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FLIGHT EVALUATION OF THE UH-60A HELICOPTER WITH THE PITCH BIAS ACTUATOR CENTERED AND ELECTRICALLY DISCONNECTED

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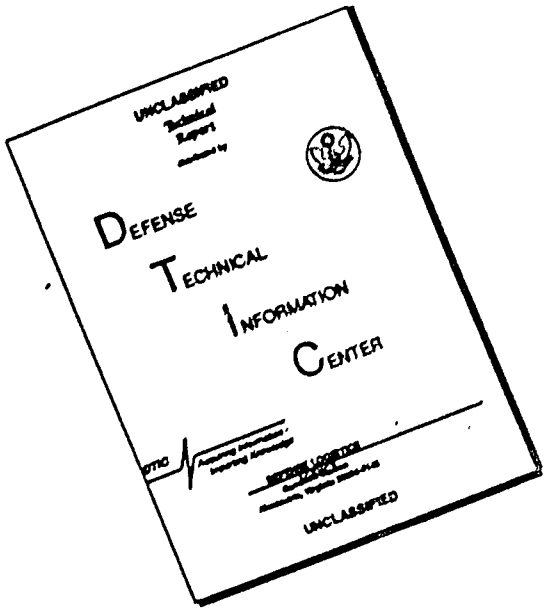

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Testing was conducted to evaluate handling qualities of the UH-60A helicopter with the pitch bias actuator (PBA) centered and electrically disconnected and with various modes of automatic flight control system (AFCS) degradation. A total of 46.4 productive flight hours were flown between 4 April 1985 and 2 July 1986. Two shortcomings and two Prime Item Development Specification noncompliances were identified. The handling qualities of the UH-60A helicopter with the PBA centered and electrically disconnected are essentially unchanged

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from those with the PBA operational, except for; (1) slightly degraded static longitudinal stability, (2) slightly degraded dynamic stability, and (3) a shortcoming, the poor maneuvering stability characteristics. One additional shortcoming is the strong pitch-due-to-sideslip coupling, which is unrelated to PBA condition. The handling qualities of the UH-60A helicopter with the PBA centered and electrically disconnected are satisfactory to continue flight under both visual and instrument meteorological conditions with any degradation of the AFCS.

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INTRODUCTION

BACKGROUND

1. As a result of previous testing, the US Army Aviation Engineering Flight Activity (USAAEFA) recommended, and the US Army Aviation Systems Command (AVSCOM) Directorate for Engineering concurred, that the pitch bias actuator (PBA) be removed from the UH-60A helicopter. An engineering change proposal for PBA removal was submitted by the contractor (Sikorsky Aircraft), which included a recommendation for further flight test verification. Some testing was accomplished during the Airworthiness and Flight Characteristics (A&FC) Evaluation of the UH-60A (Black Hawk) Helicopter (ref 1, app A) and the A&FC Test of the UH-60A Configured with the Prototype External Stores Support System (ESSS) (ref 2). However, several issues relative to degraded modes of operation (e.g., all of the automatic flight control system (AFCS) disengaged) with PBA removed had not been resolved. As a result, AVSCOM directed the USAAEFA to conduct a flight evaluation of the UH-60A helicopter with the PBA locked and centered (ref 3).

TEST OBJECTIVES

2. The objective of this evaluation was to conduct flight tests on the UH-60A helicopter with the PBA centered and electrically disconnected during various modes of AFCS degradation to determine precisely what capabilities exist and what procedures, cautions, warnings, or notes are appropriate for inclusion in the operator's manual. An additional objective of the evaluation was to determine the capability to continue flight and land safely under both visual and instrument meteorological conditions with progressively greater levels of AFCS degradation.

DESCRIPTION

3. The UH-60A Black Hawk helicopter is a twin engine, single main rotor helicopter with nonretractable wheel-type landing gear capable of transporting cargo, 11 combat troops, and weapons during day, night, visual meteorological conditions, and instrument meteorological conditions. Primary mission gross weight is 16,324 lb and the maximum alternate gross weight is 20,250 lb. A proposal to increase the maximum alternate gross weight to 22,000 lb is under consideration. The UH-60A is powered by two General Electric T700-GE-700 turboshaft engines each having an installed power available (30 minute limit) of 1553 shaft horsepower (SHP) (power turbine speed of 20,900 revolutions per minute (rpm)) at sea level, standard-day static conditions.

Installed dual-engine power is transmission limited to 2828 SHP. The aircraft also has an AFCS designed to enhance helicopter stability and handling qualities. The AFCS consists of five major subsystems: the stability augmentation system (SAS), flight path stabilization (FPS), trim system, PBA, and the stabilator control system. The PBA is an extendible link in the longitudinal control system between the cyclic stick and the control mixing unit. The PBA is positioned as a function of indicated airspeed, pitch attitude, and pitch rate. A more detailed description of the UH-60A is included in appendix B, and additional descriptions can be found in the Prime Item Development Specification (PIDS) (ref 4) and the operator's manual (ref 5).

4. The test helicopter, JUH-60A US Army S/N 82-23748 is a sixth year production Black Hawk which incorporates the ESSS fixed provisions and the modified production stabilator schedule. The test aircraft also incorporated the initial production mounts to reorient the airspeed probes as developed during USAAEFA Project No. 82-09 (ref 6). Near the end of the flight testing, a Sikorsky Aircraft maintenance team completed engineering change proposal 0252 which upgraded the airspeed system to the current production configuration i.e., the production restrictors, accumulators, one piece spacer blocks, and fairings. Photographs of the test helicopter are included in appendix B.

TEST SCOPE

5. Flight testing was conducted at Edwards Air Force Base, California (2302 feet) and Brawley Municipal Airport, Brawley, California (minus 128 feet). A total of 77 flights were conducted between 4 April 1985 and 2 July 1986 for a total of 67.8 flight hours of which 46.4 were productive. USAAEFA calibrated and maintained all the test instrumentation and performed all required maintenance on the helicopter. Flight restrictions and operating limitations observed during the evaluation are contained in the operator's manual and the airworthiness release (ref 7). The AFCS failure modes that were tested are listed in table 1. The PBA locked and centered condition was attained by disconnecting the pitch bias electrical plug P319 after confirming the PBA was centered. Testing was conducted in accordance with the test plan (ref 8) with revisions approved by AVSCOM. The conditions for each test are presented in table 2.

TEST METHODOLOGY

6. A detailed listing of the test instrumentation is contained in appendix C. Established flight test techniques and data

Table 1. Failure Modes

Failure Mode	PBA	SAS1	SAS2	FPS	Stabilator
0	ON	ON	ON	ON	AUTO
1	OFF[1]	ON	ON	ON	AUTO
2	ON	OFF	ON	ON	AUTO
3	OFF	OFF	ON	ON	AUTO
4	ON	OFF	OFF	ON	AUTO
5	OFF	OFF	OFF	ON	AUTO
6	ON	OFF	OFF	OFF	AUTO
7	OFF	OFF	OFF	OFF	AUTO
8	ON	OFF	OFF	OFF	OFF[2]
8A	ON	ON	ON	OFF	OFF
9	OFF	OFF	OFF	OFF	OFF
9A	OFF	ON	ON	OFF	OFF

NOTES:

[1]PBA OFF is with actuator centered and electrically disconnected.
[2]Stabilator OFF is with the stabilator fixed at the programmed position for the trim conditions.

Table 2. Test Conditions[1]

Test	Average Gross Weight (pounds)	Average Longitudinal Center of Gravity (Fuselage Station)	Average Density Altitude (feet)	Trim Calibrated Airspeed (knots)	Failure Mode	Remarks
Static Longitudinal Stability	14,300	363.6	5120	138 and 168	1	Level flight or dive at IRP[2]
	21,960	358.7	2480	141 and 134		
	14,250	363.3	4800	138	5 and 7	
				61 and 149	8	
	16,570	362.0	4820	61,92,122 and 150	8	
	21,890	358.1	2680	60 and 152	8A	
Static Lateral-Directional Stability	16,600	362.2	4940	121	8	Level flight
				62, 92 and 123	8A	
				122	9A	
Maneuvering Stability	16,570	362.5	4990	141	1	Left and right turns
				102 and 141	7, 8 and 9	
Dynamic Stability	13,940	362.0	4990	117	5	Short-period, and longitudinal long-term, gust response, spiral stability
	14,220	363.1	4850	62, 118, and 149	7	
	16,530	361.9	5000	61, 91, 122, 141 and 151	6, 7, 8 and 9	
	21,880	358.5	3000	61, 121 and 151	6 and 7	
Low Speed Flight	14,300	363.4	2200	0 to 45[3]	7	Aircraft azimuths = 90, 180, 270 and 315 degrees
	20,940	358.3		0 to 35[3]		
Instrument Flight Capability	16,590	363.2	4560 to 8280	0 to 143	6, 7, 8 and 9	Instrument takeoff, climb, cruise, descent and approach
System Failures	13,960	361.9	5350	139	3 to 5 and 2 to 4	Level flight and dive at IRP
	16,430	361.5	5350	141 and 169		
	21,390	357.0	3070	141 and 156		

NOTES:

[1]Tests conducted in the normal utility configuration, approximate mid lateral center of gravity, and 258 rpm main rotor speed.
[2]Intermediate Rated Power.
[3]Knots true airspeed.

reduction procedures were used (ref 9) and are described in appendix D. A Handling Qualities Rating Scale (HQRS) (fig. 1, app D) was used to augment pilot comments relative to aircraft handling qualities. The flight test data were obtained from test instrumentation displayed on the instrument panel and recorded on onboard magnetic tape. Real time telemetry monitoring of selected data parameters was used during certain tests.

RESULTS AND DISCUSSION

GENERAL

7. Tests were conducted on the UH-60A helicopter to evaluate the handling qualities with the PBA centered and electrically disconnected (OFF). Two shortcomings and two Prime Item Development Specification noncompliances were identified. The handling qualities of the UH-60A helicopter with the PBA OFF are essentially unchanged from those with the PBA operational, except for; (1) slightly degraded static longitudinal stability, (2) slightly degraded dynamic stability, and (3) a shortcoming, the poor maneuvering stability characteristics. An additional shortcoming, a strong pitch-due-to-sideslip coupling is unrelated to PBA condition. The handling qualities of the UH-60A helicopter with the PBA OFF are satisfactory to continue flight under both visual and instrument meteorological conditions with any degradation of AFCS.

HANDLING QUALITIES

Static Longitudinal Stability

8. Static longitudinal stability was evaluated at the conditions shown in table 2. The helicopter was stabilized in ball-centered flight at the desired trim airspeed and flight condition. With the collective control held fixed and rotor speed maintained constant, the helicopter was stabilized at incremental airspeeds about trim. In most cases the initial trim condition was repeated at the end of the test to determine the effect of the gross weight reduction and forward center-of-gravity (cg) shift during the test. Test results are presented in figures 1 through 10, appendix E. The "I" bars denote the control excursions and pitch attitude variations incurred and are included to indicate pilot compensation required at the test conditions.

9. The UH-60A stick-fixed static longitudinal stability as indicated by stick position variation with respect to airspeed was affected by PBA condition. With all other AFCS components operational (failure mode 1) the effect of PBA OFF at 138 knots calibrated airspeed (KCAS) was a slight shift from neutral stability (fig. 5 of ref 10) to a negative static stability at airspeeds above the trim airspeed (fig. 1, app E). The static longitudinal stability for a trim airspeed of approximately 138 KCAS was essentially unchanged by SAS and FPS condition, i. e., failure modes 1, 5, and 7 (figs. 1,3, and 4, app E). In a dive at 168 KCAS with failure mode 1 the stability was essentially neutral (fig. 2, app E). Qualitatively, the pilot noted aft longitudinal control forces (i.e., negative indicated stick-

free static longitudinal stability) at 5 knots above the trim airspeed (i.e., 173 KCAS) but the forces were variable due to the continuous longitudinal control corrections required to maintain airspeed. At trim airspeeds of 88 and 123 KCAS (failure mode 1) the slight reduction in static stability shown in figure 91 of reference 1 did not cause negative or neutral indicated stability. The effect of the PBA on longitudinal static stability becomes more noticeable at higher airspeeds where the inherent helicopter static stability is nearly neutral (e.g., fig. 11 of ref 11).

10. Stabilator operation had a strong influence on the static longitudinal stability. With fixed stabilator position (failure mode 8) at a trim airspeed of 62 KCAS, a strongly negative static stability resulted (figs. 5 and 6, app E). At airspeeds above 90 KCAS stability was improved to nearly neutral (figs. 7 through 10, app E). At approximately 120 KCAS (fig. 8, app E) with PBA operational, the stability is essentially neutral whereas with PBA OFF the stability is negative (fig. 15 of ref 12).

11. All the SAS off failure modes were also flown with the pilot-assist pitch boost actuator inoperative. The pitch boost actuator operation is controlled by the SAS ON switches, i.e., pitch boost is operational if at least one of the SAS subsystems is operational. The effect of disabling the pitch boost was a degradation in cyclic control force harmony, in that, longitudinal forces were greater than lateral forces. In addition, there was an increase in longitudinal control freeplay to approximately $\pm$0.15 inch (fig. 11, app E). The degradation of control force harmony had little effect on the pilot compensation required to maintain a constant airspeed, but the additional freeplay required considerable pilot compensation. The pilot was required to rapidly move the longitudinal control forward and aft through the freeplay band to precisely control the helicopter pitch attitude. This freeplay band could also affect the validity of the longitudinal control position data. Control position data presented in this report are the computer derived averages of the control position during the data recorded. The longitudinal control force disharmony with lateral forces and longitudinal position freeplay are undesirable but satisfactory for an AFCS degraded mode.

12. The collective-fixed static longitudinal stability of the UH-60A helicopter as indicated by stick position variation with airspeed was slightly degraded with PBA OFF but was satisfactory. The longitudinal static stability characteristics of the UH-60A helicopter do not meet the requirements of reference 4,

paragraph 10.3.3.1.3 with the PBA OFF, in that, a forward control displacement is not required to hold an increased value of airspeed above 138 KCAS.

Static Lateral-Directional Stability

13. Static lateral-directional stability characteristics were evaluated at the conditions and failure modes indicated in table 2. Tests were conducted by trimming the aircraft in ball-centered flight at the desired conditions. With the collective fixed, the aircraft was then stabilized at incremental sideslip angles up to limit sideslip on both sides of trim while maintaining a steady heading at the trim airspeed. Test results are presented in figures 12 through 16, appendix E.

14. Static directional stability, as indicated by the variation of directional control position with sideslip, was positive (increasing left directional control with increasing right sideslip) at all test conditions. The directional control variation with sideslip was essentially linear. The directional control gradient in failure mode 8A was approximately 0.05 in/deg at 62 KCAS increasing to approximately 0.12 in/deg at 122 KCAS. These gradients were approximately 0.01 in/deg lower than failure mode 9A gradients presented in reference 12, figures 21 and 26. To determine if this difference was related to PBA condition, the static lateral-directional stability in failure mode 9A was retested at 122 KCAS to compare results with the failure mode 8A results. The failure mode 9A directional control gradient was essentially identical to failure mode 8A. The static directional stability characteristics of the UH-60A are essentially uneffected by PBA operational status and are satisfactory.

15. Dihedral effect, as indicated by the variation of lateral control position with sideslip was positive (increasing right cyclic control with increasing right sideslip) and was essentially linear for all test conditions and failure modes except for sideslips greater than approximately 5 deg to the left at 121 KCAS. The lateral cyclic control position versus sideslip gradient near trim was approximately 0.03 in/deg at 62 KCAS increasing to 0.05 in/deg at 123 KCAS in failure mode 8A. The control position gradient decreased to zero at approximately 15 degrees sideslip to the left at 123 KCAS indicating neutral dihedral effect. There were no discontinuities in force or position cues. The apparent neutral dihedral effect for large left sideslip angles at 123 KCAS was not objectionable. The apparent dihedral effect was unaffected by PBA condition, however, with SAS off (failure mode 8, fig. 15, app E) the reduction in the lateral control gradient at 121 KCAS occurred at a smaller

left sideslip angle (approximately 9 deg). The effective dihedral characteristics of the UH-60A are satisfactory with the PBA OFF.

16. Sideforce characteristics, as indicated by the variation in bank angle with sideslip, were weak but positive (increasing right bank angle with increasing right sideslip) at 62 KCAS. Qualitatively, the pilot could not detect sideforce cues until approximately 24 degrees of sideslip. At 92 KCAS sideforce cues were detected at 14 degrees left sideslip and 6 degrees right sideslip. At 122 KCAS sideforce cues were characterized as strong for sideslips greater than 5 degrees in either direction. The sideforce characteristics were unaffected by either PBA or SAS condition. The sideforce cues, though weak at low airspeeds, are satisfactory.

17. A strong pitch-due-to-sideslip coupling was evident in all conditions and failure modes tested in this evaluation as during previous evaluations. The longitudinal cyclic position versus sideslip trend with the stabilator fixed was increasing aft longitudinal cyclic control with increasing left sideslip and increasing forward longitudinal cyclic control with increasing right sideslip. The gradient of longitudinal control position versus sideslip near trim was approximately 0.04 in/deg at 62 KCAS, 0.07 in/deg at 92 KCAS, and 0.10 in/deg at 122 KCAS. These gradients were reduced as right sideslip angle was increased and the trend reversed near the right sideslip limit. The gradient of longitudinal control position versus sideslip was essentially unaffected by either PBA and SAS condition. The strong pitch-due-to-sideslip coupling will increase pilot workload during terrain flight where sideslips are not uncommon. The strong pitch-due-to-sideslip coupling is a shortcoming that is unrelated to PBA condition.

Maneuvering Stability

18. Maneuvering stability was evaluated at the conditions presented in table 2. The maneuvering stability tests were accomplished by initially stabilizing the helicopter in ball-centered level flight at the trim airspeed and then incrementally increasing the normal load factor (g) by increasing the bank angle in left and right turns. Constant collective control position was maintained in the turns and the pilot attempted to maintain a constant airspeed. Test results are presented in table 3 and figures 17 through 20, appendix E.

Table 3. Maneuver Stability

Test Condition		Stick Position Gradient versus g[1] (in./g)			
		Failure Mode			
Airspeed (KCAS)	Turn Direction	1	7	8	9
101 or 102	Right	---	+1.4	+0.6	+0.7
101 or 102	Left	---	+0.5	+0.6	+0.1
140 or 141	Right	+0.7	+0.5	+1.6	0.0
140 or 141	Left	-0.1	-0.3	+1.6	-0.6

NOTE:

[1]Approximate stick position gradient versus g near the 1g trim condition.

19. The stick-fixed maneuvering stability, as indicated by the variation of longitudinal control position with normal acceleration, with the PBA operational and with SAS, FPS, and stabilator off/fixed (failure mode 8) was slightly positive (increasing aft cyclic control with increasing g) up to approximately 1.3 g at 101 KCAS (fig 19). Above 1.3 g in left turns the maneuvering stability was increased while in right turns the gradient decreased and became slightly negative. With the PBA, SAS, FPS, and stabilator off/fixed or stabilator operational (failure mode 7 and failure mode 9) the longitudinal control position vs g stability was different for right and left turns but the indicated maneuvering stability was positive up to at least 1.6 g at 102 KCAS (figs. 18 and 20). The right turn stability was higher than left turn gradients for all failure modes with PBA OFF (failure modes 1, 7 and 9). With the PBA operational (failure mode 8), right turn stability was lower than left turn gradients above approximately 1.3 g.

20. The indicated stick-fixed maneuvering stability with all AFCS operational at 141 KCAS was reported in reference 13, figure 31 as slightly positive up to approximately 1.4 g, and the stability was essentially the same for left or right turns. With the PBA OFF (failure mode 1 and 7) at 141 KCAS the stability in left and right turns were again different, with right turn results indicating an improved maneuvering stability with respect to left turns up to the maximum normal acceleration tested (approximately 1.6 g, figs. 17 and 18). The left turn indicated that maneuvering stability was slightly negative near the 1.0 g trim condition and slightly positive at the maximum normal acceleration tested. The SAS and FPS condition had essentially no effect on the maneuvering stability but pilot compensation required was higher with the SAS and FPS off (failure mode 7).

21. The indicated stick-fixed maneuvering stability was positive for left and right turns at 141 KCAS up to approximately 1.3 g with the stabilator fixed and with the PBA operational (failure mode 8). Above 1.3 g in failure mode 8 the the indicated maneuvering stability was negative. With the PBA OFF and the stabilator fixed (failure mode 9) the indicated maneuvering stability was neutral to slightly negative for all test conditions (i. e., neutral for right turns to 1.4 g, negative above 1.4 g in right turns and negative in all left turns).

22. The 'I' bars presented in figures 17 through 20, appendix E are representative of the pilot control margin required to hold the desired flight conditions during the maneuvering stability tests. At bank angles less than 45 degrees the pilot was able to maintain precise airspeeds ($\pm$0.5 knot) and bank angles ($\pm$2 deg) with minimal pilot compensation. As bank angles were increased above 45 degrees, pilot compensation increased significantly. In failure mode 1 at 141 KCAS, airspeed could only be maintained within $\pm$3 knots, bank angle within $\pm$3 degrees, and pitch attitude within $\pm$3 degrees during the execution of the maneuvering stability tests at bank angles of 45 degrees or greater. Continuous longitudinal control corrections of up to $\pm$0.5 inch were required and therefore longitudinal stick force was variable between light push and pull forces. All SAS off failure modes at both airspeeds tested required greater pilot compensation due to the degraded longitudinal long-term stability and increased longitudinal control system freeplay. Adequate performance was not attainable with maximum tolerable pilot compensation during the maneuvering stability test in any failure mode at bank angles greater than 55 degrees. The dissimilar maneuvering stability characteristics between left and right turns is also undesirable and will reduce pilot's predictability of longitudinal control position and force required for banked turn maneuvers. It was also noted that the pitch SAS actuator saturated (failure mode 1) at the nose up position when rolling toward wings level from established 50 to 55 deg left and right banks. Maneuvering stability characteristics will become more significant during helicopter air-to-air missions and various evasive maneuvers. Effectiveness of the UH-60A to perform these missions will be limited due to the poor maneuvering stability characteristics (especially above 1.4 g's) and is a shortcoming. The maneuvering stability of the UH-60A failed to meet the requirements of paragraph 10.3.3.1.4 of the PIDS (ref 4), in that, the UH-60A does not exhibit positive stick-fixed or stick-free maneuvering stability in steady turning flight.

Dynamic Stability

23. Short-period and long-term dynamic stability characteristics were evaluated at the conditions listed in table 2. The short-period response was tested by forward and aft longitudinal, right and left lateral, and right and left directional pulse control inputs to simulate a gust in each of these axes. The pulse inputs were initially performed by rapidly displacing the control approximately one inch, holding for approximately 0.5 second, then rapidly returning the control to the trim position and holding all controls fixed. The pilots determined during the light gross weight testing that one inch inputs produced excessive motions for gust response testing with the SAS off, so the size of the pulse inputs was progressively reduced to approximately one-quarter inch. Releases from steady sideslips were also accomplished to aid in the evaluation of the dynamic lateral-directional stability characteristics. Initially, all controls were held fixed following the releases, but results were later obtained by flying the helicopter in the longitudinal axis to isolate the lateral-directional response. Spiral stability characteristics were evaluated by trimming the helicopter at the desired conditions and then slowly banking the aircraft to five degrees using only lateral cyclic control. The cyclic control was then returned to trim and held fixed in the lateral axis. The longitudinal long-term response was evaluated by trimming the helicopter at the desired conditions and then fixing the controls. The longitudinal long-term response was also evaluated with controls released at the trim conditions. The predominant helicopter response during all dynamic tests was a long-term longitudinal response. In all cases, the longitudinal long-term response was self-exciting. However, the results for each test will be presented separately.

24. The results of the longitudinal cyclic control pulse inputs near the mission gross weight condition are presented in table 4. Representative time histories are also presented in figures 21 through 49, appendix E. The short-period response of the helicopter was heavily damped and not perceptible qualitatively to the pilots. The predominant helicopter response to any control pulse input (simulated gust) was an immediate long-term longitudinal divergence. Table 4 presents the type of long-term response following the control pulse input and time to double amplitude (when it was possible to determine before recovery became necessary). The character (type) of the response was influenced by the PBA, in that, with the PBA operational the response was oscillatory and with the PBA centered and electrically disconnected the response was aperiodic. Gross weight did not influence

Table 4. Gust Response[1]

Airspeed (KCAS)	Stabilator Automatic Mode				Stabilator Fixed at Trim			
	PBA Operational (Failure Mode 6)		PBA Centered (Failure Mode 7)		PBA Operational (Failure Mode 8)		PBA Centered (Failure Mode 9)	
	Type Response	Time to Double Amplitude (sec)[2]	Type Response	Time to Double amplitude (sec)	Type Response	Time to Double Amplitude (sec)[2]	Type Response	Time to Double amplitude (sec)
61-62	Oscillatory Divergent	6.0	Aperiodic	1.3	Oscillatory Divergent	See Note 3	Aperiodic	1.2
90-92	Oscillatory Convergent	N/A	Aperiodic	1.1	Oscillatory Divergent	5.1	Aperiodic	1.2
122-123	Neutral to Oscillatory Convergtory	N/A	Aperiodic	1.1	Oscillatory Divergent	2.2	Aperiodic	1.7
140-143	Oscillatory Divergent	5.6	Aperiodic	1.4	Oscillatory Divergent	2.3	Aperiodic to Oscillatory Divergent	0.7
149-152	Oscillatory Divergent	See Note 3	Aperiodic	1.1	Oscillatory Divergent	See Note 3	Aperiodic	0.7

NOTES:

[1]Longitudinal long-term response following forward and aft control pulses at mission gross weight, SAS OFF and FPS OFF.
[2]Time to double amplitudes is the average time for the forward and aft control pulses.
[3]Time could not be calculated due to only one overshoot prior to recovery control inputs.

the character of the response with either PBA operational or centered and electrically disconnected. Airspeed did affect the character of the response with the PBA operational. At approximately 92 and 122 KCAS the response following a longitudinal control pulse was either oscillatory convergent or oscillatory with neutral damping. At either higher or lower airspeeds the response was oscillatory divergent. The stabilator did not have a strong influence on the character of the divergent response. The FPS did not affect the divergent response (failure mode 5 tested at the light weight condition only) since FPS functions only open-loop when the controls can be moved by the trim actuators.

25. Representative time history results of the lateral pulse control inputs are presented in figures 50 through 78, appendix E. The short-period lateral response was heavily damped. This response was essentially unaffected by either the PBA or the stabilator operational condition. The predominant response with controls fixed following the lateral pulse was a longitudinal long-term divergence with characteristics similar to those reported in the previous paragraph. A divergent long-term roll oscillation was coupled with the divergent pitch oscillation.

26. Representative time history results of the directional pulse control inputs are presented in figures 79 through 107, appendix E. Representative time history results of the releases from steady heading sideslips are presented in figures 108 through 136, appendix E. The gust response in the lateral-directional axes was oscillatory convergent. The period of this oscillation

varied from a maximum of approximately 4 to 6 seconds near 60 KCAS to approximately 3 to 4 seconds at 150 KCAS. The response in the lateral-directional axes was essentially uneffected by PBA condition. The predominant helicopter response with controls fixed following the pulse was a longitudinal long-term response. The trends of the pitch response were similar with those stated in paragraph 24.

27. The results of the longitudinal long-term test at the mission gross weight condition in failure modes 6 through 9 are presented in table 5. Representative time histories are also presented in figures 137 through 168, appendix E. The long-term response with SAS off was so easily excited that simply fixing or releasing the controls at a trimmed condition was sufficient to excite the response, usually within a few seconds (self-exciting). Table 5 presents the character of the longitudinal response and the time to double amplitude. The long-term responses were essentially

Table 5. Longitudinal Long-Term Response with Controls Fixed/Free[1]

Airspeed (KCAS)	Stabilator Automatic Mode				Stabilator Fixed at Trim			
	PBA Operational (Failure Mode 6)		PBA Centered (Failure Mode 7)		PBA Operational (Failure Mode 8)		PBA Centered (Failure Mode 9)	
	Type Response	Time to Double Amplitude (sec)[2]	Type Response	Time to Double amplitude (sec)	Type Response	Time to Double Amplitude (sec)[2]	Type Response	Time to Double amplitude (sec)
61	Oscillatory Divergent	1.3/4.6	Aperiodic	1.2/1.1	Aperiodic	1.9/2.2	Aperiodic	0.9/1.5
90-93	Oscillatory Neutral Oscillatory Convergent	N/A	Oscillatory Divergent Aperiodic	See Note 2 1.6	Oscillatory Divergent	1.2/2.1	Aperiodic	1.4/1.4
121-123	Oscillatory Neutral	N/A	Oscillatory Divergent Aperiodic	See Note 2 1.3	Oscillatory Divergent	See Note 2/1.9	Aperiodic	1.8/1.2
140-144	Oscillatory Divergent	4.0/4.3	Aperiodic	1.6/1.5	Oscillatory Divergent	See Note 2/1.2	Aperiodic	1.1/0.8
150-152	Aperiodic	1.6/1.6	Aperiodic	1.1/1.5	Oscillatory Divergent Aperiodic	See Note 2 0.7	Aperiodic Oscillatory Divergent	0.9/See Note 2

NOTE:

[1]Type response followed by time to double amplitude at mission gross weight with controls fixed and free.
[2]Time could not be calculated due to only one overshoot prior to recovery control inputs.

identical with either controls fixed or controls free (FPS off). The trim system in the helicopter held the controls at release position. The influence of the PBA, stabilator, FPS, gross weight, and airspeed on the characteristics of the long-term response was similar to that reported in paragraph 24. However, the difference in the open-loop longitudinal long-term response with the PBA operational or with the PBA OFF was academic with the SAS and FPS off since the pilot could not detect a difference

in the compensation required (closed loop) to maintain airspeed in cruise flight. Even in calm atmospheric conditions, nearly continuous, small longitudinal control corrections were required to maintain a constant pitch attitude for airspeed control of ±1 knots.

28. The longitudinal long-term response of the UH-60A helicopter was also tested in failure mode 1. These test conditions were required on maintenance test flights conducted during the course of the evaluation. The longitudinal long-term check required by the Maintenance Test Flight Manual (ref 14), page 2-60, paragraph 4.b.(12) is conducted with a 15 knot deceleration from a 120 KIAS trim condition. The results are presented in figures 169 and 170, appendix E. The acceptable criteria for the check are a maximum of 15 degrees pitch attitude and 5 knot airspeed overshoot of the trim conditions when the controls are released after the 15 knot deceleration. With the PBA operational, the helicopter usually met the criteria with a 3 to 5 knot overshoot. With the PBA OFF (failure mode 1), the helicopter usually failed to meet the criteria due to a 7 to 8 knot overshoot of the trim airspeed. The 7 to 8 knot overshoot of the trim airspeed was not objectionable and there was no indication that the oscillation would have persisted. The maximum airspeed criterion in reference 14, paragraph 4.b(12) should be increased to at least 8 knots.

29. The spiral stability characteristics were evaluated at conditions presented in table 2. The results from a 5 degree left bank indicated the helicopter had positive spiral stability at all conditions tested. The results from a 5 degree right bank were not as consistent but a trend with gross weight was evident. At the light gross weight condition the spiral stability was usually positive while at the heavy gross weight condition the spiral stability was usually negative. At the mission gross weight condition the results indicated nearly neutral spiral stability characteristics. The spiral stability of the UH-60A is essentially unaffected by PBA condition and is satisfactory.

Low Speed Flight Characteristics

30. The low speed flight characteristics of the UH-60A were evaluated at the conditions in table 2 to determine control margins and evaluate handling qualities. Testing was performed at speeds up to approximately 45 knots true airspeed (KTAS) in the light weight condition and 35 KTAS in the heavy weight condition. A wind tower was used to determine wind speed and direction. Winds were 5 knots or less during low airspeed testing. The corrected ground speed for the test true airspeed was calculated, and a ground pace vehicle was used as a speed reference.

The helicopter was flown in-ground-effect at a wheel height of approximately 25 feet. The low airspeed flight test data are presented in figures 171 through 174, appendix E. The "I" bars denote the control excursions and attitude variations and are included to indicate pilot compensation required at the test conditions.

31. The variation of lateral cyclic control position during right sideward flight was conventional (increasing right lateral cyclic control with increasing right sideward airspeed). As the right sideward flight speed was increased up to approximately 35 KTAS, more forward longitudinal cyclic control was required. There was a change of approximately 1.5 inches of longitudinal cyclic control over the speed range tested. Adequate margins remained in all flight controls. Moderate pilot compensation was required to maintain position on the pace vehicle with heading control of $\pm$2 degrees up to approximately 10 KTAS. From 10 to 20 KTAS the pilot workload increased primarily due to pilot compensation for roll and yaw oscillations. Above 25 KTAS the required pilot compensation was reduced. The low speed flight characteristics in right sideward flight with SAS off and PBA OFF are satisfactory for a degraded mode.

32. The variation of lateral cyclic control position during left sideward flight was conventional (increasing left lateral cyclic control with increasing left sideward airspeed). As the left sideward flight speed was increased up to approximately 20 KTAS, more aft longitudinal cyclic control was required. There was a one inch change in longitudinal cyclic control over the speed range tested. Adequate margins remained in all flight controls. In the light gross weight condition, moderate pilot compensation was required to maintain position the pace vehicle up to approximately 10 KTAS. From 10 to 20 KTAS the pilot workload increased dramatically due to roll and yaw oscillations. At approximately 30 KTAS and above the required pilot compensation was reduced. Pilot compensation was reduced at the heavy weight condition. The low speed flight characteristics in left sideward flight with SAS off and PBA OFF are satisfactory for a degraded mode. The following information should be included in the flight characteristics section of the operator's manual (ref 5).

8-44. Flight With SAS Off.

a. When both SAS1 and SAS2 are turned off the pitch boost actuator is also disabled. A slight increase in longitudinal control forces and freeplay of approximately one-third inch are normal with the pitch boost disabled. The dynamic stability in the pitch axis is significantly degraded,

and the pilot will be required to continuously apply longitudinal cyclic corrections to maintain pitch attitude. The FPS shall be disabled since it decreases the stability in all axes.

b. Hovering in a left 10 to 20 knot cross wind with SAS off should be avoided if possible due to roll and yaw oscillations. Pilot workload will be reduced by hovering into the wind or with a right cross wind.

c. Cruise flight up to the airspeed limits of 140/150 KIAS is permitted. However, the pilot's workload will increase noticeably above 120 KIAS.

33. The variation of longitudinal control position during rearward flight was conventional (increasing aft longitudinal control with increased rearward airspeed) up to approximately 20 KTAS in the light weight condition and up to the limit 35 KTAS in the heavy weight condition. The reversal of approximately 0.5 inch in longitudinal control required for rearward flight above 20 KTAS in the light weight condition was not objectionable to the pilot. The trend for lateral control variation was similar at both test weights, and the variation of lateral control was three times greater than longitudinal control variation (i. e., approximately 1.5 inch of right variation versus 0.5 inch of aft control variation). Adequate margins remained in all flight controls and the trends for control variation with rearward airspeed were similar to previous test results presented in figure 31 of reference 12. The greatest pilot compensation required occurred in the 10 to 20 KTAS range. The low airspeed flight characteristics in rearward flight with PBA OFF and SAS off are satisfactory for a degraded mode.

34. The low airspeed flight characteristics of the UH-60A helicopter were also evaluated at a relative wind azimuth of 315 degrees. Reference 1 reported the characteristics in the 285 to 345 degree relative azimuths were a shortcoming due to a lateral shuffle. No change in lateral accelerations (shuffle) was noted during this test. Qualitatively the pilots reported that maintaining position on the pace vehicle was less difficult at the 315 degree azimuth than at the 270 degree azimuth. The highest pilot compensation required occurred at 15 KTAS where continuous longitudinal control corrections of approximately one inch were required. At airspeeds below 10 KTAS or airspeeds of 30 KTAS and above, the pilot compensation required was reduced. The low airspeed flight characteristics in 315 degree azimuth flight with SAS off and PBA OFF are satisfactory for a degraded mode.

Instrument Flight Capability

35. An evaluation of the UH-60A under simulated instrument conditions was conducted at Edwards AFB, California. The evaluation consisted of: takeoff, climb, cruise, instrument landing system (ILS) approach, and missed approach. Instrument conditions were simulated by the pilot wearing a hood which restricted his field-of-view to inside the cockpit. The flight tasks were flown in accordance with, and performance standards were based on, the UH-60 Aircrew Training Manual (ref 15). For pilot rating purposes, adequate performance was defined as: altitude ±100 ft, heading +/- 5 degrees (±10 degrees on takeoff), airspeed ±10 KIAS, and less than full needle deflection for localizer and glide slope tracking. Desired performance was defined as one-half of the constraints for adequate performance. Weather conditions were clear with surface wind light and variable. Turbulence at the test flight levels was described by the pilots as light chop.

36. The instrument takeoff task was conducted in failure modes 6 and 7 (figs. 175 and 176, app E). The pilot rating for this task was HQRS 6 for the takeoff where the pilot experienced high workload in the hover and transition to forward flight. Longitudinal cyclic inputs of up to 1.4 inches were required and aircraft pitch excursions of ±4 degrees were noted. Roll was less than ±2 degrees and yaw was less than ±4 degrees. The pilot rating decreased to HQRS 5 as the pilot established the climb airspeed. The pilot reported that failure mode 6 was slightly easier to fly than failure mode 7, but not enough to affect the pilot rating.

37. Climbs and cruise flight were conducted in four failure modes (failure modes 6 through 9) (figs. 175 through 182, app E). For both tasks, the pilot reported HQRS 5 and 6 depending on the level of turbulence being experienced. Increased task loading such as when leveling from a climb and during turning flight resulted in higher pilot ratings. Excursions in pitch of ±5 degrees required constant corrections of ±1.0 to 1.5 inches of longitudinal cyclic control. Repeated roll corrections of ±0.5 inch and out of trim conditions of one ball width were not uncommon. Altitude was continuously fluctuating ±50 ft and occasionally ±100 ft. Airspeed was ±5 to 8 KIAS. The pilot reported that failure mode 6 was slightly easier to fly than the other three failure modes but not enough to effect the pilot rating. The reduced compensation in failure mode 6 could be attributed to a slightly lower level of turbulence during this portion of the test.

38. The ILS approach was documented in failure modes 6 through 9 during two phases, the initial capture of the localizer and

glide slope, and tracking on the glide slope and localizer from 1000 ft above ground level (AGL) to 500 ft AGL (figs. 183 through 192, app E). The portion of the task that required intercepting the localizer and glide slope and for airspeed deceleration were rated HQRS 5. Pilot control inputs and aircraft responses were similar to those during the cruise task. Once established on the glide slope and localizer, the pilot rating was HQRS 4. This lower rating may be attributed to the pilot having to concentrate only on the flight director commands. Airspeed fluctuations were $\pm$5 KIAS and the glide slope and localizer needles were always within one quarter of full deflection. Longitudinal cyclic inputs of $\pm$0.5 inch and lateral inputs of $\pm$0.3 inch were required. No difference was detected in compensation required between failure modes.

39. The go-around task was flown in all failure modes (figs. 193 through 196, app E). The go-around was commenced at decision height, with a 90 KIAS straight ahead climb. The pilot compensation and aircraft response were similar to those reported for climbs and cruise flight.

40. For all instrument task and failure modes tested, adequate performance was demonstrated. Controllability of the aircraft was never in question. Fatigue was a factor after two consecutive one hour test flights and may have affected performance if additional instrument flight tasks were attempted. Considering that the failure modes tested are degraded modes of operation and would be flown only to return the aircraft to base, the handling qualities of the UH-60A with PBA OFF are satisfactory for all instrument tasks tested.

Automatic Flight Control System Failures

41. Helicopter SAS failures were investigated at the conditions in table 2. The failure of both SAS subsystems was simulated by trimming the helicopter at the desired conditions with SAS 1 turned off and SAS 2 operational. The failure was then initiated by turning SAS 2 off. The test was conducted with controls free and with the pilot attempting to hold the controls fixed. Since the FPS was operational, the trim actuators were actively attempting to drive the cyclic and pedal controls making it difficult to precisely fix these controls due to the control force variability. The results are presented in figures 197 through 217, appendix E. With the controls free the FPS control corrections were out of phase with the required corrections and drove the helicopter response into a three axis divergent oscillation. With the controls held fixed the divergent roll and yaw oscillations were subdued and the helicopter response was primarily a

divergent pitch oscillation. The oscillatory divergent characteristics of the helicopter were essentially uneffected by PBA condition. The helicopter characteristics with SAS off and FPS on are unacceptable for continuous operation and the present emergency procedure in reference 5 which requires the pilot to turn FPS off following a SAS failure should be continued.

PITOT-STATIC SYSTEM CALIBRATION

42. The standard (sixth year production aircraft) ship's pitot-static system was calibrated in level flight and diving flight. A calibrated T-28 pace aircraft was used to determine position error. The position error varied with gross weight and is presented in figures 218 and 219, appendix E. The correction to be added was 1 to 3 knots greater at the light gross weight condition than at the two higher gross weights.

CONCLUSIONS

GENERAL

43. The handling qualities of the UH-60A with the PBA centered and electrically disconnected (OFF) are essentially unchanged from those with the PBA operational except as follows:

a. The collective-fixed static longitudinal stability as indicated by stick position variation with airspeed is slightly degraded.

b. The collective-fixed maneuvering stability characteristics as indicated by stick position variation with load factor are different between left and right turns. The maneuvering stability characteristics in left turns are degraded.

c. The dynamic stability characteristics are slightly degraded.

44. The handling qualities of the UH-60A helicopter are satisfactory to continue flight under both visual and instrument meteorological conditions to a safe landing destination with all AFCS degraded.

SHORTCOMINGS

45. The following shortcomings were identified and are listed in decreasing order of importance.

a. The dissimilar maneuvering stability characteristics between left and right turns and the poor characteristics above 1.4 g (para 22).

b. The strong pitch-due-to-sideslip coupling not related to PBA (para 17).

SPECIFICATION COMPLIANCE

46. The UH-60A helicopter with the PBA OFF failed to meet the following requirements of the PIDS.

a. Paragraph 10.3.3.1.3 - The aircraft does not possess positive static longitudinal control force and control position stability above 138 KCAS in level flight with the PBA centered and electrically disconnected, in that, a forward control displacement is not required to hold an increased value of airspeed (para 11).

b. Paragraph 10.3.3.1.4 - The UH-60A is not capable of sustained steady turning flight at bank angles of 30 degrees or greater with positive cyclic stick force vs normal acceleration (maneuvering) stability characteristics (para 22).

RECOMMENDATIONS

47. The shortcomings reported in paragraph 45.a. should be corrected (para 22).

48. The shortcoming reported in paragraph 45.b. should be avoided in future helicopter designs (para 17).

49. The maximum airspeed overshoot criterion for the FPS check required by the Maintenance Test Flight Manual (ref 14 page 2-60, paragraph 4.b.(12)) should be increased to at least 8 knots (para 28).

50. The following information should be added in the flight characteristics section of the Operator's Manual (ref 5) (para 32).

8-44. Flight With SAS Off.

a. When both SAS1 and SAS2 are turned off the pitch boost actuator is also disabled. A slight increase in longitudinal control forces and free-play of approximately one-third inch are normal with the pitch boost disabled. The dynamic stability in the pitch axis is significantly degraded, and the pilot will be required to continuously apply longitudinal cyclic corrections to maintain a near constant pitch attitude. The FPS shall be disabled since it decreases the stability in all axes.

b. Hovering in a left 10 to 20 knot cross wind with SAS off should be avoided if possible due to roll and yaw oscillations. Pilot workload will will be reduced by hovering into the wind or with a right cross wind.

c. Cruise flight up to the airspeed limits of 140/150 KIAS is permitted. However, the pilot's workload will increase noticeable above 120 KIAS.

APPENDIX A. REFERENCES

1. Final Report, USAAEFA Project No. 77-17, *Airworthiness and Flight Characteristics Evaluation UH-60A (Black Hawk) Helicopter*, September 1981.

2. Final Report, USAAEFA Project No. 82-15, *Airworthiness and Flight Characteristics Test of the UH-60A Configured with the Prototype External Stores Support System (ESSS)*, December 1983.

3. Letter, AVSCOM, AMSAV-ED, 10 December 1984, subject: Flight Evaluation of the UH-60A Helicopter with the Pitch Bias Actuator (PBA) Locked and Centered and the Automatic Flight Control System (AFCS) Off, USAAEFA Project 84-28.

4. Prime Item Development Specification, UH-60A Black Hawk Aircraft, DARCOM-CP-2222-S1000F Part I, 18 December 1981.

5. Technical Manual, TM55-1520-237-10, *Operator's Manual UH-60A Helicopter*, Headquarters, Department of the Army, 21 May 1979, with change 36 dated 31 March 1986.

6. Final Report, USAAEFA Project No. 82-09, *Preliminary Airworthiness Evaluation of the UH-60A with an Improved Airspeed System*, April 1983.

7. Letter, AVSCOM, AMSAV-E, 10 April 1985, subject: Airworthiness Release of UH-60A Black Hawk Helicopter, S/N 82-23748 to Conduct a Flight Evaluation of the UH-60A Helicopter With the Pitch Bias Actuator Locked and Centered, USAAEFA Project No. 84-28, with revision 1 dated 19 March 1985.

8. Test Plan, USAAEFA, SAVTE-TB, *Flight Evaluation of the UH-60A Helicopter With the Pitch Bias Actuator Locked and Centered*, USAAEFA Project No. 84-28, January 1985.

9. Flight Test Manual, Naval Air Test Center, FTM No. 101, *Helicopter Stability and Control*, 10 June 1968.

10. Letter, USAAEFA, SAVTE-TB, 20 December 1979, subject: Letter Report, Preliminary Airworthiness Evaluation (PAE) III A, UH-60A Black Hawk Helicopter with the Infrared (IR) Reduction Subsystem, USAAEFA Project No. 79-11.

11. Letter, USAAEFA, SAVTE-TB, 26 April 1979, subject: Preliminary Airworthiness Evaluation (PAE III), UH-60A Black Hawk Helicopter, USAAEFA Project No. 78-22.

12. Final Report, USAAEFA Project No. 79-24, *Validation Flight Test of UH-60A for Rotorcraft Systems Integration Simulator (RSIS)*, September, 1982.

13. Advance Report, USAAEFA Project No. 81-16, *UH-60A Expanded Gross Weight and Center of Gravity Evaluation*, August 1985.

14. Technical Manual, TM55-1520-237-MTF, Maintenance Test Flight Manual, *UH-60A Helicopter*, Headquarters, Department of the Army, 6 December 1985, with change 5 dated 2 May 1986.

15. Field Circular No 1-212, *Aircrew Training Manual Utility Helicopter (UH-60A)*, Headquarters, U. S. Army Aviation Center, Fort Rucker, AL, 31 August 1984.

APPENDIX B. DESCRIPTION

GENERAL

1. The Sikorsky UH-60A (Black Hawk) is a twin turbine engine, single main rotor helicopter capable of transporting 11 combat troops plus a crew of three. It is equipped with 3 nonretractable conventional wheel-type landing gear. A movable horizontal stabilator is located on the lower portion of the tail rotor pylon. The main and tail rotors are both four-bladed with a capability of manual main rotor blade and tail pylon folding. The cross-beam tail rotor with composite blades is attached to the right side of the pylon and is canted 20 degrees upward from the horizontal. A complete description of the aircraft is contained in the operator's manual (ref 5, app A). Photographs of the test helicopter are included at photos 1 through 3.

2. General data of the UH-60A helicopter are as follows:

Weights

Current maximum gross weight	20,250 pounds
Proposed maximum gross weight	22,000 pounds
Empty weight	Approximately 10,679 pounds
Primary Mission gross weight	16,324 pounds
Fuel capacity (measured)	359 gallons

Main Rotor

Number of blades	4
Diameter	53 feet, 8 inch
Blade chord	1.73/1.75 feet
Blade twist	-18 degree (equivalent)
Blade tip sweep	20 degree aft
Blade area (one blade)	46.7 square feet
Airfoil	
section (root to tip designation)	SC1095/SC1095R8
thickness (percent chord)	9.5 percent
Main rotor mast tilt (forward)	3 degree

Tail Rotor

Number of blades	4
Diameter	11 feet
Blade chord	0.81 feet
Blade twist (equivalent linear)	-18 degree
Blade area (one blade)	4.46 square feet
Airfoil	
section (root to tip designation)	SC1095/SC1095R8
thickness (percent chord)	9.5 percent
Cant angle	20 degree

Photo 1. Right Front View, UH-60A Helicopter

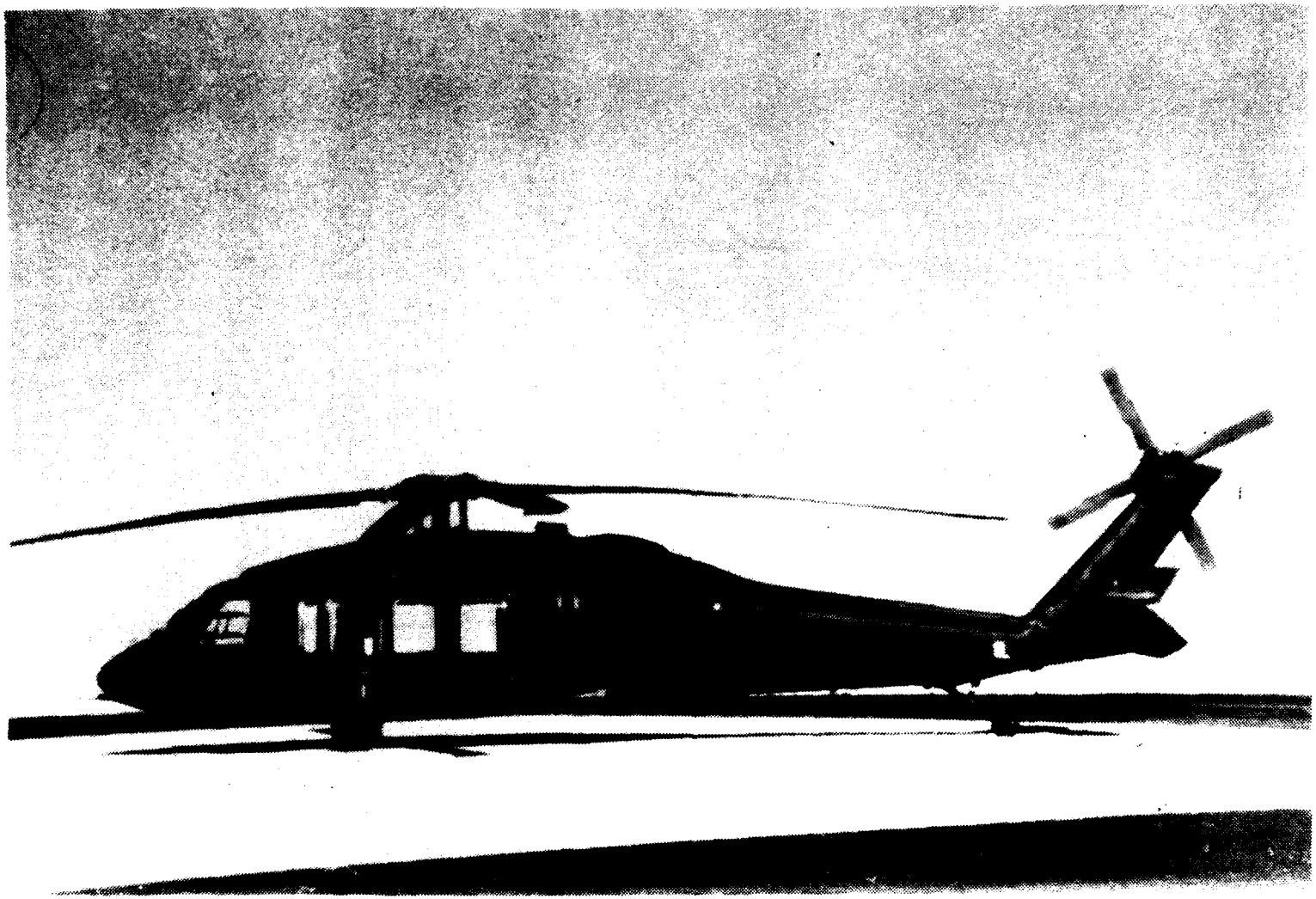


Photo 2. Left Side View, UH-60A Helicopter

Photo 3. Rear View, UH-60A Helicopter

AIRSPEED/STABILATOR MODIFICATIONS

3. The airspeed/stabilator system on the test aircraft included five modifications from the original production aircraft in an attempt to eliminate pitch oscillations during takeoff, improve climb handling qualities, and reduce large position error at approximately 30 to 40 knots indicated airspeed (KIAS). Three changes were incorporated in the pitot-static pressure systems and two changes were electrical circuit modifications to the stabilator amplifiers in the stabilator system. Major features of this system are described in detail in the Preliminary Airworthiness Evaluation of UH-60A with an Improved Airspeed System, US Army Aviation Engineering Flight Activity (USAAEFA) Report No. 82-09, (ref 6, app A).

FLIGHT CONTROL SYSTEM

General

4. The UH-60A utilizes conventional helicopter cyclic, collective, and directional controls powered by two separate 3050 pounds per square inch (psi) hydraulic systems. The pilot and copilot controls are dual but have separate paths to a combining linkage for each control axis. The control inputs from the cockpit controls are carried by mechanical linkage through the pilot-assist servos/actuators to a mixing unit. The mixing unit combines, sums, and couples the cyclic, collective, and pedal inputs (fig. 1) and provides proportional output signals to the main and tail rotor controls (fig. 2). Pilot control is assisted by an automatic flight control system (AFCS) comprised of five basic subsystems: stabilator, pitch bias actuator (PBA), stability augmentation system (SAS), trim system, and flight path stabilization (FPS).

Hydraulic System

5. The UH-60A has two separate hydraulic systems, a first stage and second stage, and incorporates a third hydraulic pump/reservoir capable of pressuring either the first or second stage systems if required. The components of the hydraulic systems are three hydraulic pump modules, two transfer modules, a utility module, three dual primary servos, one dual tail rotor servo, six pilot assist servos, an auxiliary power unit (APU) accumulator, an APU handpump, and a servicing handpump. There are three hydraulic pressure supply systems: number 1, number 2, and backup hydraulic pump modules. The hydraulic systems are independent and each is fully capable of providing essential flight control

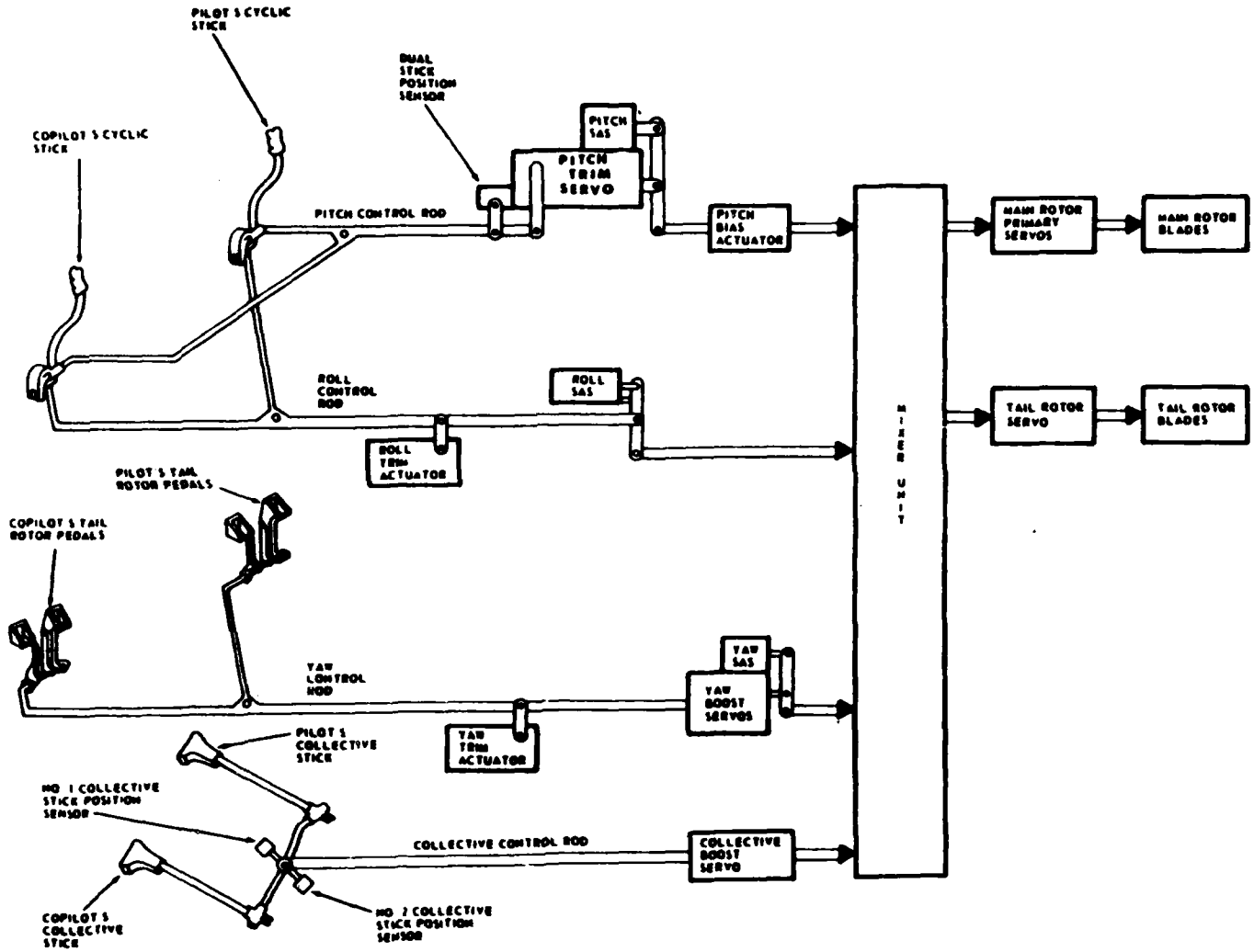


Figure 1. Flight Controls Linkage, Simplified Diagram

MECHANICAL

FROM	TO	REASON
COLLECTIVE	YAW	ANTI-TORQUE
COLLECTIVE	LATERAL	LATERAL LEAD (RIGHT TRANSLATION)
COLLECTIVE	LONGITUDINAL	ROTOR DOWNWASH ON STABILATOR
YAW	LONGITUDINAL	TAIL ROTOR LIFT VECTOR

ELECTRICAL

COLLECTIVE	YAW	CAMBER OF VERTICAL STABILIZER VARIES SIDE LOAD WITH AIRSPEED.

Figure 2. Flight Control Compensations Chart

pressure. The number 1 and number 2 pump modules are driven by the main rotor gearbox and supply pressure to the flight control servos whenever the main rotor is turning. The number 1 pump module supplies 3050 psi to the first stage of the three main rotor (primary dual) servos and to the first stage of the tail rotor servo. The number 2 pump module supplies 3050 psi to the second stage of the three main rotor (primary dual) servos, the collective and yaw boost servos, the SAS actuators, and 1000 psi to the pitch boost servo. The electrically operated backup hydraulic pump supplies emergency hydraulic pressure to the first and/or second stage hydraulic systems. This system can supply hydraulic pressure to all servos during ground checkout and recharges the APU accumulator. The electric motor driving the backup pump module is automatically activated by either a low-pressure sensing switch in the number 1 and number 2 pump modules, by the APU start accumulator switch, or by the manual switch in the cockpit. A leak detection/isolation feature is built into the hydraulic system, using fluid quantity switches on the pump modules, check valves and shutoff valves in the transfer modules, and electronic logic modules. When a fluid quantity switch senses a fluid loss in a system, the logic module will shut off the required valve or valves to isolate the leak and turn on the backup pump. A simplified hydraulic system schematic is presented in figure 3.

Automatic Flight Control System

General:

6. The UH-60A helicopter AFCS (fig. 4) is designed to enhance helicopter stability and handling qualities. The system consists of five major subsystems: SAS, FPS system, trim system, PBA, and stabilator control system. Electronic control of the systems is provided by commands from a digital SAS/FPS computer and a SAS analog amplifier. The SAS provides three-axis rate damping, pseudo attitude (roll) retention, and limited turn coordination. The FPS provides three-axis attitude and airspeed hold and is the primary source of automatic turn coordination. The trim system provides control position hold and control forces versus position gradients. The PBA is designed to enhance the longitudinal stability of the helicopter. The stabilator control system automatically positions the stabilator as a function of flight parameters to tailor aircraft pitch attitude and dynamic response.

Stability Augmentation System:

7. The SAS functions to provide three-axis rate damping and pseudo attitude retention. The SAS is a dual system with one

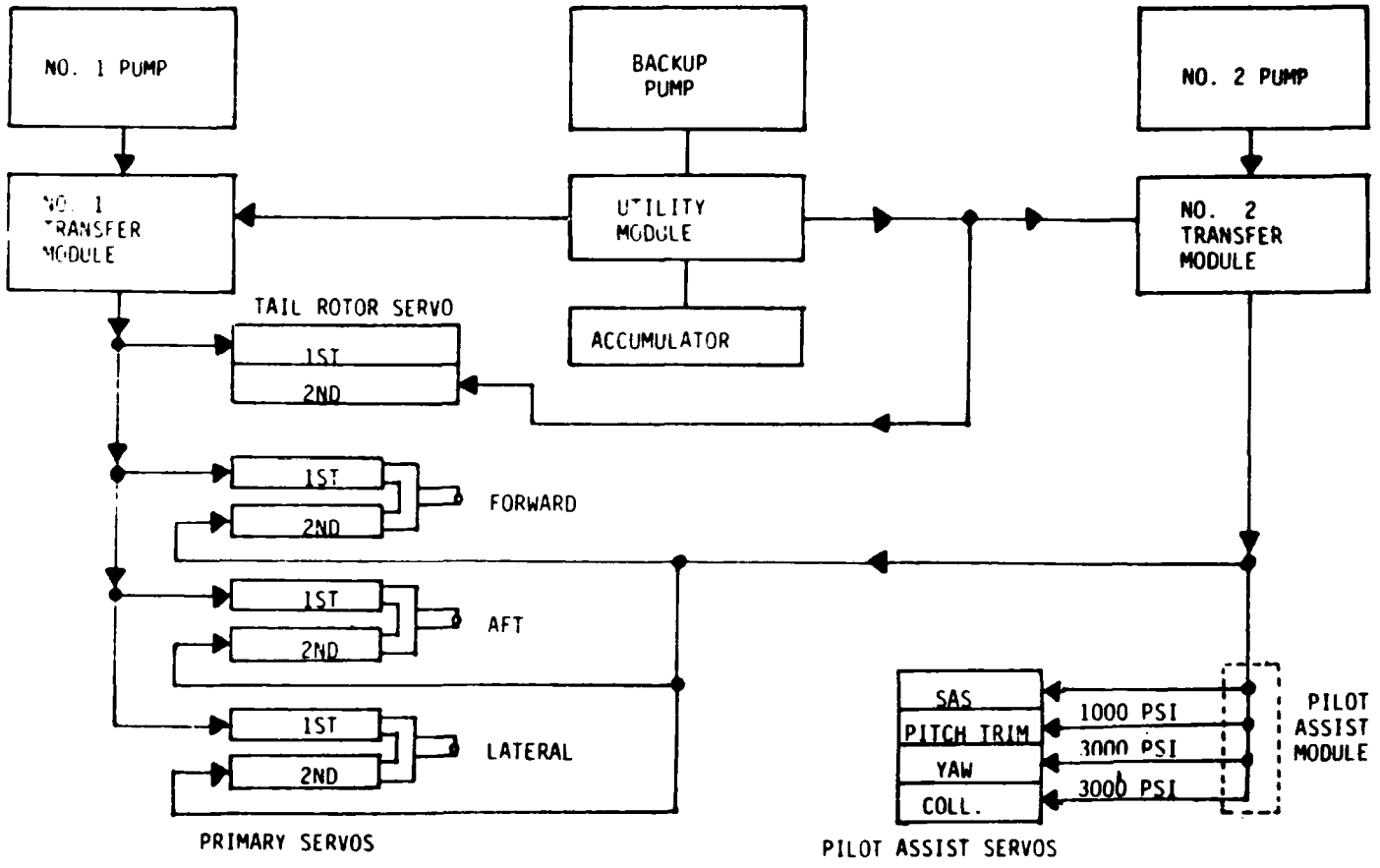


Figure 3. Hydraulic System Block Diagram

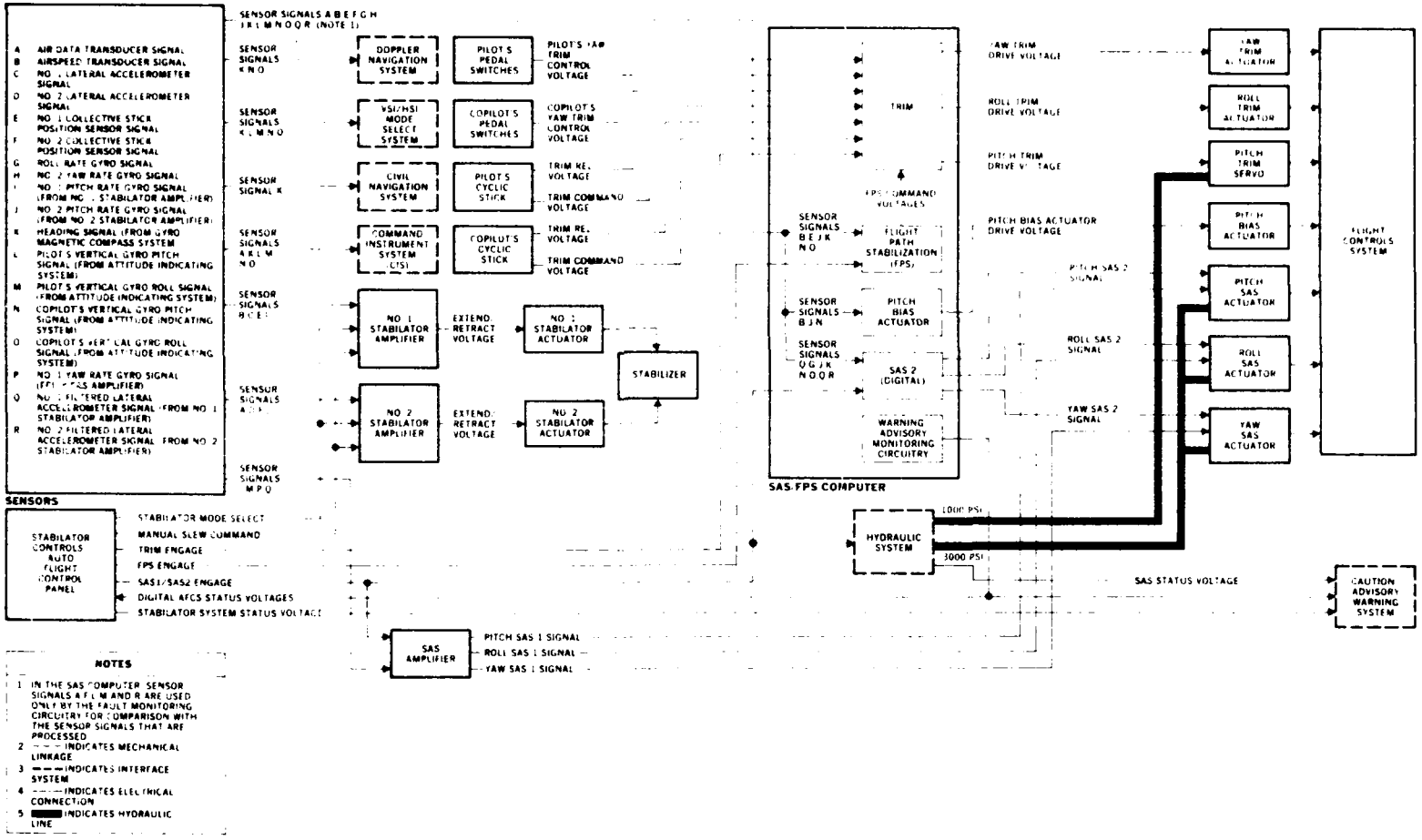


Figure 4. AFCS Functional Block Diagram

subsystem (SAS-1) controlled by the analog SAS amplifier and one subsystem (SAS-2) controlled by the digital SAS/FPS computer (fig. 5). It is redundant in sensors and command signal path; however, both SAS subsystem command signals drive a single SAS actuator in each axis. During normal operation with both SAS-1 and SAS-2 engaged, each provides one-half of the systems nominal gain and one-half of total system control authority. The control authority of each is electrically limited to ±5 percent of total control travel in pitch, roll, and yaw. SAS inputs to the SAS servo valves are additive to provide a total authority of 10 percent. The sum is limited to +/- 10 percent authority by mechanical limits of SAS actuator travel. Selectable operation of either SAS-1 or SAS-2 is available at the center console and switching either subsystem off automatically doubles the gain of the remaining SAS while its authority remains limited at 5 percent. All three axes provide damping and lagged rate damping (pseudo attitude retention). In addition, the roll SAS subsystems include a porportional attitude gain that is limited to ±5 degrees of roll. Both yaw SAS subsystems also include a constant lateral acceleration gain at airspeeds above 60 KIAS. A washout of the rate damping signal incorporated in the pitch and yaw channels is designed to prevent saturation during a steady turn.

8. The SAS-1 is controlled by the SAS-1 analog amplifier which continuously derives commands based on inputs from the No. 1 yaw rate gyro, the No. 1 pitch rate gyro, and a roll rate signal derived from the No. 2 vertical gyro, and the No. 1 filtered lateral accelerometer signal. The SAS-2 is controlled by the SAS/FPS digital computer. SAS-2 commands are continuously generated in response to signals from the roll rate gyro, No. 2 pitch rate gyro, and signals derived from magnetic compass gyros (yaw rate), No. 1 vertical gyro (pitch and roll rate), and No. 2 filtered lateral accelerometer. At airspeeds above 60 KIAS, input signals from the No. 2 filtered lateral accelerometer and the No. 1 vertical gyro (derived rate) are provided to the SAS-2 system to stabilize yaw during coordinated turns.

9. SAS-2 operation is continuously monitored by the SAS/FPS computer. This monitor system compares inputs from independent sources and compares SAS command to SAS actuator output. Failure of any of these comparison checks in SAS-2 input or output indicates a SAS-2 failure (pitch, roll, or yaw channel) and the control input from the affected channel will be removed (actuator remains at failed position) and the SAS-2 advisory light will be illuminated. SAS-1 does not contain fault detection logic.

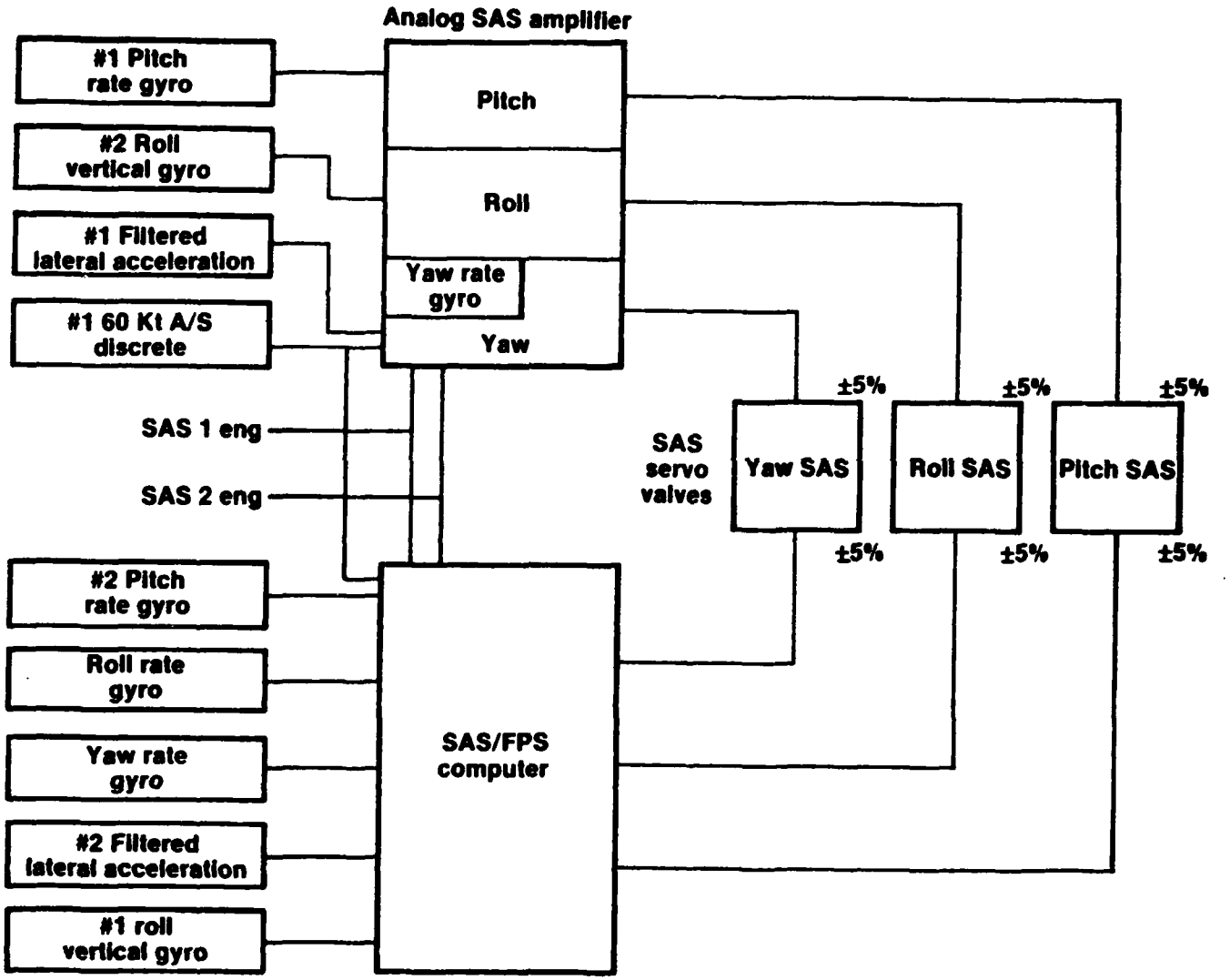


Figure 5. Simplified SAS Block Diagram

Flight Path Stabilization System:

10. The FPS is primarily an aircraft attitude hold system that incorporates conditional capability for airspeed hold and turn coordination. The FPS works through the roll, pitch, and yaw trim actuators (fig. 6). The FPS can drive the cockpit control to any position to which the pilot/copilot can trim the controls, resulting in a 100 percent FPS parallel control authority. The AFCS limits the rate of FPS within the maximum override force limits stated in the trim system section. Since FPS inputs drive the cockpit controls through the trim actuators, the trim system must be on in order to have FPS.

11. The attitude hold function of the FPS is designed to maintain a desired heading or pitch and roll attitude. The trim attitude, once established, is automatically maintained unless changed by the pilot. At airspeeds greater than 60 KIAS, the pitch axis of the FPS seeks to maintain the airspeed for which the trim attitude has been established. When the reference pitch attitude is changed with the beep trim switch, a time delay (approximately 17 seconds) in the airspeed hold function allows time to stabilize at the new trim airspeed prior to initiating the airspeed hold function. During this time, the attitude hold function maintains the pilot-selected pitch attitude.

12. The FPS provides two yaw channel functions: heading hold and automatic turn coordination. For heading hold (below 60 KIAS), the aircraft is maneuvered to the desired heading with the pilot's or copilot's feet depressing one or both of the pedal switches. When the pilot or copilot removes his feet from the switches the system is designed to automatically maintain that reference heading. At airspeeds greater than 60 KIAS the coordinated turn feature of the FPS is operational. The coordinated turn feature is initiated by a lateral stick displacement of approximately 1/2 inch and a bank angle of greater than 2 degrees. The feature is disengaged when the bank angle is less than 1 degree and the roll rate has decreased to below 2 degrees per second. Turn coordination is accomplished by directional control inputs through the trim actuator to zero the side force as sensed by the lateral accelerometers in the stabilator control system. At airspeeds greater than 60 KIAS, heading hold is automatically engaged unless the pilot engages the turn coordination feature.

13. The FPS and all inputs are subject to a number of cross-checks within the computer. In essence, each input (e.g., attitude, rate, airspeed, etc) is compared either against another independent source of the same information or, in the case of rate inputs, a

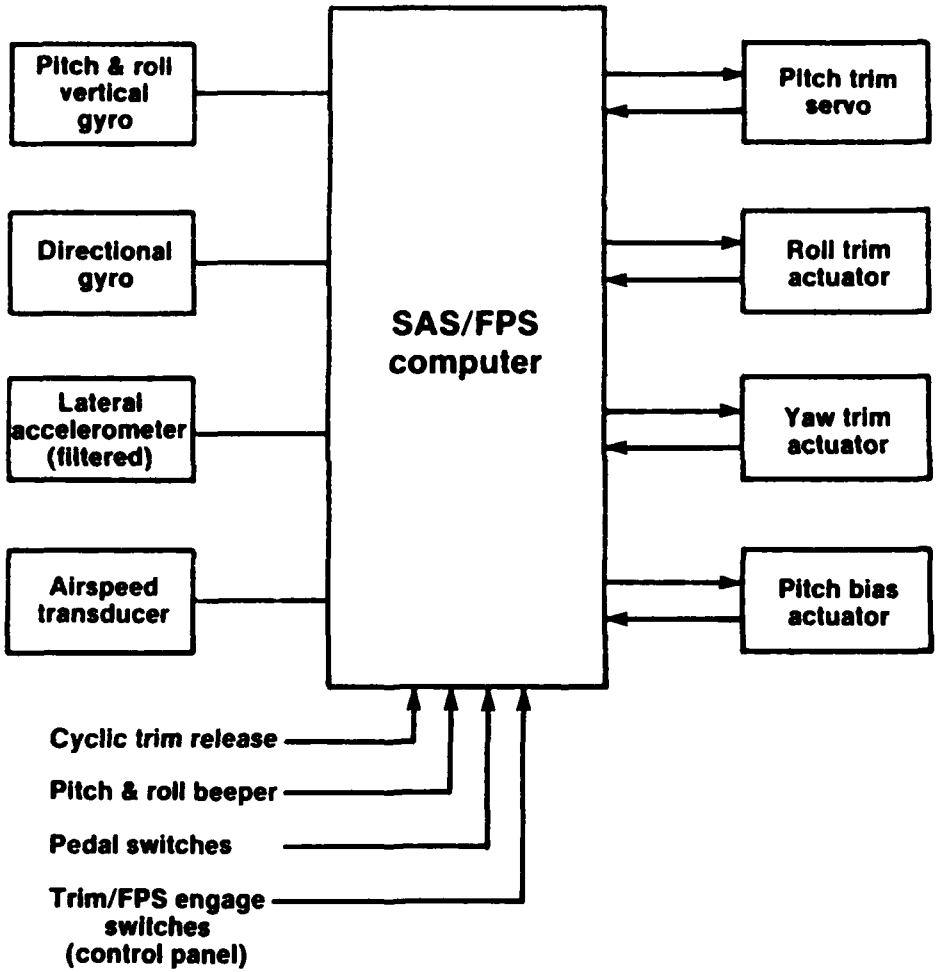


Figure 6. Simplified FPS Block Diagram

computer-derived rate. If these comparisons exceed the preprogrammed tolerance, the particular FPS function will be disabled and the appropriate AFCS advisory light and the FPS FAIL caution light will be illuminated.

Trim System:

14. The trim system provides zero force control centering at a pilot/copilot selected trim control position, a spring breakout force plus gradient and a pedal damper force. The trim system is selected by activating the push-on/off switch, marked TRIM, on the AFCS control panel.

15. With the trim system selected off, there is no control force gradient or control centering in the cyclic control system or directional control system. Directional control movements will be resisted by a pedal damper which generates an opposing pedal force proportional to the rate of pedal movement. This damping force is electrically generated but is continuously engaged without regard to TRIM switch position. With the trim system ON, directional and lateral control forces are developed in the electromechanical trim actuators. These actuators incorporate an electrically controlled rotary spring assembly which allows the pilot to select the zero force control trim position. The designed maximum override force (with full opposite control position) is 80 pounds in directional and 19 pounds in lateral cyclic control. Longitudinal cyclic control forces are developed in a combined electrohydromechanical pitch boost and trim actuator assembly (pitch trim servo) with a designed maximum override force of 20 pounds.

16. With the trim system selected on and FPS off, the pilot/copilot may change the cyclic control trim position through two means: a cyclic trim release switch and cyclic beep trim switch. The cyclic beep trim switch allows the cyclic control trim position to be changed in one direction at a time, at a fixed rate of travel, by electrically driving the trim actuator through the rotary spring assembly. The beep trim switch is a four-position "chinese hat" switch mounted on the cyclic stick grip. Activation of the trim release switch releases the force gradient on the longitudinal and lateral cyclic controls. The position of the cyclic control when the trim release switch is open (released) becomes the new cyclic trim position. At airspeeds below 60 KIAS, when the pedal switches are closed (any pedal switch depressed), the electronically controlled yaw force gradient spring is repositioned by pedal movement resisted only by the pedal rate damper. When the pilot/copilot removes his feet from the pedals which releases the pedal switches, the electronically controlled rotary

spring reengages, holding the pedals at the new trim position through the pedal breakout plus gradient spring. Above 60 KIAS the pedal switches and the trim release switch together provide yaw trim release.

17. Trim actuator position may be commanded by the pilot or by the FPS. The SAS/FPS computer monitors the trim system by comparing the commanded trim actuator position to the actual position in all three axes. If this comparison is out of tolerance, the trim system is shut off in the defective axis and the TRIM FAIL caution light and TRIM advisory light on the AFCS computer are illuminated. The trim system may be reset by pressing both POWER ON RESET buttons on the AFCS control panel.

Pitch Bias Actuator:

18. The PBA is an electromechanical differential actuator built onto the longitudinal cyclic control system to enhance the longitudinal stability of the helicopter. It receives airspeed, pitch attitude, and pitch rate inputs from the SAS/FPS computer continuously whenever power is applied to the aircraft and the SAS/FPS computer detects no faults prejudicial to PBA function regardless of AFCS control panel switch condition. Airspeed signals do not effect the PBA operation below 80 KIAS. From 80 KIAS to 180 KIAS, PBA movement is programmed at -0.0525 percent per knot. Pitch attitude programming is +0.375 percent per degree of pitch attitude up to a 20 degree limit. Pitch rate programming is +0.13 percent per deg/sec rate up to a 34.5 deg/sec limit. PBA inputs do not feed back to the cockpit controls but +/- 0.42 inches of PBA movement is equivalant to +/- 1.5 inches of longitudinal cyclic movement. The PBA is, in effect, a variable length control rod which changes the relationship between longitudinal cyclic control and swashplate tilt as a function of flight parameters.

19. The authority of the PBA is 15 percent of longitudinal cyclic full throw and is limited by the computer to a maximum rate of 3 percent per second. PBA function is monitored by the SAS/FPS computer by an actuator feedback system. If actuator position differs from the commanded position by more than the predetermined tolerance, power is removed from the PBA, the actuator remains in the position it was in at the time of failure, and the PITCH BIAS FAIL caution light is illuminated. This could result in loss of up to 15 percent (1.5 inches) of forward or aft cyclic control authority. Intermittent PBA failures due to an actuator position versus command "no compare" may be reset by pushing both POWER ON RESET buttons on the AFCS control panel.

20. The PBA operation may be failed or degraded by "no compare" results in airspeed, pitch rate, vertical gyro inputs, internal mechanical failure, or various SAS/FPS computer failures. A pitch rate or vertical gyro failure results in the PBA centering. An airspeed failure results in a constant 120 knot airspeed signal. A mechanical failure of the PBA causes the actuator to remain in the position in which it failed. There is a low probability that a SAS/FPS computer failure could result in a hardover signal to the PBA.

Stabilator Control System:

21. The stabilator control system is an electrically controlled and activated system. The primary purposes of the system are to schedule stabilator incidence to eliminate excessively nose-high attitudes at low airspeed due to downwash impingement on the stabilator, and to optimize pitch attitudes for climb, cruise, and autorotational descent. The control system is composed of two analog amplifiers which operate from independent input sources and command the position of two electric jackscrew actuators acting in series (fig. 7). During normal operation these jackscrews operate in unison, with each providing one-half of the stabilator position input.

22. The stabilator position is programmed between approximately 9 degrees trailing edge up and 39 degrees trailing edge down as a function of four variables: indicated airspeed, collective control position, pitch rate, and lateral acceleration. The airspeed input primarily allows the stabilator to align with the main rotor downwash during low speed flight, thus reducing the stabilator download and eliminating excessively nose-high pitch attitudes at low airspeed. The collective control input reduces coupling of collective to pitch attitude in forward flight. Pitch rate and lateral acceleration inputs are designed to improve the dynamic response of the helicopter. Pitch rate inputs to the stabilator system provide a degree of pitch rate damping to supplement SAS/FPS commanded damping. The lateral accelerometer inputs, providing an indication of both side force and yaw angular acceleration, decouple the pitch response to tail rotor thrust changes resulting from changes in the inflow through the tilted tail rotor with sideslip variation.

23. The stabilator system is independent of the other AFCS subsystems although it shares common inputs. Collective position, airspeed, and lateral acceleration inputs are all dual inputs which are compared in the SAS/FPS computer. The output of the No. 2 pitch gyro is compared with a pitch rate derived in the SAS/FPS computer. If the computer detects a "no compare" in

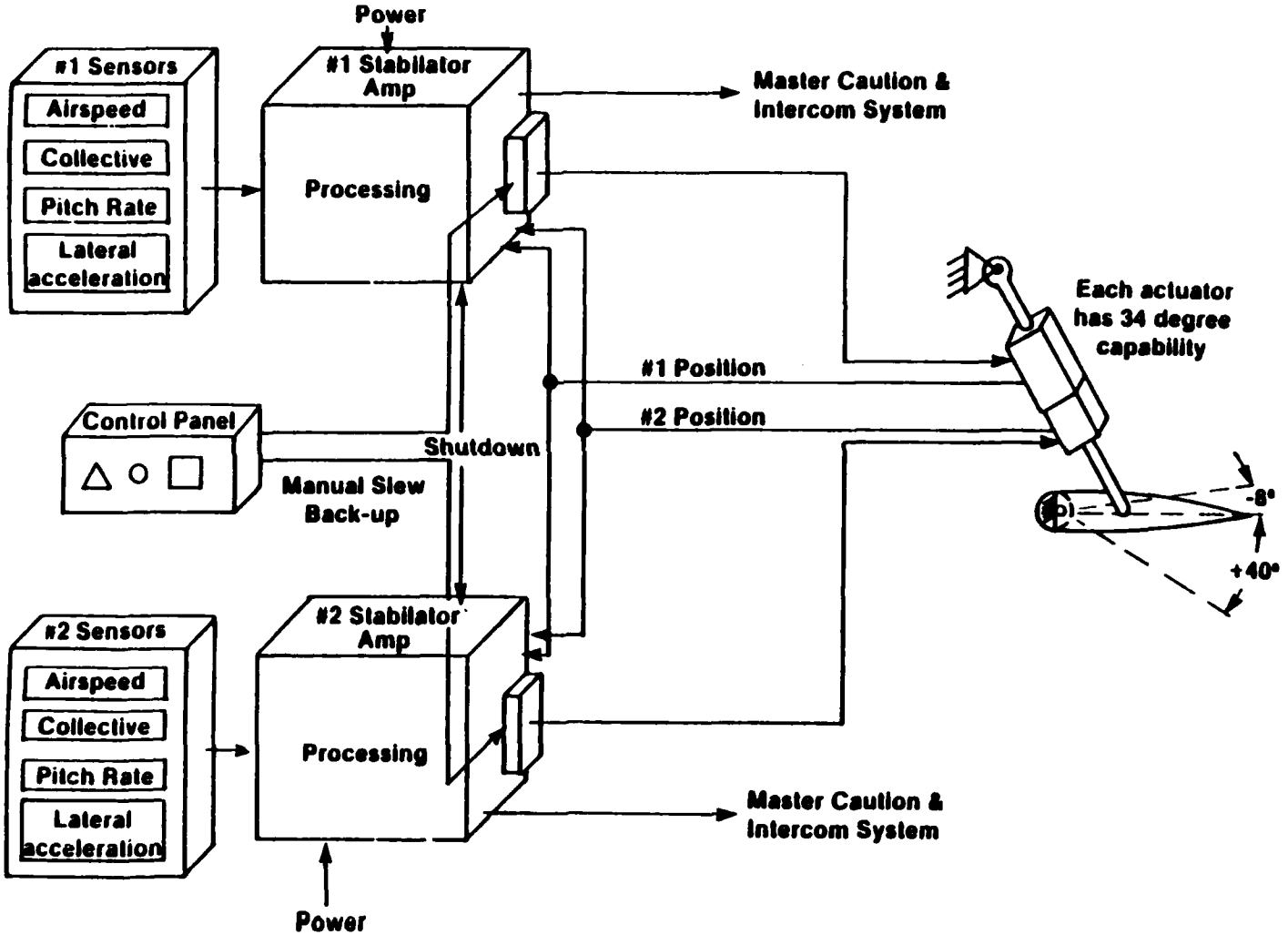


Figure 7. Stabilator System

those inputs, the appropriate caution/advisory lights will be illuminated and affected SAS/FPS computer controlled functions will be shut down; however, the computer effects no control over the stabilator system function.

24. Stabilator malfunctions are detected and automatic mode scheduling is disabled by a fault monitoring function in each of the stabilator amplifiers. The positions of the two actuators are compared and if the positions exceed the shutdown threshold (10 degrees at airspeeds less than 30 KIAS decreasing to 4 degrees at airspeeds greater than 150 KIAS) an automatic mode shutdown occurs and the system reverts to the manual backup mode. This shutdown is accompanied by an audio warning tone in the pilot headsets, illumination of the master caution and stabilator segment lights, and elimination of the stabilator ON light on the AFCS control panel. If the malfunction is transient, the stabilator system automatic scheduling may be reset by pressing the stabilator AUTO CONTROL RESET button on the AFCS control panel. The pilot may at any time take manual control of the stabilator and control its position by referring to cockpit-mounted stabilator position indicators.

APPENDIX C. INSTRUMENTATION

GENERAL

1. The test instrumentation was installed, calibrated and maintained by the US Army Aviation Engineering Flight Activity. A swiveling pitot-static tube, an angle-of-attack vane and an angle-of-sideslip vane were installed on a test boom. The tip of the swiveling pitot-static tube was 67 inches forward of the nose of the aircraft (fuselage station 97), 25.7 inches to the right of the aircraft centerline (buttline 25.7), and 7 inches below the forward avionics bay floor (waterline 208). Equipment required only for specific tests is discussed in the section on special equipment. Data was obtained from calibrated instrumentation and displayed or recorded as indicated below.

Pilot Position

Airspeed (boom system)
Altitude (boom system)
Airspeed (ship system)
Altitude (ship system)
Altitude (radar, dual range)*
Rate of climb*
Rotor speed*
Engine torque* **
Turbine gas temperature (T4.5)* **
Engine gas generator speed * **
Control positions
    Longitudinal
    Lateral
    Pedal
    Collective
Stabilator position*
Angle of sideslip
Center of gravity (cg) normal acceleration
Cg lateral acceleration

Copilot Position

Airspeed*
Altitude*
Altitude (radar, dual range)*
Rate of climb*
Rotor speed*
Engine torque* **
Stabilator position*

*Ship system/not calibrated
**Both engines

Total air temperature*
Fuel remaining*
Ballast cart position
Event switch

Engineer Panel

Pressure altitude
Ambient air pressure
Engine fuel flow**
Engine fuel used**
Auxiliary power unit (APU) fuel used
Total air temperature
Rotor speed (sensitive, digital)
Time code display
Run number
Event switch
Instrumentation controls

Digital (PCM) Data Parameters

Airspeed (boom system)
Altitude (boom system)
Airspeed (ship system)
Altitude (ship system)
Altitude (radar)
Total air temperature
Rotor speed
Engine torque**
Engine fuel flow**
Engine fuel used**
Engine fuel temperature (at fuel used transducer)**
APU fuel used
APU fuel temperature (at fuel used transducer)
Tail rotor impress pitch
Stabilator position
Ballast cart position
Control positions
    Longitudinal
    Lateral
    Pedal
    Collective
Stability augmentation system output position
    Longitudinal
    Lateral
    Directional

*Ship system/not calibrated
**Both engines

Control mixer input position
    Longitudinal
    Lateral
    Directional
Primary servo position
    Forward
    Aft
    Lateral
Pitch bias actuator position
Pitch bias actuator input voltage
Angle of attack
Angle of sideslip
Aircraft attitude
    Pitch
    Roll
    Yaw
Aircraft angular rate
    Pitch
    Roll
    Yaw
Linear acceleration
    Cg normal
    Cg lateral
    Cg longitudinal
Time of day
Run number
Pilot event
Engineer event

2. Provisions were made for telemetry transmission of parameters.

AIRSPEED CALIBRATION

3. The standard ship airspeed system and test boom airspeed system were calibrated in level flight. A calibrated T-28 pace aircraft was used to determine the position error. The position error of the boom airspeed system is presented in figure 1.

SPECIAL EQUIPMENT

Control Fixtures

4. A cyclic mechanical fixture was utilized at the copilot station to obtain a desired control input size about the longitudinal and lateral axes.

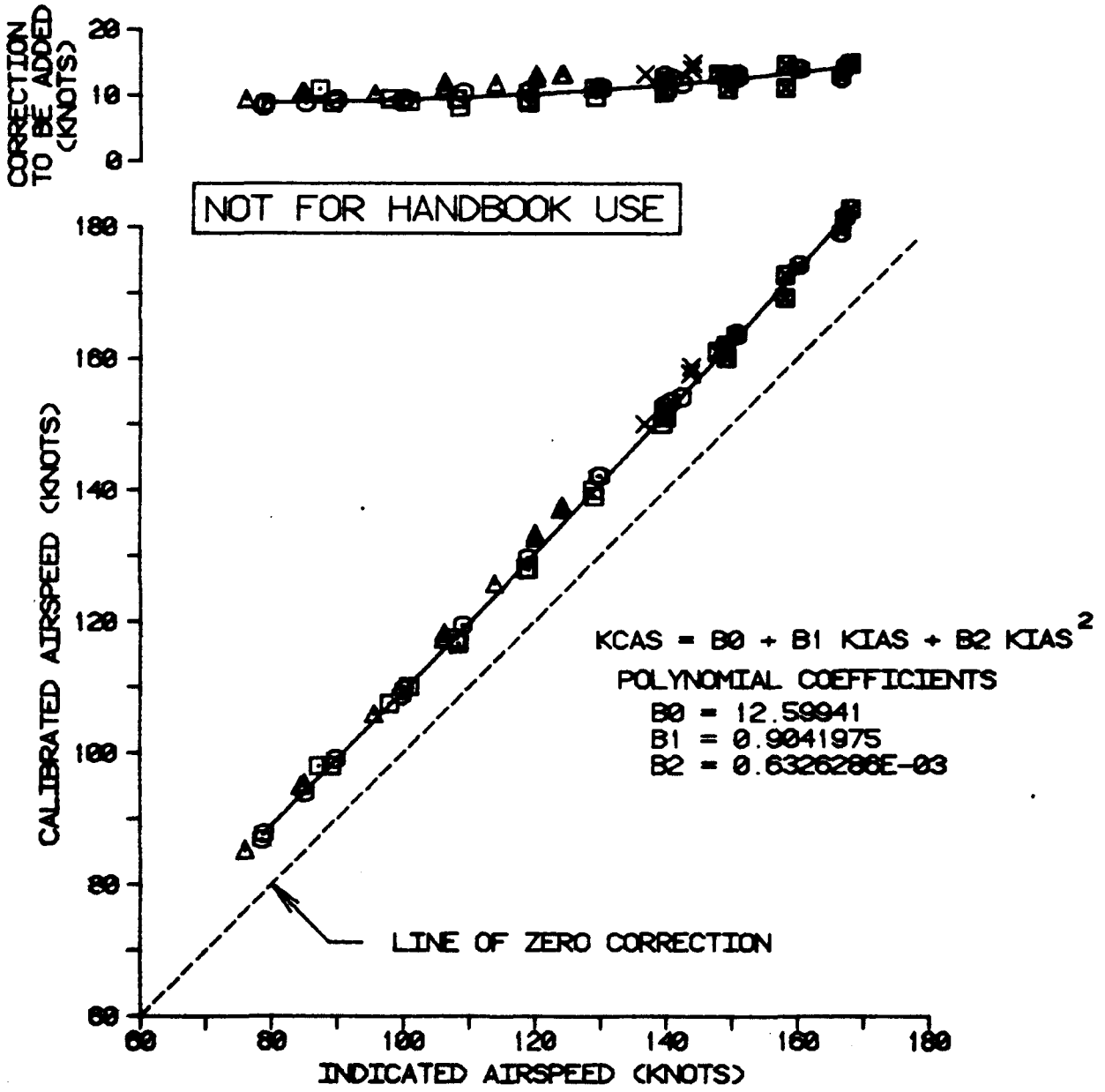
FIGURE 1

BOOM SYSTEM AIRSPEED CALIBRATION

UH-60A USA S/N 82-23748

SYM	AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	TRIM FLIGHT CONDITION
⊡	13650	361.1(AFT)	0.2RT	5200	16.5	258	LEVEL
▣	13370	361.6(AFT)	0.2RT	5400	16.5	257	DIVE
⊙	16400	361.0(AFT)	0.2RT	5100	7.0	257	LEVEL
●	16230	360.3(AFT)	0.2RT	5700	8.0	257	DIVE
△	21900	358.5(AFT)	0.0	4800	9.5	258	LEVEL
X	21500	357.3(AFT)	0.0	3700	10.5	258	DIVE

NOTES: 1. T-28 PACE AIRCRAFT
2. NORMAL UTILITY CONFIGURATION



Ground Pace Vehicle

5. A vehicle, utilizing a calibrated fifth wheel to determine accurate ground speed, was used in conjunction with wind speed and direction to provide a precise airspeed reference for the test aircraft during low speed tests.

Weather Station

6. A portable weather station, consisting of an anemometer, sensitive temperature gage, and barometer, was used to obtain wind speed, wind direction, ambient temperature, and ambient atmospheric pressure during low speed tests.

APPENDIX D. TEST TECHNIQUES AND DATA ANALYSIS METHODS

AIRCRAFT RIGGING

1. A flight controls engineering rigging check was performed on the main and tail rotors to insure representative handling qualities information and compliance with established limits. The stabilator control system was checked to verify conformance with the modified production stabilator schedule.

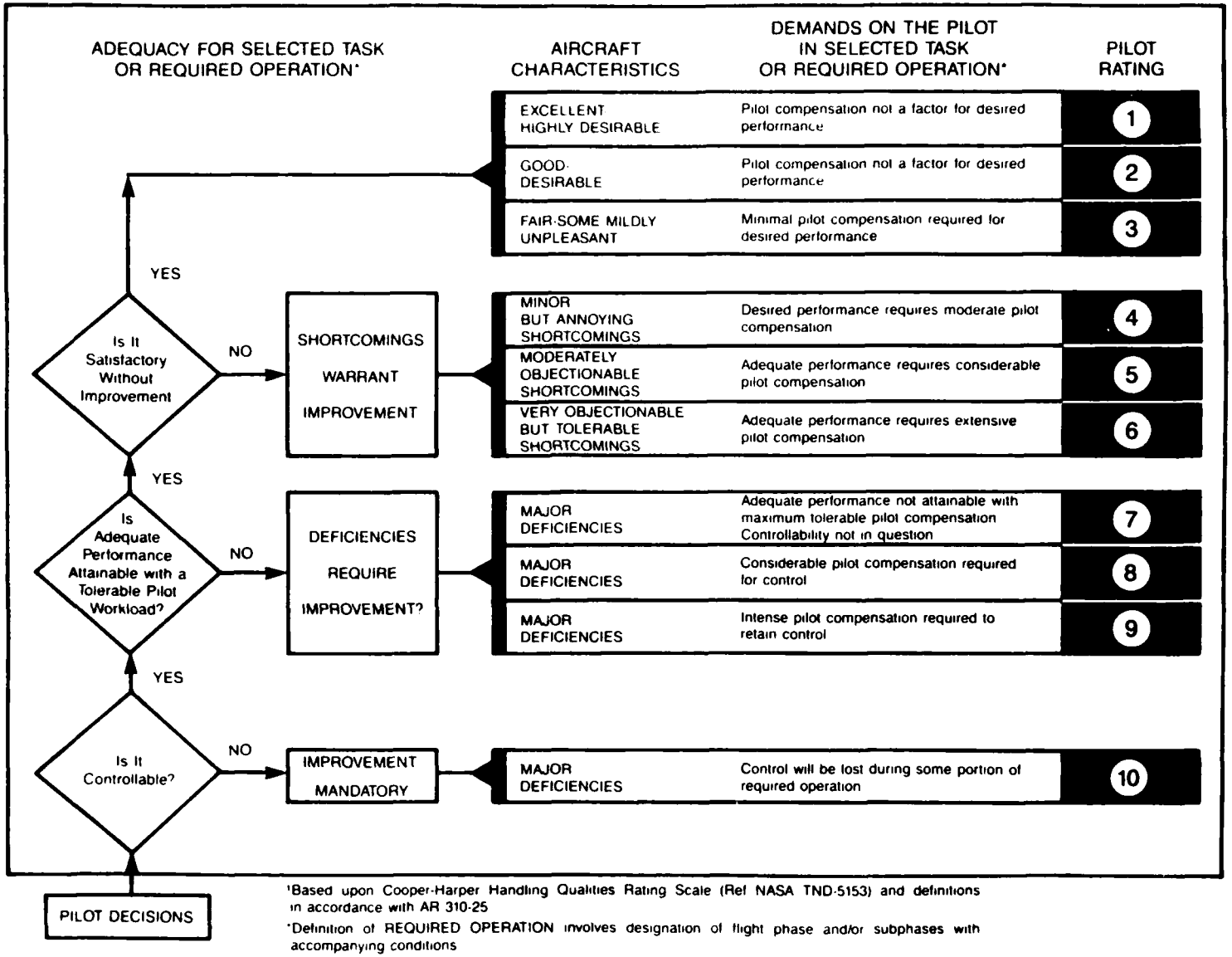
AIRCRAFT WEIGHT AND BALANCE

2. The aircraft was weighed prior to the start of the program with instrumentation installed, full oil, and all fuel drained. The weight of the aircraft was 11,820 pounds with the longitudinal center of gravity (cg) located at fuselage station 360.2. In addition, the aircraft was weighed when configured for the 22,000 pound aft cg test condition and again in conjunction with another test. The fuel cells and external sight gages were calibrated on a previous test. The measured fuel capacity using the gravity fueling method was 359 gallons. The fuel volume for each test flight was determined prior to engine start and after engine shutdown by using the external sight gages. The specific weight of the fuel was measured and multiplied by the fuel volume to determine fuel weight. The calibrated cockpit fuel totalizer indicators were monitored during the test and were compared with the sight gage readings at the end of each test. A moveable ballast system was utilized on seven test flights to maintain a constant aircraft cg. The moveable ballast system was a cart (2664 pound capacity) attached to the cabin floor by rails and driven by an electric screw jack with a total longitudinal travel of 72.7 inches. The ballast cart was manually positioned during flight to offset the cg change due to fuel burn. On test flights where the moveable ballast system was not installed, the aircraft cg was allowed to vary approximately 4 inches with fuel burn.

HANDLING QUALITIES

3. Handling qualities data were obtained using standard test methods described in Naval Air Test Center Flight Test Manual FTM No. 101 (ref 9, app A). A brief description of all test techniques is presented in respective paragraphs of the Results and Discussion section. Trim conditions for all tests were in ball-centered flight. The Handling Qualities Rating Scale shown in figure 1, appendix D was used to augment pilot comments.

4. Gust response data and longitudinal long term response data were analyzed to identify and quantify trends in the relationship



[1]Based upon Cooper-Harper Handling Qualities Rating Scale (Ref NASA TND-5153) and definitions in accordance with AR 310-25

*Definition of REQUIRED OPERATION involves designation of flight phase and/or subphases with accompanying conditions

Figure 1. Handling Qualities Rating Scale

between aircraft response (in the longitudinal axis) and failure mode. Time to double amplitude was used as a measure of the degree of instability for divergent responses and was determined graphically from time-history traces of pitch attitude. For aperiodic divergent responses, time to double amplitude was defined as the time, in seconds, that elapsed when the aircraft pitch attitude progressed from 5 degrees to 10 degrees from trim (fig. 2, app D). For oscillatory divergent responses, two lines were faired, one that was tangent to the peaks of the pitch attitude oscillations and one that was tangent to the valleys of the oscillations. The time to double amplitude was defined as the time that elapsed when the distance between the faired lines progressed from 5 degrees to 10 degrees (fig. 3, app D).

DEFINITION

5. Results were categorized as shortcomings in accordance with the following definition.

Shortcoming: An imperfection or malfunction occurring during the life cycle of equipment, which must be reported and which should be corrected to increase efficiency and to render the equipment completely serviceable. It will not cause an immediate breakdown, jeopardize safe operation, or materially reduce the usability of the materiel or end product.

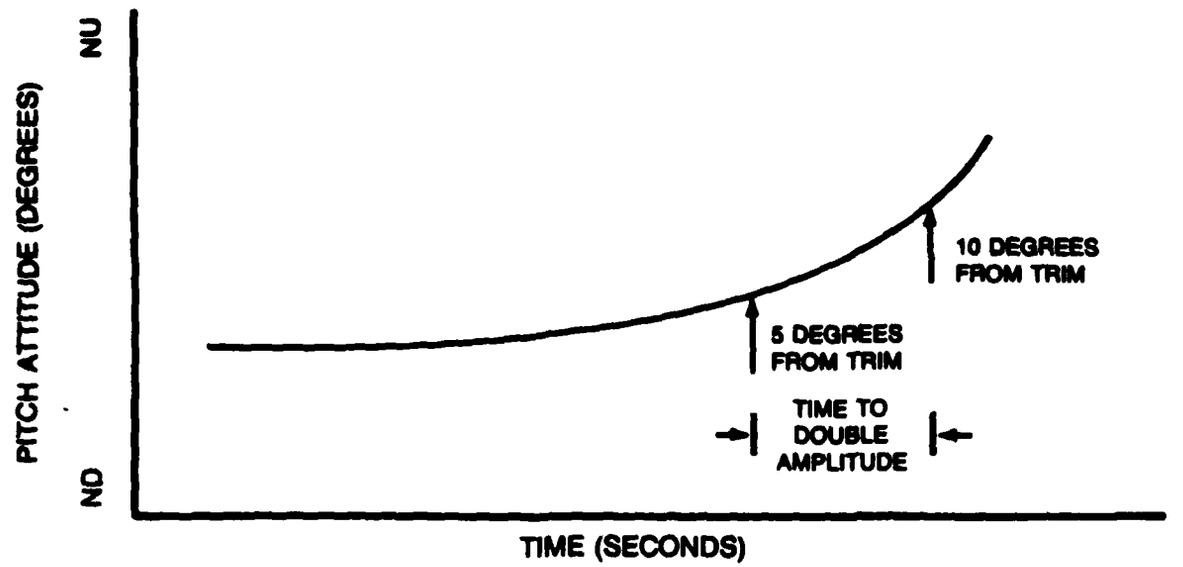


Figure 2. Time to Double Amplitude, Aperiodic Response

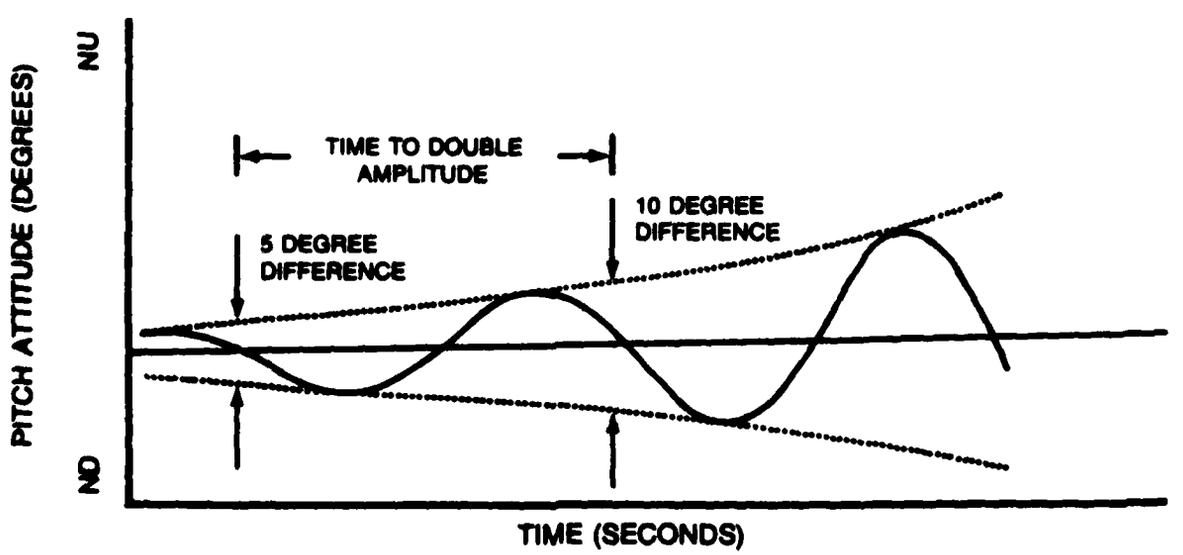


Figure 3. Time to Double Amplitude, Oscillatory Response

APPENDIX E. TEST DATA

INDEX

FIGURE 1

COLLECTIVE-FIXED STATIC LONGITUDINAL STABILITY

UH-60A USA S/N 82-23748

SYM	AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALT (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	TRIM FLIGHT CONDITION
⊡	14310	363.9 (AFT)	0.3 RT	5200	16.0	258	LEVEL
△	22150	359.2 (AFT)	0.1 RT	2800	3.5	258	LEVEL

NOTES:
1. I DENOTES CONTROL AND AIRCRAFT EXCURSIONS
2. SOLID SYMBOLS DENOTE TRIM
3. FAILURE MODE 1: PBA CENTERED, SAS ON, FPS ON, STABILATOR AUTO
4. NORMAL UTILITY CONFIGURATION

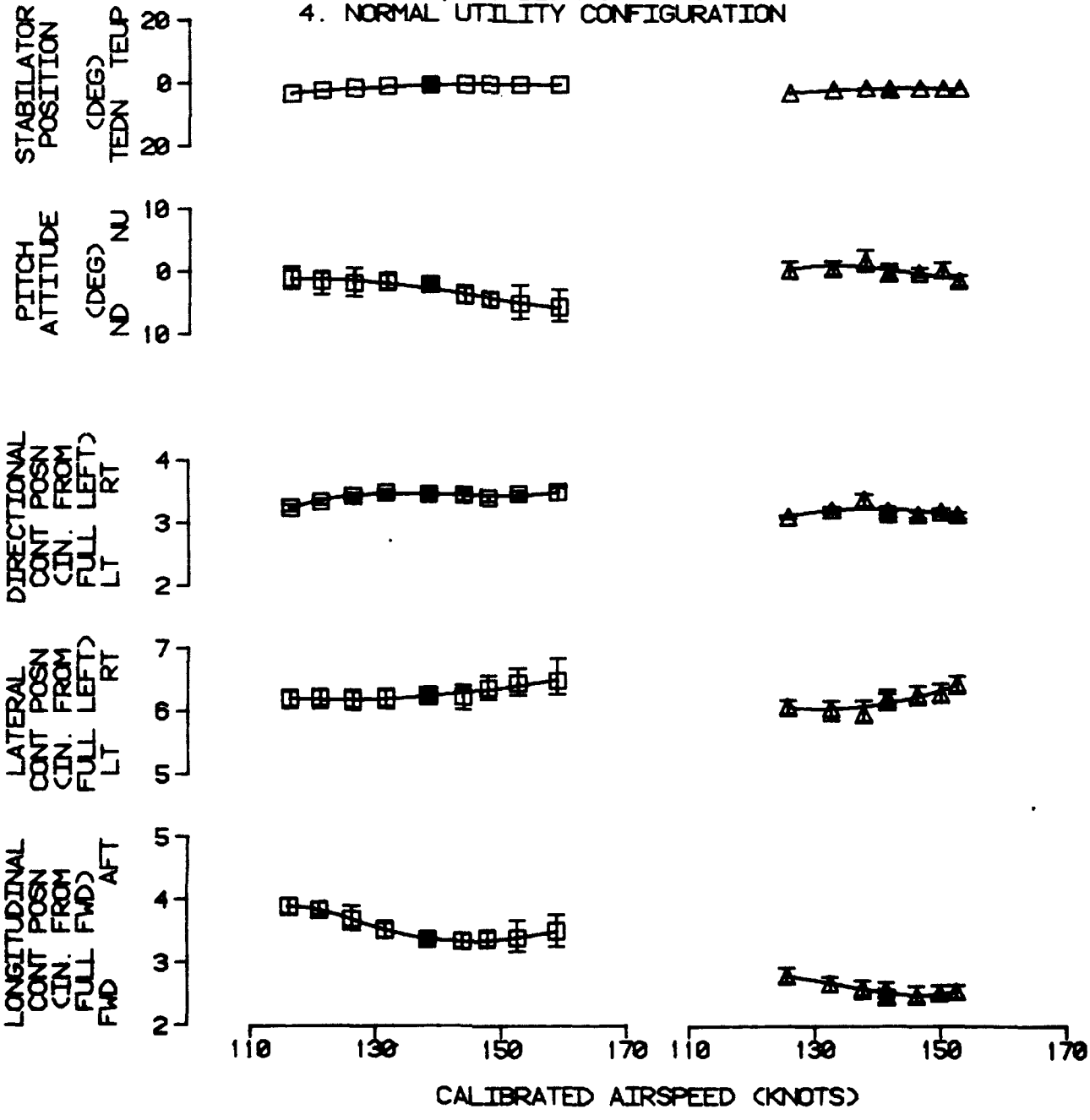


FIGURE 2

COLLECTIVE-FIXED STATIC LONGITUDINAL STABILITY

UH-60A USA S/N 82-23748

SYM	AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALT (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	TRIM FLIGHT CONDITION
⊡	14280	363.2 (AFT)	0.4 RT	5030	4.5	257	DIVE
△	21770	358.2 (AFT)	0.1 RT	2160	5.0	258	DIVE

NOTES:
1. I DENOTES CONTROL AND AIRCRAFT EXCURSIONS
2. SOLID SYMBOLS DENOTE TRIM
3. FAILURE MODE 1: PBA CENTERED, SAS ON, FPS ON, STABILATOR AUTO
4. NORMAL UTILITY CONFIGURATION

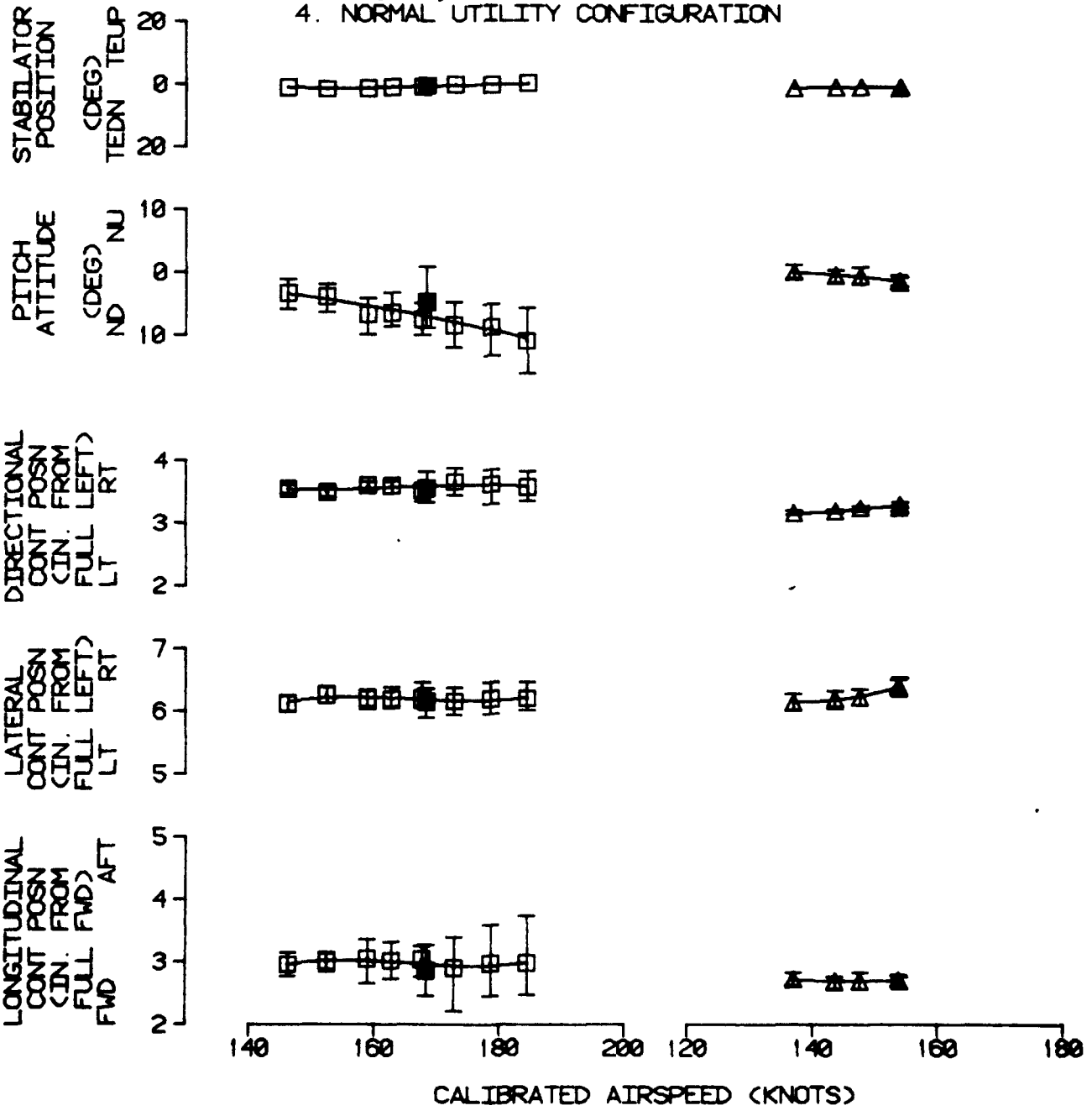


FIGURE 3

COLLECTIVE-FIXED STATIC LONGITUDINAL STABILITY

UH-60A USA S/N 82-23748

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	LAT (BL)	AVG DENSITY ALT (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	TRIM FLIGHT CONDITION
13810	361.9 (AFT)	0.3 RT	4690	15.0	257	LEVEL

NOTES:
1. I DENOTES CONTROL AND AIRCRAFT EXCURSIONS
2. SOLID SYMBOLS DENOTE TRIM
3. FAILURE MODE 5: PBA CENTERED, SAS OFF, FPS ON, STABILATOR AUTO
4. NORMAL UTILITY CONFIGURATION

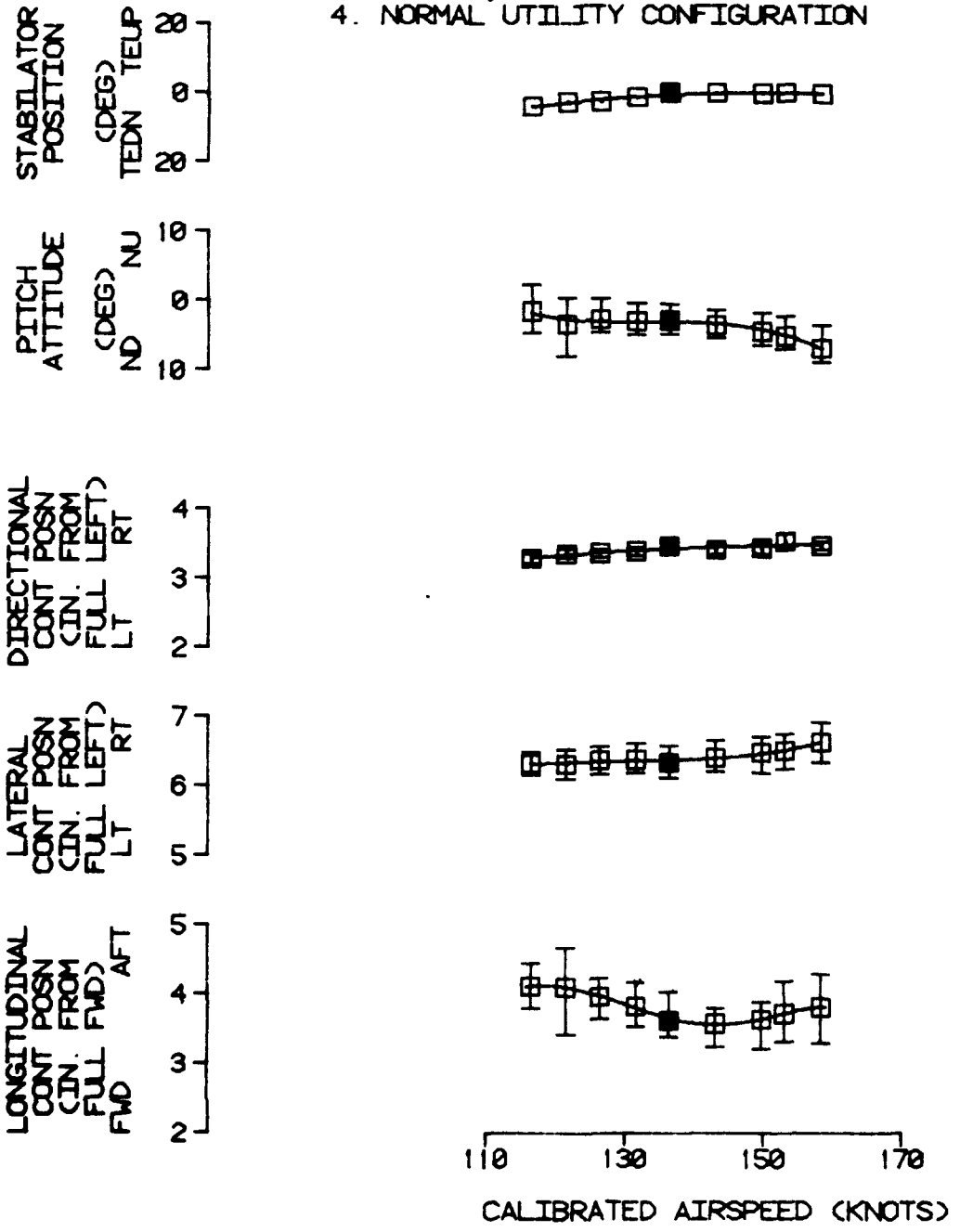


FIGURE 4

COLLECTIVE-FIXED STATIC LONGITUDINAL STABILITY

UH-60A USA S/N 82-23748

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALT (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	TRIM FLIGHT CONDITION
14460	364.2 (AFT)	0.3 RT	5020	13.0	257	LEVEL

NOTES:
1. I DENOTES CONTROL AND AIRCRAFT EXCURSIONS
2. SOLID SYMBOLS DENOTE TRIM
3. FAILURE MODE 7: PBA CENTERED, SAS OFF, FPS OFF, STABILATOR AUTO
4. NORMAL UTILITY CONFIGURATION

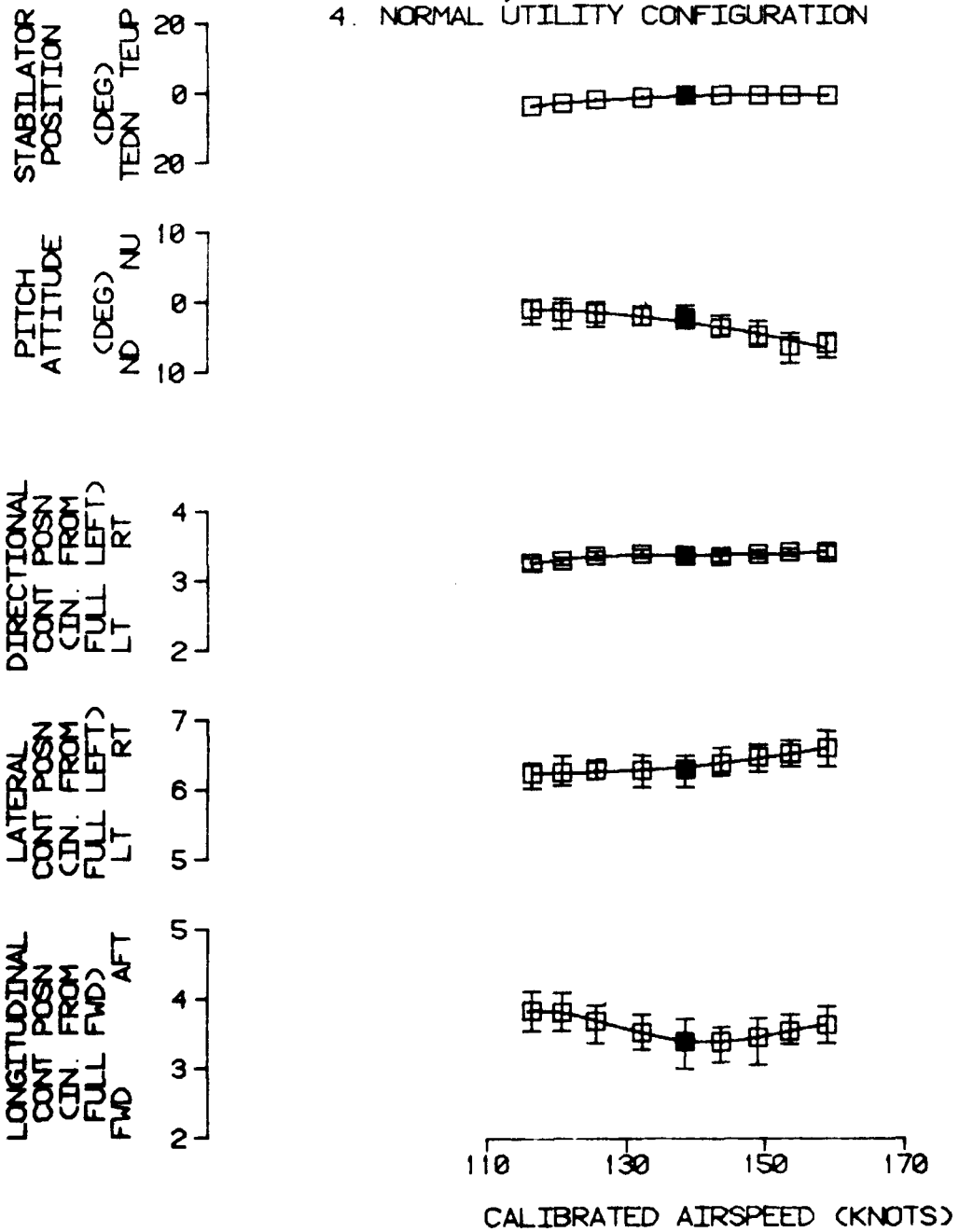


FIGURE 5

COLLECTIVE-FIXED STATIC LONGITUDINAL STABILITY

UH-60A USA S/N 82-23748

SYM	AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALT (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	TRIM FLIGHT CONDITION
⊡	14340	363.5 (AFT)	0.4 RT	4840	-1.0	258	LEVEL
⊙	16490	361.7 (AFT)	0.3 RT	4940	-3.0	257	LEVEL

NOTES:
1. I DENOTES CONTROL AND AIRCRAFT EXCURSIONS
2. SOLID SYMBOLS DENOTE TRIM
3. FAILURE MODE 8: PBA ON, SAS OFF, FPS OFF, STABILATOR FAILED AT TRIM AIRSPEED (⊡ 22 DEG TEDN, ⊙ 23 DEG TEDN)
4. NORMAL UTILITY CONFIGURATION

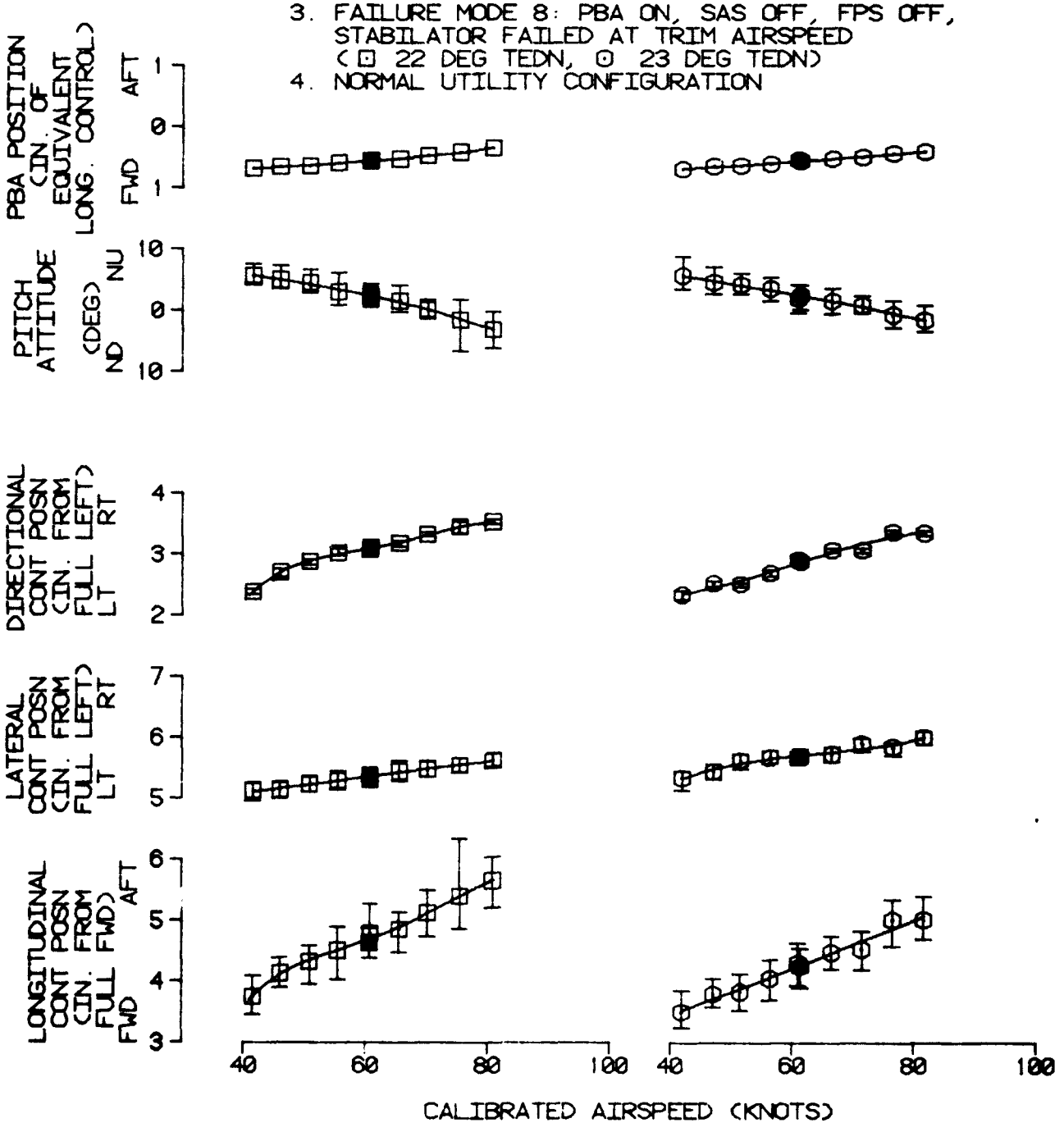


FIGURE 6

COLLECTIVE-FIXED STATIC LONGITUDINAL STABILITY

UH-60A USA S/N 82-23748

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALT (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	TRIM FLIGHT CONDITION
21700	357.9 (AFT)	0.1 RT	3190	10.0	258	LEVEL

NOTES:
1. I DENOTES CONTROL AND AIRCRAFT EXCURSIONS
2. SOLID SYMBOLS DENOTE TRIM
3. FAILURE MODE 8A: PBA ON, SAS ON, FPS OFF, STABILATOR FAILED AT TRIM AIRSPEED (24 DEG TEDN)
4. NORMAL UTILITY CONFIGURATION

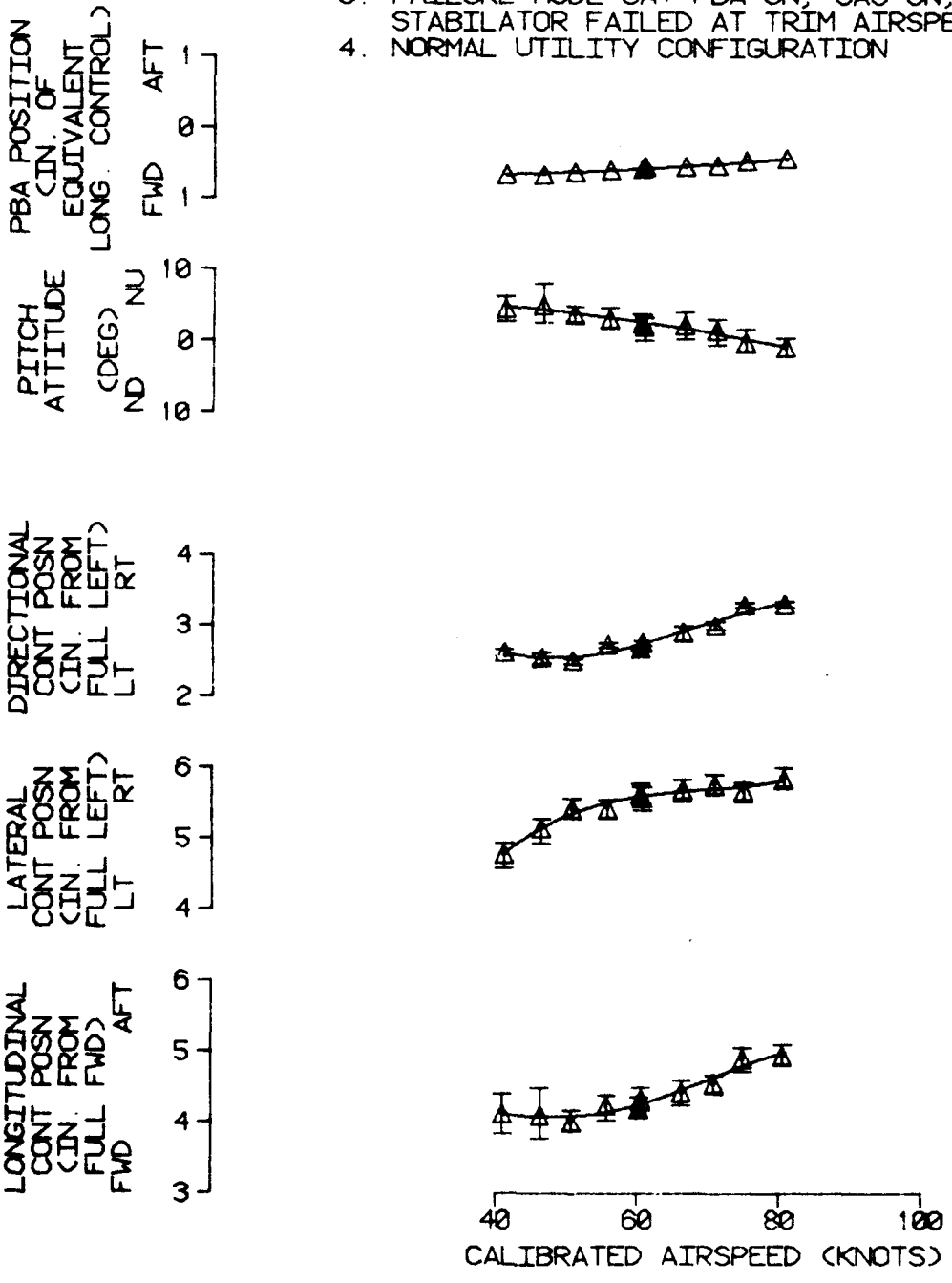


FIGURE 7

COLLECTIVE-FIXED STATIC LONGITUDINAL STABILITY

UH-60A USA S/N 82-23748

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALT (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	TRIM FLIGHT CONDITION
16780	362.7 (AFT)	0.3 RT	4920	-2.5	257	LEVEL

NOTES:
1. I DENOTES CONTROL AND AIRCRAFT EXCURSIONS
2. SOLID SYMBOLS DENOTE TRIM
3. FAILURE MODE 8: PBA ON, SAS OFF, FPS OFF, STABILATOR FAILED AT TRIM AIRSPEED (5 DEG TEDN)
4. NORMAL UTILITY CONFIGURATION

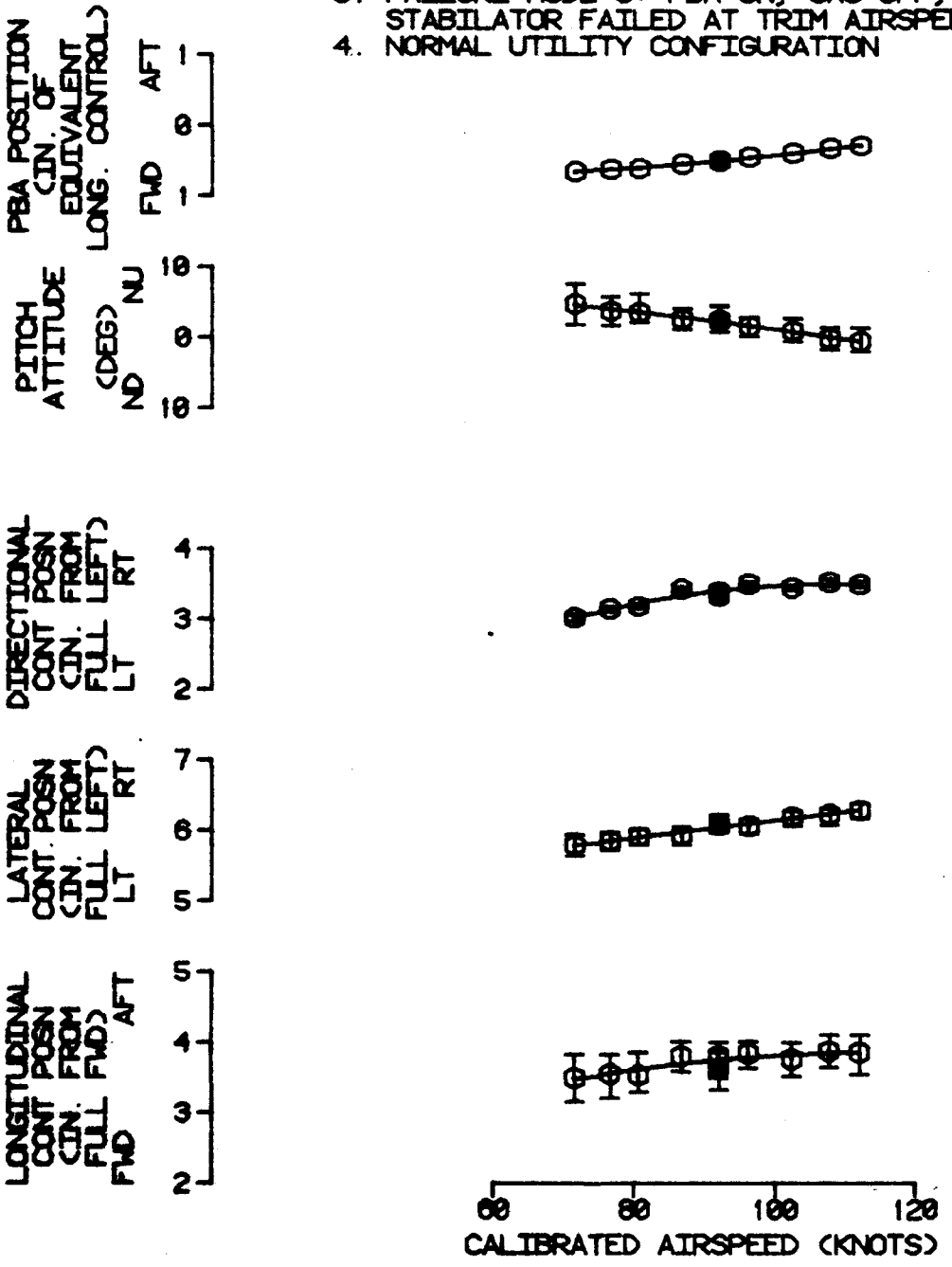


FIGURE 8

COLLECTIVE-FIXED STATIC LONGITUDINAL STABILITY

UH-60A USA S/N 82-23748

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALT (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	TRIM FLIGHT CONDITION
16530	361.7 (AFT)	0.3 RT	4680	8.0	257	LEVEL

NOTES:
1. I DENOTES CONTROL AND AIRCRAFT EXCURSIONS
2. SOLID SYMBOLS DENOTE TRIM
3. FAILURE MODE 8: PBA ON, SAS OFF, FPS OFF, STABILATOR FAILED AT TRIM AIRSPEED (2 DEG TEDN)
4. NORMAL UTILITY CONFIGURATION

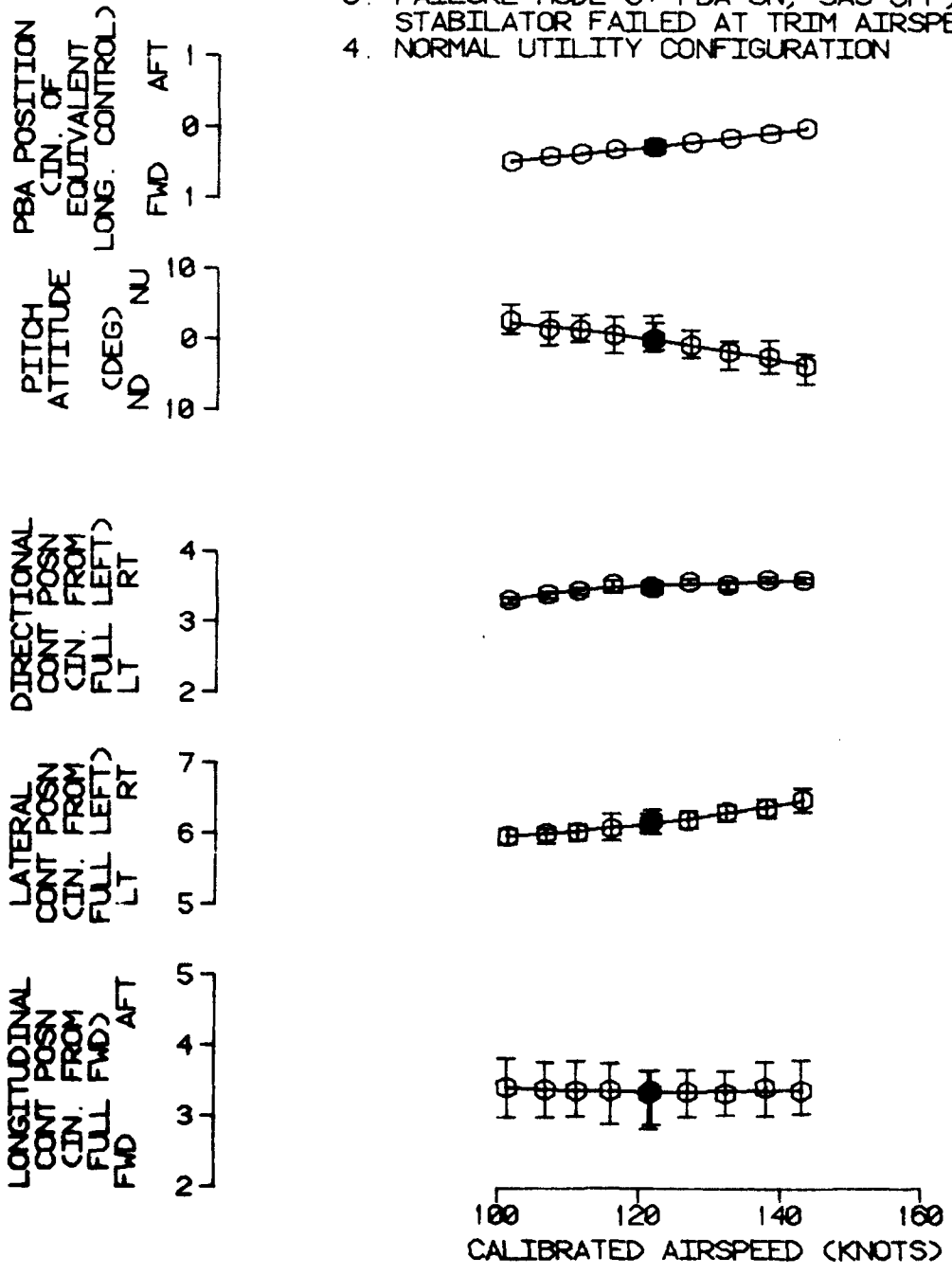


FIGURE 9

COLLECTIVE-FIXED STATIC LONGITUDINAL STABILITY

UH-60A USA S/N 82-23748

SYM	AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALT (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	TRIM FLIGHT CONDITION
⊡	14400	363.7 (AFT)	0.2 RT	4670	3.0	258	LEVEL
⊙	16490	361.7 (AFT)	0.2 RT	4720	-2.0	257	LEVEL

NOTES:
1. I DENOTES CONTROL AND AIRCRAFT EXCURSIONS
2. SOLID SYMBOLS DENOTE TRIM
3. FAILURE MODE 8: PBA ON, SAS OFF, FPS OFF, STABILATOR FAILED AT TRIM AIRSPEED (⊡ 2 DEG TEDN, ⊙ 2 DEG TEDN)
4. NORMAL UTILITY CONFIGURATION

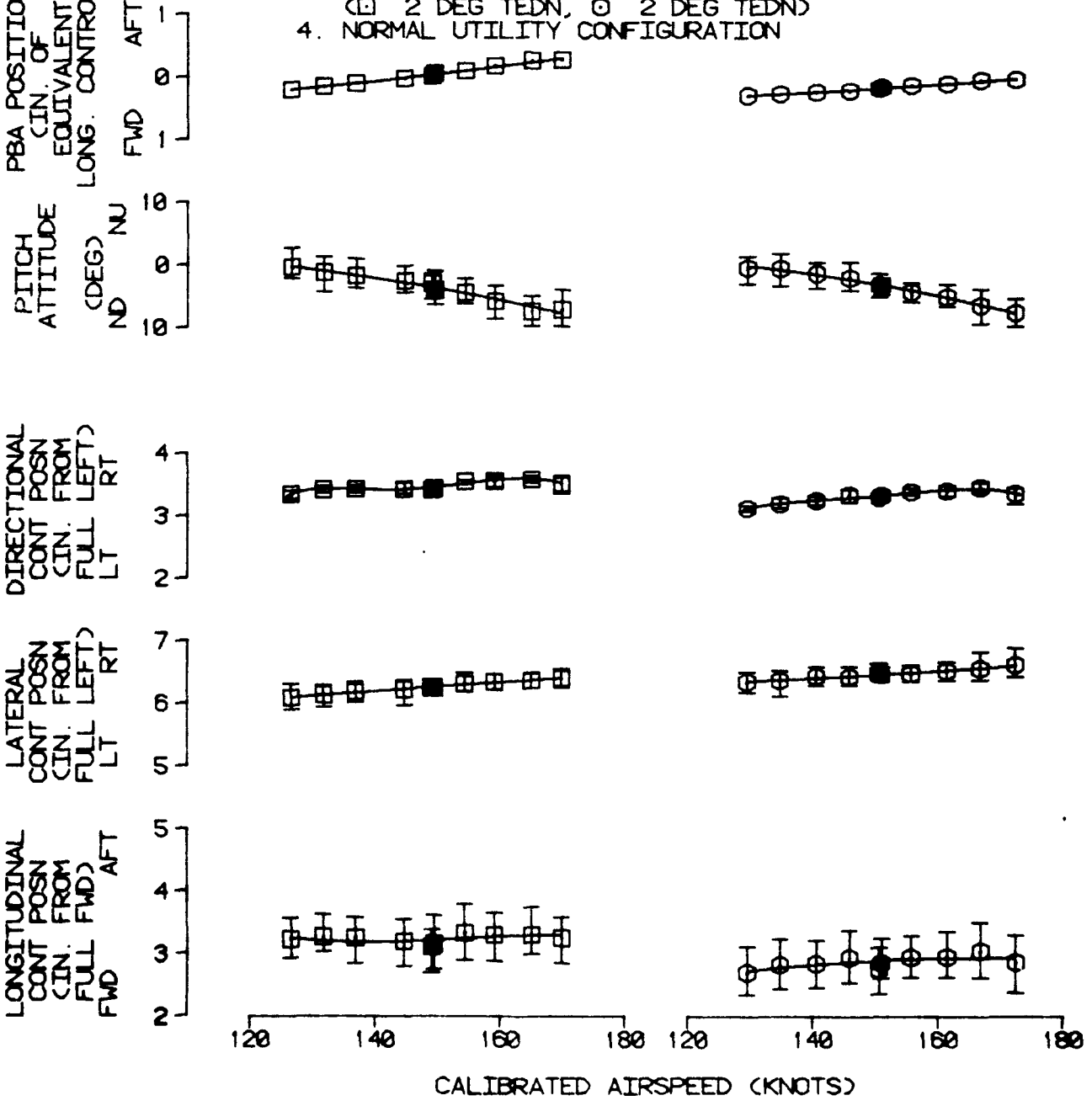


FIGURE 10

COLLECTIVE-FIXED STATIC LONGITUDINAL STABILITY

UH-60A USA S/N 82-23748

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALT (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	TRIM FLIGHT CONDITION
22070	359.0 (AFT)	0.1 RT	3230	10.5	258	DIVE

NOTES:
1. I DENOTES CONTROL AND AIRCRAFT EXCURSIONS
2. SOLID SYMBOLS DENOTE TRIM
3. FAILURE MODE 8A: PBA ON, SAS ON, FPS OFF, STABILATOR FAILED AT TRIM AIRSPEED (1 DEG TEDN)
4. NORMAL UTILITY CONFIGURATION

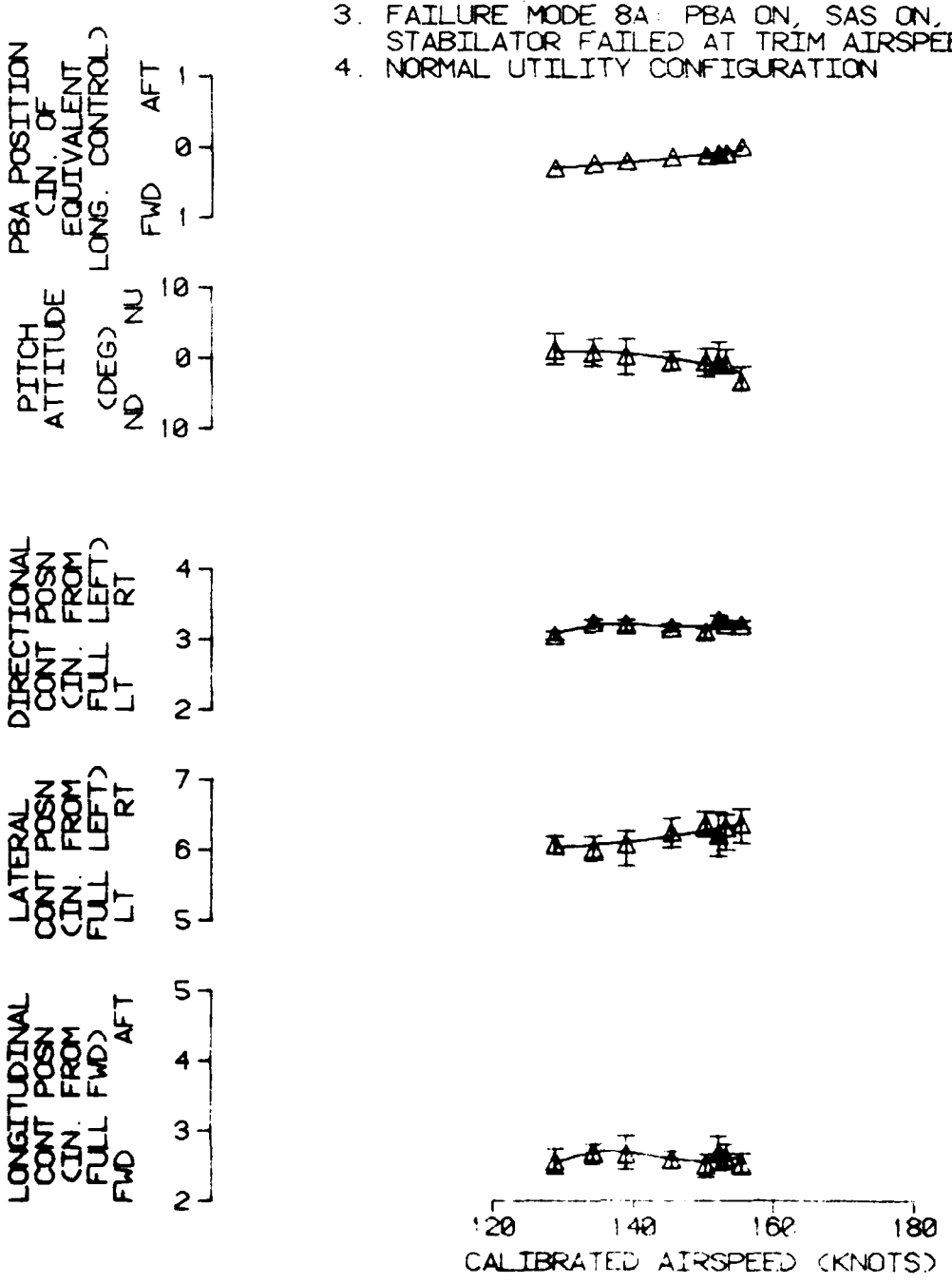
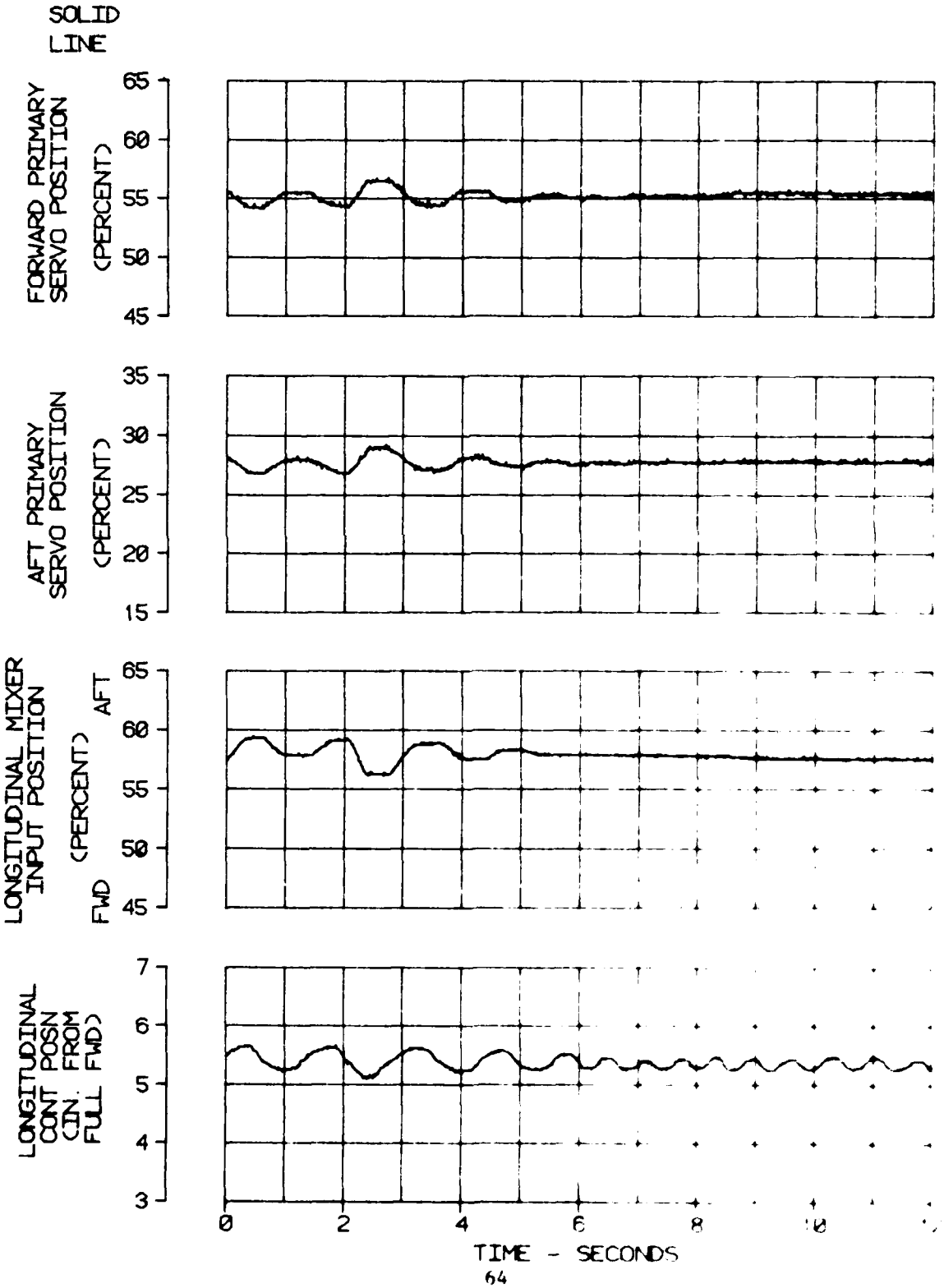


FIGURE 11

LONGITUDINAL CYCLIC CONTROL FREEPLAY WITH PITCH BOOST OFF

UH-60A USA S/N 82-23748



TRIM

COLLECTIVE FIXED STATE LATERAL-DIRECTIONAL STABILITY

UH-60A [illegible] BLACK HAWK BE 23748

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	LAT (BL)	AVG DENSITY ALT (FT)	AVG OAT (°C)	AVG ROTOR SPEED (RPM)	TRIM CALIBRATED AIRSPEED (KT)
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	258	62

[illegible]

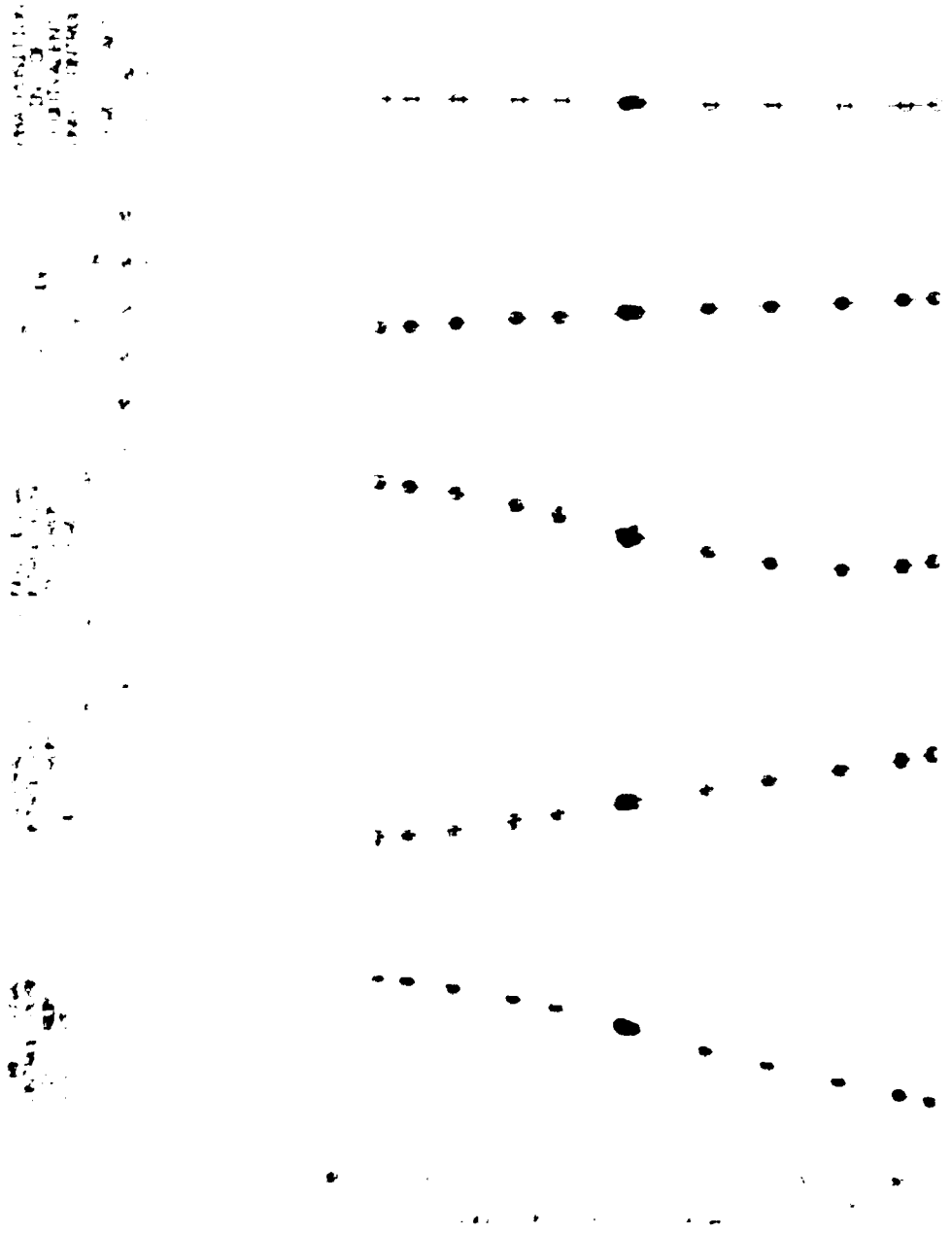


FIGURE 13

COLLECTIVE FIXED STATIC LATERAL-DIRECTIONAL STABILITY

JUH-60A USA S/N 82-23748

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALT (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	TRIM CALIBRATED AIRSPEED (KT)
16710	362.1 (AFT)	0.3 RT	485[illegible]	[illegible]0	25[illegible]	92

NOTES: 1. I DENOTES CONTROL AND AIRCRAFT EXCURSIONS
2. SOLID SYMBOLS DENOTE TRIM
3. FAILURE MODE: BA[illegible] [illegible]BA ON, SAS ON, FPS OFF, STABILATOR FAILED AT TRIM AIRSPEED (5 DEG TED)
4. NORMAL [illegible] CONFIGURATION

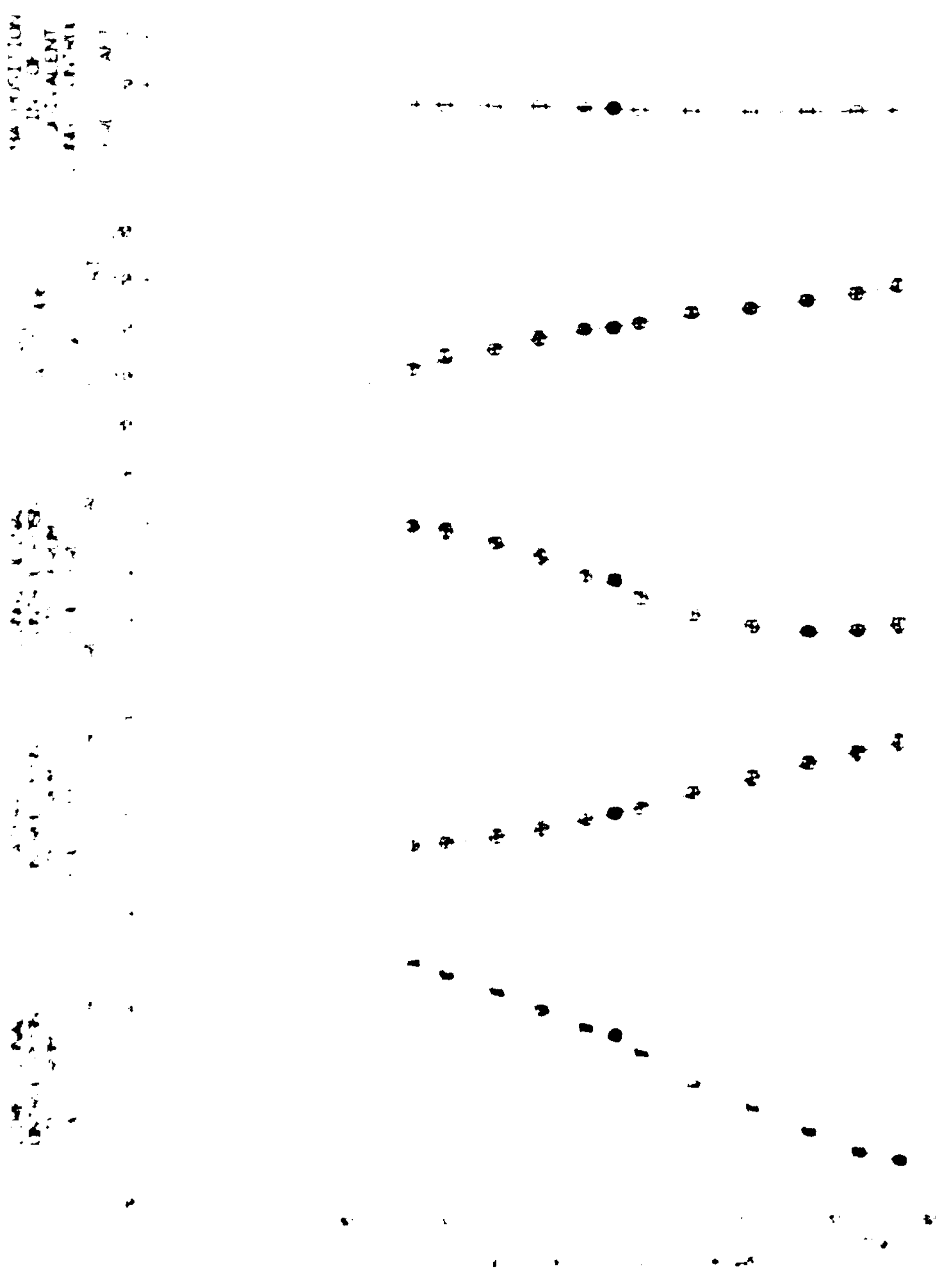


FIGURE 14

COLLECTIVE FIXED STATIC LATERAL-DIRECTIONAL STABILITY

UH-60A USA S/N 82-23748

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALT (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	TRIM CALIBRATED AIRSPEED (KT)
16480	361 5 (AFT)	0 2 RT	4970	-3 5	257	121

NOTES :
1. I DENOTES CONTROL AND AIRCRAFT EXCURSIONS
2. SOLID SYMBOLS DENOTE TRIM
3. FAILURE MODE 8 PBA ON, SAS OFF, FPS OFF, STABILATOR FAILED AT TRIM AIRSPEED (3 DEG TEDN)
4. NORMAL UTILITY CONFIGURATION

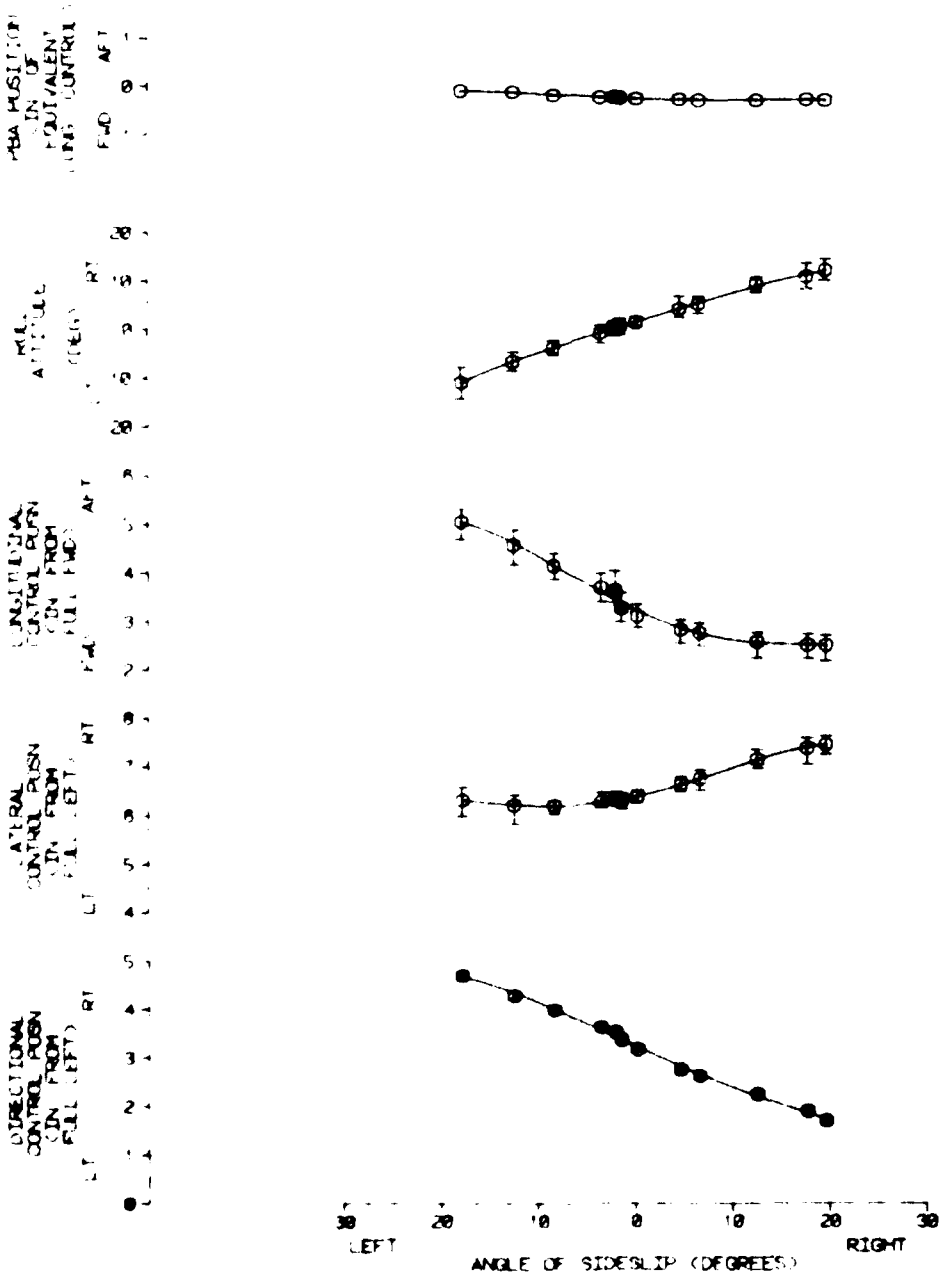


FIGURE 15

COLLECTIVE FIXED STATIC LATERAL-DIRECTIONAL STABILITY

UH-60A USA S/N 82-23748

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	LAT (BL)	AVG DENSITY ALT (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	TRIM CALIBRATED AIRSPEED (KT)
16690	362.8 (AFT)	0.1 RT	4800	26.0	258	123

NOTES: 1. I DENOTES CONTROL AND AIRCRAFT EXCURSIONS
2. SOLID SYMBOLS DENOTE TRIM
3. FAILURE MODE 8A: PBA ON, SAS ON, FPS OFF, STABILATOR FAILED AT TRIM AIRSPEED (3 DEG TEDN)
4. NORMAL UTILITY CONFIGURATION

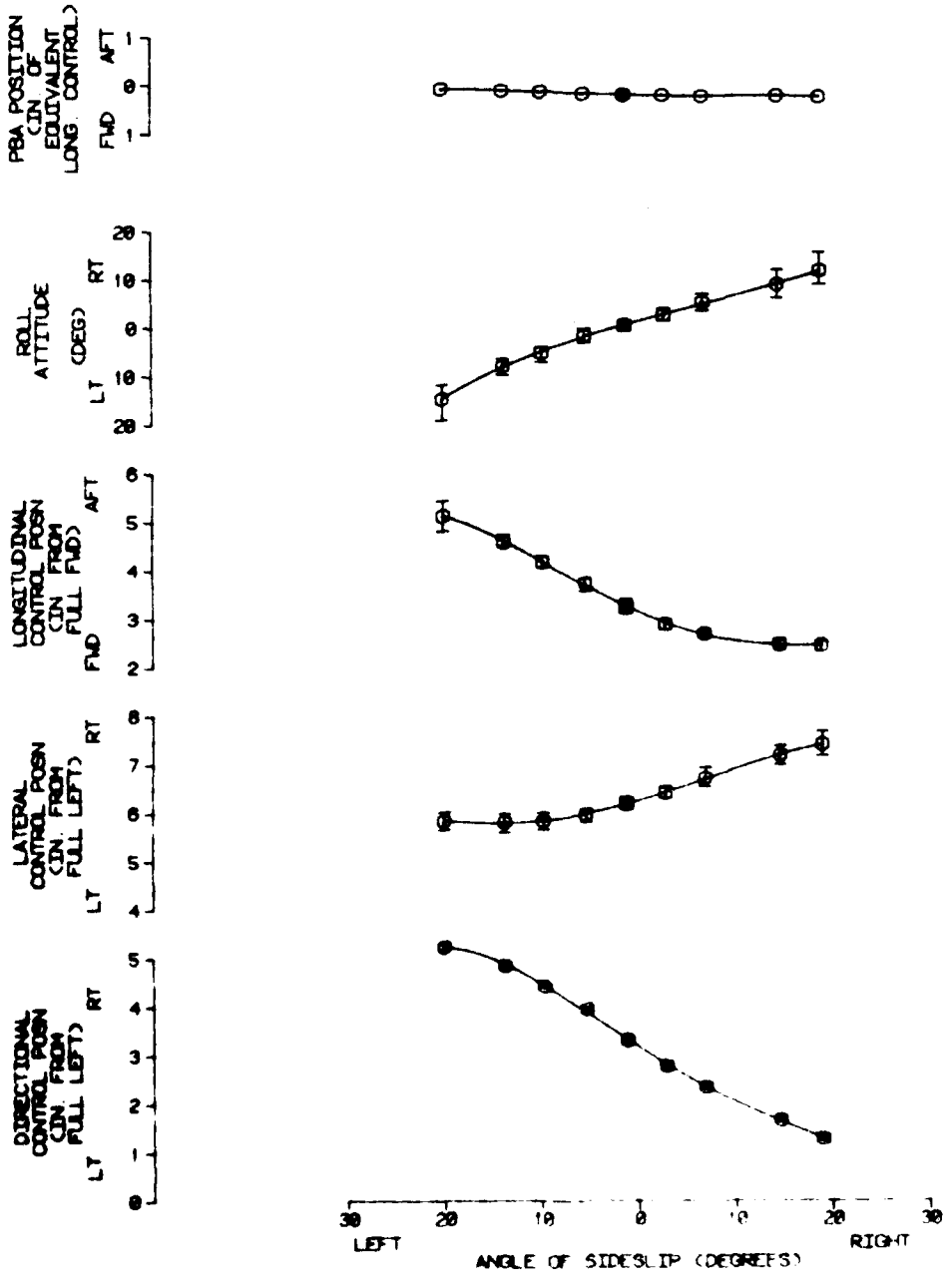


FIGURE 16

COLLECTIVE FIXED STATIC LATERAL-DIRECTIONAL STABILITY

UH-60A USA S/N 82-23746

AVG GROSS WEIGHT (LBS)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALT (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	TRIM CALIBRATED AIRSPEED (KT)
16700	363.4 (AFT)	0.1 RT	5000	25.5	258	122

NOTES: 1. I DENOTES CONTROL AND AIRCRAFT EXCURSIONS
2. SOLID SYMBOLS DENOTE TRIM
3. FAILURE MODE 9A: PBA CENTERED, SAS ON, FPS OFF, STABILATOR FAILED AT TRIM AIRSPEED (1 DEG TEDN)
4. NORMAL UTILITY CONFIGURATION

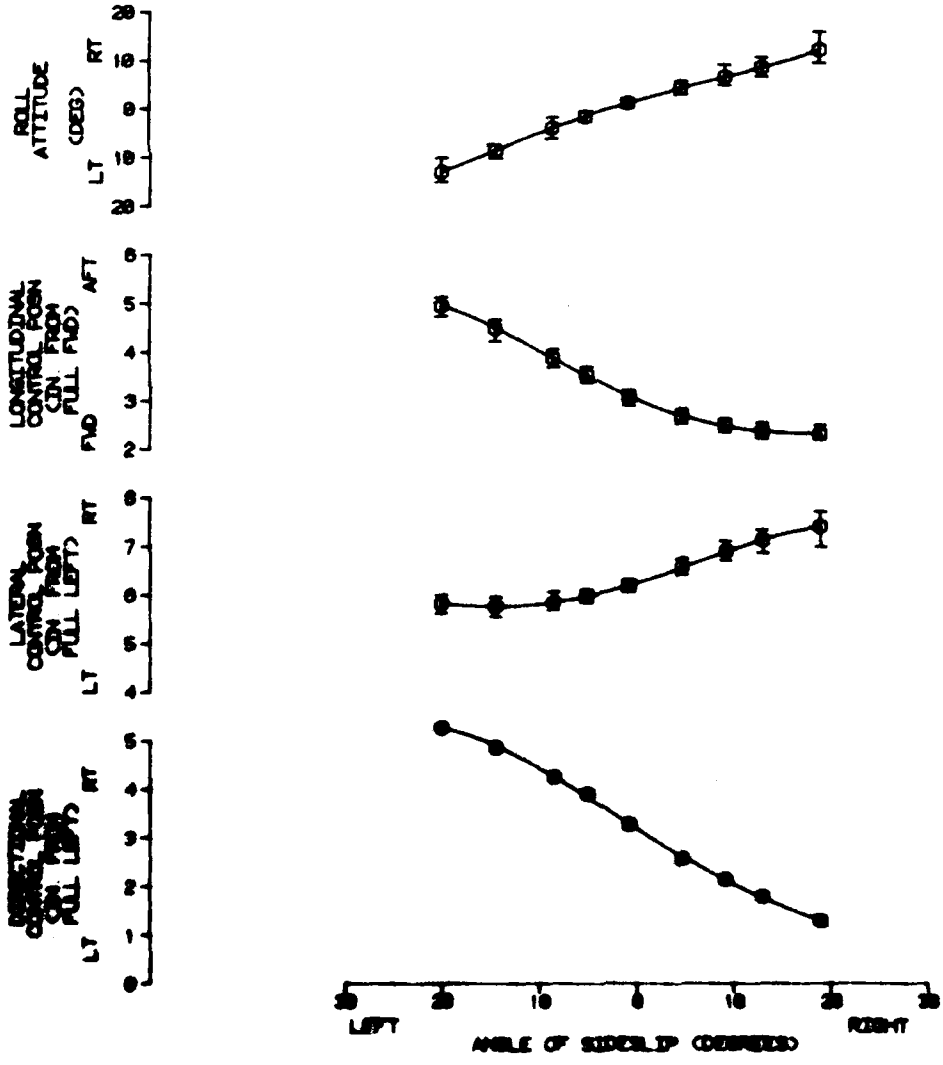


FIGURE 17
MANEUVERING STABILITY
UH-60A USA S/N 82-23748

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	LAT (BL)	AVG DENSITY ALT (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	TRIM CALIBRATED AIRSPEED (KT)	TRIM FLIGHT CONDITION
16800	362.1 (AFT)	0.3 RT	5120	16.5	259	141	LEVEL

NOTES: 1 I DENOTES CONTROL AND AIRCRAFT EXCURSIONS
2 SOLID SYMBOLS DENOTE TRIM
OPENED SYMBOLS DENOTE LEFT TURN
CROSSED SYMBOLS DENOTE RIGHT TURN
3 FAILURE MODE 1 PBA CENTERED, SAS ON, FPS ON, STABILATOR AUTO
4 NORMAL UTILITY CONFIGURATION

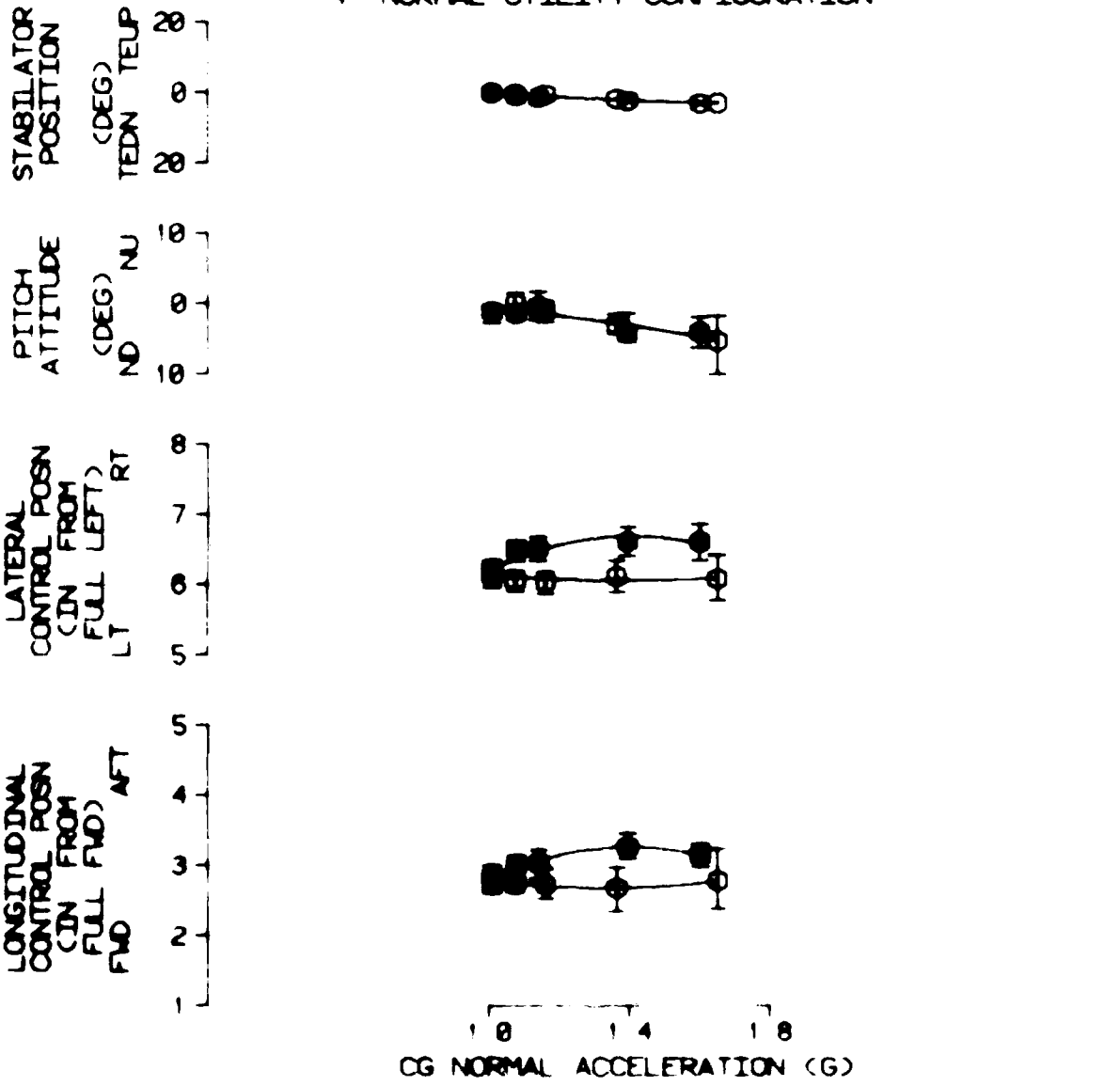


FIGURE 18
MANEUVERING STABILITY
UH-60A USA S/N 82-23748

SYM	AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALT (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	TRIM CALIBRATED AIRSPEED (KT)	TRIM FLIGHT CONDITION
⊡	16780	363.4 (AFT)	0.1 RT	4960	24.0	258	102	LEVEL
⊙	16580	362.0 (AFT)	0.2 RT	4820	16.0	258	141	LEVEL

NOTES:
1. I DENOTES CONTROL AND AIRCRAFT EXCURSIONS
2. SOLID SYMBOLS DENOTE TRIM
   OPENED SYMBOLS DENOTE LEFT TURN
   CROSSED SYMBOLS DENOTE RIGHT TURN
3. FAILURE MODE 7: PBA CENTERED, SAS OFF, FPS OFF, STABILATOR AUTO
4. NORMAL UTILITY CONFIGURATION

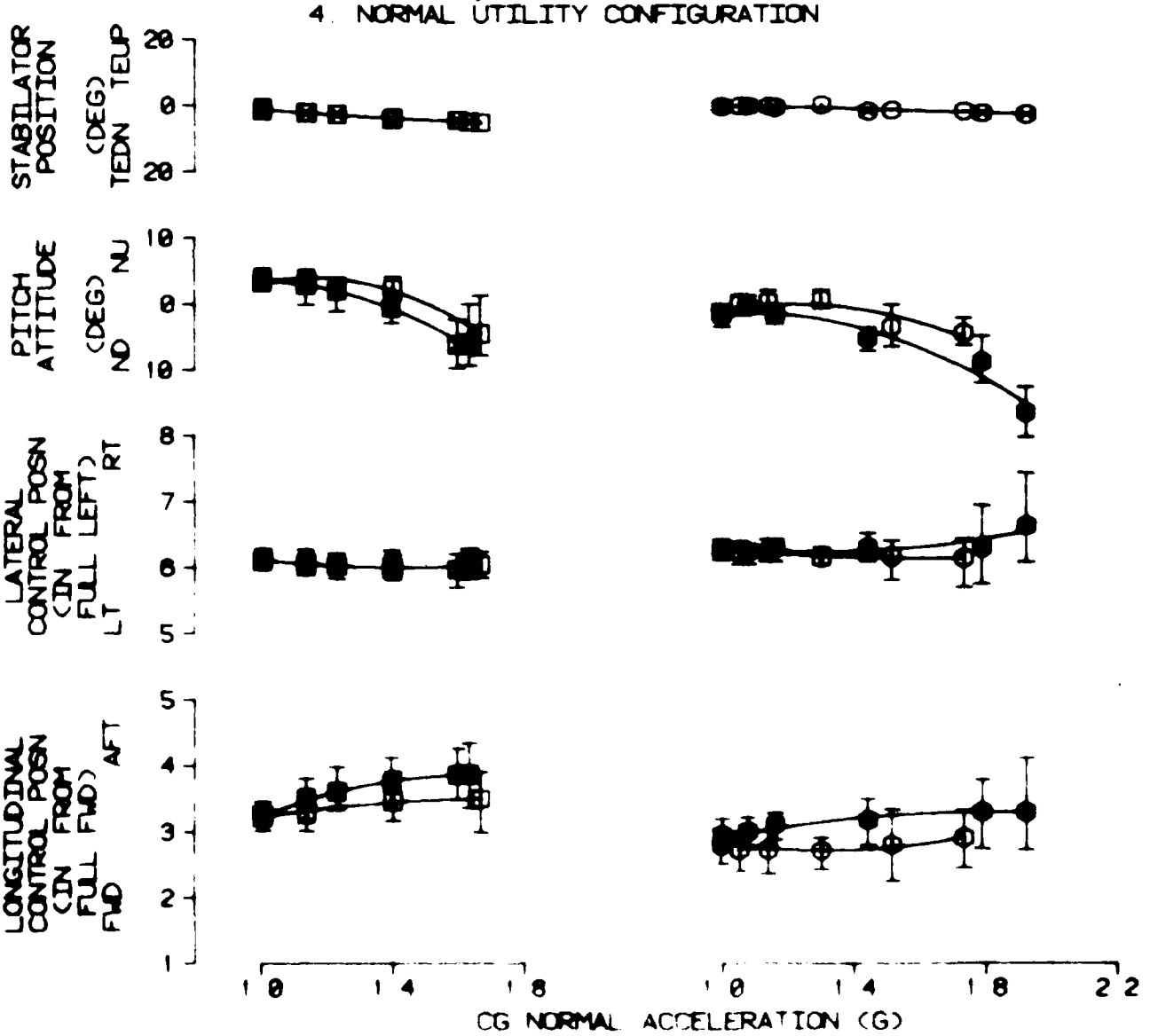


FIGURE 19
MANEUVERING STABILITY
UH-60A USA S/N 82-23748

SYM	AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALT (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	TRIM CALIBRATED AIRSPEED (KT)	TRIM FLIGHT CONDITION
⊡	16640	362.0 (AFT)	0.3 RT	5040	8.5	257	101	LEVEL
⊙	16460	361.4 (AFT)	0.3 RT	4680	8.0	257	141	LEVEL

NOTES: 1. I DENOTES CONTROL AND AIRCRAFT EXCURSIONS
2. SOLID SYMBOLS DENOTE TRIM
OPENED SYMBOLS DENOTE LEFT TURN
CROSSED SYMBOLS DENOTE RIGHT TURN
3. FAILURE MODE 8: PBA ON, SAS OFF, FPS OFF, STABILATOR FAILED AT TRIM AIRSPEED (⊡ 4 DEG TEDN, ⊙ 2 DEG TEDN)
4. NORMAL UTILITY CONFIGURATION

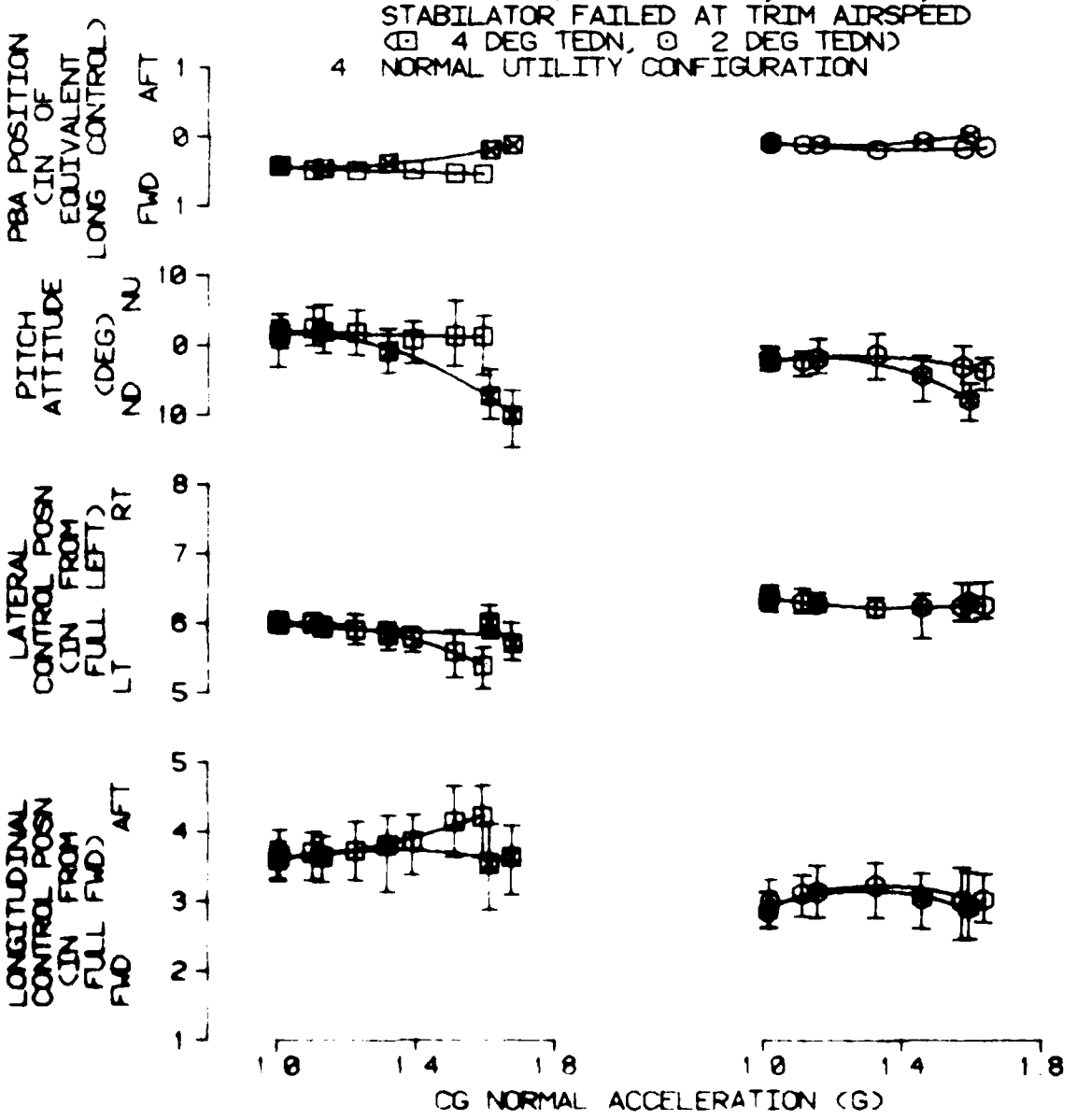


FIGURE 20
MANEUVERING STABILITY
UH-60A USA S/N 82-23748

SYM	AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALT (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	TRIM CALIBRATED AIRSPEED (KT)	TRIM FLIGHT CONDITION
⊡	16640	363.4 (AFT)	0.1 RT	5160	24.5	258	102	LEVEL
⊙	16360	363.4 (AFT)	0.1 RT	5220	25.0	258	140	LEVEL

NOTES: 1. I DENOTES CONTROL AND AIRCRAFT EXCURSIONS
2. SOLID SYMBOLS DENOTE TRIM
OPENED SYMBOLS DENOTE LEFT TURN
CROSSED SYMBOLS DENOTE RIGHT TURN
3. FAILURE MODE 9: PBA CENTERED, SAS OFF, FPS OFF, STABILATOR FAILED AT TRIM AIRSPEED (⊡ 2 DEG TEDN, ⊙ 1 DEG TEDN)
4. NORMAL UTILITY CONFIGURATION

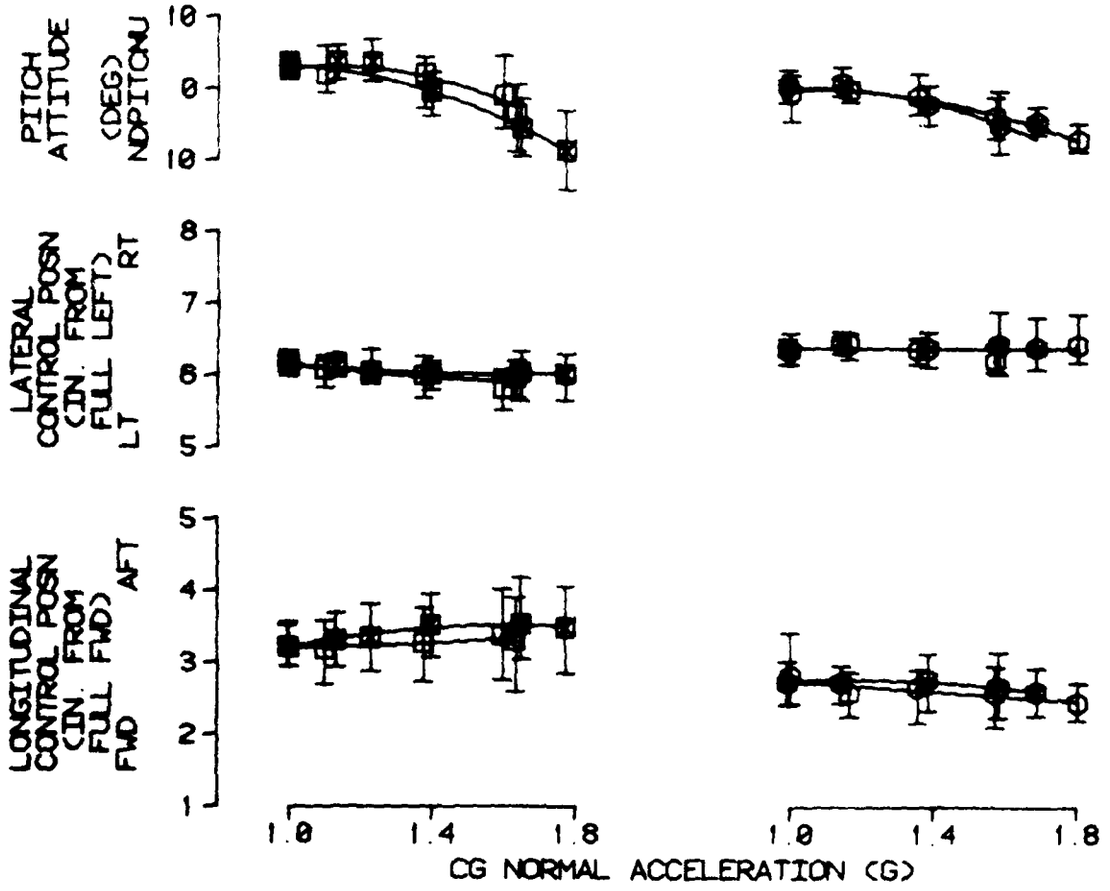


FIGURE 21
FORWARD LONGITUDINAL PULSE
UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16860	363.3 (AFT)	0 (RT)	5080	26.0	258	62	LEVEL	ON OFF OFF AUTO (FAILURE MODE 6)

SOLID LINE — SHORT DASH — LONG DASH

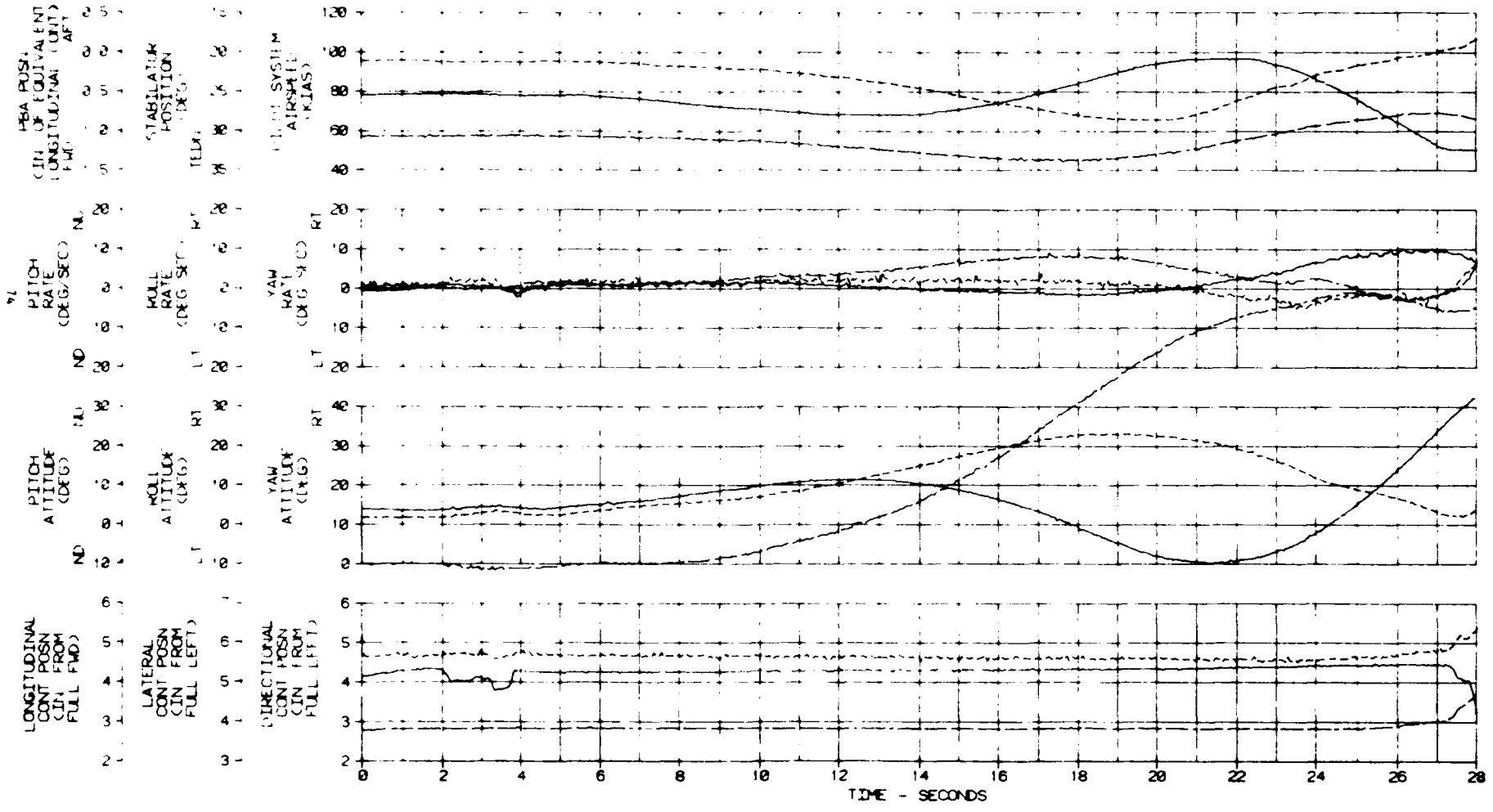


FIGURE 22
FORWARD LONGITUDINAL PULSE
UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
21820	358.3 (AFT)	0.1 RT	2920	9.0	258	62	LEVEL	ON OFF OFF AUTO (FAILURE MODE 6)

SOLID LINE
SHORT DASH
LONG DASH

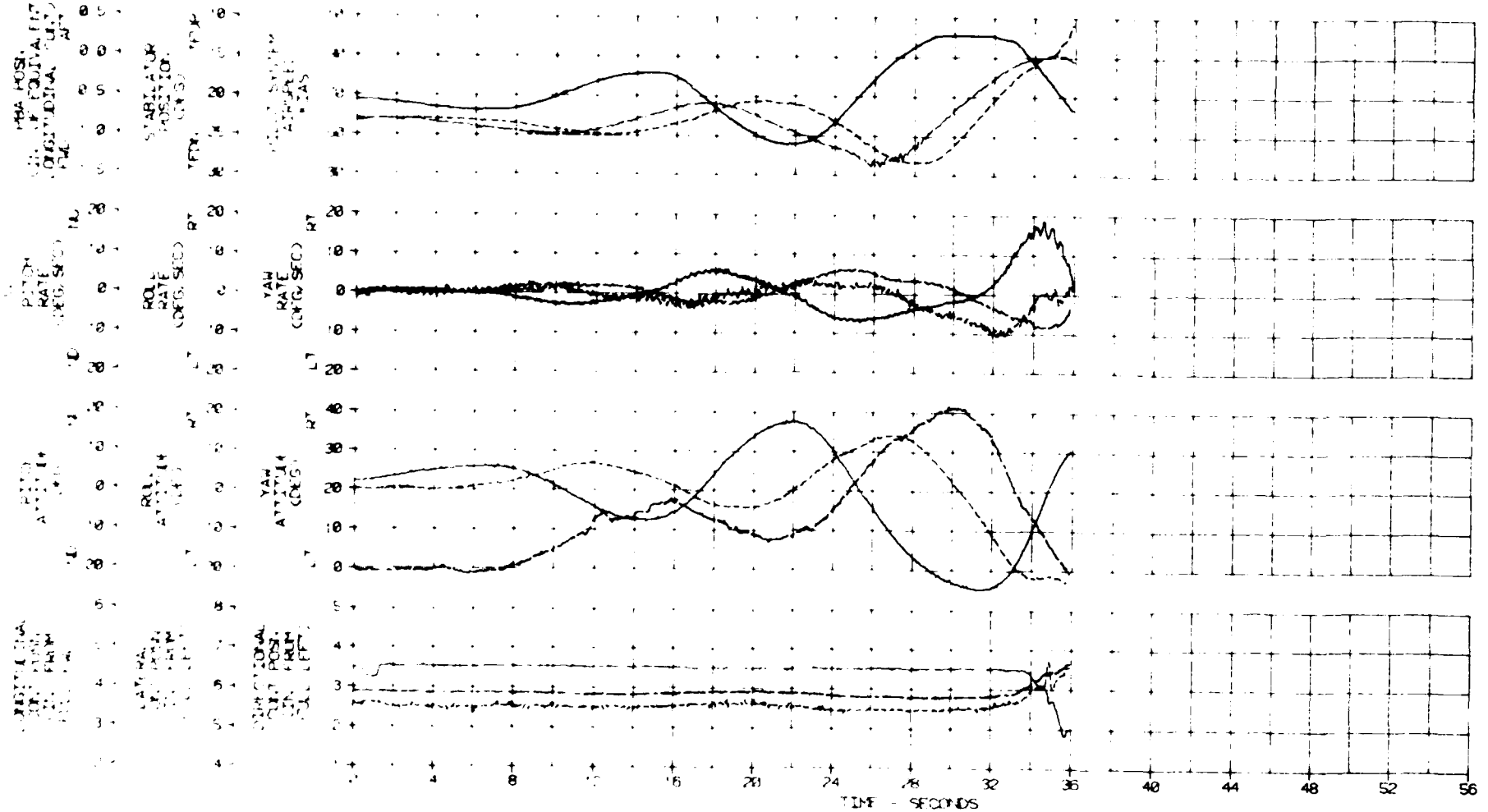
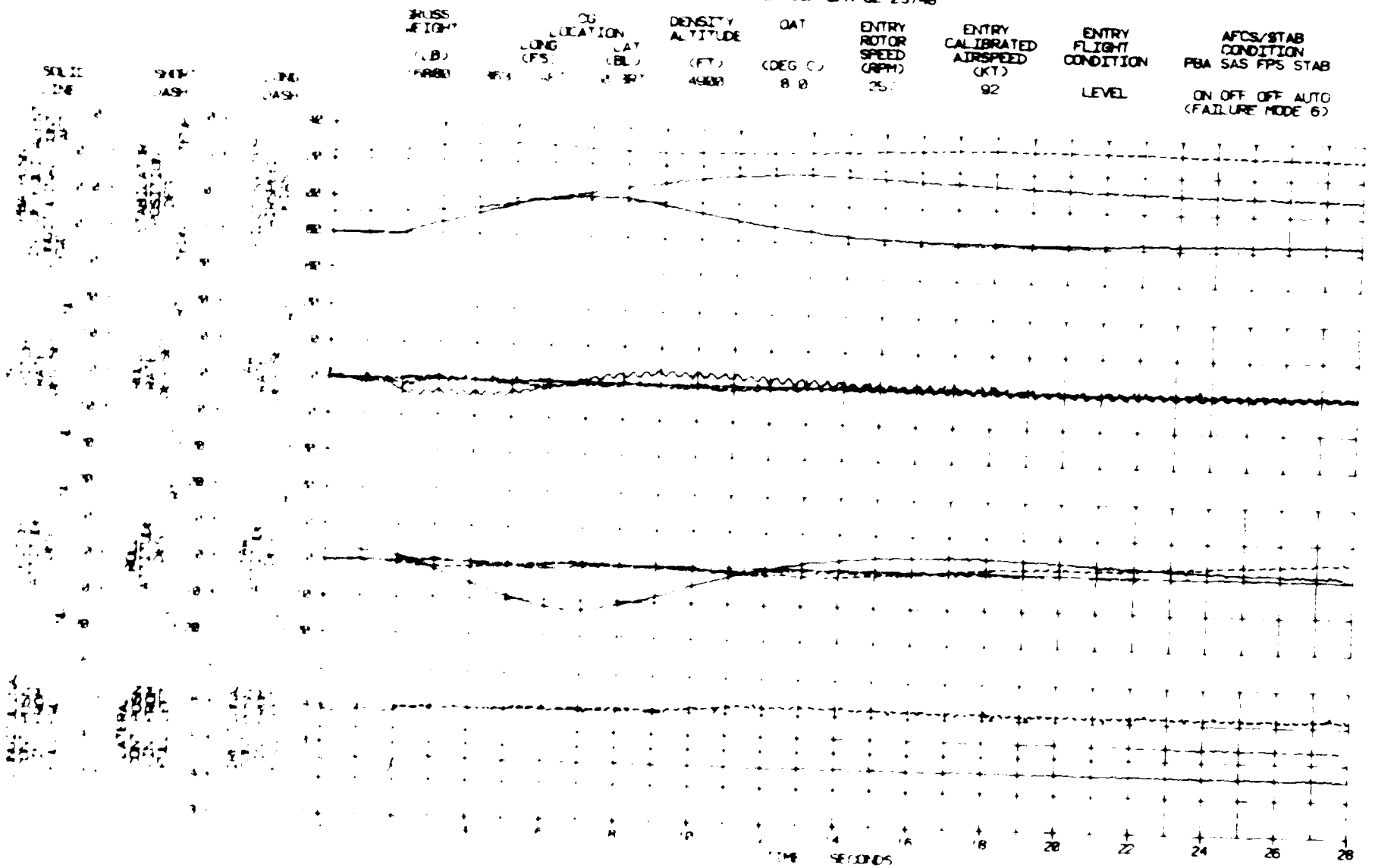


FIGURE 13
FORWARD LONGITUDINAL PULSE
UH-60A USA S/N 82-23748



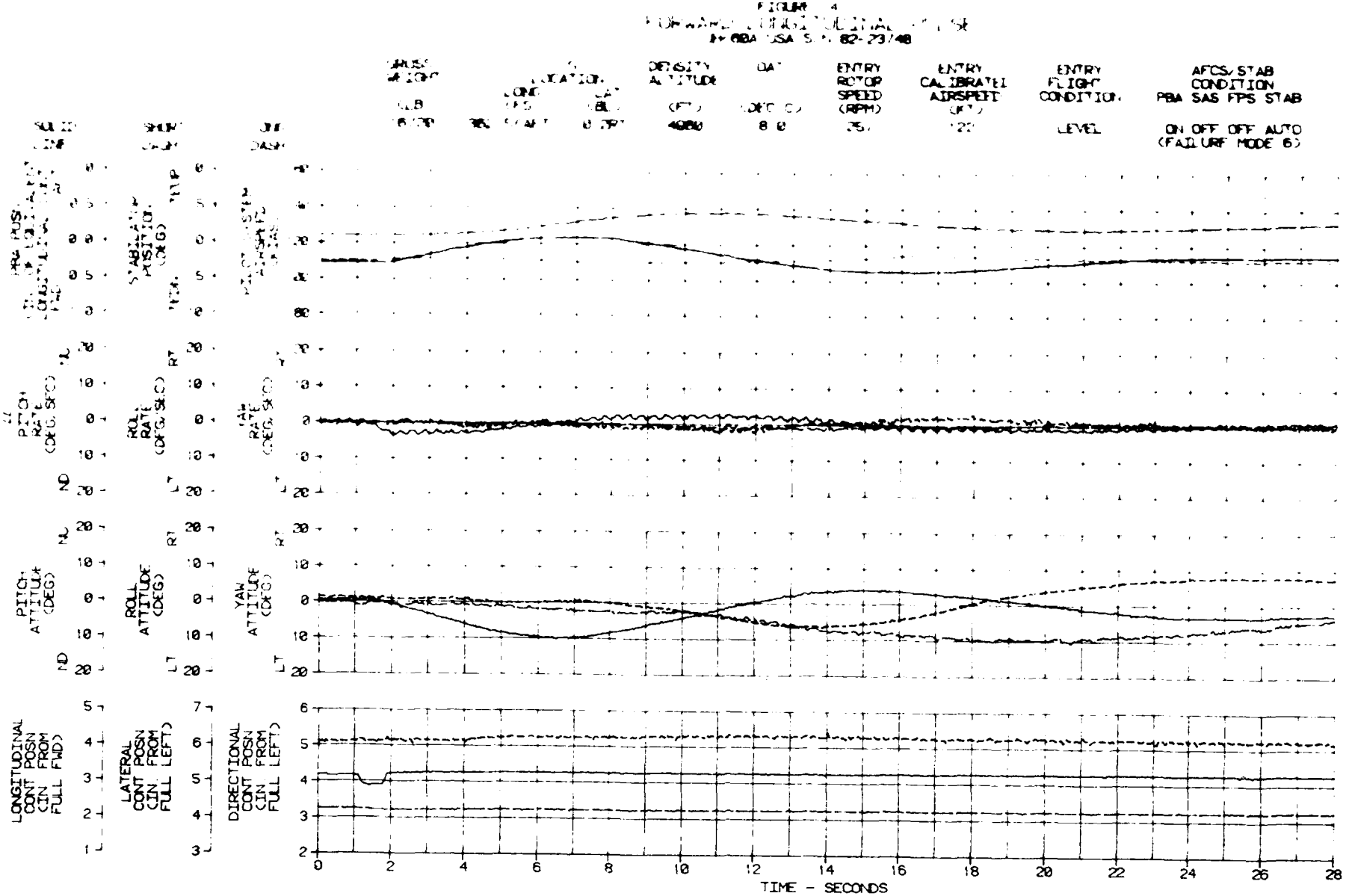
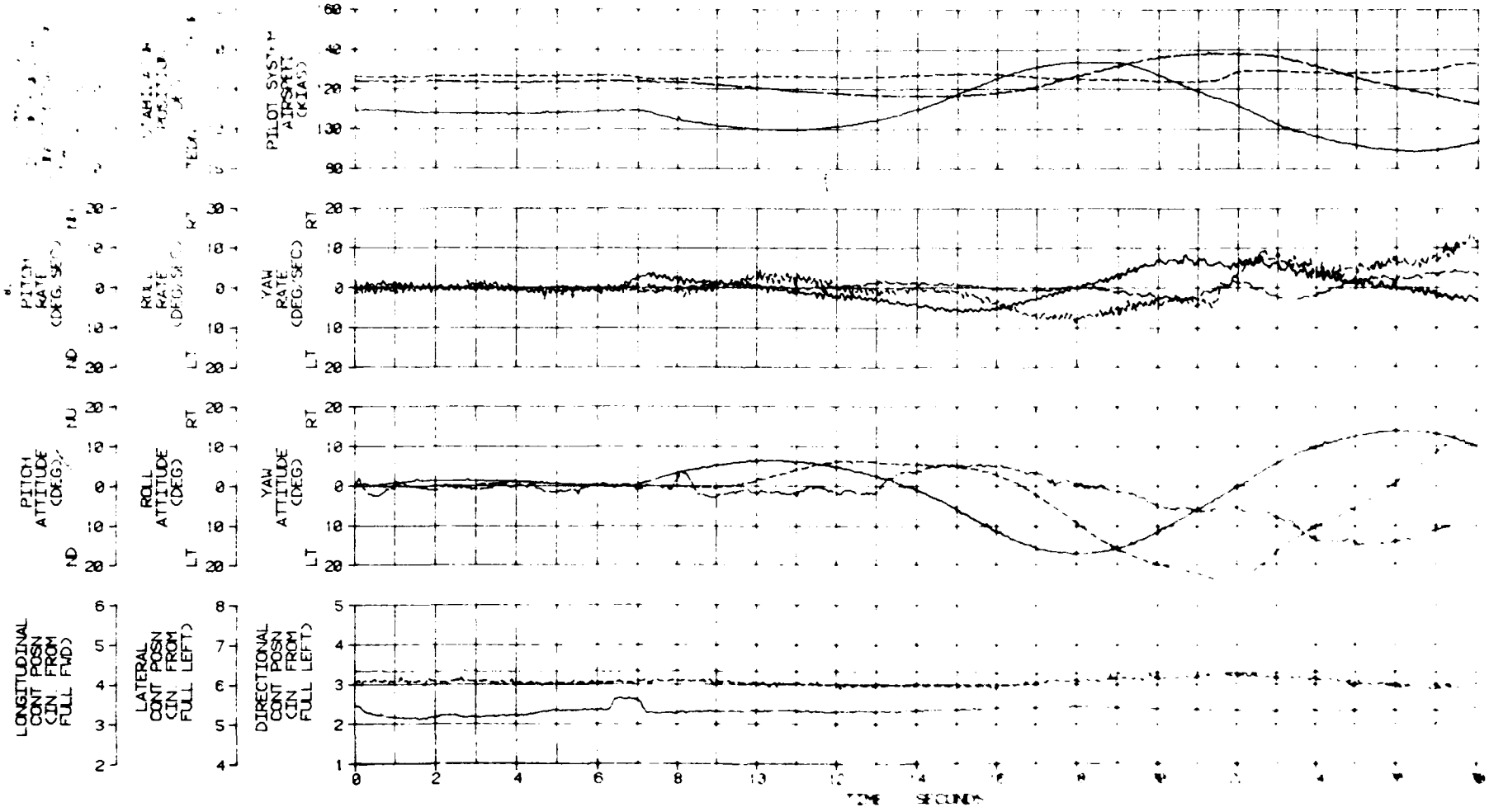

DENSITY ALTITUDE (FT)
OAT (DEG C)
ENTRY ROTOR SPEED (RPM)
ENTRY CALIBRATED AIRSPEED (KT)
ENTRY FLIGHT CONDITION
AFCS/STAB CONDITION PBA SAS FPS STAB
8 0
LEVEL
ON OFF OFF AUTO (FAILURE MODE 6)
PITCH RATE (DEG/SEC)
ROLL RATE (DEG/SEC)
YAW RATE (DEG/SEC)
PITCH ATTITUDE (DEG)
ROLL ATTITUDE (DEG)
YAW ATTITUDE (DEG)
LONGITUDINAL CONT POSN (IN FROM FULL FWD)
LATERAL CONT POSN (IN FROM FULL LEFT)
DIRECTIONAL CONT POSN (IN FROM FULL LEFT)
TIME - SECONDS

FIGURE 25
AFT LONGITUDINAL PULSE
UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
22260	359.5 (AFT)	0 IRT	3100	8.0	258	121	LEVEL	ON OFF OFF AUTO (FAILURE MODE 6)



SOLID LINE
PBA POSN (IN OF EQUIVALENT LONGITUDINAL CONT) AFT FWD
PITCH RATE (DEG/SEC)
PITCH ATTITUDE (DEG)
LONGITUDINAL CONT POSN (IN FROM FULL FWD)
SHORT DASH
STABILATOR POSITION (DEG)
ROLL RATE (DEG/SEC)
ROLL ATTITUDE (DEG)
LATERAL CONT POSN (IN FROM FULL LEFT)
LONG DASH
PILOT SYSTEM AIRSPEED (KIAS)
YAW RATE (DEG/SEC)
YAW ATTITUDE (DEG)
DIRECTIONAL CONT POSN
GROSS WEIGHT (LB)
LONG (FS)

SECONDS
LONGITUDINAL CONT POSN (IN FROM FULL FWD)
PITCH ATTITUDE (DEG)
PITCH RATE (DEG/SEC)
HBA POSN (IN OF EQUIVALENT LONGITUDINAL CONT) AFT FWD
LATERAL CONT POSN (IN FROM FULL LEFT)
ROLL ATTITUDE (DEG)
ROLL RATE (DEG/SEC)
STABILATOR POSITION (DEG)
DIRECTIONAL CONT POSN (IN FROM FULL LEFT)
YAW ATTITUDE (DEG)
YAW RATE (DEG/SEC)
PLOT SYSTEM AIRSPEED (KIAS)
SOLID LINE
SHORT DASH
LONG DASH

FIGURE 18
FORWARD LONGITUDINAL PULSE
UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
22280	359.6(AFT)	0.1RT	3020	7.0	258	150	LEVEL	ON OFF OFF AUTO (FAILURE MODE 6)

SOLID LINE — SHORT DASH — LONG DASH

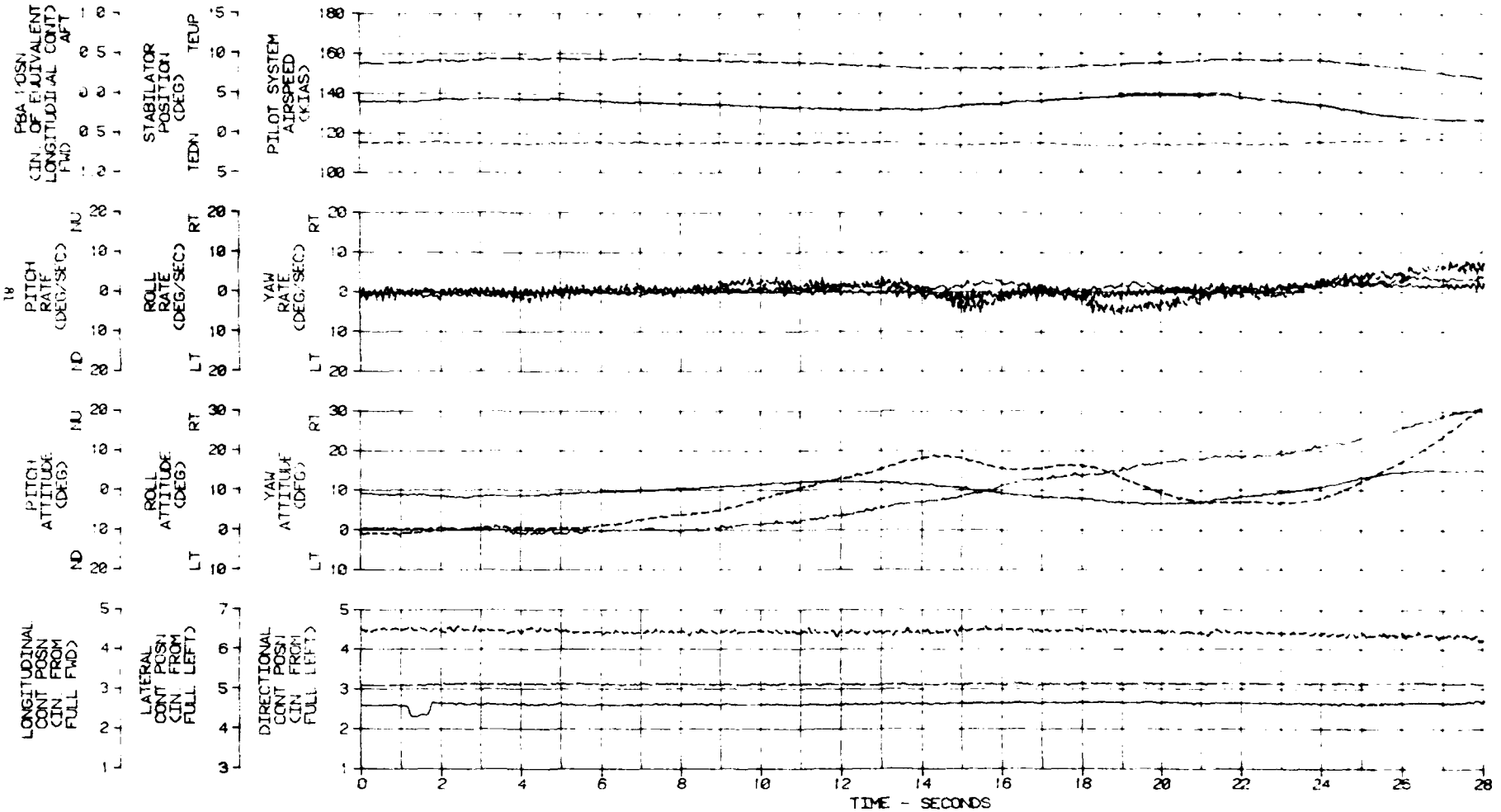


FIGURE 29
FORWARD LONGITUDINAL PULSE
UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS.)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
14520	364.3(AFT)	2.3RT	5020	-4.5	258	60	LEVEL	OFF OFF OFF AUTO (FAILURE MODE 7)

SOLID LINE — SHORT DASH — LONG DASH

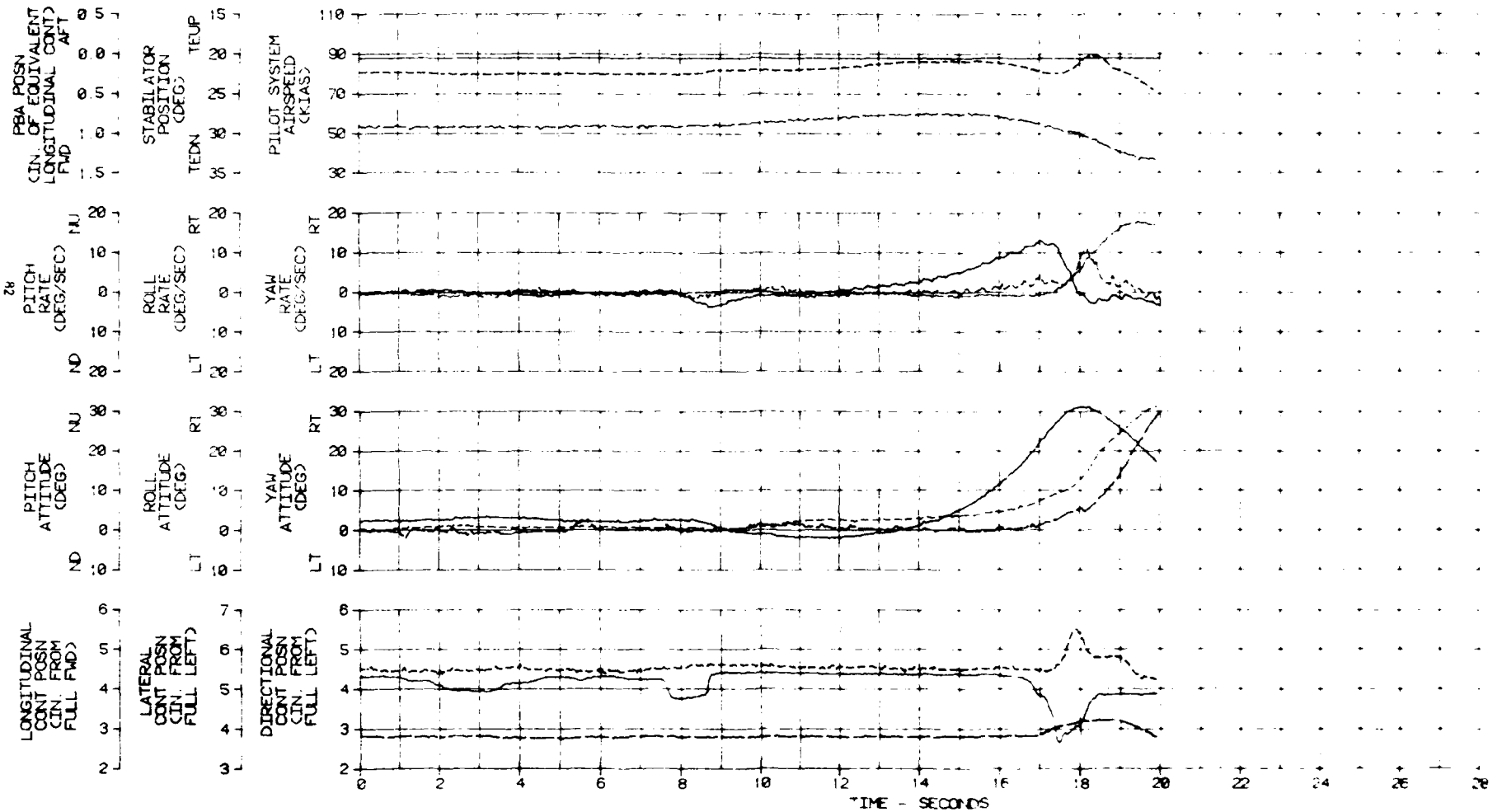
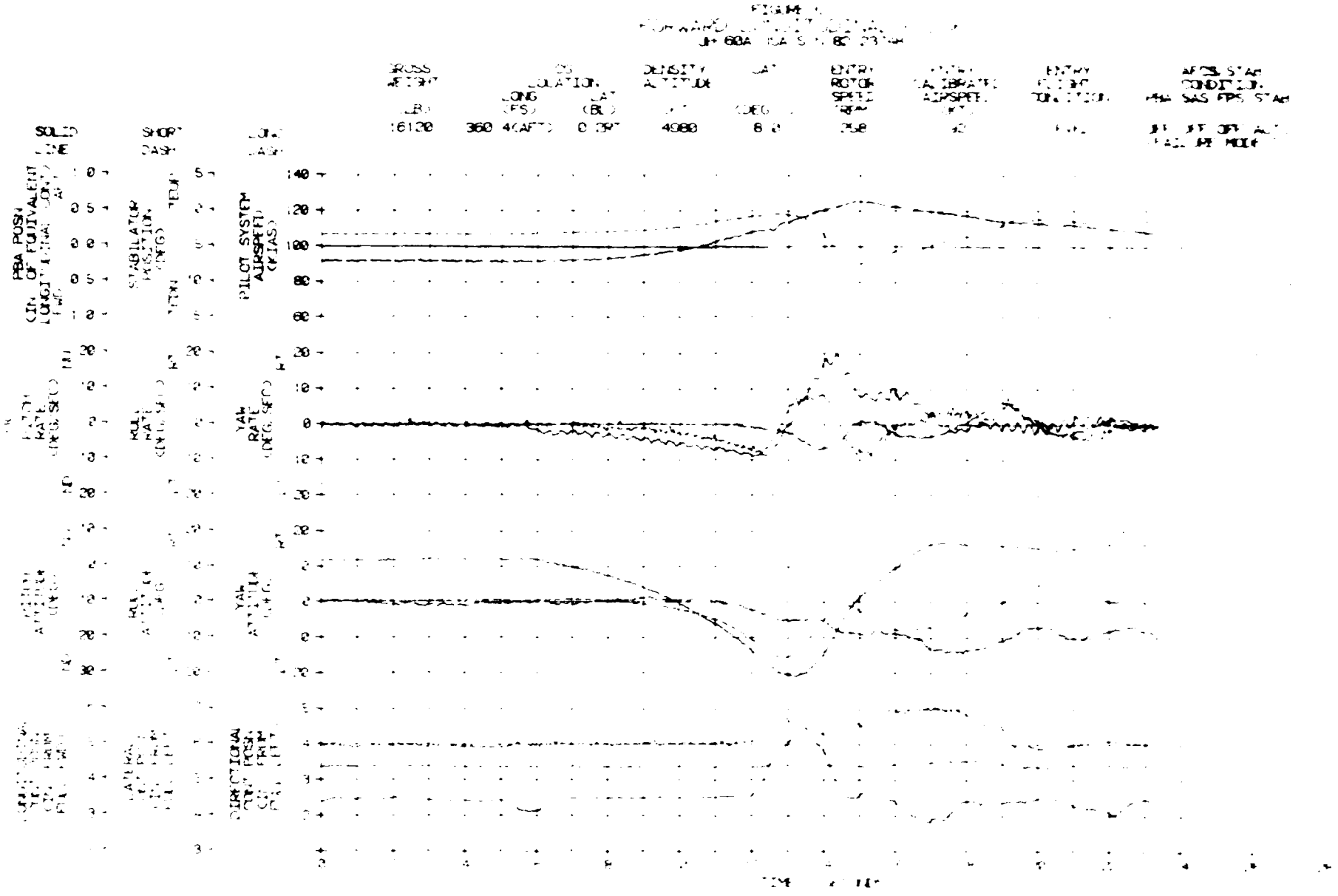


FIGURE
LONGITUDINAL PULSE
GROSS WEIGHT (LB)
CG LOCATION LONG (FS)
CG LOCATION LAT (BL)
DENSITY ALTITUDE (FT)
OAT (DEG C)
ENTRY ROTOR SPEED (RPM)
ENTRY CALIBRATED AIRSPEED (KT)
ENTRY FLIGHT CONDITION
AFCS STAB CONDITION
LEVEL
SOLID LINE
LONG DASH
SHORT DASH
LONGITUDINAL CONT POSN (IN FROM FULL FWD)
PITCH ATTITUDE (DEG)
PITCH RATE (DEG/SEC)
LATERAL CONT POSN (IN FROM FULL LFT)
ROLL ATTITUDE (DEG)
ROLL RATE (DEG/SEC)
YAW ATTITUDE (DEG)
YAW RATE (DEG/SEC)
PILOT SYSTEM AIRSPEED (KIAS)
STABILATOR POSITION (DEG)
PBA POSN (IN FROM FULL AFT)

LONGITUDINAL
CONT POSN
(IN FROM
FULL FWD)
PITCH
ATTITUDE
(DEG)
PITCH
RATE
(DEG/SEC)
HBA POSN
(IN OF EQUIVALENT
LONGITUDINAL CONT)
FWD AFT
LATERAL
CONT POSN
(IN FROM
FULL LEFT)
ROLL
ATTITUDE
(DEG)
ROLL
RATE
(DEG/SEC)
STABILATOR
POSITION
(DEG)
TEDN
TEUP
DIRECTIONAL
CONT POSN
(IN FROM
FULL LEFT)
YAW
ATTITUDE
(DEG)
YAW
RATE
(DEG/SEC)
PILOT SYSTEM
AIRSPEED
(KIAS)
SOLID LINE
DASH
GROSS WEIGHT
(LB)
358
(KIAS)
(FT)


SOLID
LINE
SHORT
DASH
PBA POSN
PILOT SYSTEM
AIRSPEED
YAW
RATE

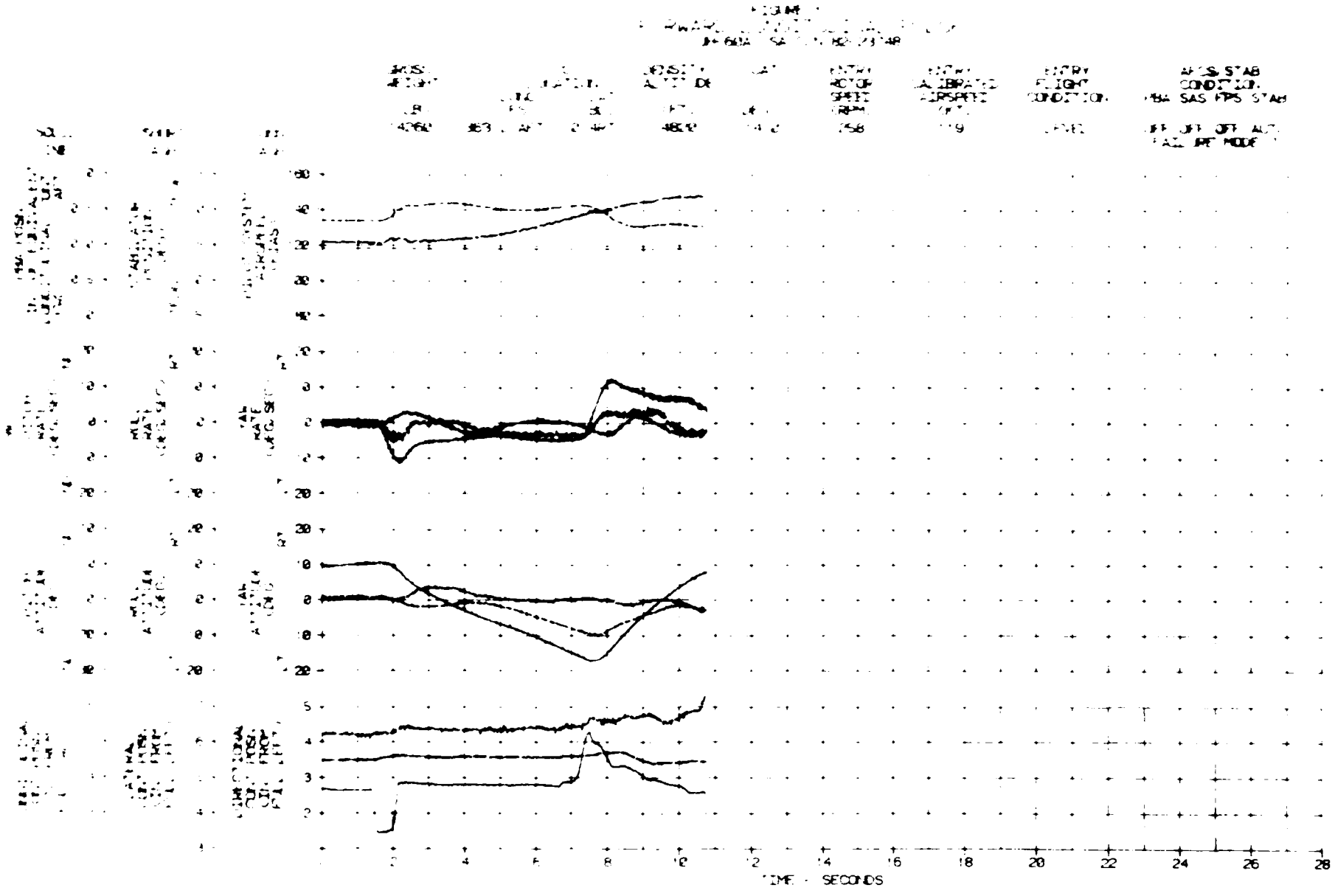

TIME - SECONDS

FIGURE 34
AFT LONGITUDINAL PULSE
UH-60A USA S/N 82-23748

[illegible]	[illegible]	[illegible]	[illegible]	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
[illegible]	365	AFT	0.34	4900	7.5	258	122	LEVEL	OFF OFF OFF AUTO (FAILURE MODE 7)

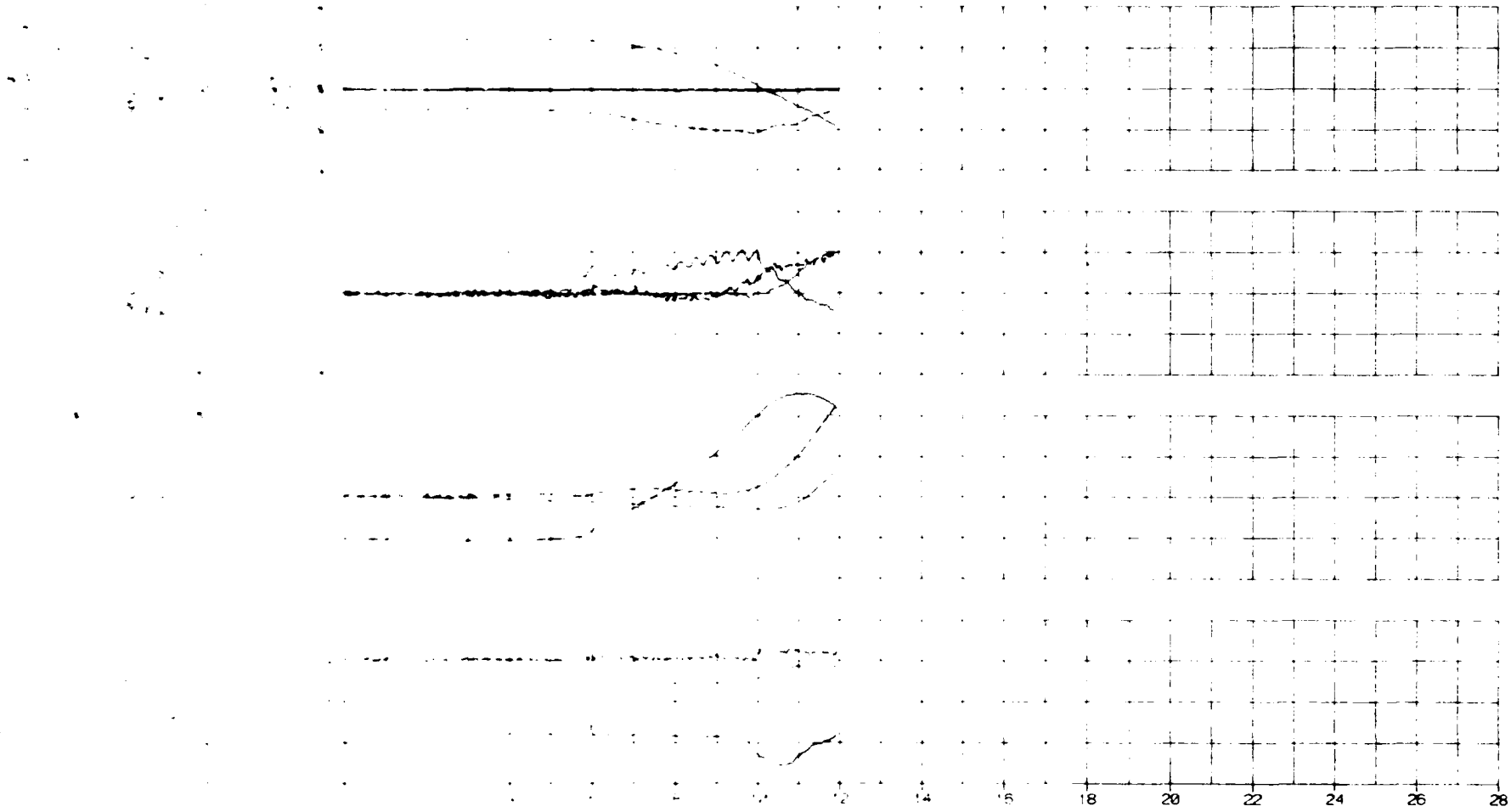
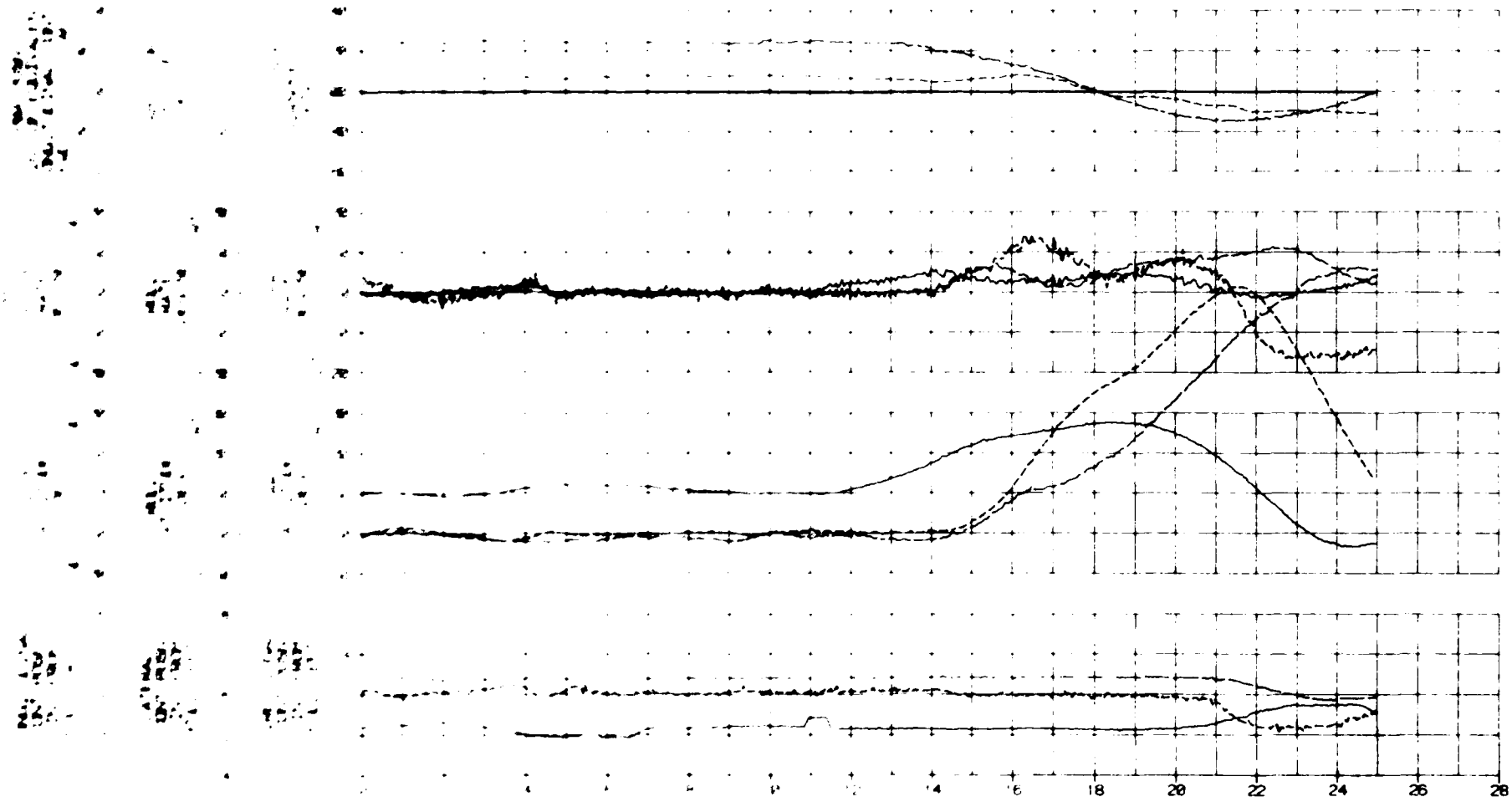


FIGURE 35
AFT LONGITUDINAL PULSE
UH-60A USA S/N 82-23748

PULSE WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
22240	358.5 AFT	0 RT	2800	4.0	258	121	LEVEL	OFF OFF OFF AUTO (FAILURE MODE 7)



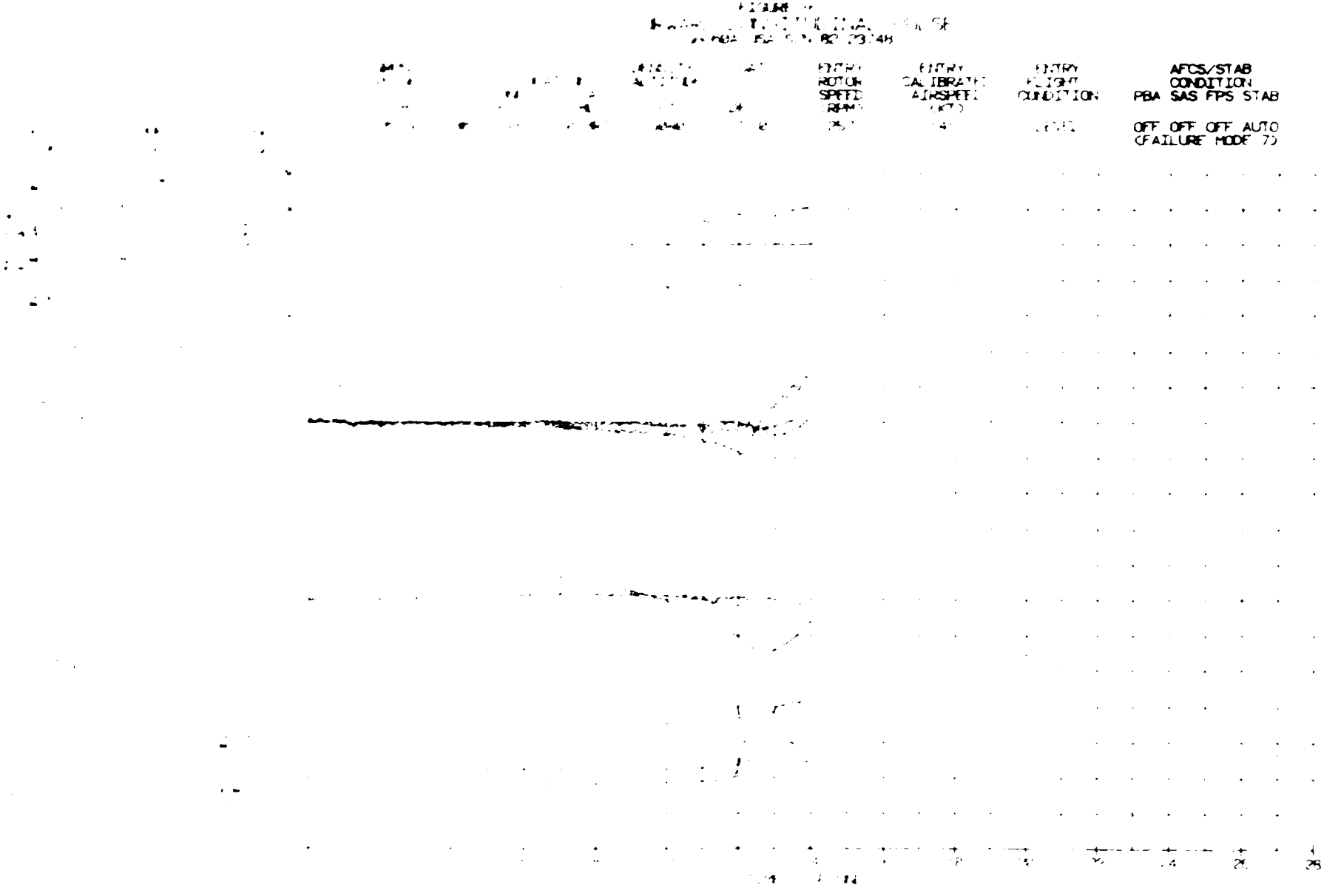
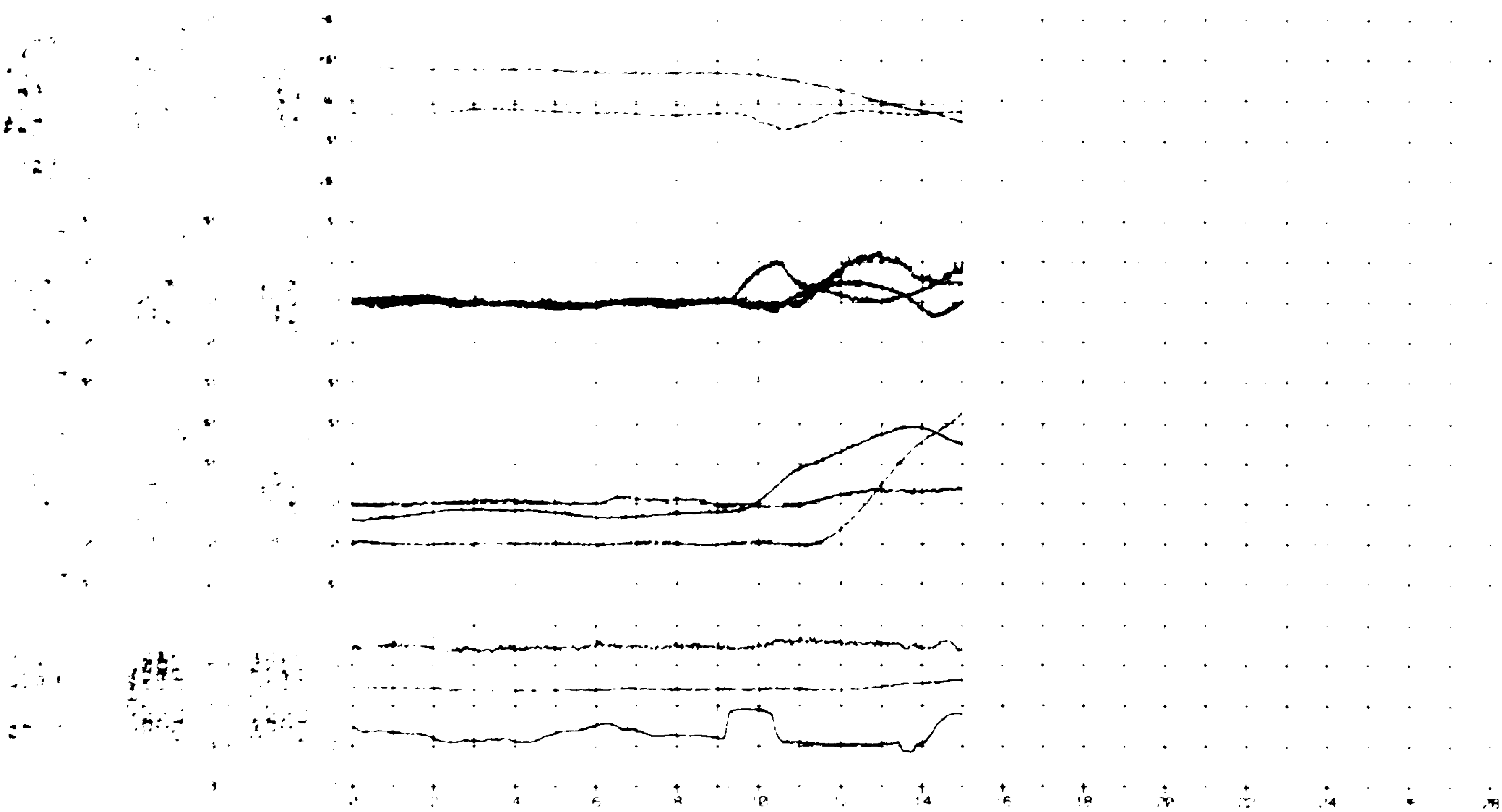

ENTRY ROTOR SPEED (RPM)
ENTRY CALIBRATED AIRSPEED (KT)
ENTRY FLIGHT CONDITION
AFCS/STAB CONDITION
PBA SAS FPS STAB
OFF OFF OFF AUTO
(FAILURE MODE 7)

FIGURE [illegible]
AFT LONGITUDINAL PULSE
UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG FS	CG LOCATION LAT BL	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
[illegible]	[illegible] (AFT)	[illegible]	[illegible]	[illegible]	258	150	LEVEL	OFF OFF OFF AUTO (FAILURE MODE [illegible])



TIME - SECONDS

FIGURE 38
FORWARD LONGITUDINAL PULSE
(UH-60A USA S/N 82-23748)

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16840	363 (AFT)	0.3RT	4920	8.5	258	151	LEVEL	OFF OFF OFF ALT (FAILURE MODE)

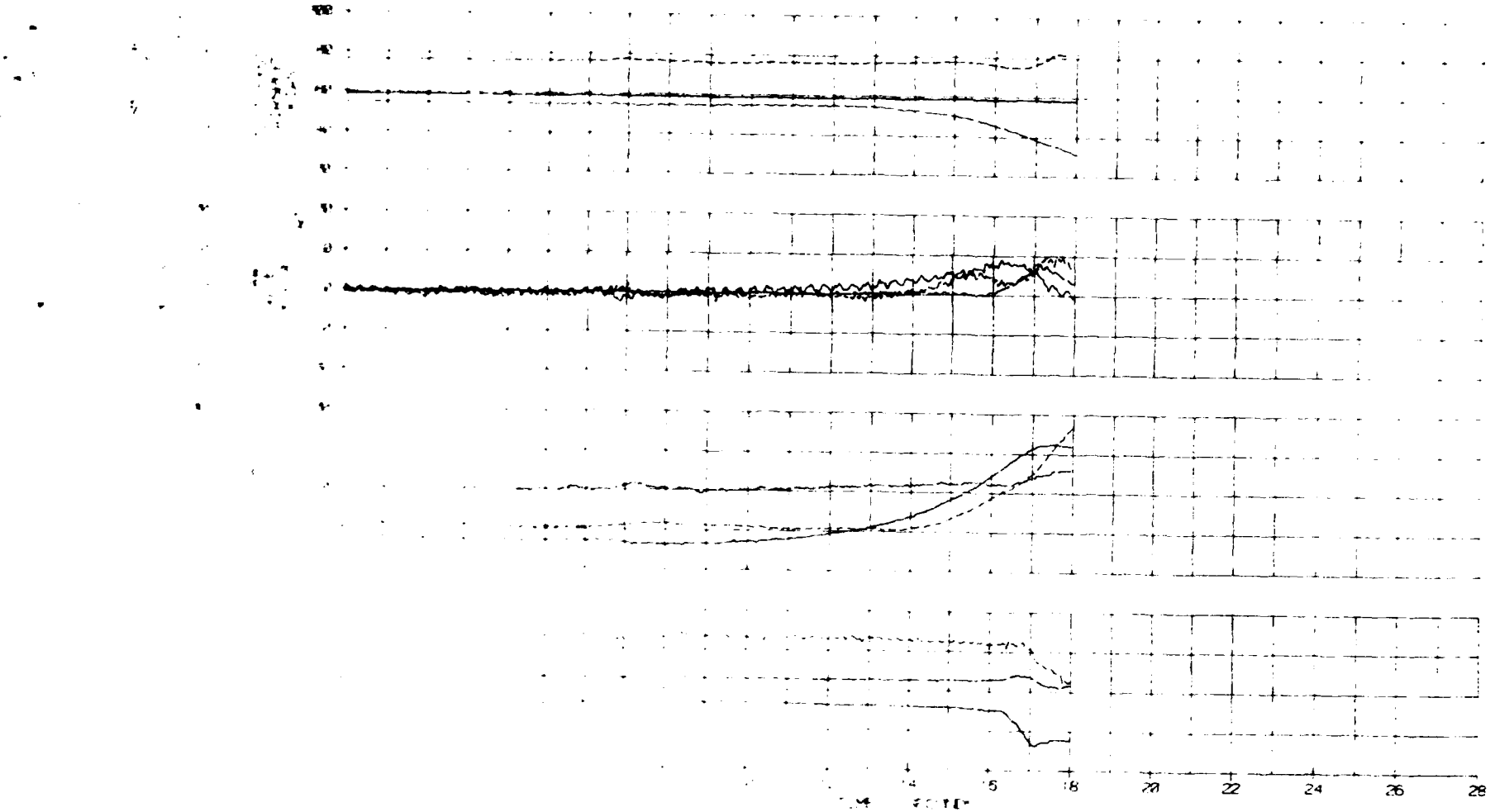


FIGURE 39

AFT LONGITUDINAL PULSE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
22080	359.0(AFT)	0 IRT	3040	7.5	258	149	LEVEL	OFF OFF OFF AUTO (FAILURE MODE 7)

SOLID LINE — SHORT DASH — LONG DASH

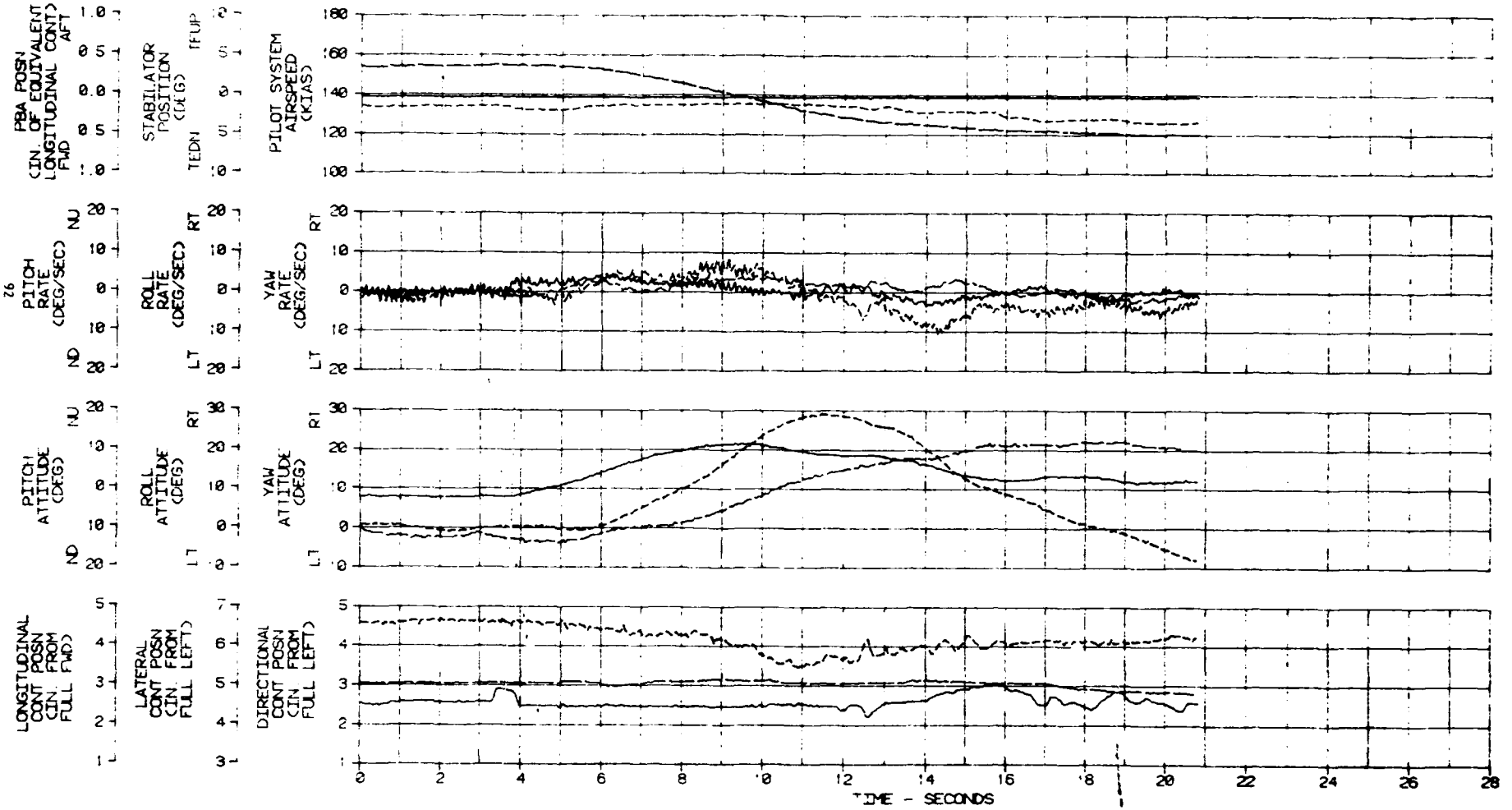


FIGURE 40
FORWARD LONGITUDINAL PULSE
UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16820	362.6(AFT)	0.2RT	4740	13.0	257	62	LEVEL	ON OFF OFF OFF (FAILURE MODE 8)

SOLID LINE — SHORT DASH — LONG DASH

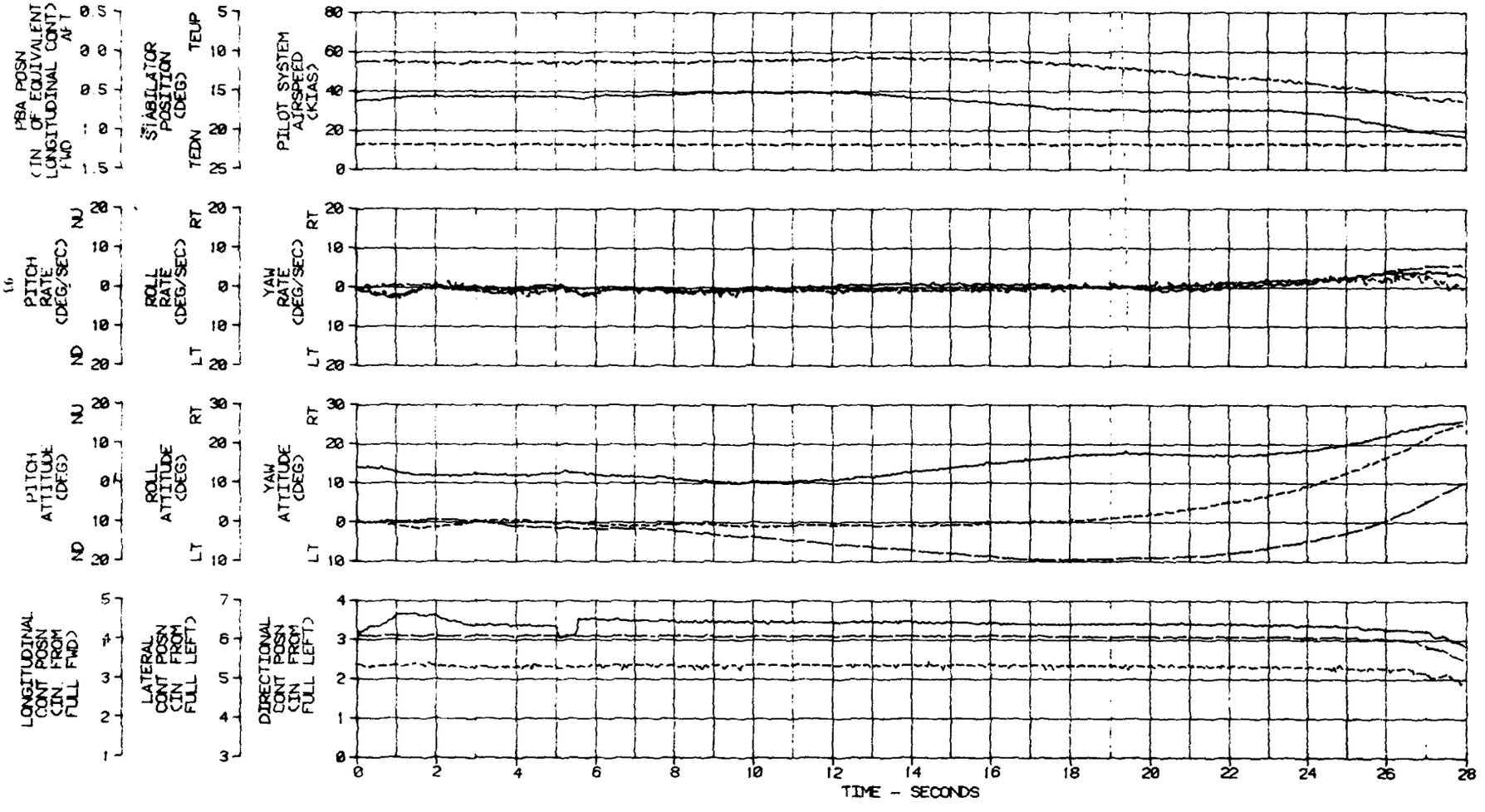


FIGURE 41
AFT LONGITUDINAL PULSE
UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16620	362.1 (AFT)	0.2RT	4960	13.5	258	92	LEVEL	ON OFF OFF OFF (FAILURE MODE B)

SOLID LINE
SHORT DASH
LONG DASH

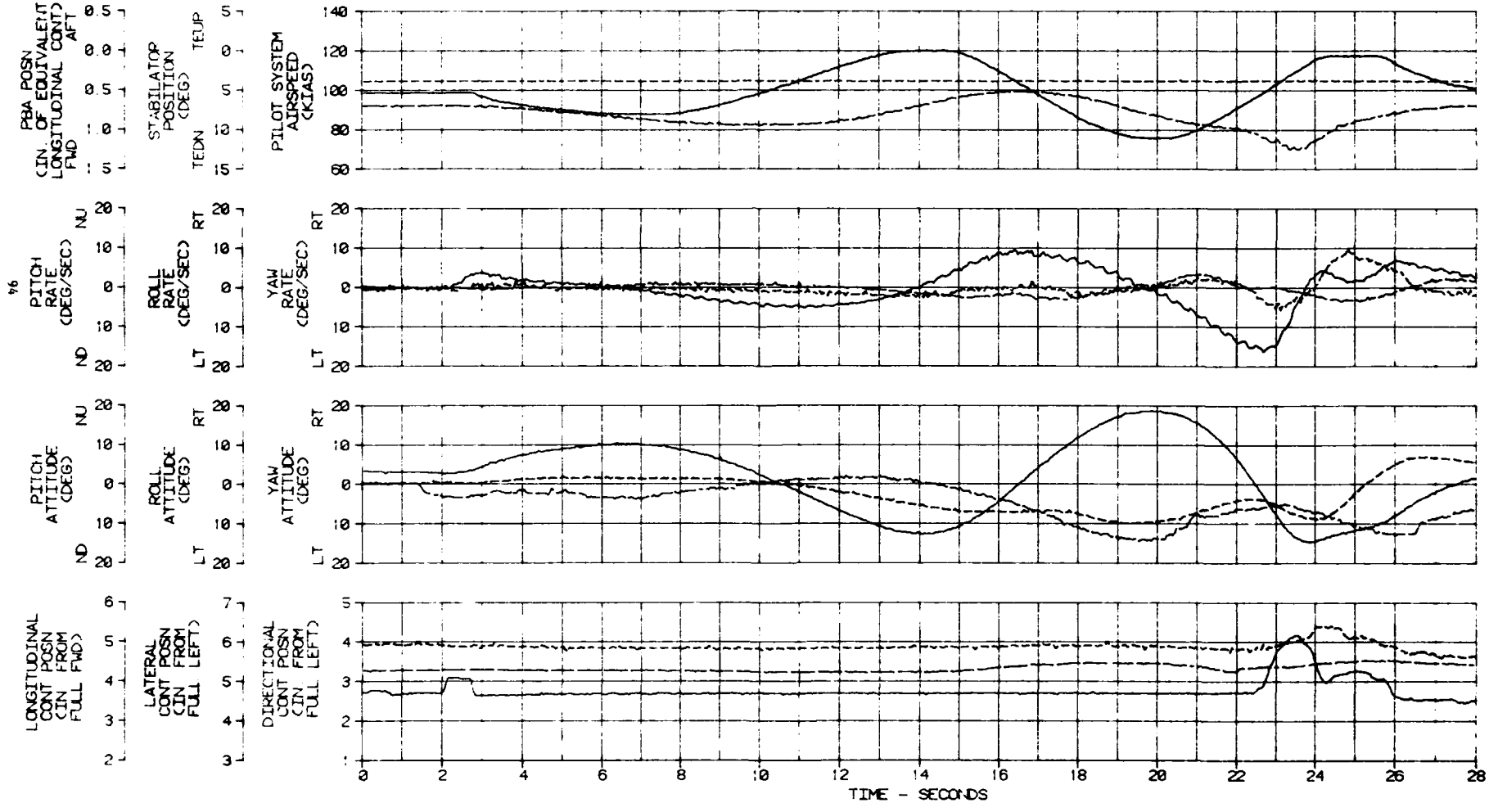


FIGURE 42

AFT LONGITUDINAL PULSE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16640	362.4(AFT)	0.2RT	4560	11.0	257	122	LEVEL	ON OFF OFF OFF (FAILURE MODE 8)

SOLID LINE — SHORT DASH — LONG DASH

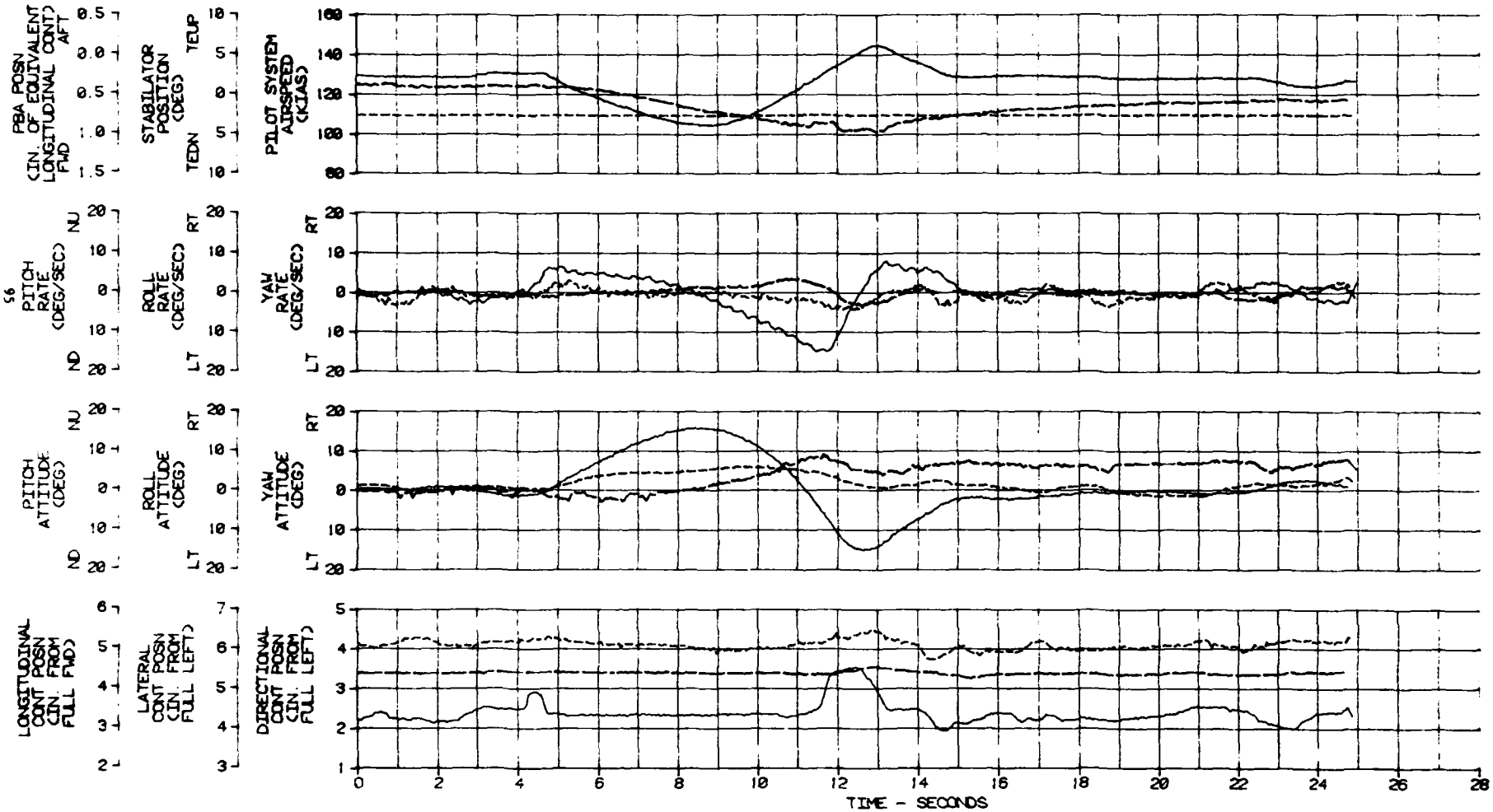


FIGURE 43

FORWARD LONGITUDINAL PULSE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16680	362.3(AFT)	0.2RT	5100	13.5	256	143	LEVEL	ON OFF OFF OFF (FAILURE MODE 8)

SOLID LINE — SHORT DASH — LONG DASH

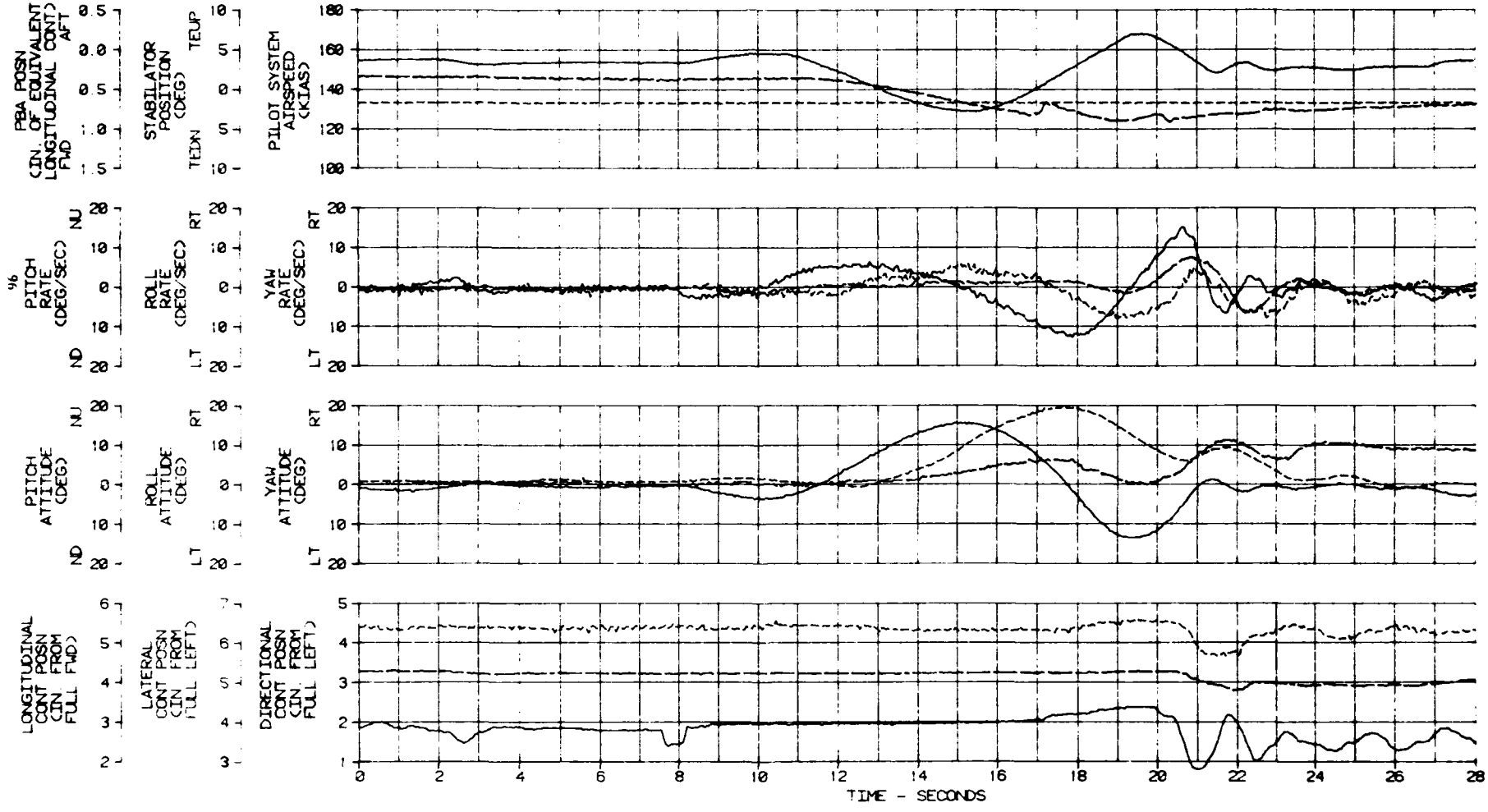


FIGURE 44

AFT LONGITUDINAL PULSE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB (FAILURE MODE 8)
16420	363 4(AFT)	0 1RT	5560	26 0	258	150	LEVEL	ON OFF OFF OFF

SOLID LINE — SHORT DASH — LONG DASH

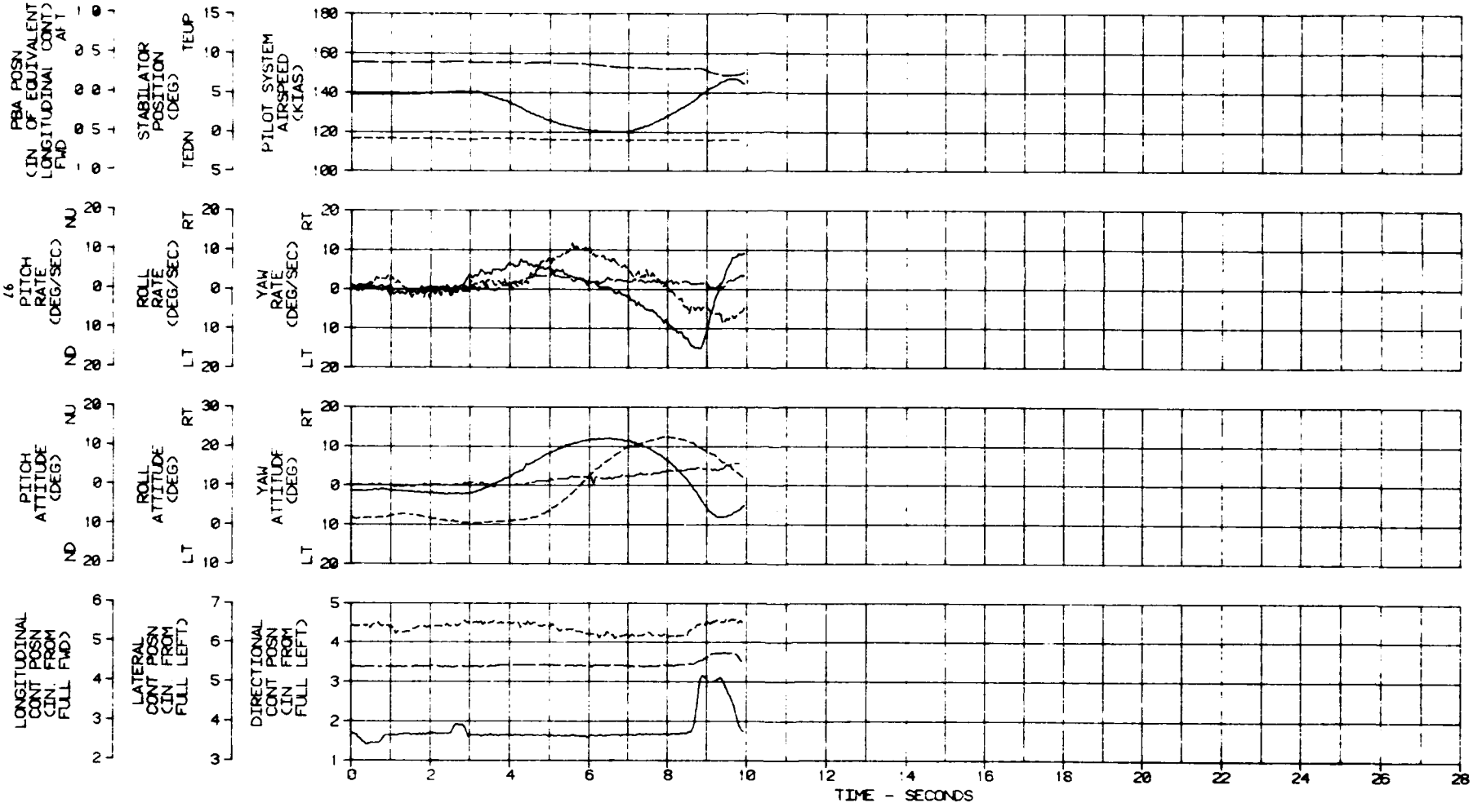


FIGURE 45

FORWARD LONGITUDINAL PULSE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16660	362.4(AFT)	0.3RT	4860	8.5	258	61	LEVEL	OFF OFF OFF OFF (FAILURE MODE 9)

SOLID LINE — SHORT DASH — LONG DASH

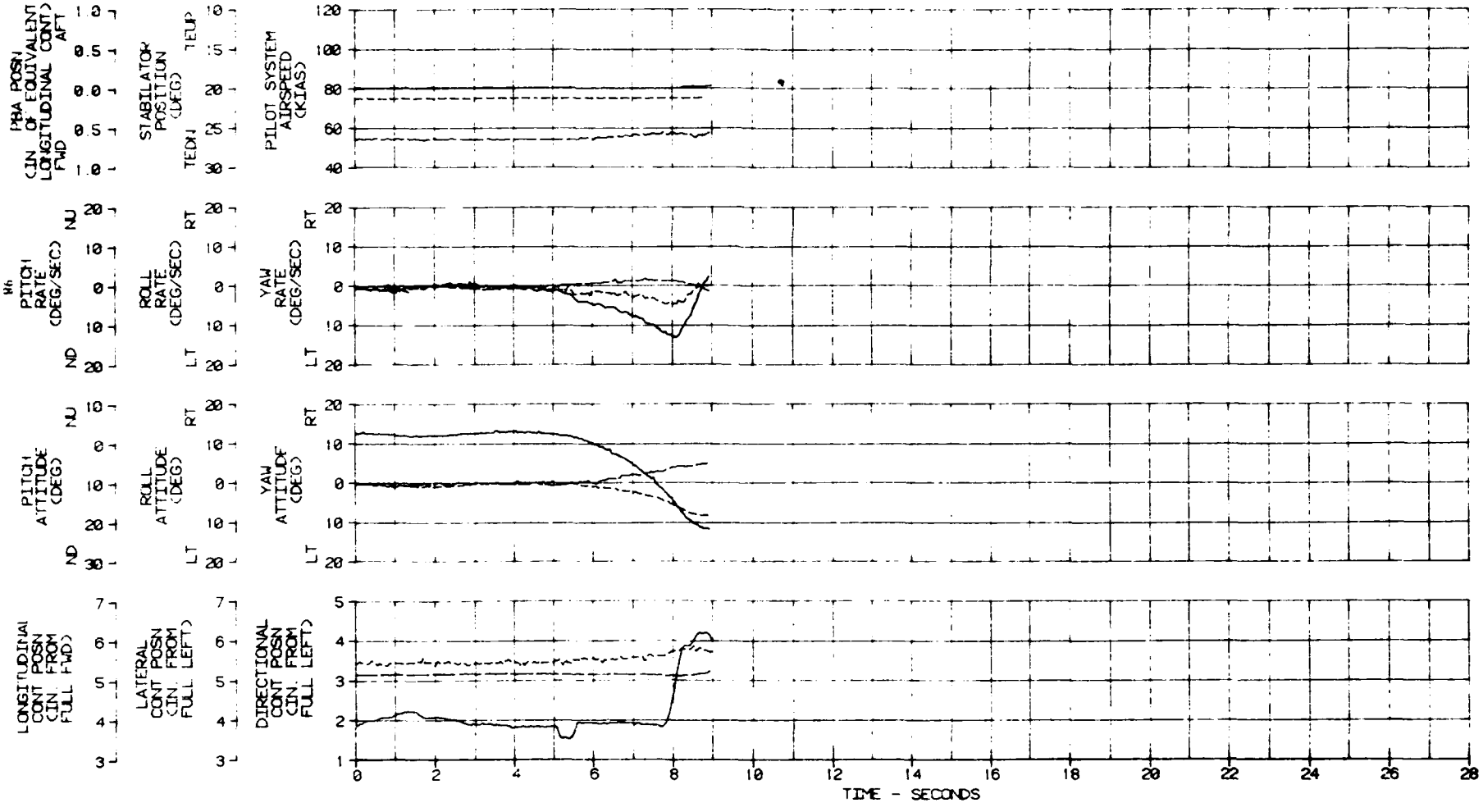


FIGURE 46

FORWARD LONGITUDINAL PULSE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16460	361.8(AFT)	0.2RT	4880	9.0	258	92	LEVEL	OFF OFF OFF OFF (FAILURE MODE 9)

SOLID LINE — SHORT DASH — LONG DASH

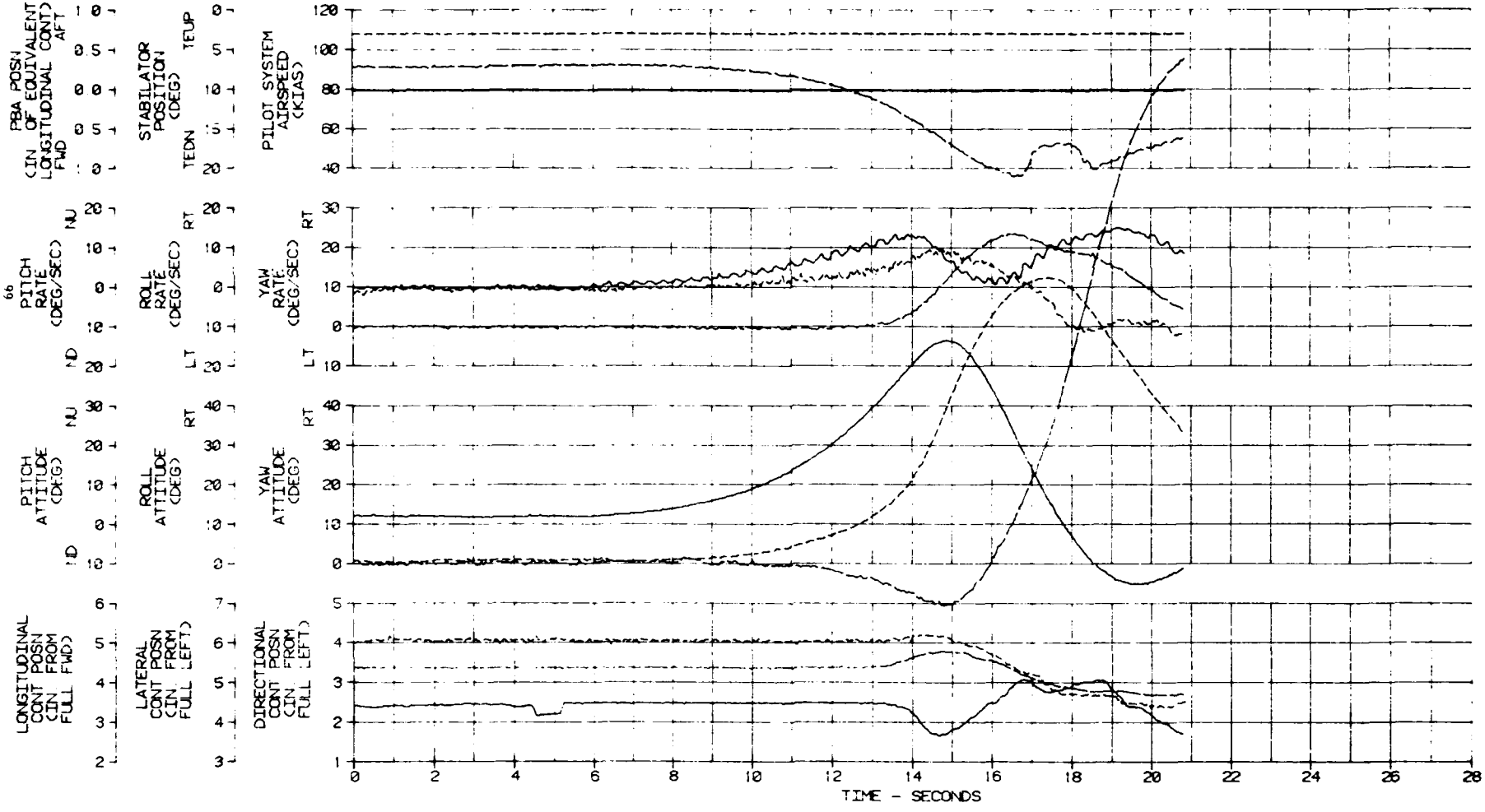


FIGURE 47
AFT LONGITUDINAL PULSE
UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16800	362.9(AFT)	0.2RT	4900	9.0	258	122	LEVEL	OFF OFF OFF OFF (FAILURE MODE 9)

SOLID LINE — SHORT DASH — LONG DASH

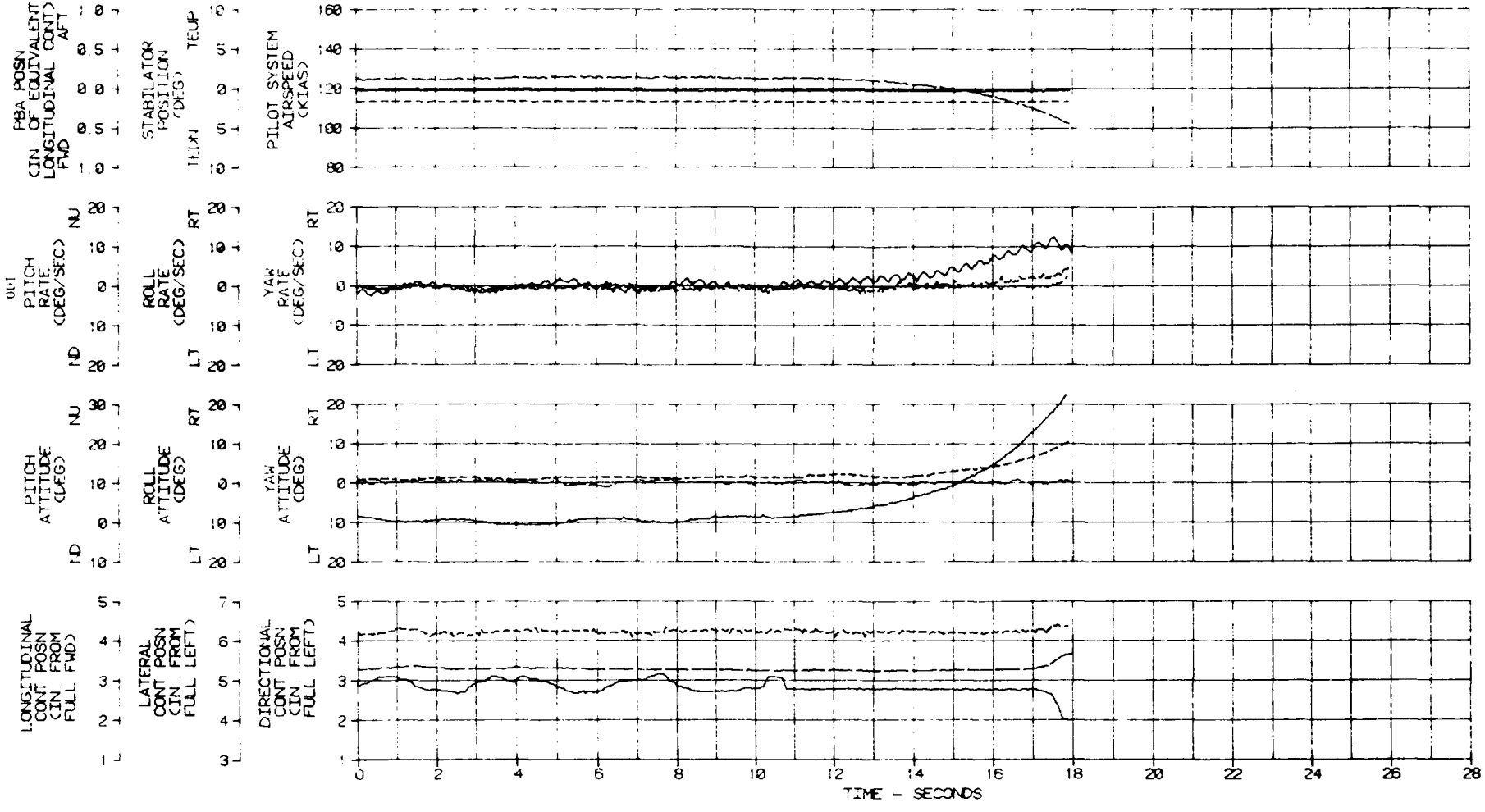


FIGURE 48
FORWARD LONGITUDINAL PULSE
UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	CAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16920	362.9(AFT)	0.1RT	5100	11.5	258	142	LEVEL	OFF OFF OFF OFF (FAILURE MODE 9)

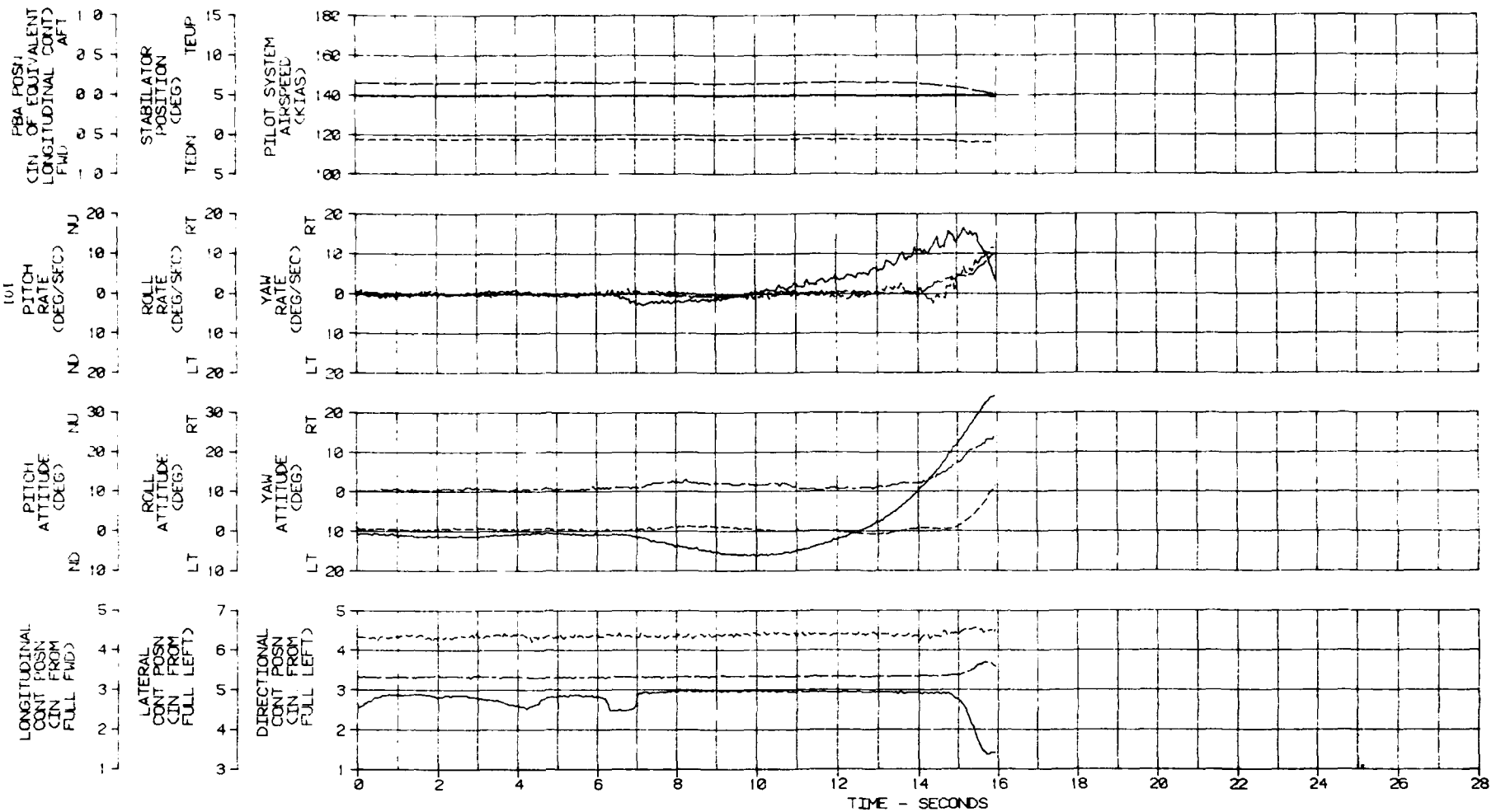


FIGURE 49

AFT LONGITUDINAL PULSE

UH-60A USA S/N 82-23748

GROSS WEIGHT	CG LOCATION LONG	CG LOCATION LAT	DENSITY ALTITUDE	OAT	ENTRY ROTOR SPEED	ENTRY CALIBRATED AIRSPEED	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
(LB)	(FS)	(BL)	(FT)	(DEG C)	(RPM)	(KT)		
16720	362.4(AFT)	0.3RT	5040	12.5	258	151	LEVEL	OFF OFF OFF OFF (FAILURE MODE 9)

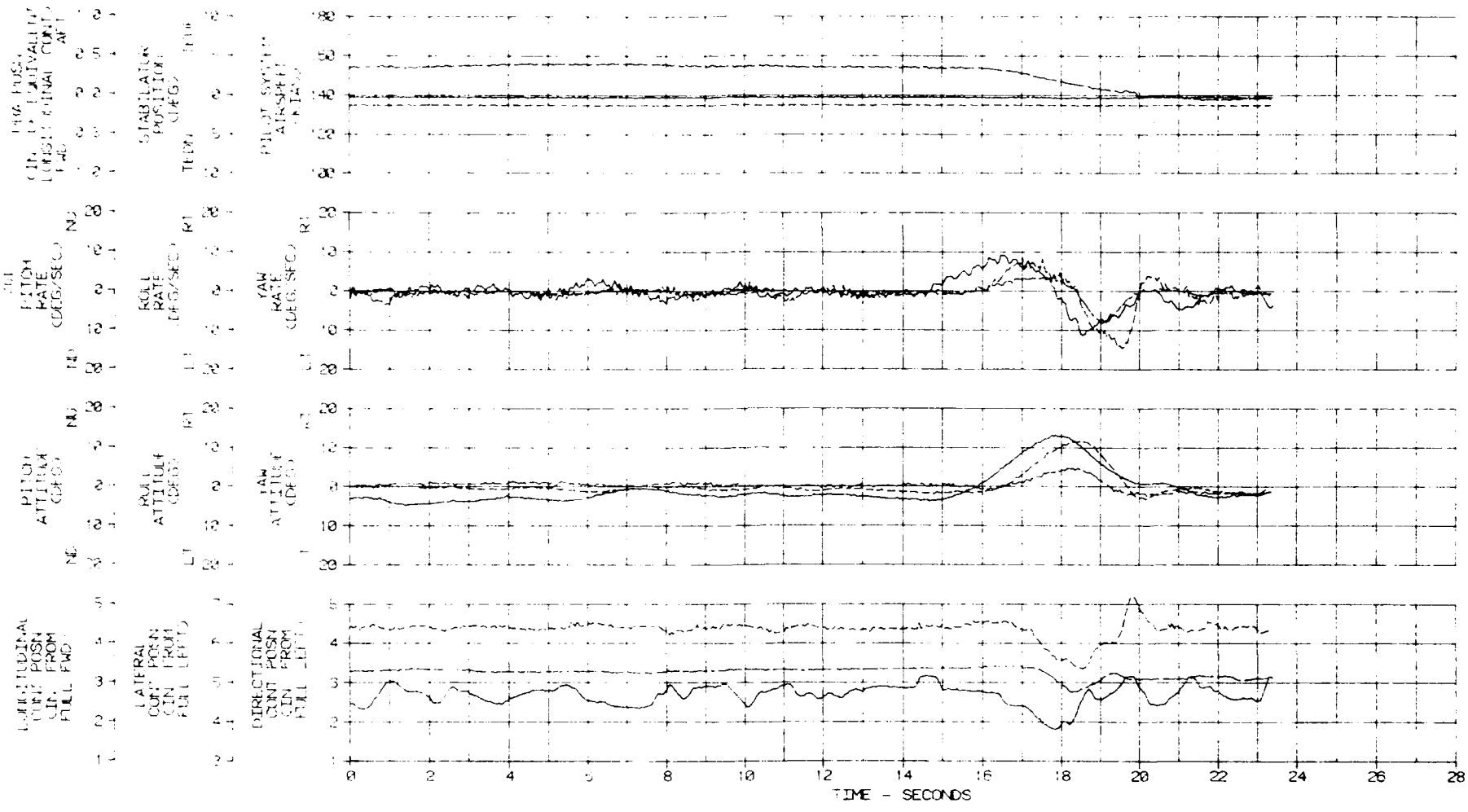


FIGURE 50

RIGHT LATERAL PULSE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16540	361.9(AFT)	0.3RT	4880	7.5	257	61	LEVEL	ON OFF OFF AUTO (FAILURE MODE 6)

SOLID LINE — SHORT DASH — LONG DASH

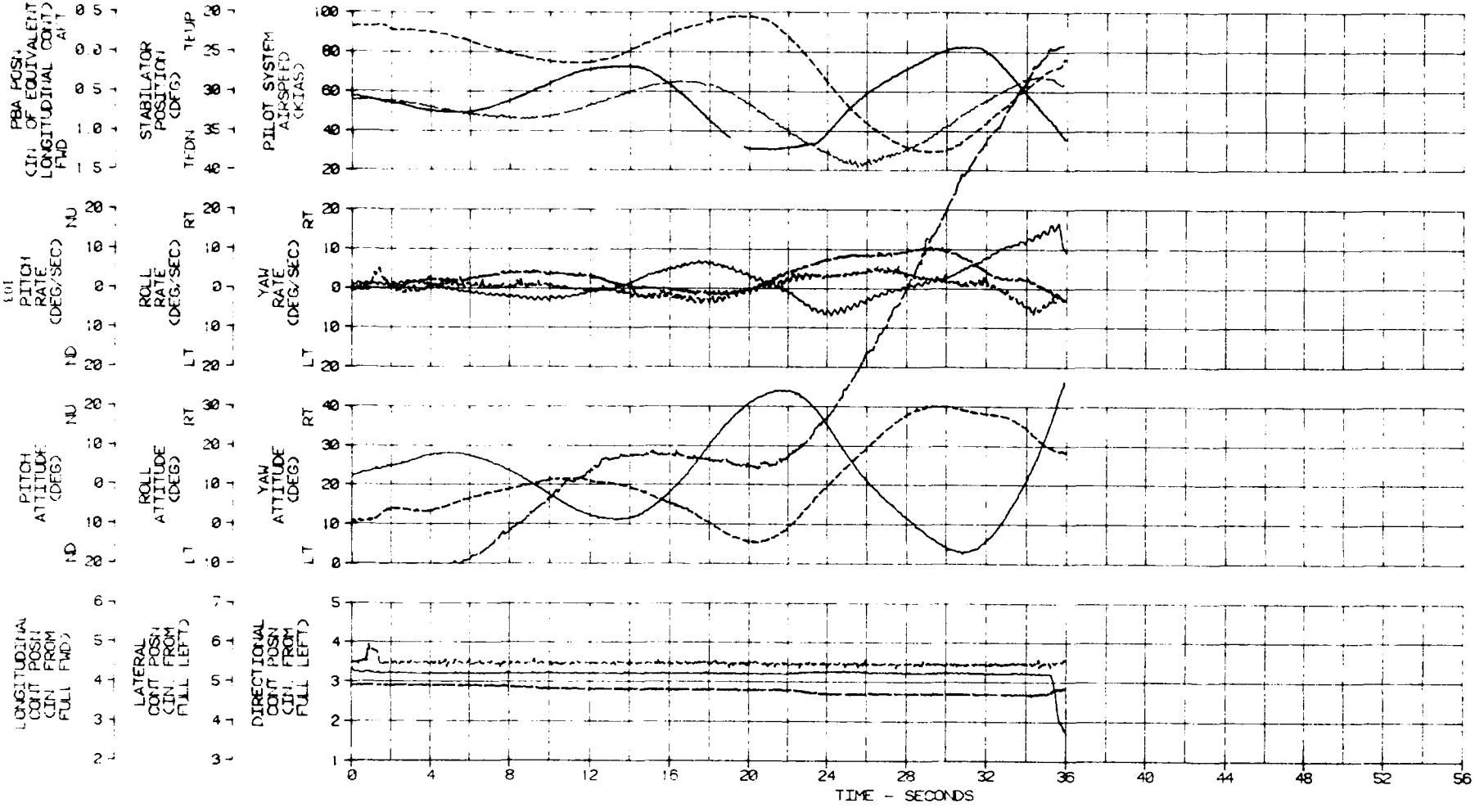


FIGURE 51

LEFT LATERAL PULSE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
21700	357.9(AFT)	0.1RT	3240	8.5	258	61	LEVEL	ON OFF OFF AUTO (FAILURE MODE 6)

SOLID LINE — SHORT DASH — LONG DASH

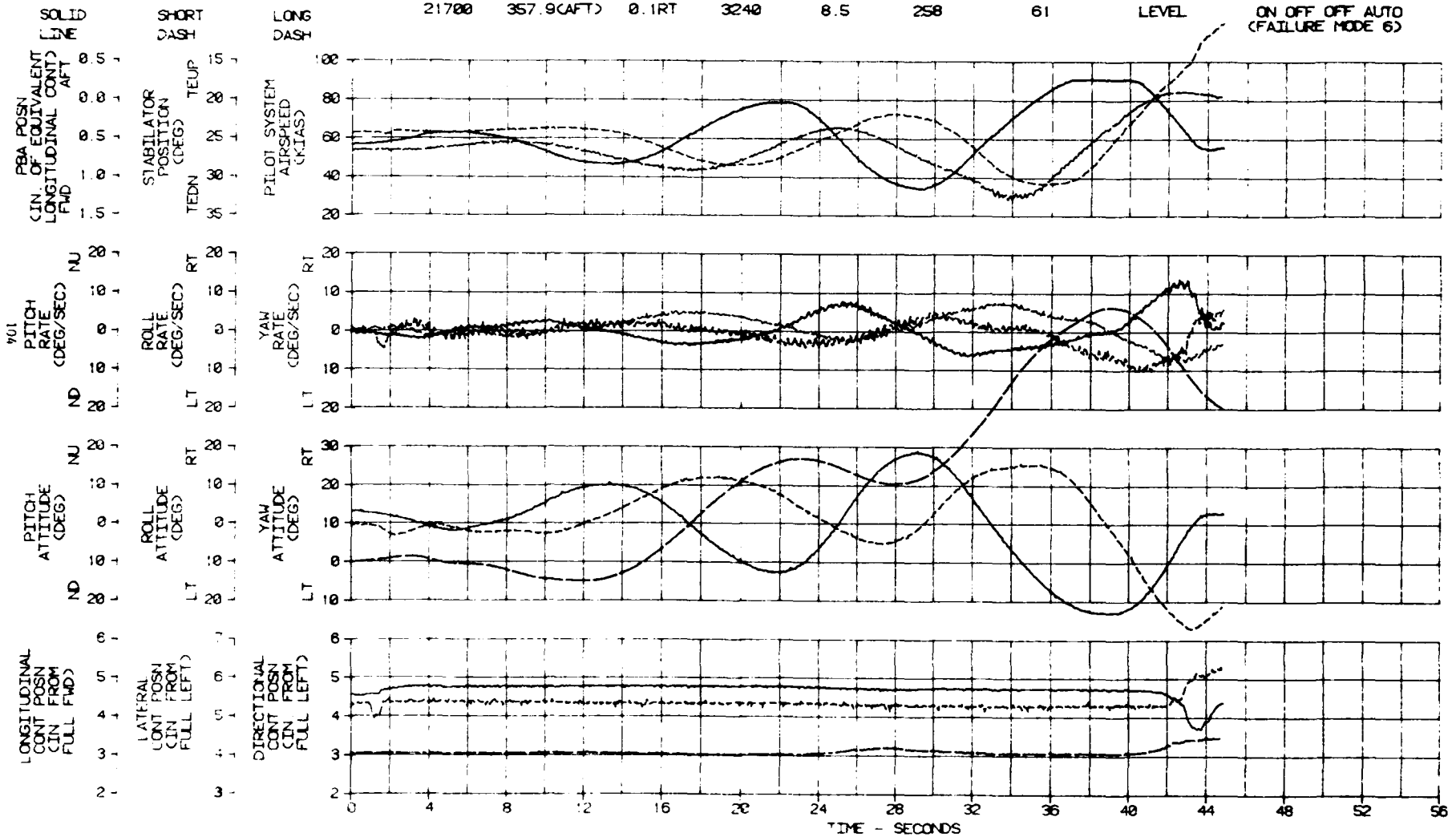


FIGURE 52

LEFT LATERAL PULSE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16780	362.7(AFT)	0.3RT	4960	7.5	258	92	LEVEL	ON OFF OFF AUTO (FAILURE MODE 6)

SOLID LINE — SHORT DASH — LONG DASH

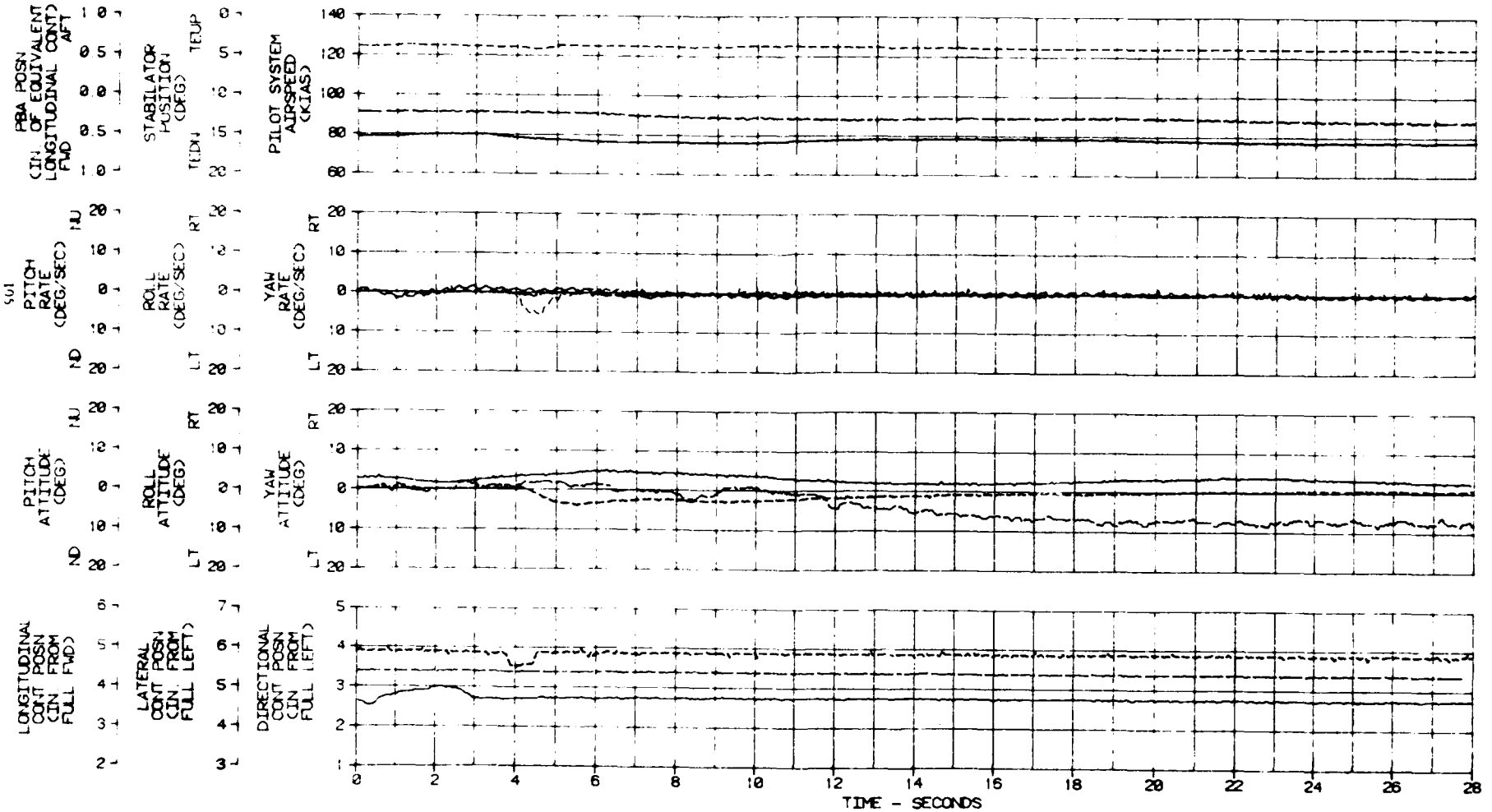


FIGURE 53
RIGHT LATERAL PULSE
UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16780	362.7(AFT)	0.2RT	4920	7.5	257	123	LEVEL	ON OFF OFF AUTO (FAILURE MODE 6)

SOLID LINE — SHORT DASH — LONG DASH

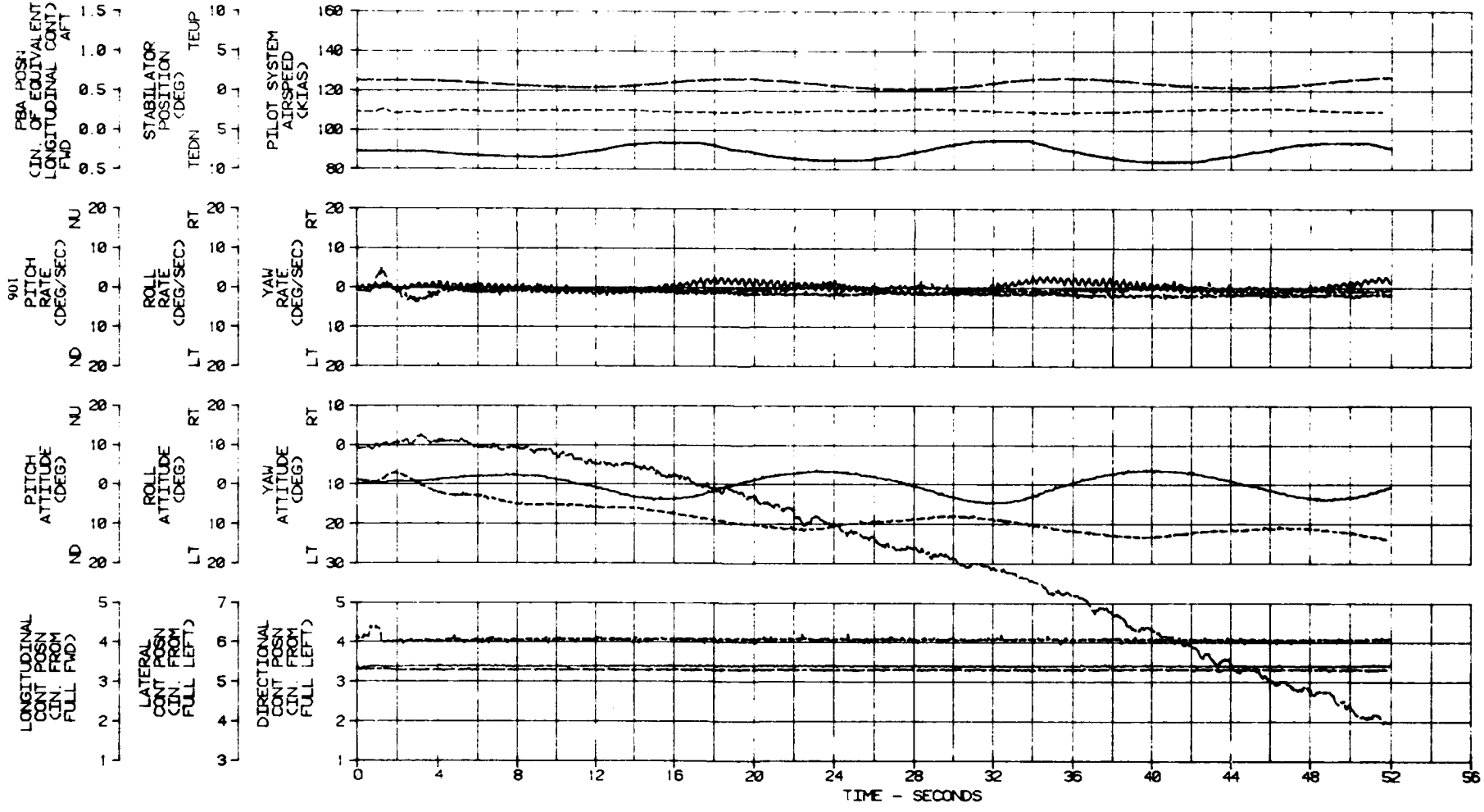


FIGURE 54

RIGHT LATERAL PULSE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
22240	359.4(AFT)	0.1RT	3140	8.0	258	122	LEVEL	ON OFF OFF AUTO (FAILURE MODE 6)

SOLID LINE — SHORT DASH — LONG DASH

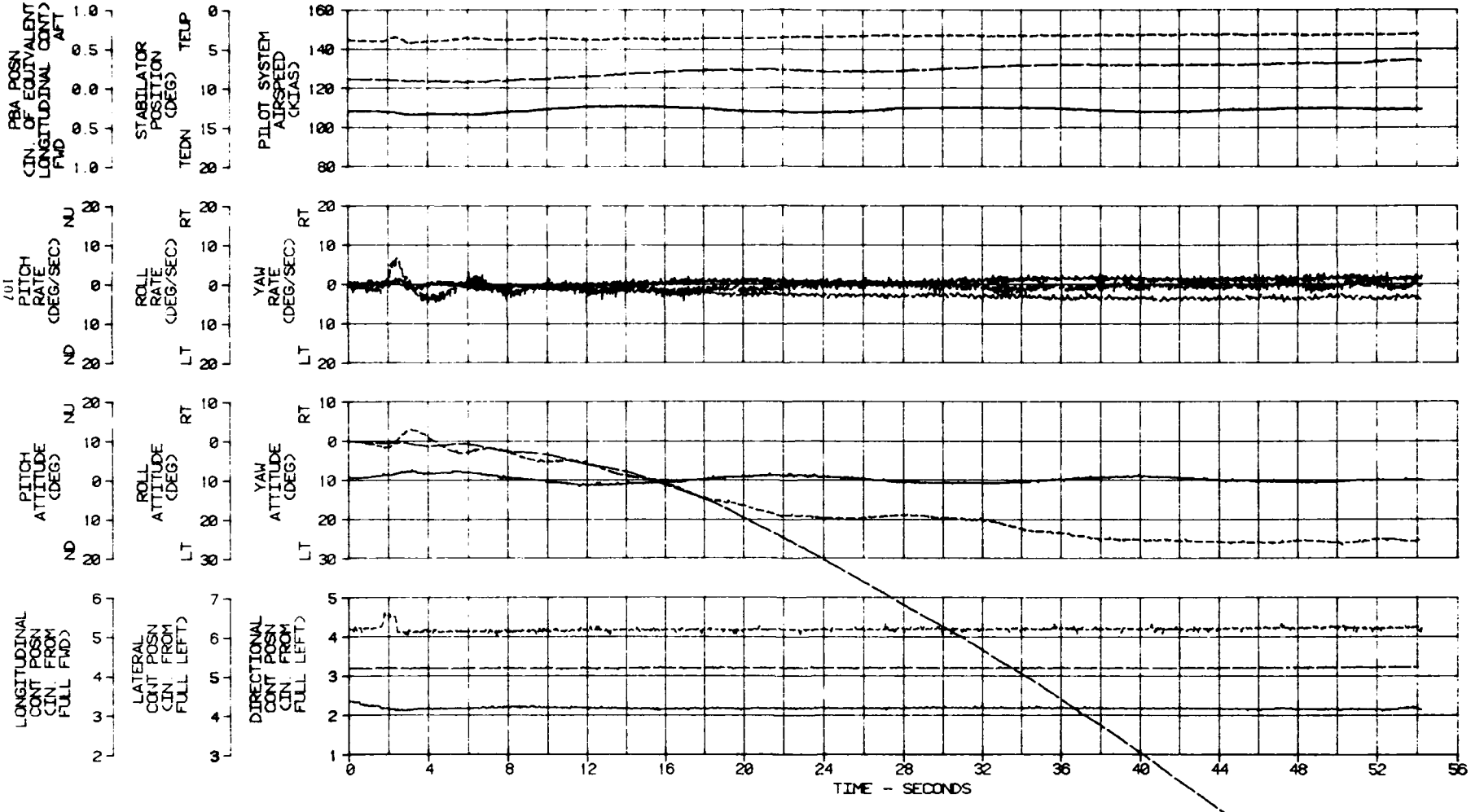


FIGURE 55

LEFT LATERAL PULSE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16540	361.9(AFT)	0.0RT	5180	13.5	258	142	LEVEL	ON OFF OFF AUTO (FAILURE MODE 6)

SOLID LINE — SHORT DASH — LONG DASH

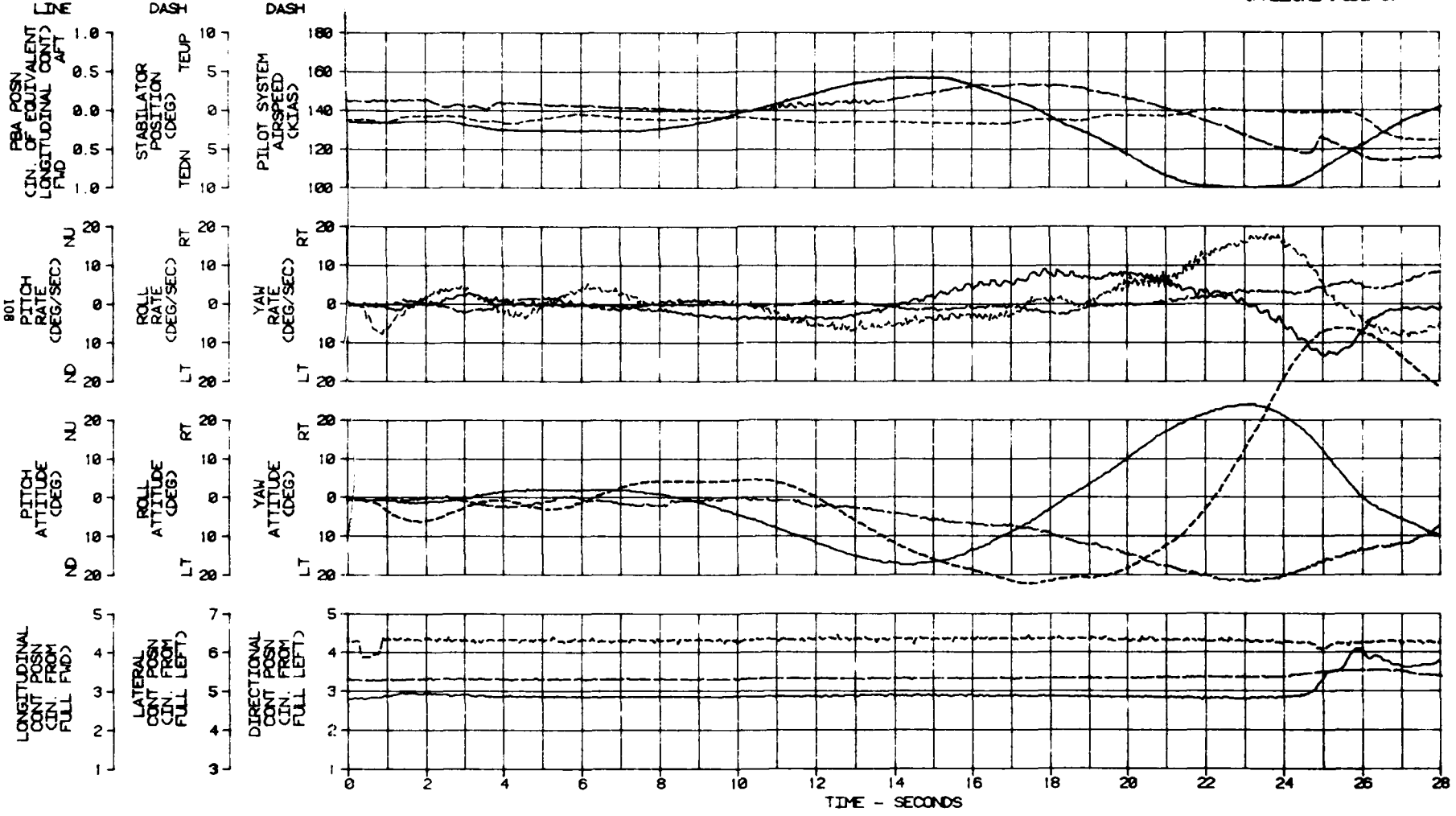


FIGURE 56

LEFT LATERAL PULSE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16720	362.3(AFT)	0.2RT	5220	13.0	257	150	LEVEL	ON OFF OFF AUTO (FAILURE MODE 6)

SOLID LINE — SHORT DASH — LONG DASH

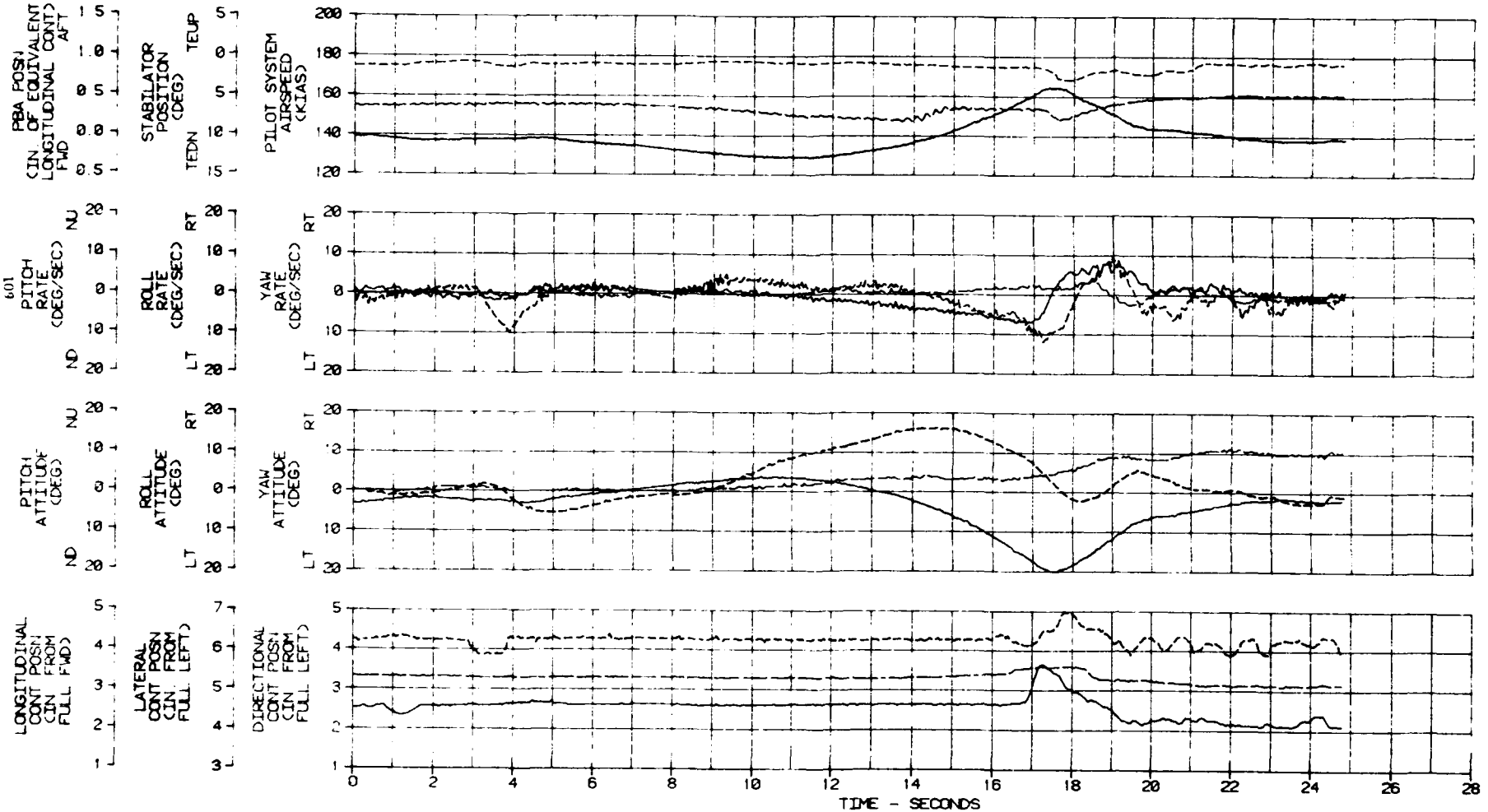


FIGURE 57

LEFT LATERAL PULSE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
22080	359.0(AFT)	0.1RT	3020	7.5	258	149	LEVEL	ON OFF OFF AUTO (FAILURE MODE 6)

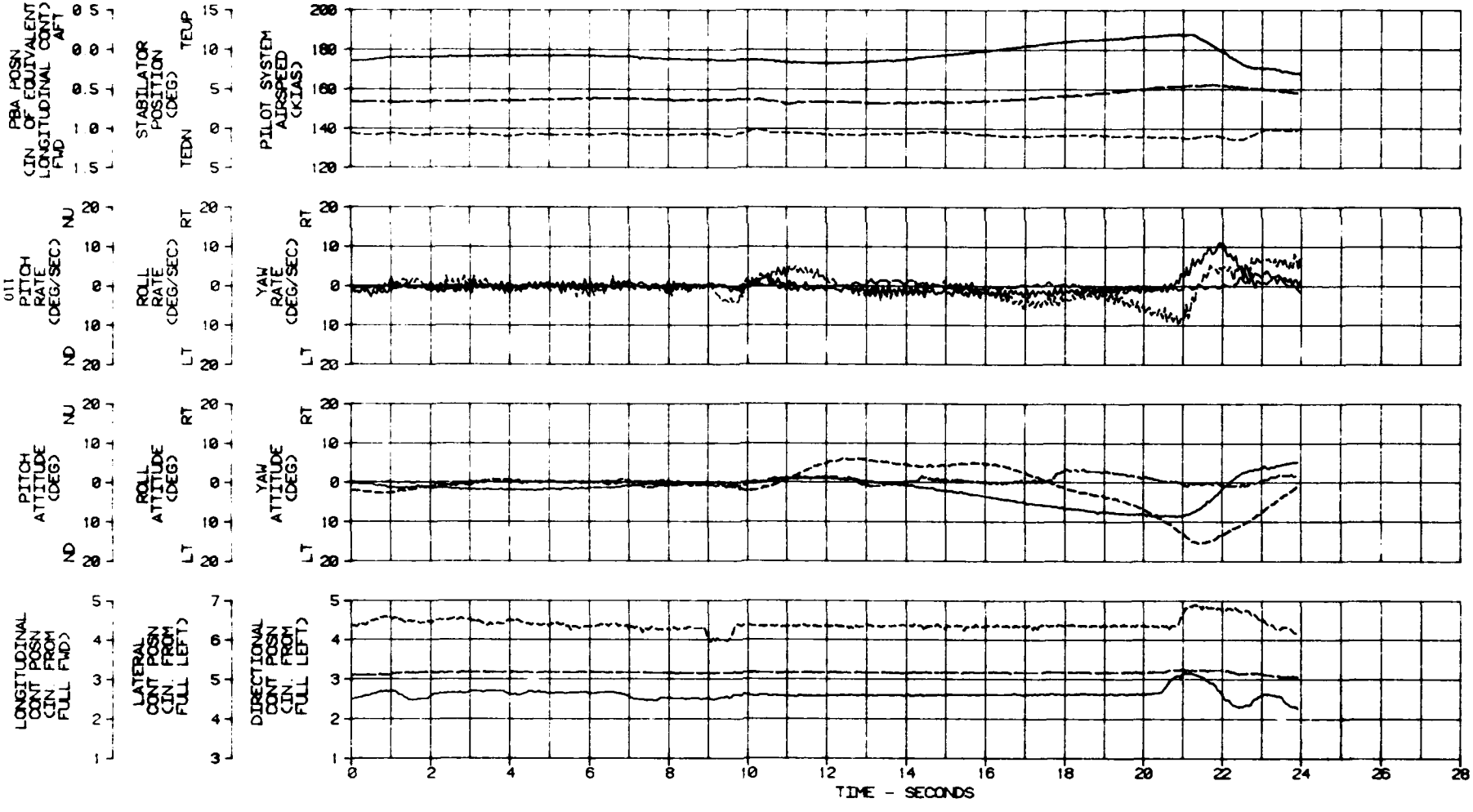


FIGURE 58
RIGHT LATERAL PULSE
UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
14440	364.0(AFT)	0.3RT	5100	-4.5	259	61	LEVEL	OFF OFF OFF AUTO (FAILURE MODE 7)

SOLID LINE — SHORT DASH — LONG DASH

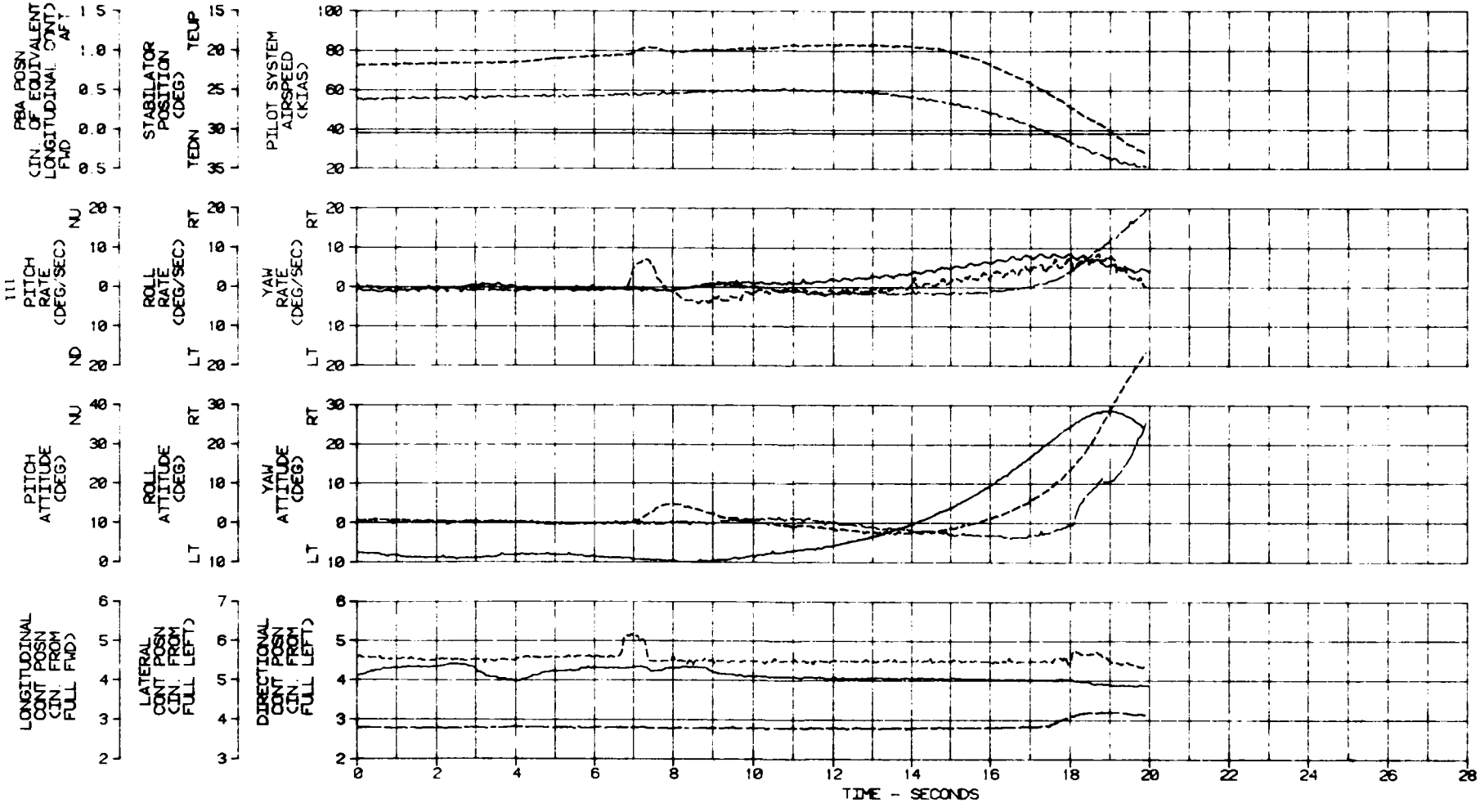


FIGURE 59

RIGHT LATERAL PULSE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16260	361.0(AFT)	0.2RT	4980	9.5	258	61	LEVEL	OFF OFF OFF AUTO (FAILURE MODE 7)

SOLID LINE — SHORT DASH — LONG DASH

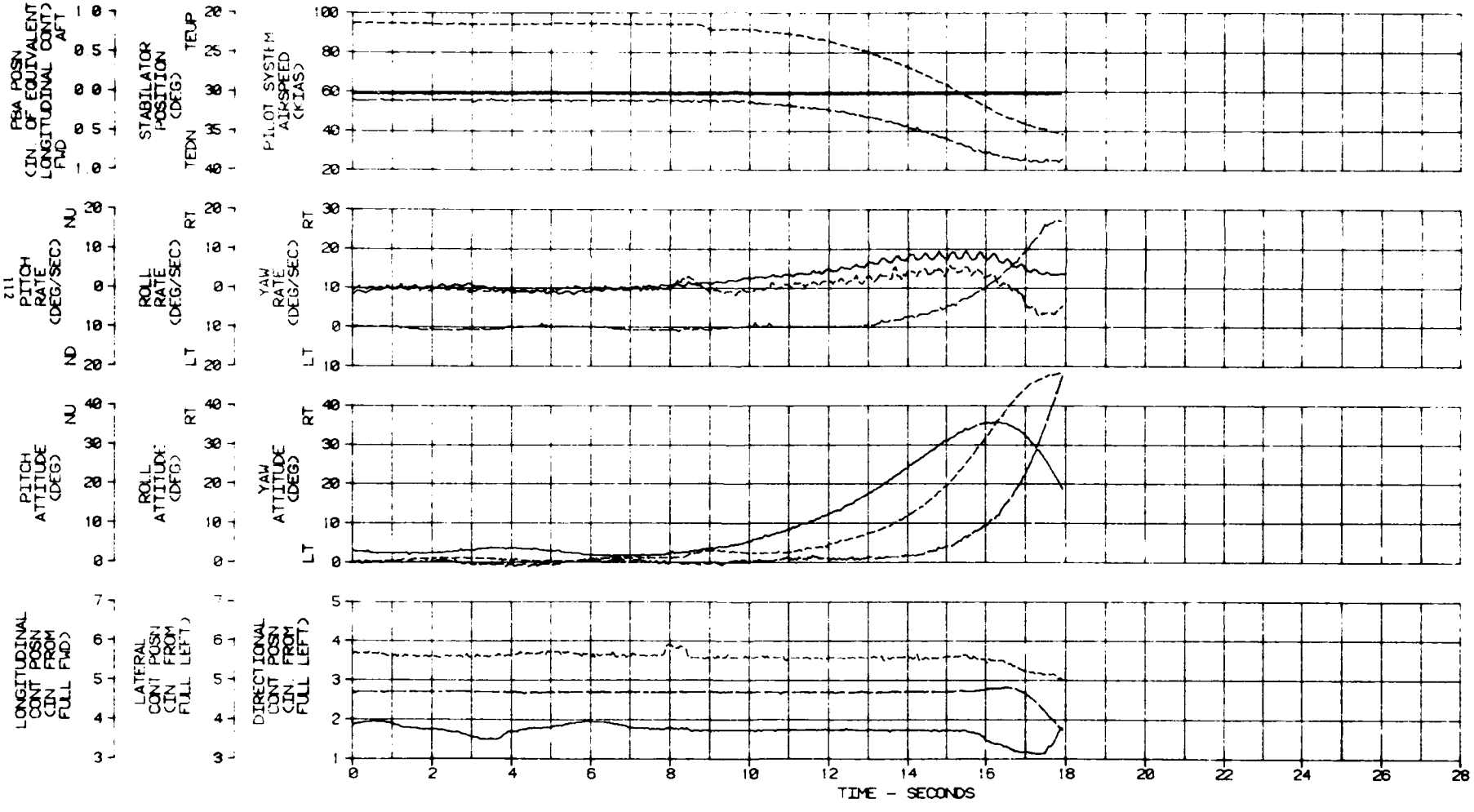


FIGURE 60

LEFT LATERAL PULSE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
21660	357.8(AFT)	0.1RT	2520	4.0	258	62	LEVEL	OFF OFF OFF AUTO (FAILURE MODE 7)

SOLID LINE — SHORT DASH — LONG DASH

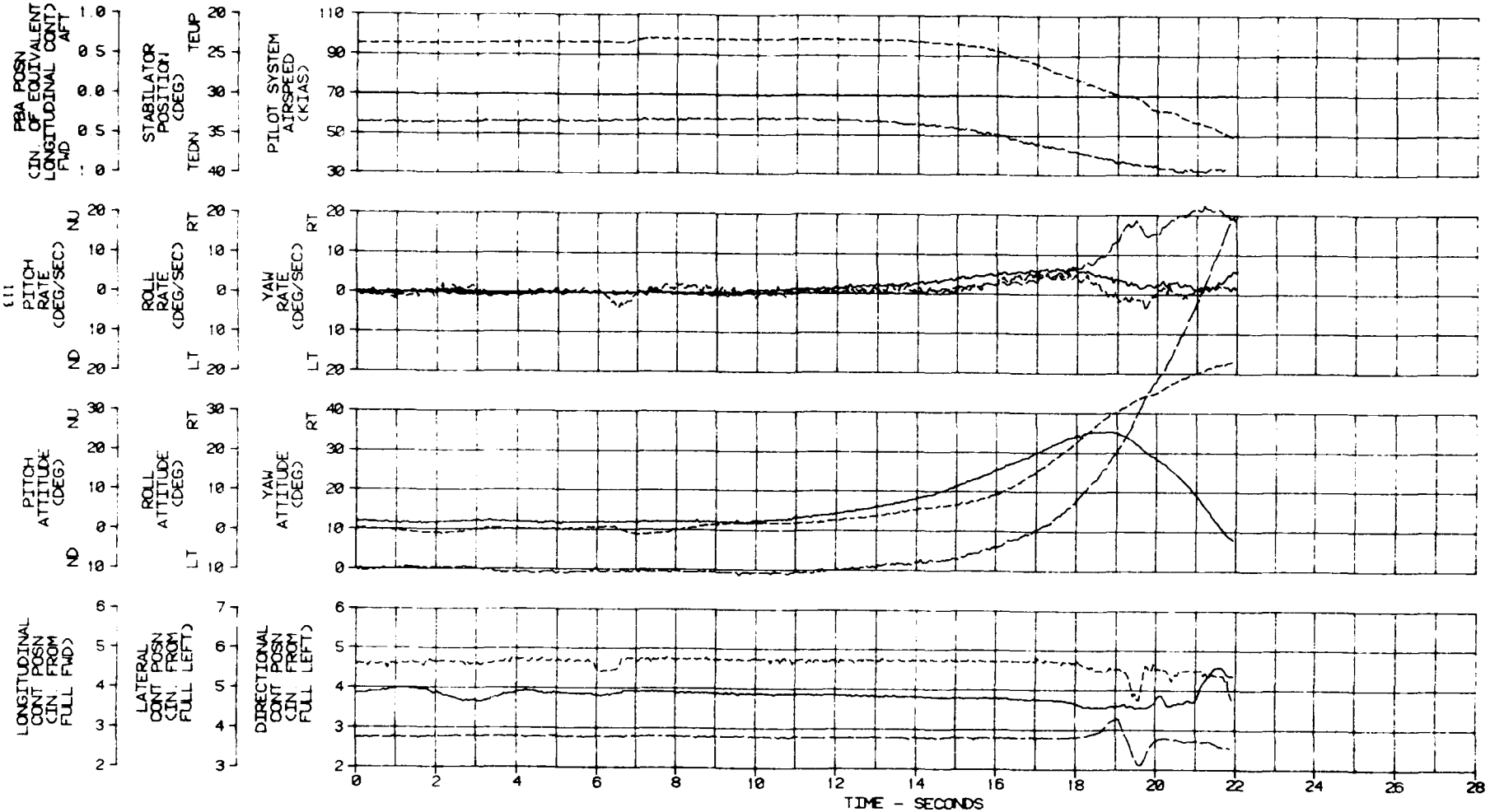


FIGURE 61

LEFT LATERAL PULSE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16440	361.5(AFT)	0.2RT	4860	8.0	258	92	LEVEL	OFF OFF OFF AUTO (FAILURE MODE 7)

SOLID LINE — SHORT DASH — LONG DASH

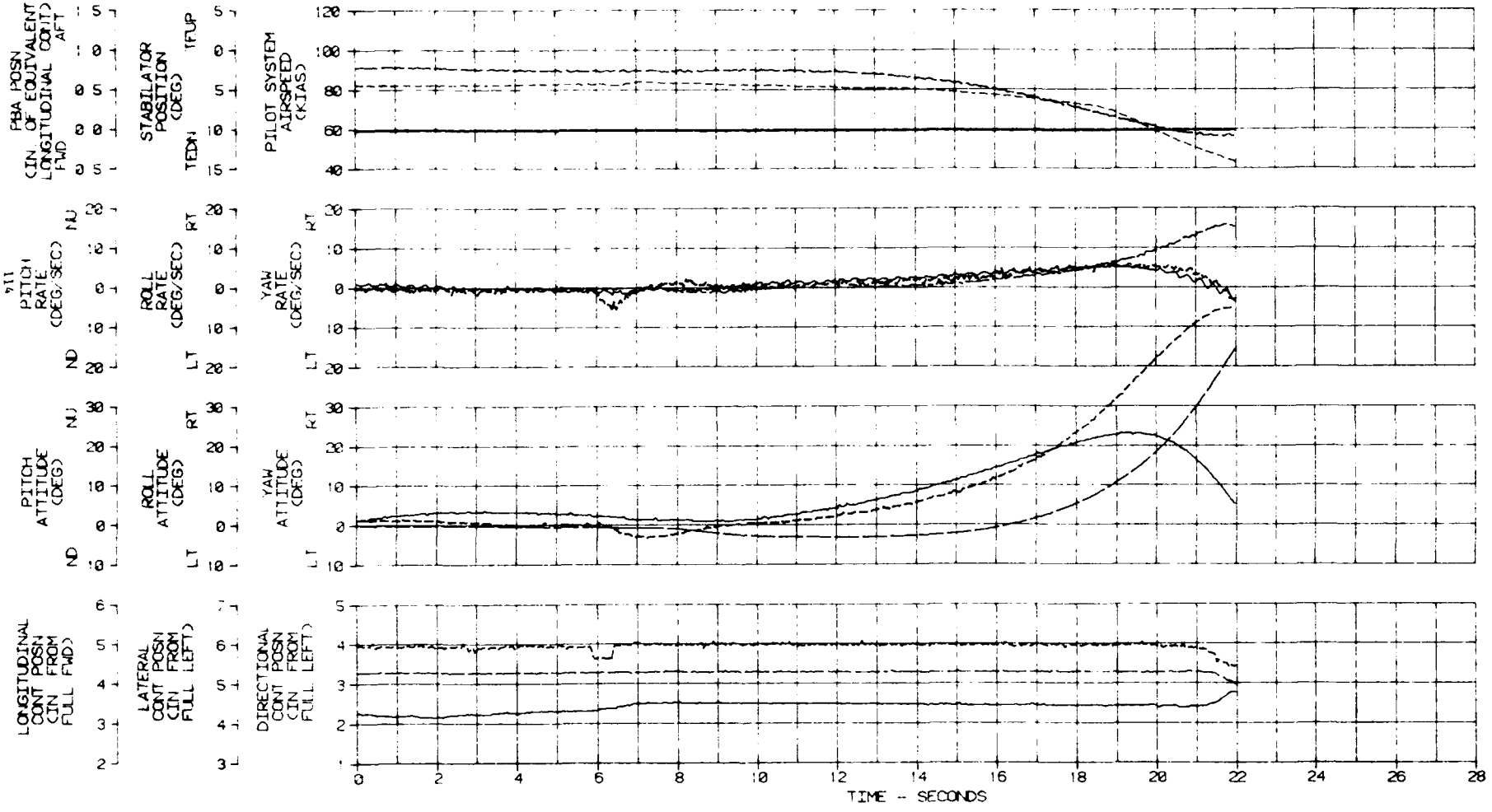


FIGURE 62

RIGHT LATERAL PULSE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
14380	363.7(AFT)	0.4RT	4880	14.5	258	117	LEVEL	OFF OFF OFF AUTO (FAILURE MODE 7)

SOLID LINE — SHORT DASH — LONG DASH

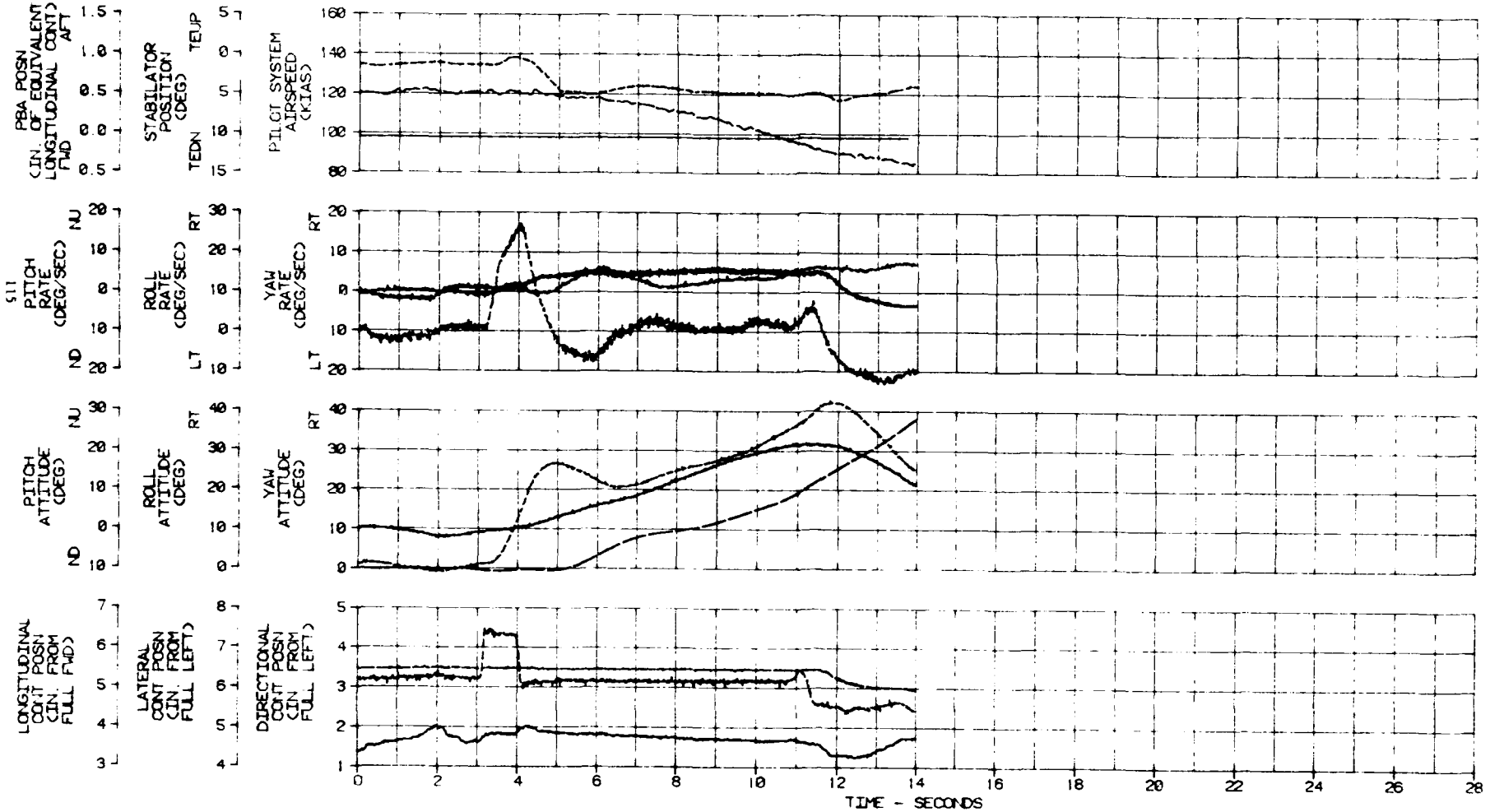


FIGURE 63
LEFT LATERAL PULSE
UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16780	362.7(AFT)	0.2RT	4960	7.5	258	122	LEVEL	OFF OFF OFF AUTO (FAILURE MODE 7)

SOLID LINE — SHORT DASH — LONG DASH

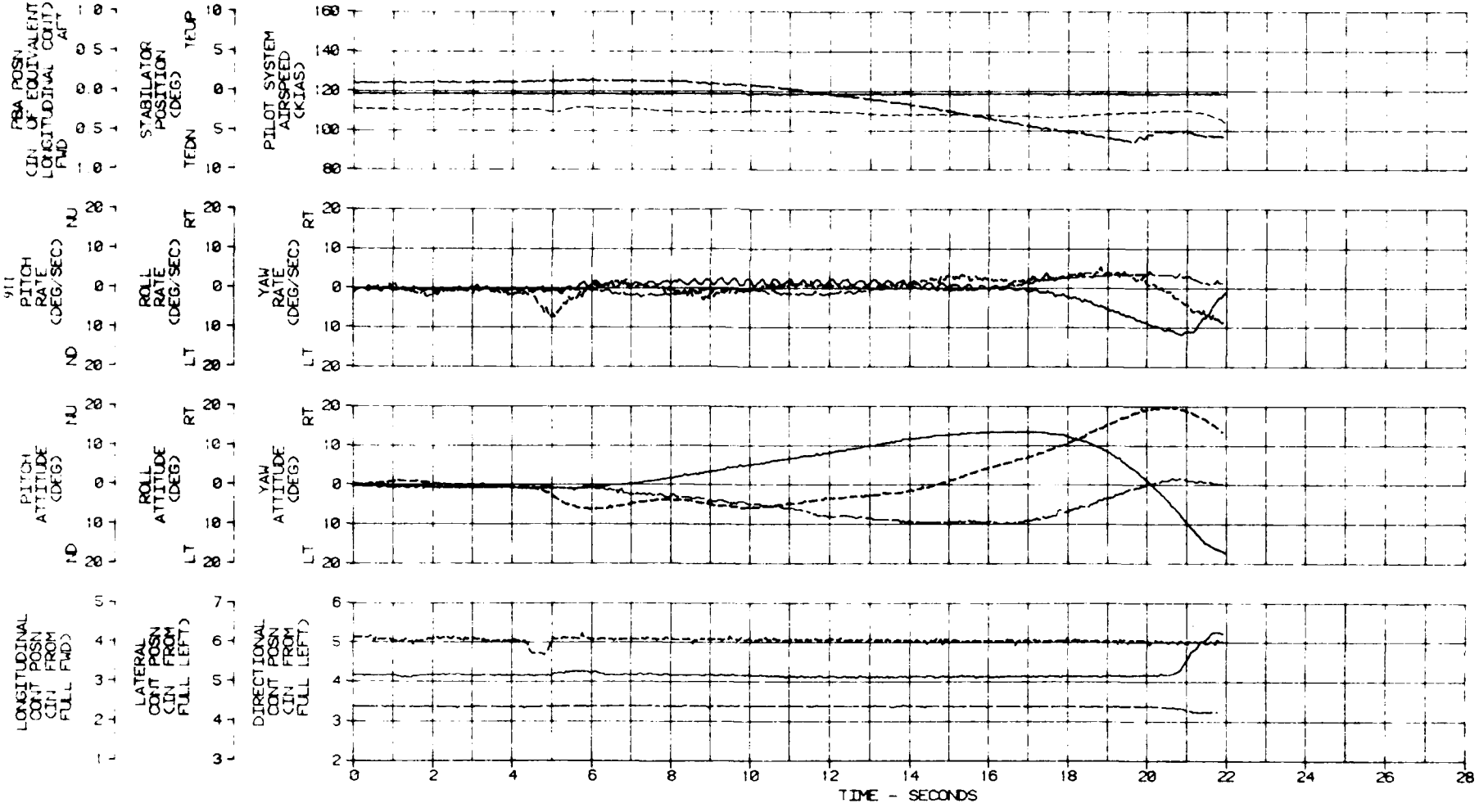


FIGURE 64

RIGHT LATERAL PULSE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
22200	359.4(AFT)	0.1RT	2600	3.0	258	123	LEVEL	OFF OFF OFF AUTO (FAILURE MODE 7)

SOLID LINE — SHORT DASH — LONG DASH

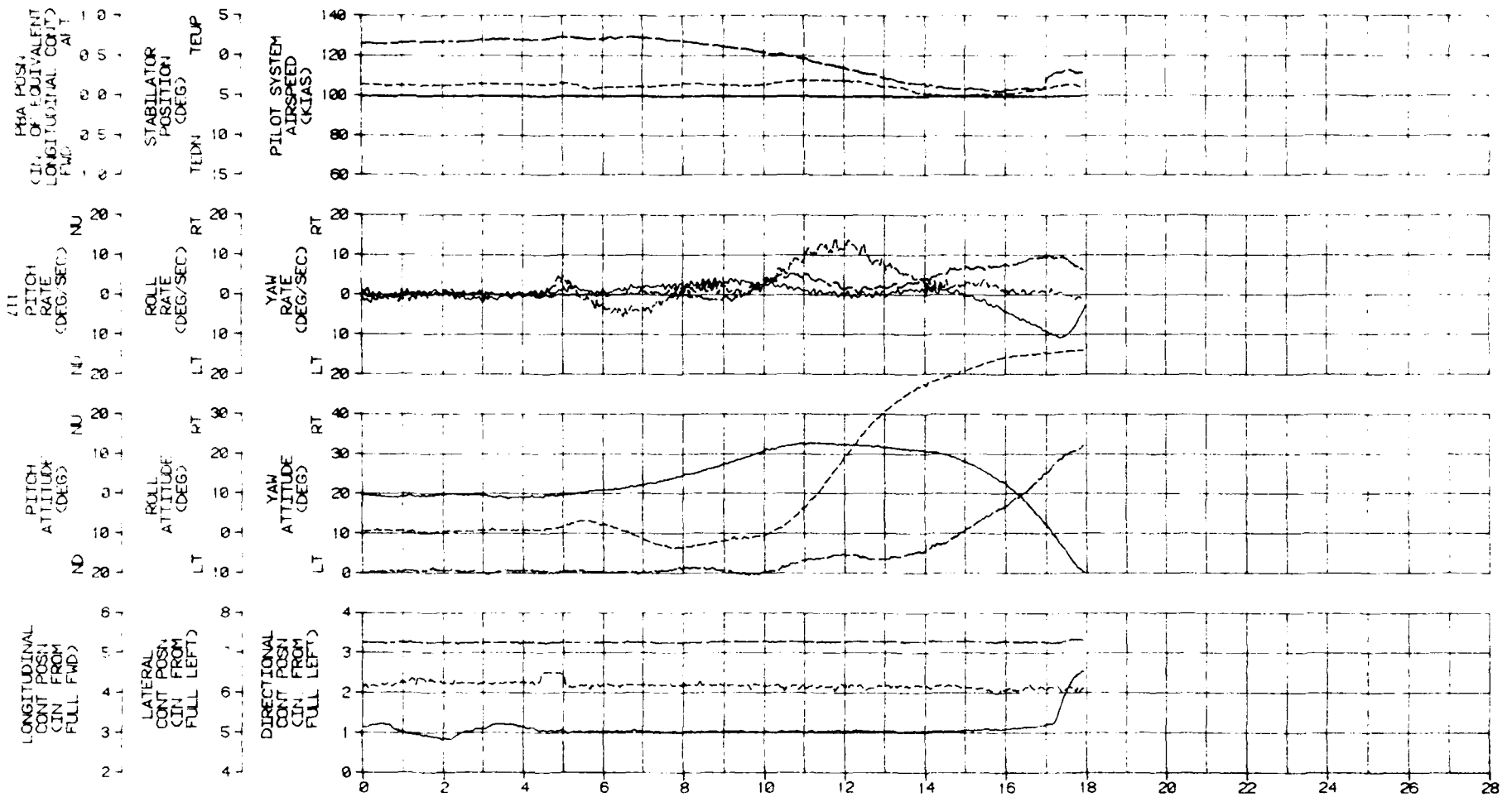


FIGURE 65

LEFT LATERAL PULSE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16760	382.8(AFT)	0.3RT	5060	4.5	258	141	LEVEL	OFF OFF OFF AUTO (FAILURE MODE 7)

SOLID LINE — SHORT DASH — LONG DASH

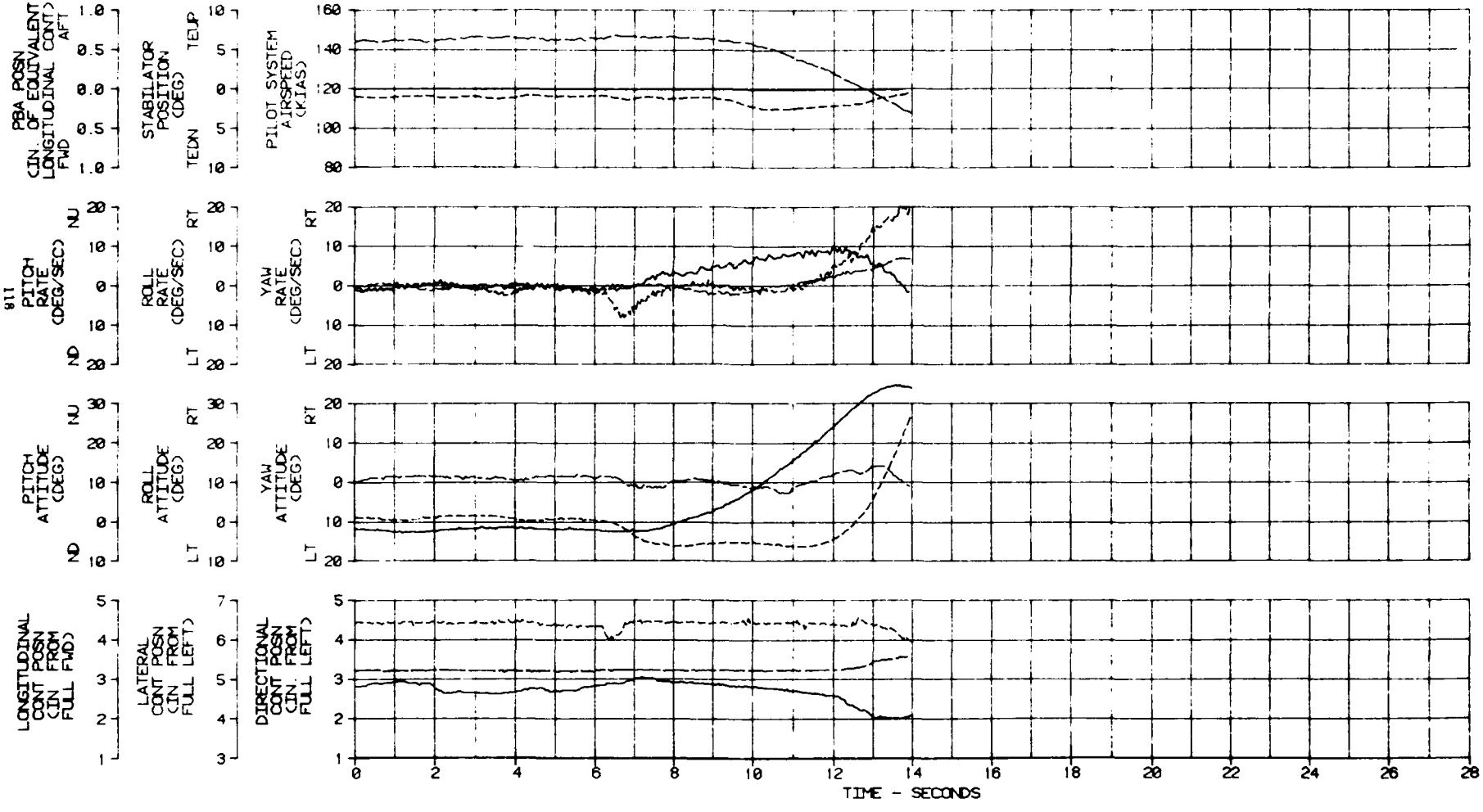


FIGURE 66

RIGHT LATERAL PULSE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
14380	363.7(AFT)	0.3RT	4640	16.5	258	150	LEVEL	OFF OFF OFF AUTO (FAILURE MODE 7)

SOLID LINE — SHORT DASH — LONG DASH

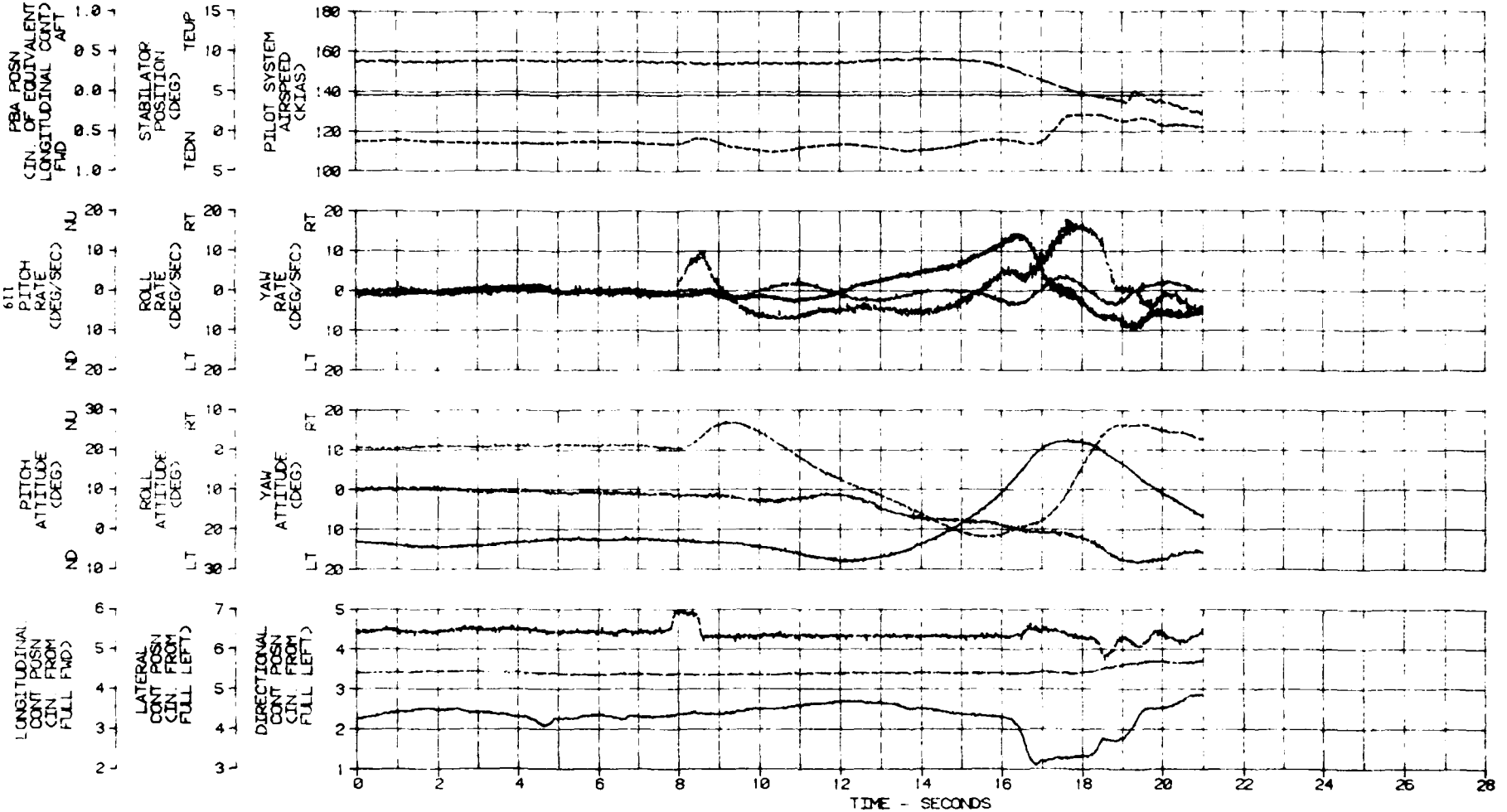


FIGURE 67

LEFT LATERAL PULSE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16880	363.2(AFT)	0.2RT	5020	9.0	258	151	LEVEL	OFF OFF OFF AUTO (FAILURE MODE 7)

SOLID LINE — SHORT DASH — LONG DASH

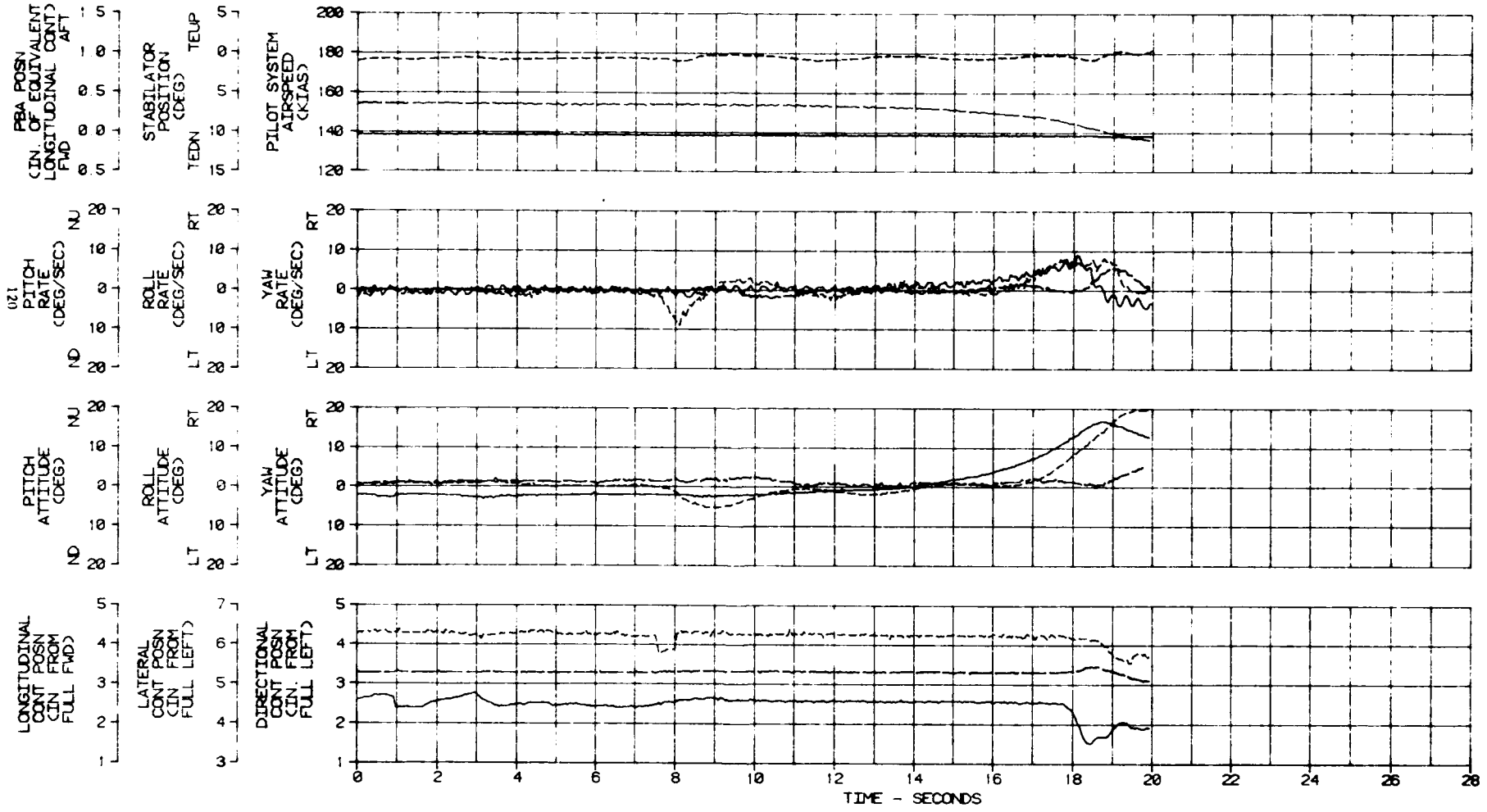


FIGURE 68
LEFT LATERAL PULSE
UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
21920	358.6(AFT)	0.1RT	3280	7.0	257	151	LEVEL	OFF OFF OFF AUTO (FAILURE MODE 7)

SOLID LINE — SHORT DASH — LONG DASH

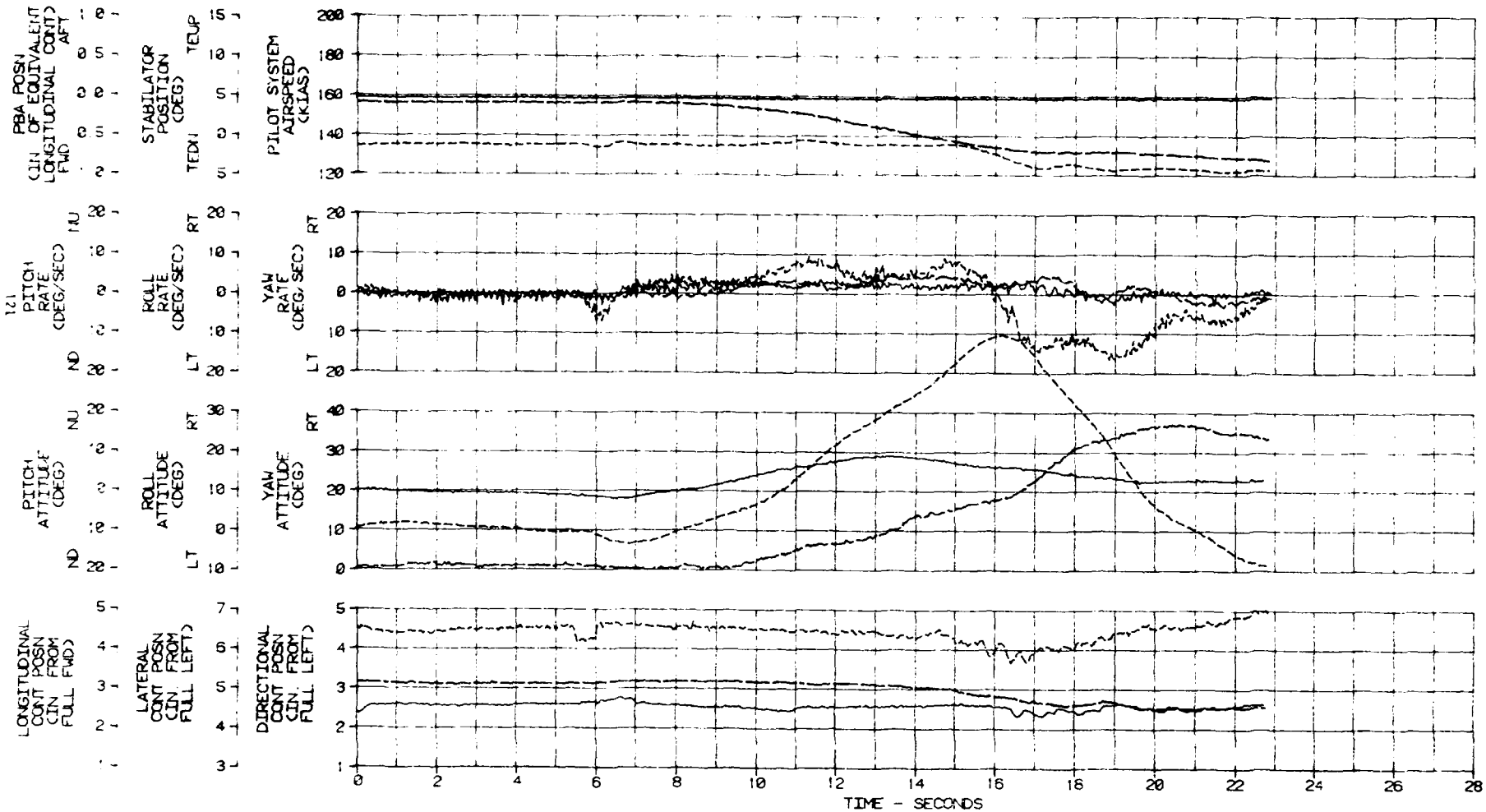


FIGURE 69

LEFT LATERAL PULSE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB (FAILURE MODE 8)
16760	362.3(AFT)	0.2RT	5020	12.5	257	61	LEVEL	ON OFF OFF OFF

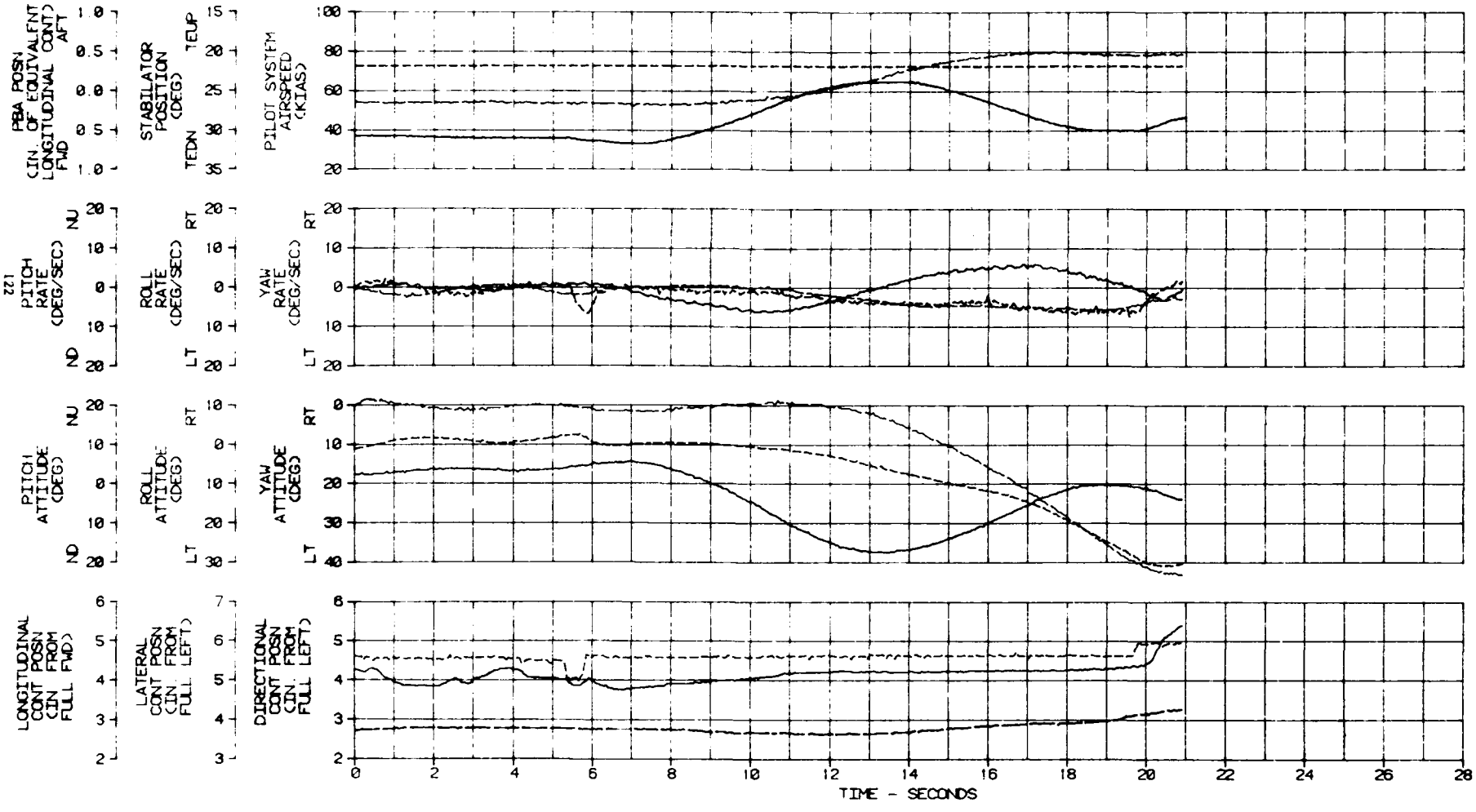


FIGURE 70

LEFT LATERAL PULSE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16520	361.8(AFT)	0.2RT	4980	13.0	257	93	LEVEL	ON OFF OFF OFF (FAILURE MODE 8)

SOLID LINE — SHORT DASH — LONG DASH

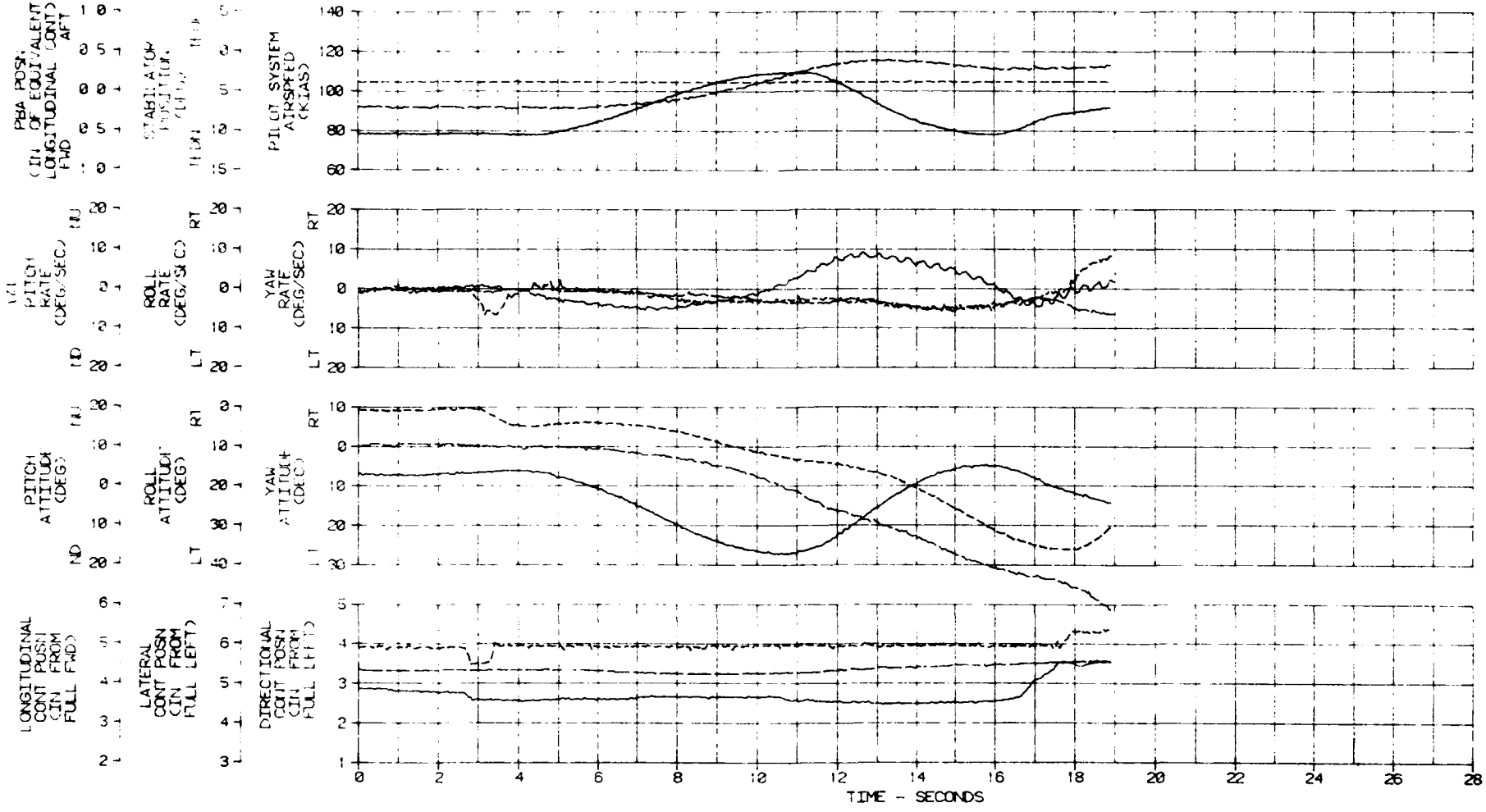


FIGURE 71
RIGHT LATERAL PULSE
UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16580	362.2 (AFT)	0.2 RT	4820	10.5	257	123	LEVEL	ON OFF OFF OFF (FAILURE MODE 8)

SOLID LINE
SHORT DASH
LONG DASH

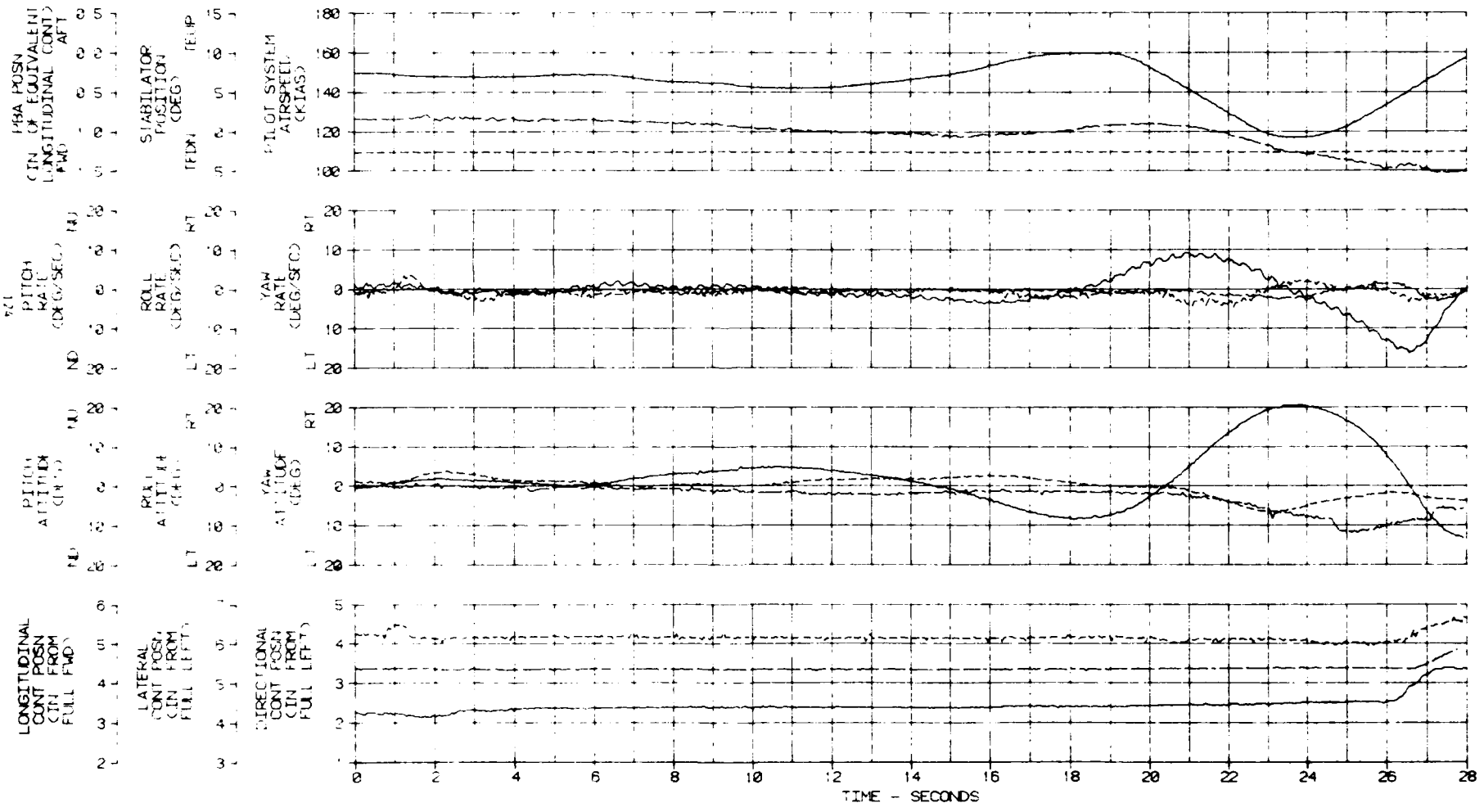


FIGURE 72

RIGHT LATERAL PULSE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB (FAILURE MODE 8)
16600	362.0 (AFT)	0.2 RT	4980	12.5	256	142	LEVEL	ON OFF OFF OFF

SOLID LINE — SHORT DASH — LONG DASH

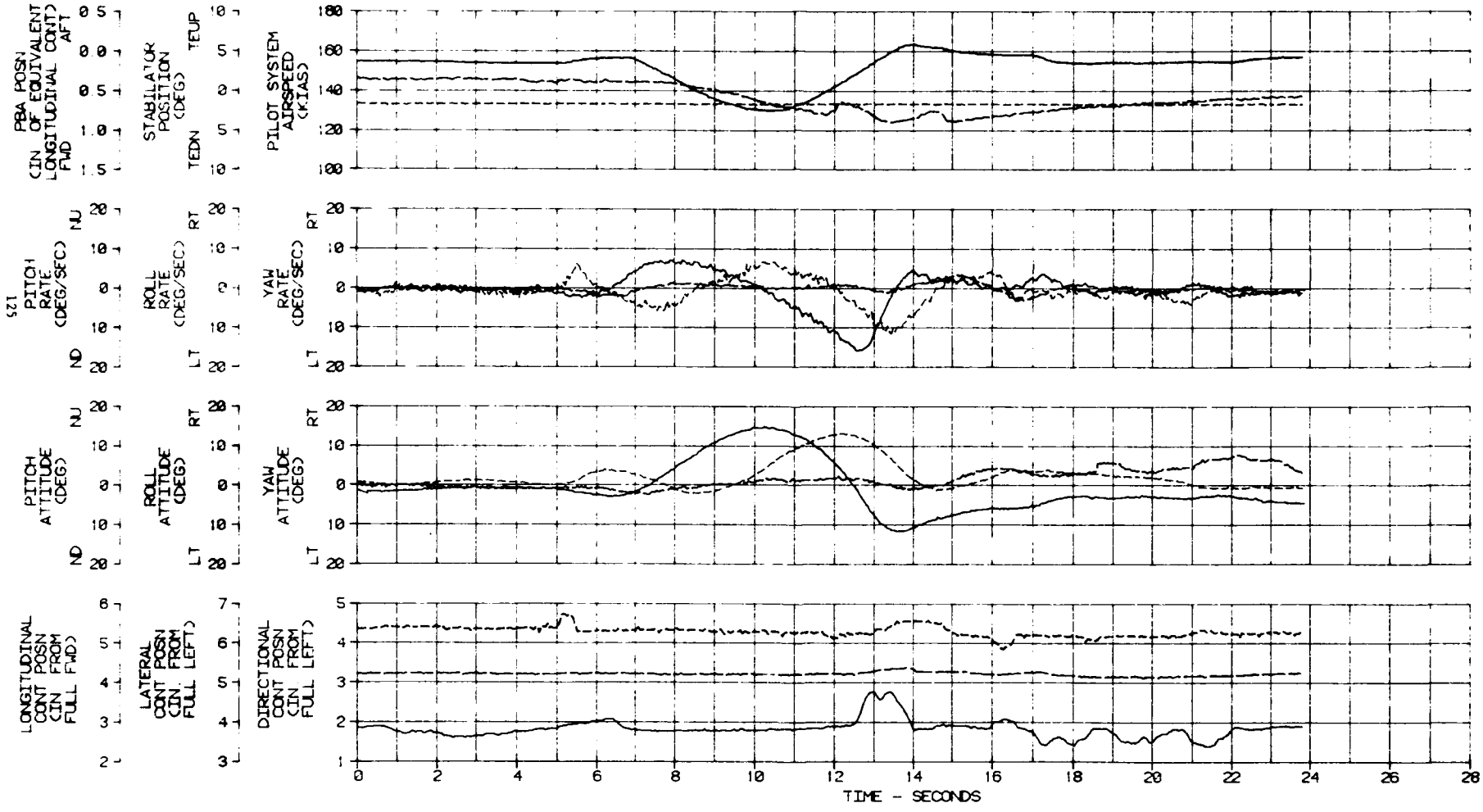


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FIGURE 73

LEFT LATERAL PULSE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16580	361.9 (AFT)	0.2 RT	5300	12.0	257	152	LEVEL	ON OFF OFF OFF (FAILURE MODE 8)

SOLID LINE — SHORT DASH — LONG DASH

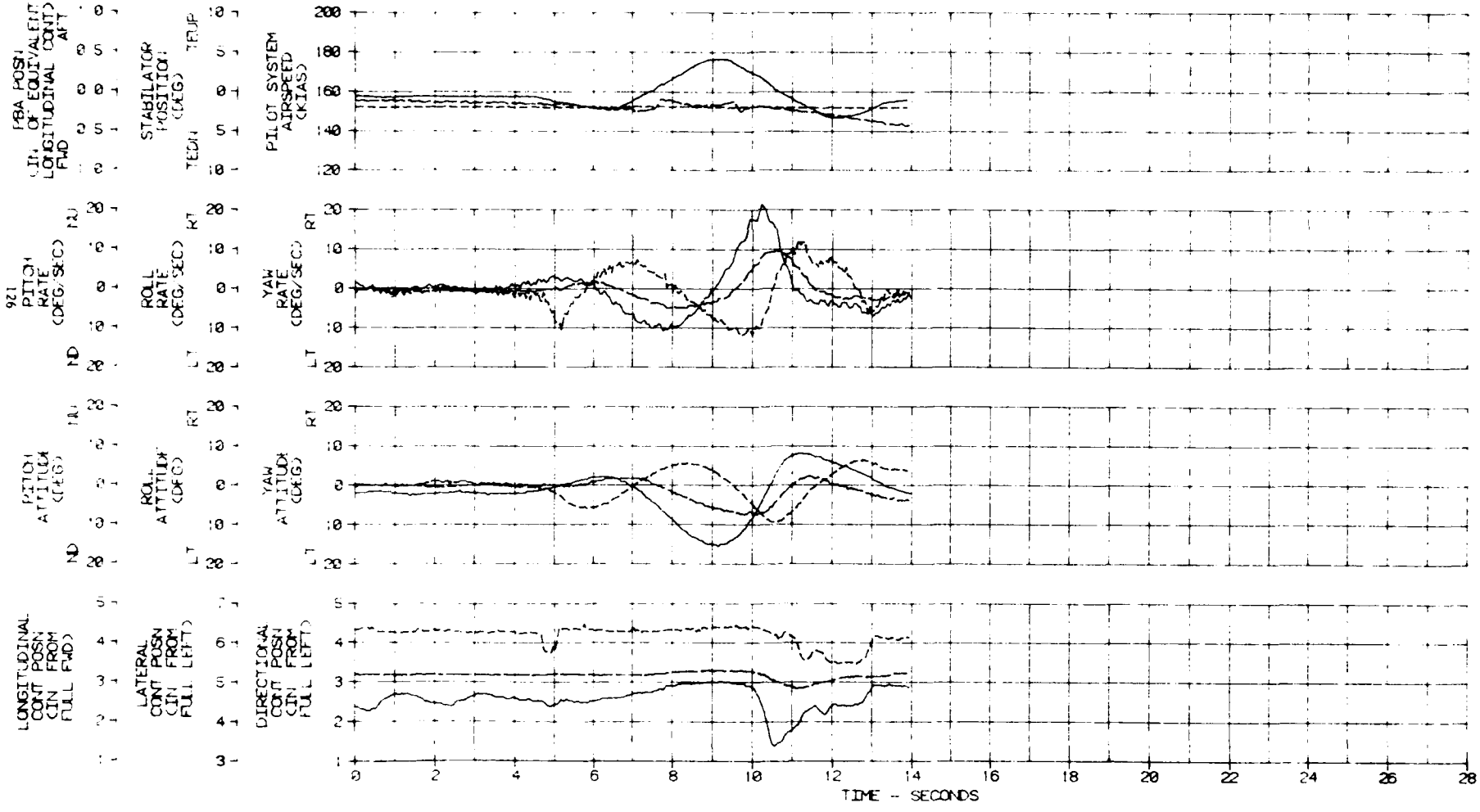

FIGURE 74

LEFT LATERAL PULSE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16580	362.2 (AFT)	0.3RT	4880	8.5	258	61	LEVEL	OFF OFF OFF OFF (FAILURE MODE 9)

SOLID LINE — SHORT DASH — LONG DASH

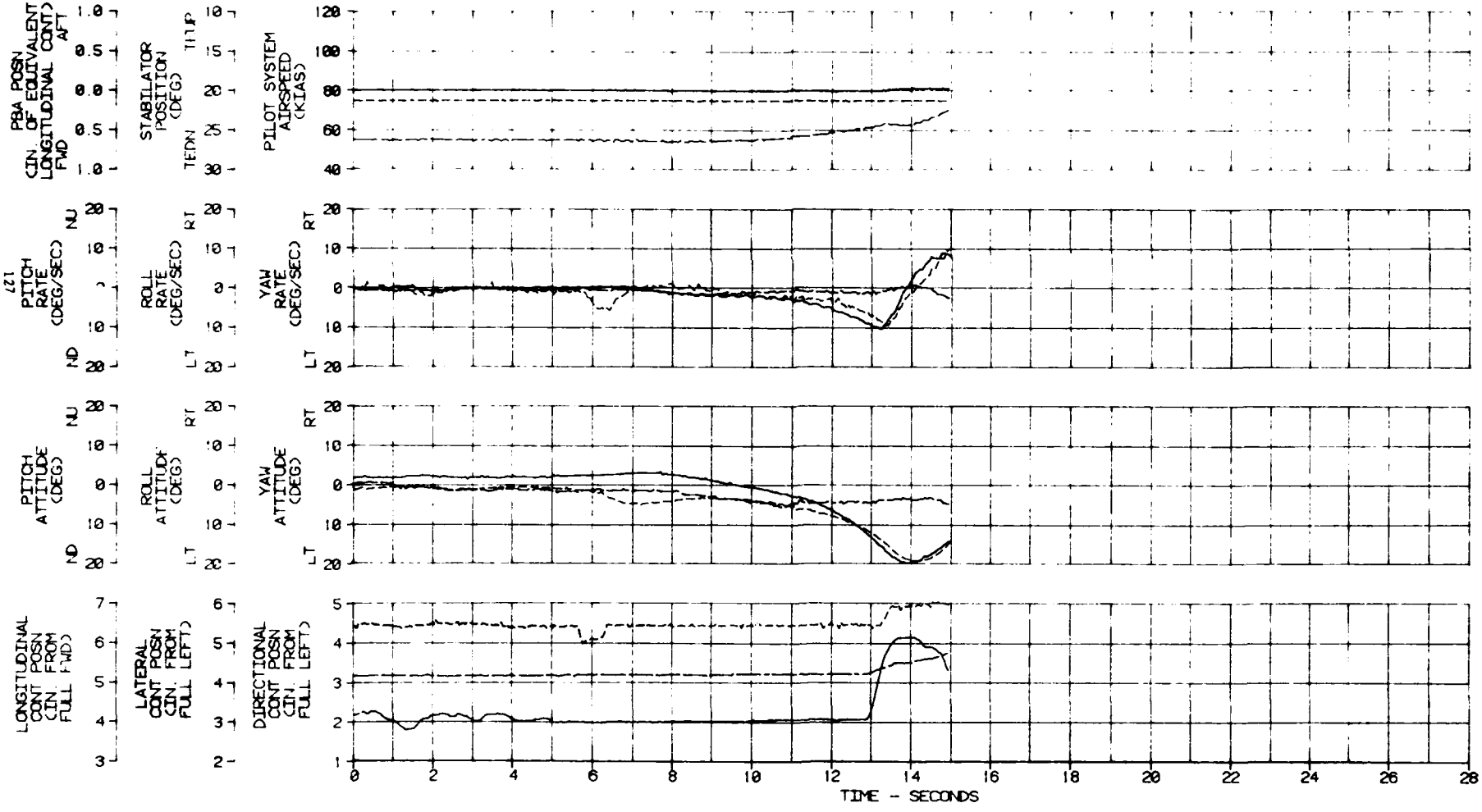

FIGURE 75

LEFT LATERAL PULSE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16400	361.5(AFT)	0.2RT	4900	9.0	258	92	LEVEL	OFF OFF OFF OFF (FAILURE MODE 9)

SOLID LINE — SHORT DASH — LONG DASH

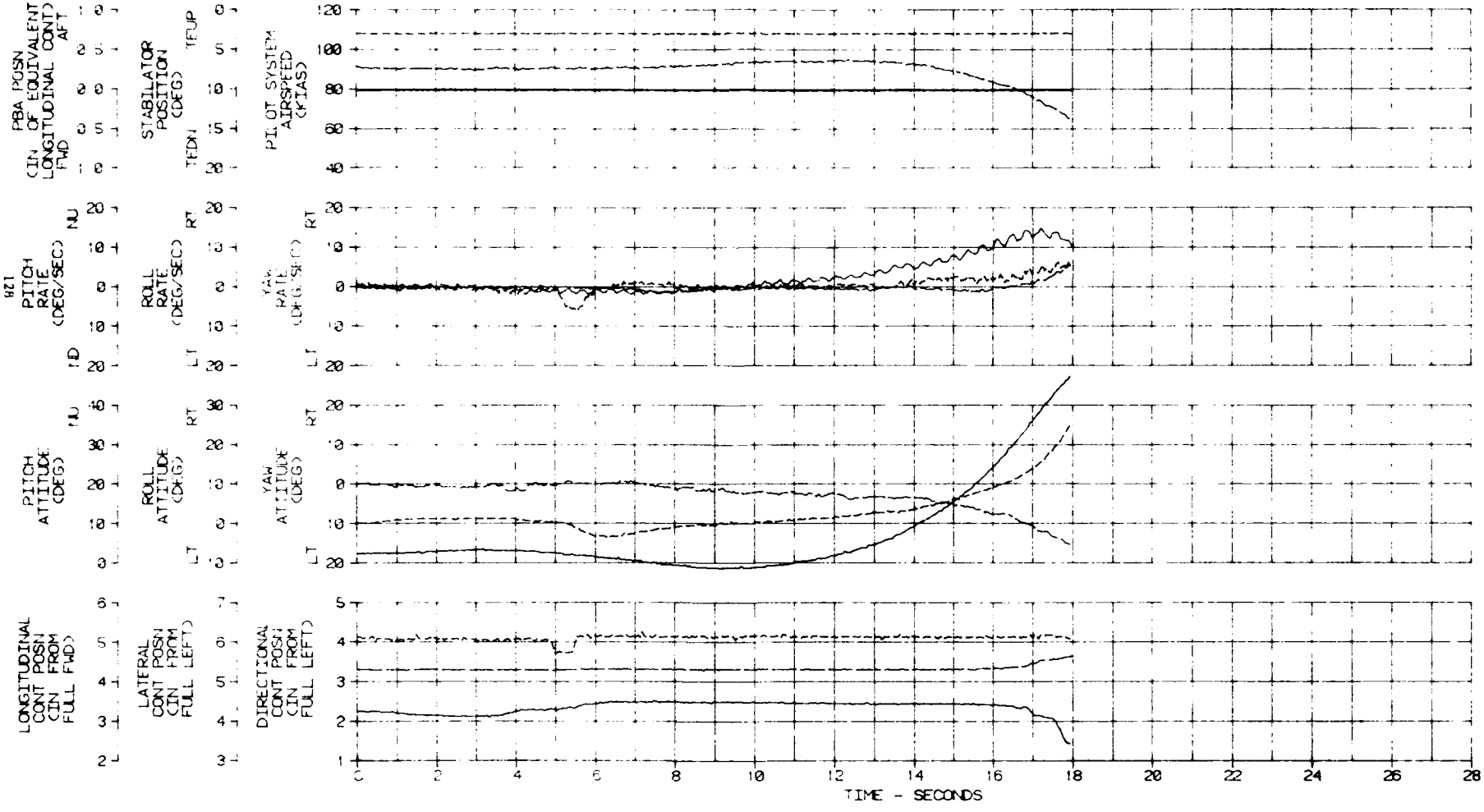

FIGURE 76

RIGHT LATERAL PULSE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16780	362.8(AFT)	0.2RT	4900	9.0	258	123	LEVEL	OFF OFF OFF OFF (FAILURE MODE 9)

SOLID LINE — SHORT DASH — LONG DASH

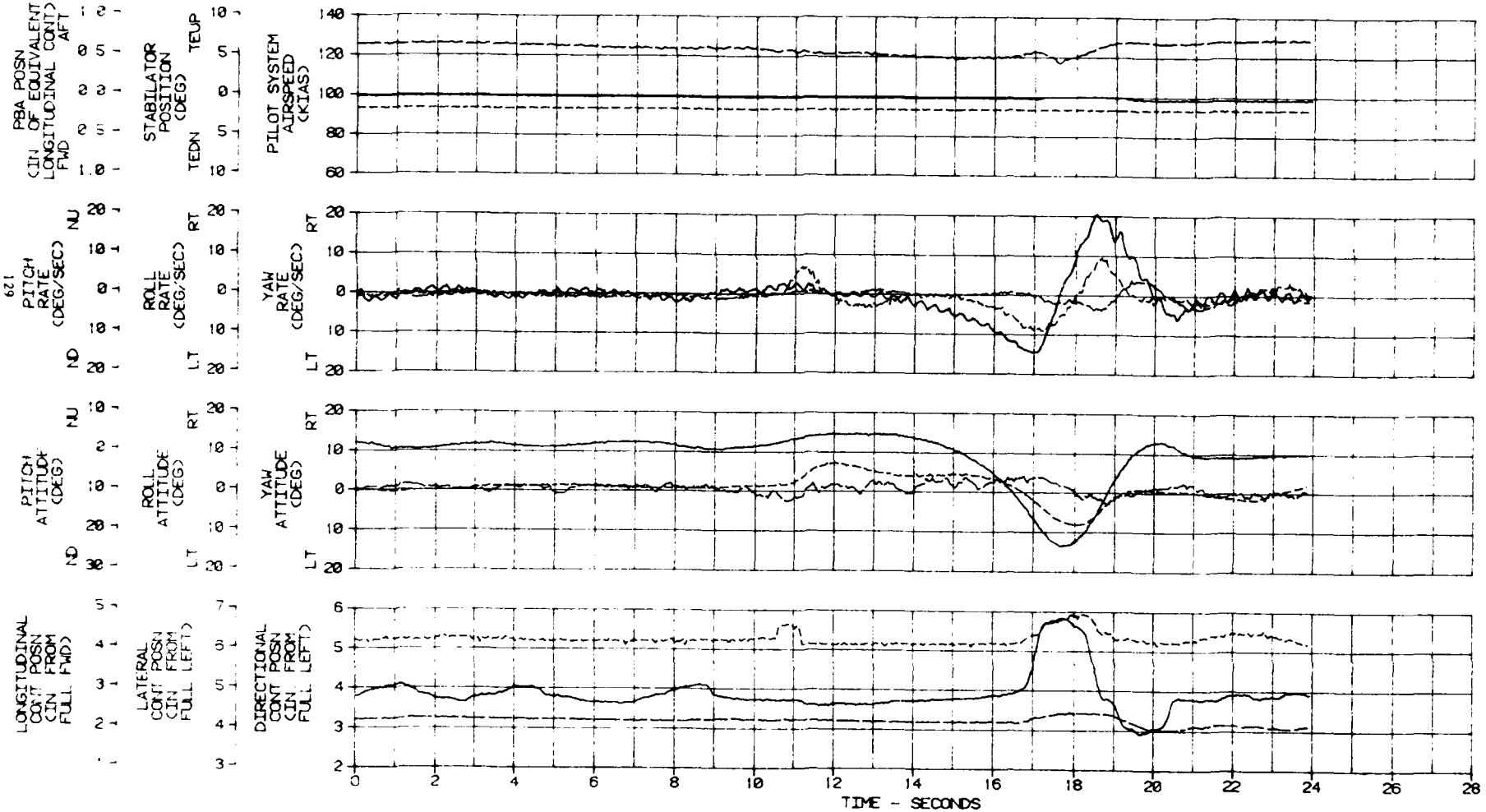

FIGURE 77

RIGHT LATERAL PULSE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
15840	362.6 (AFT)	0.1 RT	4960	11.5	259	142	LEVEL	OFF OFF OFF OFF (FAILURE MODE 9)

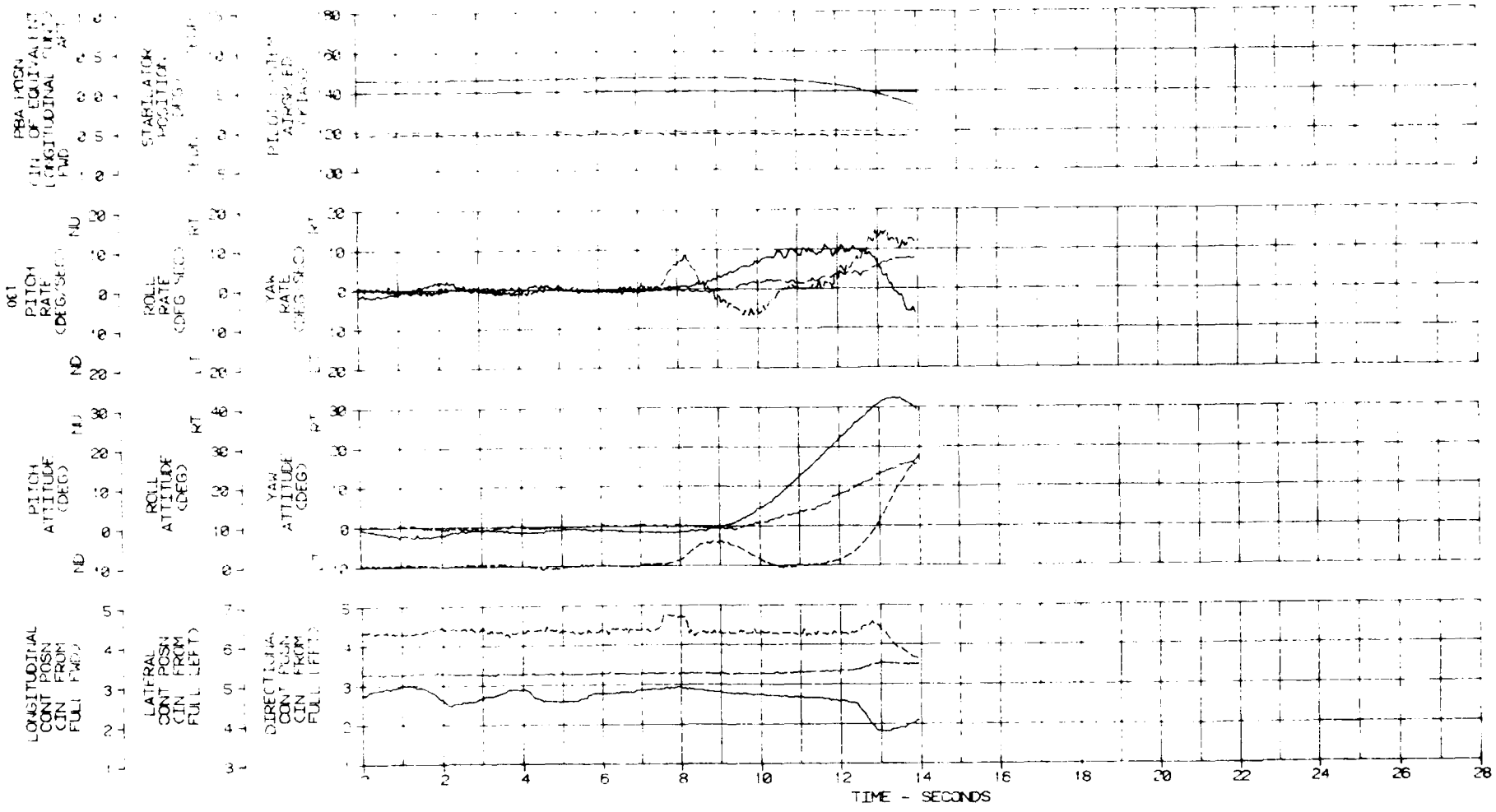

FIGURE 78
RIGHT LATERAL PULSE
UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16640	362.2 (AFT)	0.3 RT	4960	12.5	258	151	LEVEL	OFF OFF OFF OFF (FAILURE MODE 9)

SOLID LINE — SHORT DASH — LONG DASH

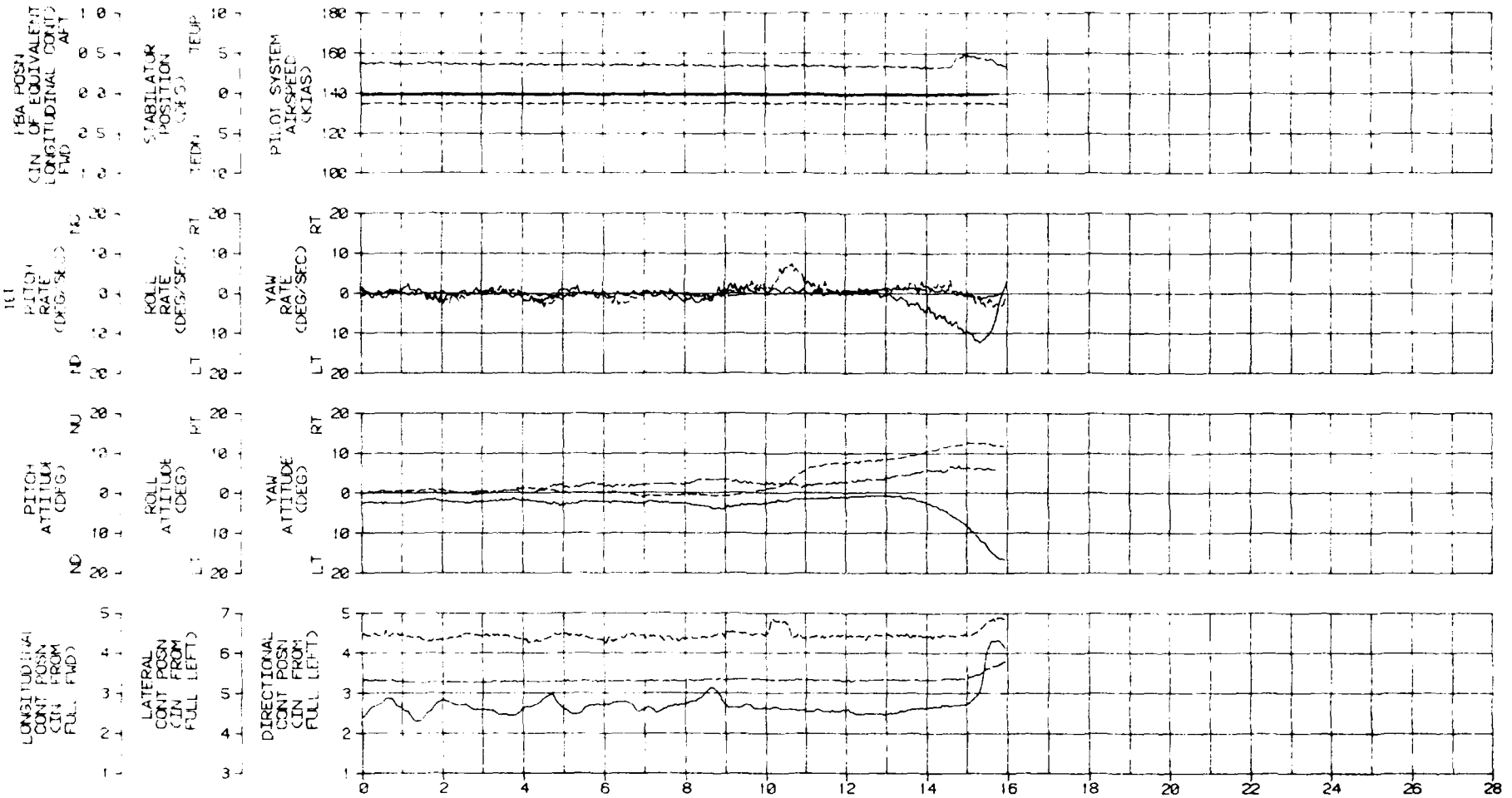

FIGURE 79

RIGHT DIRECTIONAL PULSE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16420	361.5(AFT)	0.3RT	4820	7.5	258	61	LEVEL	ON OFF OFF AUTO (FAILURE MODE 6)

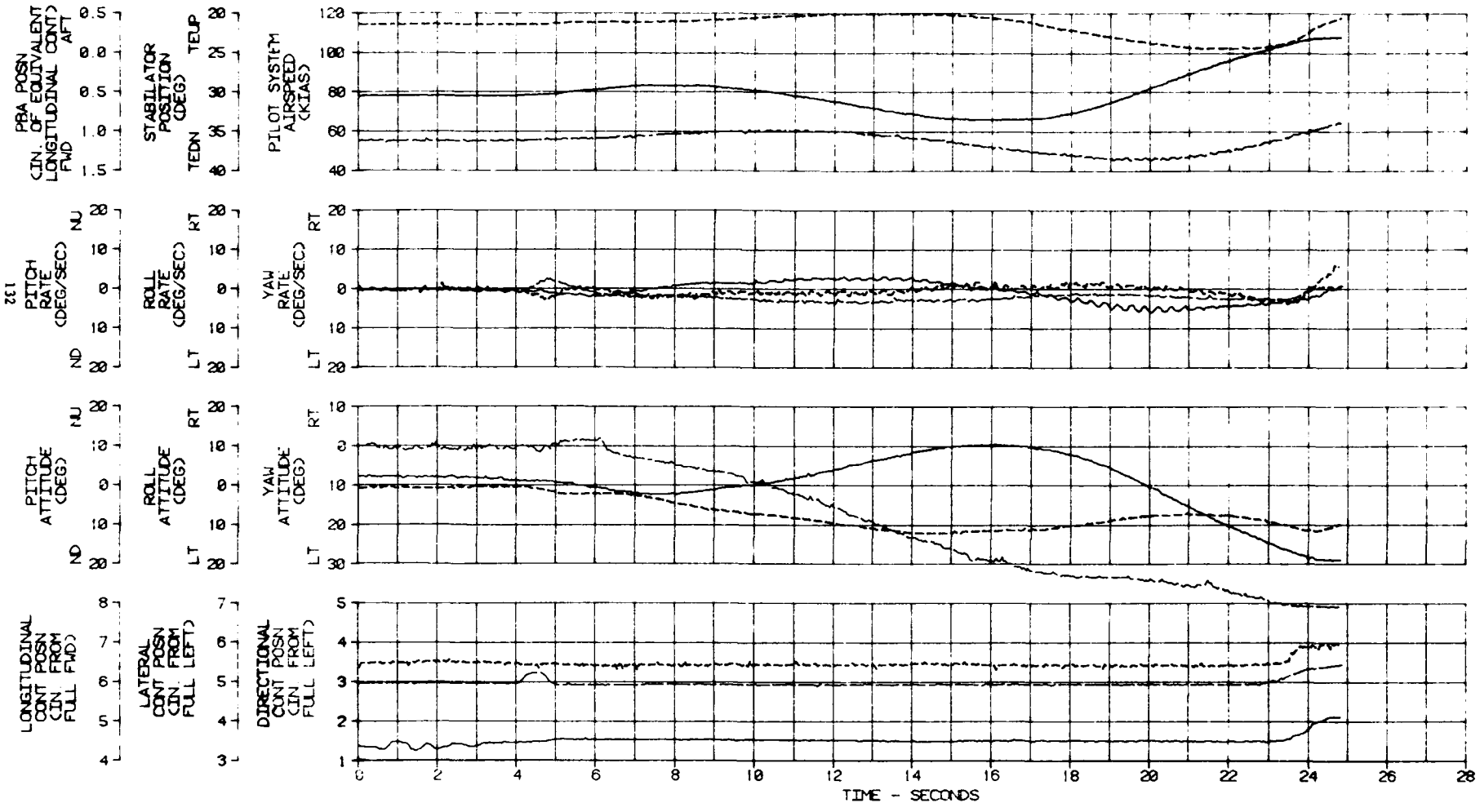

FIGURE 80

RIGHT DIRECTIONAL PULSE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
21660	357.8(AFT)	0 IRT	3120	9.0	258	61	LEVEL	ON OFF OFF AUTO (FAILURE MODE 6)

SOLID LINE — SHORT DASH — LONG DASH

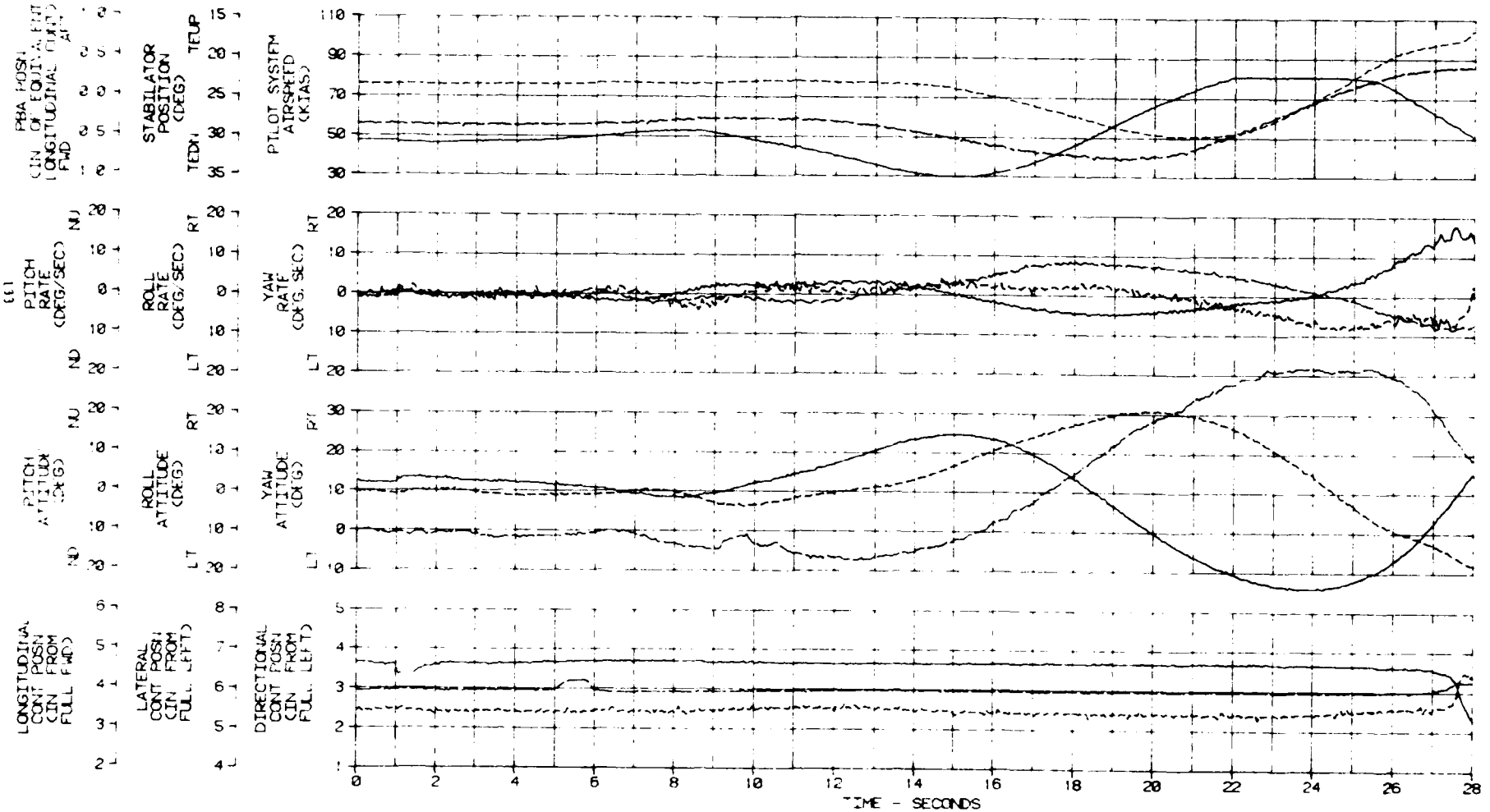

FIGURE 81
RIGHT DIRECTIONAL PULSE
UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB (FAILURE MODE 6)
16760	362.7 (AFT)	0.3 RT	4880	7.5	257	92	LEVEL	ON OFF OFF AUTO

SOLID LINE — SHORT DASH — LONG DASH

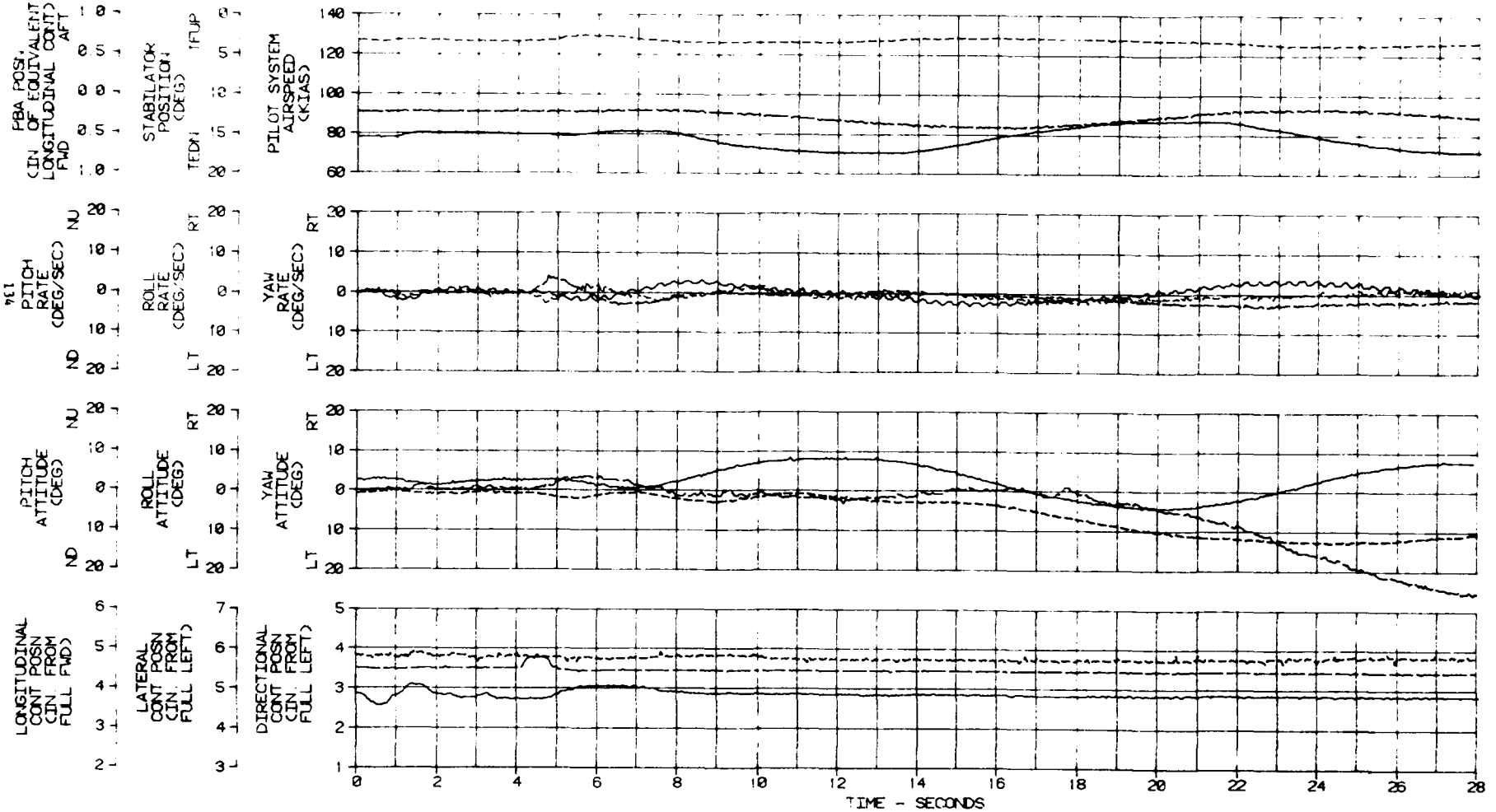

FIGURE 82

LEFT DIRECTIONAL PULSE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16560	362.0(AFT)	0.2RT	4960	7.5	258	122	LEVEL	ON OFF OFF AUTO (FAILURE MODE 6)

SOLID LINE — SHORT DASH — LONG DASH

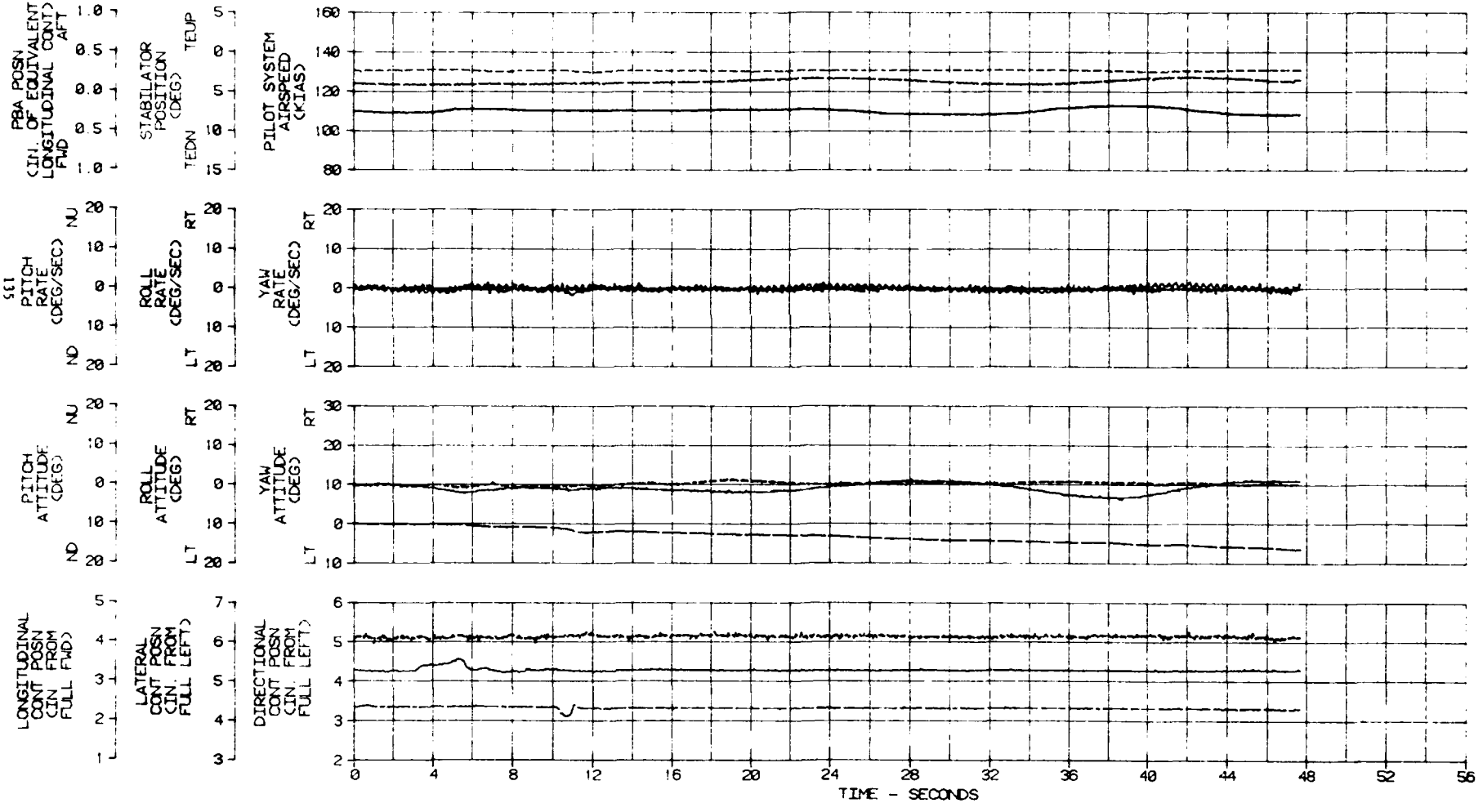

FIGURE 83

RIGHT DIRECTIONAL PULSE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
22140	359.2(AFT)	0.1RT	3240	8.5	258	121	LEVEL	ON OFF OFF AUTO (FAILURE MODE 6)

SOLID LINE — SHORT DASH — LONG DASH

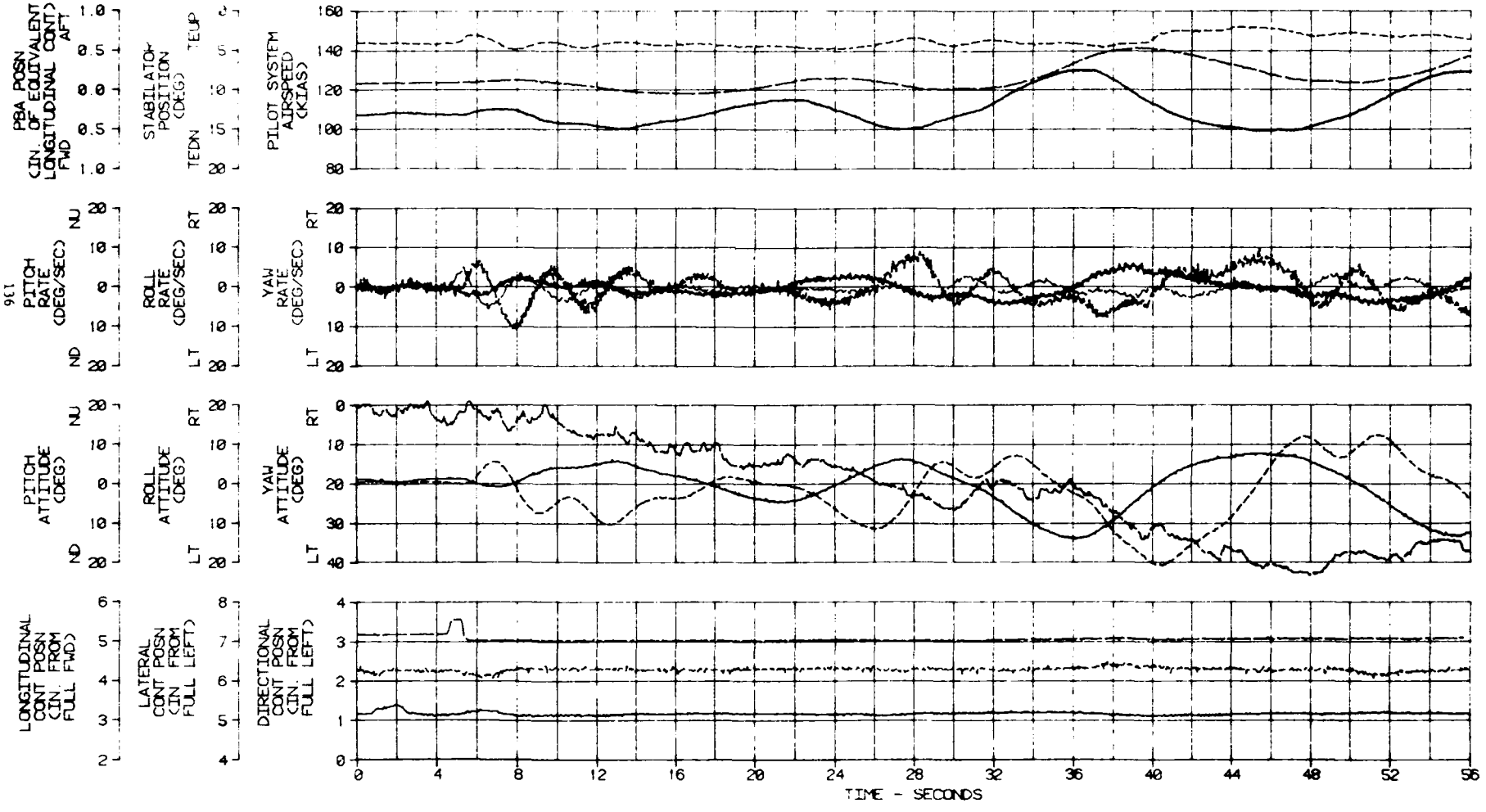

FIGURE 84

RIGHT DIRECTIONAL PULSE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB (FAILURE MODE 6)
16260	360.8(AFT)	0 0	4980	13.0	258	141	LEVEL	ON OFF OFF AUTO

SOLID LINE — SHORT DASH — LONG DASH

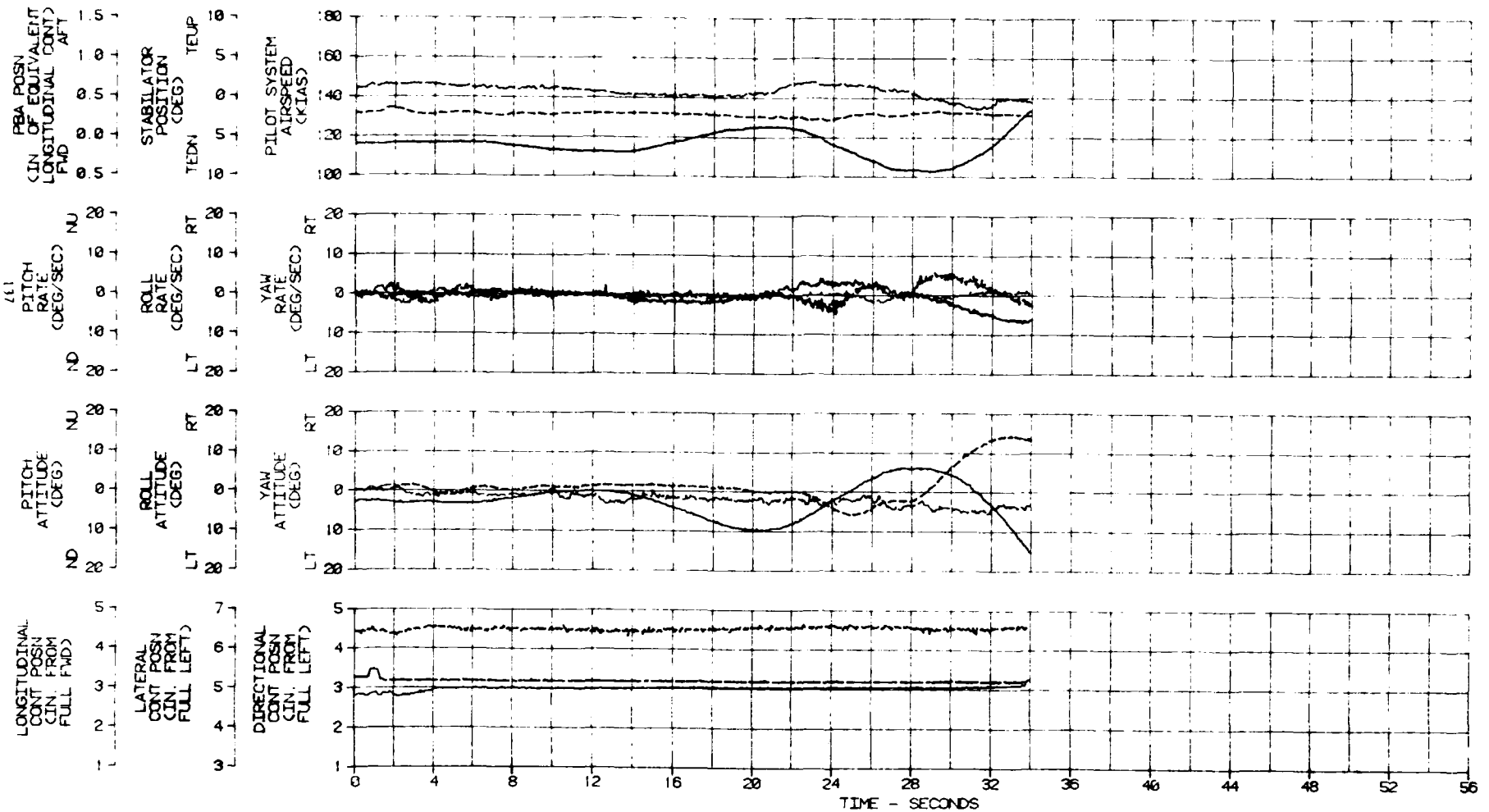

FIGURE 85
LEFT DIRECTIONAL PULSE
UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB (FAILURE MODE 6)
16620	361 9(AFT)	0 2RT	5280	13 5	257	149	LEVEL	ON OFF OFF AUTO

SOLID LINE — SHORT DASH — LONG DASH

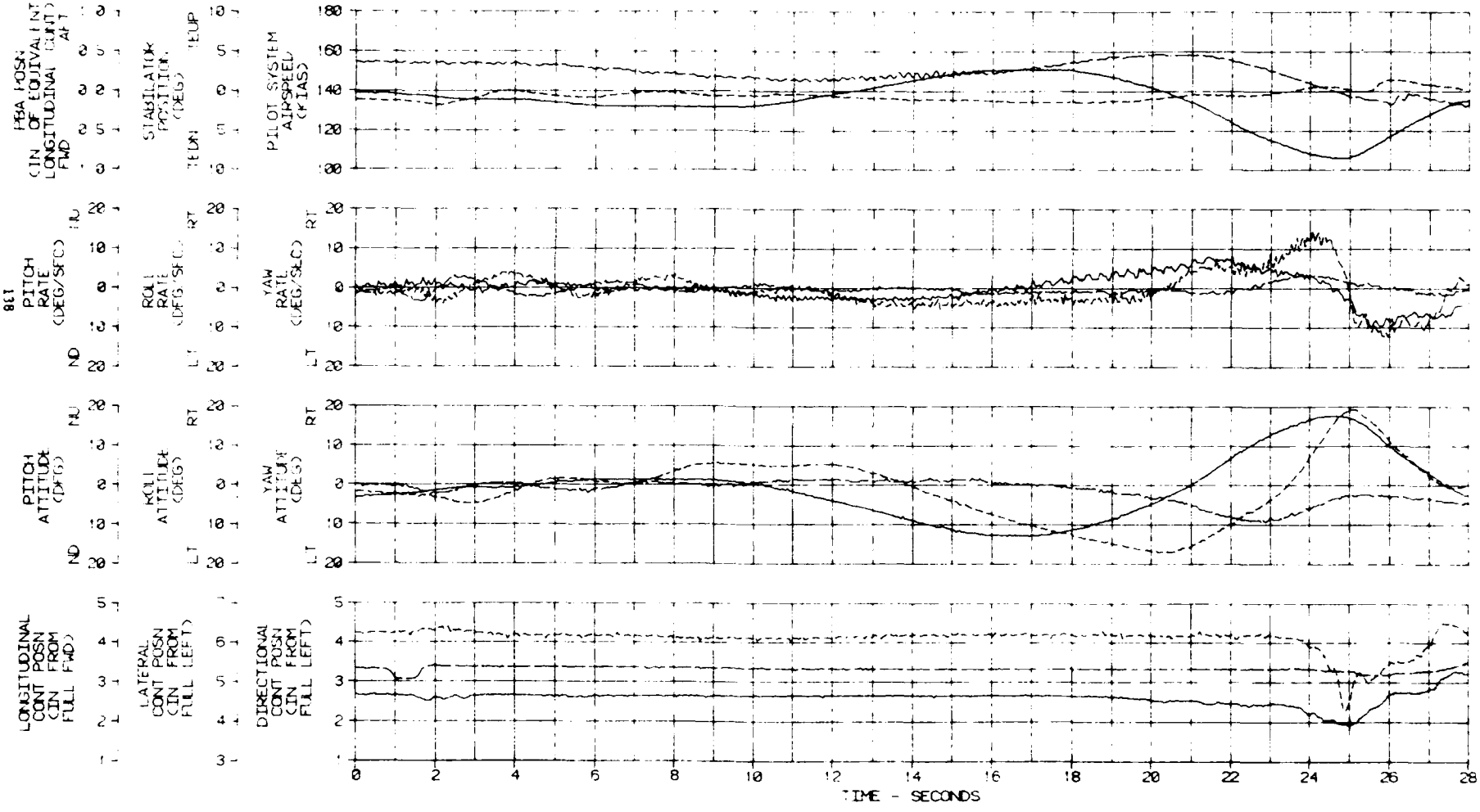

FIGURE 86

LEFT DIRECTIONAL PULSE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	CAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
21980	358.7(AFT)	0.1RT	3160	7.5	258	151	LEVEL	ON OFF OFF AUTO (FAILURE MODE 6)

SOLID LINE — SHORT DASH — LONG DASH

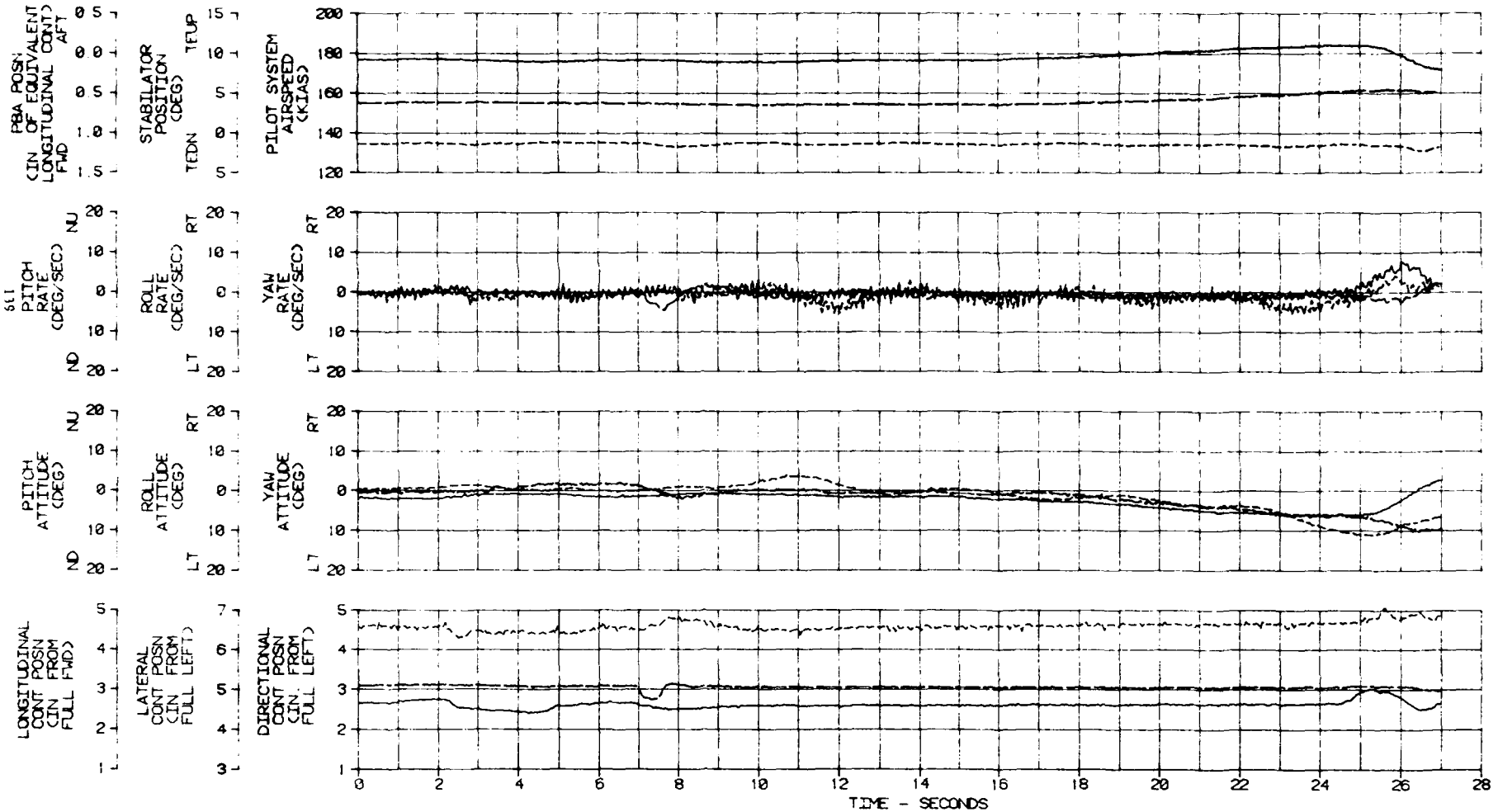

FIGURE 87

LEFT DIRECTIONAL PULSE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
14360	363.6(AFT)	0.3RT	5020	-4.5	258	62	LEVEL	OFF OFF OFF AUTO (FAILURE MODE 7)

SOLID LINE — SHORT DASH — LONG DASH

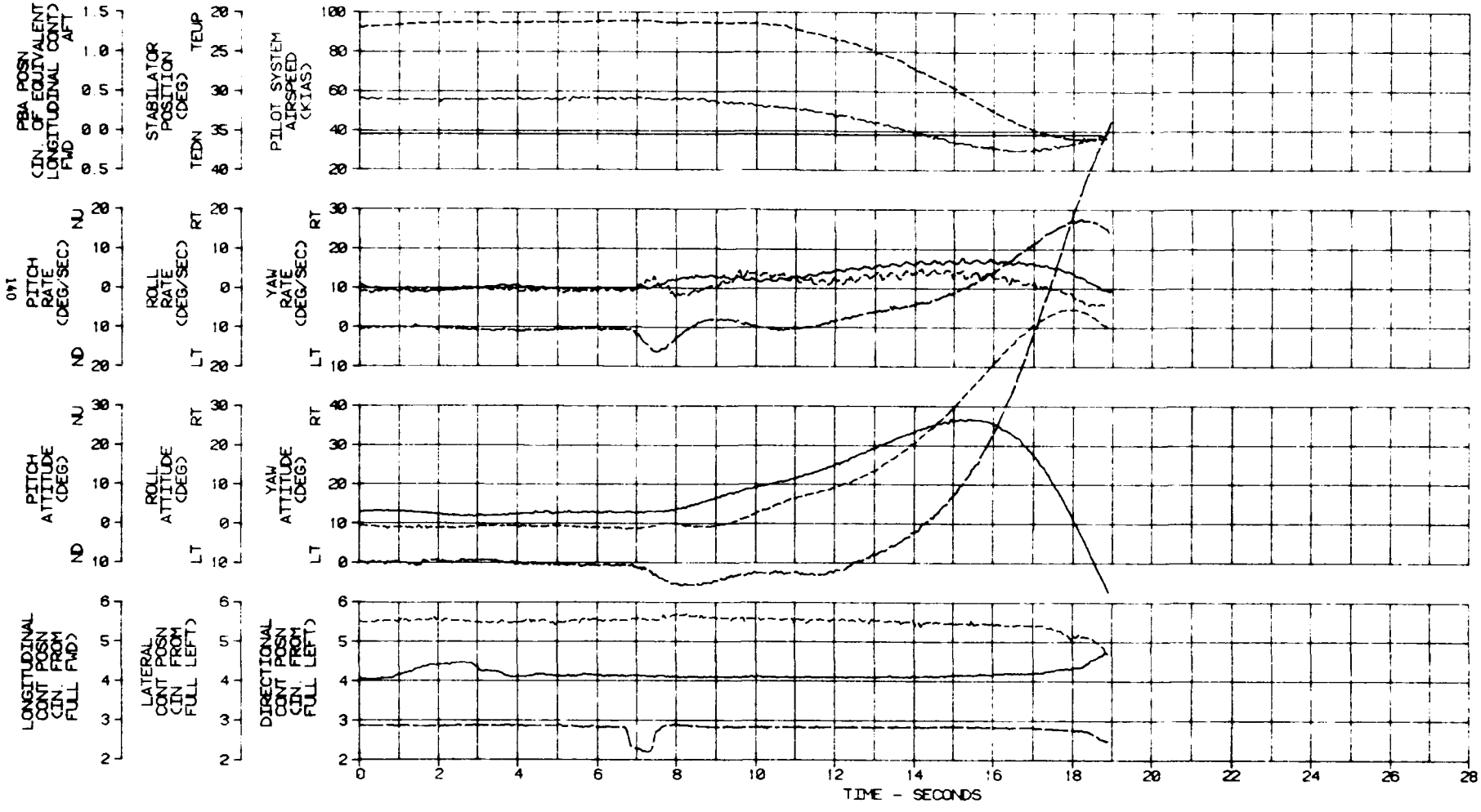

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FIGURE 88

RIGHT DIRECTIONAL PULSE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16220	360 9(AFT)	0 2RT	4980	9.5	258	61	LEVEL	OFF OFF OFF AUTO (FAILURE MODE 7)

SOLID LINE — SHORT DASH — LONG DASH

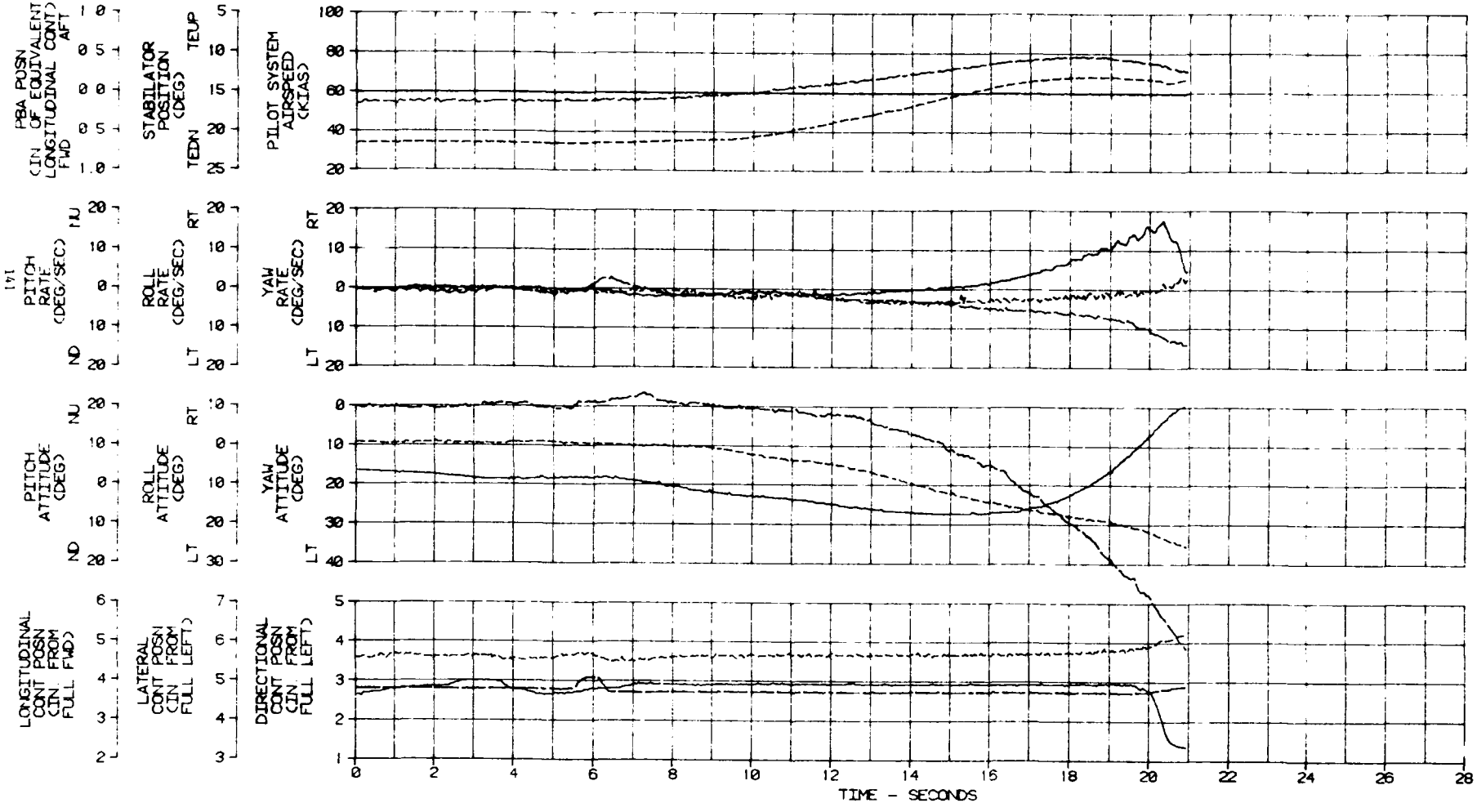


FIGURE 89

RIGHT DIRECTIONAL PULSE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
21640	357.7 (AFT)	0.1 RT	2680	3.5	258	61	LEVEL	OFF OFF OFF AUTO (FAILURE MODE 7)

SOLID LINE — SHORT DASH — LONG DASH

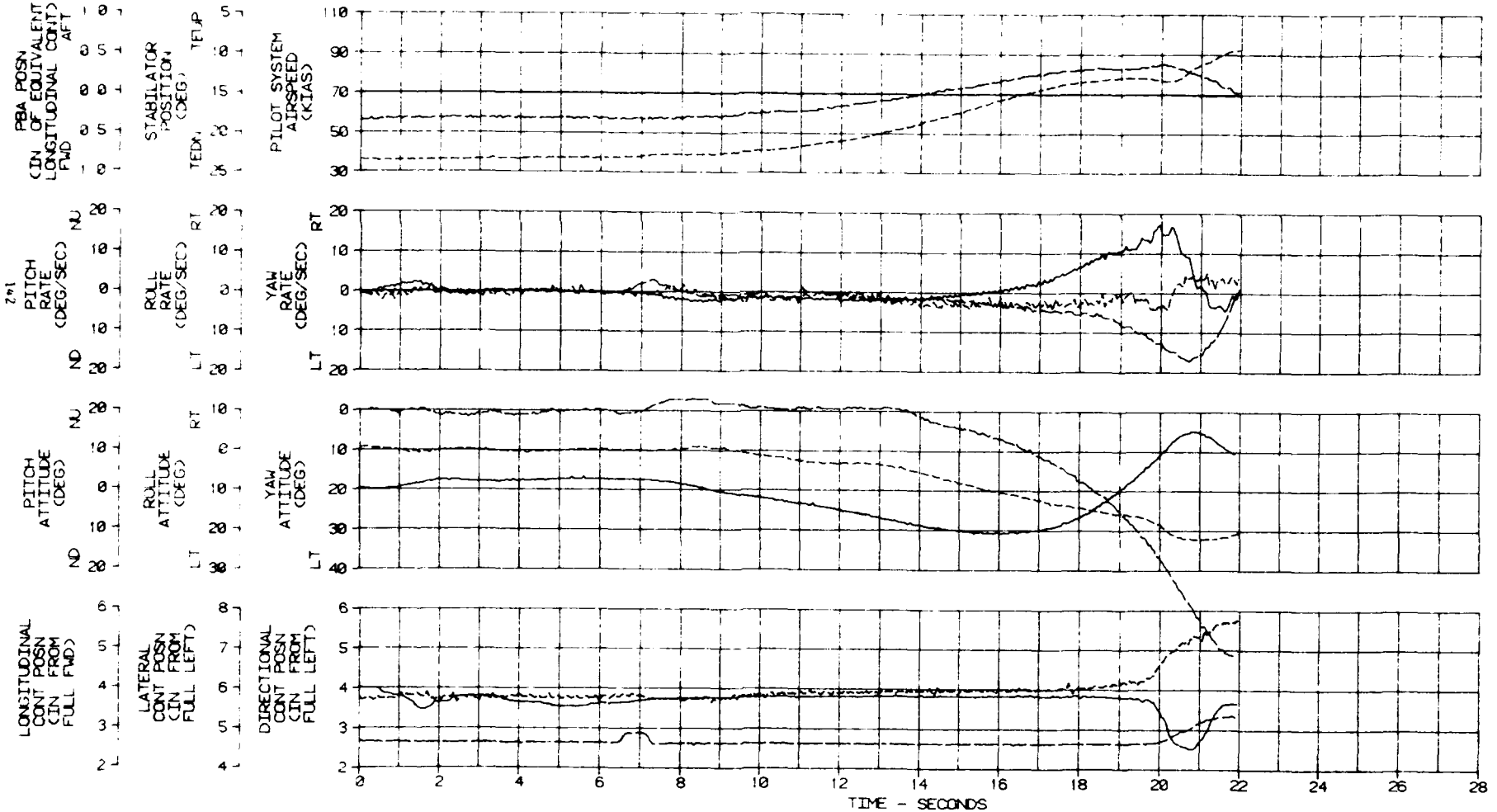


FIGURE 90

LEFT DIRECTIONAL PULSE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16320	361.1 (AFT)	0.2RT	4000	7.0	257	92	LEVEL	OFF OFF OFF AUTO (FAILURE MODE 7)

SOLID LINE — SHORT DASH — LONG DASH

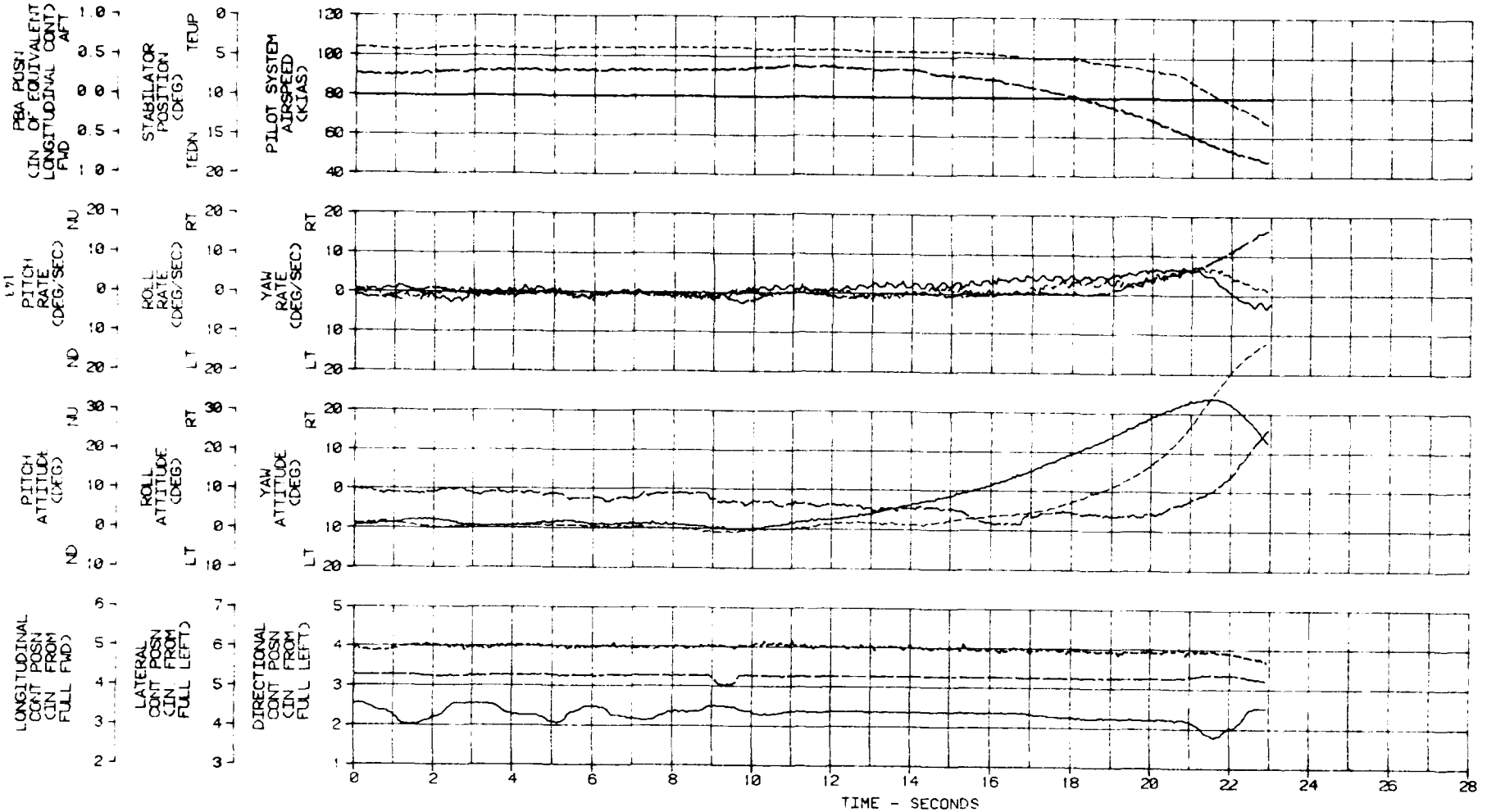


FIGURE 91
LEFT DIRECTIONAL PULSE
UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
14080	362.5(AFT)	0.4RT	5060	14.0	257	118	LEVEL	OFF OFF OFF AUTO (FAILURE MODE 7)

SOLID LINE — SHORT DASH — LONG DASH

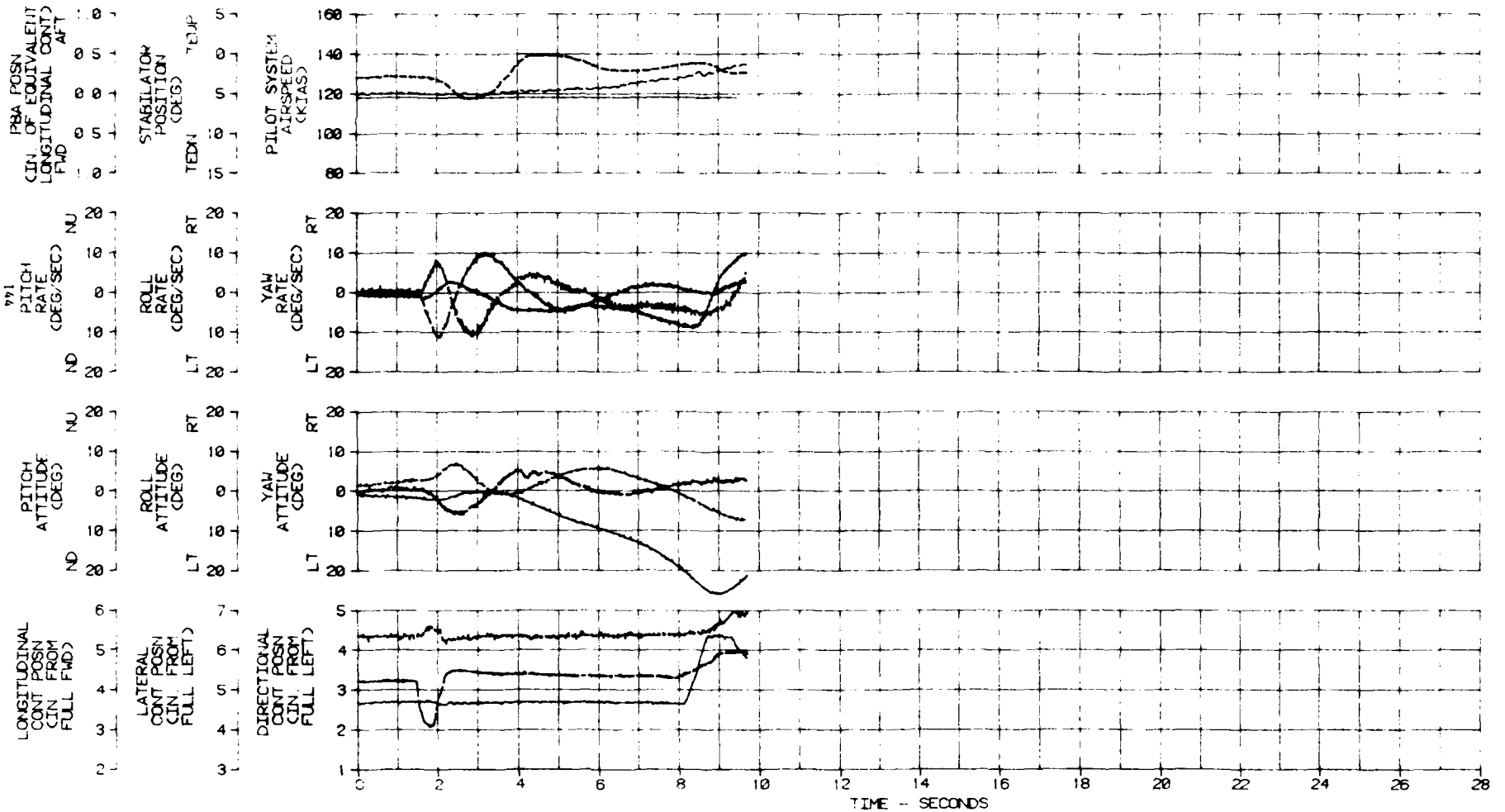


FIGURE 92
RIGHT DIRECTIONAL PULSE
UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16720	362.5(AFT)	0.2RT	5040	7.5	258	122	LEVEL	OFF OFF OFF AUTO (FAILURE MODE 7)

SOLID LINE — SHORT DASH — LONG DASH

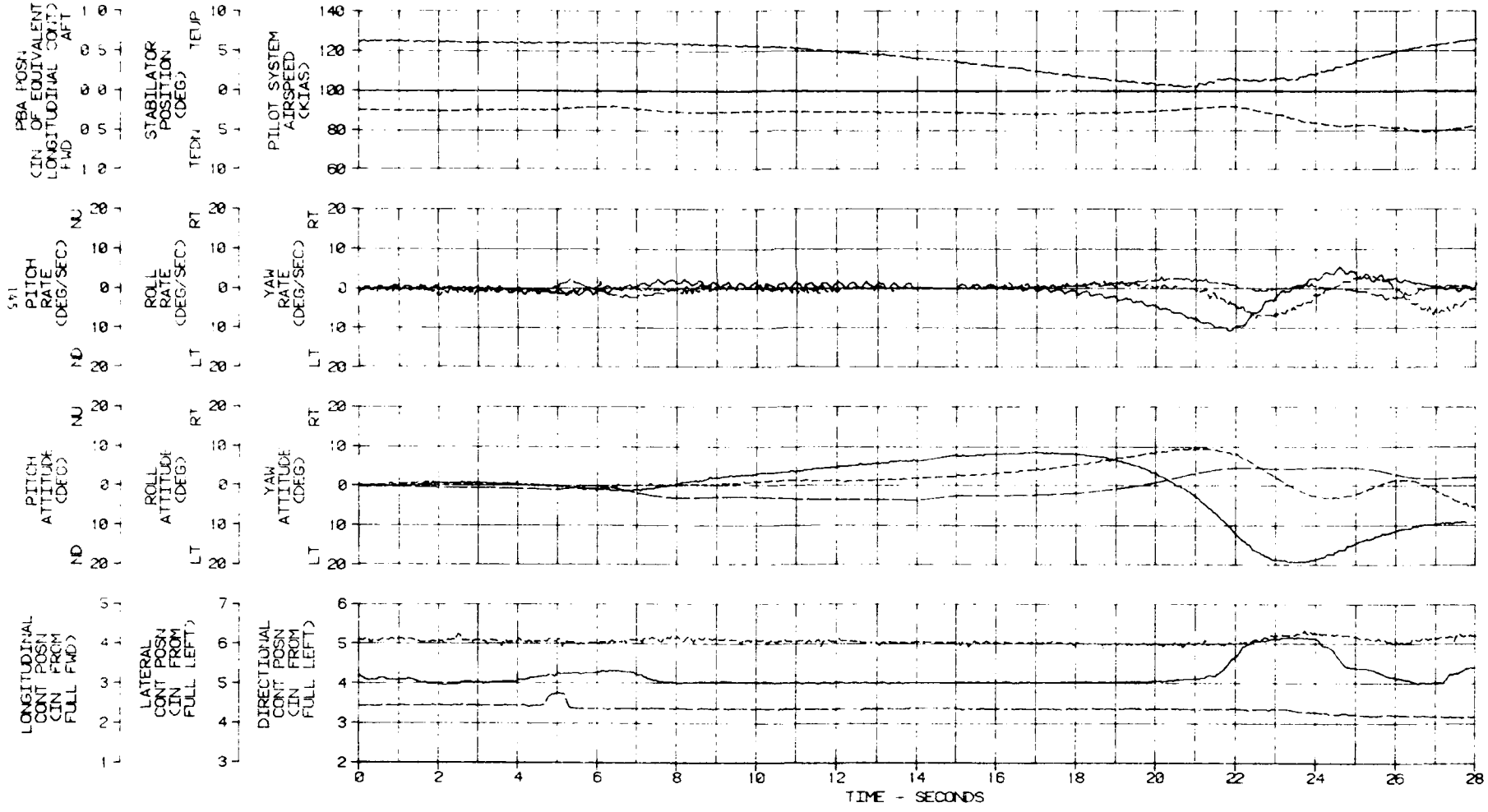


FIGURE 93

LEFT DIRECTIONAL PULSE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
22060	359.0(AFT)	0.1RT	2400	3.5	258	123	LEVEL	OFF OFF OFF AUTO (FAILURE MODE 7)

SOLID LINE — SHORT DASH — LONG DASH

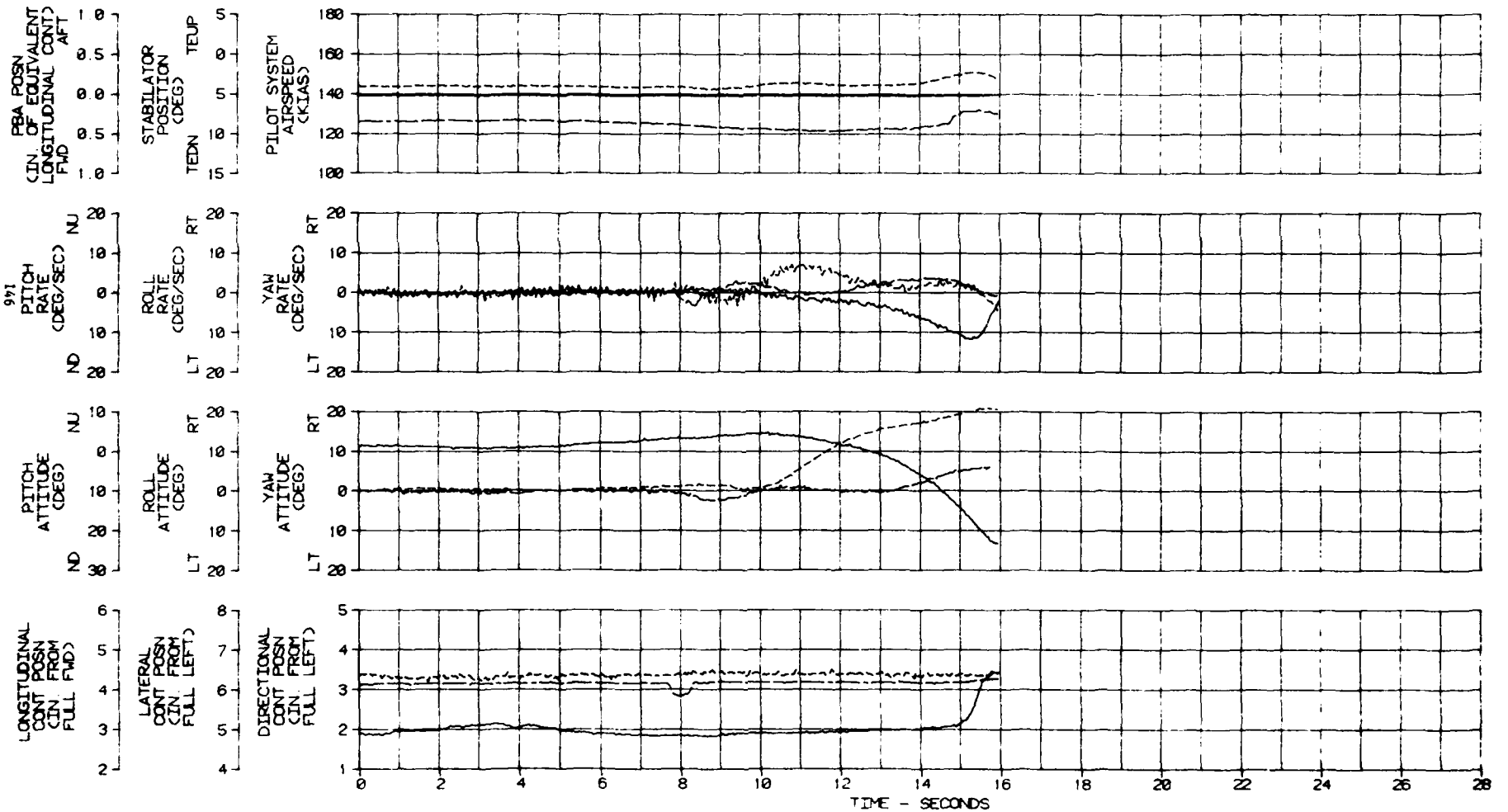


FIGURE 94

LEFT DIRECTIONAL PULSE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16540	362.0(AFT)	0.3RT	5040	5.0	258	140	LEVEL	OFF OFF OFF AUTO (FAILURE MODE 7)

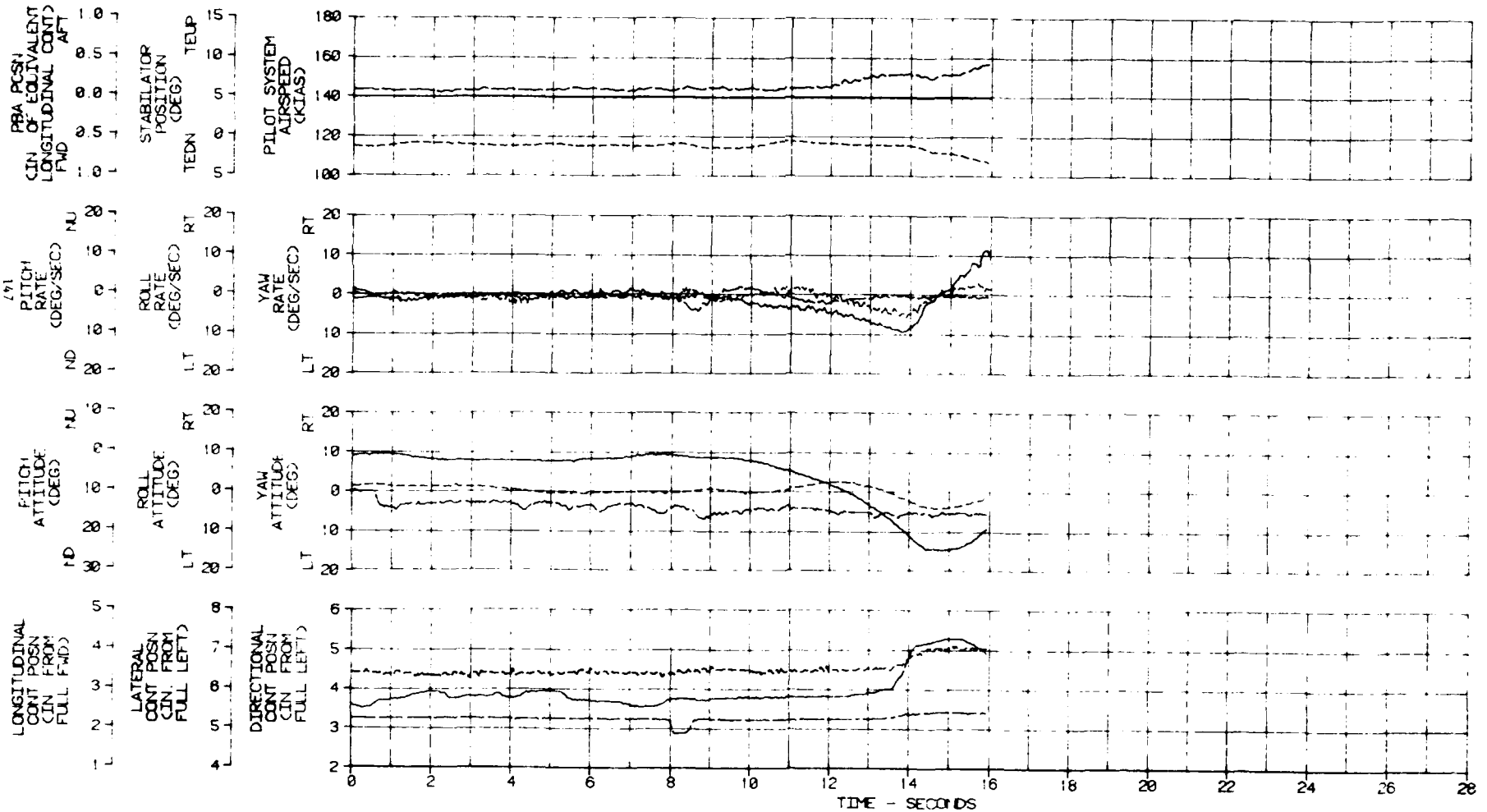


FIGURE 95

RIGHT DIRECTIONAL PULSE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
14280	363.3(AFT)	0.3RT	4560	16.5	258	149	LEVEL	OFF OFF OFF AUTO (FAILURE MODE 7)

SOLID LINE — SHORT DASH — LONG DASH

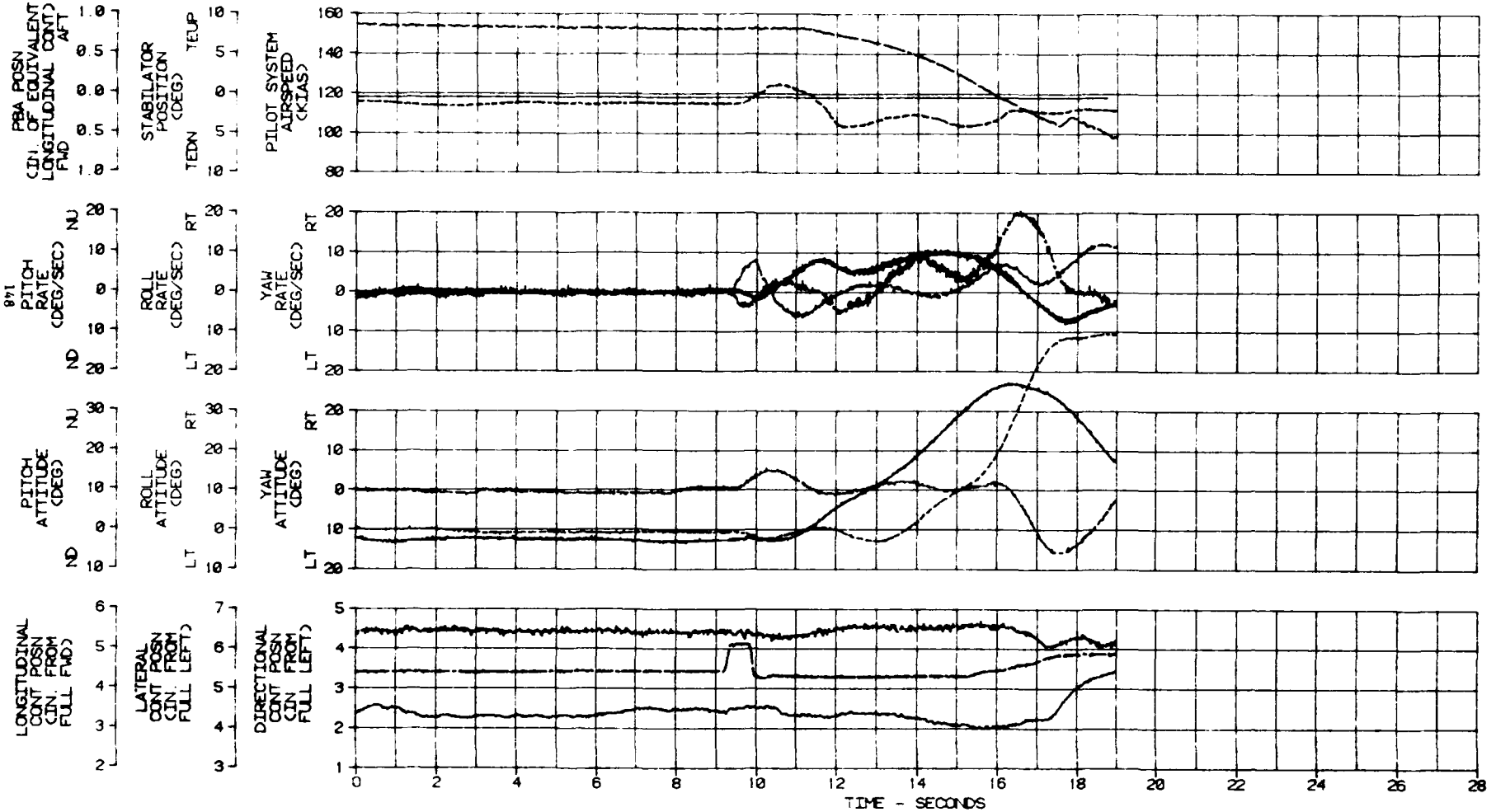


FIGURE 96

RIGHT DIRECTIONAL PULSE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16680	362.5(AFT)	0.2RT	5040	9.0	258	151	LEVEL	OFF OFF OFF AUTO (FAILURE MODE 7)

SOLID LINE — SHORT DASH — LONG DASH

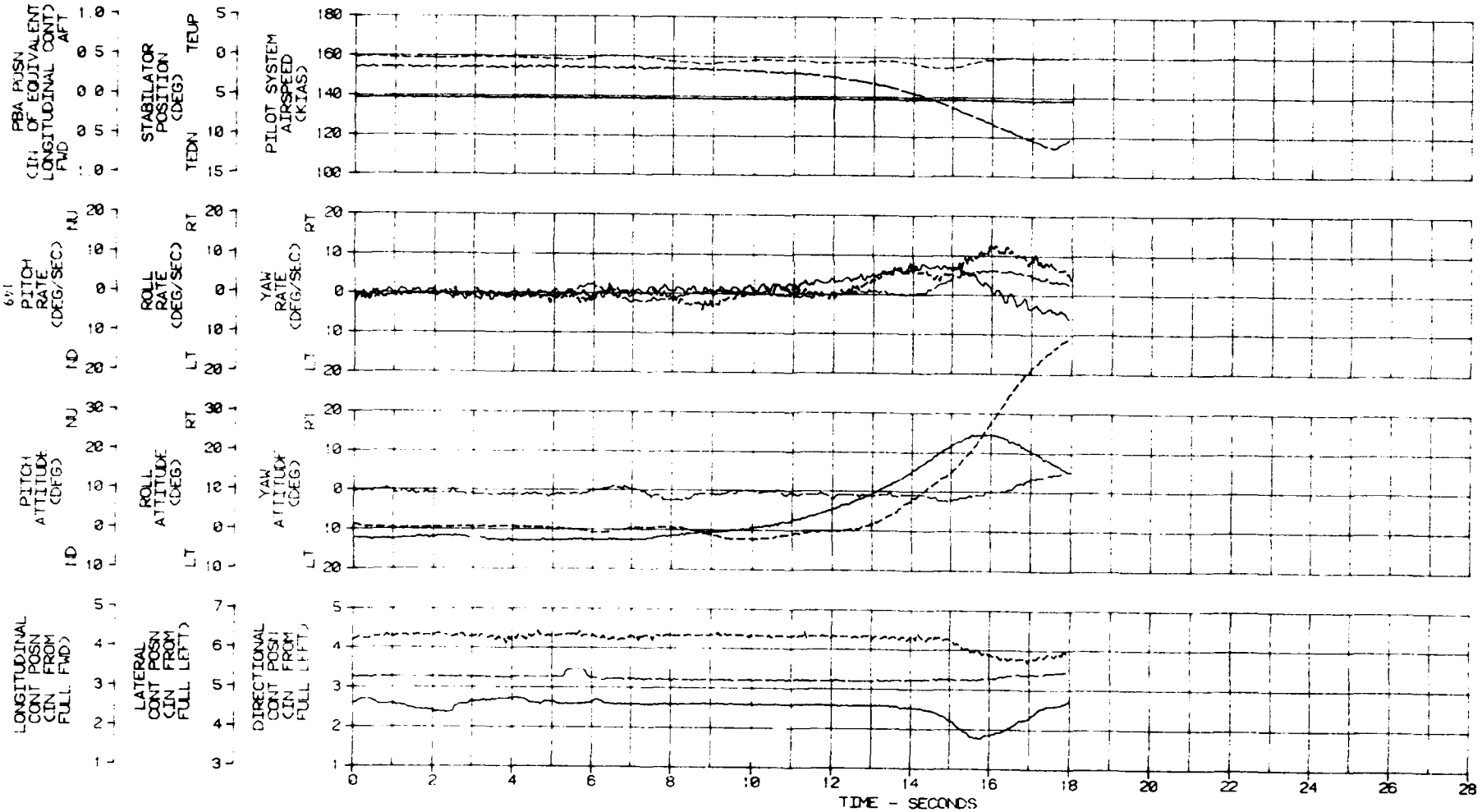


FIGURE 97

LEFT DIRECTIONAL PULSE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
21780	358.1 (AFT)	0.1RT	3200	8.0	258	151	LEVEL	OFF OFF OFF AUTO (FAILURE MODE 7)

SOLID LINE — SHORT DASH — LONG DASH

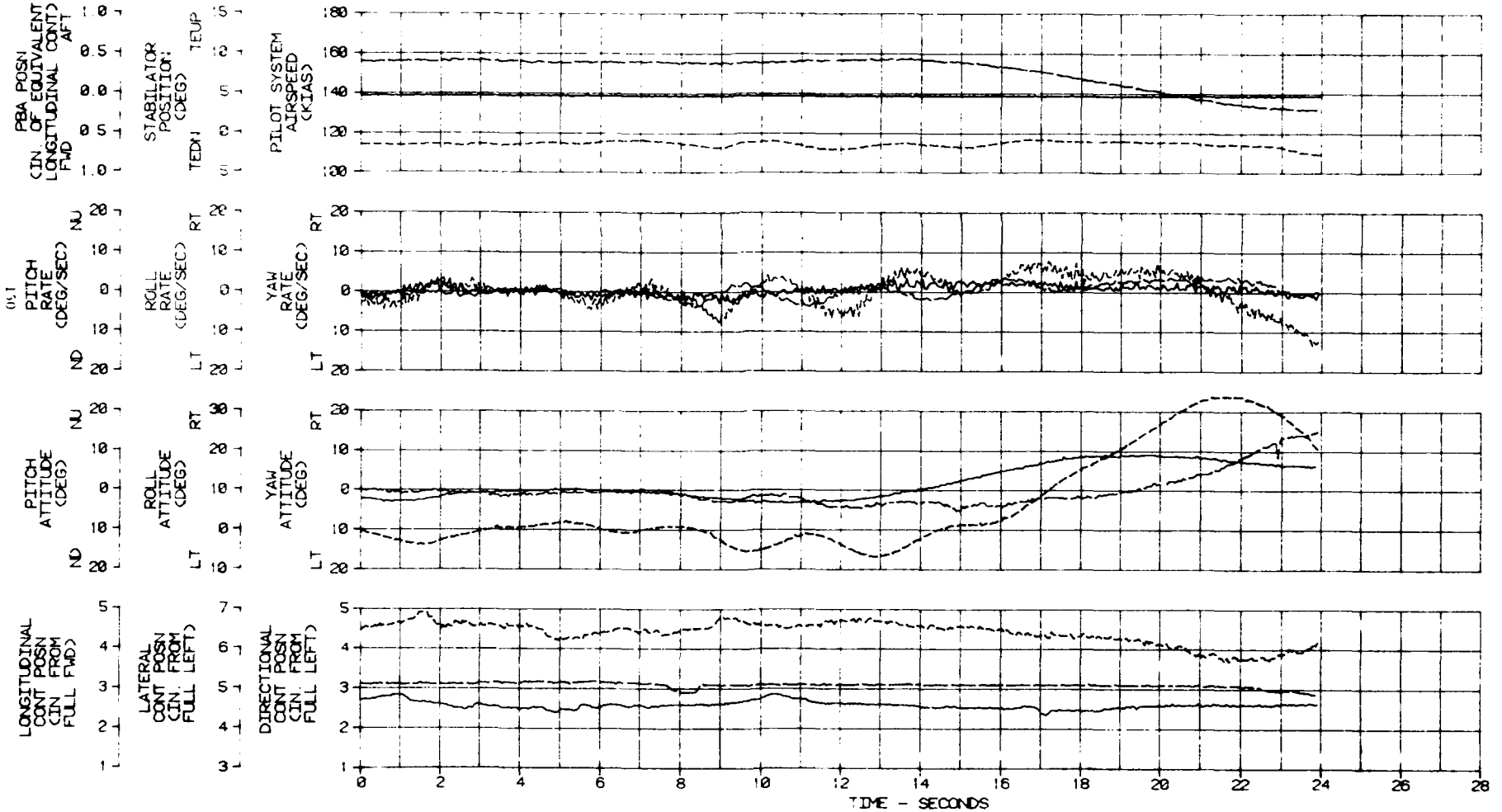


FIGURE 98

RIGHT DIRECTIONAL PULSE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB (FAILURE MODE 8)
16740	362.3(AFT)	0.2RT	4980	12.5	257	61	LEVEL	ON OFF OFF OFF

SOLID LINE — SHORT DASH — LONG DASH

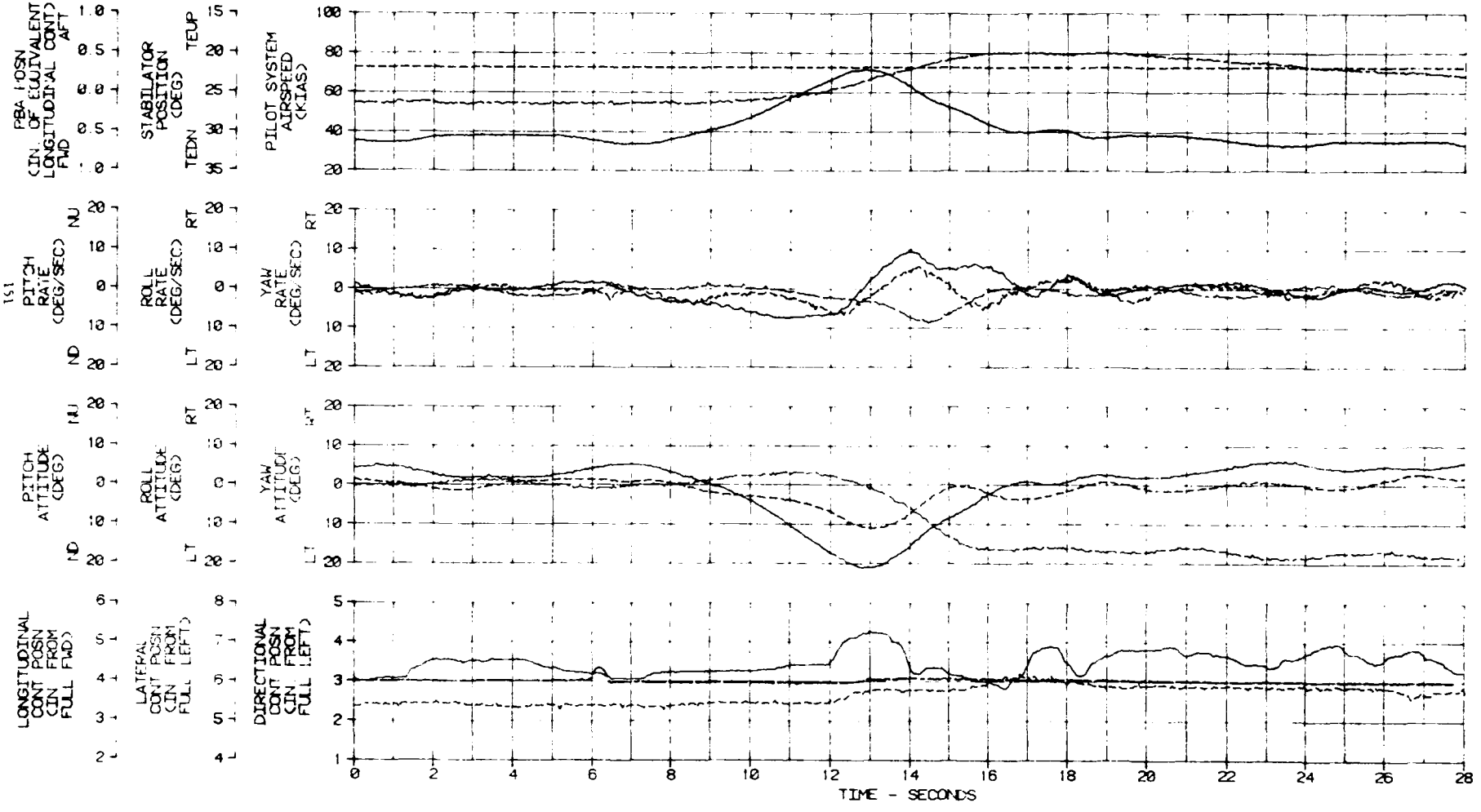


FIGURE 99

LEFT DIRECTIONAL PULSE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16500	361.7 (AFT)	0.2 RT	5020	12.5	258	91	LEVEL	ON OFF OFF OFF (FAILURE MODE B)

SOLID LINE — SHORT DASH — LONG DASH

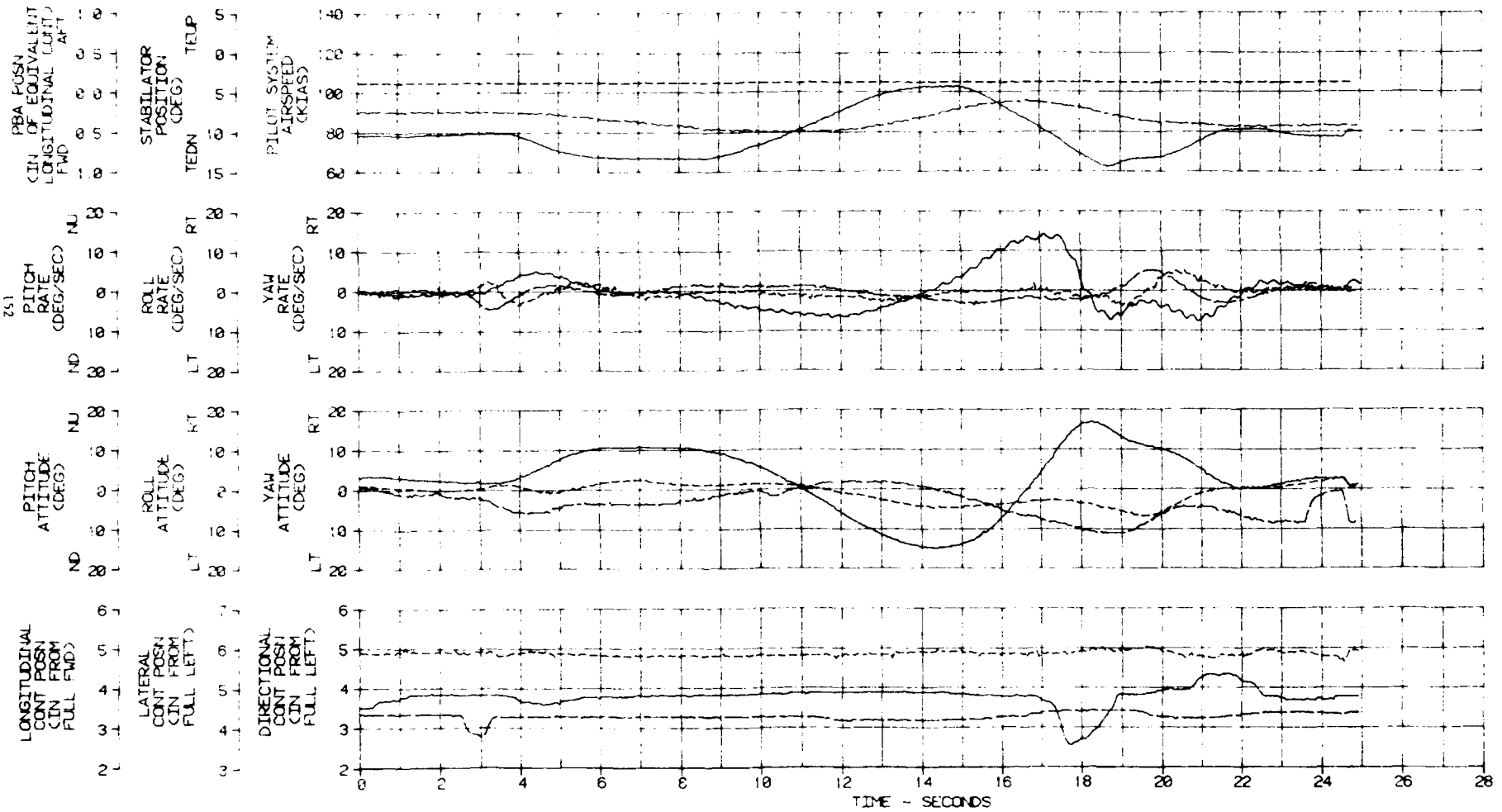


FIGURE 100
RIGHT DIRECTIONAL PULSE
UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16480	361.8(AFT)	0.2RT	4820	10.5	257	121	LEVEL	ON OFF OFF OFF (FAILURE MODE B)

SOLID LINE — SHORT DASH — LONG DASH

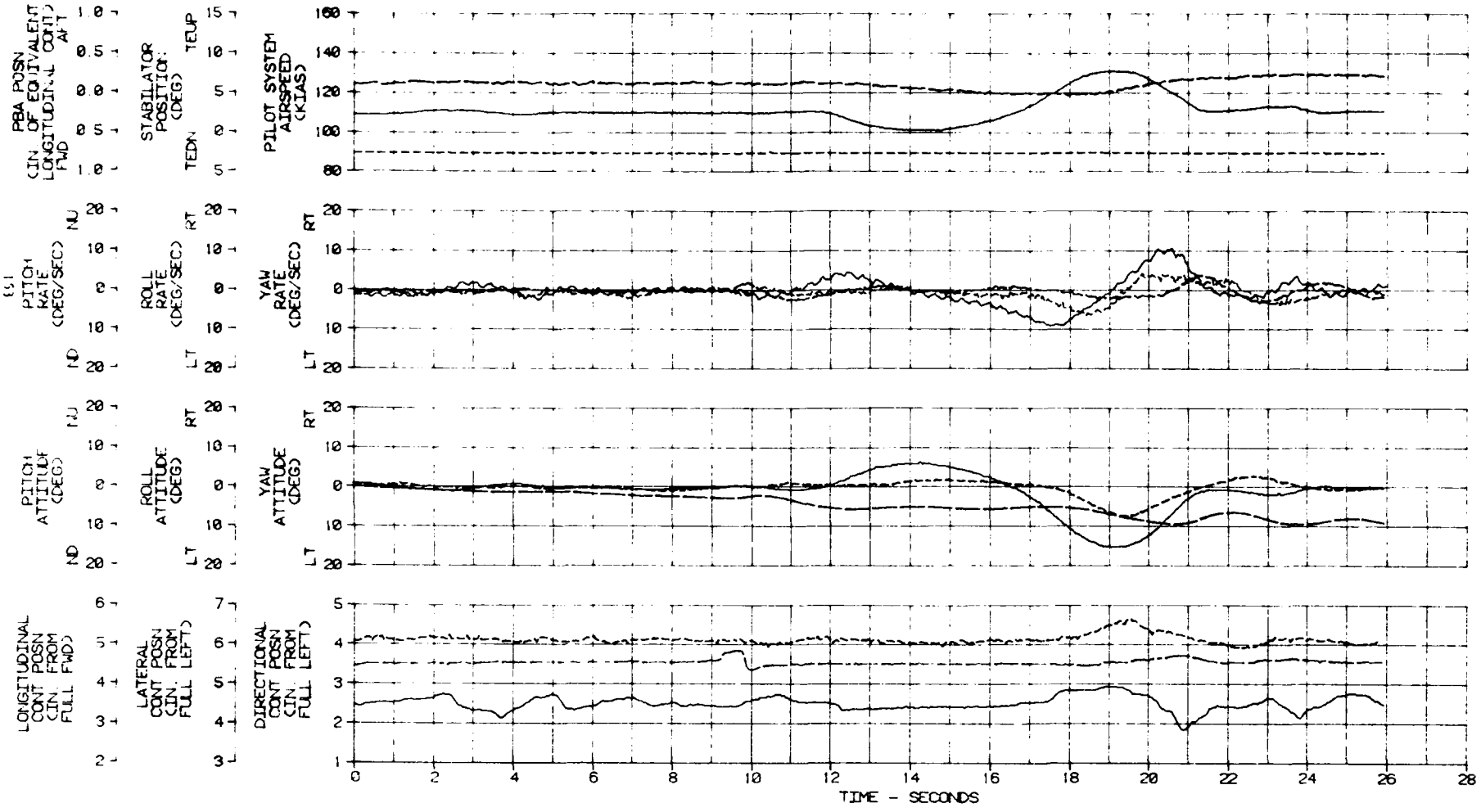


FIGURE 101

RIGHT DIRECTIONAL PULSE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16440	361.5(AFT)	0.2RT	5140	14.0	257	141	LEVEL	ON OFF OFF OFF (FAILURE MODE 8)

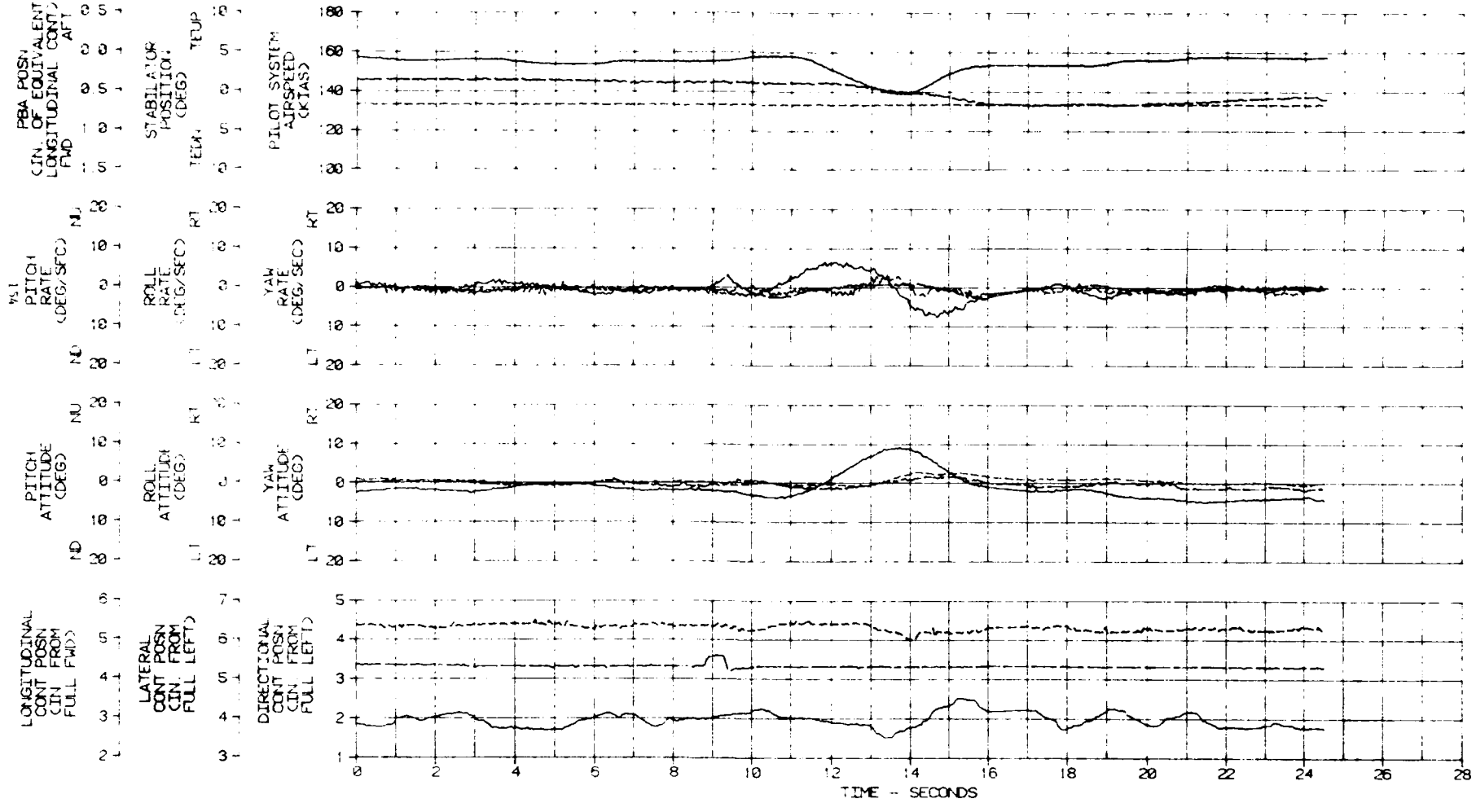


FIGURE 102
LEFT DIRECTIONAL PULSE
UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16480	361 5(AFT)	0 2RT	5080	13 0	257	150	LEVEL	ON OFF OFF OFF (FAILURE MODE 8)

SOLID LINE — SHORT DASH — LONG DASH

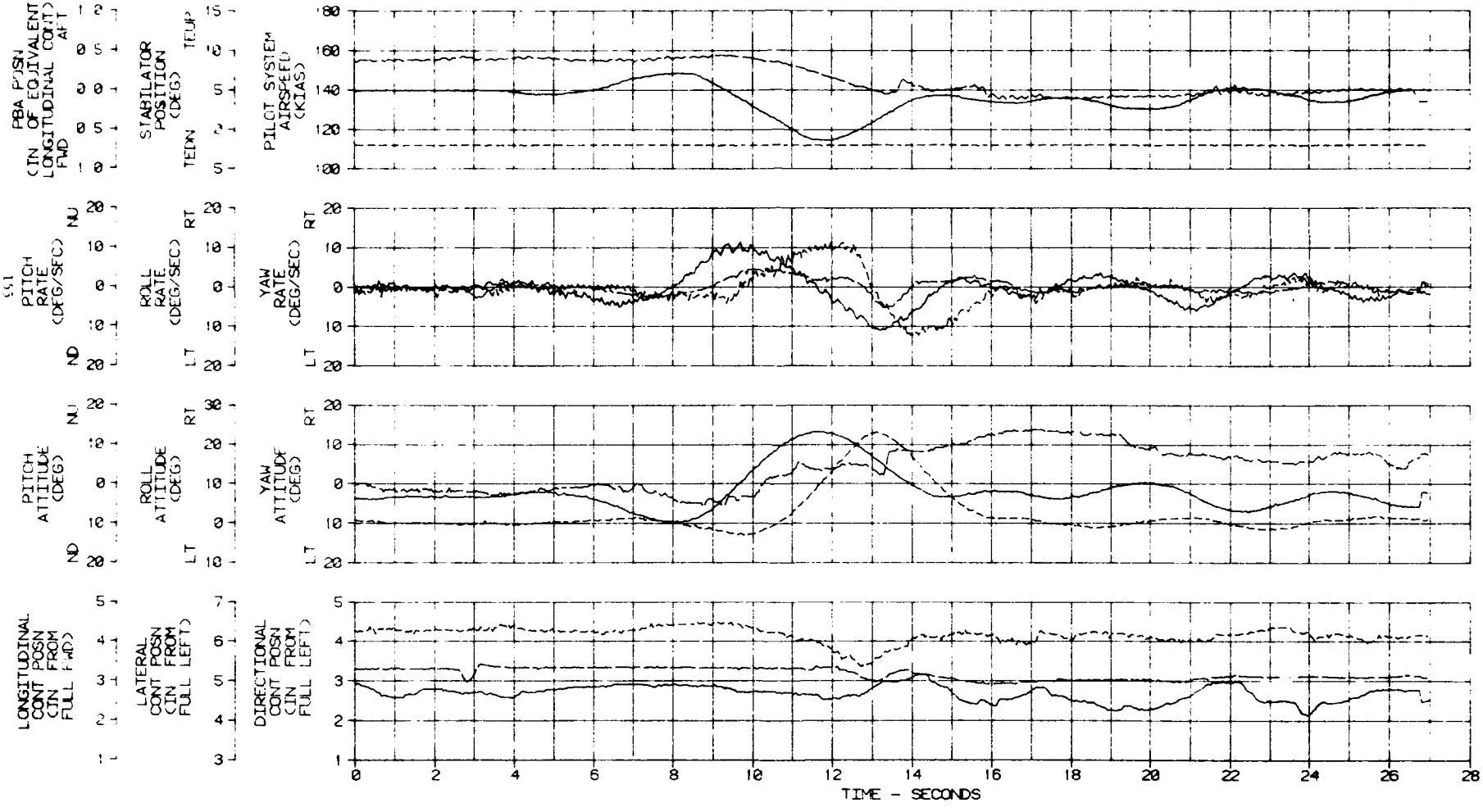


FIGURE 103
RIGHT DIRECTIONAL PULSE
UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16540	362.0(AFT)	0 3RT	4760	8 0	258	61	LEVEL	OFF OFF OFF OFF (FAILURE MODE 9)

SOLID LINE — SHORT DASH — LONG DASH

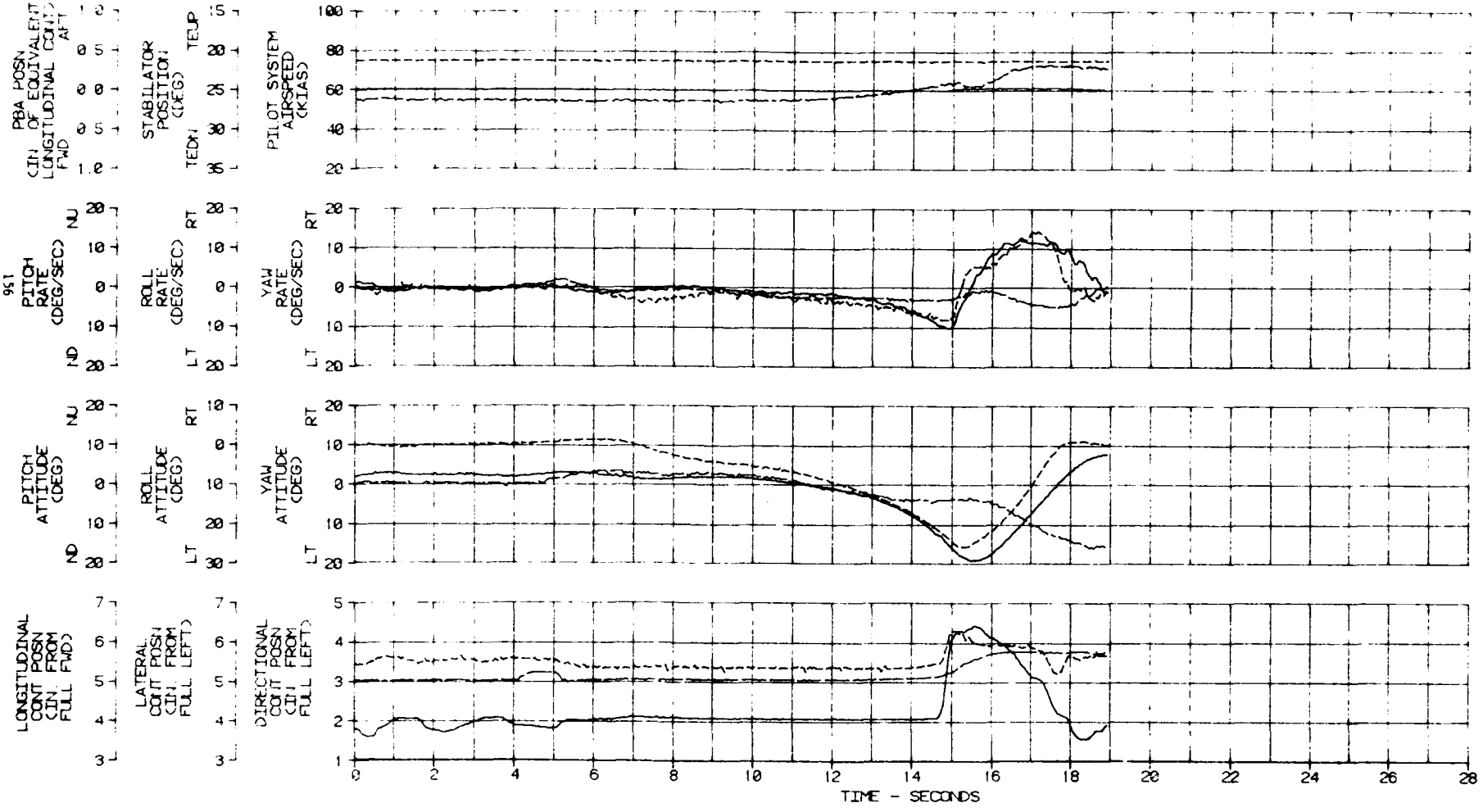


FIGURE 104

LEFT DIRECTIONAL PULSE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16340	361.3(AFT)	0.2RT	4960	8.5	258	92	LEVEL	OFF OFF OFF OFF (FAILURE MODE 9)

SOLID LINE — SHORT DASH — LONG DASH

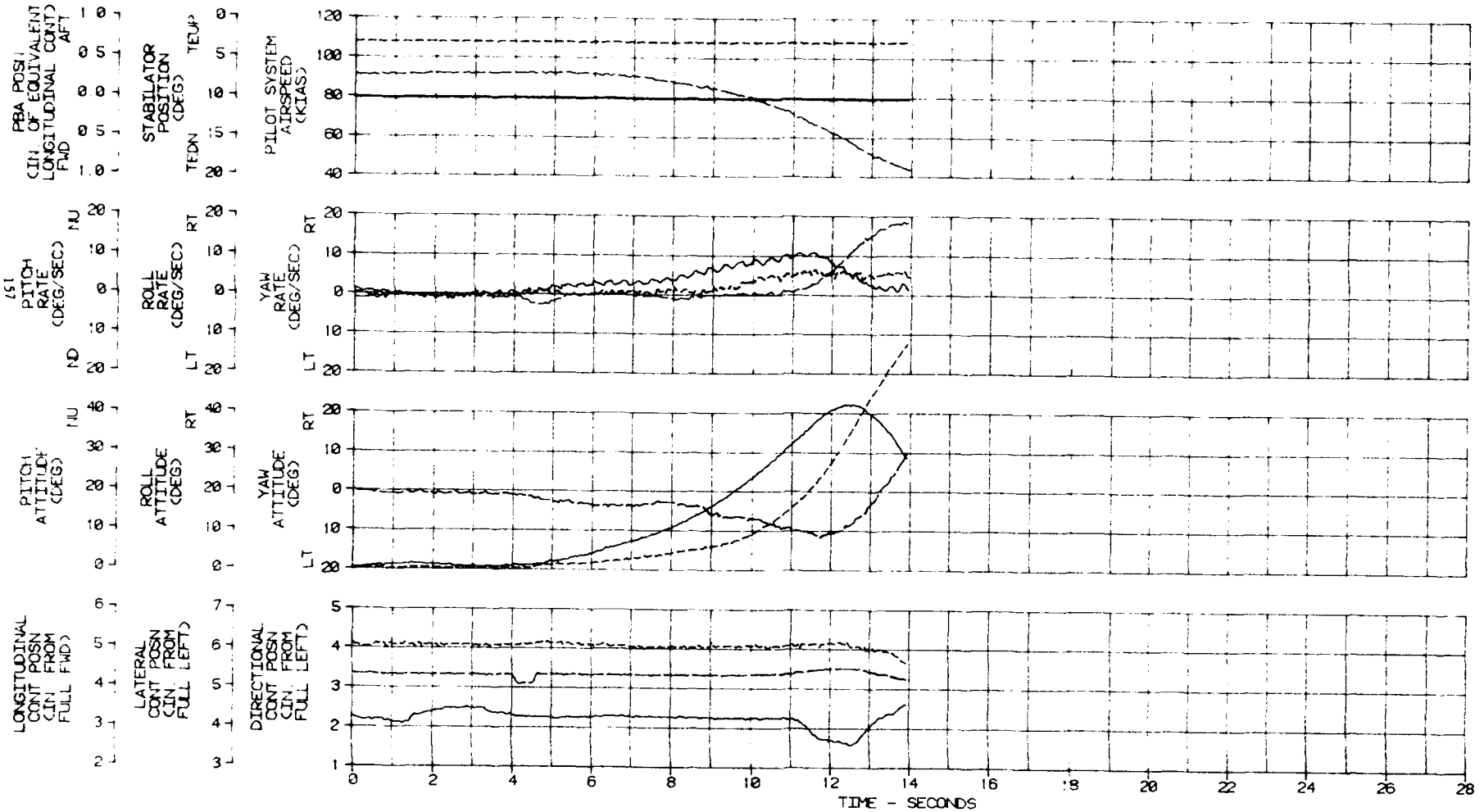


FIGURE 105

RIGHT DIRECTIONAL PULSE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16740	362.7(AFT)	0.2RT	4980	9.0	258	122	LEVEL	OFF OFF OFF OFF (FAILURE MODE 9)

SOLID LINE — SHORT DASH — LONG DASH

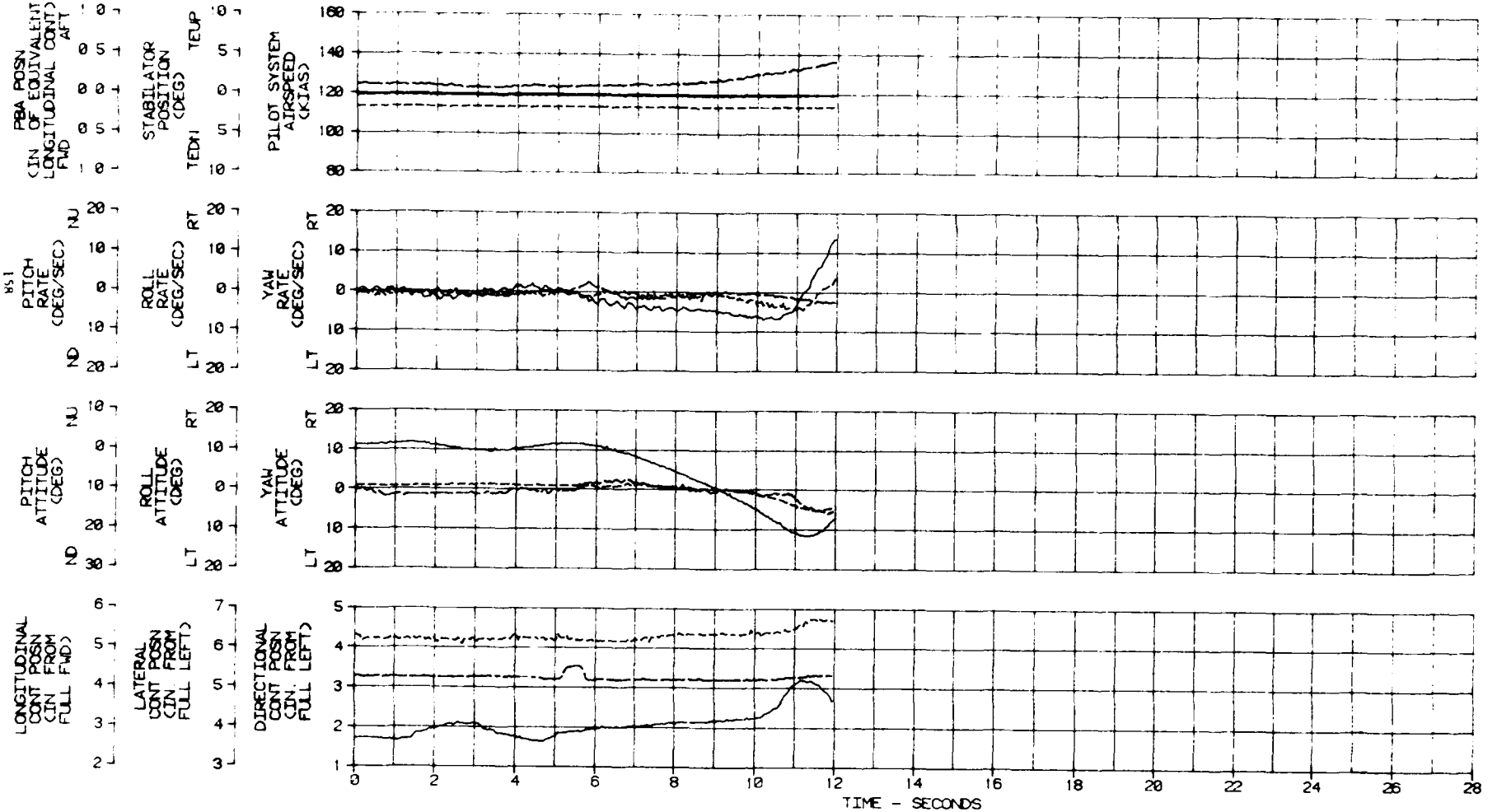


FIGURE 106
LEFT DIRECTIONAL PULSE
UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16740	362.3(AFT)	0 1RT	5060	11 5	259	141	LEVEL	OFF OFF OFF OFF (FAILURE MODE 9)

SOLID LINE — SHORT DASH — LONG DASH

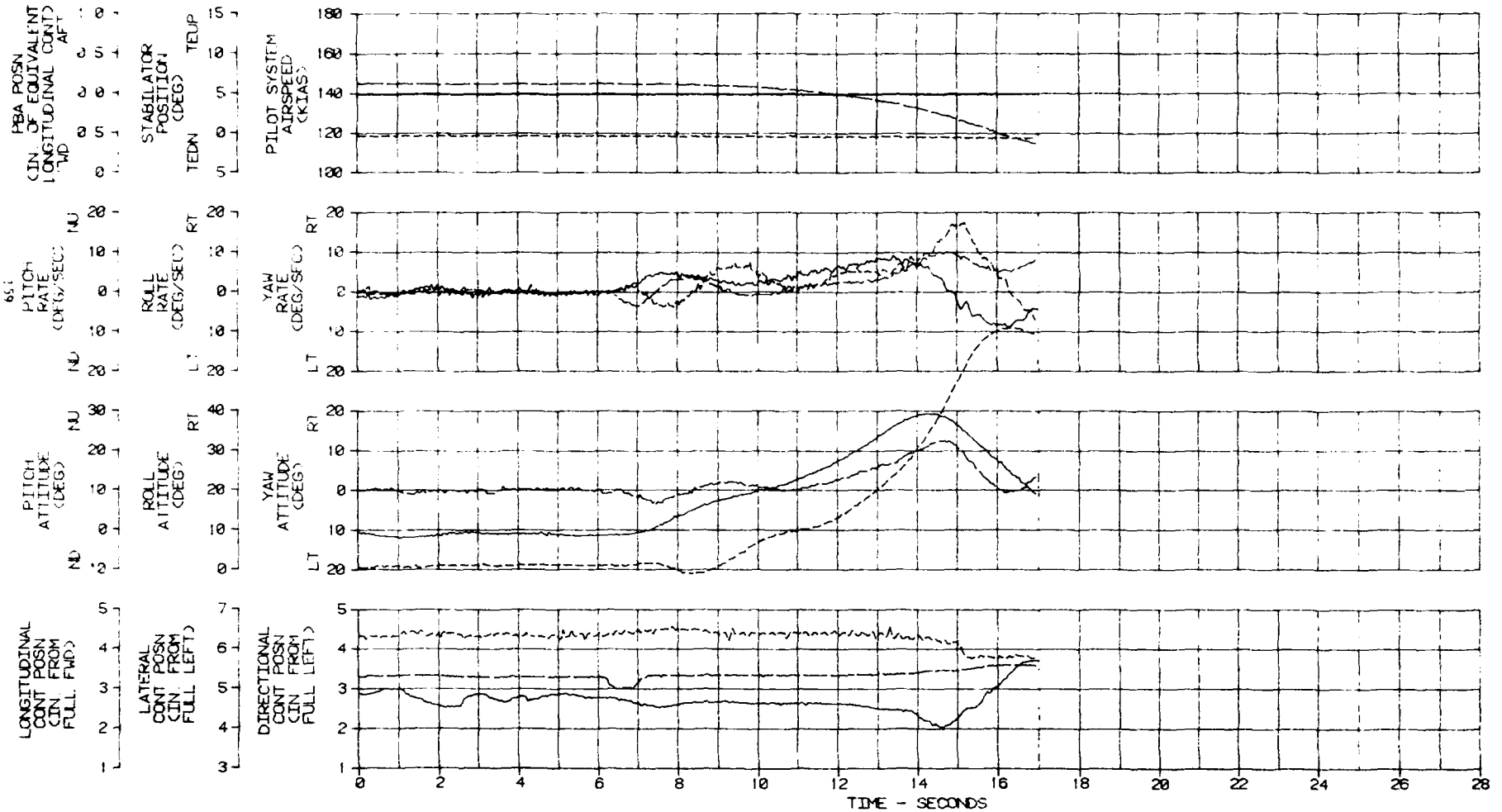


FIGURE 107

LEFT DIRECTIONAL PULSE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16540	361 8(AFT)	0 3RT	5040	12 5	258	151	LEVEL	OFF OFF OFF OFF (FAILURE MODE 9)

SOLID LINE — SHORT DASH — LONG DASH

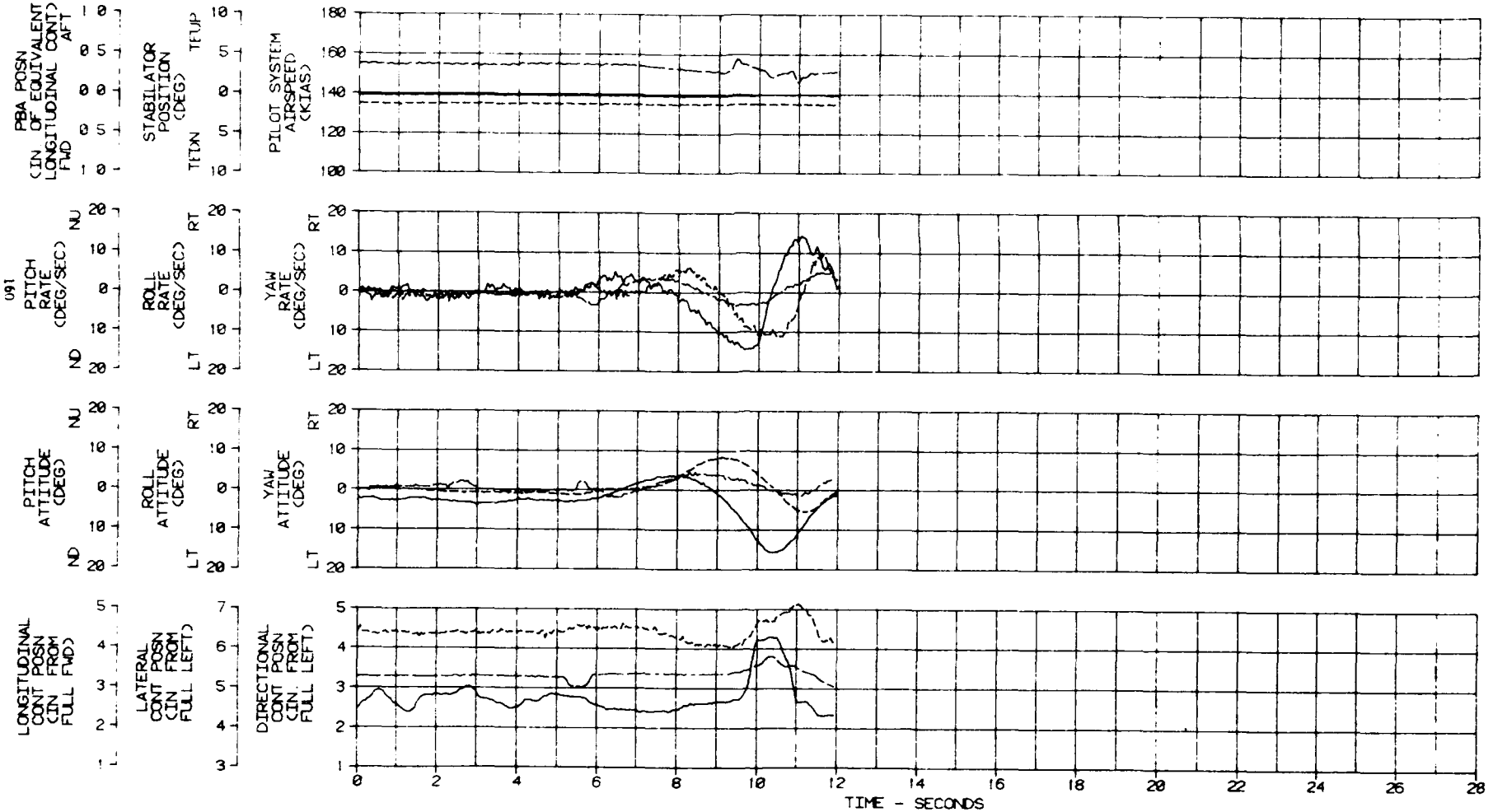


FIGURE 108

AIRCRAFT RESPONSE FOLLOWING RELEASE FROM SIDESLIP

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16380	361.3(AFT)	0.3RT	4820	7.5	258	61	LEVEL	ON OFF OFF AUTO (FAILURE MODE 6)

SOLID LINE — SHORT DASH — LONG DASH

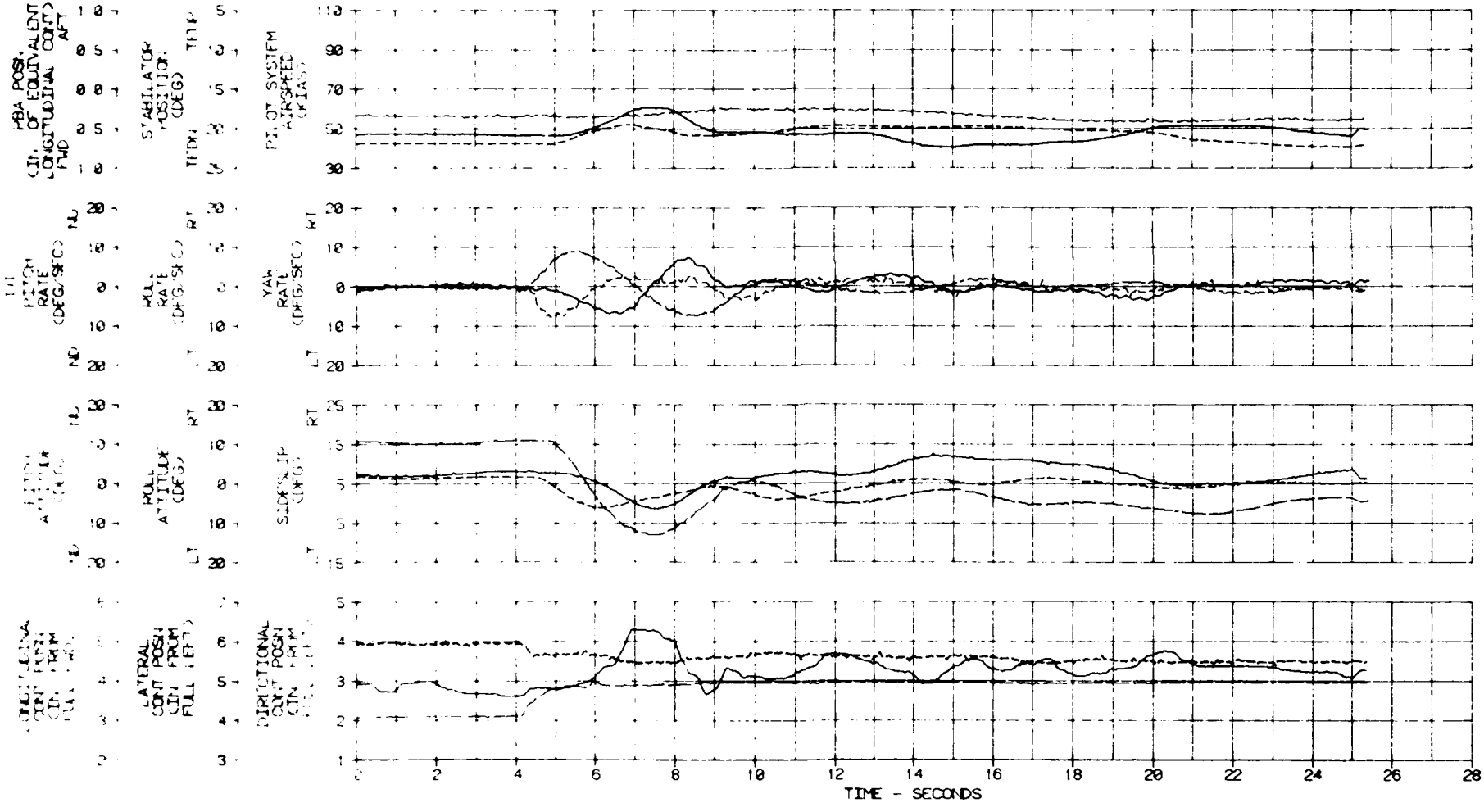


FIGURE 109

AIRCRAFT RESPONSE FOLLOWING RELEASE FROM SIDESLIP

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
21600	357.7 (AFT)	0 1RT	3320	9 5	258	62	LEVEL	ON OFF OFF AUTO (FAILURE MODE 6)

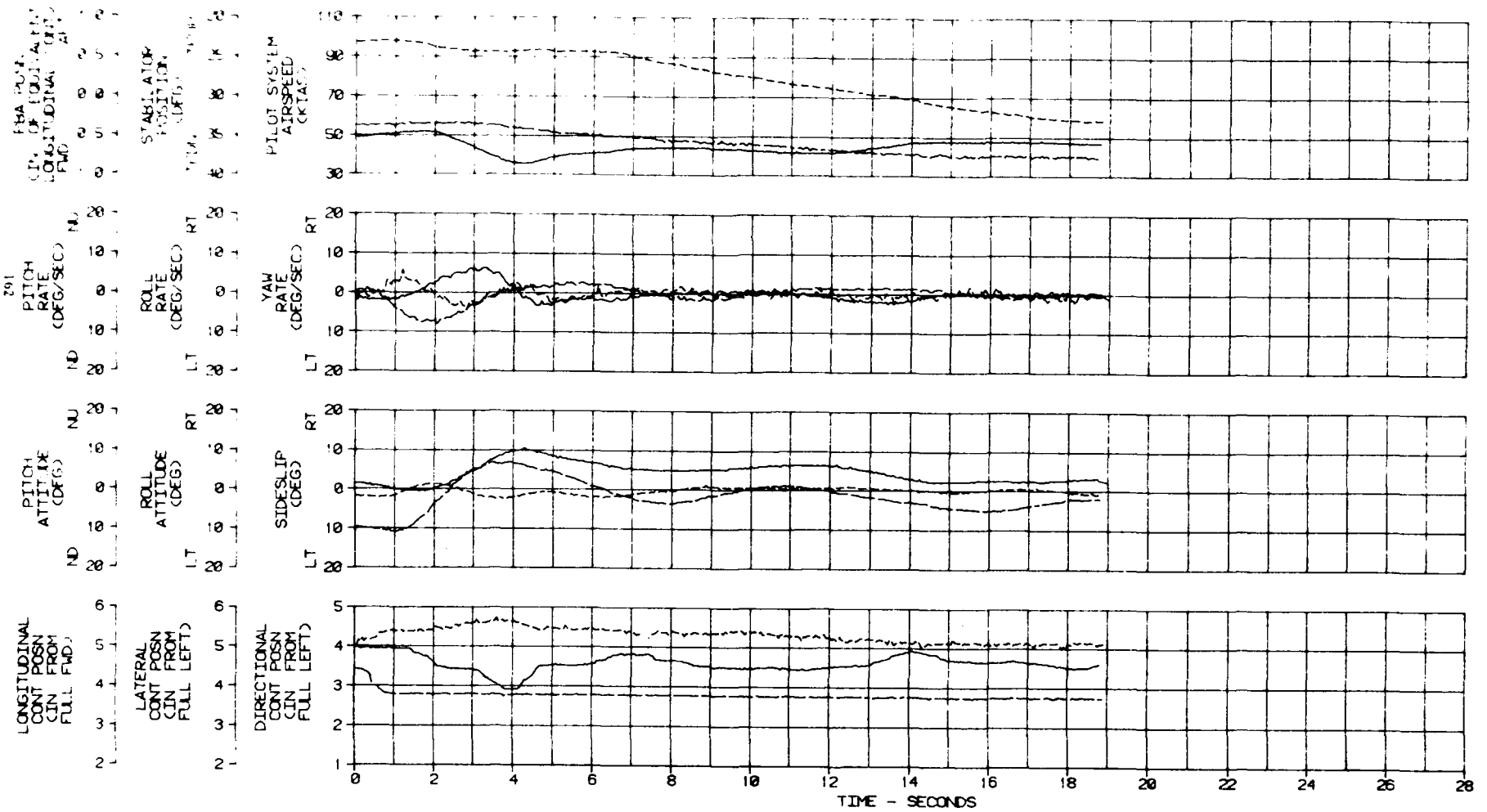


FIGURE 110

AIRCRAFT RESPONSE FOLLOWING RELEASE FROM SIDESLIP

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16680	362.4(AFT)	0.3RT	4440	8.5	258	93	LEVEL	ON OFF OFF AUTO (FAILURE MODE 6)

SOLID LINE — SHORT DASH — LONG DASH

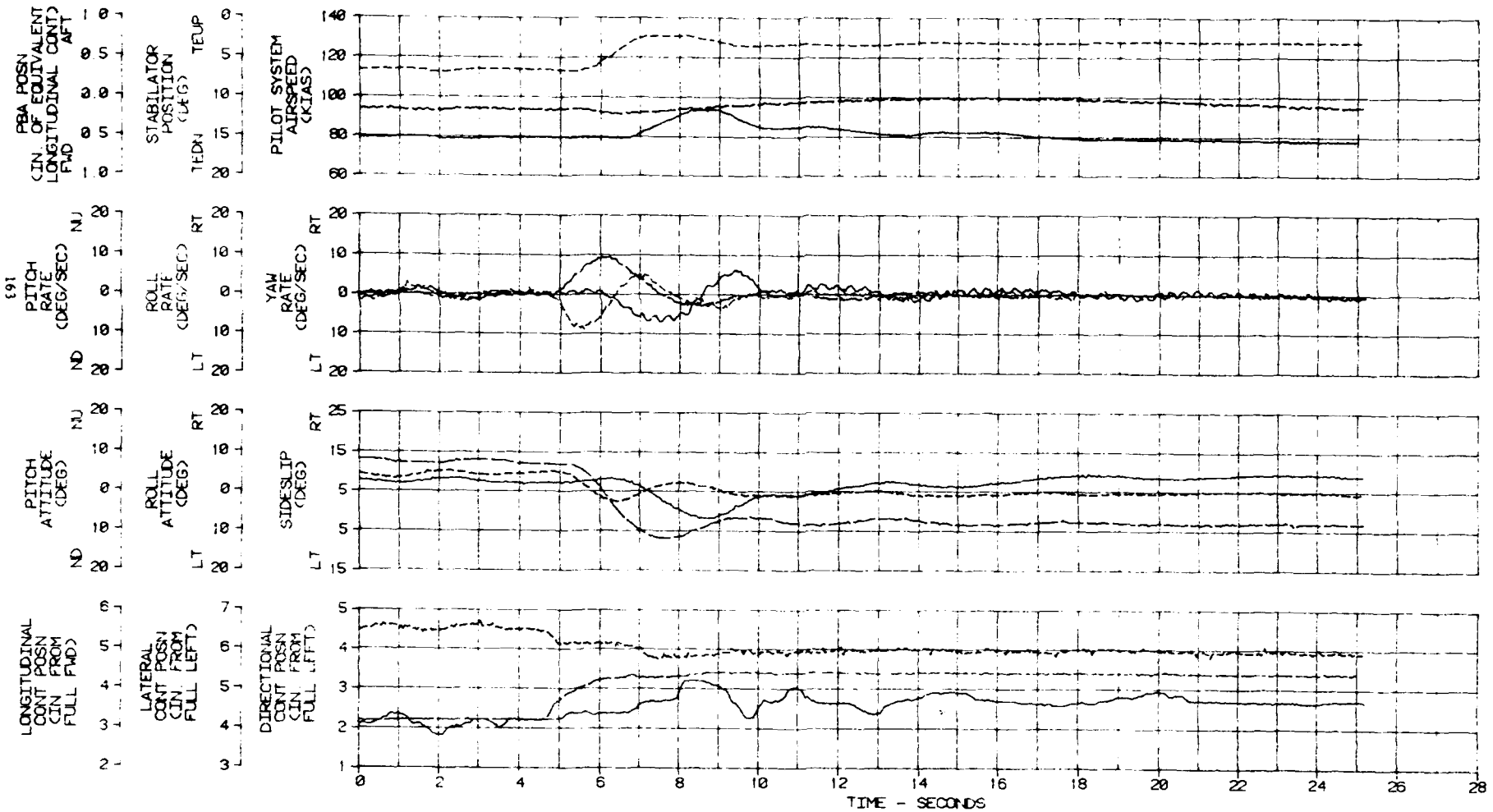


FIGURE 111

AIRCRAFT RESPONSE FOLLOWING RELEASE FROM SIDESLIP

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16460	361.6(AFT)	0.2RT	4000	7.5	258	122	LEVEL	ON OFF OFF AUTO (FAILURE MODE 6)

SOLID LINE — SHORT DASH — LONG DASH

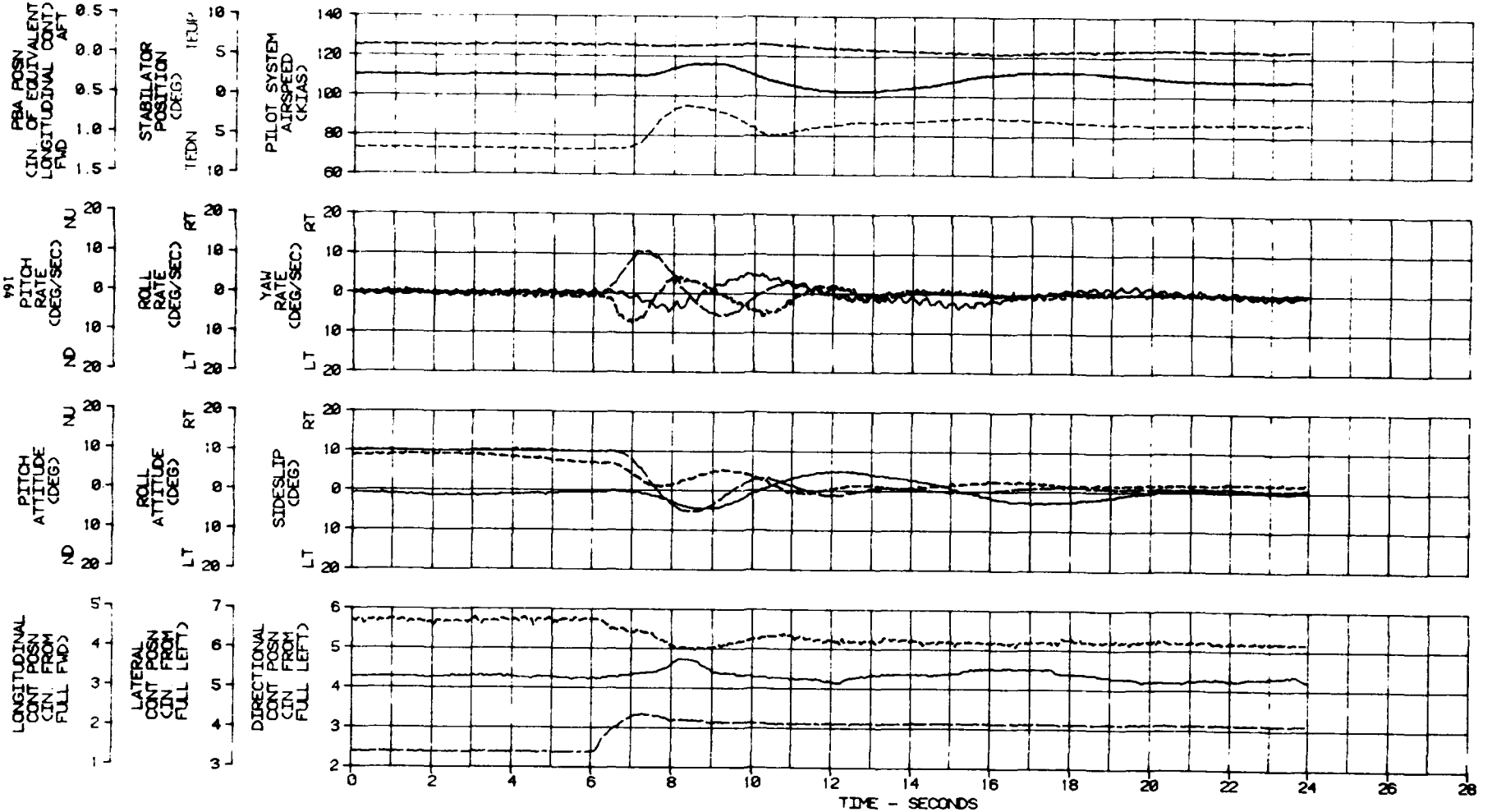


FIGURE 112

AIRCRAFT RESPONSE FOLLOWING RELEASE FROM SIDESLIP

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
22040	358.9 (AFT)	0.1 RT	3340	9.0	258	121	LEVEL	ON OFF OFF AUTO (FAILURE MODE 6)

SOLID LINE — SHORT DASH — LONG DASH

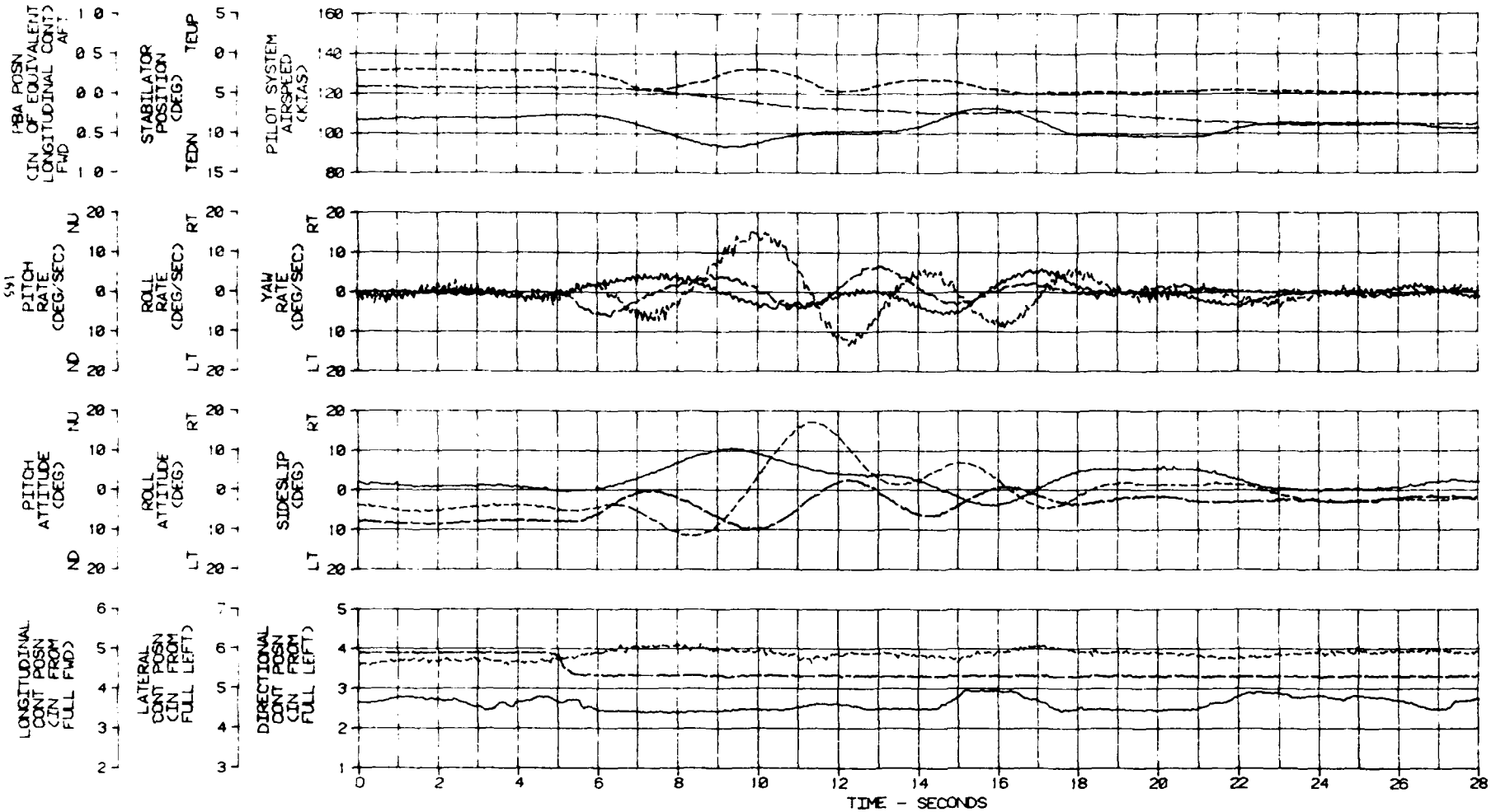


FIGURE 113

AIRCRAFT RESPONSE FOLLOWING RELEASE FROM SIDESLIP

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16000	359.8 (AFT)	[illegible]822	5020	13.0	258	141	LEVEL	ON OFF OFF AUTO (FAILURE MODE 6)

SOLID LINE — SHORT DASH — LONG DASH

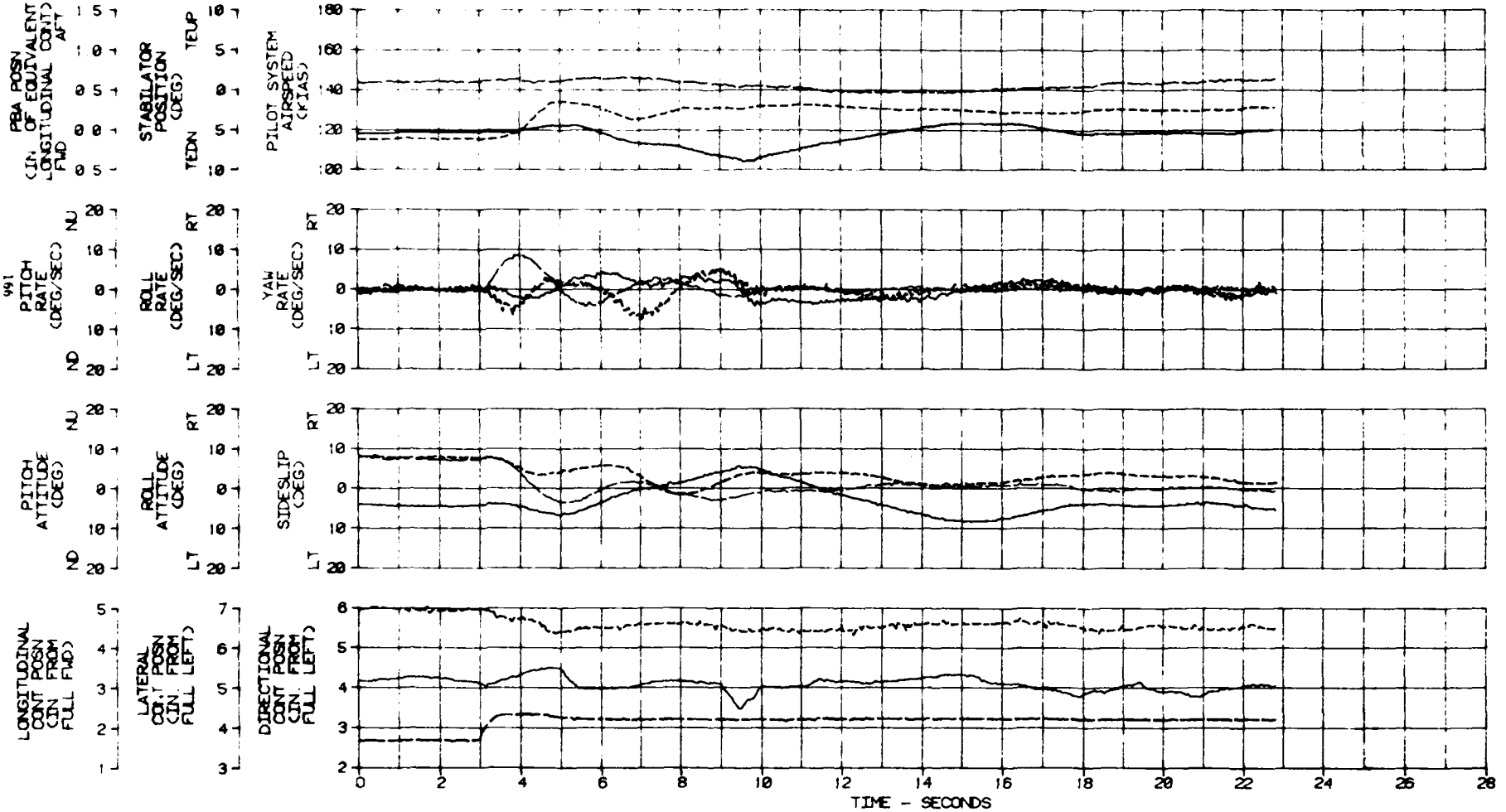


FIGURE 114

AIRCRAFT RESPONSE FOLLOWING RELEASE FROM SIDESLIP

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16440	361.3 (AFT)	0.2 RT	5020	12.5	258	151	LEVEL	ON OFF OFF AUTO (FAILURE MODE 6)

SOLID LINE — SHORT DASH — LONG DASH

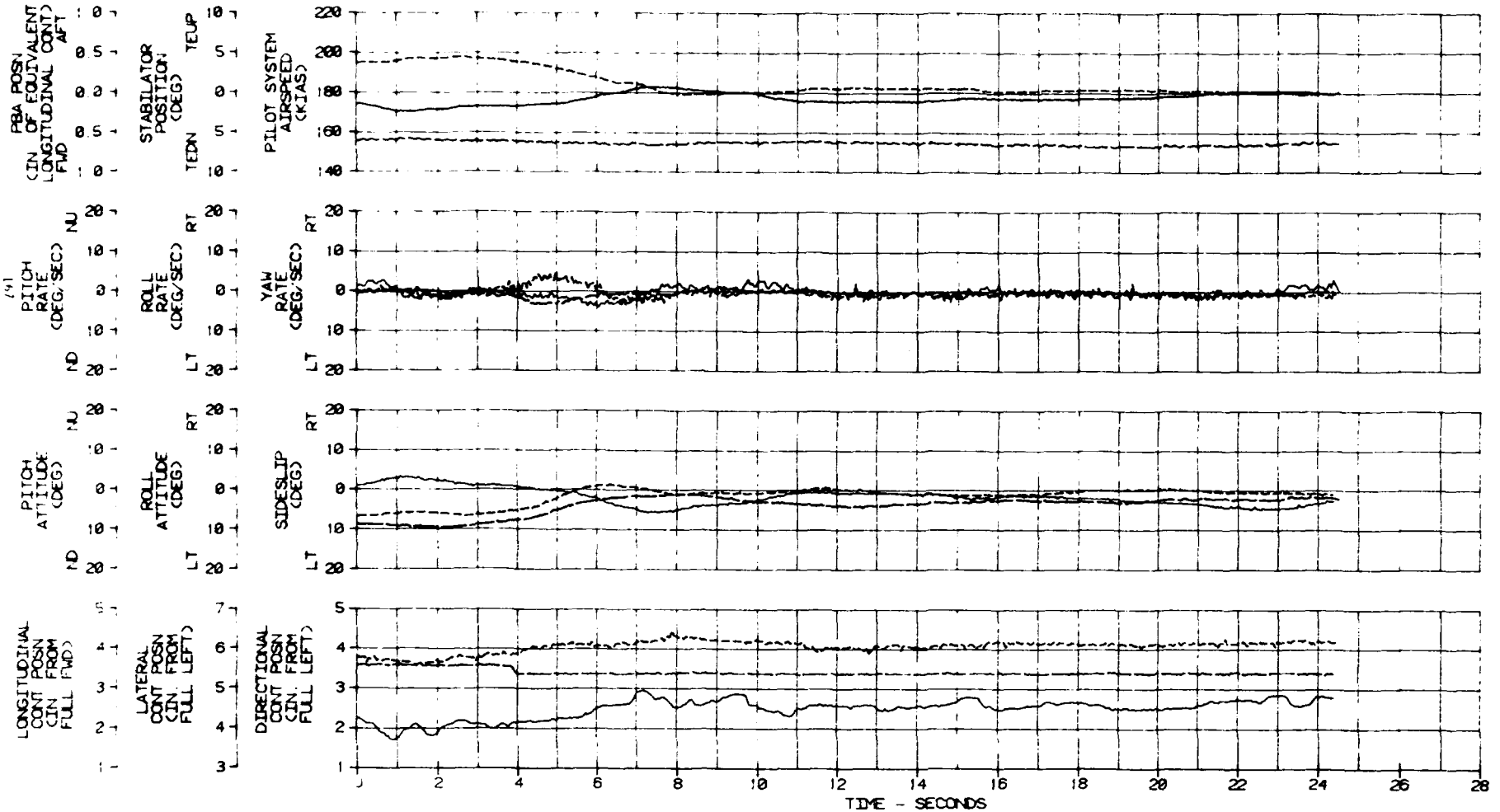


FIGURE 115

AIRCRAFT RESPONSE FOLLOWING RELEASE FROM SIDESLIP

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
21860	358.4(AFT)	0.1RT	3080	7.5	257	149	LEVEL	ON OFF OFF AUTO (FAILURE MODE 6)

SOLID LINE — SHORT DASH — LONG DASH

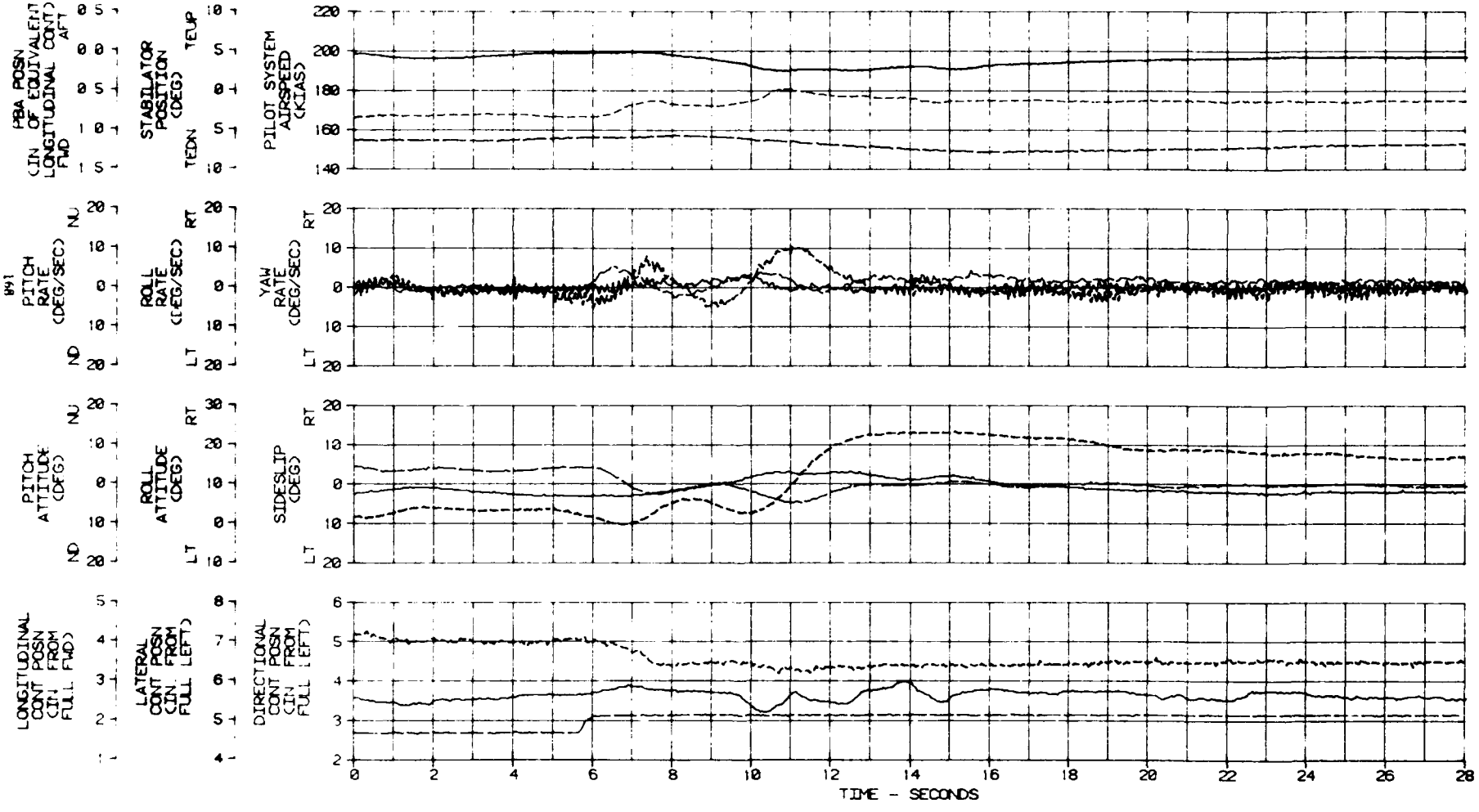


FIGURE 116

AIRCRAFT RESPONSE FOLLOWING RELEASE FROM SIDESLIP

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
14260	363.2 (AFT)	0.3 RT	5180	-4.0	258	62	LEVEL	OFF OFF OFF AUTO (FAILURE MODE 7)

SOLID LINE — SHORT DASH — LONG DASH

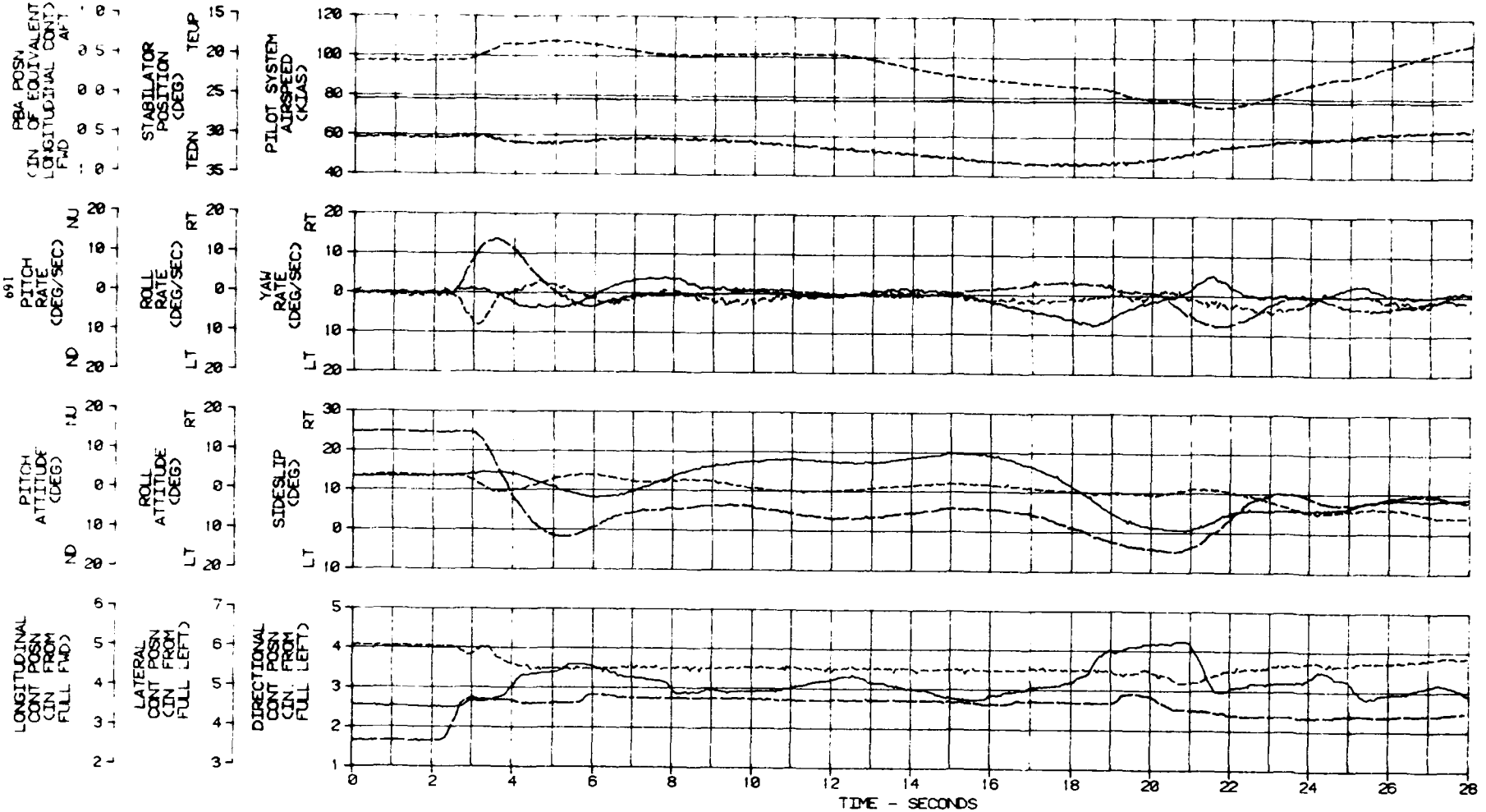


FIGURE 117

AIRCRAFT RESPONSE FOLLOWING RELEASE FROM SIDESLIP

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16180	360.7 (AFT)	0.2 RT	5000	9.5	258	62	LEVEL	OFF OFF OFF AUTO (FAILURE MODE 7)

SOLID LINE — SHORT DASH — LONG DASH

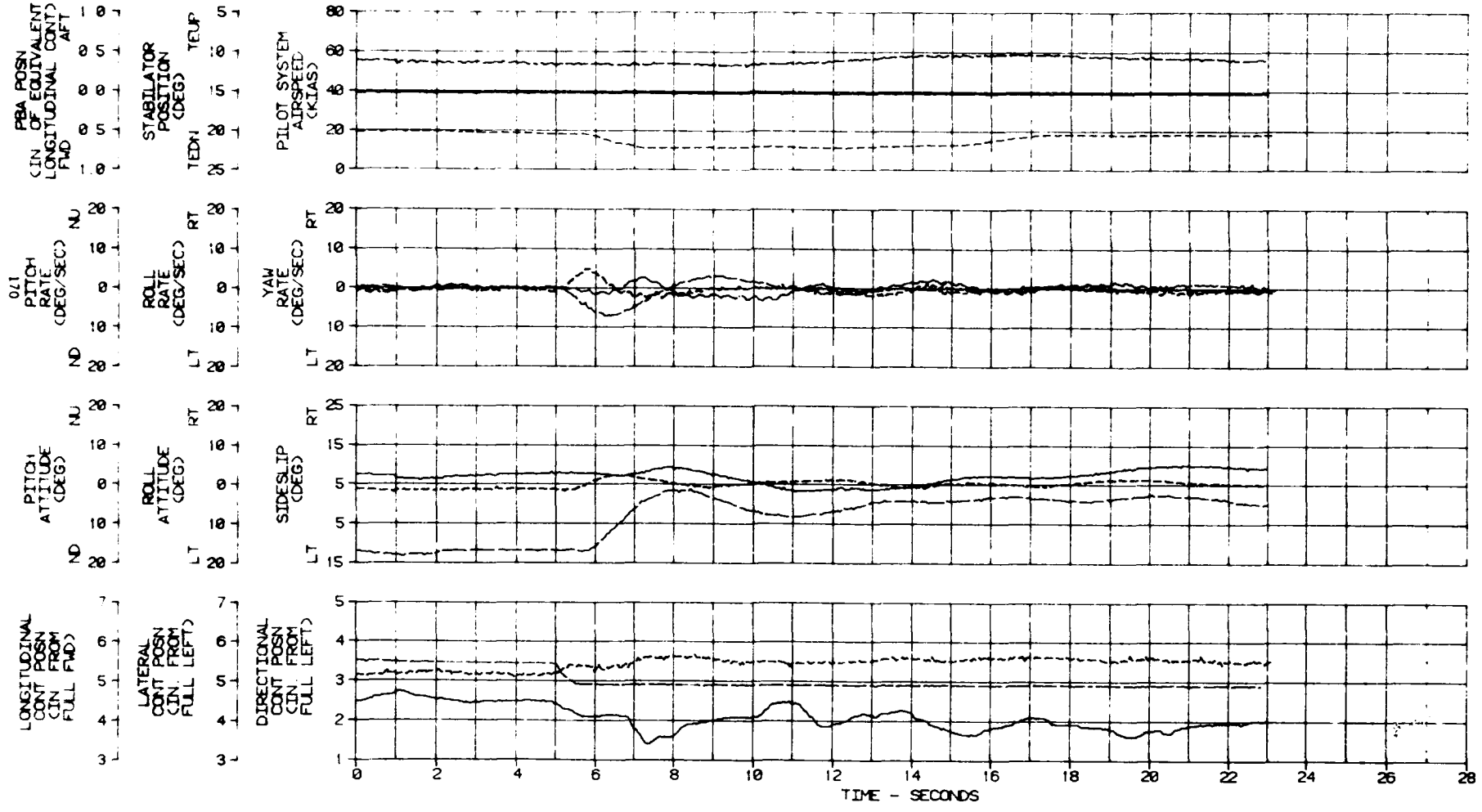


FIGURE 118

AIRCRAFT RESPONSE FOLLOWING RELEASE FROM SIDESLIP

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
21580	357.6 (AFT)	0.1 RT	2600	4.5	258	61	LEVEL	OFF OFF OFF AUTO (FAILURE MODE 7)

SOLID LINE — SHORT DASH — LONG DASH

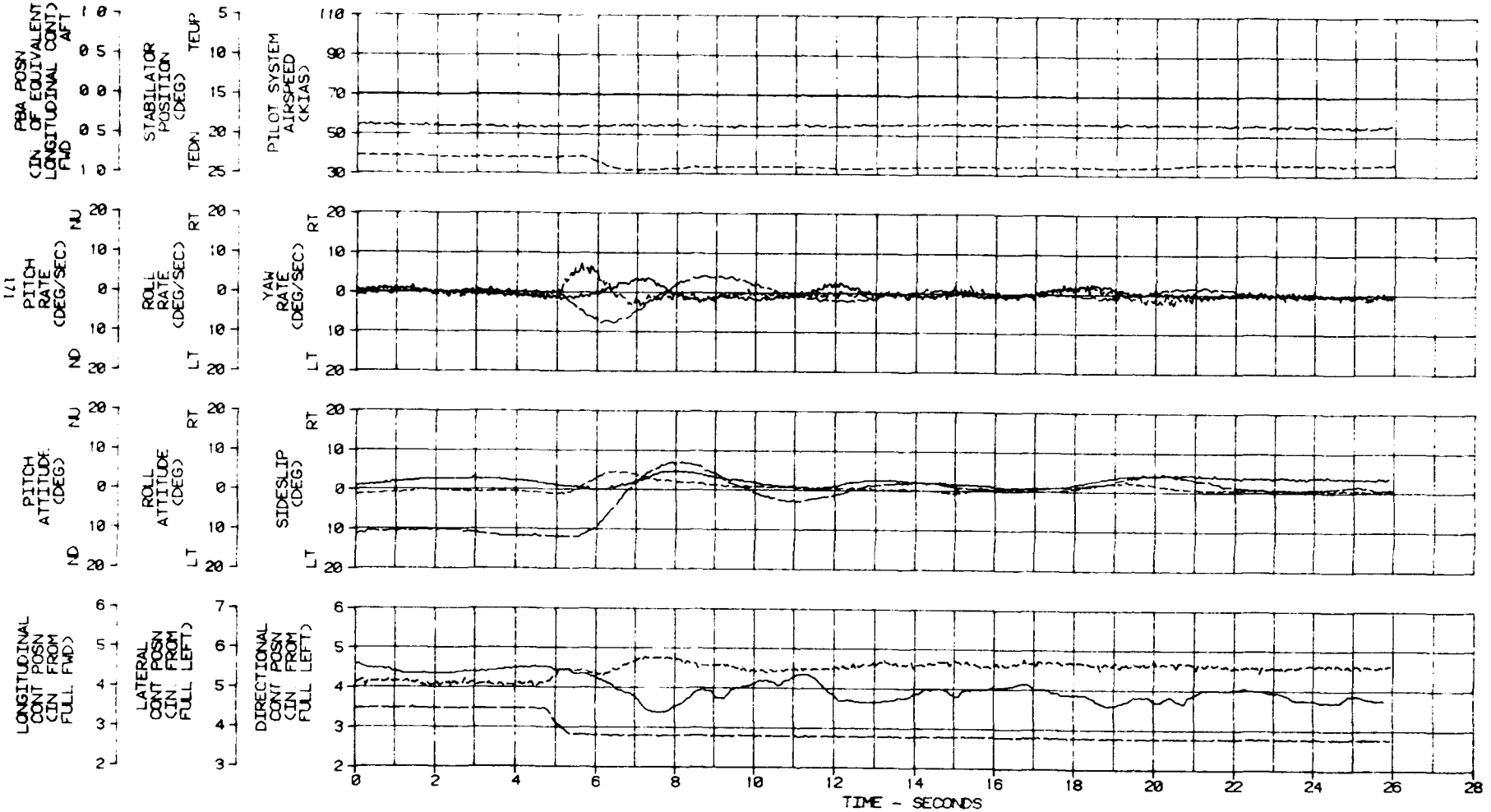


FIGURE 119

AIRCRAFT RESPONSE FOLLOWING RELEASE FROM SIDESLIP

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16220	360.7 (AFT)	0.2 RT	5100	9.0	258	91	LEVEL	OFF OFF OFF AUTO (FAILURE MODE 7)

SOLID LINE — SHORT DASH — LONG DASH

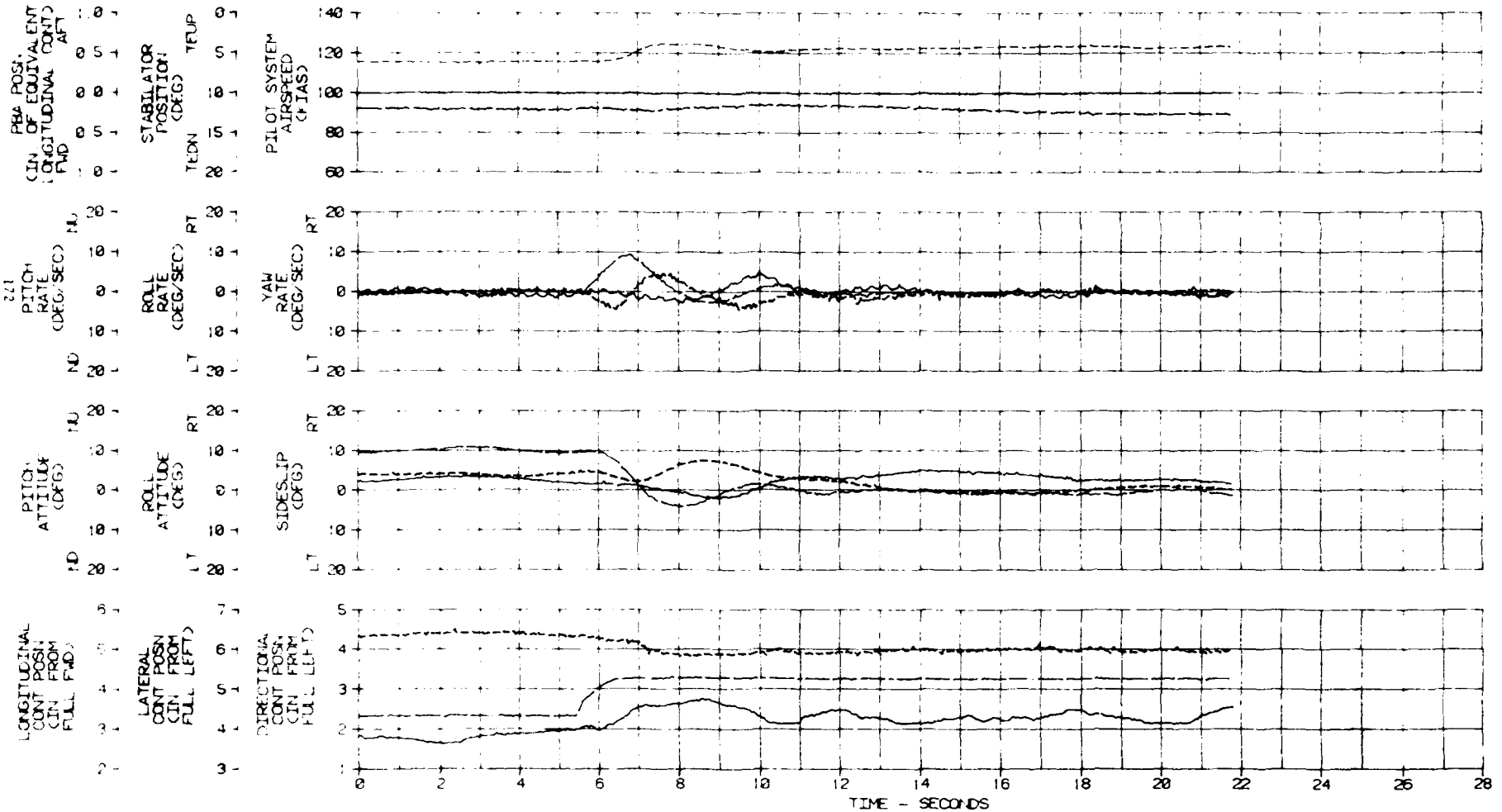


FIGURE 120

AIRCRAFT RESPONSE FOLLOWING RELEASE FROM SIDESLIP

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
13920	361.8(AFT)	0.4(RT)	5420	14.0	257	122	LEVEL	OFF OFF OFF AUTO (FAILURE MODE 7)

SOLID LINE — SHORT DASH — LONG DASH

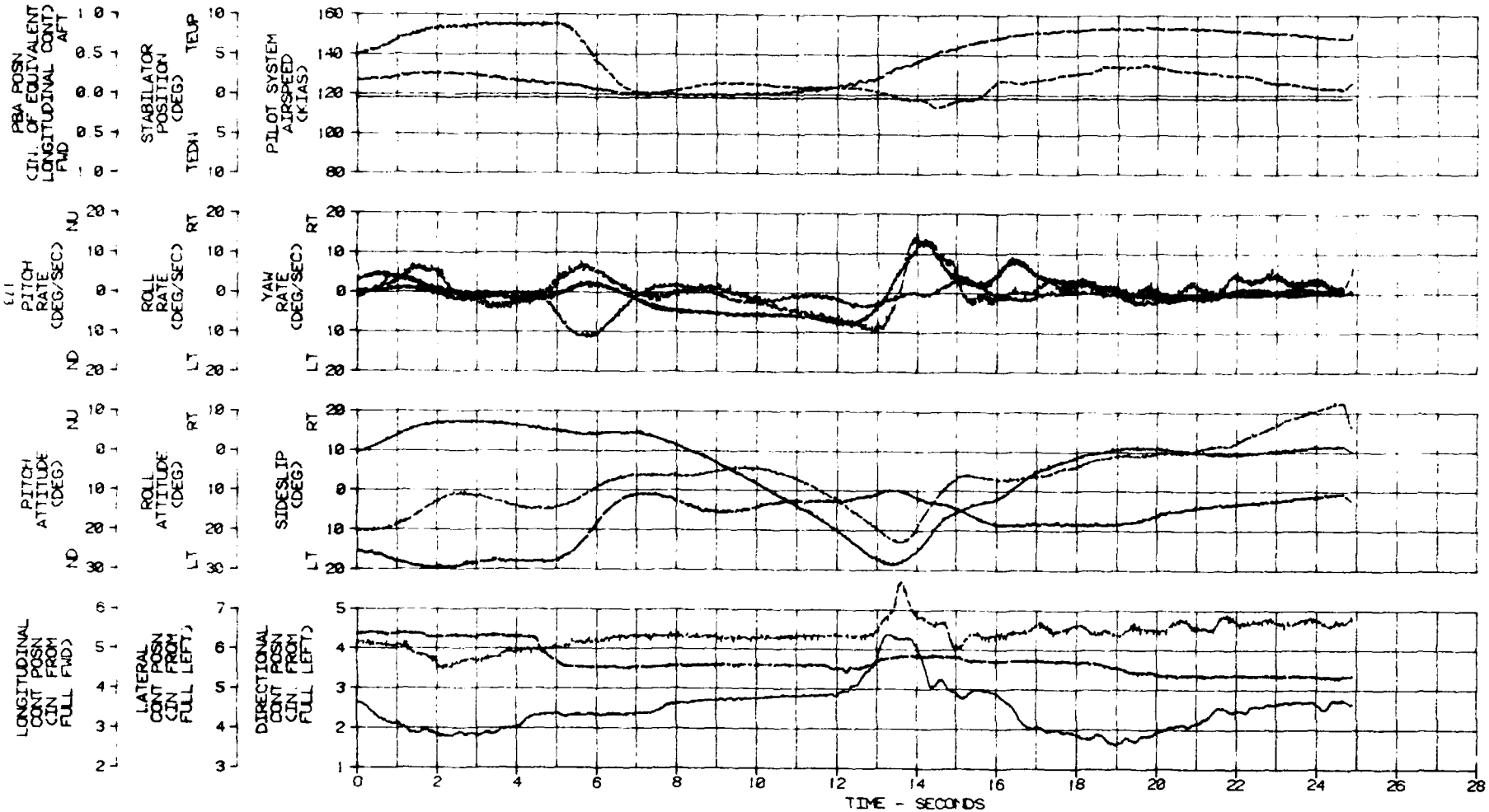


FIGURE 121

AIRCRAFT RESPONSE FOLLOWING RELEASE FROM SIDESLIP

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16620	362.2(AFT)	0.2RT	4840	7.5	258	121	LEVEL	OFF OFF OFF AUTO (FAILURE MODE 7)

SOLID LINE — SHORT DASH — LONG DASH

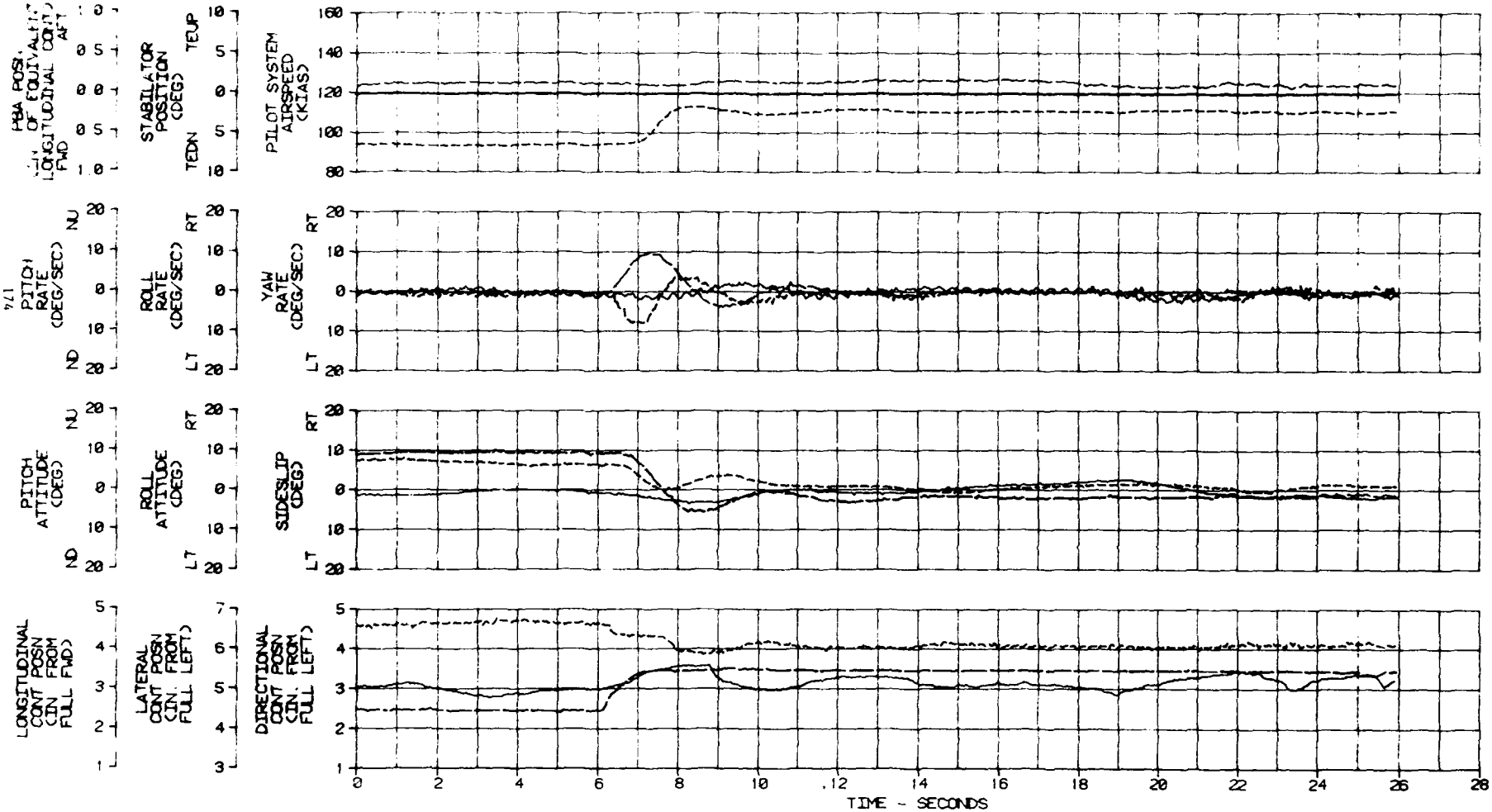


FIGURE 122

AIRCRAFT RESPONSE FOLLOWING RELEASE FROM SIDESLIP

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
22000	358.8(AFT)	0.1RT	2860	3.5	258	122	LEVEL	OFF OFF OFF AUTO (FAILURE MODE 7)

SOLID LINE — SHORT DASH — LONG DASH

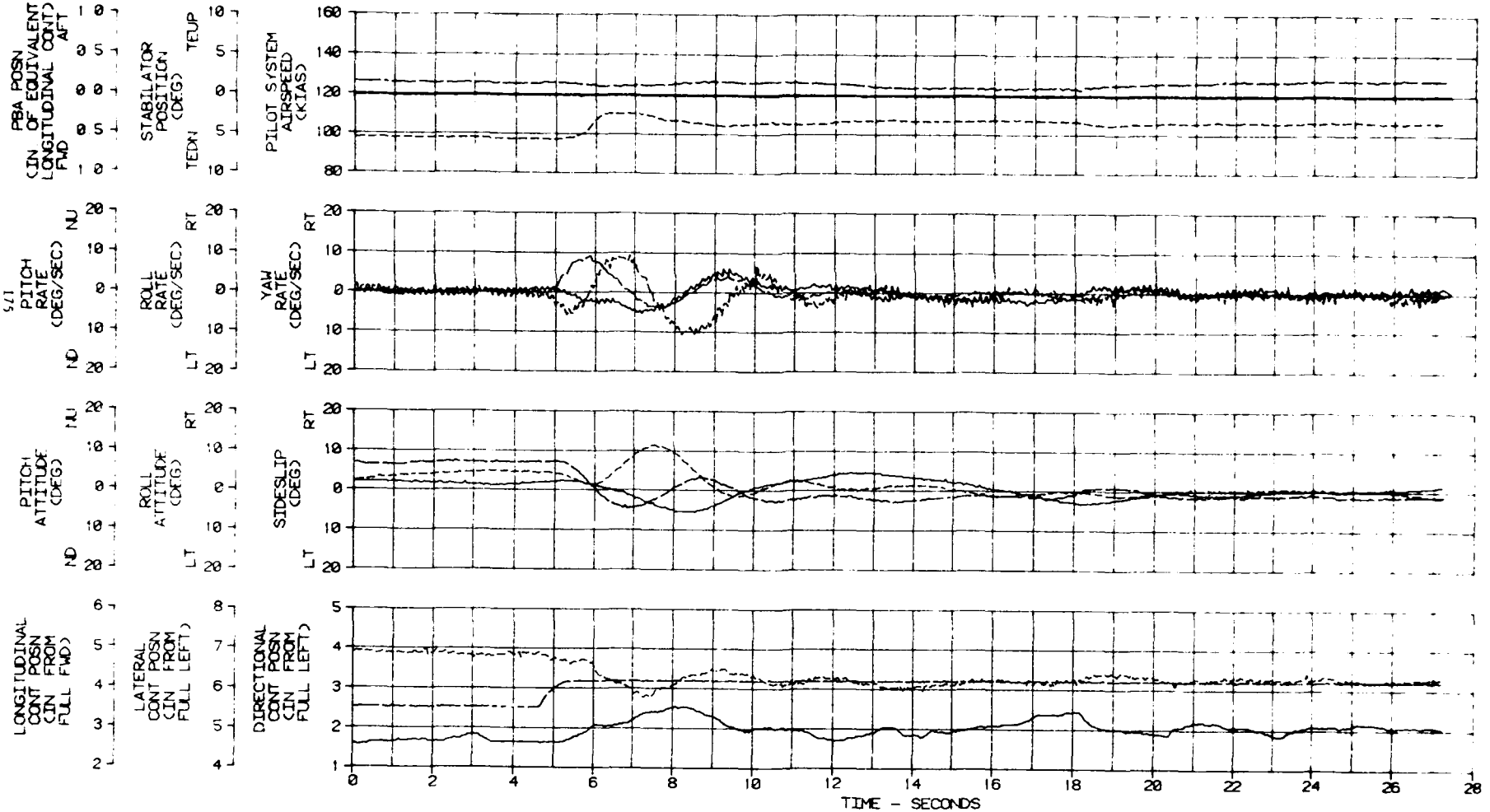


FIGURE 123

AIRCRAFT RESPONSE FOLLOWING RELEASE FROM SIDESLIP

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16500	361.9(AFT)	0.3RT	5040	5.0	258	139	LEVEL	OFF OFF OFF AUTO (FAILURE MODE 7)

SOLID LINE — SHORT DASH — LONG DASH

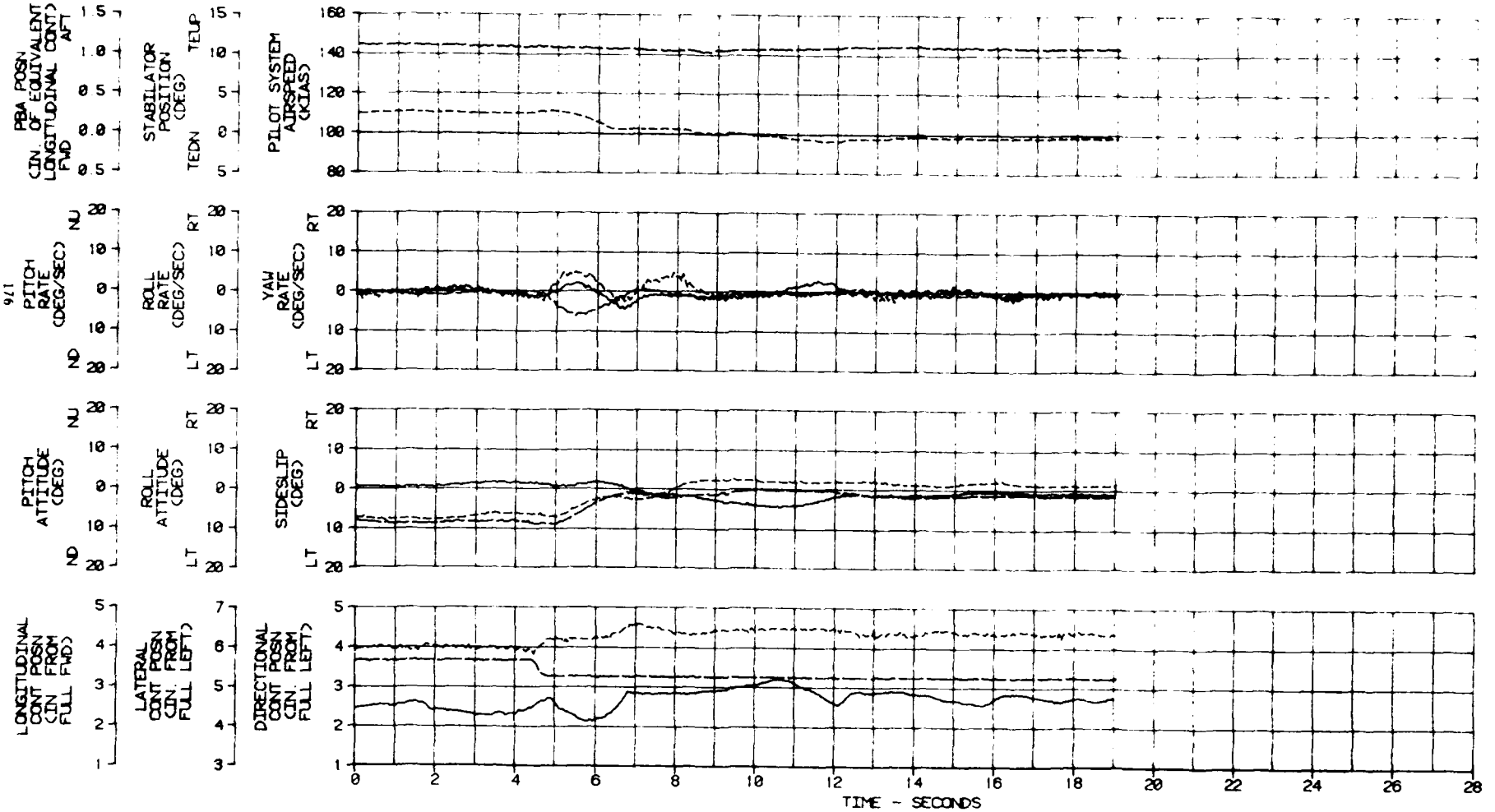


FIGURE 124

AIRCRAFT RESPONSE FOLLOWING RELEASE FROM SIDESLIP

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
14240	363.1 (AFT)	0.3RT	4540	17 0	258	150	LEVEL	OFF OFF OFF AUTO (FAILURE MODE 7)

SOLID LINE — SHORT DASH — LONG DASH

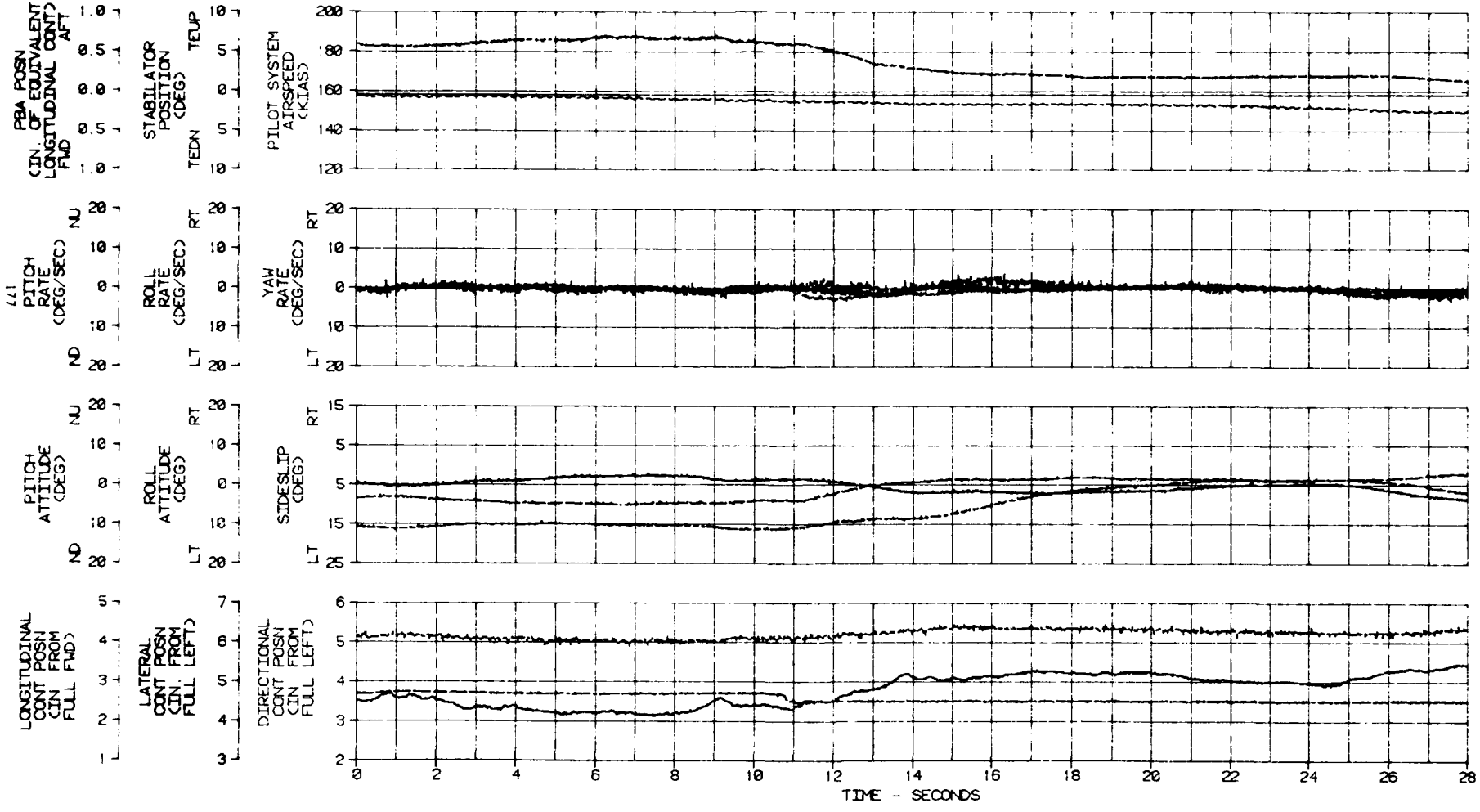


FIGURE 125

AIRCRAFT RESPONSE FOLLOWING RELEASE FROM SIDESLIP

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16540	362.0(AFT)	0.2RT	4860	9.0	256	149	LEVEL	OFF OFF OFF AUTO (FAILURE MODE 7)

SOLID LINE — SHORT DASH — LONG DASH

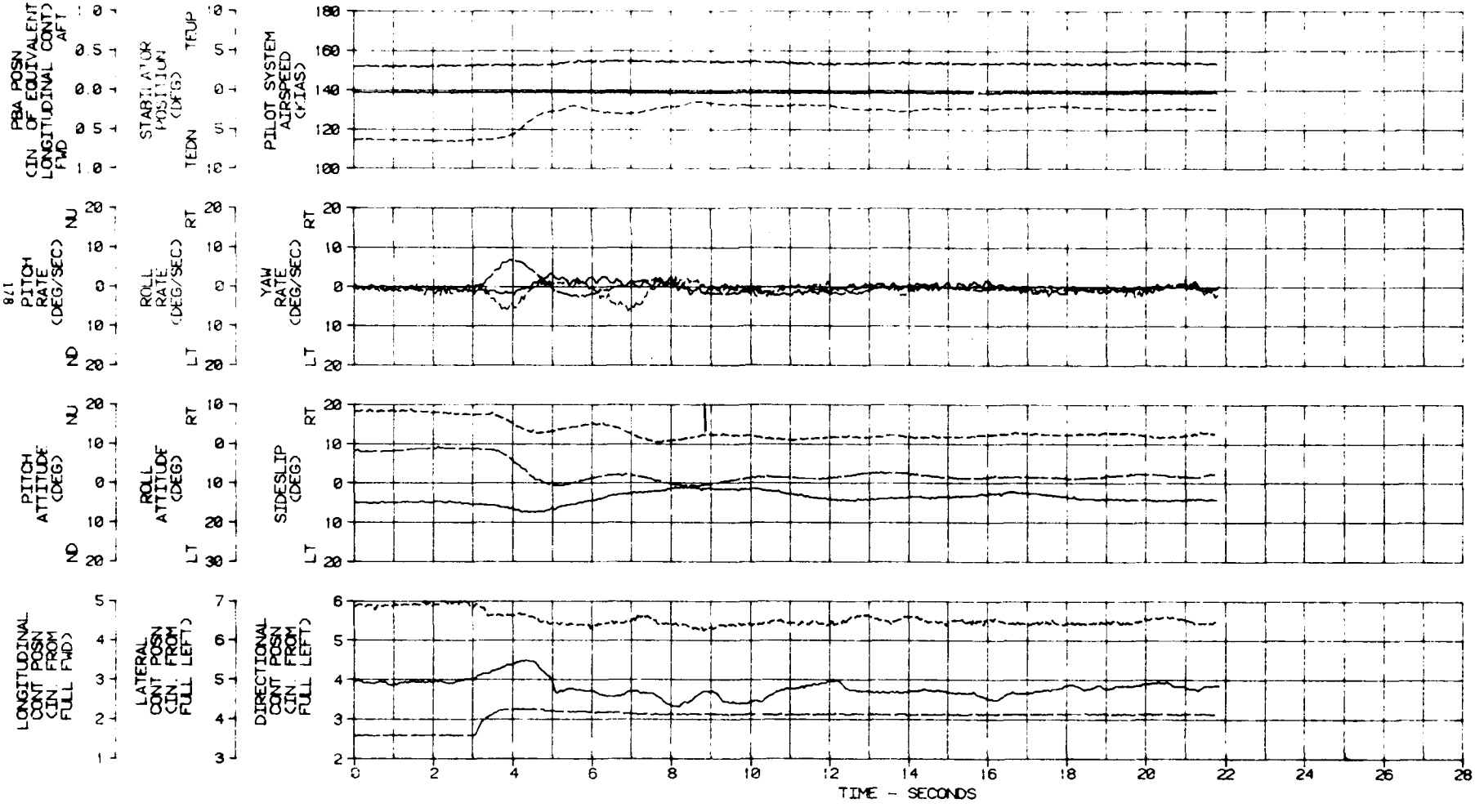


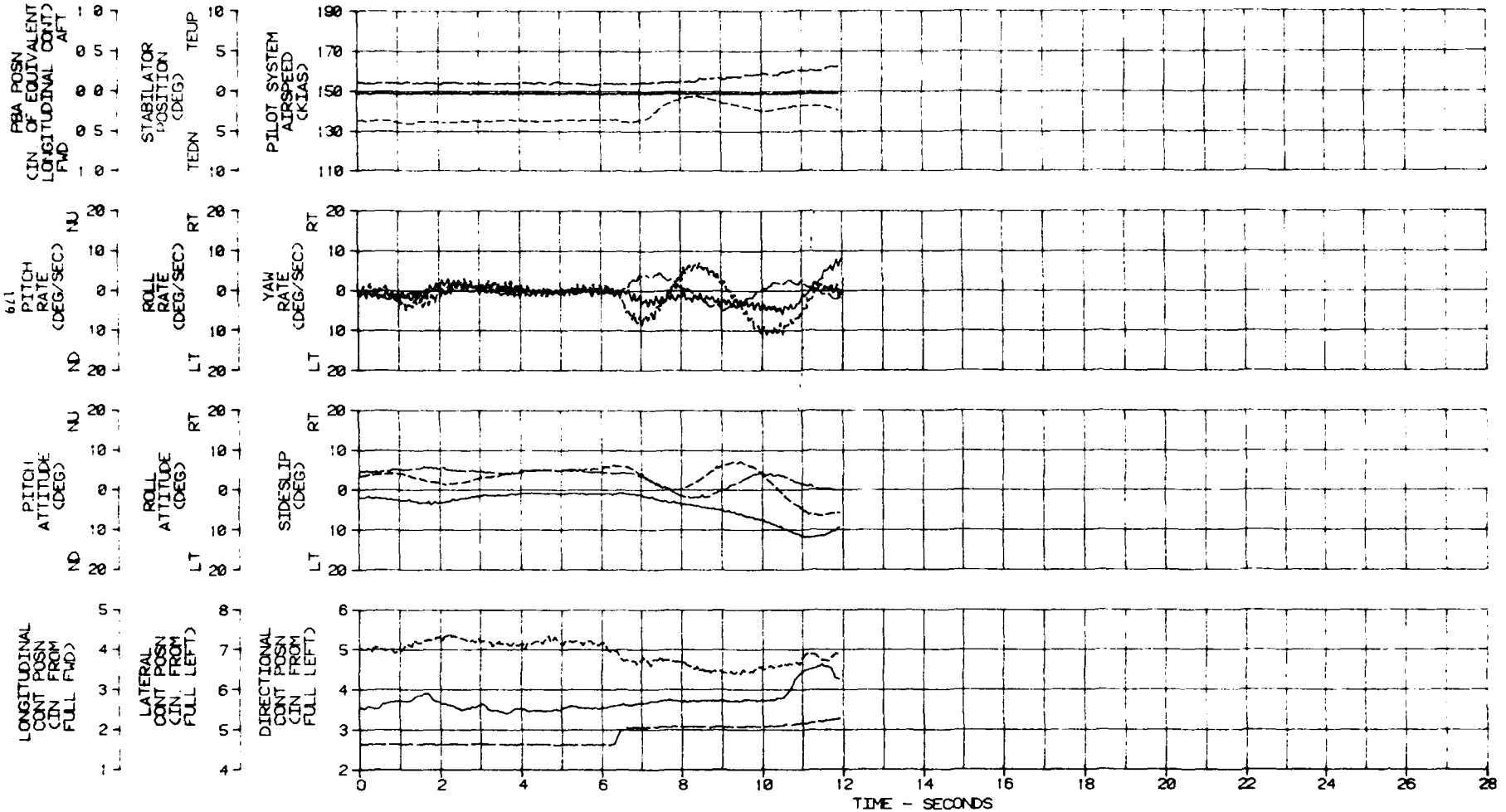
FIGURE 126

AIRCRAFT RESPONSE FOLLOWING RELEASE FROM SIDESLIP

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
21640	357.8(AFT)	0.1RT	3360	7.0	258	149	LEVEL	OFF OFF OFF AUTO (FAILURE MODE 7)

SOLID LINE — SHORT DASH — LONG DASH



611

FIGURE 127

AIRCRAFT RESPONSE FOLLOWING RELEASE FROM SIDESLIP

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16660	362.0(AFT)	0.2RT	4920	12.5	257	61	LEVEL	ON OFF OFF OFF (FAILURE MODE 8)

SOLID LINE — SHORT DASH — LONG DASH

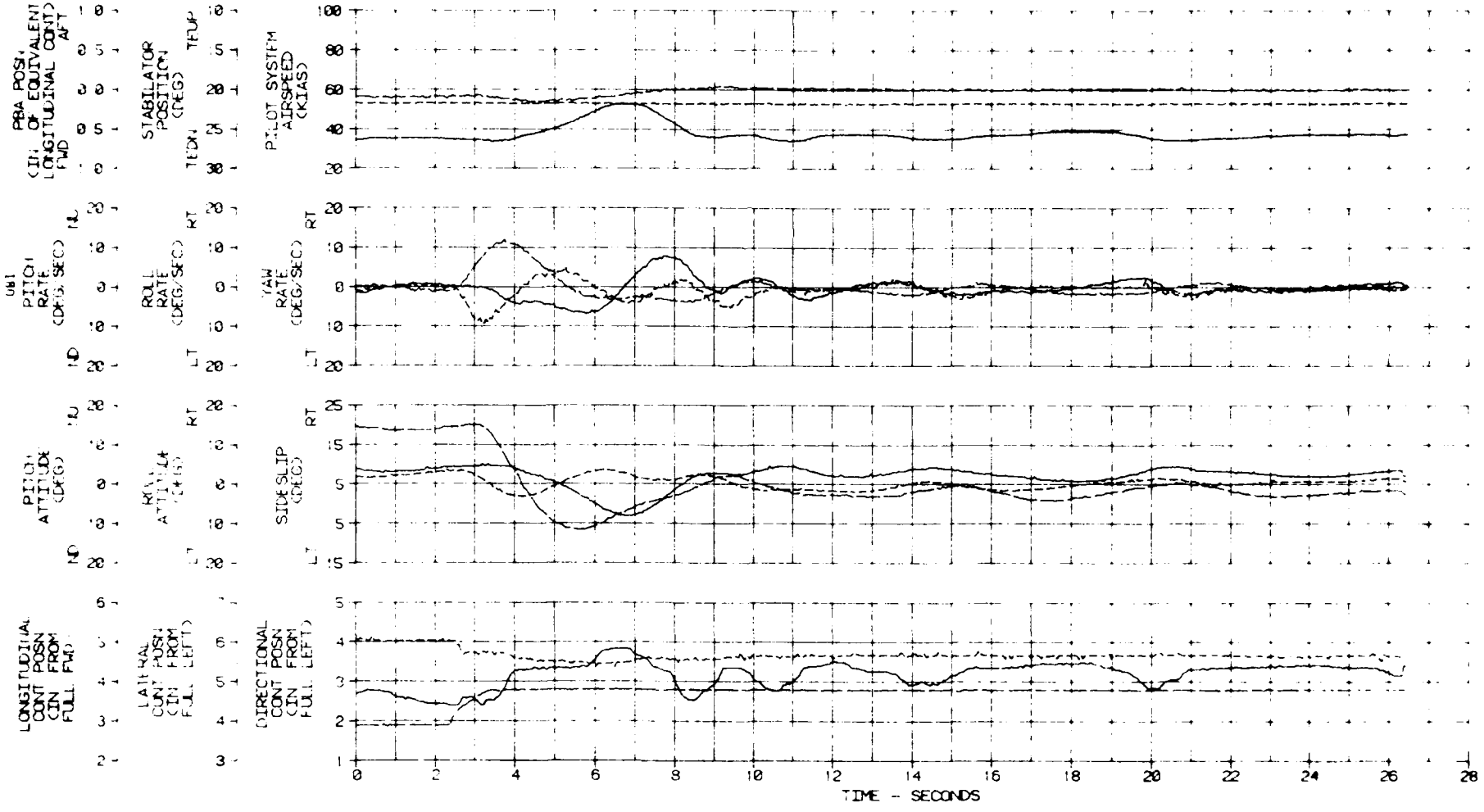


FIGURE 128

AIRCRAFT RESPONSE FOLLOWING RELEASE FROM SIDESLIP

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16360	361.2(AFT)	0.2RT	4800	13.0	257	91	LEVEL	ON OFF OFF OFF (FAILURE MODE 8)

SOLID LINE — SHORT DASH — LONG DASH

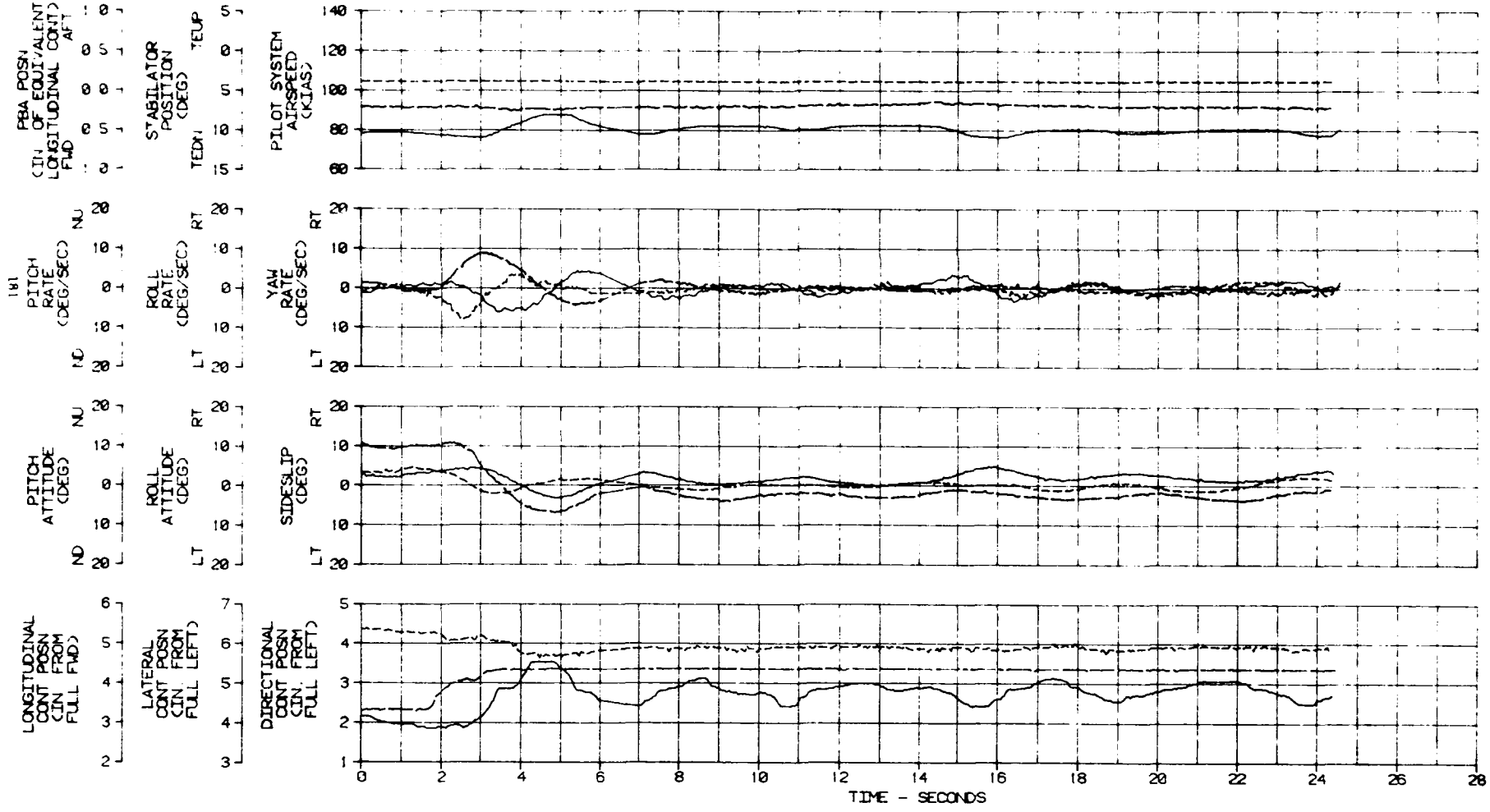


FIGURE 129

AIRCRAFT RESPONSE FOLLOWING RELEASE FROM SIDESLIP

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16380	361 4	(AFT) 0 2	RT 4280	10 0	257	121	LEVEL	ON OFF OFF OFF (FAILURE MODE 8)

SOLID LINE — SHORT DASH — LONG DASH

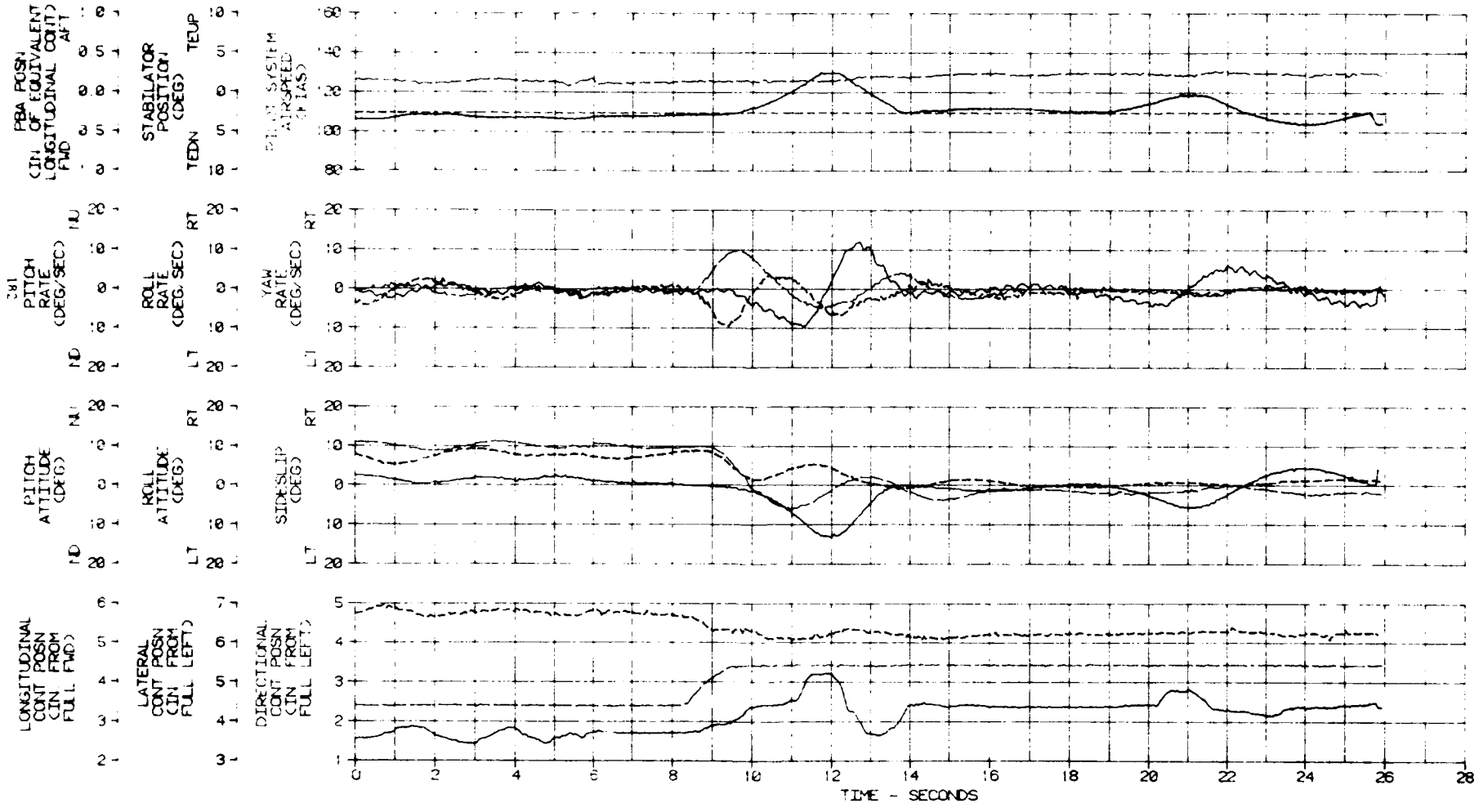


FIGURE 130

AIRCRAFT RESPONSE FOLLOWING RELEASE FROM SIDESLIP

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16380	361 3(AFT)	0.2RT	5120	12.5	257	141	LEVEL	ON OFF OFF OFF (FAILURE MODE 8)

SOLID LINE — SHORT DASH — LONG DASH

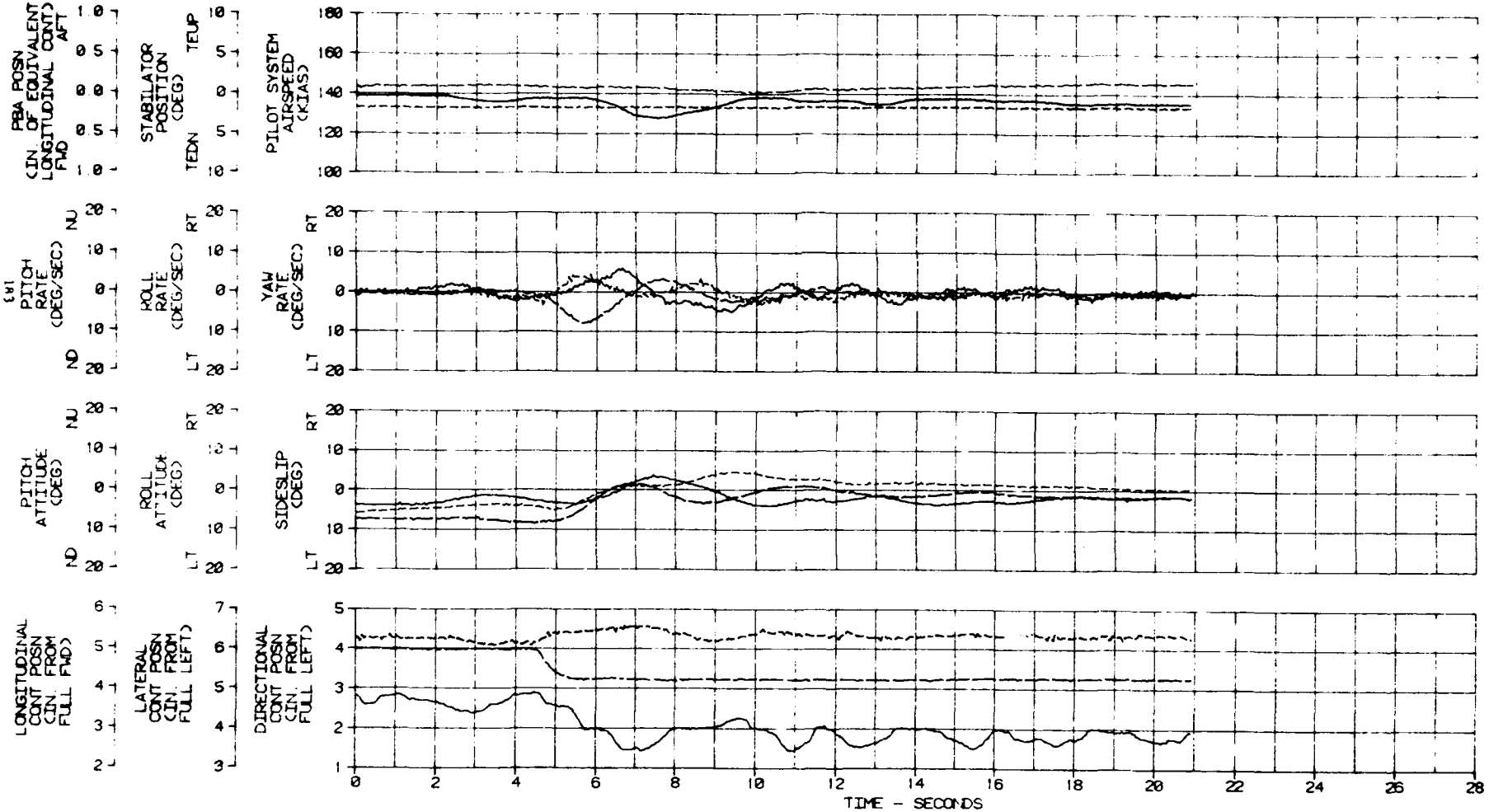


FIGURE 131

AIRCRAFT RESPONSE FOLLOWING RELEASE FROM SIDESLIP

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16400	361 3(AFT)	0 2RT	5080	12 0	257	150	LEVEL	ON OFF OFF OFF (FAILURE MODE 8)

SOLID LINE — SHORT DASH — LONG DASH

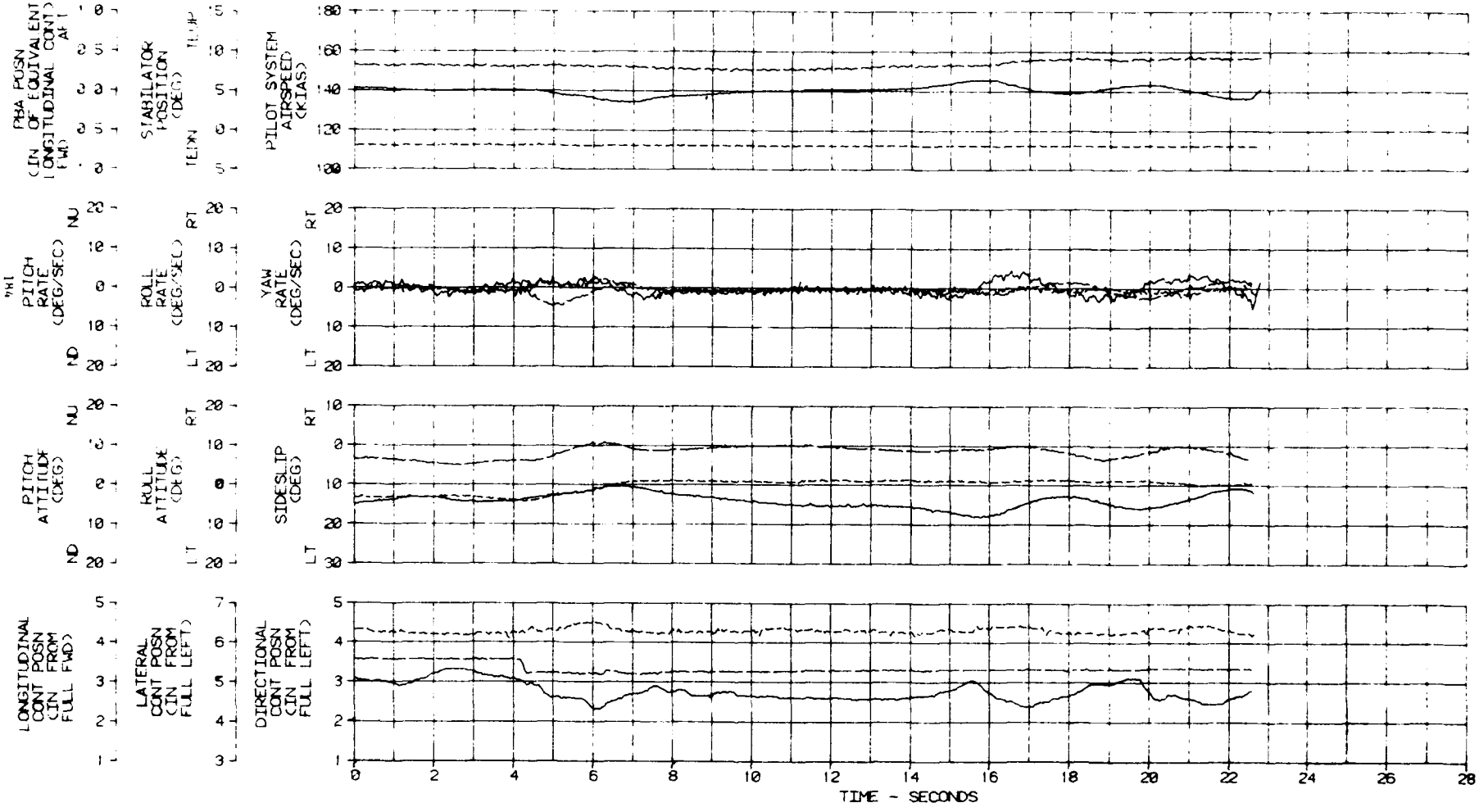


FIGURE 132

AIRCRAFT RESPONSE FOLLOWING RELEASE FROM SIDESLIP

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16480	361.8(AFT)	0.3RT	5060	8.0	258	61	LEVEL	OFF OFF OFF OFF (FAILURE MODE 9)

SOLID LINE — SHORT DASH — LONG DASH

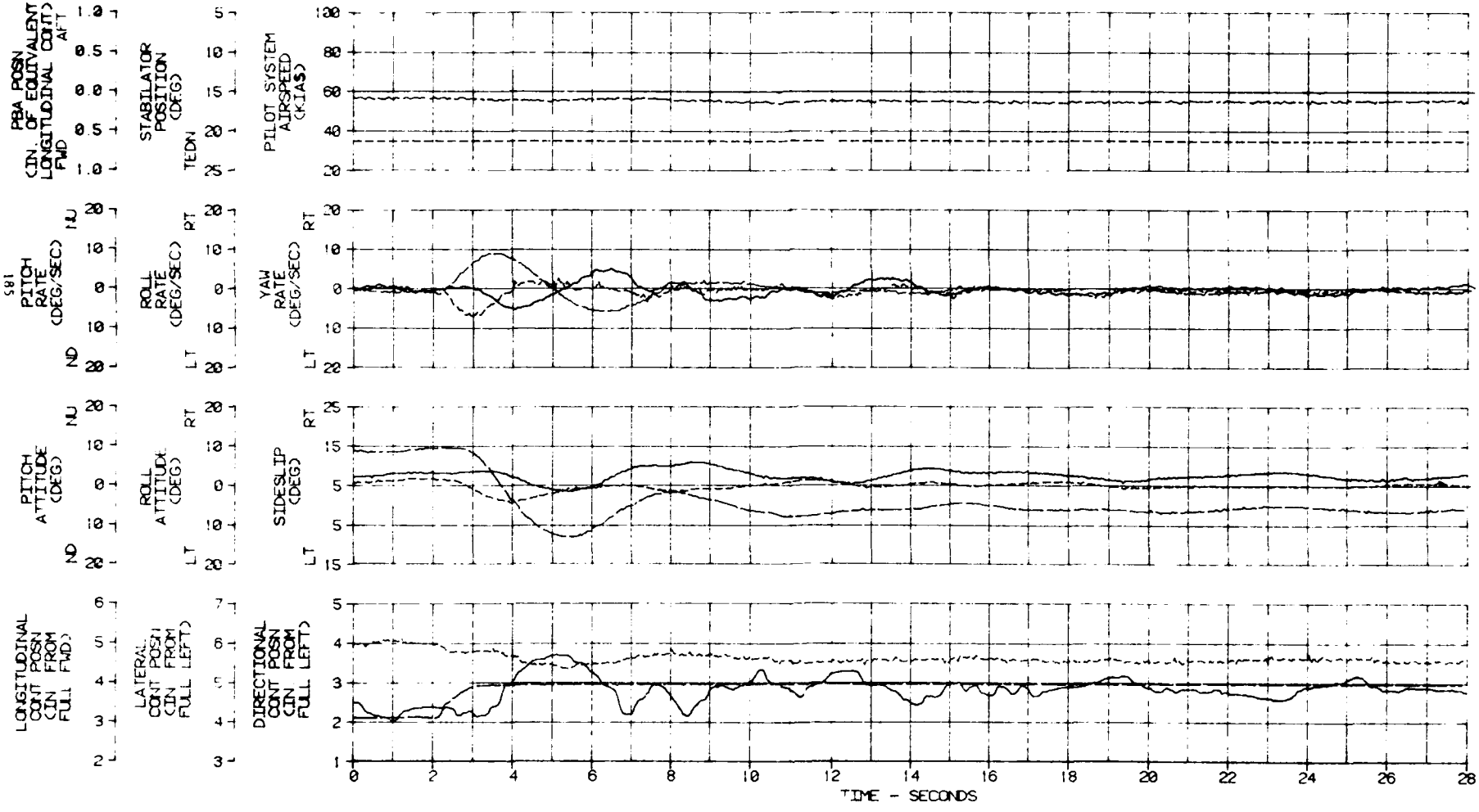


FIGURE 133

AIRCRAFT RESPONSE FOLLOWING RELEASE FROM SIDESLIP

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16320	361 2(AFT)	0 2RT	4820	9.0	257	91	LEVEL	OFF OFF OFF OFF (FAILURE MODE 9)

SOLID LINE — SHORT DASH — LONG DASH

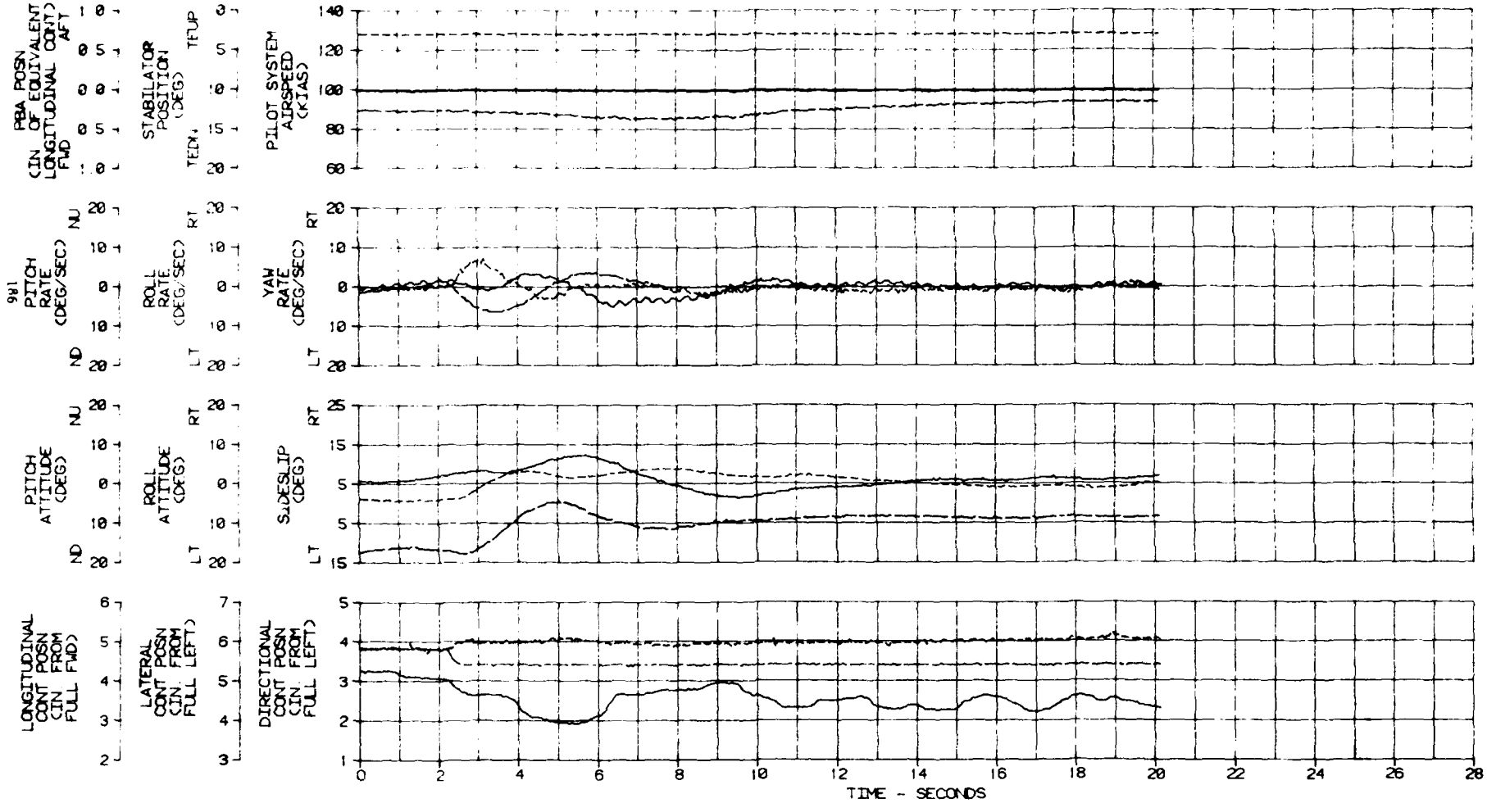


FIGURE 34

AIRCRAFT RESPONSE FOLLOWING RELEASE FROM SIDESLIP

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16680	362.5 (AFT)	0.2 RT	4960	8.0	258	122	LEVEL	OFF OFF OFF OFF (FAILURE MODE 9)

SOLID LINE — SHORT DASH — LONG DASH

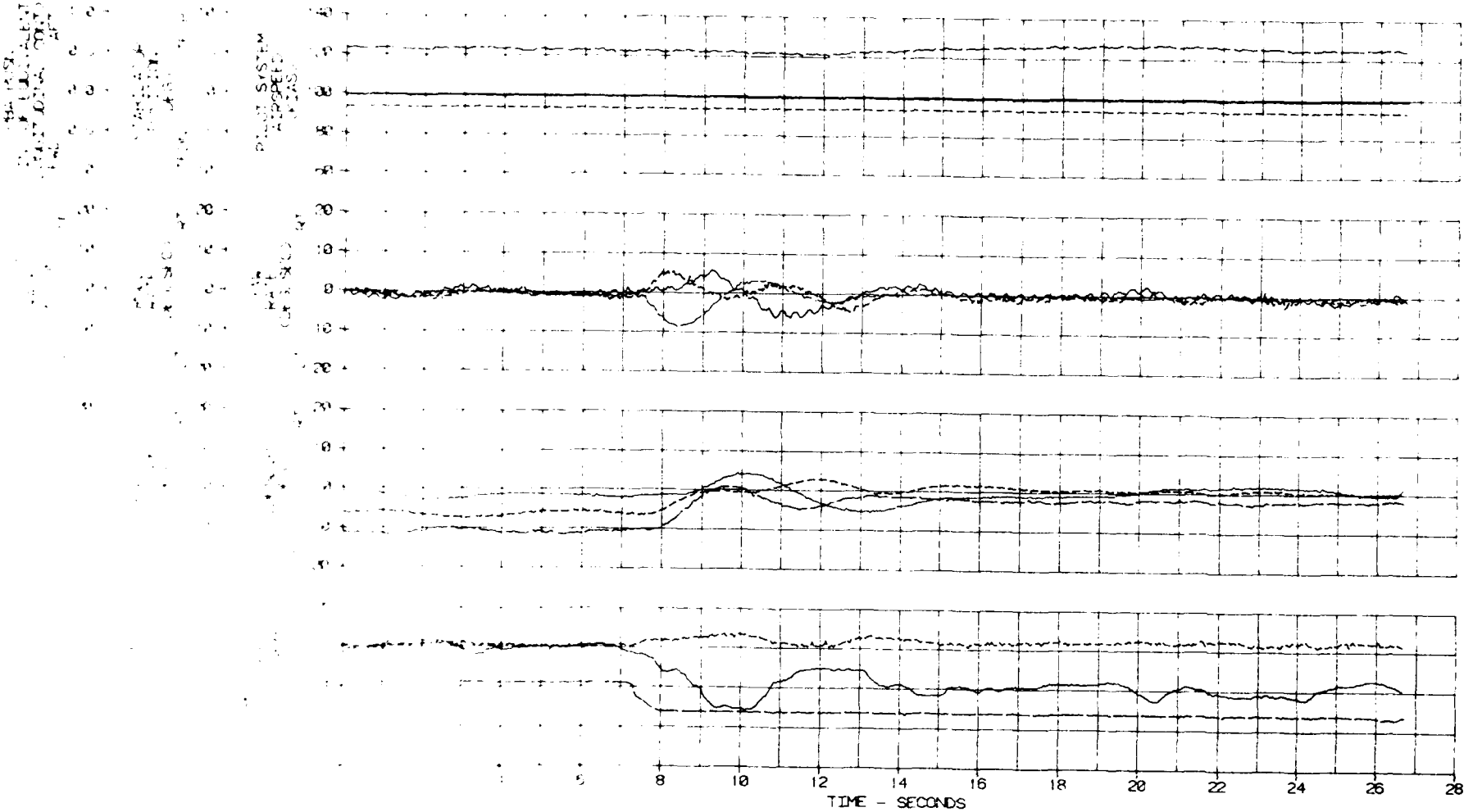


FIGURE 135

AIRCRAFT RESPONSE FOLLOWING RELEASE FROM SIDESLIP

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16680	362.0 (AFT)	0.1 RT	4900	12.0	259	140	LEVEL	OFF OFF OFF OFF (FAILURE MODE 9)

SOLID LINE — SHORT DASH — LONG DASH

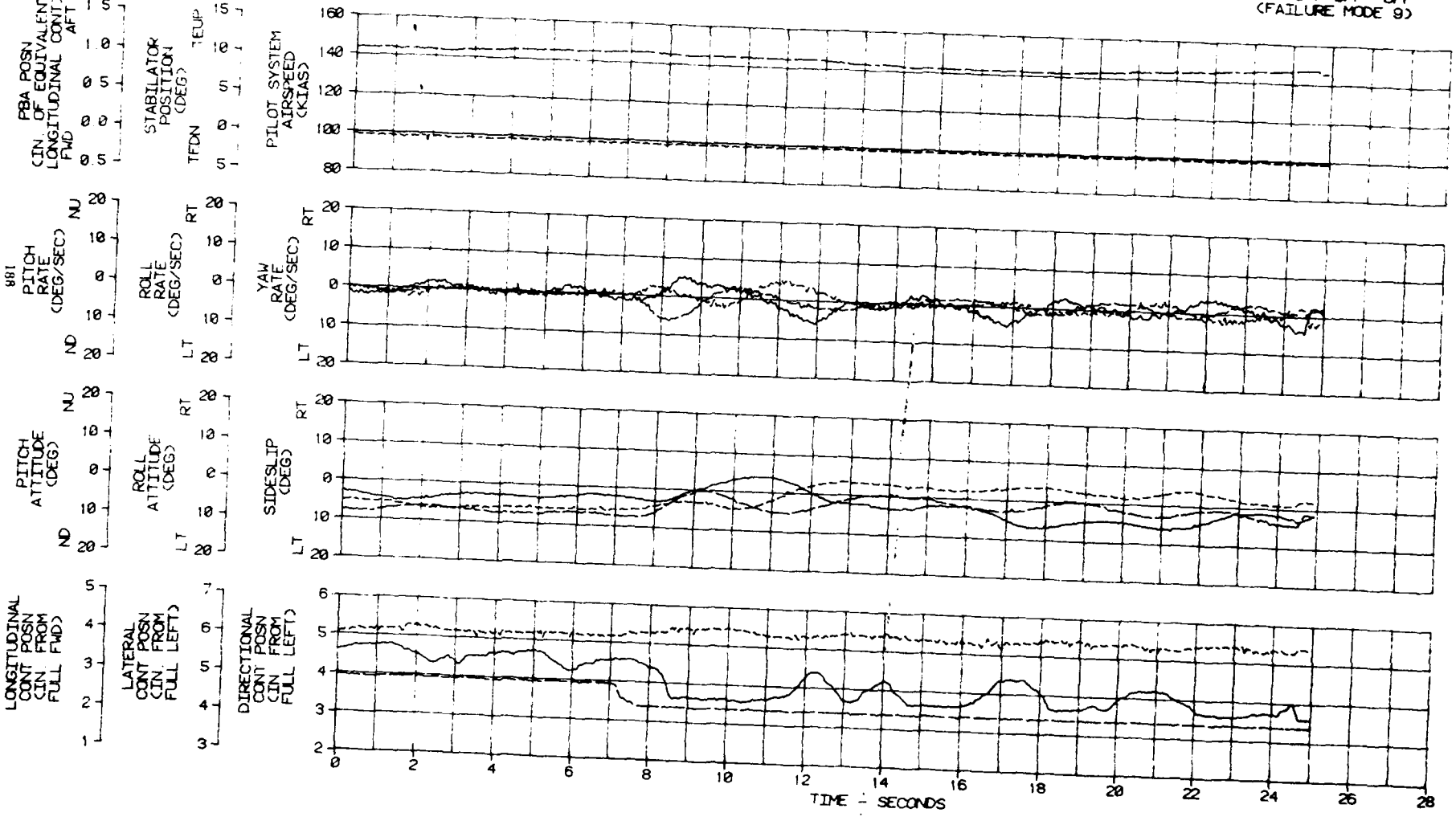


FIGURE 136

AIRCRAFT RESPONSE FOLLOWING RELEASE FROM SIDESLIP

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16440	361.4 (AFT)	0.3 RT	4980	12.5	258	151	LEVEL	OFF OFF OFF OFF (FAILURE MODE 9)

SOLID LINE — SHORT DASH — LONG DASH

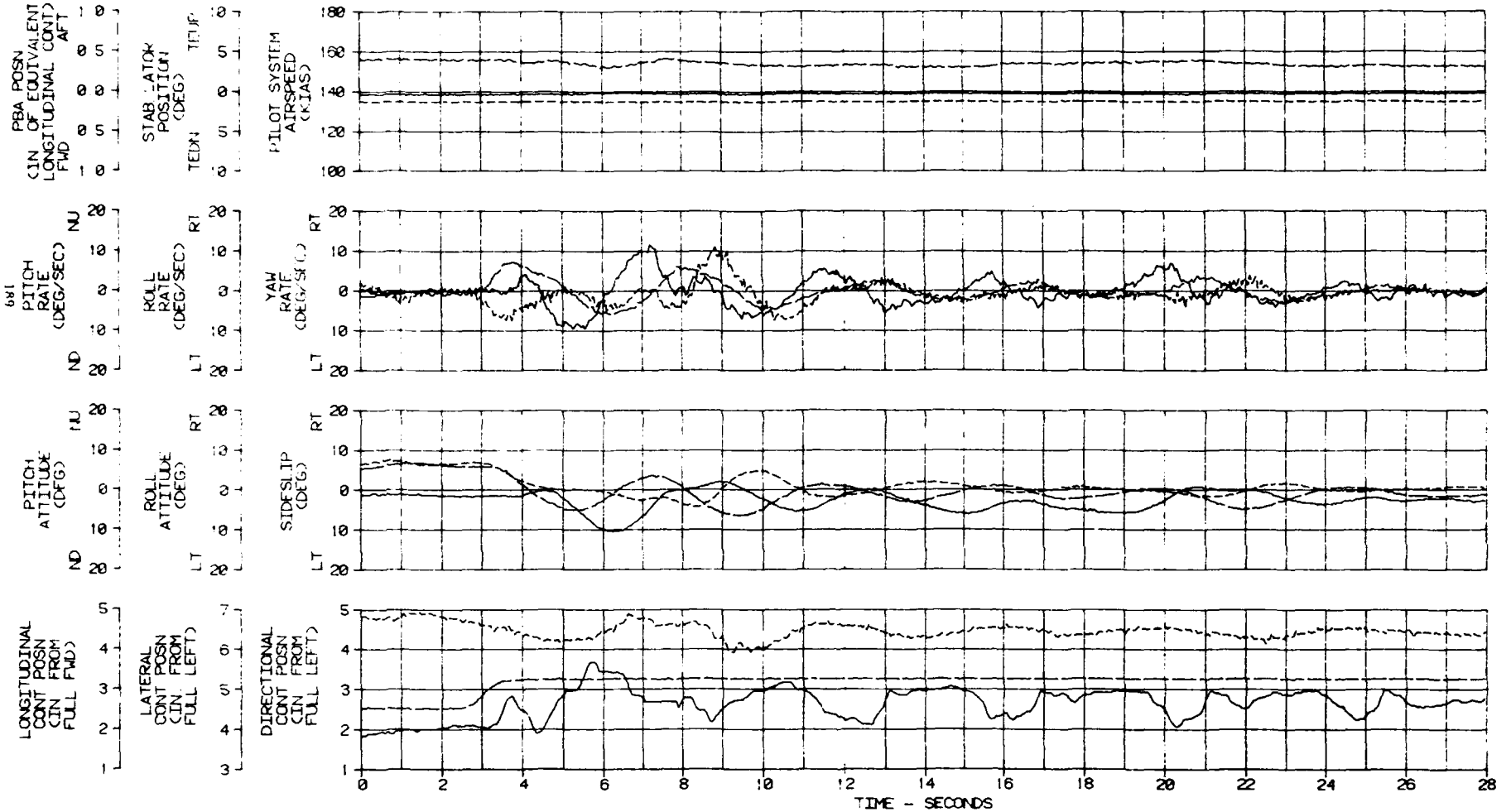


FIGURE 137

LONGITUDINAL LONG TERM RESPONSE WITH CONTROLS FREE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
14100	362.5(AFT)	0.3RT	5120	-4.5	258	60	LEVEL	OFF OFF ON AUTO (FAILURE MODE 5)

SOLID LINE — SHORT DASH — LONG DASH

PBA POSN (IN EQUIVALENT LONGITUDINAL CONT) FWD 1.0 0.5 0.0 0.5 1.0 AFT

STABILATOR POSITION (DEG) TEDN 20 30 40

PILOT SYSTEM AIRSPEED (KIAS) 120 100 80 60 40

PITCH RATE (DEG/SEC) ND 20 10 0 10 20 NU

ROLL RATE (DEG/SEC) LT 20 10 0 10 20 RT

YAW RATE (DEG/SEC) LT 20 10 0 10 20 RT

PITCH ATTITUDE (DEG) ND 20 10 0 10 20 NU

ROLL ATTITUDE (DEG) LT 20 10 0 10 20 RT

YAW ATTITUDE (DEG) LT 20 10 0 10 20 RT

CONTROLS RELEASED

LONGITUDINAL CONT POSN (IN FROM FULL FWD) 6 5 4 3 2

LATERAL CONT POSN (IN FROM FULL LEFT) 6 5 4 3 2

DIRECTIONAL CONT POSN (IN FROM FULL LEFT) 6 5 4 3 2

0 4 8 12 16 20 24 28 32 36 40 44 48 52 56

TIME - SECONDS

FIGURE 138

LONGITUDINAL LONG TERM RESPONSE WITH CONTROLS FREE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
14240	363.2(AFT)	0.2RT	5020	17.5	257	117	LEVEL	OFF OFF ON AUTO (FAILURE MODE 5)

SOLID LINE — SHORT DASH — LONG DASH

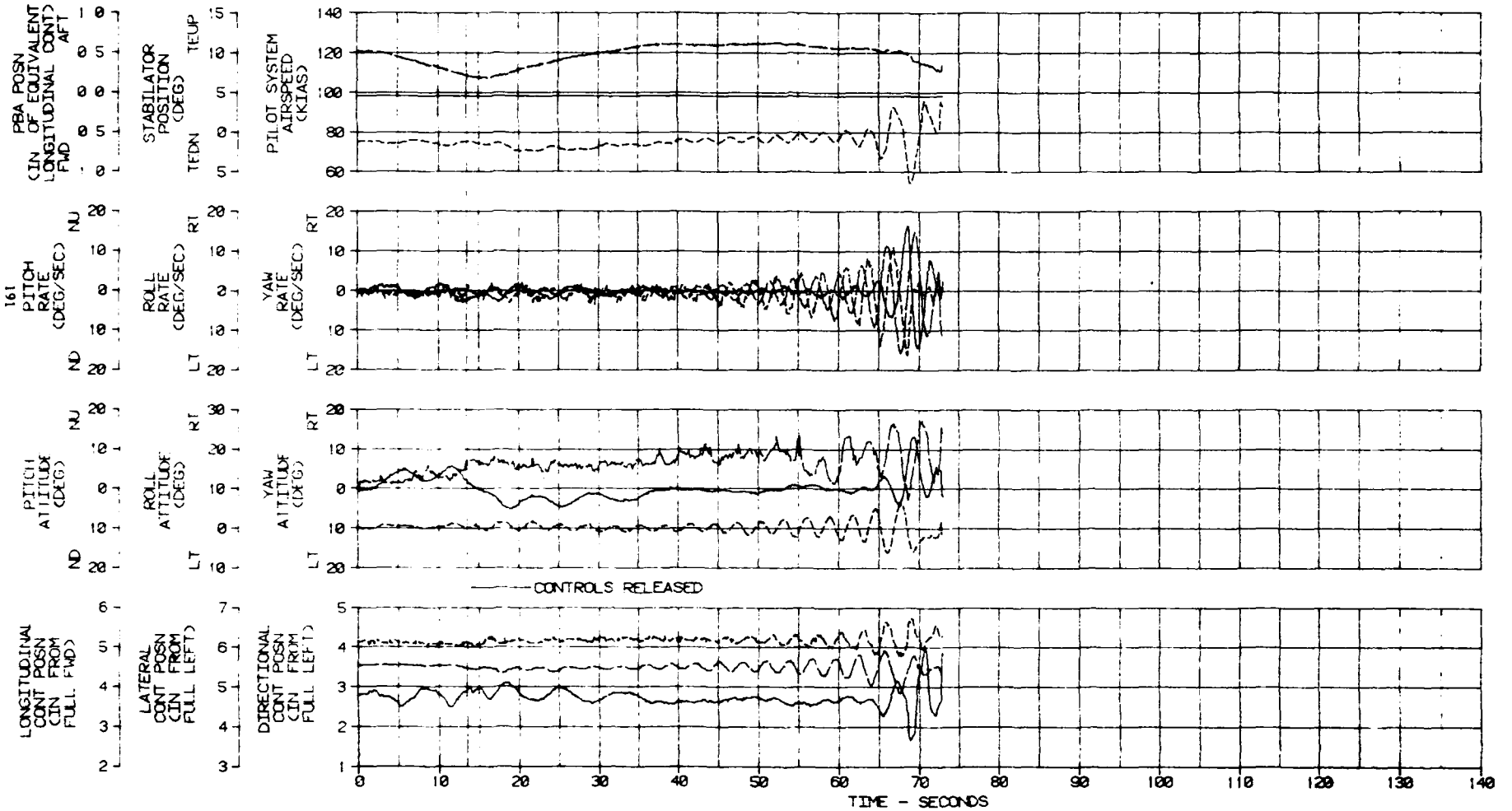


FIGURE 139

LONGITUDINAL LONG TERM RESPONSE WITH CONTROLS FREE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
13920	361 8(AFT)	0 3(RT)	5280	-4.0	258	151	LEVEL	OFF OFF ON AUTO (FAILURE MODE 5)

SOLID LINE — SHORT DASH — LONG DASH

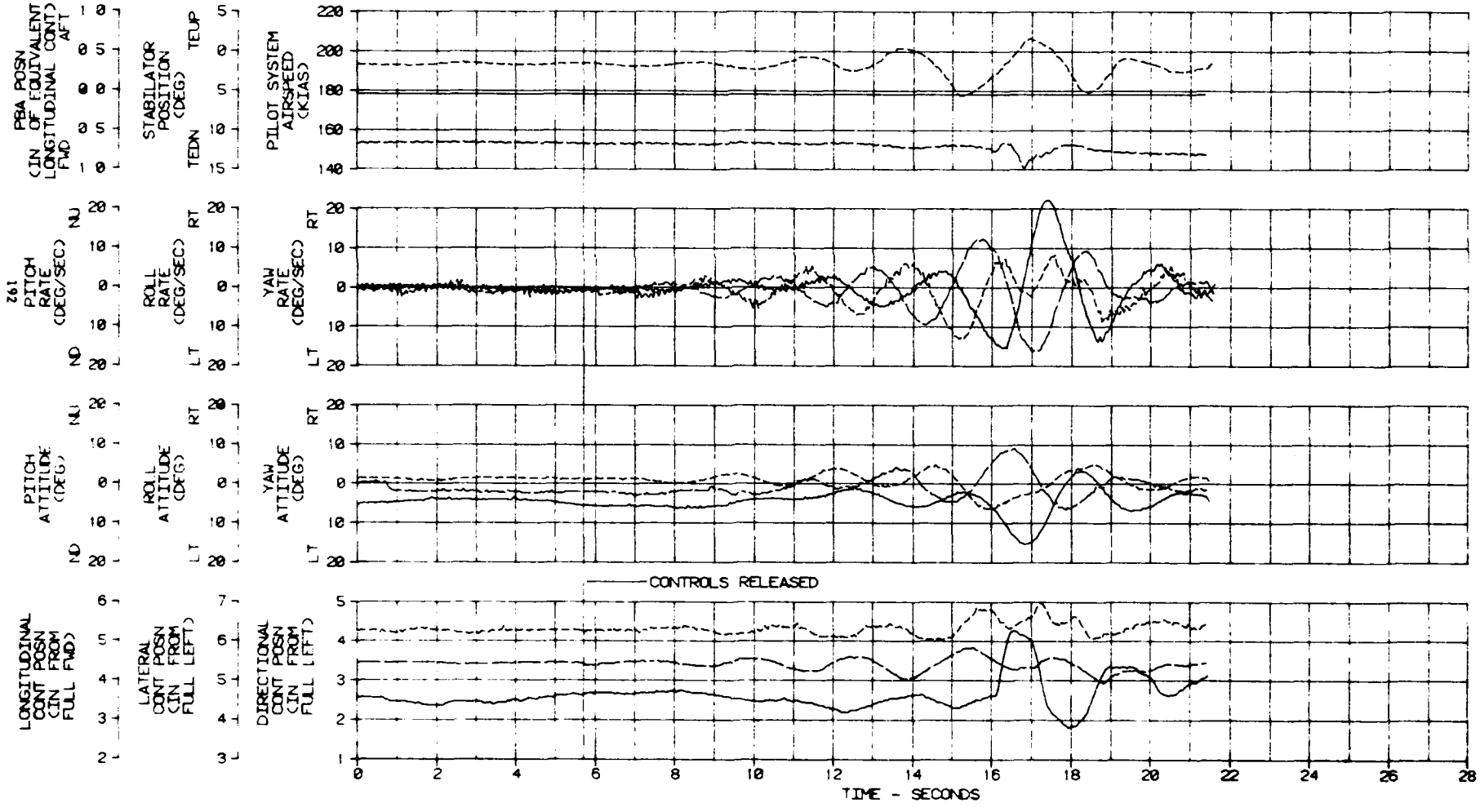


FIGURE 140

LONGITUDINAL LONG TERM RESPONSE WITH CONTROLS FREE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16920	363.2 (AFT)	0.1 RT	5320	27.0	258	62	LEVEL	ON OFF OFF AUTO (FAILURE MODE 6)

SOLID LINE — SHORT DASH — LONG DASH

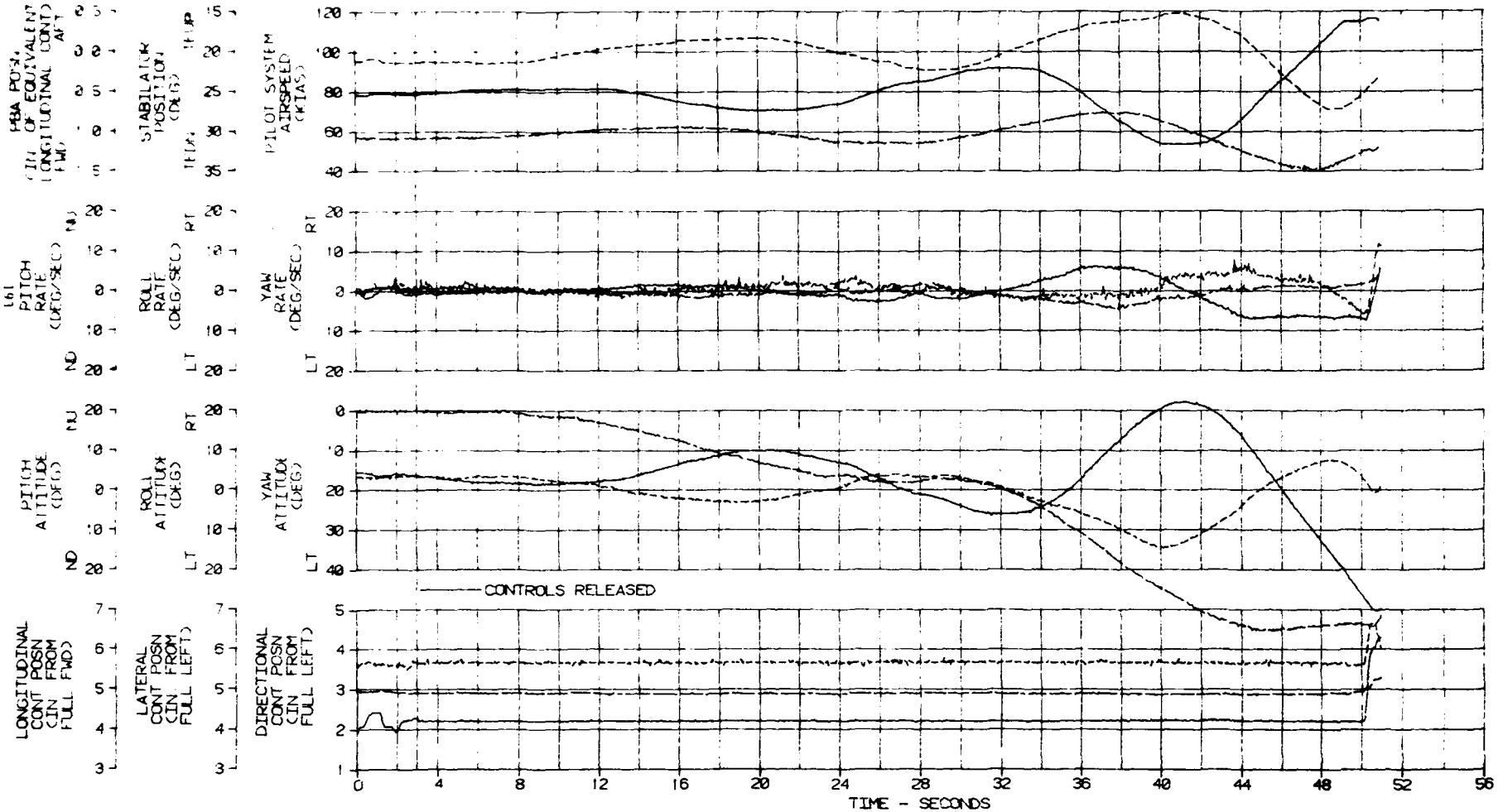


FIGURE 141

LONGITUDINAL LONG TERM RESPONSE WITH CONTROLS FREE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB (FAILURE MODE 6)
21560	357.5(AFT)	0.1RT	3440	10.0	258	60	LEVEL	ON OFF OFF AUTO

SOLID LINE — SHORT DASH — LONG DASH

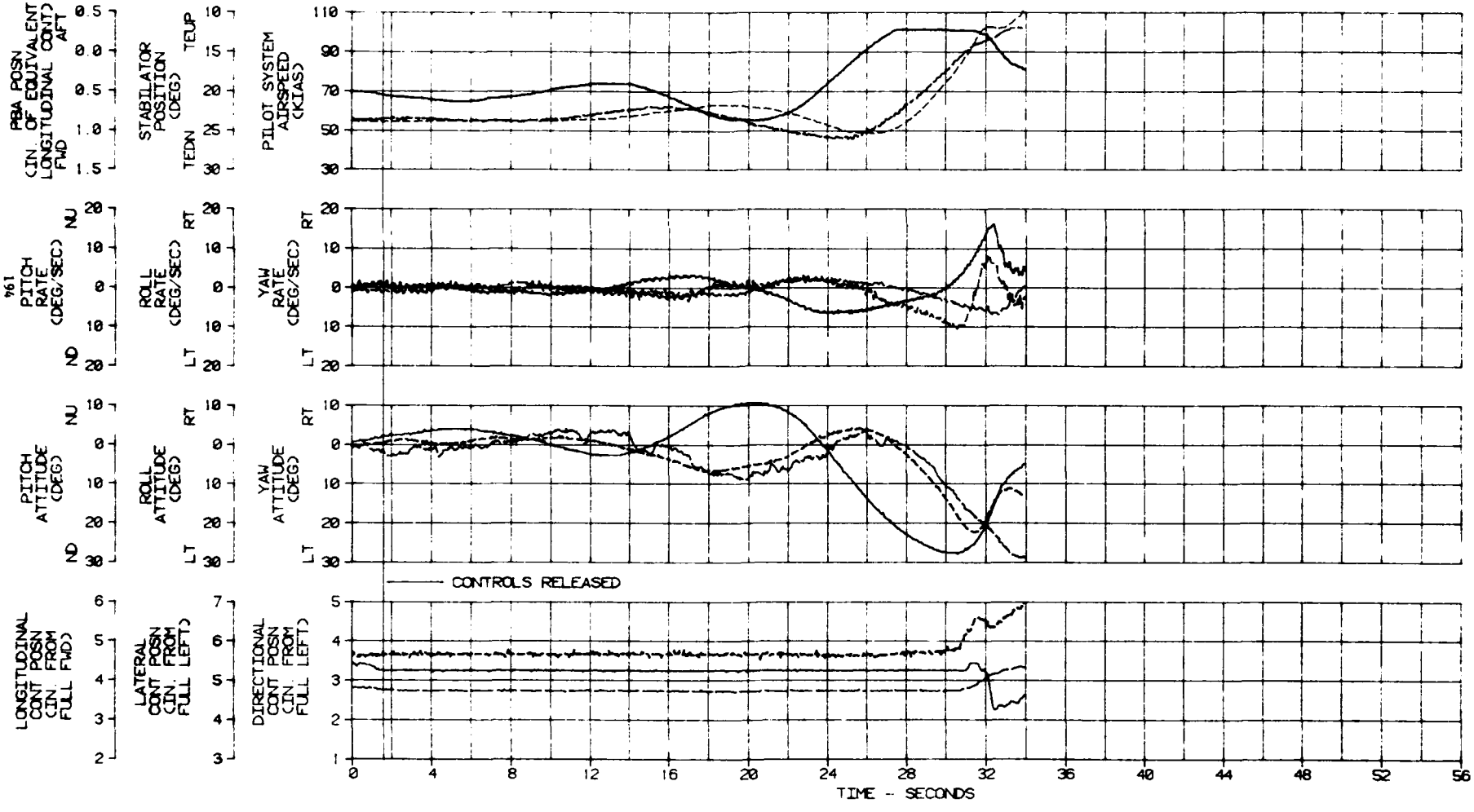


FIGURE 142

LONGITUDINAL LONG TERM RESPONSE WITH CONTROLS FREE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16700	363.4 (AFT)	0.1 RT	5600	26 5	258	93	LEVEL	ON OFF OFF AUTO (FAILURE MODE 6)

SOLID LINE — SHORT DASH — LONG DASH

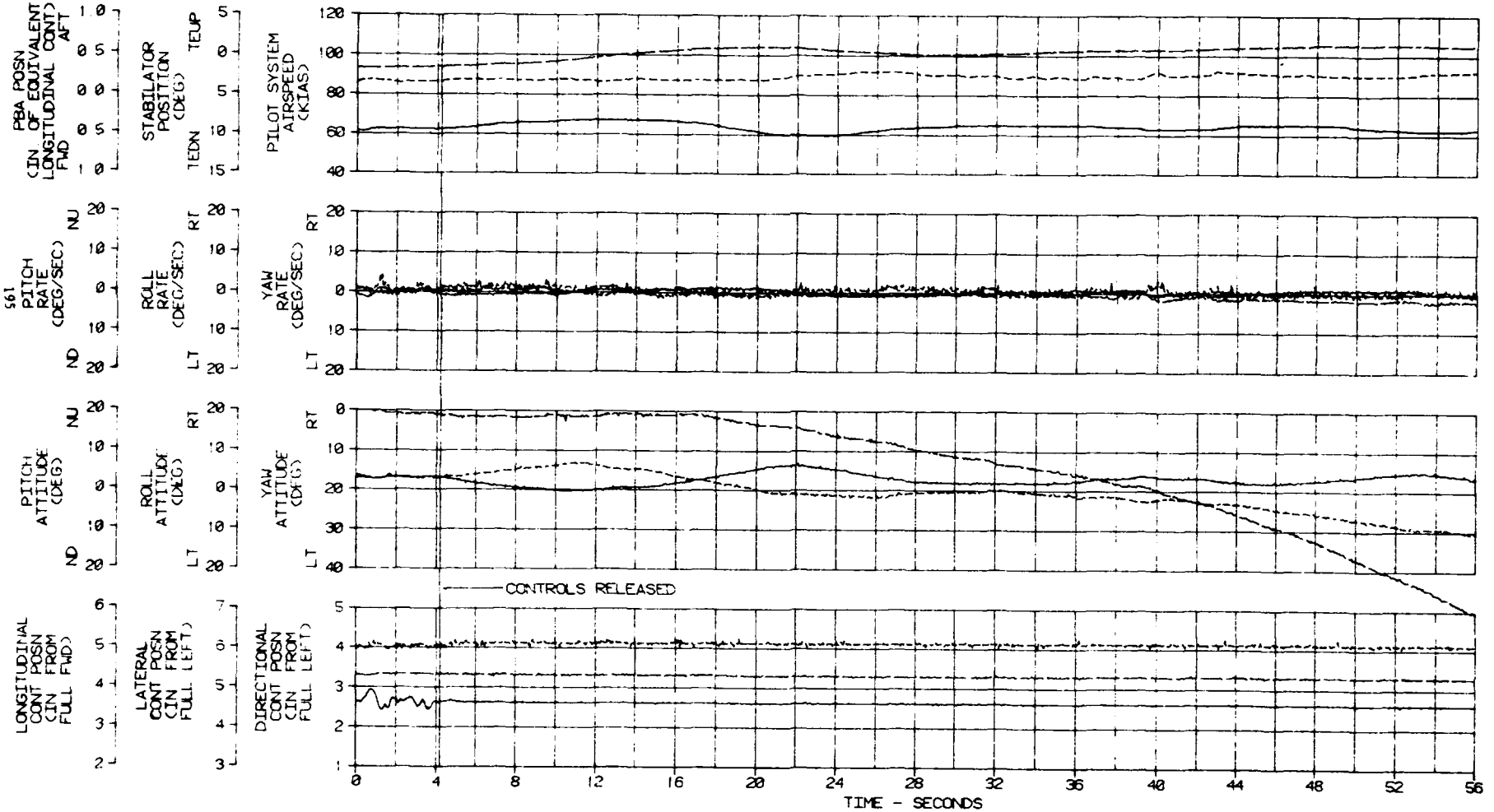


FIGURE 143

LONGITUDINAL LONG TERM RESPONSE WITH CONTROLS FIXED

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16900	363.1 (AFT)	0.2RT	4900	7.5	258	122	LEVEL	ON OFF OFF AUTO (FAILURE MODE 6)

SOLID LINE — SHORT DASH — LONG DASH

PBA POSN (IN. OF EQUIVALENT LONGITUDINAL CONT) FWD 1.0 0.5 0.0 0.5 1.0 AFT

STABILATOR POSITION (DEG) TEDN 5 0 5 10 15 TEUP

PILOT SYSTEM AIRSPEED (KIAS) 80 100 120 140 160

961 PITCH RATE (DEG/SEC) ND 20 10 0 10 20 NU

ROLL RATE (DEG/SEC) LT 20 10 0 10 20 RT

YAW RATE (DEG/SEC) LT 20 10 0 10 20 RT

PITCH ATTITUDE (DEG) ND 20 10 0 10 20 NU

ROLL ATTITUDE (DEG) LT 30 20 10 0 10 RT

YAW ATTITUDE (DEG) LT 10 0 10 20 30 RT

CONTROLS HELD FIXED

LONGITUDINAL CONT POSN (IN. FROM FULL FWD) 2 3 4 5 6

LATERAL CONT POSN (IN. FROM FULL LEFT) 3 4 5 6 7

DIRECTIONAL CONT POSN (IN. FROM FULL LEFT) 1 2 3 4 5

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140

TIME - SECONDS

FIGURE 144

LONGITUDINAL LONG TERM RESPONSE WITH CONTROLS FIXED

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB (FAILURE MODE 6)
22320	359.7(AFT)	0.1RT	3040	8.5	258	121	LEVEL	ON OFF OFF AUTO

SOLID LINE — SHORT DASH — LONG DASH

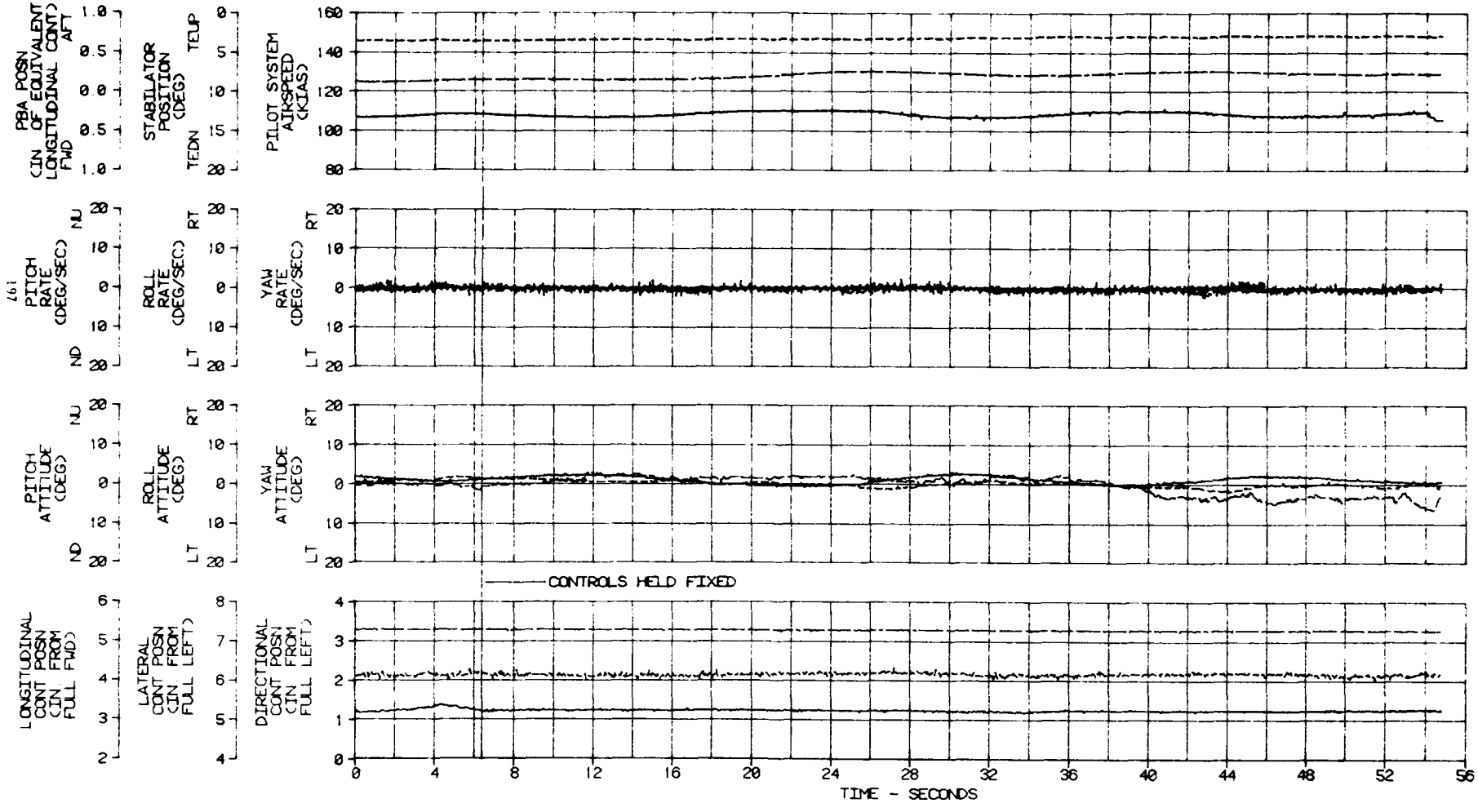


FIGURE 145

LONGITUDINAL LONG TERM RESPONSE WITH CONTROLS FIXED

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB (FAILURE MODE 6)
16520	362.2(AFT)	0.0	5040	13.0	258	140	LEVEL	ON OFF OFF AUTO

SOLID LINE — SHORT DASH — LONG DASH

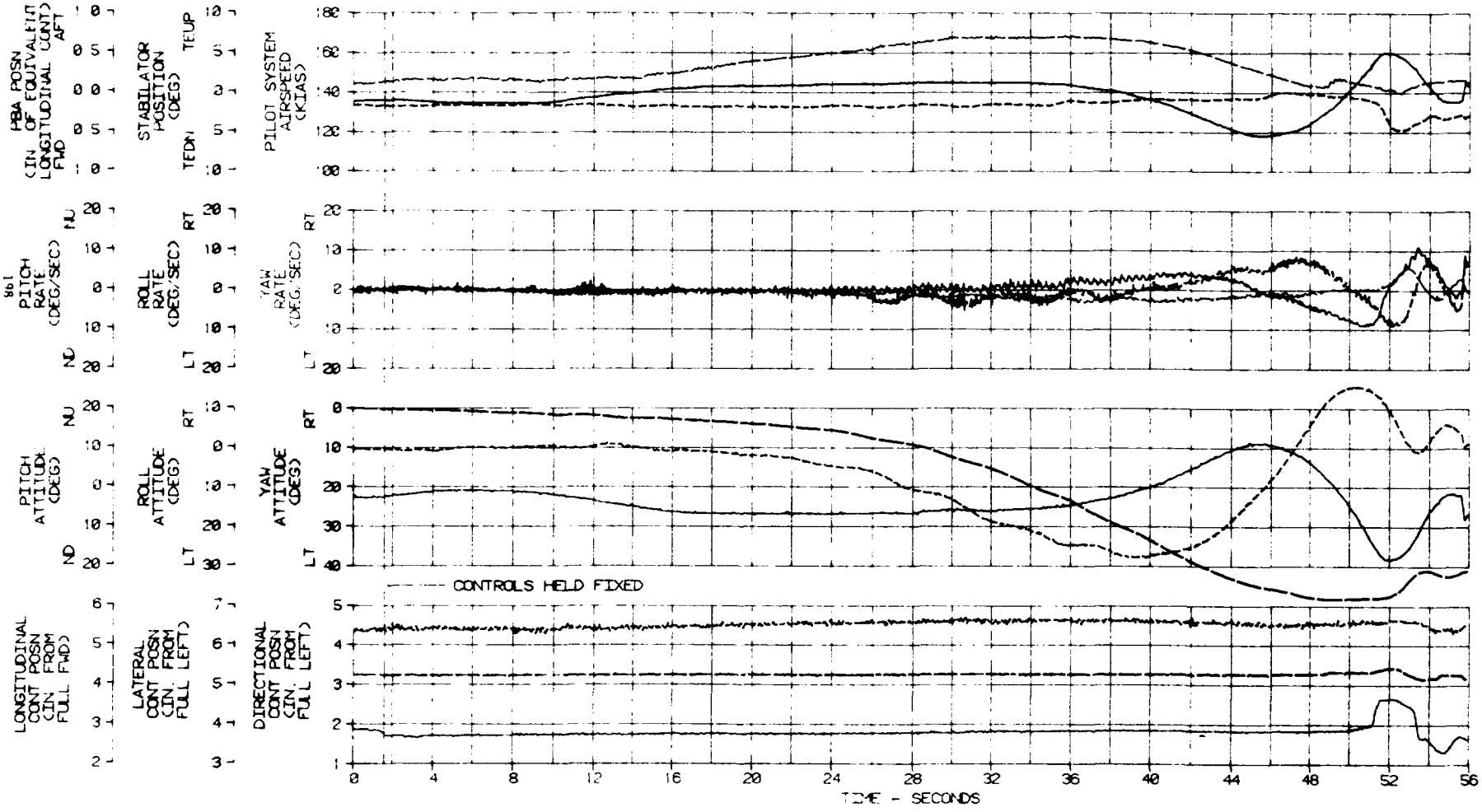


FIGURE 46

LONGITUDINAL LONG TERM RESPONSE WITH CONTROLS FREE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16240	360.6(AFT)	0.2RT	5060	13.5	258	151	LEVEL	ON OFF OFF AUTO (FAILURE MODE 6)

SOLID LINE — SHORT DASH — LONG DASH

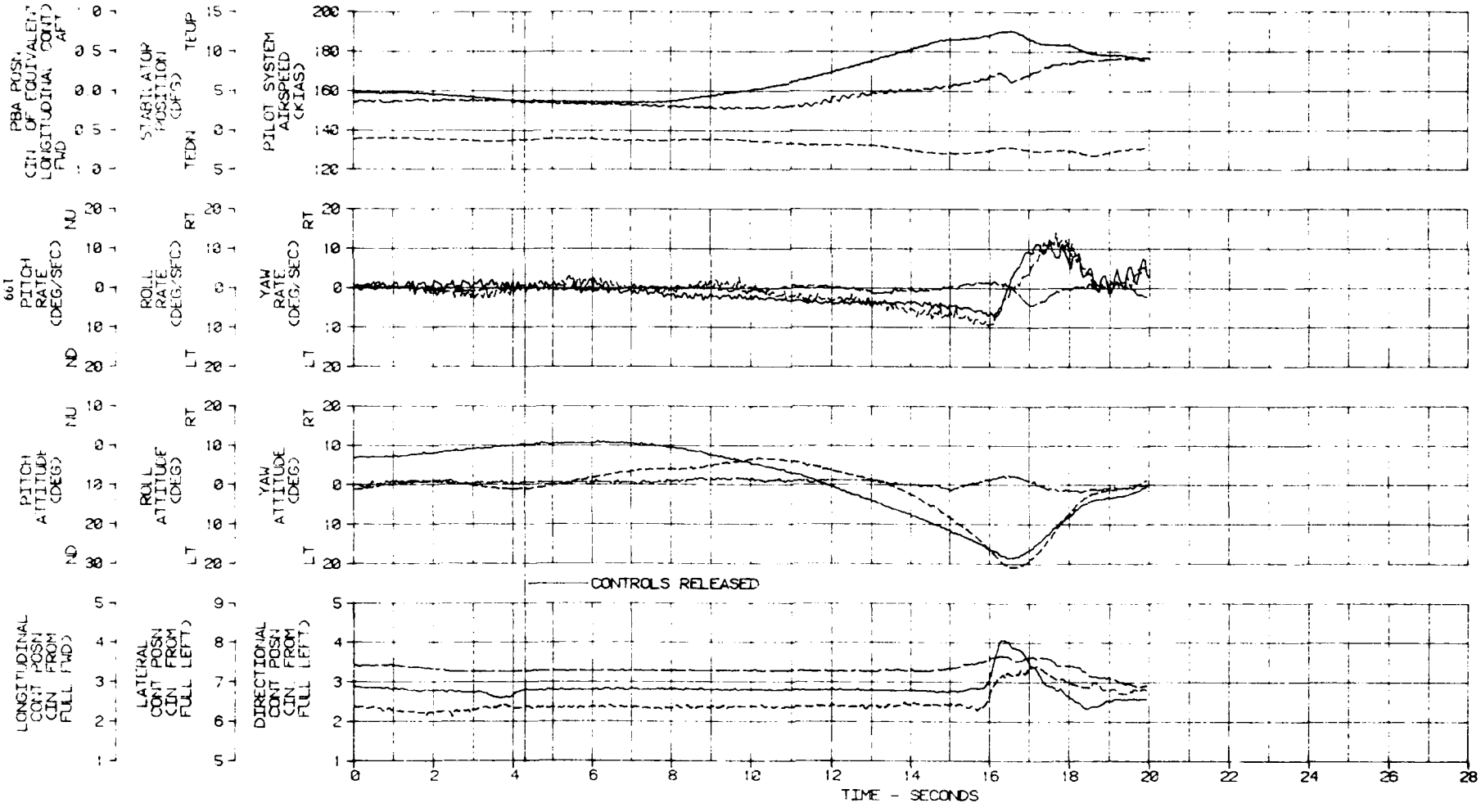


FIGURE 147

LONGITUDINAL LONG TERM RESPONSE WITH CONTROLS FREE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
21560	357.5(AFT)	0.1RT	3260	8.0	257	152	LEVEL	ON OFF OFF AUTO (FAILURE MODE 6)

SOLID LINE — SHORT DASH — LONG DASH

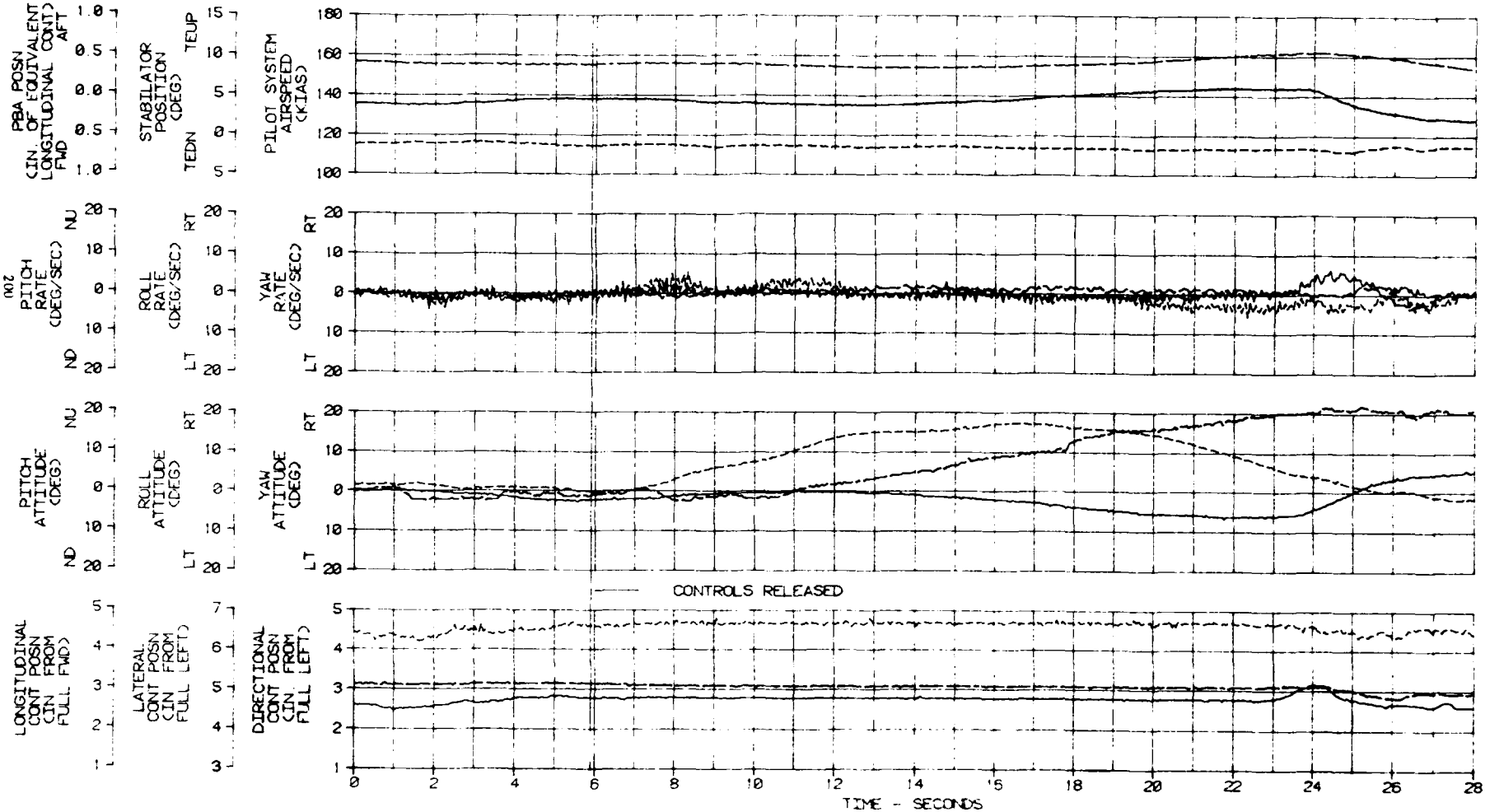


FIGURE 148

LONGITUDINAL LONG TERM RESPONSE WITH CONTROLS FIXED

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
14580	364.5(AFT)	0.3RT	3040	-1.0	258	63	LEVEL	OFF OFF OFF AUTO (FAILURE MODE 7)

SOLID LINE — SHORT DASH — LONG DASH

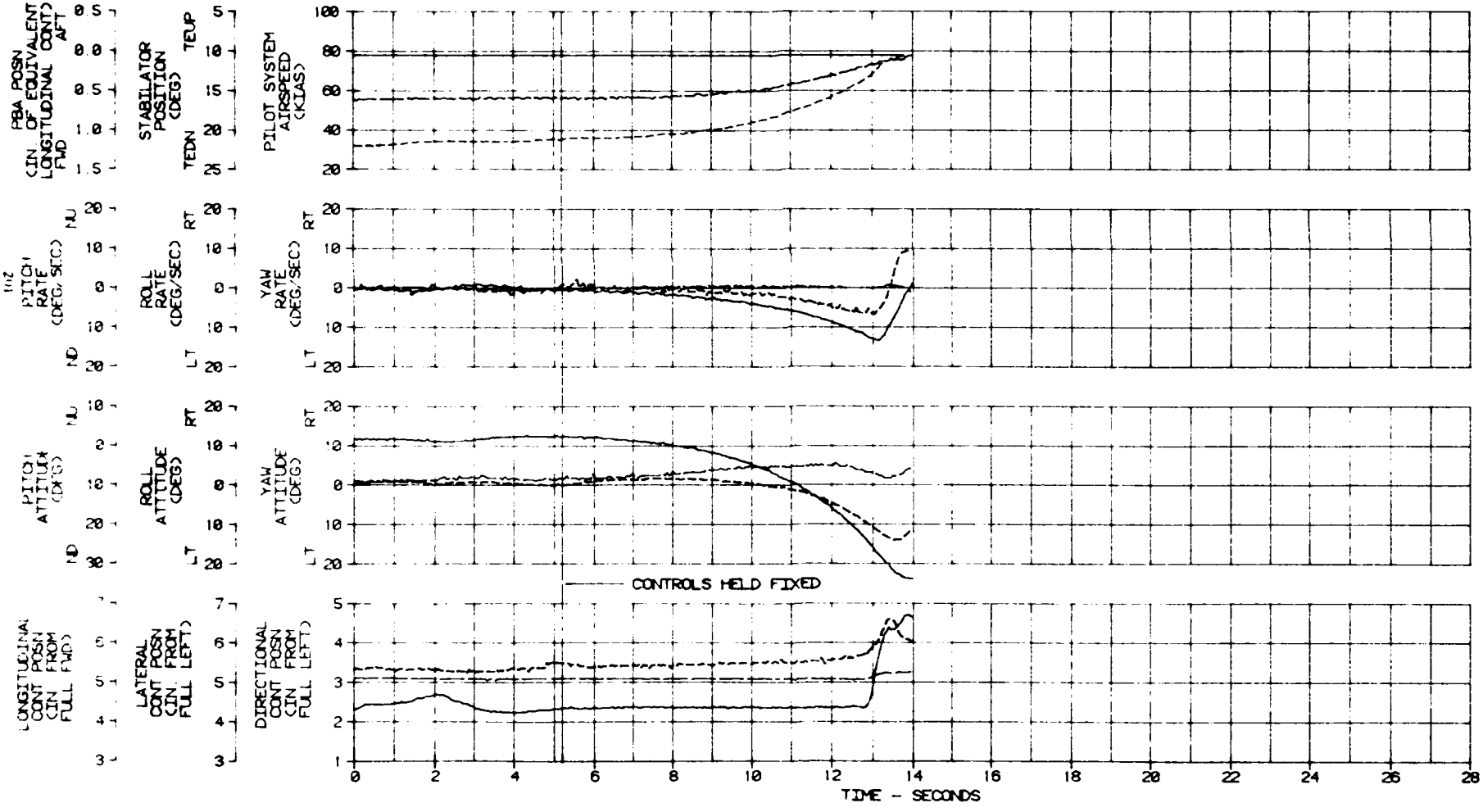


FIGURE 149

LONGITUDINAL LONG TERM RESPONSE WITH CONTROLS FIXED

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16380	361.5 (AFT)	0.2 RT	4820	9.0	259	61	LEVEL	OFF OFF OFF AUTO (FAILURE MODE 7)

SOLID LINE — SHORT DASH — LONG DASH

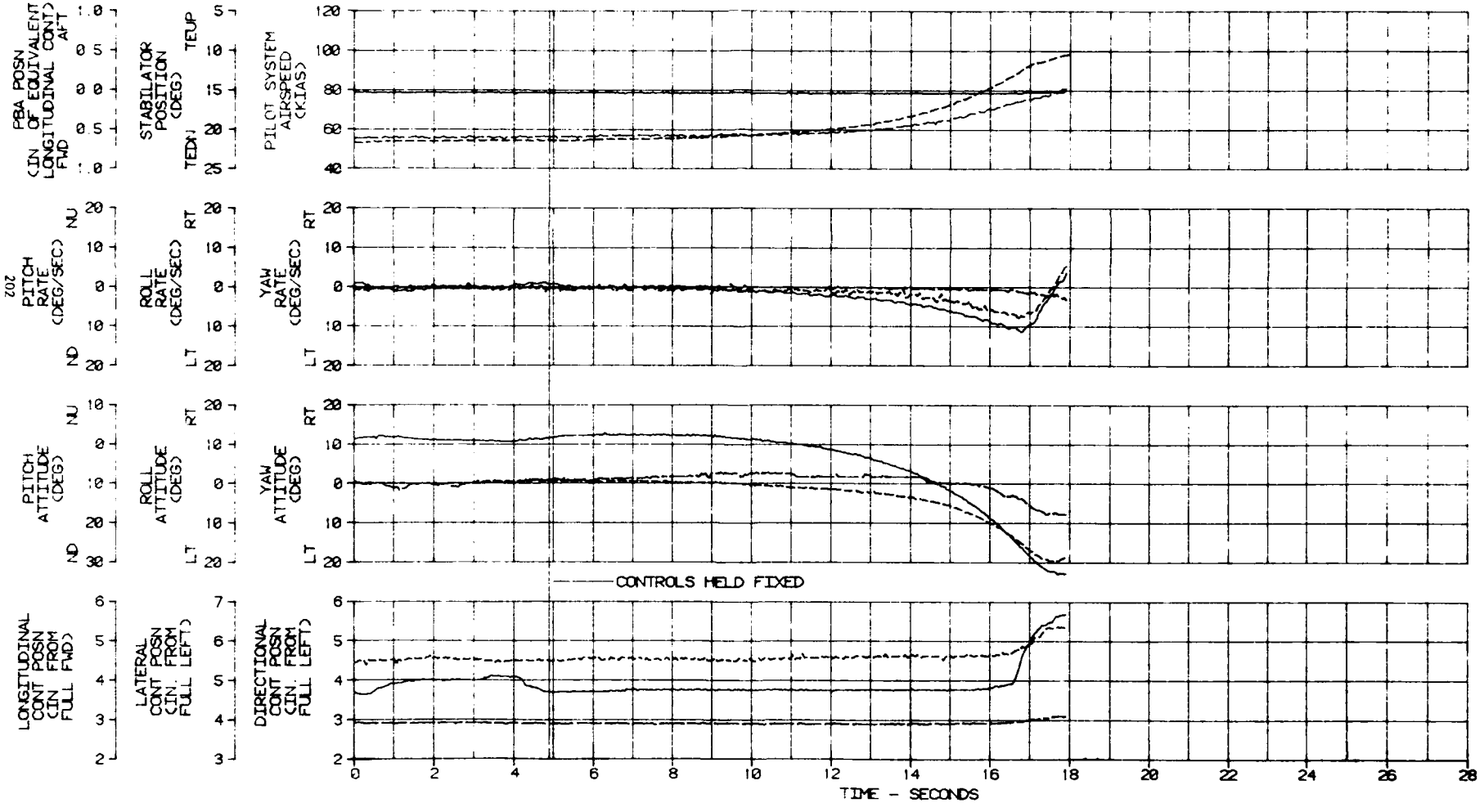


FIGURE 150

LONGITUDINAL LONG TERM RESPONSE WITH CONTROLS FREE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
21420	357.1 (AFT)	0.1 RT	2680	3.5	258	62	LEVEL	OFF OFF OFF AUTO (FAILURE MODE 7)

SOLID LINE — SHORT DASH — LONG DASH

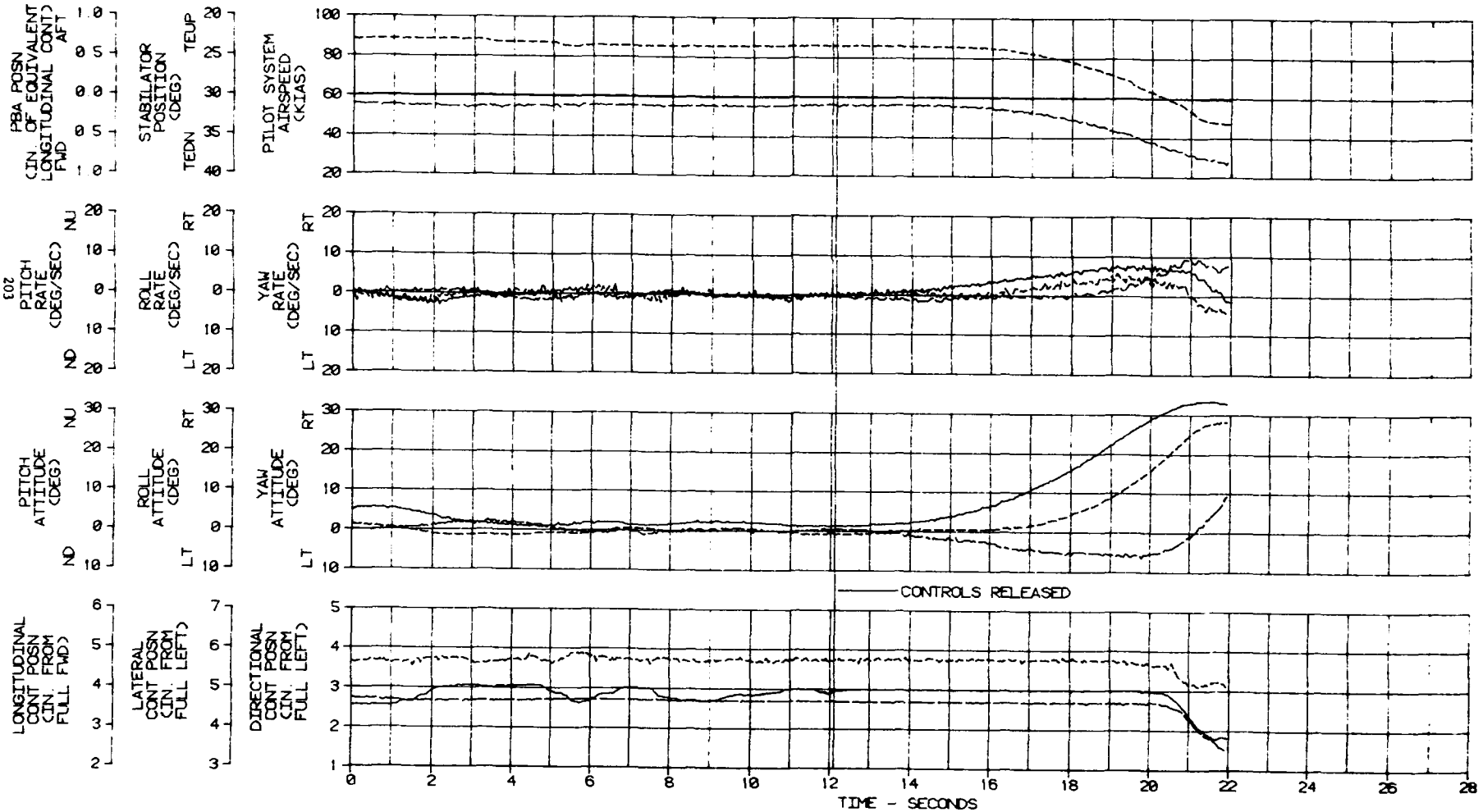


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FIGURE 151

LONGITUDINAL LONG TERM RESPONSE WITH CONTROLS FIXED

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16080	359.9 (AFT)	0 IRT	4820	12.0	259	92	LEVEL	OFF OFF OFF AUTO (FAILURE MODE 7)

SOLID LINE — SHORT DASH — LONG DASH

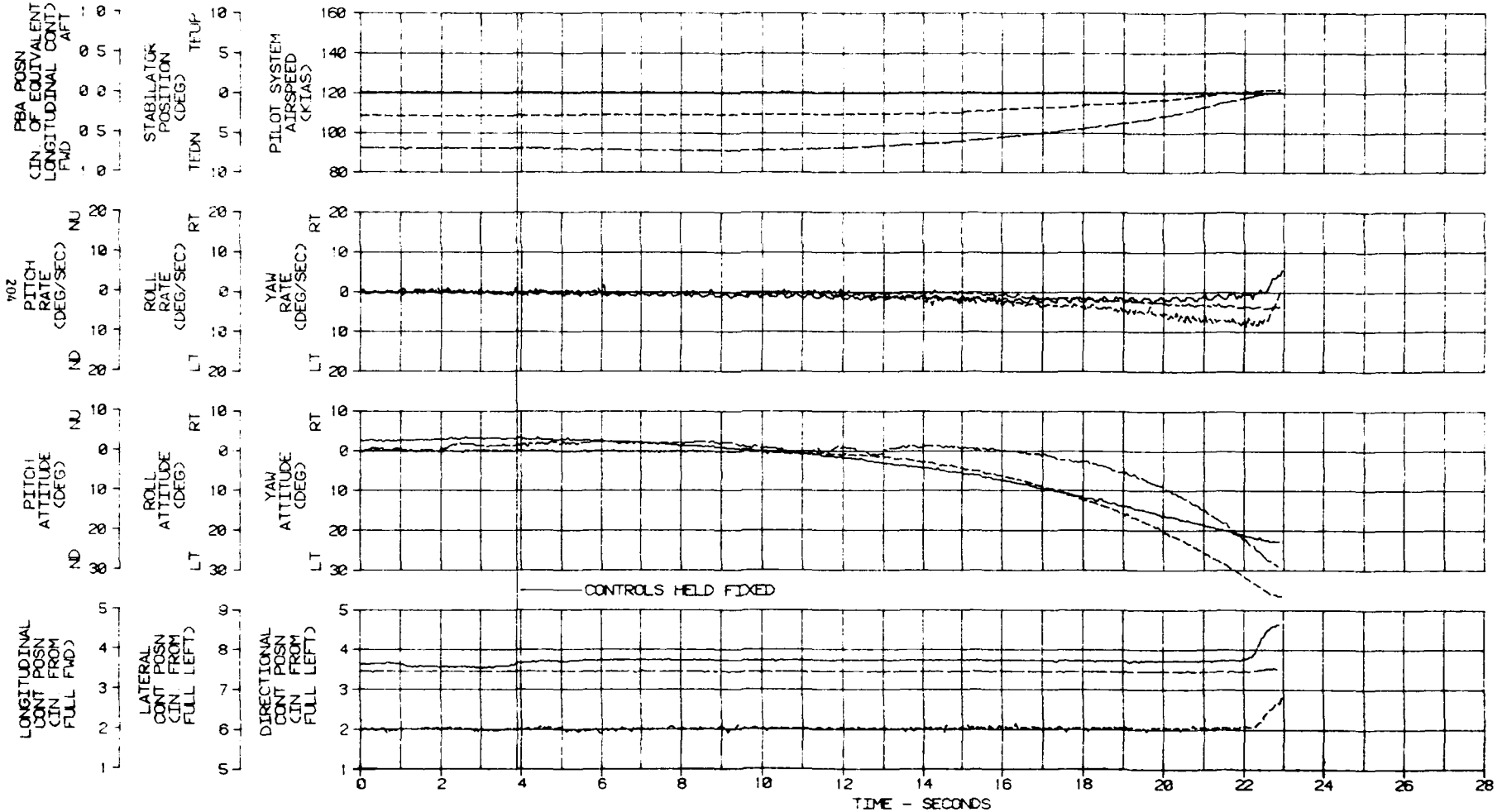

FIGURE 152

LONGITUDINAL LONG TERM RESPONSE WITH CONTROLS FREE

UH-60A USA S/N 82-23748

	GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
SOLID LINE	13780	361.2 (AFT)	0.4 RT	4800	14.0	257	118	LEVEL	OFF OFF OFF AUTO (FAILURE MODE 7)
SHORT DASH									
LONG DASH									

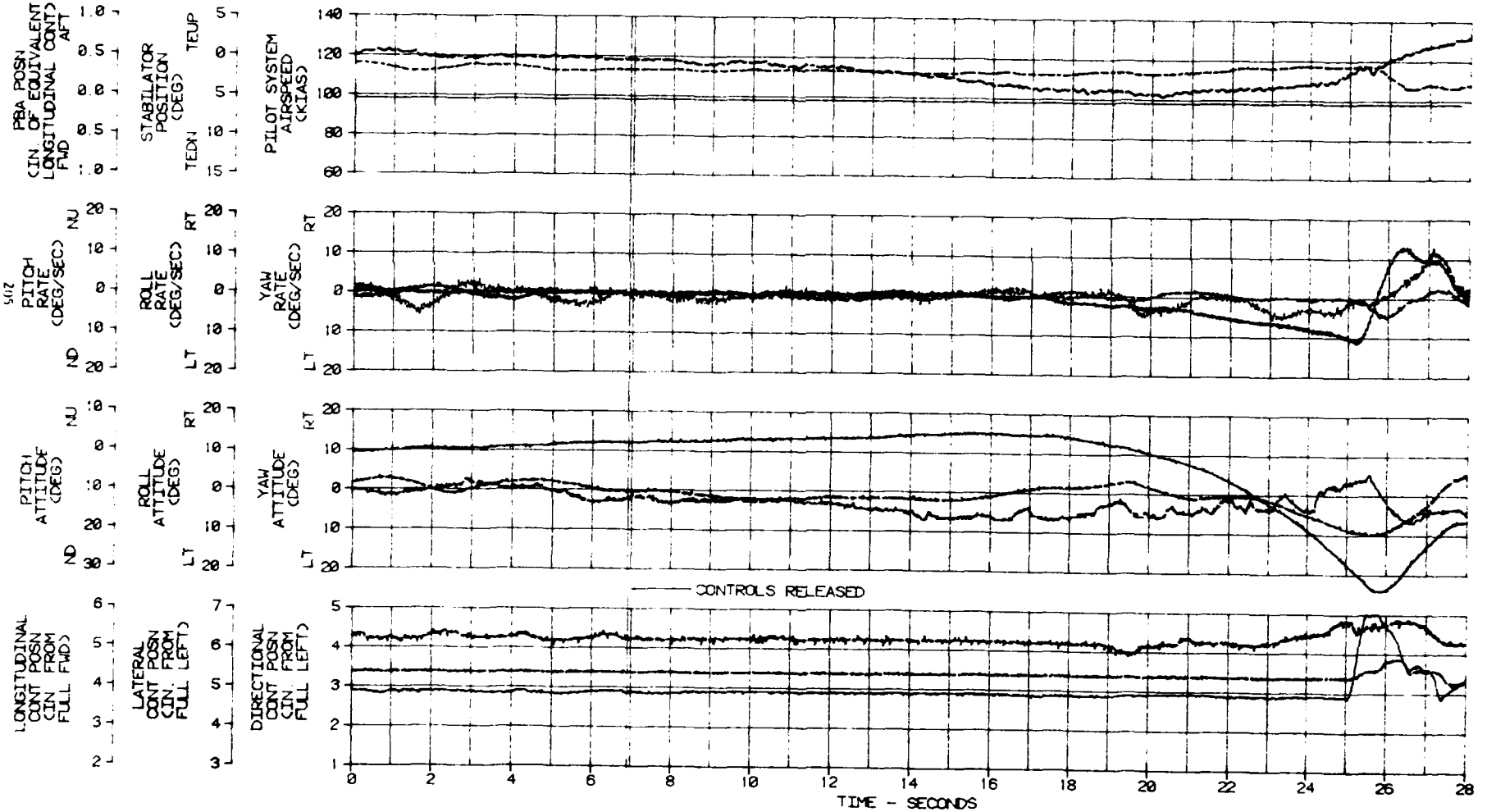

FIGURE 153

LONGITUDINAL LONG TERM RESPONSE WITH CONTROLS FREE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16540	361.9(AFT)	0.2RT	5000	7.5	258	122	LEVEL	OFF OFF OFF AUTO (FAILURE MODE 7)

SOLID LINE — SHORT DASH — LONG DASH

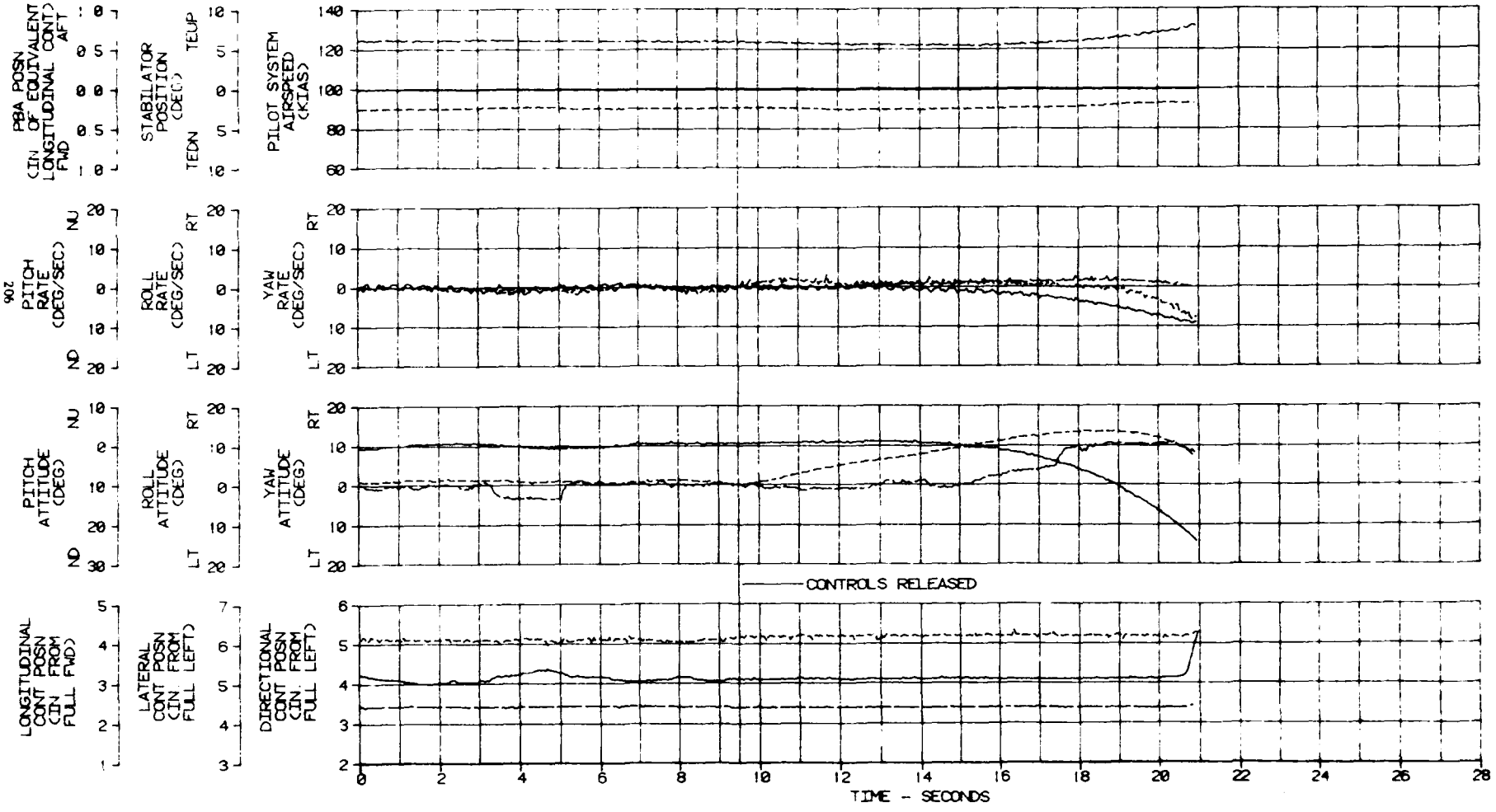

FIGURE 154

LONGITUDINAL LONG TERM RESPONSE WITH CONTROLS FREE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
21900	358.5(AFT)	0.1RT	2580	4.0	258	121	LEVEL	OFF OFF OFF AUTO (FAILURE MODE 7)

SOLID LINE — SHORT DASH — LONG DASH

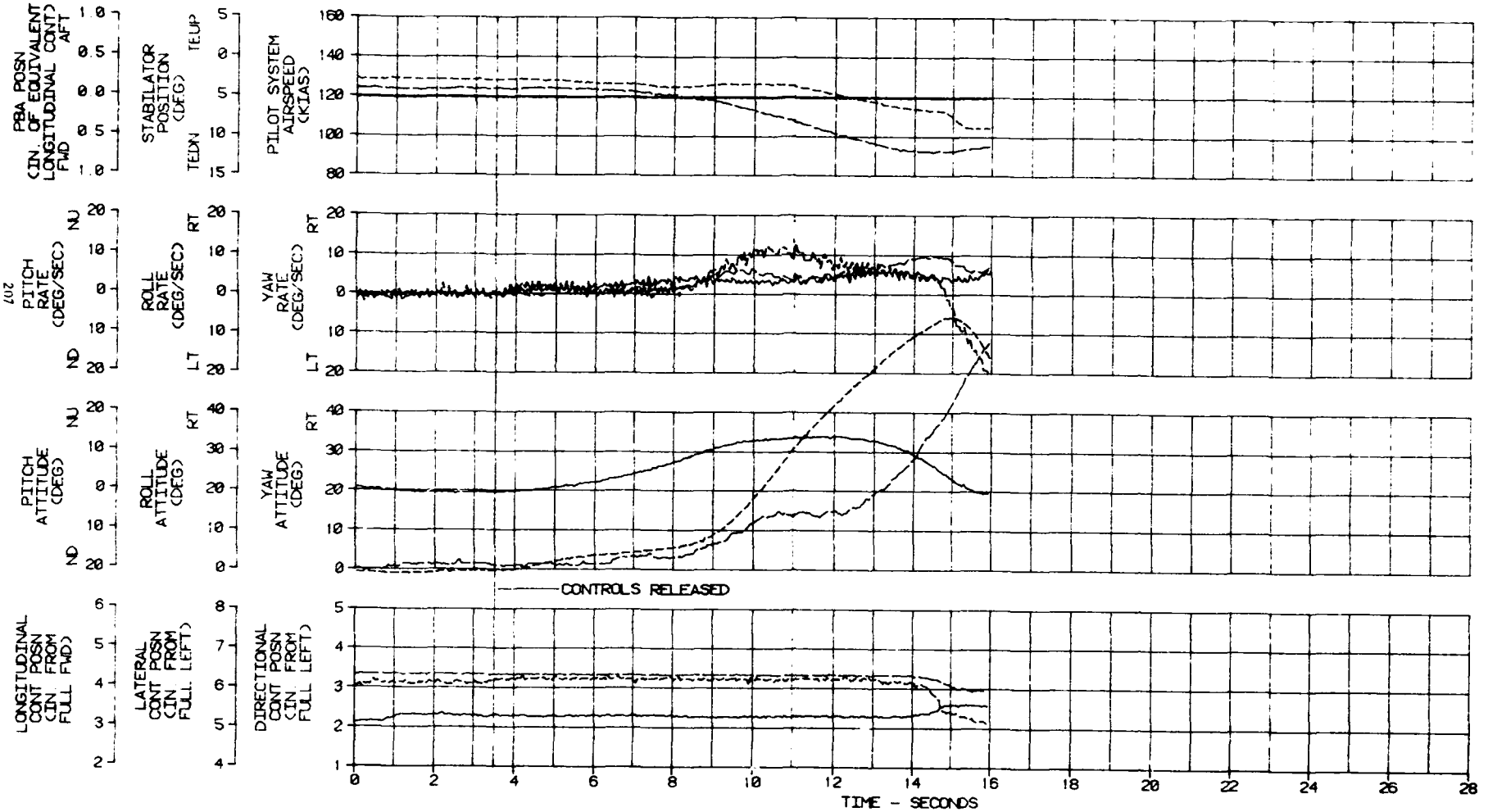

FIGURE 155

LONGITUDINAL LONG TERM RESPONSE WITH CONTROLS FREE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16400	361.5(AFT)	0.3RT	5000	5 0	258	140	LEVEL	OFF OFF OFF AUTO (FAILURE MODE 7)

SOLID LINE — SHORT DASH — LONG DASH

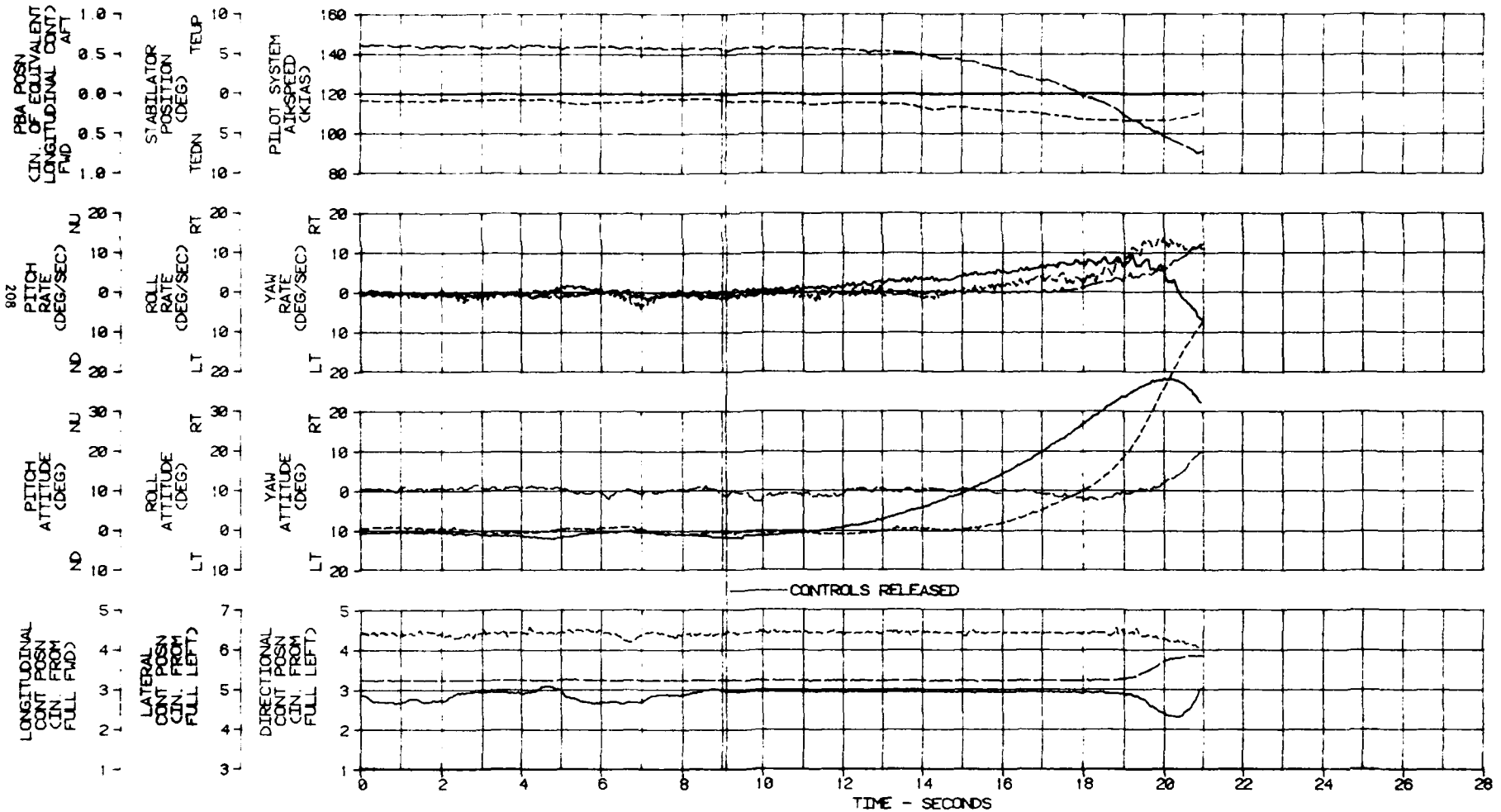

FIGURE 156

LONGITUDINAL LONG TERM RESPONSE WITH CONTROLS FREE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
13960	362.0(AFT)	0.3RT	5100	16.5	258	148	LEVEL	OFF OFF OFF AUTO (FAILURE MODE 7)

SOLID LINE — SHORT DASH — LONG DASH

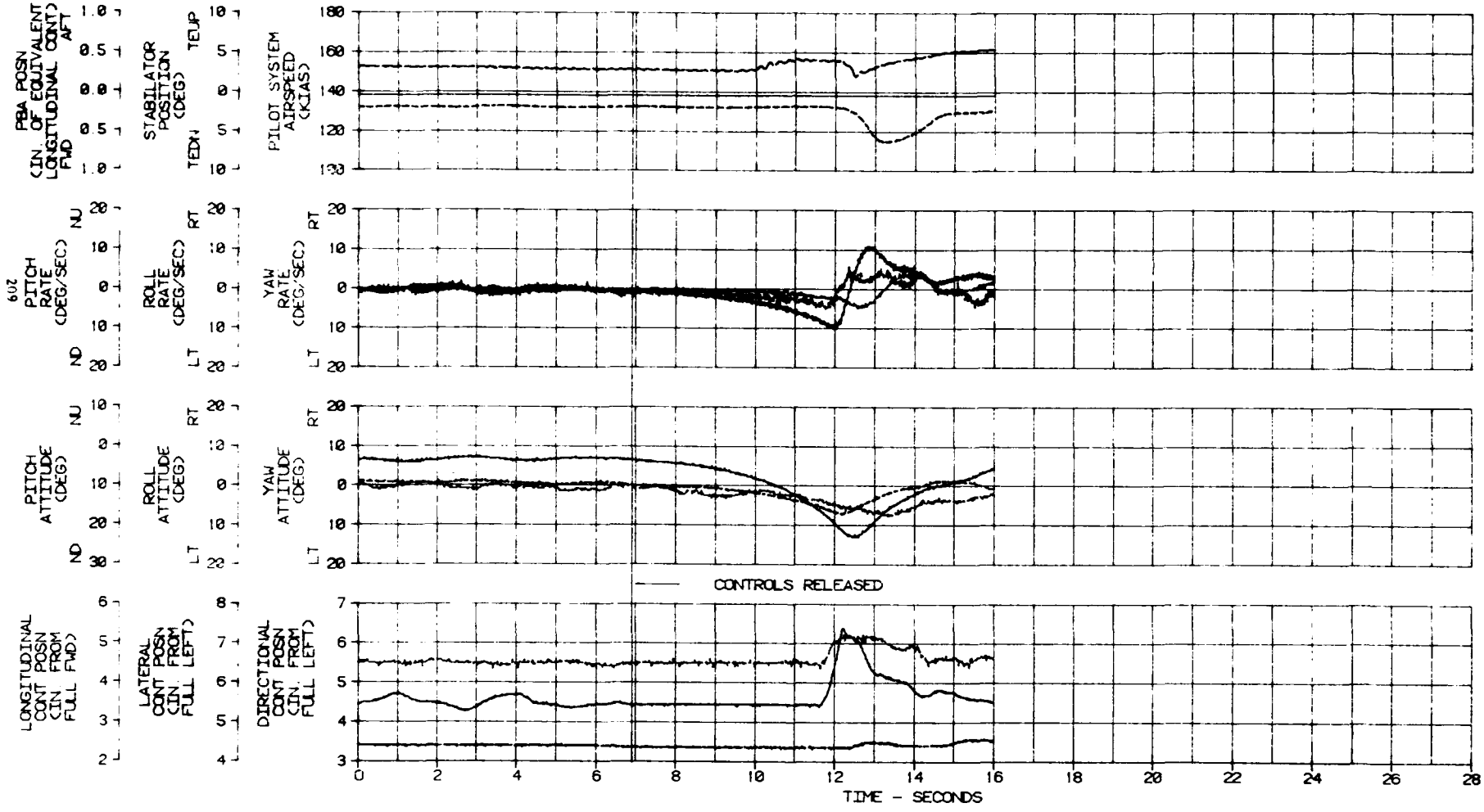

FIGURE 157

LONGITUDINAL LONG TERM RESPONSE WITH CONTROLS FREE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16720	362 6(AFT)	0 3RT	5040	8.0	257	150	LEVEL	OFF OFF OFF AUTO (FAILURE MODE 7)

SOLID LINE — SHORT DASH — LONG DASH

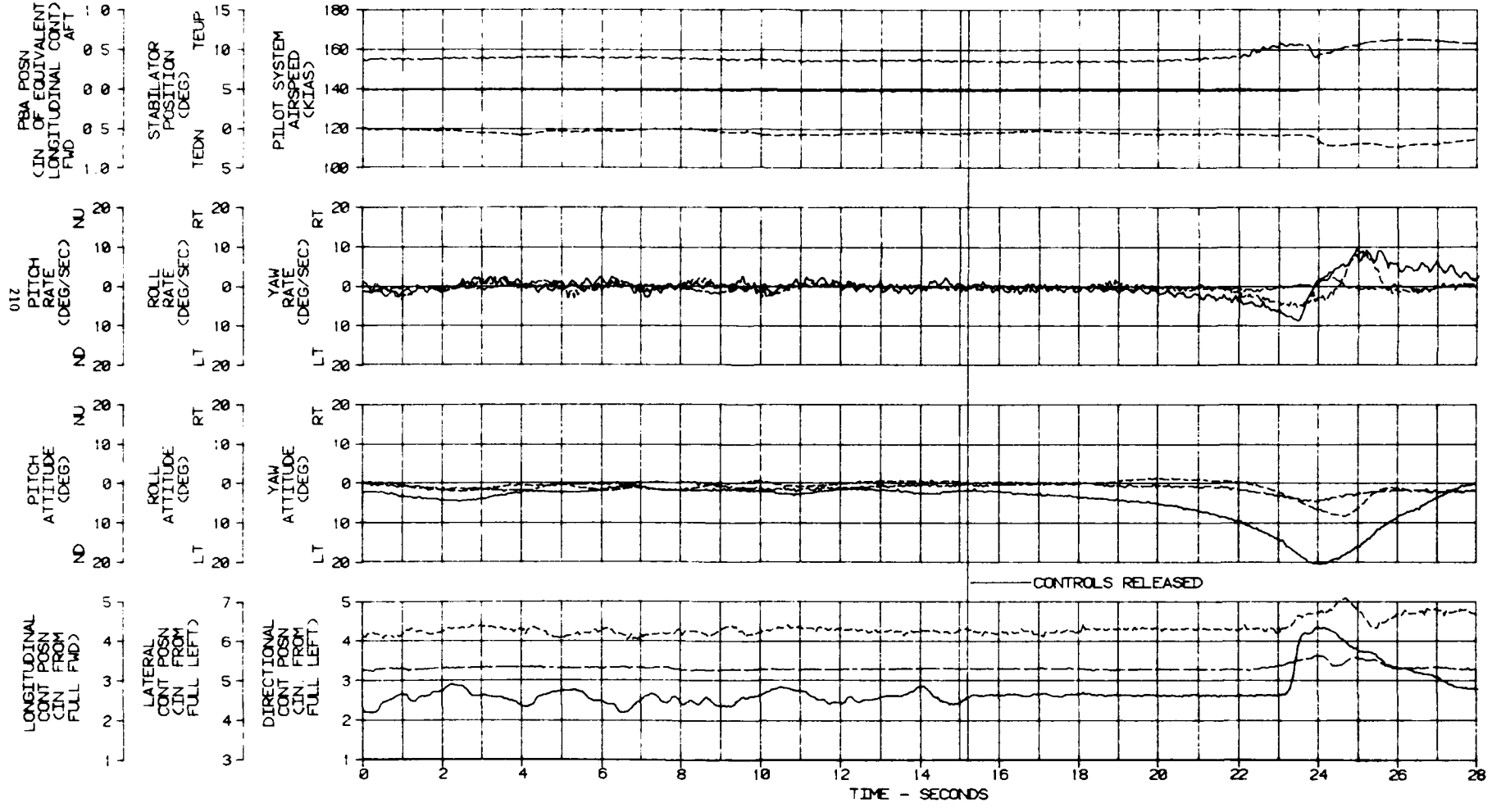

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FIGURE 158

LONGITUDINAL LONG TERM RESPONSE WITH CONTROLS FIXED

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
22220	359 4(AFT)	0 1RT	3180	7 5	258	151	LEVEL	OFF OFF OFF AUTO (FAILURE MODE 7)

SOLID LINE — SHORT DASH — LONG DASH

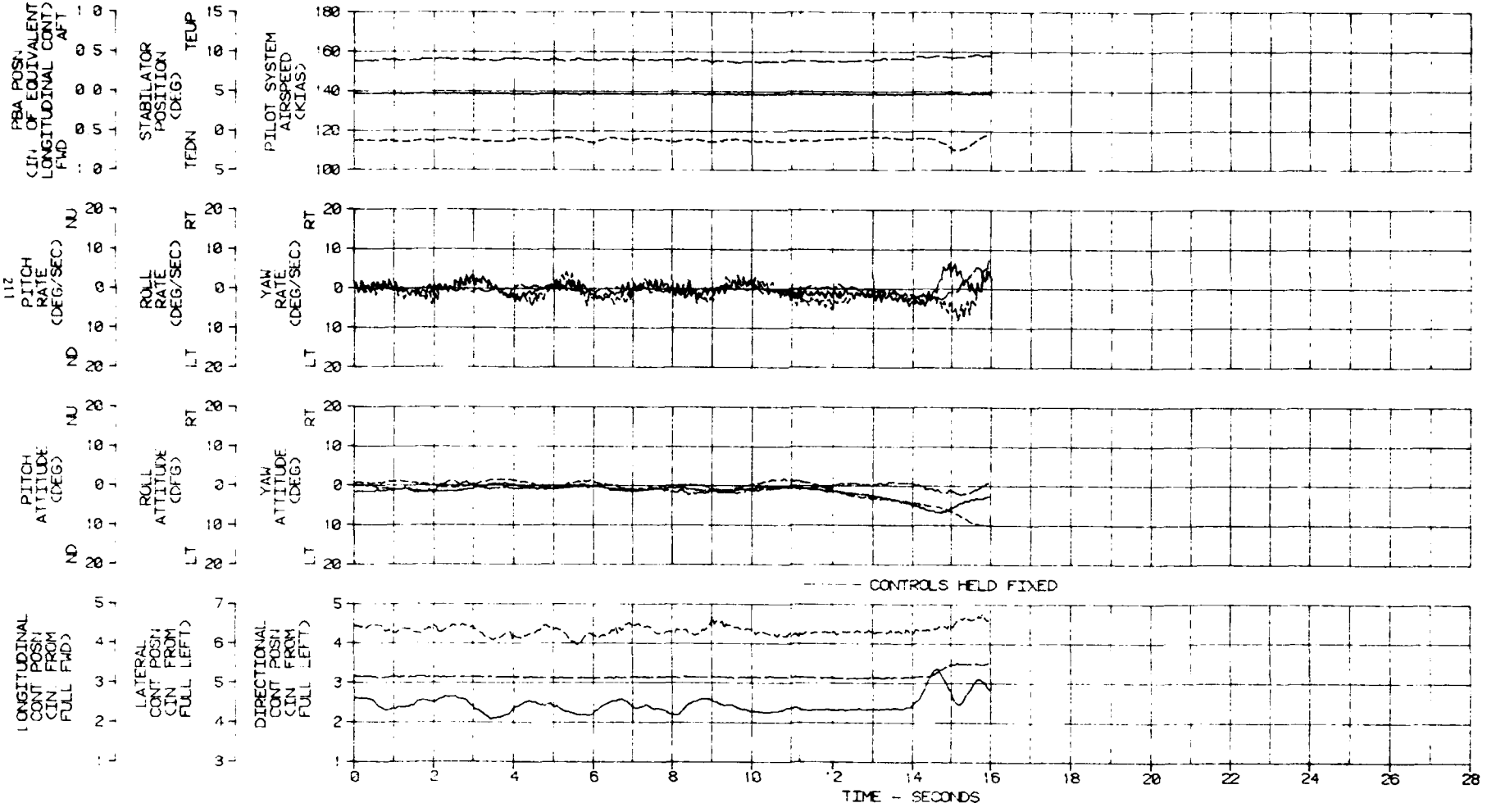


FIGURE 159

LONGITUDINAL LONG TERM RESPONSE WITH CONTROLS FIXED

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16940	363.0 (AFT)	0.2 RT	4980	13.0	257	61	LEVEL	ON OFF OFF OFF (FAILURE MODE 8)

SOLID LINE — SHORT DASH — LONG DASH

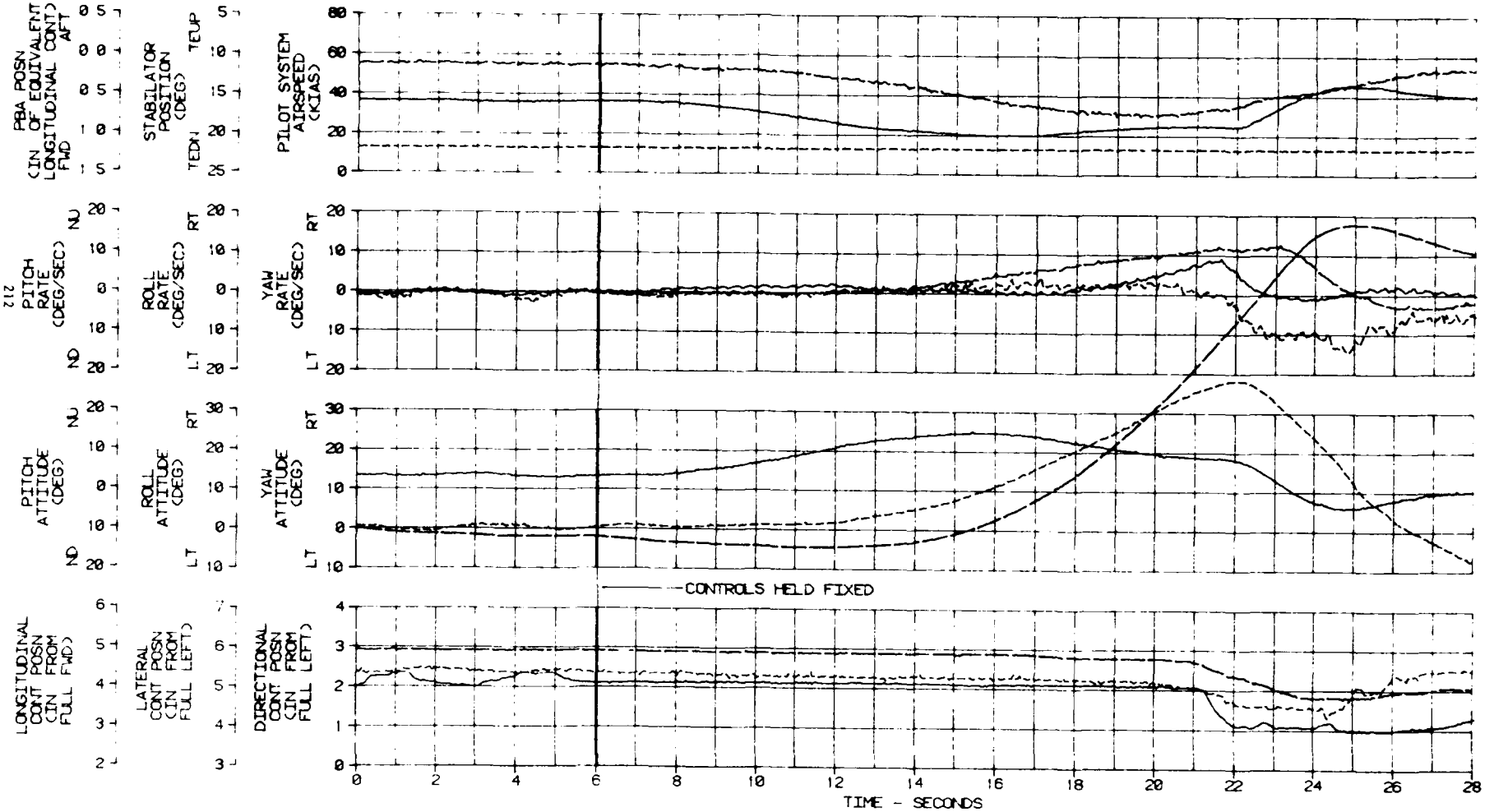


FIGURE 160

LONGITUDINAL LONG TERM RESPONSE WITH CONTROLS FREE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16300	361 0(AFT)	0 2RT	5140	12.5	257	90	LEVEL	ON OFF OFF OFF (FAILURE MODE 8)

SOLID LINE — SHORT DASH — LONG DASH

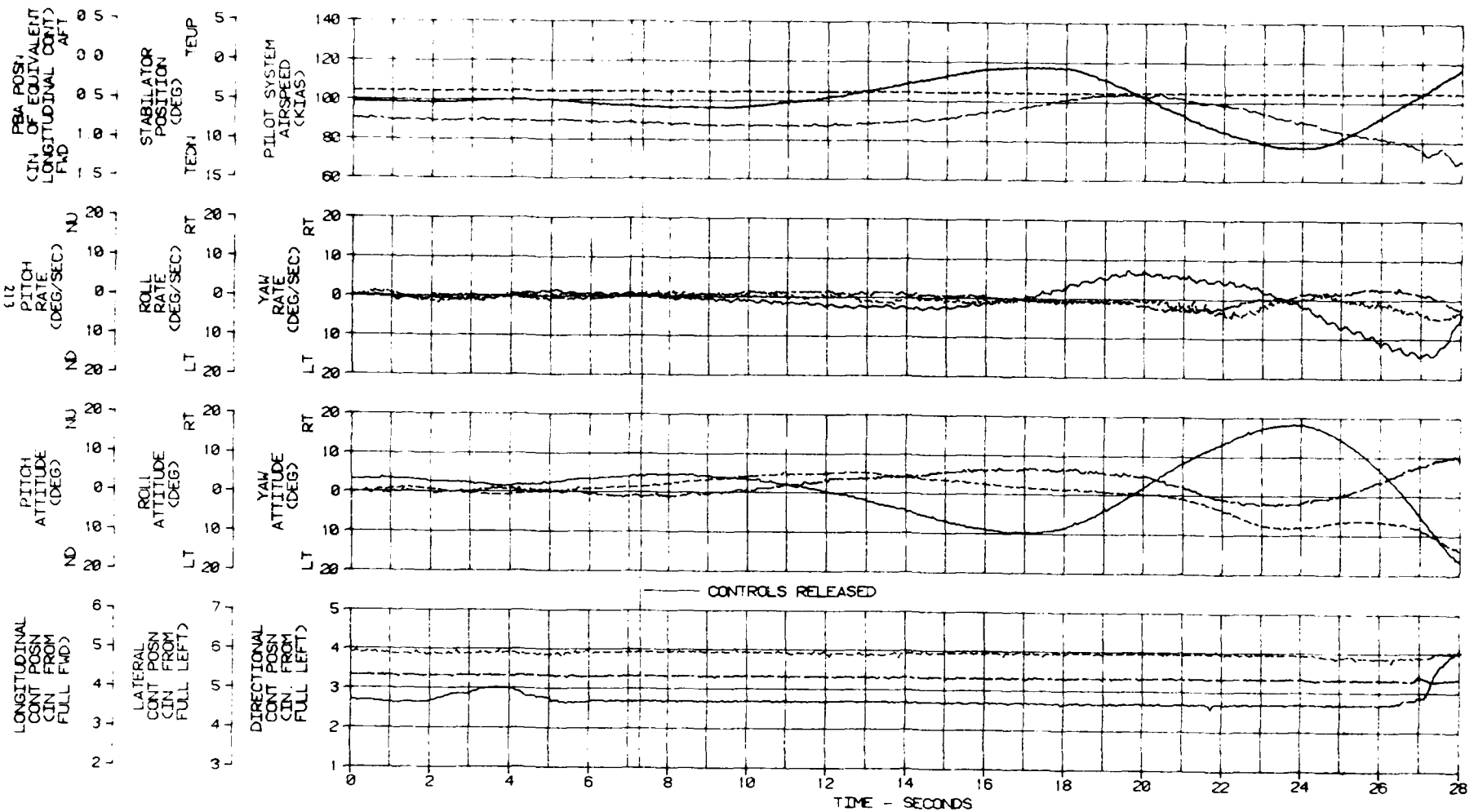


FIGURE 161

LONGITUDINAL LONG TERM RESPONSE WITH CONTROLS FREE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16220	360.9(AFT)	0.3RT	4880	10.5	257	123	LEVEL	ON OFF OFF OFF (FAILURE MODE 8)

SOLID LINE — SHORT DASH — LONG DASH

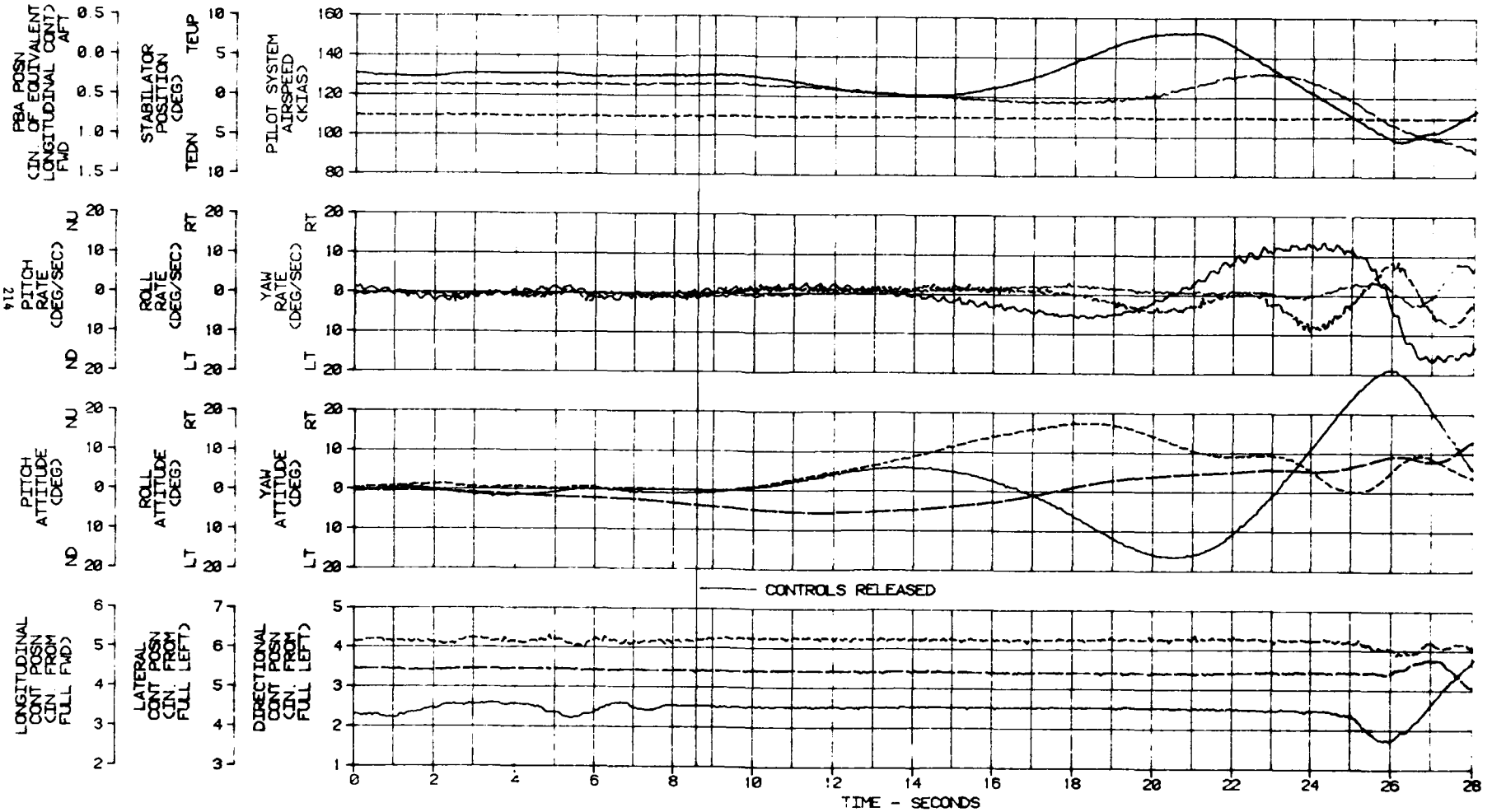


FIGURE 162

LONGITUDINAL LONG TERM RESPONSE WITH CONTROLS FIXED

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16760	362.6(AFT)	0.2RT	5140	13.0	257	140	LEVEL	ON OFF OFF OFF (FAILURE MODE 8)

SOLID LINE — SHORT DASH — LONG DASH

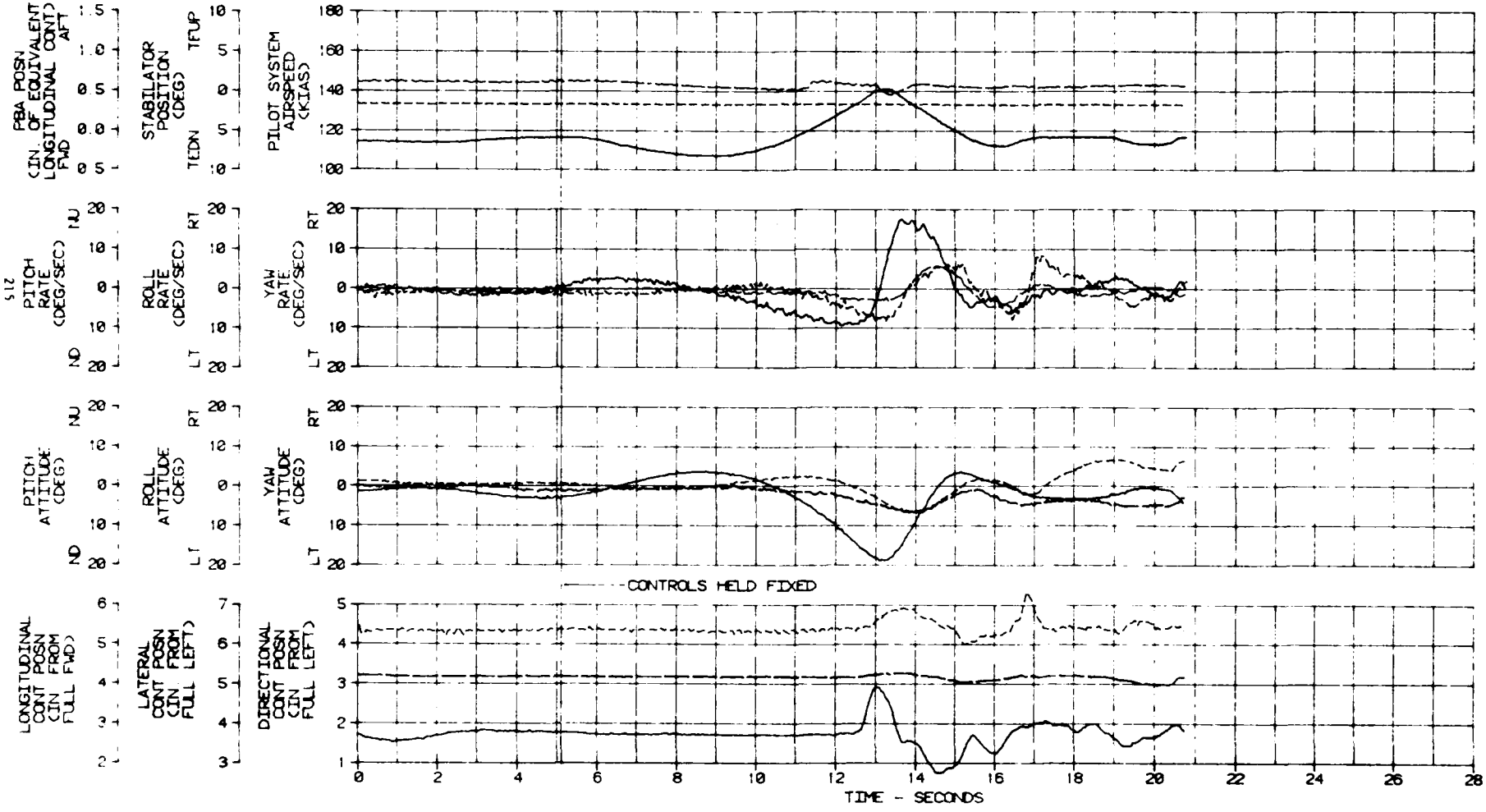


FIGURE 163

LONGITUDINAL LONG TERM RESPONSE WITH CONTROLS FIXED

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16820	362.7(AFT)	0.2RT	5500	13.5	257	152	LEVEL	ON OFF OFF OFF (FAILURE MODE 8)

SOLID LINE — SHORT DASH — LONG DASH

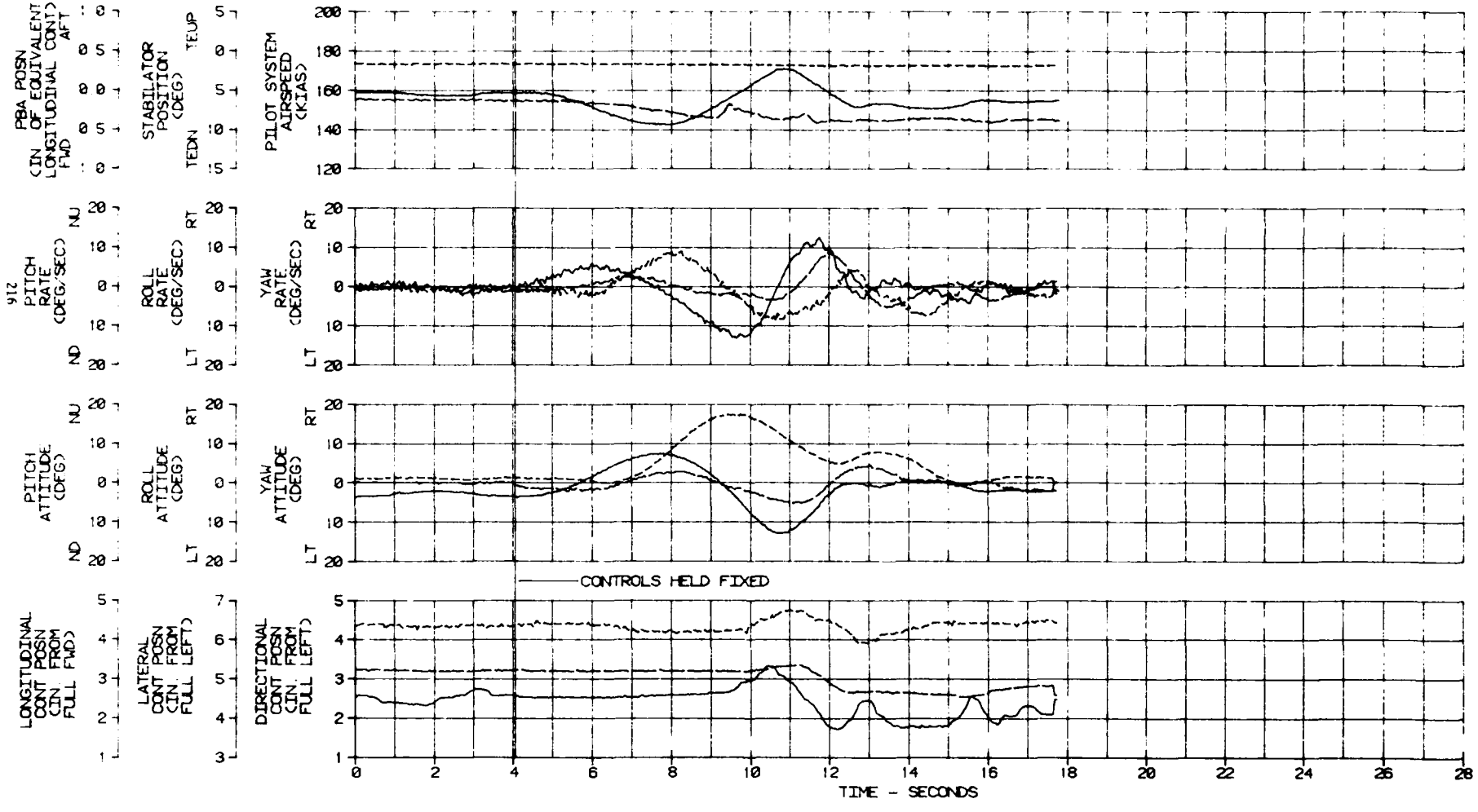


FIGURE 164

LONGITUDINAL LONG TERM RESPONSE WITH CONTROLS FIXED

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16120	360.0 (AFT)	0.1 RT	5120	11.5	259	59	LEVEL	OFF OFF OFF OFF (FAILURE MODE 9)

SOLID LINE — SHORT DASH — LONG DASH

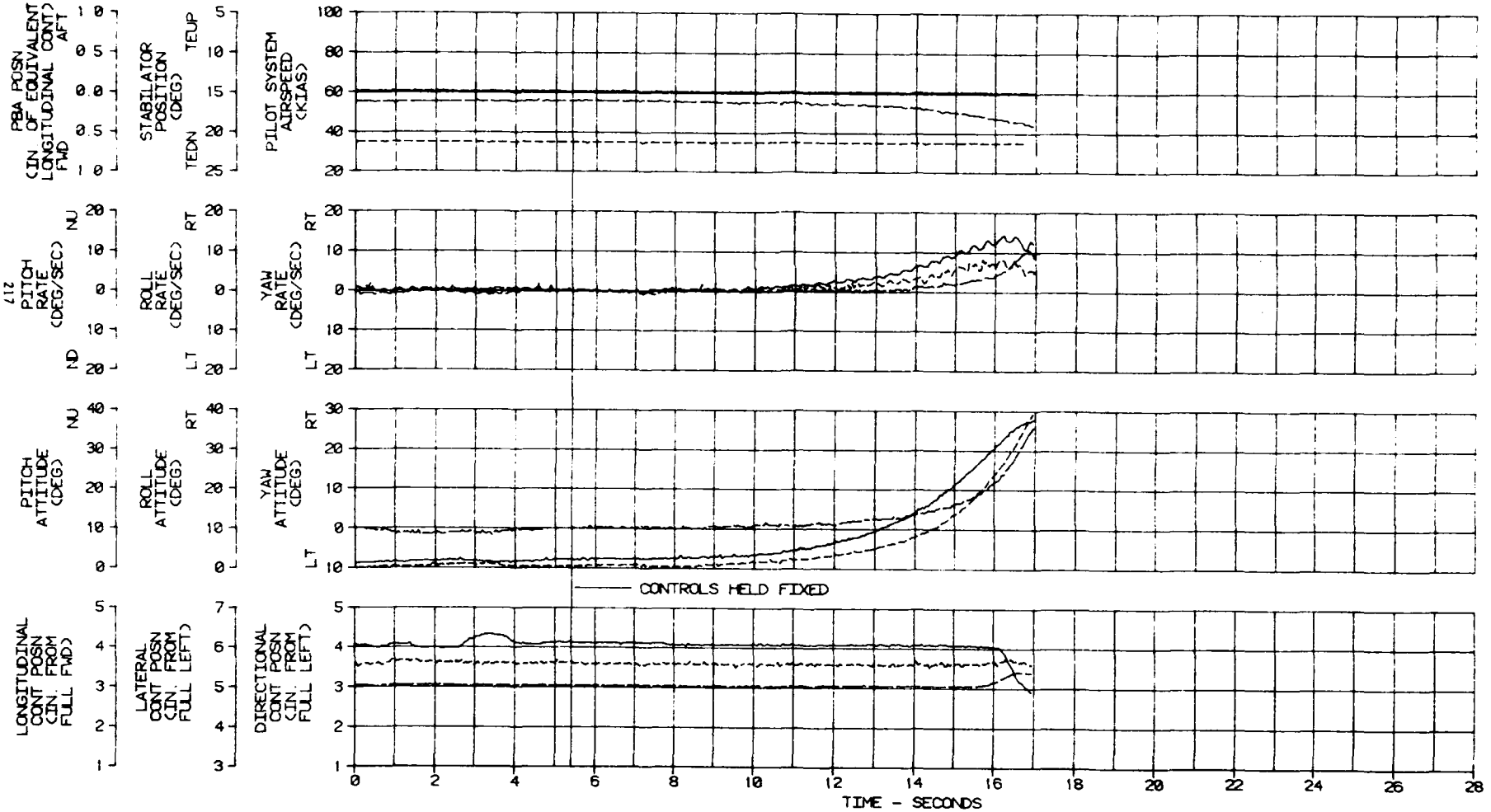


FIGURE 165

LONGITUDINAL LONG TERM RESPONSE WITH CONTROLS FREE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16220	360 9(AFT)	0.2RT	4880	9.0	258	93	LEVEL	OFF OFF OFF OFF (FAILURE MODE 9)

SOLID LINE — SHORT DASH — LONG DASH

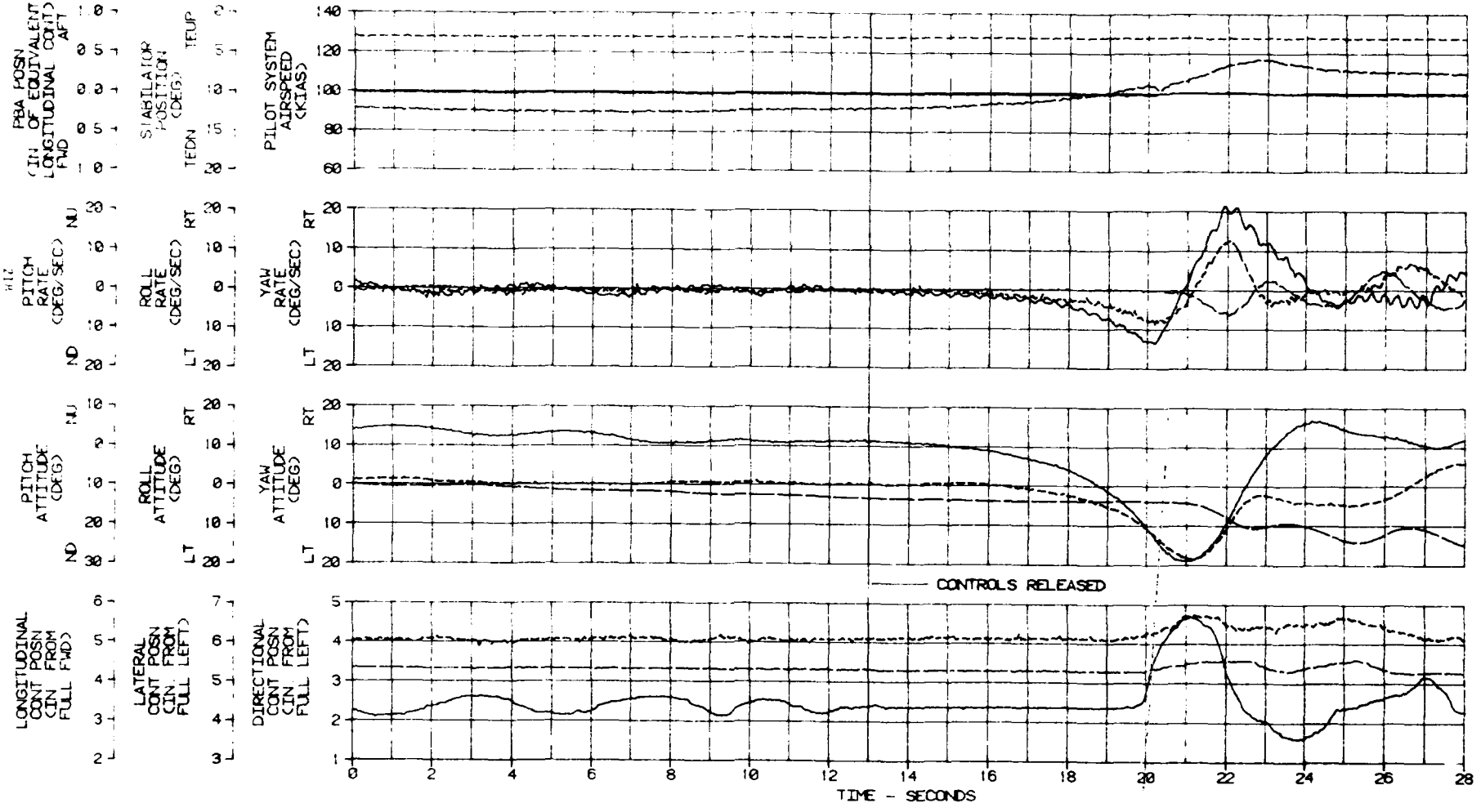


FIGURE 166

LONGITUDINAL LONG TERM RESPONSE WITH CONTROLS FREE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16160	360.2 (AFT)	0 IRT	4760	12.5	259	121	LEVEL	OFF OFF OFF OFF (FAILURE MODE 9)

SOLID LINE — SHORT DASH — LONG DASH

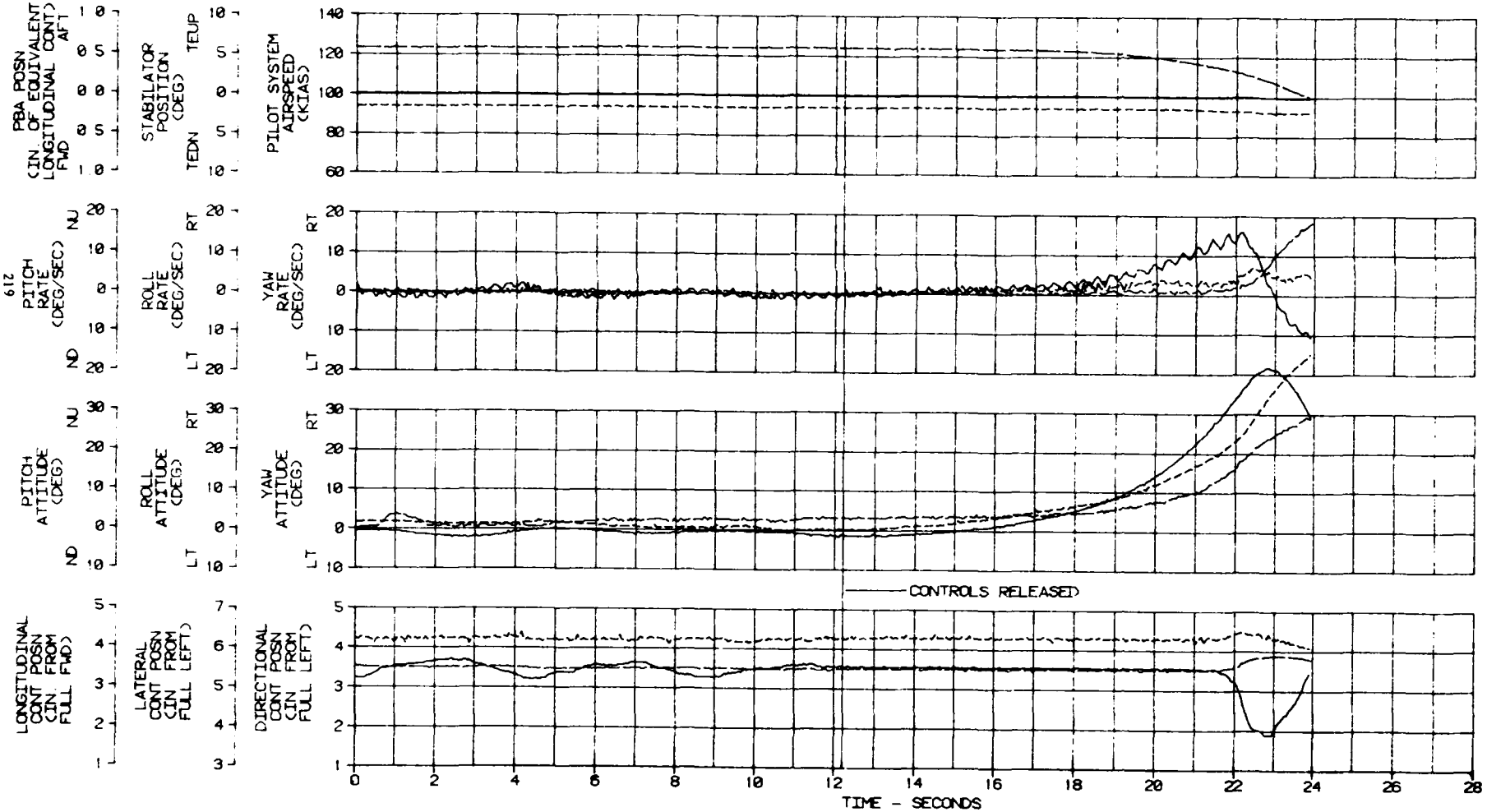


FIGURE 167

LONGITUDINAL LONG TERM RESPONSE WITH CONTROLS FIXED

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16420	361.2 (AFT)	0.1 RT	5000	12.0	259	140	LEVEL	OFF OFF OFF OFF (FAILURE MODE 9)

SOLID LINE — SHORT DASH — LONG DASH

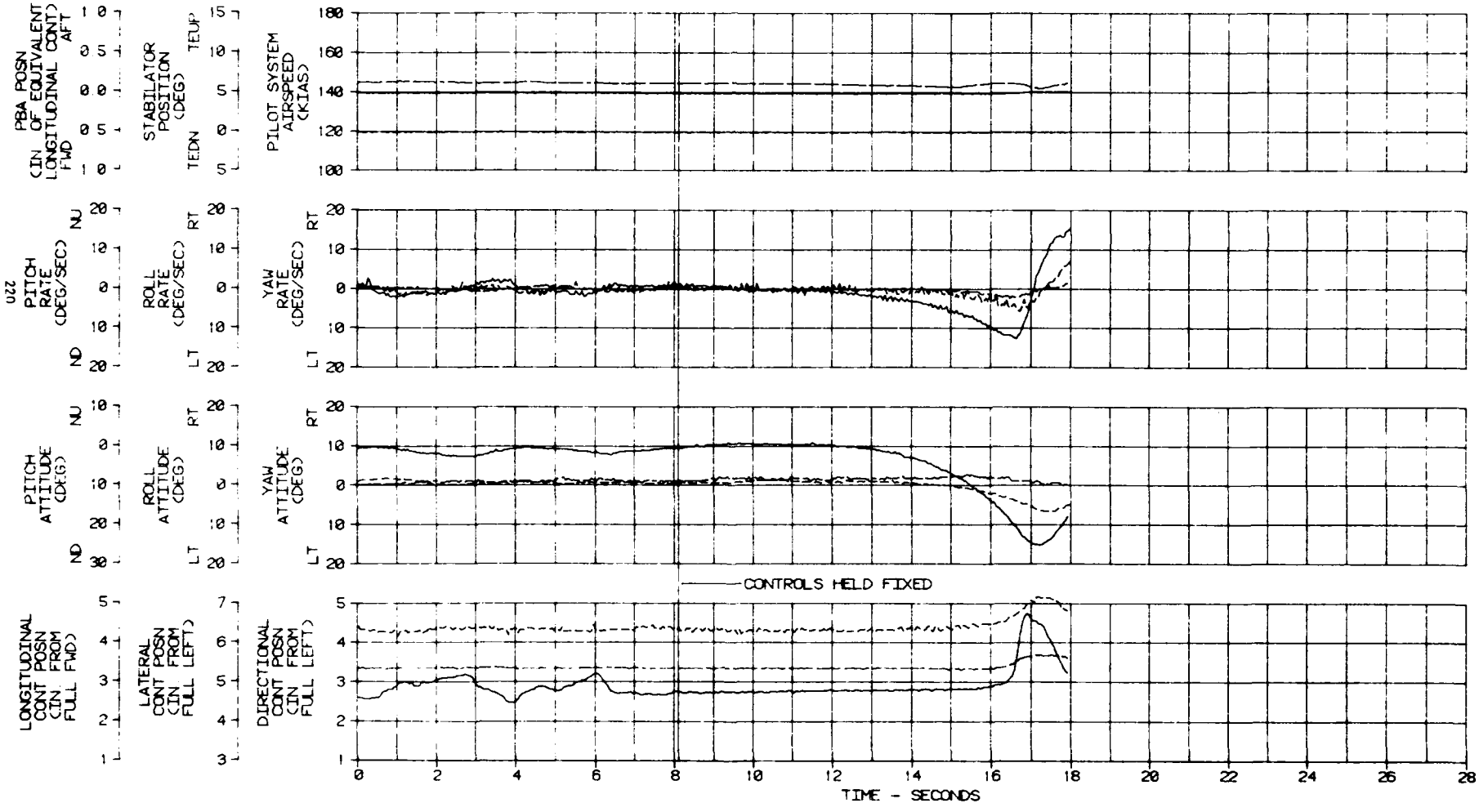


FIGURE 168

LONGITUDINAL LONG TERM RESPONSE WITH CONTROLS FIXED

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16340	360.8 (AFT)	0.1 RT	5460	11.0	258	151	LEVEL	OFF OFF OFF OFF (FAILURE MODE 9)

SOLID LINE — SHORT DASH — LONG DASH

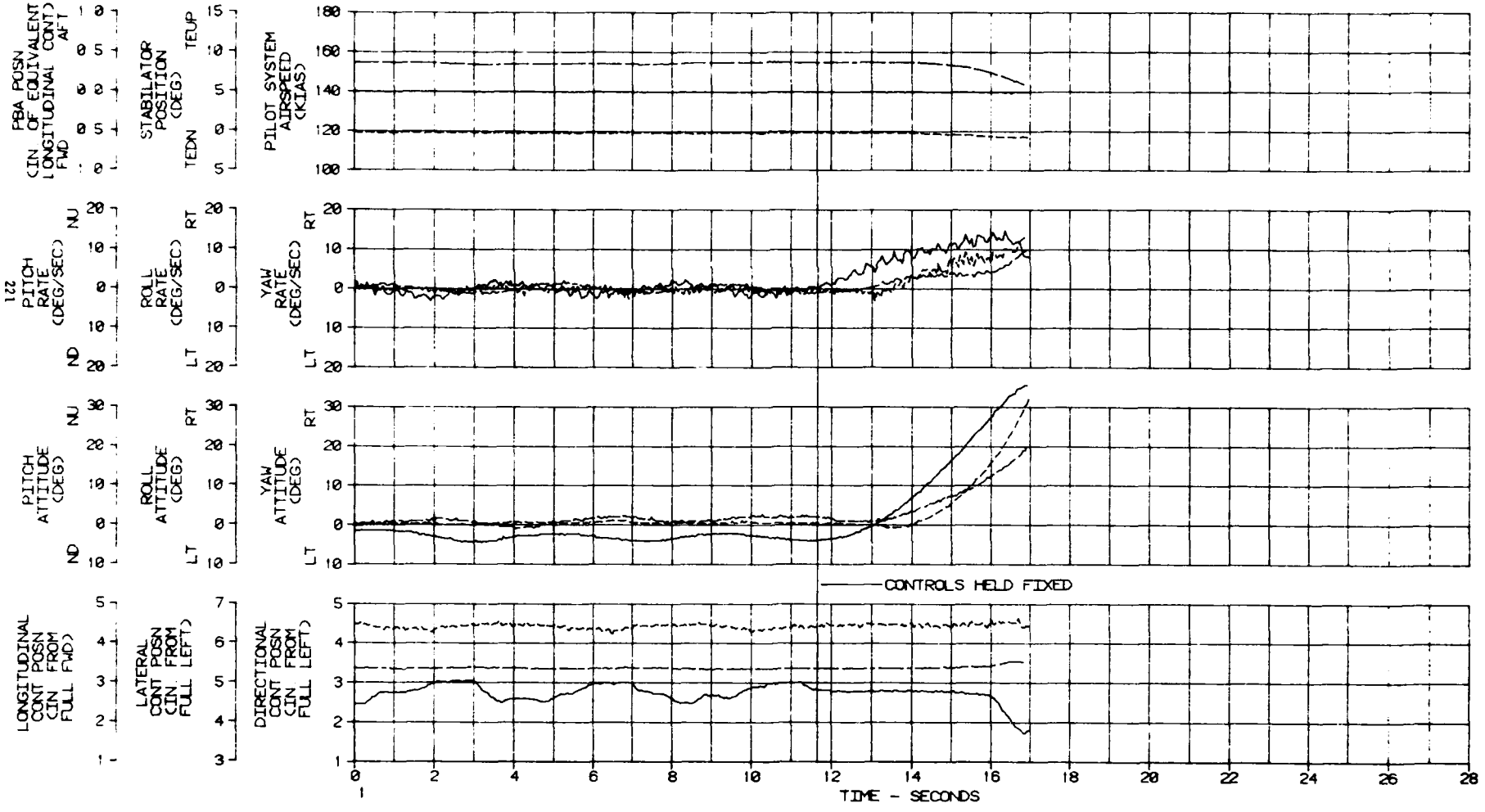


FIGURE 169

LONGITUDINAL LONG TERM RESPONSE WITH CONTROLS FREE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16320	363.5 (AFT)	0.1 RT	5020	27.5	258	116	LEVEL	ON ON ON AUTO (FAILURE MODE 0)

SOLID LINE — SHORT DASH — LONG DASH

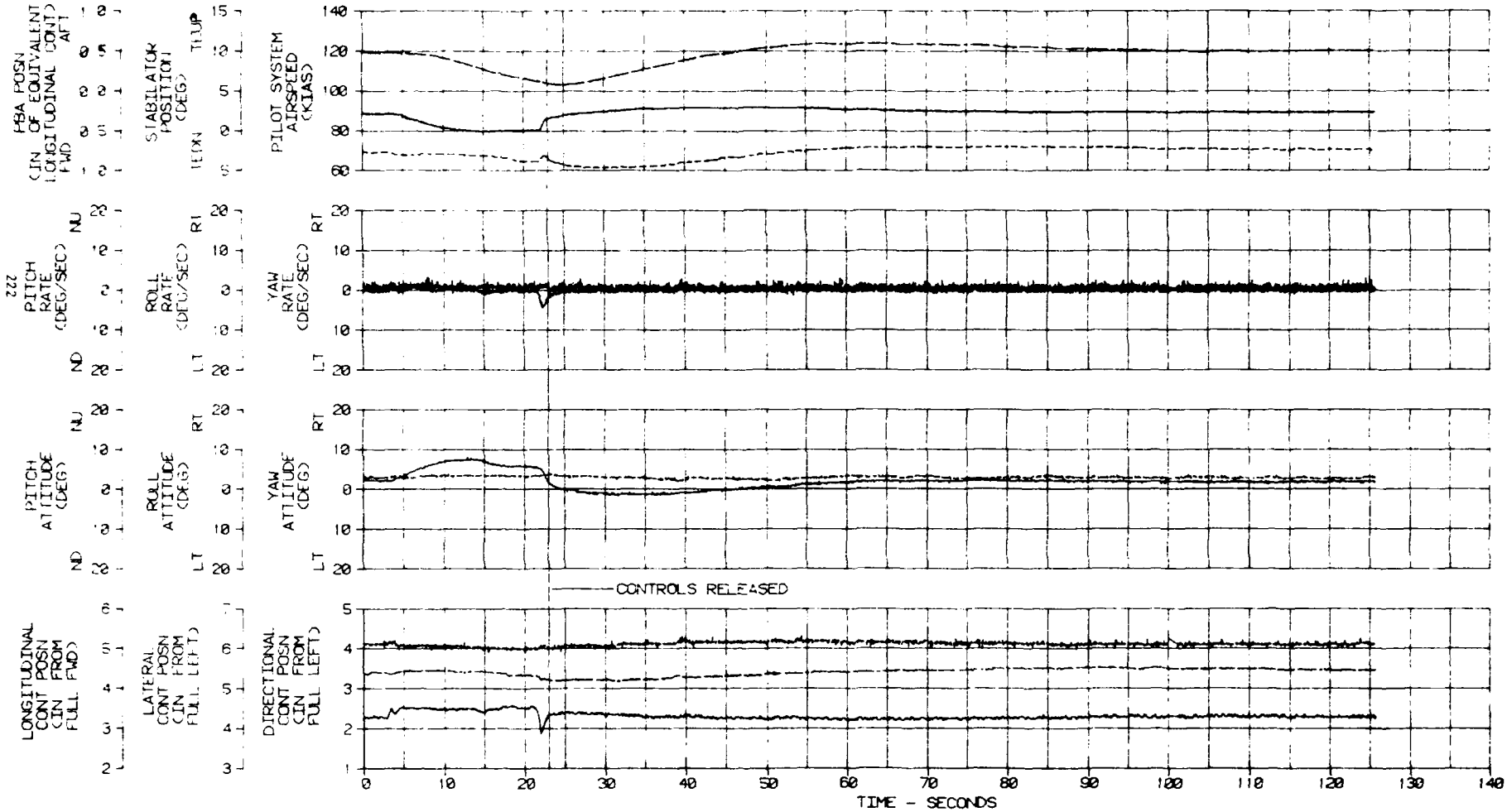


FIGURE 170

LONGITUDINAL LONG TERM RESPONSE WITH CONTROLS FREE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16440	363 4(AFT)	0 1RT	5280	27 5	258	116	LEVEL	OFF ON ON AUTO (FAILURE MODE 1)

SOLID LINE — SHORT DASH — LONG DASH

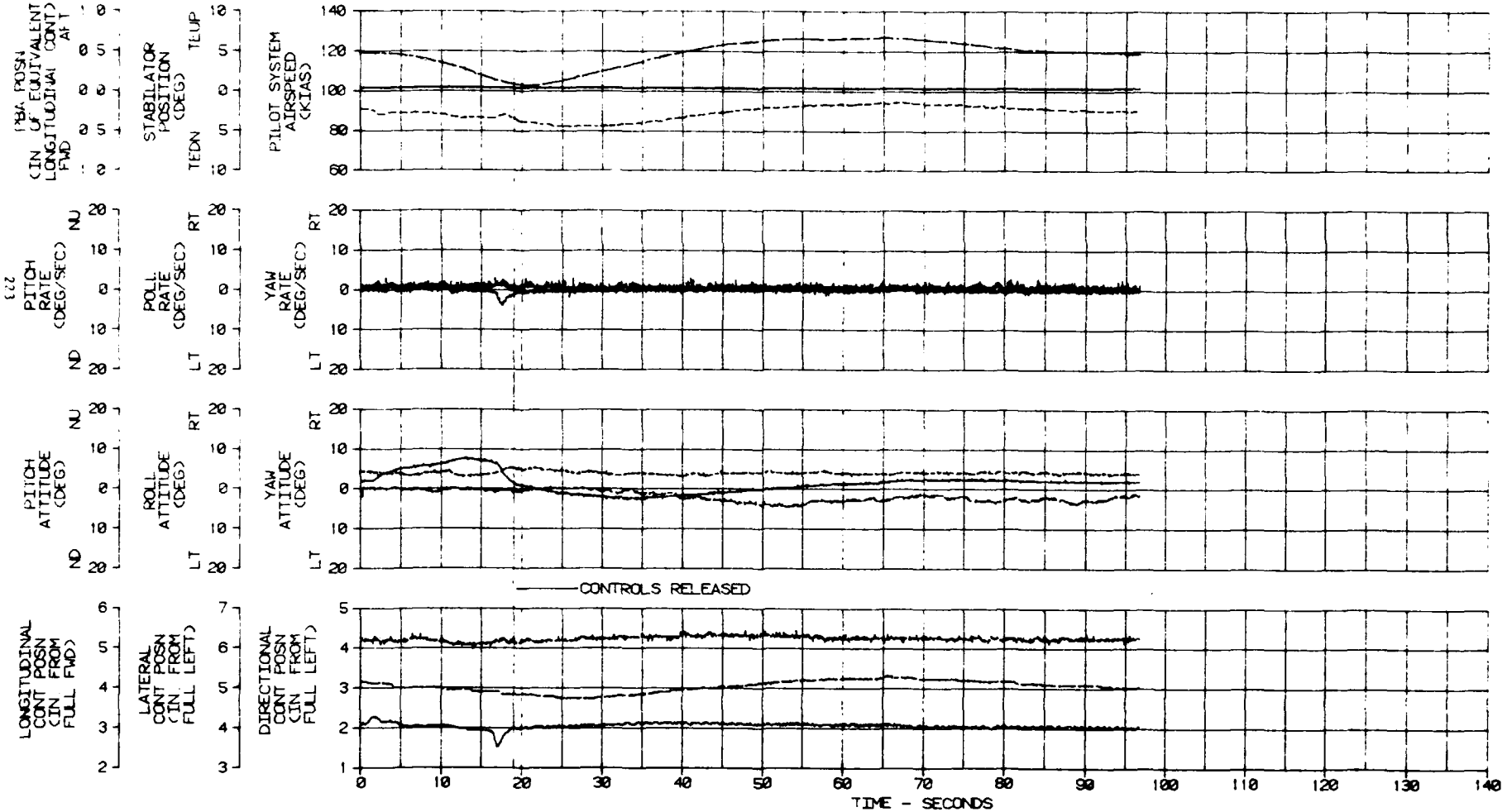


FIGURE 171
SIDEWARD FLIGHT
UH-60A USA S/N 82-23748

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	LAT (BL)	AVG DENSITY ALT (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	WHEEL HEIGHT (FT)
14220	363.0 (AFT)	0.4 RT	2380	12 0	258	25

NOTES: 1. I DENOTES CONTROL AND AIRCRAFT EXCURSIONS
2. FAILURE MODE 7: PBA CENTERED, SAS OFF, FPS OFF, STABILATOR AUTO
3. NORMAL UTILITY CONFIGURATION

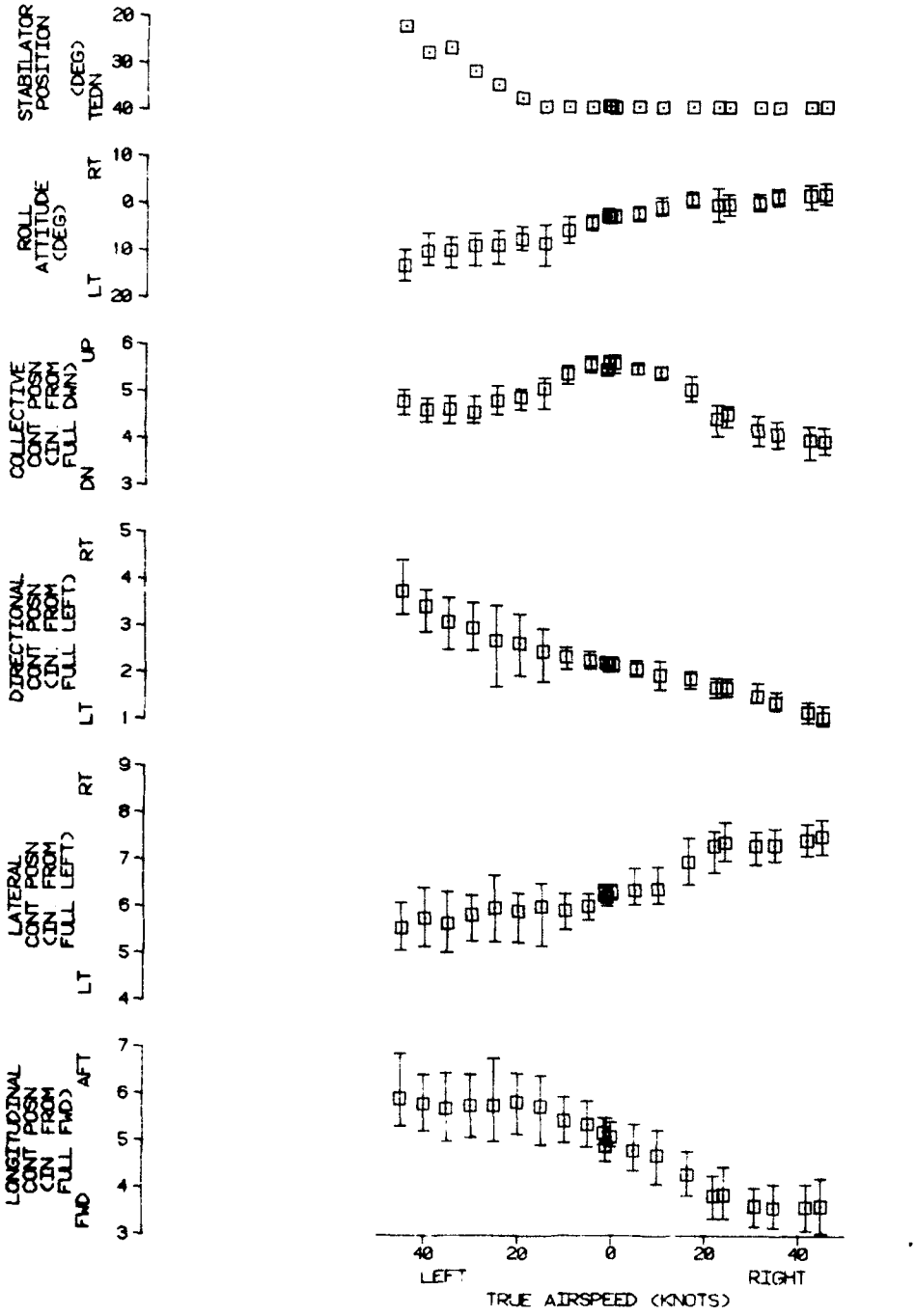


FIGURE 172
SIDEWARD FLIGHT
UH-60A USA S/N 82-23748

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALT (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	WHEEL HEIGHT (FT)
21240	358.8 (AFT)	0.1 RT	1860	9.0	258	25

NOTES
1. I DENOTES CONTROL AND AIRCRAFT EXCURSIONS
2. FAILURE MODE 7: PBA CENTERED, SAS OFF, FPS OFF, STABILATOR AUTO
3. NORMAL UTILITY CONFIGURATION

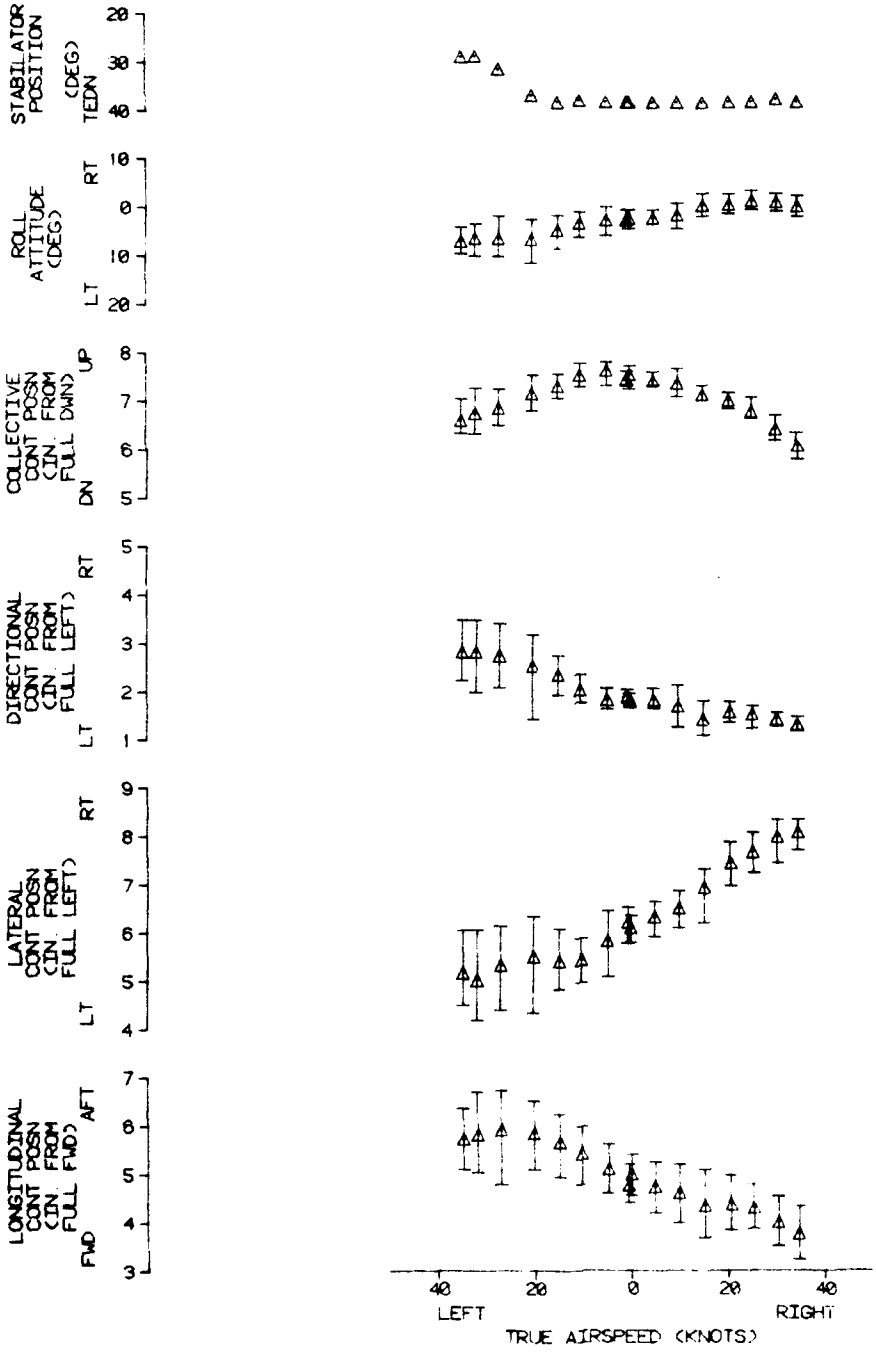


FIGURE 173
LOWSPEED FLIGHT
UH-60A USA S/N 82-23748

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALT (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	WHEEL HEIGHT (FT)
14400	363.8 (AFT)	0.3 RT	2600	14.5	257	25

NOTES:
1. I DENOTES CONTROL AND AIRCRAFT EXCURSIONS
2. FAILURE MODE 7: PBA CENTERED, SAS OFF, FPS OFF, STABILATOR AUTO
3. NORMAL UTILITY CONFIGURATION

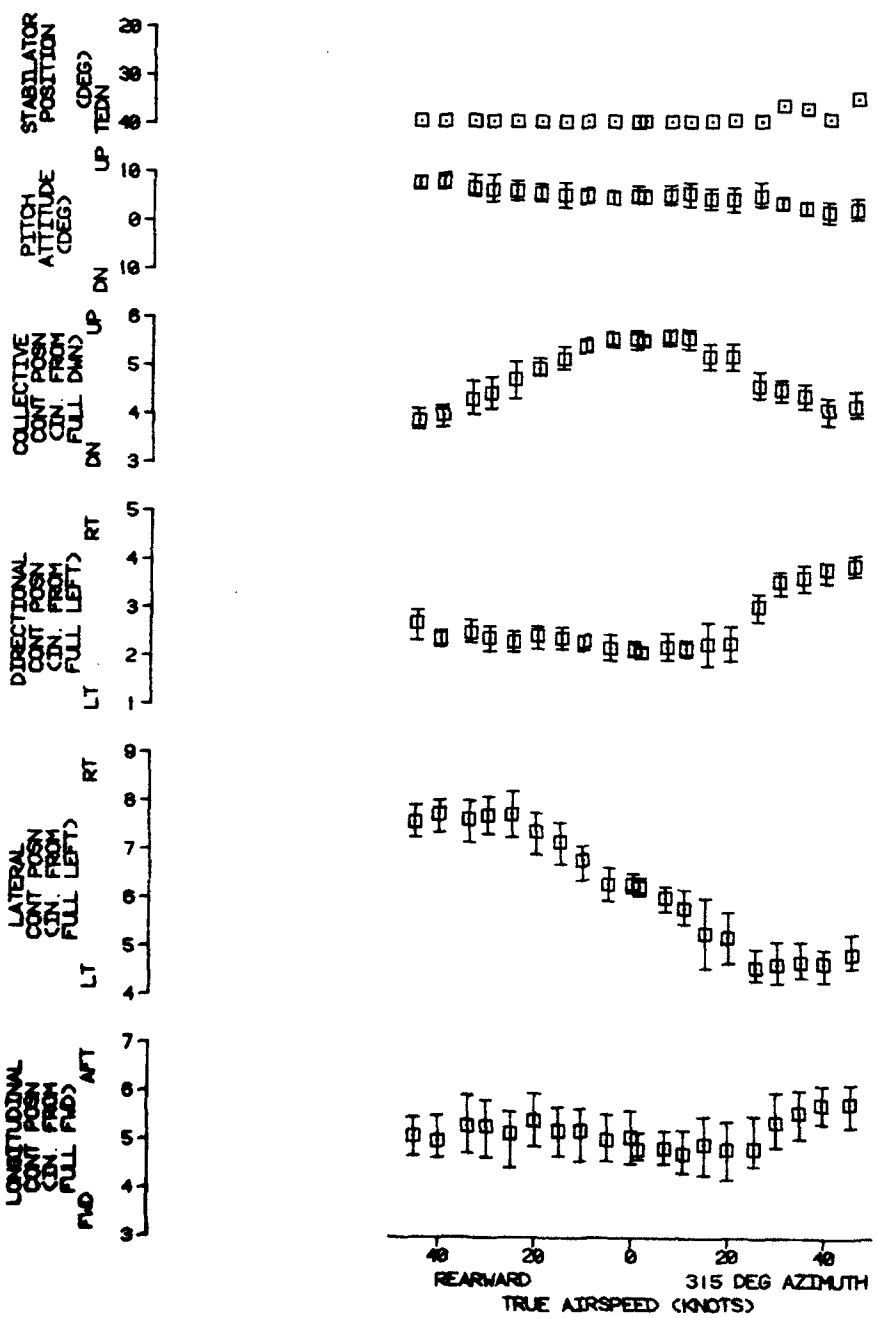


FIGURE 174
LOWSPEED FLIGHT
UH-60A USA S/N 82-23748

AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALT (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	WHEEL HEIGHT (FT)
20640	357 8 (AFT)	0 1 RT	1960	10.0	258	25

NOTES
1. I DENOTES CONTROL AND AIRCRAFT EXCURSIONS
2. FAILURE MODE 7 PBA CENTERED, SAS OFF, FPS OFF, STABILATOR AUTO
3. NORMAL UTILITY CONFIGURATION

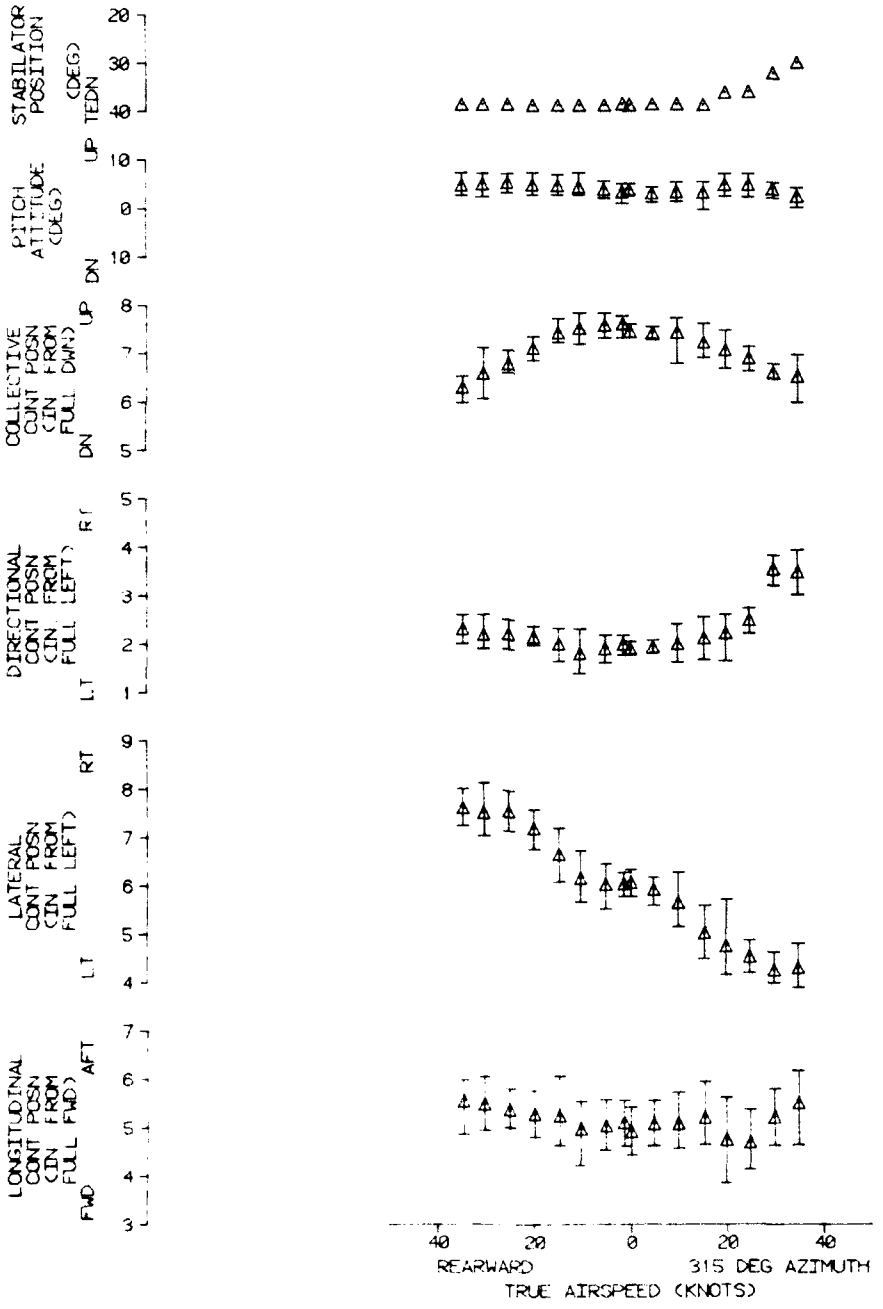


FIGURE 175
INSTRUMENT TAKEOFF AND CLIMB
UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16940	363.3(AFT)	0.2RT	5240	36.5	260	ON GROUND	ON OFF OFF AUTO (FAILURE MODE 6)

SOLID LINE — SHORT DASH — LONG DASH

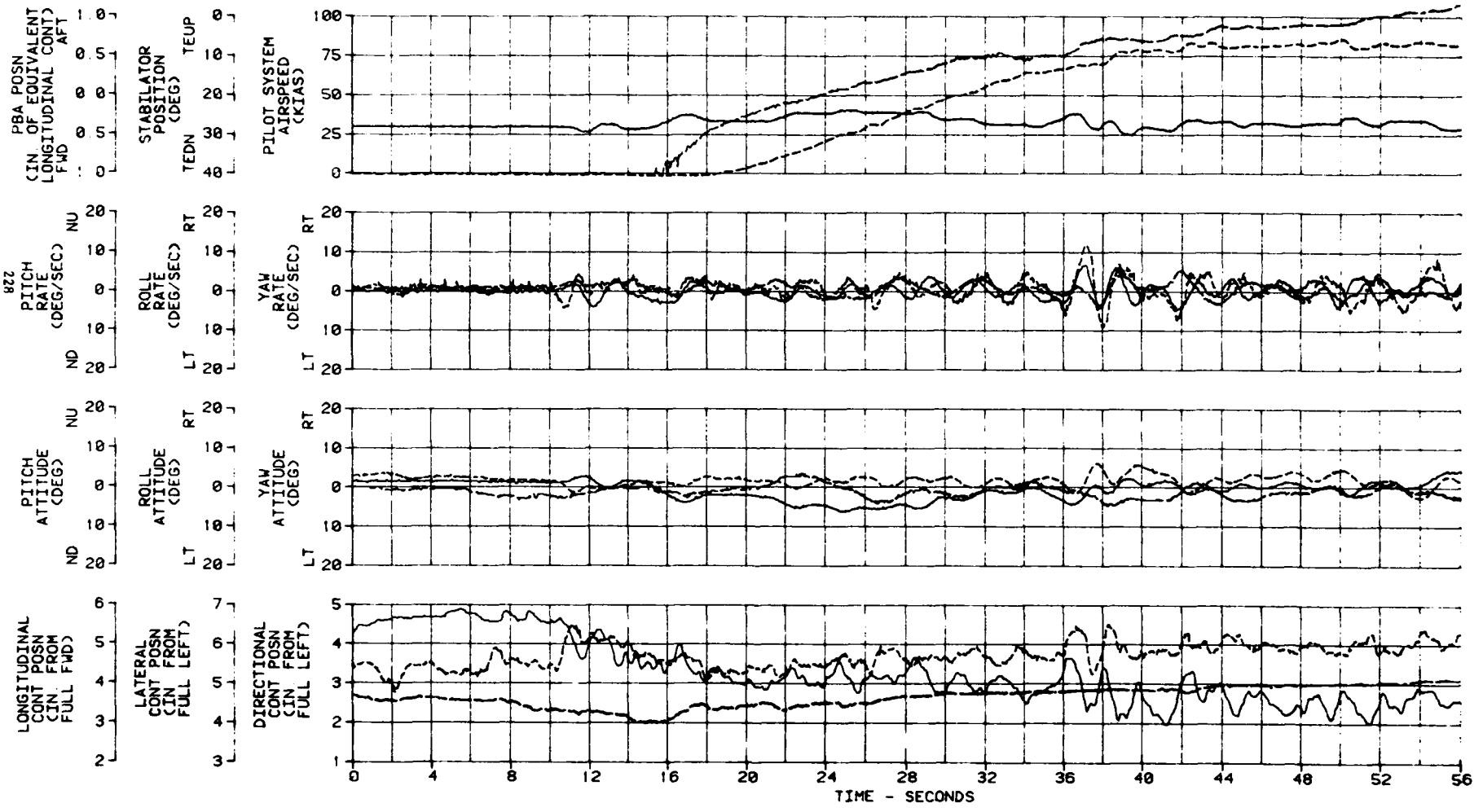


FIGURE 178
INSTRUMENT TAKEOFF AND CLIMB
UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16940	363 4(AFT)	0 1RT	4560	31 0	259	ON GROUND	OFF OFF OFF AUTO (FAILURE MODE 7)

SOLID LINE — SHORT DASH — LONG DASH

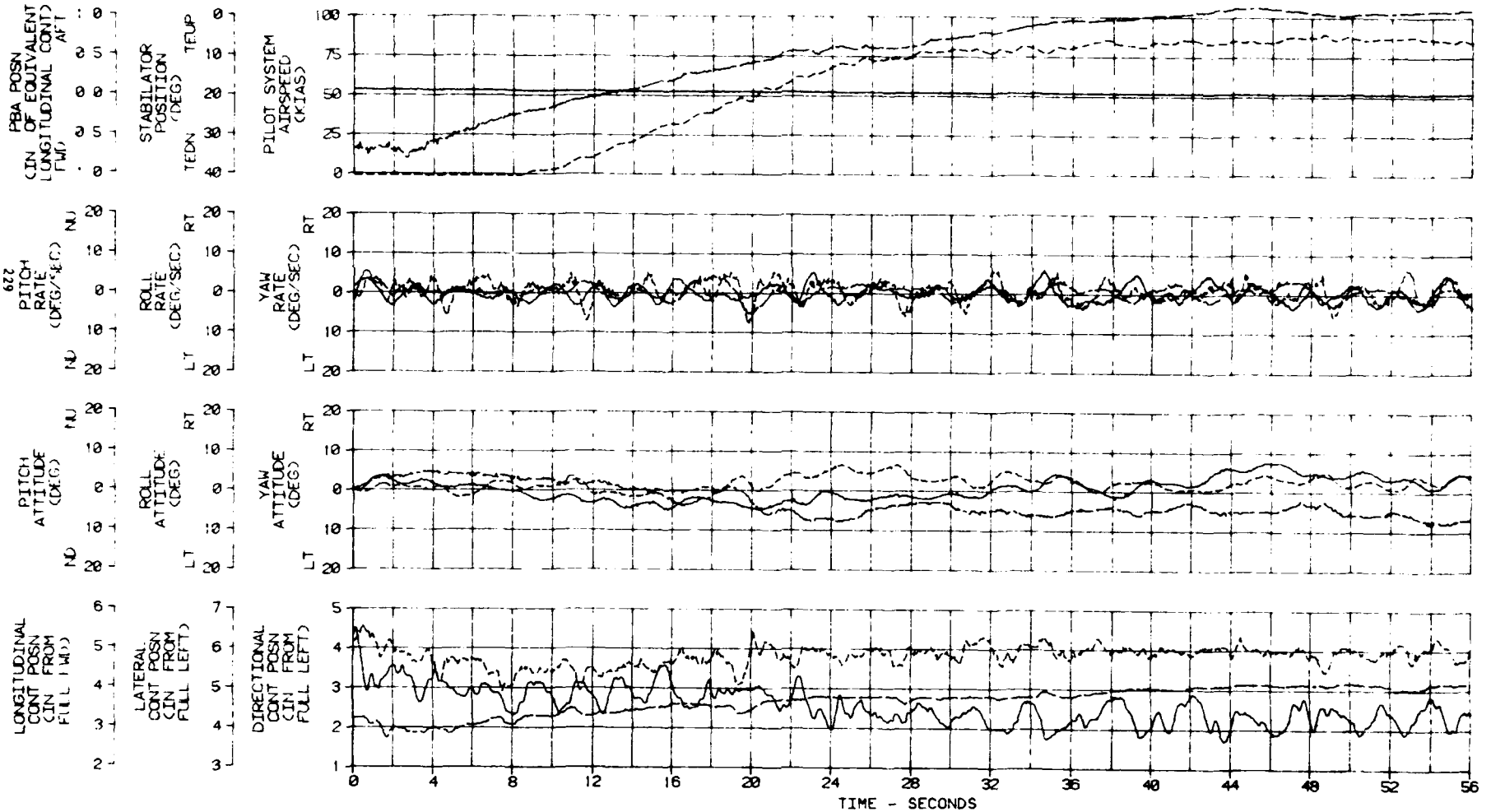


FIGURE 177

INSTRUMENT FLIGHT - CLIMB

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16560	363.1 (AFT)	0 2RT	6060	28.0	259	97	CLIMB	ON OFF OFF OFF (FAILURE MODE 8)

SOLID LINE — SHORT DASH — LONG DASH

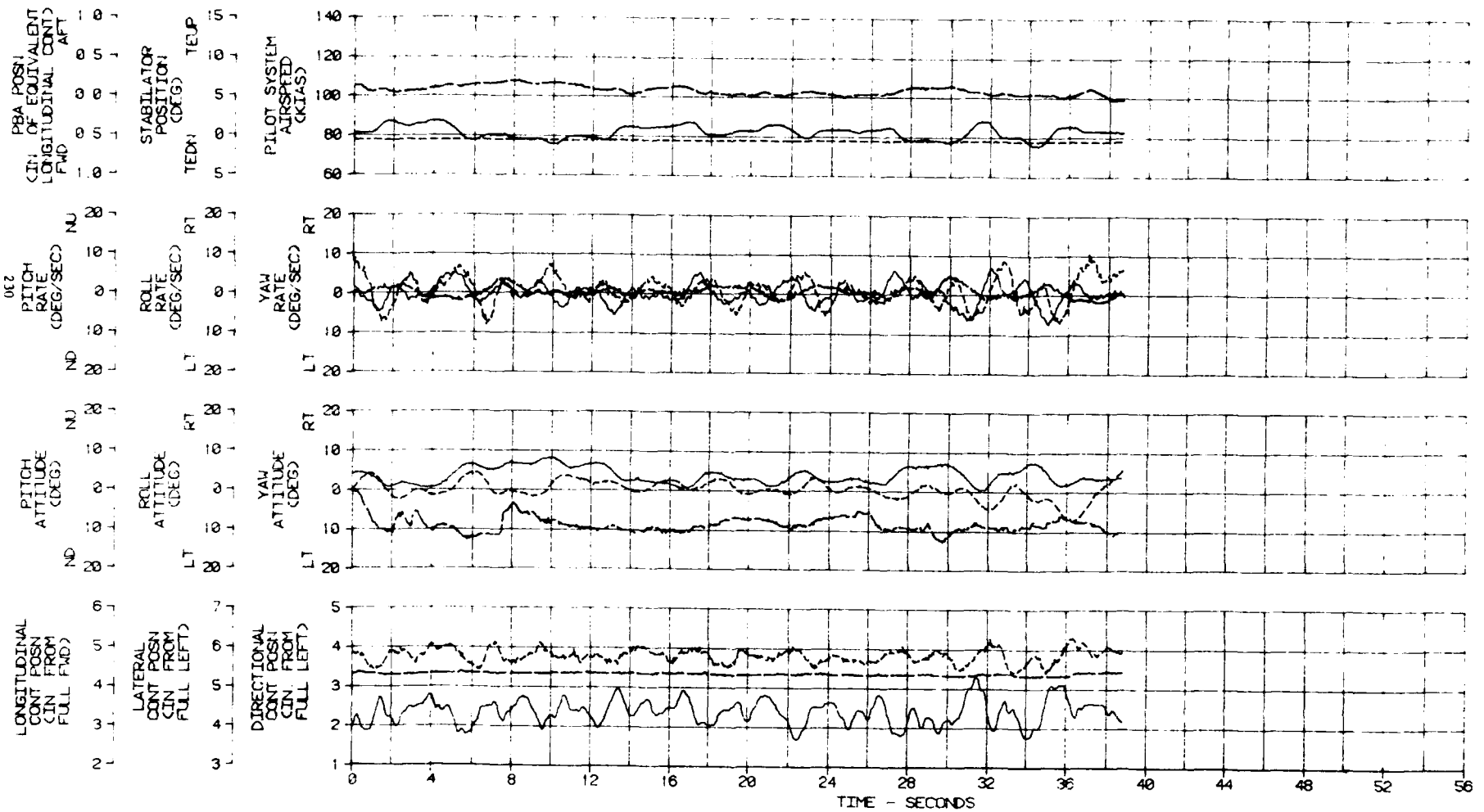


FIGURE 178
INSTRUMENT FLIGHT - CLIMB
UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16320	363.1 (AFT)	0.1 RT	5840	25.0	257	101	CLIMB	OFF OFF OFF OFF (FAILURE MODE 9)

SOLID LINE — SHORT DASH — LONG DASH

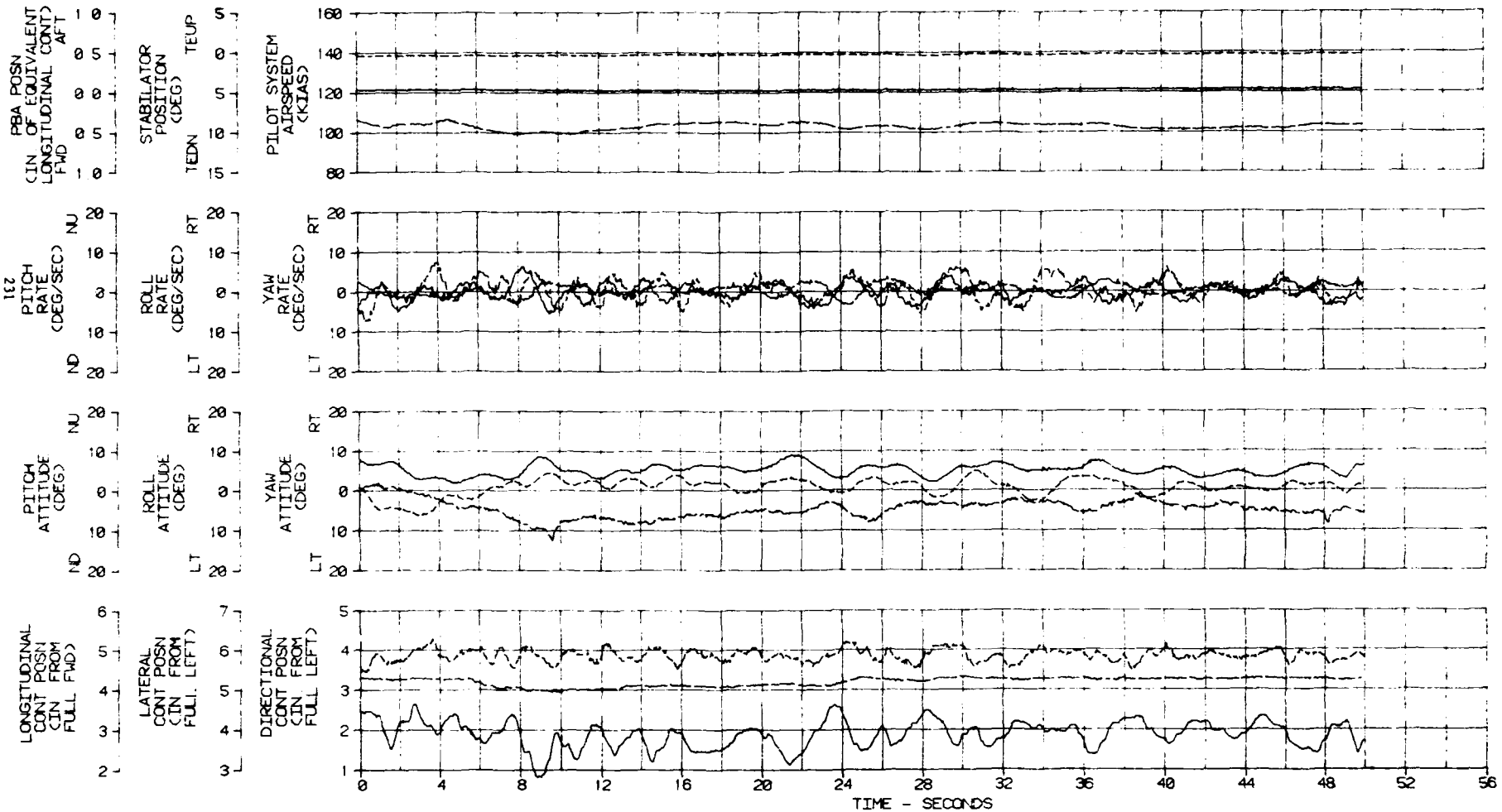


FIGURE 178

INSTRUMENT FLIGHT - CRUISE

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION, LONG (FS)	CG LOCATION, LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16840	363.2 (AFT)	0.2 RT	7240	22.5	259	143	LEVEL	ON OFF OFF AUTO (FAILURE MODE 6)

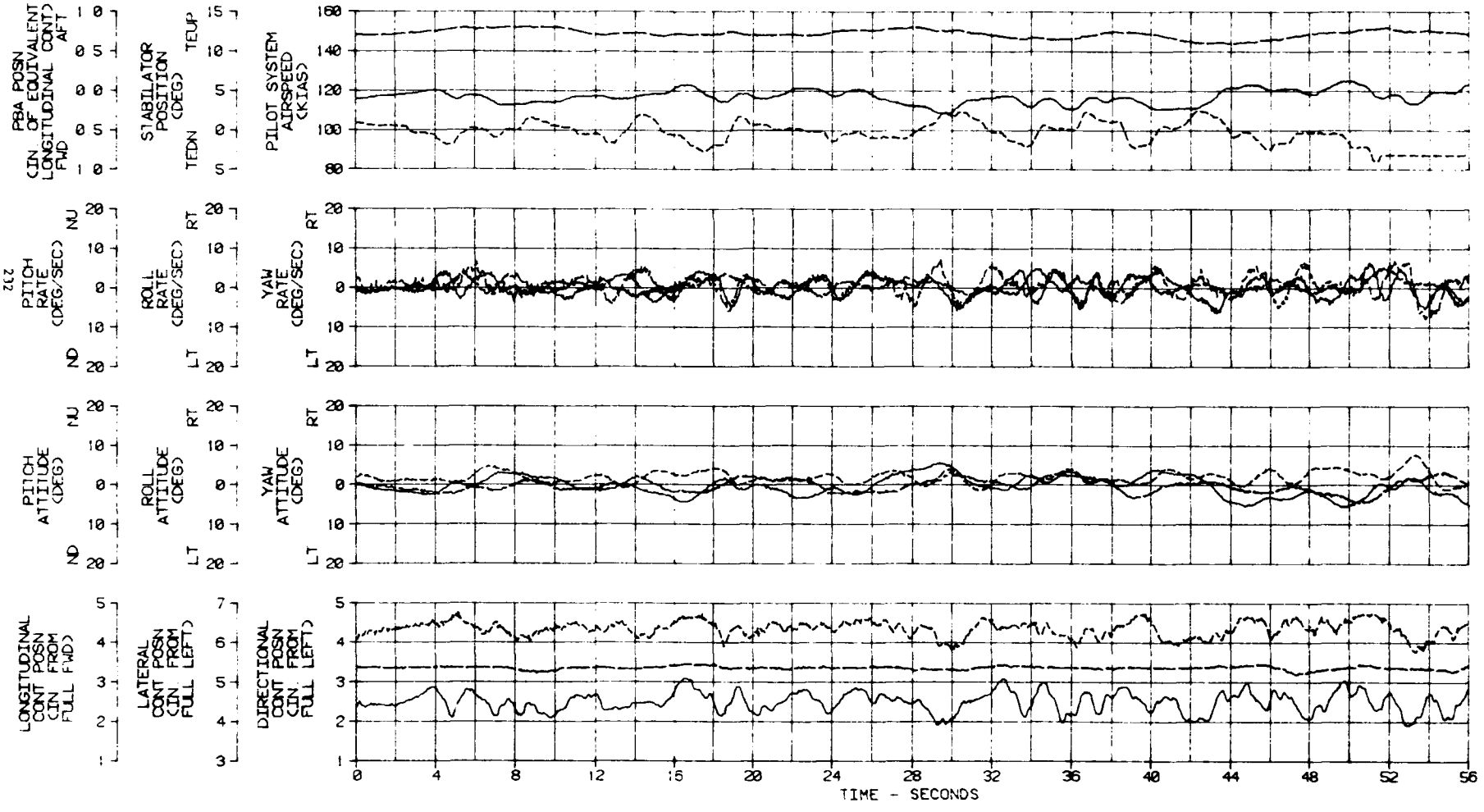


FIGURE 180
INSTRUMENT FLIGHT - CRUISE
UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16820	363 3(AFT)	0 1RT	6940	20 5	258	142	LEVEL	OFF OFF OFF AUTO (FAILURE MODE 7)

SOLID LINE — SHORT DASH — LONG DASH

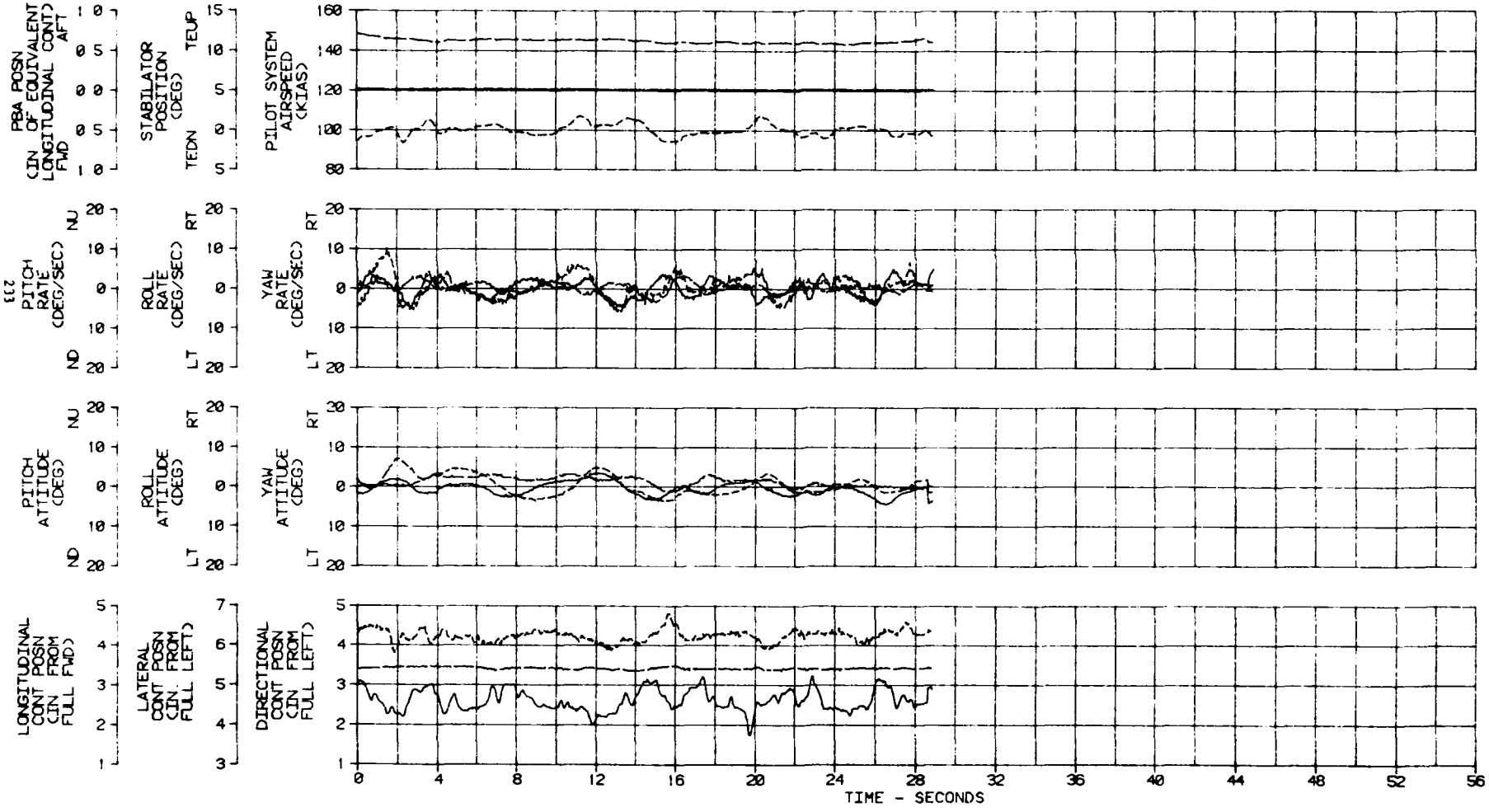


FIGURE 181
INSTRUMENT FLIGHT - CRUISE
UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16520	363.2(AFT)	0.2RT	7300	23.0	259	138	LEVEL	ON OFF OFF OFF (FAILURE MODE 8)

SOLID LINE — SHORT DASH — LONG DASH

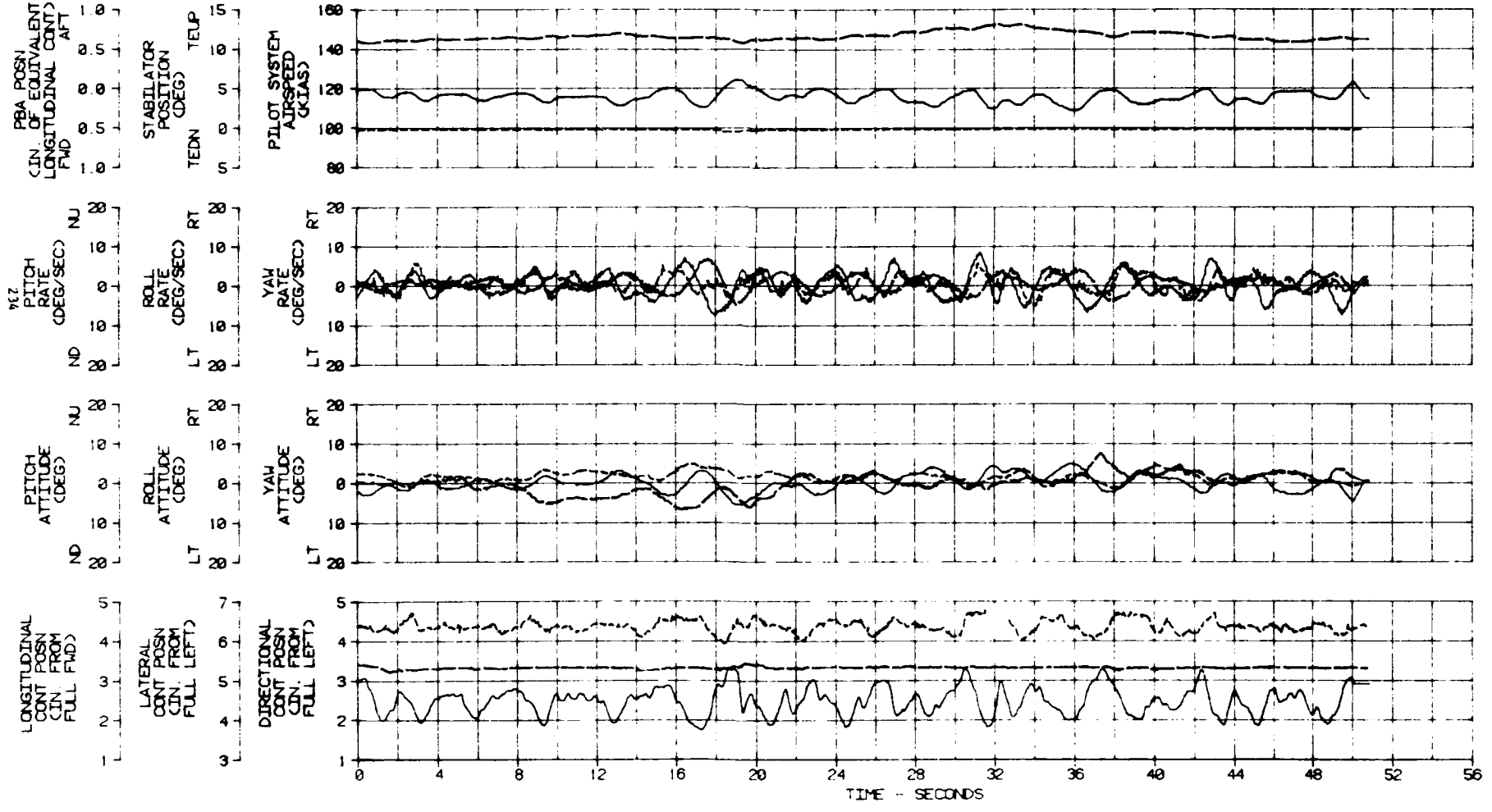


FIGURE 182
INSTRUMENT FLIGHT - CRUISE
UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16580	363.2(AFT)	0.1RT	7000	20 5	258	141	LEVEL	OFF OFF OFF OFF (FAILURE MODE 9)

SOLID LINE — SHORT DASH — LONG DASH

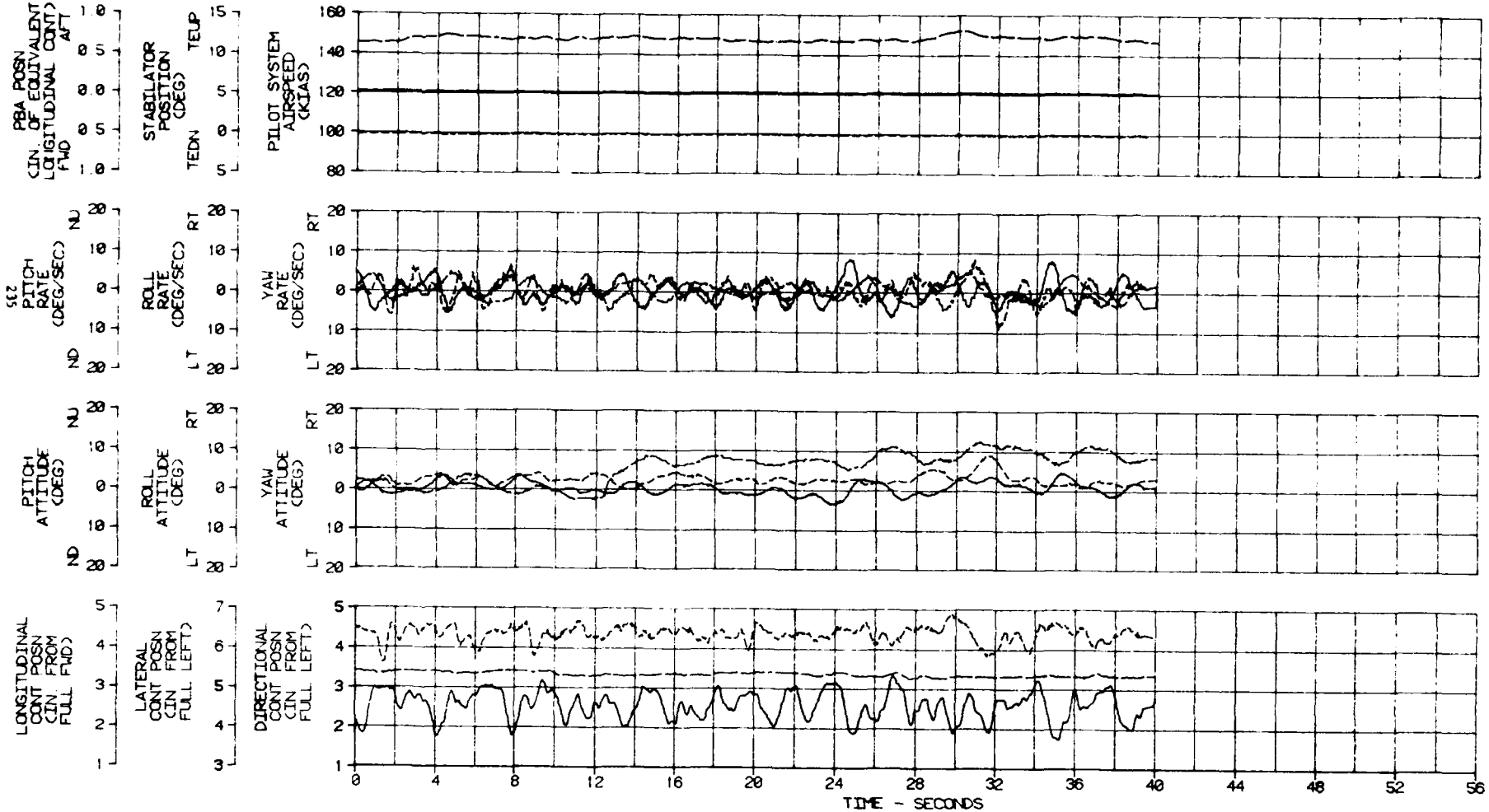


FIGURE 183

INSTRUMENT FLIGHT – LOCALIZER/GLIDESLOPE INTERCEPT

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16660	363.2(AFT)	0.2RT	8280	19.0	259	120	LEVEL	ON OFF OFF AUTO (FAILURE MODE 6)

SOLID LINE — SHORT DASH — LONG DASH

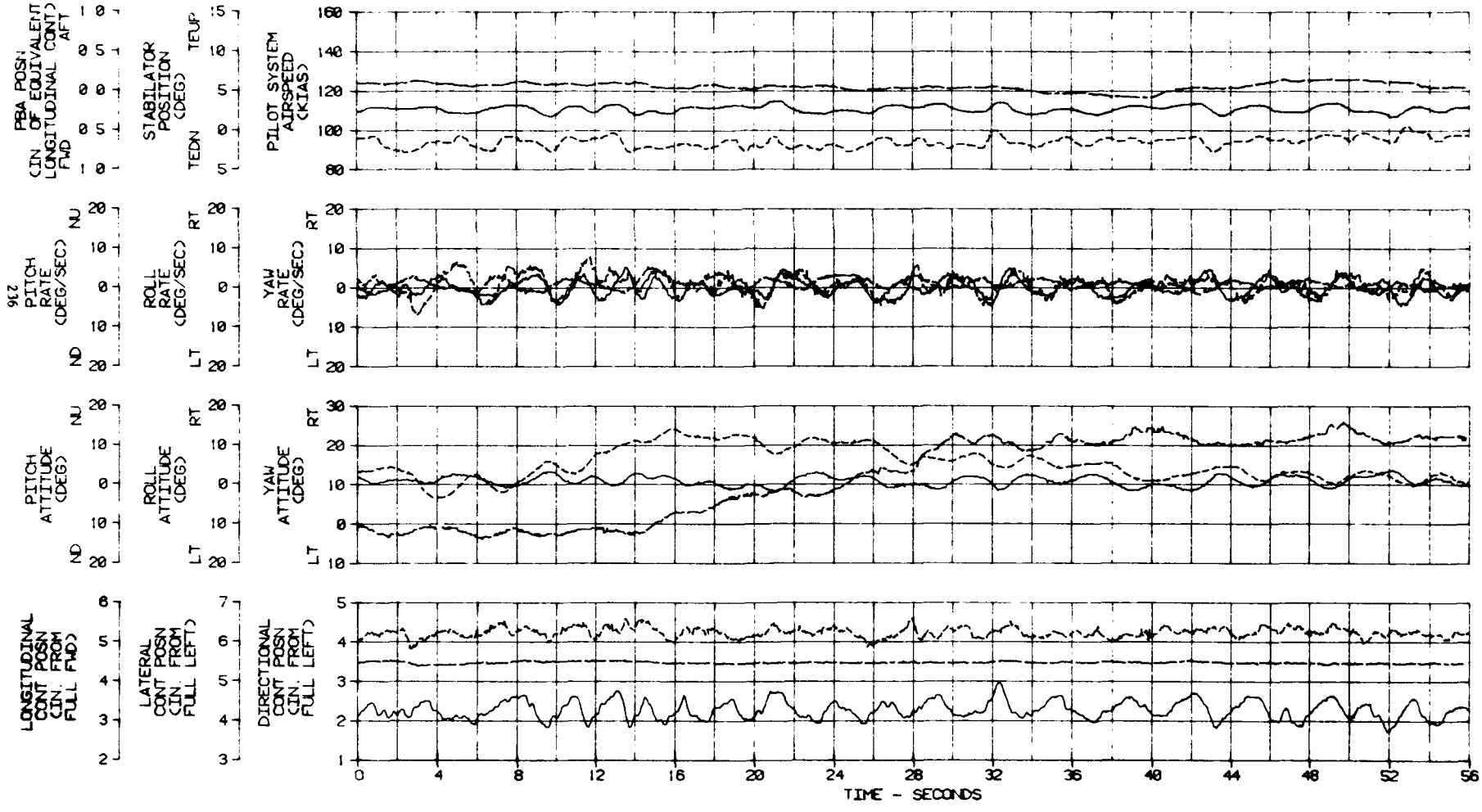


FIGURE 184

INSTRUMENT FLIGHT - LOCALIZER INTERCEPT

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16740	363.1 (AFT)	0.1 RT	6940	21.5	258	135	LEVEL	OFF OFF OFF AUTO (FAILURE MODE 7)

SOLID LINE — SHORT DASH — LONG DASH

FIGURE 185

INSTRUMENT FLIGHT - GLIDESLOPE INTERCEPT

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16720	363 0(AFT)	0 1RT	6840	20 0	258	122	LEVEL	OFF OFF OFF AUTO (FAILURE MODE 7)

SOLID LINE — SHORT DASH — LONG DASH

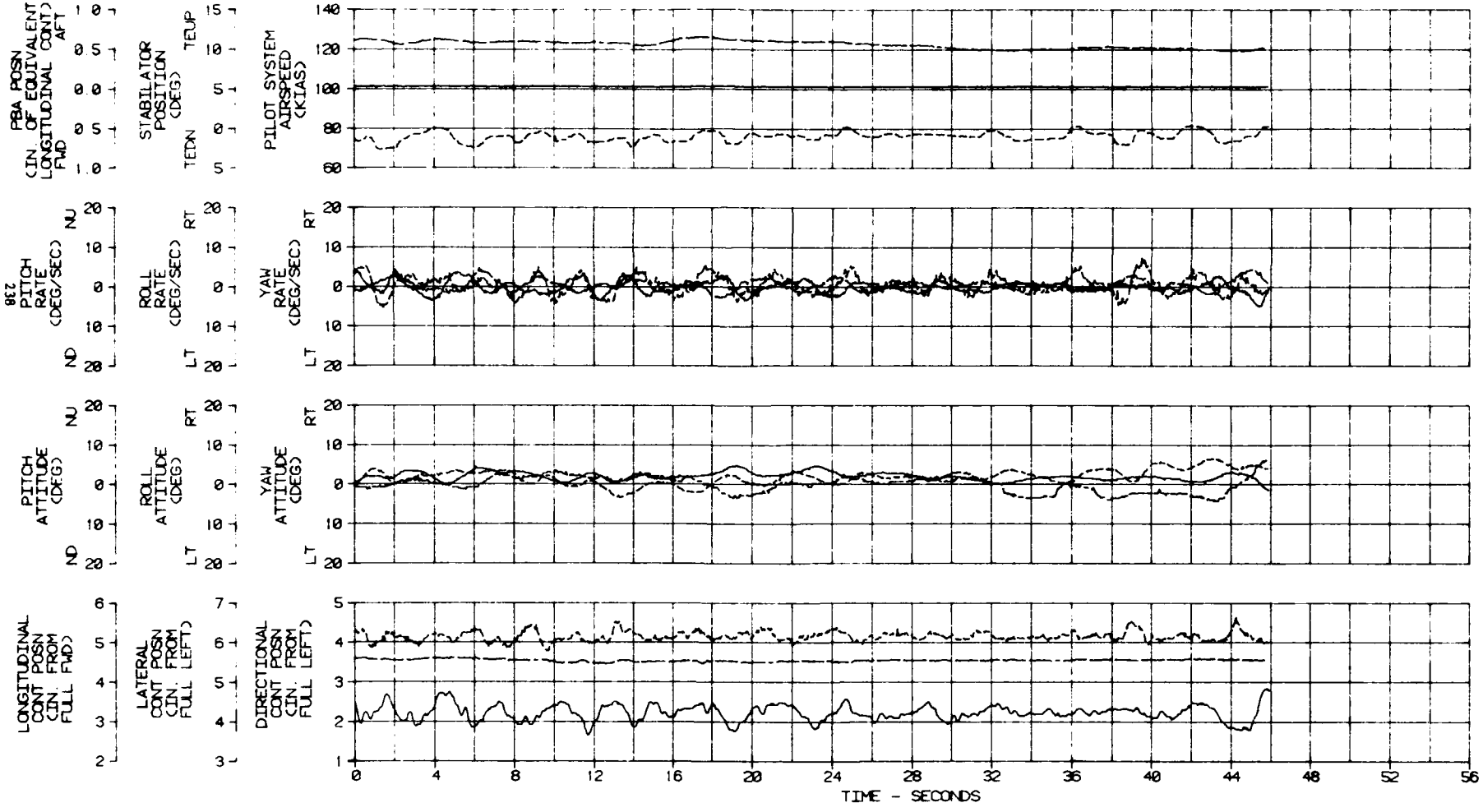


FIGURE 186

INSTRUMENT FLIGHT - LOCALIZER/GLIDESLOPE INTERCEPT

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16420	363.1(AFT)	0.2RT	7180	23.0	258	123	LEVEL	ON OFF OFF OFF (FAILURE MODE 8)

SOLID LINE — SHORT DASH — LONG DASH

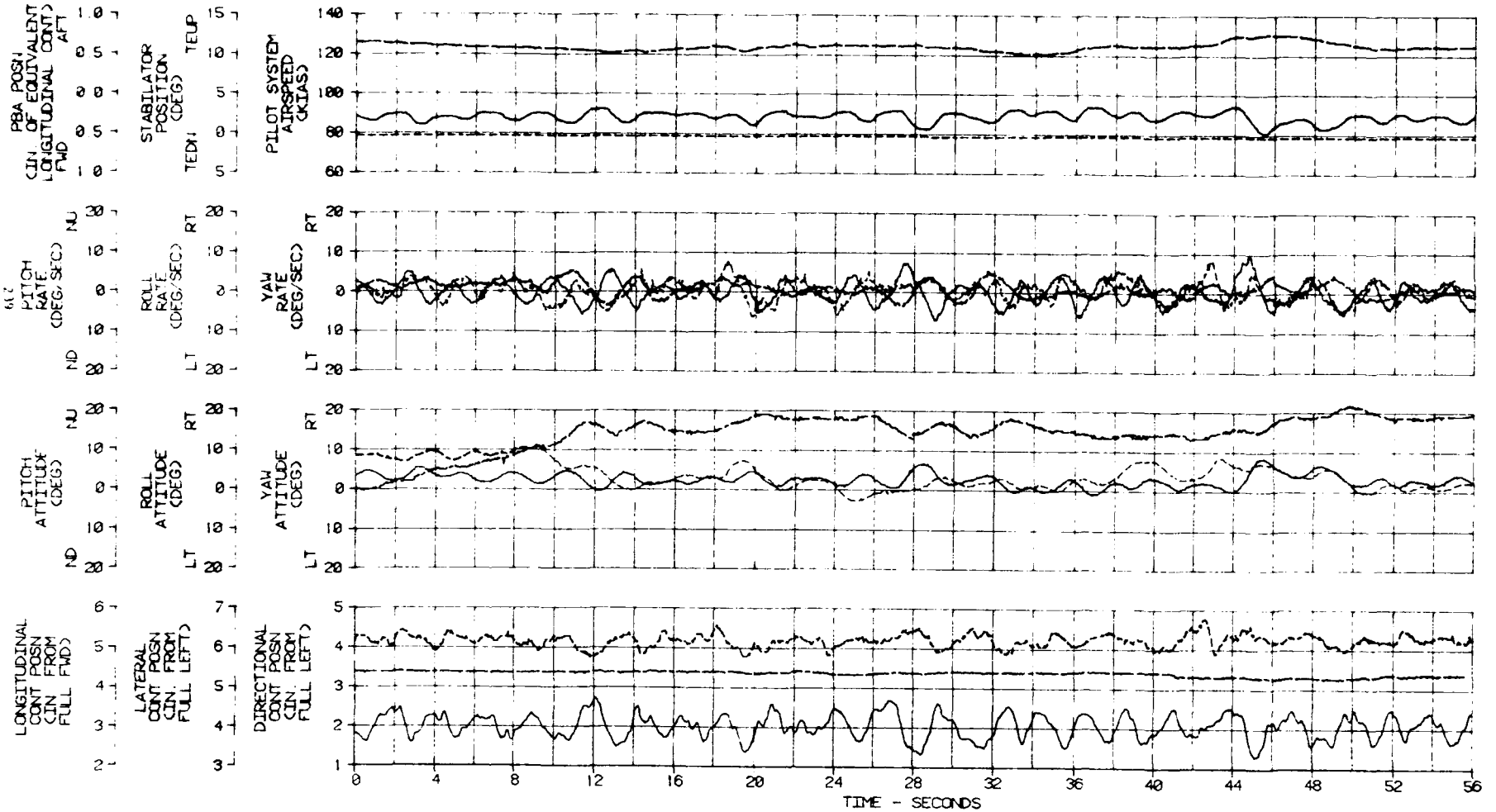


FIGURE 187

INSTRUMENT FLIGHT - LOCALIZER INTERCEPT

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16440	363.1(AFT)	0.1RT	6960	20.5	258	121	LEVEL	OFF OFF OFF OFF (FAILURE MODE 9)

SOLID LINE — SHORT DASH — LONG DASH

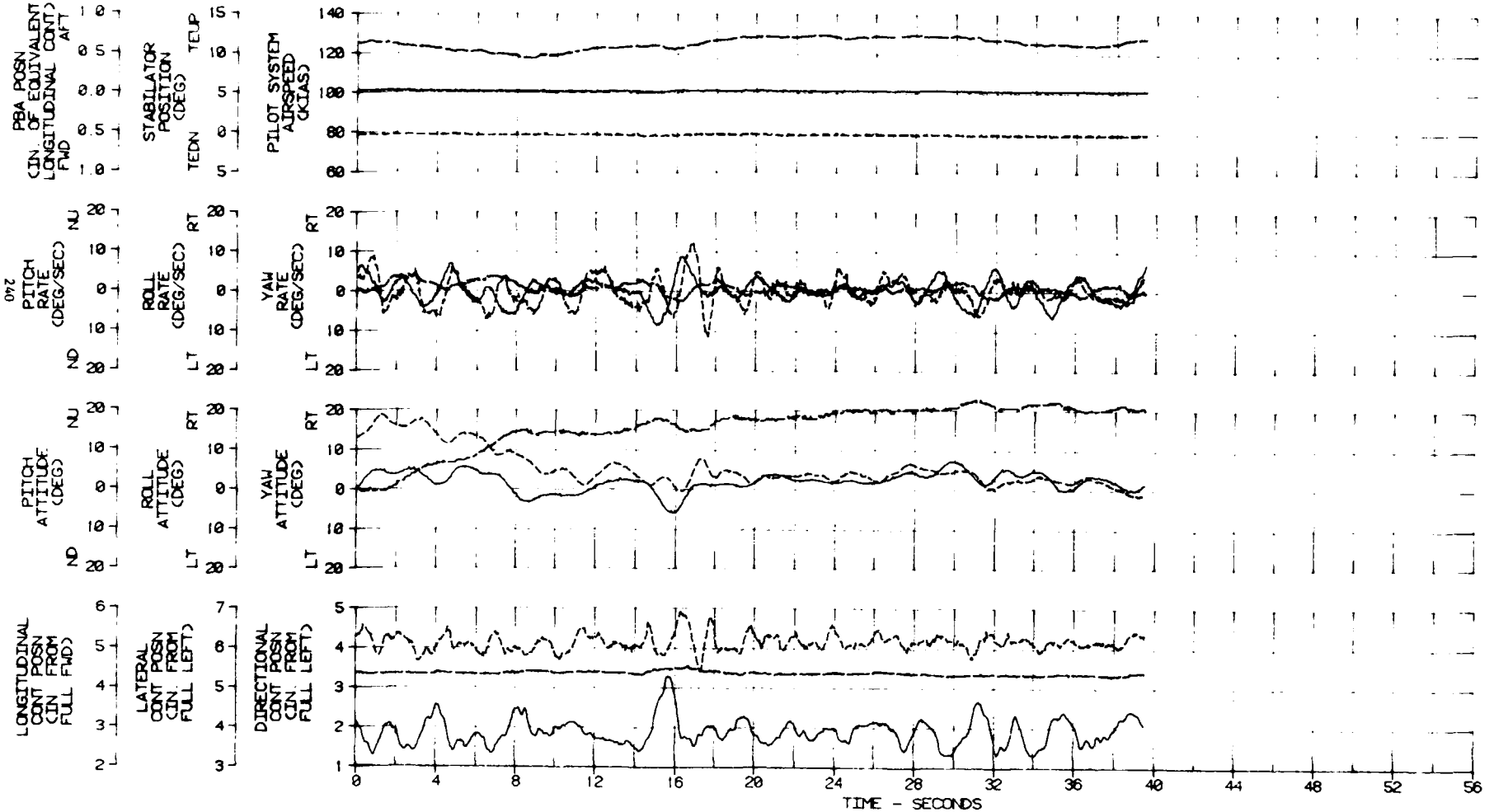


FIGURE 188

INSTRUMENT FLIGHT - GLIDESLOPE INTERCEPT

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16420	363.0(AFT)	0.1RT	6840	21.5	258	118	LEVEL	OFF OFF OFF OFF (FAILURE MODE 9)

SOLID LINE — SHORT DASH — LONG DASH

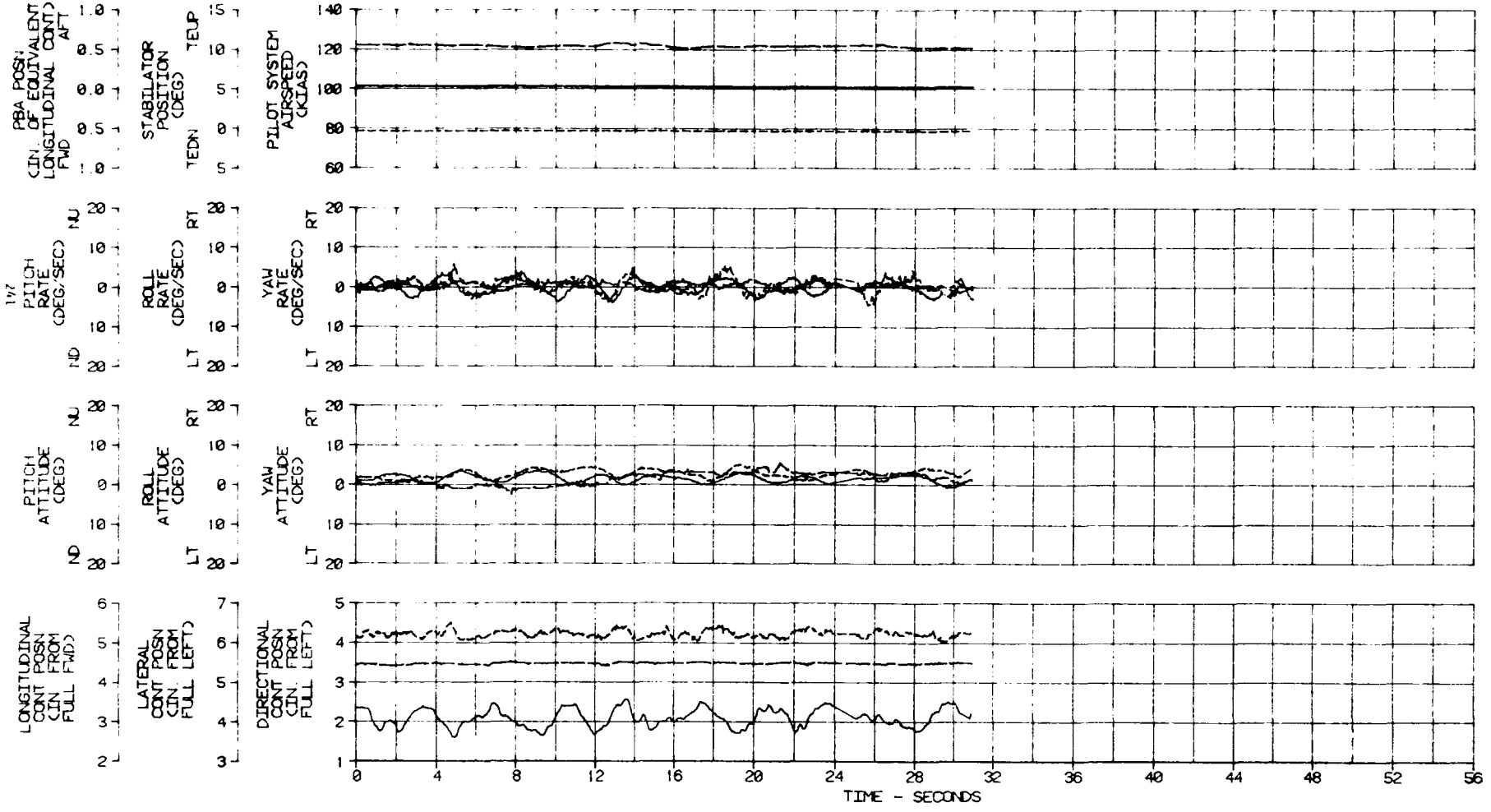


FIGURE 189

INSTRUMENT FLIGHT - ILS TRACKING

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16600	363.2(AFT)	0.2RT	5560	28.5	259	124	DESCENT	ON OFF OFF AUTO (FAILURE MODE 6)

SOLID LINE — SHORT DASH — LONG DASH

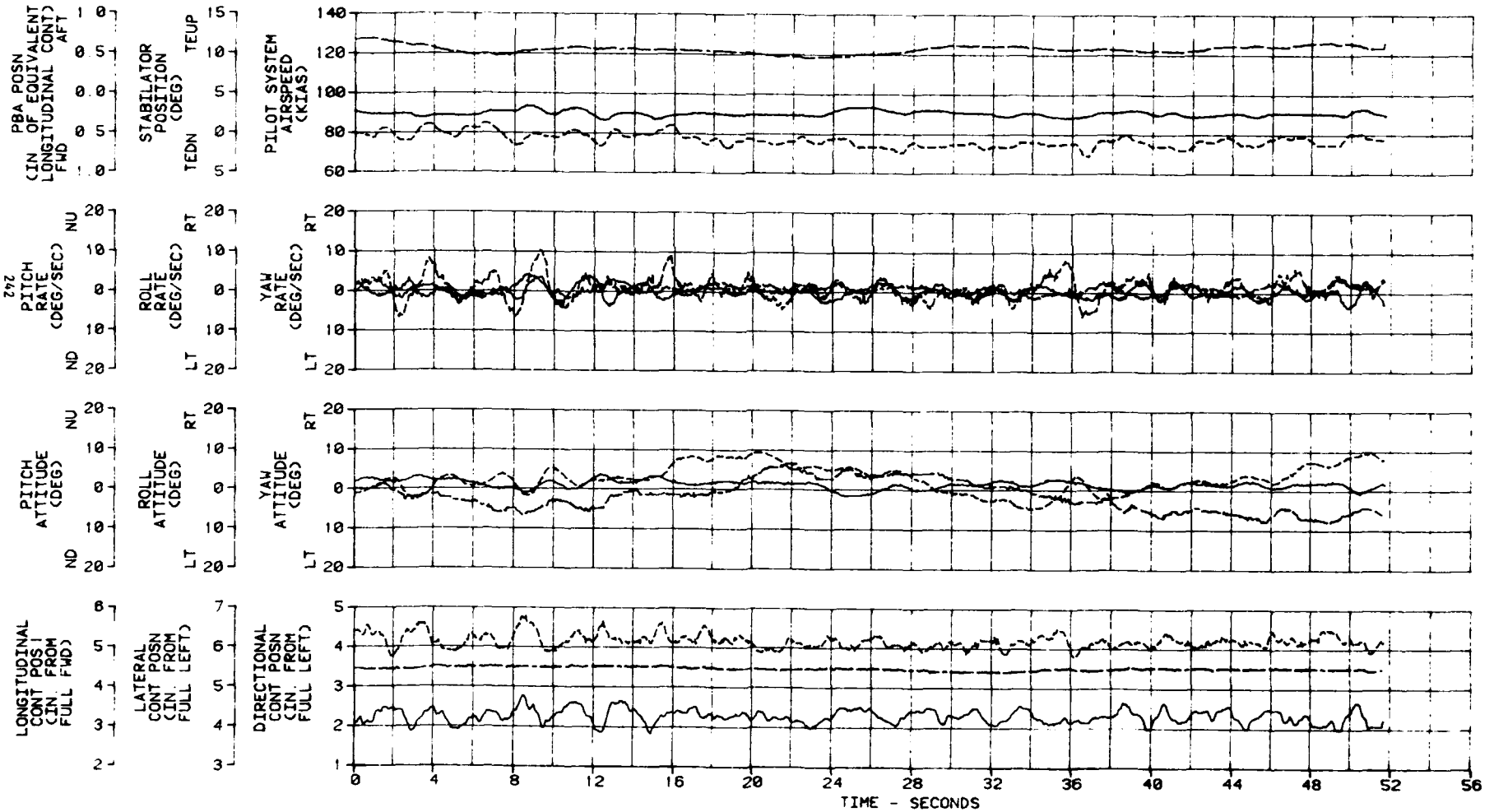


FIGURE 100

INSTRUMENT FLIGHT - ILS TRACKING

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16680	363.0(AFT)	0 IRT	5160	25.5	257	124	DESCENT	OFF OFF OFF AUTO (FAILURE MODE 7)

SOLID LINE — SHORT DASH — LONG DASH

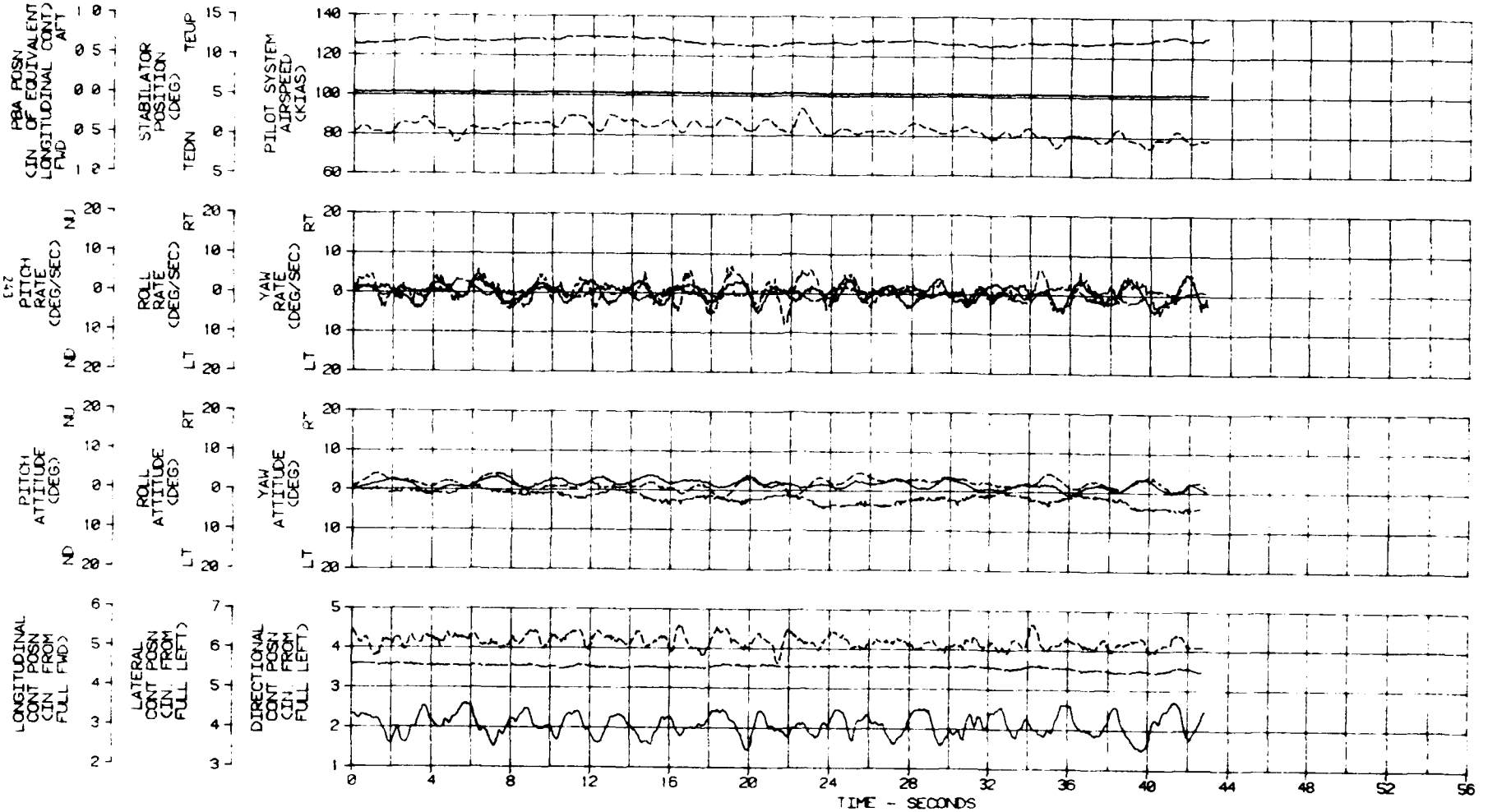


FIGURE 191
INSTRUMENT FLIGHT - ILS TRACKING
UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16360	363.1 (AFT)	0.2RT	5580	29.0	258	118	DESCENT	ON OFF OFF OFF (FAILURE MODE 8)

SOLID LINE — SHORT DASH — LONG DASH

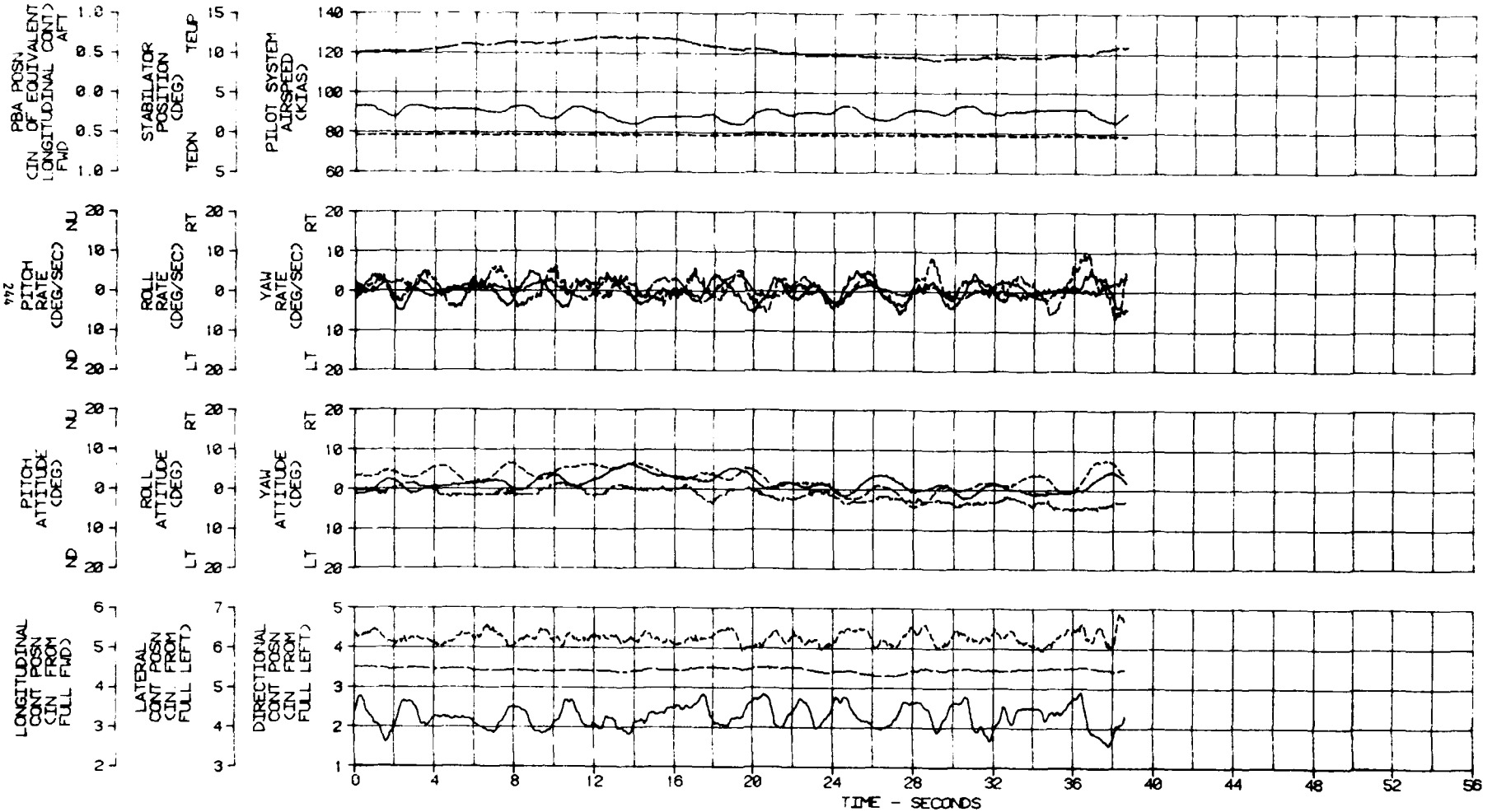


FIGURE 102
INSTRUMENT FLIGHT - ILS TRACKING
UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16380	363.2(AFT)	0.1RT	5220	26.5	258	123	DESCENT	OFF OFF OFF OFF (FAILURE MODE 9)

SOLID LINE — SHORT DASH — LONG DASH

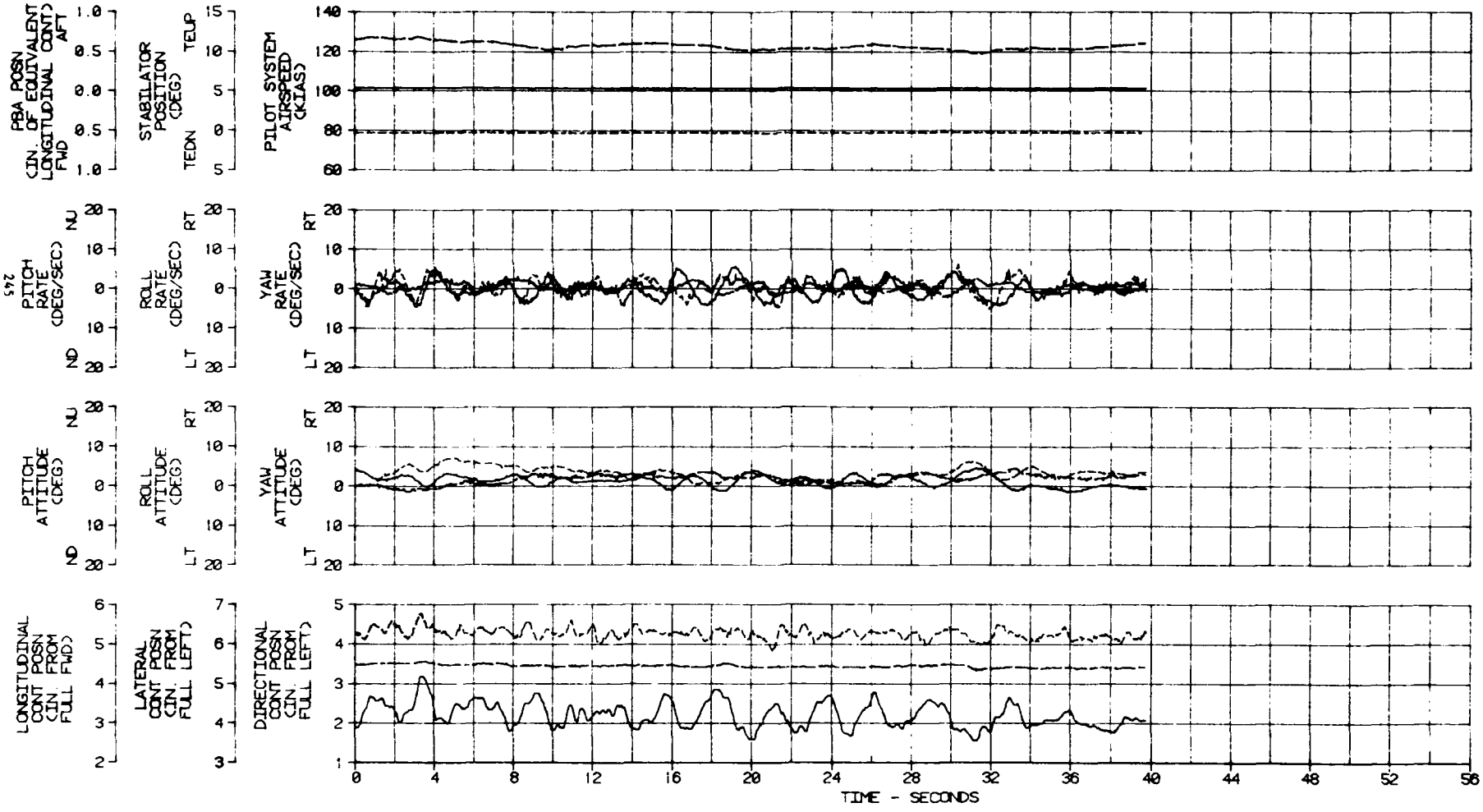


FIGURE 103
INSTRUMENT FLIGHT - MISSED APPROACH
UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16580	363.2 (AFT)	0.2 RT	5020	31.0	257	121	DESCENT	ON OFF OFF AUTO (FAILURE MODE 6)

SOLID LINE — SHORT DASH — LONG DASH

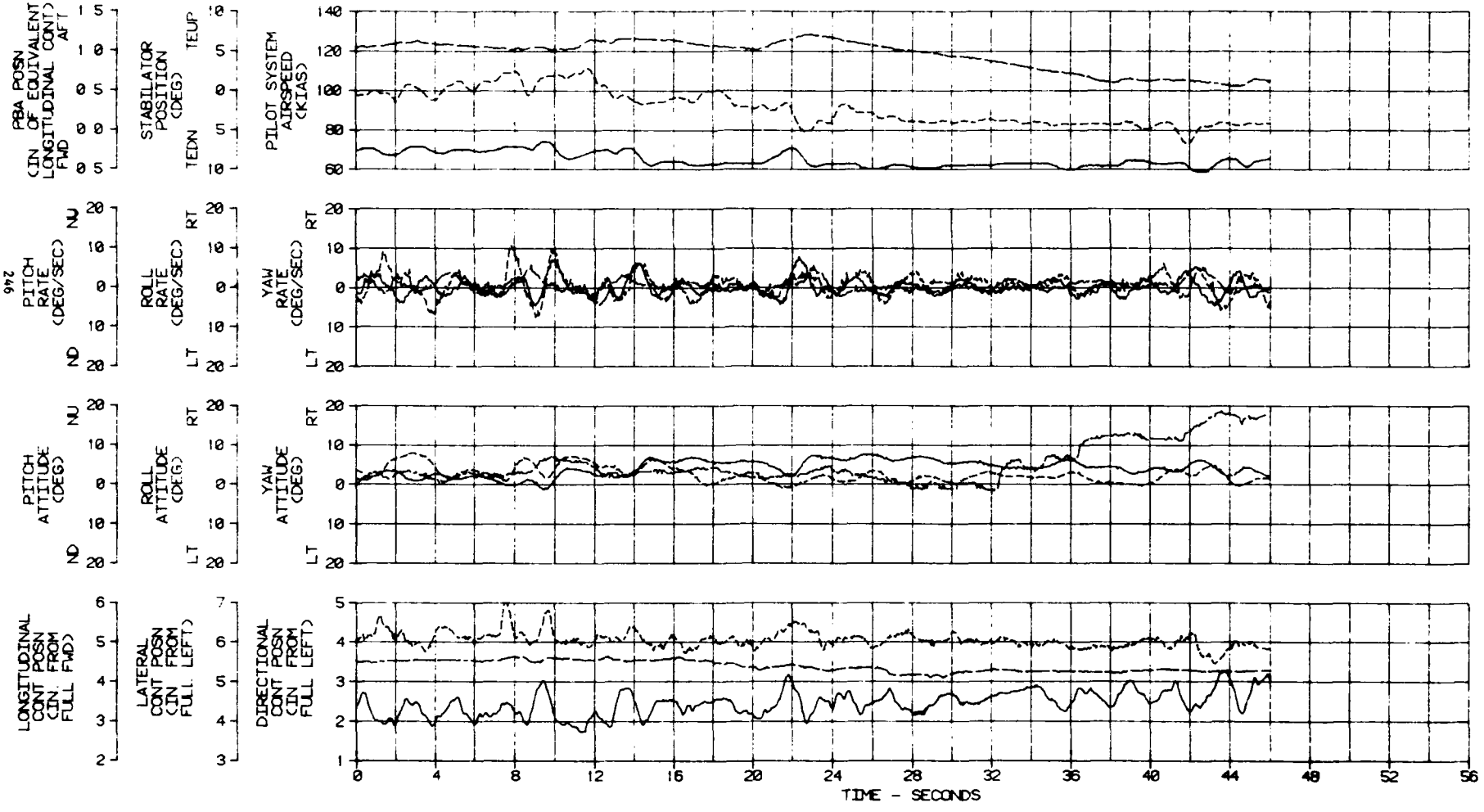


FIGURE 194
INSTRUMENT FLIGHT - MISSED APPROACH
UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16660	363.1 (AFT)	0.1RT	4640	28.0	258	120	DESCENT	OFF OFF OFF AUTO (FAILURE MODE 7)

SOLID LINE — SHORT DASH — LONG DASH

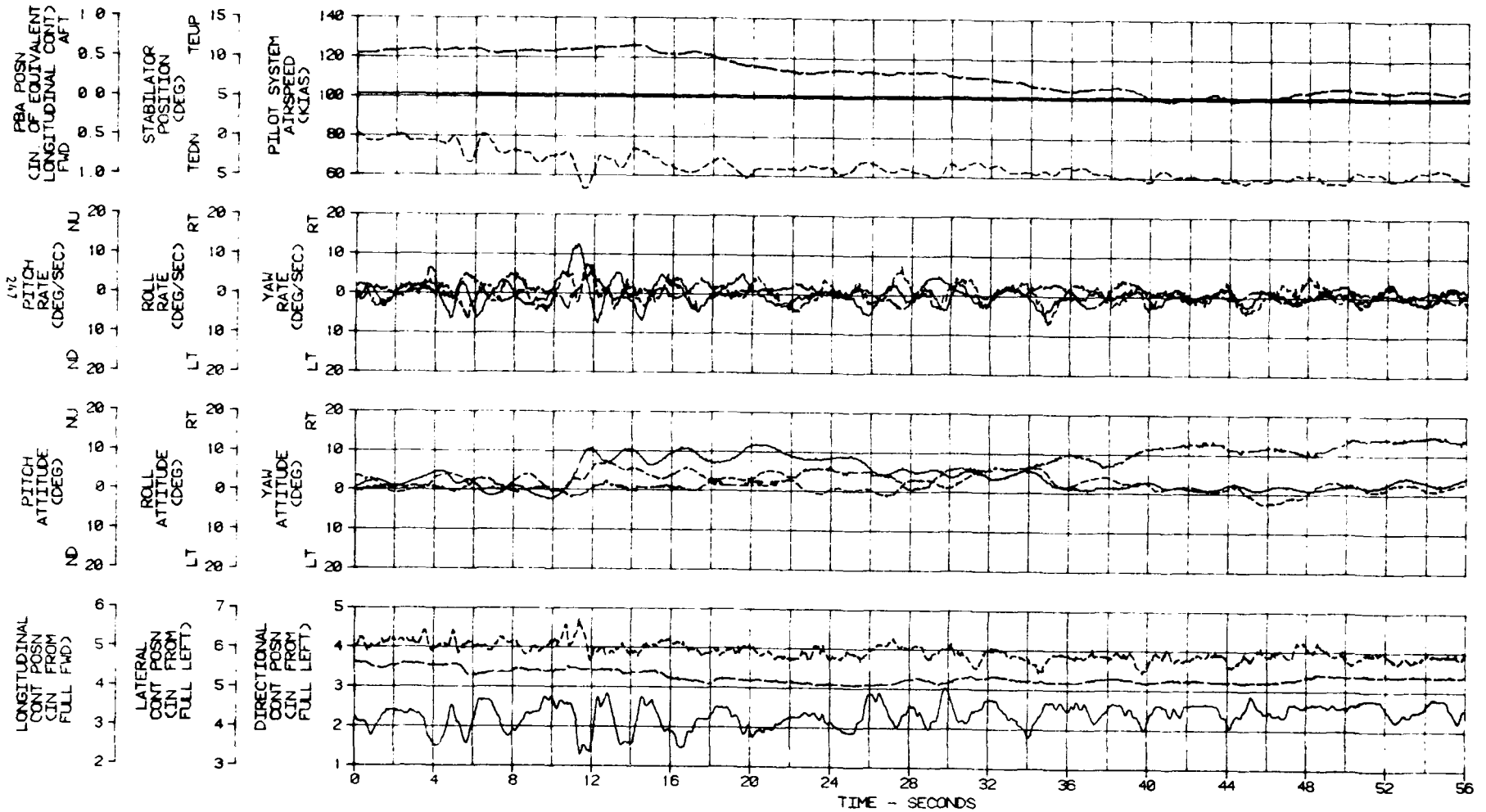


FIGURE 105
INSTRUMENT FLIGHT - MISSED APPROACH
UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB (FAILURE MODE 8)
16340	363.1 (AFT)	0.2RT	5100	31.0	258	121	DESCENT	ON OFF OFF OFF

SOLID LINE — SHORT DASH — LONG DASH

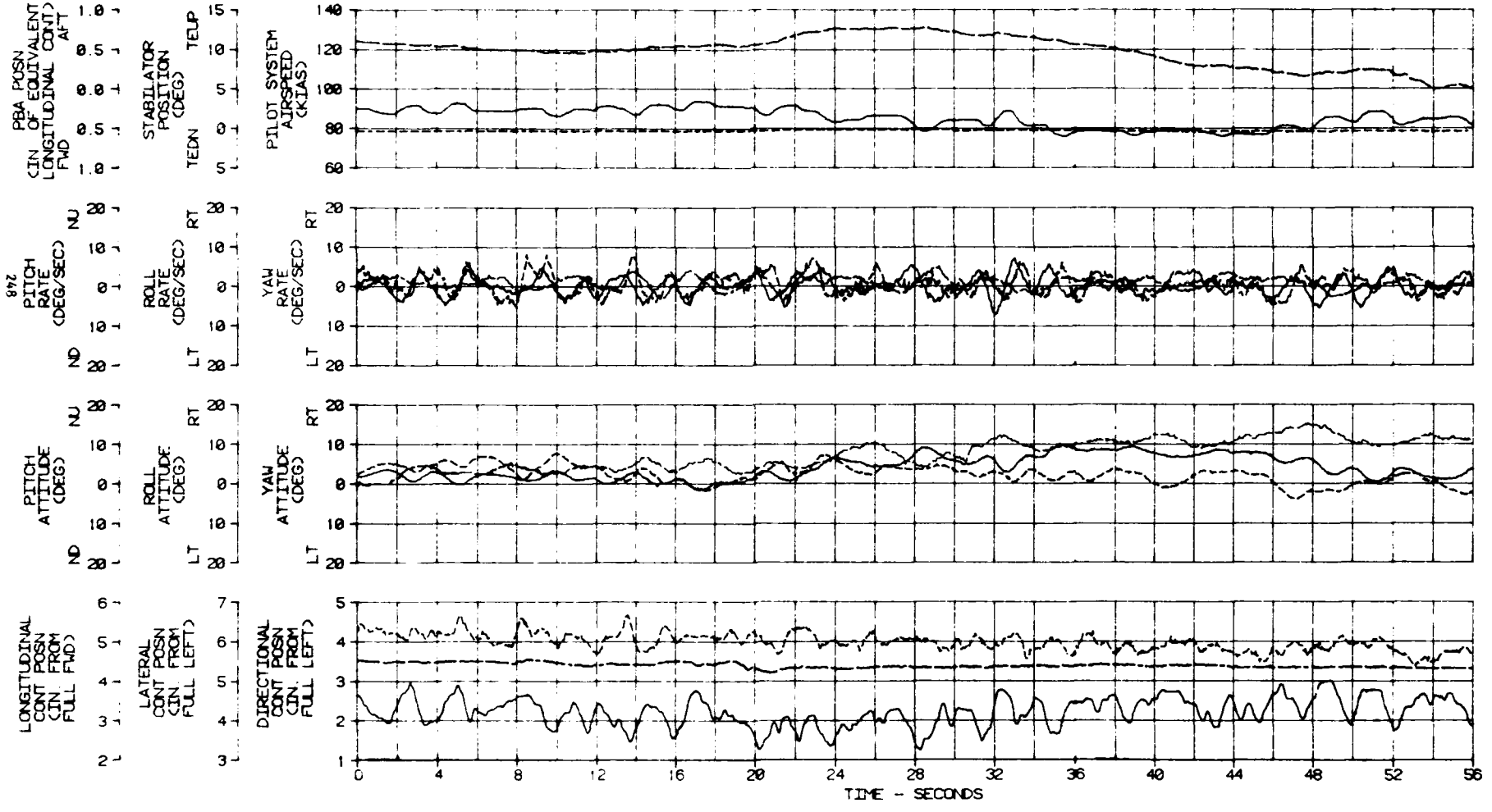


FIGURE 196

INSTRUMENT FLIGHT - MISSED APPROACH

UH-60A USA S/N 82-23748

GROSS WEIGHT (LB)	CG LOCATION LONG (FS)	CG LOCATION LAT (BL)	DENSITY ALTITUDE (FT)	OAT (DEG C)	ENTRY ROTOR SPEED (RPM)	ENTRY CALIBRATED AIRSPEED (KT)	ENTRY FLIGHT CONDITION	AFCS/STAB CONDITION PBA SAS FPS STAB
16360	363.3(AFT)	0.1RT	4820	26.5	258	126	DESCENT	OFF OFF OFF OFF (FAILURE MODE 9)

SOLID LINE — SHORT DASH — LONG DASH

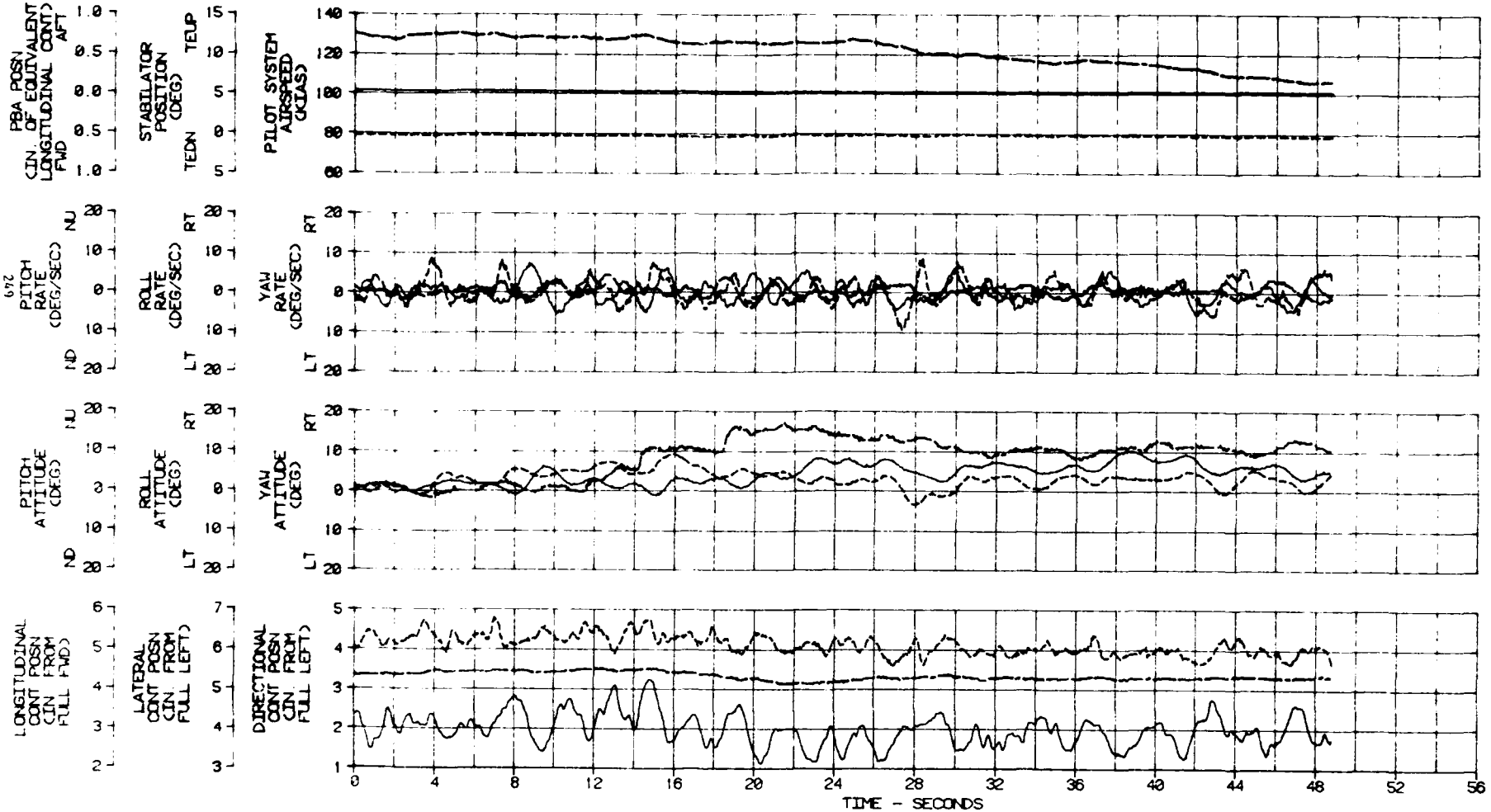


FIGURE 197

SIMULATED NO 2 STABILITY AUGMENTATION SYSTEM FAILURE

UH-60A USA S/N 82-23748

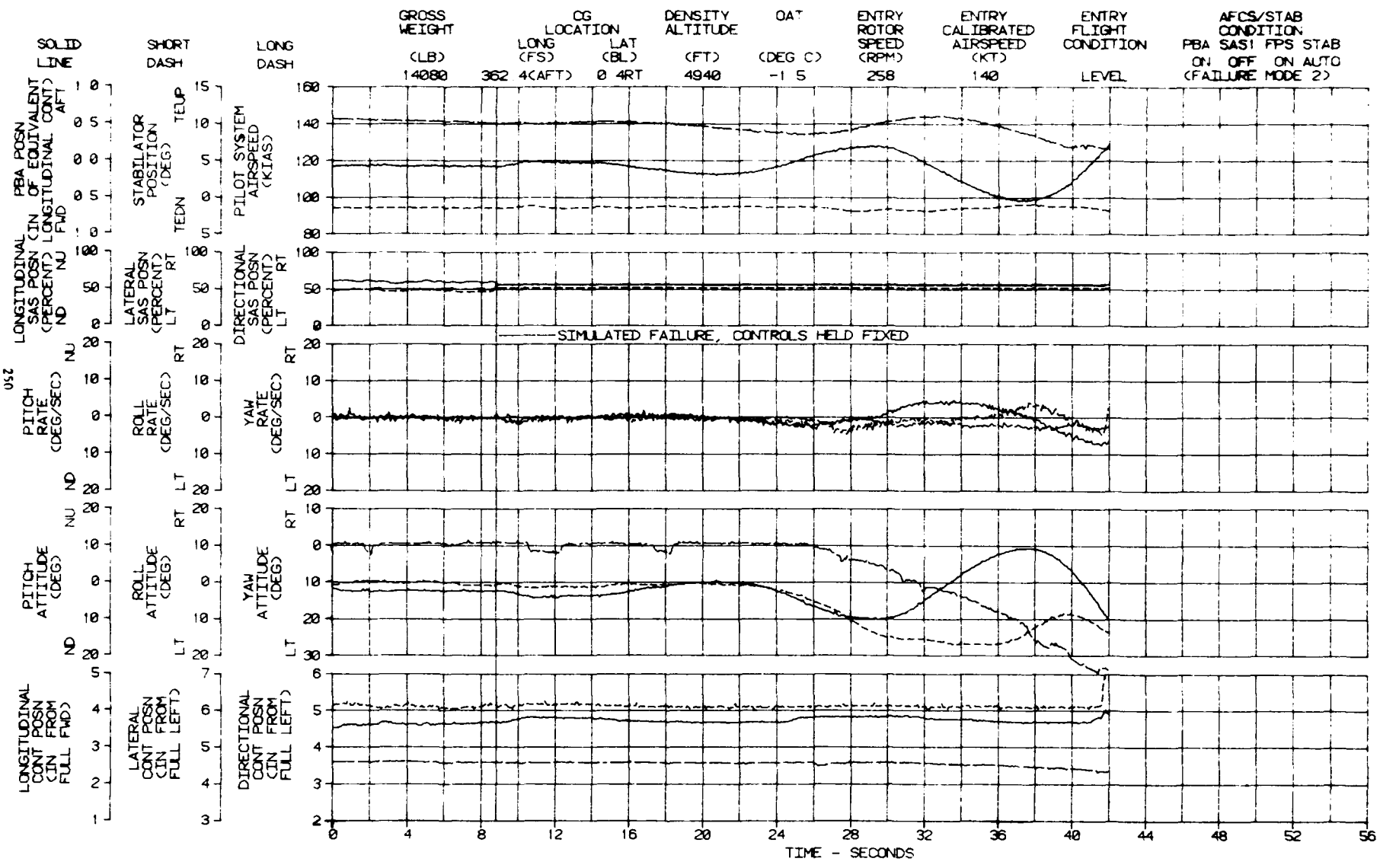


FIGURE 198

SIMULATED NO. 2 STABILITY AUGMENTATION SYSTEM FAILURE

UH-60A USA S/N 82-23748

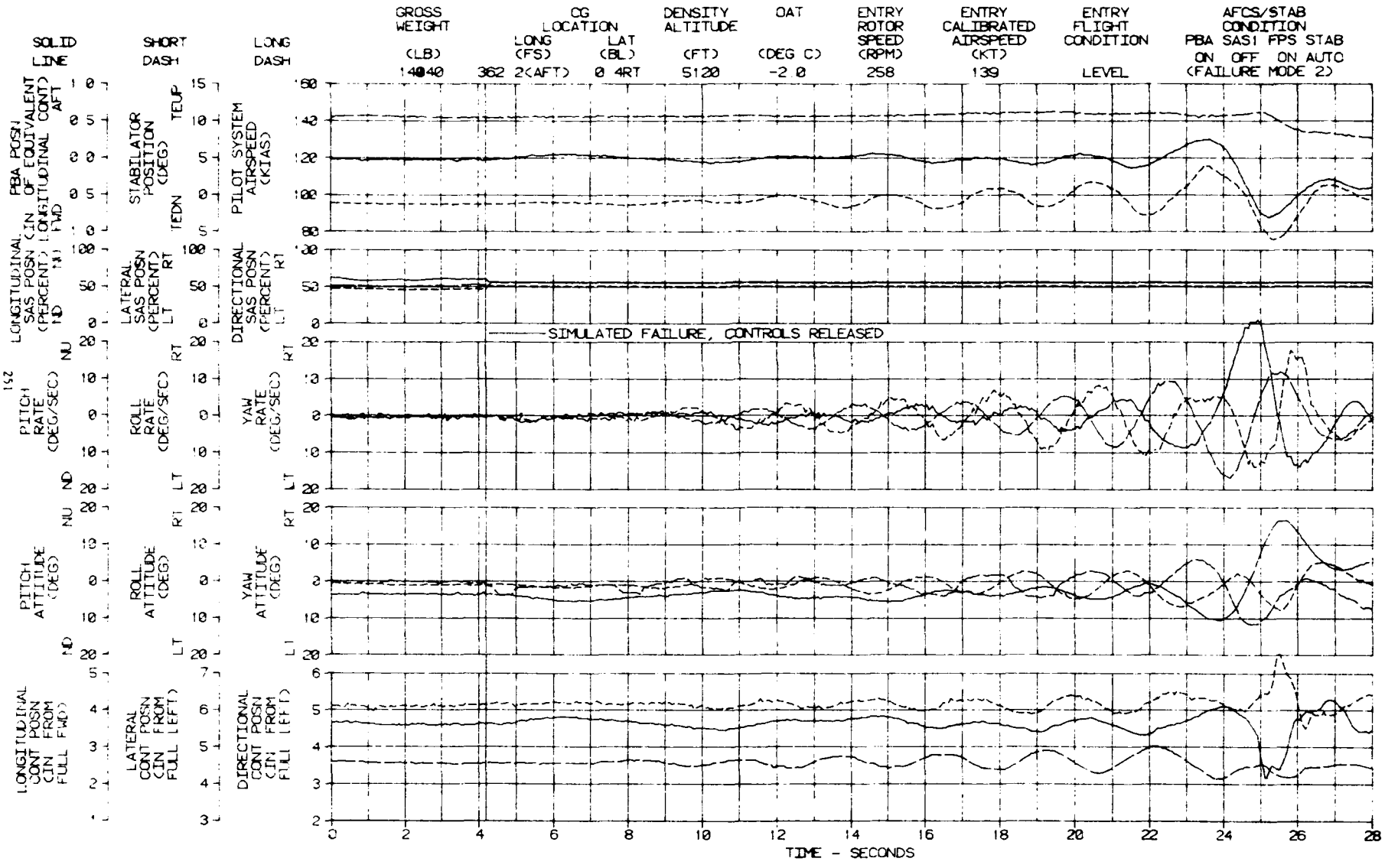


FIGURE 199

SIMULATED NO 2 STABILITY AUGMENTATION SYSTEM FAILURE

UH-60A USA S/N 82-23748

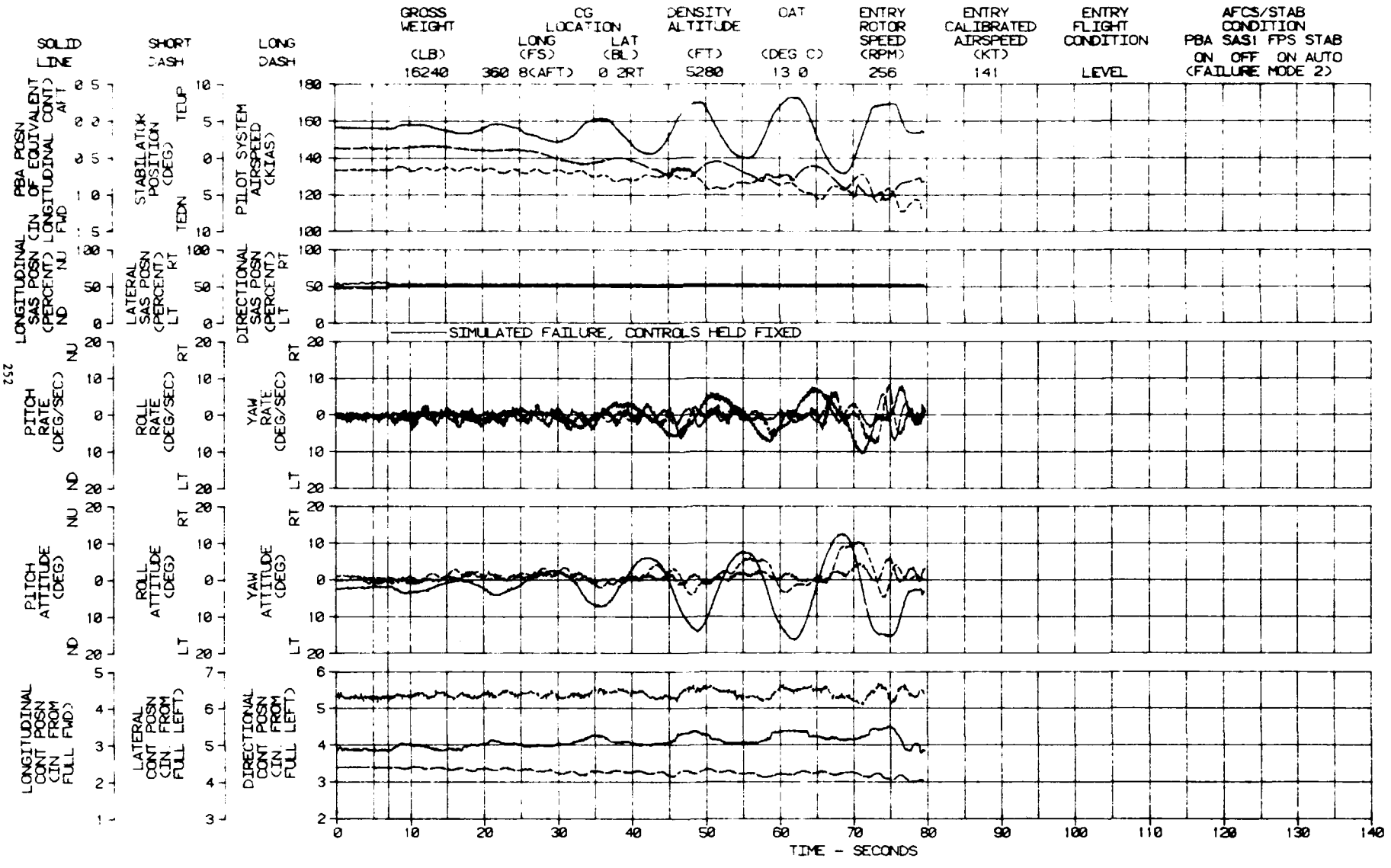


FIGURE 200

SIMULATED NO 2 STABILITY AUGMENTATION SYSTEM FAILURE

UH-60A USA S/N 82-23748

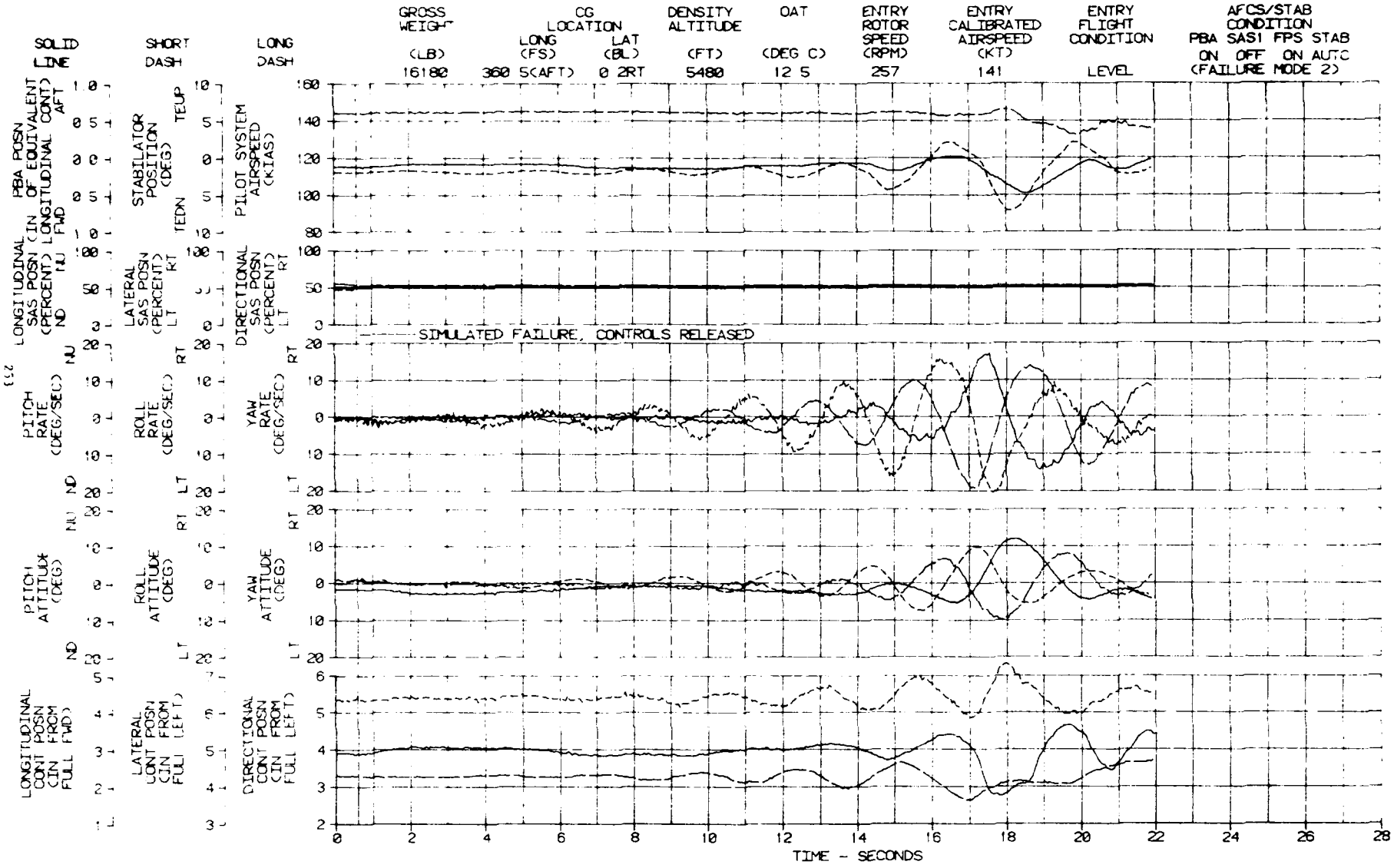


FIGURE 201

SIMULATED NO 2 STABILITY AUGMENTATION SYSTEM FAILURE

UH-60A USA S/N 82-23748

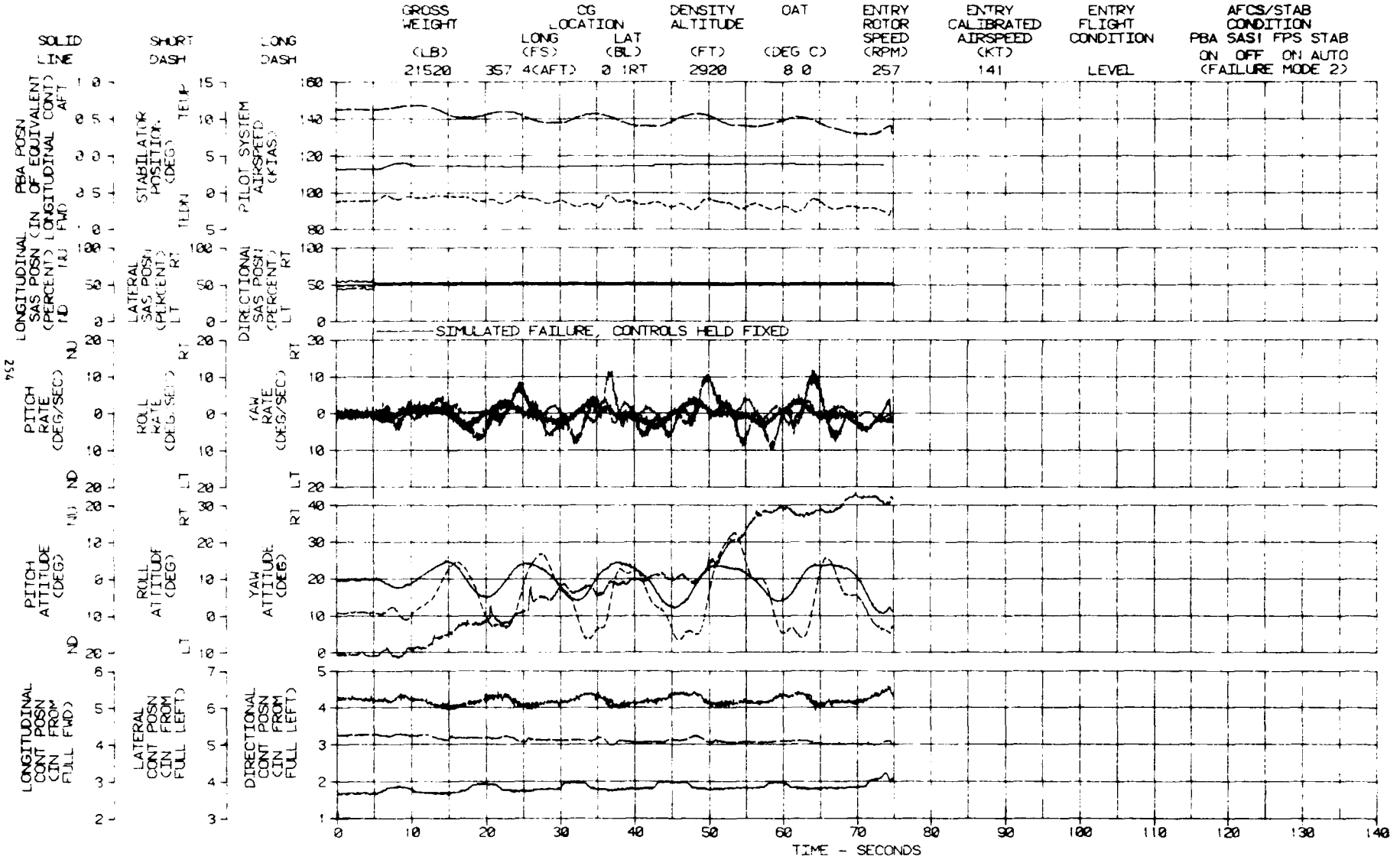


FIGURE 202

SIMULATED NO 2 STABILITY AUGMENTATION SYSTEM FAILURE

UH-60A USA S/N 82-23748

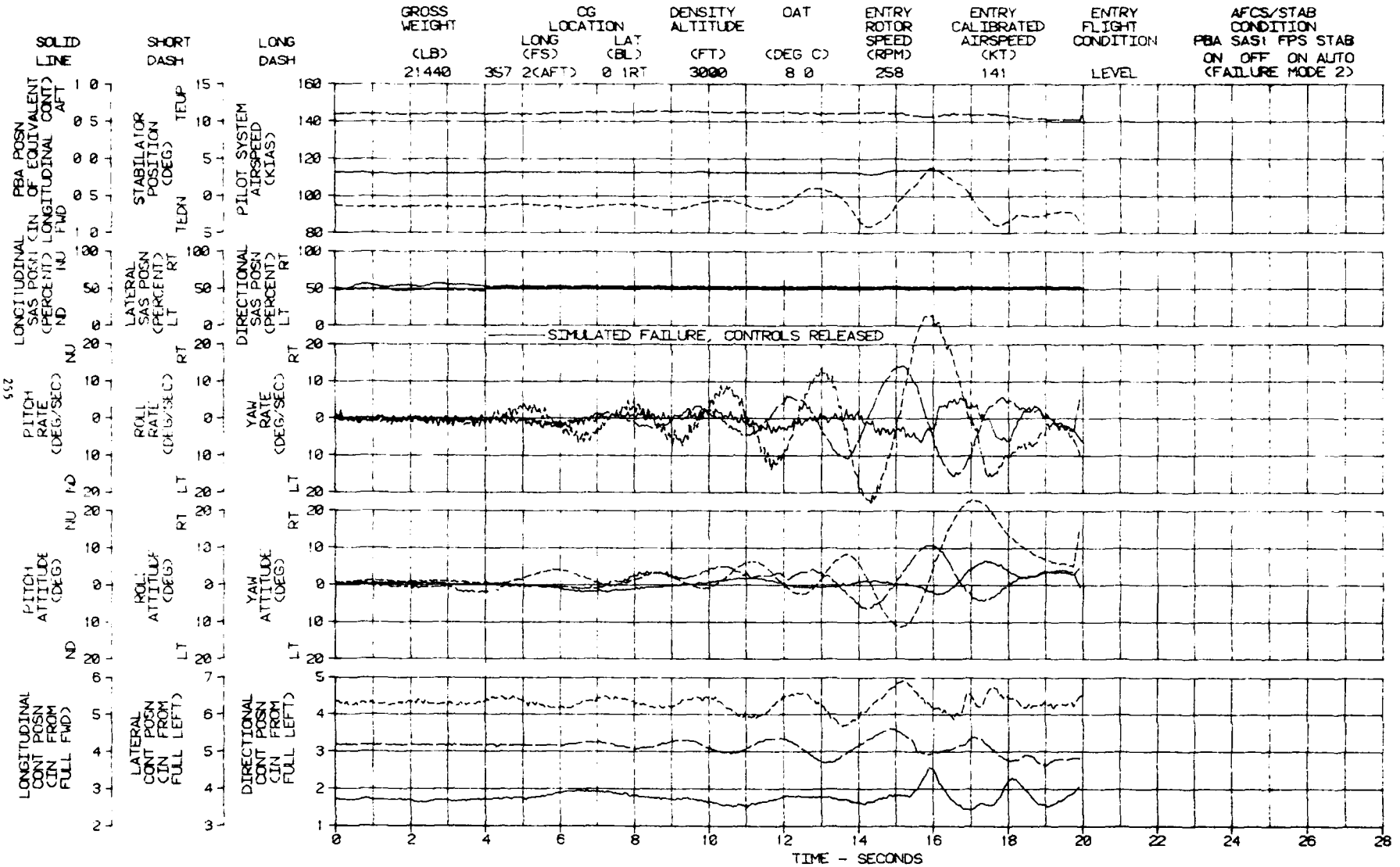


FIGURE 203

SIMULATED NO 2 STABILITY AUGMENTATION SYSTEM FAILURE

UH-60A USA S/N 82-23748

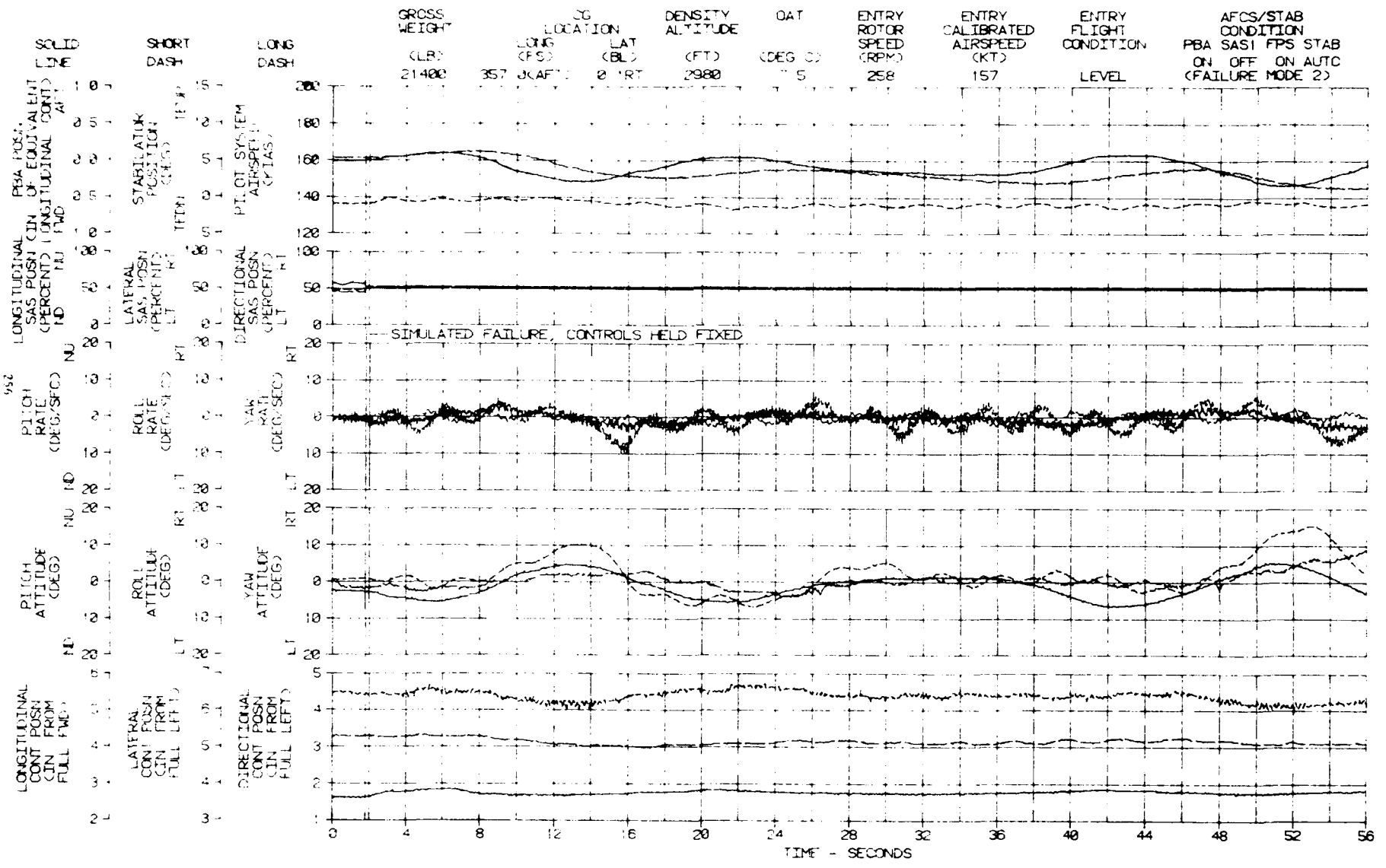


FIGURE 204

SIMULATED NO 2 STABILITY AUGMENTATION SYSTEM FAILURE

UH-60A USA S/N 82-23748

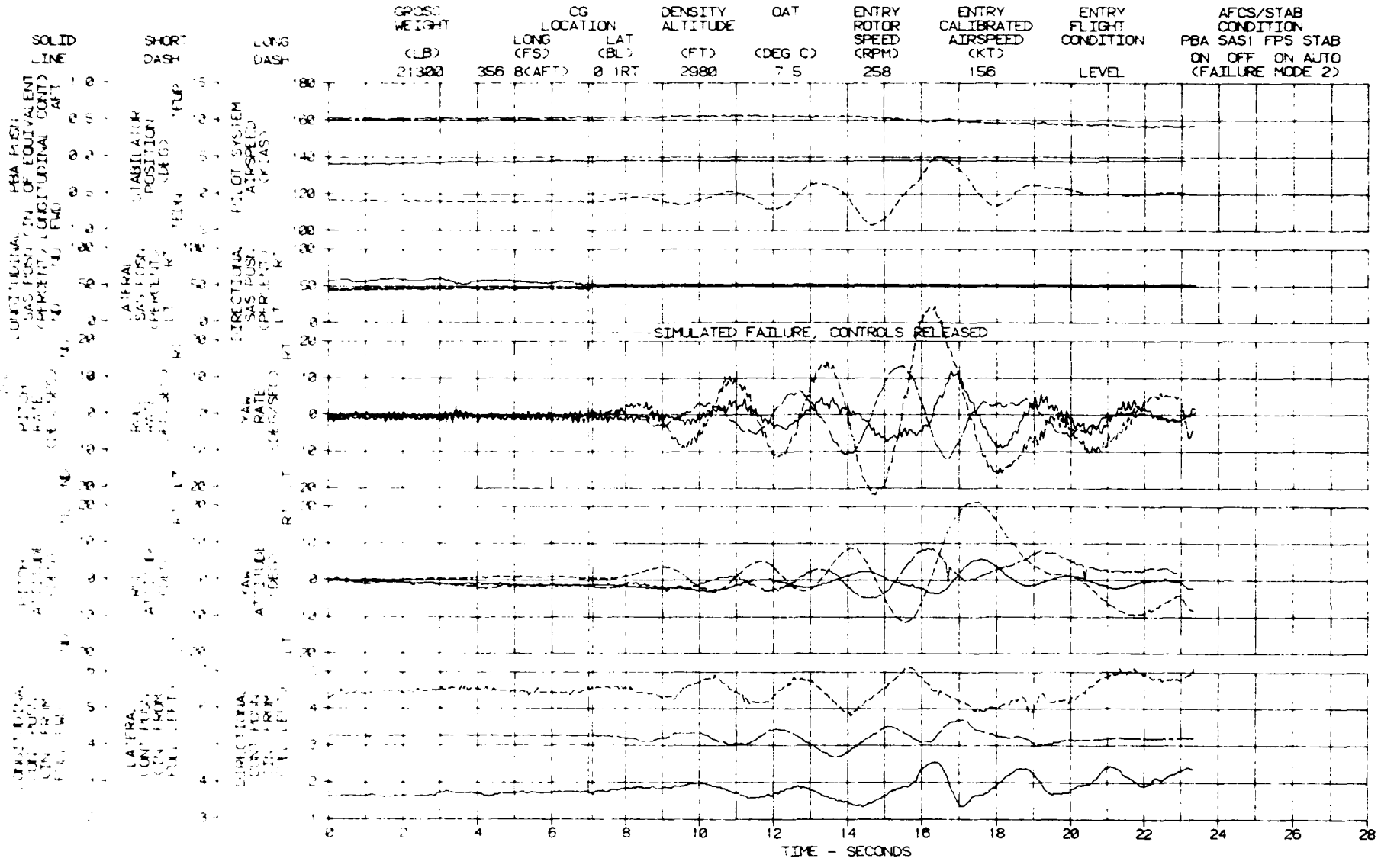


FIGURE 205

SIMULATED NO. 2 STABILITY AUGMENTATION SYSTEM FAILURE

HH-60A USA S/N 82-23748

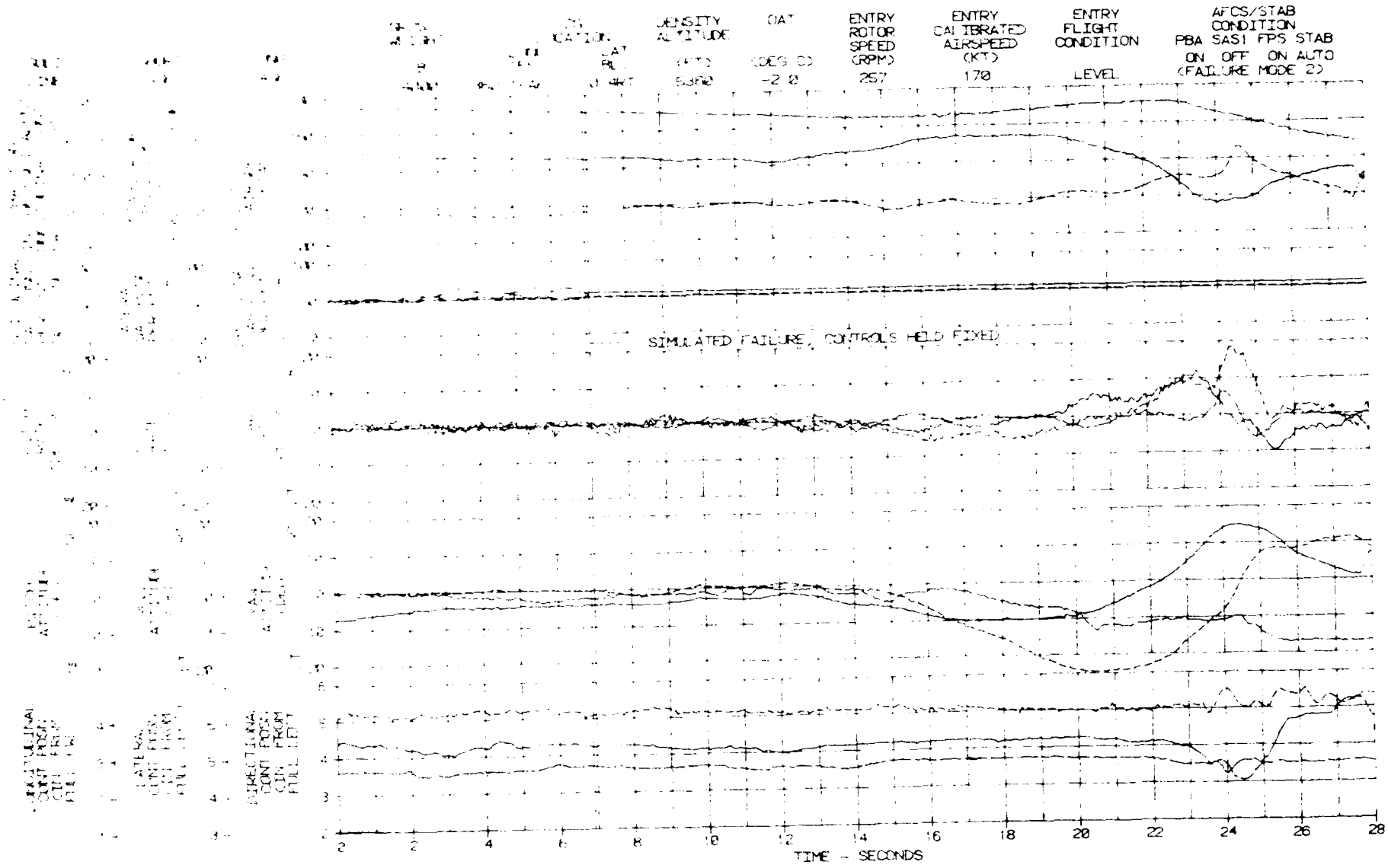


FIGURE 206

SIMULATED NO 2 STABILITY AUGMENTATION SYSTEM FAILURE

UH-60A USA S/N 82-23748

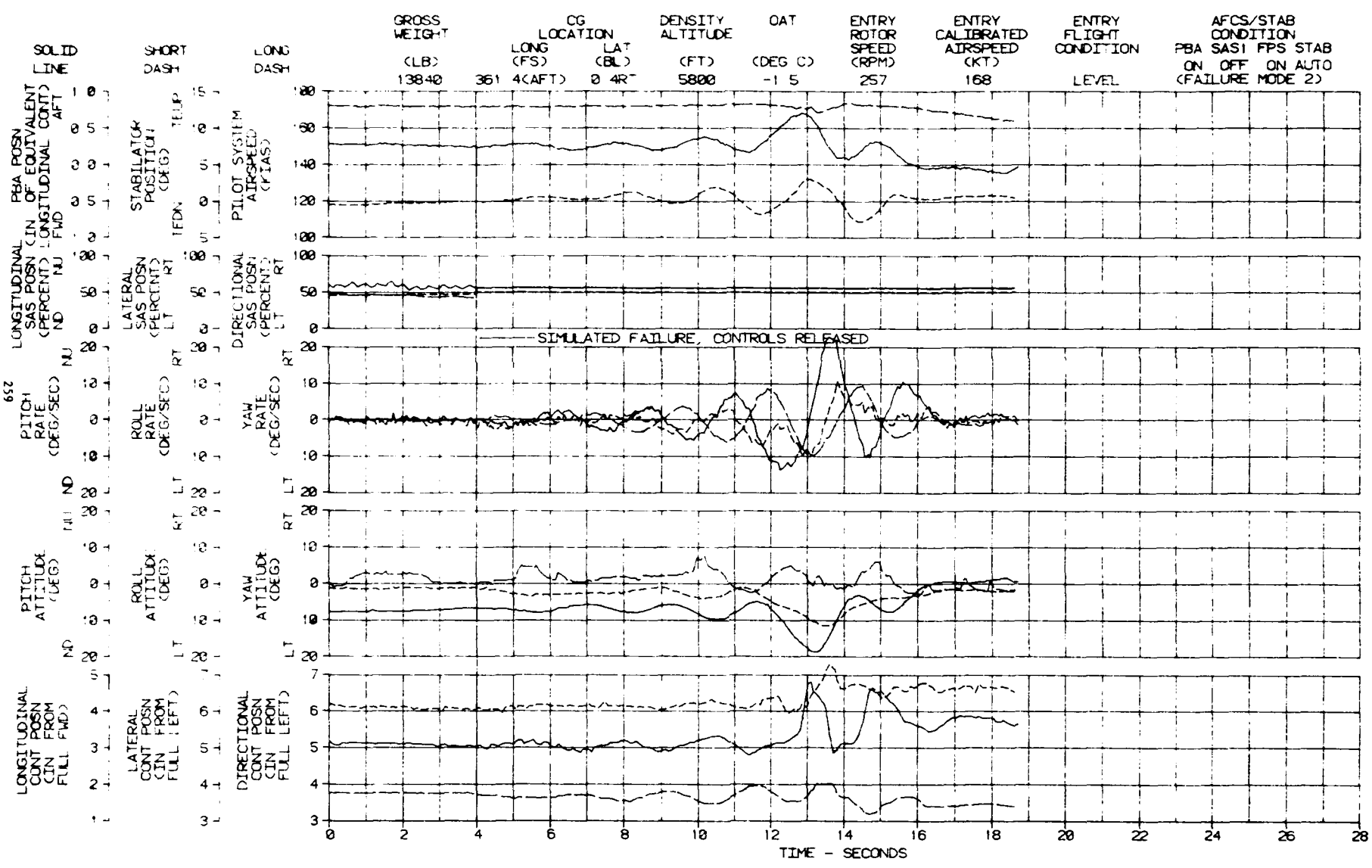


FIGURE 207

SIMULATED NO 2 STABILITY AUGMENTATION SYSTEM FAILURE

UH-60A USA S/N 82-23748

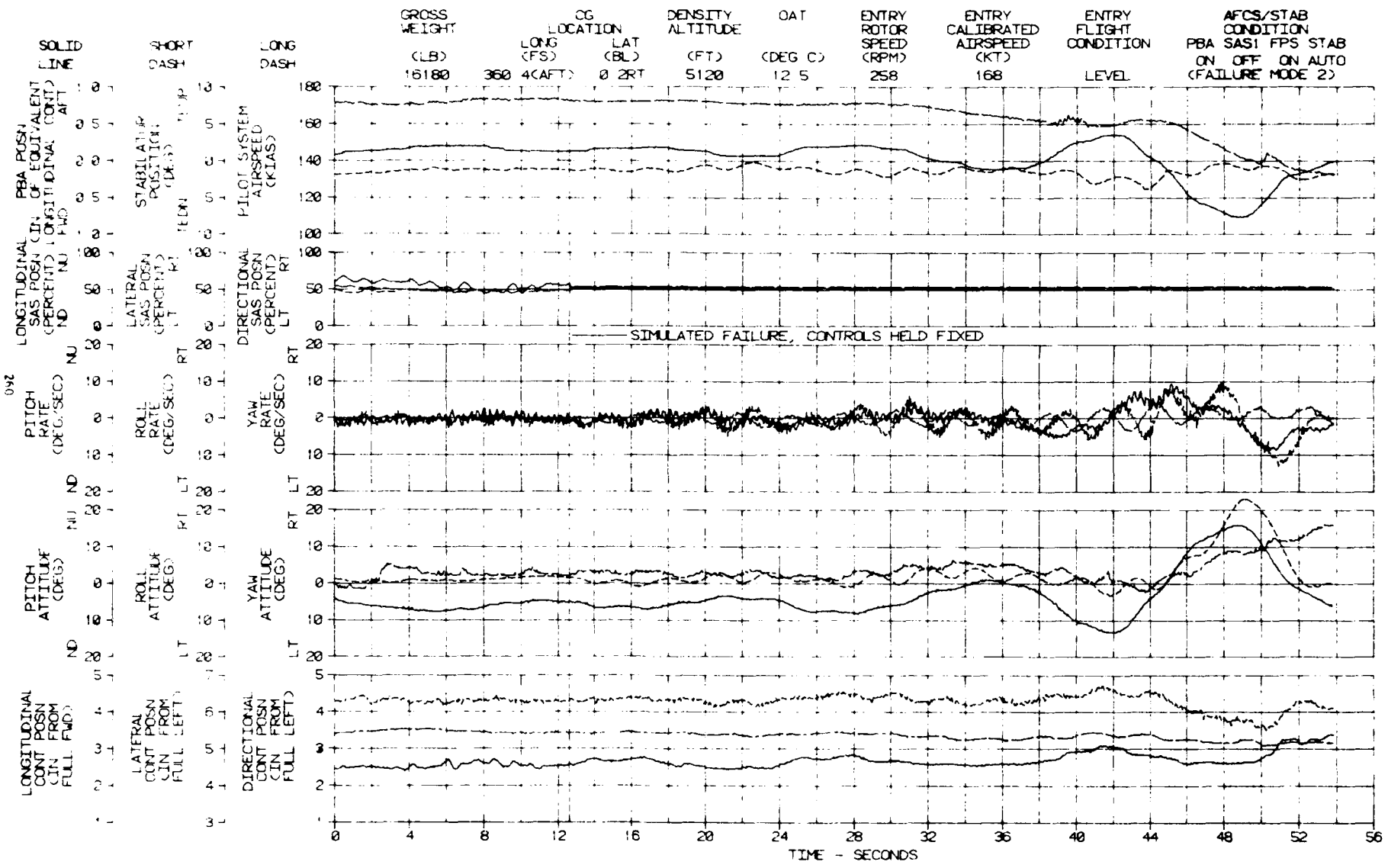


FIGURE 208

SIMULATED NO 2 STABILITY AUGMENTATION SYSTEM FAILURE

UH-60A USA S/N 82-23748

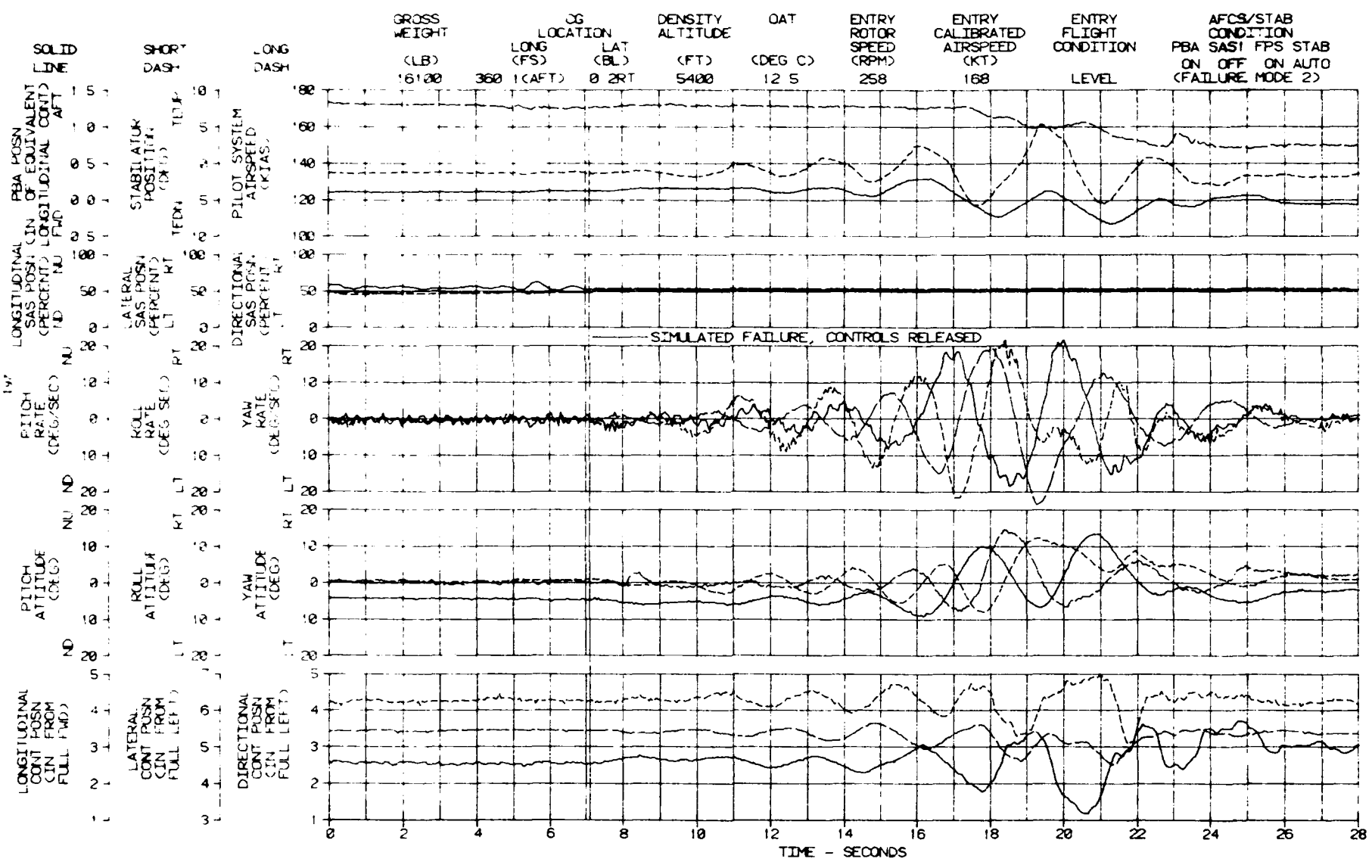


FIGURE 209

SIMULATED NO 2 STABILITY AUGMENTATION SYSTEM FAILURE

UH-60A USA S/N 82-23748

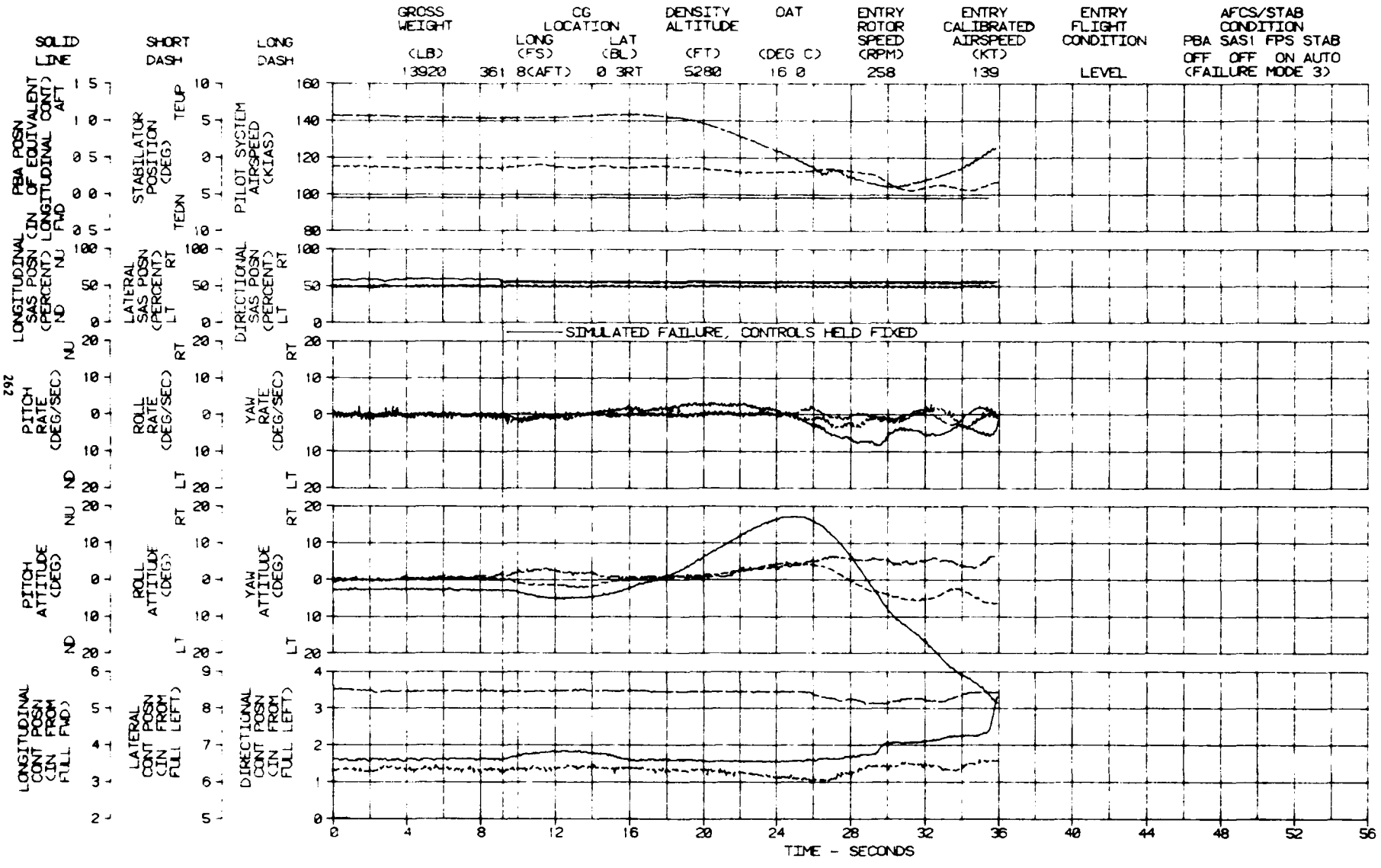


FIGURE 210

SIMULATED NO 2 STABILITY AUGMENTATION SYSTEM FAILURE

UH-60A USA S/N 82-23748

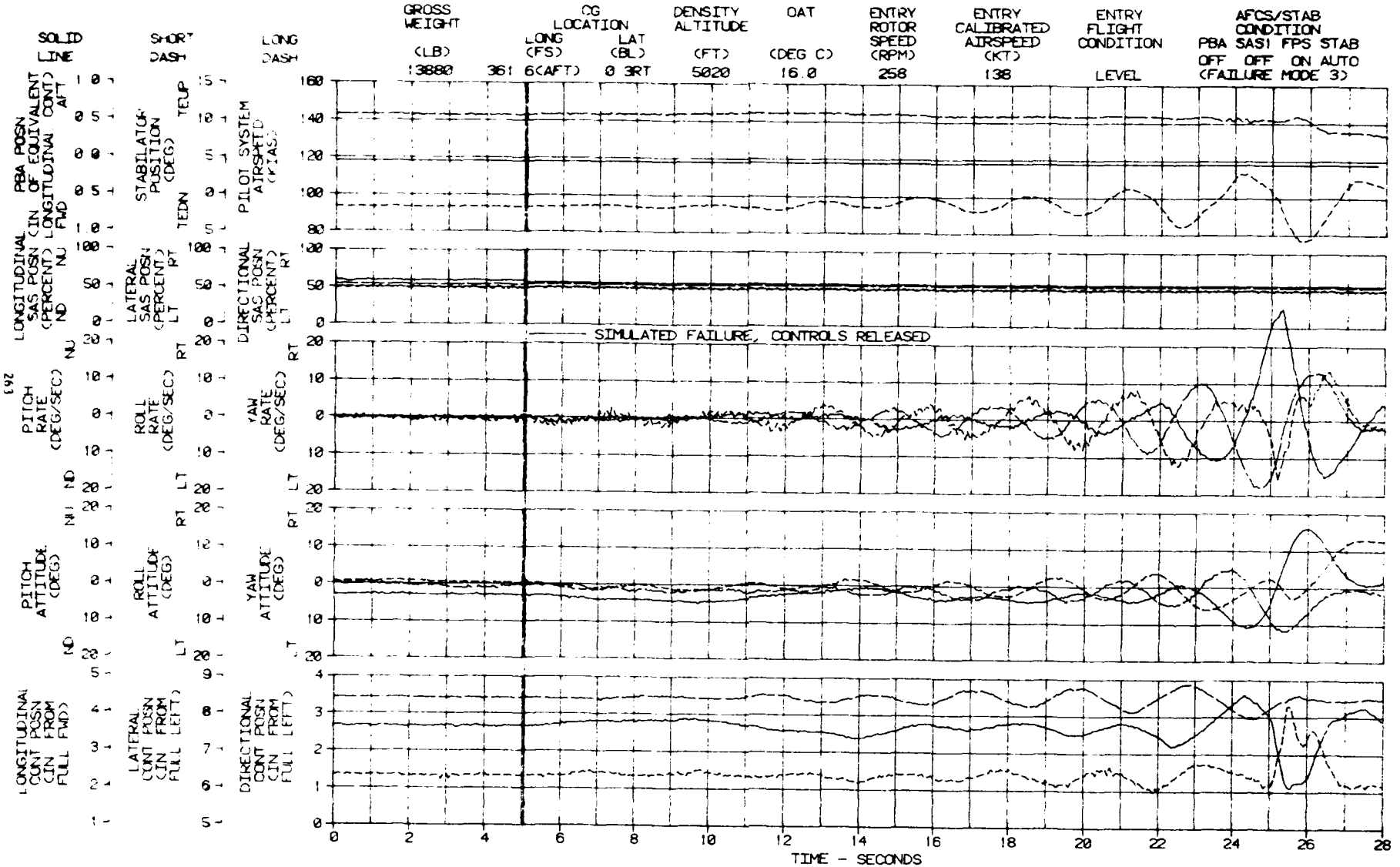


FIGURE 211

SIMULATED NO 2 STABILITY AUGMENTATION SYSTEM FAILURE

UH-60A USA S/N 82-23748

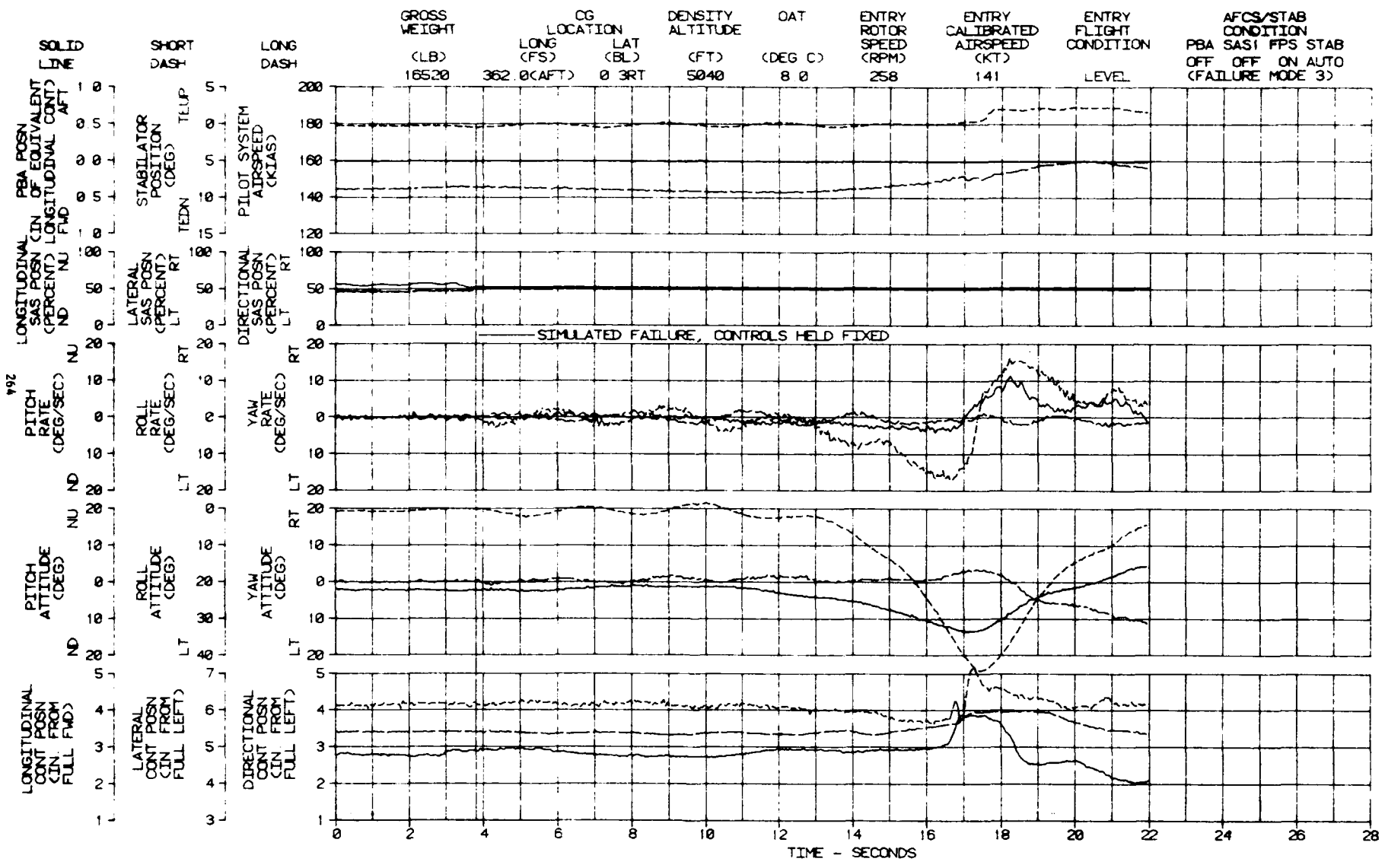


FIGURE 212

SIMULATED NO 2 STABILITY AUGMENTATION SYSTEM FAILURE

UH-60A USA S/N 82-23748

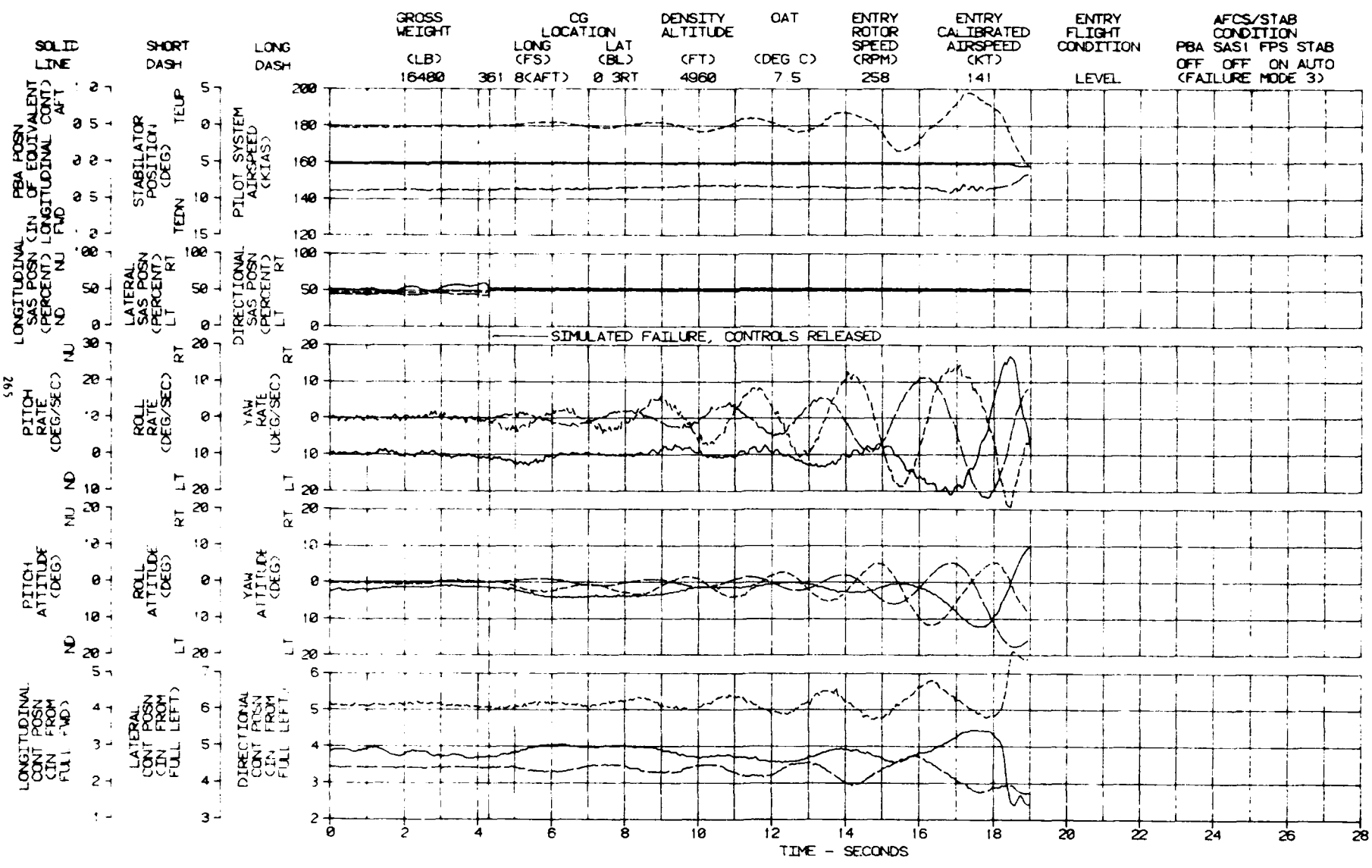


FIGURE 2-3

SIMULATED NO 2 STABILITY AUGMENTATION SYSTEM FAILURE

UH-60A USA S/N 82-23748

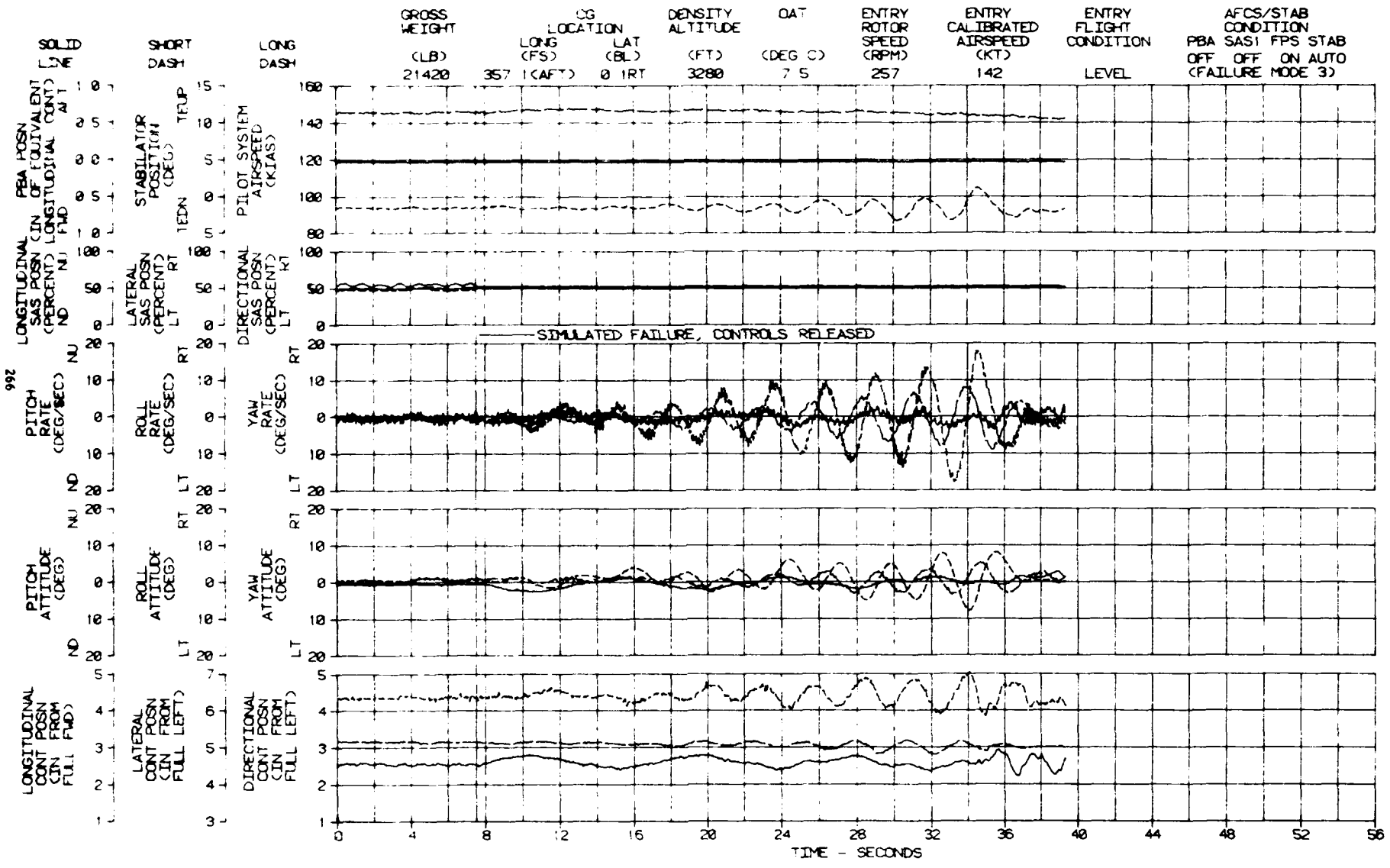


FIGURE 214

SIMULATED NO 2 STABILITY AUGMENTATION SYSTEM FAILURE

UH-60A USA S/N 82-23748

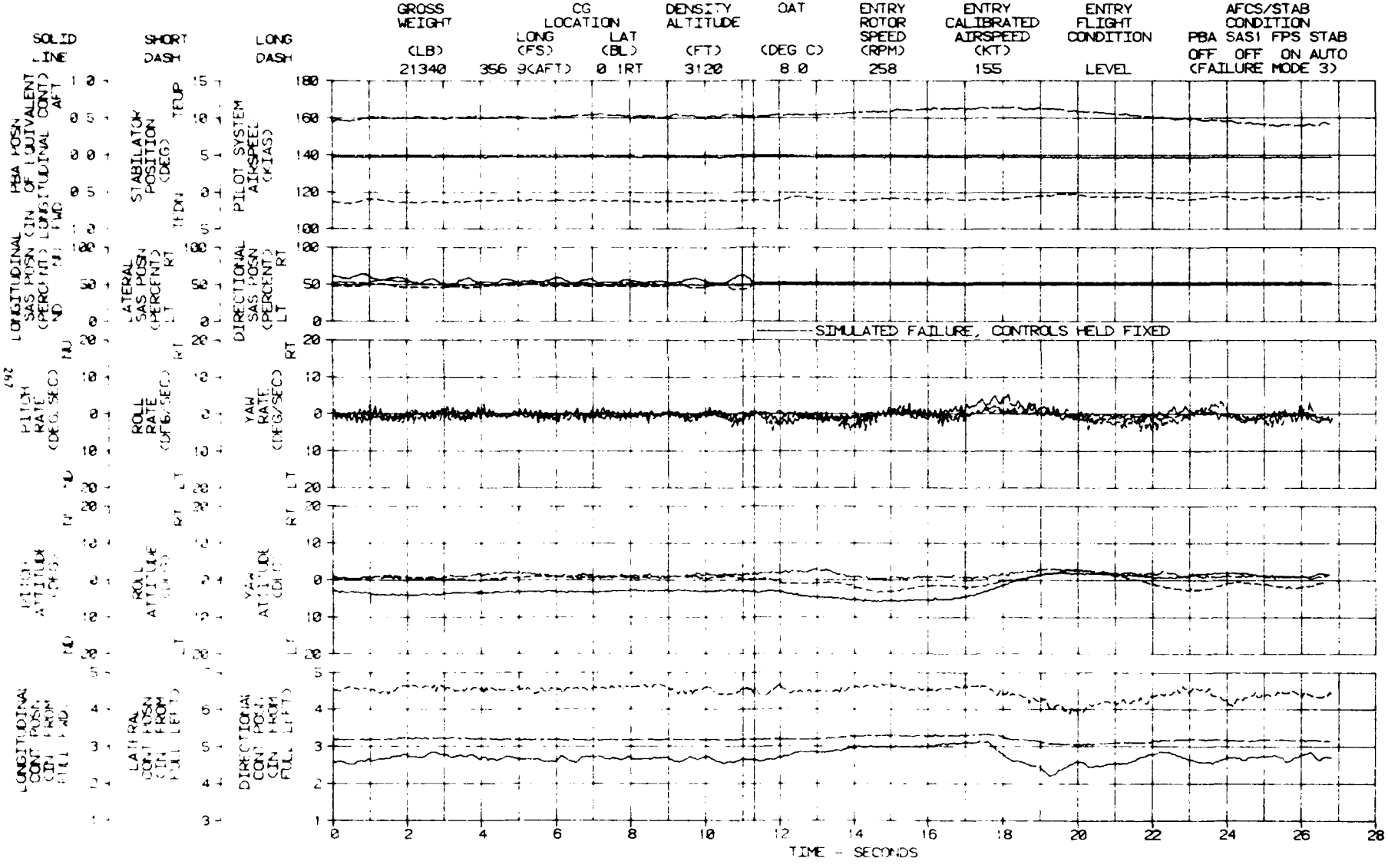


FIGURE 215

SIMULATED NO 2 STABILITY AUGMENTATION SYSTEM FAILURE

UH-60A USA S/N 82-23748

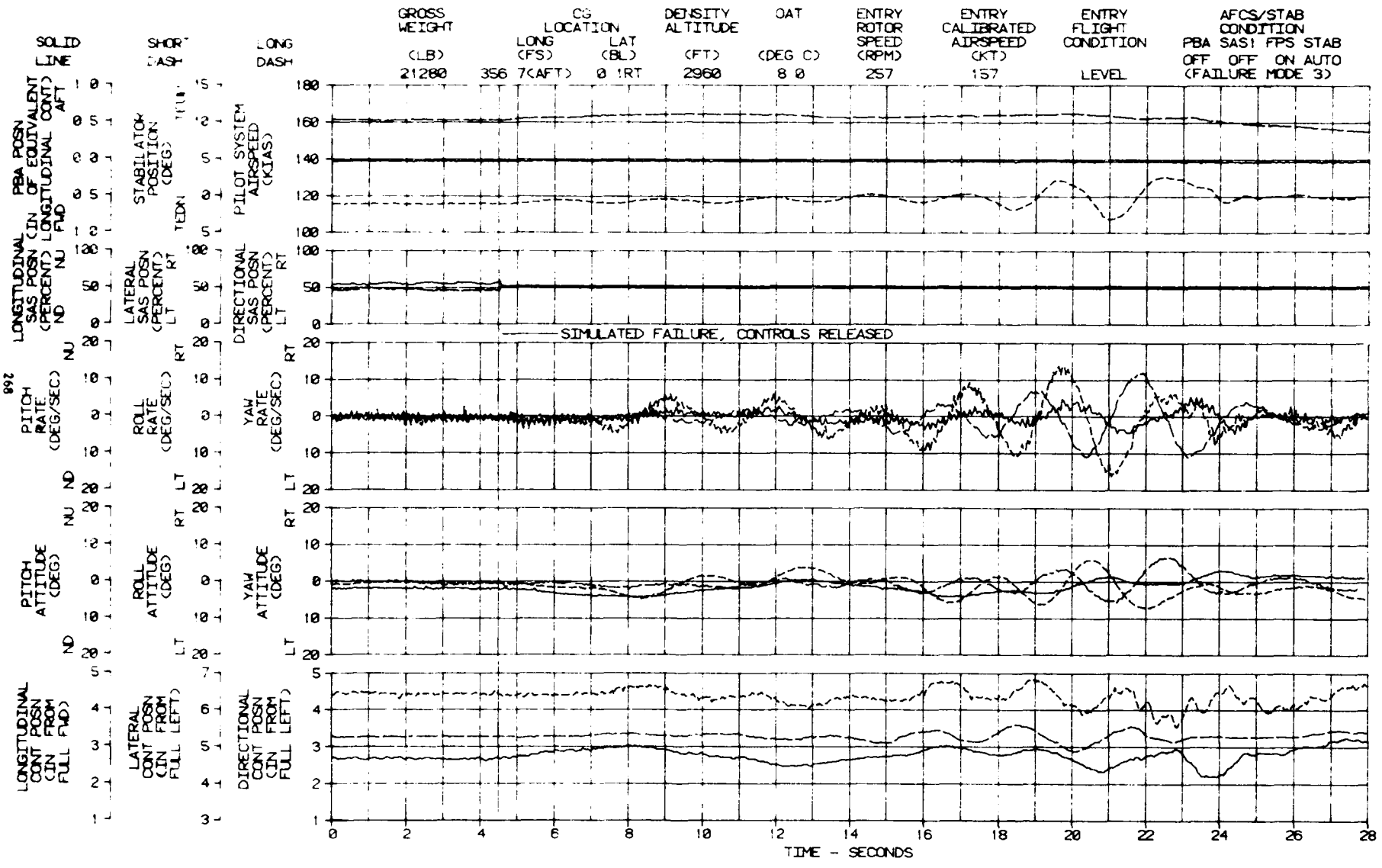


FIGURE 216

SIMULATED NO 2 STABILITY AUGMENTATION SYSTEM FAILURE

UH-60A USA S/N 82-23748

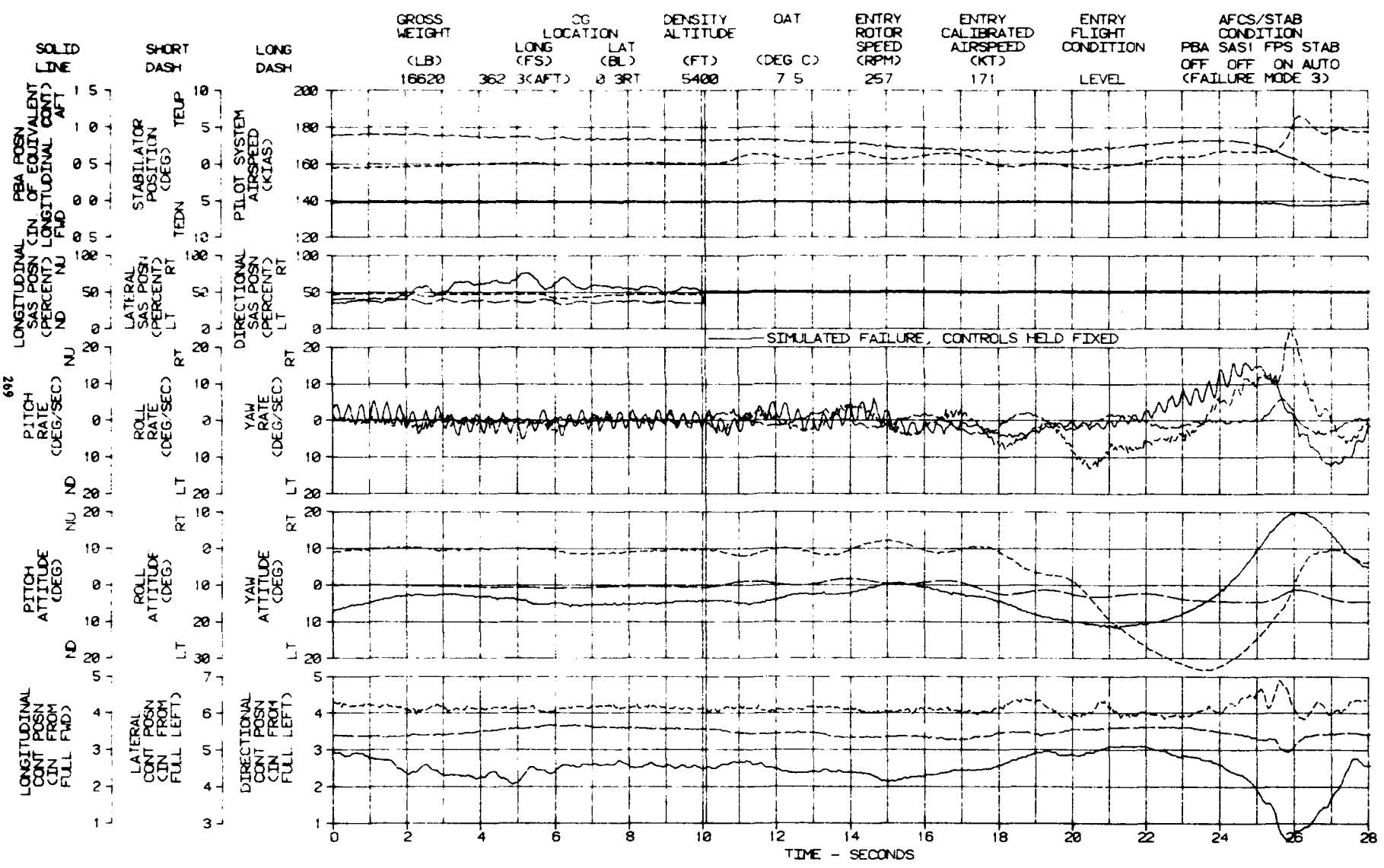


FIGURE 217

SIMULATED NO 2 STABILITY AUGMENTATION SYSTEM FAILURE

UH-60A USA S/N 82-23748

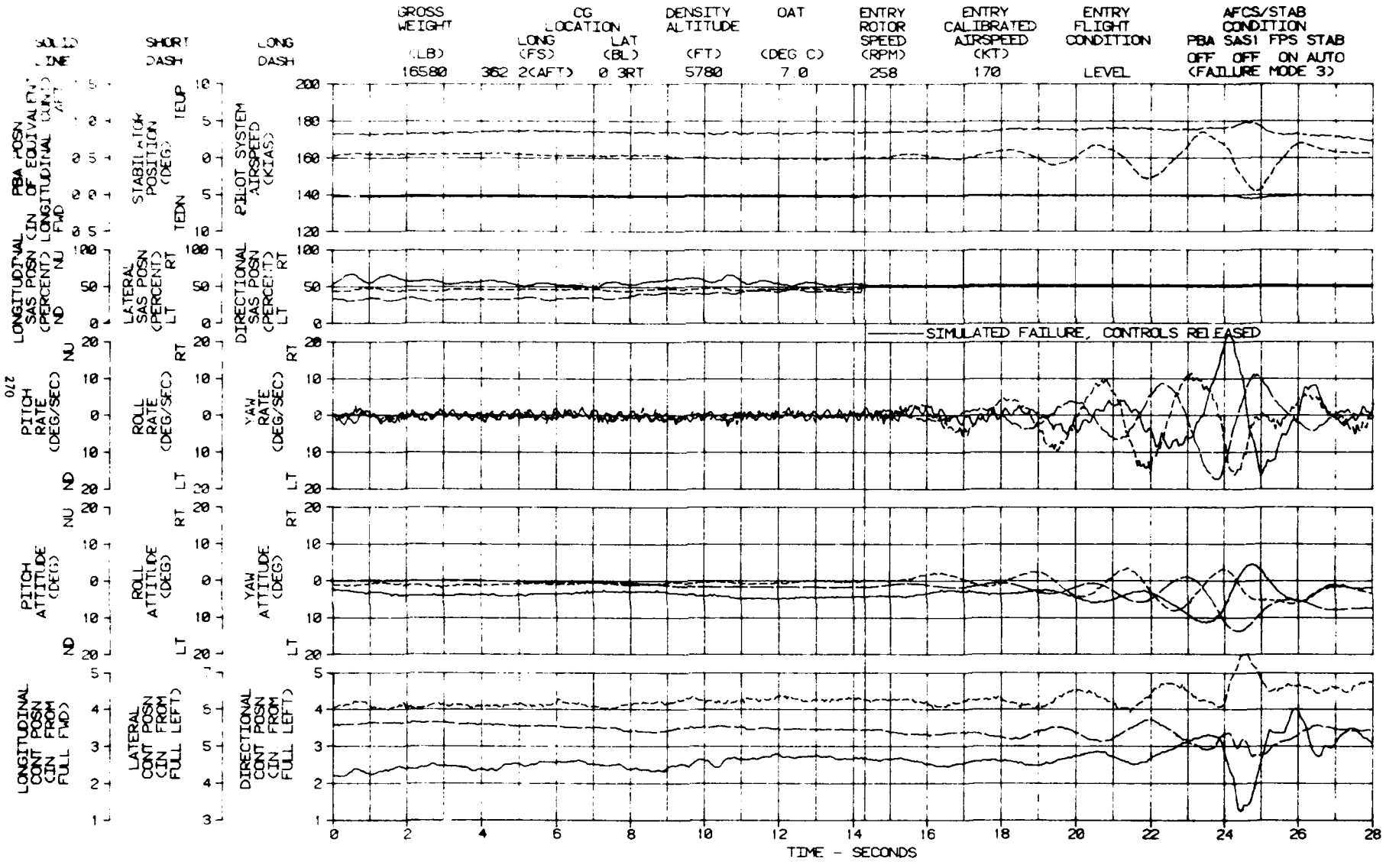


FIGURE 218

SHIP SYSTEM AIRSPEED CALIBRATION

UH-60A USA S/N 82-23748

SYM	AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	TRIM FLIGHT CONDITION
⊡	13650	361.1(AFT)	0.2RT	5200	16.5	258	LEVEL
⊠	13370	361.6(AFT)	0.2RT	5400	16.5	257	DIVE

NOTES:
1. T-28 PACE AIRCRAFT
2. NORMAL UTILITY CONFIGURATION
3. PITOT-STATIC MOUNT FAIRINGS NOT INSTALLED

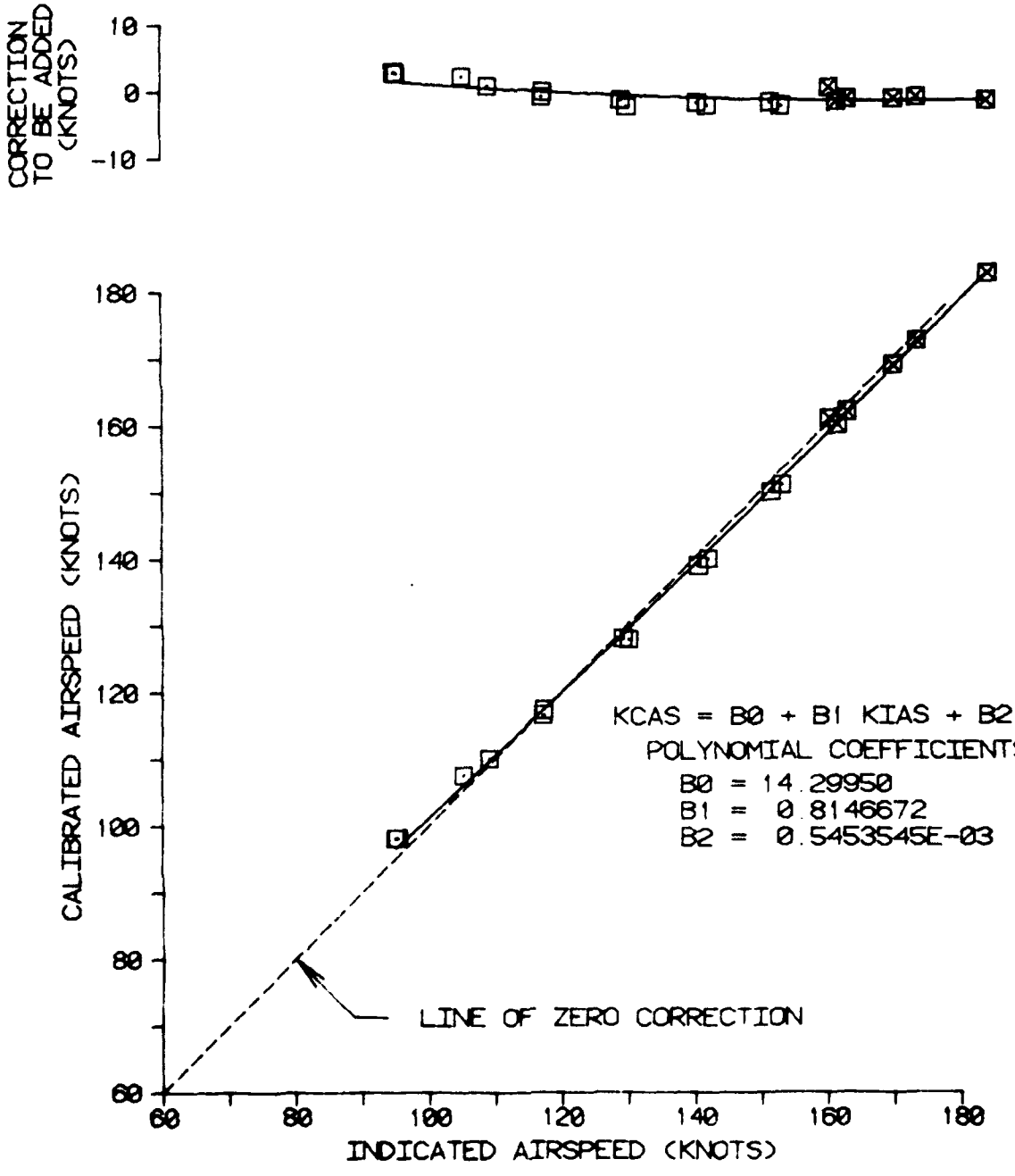


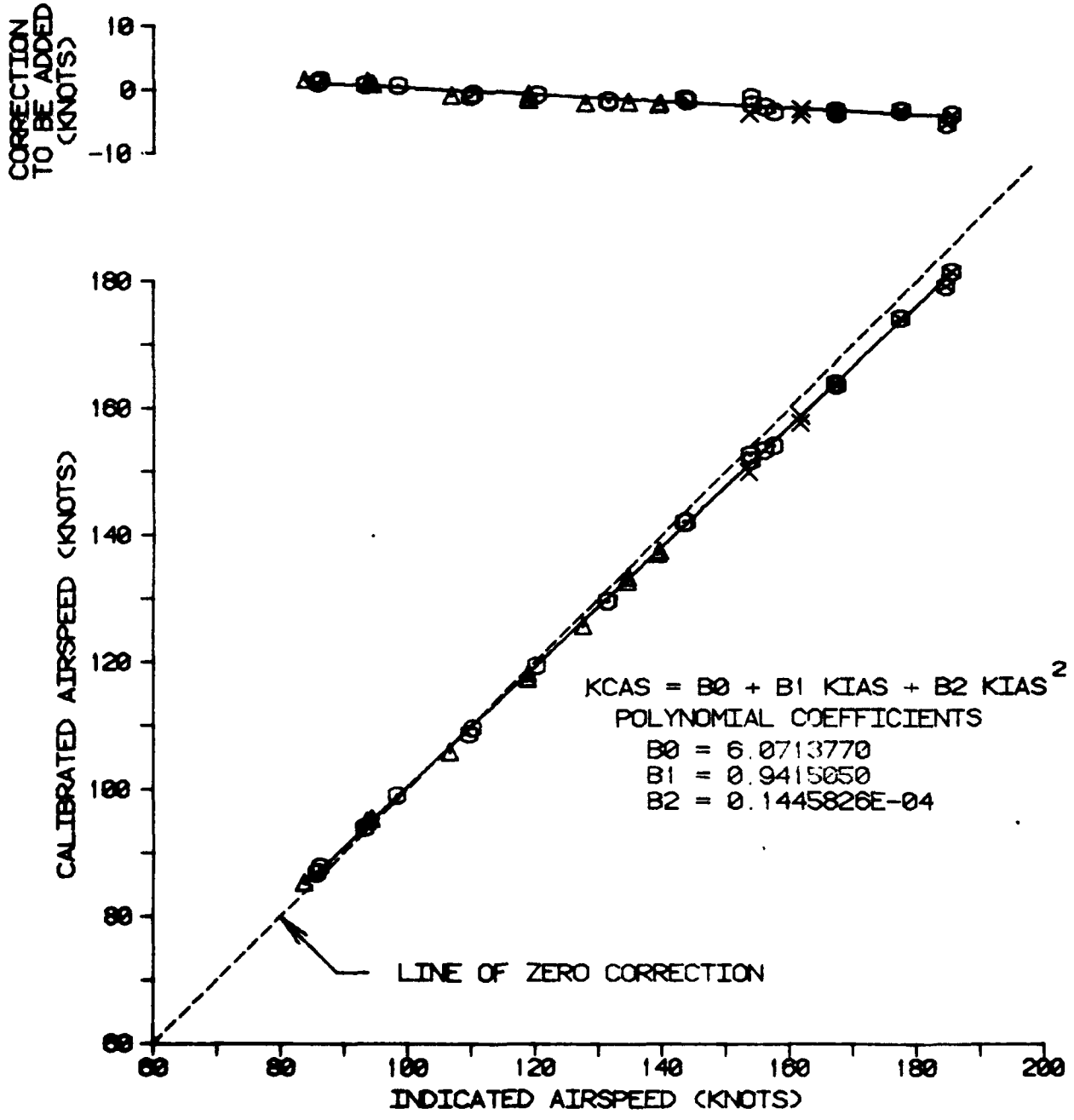
FIGURE 219

SHIP SYSTEM AIRSPEED CALIBRATION

UH-60A USA S/N 82-23748

SYM	AVG GROSS WEIGHT (LB)	AVG CG LOCATION LONG (FS)	AVG CG LOCATION LAT (BL)	AVG DENSITY ALTITUDE (FT)	AVG OAT (DEG C)	AVG ROTOR SPEED (RPM)	TRIM FLIGHT CONDITION
⊙	16400	361.0(AFT)	0.2RT	5100	7.0	257	LEVEL
●	16230	360.3(AFT)	0.2RT	5700	8.0	257	DIVE
△	21900	358.5(AFT)	0.0	4800	9.5	258	LEVEL
X	21500	357.3(AFT)	0.0	3700	10.5	258	DIVE

NOTES:
1. T-28 PACE AIRCRAFT
2. NORMAL UTILITY CONFIGURATION
3. PITOT-STATIC MOUNT FAIRINGS NOT INSTALLED



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