

DOCKET NO. **SA - 510**

EXHIBIT NO. **13X - A**

**NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.**

Group Chairman's Report of Investigation
Wake Vortex Flight Test

NATIONAL TRANSPORTATION SAFETY BOARD

Office of Research and Engineering
Washington, D.C.

November 9, 1995

Group Chairman's Report of Investigation - Wake Vortex Flight Test

A. ACCIDENT DCA-94-MA-076

Location : Aliquippa, Pennsylvania
Date : September 8, 1994
Time : 1904 Eastern Daylight Time
Aircraft : Boeing 737-300, N513AU

B. GROUP IDENTIFICATION

The Aircraft Performance Group met at the Federal Aviation Administration's (FAA) Technical Center at the Atlantic City International Airport from September 25 through October 1, 1995. The following group members participated in this investigative effort:

Chairman : Thomas R. Jacky, NTSB
Member : Bob McCullough, USAir
Member : Keakini Kaulia, ALPA
Member : James Kerrigan, Boeing

Additionally, the following persons assisted the group during the investigative effort:

Martin Ingham, Boeing
James Wilborn, Boeing
Sarah Lewis, Boeing
Mike Carriker, Boeing
Les Berven, FAA
John Cox, ALPA
Jim Gibbs, USAir
Keith Beihl, FAA

C. SUMMARY

On September 8, 1994 at 1904 Eastern Daylight Time, USAir Flight 427, a Boeing 737-3B7, N513AU, crashed while maneuvering to land at Pittsburgh International Airport, Pittsburgh, Pennsylvania. The airplane was being operated on an instrument flight rules (IFR) flight plan under the provisions of Title 14, code of Federal Regulation (CFR), Part 121, on a regularly scheduled flight from

Chicago O'Hare International Airport, Chicago, Illinois, to Pittsburgh. The airplane was destroyed by impact forces and fire near Aliquippa, Pennsylvania. All 132 persons on board the airplane were fatally injured.

D. DETAILS OF INVESTIGATION

1. General Details

The Aircraft Performance Group conducted a Wake Vortex Flight Test at the FAA's Technical Center at the Atlantic City Airport from September 25 through October 1, 1995. The objectives of the test were the following:

1. Determine effects of 727 wake vortices on 737-300 aerodynamics;
2. Additional measurement of strength and behavior of 727 wake;
3. Cockpit Voice Recorder (CVR) Sound Spectrum Group support;
4. Systems Group and future test support.

For the test, a 737-300, N533AU, was leased from USAir. The FAA donated the use of a Boeing 727-100, based at the Technical Center, for the test. The 727-100, outfitted with wingtip smoke generators to mark its wake, was the wake generator, while the B-737 was the wake penetrating airplane. Additionally, a T-33 airplane, contributed by Boeing, was a safety chase airplane for the B-737 throughout the tests. The National Aeronautics and Space Administration's OV-10A airplane, used for meteorological measurements, was used in support of the test during two flights. An additional flight with the 727 and OV-10A was flown on October 2, 1995, after the 737 departed Atlantic City.

During the test, eight flights were conducted in which data were collected. One or two flights were flown per day. The flights were typically conducted in early morning hours, immediately after sunrise. Flights were conducted at that time in order to locate atmospheric conditions leading to strong and stable vortices. A daily summary of the flight test is included in Attachment 1.

2. Flight Test Data Recording

In order to measure and document the wake encounters, several modifications were accomplished on the 737. Most of the modifications were done in order to better measure the airplane's aerodynamic parameters. A summary of 737 modifications is included in Attachment 2.

The USAir 737 used for the flight test contained an FDR recording system that recorded approximately thirty parameters, more than the accident airplane. For the wake vortex flight test, as well as the simulator calibration flight test, the 737 was outfitted with a Flight Data Acquisition Unit and Flight Data Recorder (FDR) that recorded at a rate of 128 12-bit words per second, twice the rate of most FDRs. Cockpit control wheel, control column, and rudder pedal position

sensors were added to the airplane, and wired into the data recording system. In addition, a Boeing flight test recording instrumentation system, PADDs, was added to record data at higher sampling rates than FDRs.

A solid-state Cockpit Voice Recorder (CVR), with a two-hour recording capacity, was installed on the airplane. In addition, a breakout box was installed in order to route audio information to a Digital Audio Tape (DAT) recorder.

To record the wake's position relative to the 737, a video recording system utilizing seven cameras were installed on the airplane. A diagram indicating the position of each of the cameras is included in Attachment 3. The T-33 chase airplane also carried a video recording camera.'

3. Flight Conditions Attempted

During the eight flights flown during the wake vortex test, approximately 160 individual flight conditions were attempted. A detailed explanation of each condition, used as instructions for the flight crew, is included in Exhibit 13X-F. A chronological listing of the conditions attempted during each flight is included in Attachment 4. In addition, a listing of conditions attempted, grouped by condition number, is included in Attachment 5.

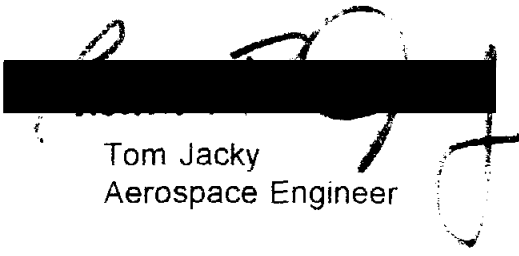
4. Data Plots of Selected Wake Encounters

From the flight conditions attempted, a selected number of data plots from selected representative conditions were included in Attachment 6. Plots from all flight conditions and wake encounters will be included in the public docket at a later time. Plots included in this exhibit were constructed from PADDs data. Note that two plots are provided for each condition flown, pages A and B, respectively.

Simulator calibration flight conditions attempted during the wake vortex portion of the flight test are detailed and included in Exhibit 13X-B.

A video tape of segments of several selected flight conditions has been entered into the public docket as Exhibit 13X-I.

Further reduction remains to be accomplished on the data collected during the flight test. Data from the FAA's 727 and NASA's OV-10A must still be reduced and compared to the 737 data. Once all the 737 data has been reduced, it will be used as input to further refine the kinematic study. In addition, the collected data will be used as a comparison to FDR data from this accident.



Tom Jacky
Aerospace Engineer

Attachments

1. Daily Summary of Wake Vortex Flight Test
2. Summary of B-737 Modifications
3. Location of Video Cameras on the B-737
4. Chronological Listing of Attempted Flight Conditions
5. Listing of Attempted Flight Conditions, by Condition Number
6. Data Plots of Selected Wake Vortex Interactions

ATTACHMENT 1

Daily Summary of Wake Vortex Flight Test

Summary of Wake Vortex Flight Tests

(All Tests Flown from FAA Technical Center, Atlantic City Intl. Airport, New Jersey)

<u>#</u>	<u>Flight Test #</u>	<u>Date</u>	<u>Time</u>	<u>Weather Support</u>	<u>Comments</u>
1	19-06-1	Tues, 9/26	1:27	FDR	Hazard Flt; Video used for Press Con.
2	19-06-2	Tues, 9/26	0:34	FDR	Scrubbed due to incimate weather
3	19-07-1	Wed, 9/27	1:24	FDR	Delay - Ground Fog; good data taken
4	19-07-2	Wed, 9/27	1:32	FDR, OV-10	Delay - Slat Prox; vortices unstable
5	19-08-1	Thur, 9/28	1:59	FDR	Exc Data; vortices stable in a.m.
6	19-09-1	Fri, 9/29	2:36	FDR, OV-10	Exc Data; vortices stable; OV-10/727
7	19-09-2	Fri, 9/29	1:20	FDR	CVR Flight; vortices unstable
8	19-10-1	Sat, 9/30	1:58	FDR, Wallops Balloon	Exc Data; Flight over Wallops Is.

ATTACHMENT 2

Summary of B-737 Modifications

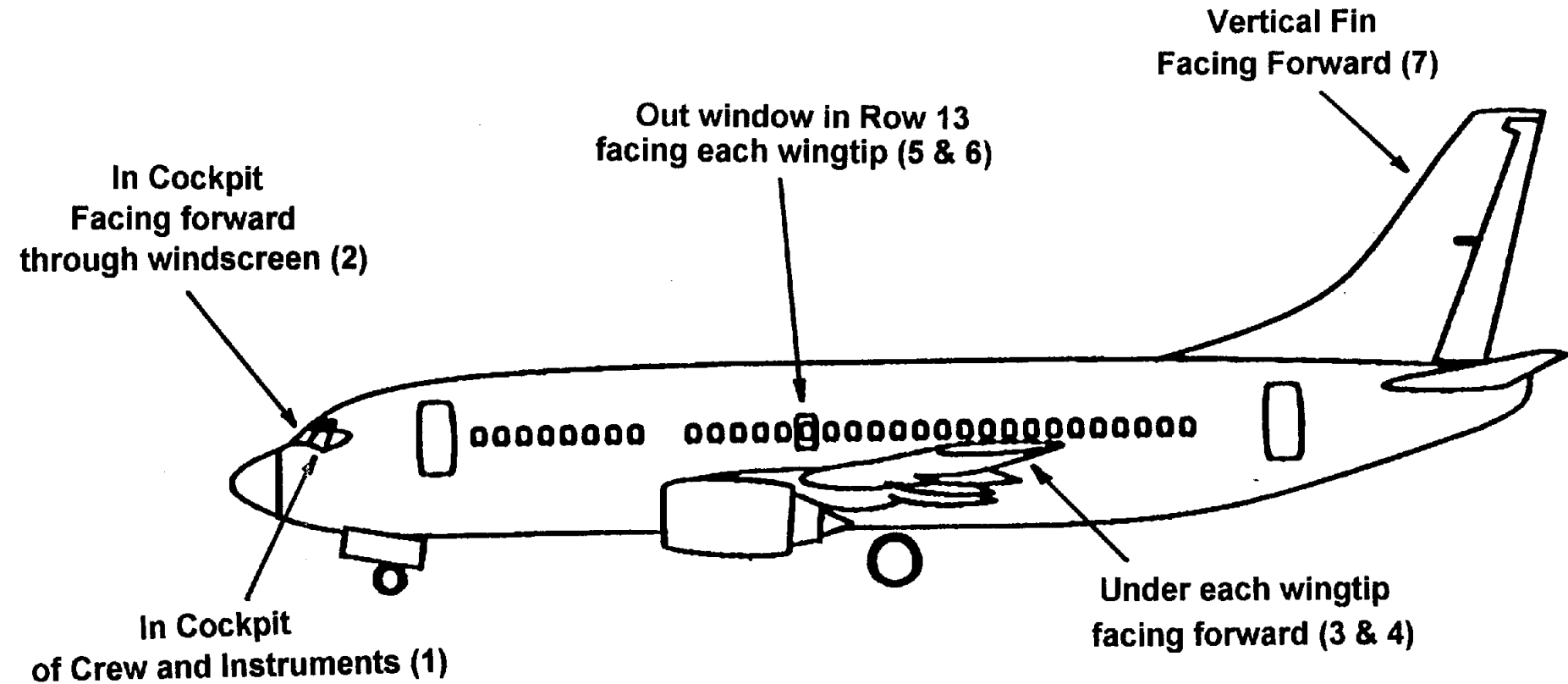
737 Modifications for Test

- 1) Solid State, 128 word/second FDR
- 2) Add Control Wheel, Control Column, and Rudder Pedal to FDR
- 3) Add 7503 lbs. Ballast
- 4) Flight test data recording system
- 5) 7 camera VCR recording system
- 6) Solid State, 2 Hour CVR
- 7) T-33 Chase w/ rear seat camera
- 8) Removal of seats for equipment and access

ATTACHMENT 3

Location of Video Cameras on the B-737

Location of Video Cameras on 737 For Flight Test



ATTACHMENT 4

Chronological Listing of Attempted Flight Conditions

727/737 WAKE ENCOUNTER FLIGHT TEST
CONDITION LIST ORDERED CHRONOLOGICALLY

Test No.	Sequence Number	Condition Number	Maneuver Description	Yaw Damper	Control	Trailing Distance	IRIG at Time = 0
19-06-1	008702	B1.41.0065.SWP	Pre-flight control sweeps**	ON	PILOT	N/A	07:41:46.40
19-06-1	008703	B1.41.0065.026	Left wing in right vortex	ON	PILOT	4.0	08:26:50.45
19-06-1	008704	B1.41.0065.026.1	Left wing in right vortex	ON	PILOT	4.0	08:31:12.40
19-06-1	008705	B1.41.0065.025	Right wing in left vortex	ON	PILOT	4.0	08:34:52.40
19-06-1	008706	B1.41.0065.027	Vertical fin in a vortex	ON	PILOT	4.0	08:39:10.35
19-06-1	008707	B1.41.0065.027.1	Vertical fin in a vortex	ON	PILOT	4.0	08:40:30.40
19-06-1	008708	B1.41.0065.027.2	Vertical fin in a vortex	ON	PILOT	4.0	08:41:50.40
19-06-1	008709	B1.41.0065.027.3	Vertical fin in a vortex	ON	PILOT	4.0	08:48:00.30
19-06-1	008710	B1.41.0065.SWP.1	Post-flight control sweeps	ON	PILOT	N/A	09:19:35.40
19-07-1	008711	B1.41.0065.SWP	Pre-flight control sweeps**	ON	PILOT	N/A	
19-07-1	008712	B1.41.0065.031	727/737 Baro altimeter calib**	ON	PILOT	N/A	
19-07-1	008713	B1.41.0065.026.4	Left wing in right vortex	ON	PILOT	4*	10:21:33.05
19-07-1	008714	B1.41.0065.025	Right wing in left vortex	ON	PILOT	4.2	10:24:13.00
19-07-1	008715	B1.41.0065.027	Vertical fin in a vortex	ON	PILOT	4*	10:27:33.00
19-07-1	008716	B1.41.0065.029	Left wing in right vortex	ON	CWS	4*	10:33:53.00
19-07-1	008717	B1.41.0065.030	Vertical fin in vortex	ON	CWS	4*	10:35:32.95
19-07-1	008718	B1.41.0065.002	Intercept at 5 deg from left	ON	PILOT	4*	10:45:12.95
19-07-1	008719	B1.41.0065.002.1	Intercept at 5 deg from right	ON	PILOT	4*	10:47:12.95
19-07-1	008720	B1.41.0065.001	Intercept at 5 deg from left	ON	FREE	4*	10:48:37.90
19-07-1	008721	B1.41.0065.001.1	Intercept at 5 deg from right	ON	FREE	3.6	10:49:52.90
19-07-1	008722	B1.41.0065.003	Intercept at 5 deg from left	ON	AUTOPILOT	4*	10:51:22.90

*Nominal target trailing distance is provided when TCAS distance is not available

**Data will be provided at a future date

727/737 WAKE ENCOUNTER FLIGHT TEST
CONDITION LIST ORDERED CHRONOLOGICALLY

Test No.	Sequence Number	Condition Number	Manuever Description	Yaw Damper	Control	Trailing Distance	IRIG at Time = 0
19-07-1	008723	B1.41.0065.003.1	Intercept at 5 deg from right	ON	AUTOPILOT	4*	10:52:32.90
19-07-1	008724	B1.41.0065.004	Intercept at 5 deg from left	ON	CWS	4*	10:53:42.90
19-07-1	008725	B1.41.0065.004.1	Intercept at 5 deg from right	ON	CWS	4*	10:54:42.90
19-07-1	008726	B1.41.0065.006	Intercept at 10 deg from left	ON	PILOT	4*	10:55:32.90
19-07-1	008727	B1.41.0065.006.1	Intercept at 10 deg from right	ON	PILOT	4*	10:57:52.90
19-07-1	008728	B1.41.0065.005	Intercept at 10 deg from left	ON	FREE	4*	11:00:22.90
19-07-1	008729	B1.41.0065.005.1	Intercept at 10 deg from right	ON	FREE	4*	11:01:22.90
19-07-1	008730	B1.41.0065.007	Intercept at 10 deg from left	ON	AUTOPILOT	4.4	11:03:22.85
19-07-1	008731	B1.41.0065.007.1	Intercept at 10 deg from right	ON	AUTOPILOT	4.2	11:04:12.90
19-07-1	008732	B1.41.0065.008	Intercept at 10 deg from left	ON	CWS	3.6	11:12:52.85
19-07-1	008733	B1.41.0065.008.1	Intercept at 10 deg from right	ON	CWS	4*	11:14:02.85
19-07-1	008734	B1.41.0065.010	Ascent thru wake	ON	PILOT	4*	11:15:47.80
19-07-1	008735	B1.41.0065.010.1	Descent thru wake	ON	PILOT	4*	11:16:32.80
19-07-1	008736	B1.41.0065.009	Ascent thru wake	ON	FREE	3.3	11:17:02.80
19-07-1	008737	B1.41.0065.009.1	Descent thru wake**	ON	FREE	4*	
19-07-1	008738	B1.41.0065.009.2	Ascent thru wake	ON	FREE	4*	11:18:22.80
19-07-1	008739	B1.41.0065.011	Ascent thru wake	ON	AUTOPILOT	4*	11:20:32.80
19-07-1	008740	B1.41.0065.011.1	Descent thru wake	ON	AUTOPILOT	4*	11:21:32.80
19-07-1	008741	B1.41.0065.012	Ascent thru wake	ON	CWS	4*	11:22:32.80
19-07-1	008742	B1.41.0065.012.1	Descent thru wake	ON	CWS	4*	11:23:12.80
19-07-1	008743	B1.41.0065.014	Left turn onto right core	ON	PILOT	4*	11:24:32.80
19-07-1	008744	B1.41.0065.014.1	Left turn onto right core	ON	FREE	4*	11:25:32.80
19-07-1	008745	B1.41.0065.014.2	Left turn onto right core	ON	PILOT	4*	11:26:32.80
19-07-1	008746	B1.41.0065.SWP.1	Post-flight control sweeps	ON	PILOT	N/A	11:38:02.75
19-07-2	008747	B1.41.0065.SWP	Pre-flight control sweeps	ON	PILOT	N/A	14:03:06.85
19-07-2	008748	B1.41.0065.032	Vertical fin in core	ON	PILOT	2.9	14:25:43.05
19-07-2	008749	B1.41.0065.010.2	Ascent thru wake	ON	PILOT	3*	14:37:34.00
19-07-2	008750	B1.41.0065.014.3	Left turn onto right core	ON	PILOT	3*	14:41:29.00
19-07-2	008751	B1.41.0065.013	Left turn onto right core	ON	PILOT	3*	14:42:49.95
19-07-2	008752	B1.41.0065.013.1	Right turn onto left core	ON	PILOT	3*	14:43:29.95

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**Data will be provided at a future date

727/737 WAKE ENCOUNTER FLIGHT TEST
CONDITION LIST ORDERED CHRONOLOGICALLY

Test No.	Sequence Number	Condition Number	Manuever Description	Yaw Damper	Control	Trailing Distance	IRIG at Time = 0
19-07-2	008753	B1.41.0065.015	Left turn onto right core	ON	AUTOPILOT	3*	14:44:56.95
19-07-2	008754	B1.41.0065.015.1	Right turn onto left core	ON	AUTOPILOT	3*	14:46:59.95
19-07-2	008755	B1.41.0065.022	Straight thru descending wake	ON	PILOT	3*	14:56:39.90
19-07-2	008756	B1.41.0065.021	Straight thru descending wake	ON	FREE	3.0	14:57:57.90
19-07-2	008757	B1.41.0065.021.1	Straight thru descending wake	ON	FREE	3.0	14:58:47.90
19-07-2	008758	B1.41.0065.023	Straight thru descending wake	ON	AUTOPILOT	3*	15:06:29.90
19-07-2	008759	B1.41.0065.023.1	Straight thru descending wake	ON	AUTOPILOT	3*	15:08:11.90
19-07-2	008760	B1.41.0065.023.2	Straight thru descending wake	ON	AUTOPILOT	3*	15:09:28.85
19-07-2	008761	B1.41.0065.023.3	Straight thru descending wake**	ON	AUTOPILOT	N/A	
19-07-2	008762	B1.41.0065.018	Left turn onto descending rt core	ON	PILOT	3*	15:20:24.85
19-07-2	008763	B1.41.0065.018.1	Left turn onto descending rt core	ON	PILOT	3*	15:22:04.80
19-07-2	008764	B1.41.0065.018.2	Left turn onto descending rt core	ON	PILOT	3.0	15:22:59.80
19-07-2	008765	B1.41.0065.018.3	Left turn onto descending rt core	ON	PILOT	3*	15:24:07.80
19-07-2	008766	B1.41.0065.026.6	Right wing in left core	ON	PILOT	3*	15:31:06.75
19-07-2	008767	B1.41.0065.SWP.1	Post-flight control sweeps	ON	PILOT	N/A	15:49:27.85
19-08-1	008768	B1.41.0065.SWP	Pre-flight control sweeps**	ON	PILOT	N/A	
19-08-1	008769	B1.41.0065.031	727/737 Baro altimeter calib**	ON	PILOT	N/A	
19-08-1	008770	B1.41.0065.026	Left wing in right vortex	ON	PILOT	1.8	07:27:13.35
19-08-1	008771	B1.41.0065.025	Right wing in leftt vortex	ON	PILOT	1.9	07:32:23.30
19-08-1	008772	B1.41.0065.027	Vertical fin in a vortex	ON	PILOT	1.8	07:35:23.30
19-08-1	008773	B1.41.0065.027.1	Vertical fin in a vortex	ON	PILOT	1.8	07:38:13.30
19-08-1	008774	B1.41.0065.027.2	Vertical fin in a vortex	ON	PILOT	1.8	07:40:33.30
19-08-1	008775	B1.41.0065.002	Intercept at 2 deg	ON	PILOT	3.0	07:50:43.25
19-08-1	008776	B1.41.0065.002.1	Intercept at 2 deg	OFF	PILOT	3.2	07:52:43.25
19-08-1	008777	B1.41.0065.001	Intercept at 2 deg	ON	FREE	3*	07:53:43.25
19-08-1	008778	B1.41.0065.001.1	Intercept at 2 deg	OFF	FREE	3*	07:53:53.25
19-08-1	008779	B1.41.0065.003	Intercept at 2 deg	ON	AUTOPILOT	3*	07:55:13.25
19-08-1	008780	B1.41.0065.003.1	Intercept at 2 deg	OFF	AUTOPILOT	2.9	07:58:23.20
19-08-1	008781	B1.41.0065.006	Intercept at 5 deg	ON	PILOT	3*	08:01:13.20
19-08-1	008782	B1.41.0065.006.1	Intercept at 5 deg	OFF	PILOT	3*	08:03:13.20

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**Data will be provided at a future date

727/737 WAKE ENCOUNTER FLIGHT TEST
CONDITION LIST ORDERED CHRONOLOGICALLY

Test No.	Sequence Number	Condition Number	Manuever Description	Yaw Damper	Control	Trailing Distance	IRIG at Time = 0
19-08-1	008783	B1.41.0065.005	Intercept at 5 deg	ON	FREE	3*	08:04:33.20
19-08-1	008784	B1.41.0065.005.1	Intercept at 5 deg	OFF	FREE	3*	08:05:03.20
19-08-1	008785	B1.41.0065.005.3	Intercept at 5 deg	ON	FREE	2.6	08:06:03.20
19-08-1	008786	B1.41.0065.005.4	Intercept at 5 deg	OFF	FREE	3*	08:14:03.15
19-08-1	008787	B1.41.0065.010	Climbing intercept at 2 deg	ON	PILOT	3*	08:15:33.15
19-08-1	008788	B1.41.0065.010.1	Climbing intercept at 2 deg	OFF	PILOT	3*	08:16:43.15
19-08-1	008789	B1.41.0065.009	Intercept at 2 deg	ON	FREE	3*	08:17:53.15
19-08-1	008790	B1.41.0065.009.1	Intercept at 2 deg	OFF	FREE	3*	08:19:33.15
19-08-1	008791	B1.41.0065.009.2	Climbing intercept at 2 deg	ON	FREE	3*	08:21:13.15
19-08-1	008792	B1.41.0065.009.3	Climbing intercept at 2 deg	OFF	FREE	3*	08:22:33.15
19-08-1	008793	B1.41.0065.009.4	Descending intercept at 2 deg	ON	FREE	3*	08:24:23.10
19-08-1	008794	B1.41.0065.009.5	Descending intercept at 2 deg	OFF	FREE	3.1	08:25:43.10
19-08-1	008795	B1.41.0065.022	Straight thru descendeding wake	ON	PILOT	3.2	08:32:53.10
19-08-1	008796	B1.41.0065.022.1	Straight thru descendeding wake	OFF	PILOT	3.1	08:35:33.10
19-08-1	008797	B1.41.0065.021	Straight thru descendeding wake	ON	FREE	3*	08:37:13.05
19-08-1	008798	B1.41.0065.021.1	Straight thru descendeding wake	OFF	FREE	3*	08:41:23.05
19-08-1	008799	B1.41.0065.026.1	Left wing in right vortex	ON	PILOT	3.2	08:51:33.00
19-08-1	008800	B1.41.0065.025.1	Right wing in leftt vortex	ON	PILOT	3.1	08:53:53.00
19-08-1	008801	B1.41.0065.027.3	Vertical fin in a vortex	ON	PILOT	3*	08:56:03.00
19-08-1	008802	B1.41.0065.SWP.1	Post-flight control sweeps	ON	PILOT	N/A	09:12:13.25
19-09-1	008803	B1.41.0065.SWP	Pre-flight control sweeps	ON	PILOT	N/A	06:36:50.00
19-09-1	008804	B1.41.0065.031	727/737 Baro altimeter calib**	ON	PILOT	N/A	
19-09-1	008805	B1.41.0065.026.1	Left wing in right vortex	ON	PILOT	2*	07:26:50.05
19-09-1	008806	B1.41.0065.025.1	Right wing in leftt vortex	ON	PILOT	2.0	07:28:10.00
19-09-1	008807	B1.41.0065.027.1	Vertical fin in a vortex	ON	PILOT	2.0	07:30:20.00
19-09-1	008808	B1.41.0065.041.1	Stabilize below wake centerline	ON	PILOT	2*	07:32:50.00
19-09-1	008809	B1.41.0065.043.1	Stabilize on wake centerline	ON	PILOT	2*	07:34:00.00
19-09-1	008810	B1.41.0065.042.1	Stabilize above wake centerline	ON	PILOT	2*	07:34:40.00
19-09-1	008884	B1.41.0065.041T	Complete ascent through wake	ON	PILOT	2*	07:32:50.00
19-09-1	008811	B1.41.0065.001.1	Intercept at 2 deg	ON	FREE	1.7	07:36:35.00

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**Data will be provided at a future date

727/737 WAKE ENCOUNTER FLIGHT TEST
CONDITION LIST ORDERED CHRONOLOGICALLY

Test No.	Sequence Number	Condition Number	Manuever Description	Yaw Damper	Control	Trailing Distance	IRIG at Time = 0
19-09-1	008812	B1.41.0065.001.2	Intercept at 2 deg	OFF	FREE	1.9	07:38:30.00
19-09-1	008813	B1.41.0065.009	Climbing intercept at 2 deg	ON	FREE	2*	07:39:30.00
19-09-1	008814	B1.41.0065.009.1	Climbing intercept at 2 deg	ON	FREE	2*	07:48:10.00
19-09-1	008815	B1.41.0065.009.2	Climbing intercept at 2 deg	OFF	FREE	2.1	07:49:29.95
19-09-1	008816	B1.41.0065.021	Straight thru descending wake	ON	FREE	1.9	07:52:39.90
19-09-1	008817	B1.41.0065.021.1	Straight thru descending wake	OFF	FREE	1.9	07:54:59.90
19-09-1	008818	B1.41.0065.026.2	Left wing in right vortex**	ON	PILOT	3.1	
19-09-1	008819	B1.41.0065.025.2	Right wing in left vortex	ON	PILOT	3.0	08:10:29.85
19-09-1	008820	B1.41.0065.027.2	Vertical fin in a vortex	ON	PILOT	2.9	08:13:19.85
19-09-1	008821	B1.41.0065.041.2	Stabilize below wake centerline	ON	PILOT	2.9	08:16:19.85
19-09-1	008822	B1.41.0065.043.2	Stabilize on wake centerline	ON	PILOT	3*	08:17:09.85
19-09-1	008823	B1.41.0065.042.2	Stabilize above wake centerline	ON	PILOT	3*	08:18:09.85
19-09-1	008824	B1.41.0065.001.4	Intercept at 2 deg	ON	FREE	3.1	08:25:20.00
19-09-1	008825	B1.41.0065.001.5	Intercept at 2 deg	OFF	FREE	3.0	08:26:59.80
19-09-1	008826	B1.41.0065.001.6	Intercept at 2 deg	OFF	FREE	2.9	08:29:29.80
19-09-1	008827	B1.41.0065.009.3	Climbing intercept at 2 deg	ON	FREE	2.9	08:30:39.75
19-09-1	008828	B1.41.0065.009.4	Climbing intercept at 2 deg	OFF	FREE	3.1	08:32:09.75
19-09-1	008829	B1.41.0065.021.3	Straight thru descending wake	ON	FREE	3*	08:37:49.75
19-09-1	008830	B1.41.0065.021.4	Straight thru descending wake	OFF	FREE	3.1	08:43:29.75
19-09-1	008831	B1.41.0081.100	Full rudder calibration @ 190 kts	ON	PILOT	N/A	08:48:58.00
19-09-1	008832	B1.41.0081.101	Sideslip to left @ 190 kts	ON	PILOT	N/A	08:52:35.00
19-09-1	008833	B1.41.0081.104	Sideslip to right @ 190 kts	ON	PILOT	N/A	09:06:25.65
19-09-1	008834	B1.41.0065.SWP.1	Post-flight control sweeps	ON	PILOT	N/A	09:18:59.55
19-09-2	008835	B1.41.0065.SWP	Pre-flight control sweeps	ON	PILOT	N/A	11:25:49.70
19-09-2	008836	B1.41.0081.107	Sideslip to left @ 190 kts	ON	PILOT	N/A	12:23:49.75
19-09-2	008837	B1.41.0081.110	Sideslip to right @ 190 kts	ON	PILOT	N/A	12:35:39.65
19-09-2	008838	B1.41.0081.041.1	3/4 pedal release @ 190 kts	ON	PILOT	N/A	12:42:53.65
19-09-2	008839	B1.41.0081.047.2	3/4 pedal release @ 190 kts	ON	PILOT	N/A	12:43:59.65
19-09-2	008840	B1.41.0081.053.1	3/4 pedal release @ 170 kts	ON	PILOT	N/A	12:48:59.60
19-09-2	008841	B1.41.0081.059.1	3/4 pedal release @ 170 kts	ON	PILOT	N/A	12:50:44.60

*Nominal target trailing distance is provided when TCAS distance is not available

**Data will be provided at a future date

727/737 WAKE ENCOUNTER FLIGHT TEST
CONDITION LIST ORDERED CHRONOLOGICALLY

Test No.	Sequence Number	Condition Number	Manuever Description	Yaw Damper	Control	Trailing Distance	IRIG at Time = 0
19-09-2	008842	B1.41.0065.SWP.1	Post-flight control sweeps	ON	PILOT	N/A	13:01:34.55
19-10-1	008843	B1.41.0065.SWP	Pre-flight control sweeps**	ON	PILOT	N/A	
19-10-1	008844	B1.41.0065.026	Left wing in right vortex	ON	PILOT	4.0	06:42:18.20
19-10-1	008845	B1.41.0065.025	Right wing in leftt vortex	ON	PILOT	3.8	06:46:18.15
19-10-1	008846	B1.41.0065.027	Vertical fin in a vortex	ON	PILOT	3.9	06:49:28.15
19-10-1	008847	B1.41.0065.041	Stabilize below wake centerline	ON	PILOT	4*	06:54:18.15
19-10-1	008848	B1.41.0065.041.1	Stabilize below wake centerline	ON	PILOT	4*	07:10:28.10
19-10-1	008849	B1.41.0065.043	Stabilize on wake centerline	ON	PILOT	4*	07:11:08.05
19-10-1	008850	B1.41.0065.042	Stabilize above wake centerline	ON	PILOT	4*	07:11:48.05
19-10-1	008886	B1.41.0065.041T	Complete ascent through wake	ON	PILOT	4*	07:10:28.10
19-10-1	008851	B1.41.0065.001	Intercept at 2 deg	ON	FREE	4.0	07:13:28.05
19-10-1	008852	B1.41.0065.001.1	Intercept at 2 deg	OFF	FREE	4.0	07:14:08.05
19-10-1	008853	B1.41.0065.009	Climbing intercept at 2 deg	ON	FREE	4.0	07:16:08.05
19-10-1	008854	B1.41.0065.009.1	Climbing intercept at 2 deg	OFF	FREE	4.3	07:17:38.05
19-10-1	008855	B1.41.0065.002	Intercept at 2 deg	ON	PILOT	4*	07:19:03.05
19-10-1	008856	B1.41.0065.002.1	Intercept at 2 deg	OFF	PILOT	4*	07:19:53.05
19-10-1	008857	B1.41.0065.021	Straight thru descending wake	ON	FREE	4*	07:21:03.05
19-10-1	008858	B1.41.0065.021.1	Straight thru descending wake	OFF	FREE	4.1	07:26:08.00
19-10-1	008859	B1.41.0065.021.2	Turn onto descending core	ON	FREE	4*	07:27:48.00
19-10-1	008860	B1.41.0065.021.3	Turn onto descending core	ON	FREE	3.6	07:30:13.00
19-10-1	008861	B1.41.0065.021.4	Turn onto descending core	OFF	FREE	3*	07:31:28.00
19-10-1	008862	B1.41.0065.026.1	Left wing in right vortex	ON	PILOT	3*	07:34:58.00
19-10-1	008863	B1.41.0065.025.1	Right wing in leftt vortex	ON	PILOT	3*	07:37:17.95
19-10-1	008864	B1.41.0065.027.1	Vertical fin in a vortex	ON	PILOT	3*	07:40:07.95
19-10-1	008865	B1.41.0065.041.2	Stabilize below wake centerline	ON	PILOT	2.8	07:42:27.95
19-10-1	008866	B1.41.0065.043.1	Stabilize on wake centerline	ON	PILOT	3*	07:43:17.95
19-10-1	008867	B1.41.0065.042.1	Stabilize above wake centerline	ON	PILOT	3*	07:44:37.95
19-10-1	008887	B1.41.0065.041T.1	Complete ascent through wake	ON	PILOT	2.8	07:42:27.95
19-10-1	008868	B1.41.0065.001.2	Intercept at 2 deg	ON	FREE	3.6	07:45:47.95
19-10-1	008869	B1.41.0065.001.3	Intercept at 2 deg	OFF	FREE	3.3	07:49:57.90

*Nominal target trailing distance is provided when TCAS distance is not available

**Data will be provided at a future date

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727/737 WAKE ENCOUNTER FLIGHT TEST
CONDITION LIST ORDERED CHRONOLOGICALLY

Test No.	Sequence Number	Condition Number	Manuever Description	Yaw Damper	Control	Trailing Distance	IRIG at Time = 0
19-10-1	008870	B1.41.0065.009.2	Climbing intercept at 2 deg	ON	FREE	3*	07:51:17.90
19-10-1	008871	B1.41.0065.009.3	Climbing intercept at 2 deg	OFF	FREE	3*	07:52:32.90
19-10-1	008872	B1.41.0065.009.4	Climbing intercept at 2 deg	ON	FREE	3*	07:53:27.90
19-10-1	008873	B1.41.0065.009.5	Climbing intercept at 2 deg	OFF	FREE	3*	07:54:42.90
19-10-1	008874	B1.41.0065.021.5	Straight thru descending wake	ON	FREE	3.0	07:55:57.90
19-10-1	008875	B1.41.0065.021.6	Straight thru descending wake	OFF	FREE	3.1	07:57:47.90
19-10-1	008876	B1.41.0065.021.7	Turn onto descending core	ON	FREE	2.4	07:59:27.90
19-10-1	008877	B1.41.0065.001.4	Intercept at 2 deg	ON	FREE	2.1	08:06:47.85
19-10-1	008878	B1.41.0065.001.5	Intercept at 2 deg	OFF	FREE	2.3	08:07:42.85
19-10-1	008879	B1.41.0065.009.6	Climbing intercept at 2 deg	ON	FREE	2*	08:09:07.85
19-10-1	008880	B1.41.0065.009.7	Climbing intercept at 2 deg	OFF	FREE	2.2	08:09:57.85
19-10-1	008881	B1.41.0065.021.8	Straight thru descending wake	ON	FREE	2.1	08:11:07.85
19-10-1	008882	B1.41.0065.021.9	Straight thru descending wake	OFF	FREE	2*	08:12:47.85
19-10-1	008883	B1.41.0065.SWP.1	Post-flight control sweeps	ON	PILOT	N/A	08:33:57.75

ATTACHMENT 5

Listing of Attempted Flight Conditions, by Condition Number

727/737 WAKE ENCOUNTER FLIGHT TEST
CONDITION LIST GROUPED BY CONDITION NUMBER

Test No.	Sequence Number	Condition Number	Manuever Description	Yaw Damper	Control	Trailing Distance	IRIG at Time = 0
19-07-1	008720	B1.41.0065.001	Intercept at 5 deg from left	ON	FREE	4*	10:48:37.90
19-08-1	008777	B1.41.0065.001	Intercept at 2 deg	ON	FREE	3*	07:53:43.25
19-10-1	008851	B1.41.0065.001	Intercept at 2 deg	ON	FREE	4.0	07:13:28.05
19-07-1	008721	B1.41.0065.001.1	Intercept at 5 deg from right	ON	FREE	3.6	10:49:52.90
19-08-1	008778	B1.41.0065.001.1	Intercept at 2 deg	OFF	FREE	3*	07:53:53.25
19-09-1	008811	B1.41.0065.001.1	Intercept at 2 deg	ON	FREE	1.7	07:36:35.00
19-10-1	008852	B1.41.0065.001.1	Intercept at 2 deg	OFF	FREE	4.0	07:14:08.05
19-09-1	008812	B1.41.0065.001.2	Intercept at 2 deg	OFF	FREE	1.9	07:38:30.00
19-10-1	008868	B1.41.0065.001.2	Intercept at 2 deg	ON	FREE	3.6	07:45:47.95
19-10-1	008869	B1.41.0065.001.3	Intercept at 2 deg	OFF	FREE	3.3	07:49:57.90
19-09-1	008824	B1.41.0065.001.4	Intercept at 2 deg	ON	FREE	3.1	08:25:20.00
19-10-1	008877	B1.41.0065.001.4	Intercept at 2 deg	ON	FREE	2.1	08:06:47.85
19-09-1	008825	B1.41.0065.001.5	Intercept at 2 deg	OFF	FREE	3.0	08:26:59.80
19-10-1	008878	B1.41.0065.001.5	Intercept at 2 deg	OFF	FREE	2.3	08:07:42.85
19-09-1	008826	B1.41.0065.001.6	Intercept at 2 deg	OFF	FREE	2.9	08:29:29.80
19-07-1	008718	B1.41.0065.002	Intercept at 5 deg from left	ON	PILOT	4*	10:45:12.95
19-08-1	008775	B1.41.0065.002	Intercept at 2 deg	ON	PILOT	3.0	07:50:43.25
19-10-1	008855	B1.41.0065.002	Intercept at 2 deg	ON	PILOT	4*	07:19:03.05
19-07-1	008719	B1.41.0065.002.1	Intercept at 5 deg from right	ON	PILOT	4*	10:47:12.95
19-08-1	008776	B1.41.0065.002.1	Intercept at 2 deg	OFF	PILOT	3.2	07:52:43.25
19-10-1	008856	B1.41.0065.002.1	Intercept at 2 deg	OFF	PILOT	4*	07:19:53.05
19-07-1	008722	B1.41.0065.003	Intercept at 5 deg from left	ON	AUTOPILOT	4*	10:51:22.90
19-08-1	008779	B1.41.0065.003	Intercept at 2 deg	ON	AUTOPILOT	3*	07:55:13.25
19-07-1	008723	B1.41.0065.003.1	Intercept at 5 deg from right	ON	AUTOPILOT	4*	10:52:32.90
19-08-1	008780	B1.41.0065.003.1	Intercept at 2 deg	OFF	AUTOPILOT	2.9	07:58:23.20
19-07-1	008724	B1.41.0065.004	Intercept at 5 deg from left	ON	CWS	4*	10:53:42.90
19-07-1	008725	B1.41.0065.004.1	Intercept at 5 deg from right	ON	CWS	4*	10:54:42.90
19-07-1	008728	B1.41.0065.005	Intercept at 10 deg from left	ON	FREE	4*	11:00:22.90
19-08-1	008783	B1.41.0065.005	Intercept at 5 deg	ON	FREE	3*	08:04:33.20
19-07-1	008729	B1.41.0065.005.1	Intercept at 10 deg from right	ON	FREE	4*	11:01:22.90
19-08-1	008784	B1.41.0065.005.1	Intercept at 5 deg	OFF	FREE	3*	08:05:03.20

*Nominal target trailing distance is provided when TCAS distance is not available

**Data will be provided at a future date

727/737 WAKE ENCOUNTER FLIGHT TEST
CONDITION LIST GROUPED BY CONDITION NUMBER

Test No.	Sequence Number	Condition Number	Manuever Description	Yaw Damper	Control	Trailing Distance	IRIG at Time = 0
19-08-1	008785	B1.41.0065.005.3	Intercept at 5 deg	ON	FREE	2.6	08:06:03.20
19-08-1	008786	B1.41.0065.005.4	Intercept at 5 deg	OFF	FREE	3*	08:14:03.15
19-07-1	008726	B1.41.0065.006	Intercept at 10 deg from left	ON	PILOT	4*	10:55:32.90
19-08-1	008781	B1.41.0065.006	Intercept at 5 deg	ON	PILOT	3*	08:01:13.20
19-07-1	008727	B1.41.0065.006.1	Intercept at 10 deg from right	ON	PILOT	4*	10:57:52.90
19-08-1	008782	B1.41.0065.006.1	Intercept at 5 deg	OFF	PILOT	3*	08:03:13.20
19-07-1	008730	B1.41.0065.007	Intercept at 10 deg from left	ON	AUTOPILOT	4.4	11:03:22.85
19-07-1	008731	B1.41.0065.007.1	Intercept at 10 deg from right	ON	AUTOPILOT	4.2	11:04:12.90
19-07-1	008732	B1.41.0065.008	Intercept at 10 deg from left	ON	CWS	3.6	11:12:52.85
19-07-1	008733	B1.41.0065.008.1	Intercept at 10 deg from right	ON	CWS	4*	11:14:02.85
19-07-1	008736	B1.41.0065.009	Ascent thru wake	ON	FREE	3.3	11:17:02.80
19-08-1	008789	B1.41.0065.009	Intercept at 2 deg	ON	FREE	3*	08:17:53.15
19-09-1	008813	B1.41.0065.009	Climbing intercept at 2 deg	ON	FREE	2*	07:39:30.00
19-10-1	008853	B1.41.0065.009	Climbing intercept at 2 deg	ON	FREE	4.0	07:16:08.05
19-07-1	008737	B1.41.0065.009.1	Descent thru wake**	ON	FREE	4*	
19-08-1	008790	B1.41.0065.009.1	Intercept at 2 deg	OFF	FREE	3*	08:19:33.15
19-09-1	008814	B1.41.0065.009.1	Climbing intercept at 2 deg	ON	FREE	2*	07:48:10.00
19-10-1	008854	B1.41.0065.009.1	Climbing intercept at 2 deg	OFF	FREE	4.3	07:17:38.05
19-07-1	008738	B1.41.0065.009.2	Ascent thru wake	ON	FREE	4*	11:18:22.80
19-08-1	008791	B1.41.0065.009.2	Climbing intercept at 2 deg	ON	FREE	3*	08:21:13.15
19-09-1	008815	B1.41.0065.009.2	Climbing intercept at 2 deg	OFF	FREE	2.1	07:49:29.95
19-10-1	008870	B1.41.0065.009.2	Climbing intercept at 2 deg	ON	FREE	3*	07:51:17.90
19-08-1	008792	B1.41.0065.009.3	Climbing intercept at 2 deg	OFF	FREE	3*	08:22:33.15
19-09-1	008827	B1.41.0065.009.3	Climbing intercept at 2 deg	ON	FREE	2.9	08:30:39.75
19-10-1	008871	B1.41.0065.009.3	Climbing intercept at 2 deg	OFF	FREE	3*	07:52:32.90
19-08-1	008793	B1.41.0065.009.4	Descending intercept at 2 deg	ON	FREE	3*	08:24:23.10
19-09-1	008828	B1.41.0065.009.4	Climbing intercept at 2 deg	OFF	FREE	3.1	08:32:09.75
19-10-1	008872	B1.41.0065.009.4	Climbing intercept at 2 deg	ON	FREE	3*	07:53:27.90
19-08-1	008794	B1.41.0065.009.5	Descending intercept at 2 deg	OFF	FREE	3.1	08:25:43.10
19-10-1	008873	B1.41.0065.009.5	Climbing intercept at 2 deg	OFF	FREE	3*	07:54:42.90
19-10-1	008879	B1.41.0065.009.6	Climbing intercept at 2 deg	ON	FREE	2*	08:09:07.85

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**Data will be provided at a future date

727/737 WAKE ENCOUNTER FLIGHT TEST
CONDITION LIST GROUPED BY CONDITION NUMBER

Test No.	Sequence Number	Condition Number	Manuever Description	Yaw Damper	Control	Trailing Distance	IRIG at Time = 0
19-10-1	008880	B1.41.0065.009.7	Climbing intercept at 2 deg	OFF	FREE	2.2	08:09:57.85
19-07-1	008734	B1.41.0065.010	Ascent thru wake	ON	PILOT	4*	11:15:47.80
19-08-1	008787	B1.41.0065.010	Climbing intercept at 2 deg	ON	PILOT	3*	08:15:33.15
19-07-1	008735	B1.41.0065.010.1	Descent thru wake	ON	PILOT	4*	11:16:32.80
19-08-1	008788	B1.41.0065.010.1	Climbing intercept at 2 deg	OFF	PILOT	3*	08:16:43.15
19-07-2	008749	B1.41.0065.010.2	Ascent thru wake	ON	PILOT	3*	14:37:34.00
19-07-1	008739	B1.41.0065.011	Ascent thru wake	ON	AUTOPILOT	4*	11:20:32.80
19-07-1	008740	B1.41.0065.011.1	Descent thru wake	ON	AUTOPILOT	4*	11:21:32.80
19-07-1	008741	B1.41.0065.012	Ascent thru wake	ON	CWS	4*	11:22:32.80
19-07-1	008742	B1.41.0065.012.1	Descent thru wake	ON	CWS	4*	11:23:12.80
19-07-2	008751	B1.41.0065.013	Left turn onto right core	ON	PILOT	3*	14:42:49.95
19-07-2	008752	B1.41.0065.013.1	Right turn onto left core	ON	PILOT	3*	14:43:29.95
19-07-1	008743	B1.41.0065.014	Left turn onto right core	ON	PILOT	4*	11:24:32.80
19-07-1	008744	B1.41.0065.014.1	Left turn onto right core	ON	FREE	4*	11:25:32.80
19-07-1	008745	B1.41.0065.014.2	Left turn onto right core	ON	PILOT	4*	11:26:32.80
19-07-2	008750	B1.41.0065.014.3	Left turn onto right core	ON	PILOT	3*	14:41:29.00
19-07-2	008753	B1.41.0065.015	Left turn onto right core	ON	AUTOPILOT	3*	14:44:56.95
19-07-2	008754	B1.41.0065.015.1	Right turn onto left core	ON	AUTOPILOT	3*	14:46:59.95
19-07-2	008762	B1.41.0065.018	Left turn onto descending rt core	ON	PILOT	3*	15:20:24.85
19-07-2	008763	B1.41.0065.018.1	Left turn onto descending rt core	ON	PILOT	3*	15:22:04.80
19-07-2	008764	B1.41.0065.018.2	Left turn onto descending rt core	ON	PILOT	3.0	15:22:59.80
19-07-2	008765	B1.41.0065.018.3	Left turn onto descending rt core	ON	PILOT	3*	15:24:07.80
19-07-2	008756	B1.41.0065.021	Straight thru descending wake	ON	FREE	3.0	14:57:57.90
19-08-1	008797	B1.41.0065.021	Straight thru descendeding wake	ON	FREE	3*	08:37:13.05
19-09-1	008816	B1.41.0065.021	Straight thru descending wake	ON	FREE	1.9	07:52:39.90
19-10-1	008857	B1.41.0065.021	Straight thru descending wake	ON	FREE	4*	07:21:03.05
19-07-2	008757	B1.41.0065.021.1	Straight thru descending wake	ON	FREE	3.0	14:58:47.90
19-08-1	008798	B1.41.0065.021.1	Straight thru descendeding wake	OFF	FREE	3*	08:41:23.05
19-09-1	008817	B1.41.0065.021.1	Straight thru descending wake	OFF	FREE	1.9	07:54:59.90
19-10-1	008858	B1.41.0065.021.1	Straight thru descending wake	OFF	FREE	4.1	07:26:03.00
19-10-1	008859	B1.41.0065.021.2	Turn onto descending core	ON	FREE	4*	07:27:48.00

*Nominal target trailing distance is provided when TCAS distance is not available

**Data will be provided at a future date

727/737 WAKE ENCOUNTER FLIGHT TEST
CONDITION LIST GROUPED BY CONDITION NUMBER

Test No.	Sequence Number	Condition Number	Manuever Description	Yaw Damper	Control	Trailing Distance	IRIG at Time = 0
19-09-1	008829	B1.41.0065.021.3	Straight thru descending wake	ON	FREE	3*	08:37:49.75
19-10-1	008860	B1.41.0065.021.3	Turn onto descending core	ON	FREE	3.6	07:30:13.00
19-09-1	008830	B1.41.0065.021.4	Straight thru descending wake	OFF	FREE	3.1	08:43:29.75
19-10-1	008861	B1.41.0065.021.4	Turn onto descending core	OFF	FREE	3*	07:31:28.00
19-10-1	008874	B1.41.0065.021.5	Straight thru descending wake	ON	FREE	3.0	07:55:57.90
19-10-1	008875	B1.41.0065.021.6	Straight thru descending wake	OFF	FREE	3.1	07:57:47.90
19-10-1	008876	B1.41.0065.021.7	Turn onto descending core	ON	FREE	2.4	07:59:27.90
19-10-1	008881	B1.41.0065.021.8	Straight thru descending wake	ON	FREE	2.1	08:11:07.85
19-10-1	008882	B1.41.0065.021.9	Straight thru descending wake	OFF	FREE	2*	08:12:47.85
19-07-2	008755	B1.41.0065.022	Straight thru descending wake	ON	PILOT	3*	14:56:39.90
19-08-1	008795	B1.41.0065.022	Straight thru descendeding wake	ON	PILOT	3.2	08:32:53.10
19-08-1	008796	B1.41.0065.022.1	Straight thru descendeding wake	OFF	PILOT	3.1	08:35:33.10
19-07-2	008758	B1.41.0065.023	Straight thru descending wake	ON	AUTOPILOT	3*	15:06:29.90
19-07-2	008759	B1.41.0065.023.1	Straight thru descending wake	ON	AUTOPILOT	3*	15:08:11.90
19-07-2	008760	B1.41.0065.023.2	Straight thru descending wake	ON	AUTOPILOT	3*	15:09:28.85
19-07-2	008761	B1.41.0065.023.3	Straight thru descending wake**	ON	AUTOPILOT	N/A	
19-06-1	008705	B1.41.0065.025	Right wing in left vortex	ON	PILOT	4.0	08:34:52.40
19-07-1	008714	B1.41.0065.025	Right wing in left vortex	ON	PILOT	4.2	10:24:13.00
19-08-1	008771	B1.41.0065.025	Right wing in left vortex	ON	PILOT	1.9	07:32:23.30
19-10-1	008845	B1.41.0065.025	Right wing in left vortex	ON	PILOT	3.8	06:46:18.15
19-08-1	008800	B1.41.0065.025.1	Right wing in left vortex	ON	PILOT	3.1	08:53:53.00
19-09-1	008806	B1.41.0065.025.1	Right wing in left vortex	ON	PILOT	2.0	07:28:10.00
19-10-1	008863	B1.41.0065.025.1	Right wing in left vortex	ON	PILOT	3*	07:37:17.95
19-09-1	008819	B1.41.0065.025.2	Right wing in left vortex	ON	PILOT	3.0	08:10:29.85
19-06-1	008703	B1.41.0065.026	Left wing in right vortex	ON	PILOT	4.0	08:26:50.45
19-08-1	008770	B1.41.0065.026	Left wing in right vortex	ON	PILOT	1.8	07:27:13.35
19-10-1	008844	B1.41.0065.026	Left wing in right vortex	ON	PILOT	4.0	06:42:18.20
19-06-1	008704	B1.41.0065.026.1	Left wing in right vortex	ON	PILOT	4.0	08:31:12.40
19-08-1	008799	B1.41.0065.026.1	Left wing in right vortex	ON	PILOT	3.2	08:51:33.00
19-09-1	008805	B1.41.0065.026.1	Left wing in right vortex	ON	PILOT	2*	07:26:50.05
19-10-1	008862	B1.41.0065.026.1	Left wing in right vortex	ON	PILOT	3*	07:34:58.00

*Nominal target trailing distance is provided when TCAS distance is not available

**Data will be provided at a future date

727/737 WAKE ENCOUNTER FLIGHT TEST
CONDITION LIST GROUPED BY CONDITION NUMBER

Test No.	Sequence Number	Condition Number	Maneuver Description	Yaw Damper	Control	Trailing Distance	IRIG at Time = 0
19-09-1	008818	B1.41.0065.026.2	Left wing in right vortex**	ON	PILOT	3.1	
19-07-1	008713	B1.41.0065.026.4	Left wing in right vortex	ON	PILOT	4*	10:21:33.05
19-07-2	008766	B1.41.0065.026.6	Right wing in left core	ON	PILOT	3*	15:31:06.75
19-06-1	008706	B1.41.0065.027	Vertical fin in a vortex	ON	PILOT	4.0	08:39:10.35
19-07-1	008715	B1.41.0065.027	Vertical fin in a vortex	ON	PILOT	4*	10:27:33.00
19-08-1	008772	B1.41.0065.027	Vertical fin in a vortex	ON	PILOT	1.8	07:35:23.30
19-10-1	008846	B1.41.0065.027	Vertical fin in a vortex	ON	PILOT	3.9	06:49:28.15
19-06-1	008707	B1.41.0065.027.1	Vertical fin in a vortex	ON	PILOT	4.0	08:40:30.40
19-08-1	008773	B1.41.0065.027.1	Vertical fin in a vortex	ON	PILOT	1.8	07:38:13.30
19-09-1	008807	B1.41.0065.027.1	Vertical fin in a vortex	ON	PILOT	2.0	07:30:20.00
19-10-1	008864	B1.41.0065.027.1	Vertical fin in a vortex	ON	PILOT	3*	07:40:07.95
19-06-1	008708	B1.41.0065.027.2	Vertical fin in a vortex	ON	PILOT	4.0	08:41:50.40
19-08-1	008774	B1.41.0065.027.2	Vertical fin in a vortex	ON	PILOT	1.8	07:40:33.30
19-09-1	008820	B1.41.0065.027.2	Vertical fin in a vortex	ON	PILOT	2.9	08:13:19.85
19-06-1	008709	B1.41.0065.027.3	Vertical fin in a vortex	ON	PILOT	4.0	08:48:00.30
19-08-1	008801	B1.41.0065.027.3	Vertical fin in a vortex	ON	PILOT	3*	08:56:03.00
19-07-1	008716	B1.41.0065.029	Left wing in right vortex	ON	CWS	4*	10:33:53.00
19-07-1	008717	B1.41.0065.030	Vertical fin in vortex	ON	CWS	4*	10:35:32.95
19-07-1	008712	B1.41.0065.031	727/737 Baro altimeter calib**	ON	PILOT	N/A	
19-08-1	008769	B1.41.0065.031	727/737 Baro altimeter calib**	ON	PILOT	N/A	
19-09-1	008804	B1.41.0065.031	727/737 Baro altimeter calib**	ON	PILOT	N/A	
19-07-2	008748	B1.41.0065.032	Vertical fin in core	ON	PILOT	2.9	14:25:43.05
19-10-1	008847	B1.41.0065.041	Stabilize below wake centerline	ON	PILOT	4*	06:54:18.15
19-09-1	008808	B1.41.0065.041.1	Stabilize below wake centerline	ON	PILOT	2*	07:32:50.00
19-10-1	008848	B1.41.0065.041.1	Stabilize below wake centerline	ON	PILOT	4*	07:10:28.10
19-09-1	008821	B1.41.0065.041.2	Stabilize below wake centerline	ON	PILOT	2.9	08:16:19.85
19-10-1	008865	B1.41.0065.041.2	Stabilize below wake centerline	ON	PILOT	2.8	07:42:27.95
19-09-1	008884	B1.41.0065.041T	Complete ascent through wake	ON	PILOT	2*	07:32:50.00
19-10-1	008886	B1.41.0065.041T	Complete ascent through wake	ON	PILOT	4*	07:10:28.10
19-10-1	008887	B1.41.0065.041T.1	Complete ascent through wake	ON	PILOT	2.8	07:42:27.95
19-10-1	008850	B1.41.0065.042	Stabilize above wake centerline	ON	PILOT	4*	07:11:48.05

*Nominal target trailing distance is provided when TCAS distance is not available

**Data will be provided at a future date

727/737 WAKE ENCOUNTER FLIGHT TEST
CONDITION LIST GROUPED BY CONDITION NUMBER

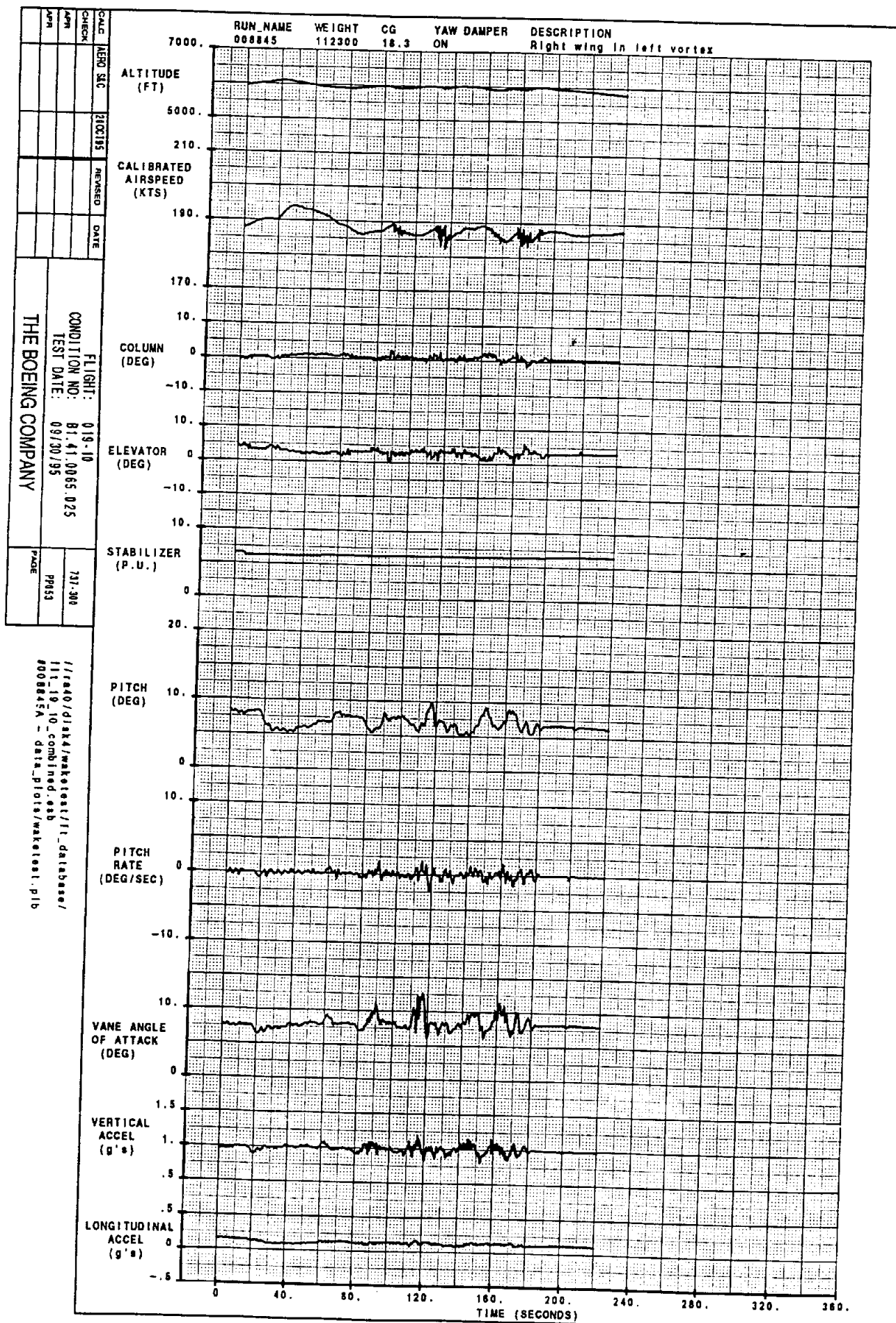
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19-10-1	008867	B1.41.0065.042.1	Stabilize above wake centerline	ON	PILOT	3*	07:44:37.95
19-09-1	008823	B1.41.0065.042.2	Stabilize above wake centerline	ON	PILOT	3*	08:18:09.85
19-10-1	008849	B1.41.0065.043	Stabilize on wake centerline	ON	PILOT	4*	07:11:08.05
19-09-1	008809	B1.41.0065.043.1	Stabilize on wake centerline	ON	PILOT	2*	07:34:00.00
19-10-1	008866	B1.41.0065.043.1	Stabilize on wake centerline	ON	PILOT	3*	07:43:17.95
19-09-1	008822	B1.41.0065.043.2	Stabilize on wake centerline	ON	PILOT	3*	08:17:09.85
19-06-1	008702	B1.41.0065.SWP	Pre-flight control sweeps**	ON	PILOT	N/A	07:43:06.40
19-07-1	008711	B1.41.0065.SWP	Pre-flight control sweeps**	ON	PILOT	N/A	
19-07-2	008747	B1.41.0065.SWP	Pre-flight control sweeps	ON	PILOT	N/A	14:03:06.85
19-08-1	008768	B1.41.0065.SWP	Pre-flight control sweeps**	ON	PILOT	N/A	
19-09-1	008803	B1.41.0065.SWP	Pre-flight control sweeps	ON	PILOT	N/A	06:36:50.00
19-09-2	008835	B1.41.0065.SWP	Pre-flight control sweeps	ON	PILOT	N/A	11:25:49.70
19-10-1	008843	B1.41.0065.SWP	Pre-flight control sweeps**	ON	PILOT	N/A	
19-06-1	008710	B1.41.0065.SWP.1	Post-flight control sweeps	ON	PILOT	N/A	09:19:35.40
19-07-1	008746	B1.41.0065.SWP.1	Post-flight control sweeps	ON	PILOT	N/A	11:38:02.75
19-07-2	008767	B1.41.0065.SWP.1	Post-flight control sweeps	ON	PILOT	N/A	15:49:27.85
19-08-1	008802	B1.41.0065.SWP.1	Post-flight control sweeps	ON	PILOT	N/A	09:12:13.25
19-09-1	008834	B1.41.0065.SWP.1	Post-flight control sweeps	ON	PILOT	N/A	09:18:59.55
19-09-2	008842	B1.41.0065.SWP.1	Post-flight control sweeps	ON	PILOT	N/A	13:01:34.55
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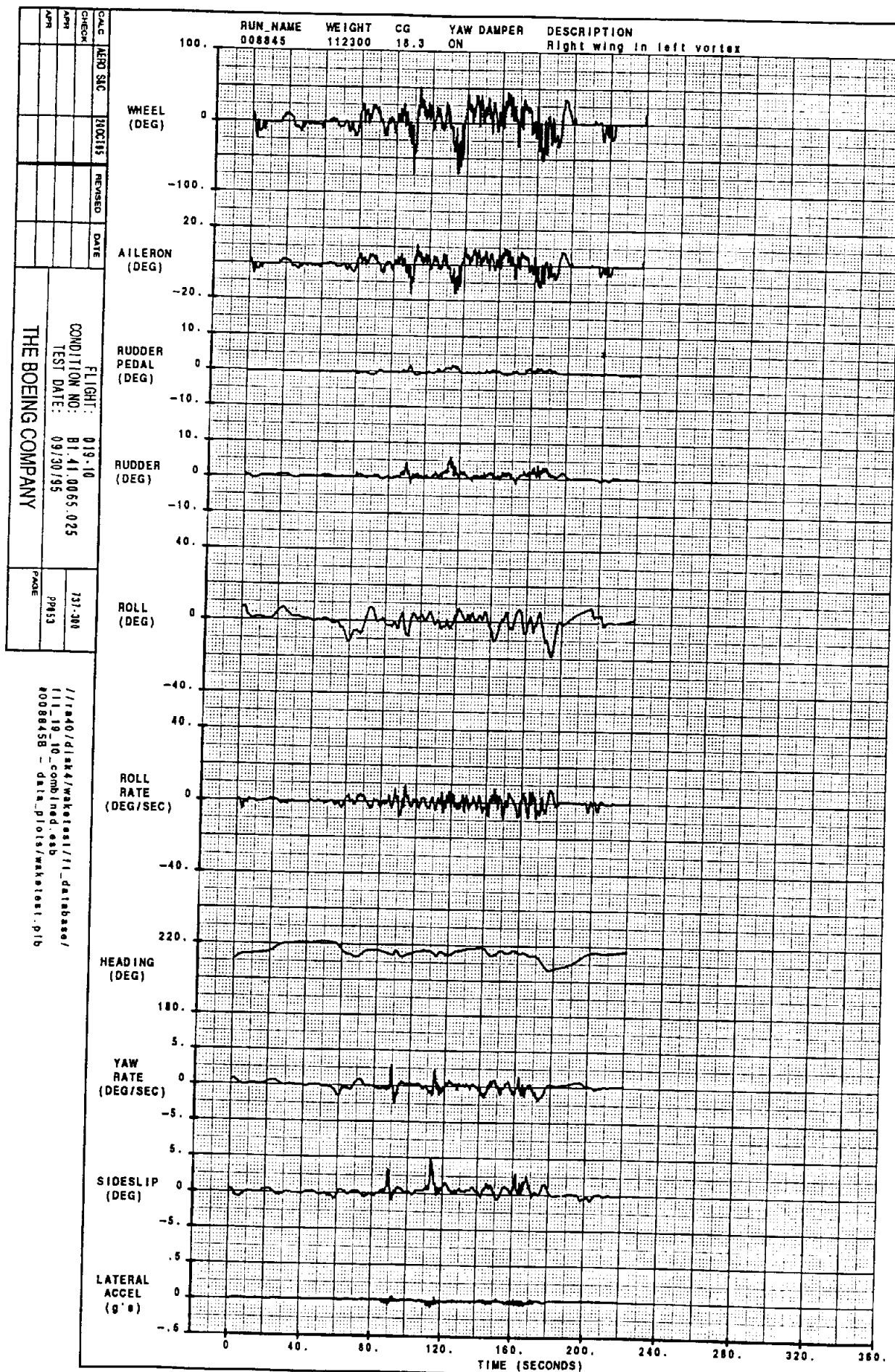
*Nominal target trailing distance is provided when TCAS distance is not available

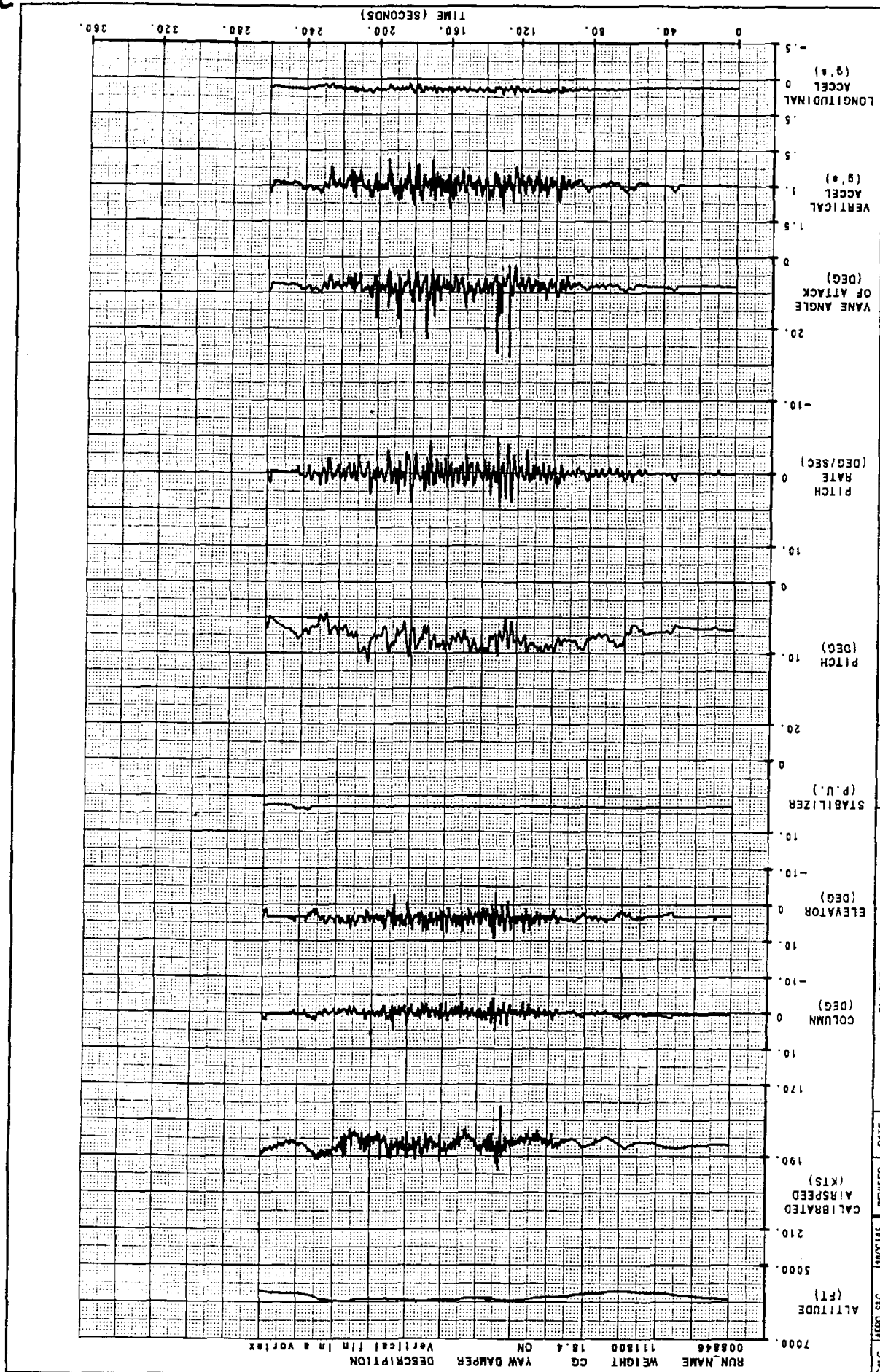
**Data will be provided at a future date

ATTACHMENT 6

Data Plots of Selected Wake Vortex Interactions







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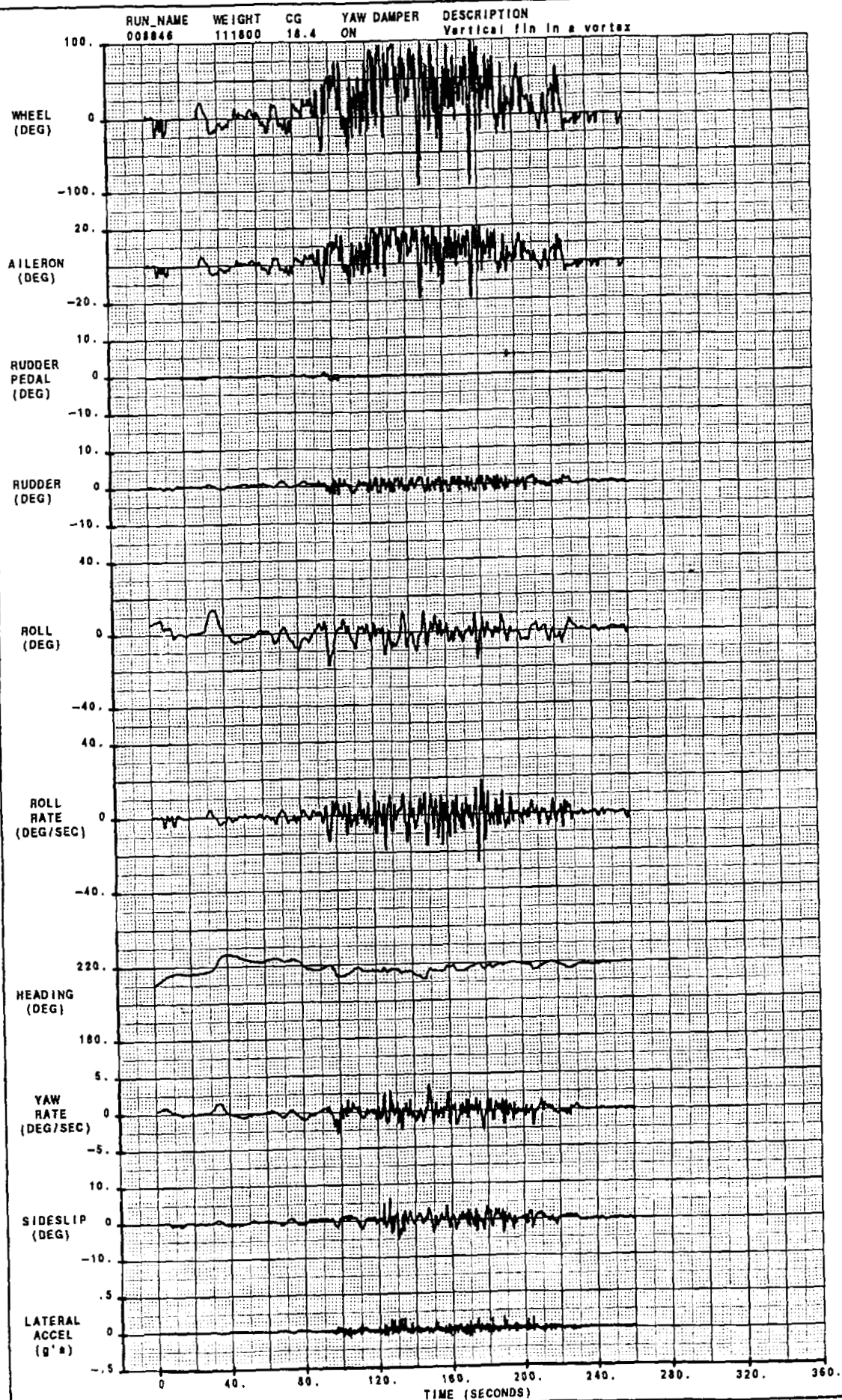
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PP13			
THE BOEING COMPANY			
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TEST DATE: 09/30/95		2002/95	
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		170	
		150	
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		110	
		90	
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RUN NAME 008846
WEIGHT 111800
CG 18.4
YAW DAMPER ON
DESCRIPTION Vertical fin in a vortex

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CHECK				
APR				
APR				

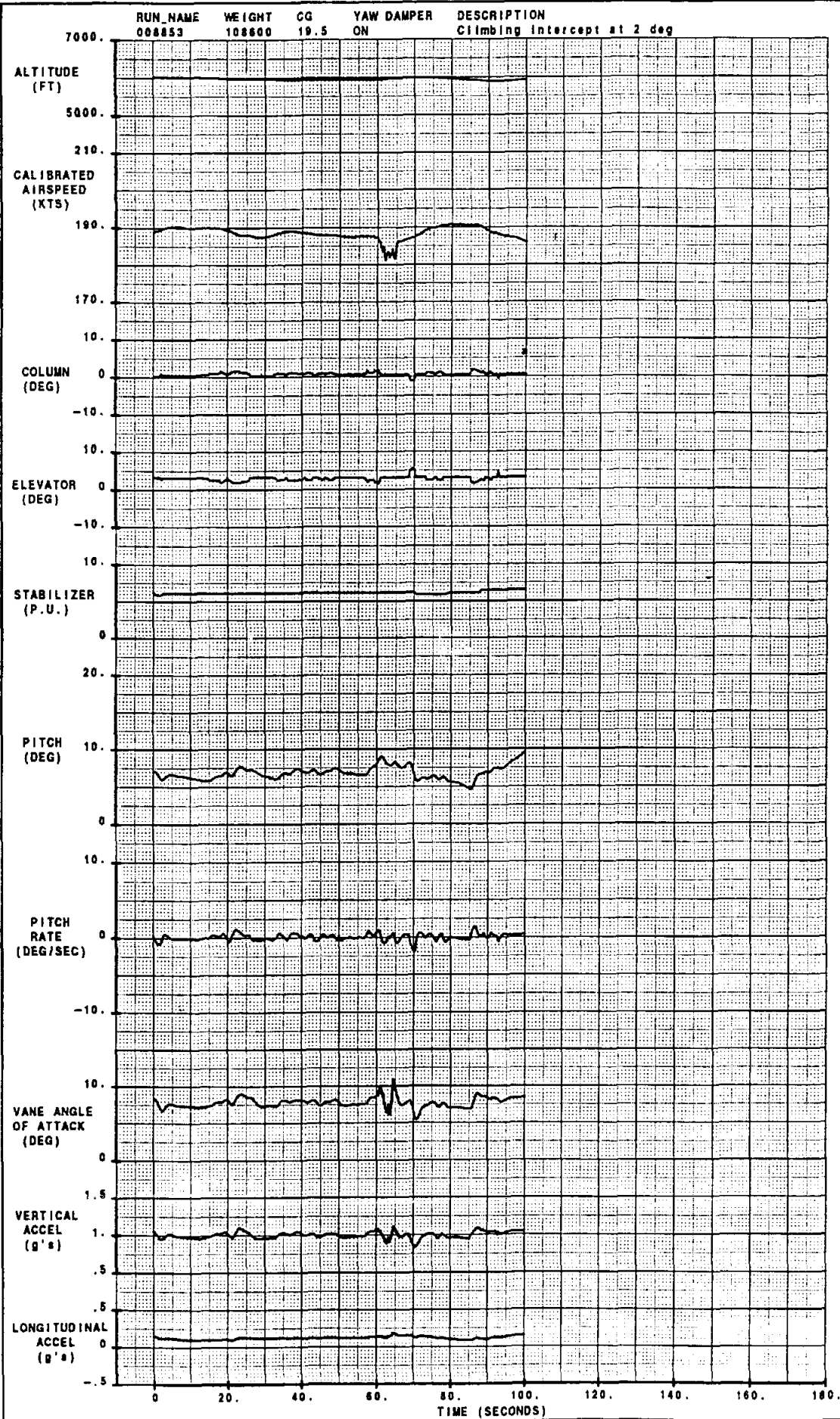
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TEST DATE: 09/30/95	
THE BOEING COMPANY	
PAGE	737-300
	PP53

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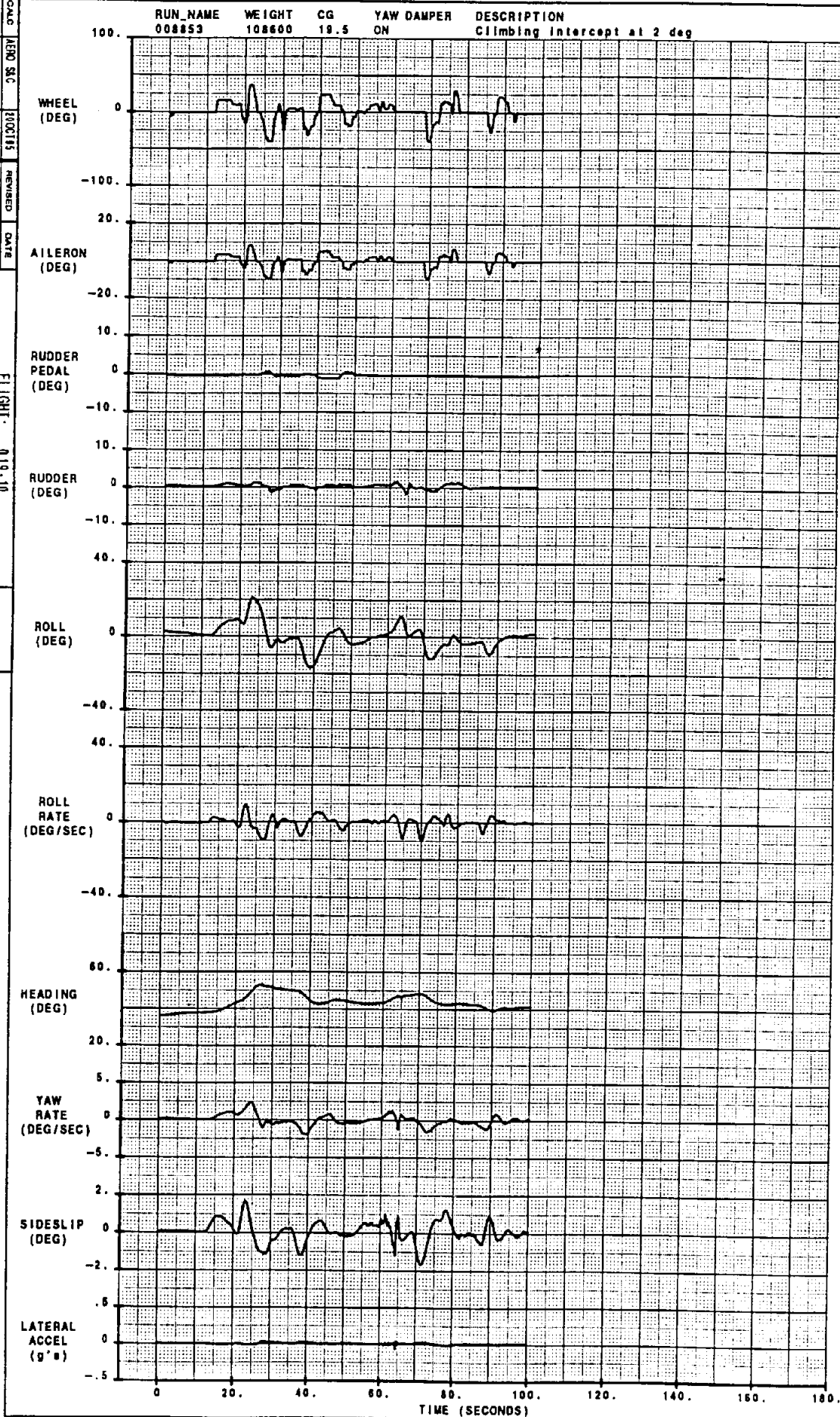
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APR				
APR				
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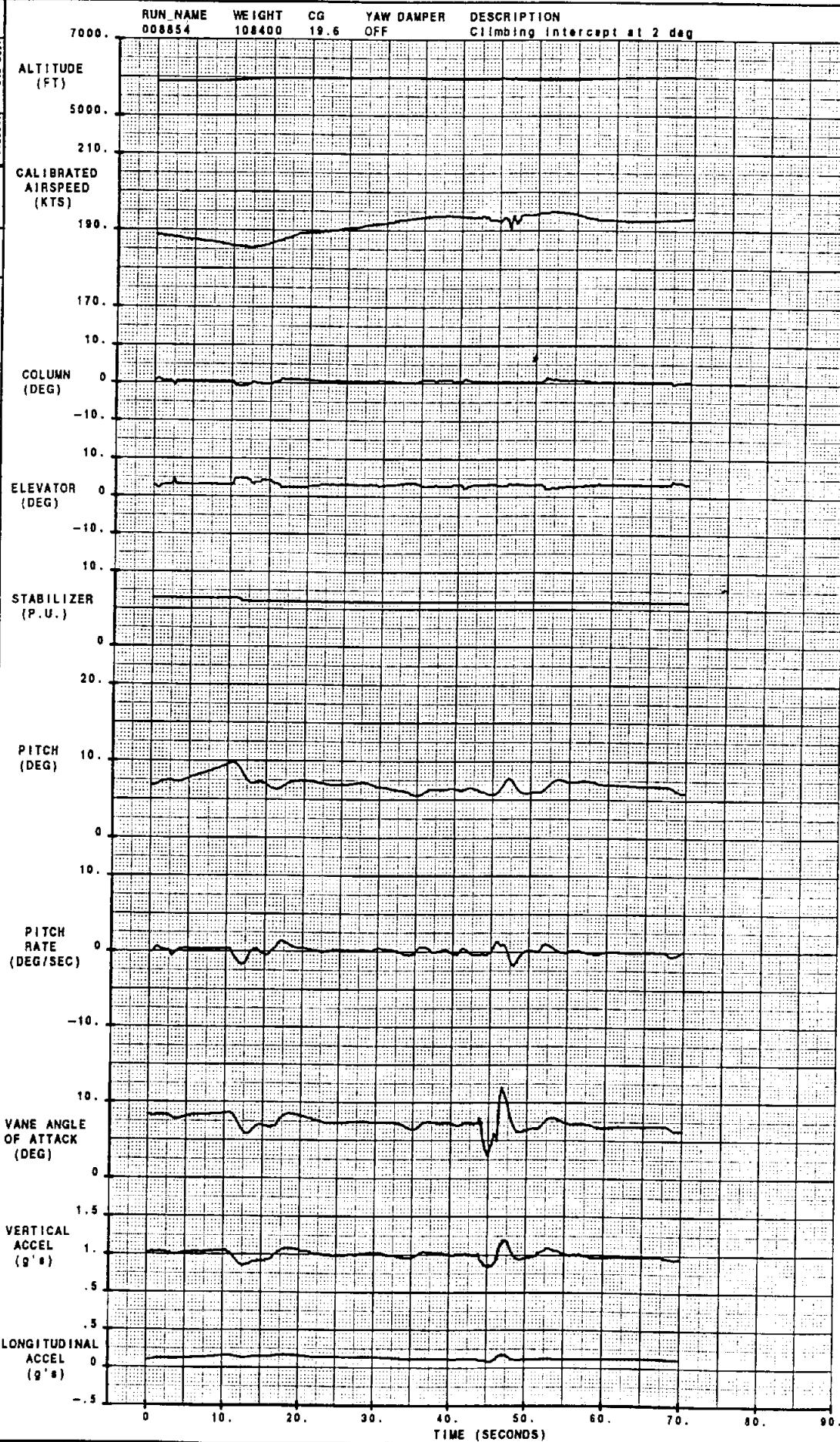
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APP				
APP				
APP				
FLIGHT: 019-10 CONDITION NO: B1-41-0065-009 TEST DATE: 09/30/95 THE BOEING COMPANY 737-300 PM53 Page				

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 8008553B - data.plots/wakeinst.plb



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APR				
APR				

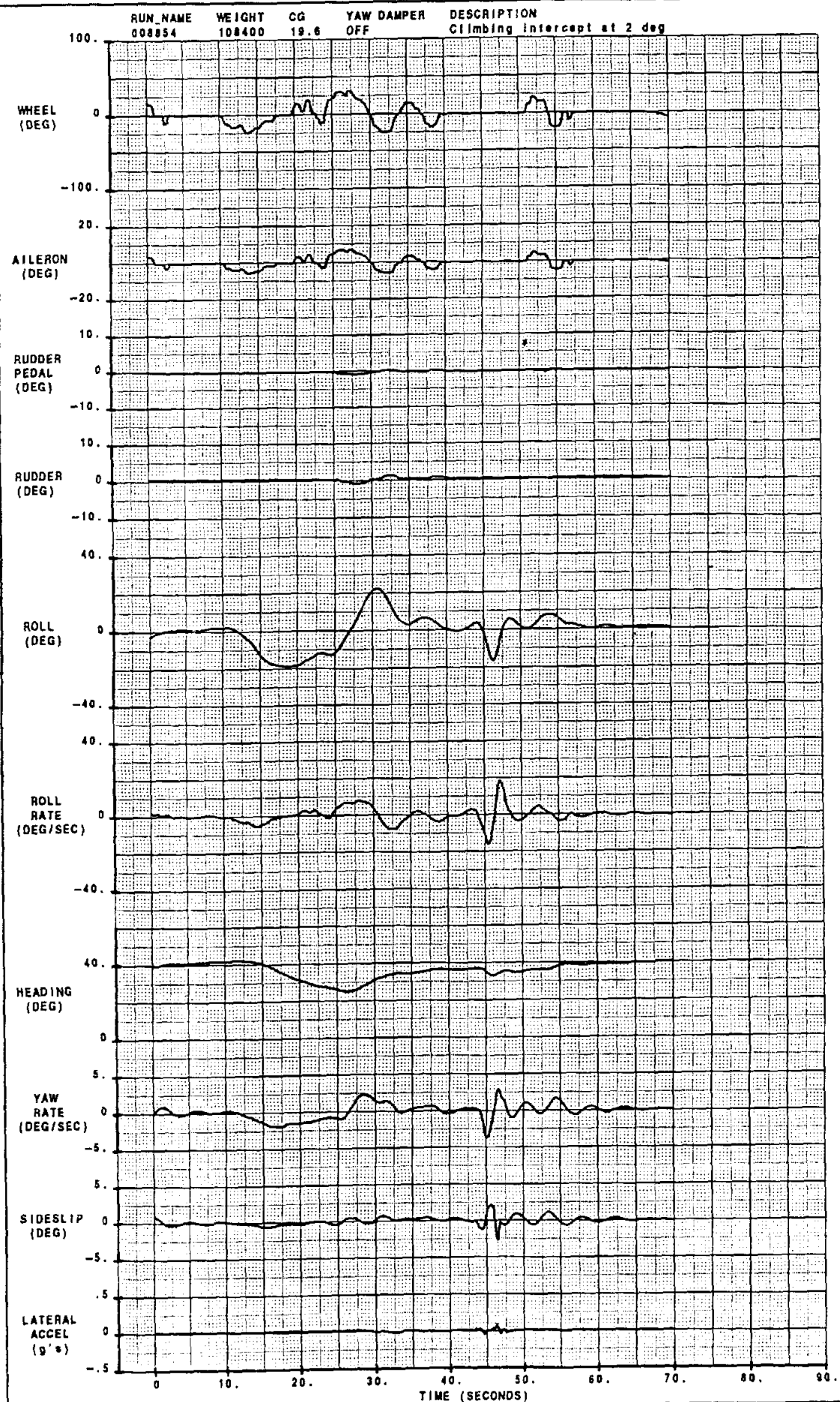
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CONDITION NO: B1.41.0065.009.1	
TEST DATE: 09/20/95	
THE BOEING COMPANY	737-300
	PAGE 3



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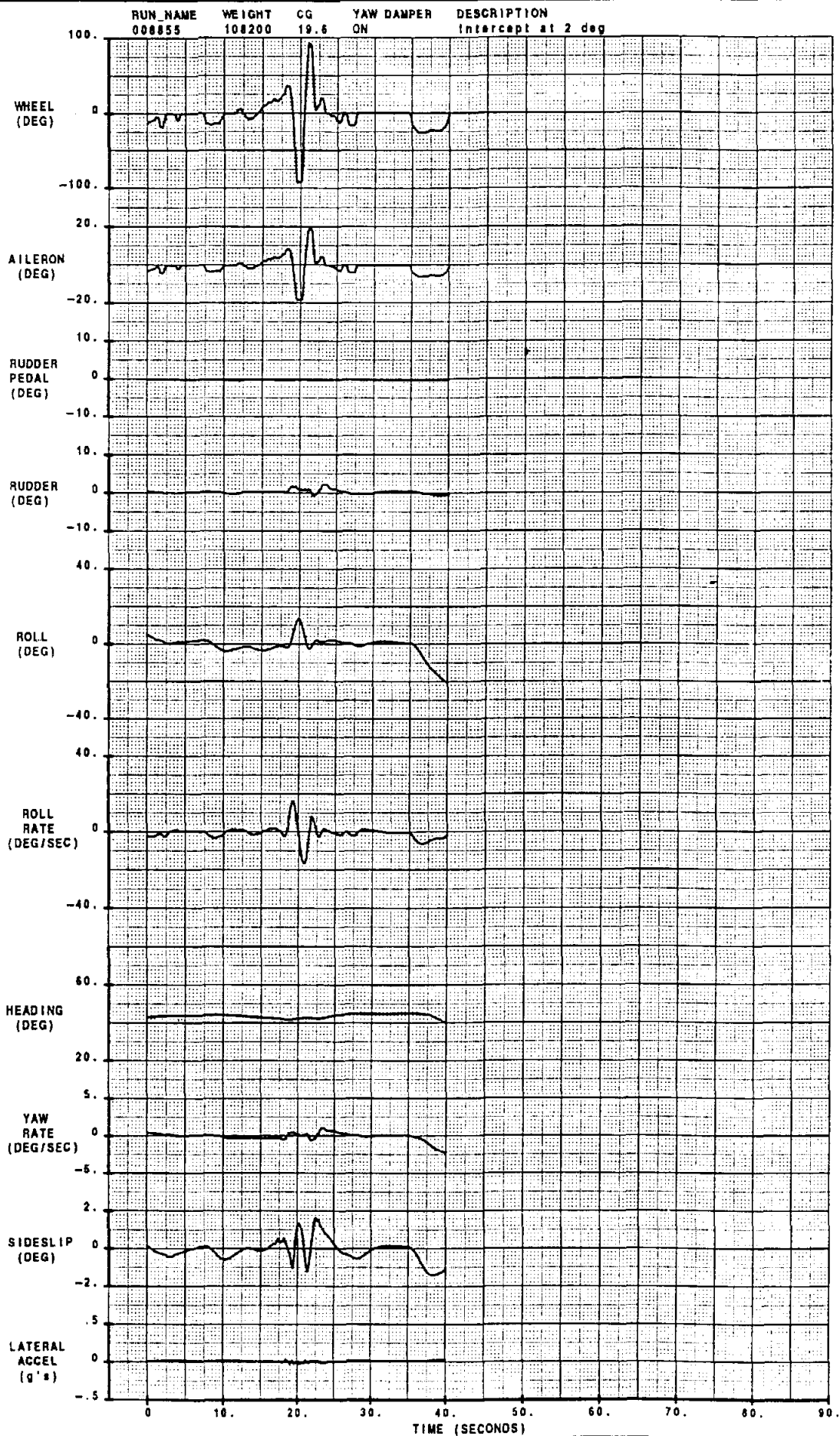
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APR				
FLIGHT: 019-10 CONDITION NO: B1.41.0065.009.1 TEST DATE: 09/30/95 THE BOEING COMPANY PAGE 53				

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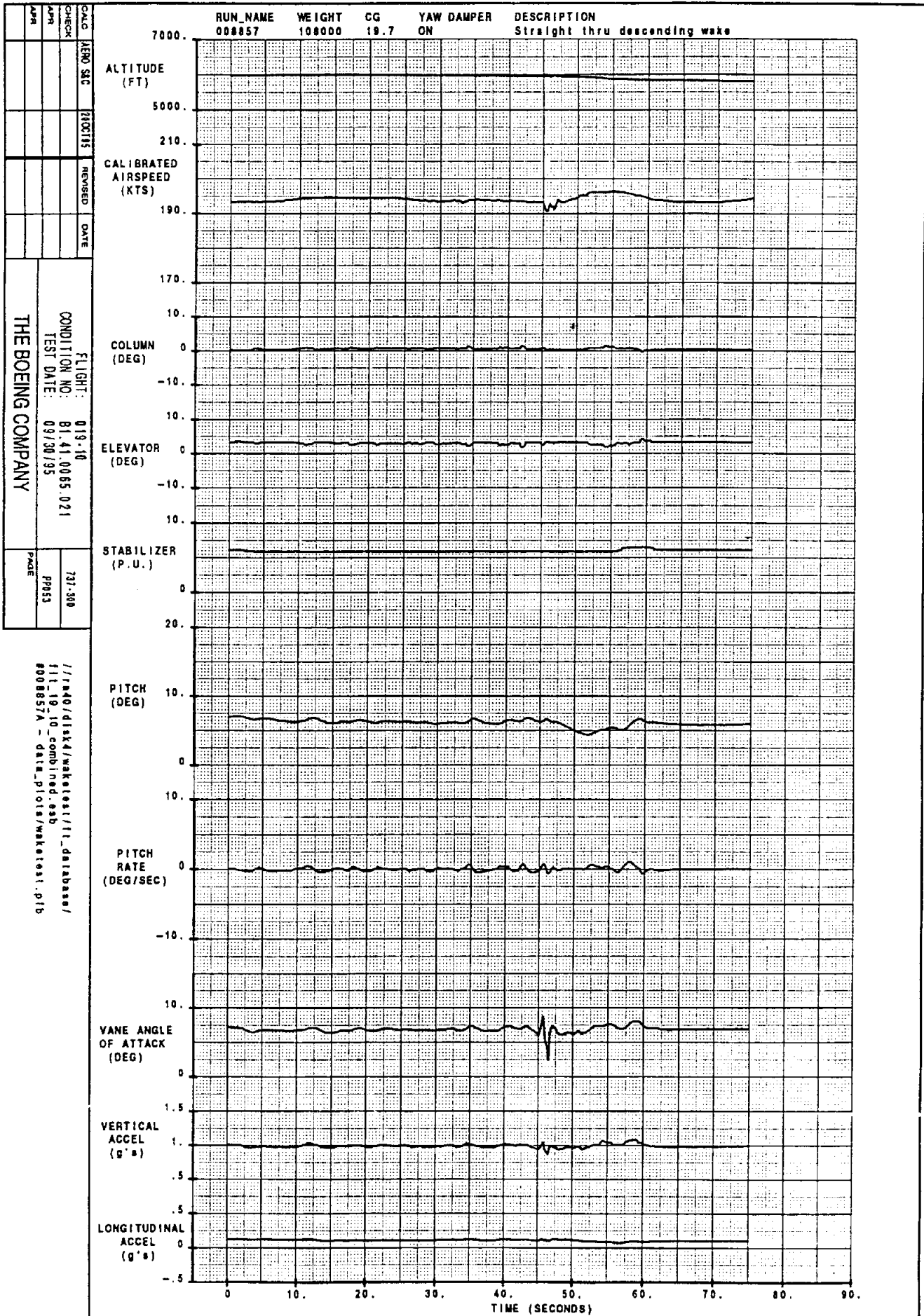


CWAG	MEMO SIC	2002/15	REVISED	DATE
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APR				
APR				

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TEST DATE: 09/30/95	
THE BOEING COMPANY	
737-320	PP353
PAGE	

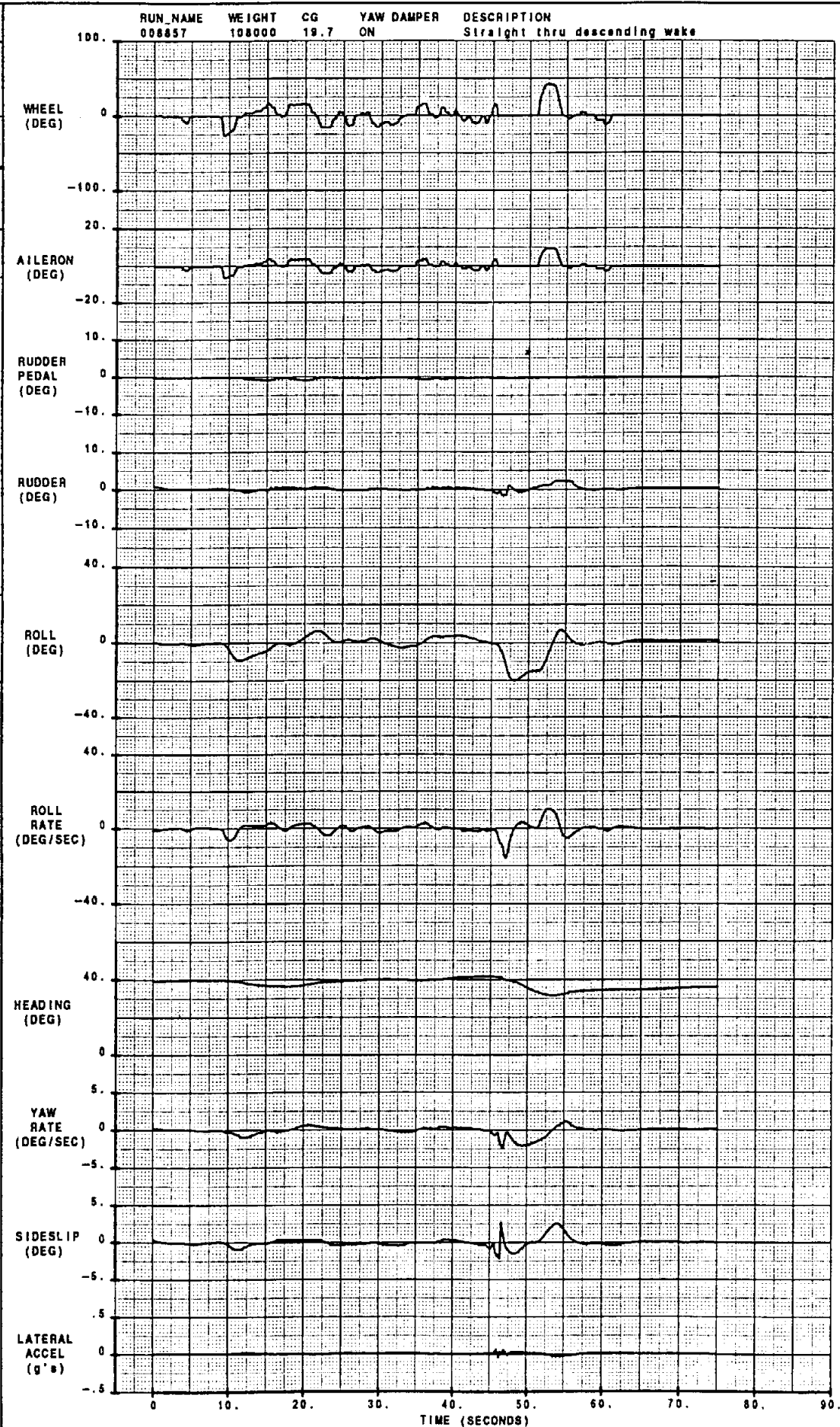


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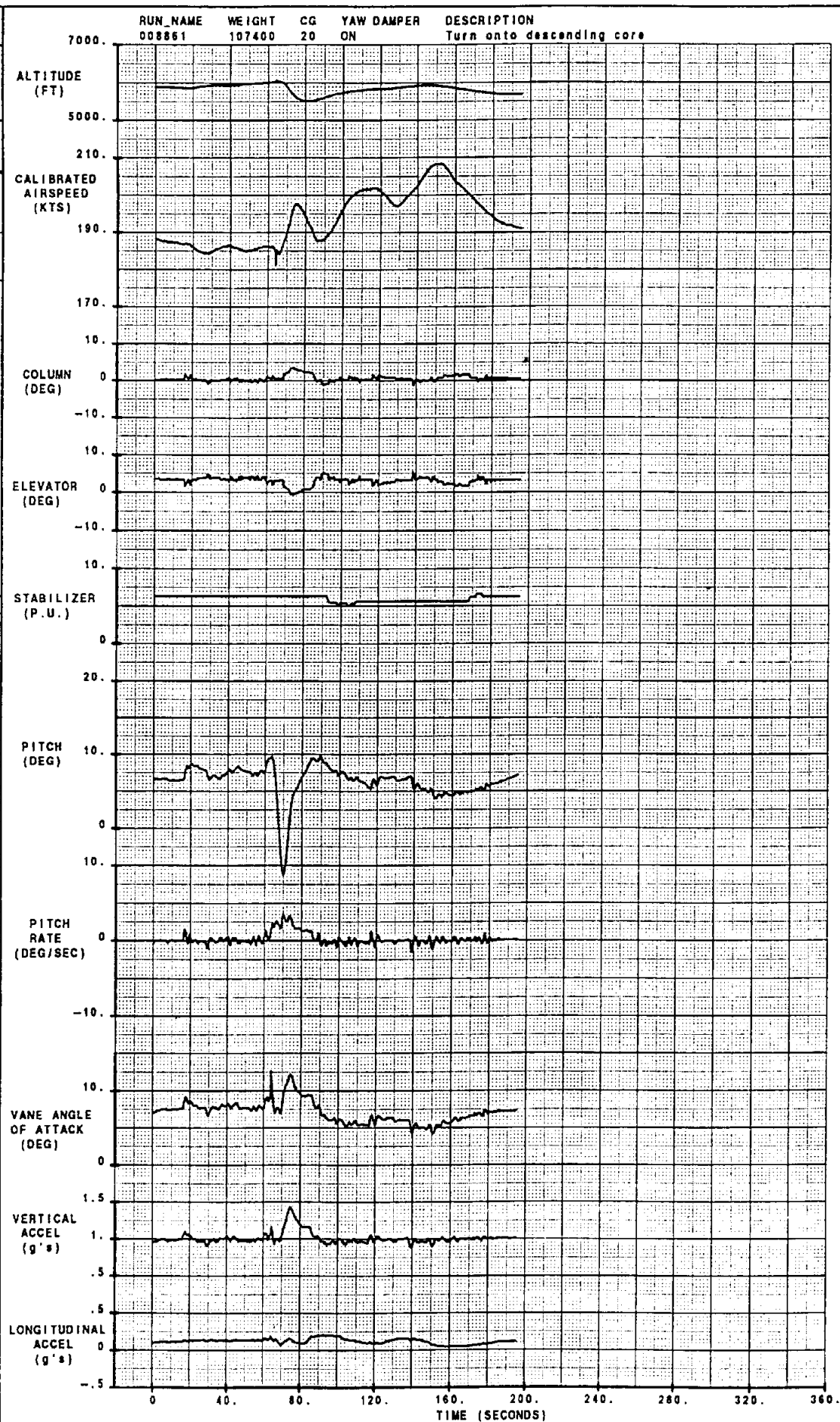


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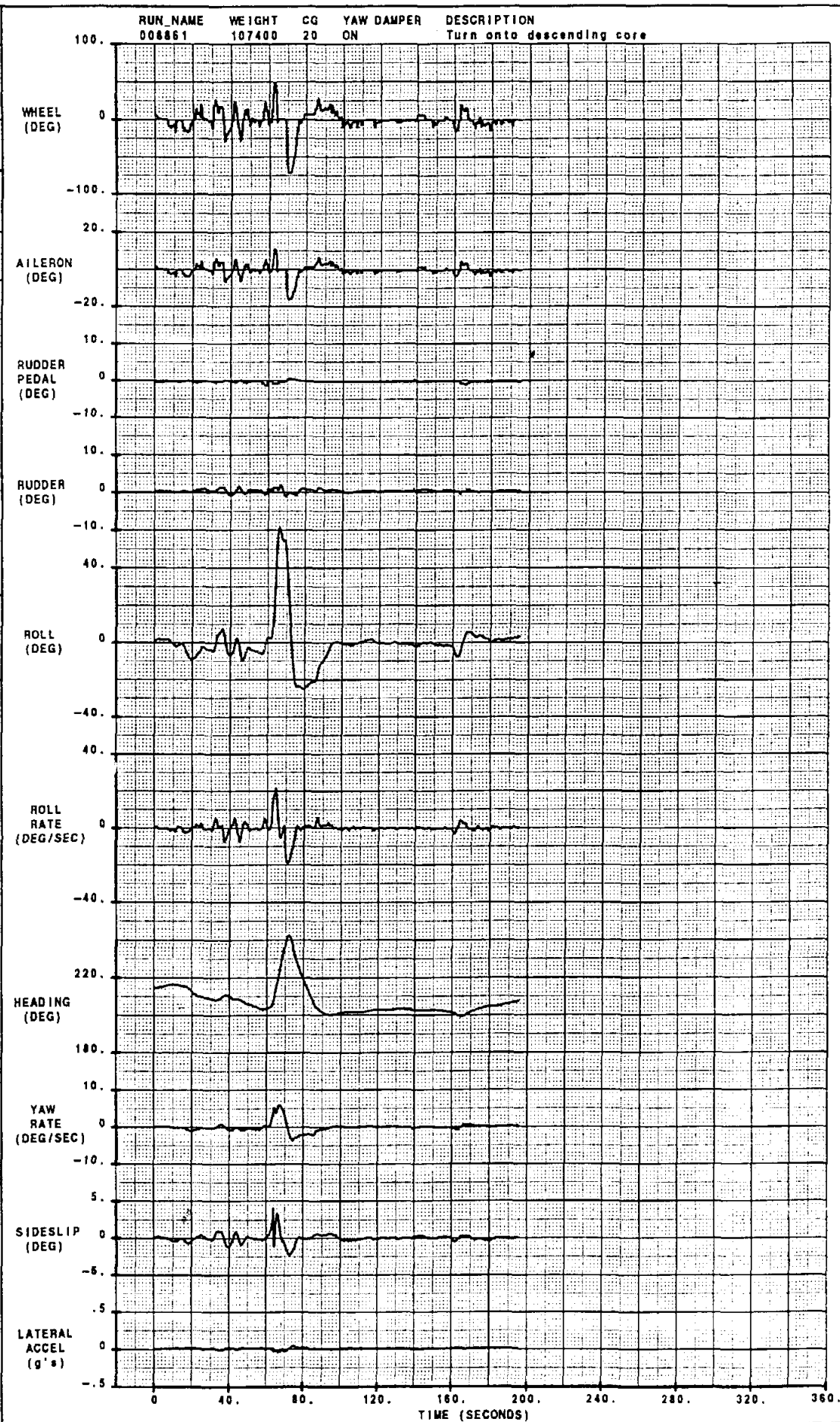
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CHECK			CONDITION NO: 81.41.0065.021.4	
APR			TEST DATE: 09/30/95	PRCS
APR				
			THE BOEING COMPANY	
			PAGE	



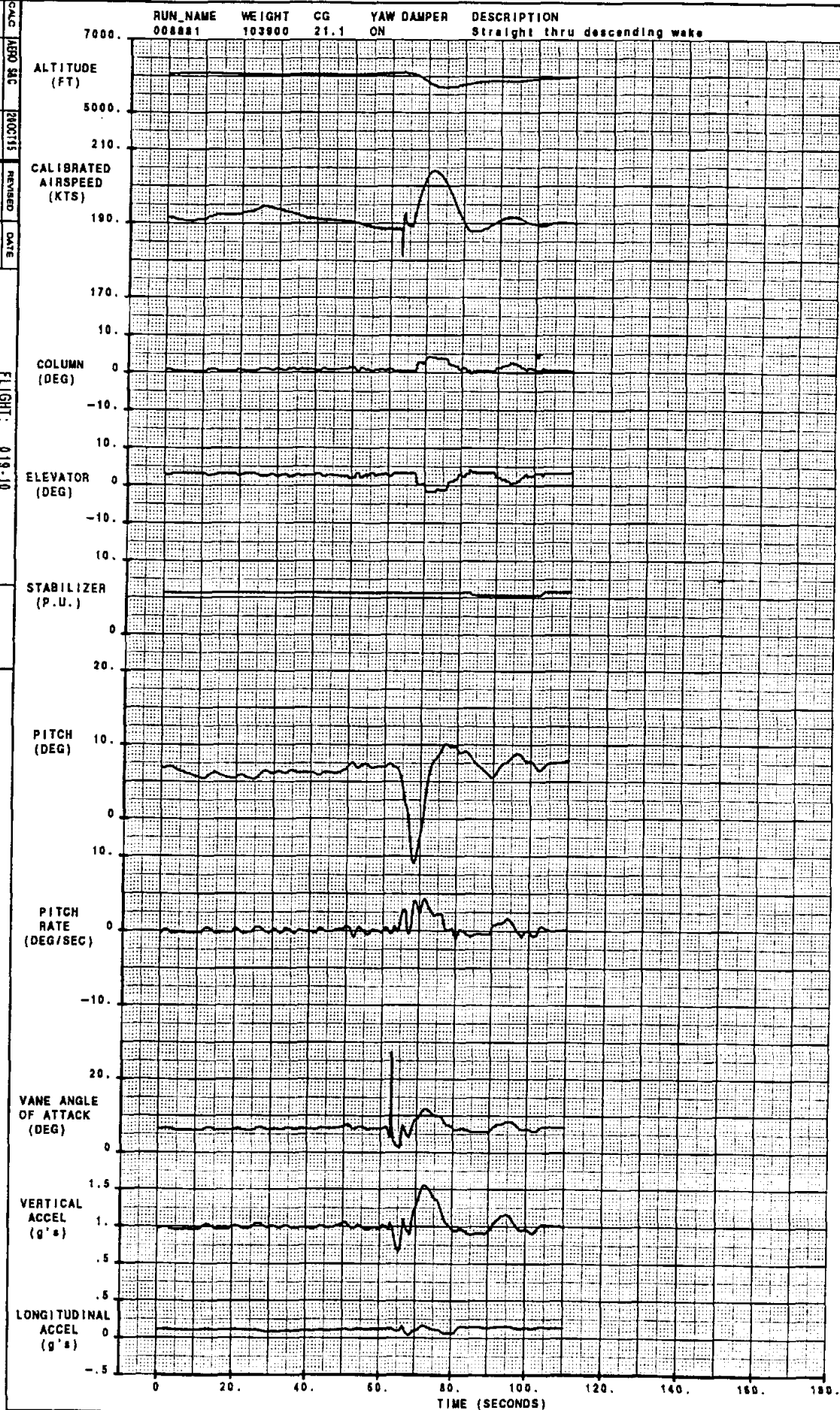
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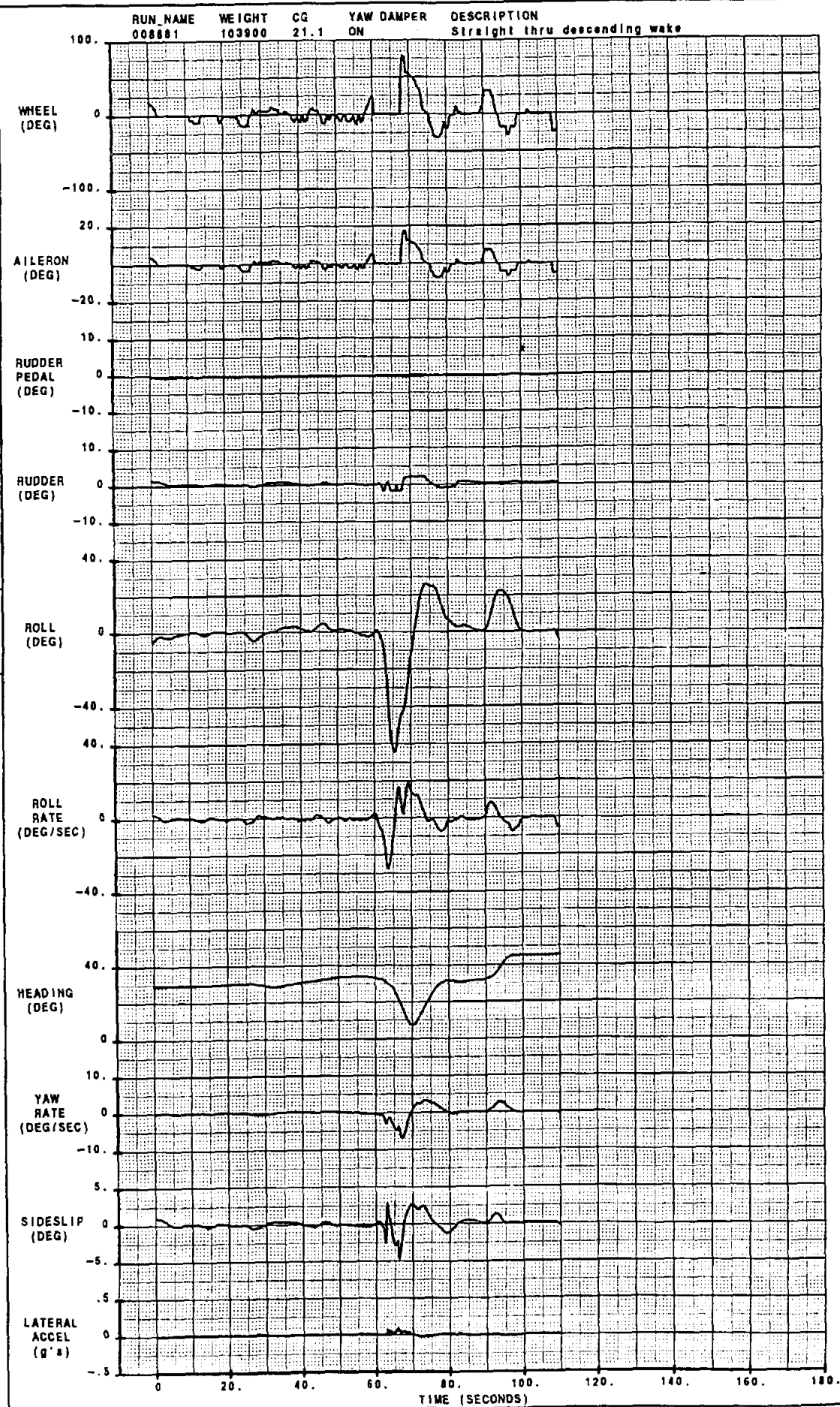
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THE BOEING COMPANY

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APP				
APP				
FLIGHT: 019-10 CONDITION NO: 81.41.0065.021.8 TEST DATE: 09/30/95 THE BOEING COMPANY PAGE 3003				



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