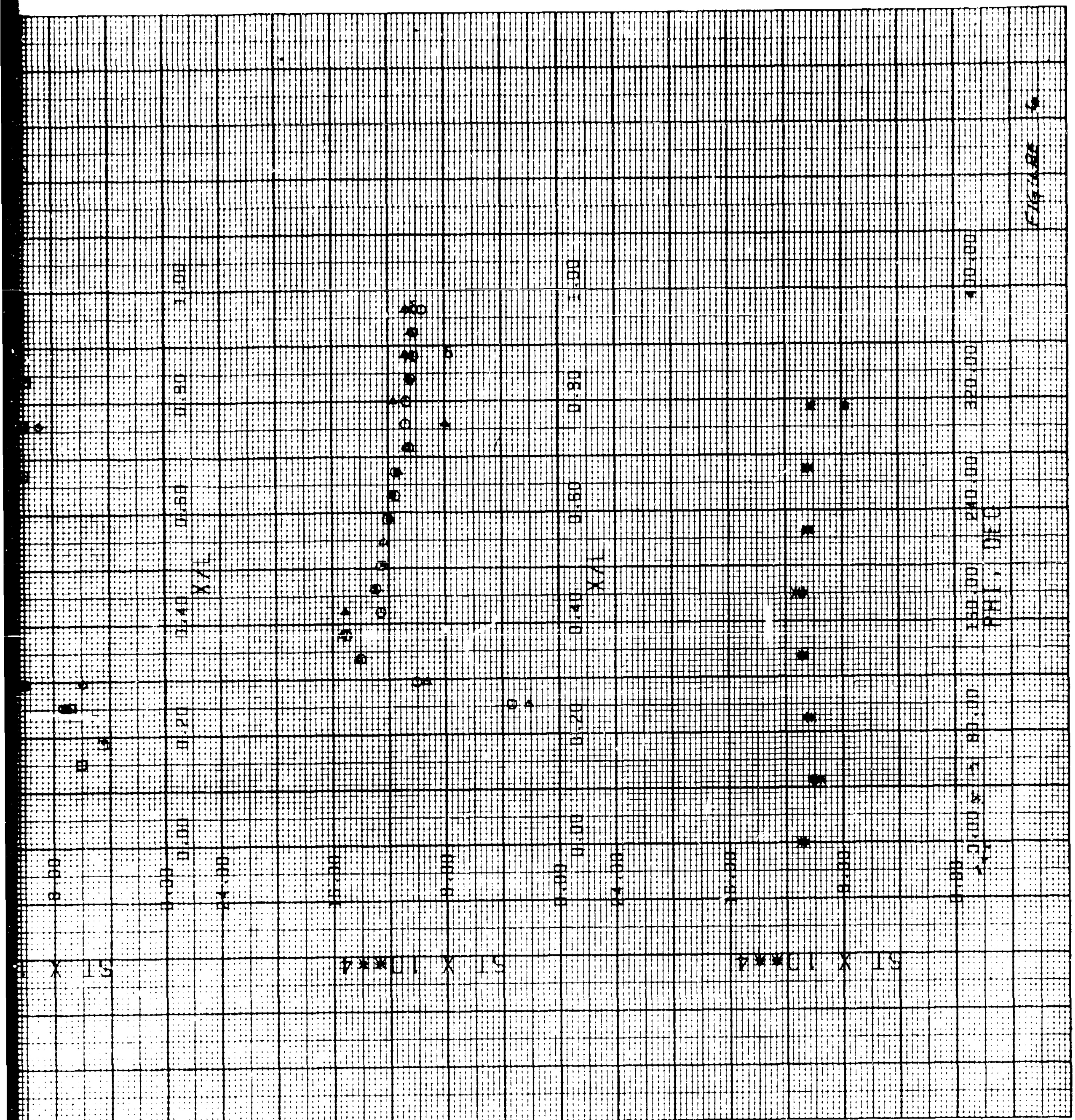


Figure 6

7/16/87

AEDC(ARO,INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
VT0967-800

GROUP	CONFIG	ALPHA-M	BETA-M	ALPHA-S	ROLL	ALP-P	DATE	MACH NO	PO	TO	TIME
2	1	1.02	0	1.02	0	0	714	8.00	860.09	1337.09	-.00

T-INF	P-INF	Q-INF	V-INF	RHO-INF	MU-INF	RE/FT	RE/D	MU
9.68903E 01	8.81803E-02	3.95604E 00	3.85857E 03	7.63577E-05	7.80044E-08	3.77702E 06	3.46352E 06	3.27859E 02

TC NO	X/L	PHI	TEMP	SLOPE	Q-STDO	HT	HM	HW	ST
1	.1500	0	519.09	4.2825E 00	9.3093E-01	1.1380E-03	4.5744E-03	1.2452E 02	4.8298E-04
2	.1867	0	513.09	3.8373E 00	8.4272E-01	1.0227E-03	4.1158E-03	1.2309E 02	4.3418E-04
3	.2524	0	515.87	6.4824E 00	1.9458E 00	2.3694E-03	9.5363E-03	1.2376E 02	1.0058E-03
4	.2943	0	524.60	7.7805E 00	2.4554E 00	3.0225E-03	1.2157E-02	1.2584E 02	1.2824E-03
5	.3363	0	526.71	8.6139E 00	2.6557E 00	3.2771E-03	1.3179E-02	1.2634E 02	1.3902E-03
6	.3783	0	526.82	8.1971E 00	2.4550E 00	3.0299E-03	1.2185E-02	1.2637E 02	1.2854E-03
7	.4203	0	523.96	6.4007E 00	1.8598E 00	2.2870E-03	9.1988E-03	1.2567E 02	9.7039E-04
8	.4623	0	527.16	7.7812E 00	2.1440E 00	2.6471E-03	1.0645E-02	1.2645E 02	1.1230E-03
9	.5043	0	526.87	7.6388E 00	2.0666E 00	2.5507E-03	1.0258E-02	1.2638E 02	1.0821E-03
10	.5463	0	516.96	1.9131E-02	4.2455E-03	5.2662E-06	2.1173E-05	1.2734E 02	2.2336E-06
11	.5882	0	529.70	7.1311E 00	1.9644E 00	2.4330E-03	9.7852E-03	1.2705E 02	1.0322E-03
12	.6302	0	533.46	6.8808E 00	1.8615E 00	2.3164E-03	9.3121E-03	1.2794E 02	9.8234E-04
13	.6722	0	539.38	6.4459E 00	1.6148E 00	2.0243E-03	8.1353E-03	1.2935E 02	8.5820E-04
99	.8822	315.0	539.09	4.4410E 00	1.2611E 00	1.5803E-03	6.3510E-03	1.2929E 02	6.6998E-04
15	.7583	0	541.05	7.0716E 00	1.7009E 00	2.1363E-03	8.5845E-03	1.2975E 02	9.0559E-04
16	.7996	0	539.89	6.3580E 00	1.7841E 00	2.2380E-03	8.9936E-03	1.2947E 02	9.4874E-04
17	.8409	0	539.39	6.3420E 00	1.6204E 00	2.0314E-03	8.1617E-03	1.2936E 02	8.6120E-04
18	.8822	0	543.22	7.1 38E 00	1.7864E 00	2.2503E-03	9.0414E-03	1.3027E 02	9.5379E-04
19	.9235	0	544.61	6.83.0E 00	1.7115E 00	2.1597E-03	8.6770E-03	1.3060E 02	9.1535E-04
20	.9648	0	545.70	7.4465E 00	1.7859E 00	2.2567E-03	9.0661E-03	1.3086E 02	9.5639E-04
21	.2524	45.0	513.18	5.2266E 00	1.5450E 00	1.8753E-03	7.5470E-03	1.2313E 02	7.9614E-04
22	.2943	45.0	521.74	6.4612E 00	2.0716E 00	2.5408E-03	1.0220E-02	1.2516E 02	1.0782E-03
23	.3363	45.0	525.54	8.9169E 00	2.6804E 00	3.3029E-03	1.3249E-02	1.2607E 02	1.4013E-03
24	.3783	45.0	527.08	8.9078E 00	2.6777E 00	3.3058E-03	1.3294E-02	1.2643E 02	1.4024E-03
25	.4203	45.0	526.06	7.5657E 00	2.1983E 00	2.7105E-03	1.0901E-02	1.2619E 02	1.1499E-03
26	.4623	45.0	529.49	8.0477E 00	2.2560E 00	2.7960E-03	1.1242E-02	1.2700E 02	1.1860E-03
27	.5043	45.0	531.94	8.2784E 00	2.1962E 00	2.7277E-03	1.0966E-02	1.2758E 02	1.1569E-03
100	.9648	315.0	548.77	7.2091E 00	1.7336E 00	2.1991E-03	8.8334E-03	1.3159E 02	9.3184E-04
29	.5882	45.0	533.82	7.6320E 00	2.1029E 00	2.6179E-03	1.0524E-02	1.2803E 02	1.1102E-03
30	.6302	45.0	537.76	7.4074E 00	2.0040E 00	2.5071E-03	1.0070E-02	1.2897E 02	1.0630E-03
31	.6722	45.0	545.05	9.0235E 00	1.9695E 00	2.4867E-03	9.9902E-03	1.3070E 02	1.0539E-03
32	.7170	45.0	547.44	7.7353E 00	1.8216E 00	2.3068E-03	9.2645E-03	1.3127E 02	9.7753E-04
33	.7583	45.0	544.90	6.6957E 00	1.8449E 00	2.3288E-03	9.3562E-03	1.3067E 02	9.8649E-04
34	.7996	45.0	544.46	6.5704E 00	1.8435E 00	2.3258E-03	9.3444E-03	1.3056E 02	9.8575E-04
35	.8409	45.0	546.30	6.5637E 00	1.7757E 00	2.2455E-03	9.0208E-03	1.3100E 02	9.5162E-04
36	.8822	45.0	548.28	6.7005E 00	1.7624E 00	2.2343E-03	8.9747E-03	1.3147E 02	9.4675E-04
37	.9235	45.0	549.96	6.7713E 00	1.7301E 00	2.1980E-03	8.8283E-03	1.3187E 02	9.3131E-04
38	.9648	45.0	550.13	6.7663E 00	1.6272E 00	2.0676E-03	8.3046E-03	1.3191E 02	8.7605E-04
39	.2524	90.0	516.03	4.1493E 00	1.2266E 00	1.4939E-03	6.0112E-03	1.2380E 02	6.3413E-04
40	.2943	90.0	523.65	5.3169E 00	1.7047E 00	2.0957E-03	8.4293E-03	1.2561E 02	8.8921E-04
41	.3363	90.0	527.17	7.7617E 00	2.4498E 00	3.0248E-03	1.2164E-02	1.2645E 02	1.2832E-03
42	.3783	90.0	529.14	9.1030E 00	2.8732E 00	3.5561E-03	1.4299E-02	1.2692E 02	1.5084E-03
43	.4203	90.0	530.58	9.2558E 00	2.7361E 00	3.3925E-03	1.3640E-02	1.2726E 02	1.4389E-03
44	.4623	90.0	527.89	7.1184E 00	2.2113E 00	2.7327E-03	1.0989E-02	1.2662E 02	1.1592E-03
45	.5043	90.0	531.93	8.9206E 00	2.4579E 00	3.0527E-03	1.2273E-02	1.2758E 02	1.2947E-03
46	.5463	90.0	534.29	9.1051E 00	2.3146E 00	2.8831E-03	1.1590E-02	1.2814E 02	1.2226E-03
47	.5882	90.0	534.73	8.0405E 00	2.2560E 00	2.8117E-03	1.1303E-02	1.2825E 02	1.1923E-03
48	.6302	90.0	538.10	8.0054E 00	2.2057E 00	2.7607E-03	1.1095E-02	1.2905E 02	1.1704E-03
49	.6722	90.0	545.46	8.6066E 00	2.1561E 00	2.7237E-03	1.0942E-02	1.3080E 02	1.1543E-03
50	.7170	90.0	548.24	8.2676E 00	1.9469E 00	2.4681E-03	9.9139E-03	1.3147E 02	1.0458E-03
51	.7583	90.0	543.82	7.2290E 00	1.8832E 00	2.3739E-03	9.5379E-03	1.3041E 02	1.0062E-03
52	.7996	90.0	544.27	7.9048E 00	2.0592E 00	2.5973E-03	1.0435E-02	1.3052E 02	1.1008E-03
53	.8409	90.0	545.27	7.4046E 00	1.9552E 00	2.4693E-03	9.9203E-03	1.3076E 02	1.0465E-03
54	.8822	90.0	547.78	8.0174E 00	1.9680E 00	2.4934E-03	1.0016E-02	1.3136E 02	1.0566E-03
55	.9235	90.0	548.55	8.0831E 00	1.9438E 00	2.4651E-03	9.9017E-03	1.3154E 02	1.0445E-03
56	.9648	90.0	547.21	8.1570E 00	1.9616E 00	2.4834E-03	9.9761E-03	1.3122E 02	1.0524E-03
57	.2524	135.0	509.51	1.3521E 00	3.9970E-01	4.8298E-04	1.9441E-03	1.2226E 02	2.0509E-04
58	.2943	135.0	518.23	5.9761E 00	1.7878E 00	2.1833E-03	8.7843E-03	1.2433E 02	9.2666E-04
59	.3363	135.0	520.60	7.4989E 00	2.3985E 00	2.9375E-03	1.1817E-02	1.2489E 02	1.2466E-03
60	.3783	135.0	522.24	9.9283E 00	3.0531E 00	3.7468E-03	1.5072E-02	1.2528E 02	1.5899E-03
61	.4203	135.0	522.43	1.0738E 01	3.2279E 00	3.9623E-03	1.5938E-02	1.2532E 02	1.6813E-03
62	.4623	135.0	522.57	9.6334E 00	2.7991E 00	3.4365E-03	1.3823E-02	1.2536E 02	1.4582E-03
63	.5043	135.0	524.99	1.0259E 01	2.6212E 00	3.2277E-03	1.2982E-02	1.2593E 02	1.3696E-03
64	.5463	135.0	525.67	9.9758E 00	2.6225E 00	3.2320E-03	1.2998E-02	1.2609E 02	1.3712E-03
65	.5882	135.0	528.21	9.4213E 00	2.5018E 00	3.0930E-03	1.2437E-02	1.2670E 02	1.3120E-03
66	.6302	135.0	530.22	9.3318E 00	2.4780E 00	3.0712E-03	1.2349E-02	1.2717E 02	1.3027E-03
67	.6722	135.0	540.63	9.7649E 00	2.3483E 00	2.9484E-03	1.1848E-02	1.2965E 02	1.2499E-03
68	.7170	135.0	542.61	9.2683E 00	2.1826E 00	2.7472E-03	1.1038E-02	1.3012E 02	1.1645E-03
69	.7583	135.0	533.83	5.7885E 00	1.6241E 00	2.0219E-03	8.1282E-03	1.2803E 02	8.5745E-04
70	.7996	135.0	537.19	8.3103E 00	2.4146E 00	3.0187E-03	1.2133E-02	1.2883E 02	1.2799E-03
71	.8409	135.0	537.81	8.1277E 00	2.2394E 00	2.8018E-03	1.1261E-02	1.2898E 02	1.1879E-03
72	.8822	135.0	539.66	8.4418E 00	2.2838E 00	2.8640E-03	1.1510E-02	1.2942E 02	1.2142E-03
73	.9235	135.0	541.24	8.7575E 00	2.1497E 00	2.7012E-03	1.0854E-02	1.2980E 02	1.1450E-03
74	.9648	135.0	545.45	9.4350E 00	2.2689E 00	2.8661E-03	1.1514E-02	1.3080E 02	1.2147E-03
75	.2524	180.0	510.86	5.0484E 00	1.4668E 00	1.7754E-03	7.1458E-03	1.2258E 02	7.5382E-04
76	.2943	180.0	517.61	3.4894E 00	1.1198E 00	1.3652E-03	5.4931E-03	1.2418E 02	5.7947E-04
77	.3363	180.0	522.04	7.1463E 00	2.1125E 00	2.5920E-03	1.0426E-02	1.2524E 02	1.0999E-03
78	.3783	180.0	525.03	1.0308E 01	3.0985E 00	3.8156E-03	1.5346E-02	1.2594E 02	1.6189E-03
79	.4203	180.0	526.66	1.1709E 01	3.4612E 00	4.2709E-03	1.7176E-02	1.2633E 02	1.8119E-03
80	.4623	180.0	528.07	1.1266E 01	3.2172E 00	3.9767E-03	1.5991E-02	1.2666E 02	1.6869E-03
81	.5043	180.0	528.64	1.0474E 01	2.6239E 00	3.2456E-03	1.3051E-02	1.2680E 02	1.3768E-03
82	.5463	180.0	529.37	1.0310E 01	2.7379E 00	3.3897E-03	1.3630E-02	1.2697E 02	1.4378E-03
83	.5882	180.0	529.47	9.6617E 00	2.3001E 00	2.8480E-03	1.1452E-02	1.2700E 02	1.2081E-03
84	.6302	180.0	534.49	8.7576E 00	2.3256E 00	2.8976E-03	1.1648E-02	1.2819E 02	1.2287E-03
85	.6722	180.0	546.17	1.0002E 01	2.4052E 00	3.0410E-03	1.2217E-02	1.3097E 02	1.2888E-03
86	.7170	180.0	548.96	1.0131E 01	2.3858E 00	3.0272E-03	1.2159E-02	1.3164E 02	1.2827E-03
87	.7583	180.0	539.42	7.9493E 00	1.8876E 00	2.3664E-03	9.5100E-03	1.2936E 02	1.0032E-03
88	.7996	180.0	542.36	8.8367E 00	2.3020E 00	2.8965E-03	1.1639E-02	1.3006E 02	1.2278E-03
89	.8409	180.0	543.24	9.4025E 00	2.4024E 00	3.0264E-03	1.2160E-02	1.3028E 02	1.2827E-03
90	.8822	180.0	545.37	1.0096E 01	2.3266E 00	2.9387E-03	1.1806E-02	1.3078E 02	1.2455E-03
91	.9235	180.0	546.77	9.7368E 00	2.3901E 00	3.0242E-03	1.2149E-02	1.3111E 02	1.2816E-03
92	.9648	180.0	550.54	1.0773E 01	2.4825E 00	3.1562E-03	1.2676E-02	1.3201E 02	1.3372E-03
93	.8822	225.0	545.67	9.5477E 00	2.1840E 00	2.7596E-03	1.1047E-02	1.3085E 02	1.1695E-03
94	.9648	225.0	550.28	9.1319E 00	2.1960E 00	2.7911E-03	1.1210E-02	1.3195E 02	1.1826E-03
95	.7170	270.0	551.28	9.0353E 00	2.0370E 00	2.5920E-03	1.0410E-02	1.3217E 02	1.0981E-03
96	.7996	270.0	546.54	7.6434E 00	2.0247E 00	2.5675E-03	1.0314E-02	1.3106E 02	1.0880E-03
97	.8822	270.0	548.51	7.7595E 00	1.9826E 00	2.5142E-03	1.0049E-02	1.3153E 02	1.0653E-03
98	.9648	270.0	550.67	8.2012E 00	[illegible]722E 00	2.5079E-03	1.0072E-02	1.3204E 02	1.0625E-03

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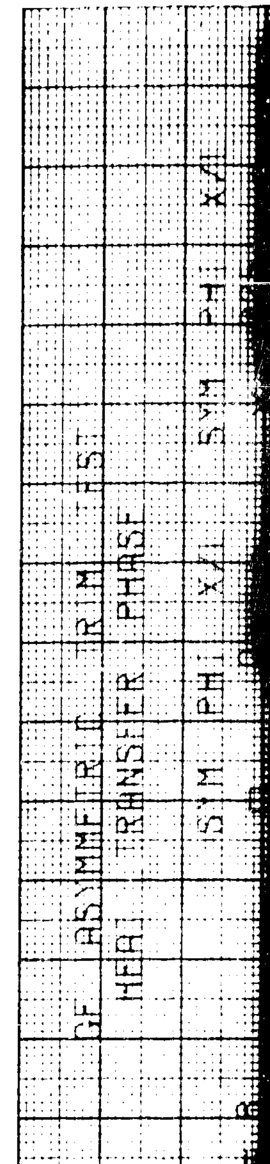
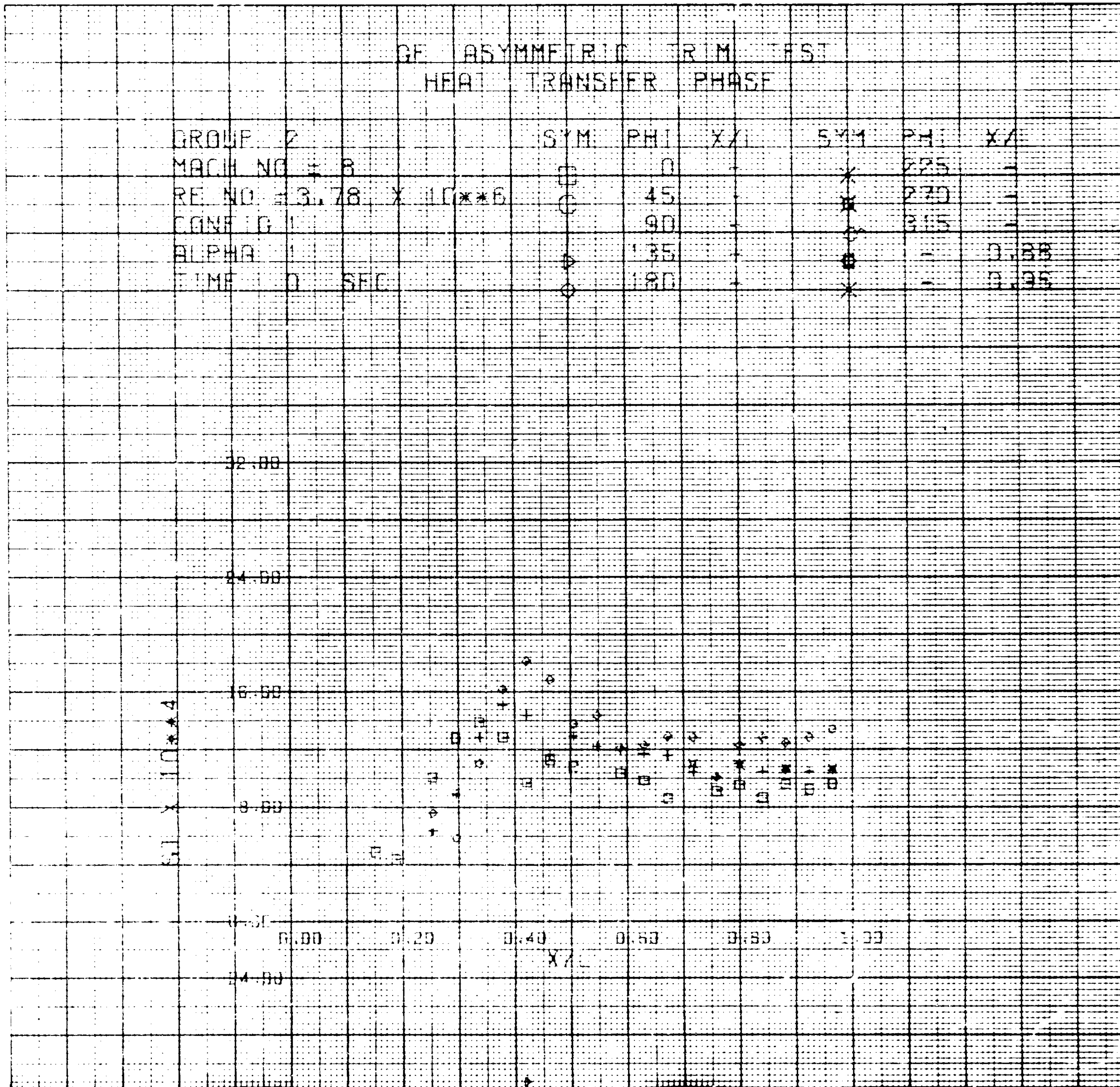



GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 2
MACH NO = 8
RE NO = 3.78 X 10**6
CONFIG 1
ALPHA 1
TIME 0 SEC
SYM PHI X/L
0
45
90
135
180
SYM PHI X/L
225
270
315
0.88
0.95
32.00
24.00
16.00
8.00
0.00
0.20
0.40
0.60
0.80
1.00
X/L
-4.00

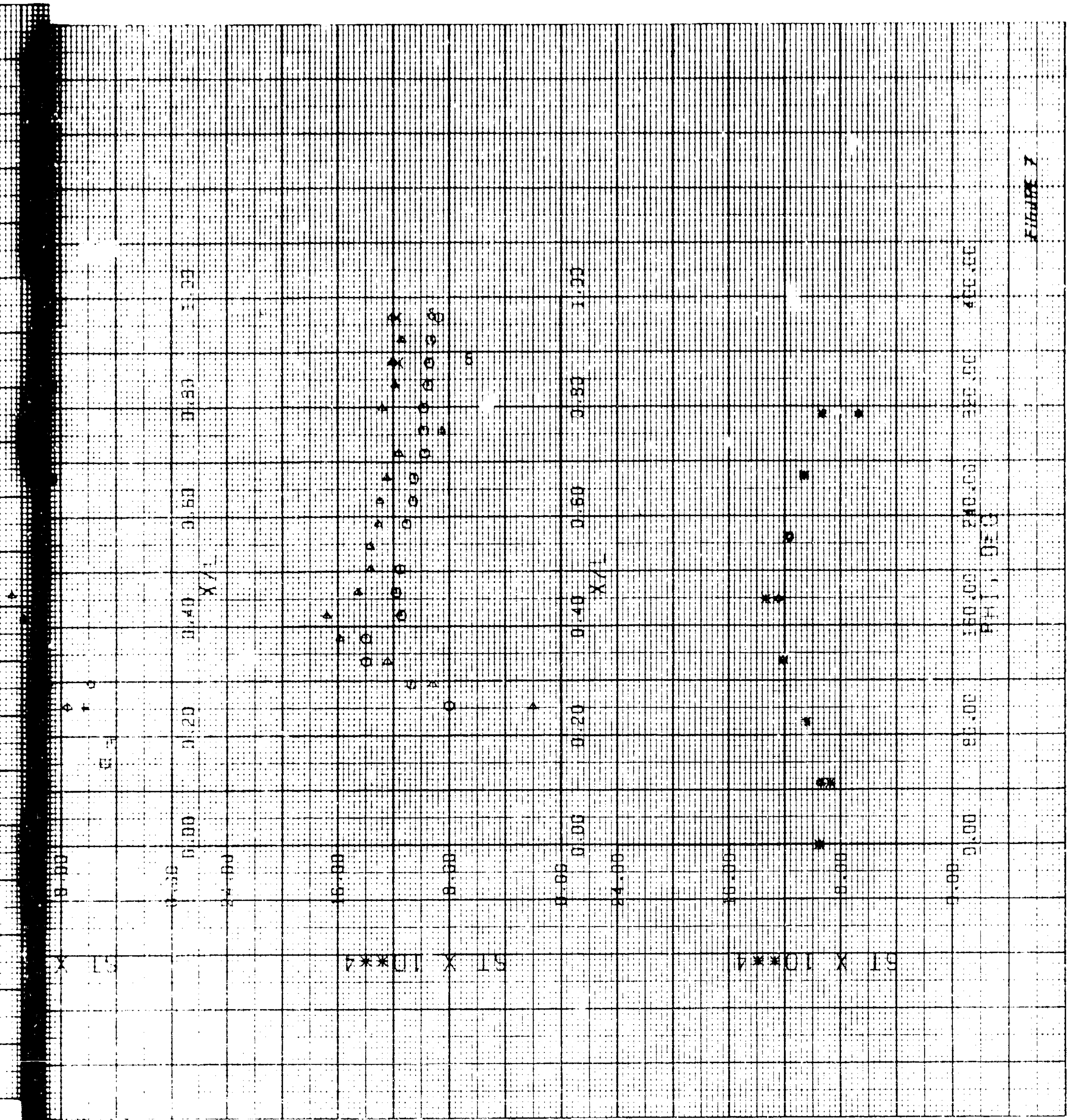


Figure 7

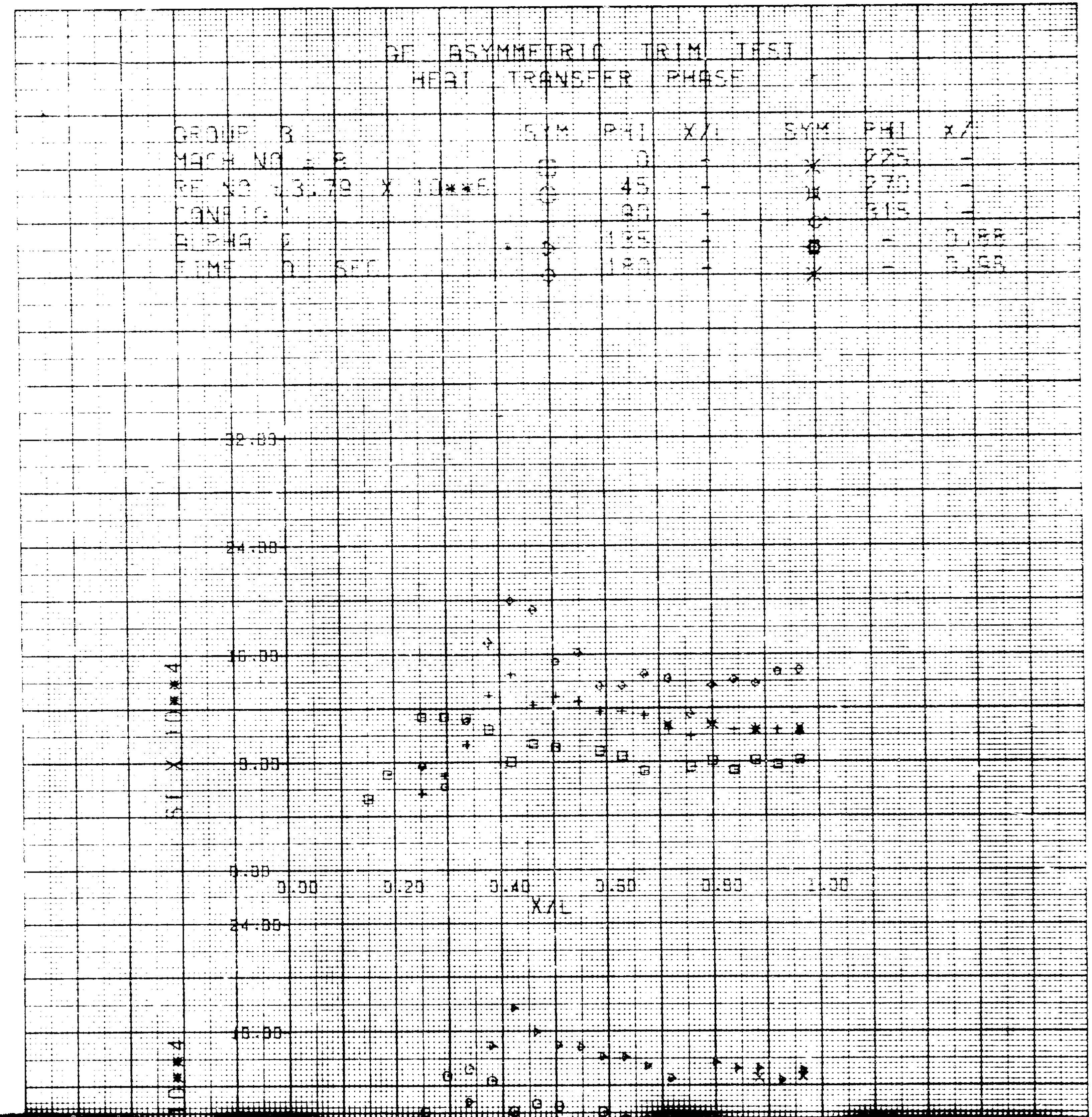
7/16/69

ARO, INC. - ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
VT0967-000

GROUP	CONFIG	ALPHA-M	BETA-M	ALPHA-S	ROLL	ALP-P	DATE	MACH NO	PO	TO	TIME
1	1	2.06	-.06	2.06	.02	0	714	8.00	840.49	1332.86	.00

T-INF	P-INF	Q-INF	V-INF	RHO-INF	MU-INF	RE/FT	RE/D	MU
9.0586E 01	8.81393E-02	3.94464E 00	3.85246E 03	7.55043E-05	[illegible]	3.79124E 06	3.47759E 06	3.26752E 02

TC NO	X/L	PHI	TEMP	SLOPE	Q-STON	HT	HM	HW	ST
1	.1589	0	518.38	4.7830E 00	1.0223E 00	1.2952E-03	5.0513E-03	1.2436E 02	5.3227E-04
2	.1867	0	515.94	6.2455E 00	1.3716E 00	1.6780E-03	6.7517E-03	1.2366E 02	7.1166E-04
3	.2524	0	521.89	7.1762E 00	2.1805E 00	2.6881E-03	1.0818E-02	1.2519E 02	1.1399E-03
4	.2943	0	529.25	6.8534E 00	2.1632E 00	2.6918E-03	1.0826E-02	1.2694E 02	1.1408E-03
5	.3363	0	530.42	6.7950E 00	2.1447E 00	2.6727E-03	1.0749E-02	1.2722E 02	1.1326E-03
6	.3783	0	532.39	6.5460E 00	1.9680E 00	2.4586E-03	9.4856E-03	1.2769E 02	1.0418E-03
7	.4203	0	530.68	5.2566E 00	1.5274E 00	1.9040E-03	7.6572E-03	1.2728E 02	8.0687E-04
8	.4623	0	534.88	6.4311E 00	1.7720E 00	2.2181E-03	8.9198E-03	1.2807E 02	9.3998E-04
9	.5043	0	534.64	6.1563E 00	1.7196E 00	2.1544E-03	8.6622E-03	1.2823E 02	9.1277E-04
10	.5463	0	529.31	1.6624E-01	4.6094E-02	5.7355E-05	2.3061E-04	1.2696E 02	2.4311E-05
11	.5882	0	538.76	6.0244E 00	1.6599E 00	2.0903E-03	8.4027E-03	1.2929E 02	8.8581E-04
12	.6302	0	541.28	5.4247E 00	1.5758E 00	1.9907E-03	8.0013E-03	1.2981E 02	8.4313E-04
13	.6722	0	543.57	5.4729E 00	1.3711E 00	1.7371E-03	6.9809E-03	1.3035E 02	7.3560E-04
99	.7170	315.0	547.73	4.3435E 00	1.1315E 00	1.4411E-03	5.7903E-03	1.3134E 02	6.1014E-04
15	.7583	0	547.39	5.9093E 00	1.4211E 00	1.8092E-03	7.2693E-03	1.3126E 02	7.6599E-04
16	.7996	0	548.32	5.1340E 00	1.4966E 00	1.9076E-03	7.6644E-03	1.3144E 02	8.0762E-04
17	.8409	0	548.14	5.1863E 00	1.3763E 00	1.7538E-03	7.0465E-03	1.3144E 02	7.4251E-04
18	.8822	0	551.29	5.9845E 00	1.4992E 00	1.9183E-03	7.7058E-03	1.3219E 02	8.1199E-04
19	.9235	0	551.86	5.7481E 00	1.4400E 00	1.8438E-03	7.4066E-03	1.3233E 02	7.8046E-04
20	.9648	0	552.34	6.2559E 00	1.5044E 00	1.9275E-03	7.7424E-03	1.3244E 02	8.1584E-04
21	.2524	45.0	515.94	6.5651E 00	1.9407E 00	2.3785E-03	9.5726E-03	1.2402E 02	1.0087E-03
22	.2943	45.0	525.39	7.5689E 00	2.4267E 00	3.0054E-03	1.2090E-02	1.2603E 02	1.2739E-03
23	.3363	45.0	527.87	8.1536E 00	2.5111E 00	3.1194E-03	1.2547E-02	1.2662E 02	1.3221E-03
24	.3783	45.0	530.51	7.8010E 00	2.3652E 00	2.9229E-03	1.1755E-02	1.2724E 02	1.2386E-03
25	.4203	45.0	530.10	6.4077E 00	1.9198E 00	2.3915E-03	9.6179E-03	1.2715E 02	1.0135E-03
26	.4623	45.0	534.18	7.1528E 00	2.0069E 00	2.5128E-03	1.0104E-02	1.2812E 02	1.0647E-03
27	.5043	45.0	537.22	7.4122E 00	1.9683E 00	2.4739E-03	9.9453E-03	1.2884E 02	1.0480E-03
100	.9648	315.0	557.09	6.3243E 00	1.5209E 00	1.9605E-03	7.8729E-03	1.3357E 02	8.2959E-04
29	.5882	45.0	539.90	6.8666E 00	1.8920E 00	2.3860E-03	9.5905E-03	1.2948E 02	1.0106E-03
30	.6302	45.0	542.89	6.5578E 00	1.7741E 00	2.2458E-03	9.0259E-03	1.3019E 02	9.5108E-04
31	.6722	45.0	547.67	7.0760E 00	1.7369E 00	2.2121E-03	8.8881E-03	1.3133E 02	9.3657E-04
32	.7170	45.0	549.84	6.8999E 00	1.6249E 00	2.0751E-03	8.3366E-03	1.3185E 02	8.7845E-04
33	.7583	45.0	548.95	6.0415E 00	1.6646E 00	2.1235E-03	8.5313E-03	1.3163E 02	8.9897E-04
34	.7996	45.0	549.49	5.8740E 00	1.6481E 00	2.1039E-03	8.4524E-03	1.3176E 02	8.9065E-04
35	.8409	45.0	551.49	5.9229E 00	1.6024E 00	2.0507E-03	8.2379E-03	1.3224E 02	8.6805E-04
36	.8822	45.0	553.01	5.9654E 00	1.5690E 00	2.0120E-03	8.0816E-03	1.3260E 02	8.5158E-04
37	.9235	45.0	554.07	5.0607E 00	1.5486E 00	1.9886E-03	7.9866E-03	1.3285E 02	8.4157E-04
38	.9648	45.0	554.98	6.1555E 00	1.4803E 00	1.9030E-03	7.6429E-03	1.3307E 02	8.0535E-04
39	.2524	90.0	516.82	3.7324E 00	1.1033E 00	1.3521E-03	5.4415E-03	1.2399E 02	5.7339E-04
40	.2943	90.0	524.09	4.1851E 00	1.3418E 00	1.6591E-03	6.6746E-03	1.2572E 02	7.0332E-04
41	.3363	90.0	527.24	5.6544E 00	1.7867E 00	2.2153E-03	8.9107E-03	1.2647E 02	9.3895E-04
42	.3783	90.0	530.21	7.7710E 00	2.4528E 00	3.0559E-03	1.2290E-02	1.2717E 02	1.2950E-03
43	.4203	90.0	533.59	9.3032E 00	2.7501E 00	3.4408E-03	1.3835E-02	1.2797E 02	1.4579E-03
44	.4623	90.0	532.12	7.4406E 00	2.3113E 00	2.9865E-03	1.1607E-02	1.2763E 02	1.2231E-03
45	.5043	90.0	537.13	8.7647E 00	2.4149E 00	3.0349E-03	1.2201E-02	1.2892E 02	1.2856E-03
46	.5463	90.0	538.33	8.2195E 00	2.3472E 00	2.9543E-03	1.1876E-02	1.2910E 02	1.2514E-03
47	.5882	90.0	540.43	7.1683E 00	2.2077E 00	2.7860E-03	1.1198E-02	1.2960E 02	1.1800E-03
48	.6302	90.0	543.11	7.9852E 00	2.2002E 00	2.7859E-03	1.1196E-02	1.3024E 02	1.1798E-03
49	.6722	90.0	547.70	8.5053E 00	2.1307E 00	2.7137E-03	1.0903E-02	1.3134E 02	1.1489E-03
50	.7170	90.0	550.66	8.1600E 00	1.9216E 00	2.4567E-03	9.8690E-03	1.3204E 02	1.0399E-03
51	.7583	90.0	547.05	7.0612E 00	1.8394E 00	2.3408E-03	9.4054E-03	1.3118E 02	9.9107E-04
52	.7996	90.0	548.35	7.7788E 00	2.0264E 00	2.5830E-03	1.0378E-02	1.3149E 02	1.0935E-03
53	.8409	90.0	549.08	7.6568E 00	1.9182E 00	2.4473E-03	9.8324E-03	1.3166E 02	1.0361E-03
54	.8822	90.0	550.99	7.8191E 00	1.9194E 00	2.4548E-03	9.8615E-03	1.3212E 02	1.0391E-03
55	.9235	90.0	551.90	7.9592E 00	1.9140E 00	2.4509E-03	9.8450E-03	1.3234E 02	1.0374E-03
56	.9648	90.0	552.43	7.8398E 00	1.8853E 00	2.4157E-03	9.7036E-03	1.3246E 02	1.0225E-03
57	.2524	135.0	509.66	1.3602E 00	4.0209E-01	4.8845E-04	1.9666E-03	1.2229E 02	2.0722E-04
58	.2943	135.0	518.25	5.3896E 00	1.7280E 00	2.1213E-03	8.5367E-03	1.2433E 02	8.9953E-04
59	.3363	135.0	520.71	6.5556E 00	2.0691E 00	2.5479E-03	1.0252E-02	1.2493E 02	1.0803E-03
60	.3783	135.0	524.24	9.1833E 00	2.8527E 00	3.5279E-03	1.4193E-02	1.2575E 02	1.4955E-03
61	.4203	135.0	526.87	1.1229E 01	3.3755E 00	4.1881E-03	1.6846E-02	1.2638E 02	1.7751E-03
62	.4623	135.0	525.28	1.0459E 01	3.0389E 00	3.7771E-03	1.5192E-02	1.2671E 02	1.6008E-03
63	.5043	135.0	531.51	1.1119E 01	2.8409E 00	3.5452E-03	1.4257E-02	1.2748E 02	1.5023E-03
64	.5463	135.0	532.89	1.0558E 01	2.8036E 00	3.5047E-03	1.4093E-02	1.2781E 02	1.4850E-03
65	.5882	135.0	535.59	1.0038E 01	2.6655E 00	3.3433E-03	1.3442E-02	1.2845E 02	1.4164E-03
66	.6302	135.0	536.88	9.9867E 00	2.6520E 00	3.3317E-03	1.3394E-02	1.2876E 02	1.4114E-03
67	.6722	135.0	544.81	1.0419E 01	2.5055E 00	3.1794E-03	1.2777E-02	1.3065E 02	1.3463E-03
68	.7170	135.0	546.40	9.8743E 00	2.3253E 00	2.9567E-03	1.1880E-02	1.3103E 02	1.2519E-03
69	.7583	135.0	538.33	6.4514E 00	1.8101E 00	2.2783E-03	9.1584E-03	1.2911E 02	9.6505E-04
70	.7996	135.0	543.42	8.8198E 00	2.5627E 00	3.2462E-03	1.3046E-02	1.3032E 02	1.3747E-03
71	.8409	135.0	544.41	8.9577E 00	2.4681E 00	3.1303E-03	1.2580E-02	1.3055E 02	1.3255E-03
72	.8822	135.0	545.70	9.0923E 00	2.4598E 00	3.1249E-03	1.2557E-02	1.3086E 02	1.3232E-03
73	.9235	135.0	547.87	9.3492E 00	2.2949E 00	2.9233E-03	1.1748E-02	1.3136E 02	1.2377E-03
74	.9648	135.0	550.87	1.0081E 01	2.4243E 00	3.1002E-03	1.2454E-02	1.3209E 02	1.3123E-03
75	.2524	180.0	513.88	5.1590E 00	1.4990E 00	1.8303E-03	7.3675E-03	1.2329E 02	7.7634E-04
76	.2943	180.0	518.87	3.7166E 00	1.1916E 00	1.4639E-03	5.8910E-03	1.2448E 02	6.2075E-04
77	.3363	180.0	523.64	7.1490E 00	2.1133E 00	2.6116E-03	1.0507E-02	1.2561E 02	1.1071E-03
78	.3783	180.0	528.43	1.0666E 01	3.2062E 00	3.9857E-03	1.6031E-02	1.2675E 02	1.6892E-03
79	.4203	180.0	533.06	1.2783E 01	3.7788E 00	4.7247E-03	1.8998E-02	1.2785E 02	2.0019E-03
80	.4623	180.0	535.75	1.2714E 01	3.6307E 00	4.5549E-03	1.8313E-02	1.2849E 02	1.9297E-03
81	.5043	180.0	536.93	1.1577E 01	2.9002E 00	3.6438E-03	1.4649E-02	1.2877E 02	1.5436E-03
82	.5463	180.0	538.29	1.1393E 01	3.0254E 00	3.8076E-03	1.5306E-02	1.2909E 02	1.6129E-03
83	.5882	180.0	538.85	9.4357E 00	2.5588E 00	3.2226E-03	1.2954E-02	1.2923E 02	1.3650E-03
84	.6302	180.0	542.97	9.4268E 00	2.5564E 00	3.2364E-03	1.3007E-02	1.3021E 02	1.3706E-03
85	.6722	180.0	551.57	1.1147E 01	2.6805E 00	3.4310E-03	1.3782E-02	1.3226E 02	1.4523E-03
86	.7170	180.0	554.47	1.1093E 01	2.6123E 00	3.3561E-03	1.3479E-02	1.3295E 02	1.4204E-03
87	.7583	180.0	546.11	8.9406E 00	2.1500E 00	2.7328E-03	1.0981E-02	1.3096E 02	1.1571E-03
88	.7996	180.0	550.44	9.7500E 00	2.5399E 00	3.2462E-03	1.3041E-02	1.3199E 02	1.3742E-03
89	.8409	180.0	551.82	1.0199E 01	2.6059E 00	3.3364E-03	1.3402E-02	1.3232E 02	1.4122E-03
90	.8822	180.0	553.51	1.1055E 01	2.5470E 00	3.2691E-03	1.3131E-02	1.3272E 02	1.3836E-03
91	.9235	180.0	554.30	1.1020E 01	2.7091E 00	3.4763E-03	1.3955E-02	1.3291E 02	1.4705E-03
92	.9648	180.0	558.55	1.1758E 01	2.7095E 00	3.4988E-03	1.4049E-02	1.3390E 02	1.4804E-03
93	.8822	225.0	555.29	9.0507E 00	2.3124E 00	2.9739E-03	1.1946E-02	1.3314E 02	1.2586E-03
94	.9648	225.0	558.69	9.6296E 00	2.3157E 00	2.9912E-03	1.2011E-02	1.3396E 02	1.2657E-03
95	.7170	270.0	556.65	8.7688E 00	1.9769E 00	2.5469E-03	1.0228E-02	1.3347E 02	1.0778E-03
96	.7996	270.0	557.80	7.4454E 00	1.9771E 00	2.5509E-03	1.0244E-02	1.3374E 02	1.0794E-03
97	.8822	270.0	558.31	7.4321E 00	1.8990E 00	2.4517E-03	9.8453E-03	1.3381E 02	1.0374E-03
98	.9648	270.0	559.15	7.9602E 00	1.9143E 00	2.4741E-03	9.9348E-03	1.3406E 02	1.0468E-03



GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP B
MACH NO = 8
RE NO = 3.79 X 10**6
CONFIG 1
ALPHA 2
TIME 0 SEC
SYM PHI X/L
0
45
90
135
180
SYM PHI X/L
225
270
315
0.88
0.98
32.00
24.00
16.00
8.00
0.00
0.00
0.20
0.40
0.60
0.80
1.00
X/L
ST X 10**4
24.00
16.00
10**4

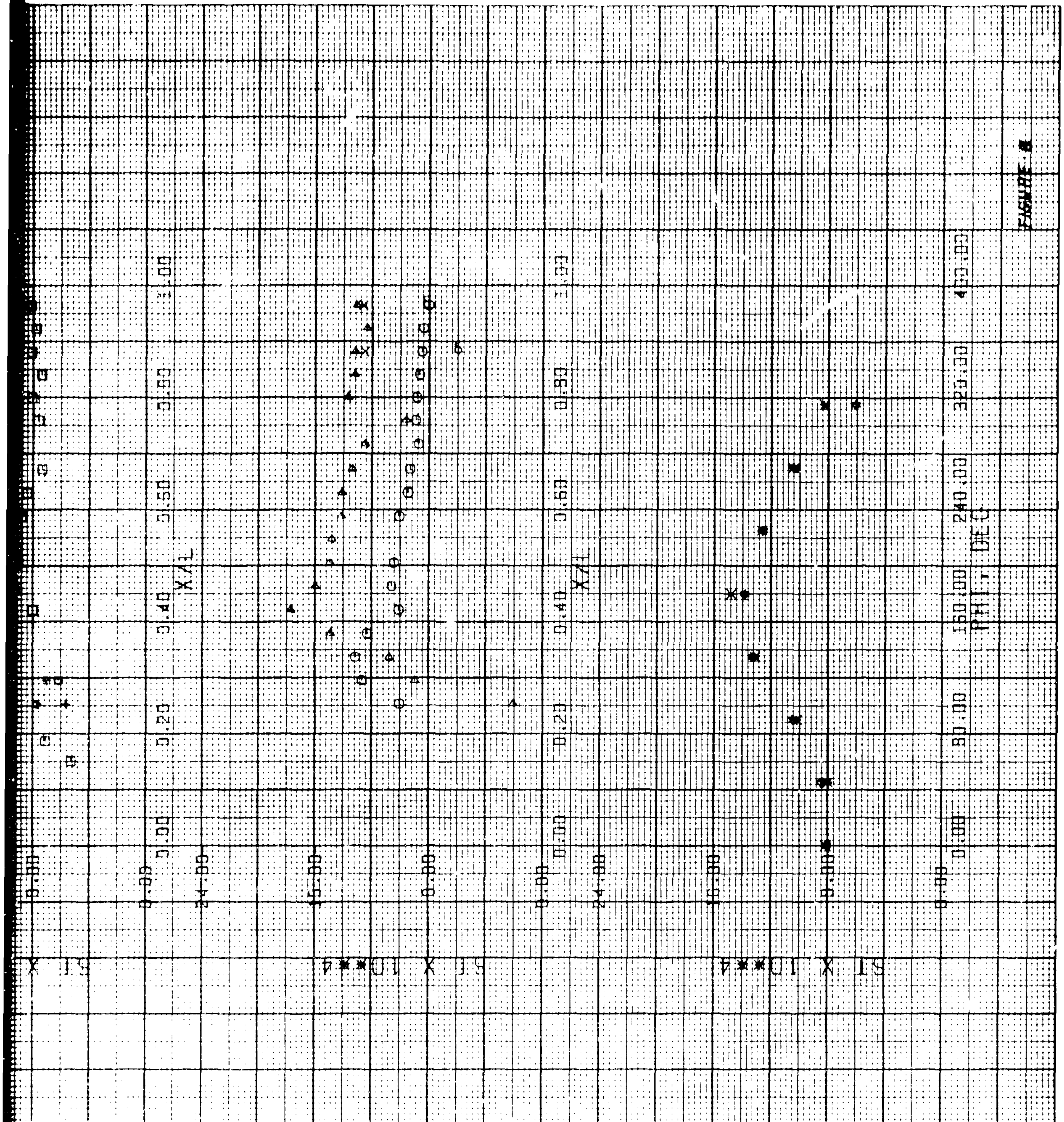


Figure 8

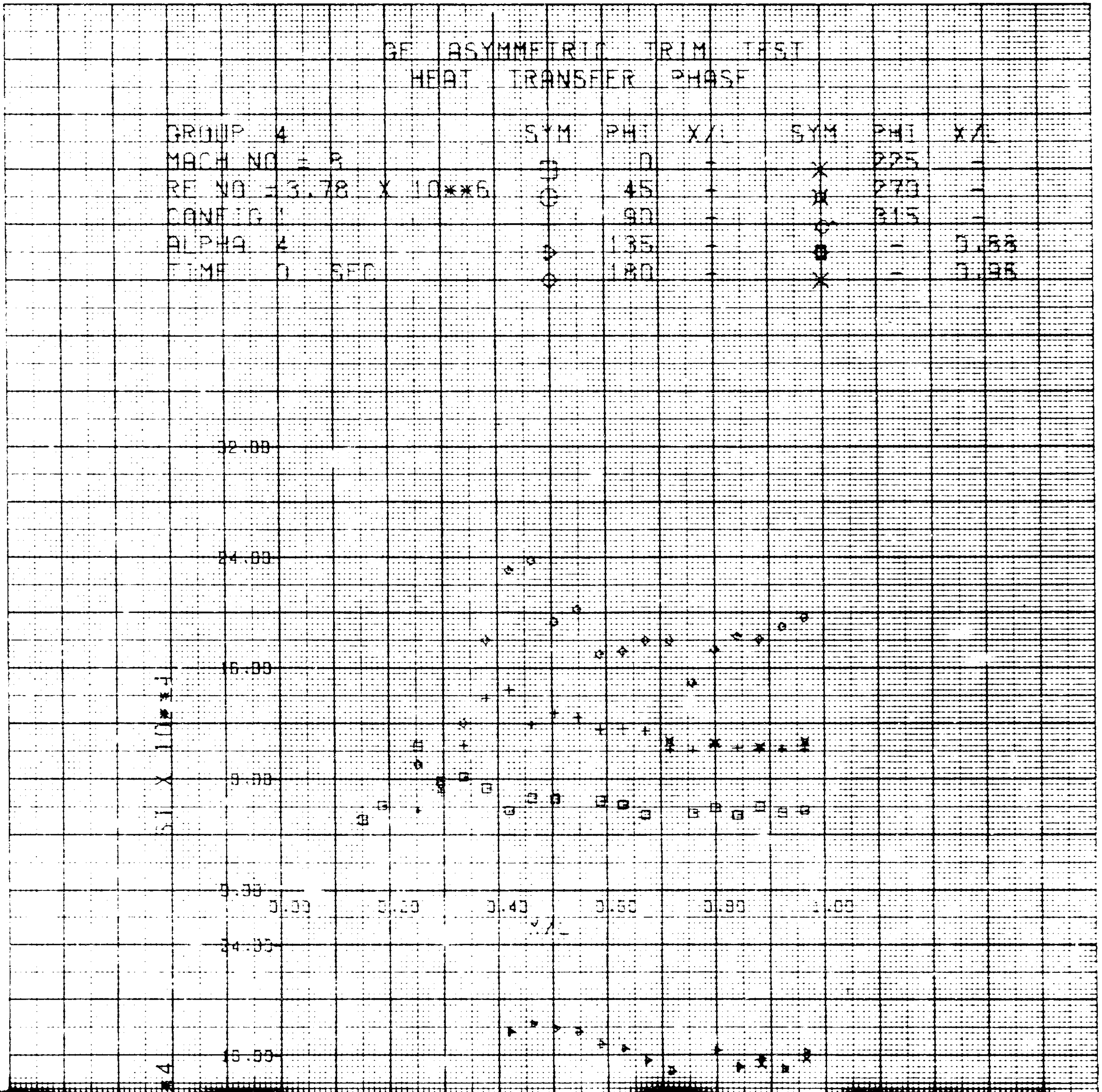
ARO (ARO, INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
VT0967-400

GROUP	CONF ID	ALPHA-M	BETA-M	ALPHA-S	ROLL	ALP-P	DATE	MACH NO	PO	TO	TIME
4	I	4.00	0	4.95	0	0	714	8.00	866.29	1336.33	.08

T-INF	P-INF	Q-INF	V-INF	RHO-INF	MU-INF	RE/FT	RE/D	HO
9.60352E 01	8.81187E-02	3.94772E 00	3.85747E 03	7.63479E-05	7.79620E-08	3.77761E 06	3.46542E 06	3.27696E 02

TC NO	X/L	PHI	TEMP	SLOPE	Q-STOR	HT	HM	[illegible]	ST
1	.1900	0	500.71	4.5700E 00	9.9395E-01	1.2005E-03	4.8320E-03	1.2207E 02	5.1002E-04
2	.1667	0	503.98	5.5139E 00	1.2109E 00	1.4548E-03	5.8582E-03	1.2096E 02	6.1826E-04
3	.2524	0	506.49	6.8724E 00	2.0116E 00	2.4401E-03	9.8565E-03	1.2154E 02	1.0402E-03
4	.2943	0	516.62	4.8315E 00	1.5250E 00	1.8604E-03	7.4860E-03	1.2394E 02	7.9003E-04
5	.3363	0	519.78	4.9922E 00	1.5757E 00	1.9297E-03	7.7637E-03	1.2469E 02	8.1934E-04
6	.3783	0	521.37	4.7000E 00	1.4128E 00	1.7336E-03	6.9741E-03	1.2507E 02	7.3601E-04
7	.4203	0	521.06	3.8095E 00	1.1069E 00	1.3577E-03	5.4618E-03	1.2499E 02	5.7641E-04
8	.4623	0	524.19	4.6550E 00	1.2826E 00	1.5791E-03	6.3522E-03	1.2574E 02	6.7038E-04
9	.5043	0	524.91	4.6051E 00	1.2675E 00	1.5621E-03	6.2829E-03	1.2591E 02	6.6306E-04
10	.5463	0	529.41	-1.9804E-02	-5.5567E-03	-6.8865E-06	-2.7691E-05	1.2699E 02	-2.9224E-06
11	.5882	0	528.97	4.4715E 00	1.2320E 00	1.5260E-03	6.1363E-03	1.2688E 02	6.4760E-04
12	.6302	0	532.22	4.1436E 00	1.1751E 00	1.4614E-03	5.8756E-03	1.2765E 02	6.2008E-04
13	.6722	0	537.57	4.0930E 00	1.0256E 00	1.2837E-03	5.1597E-03	1.2892E 02	5.4452E-04
99	.8022	315.0	540.51	3.5964E 00	9.3686E-01	1.1773E-03	4.7310E-03	1.2963E 02	4.9929E-04
15	.7583	0	539.21	4.3104E 00	1.0305E 00	1.3028E-03	5.2359E-03	1.2931E 02	5.5257E-04
16	.7996	0	539.15	3.9931E 00	1.1204E 00	1.4054E-03	5.6481E-03	1.2929E 02	5.9607E-04
17	.8409	0	538.07	3.9692E 00	1.0139E 00	1.2714E-03	5.1099E-03	1.2923E 02	5.3927E-04
18	.8822	0	541.83	4.5157E 00	1.1312E 00	1.4238E-03	5.7213E-03	1.2994E 02	6.0380E-04
19	.9235	0	543.06	4.1607E 00	1.0423E 00	1.3140E-03	5.2708E-03	1.3023E 02	5.5720E-04
20	.9648	0	544.39	4.4959E 00	1.0812E 00	1.3652E-03	5.4853E-03	1.3055E 02	5.7809E-04
21	.2524	45.0	501.26	2.8742E 00	8.4965E-01	1.0175E-03	4.0976E-03	1.2030E 02	4.3244E-04
22	.2943	45.0	511.60	7.2530E 00	1.3636E 00	1.6534E-03	6.6550E-03	1.2275E 02	7.0233E-04
23	.3363	45.0	516.56	7.4178E 00	2.2298E 00	2.7200E-03	1.0945E-02	1.2393E 02	1.1551E-03
24	.3783	45.0	518.82	7.3355E 00	2.2051E 00	2.6973E-03	1.0852E-02	1.2447E 02	1.1453E-03
25	.4203	45.0	519.39	5.9503E 00	1.7289E 00	2.1163E-03	8.5147E-03	1.2460E 02	8.9859E-04
26	.4623	45.0	523.35	6.1745E 00	1.7324E 00	2.1310E-03	8.5717E-03	1.2554E 02	9.0461E-04
27	.5043	45.0	525.89	6.2880E 00	1.6698E 00	2.0604E-03	8.2845E-03	1.2615E 02	8.7451E-04
100	.9648	315.0	549.99	5.1633E 00	1.2417E 00	1.5791E-03	6.3475E-03	1.3188E 02	6.6935E-04
29	.5882	45.0	529.22	5.7700E 00	1.5898E 00	1.9698E-03	7.9267E-03	1.2694E 02	8.3591E-04
30	.6302	45.0	533.07	5.5561E 00	1.5031E 00	1.8713E-03	7.5232E-03	1.2785E 02	7.9396E-04
31	.6722	45.0	540.96	5.9855E 00	1.4693E 00	1.8472E-03	7.4233E-03	1.2973E 02	7.8341E-04
32	.7170	45.0	543.34	5.7370E 00	1.3510E 00	1.7037E-03	6.8456E-03	1.3030E 02	7.2245E-04
33	.7583	45.0	540.51	5.0301E 00	1.3859E 00	1.7415E-03	6.9987E-03	1.2962E 02	7.3861E-04
34	.7996	45.0	540.22	4.9014E 00	1.3752E 00	1.7275E-03	6.9422E-03	1.2955E 02	7.3264E-04
35	.8409	45.0	542.06	4.9263E 00	1.3328E 00	1.6780E-03	6.7427E-03	1.2999E 02	7.1158E-04
36	.8822	45.0	543.91	4.8472E 00	1.2749E 00	1.6089E-03	6.4645E-03	1.3043E 02	6.8223E-04
37	.9235	45.0	545.92	4.8887E 00	1.2491E 00	1.5804E-03	6.3491E-03	1.3091E 02	6.7005E-04
38	.9648	45.0	547.46	5.0000E 00	1.2024E 00	1.5242E-03	6.1231E-03	1.3128E 02	6.4620E-04
39	.2524	90.0	502.91	3.8296E 00	1.1321E 00	1.3583E-03	5.4699E-03	1.2069E 02	5.7727E-04
40	.2943	90.0	510.55	4.2092E 00	1.3752E 00	1.6654E-03	6.7035E-03	1.2250E 02	7.0745E-04
41	.3363	90.0	515.08	6.4177E 00	2.0256E 00	2.4663E-03	9.9250E-03	1.2356E 02	1.0476E-03
42	.3783	90.0	519.26	8.4553E 00	2.6688E 00	3.2663E-03	1.3141E-02	1.2457E 02	1.3869E-03
43	.4203	90.0	522.78	9.3961E 00	2.7776E 00	3.4142E-03	1.3734E-02	1.2541E 02	1.4494E-03
44	.4623	90.0	521.22	7.3915E 00	2.2961E 00	2.8169E-03	1.1332E-02	1.2503E 02	1.1959E-03
45	.5043	90.0	526.24	8.9723E 00	2.4446E 00	3.0177E-03	1.2137E-02	1.2623E 02	1.2808E-03
46	.5463	90.0	529.27	8.9296E 00	2.3787E 00	2.9474E-03	1.1852E-02	1.2695E 02	1.2508E-03
47	.5882	90.0	529.96	7.8358E 00	2.1986E 00	2.7265E-03	1.0963E-02	1.2711E 02	1.1570E-03
48	.6302	90.0	533.91	7.9881E 00	2.2010E 00	2.7415E-03	1.1022E-02	1.2796E 02	1.1632E-03
49	.6722	90.0	542.15	8.5970E 00	2.1527E 00	2.7107E-03	1.0892E-02	1.3001E 02	1.1495E-03
50	.7170	90.0	544.99	8.8456E 00	1.8947E 00	2.3942E-03	9.6193E-03	1.3069E 02	1.0152E-03
51	.7583	90.0	539.42	7.2602E 00	1.8934E 00	2.3759E-03	9.5465E-03	1.2936E 02	1.0077E-03
52	.7996	90.0	546.23	7.6176E 00	1.9844E 00	2.4926E-03	1.0017E-02	1.2956E 02	1.0572E-03
53	.8409	90.0	541.48	7.7013E 00	1.9293E 00	2.4273E-03	9.7539E-03	1.2985E 02	1.0296E-03
54	.8822	90.0	544.16	7.7762E 00	1.9088E 00	2.4095E-03	9.6810E-03	1.3046E 02	1.0217E-03
55	.9235	90.0	545.36	7.9069E 00	1.9015E 00	2.4040E-03	9.6542E-03	1.3078E 02	1.0193E-03
56	.9648	90.0	545.63	7.8818E 00	1.8954E 00	2.3972E-03	9.6308E-03	1.3084E 02	1.0164E-03
57	.2524	135.0	495.58	1.6790E 00	4.9634E-01	5.9036E-04	2.3743E-03	1.1895E 02	2.5099E-04
58	.2943	135.0	504.40	5.4010E 00	1.7317E 00	2.0815E-03	8.3814E-03	1.2104E 02	8.8453E-04
59	.3363	135.0	507.10	6.0739E 00	1.9171E 00	2.3119E-03	9.3078E-03	1.2168E 02	9.8230E-04
60	.3783	135.0	510.94	8.0174E 00	2.4905E 00	3.0174E-03	1.2145E-02	1.2259E 02	1.2818E-03
61	.4203	135.0	515.02	1.1412E 01	3.4305E 00	4.1769E-03	1.6809E-02	1.2356E 02	1.7739E-03
62	.4623	135.0	518.00	1.2161E 01	3.5335E 00	4.3180E-03	1.7374E-02	1.2427E 02	1.8336E-03
63	.5043	135.0	522.27	1.3473E 01	3.4424E 00	4.2288E-03	1.7011E-02	1.2528E 02	1.7952E-03
64	.5463	135.0	523.81	1.2782E 01	3.3943E 00	4.1775E-03	1.6803E-02	1.2565E 02	1.7733E-03
65	.5882	135.0	527.15	1.2118E 01	3.2181E 00	3.9770E-03	1.5994E-02	1.2644E 02	1.6879E-03
66	.6302	135.0	529.03	1.1068E 01	3.1515E 00	3.9038E-03	1.5698E-02	1.2689E 02	1.6567E-03
67	.6722	135.0	540.72	1.2195E 01	2.9327E 00	3.6862E-03	1.4813E-02	1.2967E 02	1.5633E-03
68	.7170	135.0	542.61	1.1858E 01	2.7925E 00	3.5182E-03	1.4137E-02	1.3012E 02	1.4920E-03
69	.7583	135.0	532.13	7.7520E 00	2.1151E 00	2.7046E-03	1.0874E-02	1.2763E 02	1.1476E-03
70	.7996	135.0	537.31	1.0644E 01	3.0926E 00	3.8705E-03	1.5557E-02	1.2886E 02	1.6418E-03
71	.8409	135.0	538.85	1.0382E 01	2.8606E 00	3.5870E-03	1.4416E-02	1.2923E 02	1.5214E-03
72	.8822	135.0	540.37	1.0931E 01	2.9510E 00	3.7155E-03	1.4932E-02	1.2959E 02	1.5758E-03
73	.9235	135.0	542.39	1.1516E 01	2.82[illegible] 00	3.5604E-03	1.4307E-02	1.3007E 02	1.5099E-03
74	.9648	135.0	547.84	1.2606E 01	3.031[illegible] 00	3.8447E-03	1.5444E-02	1.3137E 02	1.6299E-03
75	.2524	180.0	498.96	6.1689E 00	1.7924E 00	2.1404E-03	8.6211E-03	1.1974E 02	9.0983E-04
76	.2943	180.0	504.85	6.6707E 00	1.4975E 00	1.8011E-03	7.2519E-03	1.2115E 02	7.6533E-04
77	.3363	180.0	511.18	7.9242E 00	2.3425E 00	2.3389E-03	1.1427E-02	1.2265E 02	1.2059E-03
78	.3783	180.0	517.18	1.1591E 01	3.4841E 00	4.2532E-03	1.7114E-02	1.2407E 02	1.8061E-03
79	.4203	180.0	522.46	1.5011E 01	4.4374E 00	5.4523E-03	2.1933E-02	1.2533E 02	2.3146E-03
80	.4623	180.0	526.62	1.5897E 01	4.5398E 00	5.6053E-03	2.2543E-02	1.2627E 02	2.3791E-03
81	.5043	180.0	528.11	1.4745E 01	3.6938E 00	4.5704E-03	1.8379E-02	1.2667E 02	1.9397E-03
82	.5463	180.0	529.77	1.4526E 01	3.8573E 00	4.7824E-03	1.9230E-02	1.2706E 02	2.0294E-03
83	.5882	180.0	530.15	1.2187E 01	3.2364E 00	4.0145E-03	1.6142E-02	1.2716E 02	1.7035E-03
84	.6302	180.0	535.36	1.2269E 01	3.2581E 00	4.0677E-03	1.6341E-02	1.2840E 02	1.7256E-03
85	.6722	180.0	548.56	1.3925E 01	3.3488E 00	4.2514E-03	1.7078E-02	1.3156E 02	1.8023E-03
86	.7170	180.0	551.99	1.4164E 01	3.3355E 00	4.2527E-03	1.7080E-02	1.3236E 02	1.8025E-03
87	.7583	180.0	539.71	1.1677E 01	2.8081E 00	3.5251E-03	1.4167E-02	1.2943E 02	1.4951E-03
88	.7996	180.0	544.95	1.2444E 01	3.2416E 00	4.0962E-03	1.6447E-02	1.3068E 02	1.7368E-03
89	.8409	180.0	546.38	1.3356E 01	3.4125E 00	4.3199E-03	1.7359E-02	1.3102E 02	1.8315E-03
90	.8822	180.0	548.85	1.4566E 01	3.3566E 00	4.2625E-03	1.7122E-02	1.3161E 02	1.8070E-03
91	.9235	180.0	556.37	1.4401E 01	3.5350E 00	4.4977E-03	1.8065E-02	1.3197E 02	1.9065E-03
92	.9648	180.0	555.45	1.5758E 01	3.6312E 00	4.6502E-03	1.8673E-02	1.3318E 02	1.9705E-03
93	.8822	225.0	548.11	1.1222E 01	2.8672E 00	3.6377E-03	1.4613E-02	1.3143E 02	1.5421E-03
94	.9648	225.0	554.81	1.2096E 01	2.9088E 00	3.7219E-03	1.4946E-02	1.3303E 02	1.5773E-03
95	.7170	270.0	551.79	8.9292E 00	1.9905E 00	2.5372E-03	1.0190E-02	1.3231E 02	1.0754E-03
96	.7996	270.0	548.36	7.4314E 00	1.9750E 00	2.5064E-03	1.0068E-02	1.3149E 02	1.0626E-03
97	.8822	270.0	550.72	7.4977E 00	1.9137E 00	2.4373E-03	9.7895E-03	1.3196E 02	1.0331E-03
98	.9648	270.0	553.46	4.2298E 00	1.9791E 00	2.5280E-03	1.0152E-02	1.3271E 02	1.0714E-03

GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
SYM PHI X/L SYM PHI X/L
GROUP 4


GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 4
MACH NO = 8
RE NO = 3.78 X 10**6
CONFIG 1
ALPHA 4
TIME 0 SEC
SYM PHI X/L
SYM PHI X/L
0
45
90
135
180
225
270
315
32.00
24.00
16.00
8.00
0.00
0.00
0.20
0.40
0.60
0.80
1.00
X/L
24.00
16.00

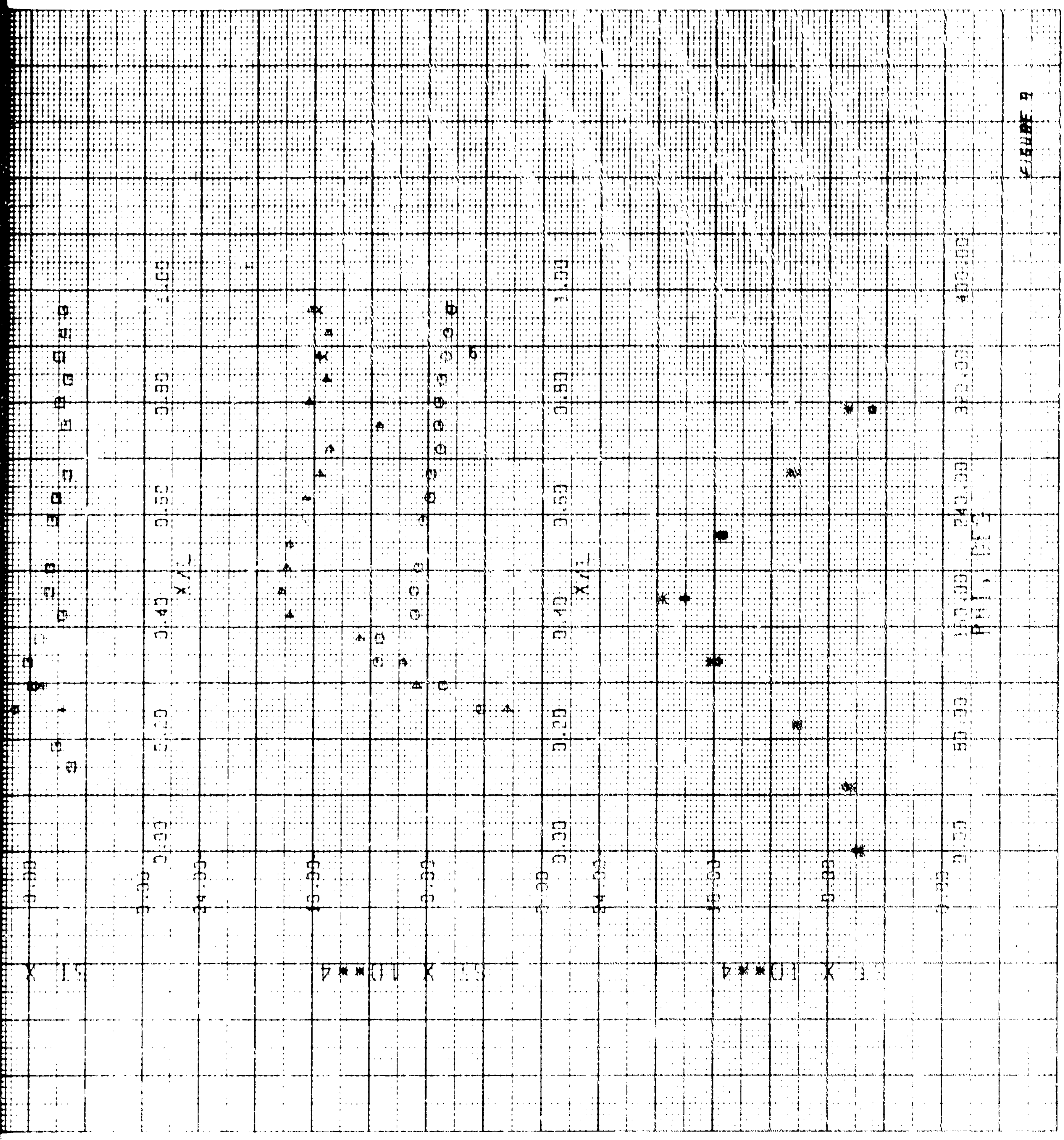


Figure 9

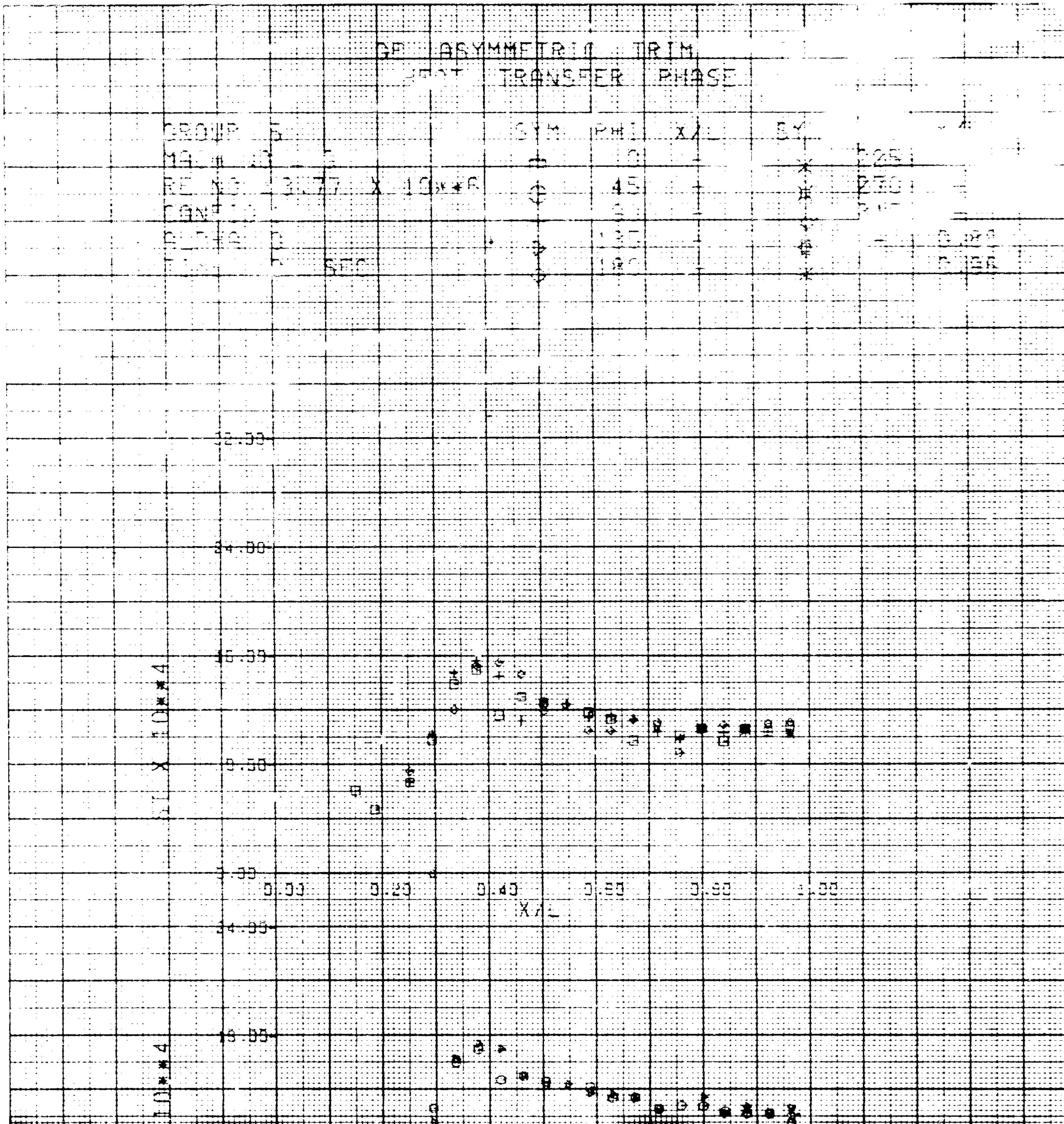
7/14/69

AEDC(ARO, INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
VT0967-000

GROUP	CONFIG	ELEVON-N	BETA-M	ALPHA-S	ROLL	ALP-P	DATE	MACH NO	PO	TO	TIME
18	8	.04	0	.04	0	9	714	8.08	860.69	1337.51	.88

T-INF	P-INF	Q-INF	V-INF	RHO-INF	MU-INF	RE/FT	RE/IN	MU
9.6921E 01	8.0139E-02	3.6664E 00	3.8591E 03	7.6298E-05	7.4031E-08	3.7734E 06	3.4590E 06	3.2778E 02

TC NO	X/L	PHI	TEMP	SLOPE	Q-STON	HT	HM	HW	ST
1	[illegible]	0	512.59	9.6773E 00	7.1093F 00	1.4417E-03	5.8021E-03	1.2298F 02	0.1245F-04
2	[illegible]	0	508.80	6.1959E 00	9.2661F-01	1.1099E-03	4.4641E-03	1.2192E 02	4.7163E-04
3	[illegible]	0	511.85	6.6143E 00	1.3649F 00	1.5804E-03	6.3608E-03	1.2281F 02	6.7143E-04
4	[illegible]	0	522.06	9.9088E 00	1.8902F 00	2.3202E-03	9.3372E-03	1.2542E 02	9.8513F-04
5	.3303	0	520.80	[illegible]	2.6611F 00	3.2906E-03	1.3231E-02	1.2604F 02	1.3967E-03
6	.3783	0	532.12	9.6767E 00	2.8487F 00	3.5370E-03	1.4220E-02	1.2763E 02	1.5020E-03
7	.4203	0	530.33	7.4654E 00	2.2215F 00	2.7528E-03	1.1068E-02	1.2725F 02	1.1683E-03
8	.4623	0	535.17	8.4644E 00	2.4701F 00	3.0784E-03	1.2374E-02	1.2834F 02	1.3062E-03
9	.5043	0	533.36	8.6682E 00	2.3030F 00	2.9700E-03	1.1918E-02	1.2835F 02	1.2602E-03
10	.5463	0	527.80	2.9037E-02	7.1933F-03	9.0975E-06	3.5776E-05	1.2689E 02	3.7764E-06
11	.5882	0	530.38	8.1350E 00	2.2144F 00	2.4046E-03	1.1272E-02	1.2910E 02	1.1898E-03
12	.6302	0	540.57	7.9160E 00	2.1421F 00	2.6879E-03	1.0801E-02	1.2964F 02	1.1401E-03
13	.6722	0	542.17	7.9459E 00	1.0398F 00	2.3150E-03	9.3014E-03	1.3016F 02	9.8182E-04
14	[illegible]	315.0	545.55	5.1120E 00	1.3318F 00	1.6917E-03	6.7559E-03	1.3082F 02	7.1314E-04
15	[illegible]	0	547.00	7.8701E 00	1.8936F 00	2.3952E-03	9.6225E-03	1.3117E 02	1.0157E-03
16	[illegible]	0	547.75	7.1015E 00	1.9925F 00	2.5228E-03	1.0134E-02	1.3134E 02	1.0697E-03
17	[illegible]	0	547.80	7.1263E 00	1.8208F 00	2.3039E-03	9.2547E-03	1.3121F 02	9.7690E-04
18	[illegible]	0	550.40	7.9304E 00	1.9867F 00	2.5244E-03	1.0134E-02	1.3200F 02	1.0702E-03
19	[illegible]	0	550.72	7.7272E 00	1.9358F 00	2.4604E-03	9.8815E-03	1.3206F 02	1.0431E-03
20	[illegible]	0	551.95	8.6138E 00	2.0234F 00	2.5744E-03	1.0339E-02	1.3225F 02	1.0913E-03
21	[illegible]	45.0	509.53	5.2226E 00	1.5439F 00	1.8646E-03	7.5055E-03	1.2226F 02	7.9225F-04
22	[illegible]	45.0	520.46	6.4152E 00	2.0568F 00	2.5173E-03	1.0127E-02	1.2485F 02	1.0690E-03
23	.3363	45.0	527.65	6.9434E 00	2.6084F 00	3.3172E-03	1.3340E-02	1.2642F 02	1.4081E-03
24	.3783	45.0	531.31	9.4944E 00	2.8540F 00	3.5402E-03	1.4213E-02	1.2744F 02	1.5024E-03
25	.4203	45.0	530.58	8.3660E 00	2.4293F 00	3.0105E-03	1.2104E-02	1.2726F 02	1.2777E-03
26	.4623	45.0	534.59	8.7931E 00	2.4672F 00	3.0727E-03	1.2352E-02	1.2821E 02	1.3038E-03
27	.5043	45.0	537.32	6.9885E 00	2.3869F 00	2.9829E-03	1.1989E-02	1.2896E 02	1.2655F-03
160	.9648	315.0	555.94	7.7784E 00	1.8606F 00	2.3907E-03	9.5990E-03	1.3329F 02	1.0132E-03
29	.5882	45.0	539.18	8.3427E 00	2.2987F 00	2.8794E-03	1.1571E-02	1.2931F 02	1.2214E-03
30	.6302	45.0	541.91	7.9444E 00	2.1493F 00	2.7015E-03	1.0855E-02	1.2996F 02	1.1458E-03
31	.6722	45.0	546.87	8.7337E 00	2.1439F 00	2.7115E-03	1.0892E-02	1.3114F 02	1.1498E-03
32	.7170	45.0	549.01	8.3953E 00	1.9770F 00	2.5073E-03	1.0071E-02	1.3165F 02	1.0630F-03
33	.7583	45.0	548.19	7.3294E 00	2.0196F 00	2.5587E-03	1.0278E-02	1.3145E 02	1.0849F-03
34	.7996	45.0	548.78	7.1663E 00	2.0107F 00	2.5493E-03	1.0240E-02	1.3159E 02	1.0809E-03
35	.8409	45.0	550.96	7.1363E 00	1.9306F 00	2.4546E-03	9.8579E-03	1.3211F 02	1.0406E-03
36	.8822	45.0	552.44	7.2454E 00	1.9057F 00	2.4275E-03	9.7483E-03	1.3247F 02	1.0290E-03
37	.9235	45.0	552.59	7.4184E 00	1.8955F 00	2.4148E-03	9.6975E-03	1.3250E 02	1.0236E-03
38	.9648	45.0	553.22	7.3930E 00	1.7779F 00	2.2668E-03	9.1028E-03	1.3265F 02	9.6087E-04
39	.2524	90.0	512.12	4.4531E 00	1.3164F 00	1.5949E-03	6.4187E-03	1.2280E 02	6.7754E-04
40	.2943	90.0	522.87	6.1691E 00	1.9779F 00	2.4280E-03	9.7641E-03	1.2543E 02	1.0309E-03
41	.3363	90.0	528.95	8.9209E 00	2.8157F 00	3.4824E-03	1.4003E-02	1.2687F 02	1.4781E-03
42	.3783	90.0	530.97	9.4729E 00	2.9899F 00	3.7071E-03	1.4904E-02	1.2735E 02	1.5733F-03
43	.4203	90.0	532.96	9.3446E 00	2.7623F 00	3.4330E-03	1.3801E-02	1.2780E 02	1.4568E-03
44	.4623	90.0	530.77	6.9688E 00	2.1461F 00	2.6603E-03	1.0696E-02	1.2731E 02	1.1290E-03
45	.5043	90.0	535.05	8.7285E 00	2.4050F 00	2.9970E-03	1.2047E-02	1.2832F 02	1.2716E-03
46	.5463	90.0	535.68	8.2929E 00	2.3682F 00	2.9535E-03	1.1872E-02	1.2847F 02	1.2531E-03
47	.5882	90.0	538.14	7.7619E 00	2.1722F 00	2.7174E-03	1.0921E-02	1.2906F 02	1.1528F-03
48	.6302	90.0	541.01	7.9230E 00	2.1030F 00	2.7408E-03	1.1013E-02	1.2974F 02	1.1625F-03
49	.6722	90.0	543.43	8.5215E 00	2.1348F 00	2.6951E-03	1.0827E-02	1.3079E 02	1.1429E-03
50	.7170	90.0	548.31	8.7485E 00	1.9624F 00	2.4613E-03	9.8863E-03	1.3148E 02	1.0436E-03
51	.7583	90.0	544.51	7.1450E 00	1.8613F 00	2.3471E-03	9.4298E-03	1.3058E 02	9.9537E-04
52	.7996	90.0	546.21	7.7330E 00	2.0144F 00	2.5457E-03	1.0227E-02	1.3098F 02	1.0795E-03
53	.8409	90.0	546.25	7.7344E 00	1.9376F 00	2.4487E-03	9.8370E-03	1.3099E 02	1.0384E-03
54	.8822	90.0	548.37	7.9618E 00	1.9544F 00	2.4766E-03	9.9478E-03	1.3150F 02	1.0501E-03
55	.9235	90.0	549.80	8.0865E 00	1.9467F 00	2.4662E-03	9.9058E-03	1.3165E 02	1.0456E-03
56	.9648	90.0	549.97	7.8817E 00	1.9194F 00	2.4345E-03	9.7782E-03	1.3166E 02	1.0322E-03
57	.2524	135.0	505.48	1.1119E 00	3.9669F-01	4.7678E-04	1.9195E-03	1.2130F 02	2.0262E-04
58	.2943	135.0	515.63	5.8590E 00	1.8785F 00	2.2856E-03	9.1970E-03	1.2371F 02	9.7081F-04
59	.3363	135.0	520.87	8.7336E 00	2.7566F 00	3.3755E-03	1.3579E-02	1.2495F 02	1.4333E-03
60	.3783	135.0	523.02	9.5533E 00	2.9676F 00	3.6435E-03	1.4655E-02	1.2546F 02	1.5469F-03
61	.4203	135.0	523.84	9.6057E 00	2.8875F 00	3.5487E-03	1.4273E-02	1.2566F 02	1.5066E-03
62	.4623	135.0	524.69	8.6138E 00	2.5028F 00	3.0792E-03	1.2384E-02	1.2586E 02	1.3072E-03
63	.5043	135.0	527.38	9.2208E 00	2.3560F 00	2.9082E-03	1.1695E-02	1.2650E 02	1.2344E-03
64	.5463	135.0	528.58	8.9407E 00	2.3742F 00	2.9350E-03	1.1802E-02	1.2678F 02	1.2457E-03
65	.5882	135.0	531.80	8.6847E 00	2.2531F 00	2.7937E-03	1.1232E-02	1.2736E 02	1.1856E-03
66	.6302	135.0	532.96	8.4430E 00	2.2316F 00	2.7737E-03	1.1151E-02	1.2782F 02	1.1770E-03
67	.6722	135.0	540.96	8.9081E 00	2.1422F 00	2.6893E-03	1.0807E-02	1.2973F 02	1.1407E-03
68	.7170	135.0	542.56	8.4431E 00	1.9883F 00	2.5010E-03	1.0049E-02	1.3010E 02	1.0607E-03
69	.7583	135.0	539.41	9.1111E 00	1.4902F 00	1.8579E-03	7.4679E-03	1.2942F 02	7.8829E-04
70	.7996	135.0	539.29	7.4692E 00	2.1702F 00	2.7189E-03	1.0926E-02	1.2933E 02	1.1533E-03
71	.8409	135.0	540.30	6.9871E 00	1.9252F 00	2.4149E-03	9.7041E-03	1.2957F 02	1.0243F-03
72	.8822	135.0	541.64	7.5053E 00	2.0905F 00	2.6513E-03	1.0252E-02	1.2989E 02	1.0821F-03
73	.9235	135.0	543.96	7.8329E 00	1.9227F 00	2.4229E-03	9.7364F-03	1.3044F 02	1.0275E-03
74	.9648	135.0	546.63	8.2742E 00	1.9898F 00	2.5159E-03	1.0107E-02	1.3108F 02	1.0660E-03
75	.2524	180.0	508.82	5.0944E 00	1.4802F 00	1.7863E-03	7.1903E-03	1.2209E 02	7.5898E-04
76	.2943	180.0	501.07	6.9063E 02	2.2143F 02	2.6471E-01	1.0660E 00	1.2024F 02	1.1752E-01
77	.3363	180.0	521.72	7.3648E 00	2.3249F 00	2.8499E-03	1.1464E-02	1.2515F 02	1.2101F-03
78	.3783	180.0	525.41	9.7740E 00	2.9381F 00	3.6178E-03	1.4560E-02	1.2603F 02	1.5359E-03
79	.4203	180.0	528.95	1.0054E 01	2.9720F 00	3.6716E-03	1.4764E-02	1.2666E 02	1.5584E-03
80	.4623	180.0	530.25	9.7902E 00	2.7958F 00	3.4633E-03	1.3925E-02	1.2718E 02	1.4698F-03
81	.5043	180.0	531.67	9.1117E 00	2.2827F 00	2.8327E-03	1.1388E-02	1.2752F 02	1.2021E-03
82	.5463	180.0	532.84	8.4533E 00	2.3510F 00	2.9217E-	1.1765E-02	1.2780E 02	1.2398E-03
83	.5882	180.0	533.78	7.9393E 00	2.0021F 00	2.4910E-03	1.0013E-02	1.2802E 02	1.0570E-03
84	.6302	180.0	538.18	7.4591E 00	1.9808F 00	2.4780E-03	9.9500E-03	1.2907F 02	1.0512E-03
85	.6722	180.0	547.06	8.7987E 00	2.1159F 00	2.6768E-03	1.0753F-02	1.3118F 02	1.1350E-03
86	.7170	180.0	549.25	8.4255E 00	2.0783F 00	2.6366E-03	1.0590E-02	1.3171F 02	1.1178F-03
87	.7583	180.0	542.46	6.0642E 00	1.6748F 00	2.1065E-03	8.4639E-03	1.3009F 02	8.9342F-04
88	.7996	180.0	545.37	7.5682E 00	1.9715F 00	2.4887E-03	9.9940E-03	1.3077F 02	1.0554E-03
89	.8409	180.0	545.21	8.6189E 00	2.0469F 00	2.5867E-03	1.0391E-02	1.3098F 02	1.0969F-03
90	.8822	180.0	547.88	8.6521E 00	1.9934F 00	2.5256E-03	1.0142E-02	1.3138E 02	1.0708F-03
91	.9235	180.0	549.18	8.7930E 00	2.0802F 00	2.6134E-03	1.0497E-02	1.3169F 02	1.1080F-03
92	.9648	180.0	553.91	9.0718E 00	2.0675F 00	2.6384E-03	1.0595E-02	1.3282F 02	1.1183F-03
93	.8022	225.0	549.48	7.4256E 00	1.9484F 00	2.4725E-03	9.9307F-03	1.3176F 02	1.0483F-03
94	.9648	225.0	554.90	8.4321E 00	1.9316F 00	2.4672E-03	9.9065E-03	1.3294F 02	1.0457F-03
95	.7170	270.0	554.19	8.8180E 00	1.9880F 00	2.5379E-03	1.0191E-02	1.3288F 02	1.0757F-03
96	.7996	270.0	554.31	7.4977E 00	1.8910F 00	2.3422E-03	1.0268E-02	1.3291F 02	1.0775F-03
97	.8822	270.0	554.25	7.4116E 00	1.9448F 00	2.4838E-03	9.9704E-03	1.3290F 02	1.0524F-03
98	.9648	270.0	556.13	7.8572E 00	1.8895F 00	2.3181E-03	9.7899E-03	1.3335F 04	1.0248F-03


GE ASYMMETRIC TRIM
TRANSFER PHASE
GROUP 5
RE NO 3.77 X 10**6
SYM PHI X/L
45
X/L
0.00
0.20
0.40
0.60
0.80
X 10**4

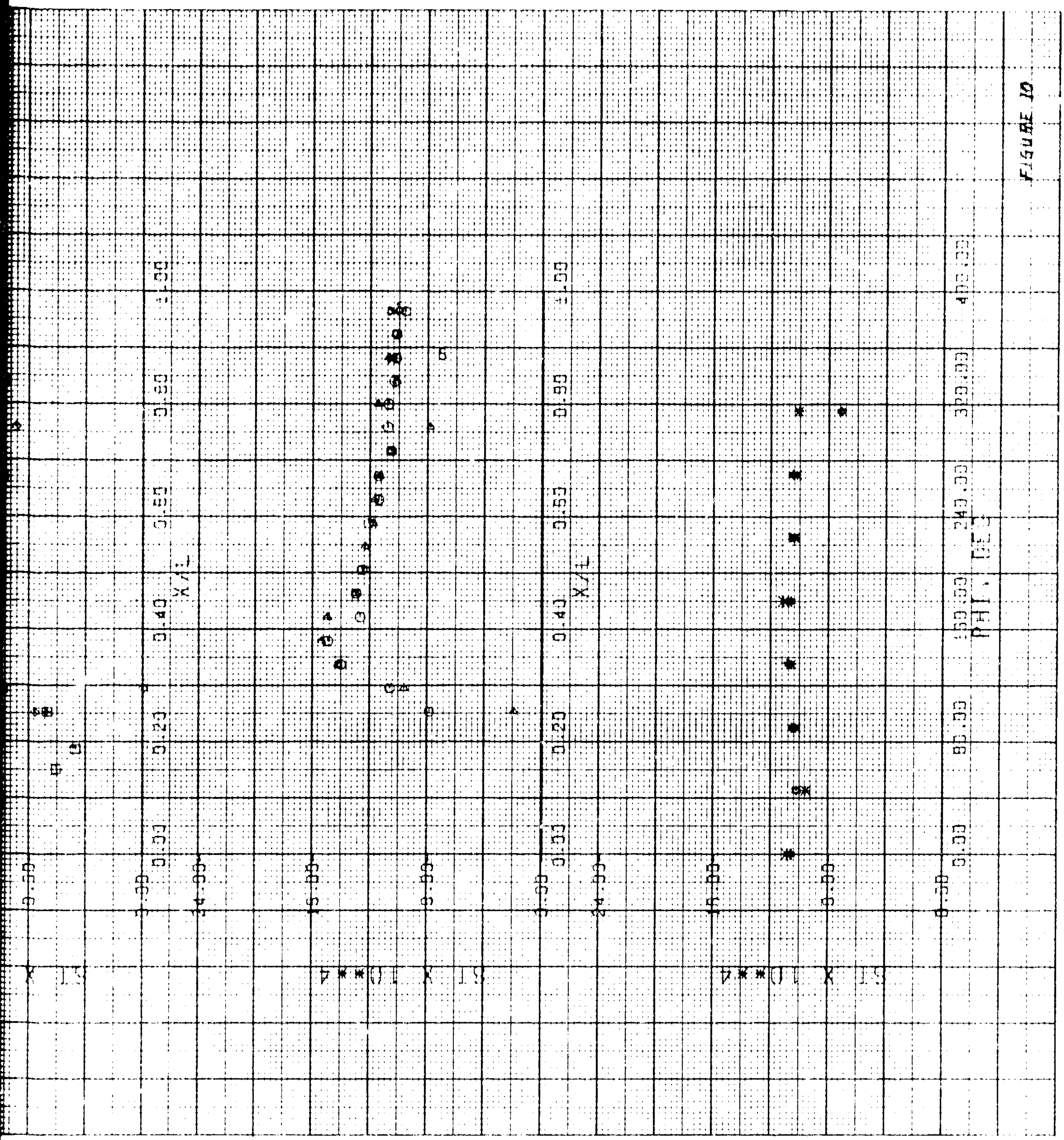


FIGURE 10
X/L
PHI, DEG
0.00
0.20
0.40
0.60
0.80
1.00
80.00
160.00
240.00
320.00
400.00

Figure 10

3

7/14/69

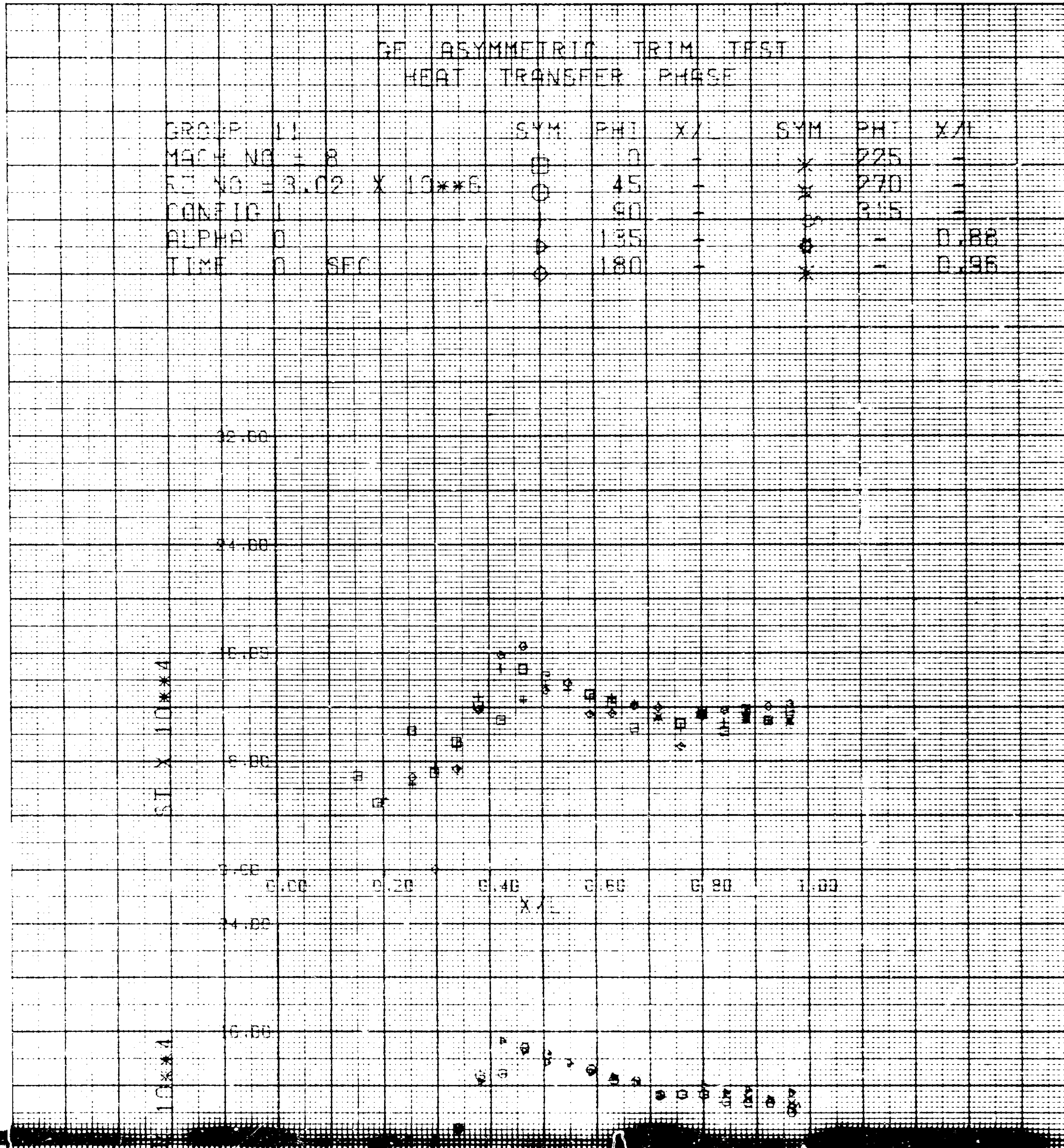
AEDC(ARO,INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
VT0047-800

GROUP	CONFIG	ALPHA-M	BETA-M	ALPHA-S	ROLL	ALP-P	DATE	MACH NO	PO	TO	TIME
11	3	.10	0	.10	0	0	714	8.08	670.37	1313.48	-.88

T-INF	P-INF	Q-INF	V-INF	RHO-INF	MU-INF	RE/FT	RE/D	HU
9.5180E 01	6.8665E-02	3.0742E 00	3.8243E 03	6.0527E-05	7.6629E-08	3.0207E 06	2.7692E 06	3.2172E 02

TC NO	X/L	PHI	TEMP	SLOPE	Q-STOW	HT	HM	HW	ST
1	.1900	0	510.37	6.8709E 00	1.3187E 00	1.2785E-03	5.1507E-03	1.2435E 02	6.9159E-04
2	.1047	0	511.21	3.1674E 00	7.9514E-01	9.1634E-04	3.6929E-03	1.2266E 02	4.9586E-04
3	.2524	0	512.17	5.1374E 00	1.5187E 00	1.8952E-03	7.6375E-03	1.2289E 02	1.0255E-03
4	.2943	0	518.51	3.1233E 00	1.0489E 00	1.3194E-03	5.3153E-03	1.2439E 02	7.1309E-04
5	.3363	0	523.08	4.1760E 00	1.3812E 00	1.7474E-03	7.0378E-03	1.2548E 02	9.4497E-04
6	.3783	0	526.00	5.4016E 00	1.7620E 00	2.2375E-03	9.0100E-03	1.2617E 02	1.2098E-03
7	.4203	0	526.36	5.5442E 00	1.6109E 00	2.0464E-03	8.2404E-03	1.2624E 02	1.1065E-03
8	.4623	0	530.30	7.7923E 00	2.1670E 00	2.7414E-03	1.1037E-02	1.2719E 02	1.4819E-03
9	.5043	0	530.48	7.4445E 00	2.0802E 00	2.6413E-03	1.0639E-02	1.2724E 02	1.4278E-03
10	.5463	0	531.05	-6.9016E-03	-1.9589E-03	-2.5036E-06	-1.0079E-05	1.2737E 02	-1.3533E-06
11	.5882	0	534.13	6.7885E 00	1.8704E 00	2.4006E-03	9.6601E-03	1.2810E 02	1.2971E-03
12	.6302	0	536.62	6.4242E 00	1.7651E 00	2.2720E-03	9.1439E-03	1.2870E 02	1.2270E-03
13	.6722	0	537.29	4.9960E 00	1.5021E 00	1.9352E-03	7.7841E-03	1.2886E 02	1.0457E-03
99	.8822	315.0	548.04	4.1617E 00	1.0841E 00	1.4164E-03	5.6949E-03	1.3143E 02	7.6492E-04
15	.7583	0	545.71	4.1674E 00	1.5312E 00	1.9944E-03	8.0227E-03	1.3087E 02	1.0772E-03
16	.7996	0	548.39	5.7899E 00	1.6245E 00	2.1233E-03	8.5399E-03	1.3150E 02	1.1467E-03
17	.8409	0	547.99	5.6494E 00	1.4435E 00	1.8857E-03	7.5844E-03	1.3141E 02	1.0184E-03
18	.8822	0	550.78	6.6642E 00	1.6695E 00	2.1889E-03	8.8027E-03	1.3207E 02	1.1829E-03
19	.9235	0	549.51	6.1998E 00	1.5532E 00	2.0331E-03	8.1764E-03	1.3177E 02	1.0978E-03
20	.9648	0	548.20	[illegible].8586E 00	1.6694E 00	2.1552E-03	8.6682E-03	1.3145E 02	1.1639E-03
21	.2524	45.0	509.99	3.5521E 00	1.0500E 00	1.3068E-03	5.2671E-03	1.2237E 02	7.0721E-04
22	.2943	45.0	517.96	3.7257E 00	1.0663E 00	1.3404E-03	5.3998E-03	1.2426E 02	7.2584E-04
23	.3363	45.0	523.36	4.7261E 00	1.3084E 00	1.6458E-03	6.6285E-03	1.2554E 02	8.9001E-04
24	.3783	45.0	527.48	6.1702E 00	1.8548E 00	2.3597E-03	9.5016E-03	1.2652E 02	1.2758E-03
25	.4203	45.0	529.26	6.6624E 00	1.8777E 00	2.3944E-03	9.6440E-03	1.2695E 02	1.2944E-03
26	.4623	45.0	532.71	7.4176E 00	2.1373E 00	2.7375E-03	1.1019E-02	1.2777E 02	1.4796E-03
27	.5043	45.0	535.21	7.7476E 00	2.0574E 00	2.6436E-03	1.0640E-02	1.2837E 02	1.4286E-03
100	.9648	315.0	553.87	4.1693E 00	1.4836E 00	1.9531E-03	7.8529E-03	1.3281E 02	1.0544E-03
29	.5882	45.0	537.67	6.4793E 00	1.8955E 00	2.4432E-03	9.8321E-03	1.2895E 02	1.3202E-03
30	.6302	45.0	539.84	6.5865E 00	1.7814E 00	2.3026E-03	9.2652E-03	1.2946E 02	1.2440E-03
31	.6722	45.0	542.51	7.1717E 00	1.7604E 00	2.2834E-03	9.1867E-03	1.3010E 02	1.2335E-03
32	.7170	45.0	545.71	6.8358E 00	1.6098E 00	2.0967E-03	8.4341E-03	1.3087E 02	1.1324E-03
33	.7583	45.0	548.98	5.4399E 00	1.6091E 00	2.1047E-03	8.4648E-03	1.3164E 02	1.1366E-03
34	.7996	45.0	551.01	5.7149E 00	1.6035E 00	2.1030E-03	8.4571E-03	1.3213E 02	1.1355E-03
35	.8409	45.0	553.01	5.6390E 00	1.5256E 00	2.0061E-03	8.0663E-03	1.3260E 02	1.0831E-03
36	.8822	45.0	554.02	5.7680E 00	1.5171E 00	1.9976E-03	8.0319E-03	1.3284E 02	1.0784E-03
37	.9235	45.0	553.98	5.9093E 00	1.5097E 00	1.9880E-03	7.9932E-03	1.3283E 02	1.0733E-03
38	.9648	45.0	552.75	5.4995E 00	1.4187E 00	1.8649E-03	7.4989E-03	1.3256E 02	1.0069E-03
39	.2524	90.0	514.08	1.1145E 00	9.2068E-01	1.1517E-03	4.6408E-03	1.2334E 02	6.2312E-04
40	.2943	90.0	521.97	3.4162E 00	1.0953E 00	1.3838E-03	5.5735E-03	1.2521E 02	7.4836E-04
41	.3363	90.0	527.51	4.1677E 00	1.3155E 00	1.6737E-03	6.7391E-03	1.2653E 02	9.0486E-04
42	.3783	90.0	530.96	5.8379E 00	1.8426E 00	2.3547E-03	9.4786E-03	1.2735E 02	1.2728E-03
43	.4203	90.0	533.59	7.2361E 00	2.1373E 00	2.7405E-03	1.1031E-02	1.2798E 02	1.4811E-03
44	.4623	90.0	531.89	5.8408E 00	1.8141E 00	2.3211E-03	9.3436E-03	1.2757E 02	1.2546E-03
45	.5043	90.0	535.48	7.1122E 00	1.9596E 00	2.5188E-03	1.0137E-02	1.2842E 02	1.3612E-03
46	.5463	90.0	537.72	6.4763E 00	1.9066E 00	2.4576E-03	9.8902E-03	1.2896E 02	1.3280E-03
47	.5882	90.0	538.86	6.4160E 00	1.8082E 00	2.3240E-03	9.3517E-03	1.2923E 02	1.2557E-03
48	.6302	90.0	540.61	6.5885E 00	1.8153E 00	2.3488E-03	9.4508E-03	1.2965E 02	1.2690E-03
49	.6722	90.0	543.09	6.9765E 00	1.7678E 00	2.2687E-03	9.1271E-03	1.3024E 02	1.2255E-03
50	.7170	90.0	545.93	6.6630E 00	1.5691E 00	2.0442E-03	8.2230E-03	1.3091E 02	1.1041E-03
51	.7583	90.0	546.62	5.7055E 00	1.4863E 00	1.9381E-03	7.7968E-03	1.3108E 02	1.0467E-03
52	.7996	90.0	548.89	6.1798E 00	1.6098E 00	2.1055E-03	8.4679E-03	1.3162E 02	1.1370E-03
53	.8409	90.0	550.09	4.1035E 00	1.5298E 00	2.0029E-03	8.0550E-03	1.3191E 02	1.0816E-03
54	.8822	90.0	551.50	6.1324E 00	1.5544E 00	2.0490E-03	8.2013E-03	1.3224E 02	1.1015E-03
55	.9235	90.0	550.77	6.4464E 00	1.5502E 00	2.0325E-03	8.1736E-03	1.3207E 02	1.0975E-03
56	.9648	90.0	548.38	6.3524E 00	1.5276E 00	1.9966E-03	8.0303E-03	1.3150E 02	1.0782E-03
57	.2524	135.0	509.06	9.2138E-01	2.7237E-01	3.3859E-04	1.3647E-03	1.2215E 02	1.8324E-04
58	.2943	135.0	517.56	3.4495E 00	1.1701E 00	1.4701E-03	5.9226E-03	1.2417E 02	7.9524E-04
59	.3363	135.0	520.97	4.1633E 00	1.3140E 00	1.6581E-03	6.6787E-03	1.2498E 02	8.9675E-04
60	.3783	135.0	523.90	5.9035E 00	1.8028E 00	2.2832E-03	9.1953E-03	1.2567E 02	1.2347E-03
61	.4203	135.0	520.24	7.6634E 00	2.2375E 00	2.8422E-03	1.1445E-02	1.2623E 02	1.5367E-03
62	.4623	135.0	527.22	7.2802E 00	2.1153E 00	2.6903E-03	1.0833E-02	1.2646E 02	1.4545E-03
63	.5043	135.0	529.08	7.8227E 00	1.9988E 00	2.5482E-03	1.0259E-02	1.2690E 02	1.3775E-03
64	.5463	135.0	530.11	7.4671E 00	1.9829E 00	2.5312E-03	1.0191E-02	1.2715E 02	1.3683E-03
65	.5882	135.0	532.69	7.0734E 00	1.8744E 00	2.4057E-03	9.6839E-03	1.2776E 02	1.3003E-03
66	.6302	135.0	533.96	6.4953E 00	1.8310E 00	2.3489E-03	9.4547E-03	1.2806E 02	1.2695E-03
67	.6722	135.0	538.55	7.3896E 00	1.7530E 00	2.2621E-03	9.1031E-03	1.2916E 02	1.2223E-03
68	.7170	135.0	540.37	6.4374E 00	1.6101E 00	2.0827E-03	8.3800E-03	1.2959E 02	1.1252E-03
69	.7583	135.0	537.85	4.7242E 00	1.1852E 00	1.5281E-03	6.1403E-03	1.2499E 02	8.2568E-04
70	.7996	135.0	542.03	5.8975E 00	1.7136E 00	2.2212E-03	8.9348E-03	1.2998E 02	1.2000E-03
71	.8409	135.0	543.10	5.9568E 00	1.6413E 00	2.1305E-03	8.5712E-03	1.3024E 02	1.1509E-03
72	.8822	135.0	543.71	6.1498E 00	1.6638E 00	2.1614E-03	8.6951E-03	1.3038E 02	1.1675E-03
73	.9235	135.0	544.38	6.7924E 00	1.5691E 00	2.0402E-03	8.2073E-03	1.3054E 02	1.1020E-03
74	.9648	135.0	546.94	6.7881E 00	1.6324E 00	2.1296E-03	8.5658E-03	1.3116E 02	1.1501E-03
75	.2524	180.0	509.63	3.4752E 00	1.0089E 00	1.2561E-03	5.0628E-03	1.2228E 02	6.7979E-04
76	.2943	180.0	1033.52	2.4771E-06	7.9420E-07	2.8368E-09	1.1116E-08	2.5629E 02	1.4926E-09
77	.3363	180.0	523.26	3.4915E 00	1.0913E 00	1.3809E-03	5.5617E-03	1.2552E 02	7.4677E-04
78	.3783	180.0	526.43	5.7179E 00	1.7188E 00	2.1838E-03	8.7937E-03	1.2627E 02	1.1807E-03
79	.4203	180.0	529.11	7.7778E 00	2.2992E 00	2.9313E-03	1.1802E-02	1.2691E 02	1.5846E-03
80	.4623	180.0	531.14	8.3662E 00	2.3891E 00	3.0539E-03	1.2294E-02	1.2740E 02	1.6507E-03
81	.5043	180.0	532.59	7.6309E 00	1.9117E 00	2.4481E-03	9.8540E-03	1.2774E 02	1.3232E-03
82	.5463	180.0	533.90	7.4865E 00	1.9881E 00	2.5502E-03	1.0265E-02	1.2805E 02	1.3783E-03
83	.5882	180.0	534.77	6.7455E 00	1.6585E 00	2.1298E-03	8.5723E-03	1.2826E 02	1.1510E-03
84	.6302	180.0	539.05	6.2162E 00	1.6507E 00	2.1315E-03	8.5772E-03	1.2928E 02	1.1517E-03
85	.6722	180.0	544.31	7.1808E 00	1.7233E 00	2.2404E-03	9.0129E-03	1.3053E 02	1.2102E-03
86	.7170	180.0	546.37	7.2152E 00	1.6941E 00	2.2150E-03	8.9094E-03	1.3102E 02	1.1963E-03
87	.7583	180.0	543.73	5.1866E 00	1.2954E 00	1.6828E-03	6.7701E-03	1.3039E 02	9.0902E-04
88	.7996	180.0	547.07	6.1773E 00	1.6092E 00	2.0996E-03	8.4453E-03	1.3119E 02	1.1340E-03
89	.8409	180.0	547.90	6.5157E 00	1.6648E 00	2.1746E-03	8.7443E-03	1.3138E 02	1.1744E-03
90	.8822	180.0	548.71	7.1796E 00	1.6172E 00	2.1157E-03	8.5069E-03	1.3162E 02	1.1422E-03
91	.9235	180.0	549.92	6.9247E 00	1.6998E 00	2.2250E-03	8.9462E-03	1.3177E 02	1.2015E-03
92	.9648	180.0	551.76	7.6985E 00	1.7238E 00	2.2630E-03	9.1001E-03	1.3230E 02	1.2219E-03
93	.8822	225.0	550.84	6.1326E 00	1.5669E 00	2.0546E-03	8.2624E-03	1.3208E 02	1.1094E-03
94	.9648	225.0	552.81	6.2620E 00	1.5109E 00	1.9863E-03	7.9867E-03	1.3255E 02	1.0724E-03
95	.7170	270.0	550.58	7.6557E 00	1.5907E 00	2.0851E-03	8.3851E-03	1.3202E 02	1.1259E-03
96	.7996	270.0	555.79	6.3929E 00	1.6188E 00	2.1354E-03	8.5850E-03	1.3326E 02	1.1527E-03
97	.8822	270.0	557.77	6.1835E 00	1.5544E 00	2.0569E-03	8.2688E-03	1.3374E 02	1.1102E-03
98	.9648	270.0	555.05	6.3533E 00	1.5278E 00	2.0161E-03	8.1859E-03	1.3323E 02	1.0883E-03

GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 11 SYM PHI X/L SYM PHI X/L


GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 11
MACH NO = 8
RE NO =3.02 X 10**6
CONFIG 1
ALPHA 0
TIME 0 SEC
SYM PHI X/L
0 -
45 -
90 -
135 -
180 -
SYM PHI X/L
225 -
270 -
315 -
- 0.88
- 0.96
32.00
24.00
16.00
8.00
0.00
0.00 0.20 0.40 0.60 0.80 1.00
X/L
ST X 10**4
24.00
16.00
10**4

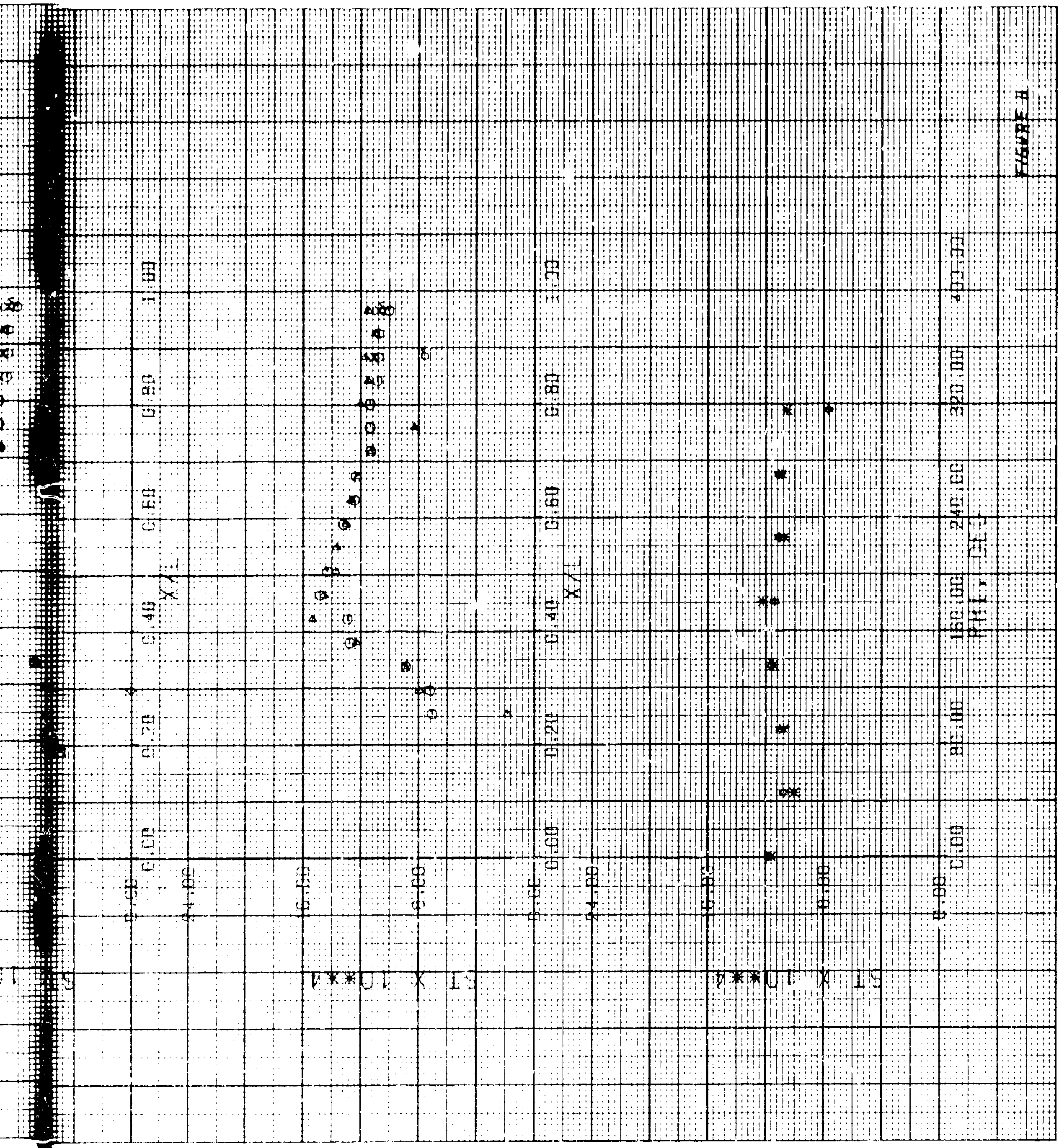


Figure 11

7/14/69

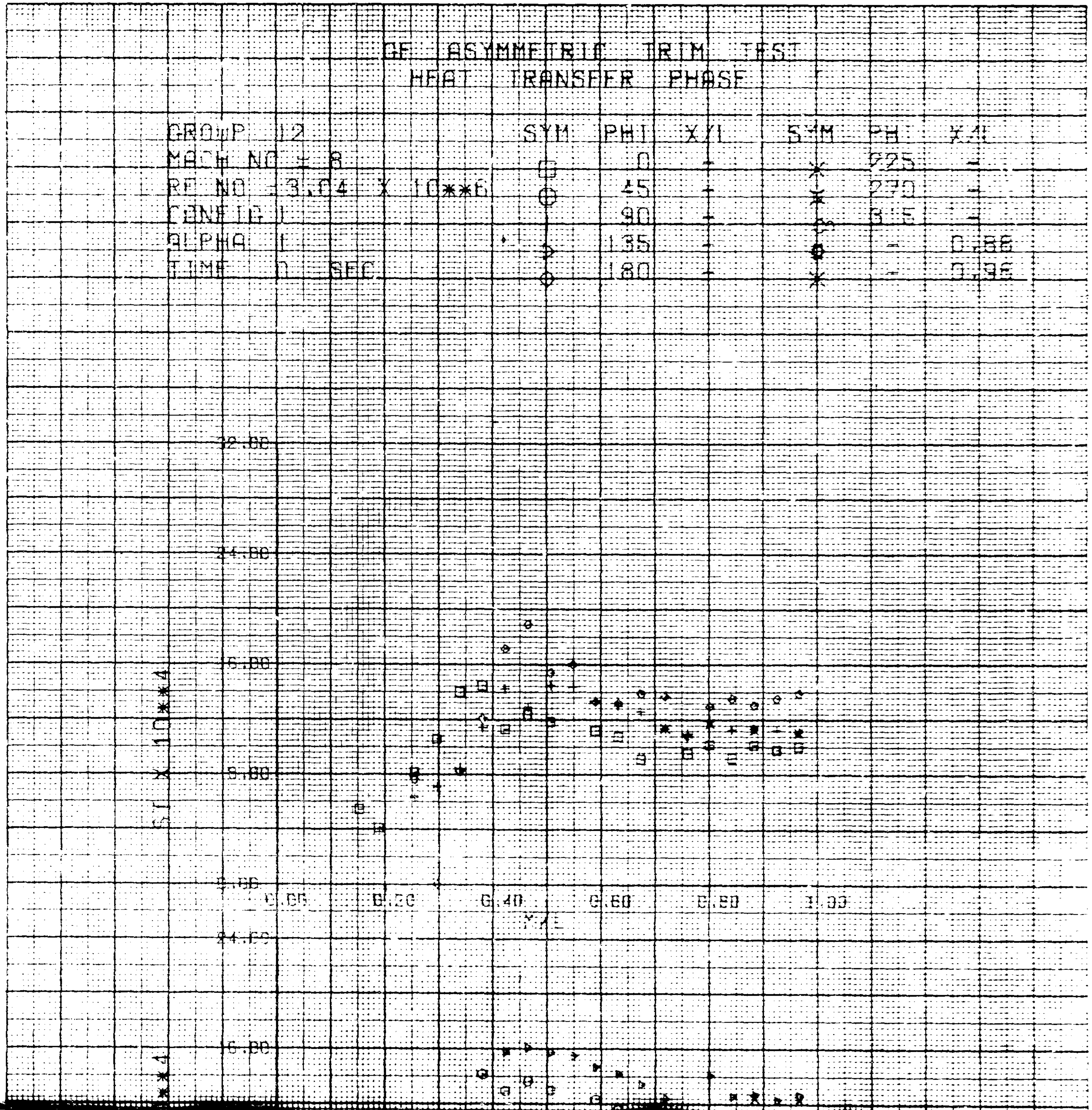
ARO, INC. — ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL H
VT0947-H00

GROUP	CONFIG	ALPHA-M	BETA-M	ALPHA-S	ROLL	ALP-P	DATE	MACH NO	PO	TO	TIME
12	X_j	1.04	0	1.04	0	0	714	8.00	669.67	1308.07	.00

T-INF	P-INF	Q-INF	V-INF	RHO-INF	MU-INF	RE/FT	RE/D	MU
9.4787E 01	6.0593E-02	3.0729E 00	3.8145E 03	4.6714E-05	7.0311E-08	1.0310E 06	2.7058E 06	3.2830E 02

TC NO	X/L	PHI	TEMP	SLOPE	Q-STDH	HT	HM	HW	ST
1	.1900	0	469.06	1.9090F 00	8.4113E-01	1.0035E-03	4.0949E-03	1.1297F 02	5.4303E-04
2	.1067	0	479.19	2.4723E 00	6.1080E-01	7.5714E-04	3.0541E-03	1.1012E 02	4.1032E-04
3	.2524	0	482.05	5.1961E 00	1.2409E 00	1.5028E-03	6.0675E-03	1.1509E 02	8.1386E-04
4	.2943	0	489.10	5.0701E 00	1.6003E 00	1.9540E-03	7.8848E-03	1.1762E 02	1.0579E-03
5	.3363	0	495.60	6.4613E 00	2.1025E 00	2.5874E-03	1.0440E-02	1.1893E 02	1.4003E-03
6	.3783	0	500.54	7.1797E 00	2.1582E 00	2.6727E-03	1.0781E-02	1.2013E 02	1.4440E-03
7	.4203	0	501.46	5.8185E 00	1.6906E 00	2.0960E-03	8.4560E-03	1.2035E 02	1.1340E-03
8	.4623	0	506.09	6.4581E 00	1.8345E 00	2.2897E-03	9.2308E-03	1.2159E 02	1.2381E-03
9	.5043	0	508.58	6.4714E 00	1.7504E 00	2.1899E-03	8.8243E-03	1.2204E 02	1.1843E-03
10	.5463	0	531.79	1.6899E-02	9.7920E-01	1.2613E-03	5.0792E-03	1.2756E 02	6.8129E-04
11	.5882	0	514.40	5.9632E 00	1.6430E 00	2.0702E-03	8.3441E-03	1.2392E 02	1.1192E-03
12	.6302	0	518.44	5.8204E 00	1.5740E 00	1.9953E-03	8.0345E-03	1.2434E 02	1.0780E-03
13	.6722	0	529.18	5.2459E 00	1.3144E 00	1.6874E-03	6.7945E-03	1.2593E 02	9.1164E-04
99	.8822	315.0	534.01	3.4270E 00	9.9709E-01	1.2891E-03	5.1902E-03	1.2822E 02	6.9618E-04
15	.7583	0	527.40	5.7113E 00	1.3788E 00	1.7663E-03	7.1142E-03	1.2652E 02	9.5429E-04
16	.7996	0	526.89	5.2503E 00	1.4731E 00	1.8858E-03	7.5956E-03	1.2634E 02	1.0188E-03
17	.8409	0	526.91	5.3124E 00	1.3319E 00	1.7050E-03	6.8677E-03	1.2639E 02	9.2119E-04
18	.8822	0	530.29	5.4314E 00	1.4609E 00	1.8782E-03	7.5617E-03	1.2718E 02	1.0146E-03
19	.9235	0	532.47	5.6048E 00	1.4041E 00	1.8103E-03	7.2842E-03	1.2770F 02	9.7773F-04
20	.9648	0	539.02	5.9345E 00	1.4271E 00	1.8557E-03	7.4606E-03	1.2927F 02	1.0019F-03
21	.2524	45.0	476.32	3.4948E 00	1.0331E 00	1.2421E-03	5.0147E-03	1.1439F 02	6.7291F-04
22	.2943	45.0	479.74	3.8715E 00	1.2413E 00	1.4985E-03	6.0519E-03	1.1520F 02	8.1170F-04
23	.3363	45.0	485.11	5.4712E 00	1.6446E 00	1.9984E-03	8.0577E-03	1.1647F 02	1.0822F-03
24	.3783	45.0	490.75	7.1075E 00	2.1365F 00	2.6140E-03	1.0550E-02	1.1781F 02	1.4151F-03
25	.4203	45.0	494.77	6.4982E 00	1.9682F 00	2.3929E-03	9.6550E-03	1.1875F 02	1.2951F-03
26	.4623	45.0	500.76	7.2770E 00	2.0414F 00	2.5291E-03	1.0201E-02	1.2018F 02	1.3683F-03
27	.5043	45.0	504.91	7.2712E 00	1.9339F 00	2.4041E-03	9.6949E-03	1.2116F 02	1.3004F-03
100	[illegible]	315.0	545.29	9.7527E 00	1.3834F 00	1.8136E-03	7.2917E-03	1.3076F 02	9.7887F-04
29	.5882	45.0	509.89	6.4963E 00	1.8175F 00	2.2770E-03	9.1800E-03	1.2234F 02	1.2314F-03
30	.6302	45.0	514.59	6.2990E 00	1.7041F 00	2.1477E-03	8.6563E-03	1.2346F 02	1.1611F-03
31	.6722	45.0	529.97	6.4410E 00	1.6302F 0	2.0951E-03	8.4372E-03	1.2711F 02	1.1317F-03
32	.7170	45.0	533.11	6.1025E 00	1.5030F 00	1.9395E-03	7.8045E-03	1.2787F 02	1.0475F-03
33	.7583	45.0	524.44	5.7366E 00	1.5806F 00	2.0170E-03	8.1242E-03	1.2580F 02	1.0899F-03
34	.7996	45.0	524.02	5.4916E 00	1.5408F 00	1.9652E-03	7.9169E-03	1.2570F 02	1.0619F-03
35	.8409	45.0	526.61	5.4005E 00	1.4681F 00	1.9038E-03	7.6685E-03	1.2627F 02	1.0286E-03
36	.8822	45.0	528.39	5.4038E 00	1.4476F 00	1.8567E-03	7.4779E-03	1.2674E 02	1.0030F-03
37	.9235	45.0	531.27	5.4453E 00	1.4424F 00	1.8568E-03	7.4771E-03	1.2741E 02	1.0029F-03
38	.9648	45.0	538.94	5.6022E 00	1.3472F 00	1.7517E-03	7.0510E-03	1.2926F 02	9.4578F-04
39	.2524	90.0	476.17	3.7605E 00	9.6303F-01	1.1586E-03	4.6796E-03	1.1436E 02	6.2769E-04
40	.2943	90.0	478.06	3.7921E 00	1.0876F 00	1.3104E-03	5.2920E-03	1.1481E 02	7.0983E-04
41	.3363	90.0	482.99	4.3657E 00	1.2896F 00	1.5629E-03	6.3102E-03	1.1596F 02	8.4641E-04
42	.3783	90.0	488.98	5.4966E 00	1.7343F 00	2.1173E-03	8.5458E-03	1.1739E 02	1.1463E-03
43	.4203	90.0	495.45	7.3466E 00	2.1422F 00	2.6369E-03	1.0636E-02	1.1891E 02	1.4266E-03
44	.4623	90.0	497.21	6.2197E 00	1.9321F 00	2.3828E-03	9.5129E-03	1.1934F 02	1.2894F-03
45	.5043	90.0	503.49	7.4328E 00	2.1582F 00	2.6824E-03	1.0818E-02	1.2083E 02	1.4510E-03
46	.5463	90.0	507.99	7.4531E 00	2.1284F 00	2.6601E-03	1.0725E-02	1.2189F 02	1.4387E-03
47	.5882	90.0	509.59	7.0385E 00	1.9749F 00	2.4733E-03	9.9714E-03	1.2228F 02	1.3375E-03
48	.6302	90.0	513.99	6.9369E 00	1.9113F 00	2.4058E-03	9.6971E-03	1.2322F 02	1.3007E-03
49	.6722	90.0	529.16	7.2397E 00	1.8137F 00	2.3285E-03	9.3778E-03	1.2692F 02	1.2579E-03
50	.7170	90.0	532.98	6.9317E 00	1.6323F 00	2.1060E-03	8.4794E-03	1.2783F 02	1.1374F-03
51	.7583	90.0	521.67	6.1533E 00	1.6029F 00	2.0383E-03	8.2124E-03	1.2514F 02	1.1016E-03
52	.7996	90.0	522.07	6.4541E 00	1.7334F 00	2.2054E-03	8.8852E-03	1.2524E 02	1.1918E-03
53	.8409	90.0	523.81	6.5420E 00	1.6389F 00	2.0892E-03	8.4166E-03	1.2560F 02	1.1290E-03
54	.8822	90.0	526.63	6.7126E 00	1.6477F 00	2.1070E-03	8.4870E-03	1.2618E 02	1.1384E-03
55	.9235	90.0	528.2	6.7529F 00	1.6239F 00	2.0826E-03	8.3877E-03	1.2672E 02	1.1251E-03
56	.9648	90.0	535.04	6.9921E 00	.5853F 00	2.0504E-03	8.2546E-03	1.2833E 02	1.1075E-03
57	.2524	135.0	469.14	1.6369E 00	3.0592F-01	3.6500E-04	1.4747E-03	1.1289E 02	1.9701E-04
58	.2943	135.0	473.96	4.2478E 00	1.3619F 00	1.6328E-03	6.5957E-03	1.1384F 02	8.8471E-04
59	.3363	135.0	478.54	4.3332E 00	1.3677F 00	1.6488E-03	6.6587E-03	1.1493E 02	8.9316E-04
60	.3783	135.0	484.88	5.5272E 00	1.7170F 00	2.0858E-03	8.4204E-03	1.1642E 02	1.1295F-03
61	.4203	135.0	490.56	7.9311E 00	2.3841F 00	2.9163E-03	1.1770E-02	1.1776E 02	1.5787E-03
62	.4623	135.0	495.87	8.3080E 00	2.4140F 00	2.9721E-03	1.1992E-02	1.1907F 02	1.6085E-03
63	.5043	135.0	501.34	9.2063E 00	2.3523F 00	2.9159E-03	1.1741E-02	1.2032F 02	1.5775F-03
64	.5463	135.0	504.27	8.4929E 00	2.3084F 00	2.8714E-03	1.1582E-02	1.2101E 02	1.5535F-03
65	.5882	135.0	507.87	8.1790E 00	2.1719F 00	2.7142E-03	1.0944E-02	1.2187E 02	1.4679E-03
66	.6302	135.0	511.16	7.4908E 00	2.0956F 00	2.6294E-03	1.0680E-02	1.2265F 02	1.4218F-03
67	.6722	135.0	527.46	7.6922E 00	1.9460F 00	2.4929E-03	1.0041E-02	1.2651F 02	1.3468F-03
68	.7170	135.0	519.84	7.5839E 00	1.7859F 00	2.2949E-03	9.2420E-03	1.2708F 02	1.2397F-03
69	.7583	135.0	517.64	4.9984E 00	1.4027F 00	1.7744E-03	7.1508E-03	1.2418E 02	9.5916E-04
70	.7996	135.0	520.76	7.0577E 00	2.0507F 00	2.6045E-03	1.0494E-02	1.2491F 02	1.4076E-03
71	.8409	135.0	523.17	6.6361E 00	1.8285F 00	2.3294E-03	9.3844E-03	1.2549E 02	1.2588E-03
72	.8822	135.0	524.23	6.4191E 00	1.8448F 00	2.3536E-03	9.4813E-03	1.2575E 02	1.2718F-03
73	.9235	135.0	527.01	7.2270E 00	1.7740F 00	2.2713E-03	9.1484E-03	1.2641E 02	1.2271E-03
74	.9648	135.0	536.01	7.4276E 00	1.8102F 00	2.3447E-03	9.4394E-03	1.2855F 02	1.2661E-03
75	.2524	180.0	474.95	4.4577E 00	1.1790F 00	1.4152E-03	5.7141E-03	1.1407F 02	7.6673F-04
76	.2943	180.0	1033.52	1.4862E-06	4.7652F-07	1.7356E-09	6.9035E-09	2.5029F 02	9.1258F-10
77	.3363	180.0	485.67	4.2389E 00	1.2531F 00	1.5237E-03	6.1509E-03	1.1661E 02	8.2504E-04
78	.3783	180.0	492.51	6.0505E 00	1.8184F 00	2.2301E-03	8.9993E-03	1.1823F 02	1.2071F-03
79	.4203	180.0	499.37	8.4582E 00	2.5594F 00	3.1649E-03	1.2747E-02	1.1985F 02	1.7125F-03
80	.4623	180.0	505.33	9.4139E 00	2.8025F 00	3.4913E-03	1.4079E-02	1.2126F 02	1.8884F-03
81	.5043	180.0	509.34	9.4755E 00	2.2736F 00	2.8466E-03	1.1477E-02	1.2222F 02	1.5394E-03
82	.5463	180.0	512.40	8.4738E 00	2.3564F 00	2.9616E-03	1.1938E-02	1.2294F 02	1.6013F-03
83	.5882	180.0	514.56	7.3511E 00	1.9521F 00	2.4601E-03	9.9154E-03	1.2345F 02	1.3300E-03
84	.6302	180.0	519.44	7.2556E 00	1.9268F 00	2.4432E-03	9.8448E-03	1.2461F 02	1.3205F-03
85	.6722	180.0	535.01	8.9723E 00	1.9893F 00	2.5733E-03	1.0340E-02	1.2831F 02	1.3897E-03
86	.7170	180.0	538.34	8.2773E 00	1.9492F 00	2.5325E-03	1.0194E-02	1.2912F 02	1.3674F-03
87	.7583	180.0	526.91	6.4917E 00	1.5611F 00	1.9985E-03	8.0466E-03	1.2639F 02	1.0797F-03
88	.7996	180.0	529.01	7.1794E 00	1.8704F 00	2.4026E-03	9.6740E-03	1.2703F 02	1.2979F-03
89	.8409	180.0	531.34	7.4249E 00	1.9462F 00	2.5083E-03	1.0101E-02	1.2744F 02	1.3548F-03
90	.8822	180.0	533.29	8.1280E 00	1.8712F 00	2.4151E-03	9.7243E-03	1.2791F 02	1.3044F-03
91	.9235	180.0	536.07	7.8872E 00	1.9361F 00	2.5079E-03	1.0066E-02	1.2857F 02	1.3543F-03
92	.9648	180.0	543.37	4.4415E 00	1.9663F 00	2.5740E-03	1.0358E-02	1.3030F 02	1.3494F-03
93	.8822	225.0	535.41	6.9429E 00	1.7740F 00	2.2959E-03	9.2434E-03	1.2841F 02	1.2398F-03
94	.9648	225.0	544.54	7.7405E 00	1.7412F 00	2.2805E-03	9.1745E-03	1.3058F 02	1.2309F-03
95	.7170	270.0	543.58	7.1112E 00	1.6077F 00	2.1030E-03	8.4630E-03	1.3035F 02	1.1352F-03
96	.7996	270.0	538.55	6.3884E 00	1.6699F 00	2.1780E-03	8.7360E-03	1.2916F 02	1.1717F-03
97	.8822	270.0	548.79	6.9882E 00	1.8087F 00	2.0946E-03	8.4280E-03	1.2969F 02	1.1305F-03
98	.9648	270.0	546.79	6.4780F 00	1.5578F 00	2.0463E-03	8.2334E-03	1.3112F 02	1.1044F-03

GROUP 12   SYM PHI X/1   SYM PHI X/1   HEAT TRANSFER PHASE   CF ASYMMETRIC TRIM TEST


GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 12
MACH NO = 8
RE NO = 3.04 X 10**6
CONFIG 1
ALPHA 1
TIME 0 SEC
SYM PHI X/L
0
45
90
135
180
SYM PHI X/L
225
270
315
0.88
0.95
32.00
24.00
16.00
8.00
0.00
0.20
0.40
0.60
0.80
1.00
X/L
ST X 10**4
16.00

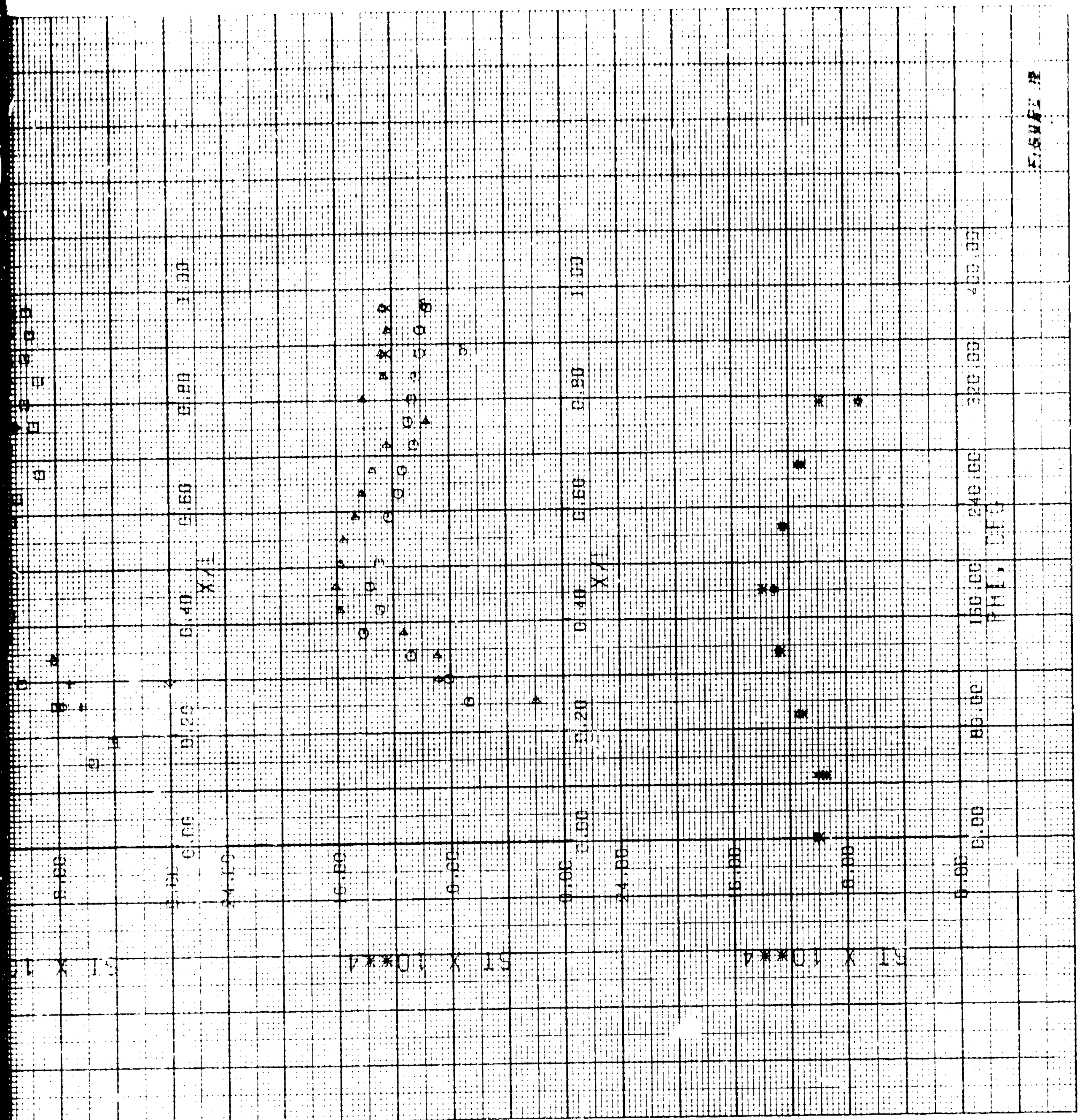


Figure 12

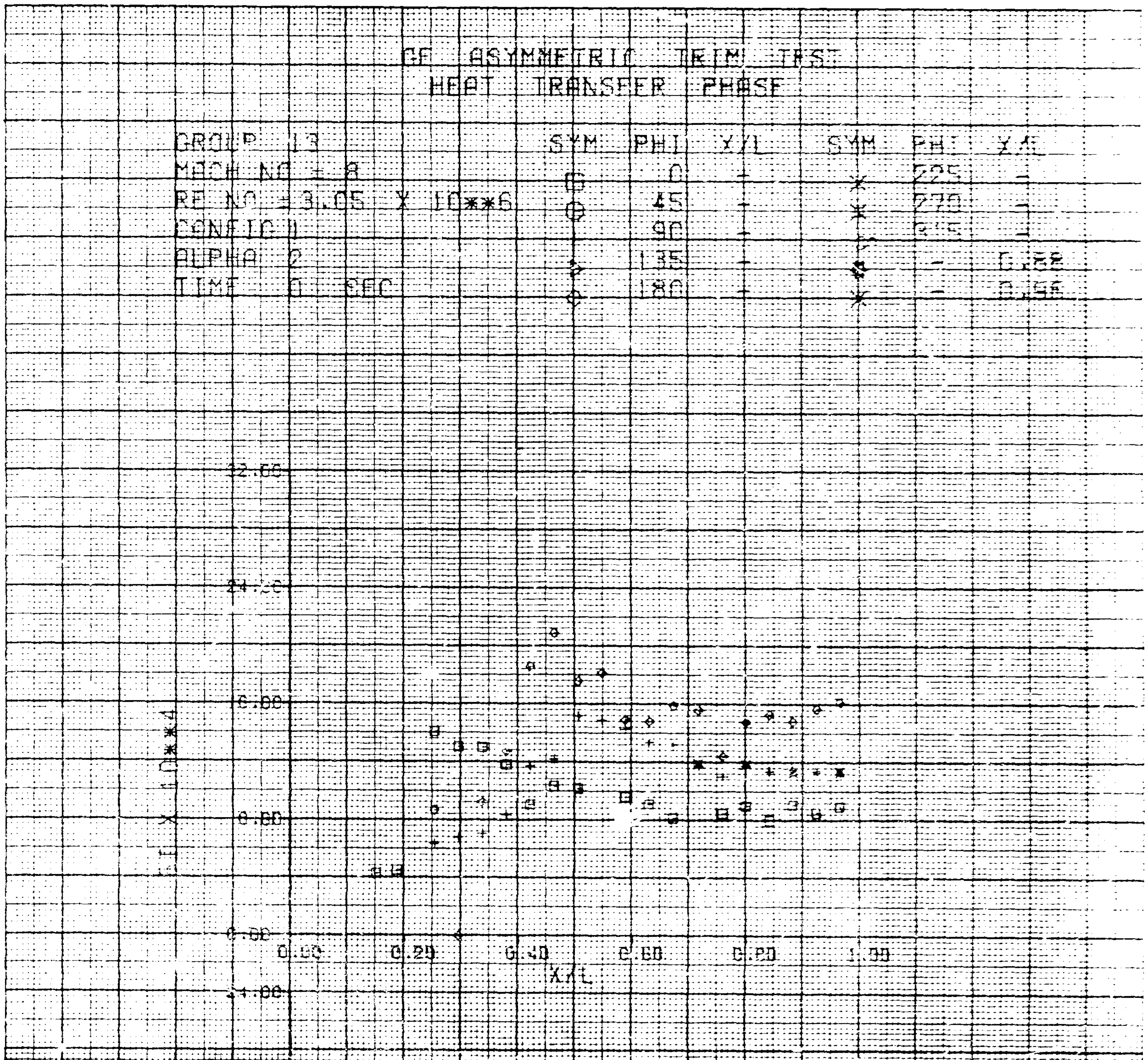
7/16/69

AEDC (ARO, INC.) ARNOLD AF S, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
V?09A?-000

GROUP	CONFIG	ALPHA-M	BETA-M	ALPHA-S	ROLL	ALP-P	DATE	MACH NO	PO	TO	TIME
13	[illegible]	2.67	0	2.57	0	0	716	8.00	674.27	1309.93	.00

T-INF	P-INF	Q-INF	V-INF	RHO-INF	MU-INF	RE/FT	RE/IN	HO
9.49224E 01	6.96952E-02	3.09412E 00	3.01??E 03	?.10956E-05	7.64220E-08	3.0590?E 06	2.79642E 06	3.20831E 02

TC NO	X/L	PHI	TEMP	SLOPE	Q-STDY	HT	HM	HW	ST
1	.1989	0	409.78	1.0810E 00	6.6971E-01	7.9897E-04	3.2190E-03	1.1275E 02	4.2924E-04
2	.1047	0	470.89	1.1913E 00	7.0080E-01	8.4113E-04	3.3974E-03	1.1453E 02	4.5295E-04
3	.2524	0	489.65	7.2065E 00	2.1530E 00	2.6245E-03	1.0591E-02	1.1750E 02	1.4120E-03
4	.2943	0	497.77	.26558 00	1.9770E 00	2.4350E-03	9.8272E-03	1.1947E 02	1.3094E-03
5	.3363	0	501.77	6.2133E 00	1.9611E 00	2.4266E-03	9.7865E-03	1.2042E 02	1.3047E-03
6	.3783	0	503.75	5.9134E 00	1.7??E 00	2.2056E-03	8.8939E-03	1.2090E 02	1.1857E-03
7	.4203	0	503.27	4.4871E 00	1.3613E 00	1.6881E-03	6.8083E-03	1.2078E 02	9.0764E-04
8	.4623	0	506.67	5.6230E 00	1.5495E 00	1.9291E-03	7.7777E-03	1.2150E 02	1.0369E-03
9	.5043	0	507.50	5.4261E 00	1.5215E 00	1.8962E-03	7.6447E-03	1.2178E 02	1.0191E-03
10	.5463	0	530.38	-2.4450E-02	-6.8601E-03	-8.7999E-06	-3.5439E-05	1.2721E 02	-4.7230E-06
11	.5882	0	511.35	3.7001E 00	1.4324E 00	1.7942E-03	7.2320E-03	1.2269E 02	9.6411E-04
12	.6302	0	513.41	5.0143E 00	1.3560E 00	1.7025E-03	6.8620E-03	1.2311E 02	9.1479E-04
13	.6722	0	520.89	4.7999E 00	1.2025E 00	1.5240E-03	6.1347E-03	1.2496E 02	8.1450E-04
99	.8022	315.0	530.18	3.4718E 00	9.5550E-01	1.2267E-03	4.9395E-03	1.2717E 02	6.5850E-04
15	.7583	0	520.29	5.1950E 00	1.2495E 00	1.5823E-03	6.3751E-03	1.2481E 02	8.4989E-04
16	.7996	0	521.28	4.7076E 00	1.3209E 00	1.6748E-03	6.7473E-03	1.2505E 02	8.9950E-04
17	.8409	0	521.67	4.6150E 00	1.1793E 00	1.4950E-03	6.0229E-03	1.2500E 02	8.0292E-04
18	.8822	0	523.68	5.3022E 00	1.3283E 00	1.6894E-03	6.8053E-03	1.2562E 02	9.0723E-04
19	.9235	0	524.81	4.9722E 00	1.2456E 00	1.5858E-03	6.3874E-03	1.2579E 02	8.5152E-04
20	.9648	0	530.50	5.4267E 00	1.3050E 00	1.6743E-03	6.7419E-03	1.2724E 02	8.9478E-04
21	.2524	45.0	469.97	3.7980E 00	1.1227E 00	1.3366E-03	5.3990E-03	1.1269E 02	7.1980E-04
22	.2943	45.0	473.76	4.4035E 00	1.5401E 00	1.8419E-03	7.4394E-03	1.1379E 02	9.9177E-04
23	.3363	45.0	479.11	6.4860E 00	1.9257E 00	2.3179E-03	9.3593E-03	1.1506E 02	1.2477E-03
24	.3783	45.0	486.49	7.0850E 00	2.1294E 00	2.5801E-03	1.0415E-02	1.1533E 02	1.3885E-03
25	.4203	45.0	488.50	6.7314E 00	1.8706E 00	2.1988E-03	8.8751E-03	1.1680E 02	1.1832E-03
26	.4623	45.0	492.50	6.4904E 00	1.8773E 00	2.2966E-03	9.2658E-03	1.1822E 02	1.2354E-03
27	.5043	45.0	498.40	6.6031E 00	1.8080E 00	2.2212E-03	8.96??E-03	1.1919E 02	1.1945E-03
100	.9648	315.0	538.34	5.4722E 00	1.3160E 00	1.7055E-03	6.?646E-03	1.2911E 02	9.1514E-04
29	.5882	45.0	501.09	6.1883E 00	1.7053E 00	2.1079E-03	8.5013E-03	1.2024E 02	1.1333E-03
30	.6302	45.0	503.66	5.9156E 00	1.6013E 00	1.9860E-03	8.0085E-03	1.2086E 02	1.0676E-03
31	.6722	45.0	515.28	6.4580E 00	1.5833E 00	1.9924E-03	8.0294E-03	1.2302E 02	1.0784E-03
32	.7170	45.0	520.67	6.7058E 00	1.4614E 00	1.8515E-03	7.4594E-03	1.2489E 02	9.9446E-04
33	.7583	45.0	513.07	5.4127E 00	1.4914E 00	1.8714E-03	7.5424E-03	1.2309E 02	1.0056E-03
34	.7996	45.0	514.22	5.2329E 00	1.4682E 00	1.8452E-03	7.4315E-03	1.2337E 02	9.9139E-04
35	.8409	45.0	516.82	5.2497E 00	1.6202E 00	1.7987E-03	7.2160E-03	1.2399E 02	9.6199E-04
36	.8822	45.0	518.91	5.2340E 00	1.3769E 00	1.7407E-03	7.0135E-03	1.2449E 02	9.3498E-04
37	.9235	45.0	520.25	5.4244E 00	1.3640E 00	1.7551E-03	7.0712E-03	1.2488E 02	9.4269E-04
38	.9648	45.0	527.01	5.2014E 00	1.2701E 00	1.6235E-03	6.5382E-03	1.2655E 02	8.7163E-04
39	.2524	90.0	459.13	3.3917E 00	1.0026E 00	1.1785E-03	4.7637E-03	1.1034E 02	6.3506E-04
40	.2943	90.0	458.05	3.1648E 00	1.0795E 00	1.2671E-03	5.1225E-03	1.1008E 02	6.8289E-04
41	.3363	90.0	464.76	3.6218E 00	1.1116E 00	1.3152E-03	5.3150E-03	1.1167E 02	7.0855E-04
42	.3783	90.0	471.17	4.1353E 00	1.3052E 00	1.5561E-03	6.2863E-03	1.1318E 02	8.3806E-04
43	.4203	90.0	477.71	6.1473E 00	1.8172E 00	2.1836E-03	8.8177E-03	1.1472E 02	1.1755E-03
44	.4623	90.0	482.56	6.6030E 00	1.8836E 00	2.2764E-03	9.1901E-03	1.1587E 02	1.2252E-03
45	.5043	90.0	490.59	8.4053E 00	2.3159E 00	2.8264E-03	1.1408E-02	1.1776E 02	1.5209E-03
46	.5463	90.0	493.80	7.0264E 00	2.2637E 00	2.7737E-03	1.1191E-02	1.1853E 02	1.4919E-03
47	.5882	90.0	497.93	7.7021E 00	2.1611E 00	2.6614E-03	1.0736E-02	1.1951E 02	1.4312E-03
48	.6302	90.0	500.30	7.1271E 00	2.0188E 00	2.4936E-03	1.0057E-02	1.2007E 02	1.3407E-03
49	.6722	90.0	510.94	7.4551E 00	1.9679E 00	2.4631E-03	9.9283E-03	1.2261E 02	1.3236E-03
50	.7170	90.0	518.47	7.3778E 00	1.7374E 00	2.1952E-03	8.8450E-03	1.2438E 02	1.1792E-03
51	.7583	90.0	508.05	6.1280E 00	1.6485E 00	2.0573E-03	8.2938E-03	1.2205E 02	1.1057E-03
52	.7996	90.0	511.36	6.7427E 00	1.7565E 00	2.1995E-03	8.8640E-03	1.2269E 02	1.1819E-03
53	.8409	90.0	513.21	6.7599E 00	1.6935E 00	2.1256E-03	8.5670E-03	1.2313E 02	1.1421E-03
54	.8822	90.0	516.14	6.9668E 00	1.7101E 00	2.1545E-03	8.6822E-03	1.2384E 02	1.1574E-03
55	.9235	90.0	517.76	6.0941E 00	1.6819E 00	2.1232E-03	8.5543E-03	1.2421E 02	1.1405E-03
56	.9648	90.0	524.14	6.4514E 00	1.6477E 00	2.0969E-03	8.4445E-03	1.2573E 02	1.1260E-03
57	.2524	135.0	456.47	1.1107E 00	3.2834E-01	3.8284E-04	1.5450E-03	1.0829E 02	2.0597E-04
58	.2943	135.0	456.18	4.2178E 00	1.3523E 00	1.5883E-03	6.3807E-03	1.0917E 02	8.5183E-04
59	.3363	135.0	461.52	4.4893E 00	1.4170E 00	1.6701E-03	6.7584E-03	1.1090E 02	8.9991E-04
60	.3783	135.0	470.76	5.1599E 00	1.6650E 00	1.9841E-03	8.0152E-03	1.1308E 02	1.0685E-03
61	.4203	135.0	478.96	7.7381E 00	2.3261E 00	2.7925E-03	1.1277E-02	1.1555E 02	1.5036E-03
62	.4623	135.0	484.16	7.4040E 00	2.5587E 00	3.0986E-03	1.2508E-02	1.1625E 02	1.6675E-03
63	.5043	135.0	490.80	1.0230E 01	2.6139E 00	3.1914E-03	1.2878E-02	1.1784E 02	1.7168E-03
64	.5463	135.0	494.29	9.7841E 00	2.5982E 00	3.1863E-03	1.2855E-02	1.1870E 02	1.7138E-03
65	.5882	135.0	498.87	8.0653E 00	2.3807E 00	2.9353E-03	1.1840E-02	1.1973E 02	1.5784E-03
66	.6302	135.0	500.66	8.0320E 00	2.3719E 00	2.9309E-03	1.1821E-02	1.2016E 02	1.5759E-03
67	.6722	135.0	512.96	9.1905E 00	2.2101E 00	2.7730E-03	1.1176E-02	1.2306E 02	1.4906E-03
68	.7170	135.0	518.71	8.4774E 00	2.0434E 00	2.5826E-03	1.0408E-02	1.2444E 02	1.3873E-03
69	.7583	135.0	507.70	5.2859E 00	1.6290E 00	2.0306E-03	8.1868E-03	1.2182E 02	1.0914E-03
70	.7996	135.0	514.06	7.4640E 00	2.1687E 00	2.7250E-03	1.0982E-02	1.2333E 02	1.4641E-03
71	.8409	135.0	516.47	7.1989E 00	2.0386E 00	2.5693E-03	1.0353E-02	1.2391E 02	1.3802E-03
72	.8822	135.0	510.54	7.7729E 00	2.1029E 00	2.6572E-03	1.0707E-02	1.2440E 02	1.4273E-03
73	.9235	135.0	521.14	8.8852E 00	1.9749E 00	2.5037E-03	1.0087E-02	1.2502E 02	1.3447E-03
74	.9648	135.0	527.08	8.4235E 00	2.0738E 00	2.6490E-03	1.0669E-02	1.2643E 02	1.4223E-03
75	.2524	180.0	458.01	4.7193E 00	1.3712E 00	1.6096E-03	6.5048E-03	1.1007E 02	8.6744E-04
76	.2943	180.0	-116.76	6.1927E-08	1.9855E-08	1.3917E-11	5.8042E-11	-2.1036E 01	7.7431E-12
77	.3363	180.0	469.26	6.4837E 00	1.4437E 00	1.7173E-03	6.9379E-03	1.1273E 02	9.2491E-04
78	.3783	180.0	478.60	6.5612E 00	1.9723E 00	2.3725E-03	9.5800E-03	1.1493E 02	1.2771E-03
79	.4203	180.0	487.51	9.8228E 00	2.8446E 00	3.4588E-03	1.3960E-02	1.1704E 02	1.8611E-03
80	.4623	180.0	495.32	1.1892E 01	3.1676E 00	3.8805E-03	1.5608E-02	1.1889E 02	2.0914E-03
81	.5043	180.0	499.90	1.1598E 01	2.6550E 00	3.2780E-03	1.3221E-02	1.2000E 02	1.7626E-03
82	.5463	180.0	503.45	1.0264E 01	2.7257E 00	3.3798E-03	1.3629E-02	1.2082E 02	1.8170E-03
83	.5882	180.0	505.04	8.4287E 00	2.2382E 00	2.7836E-03	1.1224E-02	1.2139E 02	1.4962E-03
84	.6302	180.0	509.97	8.1254E 00	2.2104E 00	2.7638E-03	1.1141E-02	1.2236E 02	1.4853E-03
85	.6722	180.0	522.38	9.7096E 00	2.3349E 00	2.7846E-03	1.1963E-02	1.2530E 02	1.5921E-03
86	.7170	180.0	520.60	9.4611E 00	2.2744E 00	2.9061E-03	1.1703E-02	1.2481E 02	1.5602E-03
87	.7583	180.0	518.10	7.6410E 00	1.8375E 00	2.3206E-03	9.3544E-03	1.2429E 02	1.2465E-03
88	.7996	180.0	523.47	8.3201E 00	2.1674E 00	2.7559E-03	1.1101E-02	1.2557E 02	1.4799E-03
89	.8409	180.0	525.96	8.3992E 00	2.2381E 00	2.8548E-03	1.1498E-02	1.2616E 02	1.5328E-03
90	.8822	180.0	528.21	3.3745E 00	2.1612E 00	2.7447E-03	1.1134E-02	1.2676E 02	1.4843E-03
91	.9235	180.0	529.01	9.1880E 00	2.2048E 00	2.9282E-03	1.1791E-02	1.2703E 02	1.5719E-03
92	.9648	180.0	536.33	1.0119E 01	2.3319E 00	3.0143E-03	1.2134E-02	1.2863E 02	1.6176E-03
93	.8822	225.0	528.07	7.9053E 00	2.0199E 00	2.5833E-03	1.0403E-02	1.2645E 02	1.3869E-03
94	.9648	225.0	536.11	8.9353E 00	1.9804E 00	2.5594E-03	1.0302E-02	1.2858E 02	1.3735E-03
95	.7170	270.0	514.90	7.4463E 00	1.7279E 00	2.2295E-03	8.9742E-03	1.2429E 02	1.1965E-03
96	.7996	270.0	524.30	6.4842E 00	1.7205E 00	2.2126E-03	8.9175E-03	1.2494E 02	1.1888E-03
97	.8822	270.0	530.46	8.6272E 00	1.6422E 00	2.1074E-03	8.4846E-03	1.2728E 02	1.1312E-03
98	.9648	270.0	517.54	6.7970E 00	1.6345E 00	2.1162E-03	8.5179E-03	1.2892E 02	1.1355E-03


CF ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 13
MACH NO = 8
RE NO = 3.05 X 10**6
CONFIG 1
ALPHA 2
TIME 0 SEC
SYM PHI X/L
0
45
90
135
180
SYM PHI X/L
225
270
315
0.88
0.96
X/L
H X 10**4
0.00
0.20
0.40
0.60
0.80
1.00
12.00
8.00
4.00
-4.00

2

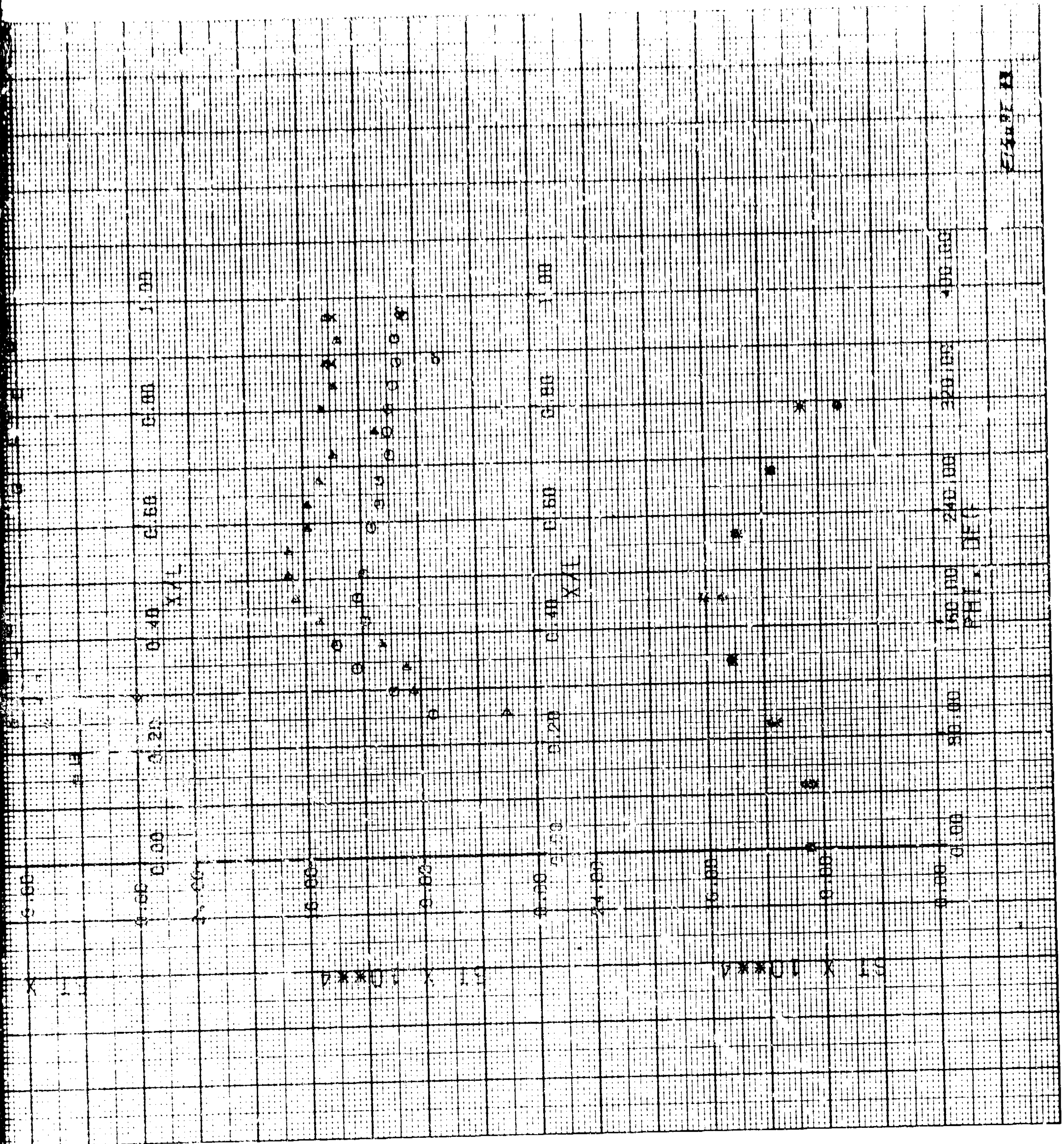


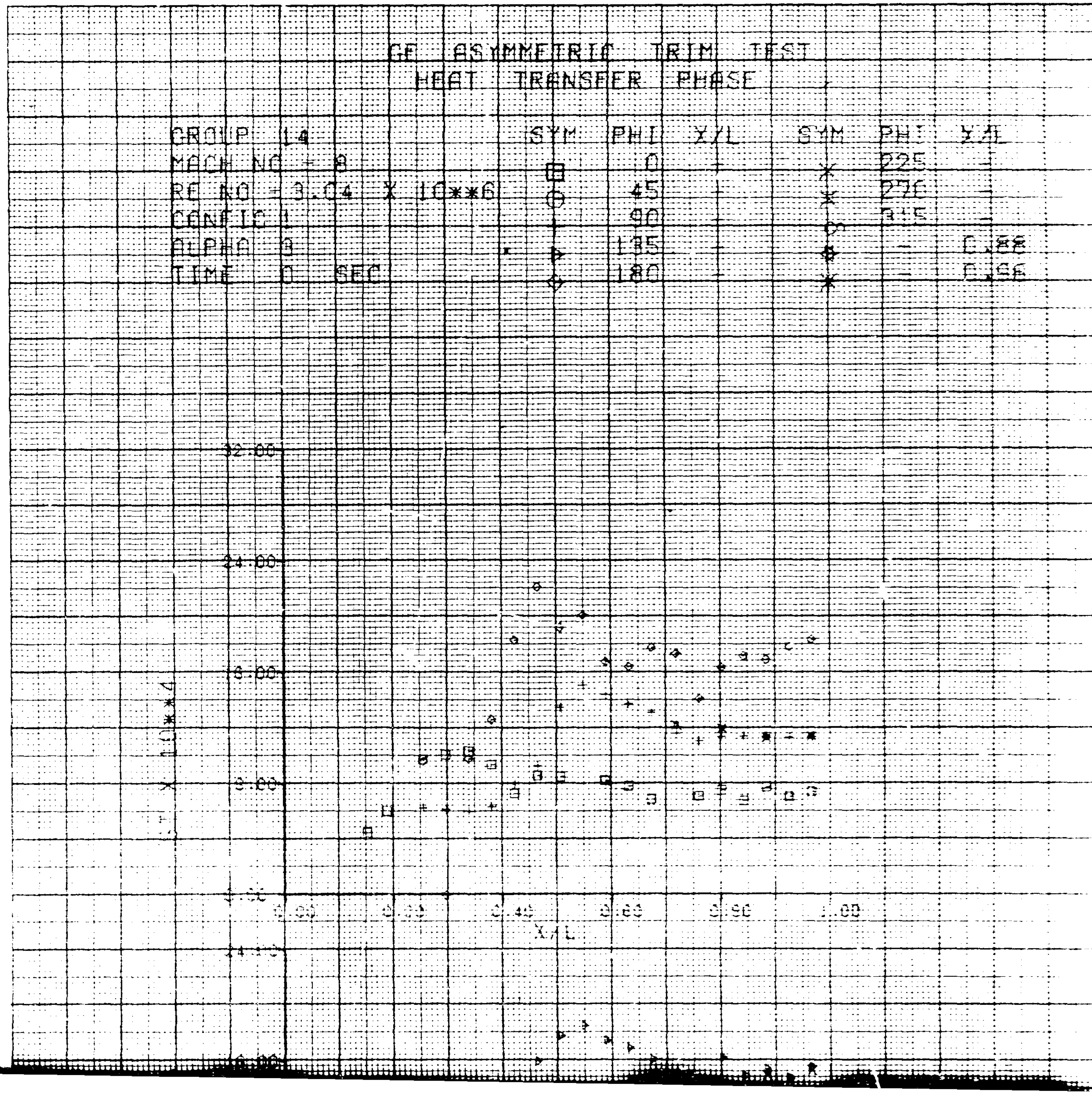
Figure 13

GROUP								MACH NO	PO	TO	TIME
[illegible]	[illegible]	[illegible]	0	3.10	0	0	714	8.00	611.57	1909.67	.06

T-INF	P-INF	U-INF	V-INF	[illegible]	[illegible]	RE/FT	RE/IN	MU
[illegible] 01	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

TC NO	X/L	PHI	T-WP	SLOPE	Q-STOW	HT	H[illegible]	HW	ST
1	[illegible]	0	[illegible]	[illegible] 00	8.8809E-01	8.3291E-04	3.3079E-03	1.1811E 02	[illegible]E-04
2	.1867	0	490.19	4.2120E 00	9.2501E-01	1.1291E-03	4.5563E-03	1.1772E 02	6.0980E-04
3	.2524	0	511.4[illegible]	[illegible] 00	1.4685E 00	1.8169E-03	7.3279E-03	1.2034E 02	9.8073E-04
4	.2943	0	513.6[illegible]	[illegible] 00	1.4971E 00	1.8809E-03	7.5809E-03	1.2123E 02	1.0146E-03
5	[illegible]	0	517.21	[illegible] 00	1.5259E 00	[illegible]E-03	7.7593E-03	1.2409E 02	1.0385E-03
6	.3783	0	516.49	4.5907E 00	1.1800E 00	1.7462E-03	7.0279E-03	1.2439E 02	9.4059E-04
7	.4203	0	517.7[illegible]	1.4995E 00	1.0749E 00	1.3571E-03	5.4643E-03	1.2420E 02	7.3198E-04
8	.4623	0	520.11	4.0658E 00	1.2580E 00	1.5913E-03	6.4194E-03	1.2477E 02	8.5915E-04
9	.5043	0	520.22	4.5206E 00	1.2501E 00	1.5815E-03	6.3796E-03	1.2480E 02	[illegible].5103E-04
10	.5463	0	530.44	-4.0551E-07	-1.3903E-07	-1.7462E-10	-7.1846E-10	1.2723E 02	[illegible].4153E-11
11	.5882	0	523.57	4.1645E 00	1.2025E 00	1.5286E-03	6.1623E-03	1.2560E 02	8.2474E-04
12	.6302	0	525.17	4.1175E 00	1.1410E 00	1.4541E-03	5.4578E-03	1.2596E 02	7.8399E-04
13	.6722	0	518.04	1.9993E 00	9.9920E-01	1.2786E-03	5.1491E-03	1.2667E 02	6.8913E-04
14	.8822	315.0	517.07	4.5593E 00	9.0012E-01	1.1650E-03	4.6846E-03	1.2880E 02	6.2764E-04
15	.7563	0	530.15	4.2912E 00	1.0319E 00	1.3238E-03	5.3367E-03	1.2716E 02	7.1344E-04
16	.7996	0	511.80	4.7057E 00	1.0959E 00	1.4084E-03	5.6710E-03	1.2750E 02	7.5898E-04
17	.8439	0	531.21	4.4602E 00	9.8122E-01	1.2605E-03	5.0754E-03	1.2742E 02	6.7928E-04
18	.8822	0	533.69	4.4001E 00	1.1173E 00	1.4324E-03	5.7971E-03	1.2800E 02	7.7586E-04
19	.9235	0	534.81	4.3703E 00	1.0197E 00	1.3156E-03	5.2945E-03	1.2822E 02	7.0086E-04
20	.9648	0	535.55	4.4415E 00	1.0681E 00	1.3798E-03	5.5543E-03	1.2844E 02	7.4337E-04
21	.2524	45.0	481.94	2.6[illegible]03E 00	7.7162E-01	9.3651E-04	3.7725E-03	1.1621E 02	5.0490E-04
22	.2943	45.0	492.69	3.3768E 00	1.0504E 00	1.2857E-03	5.1878E-03	1.1827E 02	6.9431E-04
23	.3363	45.0	496.94	4.5515E 00	1.3682E 00	1.6835E-03	6.7912E-03	1.1928E 02	9.0090E-04
24	.3783	45.0	499.71	5.5695E 00	1.6742E 00	2.0670E-03	8.3371E-03	1.1993E 02	1.1158E-03
25	.4203	45.0	502.04	5.5013E 00	1.6275E 00	2.0152E-03	8.1270E-03	1.2048E 02	1.0877E-03
26	.4623	45.0	506.35	6.1196E 00	1.7170E 00	2.1374E-03	8.6190E-03	1.2151E 02	1.1534E-03
27	.5043	45.0	508.77	6.2238E 00	1.6527E 00	2.0636E-03	8.3192E-03	1.2208E 02	1.1134E-03
28	.9648	315.0	541.94	4.4964E 00	1.1775E 00	1.5337E-03	6.1720E-03	1.2996E 02	8.2604E-04
29	.5882	45.0	511.89	5.6636E 00	1.5329E 00	1.9215E-03	7.7450E-03	1.2282E 02	1.0366E-03
30	.6302	45.0	513.85	5.1733E 00	1.4537E 00	1.8266E-03	7.3620E-03	1.2329E 02	9.8531E-04
31	.6722	45.0	522.01	5.8467E 00	1.4352E 00	1.8221E-03	7.3404E-03	1.2522E 02	9.8241E-04
32	.7170	45.0	525.95	5.4447E 00	1.3243E 00	1.6961E-03	6.8313E-03	1.2616E 02	9.1427E-04
33	.7583	45.0	521.60	4.4164E 00	1.3326E 00	1.6909E-03	6.8121E-03	1.2513E 02	9.1171E-04
34	.7996	45.0	523.00	4.6308E 00	1.3015E 00	1.6545E-03	6.6648E-03	1.2546E 02	8.9199E-04
35	.8409	45.0	525.16	4.4884E 00	1.2684E 00	1.6168E-03	6.5122E-03	1.2597E 02	8.7157E-04
36	.8822	45.0	526.56	4.4713E 00	1.2287E 00	1.5690E-03	6.3191E-03	1.2630E 02	8.4572E-04
37	.9235	45.0	527.45	4.7955E 00	1.2253E 00	1.5664E-03	6.3086E-03	1.2652E 02	8.4431E-04
38	.9648	45.0	532.30	4.7610E 00	1.1449E 00	1.4728E-03	5.9300E-03	1.2767E 02	7.9365E-04
39	.2524	90.0	469.86	3.1110E 00	9.7877E-01	1.1655E-03	4.7084E-03	1.1287E 02	6.3016E-04
40	.2943	90.0	475.70	2.9803E 00	9.5553E-01	1.1458E-03	4.6274E-03	1.1425E 02	6.1931E-04
41	.3363	90.0	481.32	2.9337E 00	9.2596E-01	1.1178E-03	4.5132E-03	1.1558E 02	6.0403E-04
42	.3783	90.0	486.31	3.0767E 00	9.7109E-01	1.1794E-03	4.7606E-03	1.1676E 02	6.3716E-04
43	.4203	90.0	492.25	4.1279E 00	1.2202E 00	1.4928E-03	6.0235E-03	1.1816E 02	8.0616E-04
44	.4623	90.0	495.49	4.5240E 00	1.4066E 00	1.7274E-03	6.9690E-03	1.1891E 02	9.3271E-04
45	.5043	90.0	502.21	7.3450E 00	2.0234E 00	2.5063E-03	1.0108E-02	1.2052E 02	[illegible]E-03
46	.5463	90.0	507.34	7.3694E 00	2.2474E 00	2.8011E-03	1.1293E-02	1.2174E 02	1.5115E-03
47	.5882	90.0	509.17	7.6389E 00	2.1433E 00	2.6775E-03	1.0794E-02	1.2217E 02	1.4446E-03
48	.6302	90.0	510.81	7.4060E 00	2.0406E 00	2.5544E-03	1.0297E-02	1.2256E 02	1.3781E-03
49	.6722	90.0	519.17	7.4936E 00	1.9274E 00	2.4382E-03	9.8240E-03	1.2455E 02	1.3148E-03
50	.7170	90.0	524.62	7.2166E 00	1.6994E 00	2.1647E-03	8.7196E-03	1.2584E 02	1.1670E-03
51	.7583	90.0	517.39	6.2597E 00	1.6306E 00	2.0581E-03	8.2934E-03	1.2413E 02	1.1100E-03
52	.7996	90.0	520.03	6.4228E 00	1.6731E 00	2.1188E-03	8.5368E-03	1.2475E 02	1.1425E-03
53	.8409	90.0	521.82	6.5740E 00	1.6720E 00	2.1222E-03	8.5495E-03	1.2518E 02	1.1442E-03
54	.8822	90.0	524.20	6.7630E 00	1.6601E 00	2.1135E-03	8.5134E-03	1.2574E 02	1.1394E-03
55	.9235	90.0	525.03	6.4644E 00	1.6507E 00	2.1039E-03	8.4739E-03	1.2594E 02	1.1341E-03
56	.9648	90.0	529.40	6.8705E 00	1.6522E 00	2.1175E-03	8.5271E-03	1.2698E 02	1.1412E-03
57	.2524	135.0	458.57	1.1131E 00	3.8816E-01	4.5607E-04	1.8437E-03	1.1020E 02	2.4675E-04
58	.2943	135.0	467.44	4.3539E 00	1.3975E 00	1.6593E-03	6.7045E-03	1.1230E 02	8.9731E-04
59	.3363	135.0	474.37	4.3273E 00	1.3658E 00	1.6351E-03	6.6044E-03	1.1394E 02	8.8390E-04
60	.3783	135.0	481.32	4.6900E 00	1.4569E 00	1.7588E-03	7.1010E-03	1.1550E 02	9.5037E-04
61	.4203	135.0	488.17	6.5591E 00	1.9717E 00	2.4001E-03	9.6847E-03	1.1720E 02	1.2964E-03
62	.4623	135.0	494.66	9.3203E 00	2.4175E 00	2.9663E-03	1.1968E-02	1.1874E 02	1.6017E-03
63	.5043	135.0	501.09	1.0466E 01	2.6742E 00	3.3072E-03	1.3339E-02	1.2026E 02	1.7852E-03
64	.5463	135.0	504.59	1.0440E 01	2.7724E 00	3.4436E-03	1.3886E-02	1.2109E 02	1.8584E-03
65	.5882	135.0	508.69	9.7838E 00	2.5981E 00	3.2433E-03	1.3075E-02	1.2204E 02	1.7499E-03
66	.6302	135.0	510.17	9.4453E 00	2.5082E 00	3.1372E-03	1.2646E-02	1.2241E 02	1.6926E-03
67	.6722	135.0	520.16	9.3150E 00	2.3603E 00	2.9896E-03	1.2045E-02	1.2478E 02	1.6120E-03
68	.7170	135.0	524.05	9.2201E 00	2.1712E 00	2.7637E-03	1.1133E-02	1.2571E 02	1.4899E-03
69	.7583	135.0	515.56	5.9721E 00	1.6756E 00	2.1101E-03	8.5035E-03	1.2369E 02	1.1381E-03
70	.7996	135.0	522.07	8.1545E 00	2.3704E 00	3.0101E-03	1.2127E-02	1.2524E 02	1.6230E-03
71	.8409	135.0	524.16	7.9072E 00	2.1787E 00	2.7736E-03	1.1172E-02	1.2573E 02	1.4952E-03
72	.8822	135.0	525.71	8.2884E 00	2.2423E 00	2.8603E-03	1.1520E-02	1.2610E 02	1.5418E-03
73	.9235	135.0	527.24	8.7394E 00	2.1453E 00	2.7418E-03	1.1042E-02	1.2647E 02	1.4779E-03
74	.9648	135.0	533.37	9.3329E 00	2.2444E 00	2.8911E-03	1.1640E-02	1.2792E 02	1.5578E-03
75	.2524	180.0	46[illegible].47	5.1970E 00	1.5100E 00	1.7845E-03	7.2118E-03	1.1136E 02	9.6520E-04
76	.2943	180.0	1033.52	1.4862E-06	4.7652E-07	1.7255E-09	6.7633E-09	2.5029E 02	9.0517E-10
77	.3363	180.0	479.74	5.1070E 00	1.5097E 00	1.8191E-03	7.3450E-03	1.1520E 02	9.8[illegible]3E-04
78	.3783	180.0	487.08	6.4102E 00	1.9269E 00	2.3425E-03	9.4547E-03	1.1696E 02	1.2654E-03
79	.4203	180.0	496.12	9.7655E 00	2.7685E 00	3.4030E-03	1.3729E-02	1.1908E 02	1.8374E-03
80	.4623	180.0	503.67	1.1597E 01	3.3117E 00	4.1087E-03	1.6549E-02	1.2087E 02	2.2175E-03
81	.5043	180.0	508.71	1.1427E 01	2.8626E 00	3.5749E-03	1.4408E-02	1.2207E 02	1.9284E-03
82	.5463	180.0	512.31	1.1238E 01	2.9841E 00	3.7425E-03	1.5085E-02	1.2292E 02	2.0189E-03
83	.5882	180.0	514.82	9.7274E 00	2.4769E 00	3.1167E-03	1.2559E-02	1.2351E 02	1.6808E-03
84	.6302	180.0	518.37	9.1004E 00	2.4166E 00	3.0539E-03	1.2305E-02	1.2436E 02	1.6469E-03
85	.6722	180.0	529.30	1.0731E 01	2.5807E 00	3.3070E-03	1.3317E-02	1.2696E 02	1.7823E-03
86	.7170	180.0	533.99	1.0616E 01	2.5001E 00	3.22[illegible]E-03	1.2976E-02	1.2807E 02	1.7366E-03
87	.7583	180.0	524.88	8.5792E 00	2.0631E 00	2.6[illegible]E-03	1.0589E-02	1.2591E 02	1.4172E-03
88	.7996	180.0	531.31	9.1066E 00	2.3723E 00	3.0478E-03	1.2272E-02	1.2743E 02	1.6424E-03
89	.8409	180.0	533.29	9.7020E 00	2.4793E 00	3.1929E-03	1.2855E-02	1.2790E 02	1.7205E-03
90	.8822	180.0	535.26	1.0551E 01	2.4314E 00	3.1396E-03	1.2639E-02	1.2837E 02	1.6916E-03
91	.9235	180.0	538.93	1.1429E 01	2.5591E 00	3.3120E-03	1.3332E-02	1.2879E 02	1.7843E-03
92	.9648	180.0	541.62	1.1386E 01	2.6237E 00	3.4160E-03	1.3747E-02	1.2989E 02	1.8399E-03
93	.8822	225.0	536.52	8.4152E 00	2.1502E 00	2.7810E-03	1.1195E-02	1.2867E 02	1.4983E-03
94	.9648	225.0	541.98	9.3607E 00	[illegible] 00	2.8445E-03	1.1447E-02	1.2997E 02	1.5320E-03
95	.7170	270.0	539.44	7.7481E 00	[illegible] 00	2.2680E-03	9.1280E-03	1.2937E 02	1.2217E-03
96	.7996	270.0	538.11	6.4674E 00	[illegible] 00	2.2259E-03	8.9503E-03	1.2905E 02	1.1991E-03
97	.8822	270.0	540.34	6.3377E 00	[illegible] 00	2.1054E-03	8.4732E-03	1.2963E 02	1.1340E-03
98	.9648	270.0	542.88	6.7690E 00	[illegible] 00	2.1229E-03	8.5424E-03	1.3019E 02	1.1433E-03

CF ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 14



GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 14
MACH NO = 8
RE NO = 3.04 X 10**6
CONFIG 1
ALPHA 0
TIME 0. SEC
SYM PHI X/L
0 -
45 -
90 -
135 -
180 -
SYM PHI X/L
225 -
270 -
315 -
- 0.88
- 0.96
32.00
24.00
16.00
8.00
0.00
0.40
0.60
0.80
1.00
X/L
X 10**4

2

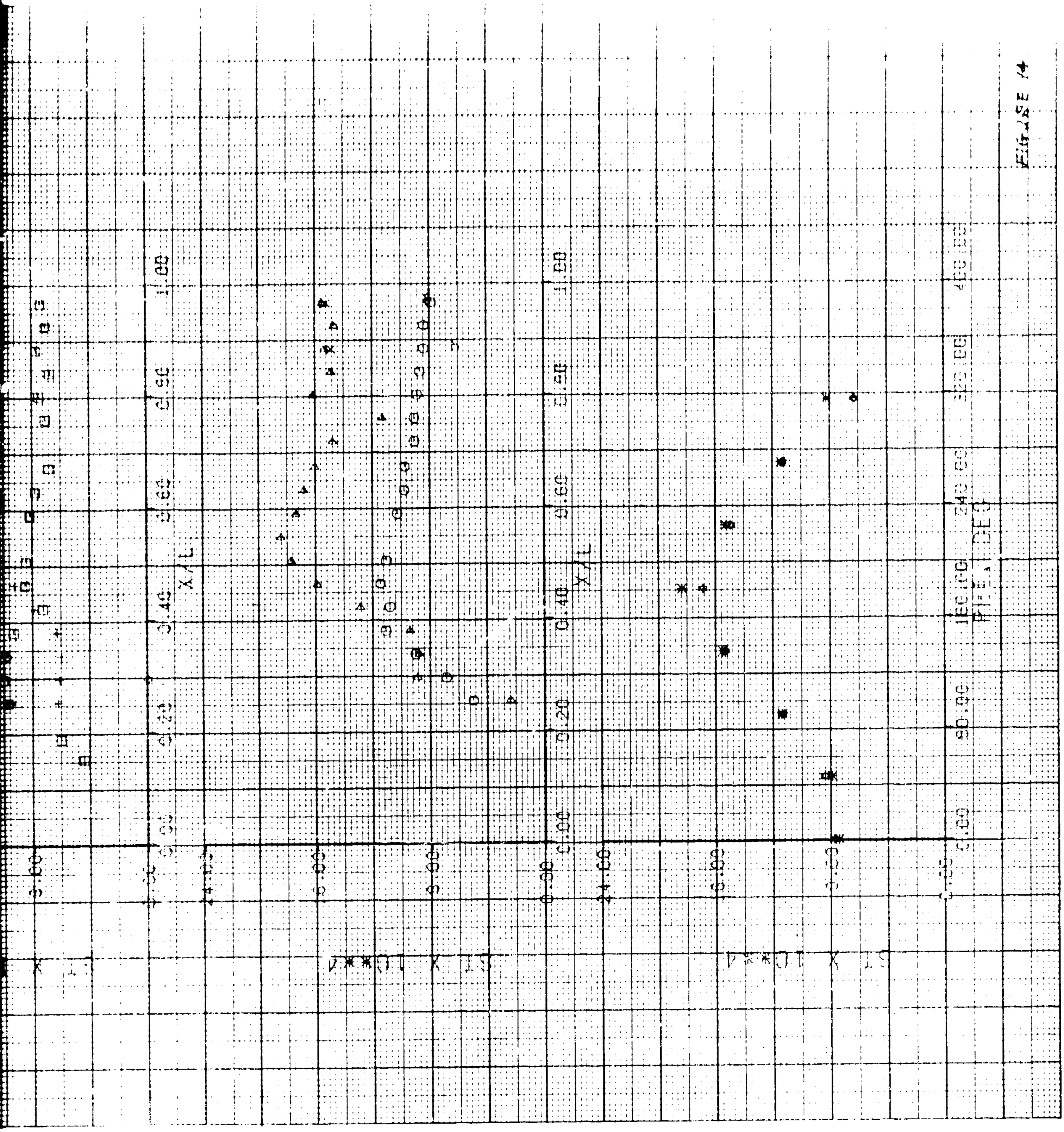
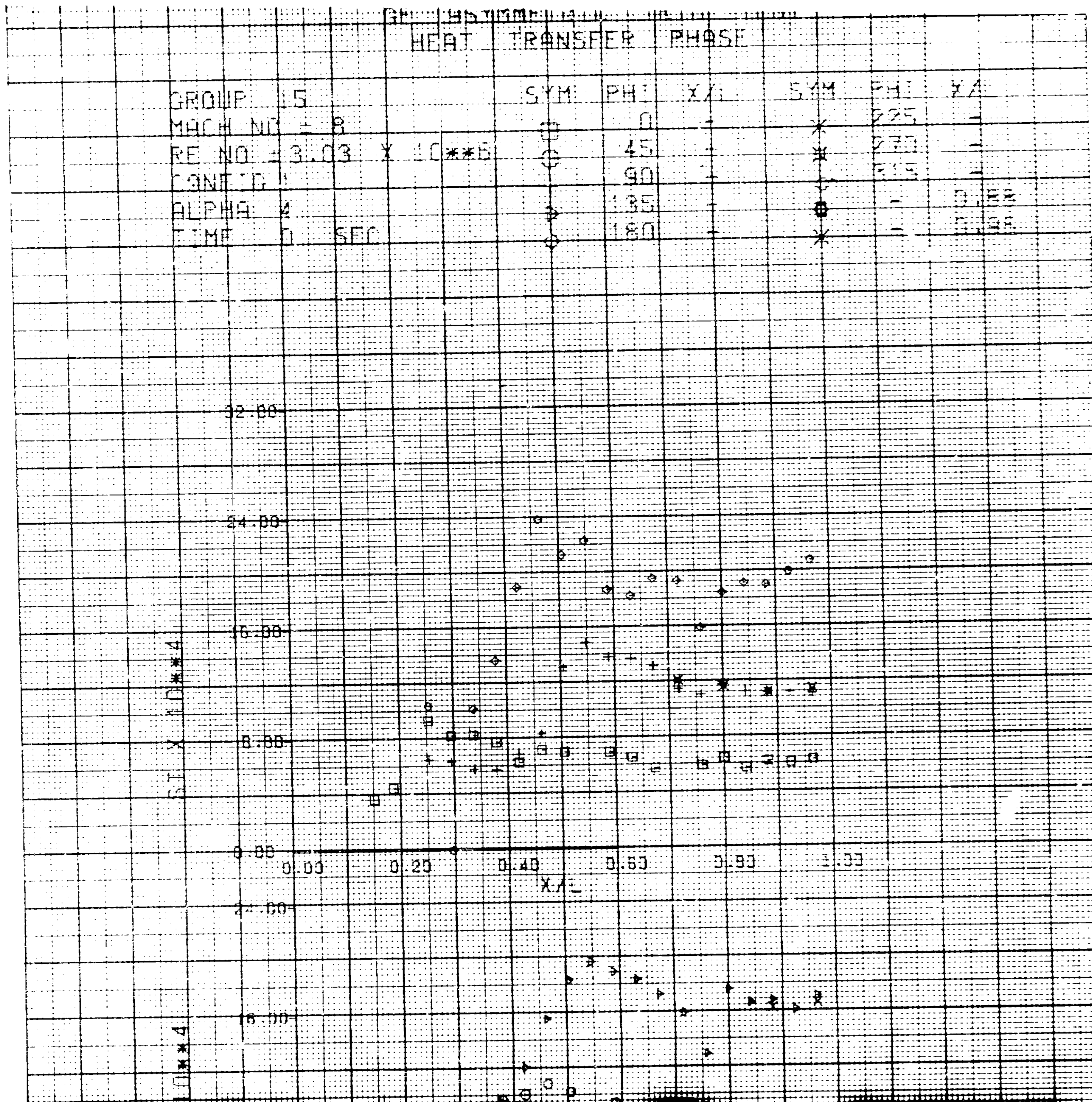


Figure 14

TC NO	X/L	PHI	TW	SLOPE	Q-STON	[illegible]	[illegible]	[illegible]	ST
1	.1980	0	482.28	2.6022E 00	5.7870E-01	6.7920E-04	2.8212E-03	1.1598E 02	1.7871E-04
2	.1867	0	489.04	1.1577E 00	6.9161E-01	8.4482E-04	3.4095E-03	1.1761E 02	4.5731E-04
3	.2524	0	501.41	4.7823E 00	1.4137E 00	1.7491E-03	7.0542E-03	1.2018E 02	9.4628E-04
4	.2943	0	512.95	1.4814E 00	1.2251E 00	1.5173E-03	6.1962E-03	1.2107E 02	8.3119E-04
5	.3363	0	516.26	1.4914E 00	1.2281E 00	1.5678E-03	6.2313E-03	1.2390E 02	8.3670E-04
6	.3783	0	517.24	1.4354E 00	1.1530E 00	1.4548E-03	5.0623E-03	1.2410E 02	7.8639E-04
7	.4203	0	518.31	1.5167E 00	9.3664E-01	1.1779E-03	4.7465E-03	1.2187E 02	6.3672E-04
8	.4623	0	518.11	1.4573E 00	1.0628E 00	1.3421E-03	5.4047E-03	1.2430E 02	7.2555E-04
9	.5043	0	517.91	1.4649E 00	1.0407E 00	1.3162E-03	5.2954E-03	1.2425E 02	7.1035E-04
10	.5463	0	510.90	-6.7509E-02	-1.4942E-02	-2.4317E-05	-9.7915E-05	1.2734E 02	-1.3135E-05
11	.5882	0	520.81	1.7317E 00	1.0262E 00	1.3031E-03	5.2900E-03	1.2494E 02	7.0426E-04
12	.6302	0	522.06	1.5776E 00	9.6784E-01	1.2288E-03	4.9495E-03	1.2521E 02	6.6394E-04
13	.6722	0	526.96	1.1886E 00	8.4891E-01	1.0843E-03	4.3671E-03	1.2640E 02	5.8582E-04
99	.8022	315.0	531.31	1.1592E 00	8.2294E-01	1.0571E-03	4.2568E-03	1.2764E 02	5.7098E-04
15	.7563	0	525.91	1.4231E 00	8.7134E-01	1.1115E-03	4.4769E-03	1.2616E 02	6.0055E-04
16	.7996	0	527.04	1.1827E 00	9.4352E-01	1.2053E-03	4.8543E-03	1.2642E 02	6.5117E-04
17	.8409	0	526.66	1.1556E 00	8.3944E-01	1.0719E-03	4.3169E-03	1.2613E 02	5.7910E-04
18	.8822	0	528.81	1.5306E 00	9.0954E-01	1.1645E-03	4.6898E-03	1.2684E 02	6.2909E-04
19	.9235	0	529.31	1.5547E 00	8.9052E-01	1.1409E-03	4.5944E-03	1.2696E 02	6.1631E-04
20	.9648	0	532.86	1.4141E 00	9.1722E-01	1.1805E-03	4.7539E-03	1.2781E 02	6.3758E-04
21	.2524	45.0	485.94	2.1071E 00	6.2289E-01	7.5602E-04	3.0510E-03	1.1667E 02	4.0936E-04
22	.2943	45.0	492.72	2.1961E 00	7.0411E-01	8.6165E-04	3.[illegible]E-03	1.1827E 02	4.6640E-04
23	.3363	45.0	496.14	1.2277E 00	9.7026E-01	1.1924E-03	4.8109E-03	1.1909E 02	6.4529E-04
24	.3783	45.0	498.54	4.4889E 00	1.4696E 00	1.8115E-03	7.3070E-03	1.1966E 02	9.8020E-04
25	.4203	45.0	500.43	5.2619E 00	1.5289E 00	1.8889E-03	7.6185E-03	1.2010E 02	1.0220E-03
26	.4623	45.0	504.06	5.4190E 00	1.6355E 00	2.0297E-03	8.1860E-03	1.2096E 02	1.0979E-03
27	.5043	45.0	505.61	5.4034E 00	1.5411E 00	1.9162E-03	7.7265E-03	1.2133E 02	1.0365E-03
100	.9648	315.0	530.44	4.4095E 00	1.0604E 00	1.3746E-03	5.5328E-03	1.2913E 02	7.4220E-04
29	.5882	45.0	508.21	5.1459E 00	1.4178E 00	1.7685E-03	7.1299E-03	1.2191E 02	9.5644E-04
30	.6302	45.0	509.91	4.9809E 00	1.3475E 00	1.6846E-03	6.7909E-03	1.2236E 02	9.1096E-04
31	.6722	45.0	521.17	5.1157E 00	1.3048E 00	1.6545E-03	6.6654E-03	1.2502E 02	8.9413E-04
32	.7170	45.0	524.74	4.1722E 00	1.2180E 00	1.5514E-03	6.2489E-03	1.2587E 02	8.3826E-04
33	.7583	45.0	517.61	4.4397E 00	1.2233E 00	1.5441E-03	6.2219E-03	1.2418E 02	8.3464E-04
34	.7996	45.0	518.53	4.2468E 00	1.1916E 00	1.5058E-03	6.0674E-03	1.2440E 02	8.1391E-04
35	.8409	45.0	520.46	4.1362E 00	1.1731E 00	1.4861E-03	5.9873E-03	1.2486E 02	8.0317E-04
36	.8822	45.0	521.59	4.2494E 00	1.1178E 00	1.4181E-03	5.7129E-03	1.2512E 02	7.6636E-04
37	.9235	45.0	522.81	4.1796E 00	1.1190E 00	1.4218E-03	5.7276E-03	1.2541E 02	7.6833E-04
38	.9648	45.0	530.41	4.2345E 00	1.0183E 00	1.3065E-03	5.2608E-03	1.2722E 02	7.0571E-04
39	.2524	90.0	471.16	3.4521E 00	1.0205E 00	1.2168E-03	4.9153E-03	1.1318E 02	6.5937E-04
40	.2943	90.0	473.42	1.1926E 00	9.9476E-01	1.1893E-03	4.8038E-03	1.1371E 02	6.4440E-04
41	.3363	90.0	478.47	2.4679E 00	9.0521E-01	1.0888E-03	4.3967E-03	1.1490E 02	5.8980E-04
42	.3783	90.0	482.96	2.8379E 00	8.9574E-01	1.0833E-03	4.3733E-03	1.1597E 02	5.8665E-04
43	.4203	90.0	488.09	3.5741E 00	1.0565E 00	1.2857E-03	5.1891E-03	1.1718E 02	6.9609E-04
44	.4623	90.0	491.42	4.0896E 00	1.2704E 00	1.5523E-03	6.2637E-03	1.1797E 02	8.4024E-04
45	.5043	90.0	497.76	7.2096E 00	1.9865E 00	2.4461E-03	9.8673E-03	1.1947E 02	1.3236E-03
46	.5463	90.0	503.11	7.8301E 00	2.2360E 00	2.7717E-03	1.1177E-02	1.2074E 02	1.4994E-03
47	.5882	90.0	50[illegible].72	7.9024E 00	2.0713E 00	2.5727E-03	1.0374E-02	1.2112E 02	1.3916E-03
48	.6302	90.0	506.36	7.4550E 00	2.0541E 00	2.5565E-03	1.0307E-02	1.2151E 02	1.3827E-03
49	.6722	90.0	518.33	7.7637E 00	1.9399E 00	2.4509E-03	9.8756E-03	1.2435E 02	1.3248E-03
50	.7170	90.0	523.54	7.1537E 00	1.6845E 00	2.1425E-03	8.6302E-03	1.2559E 02	1.1577E-03
51	.7583	90.0	513.39	6.3030E 00	1.6419E 00	2.0615E-03	8.3049E-03	1.2318E 02	1.1146E-03
52	.7996	90.0	515.52	6.6885E 00	1.7424E 00	2.1935E-03	8.8397E-03	1.2368E 02	1.1858E-03
53	.8409	90.0	517.38	6.4404E 00	1.6636E 00	2.0992E-03	8.4549E-03	1.2412E 02	1.1347E-03
54	.8822	90.0	519.66	6.7002E 00	1.6447E 00	2.0814E-03	8.3861E-03	1.2466E 02	1.1249E-03
55	.9235	90.0	520.97	6.8422E 00	1.6454E 00	2.0856E-03	8.4025E-03	1.2496E 02	1.1272E-03
56	.9648	90.0	527.87	6.7199E 00	1.6100E 00	2.0666E-03	8.3225E-03	1.2562E 02	1.1164E-03
57	.2524	135.0	456.12	1.4856E 00	4.3917E-01	5.1442E-04	2.0798E-03	1.0963E 02	2.7899E-04
58	.2943	135.0	461.32	4.6361E 00	1.4864E 00	1.7518E-03	7.0805E-03	1.1085E 02	9.4981E-04
59	.3363	135.0	468.77	4.4502E 00	1.4046E 00	1.6700E-03	6.7473E-03	1.1261E 02	9.0511E-04
60	.3783	135.0	475.44	4.7837E 00	1.4860E 00	1.7809E-03	7.1927E-03	1.1419E 02	9.6486E-04
61	.4203	135.0	482.16	6.2018E 00	1.8642E 00	2.2524E-03	9.0934E-03	1.1578E 02	1.2198E-03
62	.4623	135.0	489.36	8.1753E 00	2.3754E 00	2.8951E-03	1.1684E-02	1.1748E 02	1.5673E-03
63	.5043	135.0	496.43	1.4888E 01	2.7820E 00	3.4201E-03	1.3797E-02	1.1915E 02	1.8508E-03
64	.5463	135.0	500.24	1.1150E 01	2.9608E 00	3.6571E-03	1.4750E-02	1.2006E 02	1.9787E-03
65	.5882	135.0	504.31	1.0671E 01	2.8334E 00	3.5180E-03	1.4186E-02	1.2103E 02	1.9030E-03
66	.6302	135.0	505.80	1.0348E 01	2.7478E 00	3.4175E-03	1.3779E-02	1.2137E 02	1.8484E-03
67	.6722	135.0	519.47	1.0573E 01	2.5425E 00	3.2168E-03	1.2961E-02	1.2462E 02	1.7386E-03
68	.7170	135.0	523.18	9.4436E 00	2.3416E 00	2.9767E-03	1.1991E-02	1.2550E 02	1.6085E-03
69	.7583	135.0	511.17	6.8640E 00	1.9259E 00	2.4114E-03	9.7260E-03	1.2765E 02	1.3039E-03
70	.7996	135.0	517.50	8.9488E 00	2.6002E 00	3.2816E-03	1.3223E-02	1.2415E 02	1.7738E-03
71	.8409	135.0	519.86	8.8690E 00	2.4437E 00	3.0933E-03	1.2443E-02	1.2471E 02	1.6718E-03
72	.8822	135.0	521.53	9.1101E 00	2.4647E 00	3.1265E-03	1.2595E-02	1.2511E 02	1.6896E-03
73	.9235	135.0	523.49	9.6157E 00	2.3604E 00	3.0017E-03	1.2091E-02	1.2558E 02	1.6220E-03
74	.9648	135.0	532.55	1.0287E 01	2.4738E 00	3.1826E-03	1.2814E-02	1.2773E 02	1.7189E-03
75	.2524	180.0	461.27	5.4421E 00	1.6394E 00	1.9319E-03	7.8085E-03	1.1064E 02	1.0475E-03
76	.2943	180.0	-116.76	6.1927E-08	1.9855E-08	1.3918E-11	5.8086E-11	-2.1036E 01	7.7919E-12
77	.3363	180.0	472.88	5.3495E 00	1.5814E 00	1.8894E-03	7.6319E-03	1.1358E 02	1.0238E-03
78	.3783	180.0	480.61	7.3155E 00	2.1084E 00	2.5431E-03	1.0268E-02	1.1561E 02	1.3774E-03
79	.4203	180.0	489.68	9.7572E 00	2.8843E 00	3.5158E-03	1.41[illegible]E-02	1.1756E 02	1.9038E-03
80	.4623	180.0	498.36	1.2593E 01	3.5933E 00	4.4280E-03	1.7861E-02	1.1961E 02	2.3960E-03
81	.5043	180.0	503.60	1.2705E 01	3.1828E 00	3.9476E-03	1.5919E-02	1.2085E 02	2.1355E-03
82	.5463	180.0	507.46	1.2512E 01	3.3225E 00	4.1407E-03	1.6694E-02	1.2177E 02	2.2395E-03
83	.5882	180.0	509.07	1.0475E 01	2.7816E 00	3.4772E-03	1.4017E-02	1.2234E 02	1.8803E-03
84	.6302	180.0	513.66	1.0183E 01	2.7041E 00	3.3963E-03	1.3688E-02	1.2324E 02	1.8362E-03
85	.6722	180.0	528.47	1.1800E 01	2.8377E 00	3.6315E-03	1.4624E-02	1.2675E 02	1.9618E-03
86	.7170	180.0	533.44	1.1841E 01	2.7885E 00	3.5916E-03	1.4460E-02	1.2794E 02	1.9377E-03
87	.7583	180.0	520.37	9.7163E 00	2.3366E 00	2.9596E-03	1.1924E-02	1.2483E 02	1.5996E-03
88	.7996	180.0	526.92	1.0315E 01	2.6871E 00	3.4322E-03	1.3823E-02	1.2639E 02	1.8543E-03
89	.8409	180.0	529.94	1.0865E 01	2.7760E 00	3.5549E-03	1.4316E-02	1.2687E 02	1.9294E-03
90	.8822	180.0	531.32	1.1917E 01	2.7507E 00	3.5332E-03	1.4226E-02	1.2744E 02	1.9084E-03
91	.9235	180.0	533.18	1.1735E 01	2.8805E 00	3.7088E-03	1.4937E-02	1.2788E 02	2.0031E-03
92	.9648	180.0	541.04	1.2854E 01	2.9620E 00	3.8527E-03	1.5515E-02	1.2975E 02	2.0799E-03
93	.8822	225.0	530.93	9.2332E 00	2.1592E 00	3.0288E-03	1.2196E-02	1.2734E 02	1.6360E-03
94	.9648	225.0	540.30	9.8460E 00	2.3771E 00	3.0889E-03	1.2431E-02	1.2957E 02	1.6676E-03
95	.7170	270.0	536.49	7.7217E 00	1.7409E 00	2.2511E-03	9.0614E-03	1.2867E 02	1.2155E-03
96	.7996	270.0	530.44	6.3744E 00	1.5927E 00	2.1718E-03	8.7453E-03	1.2723E 02	1.1731E-03
97	.8822	27[illegible].0	533.01	5.3479E 00	1.5220E 00	2.0879E-03	3.4062E-03	1.2784E 02	1.1276E-03
98	.9648	270.0	539.59	6.4517E 00	1.6477E 00	2.1392E-03	8.6094E-03	1.2940E 02	1.1549E-03

RF ASYMMETRIC
HEAT TRANSFER
GROUP 15
MACH NO 3.03


HEAT TRANSFER PHASE
GROUP 15
MACH NO = 8
RE NO = 3.03 X 10**6
ALPHA 4
TIME 0 SEC
SYM PHI X/L
0
45
90
135
180
SYM PHI X/L
225
270
32.00
24.00
16.00
8.00
0.00
0.00
0.20
0.40
X/L
0.60
2.00
16.00
ST X 10**4

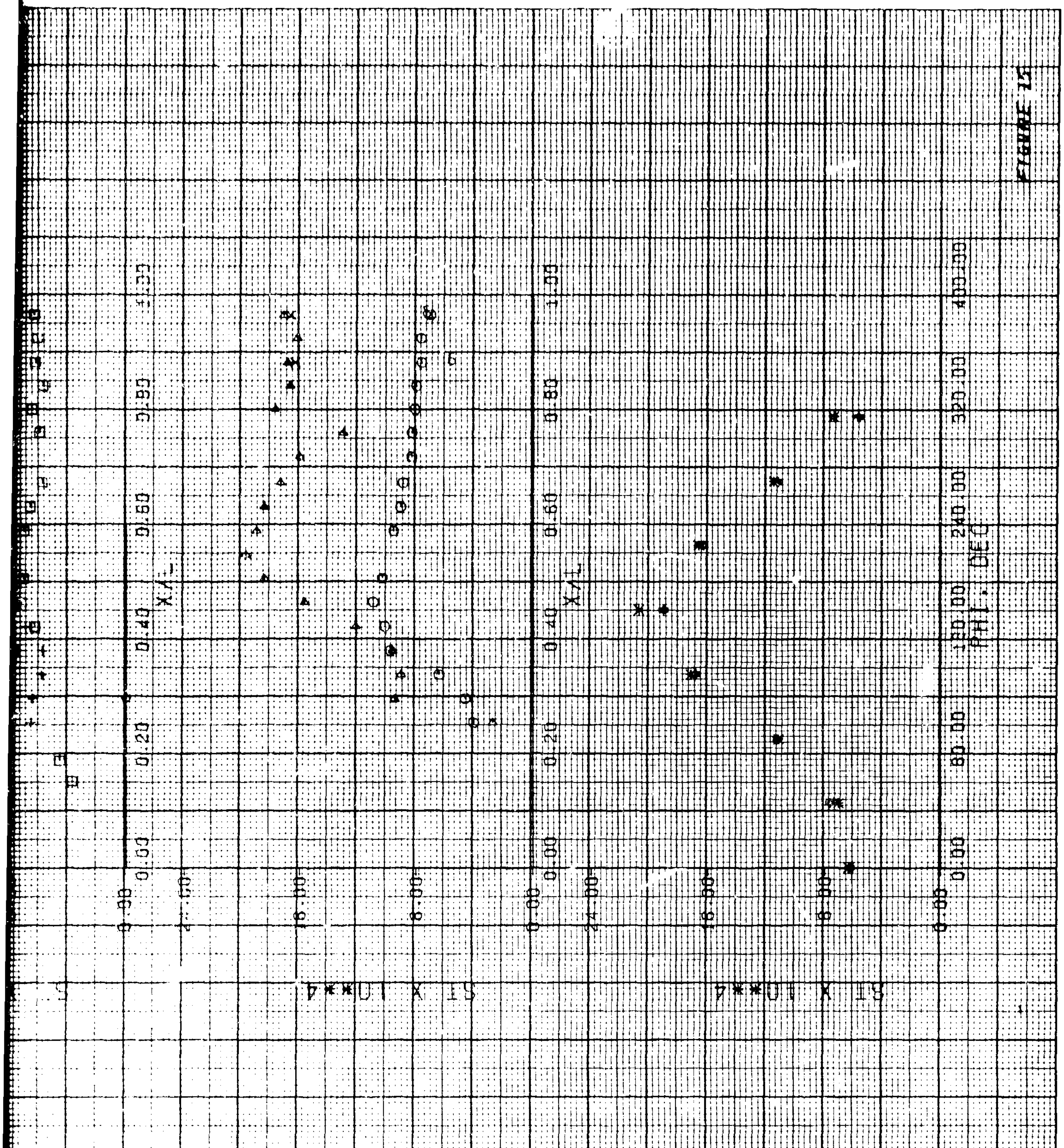


Figure 15

7/14/69

AEDC(ARO,INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
VT0967-H00

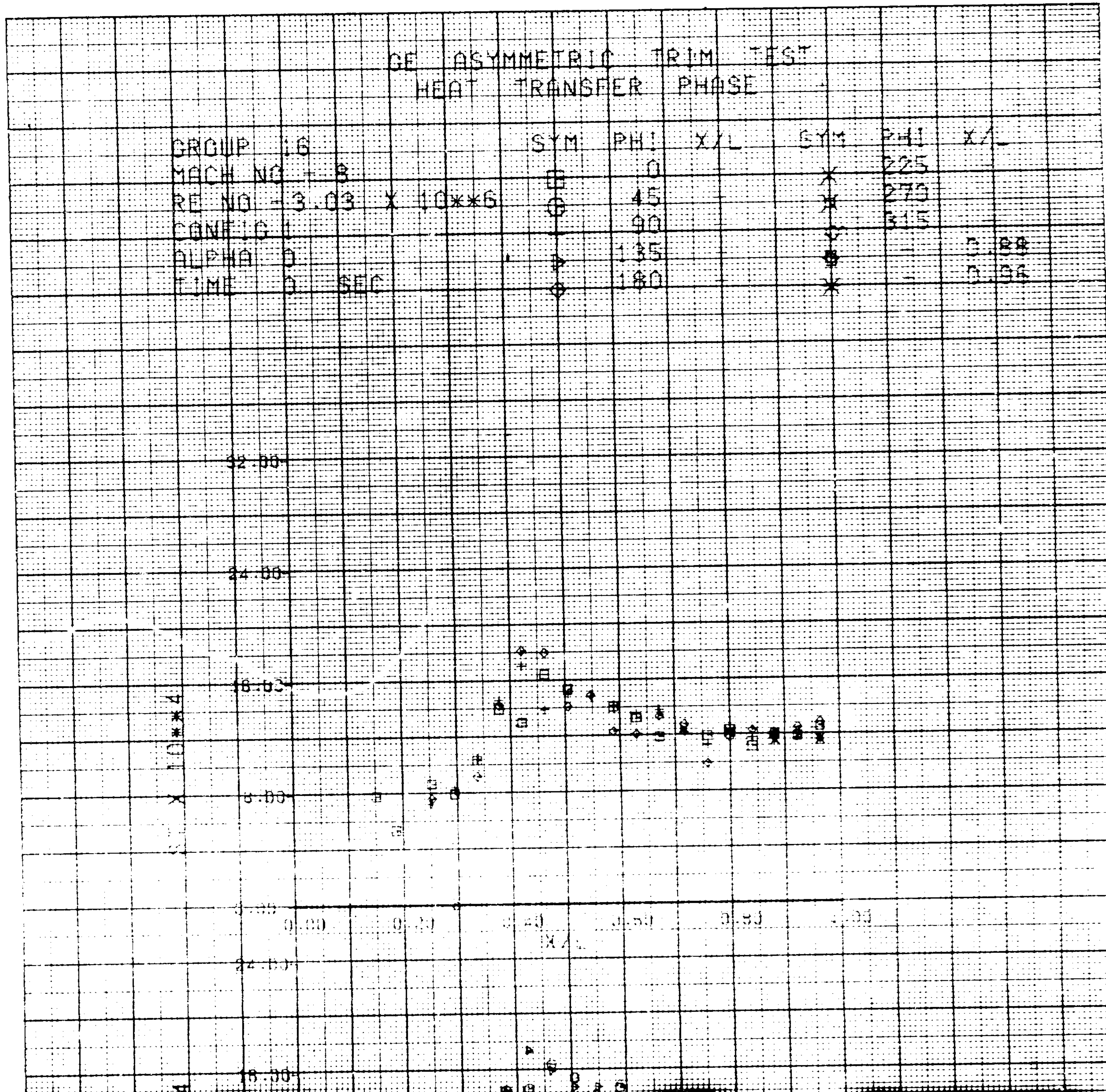
GROUP	CONFIG	ALPHA-M	BETA-M	ALPHA-S	ROLL	ALP-P	DATE	MACH NO	PO	TO	TIME
16	XI	.05	0	.05	0	0	714	8.00	670.07	1310.52	-.00

T-INF	P-INF	Q-INF	V-INF	RHO-INF	MU-INF	RE/FT	RE/D	RU
9.4945E 01	6.8726E-02	3.0749E 00	3.8260E 03	6.0710E-05	7.6455E-08	1.0337E 06	2.7833E 06	3.2098E 02

TC NO	X/L	PHI	TEMP	SLOPE	Q-STOR	HT	HM	HW	ST
1	.1760	0	420.97	5.9399E 00	1.2912E 00	1.4519E-03	5.8790E-03	1.0139E 02	7.8787E-04
2	.1867	0	420.80	4.3476E 00	8.8891E-01	1.0072E-03	4.0784E-03	1.0301E 02	5.4650E-04
3	.2524	0	425.16	6.4497E 00	1.4336E 00	1.6193E-03	6.5575E-03	1.0234E 02	8.7470E-04
4	.2943	0	424.52	6.1373E 00	1.3059E 00	1.4739E-03	5.9690E-03	1.0219E 02	7.9984E-04
5	.3363	0	415.56	5.1506E 00	1.6888E 00	1.9302E-03	7.4122E-03	1.0478E 02	1.0468E-03
6	.3783	0	431.50	7.5927E 00	2.2824E 00	2.5965E-03	1.0511E-02	1.0303E 02	1.4085E-03
7	.4203	0	425.29	7.1693E 00	2.1412E 00	2.4187E-03	9.7951E-03	1.0236E 02	1.3125E-03
8	.4623	0	440.41	9.5163E 00	2.6699E 00	3.0451E-03	1.2322E-02	1.0593E 02	1.6511E-03
9	.5043	0	444.58	9.1506E 00	2.4755E 00	2.8589E-03	1.1565E-02	1.0691E 02	1.5497E-03
10	.5463	0	530.47	2.1287E-03	6.5339E-04	8.3761E-07	3.3727E-06	1.2723E 02	4.5194E-07
11	.5882	0	453.59	8.1314E 00	2.2405E 00	2.6145E-03	1.0572E-02	1.0903E 02	1.4166E-03
12	.6302	0	460.17	7.7904E 00	2.1070E 00	2.4784E-03	1.0018E-02	1.1057E 02	1.3424E-03
13	.6722	0	476.00	7.1750E 00	1.8470E 00	2.2140E-03	8.9410E-03	1.1432E 02	1.1981E-03
14	.8822	315.0	503.00	6.4909E 00	1.2220E 00	1.5132E-03	6.1022E-03	1.2071E 02	8.1769E-04
15	.7583	0	477.40	7.4964E 00	1.8508E 00	2.2216E-03	8.9710E-03	1.1465E 02	1.2021E-03
16	.7996	0	479.75	6.4181E 00	1.9130E 00	2.3027E-03	9.2975E-03	1.1521E 02	1.2459E-03
17	.8409	0	481.60	6.7555E 00	1.7201E 00	2.0823E-03	8.4069E-03	1.1564E 02	1.1265E-03
18	.8822	0	485.91	7.1590E 00	1.8438E 00	2.2360E-03	9.0251E-03	1.1667E 02	1.2094E-03
19	.9235	0	488.58	7.3692E 00	1.8211E 00	2.2156E-03	8.9414E-03	1.1729E 02	1.1981E-03
20	.9648	0	503.39	7.8619E 00	1.8906E 00	2.3424E-03	9.4450E-03	1.2080E 02	1.2657E-03
21	.2524	45.0	421.19	4.3166E 00	1.2760E 00	1.4368E-03	5.8119E-03	1.0141E 02	7.7879E-04
22	.2943	45.0	419.01	4.1456E 00	1.3241E 00	1.4908E-03	6.0395E-03	1.0089E 02	8.0929E-04
23	.3363	45.0	429.97	5.5959E 00	1.6821E 00	1.9102E-03	7.7317E-03	1.0346E 02	1.0363E-03
24	.3783	45.0	432.09	7.9302E 00	2.3838E 00	2.7137E-03	1.0986E-02	1.0397E 02	1.4720E-03
25	.4203	45.0	422.88	8.3674E 00	2.4312E 00	2.7390E-03	1.1093E-02	1.0180E 02	1.4865E-03
26	.4623	45.0	433.81	9.5308E 00	2.6742E 00	3.0502E-03	1.2347E-02	1.0437E 02	1.6544E-03
27	.5043	45.0	446.61	9.1565E 00	2.4846E 00	2.8761E-03	1.1634E-02	1.0739E 02	1.5589E-03
100	.9648	315.0	510.71	7.1047E 00	1.7085E 00	2.1362E-03	8.6107E-03	1.2254E 02	1.1538E-03
29	.5882	45.0	4[illegible].19	8.4870E 00	2.3602E 00	2.7408E-03	1.1086E-02	1.0752E 02	1.4855E-03
30	.6302	45.0	456.59	7.8649E 00	2.1278E 00	2.4976E-03	1.0096E-02	1.1021E 02	1.3529E-03
31	.6722	45.0	476.49	8.8236E 00	2.1659E 00	2.5970E-03	1.0487E-02	1.1444E 02	1.4053E-03
32	.7170	45.0	488.86	8.5442E 00	1.9614E 00	2.3628E-03	9.5355E-03	1.1736E 02	1.2778E-03
33	.7583	45.0	476.91	7.0280E 00	1.9364E 00	2.3229E-03	9.3807E-03	1.1453E 02	1.2570E-03
34	.7996	45.0	478.97	6.8223E 00	1.9142E 00	2.3020E-03	9.2949E-03	1.1502E 02	1.2455E-03
35	.8409	45.0	482.02	6.7013E 00	1.8130E 00	2.1898E-03	8.8409E-03	1.1588E 02	1.1846E-03
36	.8822	45.0	486.94	6.7800E 00	1.7833E 00	2.1653E-03	8.7393E-03	1.1691E 02	1.1711E-03
37	.9235	45.0	488.61	6.9173E 00	1.7674E 00	2.1504E-03	8.6784E-03	1.1730E 02	1.1629E-03
38	.9648	45.0	503.22	6.9210E 00	1.6644E 00	2.0616E-03	8.3115E-03	1.2076E 02	1.1140E-03
39	.2524	90.0	423.86	4.0505E 00	1.1974E 00	1.3504E-03	5.4692E-03	1.0203E 02	7.3287E-04
40	.2943	90.0	421.00	4.2836E 00	1.3734E 00	1.5440E-03	6.2542E-03	1.0136E 02	8.3806E-04
41	.3363	90.0	431.59	5.1970E 00	1.7037E 00	1.9303E-03	7.8447E-03	1.0384E 02	1.0515E-03
42	.3783	90.0	436.58	7.5304E 00	2.3768E 00	2.7197E-03	1.1007E-02	1.0502E 02	1.4749E-03
43	.4203	90.0	427.25	7.6583E 00	2.7960E 00	3.1655E-03	1.2818E-02	1.0283E 02	1.7176E-03
44	.4623	90.0	430.04	7.3231E 00	2.2748E 00	2.5836E-03	1.0460E-02	1.0349E 02	1.4017E-03
45	.5043	90.0	446.26	4.7607E 00	2.4138E 00	2.7929E-03	1.1298E-02	1.0730E 02	1.5139E-03
46	.5463	90.0	447.19	9.3471E 00	2.3837E 00	2.7611E-03	1.1168E-02	1.0752E 02	1.4965E-03
47	.5882	90.0	448.[illegible]	8.0843E 00	2.2689E 00	2.6325E-03	1.0647E-02	1.0787E 02	1.4257E-03
48	.6302	90.0	456.27	7.7751E 00	2.1423E 00	2.5137E-03	1.0161E-02	1.1013E 02	1.3616E-03
49	.6722	90.0	478.01	8.5550E 00	2.1433E 00	2.5684E-03	1.0372E-02	1.1432E 02	1.3899E-03
50	.7170	90.0	488.47	7.9420E 00	1.8703E 00	2.2751E-03	9.1817E-03	1.1727E 02	1.2303E-03
51	.7583	90.0	473.96	6.7735E 00	1.7645E 00	2.1092E-03	8.5189E-03	1.1384E 02	1.1415E-03
52	.7996	90.0	477.34	7.1270E 00	1.9089E 00	2.2911E-03	9.2518E-03	1.1464E 02	1.2397E-03
53	.8409	90.0	480.51	7.2654E 00	1.8201E 00	2.1929E-03	8.8538E-03	1.1539E 02	1.1864E-03
54	.8822	90.0	485.01	7.4371E 00	1.8256E 00	2.2114E-03	8.9245E-03	1.1645E 02	1.1961E-03
55	.9235	90.0	487.13	7.4493E 00	1.7914E 00	2.1757E-03	8.7810E-03	1.1695E 02	1.1766E-03
56	.9648	90.0	500.78	7.2893E 00	1.7529E 00	2.1648E-03	8.7308E-03	1.2019E 02	1.1699E-03
57	.2524	135.0	415.07	1.1919E 00	3.5234E-01	3.9345E-04	1.5943E-03	9.9958E 01	2.1363E-04
58	.2943	135.0	414.92	4.7158E 00	1.5120E 00	1.6882E-03	6.8408E-03	9.9933E 01	9.1664E-04
59	.3363	135.0	425.02	5.5891E 00	1.7641E 00	1.9968E-03	8.0748E-03	1.0349E 02	1.0820E-03
60	.3783	135.0	431.08	7.4282E 00	2.3696E 00	2.6969E-03	1.0914E-02	1.0372E 02	1.4630E-03
61	.4203	135.0	420.49	9.6773E 00	2.5789E 00	3.2367E-03	1.3103E-02	1.0124E 02	1.7558E-03
62	.4623	135.0	426.08	9.0172E 00	2.6200E 00	2.9651E-03	1.2008E-02	1.0274E 02	1.6089E-03
63	.5043	135.0	440.79	9.3613E 00	2.3919E 00	2.7502E-03	1.1128E-02	1.0602E 02	1.4911E-03
64	.5463	135.0	443.05	9.0248E 00	2.3965E 00	2.7532E-03	1.1140E-02	1.0584E 02	1.4928E-03
65	.5882	135.0	445.69	4.4468E 00	2.2430E 00	2.5936E-03	1.0492E-02	1.0717E 02	1.4059E-03
66	.6302	135.0	455.56	8.1034E 00	2.1519E 00	2.5169E-03	1.0170E-02	1.0949E 02	1.3636E-03
67	.6722	135.0	474.28	8.4484E 00	2.0798E 00	2.4870E-03	1.0045E-02	1.1391E 02	1.3460E-03
68	.7170	135.0	487.74	7.9772E 00	1.8786E 00	2.2832E-03	9.2140E-03	1.1710E 02	1.2348E-03
69	.7583	135.0	472.52	5.1292E 00	1.4953E 00	1.7863E-03	7.2074E-03	1.1350E 02	9.6578E-04
70	.7996	135.0	478.40	7.0014E 00	2.0343E 00	2.4447E-03	9.8717E-03	1.1489E 02	1.3228E-03
71	.8409	135.0	483.61	6.9638E 00	1.9187E 00	2.3204E-03	9.3670E-03	1.1612E 02	1.2552E-03
72	.8822	135.0	486.94	6.9494E 00	1.8794E 00	2.2826E-03	9.2128E-03	1.1692E 02	1.2345E-03
73	.9235	135.0	488.97	7.1013E 00	1.7631E 00	2.1217E-03	8.5623E-03	1.1738E 02	1.1473E-03
74	.9648	135.0	503.80	7.4199E 00	1.8324E 00	2.2715E-03	9.1594E-03	1.2090E 02	1.2273E-03
75	.2524	180.0	471.49	4.1325E 00	1.2589E 00	1.4160E-03	5.7345E-03	1.0148E 02	7.6855E-04
76	.2943	180.0	-116.76	-1.1566E-14	-3.7020E-15	-2.5937E-18	-1.3875E-17	-2.1036E 01	-1.4505E-18
77	.3363	180.0	431.58	5.4899E 00	1.5046E 00	1.7119E-03	6.9301E-03	1.0385E 02	9.2862E-04
78	.3783	180.0	436.82	7.4738E 00	2.3007E 00	2.6402E-03	1.0685E-02	1.0508E 02	1.4318E-03
79	.4203	180.0	425.95	1.0070E 01	2.9767E 00	3.3651E-03	1.3627E-02	1.0252E 02	1.8260E-03
80	.4623	180.0	434.40	1.0235E 01	2.9220E 00	3.3361E-03	1.3503E-02	1.0451E 02	1.8095E-03
81	.5043	180.0	447.36	9.0209E 00	2.2599E 00	2.6182E-03	1.0590E-02	1.0756E 02	1.4191E-03
82	.5463	180.0	444.77	9.0540E 00	2.4043E 00	2.7771E-03	1.1234E-02	1.0695E 02	1.5054E-03
83	.5882	180.0	451.56	7.4180E 00	1.9694E 00	2.2933E-03	9.2738E-03	1.0855E 02	1.2427E-03
84	.6302	180.0	462.25	7.1840E 00	1.9077E 00	2.2449E-03	9.0890E-03	1.1107E 02	1.2179E-03
85	.6722	180.0	480.67	8.4036E 00	2.0690E 00	2.4931E-03	1.0086E-02	1.1541E 02	1.3488E-03
86	.7170	180.0	496.20	8.2533E 00	1.9436E 00	2.3667E-03	9.0241E-03	1.1910E 02	1.2902E-03
87	.7583	180.0	479.04	6.4235E 00	1.5447E 00	1.8579E-03	7.5017E-03	1.1504E 02	1.0052E-03
88	.7996	180.0	484.50	6.9707E 00	1.8182E 00	2.2012E-03	8.8853E-03	1.1633E 02	1.1906E-03
89	.8409	180.0	488.81	7.1769E 00	1.8833E 00	2.2920E-03	9.2448E-03	1.1735E 02	1.2395E-03
90	.8822	180.0	497.20	7.0349E 00	1.8285E 00	2.2345E-03	9.3159E-03	1.1815E 02	1.2081E-03
91	.9235	180.0	495.84	7.7360E 00	1.8989E 00	2.3304E-03	9.4011E-03	1.1897E 02	1.2597E-03
92	.9648	180.0	510.64	8.1300E 00	1.9194E 00	2.3998E-03	9.6733E-03	1.2252E 02	1.2962E-03
93	.8822	225.0	495.90	6.9716E 00	1.7813E 00	2.1869E-03	8.8223E-03	1.1905E 02	1.1822E-03
94	.9648	225.0	512.95	7.2590E 00	1.7456E 00	2.1513E-03	8.8212E-03	1.2307E 02	1.1820E-03
95	.7170	270.0	504.68	8.2566E 00	1.8601E 00	2.3083E-03	9.3074E-03	1.2111E 02	1.2472E-03
96	.7996	270.0	493.29	6.9887E 00	1.8544E 00	2.2713E-03	9.1648E-03	1.1841E 02	1.2281E-03
97	.8822	270.0	498.11	7.8417E 00	1.7532E 00	2.1581E-03	8.7050E-03	1.1956E 02	1.1665E-03
98	.9648	270.0	512.95	7.1715E 00	1.7246E 00	2.1623E-03	8.7149E-03	1.2307E 02	1.1678E-03

GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
SYM PHI X/L SYM PHI X/L
GROUP 16

1


GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 16
MACH NO = 8
RE NO = 3.03 X 10**6
CONFIG 1
ALPHA 0
TIME 0 SEC
SYM PHI X/L
0
45
90
135
180
SYM PHI X/L
225
270
315
32.00
24.00
16.00
8.00
0.00
0.20
0.40
0.60
0.80
X/L
24.00
16.00

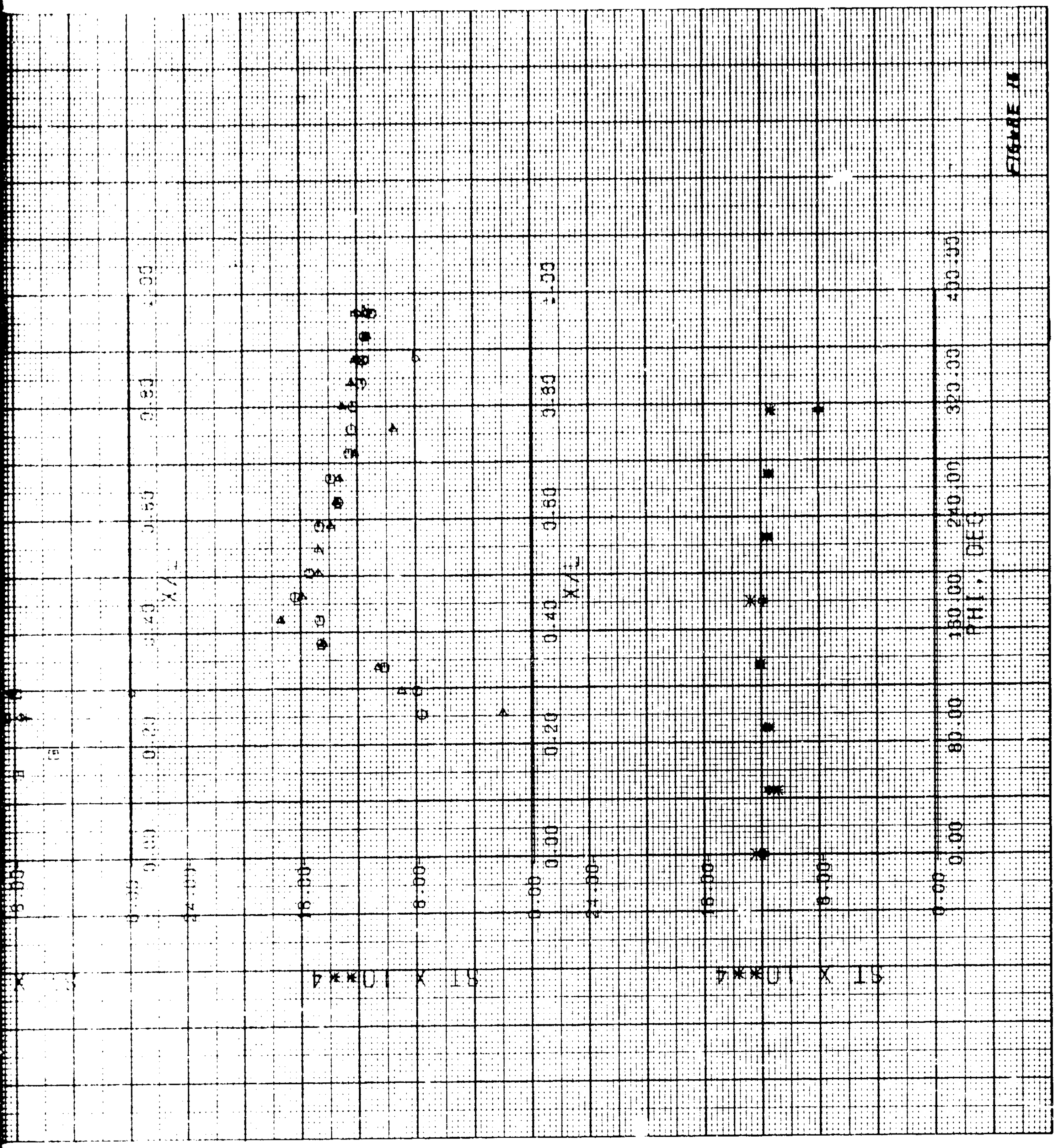


Figure 16

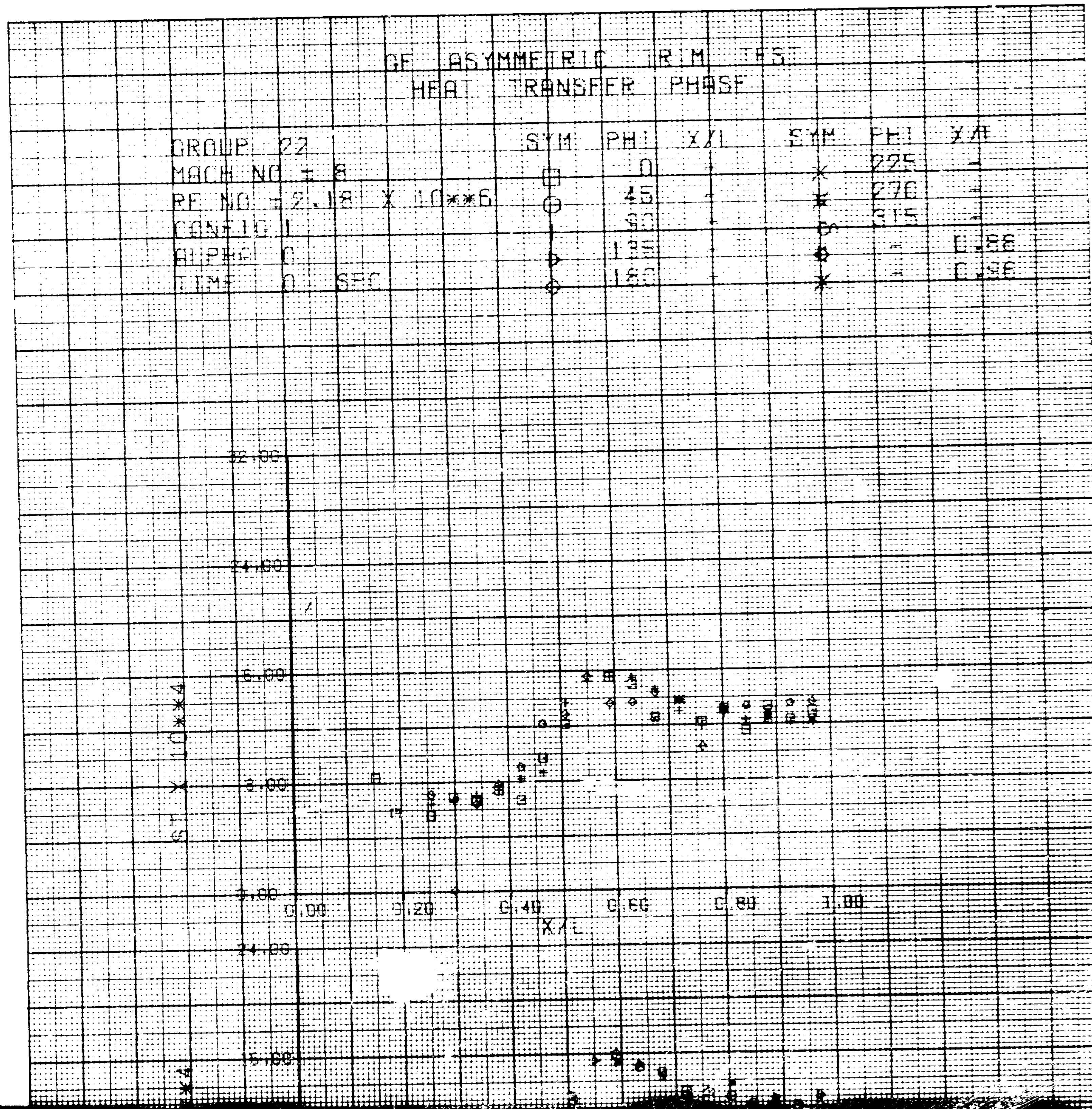
AEDC(ARO,INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
V10947-800

GROUP	CONFIG	ALPHA-M	BETA-M	ALPHA-S	ROLL	ALP-P	DATE	MACH NO	PO	TO	TIME
22	1	.02	0	.02	0	0	714	7.99	660.77	1296.67	-.06

T-INF	P-INF	Q-INF	V-INF	RHO-INF	MU-INF	RE/FT	HE/N	HO
9.3607E 01	4.0810E-02	2.1678E 00	3.7097E 03	6.3630E-05	7.5435E-08	3.1022E 06	2.0011E 06	3.1570E 02

TC NO	X/L	PHI	TEMP	SLOPE	Q-STOW	HT	HM	HW	ST
1	.1906	0	510.10	7.9150E 00	8.3112E-01	1.0918E-03	4.4042E-03	1.2241E 02	8.3194E-04
2	.1667	0	500.75	2.7269E 00	5.9754E-01	7.5700E-04	3.0546E-03	1.2410E 02	5.7714E-04
3	.2524	0	501.37	1.4200E 00	5.7024E-01	7.2300E-04	2.9191E-03	1.2632E 02	5.5116E-04
4	.2943	0	510.99	2.7166E 00	6.9964E-01	8.9809E-04	3.6241E-03	1.2201E 02	6.8425E-04
5	.3363	0	517.19	2.1131E 00	6.6695E-01	8.6209E-04	3.4609E-03	1.2406E 02	6.5721E-04
6	.3783	0	520.05	2.4564E 00	7.3853E-01	9.6017E-04	3.8725E-03	1.2495E 02	7.3115E-04
7	.4203	0	521.57	2.3951E 00	6.6687E-01	8.6781E-04	3.4994E-03	1.2512E 02	6.6080E-04
8	.4623	0	524.30	3.9262E 00	9.7156E-01	1.2690E-03	5.1169E-03	1.2579E 02	9.6611E-04
9	.5043	0	525.45	4.6460E 00	1.2133E 00	1.5869E-03	6.3986E-03	1.2604E 02	1.2081E-03
10	.5463	0	531.03	-1.1906E-01	-3.1905E-02	-4.2107E-05	-1.7064E-04	1.2756E 02	-3.2105E-05
11	.5882	0	529.76	5.4202E 00	1.5405E 00	2.0368E-03	8.2199E-03	1.2706E 02	1.5503E-03
12	.6302	0	530.59	5.5120E 00	1.4914E 00	1.9636E-03	7.9152E-03	1.2724E 02	1.4945E-03
13	.6722	0	528.54	5.6018E 00	1.2531E 00	1.6456E-03	6.6341E-03	1.2478E 02	1.2526E-03
99	.8022	315.0	545.18	3.1599E 00	8.2314E-01	1.1051E-03	4.4512E-03	1.3073E 02	8.4062E-04
15	.7583	0	538.53	5.6037E 00	1.2033E 00	1.6012E-03	6.4516E-03	1.2915E 02	1.2181E-03
16	.7996	0	541.62	4.5910E 00	1.2881E 00	1.7212E-03	6.9339E-03	1.2989E 02	1.3092E-03
17	.8409	0	541.96	4.4201E 00	1.1314E 00	1.5125E-03	6.0910E-03	1.2997E 02	1.1504E-03
18	.8822	0	544.43	5.1841E 00	1.2987E 00	1.7419E-03	7.0161E-03	1.3056E 02	1.3247E-03
19	.9235	0	543.76	4.8050E 00	1.2037E 00	1.6129E-03	6.4970E-03	1.3038E 02	1.2267E-03
20	.9648	0	541.39	5.7574E 00	1.2644E 00	1.6889E-03	6.8041E-03	1.2983E 02	1.2847E-03
21	.2524	45.0	499.32	2.4977E 00	7.3836E-01	9.3380E-04	3.7706E-03	1.1964E 02	7.1191E-04
22	.2943	45.0	516.19	2.1129E 00	6.7744E-01	8.6870E-04	3.5056E-03	1.2292E 02	6.6189E-04
23	.3363	45.0	516.81	2.2311E 00	6.7608E-01	8.6739E-04	3.4991E-03	1.2399E 02	6.6065E-04
24	.3783	45.0	521.28	2.4152E 00	7.2601E-01	9.4441E-04	3.8094E-03	1.2505E 02	7.1916E-04
25	.4203	45.0	522.91	2.4698E 00	7.1762E-01	9.3548E-04	3.7725E-03	1.2544E 02	7.1227E-04
26	.4623	45.0	526.54	3.1588E 00	9.4217E-01	1.2346E-03	4.9755E-03	1.2630E 02	9.3941E-04
27	.5043	45.0	529.18	4.7657E 00	1.2655E 00	1.6603E-03	6.7054E-03	1.2693E 02	1.2640E-03
100	.9648	315.0	546.75	4.8129E 00	1.1574E 00	1.5572E-03	6.2716E-03	1.3111E 02	1.1841E-03
29	.5882	45.0	531.81	5.7581E 00	1.5843E 00	2.0895E-03	8.4223E-03	1.2755E 02	1.5982E-03
30	.6302	45.0	532.64	5.5224E 00	1.4941E 00	1.9728E-03	7.9515E-03	1.2775E 02	1.5013E-03
31	.6722	45.0	532.48	5.4290E 00	1.4554E 00	1.9212E-03	7.7435E-03	1.2771E 02	1.4626E-03
32	.7170	45.0	535.18	5.4675E 00	1.3111E 00	1.7369E-03	6.9998E-03	1.2836E 02	1.3216E-03
33	.7583	45.0	540.64	4.4745E 00	1.2880E 00	1.7187E-03	6.9243E-03	1.2965E 02	1.3074E-03
34	.7996	45.0	543.71	4.4764E 00	1.2561E 00	1.6831E-03	6.7798E-03	1.3039E 02	1.2801E-03
35	.8409	45.0	546.14	4.4256E 00	1.1973E 00	1.6095E-03	6.4825E-03	1.3096E 02	1.2230E-03
36	.8822	45.0	547.37	4.5333E 00	1.1924E 00	1.6056E-03	6.4661E-03	1.3126E 02	1.2208E-03
37	.9235	45.0	546.74	4.5296E 00	1.1829E 00	1.5914E-03	6.4093E-03	1.3111E 02	1.2161E-03
38	.9648	45.0	544.59	4.5242E 00	1.0880E 00	1.4596E-03	5.8798E-03	1.3060E 02	1.1180E-03
39	.2524	90.0	503.80	2.2266E 00	6.5802E-01	8.3694E-04	3.3786E-03	1.2090E 02	6.3791E-04
40	.2943	90.0	514.33	2.1183E 00	6.7919E-01	8.7559E-04	3.5326E-03	1.2340E 02	6.6698E-04
41	.3363	90.0	520.42	2.2338E 00	7.0506E-01	9.1614E-04	3.6950E-03	1.2484E 02	6.9764E-04
42	.3783	90.0	523.16	2.3396E 00	7.3846E-01	9.6296E-04	3.8832E-03	1.2550E 02	7.3310E-04
43	.4203	90.0	525.28	2.7663E 00	8.1774E-01	1.0692E-03	4.3112E-03	1.2598E 02	8.1396E-04
44	.4623	90.0	525.98	2.7721E 00	8.6111E-01	1.1269E-03	4.5438E-03	1.2615E 02	8.5796E-04
45	.5043	90.0	528.77	4.9535E 00	1.3648E 00	1.7929E-03	7.2278E-03	1.2683E 02	1.3647E-03
46	.5463	90.0	529.82	5.3260E 00	1.5204E 00	2.0008E-03	8.0652E-03	1.2708E 02	1.5222E-03
47	.5882	90.0	531.97	5.4981E 00	1.5427E 00	2.0349E-03	8.2020E-03	1.2758E 02	1.5486E-03
48	.6302	90.0	532.63	5.5688E 00	1.5319E 00	2.0227E-03	8.1524E-03	1.2775E 02	1.5392E-03
49	.6722	90.0	531.52	5.7898E 00	1.4505E 00	1.9123E-03	7.7079E-03	1.2748E 02	1.4553E-03
50	.7170	90.0	534.80	5.4423E 00	1.2816E 00	1.6970E-03	6.8390E-03	1.2826E 02	1.2912E-03
51	.7583	90.0	537.78	4.5201E 00	1.1775E 00	1.5653E-03	6.3073E-03	1.2897E 02	1.1900E-03
52	.7996	90.0	541.32	4.4290E 00	1.2579E 00	1.6802E-03	6.7688E-03	1.2982E 02	1.2788E-03
53	.8409	90.0	542.42	4.4168E 00	1.2052E 00	1.6121E-03	6.4941E-03	1.3008E 02	1.2261E-03
54	.8822	90.0	544.04	4.9472E 00	1.2144E 00	1.6279E-03	6.5574E-03	1.3046E 02	1.2381E-03
55	.9235	90.0	542.94	4.4087E 00	1.1804E 00	1.5801E-03	6.3652E-03	1.3021E 02	1.2010E-03
56	.9648	90.0	539.78	4.0259E 00	1.1846E 00	1.5789E-03	6.3613E-03	1.2945E 02	1.2011E-03
57	.2524	135.0	499.54	5.4868E-01	1.6811E-01	2.1268E-04	8.5875E-04	1.1998E 02	1.6214E-04
58	.2943	135.0	509.29	2.3446E 00	7.5171E-01	9.6278E-04	3.8855E-03	1.2219E 02	7.3360E-04
59	.3363	135.0	514.29	2.2974E 00	7.2512E-01	9.3476E-04	3.7713E-03	1.2339E 02	7.1205E-04
60	.3783	135.0	517.00	2.1141E 00	7.1887E-01	9.2995E-04	3.7514E-03	1.2403E 02	7.0820E-04
61	.4203	135.0	518.67	2.4124E 00	8.4548E-01	1.0960E-03	4.4208E-03	1.2443E 02	8.3460E-04
62	.4623	135.0	520.16	3.4472E 00	1.0016E 00	1.3018E-03	5.2474E-03	1.2478E 02	9.9074E-04
63	.5043	135.0	522.36	5.1251E 00	1.3095E 00	1.7059E-03	6.8744E-03	1.2531E 02	1.2980E-03
64	.5463	135.0	523.76	5.4668E 00	1.5579E 00	2.0330E-03	8.1981E-03	1.2563E 02	1.5470E-03
65	.5882	135.0	525.33	5.4877E 00	1.5422E 00	2.0168E-03	8.1320E-03	1.2601E 02	1.5354E-03
66	.6302	135.0	525.51	5.7516E 00	1.5273E 00	1.9978E-03	8.0553E-03	1.2606E 02	1.5209E-03
67	.6722	135.0	527.08	5.9336E 00	1.4269E 00	1.8703E-03	7.5405E-03	1.2643E 02	1.4237E-03
68	.7170	135.0	528.79	5.4373E 00	1.2804E 00	1.6821E-03	6.7810E-03	1.2683E 02	1.2803E-03
69	.7583	135.0	528.97	3.3202E 00	9.3157E-01	1.2241E-03	4.9346E-03	1.2688E 02	9.3168E-04
70	.7996	135.0	533.78	4.6917E 00	1.3632E 00	1.8026E-03	7.2651E-03	1.2802E 02	1.3717E-03
71	.8409	135.0	535.24	4.1533E 00	1.1995E 00	1.5891E-03	6.4042E-03	1.2837E 02	1.2092E-03
72	.8822	135.0	536.37	4.4398E 00	1.2550E 00	1.6653E-03	6.7107E-03	1.2864E 02	1.2670E-03
73	.9235	135.0	537.43	4.5344E 00	1.1867E 00	1.5760E-03	6.3538E-03	1.2889E 02	1.1996E-03
74	.9648	135.0	536.64	5.2846E 00	1.2709E 00	1.6869E-03	6.7977E-03	1.2870E 02	1.2834E-03
75	.2524	180.0	500.58	2.5191E 00	7.3195E-01	9.2717E-04	3.7435E-03	1.2014E 02	7.0680E-04
76	.2943	180.0	-116.76	-1.1546E-14	-3.7020E-15	-2.6315E-18	-1.0905E-17	-2.1036E 01	-2.0759E-18
77	.3363	180.0	516.61	2.1738E 00	6.4260E-01	8.3086E-04	3.3517E-03	1.2394E 02	6.3283E-04
78	.3783	180.0	519.44	2.9987E 00	7.8118E-01	1.0138E-03	4.0889E-03	1.2461E 02	7.7201E-04
79	.4203	180.0	522.38	3.0749E 00	9.0896E-01	1.1840E-03	4.7747E-03	1.2529E 02	9.0156E-04
80	.4623	180.0	524.55	4.2643E 00	1.2178E 00	1.5909E-03	6.4148E-03	1.2583E 02	1.2112E-03
81	.5043	180.0	526.48	5.1347E 00	1.2863E 00	1.6847E-03	6.7926E-03	1.2629E 02	1.2825E-03
82	.5463	180.0	527.92	5.5531E 00	1.5543E 00	2.0395E-03	8.2223E-03	1.2663E 02	1.5524E-03
83	.5882	180.0	528.66	5.1031E 00	1.3551E 00	1.7799E-03	7.1754E-03	1.2680E 02	1.3548E-03
84	.6302	180.0	530.81	5.1158E 00	1.3585E 00	1.7894E-03	7.2178E-03	1.2731E 02	1.3618E-03
85	.6722	180.0	532.93	5.0228E 00	1.4243E 00	1.8813E-03	7.5856E-03	1.2782E 02	1.4316E-03
86	.7170	180.0	534.78	5.7037E 00	1.3620E 00	1.8034E-03	7.2678E-03	1.2826E 02	1.3722E-03
87	.7583	180.0	534.05	4.2575E 00	1.0238E 00	1.3558E-03	5.4639E-03	1.2828E 02	1.0316E-03
88	.7996	180.0	538.34	4.8977E 00	1.2758E 00	1.6974E-03	6.8392E-03	1.2911E 02	1.2913E-03
89	.8409	180.0	539.77	5.1136E 00	1.3066E 00	1.7415E-03	7.0148E-03	1.2945E 02	1.3248E-03
90	.8822	180.0	540.94	5.1787E 00	1.2345E 00	1.6466E-03	6.6341E-03	1.2972E 02	1.2506E-03
91	.9235	180.0	541.48	5.1748E 00	1.3194E 00	1.7626E-03	7.1086E-03	1.2985E 02	1.3406E-03
92	.9648	180.0	542.53	5.7568E 00	1.3266E 00	1.7747E-03	7.1493E-03	1.3010E 02	1.3490E-03
93	.8822	225.0	543.43	4.7677E 00	1.2182E 00	1.6317E-03	6.5727E-03	1.3032E 02	1.2418E-03
94	.9648	225.0	543.49	5.0841E 00	1.2226E 00	1.6378E-03	6.5971E-03	1.3033E 02	1.2456E-03
95	.7170	270.0	539.50	6.0115E 00	1.3553E 00	1.8060E-03	7.2765E-03	1.2941E 02	1.3730E-03
96	.7996	270.0	544.71	4.7794E 00	1.2643E 00	1.7122E-03	6.8962E-03	1.3150E 02	1.3019E-03
97	.8822	270.0	550.18	5.7335E 00	1.2895E 00	1.8347E-03	6.9893E-03	1.3192E 02	1.2920E-03
98	.9648	270.0	546.81	4.4351E 00	1.1868E 00	1.5968E-03	6.4311E-03	1.3112E 02	1.2142E-03

GROUP 22 OF ASYMMETRIC RIM 45°
HEAT TRANSFER PHASE
SYM PHI X/L SYM PHI X/L


GF ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 22
MACH NO = 8
RE NO = 2.18 X 10**6
CONFIG 1
ALPHA 0
TIME 0 SEC
SYM PHI X/L
0
45
90
135
180
SYM PHI X/L
225
270
315
0.88
0.96
32.00
24.00
16.00
8.00
0.00
0.00
0.20
0.40
0.60
0.80
1.00
X/L
ST X 10**4
24.00
16.00

2

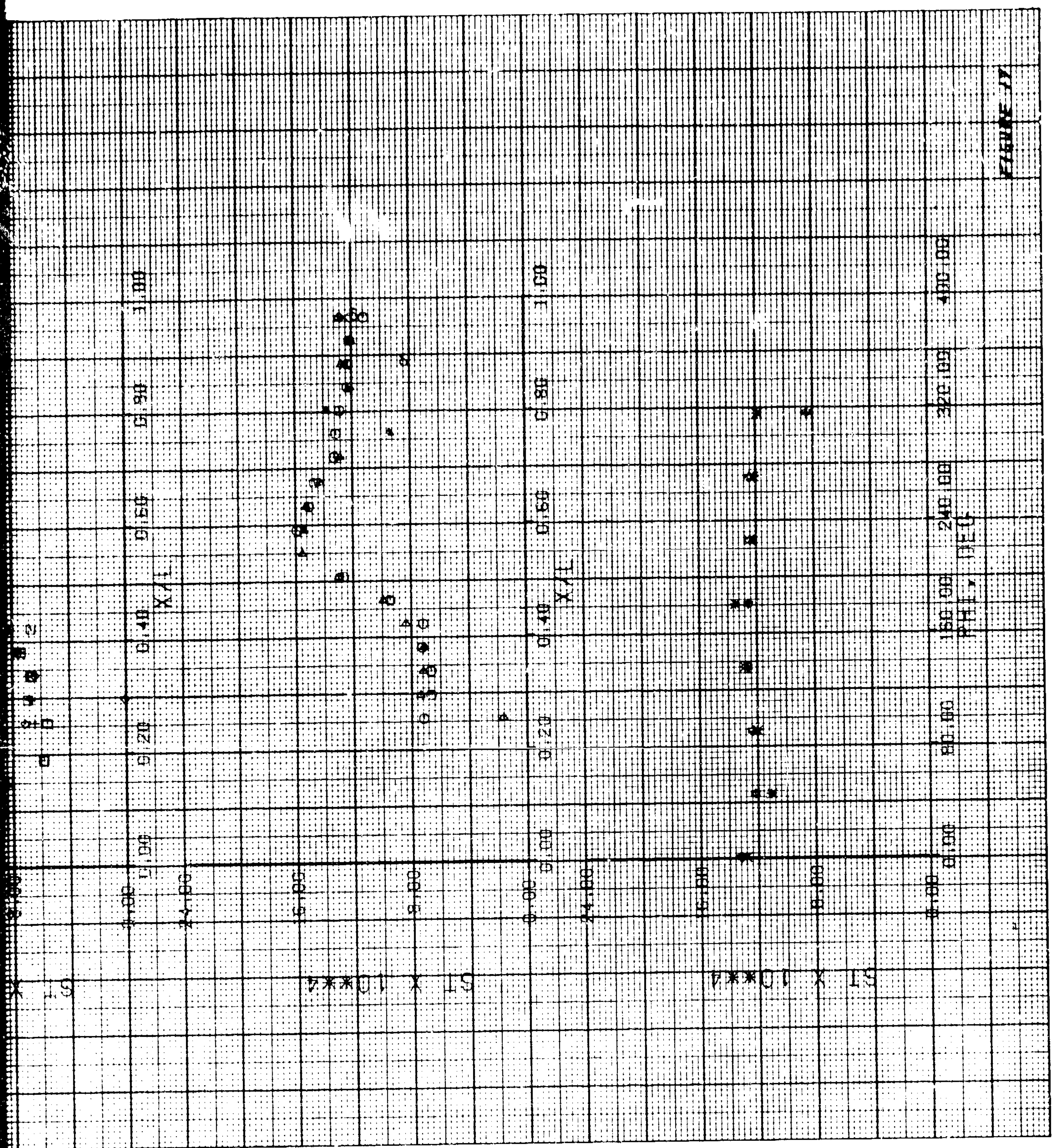


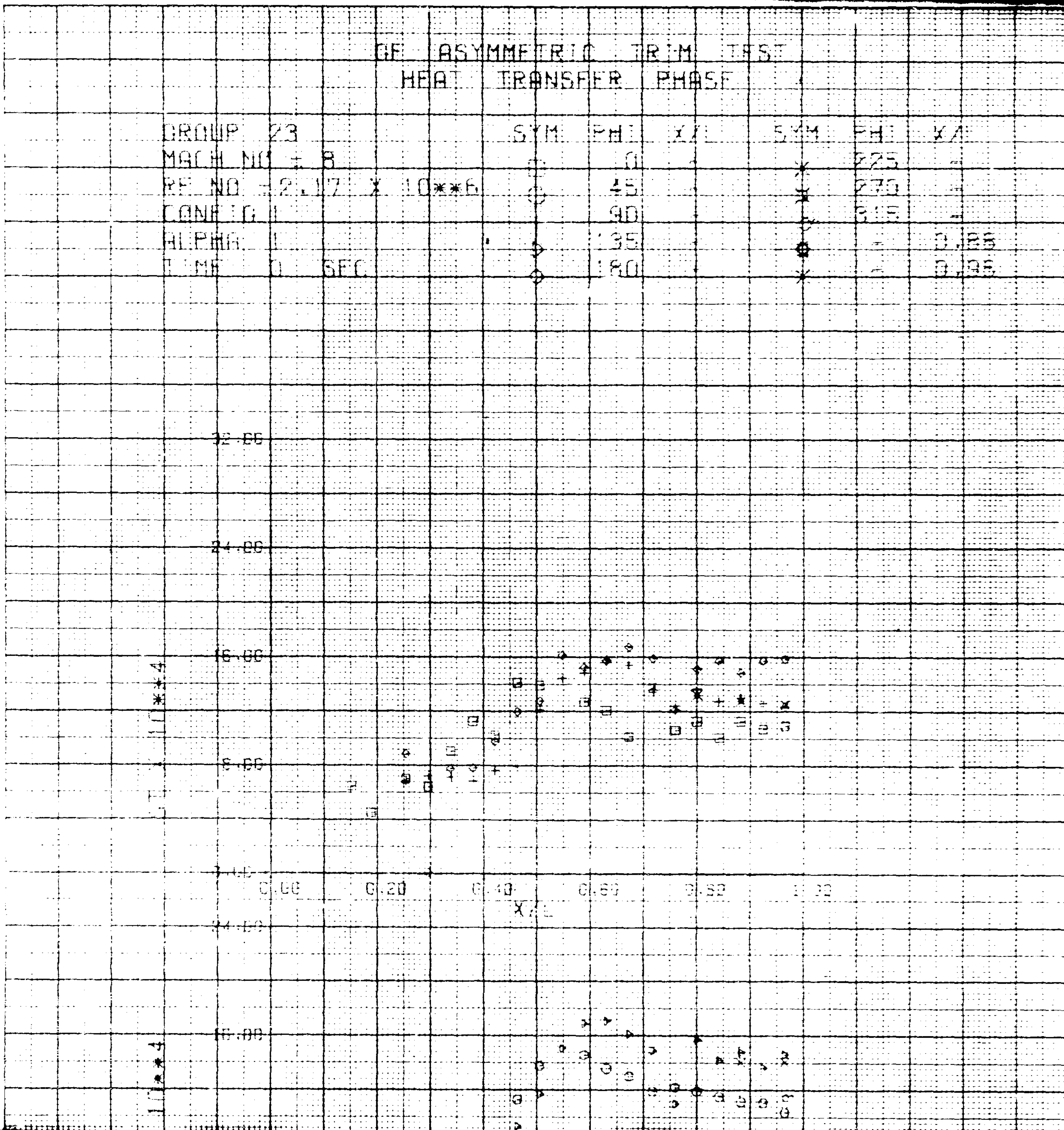
Figure 17

ARO, INC., ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
VT0947-800

GROUP	CONFIG	ALPHA-M	BETA-M	ALPHA-S	ROLL	ALPHA-P	DATE	MACH NO	PO	TO	TIME
23	1	1.10	0	1.10	0	0	714	7.99	668.87	1291.97	-.00

T-INF	P-INF	Q-INF	V-INF	RHO-INF	MU-INF	RE/FT	RE/D	MU
9.30305E 01	6.8417?E-02	2.16169E 00	3.79257E 03	4.32896E-05	7.55494E-08	2.17312E 06	1.99310E 06	3.16105E 02

TC NO	X/L	PHI	T.WP	SLOPE	Q-STDG	HT	HM	HW	ST
1	.1500	0	451.19	3.7043E 00	7.4959E-01	8.4398E-04	3.4169E-03	1.0846E 02	8.4077E-04
2	.1047	0	455.30	2.2280E 00	.8944E-01	5.8449E-04	2.3675E-03	1.0943E 02	6.4420E-04
3	.2524	0	460.57	2.5612E 00	7.5772E-01	9.1137E-04	3.6874E-03	1.1068E 02	8.9407E-04
4	.2943	0	468.84	2.1765E 00	6.8694E-01	8.3459E-04	3.3752E-03	1.1263E 02	8.3497E-04
5	.3363	0	475.84	1.9424E 00	9.6026E-01	1.1766E-03	4.7565E-03	1.1428E 02	9.8047E-04
6	.3783	0	482.82	3.9407E 00	1.1896E 00	1.4640E-03	5.9161E-03	1.1593E 02	1.1280E-03
7	.4203	0	487.41	4.4093E 00	1.0749E 00	1.3360E-03	5.3976E-03	1.1702E 02	1.0218E-03
8	.4623	0	494.48	5.1382E 00	1.4700E 00	1.8643E-03	7.4448E-03	1.1869E 02	1.4181E-03
9	.5043	0	498.16	5.1159E 00	1.4430E 00	1.8185E-03	7.3420E-03	1.1956E 02	1.3900E-03
10	.5463	0	512.18	5.8156E-02	1.6317E-02	2.1478E-05	8.6553E-05	1.2764E 02	1.6386E-05
11	.5882	0	505.99	4.7280E 00	1.3027E 00	1.6574E-03	6.6803E-03	1.2142E 02	1.2564E-03
12	.6302	0	510.95	4.5409E 00	1.2285E 00	1.5729E-03	6.3466E-03	1.2260E 02	1.2315E-03
13	.6722	0	520.24	4.0672E 00	1.0189E 00	1.3203E-03	5.3245E-03	1.2480E 02	1.0080E-03
14	.8022	315.0	529.94	3.0106E 00	7.8420E-01	1.0292E-03	4.1483E-03	1.2711E 02	7.8532E-04
15	.7583	0	521.72	4.4332E 00	1.0661E 00	1.3841E-03	5.5814E-03	1.2515E 02	1.0566E-03
16	.7996	0	521.41	4.0372E 00	1.1327E 00	1.4700E-03	5.9240E-03	1.2508E 02	1.1222E-03
17	.8409	0	521.01	3.9556E 00	1.0107E 00	1.3121E-03	5.2910E-03	1.2514E 02	1.0016E-03
18	.8822	0	525.09	4.5000E 00	1.1275E 00	1.4702E-03	5.9227E-03	1.2596E 02	1.1222E-03
19	.9235	0	527.39	4.3568E 00	1.0664E 00	1.3948E-03	5.6226E-03	1.2650E 02	1.0644E-03
20	.9648	0	532.04	4.5100E 00	1.0847E 00	1.4274E-03	5.7520E-03	1.2761E 02	1.0890E-03
21	.2524	45.0	458.79	2.3538E 00	6.9580E-01	8.3512E-04	3.3792E-03	1.1026E 02	8.3972E-04
22	.2943	45.0	465.78	2.1448E 00	6.8765E-01	8.3232E-04	3.3668E-03	1.1191E 02	8.3734E-04
23	.3363	45.0	472.11	2.3400E 00	6.7333E-01	8.2128E-04	3.3240E-03	1.1340E 02	8.2867E-04
24	.3783	45.0	478.61	2.6678E 00	8.0196E-01	9.8600E-04	3.9854E-03	1.1494E 02	7.5649E-04
25	.4203	45.0	484.41	2.9068E 00	8.1554E-01	1.0099E-03	4.0806E-03	1.1631E 02	7.7251E-04
26	.4623	45.0	491.91	4.2180E 00	1.1836E 00	1.4795E-03	5.9757E-03	1.1809E 02	1.1313E-03
27	.5043	45.0	497.47	5.6066E 00	1.4357E 00	1.8071E-03	7.2967E-03	1.1940E 02	1.3814E-03
100	.9648	315.0	537.13	4.7393E 00	[illegible]1397E 00	1.5094E-03	6.0835E-03	1.2882E 02	1.1517E-03
29	.5882	45.0	504.32	5.6593E 00	[illegible]5842E 00	1.9097E-03	7.7089E-03	1.2102E 02	1.4593E-03
30	.6302	45.0	509.72	5.1577E 00	1.3954E 00	1.7838E-03	7.1978E-03	1.2231E 02	1.3026E-03
31	.6722	45.0	522.22	5.1635E 00	1.3166E 00	1.7104E-03	6.8970E-03	1.2527E 02	1.3057E-03
32	.7170	45.0	525.63	5.0860E 00	1.1972E 00	1.5623E-03	6.2985E-03	1.2608E 02	1.1926E-03
33	.7583	45.0	520.63	4.4790E 00	1.2343E 00	1.6002E-03	6.4532E-03	1.2489E 02	1.2217E-03
34	.7996	45.0	520.41	4.2906E 00	1.2039E 00	1.5603E-03	6.2974E-03	1.2484E 02	1.1912E-03
35	.8409	45.0	522.72	4.2968E 00	1.1625E 00	1.5112E-03	6.0915E-03	1.2539E 02	1.1536E-03
36	.8822	45.0	524.94	4.2683E 00	1.1227E 00	1.4637E-03	5.9013E-03	1.2592E 02	1.1172E-03
37	.9235	45.0	528.17	4.3397E 00	1.1084E 00	1.4517E-03	5.8521E-03	1.2669E 02	1.1079E-03
38	.9648	45.0	533.01	4.2900E 00	1.0317E 00	1.3604E-03	5.4821E-03	1.2798E 02	1.0378E-03
39	.2524	90.0	463.21	2.4905E 00	7.3621E-01	8.8032E-04	3.5930E-03	1.1130E 02	6.8032E-04
40	.2943	90.0	469.31	2.4039E 00	7.7074E-01	9.3689E-04	3.7888E-03	1.1274E 02	7.1728E-04
41	.3363	90.0	475.02	2.3825E 00	7.5198E-01	9.2047E-04	3.7213E-03	1.1409E 02	7.0448E-04
42	.3783	90.0	481.15	2.2821E 00	7.2029E-01	8.8834E-04	3.5902E-03	1.1554E 02	6.7966E-04
43	.4203	90.0	486.41	2.7015E 00	7.9858E-01	9.9133E-04	4.0053E-03	1.1678E 02	7.5825E-04
44	.4623	90.0	490.66	2.6548E 00	8.2468E-01	1.0292E-03	4.1571E-03	1.1779E 02	7.8708E-04
45	.5043	90.0	495.89	4.5555E 00	1.2552E 00	1.5767E-03	6.3670E-03	1.1903E 02	1.2056E-03
46	.5463	90.0	501.55	5.2224E 00	1.4914E 00	1.8868E-03	7.6169E-03	1.2037E 02	1.4420E-03
47	.5882	90.0	504.54	5.4324E 00	1.5242E 00	1.9357E-03	7.8130E-03	1.2108E 02	1.4791E-03
48	.6302	90.0	509.06	5.4727E 00	1.6181E 00	2.0668E-03	8.3400E-03	1.2215E 02	1.5789E-03
49	.6722	90.0	521.86	6.1866E 00	1.5499E 00	2.0125E-03	8.1154E-03	1.2519E 02	1.5364E-03
50	.7170	90.0	525.65	5.7229E 00	1.3477E 00	1.7586E-03	7.0902E-03	1.2609E 02	1.3423E-03
51	.7583	90.0	518.13	4.4150E 00	1.2543E 00	1.6209E-03	6.5375E-03	1.2430E 02	1.2376E-03
52	.7996	90.0	518.19	5.1050E 00	1.3820E 00	1.7859E-03	7.2030E-03	1.2431E 02	1.3036E-03
53	.8409	90.0	519.74	5.1250E 00	1.2839E 00	1.6626E-03	6.7052E-03	1.2468E 02	1.2694E-03
54	.8822	90.0	522.92	5.3192E 00	1.3057E 00	1.6969E-03	6.8426E-03	1.2535E 02	1.2954E-03
55	.9235	90.0	524.85	5.2583E 00	1.2645E 00	1.6484E-03	6.6446E-03	1.2590E 02	1.2582E-03
56	.9648	90.0	529.41	5.0937E 00	1.2249E 00	1.6063E-03	6.4749E-03	1.2698E 02	1.2258E-03
57	.2524	135.0	459.52	7.1093E-01	2.1810E-01	2.5246E-04	1.0215E-03	1.1043E 02	1.9338E-04
58	.2943	135.0	467.58	2.7704E 00	8.8825E-01	1.0774E-03	4.3576E-03	1.1233E 02	8.2496E-04
59	.3363	135.0	472.51	2.7426E 00	8.6566E-01	1.0564E-03	4.2713E-03	1.1349E 02	8.0460E-04
60	.3783	135.0	478.44	2.4530E 00	8.2437E-01	1.0133E-03	4.0957E-03	1.1490E 02	7.7541E-04
61	.4203	135.0	483.46	2.4584E 00	8.8931E-01	1.0999E-03	4.4446E-03	1.1608E 02	8.4143E-04
62	.4623	135.0	488.58	3.1696E 00	9.7908E-01	1.2187E-03	4.9232E-03	1.1729E 02	9.3202E-04
63	.5043	135.0	493.77	4.7900E 00	1.2241E 00	1.5336E-03	6.1936E-03	1.1852E 02	1.1725E-03
64	.5463	135.0	497.85	5.9016E 00	1.5672E 00	1.9735E-03	7.9683E-03	1.1949E 02	1.5085E-03
65	.5882	135.0	502.59	6.4786E 00	1.7469E 00	2.2131E-03	8.9315E-03	1.2061E 02	1.6912E-03
66	.6302	135.0	506.60	6.6360E 00	1.7624E 00	2.2440E-03	9.0549E-03	1.2157E 02	1.7145E-03
67	.6722	135.0	519.56	6.7828E 00	1.6311E 00	2.1118E-03	8.5147E-03	1.2464E 02	1.6123E-03
68	.7170	135.0	522.30	6.1850E 00	1.5034E 00	1.9538E-03	7.8743E-03	1.2529E 02	1.4915E-03
69	.7583	135.0	513.90	3.0944E 00	1.1207E 00	1.4404E-03	5.8110E-03	1.2330E 02	1.1001E-03
70	.7996	135.0	516.22	5.5022E 00	1.5987E 00	2.0609E-03	8.3130E-03	1.2385E 02	1.5738E-03
71	.8409	135.0	517.87	5.2295E 00	1.4409E 00	1.8614E-03	7.5076E-03	1.2424E 02	1.4213E-03
72	.8822	135.0	519.78	5.5392E 00	1.4986E 00	1.9407E-03	7.8246E-03	1.2469E 02	1.4817E-03
73	.9235	135.0	522.57	5.6029E 00	1.3753E 00	1.7874E-03	7.2075E-03	1.2534E 02	1.3645E-03
74	.9648	135.0	530.19	6.0792E 00	1.4619E 00	1.9191E-03	7.7352E-03	1.2717E 02	1.4644E-03
75	.2524	180.0	460.58	3.2858E 00	9.5473E-01	1.1484E-03	4.6462E-03	1.1068E 02	8.7950E-04
76	.2943	180.0	-116.76	-1.1566E-14	-3.7020E-15	-2.6279E-18	-1.0979E-17	-2.1036E 01	-2.0784E-18
77	.3363	180.0	479.50	2.7602E 00	8.1594E-01	1.0043E-03	4.0591E-03	1.1515E 02	7.6043E-04
78	.3783	180.0	485.95	2.7051E 00	8.1314E-01	1.0088E-03	4.0760E-03	1.1667E 02	7.7164E-04
79	.4203	180.0	491.77	3.4509E 00	1.0201E 00	1.2748E-03	5.1489E-03	1.1804E 02	9.7475E-04
80	.4623	180.0	497.37	4.3400E 00	1.2394E 00	1.5597E-03	6.2940E-03	1.1938E 02	1.1929E-03
81	.5043	180.0	502.5	5.2438E 00	1.3137E 00	1.6641E-03	6.7174E-03	1.2060E 02	1.2717E-03
82	.5463	180.0	507.20	6.2161E 00	1.6507E 00	2.1034E-03	8.4887E-03	1.2171E 02	1.6078E-03
83	.5882	180.0	510.28	5.8626E 00	1.5568E 00	1.9916E-03	8.0340E-03	1.2243E 02	1.5213E-03
84	.6302	180.0	515.99	6.0024E 00	1.5939E 00	2.0541E-03	8.2857E-03	1.2379E 02	1.5686E-03
85	.6722	180.0	527.56	6.9499E 00	1.6713E 00	2.1864E-03	8.8139E-03	1.2654E 02	1.6686E-03
86	.7170	180.0	530.74	6.7146E 00	1.5812E 00	2.0772E-03	8.3722E-03	1.2730E 02	1.5850E-03
87	.7583	180.0	523.59	5.[illegible]E 00	1.2146E 00	1.5808E-03	6.3718E-03	1.2560E 02	1.2066E-03
88	.7996	180.0	525.80	5.[illegible]E 00	1.5154E 00	1.9779E-03	7.9739E-03	1.2612E 02	1.5096E-03
89	.8409	180.0	527.27	6.1501E 00	1.5714E 00	2.0549E-03	8.2841E-03	1.2647E 02	1.5683E-03
90	.8822	180.0	529.00	6.4256E 00	1.4807E 00	1.9407E-03	7.8229E-03	1.2688E 02	1.4810E-03
91	.9235	180.0	531.17	6.3668E 00	1.5627E 00	2.0539E-03	8.2779E-03	1.2739E 02	1.5671E-03
92	.9648	180.0	537.20	6.7879E 00	1.5642E 00	2.0724E-03	8.3500E-03	1.2883E 02	1.5808E-03
93	.8822	225.0	530.69	5.4926E 00	1.4034E 00	1.8435E-03	7.4303E-03	1.2729E 02	1.4066E-03
94	.9648	225.0	537.06	5.7909E 00	1.3926E 00	1.8467E-03	7.4402E-03	1.2849E 02	1.4085E-03
95	.7170	270.0	534.31	5.0757E 00	1.3698E 00	1.8079E-03	7.2855E-03	1.2815E 02	1.3792E-03
96	.7996	270.0	531.87	4.9589E 00	1.3184E 00	1.7324E-03	6.9822E-03	1.2757E 02	1.3218E-03
97	.8822	270.0	534.97	5.0814E 00	1.2877E 00	1.8734E-03	6.7414E-03	1.2817E 02	1.2766E-03
98	.9644	270.0	539.29	5.1291E 00	1.2334E 00	1.6307E-03	6.6019E-03	1.2933E 02	1.2498E-03


GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 23
MACH NO = 8
RE NO = 2.17 X 10**6
CONFIG 1
ALPHA 1
TIME 0 SEC
SYM PHI X/L
0
45
90
135
180
SYM PHI X/L
225
270
315
0.85
0.95
32.00
24.00
16.00
8.00
16.00
0.00
0.20
0.40
0.60
0.80
1.00
X/L

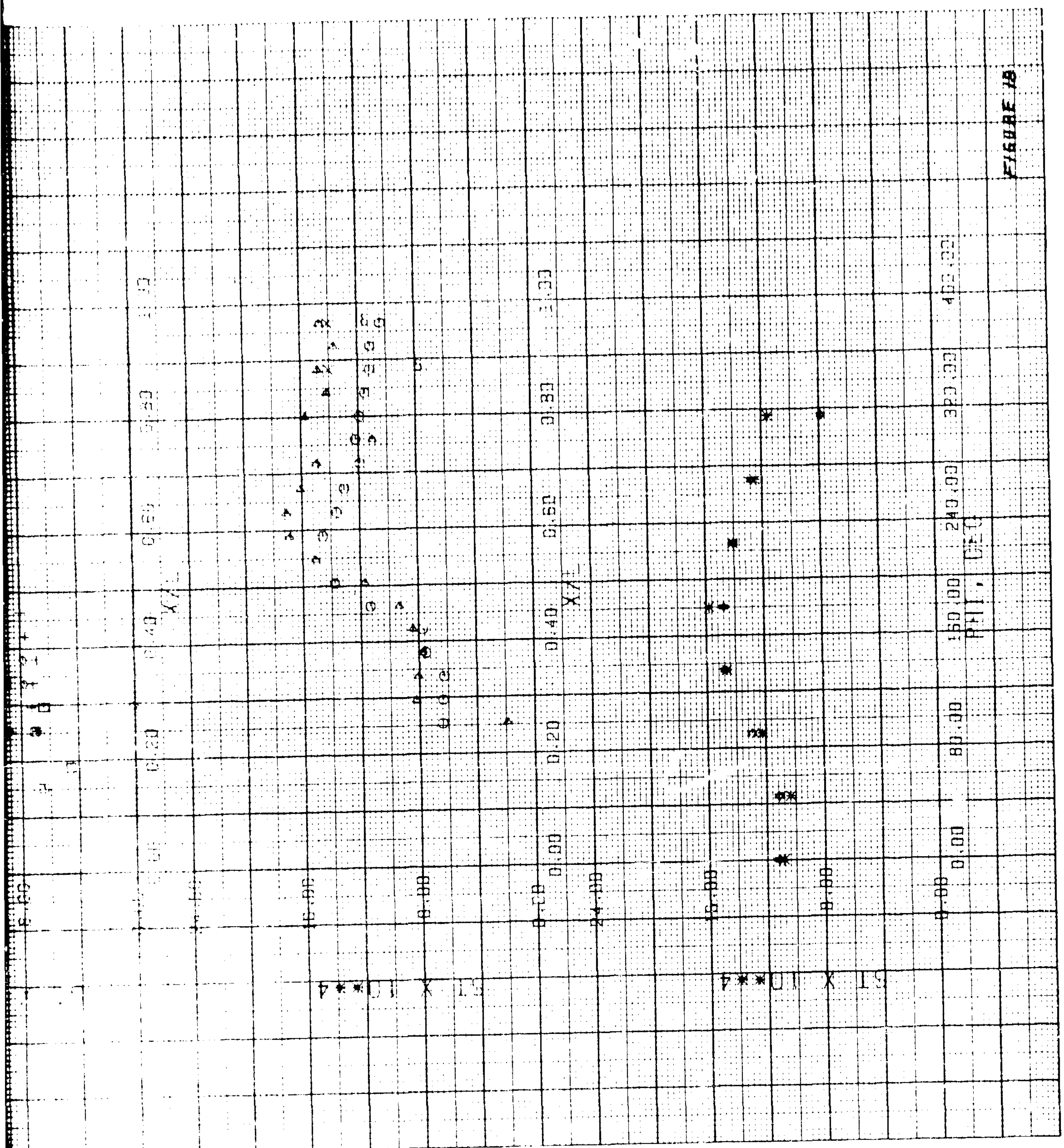


Figure 18

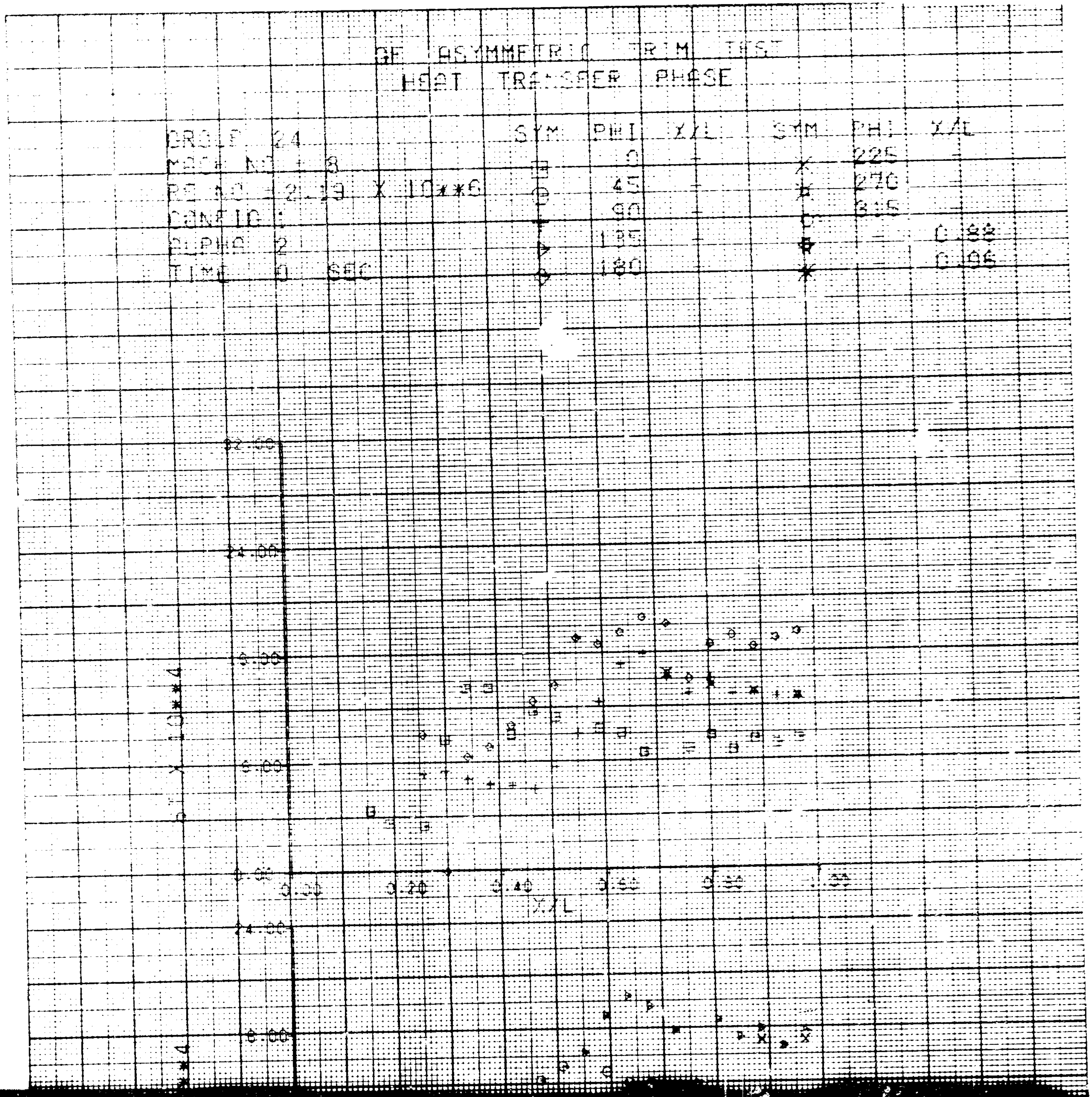
7/14/09

AEDC(ARO,INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
VT0967-B00

GROUP	CONFIG	ALPHA-M	BETA-M	ALPHA-S	ROLL	ALP-P	DATE	MACH NO	PO	TO	TIME
34	1	2.09	0	2.09	0	0	714	7.59	470.17	1288.67	.08

T-INF	P-INF	Q-INF	V-INF	RHO-INF	MU-INF	RE/FT	RE/D	HO
9.3690E 01	4.0572E-02	2.1760E 00	3.7077E 03	4.3839E-05	7.5396E-08	2.1084E 06	2.0876E 06	3.1533E 02

TC NO	X/L	PHI	TEMP	SLOPE	Q-DOT	HT	HM	HU	ST
1	.1900	0	457.01	2.7902E 00	9.9950E-01	8.0871E-04	2.4319E-03	1.0986E 02	4.5827E-04
2	.1867	0	465.20	1.7736E 00	3.8952E-01	4.7302E-04	1.9117E-03	1.1117E 02	3.6067E-04
3	.2524	0	473.90	1.7345E 00	3.6492E-01	4.4794E-04	1.0113E-03	1.1386E 02	3.4138E-04
4	.2943	0	483.41	3.7691E 00	1.0340E 00	1.2814E-03	5.1749E-03	1.1607E 02	9.7664E-04
5	.3363	0	490.09	4.9141E 00	1.4244E 00	1.7841E-03	7.2079E-03	1.1764E 02	1.3585E-03
6	.3783	0	494.61	4.7114E 00	1.4163E 00	1.7811E-03	7.2025E-03	1.1803E 02	1.3574E-03
7	.4203	0	495.98	3.6361E 00	1.0565E 00	1.3328E-03	5.3831E-03	1.1903E 02	1.0149E-03
8	.4623	0	500.92	4.4517E 00	1.2296E 00	1.5561E-03	6.2834E-03	1.2010E 02	1.1842E-03
9	.5043	0	502.41	4.1502E 00	1.1769E 00	1.4968E-03	6.0434E-03	1.2057E 02	1.1396E-03
10	.5463	0	531.37	-9.9107E-07	-2.7860E-07	-3.6719E-10	-1.4802E-09	1.2745E 02	-2.7897E-10
11	.5882	0	508.19	3.9034E 00	1.0755E 00	1.3780E-03	5.5620E-03	1.2194E 02	1.0483E-03
12	.6302	0	513.56	3.8504E 00	1.0417E 00	1.3387E-03	5.4027E-03	1.2250E 02	1.0182E-03
13	.6722	0	517.94	3.4242E 00	8.8288E-01	1.1440E-03	4.6154E-03	1.2402E 02	8.6984E-04
14	.8822	315.0	531.29	2.8347E 00	7.3844E-01	9.7994E-04	3.9303E-03	1.2743E 02	7.4073E-04
15	.7583	0	518.28	3.7450E 00	9.1022E-01	1. 15E-03	4.7862E-03	1.2434E 02	8.9427E-04
16	.7996	0	519.96	3.9796E 00	1.0843E 00	1.3065E-03	5.2690E-03	1.2476E 02	9.9318E-04
17	.8409	0	520.19	3.4821E 00	8.8979E-01	1.1579E-03	4.6703E-03	1.2479E 02	8.8020E-04
18	.8822	0	522.09	3.9763E 00	9.6958E-01	1.2661E-03	5.1060E-03	1.2542E 02	9.6232E-04
19	.9235	0	523.86	3.7183E 00	9.3150E-01	1.2180E-03	4.9117E-03	1.2566. 02	9.2570E-04
20	.9648	0	524.09	3.8944E 00	9.5918E-01	1.2627E-03	5.0906E-03	1.2685E 02	9.5941E-04
21	.2524	45.0	461.58	2.2154E 00	6.5490E-01	7.9181E-04	3.2040E-03	1.1091E 02	6.0385E-04
22	.2943	45.0	466.38	2.0249E 00	6.4923E-01	7.8954E-04	3.1940E-03	1.1205E 02	6.0197E-04
23	.3363	45.0	472.57	2.4883E 00	7.4799E-01	9.1650E-04	3.7064E-03	1.1350E 02	6.9853E-04
24	.3783	45.0	477.58	1.9610E 00	9.1436E-01	1.1273E-03	4.5577E-03	1.1469E 02	8.5898E-04
25	.4203	45.0	483.47	1.6741E 00	1.0094E 00	1.2537E-03	5.0688E-03	1.1609E 02	9.5493E-04
26	.4623	45.0	490.44	4.6373E 00	1.3011E 00	1.6308E-03	6.5855E-03	1.1773E 02	1.2411E-03
27	.5043	45.0	495.32	5.2454E 00	1.3942E 00	1.7628E-03	7.1195E-03	1.1889E 02	1.3416E-03
100	.9648	315.0	536.15	4.1048E 00	9.8713E-01	1.3118E-03	5.2845E-03	1.2858E 02	9.9634E-04
29	.5882	45.0	501.18	4.8780E 00	1.3440E 00	1.7067E-03	6.8913E-03	1.2028E 02	1.2988E-03
30	.6302	45.0	504.19	4.4418E 00	1.2559E 00	1.6008E-03	6.4626E-03	1.2099E 02	1.2180E-03
31	.6722	45.0	516.53	4.8919E 00	1.2254E 00	1.5829E-03	6.3846E-03	1.2345E 02	1.2037E-03
32	.7170	45.0	518.07	4.7269E 00	1.1131E 00	1.4460E-03	5.8331E-03	1.2448E 02	1.0993E-03
33	.7583	45.0	513.91	4.1557E 00	1.1450E 00	1.4779E-03	5.9634E-03	1.2330E 02	1.1239E-03
34	.7996	45.0	515.68	3.9988E 00	1.1220E 00	1.4515E-03	5.8562E-03	1.2372E 02	1.1037E-03
35	.8409	45.0	518.42	3.9925E 00	1.0801E 00	1.4023E-03	5.6549E-03	1.2437E 02	1.0661E-03
36	.8822	45.0	520.27	1.9815E 00	1.0472E 00	1.3629E-03	5.4973E-03	1.2481E 02	1.0361E-03
37	.9235	45.0	521.81	4.1844E 00	1.0487E 00	1.3672E-03	5.5142E-03	1.2513E 02	1.0392E-03
38	.9648	45.0	528.31	3.9547E 00	9.5101E-01	1.2507E-03	5.0427E-03	1.2672E 02	9.5039E-04
39	.2524	90.0	457.34	2.6573E 00	7.8551E-01	9.4491E-04	3.8244E-03	1.0992E 02	7.2078E-04
40	.2943	90.0	461.16	2.5171E 00	8.0705E-01	9.7528E-04	3.9465E-03	1.1082E 02	7.4379E-04
41	.3363	90.0	468.66	2.3200E 00	7.3226E-01	8.9300E-04	3.6121E-03	1.1259E 02	6.8076E-04
42	.3783	90.0	474.64	2.1756E 00	6.8660E-01	8.4396E-04	3.4110E-03	1.1400E 02	6.4287E-04
43	.4203	90.0	481.85	2.7641E 00	6.6930E-01	8.2872E-04	3.3408E-03	1.1551E 02	6.3133E-04
44	.4623	90.0	485.36	2.0515E 00	6.3729E-01	7.9334E-04	3.2061E-03	1.1653E 02	6.0424E-04
45	.5043	90.0	490.48	2.9318E 00	8.0781E-01	1.0121E-03	4.0888E-03	1.1774E 02	7.7060E-04
46	.5463	90.0	496.91	3.7041E 00	1.0576E 00	1.3353E-03	5.3931E-03	1.1917E 02	1.0164E-03
47	.5882	90.0	499.87	4.5947E 00	1.2892E 00	1.6344E-03	6.5996E-03	1.1997E 02	1.2438E-03
48	.6302	90.0	502.89	5.7108E 00	1.5735E 00	2.0025E-03	8.0847E-03	1.2066E 02	1.5237E-03
49	.6722	90.0	513.26	6.5216E 00	1.6338E 00	2.1070E-03	8.5019E-03	1.2314E 02	1.6023E-03
50	.7170	90.0	518.64	6.1284E 00	1.4432E 00	1.8742E-03	7.5605E-03	1.2443E 02	1.4249E-03
51	.7583	90.0	510.77	5.1301E 00	1.3364E 00	1.7179E-03	6.9330E-03	1.2255E 02	1.3066E-03
52	.7996	90.0	513.41	5.5383E 00	1.4427E 00	1.8610E-03	7.5091E-03	1.2318E 02	1.4152E-03
53	.8409	90.0	515.24	5.2728E 00	1.3289E 00	1.7070E-03	6.8909E-03	1.2362E 02	1.2987E-03
54	.8822	90.0	517.78	5.3840E 00	1.3210E 00	1.7145E-03	6.9164E-03	1.2420E 02	1.3035E-03
55	.9235	90.0	518.68	5.3598E 00	1.2889E 00	1.6739E-03	6.7525E-03	1.2443E 02	1.2726E-03
56	.9648	90.0	524.75	5.3116E 00	1.2773E 00	1.6721E-03	6.7428E-03	1.2587E 02	1.2738E-03
57	.2524	135.0	452.89	8.9278E-01	2.6391E-01	3.1577E-04	1.2784E-03	1.0887E 02	2.4093E-04
58	.2943	135.0	459.41	3.1552E 00	1.0116E 00	1.2199E-03	4.9369E-03	1.1040E 02	9.3044E-04
59	.3363	135.0	467.68	2.8713E 00	9.0626E-01	1.1034E-03	4.4653E-03	1.1236E 02	8.4157E-04
60	.3783	135.0	474.20	2.7945E 00	8.6810E-01	1.0658E-03	4.3099E-03	1.1389E 02	8.1228E-04
61	.4203	135.0	479.89	3.0083E 00	9.8431E-01	1.1181E-03	4.5149E-03	1.1524E 02	8.5185E-04
62	.4623	135.0	485.59	3.2263E 00	9.3744E-01	1.1673E-03	4.7173E-03	1.1659E 02	8.8906E-04
63	.5043	135.0	490.87	4.4497E 00	1.1370E 00	1.4251E-03	5.7575E-03	1.1784E 02	1.0851E-03
64	.5463	135.0	495.16	5.6533E 00	1.5012E 00	1.8919E-03	7.6415E-03	1.1885E 02	1.4402E-03
65	.5882	135.0	499.92	6.4796E 00	1.7738E 00	2.2488E-03	9.0808E-03	1.1998E 02	1.7114E-03
66	.6302	135.0	502.71	7.2038E 00	1.9130E 00	2.4339E-03	9.8267E-03	1.2064E 02	1.8520E-03
67	.6722	135.0	513.88	7.5360E 00	1.8123E 00	2.3390E-03	9.4379E-03	1.2329E 02	1.7787E-03
68	.7170	135.0	517.41	6.8644E 00	1.6165E 00	2.0959E-03	8.4553E-03	1.2413E 02	1.5935E-03
69	.7583	135.0	509.80	4.3970E 00	1.2337E 00	1.5840E-03	6.3927E-03	1.2232E 02	1.2048E-03
70	.7996	135.0	514.83	5.8547E 00	1.7011E 00	2.1983E-03	8.8697E-03	1.2352E 02	1.6716E-03
71	.8409	135.0	516.86	5.6973E 00	1.5698E 00	2.0339E-03	8.2059E-03	1.2400E 02	1.5464E-03
72	.8822	135.0	518.63	6.0120E 00	1.6265E 00	2.1122E-03	8.5206E-03	1.2442E 02	1.6058E-03
73	.9235	135.0	520.07	6.0907E 00	1.4951E 00	1.9452E-03	7.8462E-03	1.2476E 02	1.4787E-03
74	.9648	135.0	527.59	6.5902E 00	1.5848E 00	2.0823E-03	8.3958E-03	1.2655E 02	1.5823E-03
75	.2524	180.0	460.78	3.8027E 00	1.1049E 00	1.3346E-03	5.4007E-03	1.1073E 02	1.0179E-03
76	.2943	180.0	-116.74	6.1927E-08	1.9855E-08	1.4127E-11	5.9031E-11	-2.1035E 01	1.1125E-11
77	.3363	180.0	476.72	3.8601E 00	9.0459E-01	1.1141E-03	4.5045E-03	1.1449E 02	8.4896E-04
78	.3783	180.0	483.03	3.2379E 00	9.7333E-01	1.2082E-03	4.8830E-03	1.1598E 02	9.2029E-04
79	.4203	180.0	488.76	3.8408E 00	1.1356E 00	1.4194E-03	5.7350E-03	1.1734E 02	1.0808E-03
80	.4623	180.0	494.26	5.5995E 00	1.3106E 00	1.6498E-03	6.6641E-03	1.1864E 02	1.2560E-03
81	.5043	180.0	499.58	5.6876E 00	1.4249E 00	1.8057E-03	7.2917E-03	1.1990E 02	1.3742E-03
82	.5463	180.0	504.23	6.6907E 00	1.7767E 00	2.2650E-03	9.1438E-03	1.2100E 02	1.7233E-03
83	.5882	180.0	508.08	6.4734E 00	1.7190E 00	2.2022E-03	8.8887E-03	1.2192E 02	1.6752E-03
84	.6302	180.0	512.14	7.7662E 00	1.7968E 00	2.3139E-03	9.3372E-03	1.2288E 02	1.7597E-03
85	.6722	180.0	522.91	7.8475E 00	1.8872E 00	2.4645E-03	9.9394E-03	1.2544E 02	1.8732E-03
86	.7170	180.0	527.09	7.7438E 00	1.8236E 00	2.3945E-03	9.6547E-03	1.2643E 02	1.8196E-03
87	.7583	180.0	519.50	5.9515E 00	1.4312E 00	1.8607E-03	7.5057E-03	1.2463E 02	1.4146E-03
88	.7996	180.0	524.11	6.4492E 00	1.6800E 00	2.1974E-03	8.8613E-03	1.2572E 02	1.6701E-03
89	.8409	180.0	526.20	6.7992E 00	1.7373E 00	2.2785E-03	9.1873E-03	1.2622E 02	1.7315E-03
90	.8822	180.0	527.85	7.1639E 00	1.6508E 00	2.1698E-03	8.7485E-03	1.2661E 02	1.6488E-03
91	.9235	180.0	529.77	6.8472E 00	1.7853E 00	2.2470E-03	9.0586E-03	1.2706E 02	1.7072E-03
92	.9648	180.0	535.40	7.4374E 00	1.7369E 00	2.3058E-03	9.2931E-03	1.2841E 02	1.7514E-03
93	.8822	225.0	530.16	5.6406E 00	1.5179E 00	2.0012E-03	8.0675E-03	1.2716E 02	1.5204E-03
94	.9648	225.0	536.45	6.2717E 00	1.5082E 00	2.0050E-03	8.0803E-03	1.2866E 02	1.5229E-03
95	.7170	270.0	533.44	6.4181E 00	1.4470E 00	1.9160E-03	7.7226E-03	1.2795E 02	1.4554E-03
96	.7996	270.0	532.87	5.1360E 00	1.3639E 00	1.8045E-03	7.2737E-03	1.2781E 02	1.3709E-03
97	.8822	270.0	534.95	5.4980E 00	1.3078E 00	1.7282E-03	6.9652E-03	1.2836E 02	1.3127E-03
98	.9648	270.0	538.24	5.2574E 00	1.2643E 00	1.6848E-03	6.7890E-03	1.2908E 02	1.2795E-03


GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 24
MACH NO = 8
RE NO = 2.19 X 10**6
CONFIG 1
ALPHA 2
TIME 0 SEC
SYM PHI X/L
0
45
90
135
180
SYM PHI X/L
225
270
315
0.88
0.96
32.00
24.00
16.00
8.00
0.00
H X 10**4
0.00
0.20
0.40
0.60
0.80
1.00
X/L

2

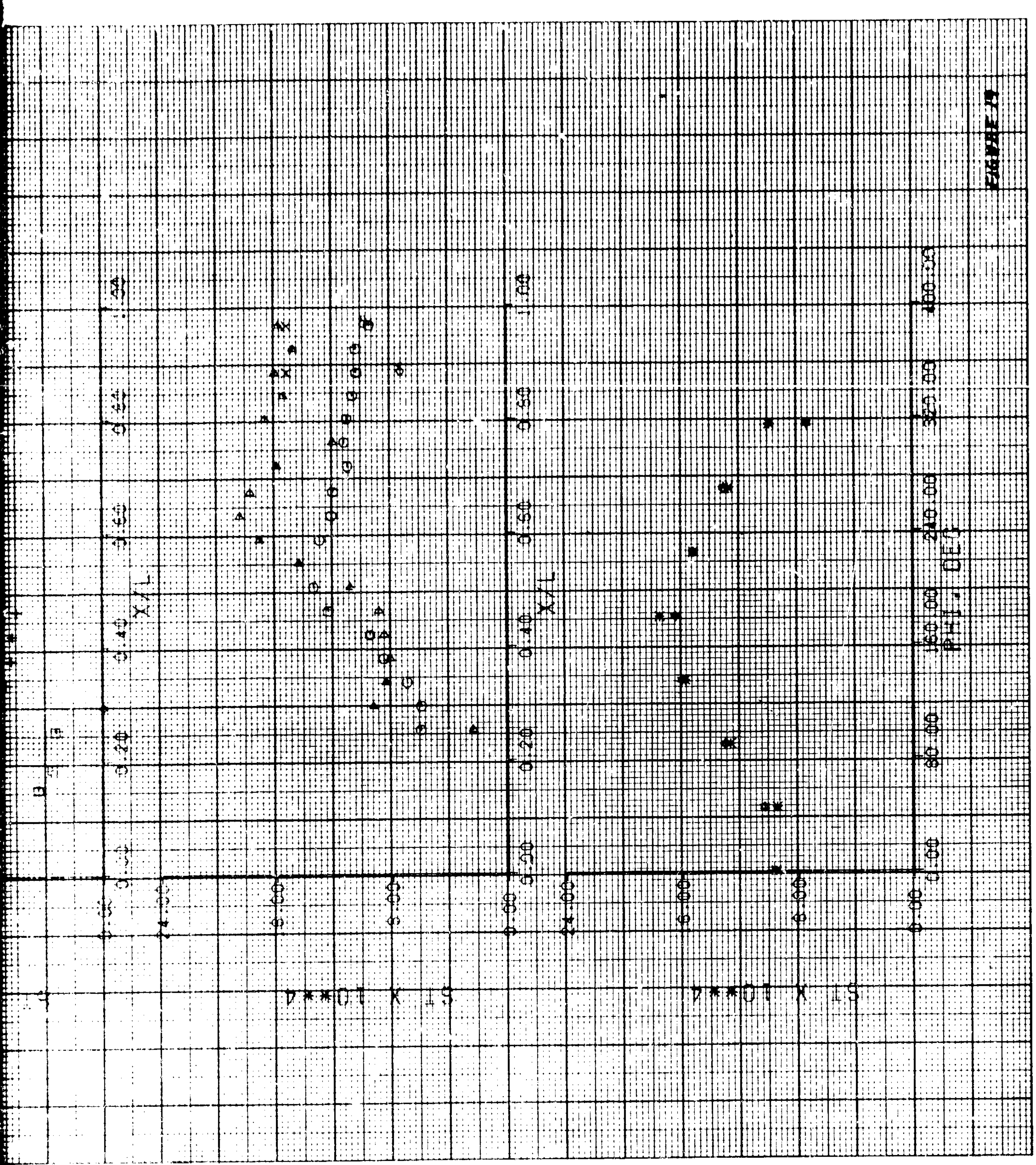


Figure 19

7/14/69

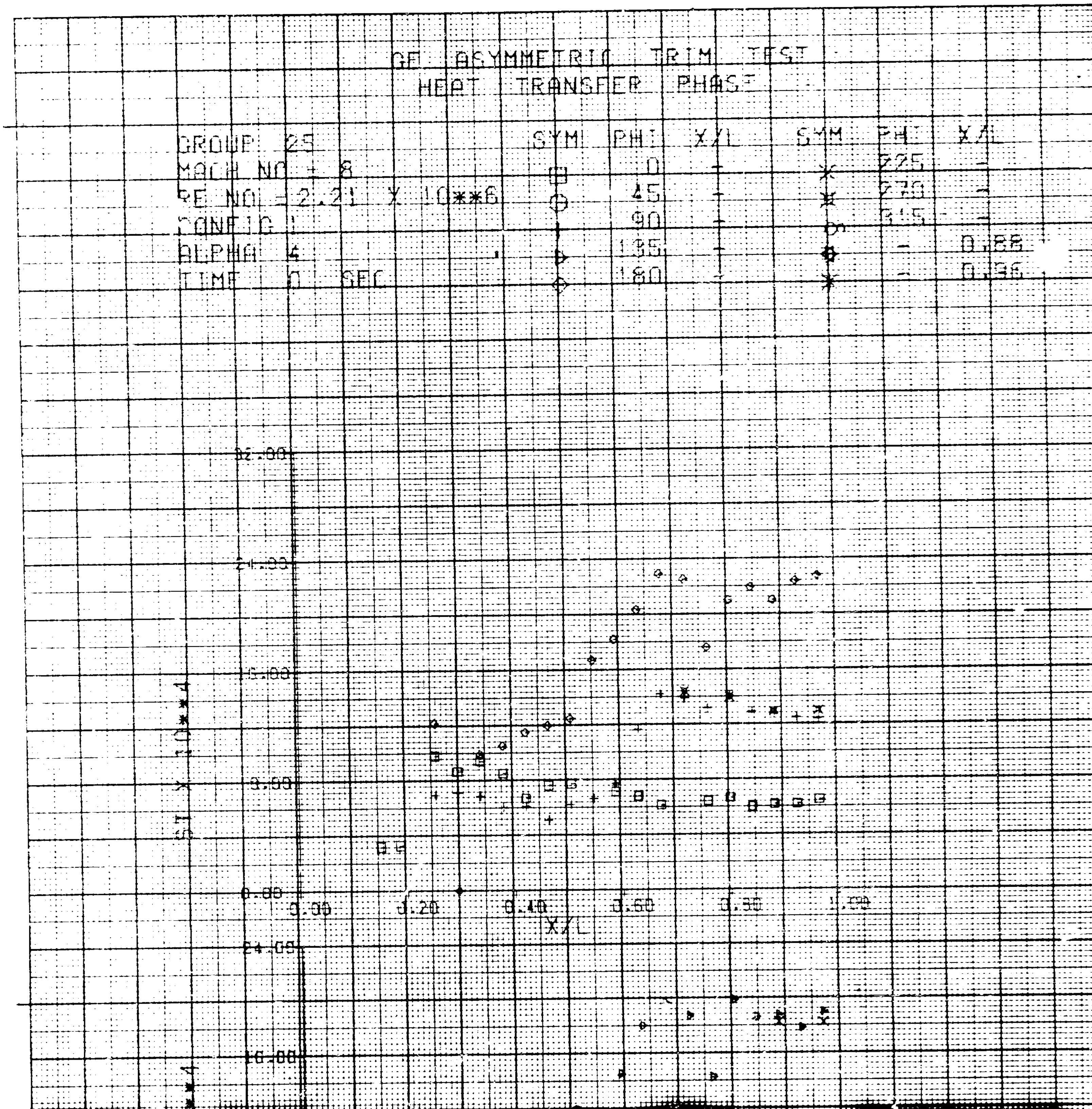
AEDC(ARO,INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
VTO957-800

GROUP	CONFIG	ALPHA-M	BETA-M	ALPHA-S	ROLL	SLP-P	DATE	MACH NO	PO	TO	TIME
25	1	4.12	0	4.12	0	0	714	7.99	470.47	1302.05	.00

T-INF	P-INF	Q-INF	V-INF	RHO-INF	MU-INF	RE/FT	RE/D	HO
9.3110E 01	4.0582E-02	2.1710E 00	3.7779E 03	4.3773E-05	7.4969E-08	2.2059E 06	2.0223E 06	3.1359E 02

TC NO	X/L	PHI	T WP	SLOPE	Q-STOW	HT	HM	HW	ST
1	.1500	0	503.26	1.9289E 00	3.3192E-01	4.2920E-04	1.7213E-03	1.2077E 02	3.2351E-04
2	.1067	0	491.01	1.5036E 00	3.4770E-01	4.4011E-04	1.7706E-03	1.1807E 02	3.3427E-04
3	.2524	0	500.62	3.4234E 00	1.0120E 00	1.2951E-03	5.2312E-03	1.2015E 02	9.8316E-04
4	.2943	0	515.52	2.7833E 00	8.7050E-01	1.1461E-03	4.6250E-03	1.2368E 02	8.6934E-04
5	.3363	0	514.25	3.3342E 00	9.5769E-01	1.2473E-03	5.0346E-03	1.2338E 02	9.4621E-04
6	.3783	0	515.69	2.9689E 00	8.6239E-01	1.1253E-03	4.5410E-03	1.2372E 02	8.5355E-04
7	.4203	0	514.81	3.3379E 00	6.7930E-01	8.8515E-04	3.5727E-03	1.2347E 02	6.7146E-04
8	.4623	0	516.53	2.8073E 00	7.7349E-01	1.0104E-03	4.0778E-03	1.2392E 02	7.6640E-04
9	.5043	0	517.40	2.8899E 00	7.8184E-01	1.0226E-03	4.1268E-03	1.2415E 02	7.7560E-04
10	.5463	0	529.32	-5.5923E-02	-1.5691E-02	-2.0845E-05	-8.4049E-05	1.2696E 02	-1.5800E-05
11	.5882	0	521.42	2.6035E 00	7.1735E-01	9.4304E-04	3.8051E-03	1.2508E 02	7.1515E-04
12	.6302	0	523.44	2.5345E 00	6.8569E-01	9.0387E-04	3.6465E-03	1.2556E 02	6.8533E-04
13	.6722	0	524.28	2.4559E 00	6.1520E-01	8.1149E-04	3.2794E-03	1.2576E 02	6.1559E-04
14	.8822	315.0	537.81	2.6791E 00	6.4581E-01	8.6774E-04	3.4940E-03	1.2898E 02	6.5742E-04
15	.7583	0	530.68	2.4577E 00	6.3911E-01	8.5060E-04	3.4302E-03	1.2728E 02	6.4469E-04
16	.7996	0	532.84	2.5565E 00	6.6118E-01	8.8158E-04	3.5549E-03	1.2781E 02	6.6811E-04
17	.8469	0	532.17	2.1295E 00	5.9522E-01	7.9375E-04	3.2007E-03	1.2764E 02	6.0155E-04
18	.8822	0	534.84	2.4511E 00	6.1405E-01	8.2178E-04	3.3113E-03	1.2827E 02	6.2270E-04
19	.9235	0	535.72	2.4346E 00	6.0992E-01	8.1722E-04	3.2947E-03	1.2848E 02	6.1922E-04
20	.9648	0	534.44	2.4813E 00	6.4470E-01	8.6271E-04	3.4783E-03	1.2823E 02	6.5372E-04
21	.2524	45.0	493.12	1.6600E 00	4.9663E-01	6.2949E-04	2.5430E-03	1.1837E 02	4.7800E-04
22	.2943	45.0	506.54	1.4321E 00	4.5910E-01	5.9200E-04	2.3908E-03	1.2155E 02	4.4934E-04
23	.3363	45.0	506.72	1.4839E 00	4.4607E-01	5.7533E-04	2.3232E-03	1.2159E 02	4.3662E-04
24	.3783	45.0	507.54	1.7327E 00	5.2084E-01	6.7249E-04	2.7159E-03	1.2179E 02	5.1034E-04
25	.4203	45.0	509.88	2.3451E 00	6.8139E-01	8.8217E-04	3.5616E-03	1.2229E 02	6.6938E-04
26	.4623	45.0	513.95	3.7963E 00	1.0652E 00	1.3867E-03	5.5974E-03	1.2331E 02	1.0520E-03
27	.5043	45.0	516.68	4.4179E 00	1.1997E 00	1.5675E-03	6.3261E-03	1.2396E 02	1.1889E-03
28	.9440	315.0	540.62	3.1914E 00	8.1556E-01	1.1000E-03	4.4335E-03	1.2965E 02	8.3325E-04
29	.5882	45.0	519.60	3.9107E 00	1.0775E 00	1.4132E-03	5.7025E-03	1.2465E 02	1.0717E-03
30	.6302	45.0	522.11	3.6794E 00	9.9541E-01	1.3099E-03	5.2847E-03	1.2525E 02	9.9322E-04
31	.6722	45.0	525.75	3.4029E 00	9.5803E-01	1.2667E-03	5.1098E-03	1.2611E 02	9.6034E-04
32	.7170	45.0	528.78	3.7204E 00	8.7611E-01	1.1631E-03	4.6908E-03	1.2683E 02	8.8160E-04
33	.7583	45.0	530.40	3.7182E 00	8.8670E-01	1.1797E-03	4.7574E-03	1.2722E 02	8.9411E-04
34	.7996	45.0	531.48	3.1100E 00	8.7261E-01	1.1626E-03	4.6882E-03	1.2747E 02	8.8111E-04
35	.8469	45.0	533.74	3.1266E 00	8.4586E-01	1.1304E-03	4.5577E-03	1.2801E 02	8.5658E-04
36	.8822	45.0	535.77	3.0461E 00	8.0121E-01	1.0736E-03	4.3284E-03	1.2850E 02	8.1348E-04
37	.9235	45.0	537.48	3.1322E 00	8.0031E-01	1.0749E-03	4.3336E-03	1.2890E 02	8.1435E-04
38	.9648	45.0	536.83	3.1323E 00	7.5326E-01	1.0108E-03	4.0749E-03	1.2875E 02	7.6584E-04
39	.2524	90.0	489.88	2.4743E 00	7.3142E-01	9.2331E-04	3.7317E-03	1.1760E 02	7.0135E-04
40	.2943	90.0	501.46	2.7966E 00	7.3632E-01	9.4329E-04	3.8101E-03	1.2035E 02	7.1607E-04
41	.3363	90.0	502.88	2.2526E 00	7.1094E-01	9.1248E-04	3.6853E-03	1.2068E 02	6.9263E-04
42	.3783	90.0	504.06	1.9671E 00	6.2087E-01	7.9807E-04	3.2241E-03	1.2115E 02	6.0433E-04
43	.4203	90.0	507.34	2.1122E 00	6.2339E-01	7.8598E-04	3.2544E-03	1.2174E 02	6.1165E-04
44	.4623	90.0	509.15	1.6834E 00	5.2292E-01	6.7656E-04	2.7316E-03	1.2217E 02	5.1338E-04
45	.5043	90.0	511.70	2.3004E 00	6.3304E-01	8.2280E-04	3.3215E-03	1.2278E 02	6.2626E-04
46	.5463	90.0	515.09	2.7727E 00	7.7757E-01	9.8413E-04	3.9604E-03	1.2372E 02	7.7005E-04
47	.5882	90.0	516.90	2.7905E 00	7.8290E-01	1.0233E-03	4.1207E-03	1.2401E 02	7.7616E-04
48	.6302	90.0	519.75	4.2715E 00	1.1769E 00	1.5430E-03	6.2290E-03	1.2449E 02	1.1788E-03
49	.6722	90.0	525.33	5.6712E 00	1.4287E 00	1.8775E-03	7.5796E-03	1.2601E 02	1.4234E-03
50	.7170	90.0	529.72	5.4604E 00	1.3811E 00	1.8358E-03	7.4035E-03	1.2705E 02	1.3914E-03
51	.7583	90.0	528.64	5.0354E 00	1.3117E 00	1.7411E-03	7.0220E-03	1.2680E 02	1.3197E-03
52	.7996	90.0	530.38	5.3674E 00	1.3962E 00	1.8601E-03	7.5014E-03	1.2721E 02	1.4098E-03
53	.8469	90.0	532.16	5.1141E 00	1.2812E 00	1.7084E-03	6.8886E-03	1.2762E 02	1.2947E-03
54	.8822	90.0	534.91	5.1273E 00	1.2586E 00	1.6846E-03	6.7914E-03	1.2829E 02	1.2765E-03
55	.9235	90.0	535.84	5.1220E 00	1.2317E 00	1.6507E-03	6.6549E-03	1.2852E 02	1.2507E-03
56	.9648	90.0	534.87	5.0849E 00	1.2220E 00	1.6348E-03	6.5915E-03	1.2809E 02	1.2388E-03
57	.2524	135.0	482.25	9.5171E-01	2.8133E-01	3.5175E-04	1.4223E-03	1.1580E 02	2.6730E-04
58	.2943	135.0	492.98	3.4631E 00	1.1183E 00	1.4072E-03	5.6863E-03	1.1834E 02	1.0687E-03
59	.3363	135.0	494.96	3.0446E 00	9.6098E-01	1.2209E-03	4.9332E-03	1.1880E 02	9.2716E-04
60	.3783	135.0	497.13	2.0775E 00	9.2492E-01	1.1784E-03	4.7609E-03	1.1933E 02	8.9477E-04
61	.4203	135.0	499.43	2.4616E 00	8.9025E-01	1.1375E-03	4.5961E-03	1.1986E 02	8.6362E-04
62	.4623	135.0	502.95	2.9534E 00	8.5825E-01	1.1016E-03	4.4491E-03	1.2078E 02	8.3618E-04
63	.5043	135.0	506.30	3.4559E 00	9.0857E-01	1.1712E-03	4.7295E-03	1.2149E 02	8.8887E-04
64	.5463	135.0	508.79	4.2417E 00	1.1264E 00	1.4563E-03	5.8812E-03	1.2208E 02	1.1053E-03
65	.5882	135.0	512.29	5.5444E 00	1.4724E 00	1.9129E-03	7.7217E-03	1.2291E 02	1.4512E-03
66	.6302	135.0	515.34	6.4724E 00	1.8251E 00	2.3405E-03	9.6077E-03	1.2344E 02	1.8057E-03
67	.6722	135.0	523.51	8.2159E 00	1.9754E 00	2.6048E-03	1.0508E-02	1.2559E 02	1.9750E-03
68	.7170	135.0	526.57	7.0366E 00	1.8474E 00	2.4726E-03	9.9725E-03	1.2633E 02	1.8743E-03
69	.7583	135.0	522.56	5.8816E 00	1.4255E 00	1.8773E-03	7.5739E-03	1.2535E 02	1.4235E-03
70	.7996	135.0	526.94	6.4148E 00	1.9799E 00	2.6221E-03	1.0576E-02	1.2640E 02	1.9877E-03
71	.8469	135.0	528.91	6.7087E 00	1.8484E 00	2.4544E-03	9.8980E-03	1.2687E 02	1.8604E-03
72	.8822	135.0	530.60	6.4869E 00	1.8626E 00	2.4787E-03	9.9940E-03	1.2726E 02	1.8787E-03
73	.9235	135.0	532.05	7.1935E 00	1.7658E 00	2.3544E-03	9.4937E-03	1.2761E 02	1.7843E-03
74	.9648	135.0	535.11	7.7818E 00	1.8714E 00	2.5054E-03	1.0101E-02	1.2834E 02	1.8906E-03
75	.2524	180.0	482.57	4.4153E 00	1.2829E 00	1.6047E-03	6.4881E-03	1.1587E 02	1.2194E-03
76	.2943	180.0	-116.76	6.1927E-08	1.9855E-08	1.6194E-11	5.9333E-11	-2.1036E 01	1.1151E-11
77	.3363	180.0	498.66	3.4603E 00	1.0253E 00	1.3067E-03	5.2867E-03	1.1967E 02	9.9359E-04
78	.3783	180.0	501.19	3.4098E 00	1.0851E 00	1.3896E-03	5.6130E-03	1.2028E 02	1.0549E-03
79	.4203	180.0	504.27	3.9986E 00	1.1821E 00	1.5197E-03	6.1374E-03	1.2106E 02	1.1535E-03
80	.4623	180.0	507.71	4.2983E 00	1.2275E 00	1.5852E-03	6.4007E-03	1.2183E 02	1.2030E-03
81	.5043	180.0	511.07	5.0626E 00	1.2683E 00	1.6450E-03	6.6410E-03	1.2262E 02	1.2481E-03
82	.5463	180.0	514.17	6.3718E 00	1.6920E 00	2.2035E-03	8.8940E-03	1.2336E 02	1.6716E-03
83	.5882	180.0	516.94	6.9294E 00	1.8401E 00	2.4052E-03	9.7046E-03	1.2403E 02	1.8243E-03
84	.6302	180.0	521.77	7.6965E 00	2.0438E 00	2.6882E-03	1.0846E-02	1.2517E 02	2.0384E-03
85	.6722	180.0	530.41	9.4684E 00	2.2770E 00	3.0309E-03	1.2223E-02	1.2732E 02	2.2972E-03
86	.7170	180.0	534.76	9.4590E 00	2.2273E 00	2.9806E-03	1.2017E-02	1.2824E 02	2.2586E-03
87	.7583	180.0	529.73	7.2765E 00	1.7499E 00	2.3260E-03	9.3849E-03	1.2706E 02	1.7630E-03
88	.7996	180.0	534.22	7.9544E 00	2.0721E 00	2.7786E-03	1.1172E-02	1.2813E 02	2.0997E-03
89	.8469	180.0	535.79	8.6851E 00	2.1629E 00	2.8983E-03	1.1685E-02	1.2850E 02	2.1961E-03
90	.8822	180.0	537.46	8.9880E 00	2.0647E 00	2.7730E-03	1.1176E-02	1.2890E 02	2.1009E-03
91	.9235	180.0	538.95	8.9820E 00	2.1994E 00	2.9684E-03	1.1933E-02	1.2925E 02	2.2427E-03
92	.9648	180.0	541.77	9.4497E 00	2.2237E 00	3.0034E-03	1.2106E-02	1.2992E 02	2.2753E-03
93	.8822	225.0	538.74	7.0894E 00	1.7910E 00	2.4095E-03	9.7124E-03	1.2920E 02	1.8254E-03
94	.9648	225.0	542.95	7.1994E 00	1.7793E 00	2.4045E-03	9.6945E-03	1.2999E 02	1.8213E-03
95	.7170	270.0	538.21	6.2746E 00	1.4146E 00	1.9018E-03	7.6661E-03	1.2908E 02	1.4408E-03
96	.7996	270.0	540.66	5.1582E 00	1.3697E 00	1.8475E-03	7.4466E-03	1.2966E 02	1.3995E-03
97	.8822	270.0	542.64	4.9470E 00	1.2642E 00	1.7097E-03	6.8901E-03	1.3012E 02	1.2949E-03
98	.9648	270.0	542.79	5.7634E 00	1.2657E 00	1.7122E-03	6.9002E-03	1.3017E 02	1.2968E-03

GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 25 MACH NO 8



GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 25
MACH NO = 8
RE NO = 2.21 X 10**6
CONFIG 1
ALPHA 4
TIME 0 SEC
SYM PHI X/L
0 -
45 -
90 -
135 -
180 -
SYM PHI X/L
225 -
270 -
315 -
- 0.88
- 0.96
ST X 10**4
32.00
24.00
16.00
8.00
0.00
0.00
0.20
0.40
0.60
0.80
1.00
X/L
24.00
16.00

2

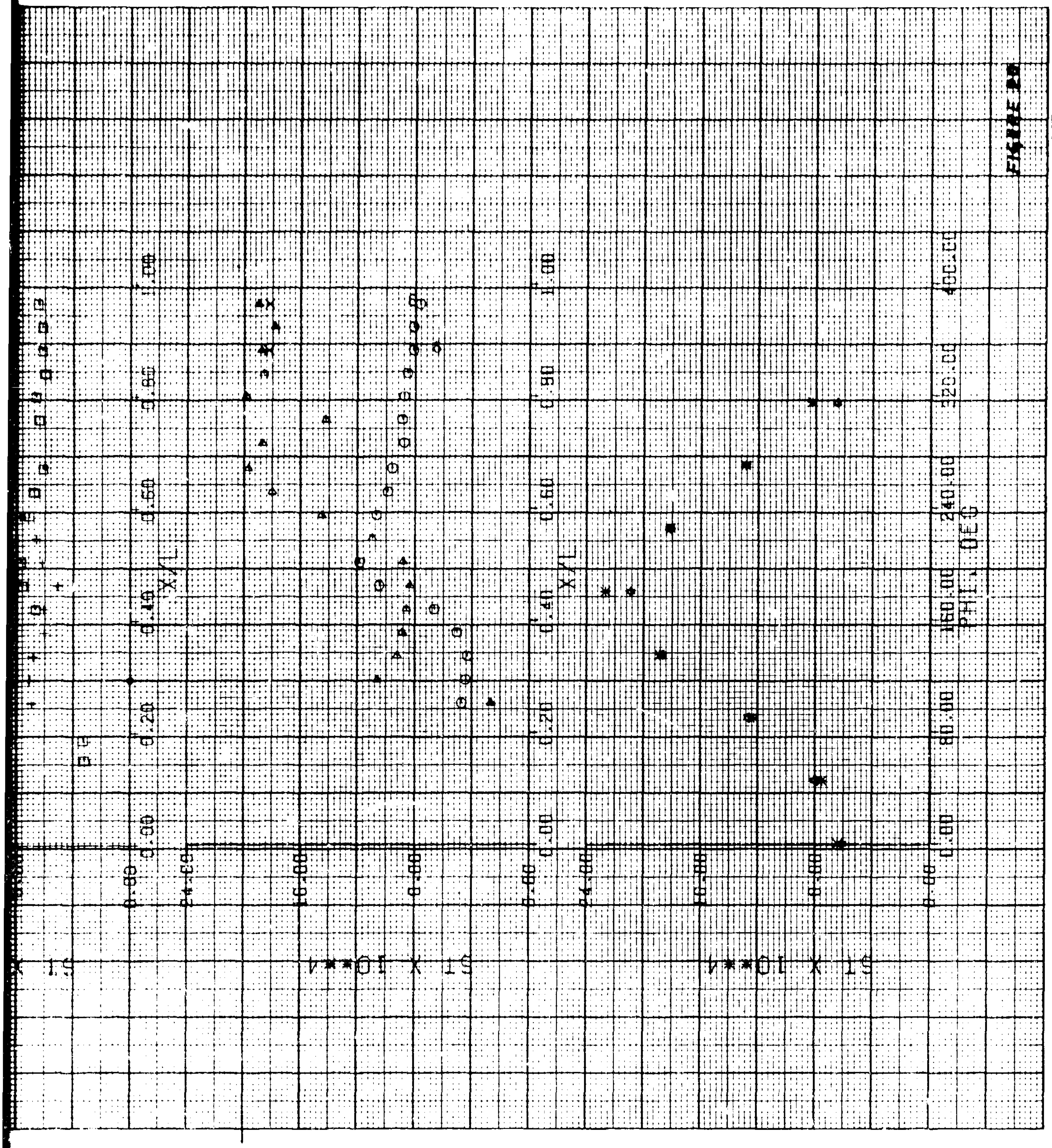


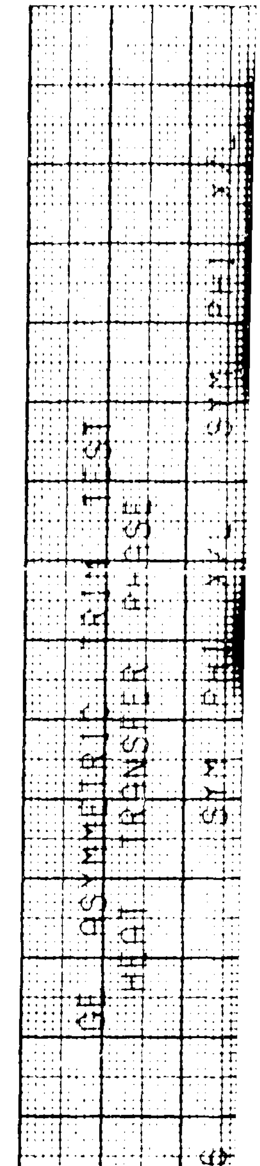
Figure 20

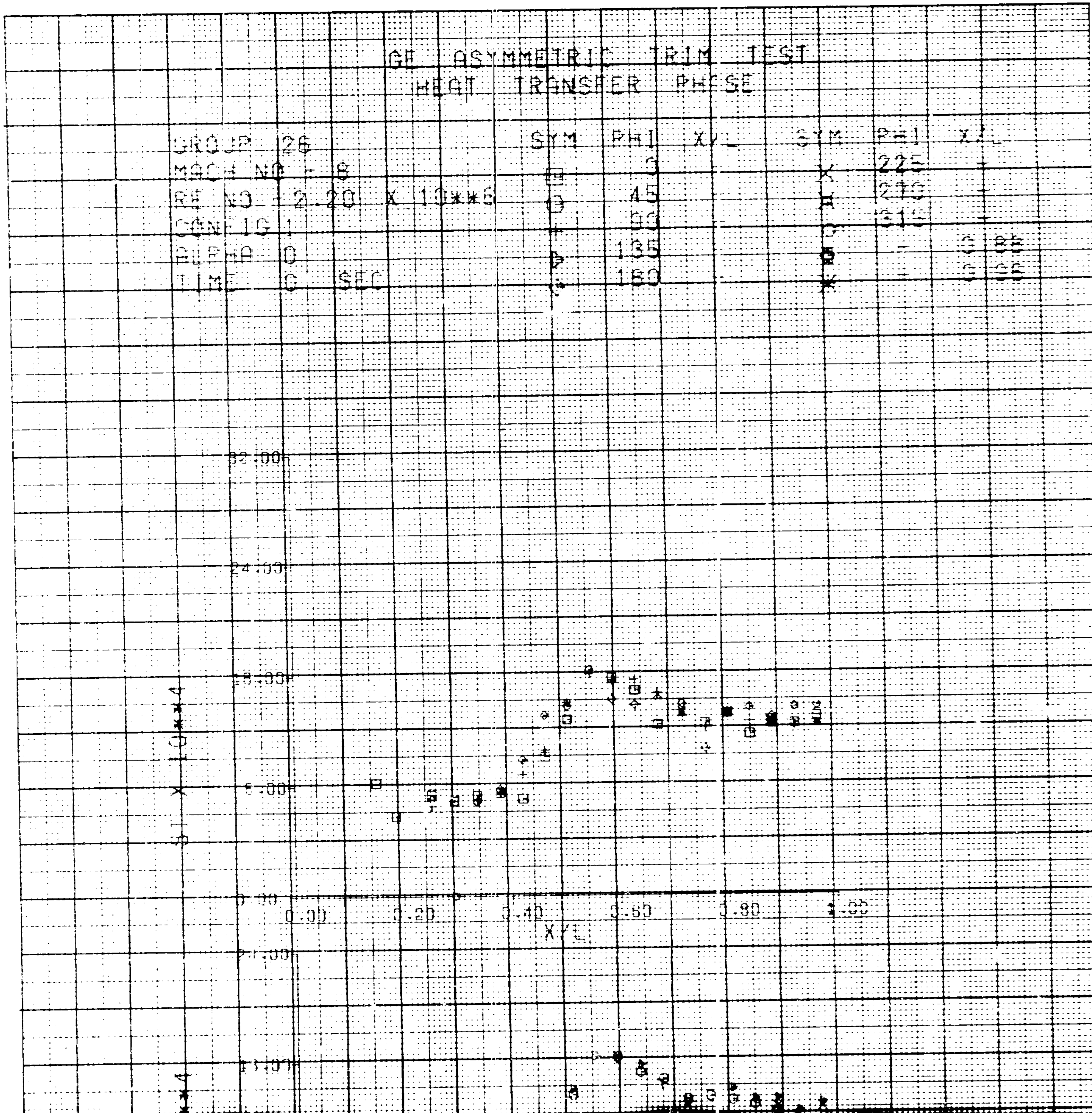
AEDC(ARO,INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
VT0947-800

GROUP	CONFIG	ALPHA-M	BETA-M	ALPHA-S	ROLL	ALP-P	DATE	MACH NO	PO	TO	TIME
36	1	.65	0	.65	0	0	714	7.09	468.97	1283.07	-.00

T-INF	P-INF	Q-INF	V-INF	RHO-INF	MU-INF	RE/FT	RE/D	HO
9.31920E 01	4.84277E-02	2.10414E 00	3.77940E 03	4.35990E-05	7.50289E-08	2.19624E 06	2.01306E 06	3.13022E 02

TC NO	X/L	PHI	TEMP	SLOPE	Q-STOW	HT	HM	HW	ST
1	.1900	0	499.49	1.9000E 00	8.4905E-01	1.0863E-03	4.3799E-03	1.1900E 02	8.2014E-04
2	.1867	0	489.44	2.7823E 00	6.1181E-01	7.6992E-04	3.1117E-03	1.1750E 02	5.8692E-04
3	.2524	0	487.42	2.6030E 00	7.6965E-01	9.6733E-04	3.9100E-03	1.1702E 02	7.3749E-04
4	.2943	0	494.74	2.2894E 00	7.2260E-01	9.1663E-04	3.7035E-03	1.1875E 02	6.9956E-04
5	.3363	0	497.52	2.3961E 00	7.5635E-01	9.6293E-04	3.8896E-03	1.1941E 02	7.3366E-04
6	.3783	0	498.96	2.5746E 00	7.7392E-01	9.8701E-04	3.9870E-03	1.1975E 02	7.5202E-04
7	.4203	0	498.56	2.5181E 00	7.3167E-01	9.3265E-04	3.7675E-03	1.1966E 02	7.1062E-04
8	.4623	0	501.27	3.7520E 00	1.0334E 00	1.3223E-03	5.3408E-03	1.2030E 02	1.0074E-03
9	.5043	0	502.86	4.8303E 00	1.3090E 00	1.6777E-03	6.7755E-03	1.2068E 02	1.2780E-03
10	.5463	0	533.31	8.4030E-02	2.1804E-02	3.1748E-05	1.2801E-04	1.2791E 02	2.4145E-05
11	.5882	0	509.34	5.8206E 00	1.6038E 00	2.0728E-03	8.3682E-03	1.2222E 02	1.5784E-03
12	.6302	0	514.23	5.5389E 00	1.4985E 00	1.9490E-03	7.8646E-03	1.2338E 02	1.4838E-03
13	.6722	0	519.91	4.9542E 00	1.2411E 00	1.6263E-03	6.5620E-03	1.2472E 02	1.2377E-03
14	.8822	315.0	531.28	3.1500E 00	8.2057E-01	1.0915E-03	4.4012E-03	1.2742E 02	8.3015E-04
15	.7583	0	525.41	5.1594E 00	1.2407E 00	1.6376E-03	6.6054E-03	1.2603E 02	1.2459E-03
16	.7996	0	525.37	4.6689E 00	1.3100E 00	1.7289E-03	6.9738E-03	1.2602E 02	[illegible]
17	.8409	0	525.17	4.4432E 00	1.1604E 00	1.5317E-03	6.1782E-03	1.2597E 02	1.1653E-03
18	.8822	0	520.77	4.9200E 00	1.2320E 00	1.6340E-03	6.5900E-03	1.2483E 02	1.2430E-03
19	.9235	0	529.95	4.9032E 00	1.2283E 00	1.6310E-03	6.5773E-03	1.2711E 02	1.2406E-03
20	.9648	0	529.56	5.1250E 00	1.2806E 00	1.6995E-03	6.8534E-03	1.2702E 02	1.2927E-03
21	.2524	45.0	485.99	2.5688E 00	7.5937E-01	9.5269E-04	3.8511E-03	1.1668E 02	7.2639E-04
22	.2943	45.0	492.95	2.2232E 00	7.1279E-01	9.0213E-04	3.6453E-03	1.1833E 02	6.8757E-04
23	.3363	45.0	495.63	2.1092E 00	6.9416E-01	8.8153E-04	3.5616E-03	1.1896E 02	6.7178E-04
24	.3783	45.0	497.06	2.4985E 00	7.5103E-01	9.5551E-04	3.8601E-03	1.1930E 02	7.2810E-04
25	.4203	45.0	497.81	2.6344E 00	7.6545E-01	9.7378E-04	3.9340E-03	1.1929E 02	7.4202E-04
26	.4623	45.0	499.91	4.5240E 00	1.0168E 00	1.2986E-03	5.2444E-03	1.1998E 02	9.8920E-04
27	.5043	45.0	502.45	5.2412E 00	1.3918E 00	1.7824E-03	7.2067E-03	1.2058E 02	1.3582E-03
100	.9648	315.0	534.37	4.9165E 00	1.1823E 00	1.5792E-03	6.3667E-03	1.2816E 02	1.2009E-03
29	.5882	45.0	506.81	6.0300E 00	1.6615E 00	2.1406E-03	8.6423E-03	1.2162E 02	1.6301E-03
30	.6302	45.0	512.38	5.6760E 00	1.5356E 00	1.9925E-03	8.0427E-03	1.2294E 02	1.5170E-03
31	.6722	45.0	521.37	5.9838E 00	1.4688E 00	1.9284E-03	7.7801E-03	1.2507E 02	1.4675E-03
32	.7170	45.0	524.72	5.5883E 00	1.3160E 00	1.7353E-03	7.0000E-03	1.2587E 02	1.3203E-03
33	.7583	45.0	523.18	4.8557E 00	1.3379E 00	1.7606E-03	7.1027E-03	1.2550E 02	1.3397E-03
34	.7996	45.0	522.71	4.6724E 00	1.3110E 00	1.7242E-03	6.9547E-03	1.2539E 02	1.3120E-03
35	.8409	45.0	524.87	4.7148E 00	1.2755E 00	1.6823E-03	6.7861E-03	1.2590E 02	1.2800E-03
36	.8822	45.0	527.80	4.4591E 00	1.2255E 00	1.6225E-03	6.5439E-03	1.2660E 02	1.2343E-03
37	.9235	45.0	529.84	4.6956E 00	1.1998E 00	1.5924E-03	6.4218E-03	1.2704E 02	1.2113E-03
38	.9648	45.0	529.51	4.7028E 00	1.1309E 00	1.5008E-03	6.0524E-03	1.2701E 02	1.1416E-03
39	.2524	90.0	489.60	2.1092E 00	6.8263E-01	8.6039E-04	3.4773E-03	1.1755E 02	6.5580E-04
40	.2943	90.0	495.31	2.2369E 00	7.1719E-01	9.1041E-04	3.6783E-03	1.1889E 02	6.9380E-04
41	.3363	90.0	496.43	2.1078E 00	7.2841E-01	9.2598E-04	3.7410E-03	1.1915E 02	7.0562E-04
42	.3783	90.0	495.63	2.4584E 00	7.7595E-01	9.8541E-04	3.9813E-03	1.1896E 02	7.5094E-04
43	.4203	90.0	495.83	3.0876E 00	9.1273E-01	1.1582E-03	4.6796E-03	1.1882E 02	8.8266E-04
44	.4623	90.0	494.48	3.5222E 00	1.0941E 00	1.3875E-03	5.6060E-03	1.1869E 02	1.0574E-03
45	.5043	90.0	495.91	5.2520E 00	1.4471E 00	1.8384E-03	7.4272E-03	1.1903E 02	1.4009E-03
46	.5463	90.0	496.83	5.8112E 00	1.6595E 00	2.1107E-03	8.5270E-03	1.1925E 02	1.6084E-03
47	.5882	90.0	500.47	5.7126E 00	1.6028E 00	2.0481E-03	8.2725E-03	1.2011E 02	1.5604E-03
48	.6302	90.0	506.49	5.7890E 00	1.5951E 00	2.0539E-03	8.2934E-03	1.2154E 02	1.5643E-03
49	.6722	90.0	518.88	5.8965E 00	1.4772E 00	1.9279E-03	7.7802E-03	1.2400E 02	1.4675E-03
50	.7170	90.0	521.47	5.5197E 00	1.2998E 00	1.7067E-03	6.8857E-03	1.2509E 02	1.2988E-03
51	.7583	90.0	515.74	4.7007E 00	1.2245E 00	1.5958E-03	6.4404E-03	1.2373E 02	1.2148E-03
52	.7996	90.0	515.04	5.0968E 00	1.3277E 00	1.7287E-03	6.9770E-03	1.2357E 02	1.3160E-03
53	.8409	90.0	516.81	5.0608E 00	1.2678E 00	1.6528E-03	6.6704E-03	1.2398E 02	1.2582E-03
54	.8822	90.0	519.87	5.1153E 00	1.2557E 00	1.6452E-03	6.6383E-03	1.2471E 02	1.2521E-03
55	.9235	90.0	522.31	5.0776E 00	1.2211E 00	1.6051E-03	6.4754E-03	1.2529E 02	1.2214E-03
56	.9648	90.0	522.37	5.1395E 00	1.2359E 00	1.6247E-03	6.5547E-03	1.2531E 02	1.2363E-03
57	.2524	135.0	484.19	6.1061E-01	1.8050E-01	2.2594E-04	9.1360E-04	1.1625E 02	1.7220E-04
58	.2943	135.0	488.56	2.4950E 00	7.9995E-01	1.0068E-03	4.0694E-03	1.1729E 02	7.6757E-04
59	.3363	135.0	488.17	2.5319E 00	7.9916E-01	1.0054E-03	4.0635E-03	1.1720E 02	7.6645E-04
60	.3783	135.0	486.66	2.5554E 00	7.9381E-01	9.9673E-04	4.0290E-03	1.1684E 02	7.5994E-04
61	.4203	135.0	485.25	3.1491E 00	9.4661E-01	1.1865E-03	4.7964E-03	1.1651E 02	9.0460E-04
62	.4623	135.0	484.65	4.6282E 00	1.1706E 00	1.4659E-03	5.9262E-03	1.1637E 02	1.1170E-03
63	.5043	135.0	485.58	5.7141E 00	1.4600E 00	1.8308E-03	7.4007E-03	1.1658E 02	1.3959E-03
64	.5463	135.0	486.25	6.4195E 00	1.7047E 00	2.1394E-03	8.6480E-03	1.1674E 02	1.6312E-03
65	.5882	135.0	489.29	6.3389E 00	1.6833E 00	2.1206E-03	8.5707E-03	1.1746E 02	1.6166E-03
66	.6302	135.0	495.64	6.1213E 00	1.6255E 00	2.0643E-03	8.3402E-03	1.1897E 02	1.5731E-03
67	.6722	135.0	510.70	5.9873E 00	1.4398E 00	1.8642E-03	7.5254E-03	1.2254E 02	1.4194E-03
68	.7170	135.0	514.21	5.5568E 00	1.3086E 00	1.7020E-03	6.8693E-03	1.2337E 02	1.2957E-03
69	.7583	135.0	505.26	3.4310E 00	1.0188E 00	1.3098E-03	5.2891E-03	1.2125E 02	9.9762E-04
70	.7996	135.0	505.47	4.9016E 00	1.4242E 00	1.8315E-03	7.3958E-03	1.2130E 02	1.3950E-03
71	.8409	135.0	507.57	4.8810E 00	1.3449E 00	1.7342E-03	7.0019E-03	1.2180E 02	1.3207E-03
72	.8822	135.0	511.09	4.9582E 00	1.3414E 00	1.7376E-03	7.0143E-03	1.2263E 02	1.3230E-03
73	.9235	135.0	516.80	5.8457E 00	1.2386E 00	1.6147E-03	6.5163E-03	1.2379E 02	1.2291E-03
74	.9648	135.0	519.87	5.4014E 00	1.2984E 00	1.7002E-03	6.8602E-03	1.2452E 02	1.2948E-03
75	.2524	180.0	485.84	2.5438E 00	7.3911E-01	9.2712E-04	3.7470E-03	1.1665E 02	7.0090E-04
76	.2943	180.0	-116.76	-1.1546E-14	-3.7020E-15	-2.6446E-18	-1.1059E-17	-2.1036E 01	-2.0850E-18
77	.3363	180.0	489.78	2.4208E 00	7.1561E-01	9.0199E-04	3.6454E-03	1.1756E 02	6.8759E-04
78	.3783	180.0	488.13	2.8031E 00	8.0653E-01	1.0146E-03	4.1008E-03	1.1719E 02	7.7348E-04
79	.4203	180.0	487.88	3.4859E 00	1.0305E 00	1.2957E-03	5.2373E-03	1.1711E 02	9.8785E-04
80	.4623	180.0	488.02	4.7840E 00	1.3662E 00	1.7194E-03	6.9454E-03	1.1716E 02	1.3100E-03
81	.5043	180.0	488.63	5.7179E 00	1.4324E 00	1.8031E-03	7.2876E-03	1.1731E 02	1.3746E-03
82	.5463	180.0	489.17	6.4236E 00	1.7058E 00	2.1486E-03	8.6838E-03	1.1743E 02	1.6379E-03
83	.5882	180.0	491.40	5.5512E 00	1.4741E 00	1.8620E-03	7.5248E-03	1.1796E 02	1.4193E-03
84	.6302	180.0	499.97	5.3450E 00	1.4194E 00	1.8125E-03	7.3212E-03	1.1999E 02	1.3809E-03
85	.6722	180.0	515.97	5.0771E 00	1.4376E 00	1.8737E-03	7.5616E-03	1.2378E 02	1.4261E-03
86	.7170	180.0	519.67	5.0934E 00	1.3878E 00	1.8180E-03	7.3353E-03	1.2467E 02	1.3836E-03
87	.7583	180.0	509.96	4.4767E 00	1.0760E 00	1.3925E-03	5.6215E-03	1.2236E 02	1.0603E-03
88	.7996	180.0	508.35	5.1600E 00	1.3444E 00	1.7353E-03	7.0042E-03	1.2198E 02	1.3215E-03
89	.8409	180.0	509.66	5.3878E 00	1.3766E 00	1.7798E-03	7.1853E-03	1.2228E 02	1.3553E-03
90	.8822	180.0	513.25	5.6741E 00	1.3075E 00	1.6985E-03	6.8557E-03	1.2314E 02	1.2931E-03
91	.9235	180.0	518.05	5.5673E 00	1.3666E 00	1.7864E-03	7.2085E-03	1.2428E 02	1.3597E-03
92	.9648	180.0	523.95	5.0278E 00	1.3660E 00	1.7995E-03	7.2590E-03	1.2568E 02	1.3692E-03
93	.8822	225.0	513.69	5.6092E 00	1.2799E 00	1.6635E-03	6.7144E-03	1.2325E 02	1.2665E-03
94	.9648	225.0	523.78	5.2403E 00	1.2602E 00	1.6597E-03	6.6952E-03	1.2564E 02	1.2628E-03
95	.7170	270.0	528.20	5.8429E 00	1.3173E 00	1.7451E-03	7.0379E-03	1.2669E 02	1.3275E-03
96	.7996	270.0	523.92	4.9738E 00	1.3208E 00	1.7398E-03	7.0144E-03	1.2568E 02	1.3238E-03
97	.8822	270.0	526.37	4.8754E 00	1.2457E 00	1.6467E-03	6.6418E-03	1.2631E 02	1.2527E-03
98	.9648	270.0	530.35	5.1084E 00	1.2285E 00	1.6320E-03	6.5813E-03	1.2721E 02	1.2414E-03




GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 26
MACH NO = 8
RE NO = 2.20 X 10**6
CONFIG 1
ALPHA 0
TIME 0 SEC
SYM PHI X/L
0
45
90
135
180
SYM PHI X/L
225
270
315
X/L

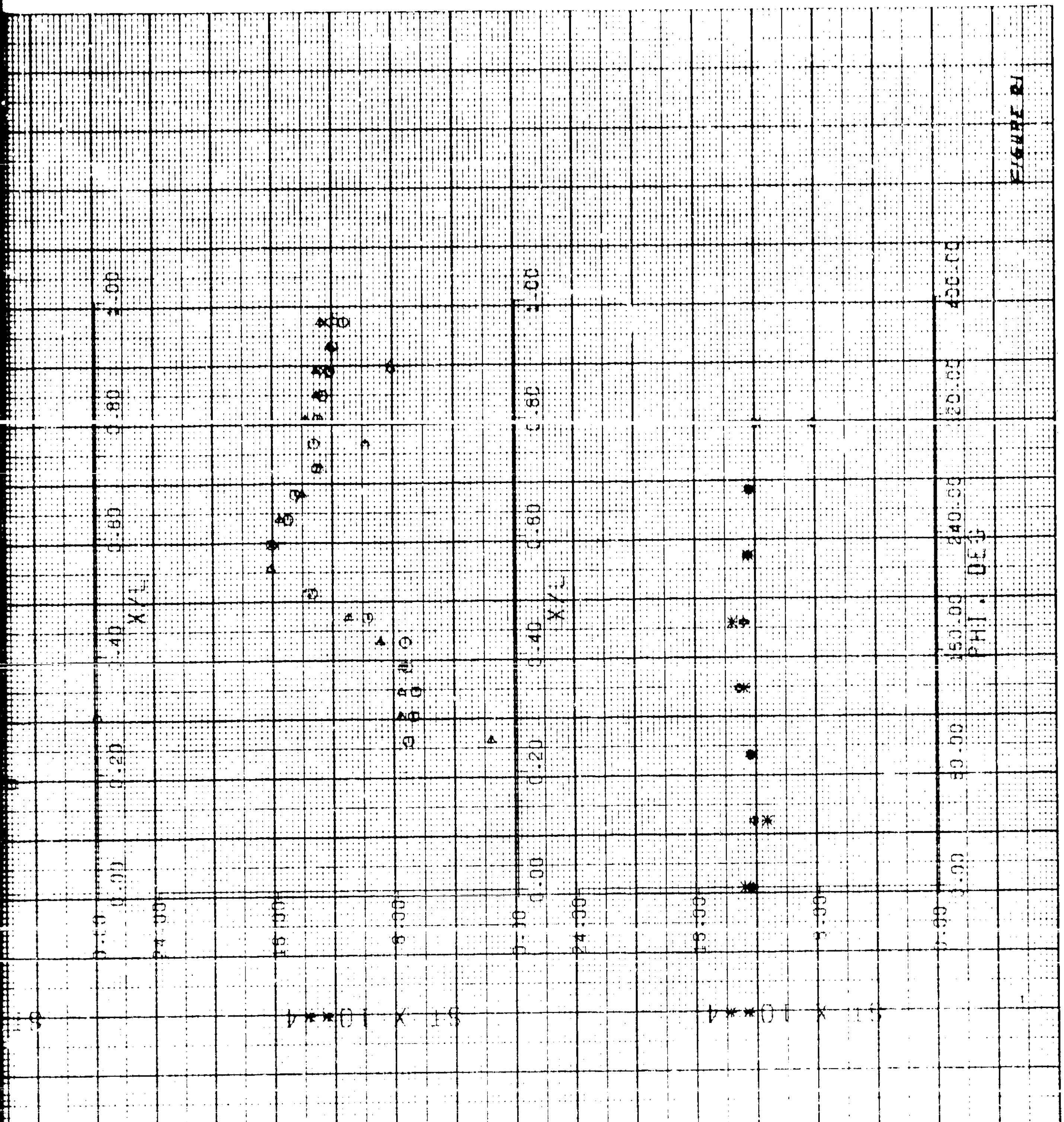


Figure 21

7/16/69

ARO(ARO, INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL H
V1096T-H00

RUN	CONFIG	ALPHA-M	BETA-M	ALPHA-S	NULL	ALP-P	DATE	MACH NO	PO	TO	TIME
52	1	0	0	6	0	0	715	7.09	369.27	1301.03	.00

T-INF	P-INF	Q-INF	V-INF	RHO-INF	MU-INF	RE/FT	RE/D	HU
9.0344E 01	4.0450E-02	2.1095E 00	3.0607E 03	4.3004E-05	7.9114E-08	2.1500E 06	1.9723E 06	3.1870E 02

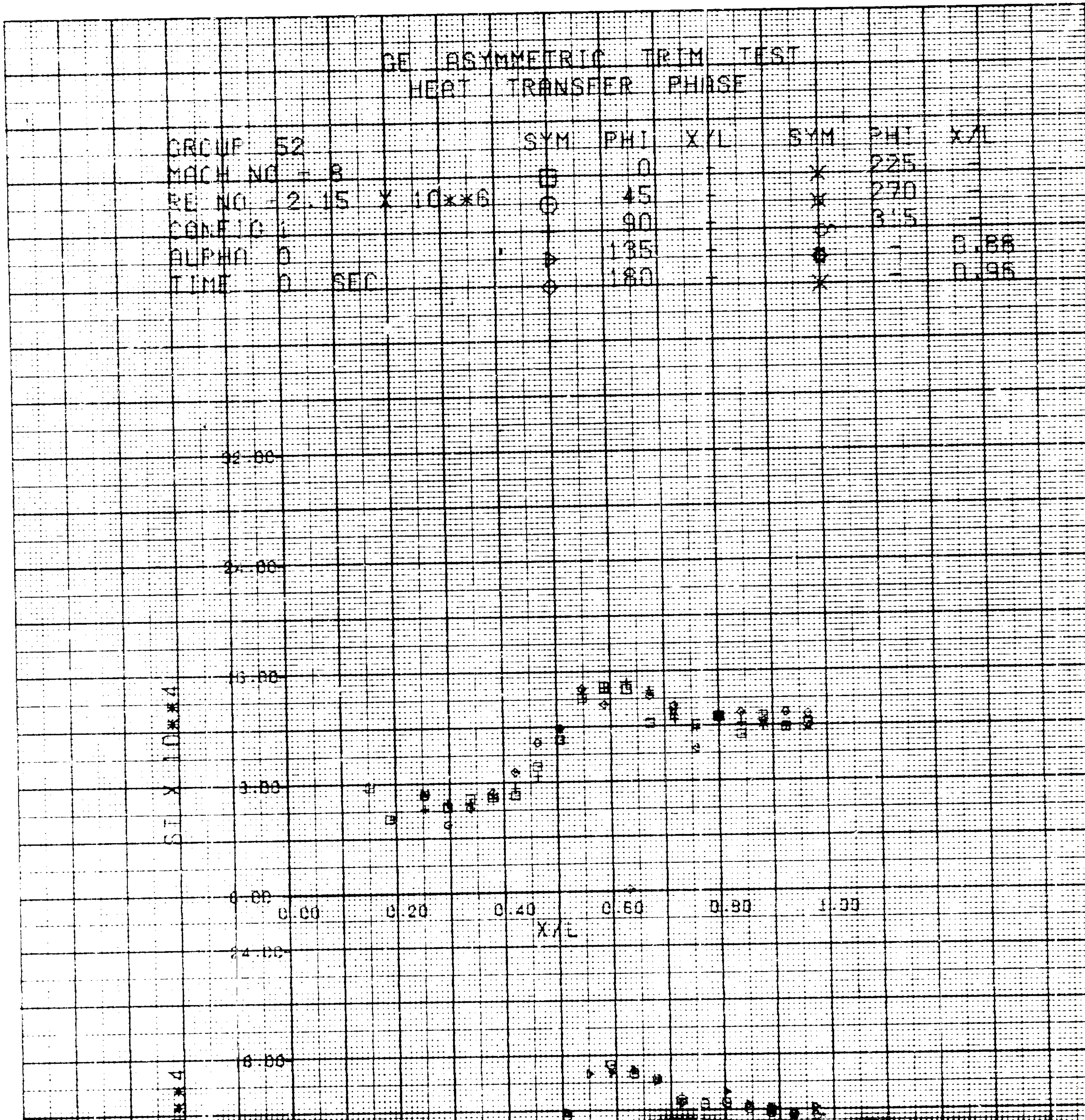
TC NO	X/L	PHI	TEMP	SLOPE	Q-STGA	HT	HH	HW	ST
1	.1518	0	534.07	3.8155E 00	7.0595E-01	1.0250E-03	4.1283E-03	1.2820E 02	7.0370E-04
2	.1867	0	531.36	2.9437E 00	5.5002E-01	7.2523E-04	2.9214E-03	1.2745E 02	5.5005E-04
3	.2524	0	532.58	2.6000E 00	7.2075E-01	9.4040E-04	3.0272E-03	1.2776E 02	7.2566E-04
4	.2943	0	537.56	2.0009E 00	6.3407E-01	8.2906E-04	3.3418E-03	1.2892E 02	6.3445E-04
5	.3363	0	539.25	2.1007E 00	6.9001E-01	9.0013E-04	3.6408E-03	1.2932E 02	6.9271E-04
6	.3783	0	540.68	2.3244E 00	6.9072E-01	9.1421E-04	3.6949E-03	1.2966E 02	7.0109E-04
7	.4203	0	541.21	2.4463E 00	7.1081E-01	9.3476E-04	3.7635E-03	1.2978E 02	7.1452E-04
8	.4623	0	543.09	3.3130E 00	9.1300E-01	1.2030E-03	4.8455E-03	1.3024E 02	9.1994E-04
9	.5043	0	543.90	4.0857E 00	1.1054E 00	1.4589E-03	5.8729E-03	1.3045E 02	1.1150E-03
10	.5463	0	544.95	4.9910E 00	1.4000E 00	1.8559E-03	7.4697E-03	1.3116E 02	1.4102E-03
11	.5882	0	548.90	5.3449E 00	1.4727E 00	1.9564E-03	7.8730E-03	1.3162E 02	1.4960E-03
12	.6302	0	550.01	5.3590E 00	1.4490E 00	1.9311E-03	7.7706E-03	1.3208E 02	1.4753E-03
13	.6722	0	551.96	4.4114E 00	1.2054E 00	1.6079E-03	6.4708E-03	1.3235E 02	1.2284E-03
99	.8822	319.0	562.01	4.4473E 00	1.1846E 00	1.6016E-03	6.4410E-03	1.3475E 02	1.2229E-03
15	.7583	0	556.99	4.9199E 00	1.1831E 00	1.5809E-03	6.3915E-03	1.3355E 02	1.2135E-03
16	.7996	0	558.68	4.4207E 00	1.2404E 00	1.6695E-03	6.7152E-03	1.3395E 02	1.2749E-03
17	.8409	0	559.04	4.1349E 00	1.1076E 00	1.4916E-03	5.9940E-03	1.3405E 02	1.1391E-03
18	.8822	0	560.03	4.9375E 00	1.2369E 00	1.6679E-03	6.7085E-03	1.3428E 02	1.2736E-03
19	.9235	0	559.30	4.6299E 00	1.1599E 00	1.5627E-03	6.2853E-03	1.3412E 02	1.1933E-03
20	.9648	0	557.28	4.9700E 00	1.1953E 00	1.6059E-03	6.4598E-03	1.3362E 02	1.2264E-03
21	.2524	45.0	530.18	2.9400E 00	6.9191E-01	8.9689E-04	3.6131E-03	1.2716E 02	6.8598E-04
22	.2943	45.0	535.34	1.9872E 00	6.3713E-01	8.3148E-04	3.3487E-03	1.2840E 02	6.3577E-04
23	.3363	45.0	[illegible]	[illegible]	[illegible]	[illegible]	3.3936E-03	1.2891E 02	6.4430E-04
24	.3783	45.0	539.07	2.5839E 00	6.8655E-01	9.0126E-04	3.6288E-03	1.2947E 02	6.8890E-04
25	.4203	45.0	540.96	2.7958E 00	6.9613E-01	9.1516E-04	3.6846E-03	1.2973E 02	6.9956E-04
26	.4623	45.0	544.39	3.1091E 00	8.1230E-01	1.1520E-03	4.6374E-03	1.3055E 02	8.8044E-04
27	.5043	45.0	547.05	4.3877E 00	1.1652E 00	1.5441E-03	6.2148E-03	1.3118E 02	1.1799E-03
100	.9648	315.0	562.08	6.7051E 00	1.1315E 00	1.5300E-03	6.1578E-03	1.3477E 02	1.1682E-03
29	.5882	45.0	550.69	5.5433E 00	1.5274E 00	2.0339E-03	8.1846E-03	1.3205E 02	1.5539E-03
30	.6302	45.0	553.06	5.3825E 00	1.4502E 00	1.9453E-03	7.8269E-03	1.3261E 02	1.4860E-03
31	.6722	45.0	555.92	5.7464E 00	1.4106E 00	1.8916E-03	7.6007E-03	1.3330E 02	1.4447E-03
32	.7170	45.0	557.78	4.9443E 00	1.2585E 00	1.6919E-03	6.8058E-03	1.3374E 02	1.2921E-03
33	.7583	45.0	558.40	4.4487E 00	1.2257E 00	1.6492E-03	6.6317E-03	1.3389E 02	1.2595E-03
34	.7996	45.0	559.54	4.1923E 00	1.2324E 00	1.6607E-03	6.6796E-03	1.3416E 02	1.2682E-03
35	.8409	45.0	561.17	4.4084E 00	1.1927E 00	1.6107E-03	6.4778E-03	1.3455E 02	1.2299E-03
36	.8822	45.0	561.90	4.6149E 00	1.1612E 00	1.5698E-03	6.3130E-03	1.3472E 02	1.1986E-03
37	.9235	45.0	561.37	4.4459E 00	1.1462E 0	1.5483E-03	6.2260E-03	1.3458E 02	1.1822E-03
38	.9648	45.0	559.89	4.4627E 00	1.0732E 0	1.4468E-03	5.8193E-03	1.3424E 02	1.1048E-03
39	.2524	90.0	534.06	2.1106E 00	6.2393E-01	8.1287E-04	3.2740E-03	1.2809E 02	6.2159E-04
40	.2943	90.0	538.65	2.3457E 00	6.5590E-01	8.5966E-04	3.4610E-03	1.2918E 02	6.5720E-04
41	.3363	90.0	539.95	2.6744E 00	6.5473E-01	8.5959E-04	3.4610E-03	1.2949E 02	6.5710E-04
42	.3783	90.0	541.23	2.1780E 00	6.8743E-01	9.0400E-04	3.6390E-03	1.2940E 02	6.9104E-04
43	.4203	90.0	543.16	2.4649E 00	7.5822E-01	9.9966E-04	4.0242E-03	1.3025E 02	7.6403E-04
44	.4623	90.0	543.33	2.7055E 00	8.4042E-01	1.1083E-03	4.4619E-03	1.3030E 02	8.4707E-04
45	.5043	90.0	540.96	[illegible]	1.1780E 00	1.5620E-03	6.2849E-03	1.3116E 02	1.1936E-03
46	.5463	90.0	548.39	4.9916E 00	1.4255E 00	1.8924E-03	7.6143E-03	1.3150E 02	1.4460E-03
47	.5882	90.0	550.91	5.2058E 00	1.4606E 00	1.9456E-03	7.8293E-03	1.3210E 02	1.4866E-03
48	.6302	90.0	552.91	5.4231E 00	1.4942E 00	1.9958E-03	8.0301E-03	1.3258E 02	1.5246E-03
49	.6722	90.0	554.94	5.7161E 00	1.4320E 00	1.9178E-03	7.7149E-03	1.3306E 02	1.4648E-03
50	.7170	90.0	557.32	5.1953E 00	1.2234E 00	1.6437E-03	6.6120E-03	1.3363E 02	1.2553E-03
51	.7583	90.0	555.14	4.4639E 00	1.1629E 00	1.5578E-03	6.2670E-03	1.3311E 02	1.1898E-03
52	.7996	90.0	556.03	4.7706E 00	1.2428E 00	1.6668E-03	6.7053E-03	1.3332E 02	1.2730E-03
53	.8409	90.0	556.57	4.7627E 00	1.1932E 00	1.6013E-03	6.4418E-03	1.3344E 02	1.2230E-03
54	.8822	90.0	557.49	4.7857E 00	1.1747E 00	1.5786E-03	6.3502E-03	1.3367E 02	1.2056E-03
55	.9235	90.0	557.20	4.8528E 00	1.1670E 00	1.5676E-03	6.3068E-03	1.3360E 02	1.1972E-03
56	.9648	90.0	555.93	4.8559E 00	1.1678E 00	1.5660E-03	6.2998E-03	1.3330E 02	1.1961E-03
57	.2524	135.0	528.93	5.4422E-01	1.6088E-01	2.0020E-04	8.3881E-04	1.2687E 02	1.5925E-04
58	.2943	135.0	533.11	2.2212E 00	7.1216E-01	9.2666E-04	3.7325E-03	1.2786E 02	7.0043E-04
59	.3363	135.0	534.18	2.1942E 00	6.9255E-01	9.0240E-04	3.6345E-03	1.2812E 02	6.9064E-04
60	.3783	135.0	533.66	2.3773E 00	7.3048E-01	9.6159E-04	3.8731E-03	1.2799E 02	7.3533E-04
61	.4203	135.0	536.17	2.6928E 00	8.0945E-01	1.0574E-03	4.2583E-03	1.2857E 02	8.0847E-04
62	.4623	135.0	537.01	3.1639E 00	9.1932E-01	1.2036E-03	4.8460E-03	1.2898E 02	9.2017E-04
63	.5043	135.0	540.42	4.7051E 00	1.2022E 00	1.5793E-03	6.3588E-03	1.2960E 02	1.2073E-03
64	.5463	135.0	542.45	5.5676E 00	1.4785E 00	1.9475E-03	7.8462E-03	1.3008E 02	1.4885E-03
65	.5882	135.0	544.98	5.5766E 00	1.4809E 00	1.9572E-03	7.8783E-03	1.3069E 02	1.4958E-03
66	.6302	135.0	546.56	5.6340E 00	1.4963E 00	1.9816E-03	7.9759E-03	1.3106E 02	1.5143E-03
67	.6722	135.0	551.07	5.8542E 00	1.4078E 00	1.8756E-03	7.5473E-03	1.3213E 02	1.4324E-03
68	.7170	135.0	552.51	5.2790E 00	[illegible]	[illegible]	6.6794E-03	1.3248E 02	1.2670E-03
69	.7583	135.0	540.12	3.3620E 00	9.4330E-01	1.2519E-03	5.0384E-03	1.3146E 02	9.5057E-04
70	.7996	135.0	551.58	4.5570E 00	1.3243E 00	1.7656E-03	7.1043E-03	1.3226E 02	1.3408E-03
71	.8409	135.0	552.04	4.6566E 00	1.2270E 00	1.6381E-03	6.5912E-03	1.3237E 02	1.2514E-03
72	.8822	135.0	552.41	4.4536E 00	1.2049E 00	1.6082E-03	6.4708E-03	1.3246E 02	1.2259E-03
73	.9235	135.0	553.21	4.7444E 00	1.1648E 00	1.5561E-03	6.2609E-03	1.3265E 02	1.1887E-03
74	.9648	135.0	553.50	5.0070E 00	1.2041E 00	1.6095E-03	6.4785E-03	1.3272E 02	1.2294E-03
75	.2524	180.0	530.86	2.4746E 00	7.1981E-01	9.3285E-04	3.7579E-03	1.2733E 02	7.1366E-04
76	.2943	180.0	534.92	1.9760E 00	5.0550E-01	6.5931E-04	2.6594E-03	1.2829E 02	5.0414E-04
77	.3363	180.0	536.55	2.1167E 00	6.2572E-01	8.1709E-04	3.2936E-03	1.2868E 02	6.2531E-04
78	.3783	180.0	537.94	2.4463E 00	7.3536E-01	9.6291E-04	3.8775E-03	1.2901E 02	7.3616E-04
79	.4203	180.0	540.57	2.8644E 00	8.7632E-01	1.1514E-03	4.6340E-03	1.2964E 02	8.8017E-04
80	.4623	180.0	543.24	3.7997E 00	1.0851E 00	1.4308E-03	5.7500E-03	1.3027E 02	1.0939E-03
81	.5043	180.0	545.42	4.7237E 00	1.1834E 00	1.5649E-03	6.2989E-03	1.3079E 02	1.1959E-03
82	.5463	180.0	[illegible]	[illegible]	[illegible]	1.9375E-03	7.7978E-03	1.3135E 02	1.4805E-03
83	.5882	180.0	549.57	5.0575E 00	1.3438E 00	1.7858E-03	7.1869E-03	1.3170E 02	[illegible]
84	.6302	180.0	539.47	5.9850E-02	1.5661E-02	2.0574E-05	8.2861E-05	1.2930E 02	1.5720E-05
85	.6722	180.0	557.34	5.7914E 00	1.3927E 00	1.8715E-03	7.5275E-03	1.3364E 02	1.4281E-03
86	.7170	180.0	559.33	5.5796E 00	1.3139E 00	1.7708E-03	7.1193E-03	1.3410E 02	1.3517E-03
87	.7583	180.0	556.47	4.2294E 00	1.0171E 00	1.3048E-03	5.4904E-03	1.3341E 02	1.0424E-03
88	.7996	180.0	559.64	4.6900E 00	1.2214E 00	1.6454E-03	6.6183E-03	1.3409E 02	1.2565E-03
89	.8409	180.0	552.51	4.9263E 00	1.2587E 00	1.6961E-03	6.8270E-03	1.3415E 02	1.2952E-03
90	.8822	180.0	559.46	5.7209E 00	1.2031E 00	1.6211E-03	6.5201E-03	1.3416E 02	1.2379E-03
91	.9235	180.0	559.38	5.1302E 00	1.2613E 00	1.6997E-03	6.8362E-03	1.3416E 02	1.2979E-03
92	.9648	180.0	560.72	5.4127E 00	1.2473E 00	1.6835E-03	6.7760E-03	1.3444E 02	1.2854E-03
93	.8822	225.0	562.30	4.5868E 00	1.1720E 00	1.5863E-03	6.3790E-03	1.3494E 02	1.2111E-03
94	.9648	225.0	561.69	4.8057E 00	1.1749E 00	1.5878E-03	6.3857E-03	1.3467E 02	1.2124E-03
95	.7170	270.0	563.31	5.4838E 00	1.2389E 00	1.7050E-03	6.8564E-03	1.3500E 02	1.3017E-03
96	.7996	270.0	566.84	6.5951E 00	1.2200E 00	1.6683E-03	6.6753E-03	1.3590E 02	1.2673E-03
97	.8822	270.0	566.08	6.5947E 00	1.1748E 00	1.5961E-03	6.4172E-03	1.3572E 02	1.2184E-03
98	.9648	270.0	562.80	6.7770E 00	1.1490E 00	1.5551E-03	6.2530E-03	1.3494E 02	1.1473E-03

GROUP 52

OE ASYMMETRIC TRIM TEST

HEAT TRANSFER PHASE

SYM PHI X/L SYM PHI X/L


GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 52
MACH NO = 8
RE NO 2.15 X 10**6
CONFIG 1
ALPHA 0
TIME 0 SEC
SYM PHI X/L
0
45
90
135
180
SYM PHI X/L
225
270
315
0.86
0.96
ST X 10**4
X/L
0.00
0.20
0.40
0.60
0.80
1.00

2

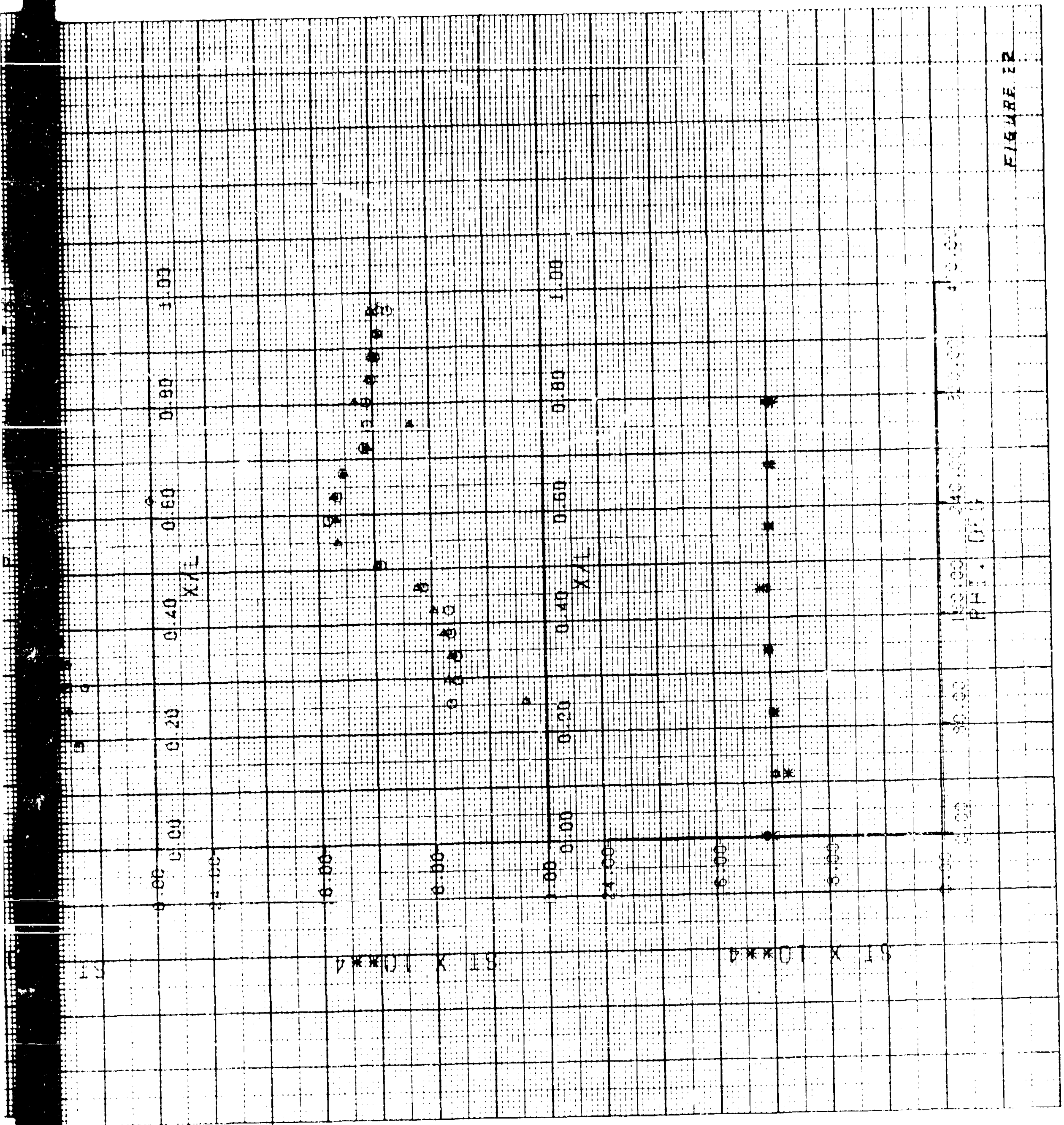


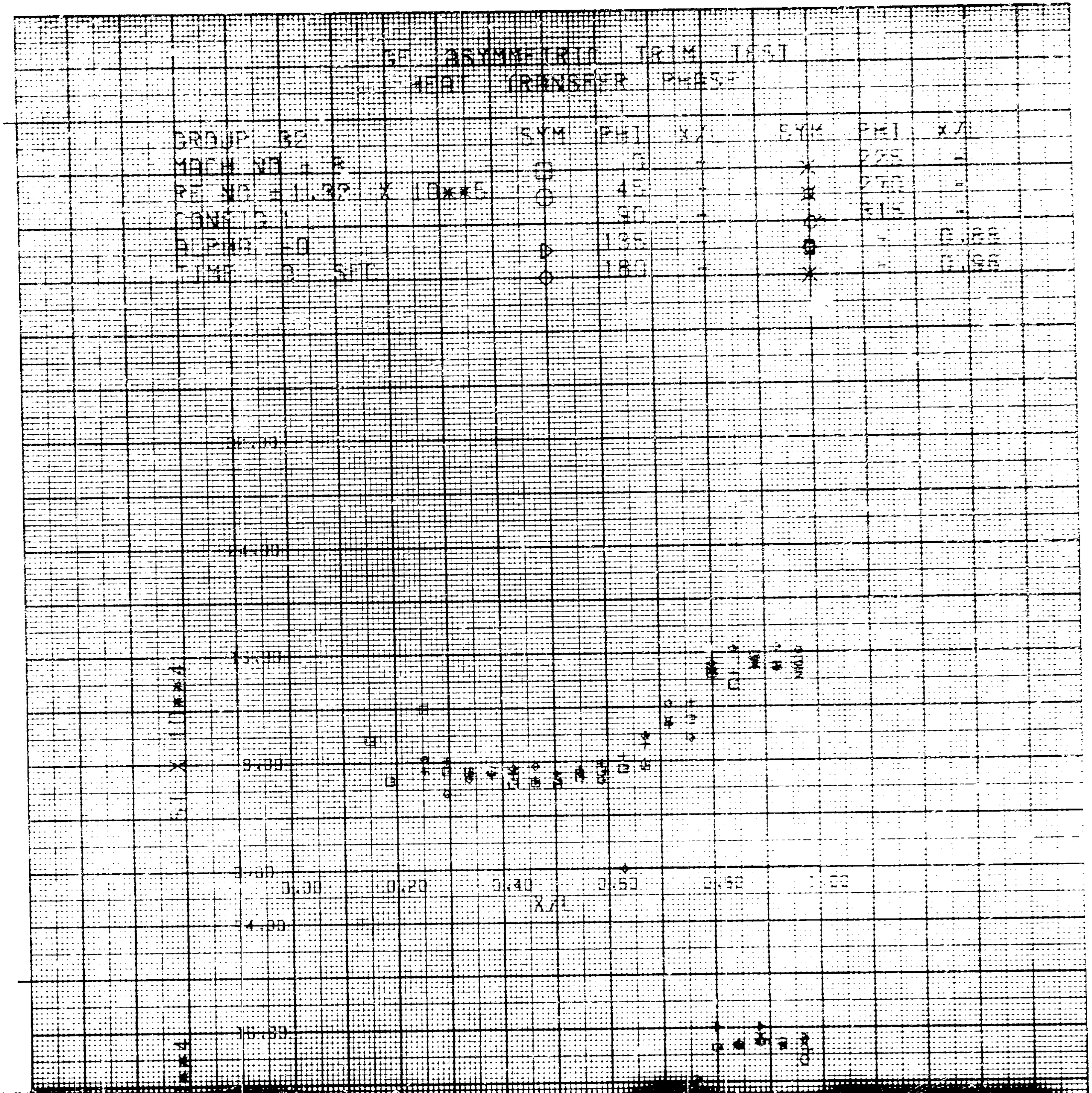
Figure 22

AEDC(ARO,INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
VT0467 000

GROUP	CONFIG	ALPHA-M	BETA-M	ALPHA-S	ROLL	ALP-P	DATE	MACH NO	PO	TO	TIME
38	1	-.03	0	-.03	0	0	715	7.97	280.78	1286.00	-.00

T-INF	P-INF	Q-INF	V-INF	RHO-INF	MU-INF	RE/FT	RE/D	HO
9.38460E 01	2.94701E-02	1.31030E 00	3.78310E 03	2.03485E-05	7.55509E-08	1.31917E 06	1.21627E 06	3.14682E 02

TC NO	X/L	PHI	TEMP	SLOPE	Q-STDN	HT	HH	HW	ST
1	.1506	0	535.19	2.6538E 00	5.7667E-01	7.6829E-04	3.0969E-03	1.2835E 02	9.6564E-04
2	.1867	0	535.07	1.8030E 00	3.9595E-01	5.2720E-04	2.1254E-03	1.2833E 02	6.6273E-04
3	.2524	0	534.67	2.4131E 00	7.1133E-01	9.4936E-04	3.8269E-03	1.2822E 02	1.1933E-03
4	.2943	0	533.94	1.3896E 00	4.1054E-01	5.8312E-04	2.3506E-03	1.2806E 02	7.3295E-04
5	.3363	0	533.69	1.3757E 00	4.3421E-01	5.7716E-04	2.3267E-03	1.2799E 02	7.2540E-04
6	.3783	0	533.09	1.4534E 00	4.3609E-01	5.8008E-04	2.3416E-03	1.2805E 02	7.3014E-04
7	.4203	0	533.61	1.5038E 00	3.7802E-01	5.0349E-04	2.0297E-03	1.2798E 02	6.3287E-04
8	.4623	0	534.49	1.6018E 00	3.8621E-01	5.1394E-04	2.0717E-03	1.2819E 02	6.4597E-04
9	.5043	0	534.84	1.3910E 00	3.7633E-01	5.0100E-04	2.0195E-03	1.2827E 02	6.2970E-04
10	.5463	0	536.73	1.4473E 00	4.0610E-01	5.4199E-04	2.1845E-03	1.2872E 02	6.8115E-04
11	.5882	0	538.24	1.5700E 00	4.3259E-01	5.7852E-04	2.3315E-03	1.2908E 02	7.2700E-04
12	.6302	0	540.17	1.6148E 00	4.3742E-01	5.8649E-04	2.3634E-03	1.2954E 02	7.3693E-04
13	.6722	0	541.34	1.7962E 00	4.4998E-01	6.0427E-04	2.4349E-03	1.2982E 02	7.5923E-04
99	.8822	315.0	553.05	3.3553E 00	8.7406E-01	1.1925E-03	4.8023E-03	1.3261E 02	1.4974E-03
15	.7583	0	545.58	2.7022E 00	6.4983E-01	8.7765E-04	3.5357E-03	1.3083E 02	1.1025E-03
16	.7996	0	547.19	3.0259E 00	8.4901E-01	1.1492E-03	4.6290E-03	1.3121E 02	1.4434E-03
17	.8409	0	547.79	3.1310E 00	8.0000E-01	1.0837E-03	4.3652E-03	1.3136E 02	1.3611E-03
18	.8822	0	548.70	3.6823E 00	9.2249E-01	1.2512E-03	5.0395E-03	1.3157E 02	1.5714E-03
19	.9235	0	548.59	3.5099E 00	8.7929E-01	1.1924E-03	4.8027E-03	1.3154E 02	1.4975E-03
20	.9648	0	547.20	3.7372E 00	8.9871E-01	1.2165E-03	4.9002E-03	1.3122E 02	1.5279E-03
21	.2524	45.0	533.06	1.5971E 00	4.7212E-01	6.2703E-04	2.5278E-03	1.2785E 02	7.8818E-04
22	.2943	45.0	532.89	1.4403E 00	4.6179E-01	6.1318E-04	2.4720E-03	1.2781E 02	7.7078E-04
23	.3363	45.0	533.03	1.4611E 00	4.3921E-01	5.8331E-04	2.3515E-03	1.2784E 02	7.3322E-04
24	.3783	45.0	533.41	1.4422E 00	4.3352E-01	5.7604E-04	2.3222E-03	1.2793E 02	7.2408E-04
25	.4203	45.0	534.53	1.2008E 00	3.4891E-01	4.6430E-04	1.8716E-03	1.2820E 02	5.8358E-04
26	.4623	45.0	536.79	1.3801E 00	3.8722E-01	5.1681E-04	2.0830E-03	1.2873E 02	6.4951E-04
27	.5043	45.0	537.63	1.4234E 00	3.7799E-01	5.0508E-04	2.0356E-03	1.2894E 02	6.3473E-04
100	.9648	315.0	551.51	3.4491E 00	8.2943E-01	1.1293E-03	4.5479E-03	1.3224E 02	1.4181E-03
29	.5882	45.0	540.46	1.5772E 00	4.3458E-01	5.8290E-04	2.3489E-03	1.2961E 02	7.3242E-04
30	.6302	45.0	542.44	1.7355E 00	4.7061E-01	6.3291E-04	2.5502E-03	1.3008E 02	7.9517E-04
31	.6722	45.0	544.74	2.1552E 00	5.2903E-01	7.1369E-04	2.8753E-03	1.3063E 02	8.9655E-04
32	.7170	45.0	546.72	2.5517E 00	6.0089E-01	8.1281E-04	3.2743E-03	1.3110E 02	1.0210E-03
33	.7583	45.0	548.05	2.5762E 00	7.0982E-01	9.6189E-04	3.8745E-03	1.3142E 02	1.2081E-03
34	.7996	45.0	549.36	3.0281E 00	8.4964E-01	1.1534E-03	4.6456E-03	1.3173E 02	1.4485E-03
35	.8409	45.0	550.72	3.1824E 00	8.6097E-01	1.1709E-03	4.7159E-03	1.3205E 02	1.4705E-03
36	.8822	45.0	551.55	3.3225E 00	8.7390E-01	1.1899E-03	4.7919E-03	1.3225E 02	1.4942E-03
37	.9235	45.0	551.88	3.4093E 00	8.7111E-01	1.1866E-03	4.7787E-03	1.3233E 02	1.4900E-03
38	.9648	45.0	551.14	3.2944E 00	7.9224E-01	1.0781E-03	4.3419E-03	1.3216E 02	1.3538E-03
39	.2524	90.0	536.56	1.4765E 00	4.3647E-01	5.8240E-04	2.3474E-03	1.2868E 02	7.3194E-04
40	.2943	90.0	536.33	1.5080E 00	4.8349E-01	6.4494E-04	2.5995E-03	1.2863E 02	8.1055E-04
41	.3363	90.0	535.99	1.3540E 00	4.2738E-01	5.6983E-04	2.2968E-03	1.2855E 02	7.1617E-04
42	.3783	90.0	536.61	1.3257E 00	4.1842E-01	5.5835E-04	2.2505E-03	1.2869E 02	7.0172E-04
43	.4203	90.0	537.38	1.4235E 00	4.2081E-01	5.6212E-04	2.2656E-03	1.2888E 02	7.0642E-04
44	.4623	90.0	536.51	1.2643E 00	3.9274E-01	5.2401E-04	2.1120E-03	1.2867E 02	6.5856E-04
45	.5043	90.0	538.12	1.5260E 00	4.2045E-01	5.6220E-04	2.2658E-03	1.2905E 02	7.0649E-04
46	.5463	90.0	540.38	1.5253E 00	4.3557E-01	5.8417E-04	2.3541E-03	1.2959E 02	7.3402E-04
47	.5882	90.0	541.22	1.6436E 00	4.6116E-01	6.1919E-04	2.4951E-03	1.2979E 02	7.7799E-04
48	.6302	90.0	542.52	1.7907E 00	4.9329E-01	6.6348E-04	2.6733E-03	1.3010E 02	8.3358E-04
49	.6722	90.0	544.57	2.1669E 00	5.4284E-01	7.3215E-04	2.9497E-03	1.3059E 02	9.1974E-04
50	.7170	90.0	546.75	2.6531E 00	6.2479E-01	8.4516E-04	3.4046E-03	1.3111E 02	1.0616E-03
51	.7583	90.0	546.28	2.7761E 00	7.2317E-01	9.7763E-04	3.9383E-03	1.3100E 02	1.2280E-03
52	.7996	90.0	547.50	3.2503E 00	8.4671E-01	1.1465E-03	4.6184E-03	1.3129E 02	1.4401E-03
53	.8409	90.0	547.98	3.3854E 00	8.4811E-01	1.1492E-03	4.6289E-03	1.3140E 02	1.4433E-03
54	.8822	90.0	549.11	3.5571E 00	8.7317E-01	1.1849E-03	4.7727E-03	1.3167E 02	1.4882E-03
55	.9235	90.0	548.31	3.6231E 00	8.7129E-01	1.1811E-03	4.7575E-03	1.3148E 02	1.4834E-03
56	.9648	90.0	546.19	3.5940E 00	8.6408E-01	1.1683E-03	4.7062E-03	1.3098E 02	1.4675E-03
57	.2524	135.0	531.69	2.9316E-01	8.6661E-02	1.1489E-04	4.6319E-04	1.2752E 02	1.4443E-04
58	.2943	135.0	531.77	1.5414E 00	4.7419E-01	6.5523E-04	2.6415E-03	1.2754E 02	8.2369E-04
59	.3363	135.0	530.59	1.5227E 00	4.8062E-01	6.3624E-04	2.5652E-03	1.2726E 02	7.9986E-04
60	.3783	135.0	528.06	1.3561E 00	4.2127E-01	5.5580E-04	2.2412E-03	1.2666E 02	6.9884E-04
61	.4203	135.0	530.33	1.4462E 00	4.3472E-01	5.7527E-04	2.3194E-03	1.2720E 02	7.2323E-04
62	.4623	135.0	530.88	1.4119E 00	4.1025E-01	5.4329E-04	2.1904E-03	1.2733E 02	6.8300E-04
63	.5043	135.0	531.67	1.5496E 00	3.9594E-01	5.2488E-04	2.1161E-03	1.2752E 02	6.5983E-04
64	.5463	135.0	532.60	1.6348E 00	4.3411E-01	5.7620E-04	2.3229E-03	1.2774E 02	7.2431E-04
65	.5882	135.0	534.28	1.7086E 00	4.5371E-01	6.0356E-04	2.4330E-03	1.2814E 02	7.5863E-04
66	.6302	135.0	535.95	1.9354E 00	5.1395E-01	6.8522E-04	2.7619E-03	1.2854E 02	8.6119E-04
67	.6722	135.0	539.72	2.4555E 00	5.9050E-01	7.9125E-04	3.1886E-03	1.2944E 02	9.9425E-04
68	.7170	135.0	540.91	2.8575E 00	6.7292E-01	9.0313E-04	3.6393E-03	1.2972E 02	1.1348E-03
69	.7583	135.0	539.31	2.0681E 00	5.8827E-01	7.7713E-04	3.1318E-03	1.2934E 02	9.7653E-04
70	.7996	135.0	540.94	3.2658E 00	9.4892E-01	1.2736E-03	5.1322E-03	1.2973E 02	1.6003E-03
71	.8409	135.0	541.48	3.1493E 00	8.6772E-01	1.1655E-03	4.6963E-03	1.2985E 02	1.4643E-03
72	.8822	135.0	541.86	3.5035E 00	9.4784E-01	1.2737E-03	5.1324E-03	1.2994E 02	1.6003E-03
73	.9235	135.0	542.21	3.5063E 00	8.6066E-01	1.1572E-03	4.6626E-03	1.3003E 02	1.4538E-03
74	.9648	135.0	543.88	[illegible]	9.0358E-01	1.2148E-03	4.8945E-03	1.3042E 02	1.5262E-03
75	.2524	180.0	532.56	1.7023E 00	4.9453E-01	6.5644E-04	2.6464E-03	1.2772E 02	[illegible]
76	.2943	180.0	533.20	1.0542E 00	3.3799E-01	4.4898E-04	1.8100E-03	1.2788E 02	5.6437E-04
77	.3363	180.0	533.11	1.3636E 00	4.0340E-01	5.3580E-04	2.1600E-03	1.2786E 02	6.7350E-04
78	.3783	180.0	532.95	1.4286E 00	4.2945E-01	5.7028E-04	2.2990E-03	1.2782E 02	7.1685E-04
79	.4203	180.0	533.63	1.5094E 00	4.4621E-01	5.9307E-04	2.3908E-03	1.2798E 02	7.4547E-04
80	.4623	180.0	534.16	1.5913E 00	4.5444E-01	6.0443E-04	2.4365E-03	1.2811E 02	7.5973E-04
81	.5043	180.0	535.29	1.5601E 00	3.9083E-01	5.2061E-04	2.0985E-03	1.2838E 02	6.5433E-04
82	.5463	180.0	536.63	1.6133E 00	4.2842E-01	5.7171E-04	2.3043E-03	1.2870E 02	7.1851E-04
83	.5882	180.0	538.28	1.4623E 00	3.8830E-01	5.1931E-04	2.0929E-03	1.2909E 02	6.5260E-04
84	.6302	180.0	536.80	-1.2756E-02	-3.3873E-03	-4.5212E-06	-1.8223E-05	1.2874E 02	-5.6820E-06
85	.6722	180.0	545.17	2.4027E 00	5.7781E-01	7.7994E-04	3.1421E-03	1.3073E 02	9.7975E-04
86	.7170	180.0	546.66	3.0497E 00	7.1817E-01	9.7137E-04	3.9130E-03	1.3109E 02	1.2201E-03
87	.7583	180.0	544.65	2.3652E 00	6.6879E-01	8.6724E-04	3.0910E-03	1.3061E 02	9.6382E-04
88	.7996	180.0	545.94	3.4298E 00	8.9342E-01	1.2072E-03	4.8633E-03	1.3092E 02	1.5164E-03
89	.8409	180.0	545.83	3.7495E 00	9.5803E-01	1.2943E-03	5.2143E-03	1.3089E 02	1.6259E-03
90	.8822	180.0	546.19	3.9462E 00	9.0799E-01	1.2273E-03	4.9442E-03	1.3098E 02	1.5417E-03
91	.9235	180.0	547.30	3.9229E 00	9.6296E-01	1.3036E-03	5.2511E-03	1.3124E 02	1.6374E-03
92	.9648	180.0	548.02	4.1048E 00	9.4591E-01	1.2818E-03	5.1630E-03	1.3141E 02	1.6099E-03
93	.8822	225.0	548.58	3.5248E 00	9.0082E-01	1.2213E-03	4.9194E-03	1.3155E 02	1.5339E-03
94	.9648	225.0	548.75	3.6029E 00	8.6643E-01	1.1752E-03	4.7336E-03	1.3158E 02	1.4760E-03
95	.7170	270.0	550.71	2.4522E 00	6.4303E-01	8.7453E-04	3.5221E-03	1.3205E 02	1.0982E-03
96	.7996	270.0	554.06	3.2887E 00	8.4995E-01	1.1625E-03	4.6809E-03	1.3304E 02	1.4599E-03
97	.6722	270.0	556.21	3.4418E 00	8.7940E-01	1.2650E-03	4.8517E-03	1.3336E 02	1.5128E-03
98	.9648	270.0	552.15	3.4064E 00	8.3306E-01	1.1395E-03	4.5748E-03	1.3243E 02	1.4264E-03



GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 32
SYM PHI X/L
SYM PHI X/L
X/L

2

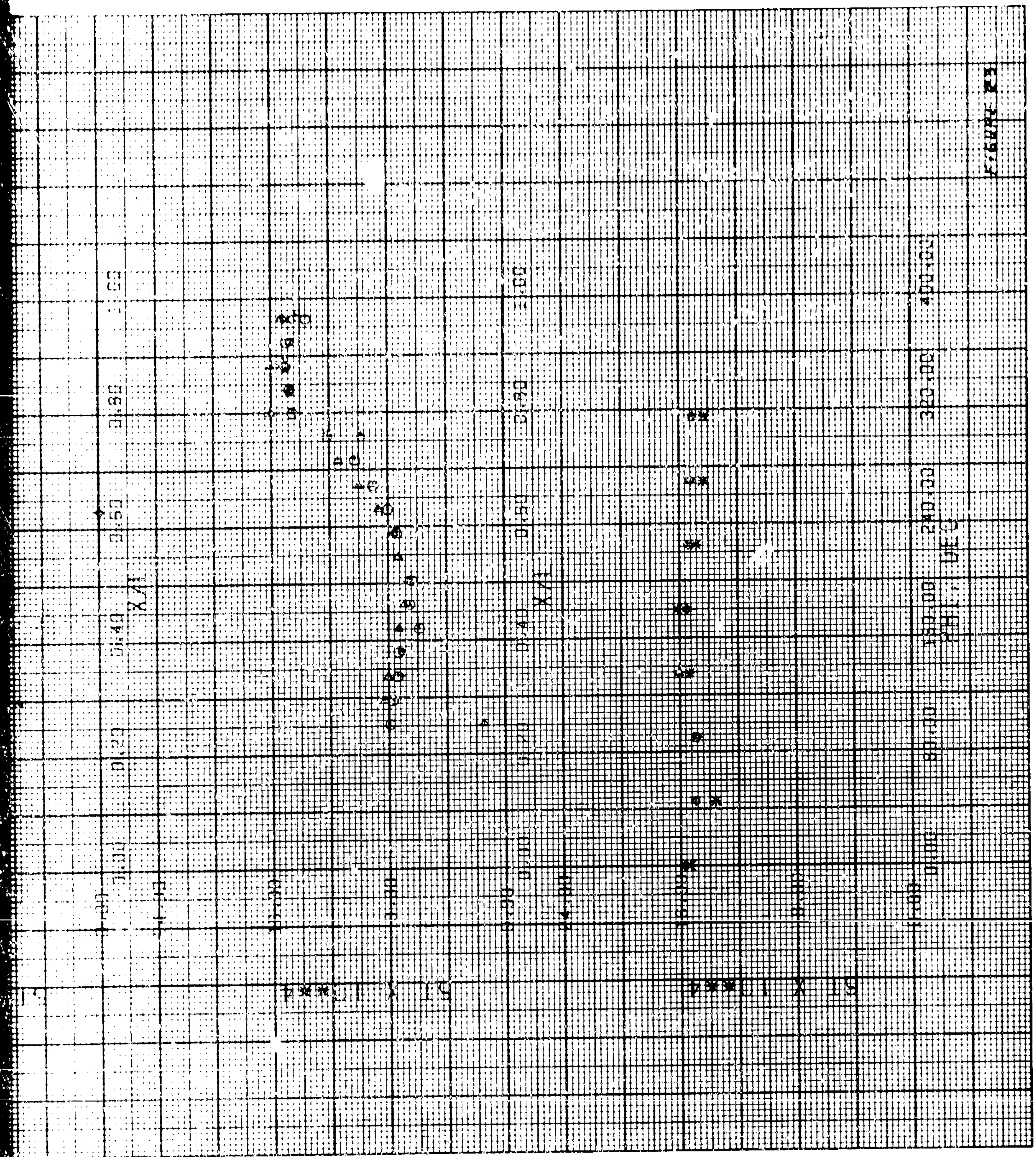


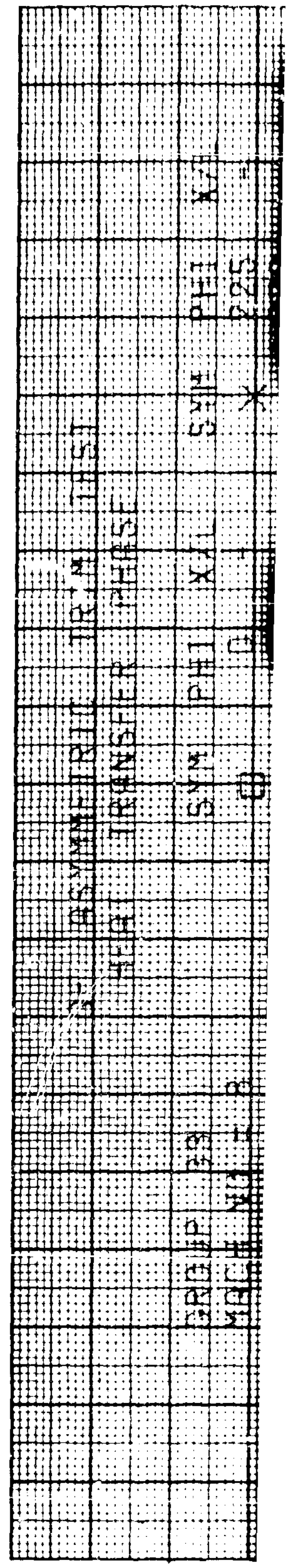
Figure 23

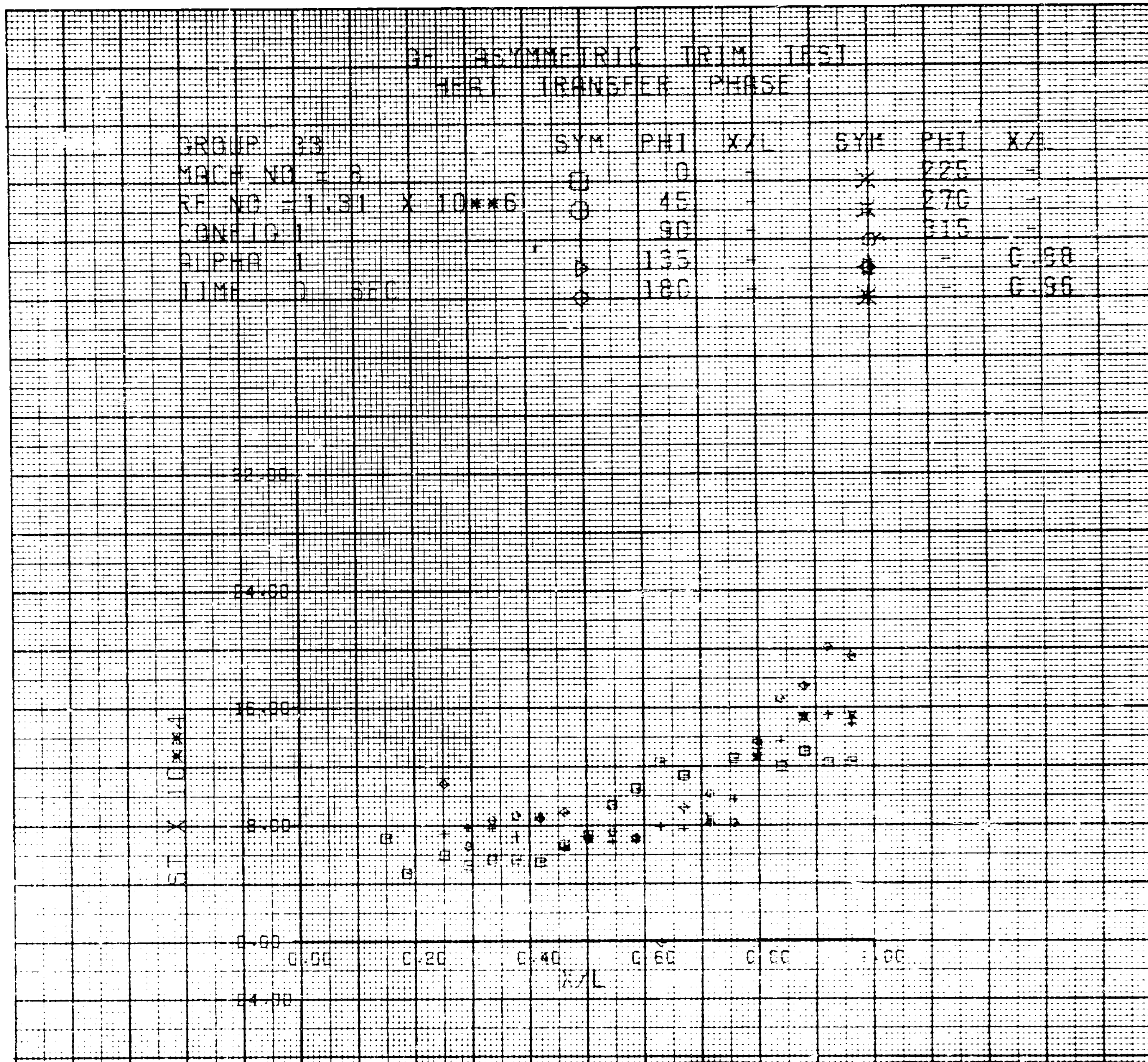
AEDC(ARO, INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
VT0967-B00

GROUP	POINT	ALPHA-M	BETA-M	ALPHA-S	ROLL	ALP-P	DATE	MACH NO	PO	TO	TIME
33	1	.99	0	.99	0	0	715	7.97	279.50	1284.00	-.00

T-INF	P-INF	Q-INF	V-INF	RHO-INF	MU-INF	RE/FT	RE/D	MO
9.18[illegible] 01	2.93440E-02	1.30477E 00	3.78310E 03	2.02350E-05	7.55506E-08	1.31372E 06	1.26555E 06	3.14622E 02

TC NO	X/L	PHI	TEMP	SLOPE	Q-STON	HT	HH	HW	ST
1	[illegible]	0	525.82	1.9920E 00	4.2215E-01	5.5532E-04	2.2396E-03	1.2613E 02	7.0132E-04
2	.1667	0	526.75	1.2638E 00	2.7756E-01	3.6557E-04	1.4742E-03	1.2615E 02	4.6166E-04
3	.2524	0	528.01	1.1952E 00	3.5332E-01	4.6614E-04	1.8797E-03	1.2665E 02	5.8862E-04
4	.2943	0	510.20	9.8194E-01	3.1056E-01	4.1098E-04	1.6567E-03	1.2717E 02	5.1881E-04
5	.3363	0	511.16	1.0480E 00	3.3095E-01	4.3844E-04	1.7677E-03	1.2740E 02	5.5355E-04
6	.3783	0	511.89	1.1086E 00	3.3323E-01	4.4187E-04	1.7814E-03	1.2750E 02	5.5785E-04
7	.4203	0	511.77	1.1051E 00	3.2111E-01	4.2575E-04	1.7164E-03	1.2754E 02	5.3759E-04
8	.4623	0	512.66	1.4137E 00	3.8953E-01	5.1707E-04	2.0845E-03	1.2775E 02	6.5277E-04
9	.5043	0	512.83	1.5868E 00	4.2924E-01	5.6997E-04	2.2978E-03	1.2780E 02	7.1954E-04
10	.5463	0	514.31	1.9745E 00	5.5400E-01	7.3700E-04	2.9709E-03	1.2815E 02	9.3034E-04
11	.5882	0	515.30	2.7518E 00	6.2043E-01	8.2647E-04	3.3314E-03	1.2838E 02	1.0437E-03
12	.6302	0	517.23	2.6769E 00	7.2421E-01	9.6719E-04	3.8982E-03	1.2884E 02	1.2207E-03
13	[illegible]	0	540.31	2.6605E 00	6.6651E-01	9.9384E-04	3.6019E-03	1.2958E 02	1.1279E-03
14	[illegible]	315.0	547.72	3.0217E 00	7.8714E-01	1.0662E-03	4.2947E-03	1.3134E 02	1.3449E-03
15	.7583	0	541.97	3.0650E 00	7.3707E-01	9.9664E-04	3.9917E-03	1.2997E 02	1.2500E-03
16	.7996	0	543.11	2.8111E 00	7.8875E-01	1.0617E-03	4.2778E-03	1.3024E 02	1.3396E-03
17	.8409	0	543.72	2.7305E 00	6.9972E-01	9.4267E-04	3.7980E-03	1.3039E 02	1.1893E-03
18	.8822	0	544.61	3.0374E 00	7.6073E-01	1.0264E-03	4.1350E-03	1.3060E 02	1.2949E-03
19	.9235	0	544.80	2.8523E 00	7.1455E-01	9.6405E-04	3.8839E-03	1.3065E 02	1.2162E-03
20	.9648	0	545.61	2.9767E 00	7.1584E-01	9.6604E-04	3.8950E-03	1.3084E 02	1.2197E-03
21	.2524	45.0	526.32	1.4791E 00	4.3722E-01	5.7553E-04	2.3210E-03	1.2625E 02	7.2683E-04
22	.2943	45.0	528.44	1.2103E 00	3.9060E-01	5.1560E-04	2.0791E-03	1.2675E 02	6.5106E-04
23	.3363	45.0	529.66	1.2953E 00	3.8934E-01	5.1482E-04	2.0758E-03	1.2704E 02	6.5003E-04
24	.3783	45.0	511.30	1.0985E 00	3.3020E-01	4.3753E-04	1.7640E-03	1.2743E 02	5.5239E-04
25	.4203	45.0	511.83	1.1179E 00	3.2682E-01	4.3069E-04	1.7365E-03	1.2756E 02	5.4375E-04
26	.4623	45.0	514.31	1.2836E 00	3.6011E-01	4.7907E-04	1.9311E-03	1.2815E 02	6.0474E-04
27	.5043	45.0	515.46	1.3731E 00	3.6462E-01	4.8580E-04	1.9582E-03	1.2842E 02	6.1320E-04
100	[illegible]	115.0	550.69	3.1537E 00	7.5839E-01	1.0314E-03	4.1539E-03	1.3205E 02	1.3008E-03
29	.5882	45.0	516.97	1.6165E 00	4.4538E-01	3.9461E-04	2.3960E-03	1.2878E 02	7.5049E-04
30	.6302	45.0	538.87	1.8625E 00	5.0388E-01	6.7442E-04	2.7180E-03	1.2923E 02	8.5113E-04
31	.6722	45.0	543.21	2.3338E 00	5.7288E-01	7.7126E-04	3.1075E-03	1.3027E 02	9.7311E-04
32	.7170	45.0	544.99	2.7851E 00	6.5586E-01	8.8509E-04	3.5658E-03	1.3069E 02	1.1166E-03
33	.7583	45.0	544.00	2.7382E 00	7.5446E-01	1.0160E-03	4.0766E-03	1.3045E 02	1.2829E-03
34	.7996	45.0	544.89	2.9444E 00	8.2615E-01	1.1147E-03	4.4910E-03	1.3067E 02	1.4064E-03
35	.8409	45.0	546.36	3.0862E 00	8.3695E-01	1.1289E-03	4.5475E-03	1.3102E 02	1.4240E-03
35	.8822	45.0	547.19	3.1170E 00	8.1886E-01	1.1097E-03	4.4701E-03	1.3121E 02	1.3998E-03
37	.9235	45.0	547.44	3.0728E 00	7.8512E-01	1.0630E-03	4.2821E-03	1.3127E 02	1.3409E-03
38	.9648	45.0	549.06	2.8582E 00	6.8734E-01	9.3266E-04	3.7566E-03	1.3165E 02	1.1764E-03
39	.2524	90.0	530.16	1.4847E 00	4.3888E-01	5.8065E-04	2.3412E-03	1.2716E 02	7.3314E-04
40	.2943	90.0	531.67	1.4449E 00	4.6376E-01	6.1413E-04	2.4760E-03	1.2752E 02	7.7535E-04
41	.3363	90.0	532.48	1.4604E 00	4.6096E-01	6.1174E-04	2.4662E-03	1.2771E 02	7.7229E-04
42	.3783	90.0	533.20	1.3505E 00	4.2627E-01	5.6625E-04	2.2827E-03	1.2788E 02	7.1483E-04
43	.4203	90.0	534.28	1.7085E 00	5.0506E-01	6.7186E-04	2.7083E-03	1.2814E 02	8.4811E-04
44	.4623	90.0	534.22	1.2289E 00	3.8174E-01	5.0778E-04	2.0469E-03	1.2812E 02	6.4098E-04
45	.5043	90.0	535.63	1.5411E 00	4.2462E-01	5.6588E-04	2.2809E-03	1.2846E 02	7.1428E-04
46	.5463	90.0	535.6-	1.4089E 00	4.0233E-01	5.3621E-04	2.1613E-03	1.2847E 02	6.7682E-04
47	.5882	90.0	537.87	1.4406E 00	4.0420E-01	5.4028E-04	2.1775E-03	1.2899E 02	6.8187E-04
48	.6302	90.0	539.11	1.4781E 00	4.6237E-01	6.1906E-04	2.4948E-03	1.2929E 02	7.8125E-04
49	.6722	90.0	541.88	1.8002E 00	4.5100E-01	6.0608E-04	2.4421E-03	1.2995E 02	7.6475E-04
50	.7170	90.0	544.40	2.0032E 00	4.7173E-01	6.3689E-04	2.5627E-03	1.3055E 02	8.0252E-04
51	.7583	90.0	541.60	2.1857E 00	5.6937E-01	7.6487E-04	3.0820E-03	1.2988E 02	9.6513E-04
52	.7996	90.0	542.68	2.8626E 00	7.4571E-01	1.0032E-03	4.0421E-03	1.3014E 02	1.2658E-03
53	.8409	90.0	543.04	3.2110E 00	8.0443E-01	1.0828E-03	4.3626E-03	1.3023E 02	1.3661E-03
54	.8822	90.0	544.33	3.6775E 00	9.0271E-01	1.2171E-03	4.9036E-03	1.3053E 02	1.5356E-03
55	.9235	90.0	544.20	3.7725E 00	9.0721E-01	1.2230E-03	4.9272E-03	1.[illegible]350E 02	1.5430E-03
56	.9648	90.0	544.89	3.6267E 00	8.7214E-01	1.1768E-03	4.7411E-03	1.3067E 02	1.4847E-03
57	.2524	135.0	524.97	3.6452E-01	1.0776E-01	1.4159E-04	5.7106E-04	1.2593E 02	1.7883E-04
58	.2943	135.0	526.51	1.7636E 00	5.6546E-01	7.4453E-04	3.0025E-03	1.2629E 02	9.4023E-04
59	.3363	135.0	526.88	1.7003E 00	5.3667E-01	7.0696E-04	2.8509E-03	1.2638E 02	8.9277E-04
60	.3783	135.0	525.05	1.6288E 00	5.0596E-01	6.6490E-04	2.6816E-03	1.2595E 02	8.3974E-04
61	.4203	135.0	527.96	1.5895E 00	4.7779E-01	6.3030E-04	2.5416E-03	1.2664E 02	7.9591E-04
62	.4623	135.0	528.90	1.5302E 00	4.4462E-01	5.8727E-04	2.3680E-03	1.2686E 02	7.4154E-04
63	.5043	135.0	529.99	1.7167E 00	4.3862E-01	5.8018E-04	2.3393E-03	1.2712E 02	7.3255E-04
64	.5463	135.0	530.71	1.6414E 00	4.3587E-01	5.7708E-04	2.3267E-03	1.2729E 02	7.2861E-04
65	.5882	135.0	531.74	1.7042E 00	4.5256E-01	6.0001E-04	2.4190E-03	1.2754E 02	7.5751E-04
66	.6302	135.0	533.09	1.9749E 00	4.9787E-01	6.6126E-04	2.6658E-03	1.2786E 02	8.3478E-04
67	.6722	135.0	537.72	2.1697E 00	5.2178E-01	6.9738E-04	2.8103E-03	1.2896E 02	8.8006E-04
68	.7170	135.0	539.22	2.2350E 00	5.2632E-01	7.0470E-04	2.8403E-03	1.2932E 02	8.8943E-04
69	.7583	135.0	536.05	1.5919E 00	[illegible]	5.9557E-04	2.4005E-03	1.2856E 02	7.5173E-04
70	.7996	135.0	538.46	2.8837E 00	8.3789E-01	1.1209E-03	4.5172E-03	1.2914E 02	1.4146E-03
71	.8409	135.0	540.15	3.2120E 00	8.8499E-01	1.1865E-03	4.7814E-03	1.2953E 02	1.4973E-03
72	.8822	135.0	540.72	3.8089E 00	1.0305E 00	1.3826E-03	5.5718E-03	1.2967E 02	1.7447E-03
73	.9235	135.0	542.13	4.0580E 00	9.9612E-01	1.3391E-03	5.3957E-03	1.3001E 02	1.6897E-03
74	.9648	135.	543.23	4.3179E 00	1.0384E 00	1.3980E-03	5.6326E-03	1.3027E 02	1.7638E-03
75	.2524	180.0	527.48	2.2292E 00	6.4771E-01	8.5392E-04	3.4435E-03	1.2652E 02	1.0783E-03
76	.2943	180.0	529.49	1.2150E 00	3.8956E-01	5.1494E-04	2.0763E-03	1.2700E 02	6.5019E-04
77	.3363	180.0	530.08	1.6816E 00	4.9711E-01	6.5761E-04	2.6515E-03	1.2714E 02	8.3031E-04
78	.3783	180.0	530.80	1.7018E 00	5.1156E-01	6.7738E-04	2.7311E-03	1.2731E 02	8.5524E-04
79	.4203	180.0	532.45	1.4954E 00	5.0118E-01	6.6510E-04	2.6813E-03	1.2770E 02	8.3965E-04
80	.4623	180.0	533.73	1.8346E 00	5.2390E-01	6.9642E-04	2.8074E-03	1.2801E 02	8.7914E-04
81	.5043	180.0	534.83	1.6511E 00	4.1363E-01	5.5065E-04	2.2190E-03	1.2827E 02	6.9508E-04
82	.5463	180.0	535.68	1.4653E 00	4.4222E-01	5.8938E-04	2.3750E-03	1.2847E 02	7.4393E-04
83	.5882	180.0	536.79	1.5633E 00	4.1514E-01	5.5411E-04	2.2333E-03	1.2874E 02	6.9937E-04
84	.6302	180.0	537.42	-3.9415E-02	-1.0467E-02	-1.3982E-05	-5.6353E-05	1.2889E 02	-1.7447E-05
85	.6722	180.0	543.84	2.2209E 00	5.3409E-01	7.1964E-04	2.8994E-03	1.3042E 02	9.0795E-04
86	.7170	180.0	545.23	2.5064E 00	5.9023E-01	7.9678E-04	3.2100E-03	1.3075E 02	1.0032E-03
87	.7583	180.0	543.38	1.9732E 00	4.7651E-01	6.3894E-04	2.5746E-03	1.303[illegible]E 02	8.[illegible]16E-04
88	.7996	180.0	545.00	3.0667E 00	7.9888E-01	1.0781E-03	4.3434E-03	1.3069E 02	1.3601E-03
89	.8409	180.0	546.32	3.7957E 00	9.6985E-01	1.3112E-03	5.2819E-03	1.3101E 02	1.6540E-03
90	.8822	180.0	547.27	4.4210E 00	1.0188E 00	1.3791E-03	5.5552E-03	1.3123E 02	1.7396E-03
91	.9235	180.0	547.77	4.7762E 00	1.1724E 00	1.5881E-03	6.3972E-03	1.3135E 02	2.0033E-03
92	.9648	180.0	549.52	4.9273E 00	1.1354E 00	1.5417E-03	6.2096E-03	1.3177E 02	1.9445E-03
93	.8822	225.0	549.28	3.7907E 00	9.6857E-01	1.3147E-03	5.2954E-03	1.3171E 02	1.6582E-03
94	.9648	225.0	550.05	4.2198E 00	1.0148E 00	1.3789E-03	5.5535E-03	1.3196E 02	1.7391E-03
95	.7170	270.0	549.86	2.1730E 00	4.8990E-01	6.6478E-04	2.6776E-03	1.3166E 02	8.3849E-04
96	.7996	270.0	551.49	2.7532E 00	7.3113E-01	9.9539E-04	4.0087E-03	1.3224E 02	1.2553E-03
97	.8822	270.0	552.43	3.4762E 00	8.8821E-01	1.2108E-03	4.8760E-03	1.324[illegible]E 02	1.5269E-03
98	.9648	270.0	551.04	3.7281E 00	8.9653E-01	1.22[illegible]E-03	4.9179E-03	1.3232E 02	1.5400E-03




ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 33
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45
90
135
180
SYM PHI X/L
225
270
315
0.98
0.96
32.00
24.00
16.00
8.00
0.00
-8.00
0.00
0.20
0.40
0.60
0.80
1.00
X/L
ST X 10**4

2

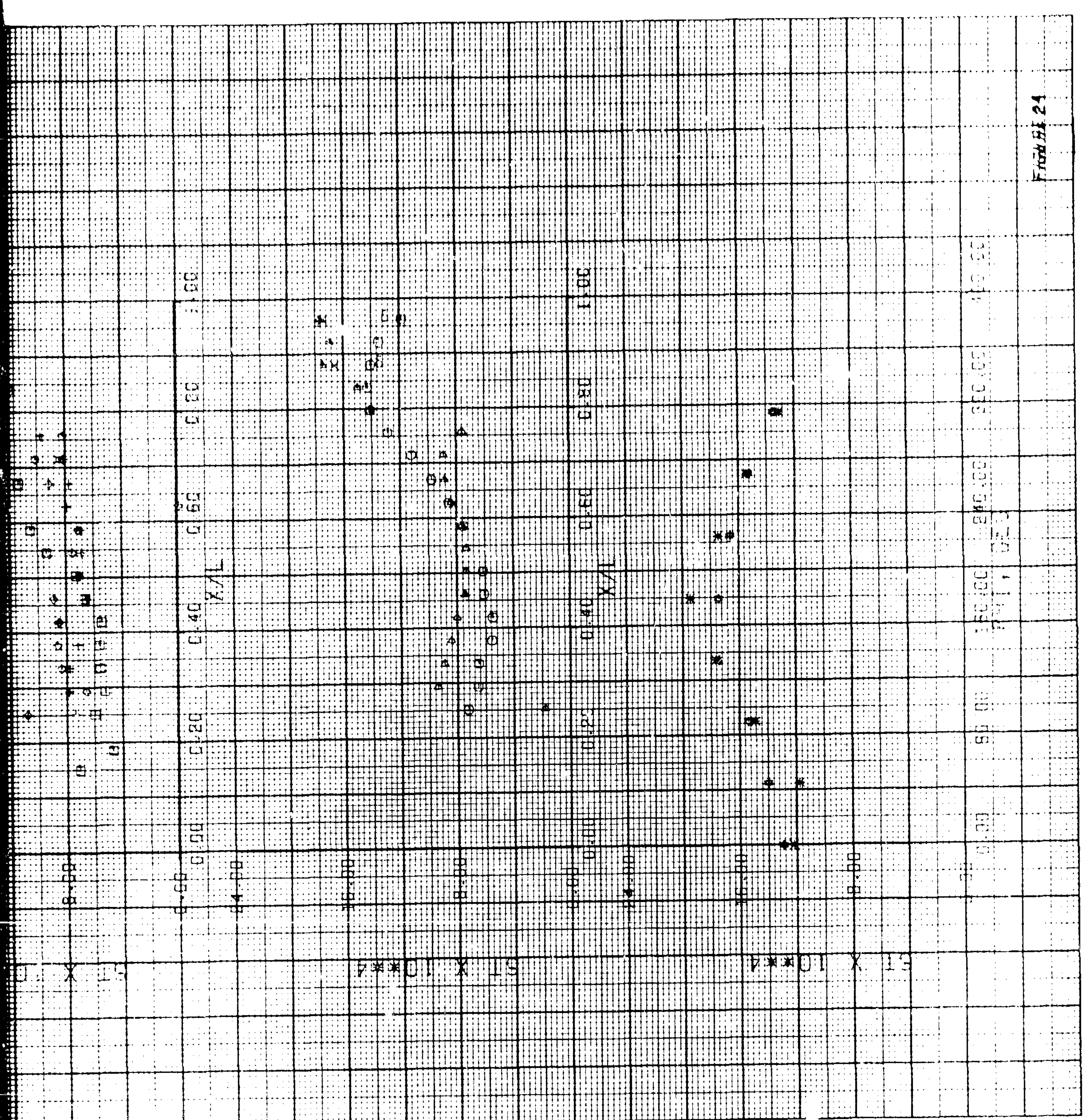


Figure 24

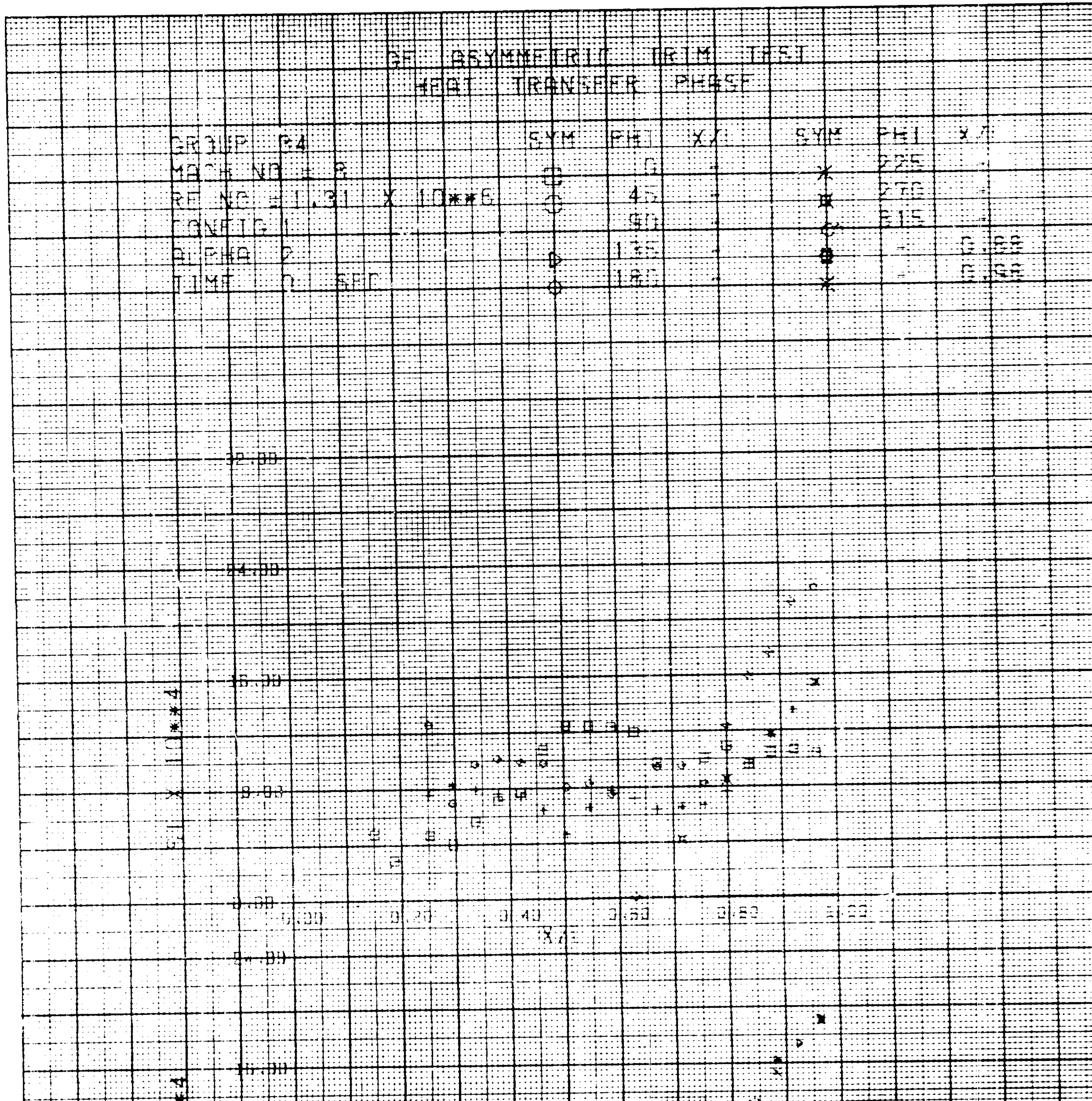
7/14/69

ARO (ARO, INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
V10967-B00

GROUP	CONFIG	ALPHA-M	BETA-M	ALPHA-S	ROLL	ALP-P	DATE	MACH NO	PO	TO	TIME
34	1	2.00	0	2.00	0	0	715	7.97	279.28	1286.00	-.00

T-INF	P-INF	Q-INF	V-INF	RHO-INF	MU-INF	RE/FT	RE/D	HO
9.38400E 01	2.93125E-02	1.30337E 00	3.78310E 03	2.02070E-05	7.55506E-08	1.31231E 06	1.20425E 06	3.14022E 02

TC NO	X/L	PHI	TEMP	SLOPE	Q-STOR	HT	HM	HW	ST
1	.1506	0	525.20	1.3131E 00	2.0544E-01	3.7518E-04	1.5131E-03	1.2590E 02	4.7434E-04
2	.1867	0	525.18	7.6635E-01	1.6930E-01	2.2121E-04	8.9216E-04	1.2598E 02	2.7968E-04
3	.2524	0	526.26	9.3366E-01	2.7600E-01	3.6328E-04	1.4650E-03	1.2623E 02	4.5927E-04
4	.2943	0	529.54	7.9480E-01	2.3026E-01	3.1497E-04	1.2700E-03	1.2701E 02	3.9812E-04
5	.3363	0	530.76	1.0593E 00	3.3433E-01	4.4268E-04	1.7848E-03	1.2730E 02	5.5952E-04
6	.3783	0	531.89	1.4109E 00	4.2412E-01	5.6241E-04	2.2674E-03	1.2757E 02	7.1080E-04
7	.4203	0	532.23	1.5757E 00	4.5784E-01	6.0741E-04	2.4488E-03	1.2765E 02	7.6766E-04
8	.4623	0	533.60	2.1204E 00	6.3933E-01	8.4912E-04	3.4254E-03	1.2798E 02	1.0738E-03
9	.5043	0	534.09	2.7345E 00	7.3979E-01	9.8389E-04	3.9662E-03	1.2810E 02	1.2433E-03
10	.5463	0	535.89	2.6235E 00	7.3611E-01	9.8133E-04	3.9555E-03	1.2852E 02	1.2400E-03
11	.5882	0	537.00	2.6496E 00	7.3005E-01	9.7471E-04	3.9285E-03	1.2879E 02	1.2315E-03
12	.6302	0	538.58	2.6089E 00	7.0580E-01	9.4431E-04	3.8057E-03	1.2916E 02	1.1930E-03
13	.6722	0	540.09	2.2941E 00	5.7473E-01	7.7133E-04	3.1082E-03	1.2971E 02	9.7437E-04
99	.8822	315.0	548.06	2.7308E 00	7.1136E-01	9.6398E-04	3.8829E-03	1.3142E 02	1.2172E-03
15	.7583	0	542.76	2.4489E 00	5.8891E-01	7.9235E-04	3.1925E-03	1.3016E 02	1.0008E-03
16	.7996	0	543.78	2.7753E 00	6.3840E-01	8.6012E-04	3.4654E-03	1.3040E 02	1.0864E-03
17	.8409	0	544.07	2.1910E 00	5.6002E-01	7.5481E-04	3.0411E-03	1.3047E 02	9.5334E-04
18	.8822	0	544.53	2.4330E 00	6.0969E-01	8.2225E-04	3.3127E-03	1.3058E 02	1.0385E-03
19	.9235	0	544.29	2.4709E 00	6.2101E-01	8.3726E-04	3.3732E-03	1.3052E 02	1.0575E-03
20	.9648	0	545.14	2.5113E 00	6.0392E-01	8.1518E-04	3.2840E-03	1.3073E 02	1.0295E-03
21	.2524	45.0	524.75	1.1614E 00	4.0244E-01	5.2865E-04	2.1321E-03	1.2587E 02	6.6840E-04
22	.2943	45.0	527.65	1.2352E 00	3.9602E-01	5.2222E-04	2.1050E-03	1.2656E 02	6.6016E-04
23	.3363	45.0	529.00	1.2236E 00	3.6781E-01	4.8588E-04	1.9592E-03	1.2688E 02	6.1418E-04
24	.3783	45.0	530.88	1.1186E 00	3.3624E-01	4.4529E-04	1.7953E-03	1.2733E 02	5.6280E-04
25	.4203	45.0	531.62	1.0261E 00	2.9815E-01	3.9522E-04	1.5934E-03	1.2751E 02	4.9951E-04
26	.4623	45.0	534.25	1.2289E 00	3.4480E-01	4.5867E-04	1.8489E-03	1.2813E 02	5.7961E-04
27	.5043	45.0	535.48	1.4287E 00	3.7939E-01	5.0551E-04	2.0376E-03	1.2843E 02	6.3876E-04
100	.9648	315.0	550.71	2.8211E 00	6.7841E-01	9.2269E-04	3.7161E-03	1.3206E 02	1.1650E-03
29	.5882	45.0	537.53	1.8628E 00	5.1325E-01	6.8574E-04	2.7630E-03	1.2891E 02	8.6460E-04
30	.6302	45.0	539.46	2.2219E 00	6.0113E-01	8.0521E-04	3.2449E-03	1.2937E 02	1.0172E-03
31	.6722	45.0	543.57	2.7908E 00	6.8505E-01	9.2271E-04	3.7176E-03	1.3035E 02	1.1654E-03
32	.7170	45.0	545.17	2.9267E 00	6.8921E-01	9.3032E-04	3.7479E-03	1.3073E 02	1.1749E-03
33	.7583	45.0	544.31	2.6996E 00	7.4382E-01	1.0029E-03	4.0405E-03	1.3053E 02	1.2667E-03
34	.7996	45.0	545.18	2.6947E 00	7.5608E-01	1.0206E-03	4.1117E-03	1.3074E 02	1.2890E-03
35	.8409	45.0	546.53	2.8370E 00	7.6753E-01	1.0378E-03	4.1807E-03	1.3103E 02	1.3106E-03
36	.8822	45.0	547.84	2.8883E 00	7.3655E-01	9.9674E-04	4.0151E-03	1.3118E 02	1.2587E-03
37	.9235	45.0	547.09	2.4988E 00	6.8956E-01	9.3322E-04	3.7592E-03	1.3119E 02	1.1785E-03
38	.9648	45.0	548.72	2.5788E 00	6.1823E-01	8.3853E-04	3.3775E-03	1.3158E 02	1.0588E-03
39	.2524	90.0	528.71	1.5291E 00	4.5203E-01	5.9690E-04	2.4069E-03	1.2682E 02	7.5453E-04
40	.2943	90.0	530.87	1.5304E 00	4.9261E-01	6.5236E-04	2.6302E-03	1.2733E 02	8.2453E-04
41	.3363	90.0	531.70	1.4972E 00	4.7257E-01	6.2650E-04	2.5258E-03	1.2753E 02	7.9188E-04
42	.3783	90.0	532.57	1.4406E 00	4.5471E-01	6.0351E-04	2.4330E-03	1.2775E 02	7.6272E-04
43	.4203	90.0	533.46	1.4805E 00	4.3764E-01	5.8155E-04	2.3444E-03	1.2795E 02	7.3493E-04
44	.4623	90.0	533.55	1.2177E 00	3.7827E-01	5.0272E-04	2.0266E-03	1.2797E 02	6.3531E-04
45	.5043	90.0	535.35	9.9593E-01	2.7441E-01	3.6556E-04	1.4735E-03	1.2840E 02	4.6193E-04
46	.5463	90.0	535.42	1.1603E 00	3.8846E-01	5.1755E-04	2.0862E-03	1.2841E 02	6.5398E-04
47	.5882	90.0	537.02	1.4389E 00	4.5983E-01	6.1443E-04	2.4764E-03	1.2893E 02	7.7630E-04
48	.6302	90.0	538.81	1.5336E 00	4.2255E-01	5.6551E-04	2.2791E-03	1.2922E 02	7.1445E-04
49	.6722	90.0	541.07	1.4908E 00	3.7343E-01	5.0166E-04	2.0214E-03	1.2989E 02	6.3369E-04
50	.7170	90.0	543.96	1.4203E 00	3.8156E-01	5.1419E-04	2.0717E-03	1.3044E 02	6.4944E-04
51	.7583	90.0	541.23	1.4933E 00	3.8900E-01	5.2232E-04	2.1047E-03	1.2980E 02	6.5980E-04
52	.7996	90.0	542.22	1.7282E 00	4.4810E-01	6.0247E-04	2.4275E-03	1.3003E 02	7.6100E-04
53	.8409	90.0	542.61	2.2537E 00	5.6460E-01	7.5952E-04	3.0603E-03	1.3013E 02	9.5935E-04
54	.8822	90.0	544.06	2.7758E 00	6.8119E-01	9.1812E-04	3.6990E-03	1.3047E 02	1.1596E-03
55	.9235	90.0	544.02	3.2774E 00	7.8815E-01	1.0622E-03	4.2797E-03	1.3046E 02	1.3416E-03
56	.9648	90.0	545.12	3.6977E 00	8.8923E-01	1.2002E-03	4.8354E-03	1.3072E 02	1.5158E-03
57	.2524	135.0	523.40	3.8709E-01	1.1443E-01	1.5009E-04	6.0537E-04	1.2560E 02	1.8978E-04
58	.2943	135.0	525.85	2.0331E 00	6.5184E-01	8.5752E-04	3.4583E-03	1.2614E 02	1.0841E-03
59	.3363	135.0	525.61	1.4348E 00	5.1599E-01	6.7860E-04	2.7367E-03	1.2608E 02	8.5793E-04
60	.3783	135.0	524.42	1.7591E 00	5.4644E-01	7.1750E-04	2.8938E-03	1.2579E 02	9.0718E-04
61	.4203	135.0	527.59	1.8231E 00	5.4802E-01	7.2259E-04	2.9139E-03	1.2655E 02	9.1345E-04
62	.4623	135.0	528.59	1.6599E 00	4.8231E-01	6.3679E-04	2.5677E-03	1.2679E 02	8.0495E-04
63	.5043	135.0	529.70	1.8125E 00	4.6311E-01	6.1234E-04	2.4690E-03	1.2705E 02	7.7390E-04
64	.5463	135.0	530.62	1.7393E 00	4.6188E-01	6.1143E-04	2.4652E-03	1.2727E 02	7.7281E-04
65	.5882	135.0	531.78	1.6868E 00	4.4792E-01	5.9389E-04	2.3943E-03	1.2755E 02	7.5059E-04
66	.6302	135.0	533.09	1.8819E 00	4.9974E-01	6.6374E-04	2.6758E-03	1.2786E 02	8.3881E-04
67	.6722	135.0	537.46	2.0192E 00	4.8558E-01	6.4886E-04	2.6151E-03	1.2894E 02	8.1980E-04
68	.7170	135.0	539.06	2.0893E 00	4.9201E-01	6.5869E-04	2.6545E-03	1.2928E 02	8.3216E-04
69	.7583	135.0	536.16	1.4026E 00	3.9355E-01	5.2485E-04	2.1155E-03	1.2859E 02	6.6318E-04
70	.7996	135.0	538.63	2.3505E 00	6.8297E-01	9.1383E-04	3.6828E-03	1.2918E 02	1.1545E-03
71	.8409	135.0	540.47	2.7184E 00	7.4901E-01	1.0047E-03	4.0485E-03	1.2961E 02	1.2692E-03
72	.8822	135.0	541.02	3.5203E 00	9.5239E-01	1.2794E-03	5.1554E-03	[illegible]	[illegible]
73	.9235	135.0	543.16	4.1425E 00	1.0169E 00	1.3689E-03	5.5154E-03	1.3026E 02	1.7290E-03
74	.9648	135.0	544.53	4.6474E 00	1.1176E 00	1.5073E-03	6.0726E-03	1.3058E 02	1.9037E-03
75	.2524	180.0	526.17	2.6058E 00	7.5713E-01	9.9645E-04	4.0185E-03	1.2621E 02	1.2598E-03
76	.2943	180.0	528.78	1.2972E 00	4.1590E-01	5.4925E-04	2.2147E-03	1.2683E 02	6.9428E-04
77	.3363	180.0	529.45	1.9711E 00	5.8269E-01	7.7019E-04	3.1055E-03	1.2699E 02	9.7353E-04
78	.3783	180.0	530.59	2.0082E 00	6.0306E-01	7.9912E-04	3.2219E-03	1.2726E 02	1.0100E-03
79	.4203	180.0	532.55	1.9836E 00	5.8637E-01	7.7824E-04	3.1374E-03	1.2773E 02	9.8355E-04
80	.4623	180.0	533.95	2.0272E 00	5.7892E-01	7.6979E-04	3.1031E-03	1.2806E 02	9.7279E-04
81	.5043	180.0	535.03	1.8981E 00	4.7552E-01	6.3321E-04	2.5524E-03	1.2832E 02	8.0014E-04
82	.5463	180.0	536.11	1.8436E 00	4.8956E-01	6.5284E-04	2.6314E-03	1.2857E 02	8.2490E-04
83	.5882	180.0	537.25	1.6649E 00	4.4212E-01	5.9048E-04	2.3799E-03	1.2885E 02	7.4606E-04
84	.6302	180.0	537.67	-1.1578E-03	-3.0745E-04	-4.1085E-07	-1.6558E-06	1.2895E 02	-5.1909E-07
85	.6722	180.0	543.98	2.2866E 00	5.4988E-01	7.4106E-04	2.9857E-03	1.3045E 02	9.3597E-04
86	.7170	180.0	545.26	2.3586E 00	5.5542E-01	7.4982E-04	3.0208E-03	1.3075E 02	9.4697E-04
87	.7583	180.0	543.55	1.9973E 00	4.8030E-01	6.4691E-04	2.6064E-03	1.3035E 02	8.1708E-04
88	.7996	180.0	545.36	2.7799E 00	7.2417E-01	9.7776E-04	3.9390E-03	1.3078E 02	1.2348E-03
89	.8409	180.0	547.06	3.6443E 00	9.3115E-01	1.2601E-03	5.0761E-03	1.3118E 02	1.5913E-03
90	.8822	180.0	548.42	4.4391E 00	1.0229E 00	1.3869E-03	5.5863E-03	1.3151E 02	1.7512E-03
91	.9235	180.0	549.23	5.0281E 00	1.2343E 00	1.6752E-03	6.7474E-03	1.3170E 02	2.1152E-03
92	.9648	180.0	551.21	5.6063E 00	1.2919E 00	1.7582E-03	7.0809E-03	1.3217E 02	2.2198E-03
93	.8822	225.0	550.30	3.4779E 00	8.8863E-01	1.2079E-03	4.8648E-03	1.3196E 02	1.5250E-03
94	.9648	225.0	551.59	4.6087E 00	1.1083E 00	1.5071E-03	6.0776E-03	1.3226E 02	1.9052E-03
95	.7170	270.0	549.15	1.0537E 00	2.3755E-01	3.2230E-04	1.2985E-03	1.3168E 02	4.0706E-04
96	.7996	270.0	551.02	1.8412E 00	4.8892E-01	6.6576E-04	2.6812E-03	1.3227E 02	8.4052E-04
97	.8822	270.0	552.90	2.6467E 00	6.7626E-01	9.2247E-04	3.7148E-03	1.3258E 02	1.1645E-03
98	.9648	270.0	552.61	3.7071E 00	8.9140E-01	1.2156E-03	4.8951E-03	1.3251E 02	1.5346E-03



GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 84
MACH NO = 8
RE NO =1.31 X 10**6
CONFIG 1
ALPHA 2
TIME 0 SEC
SYM PHI X/L
0
45
90
135
180
SYM PHI X/L
225
270
315
32.00
24.00
16.00
8.00
0.00
0.00
0.20
0.40
0.60
0.80
1.00
X/L
-8.00
16.00

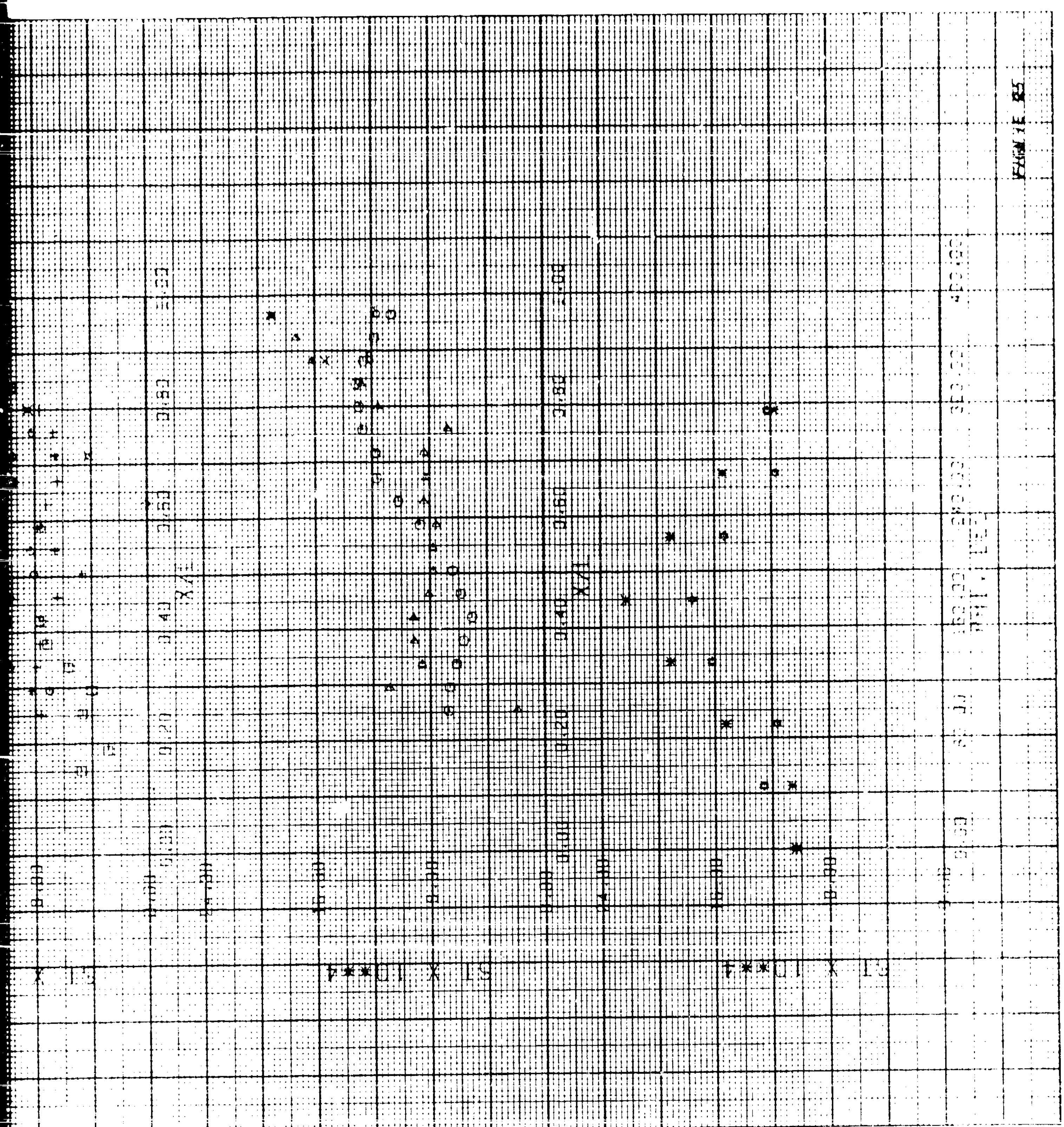


Figure 25

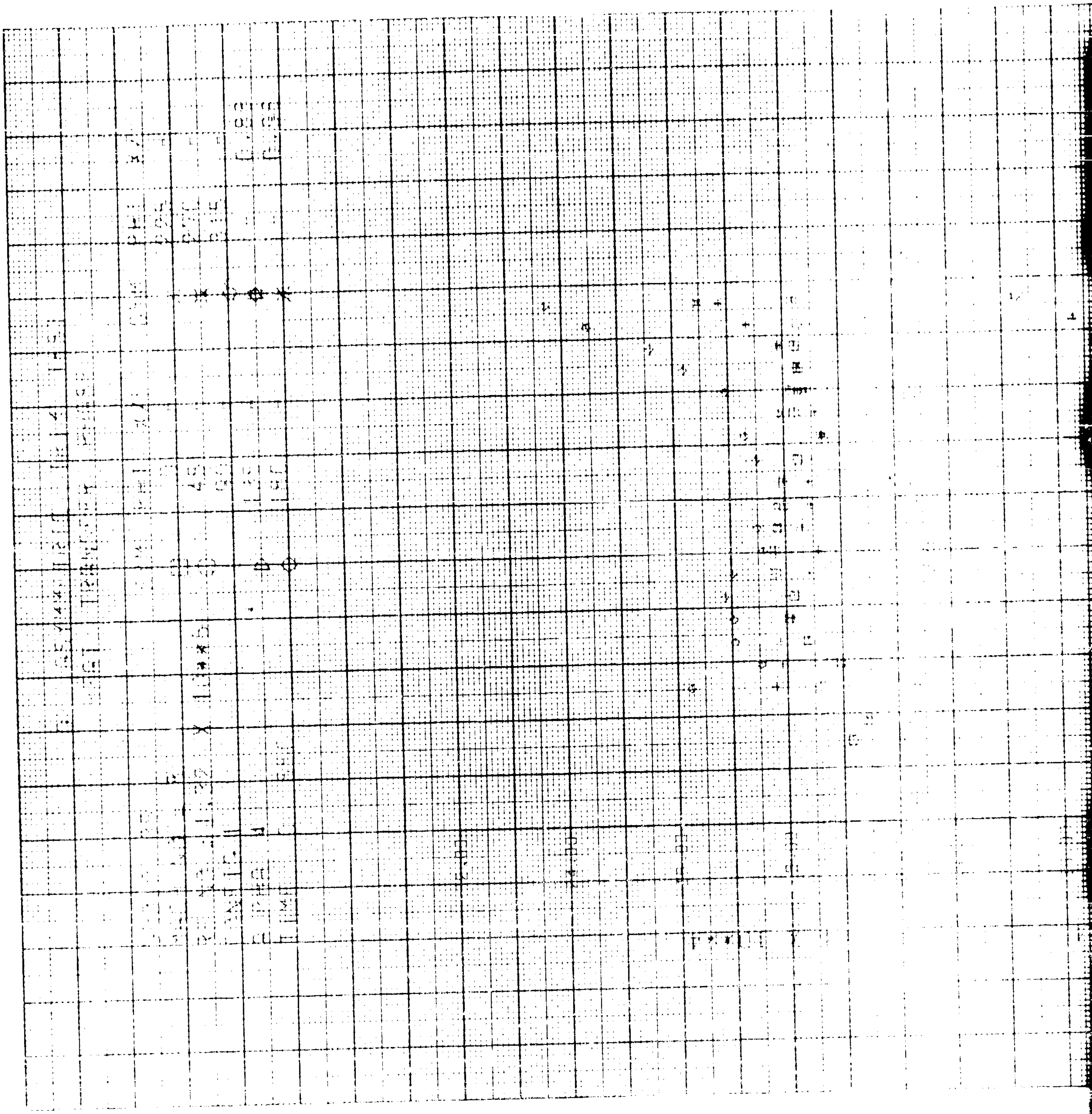
7/14/69

AEDC(ARO,INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
VT0967-H00

GROUP	CONFIG	ALPHA-M	BETA-M	ALPHA-S	ROLL	ALP-P	DATE	MACH NO	PO	TO	TIME
35	1	3.94	0	3.94	0	0	715	7.97	280.70	1280.00	-.00

T-INF	P-INF	Q-INF	V-INF	RHO-INF	MU-INF	RE/FT	RE/IN	HO
9.38480E 01	2.94781E-02	1.31039E 00	3.70310E 03	2.63405E-05	7.55506E-08	1.31937E 06	1.20948E 05	3.14022E 02

TC NO	X/L	PHI	TEMP	SLOPE	Q-STOR	HT	HO	HW	ST
1	.1536	0	528.81	9.3121E-01	2.0243E-01	2.6734E-04	1.0780E-03	1.2684E 02	3.3613E-04
2	.1867	0	527.32	6.3229E-01	1.3886E-01	1.8303E-04	7.3808E-04	1.2649E 02	2.3014E-04
3	.2524	0	528.43	1.1530E 00	3.4084E-01	4.4991E-04	1.8142E-03	1.2675E 02	5.6569E-04
4	.2943	0	533.25	7.9496E-01	2.5091E-01	3.3333E-04	1.3437E-03	1.2789E 02	4.1899E-04
5	.3363	0	535.47	1.2326E 00	3.8905E-01	5.1836E-04	2.0894E-03	1.2842E 02	6.5150E-04
6	.3783	0	536.81	1.5470E 00	4.6504E-01	6.2072E-04	2.5018E-03	1.2874E 02	7.8009E-04
7	.4203	0	537.34	1.5303E 00	4.4406E-01	5.9394E-04	2.3938E-03	1.2887E 02	7.4641E-04
8	.4623	0	538.49	1.8907E 00	5.2094E-01	6.9690E-04	2.8086E-03	1.2914E 02	8.7575E-04
9	.5043	0	538.71	1.9496E 00	5.2745E-01	7.0581E-04	2.8445E-03	1.2919E 02	8.8694E-04
10	.5463	0	540.33	1.8169E 00	5.0978E-01	6.8365E-04	2.7549E-03	1.2958E 02	8.5902E-04
11	.5882	0	541.66	1.7429E 00	4.8021E-01	6.4498E-04	2.5989E-03	1.2985E 02	8.1038E-04
12	.6302	0	542.51	1.7799E 00	4.8153E-01	6.4766E-04	2.6096E-03	1.3010E 02	8.1370E-04
13	.6722	0	542.64	1.6515E 00	4.1375E-01	5.5659E-04	2.2426E-03	1.3013E 02	6.9927E-04
99	.8822	315.0	552.85	2.3031E 00	5.9996E-01	8.1834E-04	3.2954E-03	1.3256E 02	1.0276E-03
15	.7583	0	546.52	1.7656E 00	4.2458E-01	5.7416E-04	2.3129E-03	1.3105E 02	7.2120E-04
16	.7996	0	548.33	1.5576E 00	4.3702E-01	5.9244E-04	2.3863E-03	1.3149E 02	7.4408E-04
17	.8409	0	548.99	1.5875E 00	4.0459E-01	5.4897E-04	2.2112E-03	1.3164E 02	6.8946E-04
18	.8822	0	549.73	1.6703E 00	4.1845E-01	5.6834E-04	2.2891E-03	1.3182E 02	7.1376E-04
19	.9235	0	549.43	1.6784E 00	4.0294E-01	5.4705E-04	2.2034E-03	1.3175E 02	6.8703E-04
20	.9648	0	548.34	1.7741E 00	4.2664E-01	5.7837E-04	2.3297E-03	1.3149E 02	7.2641E-04
21	.2524	45.0	526.83	1.1623E 00	3.4359E-01	4.5258E-04	1.8251E-03	1.2637E 02	5.6909E-04
22	.2943	45.0	531.50	1.0099E 00	3.2380E-01	4.2916E-04	1.7302E-03	1.2748E 02	5.3950E-04
23	.3363	45.0	533.79	1.0410E 00	3.1294E-01	4.1600E-04	1.6770E-03	1.2801E 02	5.2290E-04
24	.3783	45.0	534.94	9.6302E-01	2.8960E-01	3.8567E-04	1.5548E-03	1.2870E 02	4.8474E-04
25	.4203	45.0	536.89	9.0566E-01	2.6315E-01	3.5128E-04	1.4158E-03	1.2876E 02	4.4147E-04
26	.4623	45.0	539.59	9.8761E-01	2.7710E-01	3.7125E-04	1.4961E-03	1.2940E 02	4.6649E-04
27	.5043	45.0	540.29	9.2815E-01	2.4647E-01	3.3051E-04	1.3319E-03	1.2957E 02	4.1530E-04
100	.9648	315.0	553.26	2.5852E 00	6.2170E-01	8.4845E-04	3.4166E-03	1.3206E 02	1.0553E-03
29	.5882	45.0	542.75	1.1100E 00	3.0599E-01	4.1170E-04	1.6580E-03	1.3016E 02	5.1723E-04
30	.6302	45.0	544.01	1.2495E 00	3.3804E-01	4.5559E-04	1.8355E-03	1.3046E 02	5.7233E-04
31	.6722	45.0	545.30	1.5913E 00	3.9062E-01	5.2737E-04	2.1246E-03	1.3076E 02	6.6246E-04
32	.7170	45.0	547.04	1.7546E 00	4.1320E-01	5.5916E-04	2.2525E-03	1.3118E 02	7.0234E-04
33	.7583	45.0	548.76	1.6724E 00	4.6080E-01	6.2504E-04	2.5176E-03	1.3159E 02	7.8501E-04
34	.7996	45.0	550.52	1.9343E 00	5.4272E-01	7.3791E-04	2.9720E-03	1.3201E 02	9.2668E-04
35	.8409	45.0	552.05	2.1500E 00	5.8165E-01	7.9250E-04	3.1915E-03	1.3237E 02	9.9515E-04
36	.8822	45.0	552.09	2.2893E 00	6.0213E-01	8.2134E-04	3.3075E-03	1.3257E 02	1.0313E-03
37	.9235	45.0	553.05	2.4361E 00	6.2246E-01	8.4925E-04	3.4199E-03	1.3261E 02	1.0663E-03
38	.9648	45.0	552.66	2.4493E 00	5.8902E-01	8.0320E-04	3.2345E-03	1.3252E 02	1.0085E-03
39	.2524	90.0	530.74	1.8042E 00	5.3334E-01	7.0617E-04	2.8472E-03	1.2730E 02	8.8777E-04
40	.2943	90.0	535.03	1.5626E 00	5.0100E-01	6.6714E-04	2.6892E-03	1.2832E 02	8.3851E-04
41	.3363	90.0	536.05	1.6122E 00	5.0885E-01	6.7905E-04	2.7369E-03	1.2870E 02	8.5340E-04
42	.3783	90.0	538.37	1.4321E 00	4.5200E-01	6.0459E-04	2.4366E-03	1.2911E 02	7.5975E-04
43	.4203	90.0	539.87	1.6056E 00	4.7462E-01	6.3607E-04	2.5633E-03	1.2946E 02	7.9926E-04
44	.4623	90.0	540.23	1.7036E 00	3.7389E-01	5.0135E-04	2.0203E-03	1.2956E 02	6.2995E-04
45	.5043	90.0	541.57	1.2039E 00	3.3171E-01	4.4556E-04	1.7954E-03	1.2986E 02	5.5982E-04
46	.5463	90.0	543.31	1.4199E 00	4.0547E-01	5.4595E-04	2.1997E-03	1.3029E 02	6.8588E-04
47	.5882	90.0	543.81	1.2901E 00	3.6199E-01	4.8773E-04	1.9650E-03	1.3041E 02	6.1272E-04
48	.6102	90.0	543.85	1.3466E 00	3.7104E-01	4.9995E-04	2.0143E-03	1.3042E 02	6.2808E-04
49	.6722	90.0	544.70	1.4187E 00	3.5542E-01	4.7945E-04	1.9316E-03	1.3062E 02	6.0229E-04
50	.7170	90.0	546.50	1.3089E 00	3.0823E-01	4.1681E-04	1.6790E-03	1.3105E 02	5.2354E-04
51	.7583	90.0	546.29	1.2975E 00	3.3801E-01	4.5694E-04	1.8408E-03	1.3100E 02	5.7397E-04
52	.7996	90.0	547.59	1.5686E 00	4.0861E-01	5.5336E-04	2.2290E-03	1.3131E 02	6.9503E-04
53	.8409	90.0	548.22	1.6394E 00	4.1071E-01	5.5669E-04	2.2423E-03	1.3146E 02	6.9918E-04
54	.8822	90.0	549.49	2.0068E 00	4.9260E-01	6.6883E-04	2.6939E-03	1.3176E 02	8.3998E-04
55	.9235	90.0	549.15	2.5979E 00	6.2475E-01	8.4786E-04	3.4150E-03	1.3168E 02	1.0648E-03
56	.9648	90.0	548.62	3.0744E 00	7.3933E-01	1.0026E-03	4.0386E-03	1.3155E 02	1.2593E-03
57	.2524	135.0	526.54	4.7620E-01	1.4077E-01	1.8535E-04	7.4749E-04	1.2630E 02	2.3307E-04
58	.2943	135.0	530.66	2.6442E 00	7.9649E-01	1.0545E-03	4.2515E-03	1.2728E 02	1.3257E-03
59	.3363	135.0	531.04	2.0717E 00	6.5390E-01	8.6614E-04	3.4921E-03	1.2737E 02	1.0889E-03
60	.3783	135.0	529.92	2.0603E 00	6.4000E-01	8.4647E-04	3.4130E-03	1.2710E 02	1.0642E-03
61	.4203	135.0	533.16	2.0701E 00	6.2228E-01	8.2651E-04	3.3319E-03	1.2786E 02	1.0389E-03
62	.4623	135.0	534.16	1.9259E 00	5.5958E-01	7.4429E-04	3.0003E-03	1.2811E 02	9.3552E-04
63	.5043	135.0	535.37	2.0766E 00	5.3060E-01	7.0602E-04	2.8491E-03	1.2839E 02	8.8837E-04
64	.5463	135.0	536.11	2.0130E 00	5.3455E-01	7.1283E-04	2.8732E-03	1.2858E 02	8.9589E-04
65	.5882	135.0	537.19	1.9352E 00	5.1388E-01	6.8626E-04	2.7659E-03	1.2883E 02	8.6245E-04
66	.6302	135.0	537.68	2.0041E 00	5.3219E-01	7.1118E-04	2.8663E-03	1.2895E 02	8.9373E-04
67	.6722	135.0	540.31	2.0079E 00	4.8286E-01	6.4753E-04	2.6094E-03	1.2958E 02	8.1363E-04
68	.7170	135.0	541.29	1.9559E 00	4.6060E-01	6.1850E-04	2.4923E-03	1.2981E 02	7.7711E-04
69	.7583	135.0	540.66	1.4612E 00	3.9316E-01	5.2747E-04	2.1255E-03	1.2965E 02	6.6276E-04
70	.7996	135.0	542.08	2.7431E 00	6.5174E-01	8.7704E-04	3.5337E-03	1.3001E 02	1.1019E-03
71	.8409	135.0	543.89	2.4220E 00	6.6733E-01	8.9923E-04	3.6229E-03	1.3043E 02	1.1297E-03
72	.8822	135.0	544.65	2.9012E 00	7.9480E-01	1.0727E-03	4.2654E-03	1.3061E 02	1.3300E-03
73	.9235	135.0	545.27	3.5711E 00	8.7659E-01	1.1834E-03	4.7676E-03	1.3076E 02	1.4868E-03
74	.9648	135.0	548.65	4.6973E 00	1.1296E 00	1.5320E-03	6.1707E-03	1.3156E 02	1.9241E-03
75	.2524	180.0	527.42	3.1146E 00	9.0498E-01	1.1930E-03	4.8108E-03	1.2651E 02	1.5001E-03
76	.2943	180.0	532.01	1.8470E 00	5.9218E-01	7.8540E-04	3.1664E-03	1.2760E 02	9.8731E-04
77	.3363	180.0	534.37	2.3902E 00	7.0657E-01	9.3999E-04	3.7891E-03	1.2815E 02	1.1815E-03
78	.3783	180.0	535.49	2.3584E 00	7.0893E-01	9.4459E-04	3.8075E-03	1.2843E 02	1.1872E-03
79	.4203	180.0	536.99	2.5162E 00	7.4360E-01	9.9305E-04	4.0024E-03	1.2879E 02	1.2480E-03
80	.4623	180.0	538.28	2.4889E 00	7.1075E-01	9.5056E-04	3.8309E-03	1.2909E 02	1.1945E-03
81	.5043	180.0	539.48	2.2925E 00	5.7431E-01	7.6932E-04	3.1003E-03	1.2938E 02	9.6671E-04
82	.5463	180.0	540.84	2.2456E 00	5.9637E-01	8.0027E-04	3.2248E-03	1.2970E 02	1.0055E-03
83	.5882	180.0	541.91	1.9182E 00	5.0936E-01	6.8455E-04	2.7583E-03	1.2996E 02	8.6007E-04
84	.6302	180.0	537.91	6.1424E-02	1.6311E-02	2.1804E-05	8.7875E-05	1.2900E 02	2.7400E-05
85	.6722	180.0	546.20	2.4830E 00	5.9299E-01	8.0082E-04	3.2261E-03	1.3098E 02	1.0059E-03
86	.7170	180.0	547.57	2.7164E 00	6.3970E-01	8.6629E-04	3.4895E-03	1.3130E 02	1.0881E-03
87	.7583	180.0	547.13	2.0410E 00	4.9096E-01	6.6448E-04	2.6767E-03	1.3120E 02	8.3461E-04
88	.7996	180.0	549.38	2.7520E 00	7.1710E-01	9.7377E-04	3.9221E-03	1.3178E 02	1.2229E-03
89	.8409	180.0	550.54	3.4971E 00	8.9355E-01	1.2149E-03	4.8932E-03	1.3201E 02	1.5257E-03
90	.8822	180.0	551.73	4.4683E 00	1.0297E 00	1.4023E-03	5.6475E-03	1.3230E 02	1.7609E-03
91	.9235	180.0	552.99	5.2784E 00	1.2957E 00	1.7676E-03	7.1181E-03	1.3260E 02	2.2195E-03
92	.9648	180.0	554.95	6.3597E 00	1.4655E 00	2.0047E-03	8.0720E-03	1.3306E 02	2.5169E-03
93	.8822	225.0	553.67	2.8767E 00	7.3503E-01	1.0036E-03	4.0414E-03	1.3275E 02	1.2601E-03
94	.9648	225.0	555.40	4.5049E 00	1.0838E 00	1.4835E-03	5.9731E-03	1.3317E 02	1.8625E-03
95	.7170	270.0	551.10	1.3378E 00	3.0161E-01	4.1041E-04	1.6529E-03	1.3215E 02	5.1530E-04
96	.7996	270.0	555.32	1.4232E 00	3.7793E-01	5.1728E-04	2.0828E-03	1.3317E 02	6.4943E-04
97	.8822	270.0	557.21	1.8829E 00	4.0109E-01	6.0812E-04	2.6577E-03	1.3360E 02	8.2869E-04
98	.9648	270.0	555.81	3.4187E 00	8.2828E-01	1.1233E-03	4.5227E-03	1.3327E 02	1.4102E-03



2

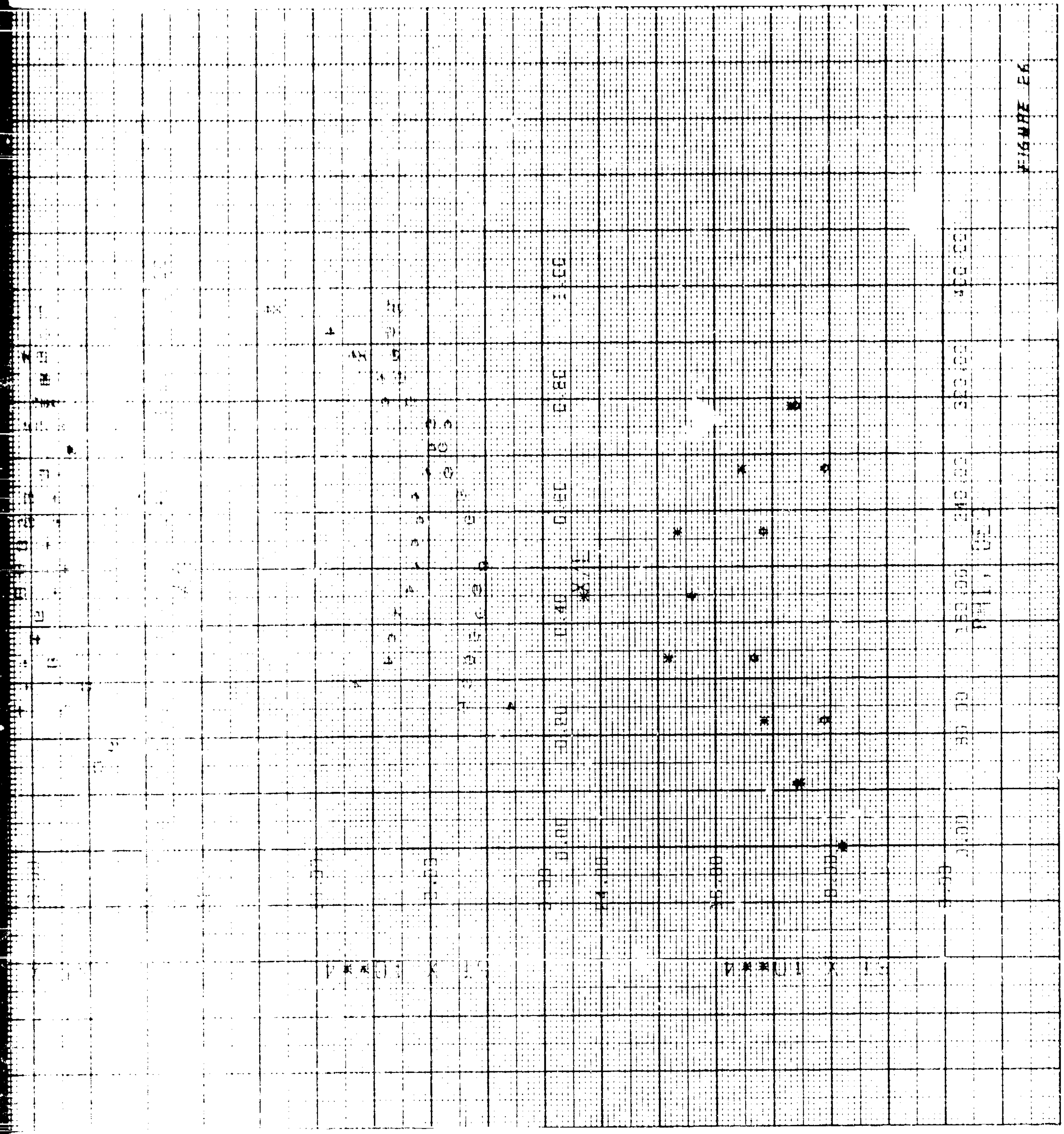


Figure 26

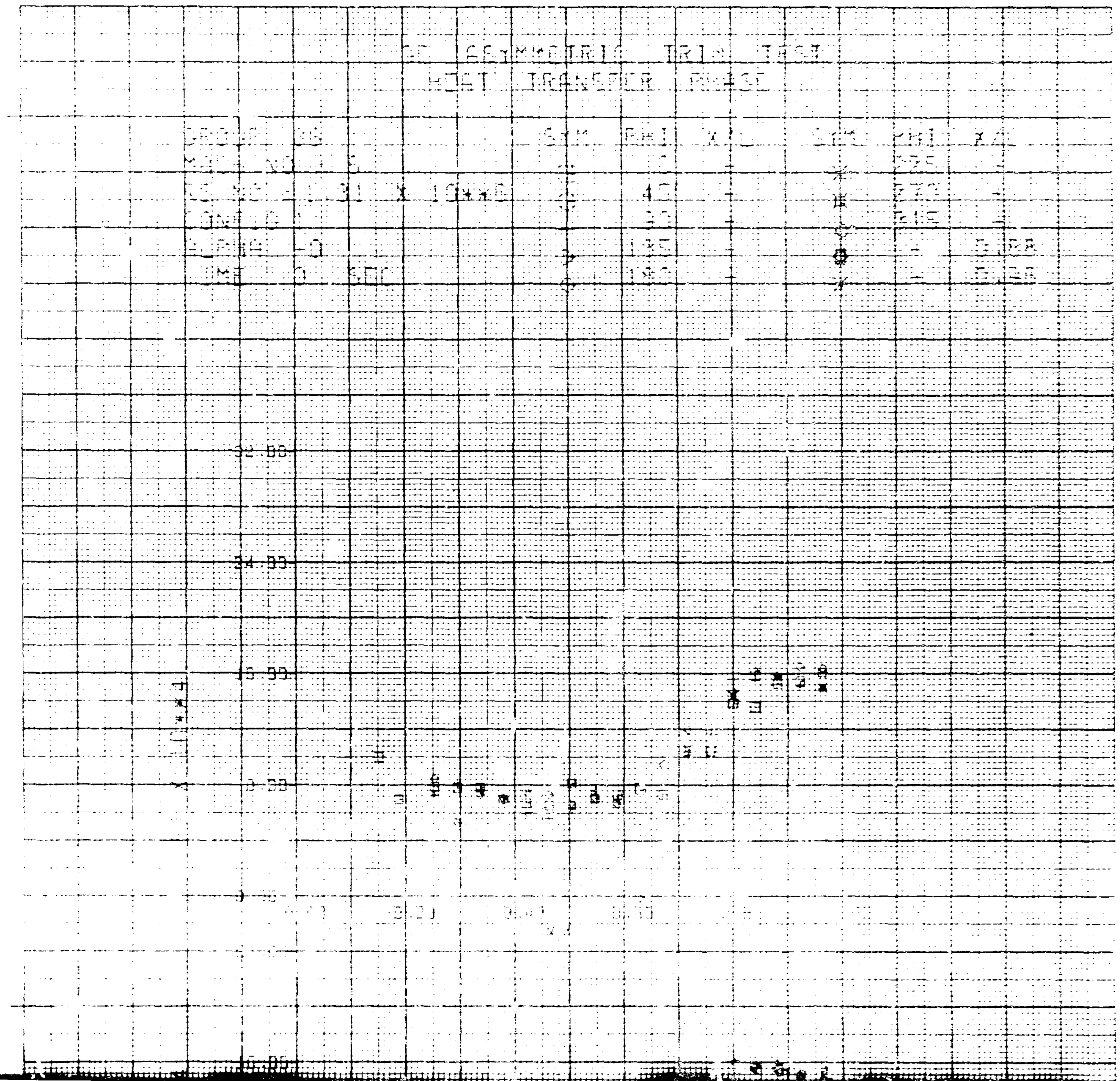
7/14/69

AEDC (ARO, INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
V10967-H00

GROUP	CONFIG	ALPHA-M	BETA-M	ALPHA-S	ROLL	ALP-P	DATE	MACH NO	PO	TO	TIME
16	1	-.06	0	-.06	0	0	715	7.97	219.50	1280.00	-.00

T-INF	P-INF	Q-INF	V-INF	RHO-INF	MU-INF	RE/FT	RE/D	HO
9.1040E 01	2.9323E-02	1.3030E 00	3.7831E 03	2.0217E-05	7.5550E-08	1.3127E 06	1.2034E 06	3.1402E 02

TC NO	X/L	PHI	TEMP	SLOPE	Q-STDM	HT	HH	HW	ST
1	.1506	0	524.52	2.7825E 00	5.848[illegible]E-01	7.9650E-04	3.2122E-03	1.2652E 02	1.0066E-03
2	.1667	0	525.67	1.3153E 00	4.2003E-01	5.5323E-04	2.2311E-03	1.2629E 02	6.9918E-04
3	.2524	0	526.50	1.5999E 00	4.7295E-01	6.2279E-04	2.5116E-03	1.2631E 02	7.8706E-04
4	.2943	0	530.34	1.6836E 00	4.6020E-01	6.1960E-04	2.4982E-03	1.2720E 02	7.8286E-04
5	.3363	0	531.76	1.6856E 00	4.6809E-01	5.2167E-04	2.5063E-03	1.2754E 02	7.0542E-04
6	.3783	0	532.82	1.3904E 00	4.1796E-01	5.5492E-04	2.2371E-03	1.2779E 02	7.0105E-04
7	.4203	0	533.20	1.3819E 00	4.0150E-01	5.3339E-04	2.1503E-03	1.2788E 02	6.7385E-04
8	.4623	0	534.48	1.4157E 00	3.9887E-01	5.1904E-04	2.0923E-03	1.2819E 02	6.5560E-04
9	.5043	0	534.83	1.7939E 00	4.8532E-01	6.4609E-04	2.6043E-03	1.2827E 02	8.1613E-04
10	.5463	0	536.59	1.4904E 00	4.1818E-01	5.5801E-04	2.2491E-03	1.2869E 02	7.0480E-04
11	.5882	0	537.64	1.5660E 00	4.3190E-01	5.7657E-04	2.3237E-03	1.2894E 02	7.2820E-04
12	.6302	0	539.29	1.6083E 00	4.5458E-01	6.0877E-04	2.4533E-03	1.2933E 02	7.6881E-04
13	.6722	0	541.73	1.7287E 00	4.3306E-01	5.8144E-04	2.3440E-03	1.2992E 02	7.3474E-04
99	.8022	315.0	548.41	3.6594E 00	9.0117E-01	1.2210E-03	4.9212E-03	1.3150E 02	1.5422E-03
15	.7583	0	543.30	2.5543E 00	6.1426E-01	8.2706E-04	3.3323E-03	1.3029E 02	1.0443E-03
16	.7996	0	544.21	2.4991E 00	8.1350E-01	1.0967E-03	4.4189E-03	1.3050E 02	1.3845E-03
17	.8409	0	544.77	3.1249E 00	7.9869E-01	1.0775E-03	4.3410E-03	1.3064E 02	1.3604E-03
18	.8822	0	545.79	3.5813E 00	8.9770E-01	1.2127E-03	4.8854E-03	1.3087E 02	1.5310E-03
19	.9235	0	549.81	3.6294E 00	9.0921E-01	1.2286E-03	4.9486E-03	1.3069E 02	1.5508E-03
20	.9648	0	547.27	3.9112E 00	9.4056E-01	1.2732E-03	5.1280E-03	1.3123E 02	1.6072E-03
21	.2524	45.0	524.72	1.7003E 00	5.0261E-01	6.6024E-04	2.6629E-03	1.2587E 02	8.3447E-04
22	.2943	45.0	528.27	1.6574E 00	4.6777E-01	6.1067E-04	2.4860E-03	1.2671E 02	7.7925E-04
23	.3363	45.0	529.84	1.4443E 00	4.3419E-01	5.7415E-04	2.3150E-03	1.2709E 02	7.2566E-04
24	.3783	45.0	531.09	1.3713E 00	4.1281E-01	5.4684E-04	2.2047E-03	1.2739E 02	6.9090E-04
25	.4203	45.0	532.71	1.2510E 00	3.6349E-01	4.8253E-04	1.9453E-03	1.2777E 02	6.0960E-04
26	.4623	45.0	535.42	1.3803E 00	3.8721E-01	5.1588E-04	2.0794E-03	1.2841E 02	6.5164E-04
27	.5043	45.0	536.77	1.5135E 00	[illegible]	[illegible]	[illegible]	1.2871E 02	6.0727E-04
103	.9648	315.0	551.98	3.5793E 00	8.6075E-01	1.1727E-03	4.7225E-03	1.3236E 02	[illegible]
29	.5882	45.0	538.62	1.6531E 00	4.5547E-01	6.0943E-04	2.4561E-03	1.2917E 02	7.6966E-04
30	.6302	45.0	[illegible]	1.6779E 00	4.5395E-01	6.0888E-04	2.4536E-03	1.2961E 02	7.6890E-04
31	.6722	45.0	[illegible]	2.0033E 00	4.9171E-01	6.6304E-04	2.6713E-03	1.3055E 02	8.3711E-04
32	.7170	45.0	545.00	2.4502E 00	5.7700E-01	7.7961E-04	3.1407E-03	1.3091E 02	9.8421E-04
33	.7583	45.0	544.90	2.8935E 00	7.1456E-01	9.6421E-04	3.8844E-03	1.3067E 02	1.2172E-03
34	.7996	45.0	545.75	3.0150E 00	8.5613E-01	1.1618E-03	4.6045E-03	1.3087E 02	1.4430E-03
35	.8409	45.0	547.57	3.3750E 00	9.1324E-01	1.2368E-03	4.9819E-03	1.3130E 02	1.5612E-03
36	.8822	45.0	548.17	3.4565E 00	9.0914E-01	1.2321E-03	4.9629E-03	1.3144E 02	1.5552E-03
37	.9235	45.0	548.43	3.4628E 00	8.8479E-01	1.1996E-03	4.8319E-03	1.3151E 02	1.5142E-03
38	.9648	45.0	555.55	3.3989E 00	8.1737E-01	1.1114E-03	4.4761E-03	1.3261E 02	1.4027E-03
39	.2524	90.0	527.59	1.4825E 00	4.3023E-01	5.7703E-04	2.3301E-03	1.2655E 02	7.3019E-04
40	.2943	90.0	530.99	1.9250E 00	4.8920E-01	6.4796E-04	2.6123E-03	1.2736E 02	8.1864E-04
41	.3363	90.0	532.05	1.4504E 00	4.5778E-01	6.0718E-04	2.4479E-03	1.2751E 02	7.6710E-04
42	.3783	90.0	533.44	1.3422E 00	4.2365E-01	5.6294E-04	2.2694E-03	1.2794E 02	7.1116E-04
43	.4203	90.0	534.98	1.1970E 00	3.5384E-01	4.7115E-04	1.8971E-03	1.2851E 02	5.9514E-04
44	.4623	90.0	536.82	1.0775E 00	3.3470E-01	4.4557E-04	1.7961E-03	1.2827E 02	5.6204E-04
45	.5043	90.0	536.59	1.3570E 00	3.7390E-01	4.9892E-04	2.0109E-03	1.2869E 02	6.3017E-04
46	.5463	90.0	538.25	1.5678E 00	4.4770E-01	5.9874E-04	2.4130E-03	1.2909E 02	7.5618E-04
47	.5882	90.0	539.14	1.4811E 00	4.1557E-01	5.5642E-04	2.2424E-03	1.2930E 02	7.0270E-04
48	.6302	90.0	540.15	1.7523E 00	4.8282E-01	6.4733E-04	2.6086E-03	1.2954E 02	8.1747E-04
49	.6722	90.0	543.54	2.1067E 00	5.4780E-01	7.3702E-04	2.9727E-03	1.3034E 02	9.3137E-04
50	.7170	90.0	545.47	2.5258E 00	5.9479E-01	8.0326E-04	3.2358E-03	1.3080E 02	1.0140E-03
51	.7583	90.0	542.58	2.6375E 00	6.8708E-01	9.2422E-04	3.7239E-03	1.3012E 02	1.1670E-03
52	.7996	90.0	543.36	3.5231E 00	9.1776E-01	1.2350E-03	4.9791E-03	1.3030E 02	1.5603E-03
53	.8409	90.0	543.84	3.6416E 00	9.1229E-01	1.2292E-03	4.9525E-03	1.3042E 02	1.5520E-03
54	.8822	90.0	544.77	3.7826E 00	9.2852E-01	1.2527E-03	5.0467E-03	1.3064E 02	1.5815E-03
55	.9235	90.0	544.98	3.6958E 00	8.8876E-01	1.1994E-03	4.8319E-03	1.3069E 02	1.5142E-03
56	.9646	90.0	546.34	3.6358E 00	8.7434E-01	1.1816E-03	4.7602E-03	1.3095E 02	1.4917E-03
57	.2524	135.0	523.25	3.4272E-01	1.0131E-01	1.3202E-04	5.3575E-04	1.2552E 02	1.6789E-04
58	.2943	135.0	524.92	1.4183E 00	5.1886E-01	6.8174E-04	2.7495E-03	1.2591E 02	8.6163E-04
59	.3363	135.0	526.07	1.3031E 00	4.1129E-01	5.4118E-04	2.1825E-03	1.2618E 02	6.8394E-04
60	.3783	135.0	524.90	1.1592E 00	4.2222E-01	5.5453E-04	2.2365E-03	1.2584E 02	7.0000E-04
61	.4203	135.0	528.12	1.6494E 00	4.3568E-01	5.7487E-04	2.3181E-03	1.2660E 02	7.2643E-04
62	.4623	135.0	529.43	1.4749E 00	4.2856E-01	5.6645E-04	2.2840E-03	1.2659E 02	7.1574E-04
63	.5043	135.0	530.75	1.5587E 00	3.9826E-01	5.2731E-04	2.1260E-03	1.2730E 02	6.6625E-04
64	.5463	135.0	531.67	1.6055E 00	4.2633E-01	5.6517E-04	2.2786E-03	1.2752E 02	7.1404E-04
65	.5882	135.0	532.59	1.7394E 00	4.6109E-01	6.1307E-04	2.4716E-03	1.2776E 02	7.7452E-04
66	.6302	135.0	534.37	1.9489E 00	5.1754E-01	6.8855E-04	2.7756E-03	1.2816E 02	8.6979E-04
67	.6722	135.0	539.26	2.4144E 00	5.8061E-01	7.7752E-04	3.1334E-03	1.2933E 02	9.6192E-04
68	.7170	135.0	540.34	2.6767E 00	6.3034E-01	8.4534E-04	3.4065E-03	1.2958E 02	1.0675E-03
69	.7583	135.0	537.64	1.9555E 00	5.4866E-01	7.3319E-04	2.9548E-03	1.2894E 02	9.2597E-04
70	.7996	135.0	539.44	3.7803E 00	9.5313E-01	1.2767E-03	5.1450E-03	1.2937E 02	1.6123E-03
71	.8409	135.0	540.80	3.3485E 00	9.2261E-01	1.2381E-03	4.9890E-03	1.2969E 02	1.5634E-03
72	.8822	135.0	541.11	3.4729E 00	9.3957E-01	1.2614E-03	5.0627E-03	1.2977E 02	1.5928E-03
73	.9235	135.0	543.74	3.6194E 00	8.8845E-01	1.1937E-03	4.8101E-03	1.2992E 02	1.5074E-03
74	.9648	135.0	546.61	3.7929E 00	9.1211E-01	1.2336E-03	4.9674E-03	1.3108E 02	1.5573E-03
75	.2524	180.0	[illegible]	[illegible]	[illegible]	6.7101E-04	2.7064E-03	1.2573E 02	8.4811E-04
76	.2943	180.0	528.66	9.9[illegible]42E-01	3.1915E-01	4.2141E-04	1.6993E-03	1.2680E 02	5.3250E-04
77	.3363	180.0	530.01	1.4802E 00	4.3757E-01	5.7881E-04	2.3337E-03	1.2713E 02	7.3134E-04
78	.3783	180.0	531.15	1.4093E 00	4.2364E-01	5.6123E-04	2.2627E-03	1.2740E 02	7.0909E-04
79	.4203	180.0	532.96	1.5170E 00	4.4844E-01	5.9551E-04	2.4007E-03	1.2703E 02	7.5232E-04
80	.4623	180.0	533.83	1.5244E 00	4.3531E-01	5.7961E-04	[illegible]	[illegible]	[illegible]
81	.5043	180.0	536.53	1.5612E 00	3.9112E-01	5.2186E-04	2.1034E-03	1.2867E 02	6.5915E-04
82	.5463	180.0	537.71	1.5856E 00	4.2107E-01	5.6271E-04	2.2679E-03	1.2896E 02	7.1070E-04
83	.5882	180.0	538.91	1.4814E 00	3.9339E-01	5.2056E-04	2.1221E-03	1.2924E 02	6.6500E-04
84	.6302	180.0	538.39	-3.8236E-02	-1.0153E-02	-1.3581E-05	-5.4735E-05	1.2912E 02	-1.7152E-05
85	.6722	180.0	545.60	2.3178E 00	5.5739E-01	7.5291E-04	3.0331E-03	1.3086E 02	9.5051E-04
86	.7170	180.0	547.17	2.9717E 00	6.9982E-01	9.4719E-04	3.8155E-03	1.3121E 02	1.1957E-03
87	.7583	180.0	545.05	2.5114E 00	6.0393E-01	8.1508E-04	3.2837E-03	1.3070E 02	1.0296E-03
88	.7996	180.0	547.02	3.3077E 00	8.8164E-01	1.1660E-03	4.6969E-03	1.3117E 02	1.4719E-03
89	.8409	180.0	547.99	3.7127E 00	9.4863E-01	1.2054E-03	5.1770E-03	1.3141E 02	1.6225E-03
90	.8822	180.0	548.85	4.0197E 00	9.2630E-01	1.2566E-03	5.0614E-03	1.3161E 02	1.5861E-03
91	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.3193E 02	1.6462E-03
92	.9648	180.0	552.49	4.1369E 00	9.5330E-01	1.3005E-03	5.2391E-03	1.3252E 02	[illegible]
93	.8822	225.0	551.10	3.5710E 00	9.1257E-01	1.2419E-03	5.0016E-03	1.3217E 02	1.5674E-0[illegible]
94	.9648	225.0	553.54	3.6206E 00	8.7501E-01	1.1946E-03	4.8105E-03	1.3273E 02	1.5075E-03
95	.7170	270.0	550.91	2.7415E 00	6.1068E-01	8.4082E-04	3.3863E-03	1.3210E 02	1.0612E-03
96	.7996	270.0	552.08	3.1651E 00	8.4050E-01	1.1452E-03	4.6120E-03	1.3238E 02	1.4453E-03
97	.8822	270.0	554.65	3.9731E 00	9.1296E-01	1.2403E-03	5.0264E-03	1.3299E 02	1.5751E-03
98	.9648	270.0	554.15	3.6088E 00	8.6779E-01	1.1858E-03	4.7747E-03	1.3287E 02	1.4963E-03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HEAT TRANSFER PHASE
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SYM PHI X/L
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24.00
16.00

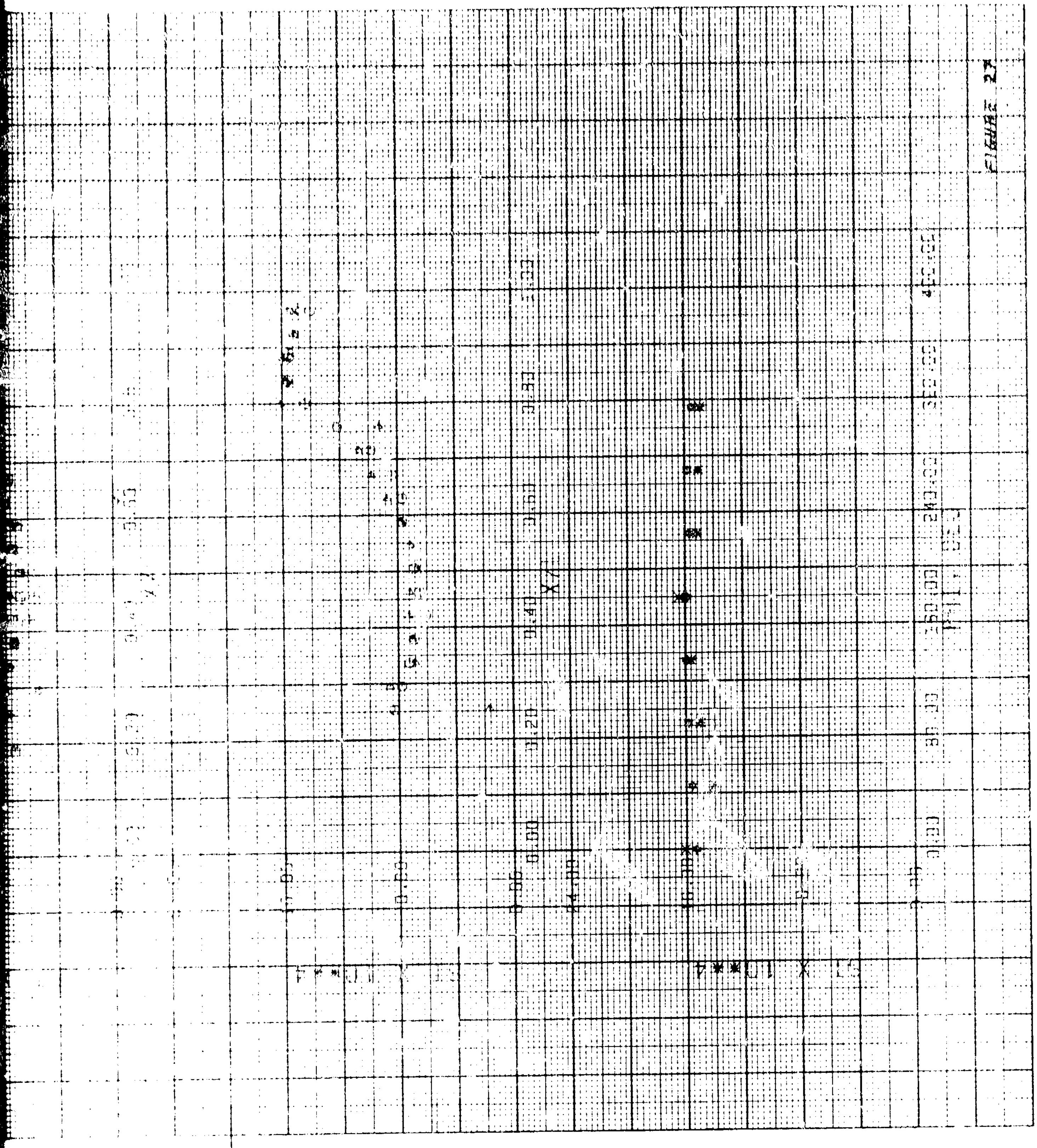


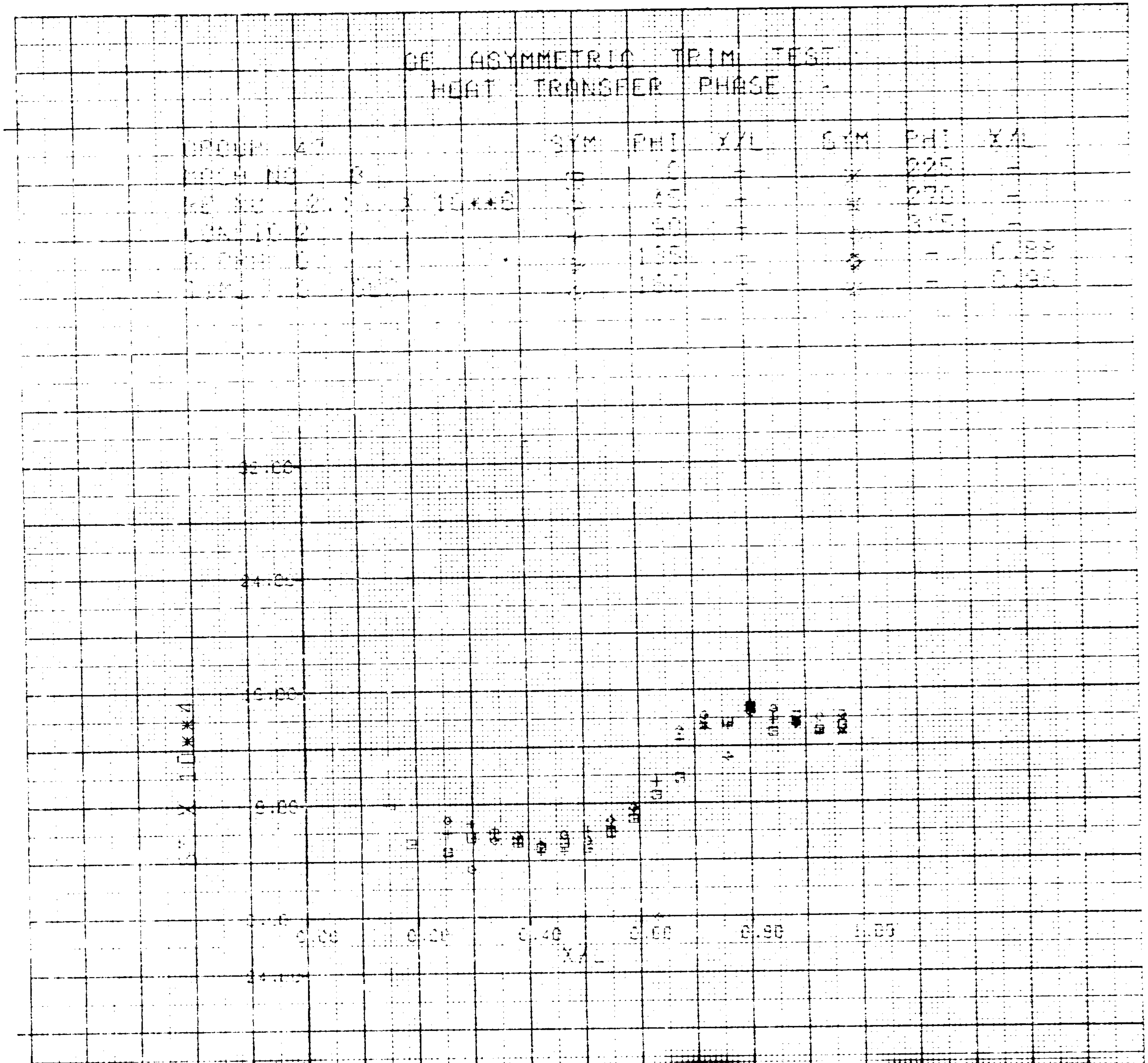
Figure 27

AEDC(ARO,INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
VT0041-000

GROUP	CONFIG	ALPHA-M	BETA-M	ALPHA-S	ROLL	ALP-P	DATE	MACH NO	PO	TO	TIME
67	3	-.01	0	.01	0	0	719	7.99	469.97	1364.05	-.00

T-INF	P-INF	Q-INF	V-INF	RHO-INF	MU-INF	RE/FT	RE/D	HO
9.0773E 01	4.3531E-02	2.1687E 00	3.8114E 03	4.2962E-05	7.0307E-09	2.1466E 06	1.9671E 06	3.1949E 02

TC NO	X/L	PHI	TEMP	SLOPE	Q-STDM	HT	HM	HW	ST
1	.1990	0	548.93	7.5906E 00	7.8177E-01	1.0728E-03	4.1175E-03	1.2963E 02	7.8155E-04
2	.1607	0	536.78	2.4435E 00	5.3662E-01	6.9866E-04	2.8131E-03	1.2873E 02	5.3394E-04
3	.2524	0	537.15	1.5947E 00	4.7141E-01	6.1406E-04	2.4725E-03	1.2882E 02	4.6920E-04
4	.2943	0	541.22	1.8691E 00	5.7899E-01	7.4774E-04	3.0100E-03	1.2979E 02	5.7131E-04
5	.3363	0	542.06	1.8022E 00	5.9607E-01	7.7808E-04	3.1136E-03	1.2999E 02	5.9502E-04
6	.3783	0	542.39	1.7789E 00	5.1673E-01	7.6132E-04	2.8229E-03	1.3007E 02	5.3982E-04
7	.4203	0	541.97	1.7227E 00	5.0054E-01	6.5912E-04	2.6410E-03	1.2997E 02	5.0129E-04
8	.4623	0	542.35	1.9235E 00	5.2997E-01	6.9505E-04	2.7977E-03	1.3006E 02	5.3182E-04
9	.5043	0	542.08	1.8256E 00	4.9390E-01	6.4752E-04	2.6064E-03	1.3000E 02	4.9471E-04
10	.5463	0	543.37	2.1500E 00	6.0325E-01	7.9220E-04	3.1886E-03	1.3030E 02	6.0522E-04
11	.5882	0	544.32	2.5290E 00	6.9703E-01	9.1650E-04	3.6887E-03	1.3053E 02	7.0014E-04
12	.6302	0	545.96	3.1425E 00	8.6100E-01	1.1346E-03	4.5659E-03	1.3092E 02	8.6664E-04
13	.6722	0	545.97	3.9138E 00	9.8049E-01	1.2920E-03	5.1996E-03	1.3092E 02	9.8692E-04
14	.8822	315.0	550.66	5.0866E 00	1.3251E 00	1.7569E-03	7.0688E-03	1.3204E 02	1.3417E-03
15	.7583	0	549.00	5.4510E 00	1.3590E 00	1.7979E-03	7.2343E-03	1.3165E 02	1.3731E-03
16	.7996	0	549.17	5.2242E 00	1.4669E 00	1.9411E-03	7.0194E-03	1.3167E 02	1.4825E-03
17	.8409	0	549.07	5.0490E 00	1.2903E 00	1.7071E-03	6.8680E-03	1.3165E 02	1.3038E-03
18	.8822	0	550.27	5.4380E 00	1.1874E 00	1.8386E-03	7.3976E-03	1.3195E 02	1.4041E-03
19	.9235	0	550.35	5.1761E 00	1.2967E 00	1.7187E-03	6.9149E-03	1.3197E 02	1.3125E-03
20	.9648	0	548.74	5.5608E 00	1.3373E 00	1.7687E-03	7.1167E-03	1.3159E 02	1.3508E-03
21	.2524	45.0	535.49	2.2632E 00	6.6904E-01	8.6960E-04	3.5016E-03	1.2843E 02	6.6463E-04
22	.2943	45.0	539.82	1.8977E 00	6.0832E-01	7.9517E-04	3.2011E-03	1.2946E 02	6.0760E-04
23	.3363	45.0	541.37	1.8491E 00	5.7086E-01	7.4771E-04	3.0098E-03	1.2983E 02	5.7129E-04
24	.3783	45.0	542.91	1.6592E 00	4.9877E-01	6.5460E-04	2.6348E-03	1.3020E 02	5.0011E-04
25	.4203	45.0	543.31	1.7249E 00	5.0117E-01	6.5810E-04	2.6488E-03	1.3029E 02	5.0277E-04
26	.4623	45.0	545.44	1.7366E 00	4.8725E-01	6.4162E-04	2.5822E-03	1.3080E 02	4.9012E-04
27	.5043	45.0	546.26	2.0834E 00	5.3200E-01	7.0130E-04	2.8223E-03	1.3099E 02	5.3569E-04
28	.9648	315.0	552.77	5.1662E 00	1.2424E 00	1.6519E-03	6.6454E-03	1.3254E 02	1.2616E-03
29	.5882	45.0	547.65	2.7359E 00	7.5302E-01	9.9554E-04	4.0061E-03	1.3132E 02	7.6538E-04
30	.6302	45.0	549.44	1.3342E 00	9.0204E-01	1.1941E-03	4.8047E-03	1.3175E 02	9.1196E-04
31	.6722	45.0	550.36	4.8011E 00	1.1785E 00	1.5620E-03	6.2846E-03	1.3197E 02	1.1929E-03
32	.7178	45.0	551.82	5.7483E 00	1.3537E 00	1.7976E-03	7.2320E-03	1.3232E 02	1.3727E-0-
33	.7583	45.0	552.67	5.0539E 00	1.3925E 00	1.8513E-03	7.4475E-03	1.3252E 02	1.4136E-03
34	.7996	45.0	553.02	5.1459E 00	1.4438E 00	1.9204E-03	7.7246E-03	1.3260E 02	1.4664E-03
35	.8409	45.0	554.34	5.0138E 00	1.3564E 00	1.8073E-03	7.2701E-03	1.3292E 02	1.3799E-03
36	.8822	45.0	555.12	5.1127E 00	1.3448E 00	1.7937E-03	7.2148E-03	1.3310E 02	1.3694E-03
37	.9235	45.0	555.14	4.9485E 00	1.2644E 00	1.6865E-03	6.7838E-03	1.3311E 02	1.2876E-03
38	.9648	45.0	552.97	4.9195E 00	1.1830E 00	1.5735E-03	6.3298E-03	1.3259E 02	1.2016E-03
39	.2524	90.0	540.39	2.4217E 00	5.9763E-01	7.8178E-04	3.1471E-03	1.2960E 02	5.9735E-04
40	.2943	90.0	544.59	2.0826E 00	6.6771E-01	8.7827E-04	3.5347E-03	1.3059E 02	6.7092E-04
41	.3363	90.0	545.41	1.4924E 00	5.9729E-01	7.8648E-04	3.1652E-03	1.3079E 02	6.0076E-04
42	.3783	90.0	545.83	1.6935E 00	5.3452E-01	7.0422E-04	2.8341E-03	1.3089E 02	5.3793E-04
43	.4203	90.0	546.56	1.5476E 00	4.5749E-01	6.0324E-04	2.4276E-03	1.3106E 02	4.6078E-04
44	.4623	90.0	546.18	1.5039E 00	4.6717E-01	6.1571E-04	2.4778E-03	1.3095E 02	4.7031E-04
45	.5043	90.0	547.82	2.1733E 00	5.9881E-01	7.9101E-04	3.1830E-03	1.3136E 02	6.0416E-04
46	.5463	90.0	547.83	2.1537E 00	6.1505E-01	8.1246E-04	3.2693E-03	1.3137E 02	6.2054E-04
47	.5882	90.0	549.29	2.5594E 00	7.1811E-01	9.5043E-04	3.8242E-03	1.3171E 02	7.2586E-04
48	.6302	90.0	550.58	3.4403E 00	9.4791E-01	1.2567E-03	5.0563E-03	1.3202E 02	9.5973E-04
49	.6722	90.0	550.19	4.4631E 00	1.2384E 00	1.6409E-03	6.6023E-03	1.3193E 02	1.2532E-03
50	.7178	90.0	552.18	5.5790E 00	1.3138E 00	1.7455E-03	7.0222E-03	1.3240E 02	1.3329E-03
51	.7583	90.0	571.21	4.9885E 00	1.2993E 00	1.7713E-03	7.1186E-03	1.3695E 02	1.3512E-03
52	.7996	90.0	552.27	5.7010E 00	1.4851E 00	1.9734E-03	7.9389E-03	1.3243E 02	1.5069E-03
53	.8409	90.0	552.03	5.4615E 00	1.3682E 00	1.8175E-03	7.3117E-03	1.3237E 02	1.3878E-03
54	.8822	90.0	553.15	5.4373E 00	1.3347E 00	1.7756E-03	7.1427E-03	1.3263E 02	1.3557E-03
55	.9235	90.0	552.90	5.3152E 00	1.2782E 00	1.6994E-03	6.8343E-03	1.3257E 02	1.2980E-03
56	.9648	90.0	549.85	5.3112E 00	1.2772E 00	1.6917E-03	6.8066E-03	1.3185E 02	1.2928E-03
57	.2524	135.0	535.43	5.3384E-01	1.5781E-01	2.0515E-04	8.2608E-04	1.2846E 02	1.5680E-04
58	.2943	135.0	539.96	1.9573E 00	6.2756E-01	8.2046E-04	3.3029E-03	1.2949E 02	6.2692E-04
59	.3363	135.0	540.47	1.8954E 00	5.9823E-01	7.8264E-04	3.1506E-03	1.2961E 02	5.9800E-04
60	.3783	135.0	539.07	1.7419E 00	5.4111E-01	7.0658E-04	2.8445E-03	1.2927E 02	5.3492E-04
61	.4203	135.0	540.78	1.8847E 00	5.6654E-01	7.4148E-04	2.9848E-03	1.2969E 02	5.6654E-04
62	.4623	135.0	541.19	1.7501E 00	5.0851E-01	6.6589E-04	2.6805E-03	1.2978E 02	5.0877E-04
63	.5043	135.0	541.85	2.1772E 00	5.5630E-01	7.2909E-04	2.9348E-03	1.2994E 02	5.5705E-04
64	.5463	135.0	542.47	2.5001E 00	6.6391E-01	8.7078E-04	3.5050E-03	1.3008E 02	6.6528E-04
65	.5882	135.0	543.58	2.9938E 00	7.9499E-01	1.0443E-03	4.2032E-03	1.3035E 02	7.9780E-04
66	.6302	135.0	544.47	3.8560E 00	1.0240E 00	1.3467E-03	5.4199E-03	1.3057E 02	1.0287E-03
67	.6722	135.0	545.89	5.2914E 00	1.2725E 00	1.6766E-03	6.7473E-03	1.3091E 02	1.2807E-03
68	.7178	135.0	546.74	5.4150E 00	1.3929E 00	1.8375E-03	7.3963E-03	1.3112E 02	1.4035E-03
69	.7583	135.0	543.32	3.7663E 00	1.0568E 00	1.3877E-03	5.5853E-03	1.3029E 02	1.0601E-03
70	.7996	135.0	546.49	5.8892E 00	1.5659E 00	2.0648E-03	8.3094E-03	1.3105E 02	1.5772E-03
71	.8409	135.0	546.87	5.0190E 00	1.3829E 00	1.8244E-03	7.3419E-03	1.3114E 02	1.3935E-03
72	.8822	135.0	547.28	5.0755E 00	1.3731E 00	1.8125E-03	7.2937E-03	1.3123E 02	1.3844E-03
73	.9235	135.0	548.05	5.9784E 00	1.2957E 00	1.7121E-03	6.8893E-03	1.3142E 02	1.3076E-03
74	.9648	135.0	546.66	5.5540E 00	1.3358E 00	1.7618E-03	7.0900E-03	1.3109E 02	1.3457E-03
75	.2524	180.0	537.16	2.4880E 00	6.9736E-01	9.0839E-04	3.6574E-03	1.2883E 02	6.9421E-04
76	.2943	180.0	542.16	1.8763E 00	3.4510E-01	4.5244E-04	1.8212E-03	1.3000E 02	3.4567E-04
77	.3363	180.0	542.69	1.8630E 00	5.5072E-01	7.2258E-04	2.9085E-03	1.3014E 02	5.5205E-04
78	.3783	180.0	542.96	1.9297E 00	5.8008E-01	7.6137E-04	3.0645E-03	1.3021E 02	5.8167E-04
79	.4203	180.0	544.56	1.7467E 00	5.1634E-01	6.7914E-04	2.7333E-03	1.3059E 02	5.1882E-04
80	.4623	180.0	545.37	2.0378E 00	5.8194E-01	7.6624E-04	3.0837E-03	1.3078E 02	5.8532E-04
81	.5043	180.0	545.70	2.1587E 00	5.4079E-01	7.1236E-04	2.8668E-03	1.3086E 02	5.4415E-04
82	.5463	180.0	546.27	2.4765E 00	6.8420E-01	9.0195E-04	3.6297E-03	1.3099E 02	6.8895E-04
83	.5882	180.0	546.78	2.9878E 00	7.7218E-01	1.0186E-03	4.0991E-03	1.3112E 02	7.7884E-04
84	.6302	180.0	538.29	-1.4428E-02	-2.7692E-03	-3.6120E-06	-1.4544E-05	1.2910E 02	-2.7606E-06
85	.6722	180.0	551.27	5.4139E 00	1.3619E 00	1.7277E-03	6.9509E-03	1.3219E 02	1.3193E-03
86	.7178	180.0	552.70	5.9431E 00	1.3995E 00	1.8607E-03	7.4855E-03	1.3253E 02	1.4208E-03
87	.7583	180.0	549.53	4.6545E 00	1.1193E 00	1.4820E-03	5.9620E-03	1.3178E 02	1.1318E-03
88	.7996	180.0	551.41	5.4382E 00	1.4167E 00	1.8803E-03	7.5646E-03	1.3222E 02	1.4358E-03
89	.8409	180.0	551.75	5.4360E 00	1.4395E 00	1.9115E-03	7.6901E-03	1.3230E 02	1.4596E-03
90	.8822	180.0	551.97	5.8287E 00	1.3432E 00	1.7840E-03	7.1772E-03	1.3235E 02	1.3623E-03
91	.9235	180.0	552.53	5.4333E 00	1.3828E 00	1.8378E-03	7.3934E-03	1.3246E 02	1.4033E-03
92	.9648	180.0	552.37	6.5520E 00	1.3946E 00	1.8534E-03	7.4561E-03	1.3245E 02	1.4152E-03
93	.8822	225.0	552.72	5.1676E 00	1.3204E 00	1.7555E-03	7.0623E-03	1.3253E 02	1.3485E-03
94	.9648	225.0	552.12	5.1636E 00	1.2417E 00	1.6497E-03	6.6366E-03	1.3239E 02	1.2597E-03
95	.7178	270.0	555.16	5.4024E 00	1.3307E 00	1.7750E-03	7.1307E-03	1.3311E 02	1.3552E-03
96	.7996	270.0	555.85	5.4677E 00	1.4519E 00	1.9385E-03	7.7971E-03	1.3328E 02	1.4790E-03
97	.8822	270.0	554.81	5.3155E 00	1.3582E 00	1.8108E-03	7.2830E-03	1.3303E 02	1.3825E-03
98	.9648	270.0	553.04	5.3483E 00	1.2861E 00	1.7167E-03	6.8870E-03	1.3261E 02	1.3061E-03


GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
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16.00
8.00
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0.60
0.80
1.00
X/L

2

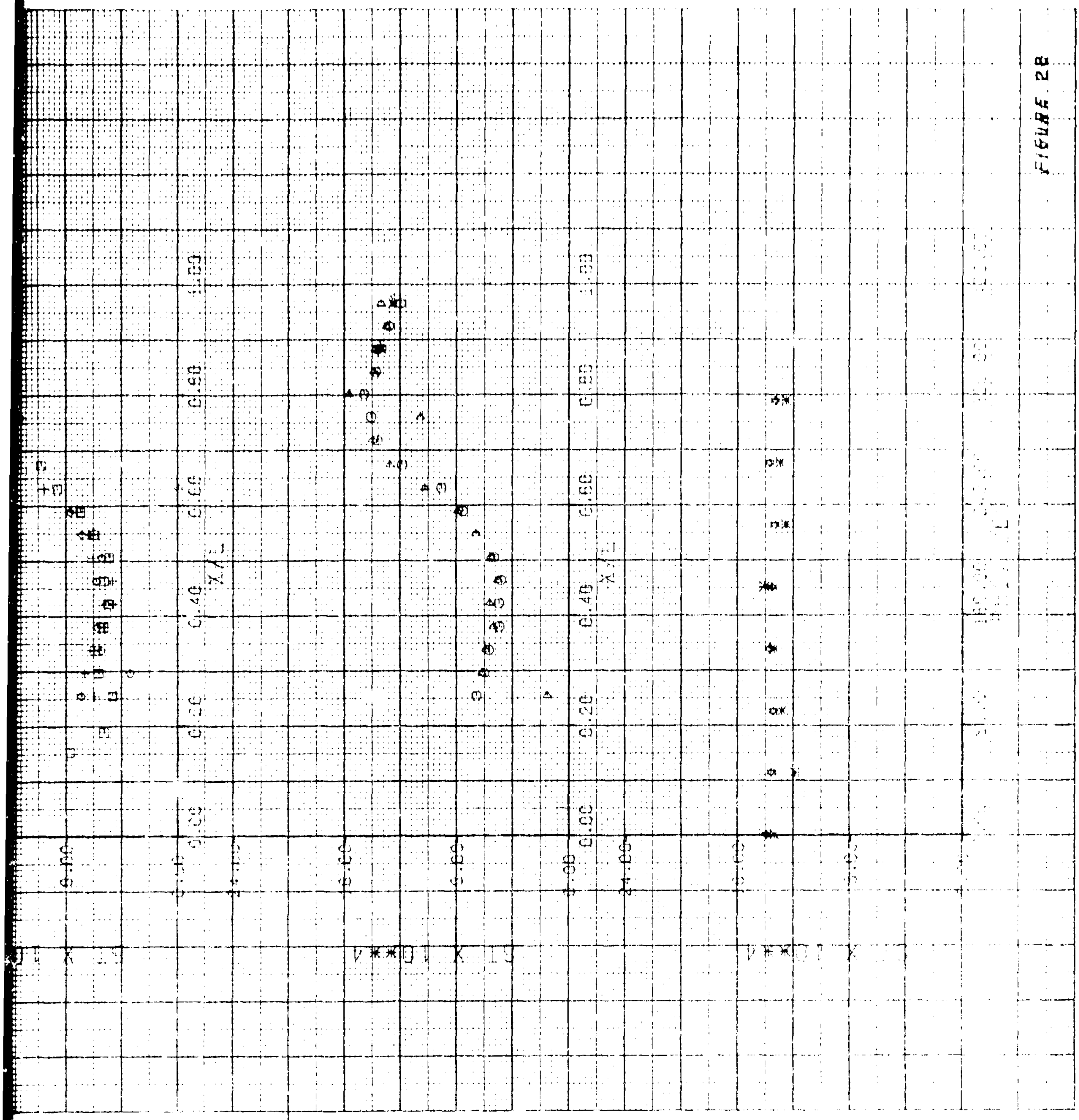


Figure 28

7/16/69

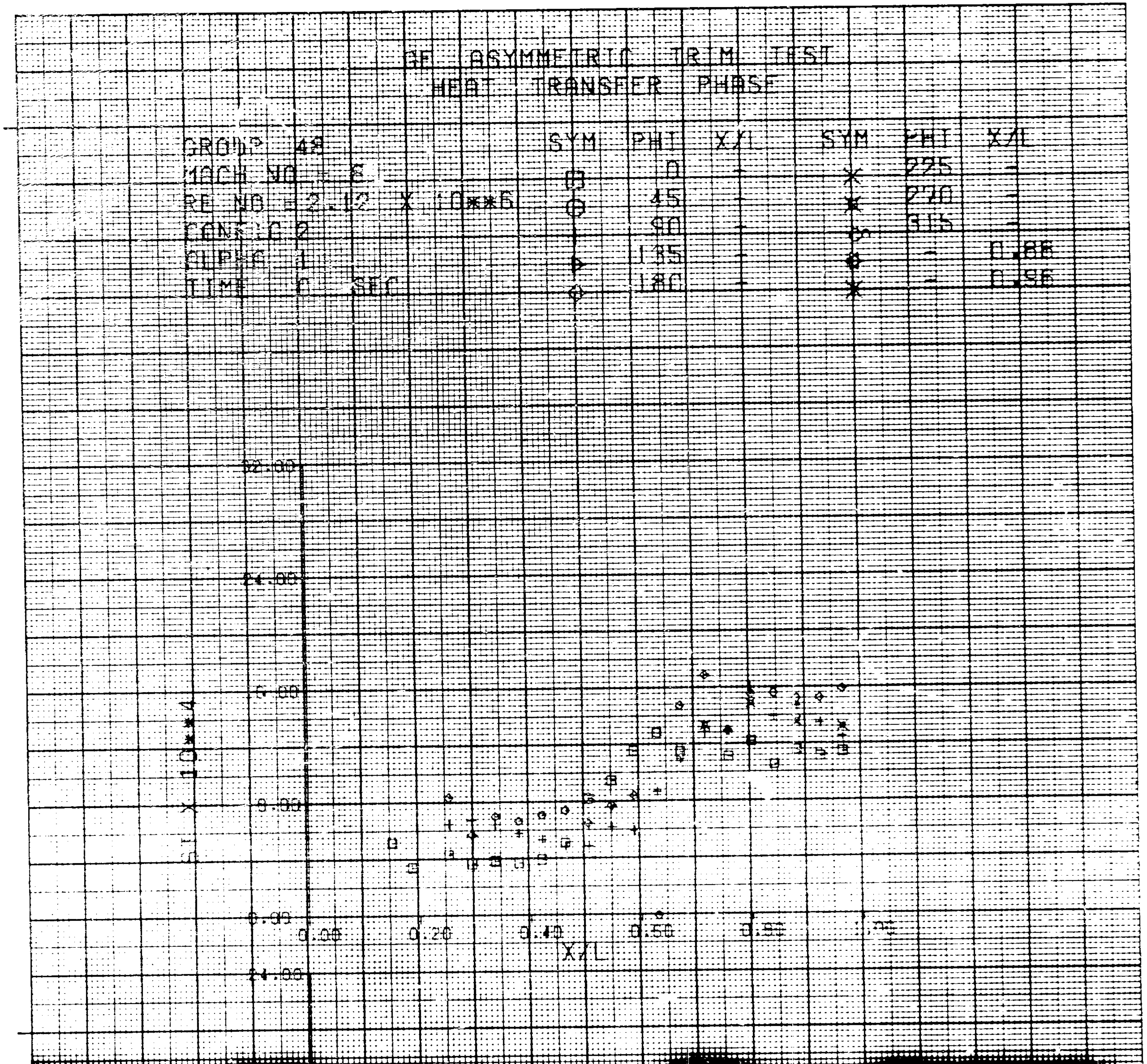
AEDC(ARO,INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
VT0047-000

GROUP	CONFIG	ALPHA-M	BETA-M	ALPHA-S	ROLL	ALP-P	DATE	MACH NO	PO	TO	TIME
48	3	1.01	0	1.01	0	0	715	7.09	470.07	1317.04	-.00

T-INF	P-INF	Q-INF	V-INF	RHO-INF	MU-INF	RE/FT	HE/R	HW
9.56493E 01	4.05414E-02	2.14922E 00	3.62919E 03	4.25742E-05	7.76153E-08	2.11674E 06	1.94026E 04	3.22050E 02

TC NO	X/L	PHI	TTMP	SLOPE	Q-STDH	HT	HM	HW	ST
1	.1700	0	510.88	2.4489E 00	5.3233E-01	6.7714E-04	2.7255E-03	1.2773E 02	5.1962E-04
2	.1467	0	511.66	1.4181E 00	3.5360E-01	4.5023E-04	1.8121E-03	1.2752E 02	3.4540E-04
3	.2524	0	533.15	1.4790E 00	4.1721E-01	5.5774E-04	2.2440E-03	1.2767E 02	4.2795E-04
4	.2943	0	534.71	1.1925E 00	3.7660E-01	4.8114E-04	1.9362E-03	1.2825E 02	3.6914E-04
5	.3363	0	535.90	1.2462E 00	3.9335E-01	5.0356E-04	2.0243E-03	1.2853E 02	3.8632E-04
6	.3783	0	536.98	1.2581E 00	3.7819E-01	4.8483E-04	1.9500E-03	1.2878E 02	3.7192E-04
7	.4203	0	537.32	1.1794E 00	4.0080E-01	5.1516E-04	2.0680E-03	1.2886E 02	3.9437E-04
8	.4623	0	538.68	1.4940E 00	5.2184E-01	6.7044E-04	2.6974E-03	1.2919E 02	5.1420E-04
9	.5043	0	539.17	1.6017E 00	8.3373E-01	1.0718E-03	4.3121E-03	1.2930E 02	8.2210E-04
10	.5463	0	541.59	3.4130E 00	9.5779E-01	1.2391E-03	4.9663E-03	1.2987E 02	9.4722E-04
11	.5882	0	543.74	4.2330E 00	1.1665E 00	1.5017E-03	6.0640E-03	1.3030E 02	1.1562E-03
12	.6302	0	545.27	4.7615E 00	1.2882E 00	1.6691E-03	6.7129E-03	1.3076E 02	1.2798E-03
13	.6722	0	547.08	4.4990E 00	1.1524E 00	1.4965E-03	6.0181E-03	1.3117E 02	1.1474E-03
99	.8022	315.0	552.71	4.7704E 00	1.2420E 00	1.6260E-03	6.5369E-03	1.3253E 02	1.2463E-03
15	.7583	0	549.75	4.4391E 00	1.1156E 00	1.5540E-03	5.4442E-03	1.3182E 02	1.1146E-03
16	.7996	0	550.38	4.3494E 00	1.2205E 00	1.5920E-03	6.4404E-03	1.3197E 02	1.2203E-03
17	.8409	0	550.09	4.1260E 00	1.0542E 00	1.3746E-03	5.5270E-03	1.3191E 02	1.0537E-03
18	.8822	0	550.16	4.4255E 00	1.1588E 00	1.5118E-03	6.0754E-03	1.3192E 02	1.1583E-03
19	.9235	0	549.08	4.4544E 00	1.1154E 00	1.4531E-03	5.8424E-03	1.3166E 02	1.1136E-03
20	.9648	0	549.17	4.7742E 00	1.1481E 00	1.4952E-03	6.0172E-03	1.3169E 02	1.1462E-03
21	.2524	45.0	531.63	2.0255E 00	5.9875E-01	7.6234E-04	3.0663E-03	1.2751E 02	5.8498E-04
22	.2943	45.0	533.51	1.8395E 00	5.8978E-01	7.5274E-04	3.0249E-03	1.2796E 02	5.7755E-04
23	.3363	45.0	535.09	1.4984E 00	5.1655E-01	6.5292E-04	2.6274E-03	1.2833E 02	5.0092E-04
24	.3783	45.0	536.13	1.4893E 00	5.0779E-01	6.5024E-04	2.6125E-03	1.2858E 02	4.9885E-04
25	.4203	45.0	537.78	1.4523E 00	4.2197E-01	5.4151E-04	2.1748E-03	1.2898E 02	4.1536E-04
26	.4623	45.0	540.46	1.4513E 00	4.6333E-01	5.9663E-04	2.4082E-03	1.2961E 02	4.5764E-04
27	.5043	45.0	541.57	1.4167E 00	4.8243E-01	6.2211E-04	2.5025E-03	1.2987E 02	4.7712E-04
100	.9648	315.0	553.36	4.4993E 00	1.1782E 00	1.5427E-03	6.2019E-03	1.3248E 02	1.1824E-03
29	.5882	45.0	544.32	2.2573E 00	6.2195E-01	8.0489E-04	3.2373E-03	1.3053E 02	6.1726E-04
30	.6302	45.0	546.25	1.0016E 00	8.1189E-01	1.0533E-03	4.2361E-03	1.3099E 02	8.0762E-04
31	.6722	45.0	550.06	4.3516E 00	1.0436E 00	1.3607E-03	5.4716E-03	1.3188E 02	1.0431E-03
32	.7170	45.0	552.19	4.1022E 00	1.2015E 00	1.5709E-03	6.3157E-03	1.3241E 02	1.2041E-03
33	.7583	45.0	552.04	5.0186E 00	1.3828E 00	1.8075E-03	7.2670E-03	1.3237E 02	1.3856E-03
34	.7996	45.0	552.80	4.4442E 00	1.3592E 00	1.7785E-03	7.1508E-03	1.3255E 02	1.3632E-03
35	.8409	45.0	553.52	4.8326E 00	1.3073E 00	1.7122E-03	6.8838E-03	1.3272E 02	1.3123E-03
36	.8822	45.0	552.95	4.8451E 00	1.2764E 00	1.6678E-03	6.7058E-03	1.3259E 02	1.2783E-03
37	.9235	45.0	551.84	4.7499E 00	1.2136E 00	1.5862E-03	6.3770E-03	1.3233E 02	1.2158E-03
38	.9648	45.0	551.01	4.4108E 00	1.1088E 00	1.4500E-03	5.8329E-03	1.3235E 02	1.1121E-03
39	.2524	90.0	535.16	2.2174E 00	6.5564E-01	8.3832E-04	3.3735E-03	1.2834E 02	6.4316E-04
40	.2943	90.0	537.36	2.1286E 00	6.6241E-01	8.7525E-04	3.5216E-03	1.2887E 02	6.7141E-04
41	.3363	90.0	538.38	2.4612E 00	6.5059E-01	8.3563E-04	3.3613E-03	1.2910E 02	6.4085E-04
42	.3783	90.0	539.73	1.8634E 00	5.8824E-01	7.5682E-04	3.0447E-03	1.2944E 02	5.8049E-04
43	.4203	90.0	541.77	1.8410E 00	5.4423E-01	7.0196E-04	2.8218E-03	1.2992E 02	5.3837E-04
44	.4623	90.0	540.93	1.4745E 00	4.8912E-01	6.3021E-04	2.5352E-03	1.2972E 02	4.8335E-04
45	.5043	90.0	542.65	1.7937E 00	4.9421E-01	6.3810E-04	2.5671E-03	1.3013E 02	4.8982E-04
46	.5463	90.0	544.93	2.1756E 00	6.2127E-01	8.0485E-04	3.2362E-03	1.3068E 02	6.1690E-04
47	.5882	90.0	545.62	2.1224E 00	5.9562E-01	7.7212E-04	3.1053E-03	1.3084E 02	5.9203E-04
48	.6302	90.0	546.90	3.1574E 00	8.7008E-01	1.1298E-03	4.5434E-03	1.3115E 02	8.6620E-04
49	.6722	90.0	550.04	4.3837E 00	1.0982E 00	1.4318E-03	5.7571E-03	1.3190E 02	1.0976E-03
50	.7170	90.0	552.19	5.4468E 00	1.2827E 00	1.6770E-03	6.7422E-03	1.3241E 02	1.2854E-03
51	.7583	90.0	549.85	4.9846E 00	1.2940E 00	1.6931E-03	6.8078E-03	1.3185E 02	1.2979E-03
52	.7996	90.0	551.55	6.1326E 00	1.5975E 00	2.0869E-03	8.3906E-03	1.3225E 02	1.5997E-03
53	.8409	90.0	550.54	5.5724E 00	1.3960E 00	1.8213E-03	7.3228E-03	1.3201E 02	1.3961E-03
54	.8822	90.0	550.42	5.0427E 00	1.4686E 00	1.9156E-03	7.7023E-03	1.3198E 02	1.4685E-03
55	.9235	90.0	549.10	5.4260E 00	1.3525E 00	1.7612E-03	7.0816E-03	1.3167E 02	1.3501E-03
56	.9648	90.0	549.31	5.2251E 00	1.2565E 00	1.6367E-03	6.5811E-03	1.3172E 02	1.2547E-03
57	.2524	135.0	530.72	5.4320E-01	1.7240E-01	2.1925E-04	8.8250E-04	1.2729E 02	1.6825E-04
58	.2943	135.0	533.21	2.3779E 00	7.6242E-01	9.7269E-04	3.9148E-03	1.2789E 02	7.4632E-04
59	.3363	135.0	533.67	2.2460E 00	7.0891E-01	9.0494E-04	3.6418E-03	1.2799E 02	6.9433E-04
60	.3783	135.0	532.89	2.1665E 00	6.7234E-01	8.5747E-04	3.4510E-03	1.2781E 02	6.5793E-04
61	.4203	135.0	535.14	2.1418E 00	6.4362E-01	8.2345E-04	3.3136E-03	1.2835E 02	6.3174E-04
62	.4623	135.0	536.31	2.7122E 00	6.4278E-01	8.2331E-04	3.3129E-03	1.2862E 02	6.3160E-04
63	.5043	135.0	537.74	2.4722E 00	6.3168E-01	8.1057E-04	3.2613E-03	1.2896E 02	6.2178E-04
64	.5463	135.0	538.91	2.7497E 00	7.3017E-01	9.3836E-04	3.7753E-03	1.2924E 02	7.1974E-04
65	.5882	135.0	540.65	3.2770E 00	8.7043E-01	1.1211E-03	4.5101E-03	1.2966E 02	8.5987E-04
66	.6302	135.0	542.20	3.9847E 00	1.0581E 00	1.3656E-03	5.4932E-03	1.3003E 02	1.0473E-03
67	.6722	135.0	547.14	5.4836E 00	1.3476E 00	1.7503E-03	7.0387E-03	1.3120E 02	1.3419E-03
68	.7170	135.0	548.31	6.2960E 00	1.4826E 00	1.9287E-03	7.7557E-03	1.3148E 02	1.4786E-03
69	.7583	135.0	544.70	3.4879E 00	9.7865E-01	1.2671E-03	5.0963E-03	1.3062E 02	9.7162E-04
70	.7996	135.0	548.29	5.7363E 00	1.6667E 00	2.1681E-03	8.7184E-03	1.3148E 02	1.6622E-03
71	.8409	135.0	548.03	5.1417E 00	1.4167E 00	1.8422E-03	7.4080E-03	1.3141E 02	1.4124E-03
72	.8822	135.0	547.90	5.9626E 00	1.5049E 00	1.9566E-03	7.8682E-03	1.3138E 02	1.5001E-03
73	.9235	135.0	547.37	5.9156E 00	1.4275E 00	1.8548E-03	7.4587E-03	1.3126E 02	1.4220E-03
74	.9648	135.0	549.38	6.1817E 00	1.4673E 00	1.9114E-03	7.6858E-03	1.3174E 02	1.4653E-03
75	.2524	180.0	532.45	2.9255E 00	8.5004E-01	1.0850E-03	4.3604E-03	1.2771E 02	8.3132E-04
76	.2943	180.0	535.92	1.8174E 00	5.8270E-01	7.4598E-04	3.0017E-03	1.2853E 02	5.7229E-04
77	.3363	180.0	537.28	2.4127E 00	7.1323E-01	9.1467E-04	3.6803E-03	1.2885E 02	7.0165E-04
78	.3783	180.0	538.49	2.2419E 00	6.7390E-01	8.6558E-04	3.4825E-03	1.2914E 02	6.6395E-04
79	.4203	180.0	540.40	2.6350E 00	7.1980E-01	9.2682E-04	3.7285E-03	1.2960E 02	7.1085E-04
80	.4623	180.0	541.34	2.6184E 00	7.4775E-01	9.6397E-04	3.8778E-03	1.2982E 02	7.393[illegible]
81	.5043	180.0	543.14	2.4952E 00	6.5015E-01	8.4009E-04	3.3791E-03	1.3025E 02	6.4424E-04
82	.5463	180.0	544.72	2.9308E 00	7.7828E-01	1.0077E-03	4.0530E-03	1.3063E 02	7.7272E-04
83	.5882	180.0	546.23	3.1762E 00	8.4344E-01	1.0942E-03	4.4006E-03	1.3098E 02	8.3898E-04
84	.6302	180.0	538.08	-3.9880E-02	-1.0403E-02	-1.3432E-05	-5.4041E-05	1.2904E 02	-1.0303E-05
85	.6722	180.0	551.67	6.1643E 00	1.4680E 00	1.9230E-03	7.7305E-03	1.3276E 02	1.4738E-03
86	.7170	180.0	555.61	7.1203E 00	1.6764E 00	2.2021E-03	8.4517E-03	1.3322E 02	1.6076E-03
87	.7583	180.0	551.74	5.1732E 00	1.2921E 00	1.6885E-03	6.7884E-03	1.3230E 02	1.2942E-03
88	.7996	180.0	555.15	5.9480E 00	1.5497E 00	2.0360E-03	8.1760E-03	1.3311E 02	1.5588E-03
89	.8409	180.0	555.19	6.0669E 00	1.5502E 00	2.0347E-03	8.1700E-03	1.3312E 02	1.5593E-03
90	.8822	180.0	555.10	6.4623E 00	1.5122E 00	1.9467E-03	7.9778E-03	1.3310E 02	1.5310E-03
91	.9235	180.0	554.91	6.1828E 00	1.5177E 00	1.9914E-03	8.0089E-03	1.3306E 02	[illegible]
92	.9648	180.0	555.13	6.4472E 00	1.5779E 00	2.0709E-03	8.3280E-03	1.3311E 02	[illegible]
93	.8822	225.0	556.19	5.7067E 00	1.4581E 00	1.9164E-03	7.7031E-03	1.3336E 02	1.4608E-03
94	.9648	225.0	554.88	5.9208E 00	1.4234E 00	1.8682E-03	7.5096E-03	1.3305E 02	1.4317E-03
95	.7170	270.0	557.15	5.4573E 00	1.3205E 00	1.7378E-03	6.9847E-03	1.3359E 02	1.3316E-03
96	.7996	270.0	558.59	5.5472E 00	1.4731E 00	1.9422E-03	7.8057E-03	1.3393E 02	1.4882E-03
97	.8822	270.0	558.49	5.7622E 00	1.3445E 00	1.7725E-03	7.1237E-03	1.3391E 02	1.3582E-03
98	.9648	270.0	555.14	5.4642E 00	1.3148E 00	1.7247E-03	6.9327E-03	1.3311E 02	1.3217E-03

GROUP 48 SYM PHI X/L SYM PHI X/L SYM PHI X/L
OF ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE



3F ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 48
MACH NO 8
RE NO 2.12 X 10**6
CONFIG 2
ALPHA 1
TIME 0 SEC
SYM PHI X/L
0
45
90
135
180
SYM PHI X/L
225
270
315
0.86
0.96
32.00
24.00
16.00
8.00
0.00
-24.00
ST X 10**4
0.00
0.20
0.40
0.60
0.80
X/L

2

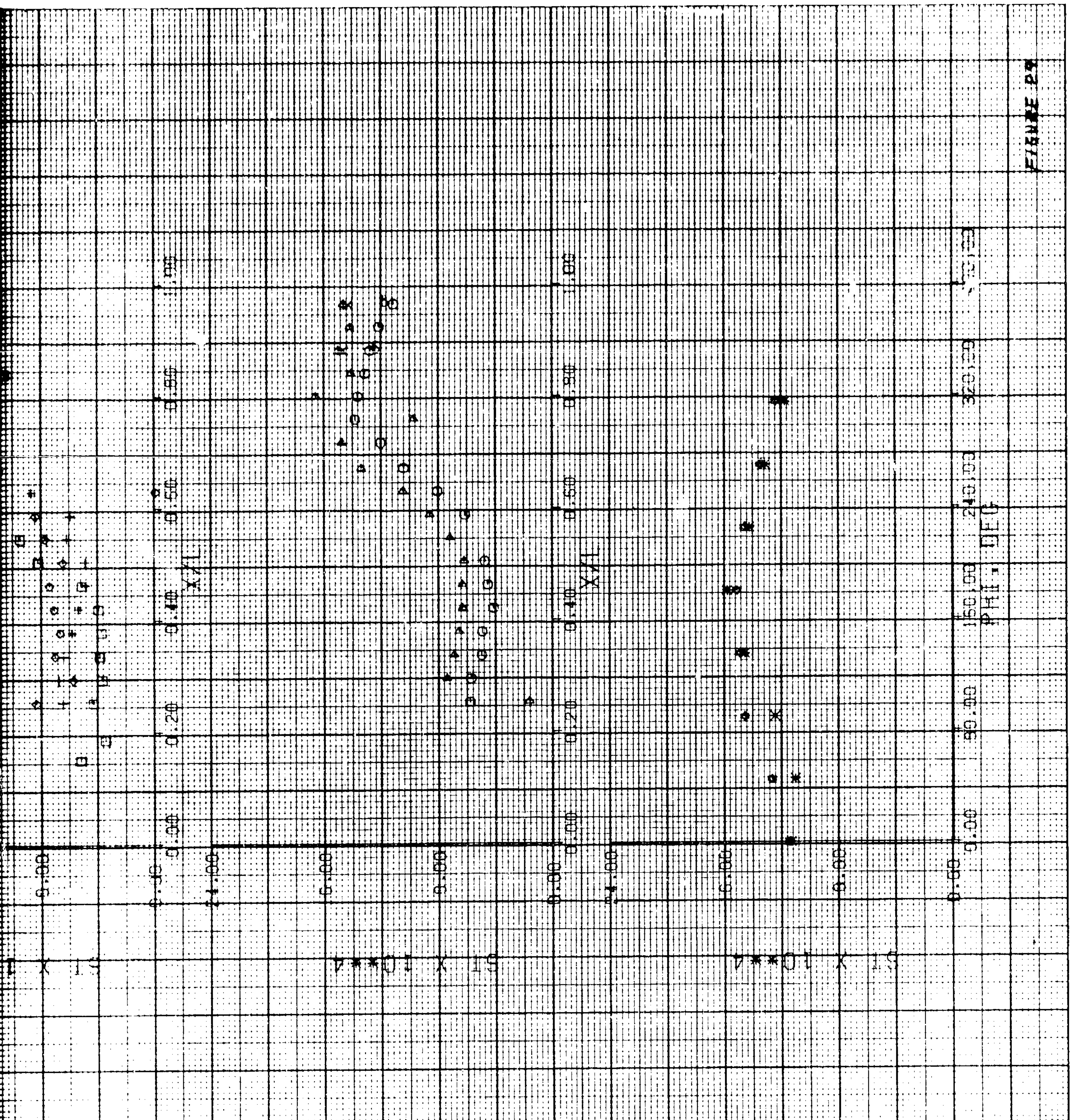


Figure 29

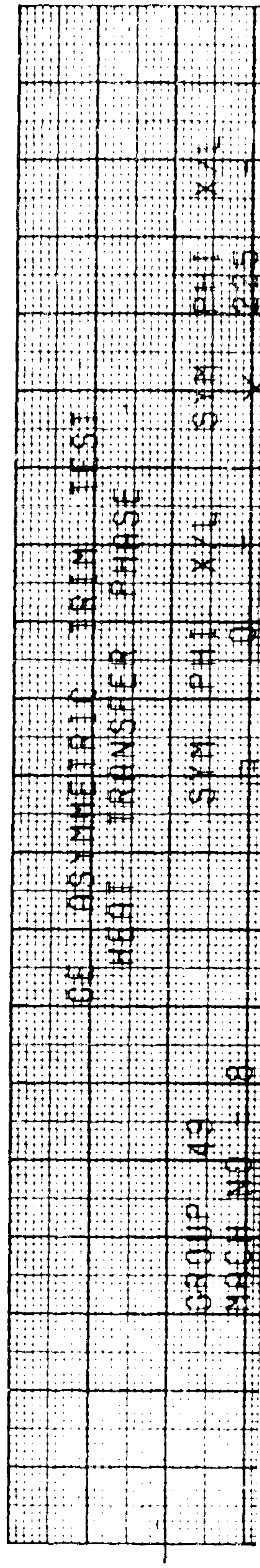
7/16/69

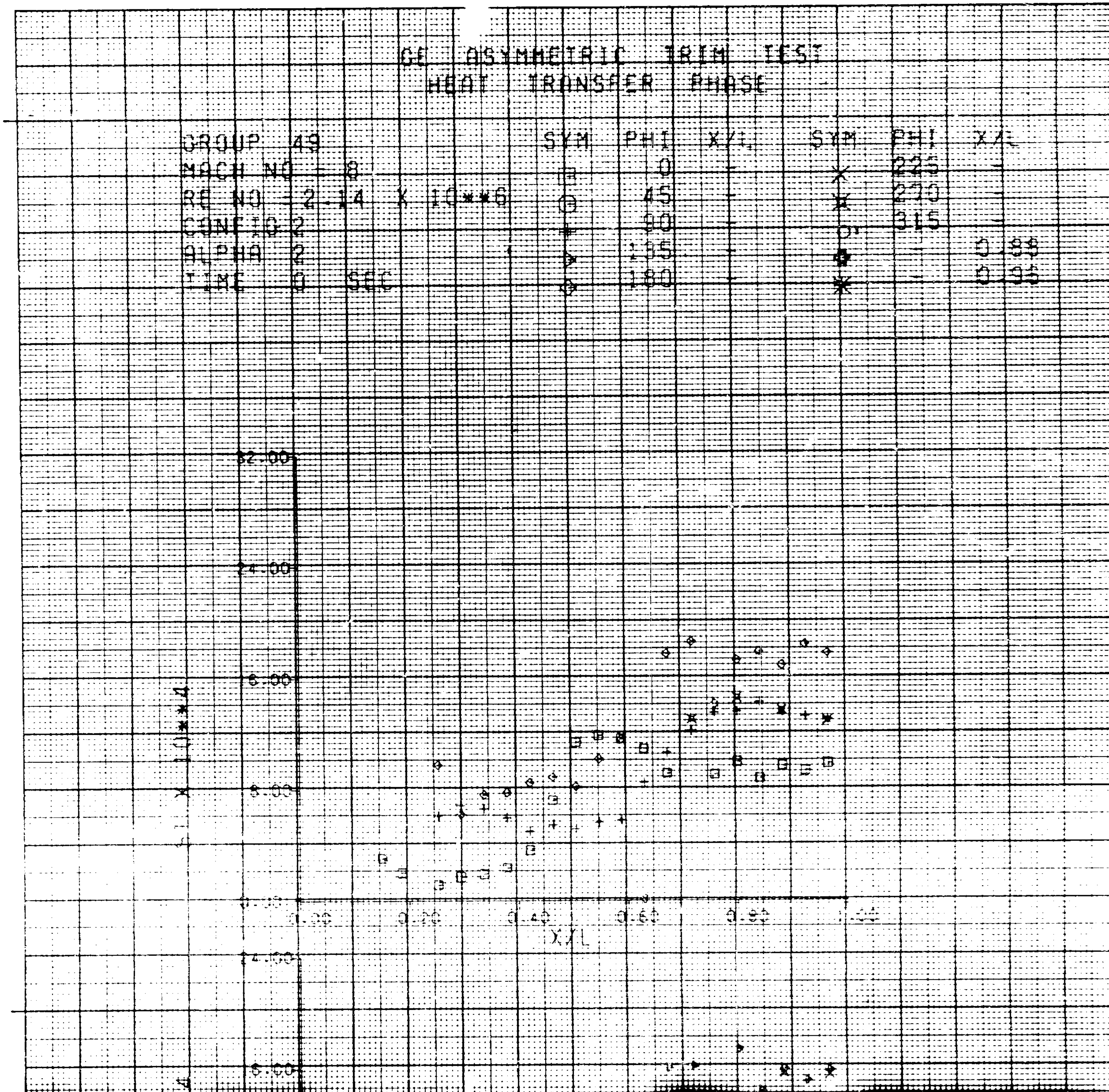
ARO(ARO, INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
VT0047-B00

GROUP	CONFIG	ALPHA-M	BETA-M	ALPHA-S	ROLL	ELP-P	DATE	MACH NO	PO	TO	TIME
49	2	2.00	0	2.00	0	0	715	7.99	669.07	1305.05	-.00

T-INF	P-INF	Q-INF	V-INF	RHO-INF	MU-INF	RE/FT	RE/D	RO
9.4053E 01	4.0520E-02	2.1043E 00	3.8130E 03	4.2917E-05	7.6304E-08	2.1420E 06	1.9664E 06	3.1900E 02

TC NO	X/L	PHI	TEMP	SLOPE	Q-STDS	HT	HM	HW	ST
1	.1900	0	528.12	1.4810E 00	3.1799E-01	4.0030E-04	1.6447E-03	1.2660E 02	3.1237E-04
2	.1857	0	529.48	9.4714E-01	2.0801E-01	2.6709E-04	1.0790E-03	1.2700E 02	2.0493E-04
3	.2524	0	531.12	4.1293E-01	1.2201E-01	1.5754E-04	6.3467E-04	1.2739E 02	1.2050E-04
4	.2943	0	533.01	5.6377E-01	1.7794E-01	2.3023E-04	9.2711E-04	1.2784E 02	1.7608E-04
5	.3363	0	534.35	6.2033E-01	1.9832E-01	2.5702E-04	1.0340E-03	1.2816E 02	1.9657E-04
6	.3783	0	535.80	6.4183E-01	2.4103E-01	3.1297E-04	1.2601E-03	1.2850E 02	2.3933E-04
7	.4203	0	536.59	1.2864E 00	3.7204E-01	4.8357E-04	1.9449E-03	1.2869E 02	3.6978E-04
8	.4623	0	539.06	2.4514E 00	7.3055E-01	9.5212E-04	3.8330E-03	1.2918E 02	7.2799E-04
9	.5043	0	540.07	4.2420E 00	1.1476E 00	1.4984E-03	6.0310E-03	1.2952E 02	1.1456E-03
10	.5463	0	543.42	4.2557E 00	1.1961E 00	1.5659E-03	6.3074E-03	1.3032E 02	1.1976E-03
11	.5882	0	545.71	4.2399E 00	1.1002E 00	1.5366E-03	6.1837E-03	1.3086E 02	1.1745E-03
12	.6302	0	547.69	4.0290E 00	1.0900E 00	1.4375E-03	5.7842E-03	1.3133E 02	1.0984E-03
13	.6722	0	548.54	3.6514E 00	9.1675E-01	1.2077E-03	4.8594E-03	1.3154E 02	9.2294E-04
14	.8822	315.0	554.00	1.9889E 00	1.0391E 00	1.3093E-03	5.5870E-03	1.3379E 02	1.0611E-03
15	.7583	0	553.09	3.7460E 00	9.0083E-01	1.1965E-03	4.8132E-03	1.3262E 02	9.1416E-04
16	.7996	0	554.44	3.5252E 00	9.8911E-01	1.3162E-03	5.2941E-03	1.3295E 02	1.0055E-03
17	.8409	0	554.21	3.4896E 00	8.7119E-01	1.1589E-03	4.6615E-03	1.3289E 02	8.8535E-04
18	.8822	0	554.03	3.4372E 00	9.6129E-01	1.2784E-03	5.1424E-03	1.3284E 02	9.7660E-04
19	.9235	0	552.52	1.4977E 00	9.2836E-01	1.2295E-03	4.9460E-03	1.3248E 02	9.3938E-04
20	.9648	0	551.18	4.6742E 00	9.7970E-01	1.2981E-03	5.2272E-03	1.3217E 02	9.9105E-04
21	.2524	45.0	529.76	2.1003E 00	6.2323E-01	8.0293E-04	3.2339E-03	1.2706E 02	6.1022E-04
22	.2943	45.0	531.34	1.6953E 00	5.4350E-01	7.0176E-04	2.8262E-03	1.2745E 02	5.3478E-04
23	.3363	45.0	533.03	1.5704E 00	4.7207E-01	6.1075E-04	2.4595E-03	1.2784E 02	4.6713E-04
24	.3783	45.0	535.11	1.4840E 00	4.4632E-01	5.7901E-04	2.3314E-03	1.2834E 02	4.4208E-04
25	.4203	45.0	536.15	1.3715E 00	3.6945E-01	4.7993E-04	1.9323E-03	1.2858E 02	3.6701E-04
26	.4623	45.0	539.30	1.5540E 00	4.3602E-01	5.6873E-04	2.2005E-03	1.2933E 02	4.3484E-04
27	.5043	45.0	541.21	1.8333E 00	4.8404E-01	6.3662E-04	2.5625E-03	1.2979E 02	4.8669E-04
100	.9648	315.0	556.89	4.2767E 00	1.0204E 00	1.3730E-03	5.5218E-03	1.3353E 02	1.0487E-03
29	.5882	45.0	545.44	3.1523E 00	8.6855E-01	1.1421E-03	4.5960E-03	1.3080E 02	8.7290E-04
30	.6302	45.0	548.07	4.1134E 00	1.1120E 00	1.4683E-03	5.9070E-03	1.3141E 02	1.1221E-03
31	.6722	45.0	551.82	5.3146E 00	1.2880E 00	1.6974E-03	6.8282E-03	1.3232E 02	1.2969E-03
32	.7176	45.0	553.80	5.1183E 00	1.2053E 00	1.6026E-03	6.4465E-03	1.3281E 02	1.2244E-03
33	.7583	45.0	554.55	4.5308E 00	1.2500E 00	1.6643E-03	6.6944E-03	1.3297E 02	1.2715E-03
34	.7996	45.0	555.80	4.1072E 00	1.1769E 00	1.5662E-03	6.2901E-03	1.3327E 02	1.1964E-03
35	.8409	45.0	556.44	4.2593E 00	1.1523E 00	1.5375E-03	6.1015E-03	1.3343E 02	1.1744E-03
36	.8822	45.0	556.08	4.6157E 00	1.0562E 00	1.4086E-03	5.6651E-03	1.3333E 02	1.0760E-03
37	.9235	45.0	554.45	4.6710E 00	1.0404E 00	1.3844E-03	5.5685E-03	1.3294E 02	1.0576E-03
38	.9648	45.0	554.55	3.9108E 00	9.4239E-01	1.2542E-03	5.0447E-03	1.3297E 02	9.5812E-04
39	.2524	90.0	533.75	2.0870E 00	6.1718E-01	7.9925E-04	3.2184E-03	1.2801E 02	6.1127E-04
40	.2943	90.0	534.87	2.1654E 00	6.9420E-01	9.0030E-04	3.6254E-03	1.2828E 02	6.8857E-04
41	.3363	90.0	535.94	2.1190E 00	6.6909E-01	8.6896E-04	3.4987E-03	1.2854E 02	6.6450E-04
42	.3783	90.0	537.21	1.9097E 00	6.0275E-01	7.8408E-04	3.1567E-03	1.2884E 02	5.9955E-04
43	.4203	90.0	538.68	1.7283E 00	5.1053E-01	6.6277E-04	2.6681E-03	1.2919E 02	5.0676E-04
44	.4623	90.0	538.08	1.7906E 00	5.5624E-01	7.2515E-04	2.9192E-03	1.2924E 02	5.5444E-04
45	.5043	90.0	541.32	1.4911E 00	5.2109E-01	6.8146E-04	2.7430E-03	1.2982E 02	5.2097E-04
46	.5463	90.0	542.18	1.9941E 00	5.6947E-01	7.4561E-04	3.0010E-03	1.3002E 02	5.6998E-04
47	.5882	90.0	545.00	2.6762E 00	5.8259E-01	7.6556E-04	3.0809E-03	1.3069E 02	5.8515E-04
48	.6302	90.0	547.13	3.6723E 00	8.4651E-01	1.1156E-03	4.4889E-03	1.3120E 02	8.5256E-04
49	.6722	90.0	550.38	4.3163E 00	1.0563E 00	1.3980E-03	5.6243E-03	1.3197E 02	1.0682E-03
50	.7176	90.0	553.79	5.1462E 00	1.2119E 00	1.6112E-03	6.4809E-03	1.3279E 02	1.2309E-03
51	.7583	90.0	551.52	5.1452E 00	1.3403E 00	1.7766E-03	7.1472E-03	1.3225E 02	1.3575E-03
52	.7996	90.0	553.07	5.1891E 00	1.3445E 00	1.7885E-03	7.1944E-03	1.3261E 02	1.3664E-03
53	.8409	90.0	552.77	5.6361E 00	1.4120E 00	1.8747E-03	7.5412E-03	1.3254E 02	1.4323E-03
54	.8822	90.0	552.47	5.4168E 00	1.3297E 00	1.7051E-03	7.1006E-03	1.3252E 02	1.3486E-03
55	.9235	90.0	551.33	5.4520E 00	1.3111E 00	1.7374E-03	6.9806E-03	1.3220E 02	1.3275E-03
56	.9648	90.0	551.90	5.3769E 00	1.2916E 00	1.7122E-03	6.8879E-03	1.3226E 02	1.3082E-03
57	.2524	135.0	528.55	6.2479E-01	1.8669E-01	2.3798E-04	9.5600E-04	1.2678E 02	1.8175E-04
58	.2943	135.0	530.89	2.7681E 00	8.8750E-01	1.1450E-03	4.6115E-03	1.2733E 02	8.7505E-04
59	.3363	135.0	531.16	2.4566E 00	8.3058E-01	1.0823E-03	4.3549E-03	1.2740E 02	8.2780E-04
60	.3783	135.0	530.40	2.4351E 00	7.3403E-01	9.7594E-04	3.9305E-03	1.2733E 02	7.4052E-04
61	.4203	135.0	533.53	2.4205E 00	7.2762E-01	9.4190E-04	3.7933E-03	1.2746E 02	7.2845E-04
62	.4623	135.0	535.89	2.4403E 00	7.0908E-01	9.1982E-04	3.7017E-03	1.2803E 02	7.0343E-04
63	.5043	135.0	536.93	2.7528E 00	7.0330E-01	9.1464E-04	3.6824E-03	1.2877E 02	6.9940E-04
64	.5463	135.0	538.60	3.1747E 00	8.4418E-01	1.1000E-03	4.4246E-03	1.2917E 02	8.4128E-04
65	.5882	135.0	541.71	3.6906E 00	9.8803E-01	1.2817E-03	5.1500E-03	1.2981E 02	9.7984E-04
66	.6302	135.0	543.43	4.9175E 00	1.3058E 00	1.7126E-03	6.8925E-03	1.3032E 02	1.3091E-03
67	.6722	135.0	548.97	6.4936E 00	1.5855E 00	2.0943E-03	8.4285E-03	1.3163E 02	1.6384E-03
68	.7176	135.0	551.02	6.7836E 00	1.5975E 00	2.1161E-03	8.5132E-03	1.3213E 02	1.6169E-03
69	.7583	135.0	547.60	3.4145E 00	1.0703E 00	1.4113E-03	5.6788E-03	1.3131E 02	1.0786E-03
70	.7996	135.0	552.43	5.8915E 00	1.7118E 00	2.2718E-03	9.1388E-03	1.3246E 02	1.7357E-03
71	.8409	135.0	552.59	5.1558E 00	1.4206E 00	1.8857E-03	7.5854E-03	1.3250E 02	1.4407E-03
72	.8822	135.0	552.52	5.4422E 00	1.5805E 00	2.0978E-03	8.4394E-03	1.3248E 02	1.6028E-03
73	.9235	135.0	552.37	6.4784E 00	1.4921E 00	1.9800E-03	7.9649E-03	1.3245E 02	1.5128E-03
74	.9648	135.0	551.81	6.4279E 00	1.5098E 00	2.0016E-03	8.3741E-03	1.3232E 02	1.5905E-03
75	.2524	180.0	532.47	3.4349E 00	9.9804E-01	1.2983E-03	5.1942E-03	1.2771E 02	9.4691E-04
76	.2943	180.0	534.09	1.9698E 00	8.3157E-01	8.1024E-04	3.2968E-03	1.2809E 02	6.2578E-04
77	.3363	180.0	535.44	2.4265E 00	7.7643E-01	1.0077E-03	4.0574E-03	1.2842E 02	7.7062E-04
78	.3783	180.0	536.94	2.4287E 00	7.9814E-01	1.0276E-03	4.1371E-03	1.2878E 02	7.8576E-04
79	.4203	180.0	539.60	2.8876E 00	8.5355E-01	1.1138E-03	4.4836E-03	1.2941E 02	8.5197E-04
80	.4623	180.0	541.73	3.1194E 00	8.7891E-01	1.1058E-03	4.4923E-03	1.2991E 02	8.9121E-04
81	.5043	180.0	543.49	3.7848E 00	8.2292E-01	1.0795E-03	4.3467E-03	1.3037E 02	8.2518E-04
82	.5463	180.0	545.88	3.8356E 00	1.0185E 00	1.3401E-03	5.3926E-03	1.3090E 02	1.0242E-03
83	.5882	180.0	548.36	4.7601E 00	1.1570E 00	1.5283E-03	6.1403E-03	1.3149E 02	1.1670E-03
84	.6302	180.0	538.43	4.4344E-02	1.2307E-02	1.6034E-05	6.4550E-05	1.2913E 02	1.2260E-05
85	.6722	180.0	556.64	7.3769E 00	1.7485E 00	2.3335E-03	9.3848E-03	1.3347E 02	1.7824E-03
86	.7176	180.0	559.37	7.7080E 00	1.8252E 00	2.4446E-03	9.4394E-03	1.3411E 02	1.8071E-03
87	.7583	180.0	556.98	4.7878E 00	1.3919E 00	1.8504E-03	7.4774E-03	1.3355E 02	1.4105E-03
88	.7996	180.0	561.18	6.4928E 00	1.6818E 00	2.2718E-03	9.1312E-03	1.3455E 02	1.7343E-03
89	.8409	180.0	561.98	6.4488E 00	1.7697E 00	2.3516E-03	9.4551E-03	1.3472E 02	1.7958E-03
90	.8822	180.0	561.74	7.1771E 00	1.6539E 00	2.2223E-03	8.7354E-03	1.3468E 02	1.6971E-03
91	.9235	180.0	568.67	7.4480E 00	1.7837E 00	2.4104E-03	9.7249E-03	1.3434E 02	1.8478E-03
92	.9648	180.0	559.41	7.8748E 00	1.7466E 00	2.3394E-03	9.4071E-03	1.3413E 02	1.7867E-03
93	.8822	225.0	563.04	5.9554E 00	1.5217E 00	2.0586E-03	8.2437E-03	1.3520E 02	1.5657E-03
94	.9648	225.0	559.11	6.3072E 00	1.3100E 00	2.0310E-03	8.1670E-03	1.3406E 02	1.5511E-03
95	.7176	270.0	560.24	4.6641E 00	1.2770E 00	1.7125E-03	6.8868E-03	1.3434E 02	1.3079E-03
96	.7996	270.0	565.40	5.3545E 00	1.4219E 00	1.9288E-03	7.7143E-03	1.3556E 02	1.4659E-03
97	.8822	270.0	566.48	5.7264E 00	1.3756E 00	1.8616E-03	7.2403E-03	1.3534E 02	1.3751E-03
98	.9648	270.0	558.74	5.7984E 00	1.2742E 00	1.7053E-03	6.8577E-03	1.3398E 02	1.3025E-03




GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 49
MACH NO = 8
RE NO = 2.14 X 10**6
CONFIG 2
ALPHA 2
TIME 0 SEC
SYM PHI X/L
0
45
90
135
180
SYM PHI X/L
225
270
315
0.88
0.95
32.00
24.00
16.00
8.00
0.00
0.20
0.40
0.60
0.80
1.00
X/L
14.00
6.00
X 10**4

2,

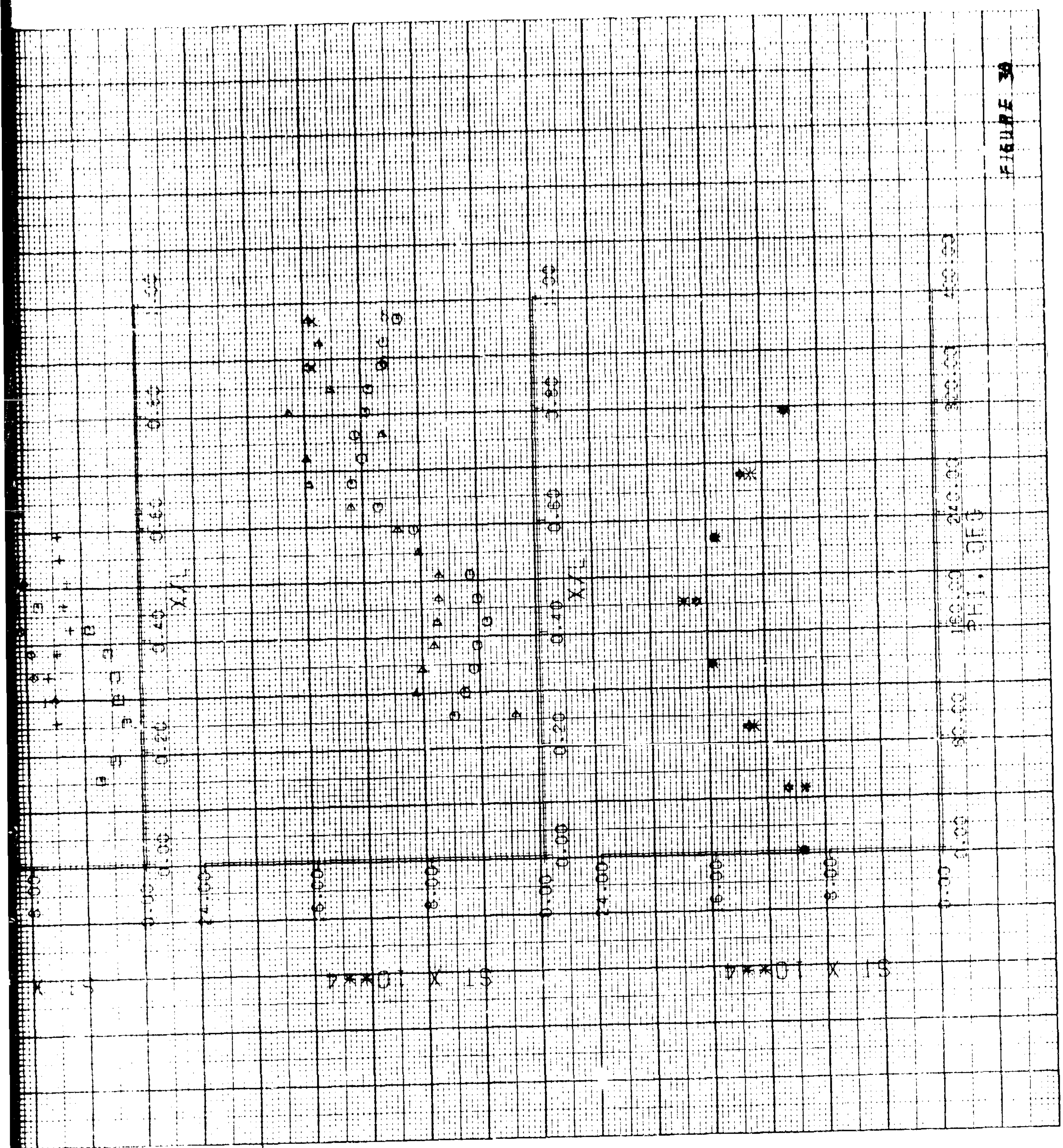


Figure 30

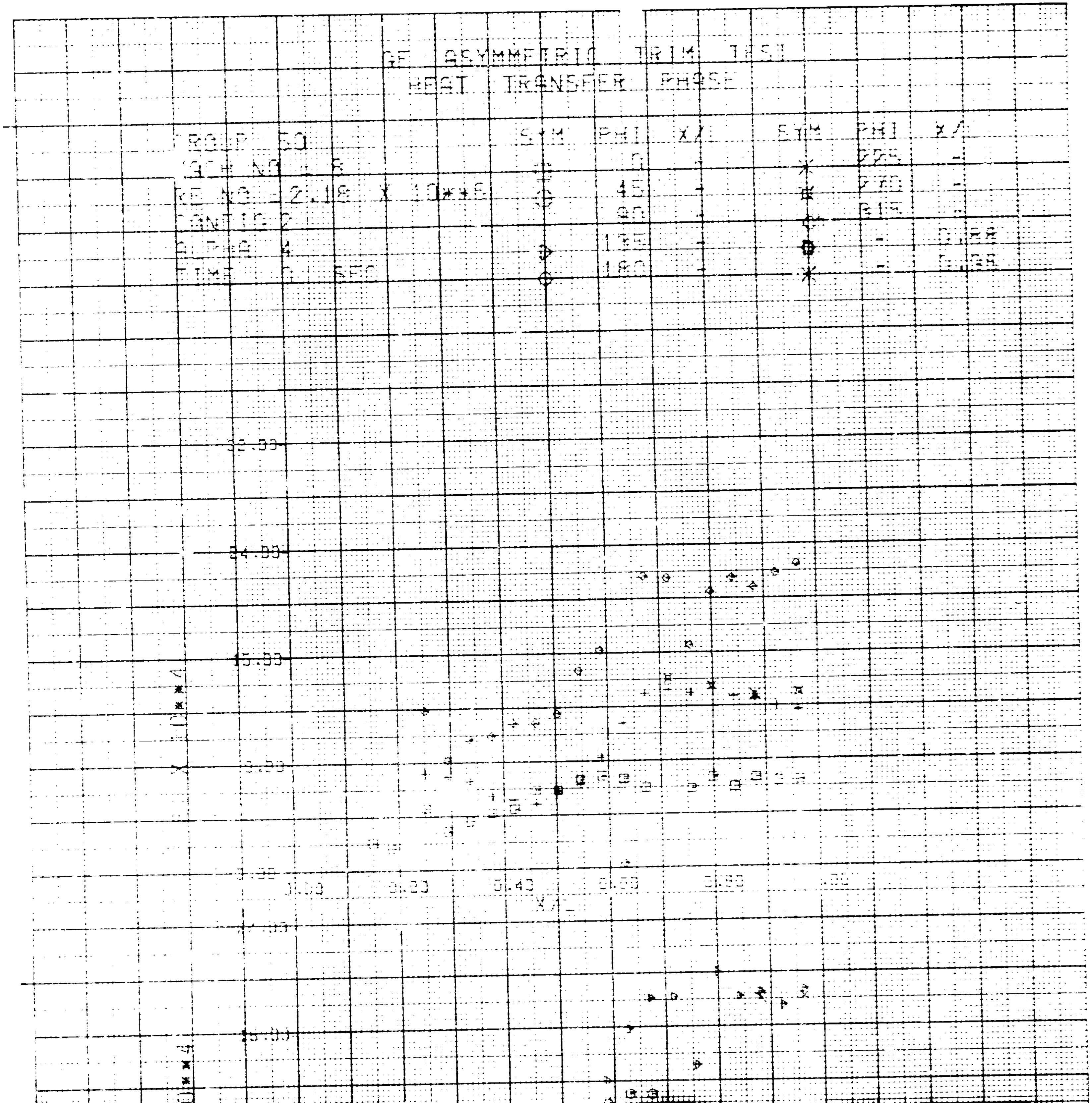
7/16/69

ARO INC. - ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
V41B57-H00

RUN	CONFIG	ALPHA-M	BETA-M	ALPHA-S	ROLL	ALP-P	DATE	MACH NO	PO	TO	TIME
-6	2	4.03	.00	4.00	-.02	8	715	7.69	470.87	1294.05	-.00

T-INF	P-INF	Q-INF	V-INF	RHO-INF	MU-INF	RE/FT	RE/IN	HO
9.4964E 01	5.8624E-02	2.1774E 00	3.7950E 03	6.3377E-05	7.5717E-08	2.3751E 06	1.9964E 05	3.1693E 02

TC NO	X/L	PHI	TEMP	SLOPE	Q-STDR	HT	HH	HW	ST
1	.1536	0	575.91	9.7260E-01	7.1142E-01	2.7863E-04	1.1217E-07	1.2843E 02	2.1769E-04
2	.1867	0	532.63	7.4977E-01	1.6905E-01	2.2173E-04	8.9347E-04	1.2770E 02	1.6961E-04
3	.2524	0	532.71	1.4931E 00	4.6799E-01	[illegible]	2.4742E-03	1.2777E 02	4.6693E-04
4	.2943	0	538.06	[illegible]	2.9078E-01	3.4423E-04	1.5478E-03	1.2904E 02	2.9209E-04
5	.3363	0	539.39	1.1521E 00	3.6364E-01	4.0136E-04	1.9389E-03	1.2936E 02	3.6591E-04
6	.3783	0	54[illegible]	1.[illegible] 00	4.2221E-01	5.2989E-04	2.2551E-03	1.2960E 02	4.2557E-04
7	.4203	0	541.30	1.3510E 00	4.5006E-01	5.7804E-04	2.4087E-03	1.2981E 02	4.5456E-04
8	.4623	0	542.64	2.1350E 00	5.8857E-01	7.8232E-04	3.1500E-03	1.3013E 02	5.9958E-04
9	.5043	0	542.78	2.1004E 00	5.8319E-01	7.7571E-04	3.1240E-03	1.3016E 02	5.8955E-04
10	.5463	0	545.02	2.3544E 00	6.6091E-01	8.8101E-04	3.5470E-03	1.3078E 02	6.6950E-04
11	.5882	0	547.96	2.4877E 00	6.8560E-01	9.1772E-04	3.6949E-03	1.3140E 02	6.9729E-04
12	.6302	0	550.20	2.4329E 00	6.5820E-01	8.8898E-04	3.5542E-03	1.3179E 02	6.7156E-04
13	[illegible]	0	549.74	2.3679E 00	5.9320E-01	7.9611E-04	3.2049E-03	1.3142E 02	6.0583E-04
14	[illegible]	315.0	[illegible]	3.1160E 00	8.3799E-01	1.1401E-03	4.5872E-03	1.3423E 02	8.6568E-04
15	[illegible]	0	554.17	2.1979E 00	5.7665E-01	7.7054E-04	3.1339E-03	1.3288E 02	5.9133E-04
16	.7996	0	555.86	2.1480E 00	6.5594E-01	8.9180E-04	3.5890E-03	1.3128E 02	6.7710E-04
17	.8409	0	556.12	2.1969E 00	5.8688E-01	7.9446E-04	3.1971E-03	1.3334E 02	6.0335E-04
18	.8822	0	556.57	2.6110E 00	6.5460E-01	8.8665E-04	3.5681E-03	1.3345E 02	6.7337E-04
19	.9235	0	555.97	2.5016E 00	6.2720E-01	8.4885E-04	3.4161E-03	1.3331E 02	6.4460E-04
20	.9648	0	553.73	2.6443E 00	6.3591E-01	8.5804E-04	3.4535E-03	1.3277E 02	6.5174E-04
21	.2524	45.0	531.77	1.6440E 00	4.8658E-01	6.3765E-04	2.5605E-03	1.2754E 02	4.8492E-04
22	.2943	45.0	536.37	1.1514E 00	4.3329E-01	5.7125E-04	2.3014E-03	1.2865E 02	4.3631E-04
23	.3363	45.0	538.17	1.0994E 00	4.2077E-01	5.5507E-04	2.2400E-03	1.2907E 02	4.2273E-04
24	.3783	45.0	539.31	1.0502E 00	3.1570E-01	4.1785E-04	1.6831E-03	1.29[illegible]E 02	3.1763E-04
25	.4203	45.0	541.41	1.1300E 00	3.2832E-01	4.3576E-04	1.7551E-03	1.2964E 02	3.3121E-04
26	.4623	45.0	544.27	1.1971E 00	3.9200E-01	5.2226E-04	2.1031E-03	1.3052E 02	3.9689E-04
27	.5043	45.0	545.72	2.1342E 00	5.6675E-01	7.5654E-04	3.0463E-03	1.3086E 02	5.7483E-04
28	.5463	315.0	558.05	3.1770E 00	8.1226E-01	1.1036E-03	4.4400E-03	1.3400E 02	8.3803E-04
29	.5882	45.0	550.30	3.7646E 00	1.0317E 00	1.3857E-03	5.5784E-03	1.3196E 02	1.0527E-03
30	.6302	45.0	552.53	4.0586E 00	1.0980E 00	1.4792E-03	5.9518E-03	1.3249E 02	1.1236E-03
31	.6722	45.0	553.71	4.4502E 00	1.0924E 00	1.4739E-03	5.9324E-03	1.3277E 02	1.1196E-03
32	.7170	45.0	555.21	4.1226E 00	9.6715E-01	1.3076E-03	5.2526E-03	1.3313E 02	9.9315E-04
33	.7563	45.0	556.90	3.3580E 00	9.2523E-01	1.2538E-03	5.0454E-03	1.3353E 02	9.5216E-04
34	.7996	45.0	558.16	3.1839E 00	8.9334E-01	1.2126E-03	4.8795E-03	1.3383E 02	9.2085E-04
35	.8409	45.0	559.45	3.1682E 00	8.5712E-01	1.1655E-03	4.6896E-03	1.3414E 02	8.8500E-04
36	.8822	45.0	559.52	3.0982E 00	8.1491E-01	1.1062E-03	4.4590E-03	1.3415E 02	8.4150E-04
37	.9235	45.0	559.24	3.1605E 00	8.0754E-01	1.0978E-03	4.4171E-03	1.3409E 02	8.3358E-04
38	.9648	45.0	557.82	3.1810E 00	7.6490E-01	1.0379E-03	4.1765E-03	1.3375E 02	7.8819E-04
39	.2524	90.0	536.06	2.4665E 00	7.2914E-01	9.6091E-04	3.8713E-03	1.2856E 02	7.3057E-04
40	.2943	90.0	540.22	2.1839E 00	7.0021E-01	9.2789E-04	3.7374E-03	1.2955E 02	7.0530E-04
41	.3363	90.0	541.20	2.0971E 00	6.6190E-01	8.7826E-04	3.5373E-03	1.2979E 02	6.6755E-04
42	.3783	90.0	542.95	1.7247E 00	5.4563E-01	7.2567E-04	2.9224E-03	1.3021E 02	5.5152E-04
43	.4203	90.0	544.85	1.7384E 00	5.1388E-01	6.8514E-04	2.7549E-03	1.3065E 02	5.2066E-04
44	.4623	90.0	544.07	1.5677E 00	4.8700E-01	6.4917E-04	2.5141E-03	1.3061E 02	4.9333E-04
45	.5043	90.0	546.95	2.0776E 00	5.7245E-01	7.6541E-04	3.0818E-03	1.3116E 02	5.8159E-04
46	.5463	90.0	549.77	2.1791E 00	6.2228E-01	8.3519E-04	3.3622E-03	1.3183E 02	6.3451E-04
47	.5882	90.0	550.55	2.9089E 00	8.1617E-01	1.0966E-03	4.4143E-03	1.3201E 02	8.3305E-04
48	.6312	90.0	552.69	3.8516E 00	1.0612E 00	1.4299E-03	5.7505E-03	1.3253E 02	1.0062E-03
49	.6722	90.0	554.67	5.0705E 00	1.2703E 00	1.7161E-03	6.9069E-03	1.3300E 02	1.3035E-03
50	.7170	90.0	556.86	5.4821E 00	1.2910E 00	1.7493E-03	7.0394E-03	1.3352E 02	1.3285E-03
51	.7563	90.0	556.24	4.8769E 00	1.2704E 00	1.7200E-03	6.9218E-03	1.3337E 02	1.3063E-03
52	.7996	90.0	557.53	5.9759E 00	1.5567E 00	2.1113E-03	8.4960E-03	1.3368E 02	1.6034E-03
53	.8409	90.0	557.92	4.9531E 00	1.2409E 00	1.6838E-03	6.7756E-03	1.3377E 02	1.2787E-03
54	.8822	90.0	558.40	4.9825E 00	1.2231E 00	1.6608E-03	6.6826E-03	1.3389E 02	1.2611E-03
55	.9235	90.0	557.69	4.8597E 00	1.1687E 00	1.5854E-03	6.3705E-03	1.3372E 02	1.2039E-03
56	.9648	90.0	555.79	4.7558E 00	1.1461E 00	1.5507E-03	6.2407E-03	1.3326E 02	1.1777E-03
57	.2524	135.0	531.49	8.4003E-01	2.4832E-01	3.2530E-04	1.3109E-03	1.2748E 02	2.4738E-04
58	.2943	135.0	536.16	3.0511E 00	9.7825E-01	1.2894E-03	5.1946E-03	1.2859E 02	9.8031E-04
59	.3363	135.0	536.48	2.6225E 00	8.2774E-01	1.0915E-03	4.3971E-03	1.2866E 02	8.2981E-04
60	.3783	135.0	536.01	2.6957E 00	7.7527E-01	1.0216E-03	4.1159E-03	1.2855E 02	7.7675E-04
61	.4203	135.0	538.26	2.8203E 00	8.4777E-01	1.1205E-03	4.5137E-03	1.2909E 02	8.5181E-04
62	.4623	135.0	539.72	2.7032E 00	7.8543E-01	1.0401E-03	4.1896E-03	1.2944E 02	7.9064E-04
63	.5043	135.0	541.70	3.1915E 00	8.1546E-01	1.0827E-03	4.3607E-03	1.2991E 02	8.2293E-04
64	.5463	135.0	543.39	3.6076E 00	9.5801E-01	1.2749E-03	5.1340E-03	1.3031E 02	9.6888E-04
65	.5882	135.0	546.31	4.5254E 00	1.2017E 00	1.6054E-03	6.0642E-03	1.3101E 02	1.2199E-03
66	.6302	135.0	548.40	5.9339E 00	1.5757E 00	2.1110E-03	8.4989E-03	1.3150E 02	1.6039E-03
67	.6722	135.0	552.50	7.4563E 00	1.7931E 00	2.4154E-03	9.7223E-03	1.3260E 02	1.8348E-03
68	.7170	135.0	554.01	7.6311E 00	1.7971E 00	2.4257E-03	9.7629E-03	1.3284E 02	1.8424E-03
69	.7563	135.0	551.76	4.4466E 00	1.3038E 00	1.7565E-03	7.0624E-03	1.3230E 02	1.3328E-03
70	.7996	135.0	556.22	6.7591E 00	1.9639E 00	2.6589E-03	1.0700E-02	1.3337E 02	2.0193E-03
71	.8409	135.0	556.17	6.5037E 00	1.7920E 00	2.4257E-03	9.7619E-03	1.3336E 02	1.8423E-03
72	.8822	135.0	556.07	6.7325E 00	1.8214E 00	2.4654E-03	9.9218E-03	1.3333E 02	1.8724E-03
73	.9235	135.0	555.59	7.0240E 00	1.7242E 00	2.3323E-03	9.3862E-03	1.3322E 02	1.7713E-03
74	.9648	135.0	556.84	7.6555E 00	1.8410E 00	2.4945E-03	1.0038E-02	1.3351E 02	1.8944E-03
75	.2524	180.0	532.96	4.1221E 00	1.1977E 00	1.5726E-03	6.3363E-03	1.2783E 02	1.1954E-03
76	.2943	180.0	537.20	2.4691E 00	8.2369E-01	1.0872E-03	4.3796E-03	1.2884E 02	8.2657E-04
77	.3363	180.0	539.55	3.2951E 00	9.7405E-01	1.2896E-03	5.1945E-03	1.2939E 02	9.8030E-04
78	.3783	180.0	541.07	3.3026E 00	9.9276E-01	1.3170E-03	5.3045E-03	1.2976E 02	1.0011E-03
79	.4203	180.0	543.07	3.8661E 00	1.0837E 00	1.4414E-03	5.8055E-03	1.3023E 02	1.0956E-03
80	.4623	180.0	545.08	3.7878E 00	1.0817E 00	1.4427E-03	5.8093E-03	1.3071E 02	1.0963E-03
81	.5043	180.0	547.28	4.9541E 00	1.1409E 00	1.5261E-03	6.1447E-03	1.3124E 02	1.1596E-03
82	.5463	180.0	549.97	5.4740E 00	1.4542E 00	1.9522E-03	7.8590E-03	1.3189E 02	1.4831E-03
83	.5882	180.0	552.59	6.0075E 00	1.5953E 00	2.1492E-03	8.6509E-03	1.3250E 02	1.6326E-03
84	.6302	180.0	538.67	1.3322E-01	3.9376E-02	4.6782E-05	1.8845E-04	1.2918E 02	3.5563E-05
85	.6722	180.0	560.30	8.7796E 00	2.1113E 00	2.8743E-03	1.1564E-02	1.3434E 02	2.1824E-03
86	.7170	180.0	562.34	8.6600E 00	2.0083E 00	2.8510E-03	1.1469E-02	1.3483E 02	2.1645E-03
87	.7563	180.0	559.74	6.7076E 00	1.6130E 00	2.1943E-03	8.8249E-03	1.3421E 02	1.6662E-03
88	.7996	180.0	564.74	7.6137E 00	1.9834E 00	2.7167E-03	1.0928E-02	1.3541E 02	2.0622E-03
89	.8409	180.0	564.96	8.1486E 00	2.0821E 00	2.8526E-03	1.1473E-02	1.3545E 02	2.1656E-03
90	.8822	180.0	564.61	8.7385E 00	2.0137E 00	2.7577E-03	1.1093E-02	1.3537E 02	2.0934E-03
91	.9235	180.0	564.11	8.4275E 00	2.1188E 00	2.8965E-03	1.1652E-02	1.3525E 02	2.1989E-03
92	.9648	180.0	563.67	[illegible]	2.1802E 00	2.9815E-03	1.1993E-02	1.3513E 02	2.2634E-03
93	.8822	225.0	566.58	6.8342E 00	1.7462E 00	2.3977E-03	9.6437E-03	1.3584E 02	1.8199E-03
94	.9648	225.0	563.49	7.3537E 00	1.7684E 00	2.4180E-03	9.7269E-03	1.3510E 02	1.8356E-03
95	[illegible]	270.0	562.47	6.0574E 00	1.3656E 00	1.8646E-03	7.5012E-03	1.3486E 02	1.4156E-03
96	[illegible]	270.0	567.17	4.8019E 00	1.3022E 00	1.7896E-03	7.1975E-03	1.3598E 02	1.3583E-03
97	.8822	270.0	567.15	4.7390E 00	1.2736E 00	1.6991E-03	6.8335E-03	1.3597E 02	1.2896E-03
98	.9648	270.0	562.18	5.2408E 00	1.2803E 00	1.7201E-03	6.9202E-03	1.3479E 02	1.3060E-03



ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
RE NO. 2.18 X 10**6
ALPHA 4
SYM PHI X/L
SYM PHI X/L
0
45
90
135
180
225
270
315
24.00
16.00
0.00
0.20
0.40
0.60
0.80
X/L

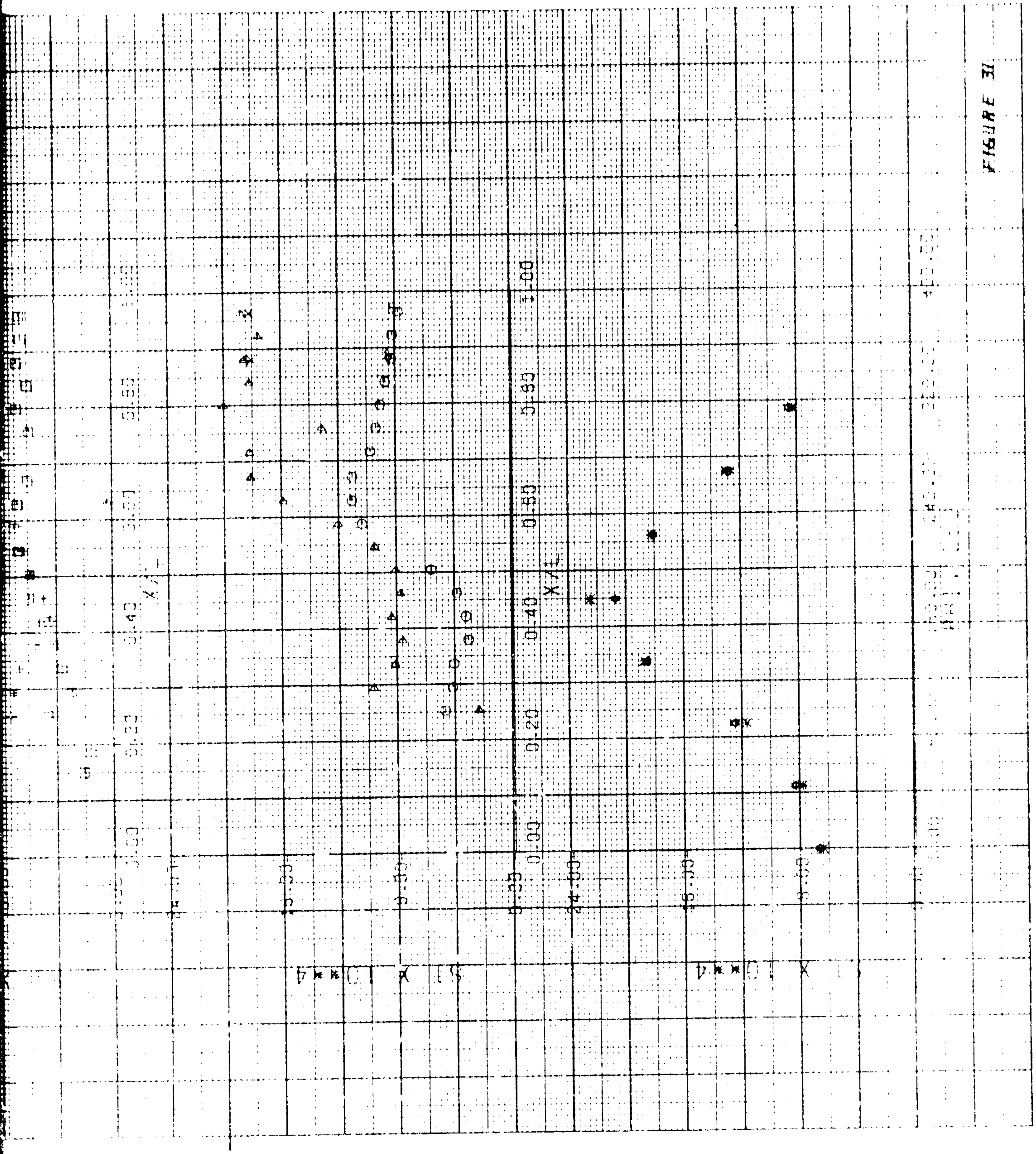


Figure 31

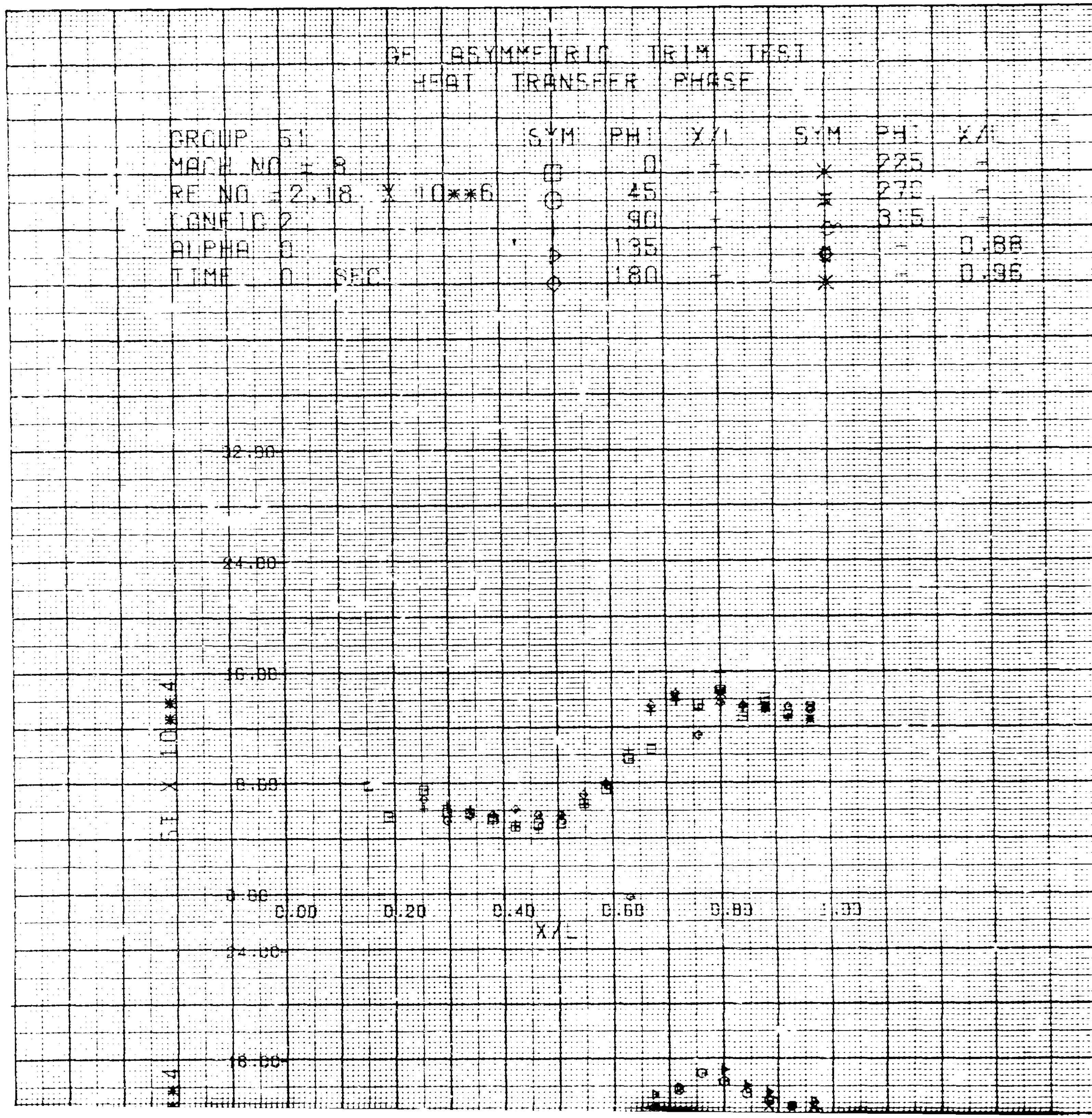
7/16/69

ARO, INC., ARNOLD AF S, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
VT0967-400

GROUP	CONFIG	ALPHA-M	BETA-M	ALPHA-S	ROLL	ALP-P	DATE	MACH NO	P0	T0	TIME
51	2	.02	0	-.02	0	0	7/5	7.69	472.47	1298.14	-.6

T-INF	P-INF	Q-INF	V-INF	RHO-INF	MU INF	RE/FT	RE/D	HO
9.42070E 01	4.06101E-02	2.18123E 00	3.86104E 03	4.39326E-05	7.59111E-08	2.17511E 06	1.99497E 06	3.17720E 02

TC NO	X/L	PHI	TTMP	SLOPE	Q-STDM	HT	HM	HW	ST
1	.7588	0	524.87	7.8765E 00	7.9919E-01	1.0332E-03	4.1645E-03	1.2586E 02	7.3391E-04
2	.1067	0	526.64	2.4926E 00	5.6925E-01	7.3787E-04	2.9737E-03	1.2633E 02	5.5975E-04
3	.2524	0	528.99	2.4700E 00	7.6232E-01	9.9111E-04	3.9917E-03	1.2688E 02	7.5177E-04
4	.2943	0	530.10	1.8842E 00	5.9471E-01	7.7431E-04	3.1199E-03	1.2715E 02	5.8729E-04
5	.3363	0	531.42	1.8764E 00	5.9230E-01	7.7260E-04	3.1120E-03	1.2746E 02	5.8595E-04
6	.3783	0	532.03	1.8229E 00	5.4795E-01	7.1597E-04	2.8844E-03	1.2779E 02	5.4296E-04
7	.4203	0	533.41	1.4932E 00	4.9197E-01	6.4331E-04	2.5916E-03	1.2793E 02	4.8784E-04
8	.4623	0	535.16	1.8667E 00	5.1434E-01	6.7010E-04	2.7154E-03	1.2835E 02	5.1115E-04
9	.5043	0	535.83	1.8870E 00	5.1073E-01	6.6997E-04	2.6987E-03	1.2851E 02	5.0799E-04
10	.5463	0	538.43	2.3344E 00	6.5499E-01	8.6214E-04	3.4723E-03	1.2913E 02	6.5361E-04
11	.5882	0	540.28	2.7509E 00	7.5795E-01	1.0001E-03	4.0275E-03	1.2957E 02	7.5813E-04
12	.6302	0	542.59	3.4909E 00	9.7365E-01	1.2886E-03	5.1888E-03	1.3012E 02	9.7673E-04
13	.6722	0	547.83	4.1115E 00	1.0388E 00	1.3727E-03	5.5258E-03	1.3137E 02	1.0402E-03
99	.8822	315.0	551.29	5.4126E 00	1.3058E 00	1.7483E-03	7.0384E-03	1.3219E 02	1.3245E-03
15	.7583	0	547.61	5.4403E 00	1.3564E 00	1.8072E-03	7.2750E-03	1.3132E 02	1.3694E-03
16	.7996	0	547.94	5.1865E 00	1.4552E 00	1.9397E-03	7.8082E-03	1.3139E 02	1.4698E-03
17	.8409	0	547.91	4.9514E 00	1.2651E 00	1.6863E-03	6.7880E-03	1.3138E 02	1.2778E-03
18	.8822	0	548.47	5.4708E 00	1.3956E 00	1.8616E-03	7.4934E-03	1.3152E 02	1.4105E-03
19	.9235	0	548.16	5.1086E 00	1.2798E 00	1.7064E-03	6.8689E-03	1.3144E 02	1.2930E-03
20	.9648	0	550.89	5.4210E 00	1.3277E 00	1.7767E-03	7.1510E-03	1.3210E 02	1.3461E-03
21	.2524	45.0	526.08	2.2967E 00	6.7715E-01	8.7705E-04	3.5347E-03	1.2619E 02	6.6536E-04
22	.2943	45.0	527.01	1.9557E 00	6.2702E-01	8.1310E-04	3.2768E-03	1.2641E 02	6.1682E-04
23	.3363	45.0	528.66	1.9052E 00	5.9075E-01	7.6771E-04	3.0936E-03	1.2680E 02	5.8233E-04
24	.3783	45.0	529.79	1.8205E 00	5.4724E-01	7.1221E-04	2.8698E-03	1.2707E 02	5.4020E-04
25	.4203	45.0	532.21	1.4072E 00	4.6700E-01	6.0970E-04	2.4564E-03	1.2765E 02	4.6239E-04
26	.4623	45.0	535.34	1.7678E 00	4.9601E-01	6.5025E-04	2.6193E-03	1.2840E 02	4.9305E-04
27	.5043	45.0	537.03	2.4605E 00	5.4717E-01	7.1890E-04	2.8958E-03	1.2880E 02	5.4505E-04
100	.9648	315.0	555.50	5.0669E 00	1.2105E 00	1.6407E-03	6.6018E-03	1.3319E 02	1.2427E-03
29	.5882	45.0	540.60	2.8997E 00	7.9895E-01	1.0546E-03	4.2471E-03	1.2965E 02	7.9946E-04
30	.6302	45.0	543.09	3.5541E 00	9.6152E-01	1.2734E-03	5.1274E-03	1.3024E 02	9.6517E-04
31	.6722	45.0	550.79	5.0277E 00	1.2341E 00	1.6513E-03	6.6462E-03	1.3207E 02	1.2511E-03
32	.7170	45.0	552.67	5.8400E 00	1.3753E 00	1.8448E-03	7.4241E-03	1.3252E 02	1.3975E-03
33	.7583	45.0	548.33	5.4341E 00	1.4972E 00	1.9968E-03	8.0377E-03	1.3149E 02	1.5130E-03
34	.7996	45.0	548.75	5.1130E 00	1.4348E 00	1.9146E-03	7.7068E-03	1.3159E 02	1.4507E-03
35	.8409	45.0	549.99	4.9988E 00	1.3524E 00	1.8076E-03	7.2754E-03	1.3188E 02	1.3695E-03
36	.8822	45.0	549.88	4.9300E 00	1.2967E 00	1.7329E-03	6.9750E-03	1.3185E 02	1.3130E-03
37	.9235	45.0	549.80	4.9140E 00	1.2556E 00	1.6778E-03	6.7531E-03	1.3184E 02	1.2712E-03
38	.9648	45.0	553.64	4.8420E 00	1.1644E 00	1.5640E-03	6.2937E-03	1.3275E 02	1.1847E-03
39	.2524	90.0	528.25	2.1400E 00	6.3279E-01	8.2191E-04	3.3121E-03	1.2671E 02	6.2345E-04
40	.2943	90.0	529.09	2.0567E 00	6.5942E-01	8.5743E-04	3.4550E-03	1.2690E 02	6.5037E-04
41	.3363	90.0	530.16	1.9691E 00	6.2151E-01	8.0927E-04	3.2608E-03	1.2716E 02	6.1301E-04
42	.3783	90.0	532.01	1.7075E 00	5.3894E-01	7.0345E-04	2.8341E-03	1.2760E 02	5.3349E-04
43	.4203	90.0	534.31	1.7168E 00	5.0749E-01	6.6439E-04	2.6764E-03	1.2815E 02	5.0381E-04
44	.4623	90.0	534.18	1.5495E 00	4.8134E-01	6.3084E-04	2.5381E-03	1.2812E 02	4.7776E-04
45	.5043	90.0	536.78	2.0909E 00	5.7612E-01	7.5668E-04	3.0478E-03	1.2874E 02	5.7371E-04
46	.5463	90.0	539.66	2.3085E 00	6.5924E-01	8.6914E-04	3.5002E-03	1.2942E 02	6.5888E-04
47	.5882	90.0	540.46	2.9043E 00	8.1489E-01	1.0755E-03	4.3310E-03	1.2961E 02	8.1526E-04
48	.6302	90.0	542.80	3.7846E 00	1.0428E 00	1.3805E-03	5.5587E-03	1.3017E 02	1.0464E-03
49	.6722	90.0	550.68	5.7281E 00	1.3077E 00	1.7495E-03	7.0416E-03	1.3205E 02	1.3255E-03
50	.7170	90.0	552.57	5.4574E 00	1.3794E 00	1.8500E-03	7.4452E-03	1.3250E 02	1.4015E-03
51	.7583	90.0	545.55	5.0812E 00	1.3237E 00	1.7588E-03	7.0807E-03	1.3082E 02	1.3329E-03
52	.7996	90.0	546.70	6.0954E 00	1.5878E 00	2.1130E-03	8.5063E-03	1.3110E 02	1.6012E-03
53	.8409	90.0	546.51	5.3495E 00	1.3402E 00	1.7830E-03	7.1778E-03	1.3105E 02	1.3511E-03
54	.8822	90.0	546.99	5.4650E 00	1.3415E 00	1.7856E-03	7.1883E-03	1.3116E 02	1.3531E-03
55	.9235	90.0	546.38	5.7693E 00	1.2672E 00	1.6855E-03	6.7856E-03	1.3102E 02	1.2773E-03
56	.9648	90.0	550.00	5.1609E 00	1.2611E 00	1.6589E-03	6.6769E-03	1.3188E 02	1.2568E-03
57	.2524	135.0	523.20	4.4487E-01	1.7289E-01	2.2310E-04	8.9929E-04	1.2551E 02	1.6926E-04
58	.2943	135.0	523.93	2.1040E 00	6.7478E-01	8.7155E-04	3.5129E-03	1.2568E 02	6.5126E-04
59	.3363	135.0	524.54	2.0651E 00	6.5181E-01	8.4255E-04	3.3959E-03	1.2582E 02	6.3924E-04
60	.3783	135.0	524.77	1.8031E 00	5.6011E-01	7.2423E-04	2.9190E-03	1.2588E 02	5.4947E-04
61	.4203	135.0	527.53	1.4678E 00	5.9152E-01	7.6759E-04	3.0933E-03	1.2654E 02	5.8227E-04
62	.4623	135.0	529.47	1.9223E 00	5.5854E-01	7.2661E-04	2.9278E-03	1.2700E 02	5.5113E-04
63	.5043	135.0	531.49	2.2246E 00	5.6841E-01	7.4141E-04	2.9871E-03	1.2748E 02	5.6230E-04
64	.5463	135.0	533.31	2.6532E 00	7.0457E-01	9.2119E-04	3.7111E-03	1.2791E 02	6.9057E-04
65	.5882	135.0	535.76	3.2294E 00	8.5757E-01	1.1248E-03	4.5309E-03	1.2849E 02	8.5280E-04
66	.6302	135.0	538.24	4.2988E 00	1.1415E 00	1.5022E-03	6.0501E-03	1.2908E 02	1.1389E-03
67	.6722	135.0	547.74	5.6085E 00	1.3468E 00	1.7948E-03	7.2248E-03	1.3135E 02	1.3608E-03
68	.7170	135.0	548.83	5.9362E 00	1.3979E 00	1.8656E-03	7.5003E-03	1.3161E 02	1.4135E-03
69	.7583	135.0	541.56	2.7488E 00	7.7127E-01	1.0194E-03	4.1049E-03	1.2987E 02	7.7276E-04
70	.7996	135.0	544.70	5.7537E 00	1.5265E 00	2.1760E-03	8.1570E-03	1.3062E 02	1.5355E-03
71	.8409	135.0	545.07	5.1257E 00	1.4123E 00	1.8752E-03	7.5497E-03	1.3070E 02	1.4211E-03
72	.8822	135.0	545.00	5.0451E 00	1.3669E 00	1.8122E-03	7.2942E-03	1.3069E 02	1.3734E-03
73	.9235	135.0	545.27	5.1299E 00	1.2592E 00	1.6725E-03	6.7335E-03	1.3076E 02	1.2675E-03
74	.9648	135.0	551.01	5.1737E 00	1.2923E 00	1.7296E-03	6.9613E-03	1.3213E 02	1.3104E-03
75	.2524	180.0	525.30	2.4461E 00	7.1075E-01	9.1964E-04	[illegible]	1.2600E 02	6.9770E-04
76	.2943	180.0	526.85	1.7695E 00	5.4811E-01	7.1063E-04	2.8639E-03	1.2637E 02	5.3909E-04
77	.3363	180.0	528.90	1.9754E 00	5.8394E-01	7.5409E-04	3.0588E-03	1.2686E 02	5.7579E-04
78	.3783	180.0	530.90	1.9415E 00	5.8361E-01	7.6065E-04	3.0667E-03	1.2734E 02	5.7690E-04
79	.4203	180.0	533.39	2.1124E 00	6.2455E-01	8.1665E-04	3.2900E-03	1.2793E 02	6.1920E-04
80	.4623	180.0	535.32	2.0410E 00	5.8308E-01	7.6435E-04	3.0789E-03	1.2839E 02	5.7957E-04
81	.5043	180.0	537.94	2.1086E 00	5.7834E-01	7.6076E-04	3.0640E-03	1.2901E 02	5.7677E-04
82	.5463	180.0	540.54	2.7343E 00	7.2609E-01	9.5839E-04	3.8505E-03	1.2963E 02	7.2950E-04
83	.5882	180.0	543.09	3.0271E 00	8.0380E-01	1.0646E-03	4.2865E-03	1.3024E 02	8.0880E-04
84	.6302	180.0	538.80	-4.9407E-02	-1.3226E-02	-1.7418E-05	-7.0148E-05	1.2922E 02	-1.3295E-05
85	.6722	180.0	555.27	5.4475E 00	1.3637E 00	1.8087E-03	7.2740E-03	1.3314E 02	1.3706E-03
86	.7170	180.0	556.84	6.0180E 00	1.4172E 00	1.9117E-03	7.6916E-03	1.3351E 02	1.4470E-03
87	.7583	180.0	550.47	4.7246E 00	1.1342E 00	1.5196E-03	6.1169E-03	1.3200E 02	1.1513E-03
88	.7996	180.0	553.75	5.7291E 00	1.3622E 00	1.8299E-03	7.3637E-03	1.3278E 02	1.3861E-03
89	.8409	180.0	554.13	5.2660E 00	1.3655E 00	1.8084E-03	7.2772E-03	1.3287E 02	1.3698E-03
90	.8822	180.0	554.08	5.7142E 00	1.3166E 00	1.7697E-03	7.1213E-03	1.3286E 02	1.3405E-03
91	.9235	180.0	554.66	5.4279E 00	1.3324E 00	1.7926E-03	7.2110E-03	1.3299E 02	1.3574E-03
92	.9648	180.0	558.17	5.5591E 00	1.3041E 00	1.7623E-03	7.0901E-03	1.3383E 02	1.3346E-03
93	.8822	225.0	556.82	4.8585E 00	1.2414E 00	1.6745E-03	6.7375E-03	1.3351E 02	1.2682E-03
94	.9648	225.0	558.59	5.1235E 00	1.2321E 00	1.6660E-03	6.7023E-03	1.3393E 02	1.2616E-03
95	.7170	270.0	559.22	6.2270E 00	1.4839E 00	1.8999E-03	7.6410E-03	1.3408E 02	1.4387E-03
96	.7996	270.0	557.45	5.7463E 00	1.4197E 00	1.9167E-03	7.7119E-03	1.3366E 02	1.4516E-03
97	.8822	270.0	558.02	5.1395E 00	1.3132E 00	1.7743E-03	7.1343E-03	1.3380E 02	1.3437E-03
98	.9648	270.0	558.12	5.1223E 00	1.2318E 00	1.6645E-03	6.6967E-03	1.3382E 02	1.2466E-03


GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 51
MACH NO = 8
RE NO = 2.18 X 10**6
CONFIG 2
ALPHA 0
TIME 0 SEC
SYM PHI X/L
0
45
90
135
180
SYM PHI X/L
225
270
315
0.88
0.96
32.00
24.00
16.00
8.00
0.00
0.00
0.20
0.40
0.60
0.80
1.00
X/L
24.00
16.00
ST X 10**4

2

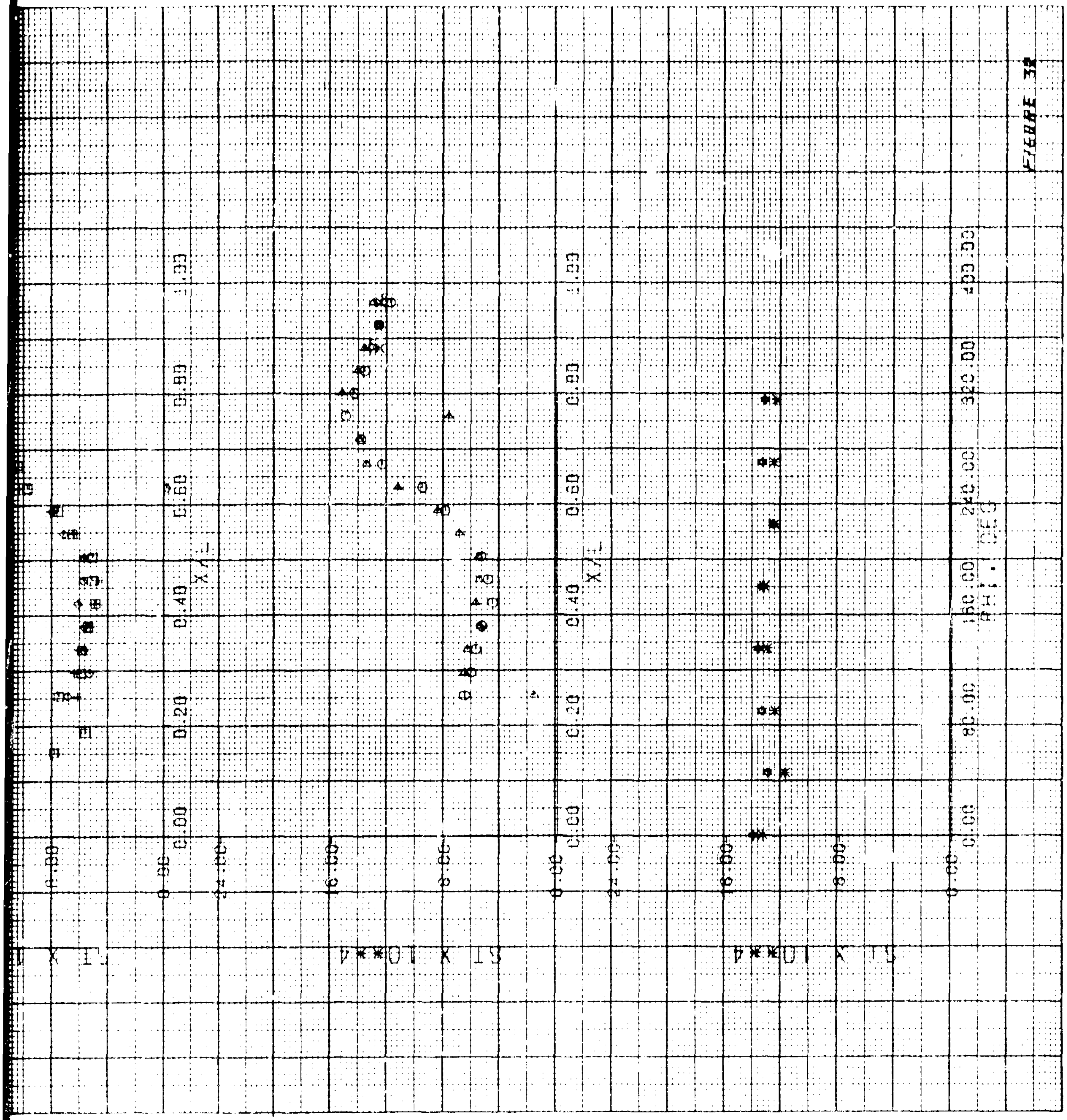


FIGURE 32
X/L
PHI, DEG
0.00
0.20
0.40
0.60
0.80
1.00
80.00
160.00
240.00
320.00
400.00

Figure 32

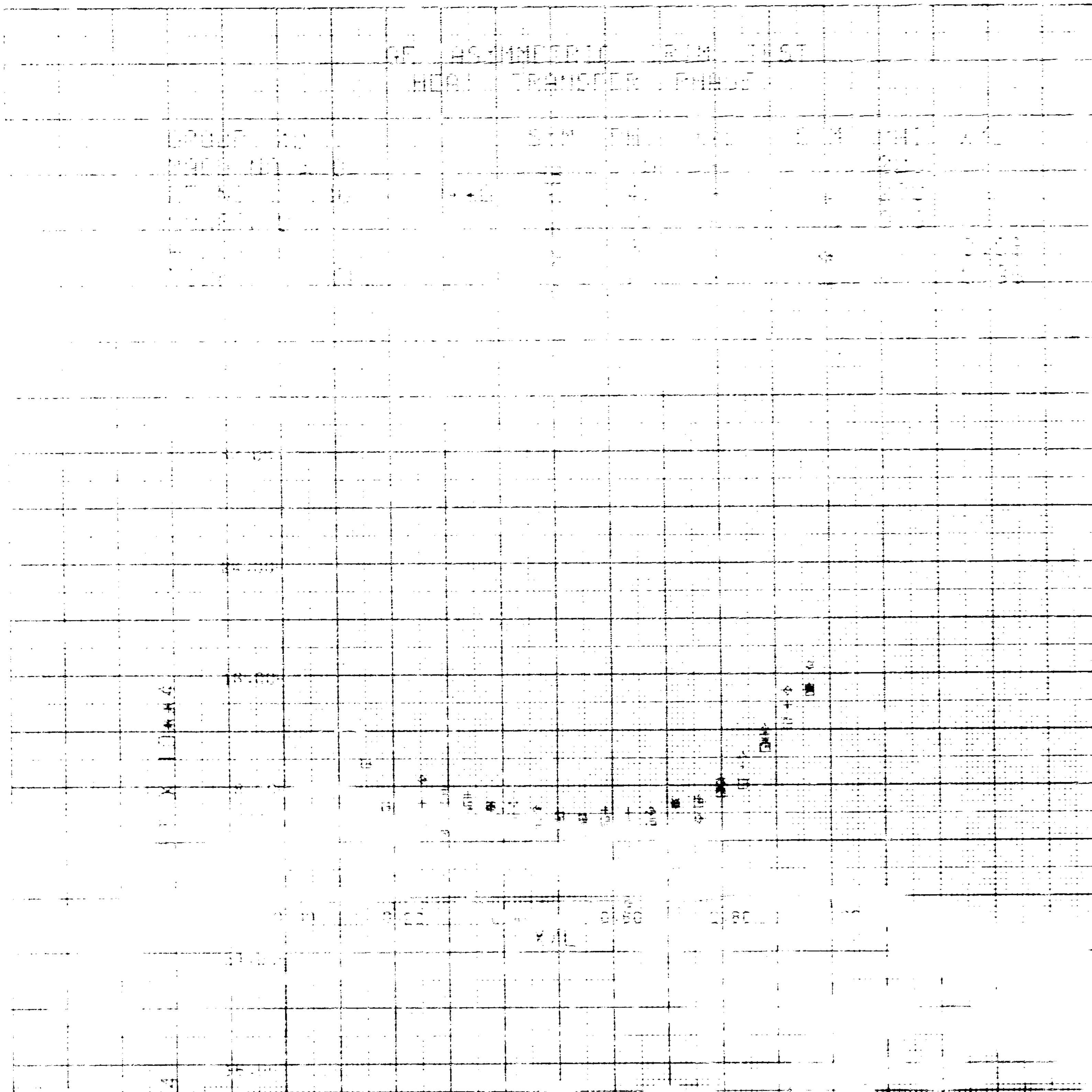
7/16/69

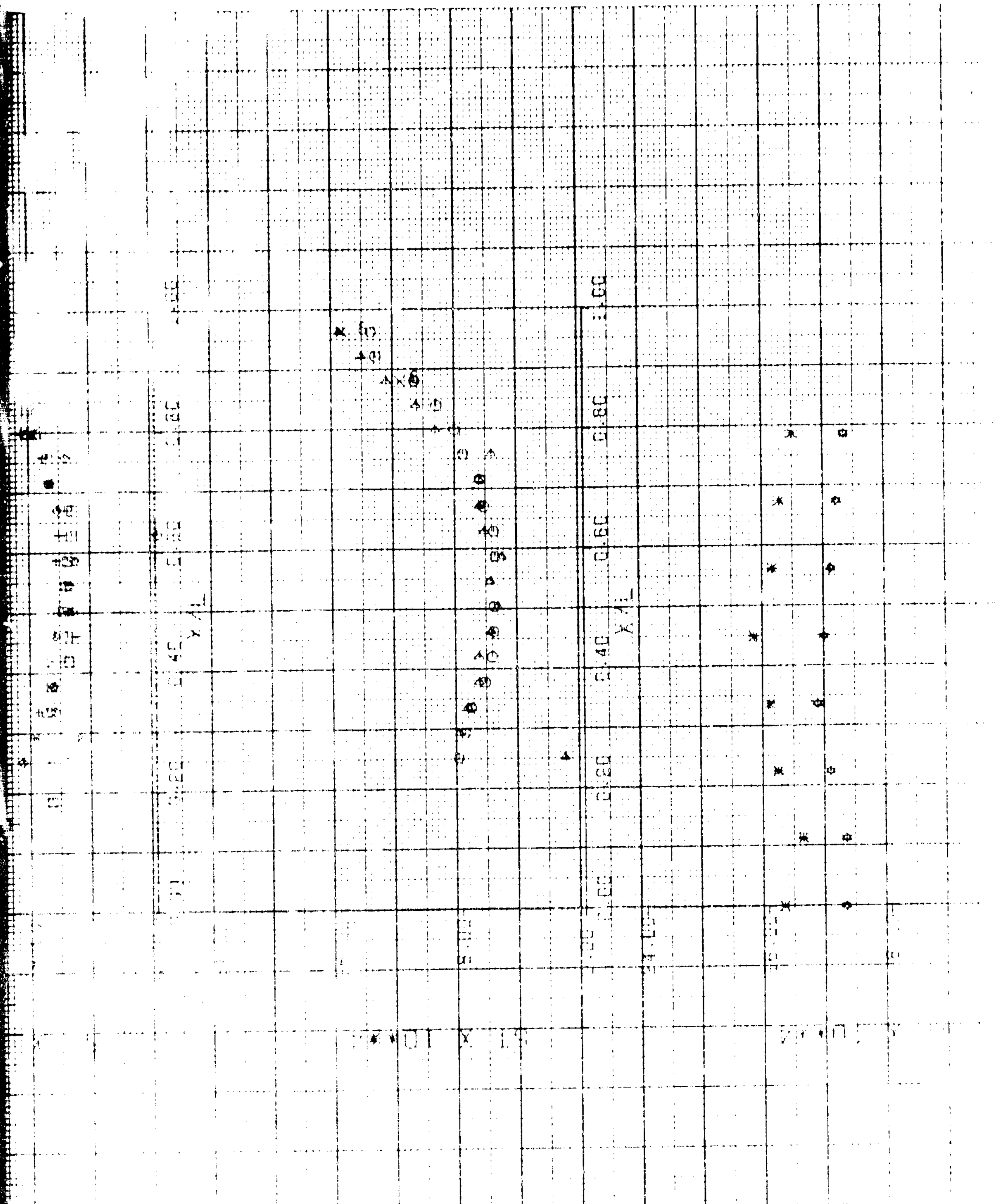
[illegible]
[illegible]
[illegible] HYPERSONIC TUNNEL [illegible]
[illegible]

GROUP	CONFIG	ALPHA-M	BETA-M	ALPHA-S	[illegible]	[illegible]	DATE	MACH NO	PO	TO	TIME
42	3	.02	0	[illegible]	[illegible]	0	7/15	7.97	279.26	1258.20	-.01

T-INF	P-INF	Q-INF	V-INF	RHO-INF	MU-INF	RE/FT	HREF	HO
9.18[illegible] 01	2.911[illegible]-02	1.30117E 00	3.74[illegible]	2.61[illegible]-05	[illegible]-08	[illegible] 06	[illegible] 02	[illegible] 02

TC NO	X/L	PHI	TEMP	SLOPE	Q-S[illegible]	H[illegible]	[illegible]	[illegible]	ST
1	.1108	0	515.91	[illegible] 00	5.7505[illegible]-01	7.9725E-05	3.21[illegible]-03	1.28[illegible] 02	[illegible]-05
2	.1867	0	533.01	1.4960E 00	3.9619E-01	5.5613E-05	2.2058E-03	1.27[illegible] 02	8.0197E-05
3	.2524	0	533.56	1.1271E 00	3.3317E-01	4.5976E-05	1.85[illegible]-03	1.2775E 02	5.7055E-05
4	.2941	0	530.31	1.1510E 00	[illegible]-01	5.9213E-05	2.1960E-03	1.2910E 02	7.41[illegible]-05
5	.3363	0	540.08	1.1094E 00	[illegible]-01	5.7218E-05	2.30[illegible]-03	1.29[illegible] 02	7.1[illegible]-05
6	.3783	0	542.42	1.1001E 00	[illegible]-01	[illegible]-05	2.21[illegible]-03	1.3000E 02	6.00[illegible]-05
7	.4203	0	542.92	1.1277E 00	[illegible]-01	6.5625E-05	[illegible]-03	1.30[illegible] 02	5.70[illegible]-05
8	.4623	0	544.19	1.1[illegible] 00	3.[illegible]-01	[illegible]-05	1.8594E-03	1.3050E 02	5.7[illegible]-05
9	.5043	0	544.49	1.2715E 00	3.4435E-01	4.5725E-05	1.9426E-03	1.3057E 02	6.03[illegible]-05
10	.5463	0	546.25	1.1903E 00	3.3[illegible]-01	4.6900E-05	1.8725E-03	1.3094E 02	5.8[illegible]-05
11	.5882	0	547.18	1.1804E 00	3.2925E-01	4.57[illegible]-05	1.8458E-03	1.3121E 02	5.722[illegible]-05
12	.6312	0	547.79	1.1455E 00	3.09[illegible]-01	4.302[illegible]-05	1.7500E-03	1.3136E 02	5.[illegible]-05
13	.6722	0	546.92	1.2244E 00	3.06[illegible]-01	4.3124E-05	1.7548E-03	1.3115E 02	5.[illegible]-05
[illegible]	.[illegible]522	315.0	559.37	2.3467E 00	6.113[illegible]-01	8.7502E-05	3.52[illegible]-03	1.3616E 02	[illegible]-03
15	.[illegible]3	0	552.00	1.6453E 00	3.9500[illegible]-01	5.6021[illegible]-05	2.25[illegible]-03	1.3[illegible] 02	[illegible]
16	.7[illegible]6	0	553.94	1.5494E 00	4.34[illegible]-01	6.1732E-05	2.4006E-03	1.3[illegible] 02	[illegible]
[illegible]	.[illegible]409	0	554.95	1.8310E 00	4.6705[illegible]-01	6.6527[illegible]-05	2.6829E-03	1.33[illegible] 02	[illegible]
[illegible]	.8827	0	555.99	2.4612E 00	6.1657E-01	8.7799E-05	3.5[illegible]-03	1.33[illegible] 02	1.09[illegible]-03
19	.9235	0	555.04	2.8333E 00	7.0980E-01	1.0103E-04	4.0740E-03	1.3323E 02	1.2573E-03
20	.9648	0	554.37	3.5124E 00	8.4477E-01	1.2001E-04	4.8349E-03	1.32[illegible] 02	1.[illegible]-03
21	.2[illegible]	45.0	531.92	1.6087E 00	4.7554E-01	6.5476E-05	2.5[illegible]-03	1.2750E 02	8.19[illegible]-05
22	.2941	45.0	536.74	1.1987E 00	4.4844E-01	6.2157E-05	2.5030E-03	1.2872E 02	7.7600E-05
23	.3363	45.0	539.60	1.4113E 00	4.2425E-01	5.9037E-05	2.3427E-03	1.2941E 02	7.3004E-05
24	.3783	45.0	540.98	1.2332E 00	3.7070E-01	5.1585E-05	2.0499E-03	1.2973E 02	6.4678E-05
25	.4203	45.0	543.00	1.1728E 00	3.4077E-01	4.7647E-05	1.8927E-03	1.3022E 02	5.9619E-05
26	.4623	45.0	545.59	1.1861E 00	3.3279E-01	4.6701E-05	1.8812E-03	1.3083E 02	5.8426E-05
27	.5043	45.0	546.45	1.1443E 00	3.3043E-01	4.6425E-05	1.8[illegible]-03	1.3104E 02	5.8076E-05
100	.9648	315.0	558.78	3.4375E 00	8.0263E-01	1.1470E-04	4.6257E-03	1.3394E 02	1.4347E-03
29	.5882	45.0	548.57	1.1795E 00	3.2499E-01	4.5797E-05	1.8470E-03	1.3154E 02	5.7286E-05
30	.6312	45.0	549.5[illegible]	1.2181E 00	3.2954E-01	4.6499E-05	1.8747E-03	1.3176E 02	5.8161E-05
31	.6722	45.0	549.75	1.4890E 00	3.6564E-01	5.1612E-05	2.0819E-03	1.3189E 02	6.4556E-05
32	.7170	45.0	551.6[illegible]	1.6009E 00	3.7699E-01	5.3348E-05	2.1515E-03	1.3225E 02	6.6715E-05
33	.7583	45.0	554.[illegible]	1.5858E 00	4.[illegible]693E-01	6.2082E-05	2.5030E-03	1.3293E 02	7.7633E-05
34	.7996	45.0	556.21	1.6658E 00	[illegible].6739E-01	6.6580E-05	2.6847E-03	1.3336E 02	8.3248E-05
35	.8409	45.0	558.09	1.9611E 00	5.3057E-01	7.5783E-05	3.0555E-03	1.3381E 02	9.4746E-05
36	.8822	45.0	559.11	2.1221E 00	6.1077E-01	8.7367E-05	3.5224E-03	1.3406E 02	1.0922E-03
37	.9235	45.0	559.24	2.9416E 00	7.5162E-01	1.0753E-04	4.3354E-03	1.3409E 02	1.3443E-03
38	.9648	45.0	558.20	3.1941E 00	7.6812E-01	1.0973E-04	4.4242E-03	1.3384E 02	1.3719E-03
39	.2524	90.0	535.21	1.3672E 00	4.1006E-01	5.6717E-05	2.2847E-03	1.2836E 02	7.3498E-05
40	.2941	90.0	541.04	1.4445E 00	4.6313E-01	6.4488E-05	2.5827E-03	1.2951E 02	8.0794E-05
41	.3363	90.0	542.25	1.4022E 00	4.4255E-01	6.1816E-05	2.4945E-03	1.3004E 02	7.7350E-05
42	.3783	90.0	544.13	1.2426E 00	3.9215E-01	5.4921E-05	2.2[illegible]-03	1.3066E 02	6.8716E-05
43	.4203	90.0	545.09	1.0779E 00	3.5705E-01	5.0122E-05	2.0222E-03	1.3089E 02	6.2735E-05
44	.4623	90.0	545.78	9.6[illegible]-01	2.9923E-01	4.2003E-05	1.6947E-03	1.3099E 02	5.2548E-05
45	.5043	90.0	546.94	1.1748E 00	3.2370E-01	4.5510E-05	1.83[illegible]-03	1.3135E 02	5.6932E-05
46	.5463	90.0	548.77	1.1161E 00	3.1372E-01	4.4926E-05	1.8123E-03	1.3179E 02	5.6176E-05
47	.5882	90.0	54[illegible].05	1.1196E 00	3.7025E-01	5.2210E-05	2.1061E-03	1.3156E 02	6.5[illegible]-05
48	.63[illegible]2	90.0	549.41	1.2930E 00	3.5626E-01	5.0262E-05	2.0275E-03	1.3176E 02	6.2867E-05
49	.6722	90.0	549.35	1.1365E 00	3.3431E-01	4.7163E-05	1.9025E-03	1.3173E 02	5.8992E-05
50	.7170	90.0	551.36	1.6723E 00	3.9352E-01	5.5715E-05	2.2472E-03	1.3221E 02	6.9682E-05
51	.7583	90.0	552.39	1.5771E 00	4.1884E-01	5.9208E-05	2.3870E-03	1.3245E 02	7.2795E-05
52	.7996	90.0	554.28	1.8833E 00	4.9600E-01	[illegible].4593E-05	2.6[illegible]-03	1.3290E 02	8.7150E-05
53	.8409	90.0	555.33	2.1521E 00	5.3916E-01	7.6705E-05	3.0[illegible]-03	1.3315E 02	9.5913E-05
54	.8822	90.0	556.79	[illegible].7251E 00	6.6842E-01	9.5368E-05	3.8459E-03	1.3350E 02	1.1924E-0[illegible]
55	.9235	90.0	556.07	3.5699E 00	7.8635E-01	1.1199E-04	4.51[illegible]-03	1.3333E 02	1.4003E-03
56	.9648	90.0	554.14	3.5925E 00	8.0392E-01	1.2271E-04	4.9440E-03	1.3288E 02	1.5341E-03
57	.2524	135.0	531.43	2.4085E-01	7.1199E-02	9.7965E-05	3.9556E-04	1.2745E 02	1.2260E-04
58	.2943	135.0	535.29	1.4660E 00	4.7004E-01	6.5020E-05	2.6248E-03	1.2838E 02	8.1390E-05
59	.3363	135.0	536.07	1.3824E 00	4.3631E-01	6.[illegible]487E-05	2.4410E-03	1.2876E 02	7.5710E-05
60	.3783	135.0	535.75	1.2617E 00	3.9257E-01	5.4339E-05	2.1916E-03	1.2849E 02	6.8018E-05
61	.4203	135.0	538.7[illegible]	1.[illegible]904E 00	3.9103E-01	5.4350E-05	2.1937E-03	1.2920E 02	6.8021E-05
62	.4623	135.0	539.98	1.1842E 00	3.4493E-01	4.7963E-05	1.9333E-03	1.2948E 02	[illegible]9949E-05
63	.5043	135.0	540.96	1.[illegible]378E 00	3.1625E-01	4.4098E-05	1.7790E-03	1.2973E 02	[illegible]5183E-05
64	.5463	135.0	541.67	1.3055E 00	3.0568E-01	4.2384E-05	1.[illegible]525E-03	1.2990E 02	[illegible]2345E-05
65	.5882	135.0	542.68	1.1280E 00	2.9953E-01	4.1852E-05	1.6892E-03	1.3014E 02	5.2180E-05
66	.6[illegible]2	135.0	543.27	1.[illegible]743E 00	3.[illegible]-01	5.1195E-05	2.0650E-03	[illegible] 02	6.4056E-05
67	.6722	135.0	546.[illegible]	1.5985E 00	3.8351E-01	5.3805E-05	2.171[illegible]-03	[illegible] 02	6.73[illegible]-05
68	.7170	135.0	545.[illegible]	1.6256E 00	3.8282E-01	5.3722E-05	2.1675E-03	1.3084E 02	6.7210E-05
69	.7583	135.0	546.01	1.1994E 00	3.1652E-01	4.72[illegible]-05	1.9075E-03	1.3103E 02	5.9146E-05
70	.7996	135.0	548.95	1.9576E 00	[illegible]-01	7.6099E-05	3.[illegible]-03	1.3163E 02	9.[illegible]88E-05
71	.8409	135.0	550.12	2.2223E 00	6.[illegible]-01	8.6[illegible]-05	3.[illegible]-03	1.31[illegible] 02	[illegible]
72	.8822	135.0	551.14	2.4651E 00	[illegible]-01	1.0198E-04	4.1133E-03	1.3215E 02	1.2755E-03
73	.9235	135.0	551.56	3.5087E 00	8.1270E-01	1.1493E-04	4.[illegible]-03	1.3225E 02	[illegible]-03
74	.9648	135.0	551.09	3.[illegible] 00	8.9208E-01	1.2563E-04	[illegible]-03	1.3212E 02	1.5836E-03
75	.2524	180.0	531.46	1.1682E 00	5.1254E-01	7.0520E-05	[illegible]-03	1.27[illegible] 02	[illegible]
76	.2941	180.0	531.79	4.1093E-01	2.9667E-01	4.1502E-05	[illegible]-03	[illegible] 02	5.1920E-05
77	.3363	180.0	540.00	1.2941E 00	[illegible]8255E-01	5.3254E-05	2.[illegible]-03	[illegible] 02	6.6051E-05
78	.3783	180.0	541.[illegible]	1.2919E 00	[illegible]-01	5.4[illegible]-05	[illegible]-03	[illegible] 02	6.77[illegible]-05
79	.4203	180.0	542.94	1.1762E 00	4.0842E-01	5.6617E-05	2.2[illegible]-03	[illegible] 02	[illegible]
80	.4623	180.0	544.16	1.3199E 00	[illegible]7602E-01	5.2705E-05	2.1[illegible]-03	[illegible] 02	[illegible]-05
81	.5043	180.0	545.63	1.3426E 00	[illegible]-01	4.3586E-05	1.7[illegible]-03	[illegible] 02	[illegible]-05
82	.5463	180.0	546.93	1.2540E 00	3.2239E-01	4.5326E-05	1.8[illegible]-03	[illegible] 02	[illegible]-05
83	.5882	180.0	547.97	1.1319E 00	3.0044E-01	4.2308E-05	1.7[illegible]-03	1.31[illegible]	5.2923E-05
84	.6102	180.0	539.61	-2.4948E-02	-7.4860E-03	-1.0597E-05	-4.[illegible]-05	1.2[illegible]	[illegible]-05
85	.6722	180.0	550.77	1.8164E 00	3.6466E-01	5.[illegible]-05	2.[illegible]-03	1.32[illegible]	[illegible]-05
86	.7170	180.0	551.05	1.6624E 00	3.9151E-01	5.[illegible]-05	2.2[illegible]-03	1.3[illegible]	[illegible]
87	.7583	180.0	552.81	1.[illegible]649E 00	[illegible]3303E-01	[illegible]-05	1.7[illegible]-03	1.3255E 02	5.50[illegible]-05
88	.7996	180.0	555.05	1.4290E 00	4.7667E-01	[illegible]-05	2.[illegible]-03	1.3[illegible] 02	8.4768E-05
89	.8409	180.0	556.17	2.2706E 00	5.[illegible]-01	8.2[illegible]-05	3.3[illegible]-03	1.3336E 02	1.0332E-0[illegible]
90	.8822	180.0	557.03	1.6024E 00	6.[illegible]-01	9.8673E-05	3.[illegible]-03	1.3[illegible] 02	1.2337E-03
91	.9235	180.0	558.71	1.6[illegible]9E 00	[illegible]-01	1.[illegible]-03	[illegible]-03	1.3[illegible] 02	1.5[illegible]-03
92	.9648	180.0	558.[illegible]	4.1010E 00	7.5504E-01	1.3[illegible]-03	5.[illegible]-03	1.3[illegible] 02	1.5092E-03
93	[illegible]2	225.0	557.81	2.5893E 00	6.6150E-01	9.4[illegible]-05	3.[illegible]-03	[illegible] 02	1.1942E-03
94	.9648	225.0	55[illegible]	1.6325E 00	9.7355E-01	1.2[illegible]-03	5.[illegible]-03	[illegible] 02	1.5[illegible]-03
95	[illegible]	270.0	[illegible]	1.7507E 00	3.9[illegible]-01	5.6[illegible]-05	2.[illegible]-03	[illegible] 02	7.0529E-05
96	[illegible]	270.0	[illegible]	1.6862E 00	4.67[illegible]-01	6.[illegible]-05	[illegible]	[illegible] 02	8.0913E-05
97	[illegible]	270.0	545.21	2.1812E 00	6.1667E-01	9.[illegible]-05	3.[illegible]-03	[illegible] 02	1.1443E-03
98	[illegible]	270.0	541.58	1.5146E 00	8.4544E-01	1.2[illegible]-03	[illegible]-03	[illegible] 02	1.5163E-03


GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
X/L



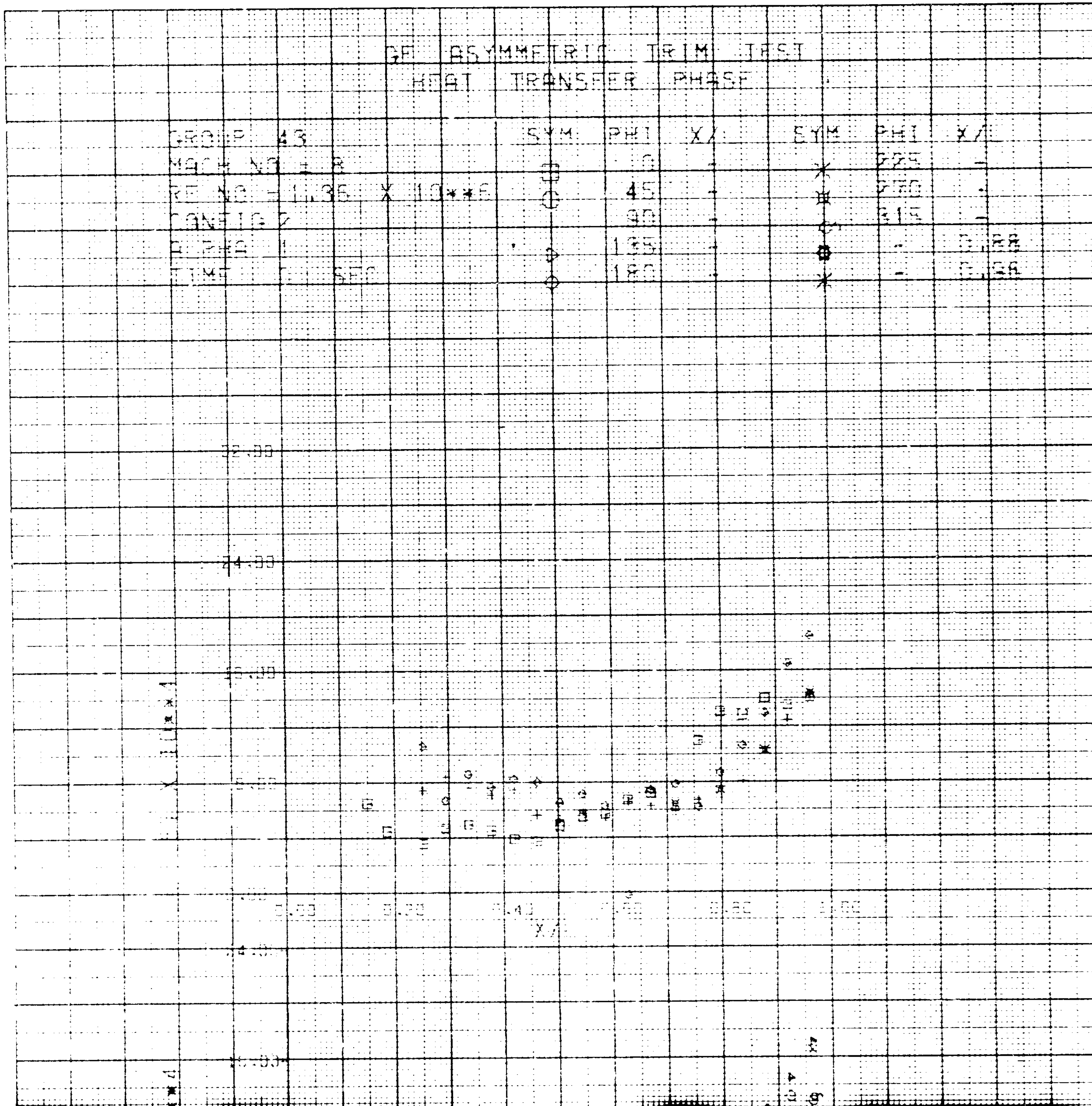
7/16/69

AEDC(ARO,INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
VT0967-000

GROUP	CONFIG	ALPHA-M	BETA-M	ALPHA-S	ROLL	ALM-P	DATE	MACH NO	PO	TO	TIME
43	2	1.03	0	1.07	0	0	715	7.97	281.90	1261.01	-.00

T-INF	P-INF	Q-INF	V-INF	RHO-INF	MU-INF	RE/FT	RE/D	HO
9.48101E 01	2.95962E-02	1.31594E 00	3.74616E 03	2.69457E-05	7.48072E-08	1.35446E 06	1.25020E 06	3.60133E 02

TC NO	X/L	PHI	TEMP	SLOPE	Q-STDN	HT	HM	HW	ST
1	.1304	0	531.18	1.7007 00	3.0274E-01	5.2463E-04	2.1173E-03	1.2740E 02	6.5095E-04
2	.1867	0	532.11	1.1944E 00	2.6231E-01	3.5988E-04	1.4570E-03	1.2762E 02	4.4668E-04
3	.2524	0	534.03	7.6400E-01	2.0811E-01	2.8627E-04	1.1545E-03	1.2808E 02	3.5527E-04
4	.2943	0	536.31	8.5726E-01	2.7058E-01	3.7338E-04	1.5070E-03	1.2863E 02	4.6333E-04
5	.3363	0	537.77	9.3752E-01	2.8645E-01	3.9605E-04	1.5984E-03	1.2897E 02	4.9142E-04
6	.3783	0	539.08	8.7287E-01	2.6214E-01	3.6312E-04	1.4654E-03	1.2928E 02	4.5052E-04
7	.4203	0	539.66	7.8036E-01	2.2674E-01	3.1431E-04	1.2683E-03	1.2941E 02	3.8995E-04
8	.4623	0	540.62	7.4029E-01	2.1775E-01	3.0227E-04	1.2197E-03	1.2965E 02	3.7500E-04
9	.5043	0	540.72	1.1285E 00	2.7025E-01	3.8630E-04	1.5588E-03	1.2967E 02	4.7925E-04
10	.5463	0	542.67	1.1210E 00	3.1453E-01	4.3781E-04	1.7667E-03	1.3014E 02	5.4316E-04
11	.5882	0	543.69	1.2047E 00	3.3192E-01	4.6273E-04	1.8649E-03	1.3038E 02	5.7397E-04
12	.6302	0	544.61	1.4257E 00	3.8570E-01	5.3860E-04	2.1721E-03	1.3060E 02	6.6780E-04
13	.6722	0	545.82	1.4531E 00	4.1414E-01	5.7907E-04	2.3360E-03	1.3089E 02	7.1819E-04
99	.8822	315.0	553.01	2.4339E 00	6.3402E-01	8.9554E-04	3.6112E-03	1.3261E 02	1.1103E-03
15	.7583	0	548.78	2.6237E 00	6.3094E-01	8.8507E-04	3.5730E-03	1.3159E 02	1.0985E-03
16	.7996	0	550.24	2.4630E 00	7.4717E-01	1.0512E-03	4.2390E-03	1.3194E 02	1.3035E-03
17	.8409	0	550.50	2.4755E 00	7.3473E-01	1.0341E-03	4.1705E-03	1.3200E 02	1.2822E-03
18	.8822	0	550.09	3.2017E 00	8.0210E-01	1.1295E-03	4.5553E-03	1.3210E 02	1.4005E-03
19	.9235	0	550.82	3.0964E 00	7.7420E-01	1.0889E-03	4.3917E-03	1.3189E 02	1.3502E-03
20	.9648	0	551.24	3.3437E 00	8.0408E-01	1.1329E-03	4.5680E-03	1.3218E 02	1.4047E-03
21	.2524	45.0	532.19	1.1712E 00	4.0533E-01	5.5615E-04	2.2452E-03	1.2764E 02	6.9028E-04
22	.2943	45.0	534.76	1.4689E 00	4.7095E-01	6.4846E-04	2.6175E-03	1.2825E 02	8.0474E-04
23	.3363	45.0	536.60	1.7341E 00	3.7096E-01	5.1210E-04	2.0668E-03	1.2869E 02	6.3545E-04
24	.3783	45.0	538.71	1.1526E 00	3.4647E-01	4.7968E-04	1.9350E-03	1.2919E 02	5.9516E-04
25	.4203	45.0	539.75	1.0685E 00	3.1047E-01	4.3046E-04	1.7371E-03	1.2944E 02	5.3406E-04
26	.4623	45.0	542.31	1.0785E 00	3.0260E-01	4.2105E-04	1.6988E-03	1.3006E 02	5.2231E-04
27	.5043	45.0	543.37	1.0605E 00	2.8161E-01	3.9242E-04	1.5832E-03	1.3030E 02	4.8676E-04
100	.9648	315.0	556.35	1.1478E 00	7.5699E-01	1.0743E-03	4.3311E-03	1.3340E 02	1.3316E-03
29	.5882	45.0	545.26	1.0282E 00	2.8331E-01	3.9582E-04	1.5948E-03	1.3075E 02	4.9094E-04
30	.6302	45.0	546.38	1.1394E 00	3.0826E-01	4.3136E-04	1.7400E-03	1.3102E 02	5.3498E-04
31	.6722	45.0	548.57	1.1719E 00	3.3676E-01	4.7268E-04	1.9065E-03	1.3154E 02	5.8616E-04
32	.7170	45.0	550.14	1.5434E 00	3.6345E-01	5.1128E-04	2.0620E-03	1.3192E 02	6.3397E-04
33	.7583	45.0	550.81	1.5773E 00	4.3459E-01	6.1194E-04	2.4679E-03	1.3208E 02	7.5875E-04
34	.7996	45.0	552.15	1.8407E 00	5.1645E-01	7.2857E-04	2.9380E-03	1.3240E 02	9.0330E-04
35	.8409	45.0	553.34	2.1175E 00	5.7207E-01	8.0955E-04	3.2644E-03	1.3268E 02	1.0036E-03
36	.8822	45.0	553.68	2.5100E 00	6.6020E-01	9.3338E-04	3.7636E-03	1.3276E 02	1.1571E-03
37	.9235	45.0	55[illegible].98	2.9683E 00	7.5844E-01	1.0712E-03	4.3195E-03	1.3259E 02	1.3280E-03
38	.9648	45.0	554.83	3.0756E 00	7.3962E-01	1.0473E-03	4.2229E-03	1.3303E 02	1.2983E-03
39	.2524	90.0	536.41	1.4801E 00	4.3753E-01	6.0384E-04	2.4372E-03	1.2865E 02	7.4930E-04
40	.2943	90.0	538.71	1.5606E 00	4.9395E-01	6.8386E-04	2.7598E-03	1.2920E 02	8.4849E-04
41	.3363	90.0	539.94	1.4145E 00	4.4644E-01	6.1919E-04	2.4986E-03	1.2950E 02	7.6820E-04
42	.3783	90.0	541.29	1.1128E 00	4.1636E-01	5.7570E-04	2.3230E-03	1.2980E 02	7.1420E-04
43	.4203	90.0	542.60	1.4723E 00	4.3523E-01	6.0583E-04	2.4444E-03	1.3012E 02	7.5152E-04
44	.4623	90.0	542.91	1.0689E 00	3.3204E-01	4.6238E-04	1.8656E-03	1.3019E 02	5.7357E-04
45	.5043	90.0	544.17	1.1293E 00	3.1116E-01	4.3405E-04	1.7511E-03	1.3048E 02	5.3938E-04
46	.5463	90.0	544.14	1.2136E 00	3.4658E-01	4.8347E-04	1.9505E-03	1.3049E 02	5.9968E-04
47	.5882	90.0	546.22	1.1176E 00	3.1358E-01	4.3871E-04	1.7697E-03	1.3098E 02	5.4410E-04
48	.6302	90.0	547.01	1.3435E 00	3.8114E-01	5.3387E-04	2.1535E-03	1.3117E 02	6.6209E-04
49	.6722	90.0	547.68	1.4567E 00	3.6494E-01	5.1160E-04	2.0636E-03	1.3133E 02	6.3445E-04
50	.7170	90.0	549.84	1.4584E 00	3.4345E-01	4.8294E-04	1.9477E-03	1.3185E 02	5.9883E-04
51	.7583	90.0	548.21	1.4874E 00	3.8748E-01	5.4360E-04	2.1926E-03	1.3146E 02	6.7412E-04
52	.7996	90.0	549.61	1.7050E 00	4.4415E-01	6.2434E-04	2.5181E-03	1.3179E 02	7.7419E-04
53	.8409	90.0	549.21	1.9619E 00	4.6644E-01	6.5531E-04	2.6430E-03	1.3170E 02	8.1260E-04
54	.8822	90.0	550.01	2.4423E 00	5.9951E-01	8.4320E-04	3.4007E-03	1.3189E 02	1.0455E-03
55	.9235	90.0	549.56	2.9864E 00	7.1817E-01	1.0095E-03	4.0718E-03	1.3178E 02	1.2517E-03
56	.9648	90.0	551.06	3.1900E 00	8.1522E-01	1.1483E-03	4.6309E-03	1.3214E 02	1.4238E-03
57	.2524	135.0	532.22	1.2796E-01	9.6948E-02	1.3303E-04	5.3763E-04	1.2765E 02	1.6511E-04
58	.2943	135.0	534.39	1.4014E 00	5.7755E-01	7.9484E-04	3.2084E-03	1.2816E 02	9.8643E-04
59	.3363	135.0	535.24	1.7005E 00	5.3674E-01	7.3960E-04	2.9853E-03	1.2838E 02	9.1782E-04
60	.3783	135.0	534.04	1.5451E 00	4.7996E-01	6.6022E-04	2.6650E-03	1.2808E 02	8.1937E-04
61	.4203	135.0	537.02	1.5503E 00	4.6603E-01	6.4370E-04	2.5979E-03	1.2879E 02	7.9874E-04
62	.4623	135.0	538.15	1.4322E 00	4.1615E-01	5.7570E-04	2.3214E-03	1.2906E 02	7.1432E-04
63	.5043	135.0	539.28	1.4370E 00	3.9293E-01	5.4443E-04	2.1970E-03	1.2933E 02	6.7547E-04
64	.5463	135.0	540.08	1.4746E 00	3.9150E-01	5.4316E-04	2.1918E-03	1.2952E 02	6.7387E-04
65	.5882	135.0	541.09	1.4367E 00	3.8151E-01	5.2995E-04	2.1346E-03	1.2976E 02	6.5744E-04
66	.6302	135.0	541.72	1.6669E 00	4.1604E-01	5.7467E-04	2.3341E-03	1.2991E 02	7.1761E-04
67	.6722	135.0	544.00	1.4422E 00	3.9491E-01	5.5077E-04	2.2220E-03	1.3045E 02	6.8317E-04
68	.7170	135.0	545.23	1.2276E 00	4.0603E-01	5.6837E-04	2.2929E-03	1.3075E 02	7.0495E-04
69	.7583	135.0	543.80	1.2980E 00	3.6195E-01	5.0474E-04	2.0363E-03	1.3043E 02	6.2007E-04
70	.7996	135.0	546.78	1.9958E 00	5.7990E-01	8.1193E-04	3.2752E-03	1.3112E 02	1.0070E-03
71	.8409	135.0	548.03	2.4325E 00	5.6003E-01	7.8547E-04	3.1682E-03	1.3141E 02	9.7407E-04
72	.8822	135.0	549.12	2.4280E 00	7.1094E-01	9.9871E-04	4.0242E-03	1.3167E 02	1.2385E-03
73	.9235	135.0	550.04	1.6045E 00	8.3571E-01	1.1755E-03	4.7410E-03	1.3190E 02	1.4576E-03
74	.9648	135.0	550.79	4.0995E 00	9.8566E-01	1.3881E-03	5.5942E-03	1.3207E 02	1.7212E-03
75	.2524	180.0	534.63	2.1541E 00	6.2589E-01	8.0166E-04	3.4741E-03	1.2822E 02	1.0093E-03
76	.2943	180.0	538.05	1.7260E 00	3.9309E-01	5.4372E-04	2.1943E-03	1.2904E 02	6.7464E-04
77	.3363	180.0	538.96	1.7014E 00	5.0295E-01	6.9655E-04	2.4110E-03	1.2925E 02	8.6423E-04
78	.3783	180.0	540.27	1.4907E 00	4.4809E-01	6.2172E-04	2.5068E-03	1.2957E 02	7.7132E-04
79	.4203	180.0	542.15	1.4358E 00	4.8356E-01	6.7268E-04	2.7141E-03	1.3001E 02	8.3448E-04
80	.4623	180.0	543.67	1.6390E 00	4.6806E-01	6.3250E-04	2.6325E-03	1.3038E 02	8.0936E-04
81	.5043	180.0	544.86	1.5167E 00	3.7997E-01	5.2058E-04	2.1694E-03	1.3065E 02	6.5806E-04
82	.5463	180.0	545.98	1.5642E 00	4.1534E-01	5.0693E-04	2.1445E-03	1.3093E 02	7.2050E-04
83	.5882	180.0	546.86	1.1704E 00	3.6405E-01	5.0977E-04	2.0543E-03	1.3114E 02	6.3221E-04
84	.6302	180.0	540.18	-1.3561E-02	-8.9122E-03	-1.7368E-05	-6.9982E-05	1.2954E 02	-1.5339E-05
85	.6722	180.0	550.43	1.7825E 00	4.2865E-01	6.0324E-04	2.4329E-03	1.3199E 02	7.4798E-04
86	.7170	180.0	551.39	1.0288E 00	4.5461E-01	6.4008E-04	2.5813E-03	1.3222E 02	7.9362E-04
87	.7583	180.0	551.10	1.4896E 00	3.5822E-01	5.0461E-04	2.0350E-03	1.3215E 02	6.2566E-04
88	.7996	180.0	553.11	1.9098E 00	4.9750E-01	7.0279E-04	2.8339E-03	1.3263E 02	8.7130E-04
89	.8409	180.0	554.22	2.3853E 00	6.0940E-01	8.6229E-04	3.4769E-03	1.3289E 02	1.0690E-03
90	.8822	180.0	555.40	1.2184E 00	7.4164E-01	1.0511E-03	4.2379E-03	1.3317E 02	1.3029E-03
91	.9235	180.0	556.14	1.4449E 00	9.4380E-01	1.3391E-03	5.3987E-03	1.3336E 02	1.6598E-03
[illegible]	.9648	180.0	557.74	4.4701E 00	1.0531E 00	1.4915E-03	6.0370E-03	1.3173E 02	1.8481E-03
[illegible]	.8822	225.0	556.96	2.2149E 00	6.6813E-01	9.4096E-04	3.4250E-03	1.3354E 02	1.1762E-03
[illegible]	[illegible]	225.0	557.88	1.1143E 00	9.4226E-01	1.3901E-03	5.6025E-03	1.3376E 02	1.6610E-03
[illegible]	[illegible]	270.0	554.71	1.4337E 00	3.6839E-01	5.2149E-04	2.1027E-03	1.3402E 02	6.4467E-04
[illegible]	[illegible]	270.0	556.26	1.4673E 00	4.2152E-01	5.9980E-04	2.4180E-03	1.3394E 02	7.3160E-04
[illegible]	[illegible]	270.0	558.01	2.3995E 00	5.8755E-01	8.3675E-04	3.3731E-03	1.3399E 02	1.0371E-03
[illegible]	[illegible]	270.0	558.34	1.4119E 00	8.2049E-01	1.1677E-03	4.7072E-03	1.3387E 02	1.4472E-03


GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 43
MACH NO = 8
RE NO = 1.35 X 10**6
CONFIG 2
SYM PHI X/L
0
45
90
135
180
SYM PHI X/L
225
270
315
32.00
24.00
16.00
8.00
0.20
0.40
0.60
X/L

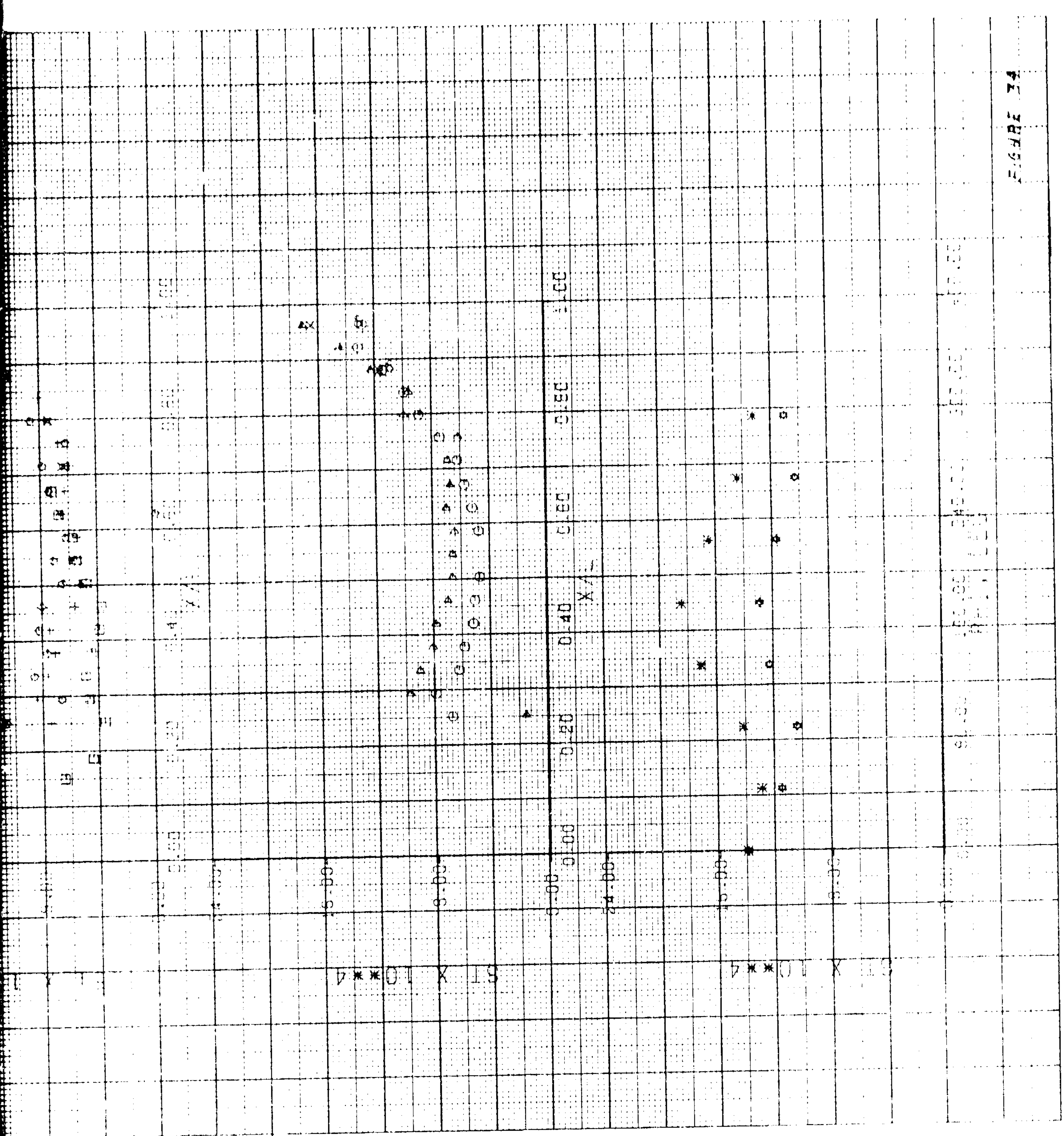


Figure 34

7/14/69

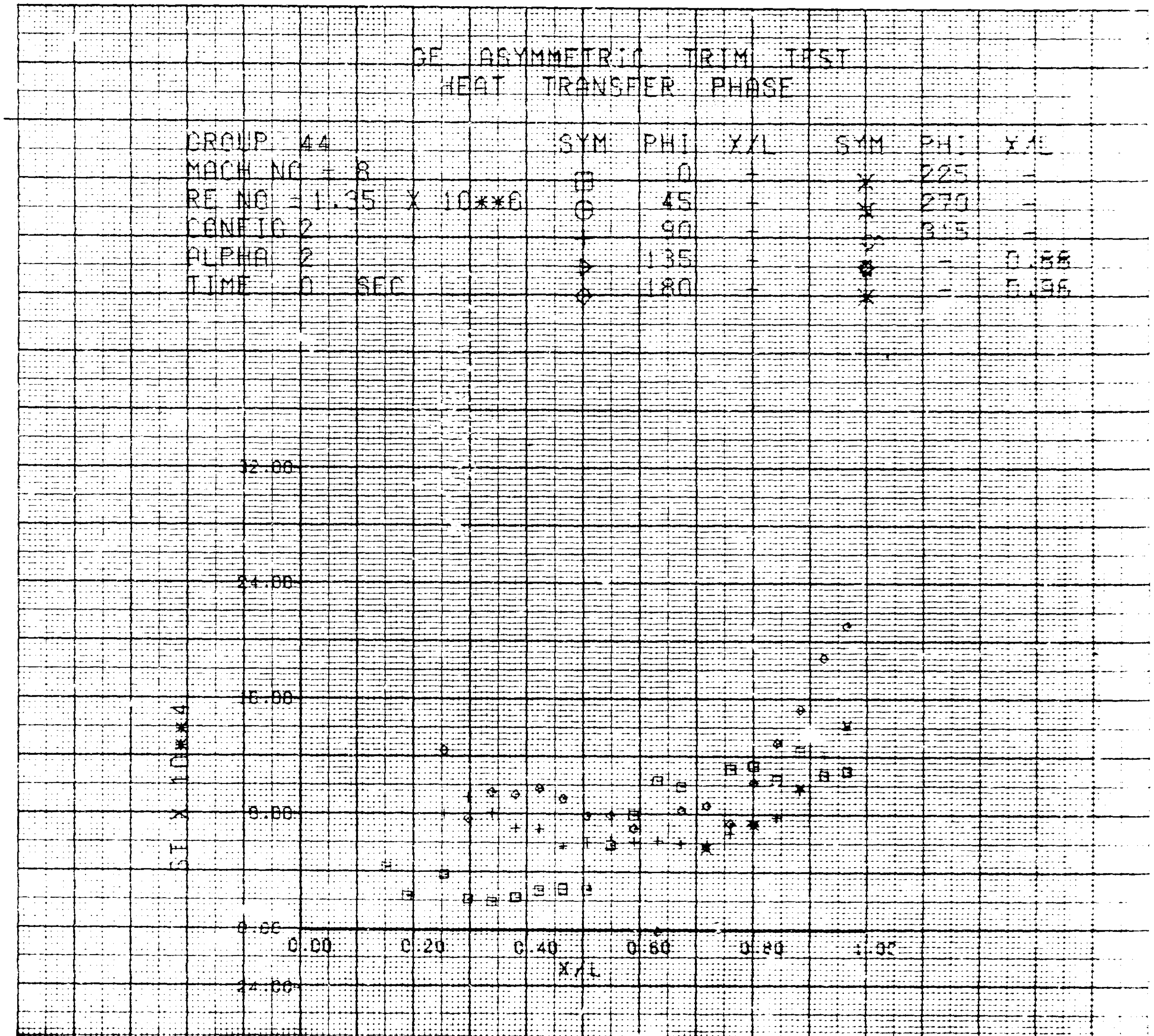
ARO INC., ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
V7094T-H00

GROUP	CONFIG	ALPHA-N	BETA-N	ALPHA-S	ROLL	ALP-P	DATE	MACH-O	PO	TO	TIME
44	2	2.80	.00	7.00	-.02	0	7/15	9.?Y	280.06	1340.02	-.00

T-INF	P-INF	Q-INF	V-INF	RHO-INF	MU-INF	RE/FT	RE/IN	MU
9.2500E 01	2.9406E-02	1.7168E 00	3.7577E 03	2.6714E-05	7.5541E-08	1.3447E 06	1.2350E 06	9.1019E 02

TC NO	X/L	PHI	T-W	SLOPE	Q-STDW	HT	HM	HW	ST
1	.1509	0	521.33	1.3393E 00	2.8904E-01	3.9458E-04	1.6311E-03	1.2588E 02	4.4726E-04
2	.1887	0	525.77	6.5979E-01	1.4493E-01	1.9561E-04	7.8719E-04	1.2612E 02	2.4772E-04
3	.2524	0	528.04	7.9448E-01	2.3149E-01	3.1338E-04	1.2644E-03	1.2645E 02	3.9159E-04
4	.2943	0	529.78	6.1931E-01	1.3233E-01	1.7908E-04	7.2275E-04	1.2707E 02	2.2377E-04
5	.3363	0	531.45	5.5281E-01	1.2681E-01	1.6386E-04	6.6125E-04	1.2747E 02	2.0473E-04
6	.3783	0	533.08	5.5729E-01	1.4067E-01	1.9090E-04	7.7010E-04	1.2749E 02	2.3849E-04
7	.4203	0	533.96	5.4810E-01	1.6507E-01	2.2442E-04	9.0612E-04	1.2806E 02	2.8060E-04
8	.4623	0	535.40	6.2077E-01	1.7270E-01	2.3547E-04	9.5001E-04	1.2841E 02	2.9413E-04
9	.5043	0	536.12	6.1492E-01	1.6636E-01	2.2705E-04	9.1603E-04	1.2854E 02	2.8361E-04
10	.5463	0	538.69	1.2371E 00	3.4711E-01	4.7540E-04	1.9177E-03	1.2919E 02	5.9176E-04
11	.5882	0	540.84	1.7029E 00	4.6920E-01	6.4453E-04	2.5997E-03	1.2970E 02	8.0478E-04
12	.6302	0	543.24	2.2512E 00	6.0633E-01	8.3265E-04	3.3701E-03	1.3027E 02	1.0434E-03
13	.6722	0	545.94	2.3105E 00	5.7882E-01	8.0072E-04	3.2287E-03	1.3092E 02	9.9965E-04
99	.8022	315.0	555.32	2.4177E 00	7.3002E-01	1.0268E-03	4.1461E-03	1.3315E 02	1.2437E-03
15	.7583	0	549.26	2.5990E 00	[illegible]	9.0201E-04	3.6365E-03	1.3171E 02	1.1259E-03
16	.7996	0	550.78	2.1574E 00	6.6143E-01	9.2116E-04	3.7114E-03	1.3207E 02	1.1497E-03
17	.8409	0	551.30	2.3694E 00	6.0590E-01	8.4374E-04	3.4012E-03	1.3219E 02	1.0530E-03
18	.8822	0	551.94	2.8653E 00	7.1783E-01	1.0013E-03	4.0343E-03	1.3235E 02	1.2497E-03
19	.9235	0	551.27	2.4703E 00	6.2306E-01	8.6938E-04	3.5046E-03	1.3218E 02	1.0851E-03
20	.9648	0	549.97	2.4624E 00	6.4025E-01	8.9059E-04	3.5943E-03	1.3186E 02	1.1116E-03
21	.2524	45.0	526.24	1.4627E 00	4.3240E-01	5.8231E-04	2.3506E-03	1.2623E 02	7.2776E-04
22	.2943	45.0	526.73	1.2569E 00	4.0299E-01	5.4304E-04	2.1920E-03	1.2634E 02	6.7866E-04
23	.3363	45.0	528.72	1.2145E 00	3.6509E-01	4.9330E-04	1.9910E-03	1.2682E 02	6.1643E-04
24	.3783	45.0	530.21	1.0712E 00	3.2201E-01	4.3599E-04	1.7595E-03	1.2710E 02	5.4576E-04
25	.4203	45.0	532.80	9.1630E-01	2.6450E-01	3.5936E-04	1.4501E-03	1.2779E 02	4.4896E-04
26	.4623	45.0	535.72	1.0456E 00	2.9337E-01	4.0018E-04	1.6145E-03	1.2848E 02	4.9987E-04
27	.5043	45.0	537.17	9.5423E-01	2.5340E-01	3.4634E-04	1.3972E-03	1.2883E 02	4.3258E-04
100	.9648	315.0	555.31	3.0637E 00	7.3675E-01	1.0323E-03	4.1604E-03	1.3310E 02	1.2881E-03
29	.5882	45.0	540.24	1.0046E 00	2.7679E-01	3.7990E-04	1.5323E-03	1.2956E 02	4.7443E-04
30	.6302	45.0	542.26	1.2207E 00	3.3025E-01	4.5454E-04	1.8312E-03	1.3004E 02	5.6758E-04
31	.6722	45.0	547.04	1.6543E 00	4.0609E-01	5.6263E-04	2.2645E-03	1.3118E 02	7.0236E-04
32	.7170	45.0	549.09	1.9410E 00	4.6887E-01	6.5145E-04	2.6264E-03	1.3167E 02	8.1315E-04
33	.7583	45.0	548.39	2.0562E 00	5.6656E-01	7.8642E-04	3.1706E-03	1.3150E 02	9.8166E-04
34	.7996	45.0	549.94	2.1756E 00	6.6656E-01	9.2723E-04	3.7380E-03	1.3187E 02	1.1573E-03
35	.8409	45.0	551.40	2.6367E 00	7.1333E-01	9.9485E-04	4.0102E-03	1.3231E 02	1.2416E-03
36	.8822	45.0	552.32	2.8498E 00	7.4957E-01	1.0462E-03	4.2169E-03	1.3244E 02	1.3056E-03
37	.9235	45.0	552.09	2.9858E 00	7.6290E-01	1.0644E-03	4.2906E-03	1.3238E 02	1.3284E-03
38	.9648	45.0	553.07	2.8659E 00	7.1323E-01	9.9649E-04	4.0165E-03	1.3262E 02	1.2436E-03
39	.2524	90.0	528.58	1.6331E 00	4.8275E-01	6.5216E-04	2.6322E-03	1.2678E 02	8.1495E-04
40	.2943	90.0	528.99	1.7247E 00	5.5299E-01	7.4742E-04	3.0166E-03	1.2687E 02	9.3396E-04
41	.3363	90.0	530.53	1.5344E 00	4.8431E-01	6.5600E-04	2.6474E-03	1.2725E 02	8.1966E-04
42	.3783	90.0	532.72	1.3370E 00	4.2200E-01	5.7329E-04	2.3133E-03	1.2777E 02	7.1623E-04
43	.4203	90.0	534.90	1.4095E 00	4.1667E-01	5.6773E-04	2.2906E-03	1.2829E 02	7.0919E-04
44	.4623	90.0	535.72	1.1141E 00	3.4607E-01	4.7207E-04	1.9046E-03	1.2848E 02	5.8967E-04
45	.5043	90.0	537.09	1.1016E 00	3.5847E-01	4.8984E-04	1.9763E-03	1.2881E 02	6.1189E-04
46	.5463	90.0	539.29	1.2865E 00	3.6740E-01	5.0361E-04	2.0314E-03	1.2933E 02	6.2895E-04
47	.5882	90.0	540.09	1.2928E 00	3.6274E-01	4.9777E-04	2.0078E-03	1.2952E 02	6.2163E-04
48	.6302	90.0	541.01	1.3280E 00	3.6590E-01	5.0274E-04	2.0277E-03	1.2974E 02	6.2780E-04
49	.6722	90.0	545.59	1.3945E 00	3.5061E-01	4.3479E-04	1.9648E-03	1.3083E 02	6.0524E-04
50	.7170	90.0	547.68	1.4821E 00	3.4902E-01	4.8399E-04	1.9514E-03	1.3133E 02	6.0417E-04
51	.7583	90.0	543.72	1.5062E 00	3.9235E-01	5.4110E-04	2.1821E-03	1.3039E 02	6.7561E-04
52	.7996	90.0	544.90	1.6599E 00	4.3240E-01	5.9730E-04	2.4086E-03	1.3067E 02	7.4573E-04
53	.8409	90.0	545.52	1.8265E 00	4.5758E-01	6.3263E-04	2.5510E-03	1.3082E 02	7.8982E-04
54	.8822	90.0	546.59	2.2982E 00	5.6413E-01	7.8119E-04	3.1495E-03	1.3107E 02	9.7511E-04
55	.9235	90.0	546.70	2.9299E 00	7.0459E-01	9.7572E-04	3.9342E-03	1.3110E 02	1.2181E-03
56	.9648	90.0	548.74	3.3689E 00	8.1315E-01	1.1251E-03	4.5361E-03	1.3159E 02	1.4044E-03
57	.2524	135.0	522.82	4.9223E-01	1.1890E-01	1.5960E-04	6.4434E-04	1.2565E 02	1.9949E-04
58	.2943	135.0	523.42	2.0836E 00	6.6806E-01	8.9673E-04	3.6202E-03	1.2565E 02	1.1209E-03
59	.3363	135.0	525.31	2.0080E 00	6.3380E-01	8.5245E-04	3.4412E-03	1.2601E 02	1.0654E-03
60	.3783	135.0	525.10	1.7274E 00	5.3676E-01	7.2173E-04	2.9135E-03	1.2596E 02	9.0205E-04
61	.4203	135.0	528.44	1.7988E 00	5.4071E-01	7.3032E-04	2.9476E-03	1.2675E 02	9.1262E-04
62	.4623	135.0	530.20	1.5720E 00	4.5677E-01	6.1841E-04	2.4957E-03	1.2717E 02	7.7270E-04
63	.5043	135.0	531.88	1.7390E 00	4.4434E-01	6.0296E-04	2.4332E-03	1.2757E 02	7.5333E-04
64	.5463	135.0	533.17	1.4888E 00	4.4846E-01	6.0962E-04	2.4599E-03	1.2788E 02	7.6160E-04
65	.5882	135.0	534.67	1.6654E 00	4.3690E-01	5.9517E-04	2.4013E-03	1.2823E 02	7.4348E-04
66	.6302	135.0	536.05	1.6418E 00	4.4103E-01	6.0296E-04	2.4320E-03	1.2856E 02	7.5315E-04
67	.6722	135.0	541.84	1.9333E 00	4.6491E-01	6.3951E-04	2.5793E-03	1.2994E 02	7.9856E-04
68	.7170	135.0	542.91	1.8812E 00	4.4301E-01	6.1028E-04	2.4612E-03	1.3019E 02	7.6202E-04
69	.7583	135.0	539.81	1.4124E 00	3.9628E-01	5.4359E-04	2.1926E-03	1.2946E 02	6.7886E-04
70	.7996	135.0	541.98	2.4406E 00	5.9292E-01	8.1576E-04	3.2901E-03	1.2997E 02	1.0186E-03
71	.8409	135.0	544.11	2.7185E 00	7.4904E-01	1.0336E-03	4.1680E-03	1.3048E 02	1.2905E-03
72	.8822	135.0	544.84	2.9247E 00	7.9259E-01	1.0948E-03	4.4147E-03	1.3065E 02	1.3668E-03
73	.9235	135.0	545.95	3.7574E 00	9.2233E-01	1.2759E-03	5.1449E-03	1.3092E 02	1.5929E-03
74	.9648	135.0	549.94	4.4710E 00	1.0752E 00	1.4957E-03	6.0296E-03	1.3188E 02	1.8669E-03
75	.2524	180.0	526.20	2.5626E 00	7.4459E-01	1.0027E-03	4.0473E-03	1.2622E 02	1.2531E-03
76	.2943	180.0	527.41	1.4418E 00	4.6226E-01	6.2352E-04	2.5167E-03	1.2651E 02	7.7920E-04
77	.3363	180.0	529.90	1.9321E 00	5.7115E-01	7.7304E-04	3.1196E-03	1.2712E 02	9.6593E-04
78	.3783	180.0	532.11	1.8632E 00	5.6008E-01	7.6025E-04	3.0678E-03	1.2762E 02	9.4983E-04
79	.4203	180.0	534.57	1.4695E 00	5.8221E-01	7.9293E-04	3.1903E-03	1.2821E 02	9.9054E-04
80	.4623	180.0	536.40	1.9885E 00	5.3929E-01	7.3632E-04	2.9706E-03	1.2864E 02	9.1972E-04
81	.5043	180.0	538.60	1.4570E 00	4.6522E-01	6.3710E-04	2.5700E-03	1.2917E 02	7.9569E-04
82	.5463	180.0	540.53	1.7589E 00	4.6787E-01	6.4133E-04	2.5868E-03	1.2963E 02	8.0089E-04
83	.5882	180.0	542.32	1.5628E 00	4.1501E-01	5.7125E-04	2.3039E-03	1.3005E 02	7.1331E-04
84	.6302	180.0	540.39	-5.7872E-03	-1.5368E-03	-2.1097E-06	-8.5096E-06	1.2959E 02	-2.6346E-06
85	.6722	180.0	549.21	2.8859E 00	4.8238E-01	6.7034E-04	2.7025E-03	1.3170E 02	8.3673E-04
86	.7170	180.0	550.21	2.1335E 00	5.0241E-01	6.9916E-04	2.8186E-03	1.3194E 02	8.7265E-04
87	.7583	180.0	548.78	1.7856E 00	4.2935E-01	5.9623E-04	2.4038E-03	1.3157E 02	7.4424E-04
88	.7996	180.0	550.83	2.7614E 00	5.9431E-01	8.2775E-04	3.3368E-03	1.3208E 02	1.0331E-03
89	.8409	180.0	552.53	2.9415E 00	7.5158E-01	1.0493E-03	4.2295E-03	1.3249E 02	1.3095E-03
90	.8822	180.0	554.39	3.4323E 00	8.8311E-01	1.2361E-03	4.9820E-03	1.3293E 02	1.5425E-03
91	.9235	180.0	556.46	4.4147E 00	1.0837E 00	1.5212E-03	6.1306E-03	1.3342E 02	1.8981E-03
92	.9648	180.0	557.01	5.2497E 00	1.2098E 00	1.6996E-03	6.8491E-03	1.3356E 02	2.1206E-03
93	.8822	225.0	557.52	2.8846E 00	7.3705E-01	1.0362E-03	4.1756E-03	1.3368E 02	1.2928E-03
94	.9648	275.0	557.58	4.2468E 00	1.0213E 00	1.4359E-03	5.7864E-03	1.3369E 02	1.7915E-03
95	.7170	270.0	554.84	1.4541E 00	3.2782E-01	4.5863E-04	1.8485E-03	1.3295E 02	5.7232E-04
96	.7996	270.0	556.17	1.8421E 00	4.2012E-01	5.8953E-04	2.3758E-03	1.3336E 02	7.3558E-04
97	.8822	270.0	559.54	2.3148E 00	5.6569E-01	7.9760E-04	3.2137E-03	1.3417E 02	9.9501E-04
98	.9648	270.0	557.42	3.4066E 00	8.1922E-01	1.1516E-03	4.6406E-03	1.3365E 02	1.4368E-03

GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 44 SYM PHI X/L SYM PHI X/L


GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 44
MACH NO = 8
RE NO = 1.35 X 10**6
CONFIG 2
ALPHA 2
TIME 0 SEC
SYM PHI X/L
0 -
45 -
90 -
135 -
180 -
SYM PHI X/L
225 -
270 -
315 -
- 0.56
- 0.96
32.00
24.00
16.00
8.00
0.00
-24.00
ST X 10**4
0.00
0.20
0.40
0.60
0.80
1.00
X/L

2

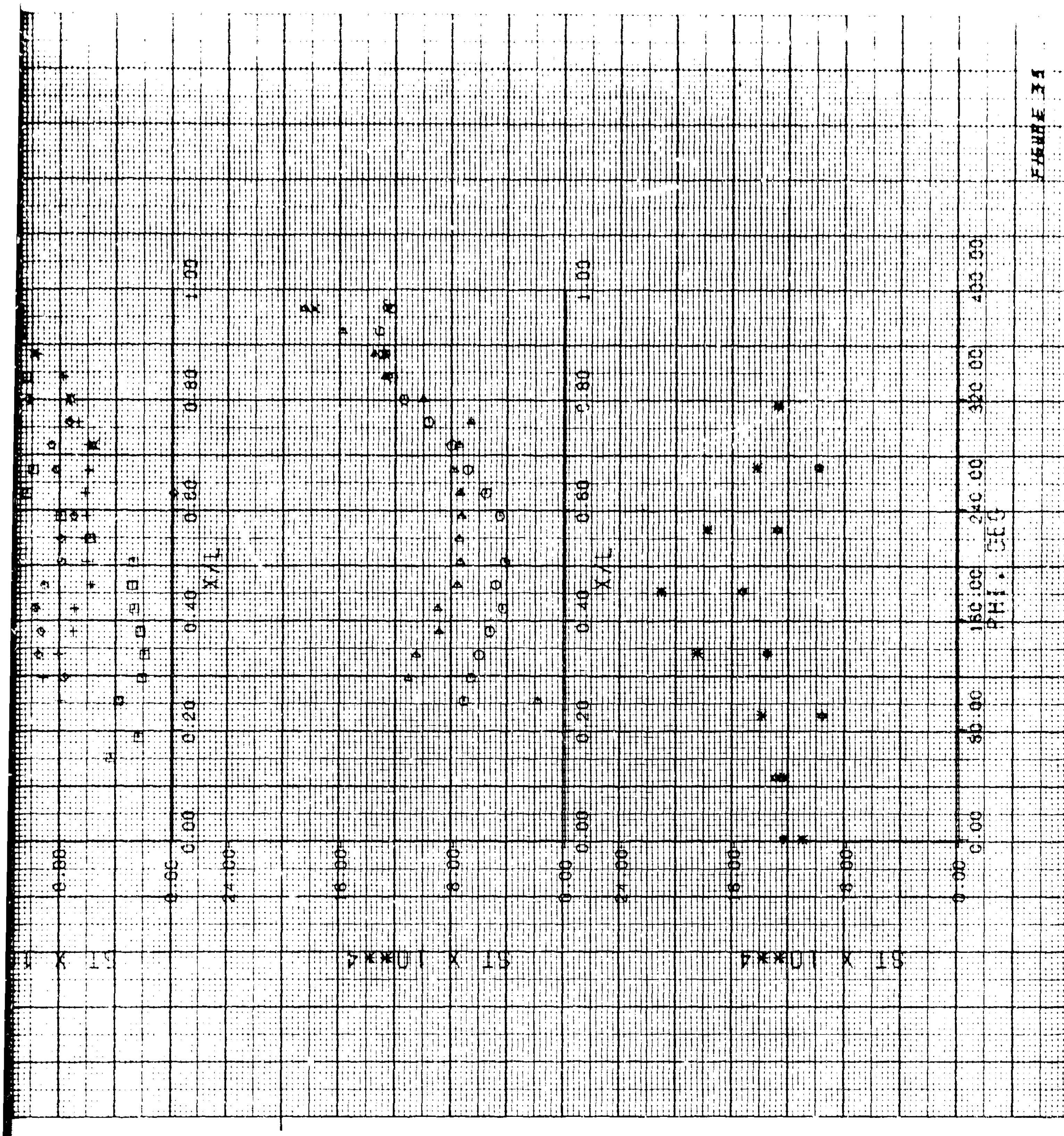


Figure 35

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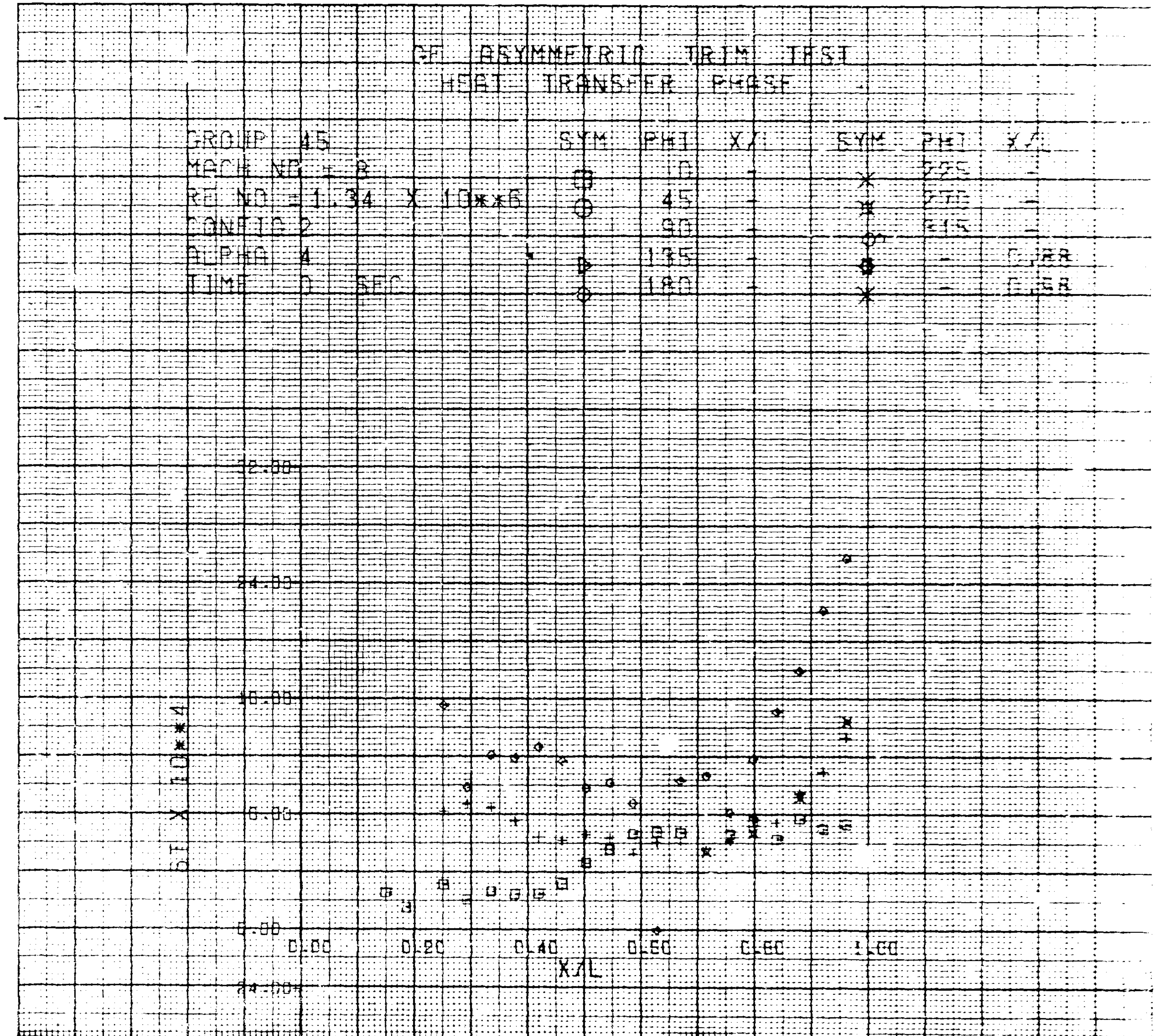
[illegible]
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
[illegible]

GROUP	CONFIG	ALPHA-N	BETA-N	ALPHA	ROLL	RUN	DATE	MACH NO	PO	TO	TIME
45	2	4.00	3	4.00	0	0	7/15	7.0?	270.00	1260.7?	[illegible]

T-INF	P-INF	Q-INF	V-INF	RHO-INF	MU-INF	RE/FT	RE/D	NU
9.2379E 01	2.9100E-02	1.3040E 00	3.7576E 03	2.4670E-05	7.0534E-0?	1.3425E 06	1.7390E 06	3.1016E 02

TC NO	X/L	PHI	TEMP	SLOPE	Q-DOT	H1	H2	HW	ST
1	.1990	0	535.71	7.0071E-01	1.0302E-01	2.5950E-04	8.8550E-04	1.2940E 02	2.0203E-04
2	.1867	0	512.05	4.2320E-01	9.2902E-02	1.2627E-04	5.0952E-04	1.2775E 02	1.5025E-04
3	.2524	0	513.27	4.2805E-01	1.9704E-01	2.5274E-04	1.0109E-03	1.2790E 02	3.1670E-04
4	.2943	0	518.04	3.9613E-01	1.2503E-01	1.7131E-04	6.9102E-04	1.2923E 02	2.1040E-04
5	.3363	0	540.19	3.9452E-01	1.5472E-01	2.1510E-04	8.4762E-04	1.2954E 02	2.6950E-04
6	.3783	0	541.29	-.7000E-01	1.4395E-01	1.9700E-04	7.9058E-04	1.2960E 02	2.4707E-04
7	.4203	0	54[illegible].71	5.4104E-01	1.4562E-01	2.0057E-04	8.0405E-04	1.2991E 02	2.5126E-04
8	.4623	0	542.01	6.4510E-01	1.8000E-01	2.5000E-04	1.0072E-03	1.3017E 02	3.2520E-04
9	.5043	0	543.30	1.1050E 00	2.7190E-01	3.7485E-04	1.5117E-03	1.3031E 02	4.6953E-04
10	.5463	0	545.36	1.1551E 00	3.2000E-01	4.4002E-04	1.8000E-03	1.3079E 02	5.0113E-04
11	.5882	0	546.24	1.4002E 00	3.0579E-01	5.3397E-04	2.1512E-03	1.3090E 02	6.6076E-04
12	.6302	0	548.10	1.4444E 00	3.9367E-01	5.4244E-04	2.1971E-03	1.3115E 02	6.7729E-04
13	.6722	0	548.27	1.5576E 00	3.9020E-01	5.4106E-04	2.1815E-03	1.3147E 02	6.7022E-04
99	.8822	315.0	540.75	2.4115E 00	6.2919E-01	8.0955E-04	3.5040E-03	1.3455E 02	1.1132E-03
15	.7583	0	554.04	1.4707E 00	3.7904E-01	5.3160E-04	2.1494E-03	1.3299E 02	6.6554E-04
16	.7996	0	556.04	1.5265E 00	4.2031E-01	6.0167E-04	2.4247E-03	1.3352E 02	7.5309E-04
17	.8409	0	557.34	1.4034E 00	3.5050E-01	5.0408E-04	2.0313E-03	1.3364E 02	6.3092E-04
18	.8822	0	558.01	1.7514E 00	4.3877E-01	6.1735E-04	2.4877E-03	1.3379E 02	7.7267E-04
19	.9235	0	557.56	1.6067E 00	3.9751E-01	5.5257E-04	2.2523E-03	1.3368E 02	6.9950E-04
20	.9648	0	554.04	1.7446E 00	4.1954E-01	5.8763E-04	2.3066E-03	1.3285E 02	7.3400E-04
21	.2524	45.0	531.01	1.1540E 00	3.4812E-01	4.6296E-04	1.8860E-03	1.2755E 02	5.8019E-04
22	.2943	45.0	536.05	4.7643E-01	3.1306E-01	4.2779E-04	1.7857E-03	1.2875E 02	5.3999E-04
23	.3363	45.0	518.64	1.0032E 00	3.0155E-01	4.1300E-04	1.6042E-03	1.2919E 02	5.1732E-04
24	.3783	45.0	539.99	9.2606E-01	2.7031E-01	3.8149E-04	1.5300E-03	1.2958E 02	4.7794E-04
25	.4203	45.0	541.86	9.1223E-01	2.6506E-01	3.6667E-04	1.4760E-03	1.2995E 02	4.5001E-04
26	.4623	45.0	544.05	9.9230E-01	2.3353E-01	3.2252E-04	1.3000E-03	1.3061E 02	4.0395E-04
27	.5043	45.0	545.38	8.8863E-01	2.3598E-01	3.2024E-04	1.3195E-03	1.3083E 02	4.0860E-04
100	.9648	315.0	558.99	2.5227E 00	6.0660E-01	8.5477E-04	3.4442E-03	1.3403E 02	1.0690E-03
29	.5882	45.0	548.45	9.8543E-01	2.4947E-01	3.4035E-04	1.3944E-03	1.3151E 02	4.3872E-04
30	.6302	45.0	550.27	1.1140E 00	3.0134E-01	4.1960E-04	1.6911E-03	1.3195E 02	5.2529E-04
31	.6722	45.0	550.84	1.4497E 00	3.8640E-01	5.2962E-04	2.1362E-03	1.3210E 02	6.6350E-04
32	.7170	45.0	553.10	1.7570E 00	4.1375E-01	5.7016E-04	2.3304E-03	1.3262E 02	7.2381E-04
33	.7583	45.0	554.64	1.8679E 00	5.1095E-01	7.2261E-04	2.9113E-03	1.3342E 02	9.0423E-04
34	.7996	45.0	558.31	2.0216E 00	5.6723E-01	7.9044E-04	3.2174E-03	1.3307E 02	9.9930E-04
35	.8409	45.0	560.93	2.3073E 00	6.2428E-01	8.8079E-04	3.5609E-03	1.3428E 02	1.1023E-03
36	.8822	45.0	560.78	2.3889E 00	6.2036E-01	8.6755E-04	3.5740E-03	1.3446E 02	1.1107E-03
37	.9235	45.0	560.96	2.3602E 00	5.8509E-01	8.5604E-04	3.4442E-03	1.3446E 02	1.0697E-03
38	.9648	45.0	552.24	2.1643E 00	5.6857E-01	8.0027E-04	3.2240E-03	1.3305E 02	1.0010E-03
39	.2524	90.0	530.31	1.6322E 00	4.0250E-01	6.5477E-04	2.6578E-03	1.2862E 02	8.2549E-04
40	.2943	90.0	540.37	1.4809E 00	5.6963E-01	6.9943E-04	2.8211E-03	1.2959E 02	8.7623E-04
41	.3363	90.0	541.37	1.8671E 00	4.9463E-01	6.8086E-04	2.7420E-03	1.2963E 02	8.5190E-04
42	.3783	90.0	543.31	1.7875E 00	4.3795E-01	6.0371E-04	2.4347E-03	1.3029E 02	7.5421E-04
43	.4203	90.0	544.97	1.7993E 00	3.7276E-01	5.1423E-04	2.0736E-03	1.3045E 02	6.4407E-04
44	.4623	90.0	545.66	1.1607E 00	3.6095E-01	4.9863E-04	2.0197E-03	1.3089E 02	6.2450E-04
45	.5043	90.0	546.95	1.3919E 00	3.8361E-01	5.3121E-04	2.1419E-03	1.3116E 02	6.6525E-04
46	.5463	90.0	549.20	1.2932E 00	3.6024E-01	5.1323E-04	2.0691E-03	1.3109E 02	6.4206E-04
47	.5882	90.0	549.37	1.0801E 00	3.0305E-01	4.2116E-04	1.6979E-03	1.3169E 02	5.2737E-04
48	.6302	90.0	549.77	1.2663E 00	3.4009E-01	4.8527E-04	1.9543E-03	1.3183E 02	6.0763E-04
49	.6722	90.0	550.05	1.4823E 00	3.6629E-01	4.8184E-04	1.9425E-03	1.3190E 02	6.0332E-04
50	.7170	90.0	552.21	1.3496E 00	3.1783E-01	4.4057E-04	1.7840E-03	1.3245E 02	5.5535E-04
51	.7583	90.0	553.09	1.7540E 00	3.5293E-01	4.9316E-04	1.9878E-03	1.3262E 02	6.1750E-04
52	.7996	90.0	554.37	1.4708E 00	4.3732E-01	6.1210E-04	2.4673E-03	1.3293E 02	7.6635E-04
53	.8409	90.0	555.23	1.4939E 00	4.2300E-01	5.9406E-04	2.3962E-03	1.3313E 02	7.4363E-04
54	.8822	90.0	556.44	2.1952E 00	5.3005E-01	7.5693E-04	3.0503E-03	1.3351E 02	9.4742E-04
55	.9235	90.0	556.05	2.8955E 00	6.2614E-01	8.7677E-04	3.5333E-03	1.3352E 02	1.0977E-03
56	.9648	90.0	554.70	3.1521E 00	7.6042E-01	1.0656E-03	4.2922E-03	1.3300E 02	1.3331E-03
57	.2524	135.0	531.84	4.4524E-01	1.3754E-01	1.8665E-04	7.5372E-04	1.2756E 02	2.3395E-04
58	.2943	135.0	536.29	2.3377E 00	7.4950E-01	1.0232E-03	4.1282E-03	1.2861E 02	1.2827E-03
59	.3363	135.0	536.04	2.0771E 00	6.5559E-01	8.9574E-04	3.6137E-03	1.2875E 02	1.1224E-03
60	.3783	135.0	535.02	1.9507E 00	6.0046E-01	8.3019E-04	3.3444E-03	1.2851E 02	1.0402E-03
61	.4203	135.0	538.58	2.0146E 00	6.0553E-01	8.2940E-04	3.3457E-03	1.2916E 02	1.0392E-03
62	.4623	135.0	539.93	1.8833E 00	5.4721E-01	7.5085E-04	3.0246E-03	1.2949E 02	9.4962E-04
63	.5043	135.0	541.35	2.0171E 00	5.1546E-01	7.0855E-04	2.8570E-03	1.2982E 02	8.8762E-04
64	.5463	135.0	542.31	1.0959E 00	5.1938E-01	7.1498E-04	2.8817E-03	1.3005E 02	8.9563E-04
65	.5882	135.0	543.92	1.0744E 00	4.9774E-01	6.4671E-04	2.7603E-03	1.3043E 02	8.6014E-04
66	.6302	135.0	544.52	1.9327E 00	5.1322E-01	7.0867E-04	2.8578E-03	1.3058E 02	8.8761E-04
67	.6722	135.0	545.70	1.8994E 00	4.8061E-01	6.6490E-04	2.6815E-03	1.3336E 02	8.3205E-04
68	.7170	135.0	547.31	1.9527E 00	4.5984E-01	6.374[illegible]E-04	2.5780E-03	1.3124E 02	7.9825E-04
69	.7583	135.0	547.68	1.7035E 00	3.6573E-01	5.0715E-04	2.0448E-03	1.3131E 02	6.3512E-04
70	.7996	135.0	550.44	2.1105E 00	6.1323E-01	8.5373E-04	3.44[illegible]E-03	1.3199E 02	1.0690E-03
71	.8409	135.0	552.24	2.1557E 00	5.9396E-01	8.2499E-04	3.3416E-03	1.3242E 02	1.0379E-03
72	.8822	135.0	553.04	2.7237E 00	7.3600E-01	1.0296E-03	4.1500E-03	1.3261E 02	1.2898E-03
73	.9235	135.0	553.48	3.4426E 00	8.9407E-01	1.2588E-03	5.0384E-03	1.3271E 02	1.5649E-03
74	.9648	135.0	555.10	4.4120E 00	1.1621E 00	1.5542E-03	6.2637E-03	1.3310E 02	1.9455E-03
75	.2524	180.0	531.97	3.1592E 00	9.1795E-01	1.2458E-03	5.0274E-03	1.2750E 02	1.5615E-03
76	.2943	180.0	537.64	1.8023E 00	5.7795E-01	7.9039E-04	3.1845E-03	1.2894E 02	9.9034E-04
77	.3363	180.0	539.91	2.1034E 00	7.0456E-01	9.6672E-04	3.8994E-03	1.2948E 02	1.2111E-03
78	.3783	180.0	541.34	2.1063E 00	6.9326E-01	9.5308E-04	3.8441E-03	1.2982E 02	1.1939E-03
79	.4203	180.0	543.88	2.4853E 00	7.3469E-01	1.0123E-03	4.0827E-03	1.3022E 02	1.2681E-03
80	.4623	180.0	544.84	2.3721E 00	6.7734E-01	9.3576E-04	3.7735E-03	1.3065E 02	1.1720E-03
81	.5043	180.0	546.33	2.0663E 00	5.6775E-01	7.8591E-04	3.1600E-03	1.3101E 02	9.8426E-04
82	.5463	180.0	547.93	2.2101E 00	5.8609E-01	8.1422E-04	3.2828E-03	1.3139E 02	1.0196E-03
83	.5882	180.0	548.92	1.9840E 00	5.0615E-01	7.0317E-04	2.8349E-03	1.3163E 02	8.8051E-04
84	.6302	180.0	540.83	-8.8481E-03	-2.1504E-03	-2.9543E-06	-1.1910E-05	1.2970E 02	-3.7010E-06
85	.6722	180.0	552.24	2.4694E 00	5.9385E-01	8.2884E-04	3.3410E-03	1.3242E 02	1.0377E-03
86	.7170	180.0	554.19	2.4116E 00	6.1500E-01	8.6057E-04	3.4685E-03	1.3286E 02	1.0773E-03
87	.7583	180.0	555.17	1.9490E 00	4.6870E-01	6.5684E-04	2.6472E-03	1.3312E 02	8.2222E-04
88	.7996	180.0	558.82	2.4986E 00	6.7693E-01	9.5247E-04	3.8381E-03	1.3380E 02	1.1921E-03
89	.8409	180.0	559.72	3.1057E 00	8.6507E-01	1.2201E-03	4.9161E-03	1.3420E 02	1.5269E-03
90	.8822	180.0	561.21	4.4309E 00	1.0210E 00	1.4431E-03	5.8142E-03	1.3456E 02	1.8059E-03
91	.9235	180.0	562.87	5.1226E 00	1.2575E 00	1.7794E-03	7.1649E-03	1.3476E 02	2.2264E-03
92	.9648	180.0	561.72	6.3460E 00	1.4624E 00	2.0684E-03	8.3312E-03	1.3468E 02	2.5883E-03
93	.8822	225.0	563.17	2.9111E 00	7.4303E-01	1.0542E-03	4.2478E-03	1.3503E 02	1.3191E-03
94	.9648	225.0	561.75	4.[illegible]97E 00	1.0934E 00	1.5442E-03	6.2211E-03	1.3469E 02	1.9323E-03
95	.7170	270.0	556.64	[illegible]32E 00	3.1103E-01	4.3792E-04	1.7644E-03	1.3347E 02	5.4814E-04
96	.7996	270.0	562.38	1.4519E 00	3.8544E-01	5.4567E-04	2.1983E-03	1.3484E 02	6.8279E-04
97	.8822	270.0	567.77	2.0368E 00	5.2621E-01	7.3897E-04	2.9767E-03	1.3541E 02	9.2459E-04
98	.9648	270.0	561.37	3.4173E 00	8.2179E-01	1.1618E-03	4.6806E-03	1.3459E 02	1.4538E-03

GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
SYM PHI


GF ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 45
MACH NO = 8
RE NO = 1.34 X 10**6
CONFIG 2
ALPHA 4
TIME 0 SEC
SYM PHI X/L
0
45
90
135
180
SYM PHI X/L
225
270
315
32.00
24.00
16.00
8.00
0.00
0.00
0.20
0.40
0.60
0.80
1.00
X/L
ST X 10**4

2

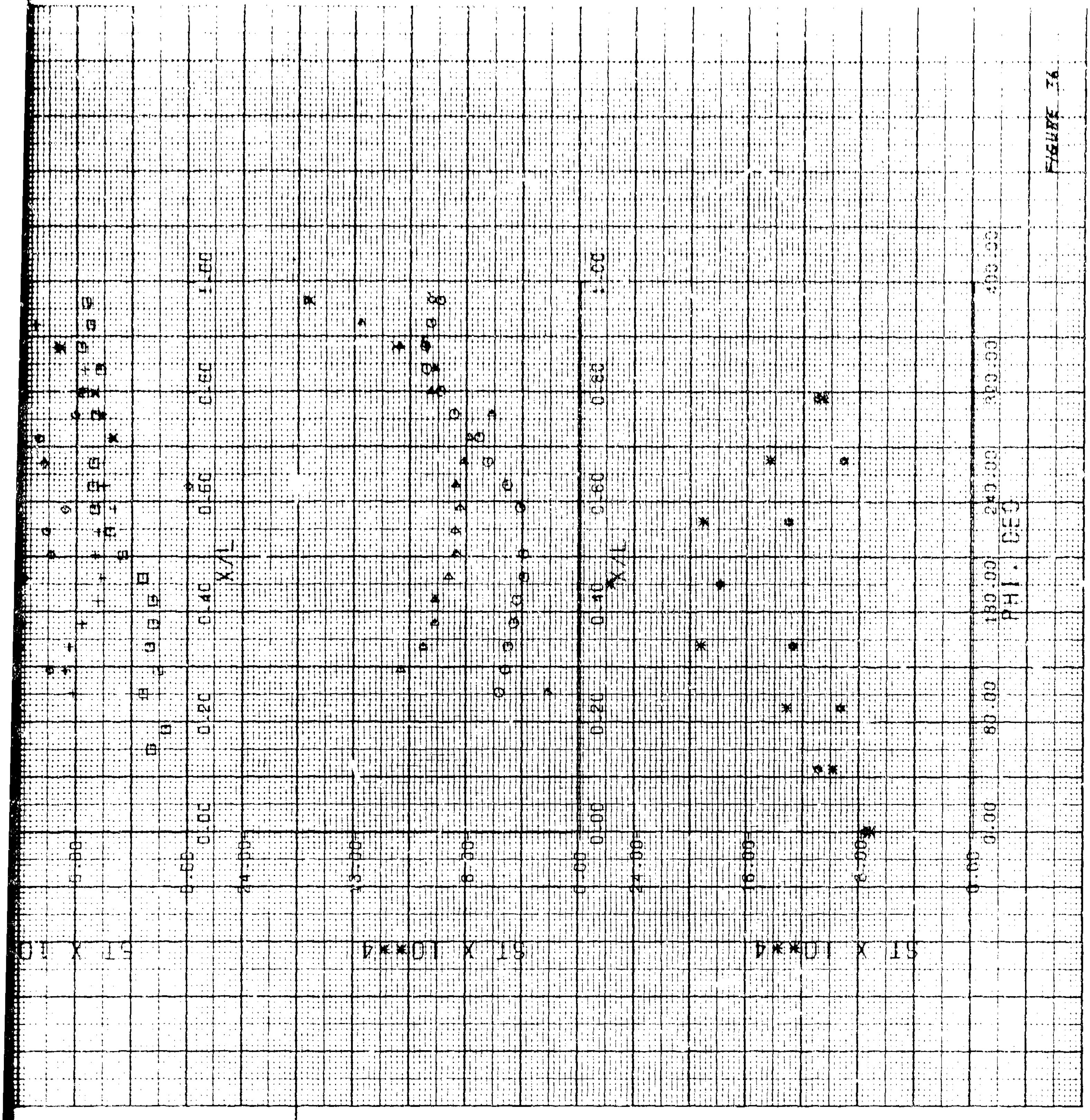


Figure 36

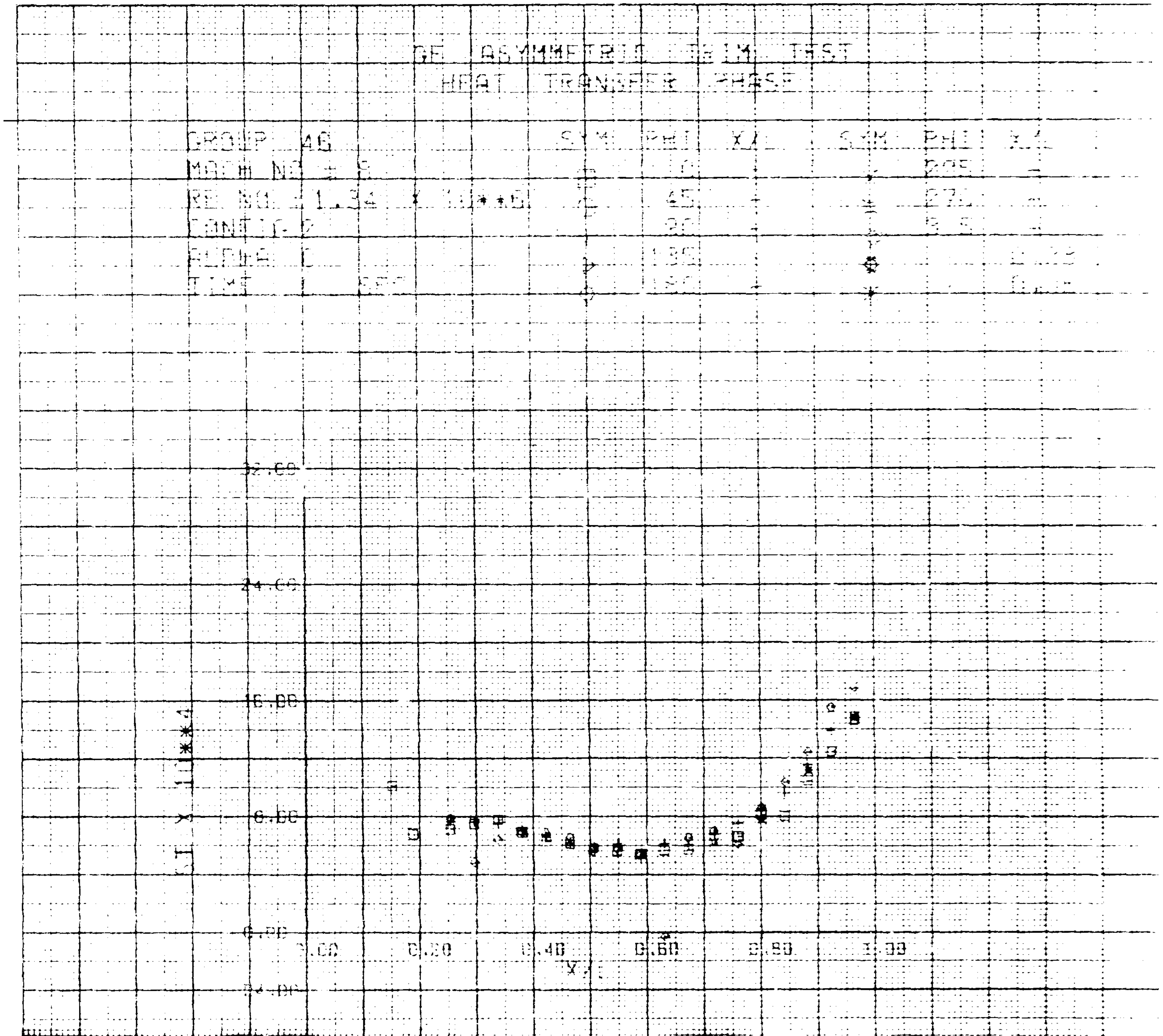
7/16/69

AERODYNAMIC HEAT TRANSFER [illegible]
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
[illegible]

GROUP	CONFIG	ALPHA-N	BETA-N	ALPHA-S	ROLL	ALF-P	DATE	MACH NO	PO	TO	TIME
56	3	-.12	0	.08	2	0	7/15	7.47	279.0	1266.78	[illegible]

T-INF	P-INF	Q-INF	V-INF	RHO-INF	MU-INF	RE/FT	RE/IN	[illegible]
9.[illegible] 01	2.[illegible]-02	1.[illegible] 00	3.[illegible] 03	2.[illegible]-05	[illegible]-08	[illegible] 06	1.[illegible] 06	3.[illegible] 08

TC NO	X/L	PHI	TEMP	DT/DT	Q-BTU	H?	[illegible]	[illegible]	ST
1	.1908	0	527.90	2.7809E 00	9.97[illegible]-01	[illegible]-04	3.[illegible]-03	1.2695E 02	1.0[illegible]-03
2	.1867	0	528.24	1.[illegible] 00	4.[illegible]-01	5.[illegible]-04	2.19[illegible]-03	1.2671E 02	6.8[illegible]-04
3	.2524	0	510.80	1.411[illegible] 00	4.1[illegible]-01	5.6[illegible]-04	2.[illegible]-03	1.2715E 02	7.[illegible]-04
4	.2943	0	511.96	1.[illegible] 00	4.3[illegible]-01	5.9[illegible]-04	2.40[illegible]-03	1.2806E 02	7.[illegible]-04
5	.3363	0	515.59	1.4110E 00	4.5166E-01	6.[illegible]-04	2.49[illegible]-03	1.2845E 02	7.[illegible]-04
6	.3783	0	536.81	1.1171E 00	4.01[illegible]-01	5.50[illegible]-04	2.2210E-03	1.2675E 02	6.[illegible]-04
7	.4203	0	537.39	1.2567E 00	3.[illegible]-01	5.0061E-04	2.0198E-03	1.2[illegible] 02	6.2[illegible]-04
8	.4623	0	538.77	1.[illegible] 00	3.523[illegible]-01	4.840[illegible]-04	1.95[illegible]-03	1.2[illegible] 02	6.0[illegible]-04
9	.5043	0	539.84	1.[illegible] 00	3.33[illegible]-01	4.58[illegible]-04	1.8[illegible]-03	1.2936E 02	5.7[illegible]-04
10	.5463	0	541.76	1.1[illegible] 00	3.22[illegible]-01	4.4[illegible]-04	1.79[illegible]-03	1.29[illegible] 02	5.5[illegible]-04
11	.5882	0	543.45	1.1[illegible] 00	3.08[illegible]-01	4.[illegible]-04	1.7[illegible]-03	1.30[illegible] 02	5.3[illegible]-04
12	.6302	0	545.15	1.1[illegible] 00	3.21[illegible]-01	4.[illegible]-04	1.7[illegible]-03	1.30[illegible] 02	5.6012E-04
13	.6722	0	547.26	1.2[illegible] 00	3.231[illegible]-01	4.4911E-04	1.8110E-03	1.31[illegible] 02	5.[illegible]-04
94	.8822	315.0	555.21	2.[illegible] 00	5.911[illegible]-01	8.3074E-04	3.[illegible]-03	1.3319E 02	1.0[illegible]-03
15	.7583	0	550.0[illegible]	1.[illegible] 00	3.7752[illegible]-01	5.2071E-04	2.1[illegible]-03	1.31[illegible] 02	6.[illegible]-04
16	.7996	0	551.38	1.[illegible] 00	4.60[illegible]-01	6.4326E-04	2.[illegible]-03	1.32[illegible] 02	8.0[illegible]-04
17	.8409	0	551.79	1.7880E 00	4.5[illegible]-01	6.3897E-04	2.57[illegible]-03	1.32[illegible] 02	8.0[illegible]-04
18	.8822	0	552.30	2.[illegible] 00	5.96[illegible]-01	8.[illegible]-04	3.3052E-03	1.32[illegible] 02	1.0[illegible]-03
19	.9235	0	551.76	2.[illegible]275E 00	7.0835E-01	9.[illegible]-04	3.994[illegible]-03	1.3231E 02	1.2[illegible]-03
20	.9648	0	552.28	[illegible] 00	8.3266E-01	1.1656E-03	4.[illegible]-03	1.32[illegible] 02	1.4628E-03
21	.2524	45.0	527.77	1.6281E 00	4.8128E-01	6.5[illegible]-04	2.62[illegible]-03	1.2650E 02	8.1[illegible]-04
22	.2943	45.0	530.23	1.4113E 00	4.5248E-01	6.1432E-04	2.[illegible]705E-03	1.2719E 02	7.7262E-04
23	.3363	45.0	531.67	1.[illegible]924E 00	4.1855E-01	5.6952E-04	2.2945E-03	1.27[illegible] 02	7.1565E-04
24	.3783	45.0	533.5[illegible]	1.2956E 00	3.8967E-01	5.3115E-04	2.1410E-03	1.2796E 02	6.6737E-04
25	.4203	45.0	534.80	1.1424E 00	3.3194E-01	4.5356E-04	1.830[illegible]-03	1.2[illegible] 02	5.6982E-04
26	.4623	45.0	537.07	1.2540E 00	3.5185E-01	4.8270E-04	1.9[illegible]-03	1.2[illegible] 02	6.0636E-04
27	.5043	45.0	539.22	1.2704E 00	3.3735E-01	4.6367E-04	1.8705E-03	1.2932E 02	5.8241E-04
100	.9648	315.0	557.24	3.2875E 00	7.9057E-01	1.1142E-03	4.4905E-03	1.3361E 02	1.3982E-03
29	.5882	45.0	542.11	1.2370E 00	3.4083E-01	4.7013E-04	1.8971E-03	1.3000E 02	5.[illegible]068E-04
30	.6302	45.0	544.10	1.[illegible]36HE 00	3.3659E-01	4.6299E-04	1.8673E-03	1.30[illegible] 02	5.8140E-04
31	.6722	45.0	546.61	1.6710E 00	3.6100E-01	5.0278E-04	2.0273E-03	1.3155E 02	6.3121E-04
32	.7170	45.0	550.31	1.5708E 00	3.6991E-01	5.1631E-04	2.0816E-03	1.3196E 02	6.4814E-04
33	.7583	45.0	549.51	1.5967E 00	4.3995E-01	6.1336E-04	2.4730E-03	1.3177E 02	7.7080E-04
34	.7996	45.0	550.09	1.6844E 00	4.7261E-01	6.5990E-04	2.6608E-03	1.3205E 02	8.2867E-04
35	.8409	45.0	551.98	2.0340E 00	5.5027E-01	7.6983E-04	3.1035E-03	1.3236E 02	9.6629E-04
36	.8822	45.0	552.41	2.4151E 00	6.3524E-01	8.8923E-04	3.5847E-03	1.3246E 02	1.1161E-03
37	.9235	45.0	552.89	2.4271E 00	7.4796E-01	1.0475E-03	4.2229E-03	1.3256E 02	1.3148E-03
38	.9648	45.0	555.17	3.2507E 00	7.8174E-01	1.0985E-03	4.4276E-03	1.3310E 02	1.3786E-03
39	.2524	90.0	529.59	1.5201E 00	4.4930E-01	6.0955E-04	2.4606E-03	1.2703E 02	7.6605E-04
40	.2943	90.0	530.99	1.4001E 00	4.4991E-01	6.1010E-04	2.4624E-03	1.2736E 02	7.6668E-04
41	.3363	90.0	532.04	1.1950E 00	4.4055E-01	5.9960E-04	2.4169E-03	1.2761E 02	7.5345E-04
42	.3783	90.0	533.64	1.1602E 00	4.1039E-01	5.5980E-04	2.2540E-03	1.2800E 02	7.0336E-04
43	.4203	90.0	534.96	1.1247E 00	3.9156E-01	5.3507E-04	2.1541E-03	1.2830E 02	6.7226E-04
44	.4623	90.0	536.14	1.1555E 00	3.5895E-01	4.9129E-04	1.9823E-03	1.2859E 02	6.1720E-04
45	.5043	90.0	537.39	1.2662E 00	3.4336E-01	4.7075E-04	1.8993E-03	1.2888E 02	5.9136E-04
46	.5463	90.0	539.11	1.2473E 00	3.5619E-01	4.8950E-04	1.9747E-03	1.2929E 02	6.1485E-04
47	.5882	90.0	540.30	1.0426E 00	2.9254E-01	4.0272E-04	1.6246E-03	1.2959E 02	5.0582E-04
48	.6302	90.0	[illegible]	1.2825E 00	3.5337E-01	4.8728E-04	1.9655E-03	1.2988E 02	6.1198E-04
49	.6722	90.0	546.95	[illegible]870E 00	3.4748E-01	4.8271E-04	1.9445E-03	1.3115E 02	6.0607E-04
50	.7170	90.0	546.67	1.4321E 00	3.8435E-01	5.3519E-04	2.1580E-03	1.3155E 02	6.7196E-04
51	.7583	90.0	535.6[illegible]	1.6424E 00	4.2763E-01	5.9276E-04	2.3905E-03	1.3069E 02	7.4431E-04
52	.7996	90.0	545.[illegible]	1.6784E 00	4.8932E-01	6.7834E-04	2.7356E-03	1.3050E 02	8.5177E-04
53	.8409	90.0	546.62	2.1889E 00	5.4830E-01	7.6123E-04	3.0607E-03	1.3103E 02	9.5570E-04
54	.8822	90.0	547.70	2.4910E 00	6.6055E-01	9.1861E-04	3.7042E-03	1.3134E 02	1.1533E-03
55	.9235	90.0	541.99	[illegible] 00	7.9198E-01	1.1017E-03	4.4423E-03	1.3138E 02	1.3831E-03
56	.9648	90.0	550.75	3.[illegible] 00	8.5715E-01	1.1971E-03	4.8263E-03	1.3207E 02	1.5027E-03
57	.2524	135.0	524.04	2.7121E-01	8.0172E-02	1.0795E-04	4.3584E-04	1.2571E 02	1.3573E-04
58	.2943	135.0	525.22	[illegible] 00	4.9250E-01	6.6423E-04	2.6817E-03	1.2501E 02	8.3496E-04
59	.3363	135.0	525.72	1.4491E 00	4.5734E-01	6.1721E-04	2.4918E-03	1.2610E 02	7.7583E-04
60	.3783	135.0	525.34	1.3106E 00	4.0713E-01	5.4911E-04	2.2169E-03	1.2601E 02	6.9025E-04
61	.4203	135.0	528.62	1.4209E 00	4.2714E-01	5.7665E-04	2.3357E-03	1.2680E 02	7.2725E-04
62	.4623	135.0	530.32	1.1993E 00	3.4857E-01	4.7318E-04	1.9098E-03	1.2720E 02	5.9464E-04
63	.5043	135.0	531.90	1.3045E 00	3.4804E-01	4.7442E-04	1.9147E-03	1.2757E 02	5.9615E-04
64	.5463	135.0	533.39	1.2437E 00	3.3028E-01	4.5017E-04	1.8166E-03	1.2786E 02	5.6563E-04
65	.5882	135.0	534.79	1.2841E 00	3.1976E-01	4.3681E-04	1.7627E-03	1.2826E 02	5.4883E-04
66	.6302	135.0	536.11	1.4439E 00	3.9406E-01	5.3931E-04	2.1760E-03	1.2858E 02	6.7753E-04
67	.6722	135.0	542.28	1.4750E 00	3.5472E-01	4.8960E-04	1.9748E-03	1.3004E 02	6.1480E-04
68	.7170	135.0	543.77	1.6842E 00	3.7778E-01	5.2251E-04	2.1074E-03	1.3004E 02	6.5616E-04
69	.7583	135.0	539.83	1.6777E 00	3.0240E-01	4.1598E-04	1.6741E-03	1.2946E 02	5.2249E-04
70	.7996	135.0	542.83	1.8383E 00	5.3413E-01	7.3698E-04	2.9727E-03	1.2998E 02	9.2557E-04
71	.8409	135.0	544.33	2.1432E 00	5.9052E-01	8.1716E-04	3.2957E-03	1.3049E 02	1.0261E-03
72	.8822	135.0	544.54	2.4121E 00	6.7961E-01	9.4104E-04	3.7952E-03	1.3059E 02	1.1817E-03
73	.9235	135.0	545.51	3.[illegible] 00	7.0130E-01	1.0858E-03	4.3788E-03	1.3091E 02	1.3609E-03
74	.9648	135.0	541.28	4.4053E 00	9.6320E-01	1.3462E-03	5.4273E-03	1.3219E 02	1.6498E-03
75	.2524	180.0	524.06	1.5964E 00	4.6386E-01	6.2505E-04	2.5236E-03	1.2505E 02	7.8576E-04
76	.2943	180.0	527.11	8.8497E-01	2.8542E-01	3.8534E-04	1.5555E-03	1.2543E 02	4.8433E-04
77	.3363	180.0	529.27	1.2723E 00	3.7611E-01	5.0998E-04	2.0585E-03	1.2695E 02	6.4892E-04
78	.3783	180.0	531.21	1.3522E 00	4.0648E-01	5.5260E-04	2.2303E-03	1.2741E 02	6.9942E-04
79	.4203	180.0	533.18	1.1621E 00	4.0268E-01	5.4888E-04	2.2150E-03	1.2784E 02	6.8467E-04
80	.4623	180.0	534.92	1.1410E 00	3.8296E-01	5.2326E-04	2.1114E-03	1.2829E 02	6.5742E-04
81	.5043	180.0	537.10	1.2847E 00	3.2134E-01	4.4107E-04	1.7796E-03	1.2881E 02	5.5408E-04
82	.5463	180.0	539.16	1.2380E 00	3.2875E-01	4.5182E-04	1.8228E-03	1.2930E 02	5.6753E-04
83	.5882	180.0	540.41	1.1514E 00	3.0577E-01	4.2096E-04	1.6981E-03	1.2960E 02	5.2873E-04
84	.6302	180.0	548.94	-6.4941E-02	-1.7511E-02	-2.4125E-05	-9.7314E-05	1.2972E 02	-3.0300E-05
85	.6722	180.0	542.75	1.5561E 00	3.7621E-01	5.2116E-04	2.1014E-03	1.3159E 02	6.5427E-04
86	.7170	180.0	550.39	1.4844E 00	3.9667E-01	5.5371E-04	2.2324E-03	1.3198E 02	6.9508E-04
87	.7583	180.0	547.79	1.4382E 00	3.4566E-01	4.8183E-04	1.9347E-03	1.3136E 02	6.0393E-04
88	.7996	180.0	549.56	1.8866E 00	4.9094E-01	6.8456E-04	2.7588E-03	1.3178E 02	8.5936E-04
89	.8409	180.0	551.64	2.1179E 00	5.7224E-01	8.2751E-04	3.3362E-03	1.3214E 02	1.0387E-03
90	.8822	180.0	552.47	3.1718E 00	7.8742E-01	9.9692E-04	3.9947E-03	1.3247E 02	1.2438E-03
91	.9235	180.0	553.77	3.4869E 00	8.7931E-01	1.2327E-03	5.0601E-03	1.3277E 02	1.5472E-03
92	.9648	180.0	557.97	4.1418E 00	9.5445E-01	1.3465E-03	5.4247E-03	1.3378E 02	1.6906E-03
93	.8822	225.0	556.15	2.6882E 00	6.8687E-01	9.6657E-04	3.8957E-03	1.3335E 02	1.2130E-03
94	.9648	225.0	558.91	3.6595E 00	8.8885E-01	1.2433E-03	5.0142E-03	1.3401E 02	1.5600E-03
95	.7170	270.0	554.87	1.5835E 00	3.5249E-01	4.9513E-04	1.9968E-03	1.3305E 02	6.2139E-04
96	.7996	270.0	556.91	1.6469E 00	4.3733E-01	6.1686E-04	2.4880E-03	1.3353E 02	7.7310E-04
97	.8822	270.0	559.80	2.1669E 00	6.7880E-01	8.8952E-04	3.5845E-03	1.3424E 02	1.1161E-03
98	.9648	270.0	559.47	3.4704E 00	8.3461E-01	1.1860E-03	4.7550E-03	1.3414E 02	1.4845E-03


GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 4G
RE NO = 1.34 X 10**6
ALPHA 0
SYM PHI X/L
SYM PHI X/L
0
45
90
180
225
270
32.00
24.00
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0.00
0.20
0.40
0.60
0.80
1.00
X/L
ST X 10**4

2

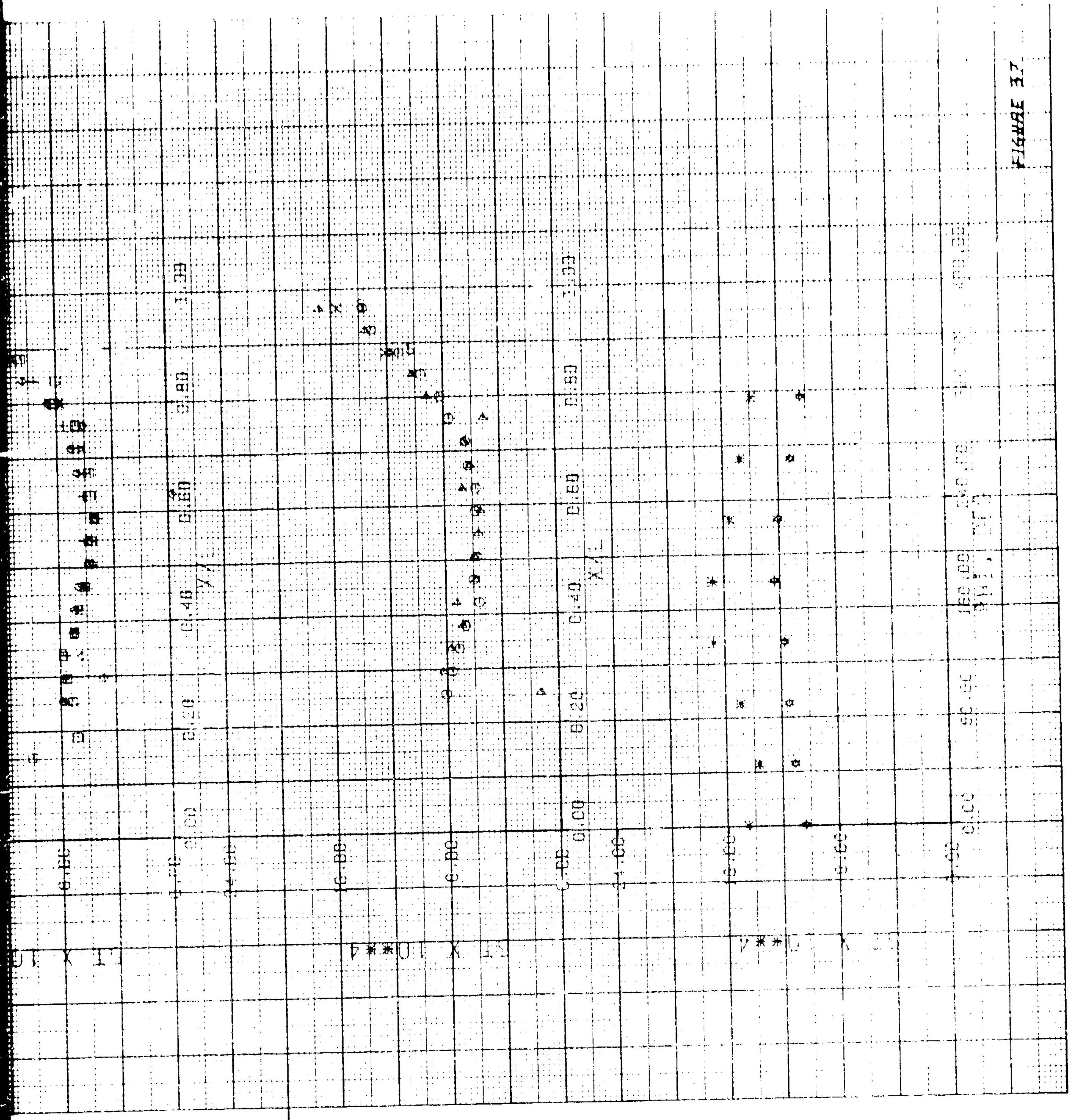


Figure 3?

3

7/14/69

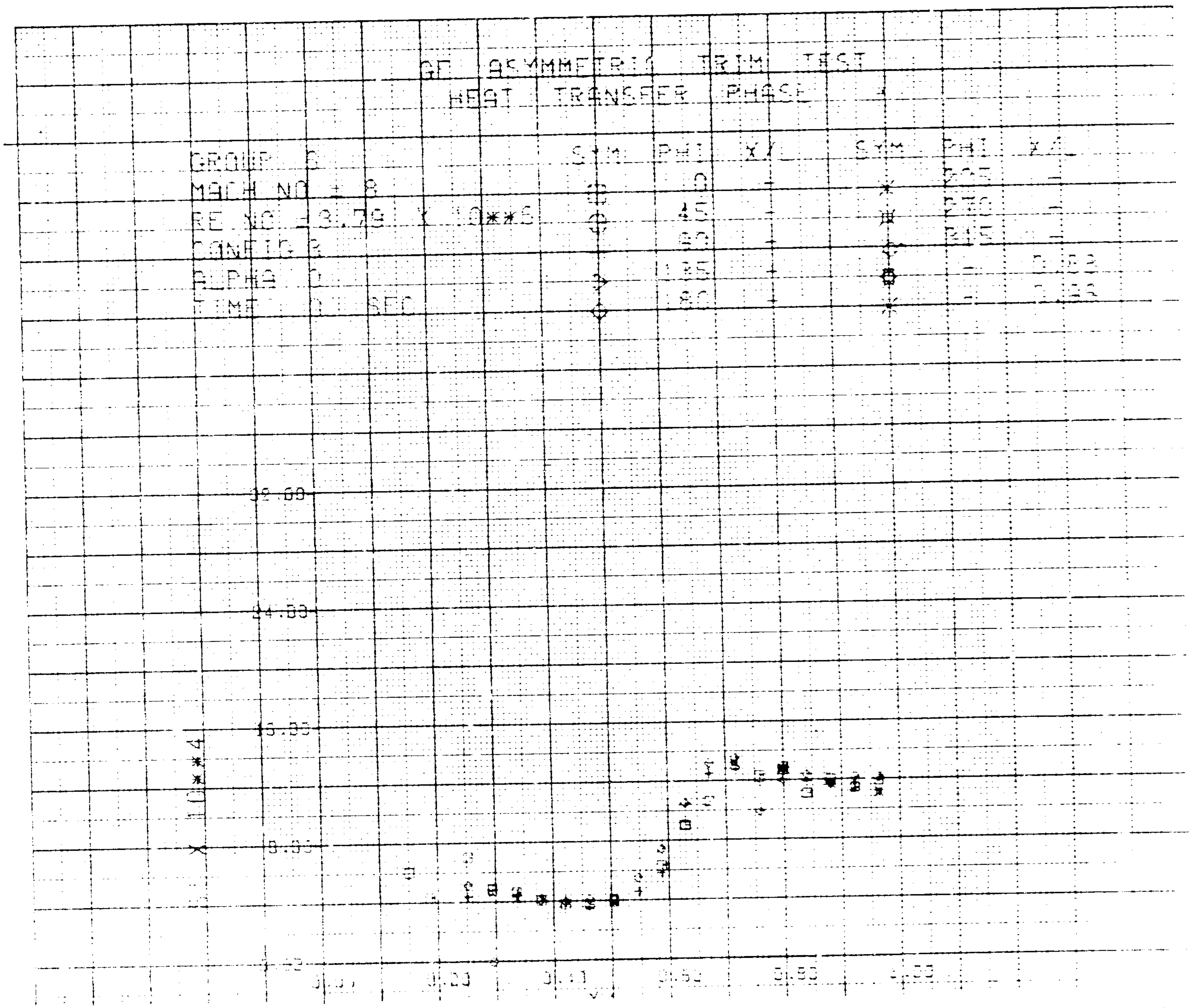
ARO, INC. - ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
VT0947-000

GROUP	CON ID	ALPHA-M	BETA-M	ALPHA-S	ROLL	ALP-P	DATE	MACH NO	PO	TO	TIME
6	3	-.03	0	.03	0	0	7.4	8.08	860.6	1336.13	9.88

Z-INF	P-INF	U-INF	V-INF	RHO-INF	MU-INF	RE/FT	RE/D	MU
9.66759E 01	8.81693E-02	1.94712E 00	3.85436E 03	7.66626E-05	7.70330E-08	3.78637E 06	3.47195E 06	3.27637E 02

PC NO	X/L	PHI	TEMP	SLOPE	Q-STDW	HT	HM	HW	ST
1	.1900	0	997.80	9.9129E 00	1.1909E 00	1.4919E-03	5.7044E-03	1.1939E 02	6.0090E-04
2	.1467	0	489.64	1.9675E 00	8.7132E-01	1.0318E-03	4.1543E-03	1.1755E 02	4.3855E-04
3	.2524	0	492.96	4.7515E 00	1.6046E 00	1.6648E-03	6.7248E-03	1.1833E 02	7.0963E-04
4	.2943	0	506.21	3.0305E 00	9.5652E-01	1.1553E-03	4.6521E-03	1.2147E 02	4.9063E-04
5	.3363	0	511.06	2.8843E 00	9.1837E-01	1.1061E-03	4.4526E-03	1.2262E 02	4.6953E-04
6	.3783	0	516.25	2.6660E 00	7.9954E-01	9.7525E-04	3.9253E-03	1.2318E 02	4.1397E-04
7	.4203	0	515.87	2.9058E 00	7.4552E-01	9.1084E-04	3.6648E-03	1.2371E 02	3.8661E-04
8	.4623	0	519.84	2.6427E 00	7.2815E-01	8.9421E-04	3.5980E-03	1.2471E 02	3.7946E-04
9	.5043	0	522.08	2.8693E 00	7.7627E-01	9.5594E-04	3.8459E-03	1.2524E 02	4.0561E-04
10	.5463	0	529.02	-1.1451E-02	-8.8245E-03	-1.0969E-05	-4.4112E-05	1.2703E 02	-4.6522E-06
11	.5882	0	527.19	4.1940E 00	1.2107E 00	1.5003E-03	6.0342E-03	1.2644E 02	6.3639E-04
14	.6302	0	531.95	6.3676E 00	1.7227E 00	2.1479E-03	8.6353E-03	1.2759E 02	9.1071E-04
13	.6722	0	537.19	7.9986E 00	2.0038E 00	2.5207E-03	1.0132E-02	1.2951E 02	1.0685E-03
99	.8022	315.0	541.04	5.6579E 00	1.4739E 00	1.8584E-03	7.4690E-03	1.2975E 02	7.8771E-04
15	.7583	0	541.62	9.6292E 00	2.3156E 00	2.9219E-03	1.1743E-02	1.2989E 02	1.2385E-03
16	.7996	0	541.20	8.6325E 00	2.4221E 00	3.0546E-03	1.2277E-02	1.2979E 02	1.2947E-03
17	.8409	0	540.60	8.1513E 00	2.0827E 00	2.6249E-03	1.0550E-02	1.2966E 02	1.1126E-03
18	.8822	0	544.67	8.9670E 00	2.2464E 00	2.8454E-03	1.1433E-02	1.3060E 02	1.2058E-03
19	.9235	0	545.98	8.5319E 00	2.1374E 00	2.7117E-03	1.0895E-02	1.3091E 02	1.1491E-03
20	.9648	0	548.24	9.2341E 00	2.2206E 00	2.8256E-03	1.1352E-02	1.3146E 02	1.1972E-03
21	.2524	45.0	489.54	3.5818E 00	1.0588E 00	1.2537E-03	5.0527E-03	1.1752E 02	5.3287E-04
22	.2943	45.0	502.55	3.0258E 00	9.7814E-01	1.1666E-03	4.6986E-03	1.2060E 02	4.9553E-04
23	.3363	45.0	507.52	2.8858E 00	8.6747E-01	1.0494E-03	4.2254E-03	1.2178E 02	4.4563E-04
24	.3783	45.0	511.60	2.6578E 00	7.9893E-01	9.7141E-04	3.9109E-03	1.2277E 02	4.1240E-04
25	.4203	45.0	514.80	2.5228E 00	7.3301E-01	8.9377E-04	3.5974E-03	1.2332E 02	3.7940E-04
26	.4623	45.0	518.95	2.4267E 00	7.3699E-01	9.0409E-04	3.6380E-03	1.2450E 02	3.8367E-04
27	.5043	45.0	522.32	2.4535E 00	7.0465E-01	8.6799E-04	3.4921E-03	1.2530E 02	3.6829E-04
100	.9648	315.0	592.05	8.3655E 00	2.0117E 00	2.5749E-03	1.0342E-02	1.3256E 02	1.0907E-03
29	.5882	45.0	527.30	4.4225E 00	1.2145E 00	1.5104E-03	6.0750E-03	1.2650E 02	6.4070E-04
30	.6302	45.0	532.67	6.4904E 00	1.7559E 00	2.1908E-03	8.8089E-03	1.2775E 02	9.2902E-04
31	.6722	45.0	542.76	9.5868E 00	2.3533E 00	2.9737E-03	1.1950E-02	1.3016E 02	1.2603E-03
32	.7170	45.0	546.07	1.0443E 01	2.4592E 00	3.1204E-03	1.2538E-02	1.3094E 02	1.3223E-03
33	.7543	45.0	542.24	9.0119E 00	2.4831E 00	3.1356E-03	1.2601E-02	1.3003E 02	1.3298E-03
34	.7996	45.0	542.27	9.5321E 00	2.3939E 00	3.0232E-03	1.2150E-02	1.3004E 02	1.2813E-03
35	.8409	45.0	544.90	8.3484E 00	2.2586E 00	2.8618E-03	1.1499E-02	1.3067E 02	1.2128E-03
36	.8822	45.0	546.92	8.0938E 00	2.1289E 00	2.7043E-03	1.0865E-02	1.3115E 02	1.1459E-03
37	.9235	45.0	547.76	8.1439E 00	2.0809E 00	2.6462E-03	1.0631E-02	1.3135E 02	1.1212E-03
38	.9648	45.0	549.28	8.0532E 00	1.9366E 00	2.4675E-03	9.9127E-03	1.3171E 02	1.0454E-03
39	.2524	90.0	492.30	2.9315E 00	8.6657E-01	1.0294E-03	4.1482E-03	1.1818E 02	4.3748E-04
40	.2943	90.0	504.46	2.9196E 00	9.3604E-01	1.1283E-03	4.5436E-03	1.2106E 02	4.7918E-04
41	.3363	90.0	509.07	2.7845E 00	8.7887E-01	1.0652E-03	4.2886E-03	1.2215E 02	4.5229E-04
42	.3783	90.0	511.97	2.7338E 00	8.6287E-01	1.0495E-03	4.2240E-03	1.2284E 02	4.4556E-04
43	.4203	90.0	513.85	2.7018E 00	7.9868E-01	9.7510E-04	3.9245E-03	1.2357E 02	4.1389E-04
44	.4623	90.0	513.60	2.2079E 00	6.8585E-01	8.3893E-04	3.3762E-03	1.2394E 02	3.5607E-04
45	.5043	90.0	520.35	2.6313E 00	7.2501E-01	8.9092E-04	3.5847E-03	1.2483E 02	3.7805E-04
46	.5463	90.0	522.47	3.0897E 00	8.8233E-01	1.0871E-03	4.3734E-03	1.2533E 02	4.6123E-04
47	.5882	90.0	526.21	3.9869E 00	1.1186E 00	1.3846E-03	5.5692E-03	1.2622E 02	5.8735E-04
48	.6302	90.0	531.34	4.1920E 00	1.7612E 00	2.1938E-03	8.8218E-03	1.2744E 02	9.3038E-04
49	.6722	90.0	541.86	9.1960E 00	2.3539E 00	2.9681E-03	1.1929E-02	1.2975E 02	1.2581E-03
50	.7170	90.0	545.58	1.0086E 01	2.3752E 00	3.0122E-03	1.2103E-02	1.3083E 02	1.2764E-03
51	.7583	90.0	539.32	8.4134E 00	2.2439E 00	2.8232E-03	1.1348E-02	1.2934E 02	1.1968E-03
52	.7996	90.0	540.61	8.9358E 00	2.3278E 00	2.9336E-03	1.1790E-02	1.2965E 02	1.2435E-03
53	.8409	90.0	541.17	8.0231E 00	2.2356E 00	2.8191E-03	1.1330E-02	1.2978E 02	1.1949E-03
54	.8822	90.0	543.74	8.8984E 00	2.1843E 00	2.7636E-03	1.1105E-02	1.3039E 02	1.1712E-03
55	.9235	90.0	544.97	8.5392E 00	2.1257E 00	2.6934E-03	1.0823E-02	1.3067E 02	1.1414E-03
56	.9648	90.0	546.91	8.7030E 00	2.0929E 00	2.6519E-03	1.0656E-02	1.3088E 02	1.1238E-03
57	.2524	135.0	487.78	9.5104E-01	2.8114E-01	3.3218E-03	1.3389E-03	1.1711E 02	1.4121E-04
58	.2943	135.0	498.82	2.4546E 00	8.1526E-01	1.0957E-03	4.4139E-03	1.1972E 02	4.6550E-04
59	.3363	135.0	502.81	2.0571E 00	6.4924E-01	7.8104E-04	3.1456E-03	1.2067E 02	3.3174E-04
60	.3783	135.0	505.90	2.4369E 00	8.1914E-01	9.4904E-04	3.9826E-03	1.2140E 02	4.2002E-04
61	.4203	135.0	508.56	2.4355E 00	7.9222E-01	9.5961E-04	3.8635E-03	1.2203E 02	4.0746E-04
62	.4623	135.0	511.40	2.4027E 00	7.2719E-01	8.8388E-04	3.5541E-03	1.2271E 02	3.7525E-04
63	.5043	135.0	514.47	2.7809E 00	7.1054E-01	8.6687E-04	3.4840E-03	1.2343E 02	3.6797E-04
64	.5463	135.0	516.77	3.2582E 00	8.6522E-01	1.0586E-03	4.2600E-03	1.2398E 02	4.4927E-04
65	.5882	135.0	519.92	4.4995E 00	1.1944E 00	1.4675E-03	5.9047E-03	1.2473E 02	6.2273E-04
66	.6302	135.0	524.28	4.6891E 00	1.7763E 00	2.1933E-03	8.8232E-03	1.2576E 02	9.3053E-04
67	.6722	135.0	537.06	9.6555E 00	2.3099E 00	2.8980E-03	1.1650E-02	1.2880E 02	1.2286E-03
68	.7170	135.0	540.11	1.0379E 01	2.4441E 00	3.0782E-03	1.2372E-02	1.2953E 02	1.3048E-03
69	.7583	135.0	530.32	8.3678E 00	1.7867E 00	2.2228E-03	8.9387E-03	1.2720E 02	9.4270E-04
70	.7996	135.0	534.22	8.4237E 00	2.5638E 00	3.2051E-03	1.2880E-02	1.2813E 02	1.3590E-03
71	.8409	135.0	535.94	9.1593E 00	2.2481E 00	2.8165E-03	1.1323E-02	1.2854E 02	1.1942E-03
72	.8822	135.0	537.18	8.3755E 00	2.2659E 00	2.8432E-03	1.1429E-02	1.2883E 02	1.2054E-03
73	.9235	135.0	539.75	8.6754E 00	2.1276E 00	2.6782E-03	1.0765E-02	1.2943E 02	1.1353E-03
74	.9648	135.0	542.35	9.2212E 00	2.1694E 00	2.7399E-03	1.1011E-02	1.3006E 02	1.1613E-03
75	.2524	180.0	490.50	3.5230E 00	1.0236E 00	1.2134E-03	4.8900E-03	1.1775E 02	5.1571E-04
76	.2943	180.0	-116.74	-1.1546E-14	-3.7020E-15	-2.5515E-18	-1.0634E-17	-2.1036E 01	-1.1215E-18
77	.3363	180.0	506.90	2.4693E 00	7.8317E-01	9.4674E-04	3.8121E-03	1.2184E 02	4.0203E-04
78	.3783	180.0	510.28	2.4758E 00	8.0435E-01	9.7632E-04	3.9305E-03	1.2244E 02	4.1452E-04
79	.4203	180.0	513.60	2.2222E 00	7.7516E-01	9.4471E-04	3.8025E-03	1.2323E 02	4.0103E-04
80	.4623	180.0	517.15	2.7780E 00	7.9330E-01	9.7102E-04	3.9076E-03	1.2407E 02	4.1211E-04
81	.5043	180.0	520.11	3.1243E 00	7.8320E-01	9.6214E-04	3.8713E-03	1.2477E 02	4.0828E-04
82	.5463	180.0	522.75	4.0251E 00	1.0669E 00	1.3173E-03	5.2997E-03	1.2540E 02	5.5893E-04
83	.5882	180.0	525.64	5.3896E 00	1.4312E 00	1.7702E-03	7.1265E-03	1.2609E 02	7.5095E-04
84	.6302	180.0	531.96	7.5232E 00	1.9978E 00	2.4905E-03	1.0014E-02	1.2759E 02	1.0562E-03
85	.6722	180.0	544.21	1.0281E 01	2.4725E 00	3.1301E-03	1.2578E-02	1.3051E 02	1.3265E-03
86	.7170	180.0	547.56	1.0702E 01	2.5202E 00	3.2040E-03	1.2872E-02	1.3130E 02	1.3576E-03
87	.7583	180.0	537.98	7.7802E 00	1.8710E 00	2.3500E-03	9.4465E-03	1.2902E 02	9.9626E-04
88	.7996	180.0	541.86	8.4433E 00	2.2516E 00	2.8390E-03	1.1410E-02	1.2975E 02	1.2034E-03
89	.8409	180.0	542.29	9.0735E 00	2.3104E 00	2.9278E-03	1.1766E-02	1.3005E 02	1.2409E-03
90	.8822	180.0	544.18	9.5121E 00	2.1920E 00	2.7745E-03	1.1149E-02	1.3048E 02	1.1758E-03
91	.9235	180.0	545.39	9.3654E 00	2.2744E 00	2.8836E-03	1.1586E-02	1.3078E 02	1.2219E-03
92	.9648	180.0	549.88	9.7900E 00	2.2560E 00	2.8767E-03	1.1556E-02	1.3186E 02	1.2187E-03
93	.8022	225.0	546.09	8.4581E 00	2.1611E 00	2.7424E-03	1.1019E-02	1.3095E 02	1.1621E-03
94	.9648	225.0	551.25	8.7117E 00	2.0950E 00	2.6760E-03	1.0749E-02	1.3218E 02	1.1336E-03
95	.7170	270.0	552.05	1.0051E 01	2.4454E 00	3.1312E-03	1.2577E-02	1.3256E 02	1.3264E-03
96	.7996	270.0	549.96	8.9526E 00	2.3774E 00	3.0316E-03	1.2178E-02	1.3187E 02	1.2844E-03
97	.8822	270.0	549.95	8.8049E 00	2.1731E 00	2.7712E-03	1.1132E-02	1.3187E 02	1.1740E-03
98	.9648	270.0	552.95	8.5517E 00	2.0565E 00	2.6326E-03	1.0574E-02	1.3259E 02	1.1151E-03

GROUP 6 AF ASYMMETRIC TRIM PHASE SYM PHI X
HEAT TRANSFER PHASE
SYM PHI X



GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 6
MACH NO = 8
RE NO = 3.79 X 10**6
CONFIG 8
ALPHA 0
TIME = 0 SEC
SYM PHI X/L
0
45
90
135
180
SYM PHI X/L
12.00
24.00
16.00
8.00
X 10**4

2

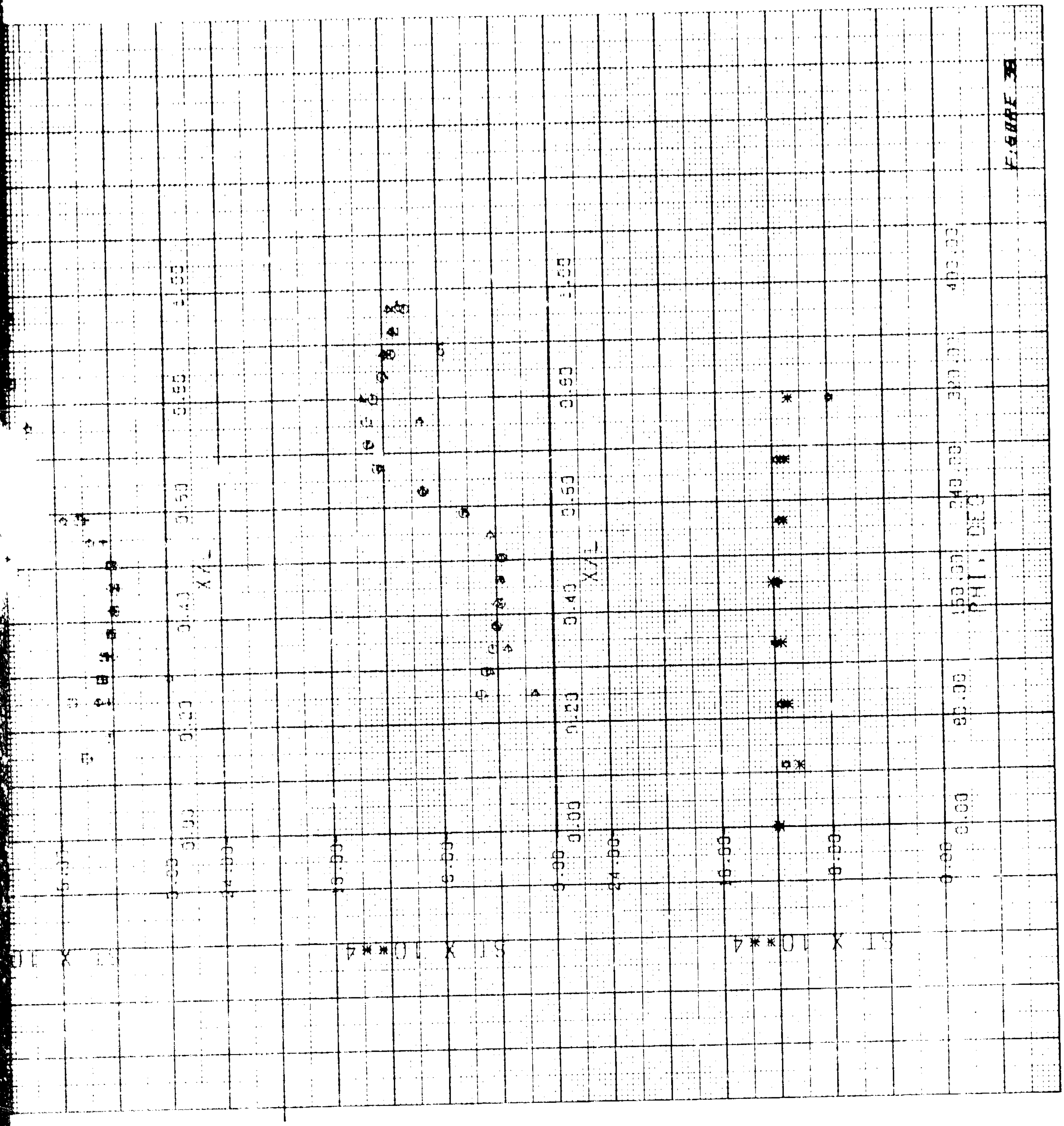


Figure 38

7/16/69

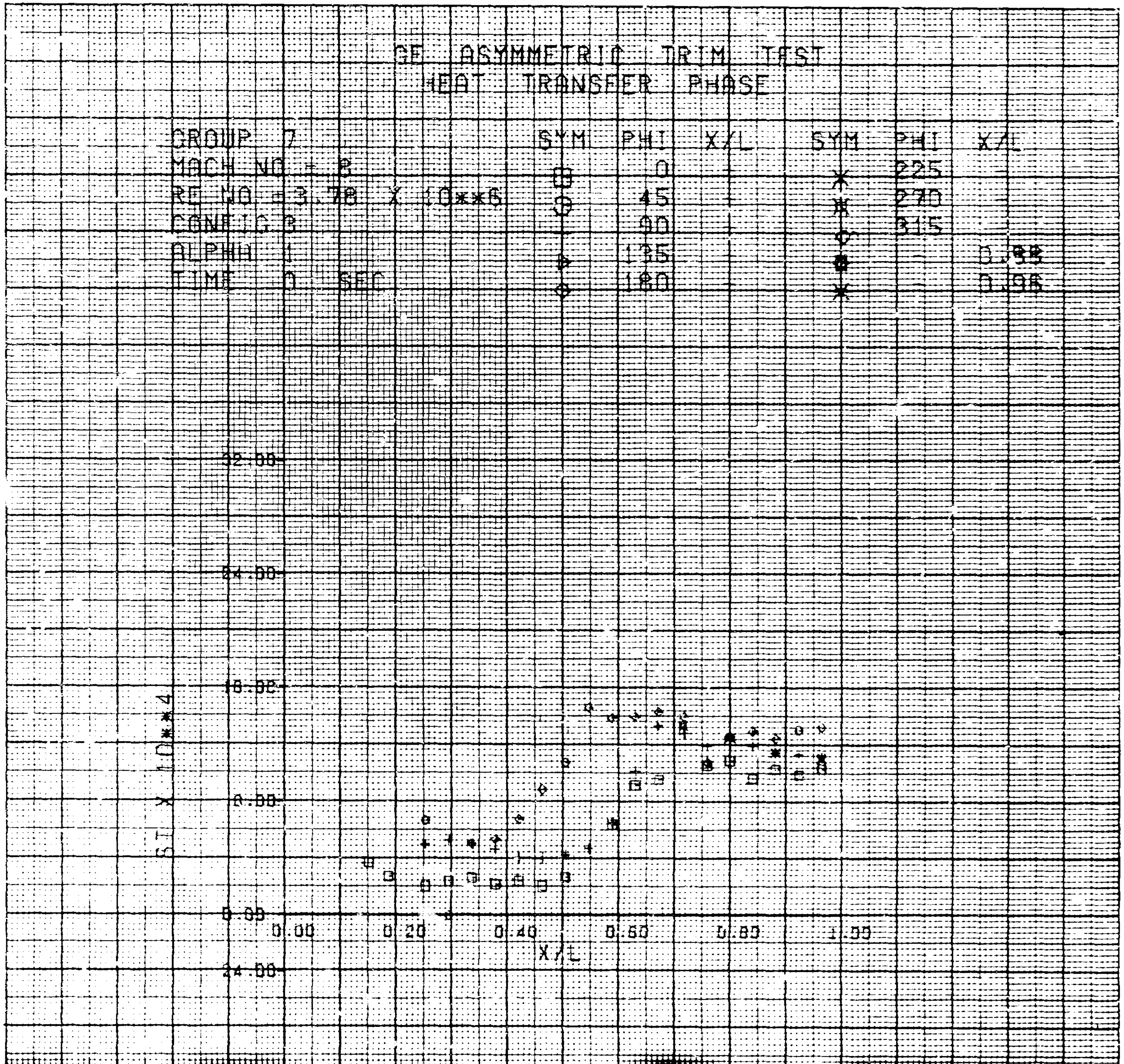
AEDC(ARO,INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
VT0967-000

GROUP	CONFIG	ALPHA-M	BETA-M	ALPHA-S	ROLL	ALP-P	DATE	MACH NO	PO	TO	TIME
7	3	1.05	0	1.05	0	0	714	8.08	999.86	1335.73	.00

T-INF	P-INF	U-INF	V-INF	RHO-INF	MU-INF	RE/FT	RE/D	HO
9.67921E 01	4.08744E-02	3.94574E 00	3.85662E 03	7.03436E-05	7.79275E-08	3.77022E 06	3.44539E 06	3.27470E 02

TC NO	X/L	PHI	TEMP	SLOPE	Q-DTOA	HT	HM	HW	ST
1	.1500	0	496.16	3.7900E 00	7.3000E-01	8.7323E-04	3.5190E-03	1.1700E 02	3.7100E-04
2	.1867	0	470.76	2.4074E 00	5.4627E-01	6.3746E-04	2.5704E-03	1.1490E 02	2.7138E-04
3	.2524	0	483.26	1.6010E 00	4.1415E-01	4.8579E-04	1.9544E-03	1.1602E 02	2.0674E-04
4	.2943	0	493.47	1.6099E 00	4.7620E-01	5.6564E-04	2.2754E-03	1.2002E 02	2.4020E-04
5	.3363	0	506.26	1.6372E 00	5.1474E-01	6.2297E-04	2.5063E-03	1.2146E 02	2.6476E-04
6	.3783	0	507.49	1.6367E 00	4.3127E-01	5.2068E-04	2.0943E-03	1.2177E 02	2.2198E-04
7	.4203	0	509.70	1.6194E 00	4.7055E-01	5.6737E-04	2.2921E-03	1.2220E 02	2.4196E-04
8	.4623	0	512.94	1.6021E 00	4.0835E-01	4.9629E-04	1.9975E-03	1.2307E 02	2.1907E-04
9	.5043	0	515.25	1.9077E 00	5.1611E-01	6.2903E-04	2.5314E-03	1.2362E 02	2.6723E-04
10	.5463	0	520.97	2.7969E-02	7.8670E-03	9.7272E-06	3.9110E-05	1.2680E 02	4.1293E-06
11	.5882	0	522.04	4.4556E 00	1.2277E 00	1.5087E-03	6.0609E-03	1.2523E 02	6.4071E-04
12	.6302	0	527.81	6.4609E 00	1.7479E 00	2.1635E-03	8.7090E-03	1.2660E 02	9.1047E-04
13	.6722	0	535.86	7.7091E 00	1.8060E 00	2.2579E-03	9.0744E-03	1.2852E 02	9.5814E-04
99	.8822	315.0	530.91	5.7459E 00	1.4960E 00	1.8785E-03	7.5609E-03	1.2924E 02	7.9700E-04
15	.7583	0	537.75	8.1125E 00	1.9940E 00	2.5051E-03	1.0069E-02	1.2897E 02	1.0629E-03
16	.7996	0	537.30	7.9223E 00	2.0545E 00	2.5734E-03	1.0349E-02	1.2880E 02	1.0915E-03
17	.8409	0	537.21	7.0980E 00	1.8136E 00	2.2712E-03	9.1201E-03	1.2886E 02	9.6371E-04
18	.8822	0	541.32	7.7137E 00	1.9324E 00	2.4325E-03	9.7754E-03	1.2941E 02	1.0319E-03
19	.9235	0	542.06	7.4180E 00	1.8505E 00	2.3415E-03	9.4079E-03	1.3610E 02	9.9326E-04
20	.9648	0	544.95	9.0344E 00	1.9321E 00	2.4433E-03	9.8148E-03	1.3060E 02	1.0363E-03
21	.2524	45.0	479.56	2.9770E 00	8.4027E-01	1.0201E-03	4.1459E-03	1.1516E 02	4.3767E-04
22	.2943	45.0	497.40	2.4964E 00	8.0045E-01	9.5491E-04	3.8440E-03	1.1941E 02	4.0606E-04
23	.3363	45.0	501.41	2.4961E 00	7.5034E-01	8.9934E-04	3.6220E-03	1.2033E 02	3.8235E-04
24	.3783	45.0	504.47	2.1292E 00	7.0015E-01	8.4228E-04	3.3919E-03	1.2106E 02	3.5803E-04
25	.4203	45.0	507.84	2.2390E 00	6.5080E-01	7.8590E-04	3.1640E-03	1.2183E 02	3.3401E-04
26	.4623	45.0	512.71	2.2906E 00	6.4209E-01	7.8089E-04	3.1430E-03	1.2302E 02	3.3179E-04
27	.5043	45.0	516.07	2.2064E 00	6.0717E-01	7.4070E-04	2.9807E-03	1.2340E 02	3.1466E-04
100	.9640	315.0	549.33	8.0947E 00	1.9666E 00	2.4753E-03	9.9432E-03	1.3173E 02	1.0496E-03
29	.5882	45.0	520.91	2.7484E 00	6.1950E-01	7.6028E-04	3.0587E-03	1.2496E 02	3.2289E-04
30	.6302	45.0	525.89	3.1961E 00	8.6465E-01	1.0677E-03	4.2943E-03	1.2615E 02	4.5332E-04
31	.6722	45.0	530.91	5.1400E 00	1.2372E 00	1.5479E-03	6.2223E-03	1.2867E 02	6.5685E-04
32	.7170	45.0	541.46	7.4542E 00	1.7554E 00	2.2101E-03	8.8813E-03	1.2905E 02	9.3759E-04
33	.7583	45.0	538.69	8.0538E 00	2.2191E 00	2.7838E-03	1.1149E-02	1.2917E 02	1.1811E-03
34	.7996	45.0	539.13	8.7222E 00	2.3351E 00	2.9313E-03	1.1781E-02	1.2929E 02	1.2437E-03
35	.8409	45.0	541.80	9.1427E 00	2.2570E 00	2.8429E-03	1.1474E-02	1.2993E 02	1.2060E-03
36	.8822	45.0	543.55	8.0364E 00	2.1130E 00	2.6683E-03	1.0722E-02	1.3035E 02	1.1318E-03
37	.9235	45.0	545.22	7.8939E 00	2.0425E 00	2.5838E-03	1.0381E-02	1.3074E 02	1.0959E-03
38	.9648	45.0	546.49	7.7480E 00	1.8536E 00	2.3486E-03	9.6394E-03	1.3109E 02	9.9606E-04
39	.2524	90.0	482.38	3.7759E 00	9.4796E-01	1.1695E-03	4.7147E-03	1.1503E 02	4.9770E-04
40	.2943	90.0	497.78	3.7500E 00	1.0420E 00	1.2435E-03	5.0091E-03	1.1947E 02	5.2070E-04
41	.3363	90.0	501.08	3.1342E 00	9.8925E-01	1.1864E-03	4.7778E-03	1.2045E 02	5.0436E-04
42	.3783	90.0	505.73	2.4717E 00	9.0640E-01	1.0920E-03	4.3970E-03	1.2136E 02	4.6417E-04
43	.4203	90.0	509.31	2.8551E 00	7.8489E-01	9.4977E-04	3.8235E-03	1.2221E 02	4.0361E-04
44	.4623	90.0	511.39	2.5392E 00	7.8876E-01	9.5683E-04	3.8514E-03	1.2270E 02	4.0657E-04
45	.5043	90.0	515.21	2.9993E 00	8.2640E-01	1.0072E-03	4.0531E-03	1.2361E 02	4.2787E-04
46	.5463	90.0	519.13	3.1471E 00	8.9072E-01	1.1086E-03	4.4280E-03	1.2454E 02	4.6744E-04
47	.5882	90.0	521.46	4.4609E 00	1.2516E 00	1.5370E-03	6.1834E-03	1.2508E 02	6.5275E-04
48	.6302	90.0	526.79	7.0296E 00	1.9350E 00	2.3920E-03	9.6236E-03	1.2635E 02	1.0159E-03
49	.6722	90.0	538.96	1.0052E 01	2.5183E 00	3.1606E-03	1.2703E-02	1.2925E 02	1.3410E-03
50	.7170	90.0	543.28	1.0240E 01	2.4113E 00	3.0428E-03	1.2227E-02	1.3028E 02	1.2907E-03
51	.7583	90.0	536.05	8.4483E 00	2.2529E 00	2.8193E-03	1.1333E-02	1.2870E 02	1.1963E-03
52	.7996	90.0	537.35	8.9499E 00	2.3445E 00	2.9365E-03	1.1083E-02	1.2867E 02	1.2460E-03
53	.8409	90.0	538.90	8.9722E 00	2.2677E 00	2.8268E-03	1.1357E-02	1.2924E 02	1.1960E-03
54	.8822	90.0	541.61	4.7556E 00	2.1492E 00	2.7060E-03	1.0876E-02	1.2989E 02	1.1481E-03
55	.9235	90.0	543.83	8.8484E 00	2.1260E 00	2.6819E-03	1.0777E-02	1.3022E 02	1.1376E-03
56	.9640	90.0	542.93	9.7036E 00	2.0930E 00	2.6481E-03	1.0609E-02	1.3020E 02	1.1199E-03
57	.2524	135.0	478.35	1.1678E 00	3.4572E-01	4.0265E-04	1.6236E-03	1.1488E 02	1.7140E-04
58	.2943	135.0	493.34	3.8902E 00	1.2473E 00	1.4806E-03	5.9050E-03	1.1842E 02	6.2975E-04
59	.3363	135.0	496.05	3.4969E 00	1.1037E 00	1.3157E-03	5.3062E-03	1.1925E 02	5.5951E-04
60	.3783	135.0	500.41	3.1566E 00	9.8058E-01	1.1739E-03	4.7279E-03	1.2010E 02	4.9910E-04
61	.4203	135.0	503.59	3.3153E 00	9.9857E-01	1.1976E-03	4.8220E-03	1.2085E 02	5.0909E-04
62	.4623	135.0	506.97	3.1404E 00	9.7290E-01	1.1739E-03	4.7244E-03	1.2165E 02	4.9893E-04
63	.5043	135.0	510.83	4.4605E 00	1.1141E 00	1.3566E-03	5.4367E-03	1.2257E 02	5.7392E-04
64	.5463	135.0	514.64	6.1261E 00	1.6264E 00	1.9798E-03	7.9679E-03	1.2333E 02	8.4113E-04
65	.5882	135.0	519.44	9.0663E 00	2.4129E 00	2.9559E-03	1.1893E-02	1.2461E 02	1.2554E-03
66	.6302	135.0	523.72	1.0793E 01	2.8660E 00	3.5295E-03	1.4197E-02	1.2562E 02	1.4987E-03
67	.6722	135.0	536.69	1.1581E 01	2.7851E 00	3.4847E-03	1.4007E-02	1.2867E 02	1.4787E-03
68	.7170	135.0	530.78	1.0800E 01	2.5433E 00	3.1912E-03	1.2826E-02	1.2921E 02	1.3540E-03
69	.7583	135.0	528.23	6.4480E 00	1.8455E 00	2.3099E-03	9.2844E-03	1.2670E 02	9.8063E-04
70	.7996	135.0	532.67	9.0265E 00	2.6227E 00	3.2659E-03	1.3131E-02	1.2776E 02	1.3861E-03
71	.8409	135.0	534.01	8.5582E 00	2.3500E 00	2.9441E-03	1.1836E-02	1.2827E 02	1.2494E-03
72	.8822	135.0	535.76	8.8620E 00	2.3975E 00	2.9970E-03	1.2048E-02	1.2849E 02	1.2718E-03
73	.9235	135.0	537.57	9.1641E 00	2.2495E 00	2.8184E-03	1.1320E-02	1.2872E 02	1.1950E-03
74	.9640	135.0	542.38	9.6601E 00	2.3105E 00	2.9124E-03	1.1703E-02	1.3067E 02	1.2354E-03
75	.2524	180.0	479.36	4.4462E 00	1.3500E 00	1.5763E-03	6.3560E-03	1.1510E 02	6.7096E-04
76	.2943	180.0	-116.76	6.1927E-08	1.9855E-08	1.3670E-11	5.6967E-11	-2.1036E 01	6.0137E-12
77	.3363	180.0	501.31	3.1683E 00	9.9333E-01	1.1984E-03	4.7946E-03	1.2031E 02	5.0612E-04
78	.3783	180.0	505.31	3.4097E 00	1.0520E 00	1.2672E-03	5.1021E-03	1.2131E 02	5.3860E-04
79	.4203	180.0	509.16	4.4482E 00	1.3149E 00	1.5968E-03	6.4041E-03	1.2217E 02	6.7665E-04
80	.4623	180.0	513.71	4.4285E 00	1.7216E 00	2.0943E-03	8.4289E-03	1.2325E 02	8.8979E-04
81	.5043	180.0	518.24	4.1109E 00	2.0821E 00	2.5469E-03	1.0248E-02	1.2433E 02	1.0810E-03
82	.5463	180.0	522.81	1.4579E 01	2.8081E 00	3.4543E-03	1.3895E-02	1.2541E 02	1.4669E-03
83	.5882	180.0	525.21	1.0013E 01	2.6580E 00	3.2804E-03	1.3194E-02	1.2590E 02	1.3920E-03
84	.6302	180.0	530.64	9.9946E 00	2.6541E 00	3.2966E-03	1.3250E-02	1.2720E 02	1.3993E-03
85	.6722	180.0	542.76	1.1168E 01	2.6848E 00	3.3857E-03	1.3605E-02	1.3016E 02	1.4362E-03
86	.7170	180.0	546.54	1.1092E 01	2.6122E 00	3.3100E-03	1.3299E-02	1.3106E 02	1.4030E-03
87	.7583	180.0	536.42	8.4924E 00	2.0423E 00	2.5558E-03	1.0270E-02	1.2865E 02	1.0842E-03
88	.7996	180.0	540.61	9.1114E 00	2.3715E 00	2.9828E-03	1.1984E-02	1.2950E 02	1.2655E-03
89	.8409	180.0	541.56	9.5317E 00	2.4354E 00	3.0664E-03	1.2373E-02	1.2986E 02	1.3080E-03
90	.8822	180.0	543.29	1.0119E 01	2.3314E 00	2.9426E-03	1.1824E-02	1.3028E 02	1.2482E-03
91	.9235	180.0	544.57	9.4413E 00	2.4463E 00	3.0864E-03	1.2363E-02	1.3059E 02	1.3043E-03
92	.9648	180.0	548.96	1.0714E 01	2.4809E 00	3.1300E-03	1.7605E-02	1.3103E 02	1.3307E-03
93	.8822	225.0	544.72	8.0545E 00	2.2024E 00	2.0681E-03	1.1492E-02	1.3063E 02	1.2131E-03
94	.9640	225.0	549.09	9.7257E 00	2.2100E 00	2.8232E-03	1.1340E-02	1.3106E 02	1.1971E-03
95	.7170	270.0	551.21	1.0976E 01	2.4760E 00	3.1563E-03	1.2609E-02	1.3217E 02	1.3374E-03
96	.7996	270.0	546.31	8.9130E 00	2.3405E 00	2.9640E-03	1.1911E-02	1.3100E 02	1.2574E-03
97	.8822	270.0	547.09	8.1625E 00	2.1367E 00	2.7120E-03	1.0805E-02	1.3137E 02	1.1501E-03
98	.9640	270.0	550.05	8.4256E 00	2.0502E 00	2.6122E-03	1.0492E-02	1.3209E 02	1.1076E-03

GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 7
SYM PHI X/L
SYM PHI X/L


GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 7
MACH NO = 8
RE NO =3.78 X 10**6
CONFIG B
ALPHA 1
TIME 0 SEC
SYM PHI X/L
0
45
90
135
180
SYM PHI X/L
225
270
315
0.98
0.96
32.00
24.00
8.00
0.00
0.00
0.20
0.40
0.60
0.80
1.00
X/L
ST X 10**4

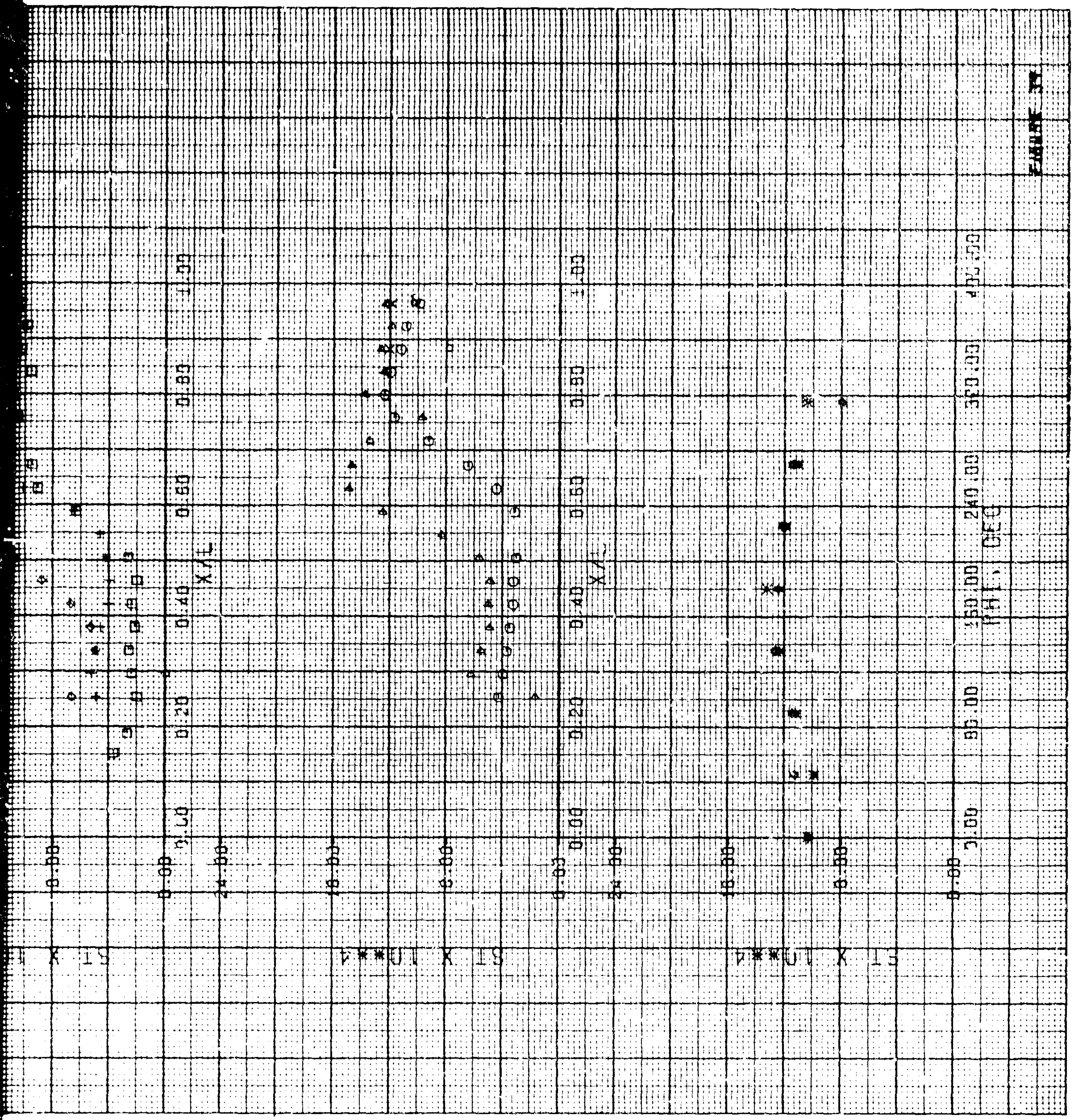


Figure 39

7/14/69

AEDC(ARO,INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
VT0467-000

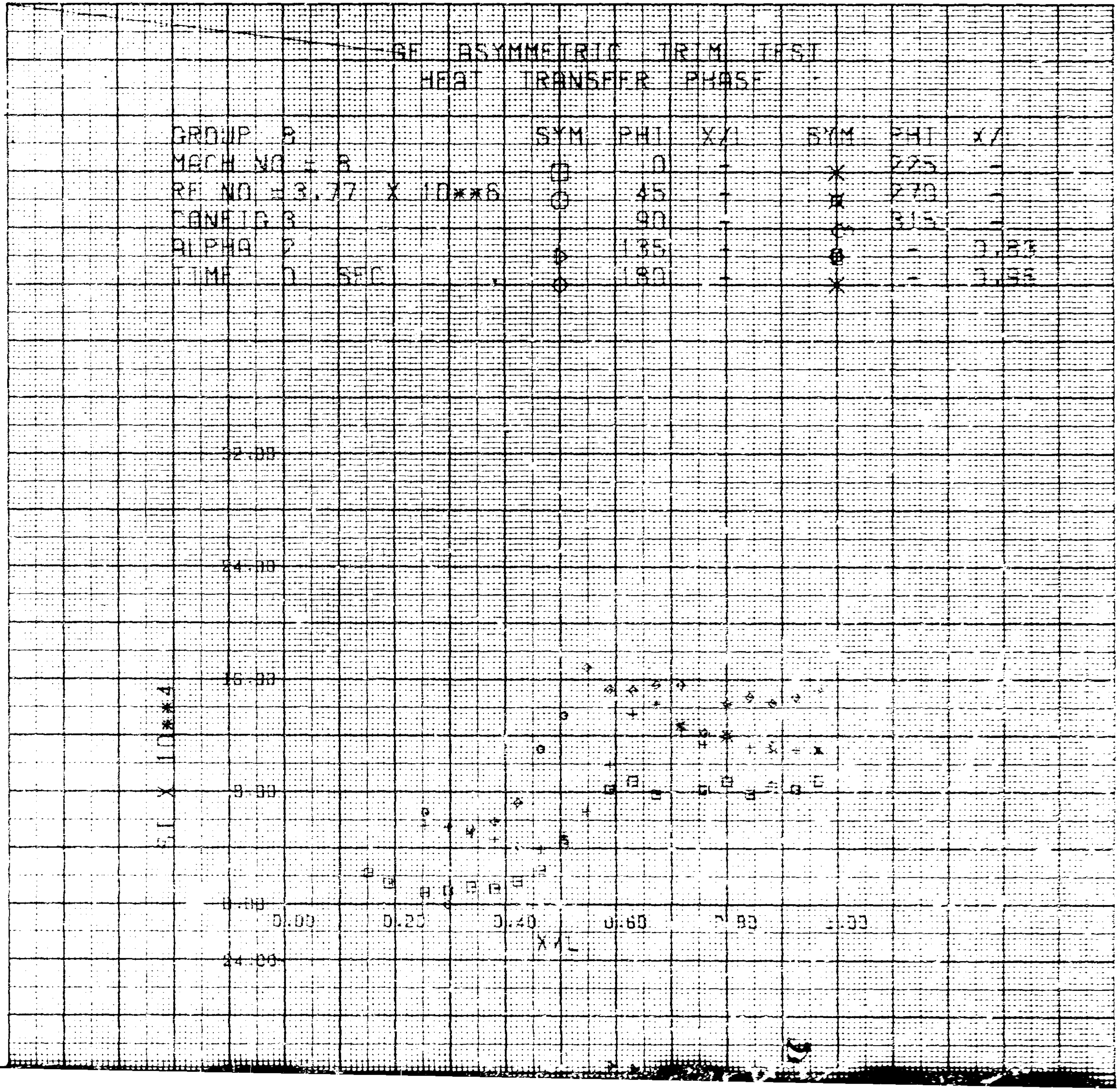
GROUP	CONFIG	ALPHA-N	BETA-N	ALPHA-S	ROLL	ALP-?	NOTE	MACH NO	PO	TO	TIME
8	3	2.0	0	2.06	0	0	714	8.08	981.86	1336.86	.00

T-INF	P-INF	Q-INF	V-INF	RHO-INF	MU-INF	RE/FT	RE/D	HO
9.7019E 01	4.8279E-02	3.9649E 00	3.8011E 03	7.6542E-05	7.3110E-08	3.7737E 06	3.4904E 06	3.2035E 02

TC NO	X/L	PHI	TEMP	SLOPE	Q-DOT	HT	HM	HW	ST
1	.1900	0	983.77	7.7083E 00	4.4879E-01	5.3998E-04	2.1839E-03	1.2003E 02	2.2772E-04
2	.1667	0	454.07	1.4076E 00	3.0517E-01	3.0123E-04	1.1942E-03	1.1459E 02	1.5343E-04
3	.2524	0	496.42	4.1941E-01	1.8514E-01	2.1742E-04	8.7572E-04	1.1919E 02	9.2337E-05
4	.2943	0	511.03	4.6462E-01	2.0504E-01	2.4792E-04	9.9773E-04	1.2201E 02	1.0320E-04
5	.3363	0	515.07	7.4237E-01	2.5010E-01	3.0304E-04	1.2227E-03	1.2376E 02	1.2392E-04
6	.3703	0	518.26	7.4358E-01	2.2650E-01	2.7602E-04	1.1109E-03	1.2433E 02	1.1709E-04
7	.4203	0	518.05	1.1229E 00	3.2624E-01	3.9784E-04	1.6005E-03	1.2447E 02	1.6876E-04
8	.4623	0	520.75	1.7597E 00	4.8468E-01	5.9265E-04	2.3619E-03	1.2492E 02	2.5136E-04
9	.5043	0	522.01	1.1048E 00	6.4111E-01	1.0297E-03	4.1410E-03	1.2522E 02	4.3676E-04
10	.5463	0	529.14	2.7960E-02	7.0673E-03	9.6789E-06	3.4043E-05	1.2691E 02	4.1004E-06
11	.5882	0	527.66	4.1292E 00	1.5775E 00	1.9446E-03	7.8101E-03	1.2657E 02	8.2466E-04
12	.6302	0	531.39	4.2276E 00	1.6840E 00	2.0065E-03	8.3681E-03	1.2749E 02	8.9445E-04
13	.6722	0	538.21	5.9327E 00	1.4938E 00	1.8611E-03	7.5709E-03	1.2860E 02	7.8813E-04
14	.8822	315.0	543.24	5.4996E 00	1.3285E 00	1.6697E-03	6.7881E-03	1.3027E 02	7.0731E-04
15	.7583	0	539.05	6.4302E 00	1.5402E 00	1.9372E-03	7.7863E-03	1.2942E 02	8.2080E-04
16	.7996	0	540.28	5.9254E 00	1.6625E 00	2.0619E-03	8.3653E-03	1.2957E 02	8.8206E-04
17	.8409	0	540.23	5.9075E 00	1.4839E 00	1.8500E-03	7.4640E-03	1.2956E 02	7.8723E-04
18	.8822	0	543.77	6.9121E 00	1.5013E 00	1.9080E-03	7.7908E-03	1.3040E 02	8.4240E-04
19	.9235	0	545.83	6.1771E 00	1.5175E 00	1.9496E-03	7.8318E-03	1.3070E 02	8.2571E-04
20	.9448	0	549.26	6.8859E 00	1.6559E 00	2.0892E-03	8.3928E-03	1.3695E 02	8.0407E-04
21	.2524	45.0	493.11	3.0502E 00	9.0167E-01	1.3641E-03	4.2948E-03	1.1937E 02	4.5284E-04
22	.2943	45.0	506.53	2.4464E 00	8.4869E-01	1.0198E-03	4.1037E-03	1.2155E 02	4.3276E-04
23	.3363	45.0	510.31	2.9754E 00	7.7410E-01	9.3435E-04	3.7605E-03	1.2245E 02	3.9652E-04
24	.3703	45.0	512.54	2.3345E 00	7.0174E-01	8.4925E-04	3.4178E-03	1.2298E 02	3.6036E-04
25	.4203	45.0	515.07	2.1143E 00	6.1634E-01	7.4539E-04	2.9993E-03	1.2348E 02	3.1625E-04
26	.4623	45.0	518.26	2.2030E 00	6.1012E-01	7.6325E-04	3.0303E-03	1.2433E 02	3.1952E-04
27	.5043	45.0	520.17	2.2446E 00	5.9606E-01	7.2807E-04	2.9247E-03	1.2479E 02	3.0081E-04
100	.9448	315.0	551.48	7.4672E 00	1.6945E 00	2.1584E-03	8.6670E-03	1.3224E 02	9.1395E-04
29	.5882	45.0	524.80	3.2977E 00	9.0861E-01	1.1161E-03	4.4844E-03	1.2509E 02	4.7329E-04
30	.6302	45.0	529.62	5.1293E 00	1.3877E 00	1.7148E-03	6.8944E-03	1.2703E 02	7.2696E-04
31	.6722	45.0	538.94	7.4628E 00	1.9388E 00	2.4128E-03	9.6950E-03	1.2925E 02	1.0223E-03
32	.7170	45.0	542.53	8.4806E 00	2.1149E 00	2.6550E-03	1.0670E-02	1.3010E 02	1.1251E-03
33	.7583	45.0	539.61	7.4785E 00	2.1708E 00	2.7160E-03	1.0914E-02	1.2941E 02	1.1308E-03
34	.7996	45.0	540.86	7.4506E 00	2.0905E 00	2.6176E-03	1.0510E-02	1.2952E 02	1.1088E-03
35	.8409	45.0	542.54	7.1995E 00	1.9478E 00	2.4459E-03	9.8271E-03	1.3011E 02	1.0362E-03
36	.8822	45.0	544.21	6.9685E 00	1.8329E 00	2.3066E-03	9.2643E-03	1.3051E 02	9.7764E-04
37	.9235	45.0	545.77	7.6480E 00	1.7990E 00	2.2683E-03	9.1119E-03	1.3080E 02	9.6078E-04
38	.9448	45.0	547.31	6.9334E 00	1.6673E 00	2.1964E-03	8.4607E-03	1.3126E 02	8.9211E-04
39	.2524	90.0	493.19	3.8117E 00	1.1208E 00	1.3324E-03	5.3675E-03	1.1839E 02	5.6596E-04
40	.2943	90.0	505.21	3.1860E 00	1.0856E 00	1.3022E-03	5.2429E-03	1.2124E 02	5.5279E-04
41	.3363	90.0	508.45	3.1663E 00	9.9930E-01	1.2035E-03	4.8442E-03	1.2200E 02	5.1070E-04
42	.3703	90.0	511.33	2.8900E 00	9.1243E-01	1.1025E-03	4.4374E-03	1.2269E 02	4.6780E-04
43	.4203	90.0	514.47	2.7219E 00	8.6653E-01	9.7603E-04	3.9274E-03	1.2343E 02	4.1411E-04
44	.4623	90.0	515.51	2.4718E 00	7.6745E-01	9.3259E-04	3.7524E-03	1.2368E 02	3.9566E-04
45	.5043	90.0	518.95	3.4559E 00	9.5220E-01	1.1613E-03	4.6719E-03	1.2450E 02	4.9261E-04
46	.5463	90.0	523.09	4.4777E 00	1.2787E 00	1.5686E-03	6.3089E-03	1.2581E 02	6.6510E-04
47	.5882	90.0	526.43	6.8078E 00	1.9101E 00	2.3511E-03	9.4544E-03	1.2627E 02	9.9689E-04
48	.6302	90.0	530.96	9.1098E 00	2.5872E 00	3.2023E-03	1.2874E-02	1.2735E 02	1.3575E-03
49	.6722	90.0	534.86	1.0755E 01	2.6944E 00	3.3722E-03	1.3550E-02	1.2847E 02	1.4288E-03
50	.7170	90.0	543.09	9.9403E 00	2.3408E 00	2.9410E-03	1.1818E-02	1.3024E 02	1.2461E-03
51	.7583	90.0	537.31	8.7042E 00	2.1632E 00	2.6988E-03	1.0846E-02	1.2884E 02	1.1436E-03
52	.7996	90.0	538.79	8.8623E 00	2.2565E 00	3.8204E-03	1.1374E-02	1.2921E 02	1.1951E-03
53	.8409	90.0	540.04	8.6515E 00	2.1173E 00	2.6506E-03	1.0651E-02	1.2952E 02	1.1231E-03
54	.8822	90.0	542.56	8.4165E 00	2.1151E 00	2.6561E-03	1.0672E-02	1.3011E 02	1.1252E-03
55	.9235	90.0	543.91	8.6241E 00	2.0749E 00	2.6102E-03	1.0486E-02	1.3044E 02	1.1057E-03
56	.9448	90.0	544.21	8.5720E 00	2.0374E 00	2.5638E-03	1.0300E-02	1.3050E 02	1.0860E-03
57	.2524	135.0	486.41	1.2009E 00	3.5500E-01	4.1645E-04	1.6783E-03	1.1678E 02	1.7696E-04
58	.2943	135.0	498.24	4.1111E 00	1.3822E 00	1.6443E-03	6.6222E-03	1.1958E 02	6.9826E-04
59	.3363	135.0	501.20	3.9997E 00	1.2624E 00	1.5071E-03	6.0686E-03	1.2029E 02	6.3988E-04
60	.3743	135.0	504.23	3.5934E 00	1.1163E 00	1.3374E-03	5.3845E-03	1.2100E 02	5.6775E-04
61	.4203	135.0	507.01	3.9800E 00	1.1964E 00	1.4382E-03	5.7865E-03	1.2166E 02	6.1045E-04
62	.4623	135.0	510.28	4.5440E 00	1.3203E 00	1.5935E-03	6.4132E-03	1.2244E 02	6.7622E-04
63	.5043	135.0	514.76	7.2662E 00	1.8566E 00	2.2529E-03	9.0650E-03	1.2350E 02	9.5583E-04
64	.5463	135.0	519.31	1.0387E 01	2.7582E 00	3.3654E-03	1.3530E-02	1.2458E 02	1.4275E-03
65	.5882	135.0	524.08	1.7017E 01	3.1911E 00	3.9166E-03	1.5751E-02	1.2572E 02	1.6609E-03
66	.6302	135.0	525.95	1.1860E 01	3.1495E 00	3.8743E-03	1.5580E-02	1.2616E 02	1.6429E-03
67	.6722	135.0	537.22	1.1846E 01	2.8488E 00	3.5537E-03	1.4282E-02	1.2884E 02	1.5059E-03
68	.7170	135.0	539.14	1.0966E 01	2.5826E 00	3.2291E-03	1.2976E-02	1.2930E 02	1.3682E-03
69	.7583	135.0	528.68	6.9378E 00	1.9466E 00	2.4057E-03	9.6720E-03	1.2705E 02	1.0190E-03
70	.7996	135.0	534.72	9.2442E 00	2.6860E 00	3.3402E-03	1.3426E-02	1.2825E 02	1.4156E-03
71	.8409	135.0	535.92	9.0004E 00	2.4799E 00	3.0805E-03	1.2413E-02	1.2853E 02	1.3089E-03
72	.8822	135.0	537.73	9.5530E 00	2.5845E 00	3.2260E-03	1.2965E-02	1.2896E 02	1.3670E-03
73	.9235	135.0	539.56	9.4514E 00	2.4182E 00	3.0253E-03	1.2157E-02	1.2939E 02	1.2818E-03
74	.9448	135.0	544.31	1.0610E 01	2.5516E 00	3.2113E-03	1.2901E-02	1.3053E 02	1.3603E-03
75	.2524	180.0	488.27	4.5292E 00	1.3160E 00	1.5471E-03	6.2341E-03	1.1721E 02	6.5734E-04
76	.2943	180.0	1033.57	1.4862E-06	4.7652E-07	1.5606E-09	6.1073E-09	2.5029E 02	6.4397E-10
77	.3363	180.0	503.05	3.5931E 00	1.0622E 00	1.2720E-03	5.1214E-03	1.2091E 02	5.4001E-04
78	.3783	180.0	507.41	3.8758E 00	1.1651E 00	1.4012E-03	5.6405E-03	1.2176E 02	5.9475E-04
79	.4203	180.0	511.25	4.4169E 00	1.4239E 00	1.7205E-03	6.9243E-03	1.2267E 02	7.3011E-04
80	.4623	180.0	515.29	7.5473E 00	2.1553E 00	2.6170E-03	1.0530E-02	1.2363E 02	1.1103E-03
81	.5043	180.0	519.54	1.0396E 01	2.6045E 00	3.1789E-03	1.2788E-02	1.2464E 02	1.3484E-03
82	.5463	180.0	523.78	1.2237E 01	3.2496E 00	3.9869E-03	1.6034E-02	1.2564E 02	1.6907E-03
83	.5882	180.0	526.67	1.1086E 01	2.9439E 00	3.6255E-03	1.4578E-02	1.2630E 02	1.5372E-03
84	.6302	180.0	531.75	1.0978E 01	2.9152E 00	3.6118E-03	1.4520E-02	1.2754E 02	1.5310E-03
85	.6722	180.0	544.17	1.2253E 01	2.9466E 00	3.7076E-03	1.4895E-02	1.3048E 02	1.5705E-03
86	.7170	180.0	547.57	1.2424E 01	2.9259E 00	3.6975E-03	1.4851E-02	1.3130E 02	1.5660E-03
87	.7583	180.0	537.08	9.4266E 00	2.3150E 00	2.8873E-03	1.1604E-02	1.2881E 02	1.2235E-03
88	.7996	180.0	541.97	1.0357E 01	2.6981E 00	3.3858E-03	1.3603E-02	1.2997E 02	1.4344E-03
89	.8409	180.0	543.44	1.0870E 01	2.7775E 00	3.4918E-03	1.4028E-02	1.3032E 02	1.4792E-03
90	.8822	180.0	545.45	1.1634E 01	2.6809E 00	3.3789E-03	1.3573E-02	1.3080E 02	1.4312E-03
91	.9235	180.0	547.26	1.1278E 01	2.7664E 00	3.4974E-03	1.4048E-02	1.3124E 02	1.4812E-03
92	.9448	180.0	551.44	1.2372E 01	2.8511E 00	3.6208E-03	1.4540E-02	1.3223E 02	1.5332E-03
93	.8822	225.0	546.08	9.6251E 00	2.4593E 00	3.1053E-03	1.2473E-02	1.3114E 02	1.3152E-03
94	.9448	225.0	552.27	1.0129E 01	2.4359E 00	3.0965E-03	1.2434E-02	1.3241E 02	1.3111E-03
95	.7170	270.0	551.95	1.0560E 01	2.3825E 00	3.0277E-03	1.2158E-02	1.3235E 02	1.2820E-03
96	.7996	270.0	549.61	9.5324E 00	2.2445E 00	2.8439E-03	1.1422E-02	1.3179E 02	1.2043E-03
97	.8822	270.0	551.50	8.1184E 00	2.0743E 00	2.6345E-03	1.0580E-02	1.3224E 02	1.1155E-03
98	.9448	270.0	553.27	8.9245E 00	2.0500E 00	2.6094E-03	1.0478E-02	1.3266E 02	1.1048E-03

1

GROUP 8 SH ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
SYM PHI X/L SYM PHI X/L SYM PHI X/L


GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 8
MACH NO = 8
RE NO =3.77 X 10**6
CONFIG 8
ALPHA 2
TIME 0 SEC
SYM PHI X/L
0
45
90
135
180
SYM PHI X/L
225
270
315
0.83
0.93
32.00
24.00
16.00
8.00
0.00
24.00
ST X 10**4
0.00
0.20
0.40
0.60
0.80
1.00
X/L

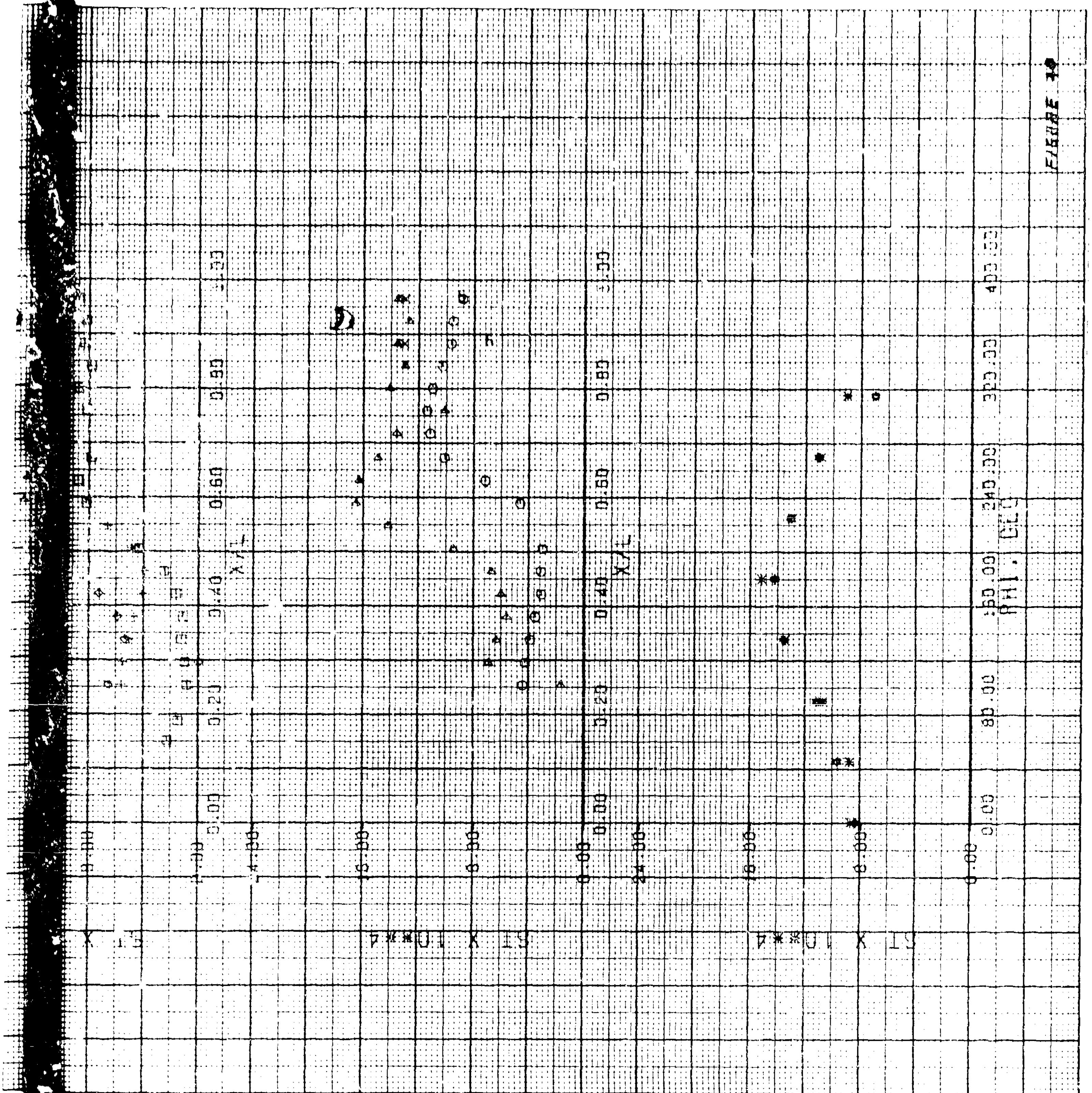


Figure 40

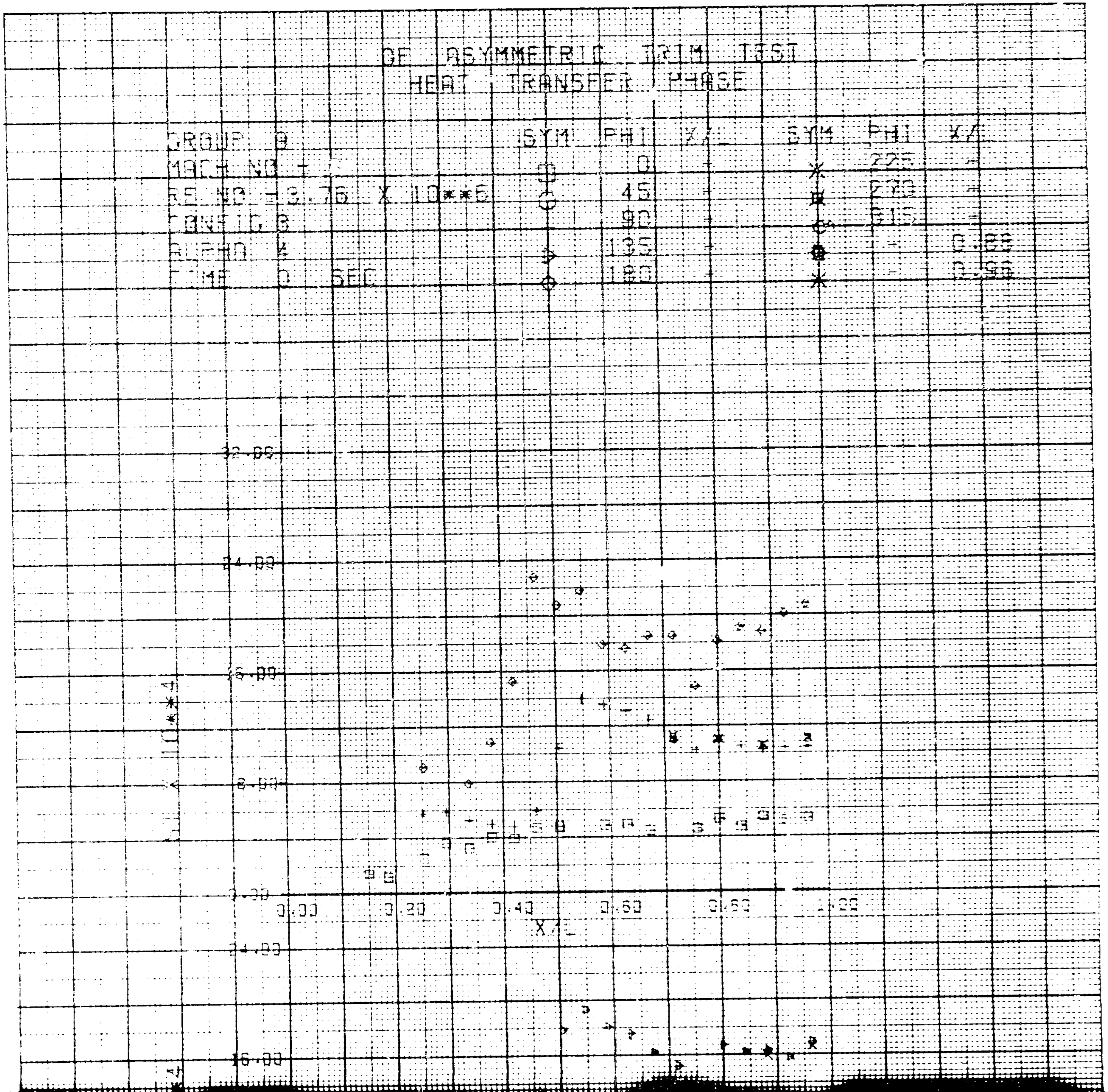
AEDC(ARO,INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
VT0967-800

RUN	CONFIG	ALPHA-M	BETA-M	ALPHA-S	ROLL	ALP-P	DATE	MACH NO	PO	TO	TIME
[illegible]	3	6.49	0	6.49	0	0	716	8.00	659.16	1338.19	-.00

[illegible]	P-INF	Q-INF	V-INF	RHO-INF	MU-INF	RE/FT	RE/O	MU
[illegible] E 01	8.8002E-02	3.9425E 00	3.8661E 01	7.6141E-05	7.8070E-08	3.7647E 06	3.4533E 06	3.2809E 02

NO.	X/L	PHI	TEMP	SLOPE	Q-STOW	HT	HM	MW	ST
1	.1936	0	519.09	1.1773E 00	2.9902E-01	3.1127E-04	1.2972E-03	1.2940E 02	1.3242E-04
2	.1887	0	507.34	6.4926E-01	2.1067E-01	2.5350E-04	1.0207E-03	1.2175E 02	1.0794E-04
3	.2524	0	508.87	1.4172E 00	4.7305E-01	5.7644E-04	2.3203E-03	1.2210E 02	2.4536E-04
4	.2943	0	523.50	2.1426E 00	6.7627E-01	8.0106E-04	3.3347E-03	1.2550E 02	3.5305E-04
5	.3363	0	526.09	1.4033E 00	6.0076E-01	7.4048E-04	2.9776E-03	1.2630E 02	3.1488E-04
6	.3783	0	529.10	2.4785E 00	7.4505E-01	9.2085E-04	3.7025E-03	1.2591E 02	3.9153E-04
7	.4203	0	529.27	2.4329E 00	7.3597E-01	9.0902E-04	3.6541E-03	1.2695E 02	3.8684E-04
8	.4623	0	531.04	3.1784E 00	8.7573E-01	1.0854E-03	4.3652E-03	1.2752E 02	4.6160E-04
9	.5043	0	532.27	3.1088E 00	8.8075E-01	1.1046E-03	4.4313E-03	1.2766E 02	4.6933E-04
10	.5463	0	530.13	5.5102E-02	1.6703E-02	1.8196E-05	7.3150E-05	1.2715E 02	7.7360E-06
11	.5882	0	535.80	3.2796E 00	9.0253E-01	1.1249E-03	4.5214E-03	1.2857E 02	4.7812E-04
12	.6302	0	538.40	3.3634E 00	9.0451E-01	1.1311E-03	4.5455E-03	1.2914E 02	4.8067E-04
13	.6722	0	538.91	3.3719E 00	8.1985E-01	1.0255E-03	4.1213E-03	1.2924E 02	4.3581E-04
14	.4422	315.0	547.60	6.1175E 00	1.0660E 00	1.3239E-03	5.3177E-03	1.3133E 02	5.6233E-04
15	.7583	0	545.78	1.4929E 00	8.3997E-01	1.0594E-03	4.2567E-03	1.3076E 02	4.5003E-04
16	.7996	0	546.55	1.4329E 00	9.6319E-01	1.2167E-03	4.8875E-03	1.3160E 02	5.1604E-04
17	.8409	0	546.04	1.3563E 00	8.5757E-01	1.0836E-03	4.3529E-03	1.3112E 02	4.6030E-04
18	.8822	0	549.01	1.9407E 00	9.9224E-01	1.2586E-03	5.0558E-03	1.3186E 02	5.3455E-04
19	.9235	0	551.08	1.7213E 00	9.3401E-01	1.1865E-03	4.7651E-03	1.3212E 02	5.0380E-04
20	.9648	0	548.96	4.0144E 00	9.6595E-01	1.2239E-03	4.9154E-03	1.3164E 02	5.1984E-04
21	.2524	45.0	506.30	2.4734E 00	7.6671E-01	9.1444E-04	3.6813E-03	1.2149E 02	3.8929E-04
22	.2943	45.0	519.42	2.1836E 00	7.0012E-01	8.5588E-04	3.4309E-03	1.2481E 02	3.6376E-04
23	.3363	45.0	523.24	2.0716E 00	6.2273E-01	7.6614E-04	3.0736E-03	1.2552E 02	3.2508E-04
24	.3783	45.0	525.01	1.7904E 00	5.3836E-01	6.6286E-04	2.6625E-03	1.2596E 02	2.8155E-04
25	.4203	45.0	527.36	1.9310E 00	5.8131E-01	6.9227E-04	2.7837E-03	1.2564E 02	2.9437E-04
26	.4623	45.0	530.91	2.4177E 00	7.9059E-01	9.7933E-04	3.9373E-03	1.2734E 02	4.1630E-04
27	.5043	45.0	534.25	5.4352E 00	1.4699E 00	1.8283E-03	7.3493E-03	1.2813E 02	7.7717E-04
28	.5463	315.0	556.59	5.2827E 00	1.2944E 00	1.6519E-03	6.6378E-03	1.3298E 02	7.0140E-04
29	.5882	45.0	538.30	7.7745E 00	1.9768E 00	2.4713E-03	9.9317E-03	1.2910E 02	1.0503E-03
30	.6302	45.0	541.21	6.7239E 00	1.4191E 00	2.2825E-03	9.1713E-03	1.2979E 02	9.6984E-04
31	.6722	45.0	543.81	8.9585E 00	1.7081E 00	2.1497E-03	8.6368E-03	1.3036E 02	9.1336E-04
32	.7170	45.0	545.87	6.4029E 00	1.5314E 00	1.9328E-03	7.7662E-03	1.3090E 02	8.2106E-04
33	.7583	45.0	547.96	6.4090E 00	1.5179E 00	1.9208E-03	7.7163E-03	1.3139E 02	8.1587E-04
34	.7996	45.0	548.90	5.2996E 00	1.4868E 00	1.8837E-03	7.5658E-03	1.3162E 02	8.0006E-04
35	.8409	45.0	551.61	5.6693E 00	1.3714E 00	1.7436E-03	7.0019E-03	1.3227E 02	7.4043E-04
36	.8822	45.0	552.34	5.1129E 00	1.3451E 00	1.7139E-03	6.8820E-03	1.3208E 02	7.2776E-04
37	.9235	45.0	554.24	5.1862E 00	1.3291E 00	1.6963E-03	6.7871E-03	1.3289E 02	7.1772E-04
38	.9648	45.0	551.86	5.2260E 00	1.2507E 00	1.5963E-03	6.4145E-03	1.3233E 02	6.7873E-04
39	.2524	90.0	508.35	3.7253E 00	1.1012E 00	1.3271E-03	5.3418E-03	1.2198E 02	5.6488E-04
40	.2943	90.0	520.67	3.4580E 00	1.1047E 00	1.3552E-03	5.4515E-03	1.2476E 02	5.7649E-04
41	.3363	90.0	522.04	3.1356E 00	9.8968E-01	1.2146E-03	4.8837E-03	1.2545E 02	5.1636E-04
42	.3783	90.0	524.94	2.9560E 00	9.3300E-01	1.1473E-03	4.6119E-03	1.2592E 02	4.8790E-04
43	.4203	90.0	527.48	3.0183E 00	8.9166E-01	1.0999E-03	4.4227E-03	1.2452E 02	4.6768E-04
44	.4623	90.0	528.92	3.4661E 00	1.1078E 00	1.3689E-03	5.5039E-03	1.2687E 02	5.8202E-04
45	.5043	90.0	534.07	7.6935E 00	1.9545E 00	2.4304E-03	9.7606E-03	1.2808E 02	1.0331E-03
46	.5463	90.0	538.82	9.1419E 00	2.6112E 00	3.2666E-03	1.3127E-02	1.2922E 02	1.3882E-03
47	.5882	90.0	539.37	9.1191E 00	2.5306E 00	3.1679E-03	1.2730E-02	1.2935E 02	1.3462E-03
48	.6302	90.0	541.74	9.4611E 00	2.4415E 00	3.0655E-03	1.2317E-02	1.2992E 02	1.3025E-03
49	.6722	90.0	544.66	9.2819E 00	2.3053E 00	2.9051E-03	1.1671E-02	1.3051E 02	1.2342E-03
50	.7170	90.0	547.75	9.4371E 00	2.0104E 00	2.5434E-03	1.0210E-02	1.3135E 02	1.0803E-03
51	.7583	90.0	547.25	7.7425E 00	1.8867E 00	2.3854E-03	9.5815E-03	1.3123E 02	1.0132E-03
52	.7996	90.0	549.06	7.7327E 00	2.0144E 00	2.5527E-03	1.0243E-02	1.3166E 02	1.0842E-03
53	.8409	90.0	550.53	7.7443E 00	1.9401E 00	2.4632E-03	9.8923E-03	1.3201E 02	1.0461E-03
54	.8822	90.0	552.97	7.4260E 00	1.8720E 00	2.3840E-03	9.5731E-03	1.3259E 02	1.0123E-03
55	.9235	90.0	553.84	7.8939E 00	1.8983E 00	2.4203E-03	9.7184E-03	1.3280E 02	1.0277E-03
56	.9648	90.0	550.50	8.9060E 00	1.9253E 00	2.4442E-03	9.8143E-03	1.3200E 02	1.0380E-03
57	.2524	135.0	503.36	1.4338E 00	4.5341E-01	5.4312E-04	2.1840E-03	1.2080E 02	2.3125E-04
58	.2943	135.0	513.97	4.9230E 00	1.5784E 00	1.9150E-03	7.7062E-03	1.2331E 02	8.1491E-04
59	.3363	135.0	515.51	4.6154E 00	1.4568E 00	1.7708E-03	7.1251E-03	1.2368E 02	7.5346E-04
60	.3783	135.0	517.09	4.5410E 00	1.4106E 00	1.7180E-03	6.9120E-03	1.2405E 02	7.3093E-04
61	.4203	135.0	519.57	5.6955E 00	1.7121E 00	2.0913E-03	8.4131E-03	1.2463E 02	8.8966E-04
62	.4623	135.0	523.84	8.7780E 00	2.5505E 00	3.1320E-03	1.2597E-02	1.2566E 02	1.3321E-03
63	.5043	135.0	529.96	1.1262E 01	3.3887E 00	4.1924E-03	1.6856E-02	1.2710E 02	1.7825E-03
64	.5463	135.0	532.64	1.1765E 01	3.6553E 00	4.5344E-03	1.8229E-02	1.2761E 02	1.9277E-03
65	.5882	135.0	534.77	1.2811E 01	3.4019E 00	4.2342E-03	1.7020E-02	1.2826E 02	1.7998E-03
66	.6302	135.0	536.21	1.2465E 01	3.3102E 00	4.1275E-03	1.6589E-02	1.2860E 02	1.7543E-03
67	.6722	135.0	547.81	1.2596E 01	3.0290E 00	3.8083E-03	1.5301E-02	1.3017E 02	1.6180E-03
68	.7170	135.0	546.54	1.2022E 01	2.8312E 00	3.5673E-03	1.4311E-02	1.3050E 02	1.5155E-03
69	.7583	135.0	538.87	7.4908E 00	2.2140E 00	2.7699E-03	1.1131E-02	1.2923E 02	1.1771E-03
70	.7996	135.0	544.50	1.0741E 01	3.1208E 00	3.9321E-03	1.5797E-02	1.3057E 02	1.6705E-03
71	.8409	135.0	545.39	1.0954E 01	3.0181E 00	3.8065E-03	1.5292E-02	1.3076E 02	1.6170E-03
72	.8822	135.0	547.67	1.1241E 01	3.0412E 00	3.8470E-03	1.5452E-02	1.3133E 02	1.6341E-03
73	.9235	135.0	549.31	1.1908E 01	2.9231E 00	3.7054E-03	1.4882E-02	1.3172E 02	1.5738E-03
74	.9648	135.0	551.35	1.1017E 01	3.1302E 00	3.9782E-03	1.5976E-02	1.3220E 02	1.6895E-03
75	.2524	180.0	505.41	4.4580E 00	1.7602E 00	2.1136E-03	8.5094E-03	1.2120E 02	8.9985E-04
76	.2943	180.0	522.04	-3.3324E 01	-1.0684E 01	-1.3091E-02	-5.2657E-02	1.2523E 02	-5.5683E-03
77	.3363	180.0	510.46	5.0872E 00	1.5038E 00	1.8345E-03	7.3805E-03	1.2438E 02	7.8047E-04
78	.3783	180.0	521.39	6.9092E 00	2.0769E 00	2.5426E-03	1.0228E-02	1.2506E 02	1.0815E-03
79	.4203	180.0	526.21	8.4346E 00	2.9072E 00	3.5405E-03	1.4399E-02	1.2623E 02	1.5226E-03
80	.4623	180.0	532.77	1.5060E 01	4.3006E 00	5.3396E-03	2.1445E-02	1.2778E 02	2.2699E-03
81	.5043	180.0	536.24	1.5585E 01	3.9042E 00	4.8685E-03	1.9567E-02	1.2461E 02	2.0692E-03
82	.5463	180.0	537.64	1.5409E 01	4.0920E 00	5.1115E-03	2.0563E-02	1.2494E 02	2.1723E-03
83	.5882	180.0	537.97	1.2632E 01	3.3545E 00	4.1918E-03	1.6846E-02	1.2901E 02	1.7814E-03
84	.6302	180.0	542.04	1.2370E 01	3.2864E 00	4.1279E-03	1.6546E-02	1.2999E 02	1.7539E-03
85	.6722	180.0	550.09	1.4201E 01	3.4150E 00	4.3365E-03	1.7416E-02	1.3205E 02	1.8417E-03
86	.7170	180.0	553.75	1.4442E 01	3.4010E 00	4.3356E-03	1.7409E-02	1.3270E 02	1.8410E-03
87	.7583	180.0	546.15	1.1459E 01	2.7557E 00	3.4793E-03	1.3977E-02	1.3097E 02	1.4780E-03
88	.7996	180.0	552.17	1.2807E 01	3.3363E 00	4.2433E-03	1.7044E-02	1.3239E 02	1.8024E-03
89	.8409	180.0	553.45	1.3736E 01	3.5096E 00	4.4724E-03	1.7959E-02	1.3271E 02	1.8991E-03
90	.8822	180.0	555.75	1.4951E 01	3.4453E 00	4.4033E-03	1.7679E-02	1.3325E 02	1.8695E-03
91	.9235	180.0	557.24	1.4975E 01	3.6758E 00	4.7071E-03	1.8897E-02	1.3362E 02	1.9983E-03
92	.9648	180.0	550.71	1.4447E 01	3.7900E 00	4.8622E-03	1.9518E-02	1.3396E 02	2.0049E-03
93	.8822	225.0	555.81	1.1656E 01	2.9270E 00	3.7413E-03	1.5021E-02	1.3327E 02	1.5884E-03
94	.9648	225.0	556.67	1.2649E 01	3.0419E 00	3.9022E-03	1.5665E-02	1.3195E 02	1.6588E-03
95	.7170	270.0	553.72	9.1523E 00	2.0634E 00	2.6303E-03	1.0562E-02	1.3277E 02	1.1189E-03
96	.7996	270.0	555.70	7.4911E 00	2.0150E 00	2.5767E-03	1.0343E-02	1.3324E 02	1.0938E-03
97	.8822	270.0	557.89	7.4357E 00	1.9254E 00	2.4676E-03	9.9061E-03	1.3376E 02	1.0475E-03
98	.9648	270.0	557.72	8.4247E 00	2.0260E 00	2.5959E-03	1.0421E-02	1.3172E 02	1.1026E-03

GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 9


OF ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 9
MACH NO =
RE NO = 3.76 X 10**6
CONFIG 3
ALPHA 4
TIME 0 SEC
SYM PHI X/L
0
45
90
135
180
SYM PHI X/L
225
270
315
0.83
0.96
32.00
24.00
16.00
8.00
0.00
-4.00
-16.00
0.00
0.20
0.40
0.60
0.80
1.00
X/L

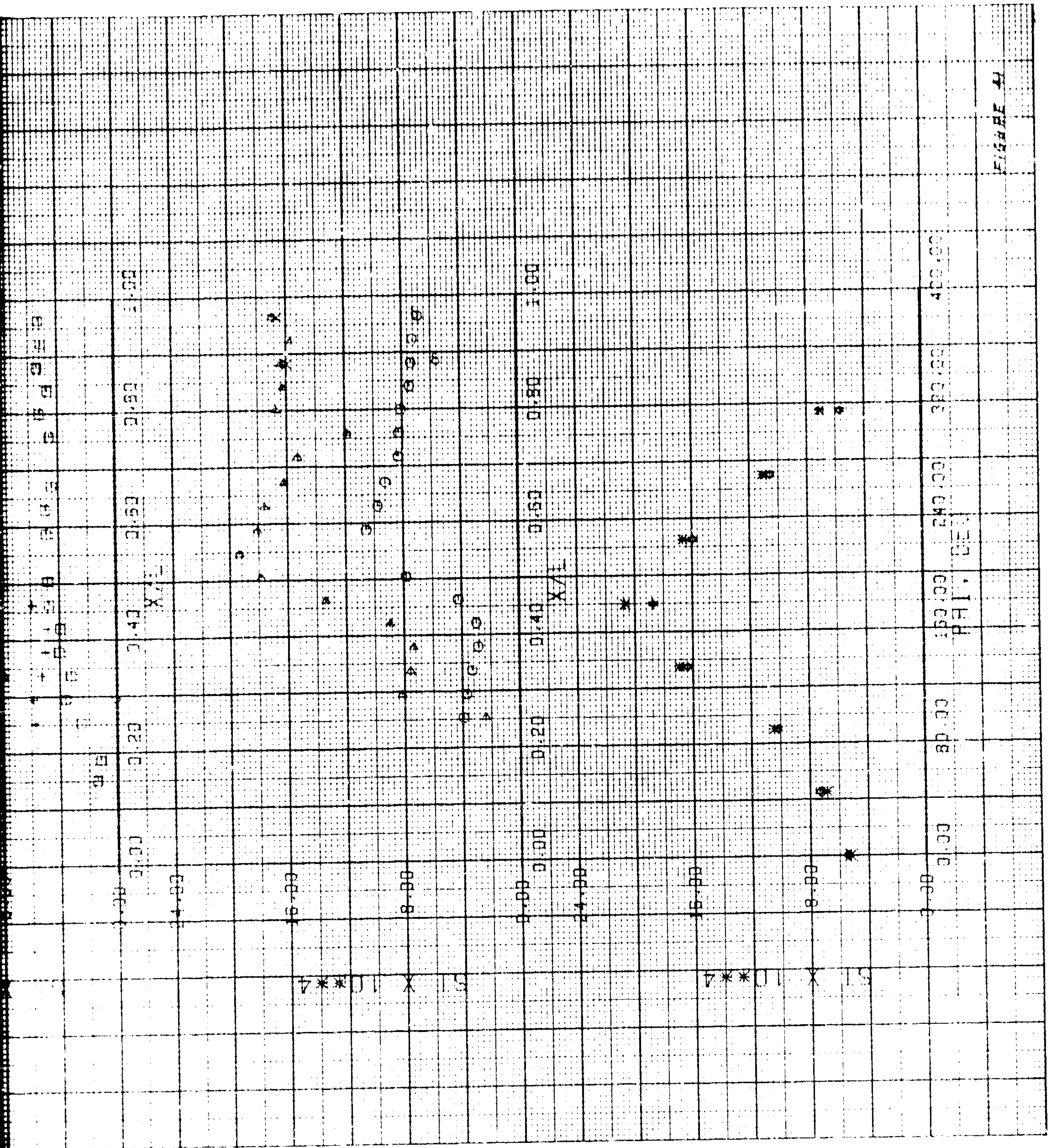


FIGURE 41
PHI, DEG
X/L
SI X 10**4
0.00
80.00
160.00
240.00
320.00
400.00
0.20
0.40
0.60
0.80
1.00
8.00
16.00
24.00

Figure 41

7/16/69

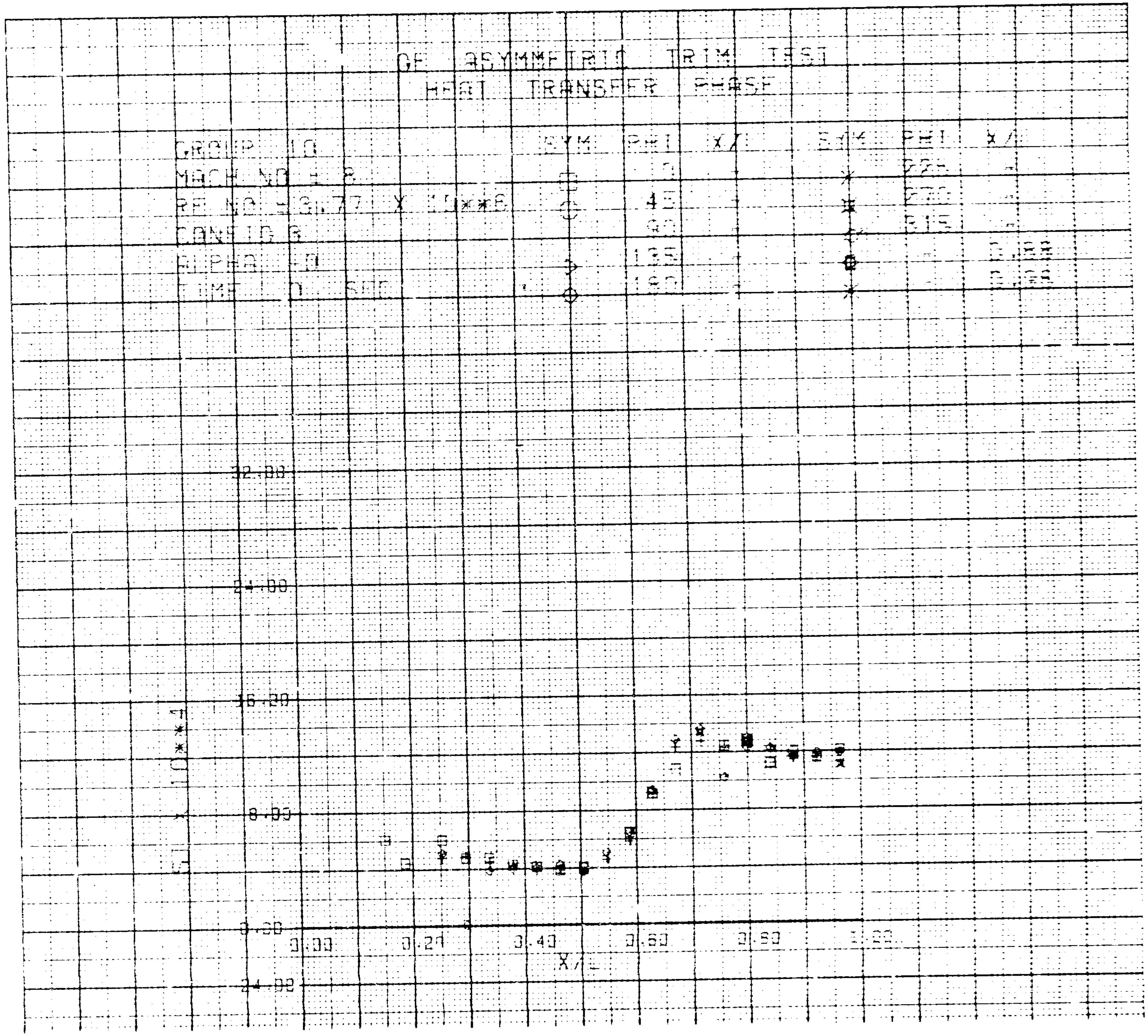
AEDC(ARO,INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL H
V70967-800

GROUP	CONFIG	ALPHA-M	BETA-M	ALPHA-S	ROLL	ALP-P	DATE	MACH NO	PO	TO	TIME
10	3	-.01	0	-.01	0	6	715	9.68	868.65	1338.44	.66

T-INF	P-INF	Q-INF	V-INF	RHO-INF	MU-INF	RE/FT	RE/D	MU
9.6900E 01	8.8695E-02	3.9440E 00	3.8605E 03	7.6208E-05	7.8805E-08	3.7676E 06	3.4567E 06	3.2015E 02

TC NO	S/L	PHI	TEMP	SLOPE	J-STUR	HT	HM	HW	ST
1	.1000	0	511.30	7.7091E 00	1.1007F 00	7.9101E-04	9.0752E-03	1.2270E 02	9.9998E-04
2	.1067	0	501.46	1.9300E 00	4.6309F-01	1.0311E-03	4.1521E-03	1.2033E 02	4.3465E-04
3	.2524	0	505.54	1.9430E 00	1.1650F 00	1.3997E-03	5.6351E-03	1.2131E 02	5.9533E-04
4	.2943	0	517.47	2.8631E 00	9.0367F-01	1.1007E-03	4.4283E-03	1.2413E 02	4.6783E-04
5	.3363	0	518.54	2.8580E 00	9.0226F-01	1.1084E-03	4.4210E-03	1.2439E 02	4.6769E-04
6	.3783	0	520.08	2.7007E 00	8.1363F-01	9.9421E-04	3.9994E-03	1.2476E 02	4.2252E-04
7	.4203	0	520.86	2.6776E 00	7.7801F-01	9.5136E-04	3.8249E-03	1.2490E 02	4.0430E-04
8	.4623	0	523.97	2.4353E 00	7.2611F-01	8.9152E-04	3.5856E-03	1.2569E 02	3.7808E-04
9	.5043	0	525.81	2.7702E 00	7.5162F-01	9.2495E-04	3.7106E-03	1.2613E 02	3.9296E-04
10	.5463	0	528.08	5.4444E-02	1.6679F-02	2.0597E-05	8.2817E-05	1.2681E 02	8.7494E-06
11	.5882	0	532.12	4.4023E 00	1.2130F 00	1.5043E-03	6.0475E-03	1.2763E 02	6.3890E-04
12	.6302	0	536.07	6.1308E 00	1.7149F 00	2.1373E-03	8.5901E-03	1.2857E 02	9.0752E-04
13	.6722	0	539.57	8.1847E 00	2.0304F 00	2.5416E-03	1.0213E-02	1.2940E 02	1.0790E-03
99	.8822	315.0	544.65	6.8411E 00	1.5737F 00	1.9825E-03	7.9645E-03	1.3061E 02	8.4142E-04
15	.7583	0	544.45	9.4151E 00	2.3122F 00	2.9122E-03	1.1699E-02	1.3056E 02	1.2368E-03
16	.7996	0	544.95	8.5205E 00	2.3907F 00	3.0129E-03	1.2109E-02	1.3068E 02	1.2787E-03
17	.8409	0	544.14	8.1980E 00	2.0824F 00	2.6217E-03	1.0532E-02	1.3049E 02	1.1127E-03
18	.8822	0	547.98	8.4584E 00	2.2193F 00	2.8076E-03	1.1277E-02	1.3140E 02	1.1914E-03
19	.9235	0	548.07	8.5572E 00	2.1438F 00	2.7142E-03	1.0901E-02	1.3155E 02	1.1517E-03
20	.9648	0	550.37	9.3113E 00	2.2392F 00	2.8412E-03	1.1410E-02	1.3196E 02	1.2055E-03
21	.2524	45.0	502.41	1.9354E 00	1.0451F 00	1.2581E-03	5.0337E-03	1.2058E 02	5.3179E-04
22	.2943	45.0	514.84	2.8475E 00	9.4502F-01	1.1472E-03	4.6162E-03	1.2348E 02	4.8760E-04
23	.3363	45.0	516.51	2.9378E 00	8.8311F-01	1.0745E-03	4.3230E-03	1.2392E 02	4.5671E-04
24	.3783	45.0	518.17	2.4915E 00	8.0988F-01	9.8628E-04	3.9679E-03	1.2430E 02	4.1919E-04
25	.4203	45.0	520.58	2.5539E 00	7.4194F-01	9.0715E-04	3.6491E-03	1.2488E 02	3.8551E-04
26	.4623	45.0	524.55	2.4998E 00	7.5750F-01	9.3071E-04	3.7411E-03	1.2583E 02	3.9544E-04
27	.5043	45.0	527.00	2.5823E 00	6.8573F-01	8.4508E-04	3.3982E-03	1.2641E 02	3.5901E-04
100	.9648	315.0	554.21	8.4618E 00	2.0344F 00	2.5948E-03	1.0419E-02	1.3249E 02	1.1007E-03
29	.5882	45.0	532.27	4.1630E 00	1.2023F 00	1.4913E-03	5.9950E-03	1.2765E 02	6.3335E-04
30	.6302	45.0	536.45	4.1893E 00	1.7284F 00	2.1553E-03	8.6676E-03	1.2866E 02	9.1517E-04
31	.6722	45.0	543.37	9.4997E 00	2.3584F 00	2.9036E-03	1.1907E-02	1.3029E 02	1.2579E-03
32	.7170	45.0	546.57	1.0478E 01	2.4675F 00	3.1160E-03	1.2517E-02	1.3107E 02	1.3223E-03
33	.7583	45.0	545.48	9.0140E 00	2.4834F 00	3.1321E-03	1.2582E-02	1.3081E 02	1.3292E-03
34	.7996	45.0	546.22	8.5224E 00	2.3912F 00	3.0134E-03	1.2175E-02	1.3098E 02	1.2869E-03
35	.8409	45.0	548.62	8.2372E 00	2.2285F 00	2.8215E-03	1.1373E-02	1.3156E 02	1.1972E-03
36	.8822	45.0	549.98	8.8490E 00	2.1171F 00	2.6851E-03	1.0784E-02	1.3188E 02	1.1393E-03
37	.9235	45.0	550.74	8.2170E 00	2.0995F 00	2.6654E-03	1.0704E-02	1.3206E 02	1.1309E-03
38	.9648	45.0	551.89	8.1569E 00	1.9616F 00	2.4939E-03	1.0015E-02	1.3233E 02	1.0580E-03
39	.2524	90.0	503.98	1.1170E 00	9.2167F-01	1.1043E-03	4.4461E-03	1.2090E 02	4.6971E-04
40	.2943	90.0	510.19	2.4938E 00	9.2781F-01	1.1284E-03	4.5401E-03	1.2304E 02	4.7965E-04
41	.3363	90.0	518.23	2.4901E 00	8.4908F-01	1.0352E-03	4.1647E-03	1.2432E 02	4.3998E-04
42	.3783	90.0	519.89	2.5523E 00	8.0557F-01	9.8414E-04	3.9589E-03	1.2472E 02	4.1825E-04
43	.4203	90.0	522.87	2.4111E 00	7.1273F-01	8.7364E-04	3.5139E-03	1.2537E 02	3.7123E-04
44	.4623	90.0	523.41	2.1966E 00	6.4230F-01	8.3722E-04	3.3672E-03	1.2556E 02	3.5574E-04
45	.5043	90.0	526.21	2.4495E 00	7.0798F-01	8.7165E-04	3.5052E-03	1.2622E 02	3.7031E-04
46	.5463	90.0	529.73	2.9994E 00	8.5653F-01	1.0591E-03	4.2583E-03	1.2706E 02	4.4987E-04
47	.5882	90.0	531.20	3.9065E 00	1.0961F 00	1.3578E-03	5.4588E-03	1.2741E 02	5.7670E-04
48	.6302	90.0	534.76	6.1772E 00	1.7020F 00	2.1178E-03	8.5124E-03	1.2825E 02	8.9930E-04
49	.6722	90.0	542.18	9.9866E 00	2.3664F 00	2.8966E-03	1.1618E-02	1.3002E 02	1.2295E-03
50	.7170	90.0	546.34	1.0062E 01	2.3694F 00	2.9913E-03	1.2010E-02	1.3101E 02	1.2694E-03
51	.7583	90.0	542.08	8.8073E 00	2.2943F 00	2.8039E-03	1.1587E-02	1.3019E 02	1.2241E-03
52	.7996	90.0	544.76	9.0958E 00	2.3695F 00	2.9054E-03	1.1993E-02	1.3064E 02	1.2671E-03
53	.8409	90.0	545.51	8.9490E 00	2.2419F 00	2.8275E-03	1.1348E-02	1.3082E 02	1.2000E-03
54	.8822	90.0	547.34	8.8111E 00	2.1624F 00	2.7340E-03	1.0982E-02	1.3125E 02	1.1602E-03
55	.9235	90.0	547.94	8.8660E 00	2.1321F 00	2.6970E-03	1.0833E-02	1.3138E 02	1.1444E-03
56	.9648	90.0	547.99	8.4845E 00	2.0884F 00	2.6421E-03	1.0612E-02	1.3141E 02	1.1211E-03
57	.2524	135.0	496.66	9.0146E-01	2.6640F-01	3.1657E-04	1.2751E-03	1.1921E 02	1.3471E-04
58	.2943	135.0	508.09	2.9039E 00	9.5669F-01	1.1522E-03	4.6378E-03	1.2192E 02	4.8996E-04
59	.3363	135.0	510.94	2.4467E 00	8.9852F-01	1.0058E-03	4.3701E-03	1.2208E 02	4.6169E-04
60	.3783	135.0	513.07	2.5480E 00	7.9151F-01	9.5897E-04	3.4591E-03	1.2310E 02	4.0778E-04
61	.4203	135.0	514.05	2.6851E 00	7.8310F-01	9.5062E-04	3.8252E-03	1.2348E 02	4.0411E-04
62	.4623	135.0	516.09	2.4143E 00	7.0150F-01	8.5387E-04	3.4355E-03	1.2401E 02	3.6294E-04
63	.5043	135.0	519.58	2.4702E 00	6.0225F-01	8.3317E-04	3.3517E-03	1.2465E 02	3.5409E-04
64	.5463	135.0	521.68	3.1558E 00	8.3803F-01	1.0260E-03	4.1271E-03	1.2515E 02	4.3601E-04
65	.5882	135.0	524.04	4.7444E 00	1.1536F 00	1.4100E-03	5.7027E-03	1.2590E 02	6.0246E-04
66	.6302	135.0	528.52	6.7012E 00	1.6949F 00	2.0922E-03	8.4120E-03	1.2677E 02	8.8876E-04
67	.6722	135.0	538.47	9.1845E 00	2.2569F 00	2.8209E-03	1.1338E-02	1.2913E 02	1.1977E-03
68	.7170	135.0	541.24	1.0357E 01	2.4390F 00	3.0594E-03	1.2293E-02	1.2908E 02	1.2987E-03
69	.7583	135.0	534.41	6.1715E 00	1.7877F 00	2.2235E-03	8.9375E-03	1.2818E 02	9.4421E-04
70	.7996	135.0	538.94	8.7449E 00	2.5424F 00	3.1800E-03	1.2779E-02	1.2925E 02	1.3500E-03
71	.8409	135.0	539.86	8.7844E 00	2.1393F 00	2.6789E-03	1.0745E-02	1.2947E 02	1.1373E-03
72	.8822	135.0	541.01	8.7277E 00	2.2395F 00	2.8086E-03	1.1294E-02	1.2974E 02	1.1922E-03
73	.9235	135.0	542.39	8.8611E 00	2.0868F 00	2.8216E-03	1.0532E-02	1.3007E 02	1.1127E-03
74	.9648	135.0	546.74	8.8783E 00	2.1350F 00	2.6968E-03	1.0813E-02	1.3111E 02	1.1444E-03
75	.2524	180.0	495.13	3.4144E 00	9.9209F-01	1.1764E-03	4.7388E-03	1.1885E 02	5.0064E-04
76	.2943	180.0	1033.52	1.4862E-06	4.7652F-07	1.5628E-09	6.1149E-09	2.5029E 02	6.4613E-10
77	.3363	180.0	512.74	2.4921E 00	7.3669F-01	8.9215E-04	3.5903E-03	1.2301E 02	3.7930E-04
78	.3783	180.0	515.43	2.5332E 00	7.6147F-01	9.2523E-04	3.7224E-03	1.2366E 02	3.9330E-04
79	.4203	180.0	517.99	2.4886E 00	7.6521F-01	9.3267E-04	3.7523E-03	1.2427E 02	3.9641E-04
80	.4623	180.0	520.74	2.8180E 00	8.0473F-01	9.8414E-04	3.9547E-03	1.2492E 02	4.1423E-04
81	.5043	180.0	523.52	2.8326E 00	7.0963F-01	8.7980E-04	3.5023E-03	1.2558E 02	3.7000E-04
82	.5463	180.0	526.40	3.5905E 00	9.5346F-01	1.1742E-03	4.7217E-03	1.2627E 02	4.9883E-04
83	.5882	180.0	529.14	4.4956E 00	1.2203F 00	1.5079E-03	6.0627E-03	1.2692E 02	6.4051E-04
84	.6302	180.0	533.49	6.4577E 00	1.7680F 00	2.1991E-03	8.8303E-03	1.2819E 02	9.3384E-04
85	.6722	180.0	544.94	9.0515E 00	2.3931 00	3.0160E-03	1.2116E-02	1.3058E 02	1.2800E-03
86	.7170	180.0	549.17	1.0698E 01	2.5194F 00	3.1920E-03	1.2820E-02	1.3169E 02	1.3544E-03
87	.7583	180.0	542.11	7.2200E 00	1.9046F 00	2.3918E-03	9.6100E-03	1.3001E 02	1.0153E-03
88	.7996	180.0	544.17	8.7536E 00	2.2803F 00	2.8782E-03	1.1542E-02	1.3097E 02	1.2215E-03
89	.8409	180.0	546.83	9.0155E 00	2.2780F 00	2.8777E-03	1.1569E-02	1.3113E 02	1.2212E-03
90	.8822	180.0	546.16	9.3333E 00	2.1508F 00	2.7214E-03	1.0931E-02	1.3144E 02	1.1548E-03
91	.9235	180.0	549.74	8.6582E 00	2.1990F 00	2.7481E-03	1.1048E-02	1.3182E 02	1.1630E-03
1	.9648	180.0	553.31	9.5218E 00	2.1947F 00	2.7468E-03	1.1292E-02	1.3268E 02	1.1856E-03
1	.8822	225.0	549.91	8.4250E 00	2.1527F 00	2.7300E-03	1.0944E-02	1.3186E 02	1.1583E-03
[illegible]	.9648	225.0	554.37	8.5582E 00	2.0581F 00	2.6247E-03	1.0539E-02	1.3291E 02	1.1134E-03
4	.7170	270.0	553.41	1.0896E 01	2.4565F 00	3.1293E-03	1.2565E-02	1.3272E 02	1.3275E-03
5	.7996	270.0	552.91	8.8695E 00	2.3553F 00	2.9984E-03	1.2040E-02	1.3250E 02	1.2720E-03
6	.8822	270.0	554.16	8.4194E 00	2.1513F 00	2.7429E-03	1.1013E-02	1.3287E 02	1.1635E-03
98	.9648	270.0	555.74	8.6434E 00	2.0353F 00	2.4444E-03	1.0448E-02	1.3326E 02	1.1030E-03

GROUP 10 OF ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
SYM. PHI X/L


OF ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 10
MACH NO = 8
RE NO = 3.77 X 10**6
CONFIG B
ALPHA 40
TIME 0 SEC
SYM PHI X/L
0
45
90
135
180
SYM PHI X/L
225
270
315
0.88
0.88
12.00
24.00
16.00
8.00
0.00
-24.00
0.00
0.20
0.40
0.60
0.80
1.00
X/L

2

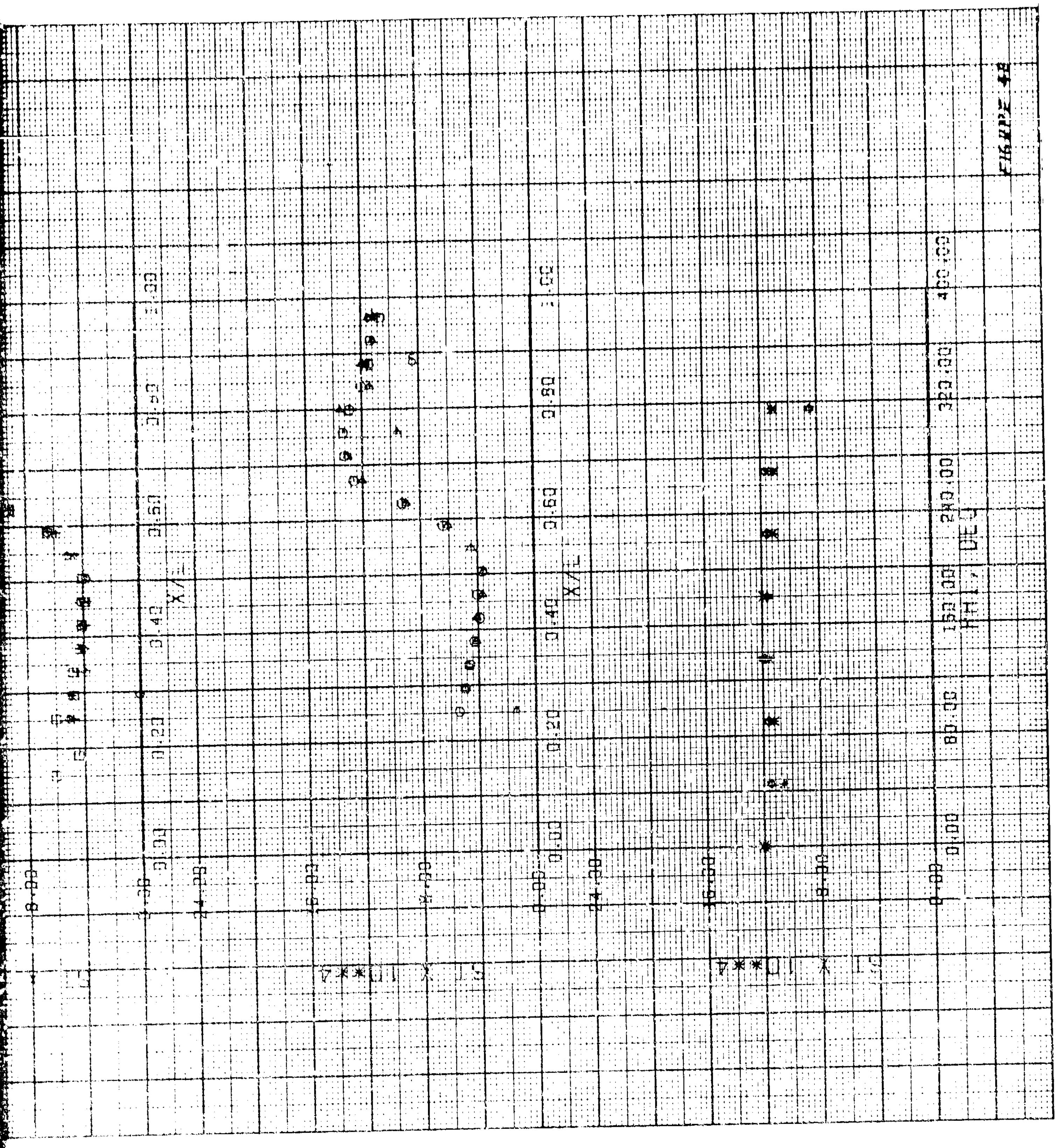


Figure 42

3

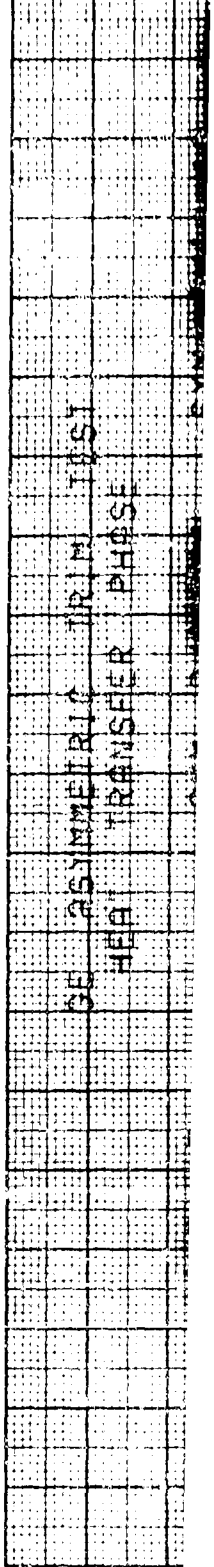
[illegible]

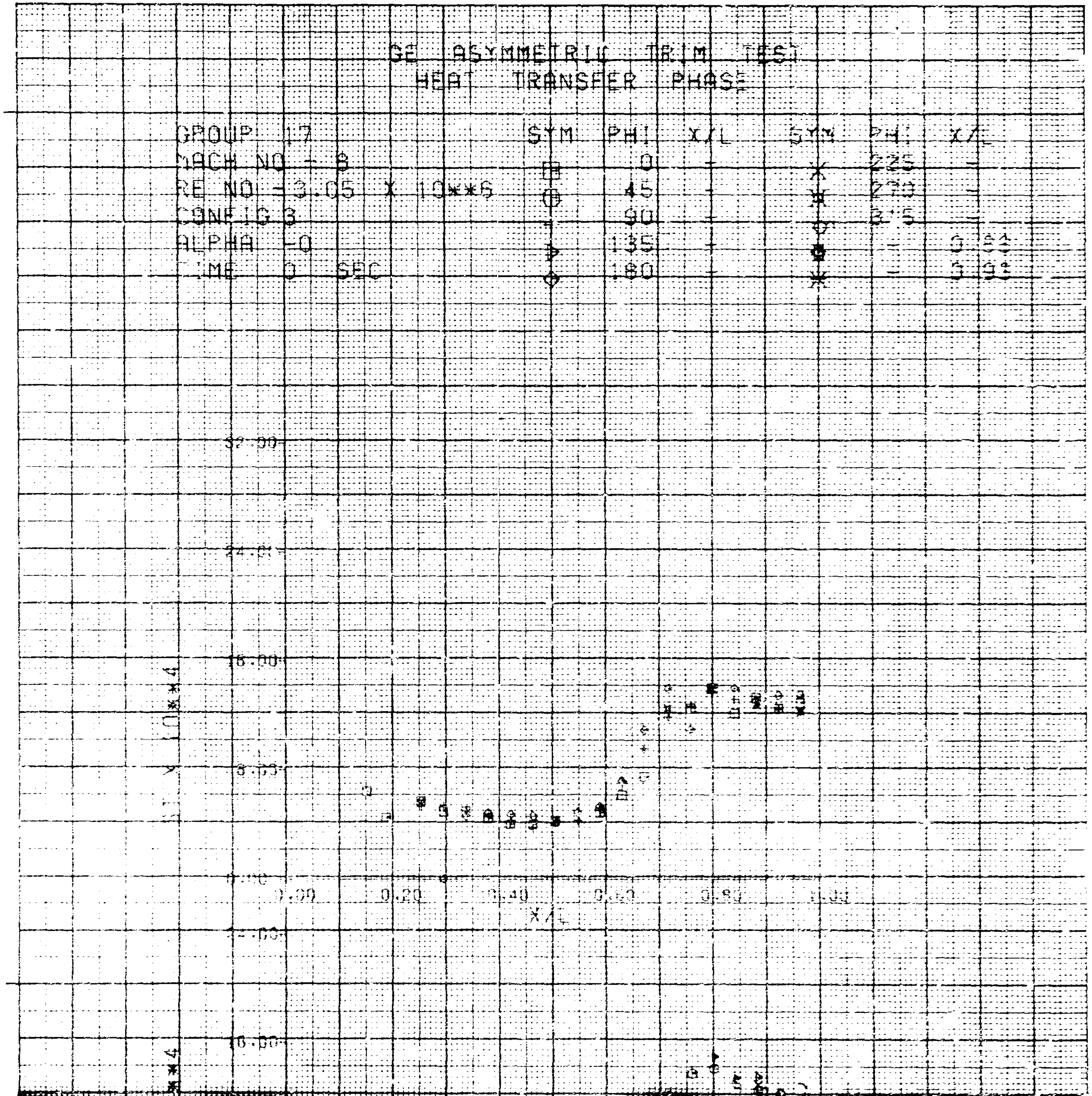
AEDC, ARO, INC. - ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
[illegible]

RUN	[illegible]	ALPH-C-M	BETA-M	ALPHA-S	ROLL	[illegible]	DATE	MACH NO	PO	TO	TIME
17	[illegible]	[illegible].01	0	-.01	0	0	71[illegible]	8.00	672.67	1368.01	[illegible].00

[illegible]	P-INF	Q-INF	V-INF	RHO-INF	MU-INF	RE/FT	HE/R	HO
[illegible]	[illegible]-02	[illegible] 00	[illegible] 03	[illegible]-05	[illegible]-08	[illegible] 06	2.[illegible] 06	3.[illegible] 02

TC NO	X/L	PHI	TEMP	SLOPE	Q-STGN	HT	[illegible]	HW	ST
1	[illegible]	0	511.38	6.1000E 00	9.5990E-01	1.1982E-03	9.8210E-03	1.2270E 02	8.8460E-04
2	.1467	0	501.02	3.0793E 00	6.7625E-01	8.3706E-04	3.1761E-03	1.2024E 02	4.5090E-04
3	.2524	0	504.58	2.4939E 00	8.5547E-01	1.0036E-03	4.2849E-03	1.2109E 02	5.7291E-04
4	.2943	0	519.37	2.1120E 00	7.2994E-01	9.2456E-04	3.7253E-03	1.2460E 02	4.9762E-04
5	.3363	0	522.77	2.2418E 00	7.2019E-01	9.1610E-04	3.6908E-03	1.2549E 02	4.9290E-04
6	.3783	0	523.57	2.1589E 00	6.6096E-01	8.2636E-04	3.3248E-03	1.2559E 02	4.4460E-04
7	.4203	0	522.07	2.6233E 00	5.8708E-01	7.4771E-04	3.0172E-03	1.2538E 02	4.0237E-04
8	.4623	0	524.68	2.1284E 00	5.8663E-01	7.4759E-04	3.0114E-03	1.2581E 02	4.0226E-04
9	.5043	0	524.52	2.2919E 00	6.2008E-01	7.9049E-04	3.1642E-03	1.2582E 02	4.2534E-04
10	.5463	0	527.07	-1.2856E-02	-6.4975E-03	-1.0905E-05	-4.3914E-05	1.2704E 02	-5.8059E-06
11	.5882	0	526.14	2.5662E 00	7.0705E-01	9.0331E-04	3.6344E-03	1.2623E 02	4.8601E-04
12	[illegible]	0	527.21	3.3123E 00	8.9610E-01	1.1464E-03	4.6170E-03	1.2644E 02	6.1676E-04
13	[illegible]	0	527.33	4.3397E 00	1.0872E 00	1.3910E-03	5.60[illegible]E-03	1.2649E 02	7.4835E-04
14	[illegible]	315.0	542.10	6.9242E 00	1.8037E 00	2.3523E-03	9.4643E-03	1.3009E 02	1.2645E-03
15	[illegible]	0	537.42	7.4918E 00	1.8015E 00	2.3351E-03	9.3995E-03	1.2889E 02	1.2556E-03
16	[illegible]	0	539.40	7.1952E 00	2.0094E 00	2.6056E-03	1.0497E-02	1.29[illegible] 02	1.4000E-03
17	[illegible]	0	518.05	6.4234E 00	1.7434E 00	2.2640E-03	9.1120E-03	1.2423E 02	1.2173E-03
18	[illegible]	0	541.34	7.5747E 00	1.8974E 00	2.4724E-03	9.9500E-03	1.2983E 02	1.3291E-03
19	.9235	0	540.01	7.1511E 00	1.7915E 00	2.3299E-03	9.3775E-03	1.2950E 02	1.2526E-03
20	[illegible]	0	517.28	7.7123E 00	1.8347E 00	2.4035E-03	9.5792E-03	1.2805E 02	1.2924E-03
21	.2524	45.0	502.11	2.4790E 00	8.4841E-01	1.0516E-03	4.2411E-03	1.2050E 02	5.6452E-04
22	.2943	45.0	517.08	2.4587E 00	7.5026E-01	9.5507E-04	3.8497E-03	1.2409E 02	5.1411E-04
23	[illegible]	45.0	521.43	2.1106E 00	6.9403E-01	8.8206E-04	3.5517E-03	1.2508E 02	[illegible]
24	[illegible]	45.0	522.08	2.1213E 00	6.3707E-01	8.1040E-04	3.2649E-03	1.2526E 02	4.3612E-04
25	[illegible]	45.0	522.67	2.6748E 00	6.0286E-01	7.6671E-04	3.0847E-03	1.2537E 02	4.1259E-04
26	[illegible]	45.0	524.95	2.1219E 00	5.9536E-01	7.5942E-04	3.0590E-03	1.2592E 02	4.0862E-04
27	[illegible]	45.0	525.76	2.1675E 00	5.7557E-01	7.3603E-04	2.96[illegible]E-03	1.2611E 02	3.9542E-04
28	[illegible]	315.0	541.64	7.0842E 00	1.7030E 00	2.2263E-03	8.9358E-03	1.2990E 02	1.1936E-03
29	[illegible]	45.0	527.41	2.4737E 00	7.3660E-01	9.4266E-04	3.7946E-03	1.2651E 02	5.0714E-04
30	[illegible]	45.0	528.72	3.4246E 00	9.5356E-01	1.2222E-03	4.9222E-03	1.2682E 02	6.5749E-04
31	.4722	45.0	530.88	5.1002E 00	1.3610E 00	1.3718E-03	6.7319E-03	1.2728E 02	9.5924E-04
32	[illegible]	45.0	534.97	7.7401E 00	1.7097E 00	2.2090E-03	8.4974E-03	1.2830E 02	1.1480E-03
33	[illegible]	45.0	539.88	7.1445E 00	1.9605E 00	2.5571E-03	1.0296E-02	1.2928E 02	1.3748E-03
34	[illegible]	45.0	541.45	7.1694E 00	2.0116E 00	2.6211E-03	1.0553E-02	1.2955E 02	1.4090E-03
35	[illegible]	45.0	541.51	6.4760E 00	1.8604E 00	2.4307E-03	9.7813E-03	1.3034E 02	1.3065E-03
36	[illegible]	45.0	544.04	6.7495E 00	1.7750E 00	2.3207E-03	9.3382E-03	1.3046E 02	1.2474E-03
37	[illegible]	45.0	542.74	6.4009E 00	1.7377E 00	2.2681E-03	9.1272E-03	1.3016E 02	1.2192E-03
38	.9640	45.0	539.94	6.7337E 00	1.6193E 00	2.1058E-03	8.4745E-03	1.2949E 02	1.1321E-03
39	.2524	90.0	503.60	2.6757E 00	7.9097E-01	9.8229E-04	3.9613E-03	1.2087E 02	5.2911E-04
40	.2943	90.0	510.21	2.4296E 00	7.7897E-01	9.6516E-04	2.9690E-03	1.2432E 02	5.3027E-04
41	.3363	90.0	522.29	2.2965E 00	7.2404E-01	9.2166E-04	3.7123E-03	1.2529E 02	4.9538E-04
42	.3783	90.0	522.54	2.1167E 00	6.6767E-01	8.4879E-04	3.4104E-03	1.2535E 02	4.5676E-04
43	.4203	90.0	522.68	2.5545E 00	6.0736E-01	7.7266E-04	3.1127E-03	1.2543E 02	4.1579E-04
44	.4623	90.0	522.55	2.7298E 00	5.3586E-01	6.8142E-04	2.7442E-03	1.2535E 02	3.6670E-04
45	.5043	90.0	524.32	2.1891E 00	6.0288E-01	7.68[illegible]E-04	3.0953E-0[illegible]	1.2577E 02	4.1347E-04
46	.5463	90.0	527.28	2.1828E 00	6.2335E-01	7.9779E-04	3.2120E-03	1.2647E 02	4.2905E-04
47	.5882	90.0	527.29	2.5819E 00	7.2443E-01	9.2683E-04	3.7329E-03	1.2646E 02	4.9863E-04
48	.6302	90.0	528.29	3.4876E 00	1.0160E 00	1.3016E-03	5.2419E-03	1.2672E 02	7.0021E-04
49	.6722	90.0	530.91	5.4965E 00	1.3745E 00	1.7682E-03	7.1201E-03	1.2722E 02	9.5109E-04
50	.7170	90.0	535.01	7.2445E 00	1.7050E 00	2.2044E-03	8.8748E-03	1.2831E 02	1.1855E-03
51	.7583	90.0	537.12	6.9998E 00	1.8234E 00	2.3626E-03	9.5105E-03	1.2882E 02	1.2704E-03
52	.7996	90.0	540.38	7.7863E 00	2.0283E 00	2.6392E-03	1.0672E-02	1.2959E 02	1.4189E-03
53	.8409	90.0	541.11	7.6259E 00	1.8854E 00	2.4556E-03	9.8820E-03	1.2977E 02	1.3201E-03
54	.8822	90.0	542.08	7.4340E 00	1.8268E 00	2.1795E-03	9.5751E-03	1.2999E 02	1.2792E-03
55	.9235	90.0	540.19	7.6828E 00	1.7802E 00	2.3158E-03	9.3254E-03	1.2955E 02	1.2450E-03
56	.9648	90.0	535.60	7.3024E 00	1.7553E 00	2.2711E-03	9.1428E-03	1.2850E 02	1.2213E-03
57	.2524	135.0	479.08	6.6443E-01	1.9557E-01	2.4198E-04	9.7607E-04	1.1977E 02	1.3038E-04
58	.2943	135.0	511.54	2.6460E 00	8.1620E-01	1.0237E-03	4.1266E-03	1.2274E 02	5.5123E-04
59	.3363	135.0	515.74	2.4470E 00	7.7239E-01	9.7331E-04	3.9227E-03	1.2359E 02	5.2398E-04
60	.3783	135.0	514.67	2.2062E 00	6.5535E-01	8.6289E-04	3.4777E-03	1.2348E 02	4.6455E-04
61	.4203	135.0	514.19	2.7411E 00	7.0376E-01	8.8552E-04	3.3090E-03	1.2337E 02	4.7675E-04
62	.4623	135.0	515.20	2.1768E 00	6.3225E-01	7.9558E-04	3.2104E-03	1.2361E 02	4.2884E-04
63	.5043	135.0	517.28	2.3456E 00	5.8909E-01	7.4117E-04	2.9908E-03	1.2410E 02	4.0058E-04
64	.5463	135.0	518.52	2.4585E 00	6.5205E-01	8.2598E-04	3.3293E-03	1.2439E 02	4.4459E-04
65	.5882	135.0	520.09	2.3540E 00	7.8443E-01	9.3443E-04	4.0057E-03	1.2477E 02	5.2521E-04
66	.6302	135.0	521.32	3.4710E 00	1.0547E 00	1.3392E-03	5.3963E-03	1.2506E 02	7.2089E-04
67	.6722	135.0	525.08	5.7290E 00	1.3777E 00	1.7595E-03	7.0849E-03	1.2614E 02	9.4805E-04
68	.7176	135.0	529.39	7.4611E 00	1.7570E 00	2.2540E-03	9.0749E-03	1.2698E 02	1.2125E-03
69	.7583	135.0	528.59	5.1371E 00	1.4434E 00	1.8472E-03	7.4390E-03	1.2679E 02	9.9369E-04
70	.7996	135.0	533.92	7.4308E 00	2.1591E 00	2.7860E-03	1.1217E-02	1.2805E 02	1.4983E-03
71	.8409	135.0	534.97	6.9630E 00	1.9243E 00	2.4860E-03	1.0006E-02	1.2830E 02	1.3369E-03
72	.8822	135.0	535.11	7.1797E 00	1.9424E 00	2.5102E-03	1.0106E-02	1.2834E 02	1.3490E-03
73	.9235	135.0	534.77	7.7140E 00	1.7719E 00	2.2870E-03	9.2078E-03	1.2815E 02	1.2299E-03
74	.9648	135.0	534.33	7.4214E 00	1.8320E 00	2.3662E-03	9.5262E-03	1.2815E 02	1.2725E-03
75	.2524	180.0	497.21	2.0739E 00	8.5608E-01	1.0645E-03	4.2945E-03	1.1934E 02	5.7369E-04
76	.2943	180.0	-110.76	-1.1546E-14	-3.7020E-15	-2.5967E-18	-1.0018E-17	-2.1625E 01	-1.4477E-18
77	.3363	180.0	515.80	2.2914E 00	6.7756E-01	8.5606E-04	3.4419E-03	1.2372E 02	4.5777E-04
78	.3783	180.0	516.38	2.3634E 00	7.1693E-01	8.9661E-04	3.6125E-03	1.2389E 02	4.8255E-04
79	.4203	180.0	517.31	2.7661E 00	6.9372E-01	8.7934E-04	3.5319E-03	1.2411E 02	4.7173E-04
80	.4623	180.0	518.31	2.1026E 00	6.7467E-01	8.5337E-04	3.4387E-03	1.2436E 02	4.5933E-04
81	.5043	180.0	519.40	2.4477E 00	6.1320E-01	7.7668E-04	3.1295E-03	1.2460E 02	4.1403E-04
82	.5463	180.0	520.81	2.4059E 00	7.0743E-01	8.9415E-04	3.6146E-03	1.2494E 02	4.8357E-04
83	.5882	180.0	522.58	2.9164E 00	7.7445E-01	9.8479E-04	3.9673E-03	1.2534E 02	5.2995E-04
84	.6302	180.0	525.40	1.9410E 00	[illegible]	1.3357E-03	5.3851E-03	1.2603E 02	7.1066E-04
85	.6722	183.0	531.07	6.4667E 00	1.5787E 00	2.0350E-03	8.1741E-03	1.2751E 02	1.0924E-03
86	.7176	180.0	535.07	6.6169E 00	2.0057E 00	2.5945E-03	1.0445E-02	1.2852E 02	1.3952E-03
87	.7583	180.0	533.95	6.5810E 00	1.5826E 00	2.0[illegible]E-03	8.2219E-03	1.2806E 02	1.0963E-03
88	.7996	180.0	530.69	7.4805E 00	1.9767E 00	2.5664E-03	1.0330E-02	1.2519E 02	1.3790E-03
89	.8409	180.0	539.39	7.3412E 00	2.0035E 00	2.6036E-03	1.0679E-02	1.2936E 02	1.3998E-03
90	.8822	180.0	540.81	4.1311E 00	1.8737E 00	2.4369E-03	9.8080E-03	1.2950E 02	1.3101E-03
91	.9235	180.0	539.96	7.8310E 00	1.9223E 00	2.3999E-03	1.0061E-02	1.2979E 02	1.3449E-03
92	.9648	180.0	539.60	8.1935E 00	1.9342E 00	2.5142E-03	1.0152E-02	1.2946E 02	1.3511E-03
93	[illegible]	225.0	542.19	9.2271E 00	1.8468E 00	2.4081E-03	9.6912E-03	1.3008E 02	1.2945E-03
94	[illegible]	225.0	540.61	7.4454E 00	1.7985E 00	2.3305E-03	9.3794E-03	1.2965E 02	1.2529E-03
95	[illegible]	270.0	540.01	7.9327E 00	1.7866E 00	2.3293E-03	9.3745E-03	1.2975E 02	1.2522E-03
96	[illegible]	270.0	547.08	7.4275E 00	1.9724E 00	2.5890E-03	1.0416E-02	1.3119E 02	1.3916E-03
97	[illegible]	270.0	547.91	7.4787E 00	1.8087E 00	2.3767E-03	9.5516E-03	1.3139E 02	1.2[illegible]E-03
98	[illegible]	270.0	542.77	7.2613E 00	1.7462E 00	2.2792E-03	9.1[illegible]E-03	1.3010E 02	1.2252E-03




GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 17
MACH NO = 8
RE NO = 3.05 X 10**6
CONFIG 3
ALPHA = 0
TIME 0 SEC
SYM PHI X/L
0
45
90
135
180
SYM PHI X/L
225
270
315
32.00
16.00
0.00
0.20
0.40
0.60
0.80
X/L

2

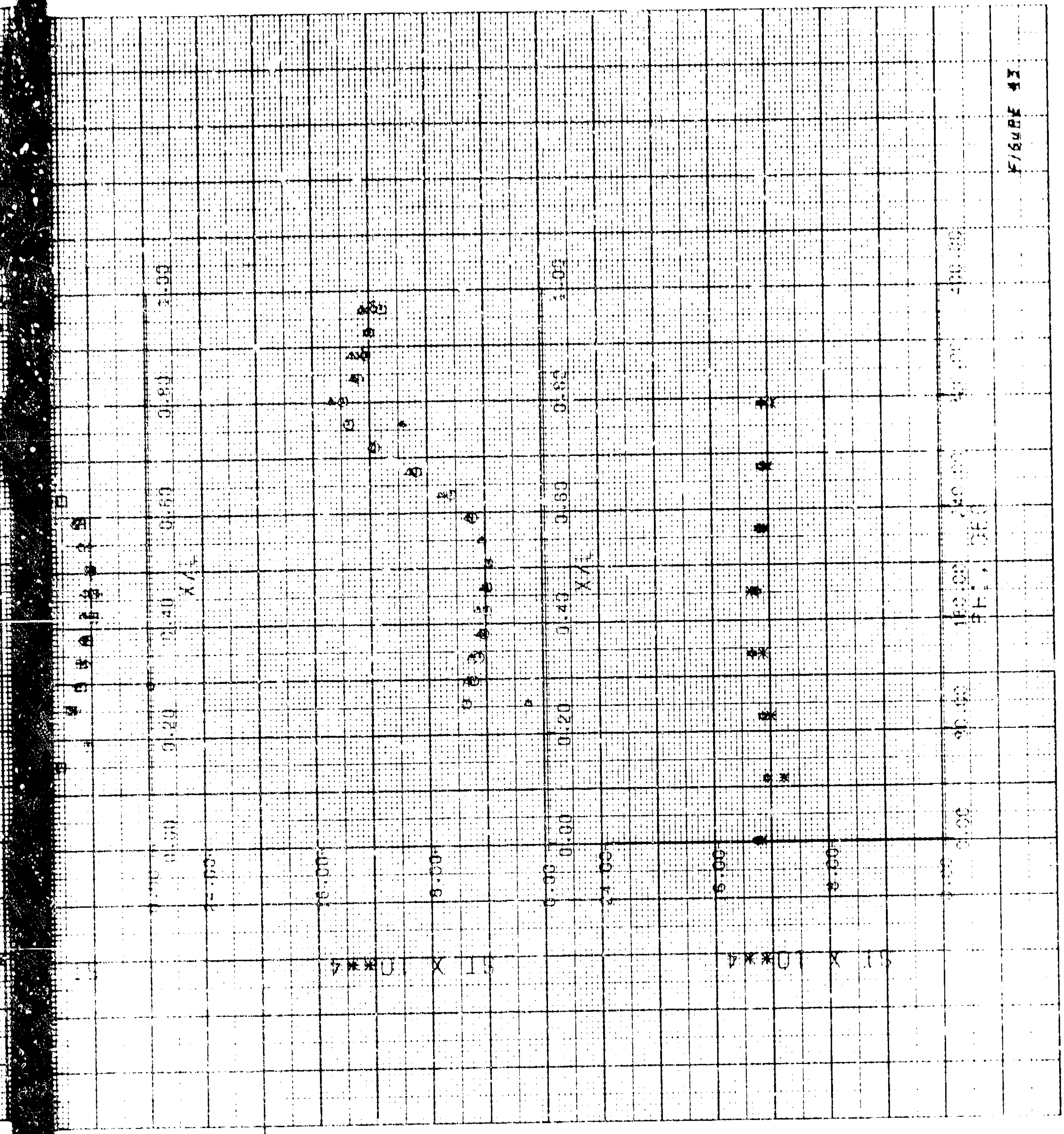


Figure 43

3

7/16/69

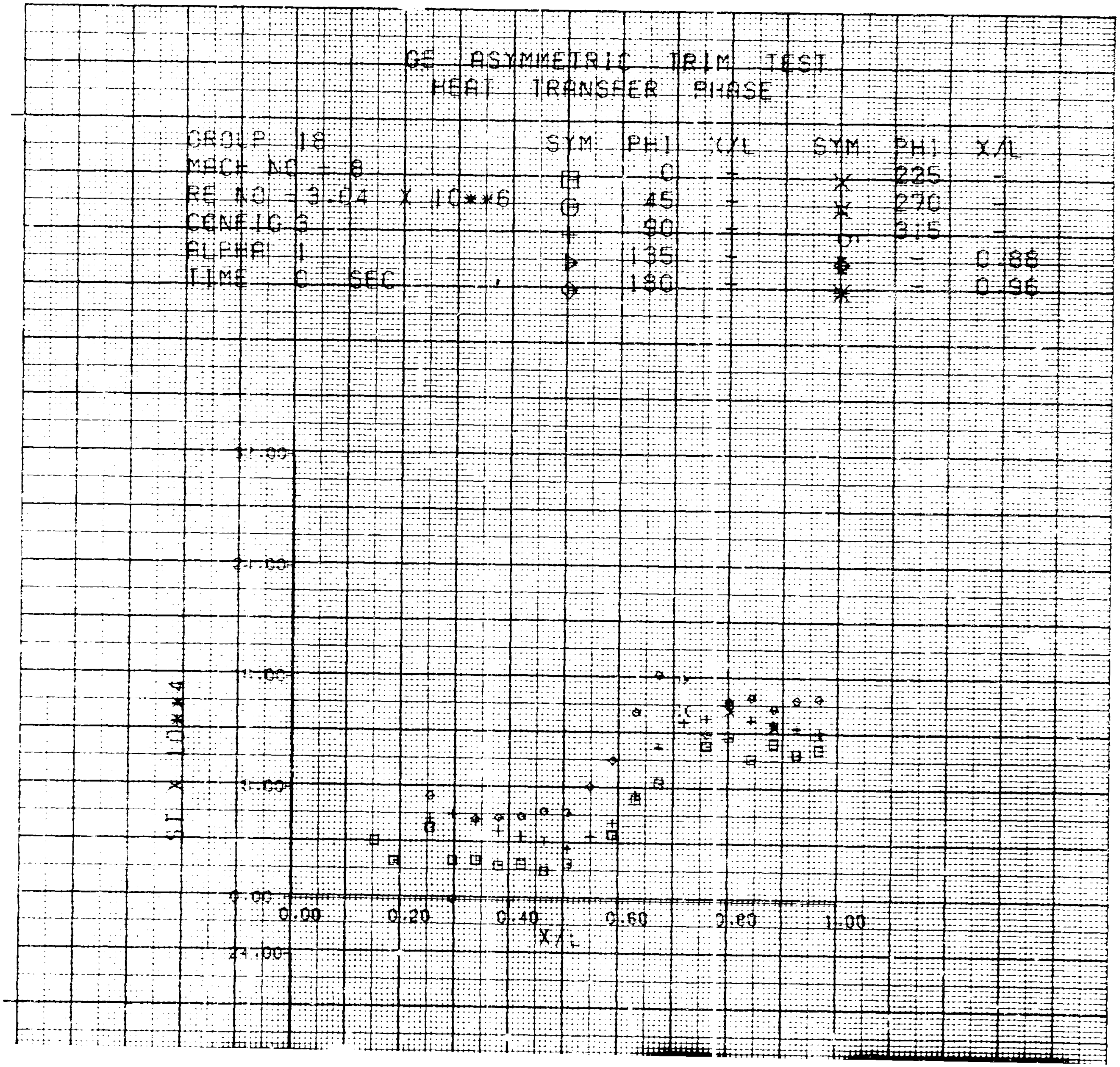
ARO(AROSPACE) INC., ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
VT0967 000

GROUP	CONFIG	ALPHA-M	BETA-M	ALPHA-C	ROLL	ALP-P	DATE	MACH NO	PO	TO	TIME
18	3	1.09	0	1.09	0	0	716	8.00	679.67	1309.93	.00

T-INF	P-INF	Q-INF	V-INF	RHO-INF	MU-INF	RE/FT	RE/D	HO
9.4922E 01	6.8039E-02	3.0840E 00	3.8191E 03	4.0844E-05	7.6422E-08	3.6407E 06	2.7801E 06	3.2803E 02

TC NO	X/L	PHI	TEMP	SLOPE	Q-STDH	HT	HM	HH	ST
1	.1900	0	479.97	3.8239E 00	8.9719E-01	7.0701E-04	3.1809E-03	1.1421E 02	4.2945E-04
2	.1067	0	466.16	1.9099E 00	4.3792E-01	5.1793E-04	2.0928E-03	1.1199E 02	2.7991E-04
3	.2524	0	467.96	2.7477E 00	8.1225E-01	9.6460E-04	3.8977E-03	1.1242E 02	5.2131E-04
4	.2943	0	478.05	1.9940E 00	4.4024E-01	5.2972E-04	2.1390E-03	1.1499E 02	2.8609E-04
5	.3363	0	483.02	1.4093E 00	4.4480E-01	5.3791E-04	2.1716E-03	1.1598E 02	2.9045E-04
6	.3783	0	487.07	1.2801E 00	3.8720E-01	4.7055E-04	1.8992E-03	1.1694E 02	2.5402E-04
7	.4203	0	490.28	1.1690E 00	3.9882E-01	4.8568E-04	1.9548E-03	1.1770E 02	2.6710E-04
8	.4623	0	495.04	1.1772E 00	3.2430E-01	3.9905E-04	1.6059E-03	1.1403E 02	2.1479E-04
9	.5043	0	498.15	1.5161E 00	4.1017E-01	5.0527E-04	2.0381E-03	1.1956E 02	2.7260E-04
10	.5463	0	531.48	8.1447E-02	2.2852E-02	2.9357E-05	1.1820E-04	1.2748E 02	1.5809E-05
11	.5882	0	505.28	2.5967E 00	7.1548E-01	8.8918E-04	3.5853E-03	1.2125E 02	4.7953E-04
12	.6302	0	509.21	4.0460E 00	1.0940E 00	1.3673E-03	5.5120E-03	1.2210E 02	7.3723E-04
13	.6722	0	518.07	6.9981E 00	1.2521E 00	1.5825E-03	6.3741E-03	1.2443E 02	8.5280E-04
99	.8822	315.0	530.13	5.0573E 00	1.3174E 00	1.6895E-03	6.8010E-03	1.2715E 02	9.0990E-04
15	.7583	0	520.91	6.4420E 00	1.6454E 00	2.0853E-03	8.4012E-03	1.2490E 02	1.1237E-03
16	.7996	0	521.64	6.2100E 00	1.7443E 00	2.2129E-03	8.9149E-03	1.2515E 02	1.1924E-03
17	.8409	0	522.19	5.9139E 00	1.5111E 00	1.9181E-03	7.7271E-03	1.2526E 02	1.0335E-03
18	.8822	0	525.92	6.4520E 00	1.6667E 00	2.1258E-03	8.5621E-03	1.2615E 02	1.1452E-03
19	.9235	0	527.09	6.1981E 00	1.5527E 00	1.9835E-03	7.9843E-03	1.2643E 02	1.0804E-03
20	.9648	0	531.37	6.6117E 00	1.5900E 00	2.0422E-03	8.2270E-03	1.2745E 02	1.0998E-03
21	.2524	45.0	462.42	2.4934E 00	7.3708E-01	8.0970E-04	3.5140E-03	1.1111E 02	4.7013E-04
22	.2943	45.0	471.60	2.7110E 00	7.0900E-01	8.4591E-04	3.4171E-03	1.1330E 02	4.5704E-04
23	.3363	45.0	476.18	2.7200E 00	6.4735E-01	8.0041E-04	3.2325E-03	1.1436E 02	4.3235E-04
24	.3783	45.0	480.81	2.1245E 00	6.3863E-01	7.7020E-04	3.1100E-03	1.1546E 02	4.1596E-04
25	.4203	45.0	486.86	1.8899E 00	5.4912E-01	6.6553E-04	2.6865E-03	1.1641E 02	3.5932E-04
26	.4623	45.0	491.18	1.9821E 00	5.5614E-01	6.7918E-04	2.7497E-03	1.1789E 02	3.6657E-04
27	.5043	45.0	495.39	1.9945E 00	5.2965E-01	6.5022E-04	2.6212E-03	1.1890E 02	3.5085E-04
100	.9648	315.0	530.94	6.8794E 00	1.6545E 00	2.1404E-03	8.6155E-03	1.2877E 02	1.1523E-03
29	.5882	45.0	501.31	1.9296E 00	5.3166E-01	6.5749E-04	2.6517E-03	1.2031E 02	3.5466E-04
30	.6302	45.0	505.04	2.2157E 00	5.9942E-01	7.4473E-04	3.0029E-03	1.2111E 02	4.0164E-04
31	.6722	45.0	517.04	2.9382E 00	7.2820E-01	9.0048E-04	3.6805E-03	1.2446E 02	4.8959E-04
32	.7170	45.0	521.79	4.4563E 00	1.0496E 00	1.3315E-03	5.3641E-03	1.2517E 02	7.1744E-04
33	.7583	45.0	517.02	5.1567E 00	1.4759E 00	1.8628E-03	7.5082E-03	1.2418E 02	1.0039E-03
34	.7996	45.0	519.78	6.2940E 00	1.7660E 00	2.2350E-03	9.0047E-03	1.2469E 02	1.2044E-03
35	.8409	45.0	523.31	6.4073E 00	1.8687E 00	2.3756E-03	9.5695E-03	1.2553E 02	1.2799E-03
36	.8822	45.0	525.72	6.8934E 00	1.8132E 00	2.3122E-03	9.3128E-03	1.2610E 02	1.2456E-03
37	.9235	45.0	527.77	6.4696E 00	1.7561E 00	2.2376E-03	9.0112E-03	1.2659E 02	1.2052E-03
38	.9648	45.0	532.72	6.5989E 00	1.5869E 00	2.0410E-03	8.2207E-03	1.2777E 02	1.0995E-03
39	.2524	90.0	463.47	3.0780E 00	9.0989E-01	1.0791E-03	4.3449E-03	1.1140E 02	5.8113E-04
40	.2943	90.0	471.16	2.9871E 00	9.5773E-01	1.1418E-03	4.6120E-03	1.1318E 02	6.1694E-04
41	.3363	90.0	476.01	2.7637E 00	8.7231E-01	1.0460E-03	4.2245E-03	1.1432E 02	5.6503E-04
42	.3783	90.0	479.66	2.4614E 00	7.7690E-01	9.3572E-04	3.7783E-03	1.1518E 02	5.0534E-04
43	.4203	90.0	484.87	2.4017E 00	7.0997E-01	8.5967E-04	3.4704E-03	1.1623E 02	4.6416E-04
44	.4623	90.0	488.40	2.0874E 00	6.4842E-01	7.8929E-04	3.1855E-03	1.1725E 02	4.2606E-04
45	.5043	90.0	493.36	2.0492E 00	5.6461E-01	6.9144E-04	2.7898E-03	1.1843E 02	3.7314E-04
46	.5463	90.0	496.93	2.4749E 00	7.0677E-01	8.6934E-04	3.5069E-03	1.1927E 02	4.6905E-04
47	.5882	90.0	500.88	3.0045E 00	8.4301E-01	1.0420E-03	4.2025E-03	1.2021E 02	5.6208E-04
48	.6302	90.0	504.67	4.1130E 00	1.1335E 00	1.4076E-03	5.6758E-03	1.2111E 02	7.5913E-04
49	.6722	90.0	517.01	6.5623E 00	1.6390E 00	2.0686E-03	8.3354E-03	1.2418E 02	1.1149E-03
50	.7170	90.0	523.54	8.0074E 00	1.8857E 00	2.3979E-03	9.6599E-03	1.2559E 02	1.2919E-03
51	.7583	90.0	516.51	7.4689E 00	1.9456E 00	2.4522E-03	9.8817E-03	1.2392E 02	1.3217E-03
52	.7996	90.0	518.46	8.0084E 00	2.0842E 00	2.6340E-03	1.0613E-02	1.2443E 02	1.4195E-03
53	.8409	90.0	520.80	7.6828E 00	1.9247E 00	2.4390E-03	9.8242E-03	1.2493E 02	1.3142E-03
54	.8822	90.0	523.59	7.4284E 00	1.8727E 00	2.3814E-03	9.5925E-03	1.2559E 02	1.2830E-03
55	.9235	90.0	524.96	7.4937E 00	1.8261E 00	2.3264E-03	9.3706E-03	1.2592E 02	1.2533E-03
56	.9648	90.0	528.71	7.1596E 00	1.7690E 00	2.2655E-03	9.1232E-03	1.2681E 02	1.2202E-03
57	.2524	135.0	459.67	1.0139E 00	2.9972E-01	3.5291E-04	1.4249E-03	1.1046E 02	1.9058E-04
58	.2943	135.0	468.94	3.5369E 00	1.1360E 00	1.3484E-03	5.4478E-03	1.1265E 02	7.2864E-04
59	.3363	135.0	473.04	3.1911E 00	1.0072E 00	1.2036E-03	4.8615E-03	1.1303E 02	6.5023E-04
60	.3783	135.0	478.11	2.4424E 00	8.8296E-01	1.0635E-03	4.2044E-03	1.1482E 02	5.7331E-04
61	.4203	135.0	482.79	2.8543E 00	8.8866E-01	1.0736E-03	4.3343E-03	1.1592E 02	5.7970E-04
62	.4623	135.0	487.04	2.8278E 00	8.2166E-01	9.9950E-04	4.0340E-03	1.1713E 02	5.3955E-04
63	.5043	135.0	492.71	3.2223E 00	8.2333E-01	1.0075E-03	4.0852E-03	1.1828E 02	5.4372E-04
64	.5463	135.0	496.27	3.7797E 00	1.0037E 00	1.2336E-03	4.9763E-03	1.1912E 02	6.6558E-04
65	.5882	135.0	500.51	5.4772E 00	1.3462E 00	1.6657E-03	6.7143E-03	1.2013E 02	8.9457E-04
66	.6302	135.0	504.40	7.1142E 00	1.4892E 00	2.3453E-03	9.4970E-03	1.2104E 02	1.2649E-03
67	.6722	135.0	518.61	9.1971E 00	2.2598E 00	2.8558E-03	1.1567E-02	1.2442E 02	1.5390E-03
68	.7170	135.0	522.15	9.2476E 00	2.1777E 00	2.7644E-03	1.1136E-02	1.2526E 02	1.4895E-03
69	.7583	135.0	512.35	5.8941E 00	1.6538E 00	2.0735E-03	8.3575E-03	1.2293E 02	1.1178E-03
70	.7996	135.0	517.44	7.4536E 00	2.2026E 00	2.8795E-03	1.1643E-02	1.2414E 02	1.5519E-03
71	.8409	135.0	519.77	7.1250E 00	2.1889E 00	2.6589E-03	1.0713E-02	1.2469E 02	1.4328E-03
72	.8822	135.0	522.77	7.4637E 00	2.0493E 00	2.5770E-03	1.0442E-02	1.2539E 02	[illegible]
73	.9235	135.0	524.45	7.7536E 00	1.9633E 00	2.4230E-03	9.7860E-03	1.2580E 02	1.3054E-03
74	.9648	135.0	529.31	8.1458E 00	1.9584E 00	2.4094E-03	1.0105E-02	1.2696E 02	1.3516E-03
75	.2524	180.0	464.41	4.0362E 00	1.1720E 00	1.3470E-03	5.4853E-03	1.1158E 02	7.4970E-04
76	.2943	180.0	-118.76	6.1927E-08	1.9855E-08	1.3917E-11	5.4042E-11	-2.1036E 01	7.7684E-12
77	.3363	180.0	482.39	3.0252E 00	8.9427E-01	1.0886E-03	4.3698E-03	1.1593E 02	5.8352E-04
78	.3783	180.0	487.61	3.0154E 00	8.8657E-01	1.1034E-03	4.4349E-03	1.1731E 02	5.9532E-04
79	.4203	180.0	494.61	3.8873E 00	9.1262E-01	1.1193E-03	4.5148E-03	1.1872E 02	6.0401E-04
80	.4623	180.0	499.46	3.1911E 00	9.6834E-01	1.1968E-03	4.8194E-03	1.1987E 02	6.4459E-04
81	.5043	180.0	503.82	3.7906E 00	9.4947E-01	1.1778E-03	4.7447E-03	1.2091E 02	6.3526E-04
82	.5463	180.0	507.75	6.4113E 00	1.2245E 00	1.5267E-03	6.1343E-03	1.2184E 02	8.2314E-04
83	.5882	180.0	511.04	7.4839E 00	1.5094E 00	1.8894E-03	7.4195E-03	1.2262E 02	1.0186E-03
84	.6302	180.0	516.74	7.5740E 00	2.0113E 00	2.5358E-03	1.0218E-02	1.2398E 02	1.3667E-03
85	.6722	180.0	528.44	9.8771E 00	2.3777E 00	3.0425E-03	1.2242E-02	1.2679E 02	1.6387E-03
86	.7170	180.0	532.34	9.8399E 00	2.3172E 00	2.9811E-03	1.2043E-02	1.2775E 02	1.6093E-03
87	.7583	180.0	524.22	7.3333E 00	1.7635E 00	2.2445E-03	9.0408E-03	1.2579E 02	1.2092E-03
88	.7996	180.0	528.30	8.0559E 00	2.0966E 00	2.6849E-03	1.0813E-02	1.2672E 02	1.4461E-03
89	.8409	180.0	530.29	8.1910E 00	2.1314E 00	2.7337E-03	1.1048E-02	1.2718E 02	1.4723E-03
90	.8822	180.0	532.07	8.7232E 00	2.0142E 00	2.5842E-03	1.0405E-02	1.2761E 02	1.3917E-03
91	.9235	180.0	533.13	8.4736E 00	2.1046E 00	2.7093E-03	1.0906E-02	1.2787E 02	1.4588E-03
92	.9648	180.0	538.21	8.1332E 00	2.1047E 00	2.7273E-03	1.0977E-02	1.2908E 02	1.4682E-03
93	.8822	225.0	533.13	7.4197E 00	1.9469E 00	2.3883E-03	1.0091E-02	1.2787E 02	1.3496E-03
94	.9648	225.0	538.32	7.4378E 00	1.8864E 00	2.4425E-03	9.8308E-03	1.2918E 02	1.3149E-03
95	.7170	270.0	539.32	8.0854E 00	1.9852E 00	2.5028E-03	1.0317E-02	1.2839E 02	1.3799E-03
96	.7996	270.0	533.31	7.5079E 00	1.9937E 00	2.5672E-03	1.0334E-02	1.2791E 02	1.3824E-03
97	.8822	270.0	534.54	7.1282E 00	1.8213E 00	2.3498E-03	9.4546E-03	1.2821E 02	1.2644E-03
98	.9648	270.0	538.55	7.1688E 00	1.7239E 00	2.2348E-03	8.9967E-03	1.2916E 02	1.2034E-03

GE ASYMMETRIC TRIP TEST
HEAT TRANSFER PHASE
GROUP 18 SYM PHI X/L SYM PHI X/L


GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 18
MACH NO = 8
RE NO = 3.04 X 10**6
CONFIG 3
ALPHA 1
TIME 0 SEC
SYM PHI X/L
0
45
90
135
180
SYM PHI X/L
225
270
315
0.88
0.96
ST X 10**4
0.00
0.20
0.40
0.60
0.80
1.00
X/L

2

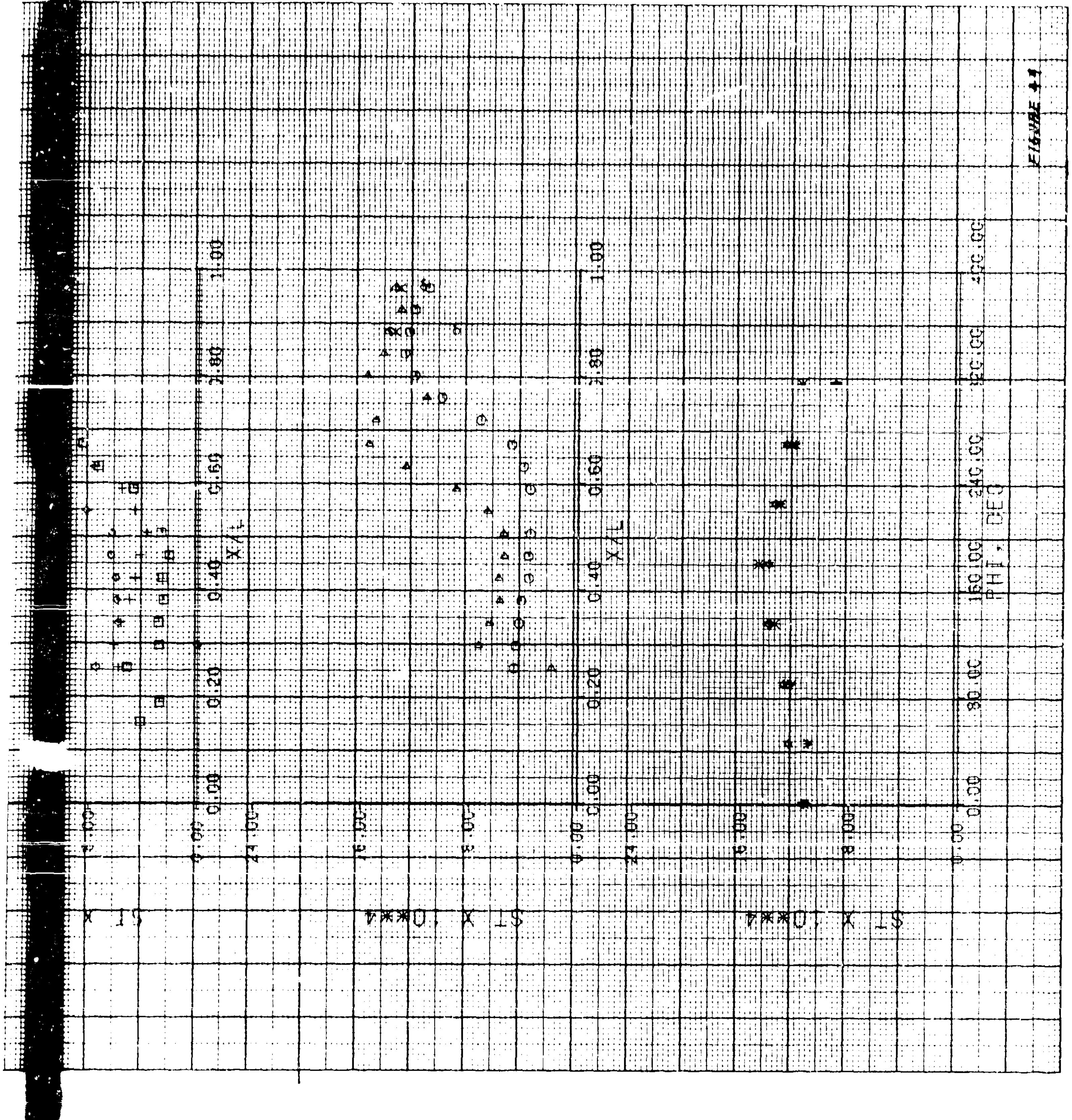


Figure 44

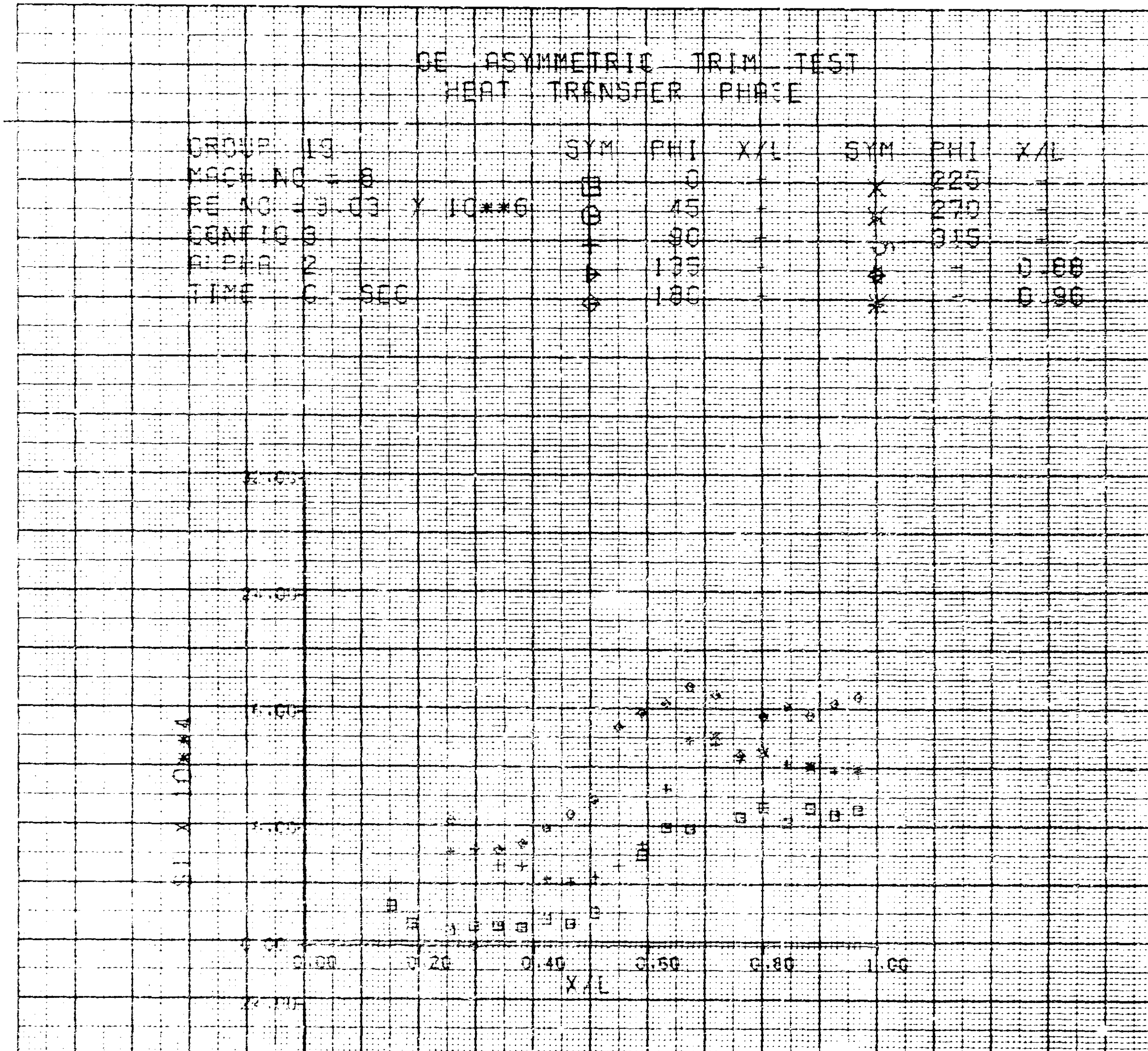
7/16/69

ARO, INC., ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
VT0957-000

GROUP	CONFIG	ALPHA-M	BETA-M	ALPHA-T	ROLL	ALP-P	DATE	MACH NO	PO	TO	TIME
IV	3	7.84	0	7.86	0	0	716	8.08	373.87	1311.18	9.88

T-INF	P-INF	Q-INF	V-INF	RHO-INF	MU-INF	RE/FT	RE/D	HO
9.6020E 01	4.0716E-02	3.0745E 00	3.8211E 03	6.0675E-05	7.0561E-04	3.0304E 06	2.779E 06	5.211E 02

TC NO	X/L	PHI	TEMP	SLOPE	Q-STON	HT	HM	HW	ST
1	.1960	0	453.06	1.0000E 00	4.2802E-01	4.9900E-04	2.0177E-03	1.0905E 02	2.7092E-04
2	.1047	0	442.40	1.0967E 00	2.3954E-01	2.1225E-04	1.1600E-03	1.1110E 04	1.5291E-04
3	.2524	0	472.19	9.7064E-01	1.5391E-01	1.0343E-04	7.0049E-04	1.1302E 02	4.9322E-05
4	.2743	0	480.90	6.4009E-01	2.0391E-01	2.4558E-04	9.9160E-04	1.1549E 02	1.3291E-04
5	.3363	0	486.93	6.3330E-01	1.9989E-01	2.4248E-04	9.7843E-04	1.1491E 02	2.3119E-04
6	.3783	0	491.17	4.2917E-01	1.8795E-01	2.2913E-04	9.2443E-04	1.1790E 02	1.2394E-04
7	.4203	0	493.96	9.4999E-01	2.7603E-01	3.3773E-04	1.3625E-03	1.1857E 02	1.0266E-04
8	.4623	0	497.39	4.1101E-01	2.2919E-01	2.8160E-04	1.1309E-03	1.1936E 02	1.5227E-04
9	.5043	0	490.69	1.2573E 00	3.4915E-01	4.1912E-04	1.6963E-03	1.1993E 02	2.2660E-04
10	.5463	0	531.80	7.2126E-02	2.0237E-02	2.5962E-05	1.0453E-04	1.2759E 02	1.4013E-05
11	.5882	0	506.40	3.1060E 00	9.3295E-01	1.1591E-03	4.6732E-03	1.2152E 02	6.2647E-04
12	.6302	0	509.79	4.4630E 00	1.2074E 00	1.5064E-03	6.0723E-03	1.2232E 02	8.1994E-04
13	.6722	0	516.05	4.7383E 00	1.1850E 00	1.4913E-03	6.0040E-03	1.2395E 02	8.0556E-04
99	.0822	315.0	533.21	4.4094E 00	1.1467E 00	1.4763E-03	5.9514E-03	1.2708E 02	7.9676E-04
15	.7503	0	519.24	5.1929E 00	1.2969E 00	1.6374E-03	6.5967E-03	1.2456E 02	8.8934E-04
16	.7906	0	521.04	4.9449E 00	1.3074E 00	1.7557E-03	7.0727E-03	1.2499E 02	9.4916E-04
17	.8409	0	521.37	4.8523E 00	1.2398E 00	1.5004E-03	6.3227E-03	1.2307E 02	8.4761E-04
18	.8822	0	524.67	5.9053E 00	1.3792E 00	1.7529E-03	7.0690E-03	1.2581E 02	9.4665E-04
19	.9235	0	525.97	5.7080E 00	1.3042E 00	1.6597E-03	6.8843E-03	1.2605E 02	8.7649E-04
20	.9640	0	530.27	5.4196E 00	1.3514E 00	1.7303E-03	6.9669E-03	1.2719E 02	9.3397E-04
21	.2524	45.0	459.94	2.7557E 00	8.1602E-01	9.5686E-04	3.8675E-03	1.1053E 02	5.1867E-04
22	[illegible]	45.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
23	.3363	45.0	470.90	2.4153E 00	7.2603E-01	8.6392E-04	3.4890E-03	1.1311E 02	4.6763E-04
24	.3783	45.0	476.79	2.1947E 00	6.5972E-01	7.9055E-04	3.1924E-03	1.1450E 02	4.2796E-04
25	.4203	45.0	481.31	1.9195E 00	5.5772E-01	6.7198E-04	2.7129E-03	1.1555E 02	3.6368E-04
26	.4623	45.0	487.57	2.0882E 00	5.6344E-01	6.8605E-04	2.7607E-03	1.1706E 02	3.7009E-04
27	.5043	45.0	491.77	1.8901E 00	5.0193E-01	6.1245E-04	2.4711E-03	1.1805E 02	3.3120E-04
100	.9640	315.0	538.70	6.9064E 00	1.4444E 00	1.8696E-03	7.5242E-03	1.2919E 02	1.0087E-03
29	.5882	45.0	498.49	2.1255E 00	5.8565E-01	7.2054E-04	2.9058E-03	1.1964E 02	3.8960E-04
30	.6302	45.0	502.12	2.8763E 00	7.7652E-01	9.5966E-04	3.8699E-03	1.2050E 02	5.1879E-04
31	.6722	45.0	513.20	6.9181E 00	1.1310E 00	1.4181E-03	5.7152E-03	1.2315E 02	7.6617E-04
32	.7170	45.0	519.10	6.5350E 00	1.5320E 00	1.9341E-03	7.7921E-03	1.2459E 02	1.0446E-03
33	.7503	45.0	514.74	6.4369E 00	1.7736E 00	2.2260E-03	8.9726E-03	1.2350E 02	1.2029E-03
34	.7906	45.0	516.04	6.4218E 00	1.8010E 00	2.2680E-03	9.1386E-03	1.2399E 02	1.2251E-03
35	.8409	45.0	519.67	6.9458E 00	1.7160E 00	2.1687E-03	8.7371E-03	1.2467E 02	1.1713E-03
36	.8822	45.0	521.73	6.0810E 00	1.5997E 00	2.0261E-03	8.1615E-03	1.2516E 02	1.0941E-03
37	.9235	45.0	522.69	6.0335E 00	1.5616E 00	1.9569E-03	7.8743E-03	1.2530E 02	1.0556E-03
38	.9640	45.0	529.44	5.9392E 00	1.4062E 00	1.7960E-03	7.2319E-03	1.2659E 02	9.6949E-04
39	.2524	90.0	456.47	3.4751E 00	1.0273E 00	1.2016E-03	4.8502E-03	1.0971E 02	6.5129E-04
40	.2943	90.0	460.69	3.2759E 00	1.0503E 00	1.2339E-03	4.9874E-03	1.1056E 02	6.6860E-04
41	.3363	90.0	466.94	2.7412E 00	8.4522E-01	1.0247E-03	4.1492E-03	1.1210E 02	5.5503E-04
42	.3783	90.0	472.46	2.6947E 00	8.5114E-01	1.0147E-03	4.0984E-03	1.1340E 02	5.4943E-04
43	.4203	90.0	478.74	2.4221E 00	7.1601E-01	8.6003E-04	3.4725E-03	1.1497E 02	4.6552E-04
44	.4623	90.0	483.87	2.1977E 00	6.8270E-01	8.2425E-04	3.3274E-03	1.1578E 02	[illegible]
45	.5043	90.0	488.92	2.4361E 00	7.2633E-01	8.8323E-04	3.5642E-03	1.1738E 02	4.7782E-04
46	.5463	90.0	492.51	2.9345E 00	8.3800E-01	1.0235E-03	4.1295E-03	1.1823E 02	5.5359E-04
47	.5882	90.0	497.60	3.7639E 00	1.0561E 00	1.2980E-03	5.2356E-03	1.1945E 02	7.0185E-04
48	.6302	90.0	501.70	5.9107E 00	1.6206E 00	2.0110E-03	8.1122E-03	1.2090E 02	1.0875E-03
49	.6722	90.0	512.81	9.1685E 00	2.0945E 00	2.6231E-03	1.0572E-02	1.2304E 02	1.4172E-03
50	.7170	90.0	519.51	8.4113E 00	2.0279E 00	2.5613E-03	1.0319E-02	1.2463E 02	1.3833E-03
51	.7503	90.0	511.23	7.1272E 00	1.9087E 00	2.3858E-03	9.6159E-03	1.2266E 02	1.2891E-03
52	.7906	90.0	514.27	7.4560E 00	1.9930E 00	2.5006E-03	1.0077E-02	1.2330E 02	1.3509E-03
53	.8409	90.0	515.81	7.4176E 00	1.8583E 00	2.3360E-03	9.4132E-03	1.2375E 02	1.2619E-03
54	.8822	90.0	518.47	7.4650E 00	1.8327E 00	2.3110E-03	9.3134E-03	1.2438E 02	1.2485E-03
55	.9235	90.0	519.88	7.7772E 00	1.7743E 00	2.2489E-03	9.0279E-03	1.2465E 02	1.2103E-03
56	.9640	90.0	525.84	7.1726E 00	1.7249E 00	2.1960E-03	8.8463E-03	1.2613E 02	1.1856E-03
57	.2524	135.0	450.62	1.1740E 00	3.4706E-01	4.0324E-04	1.6307E-03	1.0833E 02	2.1861E-04
58	.2943	135.0	458.73	4.0110E 00	1.2960E 00	1.5084E-03	6.0972E-03	1.1024E 02	8.1730E-04
59	.3363	135.0	466.18	3.9210E 00	1.1113E 00	1.3150E-03	5.3113E-03	1.1200E 02	7.1230E-04
60	.3783	135.0	472.67	3.2305E 00	1.0060E 00	1.1996E-03	4.8443E-03	1.1353E 02	6.4956E-04
61	.4203	135.0	478.57	3.1276E 00	1.3003E 00	1.2812E-03	4.8502E-03	1.1493E 02	6.5021E-04
62	.4623	135.0	484.20	3.4490E 00	1.0021E 00	1.2118E-03	4.8913E-03	1.1628E 02	6.5572E-04
63	.5043	135.0	489.05	4.4051E 00	1.1256E 00	1.3699E-03	5.5280E-03	1.1735E 02	7.4107E-04
64	.5463	135.0	494.12	6.0570E 00	1.6007E 00	1.9686E-03	7.9419E-03	1.1861E 02	1.0647E-03
65	.5882	135.0	500.33	8.5098E 00	2.2598E 00	2.7866E-03	1.1238E-02	1.2008E 02	1.5066E-03
66	.6302	135.0	503.40	9.9028E 00	2.6297E 00	3.2556E-03	1.3126E-02	1.2083E 02	1.7597E-03
67	.6722	135.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
68	.7170	135.0	519.08	9.7171E 00	2.2803E 00	2.8885E-03	1.1637E-02	1.2453E 02	1.5601E-03
69	.7503	135.0	509.64	5.4924E 00	1.6533E 00	2.0625E-03	8.3130E-03	1.2230E 02	1.1145E-03
70	.7906	135.0	510.21	[illegible]	2.3027E 00	2.9760E-03	1.2070E-02	[illegible]	[illegible]
71	.8409	135.0	518.61	9.1306E 00	2.2402E 00	2.8262E-03	1.1387E-02	1.2442E 02	1.5265E-03
72	.8822	135.0	520.40	9.1800E 00	2.2154E 00	2.8015E-03	1.1286E-02	1.2486E 02	1.5130E-03
73	.9235	135.0	522.75	8.4253E 00	2.0927E 00	2.6539E-03	1.0690E-02	1.2540E 02	1.4331E-03
74	.9640	135.0	528.33	9.1154E 00	2.1921E 00	2.7998E-03	1.1274E-02	1.2673E 02	1.5116E-03
75	.2524	180.0	460.91	4.4907E 00	1.3655E 00	1.6058E-03	6.4902E-03	1.1076E 02	8.7007E-04
76	.2943	180.0	-116.74	-1.1540E-14	-3.7020E-15	-2.5924E-18	-1.0818E-17	-2.1036E 01	-1.4503E-18
77	.3363	180.0	475.30	3.4912E 00	1.0291E 00	1.2310E-03	4.9714E-03	1.1410E 02	6.6646E-04
78	.3783	180.0	481.64	3.6026E 00	1.0830E 00	1.3053E-03	5.2697E-03	1.1565E 02	7.0644E-04
79	.4203	180.0	488.17	4.9101E 00	1.2445E 00	1.5119E-03	6.1015E-03	1.1714E 02	8.1796E-04
80	.4623	180.0	493.81	4.9407E 00	1.3824E 00	1.6910E-03	6.8222E-03	1.1853E 02	9.1450E-04
81	.5043	180.0	499.07	[illegible]	1.5139E 00	1.8639E-03	7.5194E-03	1.1970E 02	1.0070E-03
82	.5463	180.0	504.21	8.6825E 00	2.2525E 00	2.7910E-03	1.1254E-02	1.2103E 02	1.5087E-03
83	.5882	180.0	508.71	9.9777E 00	2.3840E 00	2.9706E-03	1.1975E-02	1.2207E 02	1.6053E-03
84	.6302	180.0	513.36	9.1138E 00	2.4733E 00	3.0996E-03	1.2492E-02	1.2316E 02	1.6746E-03
85	.6722	180.0	524.05	1.0830E 01	2.6044E 00	3.3108E-03	1.3335E-02	1.2585E 02	1.7876E-03
86	.7170	180.0	529.41	1.0652E 01	2.5085E 00	3.2003E-03	1.2910E-02	1.2696E 02	1.7318E-03
87	.7503	180.0	520.13	8.4554E 00	1.9372E 00	2.4486E-03	9.8644E-03	1.2470E 02	1.3224E-03
88	.7906	180.0	525.73	8.8242E 00	2.2947E 00	2.9262E-03	1.1785E-02	1.2611E 02	1.5790E-03
89	.8409	180.0	528.14	9.3937E 00	2.4001E 00	3.0647E-03	1.2341E-02	1.2660E 02	1.6544E-03
90	.8822	180.0	530.19	9.4745E 00	2.2985E 00	2.9427E-03	1.1849E-02	1.2717E 02	1.5904E-03
91	.9235	180.0	531.26	9.4394E 00	2.4153E 00	3.0964E-03	1.2467E-02	1.2742E 02	1.6713E-03
92	.9640	180.0	537.09	1.0670E 01	2.4607E 00	3.1809E-03	1.2802E-02	1.2895E 02	1.7163E-03
93	.8822	225.0	532.26	8.7143E 00	2.0908E 00	2.6942E-03	1.0847E-02	1.2766E 02	1.4542E-03
94	.9640	225.0	530.34	8.6804E 00	2.0894E 00	2.7032E-03	1.0879E-02	1.2911E 02	1.4585E-03
95	.7170	270.0	535.82	9.7325E 00	2.0815E 00	2.6842E-03	1.0804E-02	1.2851E 02	1.4484E-03
96	.7906	270.0	535.41	7.7461E 00	1.9242E 00	2.4801E-03	9.9829E-03	1.2841E 02	1.3383E-03
97	.8822	270.0	536.19	4.9771E 00	1.7827E 00	2.3000E-03	9.2577E-03	1.2859E 02	1.2411E-03
98	.9640	270.0	539.81	7.2920E 00	1.7530E 00	2.2733E-03	9.1466E-03	1.2946E 02	1.2264E-03


GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 19
MACH NO = 8
RE NO = 3.03 X 10**6
CONFIG 3
ALPHA 2
TIME 0 SEC
SYM PHI X/L
0
45
90
135
180
SYM PHI X/L
225
270
315
0.88
0.96
0.00
0.20
0.40
0.60
0.80
1.00
X/L

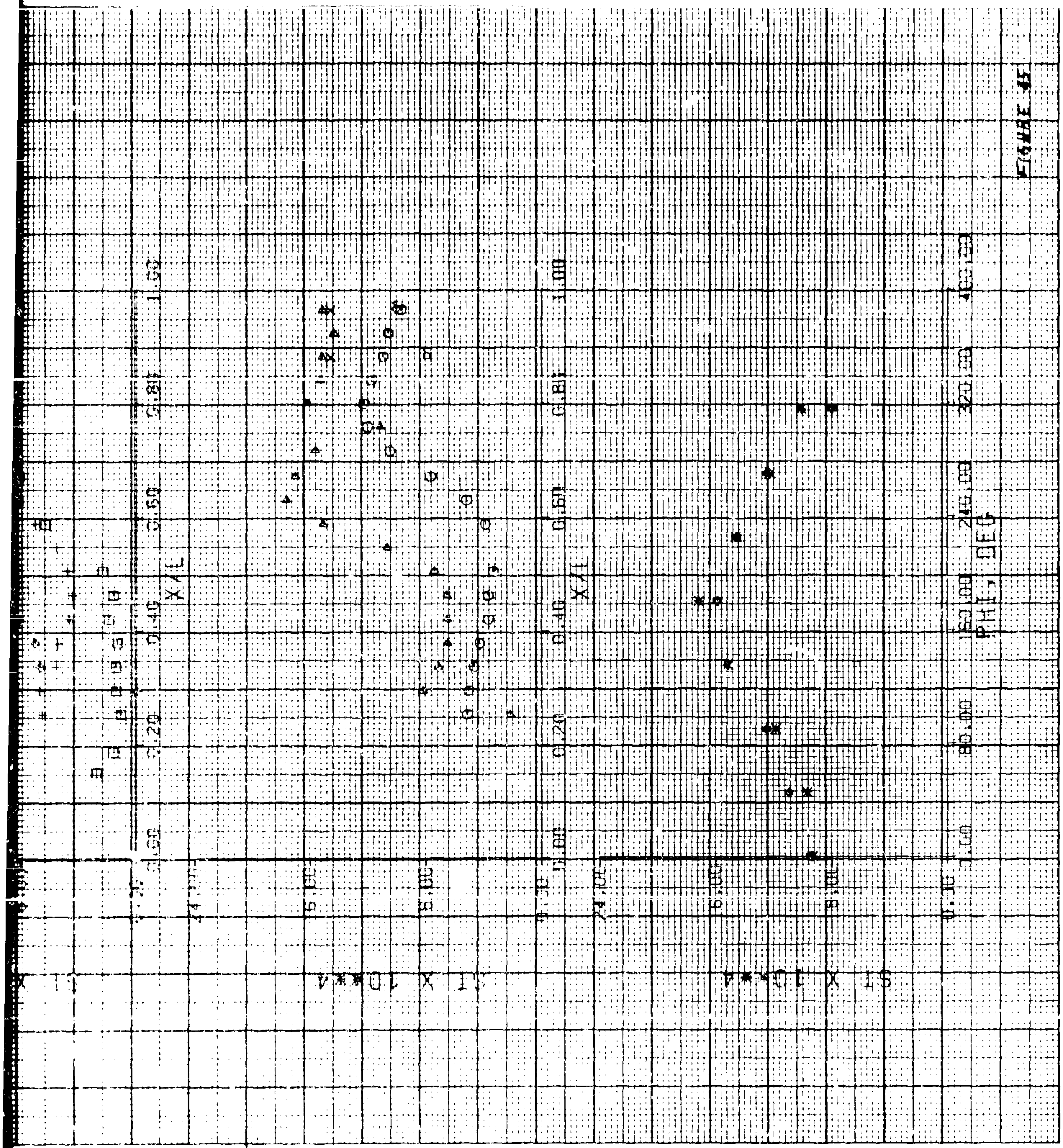


Figure 45

7/16/69

ARO(ARO-INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
VT0967-800

GROUP	CONFIG	ALPHA-M	BETA-M	ALPHA-S	ROLL	ALP-P	DATE	MACH NO	PO	TO	TIME
20	3	4.02	0	4.02	0	0	714	8.00	667.87	1313.91	.60

T-INF	P-INF	Q-INF	V-INF	RHO-INF	MU-INF	RE/FT	RE/D	MU
9.5216?E 01	6.8409?E-02	3.0647?E 00	3.8249?E 03	6.0?823E-05	7.6654?E-08	3.0?8??E 06	2.7?7?E 06	3.21?4?E 02

TC NO	X/L	PHI	TEMP	SLOPE	Q-STDS	HT	HH	HW	ST
1	.1500	0	503.92	1.4001E 00	2.7095E-01	2.0951E-04	1.1470E-03	1.2093E 02	2.5401E-04
2	.1667	0	491.15	4.4628E-01	1.9009E-01	2.3177E-04	9.3504E-04	1.1790E 02	1.2004E-04
3	.2524	0	508.06	2.0160E 00	5.9654E-01	7.3298E-04	2.9557E-03	1.2001E 02	3.9842E-04
4	.2943	0	517.37	1.5925E 00	5.0263E-01	6.3102E-04	2.5422E-03	1.2412E 02	3.4267E-04
5	.3363	0	518.41	1.6090E 00	5.0784E-01	6.3840E-04	2.5717E-03	1.2437E 02	3.4666E-04
6	.3783	0	519.09	1.7623E 00	5.2976E-01	6.6702E-04	2.6860E-03	1.2467E 02	3.6217E-04
7	.4203	0	519.91	1.5525E 00	4.5110E-01	5.6793E-04	2.2877E-03	1.2465E 02	3.0837E-04
8	.4623	0	521.59	2.1527E 00	6.4024E-01	8.1811E-04	3.2951E-03	1.2511E 02	4.4417E-04
9	.5043	0	522.21	2.7707E 00	7.4954E-01	9.4483E-04	3.8134E-03	1.2520E 02	5.1406E-04
10	.5463	0	530.47	7.9166E-02	2.2212E-02	2.8352E-05	1.1314E-04	1.2723E 02	1.5306E-05
11	.5882	0	525.21	2.7020E 00	7.4449E-01	9.4397E-04	3.4013E-03	1.2599E 02	5.1240E-04
12	.6302	0	527.16	2.4321E 00	7.1209E-01	9.0511E-04	3.6444E-03	1.2645E 02	4.9125E-04
13	.6722	0	526.07	2.4407E 00	6.1144E-01	7.7610E-04	3.1252E-03	1.2619E 02	4.2126E-04
99	.8822	315.0	541.08	3.1771E 00	8.7972E-01	1.1395E-03	4.5845E-03	1.2995E 02	6.1798E-04
15	.7583	0	535.37	2.8343E 00	6.0158E-01	8.7566E-04	3.5235E-03	1.2840E 02	4.7495E-04
16	.7996	0	537.45	2.6917E 00	7.5524E-01	9.7269E-04	3.9143E-03	1.2890E 02	5.2764E-04
17	.8409	0	537.02	2.8058E 00	7.1692E-01	9.2176E-04	3.7174E-03	1.2898E 02	5.0109E-04
18	.8822	0	540.75	3.1146E 00	7.8027E-01	1.0092E-03	4.0606E-03	1.2968E 02	5.4735E-04
19	.9235	0	541.66	3.0798E 00	7.7600E-01	1.0049E-03	4.0432E-03	1.2990E 02	5.4501E-04
20	.9648	0	539.08	3.4385E 00	8.2609E-01	1.0672E-03	4.2943E-03	1.2928E 02	5.7885E-04
21	.2524	45.0	491.91	2.3836E 00	6.7504E-01	8.2124E-04	3.3131E-03	1.1809E 02	4.4659E-04
22	.2943	45.0	507.07	1.8290E 00	5.0890E-01	7.2680E-04	2.9297E-03	1.2168E 02	3.9490E-04
23	.3363	45.0	508.81	1.7545E 00	5.2762E-01	6.5510E-04	2.6404E-03	1.2209E 02	3.5591E-04
24	.3783	45.0	509.88	1.7769E 00	5.3416E-01	6.6433E-04	2.6774E-03	1.2234E 02	3.6091E-04
25	.4203	45.0	511.96	1.5385E 00	4.4702E-01	5.5741E-04	2.2463E-03	1.2284E 02	3.0279E-04
26	.4623	45.0	515.31	1.8040E 00	5.0618E-01	6.3385E-04	2.5538E-03	1.2364E 02	3.4425E-04
27	.5043	45.0	517.21	2.5205E 00	6.6931E-01	8.4011E-04	3.3845E-03	1.2408E 02	4.5622E-04
100	.9648	315.0	544.85	4.5340E 00	1.0903E 00	1.4178E-03	5.7031E-03	1.3066E 02	7.6876E-04
29	.5882	45.0	521.65	5.0326E 00	1.3866E 00	1.7502E-03	7.0494E-03	1.2514E 02	9.5023E-04
30	.6302	45.0	524.77	5.7662E 00	1.5608E 00	1.9779E-03	7.9649E-03	1.2588E 02	1.0736E-03
31	.6722	45.0	528.43	5.9990E 00	1.5482E 00	1.9685E-03	7.9247E-03	1.2675E 02	1.0683E-03
32	.7170	45.0	531.59	5.4057E 00	1.3672E 00	1.7476E-03	7.0350E-03	1.2750E 02	9.4829E-04
33	.7583	45.0	533.68	4.9638E 00	1.3401E 00	1.7176E-03	6.9135E-03	1.2800E 02	9.3191E-04
34	.7996	45.0	535.20	4.6179E 00	1.2957E 00	1.6639E-03	6.6960E-03	1.2836E 02	9.0270E-04
35	.8409	45.0	537.85	4.5490E 00	1.2307E 00	1.5858E-03	6.3816E-03	1.2899E 02	8.6021E-04
36	.8822	45.0	539.82	4.4627E 00	1.1738E 00	1.5164E-03	6.1015E-03	1.2946E 02	8.2246E-04
37	.9235	45.0	541.22	4.4797E 00	1.1446E 00	1.4813E-03	5.9601E-03	1.2979E 02	8.0339E-04
38	.9648	45.0	540.41	4.9178E 00	1.0864E 00	1.4046E-03	5.6514E-03	1.2960E 02	7.6178E-04
39	.2524	90.0	485.21	3.3609E 00	9.9351E-01	1.1989E-03	4.8384E-03	1.1650E 02	6.5219E-04
40	.2943	90.0	498.26	2.9942E 00	9.5949E-01	1.1770E-03	4.7466E-03	1.1959E 02	6.3982E-04
41	.3363	90.0	500.99	2.8131E 00	8.8791E-01	1.0922E-03	4.4042E-03	1.2023E 02	5.9367E-04
42	.3783	90.0	503.62	2.5372E 00	8.0080E-01	9.8829E-04	3.9845E-03	1.2086E 02	5.3709E-04
43	.4203	90.0	506.24	2.5132E 00	7.4292E-01	9.1983E-04	3.7079E-03	1.2148E 02	4.9981E-04
44	.4623	90.0	508.10	2.1492E 00	6.6764E-01	8.2853E-04	3.3395E-03	1.2192E 02	4.5015E-04
45	.5043	90.0	511.84	3.0078E 00	8.2874E-01	1.0333E-03	4.1639E-03	1.2281E 02	5.6127E-04
46	.5463	90.0	516.57	4.3185E 00	1.2332E 00	1.5467E-03	6.2314E-03	1.2393E 02	8.3996E-04
47	.5882	90.0	518.98	6.3903E 00	1.7930E 00	2.2555E-03	9.0840E-03	1.2450E 02	1.2248E-03
48	.6302	90.0	522.15	7.6760E 00	2.1150E 00	2.6712E-03	1.0759E-02	1.2526E 02	1.4502E-03
49	.6722	90.0	527.96	8.3987E 00	2.1060E 00	2.6771E-03	1.0779E-02	1.2664E 02	1.4529E-03
50	.7170	90.0	531.97	7.4760E 00	1.8078E 00	2.3119E-03	9.3066E-03	1.2759E 02	1.2545E-03
51	.7583	90.0	530.37	6.6691E 00	1.6852E 00	2.1507E-03	8.6584E-03	1.2721E 02	1.1671E-03
52	.7996	90.0	532.80	6.6843E 00	1.7413E 00	2.2292E-03	8.9733E-03	1.2779E 02	1.2096E-03
53	.8409	90.0	534.79	6.4420E 00	1.6389E 00	2.1036E-03	8.4665E-03	1.2826E 02	1.1412E-03
54	.8822	90.0	537.59	6.6589E 00	1.6345E 00	2.1054E-03	8.4726E-03	1.2893E 02	1.1421E-03
55	.9235	90.0	538.87	6.7102E 00	1.6137E 00	2.0820E-03	8.3780E-03	1.2923E 02	1.1293E-03
56	.9648	90.0	537.84	6.5866E 00	1.5839E 00	2.0410E-03	8.2133E-03	1.2899E 02	1.1071E-03
57	.2524	135.0	476.00	1.2162E 00	3.5952E-01	4.2907E-04	1.7325E-03	1.1432E 02	2.3353E-04
58	.2943	135.0	486.38	4.3449E 00	1.3931E 00	1.6834E-03	6.7933E-03	1.1678E 02	9.1570E-04
59	.3363	135.0	489.93	3.4901E 00	1.2278E 00	1.4901E-03	6.0121E-03	1.1761E 02	8.1041E-04
60	.3783	135.0	493.68	3.7913E 00	1.1777E 00	1.4358E-03	5.7920E-03	1.1850E 02	7.8073E-04
61	.4203	135.0	496.88	4.0785E 00	1.2260E 00	1.5006E-03	6.0519E-03	1.1926E 02	8.1578E-04
62	.4623	135.0	501.43	4.6499E 00	1.3511E 00	1.6629E-03	6.7051E-03	1.2034E 02	9.0381E-04
63	.5043	135.0	507.29	7.5050E 00	1.9176E 00	2.3771E-03	9.5820E-03	1.2171E 02	1.2916E-03
64	.5463	135.0	512.07	9.9860E 00	2.6518E 00	3.3072E-03	1.3327E-02	1.2286E 02	1.7965E-03
65	.5882	135.0	516.78	1.0804E 01	2.8691E 00	3.5993E-03	1.4501E-02	1.2398E 02	1.9546E-03
66	.6302	135.0	518.79	1.0824E 01	2.8742E 00	3.6149E-03	1.4562E-02	1.2446E 02	1.9629E-03
67	.6722	135.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
68	.7170	135.0	529.80	1.0205E 01	2.4032E 00	3.0649E-03	1.2339E-02	1.2707E 02	1.6633E-03
69	.7583	135.0	524.31	6.5245E 00	1.8306E 00	2.3185E-03	9.3348E-03	1.2577E 02	1.2586E-03
70	.7996	135.0	530.54	8.8178E 00	2.5621E 00	3.2707E-03	1.3147E-02	1.2726E 02	1.7749E-03
71	.8409	135.0	532.62	8.6043E 00	2.3707E 00	3.0344E-03	1.2214E-02	1.2775E 02	1.6465E-03
72	.8822	135.0	534.67	8.9668E 00	2.4259E 00	3.1132E-03	1.2530E-02	1.2823E 02	1.6890E-03
73	.9235	135.0	536.55	9.4455E 00	2.3186E 00	2.9827E-03	1.2004E-02	1.2868E 02	1.6180E-03
74	.9648	135.0	539.87	1.0365E 01	2.4925E 00	3.2202E-03	1.2957E-02	1.2947E 02	1.7466E-03
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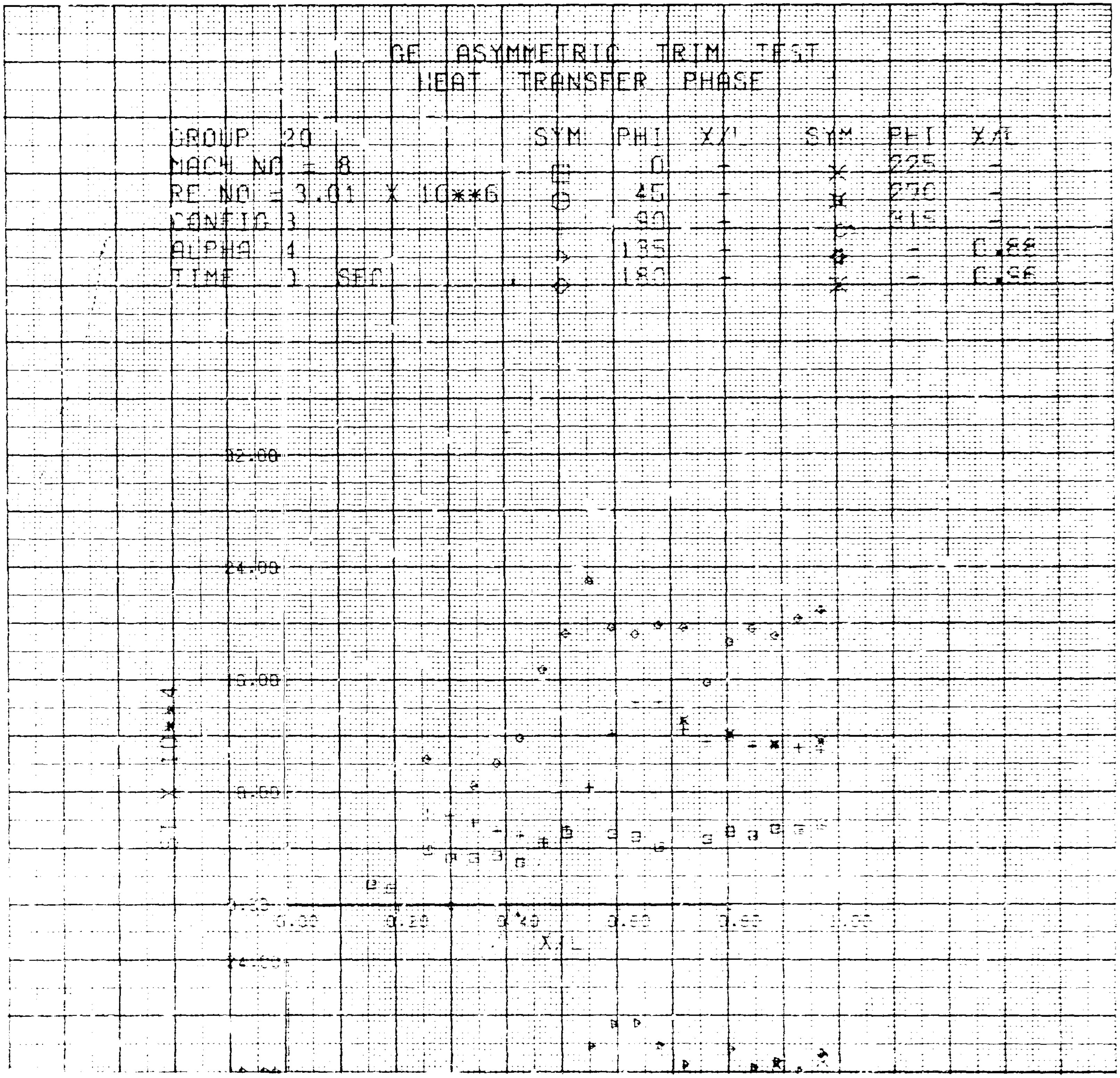
78	.3783	180.0	496.20	5.5979E 00	1.5320E 00	1.8740E-03	7.5585E-03	1.1910E 02	1.0189E-03
79	.4203	180.0	501.04	6.5427E 00	1.7863E 00	2.1975E-03	8.8609E-03	1.2025E 02	1.1944E-03
80	.4623	180.0	507.27	8.7366E 00	2.4949E 00	3.0930E-03	1.2467E-02	1.2172E 02	1.6805E-03
81	.5043	180.0	513.68	1.1387E 01	2.8528E 00	3.5649E-03	1.4365E-02	1.2324E 02	1.9363E-03
82	.5463	180.0	518.11	1.2775E 01	3.3926E 00	4.2629E-03	1.7173E-02	1.2430E 02	2.3148E-03
83	.5882	180.0	520.30	1.0932E 01	2.9030E 00	3.6580E-03	1.4734E-02	1.2482E 02	1.9861E-03
84	.6302	180.0	524.62	1.0584E 01	2.8106E 00	3.5609E-03	1.4340E-02	1.2584E 02	1.9330E-03
85	.6722	180.0	534.89	1.1943E 01	2.8721E 00	3.6865E-03	1.4837E-02	1.2827E 02	2.0000E-03
86	.7170	180.0	539.03	1.2017E 01	2.8300E 00	3.6522E-03	1.4696E-02	1.2927E 02	1.9810E-03
87	.7583	180.0	532.17	9.5107E 00	2.2871E 00	2.9257E-03	1.1777E-02	1.2764E 02	1.5875E-03
88	.7996	180.0	538.21	1.1307E 01	2.6840E 00	3.4612E-03	1.3928E-02	1.2907E 02	1.8775E-03
89	.8409	180.0	540.32	1.1004E 01	2.8117E 00	3.6347E-03	1.4625E-02	1.2958E 02	1.9713E-03
90	.8822	180.0	542.64	1.1454E 01	2.7317E 00	3.5418E-03	1.4249E-02	1.3013E 02	1.9207E-03
91	.9235	180.0	544.77	1.1870E 01	2.9014E 00	3.7720E-03	1.5173E-02	1.3063E 02	2.0453E-03
92	.9648	180.0	547.64	1.2884E 01	2.9690E 00	3.8746E-03	1.5584E-02	1.3132E 02	2.1006E-03
93	.8822	225.0	542.88	9.2639E 00	2.3670E 00	3.0760E-03	1.2351E-02	1.3019E 02	1.6648E-03
94	.9648	225.0	547.24	9.7439E 00	2.3913E 00	3.1191E-03	1.2545E-02	1.3123E 02	1.6911E-03
95	.7170	270.0	541.24	8.1594E 00	1.8845E 00	2.4392E-03	9.8138E-03	1.2980E 02	1.3229E-03
96	.7996	270.0	543.86	6.5116E 00	1.7292E 00	2.2455E-03	9.0331E-03	1.3042E 02	1.2176E-03
97	.8822	270.0	546.00	6.3675E 00	1.6270E 00	2.1187E-03	8.5223E-03	1.3093E 02	1.1488E-03
98	.9648	270.0	546.77	6.4812E 00	1.6560E 00	2.1571E-03	8.6763E-03	1.3111E 02	1.1695E-03

GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
SYM PHI X/L SYM PHI X/L SYM PHI X/L
GROUP 20
MACH NO 8


GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 20
MACH NO = 8
RE NO = 3.01 X 10**6
CONFIG 3
ALPHA 4
TIME 1 SEC
SYM PHI X/L
0 -
45 -
90 -
135 -
180 -
SYM PHI X/L
225 -
270 -
315 -
- 0.88
- 0.96
32.00
24.00
16.00
8.00
0.00
0.20
0.40
0.60
0.80
1.00
X/L

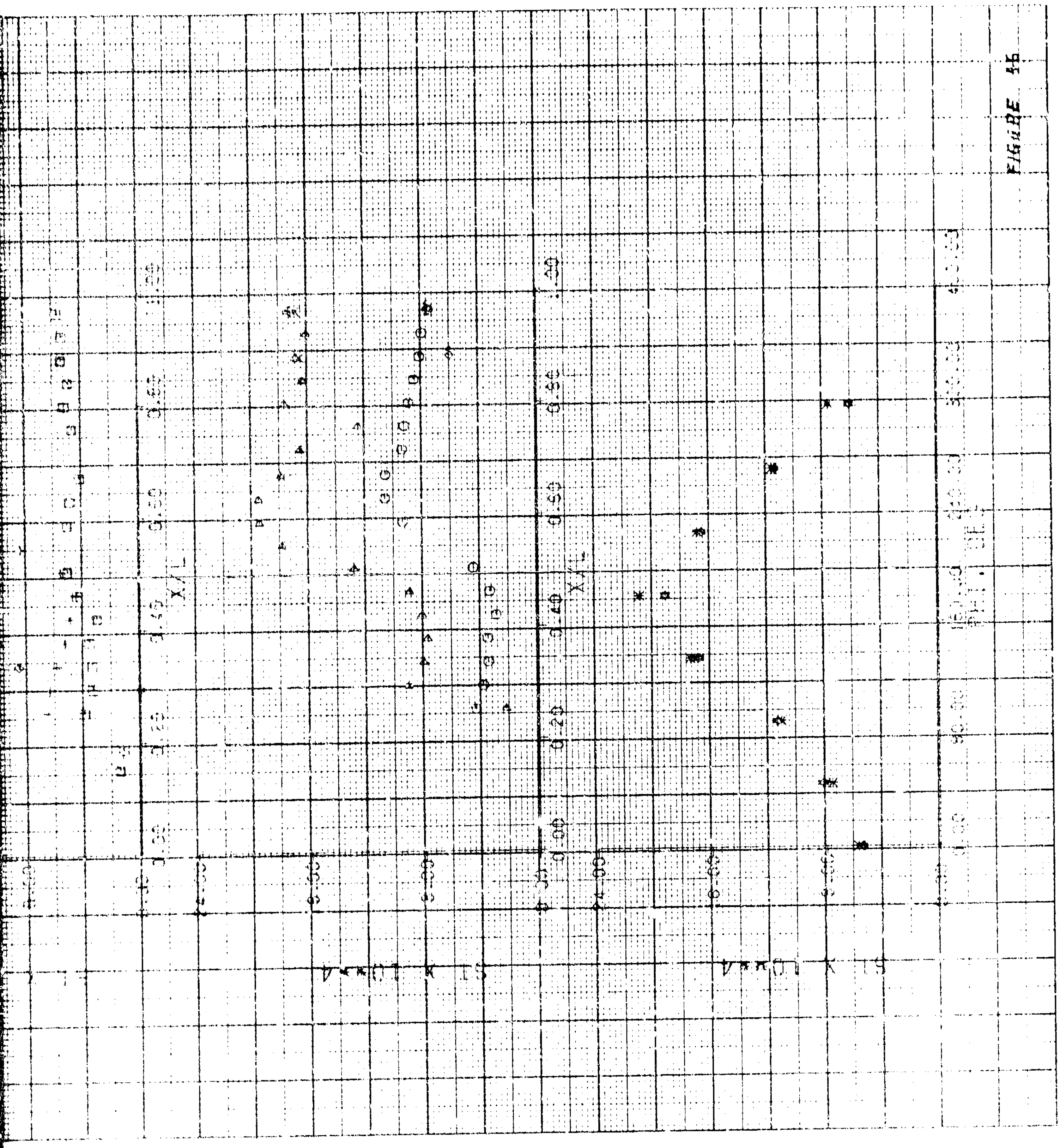


Figure 46

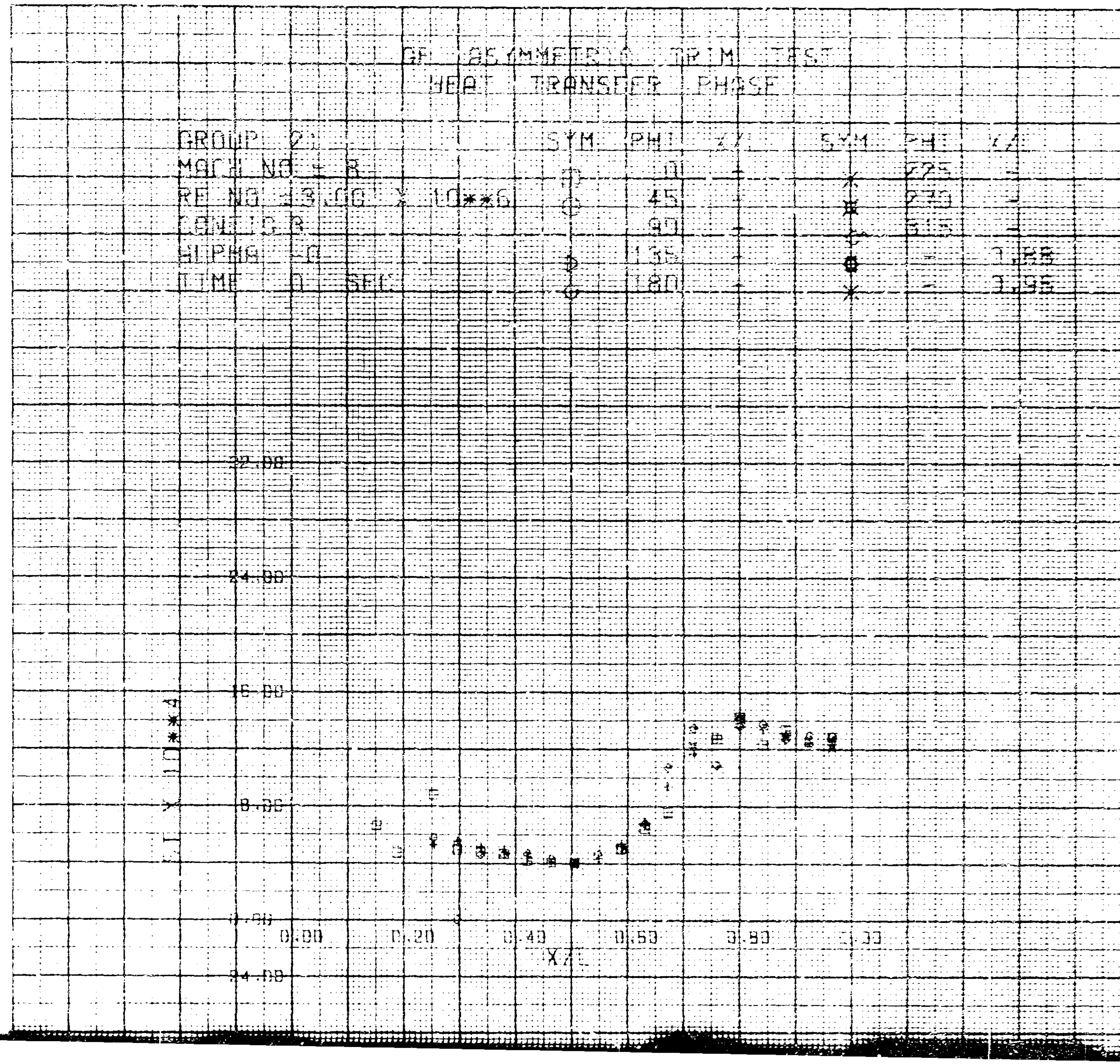
7/14/69

ARO, INC., ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
VKF-800

GROUP	CONFIG	ALPHA-M	BETA-M	ALPHA-S	ROLL	?-P	DATE	MACH NO	PC	TO	TIME
41	1	-.01	0	-.01	0	0	714	8.00	868.47	1316.11	.00

T-INF	P-INF	U-INF	V-INF	RHO-INF	MU-INF	RE/FT	RE/D	MU
9.5570E 01	6.0476E-02	3.8674E 03	3.9281E 03	6.0235E-05	7.6702E-08	3.3031E 06	2.7547E 06	3.1240E 02

TC NO	X/L	PHI	TEMP	SLOPE	Q-STDO	HT	HM	HR	ST
1	.1900	0	509.87	4.4309E 00	9.8623E-01	1.2223E-03	4.9259E-03	1.2220E 02	6.0799E-04
2	.1867	0	498.52	1.7590E 00	7.1573E-01	8.7541E-04	3.5249E-03	1.1965E 02	4.7579E-04
3	.2524	0	503.74	4.4627E 00	1.3192E 00	1.6239E-03	6.5463E-03	1.2089E 02	8.0236E-04
4	.2943	0	519.75	2.3010E 00	7.2666E-01	9.1222E-04	3.6741E-03	1.2469E 02	4.9542E-04
5	.3363	0	522.57	2.2492E 00	7.0993E-01	8.9464E-04	3.6027E-03	1.2536E 02	4.8560E-04
6	.3783	0	521.50	2.2721E 00	6.8506E-01	8.6187E-04	3.4706E-03	1.2560E 02	4.6779E-04
7	.4203	0	524.18	2.0973E 00	6.0938E-01	7.6950E-04	3.0985E-03	1.2574E 02	4.1784E-04
8	.4623	0	526.45	2.1373E 00	5.8890E-01	7.4577E-04	3.0029E-03	1.2628E 02	4.0471E-04
9	.5043	0	525.97	2.1555E 00	5.8314E-01	7.3602E-04	2.9715E-03	1.2616E 02	4.0052E-04
10	.5463	0	530.17	-5.4206E-03	-1.6332E-03	-2.0796E-06	-8.3767E-06	1.2733E 02	-1.1207E-06
11	.5882	0	529.04	2.4476E 00	7.2940E-01	9.2689E-04	3.7313E-03	1.2690E 02	5.0293E-04
12	.6302	0	531.17	3.4517E 00	9.1302E-01	1.1497E-03	4.7886E-03	1.2740E 02	6.4544E-04
13	.6722	0	530.29	4.3888E 00	1.0945E 00	1.3928E-03	5.6064E-03	1.2719E 02	7.5567E-04
99	.8822	315.0	542.35	5.9548E 00	1.3369E 00	1.7018E-03	6.8456E-03	1.3006E 02	9.2272E-04
15	.7583	0	539.63	7.5788E 00	1.8225E 00	2.3472E-03	9.4435E-03	1.2941E 02	1.2729E-03
16	.7996	0	541.11	7.2564E 00	2.0360E 00	2.6272E-03	1.0569E-02	1.2977E 02	1.4246E-03
17	.8409	0	550.10	6.9106E 00	1.7657E 00	2.2773E-03	9.1618E-03	1.2968E 02	1.2349E-03
18	.8822	0	544.30	7.5043E 00	1.9050E 00	2.4683E-03	9.9280E-03	1.3053E 02	1.3382E-03
19	.9235	0	545.01	7.1143E 00	1.7823E 00	2.3114E-03	9.2966E-03	1.3070E 02	1.2531E-03
20	.9648	0	544.42	7.2282E 00	1.8344E 00	2.3772E-03	9.5610E-03	1.3055E 02	1.2888E-03
21	.2524	45.0	497.37	2.9306E 00	8.6633E-01	1.0581E-03	4.2669E-03	1.1938E 02	5.7513E-04
22	.2943	45.0	511.38	2.6979E 00	8.0086E-01	9.9523E-04	4.0102E-03	1.2270E 02	5.4053E-04
23	.3363	45.0	514.20	2.3970E 00	7.2073E-01	8.9878E-04	3.6210E-03	1.2337E 02	4.8807E-04
24	.3783	45.0	510.05	2.2311E 00	6.7666E-01	8.3825E-04	3.3769E-03	1.2301E 02	4.5516E-04
25	.4203	45.0	510.94	2.8559E 00	5.9730E-01	7.4747E-04	3.0110E-03	1.2402E 02	4.0585E-04
26	.4623	45.0	520.09	2.1862E 00	6.1391E-01	7.7057E-04	3.1035E-03	1.2476E 02	4.1332E-04
27	.5043	45.0	522.34	2.1540E 00	5.7200E-01	7.1972E-04	2.8985E-03	1.2507E 02	3.9066E-04
100	.9648	315.0	548.68	7.3603E 00	1.6975E 00	2.2125E-03	8.8970E-03	1.3157E 02	1.1992E-03
29	.5882	45.0	523.81	2.4777E 00	7.3779E-01	9.3121E-04	3.7480E-03	1.2565E 02	5.0542E-04
30	.6302	45.0	526.73	3.5163E 00	9.5130E-01	1.2052E-03	4.8523E-03	1.2636E 02	6.5403E-04
31	.6722	45.0	530.70	5.7260E 00	1.3074E 00	1.6646E-03	6.7003E-03	1.2729E 02	9.0312E-04
32	.7170	45.0	534.76	7.2877E 00	1.7162E 00	2.1964E-03	8.8342E-03	1.2825E 02	1.1914E-03
33	.7583	45.0	536.59	7.7745E 00	2.0093E 00	2.5713E-03	1.0347E-02	1.2869E 02	1.3946E-03
34	.7996	45.0	537.99	7.9983E 00	2.0472E 00	2.6309E-03	1.0580E-02	1.2902E 02	1.4259E-03
35	.8409	45.0	540.82	7.6876E 00	1.9175E 00	2.4732E-03	9.9499E-03	1.2970E 02	1.3411E-03
36	.8822	45.0	542.91	6.4538E 00	1.8027E 00	2.3314E-03	9.3784E-03	1.3020E 02	1.2641E-03
37	.9235	45.0	544.12	6.4212E 00	1.7429E 00	2.2577E-03	9.0810E-03	1.3048E 02	1.2240E-03
38	.9648	45.0	544.51	6.4891E 00	1.6086E 00	2.0848E-03	8.3854E-03	1.3055E 02	1.1302E-03
39	.2524	90.0	490.05	2.4968E 00	7.4720E-01	9.6975E-04	3.9113E-03	1.1859E 02	5.2719E-04
40	.2943	90.0	50 24	2.5502E 00	8.1765E-01	1.0071E-03	4.0599E-03	1.2101E 02	5.4721E-04
41	.3363	90.0	506.83	2.3974E 00	7.5608E-01	9.3501E-04	3.7685E-03	1.2162E 02	5.0795E-04
42	.3783	90.0	508.62	2.2890E 00	7.2249E-01	8.9474E-04	3.6059E-03	1.2204E 02	4.8603E-04
43	.4203	90.0	510.78	2.2241E 00	6.5748E-01	8.1641E-04	3.2898E-03	1.2256E 02	4.4343E-04
44	.4623	90.0	512.55	1.9316E 00	5.9947E-01	7.4665E-04	3.0084E-03	1.2298E 02	4.0549E-04
45	.5043	90.0	515.11	2.2100E 00	6.0892E-01	7.6020E-04	3.0676E-03	1.2358E 02	4.1280E-04
46	.5463	90.0	516.5	2.2374E 00	6.3803E-01	7.9910E-04	3.2196E-03	1.2392E 02	4.3389E-04
47	.5882	90.0	519.56	2.7042E 00	7.5574E-01	9.5254E-04	3.8365E-03	1.2464E 02	5.1712E-04
48	.6302	90.0	522.64	3.6182E 00	9.9693E-01	1.2564E-03	5.0597E-03	1.2537E 02	6.8198E-04
49	.6722	90.0	527.55	5.4357E 00	1.3619E 00	1.7269E-03	6.9534E-03	1.2654E 02	9.3710E-04
50	.7170	90.0	533.42	7.1575E 00	1.6855E 00	2.1535E-03	8.6672E-03	1.2794E 02	1.1682E-03
51	.7583	90.0	532.15	7.0703E 00	1.8418E 00	2.3560E-03	9.4584E-03	1.2768E 02	1.2749E-03
52	.7996	90.0	534.76	7.4516E 00	2.0453E 00	2.6177E-03	1.0535E-02	1.2825E 02	1.4199E-03
53	.8409	90.0	536.95	7.7260E 00	1.9355E 00	2.4813E-03	9.9848E-03	1.2856E 02	1.3458E-03
54	.8822	90.0	538.95	7.5854E 00	1.8620E 00	2.3959E-03	9.6398E-03	1.2925E 02	1.2993E-03
55	.9235	90.0	540.47	7.4259E 00	1.7858E 00	2.3022E-03	9.2621E-03	1.2960E 02	1.2484E-03
56	.9648	90.0	540.15	7.3611E 00	1.7702E 00	2.2813E-03	9.1782E-03	1.2954E 02	1.2371E-03
57	.2524	135.0	484.42	8.1277E-01	2.4026E-01	2.8889E-04	1.1658E-03	1.1631E 02	1.5713E-04
58	.2943	135.0	491.65	2.7140E 00	8.7015E-01	1.0554E-03	4.2573E-03	1.1802E 02	5.7383E-04
59	.3363	135.0	494.63	2.4794E 00	7.8257E-01	9.5364E-04	3.8471E-03	1.1873E 02	5.1787E-04
60	.3783	135.0	497.66	2.1330E 00	7.2472E-01	8.8550E-04	3.5708E-03	1.1945E 02	4.8130E-04
61	.4203	135.0	500.94	2.2478E 00	6.7561E-01	3.2881E-04	3.3418E-03	1.2022E 02	4.5040E-04
62	.4623	135.0	504.64	2.1488E 00	6.2437E-01	7.6943E-04	3.1015E-03	1.2110E 02	4.1805E-04
63	.5043	135.0	508.08	2.2605E 00	5.7757E-01	7.1479E-04	2.8807E-03	1.2192E 02	3.8829E-04
64	.5463	135.0	510.41	2.4442E 00	6.4906E-01	8.0559E-04	3.2463E-03	1.2247E 02	4.3756E-04
65	.5882	135.0	513.09	3.0013E 00	7.9701E-01	9.9251E-04	3.9949E-03	1.2310E 02	5.3920E-04
66	.6302	135.0	516.20	3.9457E 00	1.0478E 00	1.3099E-03	5.2768E-03	1.2384E 02	7.1124E-04
67	.6722	135.0	524.07	5.7683E 00	1.3872E 00	1.7514E-03	7.0553E-03	1.2571E 02	9.5056E-04
68	.7170	135.0	528.49	7.3794E 00	1.7650E 00	2.2663E-03	9.1234E-03	1.2676E 02	1.2297E-03
69	.7583	135.0	524.21	5.1717E 00	1.4517E 00	1.8331E-03	7.3814E-03	1.2575E 02	9.9492E-04
70	.7996	135.0	529.42	7.4077E 00	2.1524E 00	2.7360E-03	1.1014E-02	1.2698E 02	1.4845E-03
71	.8409	135.0	530.77	6.9512E 00	1.9130E 00	2.4388E-03	9.8160E-03	1.2731E 02	1.3230E-03
72	.8822	135.0	533.31	7.6443E 00	1.9058E 00	2.4346E-03	9.7985E-03	1.2791E 02	1.3207E-03
73	.9235	135.0	535.93	7.1154E 00	1.7468E 00	2.2387E-03	9.0049E-03	1.2853E 02	1.2143E-03
74	.9648	135.0	538.19	7.4106E 00	1.7821E 00	2.2909E-03	9.2176E-03	1.2907E 02	1.2424E-03
75	.2524	180.0	485.92	3.0103E 00	8.7465E-01	1.0536E-03	4.2512E-03	1.1667E 02	5.7301E-04
76	.2943	180.0	-116.74	6.1927E-08	1.9855E-08	1.3857E-11	5.7811E-11	-2.1036E 01	7.7921E-12
77	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
78	.3783	180.0	499.71	2.1175E 00	6.9663E-01	8.5327E-04	3.4405E-03	1.1993E 02	4.6374E-04
79	.4203	180.0	503.94	2.1799E 00	7.0353E-01	8.6627E-04	3.4920E-03	1.2094E 02	4.7068E-04
80	.4623	180.0	508.30	2.2647E 00	6.4673E-01	8.0069E-04	3.2265E-03	1.2197E 02	4.3489E-04
81	.5043	180.0	511.53	2.3904E 00	5.9864E-01	7.4429E-04	2.9991E-03	1.2273E 02	4.0424E-04
82	.5463	180.0	514.11	2.5660E 00	6.8190E-01	8.4563E-04	3.5211E-03	1.2335E 02	4.6139E-04
83	.5882	180.0	515.61	2.8387E 00	7.5382E-01	9.4299E-04	3.7963E-03	1.2395E 02	5.1196E-04
84	.6302	180.0	521.64	3.7564E 00	9.9752E-01	1.2558E-03	5.0346E-03	1.2516E 02	6.8156E-04
85	.6722	180.0	530.64	6.4537E 00	1.5520E 00	1.9759E-03	7.9535E-03	1.2727E 02	1.0720E-03
86	.7170	180.0	535.75	8.2404E 00	1.9405E 00	2.4867E-03	1.0007E-02	1.2849E 02	1.3488E-03
87	.7583	180.0	531.70	6.5515E 00	1.5755E 00	2.0085E-03	8.0844E-03	1.2753E 02	1.0897E-03
88	.7996	180.0	535.45	7.4295E 00	1.9612E 00	2.5122E-03	1.0110E-02	1.2842E 02	1.3627E-03
89	.8409	180.0	537.40	7.7270E 00	1.9743E 00	2.5354E-03	1.0202E-02	1.2888E 02	1.3751E-03
90	.8822	180.0	539.45	7.9215E 00	1.8254E 00	2.3504E-03	9.4543E-03	1.2937E 02	1.2746E-03
91	.9235	180.0	541.30	7.5650E 00	1.8570E 00	2.3967E-03	9.6417E-03	1.2981E 02	1.2996E-03
92	.9648	180.0	545.48	8.0077E 00	1.8453E 00	2.3945E-03	9.6309E-03	1.3081E 02	1.2981E-03
93	.8822	225.0	541.34	7.1343E 00	1.8224E 00	2.3528E-03	9.4642E-03	1.2982E 02	1.2758E-03
94	.9648	225.0	546.09	7.2535E 00	1.7443E 00	2.2653E-03	9.1107E-03	1.3095E 02	1.2280E-03
95	.7170	270.0	541.65	7.7517E 00	1.7476E 00	2.2563E-03	9.0779E-03	1.2990E 02	1.2236E-03
96	.7596	270.0	545.17	7.5732E 00	2.0111E 00	2.6084E-03	1.0491E-02	1.3072E 02	1.4141E-03
97	.8822	270.0	545.81	7.1839E 00	1.8356E 00	2.3829E-03	9.5840E-03	1.3069E 02	1.2918E-03
98	.9648	270.0	548.02	7.1233E 00	1.7130E 00	2.2302E-03	8.9687E-03	1.3141E 02	1.2089E-03



HEAT TRANSFER PHASE
GROUP 2
MACH NO = 8
RE NO = 3.00 X 10**6
SYM PHI Z/L
0
45
90
135
180
SYM PHI Z/L
225
270
315
32.00
24.00
16.00
8.00
0.00
0.00
0.20
0.40
0.60
0.80
X/L

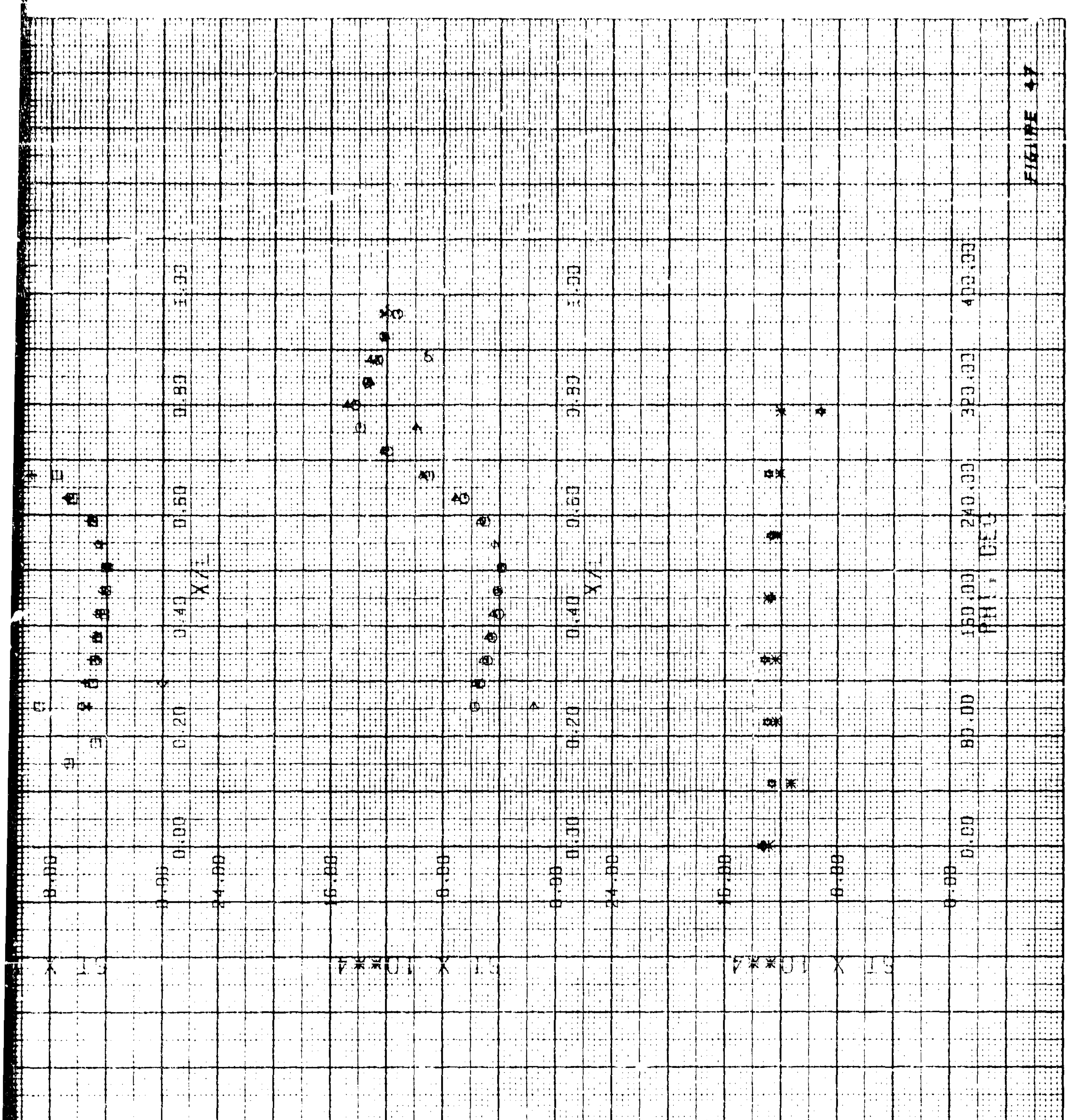


Figure 47

3

7/16/??

AEDC(ARO, INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
VT0047-000

GROUP	CONFIG	ALPHA-N	BETA-N	ALPHA-S	ROLL	ALP-P	DATE	MACH NO	PO	TO	TIME
27	3	.02	0	.02	0	0	716	7.99	472.37	1266.12	-.00

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
9.34137E 01	4.07791E-02	2.17984E 00	3.70397E 03	4.38112E-05	7.52074E-08	2.20431E 04	2.02083E 04	3.14719E 02

TC NO	X/L	PHI	TEMP	SLOPE	Q-STOA	HT	HM	HW	ST
1	.1508	0	497.31	3.8750E 00	8.6252E-01	1.0851E-03	4.3141E-03	1.1936E 02	8.0802E-04
2	.1867	0	481.94	2.7930E 00	6.1350E-01	7.6673E-04	3.0949E-03	1.1666E 02	5.8099E-04
3	.2524	0	488.55	2.8244E 00	8.3490E-01	1.0449E-03	4.2386E-03	1.1729E 02	7.9317E-04
4	.2943	0	503.92	1.9130E 00	6.0399E-01	7.6921E-04	3.1043E-03	1.2022E 02	5.8230E-04
5	.3362	0	504.46	1.8224E 00	6.0680E-01	7.7634E-04	3.1345E-03	1.2108E 02	5.8767E-04
6	.3783	0	508.17	1.8524E 00	5.5681E-01	7.1577E-04	2.8894E-03	1.2194E 02	5.4171E-04
7	.4203	0	512.22	1.7351E 00	5.0417E-01	6.4979E-04	2.6228E-03	1.2242E 02	4.9172E-04
8	.4623	0	514.27	1.7573E 00	4.8418E-01	6.2729E-04	2.5312E-03	1.2337E 02	4.7456E-04
9	.5043	0	515.08	1.7310E 00	4.6852E-01	6.081?E-04	2.4862E-03	1.2375E 02	4.6012E-04
10	.5461	0	530.94	2.2115E-02	4.2050E-03	8.2160E-06	3.3124E-05	1.2735E 02	6.2110E-06
11	.5882	0	520.75	1.7212E 00	4.7625E-01	6.1964E-04	2.4990E-03	1.2492E 02	4.6804E-04
12	.6302	0	523.07	1.8393E 00	4.9761E-01	6.5277E-04	2.6320E-03	1.2565E 02	4.9361E-04
13	.6722	0	523.46	2.1369E 00	5.3532E-01	7.0191E-04	2.8311E-03	1.2557E 02	5.3070E-04
14	.8822	315.0	539.98	4.7731E 00	1.1392E 00	1.5260E-03	6.1520E-03	1.2950E 02	1.1535E-03
15	.7583	0	532.22	3.9983E 00	8.1722E-01	1.0904E-03	4.3701E-03	1.2765E 02	8.1931E-04
16	.7996	0	534.76	4.1116E 00	1.1536E 00	1.5394E-03	6.1801E-03	1.2825E 02	1.1603E-03
17	.8409	0	535.47	4.4212E 00	1.2319E 00	1.6411E-03	6.6160E-03	1.2842E 02	1.2402E-03
18	.8822	0	539.15	5.0377E 00	1.4875E 00	1.9914E-03	8.0252E-03	1.2930E 02	1.5046E-03
19	.9235	0	539.51	5.4619E 00	1.4535E 00	1.9468E-03	7.8444E-03	1.2939E 02	1.4709E-03
20	.9648	0	537.02	6.2826E 00	1.5108E 00	2.0109E-03	8.1341E-03	1.2894E 02	1.5252E-03
21	.2524	45.0	483.98	2.9224E 00	7.4564E-01	9.2957E-04	3.7574E-03	1.1621E 02	7.0445E-04
22	.2943	45.0	496.09	2.8749E 00	6.6524E-01	8.4264E-04	3.4037E-03	1.1921E 02	6.3813E-04
23	.3363	45.0	500.83	1.9921E 00	5.9883E-01	7.6256E-04	3.0795E-03	1.2020E 02	5.7736E-04
24	.3783	45.0	504.59	1.8081E 00	5.6755E-01	7.2528E-04	2.9321E-03	1.2109E 02	5.4972E-04
25	.4203	45.0	508.24	1.6087E 00	4.8743E-01	6.0898E-04	2.4247E-03	1.2196E 02	4.5478E-04
26	.4623	45.0	513.09	1.4951E 00	4.7560E-01	6.1524E-04	2.4829E-03	1.2311E 02	4.6551E-04
27	.5043	45.0	515.44	1.7510E 00	4.6490E-01	6.0333E-04	2.4345E-03	1.2366E 02	4.5643E-04
100	.9648	315.0	541.25	9.4872E 00	1.3677E 00	1.8361E-03	7.3986E-03	1.2980E 02	1.3871E-03
29	.5882	45.0	520.28	1.7735E 00	4.8864E-01	6.3797E-04	2.5737E-03	1.2479E 02	4.8252E-04
30	.6302	45.0	522.88	1.9176E 00	5.1880E-01	6.7974E-04	2.7417E-03	1.2543E 02	5.1403E-04
31	.6722	45.0	524.57	2.4946E 00	5.3685E-01	8.3631E-04	3.3730E-03	1.2584E 02	6.3237E-04
32	.7176	45.0	528.19	3.0544E 00	7.1939E-01	9.4919E-04	3.8273E-03	1.2669E 02	7.1755E-04
33	.7583	45.0	533.10	3.1497E 00	9.3673E-01	1.2440E-03	5.0140E-03	1.2786E 02	9.4019E-04
34	.7996	45.0	535.87	4.1760E 00	1.2201E 00	1.6369E-03	6.5977E-03	1.2852E 02	1.2369E-03
35	.8409	45.0	539.08	5.2546E 00	1.4216E 00	1.9030E-03	7.6689E-03	1.2928E 02	1.4378E-03
36	.8822	45.0	541.15	5.1937E 00	1.4107E 00	1.9043E-03	7.6739E-03	1.2978E 02	1.4387E-03
37	.9235	45.0	541.87	5.4860E 00	1.4068E 00	1.8953E-03	7.6146E-03	1.2994E 02	1.4280E-03
38	.9648	45.0	539.01	9.4160E 00	1.3024E 00	1.7447E-03	7.0309E-03	1.2941E 02	1.3182E-03
39	.2524	90.0	485.21	2.1889E 00	6.4705E-01	8.0789E-04	3.2694E-03	1.1650E 02	6.1220E-04
40	.2943	90.0	497.62	2.0887E 00	6.6969E-01	8.4932E-04	3.4305E-03	1.1944E 02	6.4316E-04
41	.3363	90.0	502.23	2.0126E 00	6.3522E-01	8.1034E-04	3.2722E-03	1.2053E 02	6.1349E-04
42	.3783	90.0	506.26	1.7634E 00	5.5672E-01	7.1387E-04	2.8820E-03	1.2148E 02	5.4033E-04
43	.4203	90.0	509.74	1.7582E 00	5.1973E-01	6.6943E-04	2.7021E-03	1.2231E 02	5.0660E-04
44	.4623	90.0	511.80	1.5505E 00	4.8164E-01	6.2281E-04	2.5104E-03	1.2280E 02	4.7066E-04
45	.5043	90.0	514.42	1.6487E 00	4.5426E-01	5.8869E-04	2.3754E-03	1.2342E 02	4.4535E-04
46	.5463	90.0	518.37	1.4503E 00	4.4273E-01	5.7666E-04	2.3245E-03	1.2436E 02	4.3619E-04
47	.5882	90.0	519.39	1.4913E 00	4.7654E-01	6.1892E-04	2.4969E-03	1.2460E 02	4.6812E-04
48	.6302	90.0	521.04	2.0079E 00	5.5325E-01	7.2312E-04	2.9170E-03	1.2499E 02	5.4849E-04
49	.6722	90.0	522.77	2.4630E 00	6.4229E-01	8.4141E-04	3.3939E-03	1.2540E 02	6.3629E-04
50	.7176	90.0	527.05	2.9591E 00	6.9683E-01	9.1800E-04	3.7019E-03	1.2642E 02	6.9405E-04
51	.7583	90.0	530.31	3.1919E 00	8.0358E-01	1.1691E-03	4.7135E-03	1.2720E 02	8.8370E-04
52	.7996	90.0	533.49	4.6120E 00	1.2014E 00	1.5963E-03	6.4350E-03	1.2795E 02	1.2065E-03
53	.8409	90.0	535.64	5.6464E 00	1.3644E 00	1.8181E-03	7.3281E-03	1.2846E 02	1.3739E-03
54	.8822	90.0	538.25	6.6027E 00	1.4735E 00	1.9705E-03	7.9414E-03	1.2911E 02	1.4889E-03
55	.9235	90.0	538.37	6.6318E 00	1.4585E 00	1.9398E-03	7.8179E-03	1.2911E 02	1.4657E-03
56	.9648	90.0	534.38	5.9430E 00	1.4051E 00	1.8692E-03	7.5346E-03	1.2816E 02	1.4126E-03
57	.2524	135.0	482.06	5.8792E-01	1.5015E-01	1.8674E-04	7.5488E-04	1.1575E 02	1.4153E-04
58	.2943	135.0	493.34	2.1161E 00	6.7845E-01	8.5579E-04	3.4574E-03	1.1842E 02	6.4821E-04
59	.3363	135.0	497.24	2.1728E 00	6.8582E-01	8.6946E-04	3.5119E-03	1.1937E 02	6.5842E-04
60	.3783	135.0	504.50	1.6892E 00	5.2474E-01	6.6800E-04	2.6977E-03	1.2014E 02	5.0577E-04
61	.4203	135.0	503.81	1.4886E 00	5.4127E-01	6.9170E-04	2.7929E-03	1.2085E 02	5.2363E-04
62	.4623	135.0	506.50	1.7399E 00	5.0553E-01	6.4843E-04	2.6178E-03	1.2154E 02	4.9079E-04
63	.5043	135.0	509.39	1.7481E 00	4.4615E-01	5.7503E-04	2.3211E-03	1.2223E 02	4.3517E-04
64	.5463	135.0	511.30	1.8151E 00	4.8201E-01	6.2216E-04	2.5111E-03	1.2270E 02	4.7078E-04
65	.5882	135.0	513.49	1.4641E 00	3.6227E-01	4.6883E-04	1.8920E-03	1.2320E 02	3.5472E-04
66	.6302	135.0	515.26	2.1724E 00	5.7689E-01	7.4637E-04	3.0194E-03	1.2362E 02	5.6617E-04
67	.6722	135.0	517.55	2.8362E 00	6.3396E-01	8.2685E-04	3.3280E-03	1.2416E 02	6.2395E-04
68	.7176	135.0	520.63	3.1127E 00	7.8010E-01	1.0191E-03	4.1110E-03	1.2490E 02	7.7075E-04
69	.7583	135.0	523.13	2.4086E 00	7.3196E-01	9.5930E-04	3.8603E-03	1.2549E 02	7.2543E-04
70	.7996	135.0	528.04	4.4187E 00	1.3420E 00	1.7784E-03	7.1389E-03	1.2607E 02	1.3384E-03
71	.8409	135.0	530.34	4.9513E 00	1.3542E 00	1.8051E-03	7.2778E-03	1.2720E 02	[illegible]
72	.8822	135.0	531.81	5.4666E 00	1.5530E 00	2.0324E-03	8.1930E-03	1.2755E 02	1.5362E-03
73	.9235	135.0	532.09	5.4032E 00	1.6392E 00	1.9087E-03	7.6994E-03	1.2762E 02	1.4427E-03
74	.9648	135.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
75	.2524	180.0	482.98	2.4570E 00	7.1392E-01	8.0912E-04	3.5932E-03	1.1597E 02	6.7367E-04
76	.2943	180.0	-116.76	-1.1546E-14	-3.7820E-15	-2.6388E-18	-1.1027E-17	-2.1036E 01	-2.0676E-18
77	.3363	180.0	501.80	1.9170E 00	5.6667E-01	7.2250E-04	2.9174E-03	1.2043E 02	5.4698E-04
78	.3783	180.0	505.58	1.8021E 00	5.4576E-01	7.2475E-04	2.9241E-03	1.2130E 02	5.4459E-04
79	.4203	180.0	508.57	1.8038E 00	5.5094E-01	7.0858E-04	2.3562E-03	1.2203E 02	5.3624E-04
80	.4623	180.0	511.00	1.9712E 00	5.3434E-01	6.9008E-04	2.7852E-03	1.2200E 02	5.2217E-04
81	.5043	180.0	514.40	1.7649E 00	4.4214E-01	5.7315E-04	2.3128E-03	1.2349E 02	4.3362E-04
82	.5463	180.0	517.27	1.7595E 00	4.6723E-01	6.0769E-04	2.4519E-03	1.2418E 02	4.5960E-04
83	.5882	180.0	519.20	1.6773E 00	4.4741E-01	5.8078E-04	2.3431E-03	1.2456E 02	4.3920E-04
84	.6302	180.0	521.71	1.8062E 00	5.0460E-01	6.6221E-04	2.6712E-03	1.2515E 02	5.0081E-04
85	.6722	180.0	523.09	2.4041E 00	6.7436E-01	8.8445E-04	3.5673E-03	1.2562E 02	6.4881E-04
86	.7176	180.0	526.02	3.4635E 00	8.1562E-01	1.0742E-03	4.3314E-03	1.2637E 02	8.1214E-04
87	.7583	180.0	530.31	3.?906E 00	8.1089E-01	1.0?16E-03	4.3215E-03	1.2720E 02	8.1020E-04
88	.7996	180.0	534.77	4.?053E 00	1.2674E 00	1.6606E-03	6.7946E-03	1.2826E 02	1.2740E-03
89	.8409	180.0	536.61	5.4540E 00	1.4958E 00	1.9957E-03	8.0?16E-03	1.2870E 02	1.5080E-03
90	.8822	180.0	537.97	6.4014E 00	1.4840E 00	1.9902E-03	8.0249E-03	1.2902E 02	1.5030E-03
91	.9235	180.0	538.47	6.312?E 00	1.5748E 00	2.1852E-03	8.4842E-03	1.2913E 02	1.5984E-03
92	.9648	180.0	537.94	5.7422E 00	1.5629E 00	2.0804E-03	8.4001E-03	1.2880E 02	1.5766E-03
93	.8822	225.0	540.37	5.7032E 00	1.4572E 00	1.9540E-03	7.8741E-03	1.2959E 02	1.4763E-03
94	.9648	225.0	538.16	5.4795E 00	1.4380E 00	1.9225E-03	7.7440E-03	1.2906E 02	1.4526E-03
95	.7176	270.0	533.57	3.1052E 00	7.0884E-01	9.3619E-04	3.7448E-03	1.2796E 02	7.0302E-04
96	.7996	270.0	542.38	5.4719E 00	1.1873E 00	1.5964E-03	6.4321E-03	1.3007E 02	1.2059E-03
97	.8822	270.0	545.71	5.4741E 00	1.4584E 00	1.9979E-03	7.8877E-03	1.3072E 02	1.4788E-03
98	.9648	270.0	541.14	5.4173E 00	1.3990E 00	1.8779E-03	7.5469E-03	1.2978E 02	1.4167E-03

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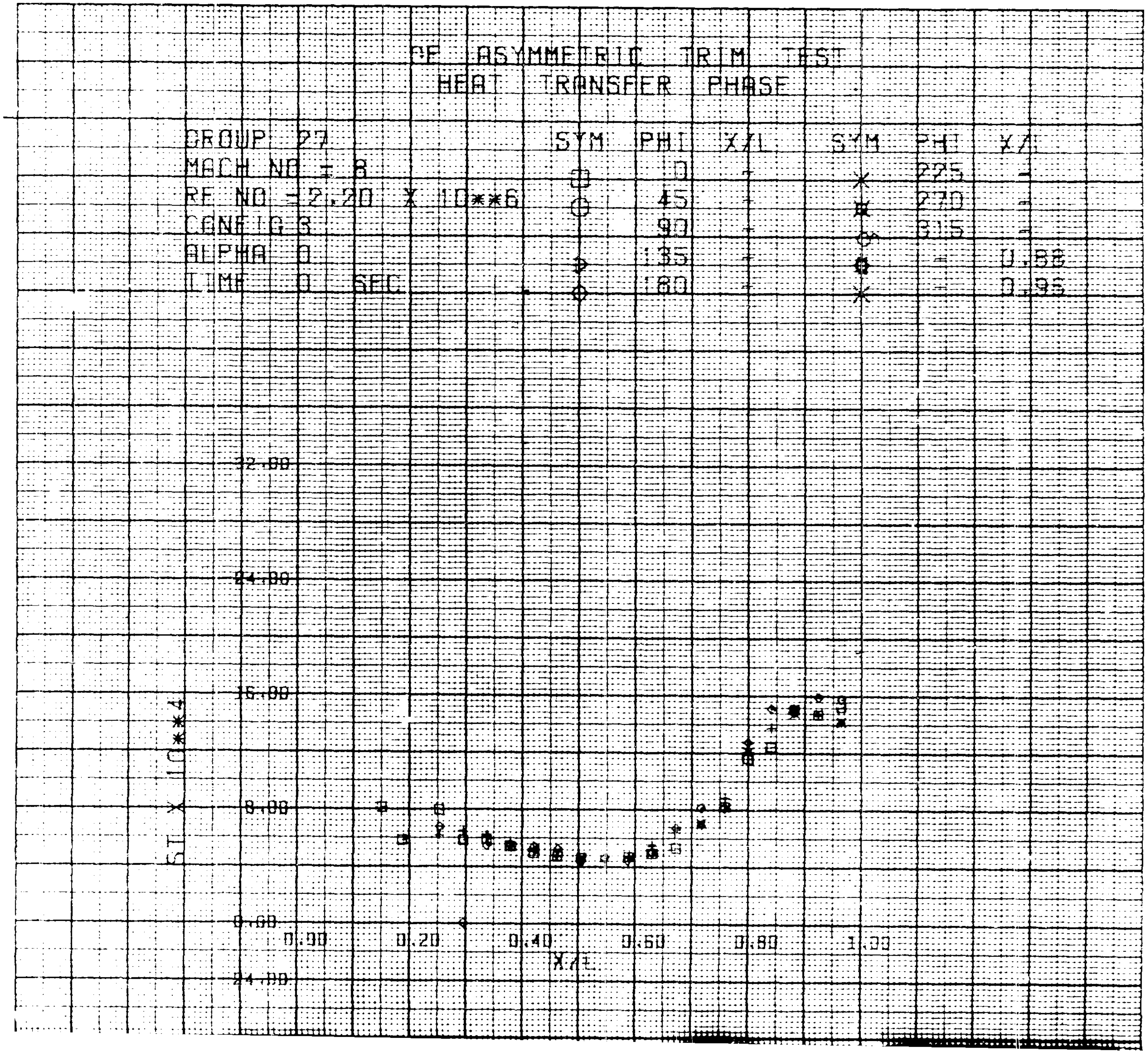
ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 27
MACH NO = 8

1



AF ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 27
MACH NO = 8
RE NO = 2.20 X 10**6
CONFIG 3
ALPHA 0
TIME 0 SEC
SYM PHI X/L
0 -
45 -
90 -
135 -
180 -
SYM PHI X/L
225 -
270 -
315 -
- 0.88
- 0.95
32.00
24.00
16.00
8.00
0.00
-24.00
ST X 10**4
0.00
0.20
0.40
0.60
0.80
1.00
X/L

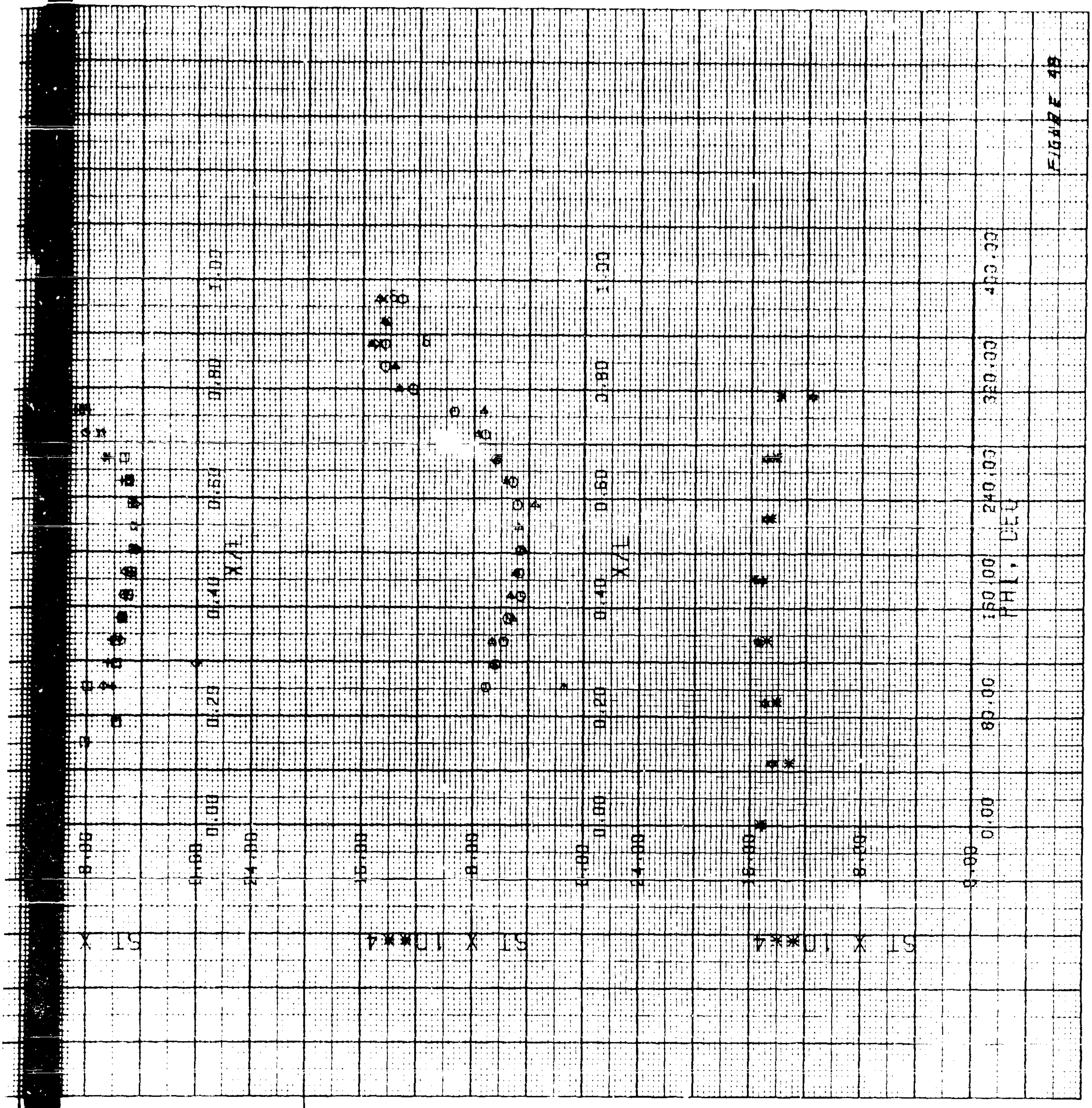


Figure 48

7/14/69

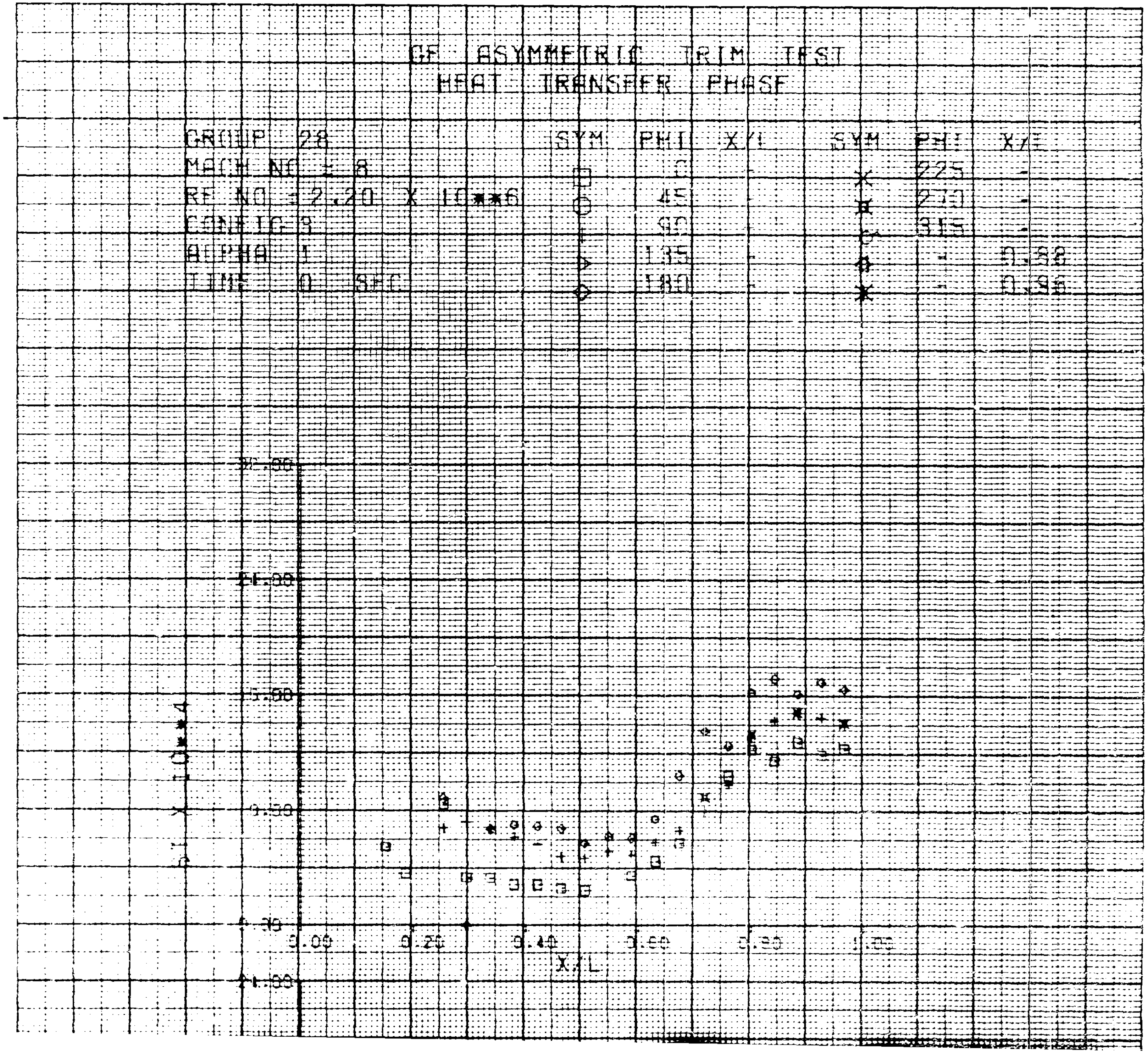
ARO, INC., ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
VT0947-000

GROUP	CONFIG	ALPHA-M	BETA-M	ALPHA-S	ROLL	ALP-P	DATE	MACH NO	PO	TO	TIME
30	3	1.09	0	1.09	0	0	714	7.99	472.4V	1284.04	.66

T-INF	P-INF	Q-INF	V-INF	RHO-INF	MU-INF	RE/FT	RE/D	MU
9.3467E 01	4.8709E-02	2.1803E 00	3.7038E 03	4.3821E-05	7.5202E-08	2.2550E 06	2.0222E 06	3.1468E 02

TC NO	X/L	PHI	TEMP	SLOPE	Q-STOW	HT	HM	HW	ST
1	.1900	0	440.83	2.7899E 00	8.8800E-01	7.2190E-04	2.9243E-03	1.0725E 02	5.4012E-04
2	.1867	0	450.51	1.4041E 00	3.9664E-01	4.7931E-04	1.9461E-03	1.1019E 02	3.6365E-04
3	.2524	0	470.50	3.1050E 00	9.1011E-01	1.1250E-03	4.5519E-03	1.1302E 02	8.5357E-04
4	.2943	0	476.67	1.1381E 00	3.5921E-01	4.4379E-04	1.7940E-03	1.1447E 02	3.3837E-04
5	.3363	0	484.50	1.1126E 00	3.5116E-01	4.3811E-04	1.7709E-03	1.1433E 02	3.3192E-04
6	.3783	0	490.76	9.9552E-01	2.9925E-01	3.7629E-04	1.5290E-03	1.1761E 02	2.8499E-04
7	.4203	0	495.22	1.0291E 00	2.9900E-01	3.7409E-04	1.5274E-03	1.1887E 02	2.8620E-04
8	.4623	0	499.94	9.4011E-01	2.7005E-01	3.4353E-04	1.3079E-03	1.1998E 02	2.6005E-04
9	.5043	0	502.94	9.1846E-01	2.5195E-01	3.2429E-04	1.3094E-03	1.2070E 02	2.4544E-04
10	.5463	0	531.94	1.2479E-01	3.5570E-02	4.7178E-05	1.9290E-04	1.2759E 02	3.5050E-05
11	.5882	0	510.24	1.2930E 00	3.5667E-01	4.5946E-04	1.8546E-03	1.2242E 02	3.4761E-04
12	.6302	0	513.25	1.4961E 00	4.5005E-01	5.9377E-04	2.3942E-03	1.2214E 02	4.4914E-04
13	.6722	0	517.81	2.3602E 00	5.9127E-01	7.6946E-04	3.1045E-03	1.2410E 02	5.8190E-04
99	.8822	315.0	534.76	3.4763E 00	9.3164E-01	1.2403E-03	4.9980E-03	1.2925E 02	9.3693E-04
15	.7583	0	523.04	4.1945E 00	1.0573E 00	1.3057E-03	5.3091E-03	1.2547E 02	1.0476E-03
16	.7996	0	526.12	4.4230E 00	1.2412E 00	1.6334E-03	6.5071E-03	1.2620E 02	1.2347E-03
17	.8409	0	526.87	4.5360E 00	1.1590E 00	1.5267E-03	6.1545E-03	1.2638E 02	1.1540E-03
18	.8822	0	530.00	5.1173E 00	1.2020E 00	1.6957E-03	6.8369E-03	1.2712E 02	1.2815E-03
19	.9235	0	530.88	4.7769E 00	1.1967E 00	1.5867E-03	6.3803E-03	1.2733E 02	1.1974E-03
20	.9648	0	534.44	5.1205E 00	1.2314E 00	1.6384E-03	6.6059E-03	1.2818E 02	1.2379E-03
21	.2524	45.0	443.65	2.0949E 00	6.1926E-01	7.5301E-04	3.0471E-03	1.1140E 02	5.7114E-04
22	.2943	45.0	468.26	1.8239E 00	5.8477E-01	7.1507E-04	2.8929E-03	1.1249E 02	5.4223E-04
23	.3363	45.0	475.70	1.7819E 00	5.3563E-01	6.6100E-04	2.6730E-03	1.1625E 02	5.0102E-04
24	.3783	45.0	482.57	1.7224E 00	5.1774E-01	6.4435E-04	2.6097E-03	1.1588E 02	4.8822E-04
25	.4203	45.0	488.47	1.5855E 00	4.6867E-01	5.7756E-04	2.3360E-03	1.1726E 02	4.3746E-04
26	.4623	45.0	495.12	1.5341E 00	4.3044E-01	5.4423E-04	2.1985E-03	1.1806E 02	4.1200E-04
27	.5043	45.0	498.98	1.5651E 00	4.1029E-01	5.2130E-04	2.1054E-03	1.1976E 02	3.9463E-04
100	.9648	315.0	540.03	5.4230E 00	1.3041E 00	1.7481E-03	7.0445E-03	1.2951E 02	1.3204E-03
29	.5882	45.0	505.97	1.4812E 00	4.0913E-01	5.2319E-04	2.1123E-03	1.2142E 02	3.9592E-04
30	.6302	45.0	509.06	1.4850E 00	4.0175E-01	5.1706E-04	2.0872E-03	1.2215E 02	3.9121E-04
31	.6722	45.0	515.70	1.8648E 00	4.4302E-01	5.7510E-04	2.3206E-03	1.2372E 02	4.3497E-04
32	.7170	45.0	519.00	2.1402E 00	5.1577E-01	6.7312E-04	2.7155E-03	1.2470E 02	5.0890E-04
33	.7583	45.0	519.17	2.4468E 00	6.7417E-01	8.7912E-04	3.5467E-03	1.2455E 02	6.6470E-04
34	.7996	45.0	522.17	3.0310E 00	8.5067E-01	1.1136E-03	4.4921E-03	1.2526E 02	8.4190E-04
35	.8409	45.0	525.41	3.9190E 00	1.0682E 00	1.3939E-03	5.6216E-03	1.2603E 02	1.0537E-03
36	.8822	45.0	527.00	4.9549E 00	1.1980E 00	1.5796E-03	6.3649E-03	1.2655E 02	1.1930E-03
37	.9235	45.0	529.01	5.1681E 00	1.3185E 00	1.7417E-03	7.0278E-03	1.2689E 02	1.3163E-03
38	.9648	45.0	534.60	5.2153E 00	1.2542E 00	1.6690E-03	6.7270E-03	1.2822E 02	1.2610E-03
39	.2524	90.0	465.61	2.4877E 00	7.3520E-01	8.9635E-04	3.6240E-03	1.1107E 02	6.7979E-04
40	.2943	90.0	469.46	2.4190E 00	7.7576E-01	9.5002E-04	3.8431E-03	1.1277E 02	7.2034E-04
41	.3363	90.0	476.21	2.2863E 00	7.2099E-01	8.9030E-04	3.6002E-03	1.1437E 02	6.7481E-04
42	.3783	90.0	483.36	2.0825E 00	6.5731E-01	8.1090E-04	3.3102E-03	1.1606E 02	6.2046E-04
43	.4203	90.0	489.86	2.0369E 00	6.0214E-01	7.5551E-04	3.0530E-03	1.1740E 02	5.7224E-04
44	.4623	90.0	493.14	1.4263E 00	5.0519E-01	6.3714E-04	2.5741E-03	1.1836E 02	4.8240E-04
45	.5043	90.0	497.50	1.7661E 00	5.0661E-01	6.1711E-04	2.4926E-03	1.1941E 02	4.6720E-04
46	.5463	90.0	502.37	1.8540E 00	5.3083E-01	6.7753E-04	2.7349E-03	1.2061E 02	5.1281E-04
47	.5882	90.0	504.96	1.7940E 00	5.0336E-01	6.4444E-04	2.6019E-03	1.2118E 02	4.8770E-04
48	.6302	90.0	507.07	2.1851E 00	6.0206E-01	7.7291E-04	3.1202E-03	1.2160E 02	5.8405E-04
49	.6722	90.0	513.67	2.4984E 00	6.7480E-01	8.7263E-04	3.5216E-03	1.2324E 02	6.6087E-04
50	.7170	90.0	518.04	3.4444E 00	8.1113E-01	1.0573E-03	4.2645E-03	1.2447E 02	7.9951E-04
51	.7583	90.0	515.85	3.8724E 00	1.0080E 00	1.3098E-03	5.2850E-03	1.2376E 02	9.9061E-04
52	.7996	90.0	519.49	5.1084E 00	1.3307E 00	1.7360E-03	7.0030E-03	1.2462E 02	1.3127E-03
53	.8409	90.0	521.90	5.7755E 00	1.4469E 00	1.8935E-03	7.6378E-03	1.2520E 02	1.4316E-03
54	.8822	90.0	524.44	6.1070E 00	1.4991E 00	1.9684E-03	7.9300E-03	1.2581E 02	1.4881E-03
55	.9235	90.0	524.97	6.1072E 00	1.4687E 00	1.9298E-03	7.7829E-03	1.2593E 02	1.4588E-03
56	.9648	90.0	529.56	5.4505E 00	1.4084E 00	1.8598E-03	7.4989E-03	1.2701E 02	1.4056E-03
57	.2524	135.0	463.10	7.4430E-01	2.2085E-01	2.6739E-04	1.0821E-03	1.1127E 02	2.0282E-04
58	.2943	135.0	470.05	2.7437E 00	8.9250E-01	1.0946E-03	4.4270E-03	1.1306E 02	8.2990E-04
59	.3363	135.0	476.34	2.7639E 00	7.4613E-01	9.2151E-04	3.7264E-03	1.1440E 02	6.9846E-04
60	.3783	135.0	482.70	2.2779E 00	7.0759E-01	8.8081E-04	3.5606E-03	1.1590E 02	6.6739E-04
61	.4203	135.0	487.45	2.2788E 00	6.8496E-01	8.5771E-04	3.4663E-03	1.1703E 02	6.4971E-04
62	.4623	135.0	492.27	2.0521E 00	5.9626E-01	7.5118E-04	3.0350E-03	1.1817E 02	5.6887E-04
63	.5043	135.0	496.33	2.2602E 00	5.7751E-01	7.3129E-04	2.9540E-03	1.1913E 02	5.5360E-04
64	.5463	135.0	499.53	2.2345E 00	5.9336E-01	7.5443E-04	3.0469E-03	1.1989E 02	5.7110E-04
65	.5882	135.0	503.27	2.4647E 00	7.0762E-01	9.0399E-04	3.6502E-03	1.2078E 02	6.8410E-04
66	.6302	135.0	505.40	2.8767E 00	7.6338E-01	9.7799E-04	3.9485E-03	1.2130E 02	7.4010E-04
67	.6722	135.0	512.87	3.7946E 00	9.1252E-01	1.1790E-03	4.7584E-03	1.2286E 02	8.9190E-04
68	.7170	135.0	516.40	4.0360E 00	1.1390E 00	1.4861E-03	5.9722E-03	1.2391E 02	1.1194E-03
69	.7583	135.0	514.28	3.8945E 00	1.0927E 00	1.4159E-03	5.7137E-03	1.2339E 02	1.0710E-03
70	.7996	135.0	520.43	5.9050E 00	1.7159E 00	2.2413E-03	9.0415E-03	1.2485E 02	1.6947E-03
71	.8409	135.0	523.27	5.9317E 00	1.6060E 00	2.1065E-03	8.4967E-03	1.2552E 02	1.5926E-03
72	.8822	135.0	524.17	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
73	.9235	135.0	524.83	6.1585E 00	1.5117E 00	1.9859E-03	8.0880E-03	1.2589E 02	1.5013E-03
74	.9648	135.0	530.04	4.3721E 00	1.5324E 00	2.0285E-03	8.1788E-03	1.2727E 02	1.5330E-03
75	.2524	180.0	470.34	3.2453E 00	9.5457E-01	1.1703E-03	4.7339E-03	1.1299E 02	8.8731E-04
76	.2943	180.0	-110.74	6.1927E-08	1.9055E-08	1.4154E-11	5.9151E-11	-2.1036E 01	1.1007E-11
77	.3363	180.0	485.84	2.4032E 00	7.1041E-01	8.8781E-04	3.5882E-03	1.1665E 02	6.7257E-04
78	.3783	180.0	491.90	2.4392E 00	7.3324E-01	9.2331E-04	3.7305E-03	1.1808E 02	6.9924E-04
79	.4203	180.0	496.57	2.4375E 00	7.2054E-01	9.1270E-04	3.6867E-03	1.1919E 02	6.9102E-04
80	.4623	180.0	501.29	2.4619E 00	7.8305E-01	8.9590E-04	3.6179E-03	1.2031E 02	6.7813E-04
81	.5043	180.0	505.19	2.4729E 00	5.9446E-01	7.6131E-04	3.0737E-03	1.2123E 02	5.7613E-04
82	.5463	180.0	509.84	2.4230E 00	6.4343E-01	8.2810E-04	3.3427E-03	1.2215E 02	6.2655E-04
83	.5882	180.0	512.86	2.1683E 00	6.2891E-01	8.1256E-04	3.2799E-03	1.2286E 02	6.1469E-04
84	.6302	180.0	515.64	2.4631E 00	7.6030E-01	9.8894E-04	3.9825E-03	1.2372E 02	7.4844E-04
85	.6722	180.0	521.33	[illegible]	1.0596E 00	1.3856E-03	5.5803E-03	1.2486E 02	1.0474E-03
86	.7170	180.0	529.95	5.7963E 00	1.3050E 00	1.7958E-03	7.2623E-03	1.2648E 02	1.3575E-03
87	.7583	180.0	534.67	5.2588E 00	1.2646E 00	1.6610E-03	6.6908E-03	1.2585E 02	1.2596E-03
88	.7996	180.0	530.57	6.2649E 00	1.6294E 00	2.1567E-03	8.6904E-03	1.2724E 02	1.6298E-03
89	.8409	180.0	532.41	6.7369E 00	1.7214E 00	2.2841E-03	9.2042E-03	1.2769E 02	1.7259E-03
90	.8822	180.0	533.41	6.9888E 00	1.6105E 00	2.1404E-03	8.6249E-03	1.2790E 02	1.6173E-03
91	.9235	180.0	534.64	6.4947E 00	1.6924E 00	2.2518E-03	9.0771E-03	1.2818E 02	1.7014E-03
92	.9648	180.0	537.68	7.0860E 00	1.6331E 00	2.1822E-03	8.7951E-03	1.2895E 02	1.6489E-03
93	.8822	225.0	534.83	6.1362E 00	1.5679E 00	2.0927E-03	8.4346E-03	1.2875E 02	1.5809E-03
94	.9648	225.0	539.23	6.1473E 00	1.4783E 00	1.9795E-03	7.9774E-03	1.2932E 02	1.4953E-03
95	.7170	270.0	530.37	3.9669E 00	9.9433E-01	1.1836E-03	4.7713E-03	1.2720E 02	8.9435E-04
96	.7996	270.0	535.70	4.9803E 00	1.3241E 00	1.7647E-03	7.1111E-03	1.2848E 02	1.3335E-03
97	.8822	270.0	539.54	5.7602E 00	1.5718E 00	1.9716E-03	7.9444E-03	1.2930E 02	1.4893E-03
98	.9648	270.0	541.17	5.3944E 00	1.3935E 00	1.8706E-03	7.5337E-03	1.2977E 02	1.4120E-03

GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE


GF ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 28
MACH NO = 8
RE NO =2.20 X 10**6
CONFIG-3
ALPHA 1
TIME 0 SEC
SYM PHI X/L
0
45
90
135
180
SYM PHI X/E
225
270
315
0.88
0.96
X/L
0.00
0.20
0.40
0.60
0.80
1.00
ST X 10**4

2

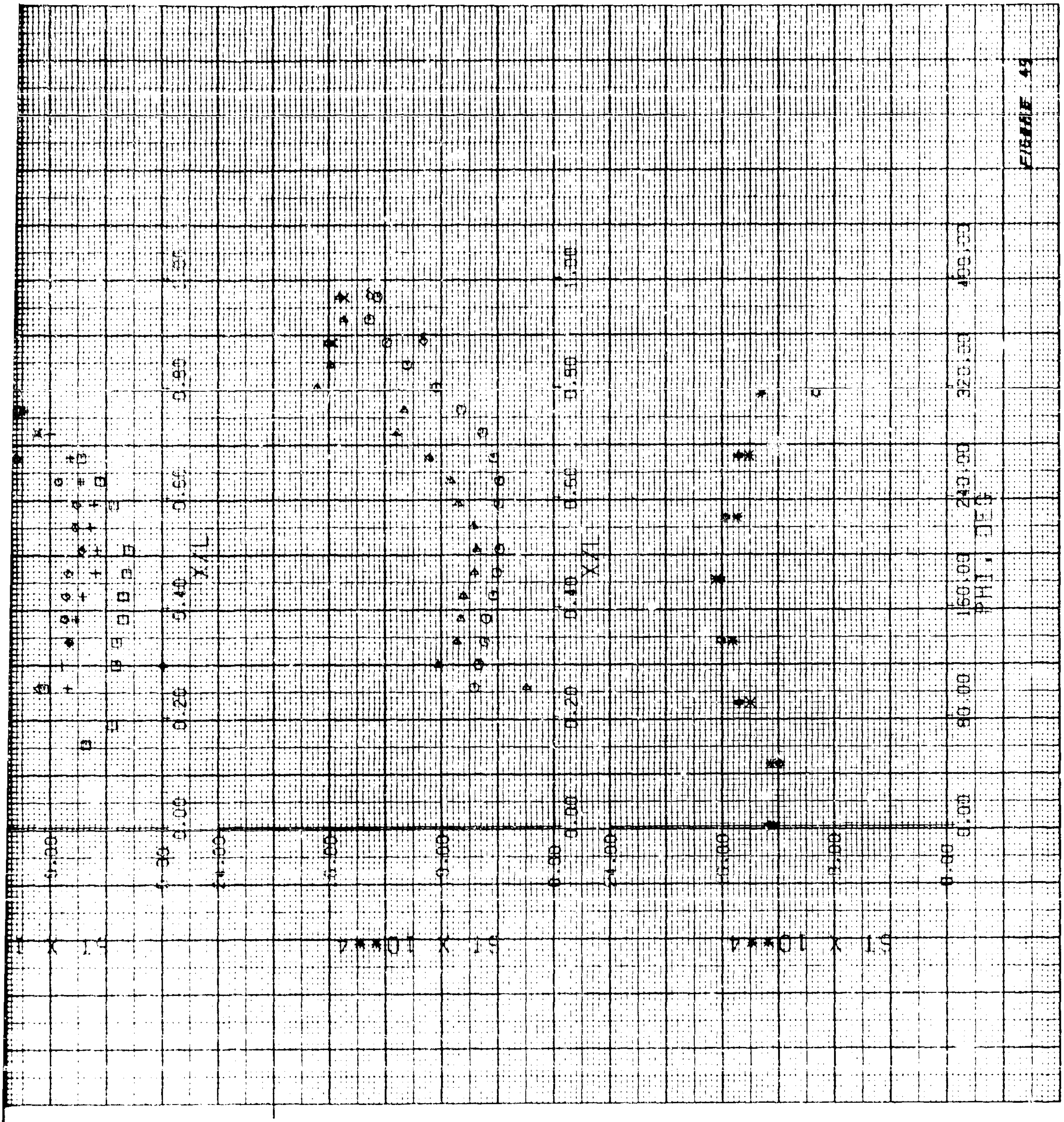


Figure 49

7/16/69

AEDC(ARO,INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
VT0967-000

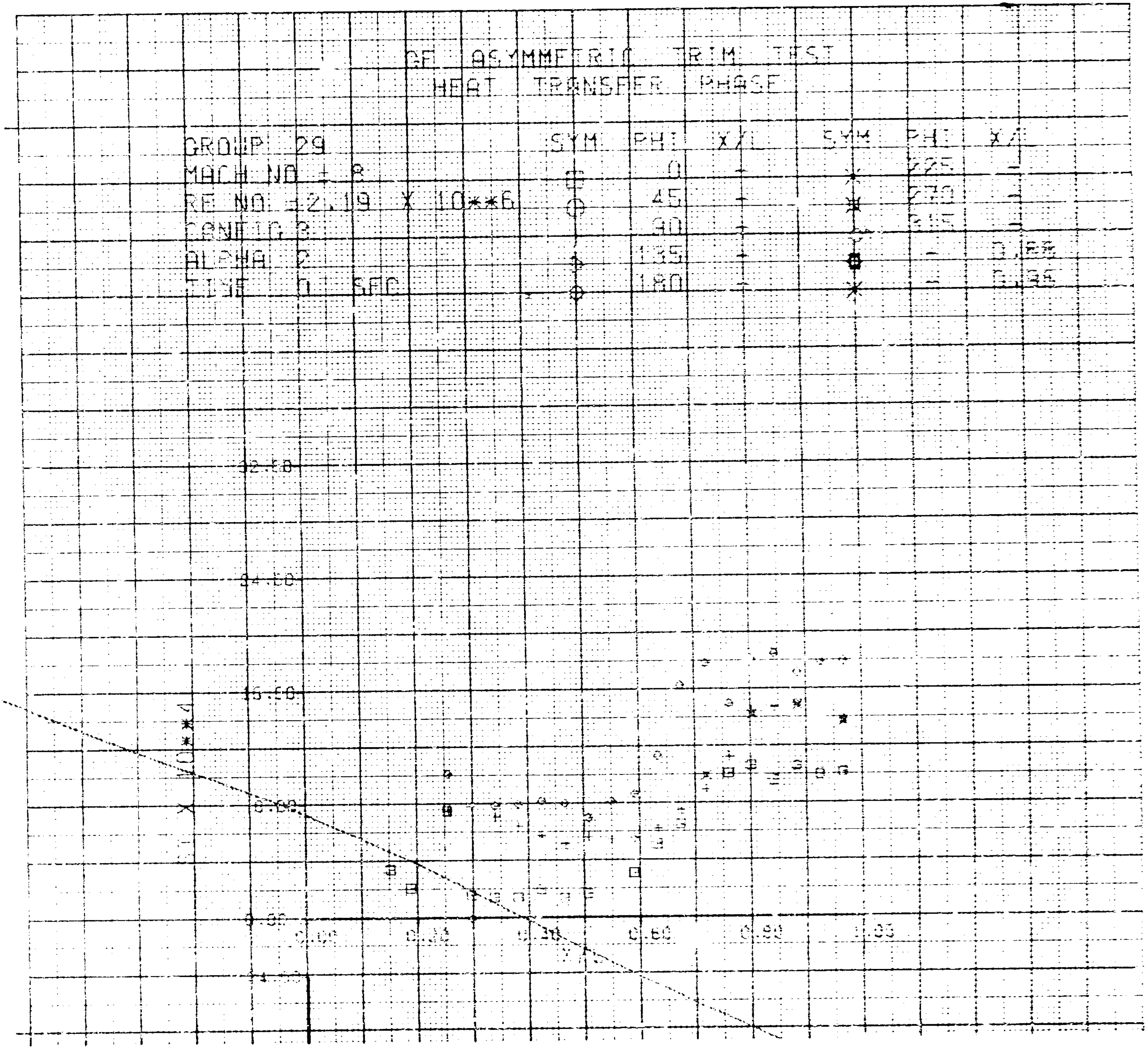
GROUP	CONFIG	ALPHA-M	BETA-M	ALPHA-S	ROLL	ALP-P	DATE	MACH NO	PO	TO	TW/TO
29	3	2.05	0	2.05	0	0	716	7.09	471.57	1309.00	.38

T-INF	P-INF	Q-INF	V-INF	RHO-INF	MU-INF	RE/FT	RE/D	MU
9.36231E 01	4.06757E-02	2.17522E 00	3.70021E 03	4.36206E-05	7.53759E-08	2.19227E 06	2.01073E 06	3.53906E 02

TC NO	X/L	PHI	TEMP	SLOPE	Q-STOW	HT	HM	NU	ST
1	.1580	0	455.05	1.7580E 00	3.8273E-01	4.5898E-04	1.0579E-03	1.0998E 02	3.6937E-04
2	.1867	0	465.67	1.0694E 00	2.3605E-01	2.0526E-04	1.1539E-03	1.1108E 02	2.1705E-04
3	.2524	0	474.98	2.7573E 00	8.1509E-01	1.0013E-03	4.0480E-03	1.1408E 02	7.6156E-04
4	.2943	0	482.21	5.5613E-01	1.7553E-01	2.1757E-04	8.7937E-04	1.1579E 02	1.6540E-04
5	.3363	0	488.00	4.9228E-01	1.5538E-01	1.9398E-04	7.8379E-04	1.1716E 02	1.4742E-04
6	.3783	0	492.06	5.2536E-01	1.5793E-01	1.9617E-04	8.0953E-04	1.1912E 02	1.5057E-04
7	.4203	0	495.64	7.4263E-01	2.1574E-01	2.7179E-04	1.0978E-03	1.1883E 02	2.0640E-04
8	.4623	0	498.38	5.1706E-01	1.4794E-01	1.8716E-04	7.5582E-04	1.1962E 02	1.4216E-04
9	.5043	0	500.04	6.4572E-01	1.8011E-01	2.2045E-04	9.2245E-04	1.2015E 02	1.7350E-04
10	.5463	0	532.35	1.2792E-01	3.5892E-02	4.7634E-05	1.9120E-04	1.2764E 02	3.5963E-05
11	.5882	0	506.78	1.1910E 00	3.2832E-01	4.1972E-04	1.6942E-03	1.2101E 02	3.1666E-04
12	.6302	0	509.67	1.9708E 00	5.3317E-01	6.6613E-04	2.7618E-03	1.2229E 02	5.1932E-04
13	.6722	0	515.47	2.4905E 00	6.7401E-01	8.7135E-04	3.5155E-03	1.2367E 02	6.6123E-04
14	.8822	315.0	534.55	3.5234E 00	9.1784E-01	1.2166E-03	4.9011E-03	1.2829E 02	9.2223E-04
15	.7563	0	519.47	4.2968E 00	1.0333E 00	1.3428E-03	5.4162E-03	1.2462E 02	1.0187E-03
16	.7983	0	521.96	3.8612E 00	1.0834E 00	1.4124E-03	5.6964E-03	1.2521E 02	1.0714E-03
17	.8403	0	522.57	3.8233E 00	9.7688E-01	1.2746E-03	5.1484E-03	1.2536E 02	9.6685E-04
18	.8822	0	525.65	4.2876E 00	1.0791E 00	1.4071E-03	5.6730E-03	1.2609E 02	1.0672E-03
19	.9235	0	526.76	4.0310E 00	1.0099E 00	1.3248E-03	5.3418E-03	1.2635E 02	1.0047E-03
20	.9644	0	532.13	4.2498E 00	1.0220E 00	1.3503E-03	5.4427E-03	1.2763E 02	1.0237E-03
21	.2524	45.0	462.03	2.1718E 00	6.4196E-01	7.7604E-04	3.1432E-03	1.1116E 02	5.9121E-04
22	.2943	45.0	466.06	1.9085E 00	6.1189E-01	7.4403E-04	3.0098E-03	1.1210E 02	5.6612E-04
23	.3363	45.0	472.33	1.9184E 00	5.7666E-01	7.0611E-04	2.8555E-03	1.1345E 02	5.3716E-04
24	.3783	45.0	478.05	1.7795E 00	5.3492E-01	6.5962E-04	2.6667E-03	1.1480E 02	5.0150E-04
25	.4203	45.0	482.72	1.6412E 00	4.7685E-01	5.9142E-04	2.3904E-03	1.1591E 02	4.4961E-04
26	.4623	45.0	488.96	1.5981E 00	4.6834E-01	5.8045E-04	2.2644E-03	1.1739E 02	4.2592E-04
27	.5043	45.0	492.74	1.4231E 00	4.3102E-01	5.4130E-04	2.1866E-03	1.1828E 02	4.1128E-04
100	.9644	315.0	546.29	4.8434E 00	1.1047E 00	1.5596E-03	6.2070E-03	1.2997E 02	1.1709E-03
29	.5882	45.0	499.46	1.4314E 00	3.9439E-01	4.9952E-04	2.0171E-03	1.1987E 02	3.7940E-04
30	.6302	45.0	502.60	1.6025E 00	4.3353E-01	5.5128E-04	2.2257E-03	1.2062E 02	4.1064E-04
31	.6722	45.0	511.59	1.8531E 00	4.5736E-01	5.8829E-04	2.3740E-03	1.2275E 02	4.4652E-04
32	.7170	45.0	516.44	2.5114E 00	5.9140E-01	7.6551E-04	3.0883E-03	1.2390E 02	5.8000E-04
33	.7563	45.0	513.93	2.4538E 00	8.1366E-01	1.0500E-03	4.2368E-03	1.2330E 02	7.9090E-04
34	.7996	45.0	516.72	3.7481E 00	1.0516E 00	1.3617E-03	5.4936E-03	1.2397E 02	1.0333E-03
35	.8409	45.0	519.92	4.4324E 00	1.1943E 00	1.5594E-03	6.2898E-03	1.2473E 02	1.1830E-03
36	.8822	45.0	522.04	5.0908E 00	1.3390E 00	1.7459E-03	7.0412E-03	1.2523E 02	1.3244E-03
37	.9235	45.0	523.56	5.3241E 00	1.2837E 00	1.6771E-03	6.7631E-03	1.2559E 02	1.2721E-03
38	.9644	45.0	531.21	4.4167E 00	1.1583E 00	1.5285E-03	6.1616E-03	1.2741E 02	1.1509E-03
39	.2524	90.0	458.77	2.7987E 00	8.2731E-01	9.9668E-04	4.0370E-03	1.1025E 02	7.5453E-04
40	.2943	90.0	461.50	2.4713E 00	8.5647E-01	1.0350E-03	4.1881E-03	1.1090E 02	7.8774E-04
41	.3363	90.0	468.66	2.4432E 00	7.7115E-01	9.4003E-04	3.8023E-03	1.1259E 02	7.1517E-04
42	.3783	90.0	473.69	2.2017E 00	6.9491E-01	8.5232E-04	3.4466E-03	1.1377E 02	6.4427E-04
43	.4203	90.0	479.30	2.0895E 00	6.1767E-01	7.6292E-04	3.0841E-03	1.1512E 02	5.8689E-04
44	.4623	90.0	484.26	1.7884E 00	5.5554E-01	6.9033E-04	2.7909E-03	1.1627E 02	5.2476E-04
45	.5043	90.0	489.29	2.1744E 00	5.9912E-01	7.4917E-04	3.0269E-03	1.1746E 02	5.6933E-04
46	.5463	90.0	493.31	2.0312E 00	5.8006E-01	7.2900E-04	2.9447E-03	1.1841E 02	5.5387E-04
47	.5882	90.0	497.67	2.0901E 00	5.8843E-01	7.4106E-04	2.9927E-03	1.1945E 02	5.6291E-04
48	.6302	90.0	499.94	2.1787E 00	6.5542E-01	.3063E-04	3.3540E-03	1.1999E 02	6.3086E-04
49	.6722	90.0	509.11	2.8973E 00	7.7595E-01	9.9497E-04	4.0140E-03	1.2217E 02	7.5530E-04
50	.7170	90.0	515.37	3.9174E 00	9.2251E-01	1.1924E-03	4.8109E-03	1.2365E 02	9.0489E-04
51	.7563	90.0	510.81	4.4562E 00	1.1668E 00	1.4917E-03	6.0199E-03	1.2256E 02	1.1323E-03
52	.7996	90.0	513.92	5.6973E 00	1.4842E 00	1.9148E-03	7.7246E-03	1.2330E 02	1.4532E-03
53	.8409	90.0	516.44	6.0159E 00	1.5071E 00	1.9508E-03	7.4788E-03	1.2390E 02	1.4803E-03
54	.8822	90.0	519.05	6.2407E 00	1.5319E 00	1.9496E-03	8.0255E-03	1.2452E 02	1.5095E-03
55	.9235	90.0	519.84	6.4236E 00	1.6486E 00	1.8834E-03	7.5978E-03	1.2472E 02	1.4286E-03
56	.9644	90.0	527.01	5.4217E 00	1.4060E 00	1.8373E-03	7.4079E-03	1.2641E 02	1.3934E-03
57	.2524	135.0	453.32	9.3547E-01	2.7653E-01	3.3091E-04	1.3346E-03	1.0897E 02	2.5196E-04
58	.2943	135.0	460.23	3.7822E 00	1.0523E 00	1.2698E-03	5.1383E-03	1.1040E 02	9.6647E-04
59	.3363	135.0	467.41	2.9467E 00	9.3006E-01	1.1320E-03	4.5741E-03	1.1229E 02	8.6130E-04
60	.3783	135.0	473.26	2.4987E 00	8.0726E-01	9.4960E-04	4.0018E-03	1.1367E 02	7.5276E-04
61	.4203	135.0	479.06	2.4740E 00	7.7374E-01	9.5523E-04	3.8616E-03	1.1503E 02	7.2633E-04
62	.4623	135.0	484.81	2.3401E 00	6.7995E-01	8.4551E-04	3.4169E-03	1.1644E 02	6.4269E-04
63	.5043	135.0	489.55	2.4279E 00	6.4590E-01	8.0793E-04	3.2642E-03	1.1753E 02	6.1397E-04
64	.5463	135.0	493.22	2.7494E 00	7.3624E-01	9.1764E-04	3.7067E-03	1.1839E 02	6.9720E-04
65	.5882	135.0	497.43	3.1354E 00	8.3260E-01	1.0518E-03	4.2470E-03	1.1939E 02	7.9898E-04
66	.6302	135.0	500.37	3.6085E 00	1.0113E 00	1.2823E-03	5.1774E-03	1.2008E 02	9.7390E-04
67	.6722	135.0	510.10	5.4485E 00	1.3463E 00	1.7285E-03	6.9757E-03	1.2240E 02	1.3121E-03
68	.7170	135.0	515.08	6.7939E 00	1.5999E 00	2.0694E-03	8.3487E-03	1.2377E 02	1.5703E-03
69	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
70	.7996	135.0	514.66	6.4747E 00	1.9183E 00	2.4734E-03	9.9743E-03	1.2395E 02	1.8768E-03
71	.8409	135.0	519.54	6.7218E 00	1.7143E 00	2.2281E-03	8.9871E-03	1.2469E 02	1.6904E-03
72	.8822	135.0	520.60	6.3004E 00	1.7045E 00	2.2182E-03	8.9478E-03	1.2489E 02	1.6829E-03
73	.9235	135.0	522.50	6.4690E 00	1.5879E 00	2.0718E-03	8.3550E-03	1.2535E 02	1.5711E-03
74	.9644	135.0	520.79	6.7589E 00	1.6254E 00	2.1380E-03	8.6197E-03	1.2493E 02	1.6213E-03
75	.2524	180.0	463.41	3.6093E 00	1.1064E 00	1.3467E-03	5.4243E-03	1.1135E 02	1.0203E-03
76	.2943	180.0	-116.74	6.1927E-05	1.9855E-08	1.4124E-11	5.9815E-11	-2.1036E 01	1.1180E-11
77	.3363	180.0	476.18	2.6663E 00	8.4731E-01	1.0424E-03	4.2167E-03	1.1436E 02	7.9275E-04
78	.3783	180.0	481.91	2.4666E 00	8.5562E-01	1.0601E-03	4.2849E-03	1.1572E 02	8.0596E-04
79	.4203	180.0	487.46	2.9513E 00	8.7243E-01	1.0884E-03	4.3988E-03	1.1703E 02	8.2723E-04
80	.4623	180.0	492.51	2.9443E 00	8.4651E-01	1.0628E-03	4.2933E-03	1.1823E 02	8.0753E-04
81	.5043	180.0	497.16	2.9440E 00	7.3753E-01	9.3141E-04	3.7616E-03	1.1935E 02	7.0751E-04
82	.5463	180.0	501.35	3.2032E 00	8.5062E-01	1.0799E-03	4.3606E-03	1.2032E 02	8.2016E-04
83	.5882	180.0	504.99	3.4111E 00	9.0582E-01	1.1554E-03	4.6648E-03	1.2118E 02	8.7726E-04
84	.6302	180.0	509.95	4.4048E 00	1.1497E 00	1.5014E-03	6.0543E-03	1.2236E 02	1.1397E-03
85	.6722	180.0	519.19	6.4978E 00	1.6588E 00	2.1556E-03	8.6995E-03	1.2459E 02	1.6356E-03
86	.7170	180.0	525.16	7.6615E 00	1.8042E 00	2.3620E-03	9.5243E-03	1.2597E 02	1.7915E-03
87	.7563	180.0	519.92	6.3586E 00	1.9272E 00	1.9858E-03	8.0098E-03	1.2473E 02	1.5065E-03
88	.7996	180.0	525.52	7.1222E 00	1.8267E 00	2.3925E-03	9.6475E-03	1.2606E 02	1.8146E-03
89	.8409	180.0	577.89	7.2908E 00	1.8629E 00	2.4476E-03	9.8691E-03	1.2662E 02	1.8561E-03
90	.8822	180.0	529.34	7.5032E 00	1.7290E 00	2.2714E-03	9.1761E-03	1.2697E 02	1.7250E-03
91	.9235	180.0	530.55	7.3324E 00	1.7209E 00	2.3731E-03	9.5685E-03	1.2725E 02	1.7994E-03
92	.9644	180.0	537.09	7.7707E 00	1.7907E 00	2.3015E-03	9.5969E-03	1.2881E 02	1.8051E-03
93	.8822	225.0	532.82	6.3969E 00	1.6345E 00	2.1615E-03	8.7123E-03	1.2779E 02	1.6387E-03
94	.9644	225.0	538.63	6.4569E 00	1.5524E 00	2.0693E-03	8.3361E-03	1.2917E 02	1.5683E-03
95	.7170	270.0	530.49	4.4333E 00	9.9969E-01	1.3177E-03	5.3120E-03	1.2724E 02	9.9913E-04
96	.7996	270.0	535.15	5.3516E 00	1.4211E 00	1.8851E-03	7.5974E-03	1.2835E 02	1.4290E-03
97	.8822	270.0	538.89	5.7811E 00	1.4771E 00	1.9681E-03	7.9340E-03	1.2914E 02	1.4917E-03
98	.9644	270.0	541.48	5.6545E 00	1.3594E 00	1.8193E-03	7.3244E-03	1.2985E 02	1.3785E-03

GROUP 29
GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
SYM X/L SYM PHI X/L

1


GF ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 29
MACH NO = 8
RE NO =2.19 X 10**6
CONFIG 3
ALPHA 2
TIME 0. SEC
SYM PHI X/L
0 —
45 —
90 —
135 —
180 —
SYM PHI X/L
225 —
270 —
315 —
— 0.88
— 0.95
0.00
0.20
0.40
0.60
0.80
1.00
X/L

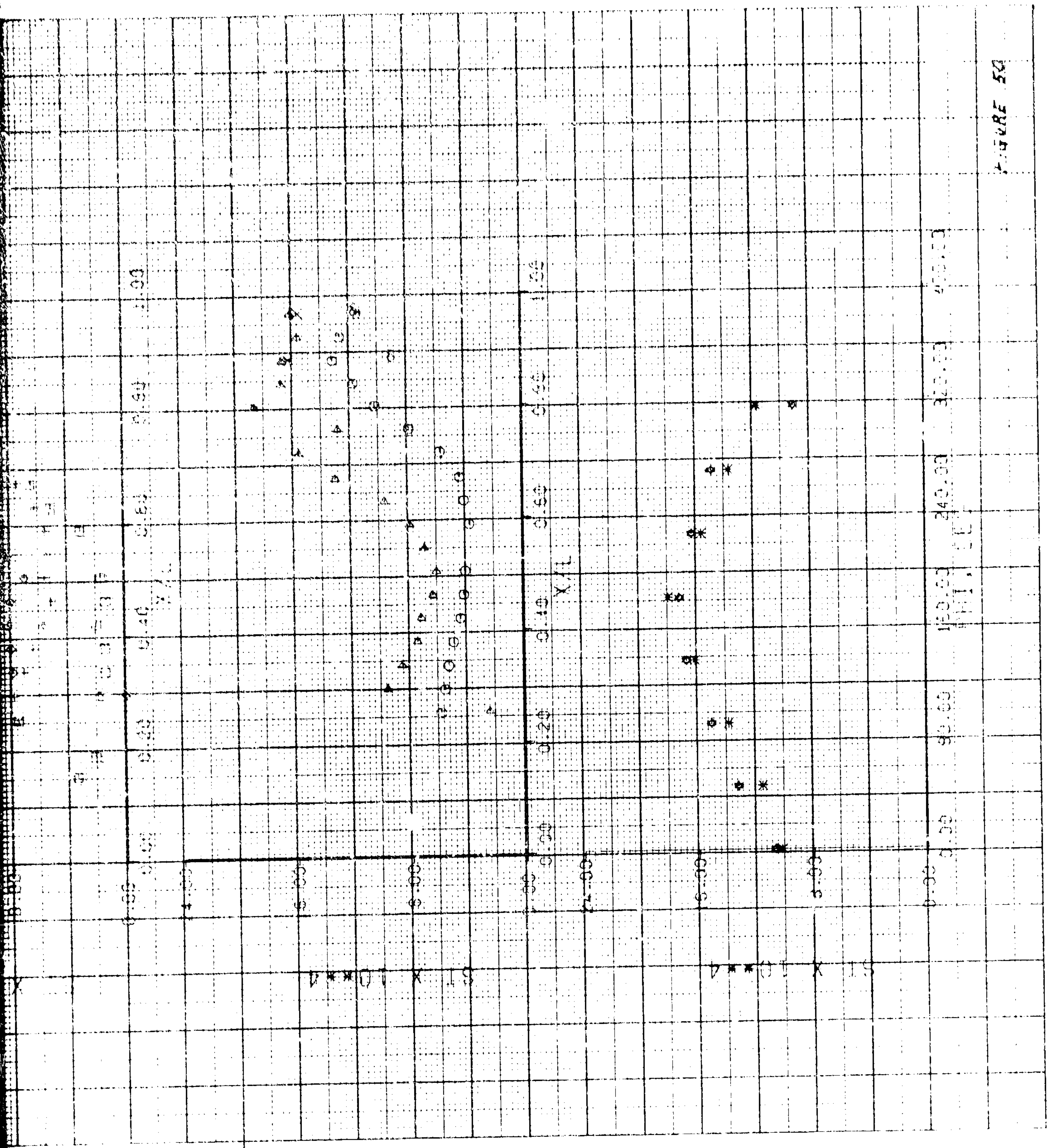


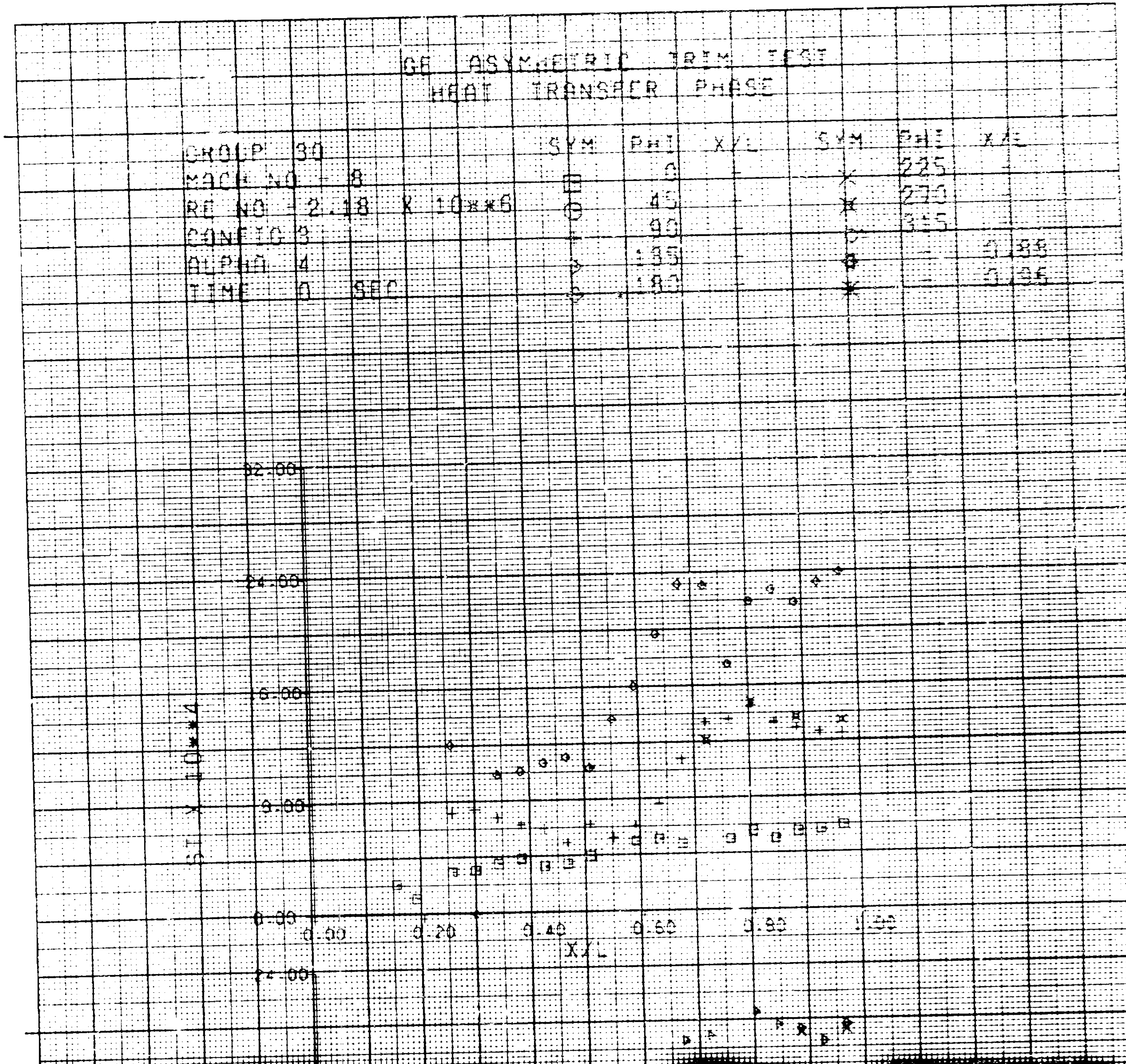
Figure 50

AEDC-ARO, INC., ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
V10857-800

GROUP	CONFIG	ALPHA-M	BETA-M	ALPHA-S	ROLL	AL-P	DATE	MACH NO	PO	TO	TIME
36	3	4.09	0	4.04	0	0	714	7.99	470.27	1292.06	-.06

T-IN	P-INF	RHO-INF	V-INF	RHO-INF	MU-INF	RE/FT	RE/L	MU
9.3064?E 01	4.0942E-02	8.17E 00	3.7026E 03	6.3415E-05	7.5554E-08	2.7946E 06	1.9905E 06	3.1610E 02

TC NO	X/L	PHI	TEMP	SLOPE	Q-STOW	HT	HM	HW	ST
1	.1980	0	593.39	1.4991E 00	2.2699E-01	2.0777E-04	1.1016E-03	1.2688E 02	2.1726E-04
2	.1867	0	492.18	5.6960E-01	1.2504E-01	1.5439E-04	6.3165E-04	1.1815E 02	1.1923E-04
3	.2524	0	495.96	1.0980E 00	3.2422E-01	4.0779E-04	1.6660E-03	1.1920E 02	3.1081E-04
4	.2943	0	511.66	1.0294E 00	3.2490E-01	4.1032E-04	1.6707E-03	1.2276E 02	3.1705E-04
5	.3363	0	512.57	1.1701E 00	3.6932E-01	4.7380E-04	1.9115E-03	1.2298E 02	3.6081E-04
6	.3783	0	514.95	1.3329E 00	4.0066E-01	5.1558E-04	2.0708E-03	1.2355E 02	3.9258E-04
7	.4203	0	515.86	1.1918E 00	3.4623E-01	4.4560E-04	1.7975E-03	1.2157E 02	3.3929E-04
8	.4623	0	517.02	1.3110E 00	3.6122E-01	4.6667E-04	1.8799E-03	1.2404E 02	3.5464E-04
9	.5043	0	518.07	1.5272E 00	4.1310E-01	5.3382E-04	2.1510E-03	1.2429E 02	4.0640E-04
10	.5463	0	521.12	7.2155E-02	2.0245E-02	2.6660E-05	1.0723E-04	1.2730E 02	2.0240E-05
11	.5882	0	522.06	1.4626E 00	5.3319E-01	6.6667E-04	2.6675E-03	1.2523E 02	5.0728E-04
12	.6302	0	524.24	1.6369E 00	5.2491E-01	6.8249E-04	2.7517E-03	1.2576E 02	5.1940E-04
13	.6722	0	523.92	1.9490E 00	4.8824E-01	6.3566E-04	2.5630E-03	1.2564E 02	4.8378E-04
14	.8822	315.0	541.98	2.4226E 00	7.3520E-01	9.0290E-04	3.4587E-03	1.3045E 02	7.4723E-04
15	.7583	0	533.05	2.1361E 00	5.1320E-01	6.7615E-04	2.7249E-03	1.2785E 02	5.1434E-04
16	.7996	0	535.33	2.0197E 00	5.6670E-01	7.4888E-04	3.0179E-03	1.2839E 02	5.6959E-04
17	.8409	0	536.31	1.9941E 00	5.0951E-01	6.7418E-04	2.7165E-03	1.2862E 02	5.1275E-04
18	.8822	0	539.63	2.2148E 00	5.5486E-01	7.3743E-04	2.9708E-03	1.2941E 02	5.6075E-04
19	.9235	0	541.07	2.5697E 00	5.6860E-01	7.5789E-04	3.0497E-03	1.2975E 02	5.7565E-04
20	.9648	0	539.86	2.4727E 00	5.9446E-01	7.9052E-04	3.1848E-03	1.2946E 02	6.0111E-04
21	.2524	45.0	491.47	1.4582E 00	5.4931E-01	6.8614E-04	2.7714E-03	1.1798E 02	5.2111E-04
22	.2943	45.0	503.46	1.4935E 00	4.7845E-01	6.0720E-04	2.4510E-03	1.2062E 02	4.6463E-04
23	.3363	45.0	504.84	1.4495E 00	4.3572E-01	5.5336E-04	2.2319E-03	1.2116E 02	4.2158E-04
24	.3783	45.0	506.30	1.3560E 00	3.7755E-01	4.8050E-04	1.9382E-03	1.2149E 02	3.6604E-04
25	.4203	45.0	508.74	1.3478E 00	3.6256E-01	4.6284E-04	1.8678E-03	1.2207E 02	3.5255E-04
26	.4623	45.0	512.57	1.2444E 00	3.4915E-01	4.4792E-04	1.8071E-03	1.2298E 02	3.4118E-04
27	.5043	45.0	516.40	1.4015E 00	3.7214E-01	4.7865E-04	1.9309E-03	1.2394E 02	3.6447E-04
100	.9648	315.0	545.72	1.6618E 00	8.8050E-01	1.1812E-03	4.7568E-03	1.3110E 02	8.9786E-04
[illegible]	[illegible]	45.0	518.36	1.6864E 00	4.6466E-01	6.0060E-04	2.4223E-03	1.2436E 02	4.5723E-04
30	.6302	45.0	521.06	2.1008E 00	6.4626E-01	8.3884E-04	3.3826E-03	1.2514E 02	6.3849E-04
31	.6722	45.0	525.14	3.4947E 00	8.0246E-01	1.1596E-03	4.6388E-03	1.2597E 02	8.7560E-04
32	.7170	45.0	529.00	4.2780E 00	1.0874E 00	1.3202E-03	5.3214E-03	1.2688E 02	1.0045E-03
33	.7583	45.0	532.17	3.9490E 00	1.0881E 00	1.4323E-03	5.7725E-03	1.2770E 02	1.0896E-03
34	.7996	45.0	534.33	3.8213E 00	1.0722E 00	1.4150E-03	5.7020E-03	1.2815E 02	1.0763E-03
35	.8409	45.0	537.29	3.4318E 00	1.0366E 00	1.3735E-03	5.5318E-03	1.2886E 02	1.0445E-03
36	.8822	45.0	539.48	3.4554E 00	9.6146E-01	1.2776E-03	5.1447E-03	1.2938E 02	9.7147E-04
37	.9235	45.0	541.65	3.6089E 00	9.2212E-01	1.2286E-03	4.9469E-03	1.2996E 02	9.3431E-04
38	.9648	45.0	541.63	3.5469E 00	8.6249E-01	1.1488E-03	4.6275E-03	1.2990E 02	8.7346E-04
39	.2524	90.0	490.30	2.4836E 00	7.6375E-01	9.5260E-04	3.8479E-03	1.1770E 02	7.2631E-04
40	.2943	90.0	500.14	2.4380E 00	7.8144E-01	9.8705E-04	3.9858E-03	1.2003E 02	7.5218E-04
41	.3363	90.0	502.05	2.7682E 00	7.1591E-01	9.0620E-04	3.6581E-03	1.2048E 02	6.9049E-04
42	.3783	90.0	504.39	2.4733E 00	6.5439E-01	8.3079E-04	3.3533E-03	1.2104E 02	6.3295E-04
43	.4203	90.0	507.87	2.1138E 00	6.2462E-01	7.9566E-04	3.2111E-03	1.2187E 02	6.0610E-04
44	.4623	90.0	508.98	2.4724E 00	5.1964E-01	6.6359E-04	2.6770E-03	1.2215E 02	5.0544E-04
45	.5043	90.0	511.34	2.3411E 00	6.4504E-01	8.2622E-04	3.3336E-03	1.2264E 02	6.2923E-04
46	.5463	90.0	514.92	1.9176E 00	5.4760E-01	7.0465E-04	2.8425E-03	1.2354E 02	5.3054E-04
47	.5882	90.0	514.35	2.2295E 00	6.2555E-01	8.0642E-04	3.2520E-03	1.2388E 02	6.1399E-04
48	.6302	90.0	518.97	2.8556E 00	7.8408E-01	1.0177E-03	4.1040E-03	1.2450E 02	7.7476E-04
49	.6722	90.0	523.92	4.4788E 00	1.0954E 00	1.4255E-03	5.7475E-03	1.2568E 02	1.0849E-03
50	.7170	90.0	529.34	4.7290E 00	1.3491E 00	1.7689E-03	7.1300E-03	1.2697E 02	1.3458E-03
51	.7583	90.0	530.24	4.2529E 00	1.3464E 00	1.7962E-03	7.2397E-03	1.2718E 02	1.3665E-03
52	.7996	90.0	532.67	4.4817E 00	1.4540E 00	1.9148E-03	7.7150E-03	1.2776E 02	1.4565E-03
53	.8409	90.0	534.73	5.3334E 00	1.3301E 00	1.7643E-03	7.1094E-03	1.2825E 02	1.3419E-03
54	.8822	90.0	537.08	5.2221E 00	1.2819E 00	1.6996E-03	6.8453E-03	1.2893E 02	1.2921E-03
55	.9235	90.0	538.91	5.2111E 00	1.2532E 00	1.6639E-03	6.7034E-03	1.2924E 02	1.2653E-03
56	.9648	90.0	538.10	5.1500E 00	1.2305E 00	1.6426E-03	6.6180E-03	1.2905E 02	1.2492E-03
57	.2524	135.0	483.29	8.9581E-01	2.6106E-01	3.2376E-04	1.3043E-03	1.1604E [illegible]	2.4695E-04
58	.2943	135.0	492.01	3.5244E 00	1.1300E 00	1.4124E-03	5.7040E-03	1.1811E 02	[illegible].0768E-03
59	.3363	135.0	494.15	3.1167E 00	1.0468E 00	1.3120E-03	5.2985E-03	1.1861E 02	[illegible].0001E-03
60	.3783	135.0	496.97	2.8375E 00	8.8143E-01	1.1085E-03	4.4742E-03	1.1927E 02	[illegible]
61	.4203	135.0	499.74	2.9538E 00	8.8793E-01	1.1207E-03	4.5245E-03	1.1994E 02	[illegible]
62	.4623	135.0	[illegible]	2.8221E 00	8.1994E-01	1.0391E-03	4.1945E-03	1.2070E 02	[illegible]
63	.5043	135.0	506.24	3.2471E 00	8.2907E-01	1.0558E-03	4.2611E-03	1.2148E 02	8.0430E-04
64	.5463	135.0	508.97	3.5395E 00	9.2991E-01	1.2083E-03	4.8434E-03	1.2213E 02	9.1421E-04
65	.5882	135.0	512.70	4.4372E 00	1.1703E 00	1.5119E-03	6.0947E-03	1.2301E 02	1.1513E-03
66	.6302	135.0	515.96	6.1083E 00	1.6221E 00	[illegible]	8.4306E-03	1.2379E 02	1.5913E-03
67	.6722	135.0	522.82	7.9624E 00	1.9604E 00	[illegible]	9.9615E-03	1.2541E 02	1.8803E-03
68	.7170	135.0	526.96	8.1759E 00	1.9253E 00	2.5165E-03	[illegible]	1.2640E 02	1.9149E-03
69	.7583	135.0	525.13	5.7459E 00	1.4719E 00	1.9192E-03	[illegible]	1.2596E 02	1.4005E-03
70	.7996	135.0	530.85	7.1531E 00	2.0704E 00	2.7366E-03	[illegible]	1.2733E 02	2.0772E-03
71	.8409	135.0	533.46	7.1914E 00	1.9815E 00	2.6120E-03	1.0520E-02	1.2794E 02	1.9868E-03
72	.8822	135.0	534.48	7.1841E 00	1.9436E 00	2.5695E-03	1.0338E-02	1.2819E 02	1.9516E-03
73	.9235	135.0	535.89	7.5587E 00	1.8535E 00	2.4511E-03	9.8765E-03	1.2852E 02	1.8642E-03
74	.9648	135.0	539.35	8.1945E 00	1.9786E 00	2.6181E-03	1.0547E-02	1.2935E 02	1.9908E-03
75	.2524	180.0	482.88	4.4334E 00	1.2882E 00	1.5920E-03	6.4332E-03	1.1595E 02	1.2143E-03
76	.2943	180.0	-116.74	-1.1546E-14	-3.7820E-15	-2.6277E-18	-1.0978E-17	-2.1036E 01	-2.0721E-18
77	.3363	180.0	497.12	3.4247E 00	1.0439E 00	1.3107E-03	5.2925E-03	1.1932E 02	9.9899E-04
78	.3783	180.0	500.39	3.5008E 00	1.0547E 00	1.3323E-03	5.3787E-03	1.2009E 02	1.0153E-03
79	.4203	180.0	503.80	3.7608E 00	1.1117E 00	1.4106E-03	[illegible]	1.2090E 02	1.0745E-03
80	.4623	180.0	507.72	3.9921E 00	1.1490E 00	1.4535E-03	[illegible]	1.2183E 02	1.1072E-03
81	.5043	180.0	510.68	4.2312E 00	1.0680E 00	1.3566E-03	5.4736E-03	1.2253E 02	1.0332E-03
82	.5463	180.0	514.03	5.3050E 00	1.4007E 00	1.8107E-03	7.3045E-03	1.2333E 02	1.3788E-03
83	.5882	180.0	517.35	6.1604E 00	1.6359E 00	2.1116E-03	8.5172E-03	1.2412E 02	1.6077E-03
84	.6302	180.0	523.32	7.4231E 00	1.9970E 00	2.5988E-03	1.0479E-02	1.2556E 02	1.9779E-03
85	.6722	180.0	531.84	9.6842E 00	2.3279E 00	3.0589E-03	1.2329E-02	1.2737E 02	2.3271E-03
86	.7170	180.0	535.43	9.7869E 00	2.3047E 00	3.0440E-03	1.2274E-02	1.2841E 02	2.3168E-03
87	.7583	180.0	532.99	7.2916E 00	1.7535E 00	2.3101E-03	9.3046E-03	1.2783E 02	1.7572E-03
88	.7996	180.0	538.67	8.3695E 00	2.1802E 00	2.8939E-03	1.1659E-02	1.2918E 02	2.2007E-03
89	.8409	180.0	540.47	8.4317E 00	2.2566E 00	3.0022E-03	1.2094E-02	1.2960E 02	2.2828E-03
90	.8822	180.0	542.16	9.3655E 00	2.1582E 00	2.8780E-03	1.1593E-02	1.3002E 02	2.1882E-03
91	.9235	180.0	543.46	9.3355E 00	2.2916E 00	3.0569E-03	1.2379E-02	1.3031E 02	2.3271E-03
92	.9648	180.0	546.24	1.0229E 01	2.3573E 00	3.1667E-03	1.2724E-02	1.3099E 02	2.4025E-03
93	.8822	225.0	544.06	7.4214E 00	1.8962E 00	2.5351E-03	1.0210E-02	1.3047E 02	1.9272E-03
94	.9648	225.0	546.96	7.9279E 00	1.9065E 00	2.5587E-03	1.0309E-02	1.3116E 02	1.9449E-03
95	.7170	270.0	538.19	5.3468E 00	1.2054E 00	1.5990E-03	6.4473E-03	1.2907E 02	1.2160E-03
96	.7996	270.0	546.20	5.4820E 00	1.4557E 00	1.9518E-03	7.8601E-03	1.3098E 02	1.4836E-03
97	.8822	270.0	548.88	5.7878E 00	1.3460E 00	1.8111E-03	7.2925E-03	1.3162E 02	1.3769E-03
98	.9648	270.0	548.34	5.4834E 00	1.3187E 00	1.7731E-03	7.1396E-03	1.3149E 02	1.3476E-03


GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 30
MACH NO = 8
RE NO = 2.18 X 10**6
CONFIG 3
ALPHA 4
TIME 0 SEC
SYM PHI X/L
0
45
90
135
180
SYM PHI X/L
225
270
315
0.88
0.95
32.00
24.00
16.00
8.00
0.00
-8.00
ST X 10**4
0.00
0.20
0.40
0.60
0.80
1.00
X/L

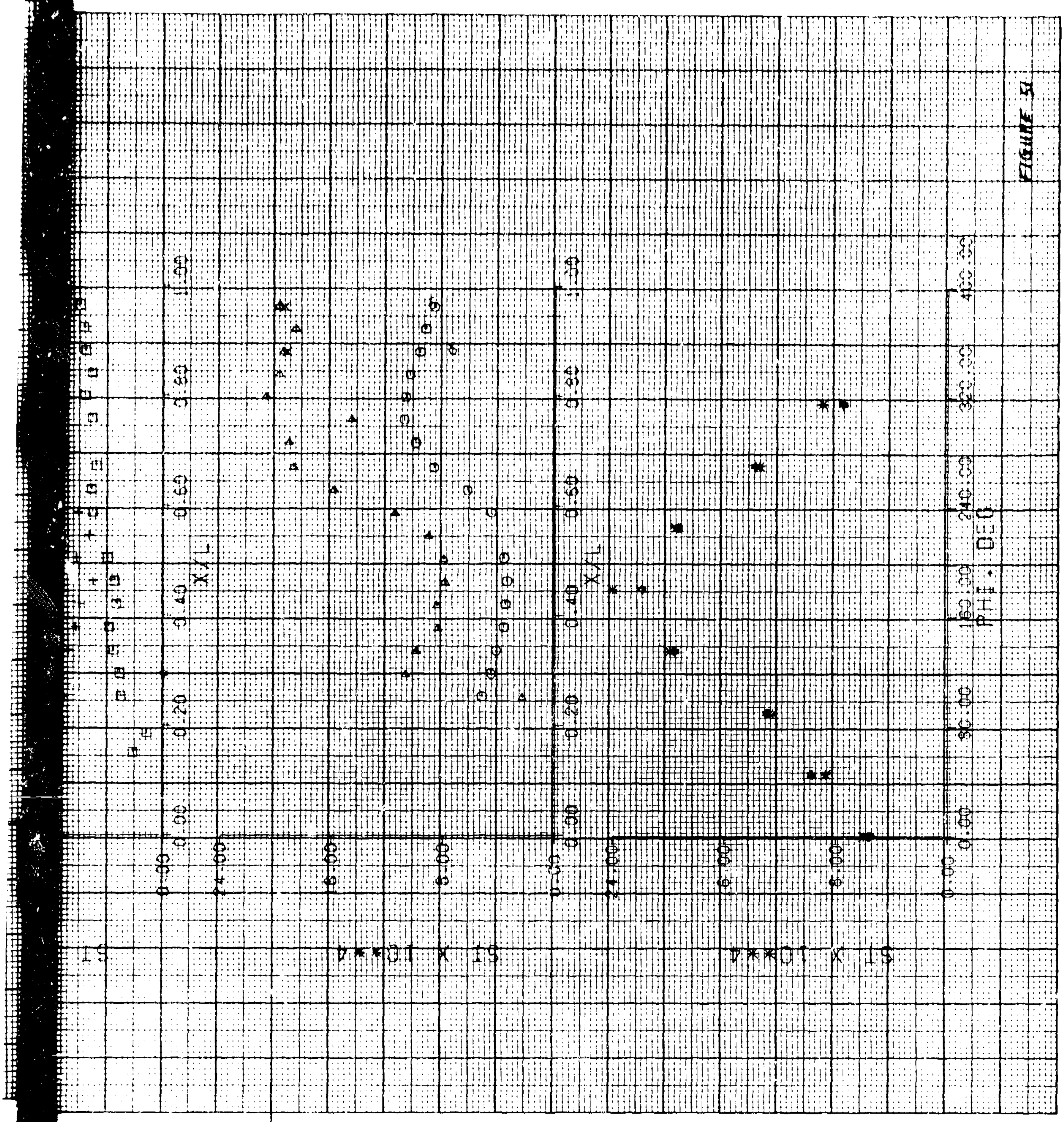


Figure 51

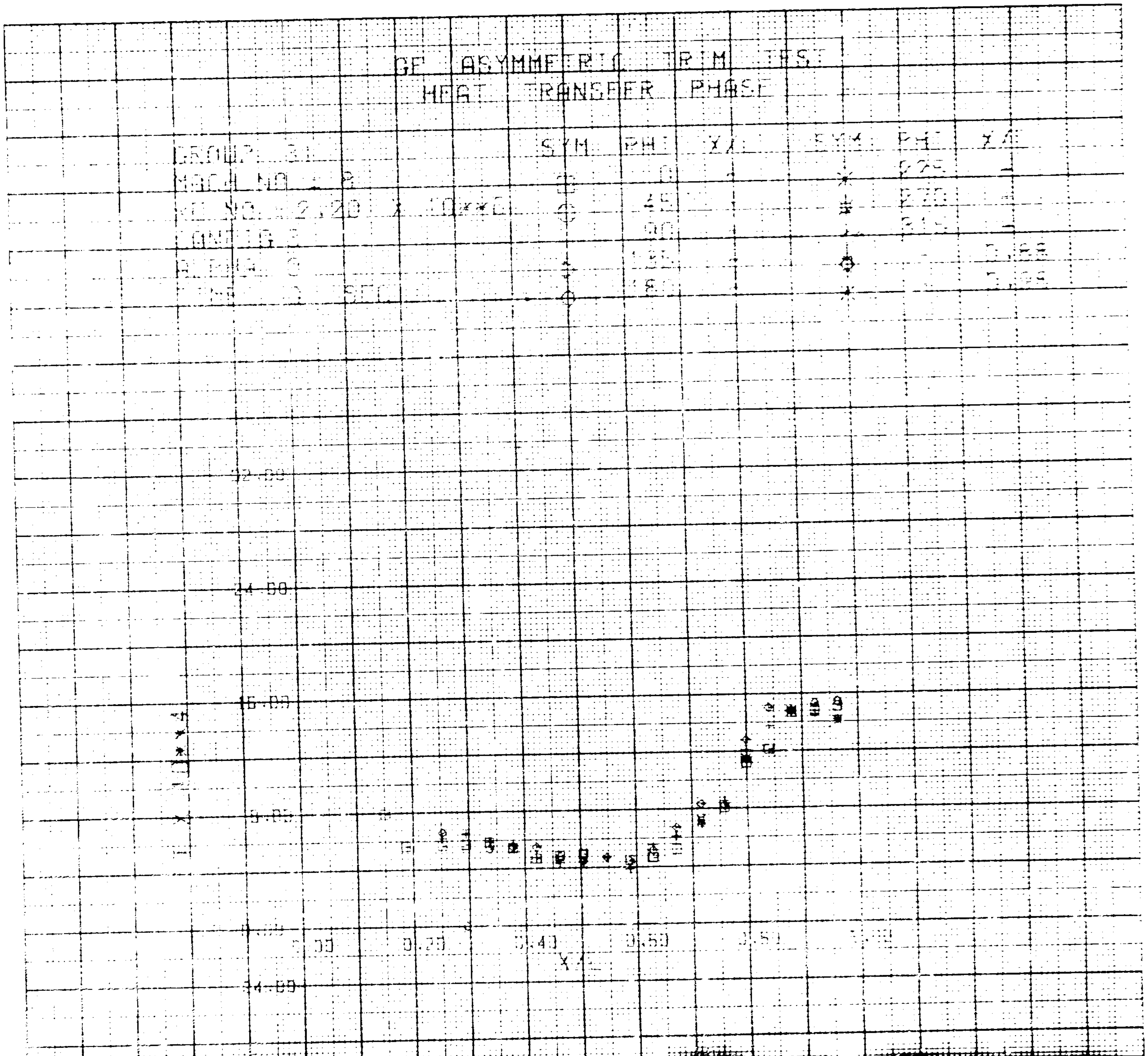
7/14/69

AEDC(ARO,INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
VTO947-600

GROUP	CONFIG	ALPHA-M	BETA-M	ALPHA-S	ROLL	ALP-P	DATE	MACH NO	PO	TO	TIME
31	7	.05	0	.05	0	0	714	7.99	478.07	1205.83	-.00

T-INF	P-INF	Q-INF	V-INF	RHO-INF	MU-INF	RE/FT	HE/D	MU
9.8370E 01	4.8941E-02	2.1992E 00	3.7831E 03	4.3917E-05	7.5177E-08	2.1959E 06	2.0195E 06	3.1447E 02

TC NO	X/L	PHI	TEMP	SLOPE	Q-STON	HT	HM	HW	ST
1	.1900	0	511.14	1.7079E 00	8.0591E-01	1.0907E-03	4.2085E-03	1.2204E 02	7.9120E-04
2	.1667	0	501.26	2.6557E 00	5.8324E-01	7.4167E-04	3.0012E-03	1.2030E 02	5.6560E-04
3	.2524	0	505.80	1.9754E 00	5.8396E-01	7.4492E-04	3.0217E-03	1.2137E 02	5.6954E-04
4	.2943	0	521.96	1.8240E 00	5.7571E-01	7.5397E-04	3.0419E-03	1.2561E 02	5.7207E-04
5	.3363	0	523.58	1.6595E 00	5.8692E-01	7.7024E-04	3.1070E-03	1.2560E 02	5.8522E-04
6	.3783	0	523.84	1.8229E 00	5.6797E-01	7.1941E-04	2.9017E-03	1.2566E 02	5.4656E-04
7	.4203	0	523.85	1.6241E 00	4.7191E-01	6.1956E-04	2.4990E-03	1.2566E 02	4.7070E-04
8	.4623	0	525.41	1.7012E 00	4.8528E-01	6.3868E-04	2.5755E-03	1.2608E 02	4.8512E-04
9	.5043	0	526.21	1.8176E 00	4.9715E-01	6.5475E-04	2.6405E-03	1.2623E 02	4.9737E-04
10	.5463	0	510.07	4.5401E-02	1.2739E-02	1.6675E-05	6.8041E-05	1.2728E 02	1.2816E-05
11	.5882	0	510.41	1.6254E 00	4.4784E-01	5.9307E-04	2.3913E-03	1.2722E 02	4.5041E-04
12	.6302	0	531.46	1.7127E 00	4.6330E-01	6.1448E-04	2.4774E-03	1.2747E 02	4.6664E-04
13	.6722	0	527.95	2.0700E 00	5.1857E-01	6.8450E-04	2.7603E-03	1.2663E 02	5.1992E-04
99	.8822	315.0	543.98	4.3076E 00	1.1221E 00	1.5132E-03	6.0969E-03	1.3045E 02	1.1496E-03
15	.7583	0	538.15	1.2886E 00	7.9064E-01	1.0582E-03	4.2647E-03	1.2906E 02	8.0329E-04
16	.7996	0	540.07	3.9209E 00	1.1001E 00	1.4773E-03	5.9533E-03	1.2971E 02	1.1213E-03
17	.8409	0	541.43	4.6596E 00	1.1906E 00	1.6000E-03	6.4474E-03	1.2984E 02	1.2144E-03
18	.8822	0	545.06	5.7257E 00	1.4344E 00	1.9372E-03	7.8064E-03	1.3071E 02	1.4700E-03
19	.9235	0	545.86	5.7502E 00	1.4405E 00	1.9470E-03	7.8419E-03	1.3085E 02	1.4775E-03
20	.9648	0	544.86	6.1314E 00	1.4745E 00	1.9908E-03	8.0205E-03	1.3066E 02	1.5107E-03
21	.2524	45.0	500.27	2.3116E 00	6.8333E-01	8.7020E-04	3.5144E-03	1.2006E 02	6.6196E-04
22	.2943	45.0	513.45	1.9325E 00	6.1960E-01	8.0250E-04	3.2387E-03	1.2319E 02	6.1003E-04
23	.3363	45.0	515.43	1.9980E 00	6.0061E-01	7.7991E-04	3.1472E-03	1.2366E 02	5.9260E-04
24	.3783	45.0	516.92	1.7646E 00	5.3044E-01	6.9013E-04	2.7846E-03	1.2401E 02	5.2451E-04
25	.4203	45.0	518.25	1.6221E 00	4.7131E-01	6.1426E-04	2.4743E-03	1.2433E 02	4.6681E-04
26	.4623	45.0	521.34	1.7370E 00	4.8736E-01	6.3775E-04	2.5727E-03	1.2506E 02	4.8458E-04
27	.5043	45.0	522.49	1.7227E 00	4.5747E-01	5.9954E-04	2.4144E-03	1.2534E 02	4.5552E-04
100	.9648	315.0	549.33	5.6132E 00	1.3499E 00	1.8336E-03	7.1853E-03	1.3173E 02	1.3911E-03
29	.5882	45.0	525.38	1.6552E 00	4.5605E-01	5.9995E-04	2.4197E-03	1.2602E 02	4.5576E-04
30	.6302	45.0	527.46	1.8839E 00	5.0967E-01	6.7233E-04	2.7113E-03	1.2652E 02	5.1069E-04
31	.6722	45.0	528.23	2.5405E 00	6.2362E-01	8.2349E-04	3.3207E-03	1.2670E 02	6.2548E-04
32	.7170	45.0	531.50	2.0321E 00	6.9047E-01	9.1571E-04	3.6919E-03	1.2748E 02	6.9540E-04
33	.7583	45.0	536.35	3.2956E 00	9.0803E-01	1.2120E-03	4.8854E-03	1.2863E 02	9.2019E-04
34	.7996	45.0	539.83	4.1525E 00	1.1651E 00	1.5603E-03	6.2884E-03	1.2922E 02	1.1845E-03
35	.8409	45.0	542.26	4.9534E 00	1.3401E 00	1.8030E-03	7.2649E-03	1.3004E 02	1.3684E-03
36	.8822	45.0	544.34	5.1896E 00	1.4176E 00	1.9126E-03	7.7059E-03	1.3054E 02	1.4515E-03
37	.9235	45.0	545.38	5.6407E 00	1.3902E 00	1.8782E-03	7.5668E-03	1.3078E 02	1.4253E-03
38	.9648	45.0	545.55	5.3802E 00	1.2938E 00	1.7485E-03	7.0441E-03	1.3082E 02	1.3268E-03
39	.2524	90.0	496.97	2.1685E 00	6.4102E-01	8.1285E-04	3.2834E-03	1.1927E 02	6.1845E-04
40	.2943	90.0	507.24	2.0689E 00	6.6333E-01	8.5229E-04	3.4408E-03	1.2172E 02	6.4809E-04
41	.3363	90.0	509.69	1.9988E 00	5.9930E-01	7.7246E-04	3.1181E-03	1.2230E 02	5.8732E-04
42	.3783	90.0	511.81	1.8134E 00	5.7235E-01	7.3974E-04	2.9857E-03	1.2280E 02	5.6237E-04
43	.4203	90.0	514.38	1.6366E 00	4.8321E-01	6.266 E-04	2.5287E-03	1.2341E 02	4.7630E-04
44	.4623	90.0	515.22	1.4184E 00	4.4081E-01	5.7199E-04	2.3082E-03	1.2361E 02	4.3476E-04
45	.5043	90.0	517.46	1.6168E 00	4.4549E-01	5.8001E-04	2.3403E-03	1.2414E 02	4.4080E-04
46	.5463	90.0	520.04	1.4576E 00	4.7337E-01	6.1840E-04	2.4948E-03	1.2476E 02	4.6992E-04
47	.5882	90.0	521.82	1.1782E 00	3.8663E-01	5.0633E-04	2.0425E-03	1.2518E 02	3.8471E-04
48	.6302	90.0	523.46	2.0140E 00	5.5492E-01	7.2817E-04	2.9371E-03	1.2557E 02	5.5323E-04
49	.6722	90.0	525.53	2.4480E 00	6.1126E-01	8.0429E-04	3.2438E-03	1.2606E 02	6.1099E-04
50	.7170	90.0	530.19	2.4301E 00	6.9000E-01	9.1350E-04	3.6833E-03	1.2717E 02	6.9377E-04
51	.7583	90.0	532.01	3.2487E 00	8.4628E-01	1.1231E-03	4.5280E-03	1.2760E 02	8.5288E-04
52	.7996	90.0	535.27	4.5806E 00	1.1932E 00	1.5904E-03	6.4110E-03	1.2838E 02	1.2076E-03
53	.8409	90.0	536.99	5.3968E 00	1.3520E 00	1.8062E-03	7.2799E-03	1.2878E 02	1.3712E-03
54	.8822	90.0	539.95	5.9395E 00	1.4580E 00	1.9555E-03	7.8804E-03	1.2949E 02	1.4843E-03
55	.9235	90.0	541.61	5.9358E 00	1.4274E 00	1.9189E-03	7.7322E-03	1.2989E 02	1.4566E-03
56	.9648	90.0	540.68	5.7817E 00	1.3904E 00	1.8667E-03	7.5222E-03	1.2966E 02	1.4169E-03
57	.2524	135.0	488.92	5.2548E-01	1.5534E-01	1.9500E-04	7.8801E-04	1.1738E 02	1.4843E-04
58	.2943	135.0	495.01	2.0860E 00	6.6880E-01	8.4603E-04	3.4178E-03	1.1882E 02	6.4376E-04
59	.3363	135.0	498.36	1.9758E 00	6.2361E-01	7.9222E-04	3.1998E-03	1.1961E 02	6.0271E-04
60	.3783	135.0	500.97	1.8707E 00	5.8110E-01	7.4067E-04	2.9912E-03	1.2023E 02	5.6341E-04
61	.4203	135.0	503.99	1.6048E 00	5.4253E-01	6.9418E-04	2.8030E-03	1.2095E 02	5.2796E-04
62	.4623	135.0	507.12	1.7664E 00	5.1323E-01	6.5933E-04	2.6618E-03	1.2169E 02	5.0137E-04
63	.5043	135.0	510.04	1.7448E 00	4.4582E-01	5.7490E-04	2.3206E-03	1.2238E 02	4.3709E-04
64	.5463	135.0	512.26	1.7550E 00	4.6605E-01	6.0270E-04	2.4325E-03	1.2291E 02	4.5818E-04
65	.5882	135.0	514.39	1.8148E 00	4.8191E-01	6.2493E-04	2.5219E-03	1.2341E 02	4.7502E-04
66	.6302	135.0	517.05	2.1450E 00	5.6961E-01	7.4122E-04	2.9908E-03	1.2404E 02	5.6333E-04
67	.6722	135.0	521.39	2.6937E 00	6.4778E-01	8.4772E-04	3.4197E-03	1.2508E 02	6.4413E-04
68	.7170	135.0	524.64	3.0444E 00	7.1693E-01	9.4223E-04	3.8003E-03	1.2585E 02	7.1581E-04
69	.7583	135.0	525.71	2.5529E 00	7.1629E-01	9.4271E-04	3.8020E-03	1.2610E 02	7.1613E-04
70	.7996	135.0	529.58	4.4177E 00	1.3417E 00	1.7749E-03	7.1567E-03	1.2702E 02	1.3480E-03
71	.8409	135.0	532.45	5.1505E 00	1.4191E 00	1.8844E-03	7.5971E-03	1.2771E 02	1.4310E-03
72	.8822	135.0	533.87	5.6348E 00	1.5245E 00	2.0281E-03	8.1758E-03	1.2804E 02	1.5400E-03
73	.9235	135.0	536.00	5.7333E 00	1.4074E 00	1.8777E-03	7.5685E-03	1.2855E 02	1.4256E-03
74	.9648	135.0	538.73	6.0622E 00	1.4578E 00	1.9521E-03	7.8673E-03	1.2920E 02	1.4819E-03
75	.2524	180.0	490.26	2.3562E 00	6.8401E-01	8.8085E-04	3.4786E-03	1.1769E 02	6.5521E-04
76	.2943	180.0	-116.74	-1.1546E-14	-3.7020E-15	-2.6400E-18	-1.1033E-17	-2.1036E 01	-2.0702E-18
77	.3363	180.0	500.24	1.8835E 00	5.5673E-01	7.0905E-04	2.8636E-03	1.2006E 02	5.3938E-04
78	.3783	180.0	503.23	1.8984E 00	5.7065E-01	7.2945E-04	2.9455E-03	1.2077E 02	5.5481E-04
79	.4203	180.0	506.70	1.8052E 00	5.6320E-01	7.2314E-04	2.9195E-03	1.2159E 02	5.4990E-04
80	.4623	180.0	510.84	1.7191E 00	4.9093E-01	6.3371E-04	2.5579E-03	1.2257E 02	4.8179E-04
81	.5043	180.0	513.60	1.8228E 00	4.5665E-01	5.9157E-04	2.3874E-03	1.2323E 02	4.4968E-04
82	.5463	180.0	515.97	1.7975E 00	4.7732E-01	6.2026E-04	2.5029E-03	1.2379E 02	4.714 E-04
83	.5882	180.0	518.17	1.4961E 00	4.5041E-01	5.8702E-04	2.3681E-03	1.2430E 02	4.4604E-04
84	.6302	180.0	522.22	1.9548E 00	5.1911E-01	6.8038E-04	2.7443E-03	1.2527E 02	5.1672E-04
85	.6722	180.0	527.22	2.7812E 00	6.7362E-01	8.8832E-04	3.5823E-03	1.2646E 02	6.7476E-04
86	.7170	180.0	531.09	3.5124E 00	8.2713E-01	1.0964E-03	4.4204E-03	1.2734E 02	8.3261E-04
87	.7583	180.0	532.08	3.3951E 00	8.1644E-01	1.0836E-03	4.3687E-03	1.2762E 02	8.2288E-04
88	.7996	180.0	535.80	4.8611E 00	1.2663E 00	1.6890E-03	6.8083E-03	1.2850E 02	1.2824E-03
89	.8409	180.0	537.99	5.4073E 00	1.4034E 00	1.9849E-03	8.0000E-03	1.2902E 02	1.5069E-03
90	.8822	180.0	539.91	6.1116E 00	1.4544E 00	1.9506E-03	7.8610E-03	1.2948E 02	1.4807E-03
91	.9235	180.0	542.17	6.1230E 00	1.5030E 00	2.0219E-03	8.1472E-03	1.3002E 02	1.5346E-03
92	.9648	180.0	545.47	6.5361E 00	1.5057E 00	2.0346E-03	8.1948E-03	1.3080E 02	1.5419E-03
93	.8822	225.0	542.04	5.4768E 00	1.4505E 00	1.9509E-03	7.8610E-03	1.2999E 02	1.4807E-03
94	.9648	225.0	546.72	5.7403E 00	1.3904E 00	1.8684E-03	7.5269E-03	1.3110E 02	1.4177E-03
95	.7170	270.0	537.08	3.1713E 00	7.1498E-01	9.5528E-04	3.8503E-03	1.2881E 02	7.2524E-04
96	.7996	270.0	544.01	4.2243E 00	1.1231E 00	1.5163E-03	6.1049E-03	1.3065E 02	1.1507E-03
97	.8822	270.0	548.08	5.4377E 00	1.4485E 00	1.9533E-03	7.8844E-03	1.3143E 02	1.4821E-03
98	.9648	270.0	548.93	5.4860E 00	1.3674E 00	1.8563E-03	7.4772E-03	1.3163E 02	1.4084E-03


GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
SYM
PHI
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0.60
X/L

2

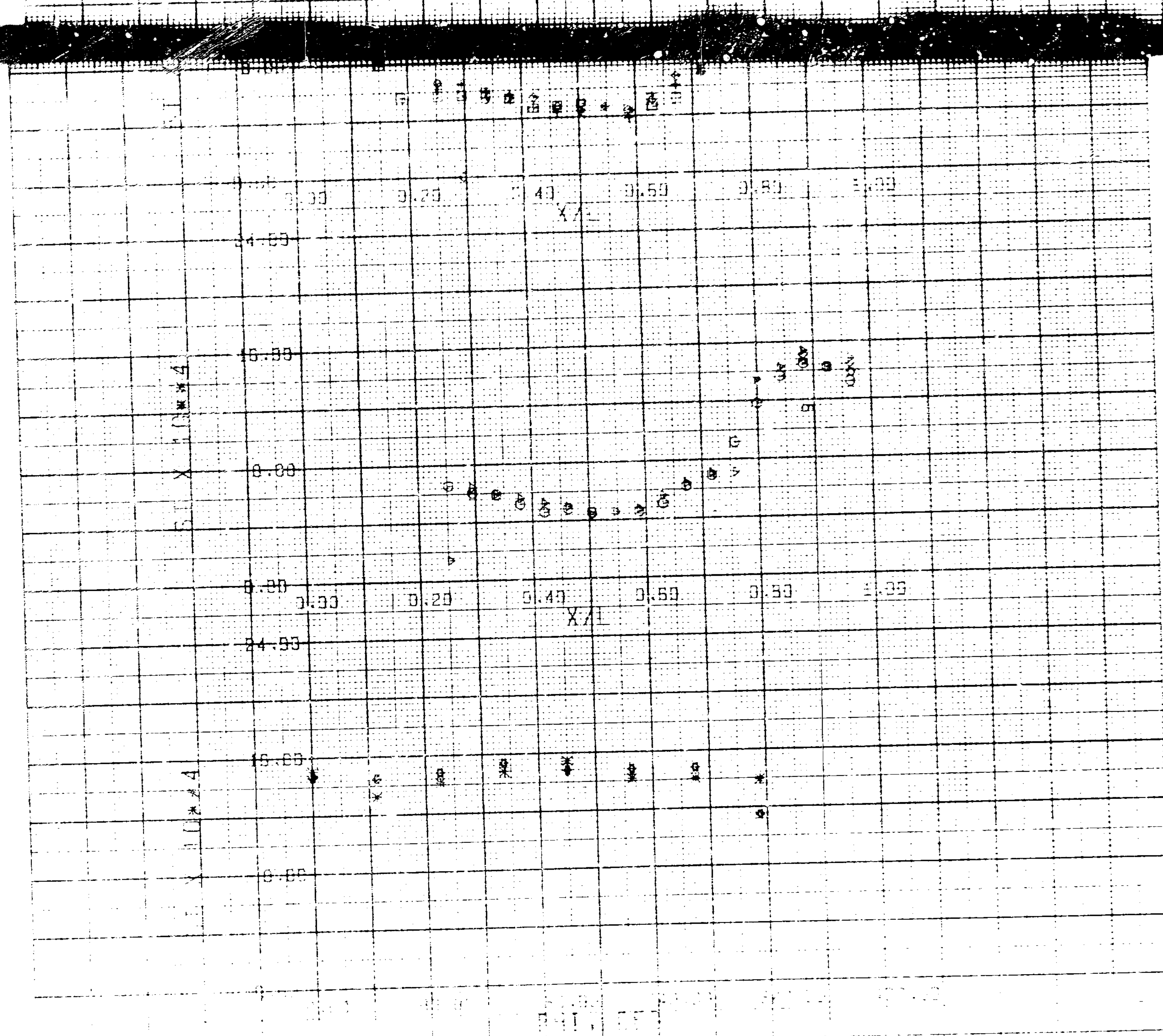

FIGURE 52

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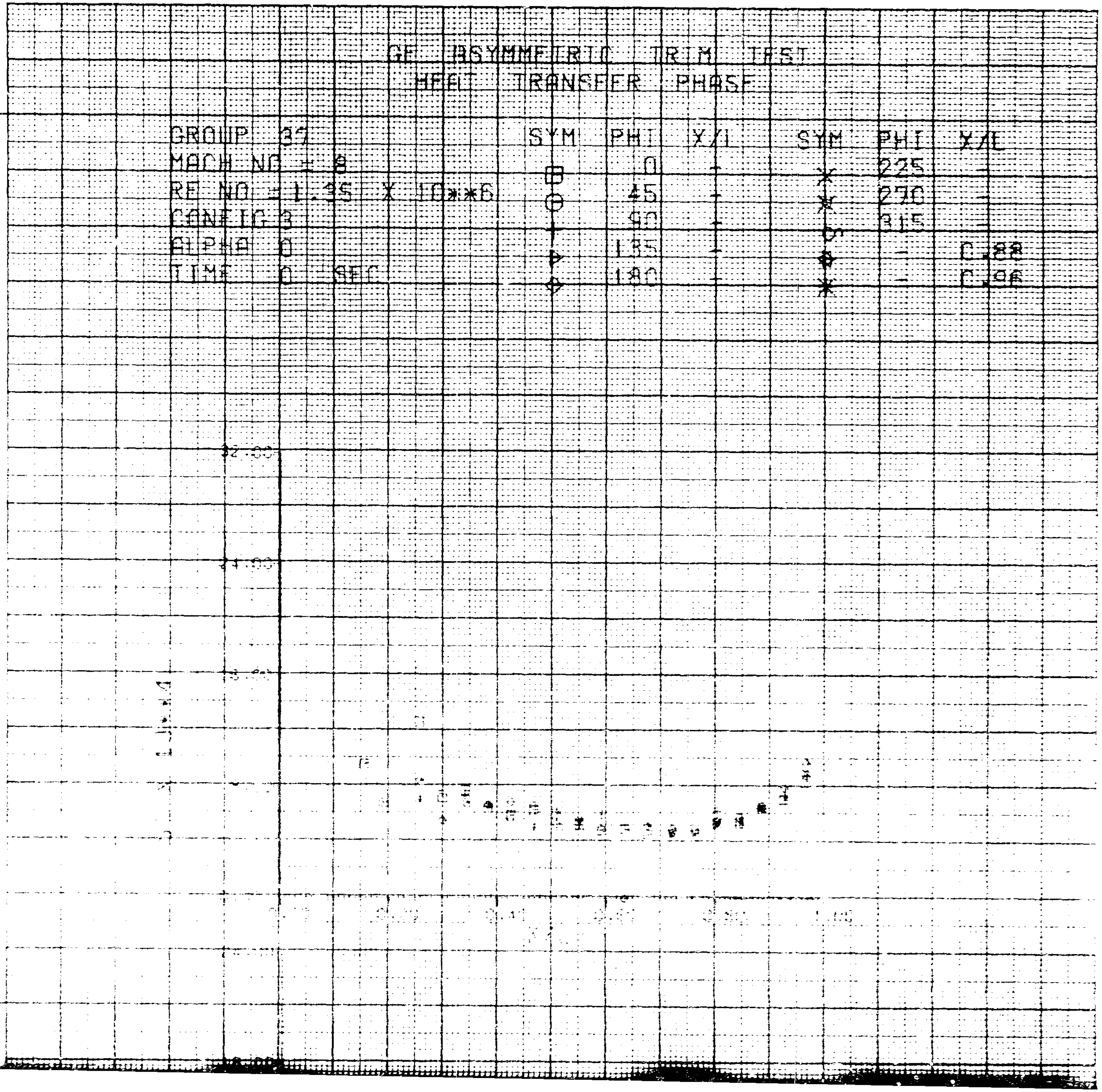
ARO, INC., ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
VT09A7-800

RUN	CONFIG	ALPHA-M	BETA-M	ALPHA-S	ROLL	ALP-P	DATE	MACH NO	PO	TO	TIME
17	3	.01	0	.01	0	0	715	7.97	281.60	1270.00	-.00

[illegible]	P-INF	Q-INF	V-INF	RHO-INF	MU-INF	RE/FT	RE/D	HO
9.2617E 01	2.9566E-02	1.3145E 00	3.759E 03	2.0765E-05	7.4610E-08	1.3486E 06	1.2363E 06	3.1049E 02

TC NO	X/L	PHI	TEMP	SLOPE	Q-STDW	HT	HM	HW	ST
1	.1306	0	516.56	2.5280E 00	5.7083E-01	7.7828E-04	3.1397E-03	1.2868E 02	9.6976E-04
2	.1867	0	511.55	1.4685E 00	4.0597E-01	5.5133E-04	2.2265E-03	1.2799E 02	6.8766E-04
3	.2524	0	513.60	2.5442E 00	7.5230E-01	1.0216E-03	4.1217E-03	1.2803E 02	1.2731E-03
4	.2943	0	517.81	1.4660E 00	4.2503E-01	5.8056E-04	2.3419E-03	1.2898E 02	7.2334E-04
5	.3363	0	540.11	1.6422E 00	4.5519E-01	6.2363E-04	2.5153E-03	1.2953E 02	7.769:E-04
6	.3783	0	541.36	1.7665E 00	3.8070E-01	5.2247E-04	2.1071E-03	1.2982E 02	6.5003E-04
7	.4203	0	541.55	1.2039E 00	3.4980E-01	4.6019E-04	1.9360E-03	1.2987E 02	5.9817E-04
8	.4623	0	542.44	1.1489E 00	3.7166E-01	5.1083E-04	2.0601E-03	1.3008E 02	6.3630E-04
9	.5043	0	542.48	1.1151E 00	3.5564E-01	4.8910E-04	1.9724E-03	1.3309E 02	6.0924E-04
10	.5463	0	544.17	1.1143E 00	3.1266E-01	4.3075E-04	1.7370E-03	1.3049E 02	5.3650E-04
11	.5882	0	544.96	1.0388E 00	2.8621E-01	3.9475E-04	1.5917E-03	1.3068E 02	4.9164E-04
[illegible]	[illegible]	0	545.49	1.0881E 00	2.9437E-01	4.0629E-04	1.6382E-03	1.3081E 02	5.0600E-04
[illegible]	.6722	0	544.81	1.0627E 00	2.7124E-01	3.7404E-04	1.5042E-03	1.3065E 02	4.6585E-04
01	.7172	315.0	556.33	1.4831E 00	3.8641E-01	5.4143E-04	2.1818E-03	1.3339E 02	6.7391E-04
15	.7543	0	549.51	1.1111E 00	2.9125E-01	4.0430E-04	1.6298E-03	1.3179E 02	5.0340E-04
16	.7996	0	551.77	1.1199E 00	3.1399E-01	4.3708E-04	1.7619E-03	1.3231E 02	5.4416E-04
17	.8409	0	552.64	1.1402E 00	3.1688E-01	4.4173E-04	1.7804E-03	1.3251E 02	5.4992E-04
18	.8822	0	553.10	1.4901E 00	3.7481E-01	5.2282E-04	2.1072E-03	1.3262E 02	6.5085E-04
19	.9235	0	552.85	1.6597E 00	4.1578E-01	5.7960E-04	2.3361E-03	1.3252E 02	7.2156E-04
20	.9648	0	551.27	2.1186E 00	4.8543E-01	6.7540E-04	2.7224E-03	1.3219E 02	8.4088E-04
21	.2524	45.0	532.37	1.6338E 00	4.8298E-01	6.5976E-04	2.6420E-03	1.2769E 02	8.1603E-04
22	.2943	45.0	536.61	1.4081E 00	4.5145E-01	6.1556E-04	2.4832E-03	1.2870E 02	7.6700E-04
23	.3363	45.0	539.24	1.4521E 00	4.3652E-01	5.9734E-04	2.4094E-03	1.2932E 02	7.4419E-04
24	.3783	45.0	540.39	1.2324E 00	3.7047E-01	5.0776E-04	2.0479E-03	1.2959E 02	6.3255E-04
25	.4203	45.0	542.28	1.1791E 00	3.4261E-01	4.7074E-04	1.8984E-03	1.3003E 02	5.8638E-04
26	.4623	45.0	544.48	1.2111E 00	3.3900E-01	4.6835E-04	1.8880E-03	1.3057E 02	5.8333E-04
27	.5043	45.0	545.27	1.2460E 00	3.3034E-01	4.5581E-04	1.8379E-03	1.3076E 02	5.6768E-04
300	.9648	315.0	555.25	2.0242E 00	4.8774E-01	6.8238E-04	2.7500E-03	1.3313E 02	8.4939E-04
29	.5882	45.0	546.99	1.1125E 00	3.0653E-01	4.2397E-04	1.7003E-03	1.3117E 02	5.2797E-04
30	.6302	45.0	547.66	1.1179E 00	3.0243E-01	4.1868E-04	1.6880E-03	1.3133E 02	5.2137E-04
31	.6722	45.0	547.79	1.1639E 00	2.8570E-01	3.9554E-04	1.5949E-03	1.3136E 02	4.9263E-04
32	.7170	45.0	549.36	1.1099E 00	2.6138E-01	3.6270E-04	1.4621E-03	1.3173E 02	4.5162E-04
33	.7543	45.0	552.20	1.1829E 00	3.2593E-01	4.5407E-04	1.8302E-03	1.3241E 02	5.6530E-04
34	.7996	45.0	554.23	1.1461E 00	3.2158E-01	4.4927E-04	1.8100E-03	1.3289E 02	5.5926E-04
35	.8409	45.0	555.80	1.3881E 00	3.7499E-01	5.2512E-04	2.1141E-03	1.3329E 02	6.5362E-04
36	.8822	45.0	556.44	1.4958E 00	3.9344E-01	5.5137E-04	2.2219E-03	1.3342E 02	6.8628E-04
37	.9235	45.0	556.27	1.6892E 00	4.2651E-01	5.9753E-04	2.4079E-03	1.3337E 02	7.4374E-04
38	.9648	45.0	555.09	1.9571E 00	4.7065E-01	6.5832E-04	2.6530E-03	1.3310E 02	8.1946E-04
39	.2524	90.0	535.58	1.4217E 00	4.2026E-01	5.7223E-04	2.3085E-03	1.2845E 02	7.1304E-04
40	.2943	90.0	540.08	1.4213E 00	4.5570E-01	6.2431E-04	2.5180E-03	1.2952E 02	7.7776E-04
[illegible]	.3363	90.0	542.18	1.3918E 00	4.3930E-01	6.0358E-04	2.4342E-03	1.3002E 02	7.5185E-04
42	.3783	90.0	543.89	1.3173E 00	3.8421E-01	5.2914E-04	2.1337E-03	1.3043E 02	6.5905E-04
43	.4203	90.0	545.27	1.3117E 00	3.5818E-01	4.9423E-04	1.9928E-03	1.3076E 02	6.1553E-04
44	.4623	90.0	545.07	9.4364E-01	2.9935E-01	4.1293E-04	1.6650E-03	1.3071E 02	5.1428E-04
[illegible]	.5043	90.0	546.17	1.3114E 00	3.6133E-01	4.9919E-04	2.0127E-03	1.3097E 02	6.2168E-04
46	.5463	90.0	547.74	1.0866E 00	3.0967E-01	4.2878E-04	1.7287E-03	1.3136E 02	5.3394E-04
47	.5882	90.0	548.14	1.2455E 00	3.4944E-01	4.8413E-04	1.9518E-03	1.3144E 02	6.0285E-04
[illegible]	.6302	90.0	547.95	1.1258E 00	3.1018E-01	4.2958E-04	1.7319E-03	1.3139E 02	5.349[illegible]E-04
49	.6722	90.0	547.47	1.2425E 00	3.1127E-01	4.3080E-04	1.7368E-03	1.3128E 02	5.3647E-04
50	.7170	90.0	549.31	1.1618E 00	2.7359E-01	3.7962E-04	1.5303E-03	1.3172E 02	4.7268E-04
51	.7543	90.0	550.63	1.1126E 00	2.6378E-01	3.6668E-04	1.4781E-03	1.3203E 02	4.5654E-04
52	.7996	90.0	552.43	1.3909E 00	3.6234E-01	5.0495E-04	2.0352E-03	1.3246E 02	6.2863E-04
53	.8409	90.0	553.01	1.2847E 00	3.2185E-01	4.4889E-04	1.8092E-03	1.3260E 02	5.5883E-04
54	.8822	90.0	553.84	1.5277E 00	3.7501E-01	5.2363E-04	2.1103E-03	1.3280E 02	6.5184E-04
55	.9235	90.0	552.71	1.7918E 00	4.3090E-01	6.0073E-04	2.4213E-03	1.3253E 02	7.4786E-04
56	.9648	90.0	550.86	2.1467E 00	5.1625E-01	7.1787E-04	2.8937E-03	1.3209E 02	8.9378E-04
57	.2524	135.0	531.77	2.4755E-01	7.9092E-02	1.0714E-04	4.3231E-04	1.2756E 02	1.3353E-04
58	.2943	135.0	535.17	1.4941E 00	4.7903E-01	6.5189E-04	2.6300E-03	1.2835E 02	8.1233E-04
59	.3363	135.0	536.72	1.3871E 00	4.3781E-01	5.9705E-04	2.4085E-03	1.2872E 02	7.4393E-04
60	.3783	135.0	535.19	1.3385E 00	4.1574E-01	5.6583E-04	2.2828E-03	1.2836E 02	7.0509E-04
61	.4203	135.0	538.31	1.2931E 00	3.8870E-01	5.3123E-04	2.1428E-03	1.2910E 02	6.6186E-04
[illegible]	.4623	135.0	539.14	1.2588E 00	3.6577E-01	5.0046E-04	2.0186E-03	1.2930E 02	6.2349E-04
[illegible]	.5043	135.0	540.03	1.2987E 00	3.3183E-01	4.5458E-04	1.8335E-03	1.2951E 02	5.6631E-04
[illegible]	.5463	135.0	540.63	1.2219E 00	3.2447E-01	4.4485E-04	1.7942E-03	1.2965E 02	5.5418E-04
65	.5882	135.0	541.18	1.0734E 00	2.8504E-01	3.9110E-04	1.5773E-03	1.2978E 02	4.8720E-04
66	.6302	135.0	541.54	1.2444E 00	3.3044E-01	4.5362E-04	1.8294E-03	1.2987E 02	5.6506E-04
67	.6722	135.0	542.69	1.2761E 00	3.0545E-01	4.1996E-04	1.6936E-03	1.3014E 02	5.231[illegible]E-04
68	.7170	135.0	543.43	1.1436E 00	2.6931E-01	3.7066E-04	1.4947E-03	1.3032E 02	4.6168E-04
69	.7543	135.0	544.44	9.3173E-01	2.6142E-01	3.6030E-04	1.4529E-03	1.3056E 02	4.4875E-04
70	.7996	135.0	546.86	1.2948E 00	3.7622E-01	5.2025E-04	2.0976E-03	1.3113E 02	6.4788E-04
71	.8409	135.0	547.70	1.5707E 00	4.3277E-01	5.9915E-04	2.4155E-03	1.3134E 02	7.4610E-04
72	.8822	135.0	547.65	1.8823E 00	4.2807E-01	5.9260E-04	2.3892E-03	1.3132E 02	7.3795E-04
73	.9235	135.0	547.67	1.8938E 00	4.6182E-01	6.4346E-04	2.5942E-03	1.3132E 02	8.0128E-04
[illegible]	.9648	135.0	549.30	2.2579E 00	5.4294E-01	7.5350E-04	3.0375E-03	1.3174E 02	9.3822E-04
75	.2524	180.0	531.94	1.7296E 00	5.0256E-01	6.8092E-04	2.7476E-03	1.2758E 02	8.4865E-04
76	.2943	180.0	537.13	1.0389E 00	3.3309E-01	4.5450E-04	1.8334E-03	1.2882E 02	5.6630E-04
77	.3363	180.0	539.55	1.1685E 00	4.0454E-01	5.5392E-04	2.2318E-03	1.2939E 02	6.8996E-04
78	.3783	180.0	540.63	1.3087E 00	3.9330E-01	5.3934E-04	2.1753E-03	1.2965E 02	6.7188E-04
[illegible]	.4203	180.0	542.01	1.3793E 00	4.0773E-01	5.6007E-04	2.2587E-03	1.2998E 02	6.9765E-04
80	.4623	180.0	542.77	1.3636E 00	3.8941E-01	5.3547E-04	2.1594E-03	1.3016E 02	6.6698E-04
81	.5043	180.0	543.97	1.2565E 00	3.1477E-01	4.3354E-04	1.7482E-03	1.3045E 02	5.3999E-04
82	.5463	180.0	545.10	1.2557E 00	3.3344E-01	4.5998E-04	1.8547E-03	1.3072E 02	5.7288E-04
83	.5882	180.0	545.95	1.1074E 00	2.9407E-01	4.0615E-04	1.6376E-03	1.3092E 02	5.0581E-04
84	.6302	180.0	538.61	-4.9499E-03	-1.8456E-03	-2.5233E-06	-1.0178E-05	1.2917E 02	-3.1438E-06
85	.6722	180.0	548.36	1.2819E 00	3.0335E-01	[illegible]E-04	1.6947E-03	1.3149E 02	5.2346E-04
86	.7170	180.0	549.24	1.2505E 00	2.9447E-01	4.0854E-04	1.6471E-03	1.3171E 02	5.0875E-04
87	.7543	180.0	550.27	1.1923E 00	2.8672E-01	3.9837E-04	1.6058E-03	1.3195E 02	4.9600E-04
88	.7996	180.0	552.09	1.2371E 00	3.2227E-01	4.4890E-04	1.8094E-03	1.3238E 02	5.5886E-04
89	.8409	180.0	552.34	1.3174E 00	3.3660E-01	4.6903E-04	1.8905E-03	1.3244E 02	5.8391E-04
90	.8822	180.0	552.48	1.4932E 00	3.9018E-01	5.4379E-04	2.1918E-03	1.3248E 02	6.7698E-04
91	.9235	180.0	553.38	1.8683E 00	4.5881E-01	6.3993E-04	2.5792E-03	1.3268E 02	7.9664E-04
92	.9648	180.0	554.32	2.4509E 00	5.6477E-01	7.8912E-04	3.1803E-03	1.3291E 02	9.8231E-04
93	.8822	225.0	555.13	1.4120E 00	4.1208E-01	5.7644E-04	2.3211E-03	1.3311E 02	7.1753E-04
94	.9648	225.0	555.30	2.3808E 00	5.4848E-01	7.6742E-04	3.0927E-03	1.3315E 02	9.5524E-04
95	.7170	270.0	553.54	1.1822E 00	2.6652E-01	3.7199E-04	1.4992E-03	1.3273E 02	4.6308E-04
96	.7996	270.0	559.64	1.1693E 00	3.1052E-01	4.3715E-04	1.7613E-03	1.3419E 02	5.4407E-04
97	.8822	270.0	560.98	1.4571E 00	3.7229E-01	5.2502E-04	2.1152E-03	1.3448E 02	6.5332E-04
98	.9648	270.0	557.56	2.1600E 00	5.1944E-01	7.2910E-04	2.9379E-03	1.3369E 02	9.0743E-04

GROUP 89
GF ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
SYM PHI X/L
SYM PHI X/L
SYM PHI X/L


GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 37
MACH NO = 8
RE NO = 1.35 X 10**6
CONFIG 3
ALPHA 0
TIME 0 SEC
SYM PHI X/L
0 -
45 -
90 -
135 -
180 -
SYM PHI X/L
225 -
270 -
315 -
- 0.88
- 0.96

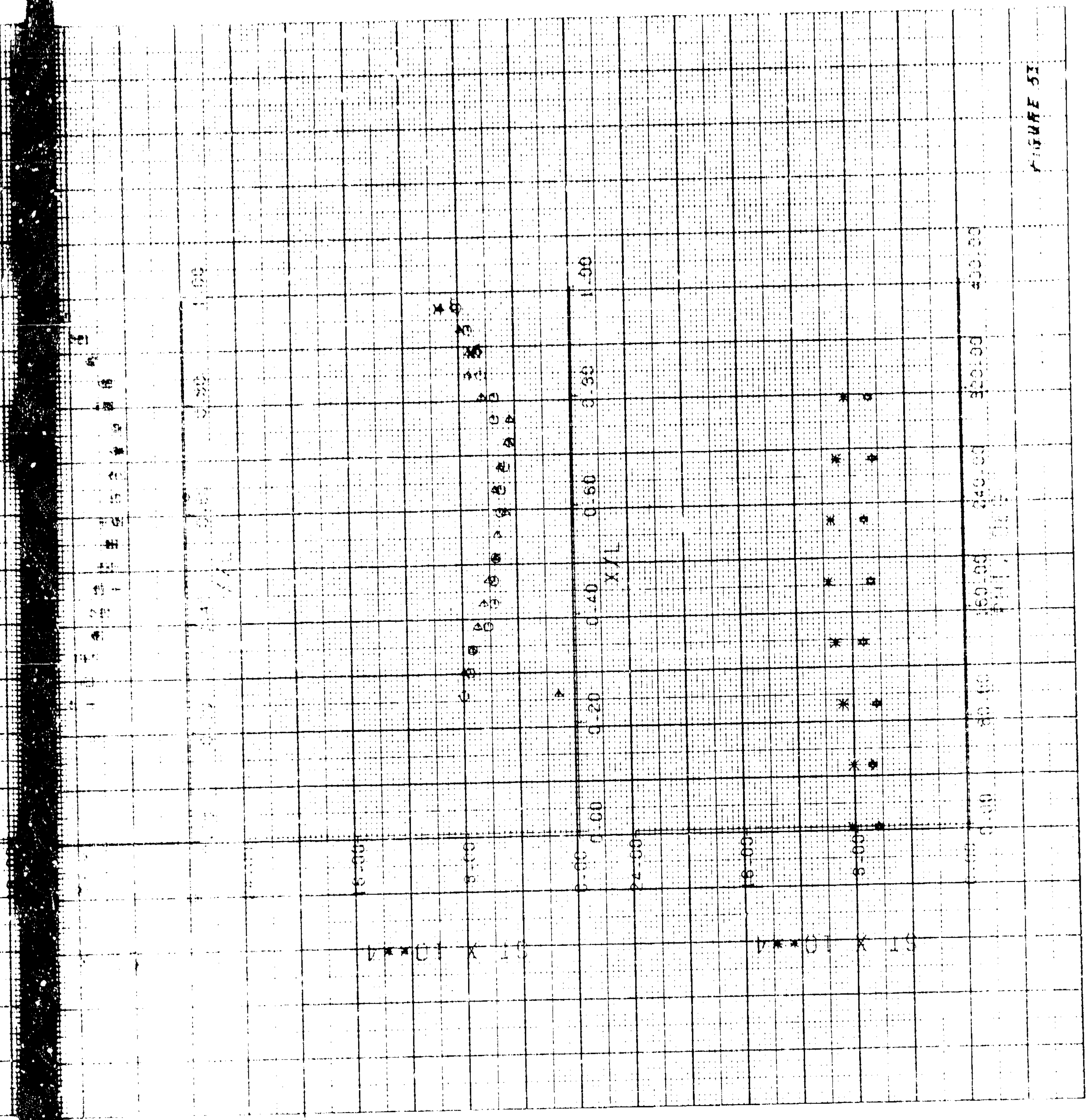
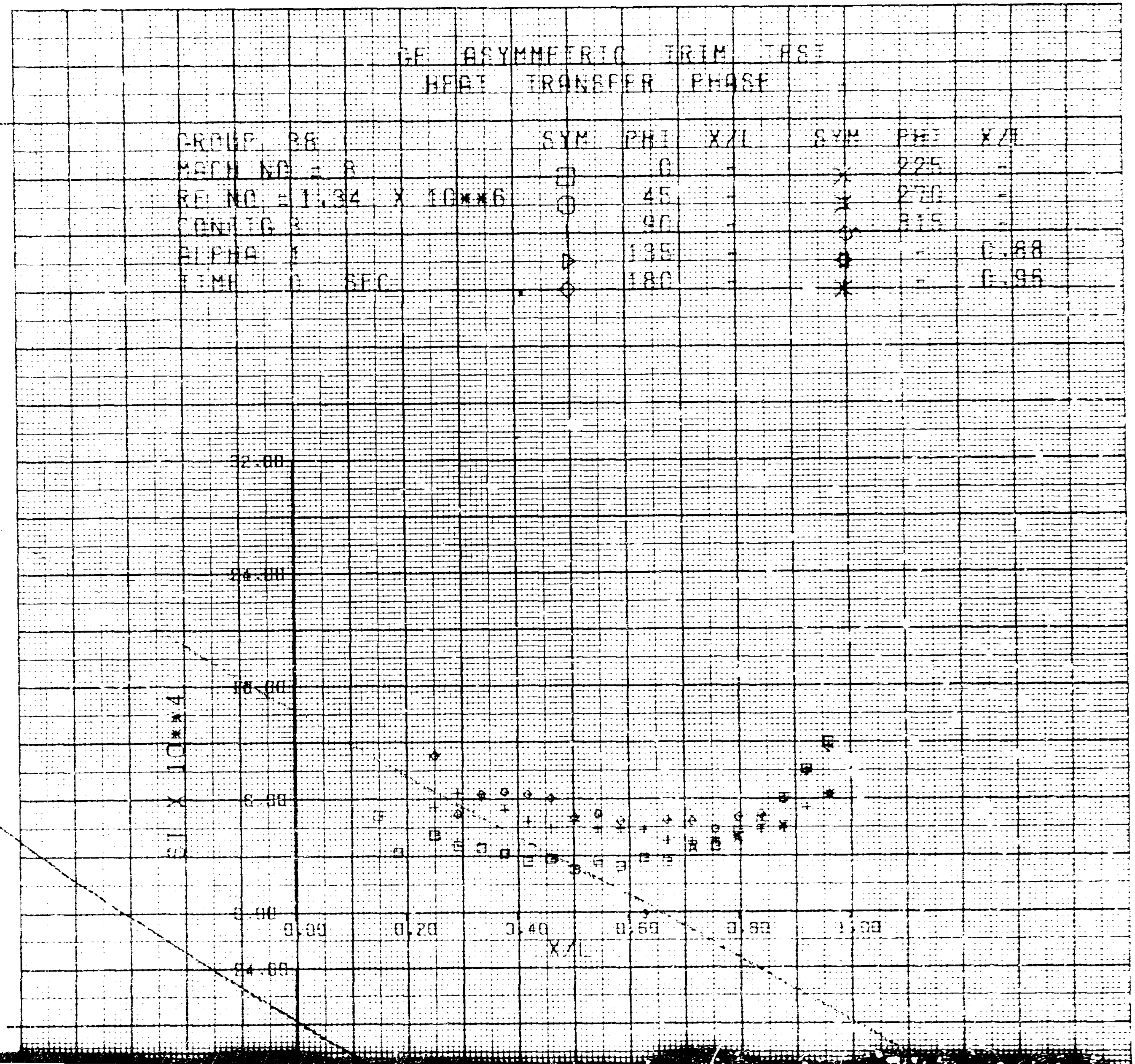


Figure 53

3



GE ASYMMETRIC TRIM CASE
HEAT TRANSFER PHASE
GROUP 86
MACH NO = 8
RE NO = 1.34 X 10**6
TIME 0 SEC
SYM PHI X/L
0
45
90
135
180
SYM PHI X/R
225
270
315
0.88
0.95
32.00
24.00
16.00
8.00
0.00
0.00
0.20
0.40
0.60
0.80
1.00
X/L
ST X 10**4

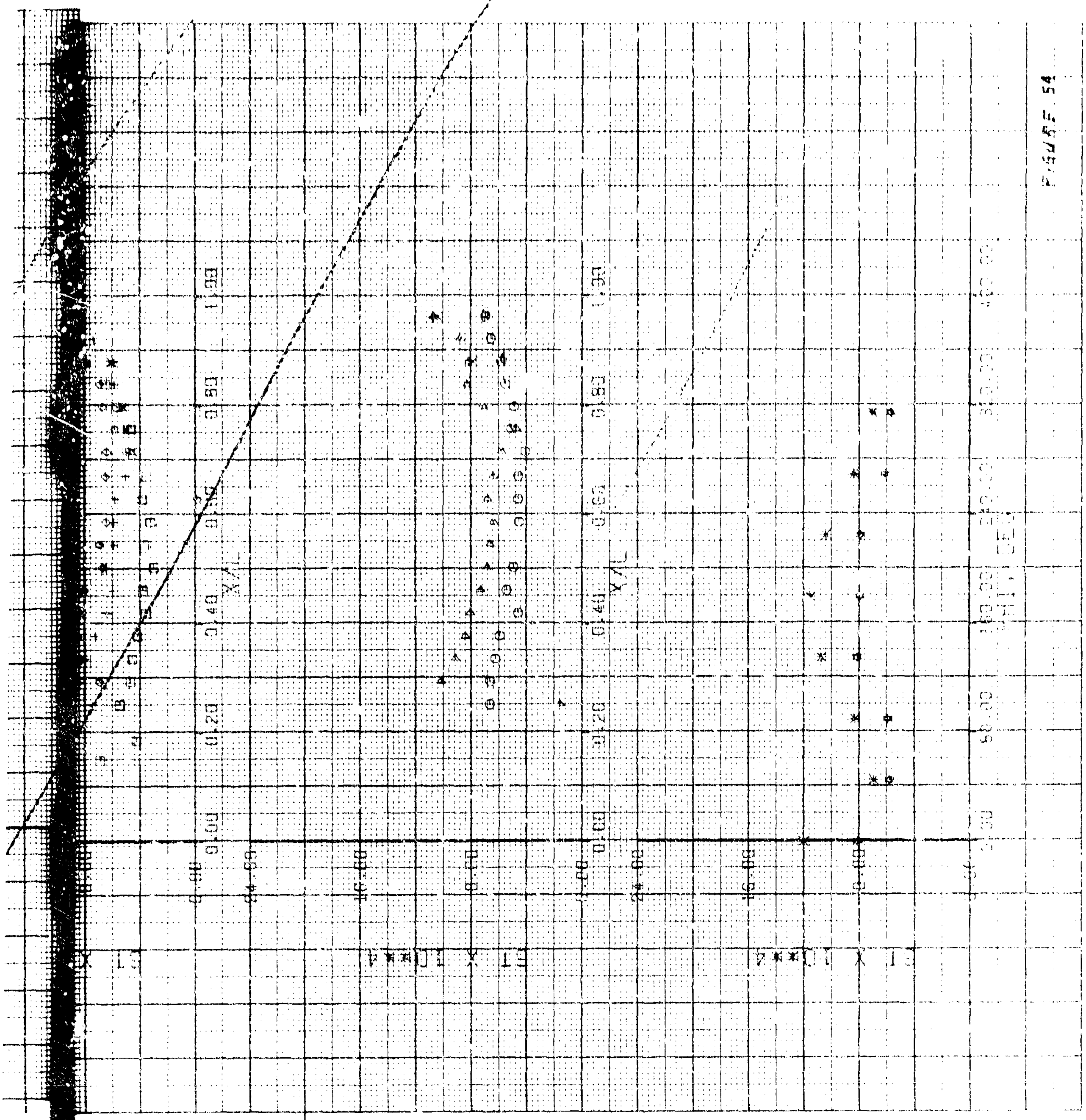


Figure 54

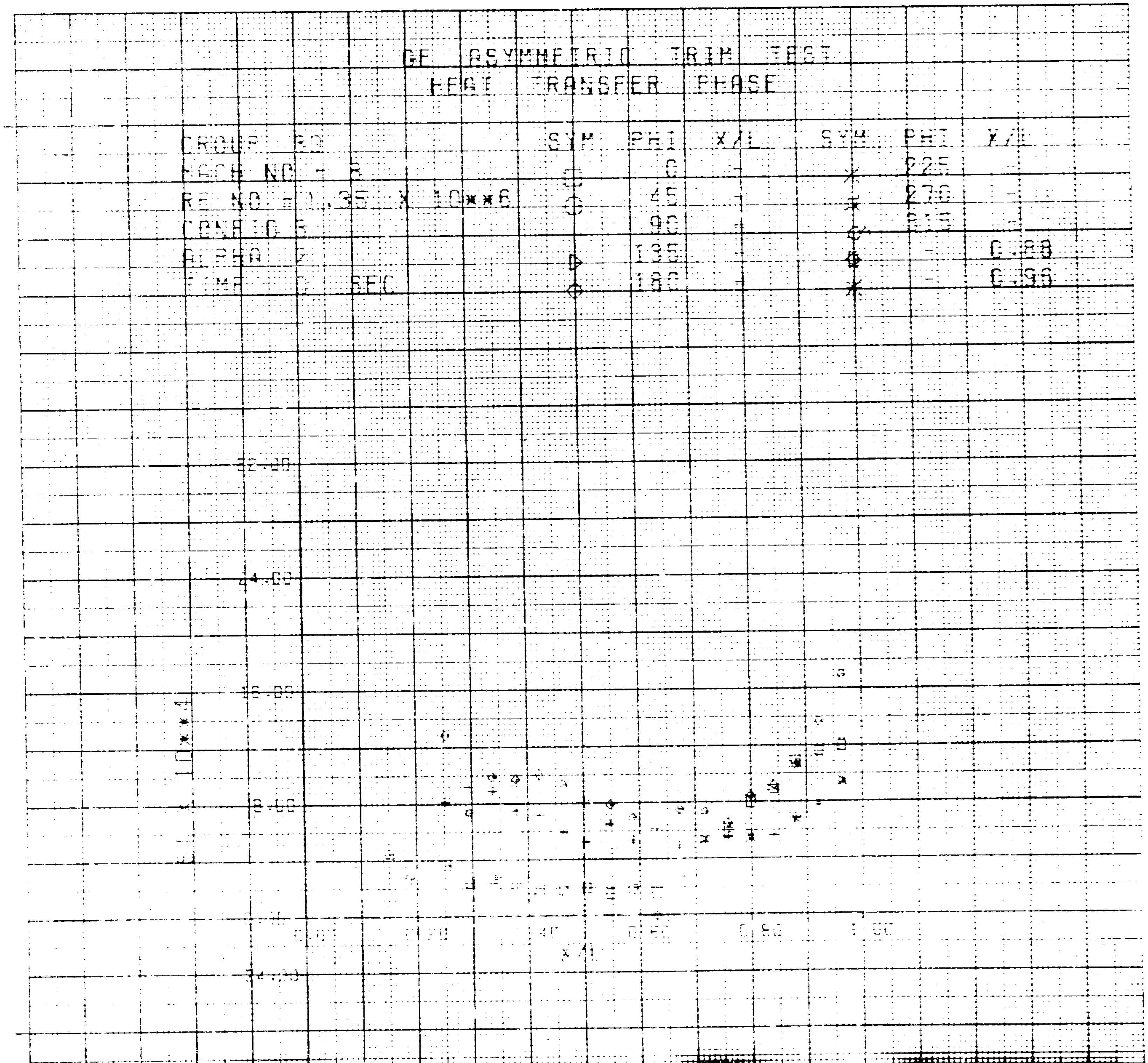
7/15/69

ARO, INC. - ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
VTOV.7-000

RUN	CONF	ALPHA-M	BETA-M	ALPHAS	ROLL	ALP-P	DATE	MACH NO	PO	TO	TIME
39	3	1.96	0	1.96	0	0	7/15	7.97	279.4	1263.47	-.00

T-INF	P-INF	Q-INF	V-INF	RHO-INF	MU-INF	RE/FT	RE/L	MU
9.2150E 01	3.9291E-02	1.3044E 00	3.7498E 03	2.0655E-05	7.9226E-08	1.3466E 06	1.2350E 06	3.08855E 02

NO	X/L	PHI	TEMP	SLOPE	Q-STDO	HT	HM	HW	ST
1	.1530	0	522.22	1.7033E 00	2.0159E-01	3.9288E-04	1.4252E-03	1.2527E 02	4.6316E-04
2	.1867	0	524.64	7.1402E-01	1.5701E-01	2.1225E-04	8.5711E-04	1.2596E 02	2.6652E-04
3	.2524	0	526.84	7.2217E-01	2.1354E-01	2.8991E-04	1.1765E-03	1.2538E 02	3.6198E-04
4	.2963	0	529.31	4.1343E-01	1.3600E-01	1.8634E-04	7.5220E-04	1.2596E 02	2.3392E-04
5	.3363	0	530.98	4.8069E-01	1.5172E-01	2.0712E-04	8.3604E-04	1.2735E 02	2.5998E-04
6	.3783	0	532.52	3.9069E-01	1.1744E-01	1.6067E-04	6.4852E-04	1.2772E 02	2.0166E-04
7	.4203	0	533.46	3.4955E-01	1.0738E-01	1.4709E-04	5.9368E-04	1.2795E 02	1.8461E-04
8	.4623	0	534.09	3.7270E-01	1.0264E-01	1.4095E-04	5.0865E-04	1.2829E 02	1.7688E-04
9	.5043	0	535.36	4.0951E-01	1.1084E-01	1.5224E-04	6.1419E-04	1.2840E 02	1.9105E-04
10	.5463	0	537.53	3.1183E-01	8.7492E-02	1.2052E-04	4.8635E-04	1.2891E 02	1.5123E-04
11	.5882	0	538.79	3.4360E-01	1.0564E-01	1.4577E-04	5.8820E-04	1.2921E 02	1.8290E-04
12	.6302	0	540.30	3.3561E-01	9.0797E-02	1.2555E-04	5.0657E-04	1.2957E 02	1.5752E-04
13	.6722	0	542.84	6.1824E-01	1.5480E-01	2.1493E-04	8.6704E-04	1.3018E 02	2.6961E-04
99	.8022	315.0	551.16	1.5112E 00	3.9360E-01	5.5283E-04	2.2292E-03	1.3221E 02	6.9316E-04
15	.7583	0	544.79	1.1880E 00	3.3391E-01	4.6464E-04	1.8742E-03	1.3064E 02	5.8279E-04
16	.7996	0	546.42	1.6122E 00	4.5235E-01	6.3085E-04	2.5444E-03	1.3103E 02	7.9120E-04
17	.8409	0	547.51	1.7766E 00	5.0504E-01	7.0540E-04	2.8450E-03	1.3129E 02	8.8464E-04
18	.8822	0	548.71	2.1798E 00	6.2124E-01	8.6916E-04	3.5052E-03	1.3158E 02	1.0899E-03
19	.9235	0	549.09	2.4267E 00	6.5806E-01	9.2113E-04	3.7147E-03	1.3167E 02	1.1551E-03
20	.9648	0	549.96	2.4189E 00	6.7789E-01	9.5009E-04	3.8313E-03	1.3188E 02	1.1913E-03
21	.2524	45.0	524.95	1.3670E 00	4.0411E-01	5.4719E-04	2.2096E-03	1.2592E 02	6.8707E-04
22	.2963	45.0	526.90	1.2357E 00	3.9620E-01	5.3795E-04	2.1721E-03	1.2640E 02	6.7540E-04
23	.3363	45.0	528.85	1.2286E 00	3.6927E-01	5.0263E-04	2.0292E-03	1.2686E 02	6.3099E-04
24	.3783	45.0	530.67	1.1351E 00	3.4122E-01	4.6551E-04	1.8792E-03	1.2723E 02	5.8434E-04
25	.4203	45.0	532.67	1.0652E 00	3.0370E-01	4.1557E-04	1.6774E-03	1.2776E 02	5.2159E-04
26	.4623	45.0	535.66	1.0712E 00	3.0054E-01	4.1294E-04	1.6665E-03	1.2847E 02	5.1821E-04
27	.5043	45.0	536.69	1.1389E 00	3.0290E-01	4.1612E-04	1.6792E-03	1.2871E 02	5.2216E-04
100	.9648	315.0	554.04	2.3280E 00	5.5983E-01	7.8917E-04	3.1817E-03	1.3286E 02	9.8534E-04
29	.5882	45.0	539.57	9.2970E-01	2.5616E-01	3.5386E-04	1.4278E-03	1.2940E 02	4.4397E-04
30	.6302	45.0	541.31	9.0440E-01	2.4470E-01	3.3885E-04	1.3671E-03	1.2981E 02	4.2509E-04
31	.6722	45.0	545.25	9.6129E-01	2.3597E-01	3.2854E-04	1.3252E-03	1.3075E 02	4.1208E-04
32	.7170	45.0	546.77	9.7662E-01	2.2990E-01	3.2090E-04	1.2943E-03	1.3111E 02	4.0245E-04
33	.7583	45.0	545.97	9.9088E-01	2.7302E-01	3.8051E-04	1.5348E-03	1.3092E 02	4.7724E-04
34	.7996	45.0	547.04	9.4914E-01	2.7753E-01	3.8738E-04	1.5624E-03	1.3118E 02	4.8583E-04
35	.8409	45.0	548.33	1.1918E 00	3.5218E-01	4.9246E-04	1.9861E-03	1.3149E 02	6.1757E-04
36	.8822	45.0	549.21	1.3785E 00	3.8884E-01	5.4445E-04	2.1956E-03	1.3170E 02	6.8273E-04
37	.9235	45.0	550.26	1.4160E 00	4.6400E-01	6.5058E-04	2.6235E-03	1.3194E 02	8.1577E-04
38	.9648	45.0	552.72	2.2469E 00	5.4033E-01	7.6023E-04	3.0652E-03	1.3253E 02	9.5313E-04
39	.2524	90.0	528.41	1.6041E 00	4.7419E-01	6.4512E-04	2.6045E-03	1.2675E 02	8.0988E-04
40	.2963	90.0	529.42	1.6671E 00	5.3452E-01	7.2818E-04	2.9397E-03	1.2699E 02	9.1411E-04
41	.3363	90.0	530.59	1.7287E 00	5.1407E-01	7.0143E-04	2.8316E-03	1.2726E 02	8.8048E-04
42	.3783	90.0	532.68	1.8730E 00	4.3335E-01	5.9312E-04	2.3940E-03	1.2780E 02	7.4443E-04
43	.4203	90.0	534.87	1.3956E 00	4.1256E-01	5.6624E-04	2.2853E-03	1.2828E 02	7.1061E-04
44	.4623	90.0	535.17	1.0912E 00	3.3890E-01	4.6541E-04	1.8783E-03	1.2835E 02	5.8407E-04
45	.5043	90.0	537.11	1.1038E 00	3.0414E-01	4.1872E-04	1.6897E-03	1.2881E 02	5.2543E-04
46	.5463	90.0	539.51	1.3061E 00	3.7297E-01	5.1518E-04	2.0787E-03	1.2938E 02	6.4637E-04
47	.5882	90.0	539.98	1.1986E 00	3.0819E-01	4.2598E-04	1.7147E-03	1.2950E 02	5.3444E-04
48	.6302	90.0	540.98	1.2737E 00	3.5094E-01	4.8573E-04	1.9597E-03	1.2973E 02	6.0937E-04
49	.6722	90.0	544.88	1.1288E 00	2.8280E-01	3.9355E-04	1.5874E-03	1.3066E 02	4.9362E-04
50	.7170	90.0	546.59	1.2342E 00	2.9301E-01	4.0873E-04	1.6485E-03	1.3107E 02	5.1261E-04
51	.7583	90.0	543.61	1.1944E 00	3.1114E-01	4.3222E-04	1.7430E-03	1.3036E 02	5.4216E-04
52	.7996	90.0	544.27	1.3041E 00	3.4077E-01	4.7382E-04	1.9113E-03	1.3052E 02	5.9432E-04
53	.8409	90.0	544.83	1.2859E 00	3.2214E-01	4.4824E-04	1.8081E-03	1.3036E 02	5.6222E-04
54	.8822	90.0	545.09	1.5873E 00	3.8963E-01	5.4298E-04	2.1961E-03	1.3090E 02	6.8101E-04
55	.9235	90.0	545.97	1.3388E 00	4.4227E-01	6.1630E-04	2.4856E-03	1.3092E 02	7.7296E-04
56	.9648	90.0	548.15	2.2217E 00	5.3476E-01	7.4759E-04	3.0150E-03	1.3144E 02	9.3751E-04
57	.2524	135.0	523.39	3.1685E-01	9.9575E-02	1.3455E-04	5.4335E-04	1.2555E 02	1.6896E-04
58	.2963	135.0	525.04	2.0960E 00	6.7203E-01	9.1013E-04	3.6751E-03	1.2595E 02	1.1428E-03
59	.3363	135.0	525.67	1.8745E 00	5.9165E-01	8.0191E-04	3.2380E-03	1.2609E 02	1.0069E-03
60	.3783	135.0	524.65	1.6478E 00	5.1188E-01	6.9284E-04	2.7978E-03	1.2585E 02	8.6997E-04
61	.4203	135.0	526.46	1.7801E 00	5.3510E-01	7.2803E-04	2.9392E-03	1.2676E 02	9.1396E-04
62	.4623	135.0	530.24	1.6302E 00	4.7368E-01	6.4601E-04	2.6079E-03	1.2718E 02	8.1093E-04
63	.5043	135.0	531.88	1.7162E 00	4.3869E-01	5.9965E-04	2.4205E-03	1.2757E 02	7.5265E-04
64	.5463	135.0	533.16	1.6261E 00	4.3182E-01	5.9123E-04	2.3864E-03	1.2788E 02	7.4205E-04
65	.5882	135.0	534.85	1.5361E 00	4.0792E-01	5.5986E-04	2.2595E-03	1.2828E 02	7.0260E-04
66	.6302	135.0	535.91	1.6582E 00	4.4033E-01	6.0523E-04	2.4425E-03	1.2853E 02	7.5950E-04
67	.6722	135.0	540.81	1.6764E 00	4.0315E-01	5.5787E-04	2.2508E-03	1.2969E 02	6.9988E-04
68	.7170	135.0	541.91	1.6580E 00	3.9094E-01	5.4110E-04	2.1830E-03	1.2996E 02	6.7880E-04
69	.7583	135.0	[illegible]	1.2193E 00	3.4211E-01	4.7249E-04	1.9064E-03	1.2936E 02	5.9280E-04
70	.7996	135.0	541.29	1.6147E 00	4.6917E-01	6.4966E-04	2.6210E-03	1.2981E 02	8.1502E-04
71	.8409	135.0	542.34	1.7859E 00	4.9207E-01	6.8236E-04	2.7528E-03	1.3006E 02	8.5599E-04
72	.8822	135.0	542.97	2.1205E 00	5.7366E-01	7.9622E-04	3.2120E-03	1.3021E 02	9.9879E-04
73	.9235	135.0	543.77	2.5365E 00	6.2264E-01	8.6514E-04	3.4899E-03	1.3040E 02	1.0852E-03
74	.9648	135.0	548.71	3.2231E 00	7.7509E-01	1.0844E-03	4.3732E-03	1.3158E 02	1.3599E-03
75	.2524	180.0	524.48	2.8841E 00	7.5083E-01	1.0150E-03	4.1029E-03	1.2581E 02	1.2754E-03
76	.2963	180.0	527.30	1.3416E 00	4.3013E-01	5.8428E-04	2.3591E-03	1.2648E 02	7.3356E-04
77	.3363	180.0	529.71	1.9452E 00	5.7502E-01	7.8367E-04	3.1637E-03	1.2705E 02	9.8375E-04
78	.3783	180.0	531.82	1.9822E 00	5.6578E-01	7.7330E-04	3.1215E-03	1.2755E 02	9.7062E-04
79	.4203	180.0	533.86	1.9672E 00	5.8805E-01	7.9502E-04	3.2048E-03	1.2804E 02	9.9777E-04
80	.4623	180.0	535.94	1.8820E 00	5.3746E-01	7.3874E-04	2.9813E-03	1.2853E 02	9.2704E-04
81	.5043	180.0	537.90	1.7334E 00	4.5930E-01	6.3202E-04	2.5544E-03	1.2900E 02	7.9429E-04
82	.5463	180.0	539.88	1.7063E 00	4.5311E-01	6.2618E-04	2.5265E-03	1.2947E 02	7.8562E-04
83	.5882	180.0	541.23	1.4910E 00	3.9593E-01	5.4820E-04	2.2117E-03	1.2979E 02	6.8773E-04
84	.6302	180.0	539.00	-1.3898E-02	-3.6905E-03	-5.0931E-06	-2.0555E-05	1.2926E 02	-6.3915E-06
85	.6722	180.0	547.48	1.7773E 00	4.2741E-01	5.9695E-04	2.4075E-03	1.3128E 02	7.4863E-04
86	.7170	180.0	548.92	1.7621E 00	4.1695E-01	5.8071E-04	2.3417E-03	1.3163E 02	7.2421E-04
87	.7583	180.0	557.29	1.5320E 00	3.6841E-01	5.1442E-04	2.0747E-03	1.3124E 02	6.4513E-04
88	.7996	180.0	549.98	1.8323E 00	4.7731E-01	6.6495E-04	2.6941E-03	1.3164E 02	8.3773E-04
89	.8409	180.0	549.76	2.0387E 00	5.2092E-01	7.2988E-04	2.9413E-03	1.3183E 02	9.1522E-04
90	.8822	180.0	550.69	2.5786E 00	5.9421E-01	8.3365E-04	3.3616E-03	1.3205E 02	1.0453E-03
91	.9235	180.0	552.07	3.1450E 00	7.7200E-01	1.0851E-03	4.3753E-03	1.3237E 02	1.3605E-03
92	.9648	180.0	554.94	4.1462E 00	9.5546E-01	1.3484E-03	5.4362E-03	1.3305E 02	1.6904E-03
93	.8822	225.0	554.24	2.6787E 00	5.3112E-01	7.4887E-04	3.0192E-03	1.3289E 02	9.3881E-04
94	.9648	225.0	555.89	3.1879E 00	7.6603E-01	1.0835E-03	4.3677E-03	1.3329E 02	1.3581E-03
95	.7170	270.0	552.63	1.1513E 00	3.0472E-01	4.2868E-04	1.7284E-03	1.3251E 02	5.3746E-04
96	.7996	270.0	555.07	1.1674E 00	3.1001E-01	4.3762E-04	1.7643E-03	[illegible]	5.4860E-04
97	.8822	270.0	557.43	1.4722E 00	3.7617E-01	5.3277E-04	2.1475E-03	1.3366E 02	6.6778E-04
98	.9648	270.0	556.76	2.2172E 00	5.3314E-01	7.5448E-04	3.0413E-03	1.3350E 02	9.4571E-04


GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
MACH NO = 8
SYM PHI X/L
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90
135
180
SYM PHI X/L
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16.00
8.00
0.80
1.00
X/L

2

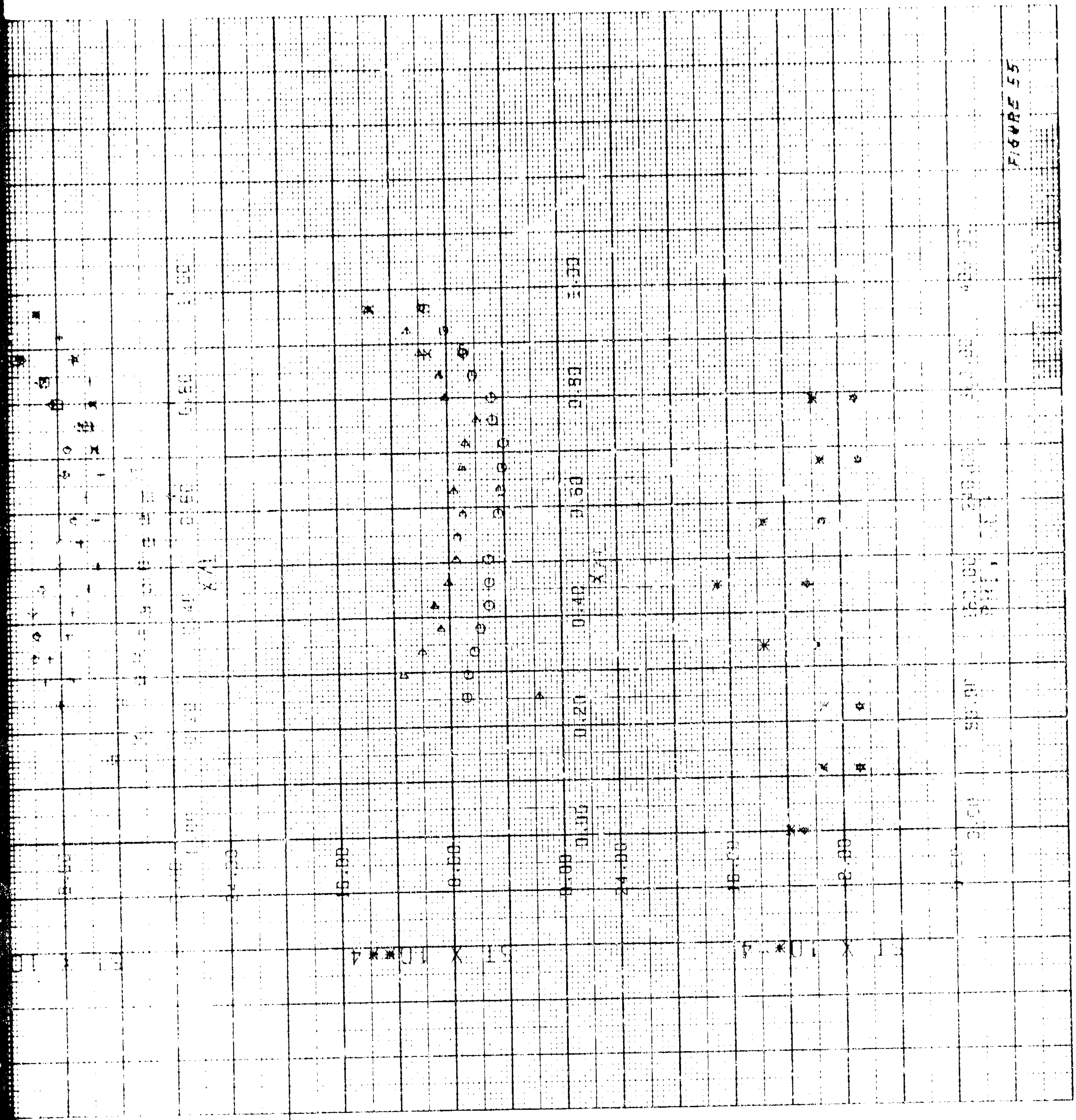


Figure 55

7/16/69

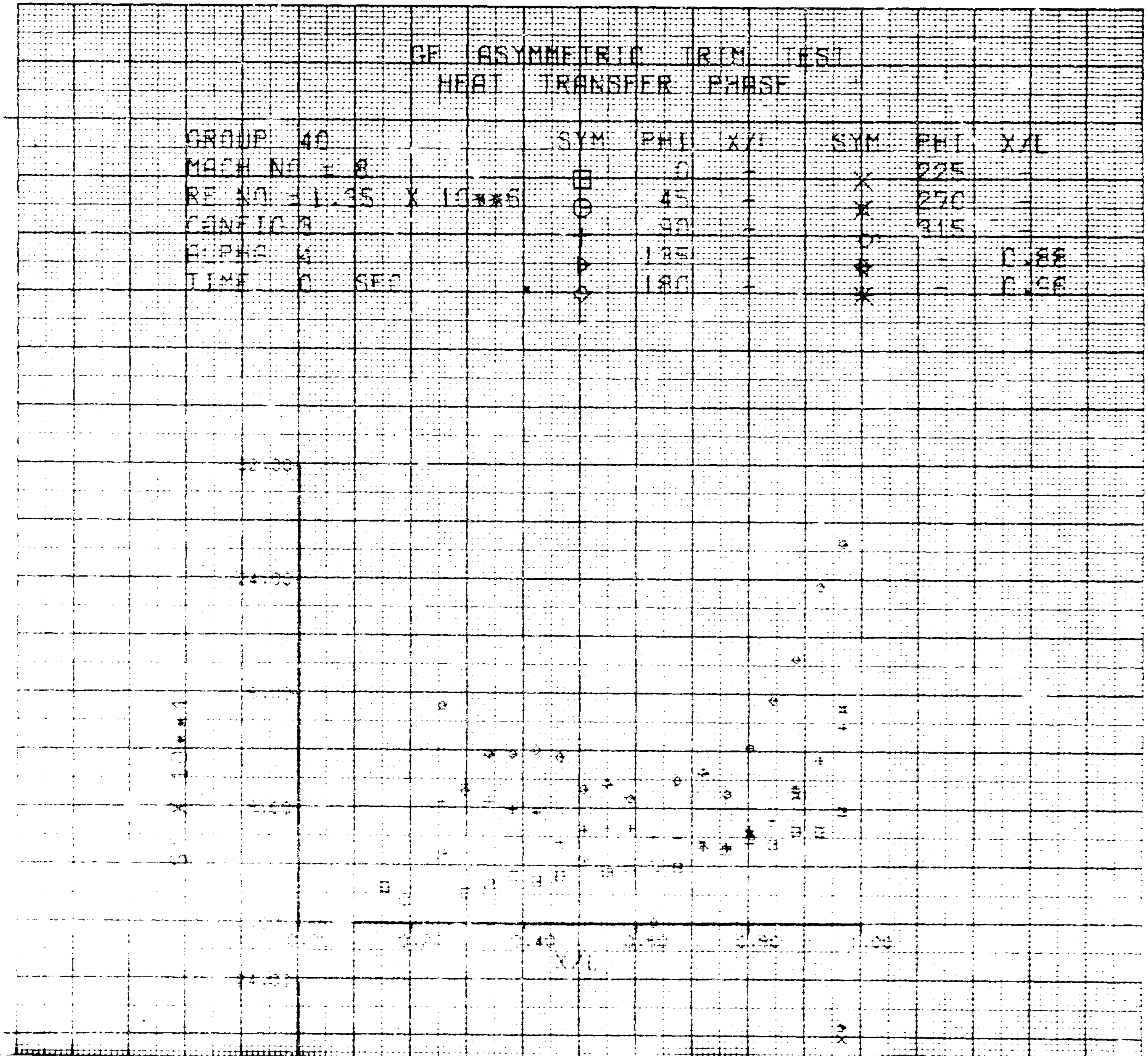
ARO, INC., ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
V10967-000

GROUP	ALPHA-M	BETA-M	ALPHA-S	ROLL	[illegible]	DATE	MACH NO	PO	TO	TIME
40	3.99	0	3.99	0	0	715	7.97	278.78	1257.95	-.00

[illegible]	P-INF	Q-INF	V-INF	RHO-INF	MU-INF	RE/FT	RE/D	HO
9.1791E 01	2.9209E-02	1.3010E 00	3.7410E 03	2.0744E-05	7.3907E-08	1.3549E 06	1.2624E 06	3.0741E 02

TC NO	X/L	PHI	TEMP	SLOPE	Q-STDW	HT	HM	HW	ST
[illegible]	[illegible]	0	531.71	6.8879E-01	1.4972E-01	2.0611E-04	8.3272E-04	1.2749E 02	2.5849E-04
[illegible]	[illegible]	0	529.14	6.1364E-01	9.0041E-02	1.2465E-04	5.0338E-04	1.2693E 02	1.5635E-04
[illegible]	[illegible]	0	529.80	9.0045E-01	2.8095E-01	3.8580E-04	1.5582E-03	1.2707E 02	4.8390E-04
[illegible]	[illegible]	0	535.04	1.9935E-01	1.2605E-01	1.7436E-04	7.0341E-04	1.2832E 02	2.1866E-04
[illegible]	[illegible]	0	536.87	5.1371E-01	1.6214E-01	2.2485E-04	9.0769E-04	1.2876E 02	2.8193E-04
[illegible]	[illegible]	0	538.15	5.4078E-01	1.9262E-01	2.6760E-04	1.0801E-03	1.2906E 02	3.3559E-04
7	[illegible]	0	538.72	5.4773E-01	1.7368E-01	2.4146E-04	9.7460E-04	1.2920E 02	3.0273E-04
[illegible]	[illegible]	0	539.80	7.6152E-01	1.9324E-01	2.6915E-04	1.0863E-03	1.2945E 02	3.3741E-04
[illegible]	[illegible]	0	540.19	9.1289E-01	2.5230E-01	3.5158E-04	1.4190E-03	1.2953E 02	4.4074E-04
10	[illegible]	0	542.07	7.4222E-01	[illegible]	2.9094E-04	1.1739E-03	1.2999E 02	3.6463E-04
11	[illegible]	0	543.36	7.9943E-01	2.2027E-01	3.0823E-04	1.2436E-03	1.3030E 02	3.8633E-04
[illegible]	[illegible]	0	544.41	8.5772E-01	2.3205E-01	3.2530E-04	1.3124E-03	1.3060E 02	4.0769E-04
[illegible]	[illegible]	0	544.95	9.1836E-01	2.2756E-01	3.1916E-04	1.2876E-03	1.3050E 02	3.9999E-04
[illegible]	[illegible]	315.0	546.02	1.8657E 00	4.8601E-01	6.9239E-04	2.7920E-03	1.3132E 02	8.6721E-04
[illegible]	[illegible]	0	548.97	1.2230E 00	2.9411E-01	4.1494E-04	1.6735E-03	1.3164E 02	5.1979E-04
[illegible]	[illegible]	0	550.46	1.1989E 00	3.3639E-01	4.7560E-04	1.9184E-03	1.3204E 02	5.9586E-04
[illegible]	[illegible]	0	551.71	1.2339E 00	3.1526E-01	4.4640E-04	1.8007E-03	1.3229E 02	5.5925E-04
[illegible]	.8222	0	552.97	1.4708E 00	3.6996E-01	5.2474E-04	2.1163E-03	1.3258E 02	6.5735E-04
[illegible]	.9235	0	553.20	1.4673E 00	3.6759E-01	5.2160E-04	2.1036E-03	1.3265E 02	6.5340E-04
[illegible]	[illegible]	0	551.94	1.8651E 00	4.4851E-01	6.3525E-04	2.5622E-03	1.3234E 02	7.9582E-04
[illegible]	[illegible]	45.0	528.56	1.1428E 00	3.9695E-01	5.4473E-04	2.1971E-03	1.2678E 02	6.4267E-04
[illegible]	[illegible]	45.0	531.26	1.1009E 00	3.5288E-01	4.8694E-04	1.9640E-03	1.2790E 02	6.1605E-04
[illegible]	[illegible]	45.0	535.32	9.9010E-01	2.9762E-01	4.1186E-04	[illegible]	1.2839E 02	5.1644E-04
[illegible]	[illegible]	45.0	537.32	9.6691E-01	2.9055E-01	4.0333E-04	1.6261E-03	1.2886E 02	5.0569E-04
[illegible]	[illegible]	45.0	538.43	9.0948E-01	2.6426E-01	3.6727E-04	1.4824E-03	1.2913E 02	4.6045E-04
[illegible]	[illegible]	45.0	541.15	9.0687E-01	2.5445E-01	3.5498E-04	1.4326E-03	1.2978E 02	4.4497E-04
[illegible]	[illegible]	45.0	542.49	9.0735E-01	2.4095E-01	3.3677E-04	1.3590E-03	1.3009E 02	4.2212E-04
[illegible]	[illegible]	315.0	557.54	2.1709E 00	5.7016E-01	8.1405E-04	3.2823E-03	1.3368E 02	1.0195E-03
[illegible]	[illegible]	45.0	544.74	7.7340E-01	2.1310E-01	2.9878E-04	1.2056E-03	1.3063E 02	3.7446E-04
[illegible]	[illegible]	45.0	546.30	7.9002E-01	2.1372E-01	3.0034E-04	1.2117E-03	1.3100E 02	3.7637E-04
[illegible]	[illegible]	45.0	547.62	9.7731E-01	2.3990E-01	3.3773E-04	1.3625E-03	1.3132E 02	4.2320E-04
[illegible]	[illegible]	45.0	549.36	8.9119E-01	2.0987E-01	2.9617E-04	1.1947E-03	1.3173E 02	3.7108E-04
[illegible]	[illegible]	45.0	551.29	9.4316E-01	2.5906E-01	3.6774E-04	1.4833E-03	1.3219E 02	4.6071E-04
[illegible]	[illegible]	45.0	552.74	1.0803E 00	3.0312E-01	4.2996E-04	1.7337E-03	1.3255E 02	5.3849E-04
[illegible]	[illegible]	45.0	550.76	1.4524E 00	3.9293E-01	5.5879E-04	2.2534E-03	1.3302E 02	6.9993E-04
[illegible]	[illegible]	45.0	556.40	1.6817E 00	4.4234E-01	6.3052E-04	[illegible]	1.3341E 02	7.8970E-04
[illegible]	[illegible]	45.0	555.86	2.0334E 00	5.1956E-01	7.4109E-04	2.9883E-03	1.3352E 02	9.2817E-04
[illegible]	[illegible]	45.0	556.19	2.3152E 00	5.5675E-01	7.9337E-04	3.1992E-03	1.3336E 02	9.9368E-04
[illegible]	[illegible]	90.0	532.93	1.6705E 00	4.9381E-01	6.8109E-04	[illegible]	1.2782E 02	8.5414E-04
[illegible]	[illegible]	90.0	536.81	1.7500E 00	5.6108E-01	7.7805E-04	3.1407E-03	1.2874E 02	9.7553E-04
[illegible]	[illegible]	90.0	538.27	1.5596E 00	4.9224E-01	6.8397E-04	2.7604E-03	1.2909E 02	8.5750E-04
[illegible]	[illegible]	90.0	539.47	1.4544E 00	4.5904E-01	6.3886E-04	2.5785E-03	1.2938E 02	8.0090E-04
[illegible]	[illegible]	90.0	540.98	1.5224E 00	4.5004E-01	6.2770E-04	2.5332E-03	1.2973E 02	7.8684E-04
[illegible]	[illegible]	90.0	541.18	1.1572E 00	3.2841E-01	4.5810E-04	1.8491E-03	1.2978E 02	5.7434E-04
[illegible]	[illegible]	90.0	543.00	1.3666E 00	3.7899E-01	5.2590E-04	2.1222E-03	1.3022E 02	6.5916E-04
[illegible]	[illegible]	90.0	543.14	1.1541E 00	3.9670E-01	5.4098E-04	2.1830E-03	1.3025E 02	6.7805E-04
47	.4882	90.0	545.58	1.1649E 00	3.8297E-01	5.3760E-04	[illegible]	1.3083E 02	6.7373E-04
[illegible]	[illegible]	90.0	546.70	1.2545E 00	3.4566E-01	4.8600E-04	1.9608E-03	1.3110E 02	6.6902E-04
[illegible]	[illegible]	90.0	546.92	1.1743E 00	3.4430E-01	4.8423E-04	1.9536E-03	1.3115E 02	6.0079E-04
[illegible]	[illegible]	90.0	549.59	1.2194E 00	2.9190E-01	4.1219E-04	1.6627E-03	1.3179E 02	5.1649E-04
[illegible]	[illegible]	90.0	549.33	1.1687E 00	3.0444E-01	4.2962E-04	1.7330E-03	1.3172E 02	5.3829E-04
[illegible]	[illegible]	90.0	550.87	1.6311E 00	3.7281E-01	5.2721E-04	2.1266E-03	1.3208E 02	6.6052E-04
[illegible]	.8409	90.0	551.55	1.6434E 00	4.1170E-01	5.8282E-04	2.3508E-03	1.3225E 02	7.3016E-04
[illegible]	.8622	90.0	553.47	2.1920E 00	5.3800E-01	7.6380E-04	3.0804E-03	1.3271E 02	9.5679E-04
[illegible]	.9235	90.0	553.60	2.6984E 00	6.4897E-01	9.2142E-04	3.7160E-03	1.3276E 02	1.1542E-03
[illegible]	.9248	90.0	552.65	1.2391E 00	7.7693E-01	1.1044E-03	4.4542E-03	1.3251E 02	1.3835E-03
[illegible]	.2524	135.0	528.22	6.7918E-01	1.4165E-01	1.9412E-04	7.8395E-04	1.2670E 02	2.4350E-04
[illegible]	.2941	135.0	532.07	2.3100E 00	7.4062E-01	1.0203E-03	4.1197E-03	1.2761E 02	1.2796E-03
[illegible]	.3363	135.0	533.02	2.2016E 00	6.9490E-01	9.5857E-04	3.8702E-03	1.2785E 02	1.2021E-03
[illegible]	.3783	135.0	531.43	1.9408E 00	6.0288E-01	8.2982E-04	3.3507E-03	1.2746E 02	1.0407E-03
[illegible]	.4283	135.0	534.90	2.0214E 00	6.0763E-01	8.4037E-04	3.3927E-03	1.2829E 02	1.0538E-03
[illegible]	.4823	135.0	536.20	1.9165E 00	5.5687E-01	7.7155E-04	3.1146E-03	1.2860E 02	9.6740E-04
[illegible]	[illegible]	135.0	537.69	1.9682E 00	5.0290E-01	6.9818E-04	2.8182E-03	1.2894E 02	8.7534E-04
[illegible]	[illegible]	135.0	538.59	1.3844E 00	5.2696E-01	7.3255E-04	2.9568E-03	1.2917E 02	9.1830E-04
[illegible]	[illegible]	135.0	539.72	1.8013E 00	4.9527E-01	6.8837E-04	2.7783E-03	1.2948E 02	8.6296E-04
[illegible]	[illegible]	135.0	540.77	1.8608E 00	4.8802E-01	6.8159E-04	2.7508E-03	1.2968E 02	8.5440E-04
[illegible]	[illegible]	135.0	543.11	1.3746E 00	4.7685E-01	6.6429E-04	2.6866E-03	1.3024E 02	8.3260E-04
[illegible]	[illegible]	135.0	544.71	1.9093E 00	4.4962E-01	6.3038E-04	2.5435E-03	1.3062E 02	7.9004E-04
[illegible]	[illegible]	135.0	543.74	1.3710E 00	3.6468E-01	5.1860E-04	2.1733E-03	1.3039E 02	6.7505E-04
70	.7936	135.0	546.57	2.0988E 00	6.0982E-01	8.5724E-04	3.4585E-03	1.3107E 02	1.0742E-03
71	.8409	135.0	548.30	2.3169E 00	6.3839E-01	[illegible]	3.6290E-03	1.3148E 02	1.1272E-03
[illegible]	.8922	135.0	549.41	2.9554E 00	7.9967E-01	1.1286E-03	4.5527E-03	1.3174E 02	1.4141E-03
[illegible]	[illegible]	135.0	551.21	3.9283E 00	9.3925E-01	1.3290E-03	5.3605E-03	1.3217E 02	1.6650E-03
[illegible]	[illegible]	135.0	551.93	4.8800E 00	1.1757E 00	1.6653E-03	6.7166E-03	1.3234E 02	2.0862E-03
[illegible]	.2524	180.0	536.81	3.0450E 00	8.8477E-01	1.2168E-03	4.9133E-03	1.2731E 02	1.5261E-03
[illegible]	[illegible]	180.0	534.71	1.6708E 00	5.3570E-01	7.4071E-04	2.9913E-03	1.2824E 02	9.2881E-04
[illegible]	[illegible]	180.0	536.34	2.3153E 00	6.8444E-01	9.4655E-04	3.8201E-03	1.2864E 02	1.1893E-03
[illegible]	[illegible]	180.0	537.61	2.2719E 00	6.8294E-01	9.4808E-04	3.8269E-03	1.2893E 02	1.1887E-03
[illegible]	[illegible]	180.0	539.84	2.3532E 00	6.9741E-01	9.7117E-04	3.9106E-03	1.2946E 02	1.2175E-03
[illegible]	[illegible]	180.0	541.61	2.3394E 00	6.6807E-01	9.3262E-04	3.7637E-03	1.2989E 02	1.1690E-03
[illegible]	[illegible]	180.0	543.10	2.1479E 00	5.3810E-01	7.5275E-04	3.0375E-03	1.3024E 02	9.4348E-04
[illegible]	[illegible]	180.0	544.40	2.1025E 00	5.5832E-01	7.8245E-04	3.1572E-03	1.3055E 02	9.8064E-04
[illegible]	.4882	180.0	545.51	1.8834E 00	5.0067E-01	7.0275E-04	2.8354E-03	1.3081E 02	8.8070E-04
[illegible]	[illegible]	180.0	545.47	3.1264E-02	8.1022E-03	1.1555E-05	4.6630E-05	1.2938E 02	1.4486E-05
[illegible]	[illegible]	180.0	549.75	2.3608E 00	5.6916E-01	8.0368E-04	3.2419E-03	1.3183E 02	1.0070E-03
[illegible]	[illegible]	180.0	551.36	2.5475E 00	5.9993E-01	8.4905E-04	3.4246E-03	1.3225E 02	1.0637E-03
[illegible]	[illegible]	180.0	551.31	2.1451E 00	5.1386E-01	7.3002E-04	2.9445E-03	1.3220E 02	9.1458E-04
[illegible]	[illegible]	180.0	551.35	2.4668E 00	6.9471E-01	9.8596E-04	3.9764E-03	1.3260E 02	1.2351E-03
[illegible]	[illegible]	180.0	554.78	3.4442E 00	8.8004E-01	1.2519E-03	5.0485E-03	1.3307E 02	1.5681E-03
[illegible]	[illegible]	180.0	556.60	4.5270E 00	1.0412E 00	1.4874E-03	5.9958E-03	1.3346E 02	1.8629E-03
[illegible]	[illegible]	180.0	557.67	5.3897E 00	1.3713E 00	1.3892E-03	7.6173E-03	1.3370E 02	2.3660E-03
[illegible]	[illegible]	180.0	559.29	6.4557E 00	1.6676E 00	2.1293E-03	8.5848E-03	1.3410E 02	2.6665E-03
[illegible]	[illegible]	225.0	558.97	2.9527E 00	7.5444E-01	1.0794E-03	4.3518E-03	1.3402E 02	1.3517E-03
[illegible]	[illegible]	225.0	559.71	[illegible]	1.1167E 00	1.5993E-03	6.4480E-03	1.3420E 02	2.0028E-03
[illegible]	[illegible]	270.0	554.71	1.4097E 00	1.1786E-01	4.5203E-04	1.8229E-03	1.3102E 02	5.6621E-04
[illegible]	[illegible]	270.0	560.79	[illegible]	3.5814E-01	5.1316E-04	2.0696E-03	1.3434E 02	6.4283E-04
[illegible]	[illegible]	270.0	561.58	[illegible]	5.0669E-01	7.2749E-04	2.9327E-03	1.3462E 02	9.1090E-04
[illegible]	[illegible]	270.0	560.00	1.5600E 00	8.4187E-01	1.2062E-03	4.8629E-03	1.3427E 02	1.5134E-03

GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 40
SYM PHI X/L SYM PHI X/L


GE ASYMMETRIC TRIM TEST
HEAT TRANSFER PHASE
GROUP 40
MACH NO = 8
RE NO = 1.35 X 10**5
CONFIG
ALPHA
TIME 0 SEC
SYM PHI X/L
0
45
90
135
180
SYM PHI X/L
225
270
315
0.88
0.96
X/L

2

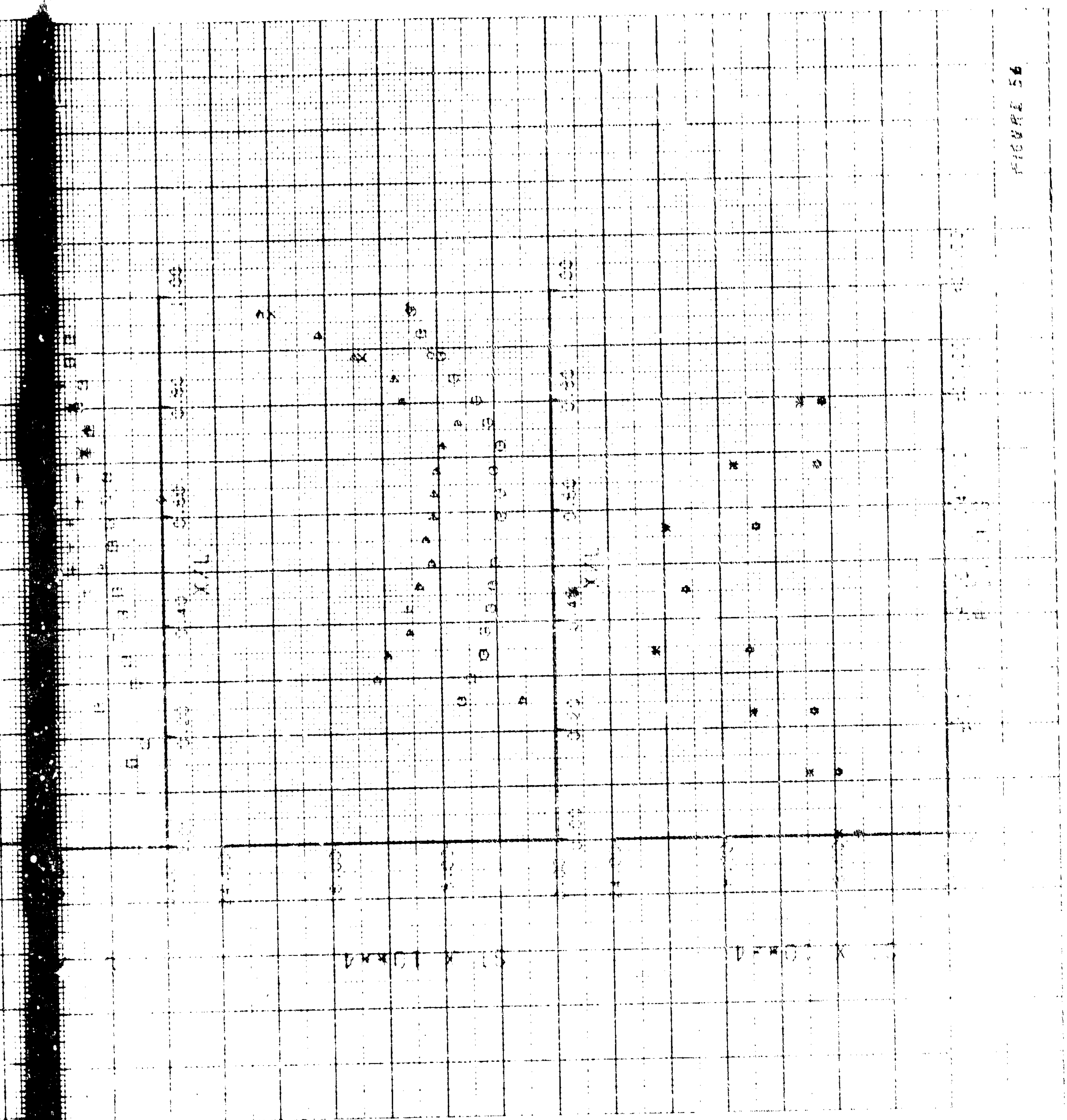


Figure 56

7/14/69

AEDC (ARO, INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
VT0947-000

GROUP	CONFIG	ALPHA-M	BETA-M	ALPHA-S	ROLL	ALP-P	DATE	MACH NO	PO	TO	TIME
41	3	.03	0	.01	0	0	715	7.97	280.20	1254.80	-.00

T-INF	P-INF	Q-INF	V-INF	RHO-INF	MU-INF	RE/FT	RE/D	HO
9.15036E 01	2.54[illegible]E-02	1.10[illegible]E 00	3.73[illegible]E 03	2.09554E-05	7.17178E-08	1.36644E 06	1.25181E 05	3.60025E 02

TC NO	X/L	PHI	TEMP	QDOT	Q-STOD	HT	HF	MW	ST
1	.1964	0	523.[illegible]	1.4463E 00	5.7997E-01	7.8722E-04	3.1085E-03	1.2584E 02	9.0137E-04
2	.1467	0	524.87	1.2982E 00	5.0172E-01	5.4997E-04	2.2230E-03	1.2578E 02	6.8559E-04
3	.2524	0	526.56	1.0262E 00	4.2108E-01	[illegible]	2.3350E-03	1.2630E 02	7.2258E-04
4	.2963	0	529.80	1.0788E 00	4.7591E-01	6.5277E-04	2.6447E-03	1.2640E 02	8.1727E-04
5	.3363	0	530.56	1.0075E 00	4.4426E-01	6.1342E-04	2.4774E-03	1.2726E 02	7.6442E-04
6	.3763	0	531.71	1.0461E 00	3.7276E-01	5.1555E-04	2.0820E-03	1.2734E 02	6.4243E-04
7	.4263	0	532.33	1.2059E 00	3.5039E-01	4.8498E-04	1.9585E-03	1.2768E 02	6.0431E-04
8	.4623	0	533.67	1.2829E 00	3.5472E-01	4.9190E-04	1.9863E-03	1.2800E 02	6.1208E-04
9	.5063	0	533.98	1.0960E 00	3.7622E-01	5.2193E-04	2.1075E-03	1.2807E 02	6.5029E-04
10	.5463	0	531.93	1.1207E 00	3.1613E-01	4.3976E-04	1.7756E-03	1.2853E 02	5.4786E-04
11	.5882	0	537.88	1.1395E 00	2.9138E-01	4.0593E-04	1.6389E-03	1.2879E 02	5.0568E-04
12	.6302	0	538.86	1.0608E 00	2.8676E-01	4.0043E-04	1.6165E-03	1.2918E 02	4.9878E-04
13	.6722	0	542.38	1.0710E 00	2.6842E-01	3.7582E-04	1.5269E-03	1.3009E 02	4.6927E-04
99	.8022	315.0	548.04	1.4949E 00	3.9941E-01	5.5167E-04	2.2258E-03	1.3163E 02	6.8079E-04
15	.7583	0	543.20	1.1964E 00	2.8764E-01	4.0452E-04	1.6328E-03	1.3028E 02	5.0375E-04
16	.7996	0	544.30	1.3053E 00	3.0451E-01	4.2864E-04	1.7299E-03	1.3055E 02	5.3377E-04
17	.8409	0	545.30	1.2568E 00	3.2111E-01	4.5250E-04	1.8261E-03	1.3073E 02	5.634[illegible]E-04
18	.8822	0	546.97	1.5050E 00	3.5190E-01	4.9660E-04	2.0039E-03	1.3094E 02	6.1813E-04
19	.9235	0	546.31	1.6942E 00	4.2643E-01	5.9906E-04	2.4174E-03	1.3100E 02	7.4590E-04
20	.9648	0	548.49	2.0430E 00	5.0333E-01	7.1261E-04	2.8752E-03	1.3152E 02	8.8717E-04
21	.2524	45.0	523.48	1.6327E 00	4.8264E-01	6.5995E-04	2.6664E-03	1.2557E 02	8.2271E-04
22	.2963	45.0	526.14	1.6337E 00	4.5967E-01	6.3084E-04	2.5444E-03	1.2620E 02	7.8633E-04
23	.3363	45.0	527.74	1.4276E 00	4.2912E-01	5.9021E-04	2.3841E-03	1.2658E 02	7.3562E-04
24	.3763	45.0	529.36	1.2190E 00	3.6600E-01	5.0546E-04	2.0416E-03	1.2697E 02	6.2993E-04
25	.4263	45.0	530.98	1.0830E 00	3.1405E-01	4.3496E-04	1.7567E-03	1.2735E 02	5.4705E-04
26	.4623	45.0	533.05	1.3070E 00	3.6673E-01	5.0867E-04	2.0540E-03	1.2804E 02	6.3378E-04
27	.5063	45.0	535.05	1.1041E 00	3.1445E-01	4.3688E-04	1.7640E-03	1.2812E 02	5.4430E-04
100	.9644	315.0	553.04	1.4983E 00	4.8056E-01	6.8478E-04	2.7623E-03	1.3261E 02	8.5231E-04
29	.5882	45.0	537.39	1.1037E 00	3.0410E-01	4.2388E-04	1.7113E-03	1.2868E 02	5.2803E-04
30	.6302	45.0	539.26	1.1735E 00	2.9042E-01	4.0588E-04	1.6384E-03	1.2933E 02	5.0555E-04
31	.6722	45.0	546.55	1.1718E 00	2.8764E-01	4.0498E-04	1.6344E-03	1.3059E 02	5.0429E-04
32	.7170	45.0	546.11	1.1212E 00	2.6402E-01	3.7255E-04	1.5034E-03	1.3096E 02	4.6387E-04
33	.7583	45.0	544.07	1.1606E 00	3.2200E-01	4.5305E-04	1.8288E-03	1.3037E 02	5.6416E-04
34	.7996	45.0	544.87	1.4131E 00	3.4037E-01	4.7944E-04	1.9340E-03	1.3066E 02	5.9700E-04
35	.8409	45.0	546.27	1.3671E 00	3.6445E-01	5.1434E-04	2.0755E-03	1.3098E 02	6.4041E-04
36	.8822	45.0	546.92	1.5661E 00	4.0665E-01	5.7446E-04	2.3180E-03	1.3115E 02	7.1524E-04
37	.9235	45.0	550.81	1.7370E 00	4.4390E-01	6.2814E-04	2.5345E-03	1.3141E 02	7.8202E-04
38	.9648	45.0	551.48	2.0334E 00	4.8899E-01	6.9517E-04	2.8044E-03	1.3222E 02	8.6532E-04
39	.2524	90.0	524.20	1.3997E 00	4.1376E-01	5.6795E-04	2.2943E-03	1.2624E 02	7.0793E-04
40	.2963	90.0	527.80	1.6659E 00	4.6999E-01	6.4655E-04	2.0116E-03	1.2662E 02	8.0502E-04
41	.3363	90.0	528.77	1.1050E 00	4.3740E-01	6.0245E-04	2.4334E-03	1.2683E 02	7.5083E-04
42	.3763	90.0	530.73	1.2432E 00	3.9240E-01	5.4194E-04	2.1887E-03	1.2730E 02	6.7534E-04
43	.4263	90.0	532.07	1.1769E 00	4.0702E-01	5.6333E-04	2.2749E-03	1.2766E 02	7.0194E-04
44	.4623	90.0	532.96	9.8110E-01	3.0477E-01	4.2220E-04	1.7049E-03	1.2782E 02	5.2607E-04
45	.5063	90.0	536.42	1.0811E 00	3.2542E-01	4.5174E-04	1.8241E-03	1.2837E 02	5.6282E-04
46	.5463	90.0	536.27	1.1033E 00	3.3792E-01	4.7028E-04	1.8988E-03	1.2861E 02	5.8587E-04
47	.5882	90.0	537.14	8.9042E-01	2.4983E-01	3.4812E-04	1.4055E-03	1.2892E 02	4.3366E-04
48	.6302	90.0	538.20	1.1613E 00	3.1448E-01	4.3884E-04	1.7710E-03	1.2907E 02	5.4665E-04
49	.6722	90.0	543.84	1.1608E 00	2.7576E-01	3.8777E-04	1.5658E-03	1.3037E 02	4.8280E-04
50	.7170	90.0	545.39	1.1989E 00	2.8233E-01	3.9798E-04	1.6060E-03	1.3078E 02	4.9555E-04
51	.7583	90.0	541.24	1.1313E 00	2.9469E-01	4.1300E-04	1.6670E-03	1.2986E 02	5.1437E-04
52	.7996	90.0	541.36	1.3164E 00	3.4135E-01	4.7845E-04	1.9312E-03	1.2982E 02	5.9588E-04
53	.8409	90.0	542.18	1.4184E 00	3.5535E-01	4.9865E-04	2.0120E-03	1.3002E 02	6.2101E-04
54	.8822	90.0	543.38	1.6654E 00	4.0898E-01	5.7476E-04	2.3197E-03	1.3031E 02	7.1575E-04
55	.9235	90.0	543.70	1.4642E 00	4.4831E-01	6.3045E-04	2.5444E-03	1.3034E 02	7.8508E-04
56	.9648	90.0	547.80	2.2469E 00	5.4034E-01	7.6361E-04	3.0805E-03	1.3117E 02	9.5049E-04
57	.2524	135.0	521.51	2.5178E-01	7.4424E-02	1.0150E-04	4.1013E-04	1.2511E 02	1.2655E-04
58	.2963	135.0	523.17	1.4289E 00	4.9021E-01	6.7042E-04	2.7071E-03	1.2550E 02	8.3529E-04
59	.3363	135.0	523.36	1.4632E 00	4.6182E-01	6.3138E-04	2.5510E-03	1.2550E 02	7.8712E-04
60	.3763	135.0	522.27	1.7052E 00	3.9924E-01	5.4501E-04	2.2022E-03	1.2528E 02	6.7949E-04
61	.4263	135.0	525.97	1.3770E 00	4.1418E-01	5.6828E-04	2.2957E-03	1.2616E 02	7.0835E-04
62	.4623	135.0	527.56	1.2177E 00	3.5382E-01	4.8653E-04	1.9653E-03	1.2654E 02	6.0640E-04
63	.5063	135.0	529.08	1.1074E 00	3.3600E-01	4.6032E-04	1.8592E-03	1.2690E 02	5.7360E-04
64	.5463	135.0	530.27	1.2587E 00	3.3426E-01	4.6134E-04	1.8613E-03	1.2719E 02	5.7492E-04
65	.5882	135.0	531.80	1.2376E 00	3.2869E-01	4.5463E-04	1.8360E-03	1.2757E 02	5.6650E-04
66	.6302	135.0	533.16	1.2321E 00	3.2714E-01	4.5338E-04	1.8308E-03	1.2787E 02	5.6491E-04
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68	.7170	135.0	540.81	1.1870E 00	2.7953E-01	3.9152E-04	1.5809E-03	1.2970E 02	4.8763E-04
69	.7583	135.0	536.72	9.4622E-01	2.7952E-01	3.8926E-04	1.5716E-03	1.2872E 02	4.8492E-04
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74	.9648	135.0	547.68	2.4341E 00	5.8535E-01	8.2774E-04	3.3401E-03	1.3133E 02	1.0306E-03
75	.2524	180.0	521.87	1.4145E 00	4.6912E-01	6.4605E-04	2.5862E-03	1.2519E 02	7.9799E-04
76	.2963	180.0	525.46	9.7883E-01	3.1383E-01	4.3029E-04	1.7343E-03	1.2604E 02	5.3637E-04
77	.3363	180.0	527.64	1.3098E 00	3.8719E-01	5.3248E-04	2.1509E-03	1.2656E 02	6.6367E-04
78	.3763	180.0	529.61	1.3536E 00	4.0689E-01	5.6108E-04	2.2662E-03	1.2703E 02	6.9724E-04
79	.4263	180.0	531.47	1.3451E 00	3.9762E-01	5.4966E-04	2.2198E-03	1.2746E 02	6.8494E-04
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96	.7996	270.0	552.75	1.1700E 00	3.1009E-01	4.4255E-04	1.7852E-03	1.3254E 02	5.5082E-04
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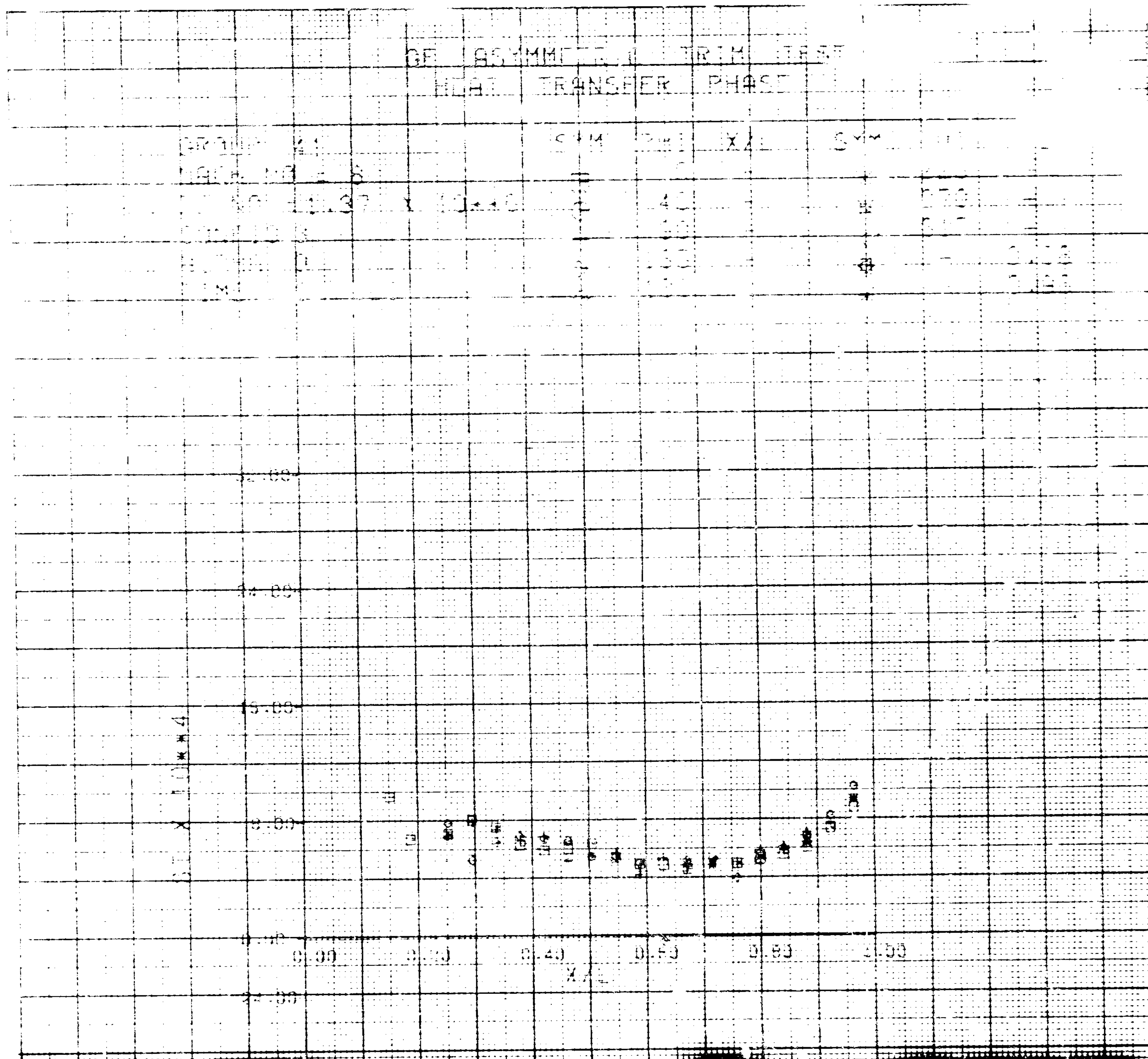
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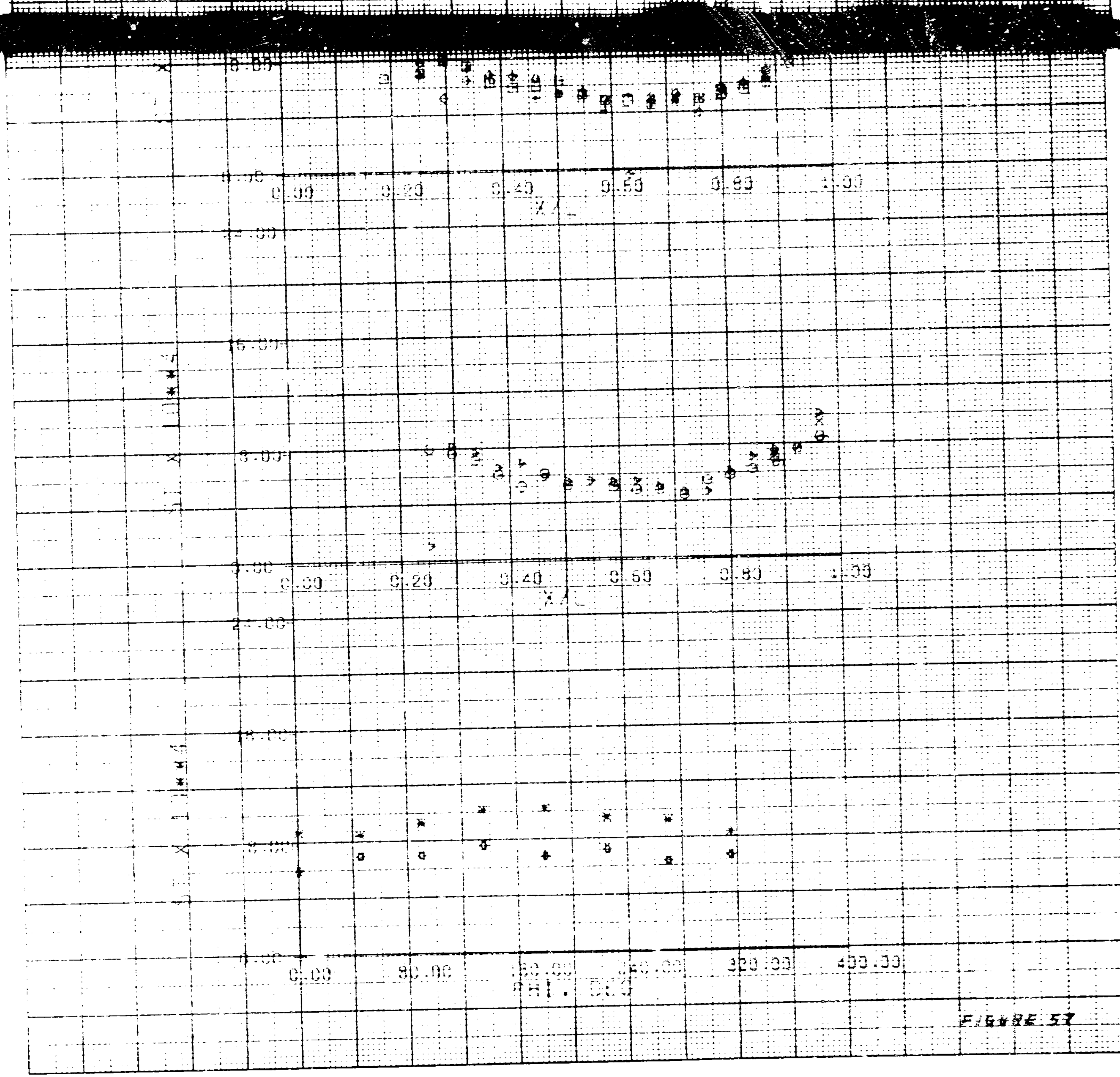
X/L

2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PHI, DEG

FIGURE 57

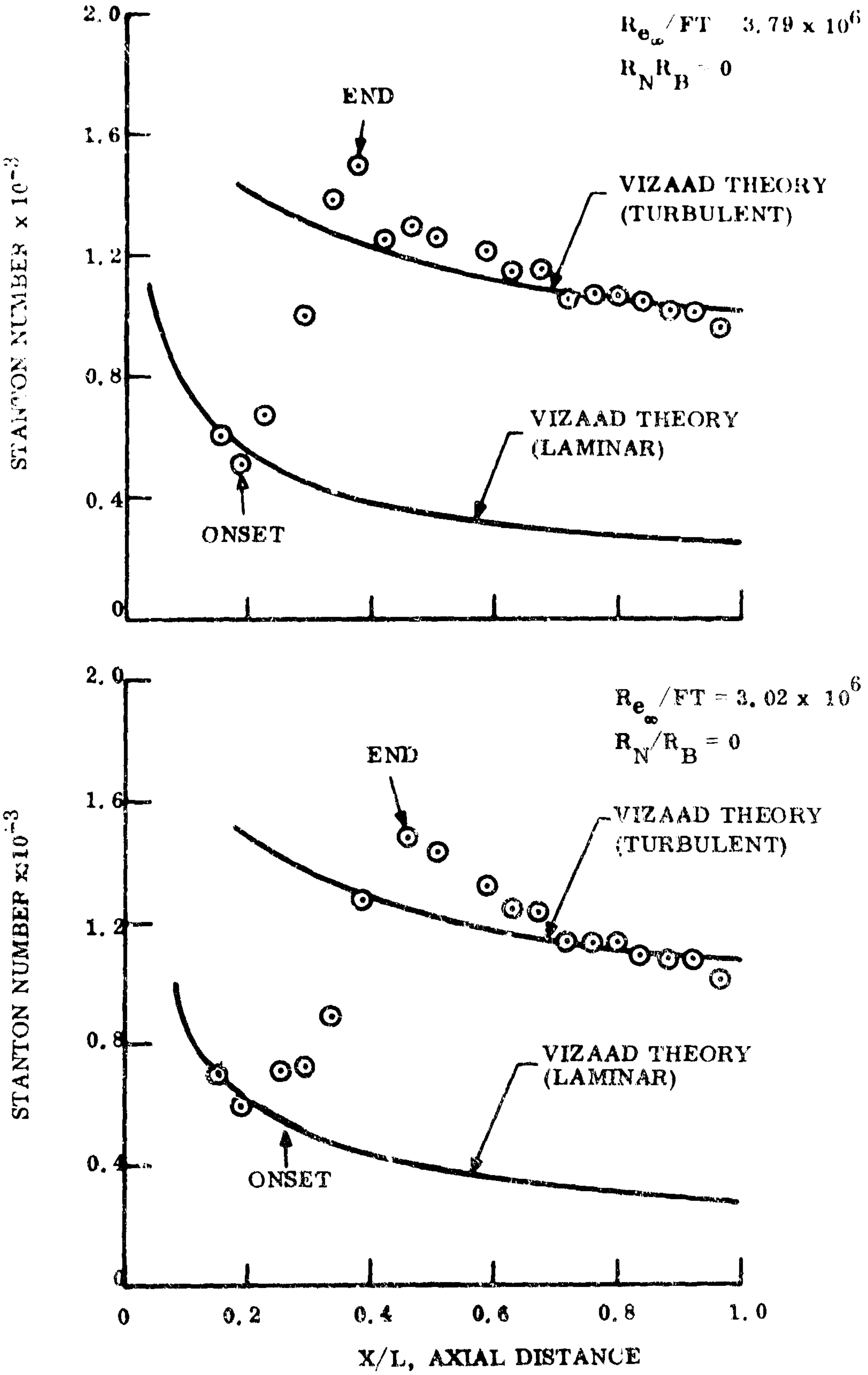

Figure 58. Stanton Number Distribution for a 7.2° Cone at Mach 8, Re_∞ = 3.79 x 10^6 per foot, R_N/R_B = 0

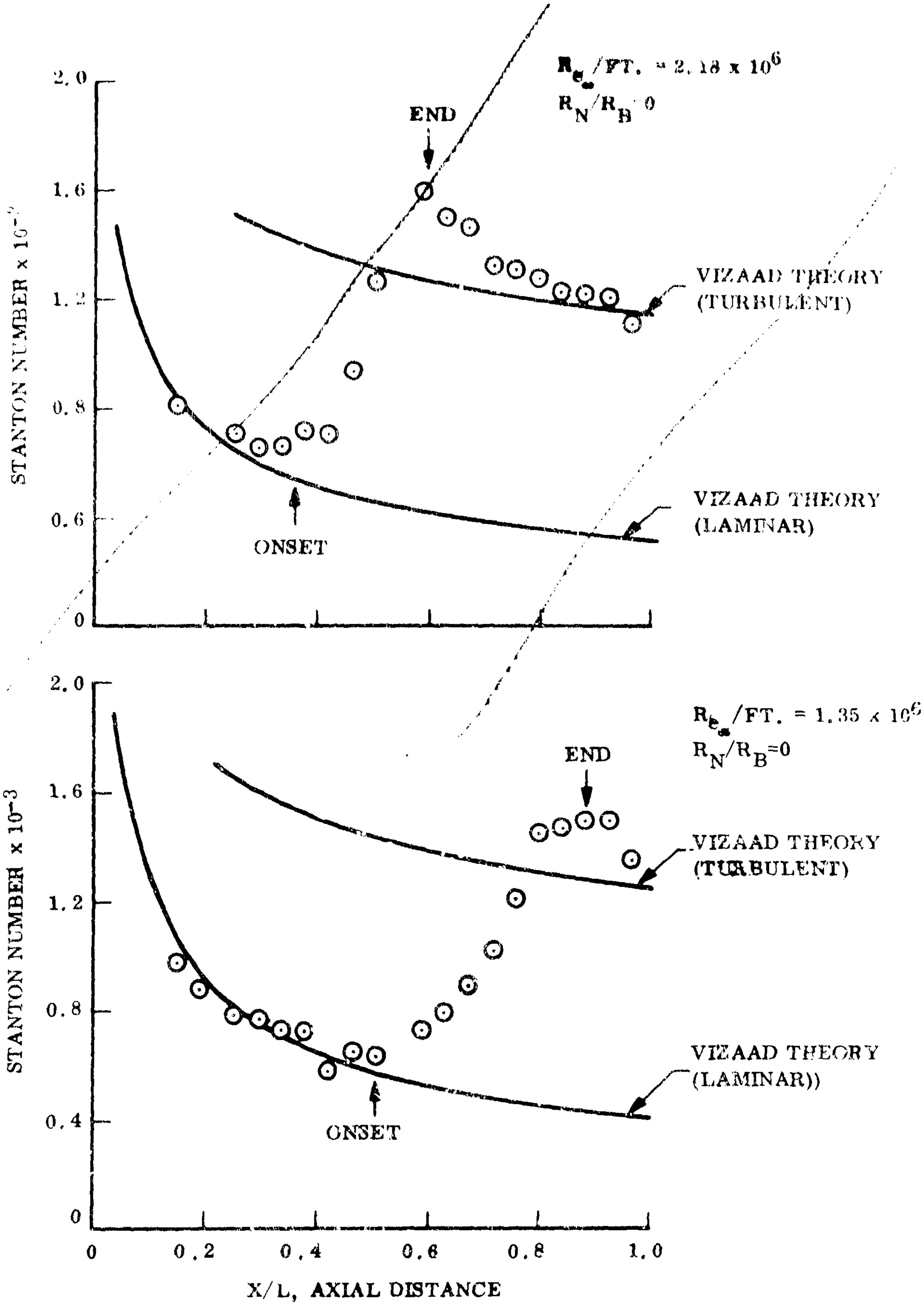

Figure 59. Stanton Number Distribution for a 7.2° Cone at Mach 8. Re_∞ 2.18 x 10^6 per foot, R_N/R_B = 0

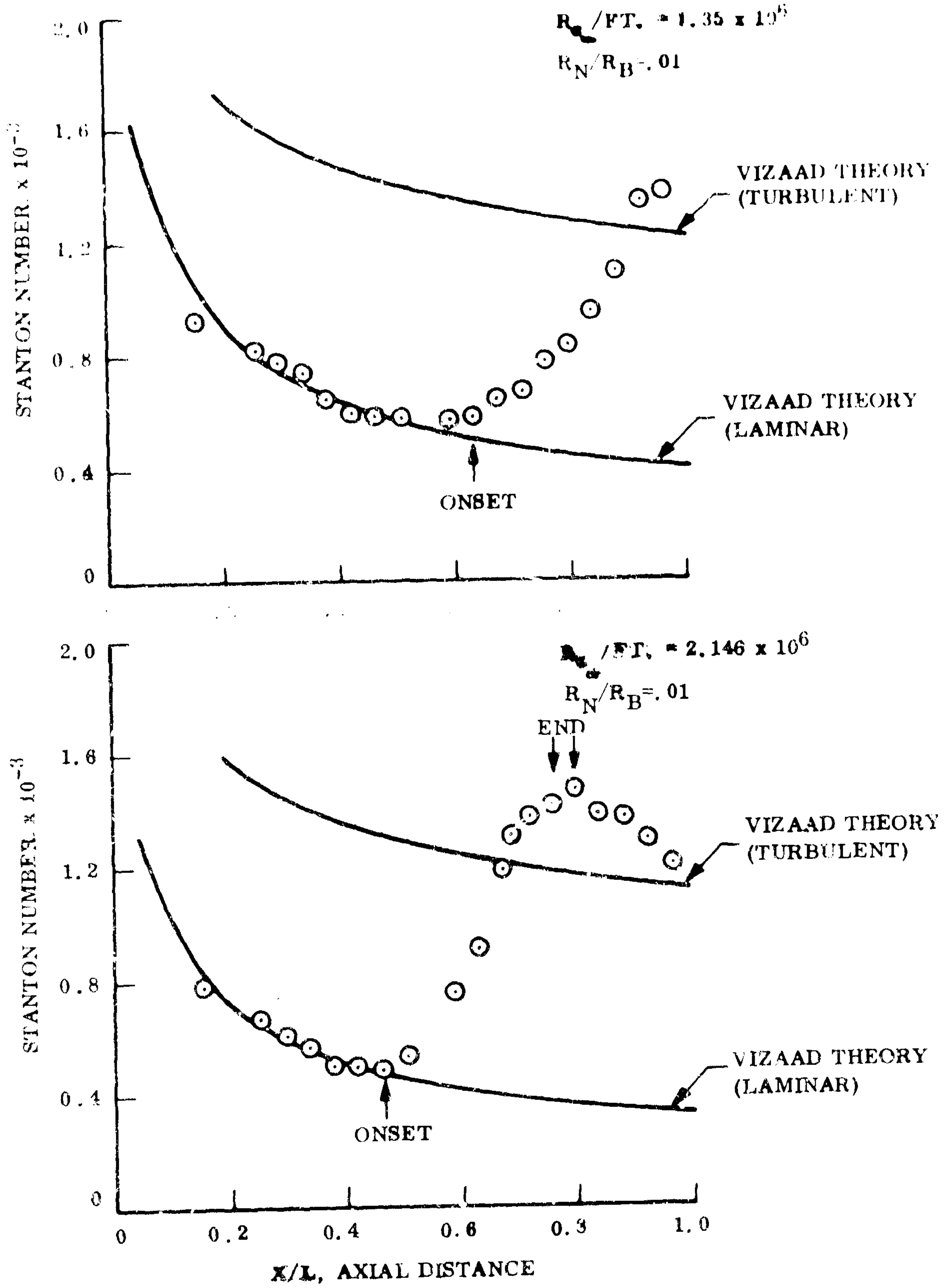

Figure 66. Stanton Number Distribution for a 7.2° Cone at Mach 8, Re_∞ 1.35 x 10^6 per foot, R_N/R_B = 0.01

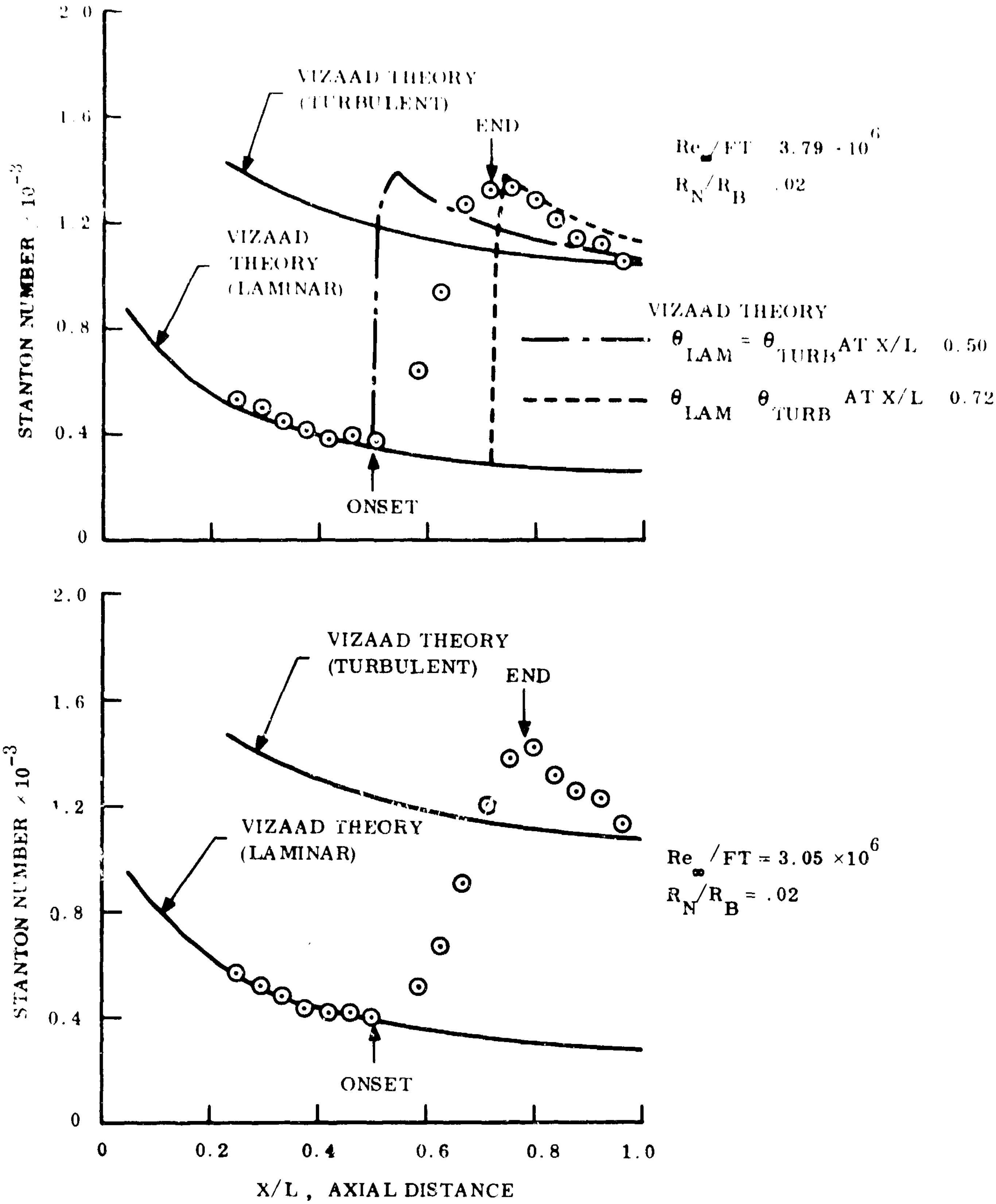

Figure 61. Stanton Number Distribution for a 7.2° Cone at Mach 8. Re_∞ 3.79 x 10^6 per foot, R_N/R_B = 0.02

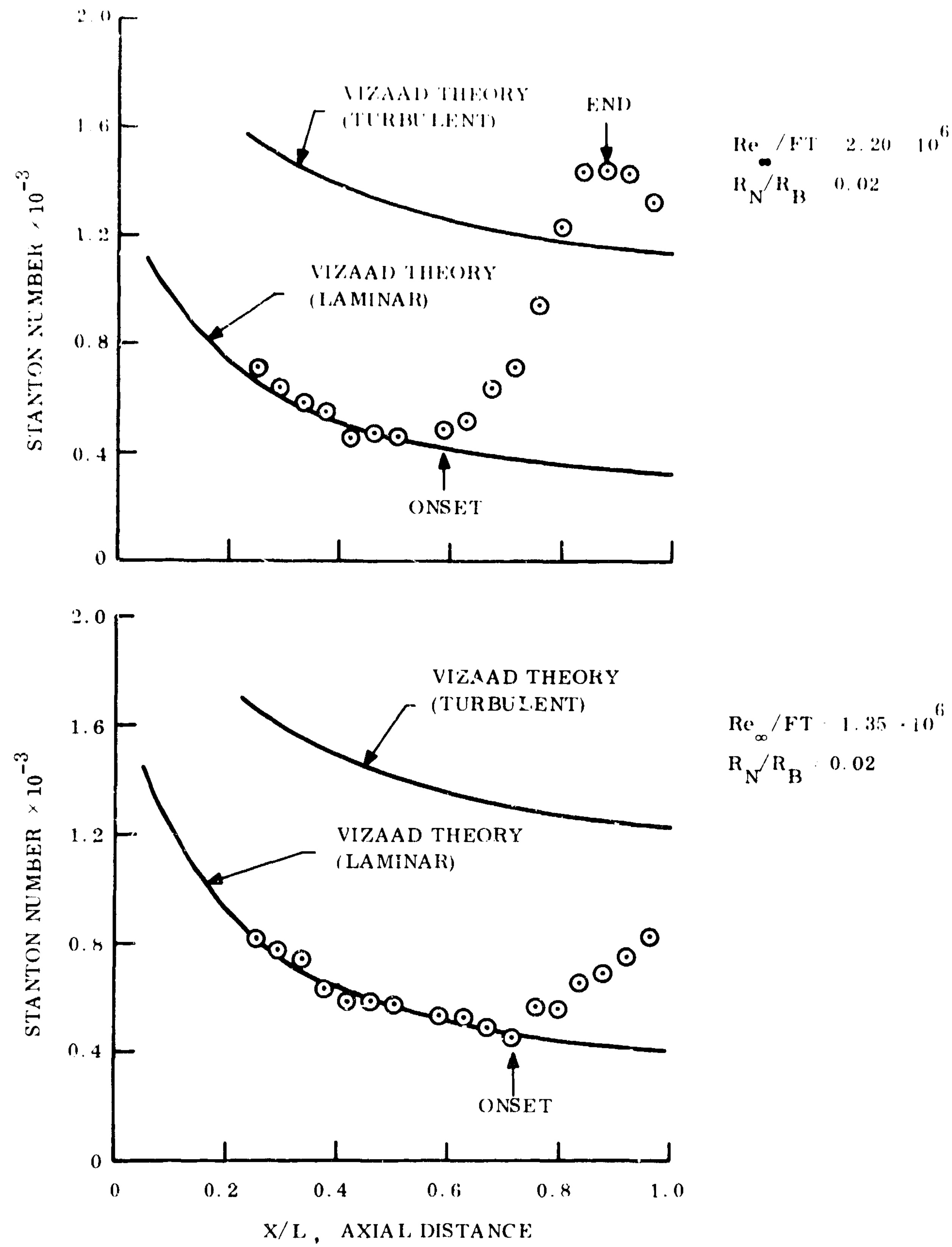

Figure 62. Stanton Number Distribution for a 7.2° Cone at Mach 8, Re_∞ 2.20 x 10^6 per foot, R_N/R_B = 0.02

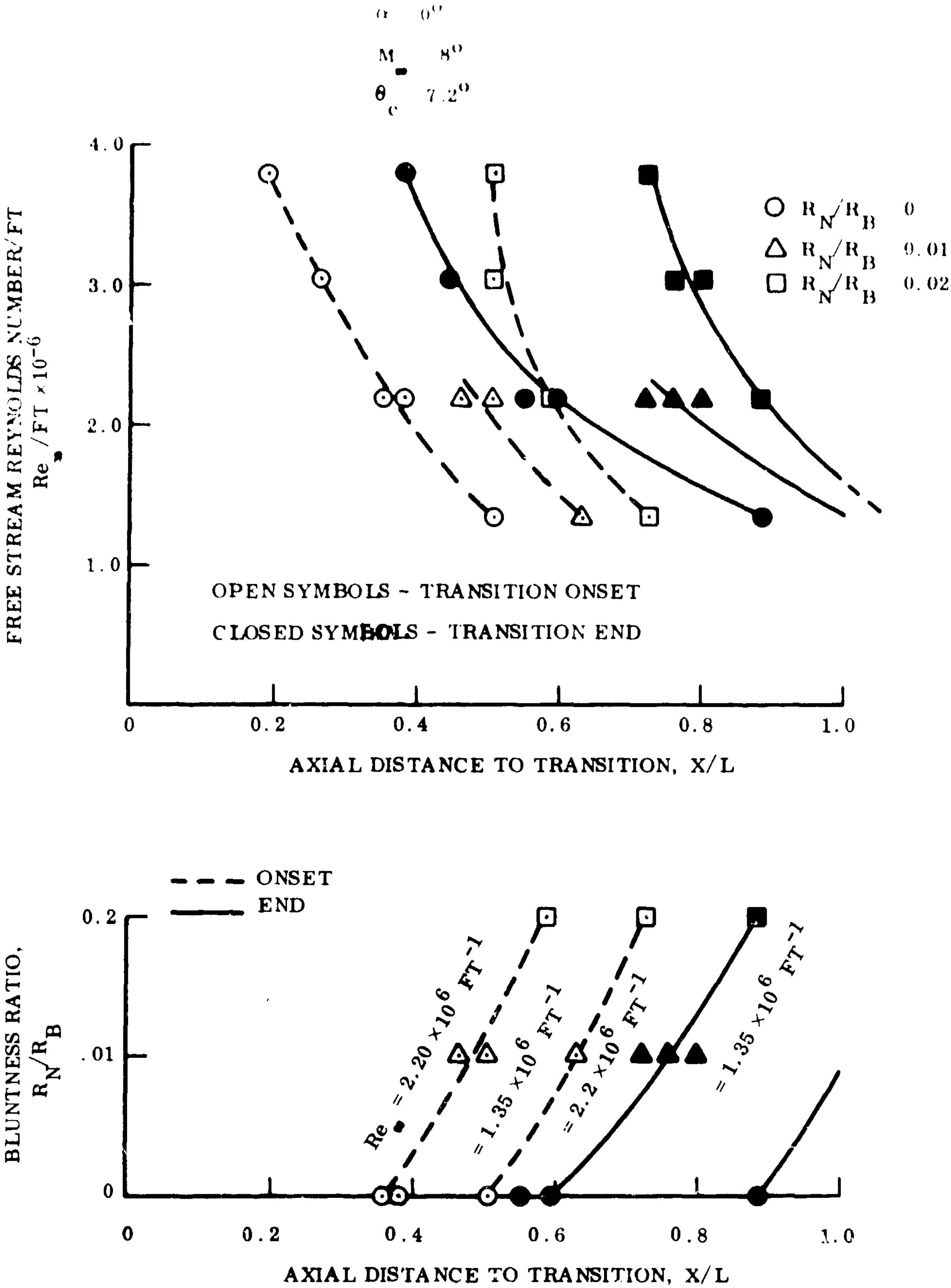

Figure 63. Effect of Reynolds Number and Bluntness on the Transition Region

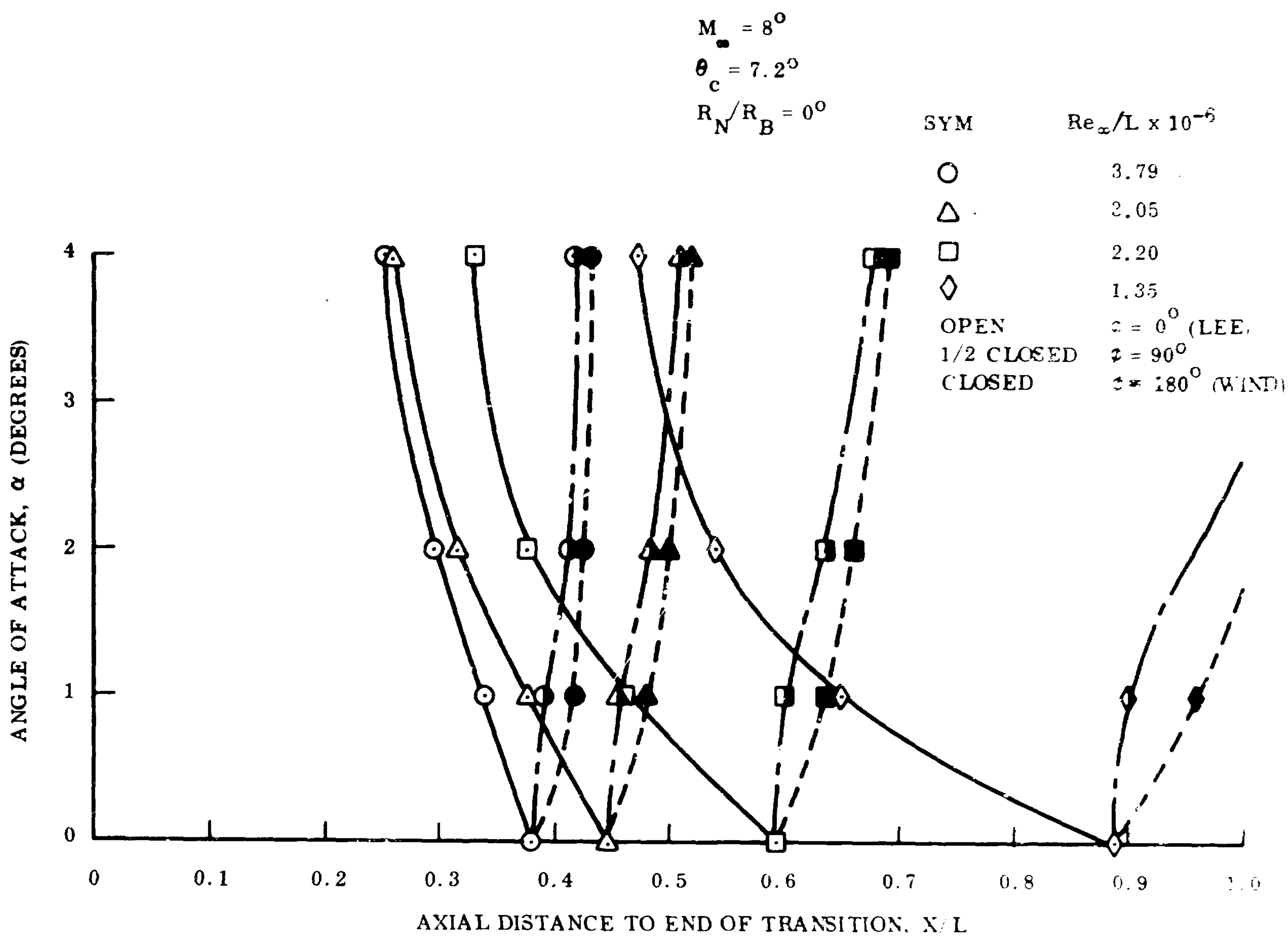

Figure 64. *End of Transition Location on a Cone at Angle of Attack, $M_\infty = 8$, $\theta_c = 7.2^o$, $R_N/R_B = 0$*

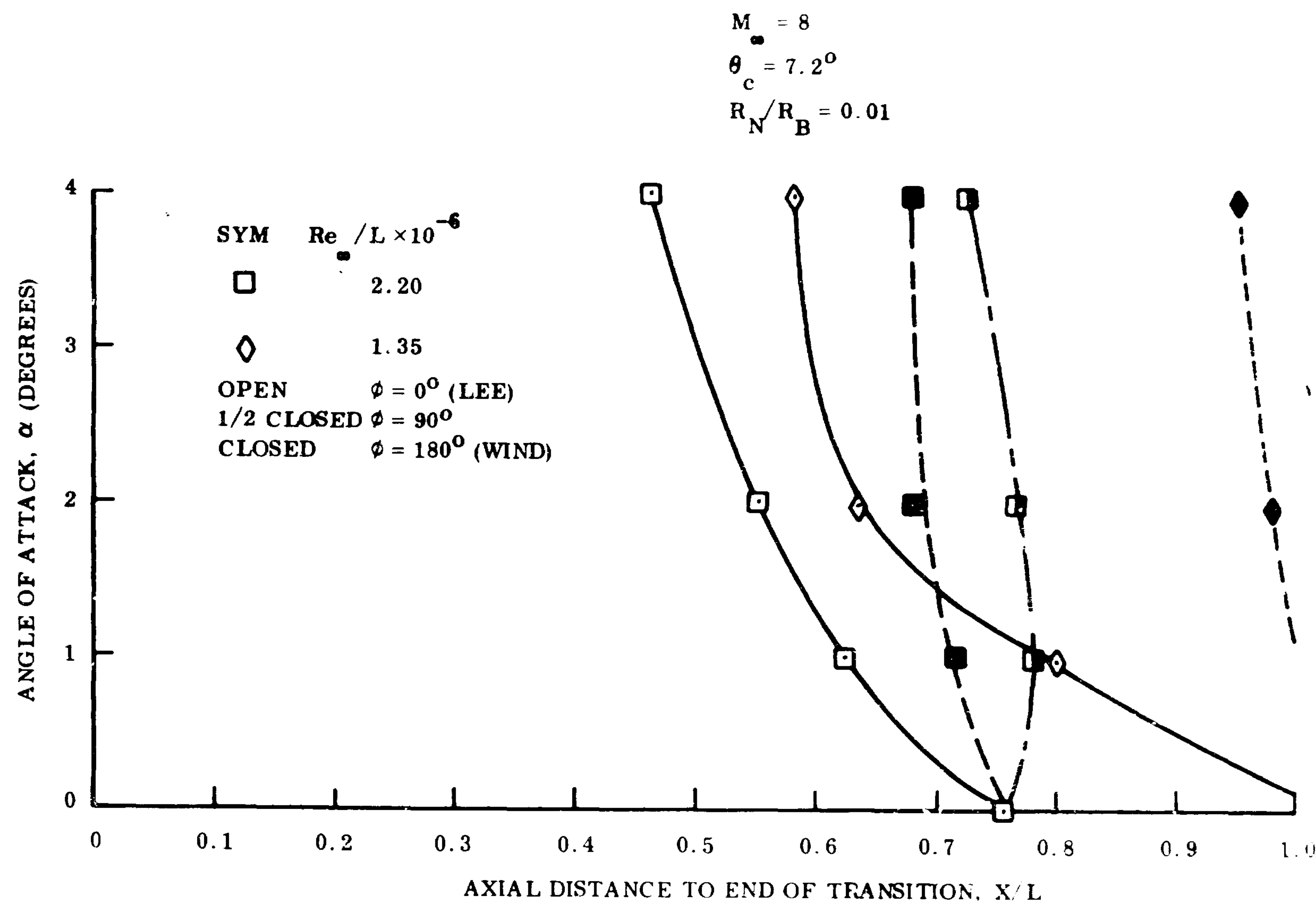

Figure 65. End of Transition Location on a Cone at Angle of Attack, $M_\infty = 8$, $\theta_c = 7.2^o$, $R_N/R_B = 0.01$

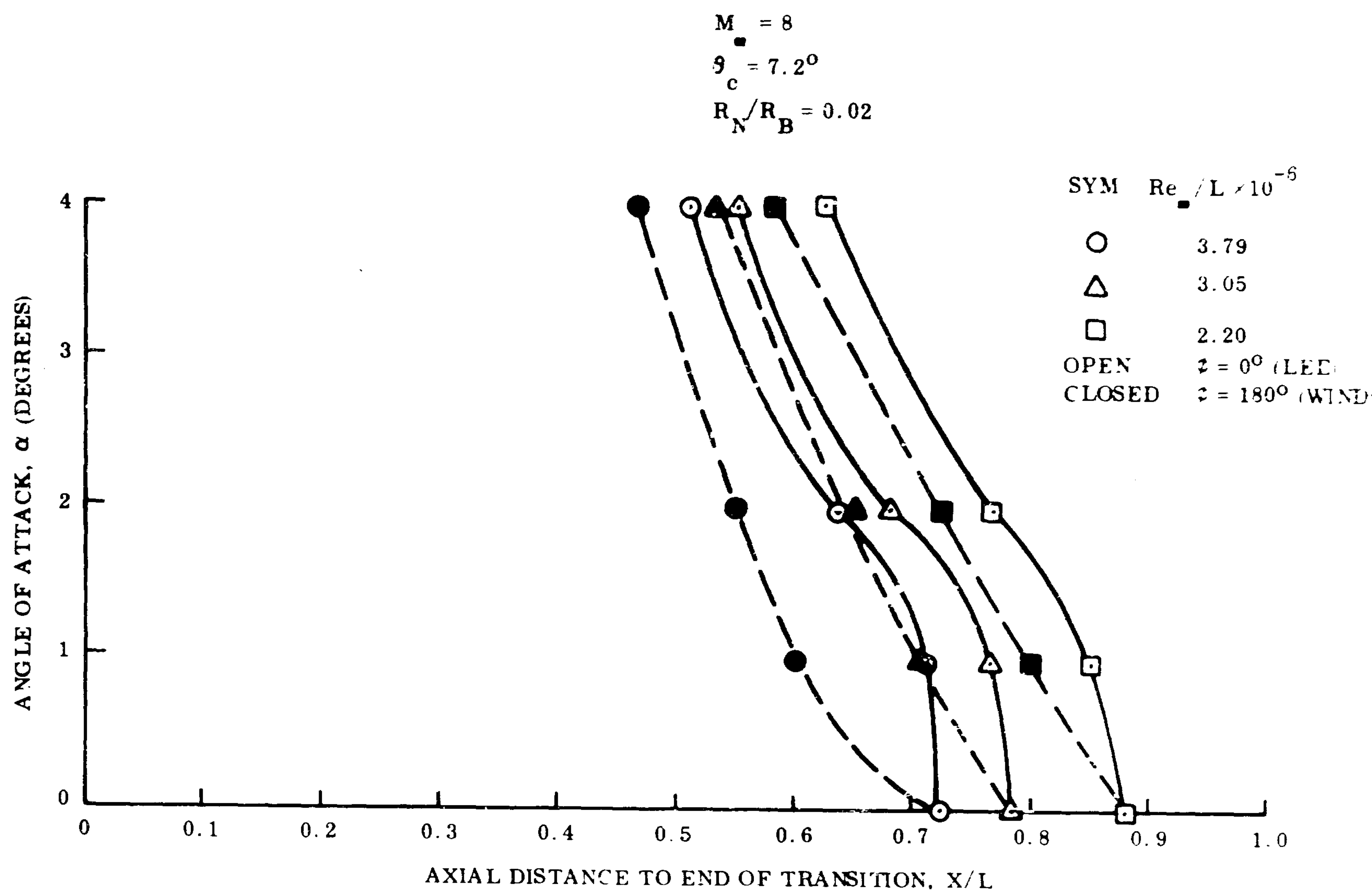

Figure 66. End of Transition Location on a Cone at Angle of Attack, $M_\infty = 8$, $\theta_c = 7.2^o$, $R_N/R_B = 0.02$

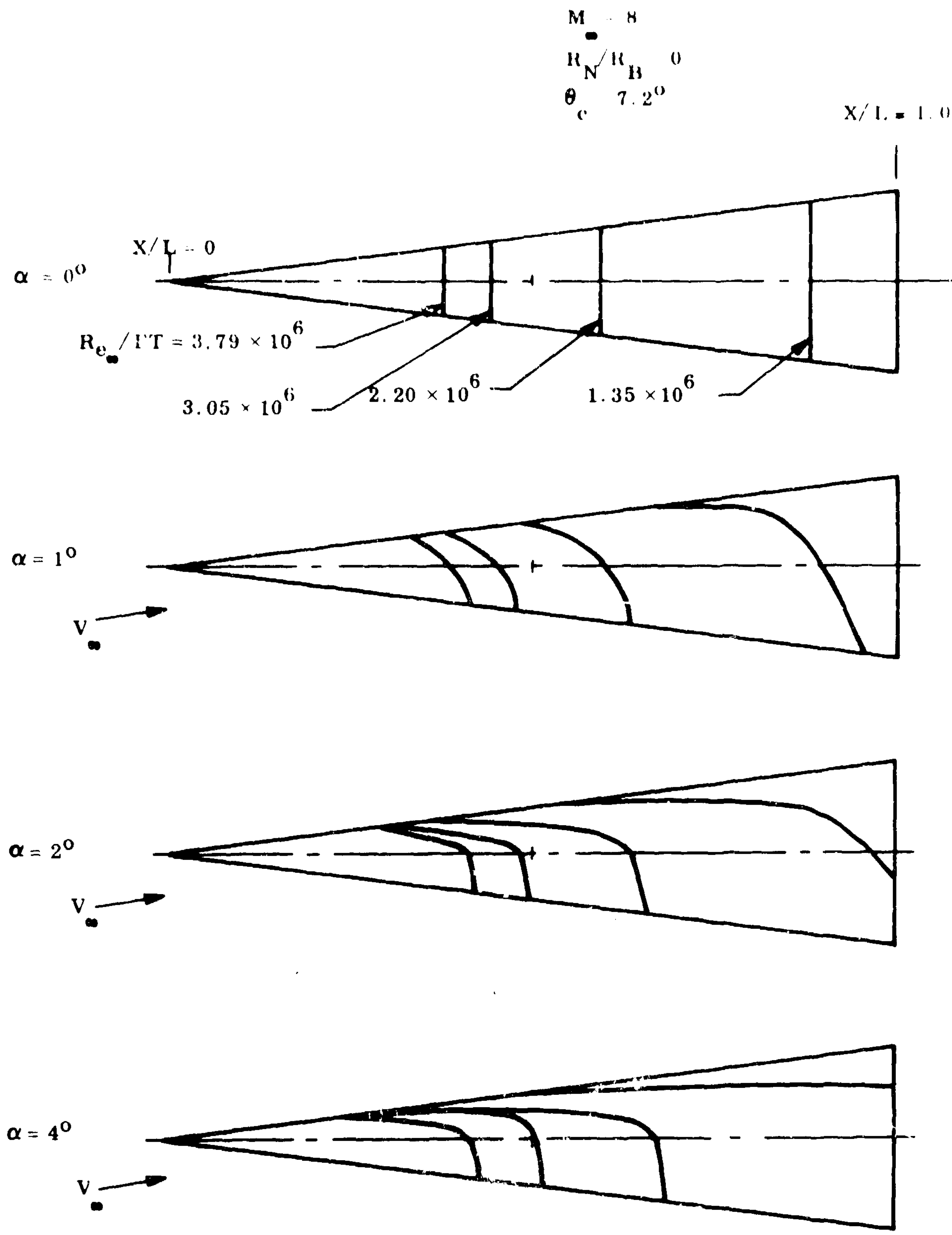

Figure 67. Spatial Distribution of End of Transition with Reynolds Number and Angle of Attack, $M_\infty = 8$, $R_N/R_B = 0$, $\theta_c = 7.2°$

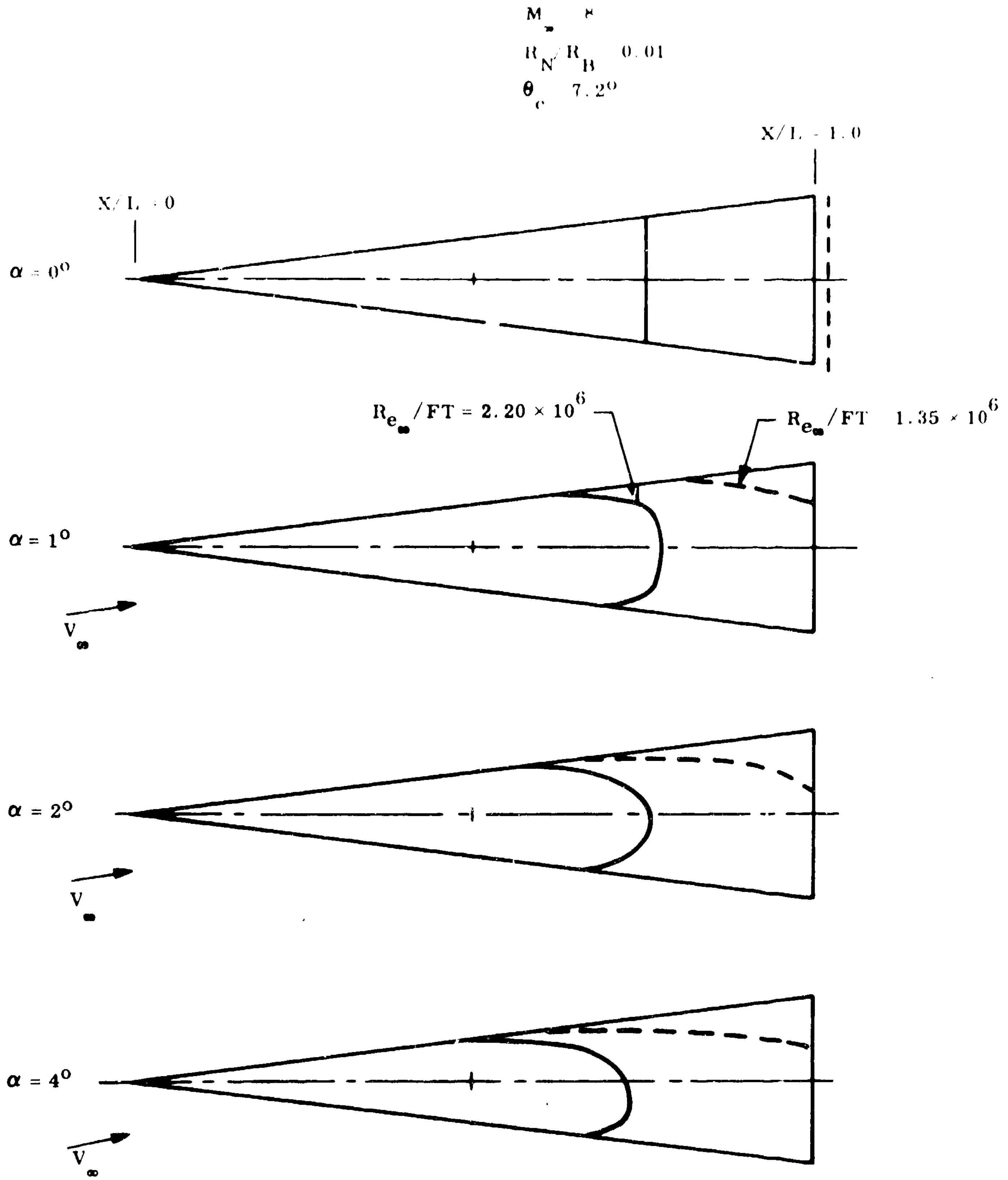

Figure 68. Spatial Distribution of End of Transition with Reynolds Number and Angle of Attack, $M_\infty = 8$, $R_N/R_B = 0.01$, $\theta_c = 7.2^o$

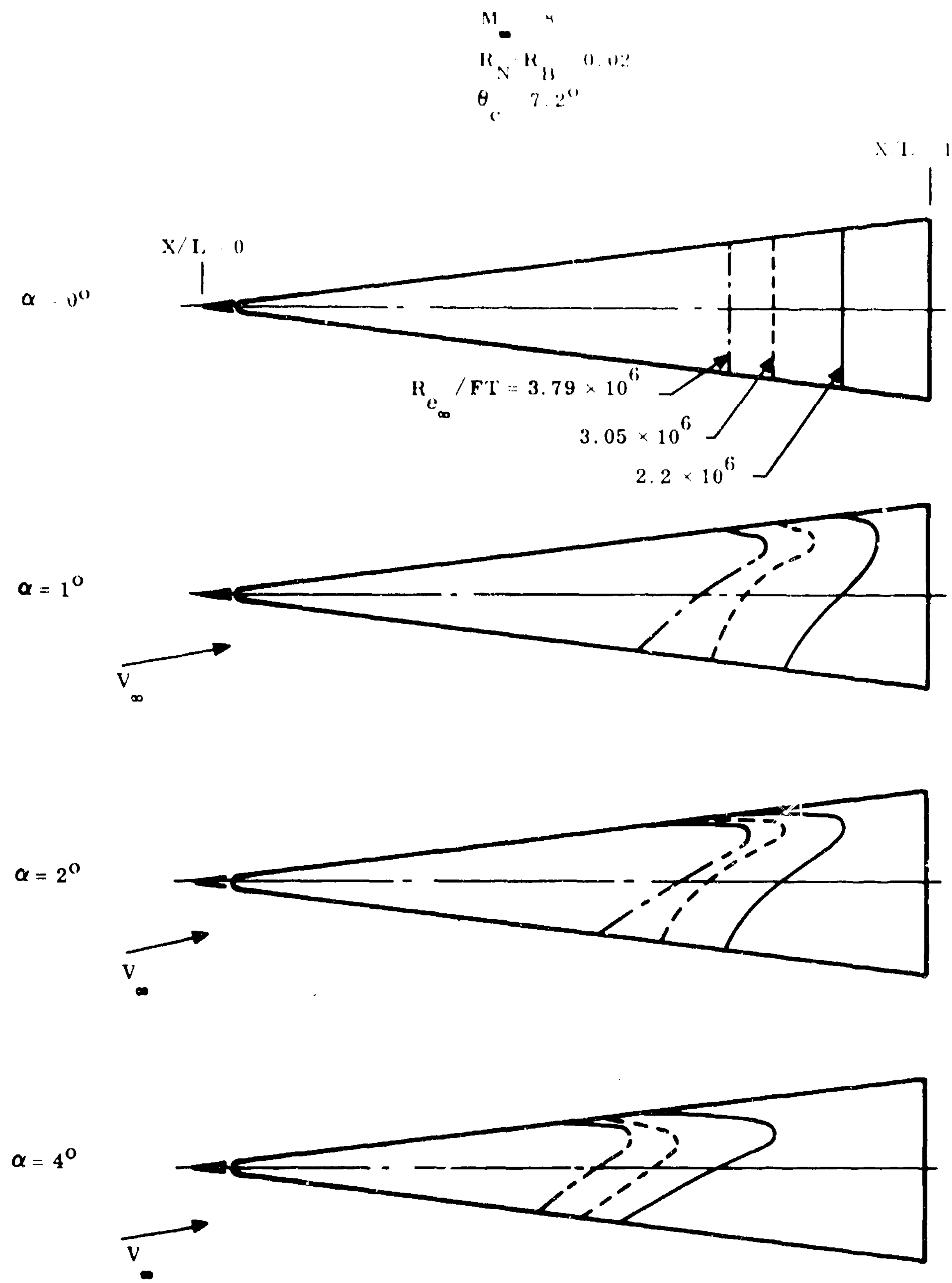

Figure 69. Spatial Distribution of End of Transition with Reynolds Number and Angle of attack, $M_\infty = 8$, $R_N/R_B = 0.02$, $\theta_c = 7.2^o$

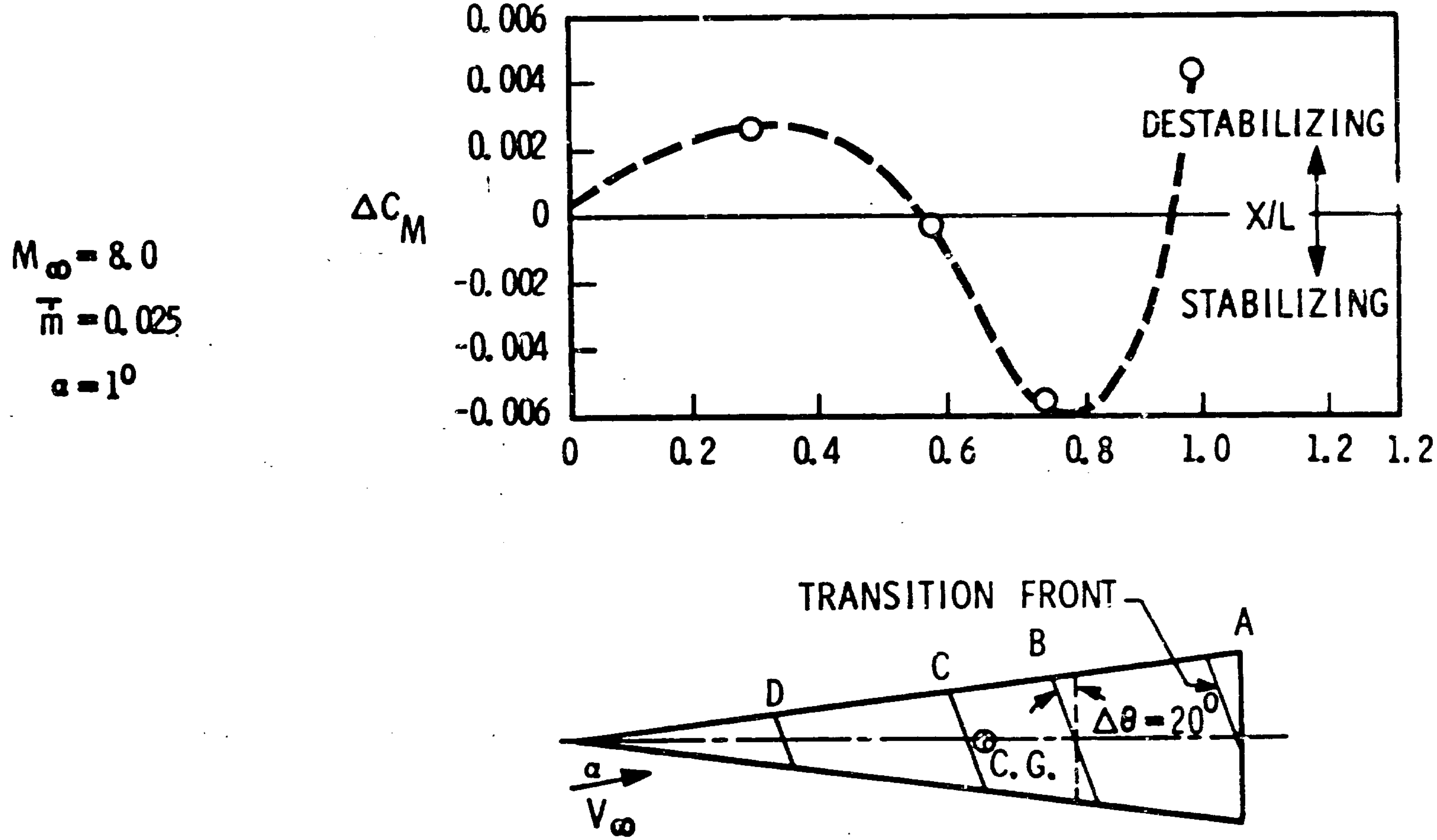

Figure 70. Effect of Asymmetric Transition on Pitching Moment Coefficient

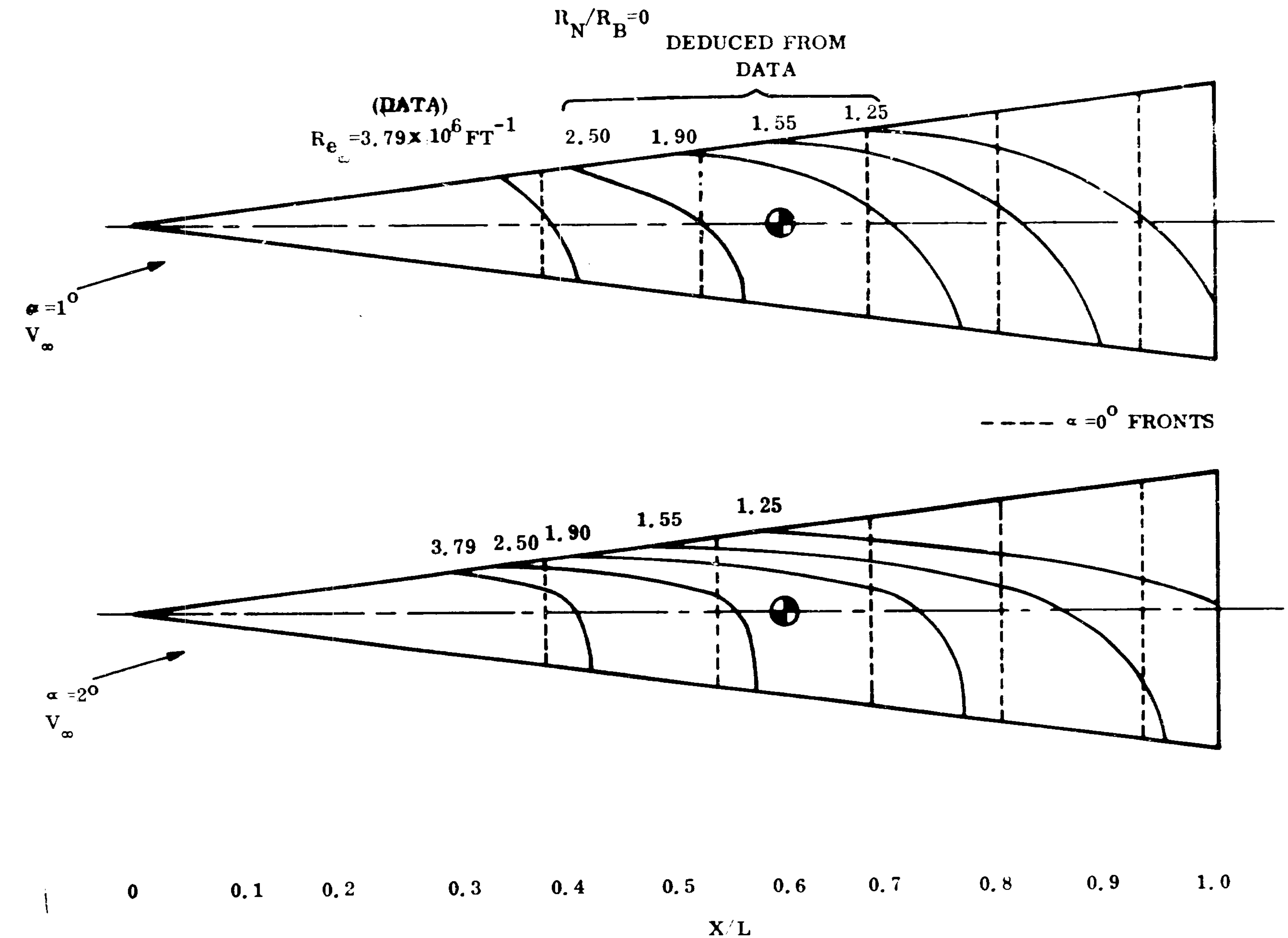

Figure 71. Proposed End of Transition Front Locations for Force Tests. $R_N/R_B = 0$

Unclassified
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As the first part of the Strategic Re-entry Technology (STREET G) task to determine the effect of asymmetric transition on static stability, an experimental investigation of the influence of angle of attack on boundary layer transition front location and shape has been conducted at AEDC Tunnel B at Mach 8. The model was a stainless steel 7.2^{o} half-angle cone with three bluntness ratios (R_N/R_B = 0, .01, .02). For each of the bluntness ratios, heat transfer data were obtained for four (4) values of the free stream Reynolds number and for four (4) angles of attack, that is, α = 0^{o}, 1^{o}, 2^{o}, and 4^{o}. Comparisons of the heat transfer at α = 0^{o} were made with theory and good agreement resulted.

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Security Classification

14 KEY WORDS	LINK A ROLE	LINK A WT	LINK B ROLE	LINK B WT	LINK C ROLE	LINK C WT
Hypersonic Flow						
Boundary Layer Transition						
Heat Transfer						
Angle of Attack						
Bluntness						
Reynolds Number						

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