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VOL IV-D A063214

INTERACTIONAL AERODYNAMICS OF THE SINGLE ROTOR HELICOPTER CONFIGURATION

VOLUME IV-E - One-Third Octave Band Spectrograms of Wake Split Film Data, Air Ejectors

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APPLIED TECHNOLOGY LABORATORY POSITION STATEMENT

In 1975 a wind tunnel test program was conducted in the Boeing-Vertol 20-foot V/STOL Wind Tunnel on a 1/5th-scale UTTAS model to investigate and find solutions for several aerodynamic problems encountered during the UTTAS flight-testing. Specifically, these tests focused upon (a) the structure of the hub/rotor wake in the vicinity of the empennage, (b) the formulation of the ground vortex and its relation to hub loads and fuselage loads during transition, and (c) the occurrence of vibratory air pressures from the blade passing over the fuselage. Only portions of the above-mentioned wind tunnel test data were reduced and analyzed in addressing the flight-test problems of the UTTAS aircraft.

Under Contract DAAJ02-77-C-0020, Boeing-Vertol completed analyses on the data to understand more completely the aerodynamic interactions that are involved and to formulate instructions for the guidance of designers in these respects. The results of these studies are applicable to all existing and future single-rotor/tail rotor helicopters. The data have been segregated according to aerodynamic interactions and associated phenomena/problem areas. From this body of knowledge, a generalized set of design guidelines meaningful to the single-rotor helicopter design concept formulation were developed and are included in these reports.

Mr. Robert P. Smith of the Aeronautical Technology Division, Aeromechanics Technical Area, served as project engineer for this effort.

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Flow	Empennage	
Interaction	Flow Modifier	
Aerodynamic Interaction	Powered Model	
Flow Environment		

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This is the fifth of the seven sub-volumes of Volume IV containing one-third octave band spectrographs of the model helicopter hub/rotor wake as it was modified by various aerodynamic devices. This sub-volume deals with the effects of various air ejector systems on the wake.

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PREFACE

The entire report describing the investigation of INTERACTIONAL AERODYNAMICS OF THE SINGLE-ROTOR HELICOPTER CONFIGURATION comprises eight numbered volumes bound as 33 separate documents. The complete list of these documents is as follows:

Volume I, Final Report

Volume II, Harmonic Analyses of Airframe Surface Pressure Data
- A – Runs 7-14, Forward Section
- B – Runs 7-14, Mid Section
- C – Runs 7-14, Aft Section
- D – Runs 15-22, Forward Section
- E – Runs 15-22, Mid Section
- F – Runs 15-22, Aft Section
- G – Runs 23-33, Forward Section
- H – Runs 23-33, Mid Section
- I – Runs 23-33, Aft Section

Volume III, Flow Angle and Velocity Wake Profiles in Low-Frequency Band
- A – Basic Investigations and Hubcap Variations
- B – Air Ejector Systems and Other Devices

Volume IV, One-Third Octave Band Spectrograms of Wake Split-Film Data
- A – Buildup to Baseline
- B – Basic Configuration Wake Explorations
- C – Solid Hubcaps
- D – Open Hubcaps
- E – Air Ejectors
- F – Air Ejectors With Hubcaps; Wings
- G – Fairings and Surface Devices

This volume is

Volume V, Harmonic Analyses of Hub Wake

Volume VI, One-Third Octave Band Spectrograms of Wake Single Film Data
- A – Buildup to Baseline
- B – Basic Configuration Wake Exploration
- C – Hubcaps and Air Ejectors

Volume VII, Frequency Analyses of Wake Split-Film Data
- A – Buildup to Baseline
- B – Basic Configuration Wake Explorations
- C – Solid Hubcaps

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D – Open Hubcaps
E – Air Ejectors
F – Air Ejectors With Hubcaps; Wings
G – Fairings and Surface Devices

Volume VIII, Frequency Analyses of Wake Single Film Data
A – Buildup to Baseline
B – Basic Configuration Wake Exploration
C – Hubcaps and Air Ejectors

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INTRODUCTION

Volume IV presents spectrograms of the flow angles and velocity components for each run and its test points. Specifically, these machine plots show the root mean square value of each wake parameter over discrete frequency intervals one-third of an octave band in width. The octave arrangement is selected to provide 19 spectral increments from 3.9 to 250.0 Hz centerband frequency. A special computer program is employed to derive wake parameters within these bands consistent with corresponding basic spectral functions depicted in Volume VII.

The graphs showing the one-third octave band values are sequenced in the same order as the Outline of Wake Investigations (Table 1). These graphs are distributed among Volumes IV-A through IV-G by the major categories of Table I in the following arrangement:

Volume IV-A	Build-up to Baseline
Volume IV-B	Basic Configuration
Volume IV-C	Effect of Hub Caps Section 1 & 2
Volume IV-D	Effect of Hub Caps Section 3 & 4
Volume IV-E	Effect of Hub Caps Section 5 and Effect of Air Ejectors
Volume IV-F	Air Ejectors with Open Hub Caps and Effect of Wings and Misc. Section
Volume IV-G	Effect of Wings and Misc. Sections 2 and 3

The Table I outline and other material is included for reference and as a context to the work of each sub-volume. Table 2, the List of Test Runs, arranges the runs in numerical order and gives pertinent text parameters.

The Index of Rake Positions, Table 3, lists the hot film transducer rake positions in the model coordinate system for each run and its test points. The main feature of Table 3 is the indexing of the test point number to the model waterline station and butt line as it varied from run to run. The table groups the runs as they shared the indexing correspondence of point with position. It is emphasized that the runs in a group do not necessarily all share the same number of test points but they do have same correspondence within their respective ranges of test points.

The orientation of the rake is shown pictorially in Figures 1 through 6 for the various test runs. Figure 7 presents a scaled drawing of the model with reference to the three-axis coordinate system. Table 4 lists the center frequency and the upper and lower band limits for each of the numbered one-third octave bands.

TABLE 1

OUTLINE OF WAKE INVESTIGATIONS

Description	Configuration Code	Run No.	Base-line
Build-up to Baseline			
1. Nacelles removed	$K_{13}+H_1-N$	149	150
2. Blades off, rotating hub	$K_{13}-M+H_{1.0}$	160	156
3. " " , non-rotating hub	$K_{13}-M+H_{1.0}$	158	156
4. " " , hub off	$K_{13}-M-H_{1.0}$	159	156
Basic Configuration			
1. Wake Explorations near Empennage			
(a) 15" Long. + traverse at T/R C.L.	K_{11}	111	---
(b) 9" Vert. + " above T/R "	"	112	---
(c) 2" " " in vortex	"	113	---
(d) 8" " " (continue 112)	"	114	---
(e) 13" " " behind stab.	"	115	---
(f) Lateral traverse, left stab. (One T.P. only)	"	116	---
(g) Same continued	"	117	---
(h) Same continued (One T.P. only)	"	118	---
(i) Lateral traverse right stab.	"	119	---
(j) T/R effect on wake	$K_{11}+T_2^0$	121	115
2. Climb/Descent Studies			
(a) Climb 900 FPM	K_{11}	135	---
(b) Descent 800 FPM	"	136	---
Effect Of Hub Caps			
1. Solid Caps on Canister			
(a) 7.6" diam. 2.17" ht. soft Pitch Arms	$K_{11}-H_{1.0}+H_{1.2}$	137	136
(b) 7.6" diam. 2.17" ht. stiff Pitch Arms	$K_{13}+H_{1.2}$	153	156
(b) 7.6" diam. 2.45" ht. flt. test config.	$K_{13}+H_{1.2.1}+I_1+E_{1.0}$	207	188

TABLE 1 (CONTINUED)

OUTLINE OF WAKE INVESTIGATIONS

Description	Configuration Code*	Run No.	Base-line
Effect of Hub Caps (Continued)			
2. Solid Caps Raised Above Canister			
(a) 7.6" diam. 2.45" ht. 70" depth, .55 gap	$H_{1.2.2}+I_1+E_{1.0}$	208	188
(b) 10.0" diam. 3.25" ht. 1.55" depth, .50" gap	$H_{1.8.1}+I_1+E_{1.0}$	189	188
(c) 10.0" diam. 4.125" ht. 2.05" depth, .875" gap	$H_{1.8.2}+I_1+E_{1.0}$	190	188
(d) Repeat of 189	" " "	210	188
3. Open Caps Without Underbody			
(a) 10.0" diam. 1.25" gap,blades	$H_{1.0.2}+I_1+E_{1.0}$	193	188/166
(b) " " " gap, no blades	$H_{1.0.1}-M$	166	158
(c) " " 2.05" gap,blades	$H_{1.14.1}+I_1+E_{1.0}$	211	188
(d) " " 1.75" gap, no blades	$H_{1.0.1}-M$	165	158
(e) " " 1.87" gap,blades	$H_{1.0.3}+I_1+E_{1.0}$	191	188
(f) 16" diam. 2.00" gap,blades	$H_{1.7.1}$	168	156/167
(g) " " " gap, no blades	$H_{1.7.1}-M$	167	158
(h) " " 4.00" gap,blades	$H_{1.7.2}$	169	156
4. Open Caps with Underbody			
(a) 7.6" diam. 1.25" gap	$H_{1.11.1}+I_2+E_{1.0}$	194	188
(b) " " " "	$H_{1.11.1}+I_2+E_{4.0}$	198	188
(c) " " " " center post	$H_{1.11.2}+I_2$	202	194
(d) 10.0" diam. .5" gap, no blades	$H_{1.5.1}-M$	164	158
(e) " " 1.25" gap, no blades	$H_{1.5.2}-M$	161	158
(f) " " 2.0" gap, no blades	$H_{1.5.4}-M$	163	158
(g) " " 4.0" gap, no blades	$H_{1.5.3}-M$	162	158
(h) " " 1.25" gap	$H_{1.5.2}$	154	156/161

*Basic Code is K13.

TABLE 1 (CONTINUED)

OUTLINE OF WAKE INVESTIGATIONS

Description	Configuration Code*	Run No.	Base-line
5. Miscellaneous Hub Covers			
(a) Hub fairing 16" diam.	$H_{1.3}$	151	150
(b) Wham-O-Frisbee 10" diam.	$H_{1.9.0}+E_{1.2}$	182	181
(c) Fab. glass Frisbee 16" diam.	$H_{1.9.1}+E_{1.2}$	183	181
Effect of Air Ejectors			
1. Basic system no blowing	$H_{1.0}+E_{1.0}$	172	156
2. " " 40 psi	" "	173	156/172
3. " " 150 psi	" "	174	156/172
4. Wide chord shroud 40 psi	$H_{1.0}+E_{2.5.1}$	175	156/173
5. Wide " " 150 psi	" "	176	156/174
6. W/C shroud w. lip 40 psi	$H_{1.0}+E_{3.5.2}$	184	156/173
7. Same Contoured Parallel 150 psi	$H_{1.0}+E_{3.5.4}$	187	156/174
8. Bifurcated duct 0 psi	$H_{1.0}+E_{5.0}$	203	156
9. " " 40 psi	" "	204	156/203
10. " " 150 psi	" "	205	156/203
Air Ejectors with Open Hub Caps with Underbodies			
1. 7.6" diam. 1.25" gap, 0 psi	$H_{1.11.1}+I_2+E_{1.0}$	194	188/172
2. " " " " 20 psi	" " "	195	188
3. " " " " 40 psi	" " "	196	188/173
4. " " " " 150 psi	" " "	197	188/174
5. " " " " 0 psi	$H_{1.11.1}+I_2+E_{4.0}$	198	188/194
6. " " " " 40 psi	" " "	199	188/196
7. " " " " 150 psi	" " "	200	188/196
8. Same with center post	$H_{1.11.2}+I_2+E_{4.6}$	201	188/200
9. 10.0" diam. 2.0" gap wide ch'd. shroud (150 psi)	$H_{1.5.4}+E_{2.5.1}$	177	156/176
Effect of Wings and Misc.			
1. Wings			
(a) Nacelle-mounted stub wing	$H_{1.0}+W_{1.0}+E_{1.1}$	178	181
(b) Single slotted flapped wing	$H_{1.0}+W_{3.0}+E_{1.0}$	180	181
(c) Dougle slotted flapped wing	$H_{1.0}+W_{2.0}+E_{1.0}$	179	181
(d) Boom-mounted stub wing	$H_{1.0}+W_{4.0}$	186	156

*Basic Code is K13.

TABLE 1 (CONTINUED)

OUTLINE OF WAKE INVESTIGATIONS

Description	Configuration Code*	Run No.	Base-line
2. Crown Fairings			
(a) Flat top behind shaft	$K_{11}+D_1$	140	138
(b) Round top behind shaft	$K_{11}+D_2$	141	138
(c) Extended flat top fairing	H_1+D_4	170	156
(d) Flat top + 16" cap, 4" gap	$H_{1.7.2}+D_4$	171	170
(e) Forward fairing/nacelle fairing	$P_{1.0}$	152	156
3. Surface Devices			
(a) Vortex generators	$K_{11}+VG_{2.1}$	139	138
(b) Guidevane between nacelles	$K_{11}+FV_1$	142	138
(c) Longitudinal strakes	$H_{1.5.3}+S_4$	155	156
(d) 14% porosity spoiler	$K_{11}+X_1$	143	138

*Basic Code is K13 unless noted otherwise.

TABLE 2

LIST OF TEST RUNS

BASIC INVESTIGATIONS OF THE HUB WAKE

RUN NO.	CONFIGURATION/CONDITION	V_{TUN} KNOTS	RPM MR/TR	DISK LDG. psf	MODEL ANGLES		MR HT.	TAIL ROTOR
					α°	ψ°	h/d	
111	K_{11}/15" Long. wake traverse at TR center line	80	1433/0	8	6.0	-2.0	∞	Off
112	" /9" Vert. wake traverse above TR center line	"	"	"	"	"	"	"
113	" /2" Vert traverse through MR vortex	"	"	"	"	"	"	"
114	" /8" Vert. traverse below TR center line	"	"	"	"	"	"	"
115	" /13" Vert. traverse behind stabilizer	"	"	"	"	"	"	"
116	" /Lateral traverse - left stabilizer	"	"	"	"	"	"	"
117	" /116 continued	"	"	"	"	"	"	"
118	" /116 continued	"	"	"	"	"	"	"
119	" /Lateral traverse - right stabilizer	"	"	"	"	"	"	"
121	$K_{11}+T_2$/Effect of tail rotor flow on wake	"	1433/ 4500	"	"	"	"	On
135	K_{11}/Wake in 900 fpm climb	"	"	"	-6.0	-4.5	"	Off
136	" /Wake in 800 fpm descent	"	"	"	6.0	-2.0	"	"

TABLE 2 (CONTINUED)

LIST OF TEST RUNS

EVALUATION OF WAKE-ALTERING DEVICES

RUN NO.	CONFIGURATION/CONDITION	V_{TUN} KNOTS	RPM MR/TR	DISK LDG, psf	MODEL ANGLES		MR HT.	TAIL ROTOR
					α°	ψ°	h/d	
137	$K_{11}-H_{1.0}+H_{1.2}$/Effect of 7.6 inch diam. solid hub cap	80	1433/0	8	0	-3.8	∞	Off
138	K_{11}/Repeat of base run	"	"	"	"	"	"	"
139	$K_{11}+VG_{2.1}$/Effect of vortex generators on aft crown	"	"	"	"	"	"	"
140	$K_{11}+D_1$/Flat-topped "doghouse" fairing on aft crown	"	"	"	"	"	"	"
141	$K_{11}+D_2$/Rounded-top fairing	"	"	"	"	"	"	"
142	$K_{11}+FV_1$/Deflection vane on crown between nacelles	"	"	"	"	"	"	"
143	$K_{11}+X_1$/Variable porosity spoiler	"	"	"	"	"	"	"
149	$K_{13}+H_1-N_1$/Effect of nacelles off also add stiff pitch arms (K_{13})	60	1075/0	4.5	"	"	"	"
150	$K_{13}+H_1$/60 knot baseline	"	"	"	"	"	"	"
151	$K_{13}+H_{1.3}$/16 inch diam. helmet fairing	"	"	"	"	"	"	"
152	$K_{13}+P_{1.0}$/Pylon and intake fairings	80	1433/0	8	"	"	"	"
153	$K_{13}+H_{1.2}$/Repeat 137 with K_{13} pitch arms	"	"	"	"	"	"	"

TABLE 2 (CONTINUED)

LIST OF TEST RUNS

EVALUATION OF WAKE-ALTERING DEVICES

RUN NO.	CONFIGURATION/CONDITION	V_{TUN} KNOTS	RPM MR/TR	DISK LDG. psf	MODEL ANGLES		MR HT.	TAIL ROTOR
					α°	ψ°	h/d	
154	$K_{13}+H_{1.5.2}$/10" open hub cap, 7" underbody, 1.25"gap	80	1433/0	8	6	-3.8	∞	Off
155	$K_{13}+H_{1.5.2}+S_4$/Same as 154 except strakes on aft crown	"	"	"	"	"	"	"
156	$K_{13}+H_{1.0}$/Baseline with K_{13},i.e., stiff pitch arms	"	"	"	"	"	"	"
158	$K_{13}-M+H_{1.0}$/Wake studies with blades off, hub not rotating	"	0/0	"	"	"	"	"
159	$K_{13}-M-H_{1.0}$/Wake studies with hub off	"	"	"	"	"	"	"
160	$K_{13}-M+H_{1.0}$/Same as 158 except hub is rotating	"	1433/0	"	"	"	"	"
161	$K_{13}-M+H_{1.5.2}$/Repeat of 154 without blades	"	0/0	"	"	"	"	"
162	$K_{13}-M+H_{1.5.3}$/Same as 161 except 4" gap	"	"	"	"	"	"	"
163	$K_{13}-M+H_{1.5.4}$/Same as 161 except 2" gap	"	"	"	"	"	"	"
164	$K_{13}-M+H_{1.5.1}$/Same as 161 except 0.5" gap	"	"	"	"	"	"	"
165	$K_{13}-M+H_{1.0.1}$/ 10" open hub cap,no underbody,same cap vert.position as Run 154	"	"	"	"	"	"	"
166	$K_{13}-M+H_{1.0.2}$/Same as 165 with cap lowered by 0.5"	"	"	"	"	"	"	"

TABLE 2 (CONTINUED)

LIST OF TEST RUNS

EVALUATION OF WAKE-ALTERING DEVICES

RUN NO.	CONFIGURATION/CONDITION	V_{TUN} KNOTS	RPM MR/TR	DISK LDG. psf	MODEL ANGLES		MR HT.	TAIL ROTOR
					α°	ψ°	h/d	
167	K_{13}-M+$H_{1.7.1}$/16" open cap, no under-body, 2" gap	80	0/0	8	6	-3.8	∞	Off
168	K_{13}+$H_{1.7.1}$/Blades on, same cap config. as 167	"	1433/0	"	"	"	"	"
169	K_{13}+$H_{1.7.2}$/16" open cap, no under-body, 4" gap	"	"	"	"	"	"	"
170	K_{13}+$H_{1.0}$+$D_{4.0}$/Extended flat top fairing on aft crown	"	"	"	"	"	"	"
171	K_{13}+$H_{1.7.2}$+$D_{4.0}$/Same fairing as 170, same cap as 169	"	"	"	"	"	"	"
172	K_{13}+$H_{1.0}$+$E_{1.0}$(0psi)/Basic air ejector zero blowing baseline	"	"	"	"	"	"	"
173	K_{13}+$H_{1.0}$+$E_{1.0}$(40 psi)/Same as 172 with 40 psi supply	"	"	"	"	"	"	"
174	K_{13}+$H_{1.0}$+$E_{1.0}$(150 psi)/Same as 172 with 150 psi supply	"	"	"	"	"	"	"
175	K_{13}+$H_{1.0}$+$E_{2.5.1}$(40 psi)/Ejector with wide chord shroud at 40 psi	"	"	"	"	"	"	"
176	K_{13}+$H_{1.0}$+$E_{2.5.1}$(150 psi)/Same as 174 with 150 psi supply	"	"	"	"	"	"	"
177	K_{13}+$H_{1.5.4}$+$E_{2.5.1}$(150 psi)/Same as 176 with 10" cap like 163	"	"	"	"	"	"	"
178	K_{13}+$H_{1.0}$+$W_{1.0}$+$E_{1.1}$(0 psi)/Nacelle mounted wing	"	"	"	"	"	"	"

TABLE 2 (CONTINUED)

LIST OF TEST RUNS

EVALUATION OF WAKE-ALTERING DEVICES

RUN NO.	CONFIGURATION/CONDITION	V_{TUN} KNOTS	RPM MR/TR	DISK LDG. psf	MODEL ANGLES		MR HT.	TAIL ROTOR
					α°	ψ°	h/d	
179	$K_{13}+H_{1.0}+W_{2.0}+E_{1.0}$ (0 psi)/Double slotted flapped wing	80	1433/0	8	6	-3.8	∞	Off
180	$K_{13}+H_{1.0}+W_{3.0}+E_{1.0}$ (0 psi)/Single slotted flapped wing	"	"	"	"	"	"	"
181	$K_{13}+H_{1.0}+E_{1.2}$ (0 psi)/Baseline with ejector tube moved aft	"	"	"	"	"	"	"
182	$K_{13}+H_{1.9.0}+E_{1.2}$ (0 psi)/Standard 10" frisbee	"	"	"	"	"	"	"
183	$K_{13}+H_{1.9.1}+E_{1.2}$ (0 psi)/16" fabricated frisbee	"	"	"	"	"	"	"
184	$K_{13}+H_{1.0}+E_{3.5.2}$ (40 psi)/Wide chord with lip at 40 psi	"	"	"	"	"	"	"
185	$K_{13}+H_{1.0}+E_{3.5.2}$ (150 psi)/Same as 184 with 150 psi air	"	"	"	"	"	"	"
186	$K_{13}+H_{1.0}+W_{4.0}$/Boom mounted stub wing	"	"	"	"	"	"	"
187	$K_{13}+H_{1.0}+E_{3.5.4}$ (150 psi)/Like 185 with modified shroud	"	"	"	"	"	"	"
188	$K_{13}+H_{1.0}+I_1+E_{1.0}$ (0 psi)/Baseline with I_1 instr. ring	"	"	"	"	"	"	"
189	$K_{13}+H_{1.8.1}+I_1+E_{1.0}$ (0 psi)/Solid cap, 10" diam. 3.25" height	"	"	"	"	"	"	"
190	$K_{13}+H_{1.8.2}+I_1+E_{1.0}$ (0 psi)/Same as 190 except + 4.12" height	"	"	"	"	"	"	"

TABLE 2(CONTINUED)

LIST OF TEST RUNS

EVALUATION OF WAKE-ALTERING DEVICES

RUN NO.	CONFIGURATION/CONDITION	V_{TUN} KNOTS	RPM MR/TR	DISK LDG. psf	MODEL ANGLES		MR HT.	TAIL ROTOR
					α°	ψ°	h/d	
191	$K_{13}+H_{1.0.2}+I_1+E_{1.0}$ (0 psi)/10" cap, no underbody, 1.87" gap	80	1433/0	8	6	-3.8	∞	Off
193	$K_{13}+H_{1.0.2}+I_1+E_{1.0}$ (0 psi)/10" cap, no underbody, 1.25" gap	"	"	"	"	"	"	"
194	$K_{13}+H_{1.11.1}+I_2+E_{1.0}$(0 psi)/7.6" cap, underbody, 1.25" gap	"	"	"	"	"	"	"
195	$K_{13}+H_{1.11.1}+I_2+E_{1.0}$(20 psi)/Same as 194 with 20 psi air	"	"	"	"	"	"	"
196	$K_{13}+H_{1.11.1}+I_2+E_{1.0}$(40 psi)/Same as 194 with 40 psi air	"	"	"	"	"	"	"
197	$K_{13}+H_{1.11.1}+I_2+E_{1.0}$(150 psi)/Same as 194 with 150 psi air	"	"	"	"	"	"	"
198	$K_{13}+H_{1.11.1}+I_2+E_{4.0}$ (0 psi)/Same as 194 except blowing tube 2" aft	"	"	"	"	"	"	"
199	$K_{13}+H_{1.11.1}+I_2+E_{4.0}$ (40 psi)/Same as 198 with 40 psi air	"	"	"	"	"	"	"
200	$K_{13}+H_{1.11.1}+I_2+E_{4.0}$ (150 psi)/Same as 198 with 150 psi air	"	"	"	"	"	"	"
201	$K_{13}+H_{1.11.2}+I_2+E_{4.0}$ (150 psi)/Same as 200 except center support cap	"	"	"	"	"	"	"
202	$K_{13}+H_{1.11.2}+I_2$/Baseline with I_2 and no blowing tube	"	"	"	"	"	"	"
203	$K_{13}+H_{1.0}+E_{5.0}$(0 psi)/Bifurcated air duct baseline	"	"	"	"	"	"	"

TABLE 2 (CONTINUED)

LIST OF TEST RUNS

EVALUATION OF WAKE-ALTERING DEVICES

RUN NO.	CONFIGURATION/CONDITION	V_{TUN} KNOTS	RPM MR/TR	DISK LDG. psf	MODEL ANGLES		MR HT.	TAIL ROTOR
					α°	ψ°	h/d	
204	$K_{13}+H_{1.0}+E_{5.0}$ (150 psi)/Bifurcated duct with 150 psi air	80	1433/0	8	6	-3.8	∞	Off
205	$K_{13}+H_{1.0}+E_{5.0}$ (40 psi)/Same as 204 with 40 psi air	"	"	"	"	"	"	"
207	$K_{13}+H_{1.2.1}+I_1+E_{1.0}$ (0 psi)/7.6" solid cap, no gap	"	"	"	"	"	"	"
208	$K_{13}+H_{1.2.2}+I_1+E_{1.0}$ (0 psi)/Same as 207 except 0.55" gap	"	"	"	"	"	"	"
210	$K_{13}+H_{1.15.1}+I_1+E_{1.0}$ (0 psi)/Repeat of 189	"	"	"	"	"	"	"
211	$K_{13}+H_{1.14.1}+I_1+E_{1.0}$ (0 psi)/Like 189 and 210 except cap is open	"	"	"	"	"	"	"

TABLE 3

INDEX TO RAKE POSITIONS

RUN NUMBER	TEST POINT	WATER LINE	MODEL STATION	BUTT LINE	LOCATION FIGURE
111	20	53.5	103.1	-7.25	1
	21	"	"	"	
	22	"	105.0	"	
	24	"	107.0	"	
	26	"	109.0	"	
	28	"	111.0	"	
	30	"	112.9	"	
	32	"	114.9	"	
	34	"	116.9	"	
	36	"	118.9	"	
112	2	48.9	107.3	-7.25	1
	4	50.8	"	"	
	6	52.7	103.3	"	
	8	54.5	"	"	
	10	56.2	"	"	
	12	57.2	"	"	
113	2	51.7	103.3	-3.25	1
	4	52.3	"	"	
	6	52.8	"	"	
	8	53.3	"	"	
	10	53.9	"	"	
	11	53.3	"	"	
114	2	44.5	103.0	-3.25	1
	4	46.4	"	"	
	6	48.2	"	"	
	8	50.0	"	"	
	10	51.9	"	"	
115	3	52.9	124.7	-3.25	1
	4	52.0	"	"	
	6	50.0	"	"	
	9	48.0	"	"	
	10	46.0	"	"	
	12	44.1	"	"	
	14	42.1	"	"	
	16	53.0	"	"	
	18	54.0	"	"	
	20	55.0	"	"	

TABLE 3 (CONTINUED)

INDEX TO RAKE POSITIONS

RUN NUMBER	TEST POINT	WATER LINE	MODEL STATION	BUTT LINE	LOCATION FIGURE
116	7	36.9	100.5	-17.5	1
117	2	37.6	100.5	-16.0	1
	4	"	"	-14.0	
	6	37.3	99.6	-12.0	
	8	"	"	-10.0	
	10	"	"	- 8.0	
118	2	37.6	100.5	- 6.0	1
119	2	37.3	99.6	+ 6.0	1
	5	"	"	8	
	8	"	"	10	
	9	"	"	"	
	14	"	"	14	
	16	"	"	16	
	20	51.5	102.5	17.5	
	25	52.3	101.7	-17.5	
121	3	62.9	129.0	+ 5.7	2
	4	53.5	"	"	
	6	50.1	"	"	
	8	46.0	"	"	
	10	42.1	"	"	
135	2	56.9	106.3	- 5.7	3
	4	54.5	"	"	
	6	52.5	"	"	
	8	50.5	"	"	
	10	48.5	"	"	
	12	46.5	"	"	
	14	44.5	"	"	
136	2	56.5	104.0	- 8.0	4
	4	54.5	"	"	
	6	52.5	"	"	
	8	50.6	"	"	
	10	48.5	"	"	
	12	46.5	"	"	
	14	44.5	"	"	
	17	37.1	"	"	
	18	39.0	"	"	
	19	41.0	"	"	

79 01 22 056

TABLE 3 (CONTINUED)

INDEX TO RAKE POSITIONS

RUN NUMBER	TEST POINT	WATER LINE	MODEL STATION	BUTT LINE	LOCATION FIGURE
137	3	38.7	98.4	- 8.0	5
	5	39.9	"	"	
	7	42.0	100.5	"	
	9	44.0	"	"	
	11	46.0	103.6	"	
	13	48.0	"	"	
	15	50.0	"	"	
	17	52.0	"	"	
	19	54.0	"	"	
138-41, 143	2	38.8	98.4	- 8.0	5
	3	40.0	"	"	
	4	42.0	100.5	"	
	5	44.0	"	"	
	6	46.0	103.6	"	
	7	48.0	"	"	
	8	50.0	"	"	
	9	52.0	"	"	
	10	54.0	"	"	
142	7	37.8	98.4	- 8.0	5
	8	"	"	"	
	9	40.2	"	"	
	10	42.0	100.5	"	
	11	44.0	"	"	
	12	46.0	103.6	"	
	13	48.0	"	"	
	14	50.0	"	"	
	15	52.0	"	"	
	16	54.0	"	"	
	17	56.8	"	"	

TABLE 3 (CONTINUED)

INDEX TO RAKE POSITIONS

RUN NUMBER	TEST POINT	WATER LINE	MODEL STATION	BUTT LINE	LOCATION FIGURE
149-151	2	38.8	98.5	- 8.0	5
	3	40.0	"	"	
	4	42.0	100.6	"	
	5	44.0	"	"	
	6	46.0	103.5	"	
	7	48.0	"	"	
	8	50.0	"	"	
	9	52.0	"	"	
	10	54.0	"	"	
152-6, 158	2	42.9	97.9	0.0	6
161-4, 166	3	44.9	"	"	
167, 169-71	4	46.9	100.6	"	
175, 177-9	5	48.9	"	"	
180,182,184	6	50.9	104.6	"	
186-8, 190	7	52.9	"	"	
191,193,194	8	54.9	"	"	
196,198,201	9	56.9	"	"	
204,207,208					
211					
159	1	54.9	104.6	0.0	6
	2	52.9	"	"	
	3	50.7	"	"	
	4	48.6	100.6	"	
	5	46.7	"	"	
160,203	5	42.9	97.9	0.0	6
	6	44.9	"	"	
	7	46.9	100.6	"	
	8	48.9	"	"	
	9	50.9	104.6	"	
	10	52.9	"	"	
	11	54.9	"	"	
165	3	44.9	97.9	0.0	6
	4	42.9	"	"	
	5	46.9	100.6	"	
	6	48.9	"	"	
	7	50.9	104.6	"	
	8	52.9	"	"	

TABLE 3 (CONTINUED)

INDEX TO RAKE POSITIONS

RUN NUMBER	TEST POINT	WATER LINE	MODEL STATION	BUTT LINE	LOCATION FIGURE
168, 183	4	42.9	97.9	0.0	6
	5	44.9	"	"	
	6	46.9	100.6	"	
	7	48.9	"	"	
	8	50.9	104.6	"	
	9	52.9	"	"	
	10	54.9	"	"	
172	3	42.9	97.9	0.0	6
	4	44.9	"	"	
	6	44.9	"	"	
	7	46.9	100.6	"	
	8	48.9	"	"	
	9	50.9	104.6	"	
	10	52.9	"	"	
	11	54.9	"	"	
173,174,176	1	42.9	97.9	0.0	6
185,195,197	2	44.9	"	"	
199,200,205	3	46.9	100.6	"	
210	4	48.9	"	"	
	5	50.9	104.6	"	
	6	52.9	"	"	
	7	54.9	"	"	
181	2	42.9	97.9	0.0	6
	3	44.9	"	"	
	4	46.9	100.6	"	
	5	48.9	"	"	
	6	50.9	104.6	"	
	7	52.9	"	"	
	9	54.9	"	"	
	10	"	"	"	
	11	"	"	"	
	12	"	"	"	
	13	42.9	97.9	"	

TABLE 3 (CONTINUED)

INDEX TO RAKE POSITIONS

RUN NUMBER	TEST POINT	WATER LINE	MODEL STATION	BUTT LINE	LOCATION FIGURE
189	29	42.9	97.9	0.0	6
	30	44.9	"	"	
	31	46.9	100.6	"	
	32	48.9	"	"	
	33	"	"	"	
	34	50.9	104.6	"	
	35	"	"	"	
	36	48.9	100.6	"	
	37	50.9	104.6	"	
	38	52.9	"	"	
	39	54.9	"	"	
202	3	43.4	97.9	0.0	6
	4	44.9	"	"	
	5	46.9	100.6	"	
	6	48.9	"	"	
	7	50.9	104.6	"	

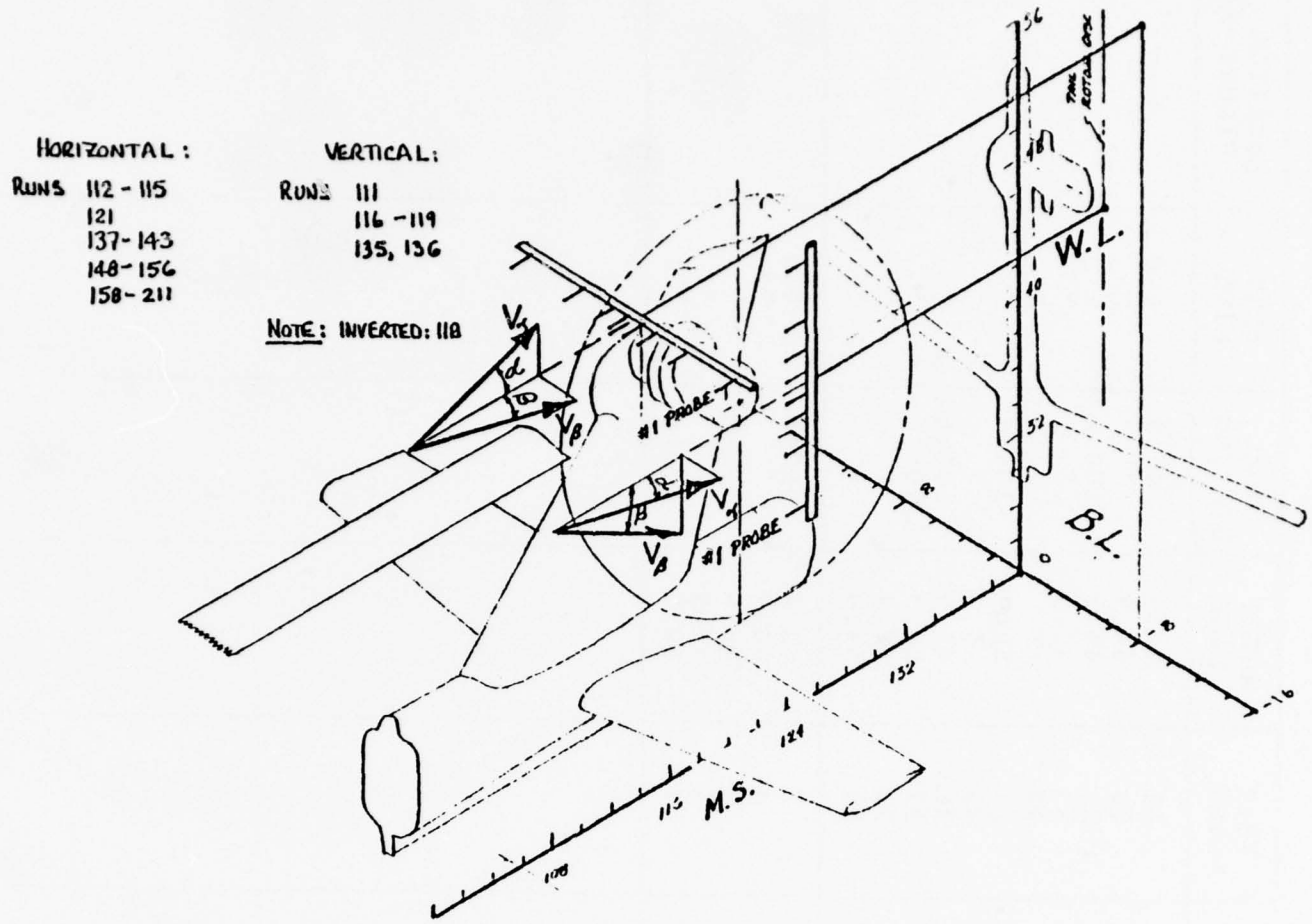


FIGURE 1 - RAKE ORIENTATION DIAGRAM

RUN 121

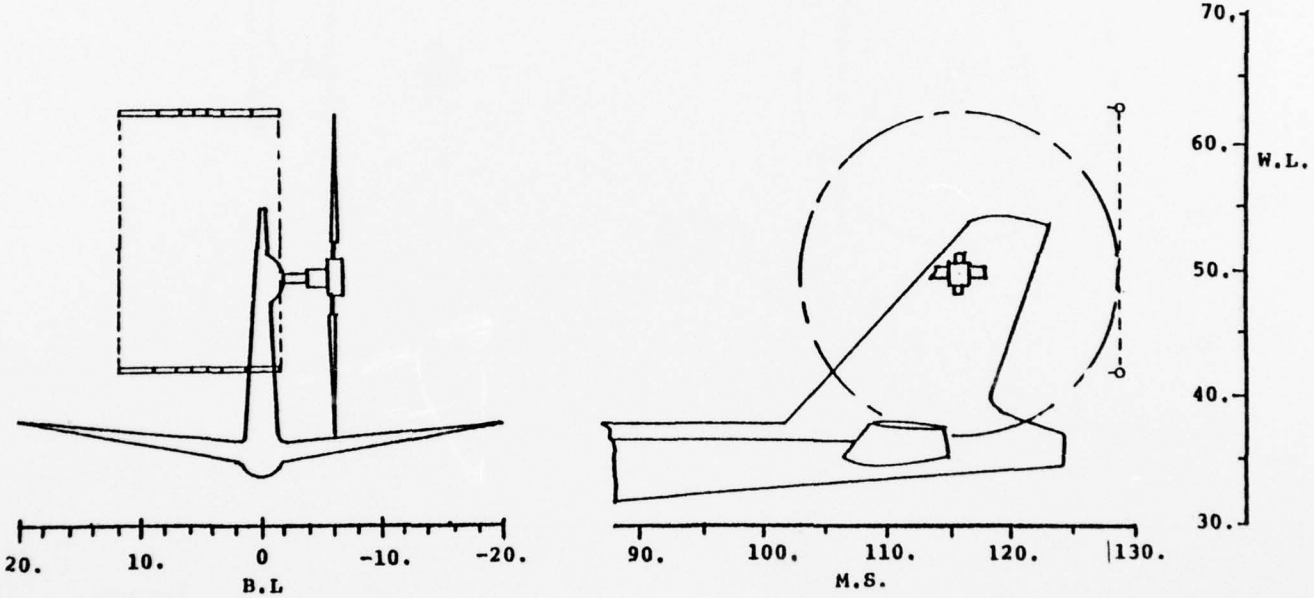


FIGURE 2 -HOT FILM RAKE LOCATIONS

RUN 135

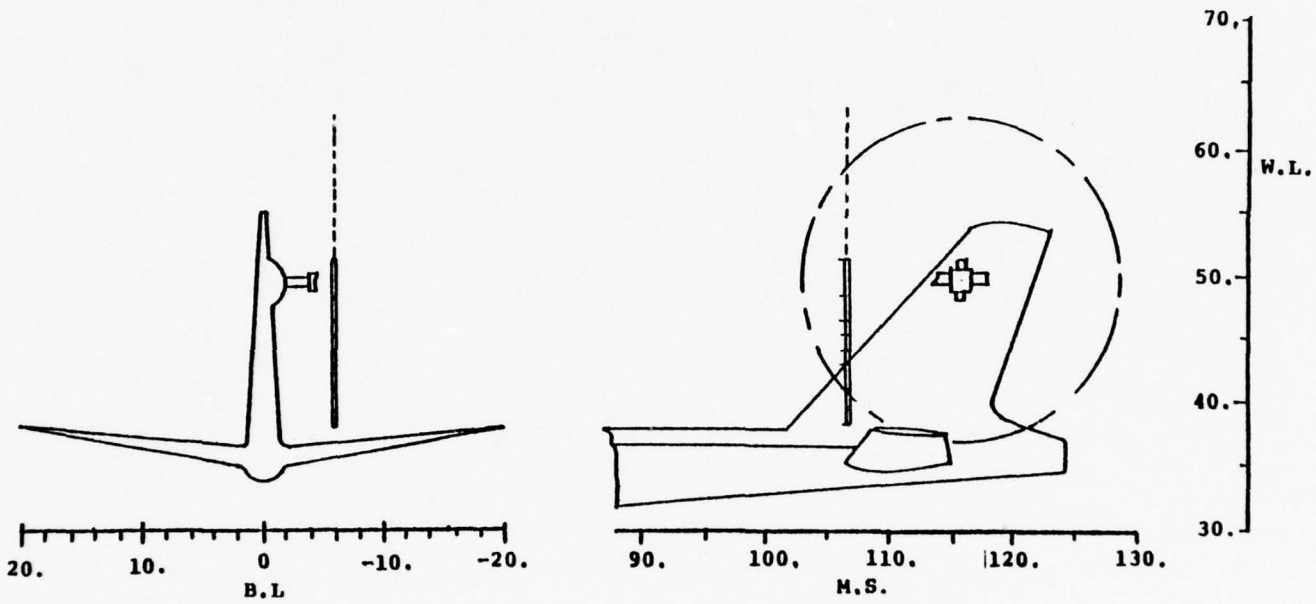


FIGURE 3 -HOT FILM RAKE LOCATIONS

RUN 136

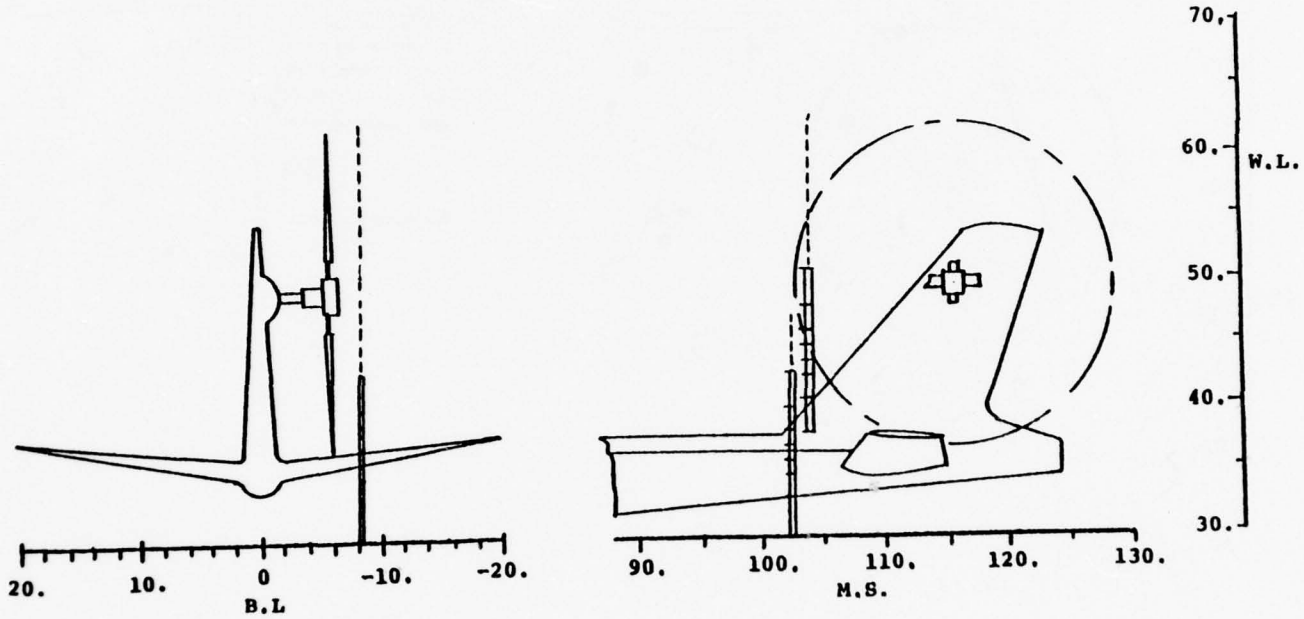


FIGURE 4 -HOT FILM RAKE LOCATIONS

RUN 137, 138, 139, 140, 141, 142,
143, 148, 149, 150, 151

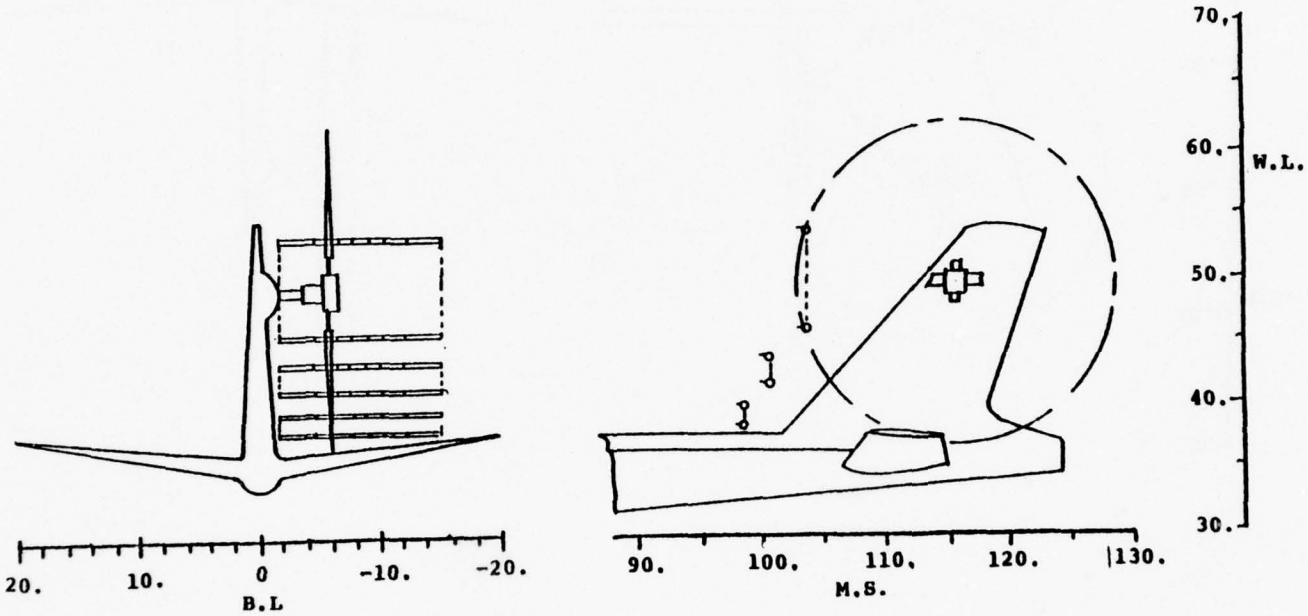


FIGURE 5 -HOT FILM RAKE LOCATIONS

RUN 152-156, 158-211

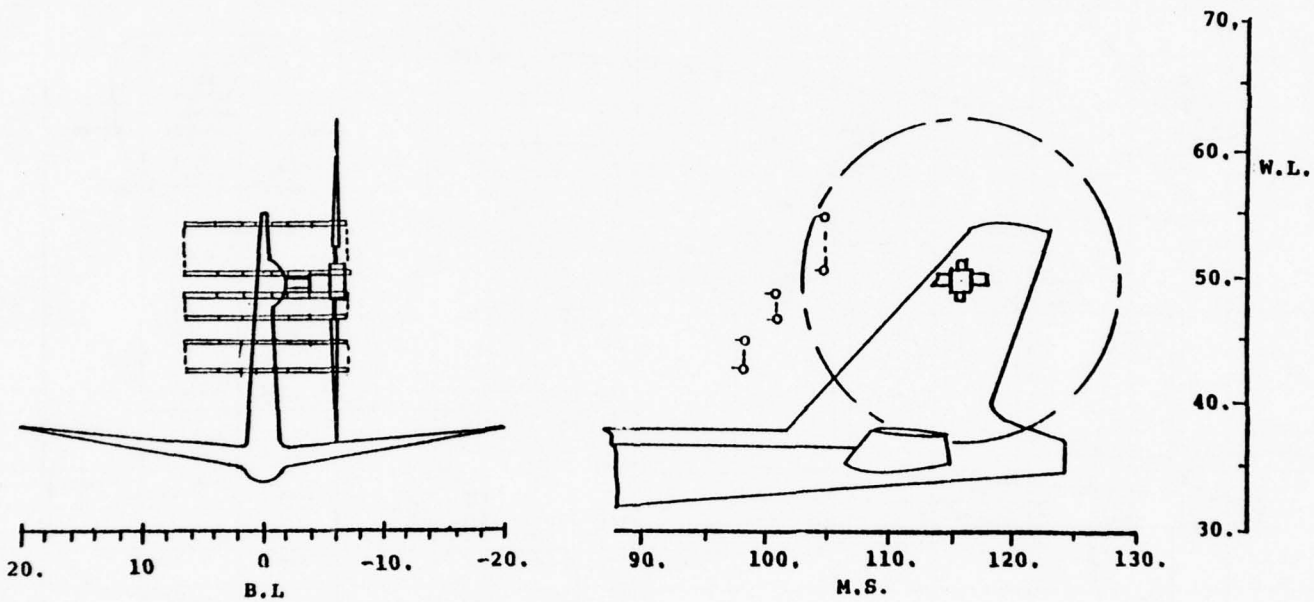


FIGURE 6 -HOT FILM RAKE LOCATIONS

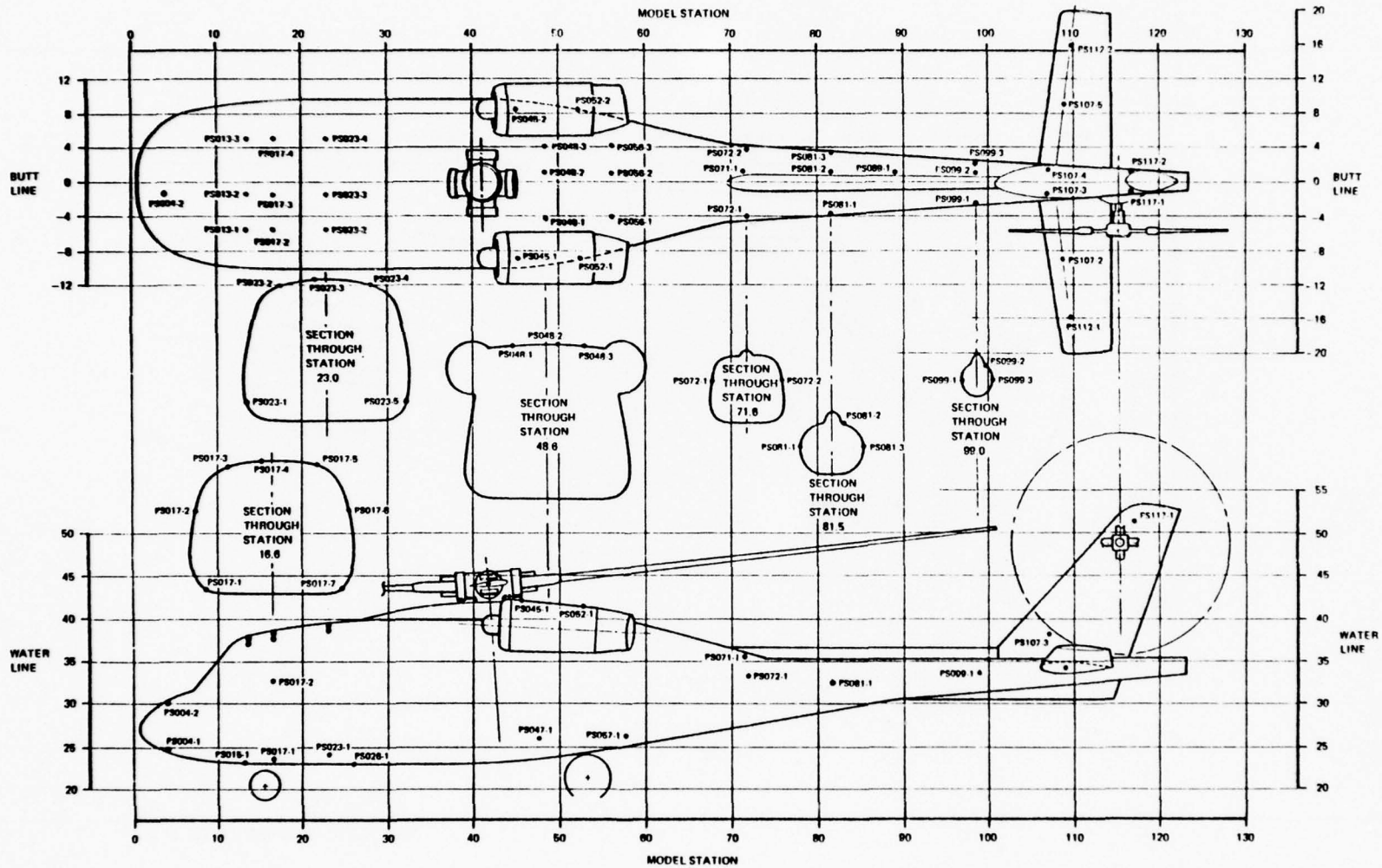
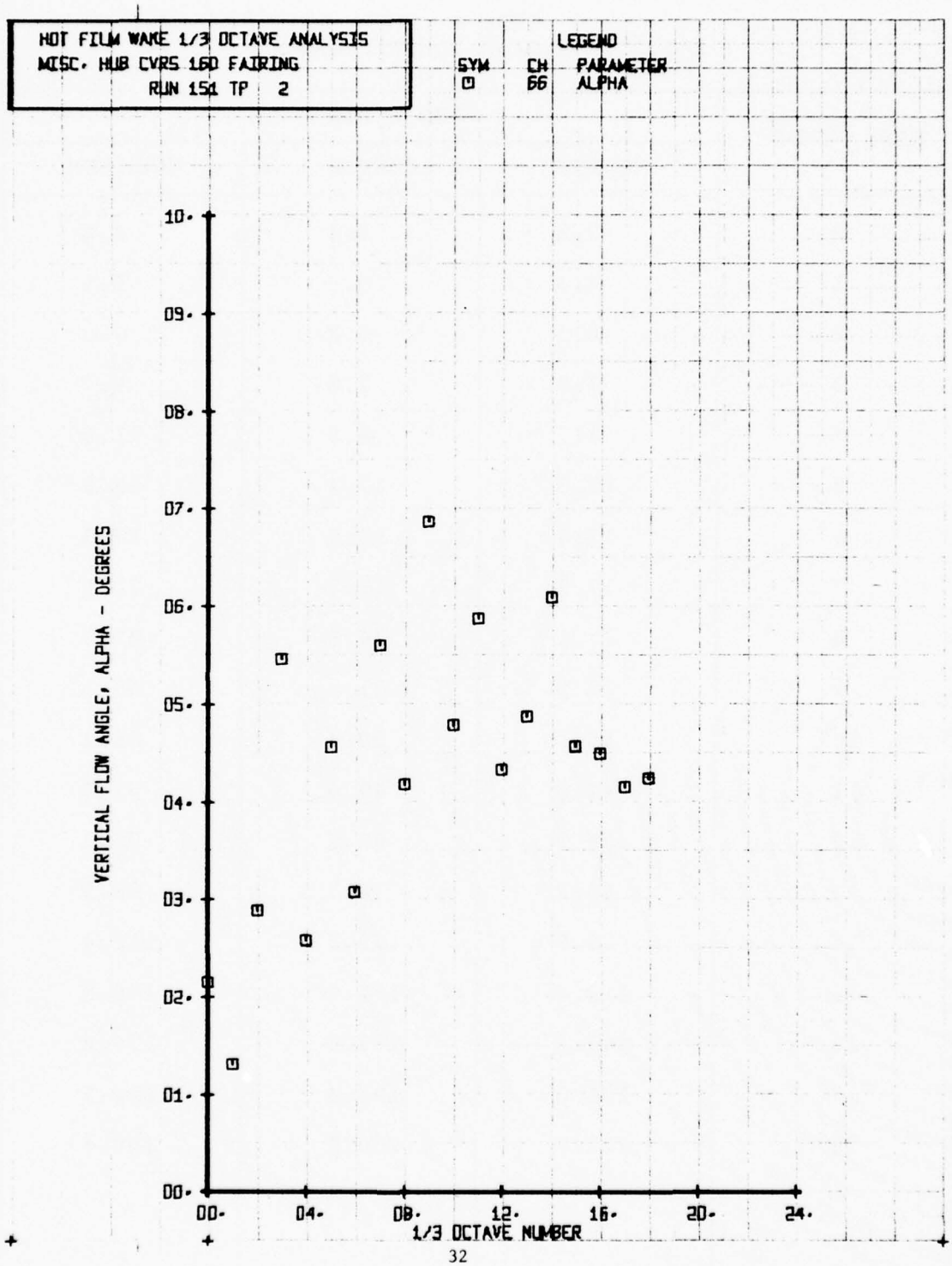
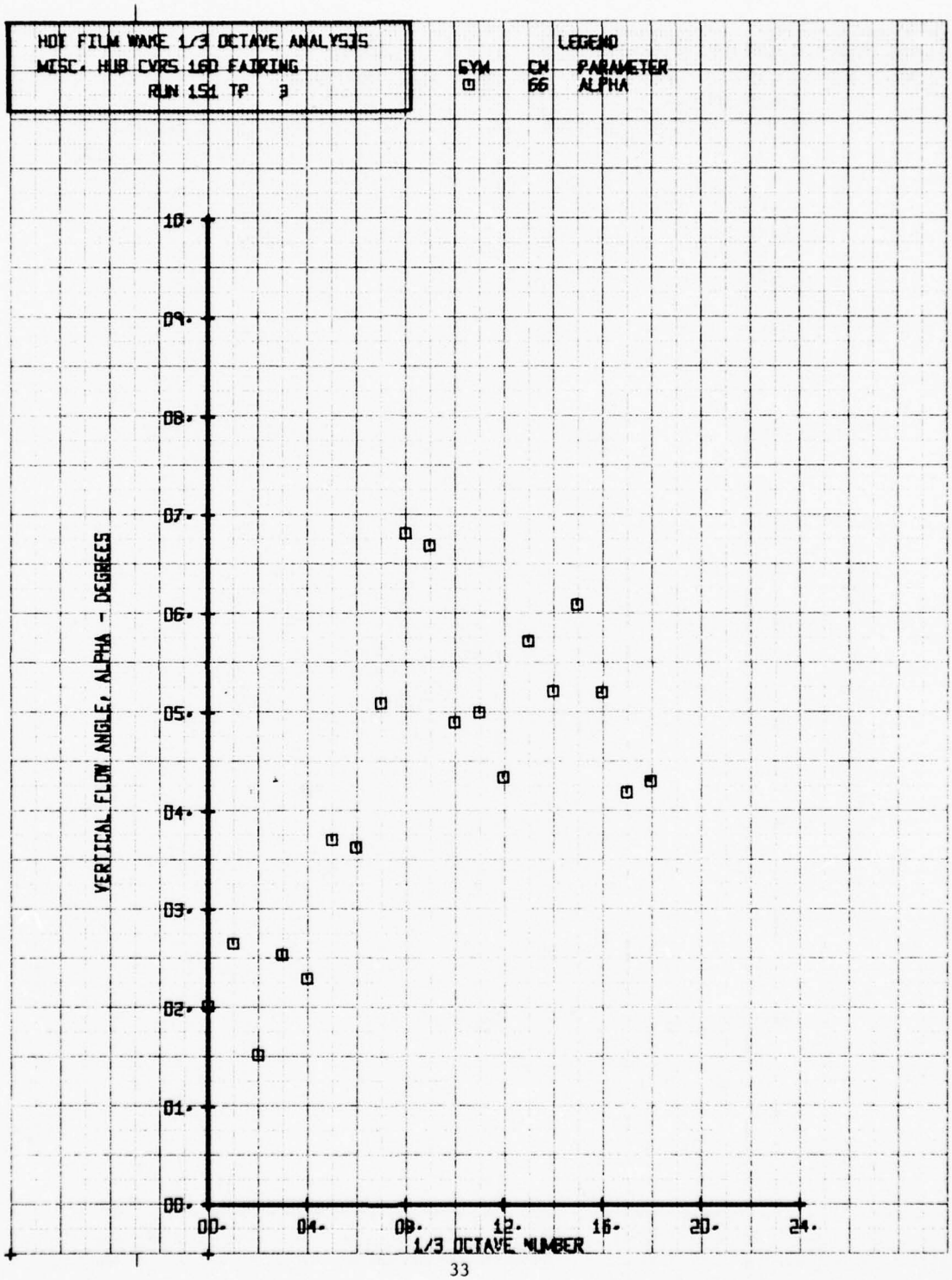


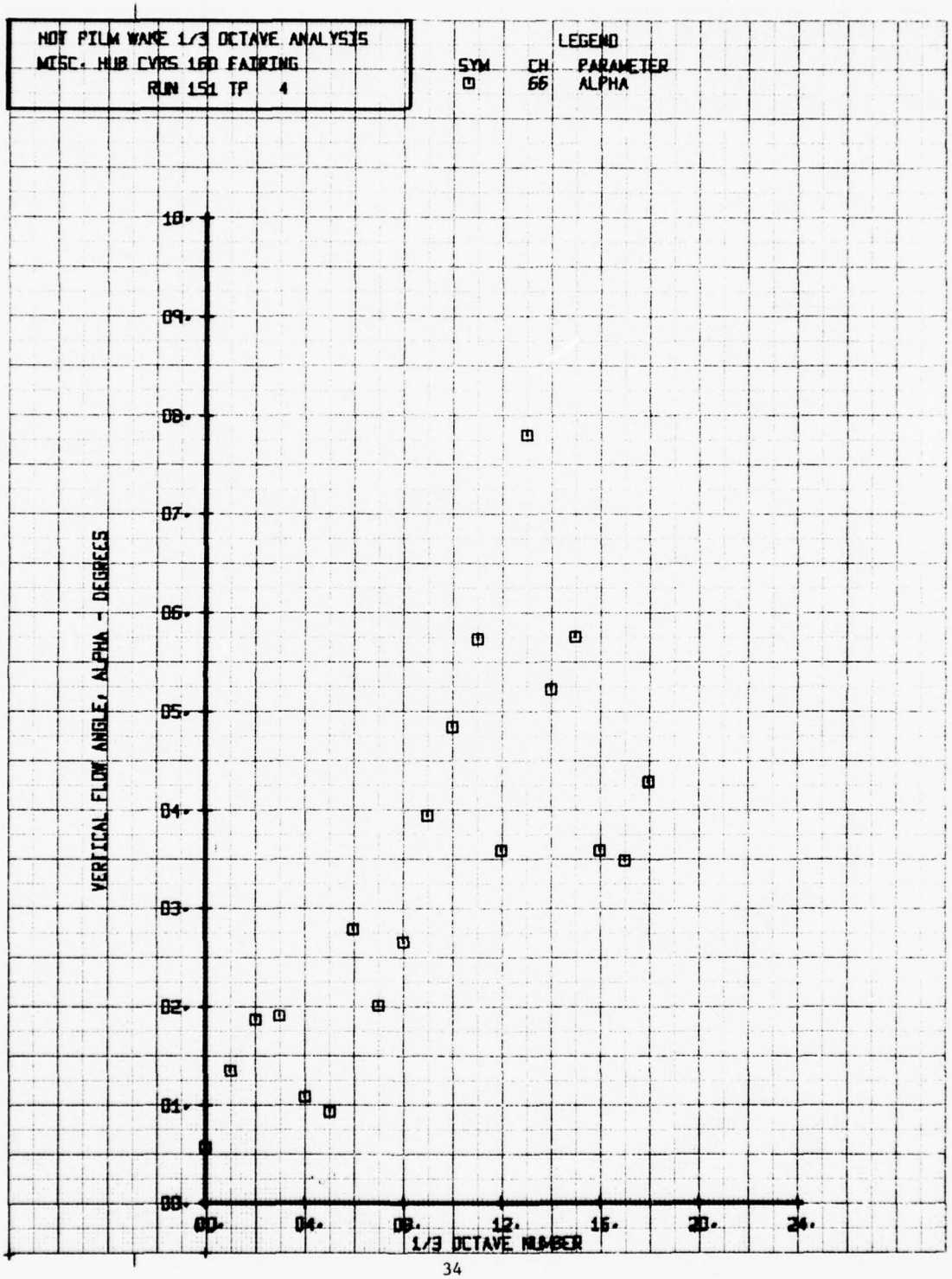
FIGURE 7 -1/4.85 SCALE MODEL GEOMETRY AND SURFACE PRESSURE TRANSDUCER LOCATIONS

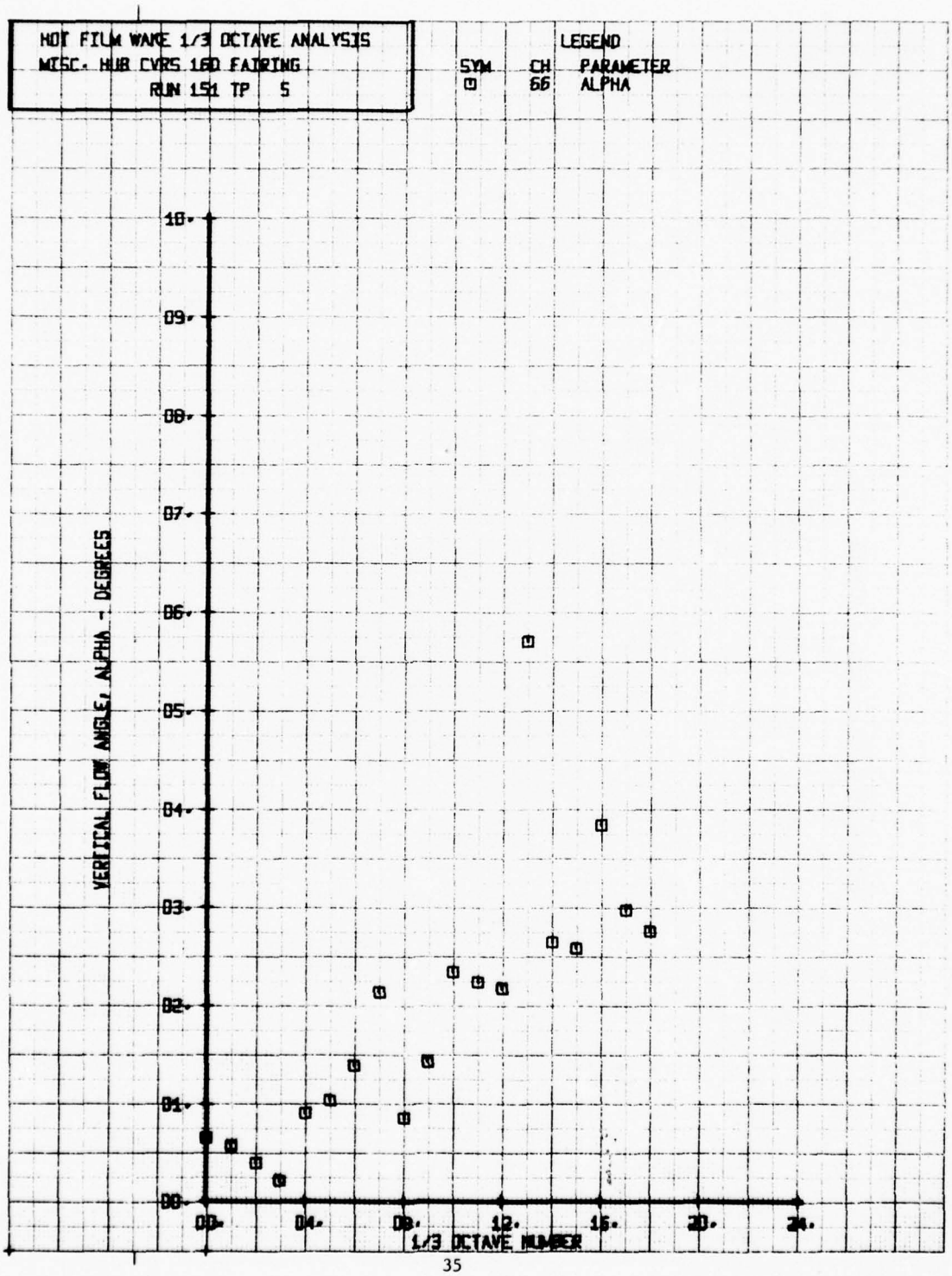
TABLE 4
1/3 OCTAVE BAND IDENTIFICATION

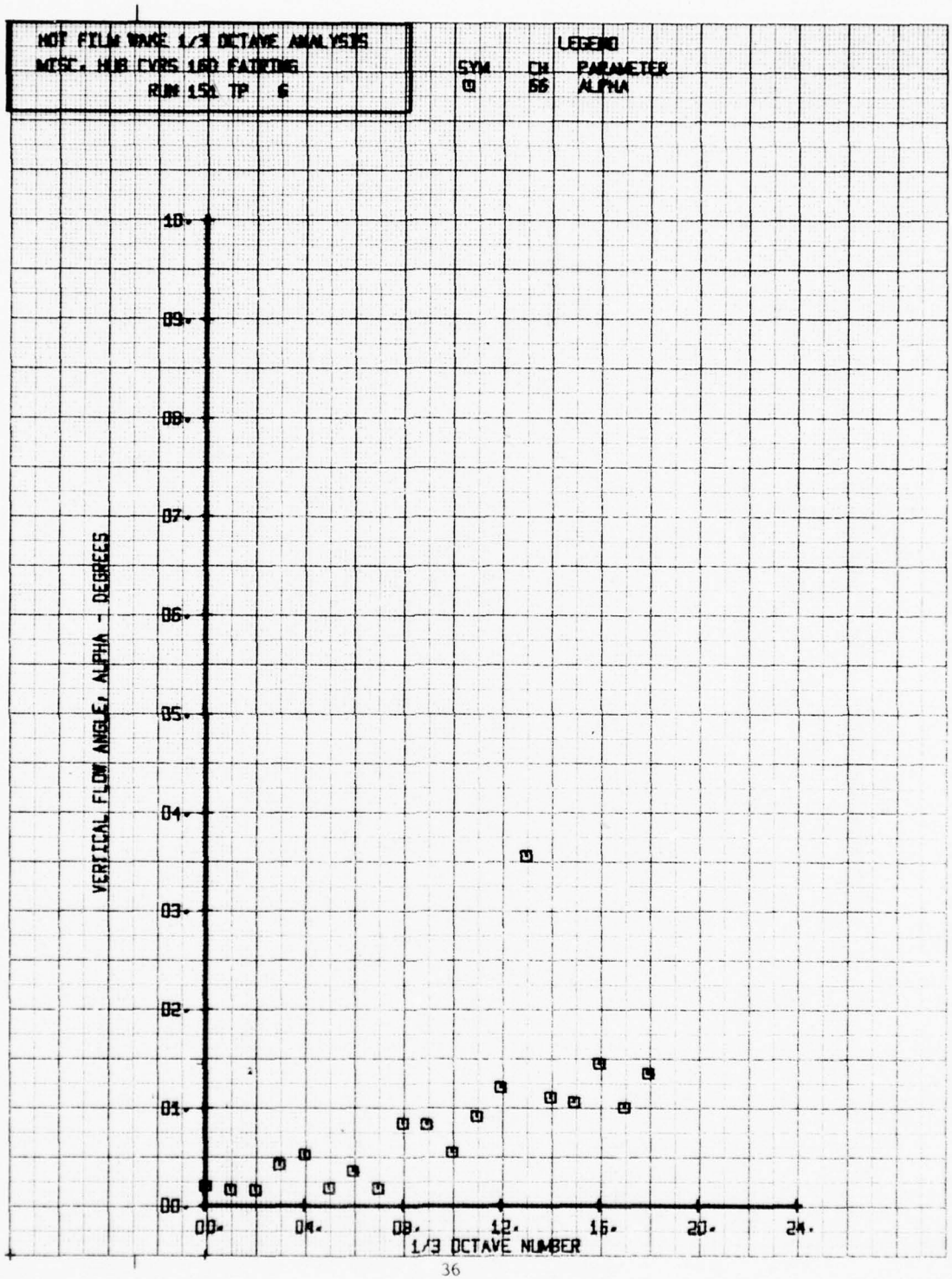
BAND NUMBER	BAND WIDTH - Hz		
	MINIMUM	CENTER	MAXIMUM
0	3.5	3.4	4.4
1	4.4	4.9	5.5
2	5.5	6.2	7.0
3	7.0	7.8	8.7
4	8.7	9.8	11.0
5	11.0	12.4	13.9
6	13.4	15.6	17.5
7	17.5	19.7	22.1
8	22.1	24.8	27.8
9	27.8	31.25	35.1
10	35.1	39.4	44.2
11	44.2	49.6	55.7
12	55.7	62.5	70.2
13	70.2	78.7	88.9
14	88.9	99.2	111.4
15	111.4	125.0	140.3
16	140.3	157.5	176.8
17	176.8	198.4	222.7
18	222.7	250.0	280.6

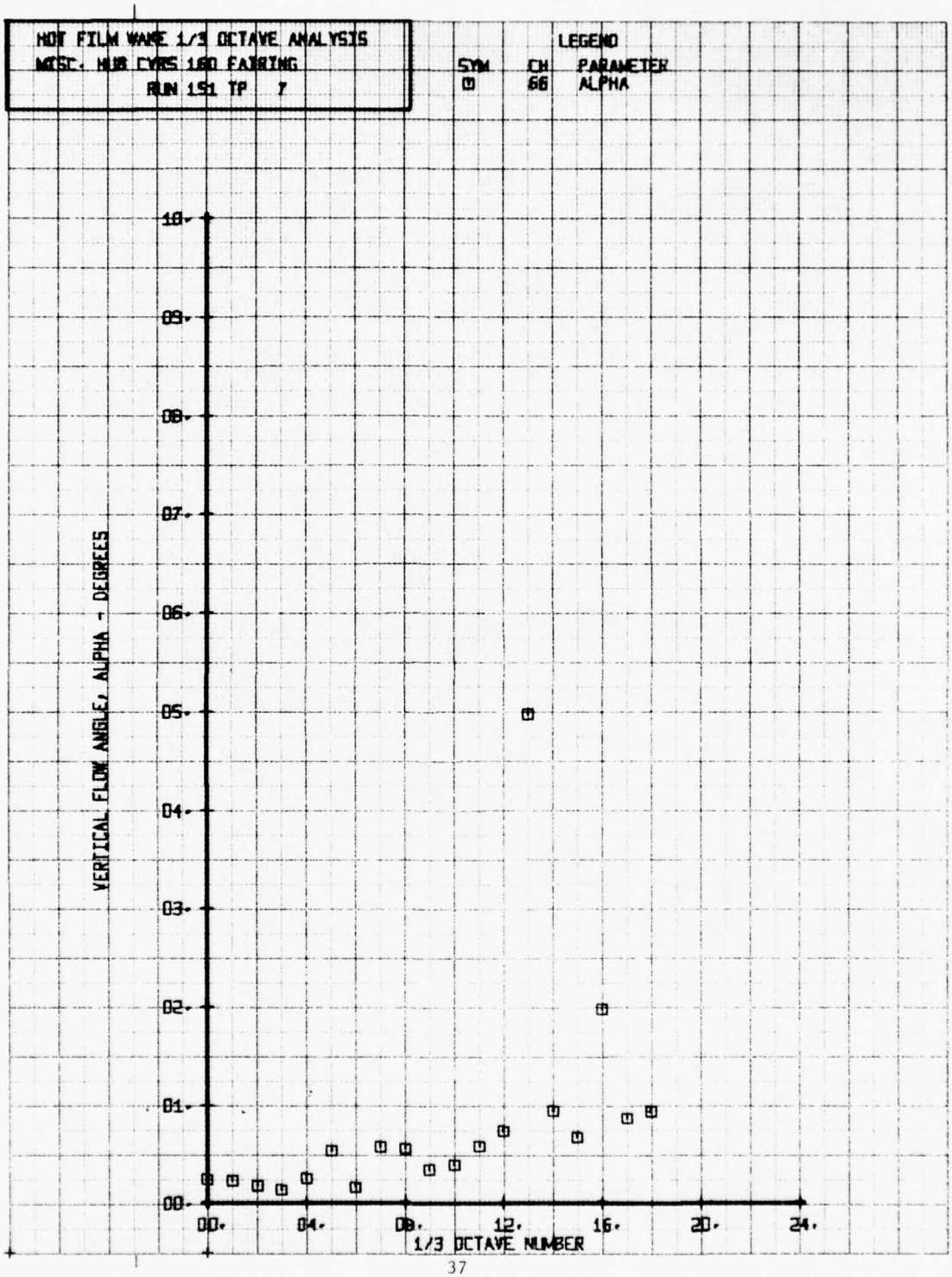

HOT FILM WAKE 1/3 OCTAVE ANALYSIS
MISC. HUB CVRS 160 FAIRING
RUN 151 TP 2
LEGEND
SYM CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
10.
09.
08.
07.
06.
05.
04.
03.
02.
01.
00.
00.
04.
08.
12.
16.
20.
24.
1/3 OCTAVE NUMBER

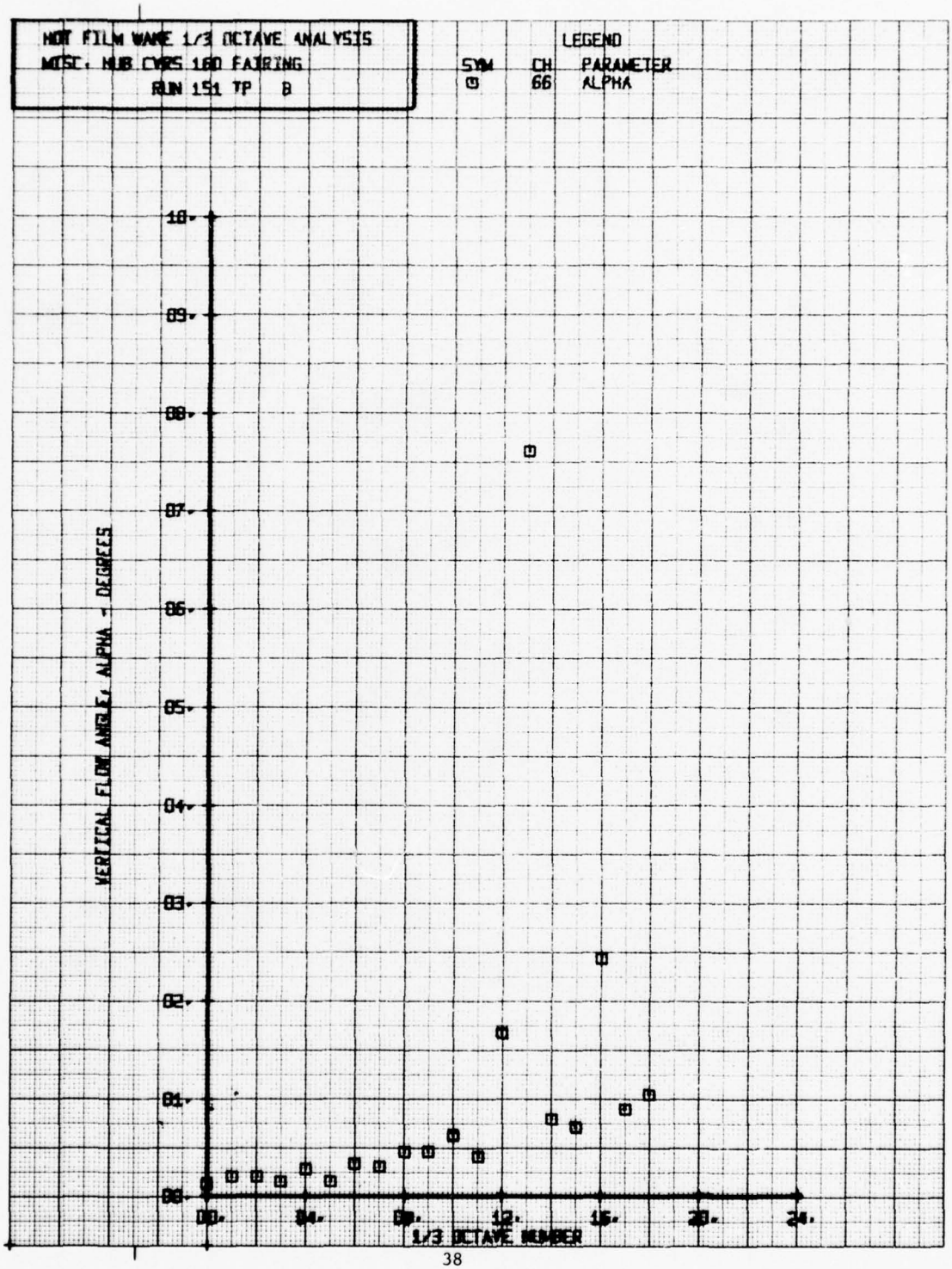

HOT FILM WAKE 1/3 OCTAVE ANALYSIS
MISC. HUB CVRS 16D FAIRING
RUN 151 TP 3
LEGEND
SYM CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
1/3 OCTAVE NUMBER
10.
09.
08.
07.
06.
05.
04.
03.
02.
01.
00.
00.
04.
08.
12.
16.
20.
24.

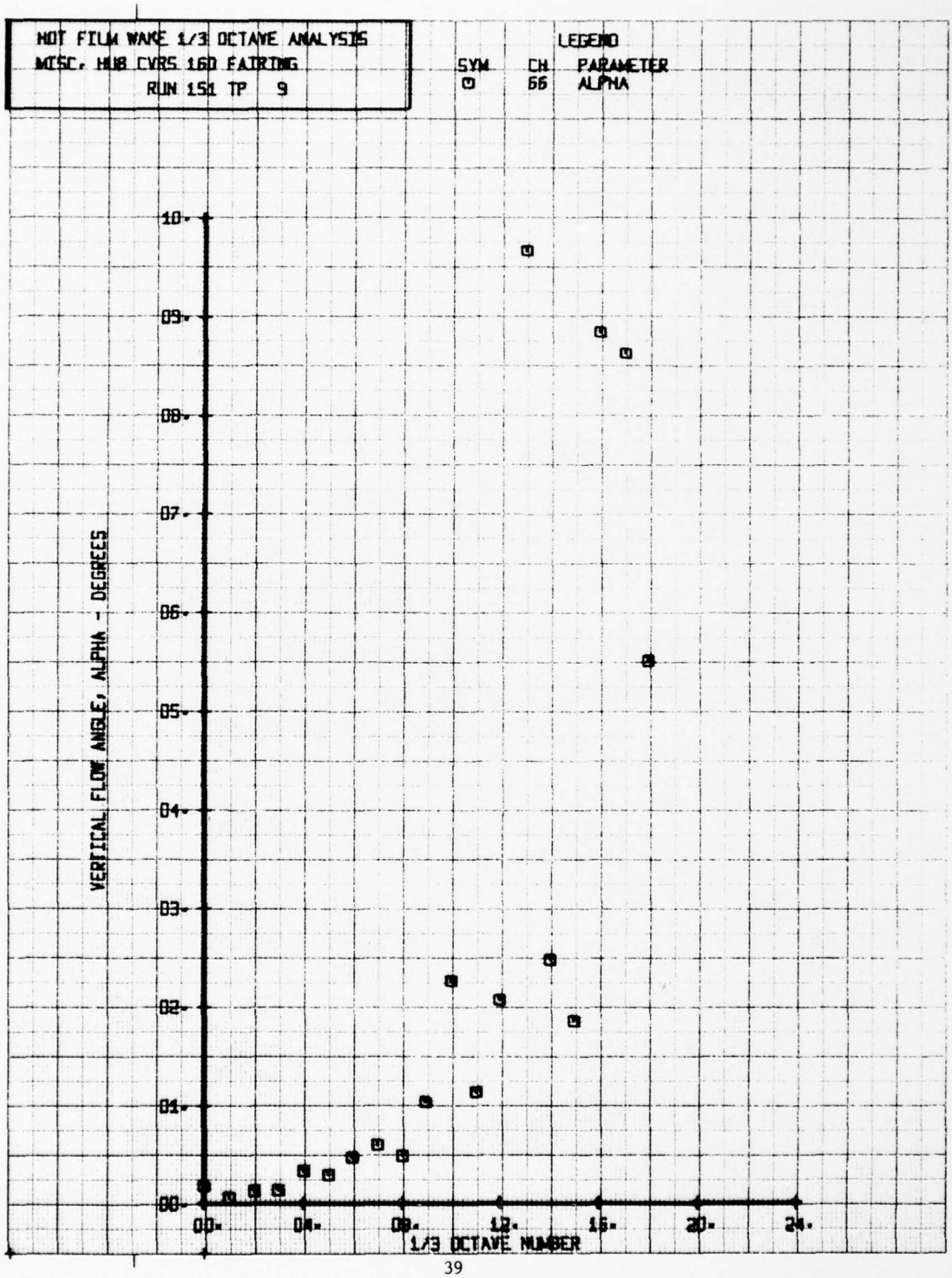

HOT FILM WAKE 1/3 OCTAVE ANALYSIS
MISC. HUB CVRS 160 FAIRING
RUN 151 TP 4
LEGEND
SYM CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
10.
09.
08.
07.
06.
05.
04.
03.
02.
01.
00.
00.
04.
08.
12.
16.
20.
24.
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
MISC. HUB CVRS 160 FAIRING
RUN 151 TP 5
LEGEND
SYM CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
1/3 OCTAVE NUMBER
10.
09.
08.
07.
06.
05.
04.
03.
02.
01.
00.
00.
04.
08.
12.
16.
20.
24.


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
MISC. HUB CVRS 160 FAIRING
RUN 151 TP 6
LEGEND
SYM CH PARAMETER
56 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
10.
09.
08.
07.
06.
05.
04.
03.
02.
01.
00.
00.
04.
08.
12.
16.
20.
24.
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
MISC. HUB CYRS 160 FAIRING
RUN 151 TP 7
LEGEND
SYM CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
10.
09.
08.
07.
06.
05.
04.
03.
02.
01.
00.
00.
04.
08.
12.
16.
20.
24.
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
MISC. HUB CYRS 160 FAIRING
RUN 151 TP B
LEGEND
SYM CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
MISC. HUB CVRS 160 FAIRING
RUN 151 TP 9
LEGEND
SYM CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
1/3 OCTAVE NUMBER
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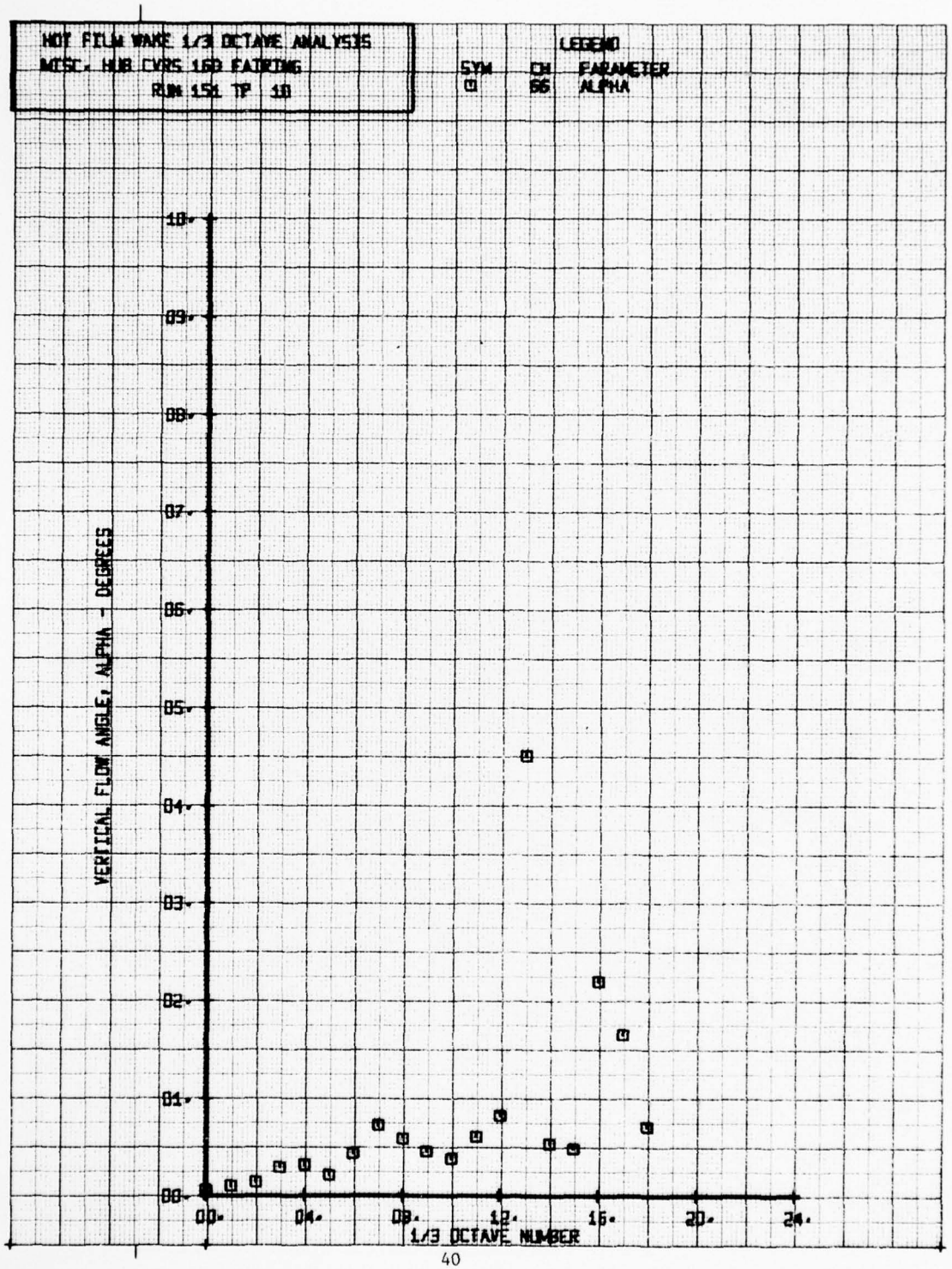
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
MISC. HUB CVRS 1&D FAIRING
RUN 151 TP 10
LEGEND
SYM CH PARAMETER
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VERTICAL FLOW ANGLE, ALPHA - DEGREES
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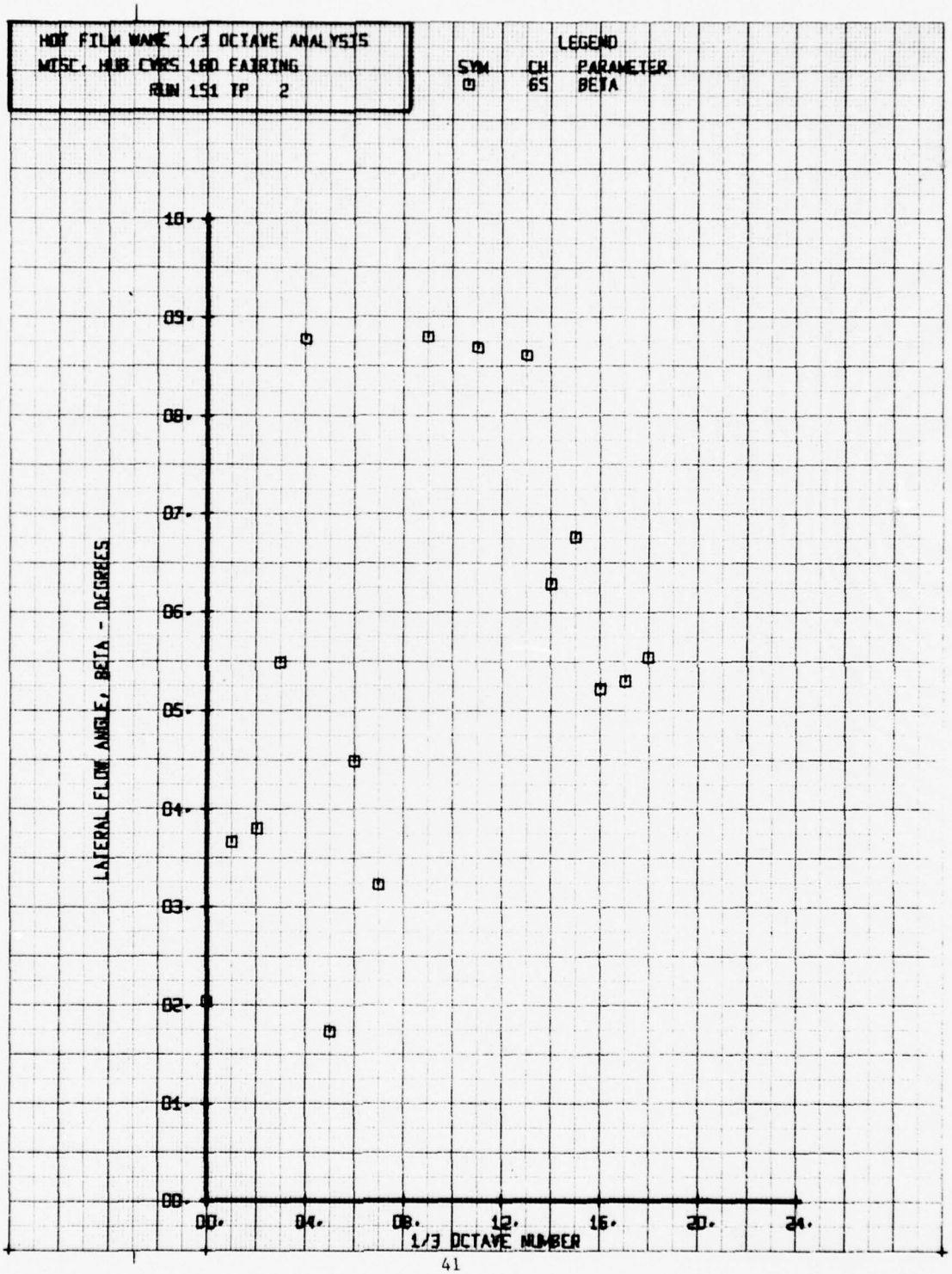
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
MISC. HUB CVRS 180 FAIRING
RUN 151 TP 2
LEGEND
SYM CH PARAMETER
65 BETA
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LATERAL FLOW ANGLE, BETA - DEGREES
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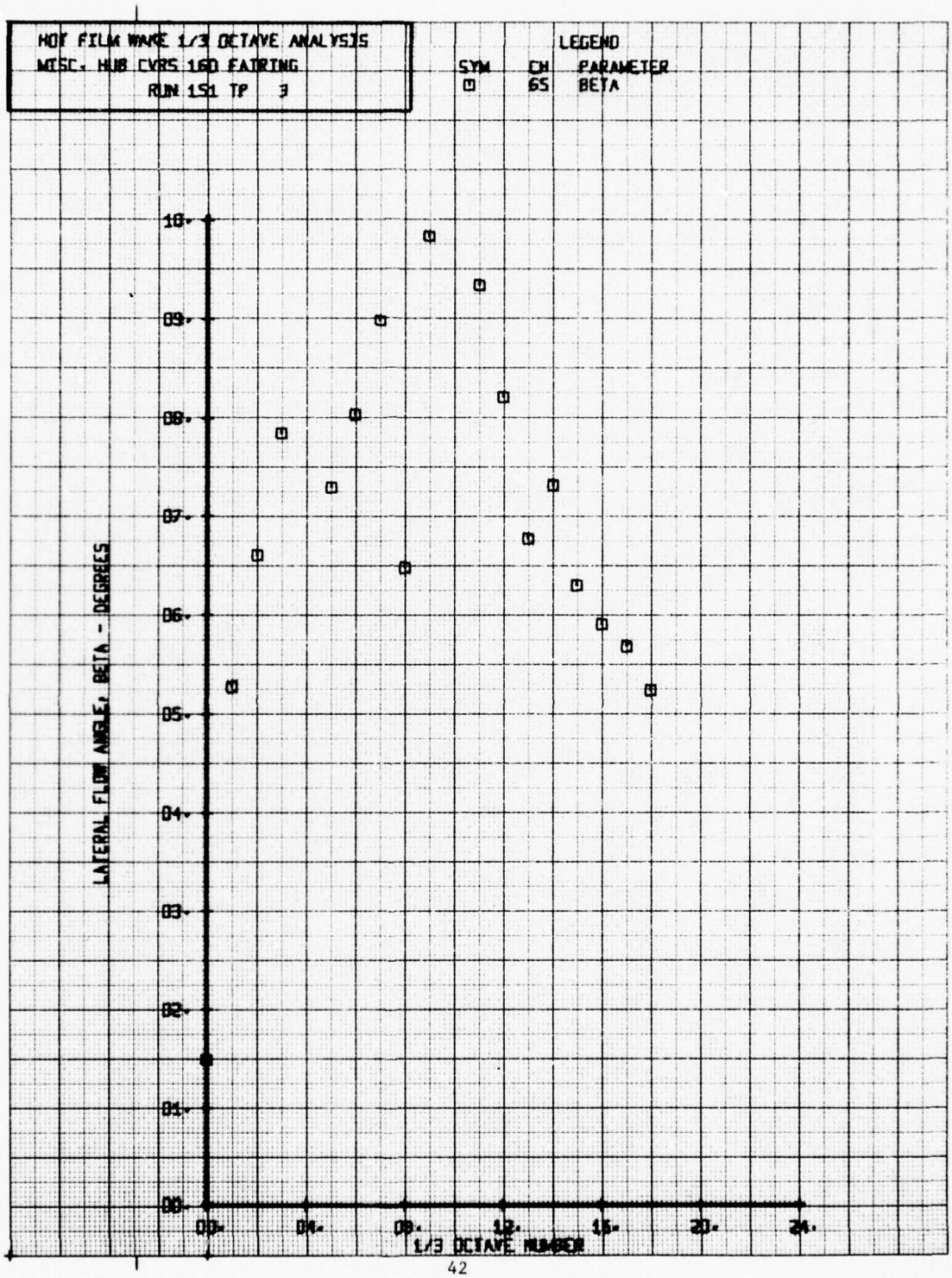
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
MISC. HUB CVRS 160 FAIRING
RUN 151 TP 3
LEGEND
SYM CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
1/3 OCTAVE NUMBER
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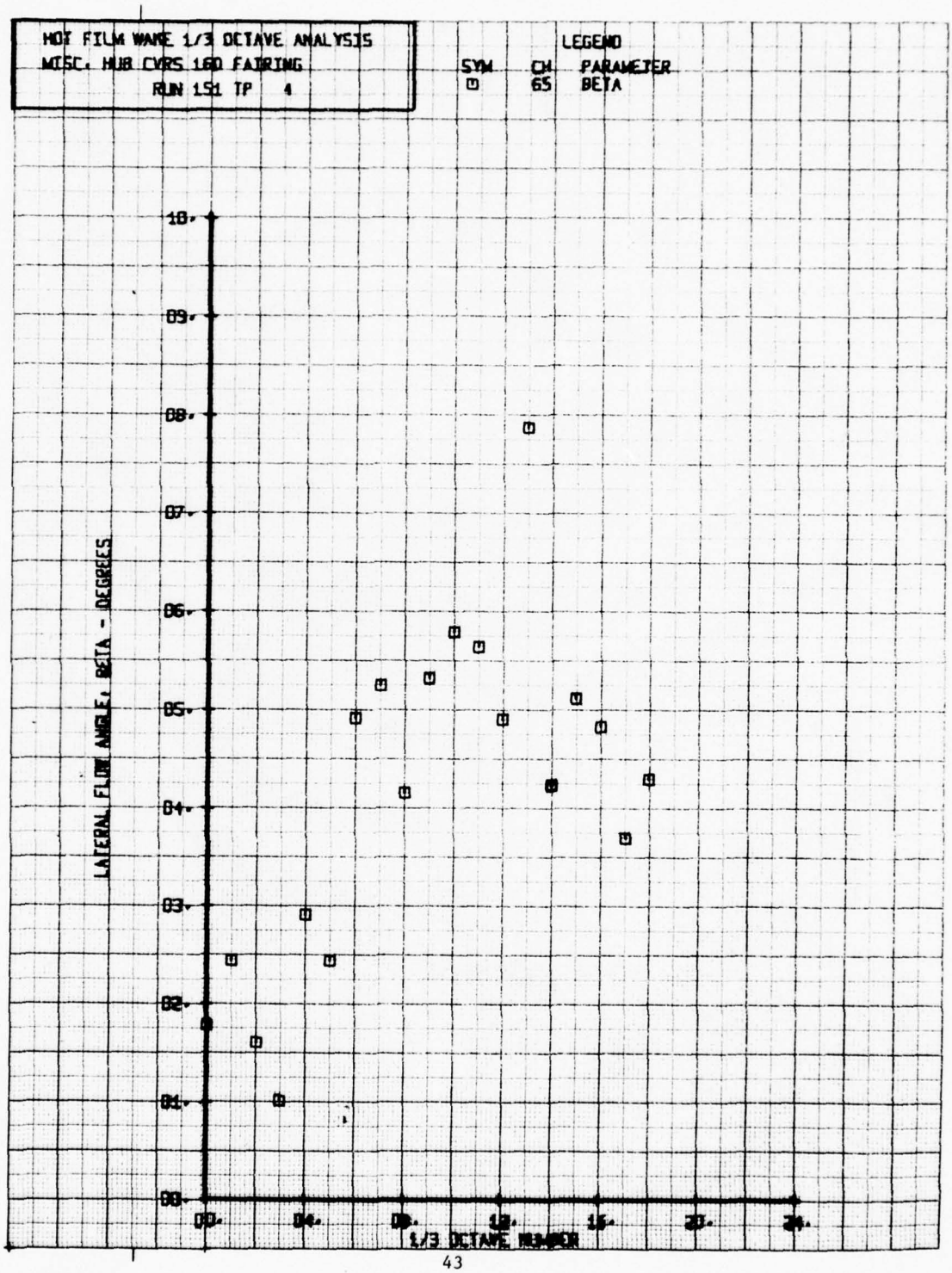
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LEGEND
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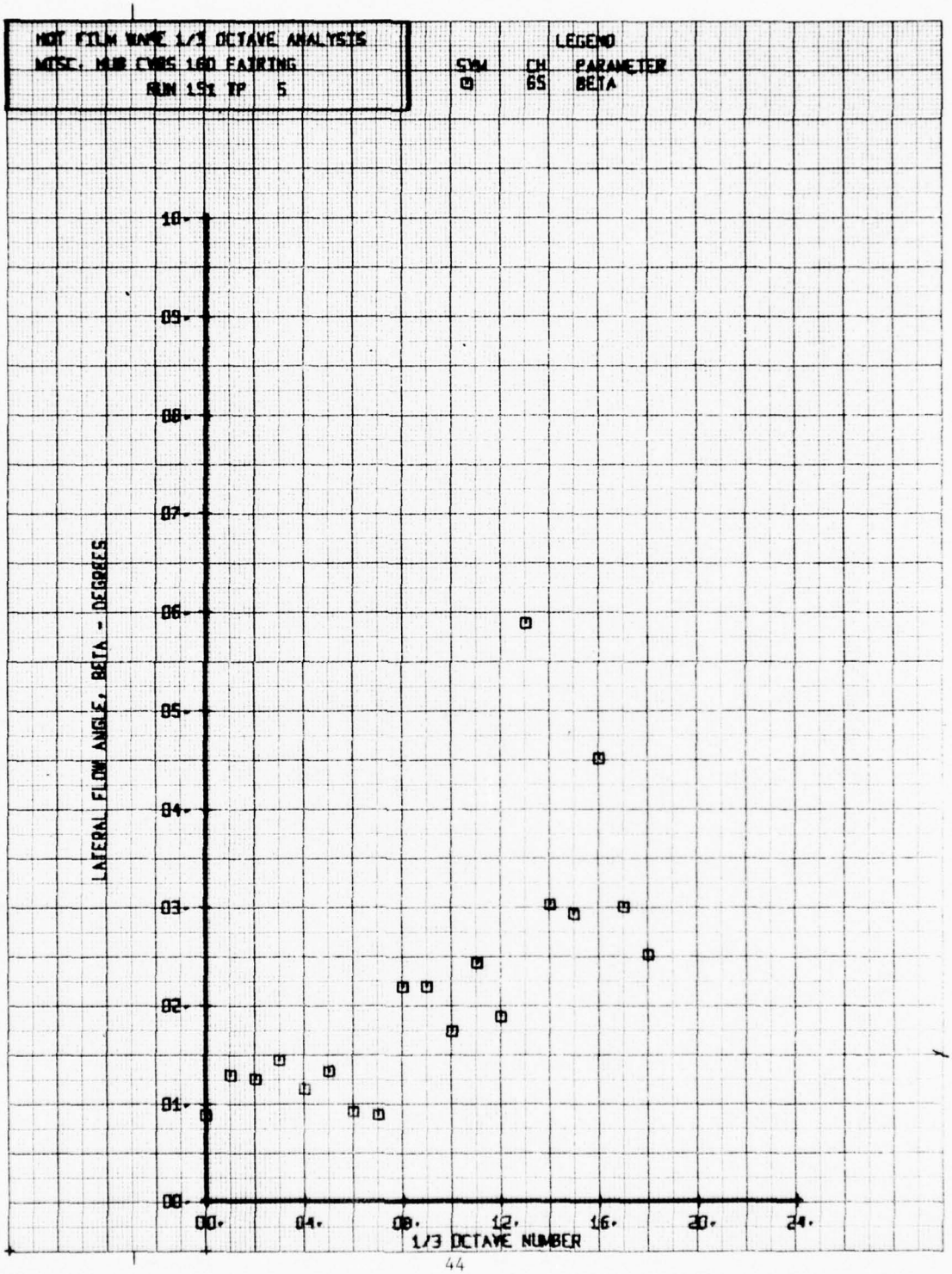
LATERAL FLOW ANGLE, BETA - DEGREES
1/3 OCTAVE NUMBER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MISC. MUB CVBS 160 FAIRING
RUN 151 TP 5
LEGEND
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LATERAL FLOW ANGLE, BETA - DEGREES
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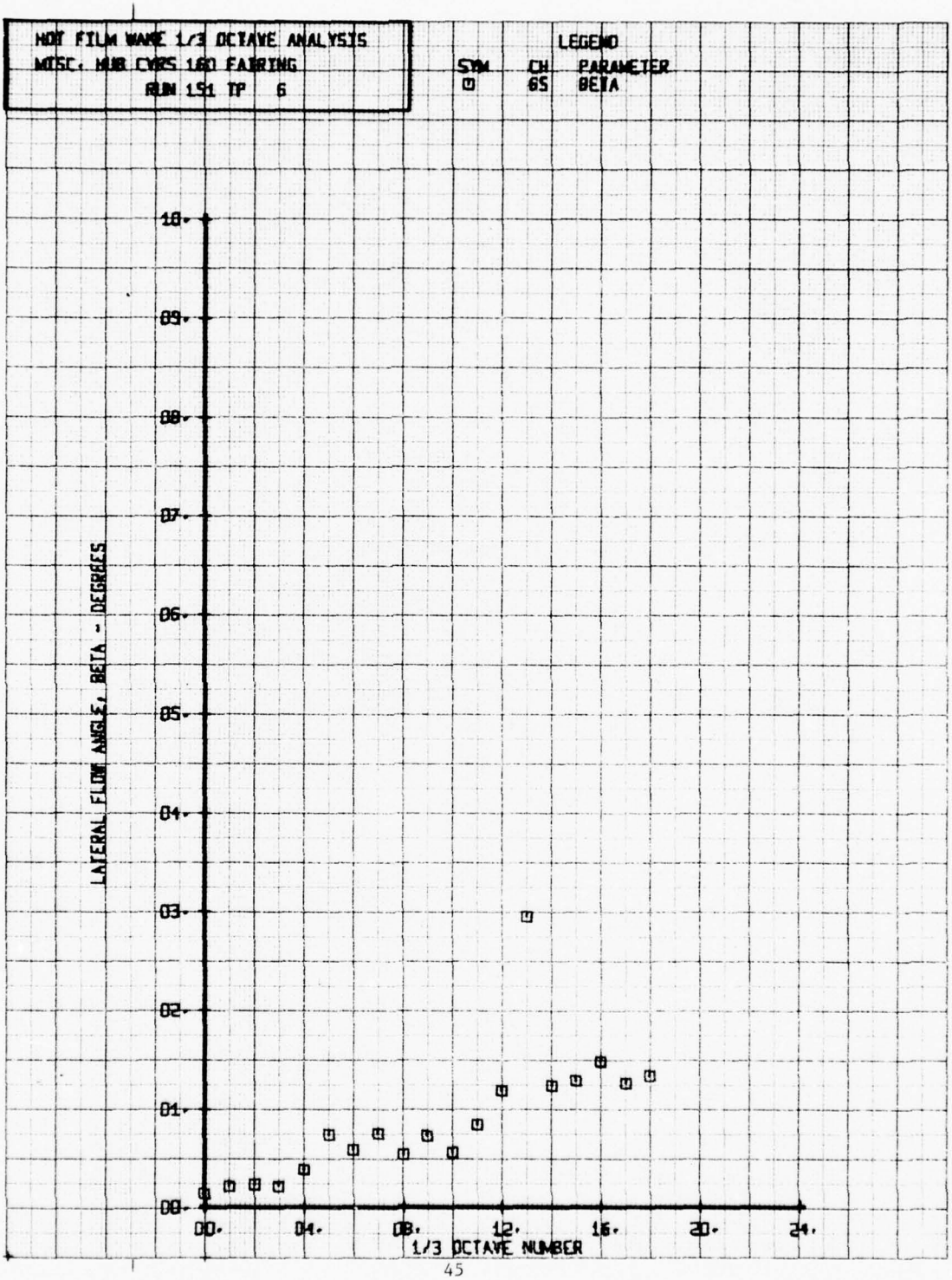
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MISC. HUB CYRS 160 FAIRING
RUN 151 TP 6
LEGEND
SYM CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
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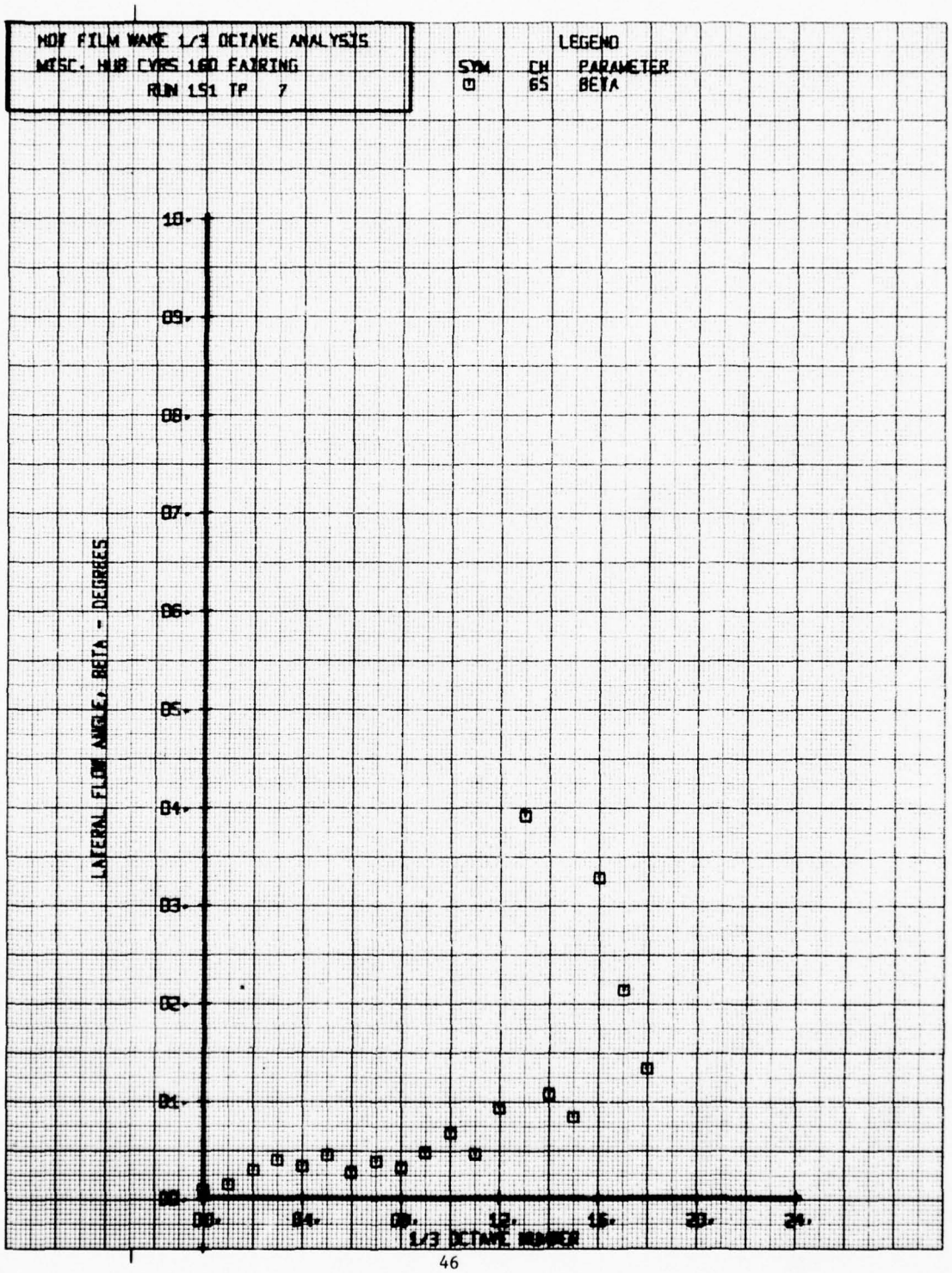
1/3 OCTAVE NUMBER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LEGEND
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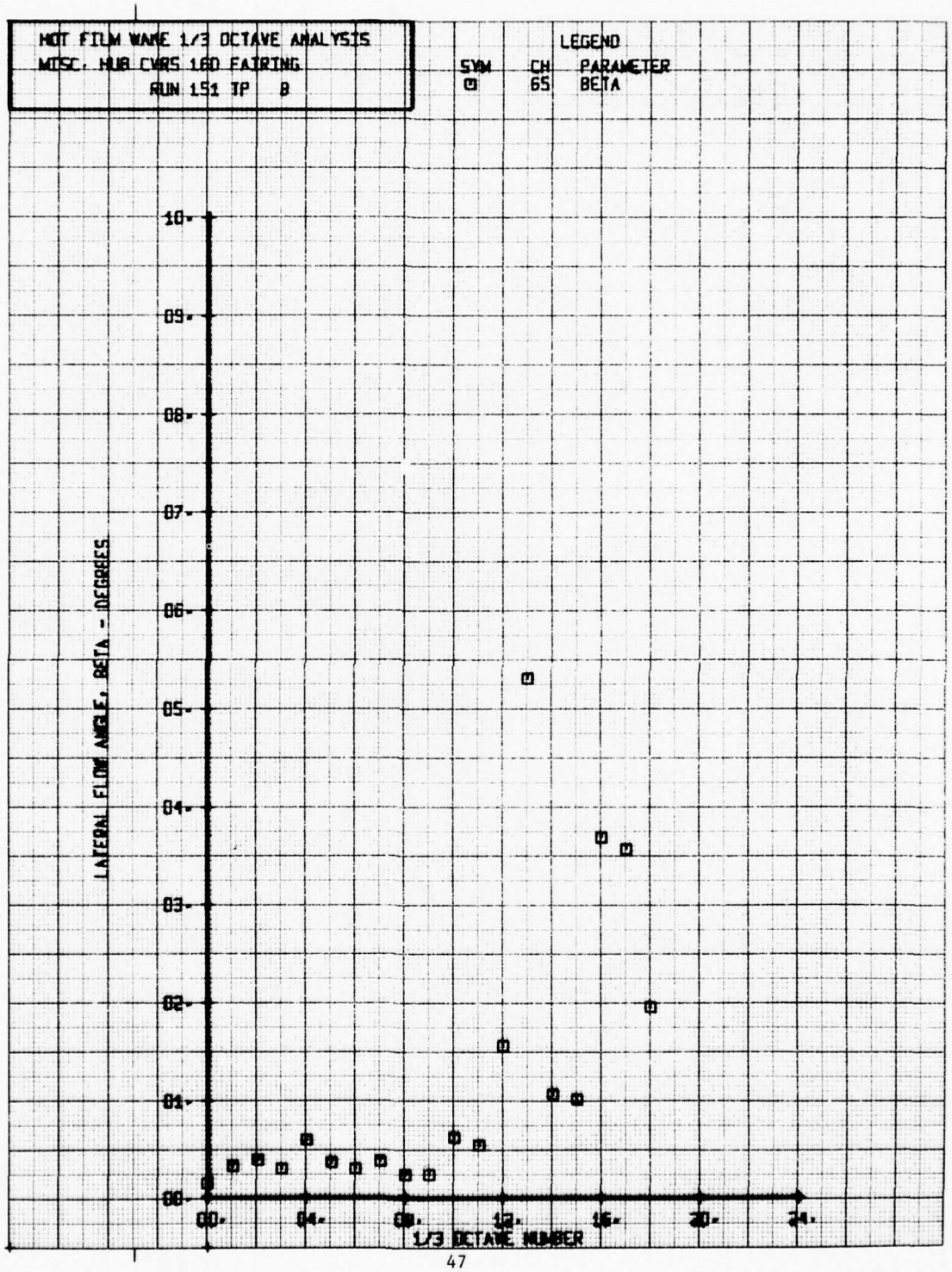
LATERAL FLOW ANGLE, BETA - DEGREES
1/3 OCTAVE NUMBER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LEGEND
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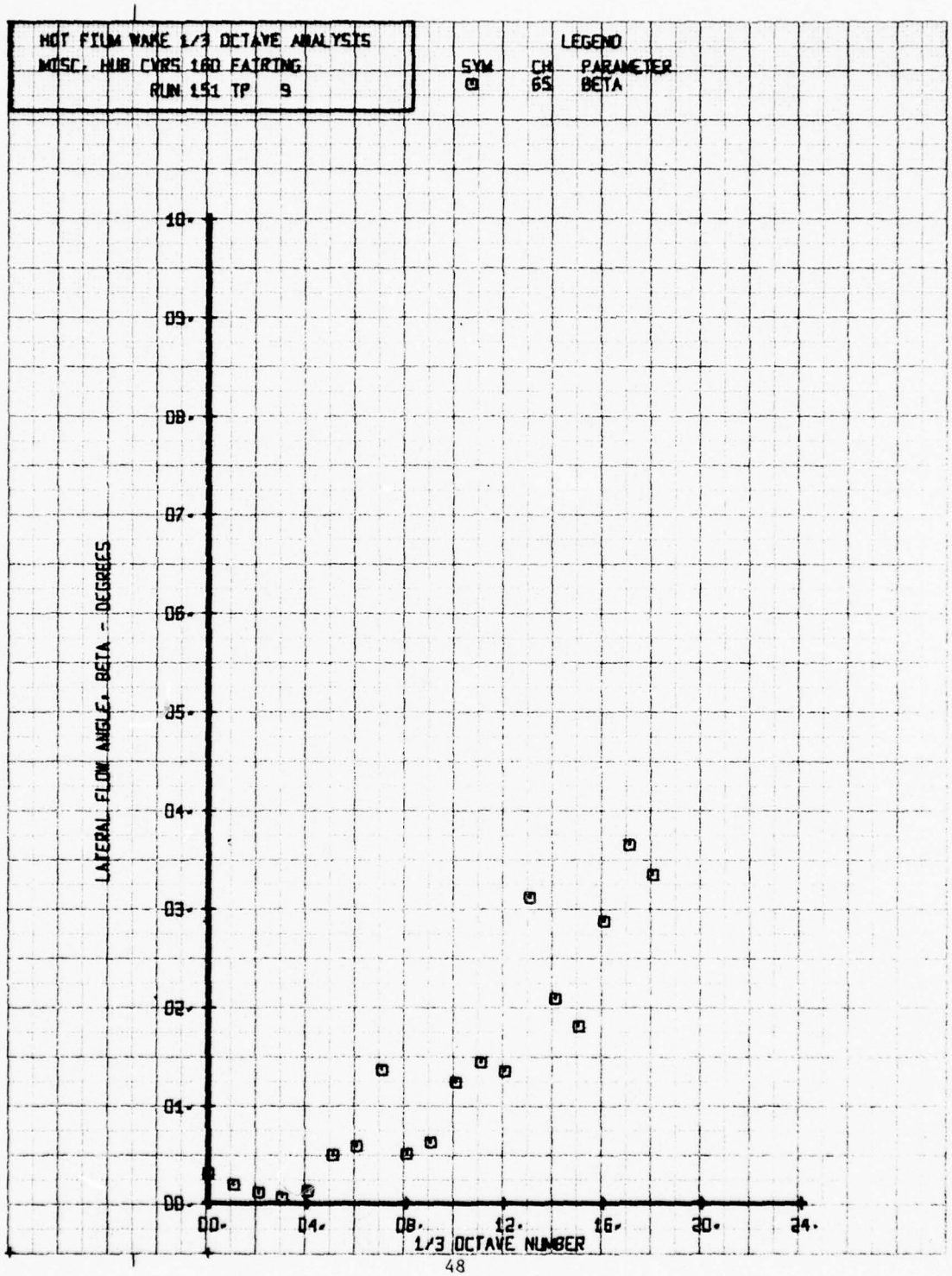
LATERAL FLOW ANGLE, BETA - DEGREES
1/3 OCTAVE NUMBER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RUN 151 TP 9
LEGEND
SYM CH PARAMETER
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LATERAL FLOW ANGLE, BETA - DEGREES
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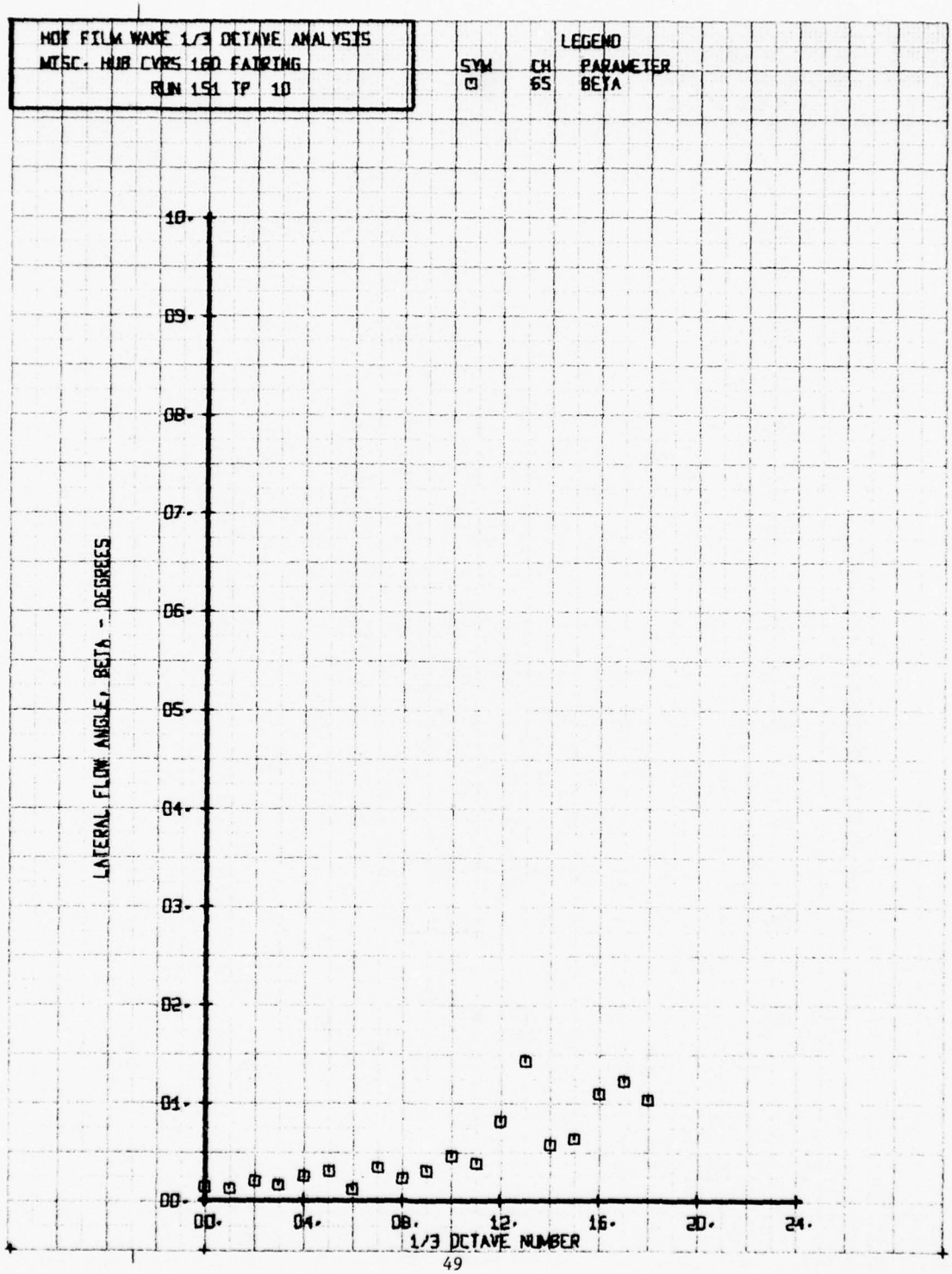
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RUN 151 TP 10
LEGEND
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LATERAL FLOW ANGLE, BETA - DEGREES
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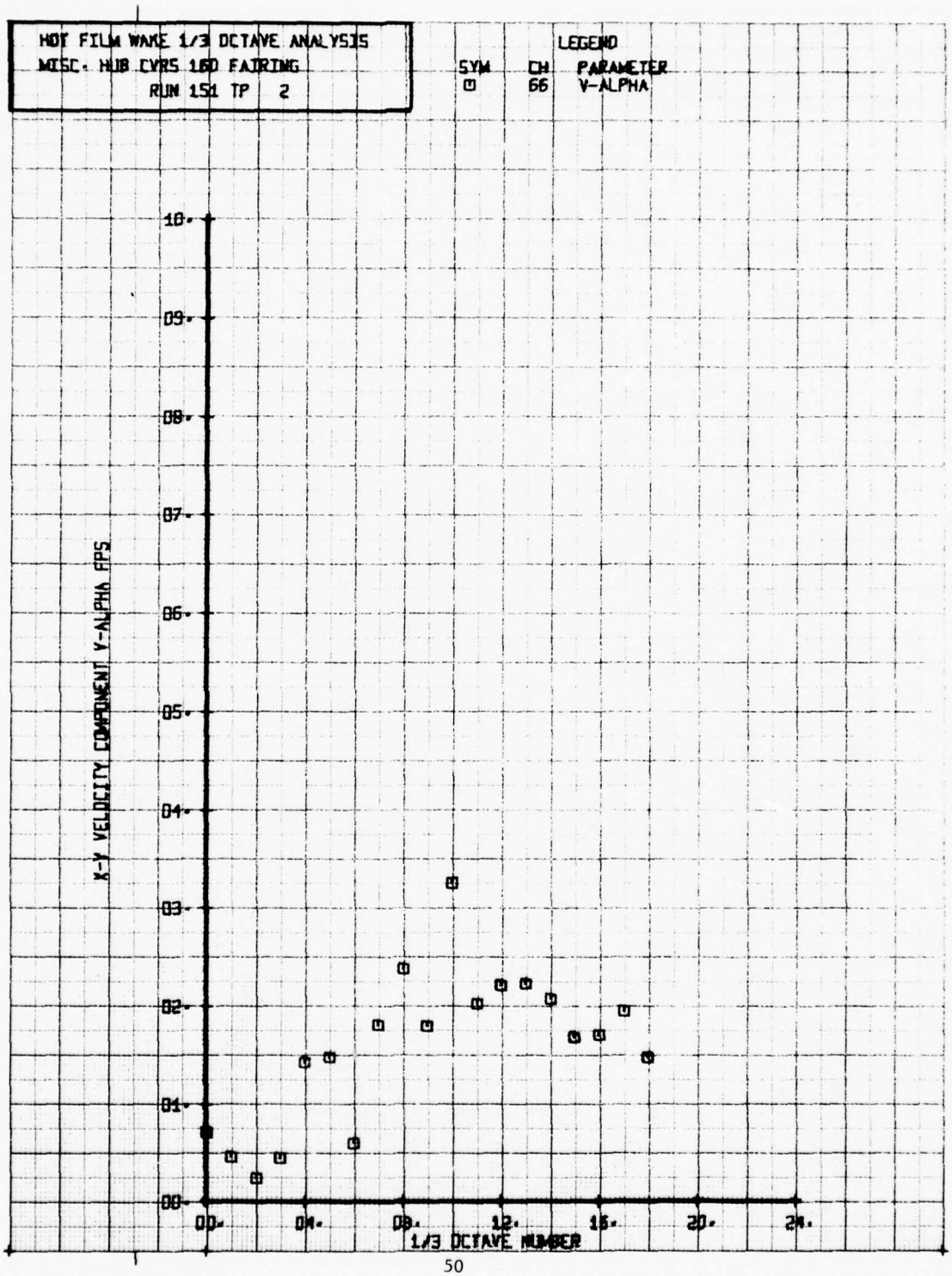
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MISC. HUB CVRS 160 FAIRING
RUN 151 TP 2
LEGEND
SYM CH PARAMETER
66 V-ALPHA
X-Y VELOCITY COMPONENT V-ALPHA FPS
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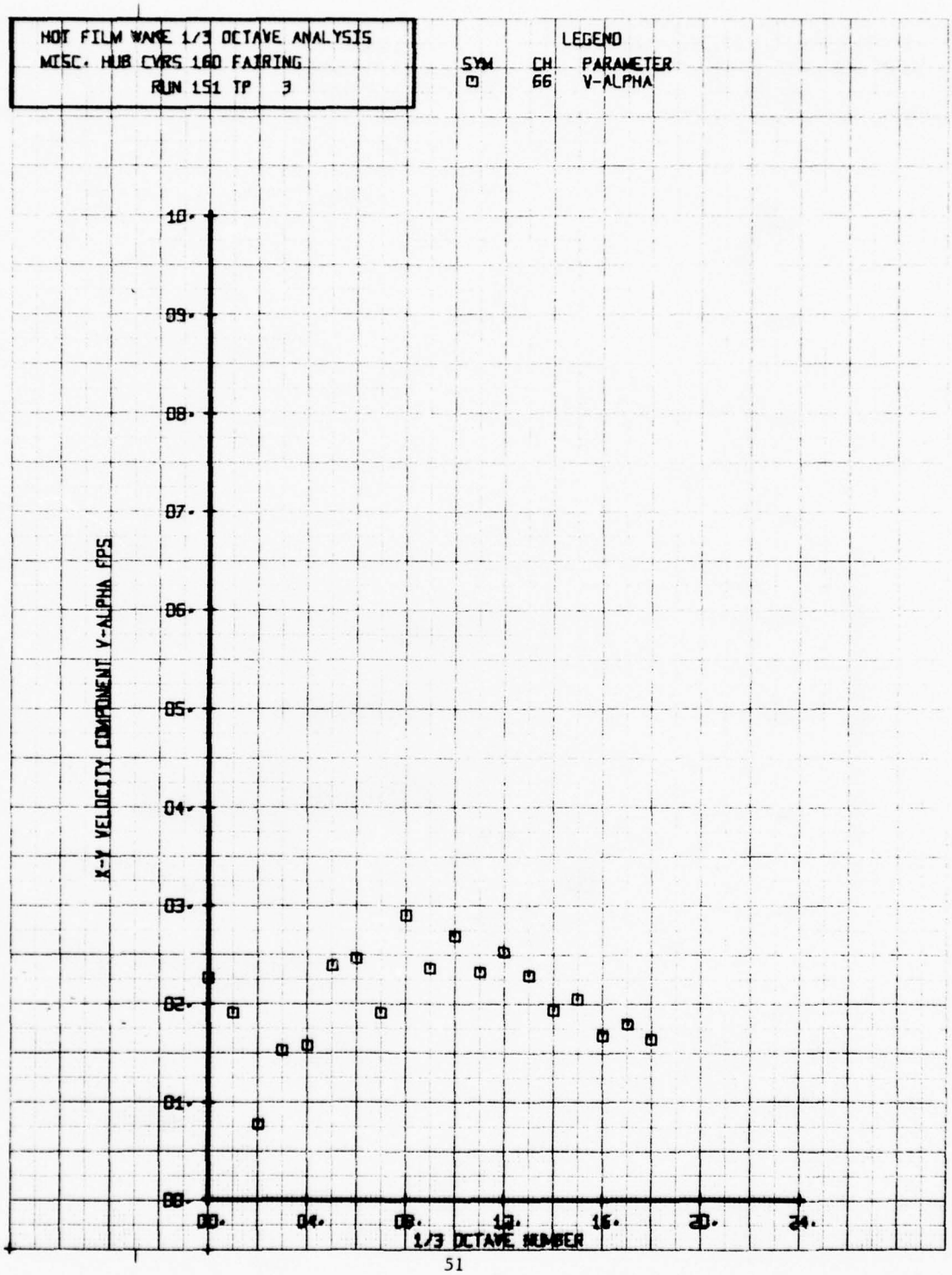
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
MISC. HUB CVRS 160 FAIRING
RUN 151 TP 3
LEGEND
SYM CH PARAMETER
66 V-ALPHA
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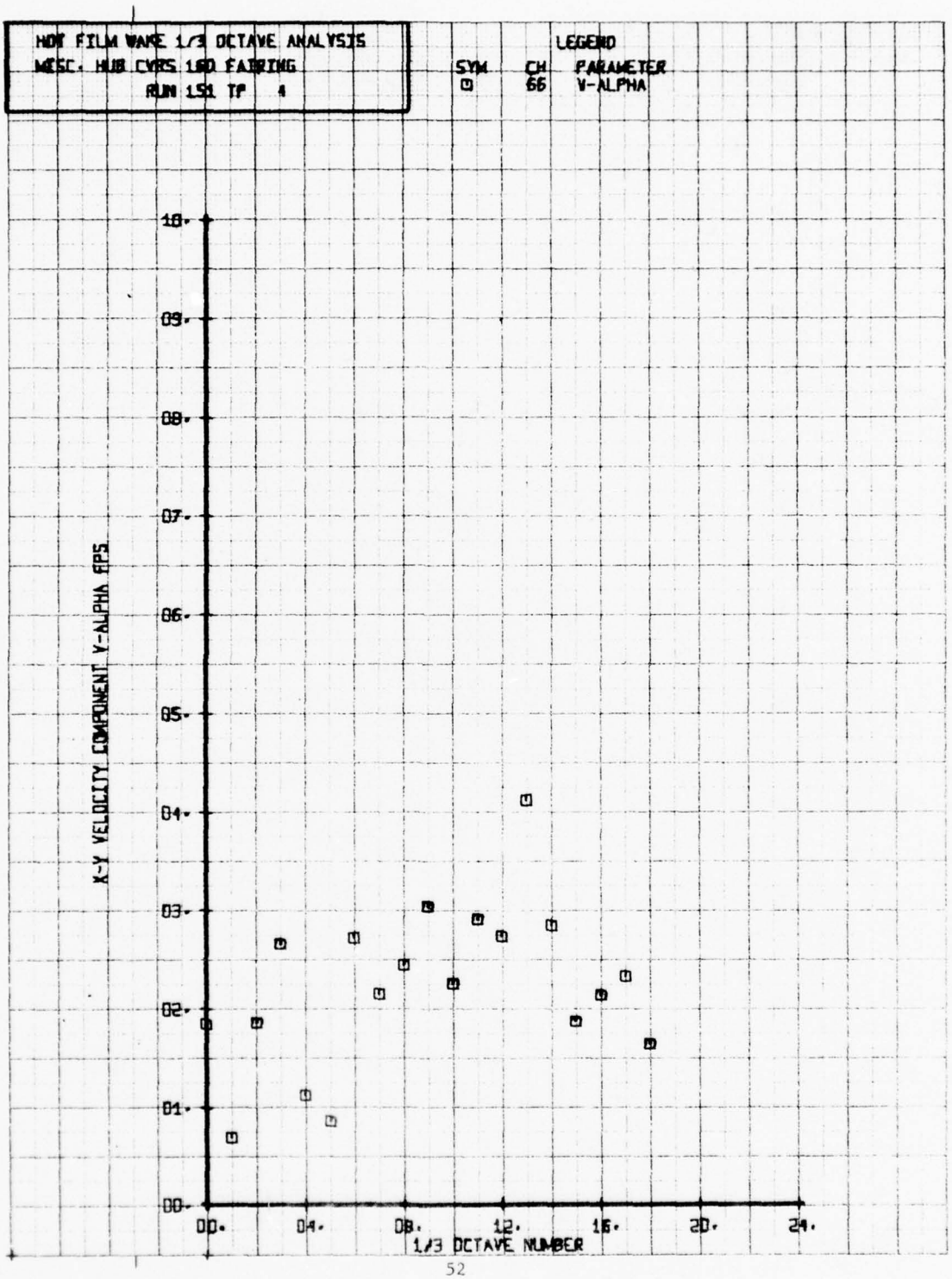
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RUN 151 TP 4
LEGEND
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X-Y VELOCITY COMPONENT V-ALPHA FPS
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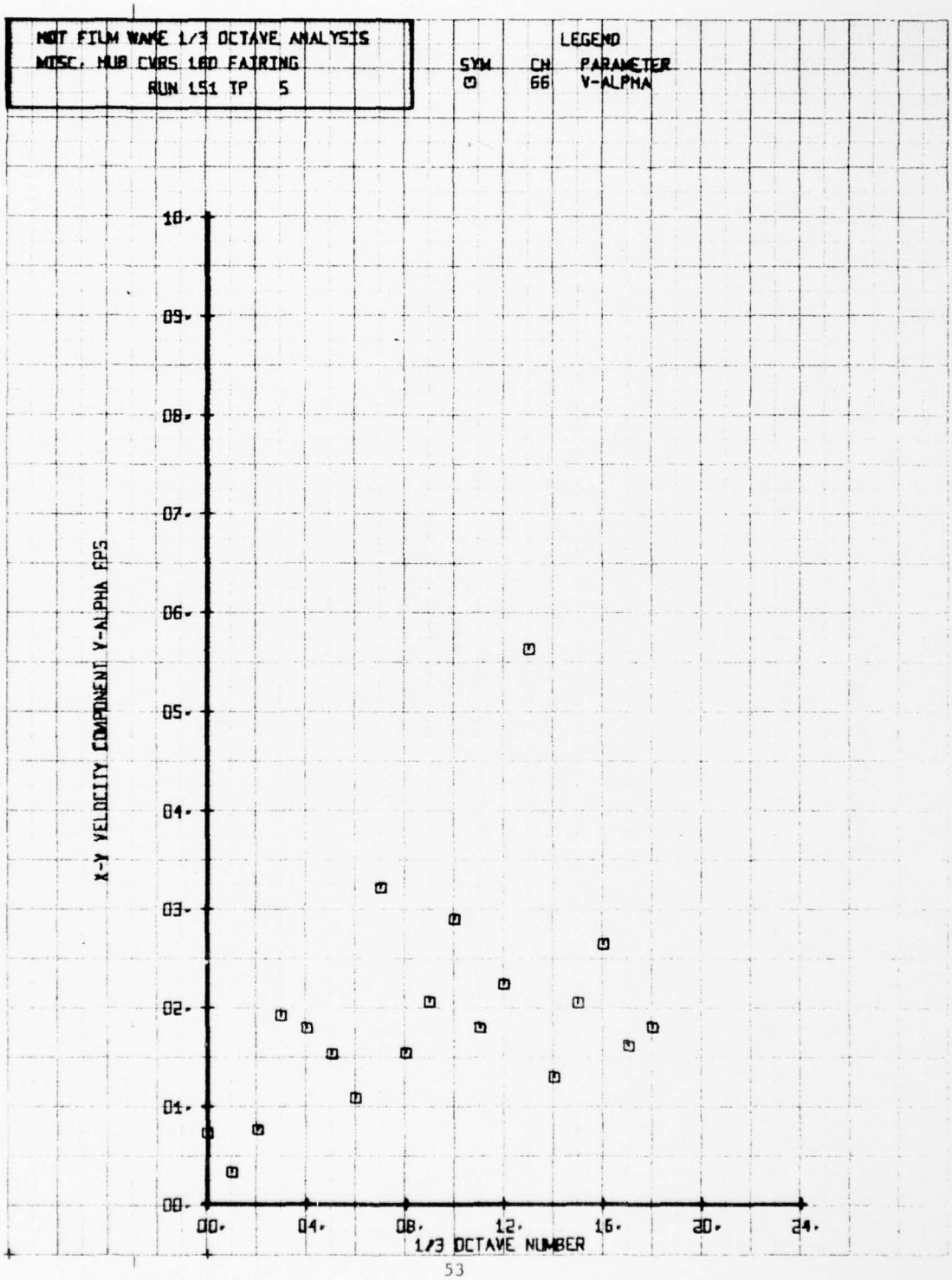
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MISC. HUB CVRS LED FAIRING
RUN 151 TP 5
LEGEND
SYM CH PARAMETER
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X-Y VELOCITY COMPONENT V-ALPHA FPS
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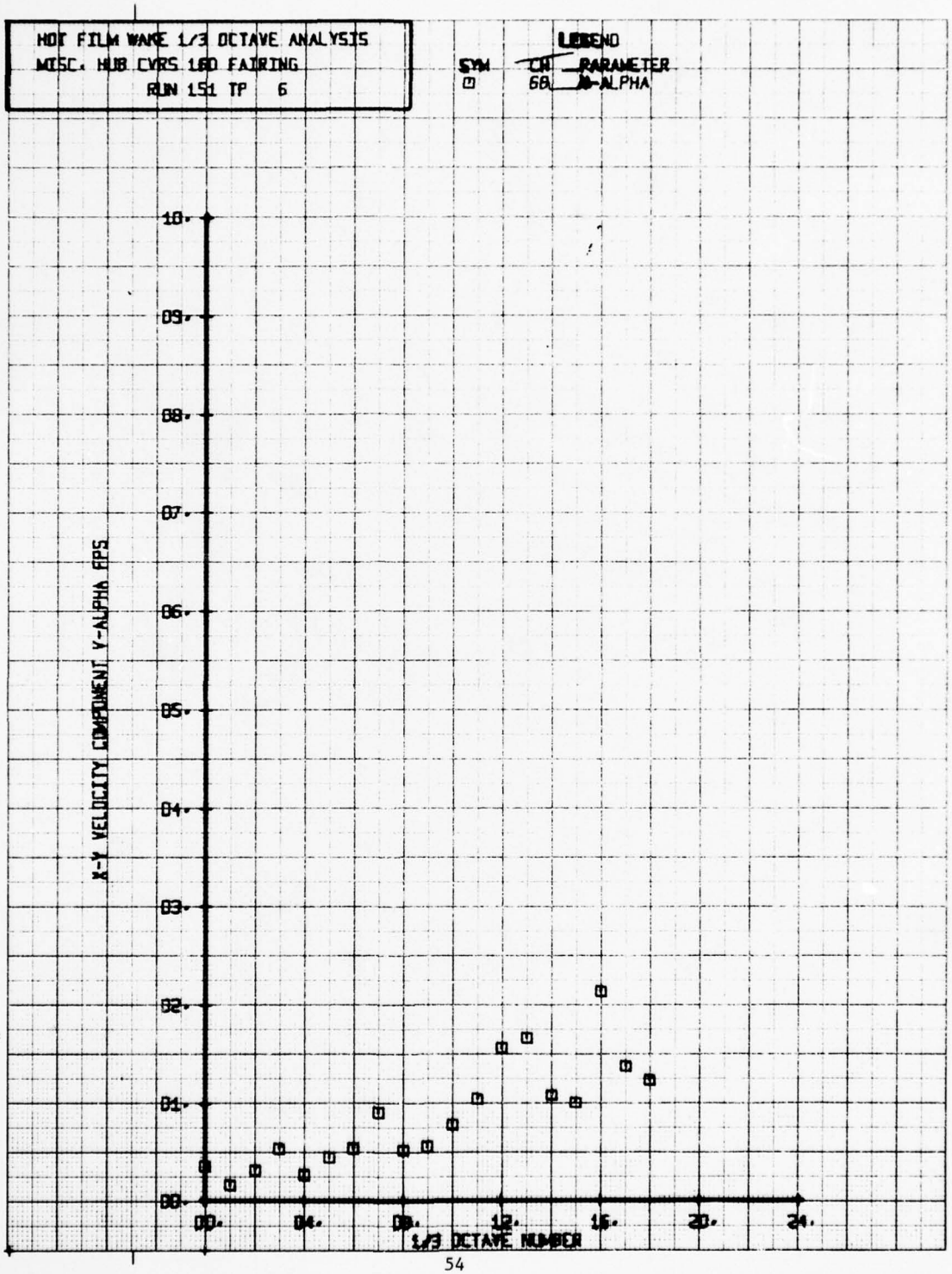
1/3 OCTAVE NUMBER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LEGEND
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68 X-ALPHA
X-Y VELOCITY COMPONENT Y-ALPHA FPS
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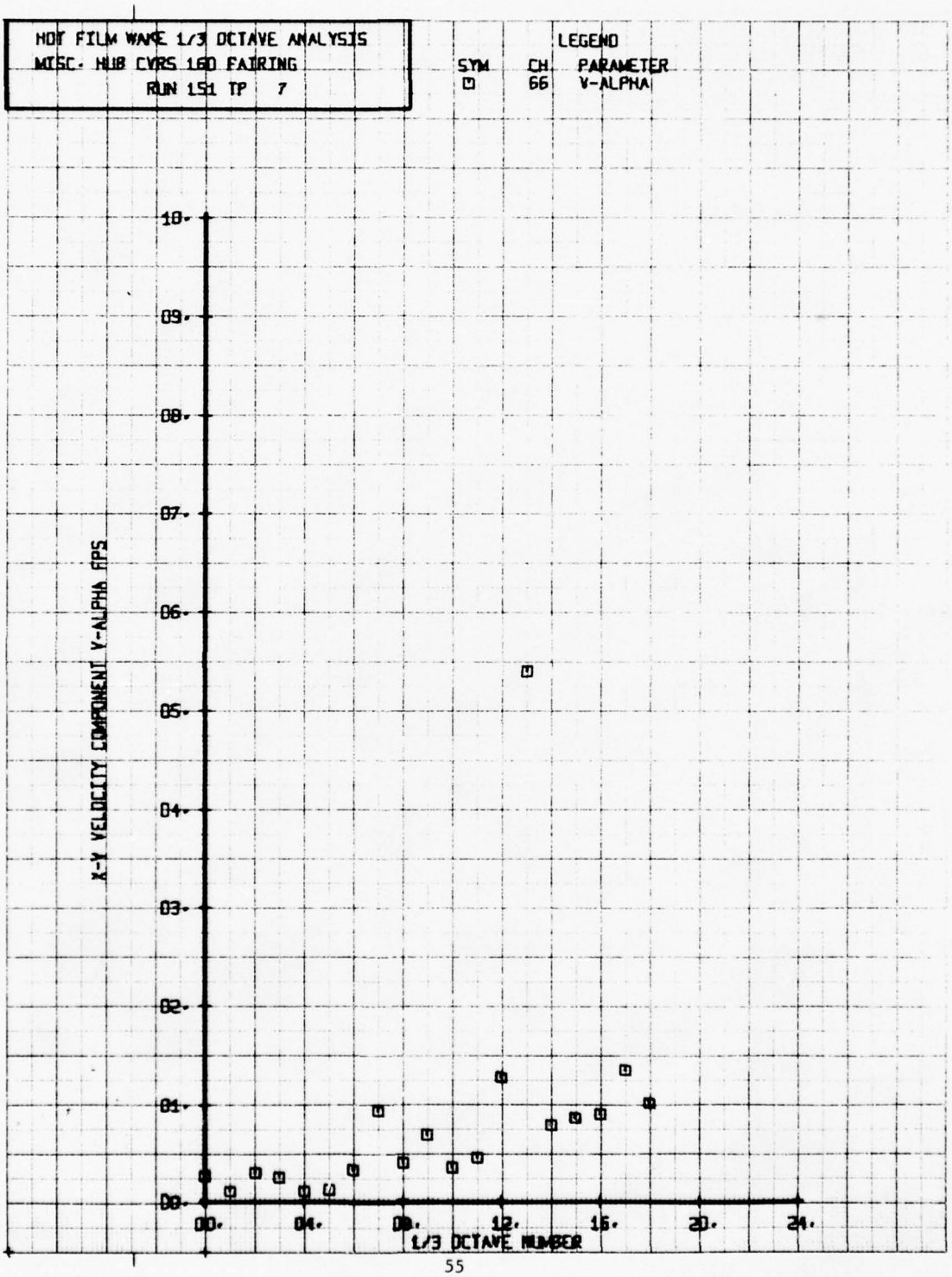
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LEGEND
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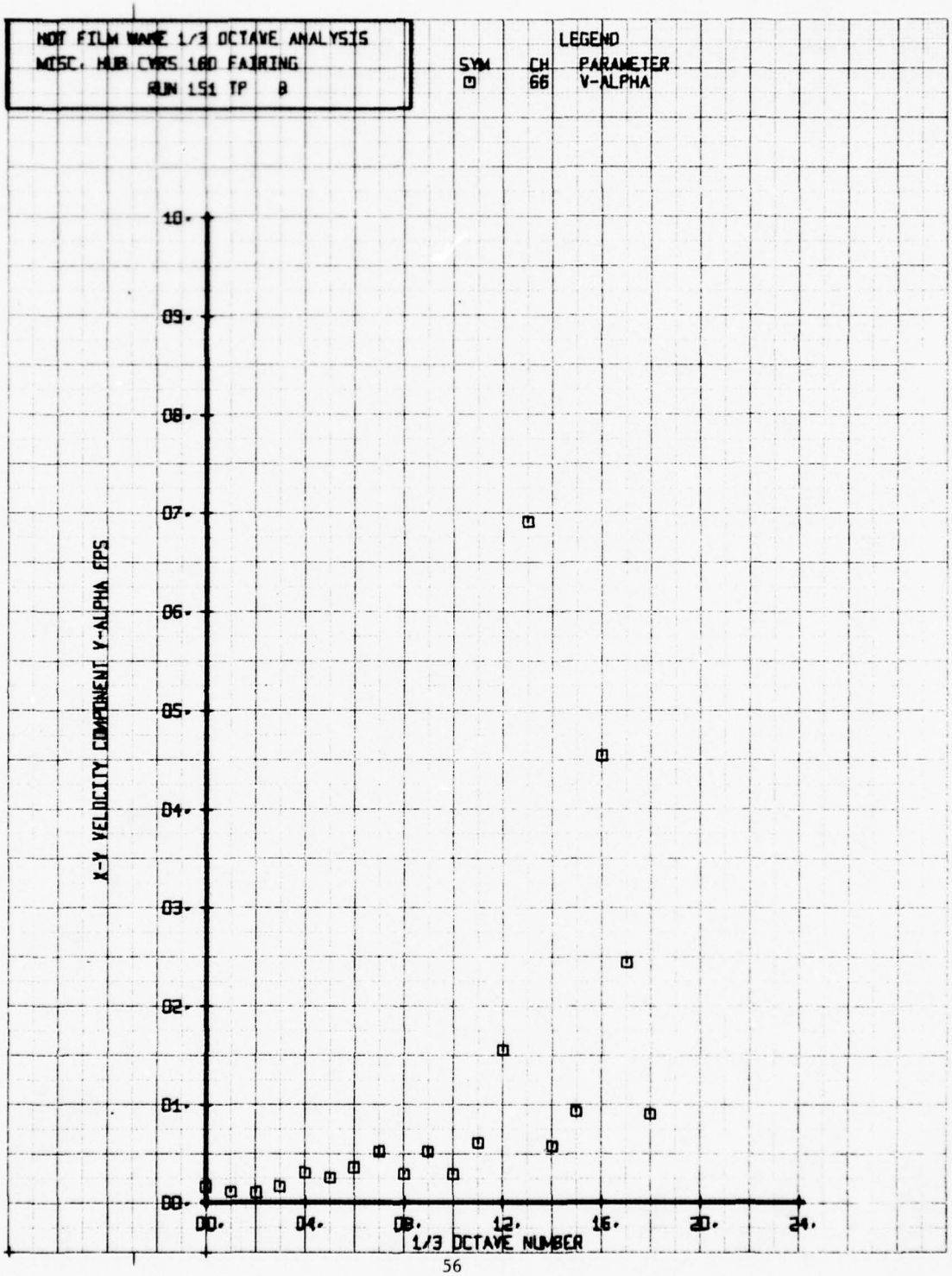
1/3 OCTAVE NUMBER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MISC. HUB CVRS 180 FAIRING
RUN 151 TP B
LEGEND
SYM CH PARAMETER
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X-V VELOCITY COMPONENT V-ALPHA FPS
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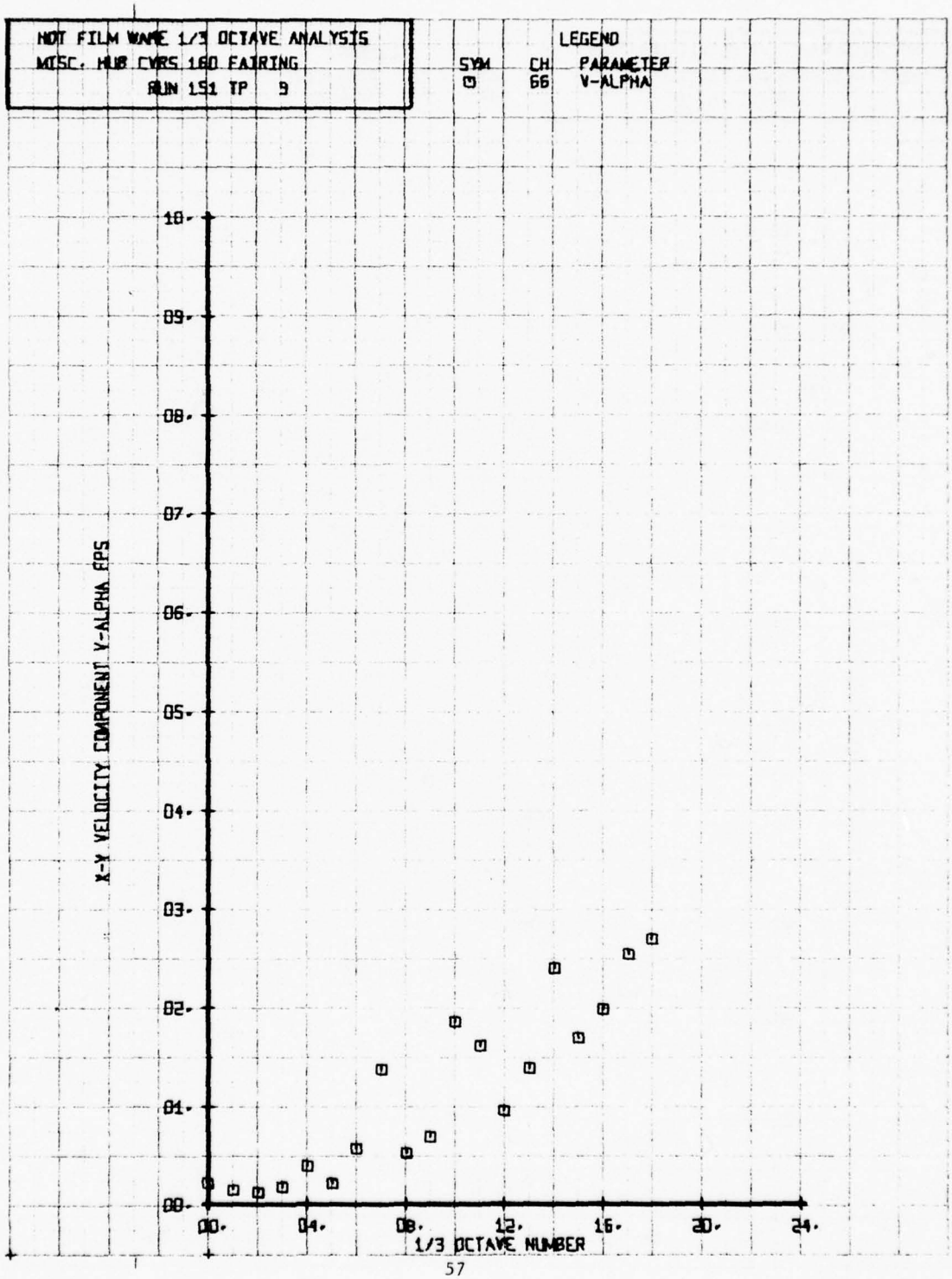
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MISC. HUB CVRS 160 FAIRING
RUN 151 TP 9
LEGEND
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X-Y VELOCITY COMPONENT V-ALPHA FPS
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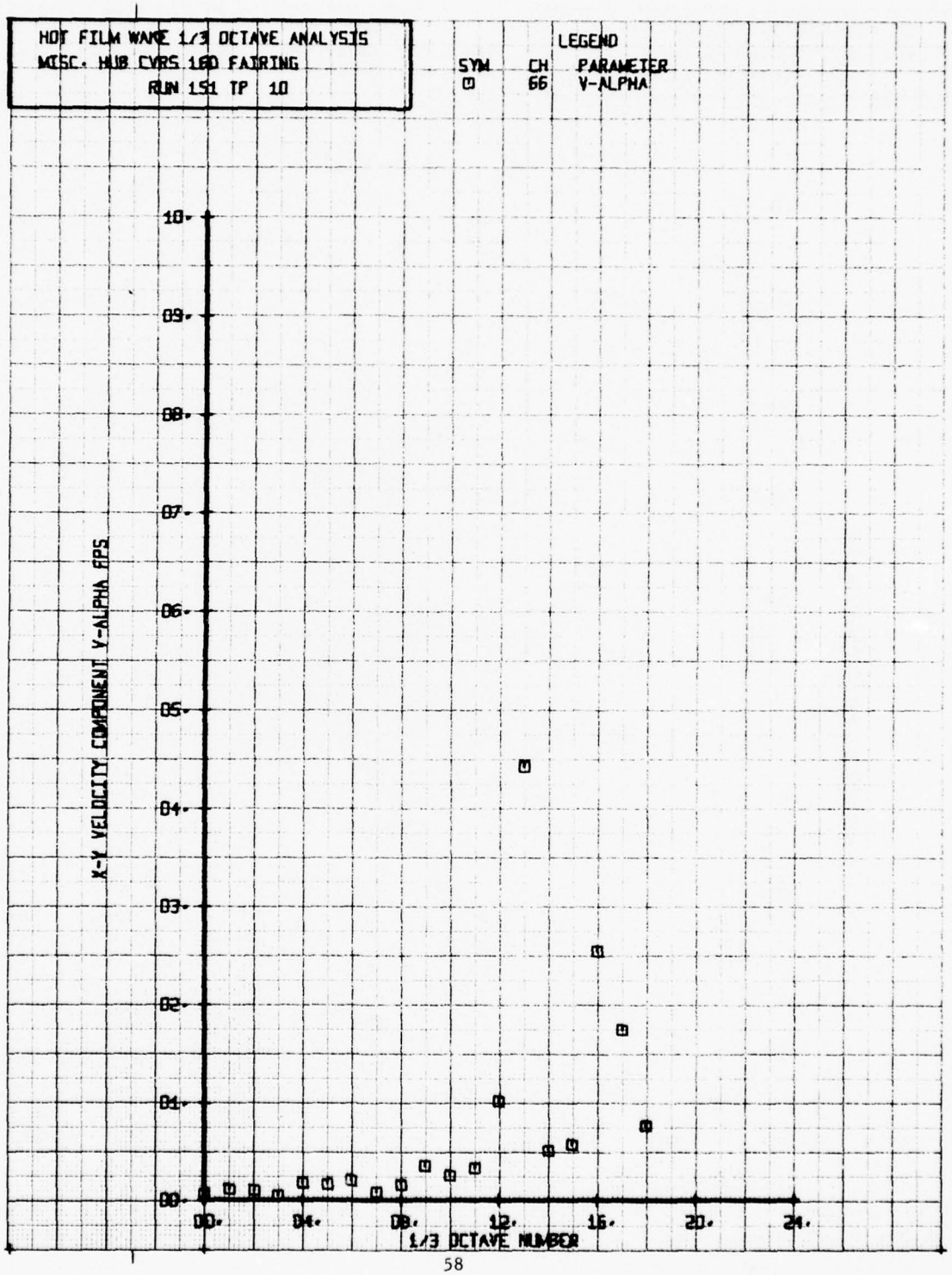
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LEGEND
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X-Y VELOCITY COMPONENT V-ALPHA FPS
1/3 OCTAVE NUMBER
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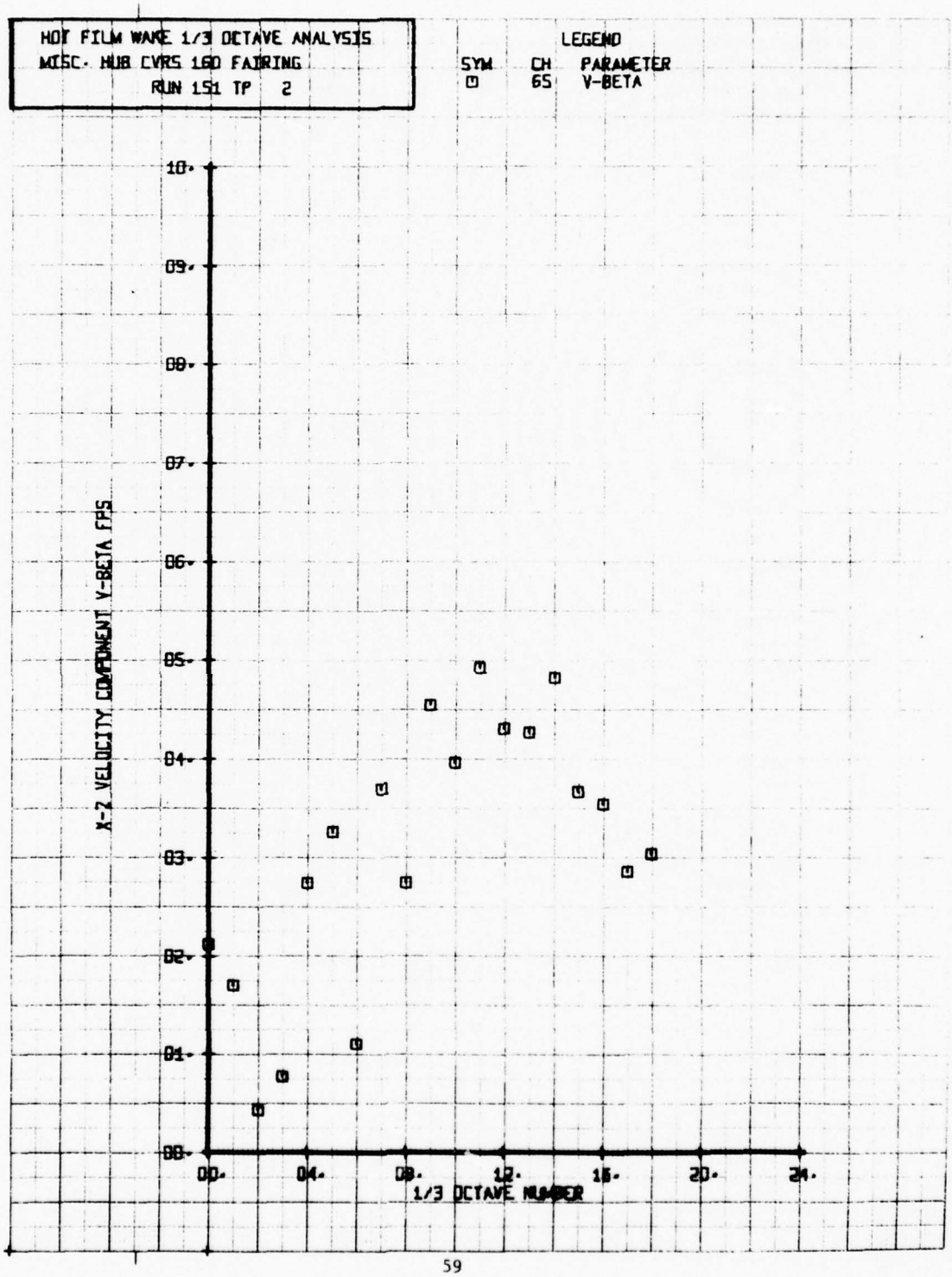
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MISC. HUB CVRS 160 FAIRING
RUN 151 TP 2
LEGEND
SYM CH PARAMETER
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X-Z VELOCITY COMPONENT V-BETA FPS
1/3 OCTAVE NUMBER
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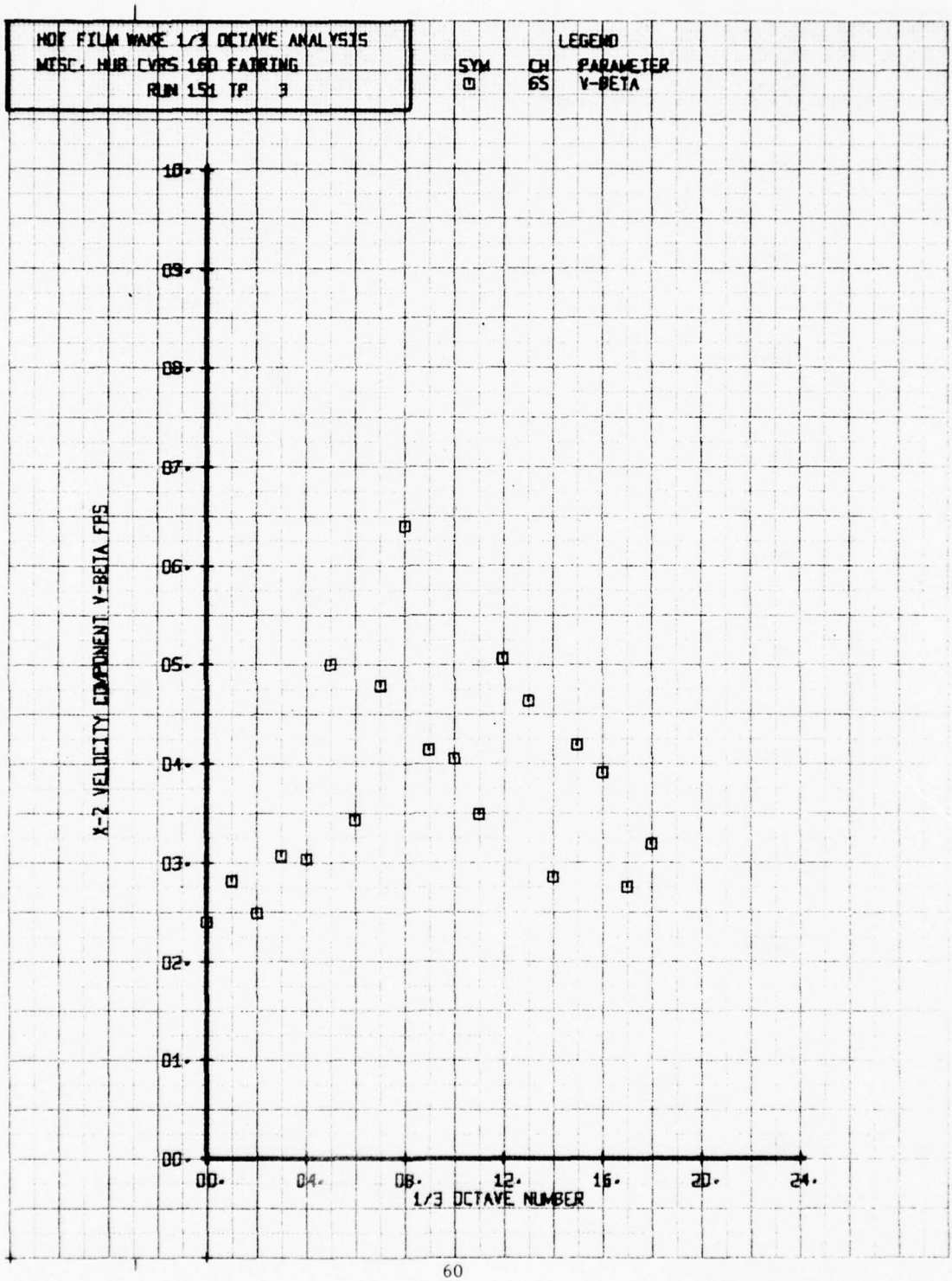
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MISC. HUB CVRS 160 FAIRING
RUN 151 TP 3
LEGEND
SYM CH PARAMETER
65 V-BETA
X-2 VELOCITY COMPONENT V-BETA FPS
1/3 OCTAVE NUMBER
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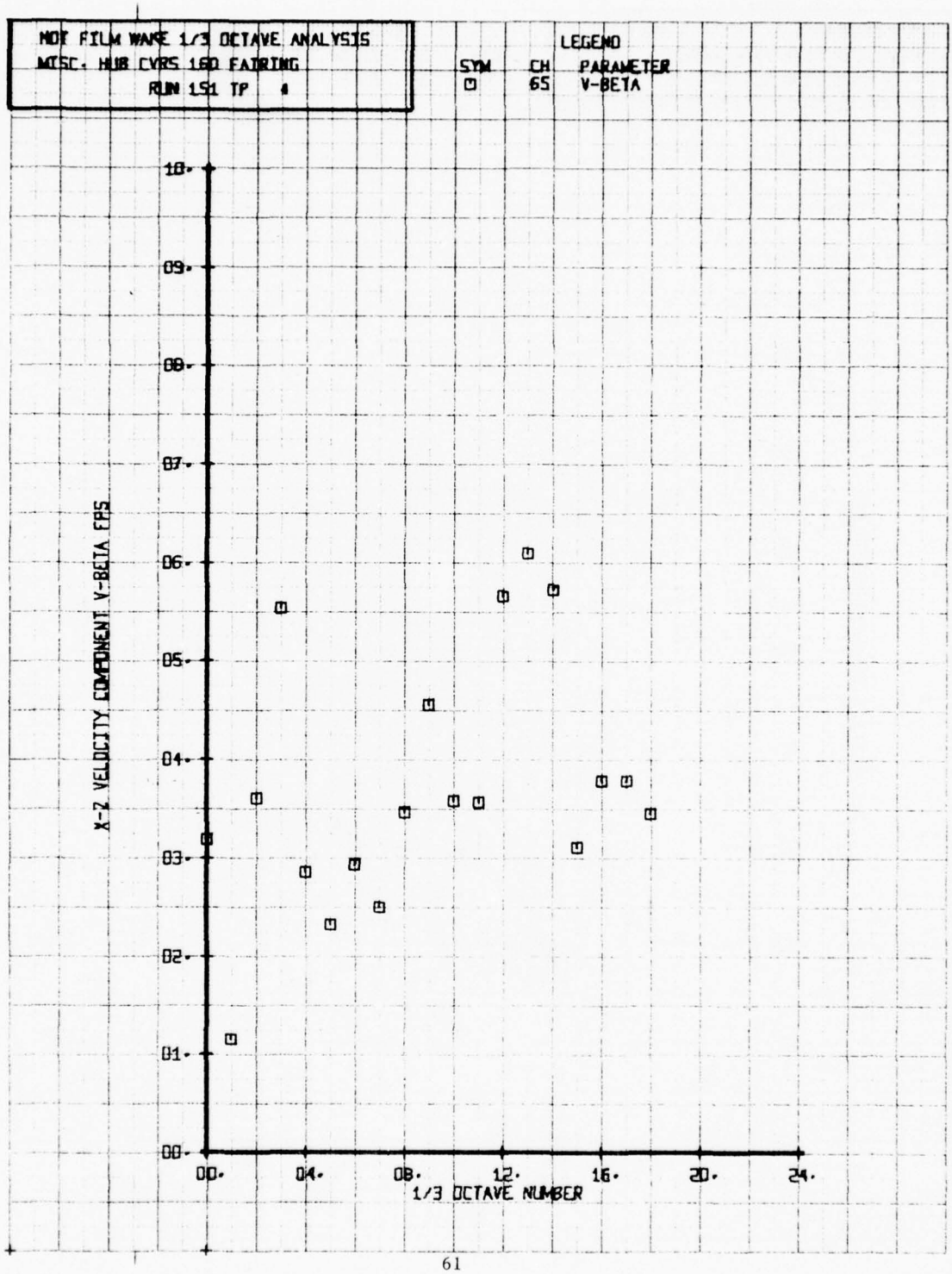
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
MISC. HUB CVRS 160 FAIRING
RUN 151 TP 4
LEGEND
SYM CH PARAMETER
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X-Z VELOCITY COMPONENT V-BETA FPS
1/3 OCTAVE NUMBER
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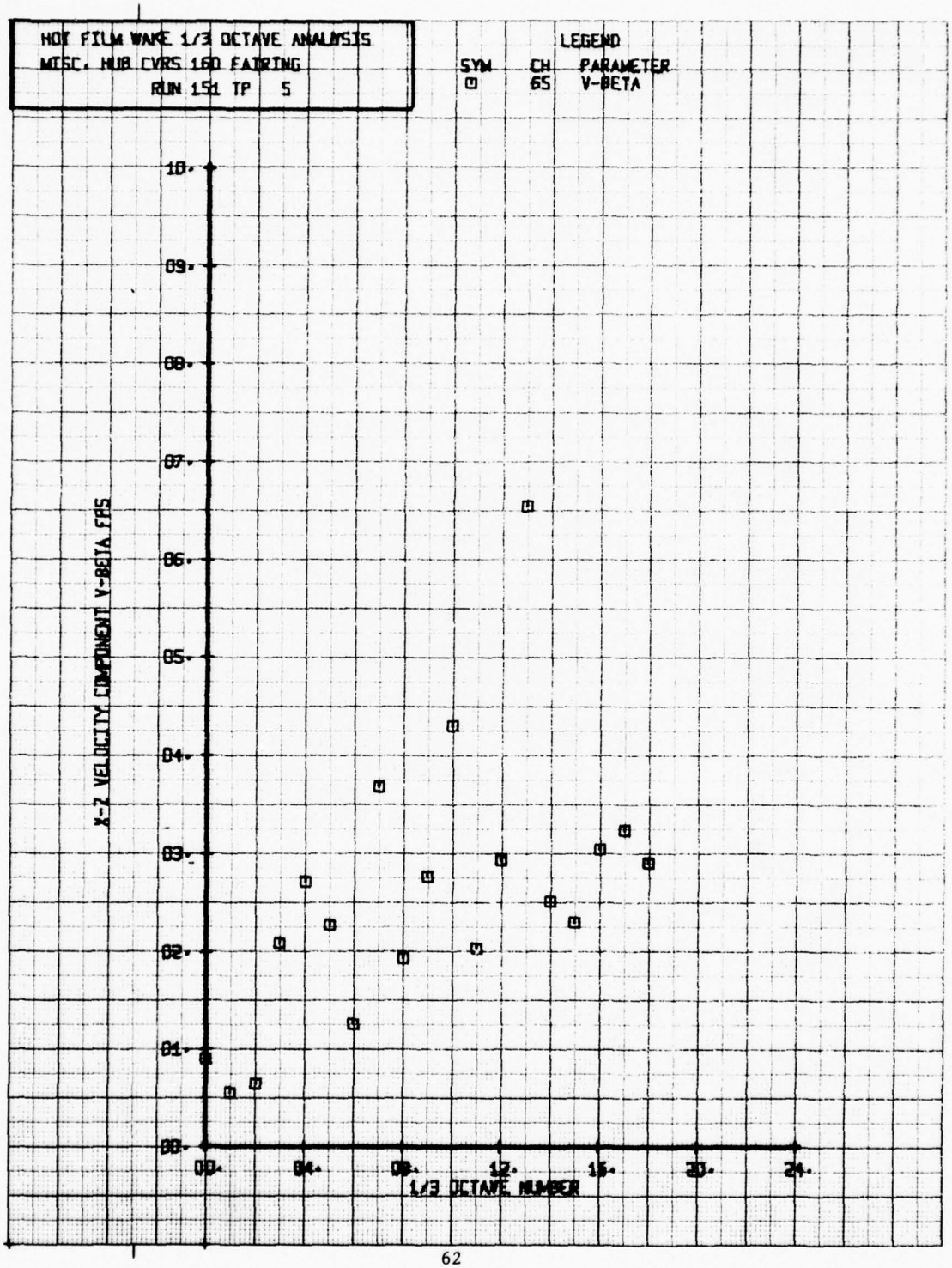
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MISC. HUB CVRS 160 FAIRING
RUN 151 TP 5
LEGEND
SYM CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA FPS
1/3 OCTAVE NUMBER
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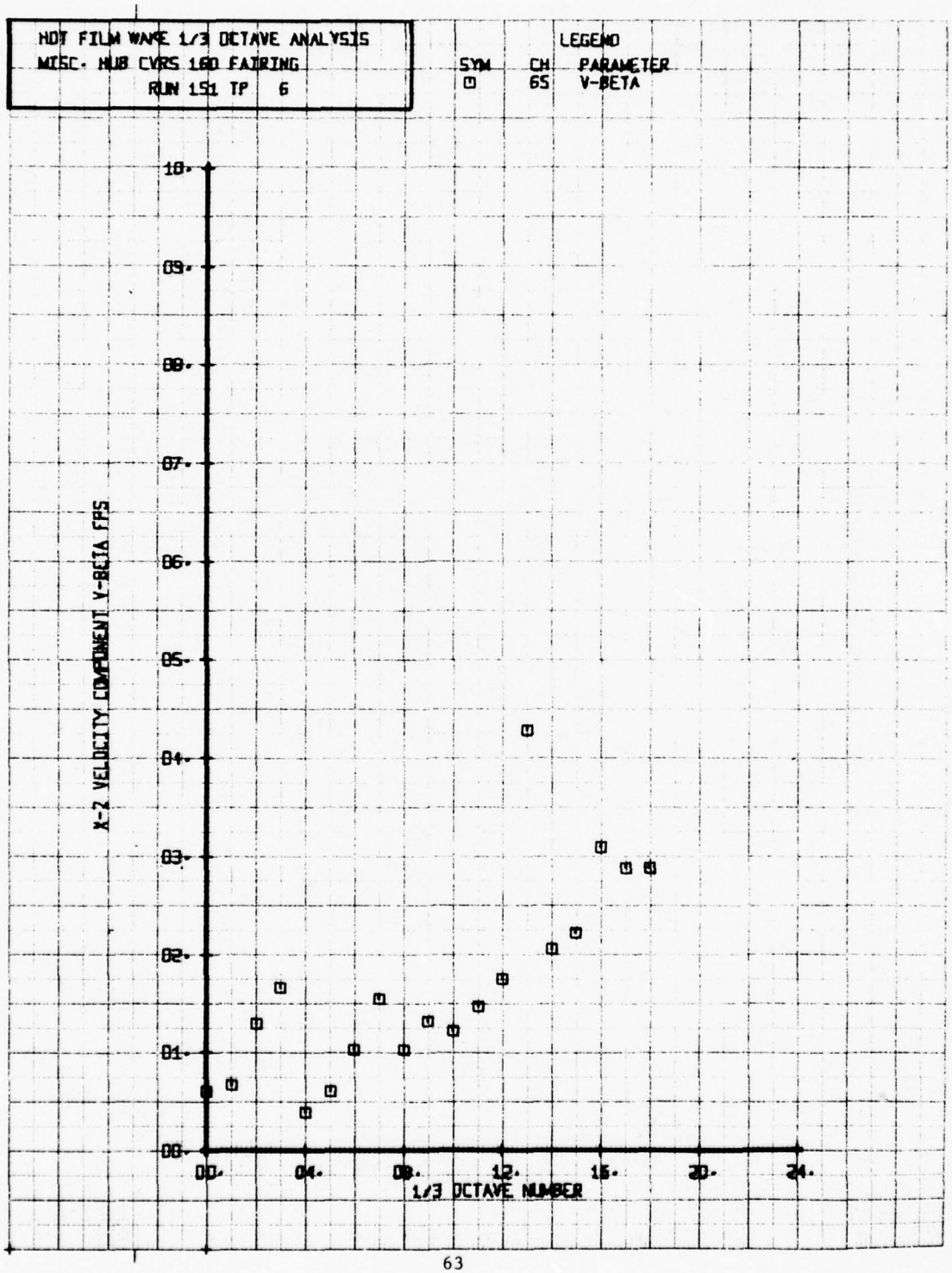
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
MISC. HUB CVRS 160 FAIRING
RUN 151 TP 6
LEGEND
SYM CH PARAMETER
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X-Z VELOCITY COMPONENT V-BETA FPS
1/3 OCTAVE NUMBER
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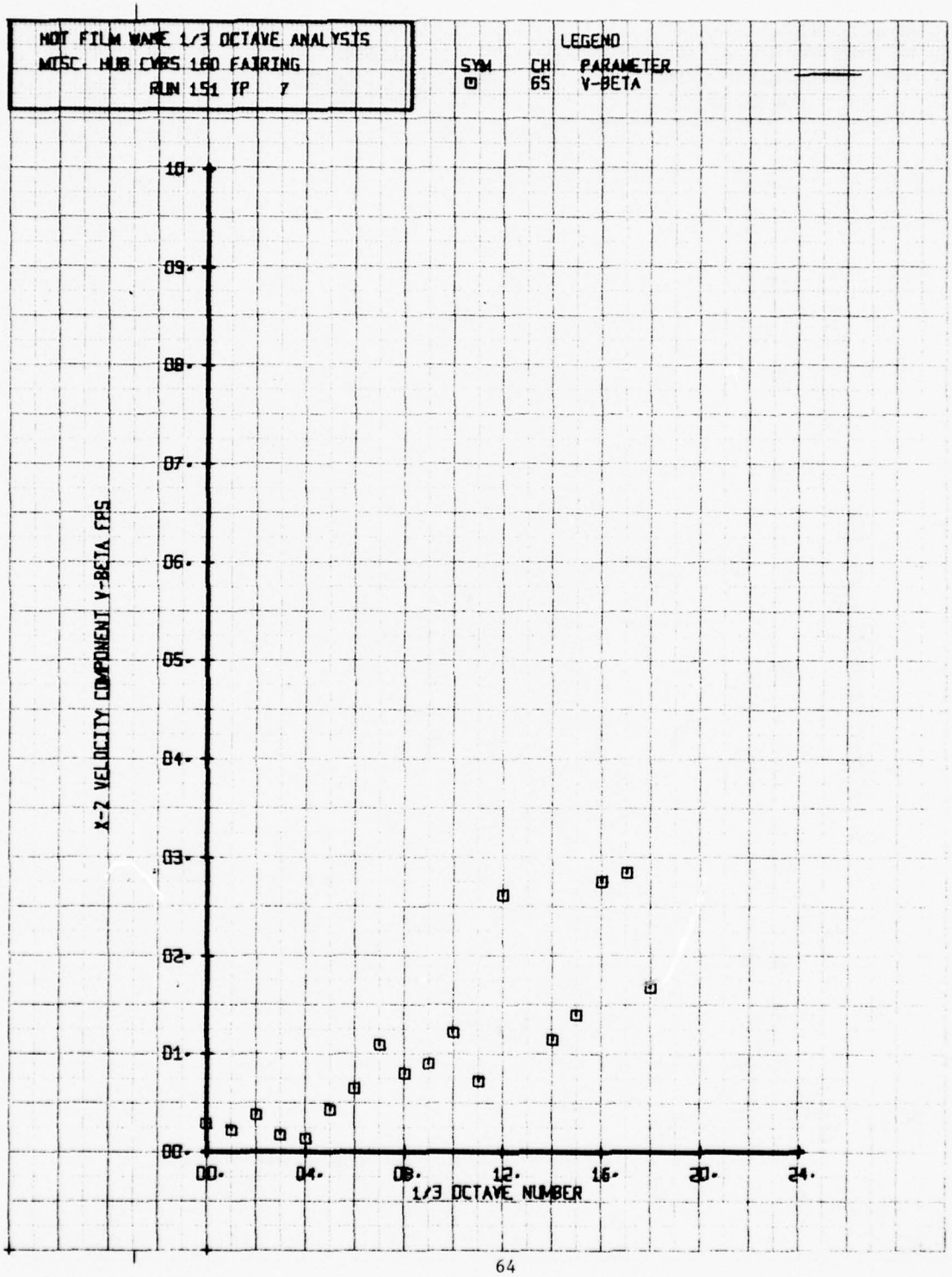
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MISC. HUB CVRS 160 FAIRING
RUN 151 TP 7
LEGEND
SYM CH PARAMETER
65 V-BETA
X-2 VELOCITY COMPONENT V-BETA FPS
1/3 OCTAVE NUMBER
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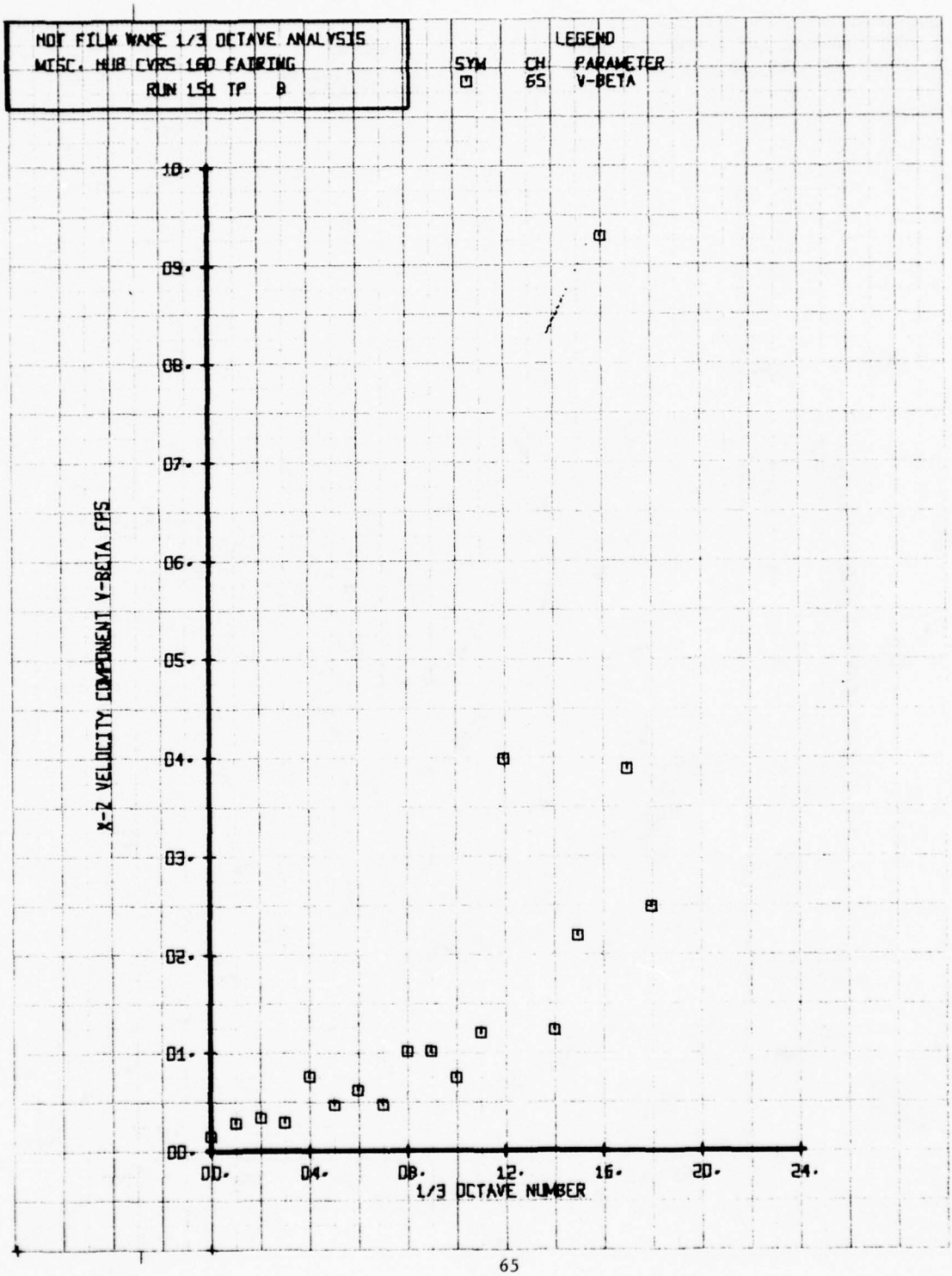
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RUN 151 TP B
LEGEND
SYM CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA FPS
1/3 OCTAVE NUMBER
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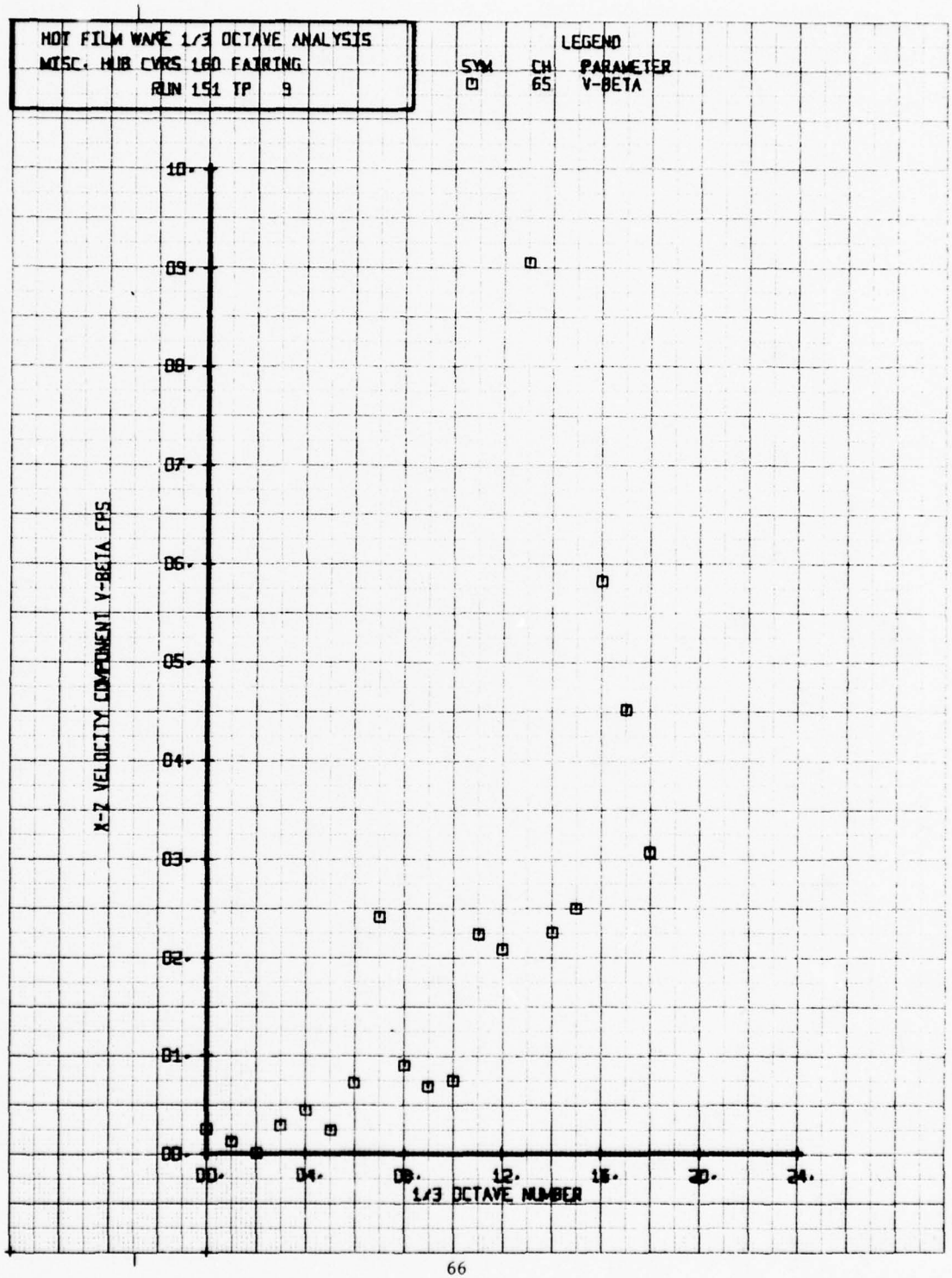
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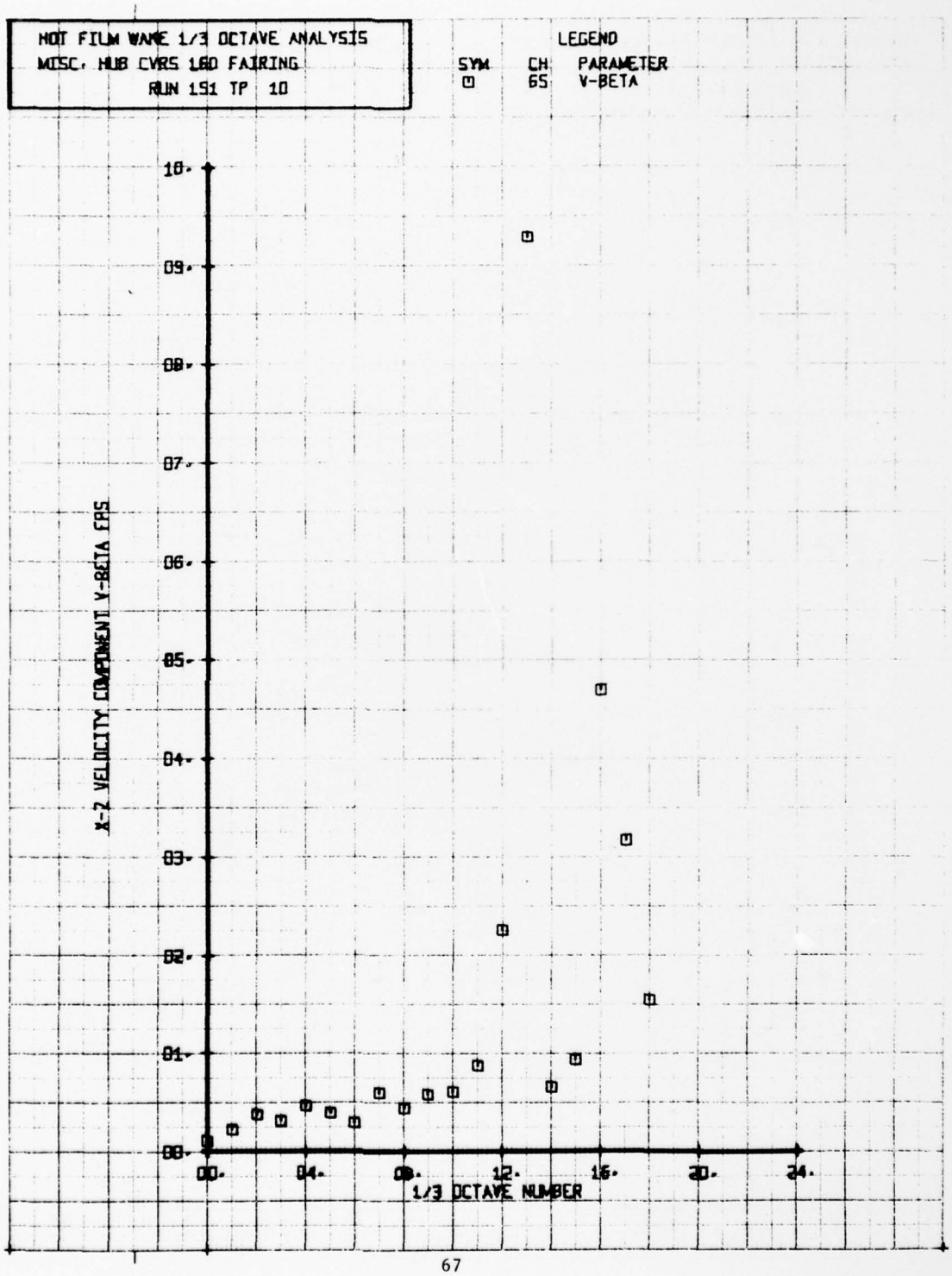
X-Z VELOCITY COMPONENT V-BETA FPS
1/3 OCTAVE NUMBER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65 V-BETA
X-Z VELOCITY COMPONENT V-BETA FPS
1/3 OCTAVE NUMBER
10.
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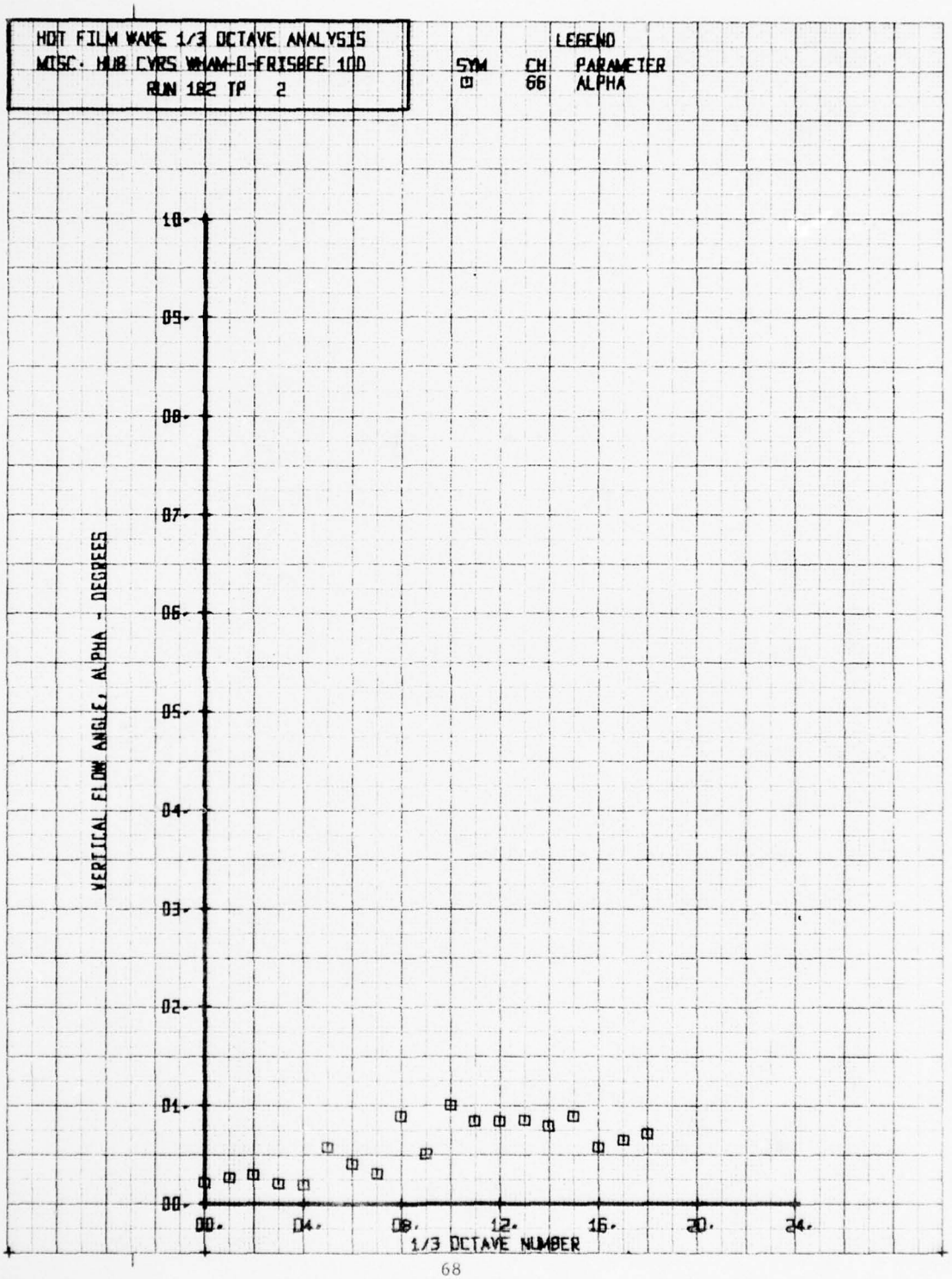
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
MISC: HUB CYRS WHAM-O-FRISBEE 10D
RUN 182 TP 2
LEGEND
SYM CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
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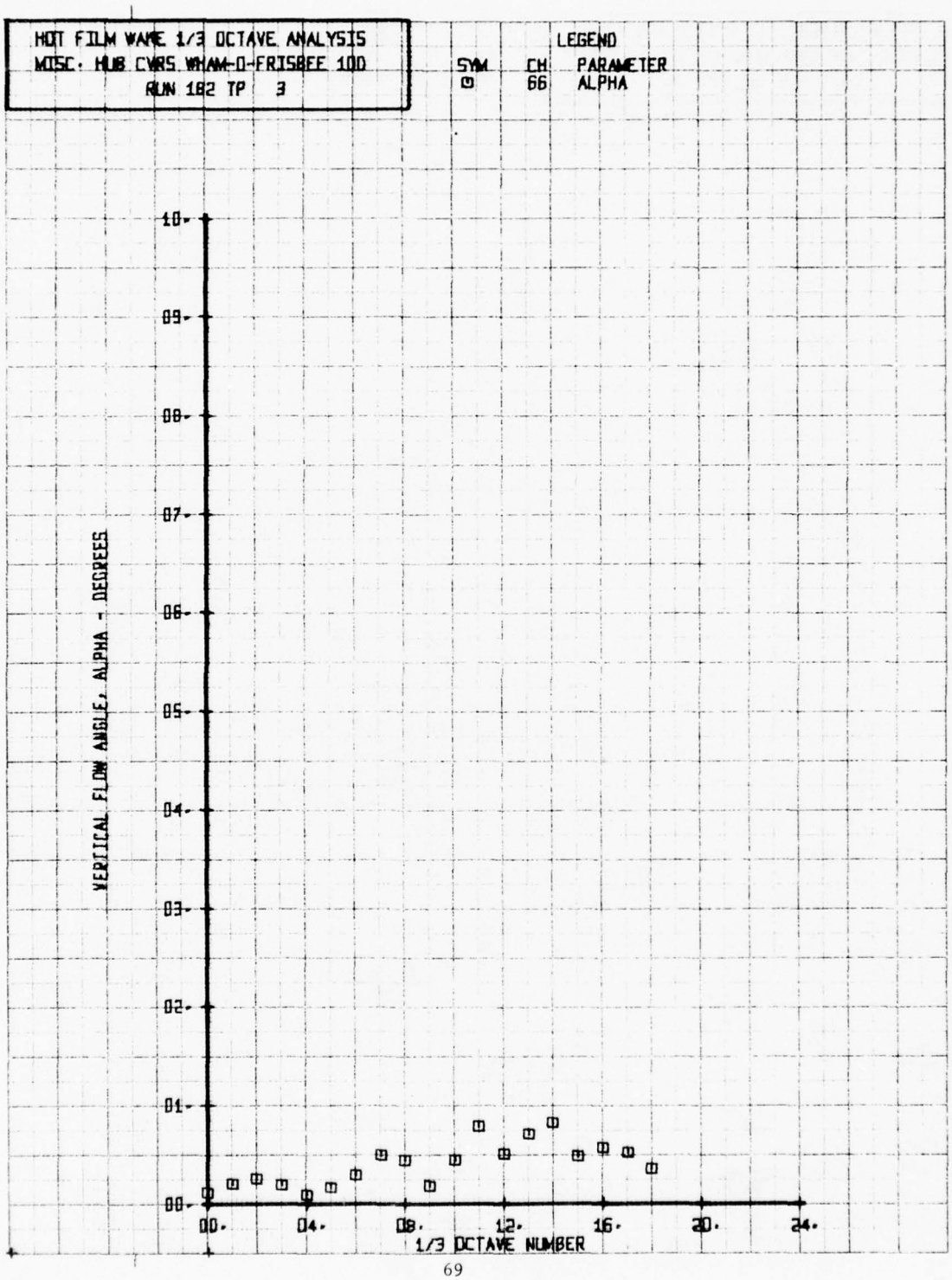
24.
1/3 OCTAVE NUMBER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MISC. HUB CVRS WHAM-O-FRISBEE 100
RUN 182 TP 3
LEGEND
SYM CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
1/3 OCTAVE NUMBER
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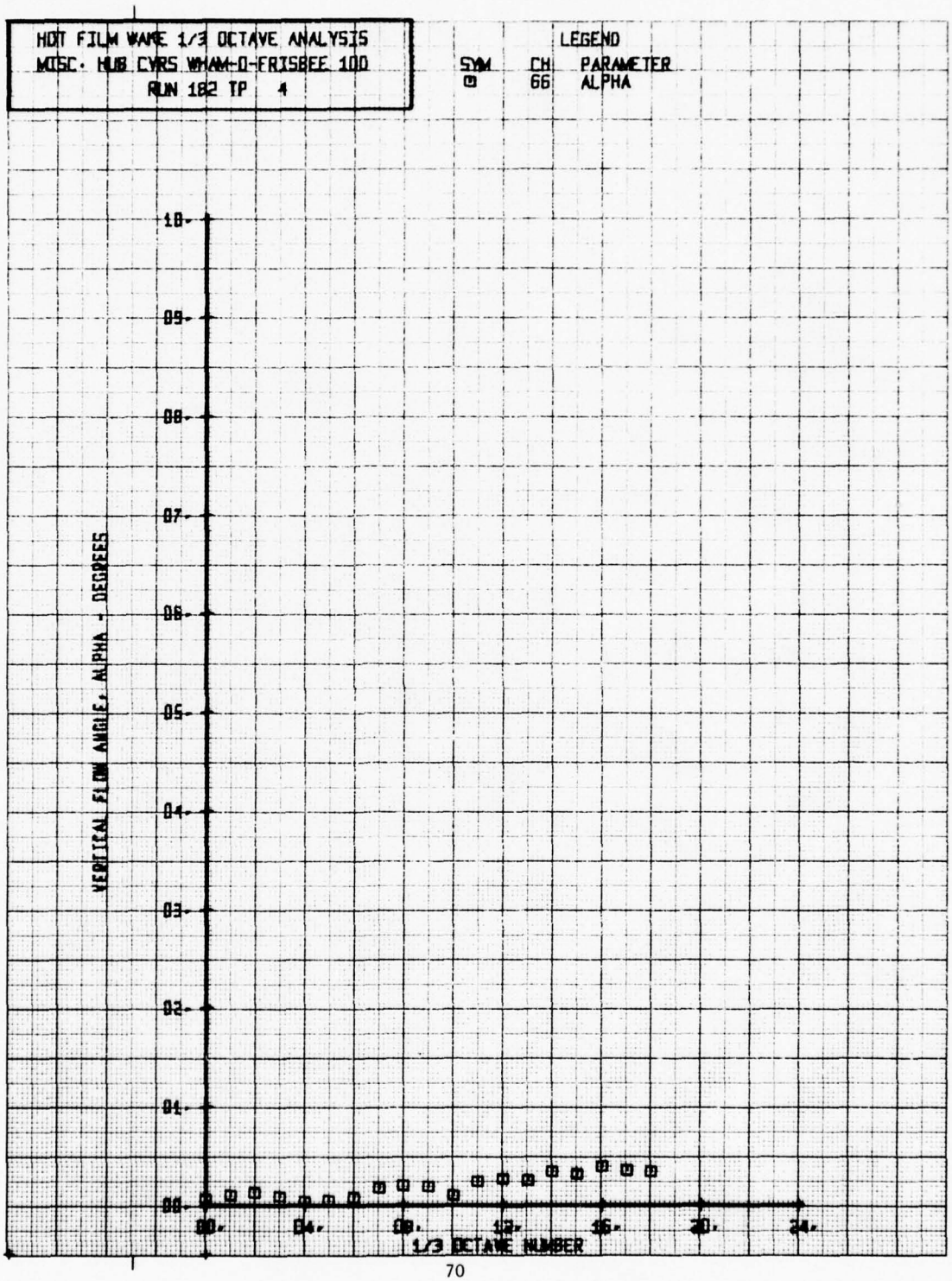
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
MISC. HUB CYRS WHAM-O-FRISBEE 100
RUN 182 TP 4
LEGEND
SYM CH PARAMETER
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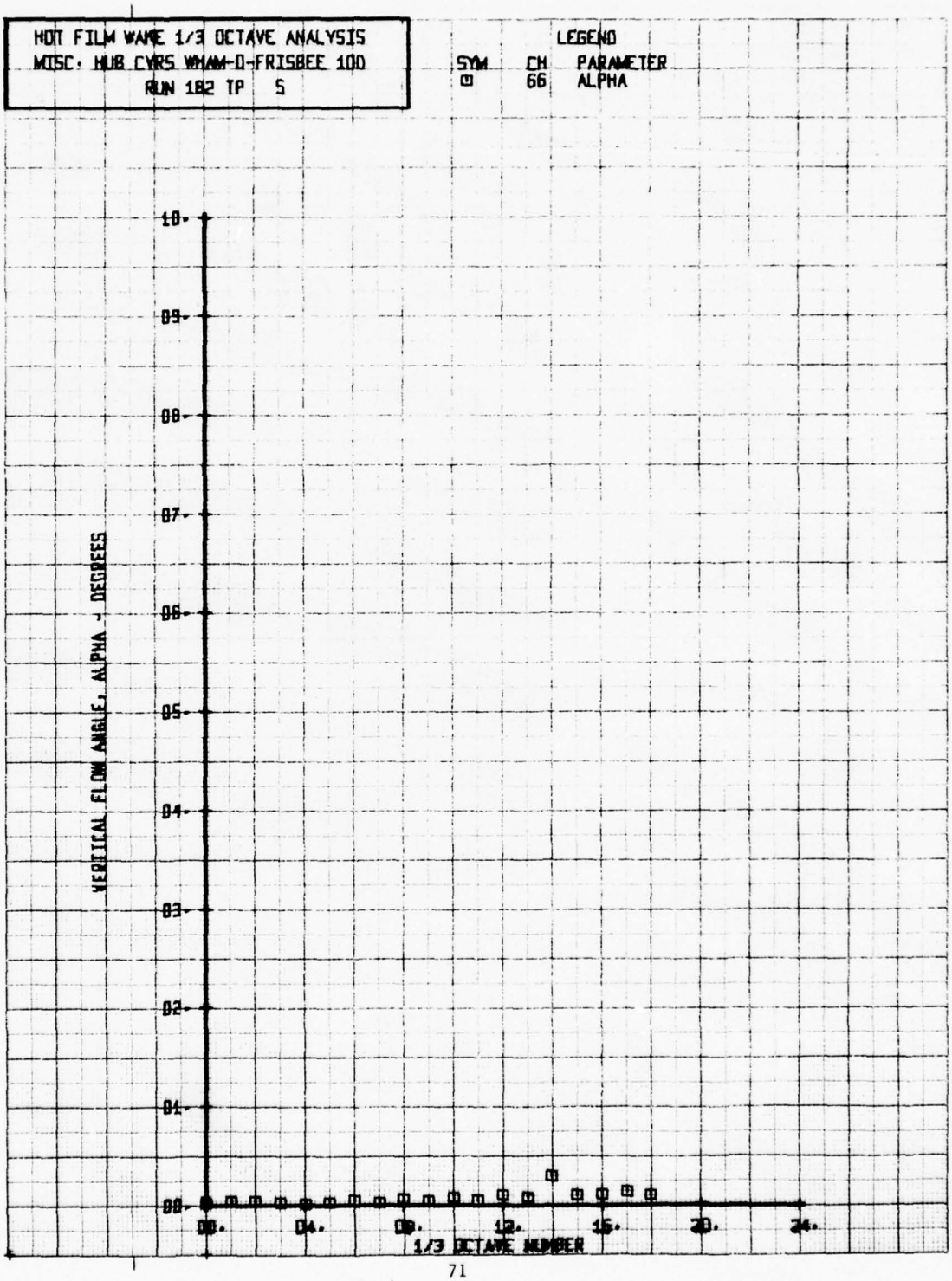
VERTICAL FLOW ANGLE, ALPHA - DEGREES
1/3 OCTAVE NUMBER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MISC: HUB CYRS WMAM-D-FRISBEE 100
RUN 182 TP 5
LEGEND
SYM CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA , DEGREES
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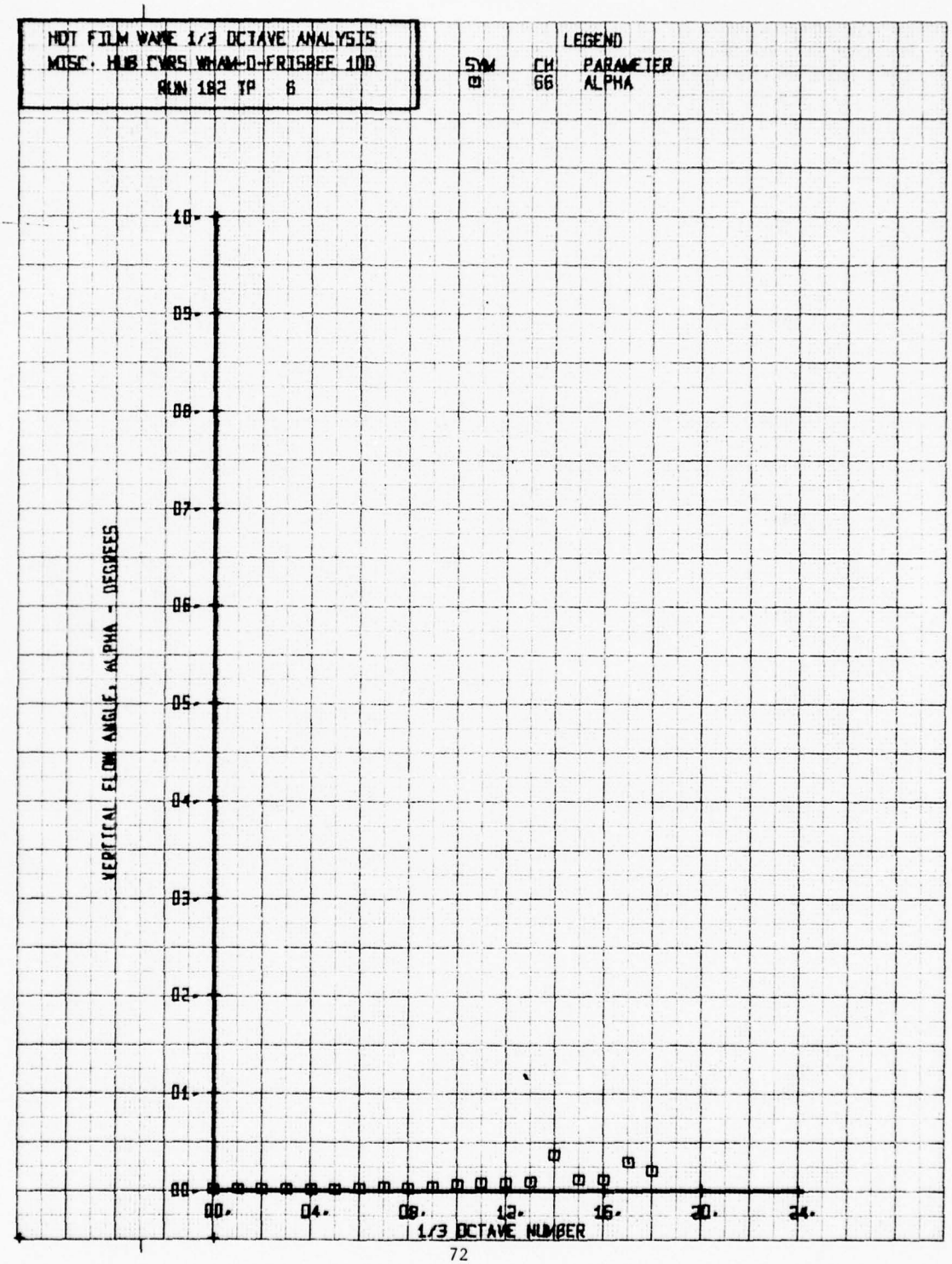
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
MISC. HUB CVRS WHAM-O-FRISBEE 10D
RUN 182 TP 6
LEGEND
SYM CH PARAMETER
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VERTICAL FLOW ANGLE, ALPHA - DEGREES
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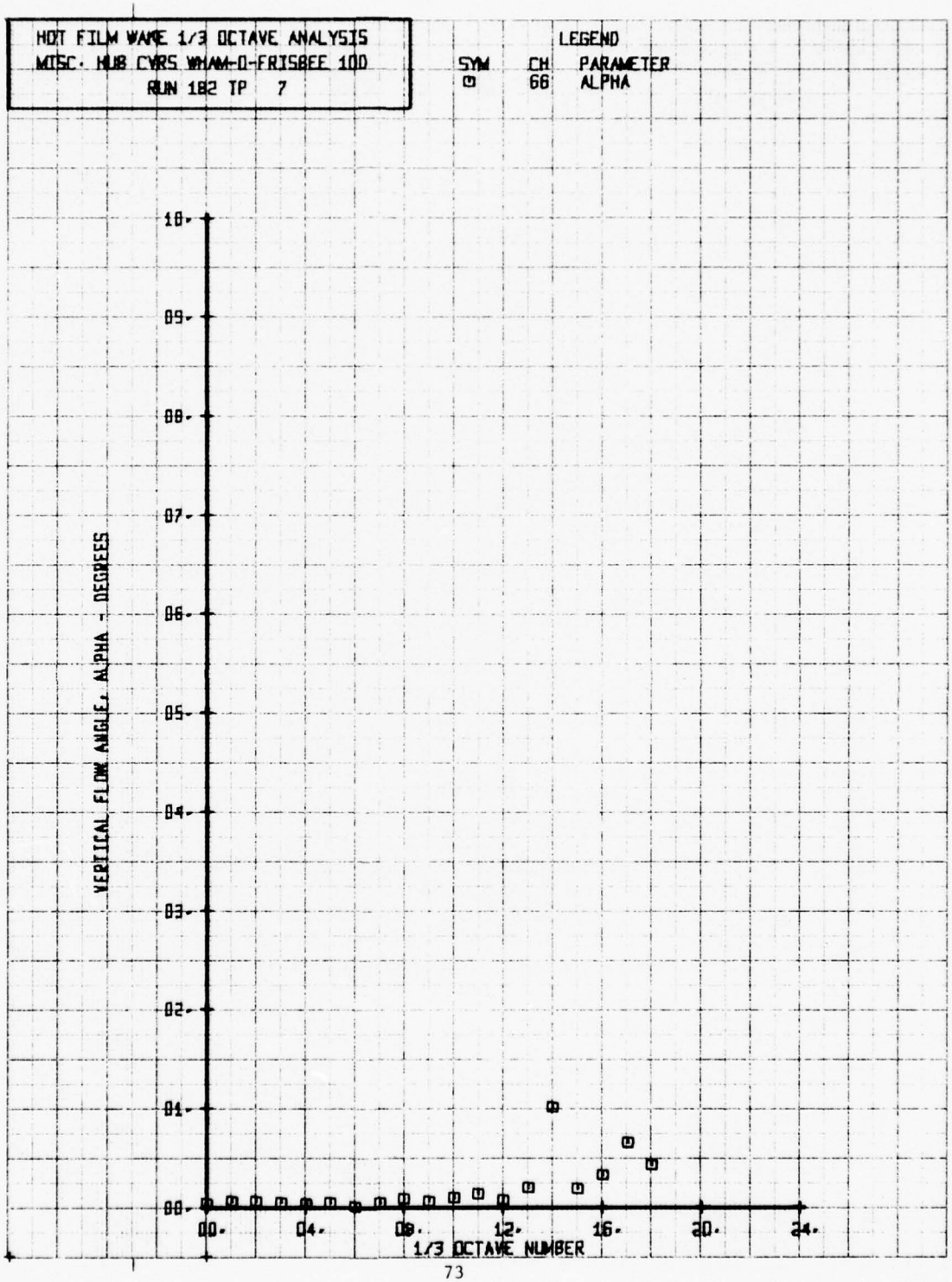
1/3 OCTAVE NUMBER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MISC. HUB CVRS WHAM-O-FRISBEE 10D
RUN 182 TP 7
LEGEND
SYM CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
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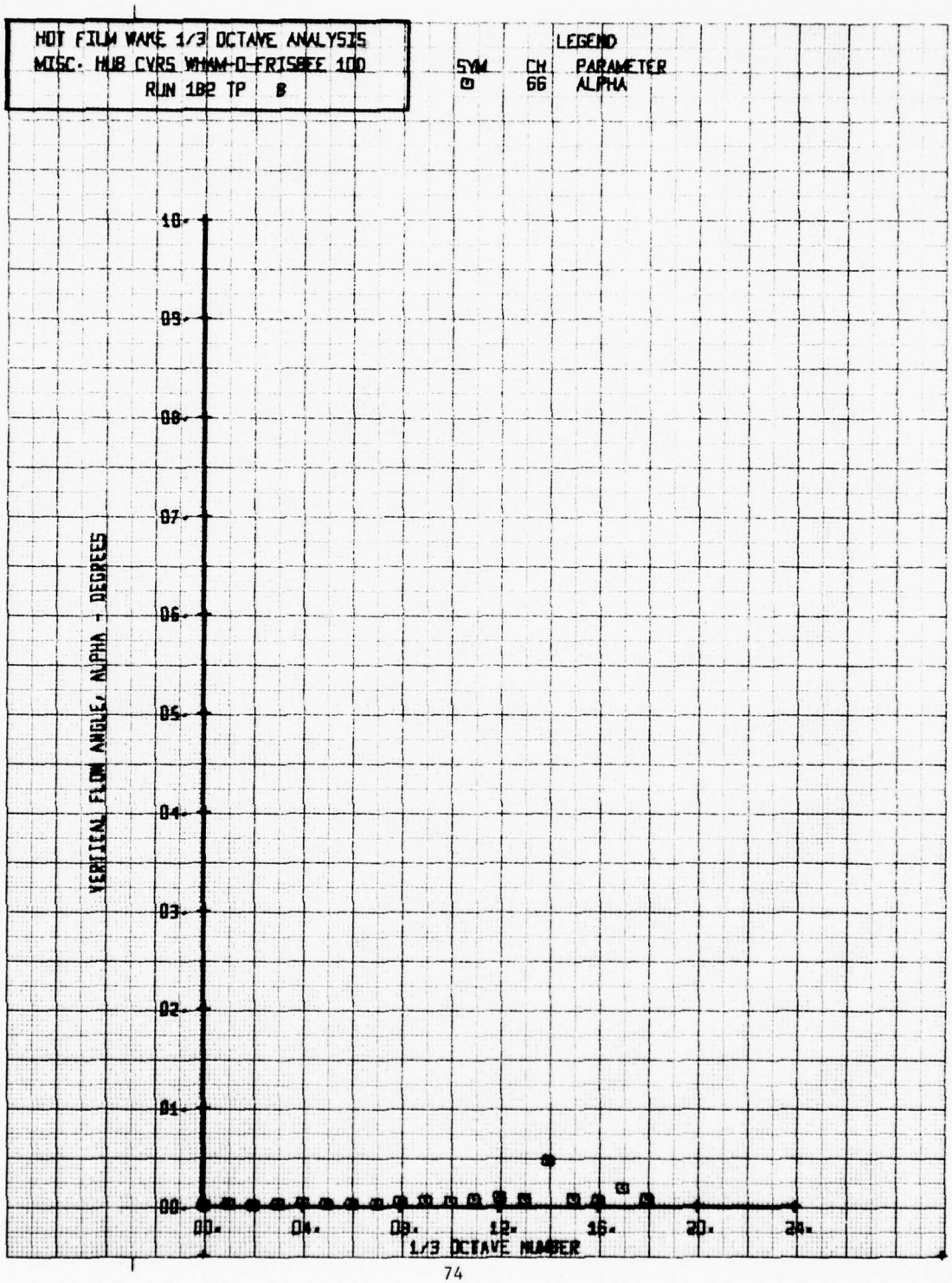
1/3 OCTAVE NUMBER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MISC. HUB CVRS WHAM-O-FRISBEE 100
RUN 182 TP 8
LEGEND
SYM CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
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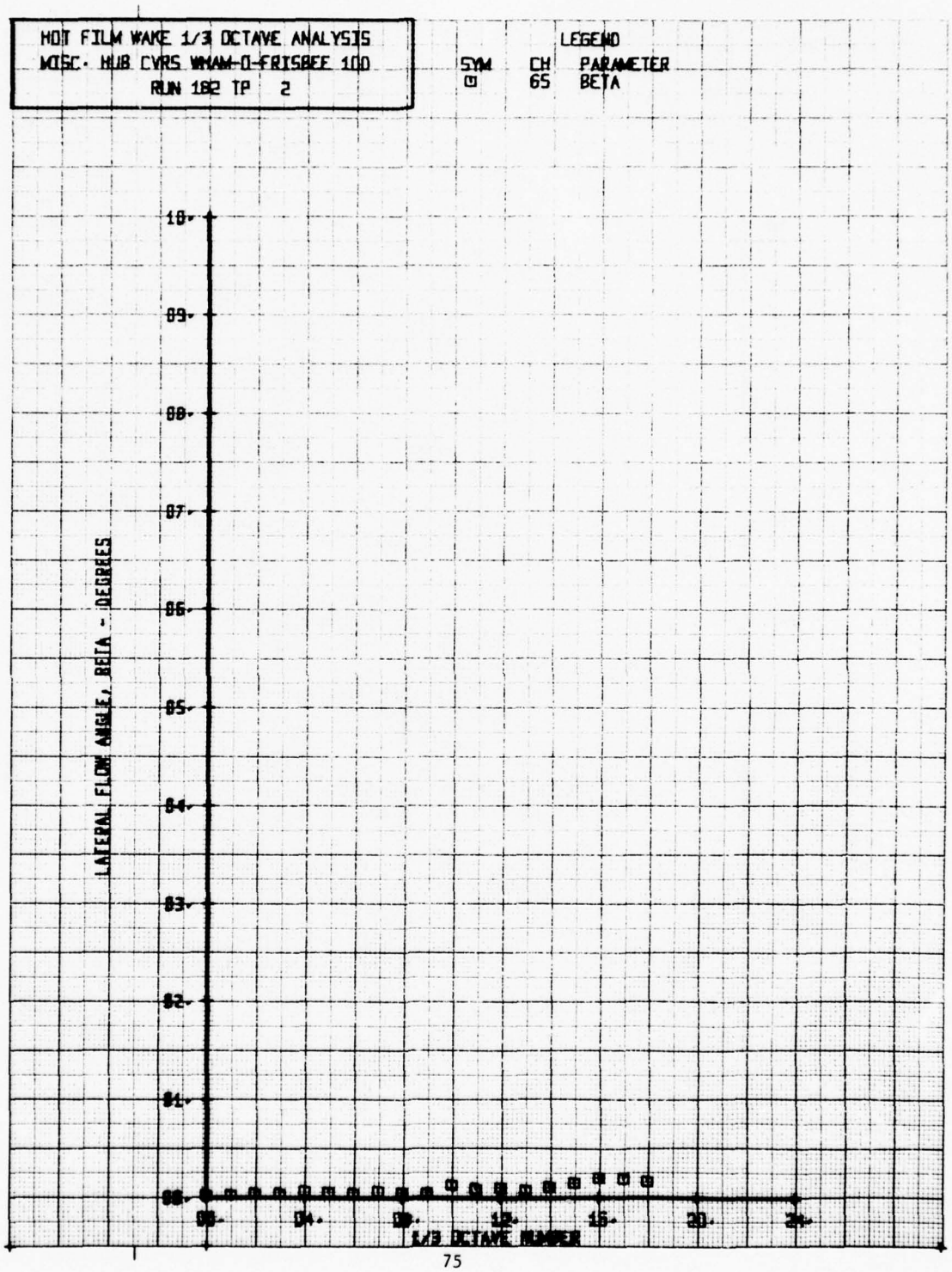
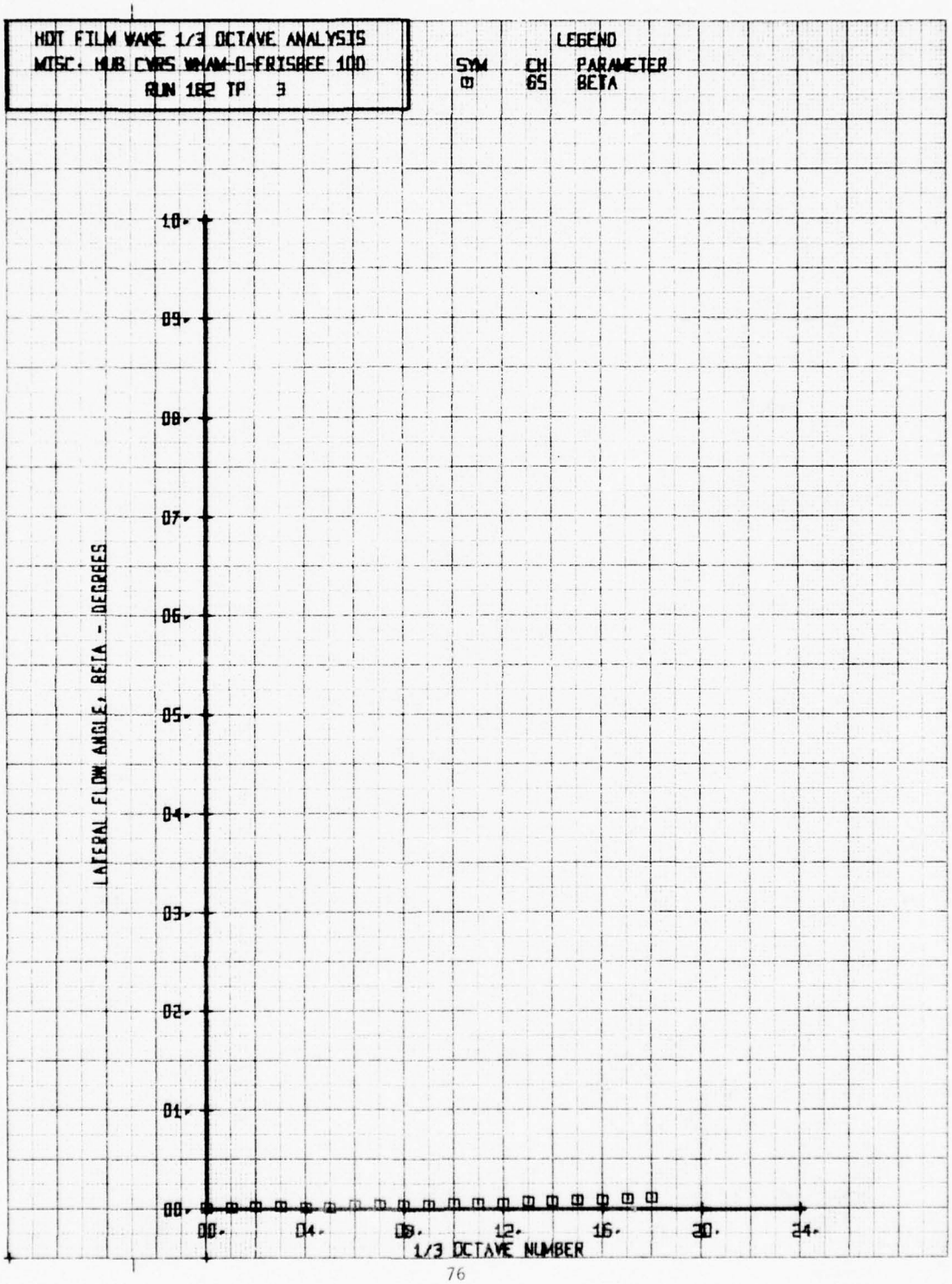
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
MISC. HUB CVRS WMAM-0-FRISBEE 100
RUN 182 TP 2
LEGEND
SYM CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
MISC: MUB CVRS WHAM-O-FRISBEE 100
RUN 182 TP 3
LEGEND
SYM CH PARAMETER
65 BETA
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LATERAL FLOW ANGLE, BETA - DEGREES
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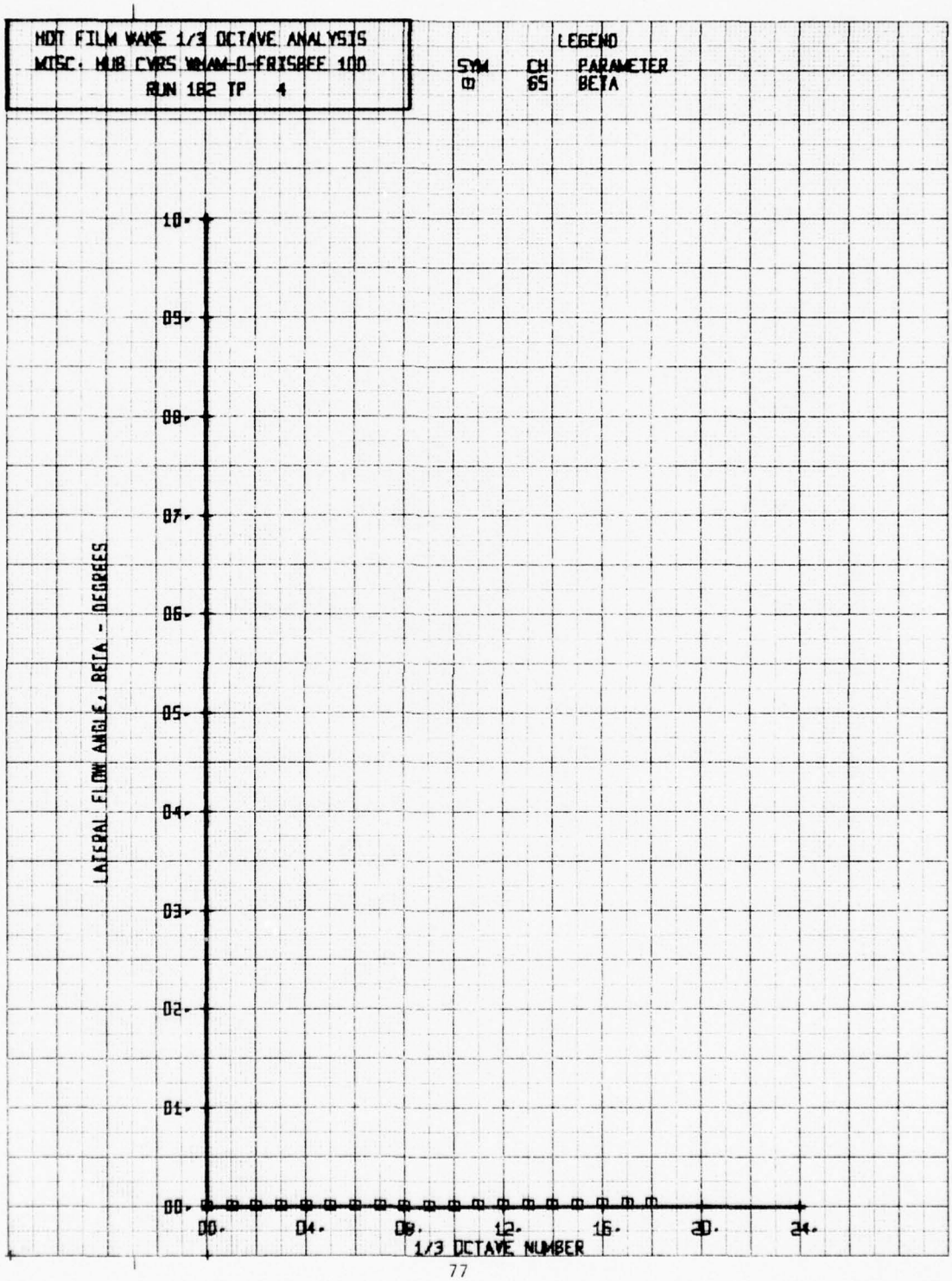
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
MISC. HUB CVRS WRAM-0-FRISBEE 100
RUN 182 TP 4
LEGEND
SYM CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
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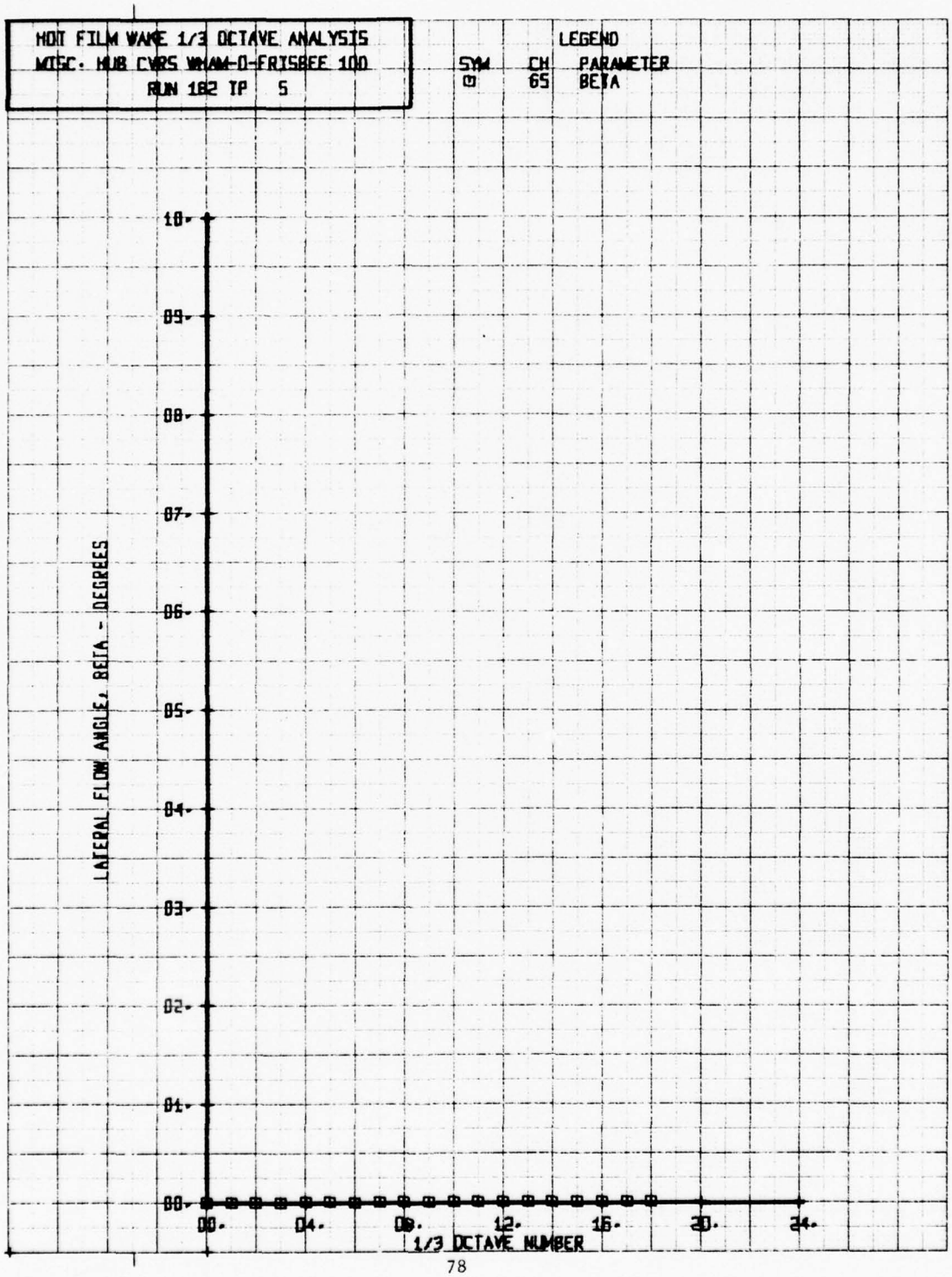
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
MISC. HUB CVRS WHAM-O-FRISBEE 100
RUN 182 TP 5
LEGEND
SYM CH PARAMETER
65 BETA
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LATERAL FLOW ANGLE, BETA - DEGREES
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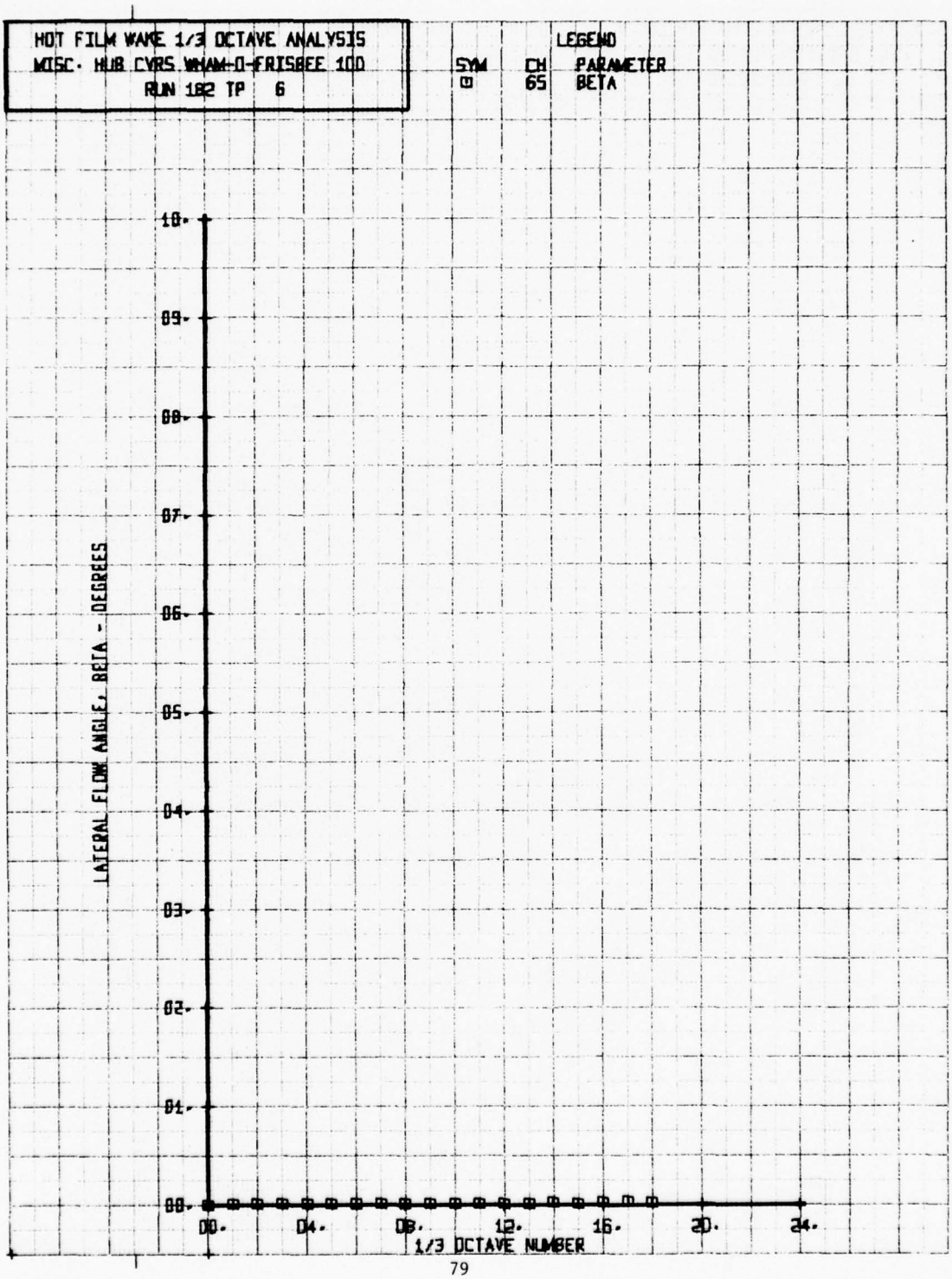
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
MISC. HUB CVRS WHAM-O-FRISBEE 100
RUN 182 TP 6
LEGEND
SYM CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
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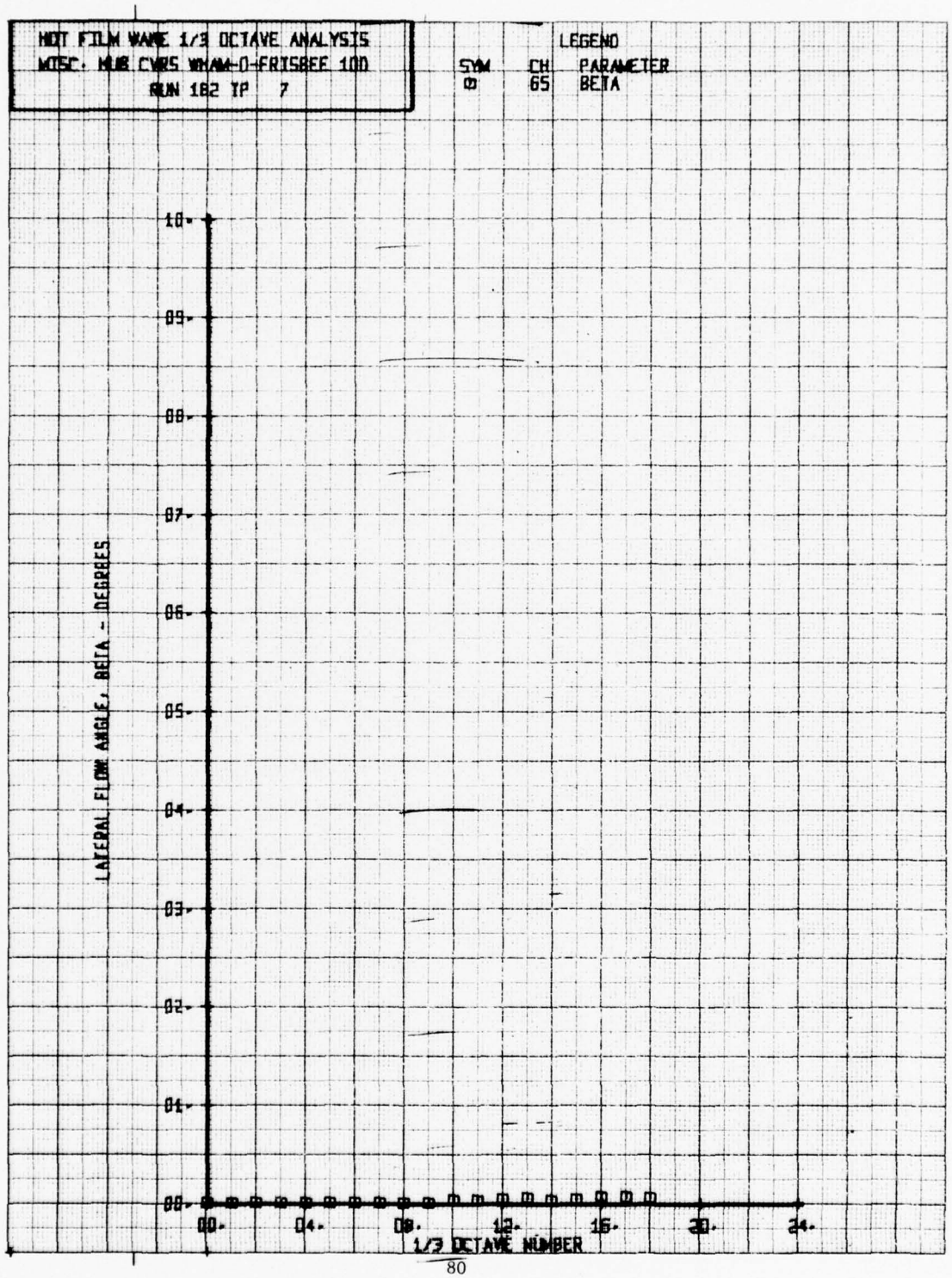
1/3 OCTAVE NUMBER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MISC: MUB CVRS WAKA-0-FRISBEE 100
RUN 182 TP 7
LEGEND
SYM CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
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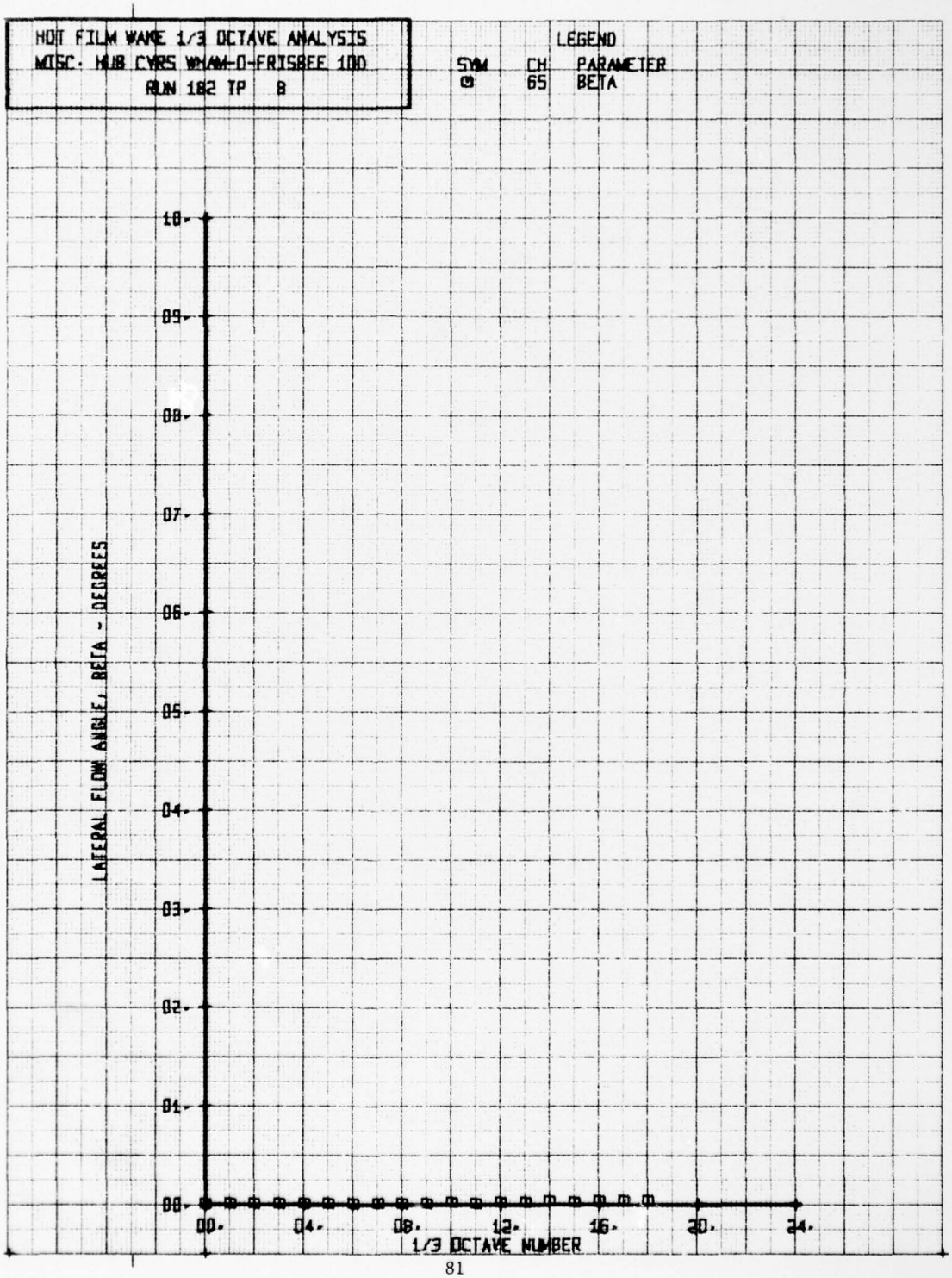
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
MISC. HUB CVRS WHAM-O-FRISBEE 100
RUN 182 TP 8
LEGEND
SYM CH PARAMETER
65 BETA
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LATERAL FLOW ANGLE, BETA - DEGREES
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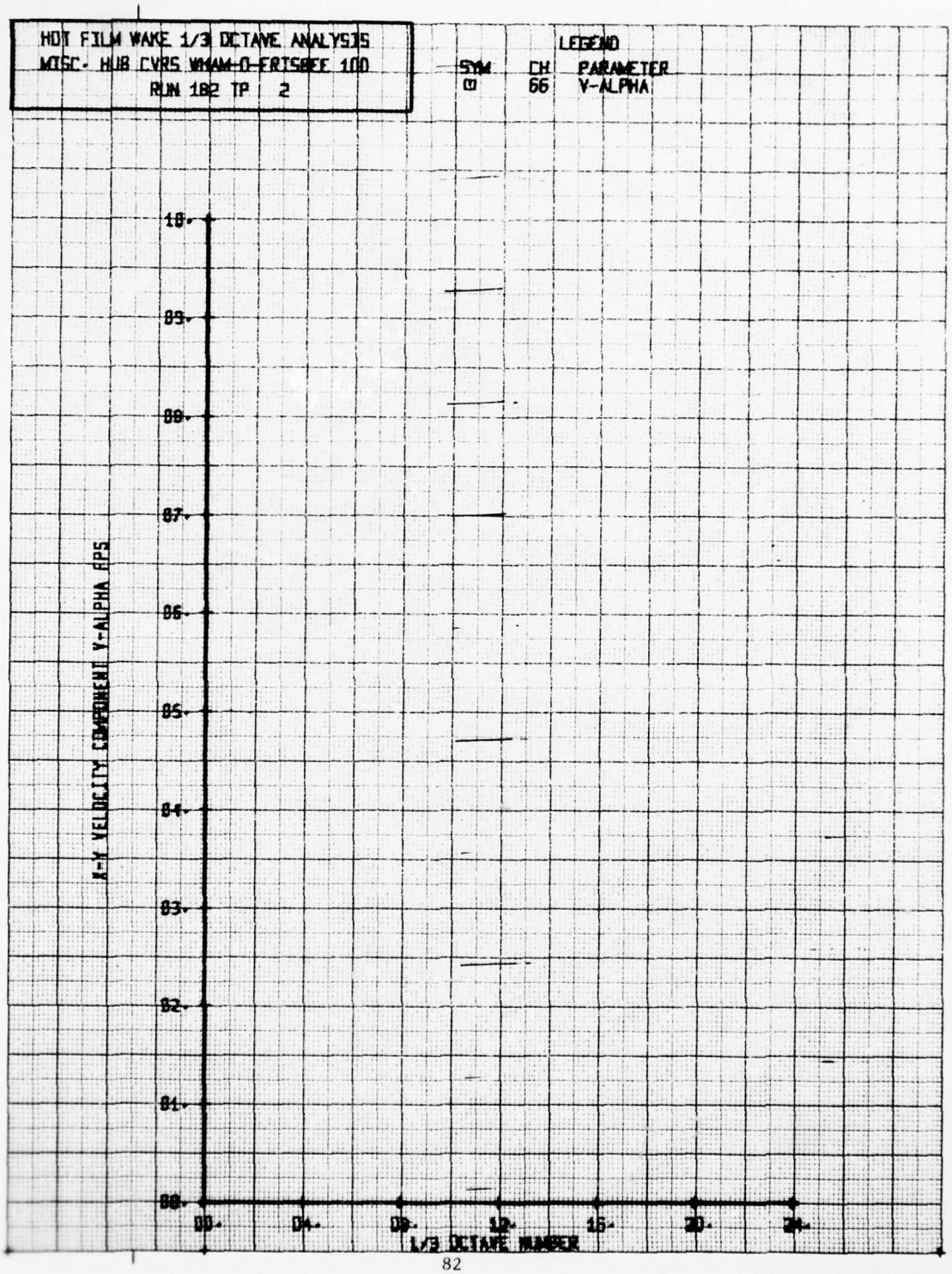
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
MISC. HUB CVRS WHAM-O-FRISBEE 100
RUN 182 TP 2
LEGEND
SYM CH PARAMETER
66 V-ALPHA
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A-V VELOCITY COMPONENT V-ALPHA FPS
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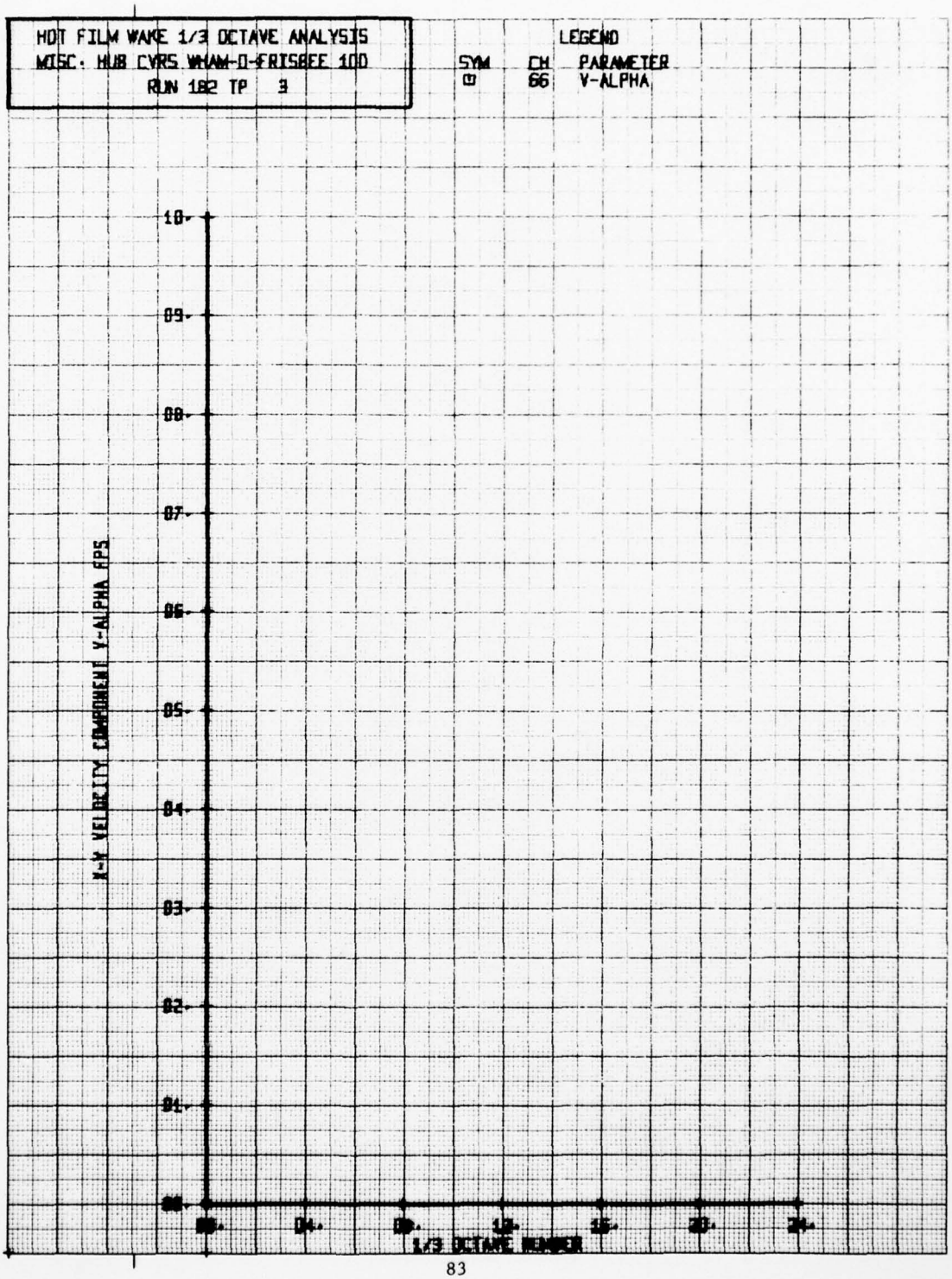
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
MISC. HUB CYRS WHAM-O-FRISBEE 100
RUN 182 TP 3
LEGEND
SYM CH PARAMETER
66 V-ALPHA
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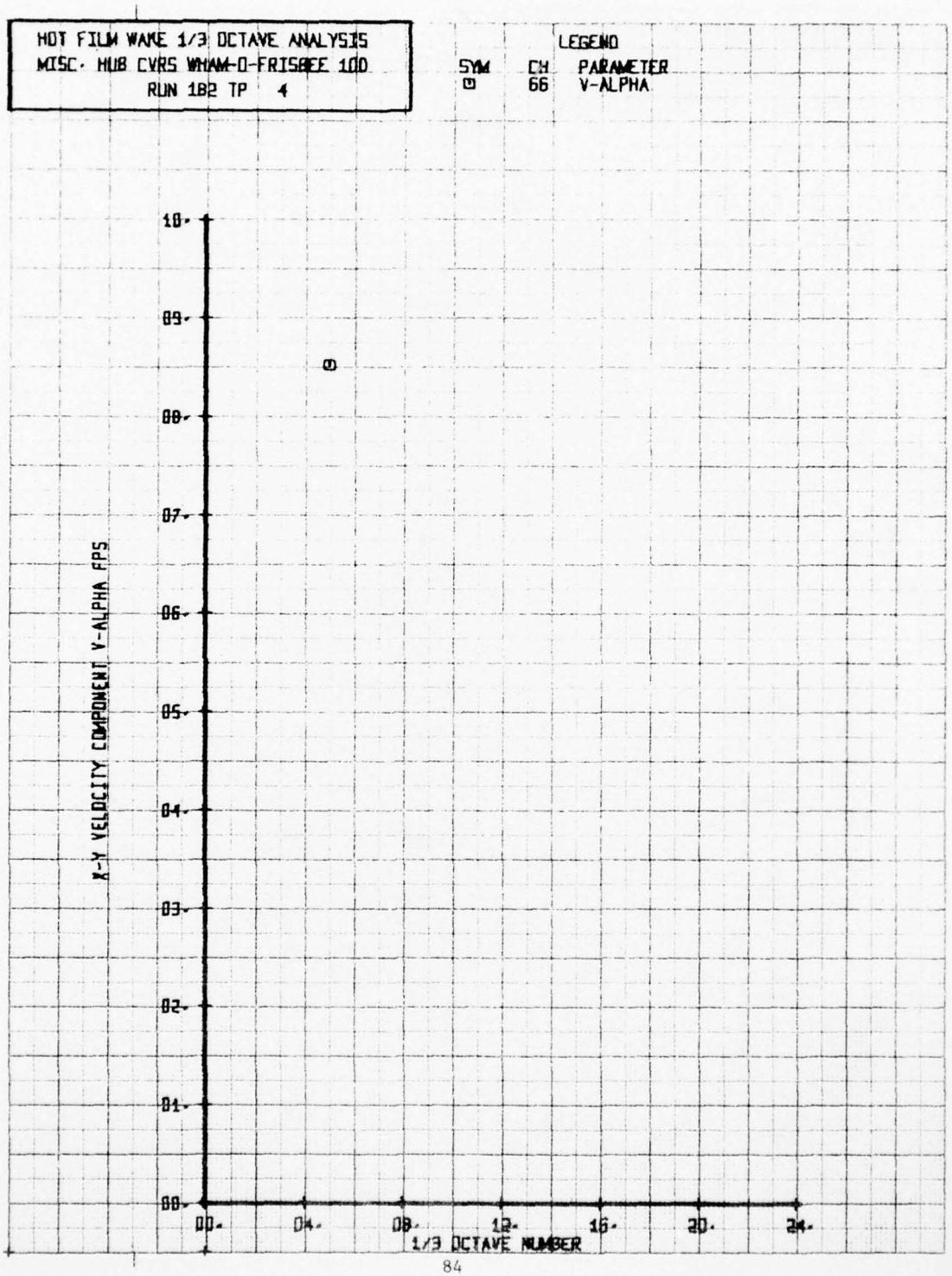
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
MISC. HUB CVRS WHAM-O-FRISBEE 100
RUN 182 TP 4
LEGEND
SYM CH PARAMETER
66 V-ALPHA
X-Y VELOCITY COMPONENT V-ALPHA FPS
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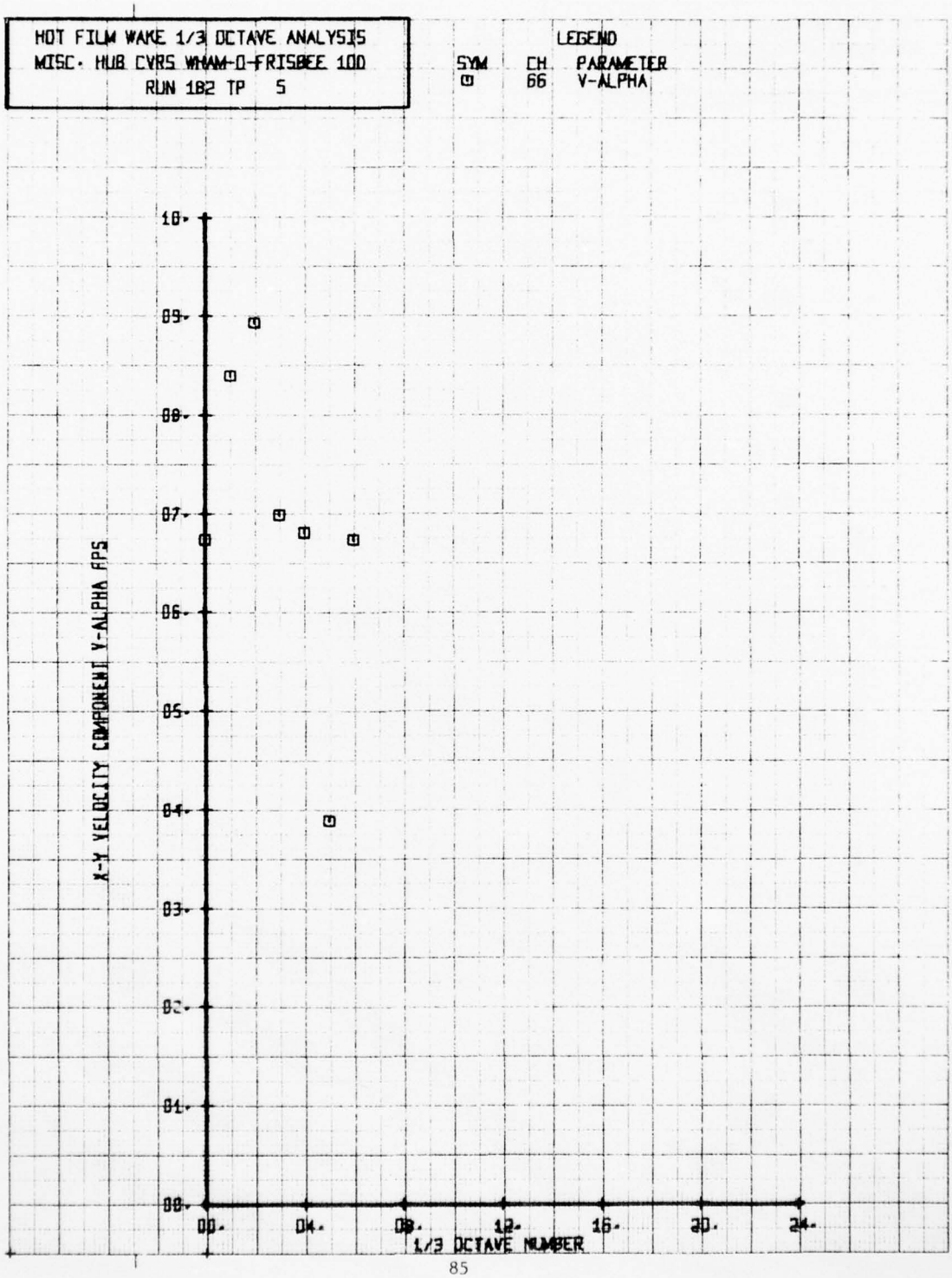
1/3 OCTAVE NUMBER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MISC. HUB CVRS WHAM-O-FRISBEE 100
RUN 182 TP 5
LEGEND
SYM CH PARAMETER
66 V-ALPHA
X-Y VELOCITY COMPONENT V-ALPHA FPS
1/3 OCTAVE NUMBER
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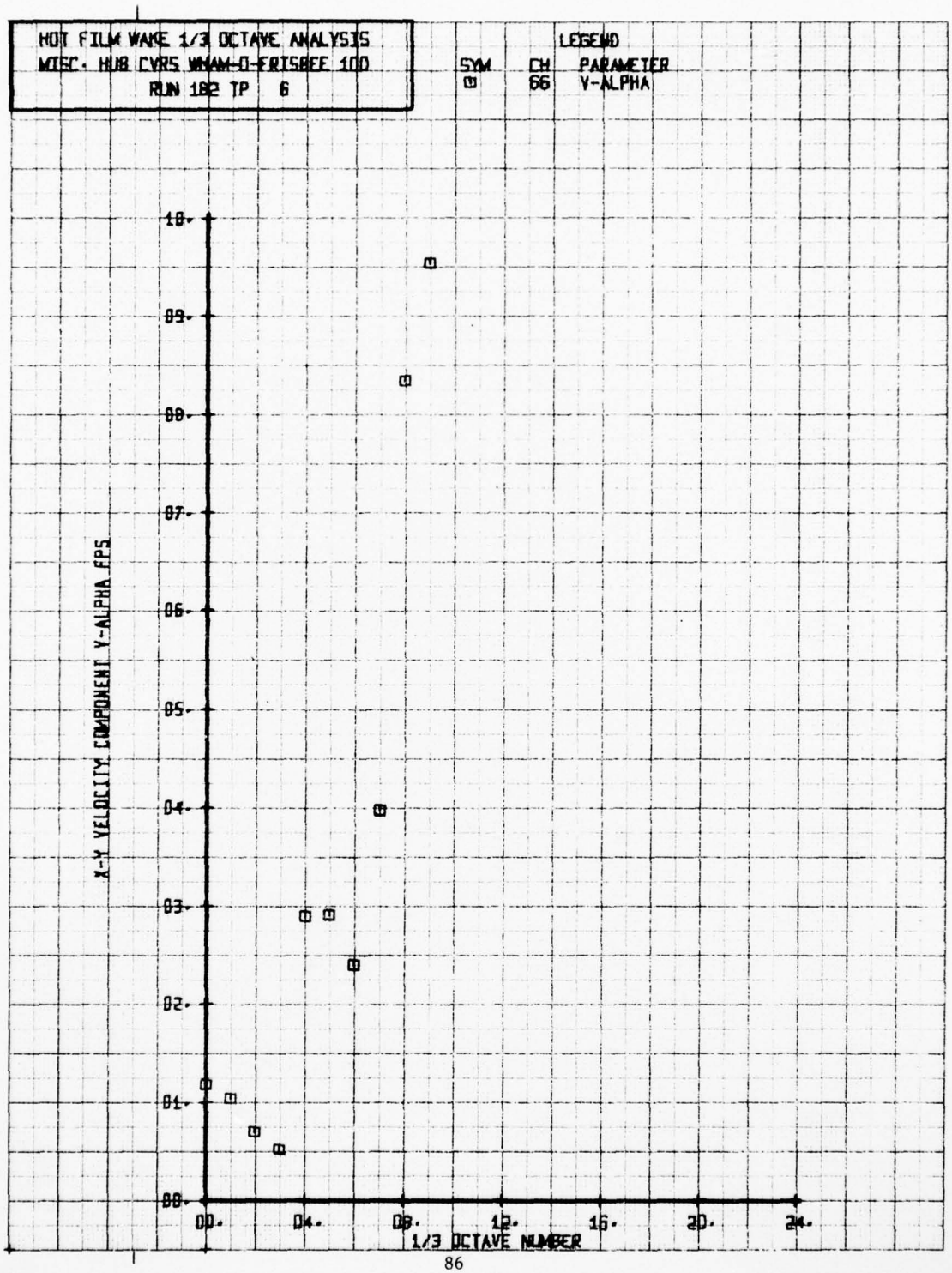
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RUN 182 TP 6
LEGEND
SYM CH PARAMETER
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X-Y VELOCITY COMPONENT V-ALPHA FPS
1/3 OCTAVE NUMBER
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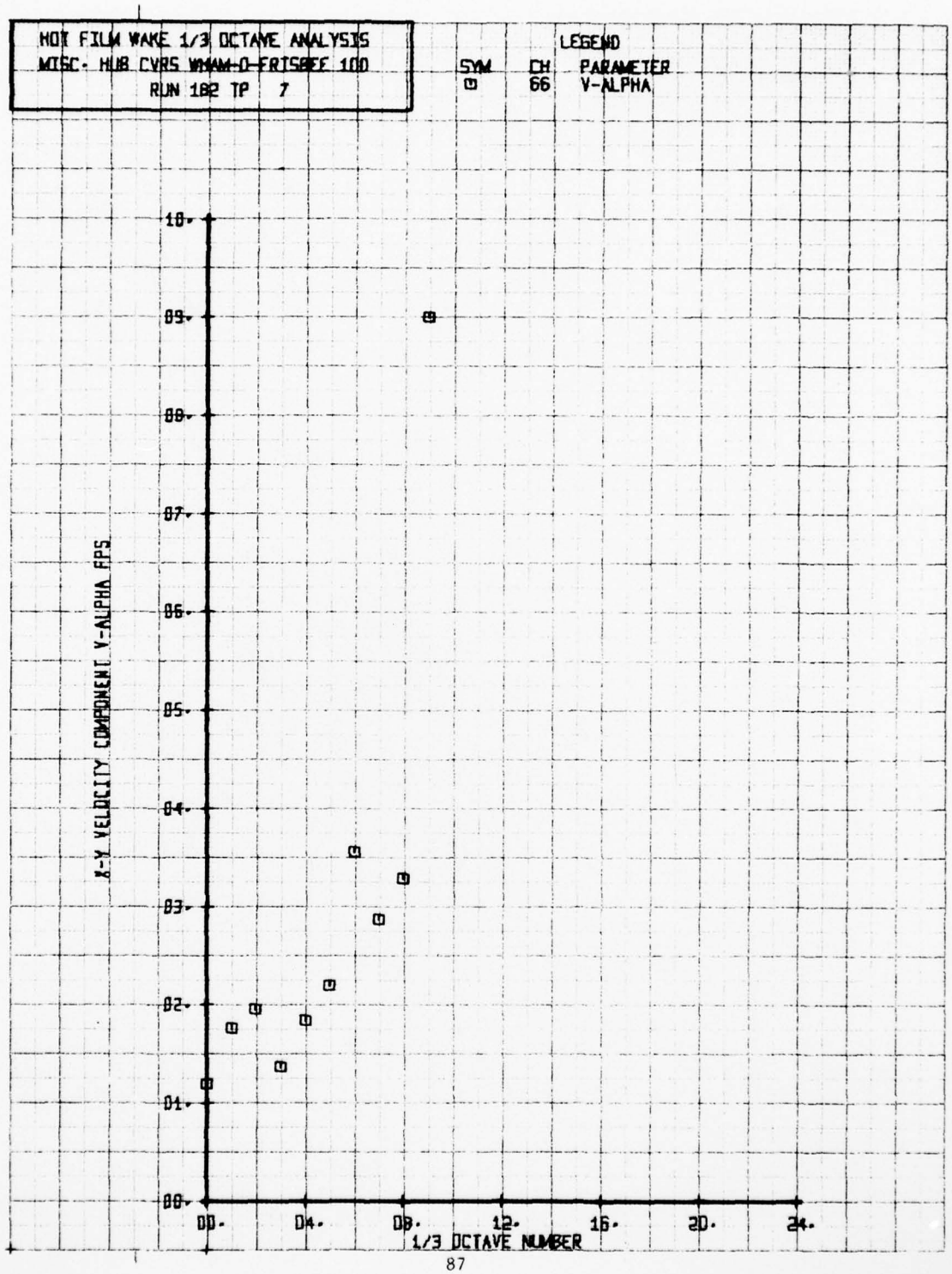
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
MISC. HUB CVRS WHAM-O-FRISBEE 100
RUN 182 TP 7
LEGEND
SYM CH PARAMETER
66 V-ALPHA
X-V VELOCITY COMPONENT V-ALPHA FPS
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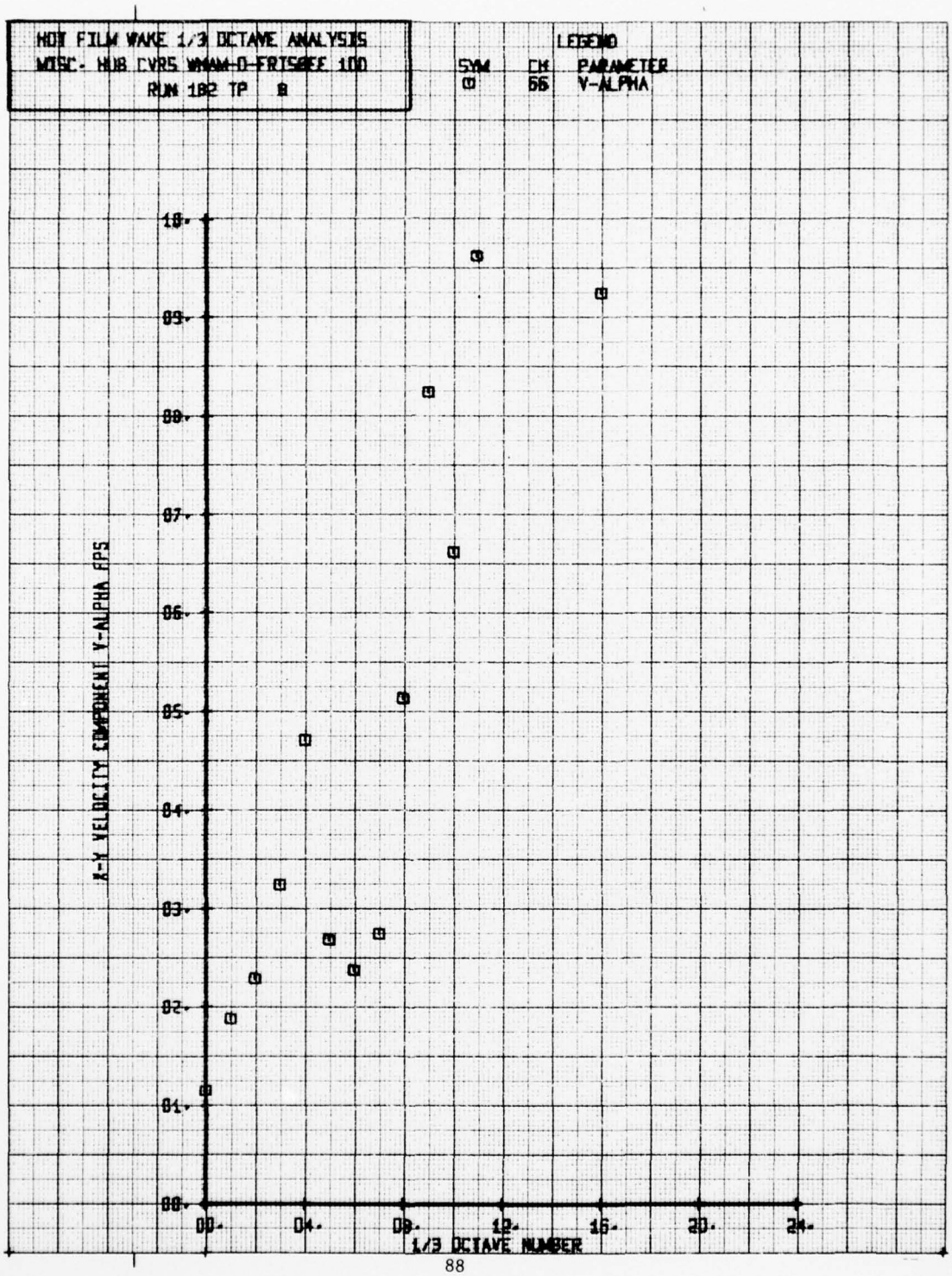
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
MISC. HUB CVRS WMAM-0-FRISBEE 100
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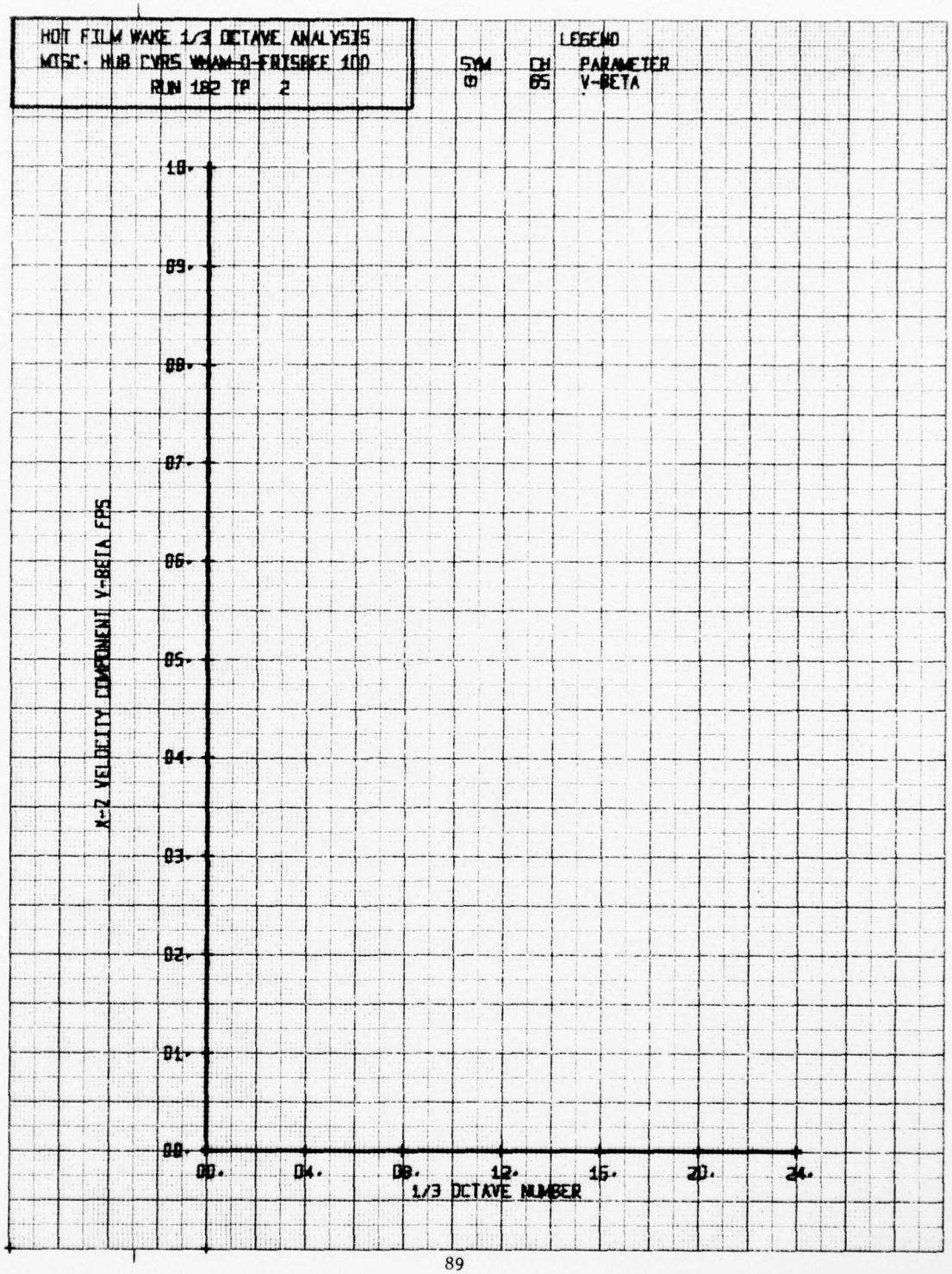
LEGEND
SYM CH PARAMETER
56 V-ALPHA
X-Y VELOCITY COMPONENT V-ALPHA FPS
1/3 OCTAVE NUMBER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MISC. HUB CYRS WHAM-O-FRISBEE 100
RUN 182 TP 2
LEGEND
SYM CH PARAMETER
65 V-BETA
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X-Z VELOCITY COMPONENT V-BETA FPS
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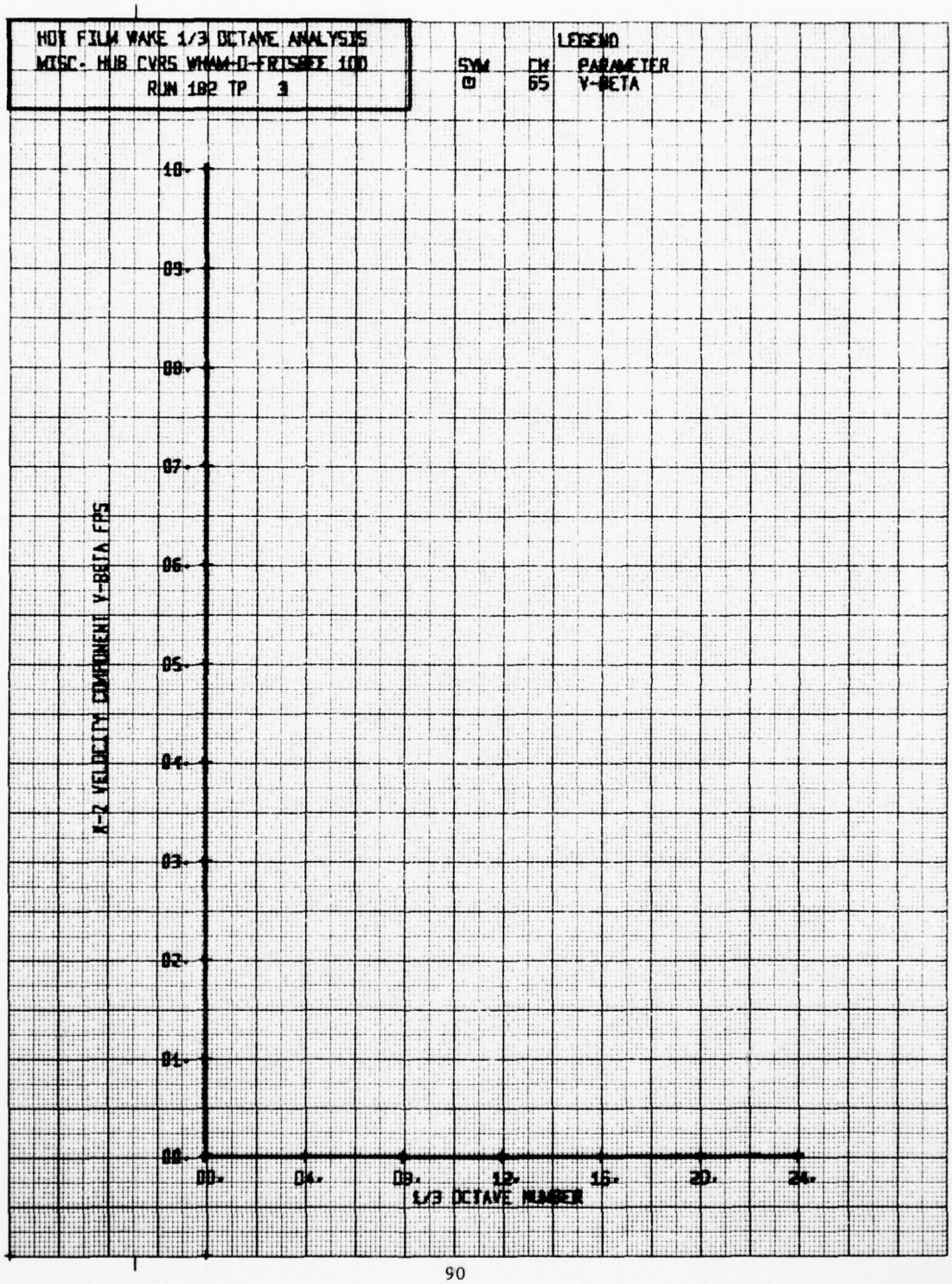
1/3 OCTAVE NUMBER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MISC- HUB CVRS WHAM-0-FRISBEE 100
RUN 182 TP 3
LEGEND
SYM CH PARAMETER
65 V-BETA
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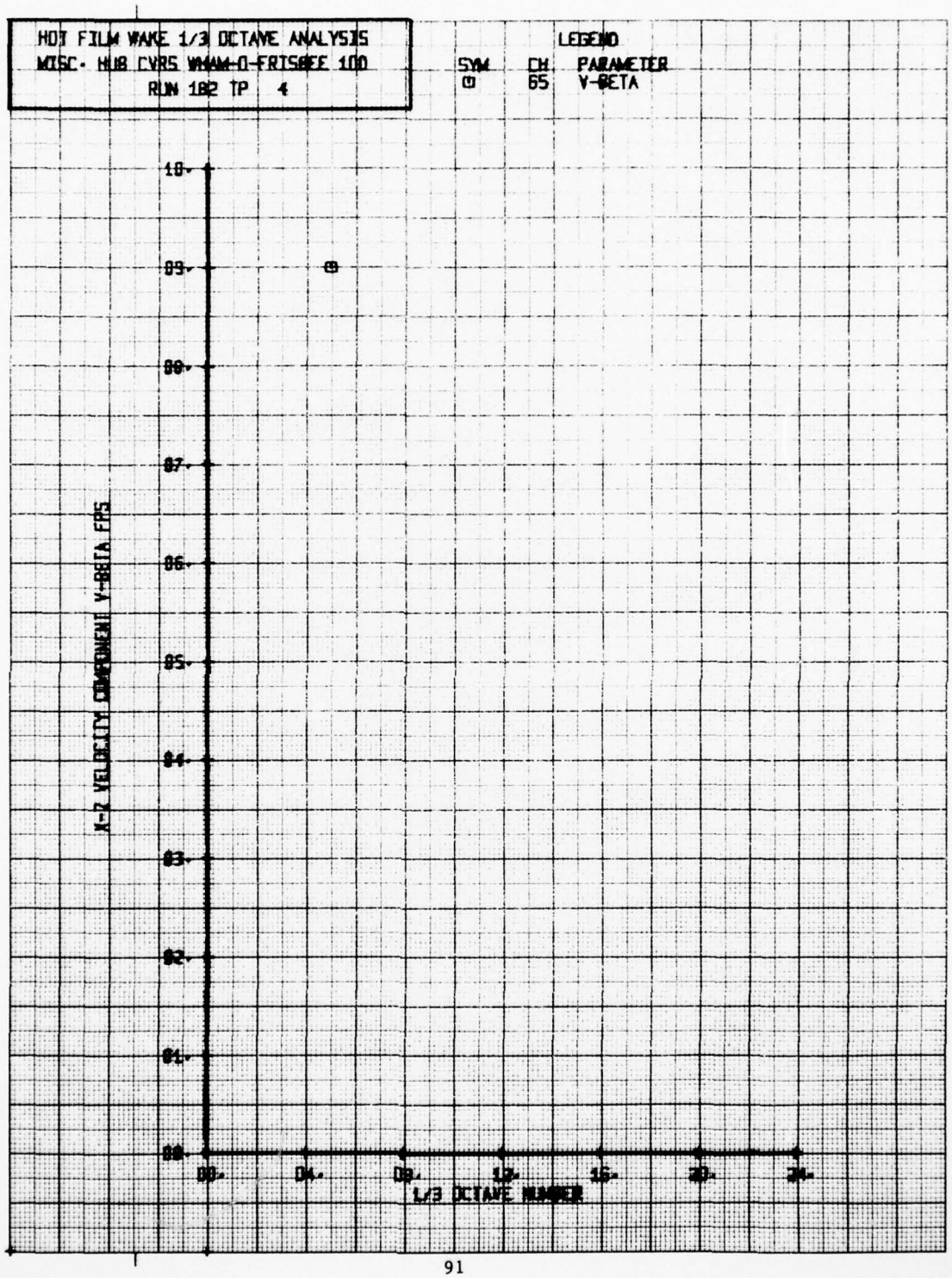
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
MISC. HUB CVRS WMAM-0-FRISBEE 100
RUN 182 TP 4
LEGEND
SYM CH. PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA FRS
1.0
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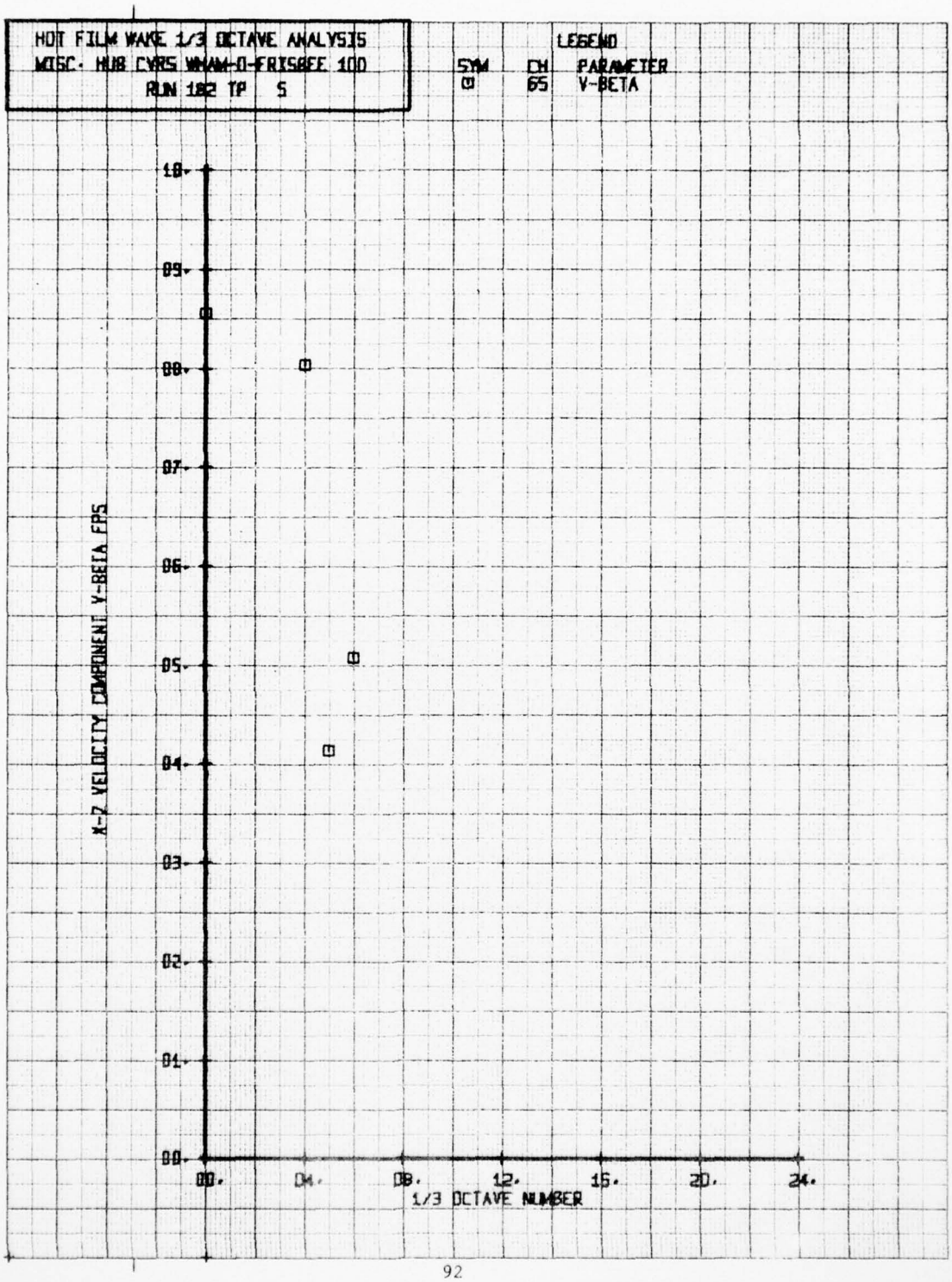
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
MISC. HUB CYRS WHAM-0-FRISBEE 100
RUN 182 TP 5
LEGEND
SYM CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT Y-BETA FPS
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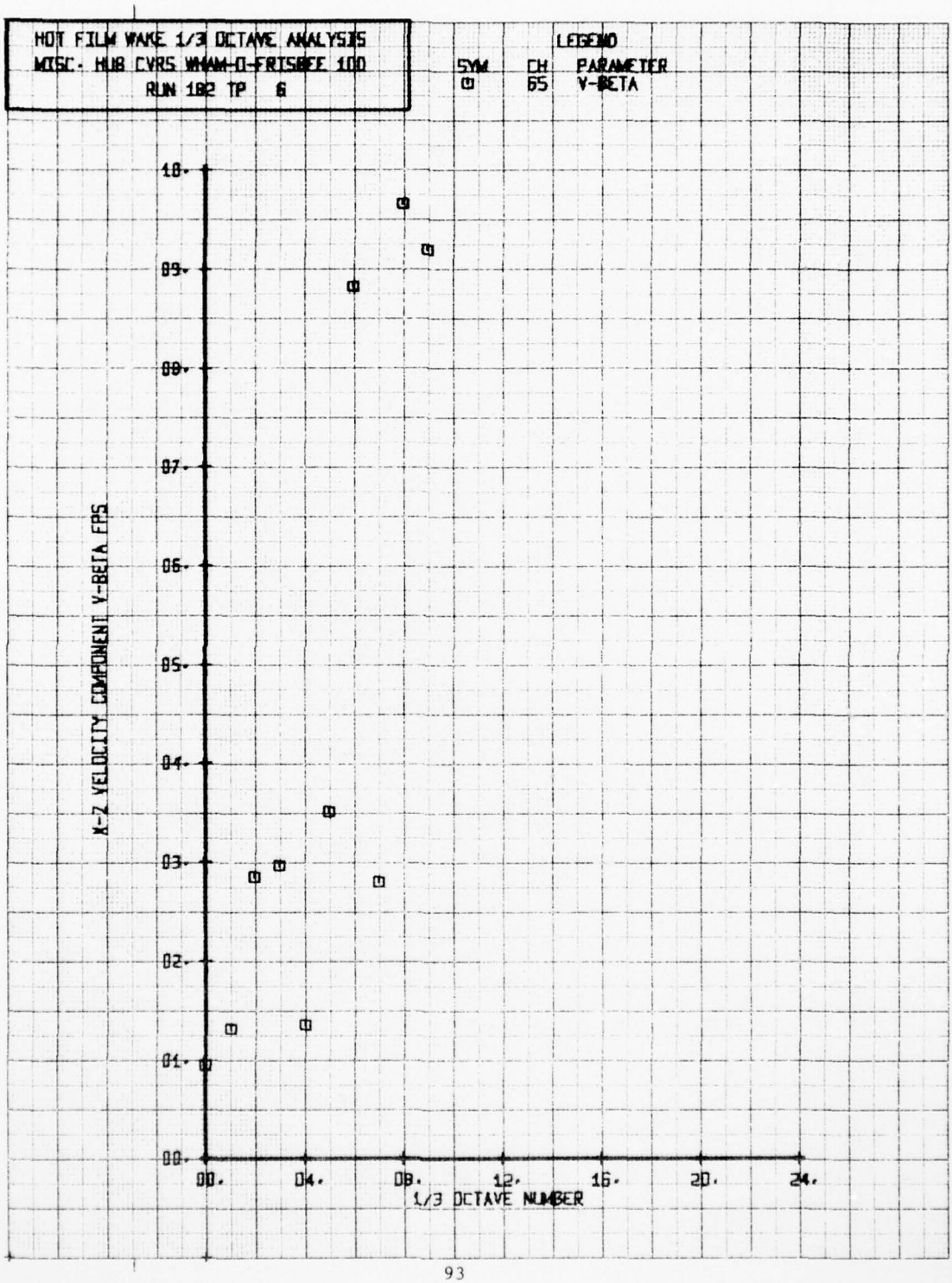
1/3 OCTAVE NUMBER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MISC. HUB CVRS WHAM-O-FRISBEE 100
RUN 182 TP 6
LEGEND
SYM CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA FPS
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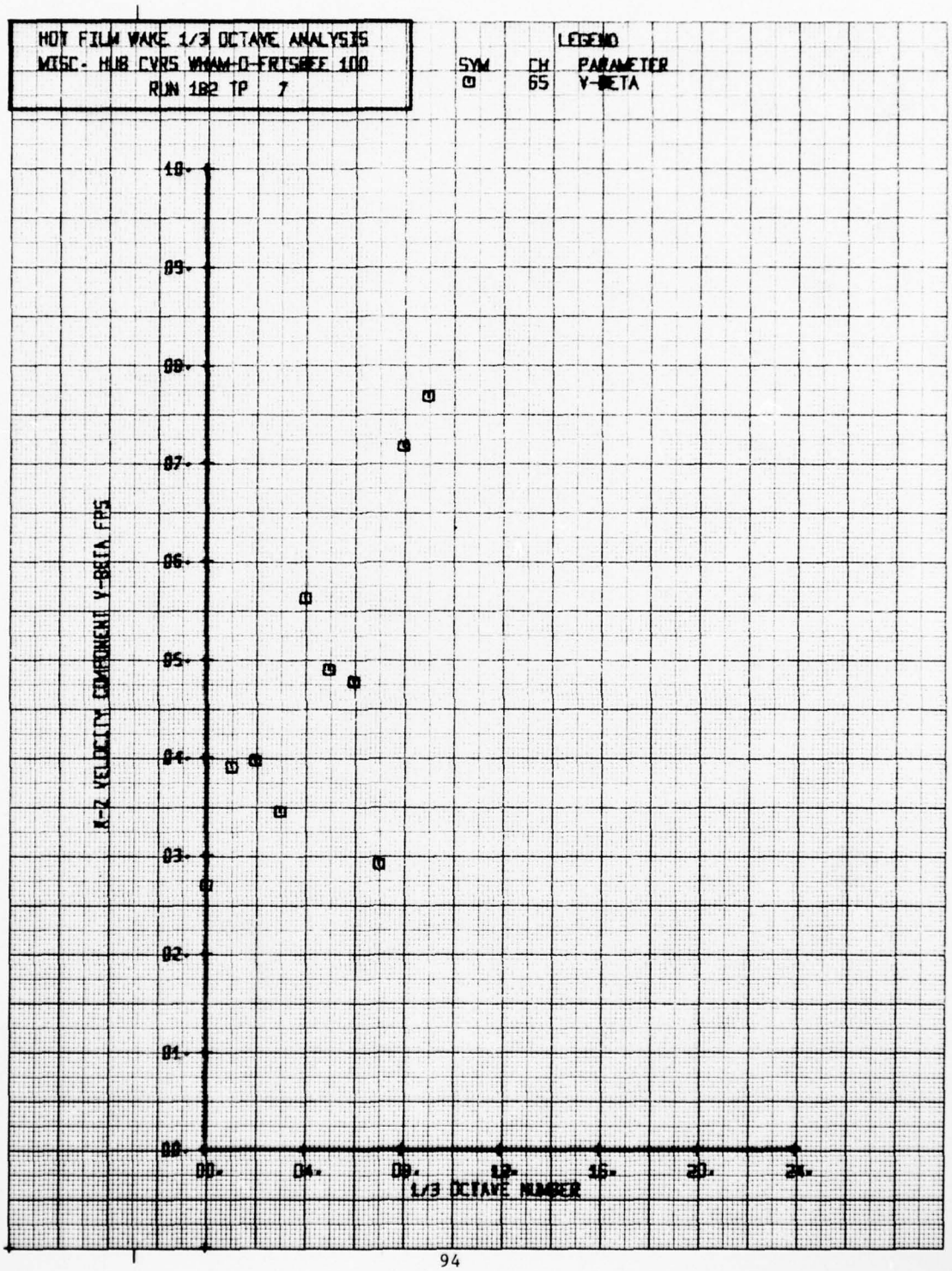
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
MISC- HUB CVRS WMAM-O-FRISBEE 100
RUN 182 TP 7
LEGEND
SYM CH PARAMETER
65 V-BETA
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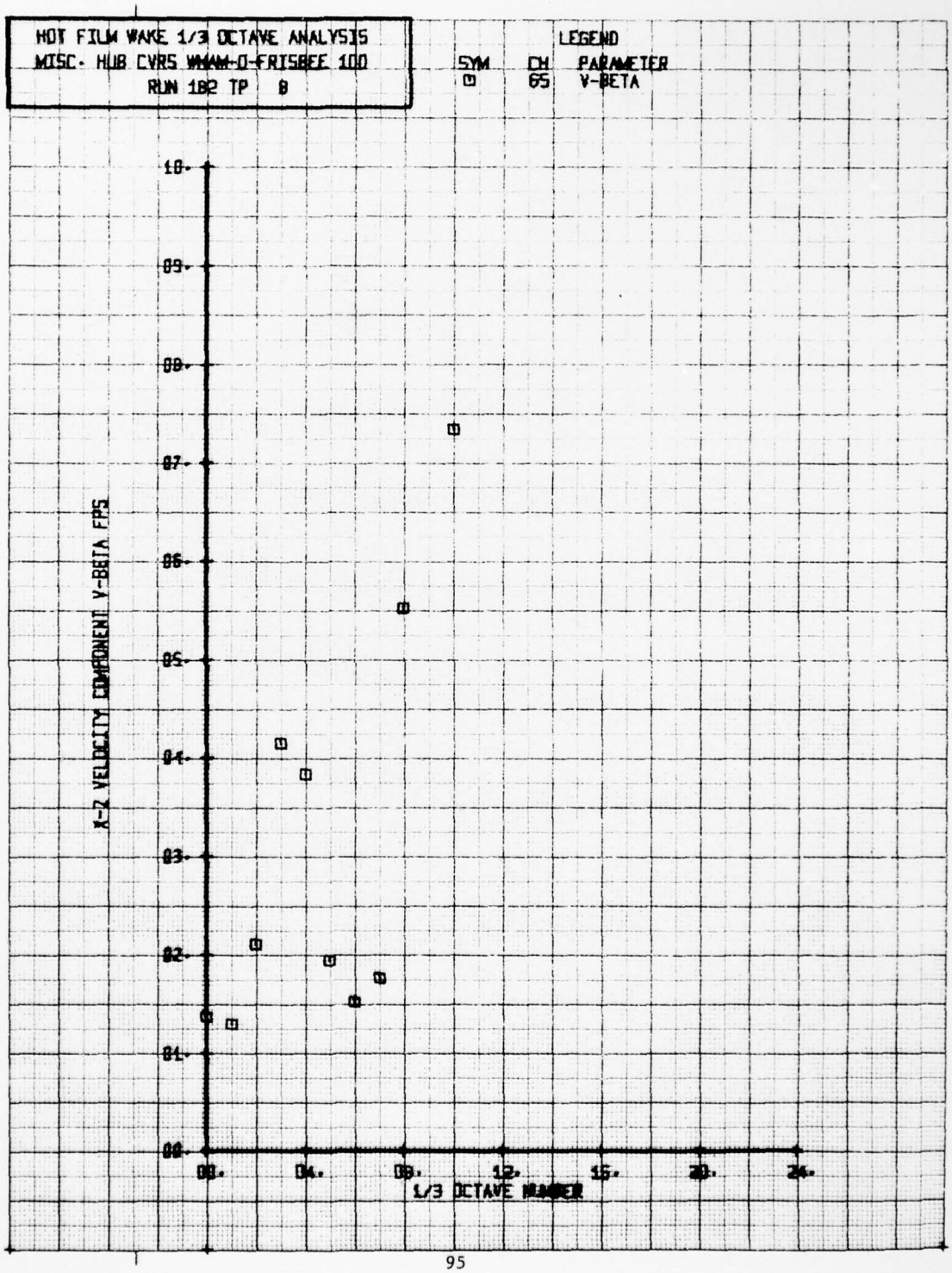
1/3 OCTAVE NUMBER
X-Z VELOCITY COMPONENT V-BETA FPS


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
MISC. HUB CVRS WMAM-0-FRISBEE 100
RUN 182 TP 8
LEGEND
SYM CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA FPS
1/3 OCTAVE NUMBER

AD-A063 653 BOEING VERTOL CO PHILADELPHIA PA F/G 1/3

INTERACTIONAL AERODYNAMICS OF THE SINGLE ROTOR HELICOPTER CONFI--ETC(U)

SEP 78 P F SHERIDAN DAAJ02-77-C-0020

UNCLASSIFIED USARTL-TR-78-23D-V4-E NL

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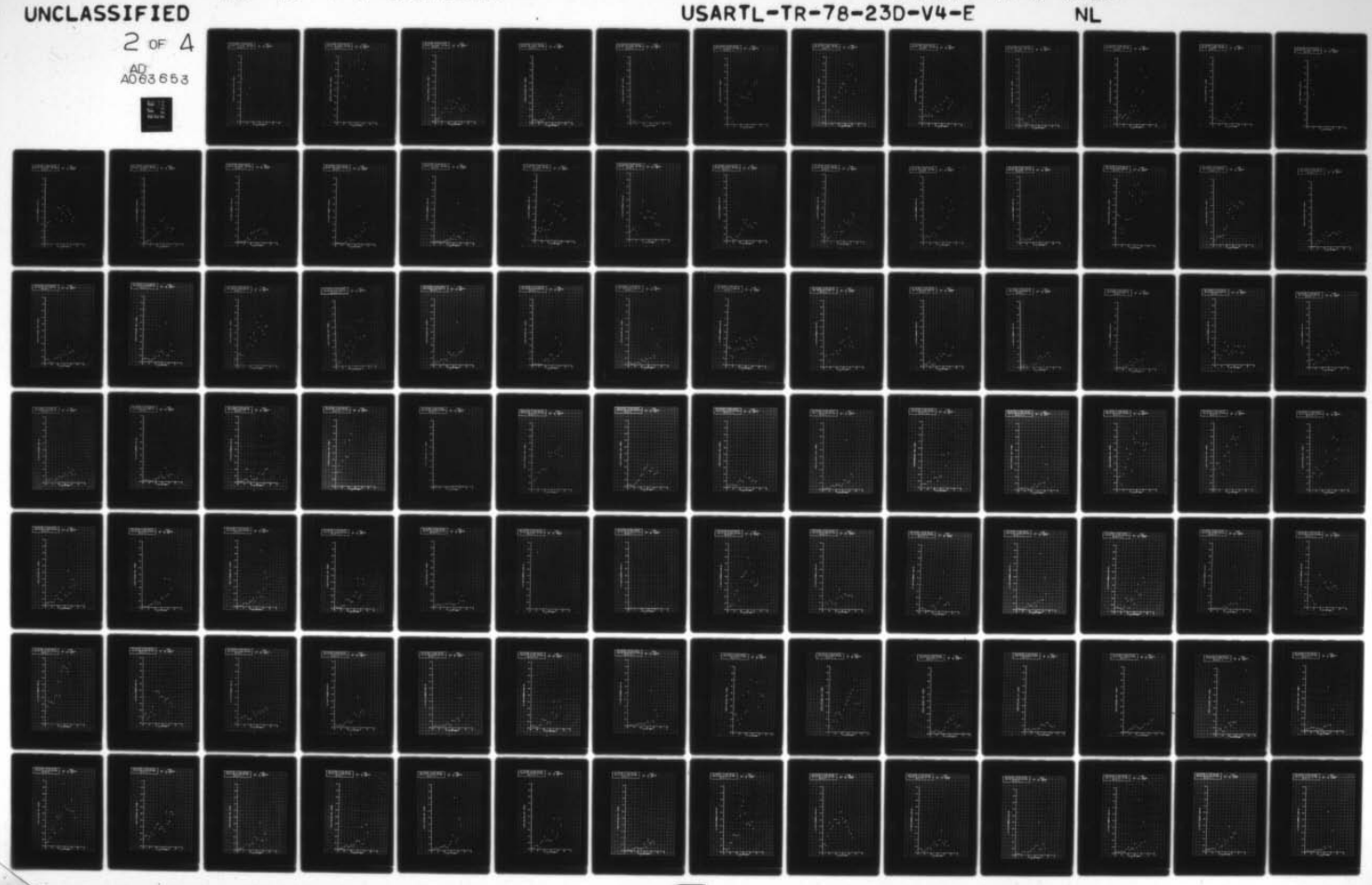

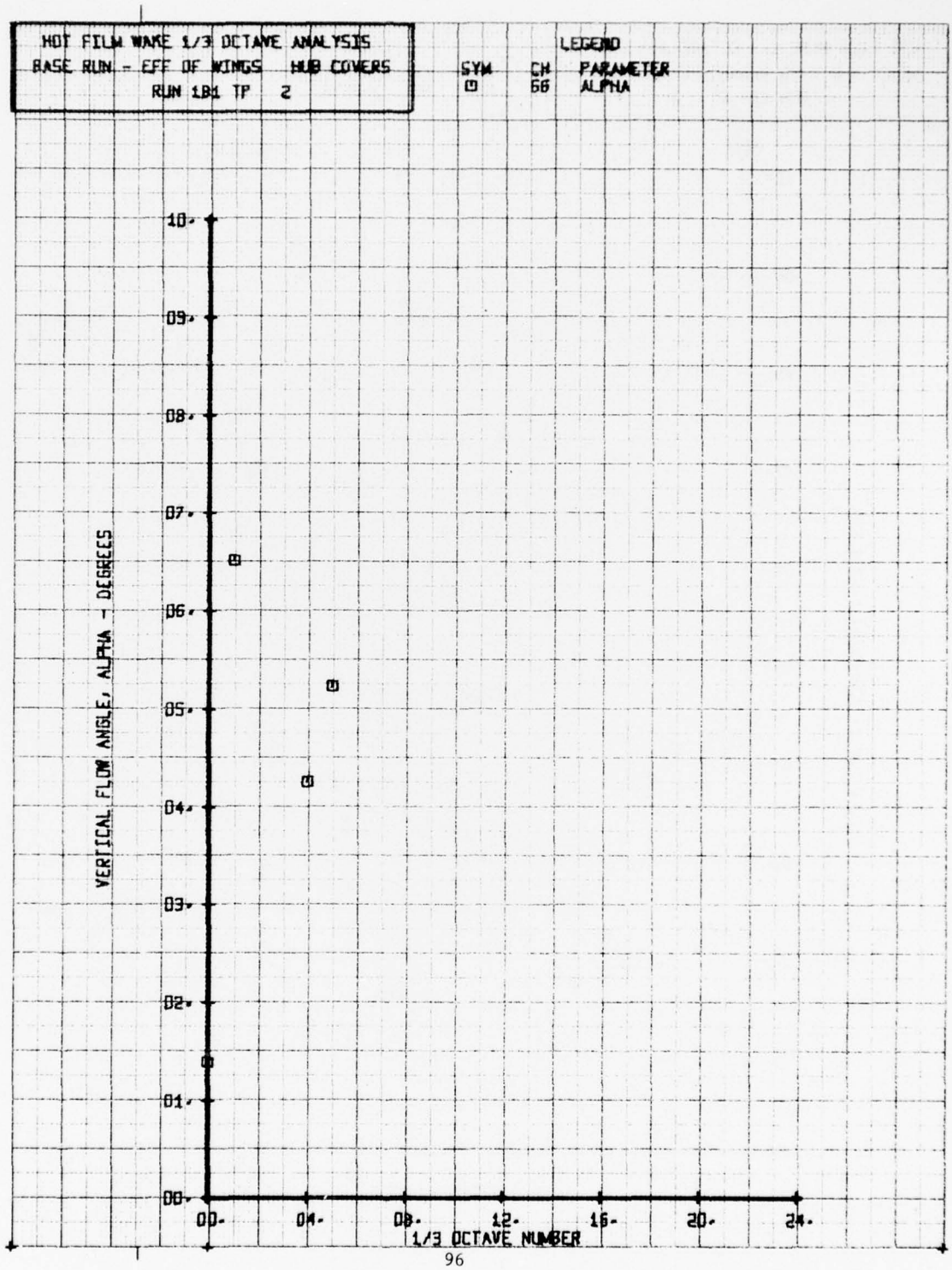
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
BASE RUN - EFF OF WINGS HUB COVERS
RUN 181 TP 2
LEGEND
SYM CH PARAMETER
66 ALPHA
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VERTICAL FLOW ANGLE, ALPHA - DEGREES
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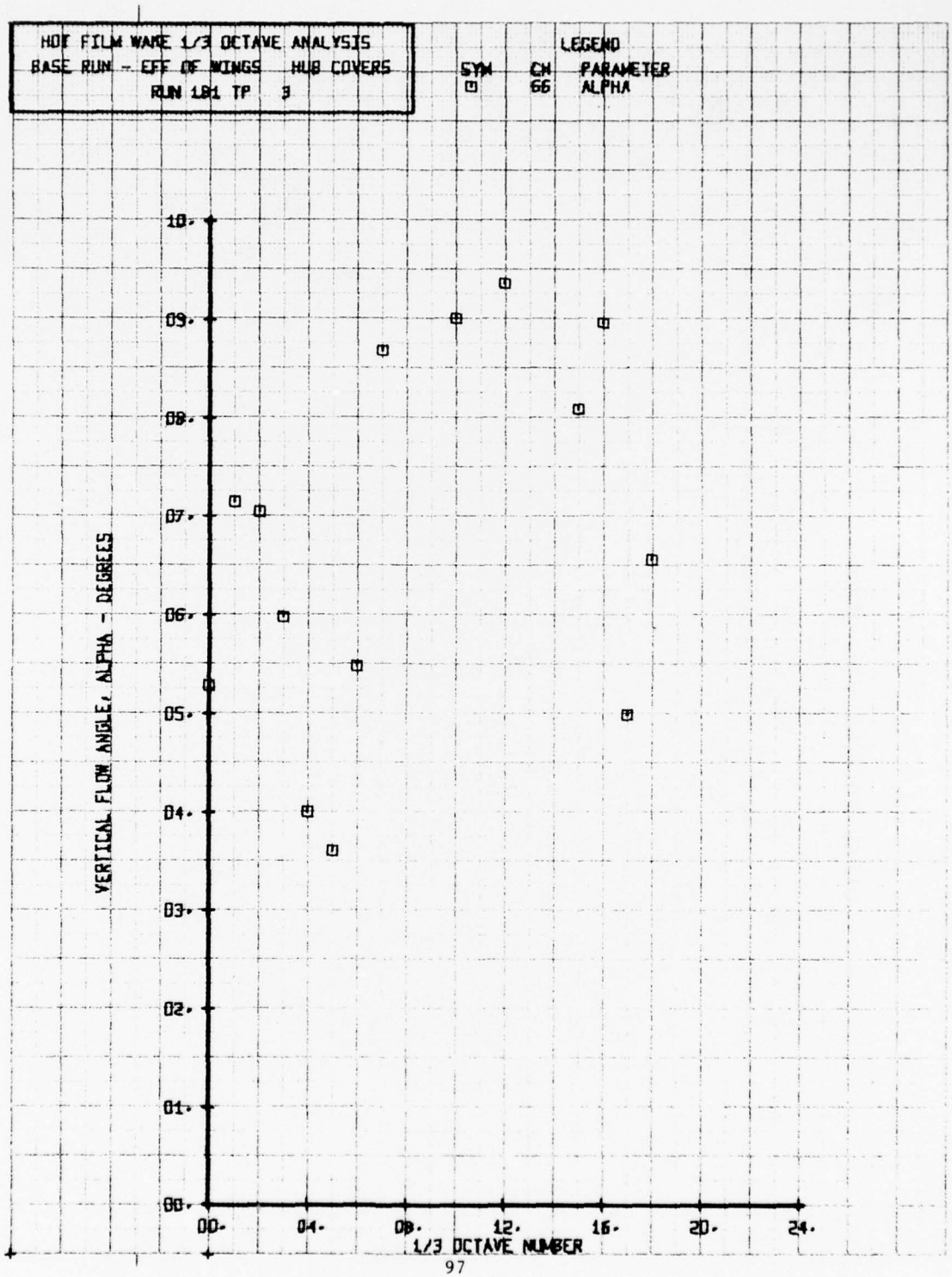
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
BASE RUN - EFF OF WINGS HUB COVERS
RUN 181 TP 3
LEGEND
SYM CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
1/3 OCTAVE NUMBER
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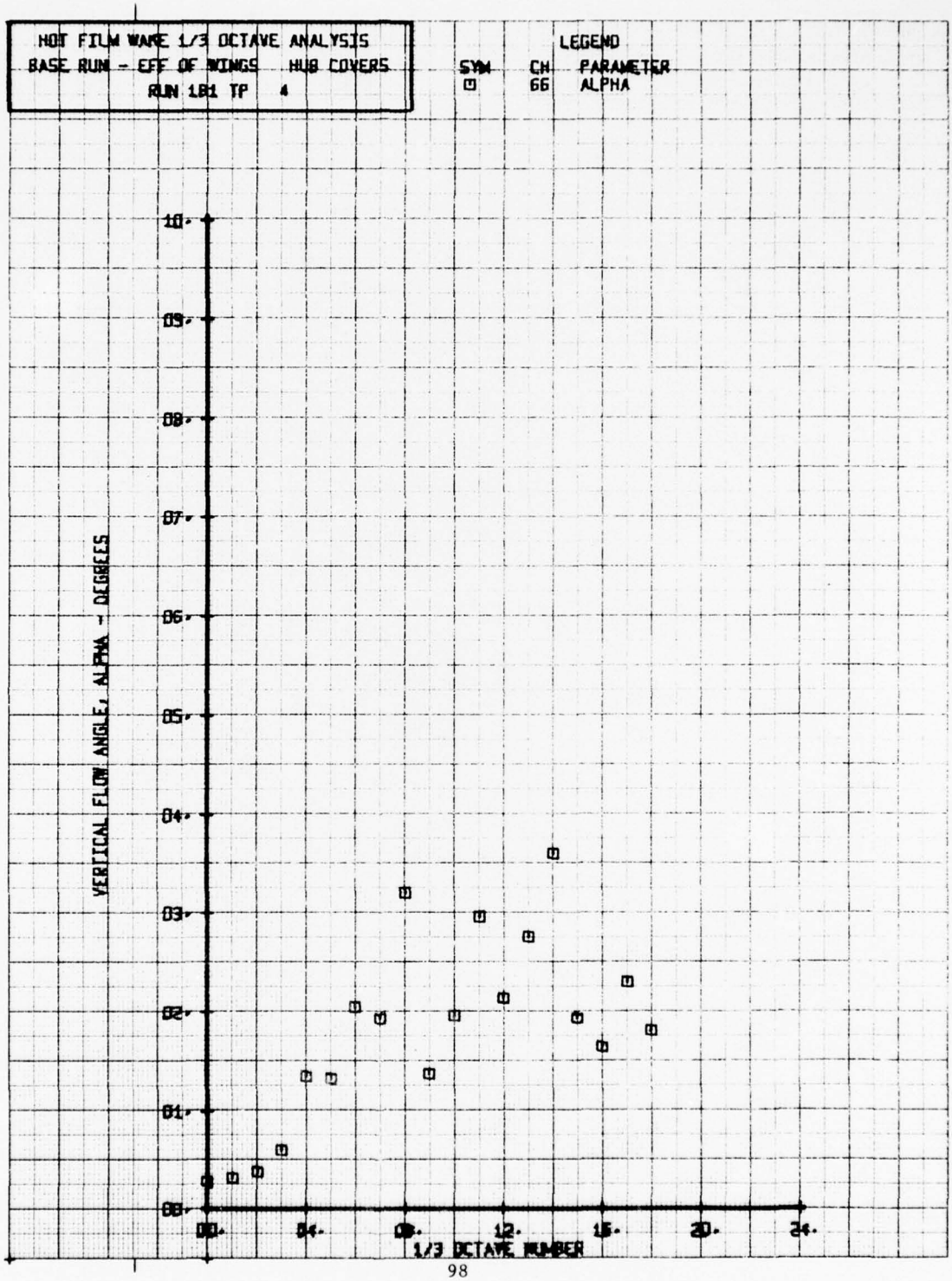
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
BASE RUN - EFF OF WINGS HUB COVERS
RUN 181 TP 4
LEGEND
SYM CH PARAMETER
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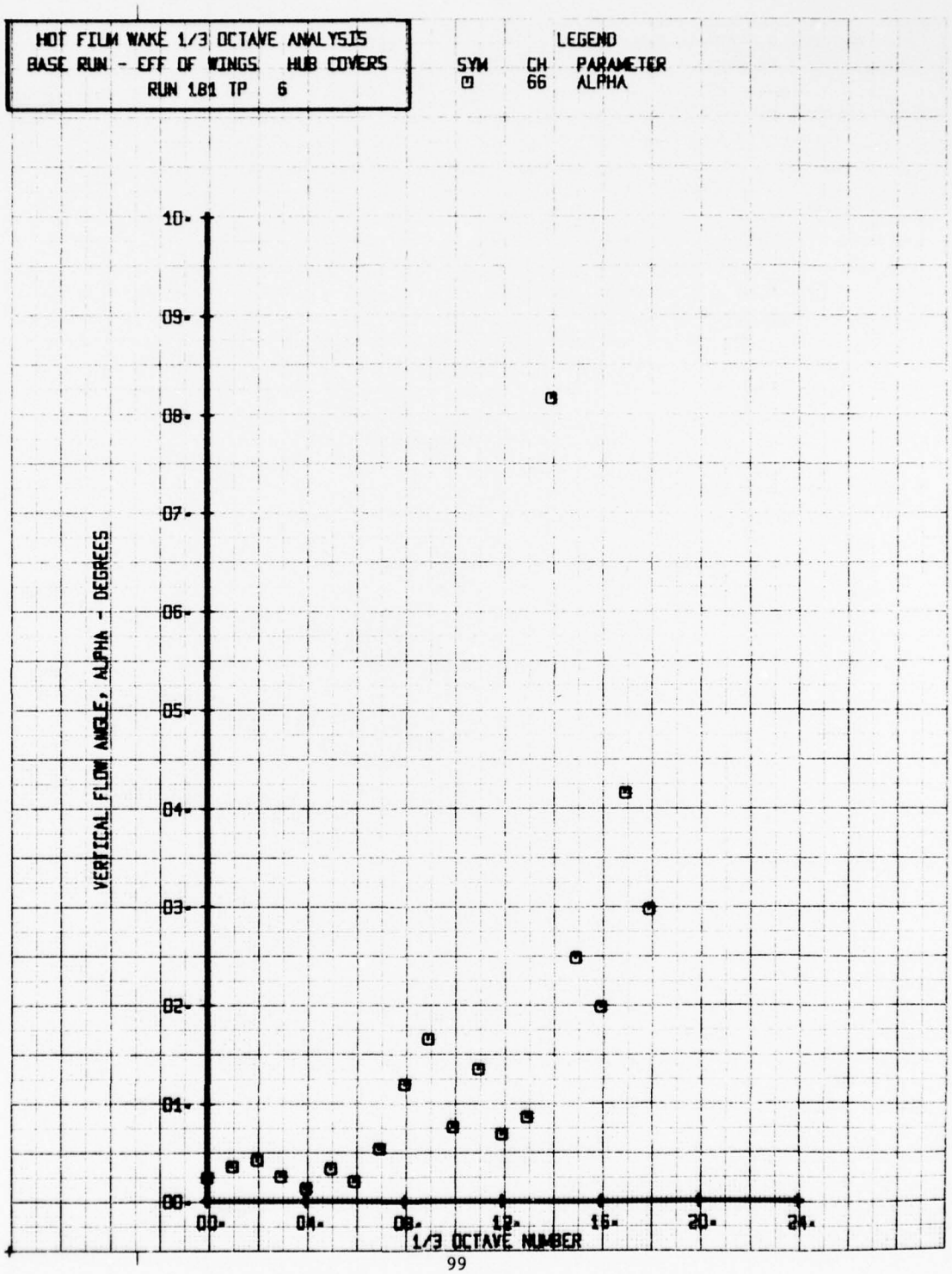
VERTICAL FLOW ANGLE, ALPHA - DEGREES
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
BASE RUN - EFF OF WINGS HUB COVERS
RUN 181 TP 6
LEGEND
SYM CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
1/3 OCTAVE NUMBER
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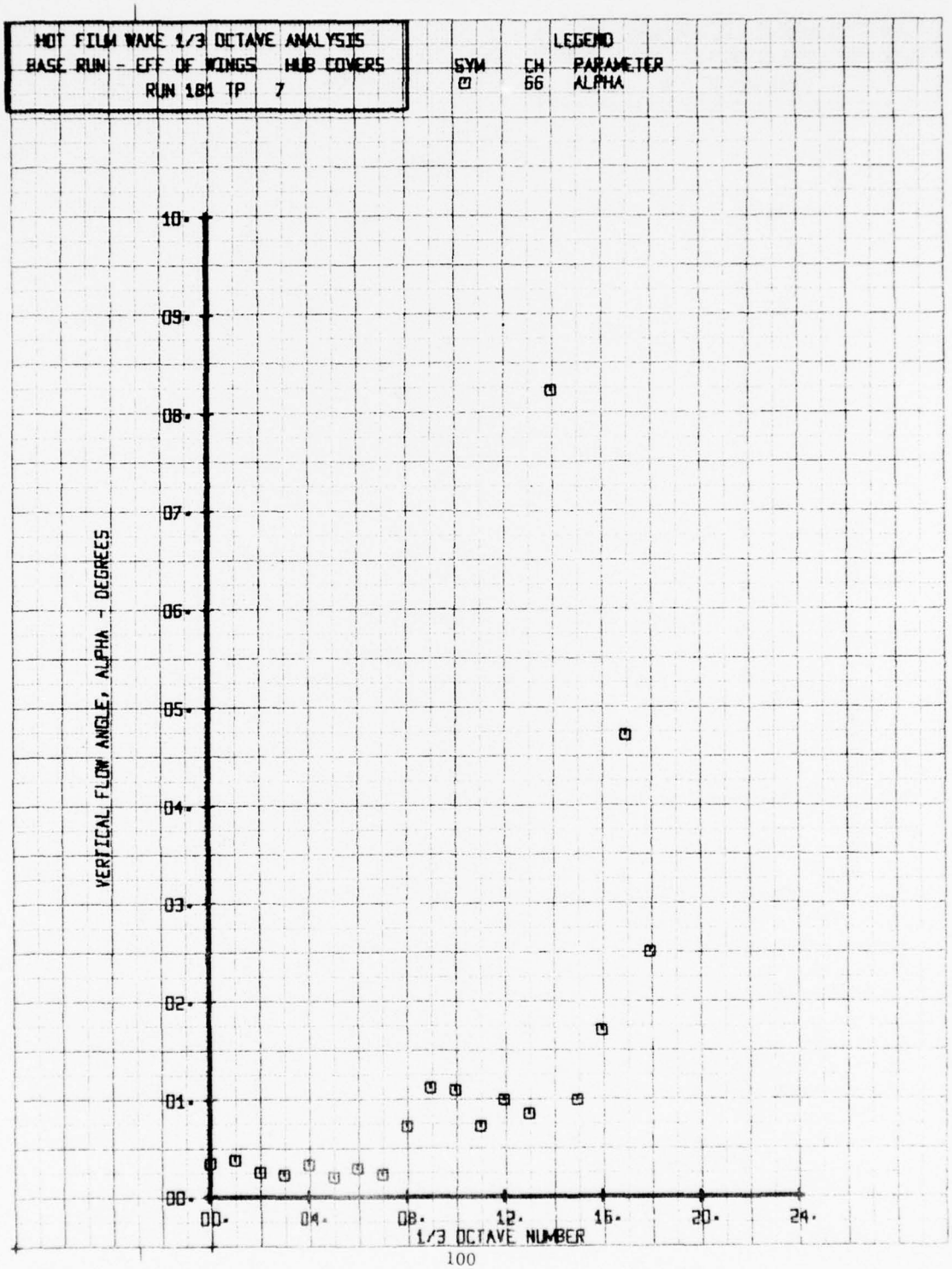
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BASE RUN - OFF OF WINGS HUB COVERS
RUN 181 TP 7
LEGEND
SYM CH PARAMETER
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VERTICAL FLOW ANGLE, ALPHA - DEGREES
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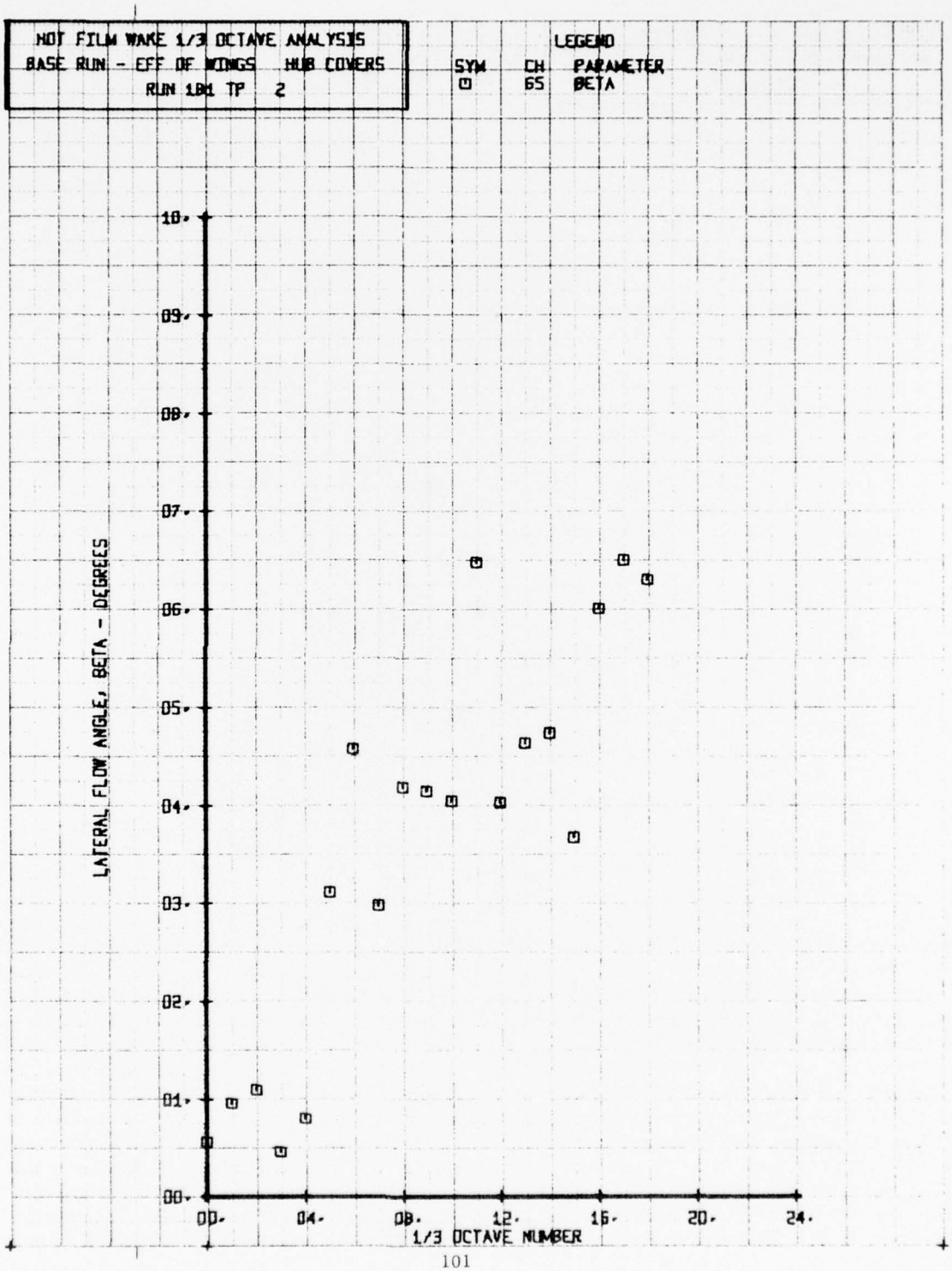
1/3 OCTAVE NUMBER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BASE RUN - EFF OF WINGS HUB COVERS
RUN 181 TP 2
LEGEND
SYM CH PARAMETER
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LATERAL FLOW ANGLE, BETA - DEGREES
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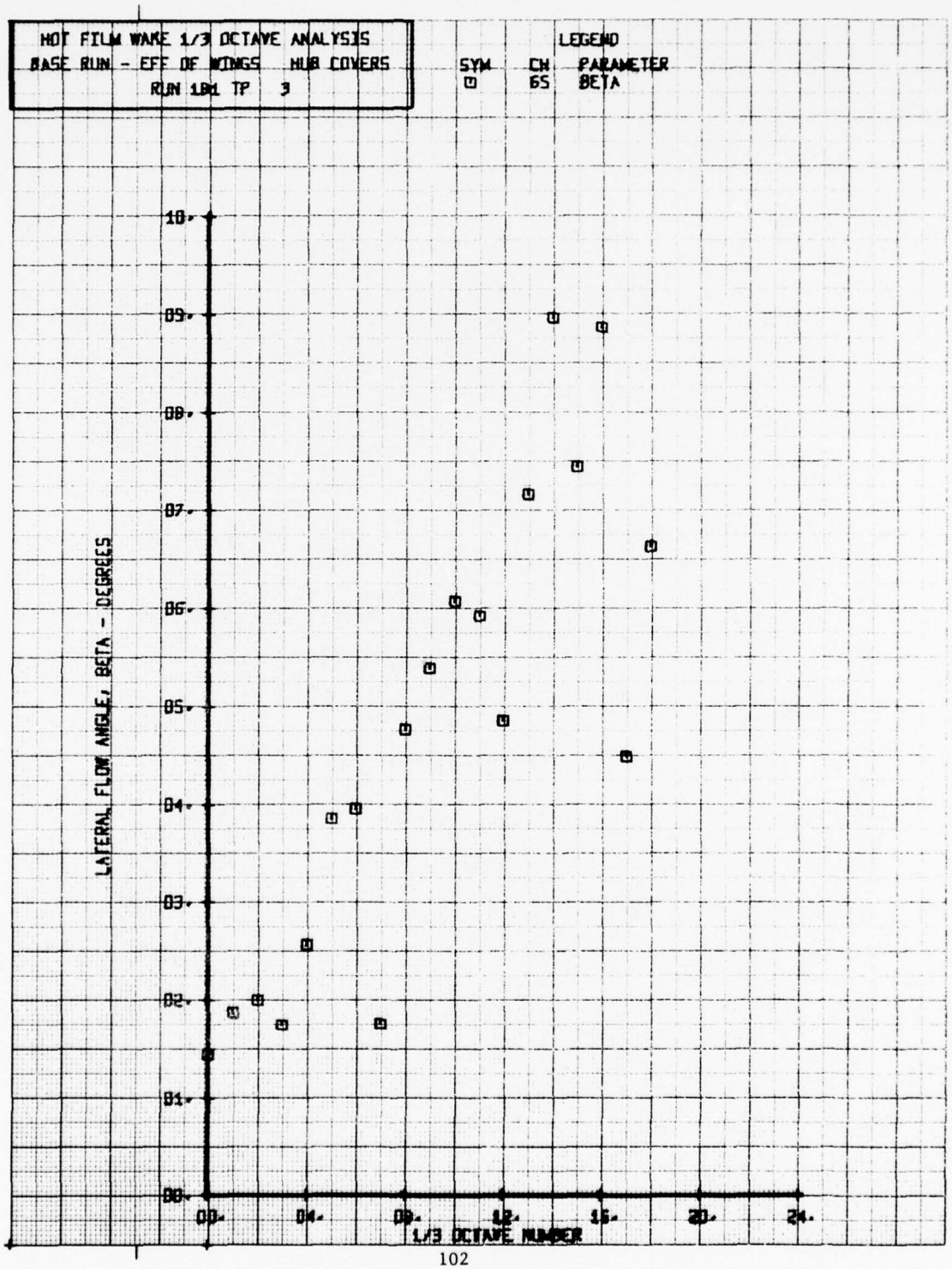
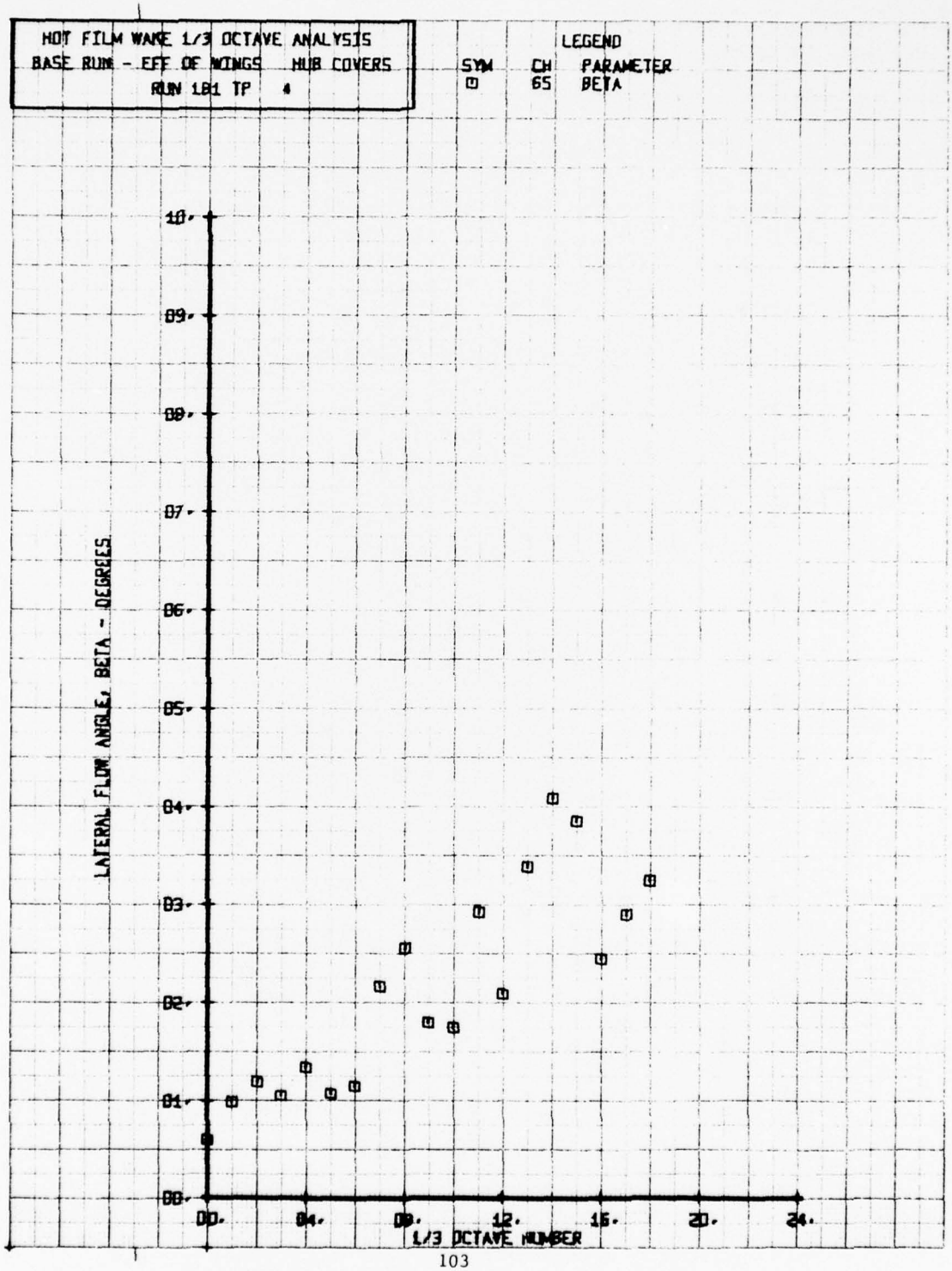
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
BASE RUN - EFF OF WINGS HUB COVERS
RUN 181 TP 3
LEGEND
SYM CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
BASE RUN - EFF OF WINGS HUB COVERS
RUN 181 TP 4
LEGEND
SYM CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
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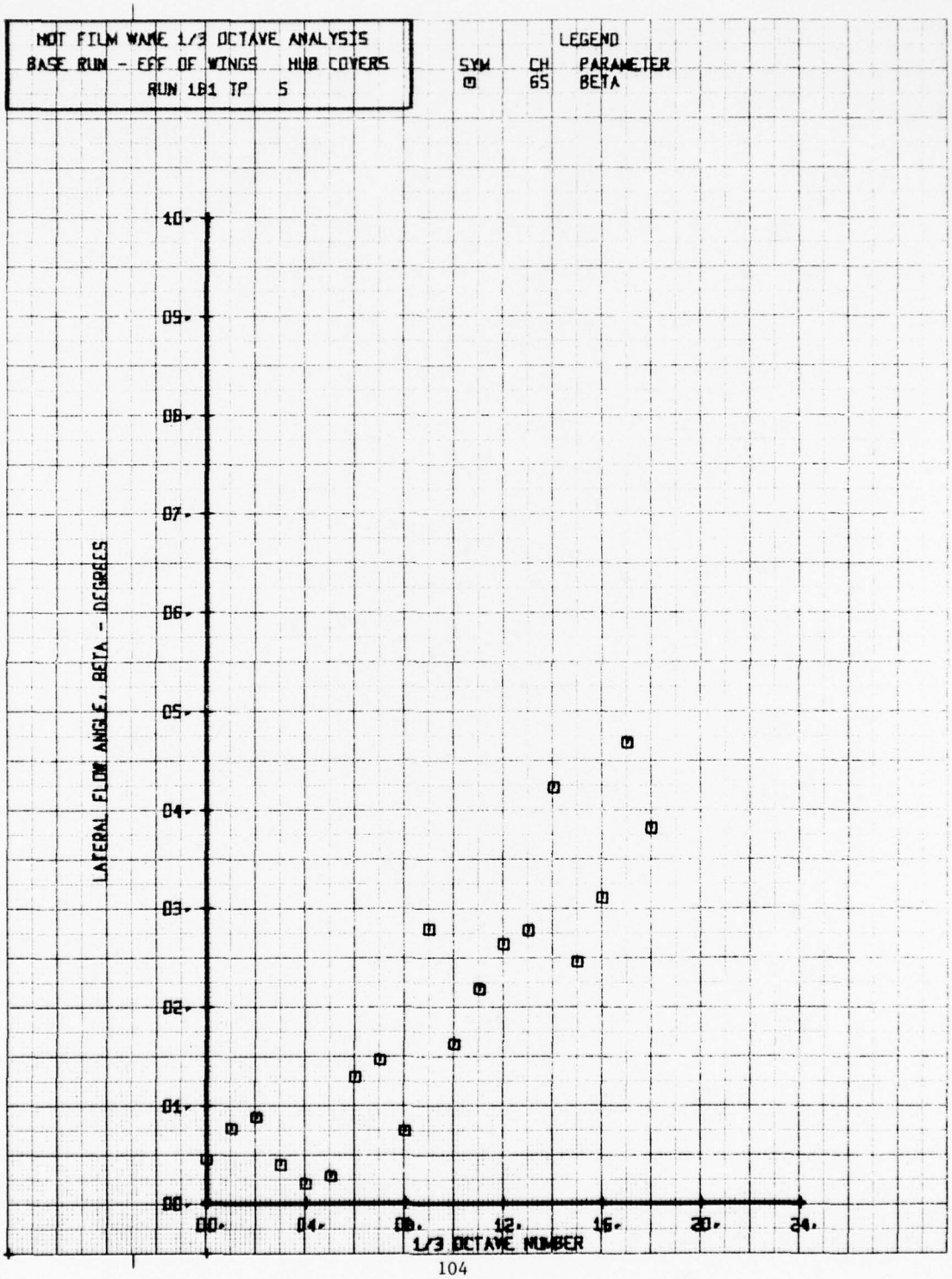
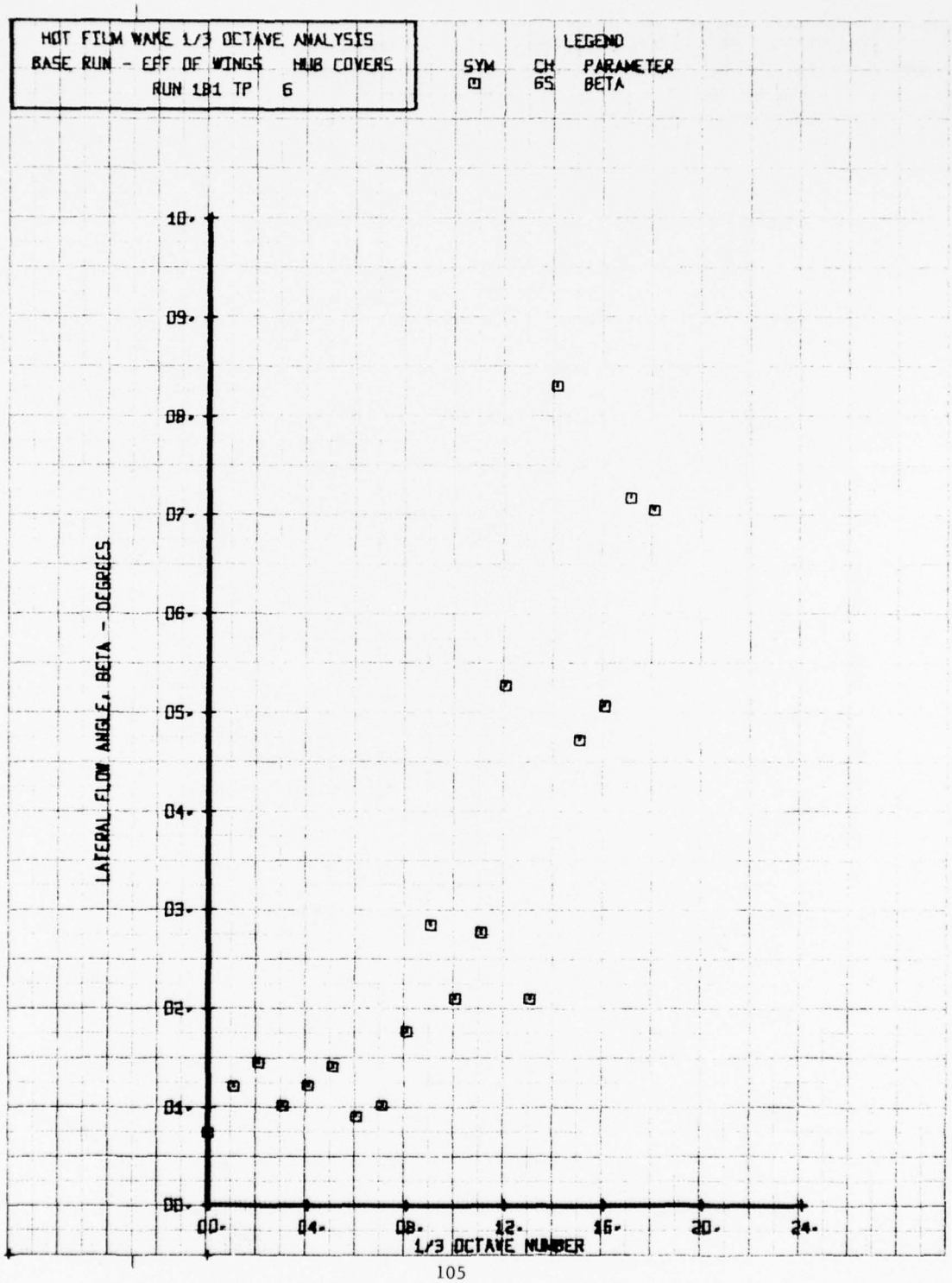
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
BASE RUN - EFF OF WINGS HUB COVERS
RUN 181 TP 5
LEGEND
SYM CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
1/3 OCTAVE NUMBER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BASE RUN - EFF OF WINGS HUB COVERS
RUN 181 TP 6
LEGEND
SYM CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
1/3 OCTAVE NUMBER
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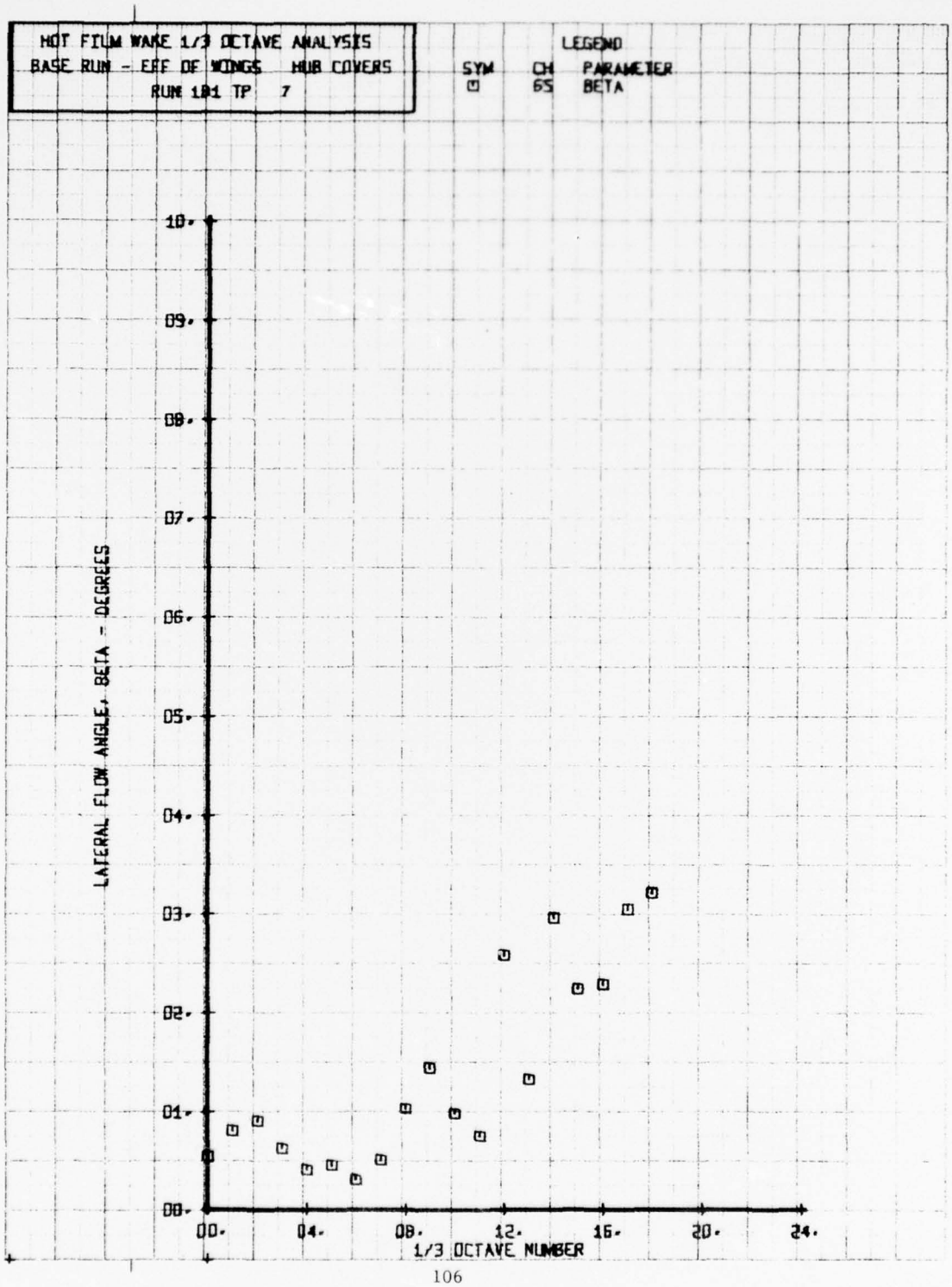
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BASE RUN - EFF OF WINGS HUB COVERS
RUN 101 TP 7
LEGEND
SYM CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
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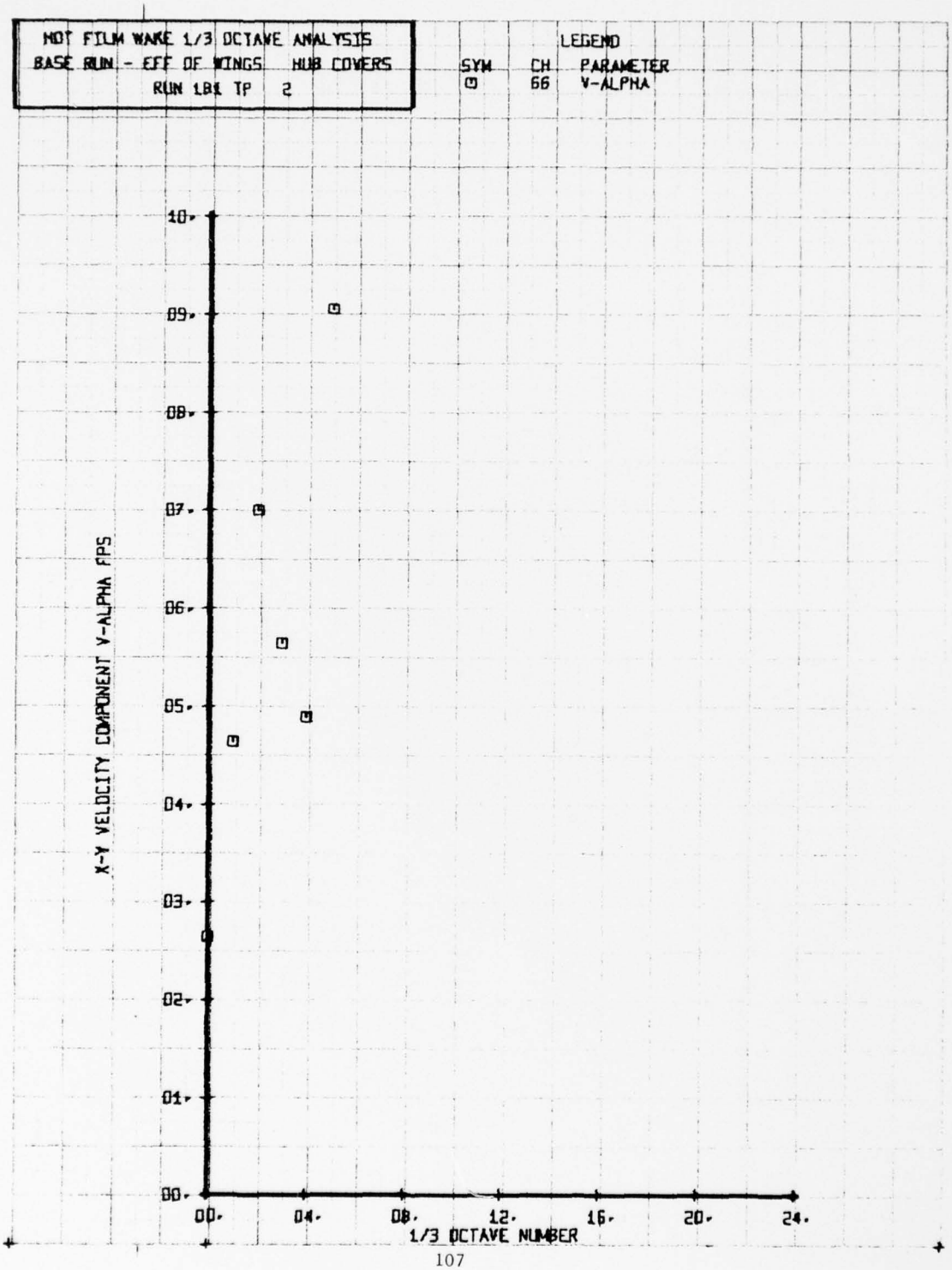
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
BASE RUN - EFF OF WINGS HUB COVERS
RUN 181 TP 2
LEGEND
SYM CH PARAMETER
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X-Y VELOCITY COMPONENT V-ALPHA FPS
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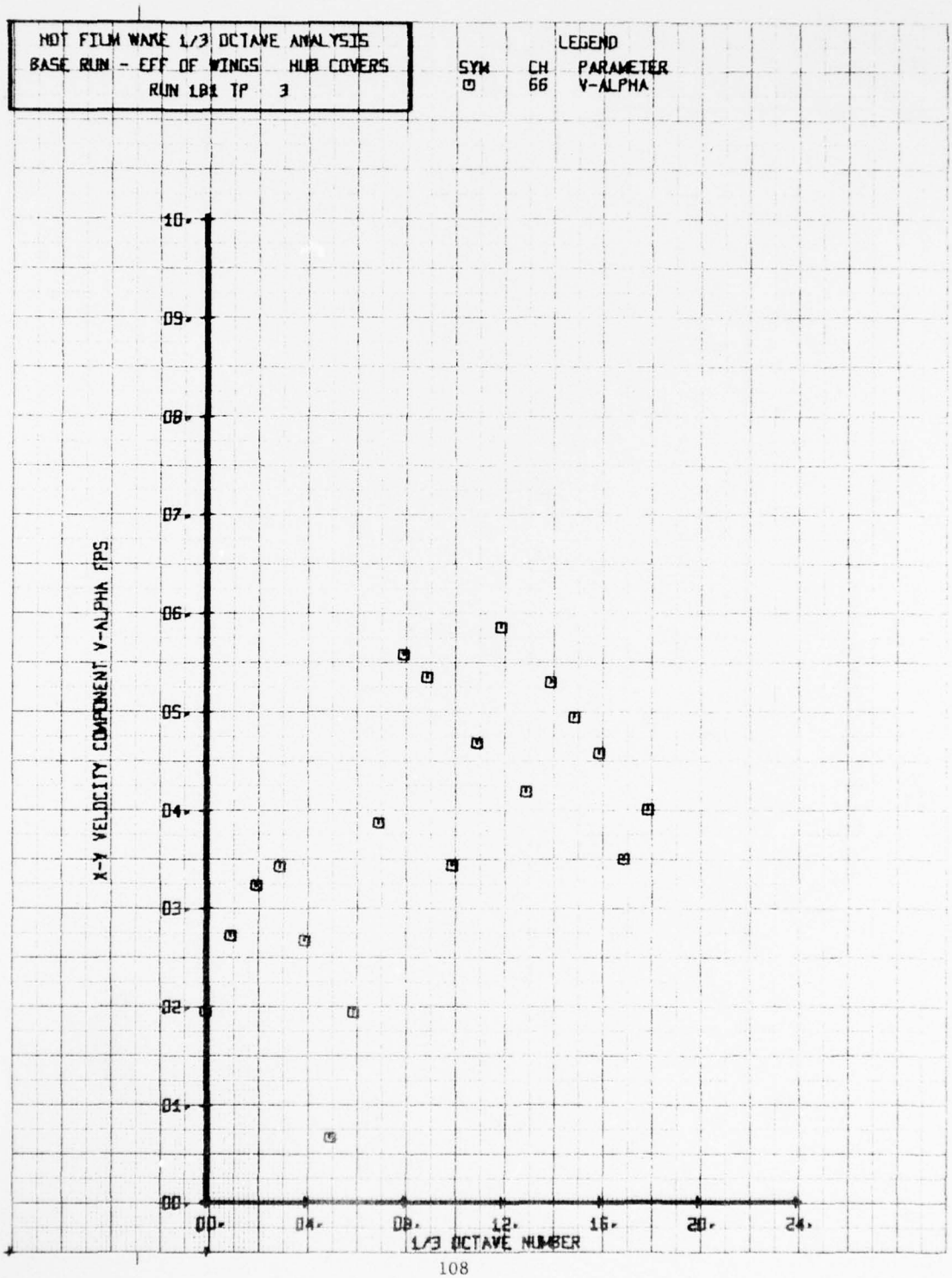
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
BASE RUN - EFF OF WINGS HUB COVERS
RUN 181 TP 3
LEGEND
SYM CH PARAMETER
66 V-ALPHA
X-V VELOCITY COMPONENT V-ALPHA FPS
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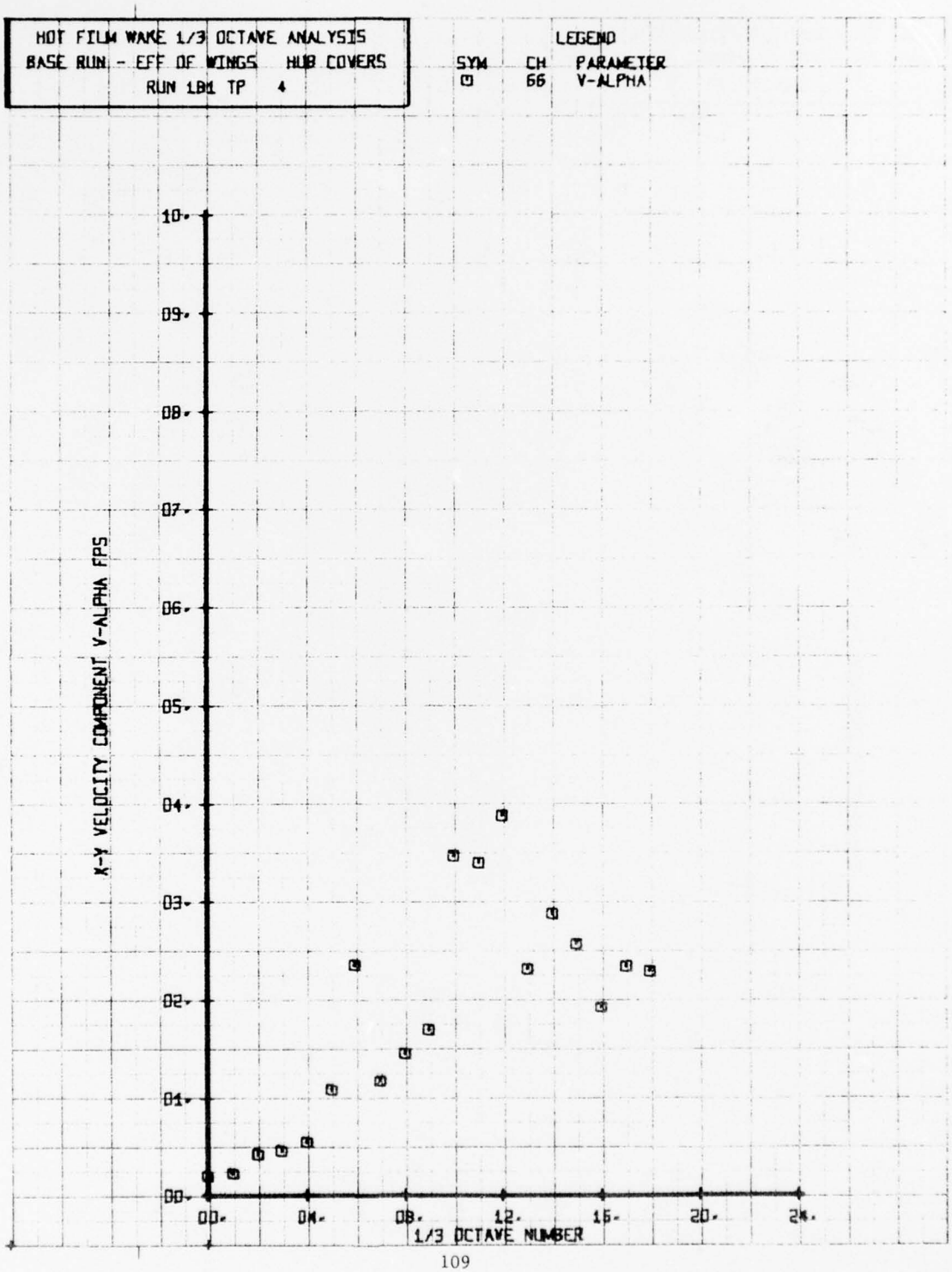
1/3 OCTAVE NUMBER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BASE RUN - EFF OF WINGS HUB COVERS
RUN 1B1 TP 4
LEGEND
SYM CH PARAMETER
66 V-ALPHA
X-Y VELOCITY COMPONENT V-ALPHA FPS
1/3 OCTAVE NUMBER
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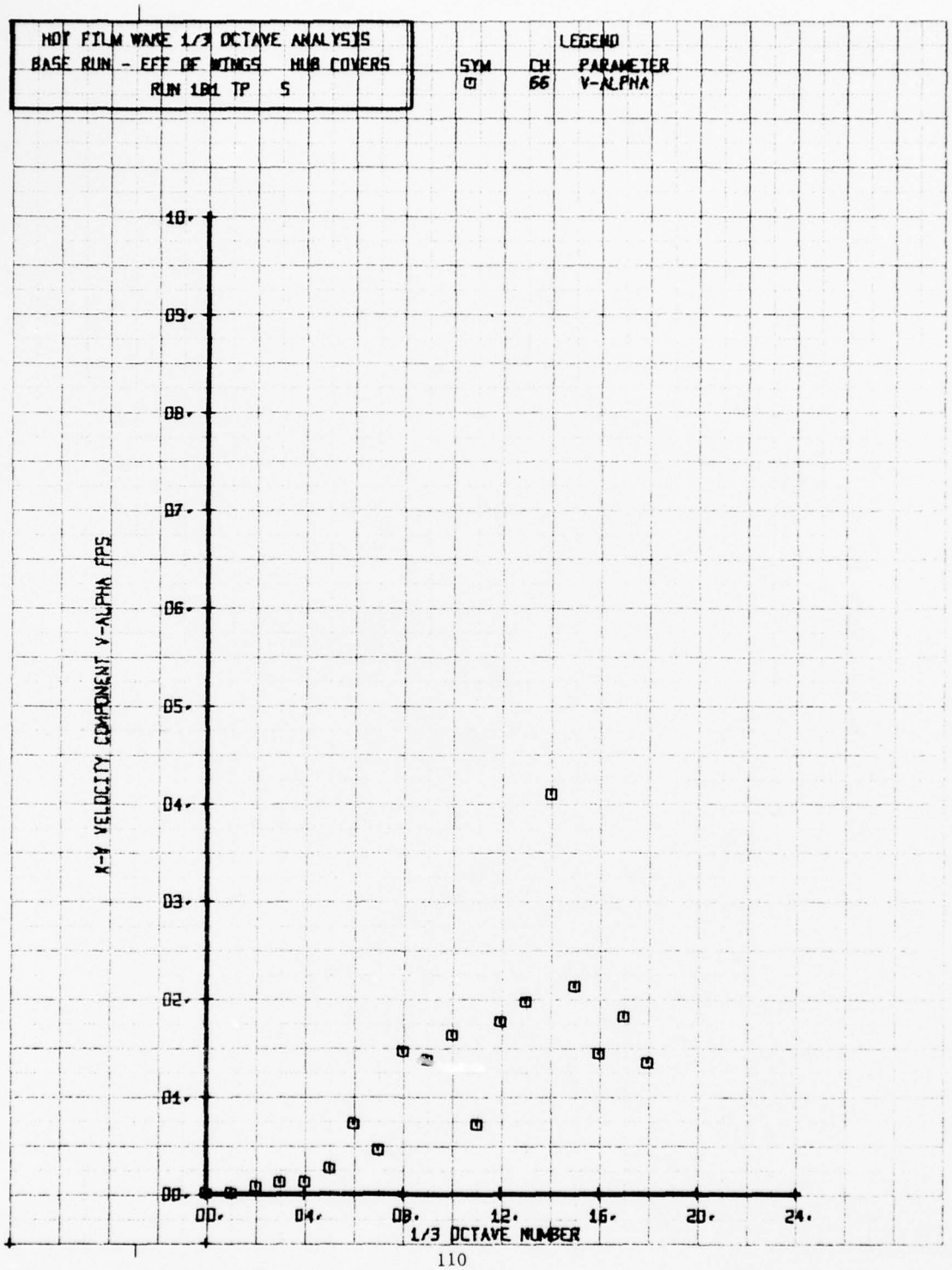
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
BASE RUN - EFF OF WINGS HUB COVERS
RUN 181 TP 5
LEGEND
SYM CH PARAMETER
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X-V VELOCITY COMPONENT V-ALPHA FPS
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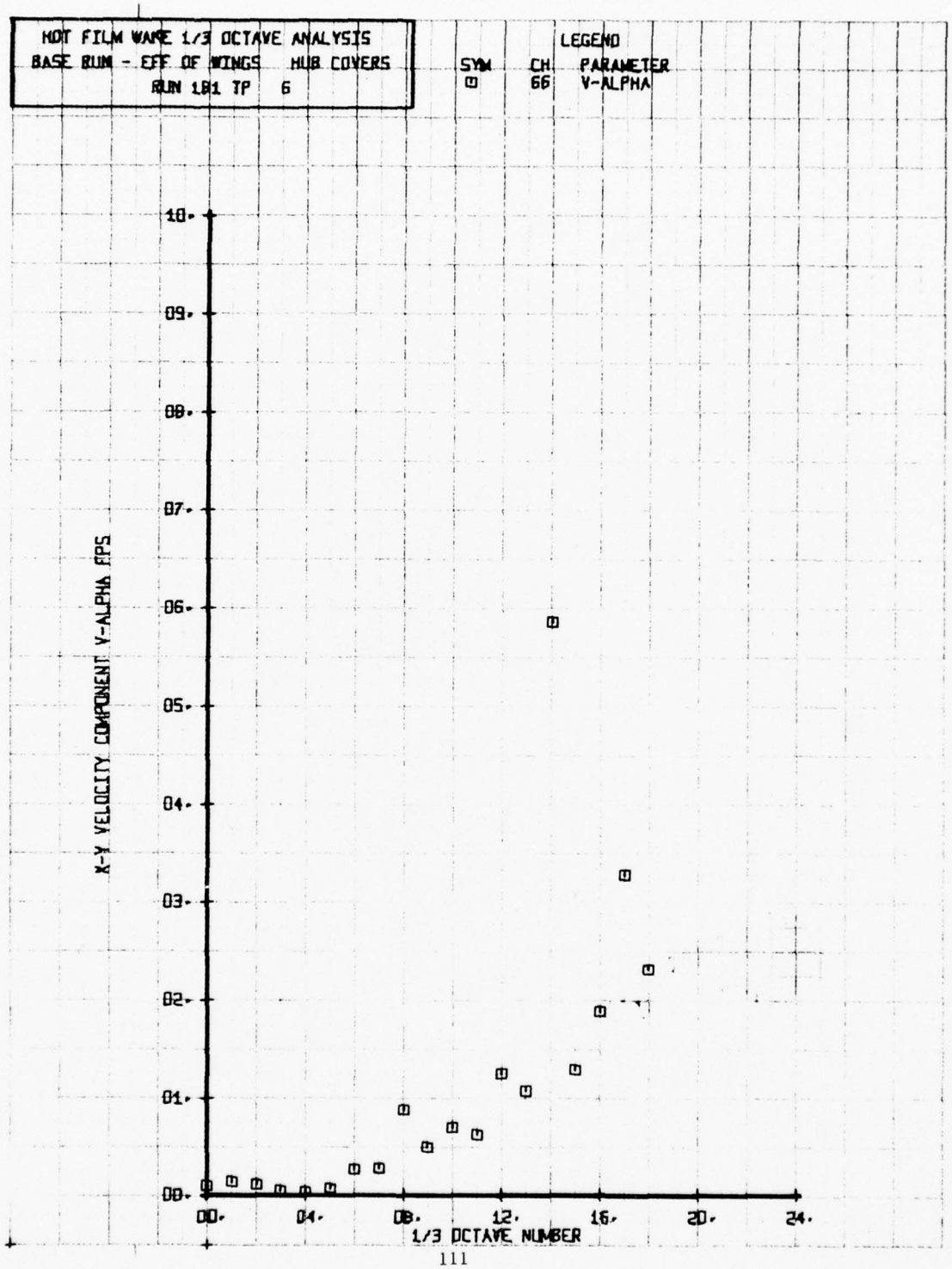
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
BASE RUN - EFF OF WINGS HUB COVERS
RUN 181 TP 6
LEGEND
SYM CH PARAMETER
66 V-ALPHA
X-V VELOCITY COMPONENT V-ALPHA FPS
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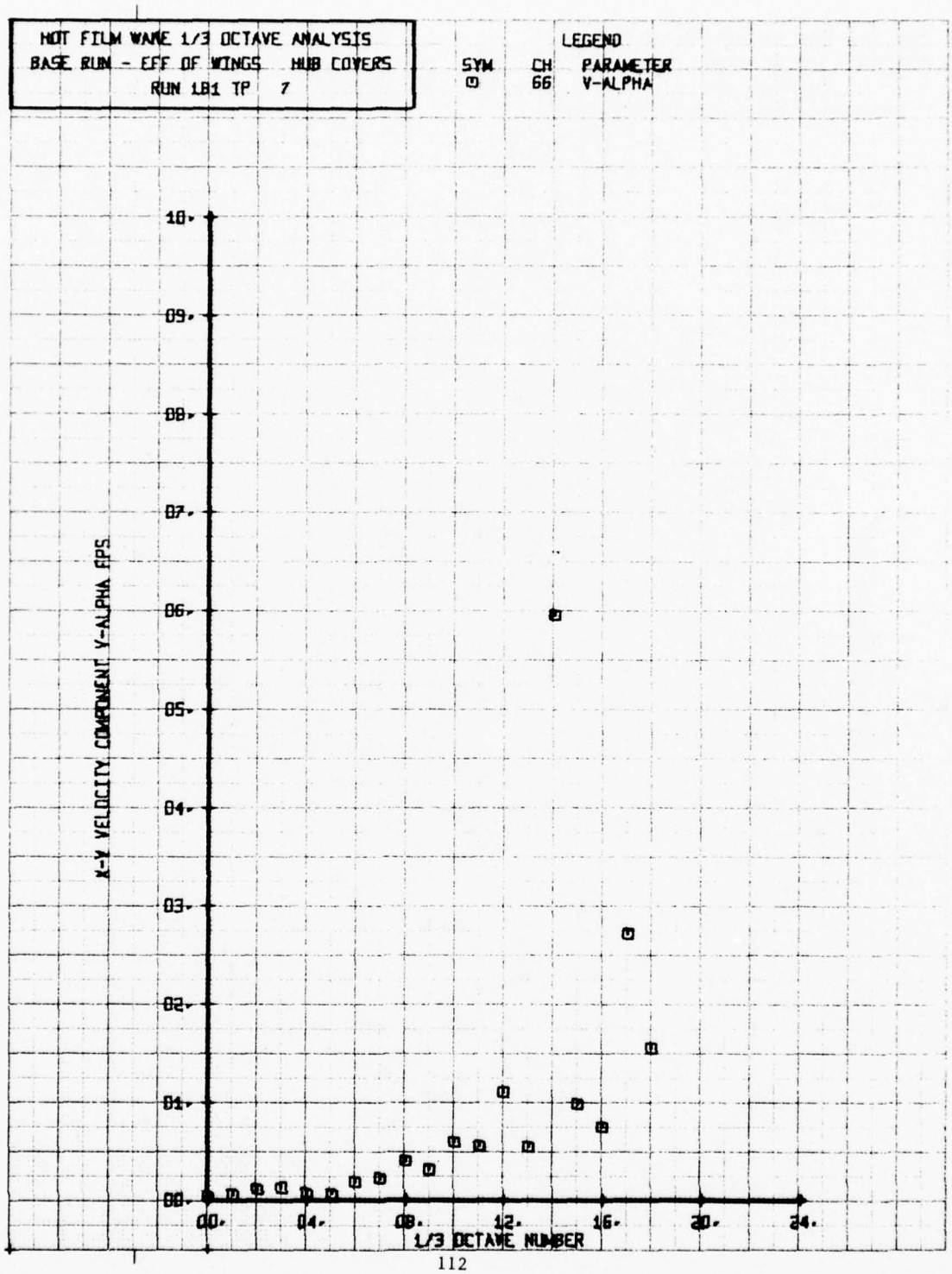
1/3 OCTAVE NUMBER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BASE RUN - EFF OF WINGS HUB COVERS
RUN 181 TP 7
LEGEND
SYM CH PARAMETER
66 V-ALPHA
X-Y VELOCITY COMPONENT V-ALPHA FPS
1/3 OCTAVE NUMBER
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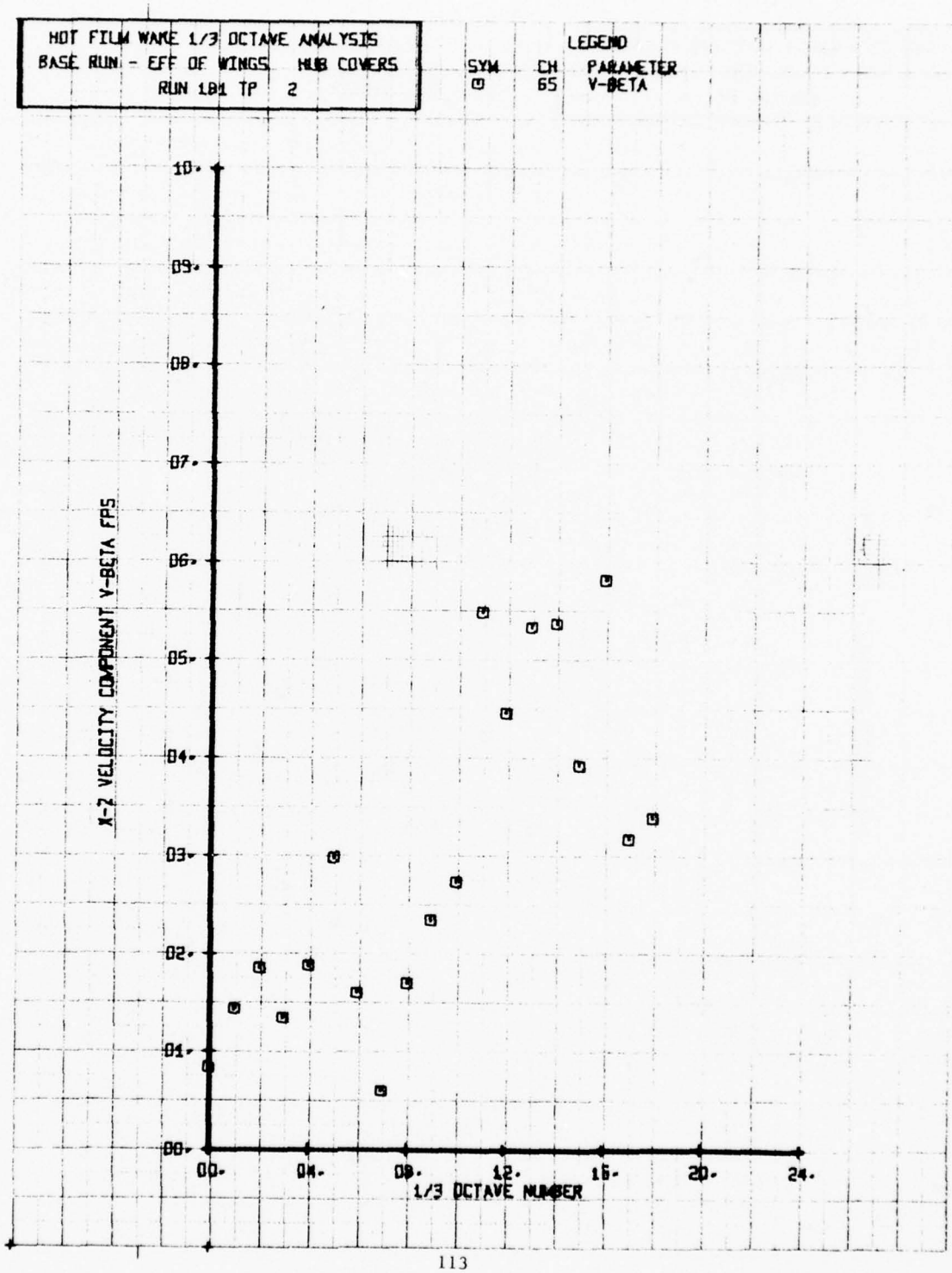
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BASE RUN - EFF OF WINGS HUB COVERS
RUN 181 TP 2
LEGEND
SYM CH PARAMETER
65 V-BETA
X-2 VELOCITY COMPONENT V-BETA FPS
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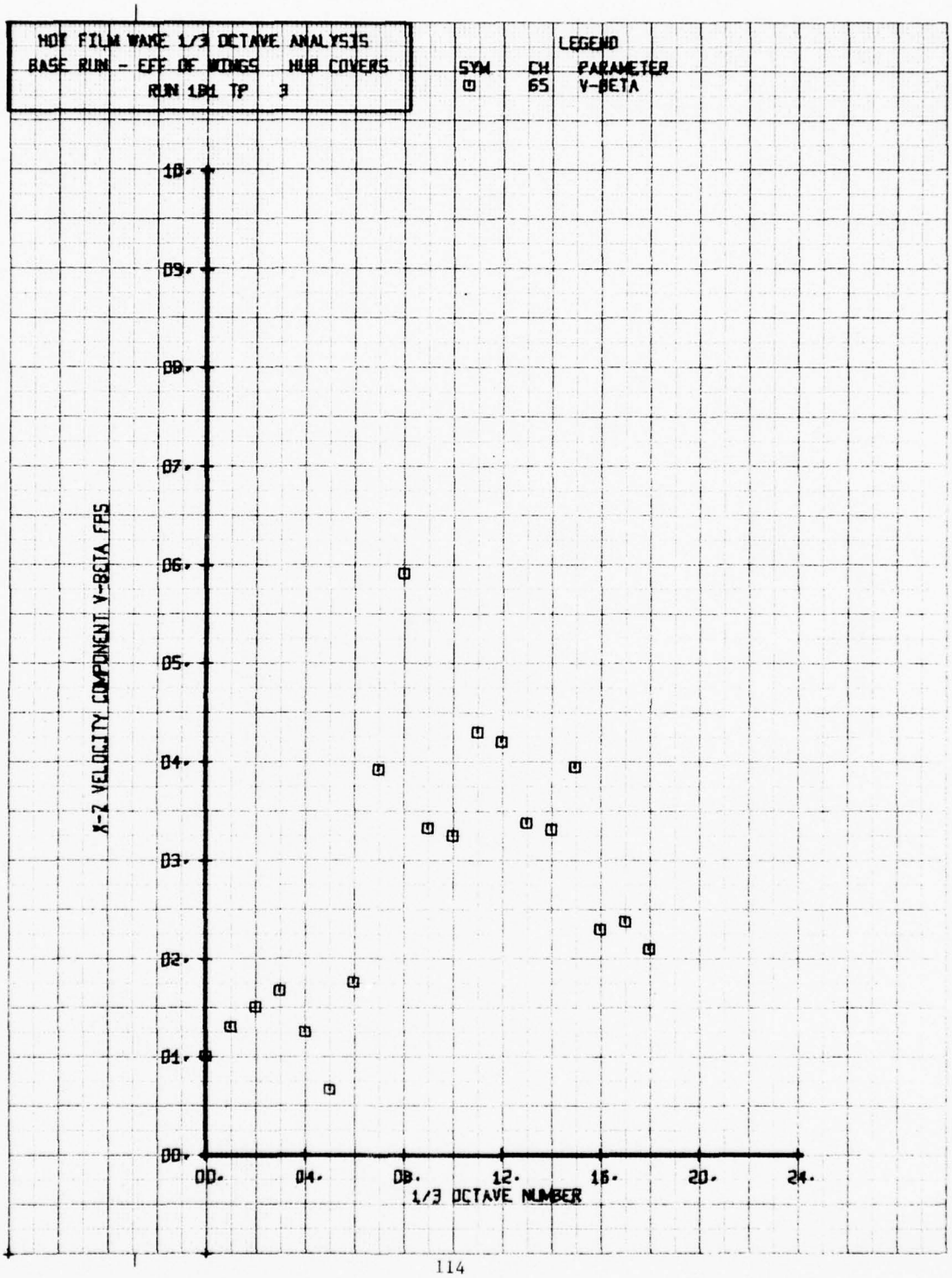
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
BASE RUN - EFF OF WINGS HUB COVERS
RUN 181 TP 3
LEGEND
SYM CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA FPS
1/3 OCTAVE NUMBER
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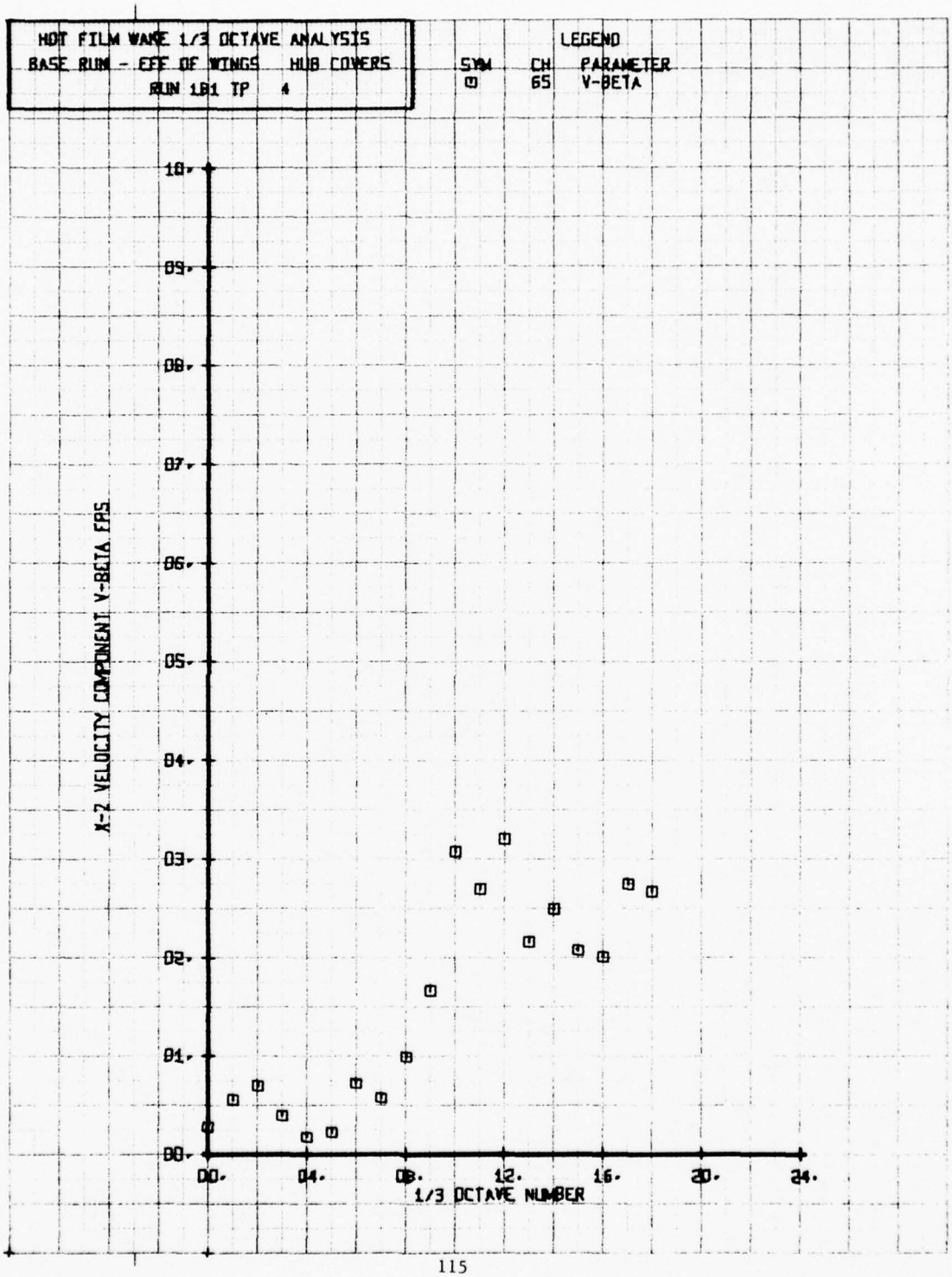
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BASE RUN - EFF OF WINGS HUB COVERS
RUN 181 TP 4
LEGEND
SYM CH PARAMETER
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X-Z VELOCITY COMPONENT V-BETA FPS
1/3 OCTAVE NUMBER
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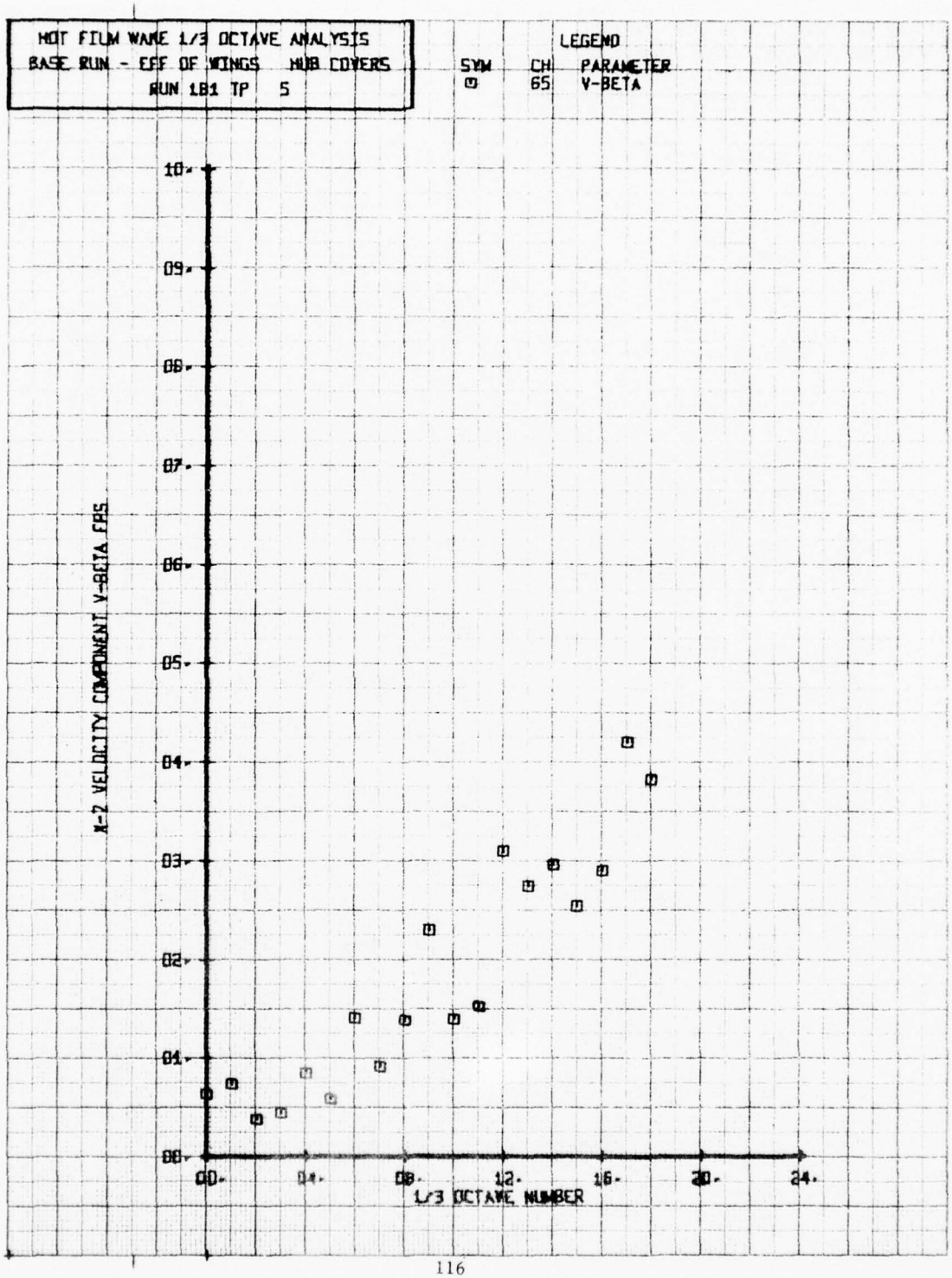
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
BASE RUN - EFF OF WINGS HUB COVERS
RUN 181 TP 5
LEGEND
SYM CH PARAMETER
65 V-BETA
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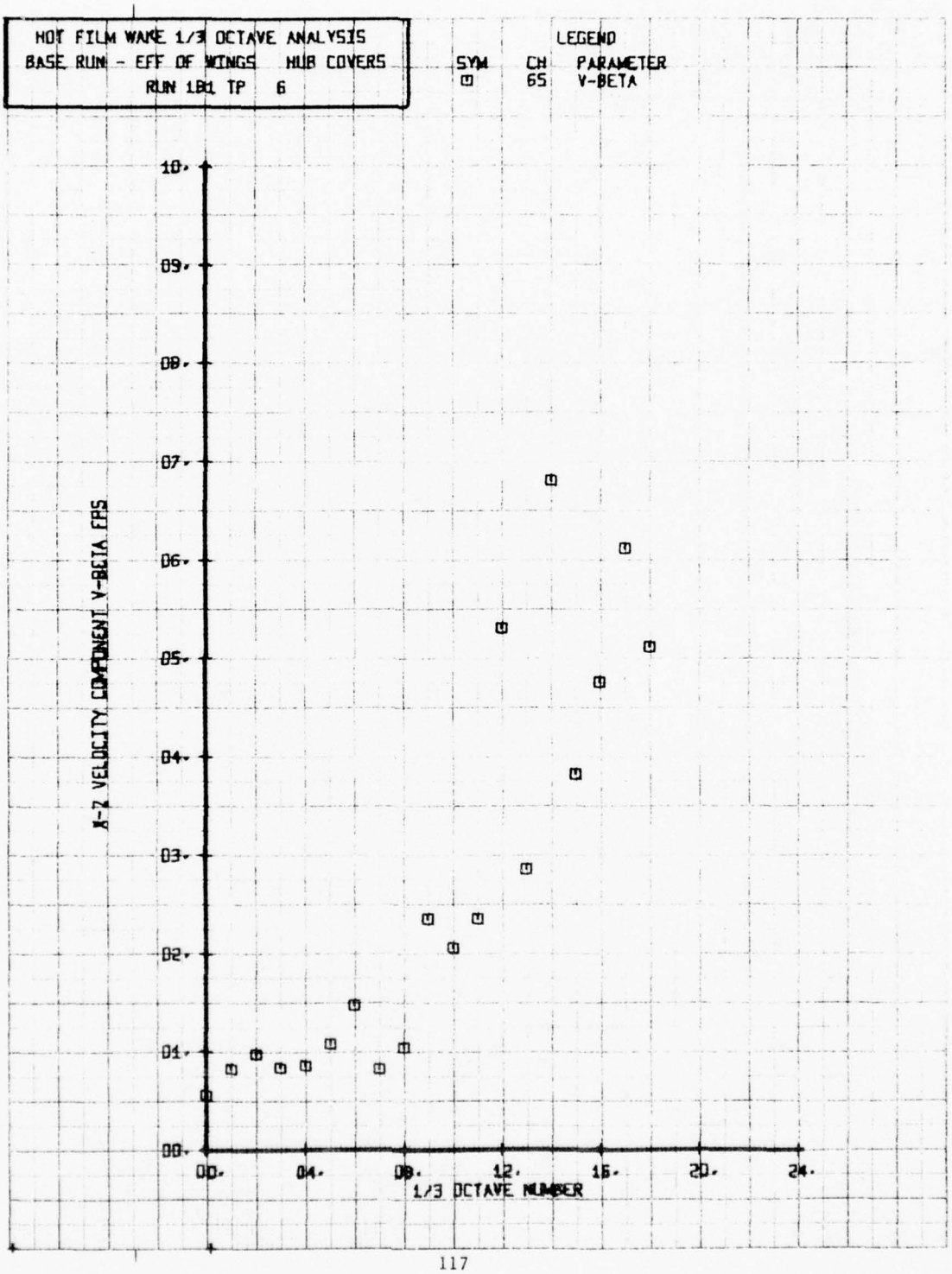
1/3 OCTAVE NUMBER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BASE RUN - EFF OF WINGS HUB COVERS
RUN 181 TP 6
LEGEND
SYM CH PARAMETER
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X-2 VELOCITY COMPONENT V-BETA FPS
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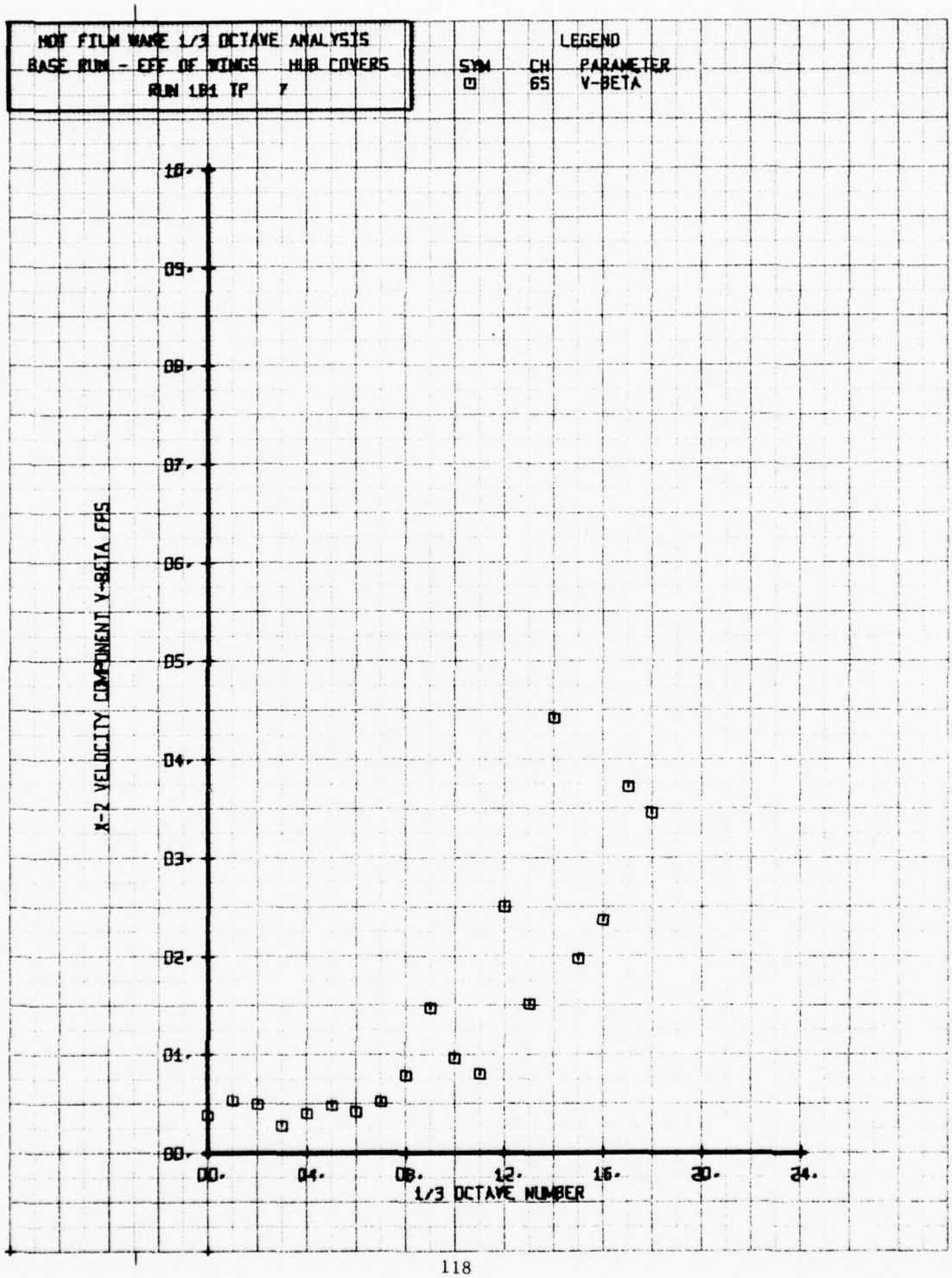
1/3 OCTAVE NUMBER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BASE RUN - EFF OF WINGS HUB COVERS
RUN 181 TP 7
LEGEND
SYM CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA FPS
1/3 OCTAVE NUMBER
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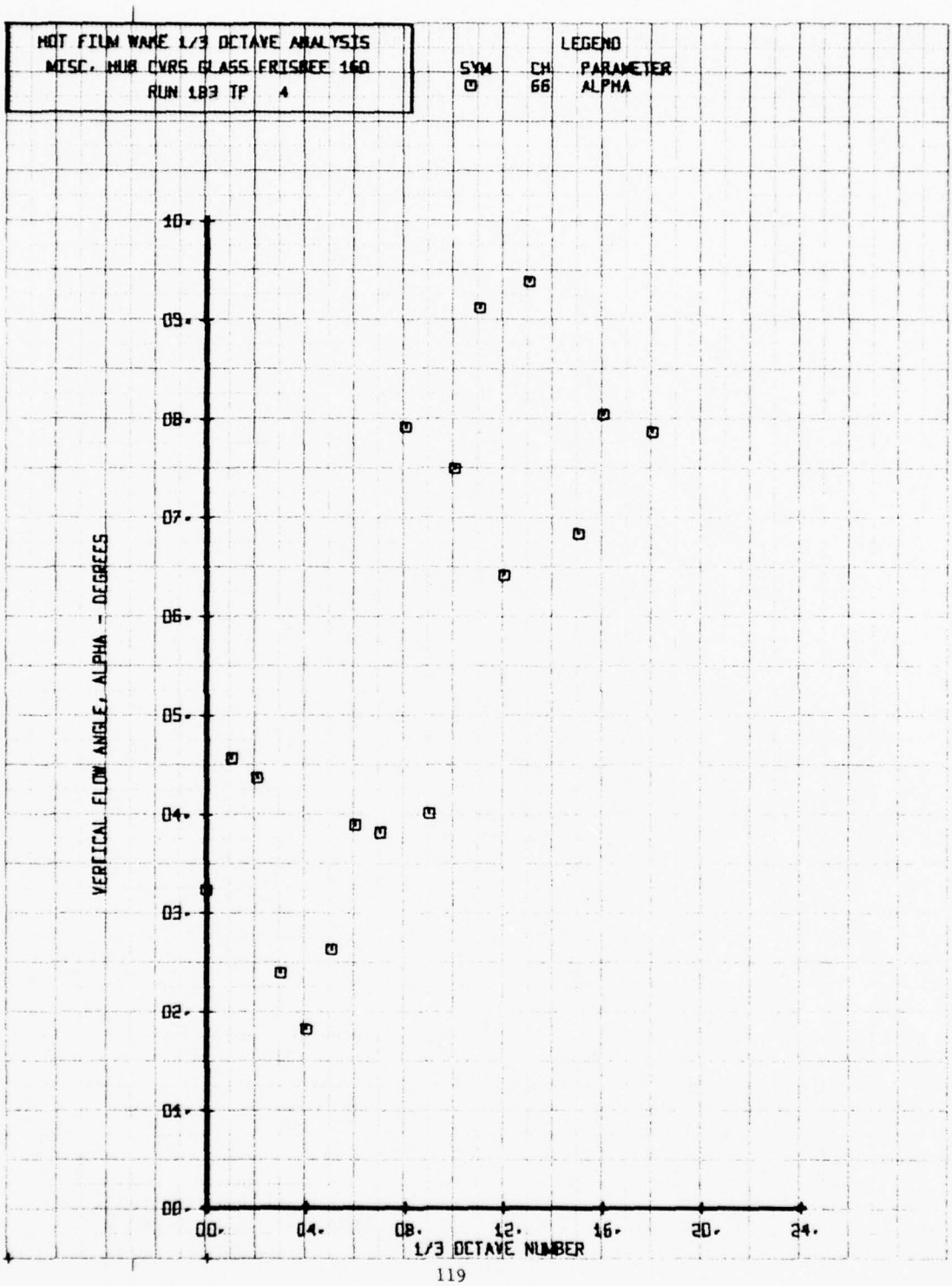
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
MISC. HUB CVRS GLASS FRISBEE 160
RUN 183 TP 4
LEGEND
SYM CH PARAMETER
66 ALPHA
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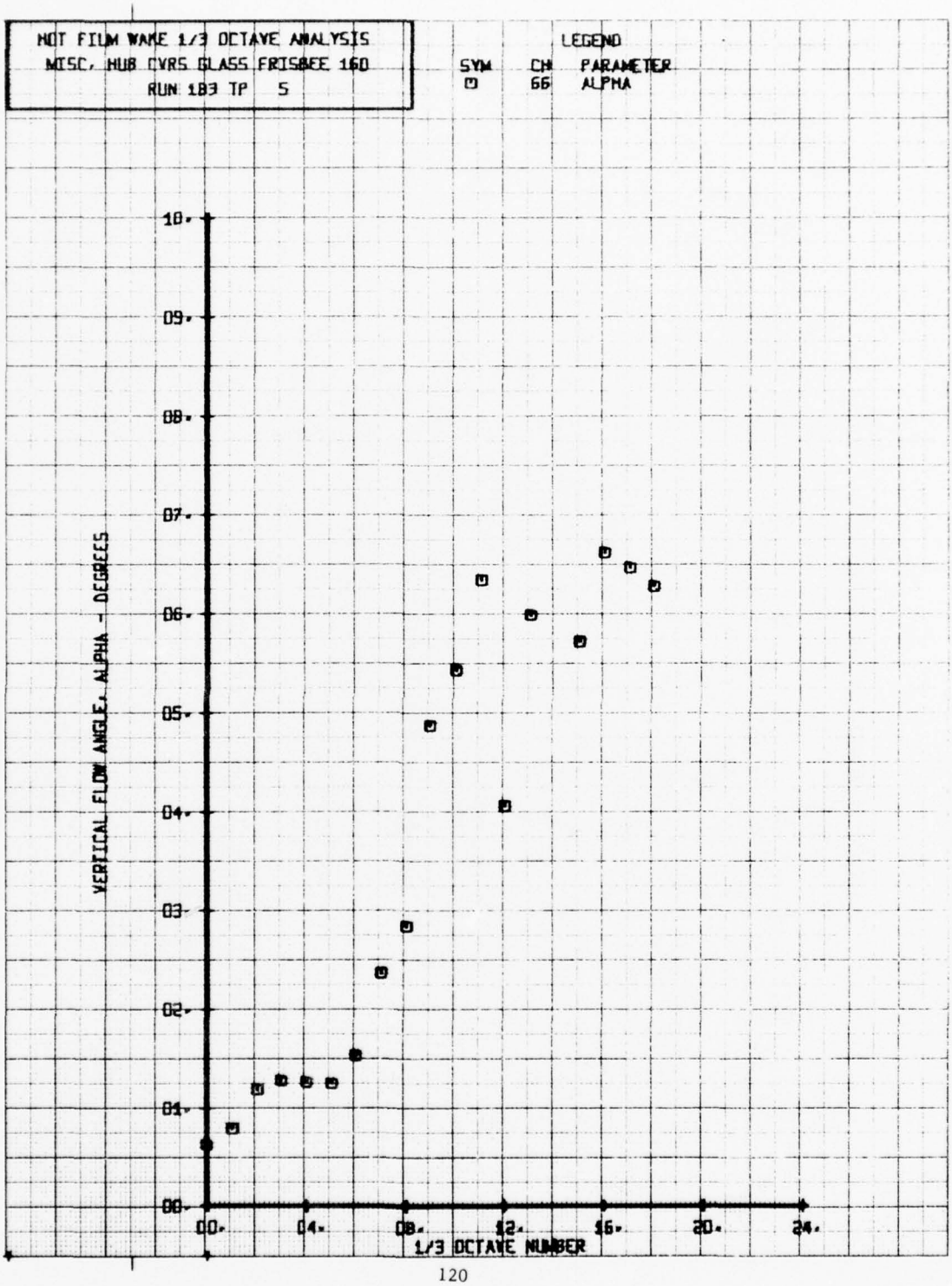
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
MISC, HUB OVRS GLASS FRISBEE 160
RUN 183 TP 5
LEGEND
SYM CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
1/3 OCTAVE NUMBER
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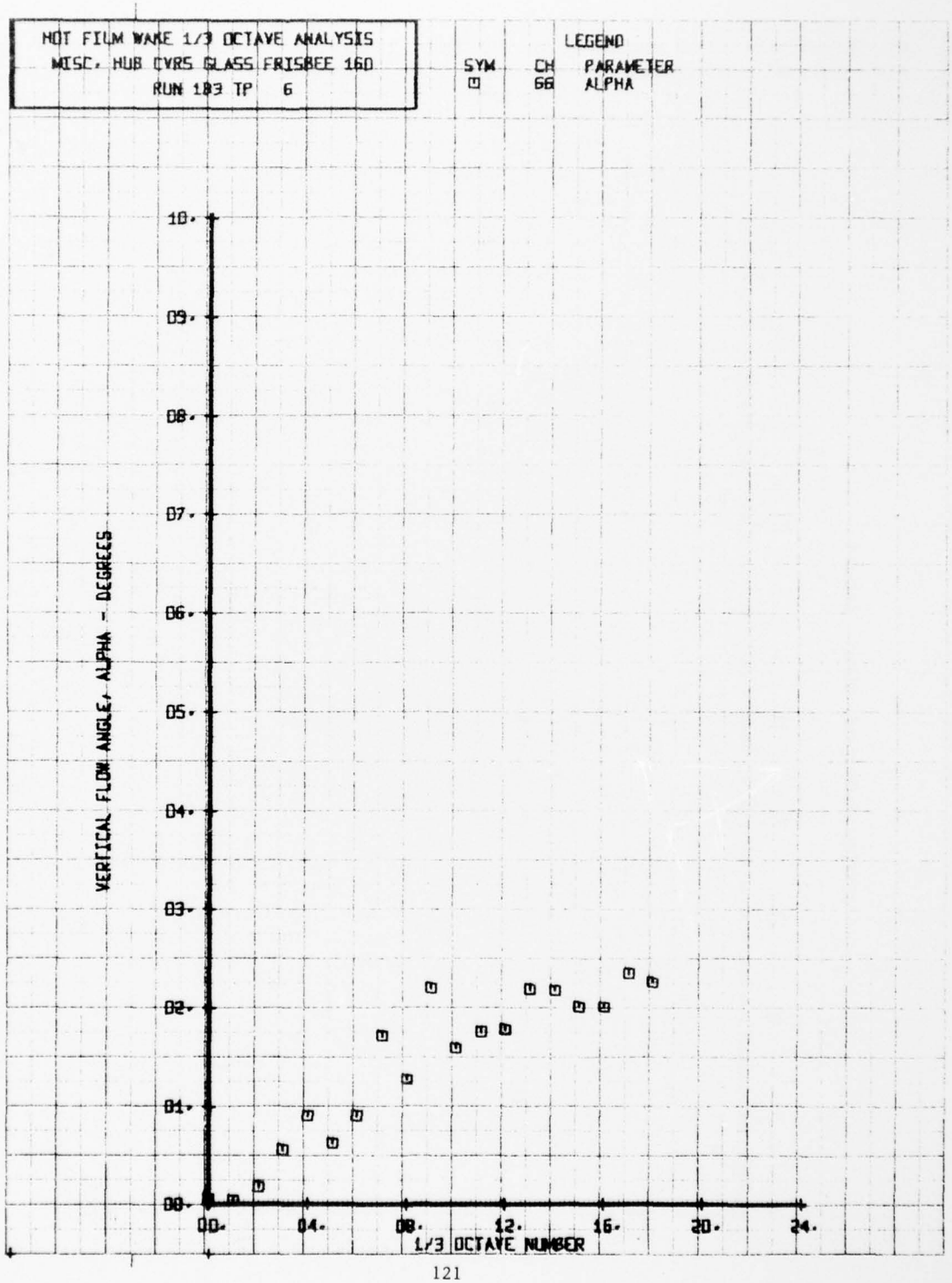
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
MISC. HUB CVRS GLASS FRISBEE 160
RUN 183 TP 6
LEGEND
SYM CH PARAMETER
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VERTICAL FLOW ANGLE, ALPHA - DEGREES
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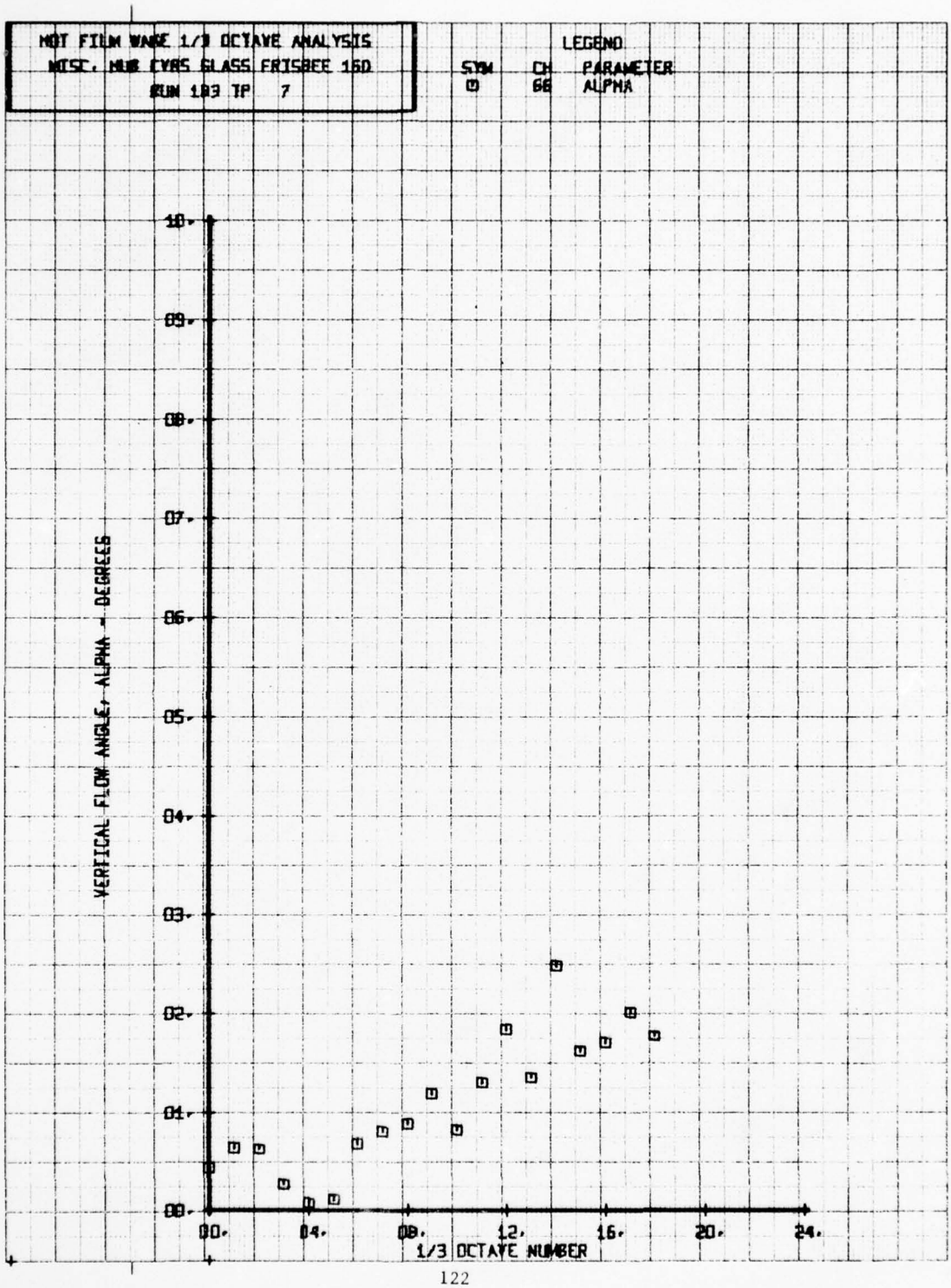
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
MISC. HUB CYRS GLASS FRISBEE 16D
RUN 183 TP 7
LEGEND
SYM CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
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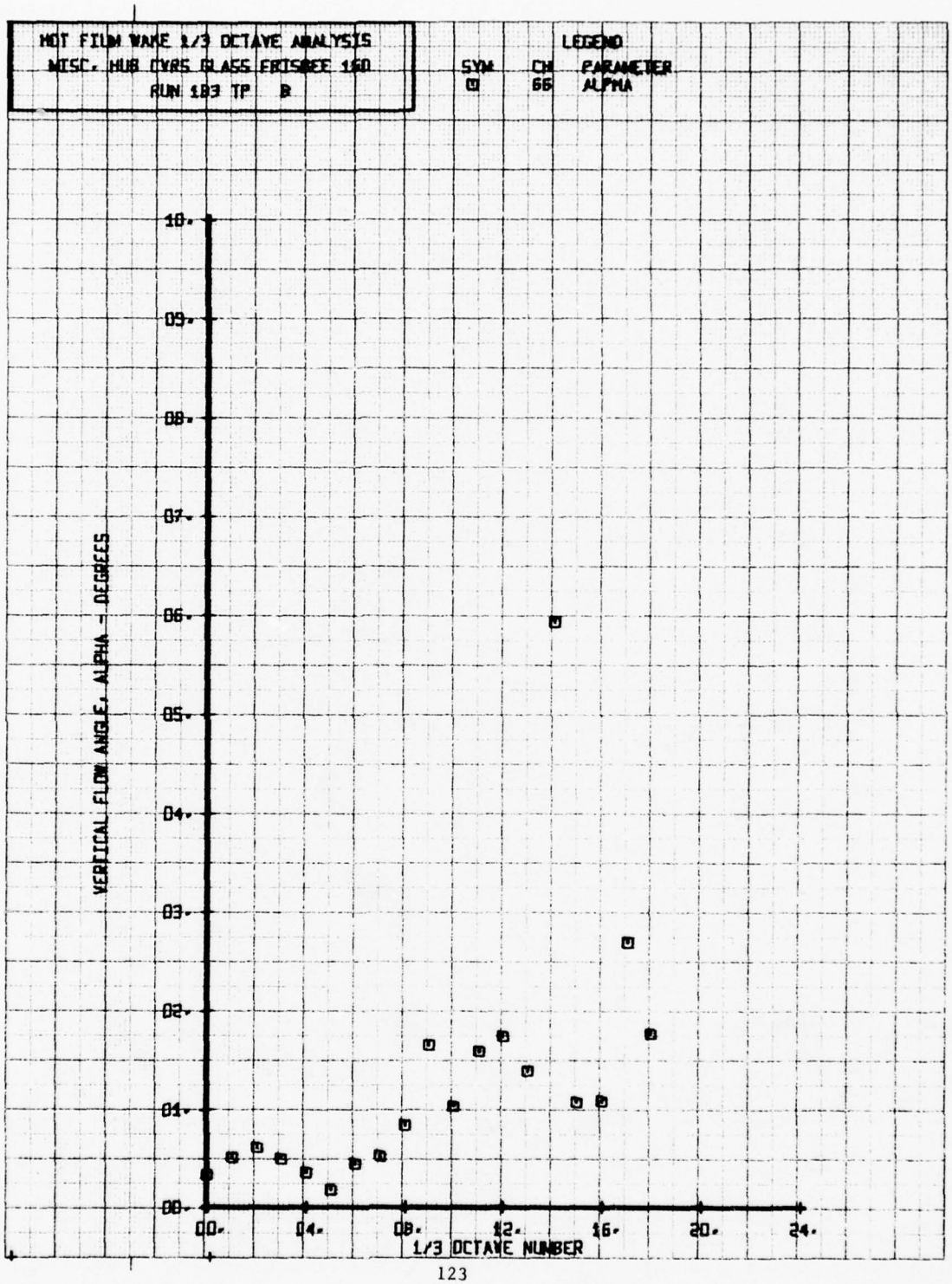
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
MISC. HUB CYRS GLASS FRISBEE 160
RUN 183 TP B
LEGEND
SYM CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
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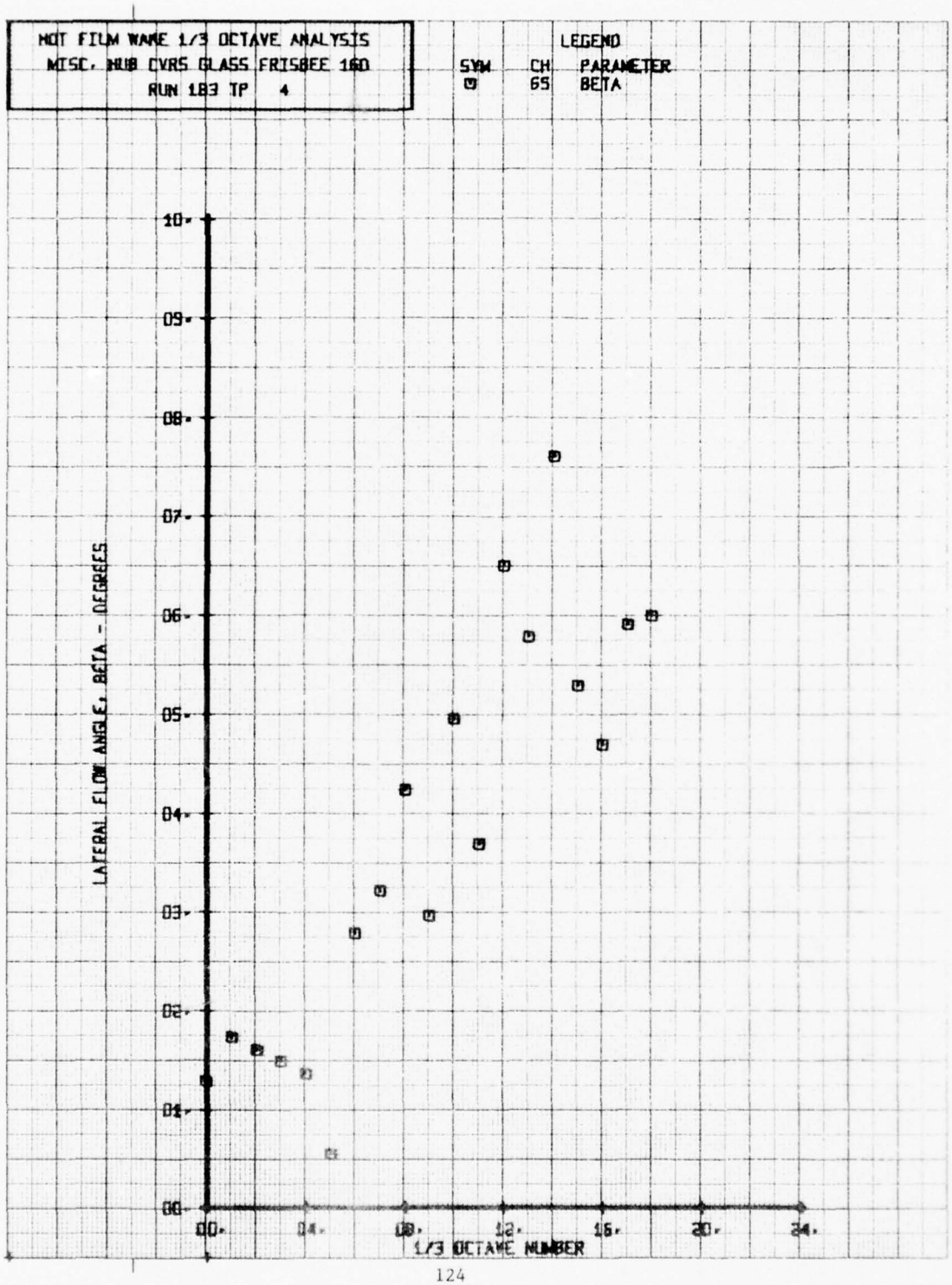
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
MISC. HUB CVRS GLASS FRISBEE 160
RUN 183 TP 4
LEGEND
SYM CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
1/3 OCTAVE NUMBER
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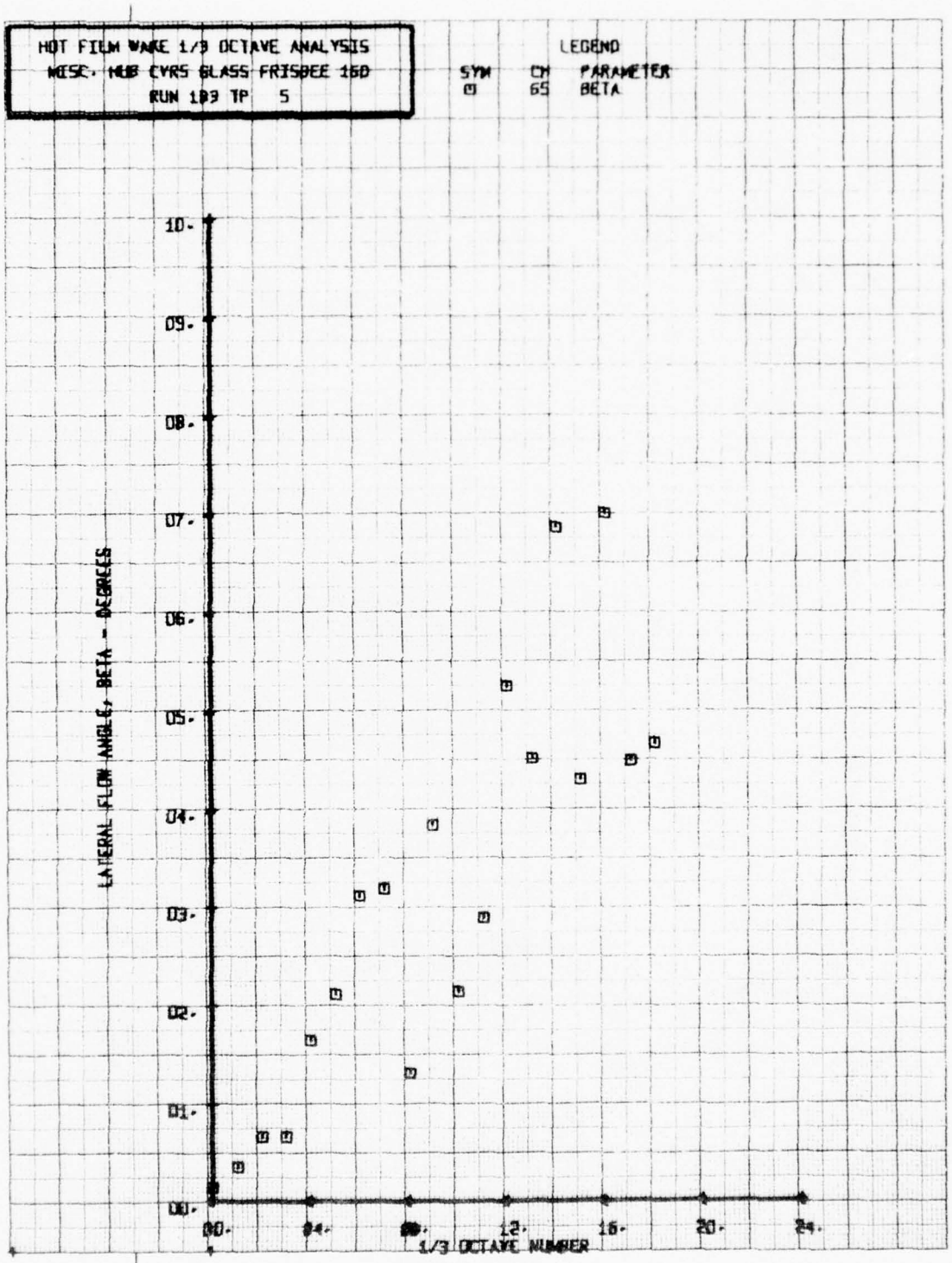
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
NOISE, HUB CVRS GLASS FRISBEE 16D
RUN 103 TP 5
LEGEND
SYM CM PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
1/3 OCTAVE NUMBER
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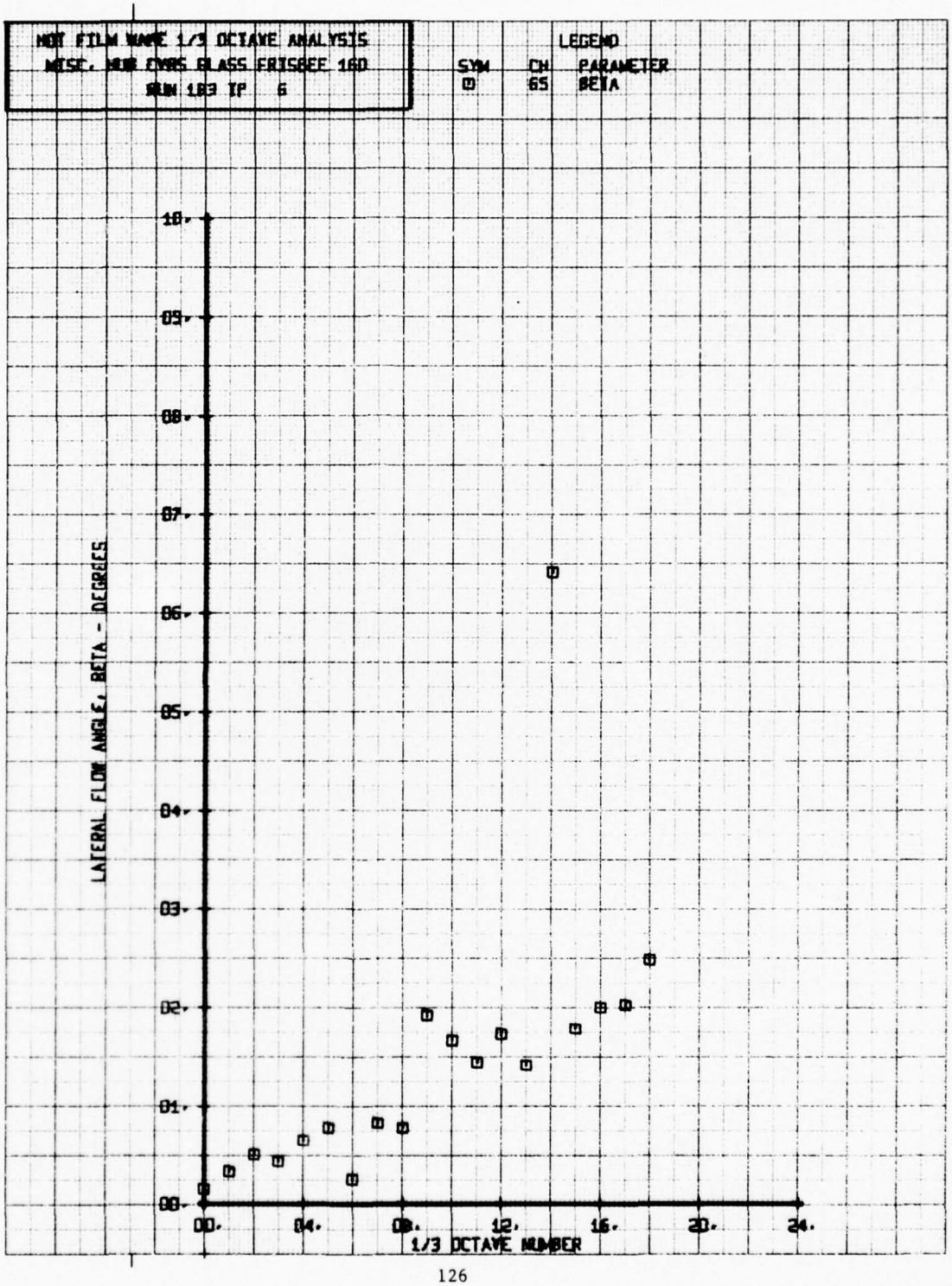
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MISC. HOW OVRS GLASS FRISBEE 160
RUN 183 TP 6
LEGEND
SYM CH PARAMETER
65 BETA
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LATERAL FLOW ANGLE, BETA - DEGREES
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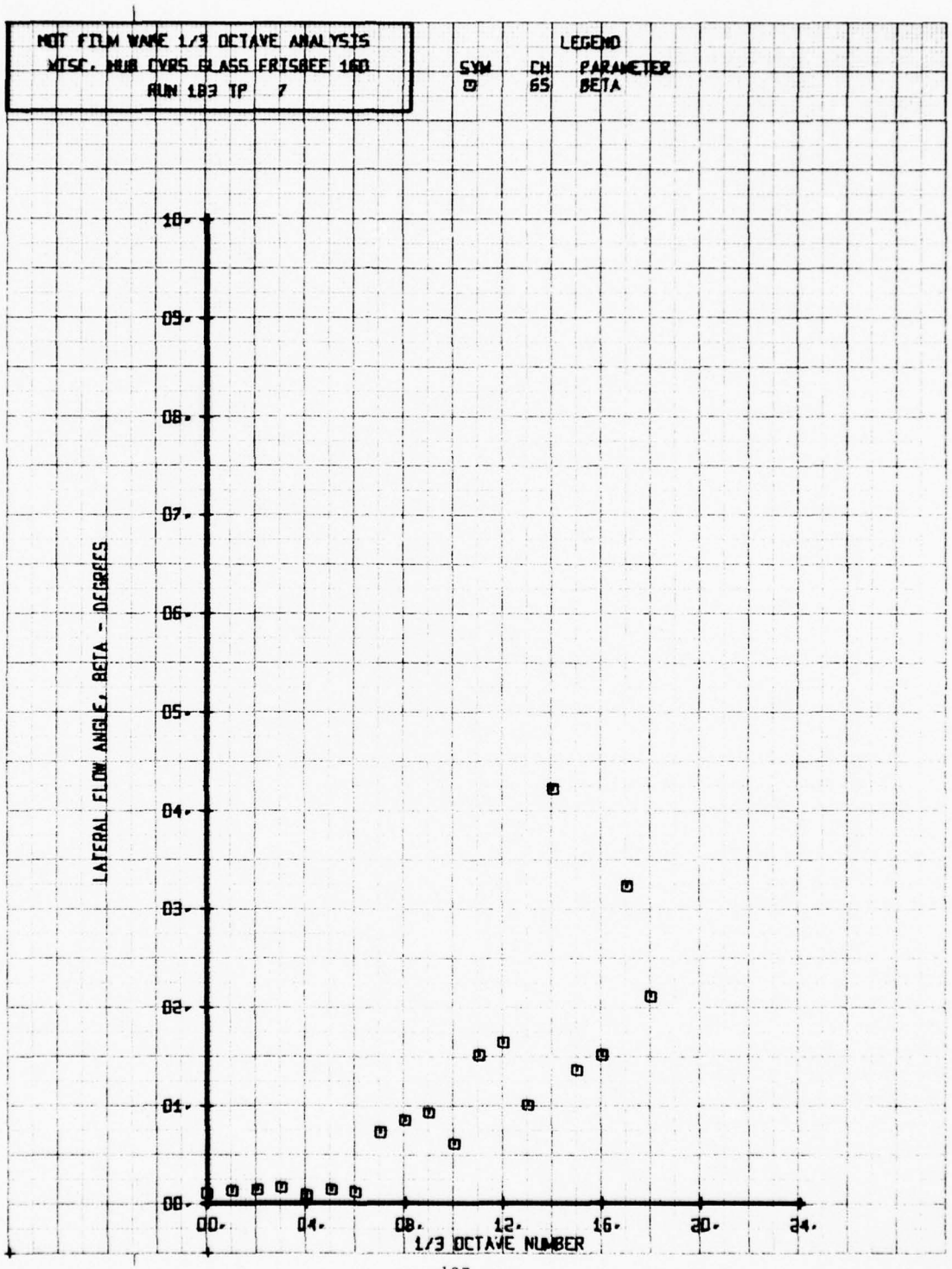
1/3 OCTAVE NUMBER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XTSC. HUB OVRS GLASS FRISBEE 160
RUN 183 TP 7
LEGEND
SYM CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
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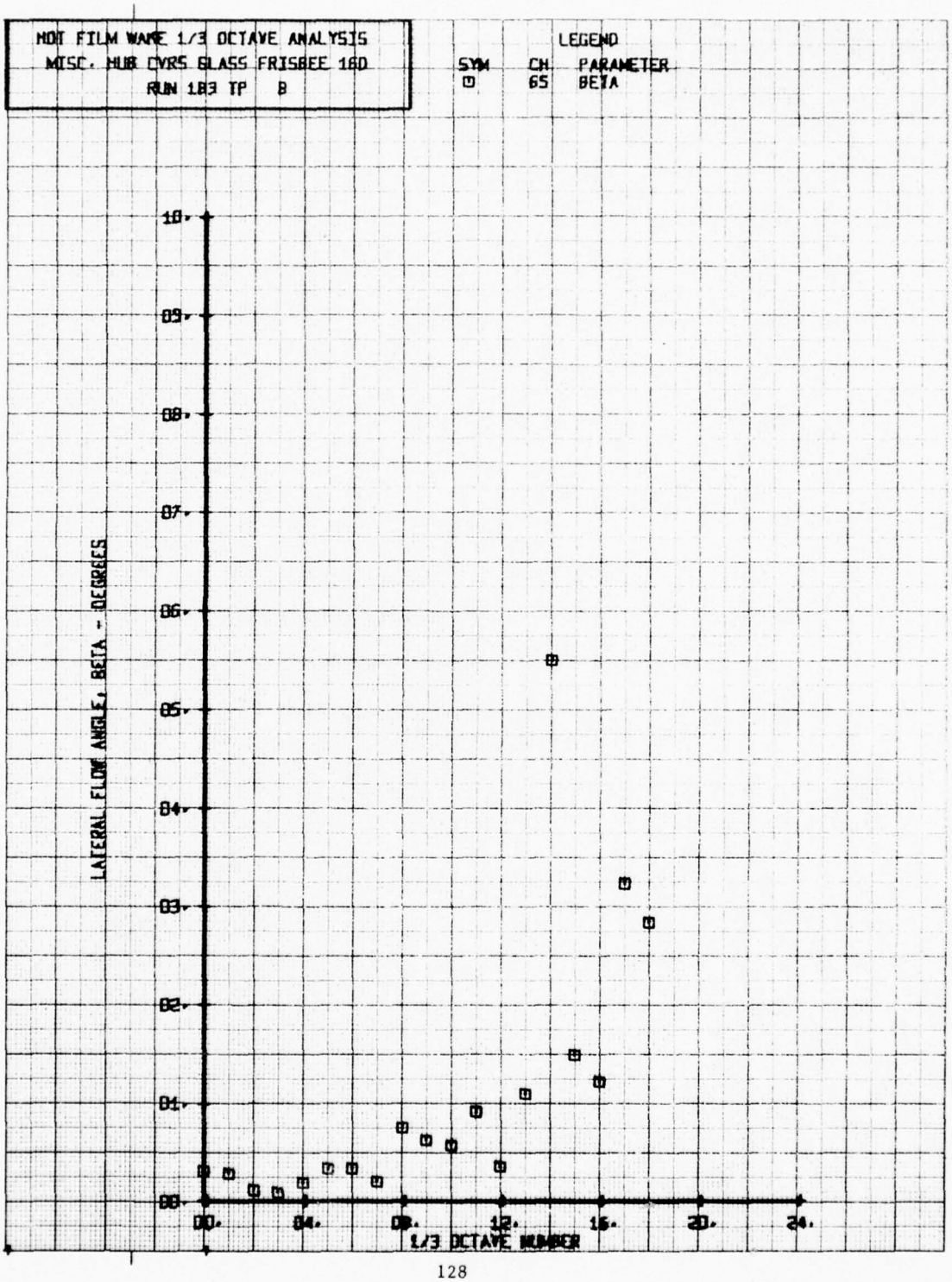
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
MISC. HUB CVRS GLASS FRISBEE 16D
RUN 183 TP B
LEGEND
SYM CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
1/3 OCTAVE NUMBER
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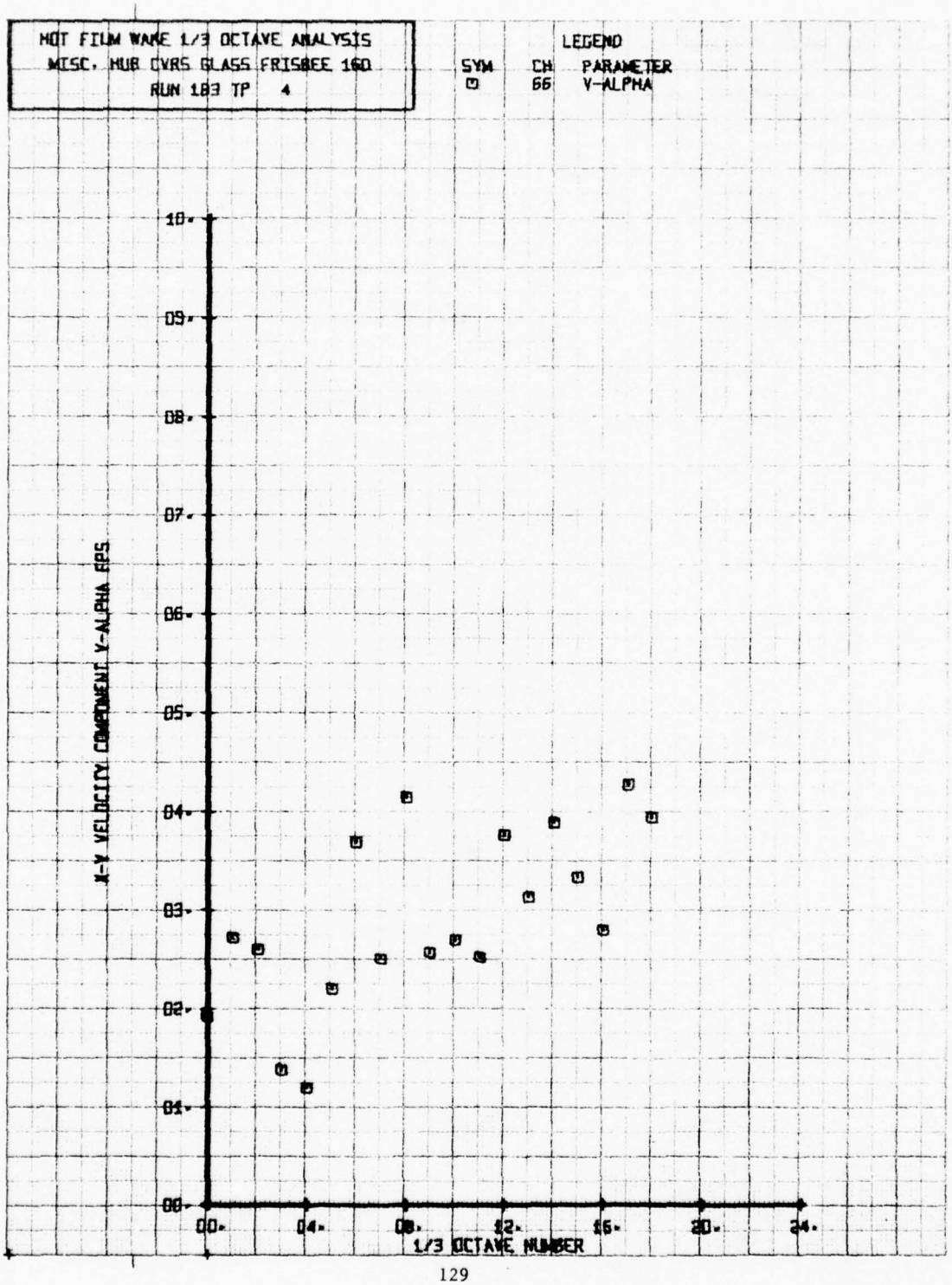
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
MISC. HUB CVRS GLASS FRISBEE 160
RUN 183 TP 4
LEGEND
SYM CH PARAMETER
66 V-ALPHA
X-V VELOCITY COMPONENT V-ALPHA FPS
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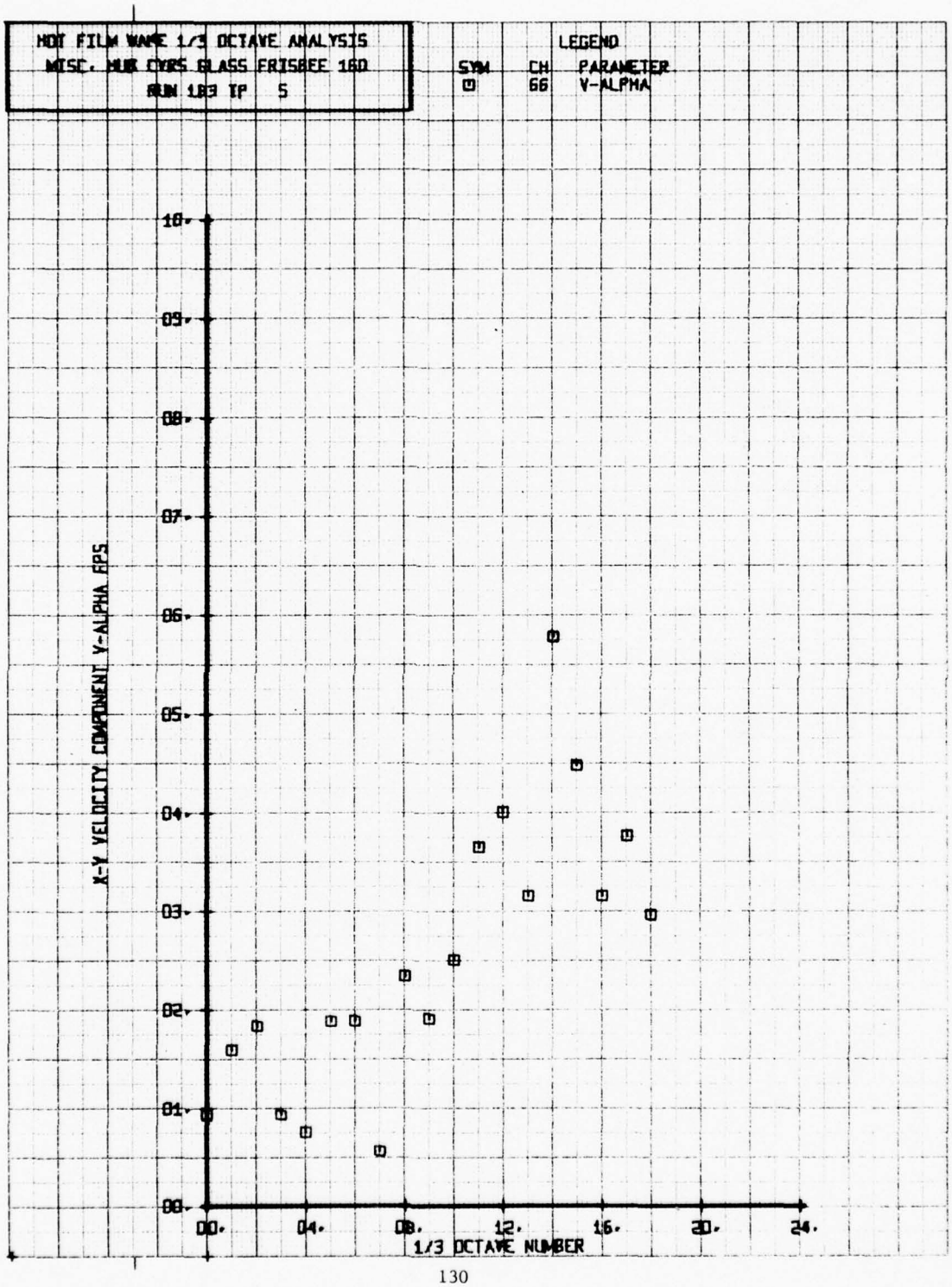
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
MISC. MUR CYRS GLASS FRISBEE 16D
RUN 183 TP 5
LEGEND
SYM CH PARAMETER
66 V-ALPHA
X-Y VELOCITY COMPONENT V-ALPHA FPS
1/3 OCTAVE NUMBER
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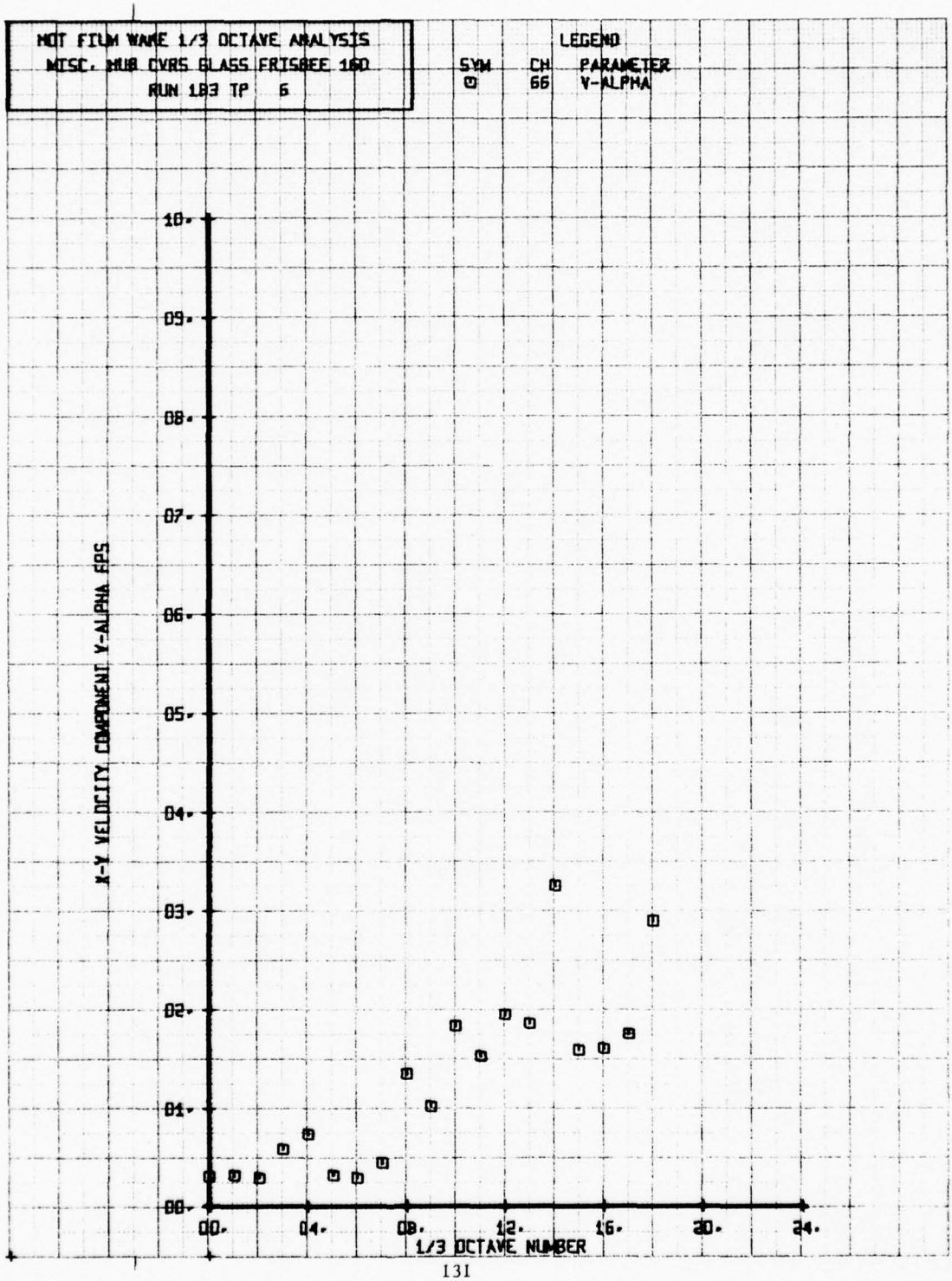
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
MISC. HUB OVRS GLASS FRISBEE 160
RUN 183 TP 6
LEGEND
SYM CH PARAMETER
66 V-ALPHA
X-V VELOCITY COMPONENT V-ALPHA FPS
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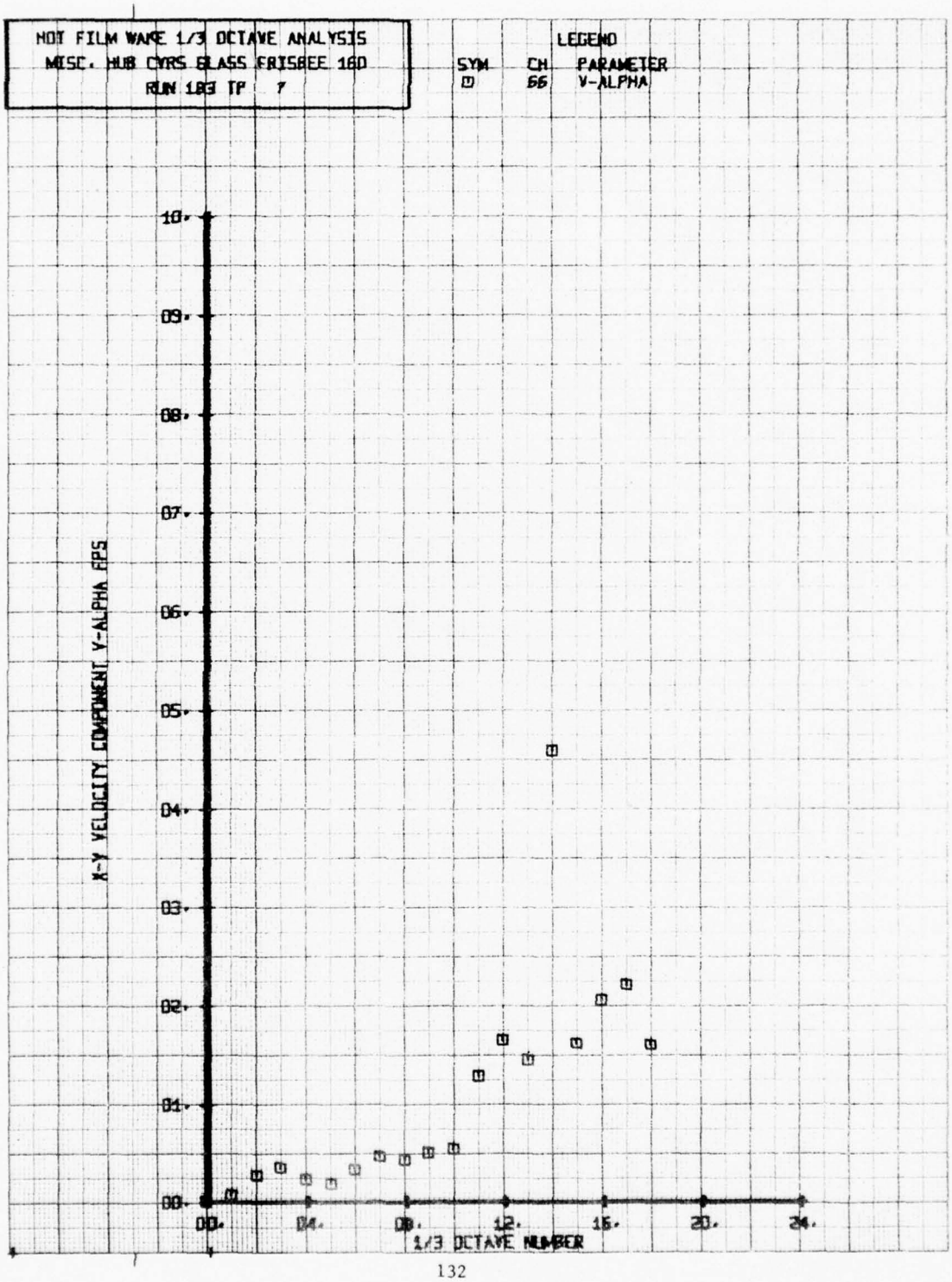
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
MISC. HUB CYRS GLASS FRISBEE 160
RUN 183 TP 7
LEGEND
SYM CH PARAMETER
66 V-ALPHA
X-Y VELOCITY COMPONENT V-ALPHA FPS
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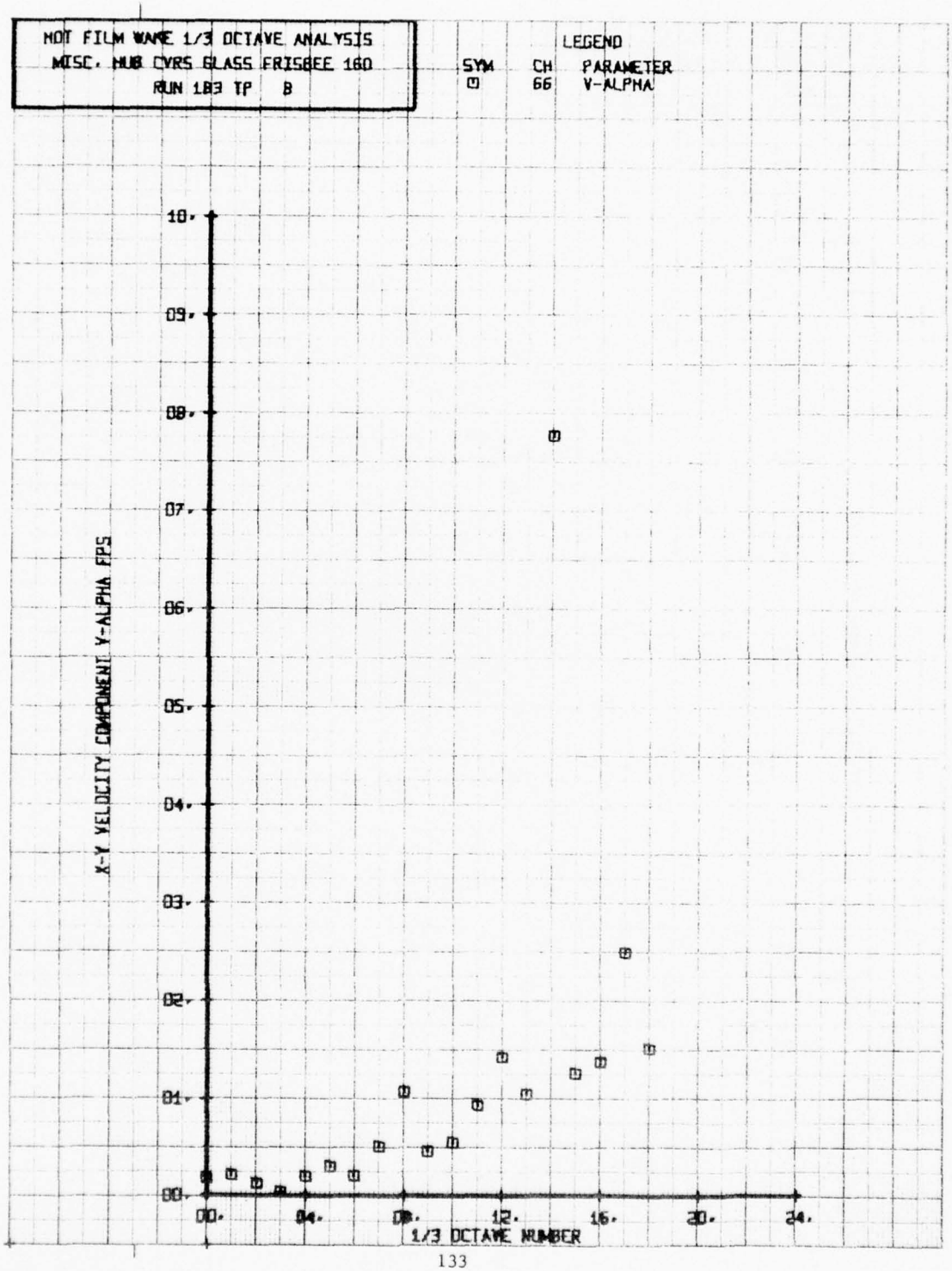
HOT FILM WAVE 1/3 OCTAVE ANALYSIS
MISC. HUB CVRS GLASS FRISBEE 160
RUN 183 TP B
LEGEND
SYM CH PARAMETER
66 V-ALPHA
X-Y VELOCITY COMPONENT V-ALPHA FPS
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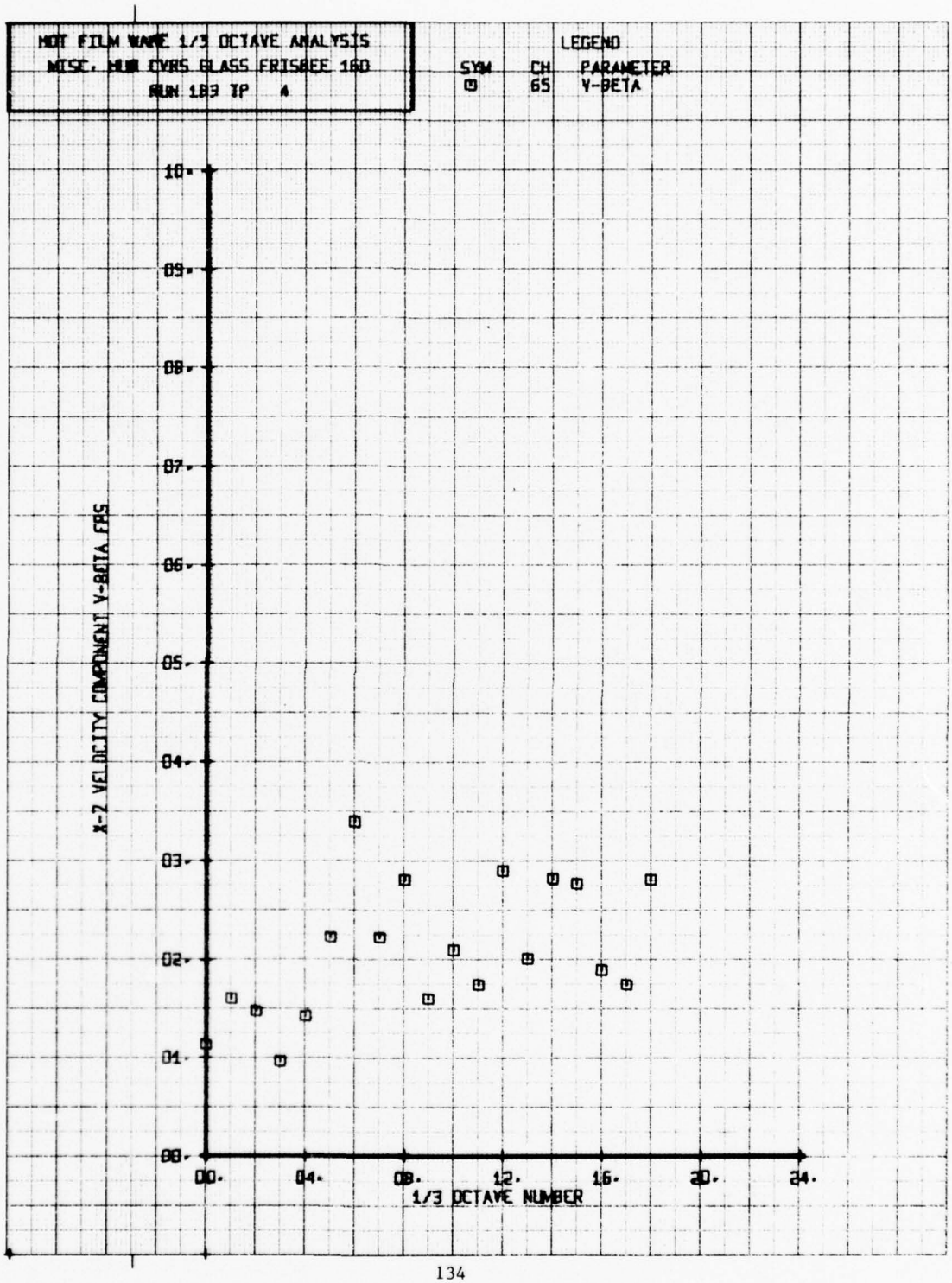
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
MISC. HUB OVRS GLASS FRISBEE 160
RUN 183 IP 4
LEGEND
SYM CH PARAMETER
65 V-BETA
X-2 VELOCITY COMPONENT V-BETA FPS
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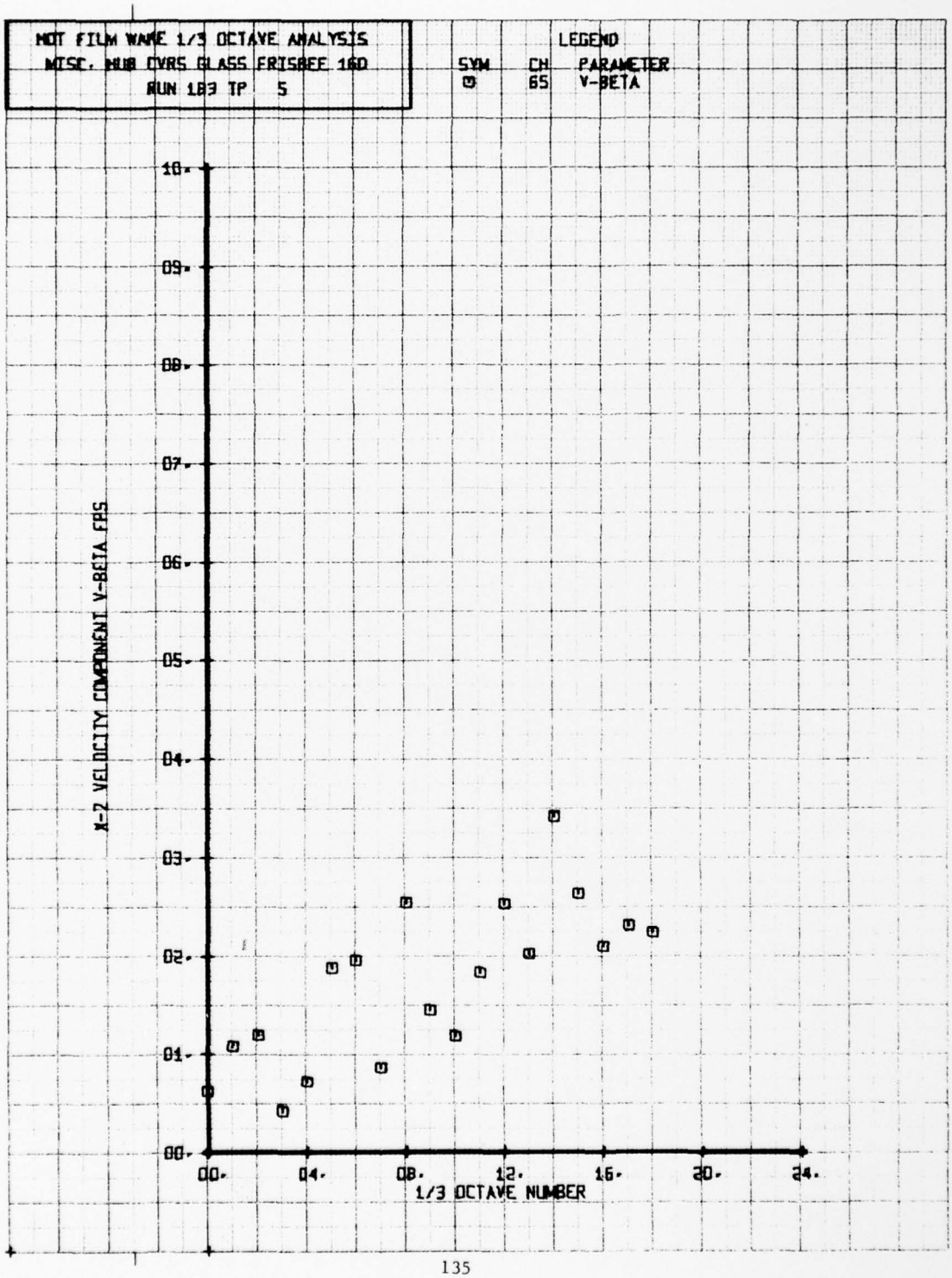
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
MISC. HUB CVRS GLASS FRISBEE 16D
RUN 183 TP 5
LEGEND
SYM CH PARAMETER
65 V-BETA
X-2 VELOCITY COMPONENT V-BETA FPS
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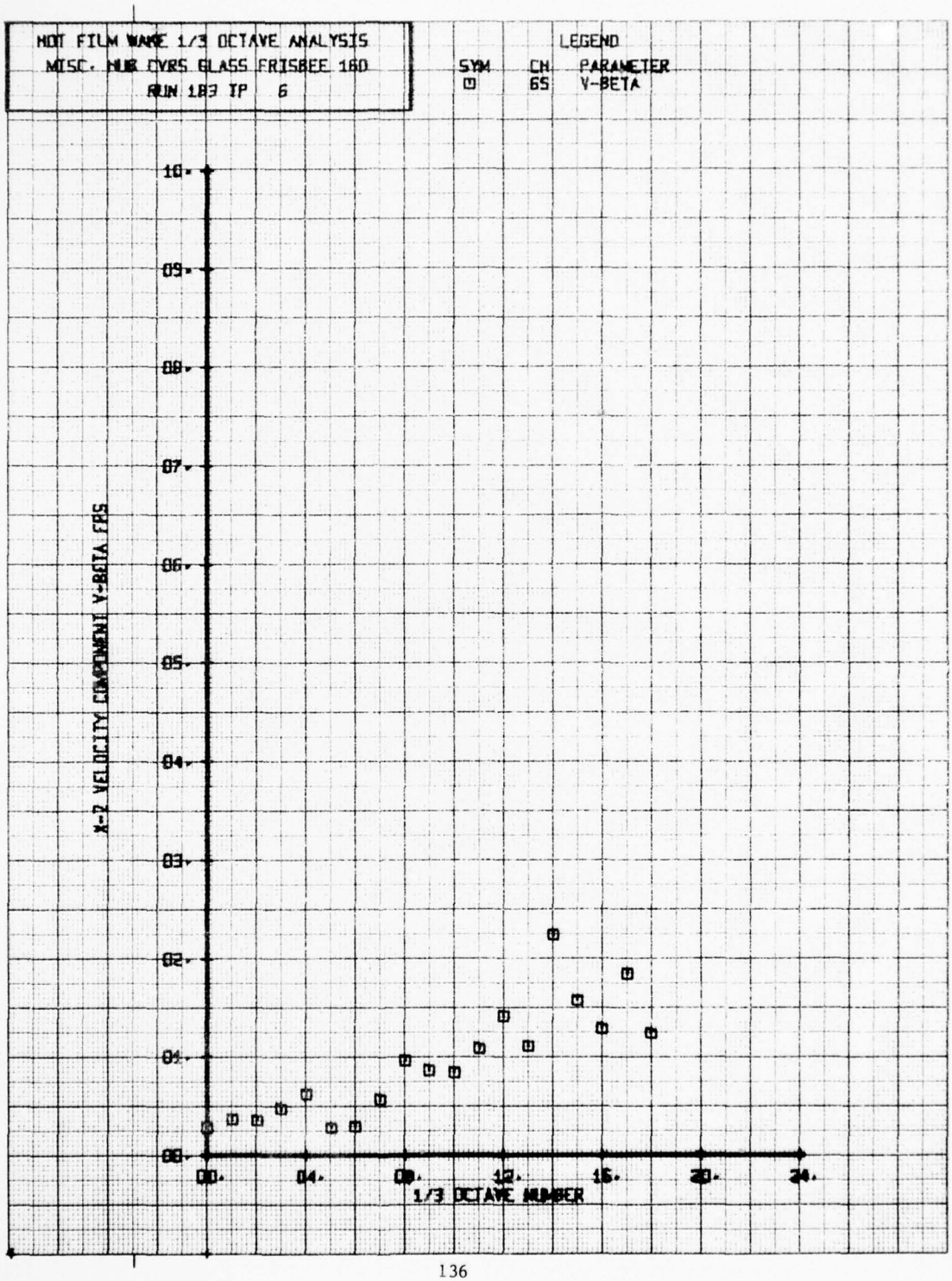
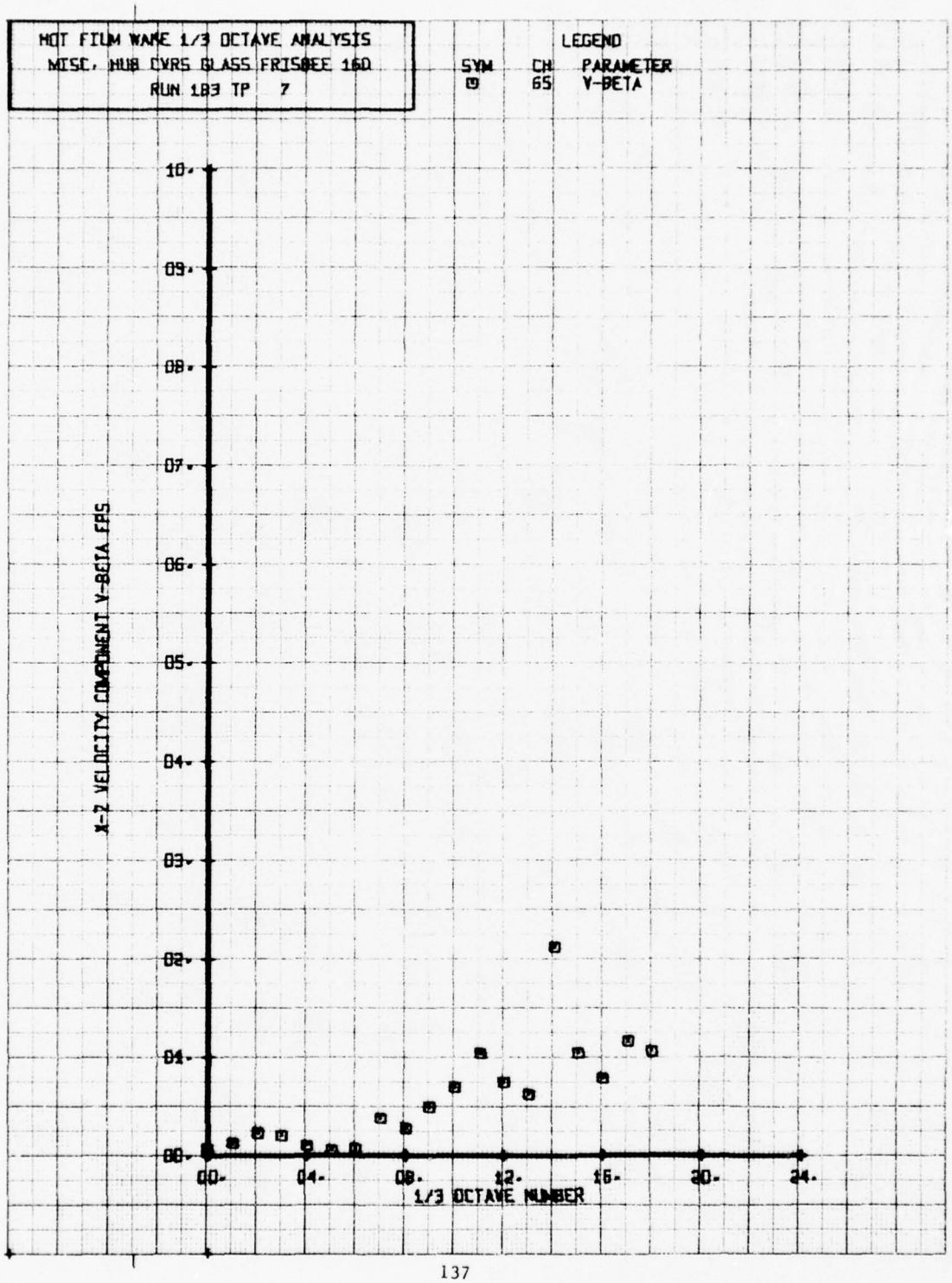

HOT FILM WAKE 1/3 OCTAVE ANALYSIS
MISC. HUB CVRS GLASS FRISBEE 160
RUN 183 TP 6
LEGEND
SYM CH PARAMETER
65 V-BETA
X-2 VELOCITY COMPONENT V-BETA FPS
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
MISC. HUB CVRS GLASS FRISBEE 160
RUN 183 TP 7
LEGEND
SYM CH PARAMETER
65 V-BETA
X-2 VELOCITY COMPONENT V-BETA FPS
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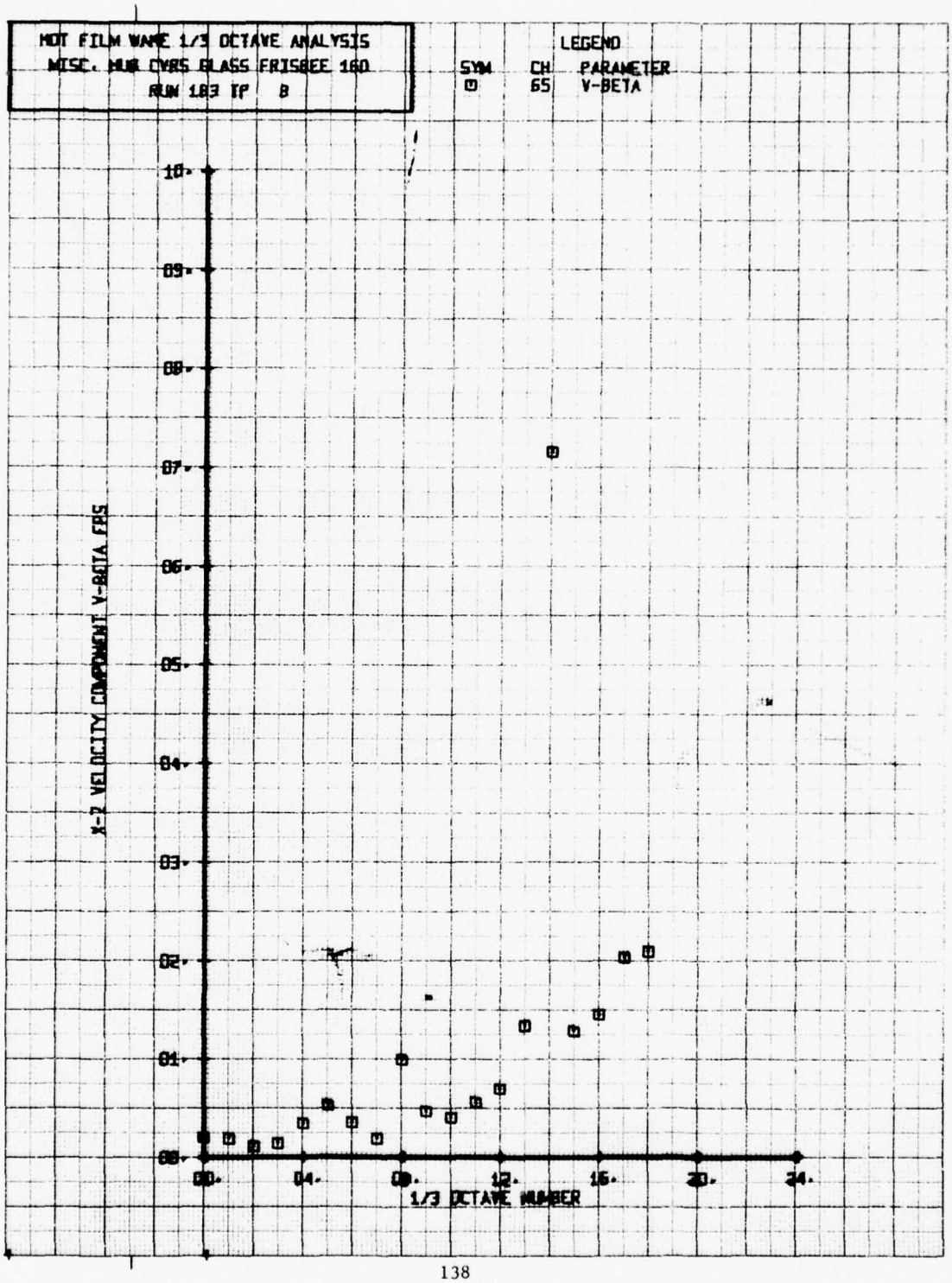
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
MISC. HUB CVRS GLASS FRISBEE 160
RUN 183 TP 8
LEGEND
SYM CH PARAMETER
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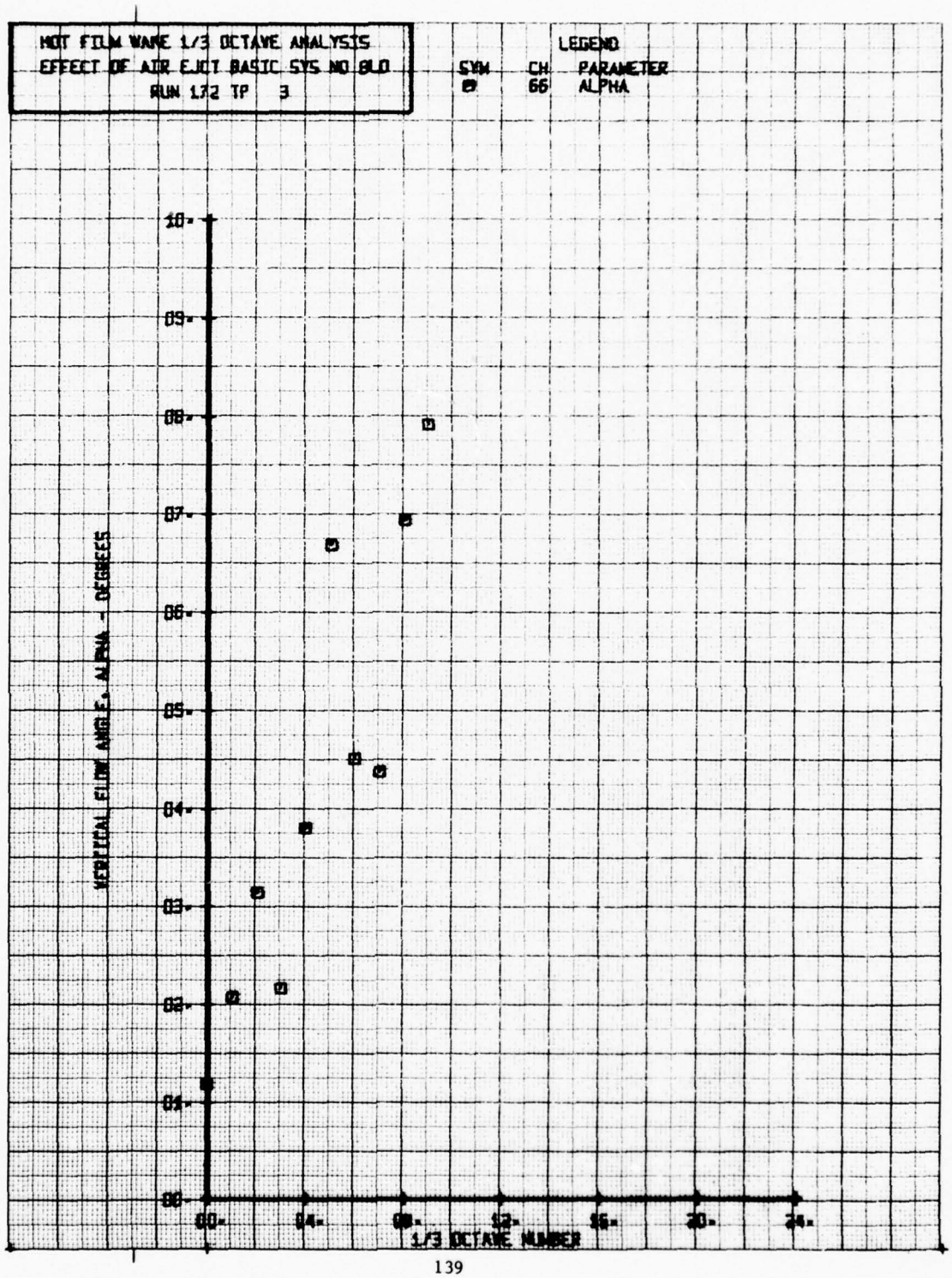
X-2 VELOCITY COMPONENT V-BETA FPS
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
EFFECT OF AIR EJCT BASIC SYS NO BLO
RUN 172 TP 3
LEGEND
SYM CH PARAMETER
66 ALPHA
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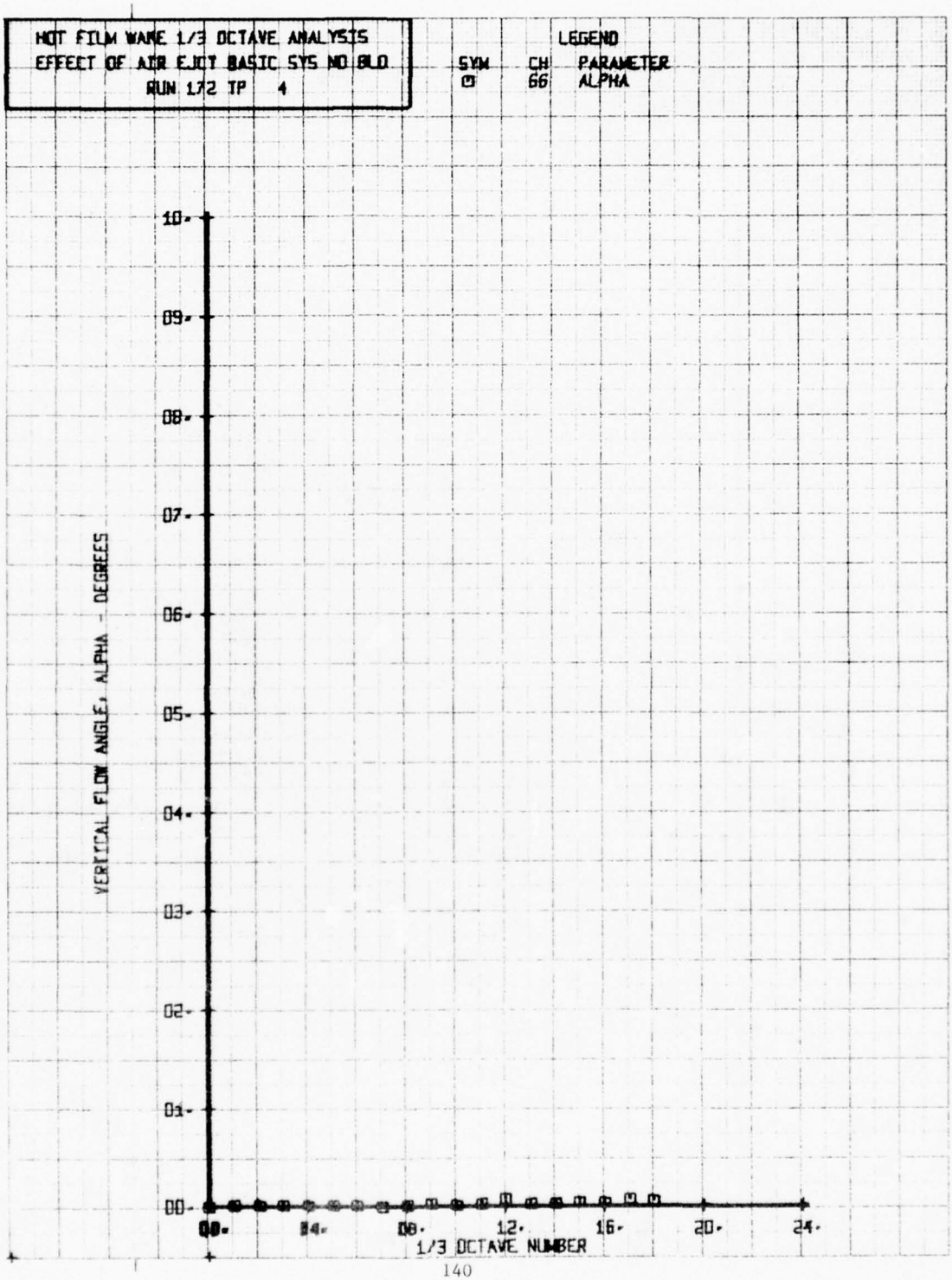
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
EFFECT OF AIR EJCT BASIC SYS NO BLD
RUN 172 TP 4
LEGEND
SYM CH PARAMETER
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VERTICAL FLOW ANGLE, ALPHA - DEGREES
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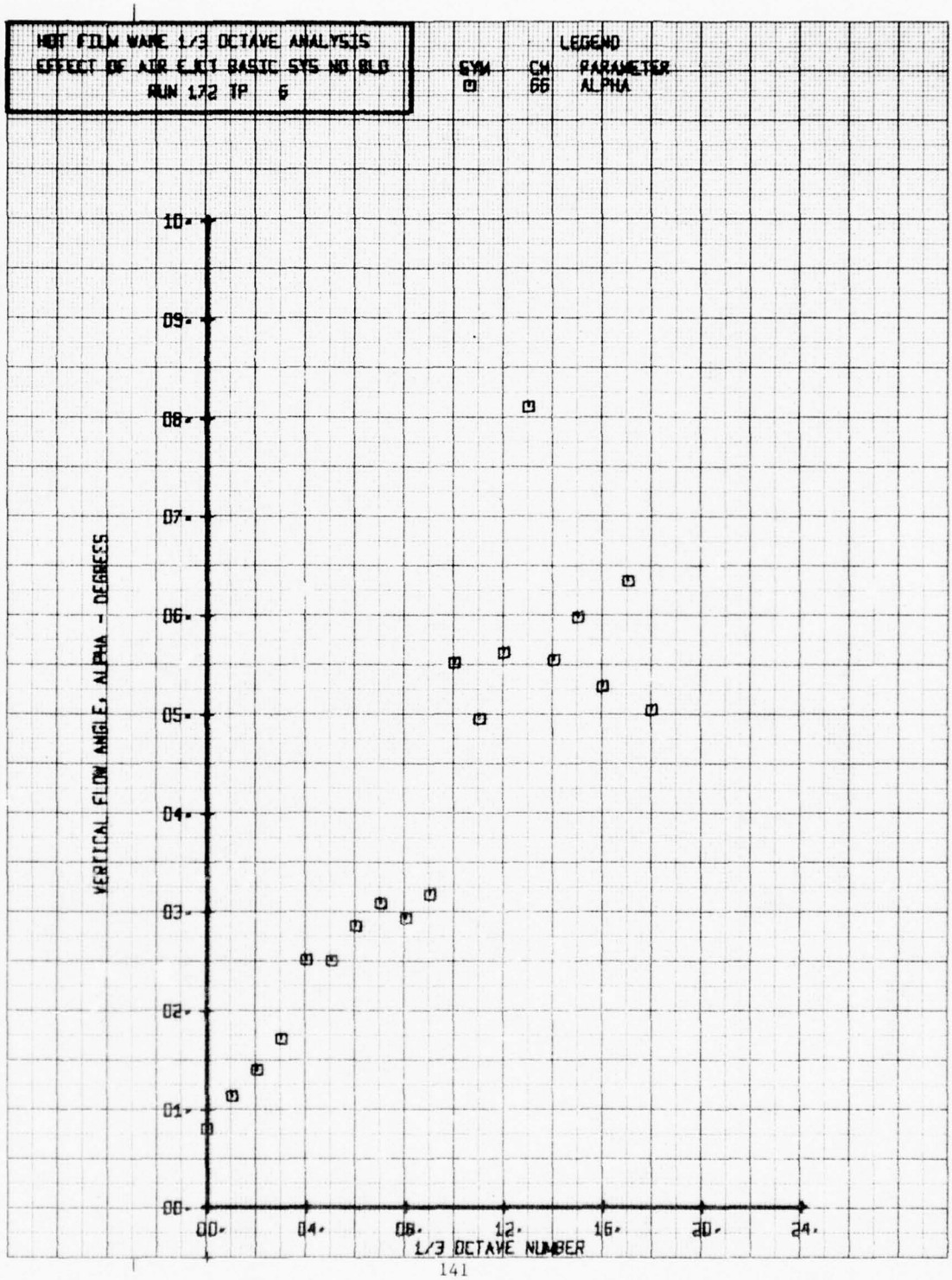
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
EFFECT OF AIR EJCT BASIC SYS NO BLD
RUN 172 TP 6
LEGEND
SYM CM PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
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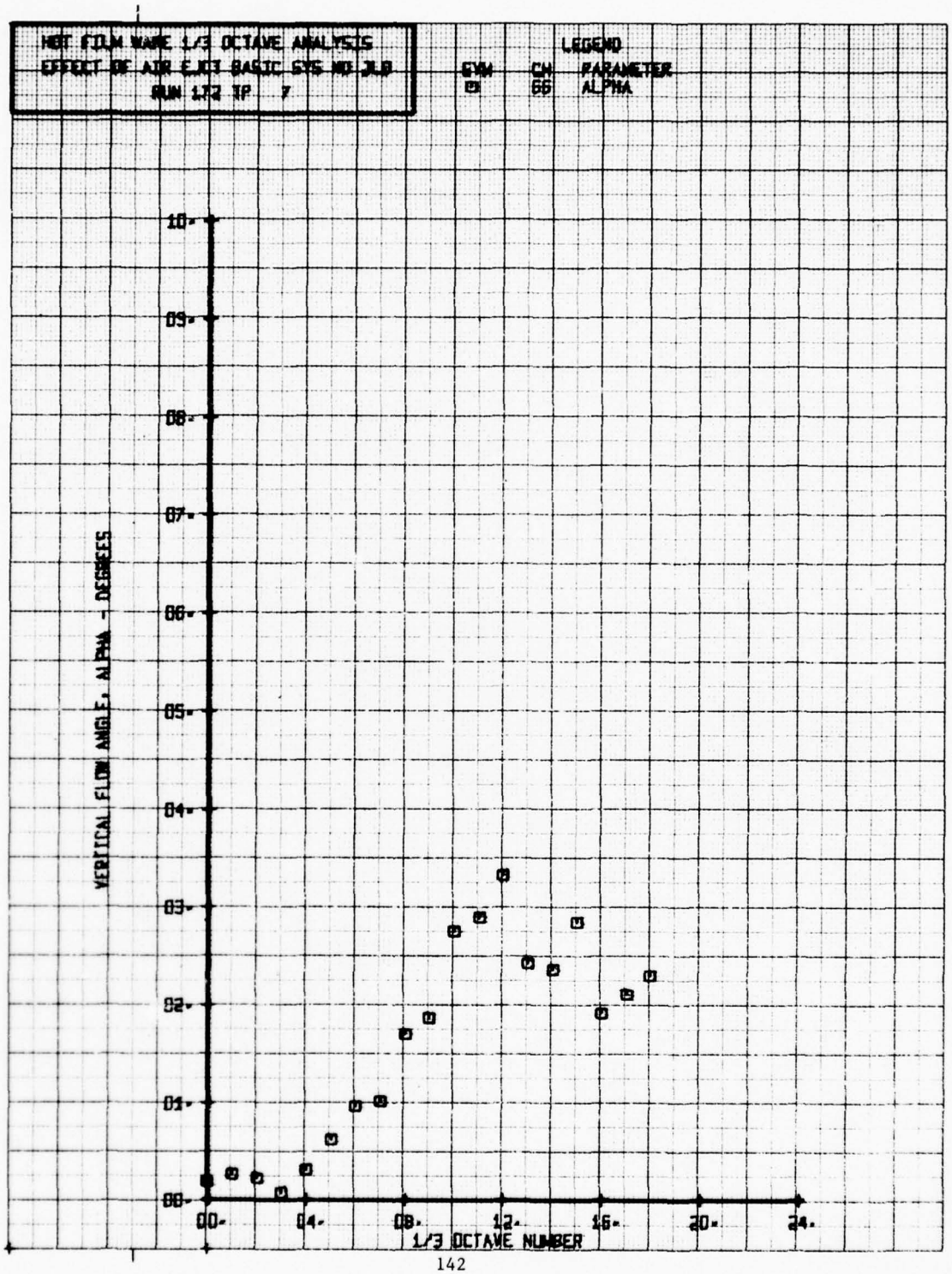
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
EFFECT OF AIR EJCT BASIC SYS NO JLB
RUN 172 TP 7
LEGEND
GVM CH PARAMETER
66 ALPHA
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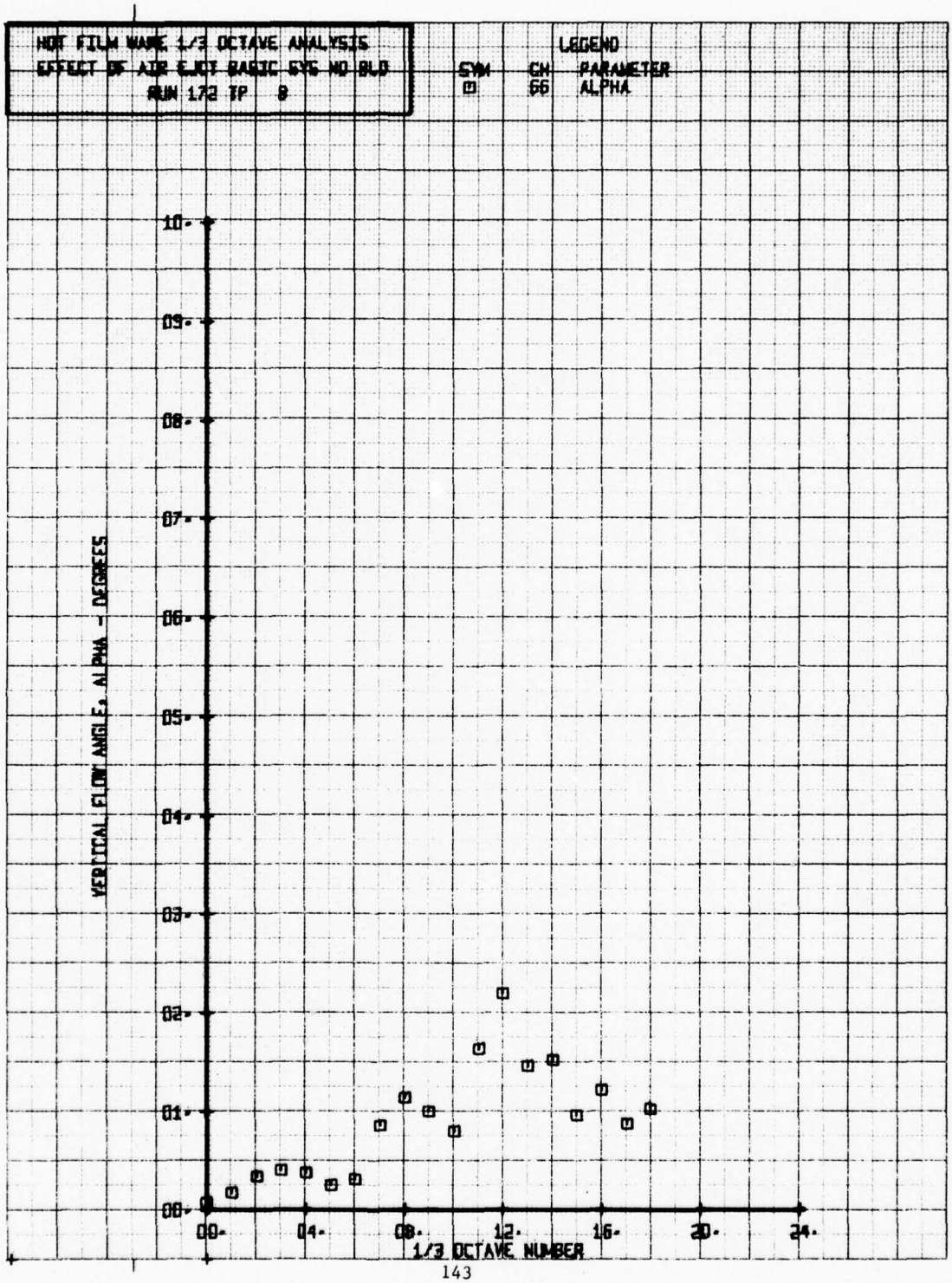
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EFFECT OF AIR EJCT BASIC CYC NO BLD
RUN 172 TP 8
LEGEND
SYM CH PARAMETER
56 ALPHA
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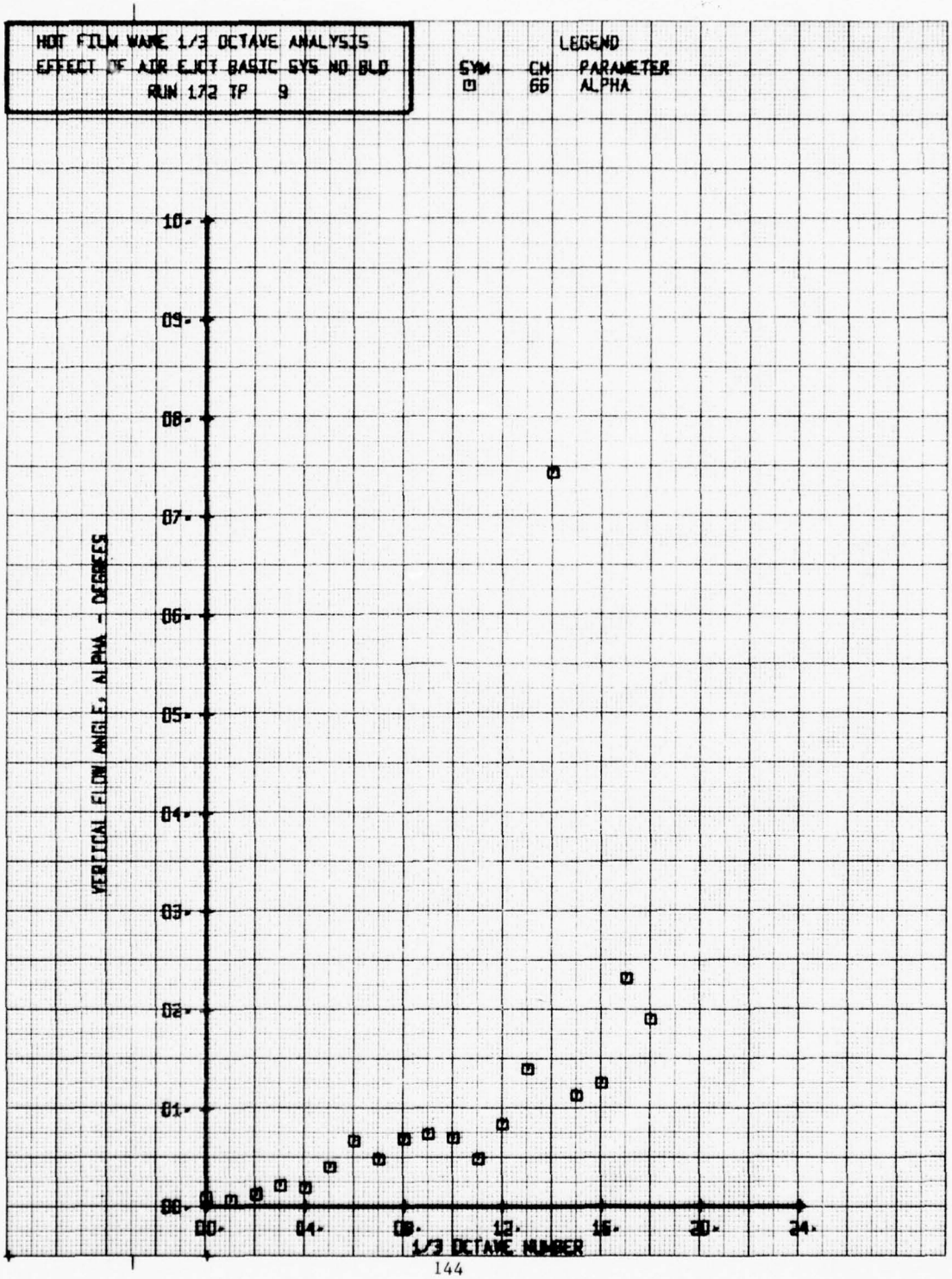
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EFFECT OF AIR EJCT BASIC SYS NO BLD
RUN 172 TP 9
LEGEND
SYM CH PARAMETER
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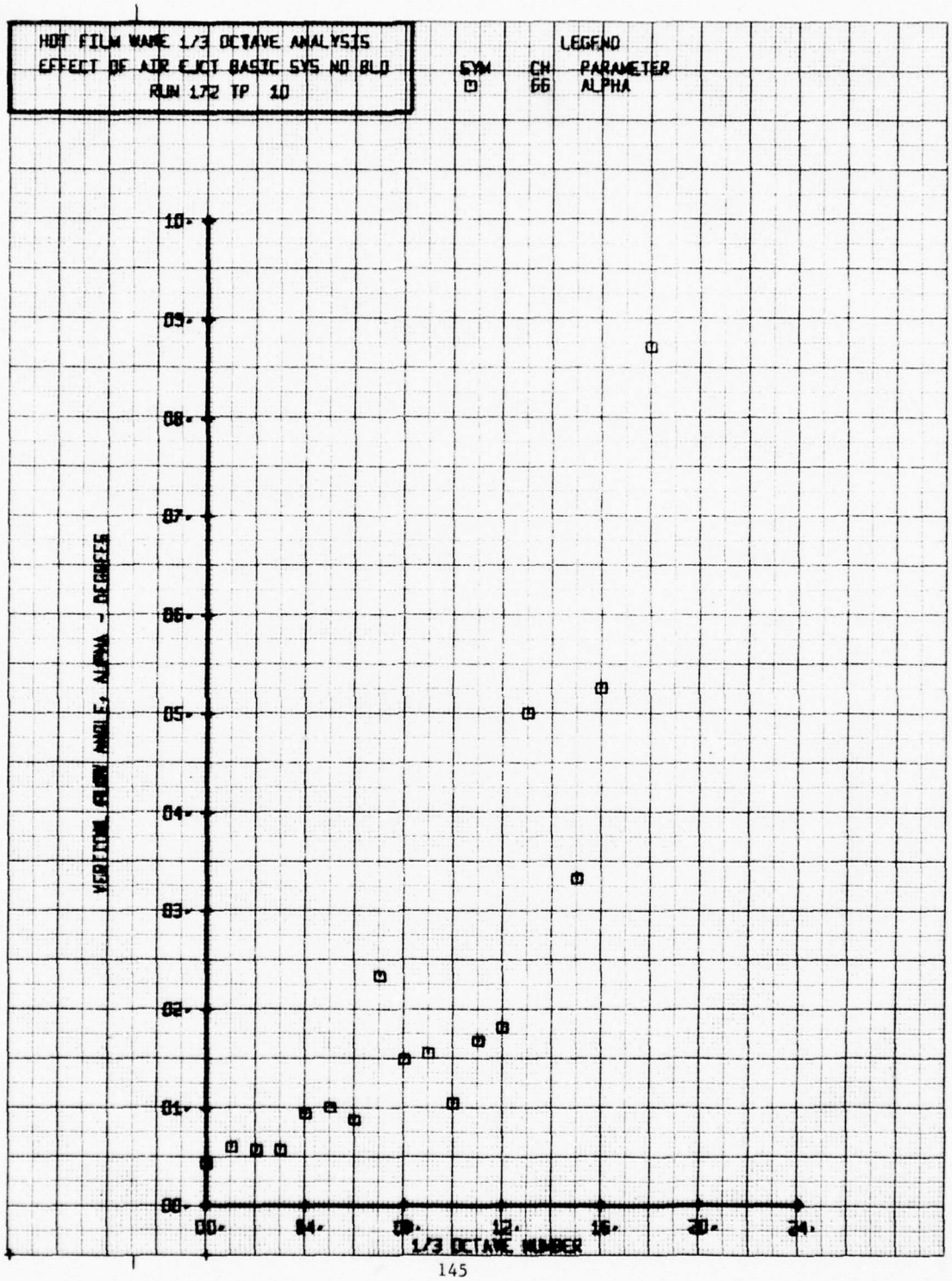
VERTICAL FLOW ANGLE, ALPHA - DEGREES
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
EFFECT OF AIR EJCT BASIC SYS NO BLD
RUN 172 TP 10
LEGEND
SYM CH PARAMETER
66 ALPHA
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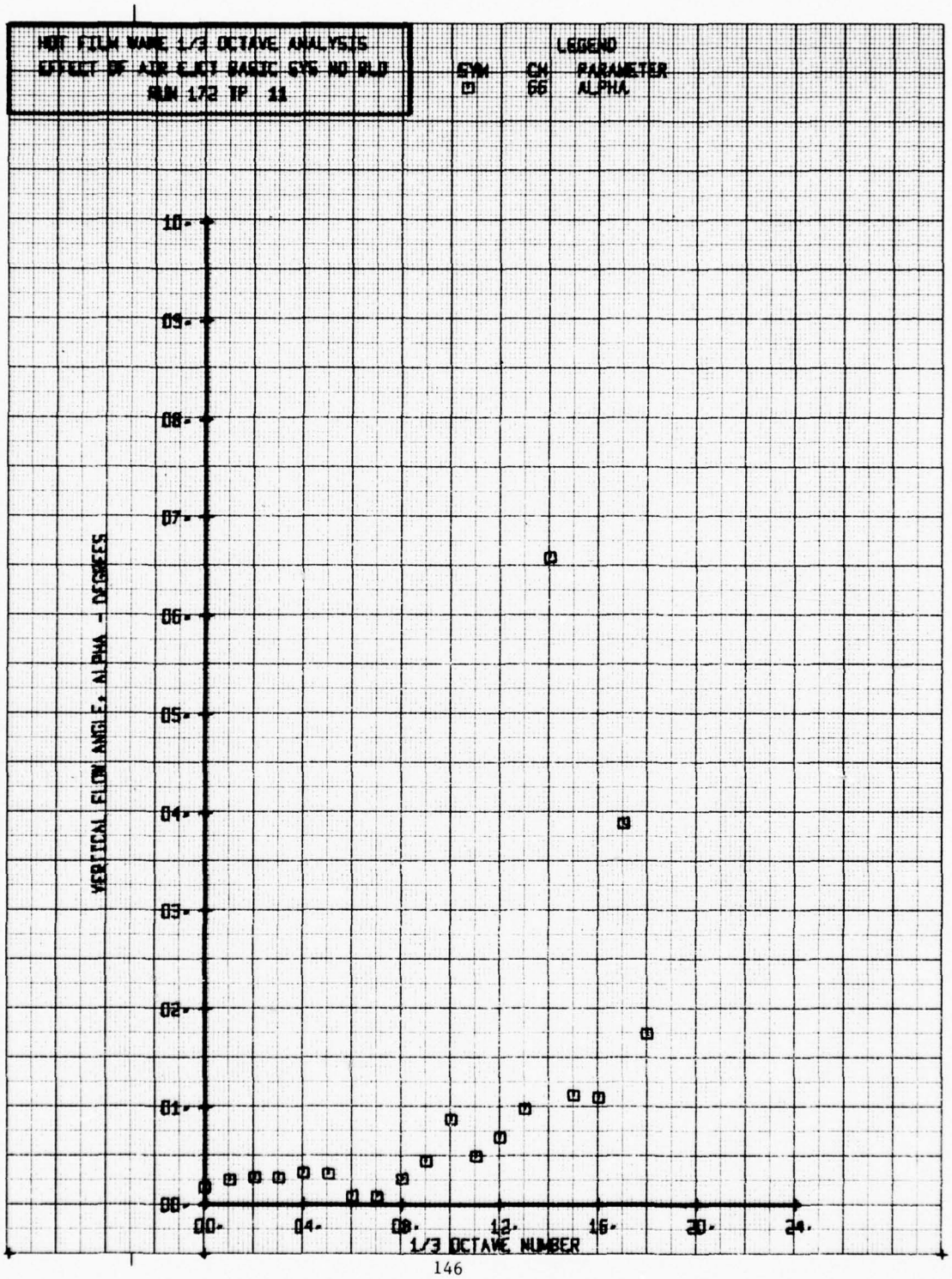
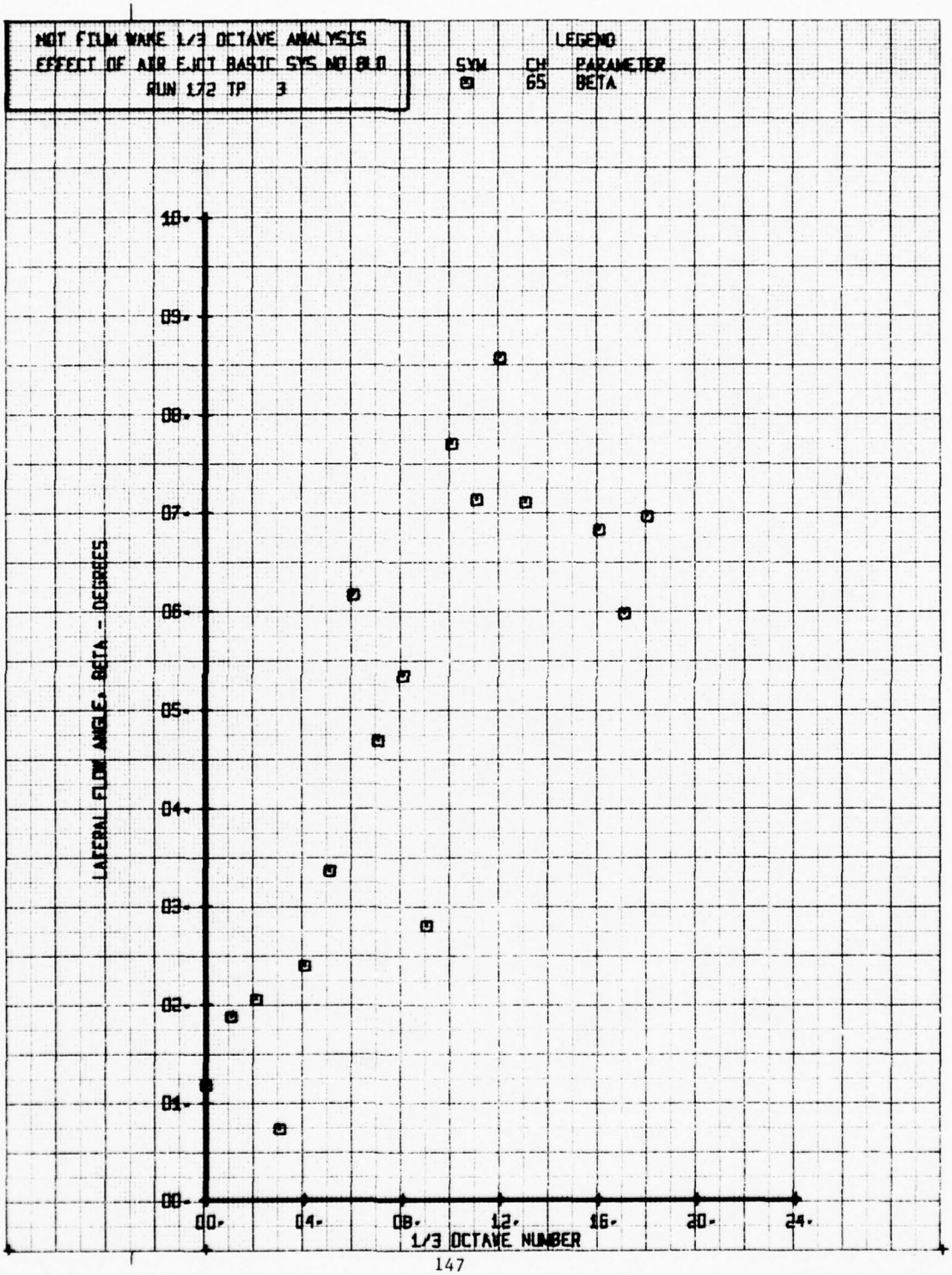

HOT FILM WAKE 1/3 OCTAVE ANALYSIS
EFFECT OF AIR JET BASIC SYS NO BLD
RUN 172 TP 11
LEGEND
SYM CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
EFFECT OF AIR EJCT BASIC SYS NO BLO
RUN 172 TP 3
LEGEND
SYM CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
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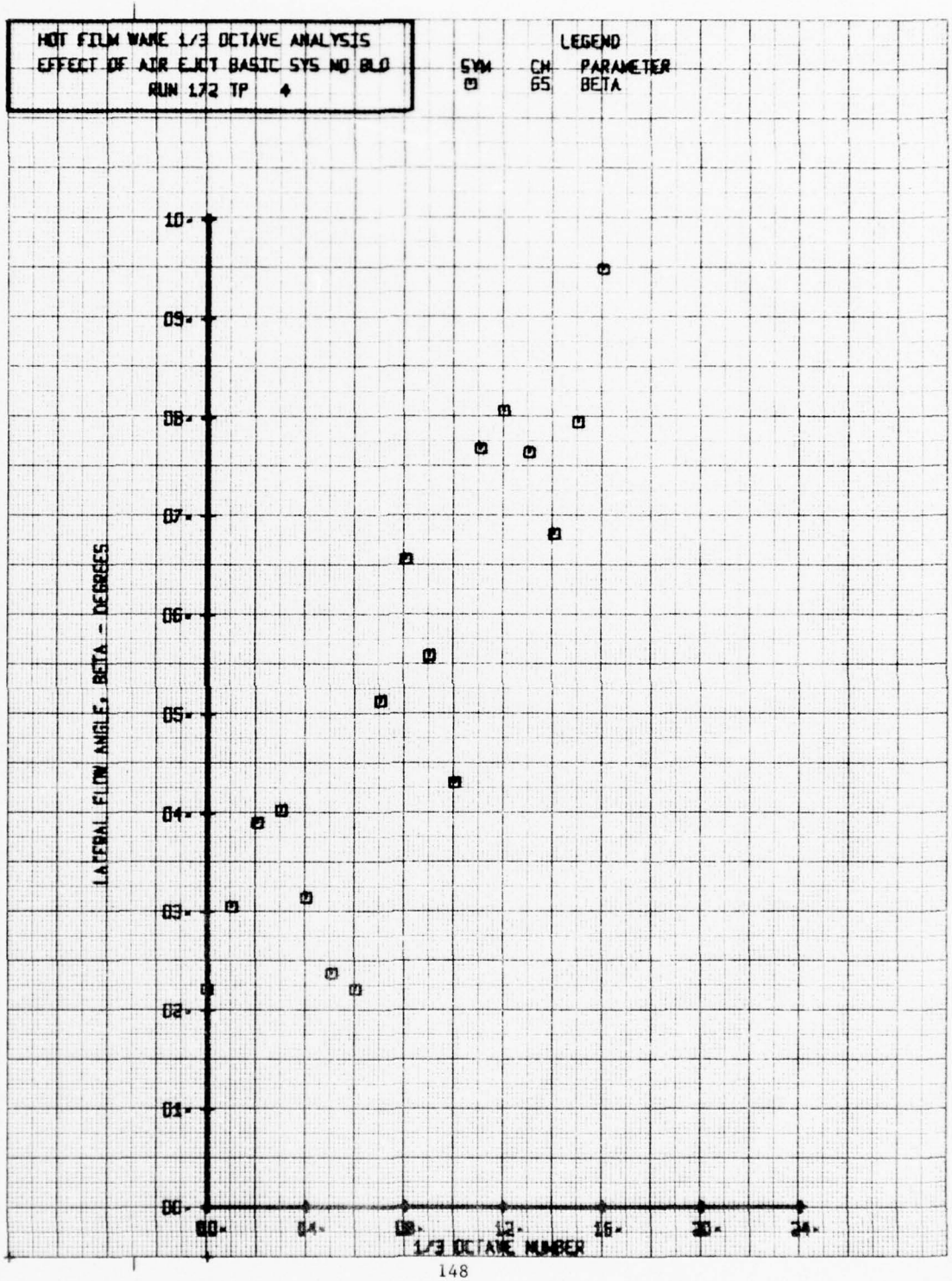
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
EFFECT OF AIR EJCT BASIC SYS NO BLO
RUN 172 TP 4
LEGEND
SYM CH PARAMETER
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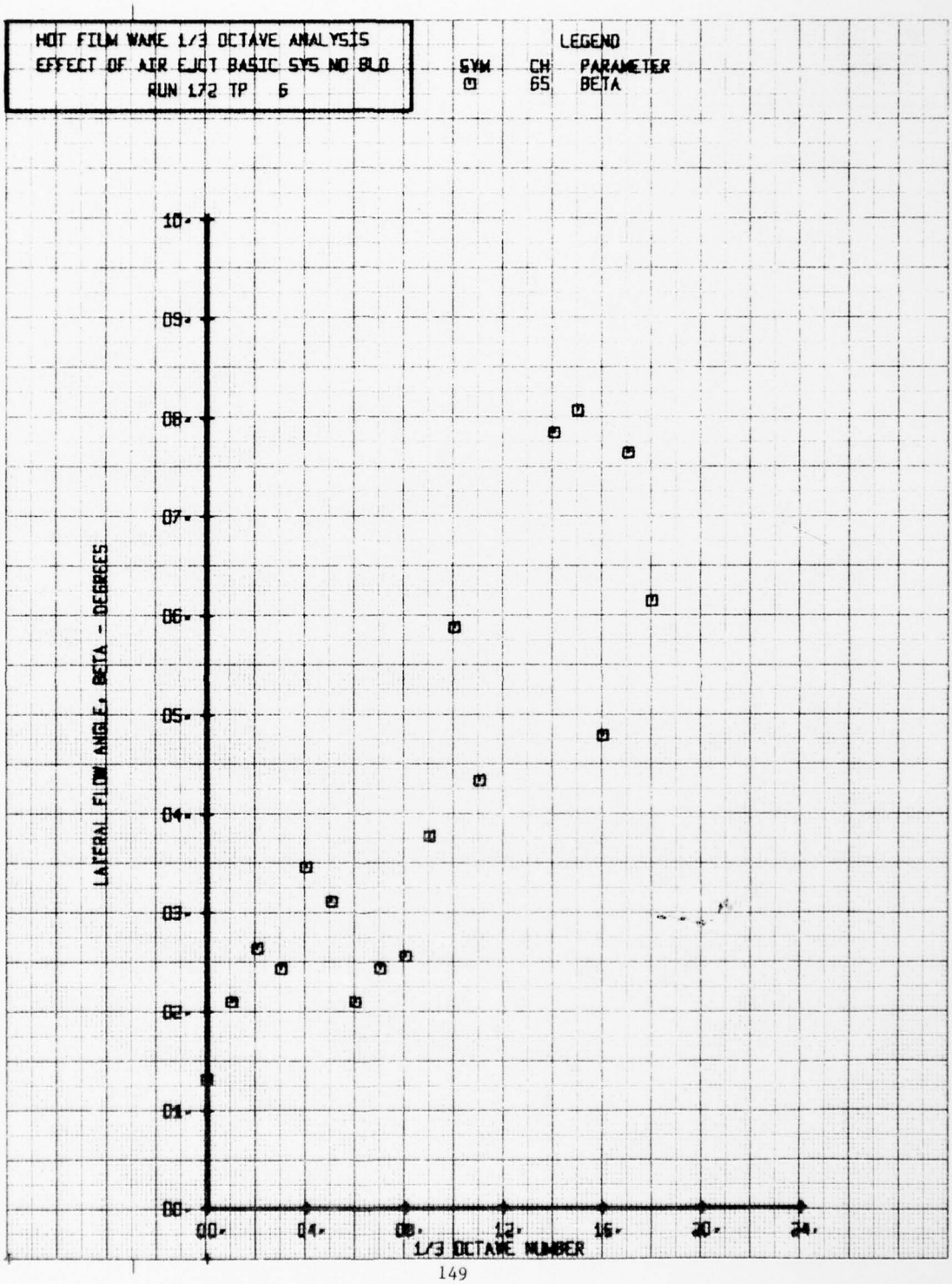
LATERAL FLOW ANGLE, BETA - DEGREES
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
EFFECT OF AIR EJCT BASIC SYS NO BLD
RUN 172 TP 6
LEGEND
SYM CH PARAMETER
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LATERAL FLOW ANGLE, BETA - DEGREES
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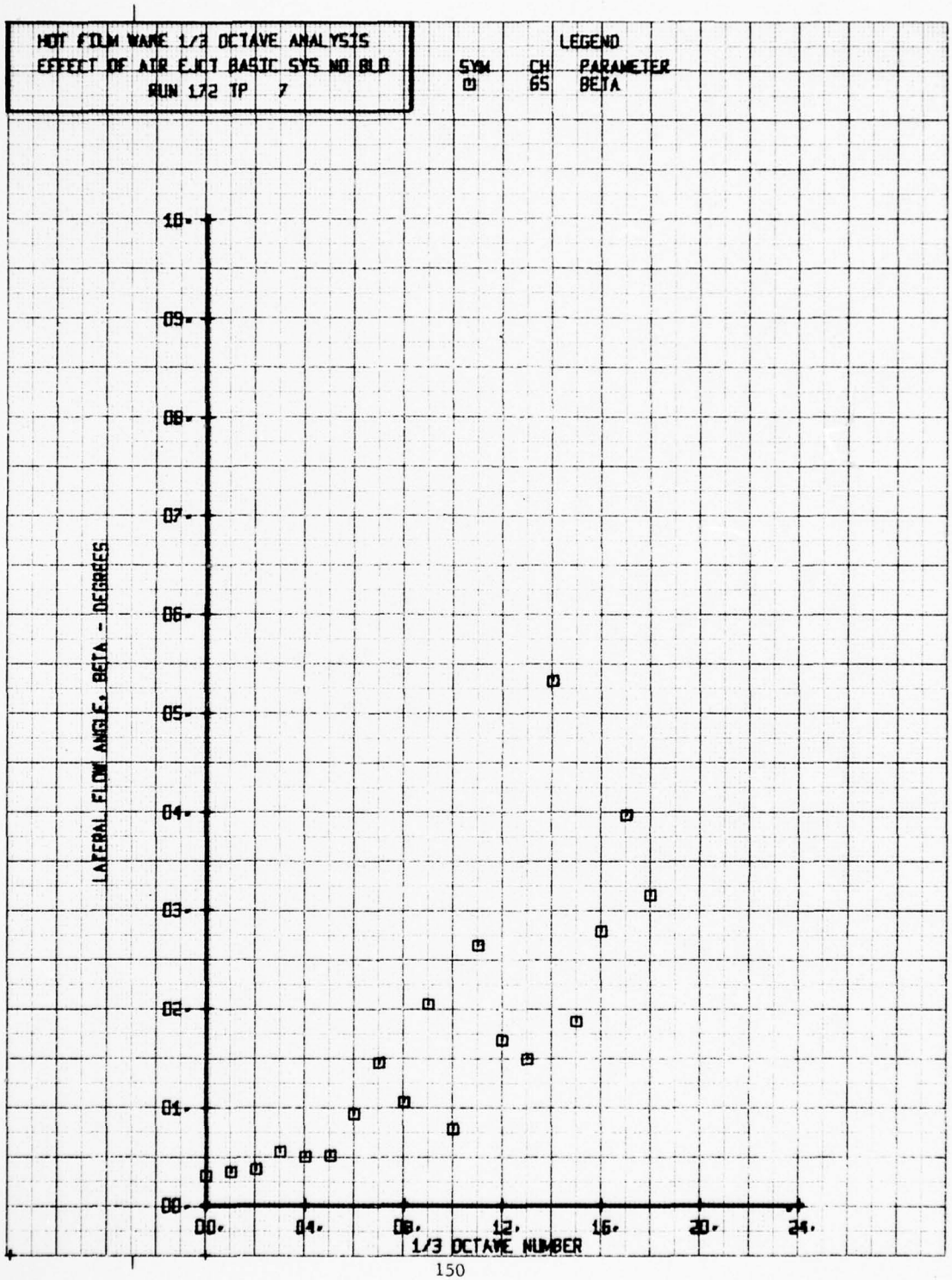
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
EFFECT OF AIR EJCT BASIC SYS NO BLD
RUN 172 TP 7
LEGEND
SYM CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
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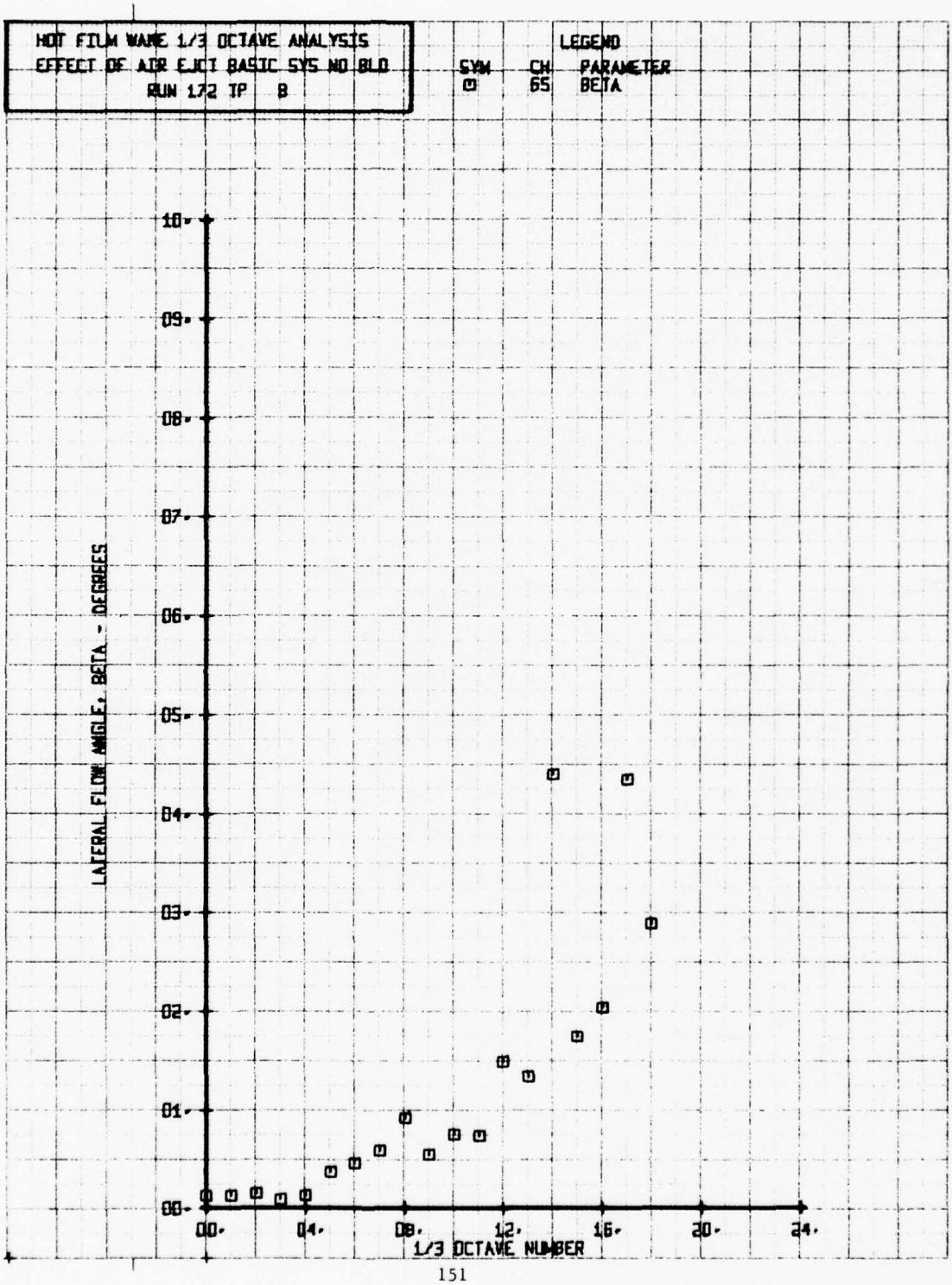
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
EFFECT OF AIR EJCT BASIC SYS NO BLD
RUN 172 TP B
LEGEND
SYM CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
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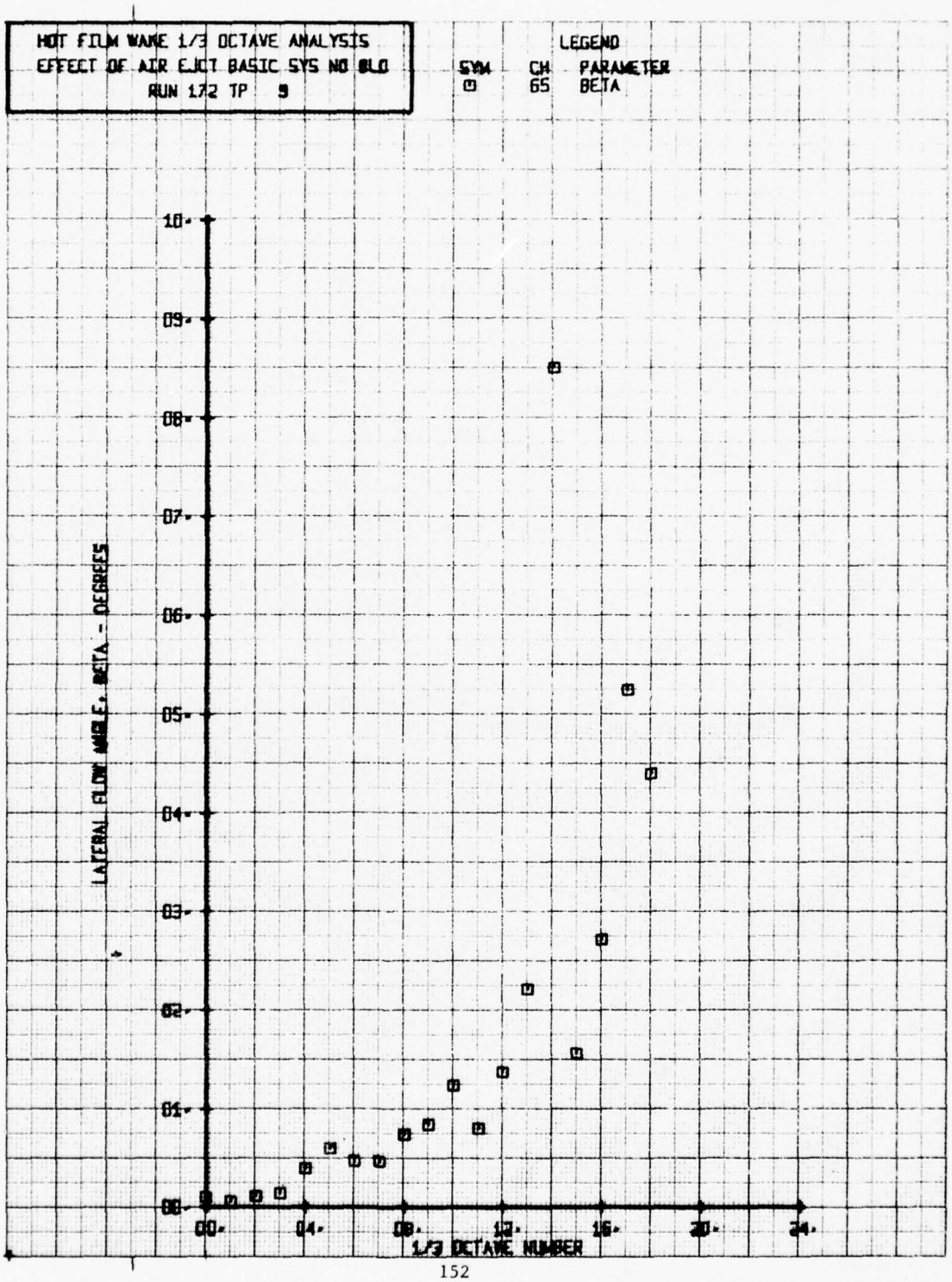
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
EFFECT OF AIR EJCT BASIC SYS NO BLO
RUN 172 TP 9
LEGEND
SYM CH PARAMETER
65 BETA
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LATERAL FLOW ANGLE, BETA - DEGREES
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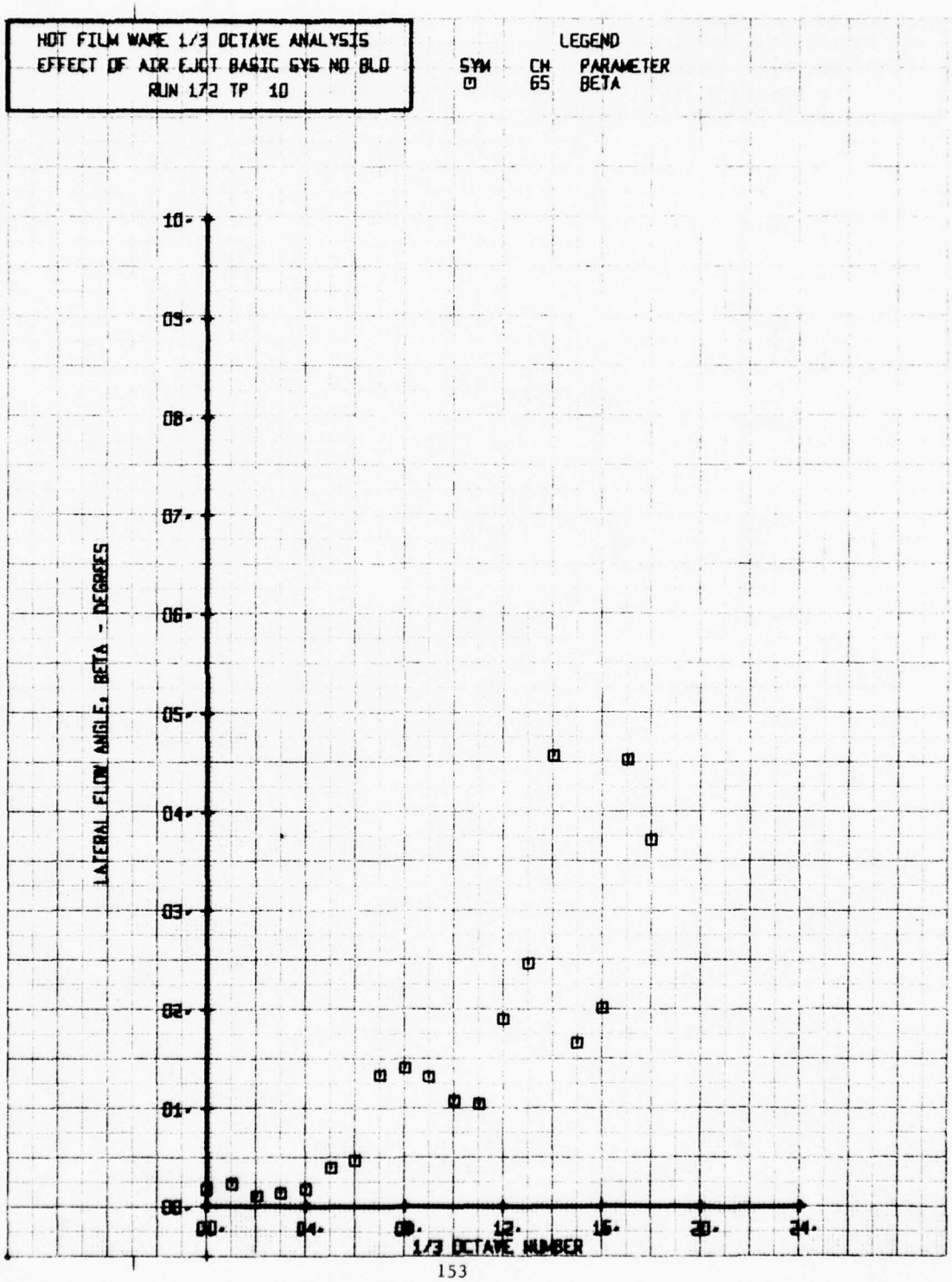
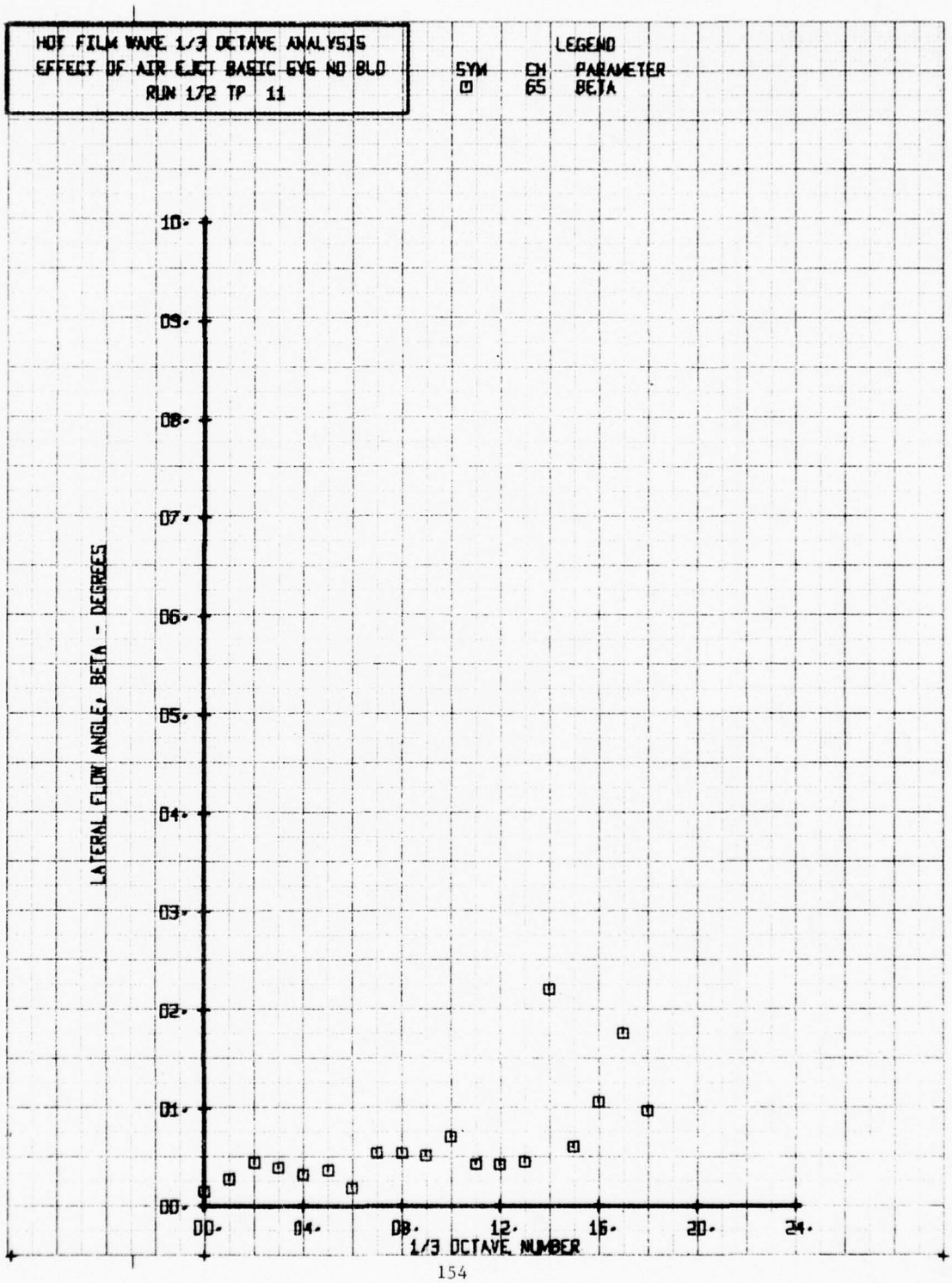
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
EFFECT OF AIR EJCT BASIC SYS NO BLD
RUN 172 TP 10
LEGEND
SYM CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
EFFECT OF AIR EJCT BASIC GYG NO BLD
RUN 172 TP 11
LEGEND
SYM CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
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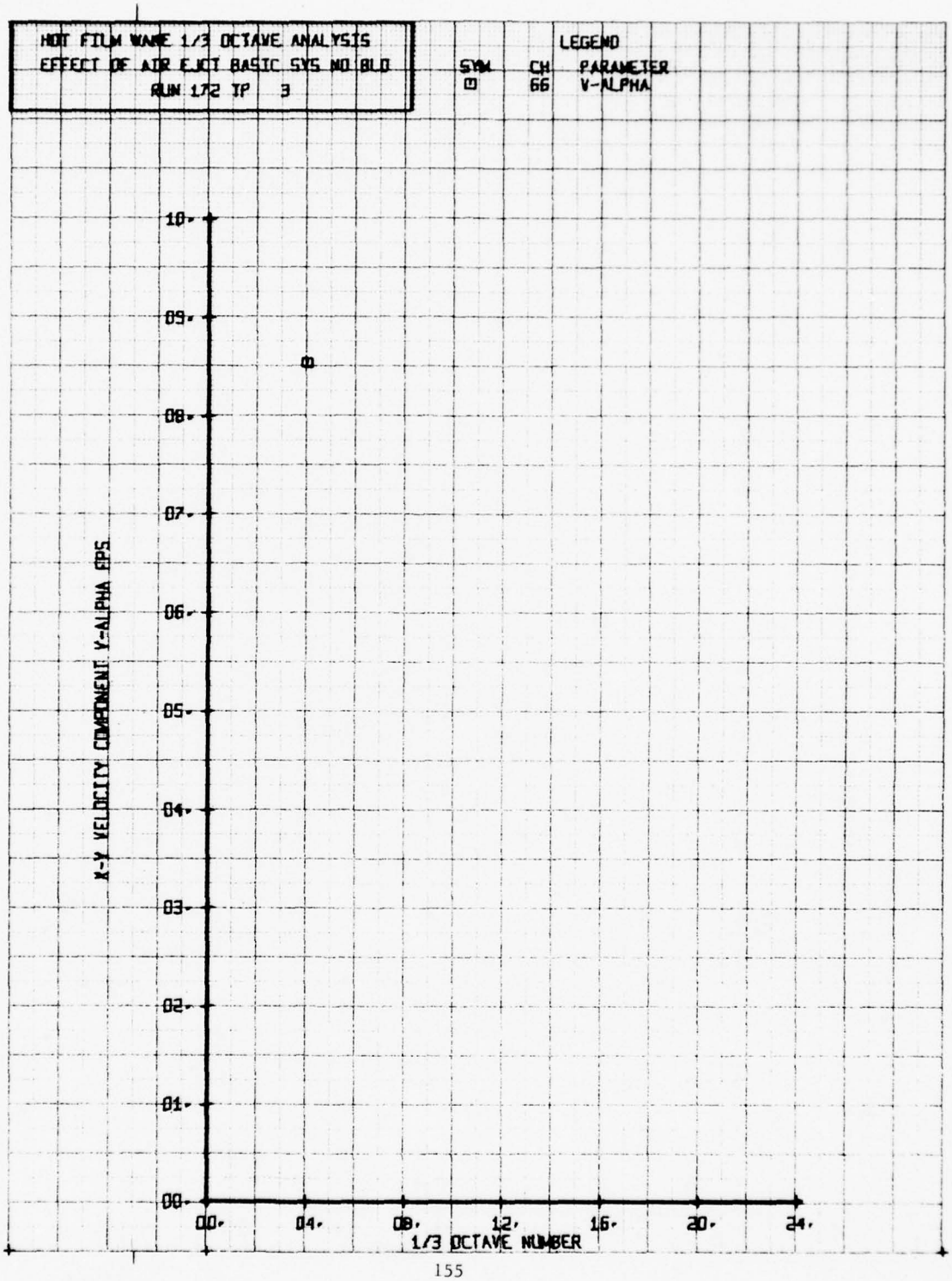
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
EFFECT OF AIR EJCT BASIC SYS NO BLD
RUN 172 TP 3
LEGEND
SYM CH PARAMETER
66 V-ALPHA
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X-Y VELOCITY COMPONENT Y-ALPHA FPS
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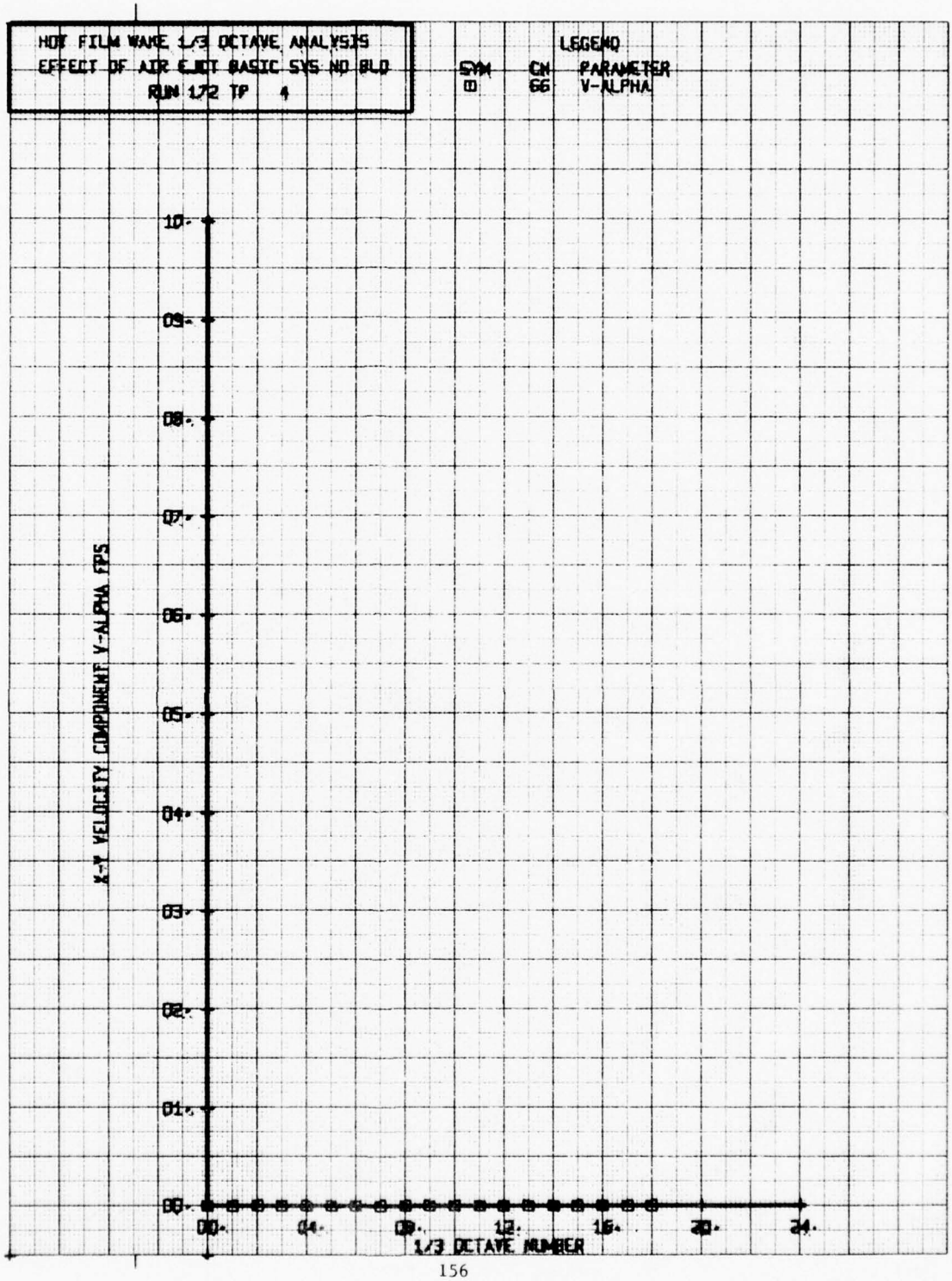
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
EFFECT OF AIR EJECT BASIC SYS NO BLD
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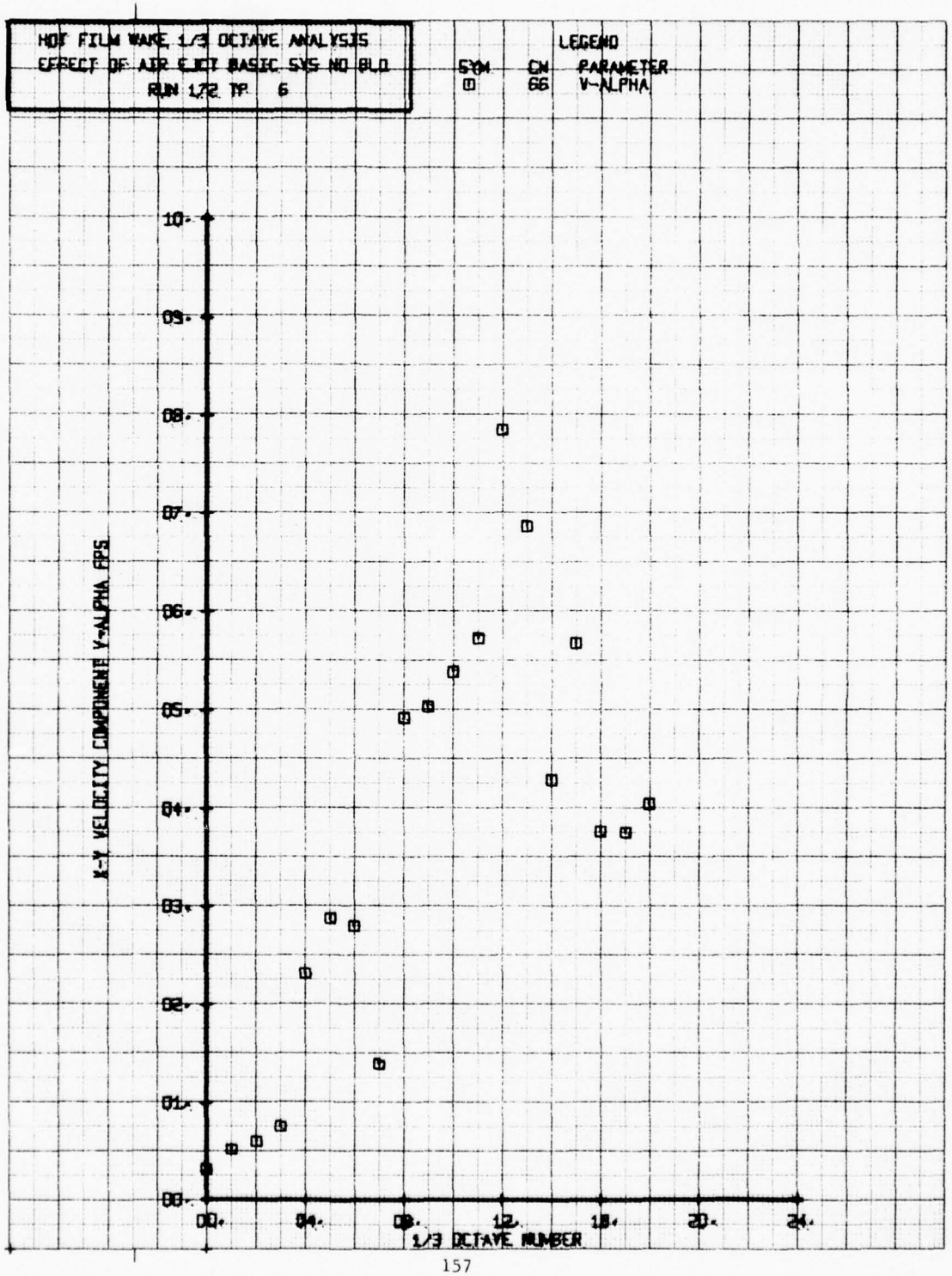
LEGEND
SYM CN PARAMETER
66 V-ALPHA
X-Y VELOCITY COMPONENT V-ALPHA FPS
1/3 OCTAVE NUMBER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EFFECT OF AIR EJCT BASIC SYS NO BLD
RUN 1/2 TP 6
LEGEND
SYM CN PARAMETER
66 V-ALPHA
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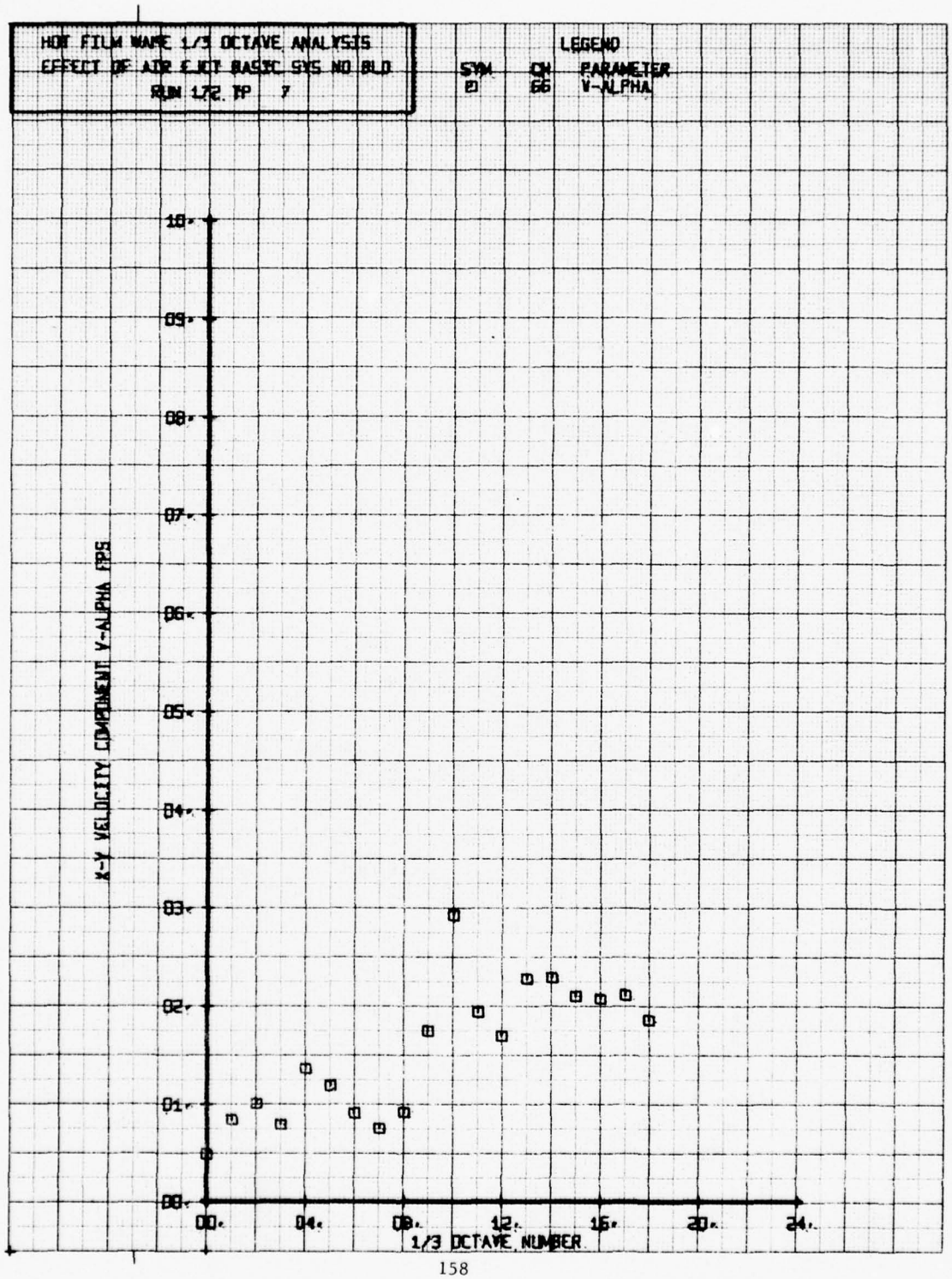
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
EFFECT OF AIR EJCT BASIC SYS NO BLD
RUN 172 TP 7
LEGEND
SYM CH PARAMETER
66 V-ALPHA
X-V VELOCITY COMPONENT V-ALPHA FPS
1/3 OCTAVE NUMBER
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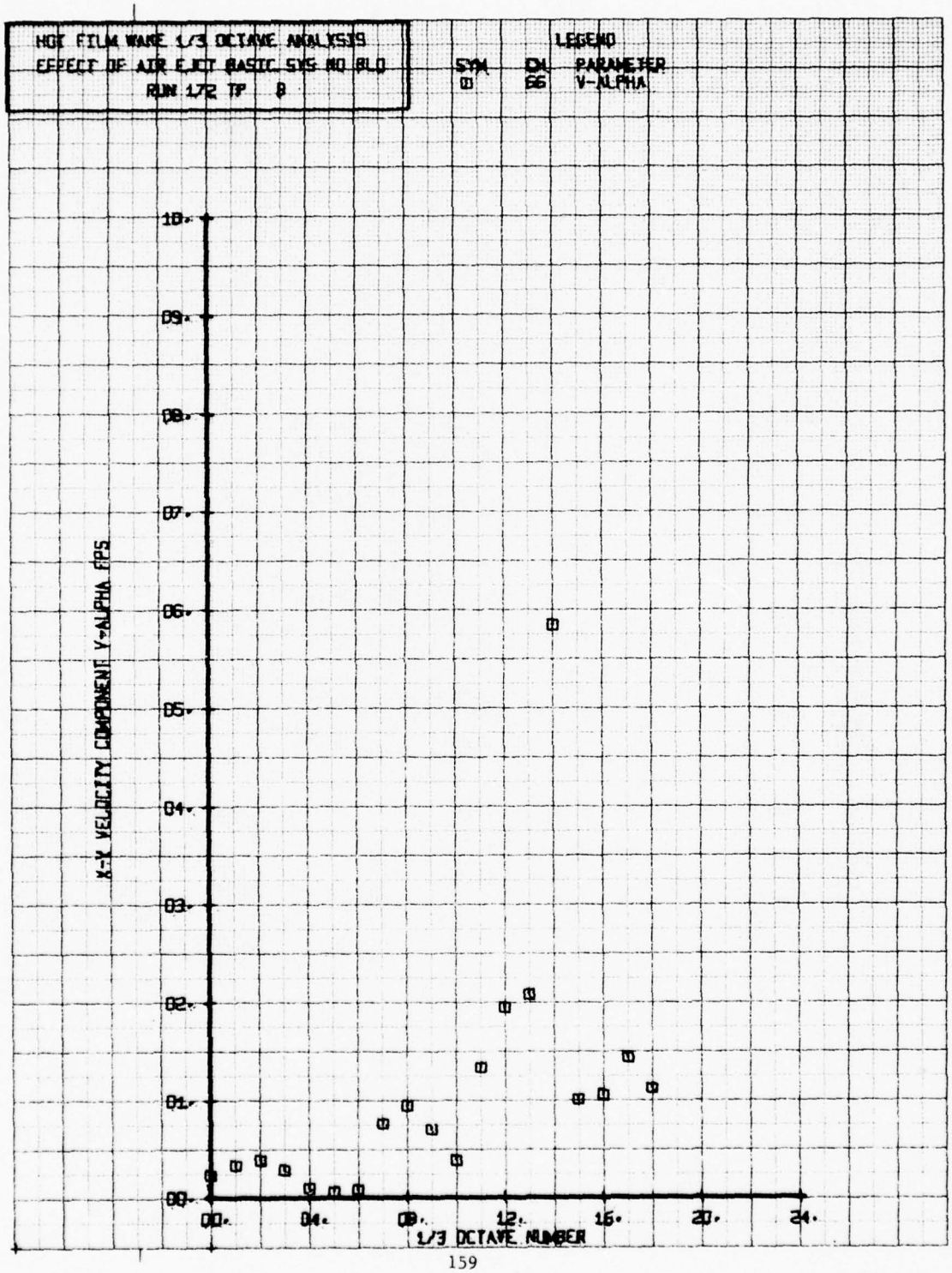
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
EFFECT OF AIR EJCT BASIC SYS NO BLO
RUN 172 TP 8
LEGEND
SYM CH PARAMETER
66 V-ALPHA
X-X VELOCITY COMPONENT V-ALPHA FPS
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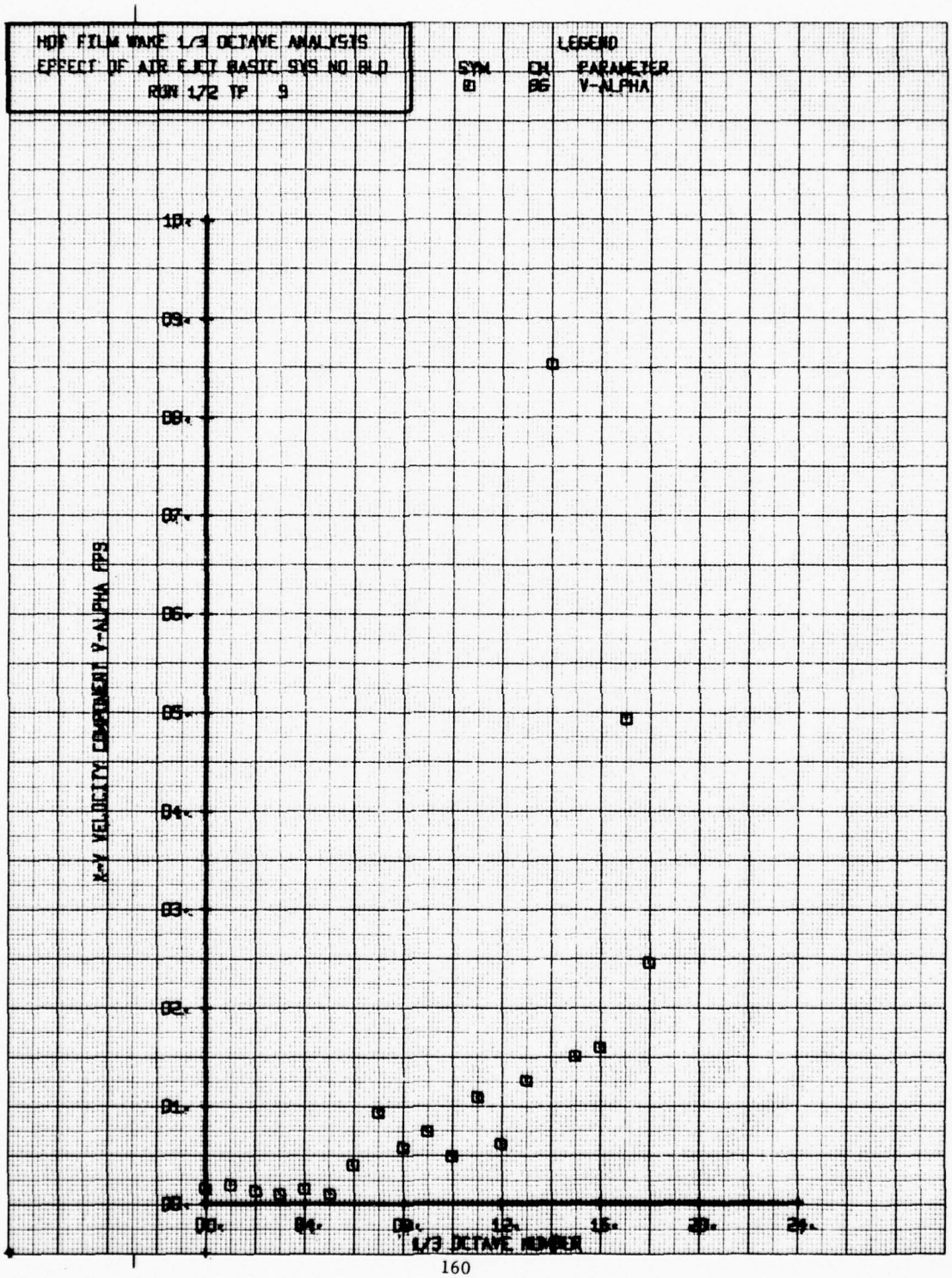
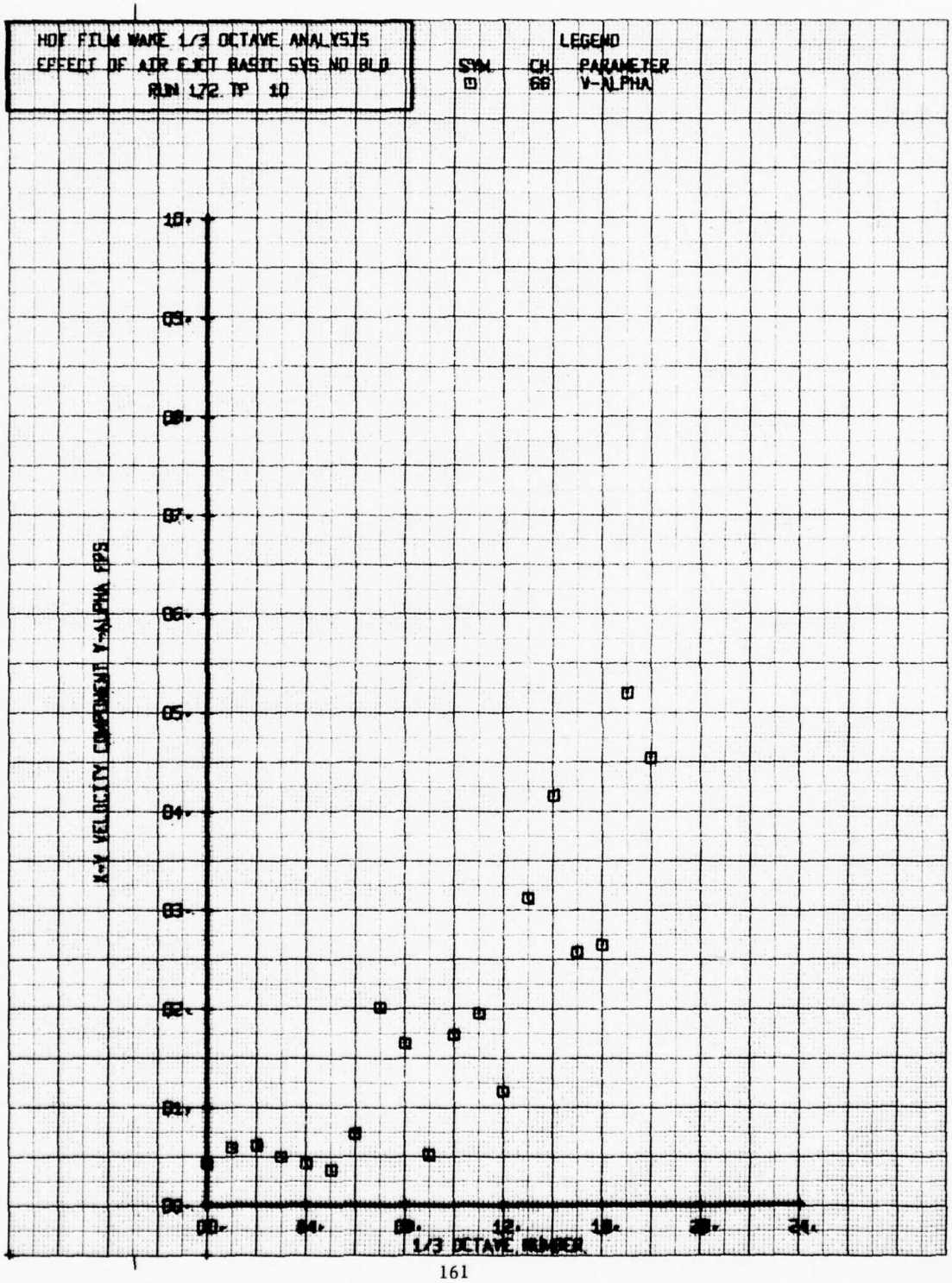
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
EFFECT OF AIR EJECT BASIC SYS NO BLD
RUN 172 TP 9
LEGEND
SYM CH PARAMETER
86 V-ALPHA
X-V VELOCITY COMPONENT V-ALPHA FPS
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
EFFECT OF AIR EXCT BASIC SYS NO BLD
RUN 172 TP 10
LEGEND
SYM CH PARAMETER
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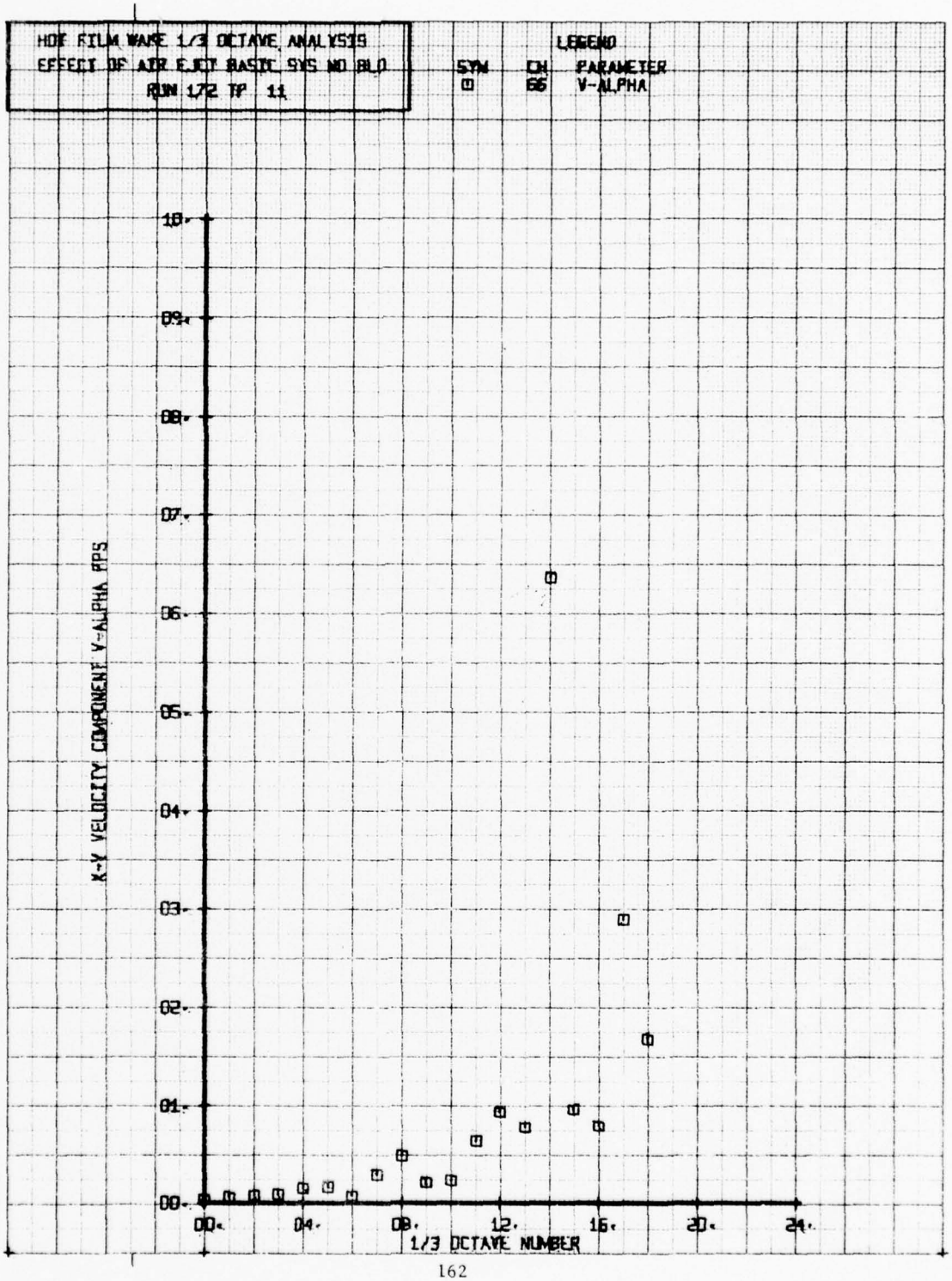
X-V VELOCITY COMPONENT V-ALPHA FPS
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
EFFECT OF AIR EJCT BASIC SYS NO BLO
RUN 172 TP 11
LEGEND
SYM CH PARAMETER
66 V-ALPHA
X-Y VELOCITY COMPONENT V-ALPHA FPS
1/3 OCTAVE NUMBER
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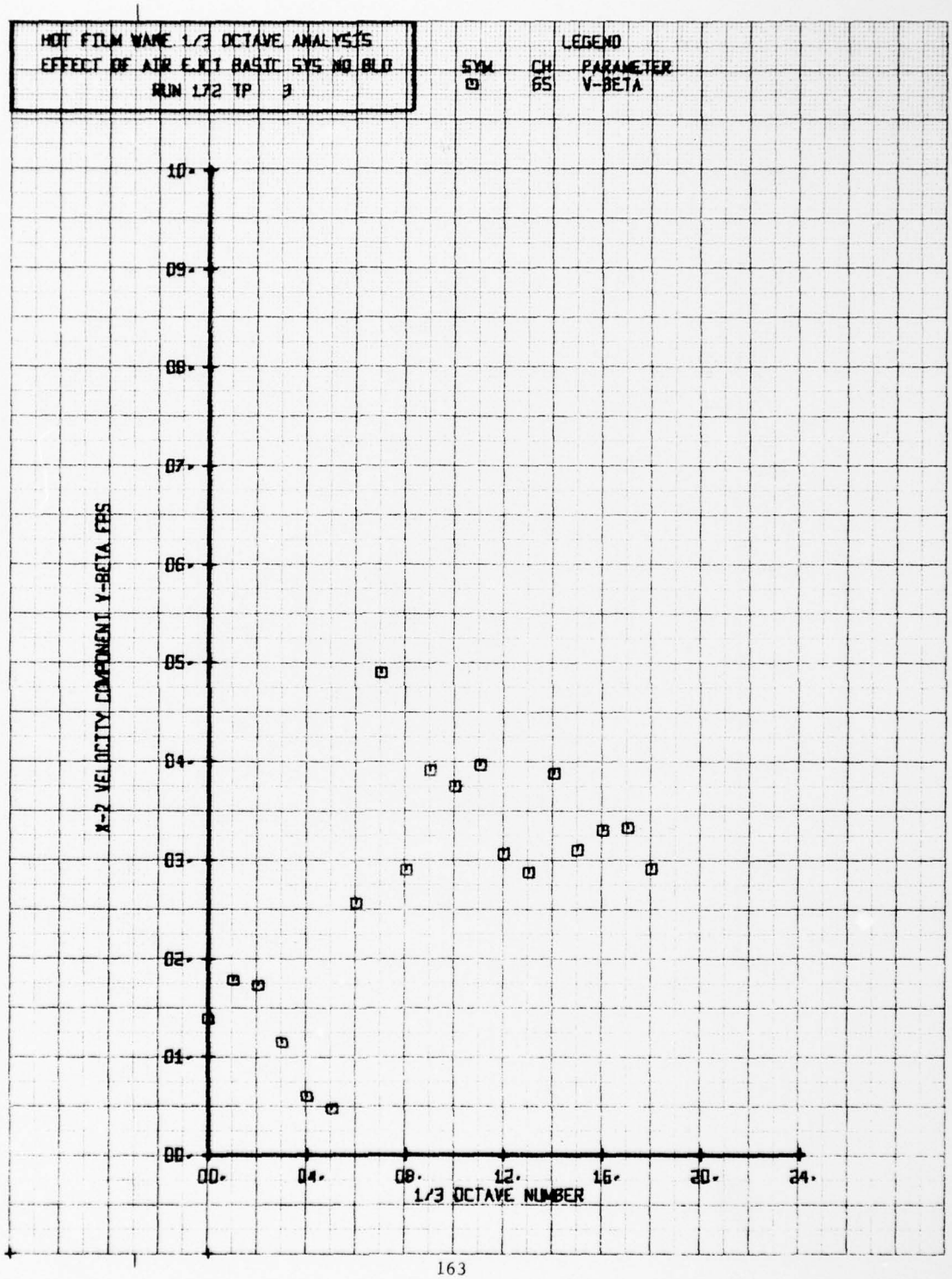
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
EFFECT OF AIR EJCT BASIC SYS NO BLD
RUN 172 TP 3
LEGEND
SYM CH PARAMETER
65 V-BETA
X-2 VELOCITY COMPONENT V-BETA FPS
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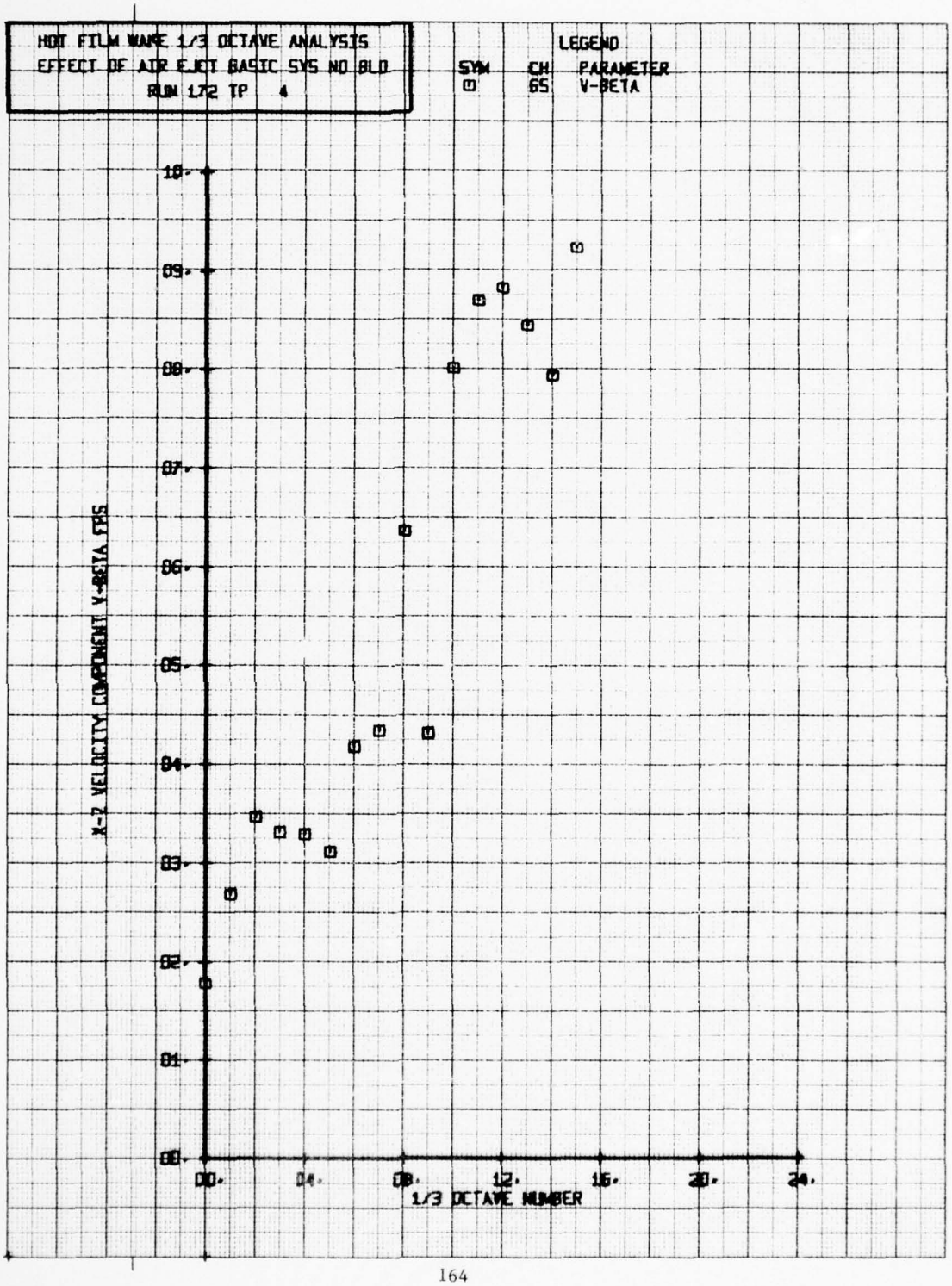
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
EFFECT OF AIR EJCT BASIC SYS NO BLD
RUN 172 TP 4
LEGEND
SYM CH PARAMETER
65 V-BETA
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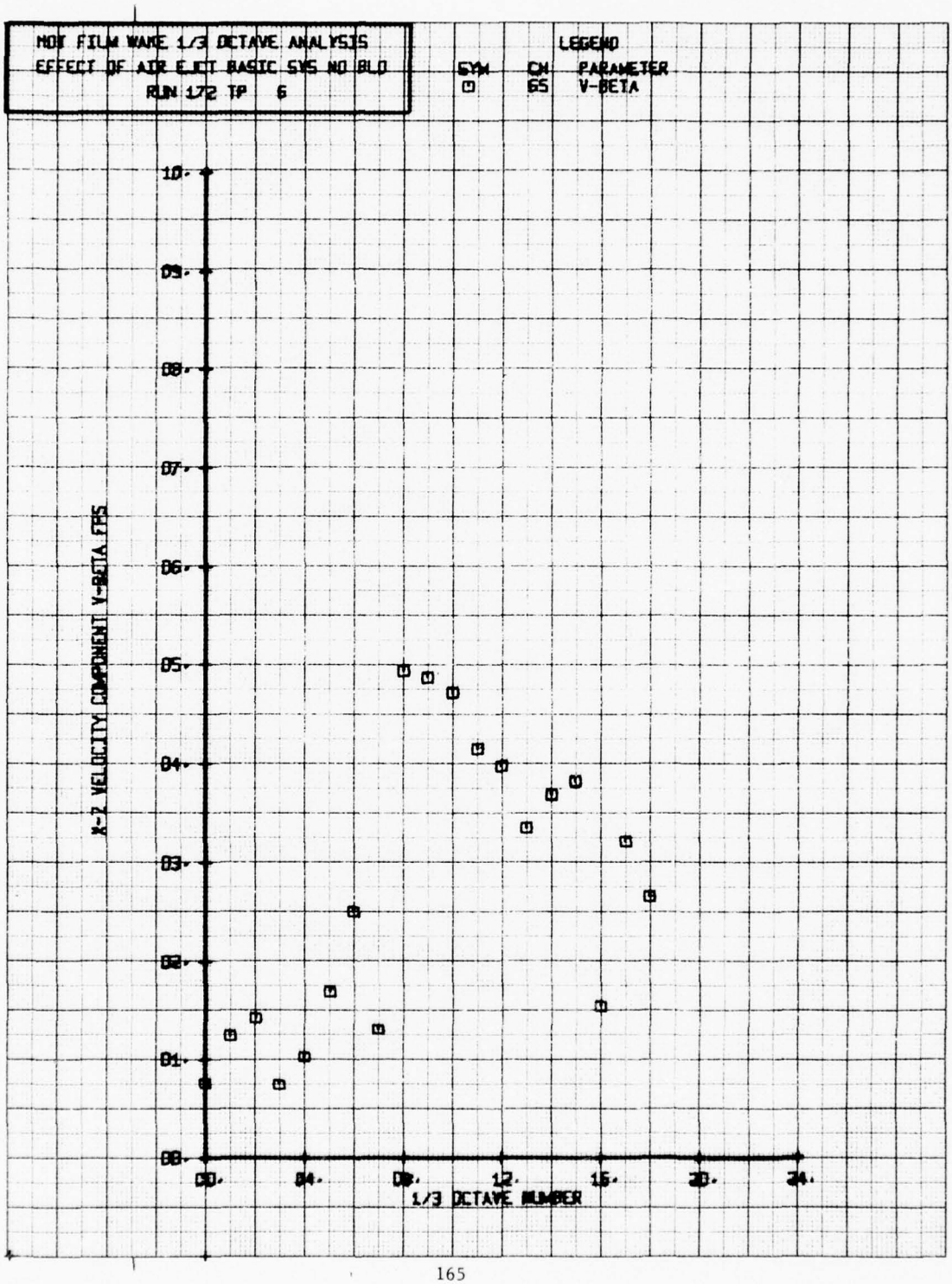
1/3 OCTAVE NUMBER
X-2 VELOCITY COMPONENT V-BETA FPS


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
EFFECT OF AIR EJCT BASIC SYS NO BLD
RUN 172 TP 6
LEGEND
SYM CN PARAMETER
65 V-BETA
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X-Z VELOCITY COMPONENT V-BETA FPS
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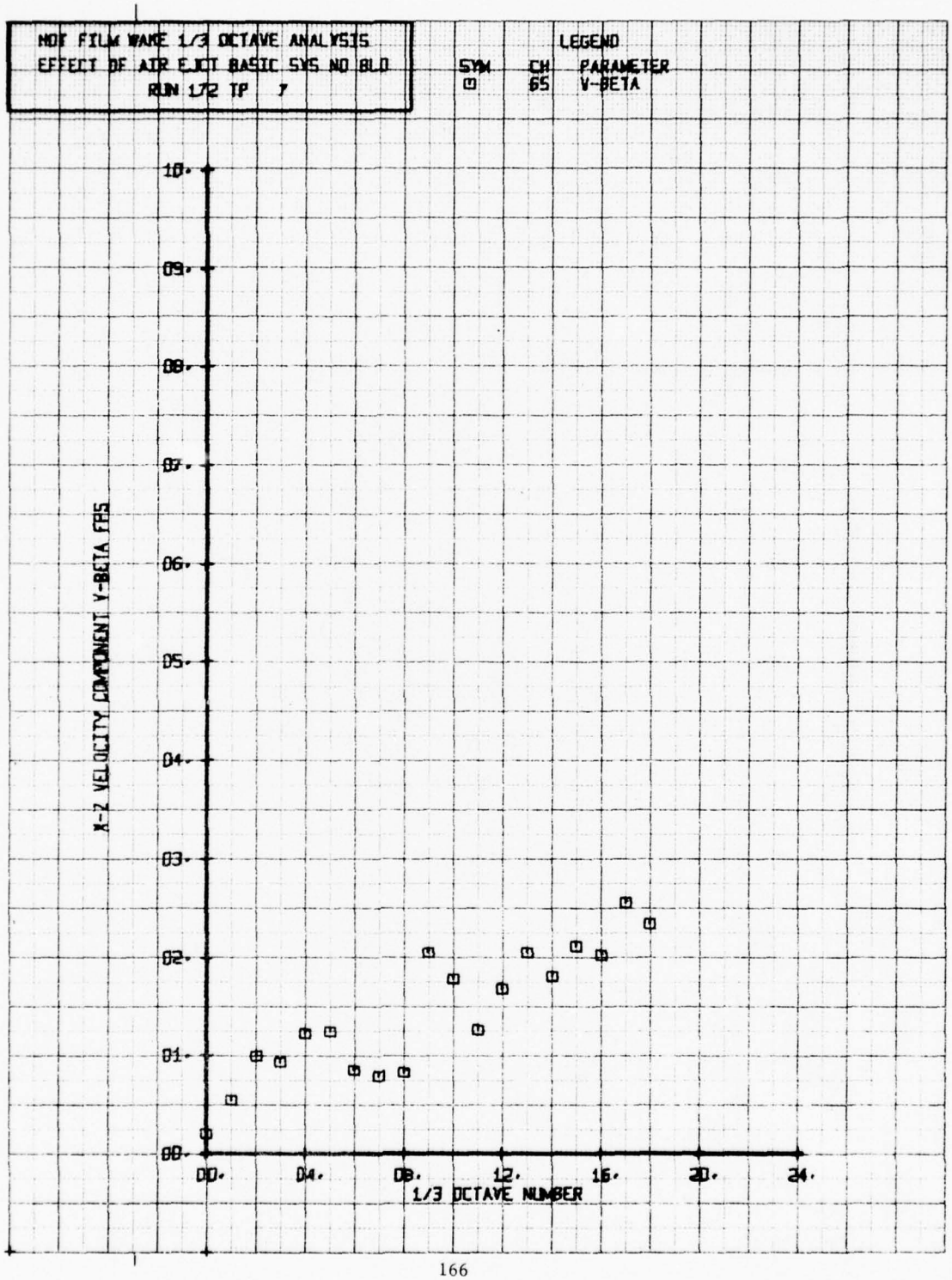
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
EFFECT OF AIR EJCT BASIC SYS NO BLD
RUN 172 TP 7
LEGEND
SYM CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT Y-BETA FBS
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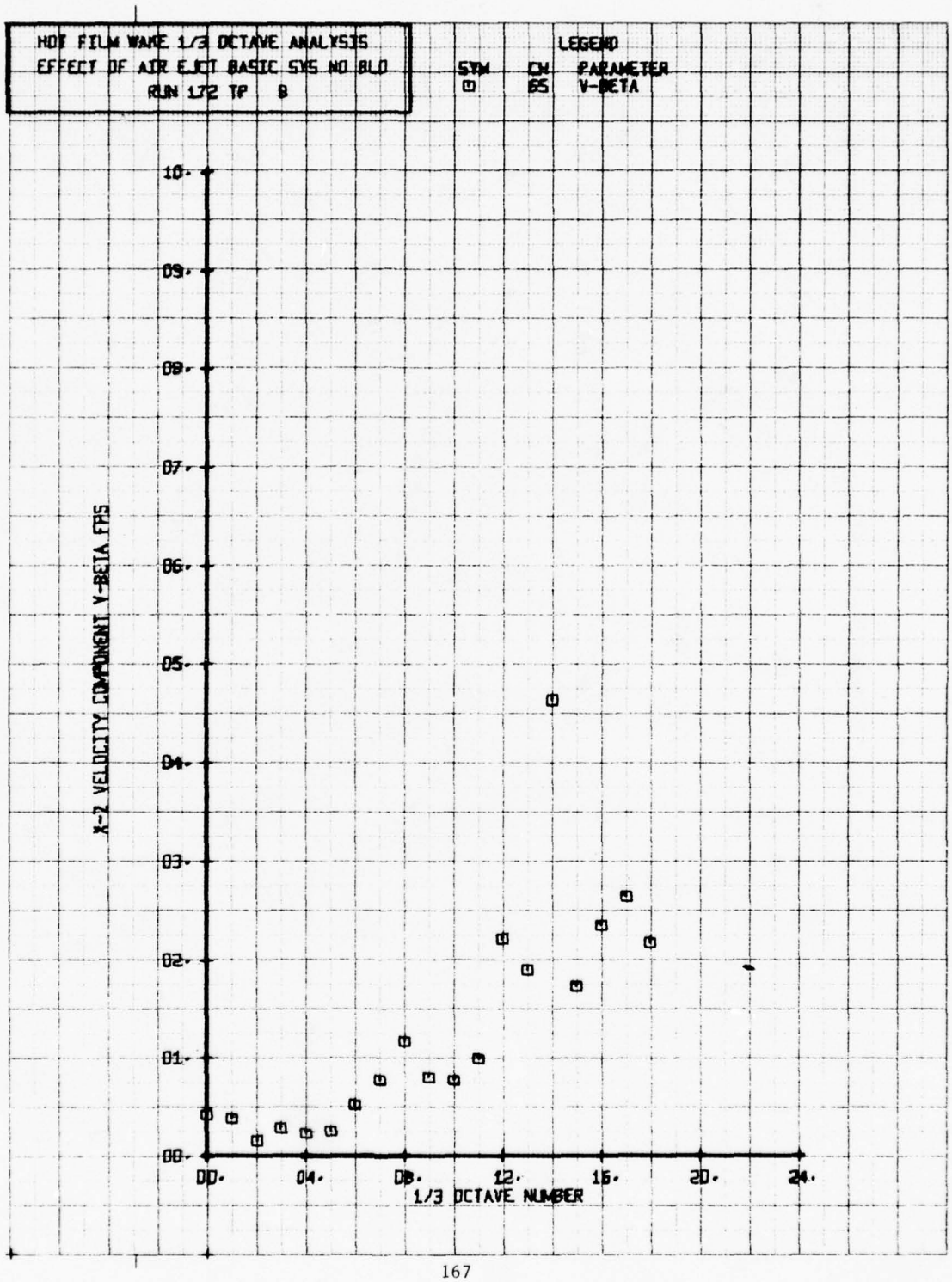
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
EFFECT OF AIR EJCT BASIC SYS NO BLO
RUN 172 TP 8
LEGEND
SYM CH PARAMETER
65 V-BETA
X-2 VELOCITY COMPONENT V-BETA FRS
1/3 OCTAVE NUMBER
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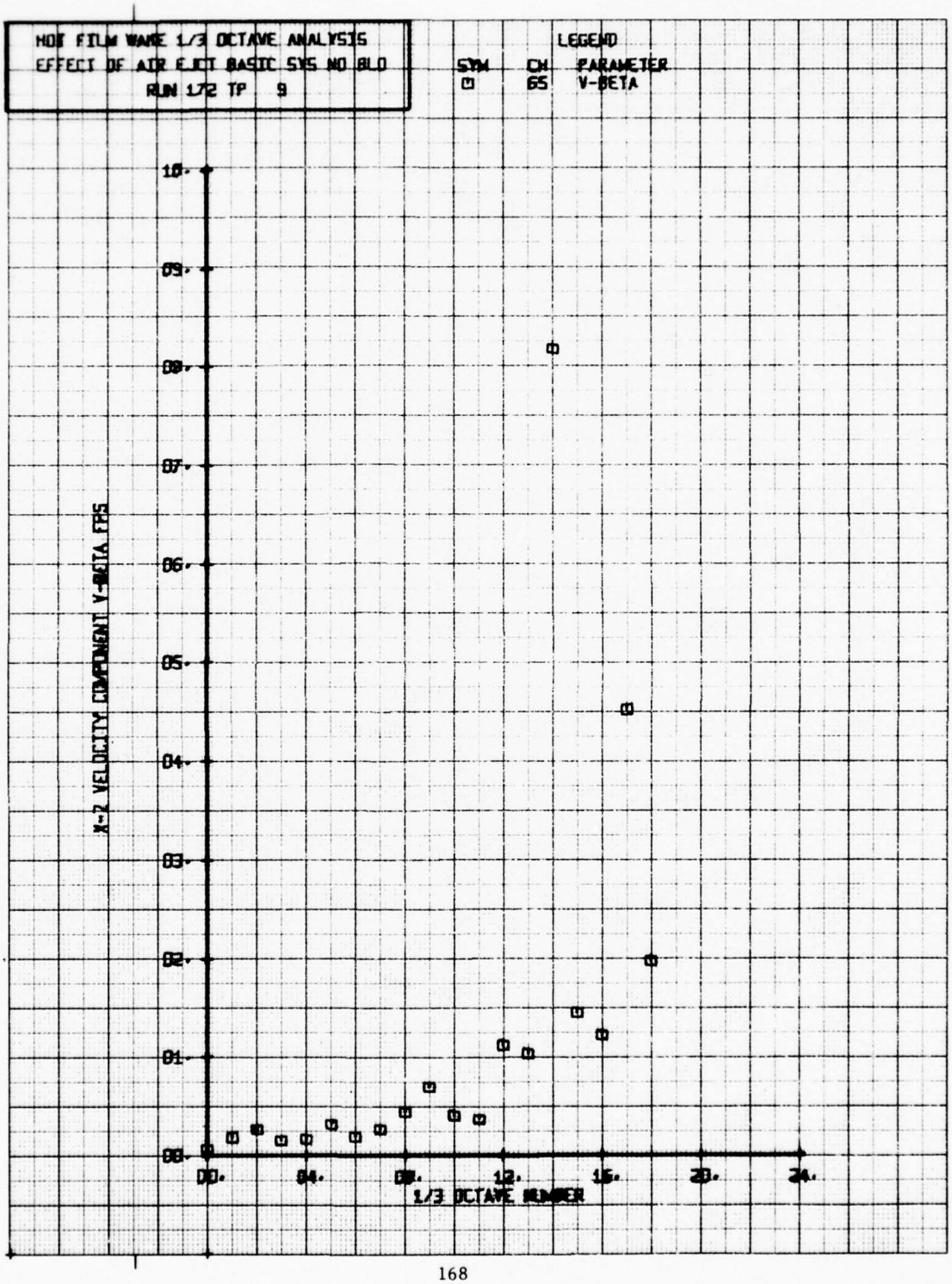
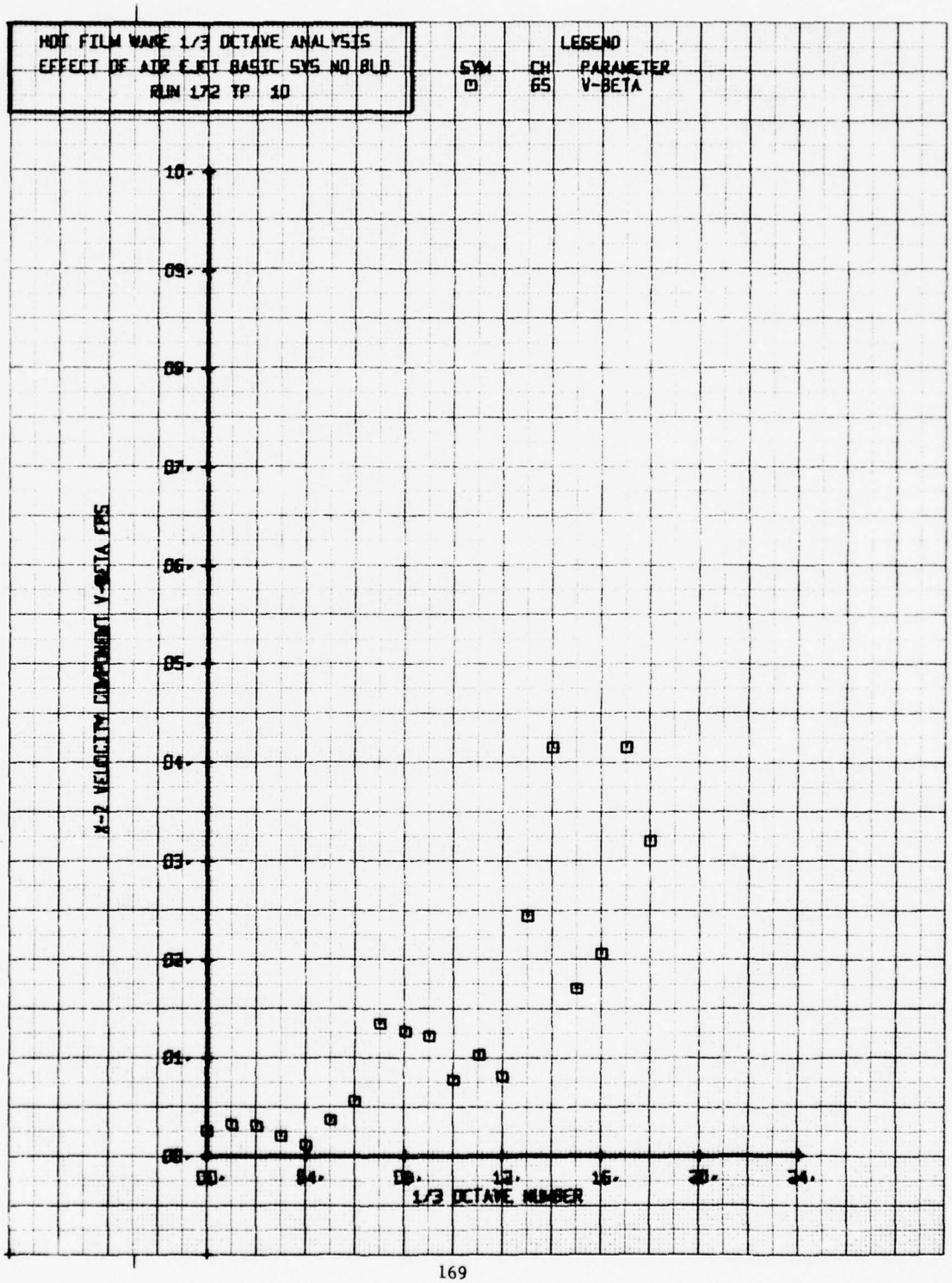

HOT FILM WAKE 1/3 OCTAVE ANALYSIS
EFFECT OF AIR EJCT BASIC SYS NO BLD
RUN 1/2 TP 9
LEGEND
SYM CH PARAMETER
65 V-BETA
X-2 VELOCITY COMPONENT V-BETA FBS
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
EFFECT OF AIR EJECT BASIC SYS NO BLD
RUN 172 TP 10
LEGEND
SYM CH PARAMETER
65 V-BETA
X-Z VELOCITY MEASURED V-BETA (FPS)
1/3 OCTAVE NUMBER
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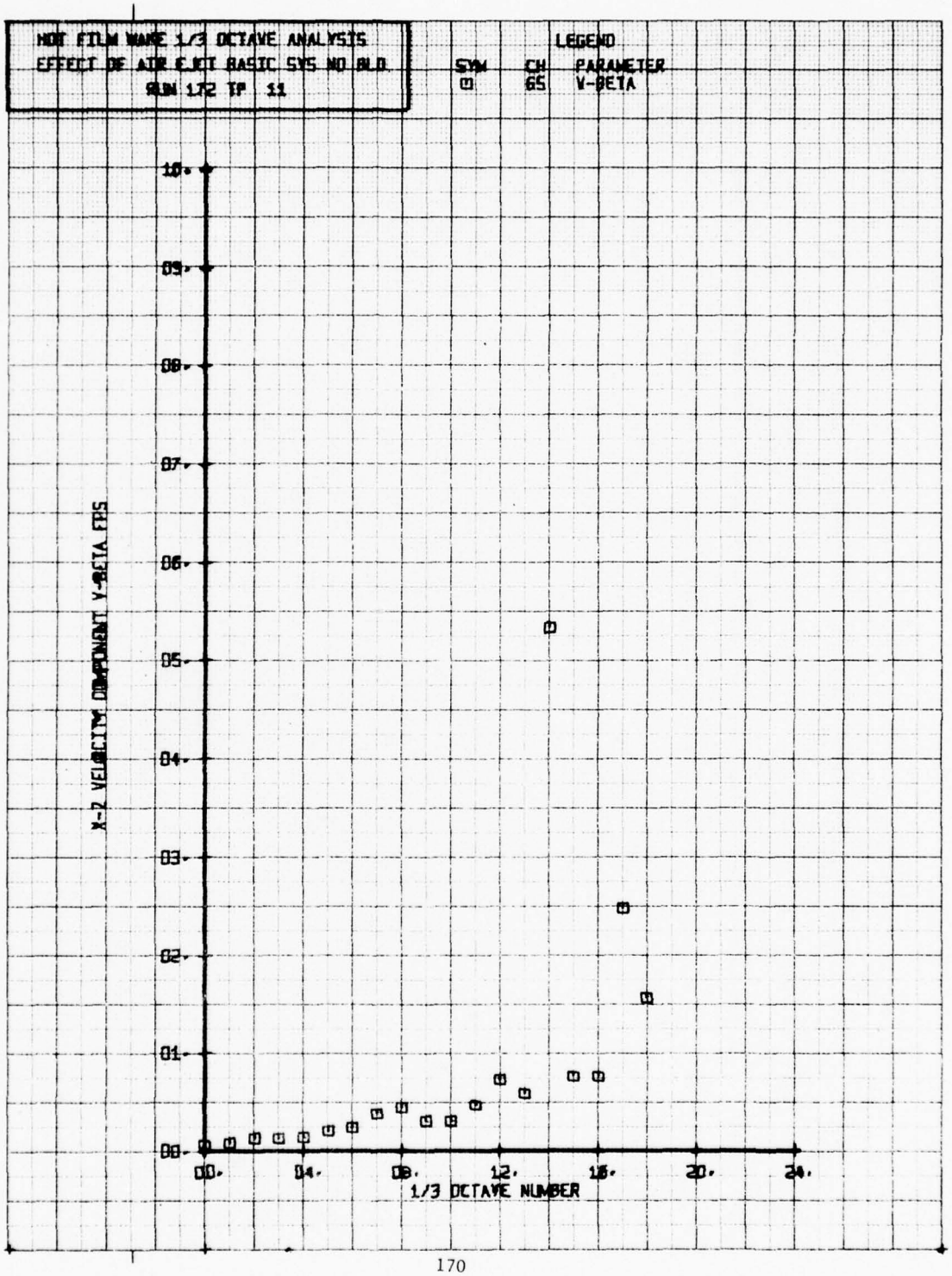
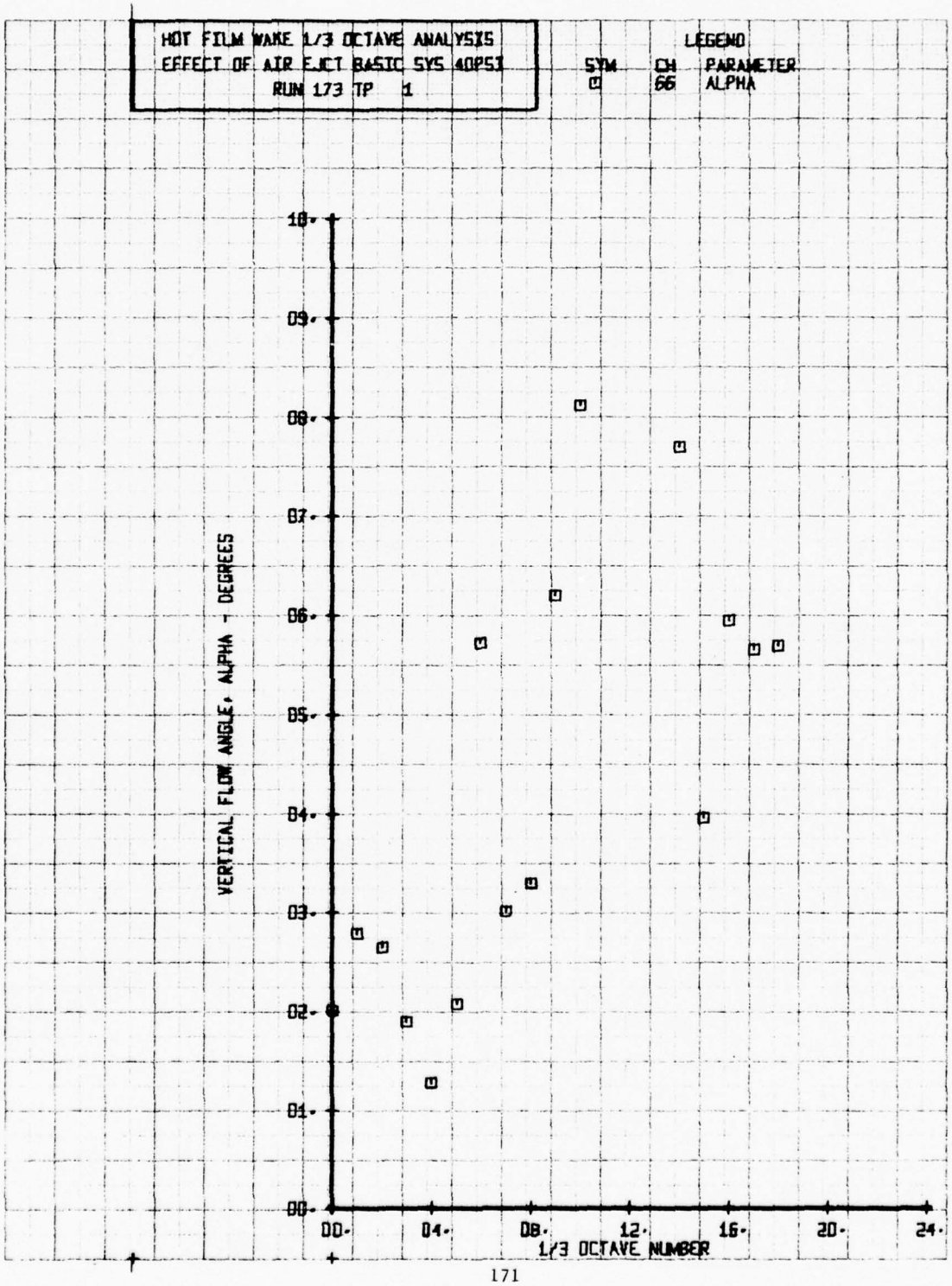

HOT FILM WAKE 1/3 OCTAVE ANALYSIS
EFFECT OF ATR E.KT BASIC SYS NO BLD
RUN 172 TP 11
LEGEND
SYM CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA FPS
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
EFFECT OF AIR EJCT BASIC SYS 40PSI
RUN 173 TP 1
LEGEND
SYM CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
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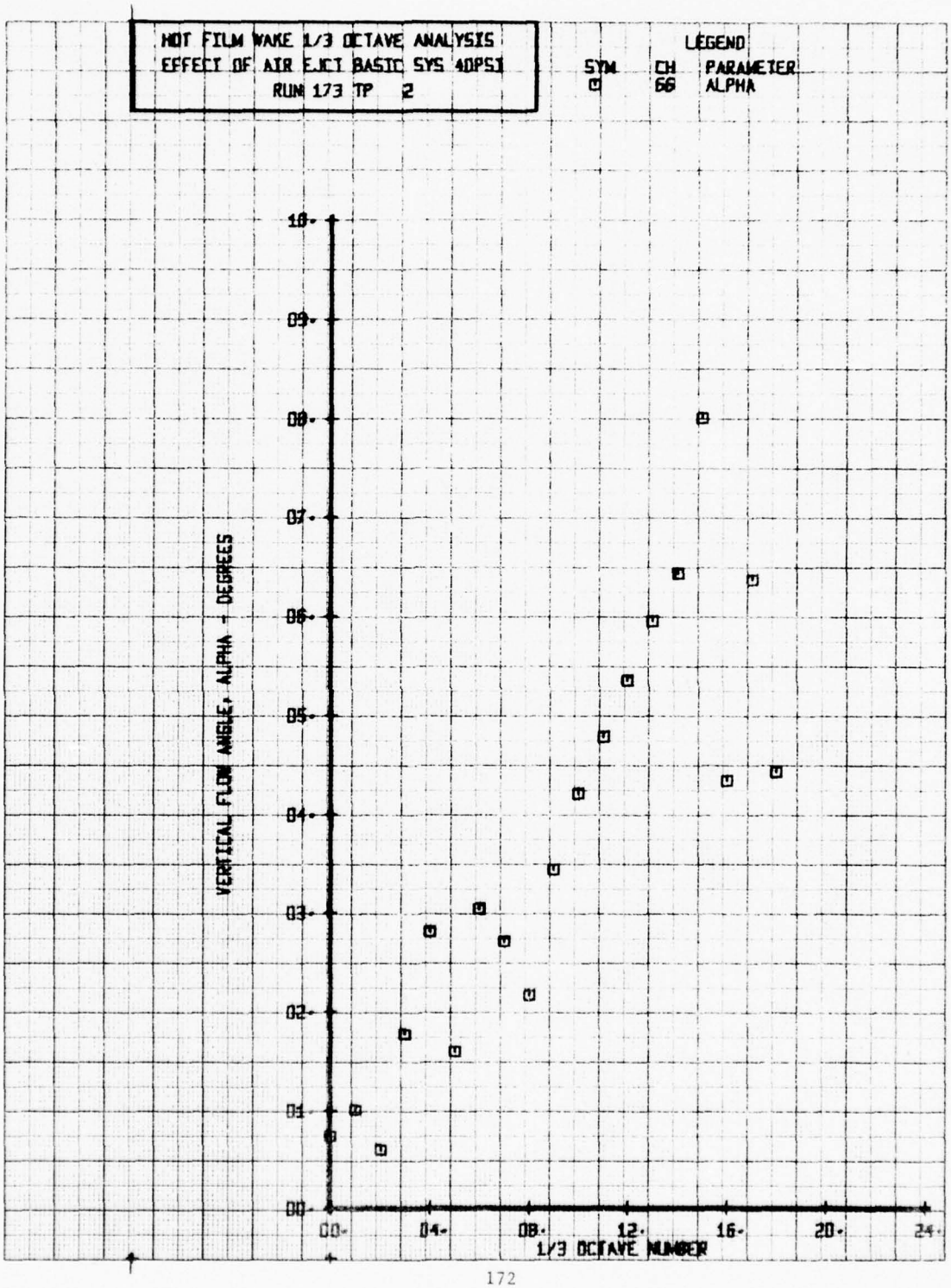
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
EFFECT OF AIR EJCT BASIC SYS 40PSI
RUN 173 TP 2
LEGEND
SYM CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
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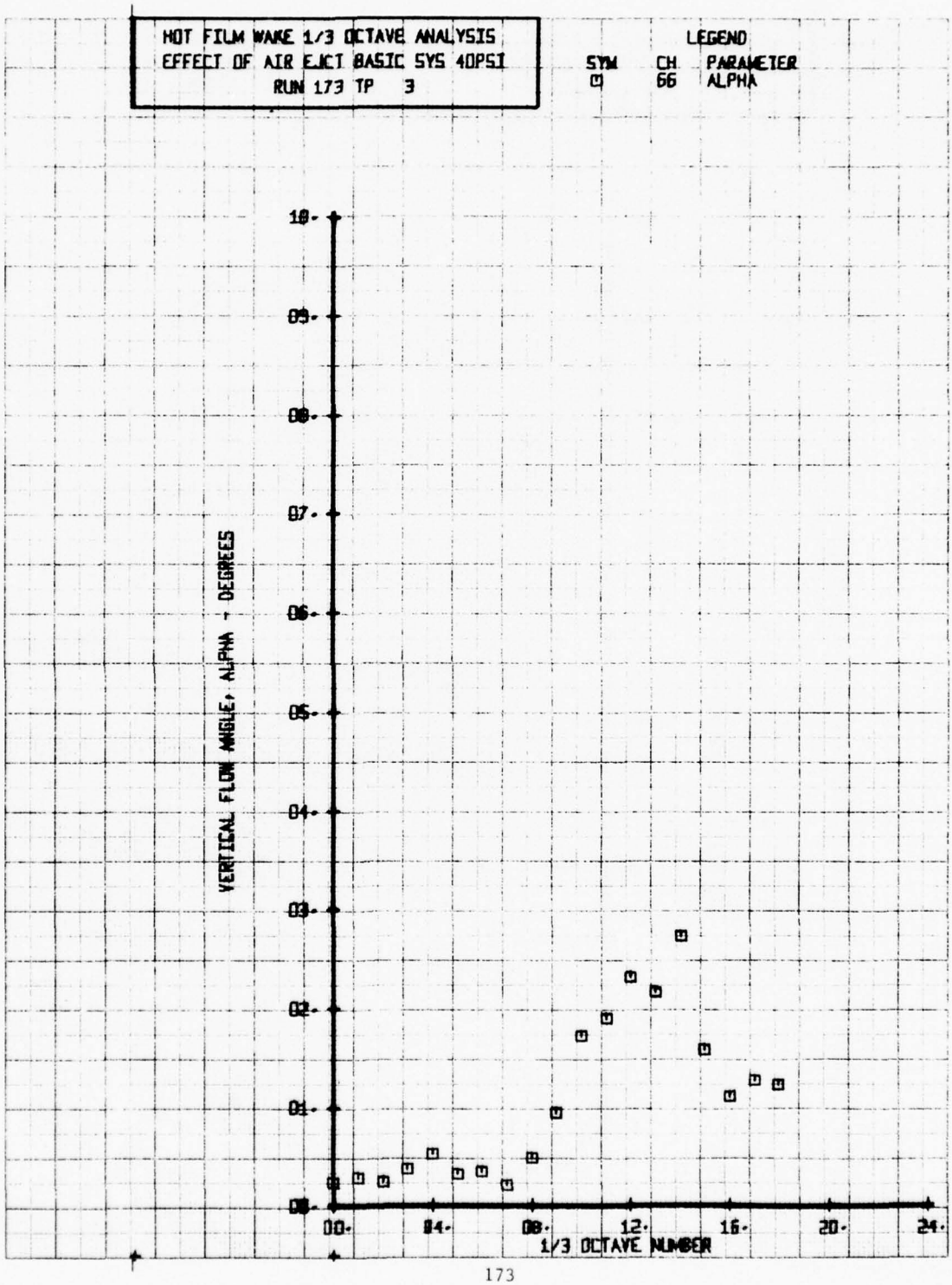
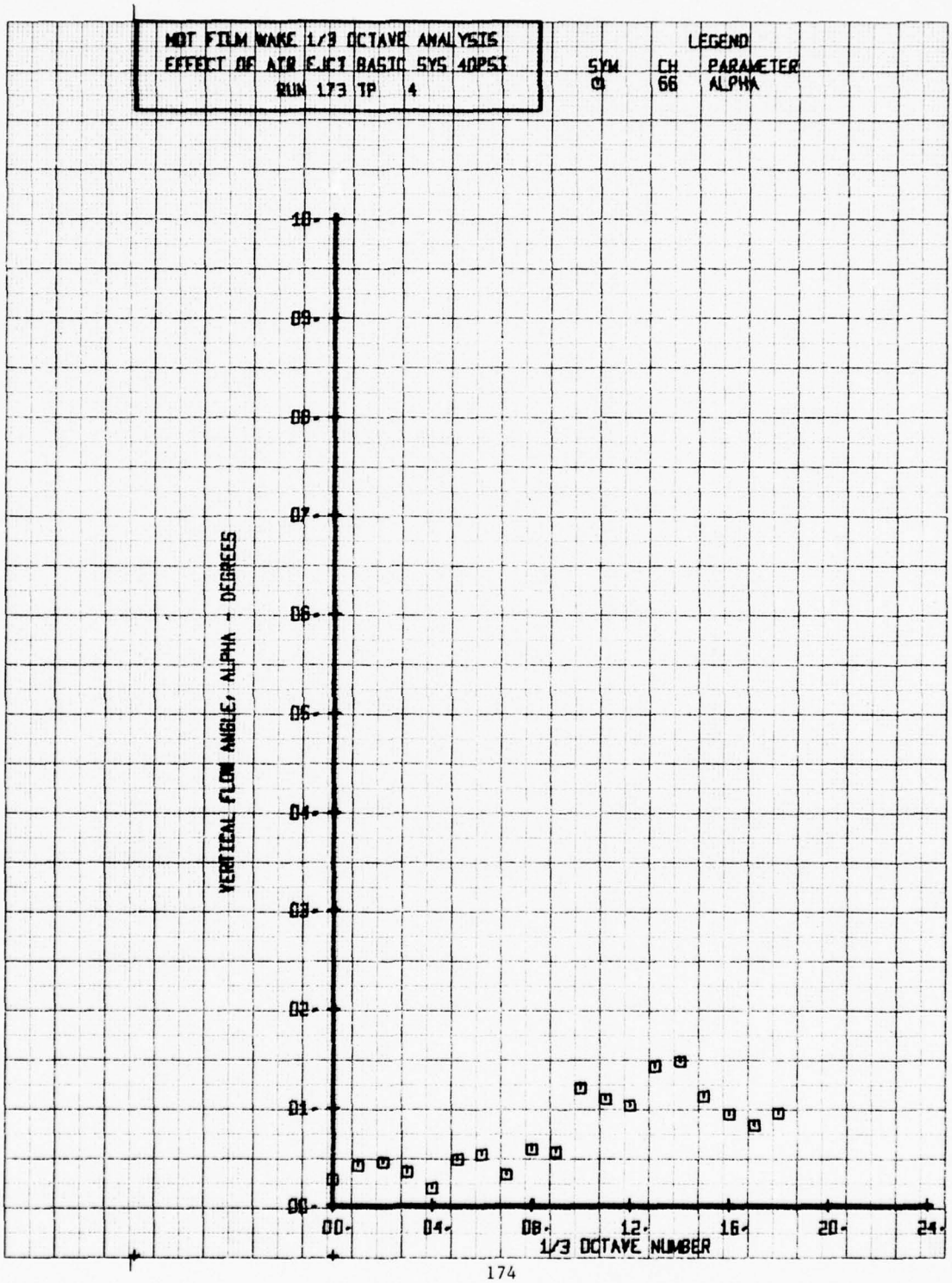
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
EFFECT OF AIR EJCT BASIC SYS 40PSI
RUN 173 TP 3
LEGEND
SYM CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
EFFECT OF AIR EJCT BASIC SYS 40PSI
RUN 173 TP 4
LEGEND
SYM CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
1/3 OCTAVE NUMBER
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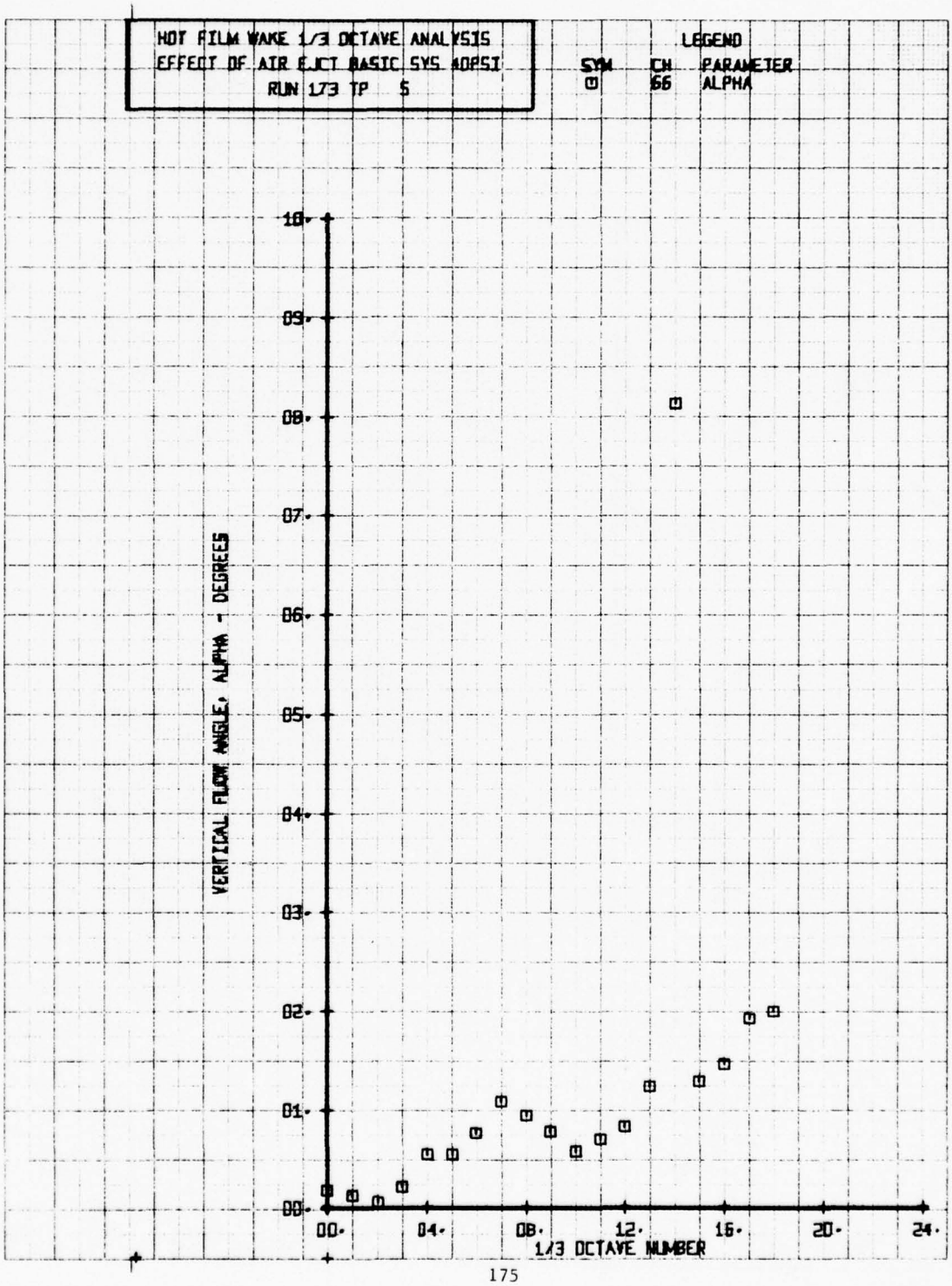
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
EFFECT OF AIR EJCT BASIC SYS 40PSI
RUN 173 TP 5
LEGEND
SYM CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
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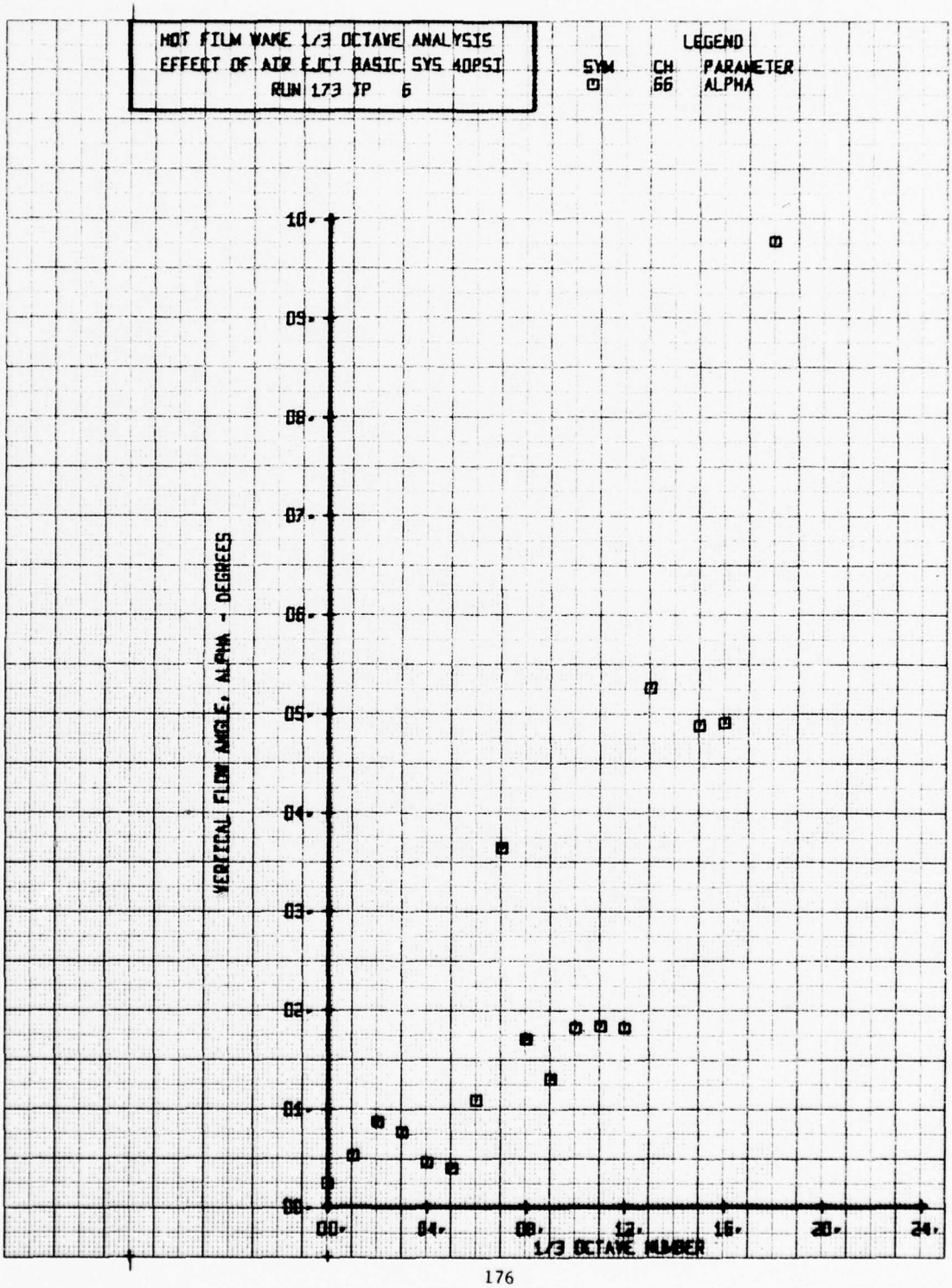
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
EFFECT OF AIR EJCT BASIC SYS 40PSI
RUN 173 TP 6
LEGEND
SYM CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
1/3 OCTAVE NUMBER
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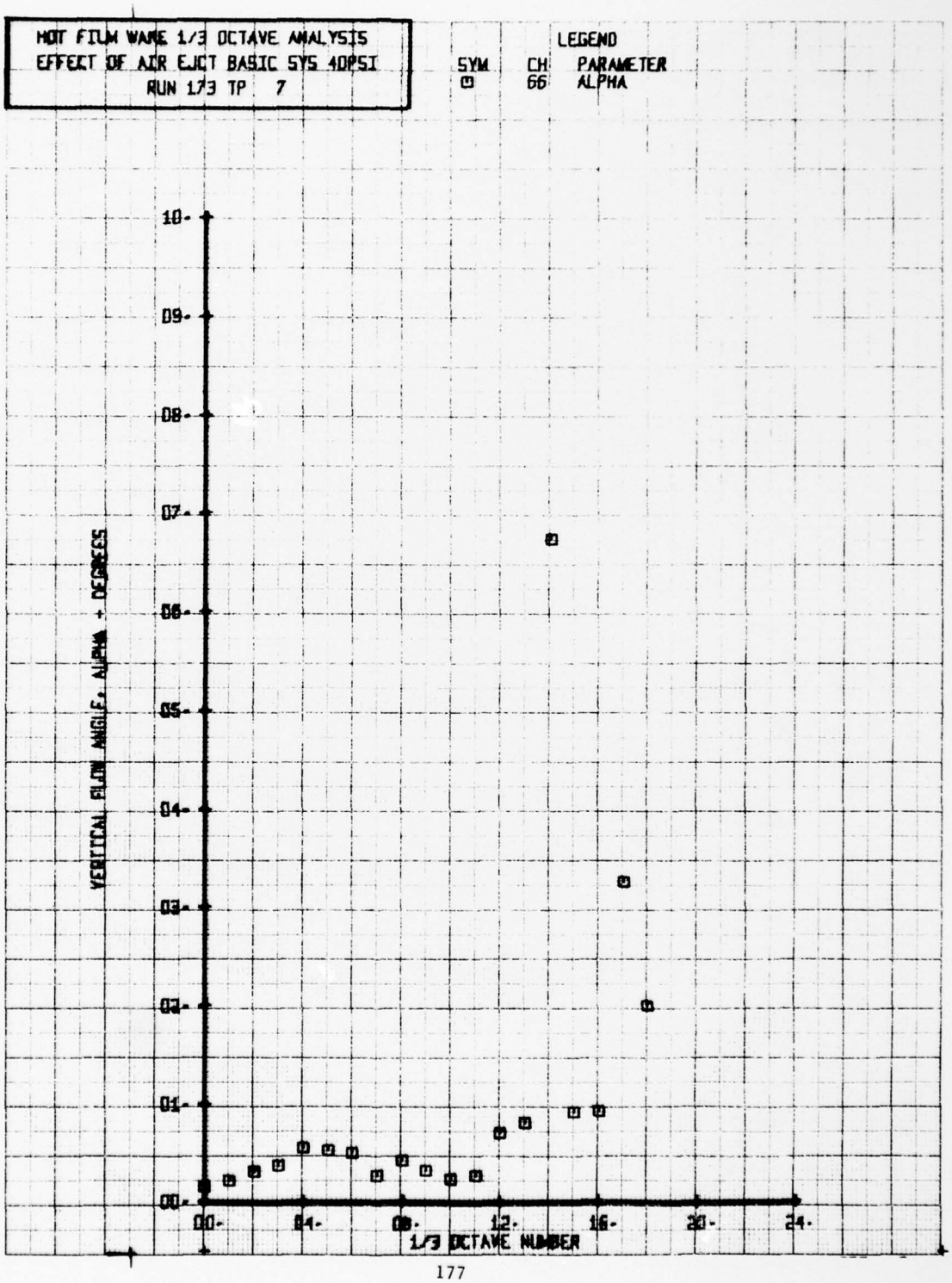
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
EFFECT OF AIR EJCT BASIC SYS 40PSI
RUN 173 TP 7
LEGEND
SYM CH PARAMETER
66 ALPHA
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VERTICAL FLOW ANGLE, ALPHA - DEGREES
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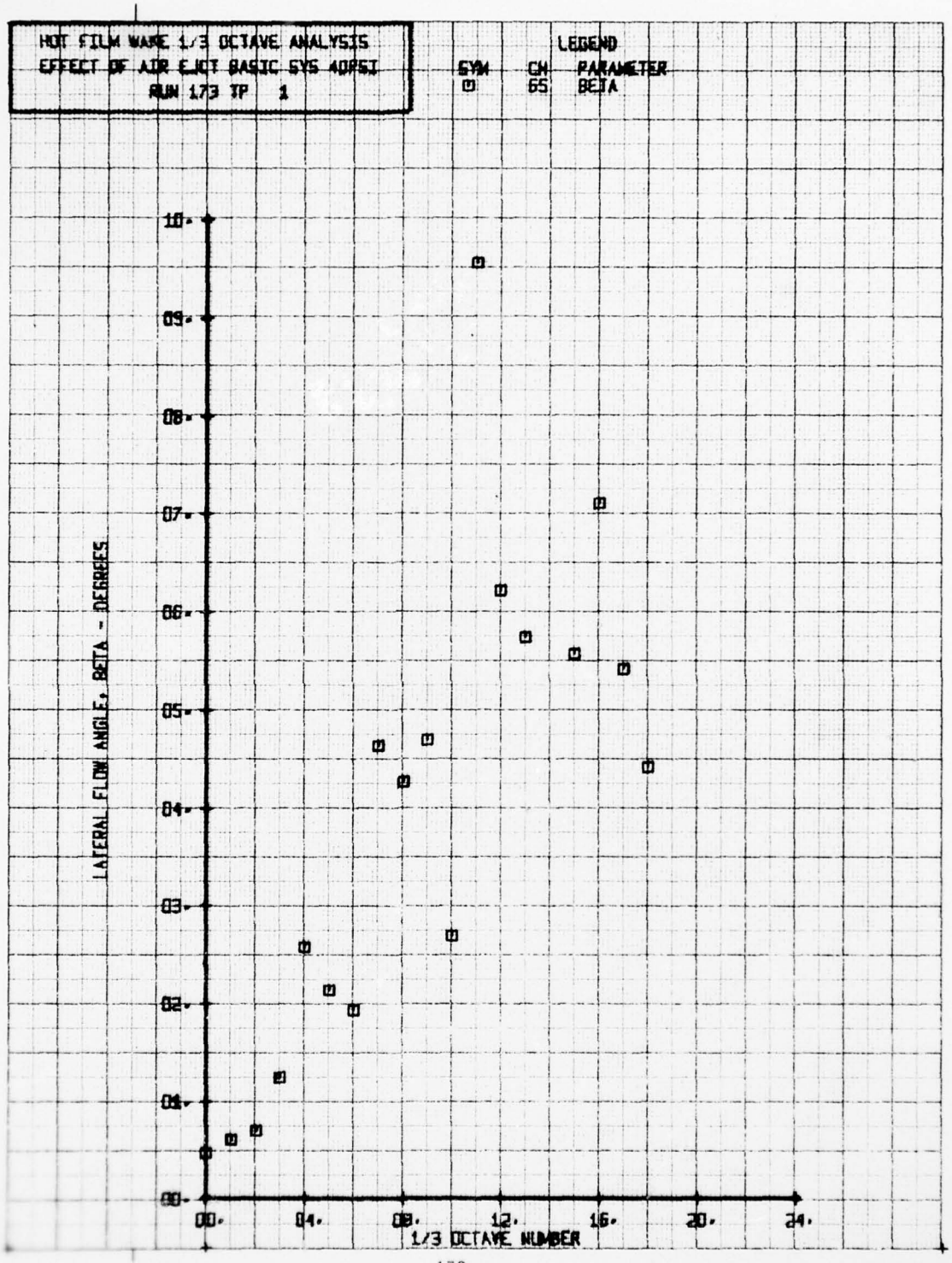
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
EFFECT OF AIR EJCT BASIC SYS 40PSI
RUN 173 TP 1
LEGEND
SYM CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
1/3 OCTAVE NUMBER
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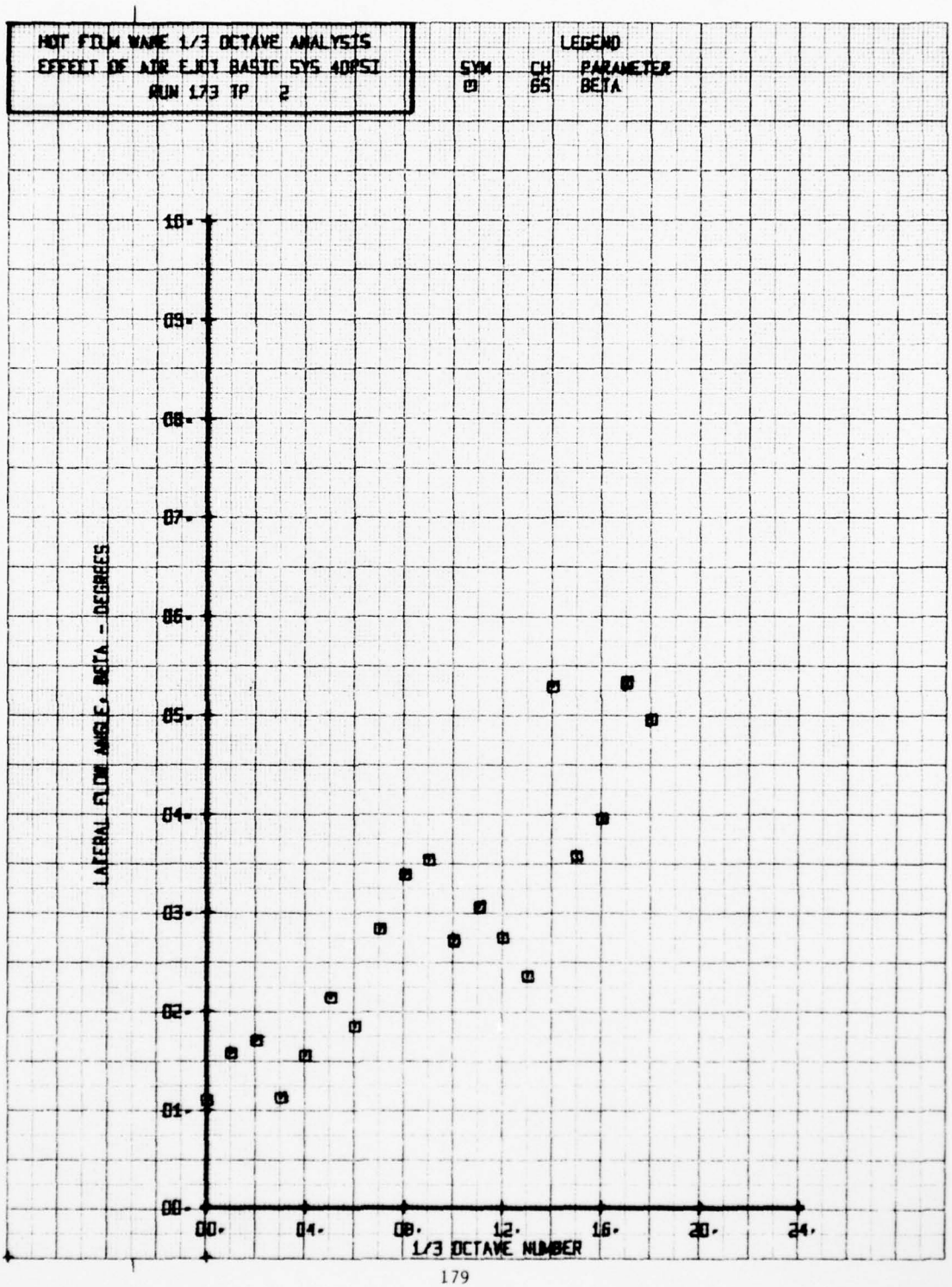
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LATERAL FLOW ANGLE, BETA - DEGREES
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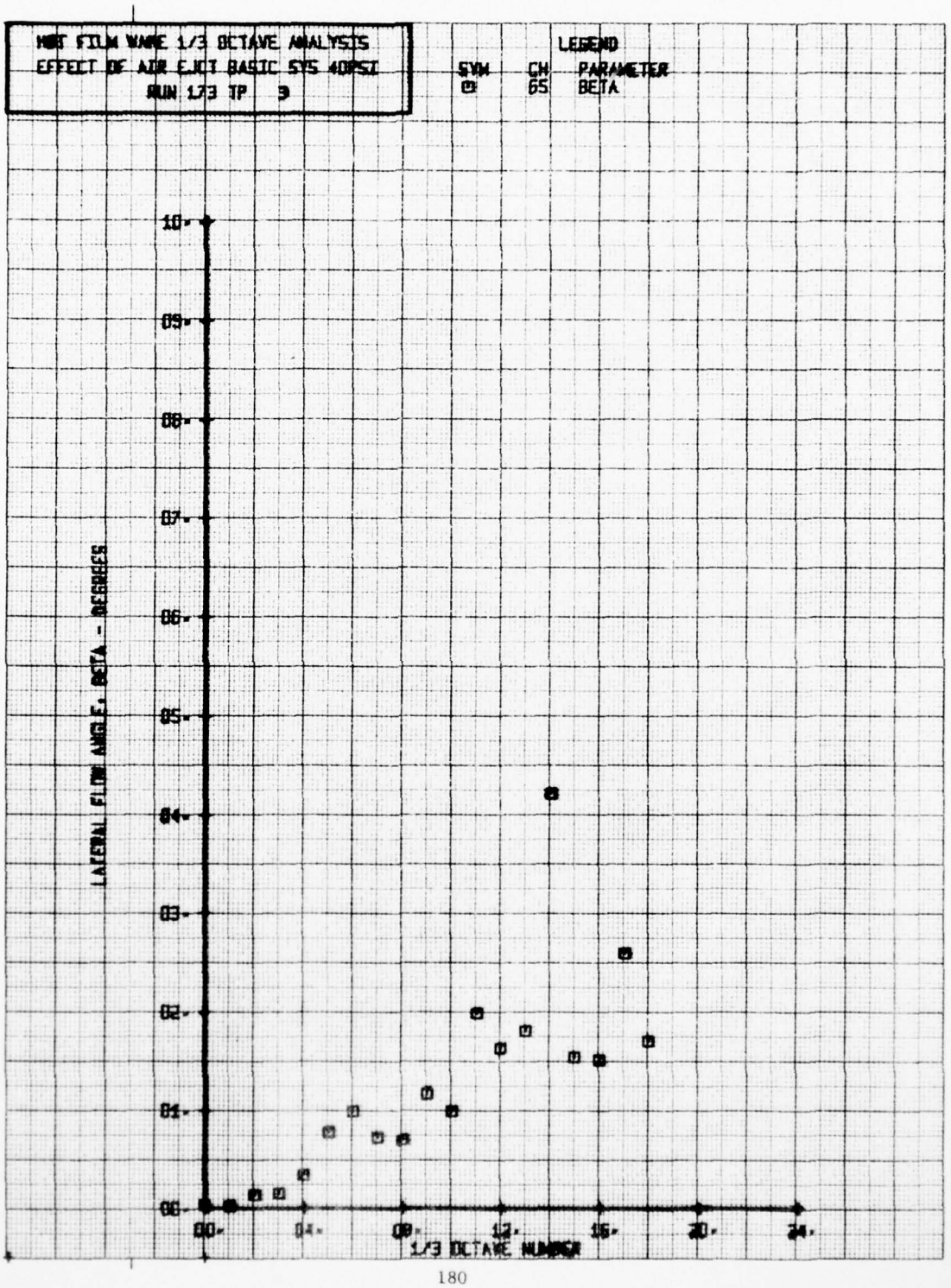
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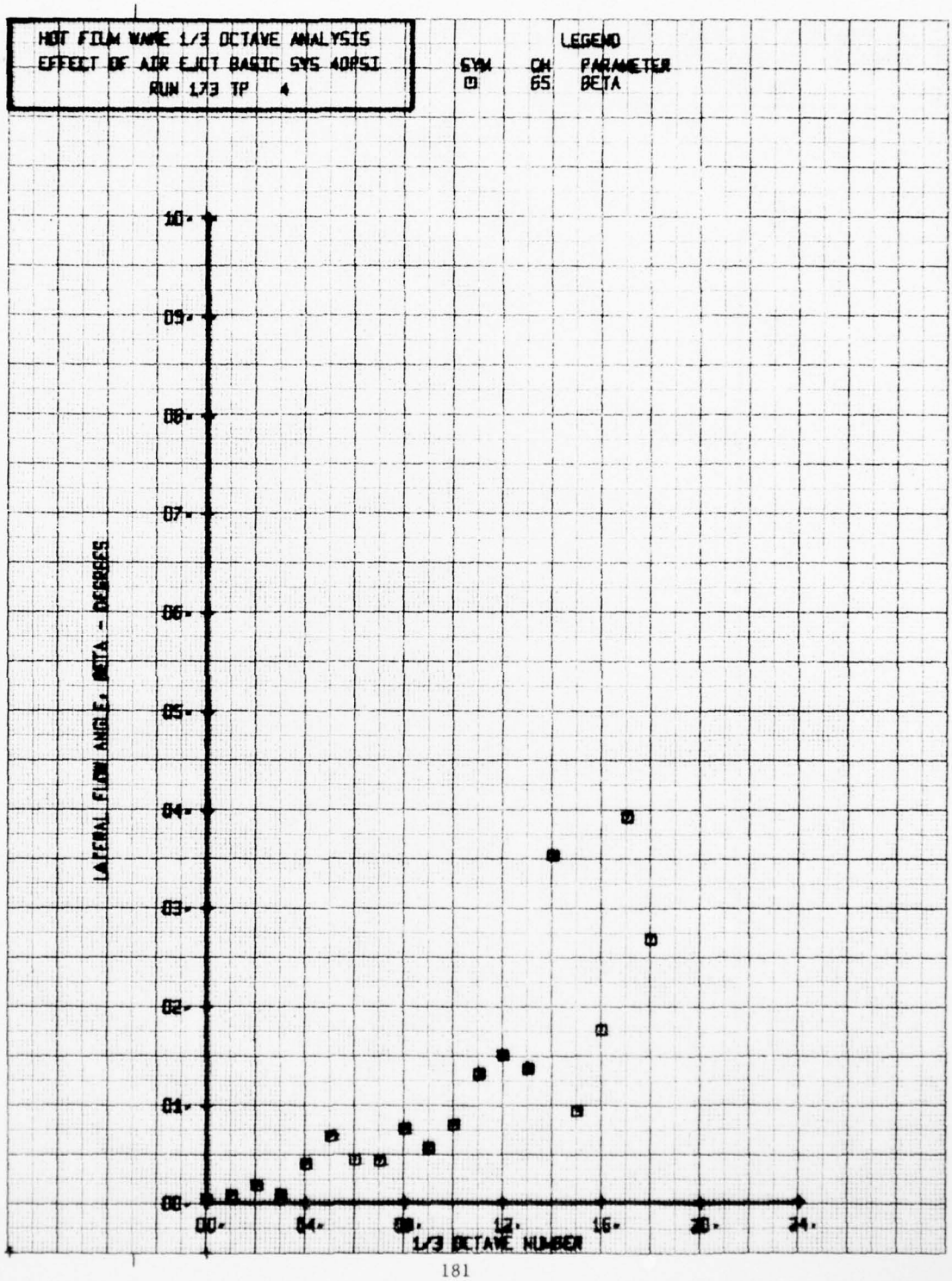
LATERAL FLOW ANGLE, BETA - DEGREES
1/3 OCTAVE NUMBER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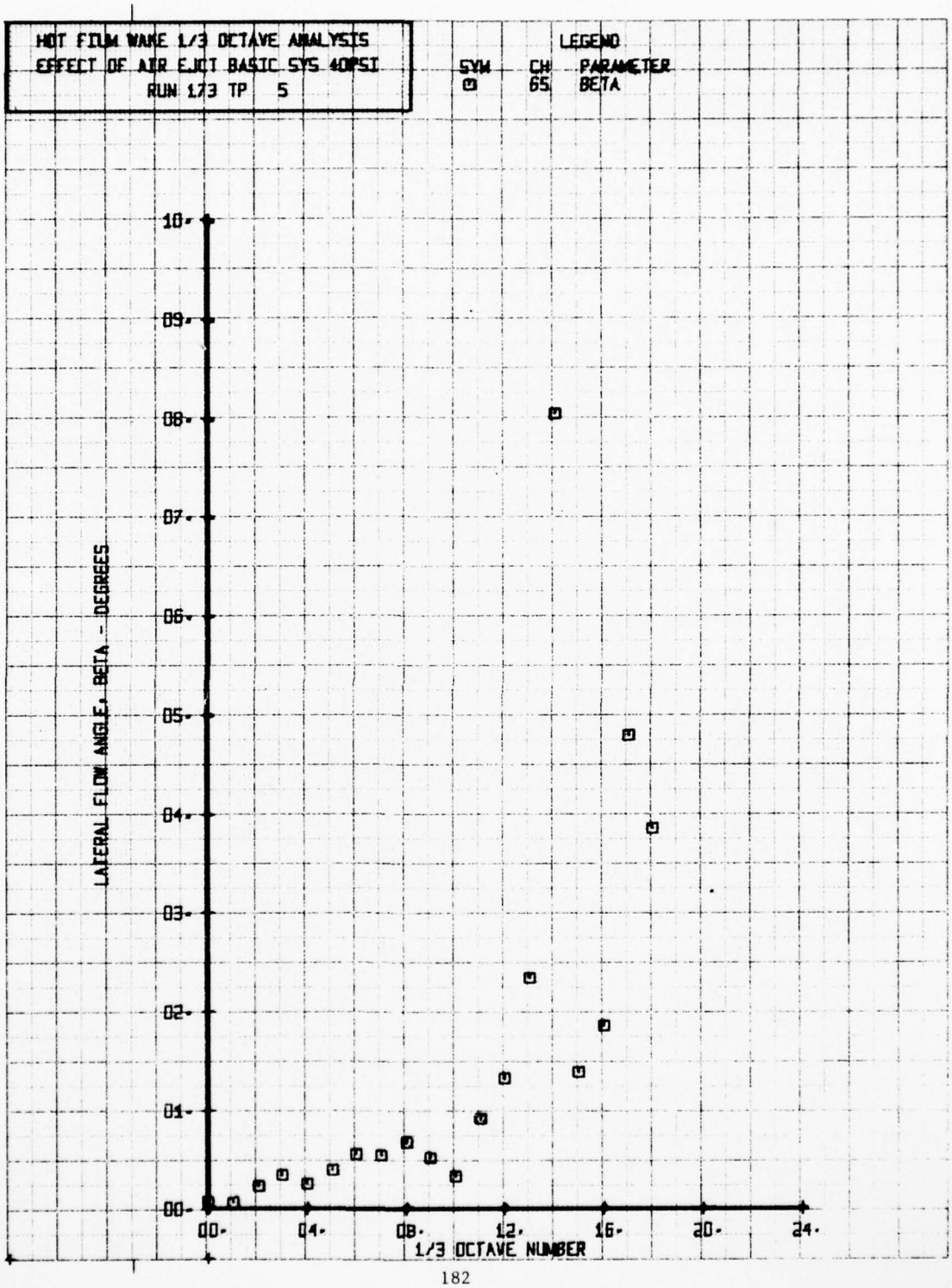
1/3 OCTAVE NUMBER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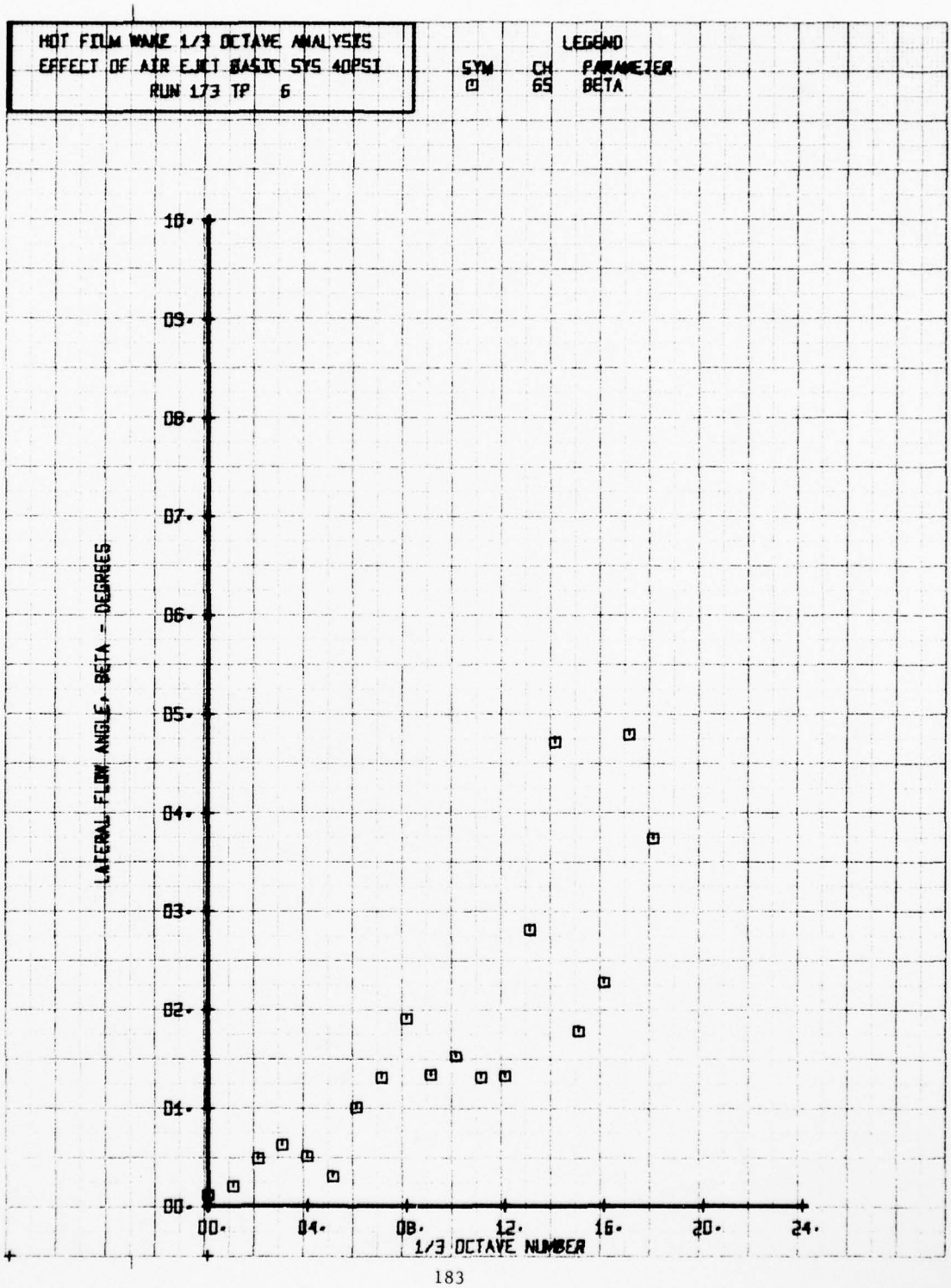
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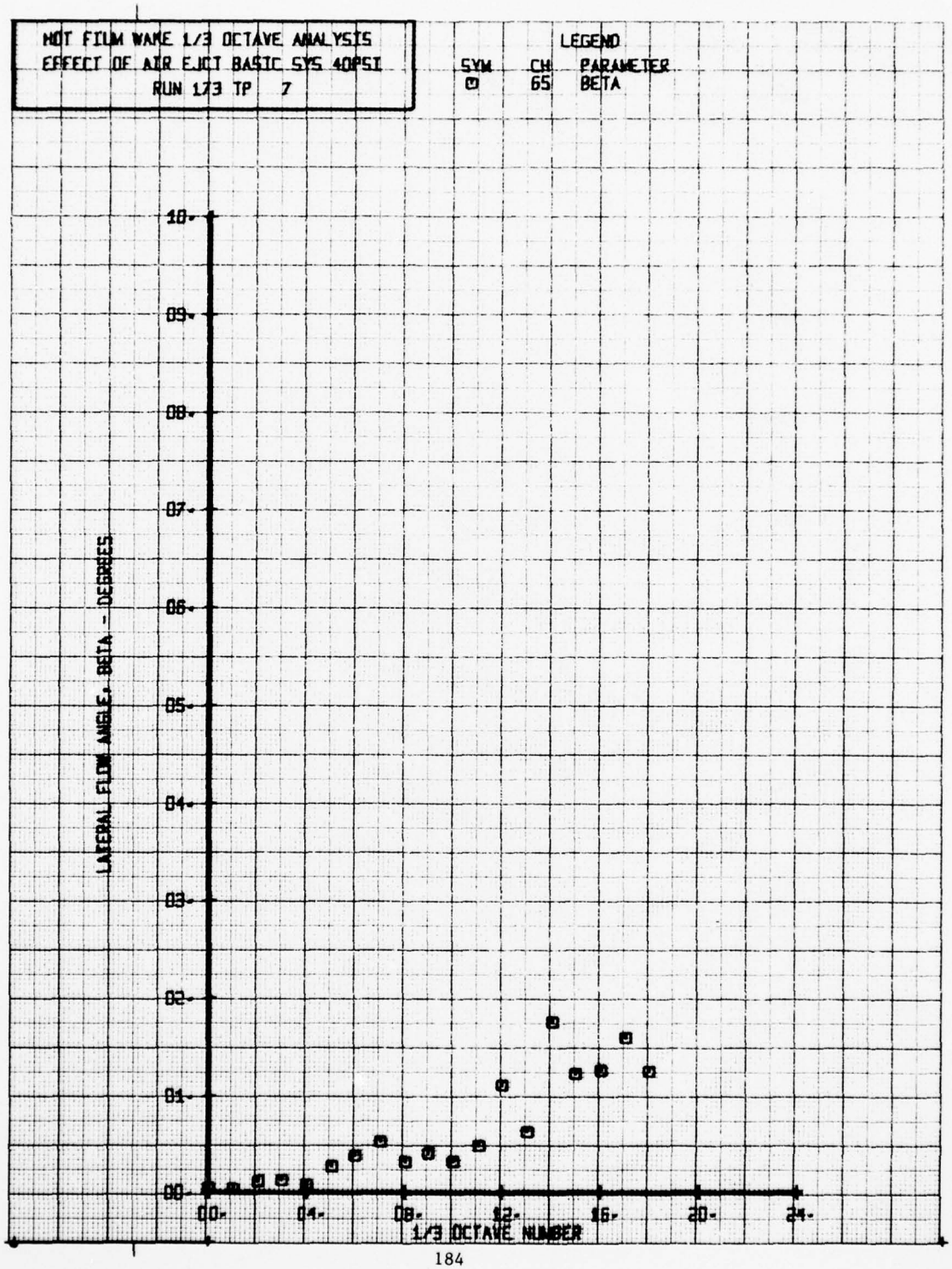
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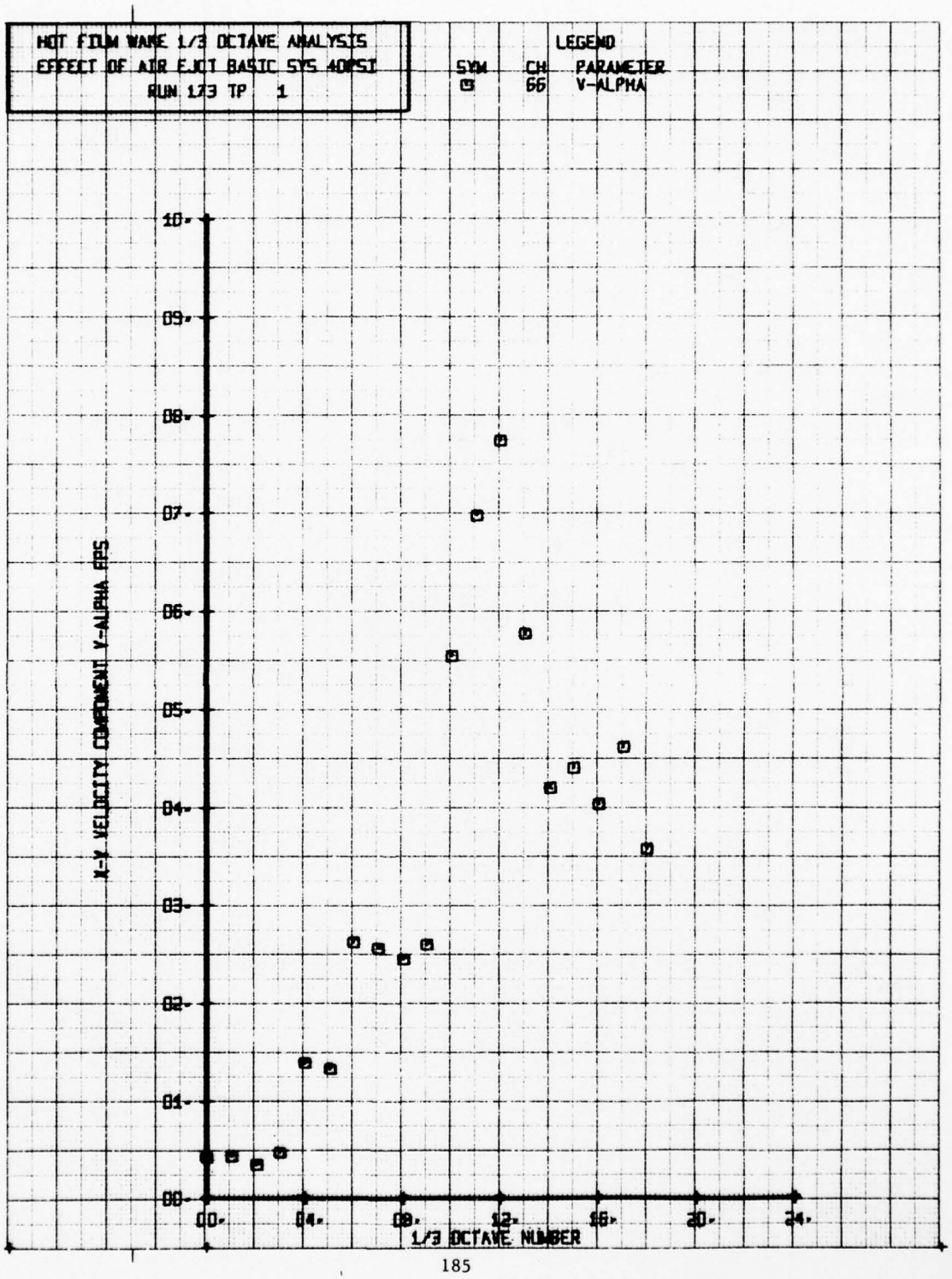
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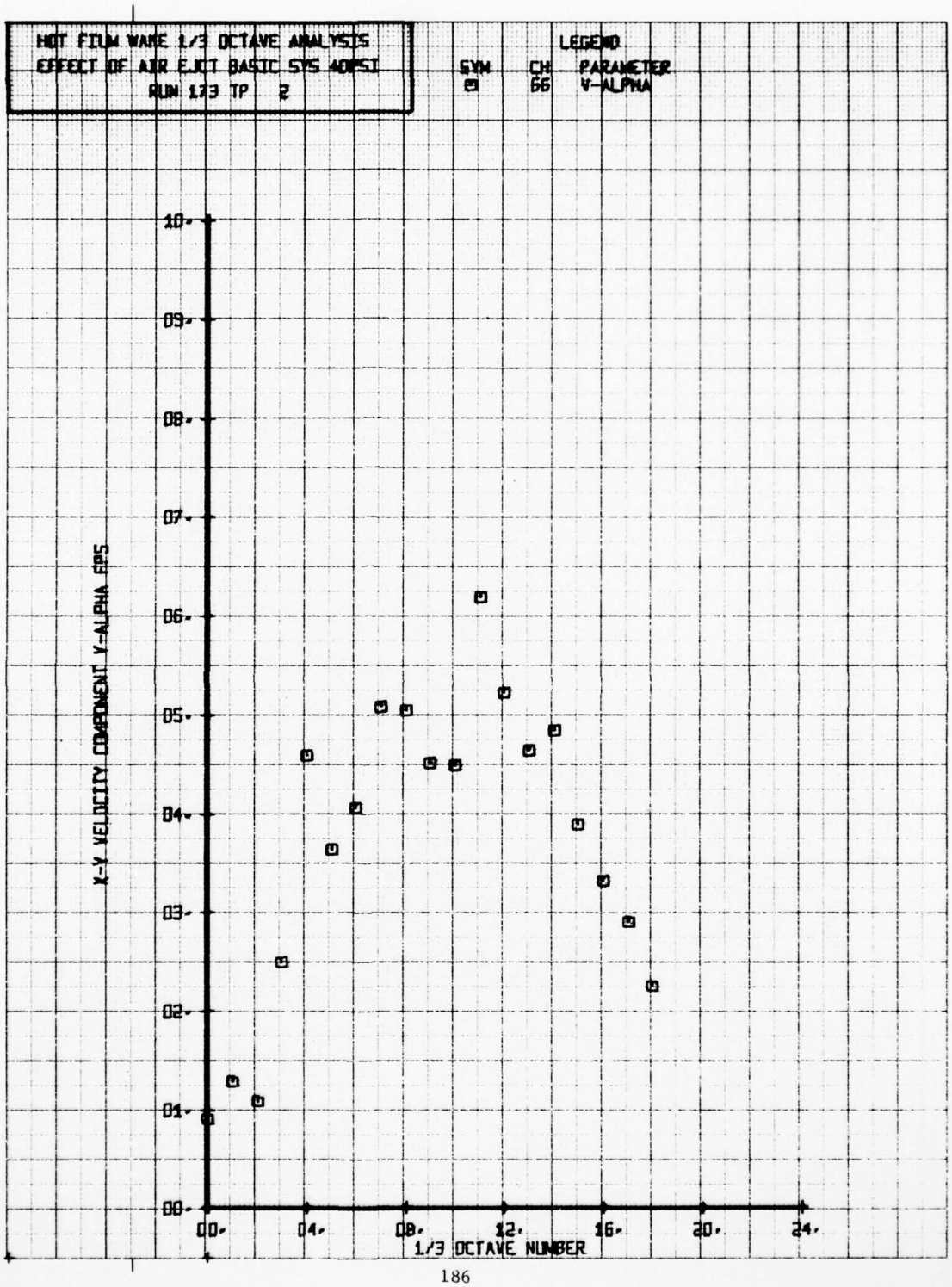
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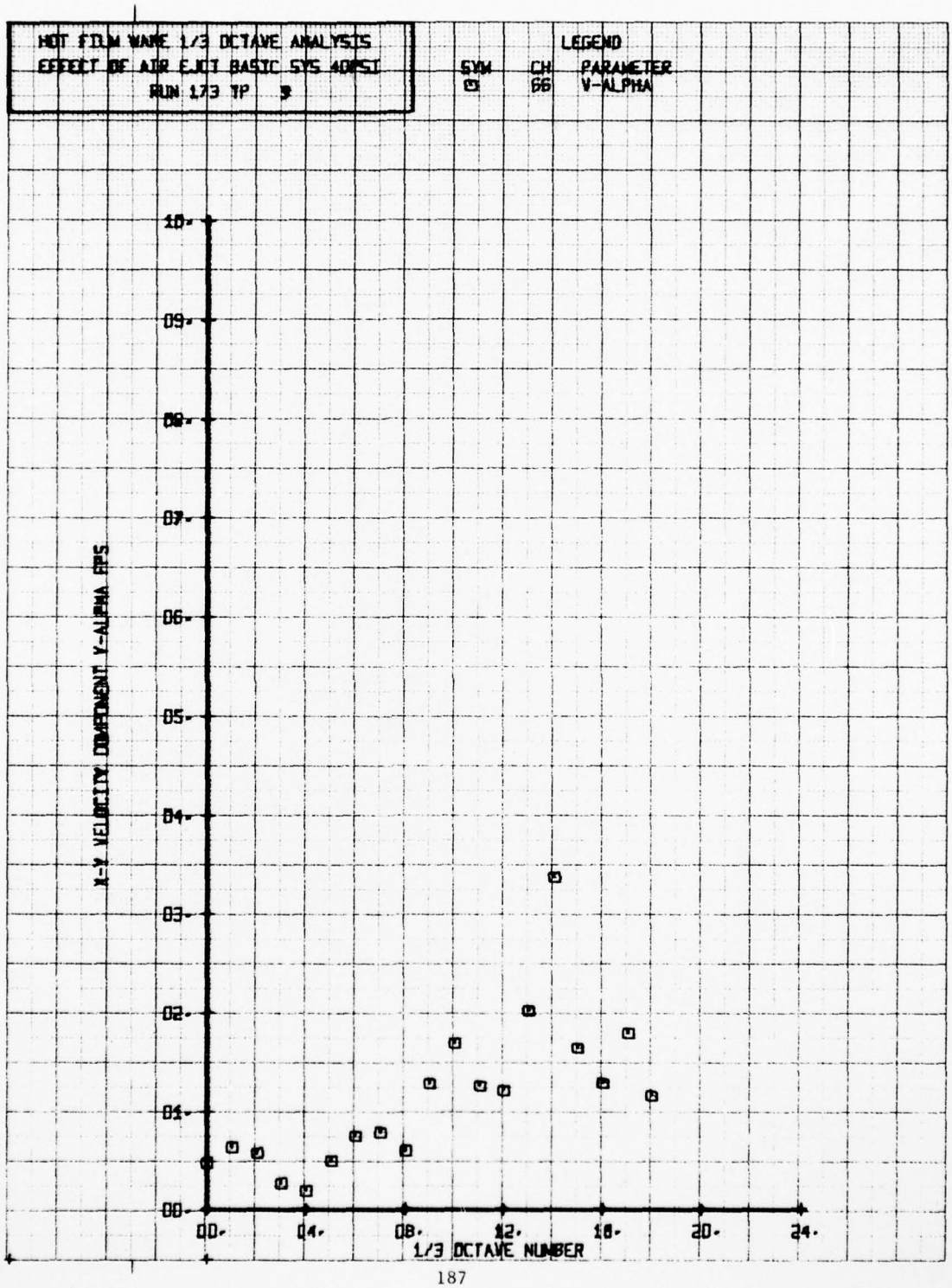
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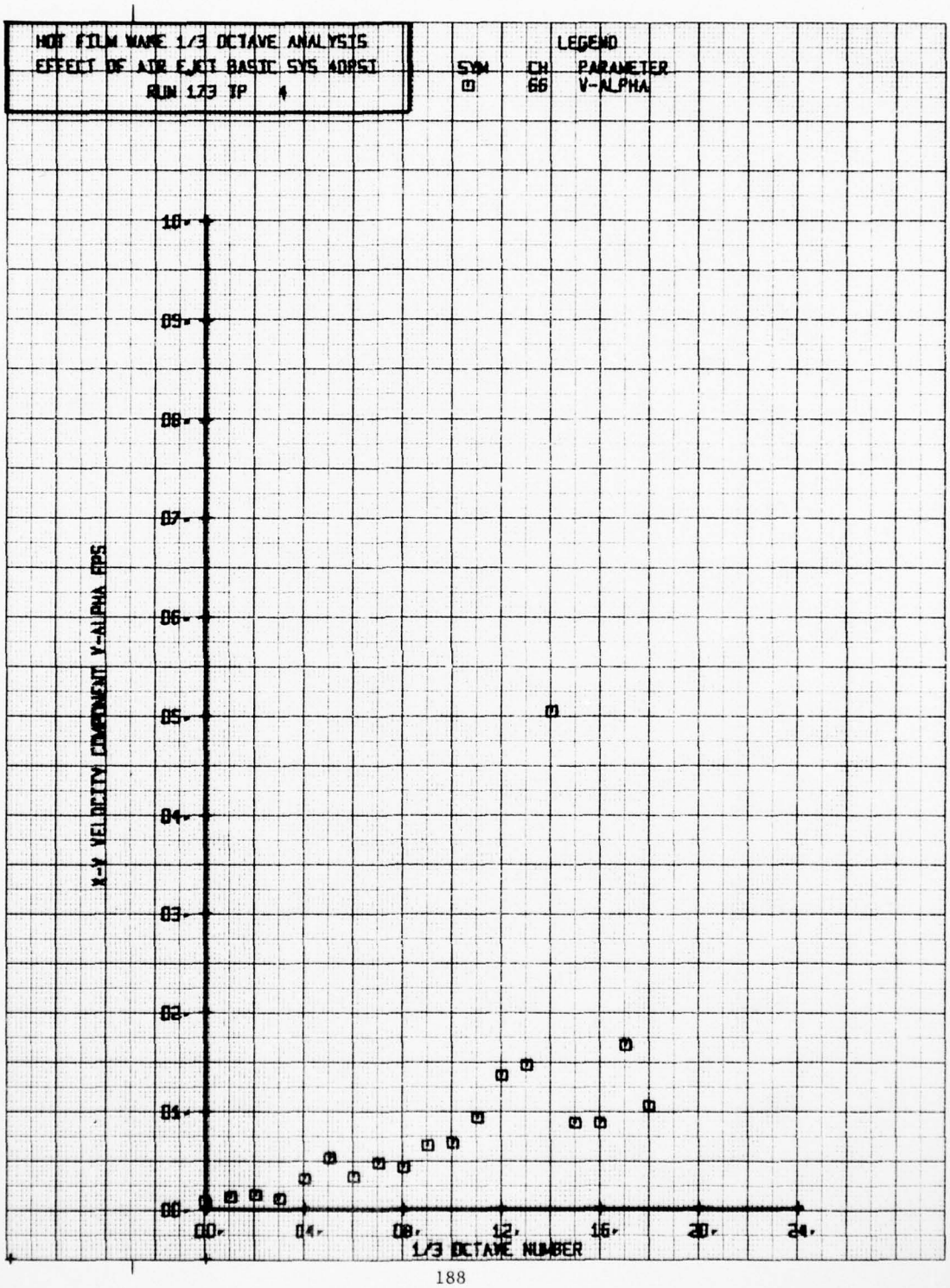
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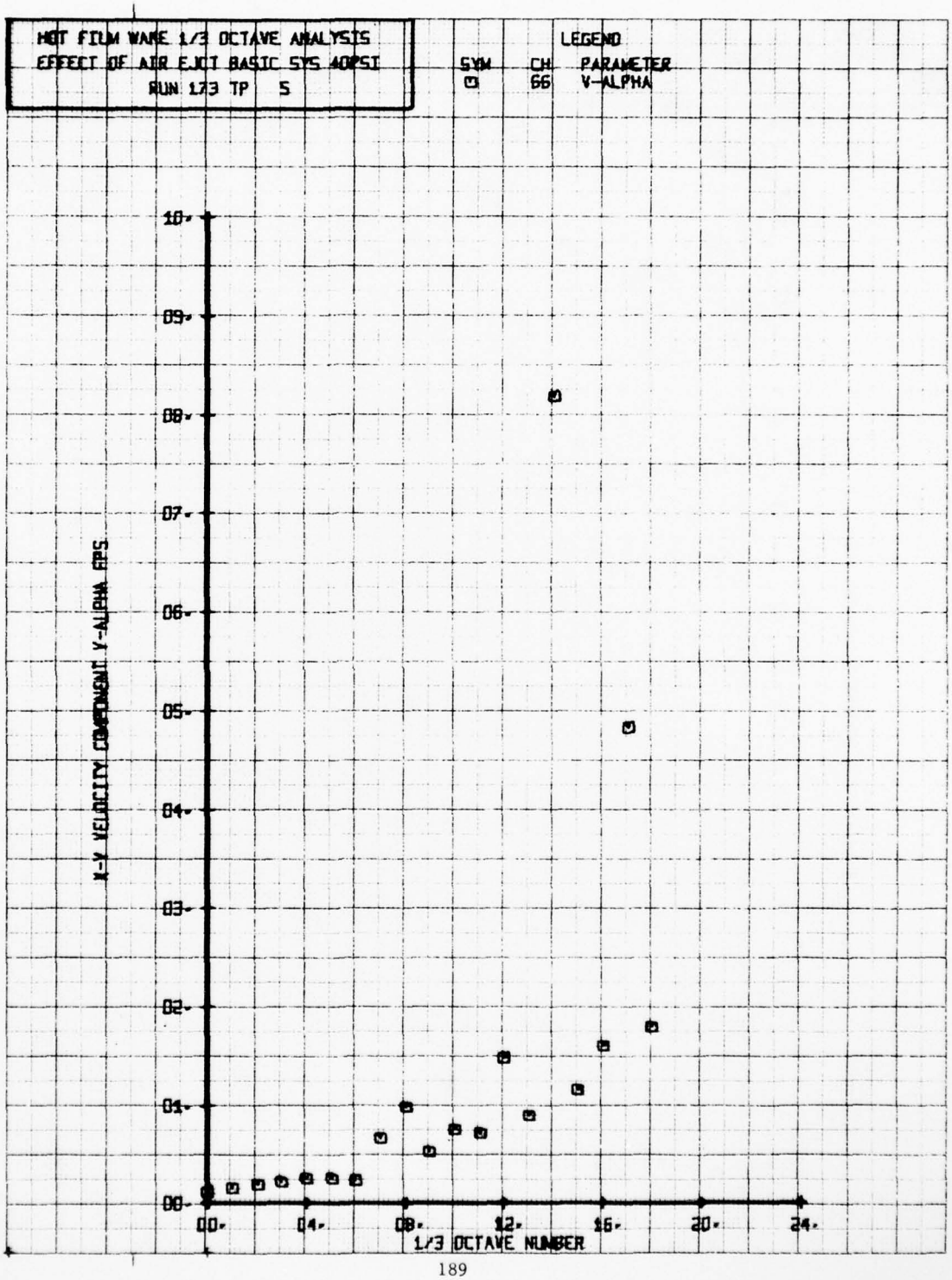
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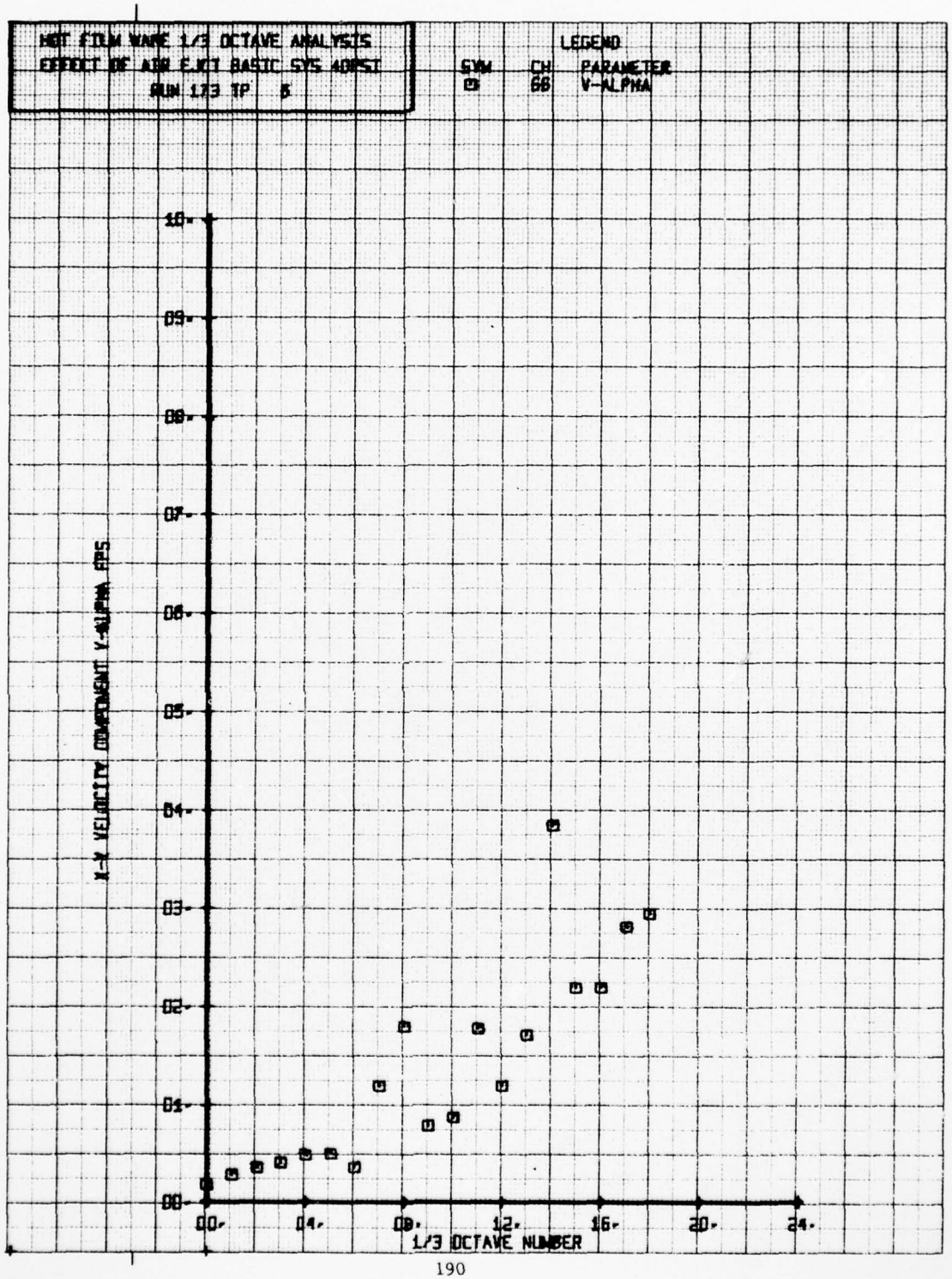
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EFFECT OF AIR EJCT BASIC SYS 40MST
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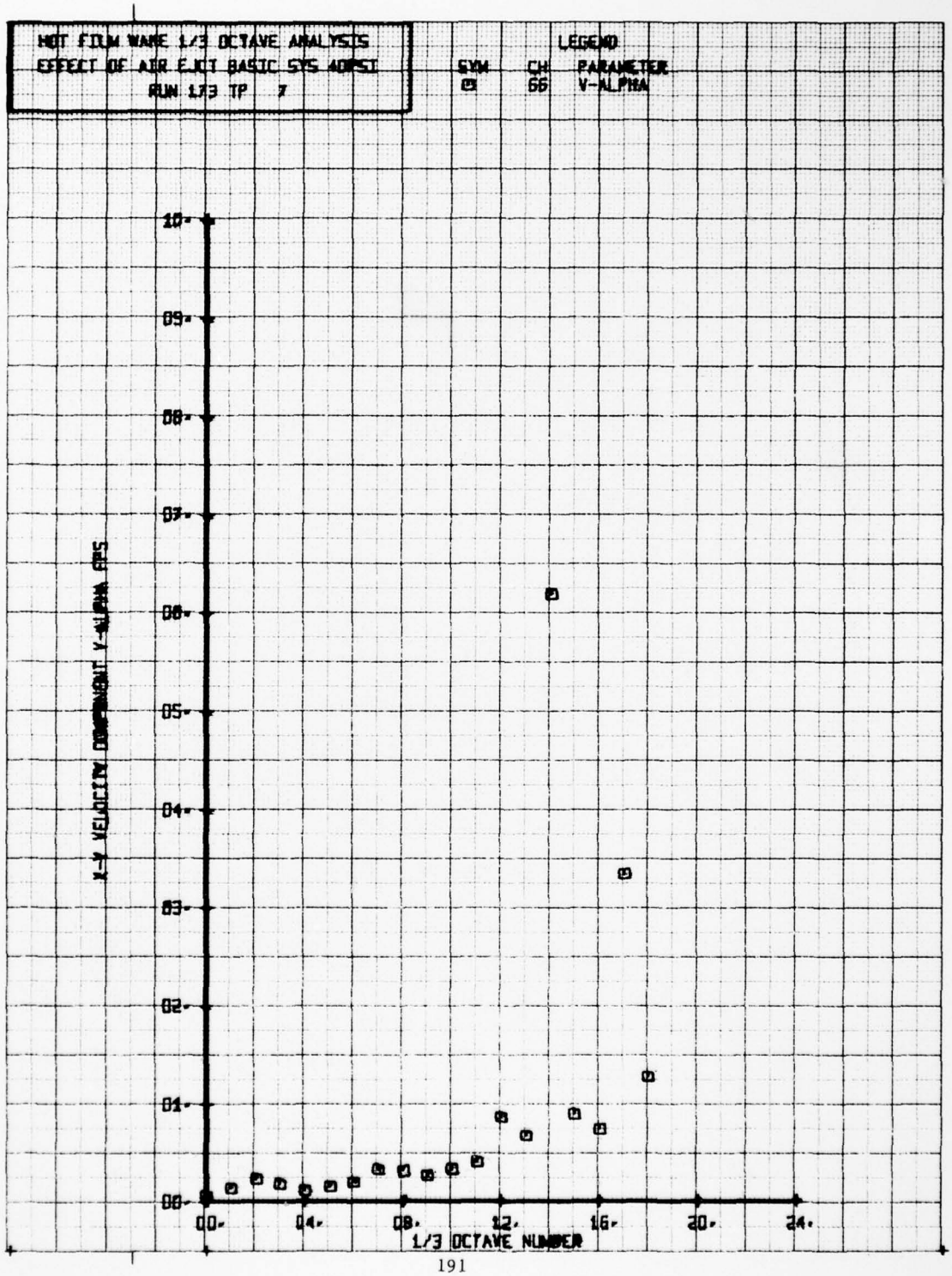
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INTERACTIONAL AERODYNAMICS OF THE SINGLE ROTOR HELICOPTER CONFI--ETC(U)

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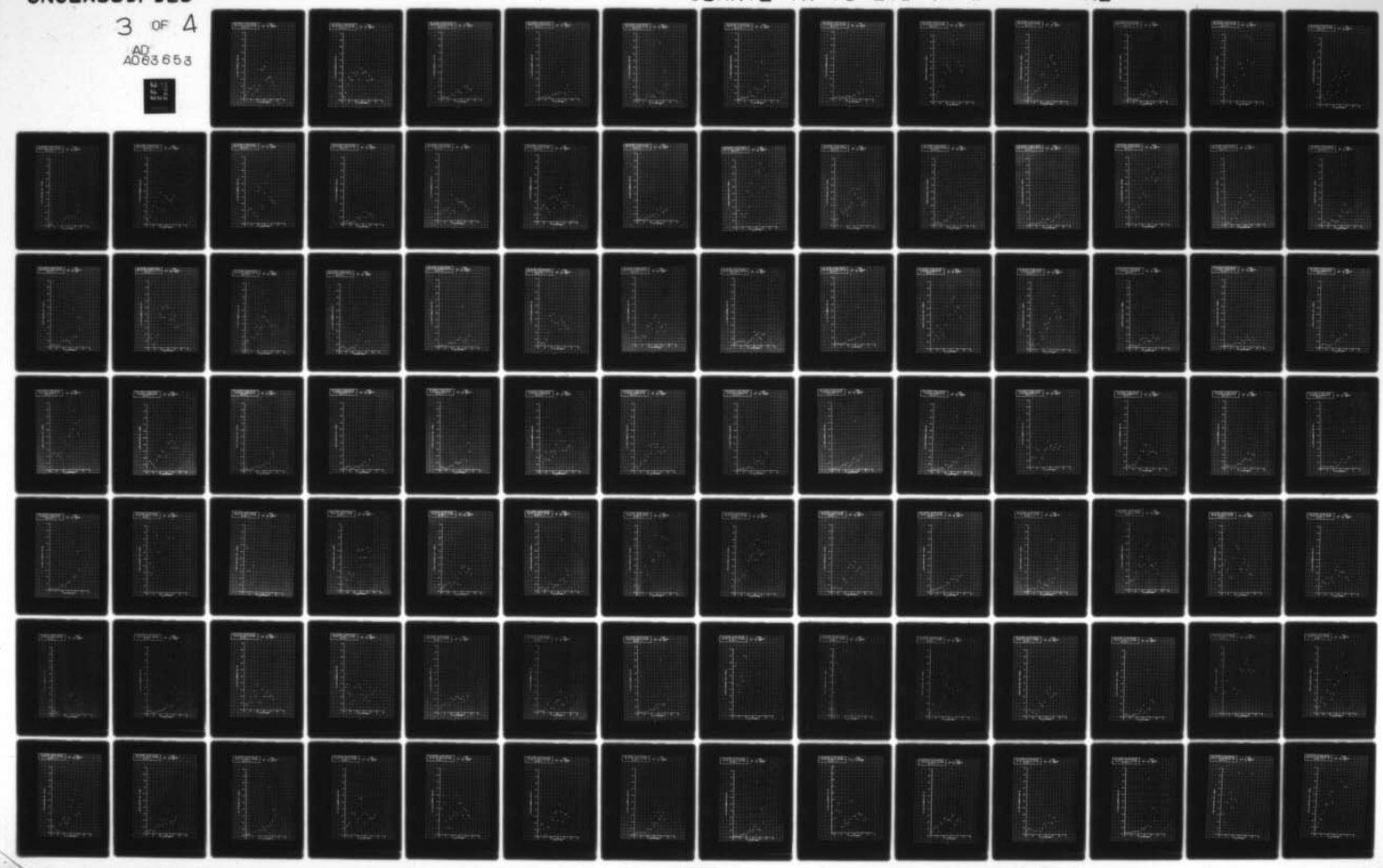

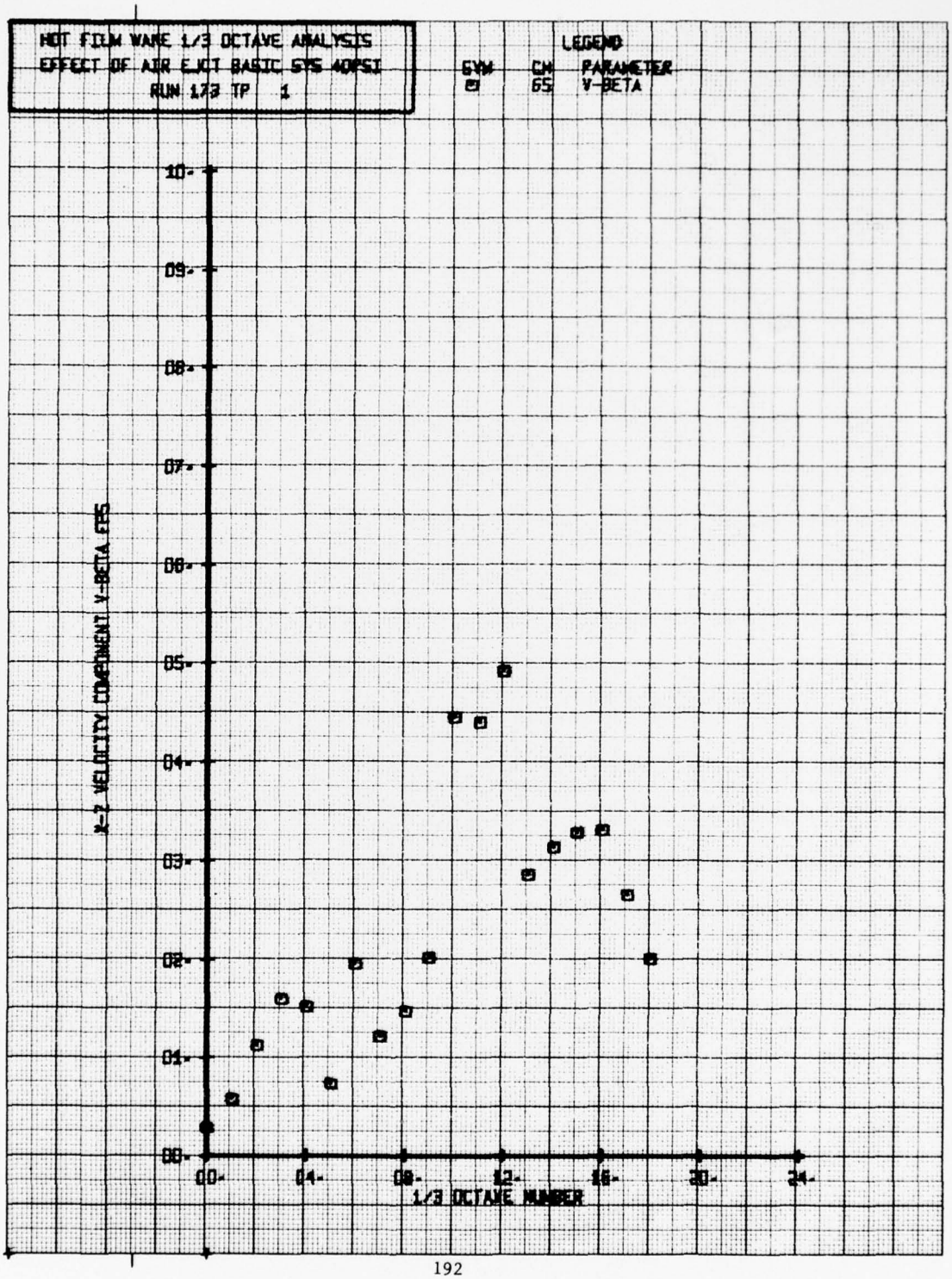
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LEGEND
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X-Z VELOCITY COMPONENT V-BETA FPS
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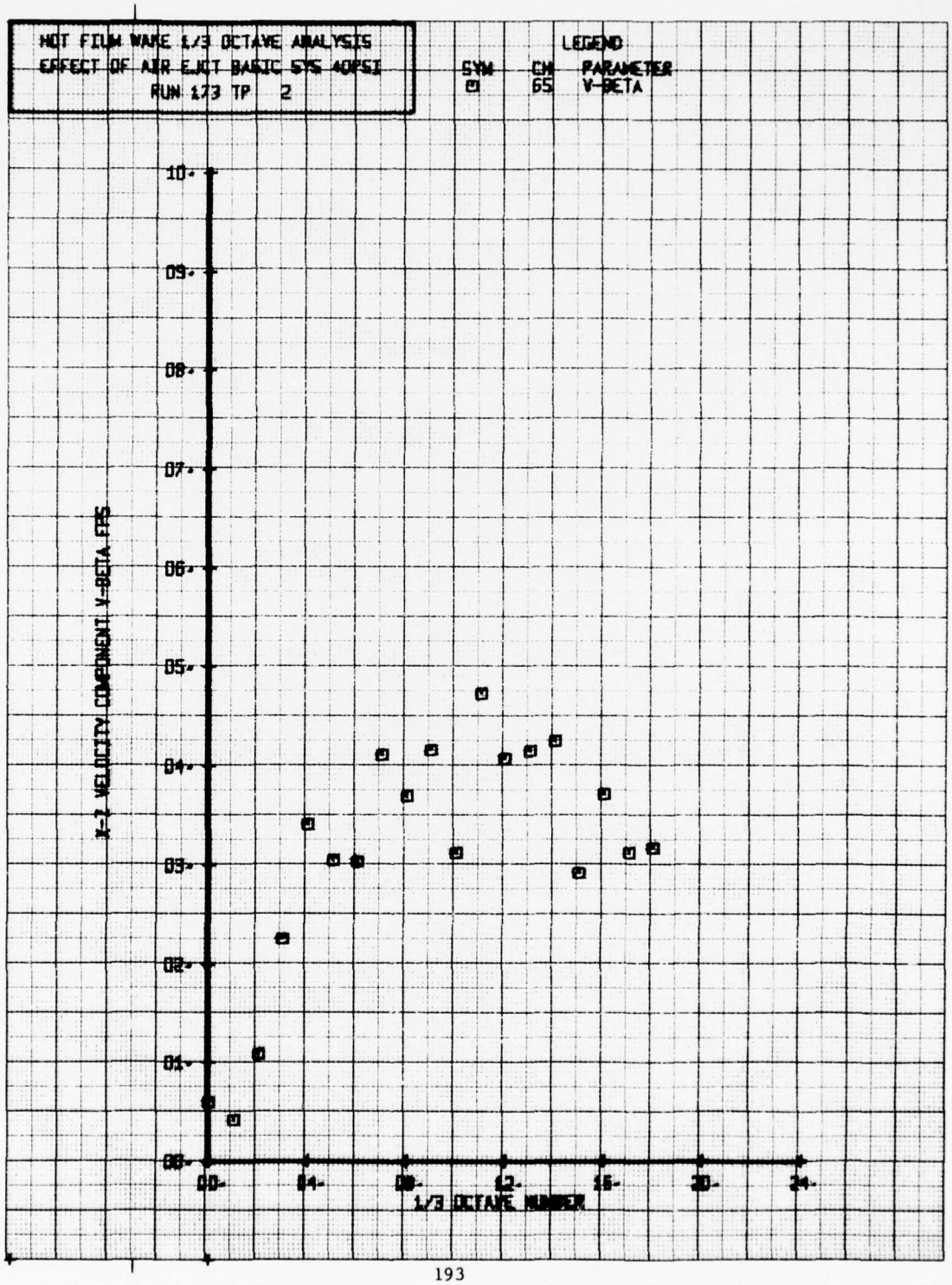
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LEGEND
SYM CH PARAMETER
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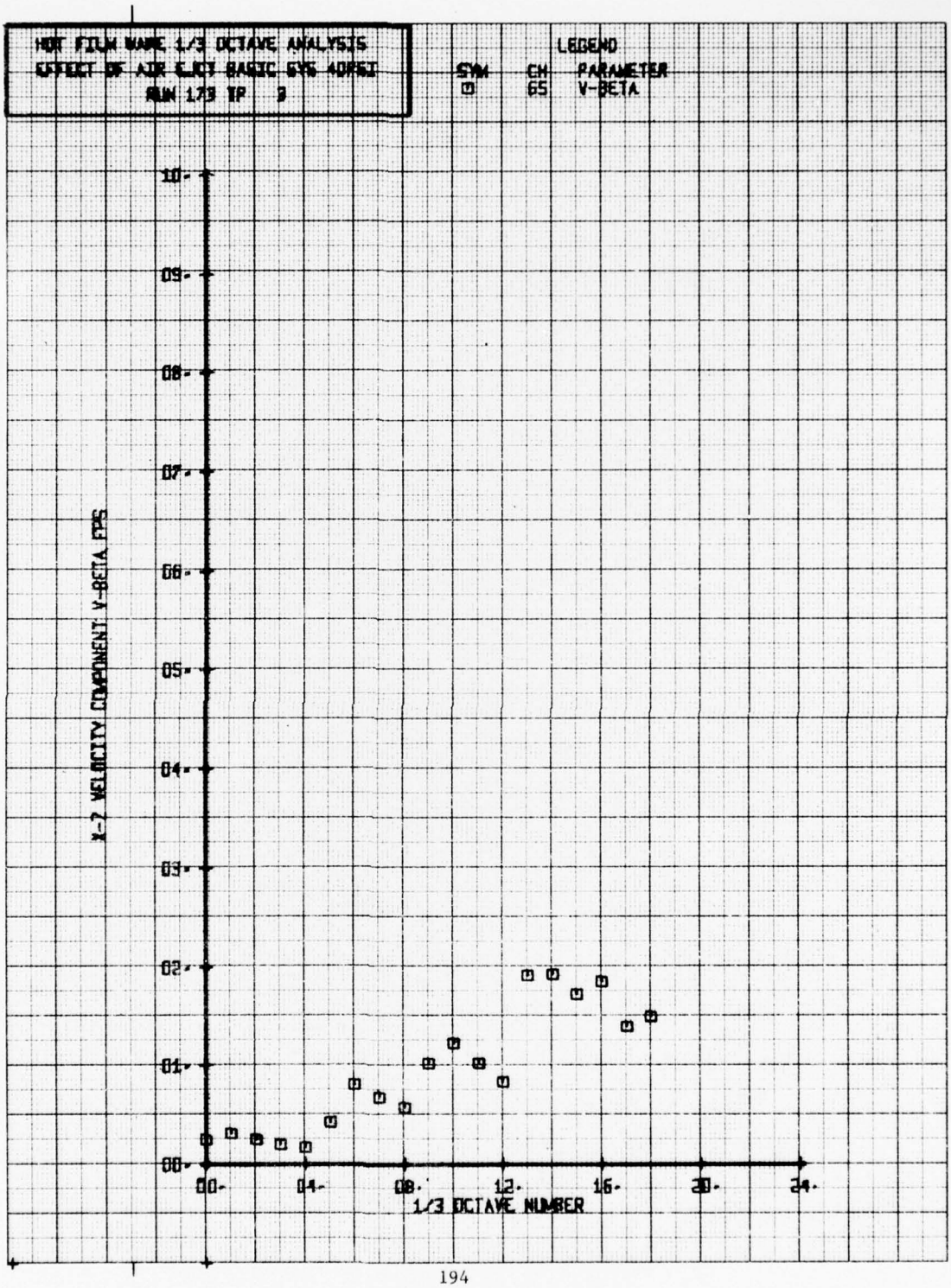
X-Z VELOCITY COMPONENT V-BETA FPS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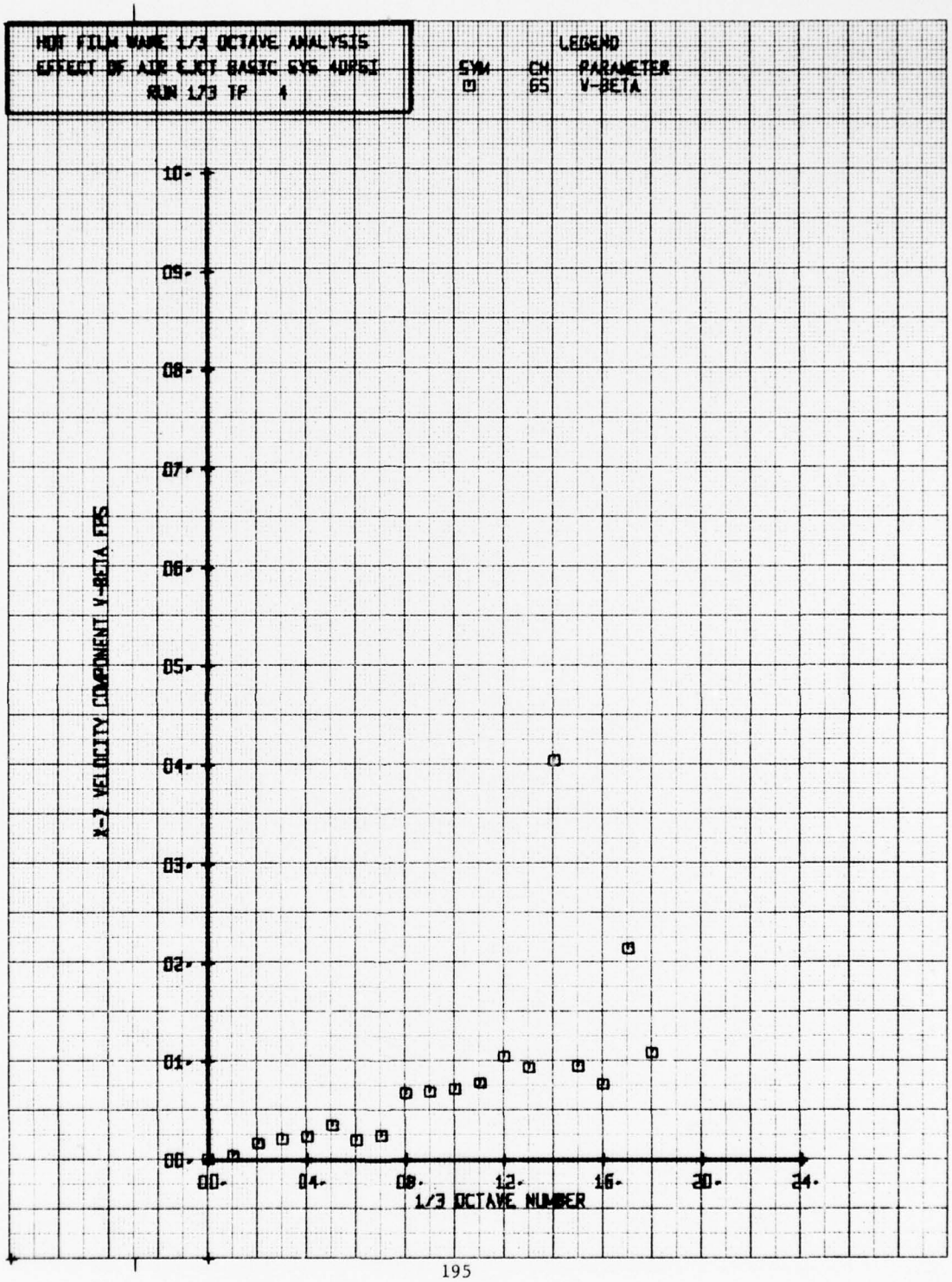
1/3 OCTAVE NUMBER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X-2 VELOCITY COMPONENT V-BETA FPS
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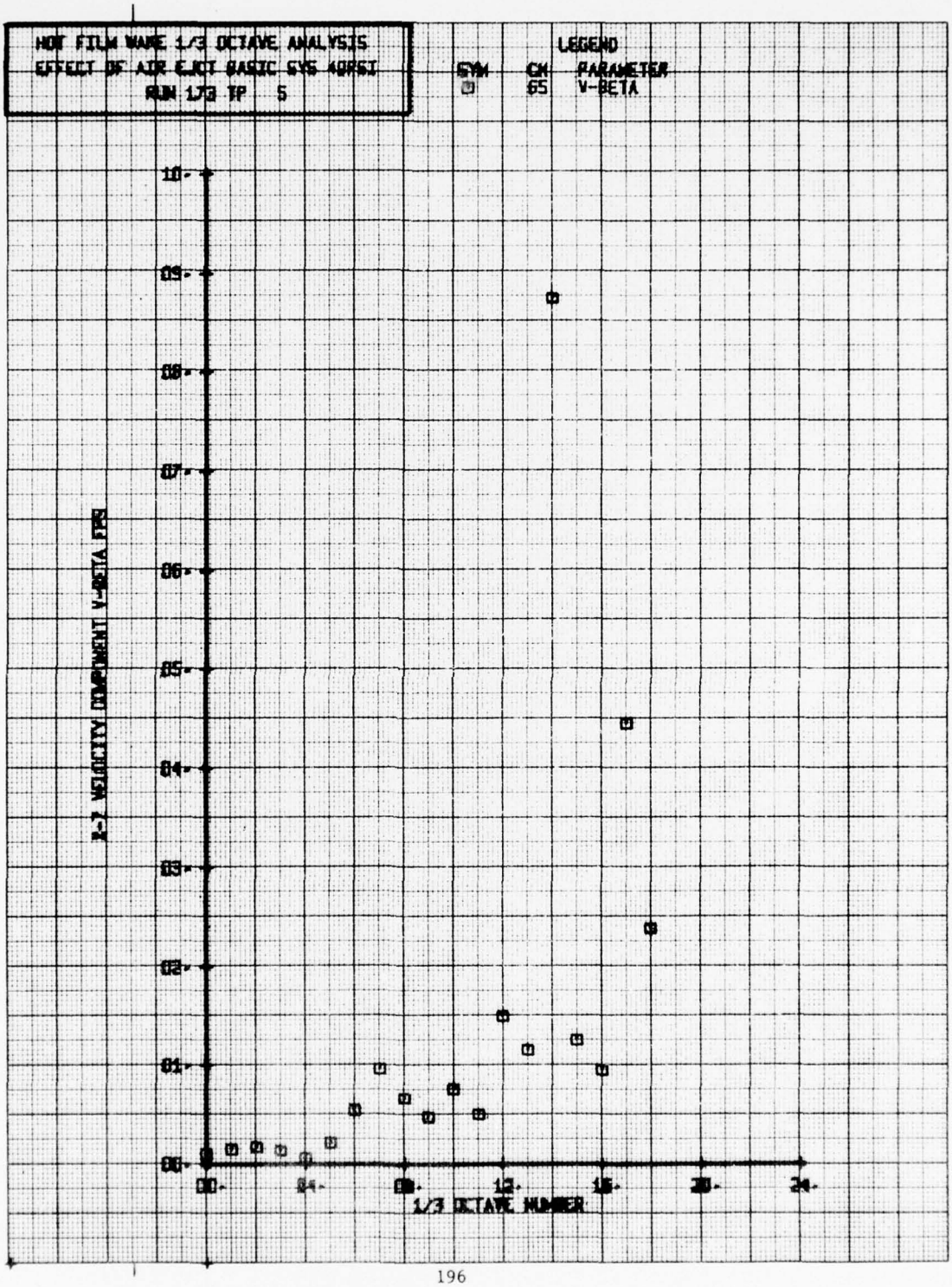
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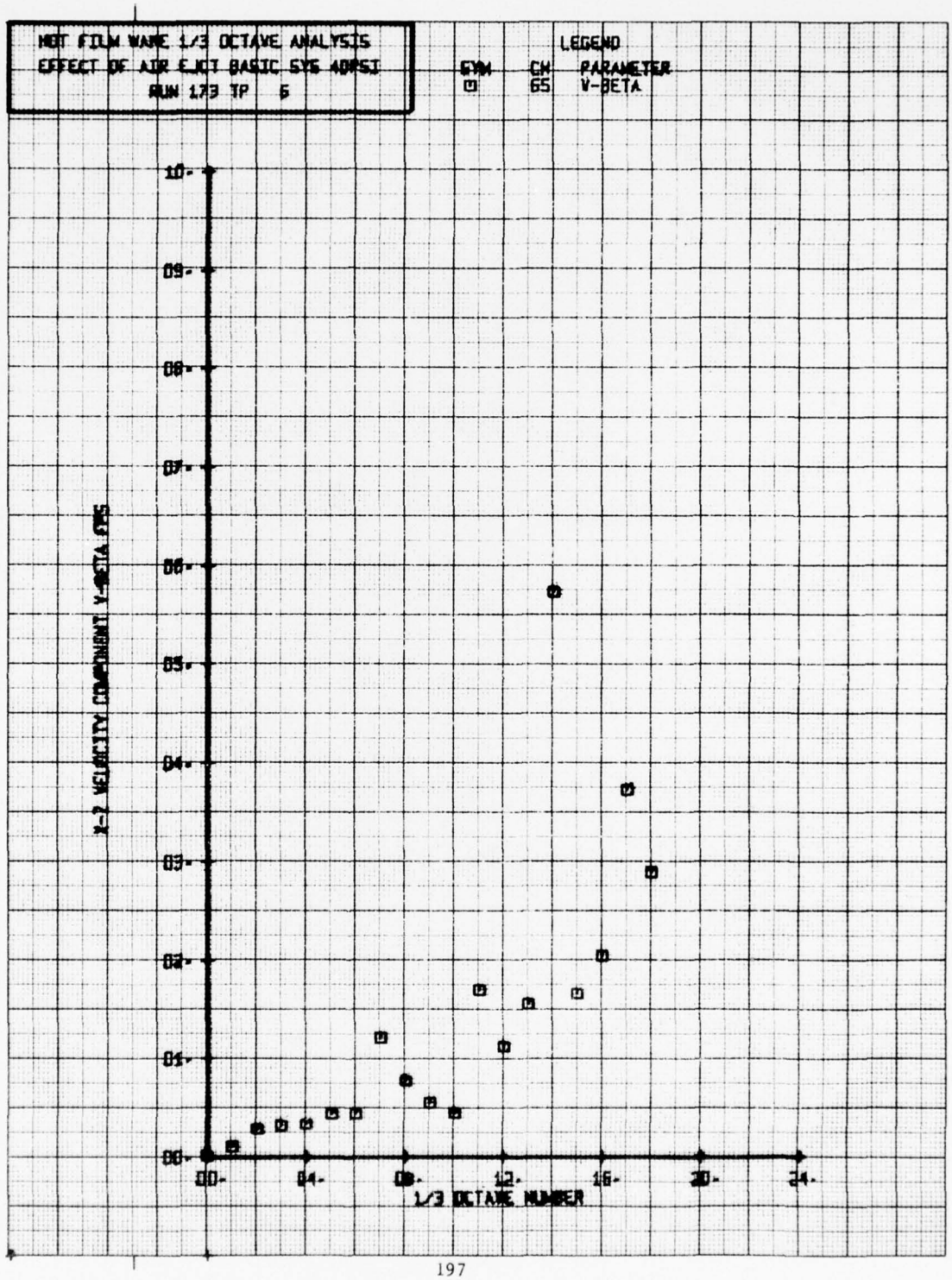
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RUN 173 TP 6
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SYM CH PARAMETER
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X-2 VELOCITY COMPONENT V-BETA CMS
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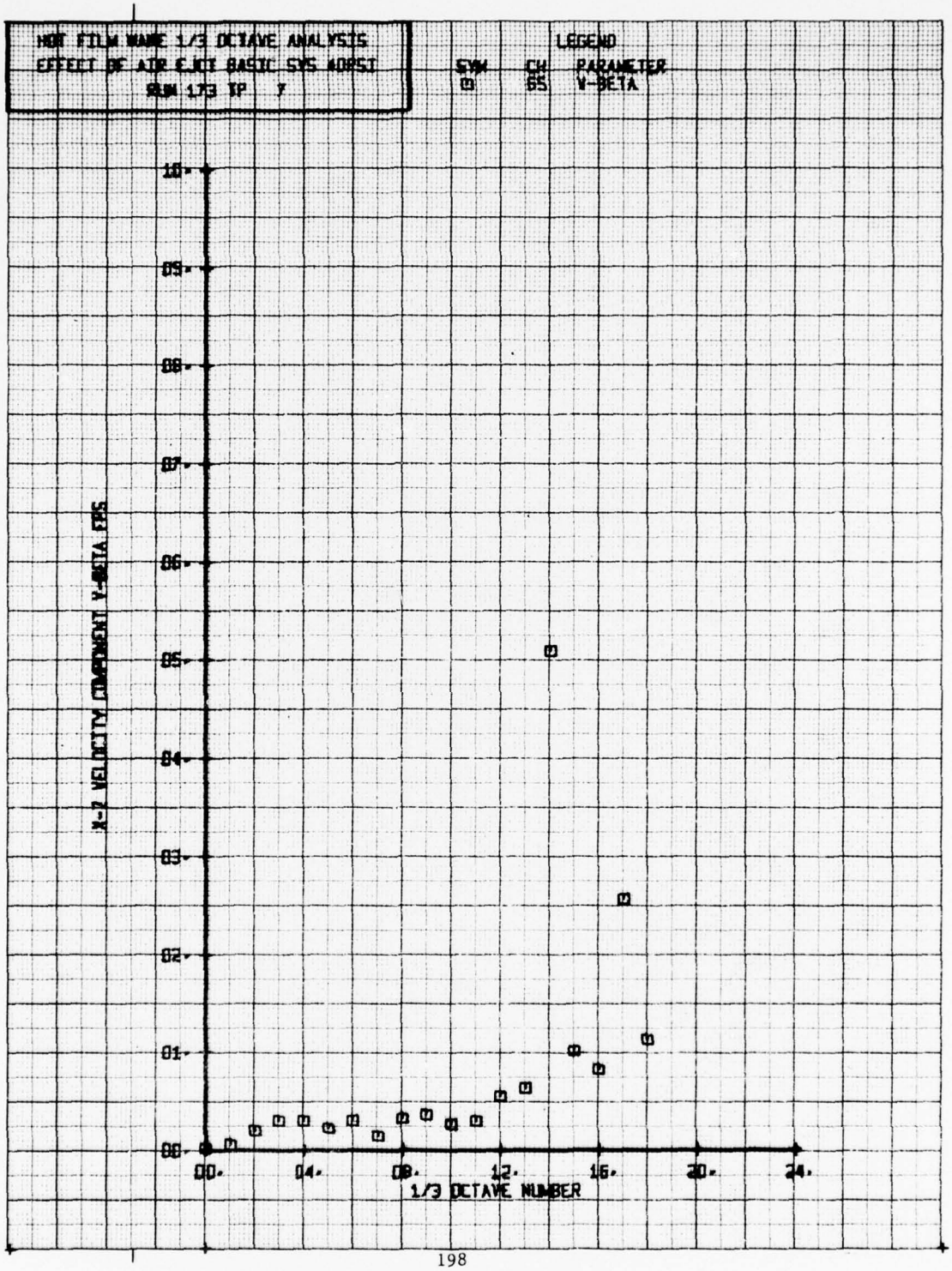
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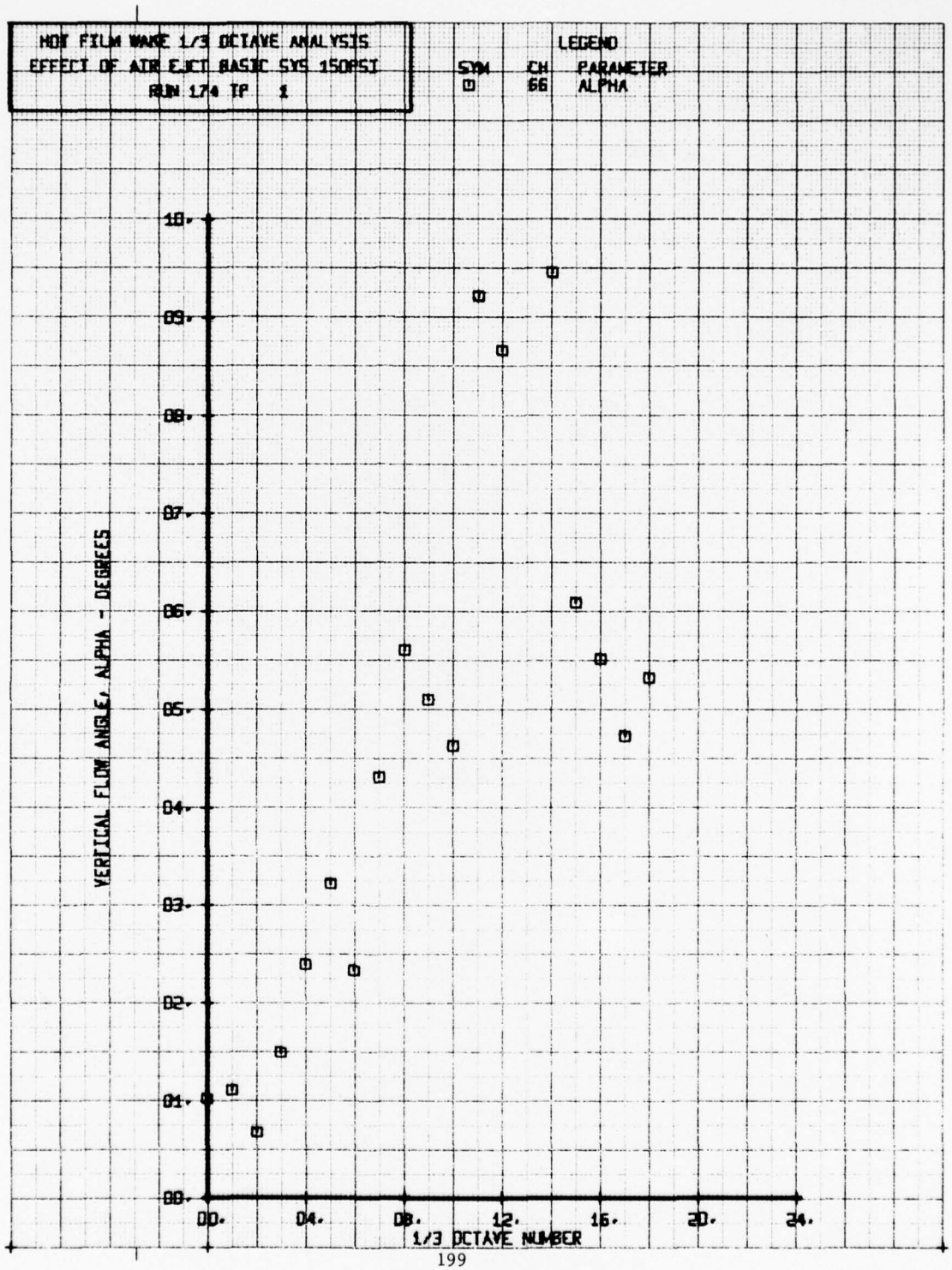
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VERTICAL FLOW ANGLE, ALPHA - DEGREES
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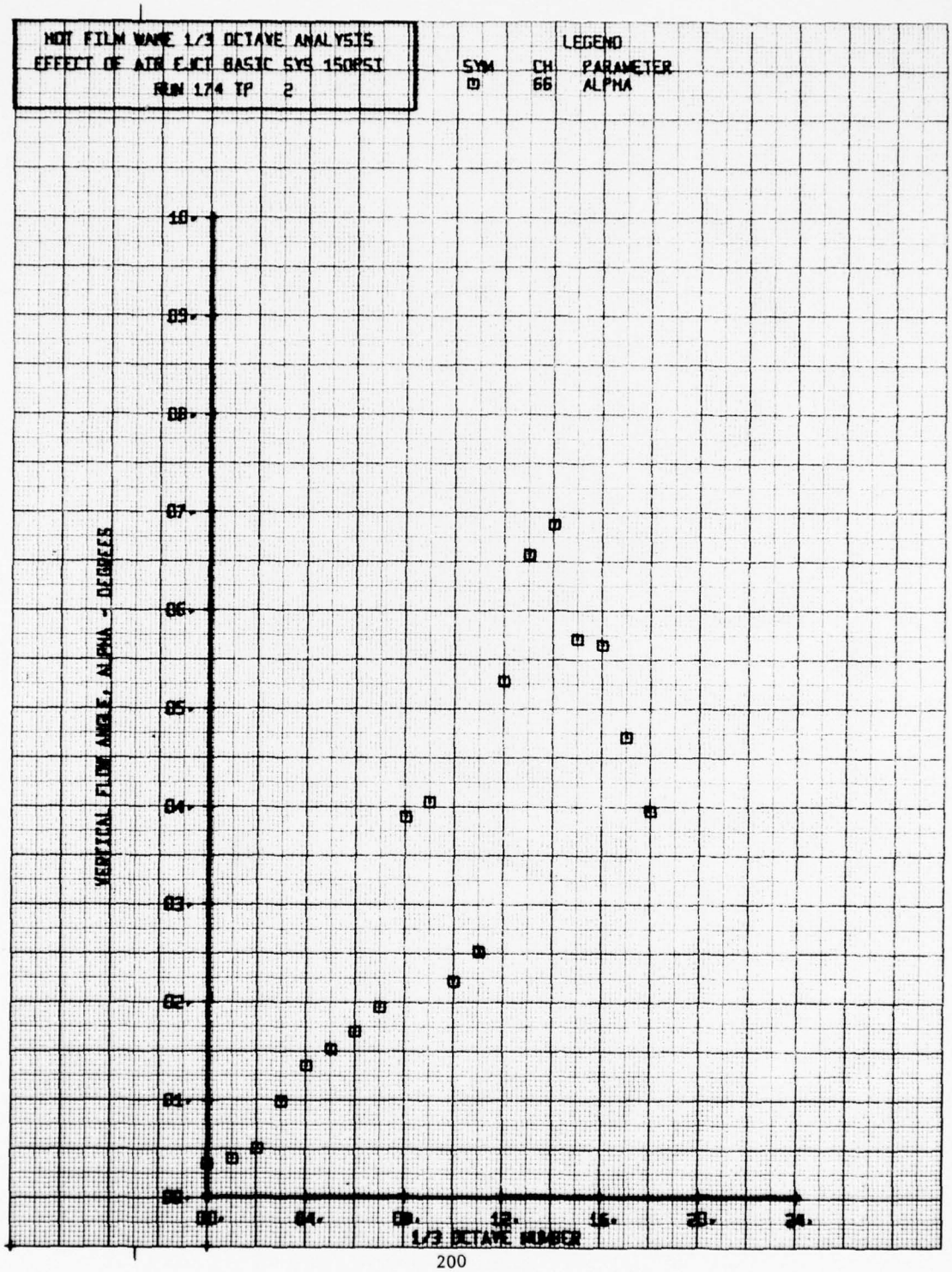
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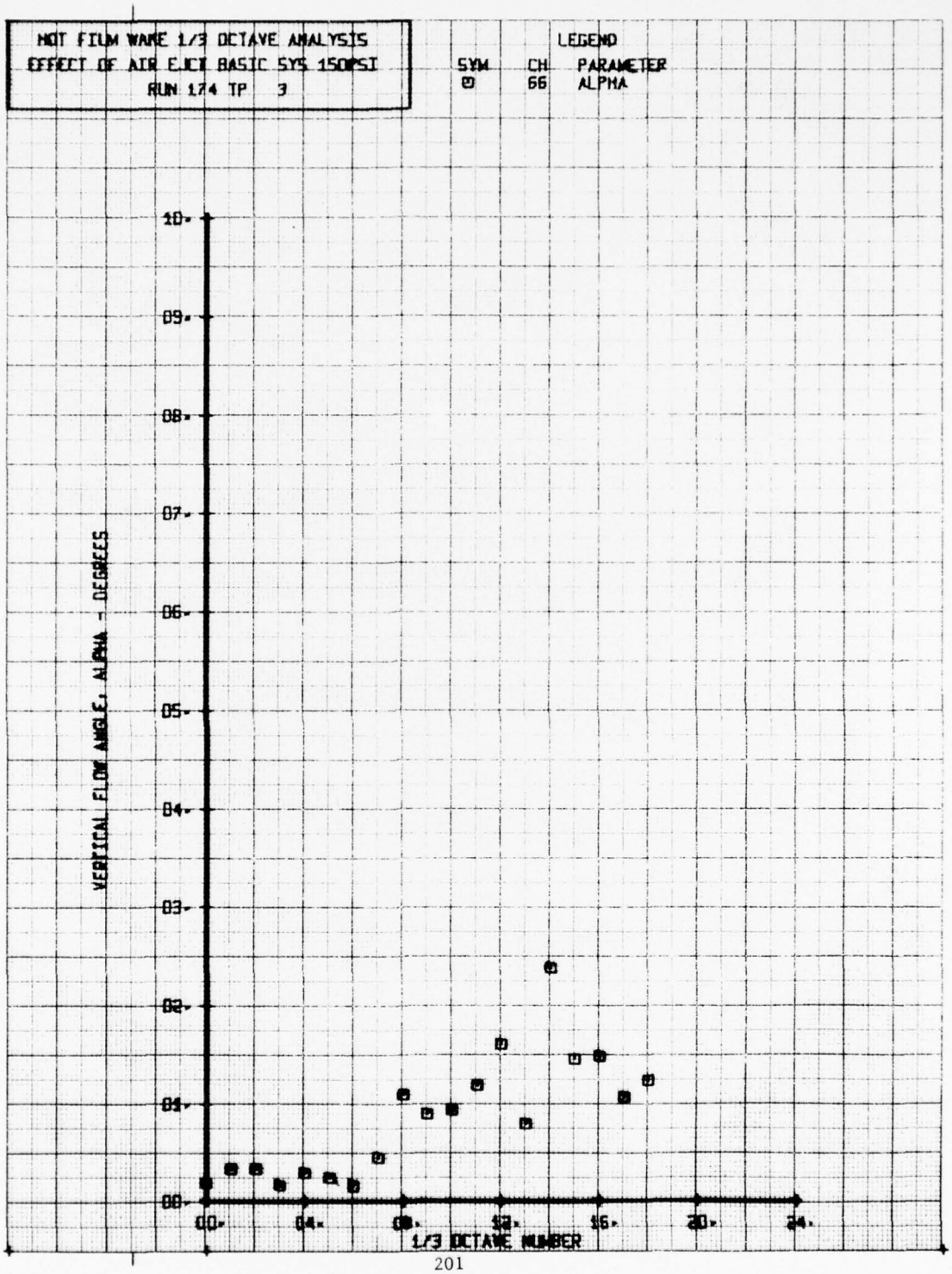
VERTICAL FLOW ANGLE, ALPHA - DEGREES
1/3 OCTAVE NUMBER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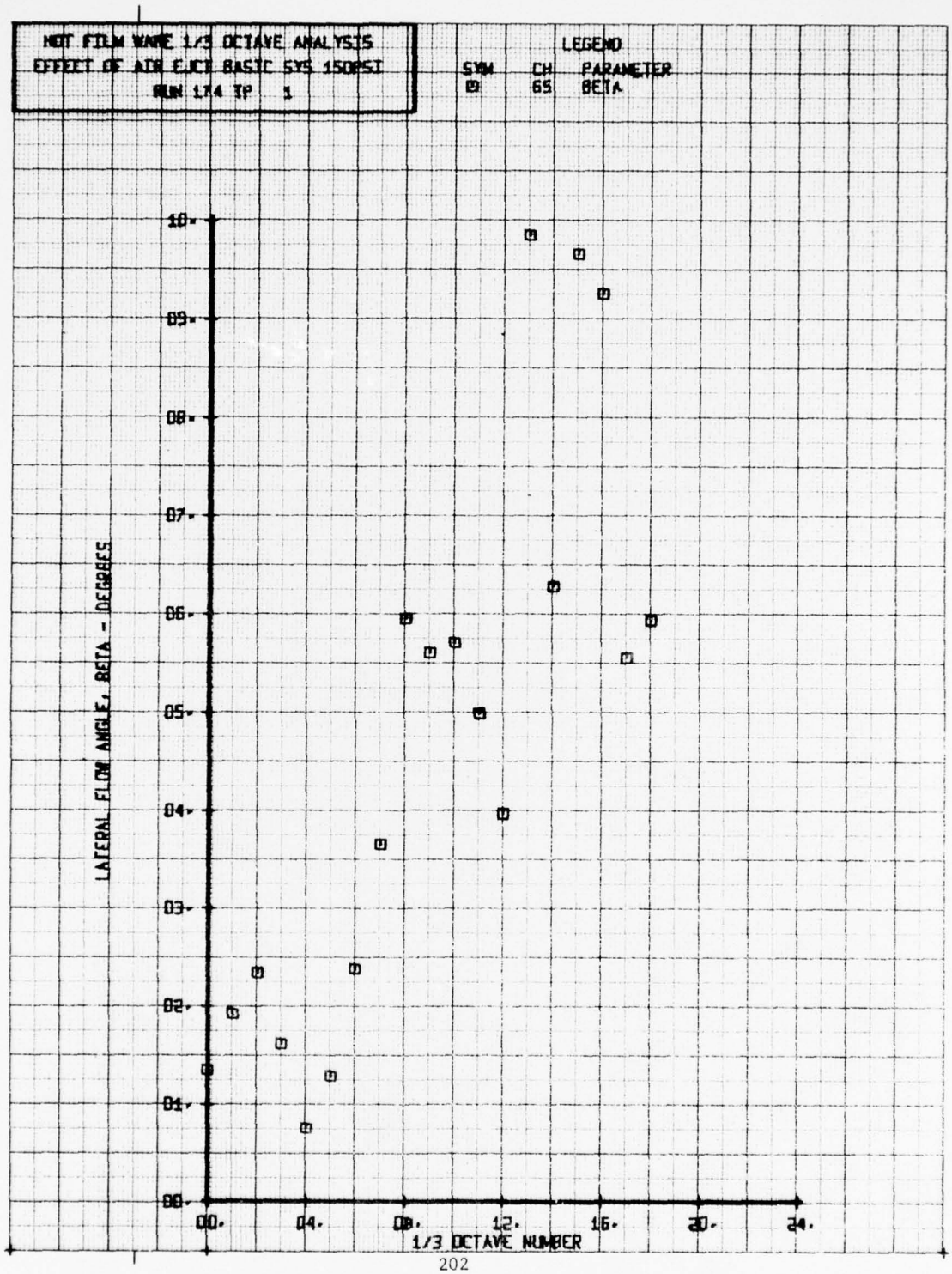
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LATERAL FLOW ANGLE, BETA - DEGREES
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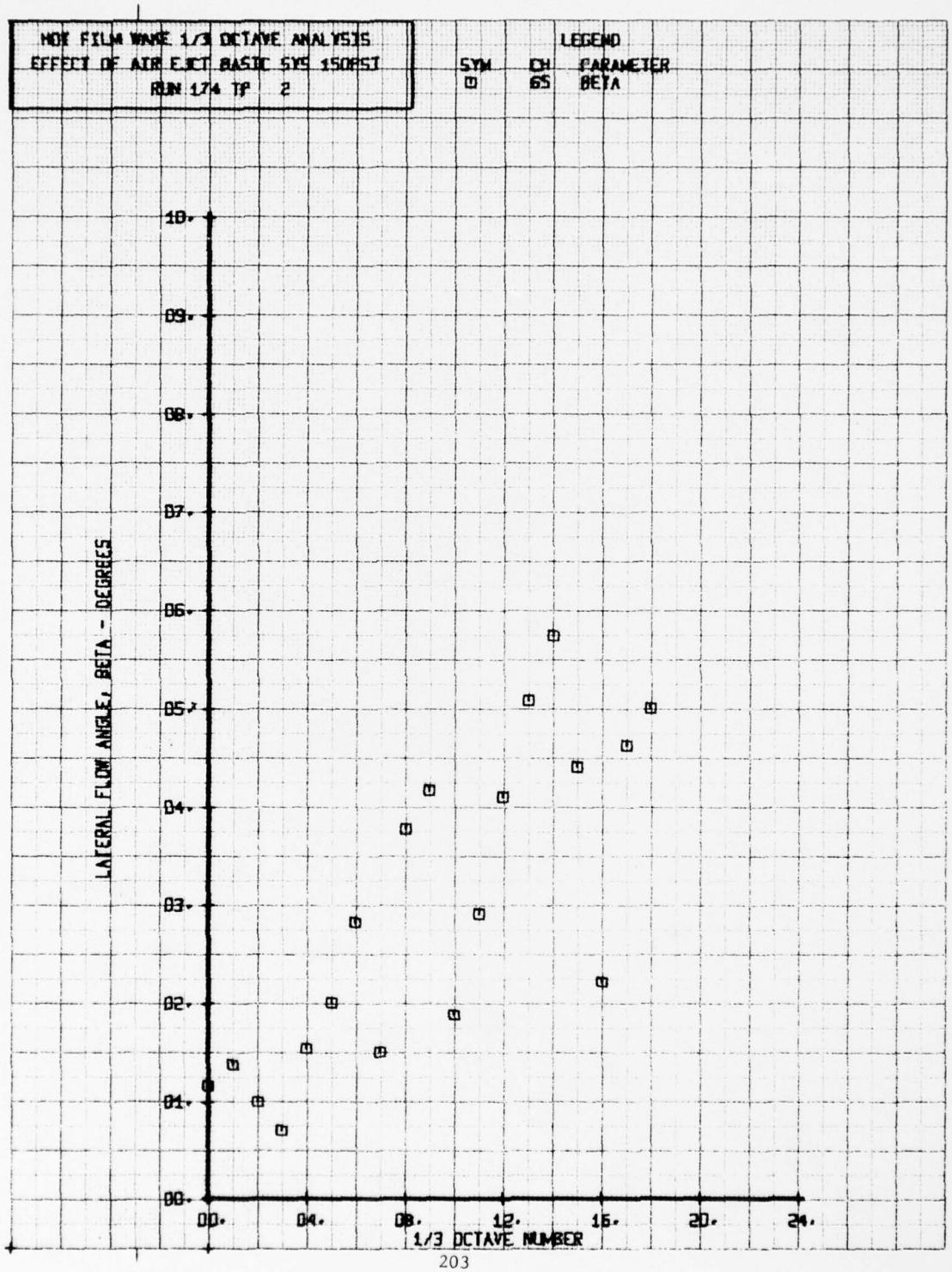
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EFFECT OF AIR EJCT BASIC SYS 150PSI
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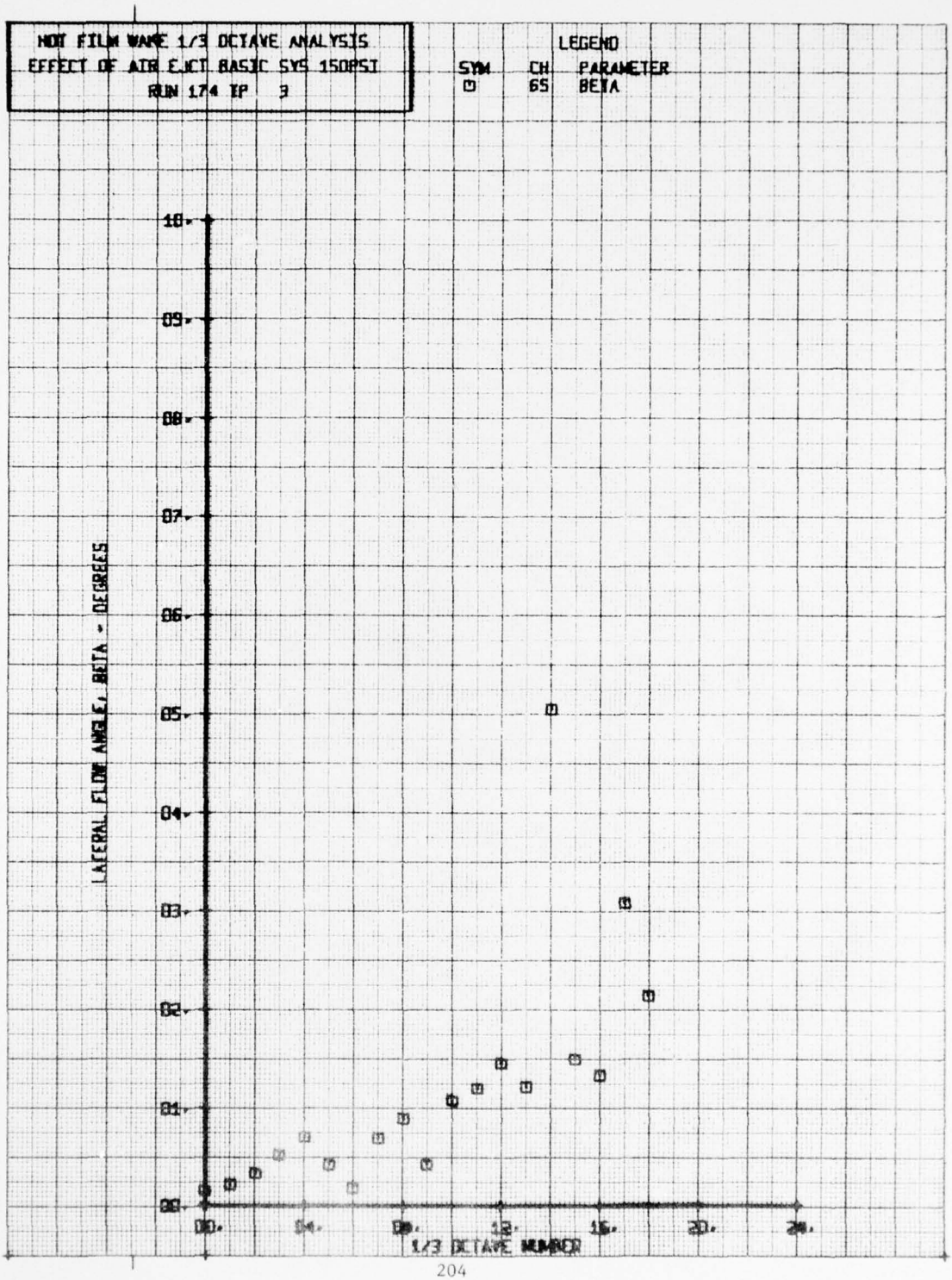
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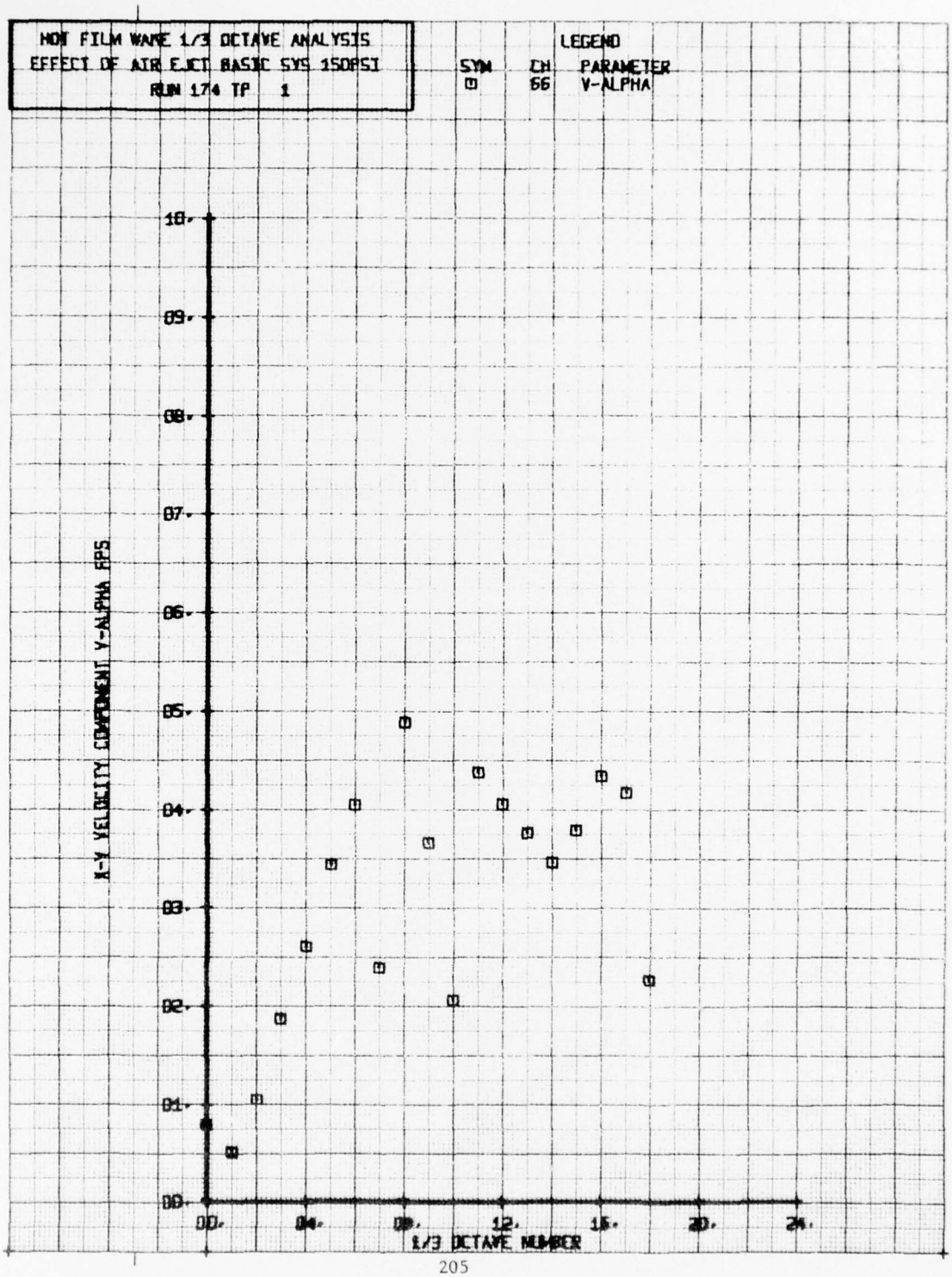
LATERAL FLOW ANGLE, BETA - DEGREES
1/3 OCTAVE NUMBER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X-V VELOCITY COMPONENT V-ALPHA FPS
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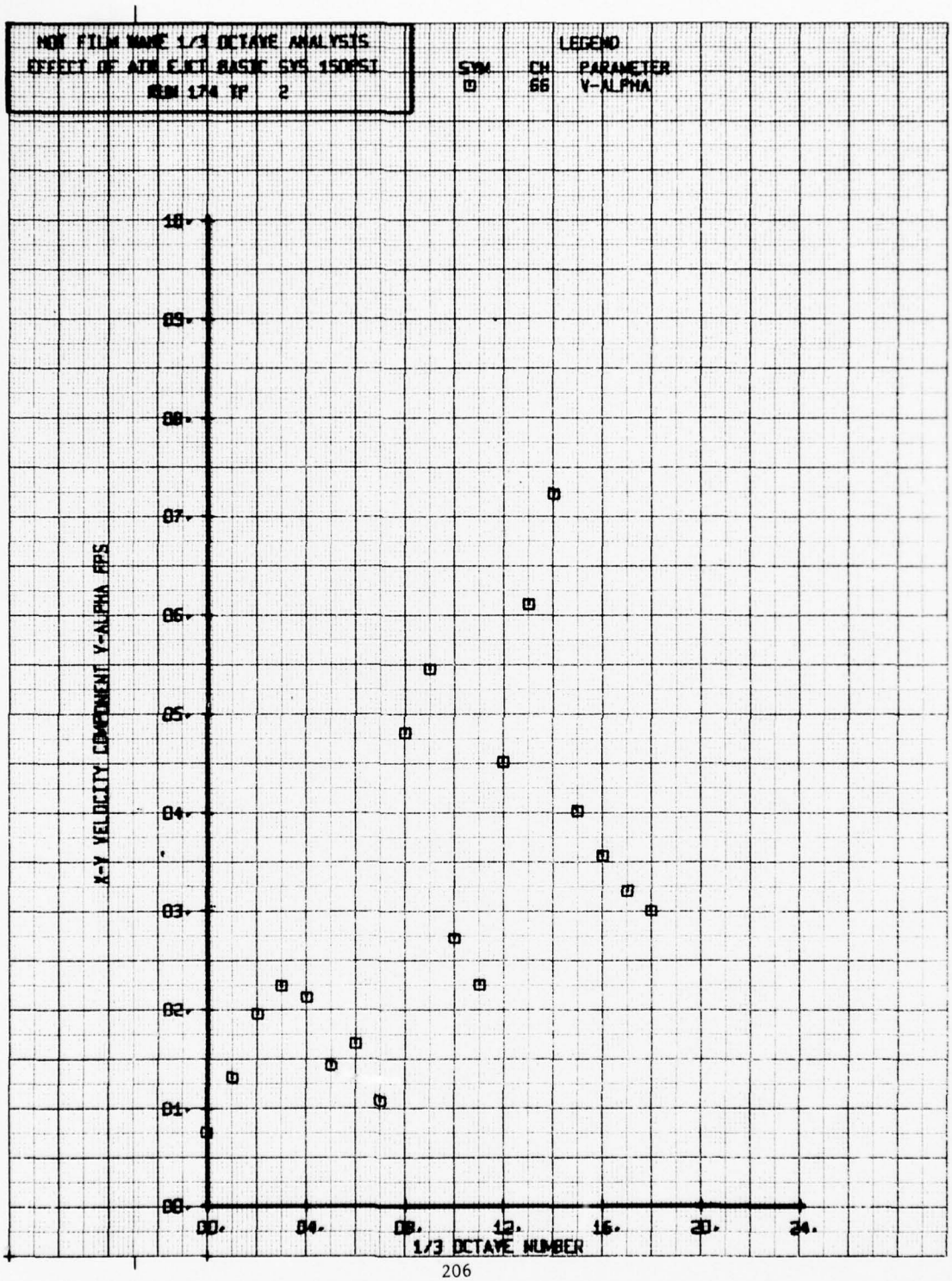
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X-Y VELOCITY COMPONENT V-ALPHA FPS
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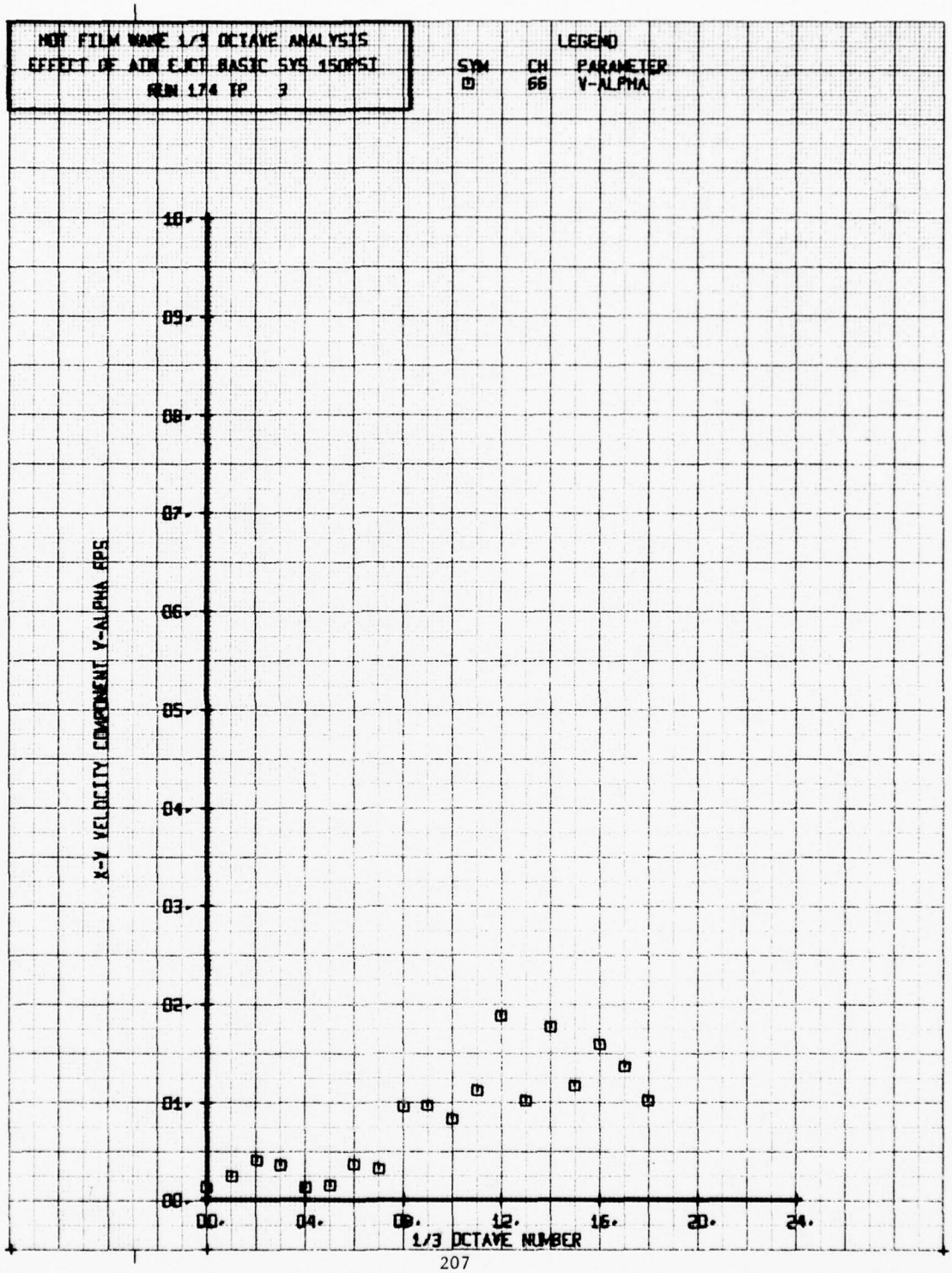
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
EFFECT OF ATM EJCT BASIC SYS 150PSI
RUN 174 TP 3
LEGEND
SYM CH PARAMETER
66 V-ALPHA
X-Y VELOCITY COMPONENT V-ALPHA FPS
1/3 OCTAVE NUMBER
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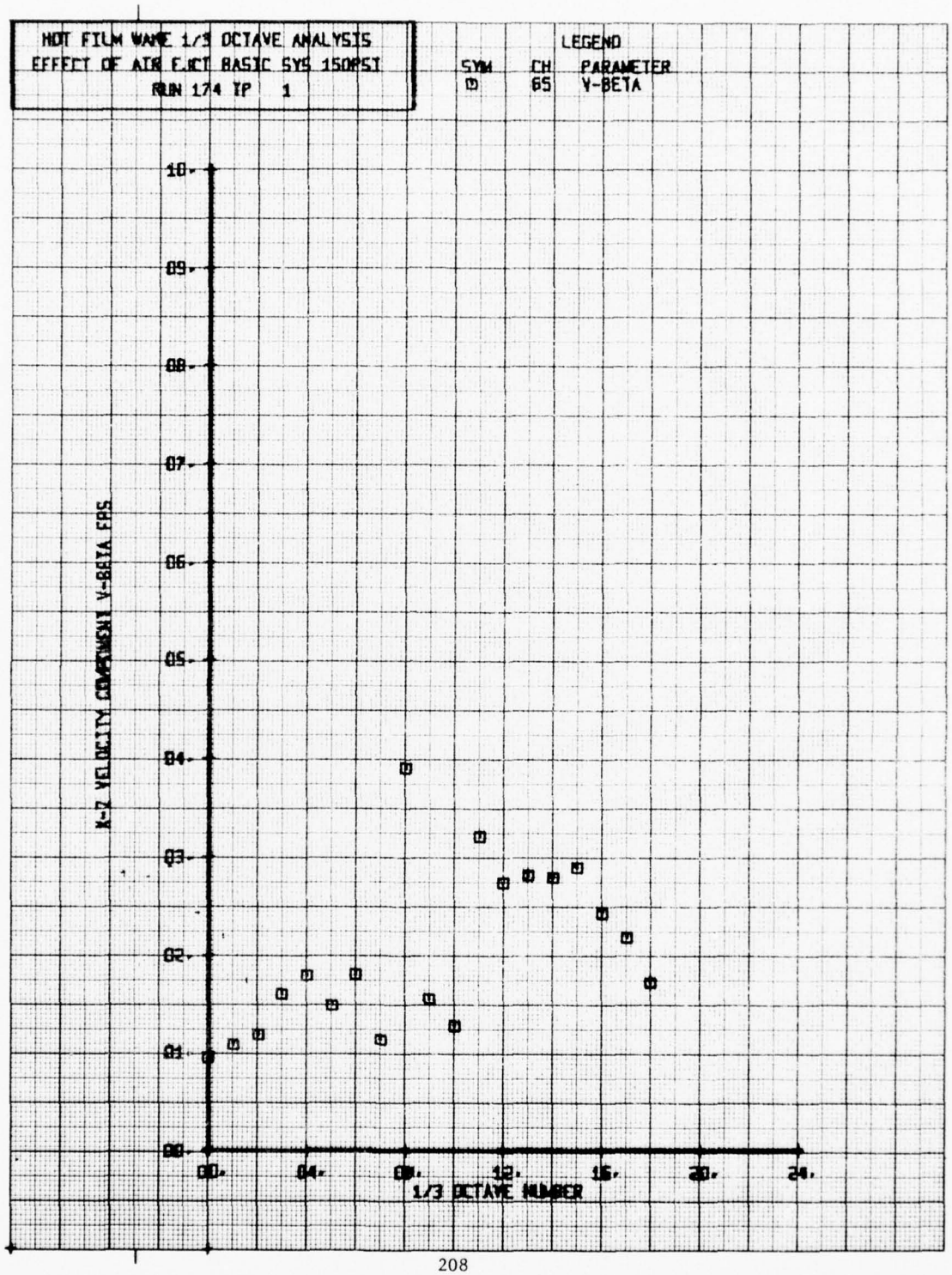
04.
08.
12.
16.
20.
24.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EFFECT OF AIR EJCT BASIC SYS 150PSI
RUN 174 TP 1
LEGEND
SYM CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA FPS
1/3 OCTAVE NUMBER
10.
09.
08.
07.
06.
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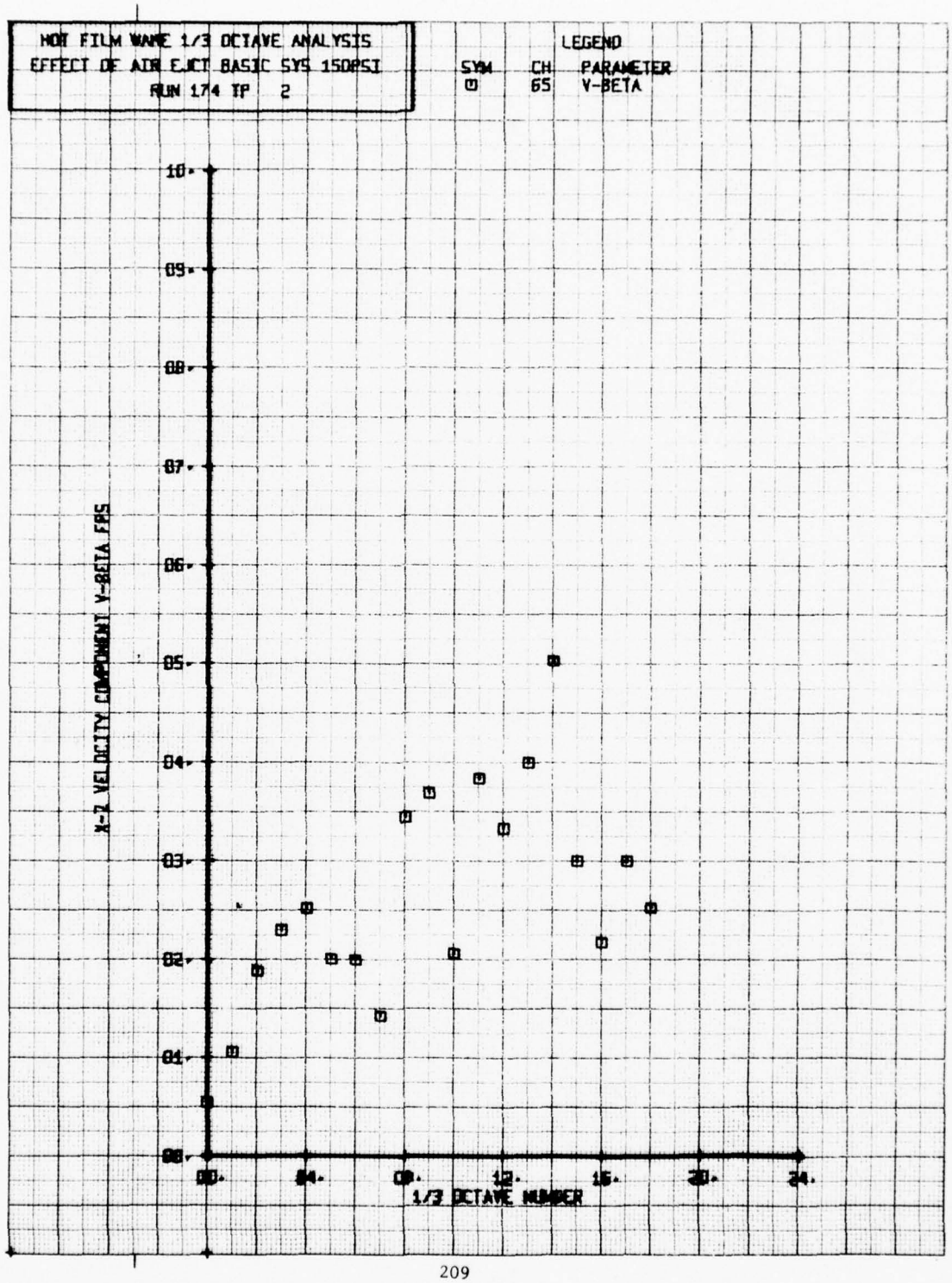
04.
03.
02.
01.
00.
00.
04.
08.
12.
16.
20.
24.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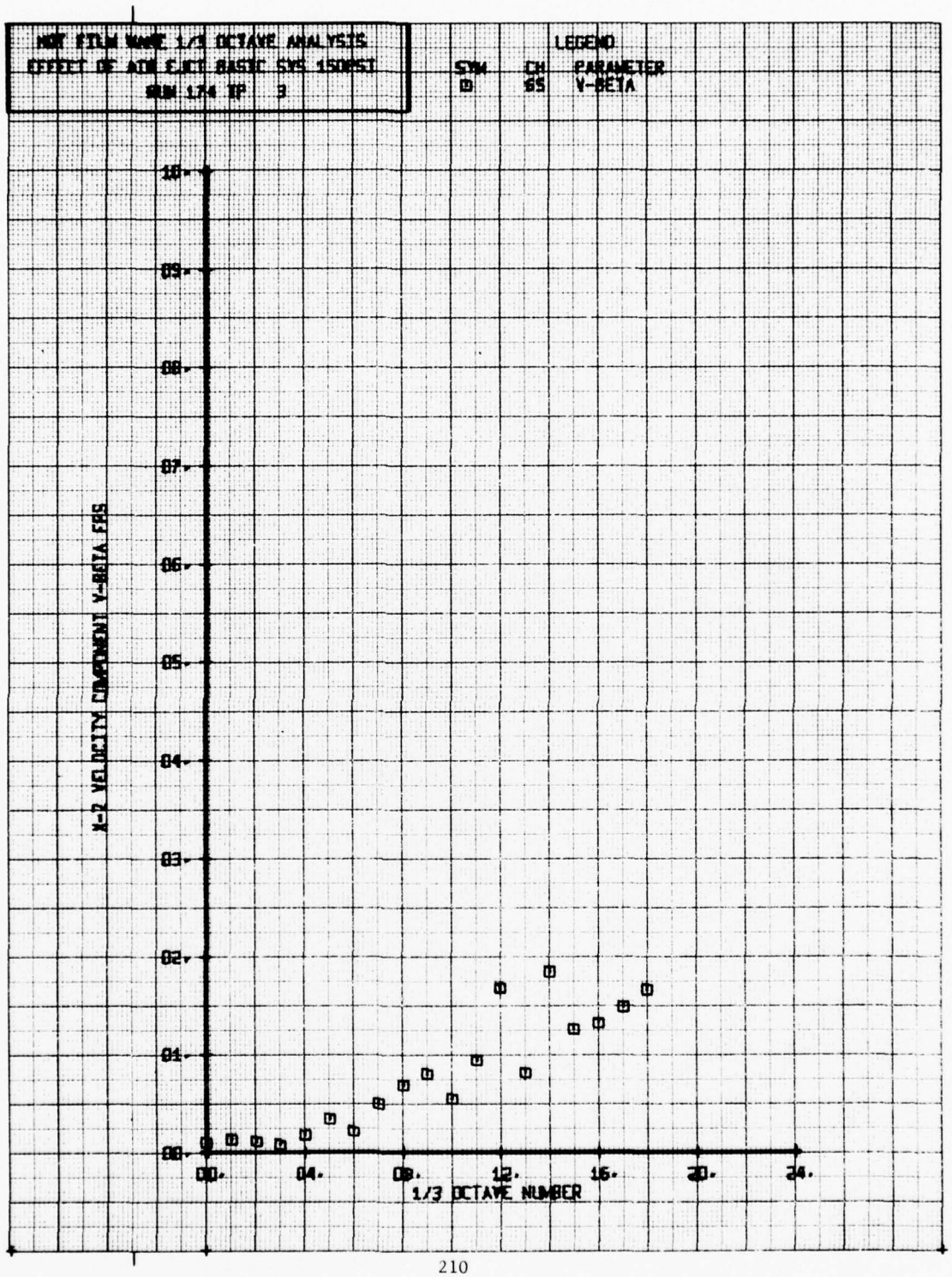
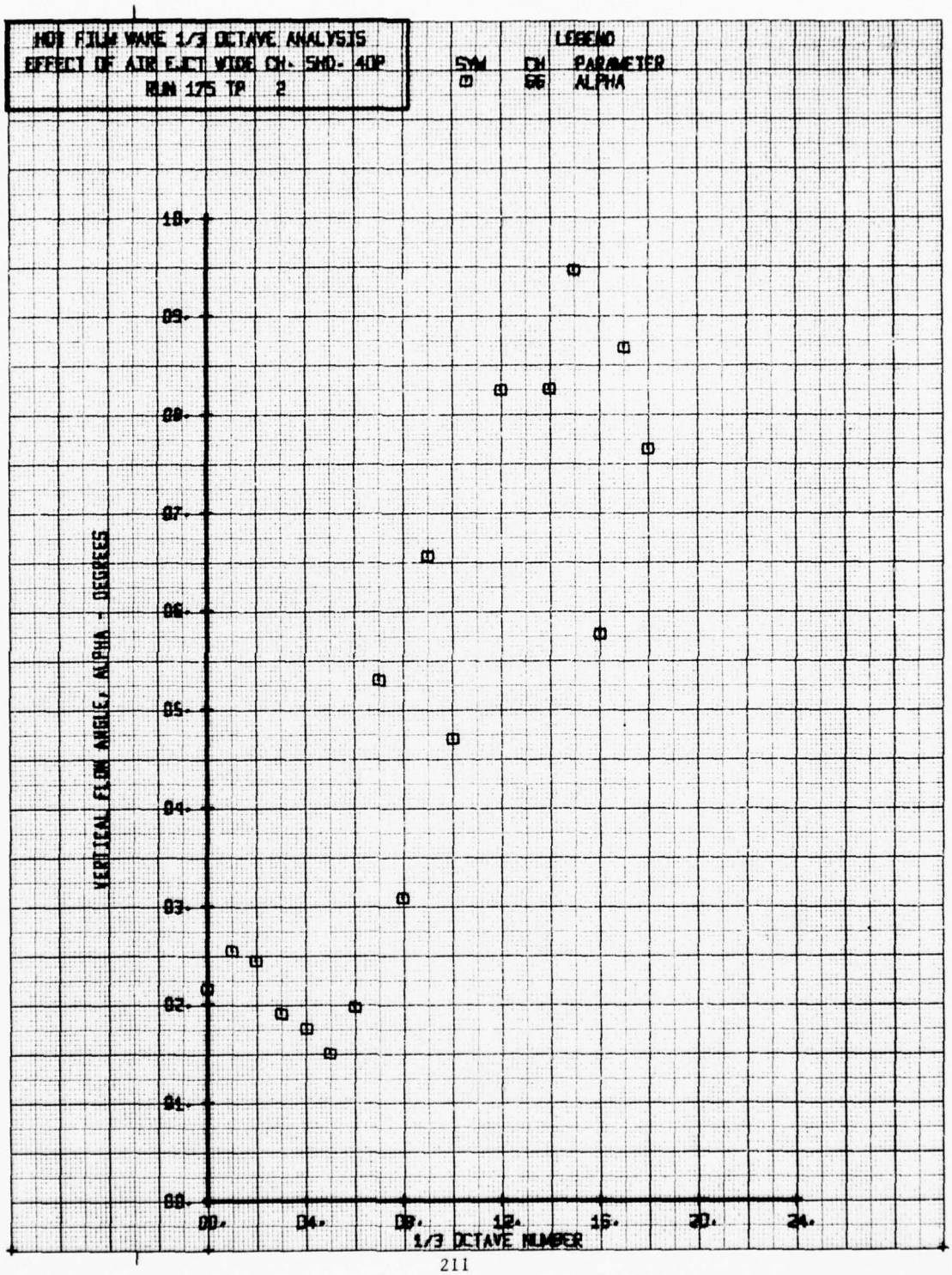
EFFECT OF AIR EJCT BASIC SYS 150PSI
RUN 174 TP 2
LEGEND
SYM CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA FPS
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
EFFECT OF ATM EJCT BASIC SYS 150MSI
RUN 174 TP 3
LEGEND
SYM CH PARAMETER
65 V-BETA
10.
09.
08.
07.
06.
05.
04.
03.
02.
01.
00.
X-2 VELOCITY COMPONENT V-BETA FPS
00.
04.
08.
12.
16.
20.
24.
1/3 OCTAVE NUMBER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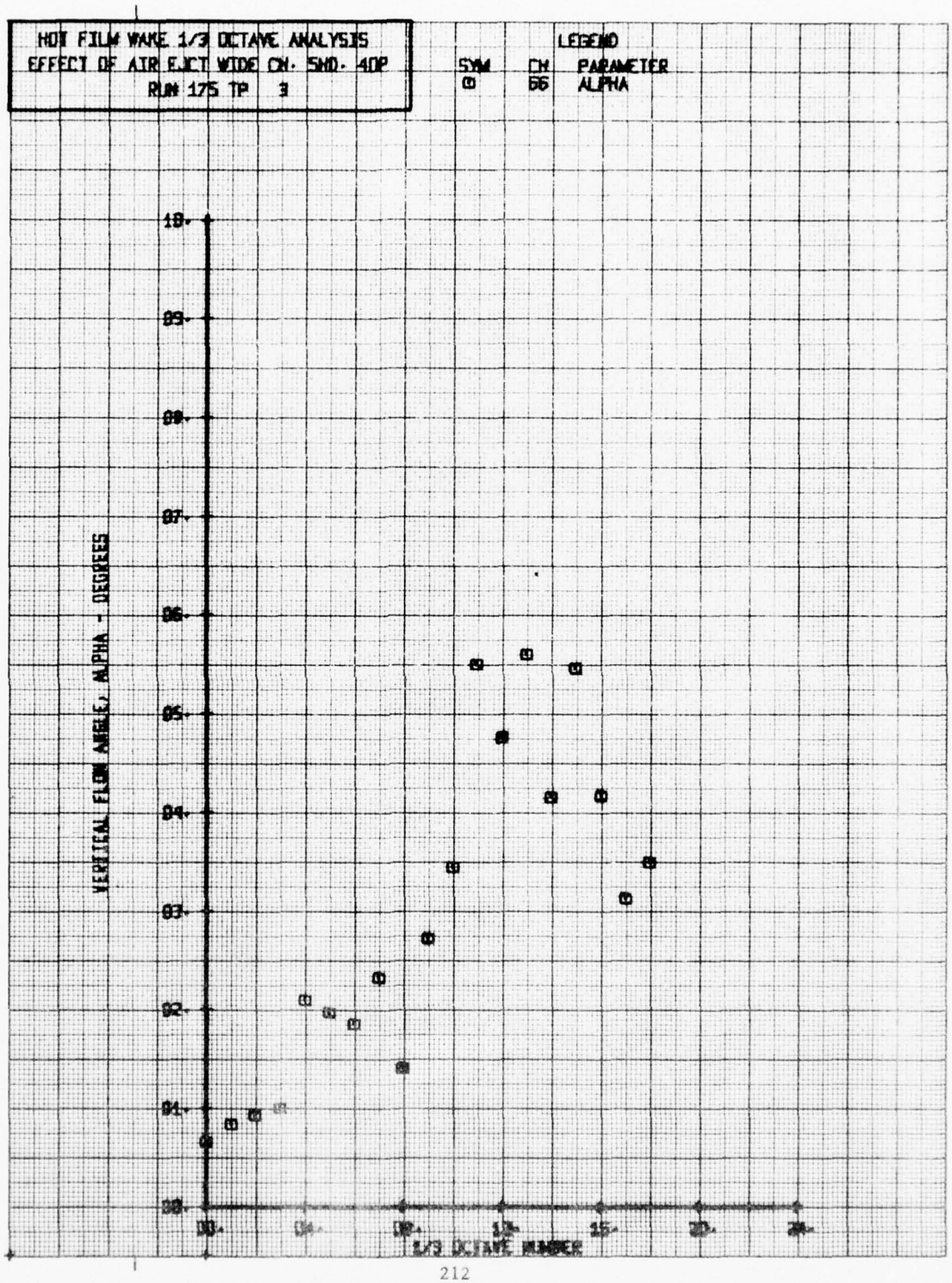
EFFECT OF AIR EJCT WIDE CH. SHD. 40P
RUN 175 TP 2
LEGEND
SYM CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
1/3 OCTAVE NUMBER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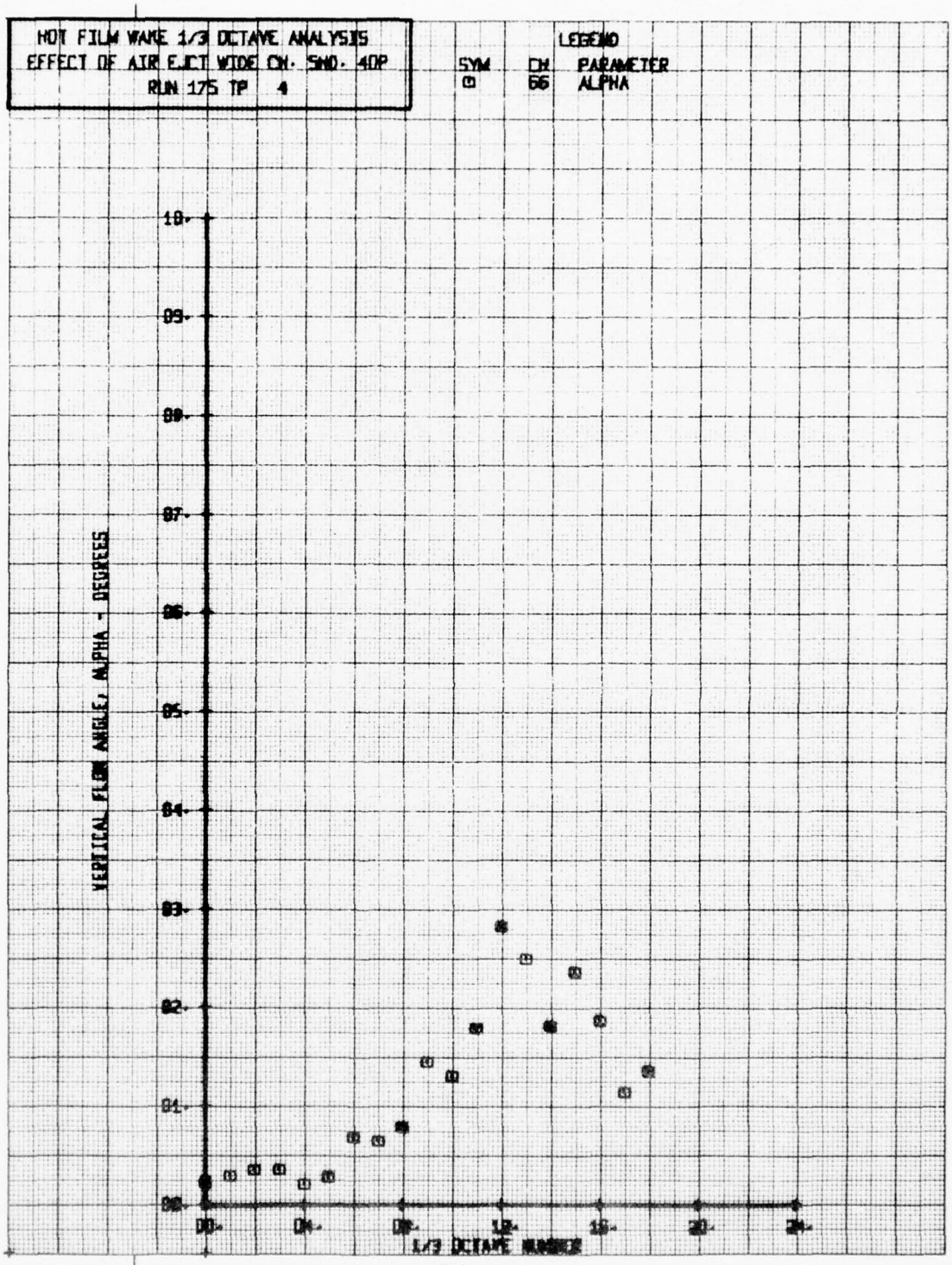
EFFECT OF AIR EJCT WIDE CH. SND. 40P
RUN 175 TP 3
LEGEND
SYM CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
1/3 OCTAVE NUMBER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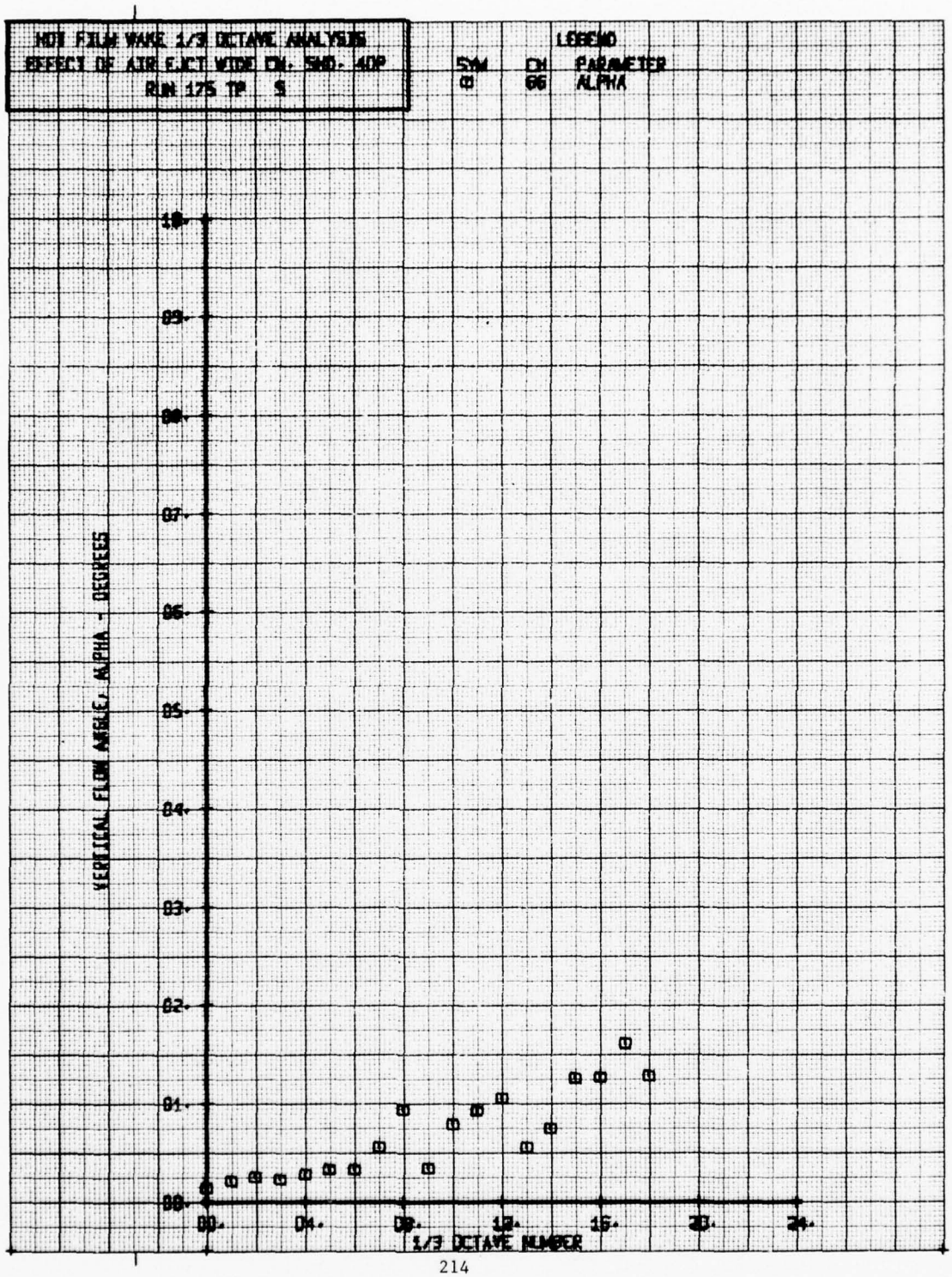
EFFECT OF AIR EJCT WIDE CH. SNO. 40P
RUN 175 TP 4
LEGEND
SYM CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
1/3 OCTAVE NUMBER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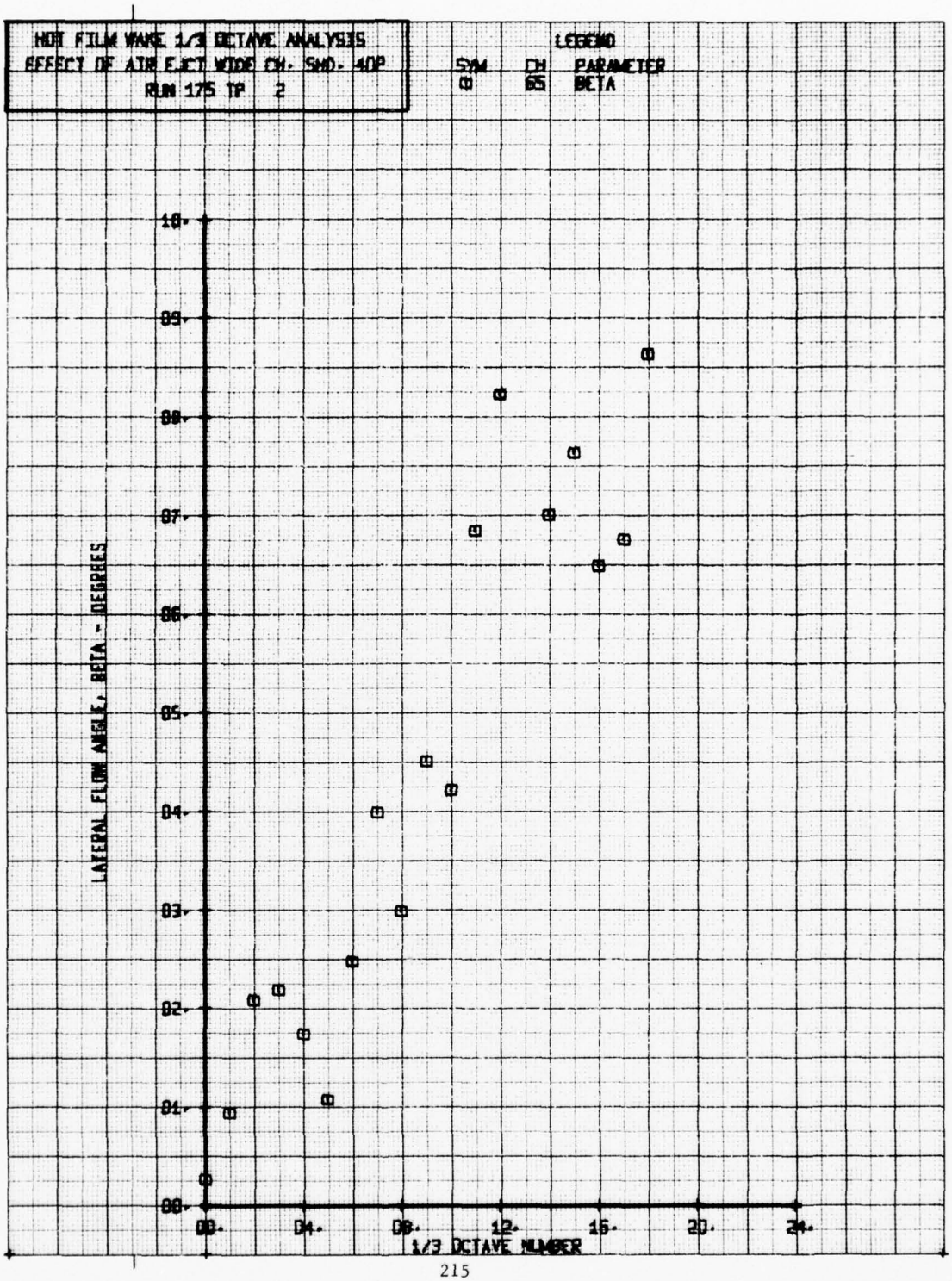
EFFECT OF AIR EJCT WIDE CH. SWD. 40P
RUN 175 TP 5
LEGEND
SYM CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
1/3 OCTAVE NUMBER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EFFECT OF AIR EJCT WIDE CH. SWD- 40P
RUN 175 TP 2
LEGEND
SYM CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
1/3 OCTAVE NUMBER
10.
09.
08.
07.
06.
05.
04.
03.
02.
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04.
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12.
16.
20.
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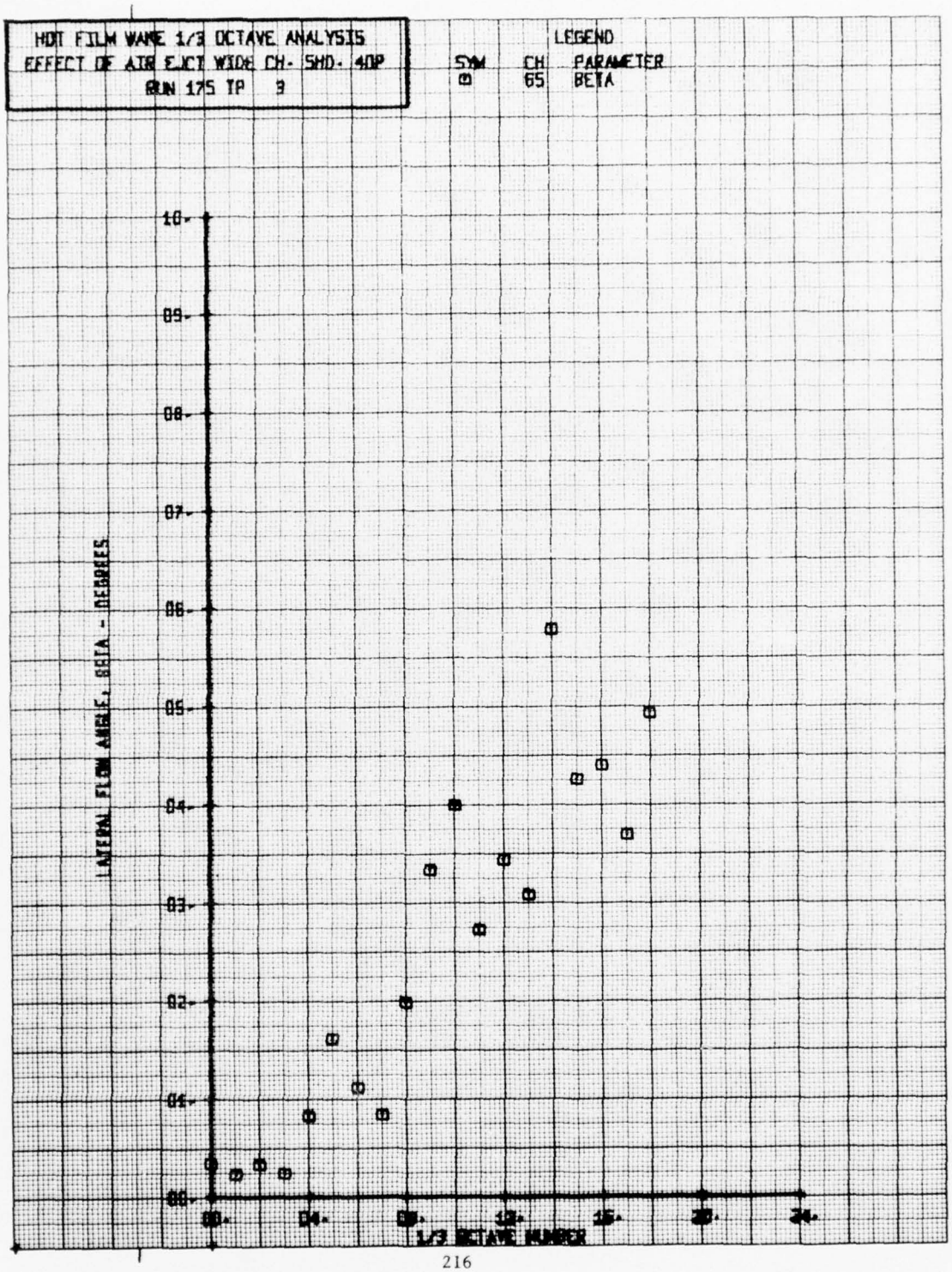
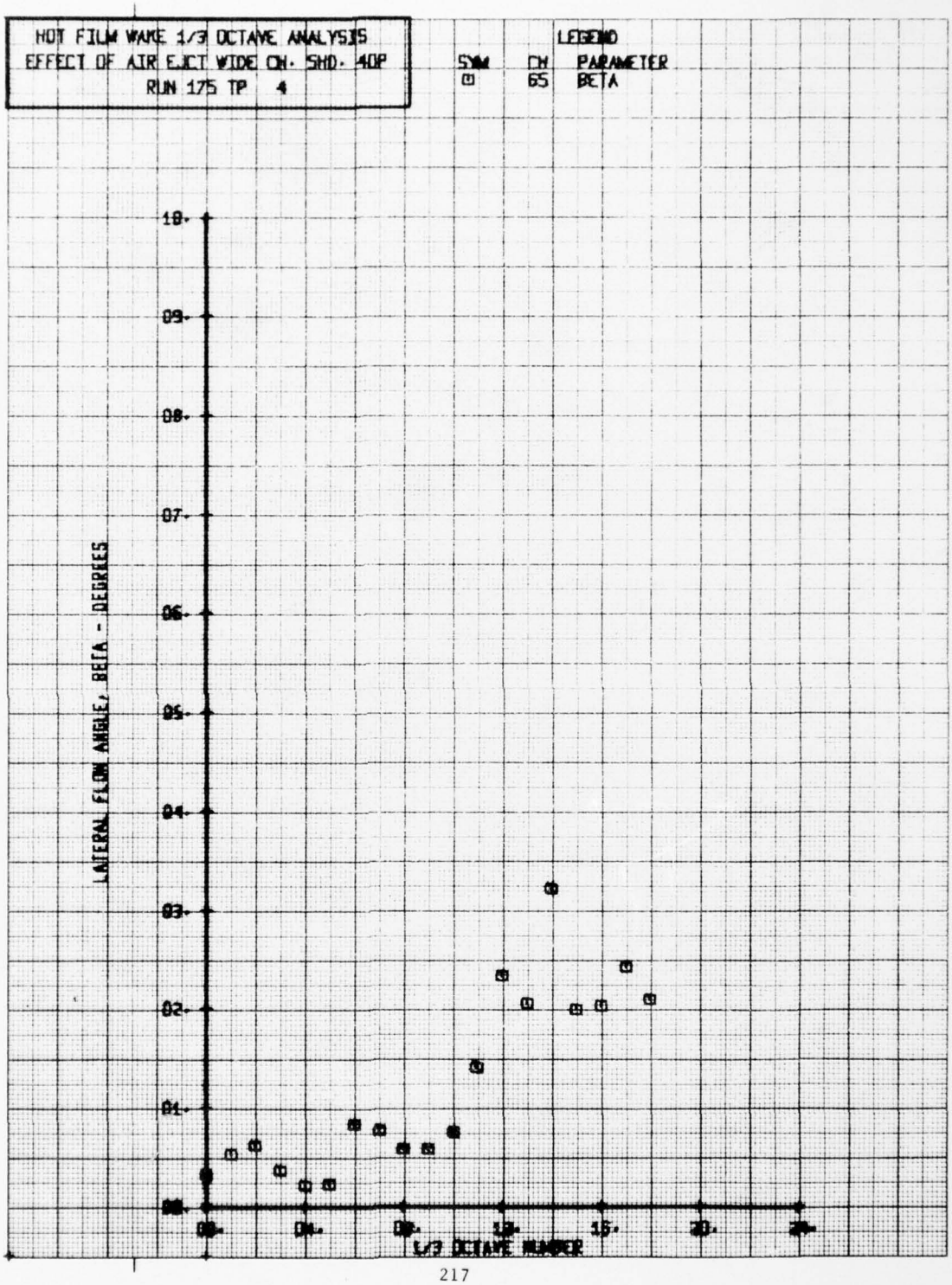
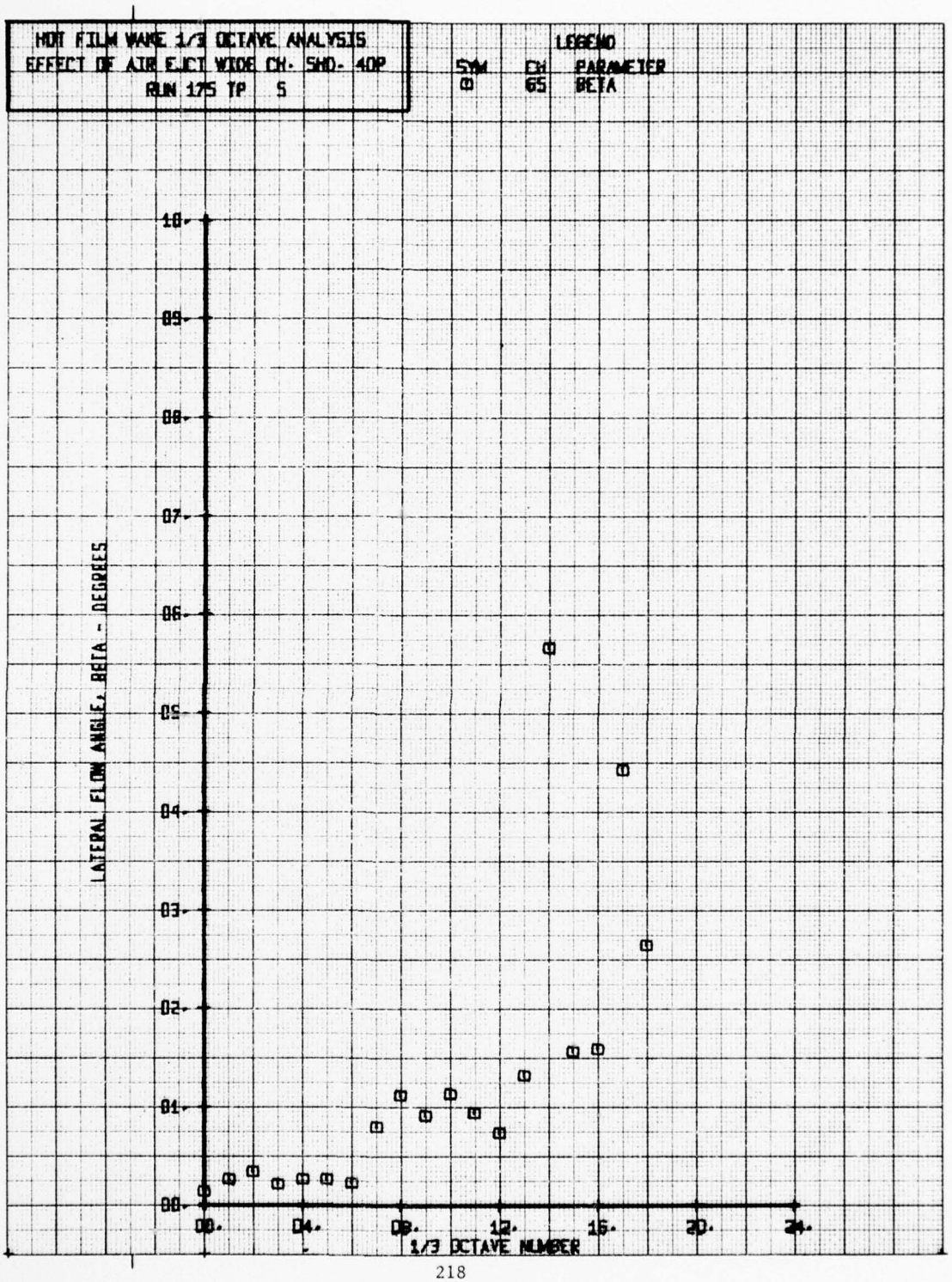

HOT FILM WAKE 1/3 OCTAVE ANALYSIS
EFFECT OF AIR EJCT WIDE CH- SHD- 40P
RUN 175 TP 3
LEGEND
SYM CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
EFFECT OF AIR EJCT WIDE CH. SHD. 40P
RUN 175 TP 4
LEGEND
SYM CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
EFFECT OF AIR EJCT WIDE CH- SHD- 40P
RUN 175 TP 5
LEGEND
SYM CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
10.
09.
08.
07.
06.
05.
04.
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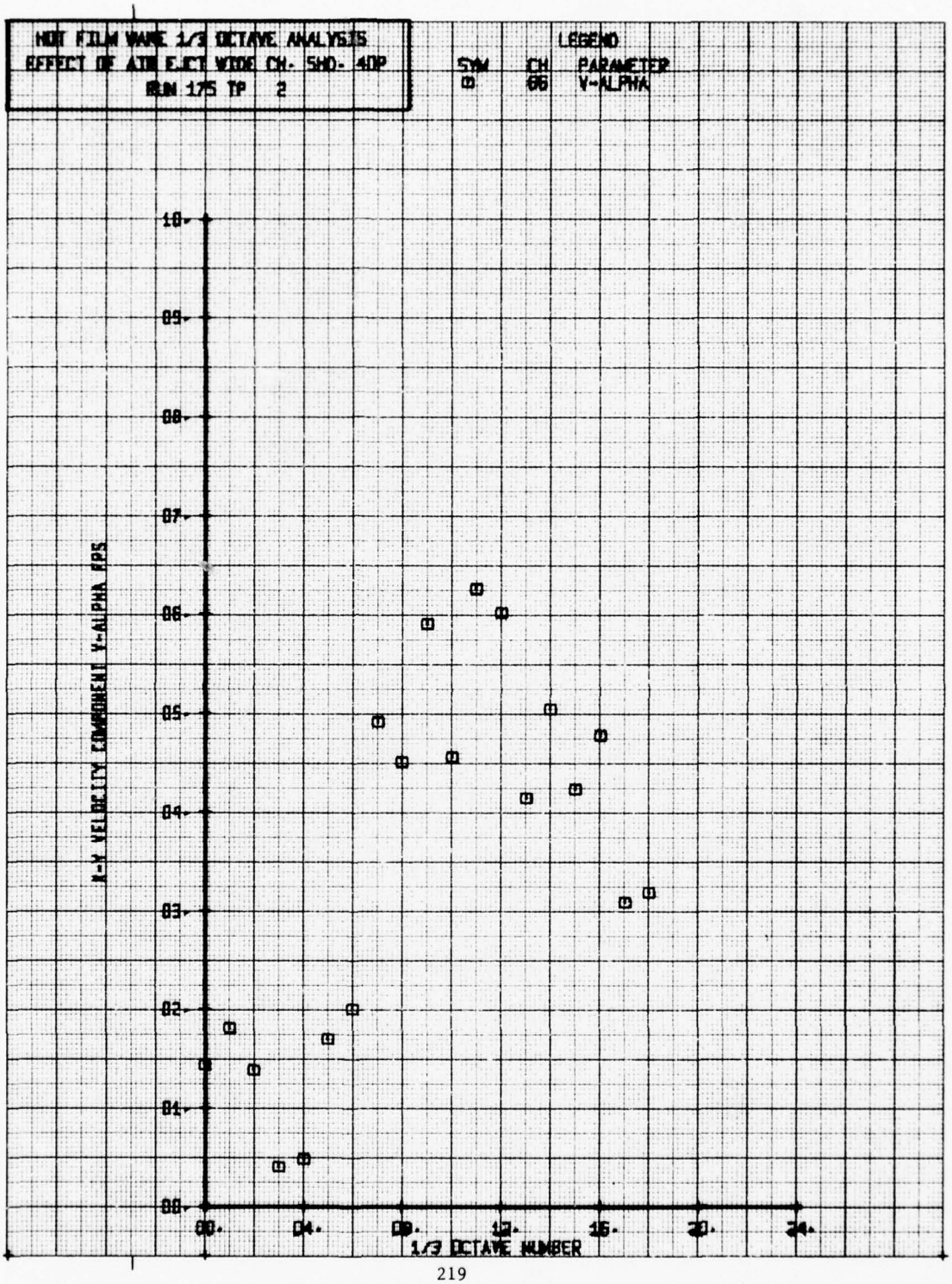
16.
20.
24.
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
EFFECT OF ATM EJCT WIDE CH- SHO- 40P
RUN 175 TP 2
LEGEND
SYM CH PARAMETER
66 V-ALPHA
10.
09.
08.
07.
06.
05.
04.
03.
02.
01.
00.
X-Y VELOCITY COMPONENT Y-ALPHA FPS
00.
04.
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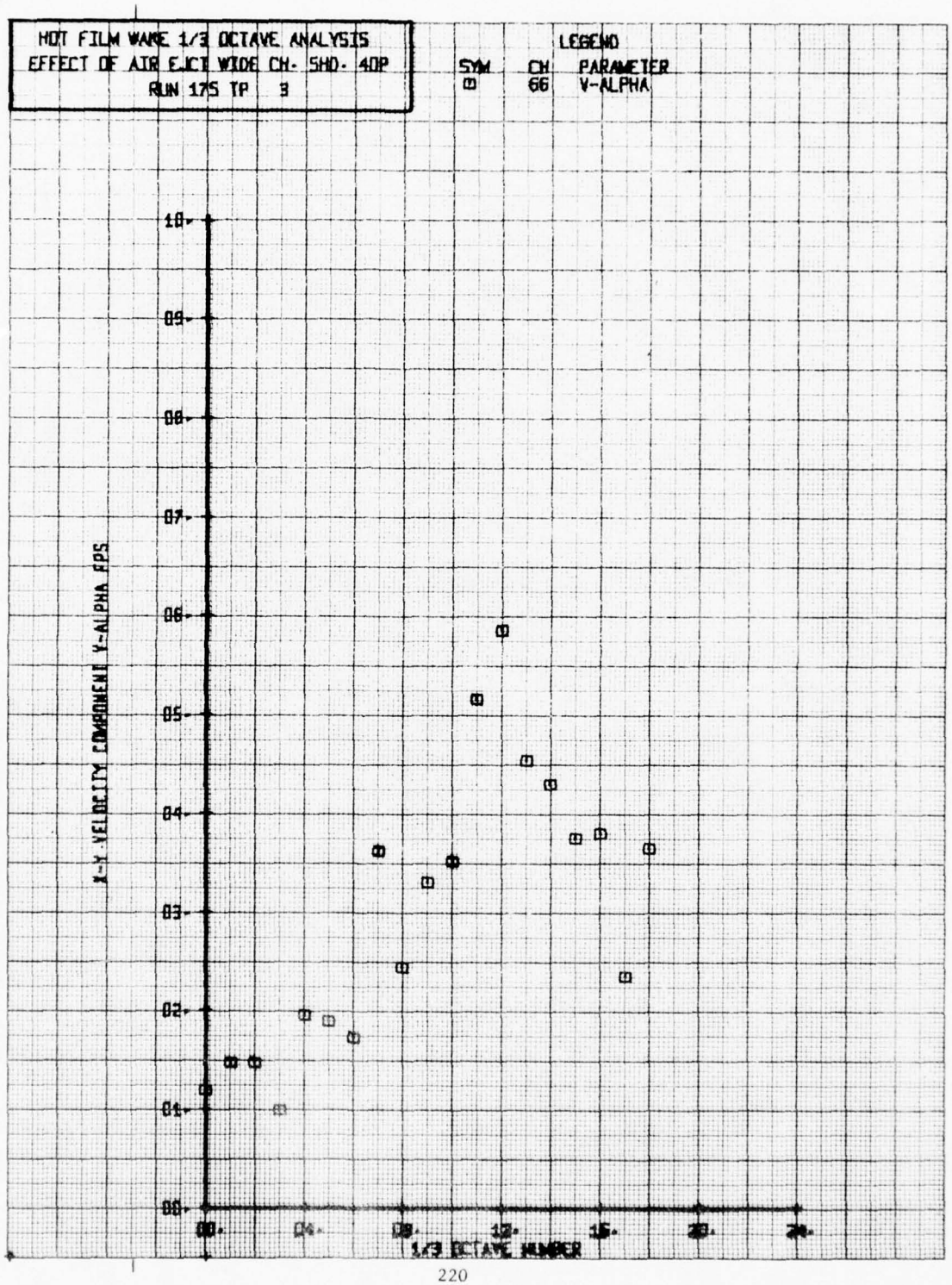
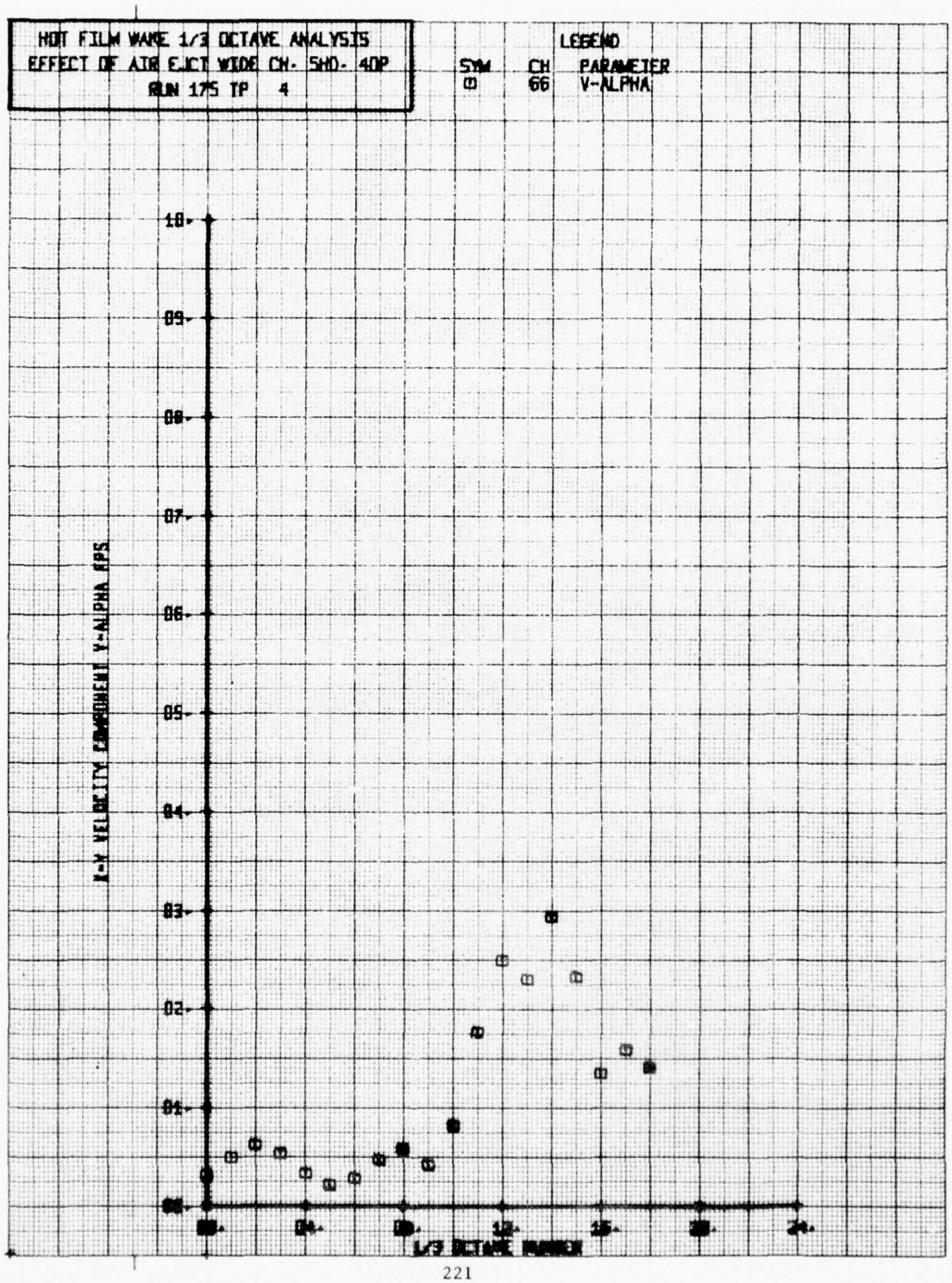
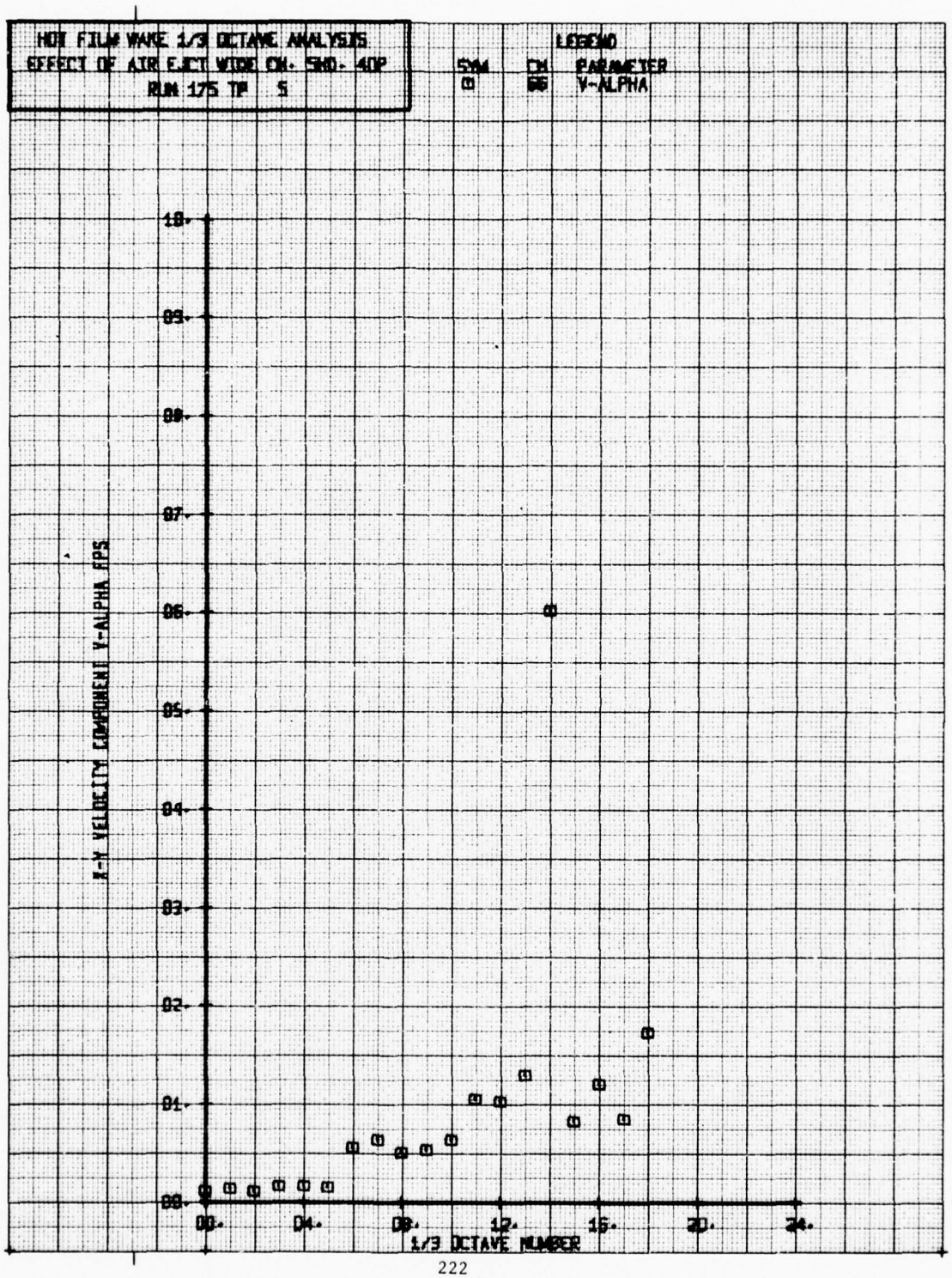
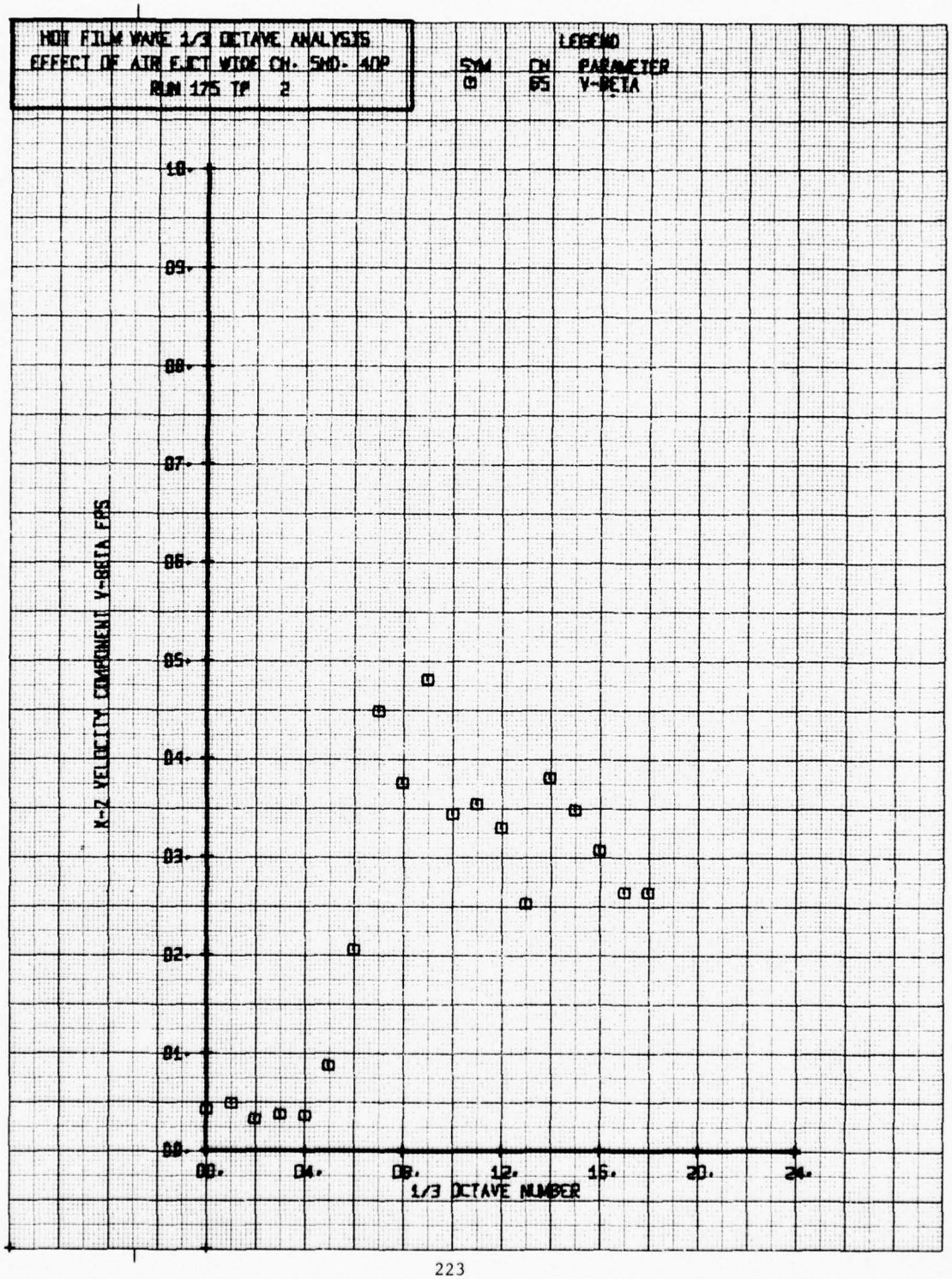
12.
16.
20.
24.
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
EFFECT OF AIR EJCT WIDE CH- SHD- 40P
RUN 175 TP 3
LEGEND
SYM CH PARAMETER
66 V-ALPHA
X-Y VELOCITY COMPONENT V-ALPHA FPS
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
EFFECT OF AIR EJCT WIDE CH. SHO. 40P
RUN 175 TP 4
LEGEND
SYM CH PARAMETER
66 V-ALPHA
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0.0
0.4
0.8
1.2
1.6
2.0
2.4
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
EFFECT OF AIR EJCT WIDE CH. SWD. 40P
RUN 175 TP 5
LEGEND
SYM CH PARAMETER
V-ALPHA
10.
09.
08.
07.
06.
05.
04.
03.
02.
01.
00.
X-Y VELOCITY COMPONENT V-ALPHA FPS
00.
04.
08.
12.
16.
20.
24.
1/3 OCTAVE NUMBER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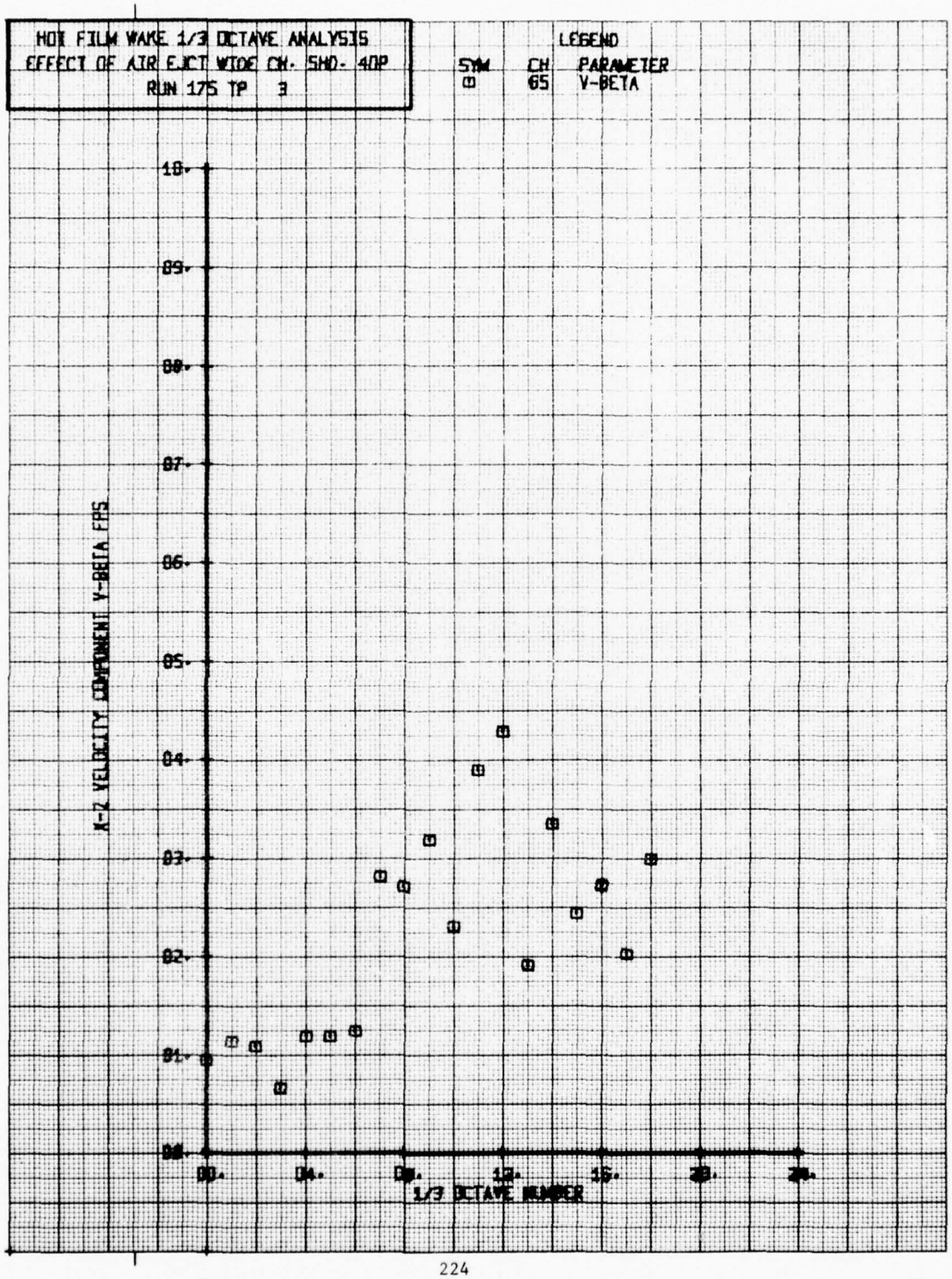
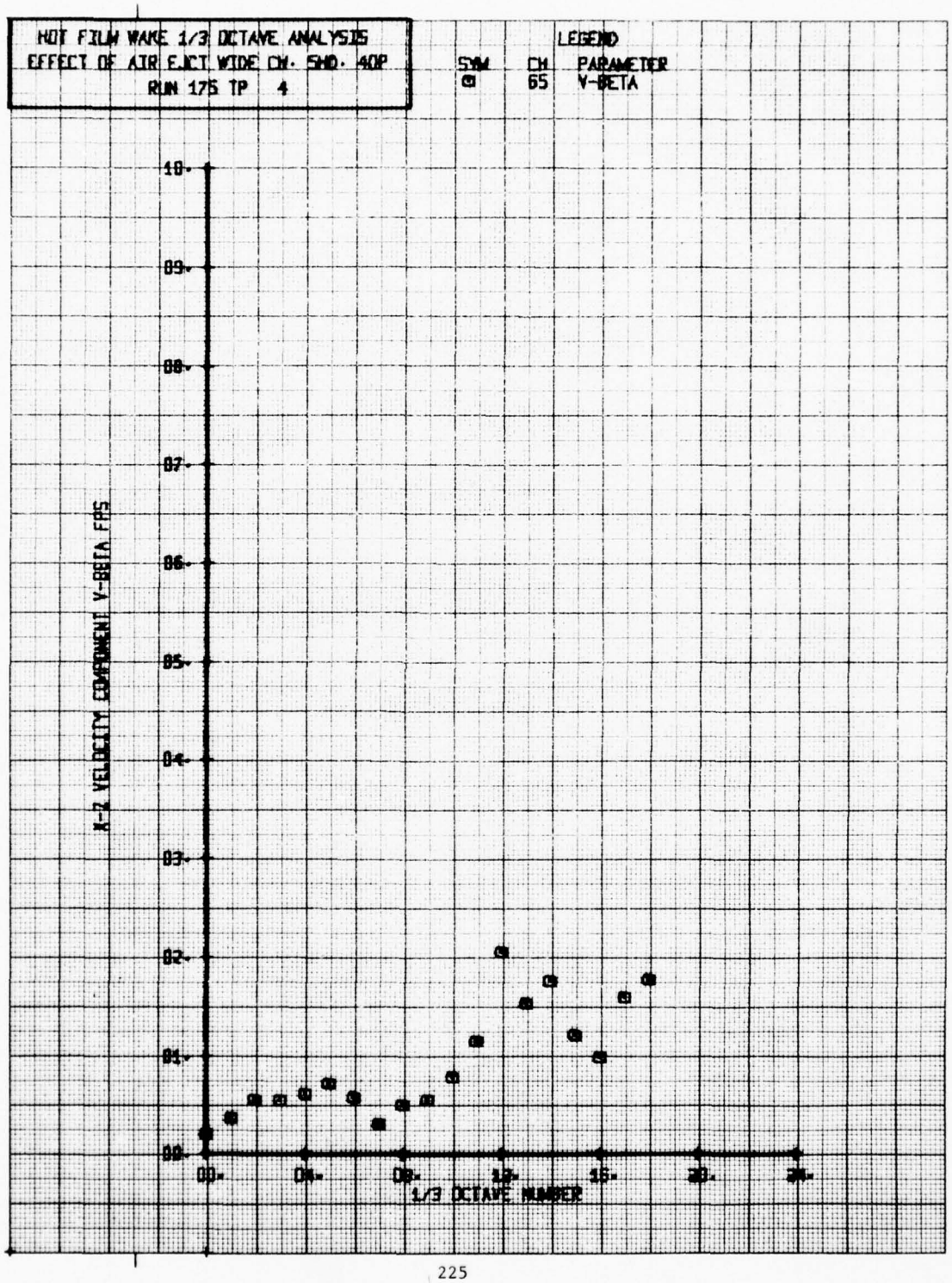
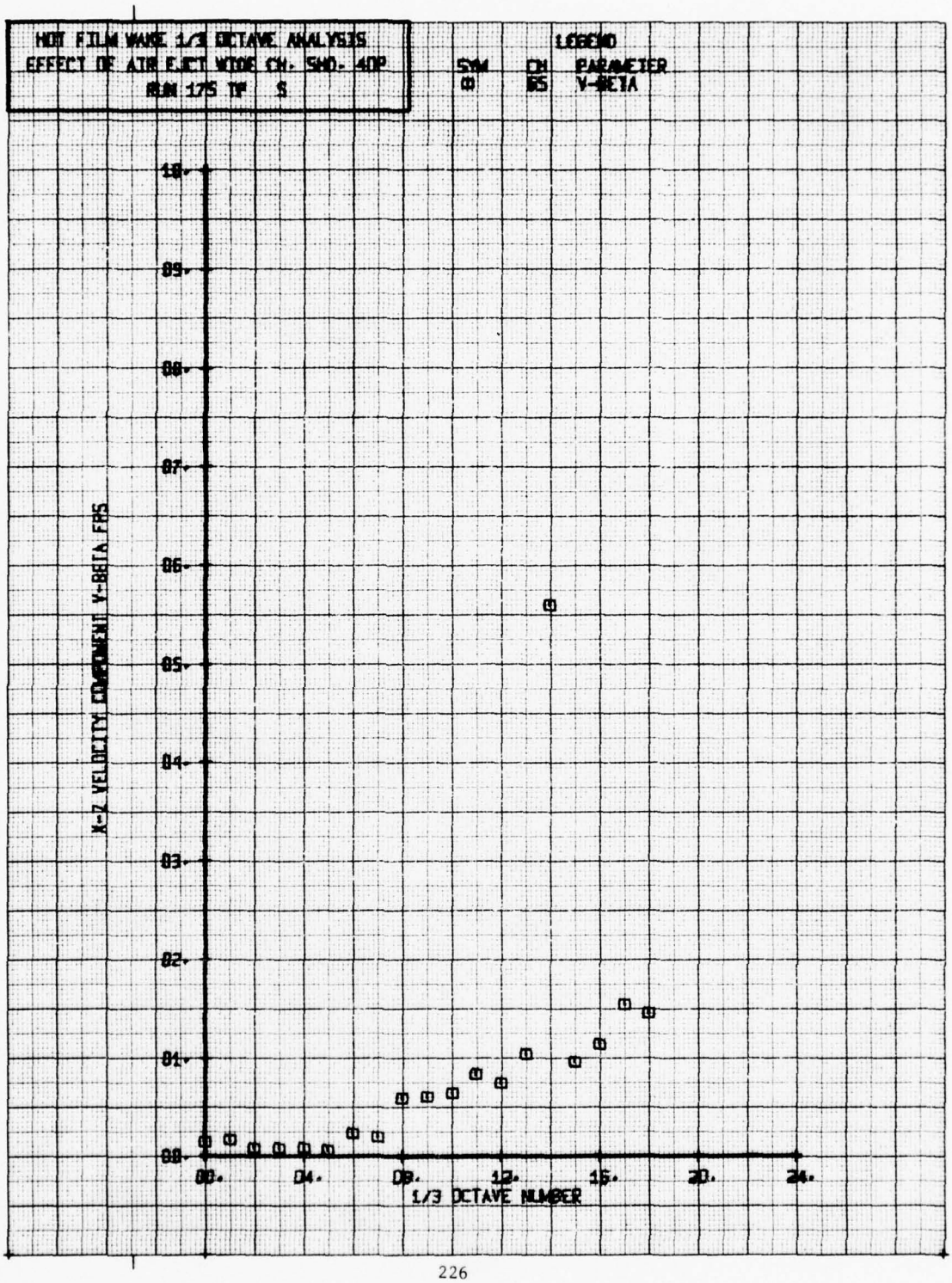
EFFECT OF AIR EJCT WIDE CH. SMD- 40P
RUN 175 TP 2
LEGEND
SYM CH PARAMETER
V-BETA
X-Z VELOCITY COMPONENT V-BETA FPS
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
EFFECT OF AIR EJCT WIDE CH. SHD- 40P
RUN 175 TP 3
LEGEND
SYM CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA FPS
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
EFFECT OF AIR EJCT WIDE CH. SHD. 40P
RUN 175 TP 4
LEGEND
SYM CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA FPS
1/3 OCTAVE NUMBER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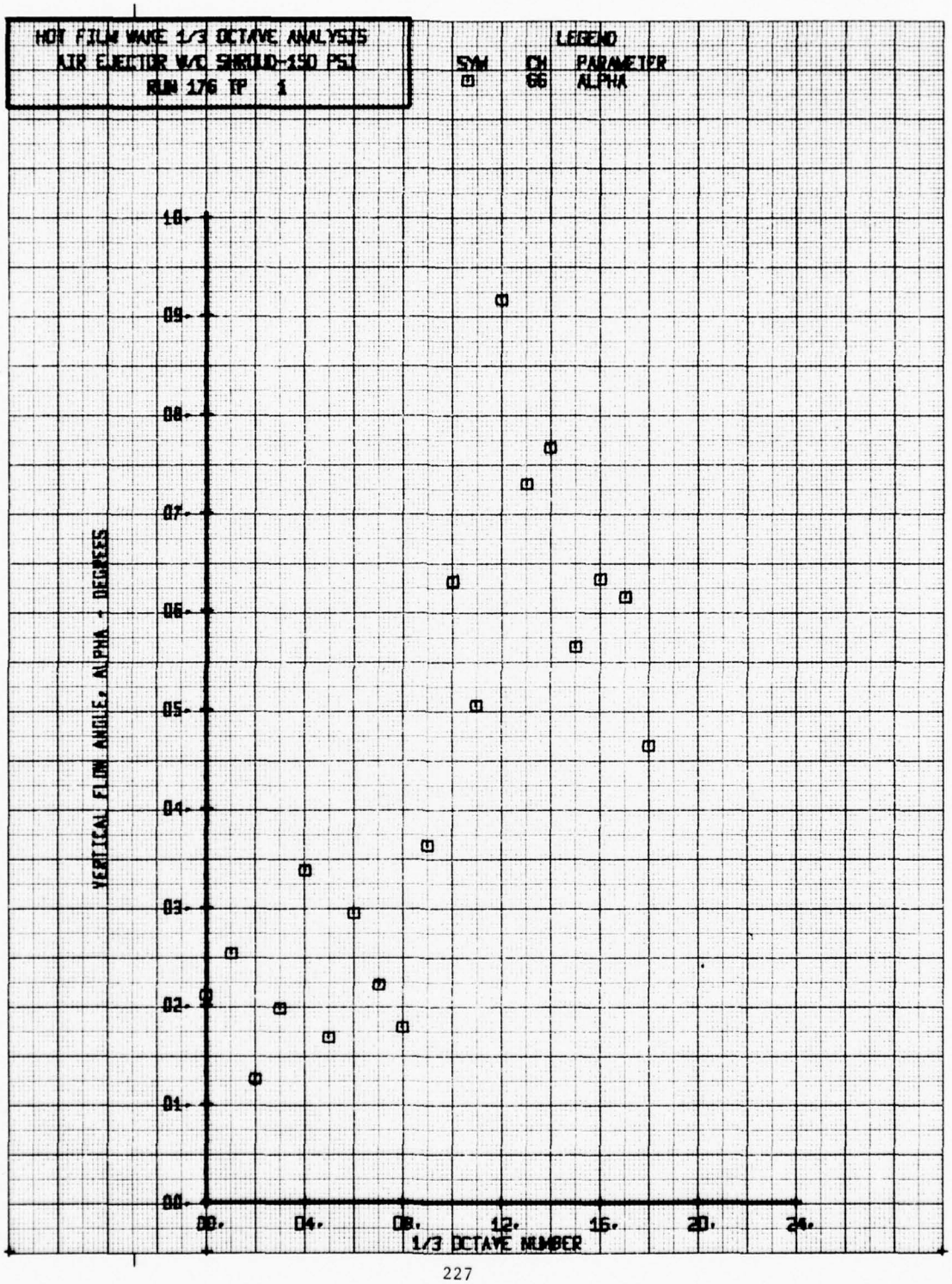
EFFECT OF AIR EJECT WTOR CH. SHD. 4DP
RUN 175 TP S
LEGEND
SYM CH PARAMETER
B 85 V-BETA
X-Z VELOCITY COMPONENT V-BETA FPS
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
00.
04.
08.
12.
16.
20.
24.
1/3 OCTAVE NUMBER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AIR EJECTOR W/O SHROUD-150 PSI
RUN 176 TP 1
LEGEND
SYM CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
10.
09.
08.
07.
06.
05.
04.
03.
02.
01.
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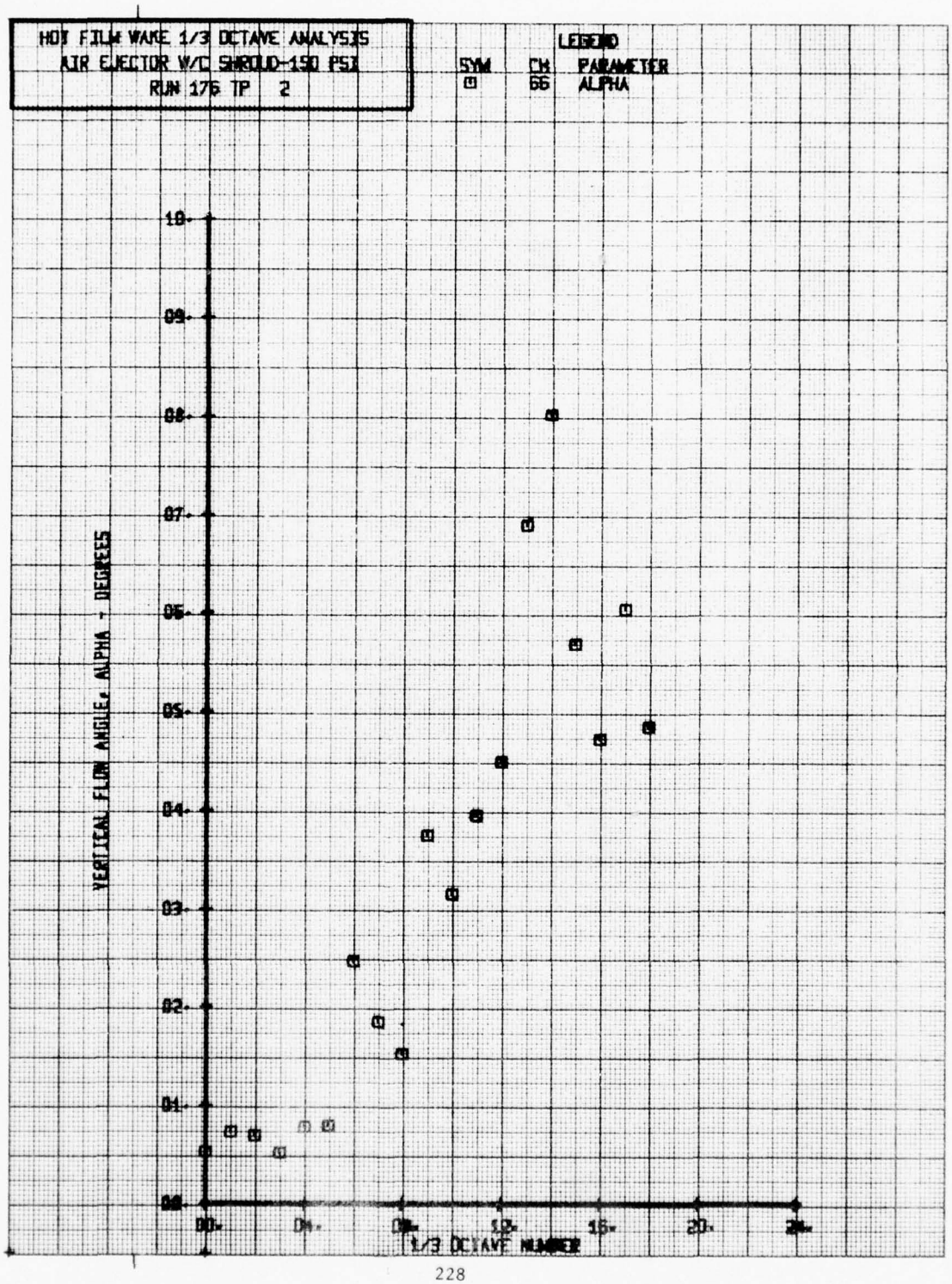
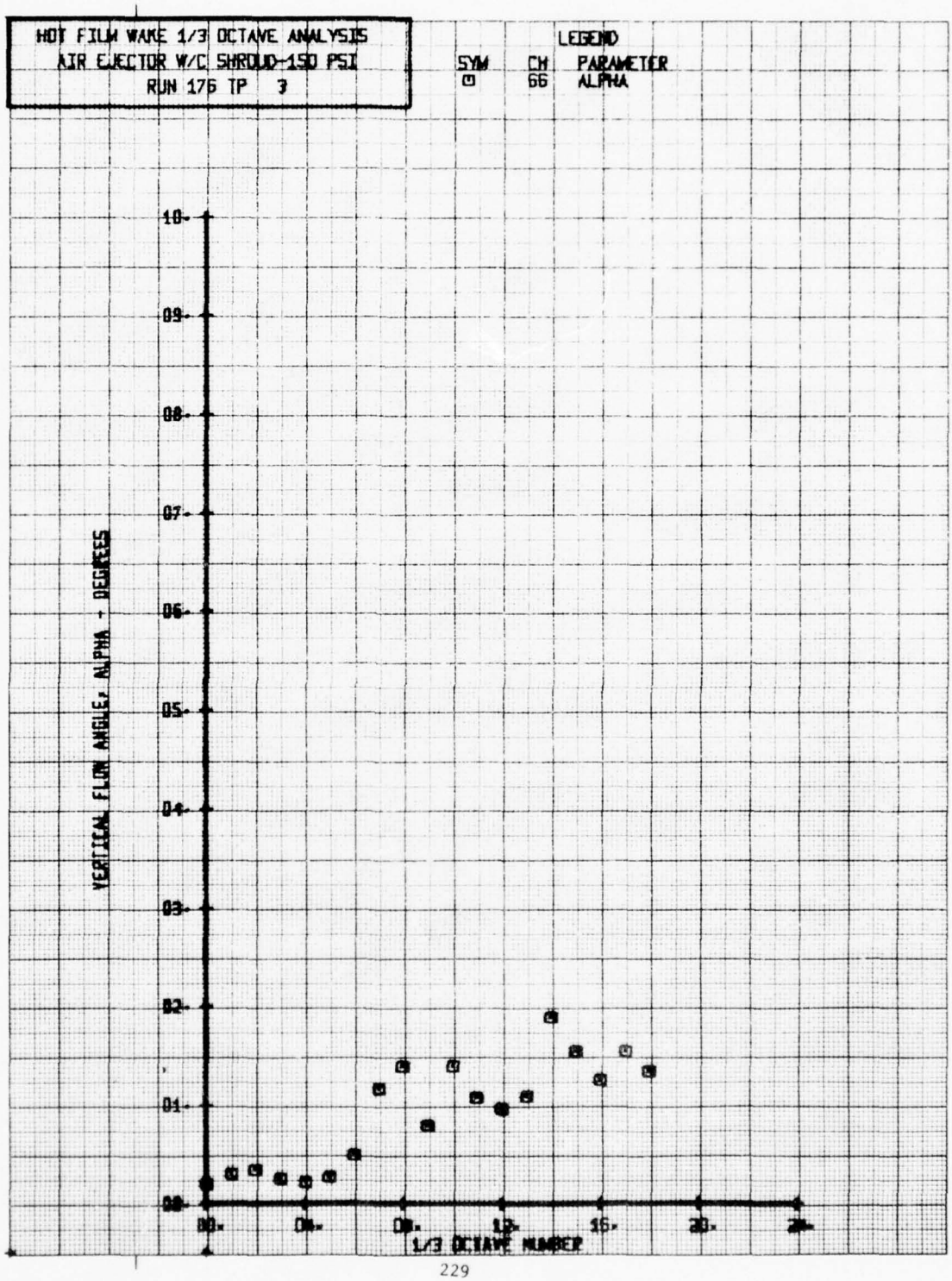
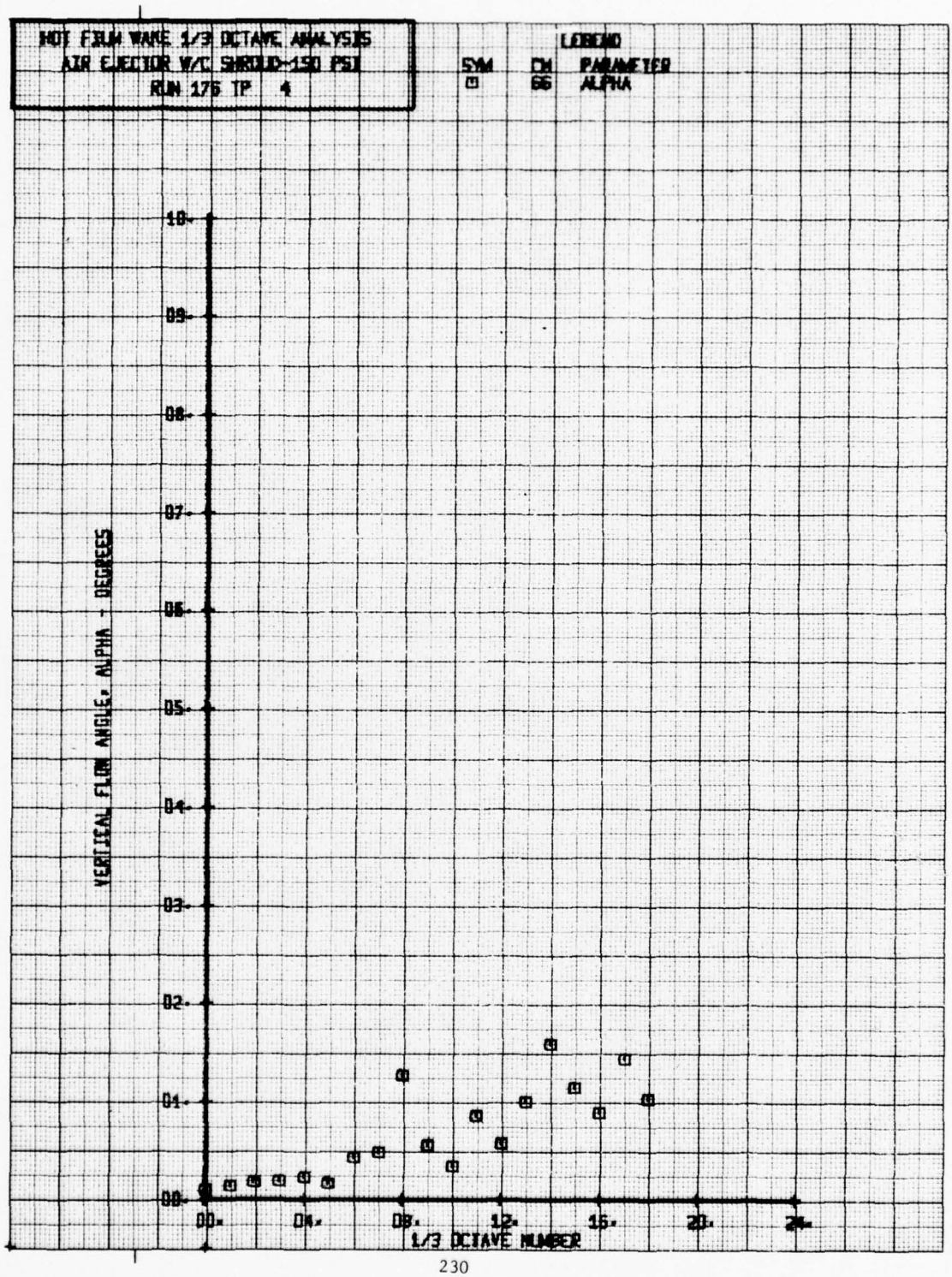
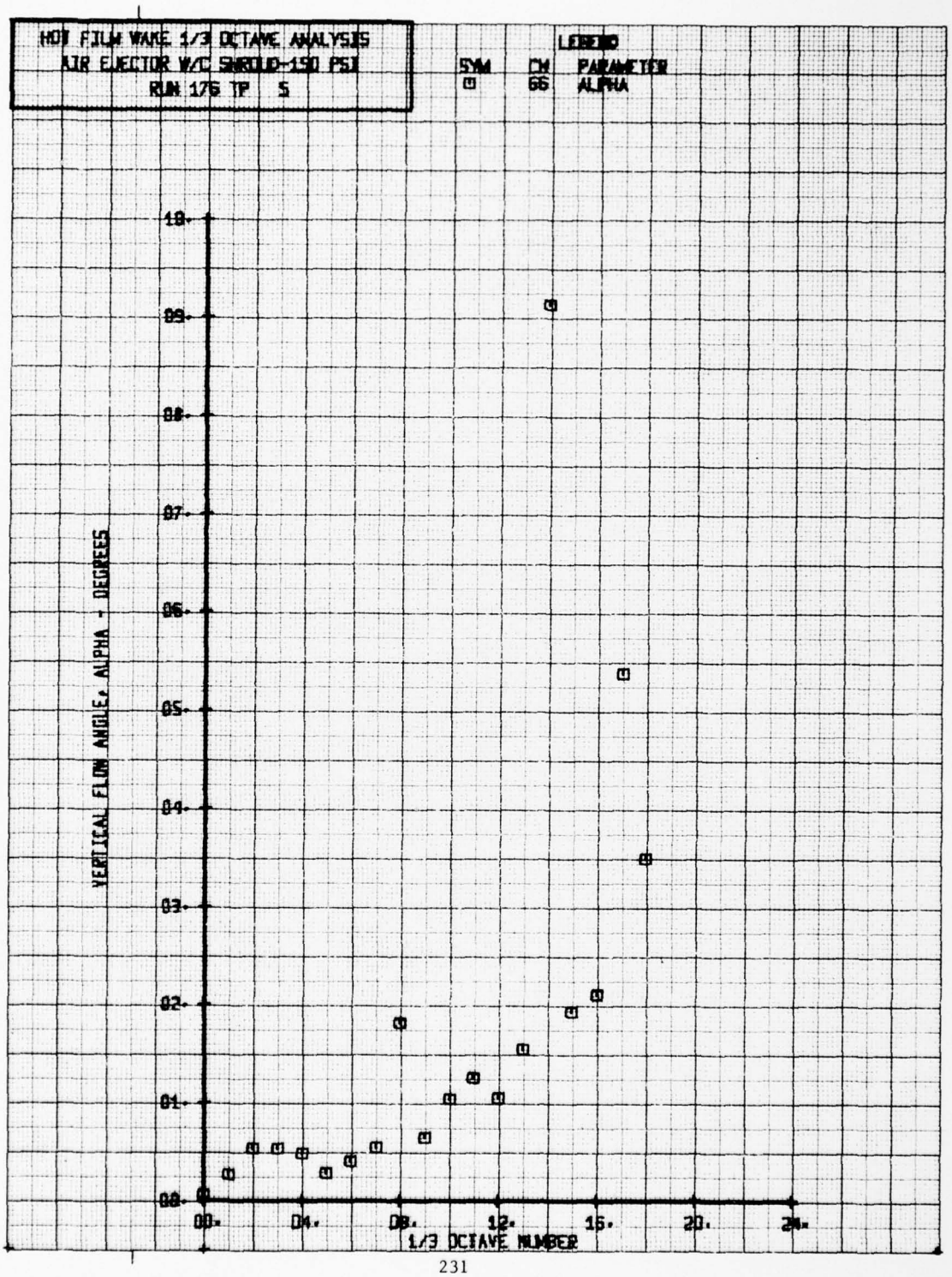
00.
04.
08.
12.
16.
20.
24.
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
AIR EJECTOR W/C SHROUD-150 PSI
RUN 176 TP 2
LEGEND
SYM CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
AIR EJECTOR W/C SHROUD-150 PSI
RUN 176 TP 3
LEGEND
SYM CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
AIR EJECTOR W/C SHROUD-150 PSI
RUN 176 TP 4
LEGEND
SYM CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
1/3 OCTAVE NUMBER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AIR EJECTOR W/C SHROUD-150 PSI
RUN 176 TP 5
LEGEND
SYM CM PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
10.
09.
08.
07.
06.
05.
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16.
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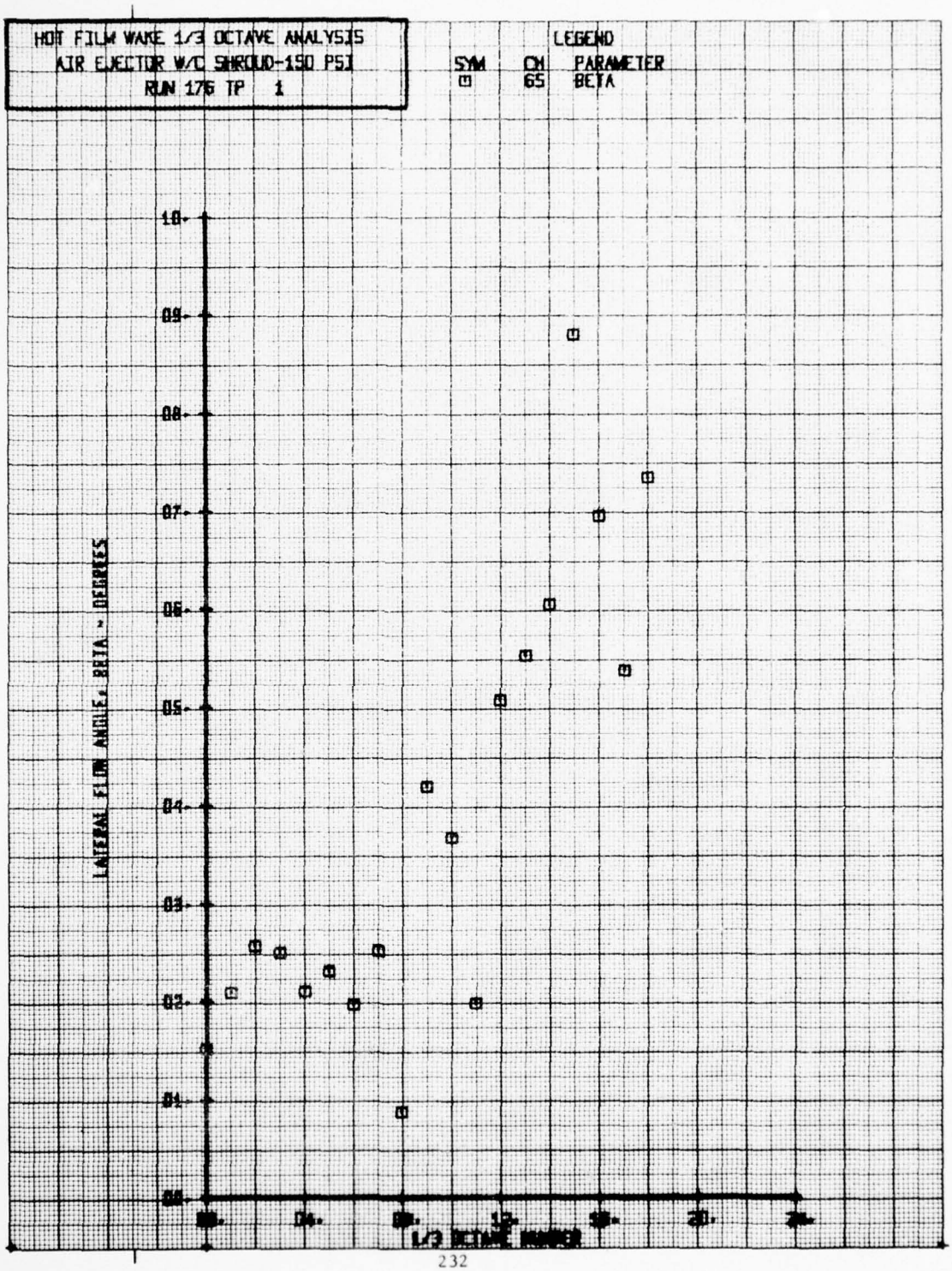
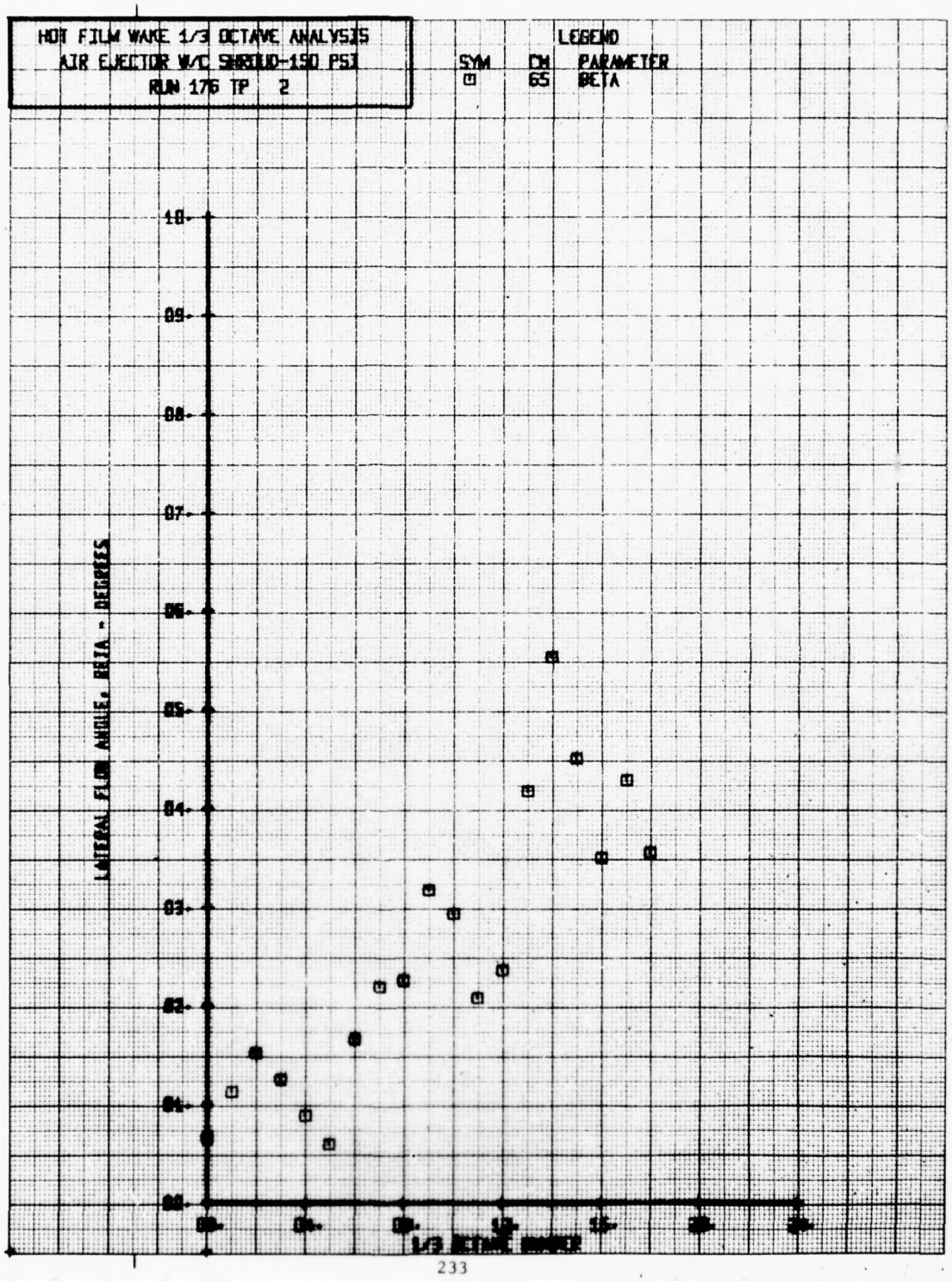
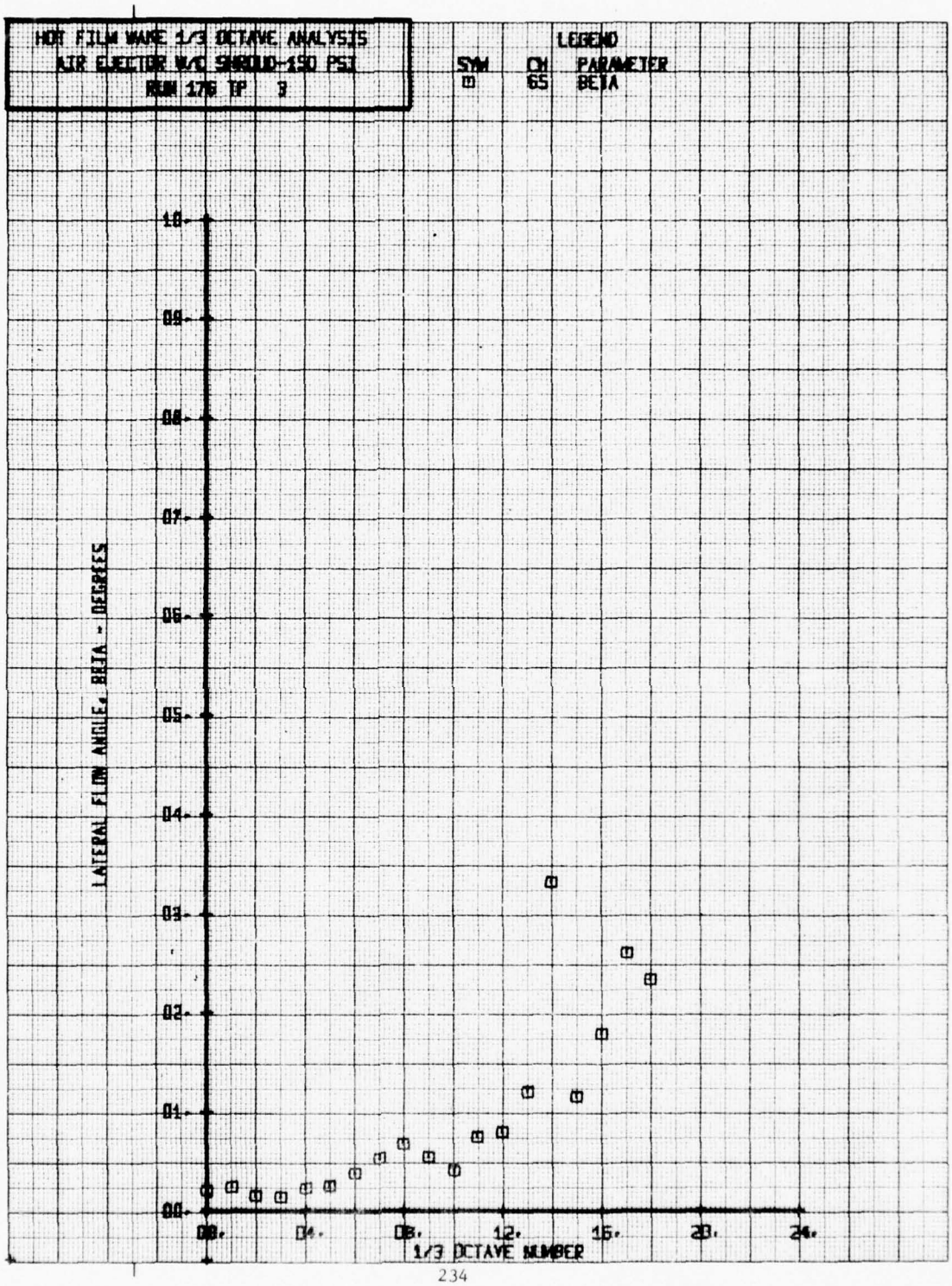
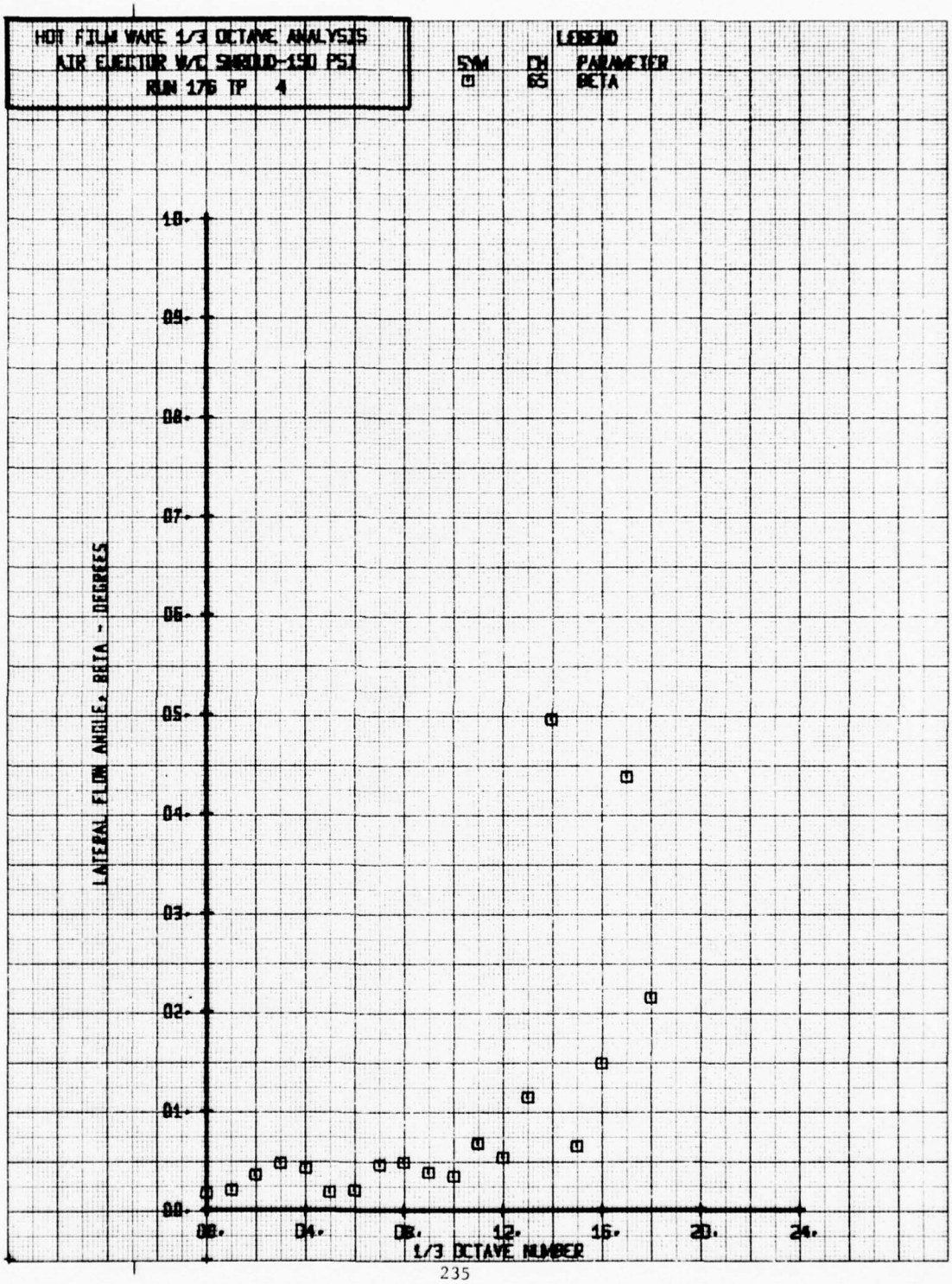
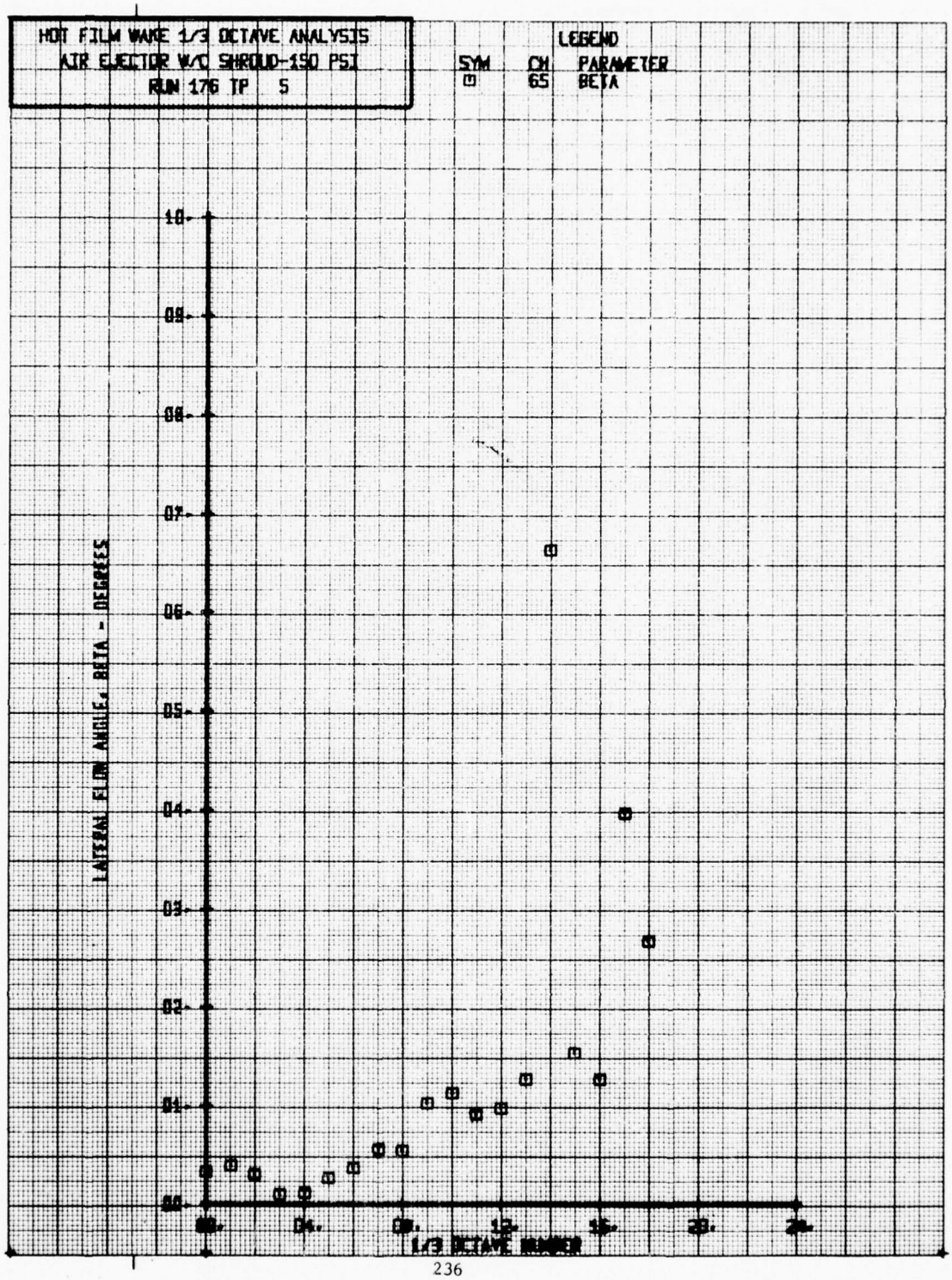
24.
1/3 OCTAVE NUMBER

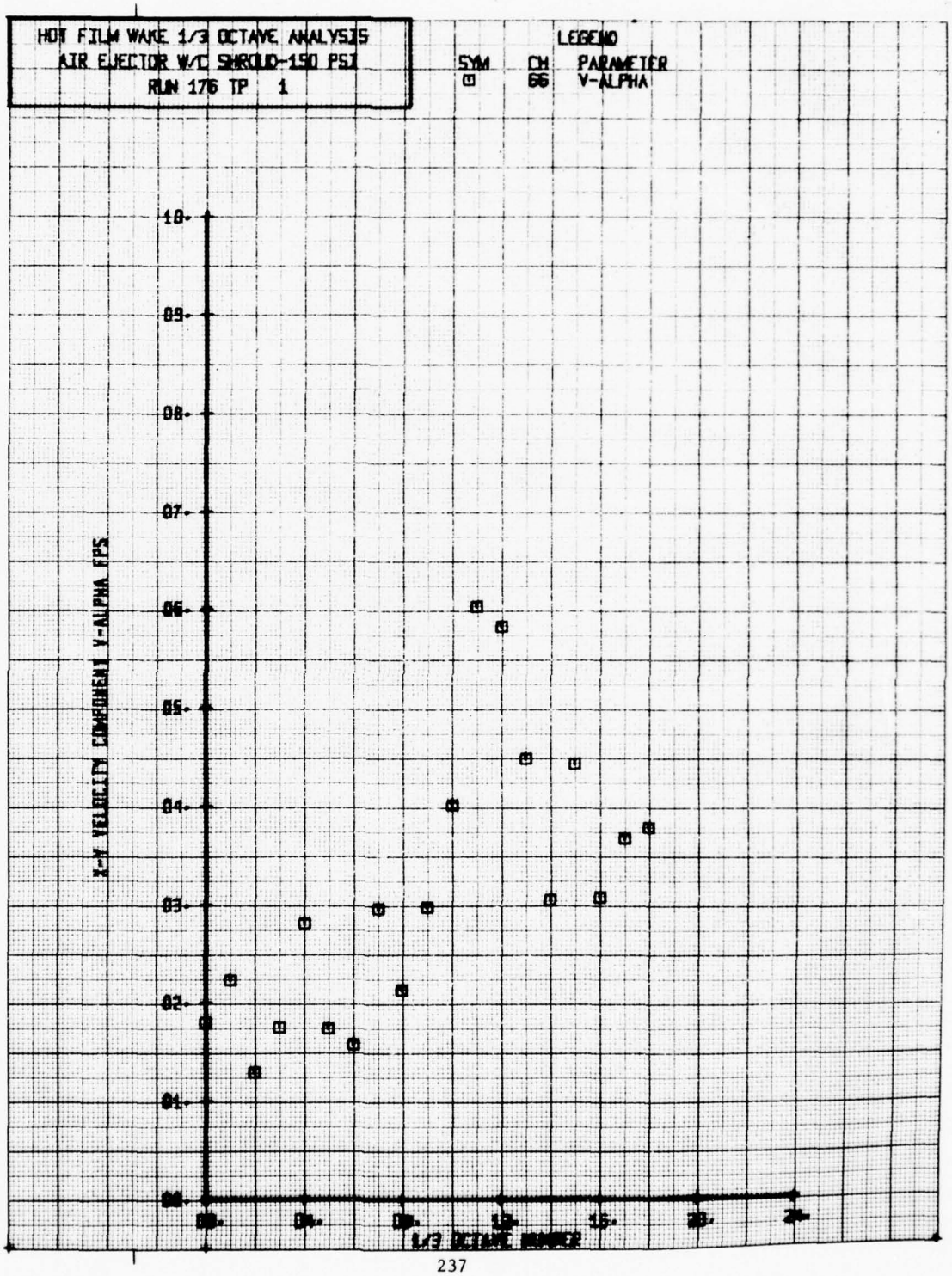

HOT FILM WAKE 1/3 OCTAVE ANALYSIS
AIR EJECTOR W/C SHROUD-150 PSI
RUN 176 TP 1
LEGEND
SYM CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
AIR EJECTOR W/C SHROUD-150 PSI
RUN 176 TP 2
LEGEND
SYM CM PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0.0
0.5
1.0
1.5
2.0
2.5
3.0
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
AIR EJECTOR W/O SHROUD-150 PSI
RUN 176 TP 3
LEGEND
SYM CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
AIR EJECTOR W/C SHROUD-150 PSI
RUN 176 TP 4
LEGEND
SYM CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
AIR EJECTOR W/O SHROUD-150 PSI
RUN 176 TP 5
LEGEND
SYM CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
1/3 OCTAVE NUMBER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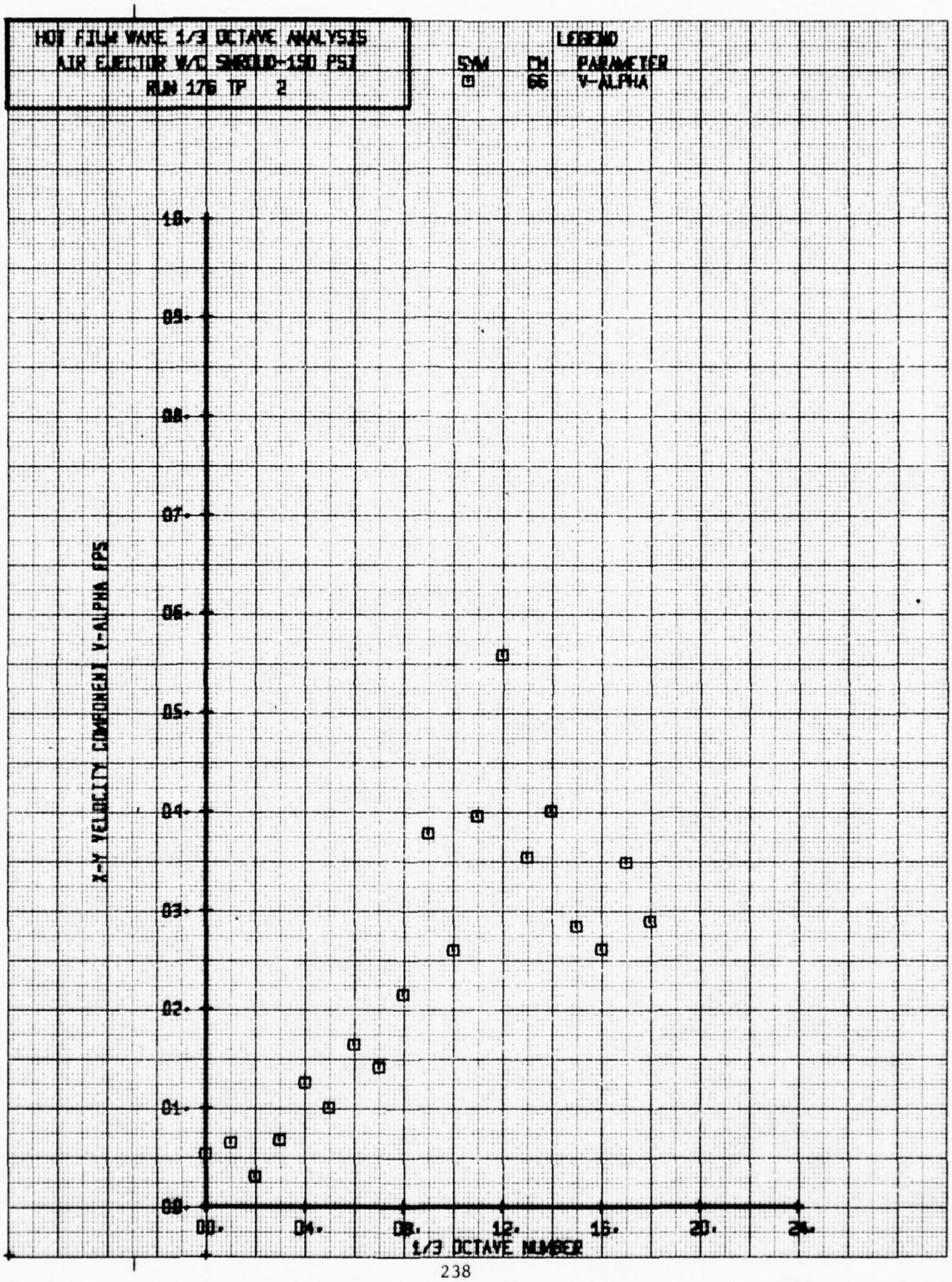
AIR EJECTOR W/O SHROUD-150 PSI
RUN 176 TP 1
LEGEND
SYM CH PARAMETER
66 V-ALPHA
X-X VELOCITY COMPONENT V-ALPHA FPS
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
AIR EJECTOR W/C SHROUD-150 PSI
RUN 176 TP 2
LEGEND
SYM CH PARAMETER
66 V-ALPHA
X-Y VELOCITY COMPONENT V-ALPHA FPS
1/3 OCTAVE NUMBER
00.
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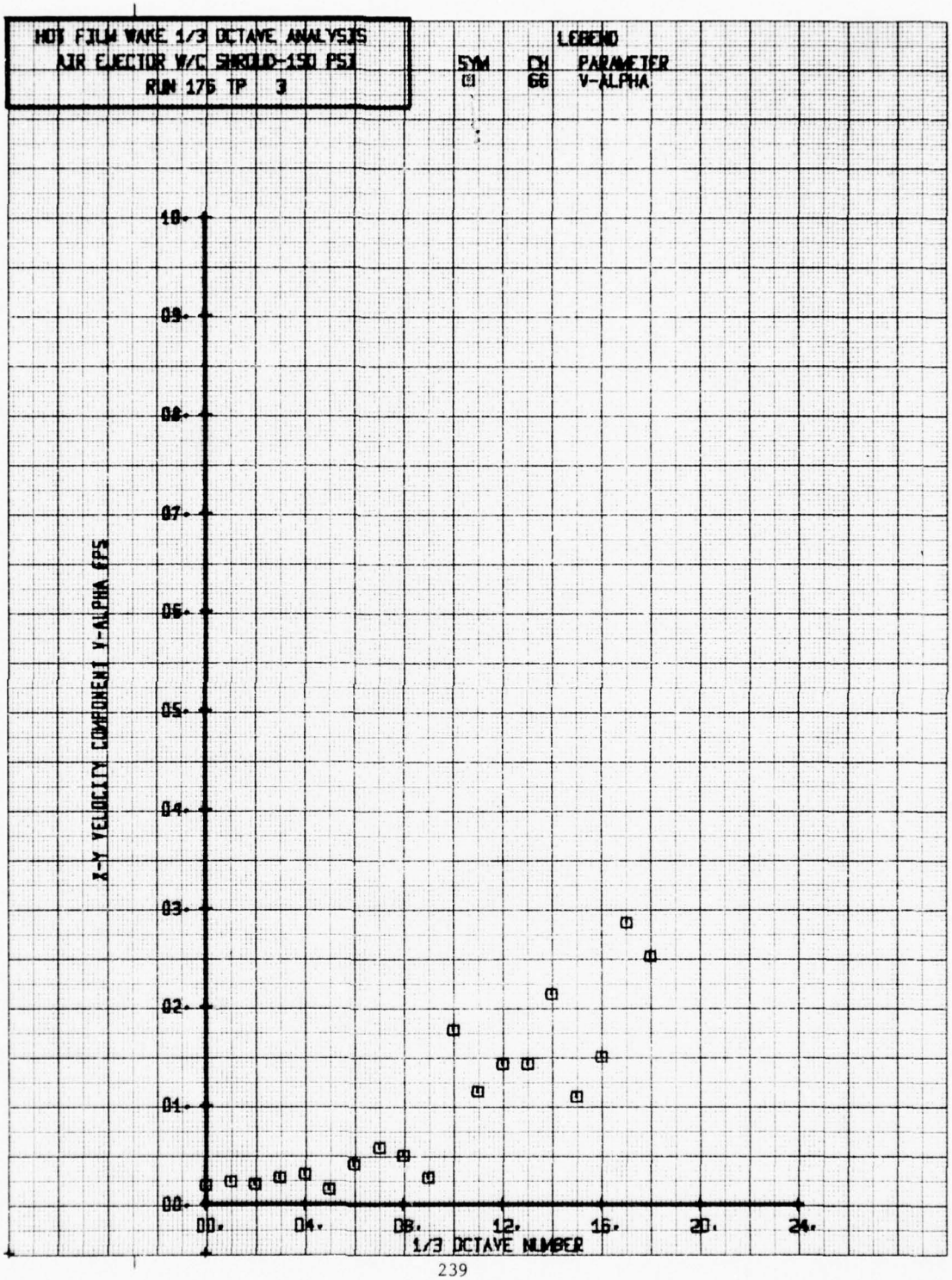
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AIR EJECTOR W/C SHROUD-150 PSI
RUN 176 TP 3
LEGEND
SYM CH PARAMETER
66 V-ALPHA
X-Y VELOCITY COMPONENT V-ALPHA FPS
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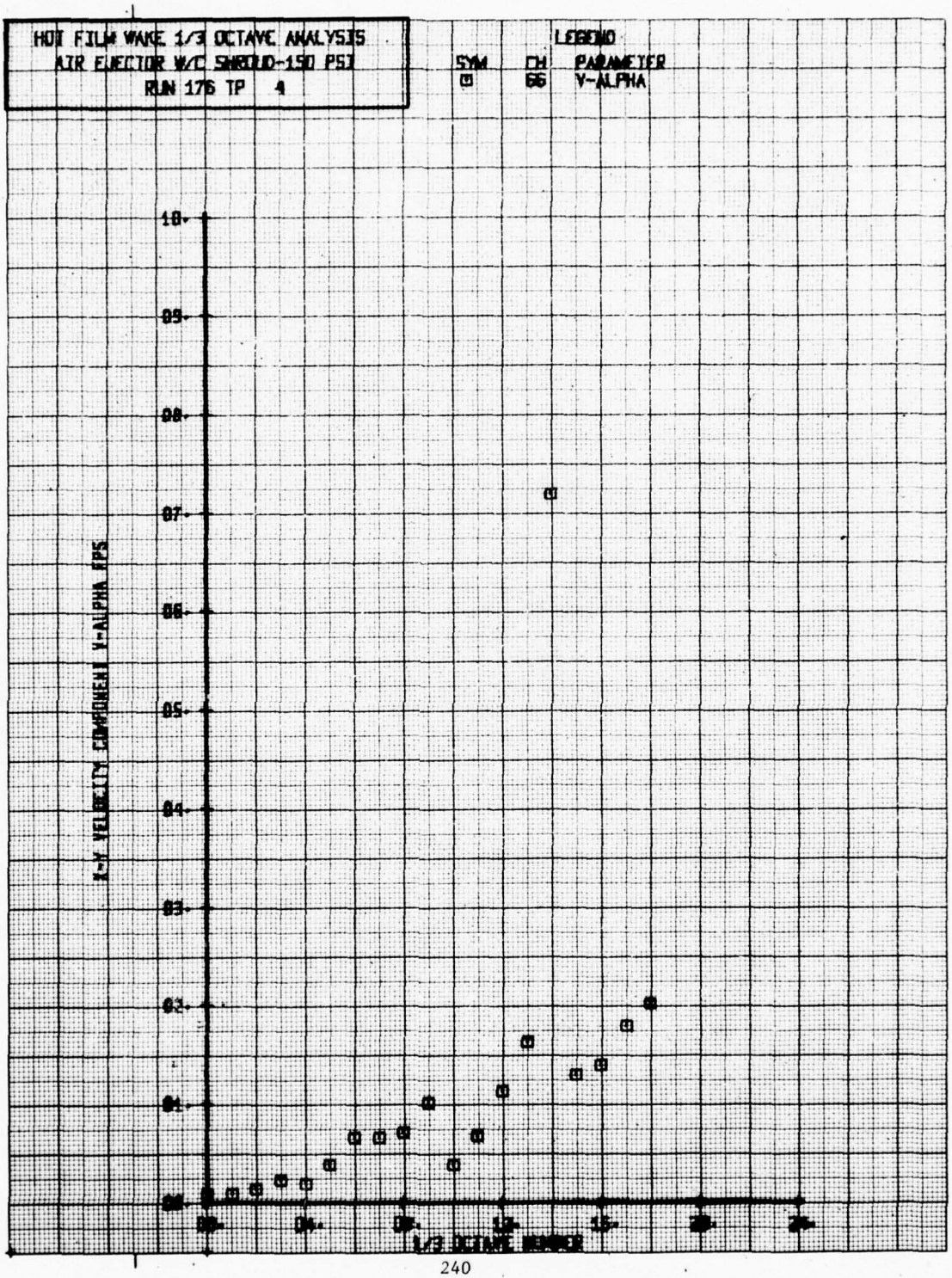
1/3 OCTAVE NUMBER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AIR EJECTOR W/C SHROUD-150 PSI
RUN 176 TP 4
LEGEND
SYM CH PARAMETER
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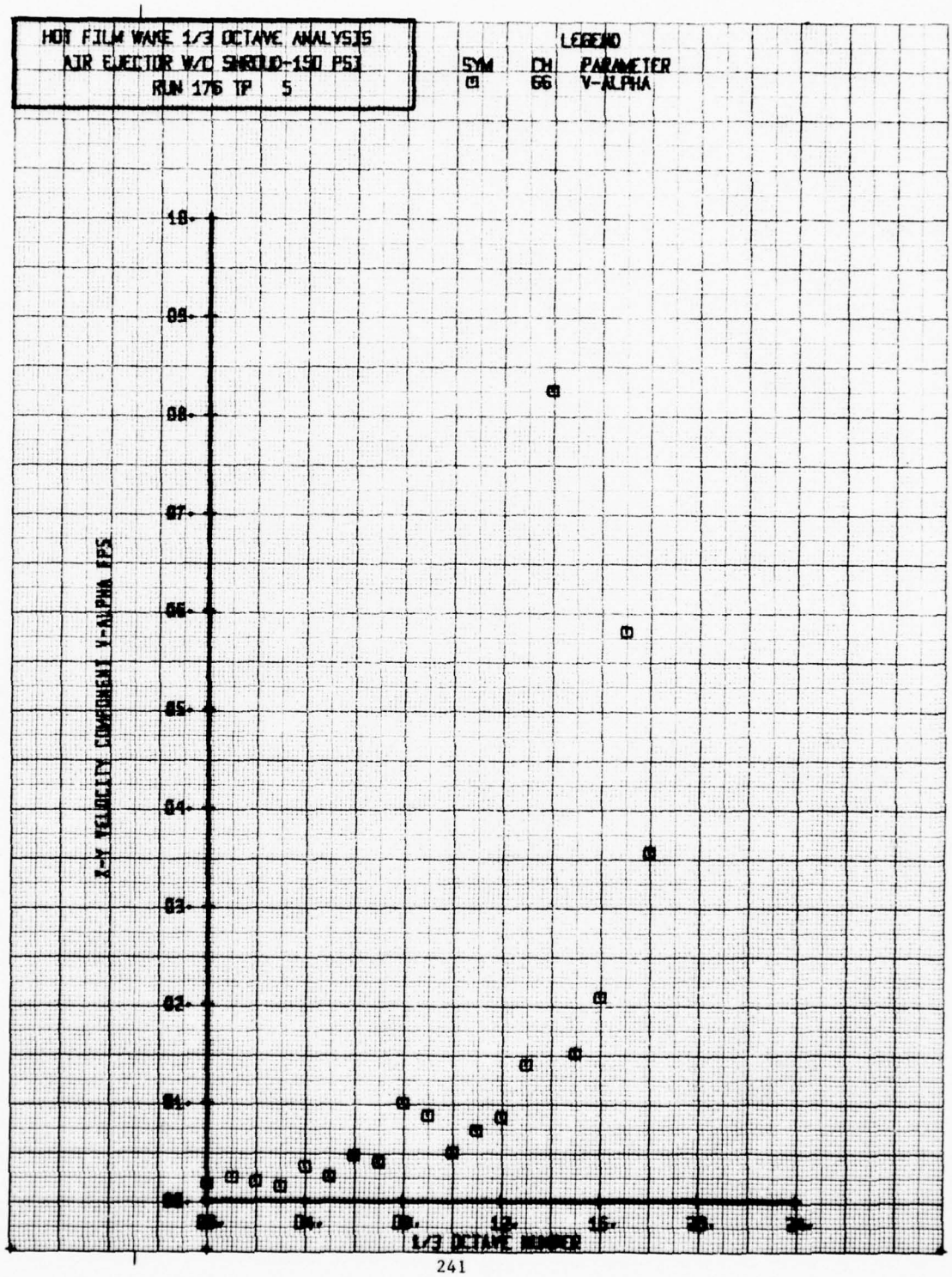
X-Y VELOCITY COMPONENT V-ALPHA FPS
1/3 OCTAVE NUMBER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AIR EJECTOR W/O SHROUD-150 PSI
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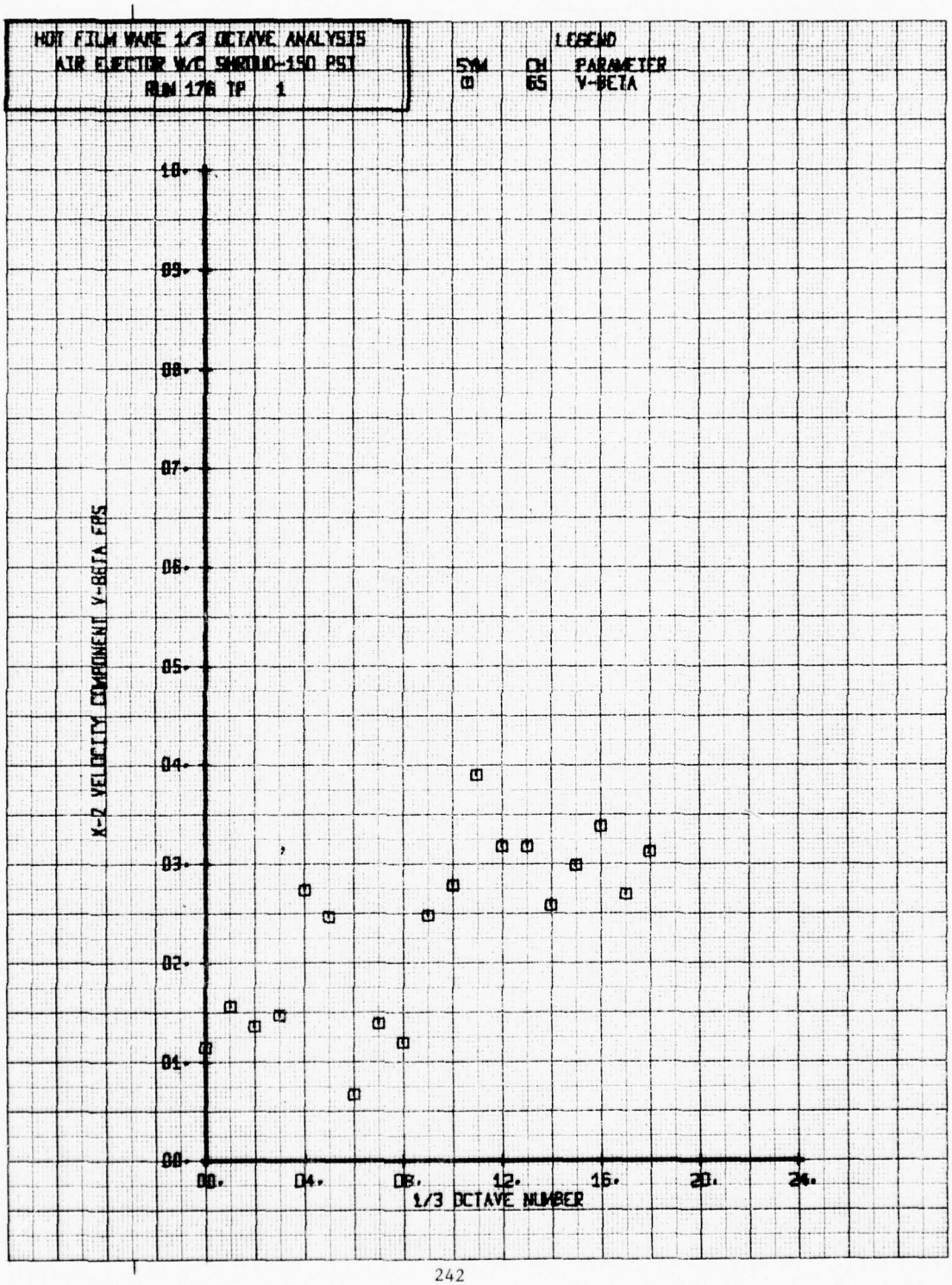
LEGEND
SYM CH PARAMETER
66 V-ALPHA
X-Y VELOCITY COMPONENT V-ALPHA FPS
1/3 OCTAVE NUMBER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RUN 176 TP 1
LEGEND
SYM CH PARAMETER
65 V-BETA
X-2 VELOCITY COMPONENT V-BETA FPS
1/3 OCTAVE NUMBER
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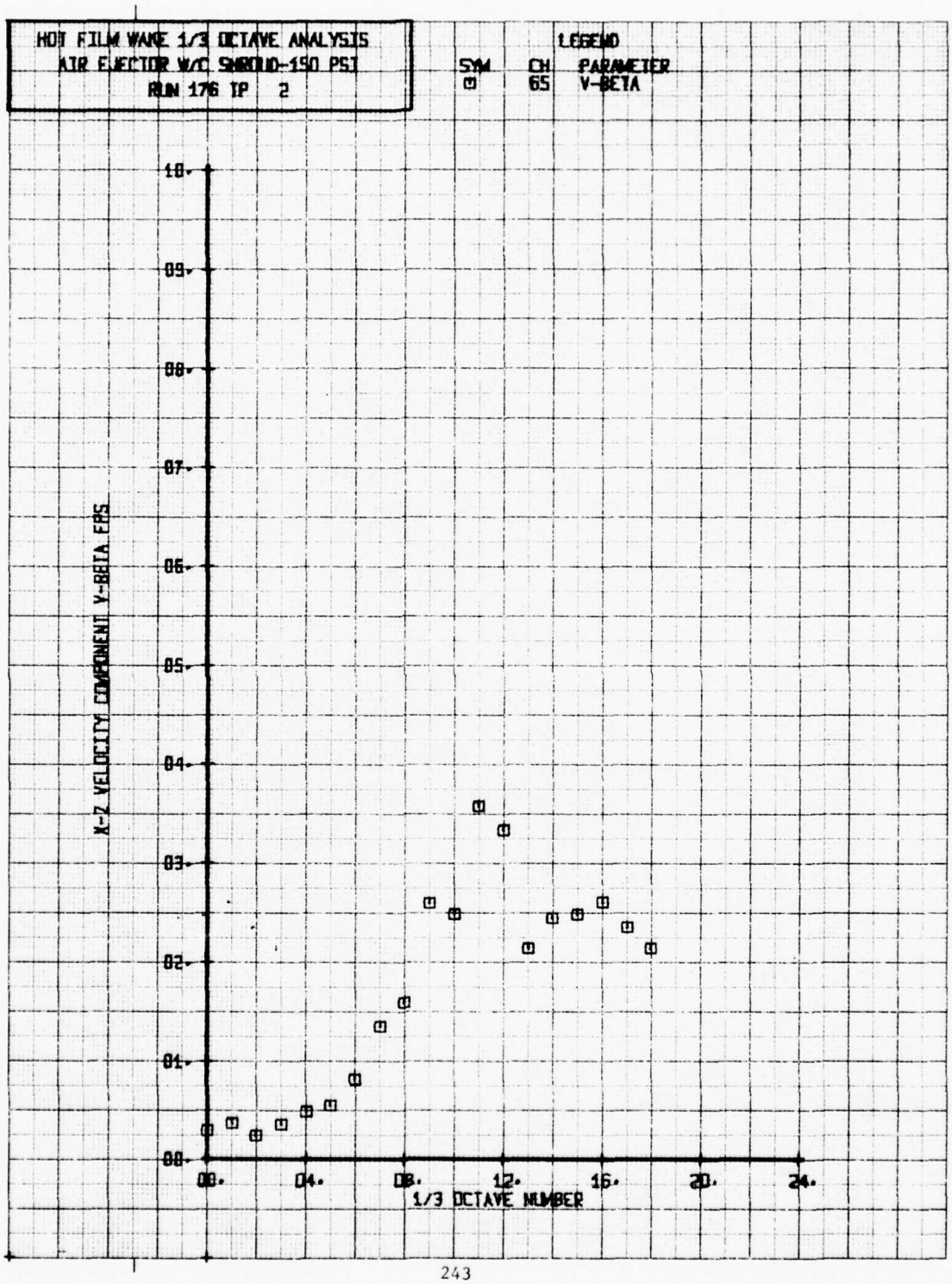
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AIR EJECTOR W/C SHROUD-150 PSI
RUN 176 TP 2
LEGEND
SYM CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA FBS
1/3 OCTAVE NUMBER
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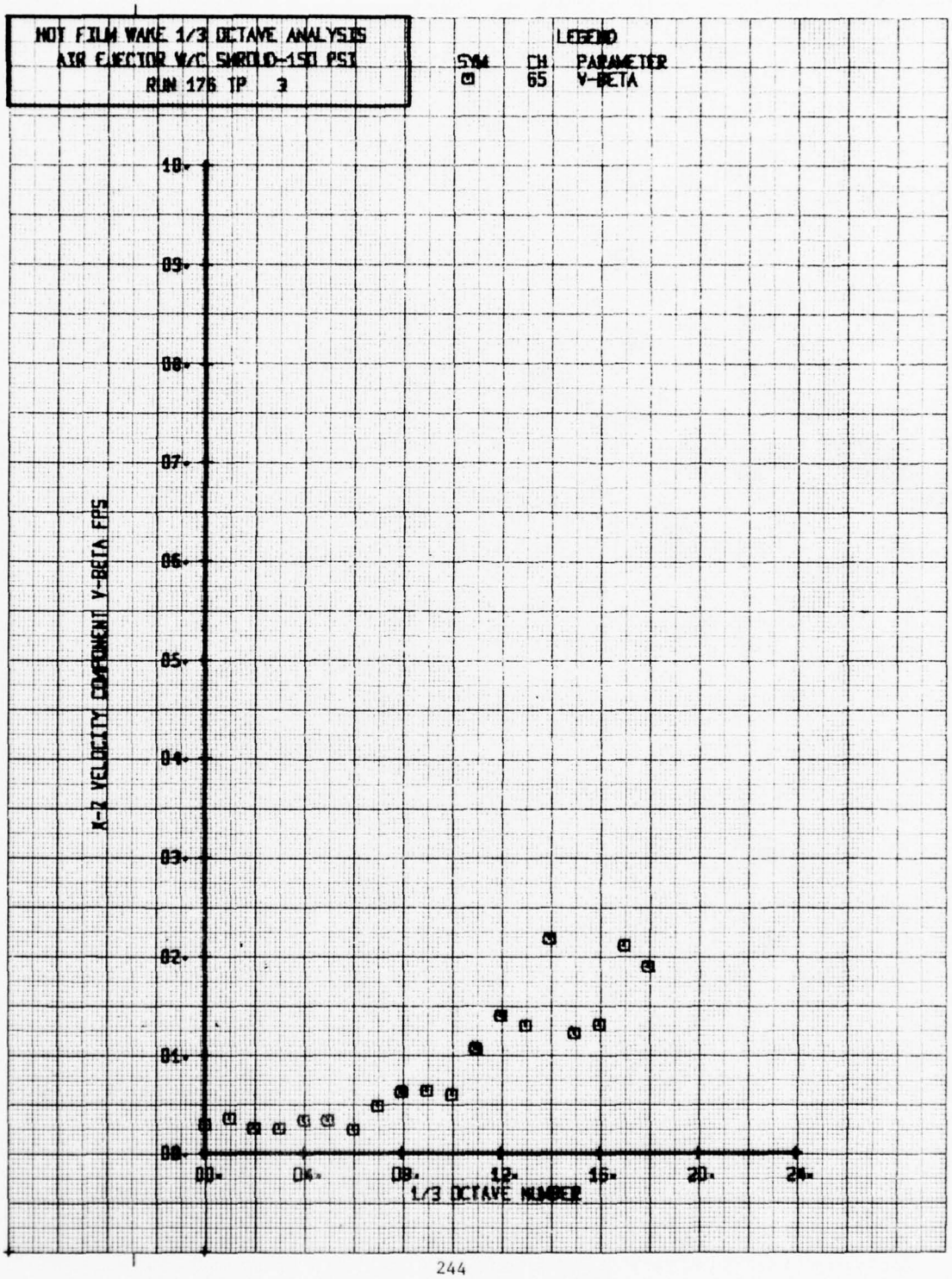
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AIR EJECTOR W/C SHROUD-150 PSI
RUN 176 TP 3
LEGEND
SYM CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA FPS
1/3 OCTAVE NUMBER
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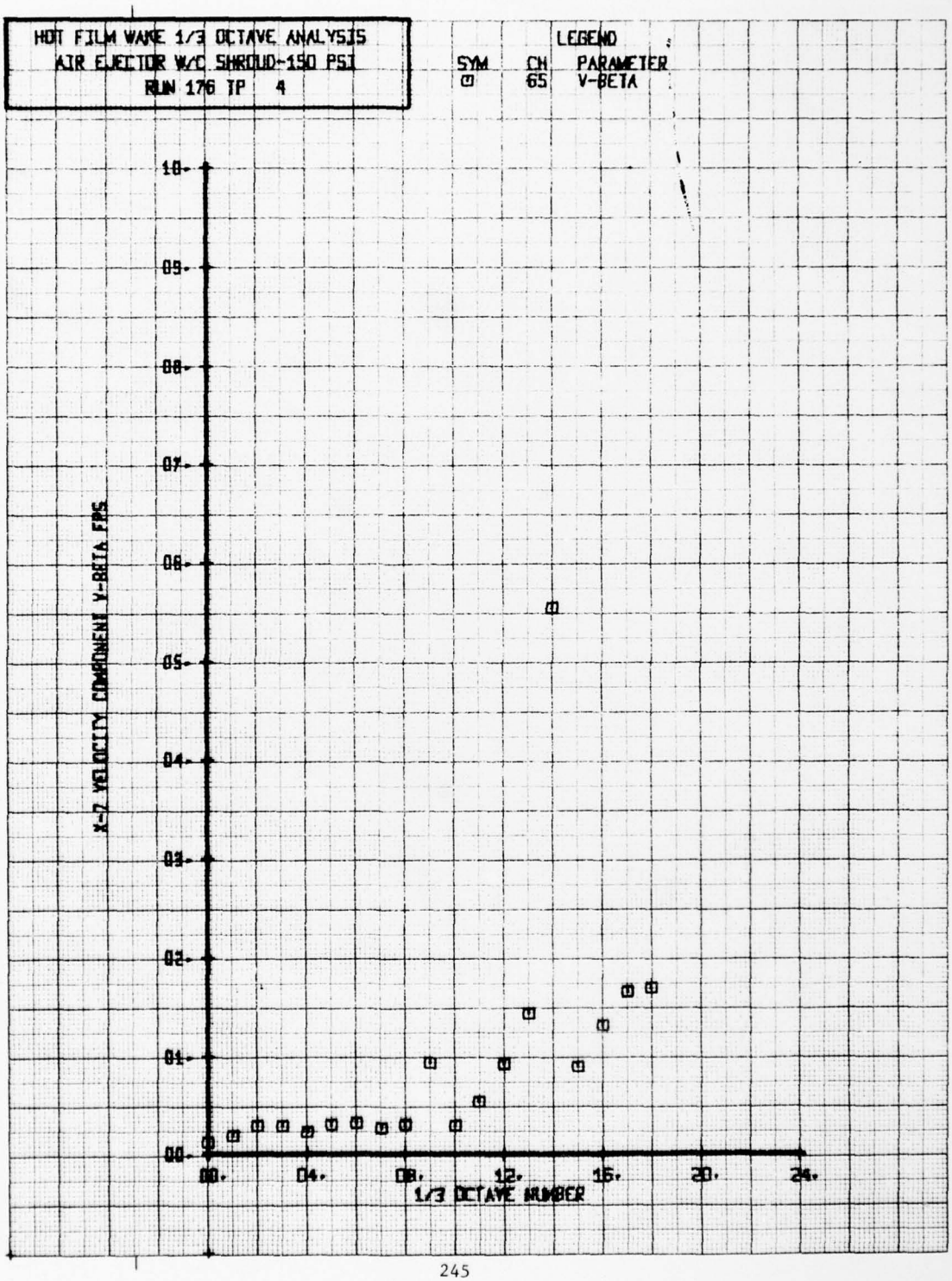
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AIR EJECTOR W/O SHROUD-150 PSI
RUN 176 TP 4
LEGEND
SYM CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA FPS
1/3 OCTAVE NUMBER
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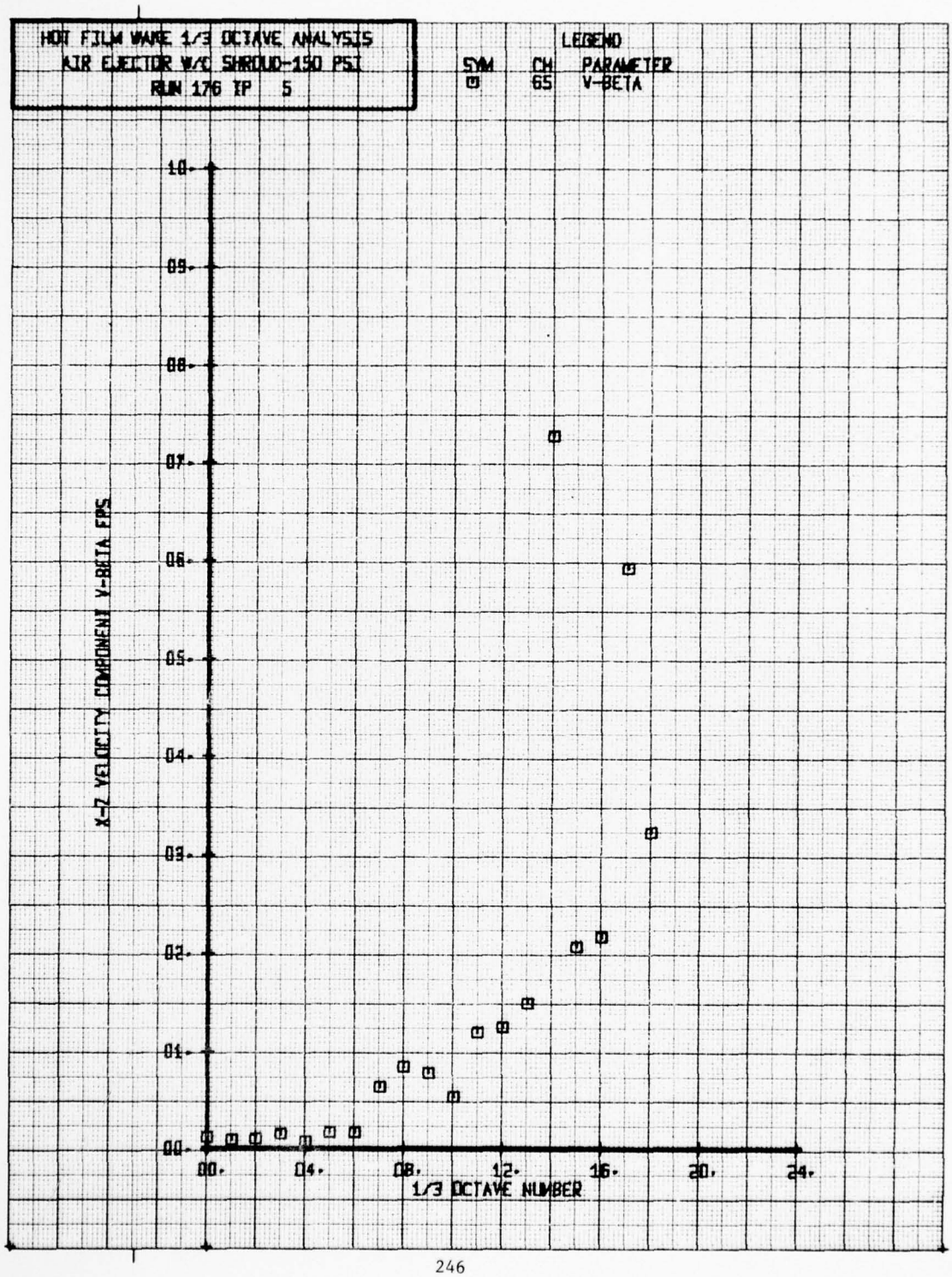
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AIR EJECTOR W/O SHROUD-150 PSI
RUN 176 TP 5
LEGEND
SYM CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA FPS
1/3 OCTAVE NUMBER
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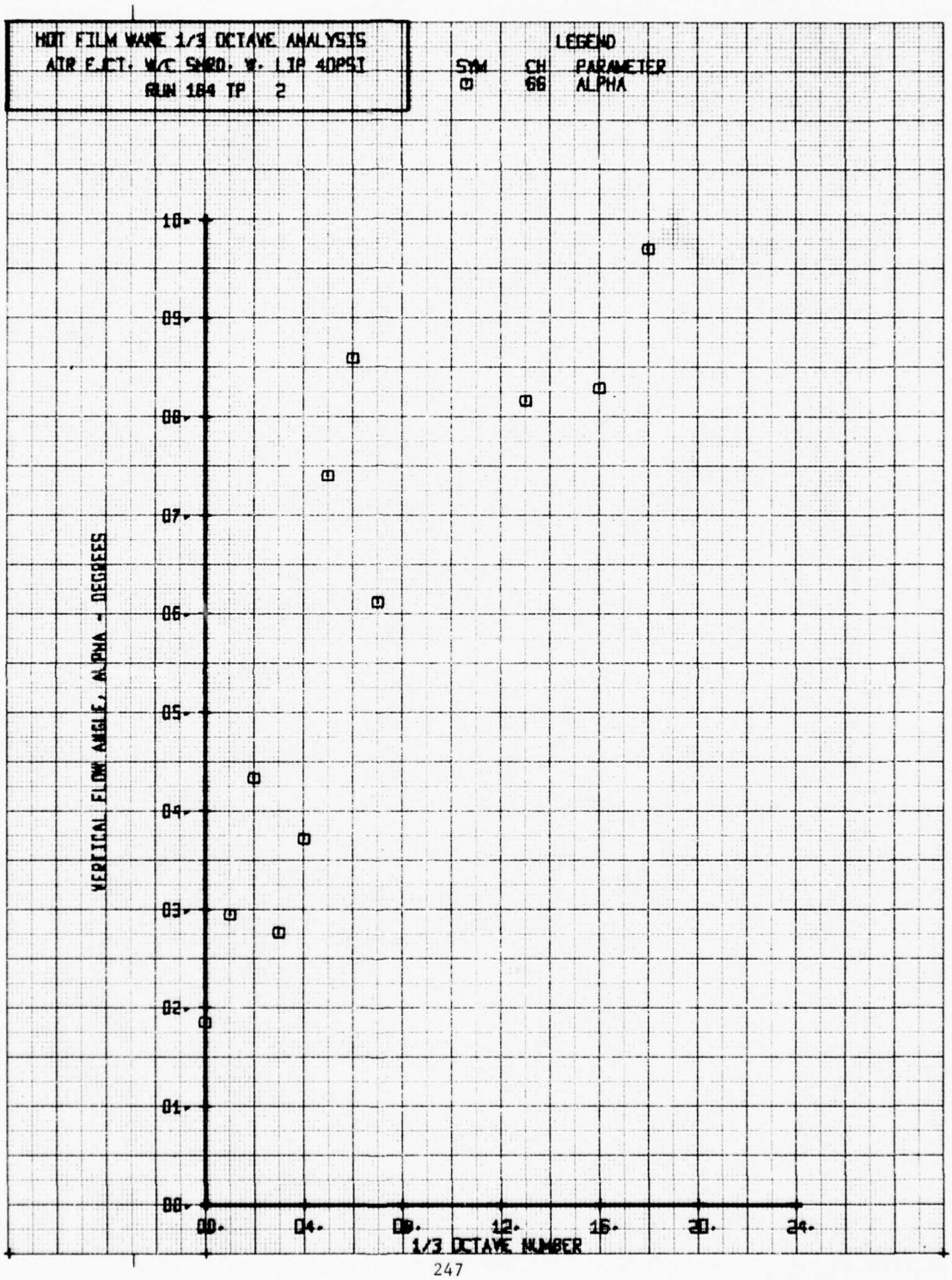
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
AIR EJCT. W/C SMRD. W. LIP 40PSI
RUN 184 TP 2
LEGEND
SYM CH PARAMETER
68 ALPHA
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VERTICAL FLOW ANGLE, ALPHA - DEGREES
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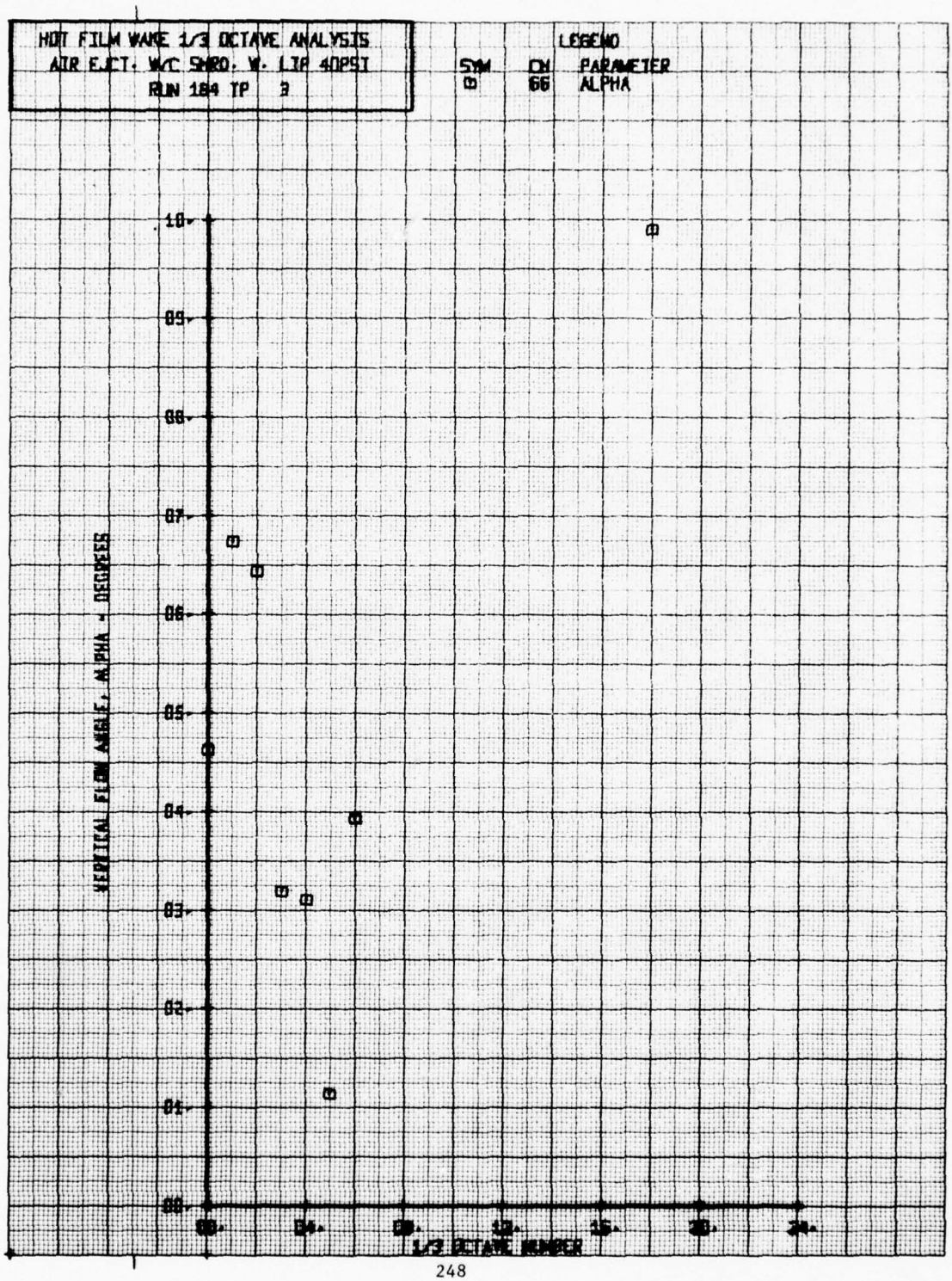
1/3 OCTAVE NUMBER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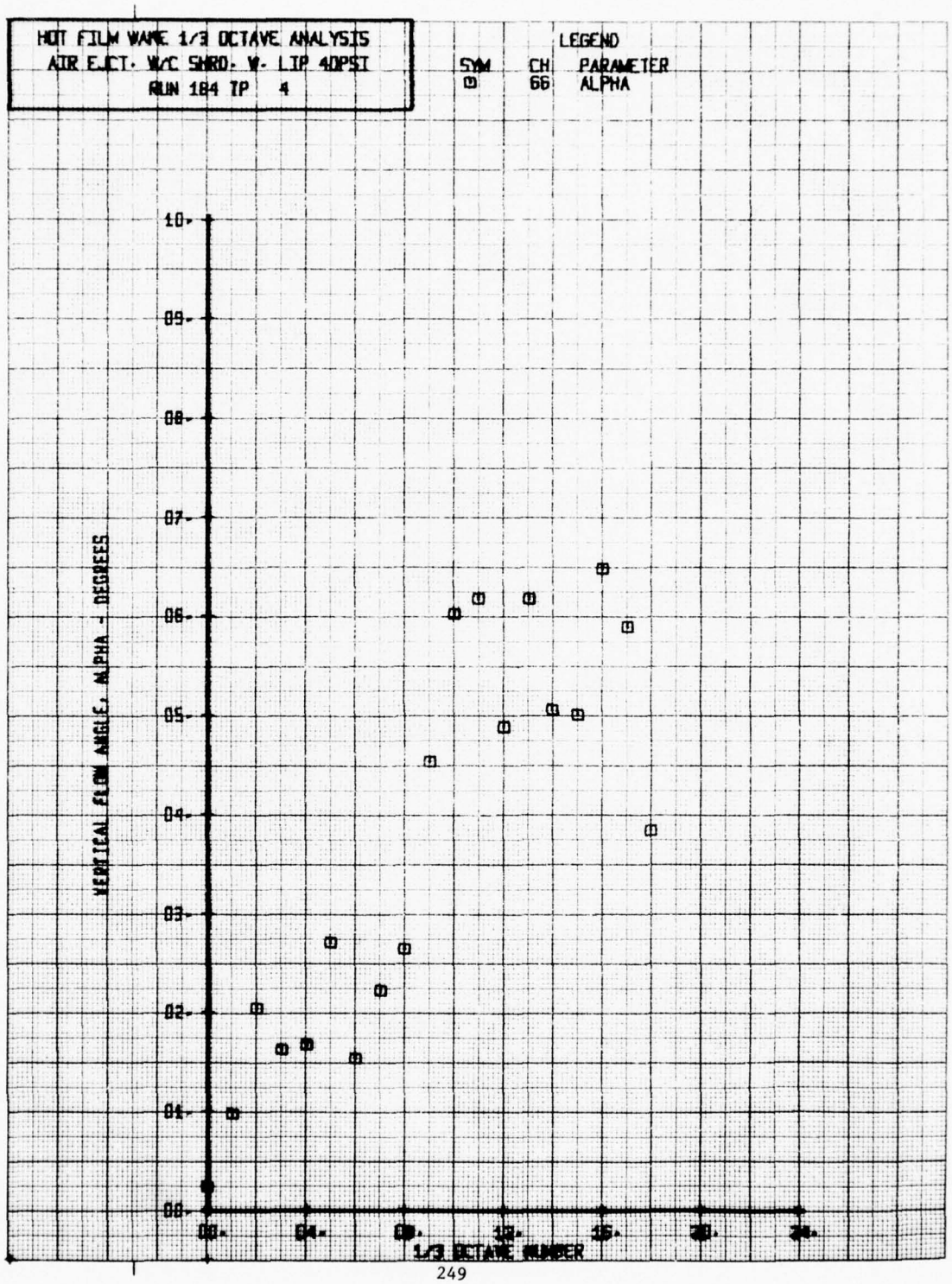
AIR EJCT. W/C SHRD. W. LIP 40PSI
RUN 184 TP 3
LEGEND
SYM CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
1/3 OCTAVE NUMBER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AIR EJCT. W/C SHRD. W. LIP 40PSI
RUN 184 TP 4
LEGEND
SYM CH PARAMETER
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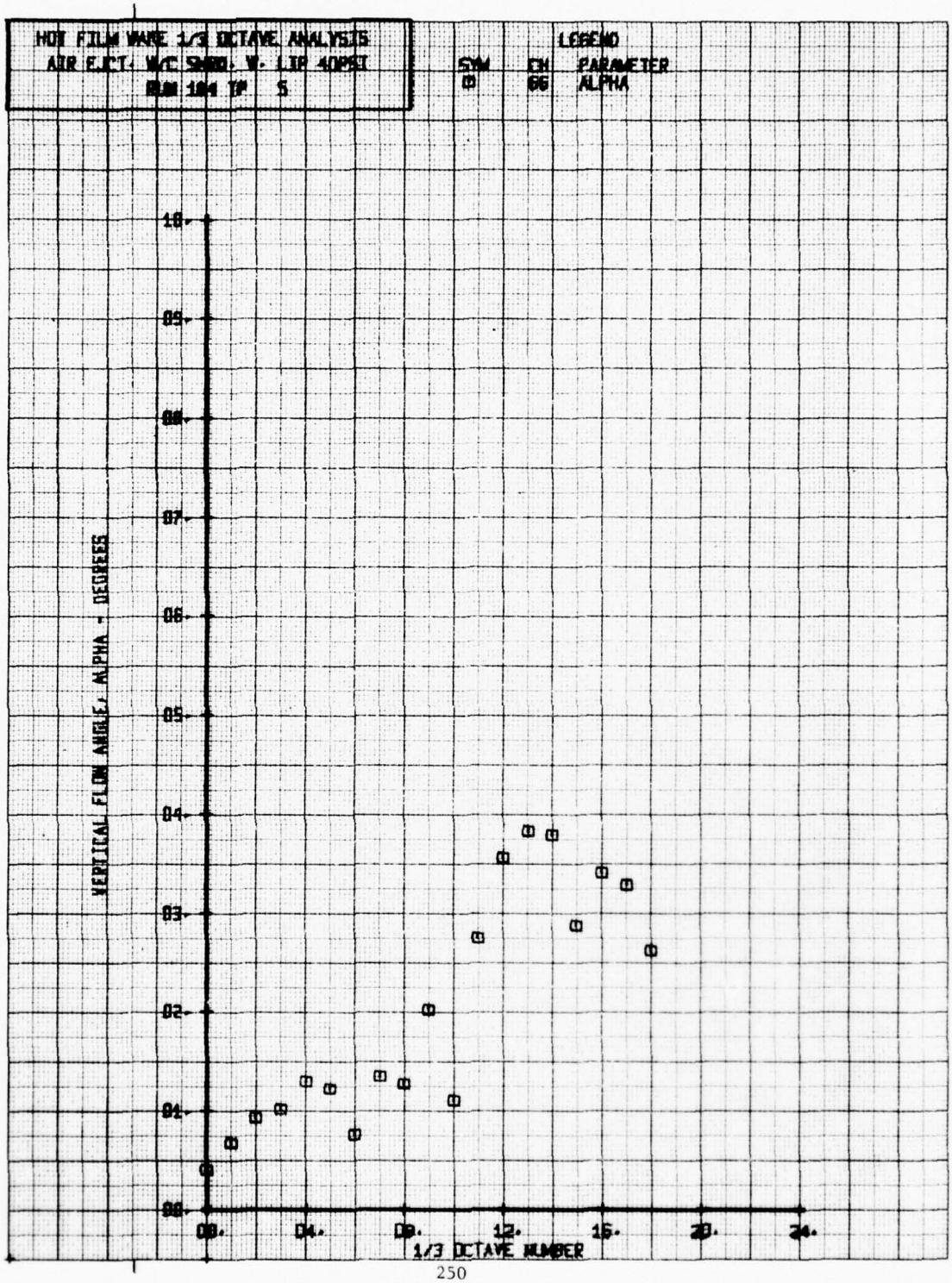
VERTICAL FLOW ANGLE, ALPHA - DEGREES
1/3 OCTAVE NUMBER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AIR EJCT. W/C SHED. W. LIP 40PSI
RUN 104 TP 5
LEGEND
SYM CH PARAMETER
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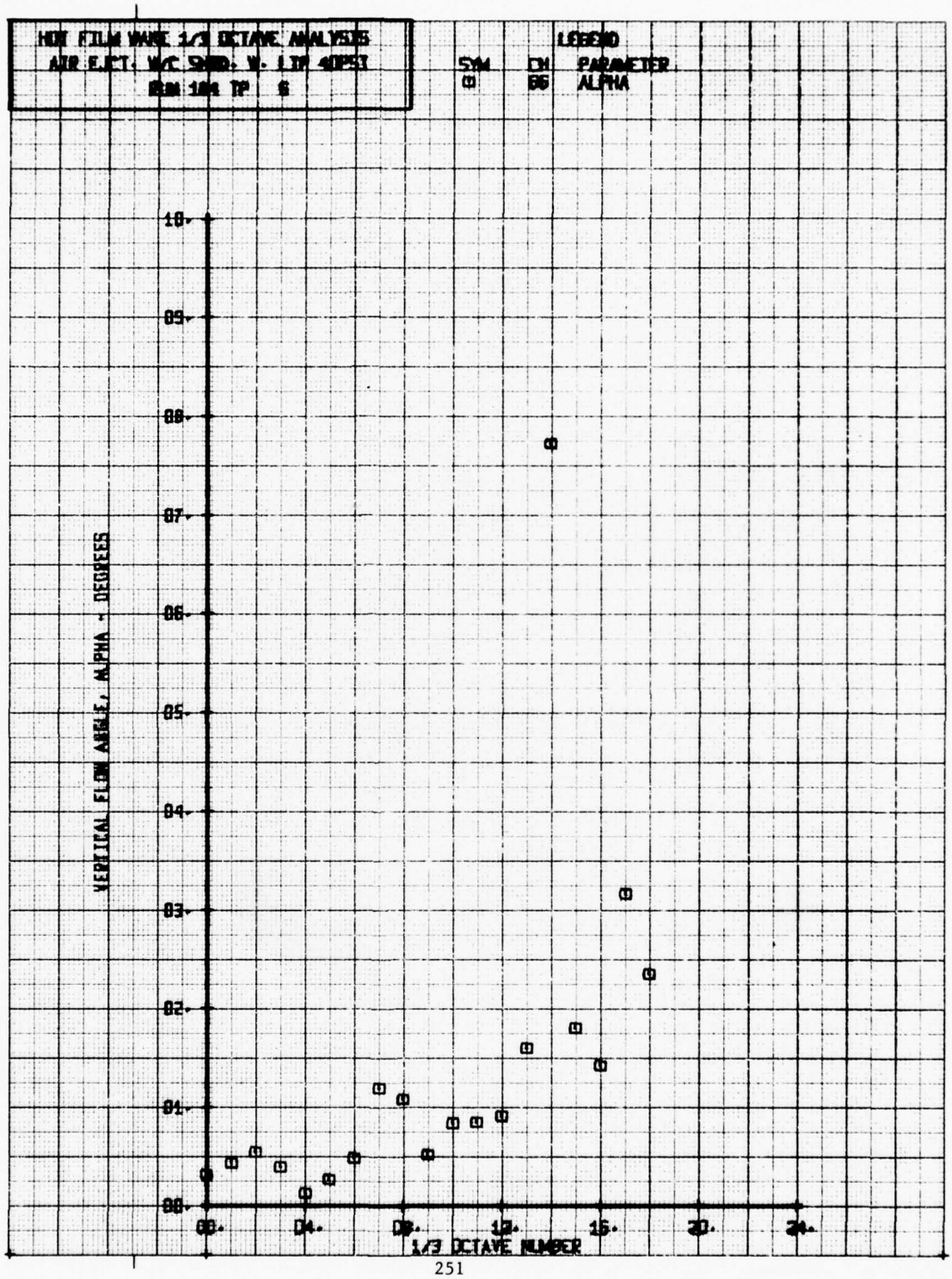
VERTICAL FLOW ANGLE, ALPHA - DEGREES
1/3 OCTAVE NUMBER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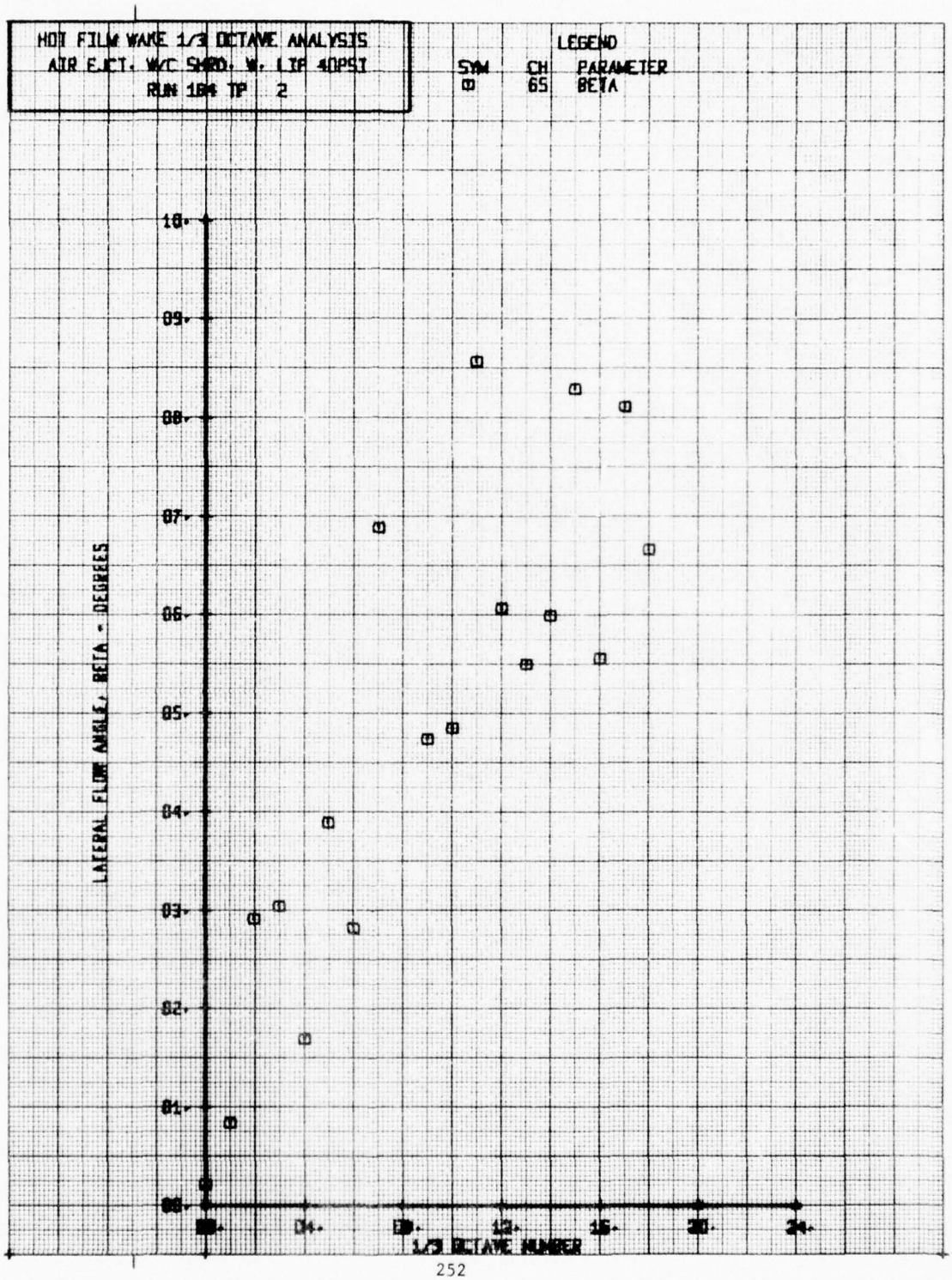
AIR EJCT. W/C SHED. W. LTP 40PSI
RUN 104 TP 6
LEGEND
SYM CH PARAMETER
B 06 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
1/3 OCTAVE NUMBER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AIR EJCT. W/C SHRD. W. LIP 40PSI
RUN 184 TP 2
LEGEND
SYM CH PARAMETER
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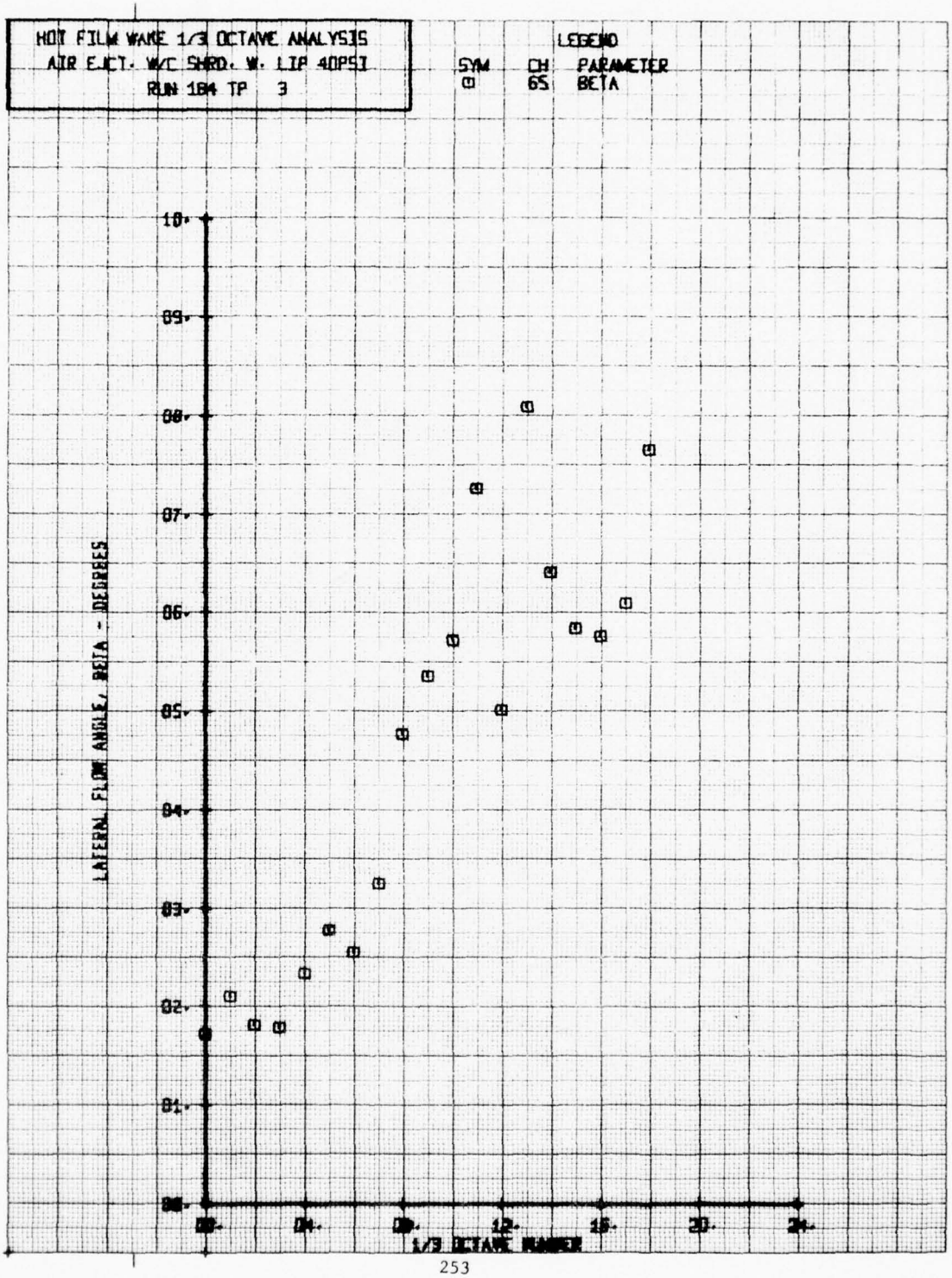
LATERAL FLOW ANGLE, BETA - DEGREES
1/3 OCTAVE NUMBER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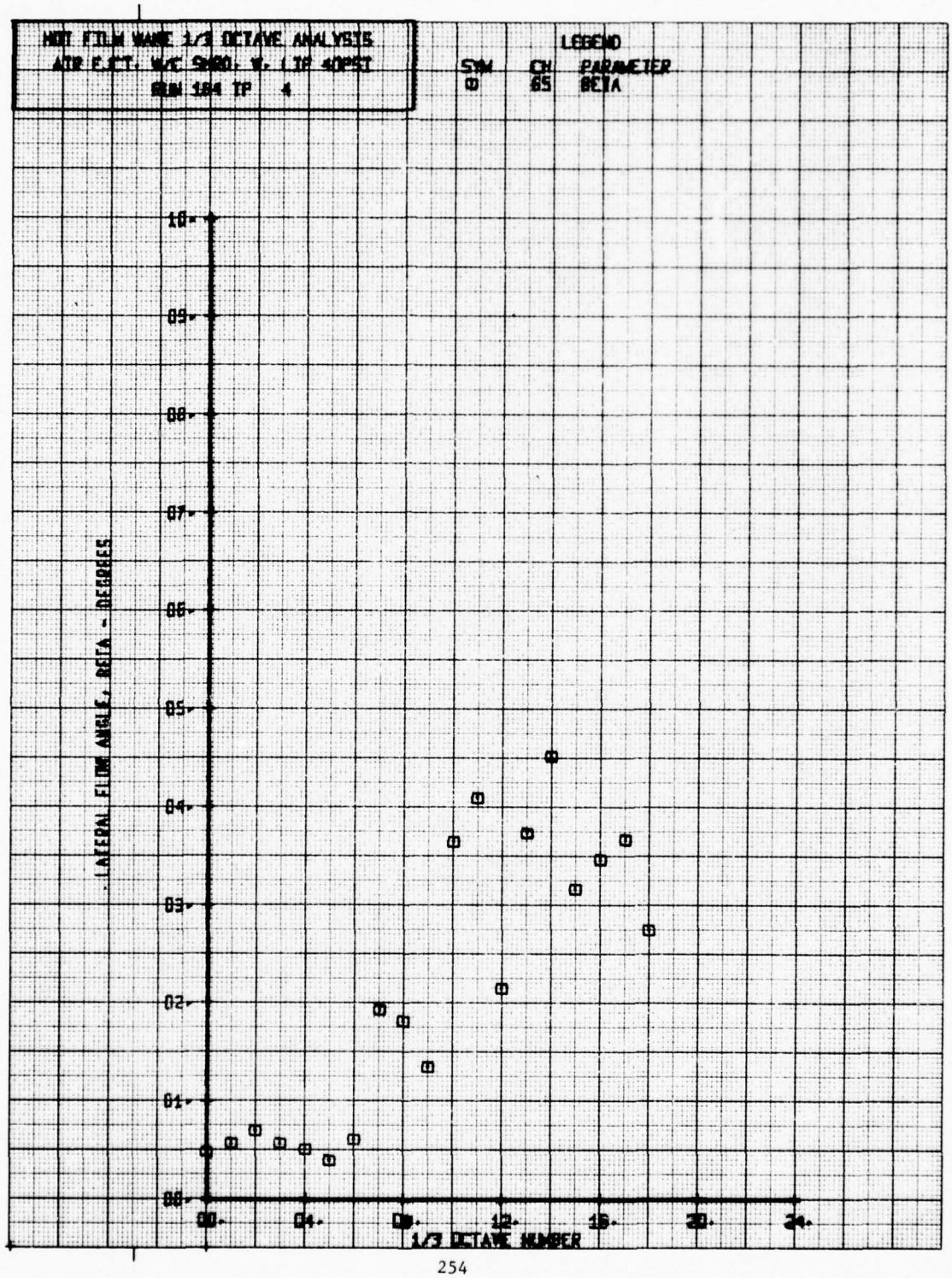
AIR EJCT. W/C SHRD. W. LIP 40PSI
RUN 184 TP 3
LEGEND
SYM CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
1/3 OCTAVE NUMBER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ATR E.CT. W/C 5000. W. 1 IP 40PST
RUN 184 TP 4
LEGEND
SYM CH PARAMETER
65 BETA
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LATERAL FLOW ANGLE, BETA - DEGREES
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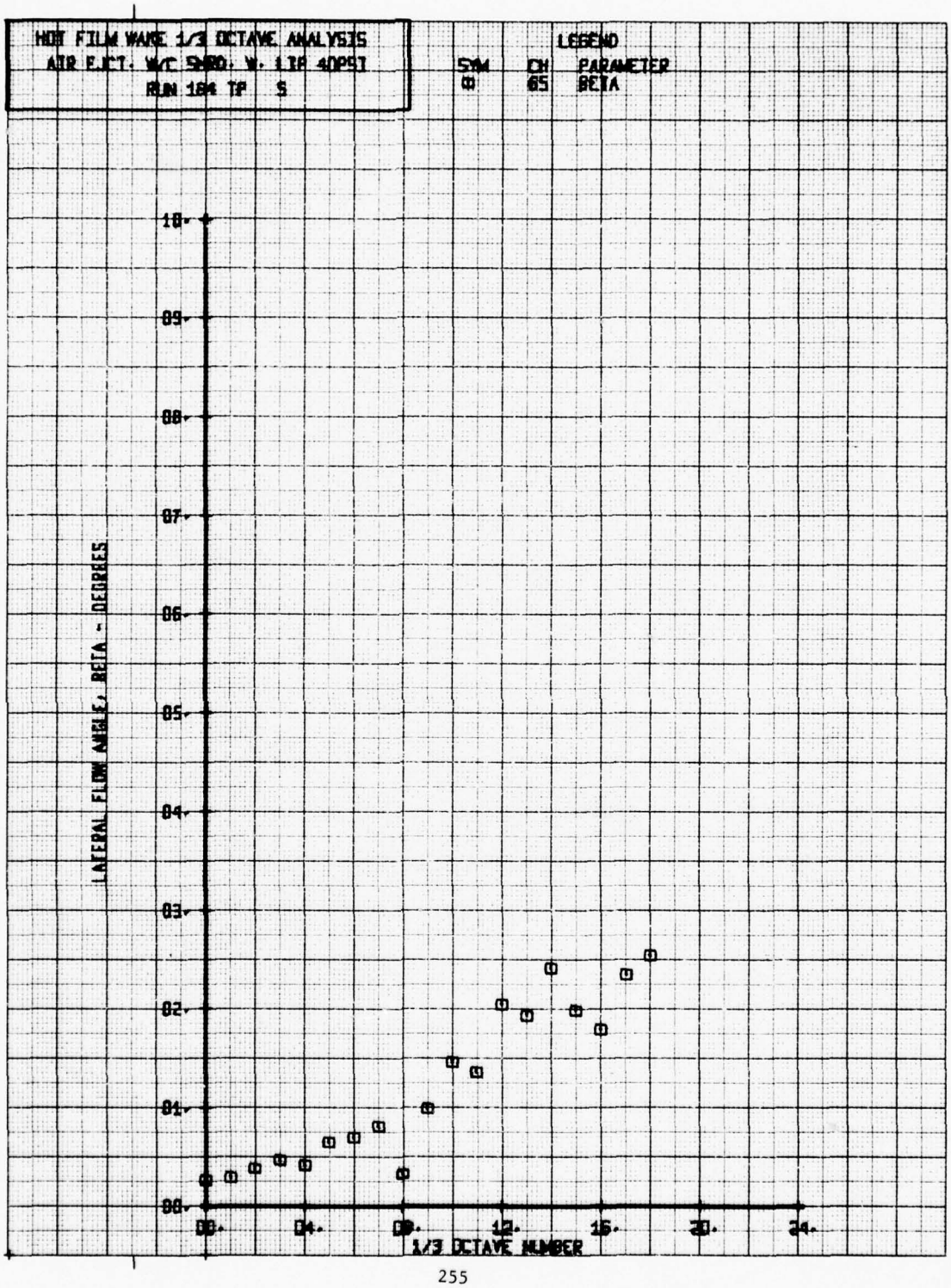
1/3 OCTAVE NUMBER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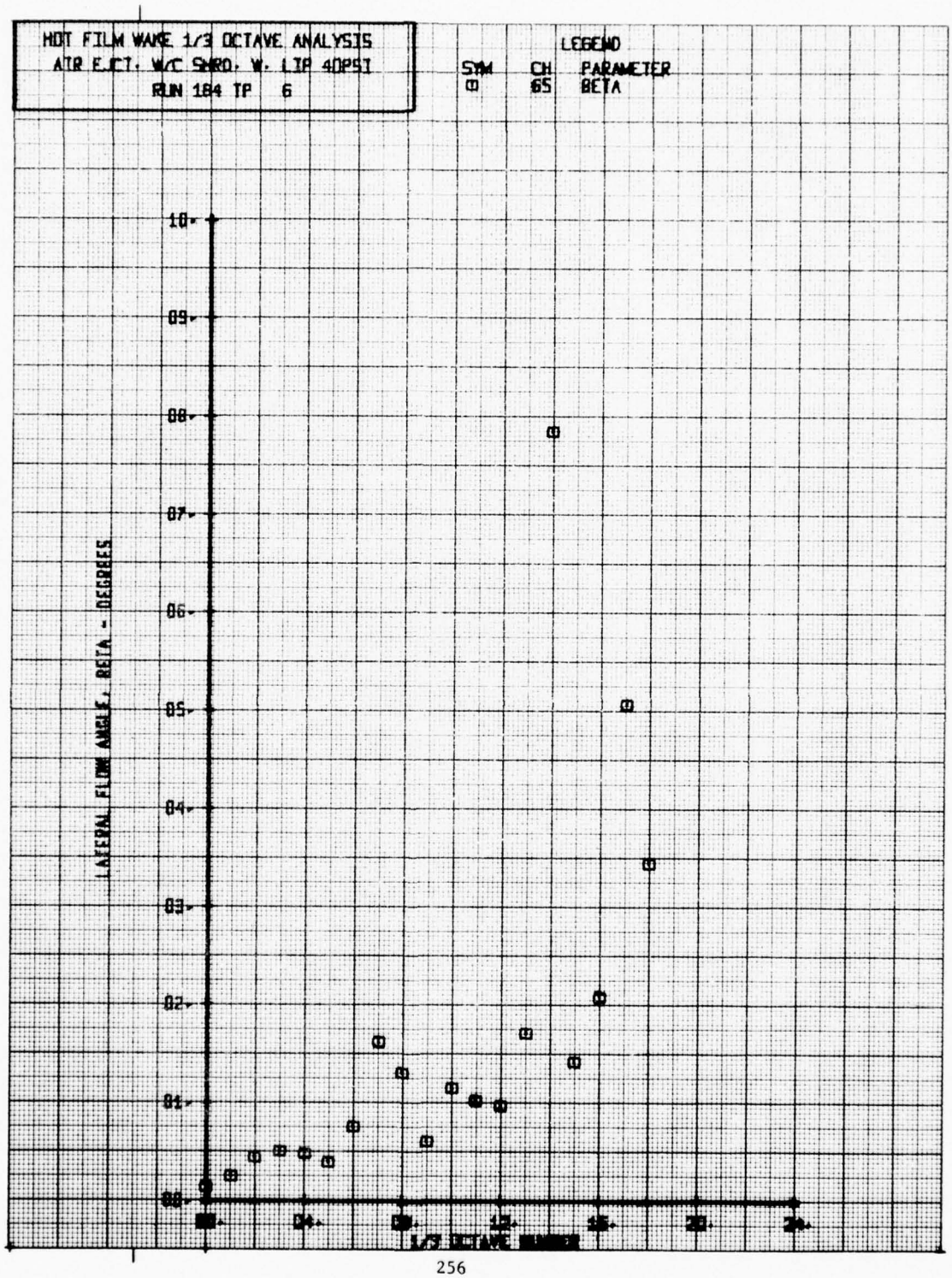
RUN 184 TP 5
LEGEND
SYM CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
1/3 OCTAVE NUMBER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LEGEND
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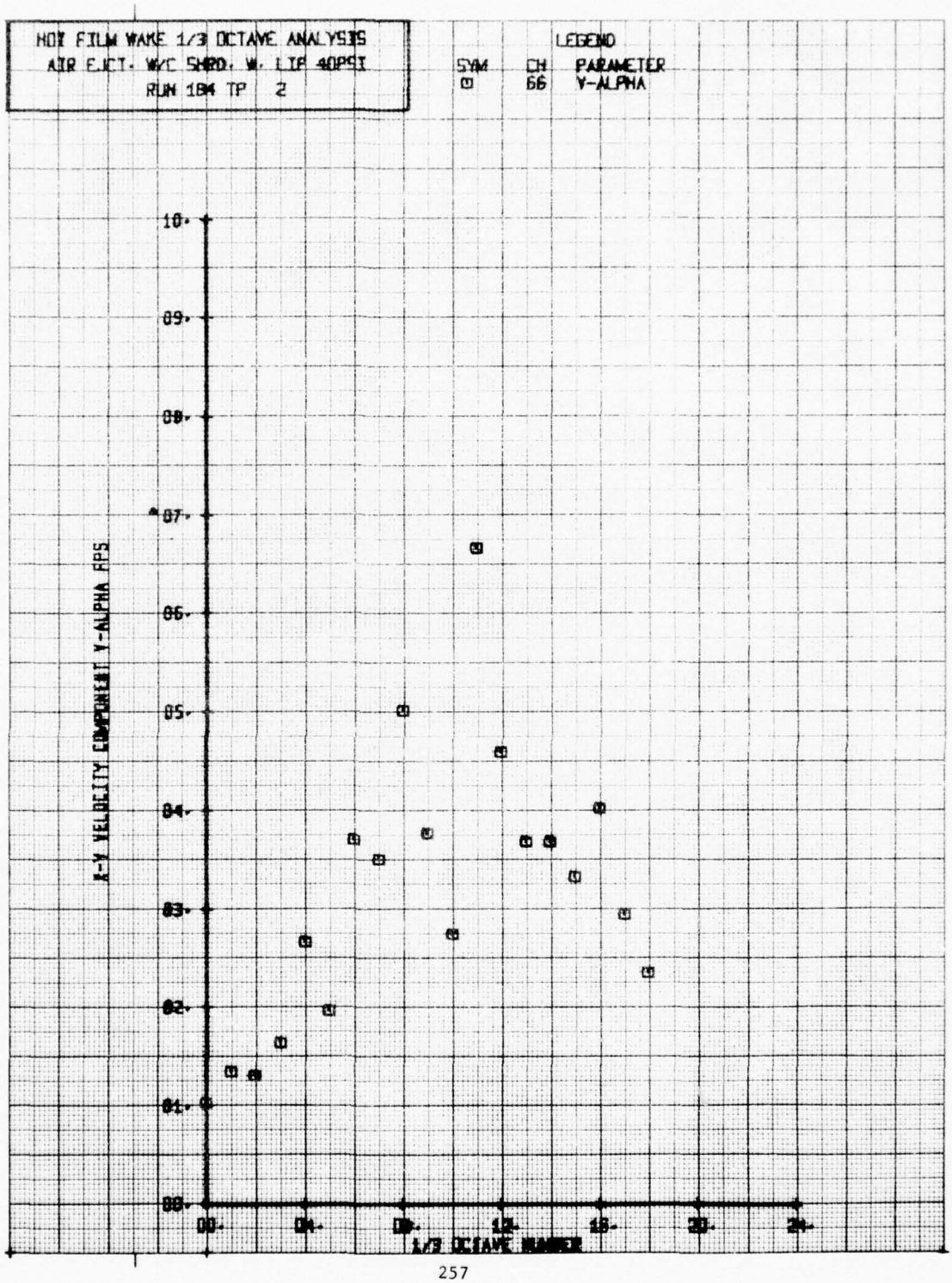
LATERAL FLOW ANGLE, BETA - DEGREES
1/3 OCTAVE NUMBER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LEGEND
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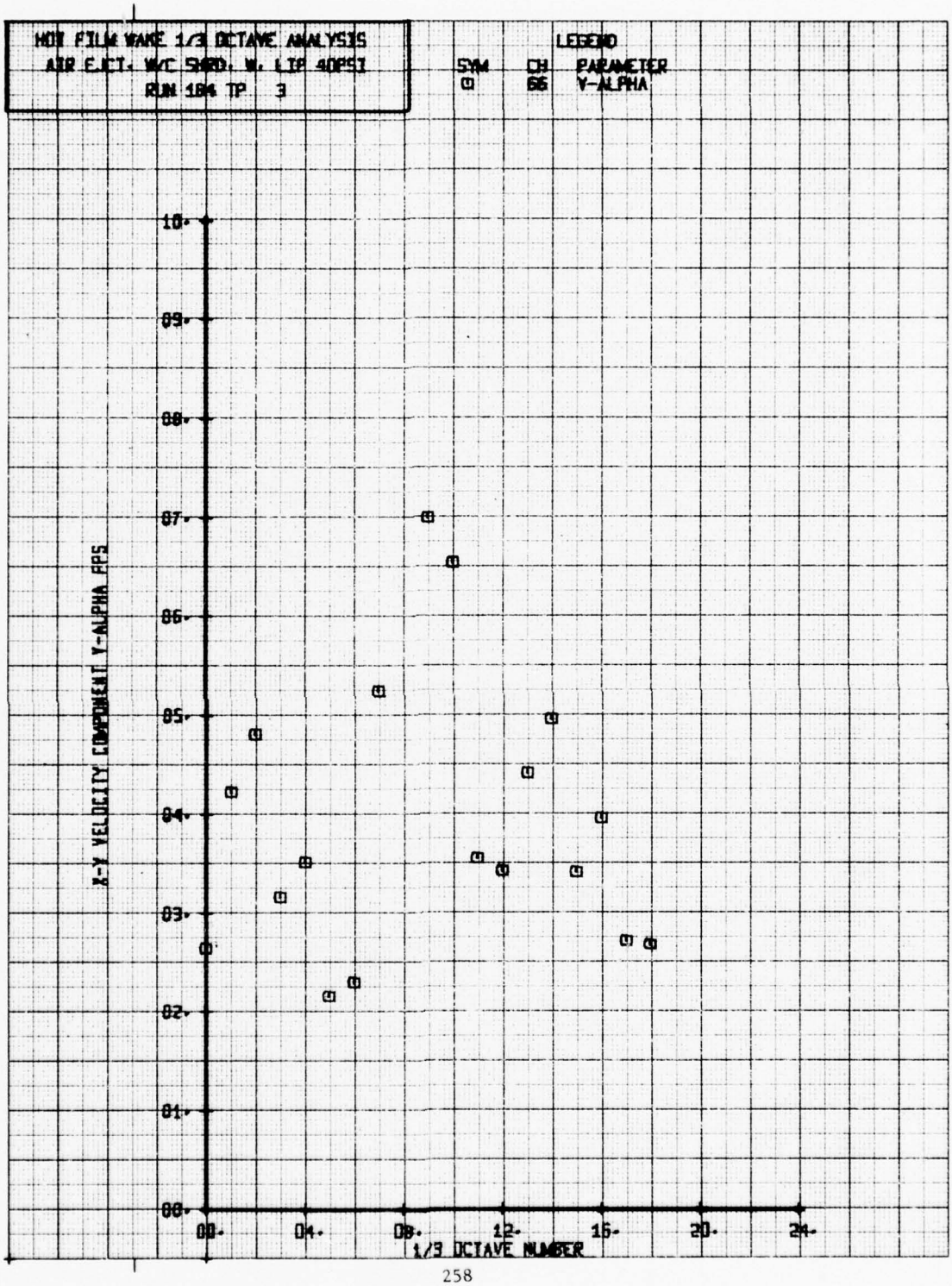
1/3 OCTAVE NUMBER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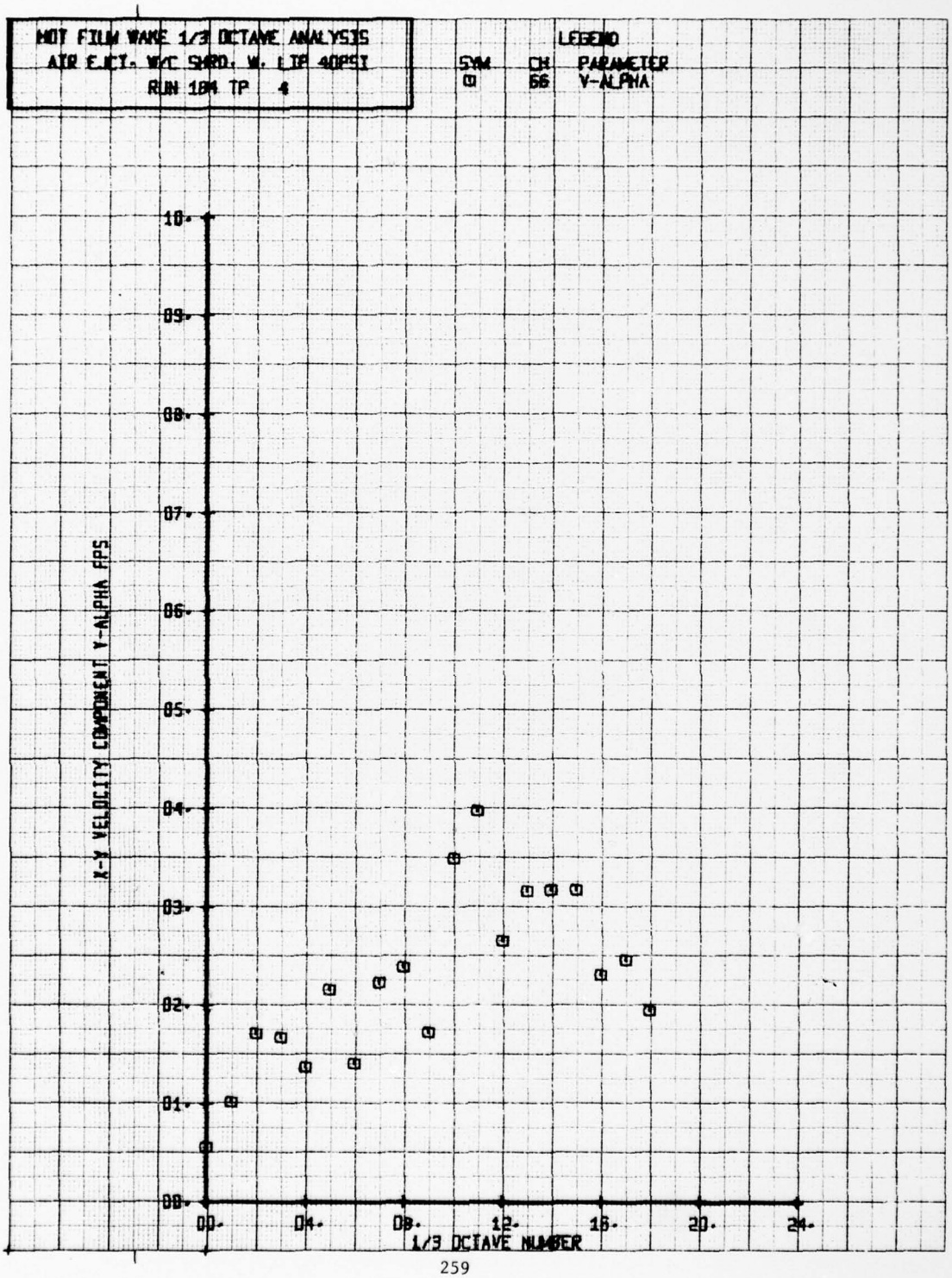
1/3 OCTAVE NUMBER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RUN 184 TP 4
LEGEND
SYM CH PARAMETER
66 V-ALPHA
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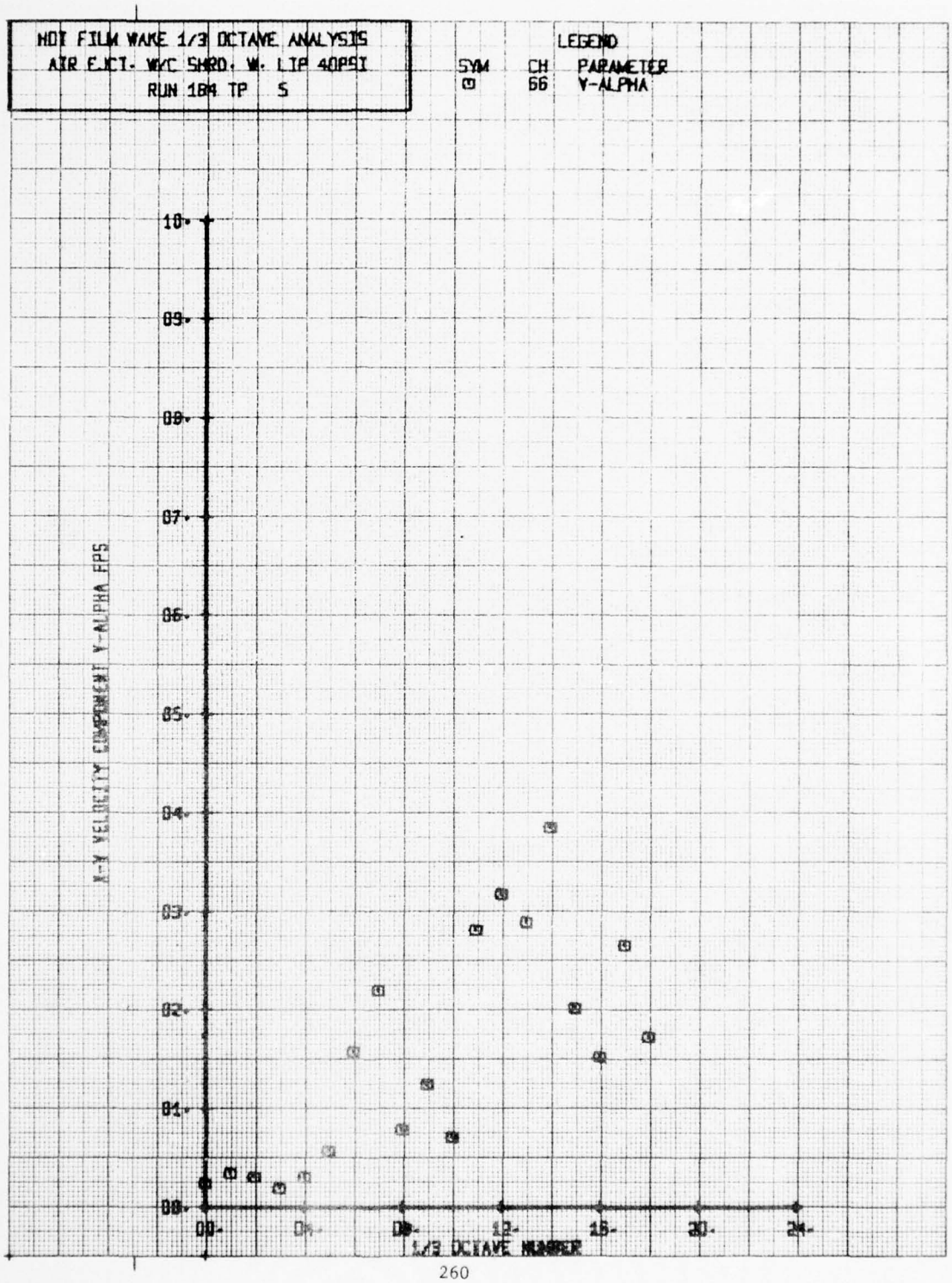
1/3 OCTAVE NUMBER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RUN 184 TP S
LEGEND
SYM CH PARAMETER
66 V-ALPHA
X-V VELOCITY COMPONENT V-ALPHA FPS
1/3 OCTAVE NUMBER
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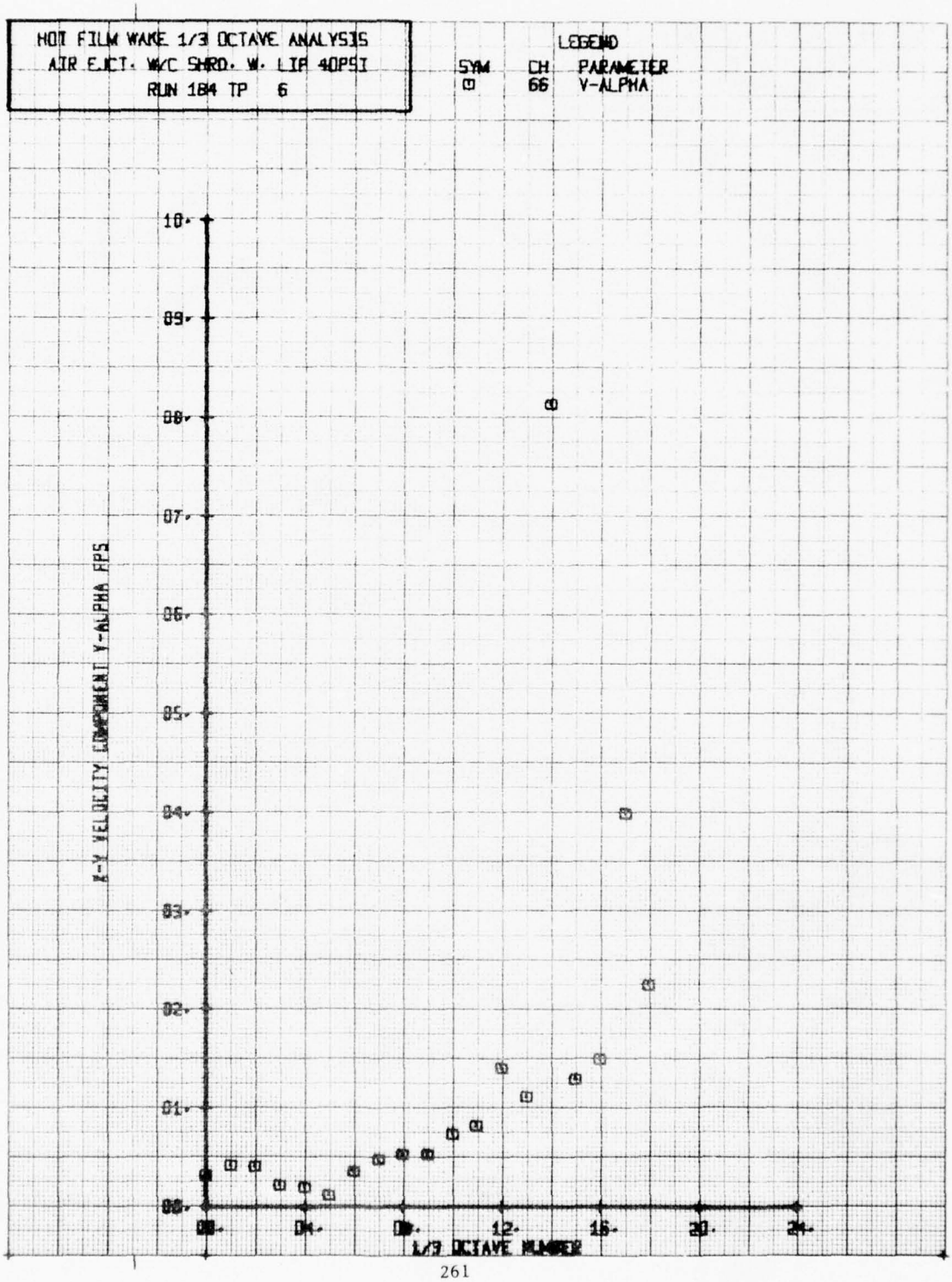
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RUN 184 TP 6
LEGEND
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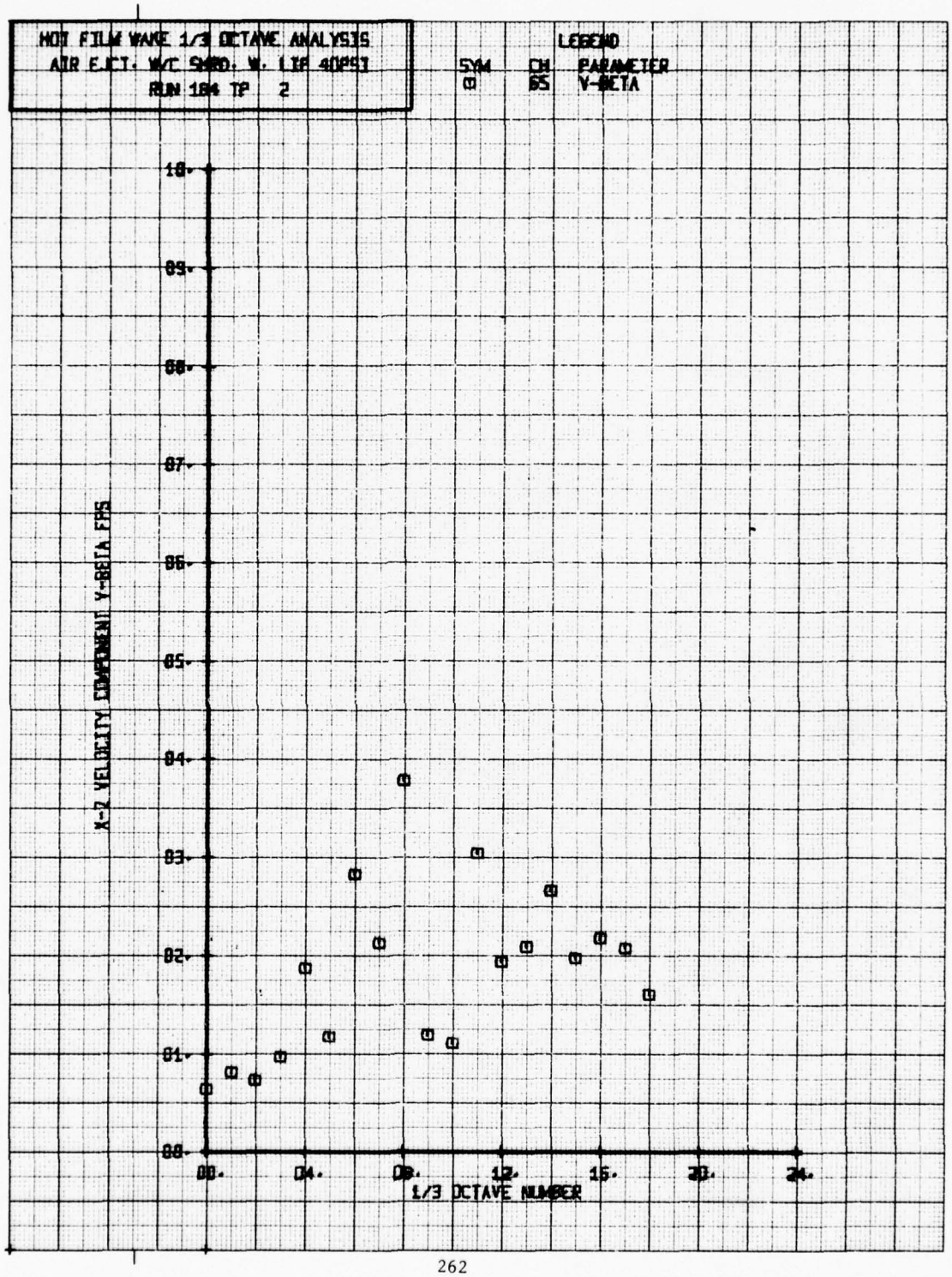
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SYM CH PARAMETER
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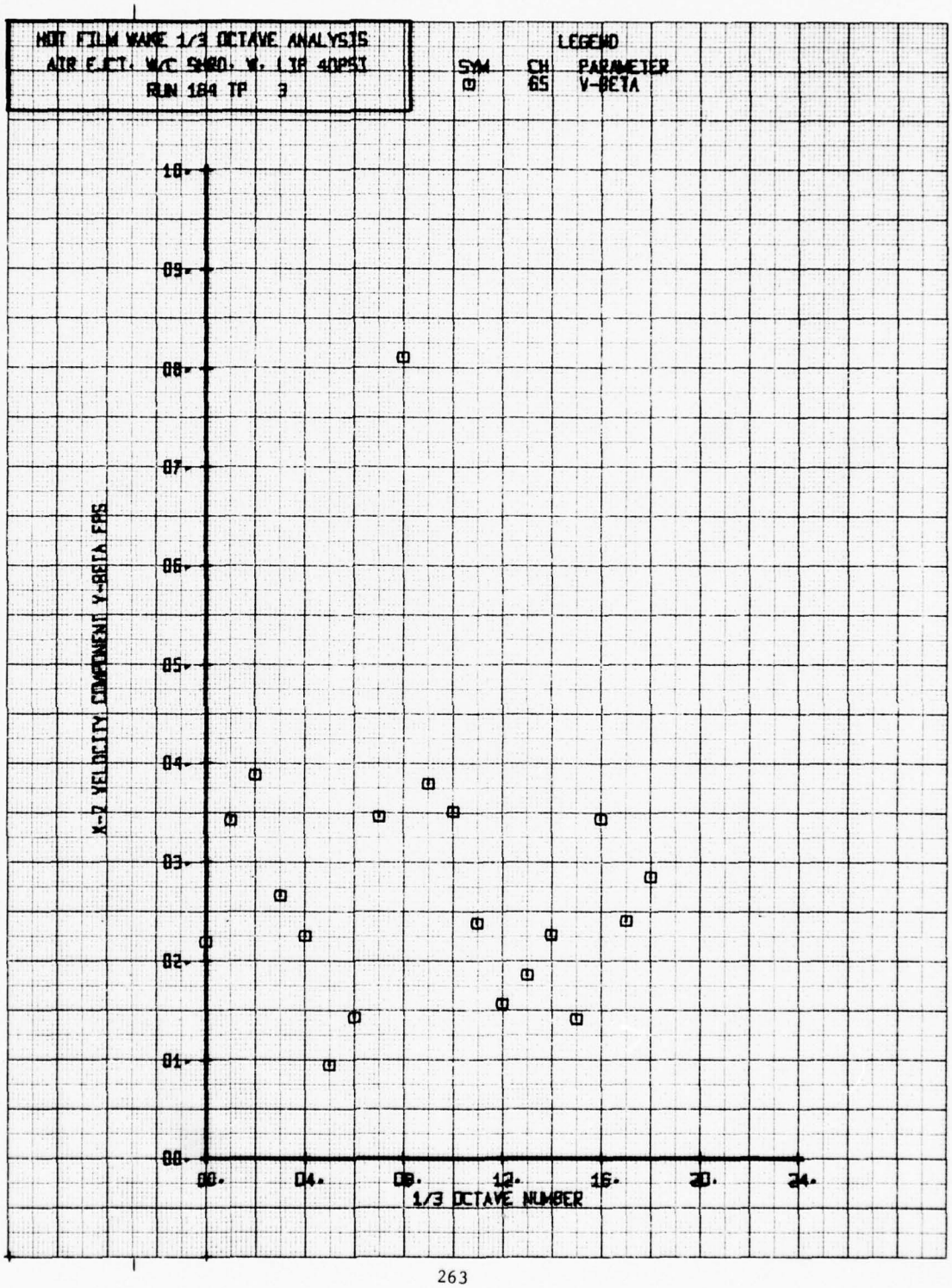
1/3 OCTAVE NUMBER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SYM CH PARAMETER
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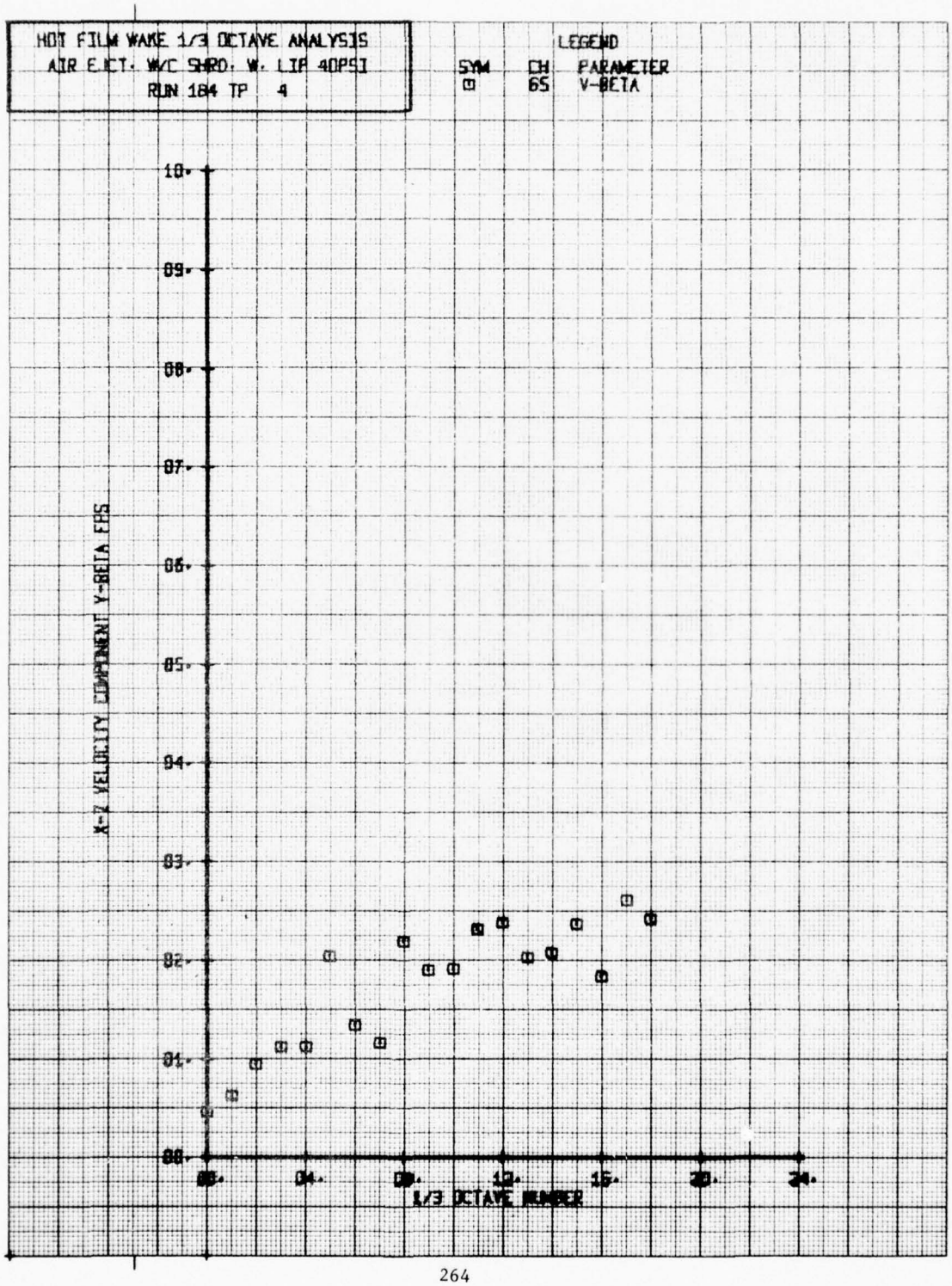
1/3 OCTAVE NUMBER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AIR EJCT. W/C SHRD. W. LIP 40PSI
RUN 184 TP 4
LEGEND
SYM CH PARAMETER
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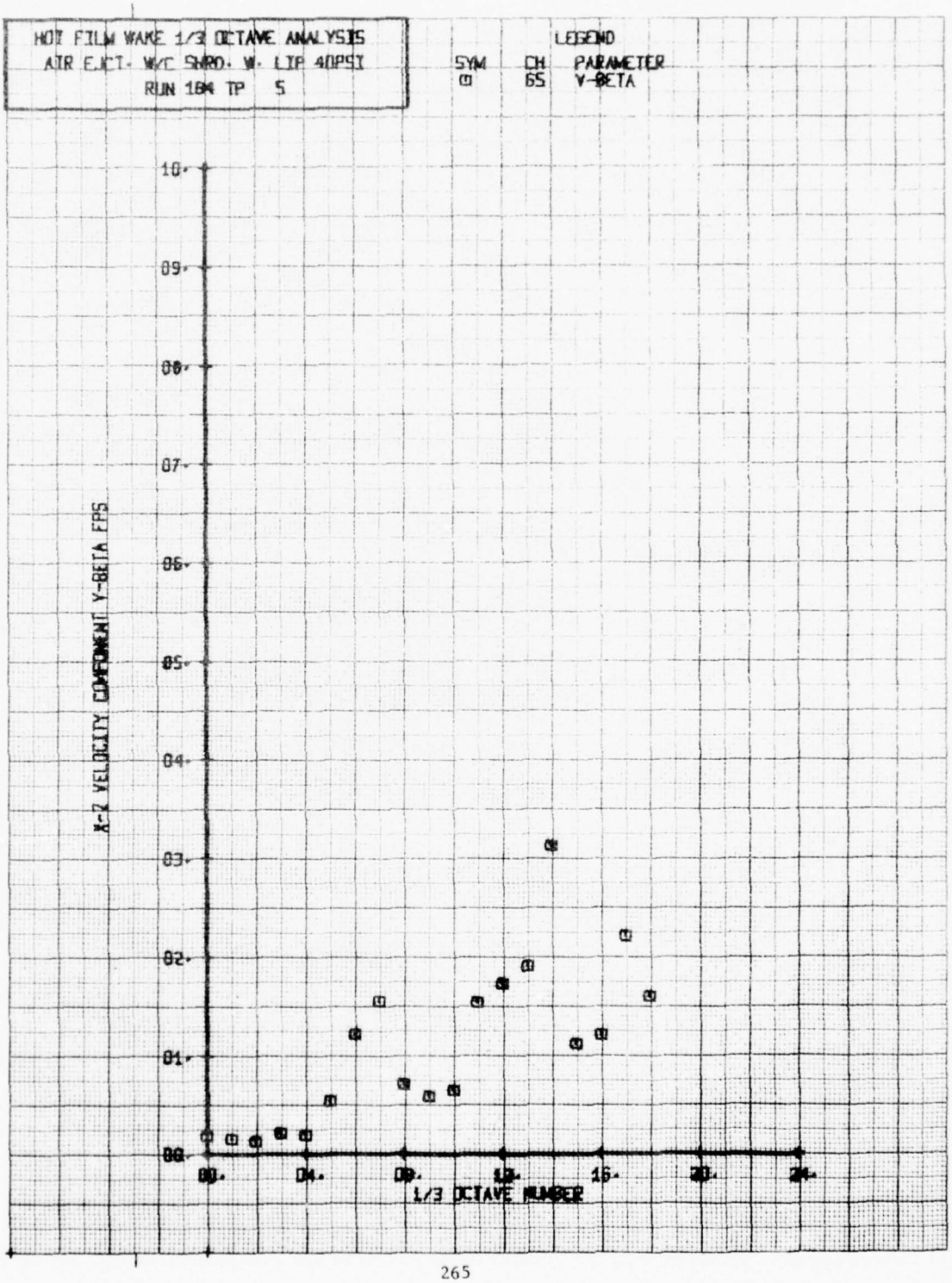
X-Z VELOCITY COMPONENT V-BETA FPS
1/3 OCTAVE NUMBER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RUN 184 TP 5
LEGEND
SYM CH PARAMETER
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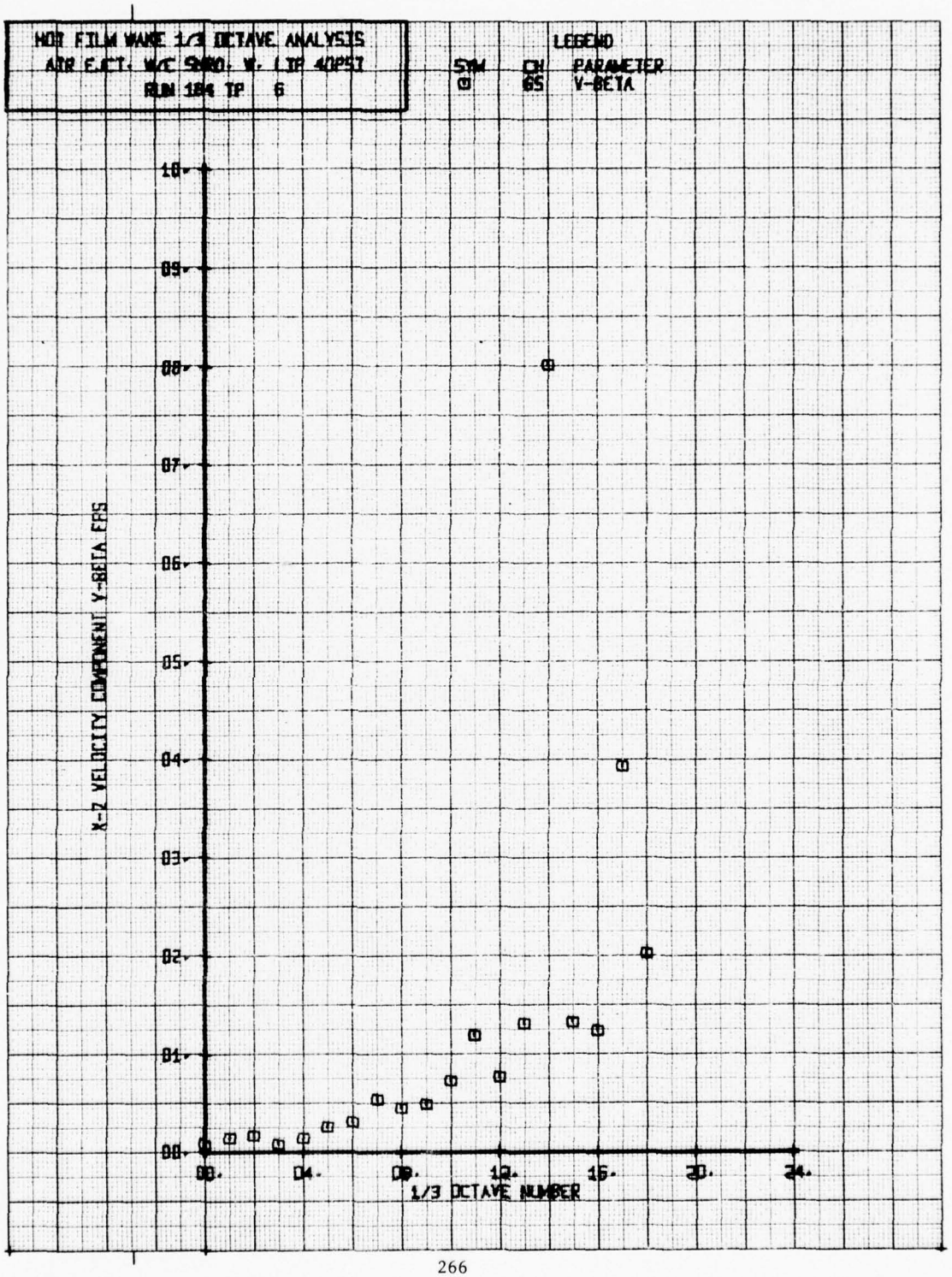
X-Z VELOCITY COMPONENT Y-BETA FPS
1/3 OCTAVE NUMBER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RUN 184 TP 6
LEGEND
SYM CH PARAMETER
65 V-BETA
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X-Z VELOCITY COMPONENT Y-BETA FPS
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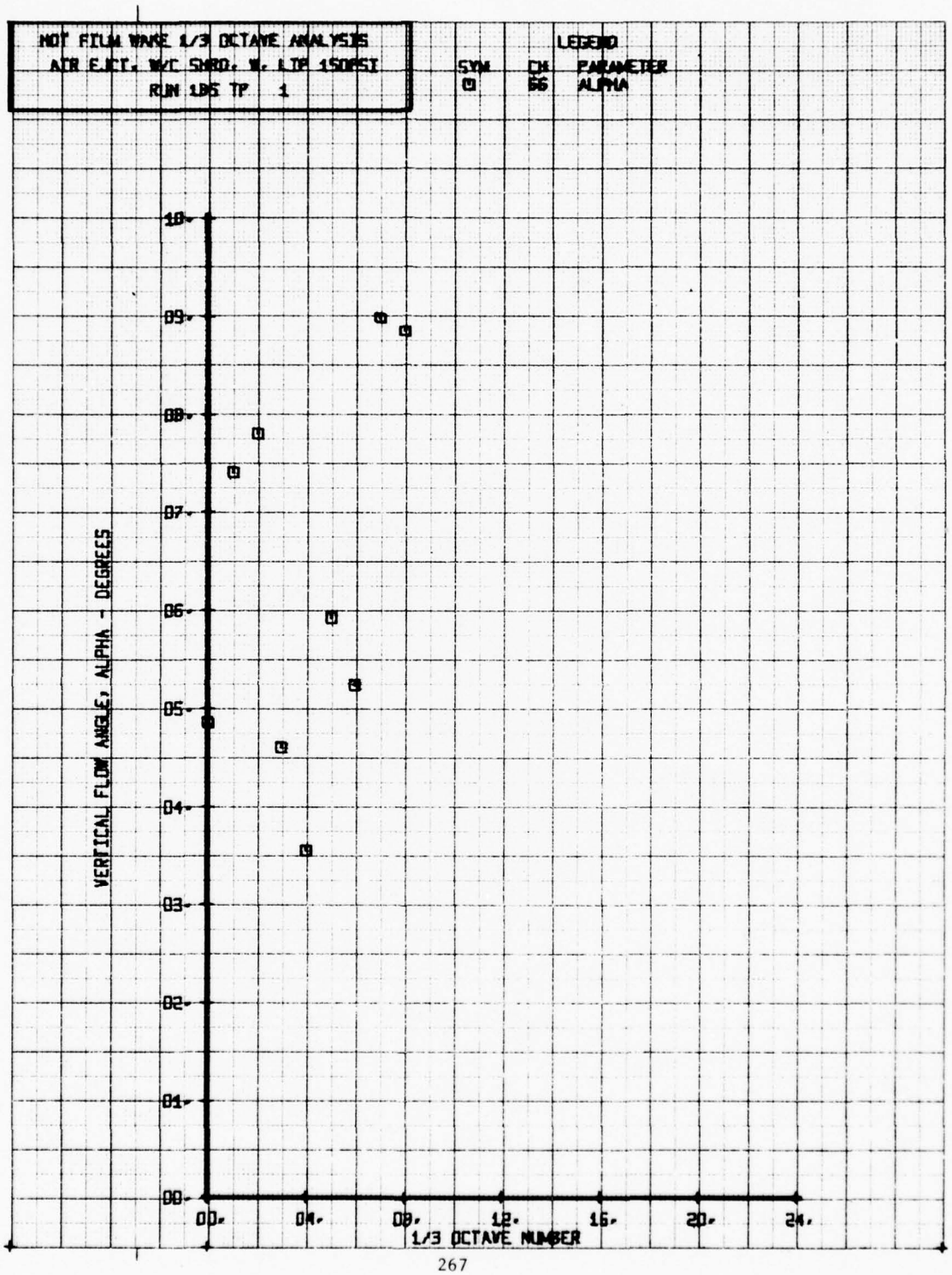
24.
1/3 OCTAVE NUMBER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AIR EJCT. W/C SHRD. W. LTP 150PSI
RUN 1B5 TP 1
LEGEND
SYM CH PARAMETER
56 ALPHA
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VERTICAL FLOW ANGLE, ALPHA - DEGREES
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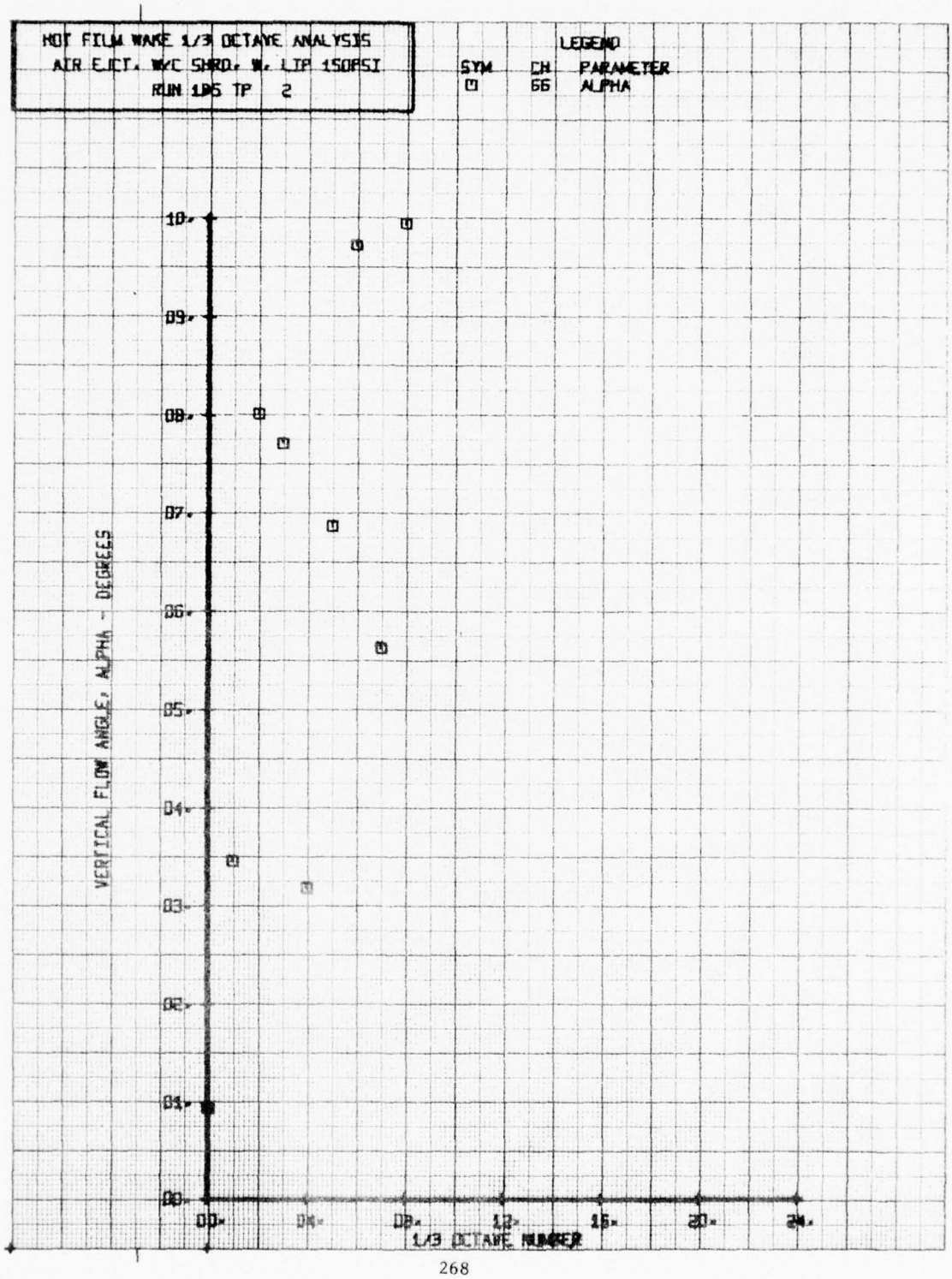
1/3 OCTAVE NUMBER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RUN 105 TP 2
LEGEND
SYM CH PARAMETER
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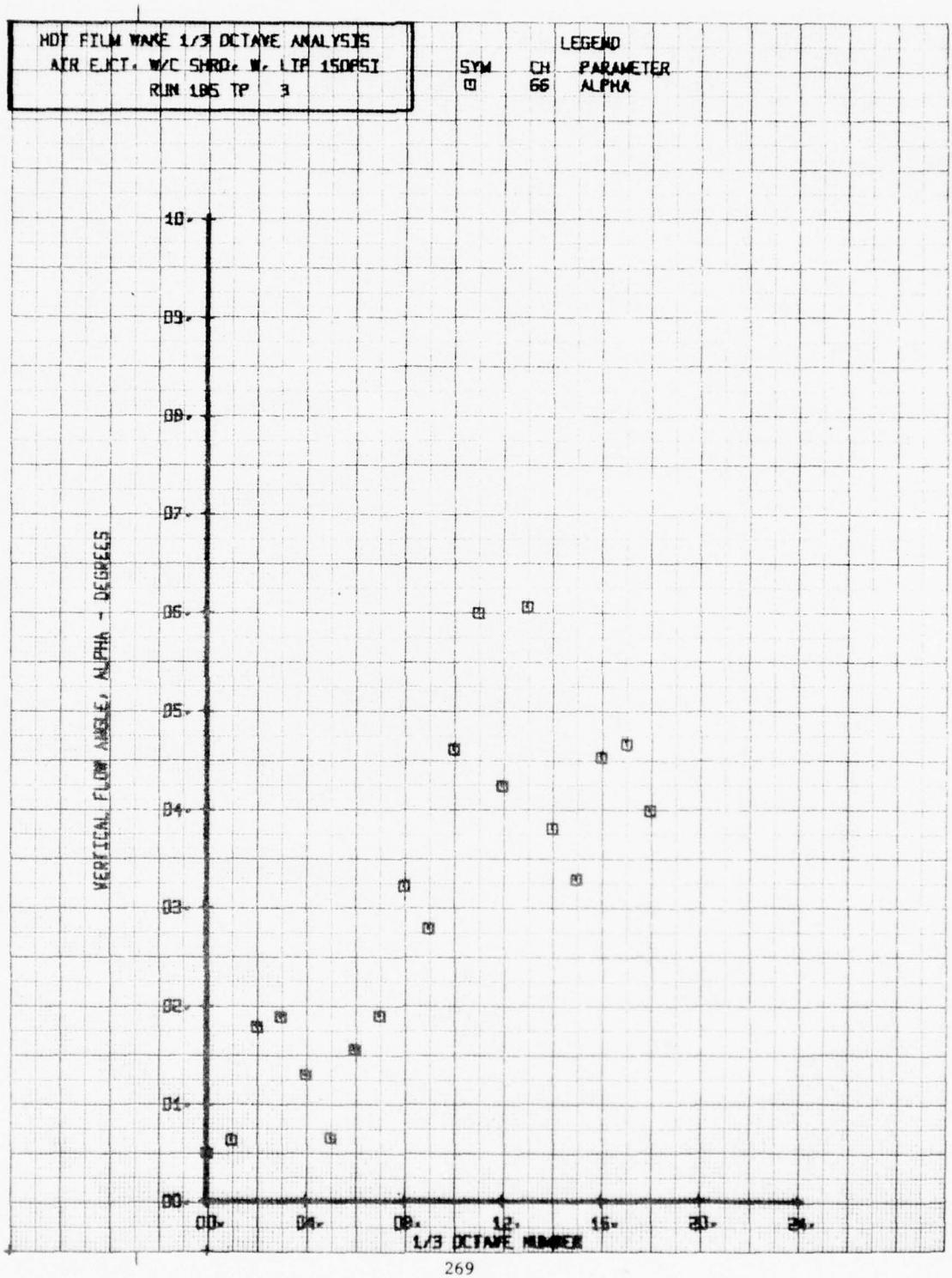
VERTICAL FLOW ANGLE, ALPHA - DEGREES
1/3 OCTAVE NUMBER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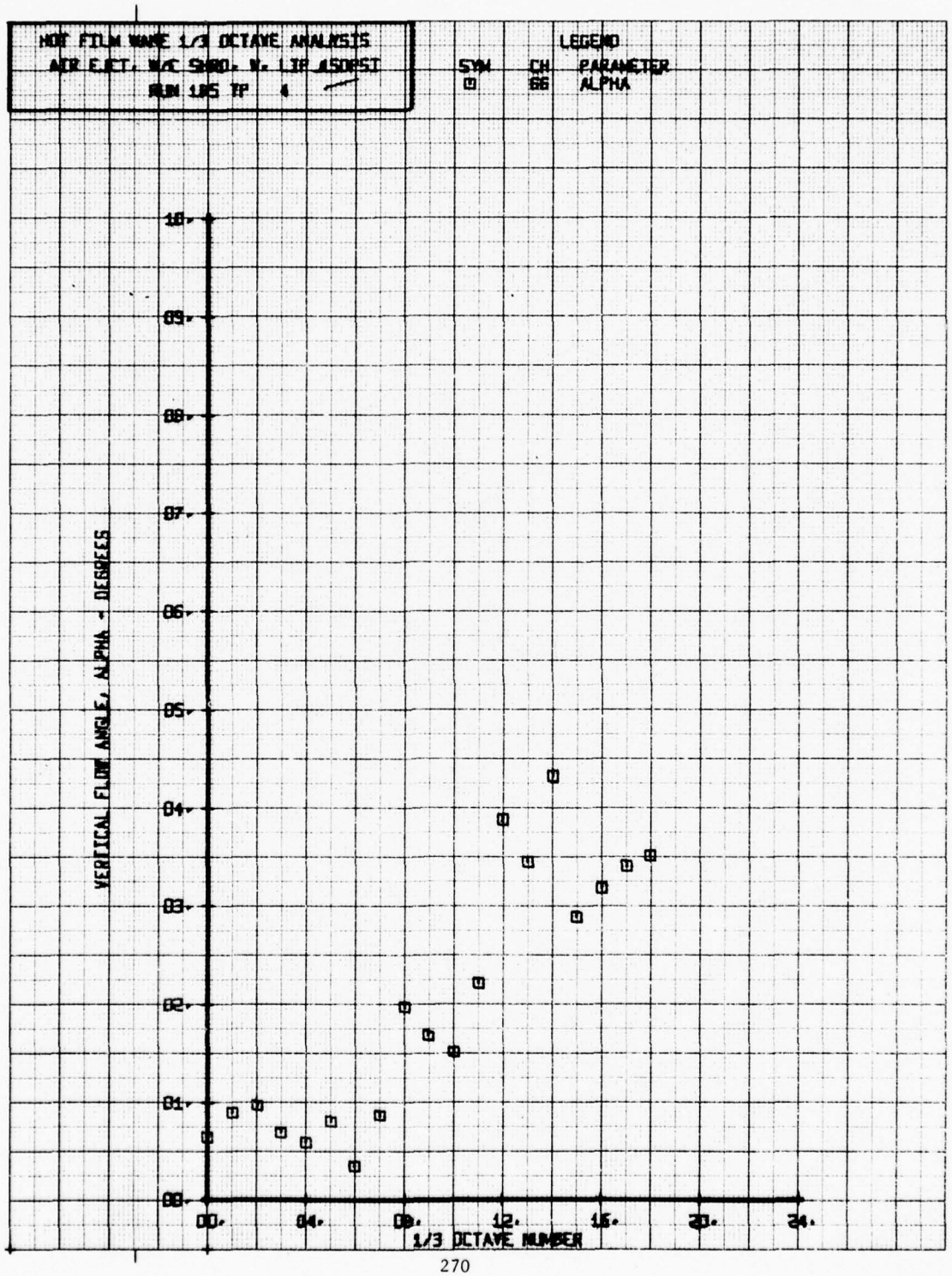
AIR EJCT. W/C SHRD. W. LTP 150PSI
RUN 185 TP 3
LEGEND
SYM CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
AIR EJECT. W/C 5980. N. LIP ASDRSI
RUN 105 TP 4
LEGEND
SYM CH PARAMETER
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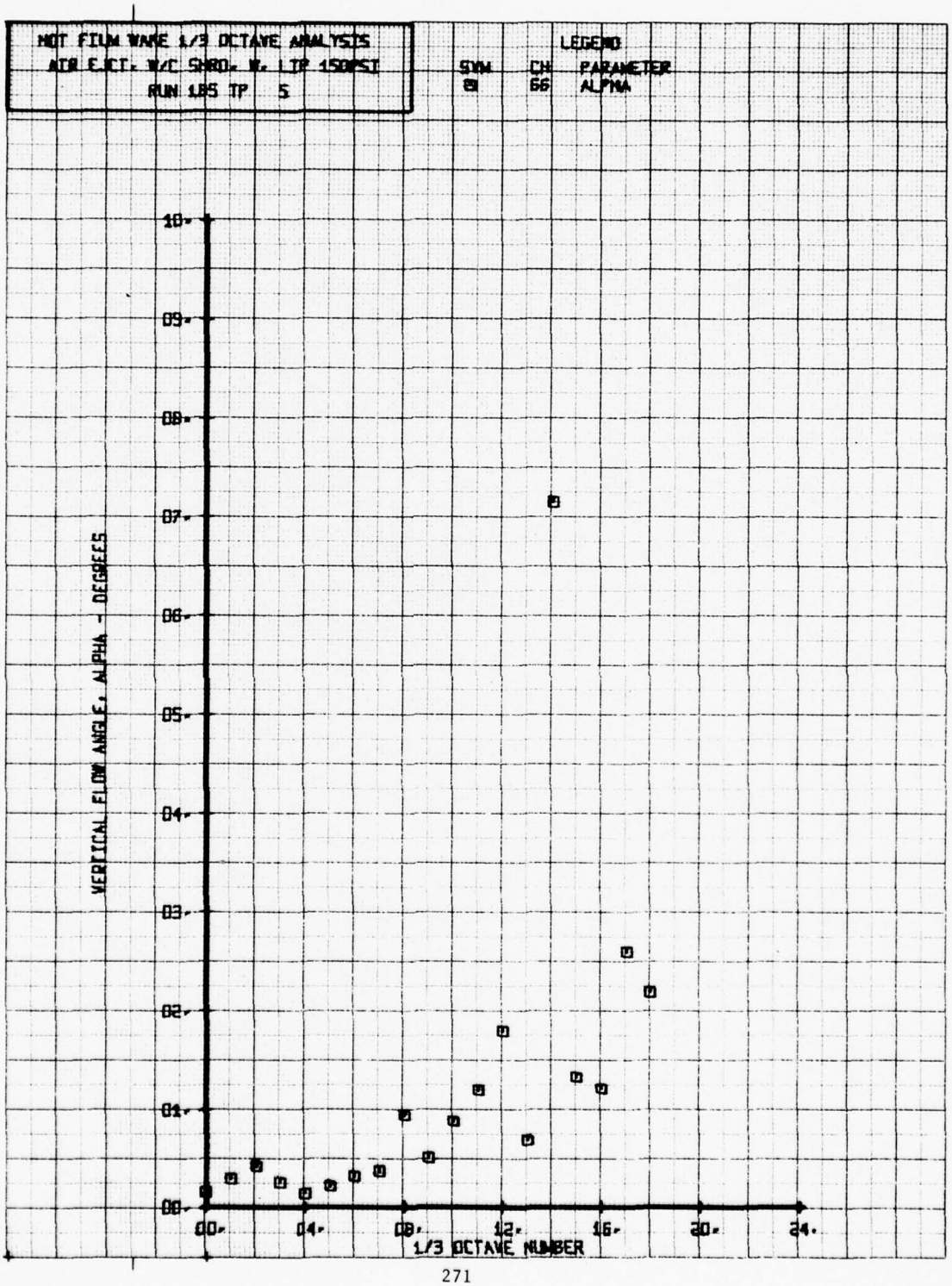
VERTICAL FLOW ANGLE, ALPHA - DEGREES
1/3 OCTAVE NUMBER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ATR EJCT. W/C SHRD. W. LTP 150PSI
RUN 185 TP 5
LEGEND
SYM CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
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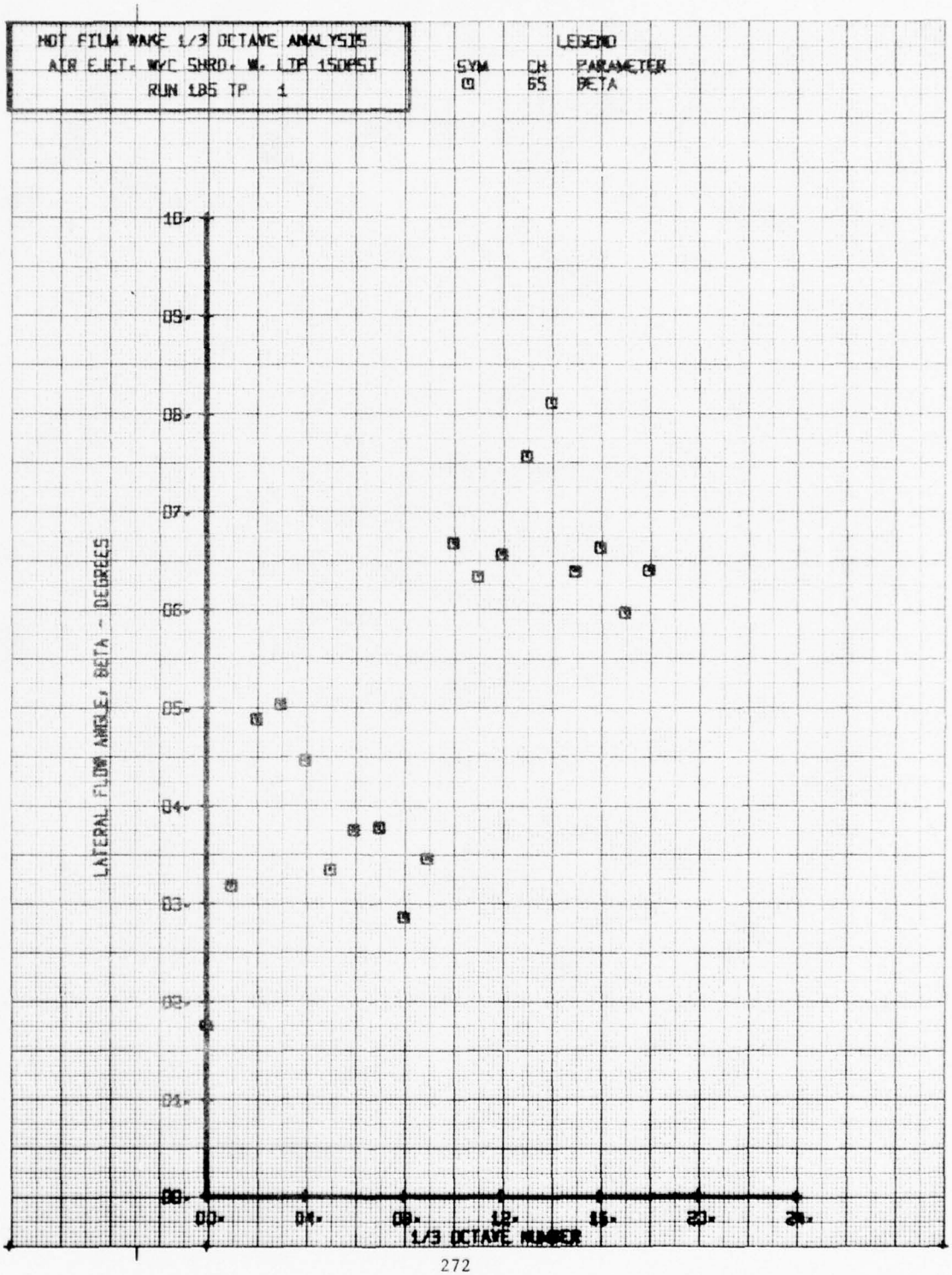
1/3 OCTAVE NUMBER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AIR EJCT. WYC SHRD. W. LTP 150PSI
RUN 185 TP 1
LEGEND
SYM CH PARAMETER
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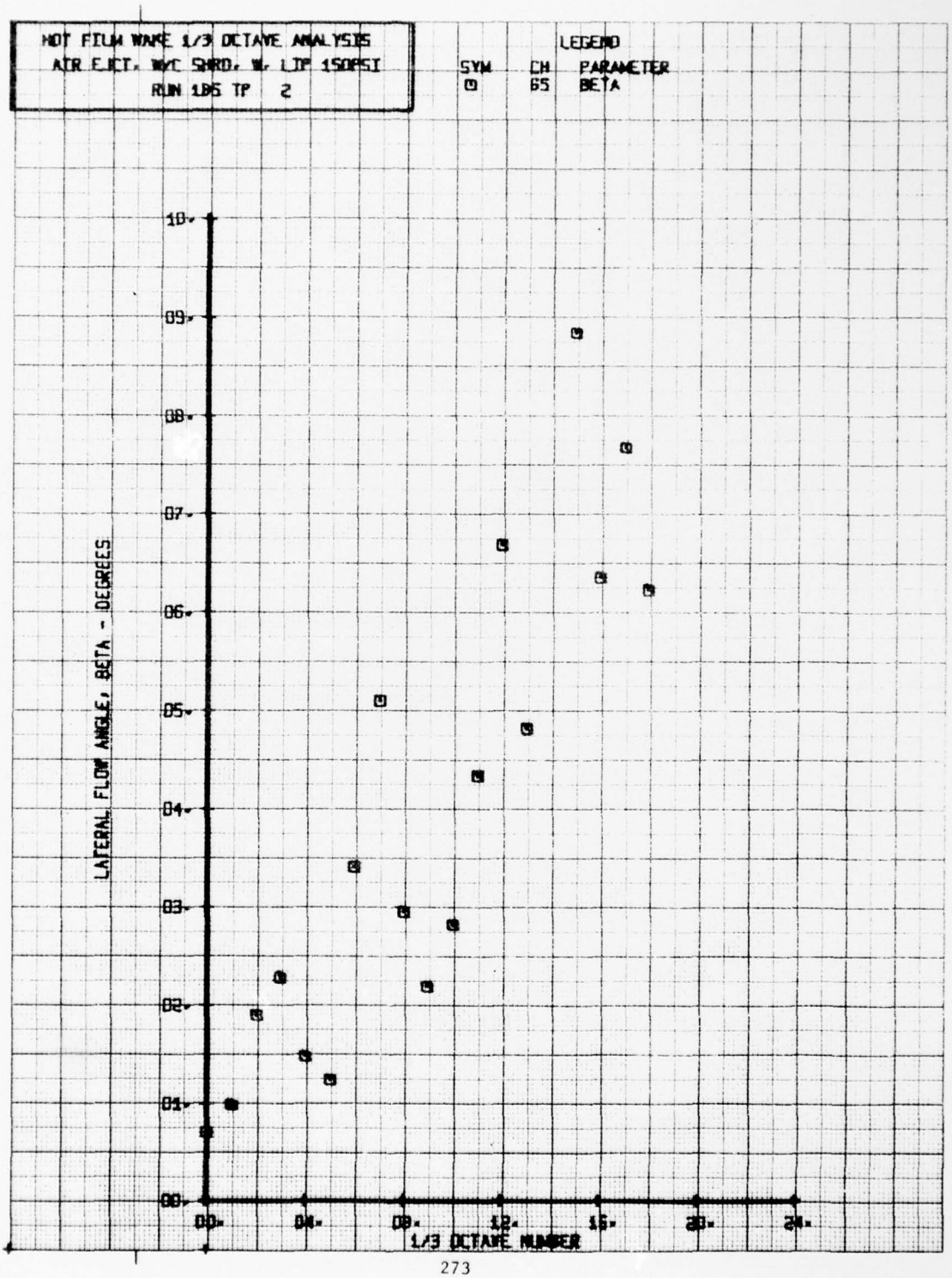
LATERAL FLOW ANGLE, BETA ~ DEGREES
1/3 OCTAVE NUMBER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AIR EJCT. W/C SHRD. W. LTP 150PSI
RUN 106 TP 2
LEGEND
SYM CH PARAMETER
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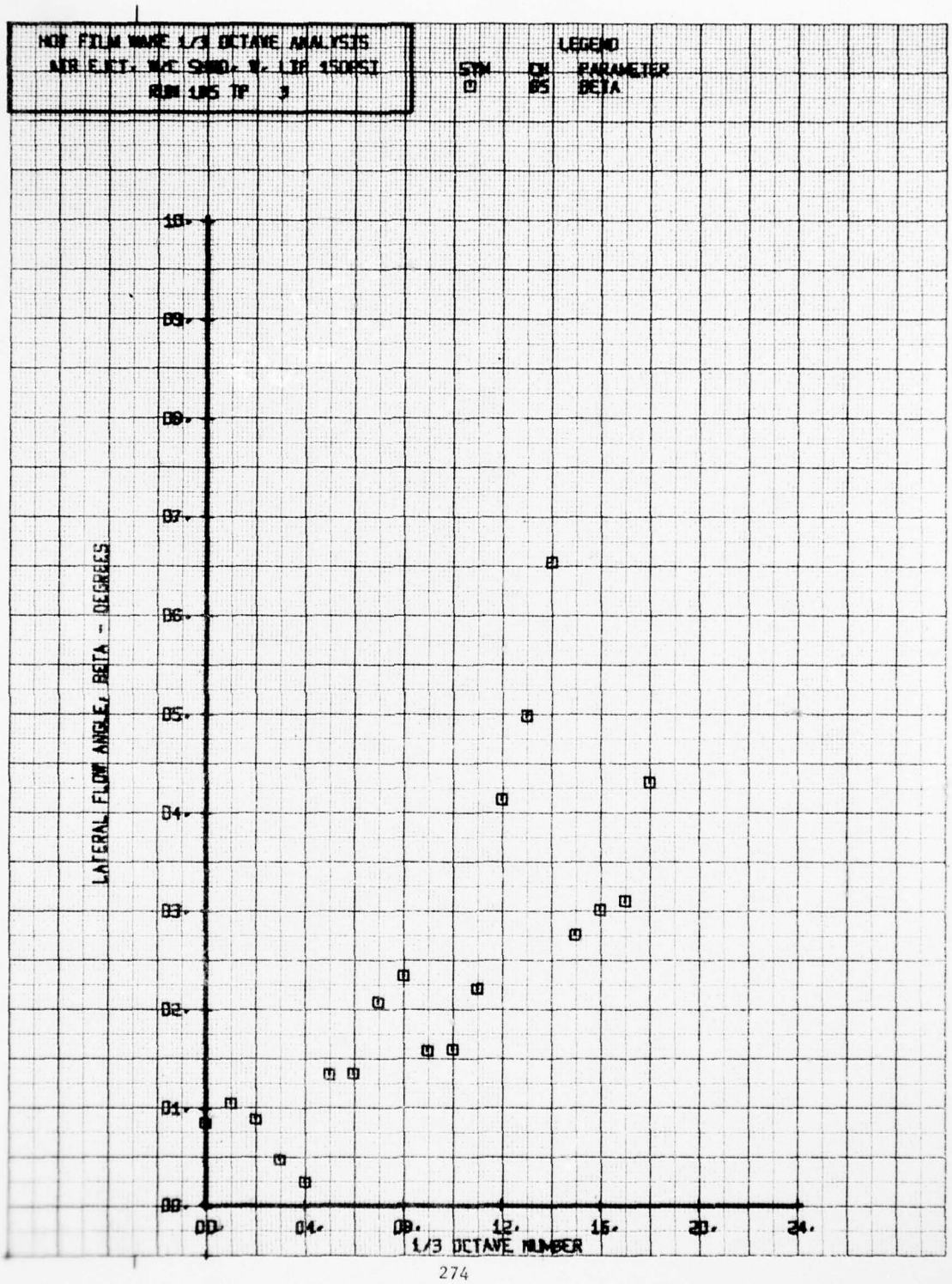
LATERAL FLOW ANGLE, BETA - DEGREES
1/3 OCTAVE NUMBER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AIR EJECT. W/C SUBO. W. LTP 150PSI
RUN 105 TP 3
LEGEND
STM CH PARAMETER
05 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
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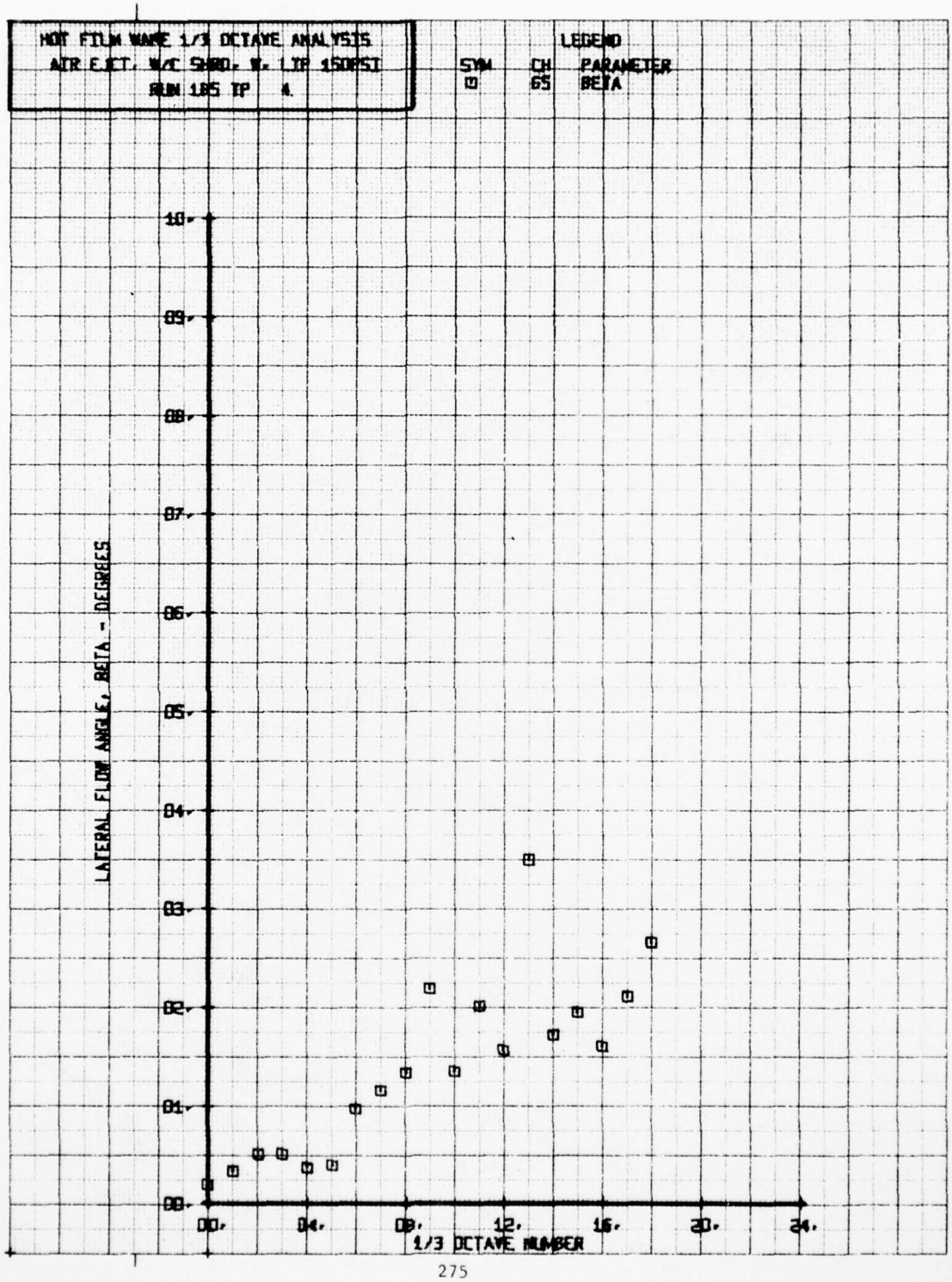
1/3 OCTAVE NUMBER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AIR EJCT. W/C 5480. W. LTP 150PSI
RUN 185 TP 4.
LEGEND
SYM CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
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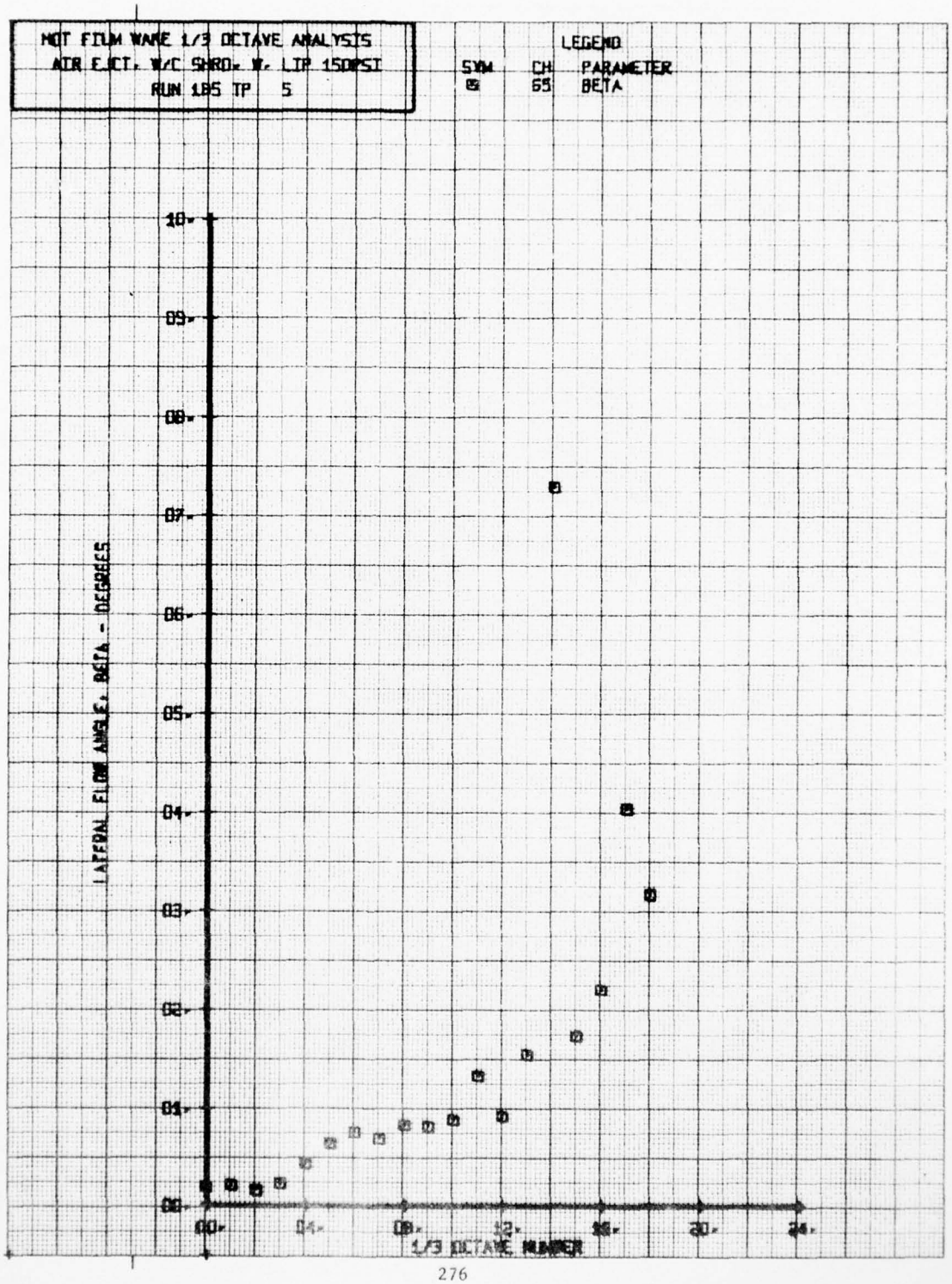
1/3 OCTAVE NUMBER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AIR EJCT. W/C SHRD. W. LTP 150PSI
RUN 185 TP 5
LEGEND
SYM CH PARAMETER
65 BETA
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LATERAL FLOW ANGLE, BETA - DEGREES
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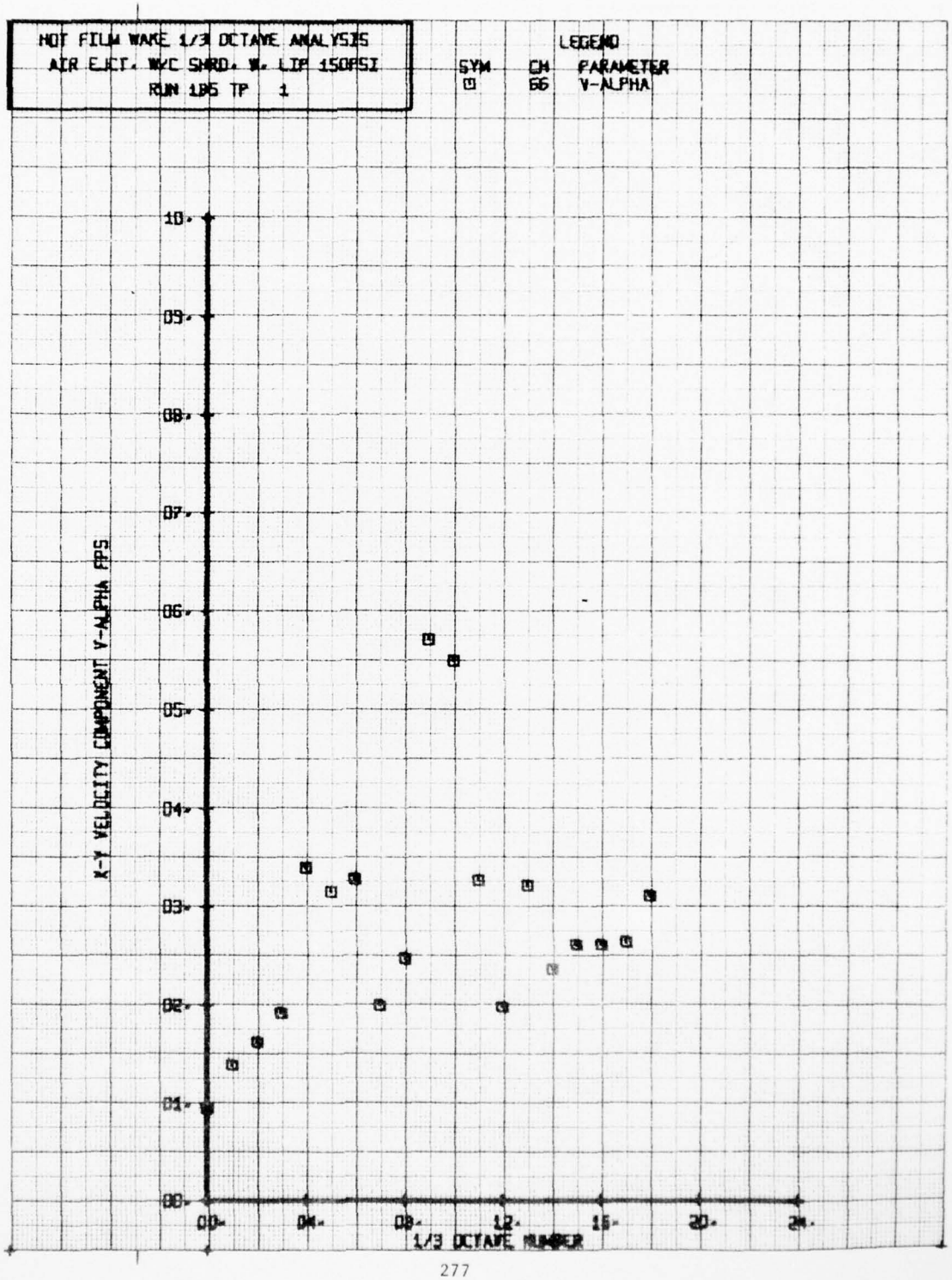
1/3 OCTAVE NUMBER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AIR EJCT. W/C SHRD. W. LIP 150PSI
RUN 105 TP 1
LEGEND
SYM CH PARAMETER
66 V-ALPHA
X-Y VELOCITY COMPONENT V-ALPHA FPS
1/3 OCTAVE NUMBER
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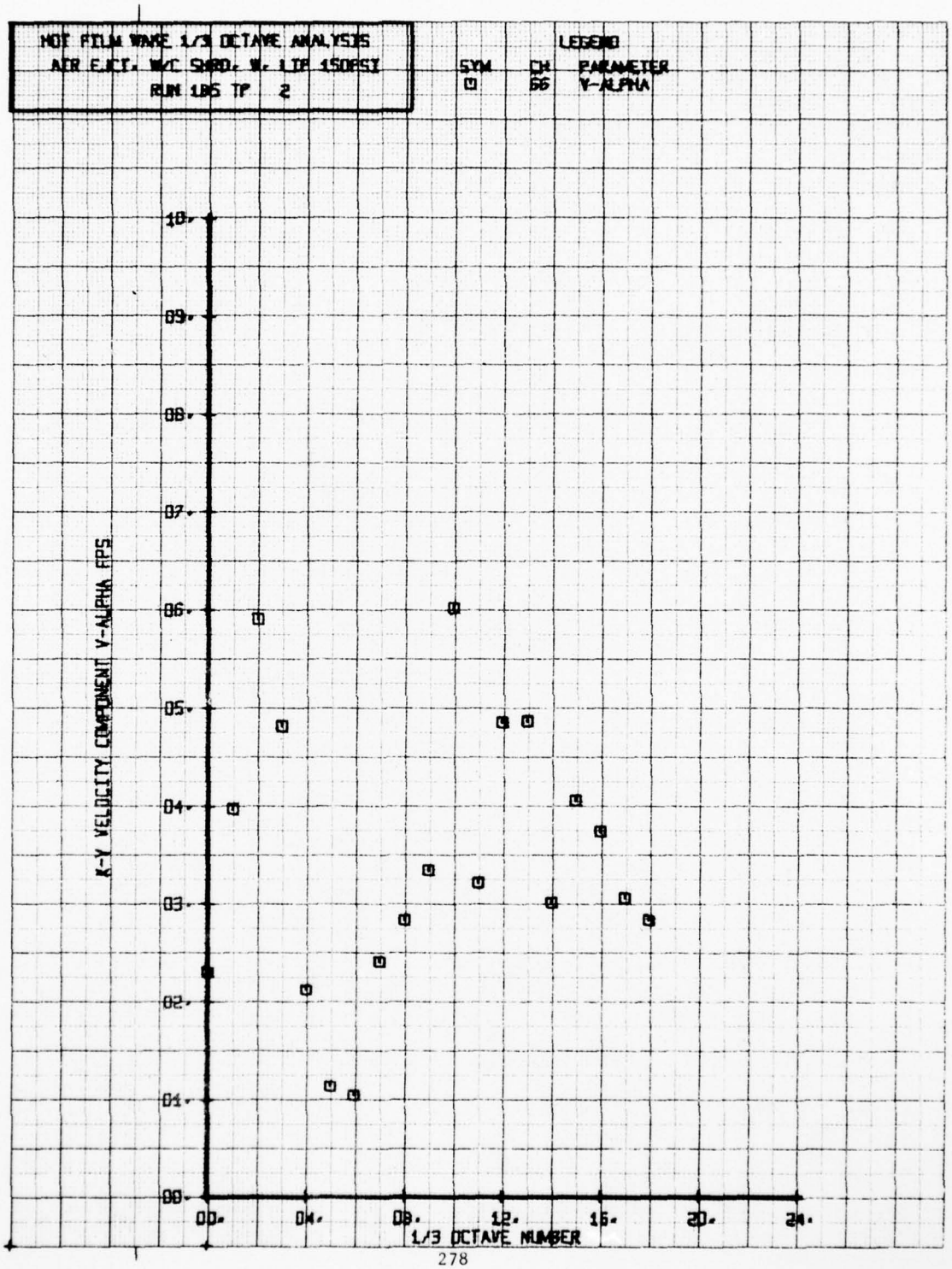
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AIR EJCT. W/C SHRD. W. LIP 150PSI
RUN 186 TP 2
LEGEND
SYM CH PARAMETER
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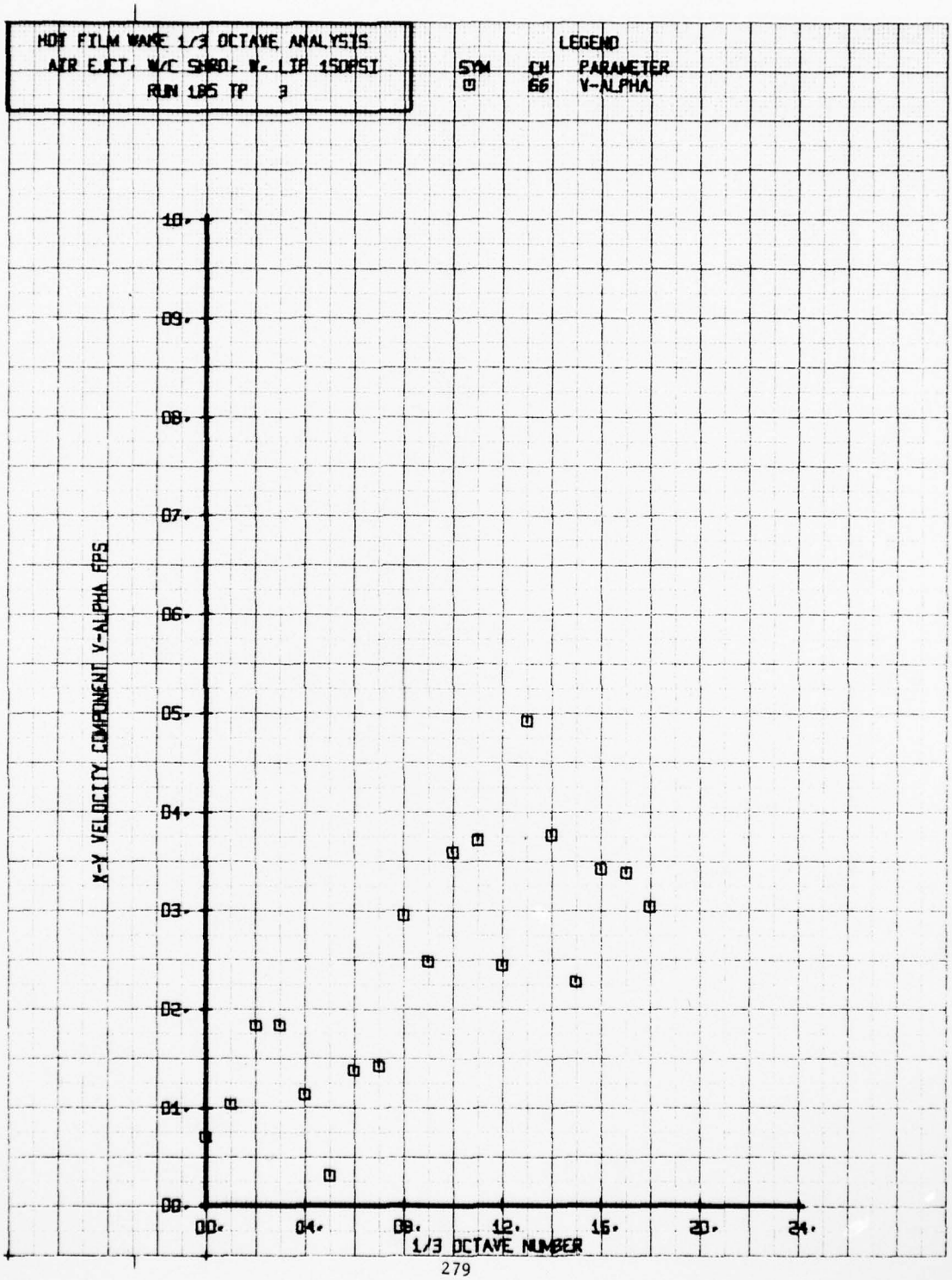
1/3 OCTAVE NUMBER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AIR EJCT. W/C SHRD. W. LIP 150PSI
RUN 185 TP 3
LEGEND
SYM CH PARAMETER
66 V-ALPHA
X-Y VELOCITY COMPONENT V-ALPHA FPS
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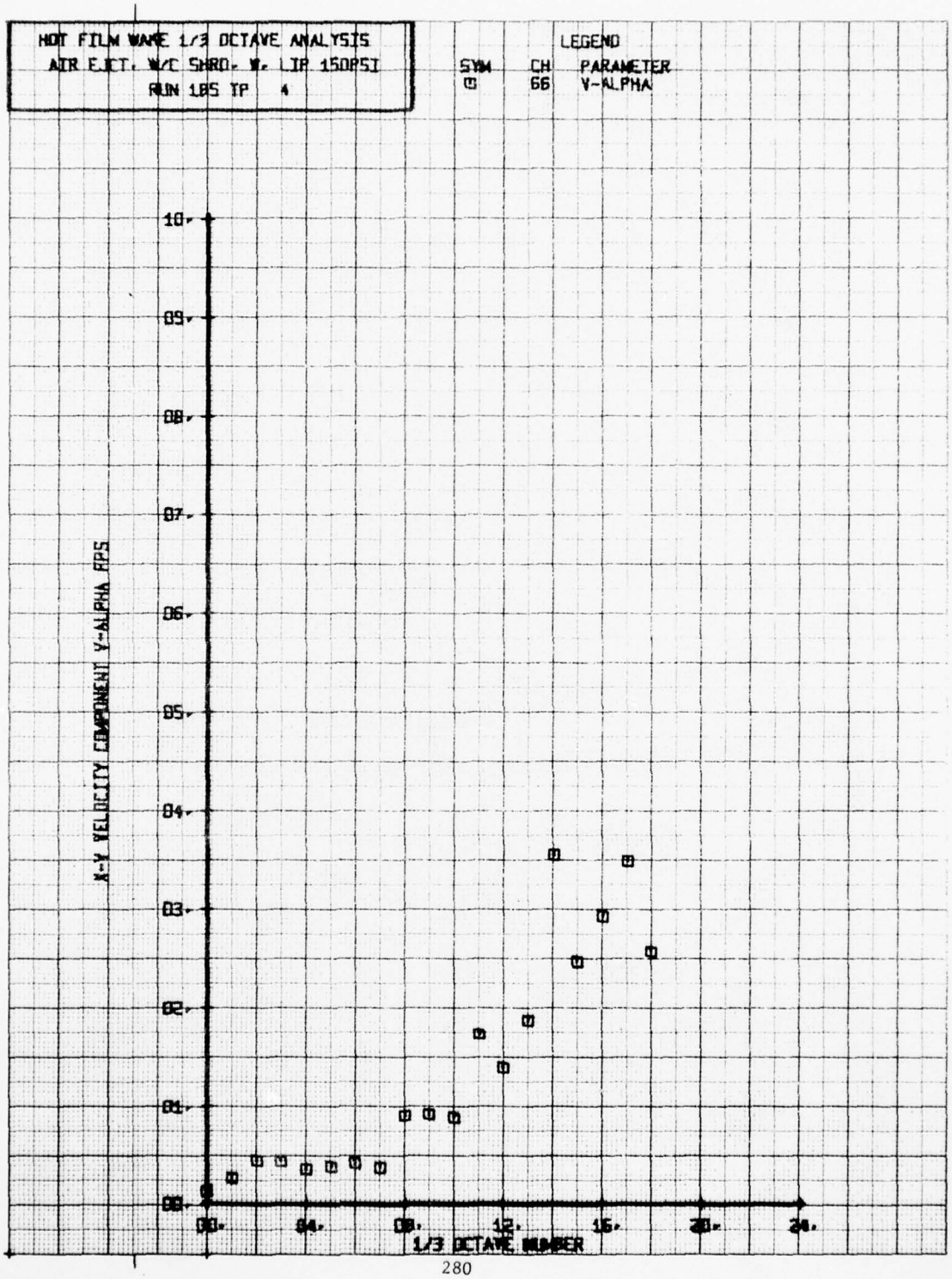
1/3 OCTAVE NUMBER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AIR EJCT. W/C SHRD. W. LIP 150PSI
RUN 185 TP 4
LEGEND
SYM CH PARAMETER
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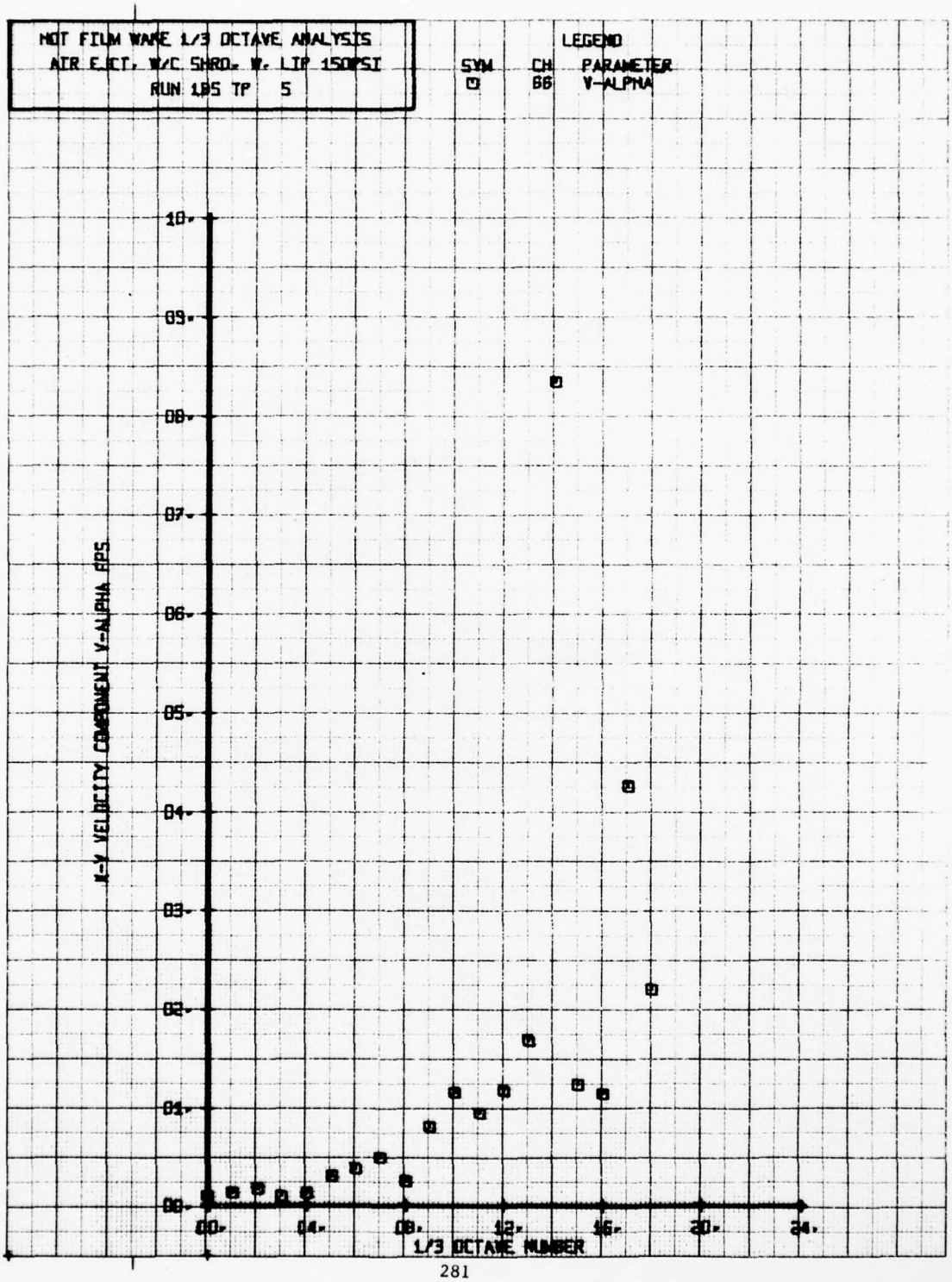
X-Y VELOCITY COMPONENT V-ALPHA FPS
1/3 OCTAVE NUMBER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AIR EJCT. W/C SHRD. W. LIP 150PSI
RUN 185 TP 5
LEGEND
SYM CH PARAMETER
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N-V VELOCITY COMPONENT V-ALPHA FPS
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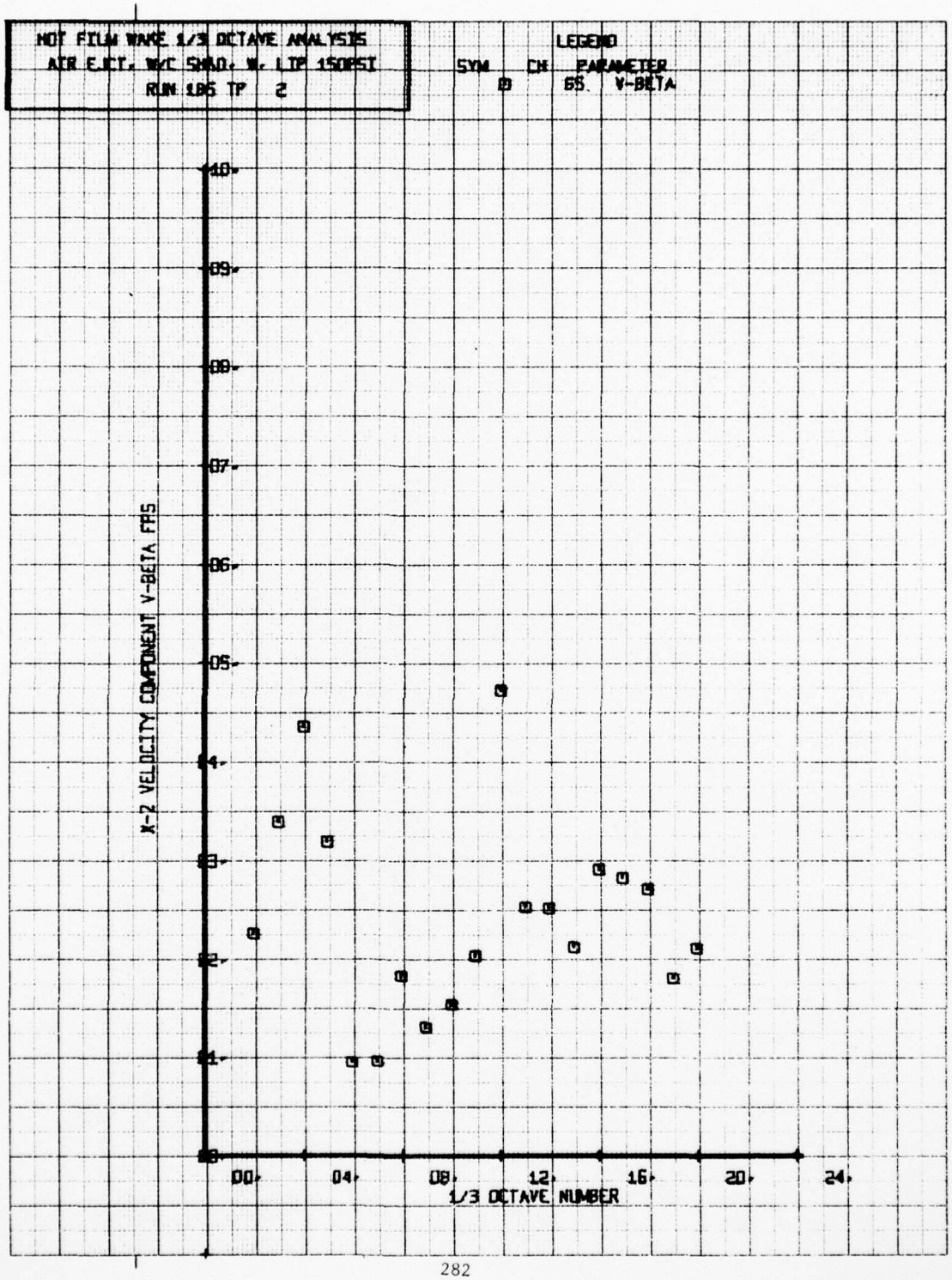
1/3 OCTAVE NUMBER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AIR EJCT. W/C SHRD. W. LTP 150PSI
RUN 185 TP 2
LEGEND
SYM CH PARAMETER
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X-2 VELOCITY COMPONENT V-BETA FPS
1/3 OCTAVE NUMBER
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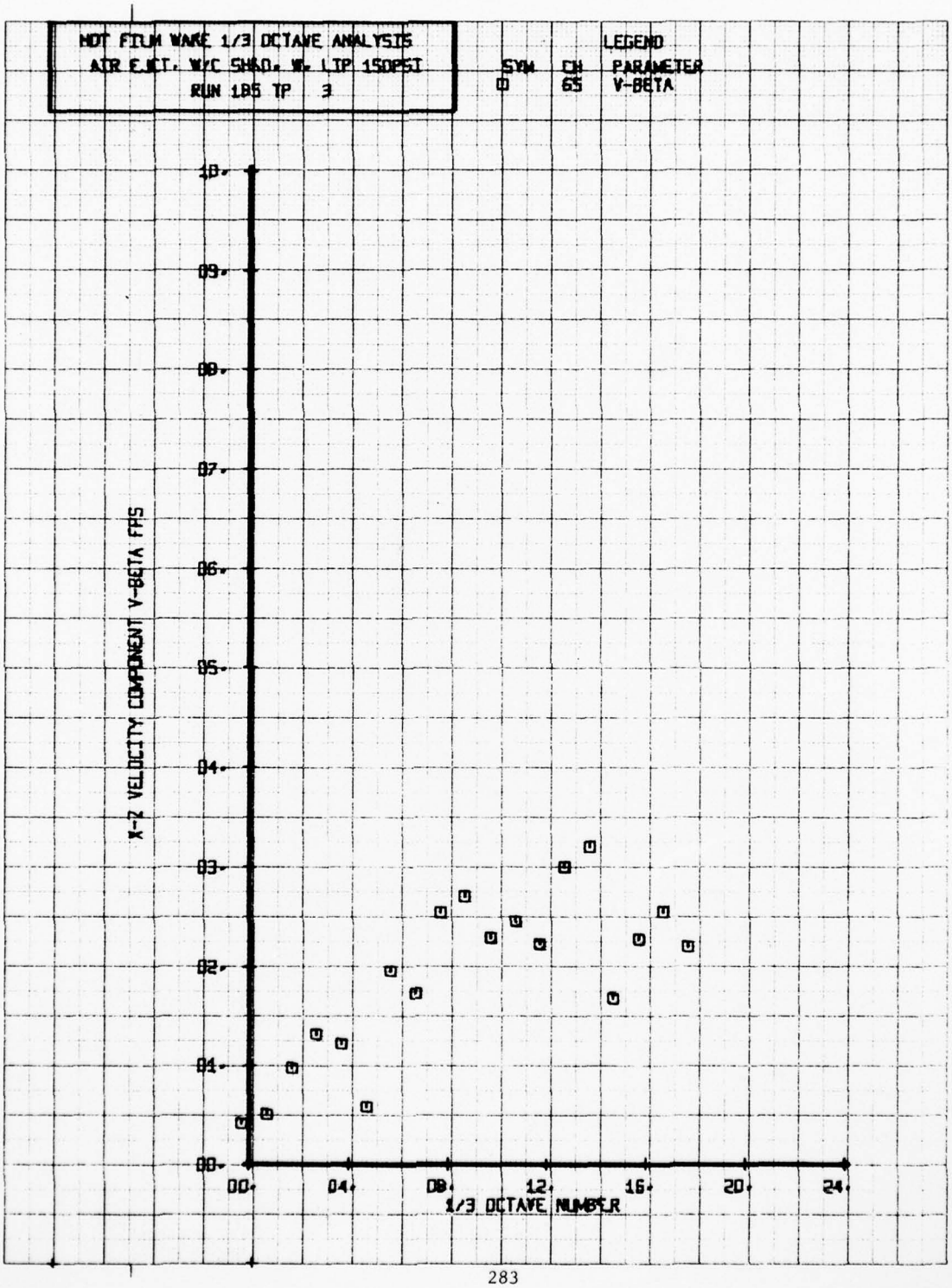
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AIR EJCT. W/C SHAD. W. LTP 150PSI
RUN 185 TP 3
LEGEND
SYM CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA FPS
1/3 OCTAVE NUMBER
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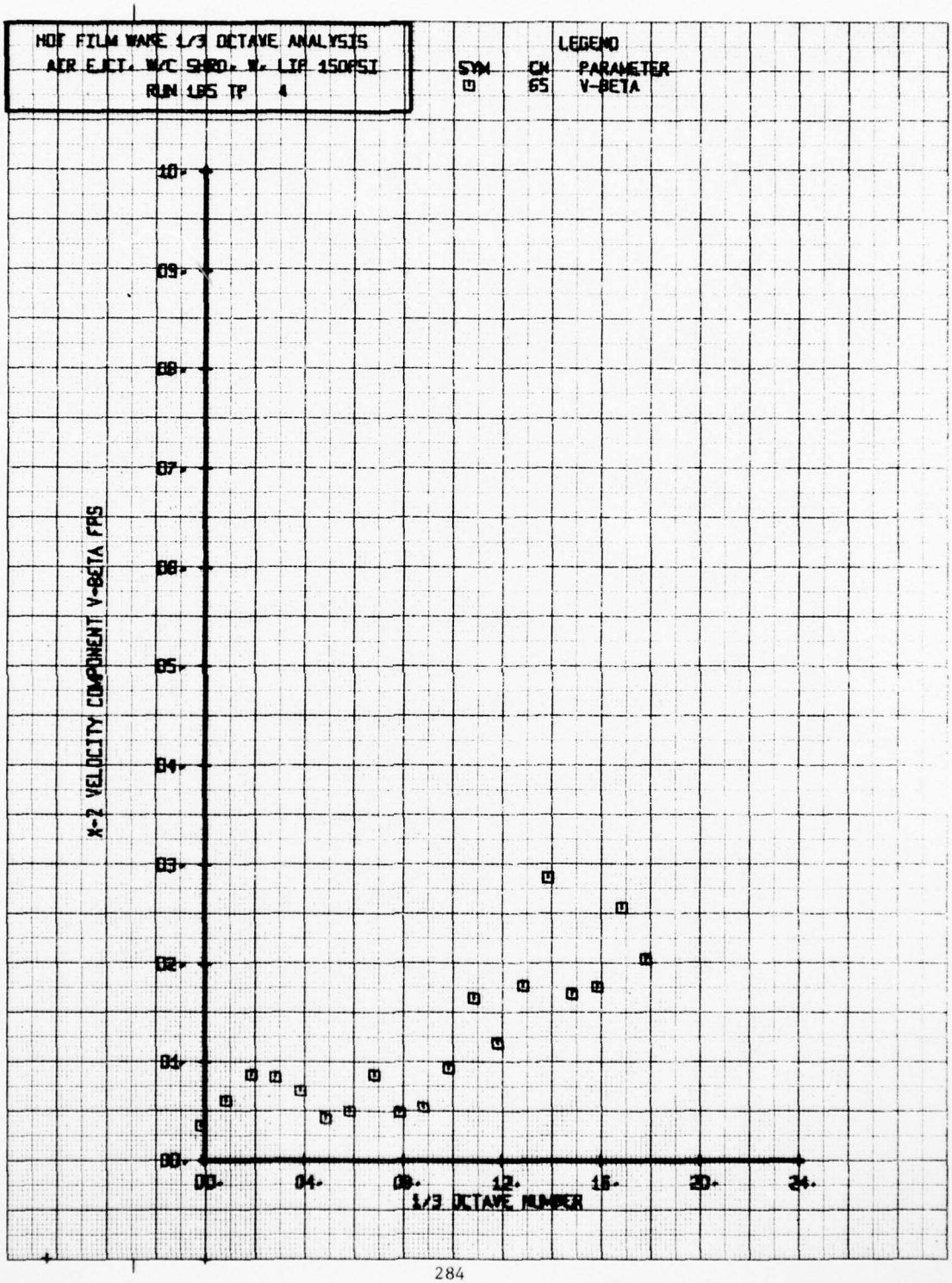
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AIR EJCT. W/C 5480. W. LIP 150PSI
RUN 185 TP 4
LEGEND
SYM CM PARAMETER
65 V-BETA
X-2 VELOCITY COMPONENT V-BETA FPS
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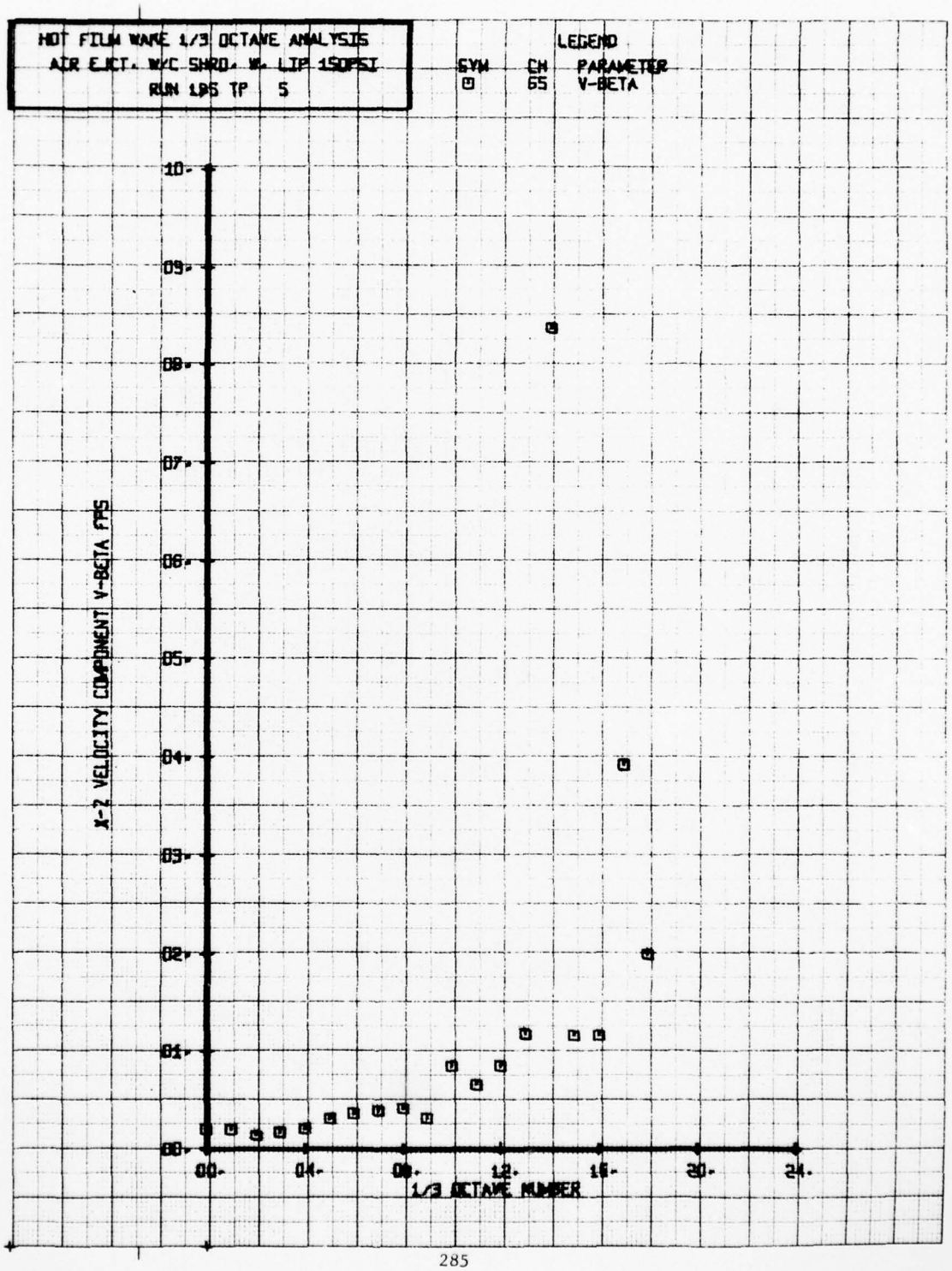
1/3 OCTAVE NUMBER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AIR EJCT. W/C SHRD. W. LIP 150PSI
RUN 1P5 TP 5
LEGEND
SYM CH PARAMETER
65 V-BETA
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X-2 VELOCITY COMPONENT V-BETA FPS
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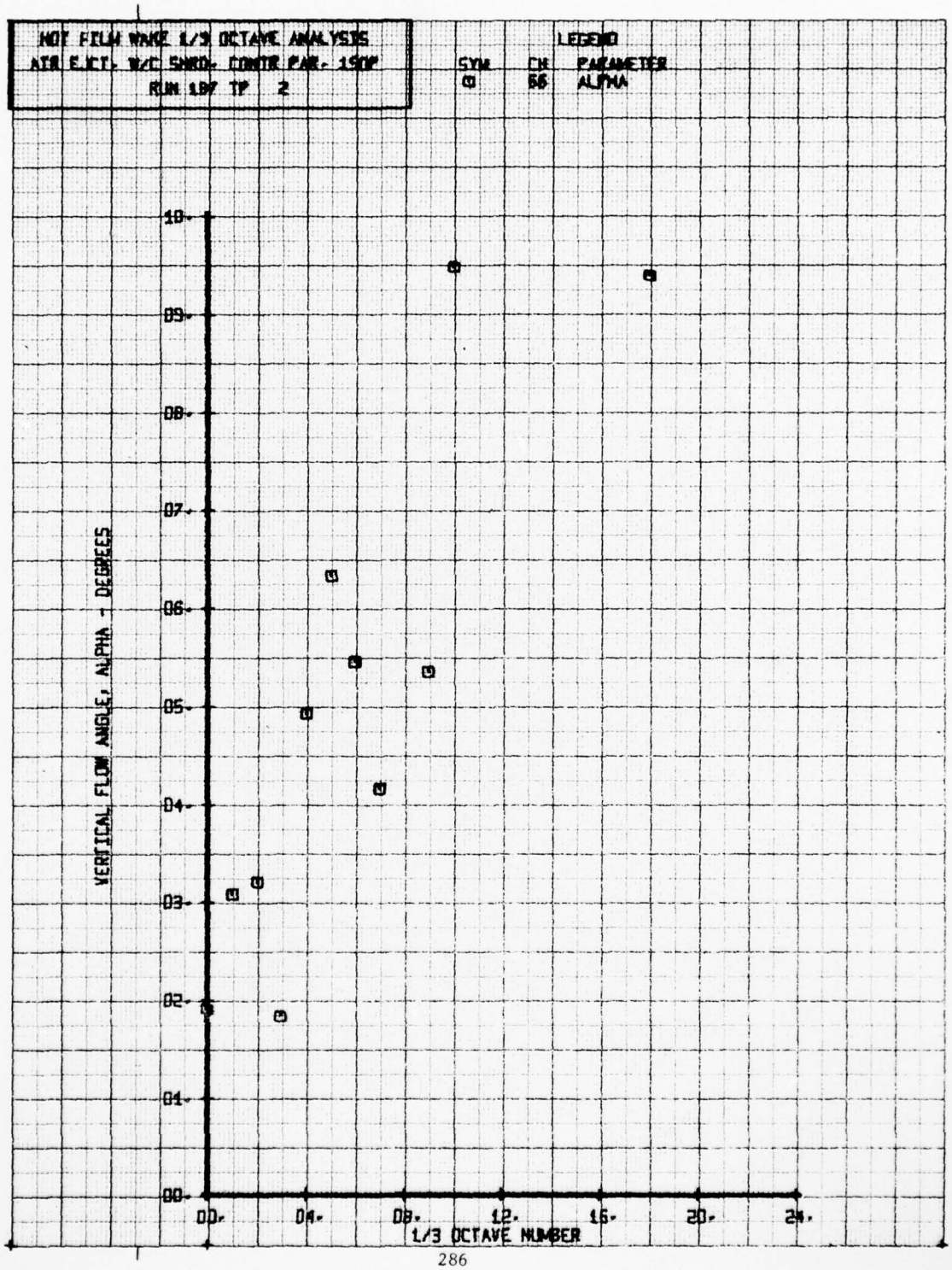
1/3 OCTAVE NUMBER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ATR EJCT. W/C SHRD. CONTR PAR. 150P
RUN 187 TP 2
LEGEND
SYM CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
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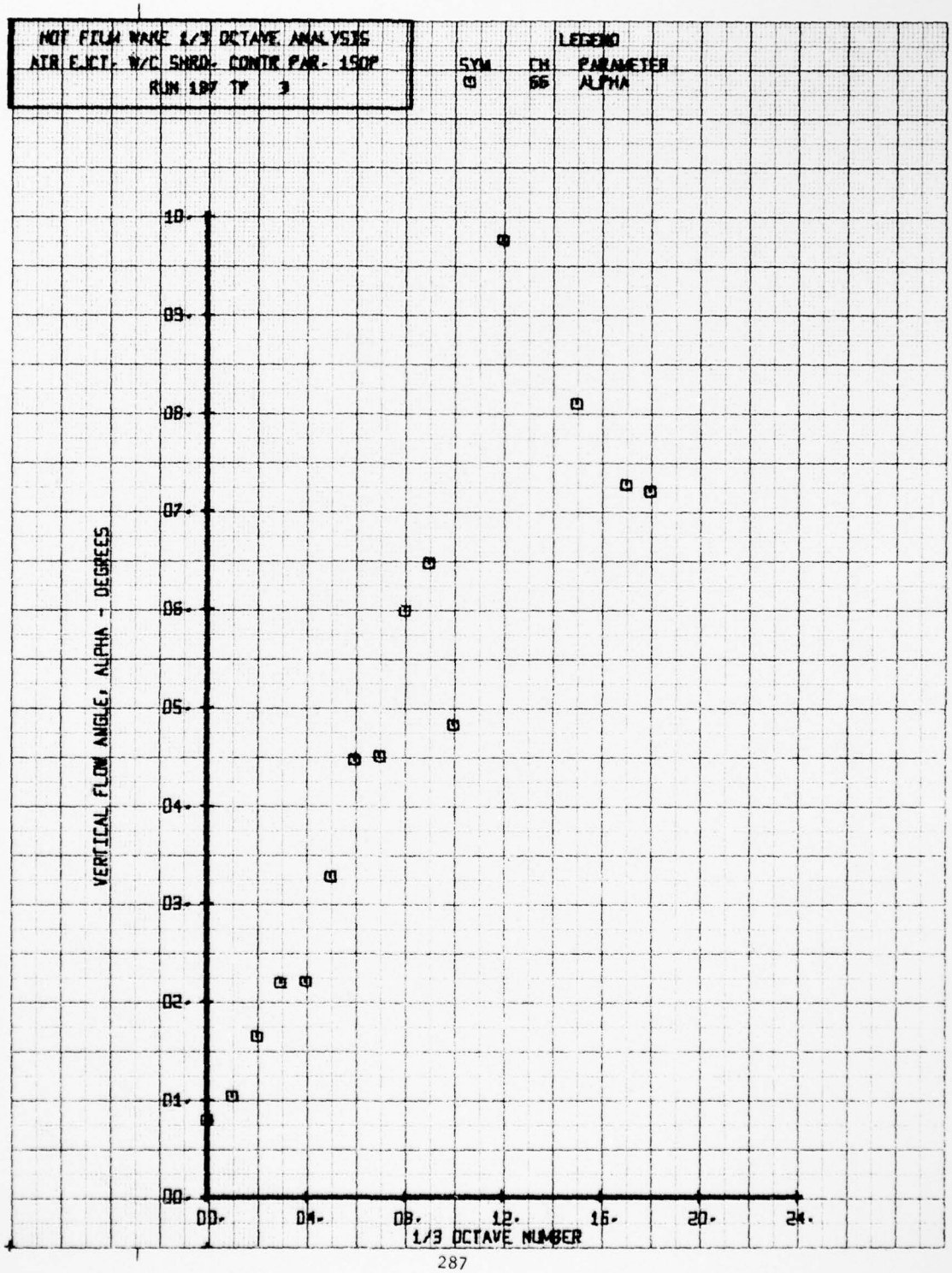
1/3 OCTAVE NUMBER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RUN 187 TP 3
LEGEND
SYM CH PARAMETER
56 ALPHA
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1/3 OCTAVE NUMBER

AD-A063 653 BOEING VERTOL CO PHILADELPHIA PA F/G 1/3
INTERACTIONAL AERODYNAMICS OF THE SINGLE ROTOR HELICOPTER CONFI--ETC(U)
SEP 78 P F SHERIDAN DAAJ02-77-C-0020
UNCLASSIFIED USARTL-TR-78-23D-V4-E NL

4 OF 4
AD
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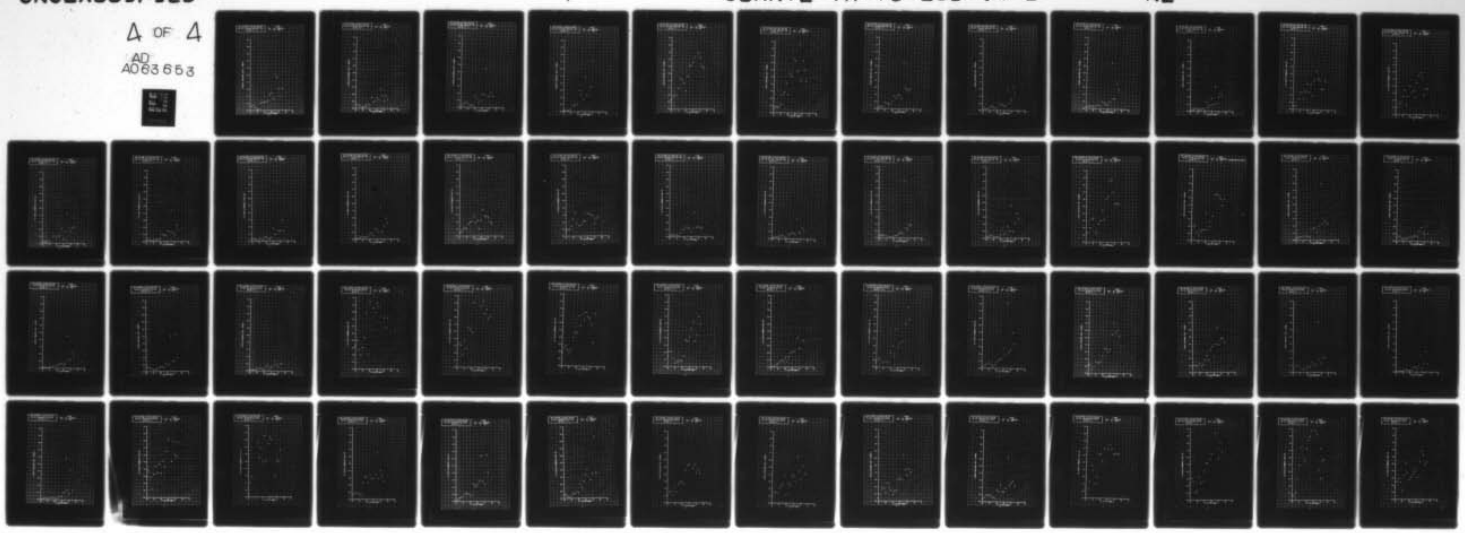

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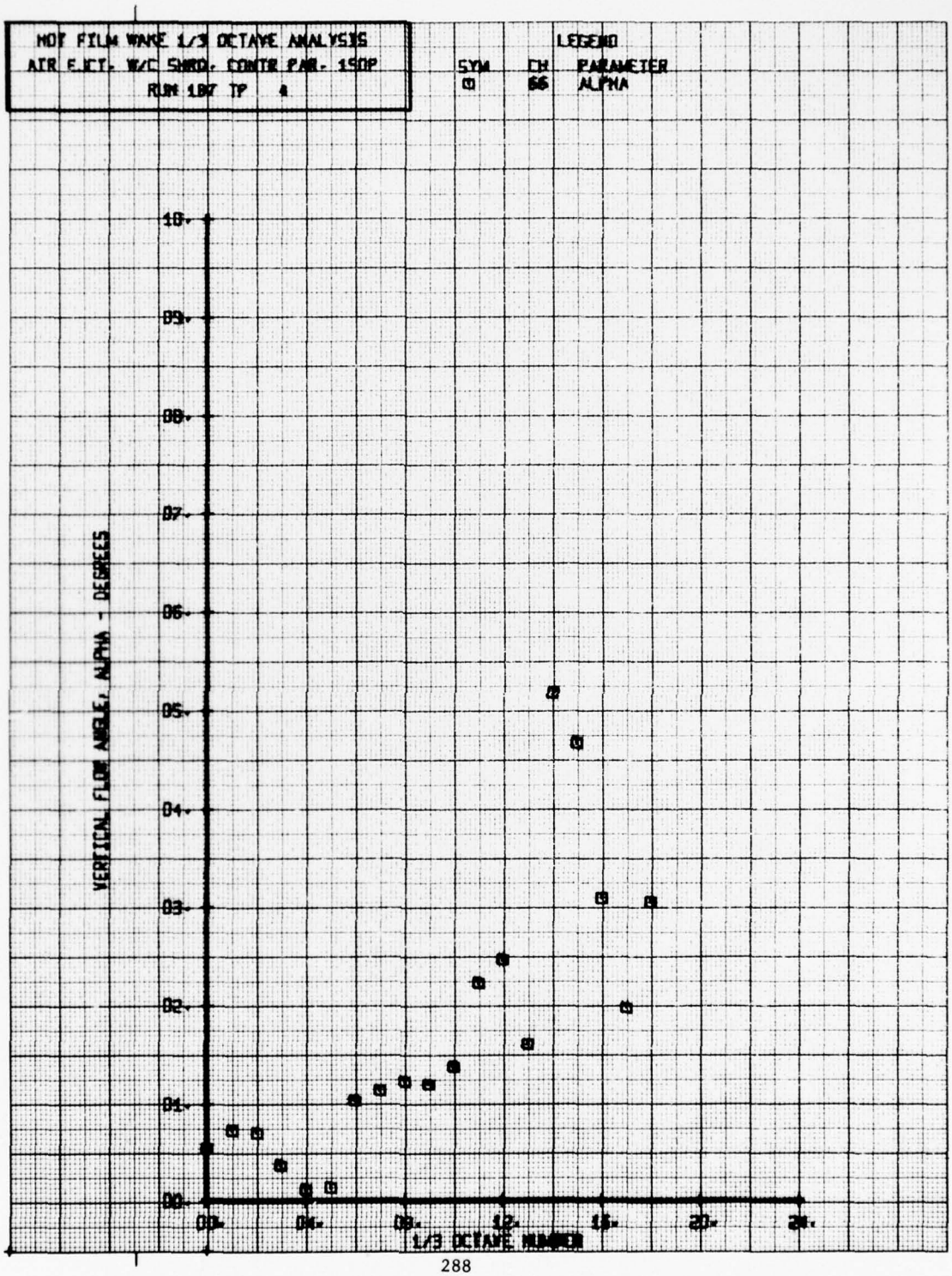
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AIR EJCT. W/C SHRD. CONTR PAR. 150P
RUN 187 TP 4
LEGEND
SYM CH PARAMETER
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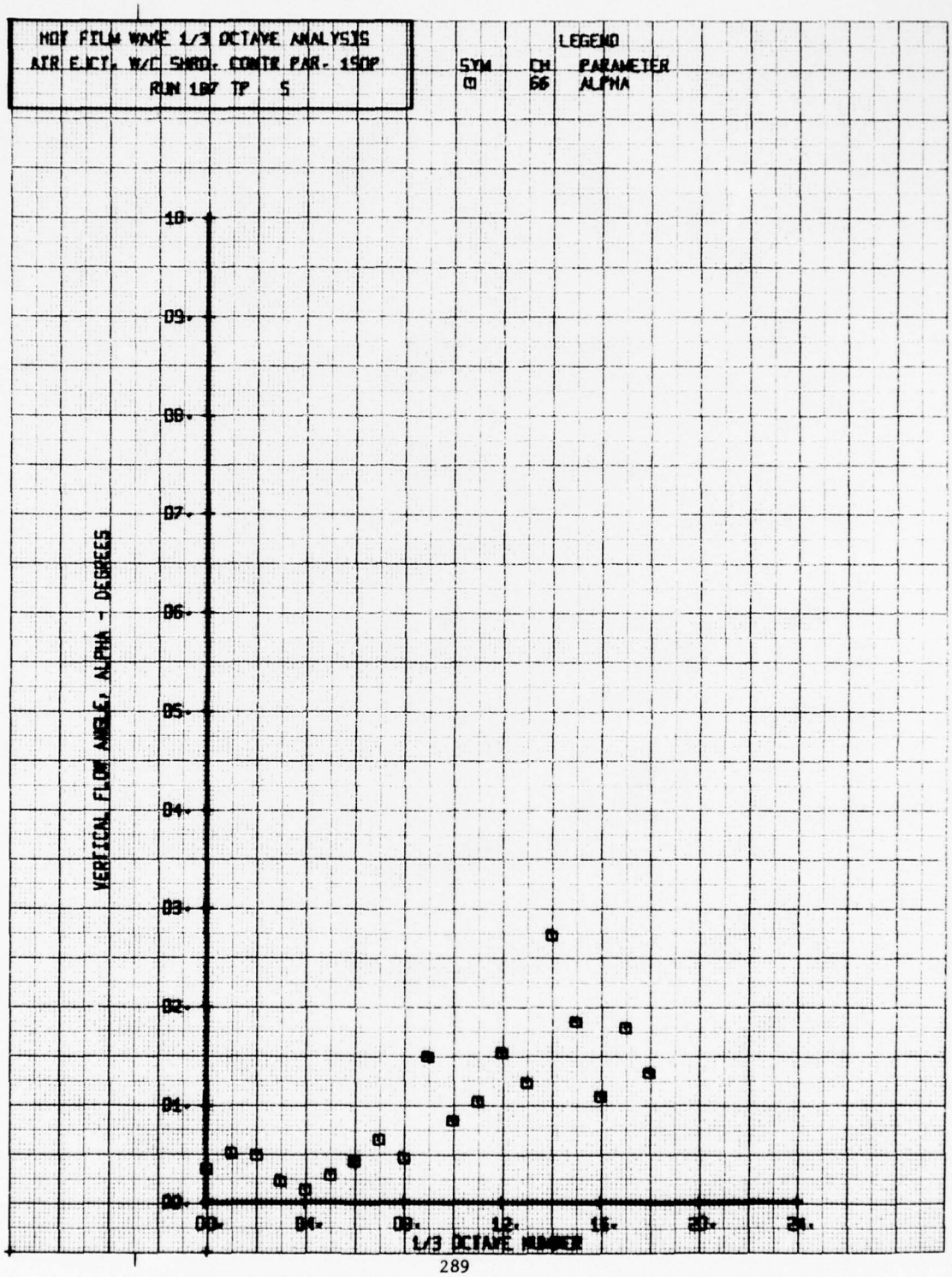
VERTICAL FLOW ANGLE, ALPHA - DEGREES
1/3 OCTAVE NUMBER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AIR EJCT. W/C SHRD. CONTR PAR. 150P
RUN 187 TP 5
LEGEND
SYM CH PARAMETER
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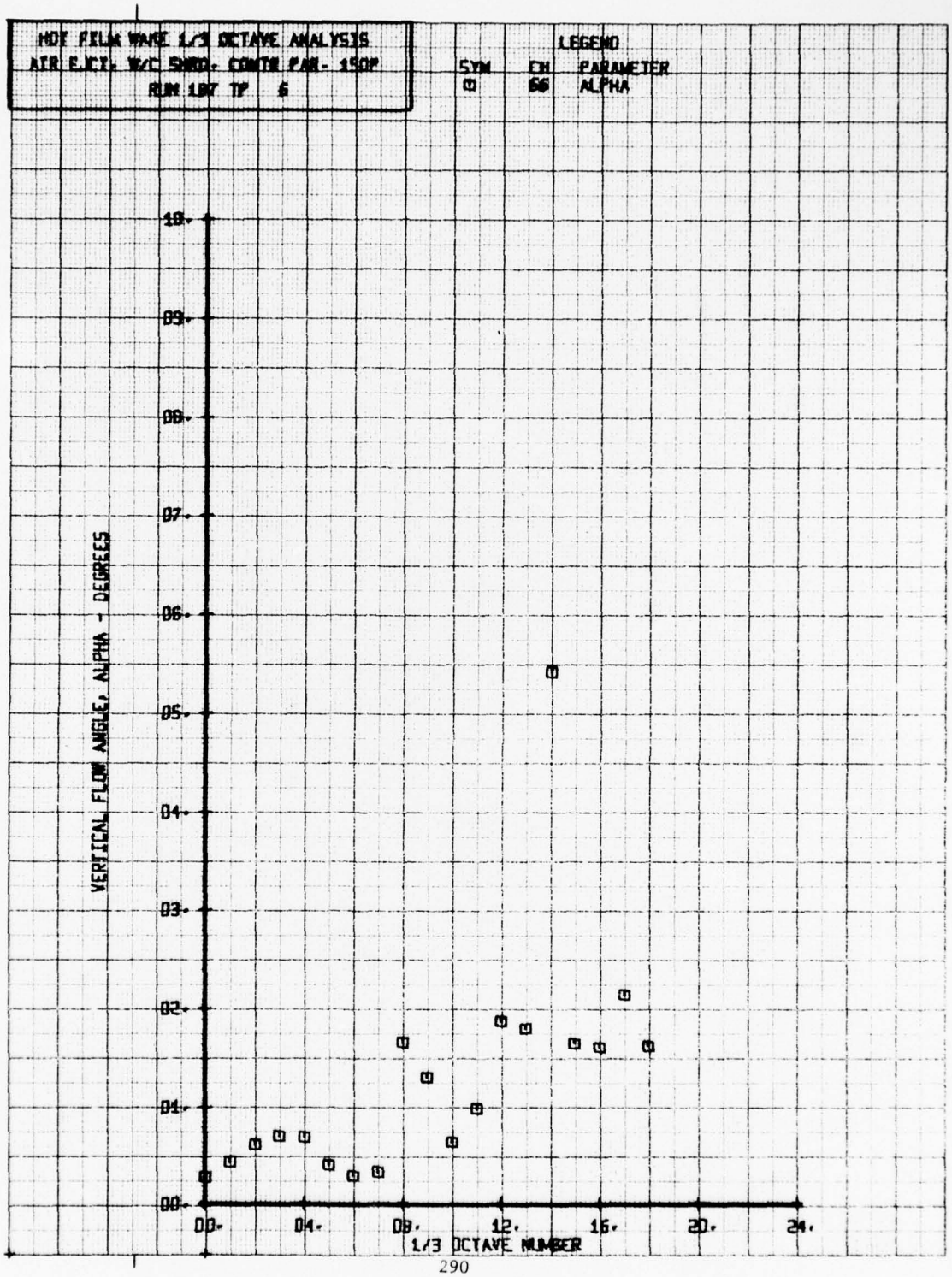
VERTICAL FLOW ANGLE, ALPHA - DEGREES
1/3 OCTAVE NUMBER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AIR E.CY. W/C SWRD. CONTR FAN- 150P
RUN 187 TP 6
LEGEND
SYM CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
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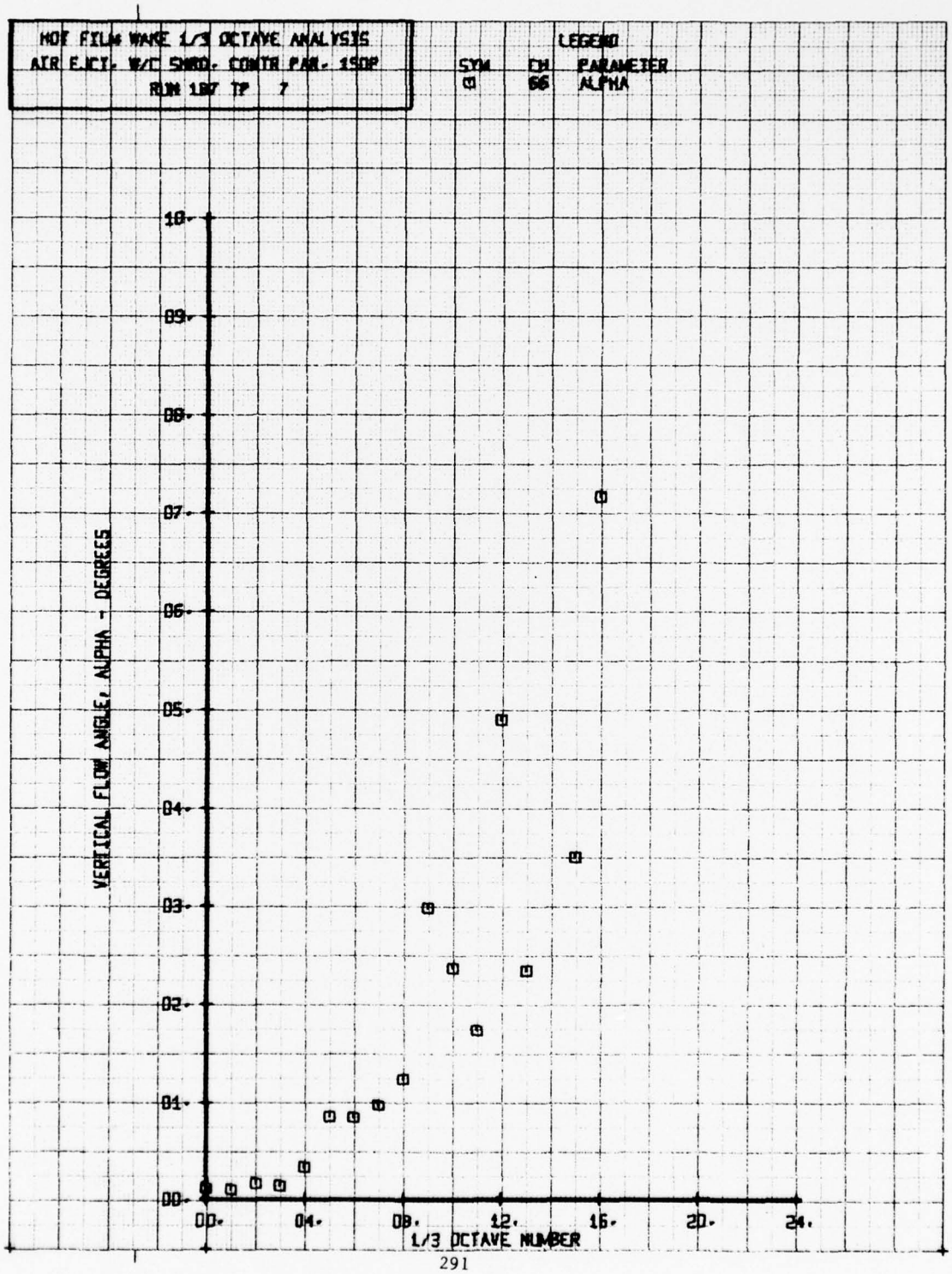
1/3 OCTAVE NUMBER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AIR EJCT. W/C SHRD. CONTR PAR. 150P
RUN 187 TP 7
LEGEND
SYM CH PARAMETER
66 ALPHA
VERTICAL FLOW ANGLE, ALPHA - DEGREES
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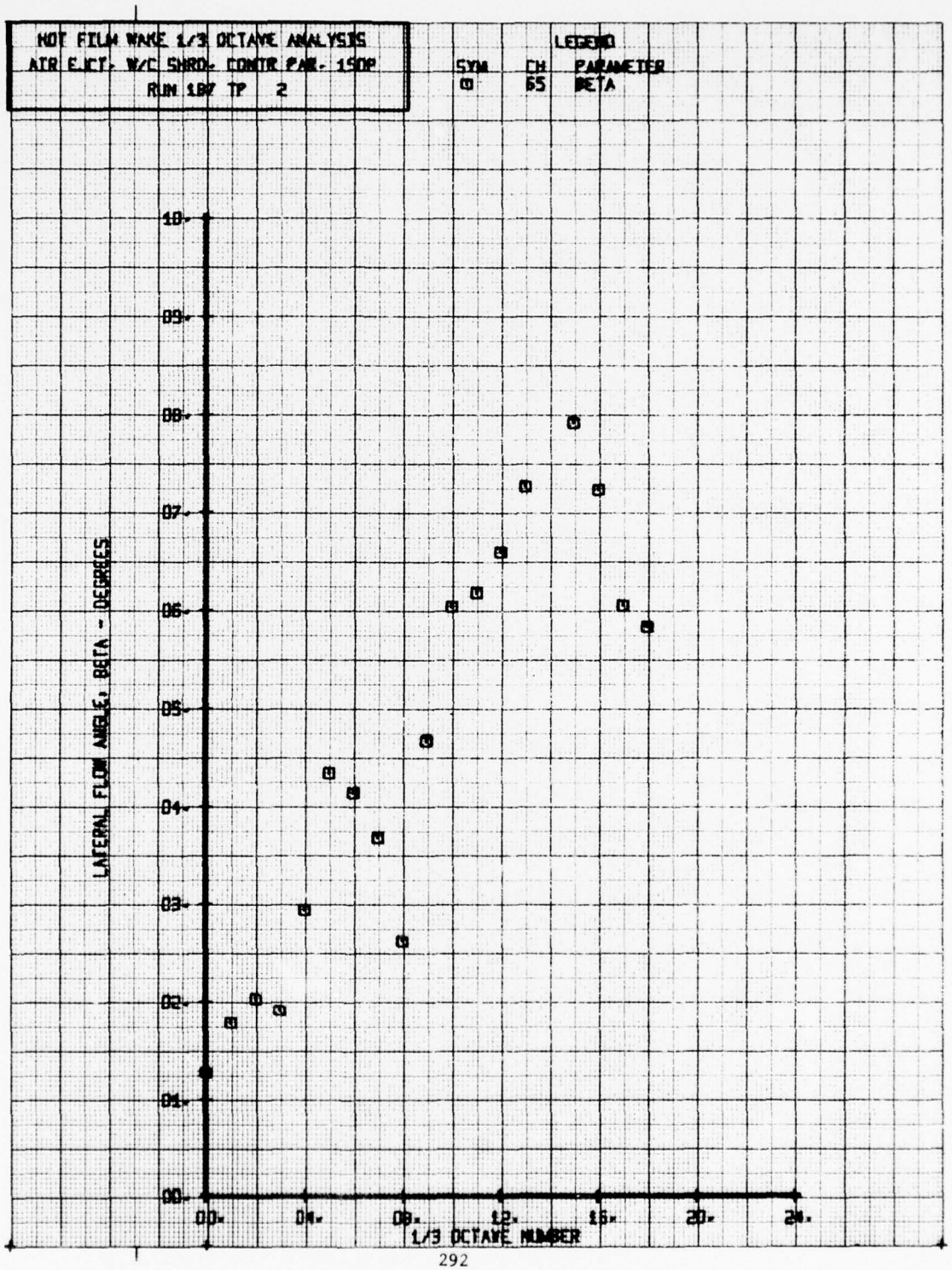
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AIR EJCT. W/C SHRD. CONTR PAR. 150P
RUN 187 TP 2
LEGEND
SYM CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
1/3 OCTAVE NUMBER
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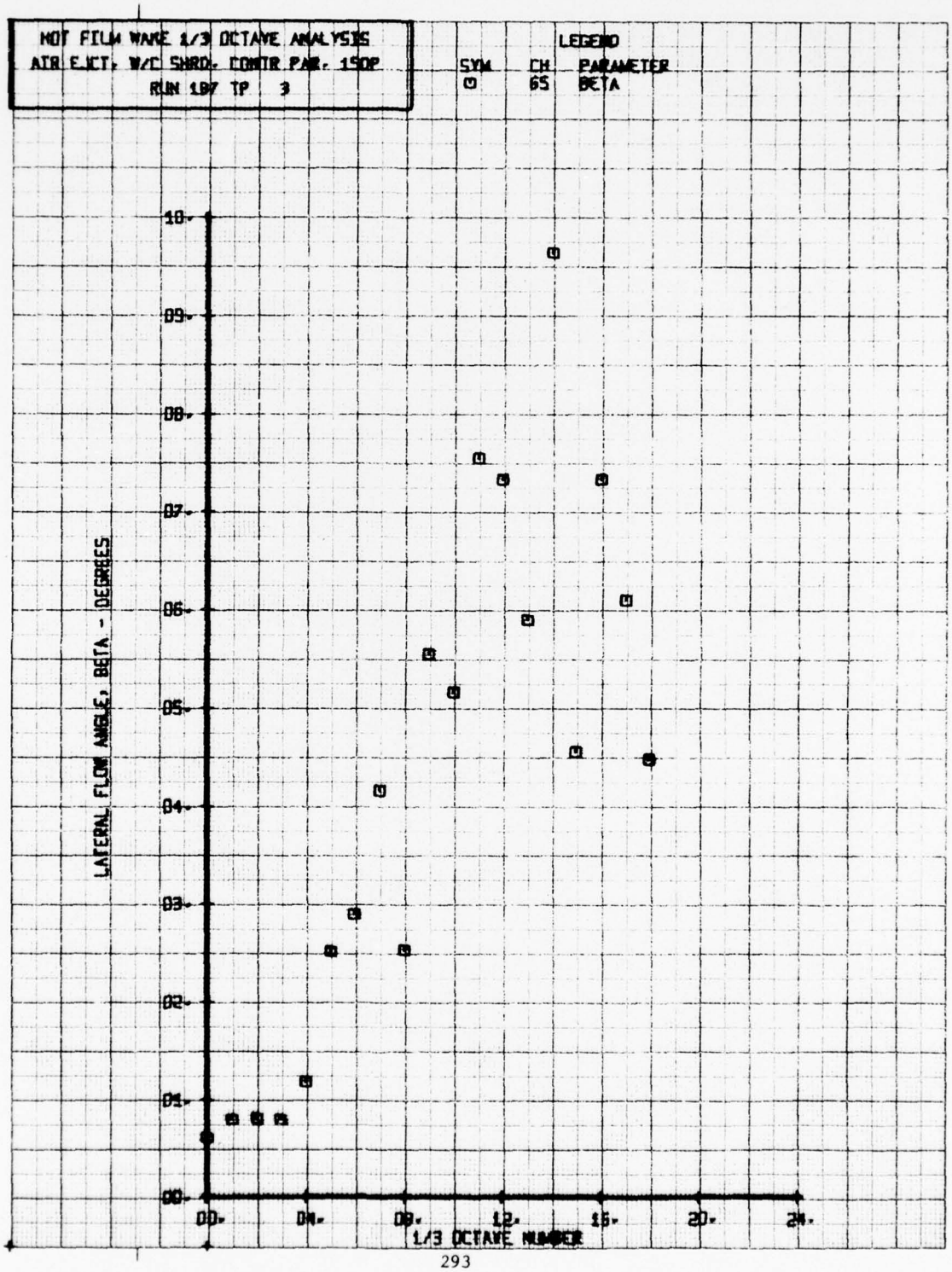
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AIR EJCT. W/C SHRD. CONTR PAR. 150P
RUN 197 TP 3
LEGEND
SYM CH PARAMETER
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LATERAL FLOW ANGLE, BETA - DEGREES
1/3 OCTAVE NUMBER
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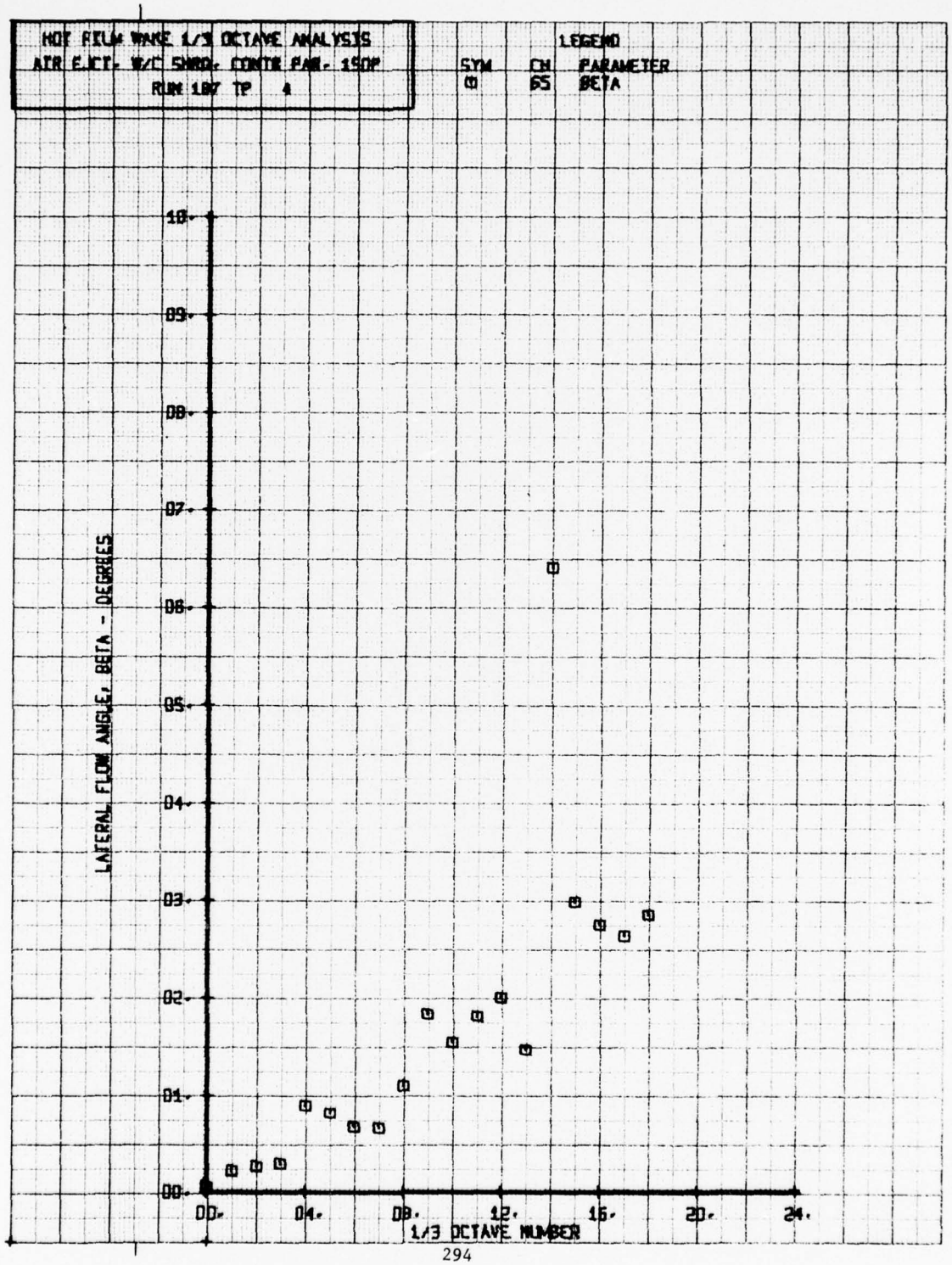
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AIR EJCT. W/C SHRD. CONTR FAN. 150P
RUN 187 TP 4
LEGEND
SYM CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
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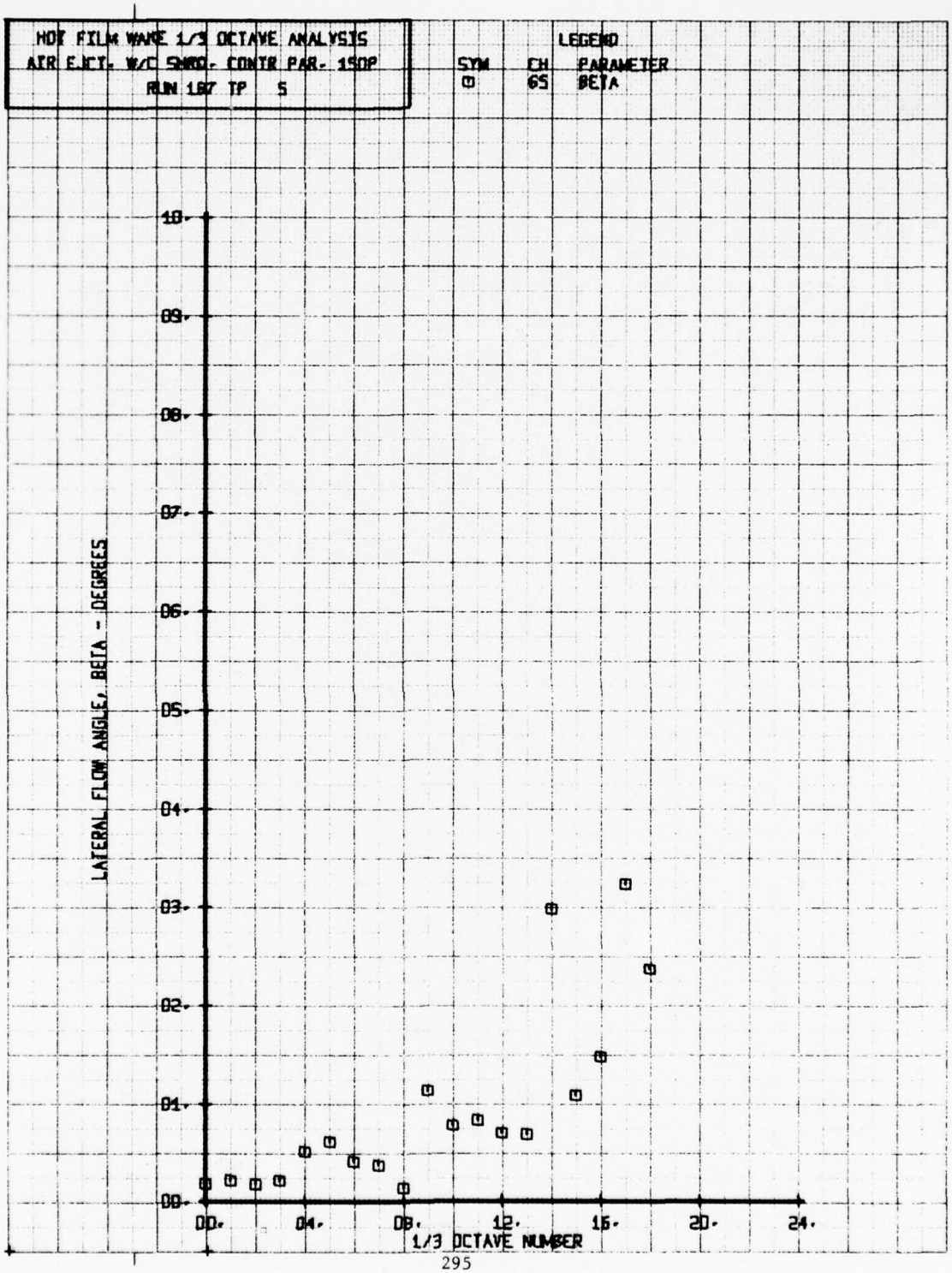
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
AIR EJCT. W/C SHRD. CONTR PAR. 150P
RUN 187 TP 5
LEGEND
SYM CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
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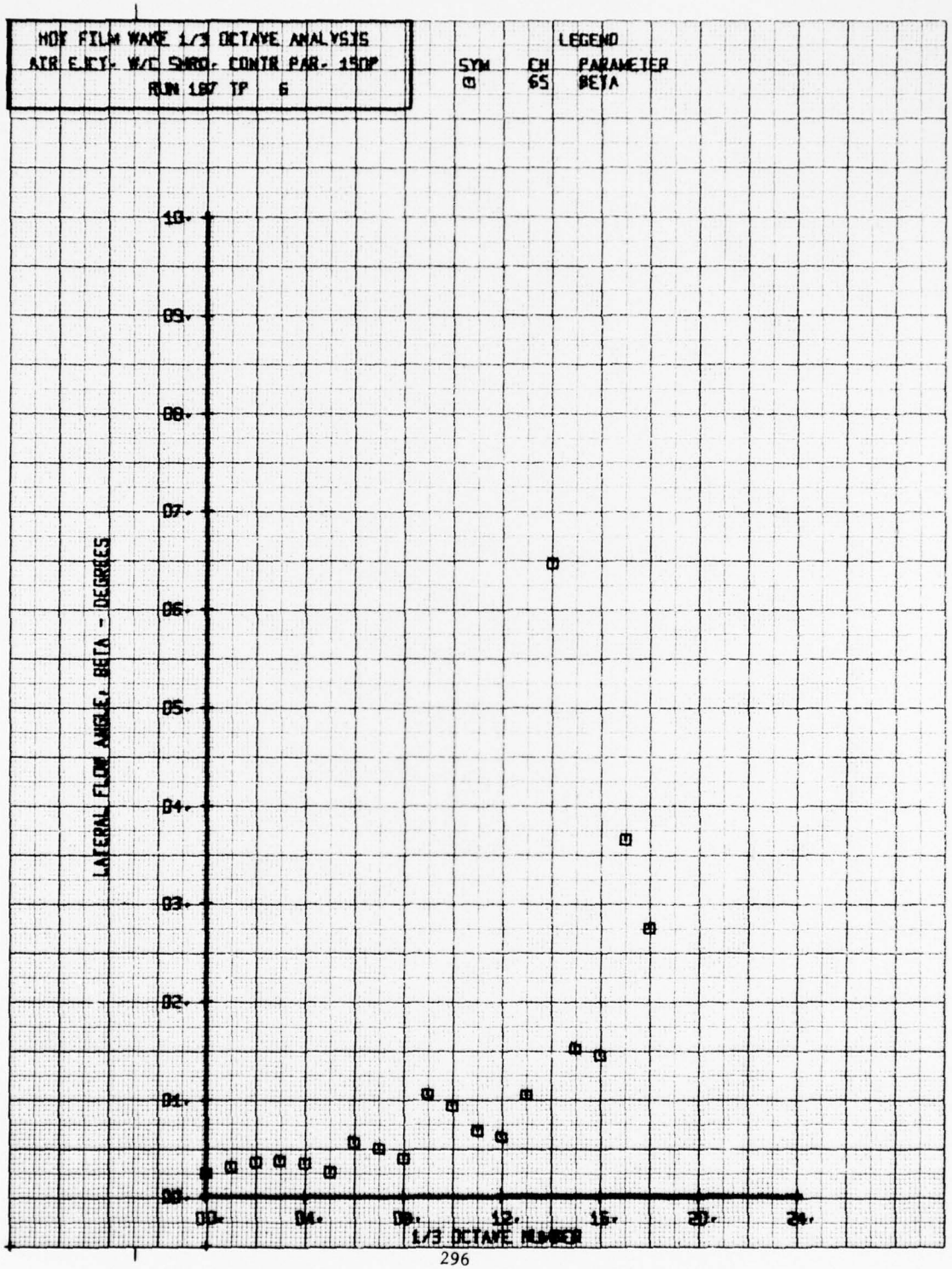
1/3 OCTAVE NUMBER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AIR EJCT. W/C SHRD. CONTR PAR. 150P
RUN 187 TP 6
LEGEND
SYM CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
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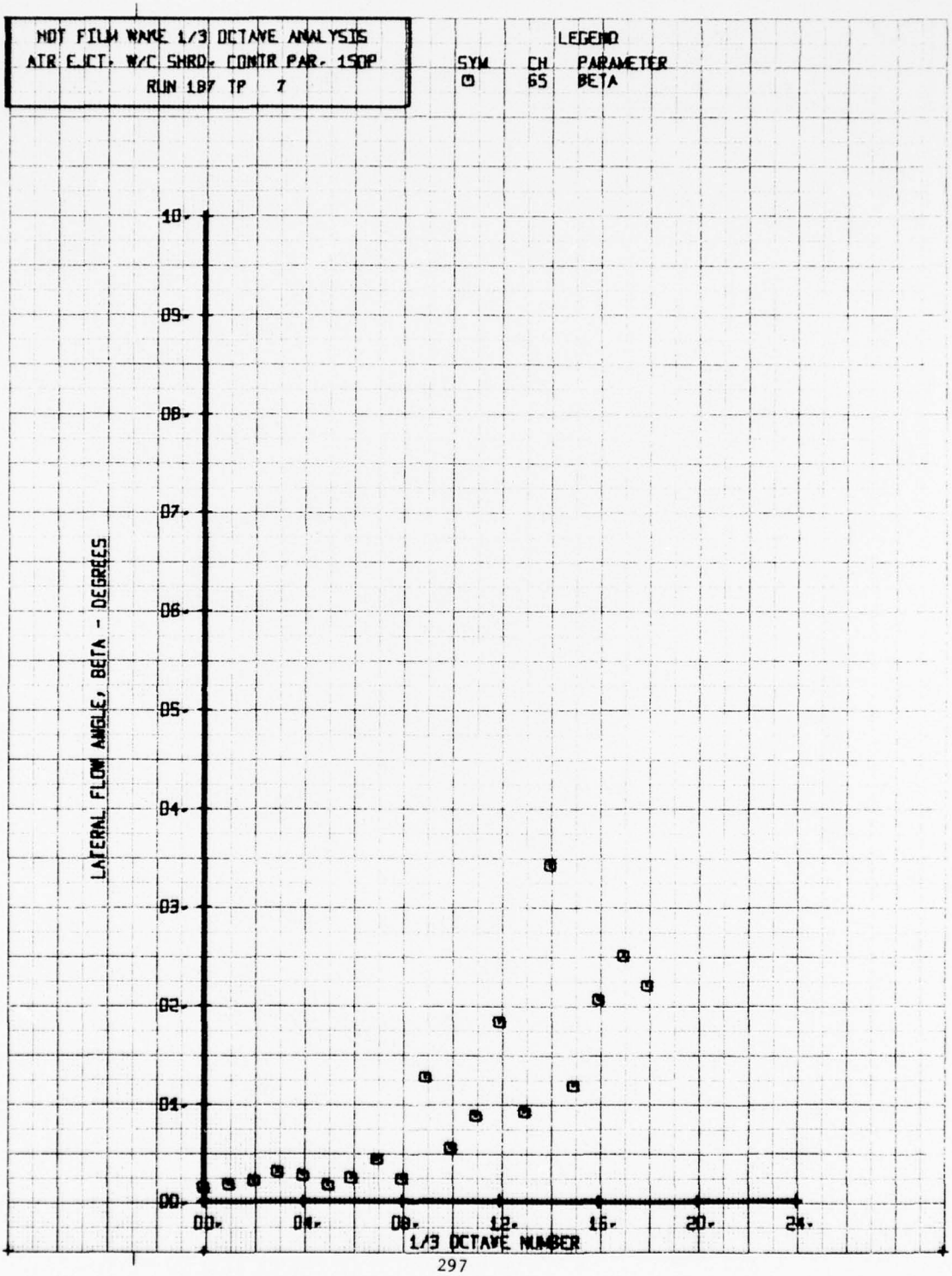
1/3 OCTAVE NUMBER


HOT FILM WAKE 1/3 OCTAVE ANALYSIS
AIR EJCT. W/C SHRD. CONTR PAR. 150P
RUN 187 TP 7
LEGEND
SYM CH PARAMETER
65 BETA
LATERAL FLOW ANGLE, BETA - DEGREES
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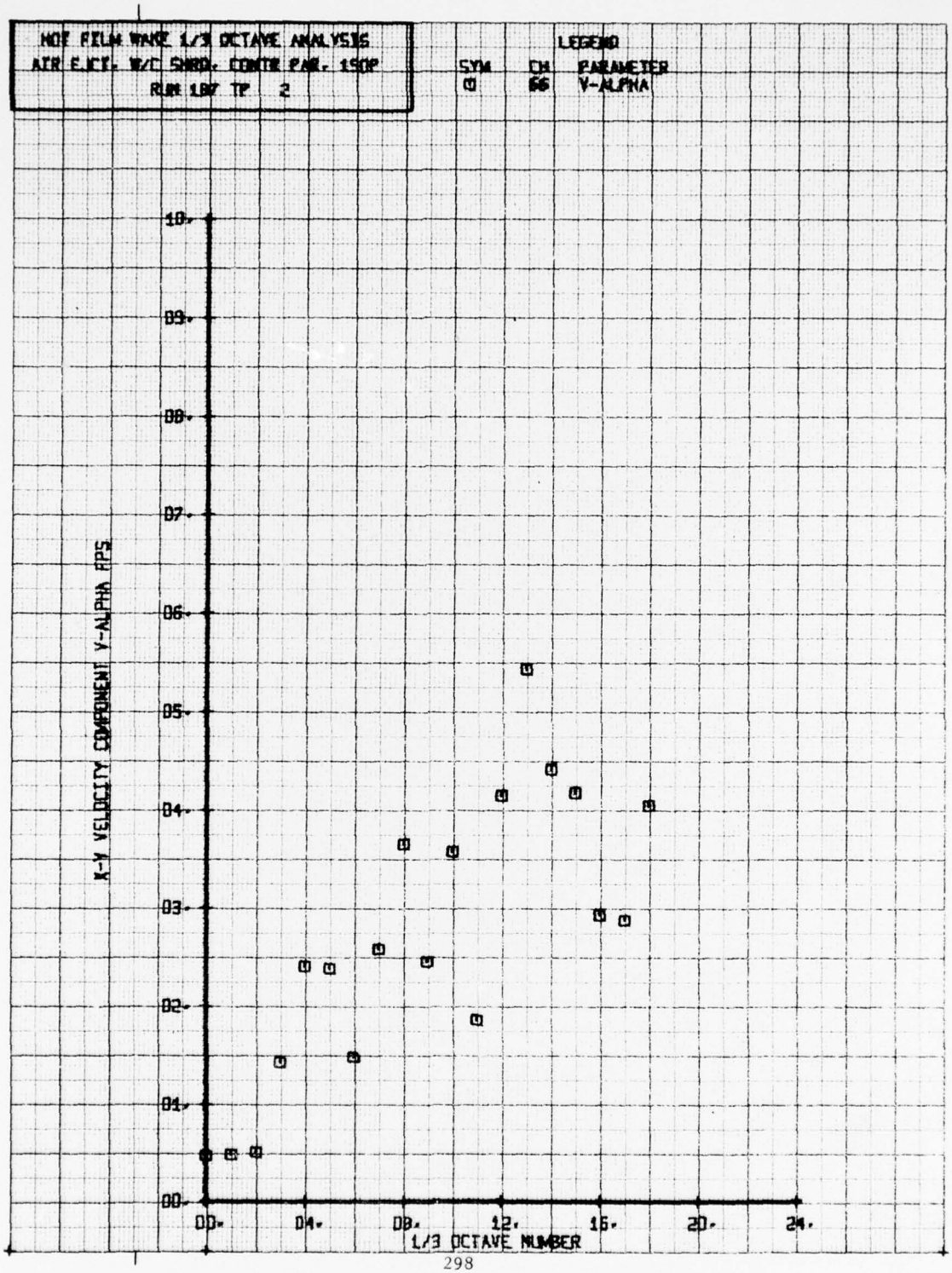
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AIR E.K.E. W/C SHRD. CONTR PAR. 150P
RUN 187 TP 2
LEGEND
SYM CH PARAMETER
66 V-ALPHA
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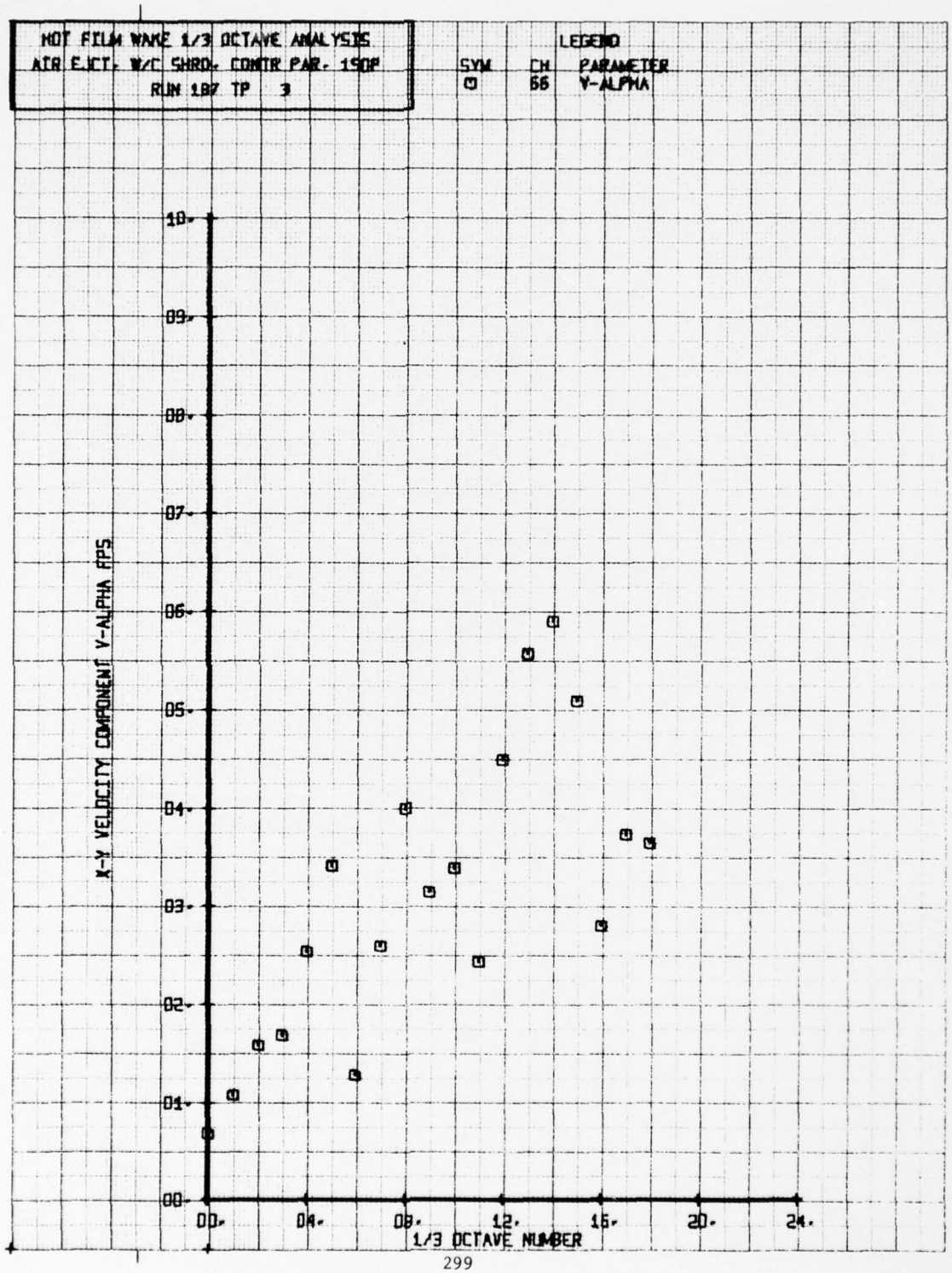
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AIR EJCT. W/C SHRD. CONTR PAR. 150P
RUN 187 TP 3
LEGEND
SYM CH PARAMETER
56 V-ALPHA
X-Y VELOCITY COMPONENT V-ALPHA FPS
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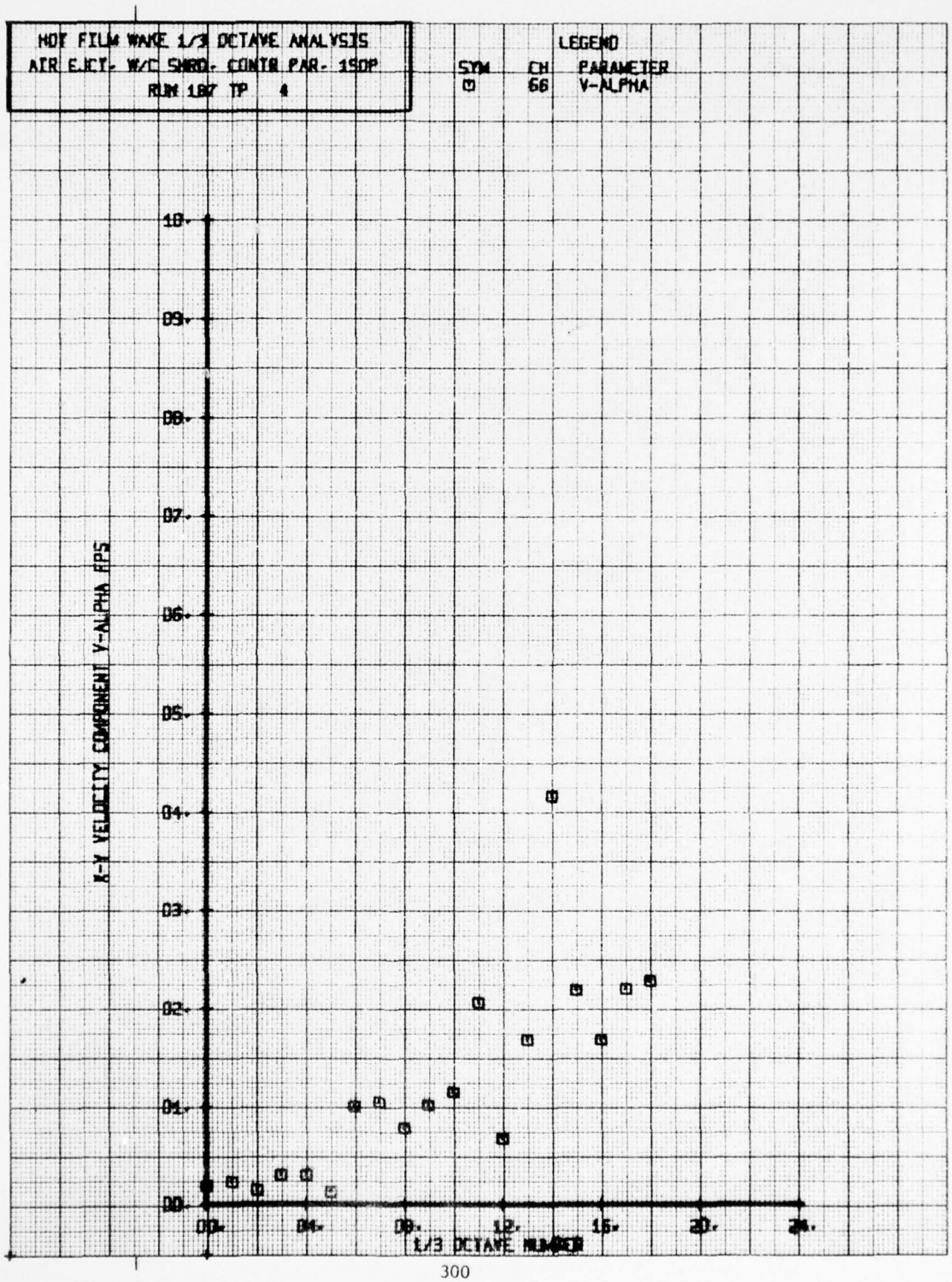
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AIR EJCT. W/C SHRD. CONTR PAR. 150P
RUN 187 TP 4
LEGEND
SYM CH PARAMETER
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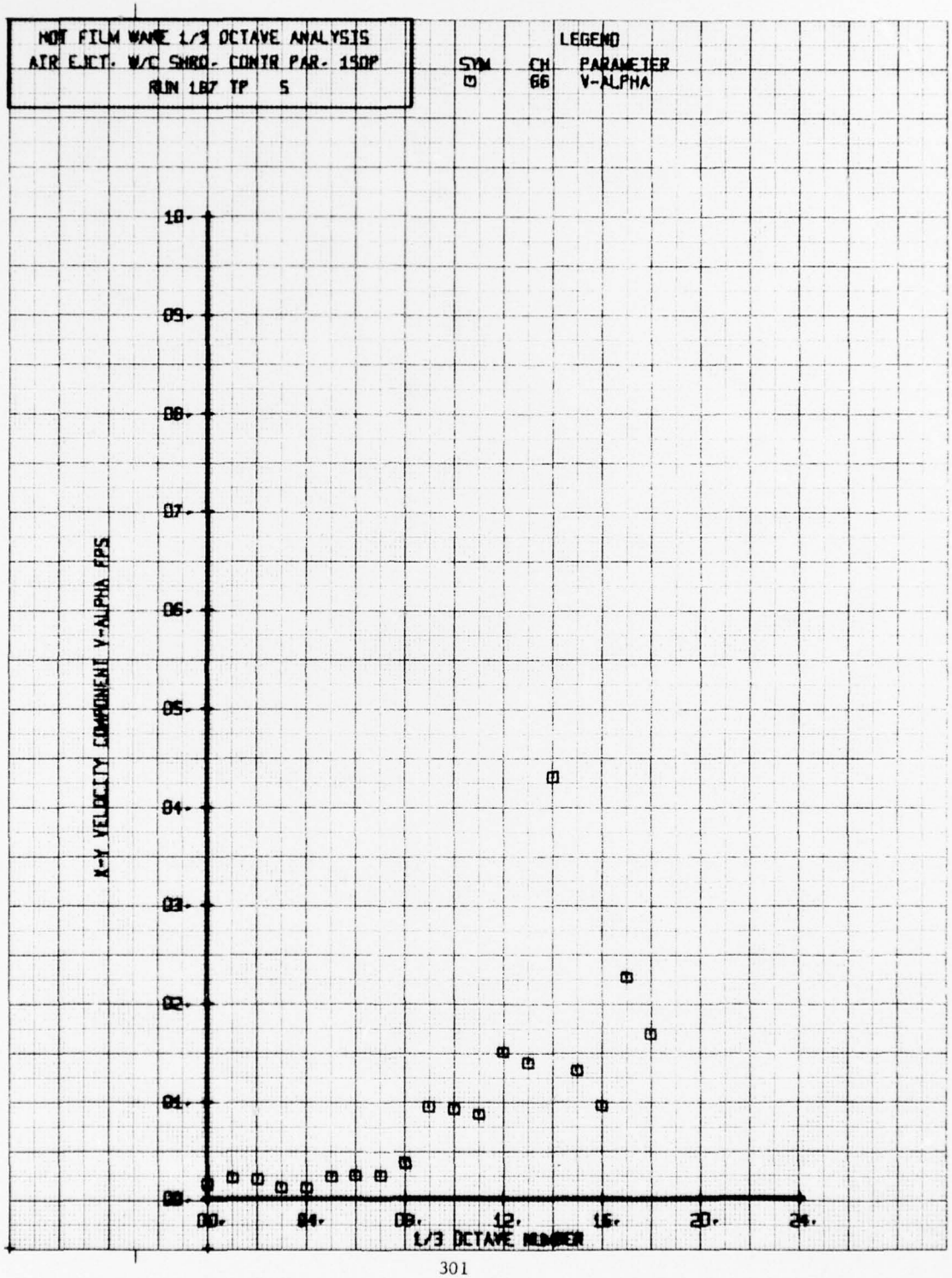
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AIR EJCT. W/C SHRD. CONTR PAR. 150P
RUN 187 TP 5
LEGEND
SYM CH PARAMETER
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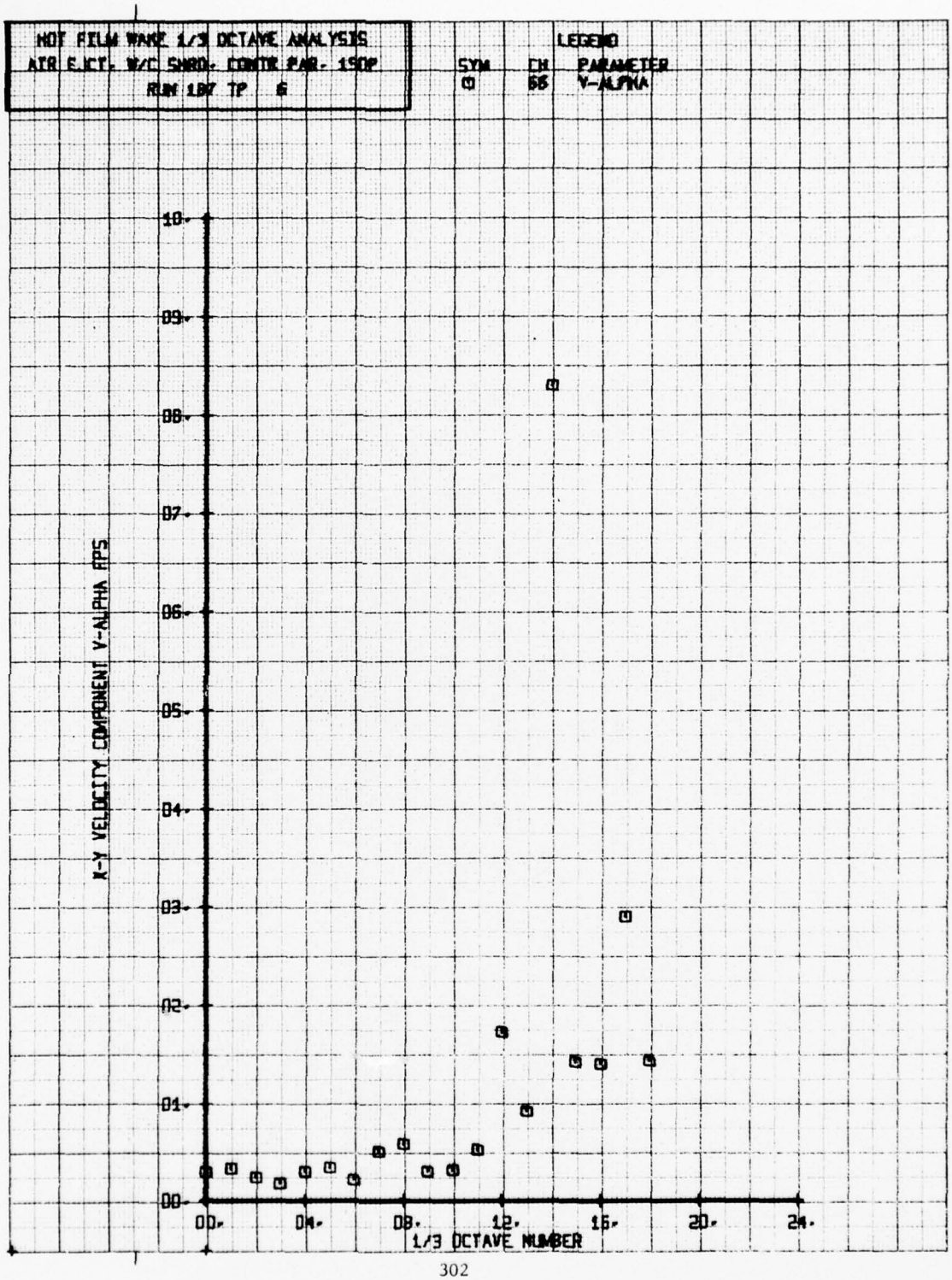
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RUN 187 TP 6
LEGEND
SYM CH PARAMETER
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X-Y VELOCITY COMPONENT V-ALPHA FPS
1/3 OCTAVE NUMBER
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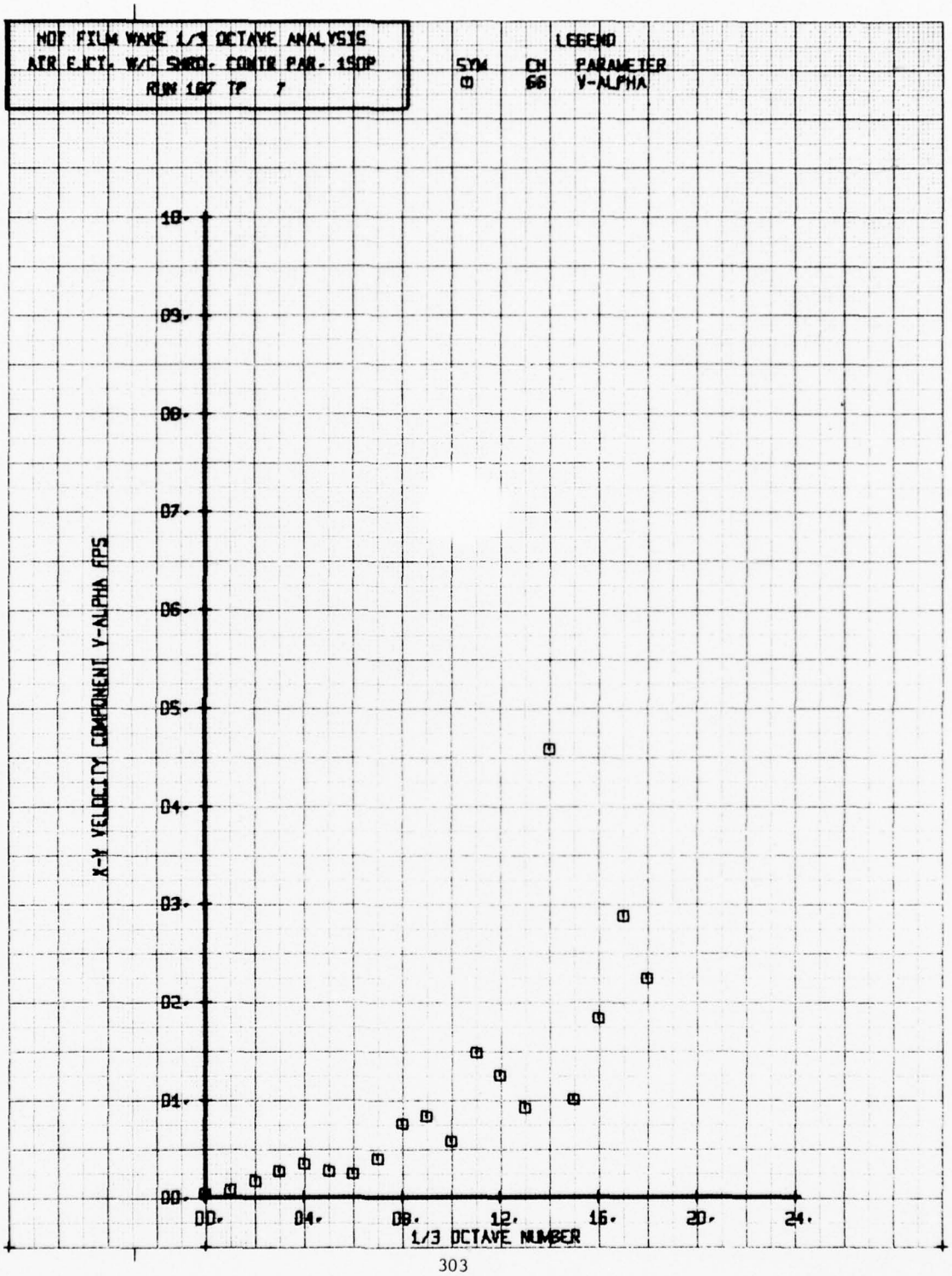
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AIR EJCT. W/C SHRD. CONTR PAR. 15DP
RUN 187 TP 7
LEGEND
SYM CH PARAMETER
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X-Y VELOCITY COMPONENT V-ALPHA FPS
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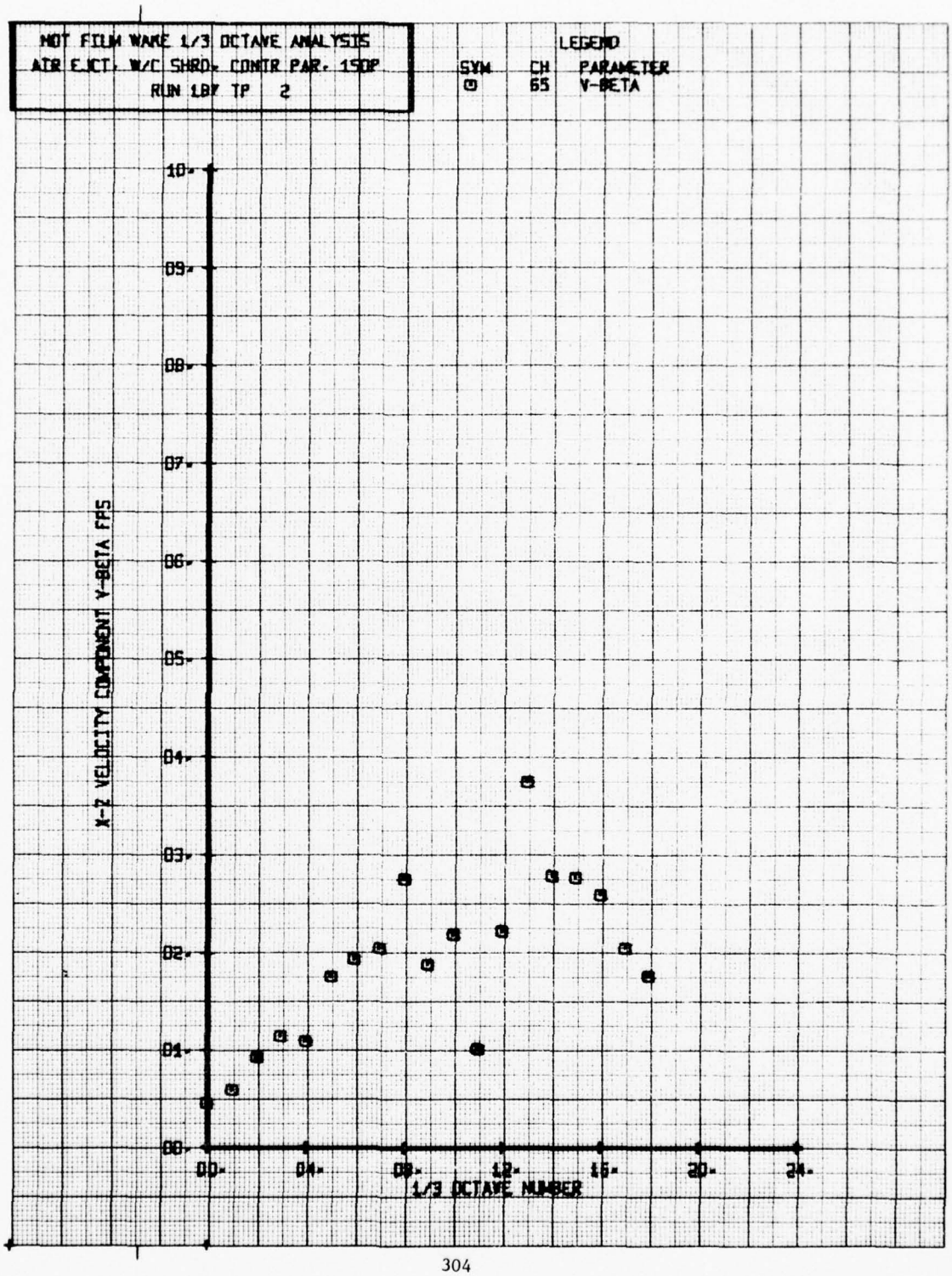
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AIR EJCT. W/C SHRD. CONTR PAR. 150P
RUN 18Y TP 2
LEGEND
SYM CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA FPS
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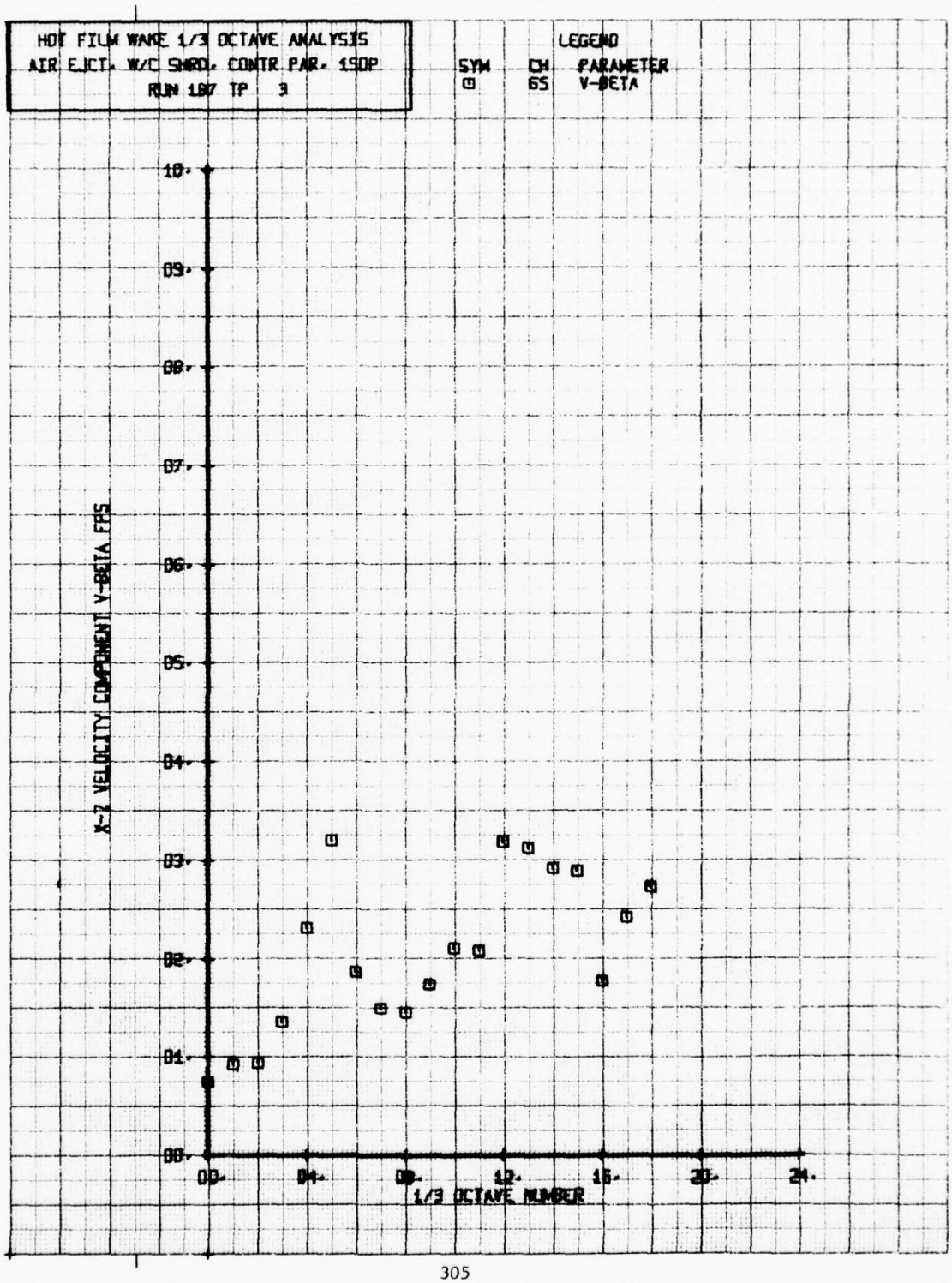
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AIR EJCT. W/C SHRD. CONTR PAR. 150P
RUN 187 TP 3
LEGEND
SYM CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA FPS
1/3 OCTAVE NUMBER
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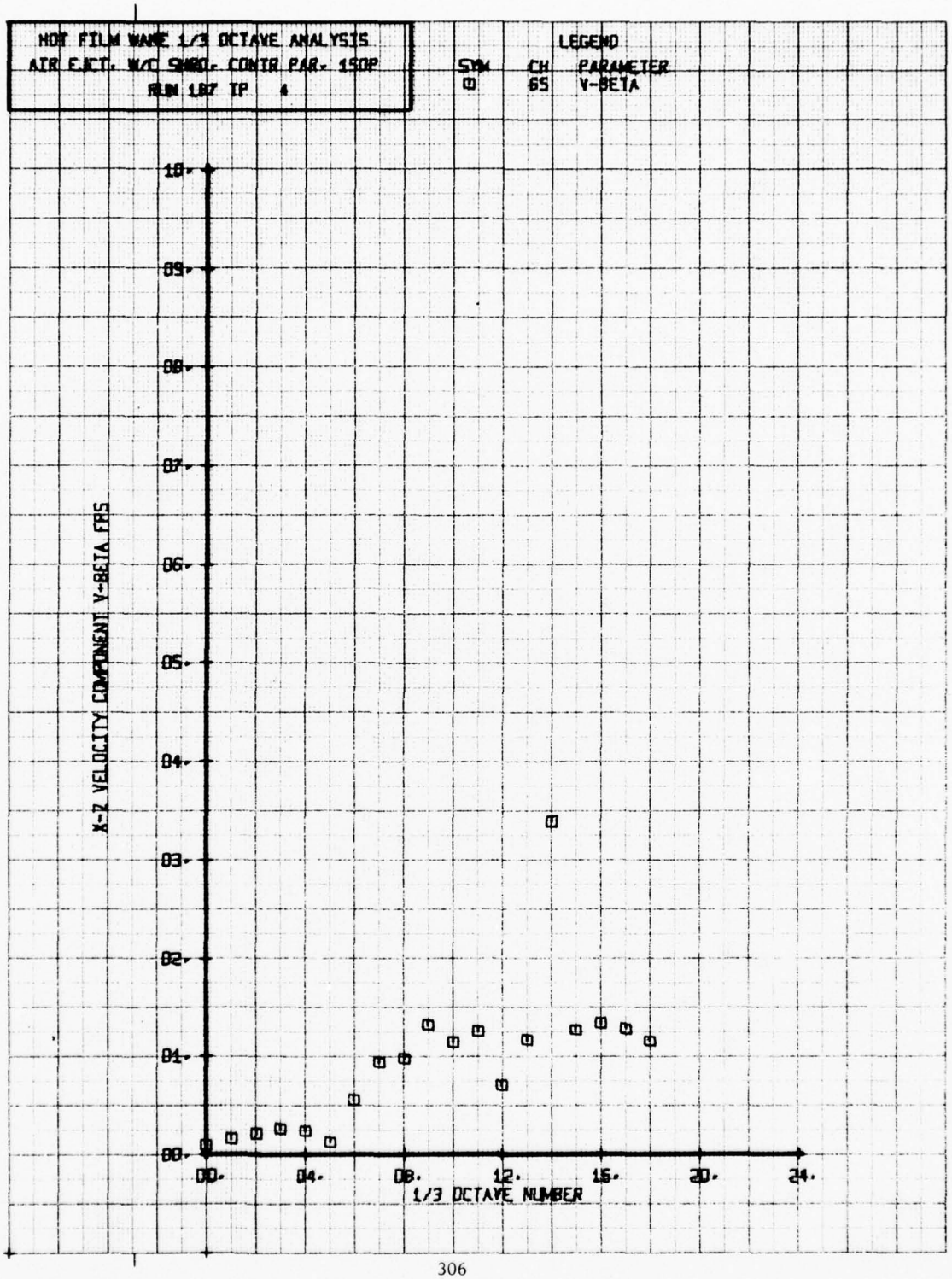
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AIR EJCT. W/C SHRD. CONTR PAR. 150P
RUN 187 TP 4
LEGEND
SYM CH PARAMETER
65 V-BETA
X-Z VELOCITY COMPONENT V-BETA FPS
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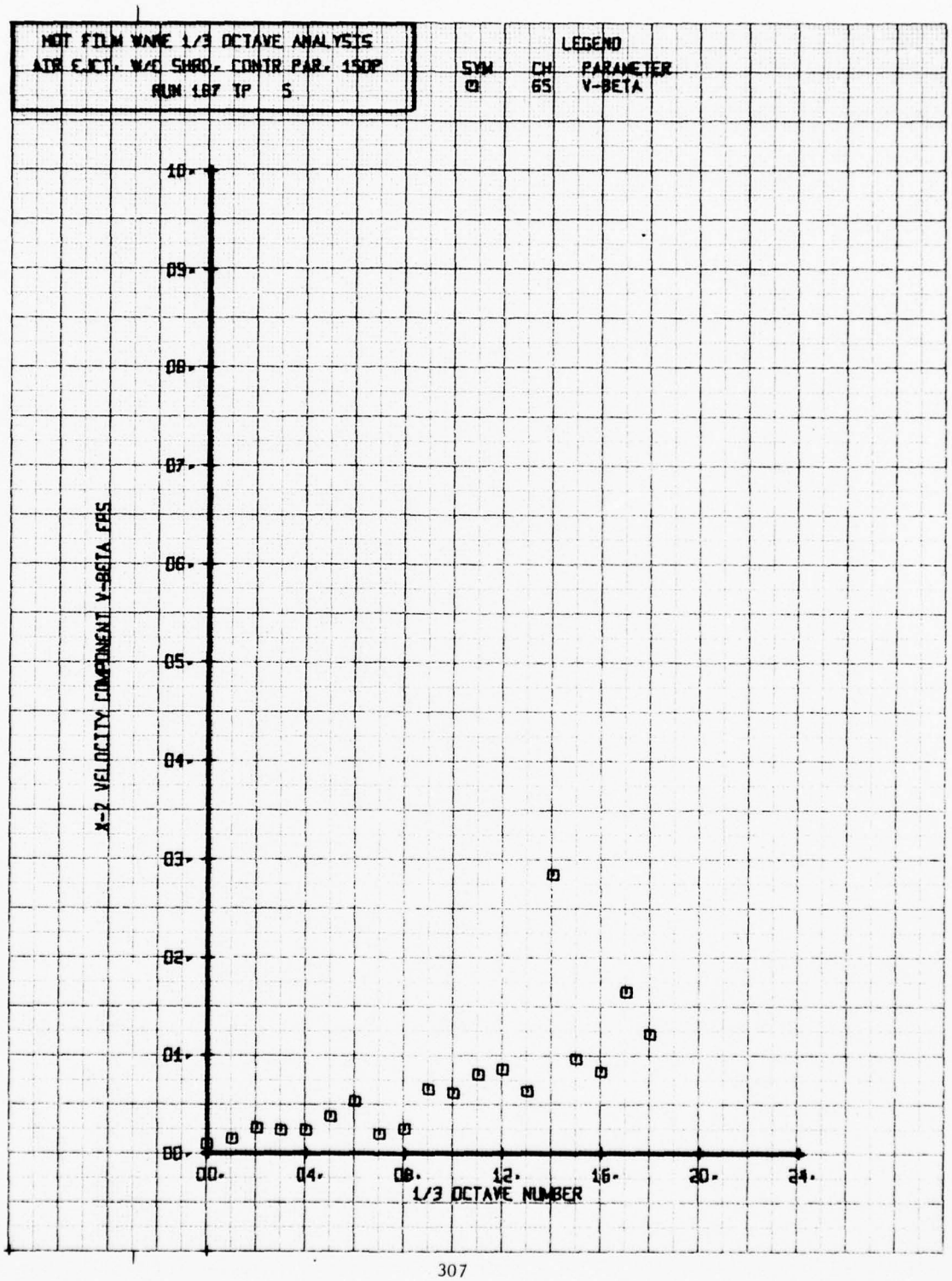
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AIR EJCT. W/O SHRD. CONTR PAR. 150P
RUN 187 TP 5
LEGEND
SYM CH PARAMETER
65 V-BETA
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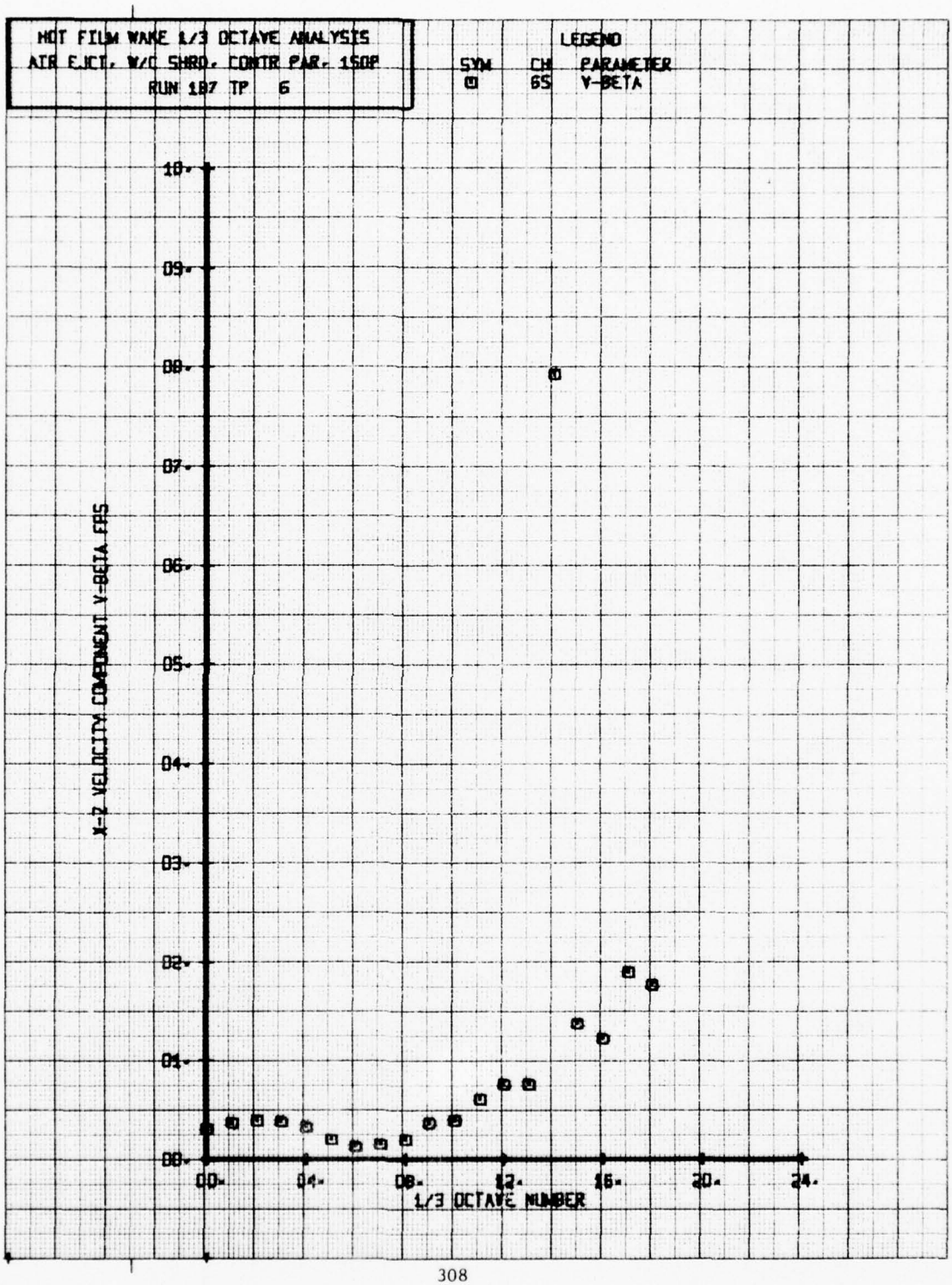
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AIR EJCT. W/O SHRD. CONTR PAR. 150P
RUN 187 TP 6
LEGEND
SYM CH PARAMETER
6S V-BETA
X-Z VELOCITY COMPONENT V-BETA FPS
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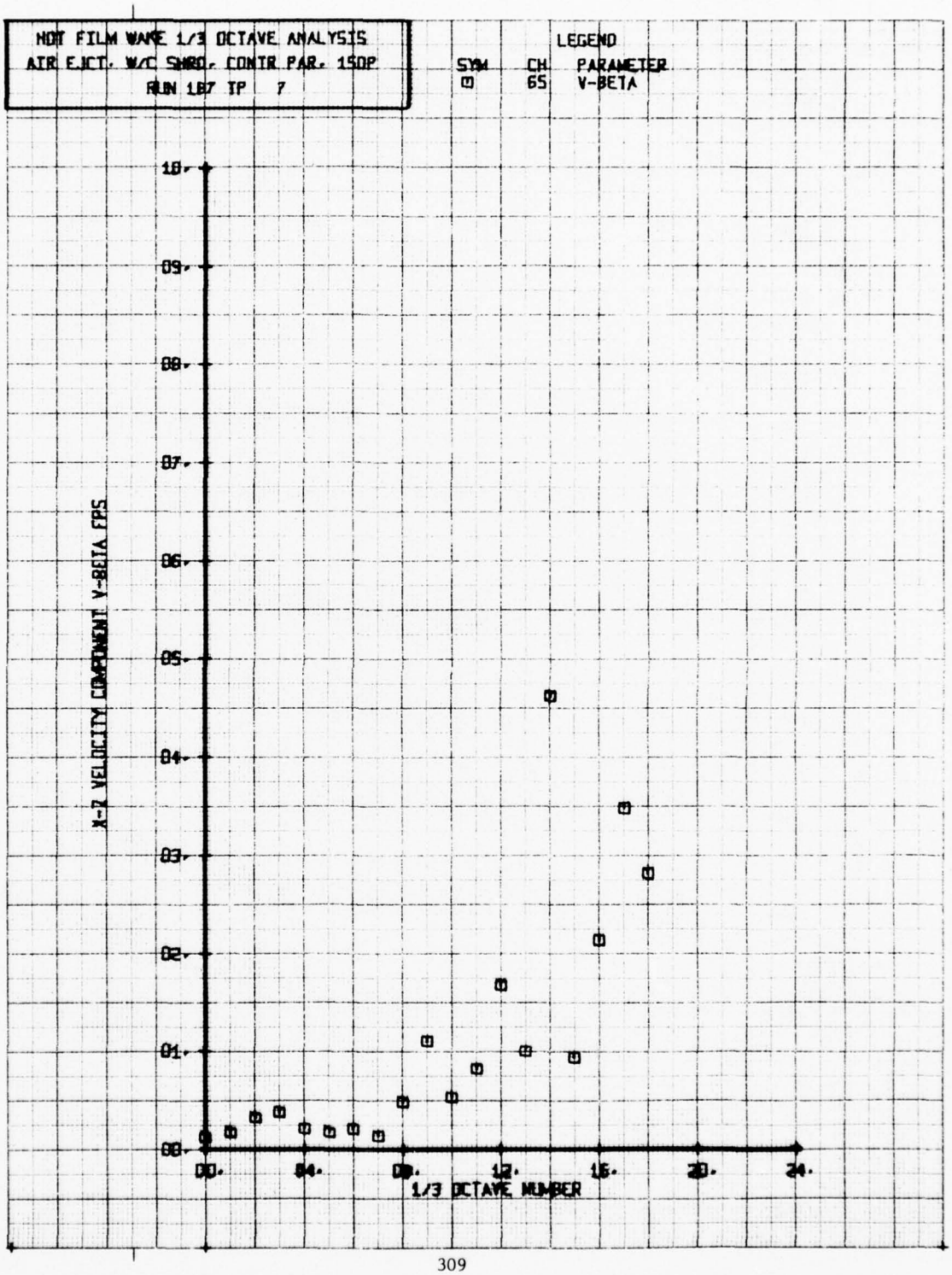
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AIR EJCT. W/C SHRD. CONTR PAR. 150P
RUN 187 TP 7
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SYM CH PARAMETER
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X-Z VELOCITY COMPONENT V-BETA FPS
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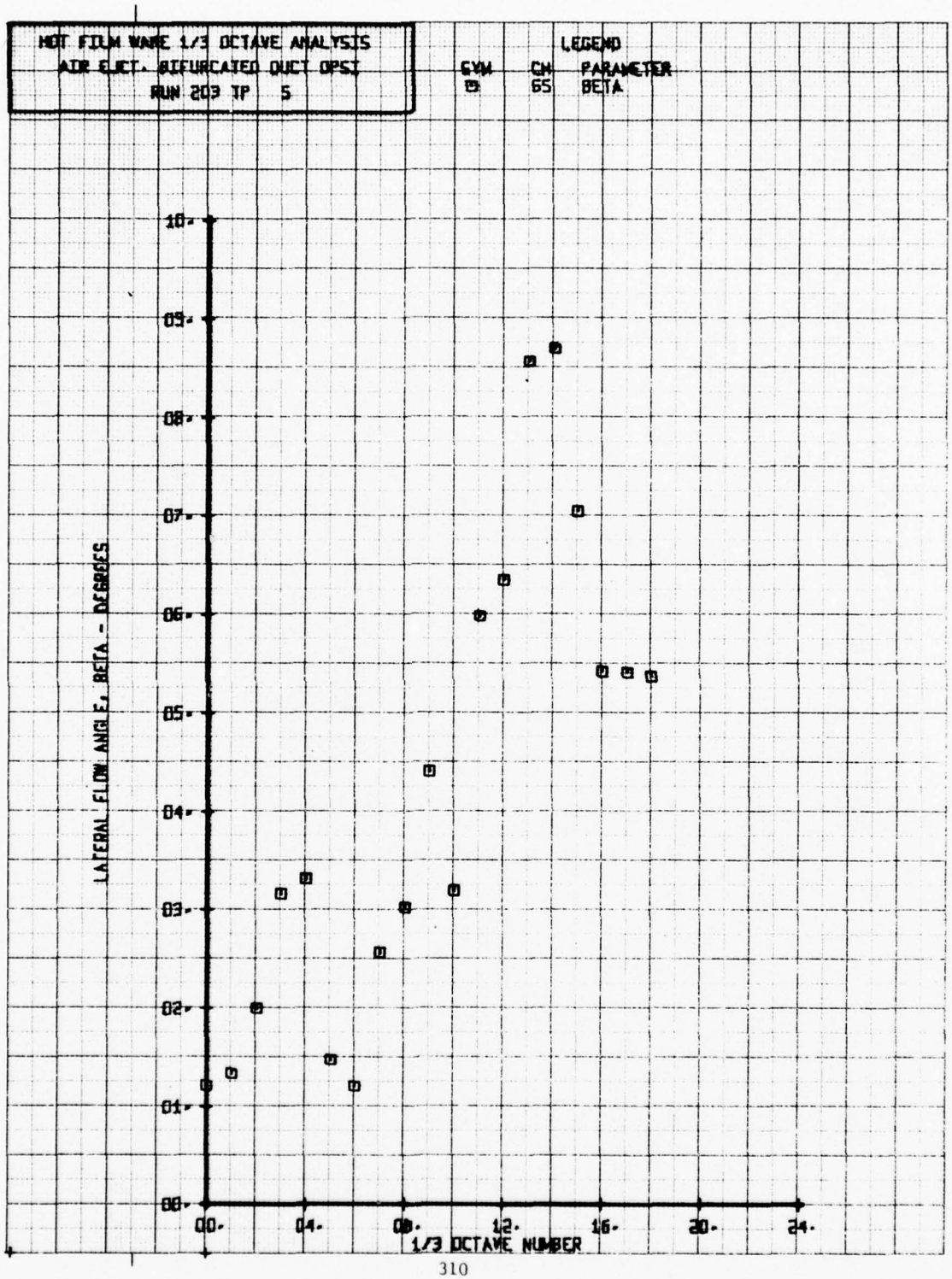
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AIR DUCT. BIFURCATED DUCT OPST
RUN 203 TP 5
LEGEND
GVM CH PARAMETER
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LATERAL FLOW ANGLE, BETA - DEGREES
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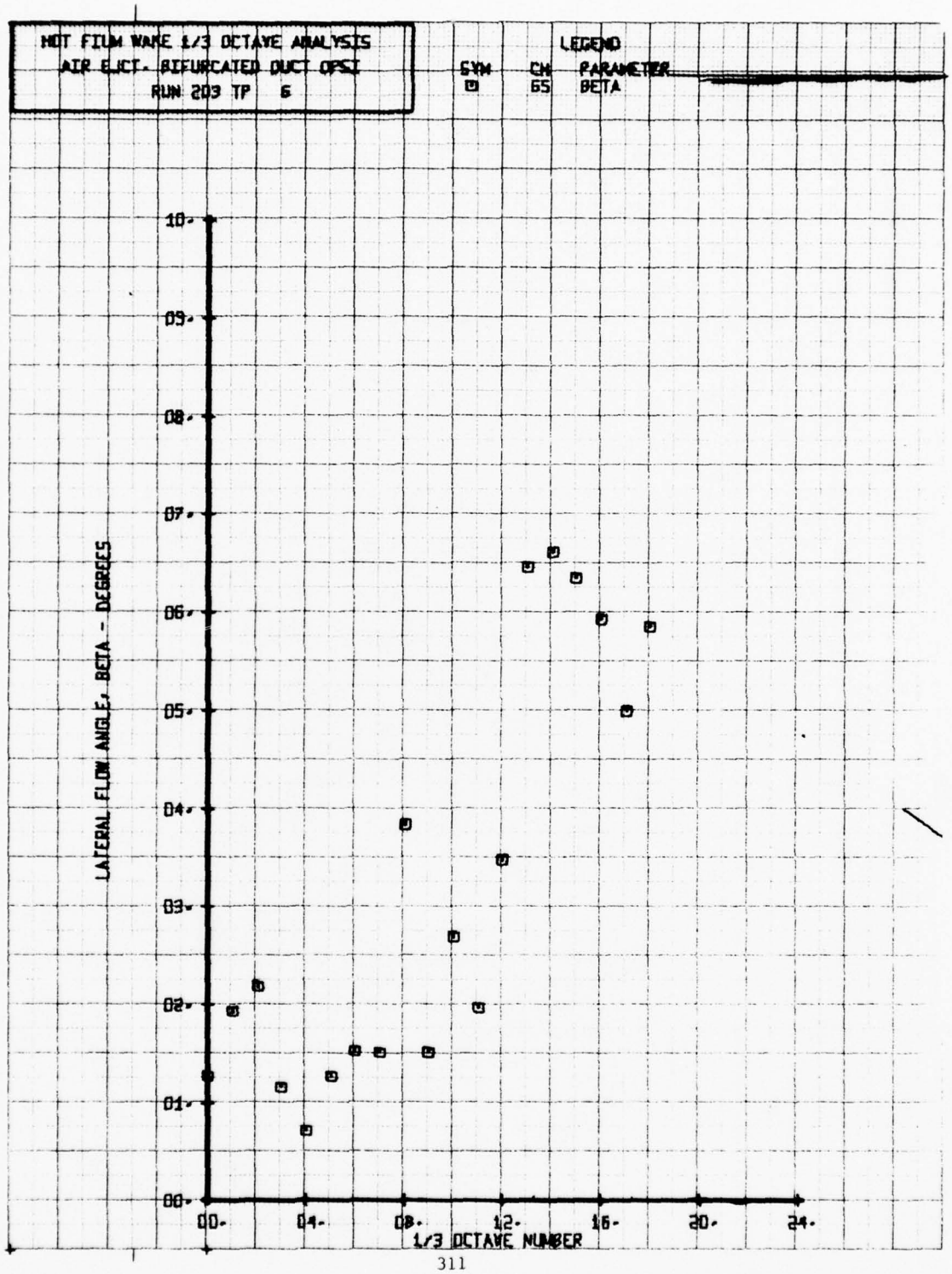
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
AIR EJCT. BIFURCATED DUCT OPSI
RUN 203 TP 6
LEGEND
SYM CH PARAMETER
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LATERAL FLOW ANGLE, BETA - DEGREES
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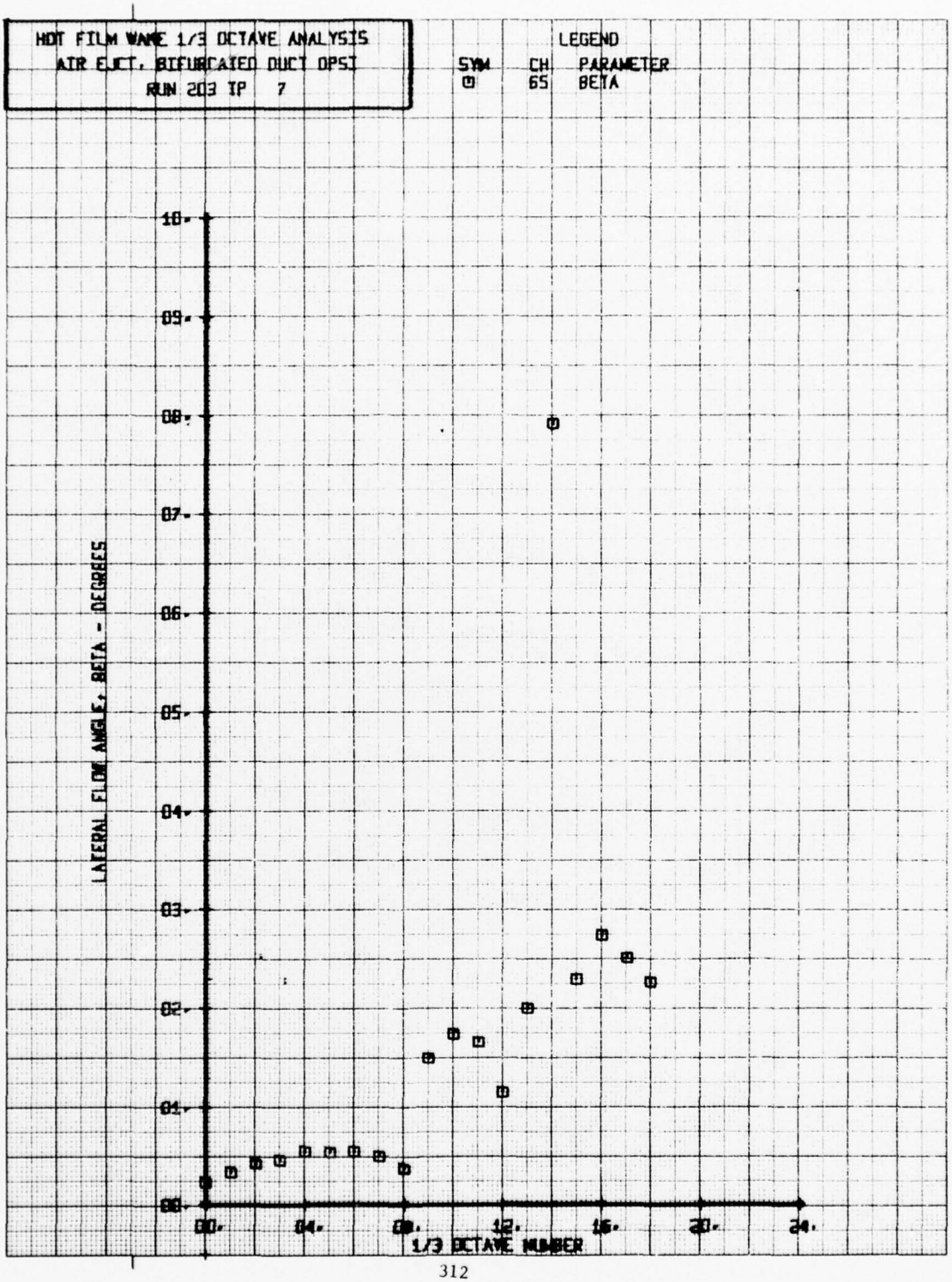
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AIR EJCT. BIFURCATED DUCT OPSI
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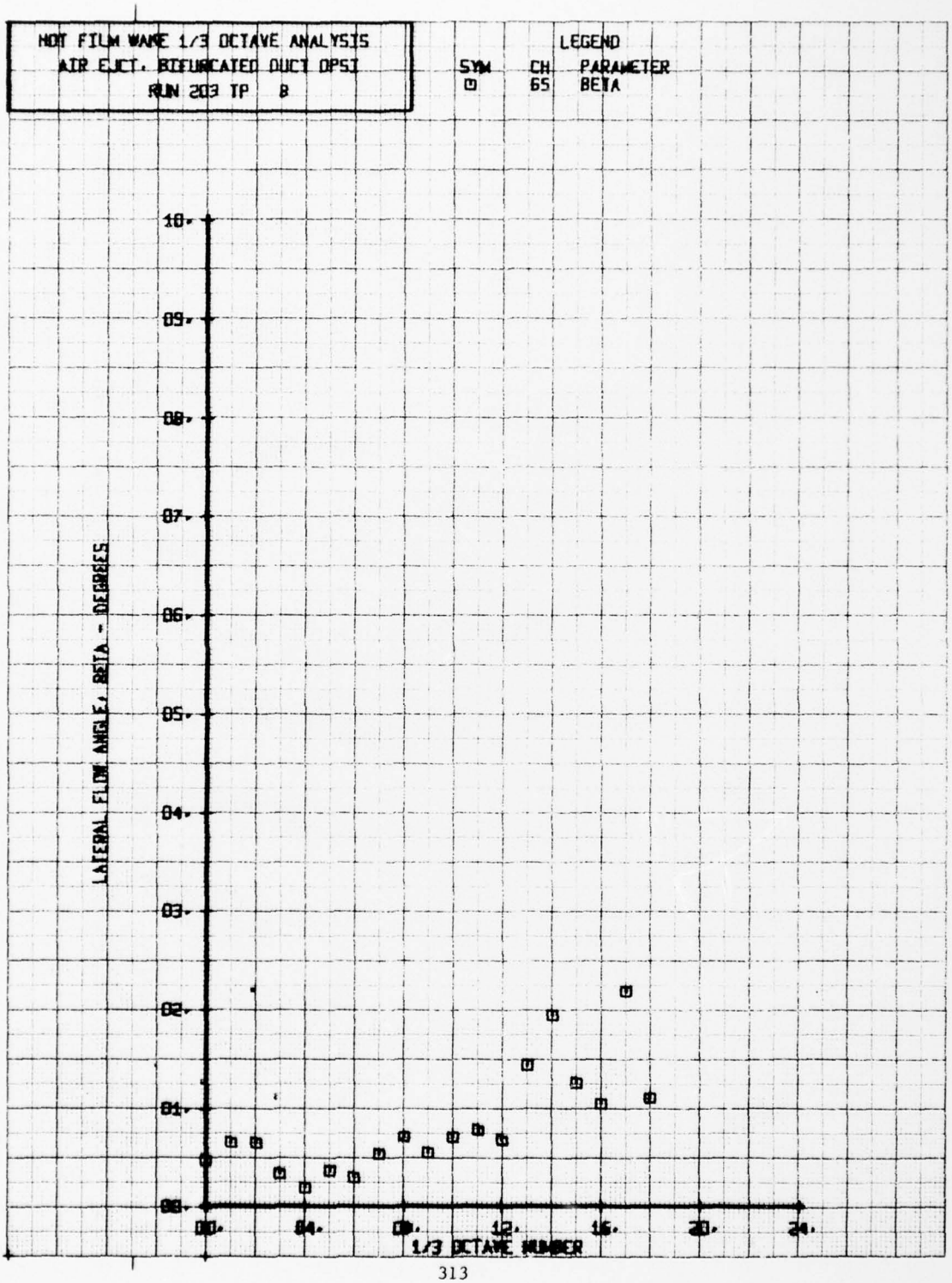
LATERAL FLOW ANGLE, BETA - DEGREES
1/3 OCTAVE NUMBER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LATERAL FLOW ANGLE, BETA - DEGREES
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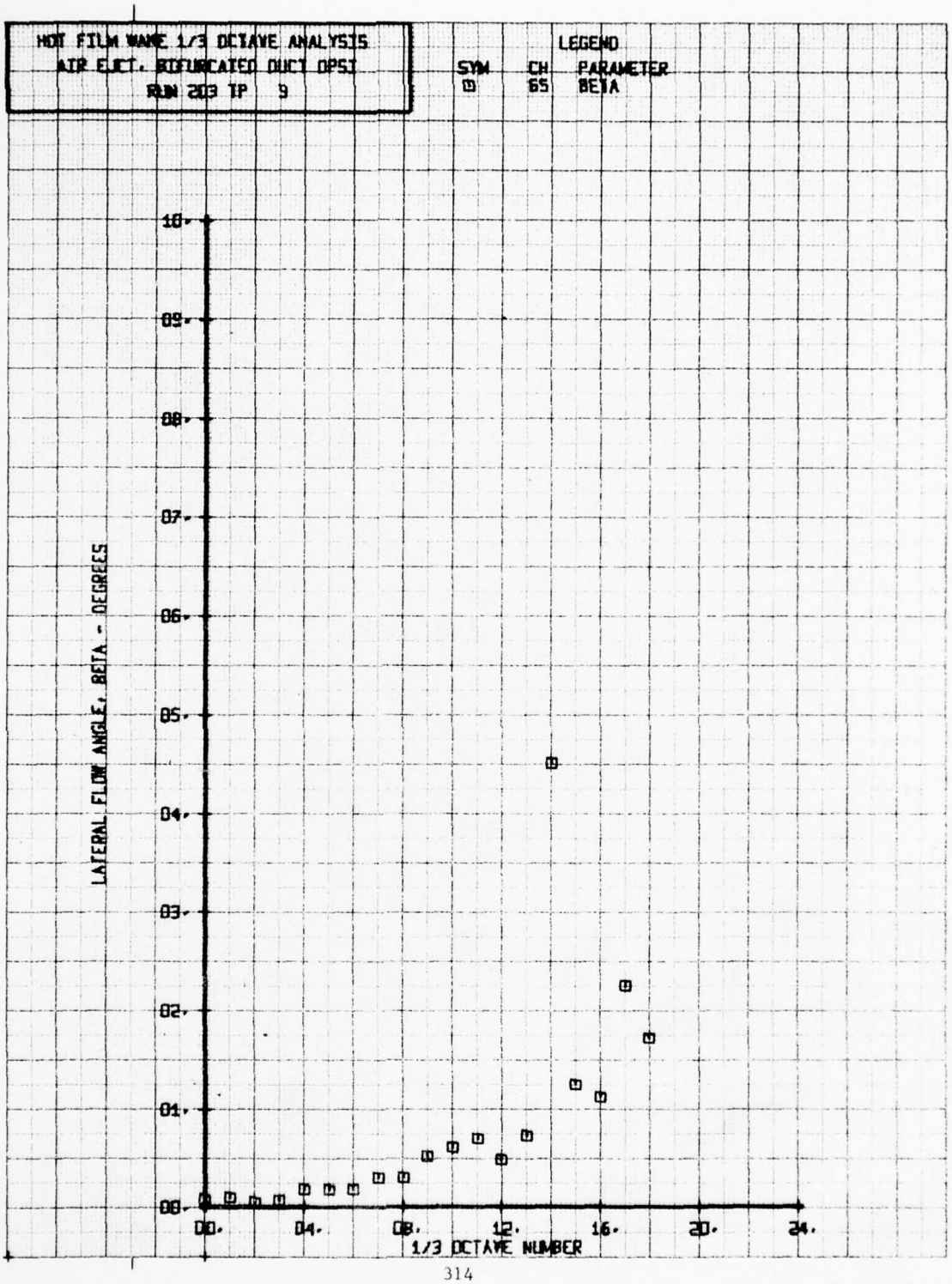
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AIR EJCT. BIFURCATED DUCT OPSI
RUN 203 TP 9
LEGEND
SYM CH PARAMETER
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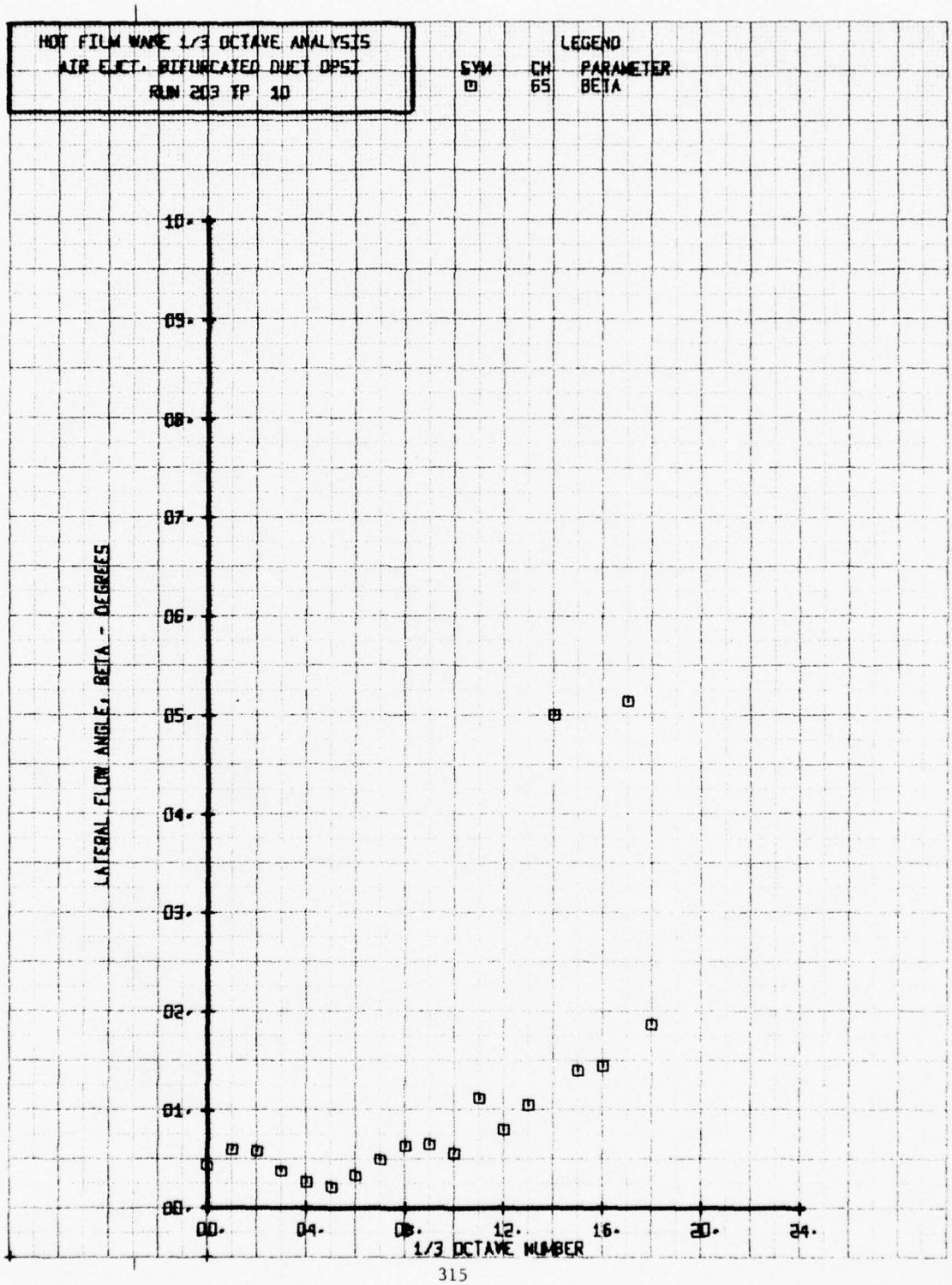
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AIR EJCT. BIFURCATED DUCT DPSI
RUN 203 TP 10
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LATERAL FLOW ANGLE, BETA - DEGREES
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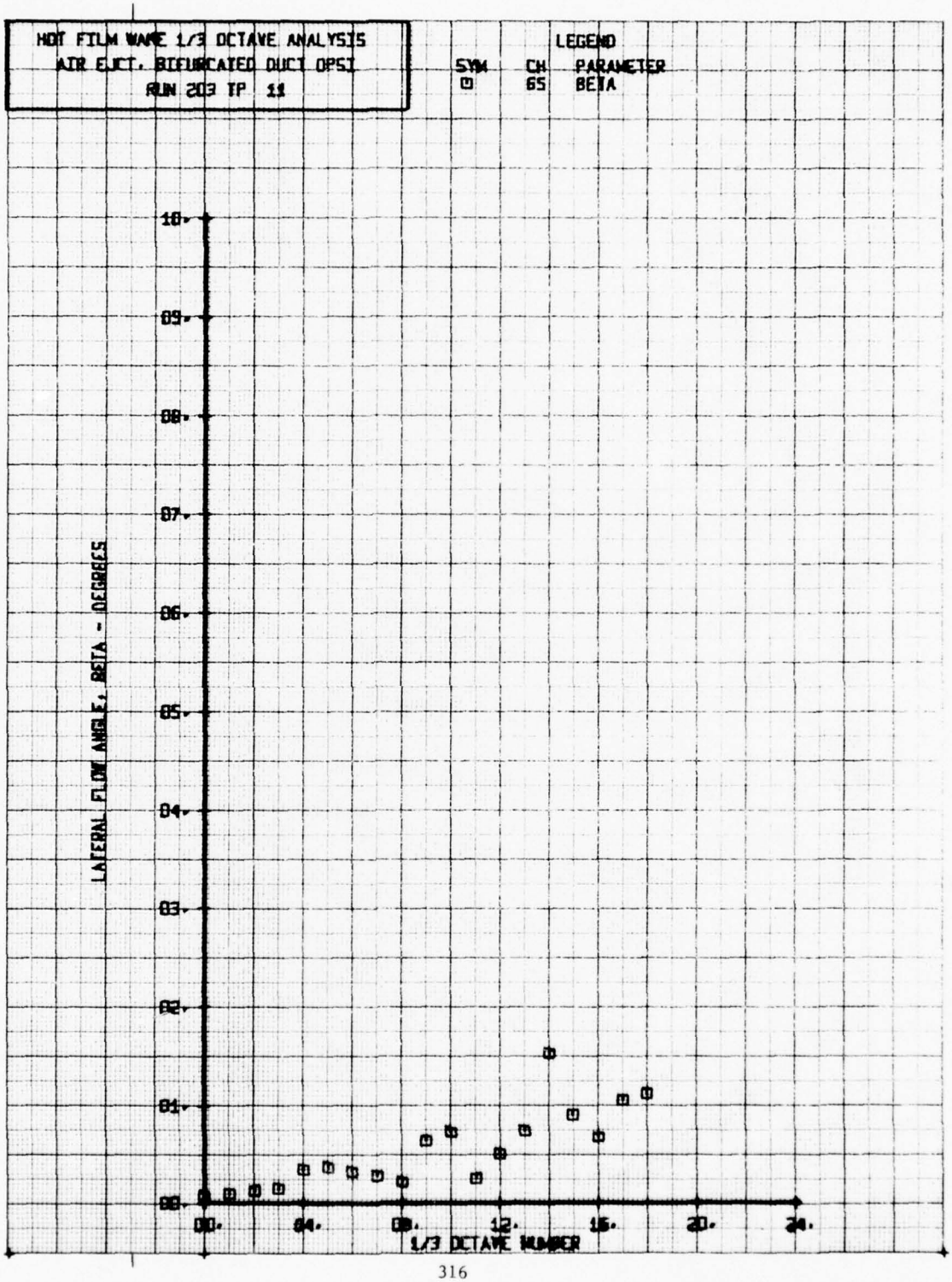
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LATERAL FLOW ANGLE, BETA - DEGREES
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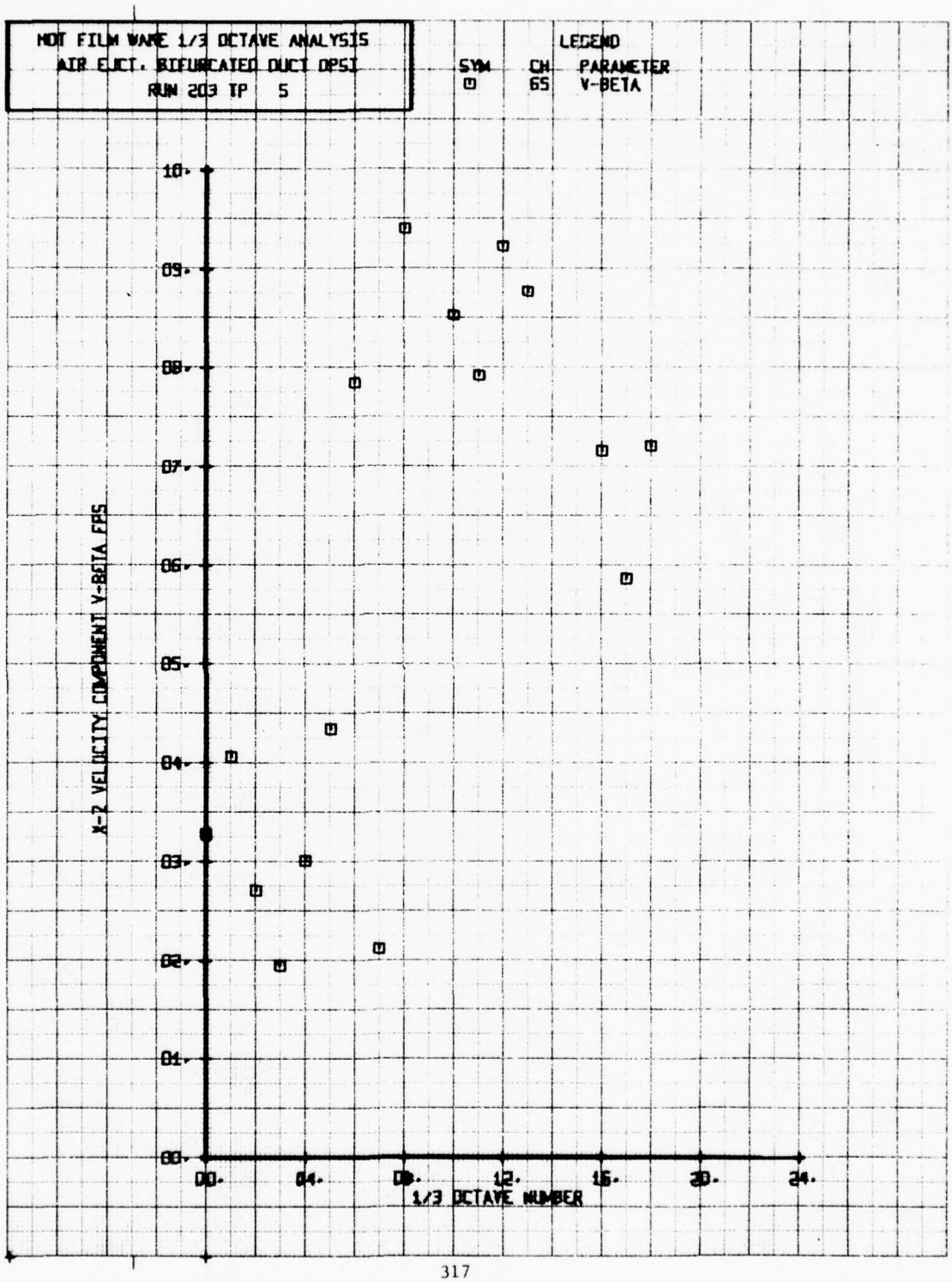
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RUN 203 TP 5
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X-2 VELOCITY COMPONENT V-BETA FPS
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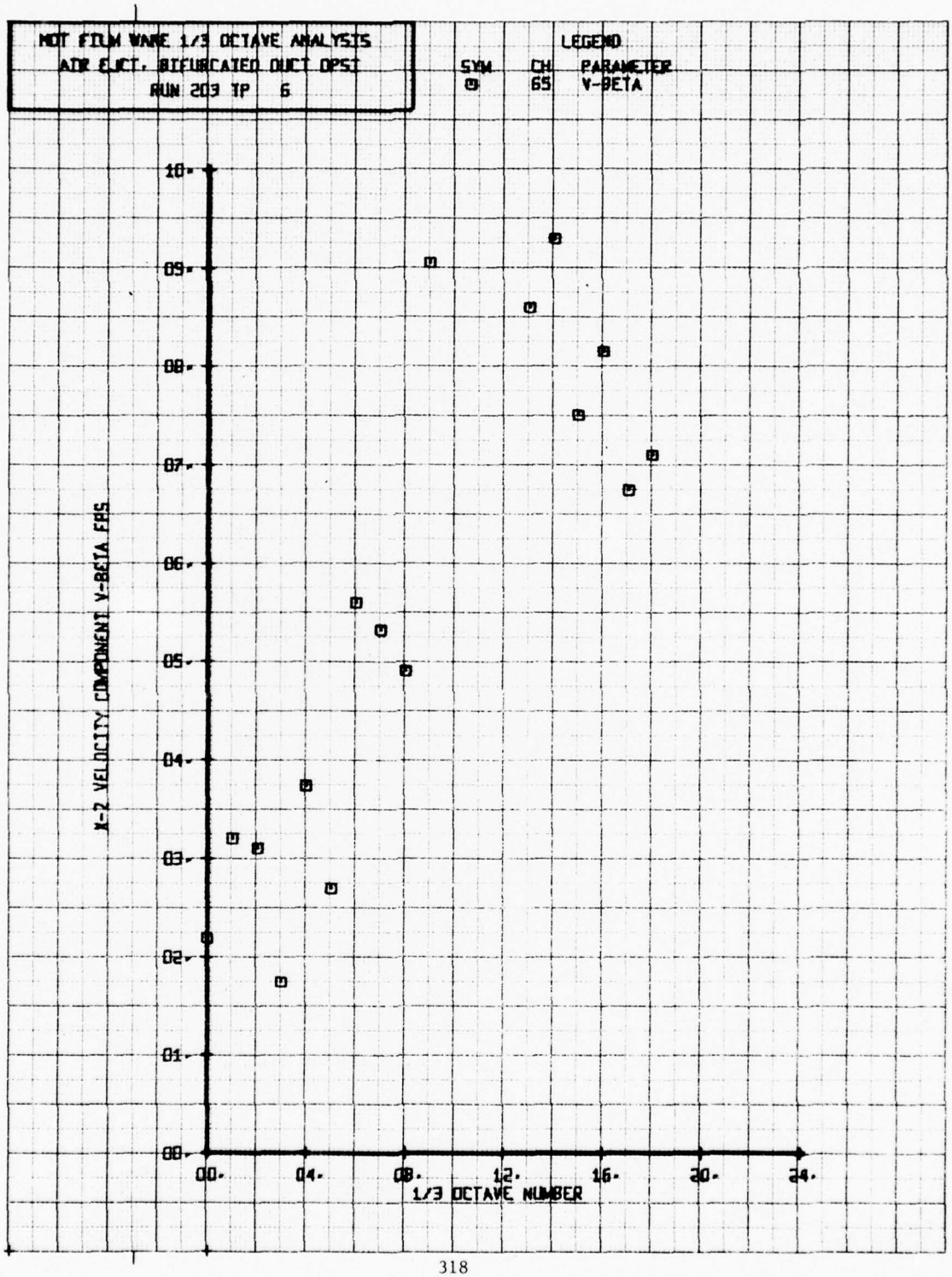
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RUN 203 TP 6
LEGEND
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X-2 VELOCITY COMPONENT V-BETA FBS
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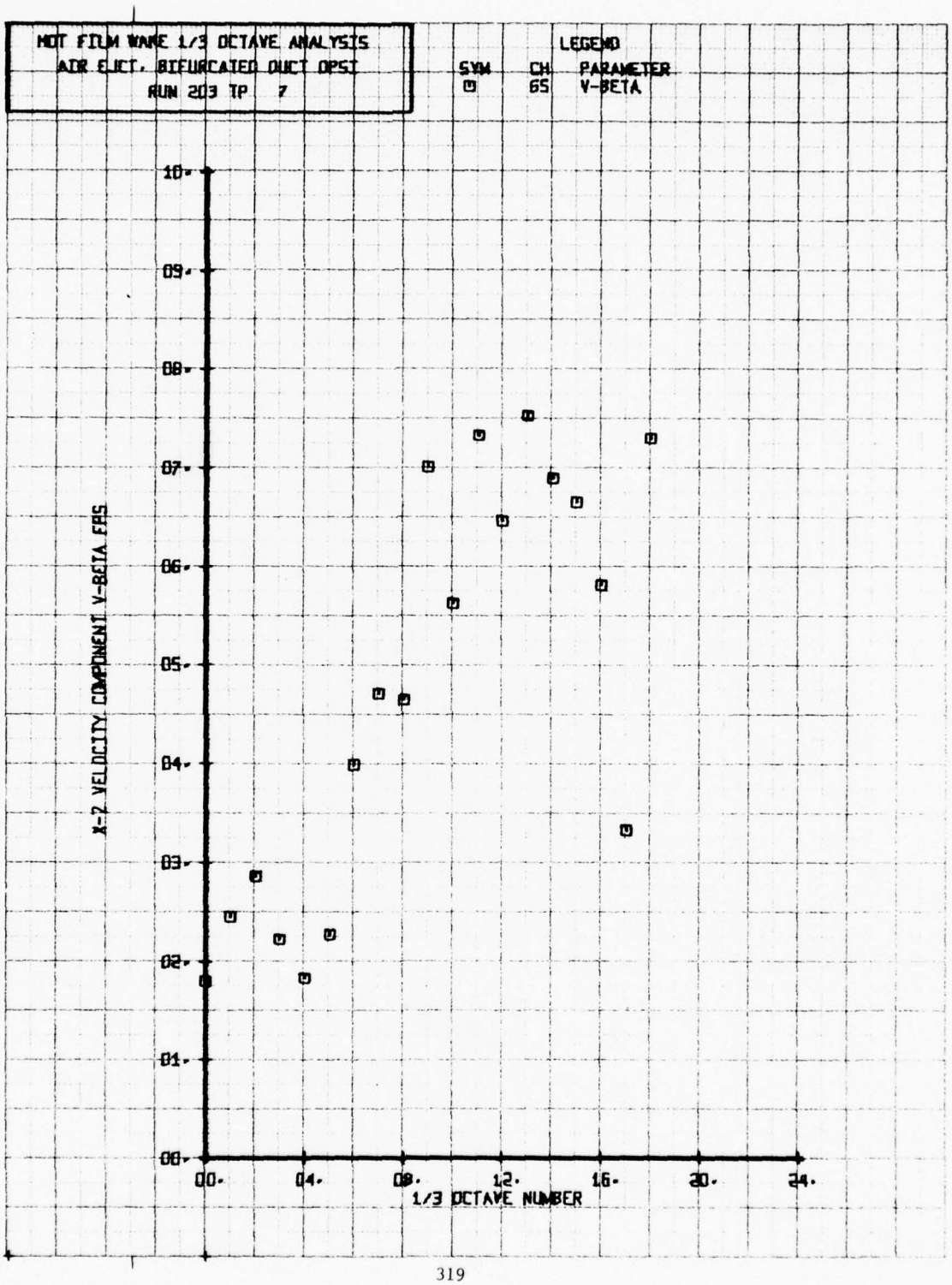
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RUN 203 TP 7
LEGEND
SYM CH PARAMETER
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X-7 VELOCITY COMPONENT V-BETA FRS
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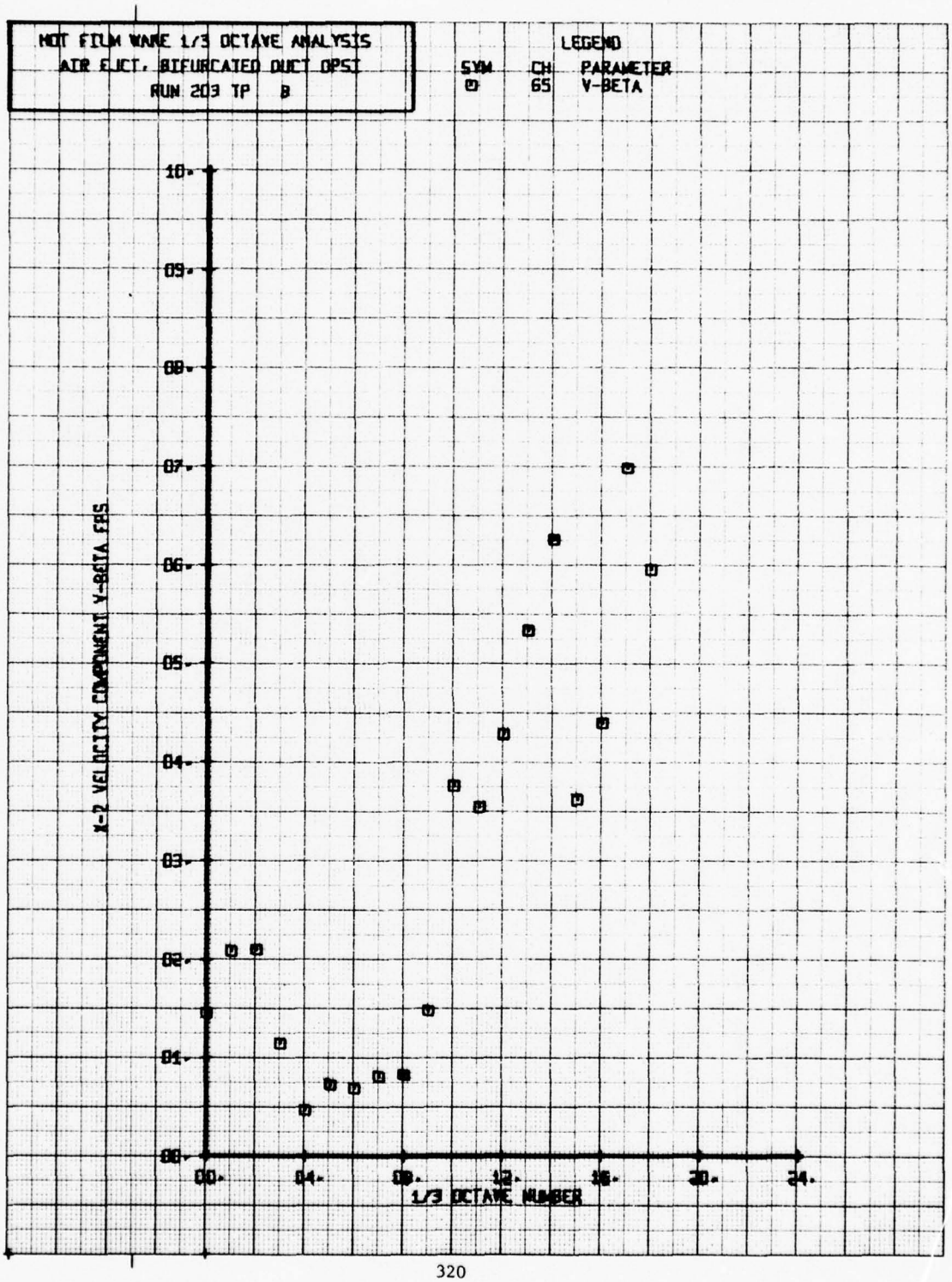
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AIR EJCT. BIFURCATED DUCT DPSI
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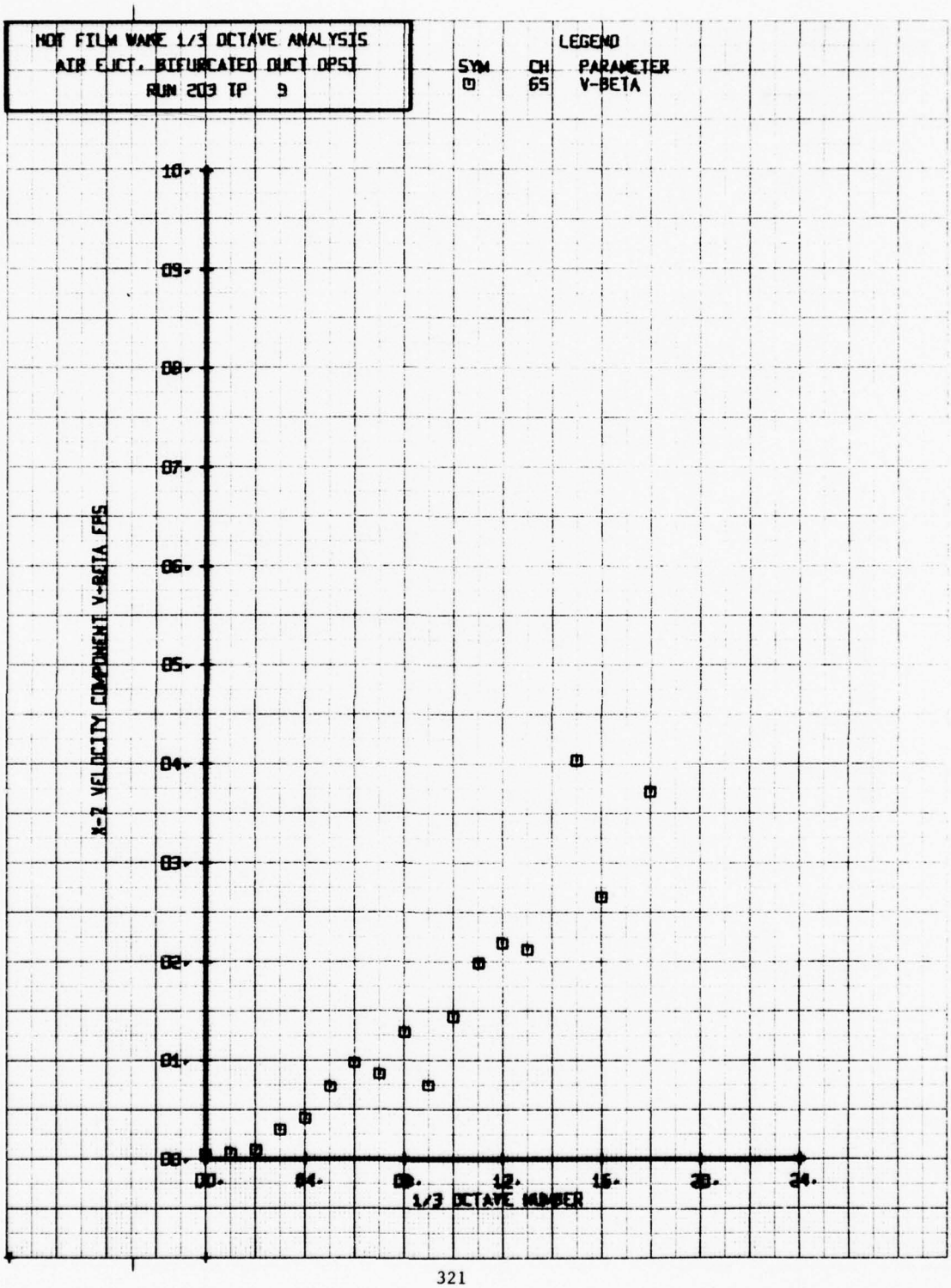
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AIR EJCT. BIFURCATED DUCT OPSI
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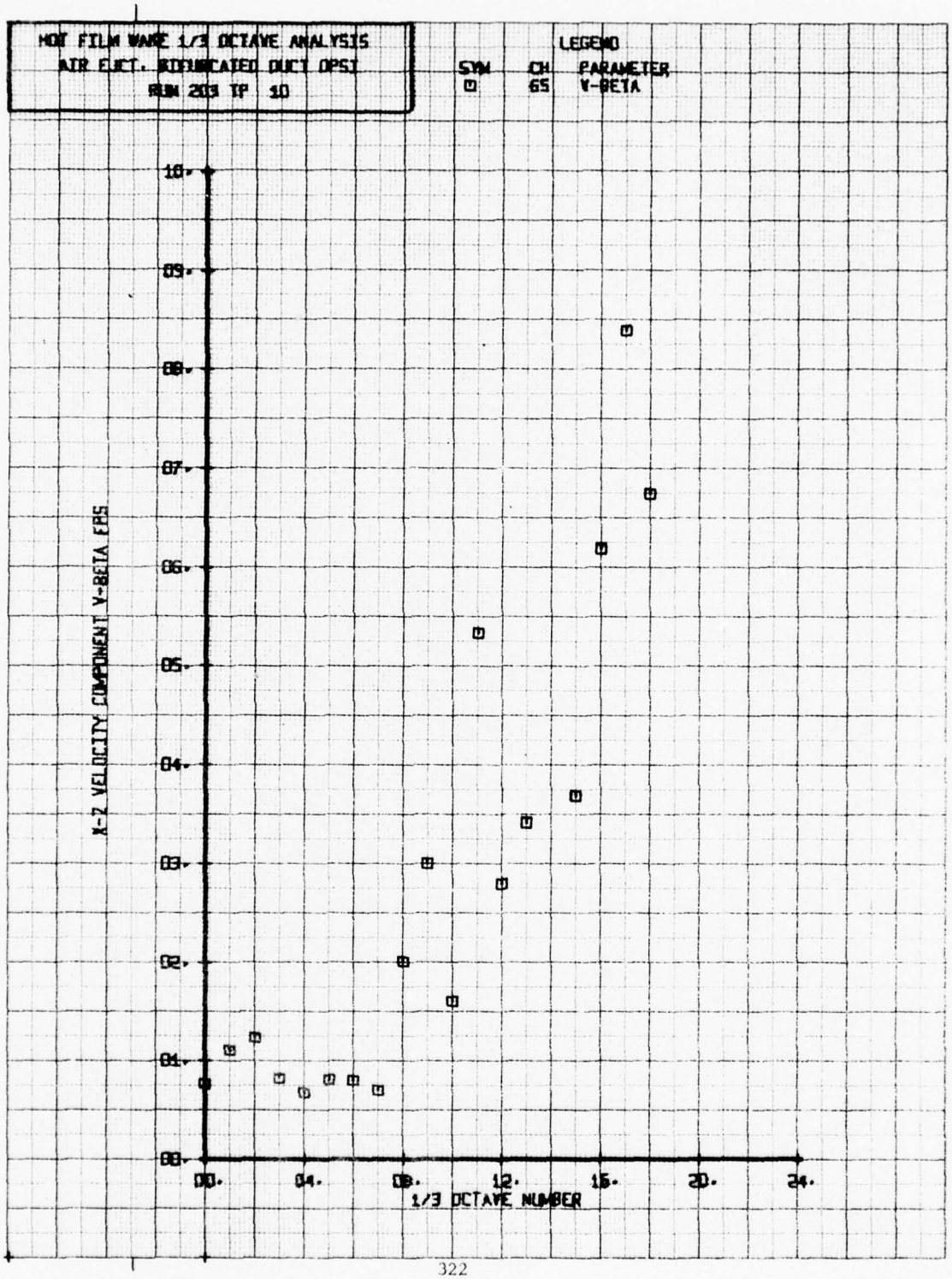
1/3 OCTAVE NUMBER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RUN 203 TP 10
LEGEND
SYM CH PARAMETER
65 V-BETA
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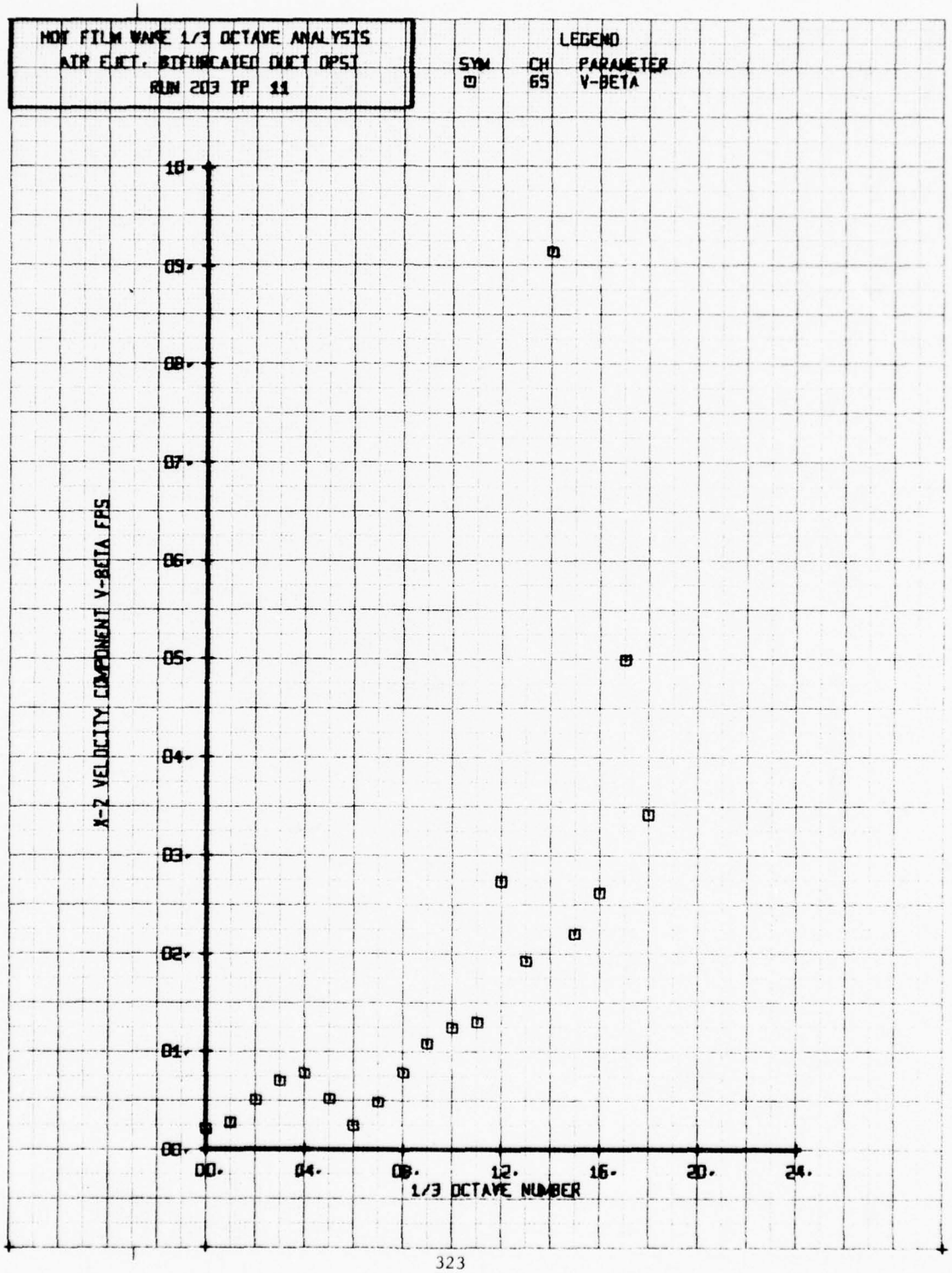
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RUN 203 TP 11
LEGEND
SYM CH PARAMETER
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X-Z VELOCITY COMPONENT V-BETA FPS
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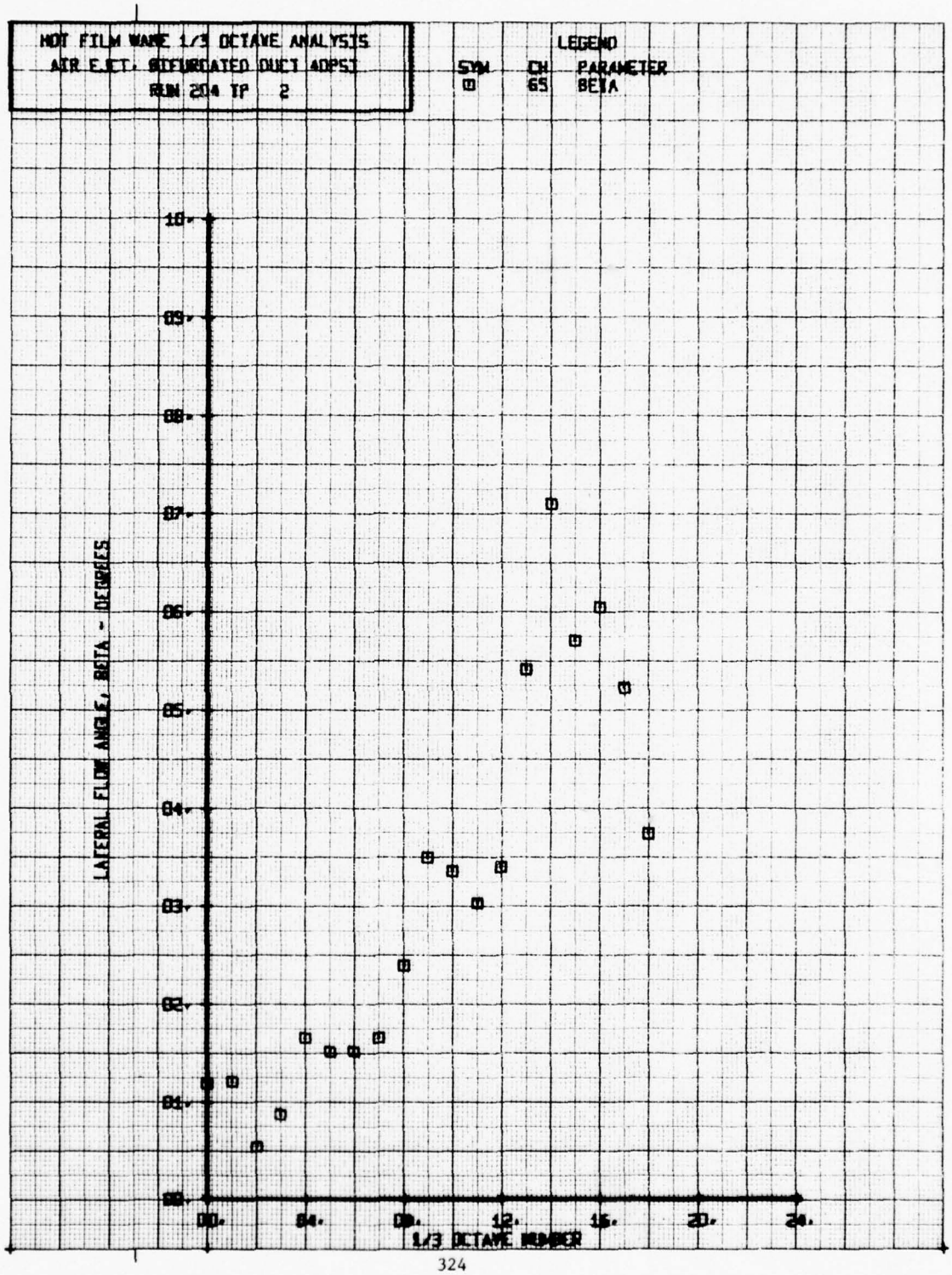
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AIR EJCT. BIFURCATED DUCT 40PSI
RUN 204 TP 2
LEGEND
SYM CH PARAMETER
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LATERAL FLOW ANGLE, BETA - DEGREES
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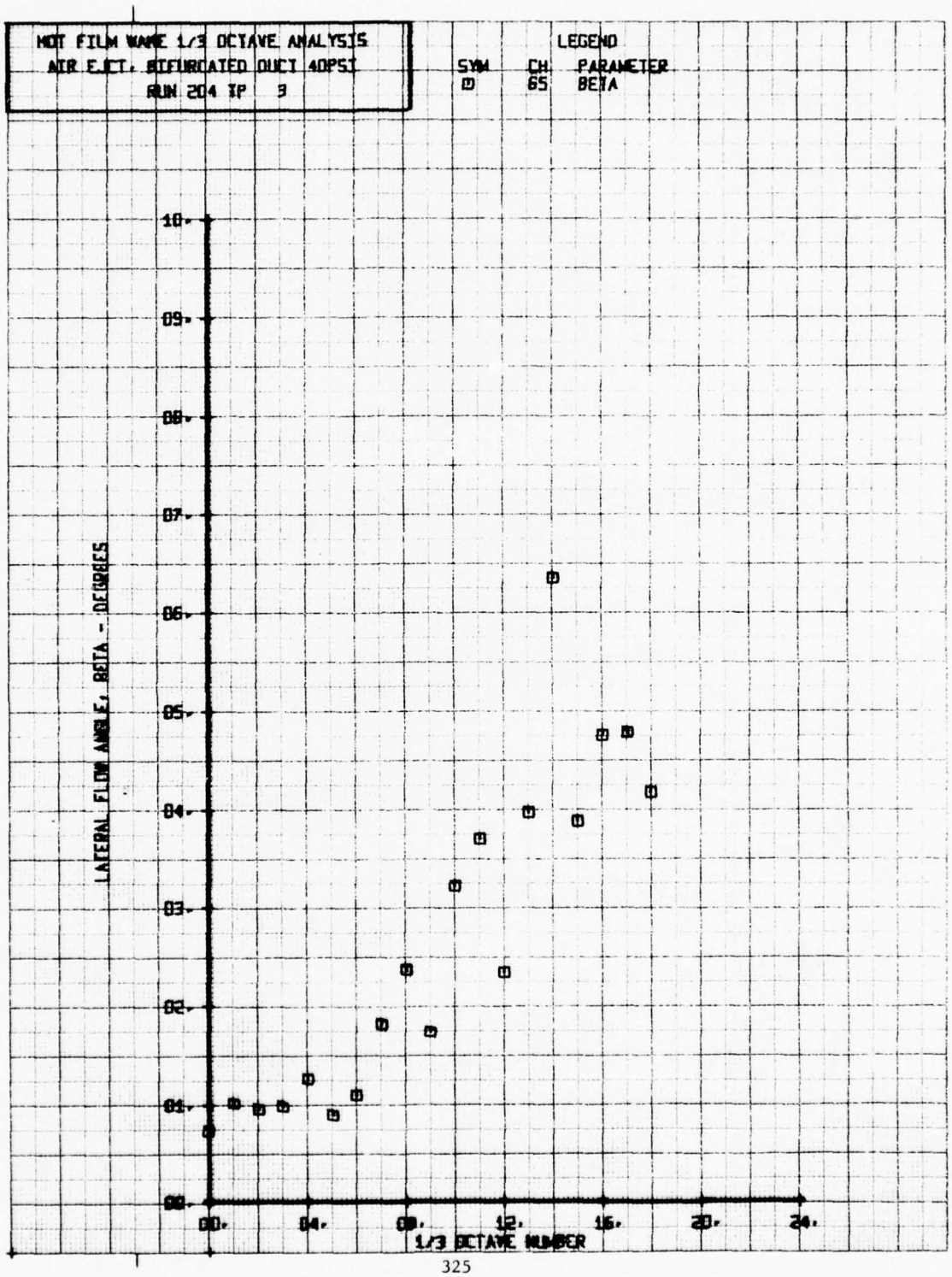
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AIR EJCT. BIFURCATED DUCT 40PSI
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LEGEND
SYM CH PARAMETER
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LATERAL FLOW ANGLE, BETA - DEGREES
1/3 OCTAVE NUMBER
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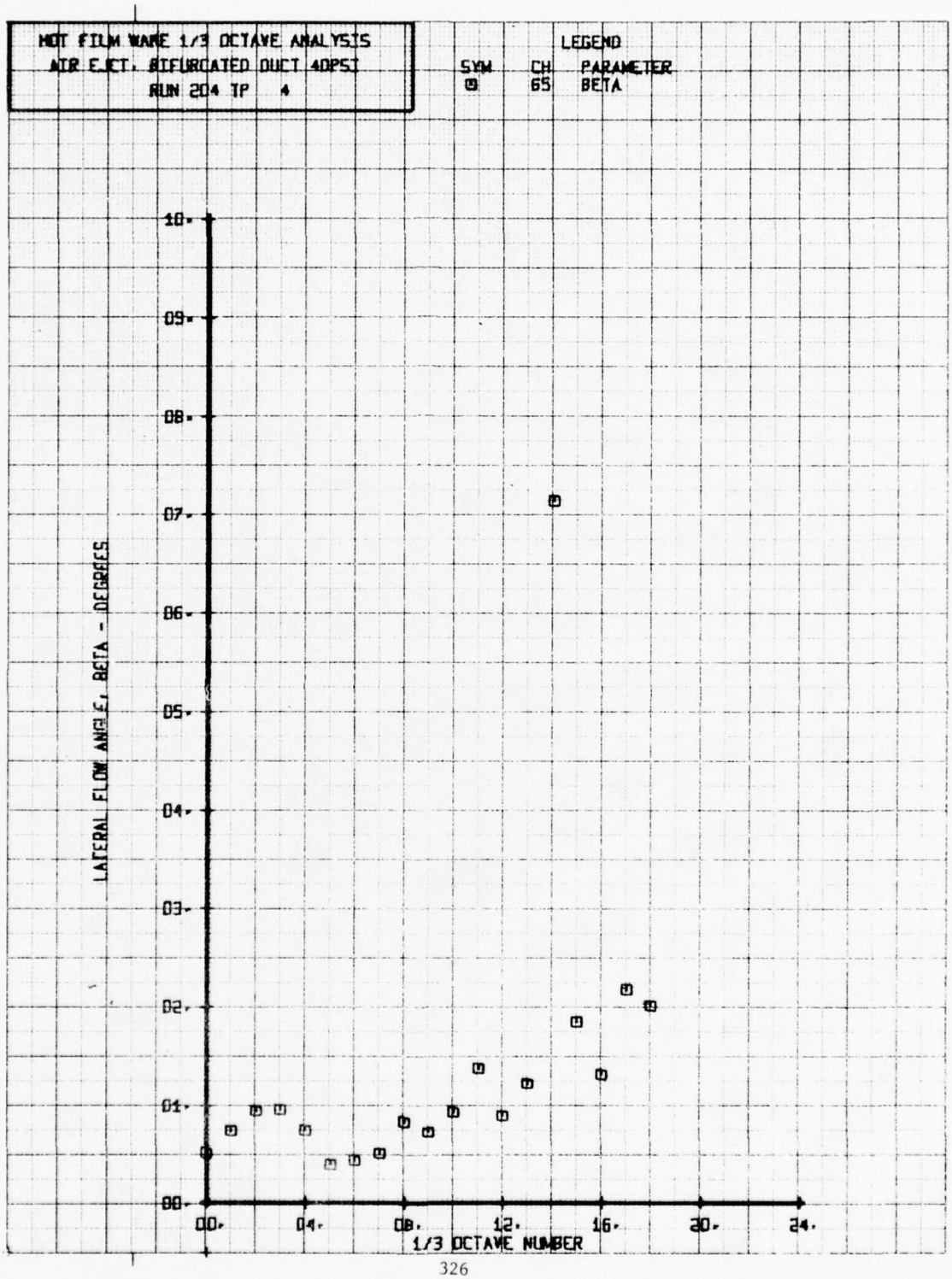
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
AIR EJCT. BIFURCATED DUCT 40PSI
RUN 204 TP 4
LEGEND
SYM CH PARAMETER
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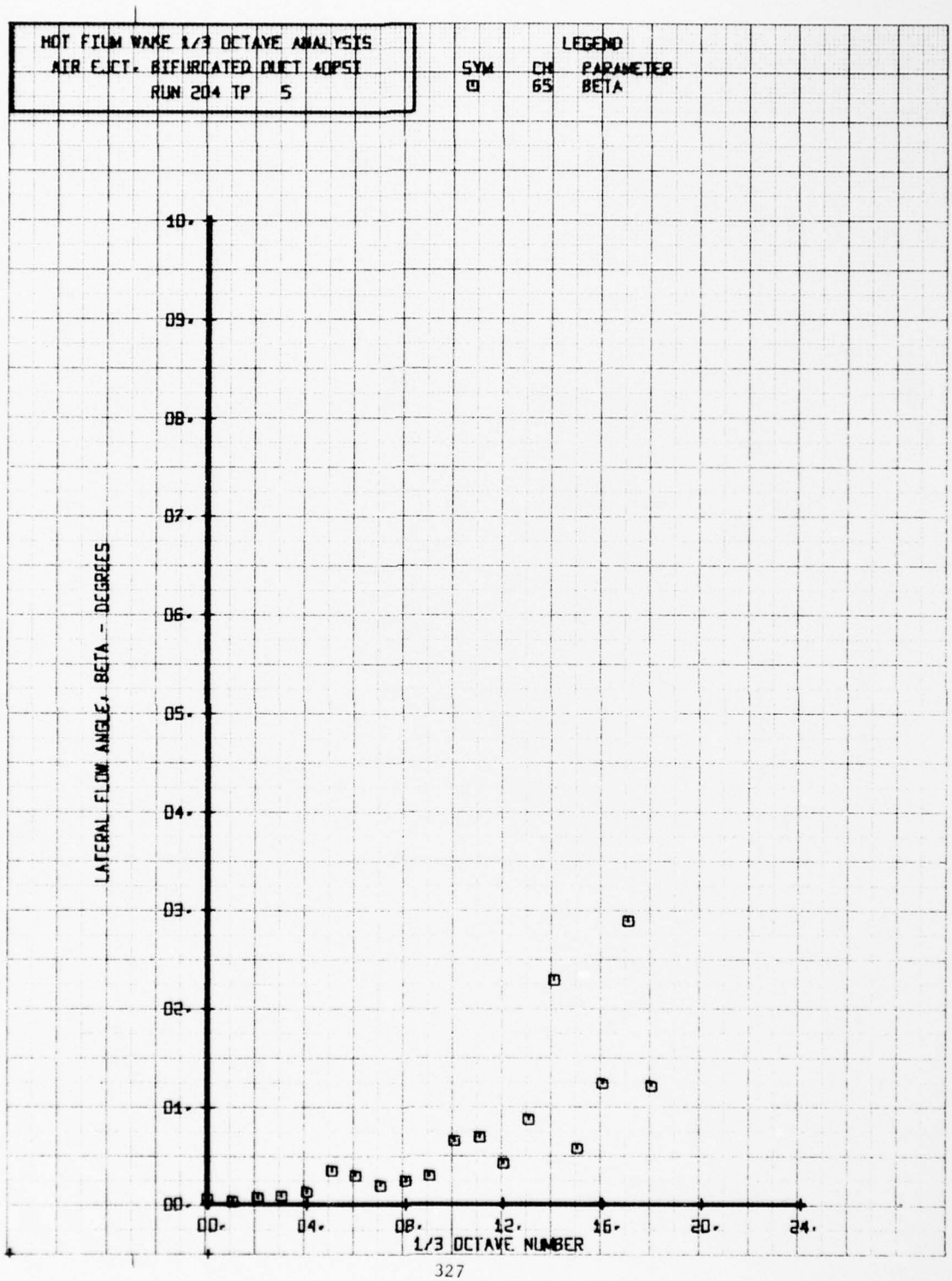
1/3 OCTAVE NUMBER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RUN 204 TP 5
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SYM CH PARAMETER
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LATERAL FLOW ANGLE, BETA - DEGREES
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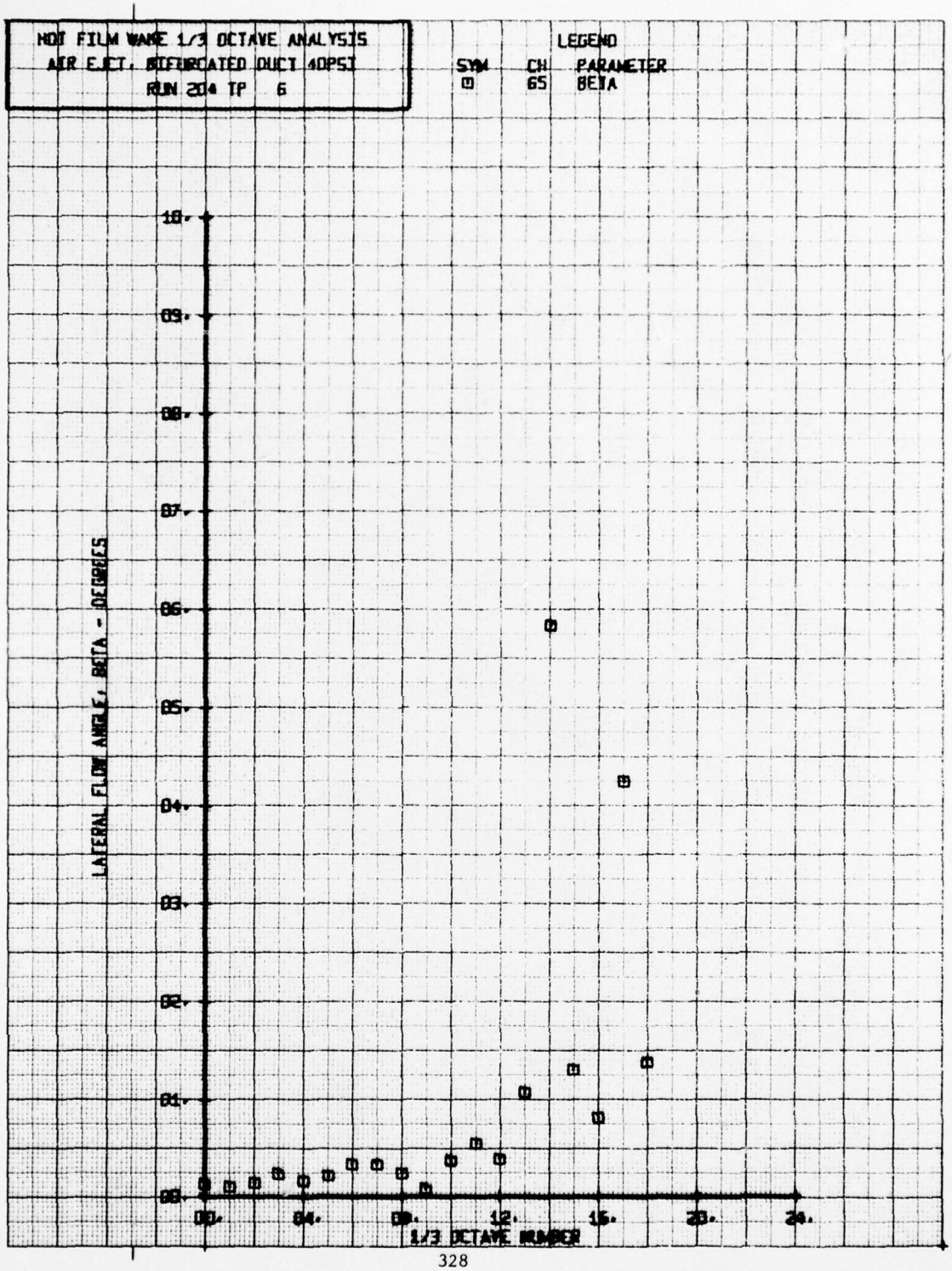
1/3 OCTAVE NUMBER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RUN 204 TP 6
LEGEND
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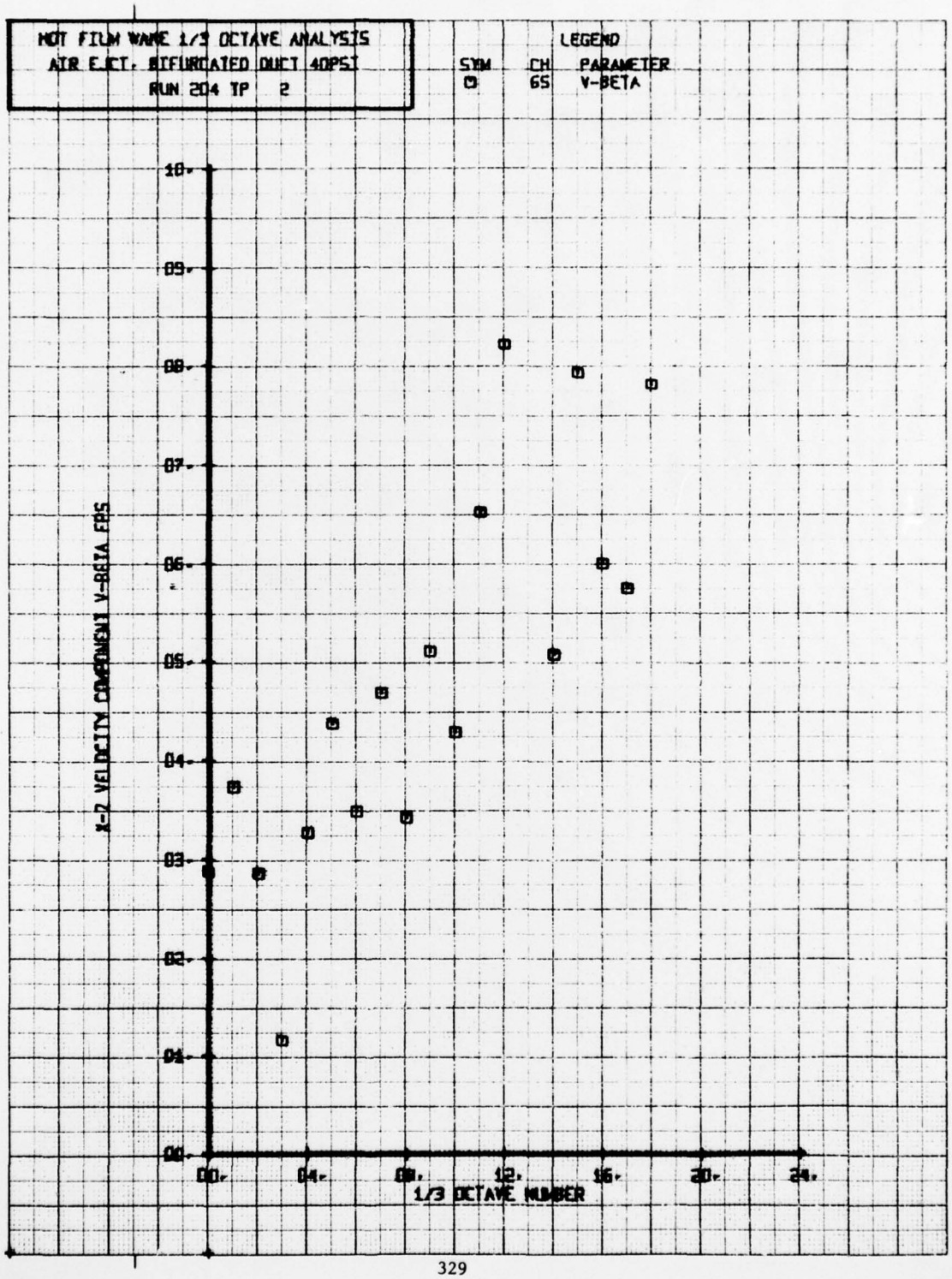
LATERAL FLOW ANGLE, BETA - DEGREES
1/3 OCTAVE NUMBER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RUN 204 TP 2
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SYM CH PARAMETER
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X-Z VELOCITY COMPONENT V-BETA FBS
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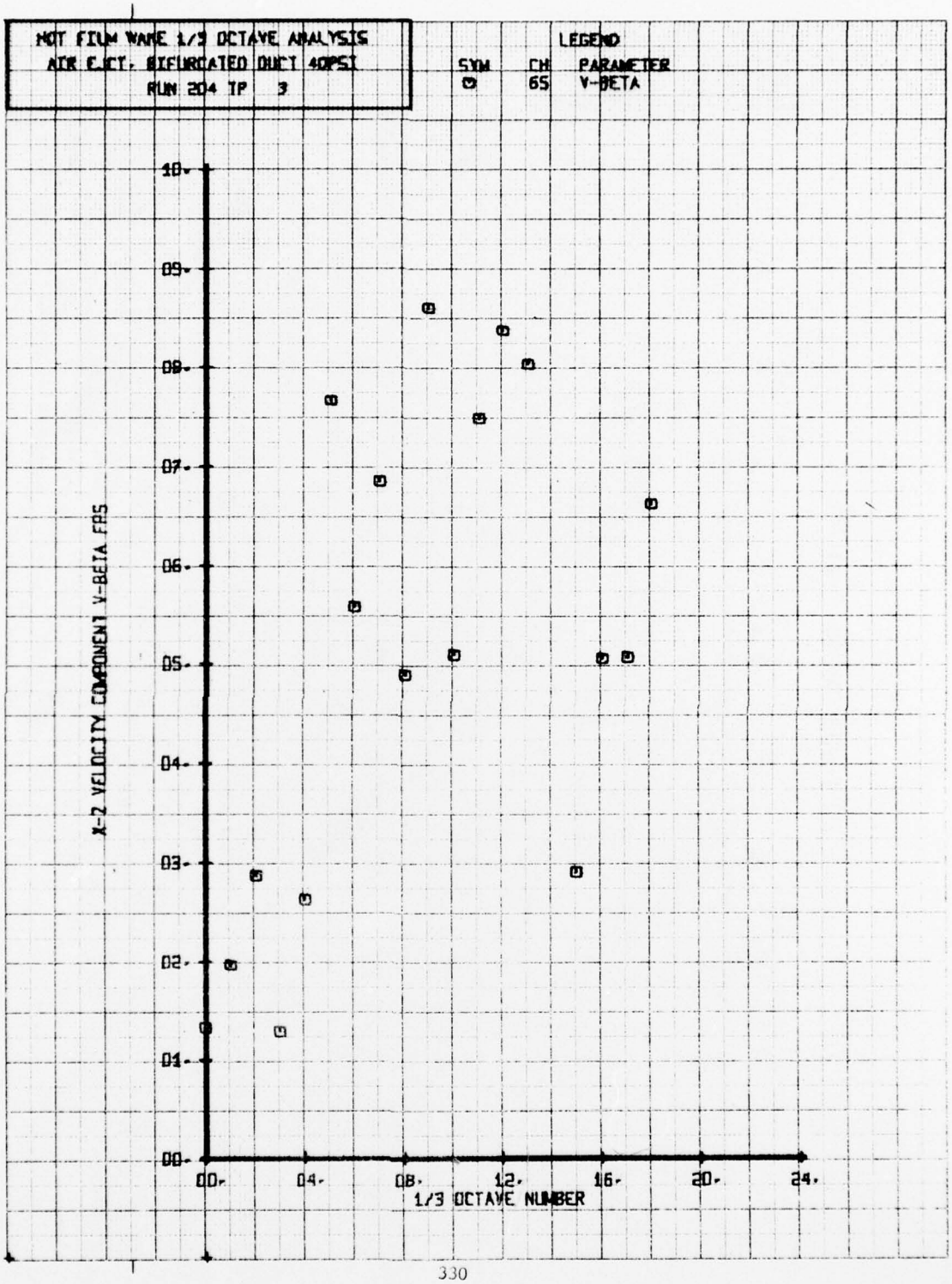
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RUN 204 TP 3
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SYM CH PARAMETER
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X-2 VELOCITY COMPONENT V-BETA FPS
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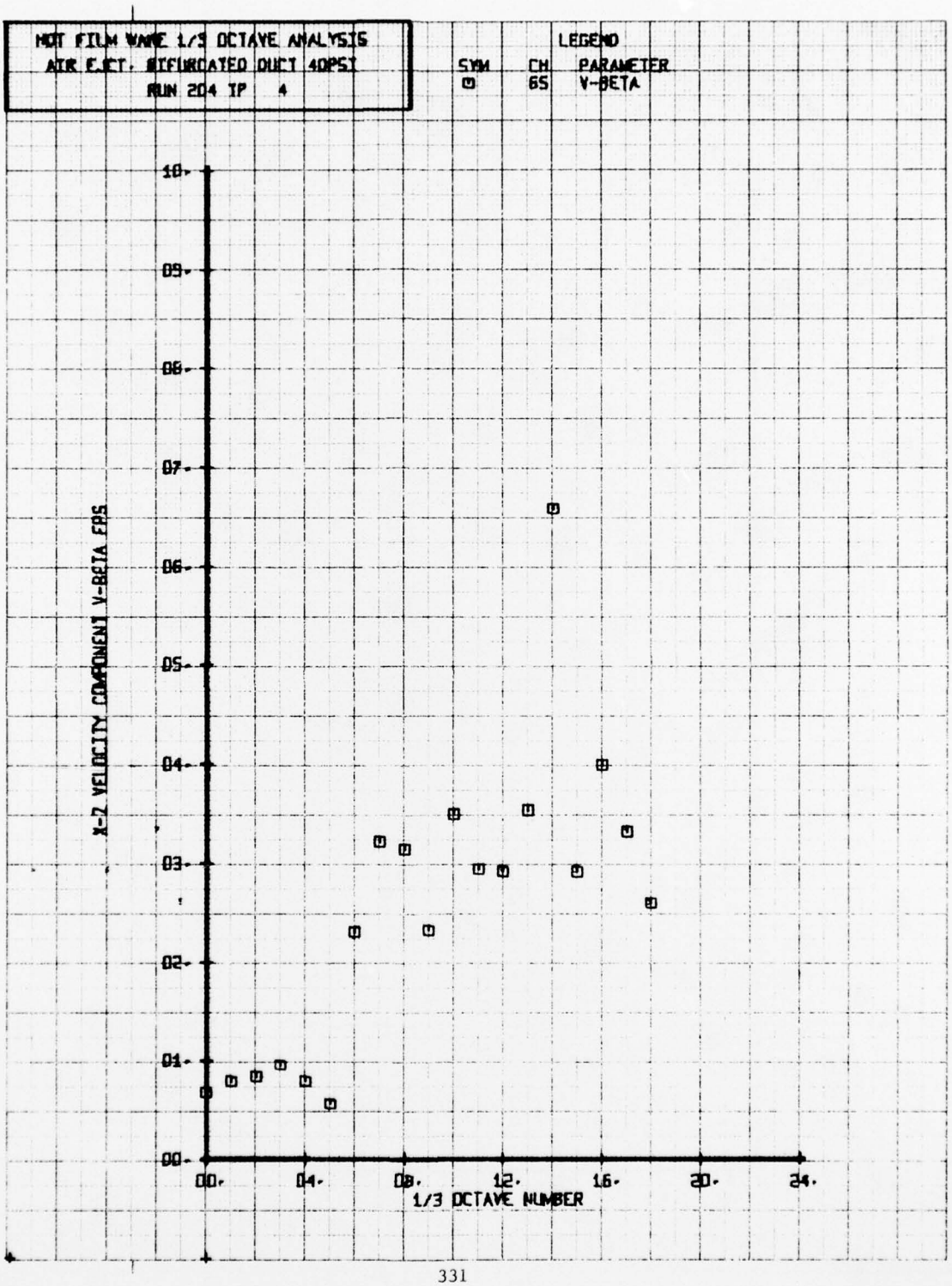
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RUN 204 TP 4
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X-Z VELOCITY COMPONENT V-BETA FPS
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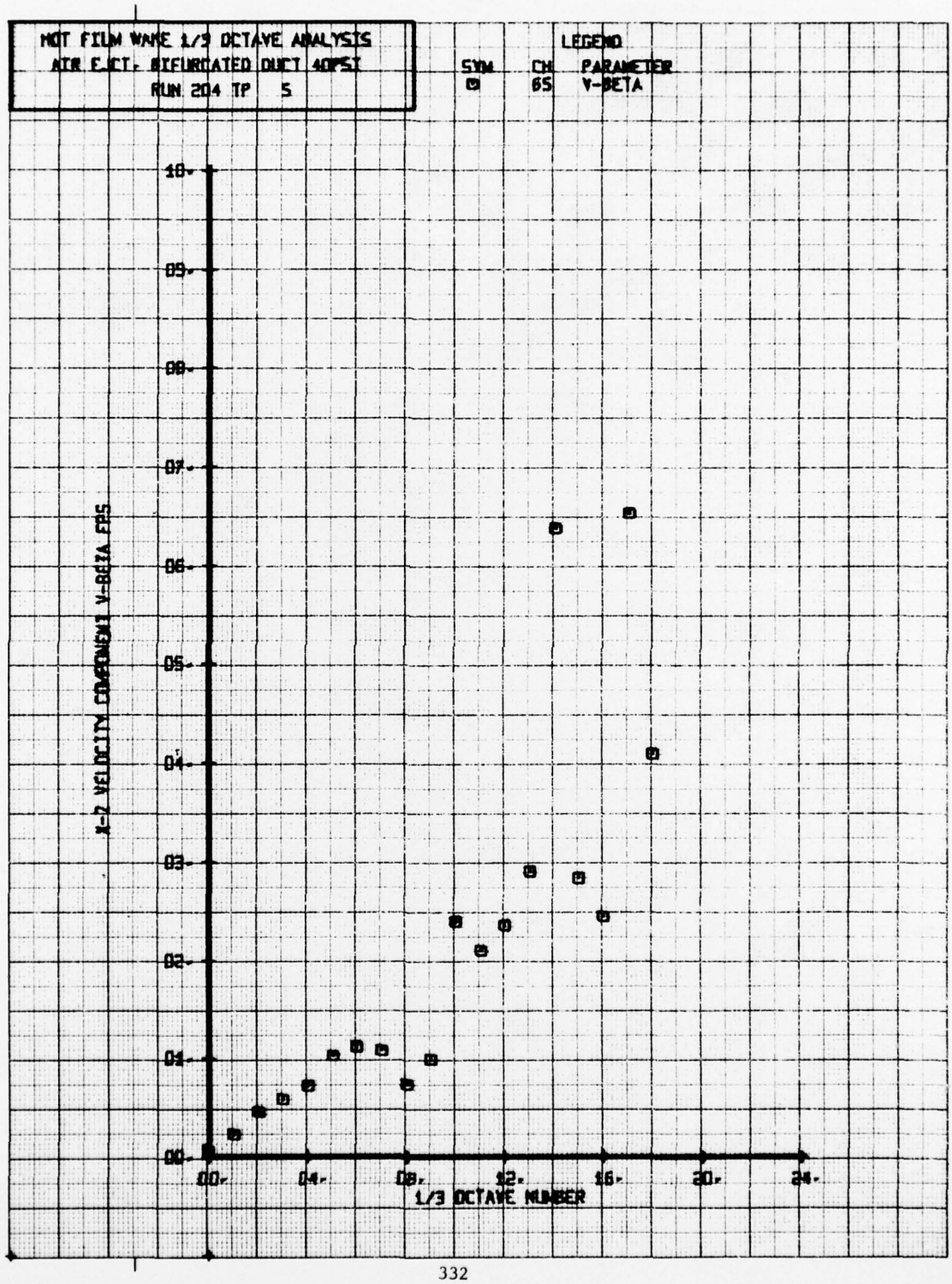
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
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RUN 204 TP 5
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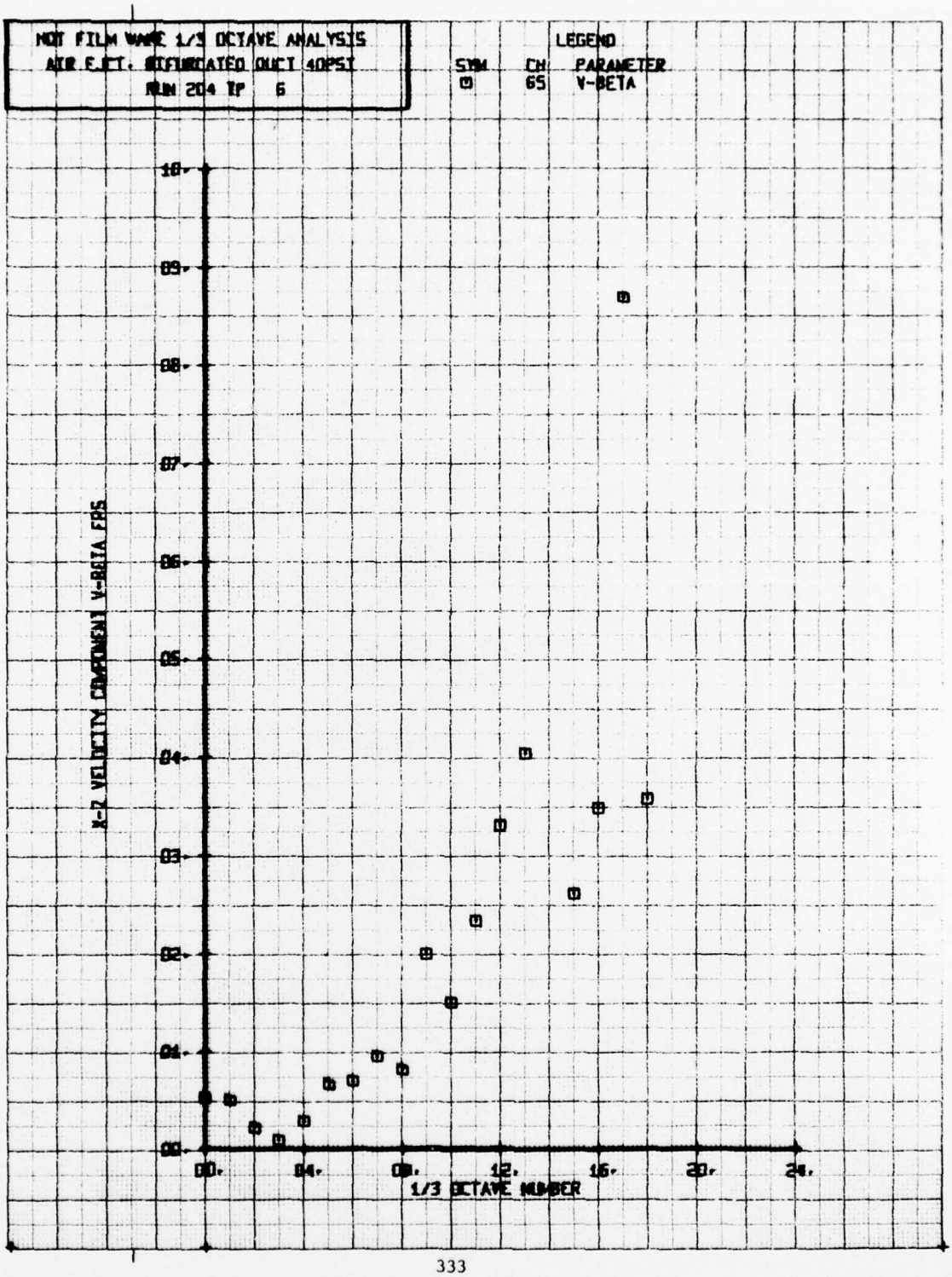
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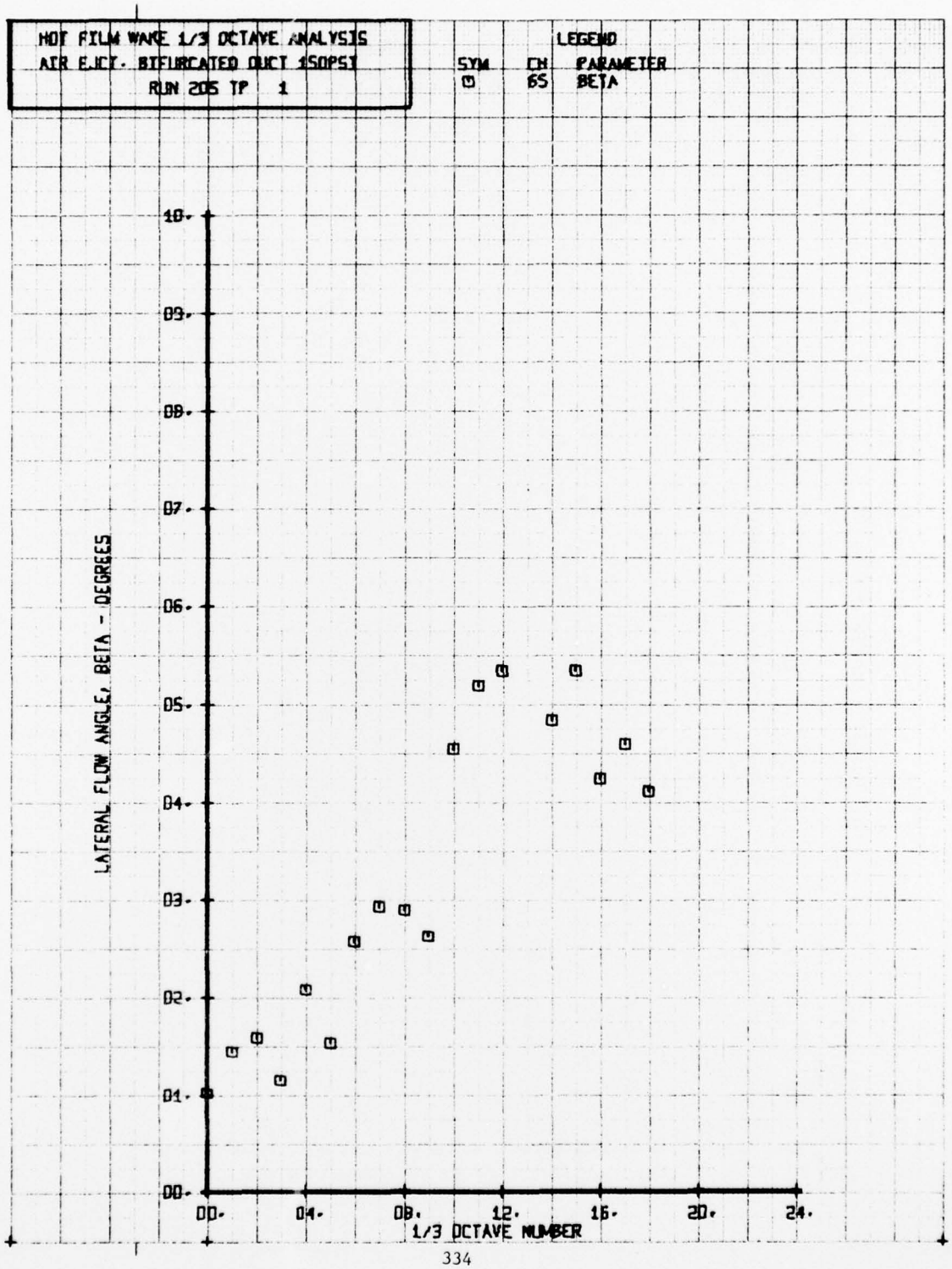
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AIR EJCT. BIFURCATED DUCT 150PSI
RUN 205 TP 1
LEGEND
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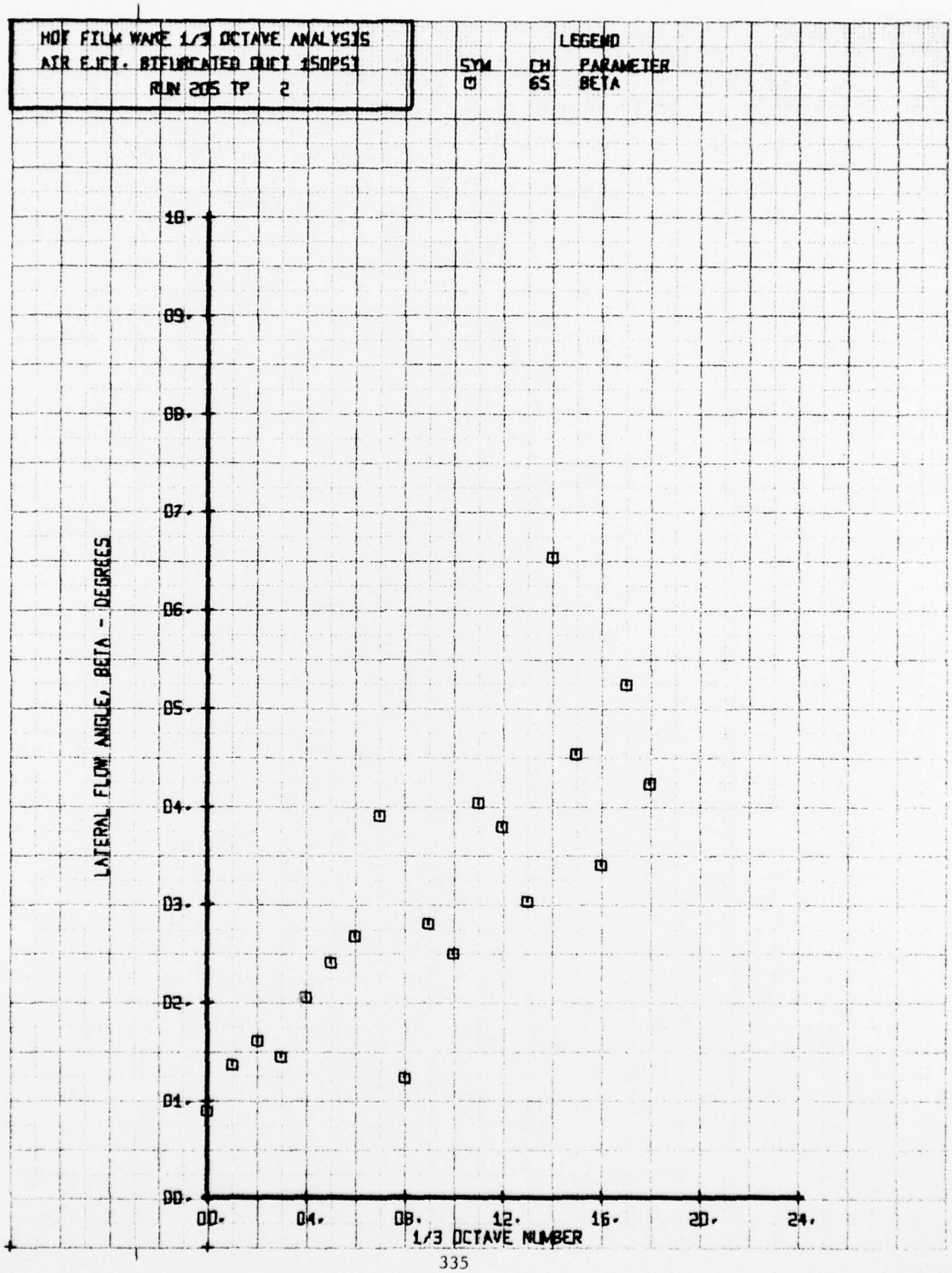
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AIR EJCT. BIFURCATED DUCT 150PSI
RUN 205 TP 2
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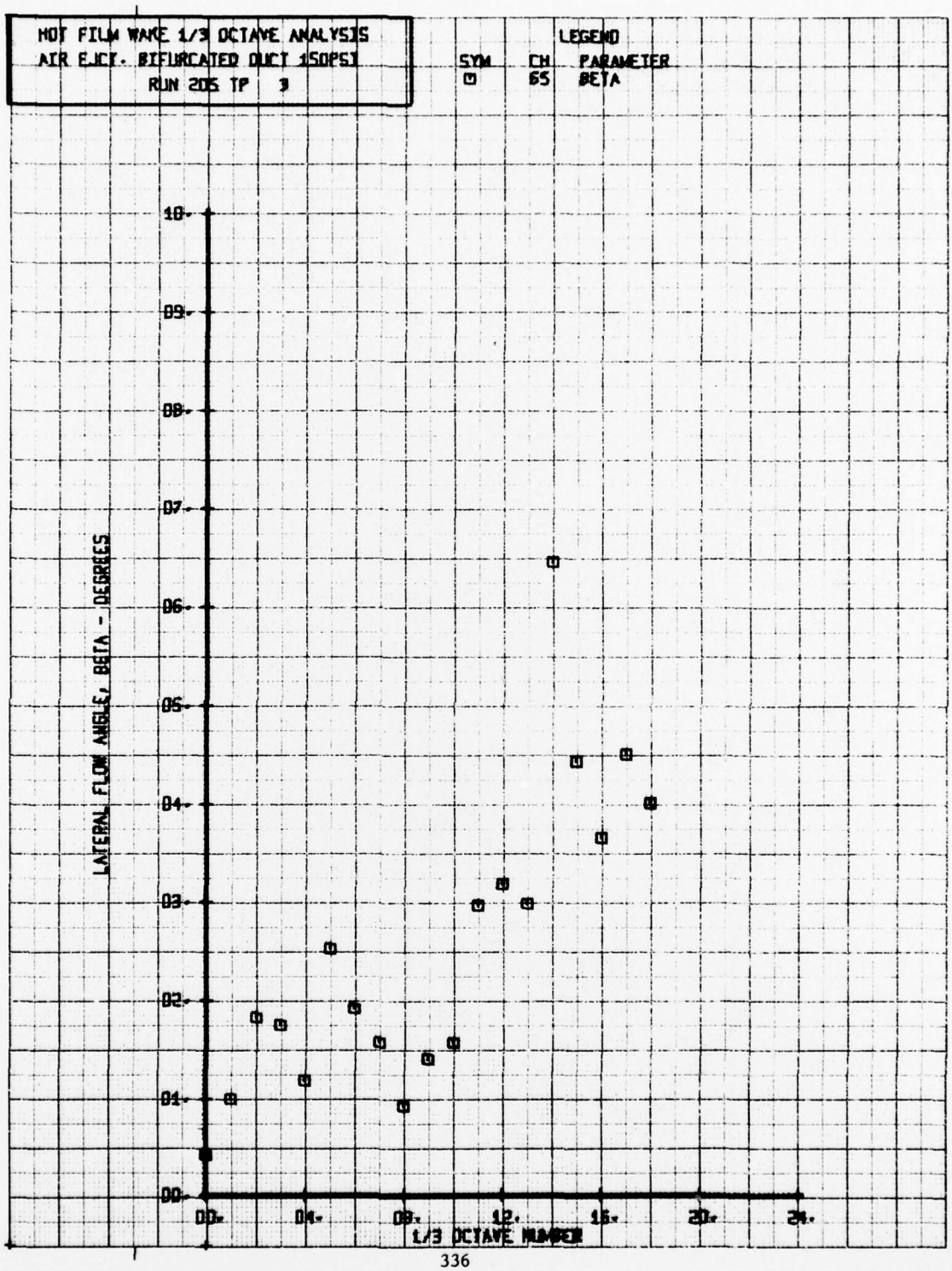
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AIR EJCT. BIFURCATED DUCT 150PSI
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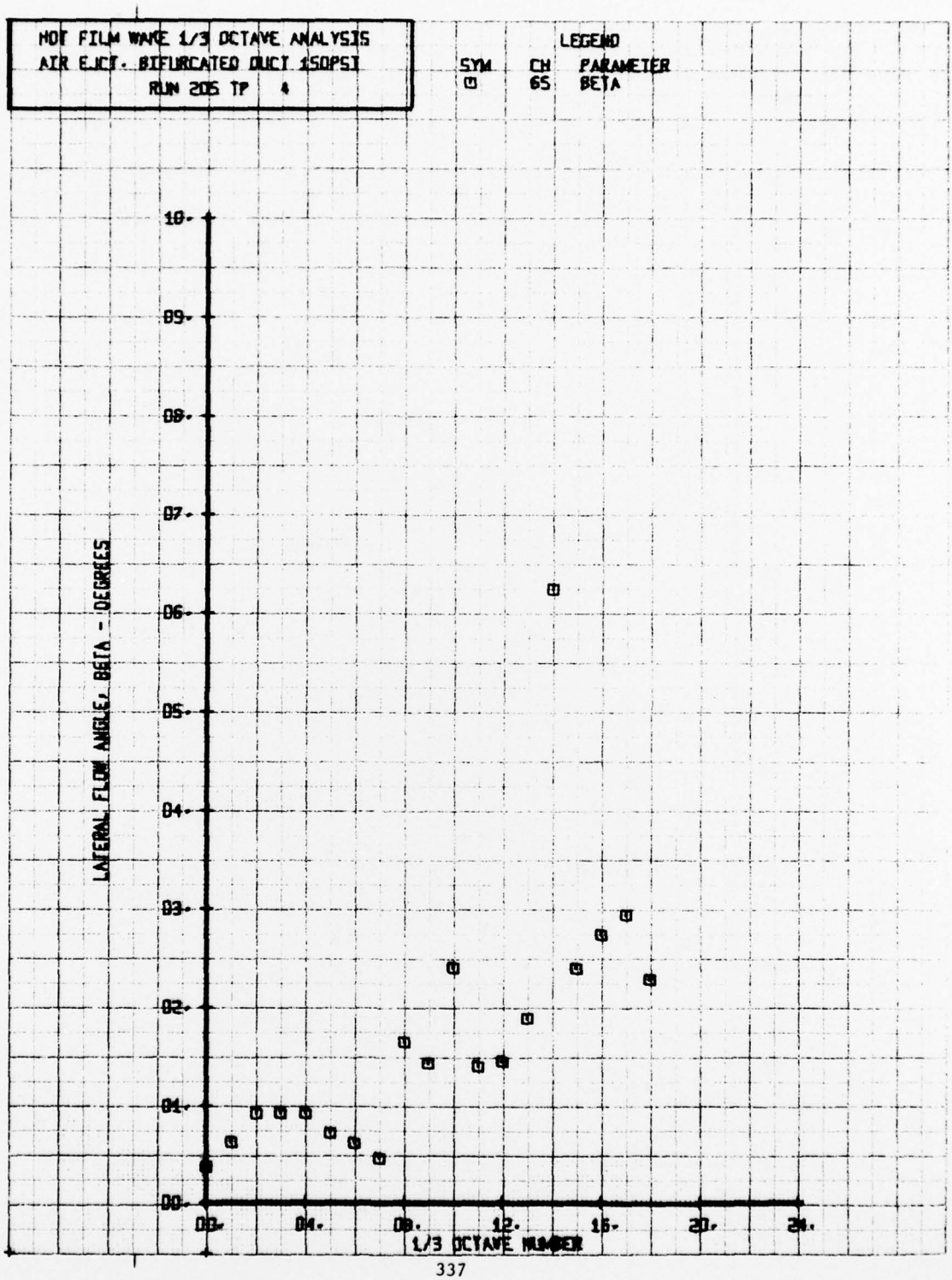
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
AIR EJCT. BIFURCATED DUCT 150PSI
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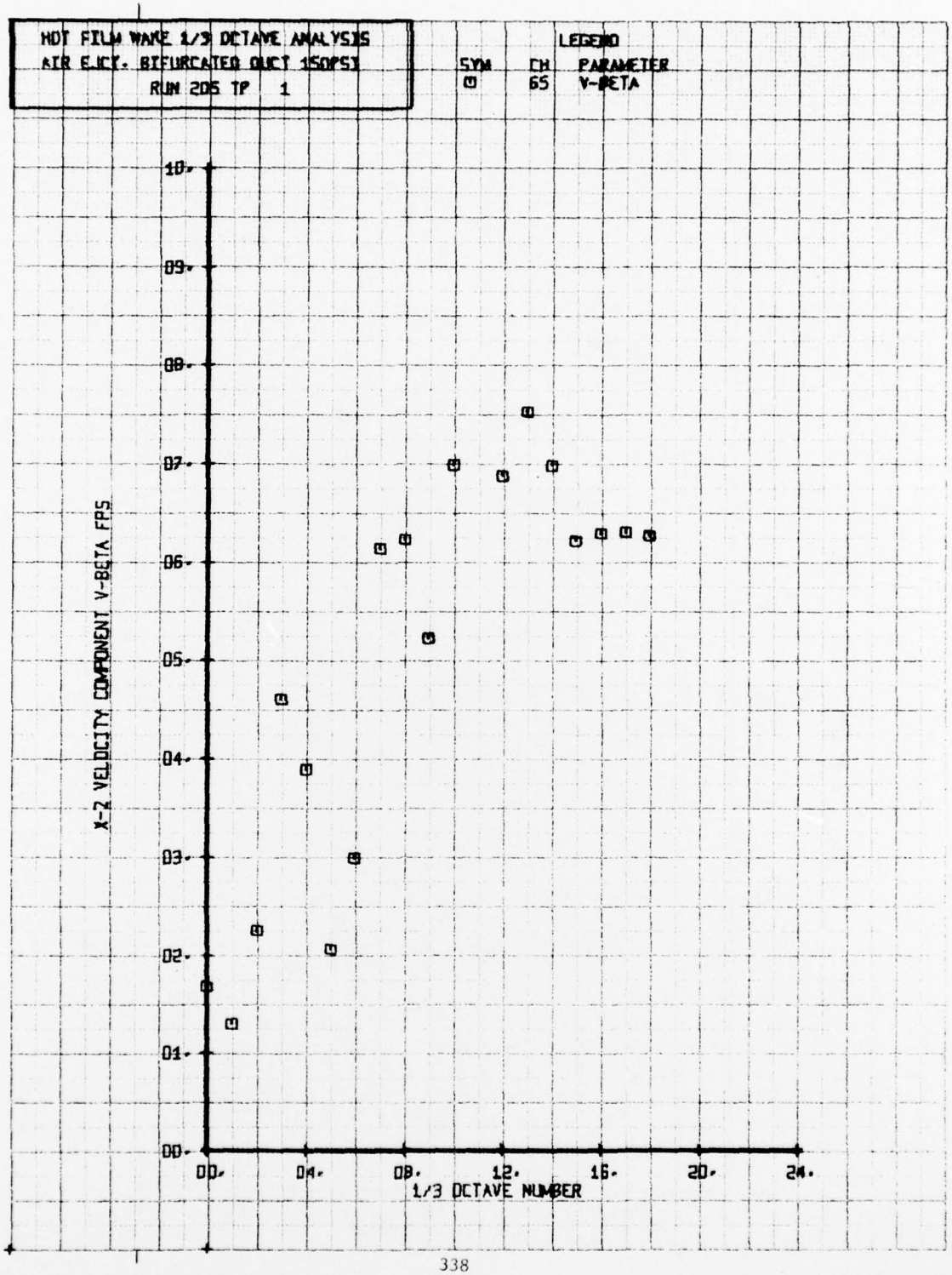
HOT FILM WAKE 1/3 OCTAVE ANALYSIS
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RUN 206 TP 1
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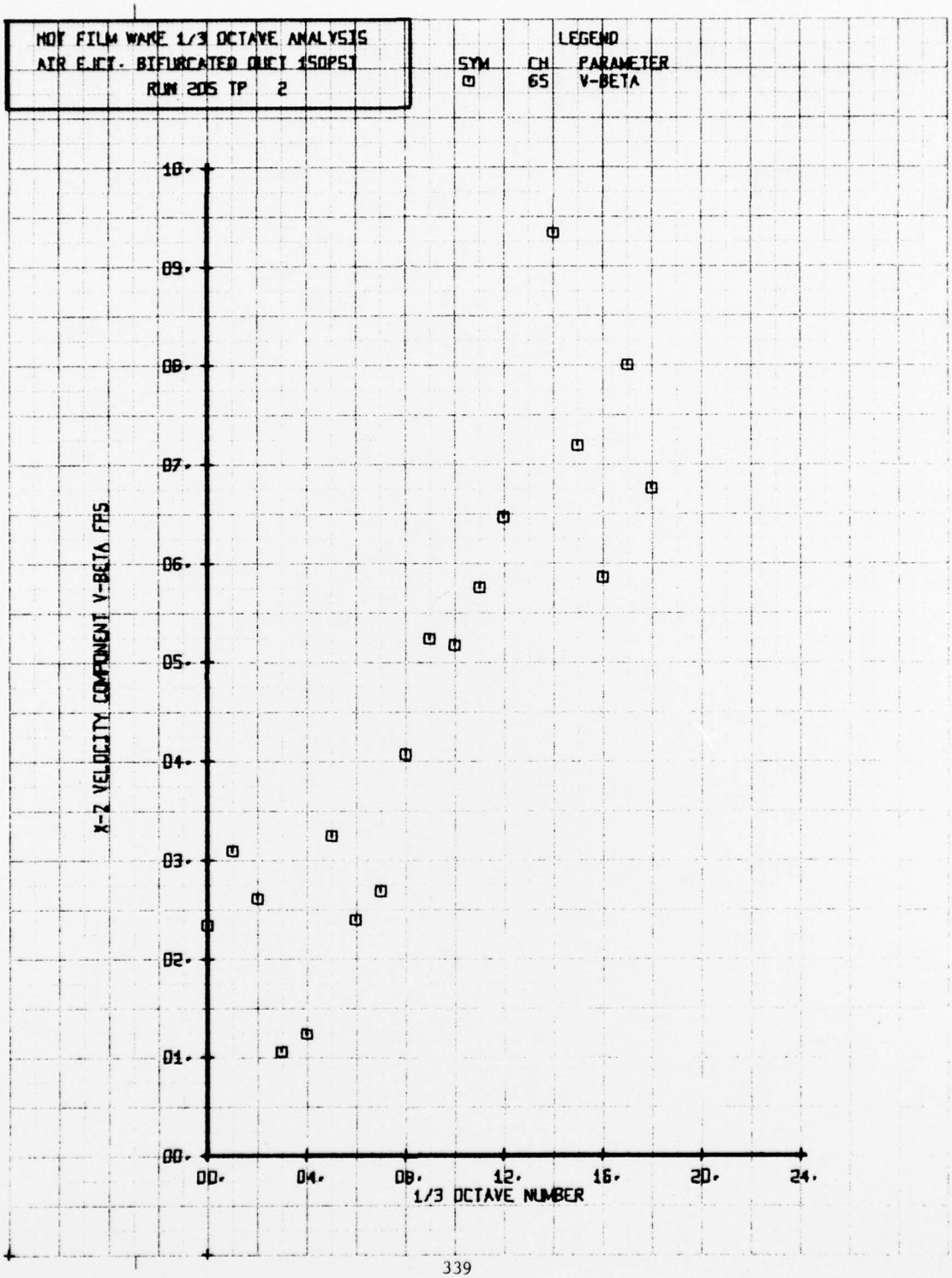
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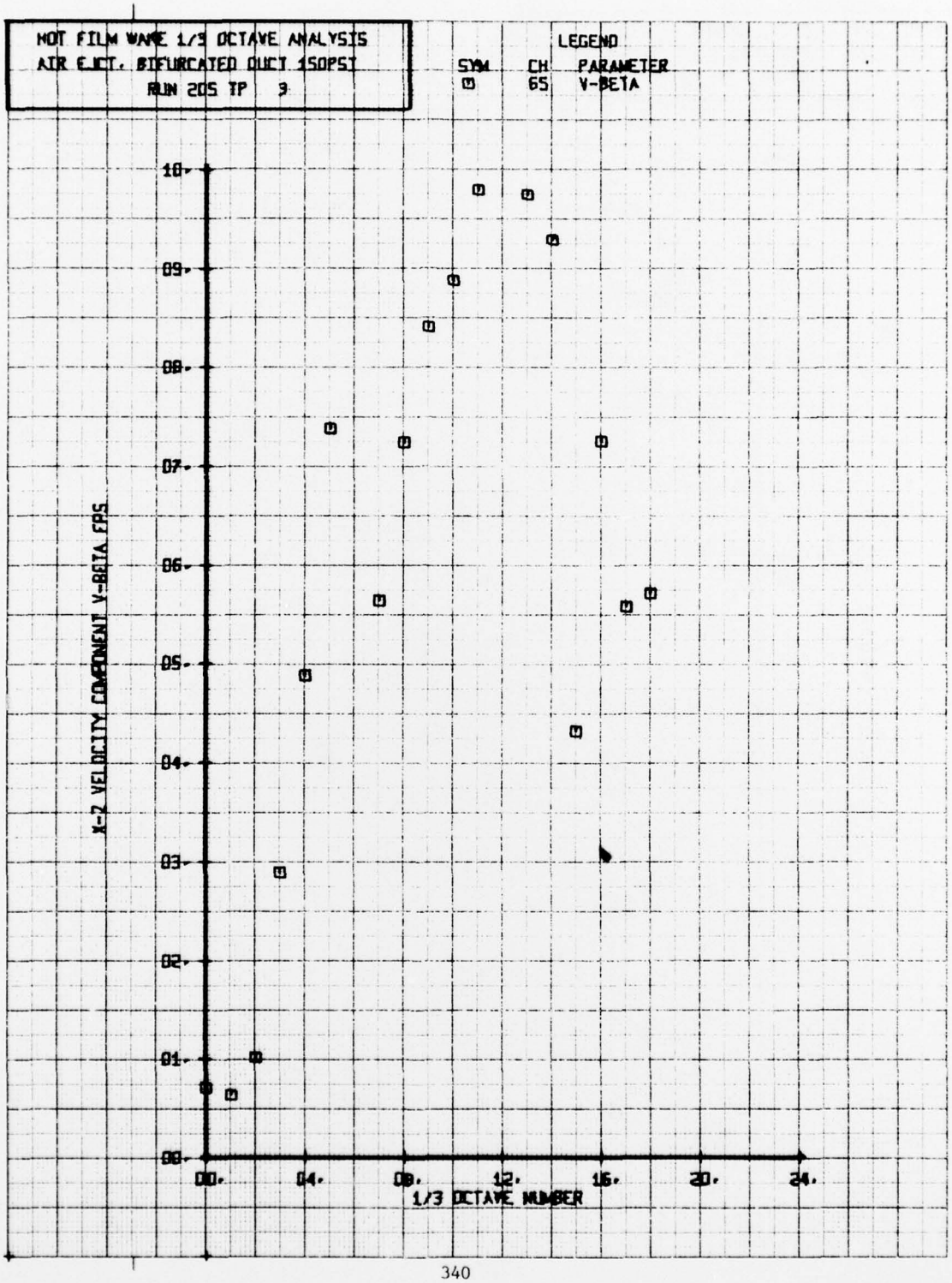
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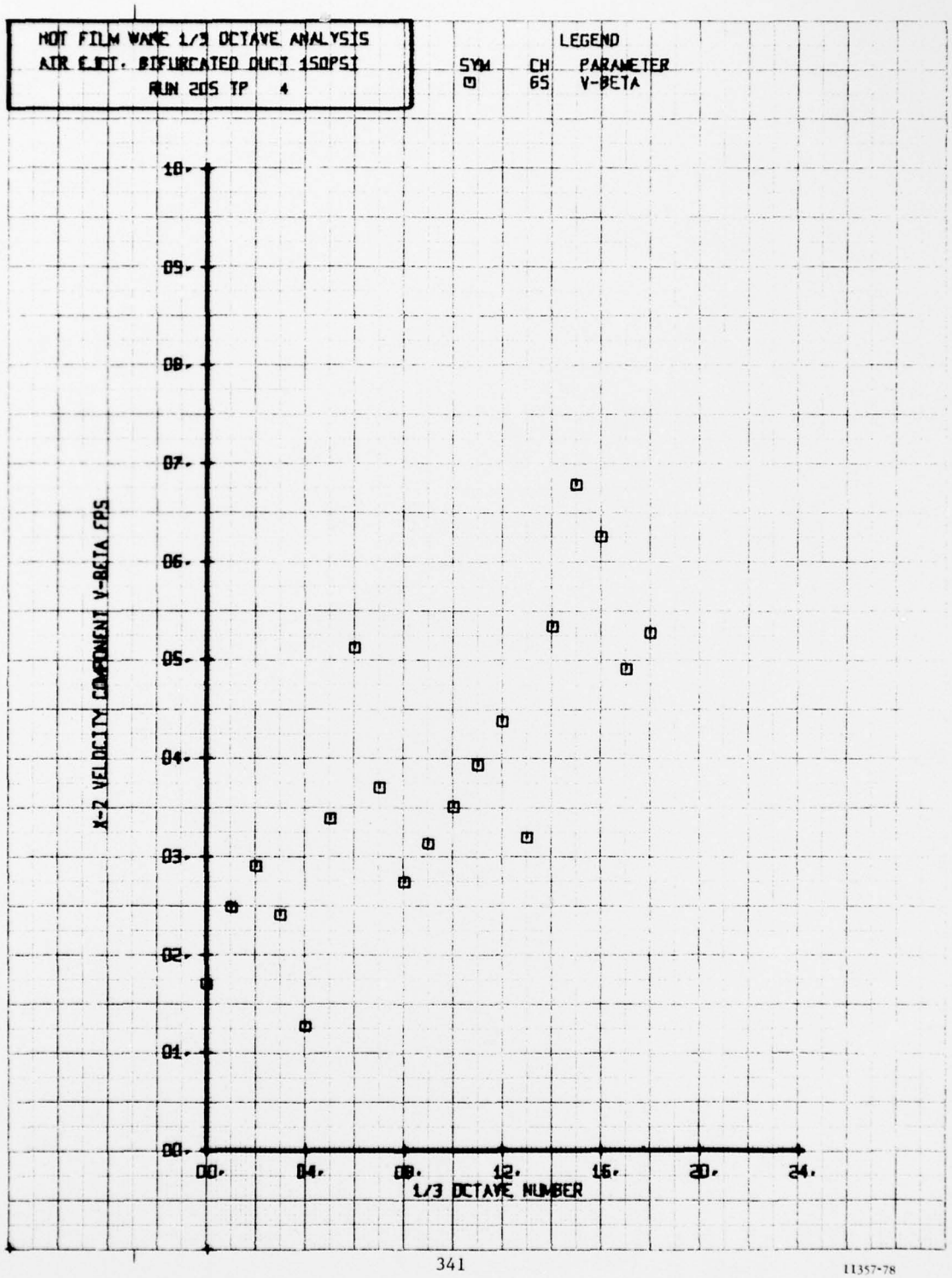
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