Attachment 6
Test 001-10, 3/4/96

Materials contained in attachment 6

Test data tracking forms

Test engineer's notes

Test sequence

Time-history data plots for:

- Conditions B1.39.0928.701.1-701.2
- Conditions B1.39.0928.702-.703
- Condition B1.39.0928.702.1
- Condition B1.39.0928.703.1
- Conditions B1.39.0928.705-.706
- Conditions B1.39.0928.705.1-705.2
- Condition B1.39.0928.707
- Conditions B1.39.0928.708.1-708.2

737 FLIGHT CONTROLS DATA TRACKING FORM

(WRITE IN BLACK INK OR PHOTOCOPY BEFORE TRANSMITTING)

PRIORITY:

DESCRIPTION 737-200 RUDDER GROUND TESTING — SPS 20

TEST NO. 001-10 — PILOT/AIRPLANE ——— / PG309 — PARAM. SET # ——— — WINDS ———

TEST DATE 3/4/96 — AIRPORT/RUNWAY ——— — PLOT FORMAT # ——— — GW/CG/I ———

MANEUVER CODE ——— — FC STAFF Ben Smith — PHONE 294-7923 — FLT TEST STAFF D. Nagel

DATA REQUEST NUMBER	EKS DATE	STAT. SOURCE	CONDITION NUMBER	SEQUENCE NUMBER	IRIG TIME START	IRIG TIME END	ALT MC	REMARKS
IAA1.9044			B1-39-0928.702		10:29:45	10:30:45		
			.703		10:32:20	10:33:50		
			.705		10:37:00	10:44:45		
			.706		10:47:55	10:49:25		
			.705.1		10:49:50	10:51:30		
			.705.2		10:52:30	10:54:10		
			.701.1		10:55:55	10:56:40		
			.702.1		10:59:50	11:01:00		
			.703.1		11:01:55	11:03:20		
			.701.2		11:04:00	11:04:30		
			.707		11:07:50	11:09:20		
			.708.1		11:37:35	11:39:10		
			.708.2		11:40:25	11:41:25		

FILE RECEIVED ——— FAST ——— ——— TINKER/FILTER ———

ADDATA ——— ADDKEY ———

DATABASE PACK# ———

IMPORTANT: DO NOT USE BLUE INK AS IT WILL NOT REPRODUCE FROM THE ORIGINAL

		Note: This Standby PCU will not support "Standby" Hydraulics ON.	
TAPE ON	09:45:52		
	NOTE: Installed is a Standby PCU actuator with a "galled" input bearing. The "galling" is to 60 pounds end force.		
	09:47:43	125 knots on feel pitots	
	09:48:02	A & B Hydraulics ON	
B1.39.0928.701	~~////~~	Pedal Cycles End	
TAPE OFF	~~Stop~~ 10:05:07		
TAPE ON	10:21:09		
Rudder Sweep ±30° FQ	10:24:15	Begin	
	10:24:25	L, 20° FQ	80 lbs pedal force
	10:25:02	R, 20° FQ	77 lbs pedal force
B1.39.0928.701	10:26:45	Begin Sweep	A & B ON
	10:26:52	Full L	
	10:26:58	Neutral	
	10:27:03	Full R	
	10:27:10	Neutral	
B1.39.0928.702	10:29:59	±3° FQ @ 0.3 Hz	Dwell, A & B ON
	10:30:00	Begin	
	10:30:30	End	
		Pedals didn't move as much as the USAir actuator"	
B1.39.0928.703	10:32:35	±1° FQ @ 0.3 Hz	Dwell, A & B ON
	10:32:55	Pedal Input	
	10:32:15	End Input	
	10:33:35	End Dwell	
		"Not as much pedal as before"	

SHEET 1 OF 3	TITLE 737-200 Rudder Ground Testing		MODEL
RECORDER D. Nagel			AIRPLANE
TEST NO. 001-10 S/A	BOEING		DOC. NO.
DATE 3/4/96			PAGE

X-21094 REV. 4/93

IMPORTANT: DO NOT USE BLUE INK AS IT WILL NOT REPRODUCE FROM THE ORIGINAL

B1.39.0928.705	10: 37:25	±3° δr @ 1 Hz to make the galling worse	
	10: 38:30	End	
	10: 38:44	Repeat another Dwell	
	10: 39:47	End	
	10: 40:00	Repeat another Dwell	
	10 40 56	End	
	10: 41:02	Repeat another Dwell	
	10: 42:05	End	
	10: 42:15	Repeat another Dwell	
	10: 43:18	End	
	10: 43:25	Repeat another Dwell	
	44:27	End	
B1.39.0928.706	10: 48:10	±1° δr @ 1 Hz to look at galling forces	
	49:13	End	
B1.39.0928.705.1	10: 50:05	±3° δr @ 1 Hz to look at galling forces	
	10: 51:14	End	
B1.39.0928.705.2	10: 52:50	±3° δr @ 1 Hz to look at galling forces	
	10: 53:57	End	
B1.39.0928.701.1	10: 56:05	Begin Rudder Pedal Sweep	
	1 : 56: 11	Full L	
	1 : 56: 16	Neutral	
	: 56: 24	Full R	"Didn't feel any binding"
	10: 56: 30	Neutral	
B1.39.0928.702	11: 00:00	±3° δr @ 0.3 Hz	Dwell
	1: 00:50	End	
B1.39.0928.703	11: 02:05	±1° δr @ 0.3 Hz	Dwell
	1 : 02:30	Begin Pedal Sweep	
	1 : 02:48	End Pedal	"Feel a mildly during dwell"
	11 : 03:08	End Dwell	"but not a binding" "just a release"

SHEET 2 OF 3	TITLE 737-200 Rudder Ground Testing		MODEL
RECORDER D. Nagel			AIRPLANE
TEST NO. 001-10 S1.1	BOEING		DOC. NO.
DATE 3/4/96			PAGE

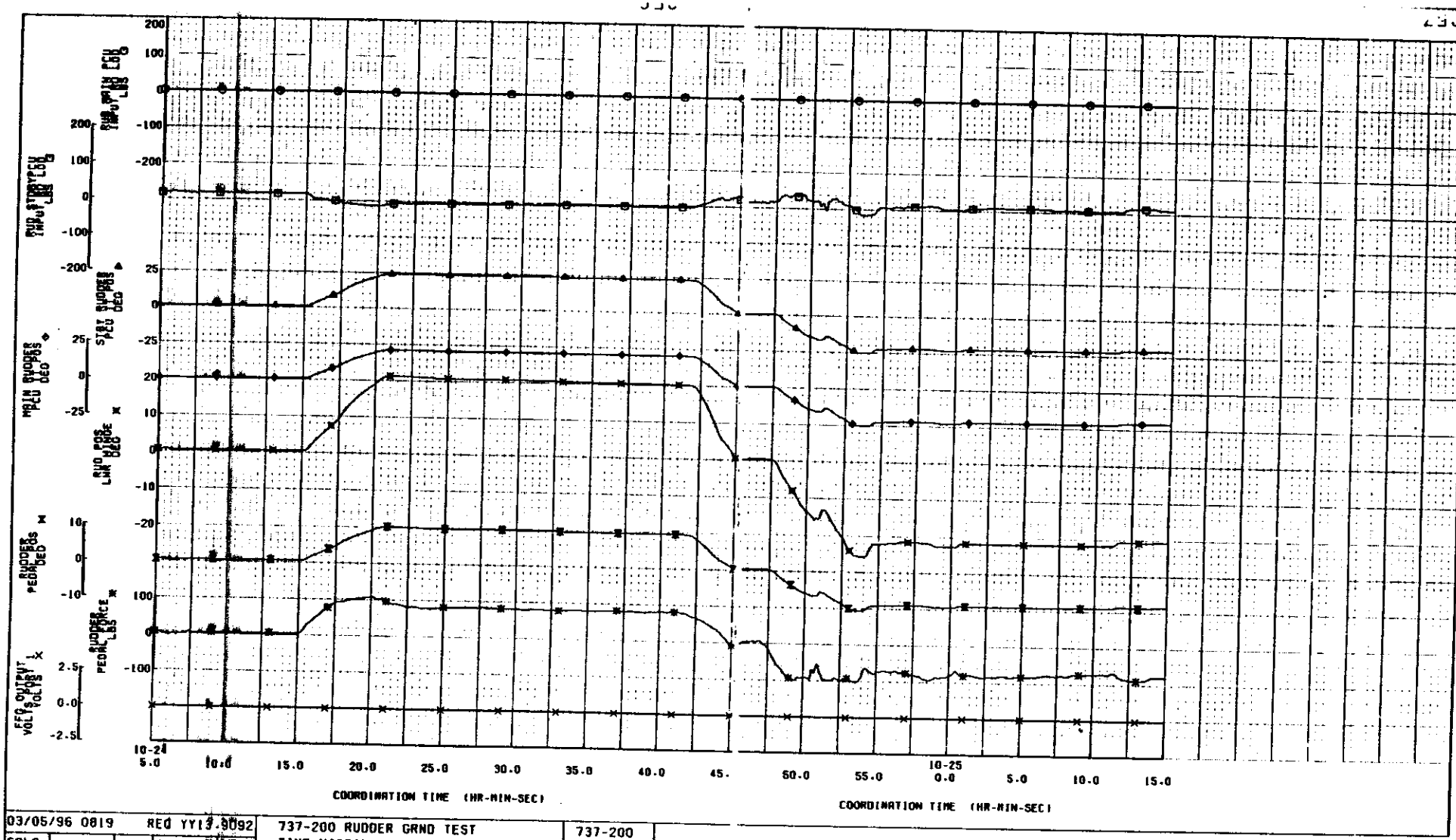
X-21094 REV. 4/93

IMPORTANT: DO NOT USE BLUE INK AS IT WILL NOT REPRODUCE FROM THE ORIGINAL

B1.39.0928.702	11:04:10	Begin quicker sweep	
	04:18	End	
			"Baseline"
			"Couldn't tell any difference"
B1.39.0928.707	11:08:05	A&B OFF	
	1:08:30	Pedal Sweep	
	11:09:07	End	
		• Tom Nacastro Condition:	
	hyd "on"	• bind up Main PCU input linkage w/ input	
		• R Yaw Damper Hardover (Command)	
		• Pilot will attempt to un-jam the blind	
		• Remove R Yaw Damper Hardover	
		• Note if Rudder returns to neutral when R Yaw Damper is removed	
B1.39.0928.708	11:25:35	A&B ON (w/ bind)	
	:26:31	R Hardover	L = + Hard
	:26:40	End	R = - Hard
	:26:13	L Hardover	
	:27:53	End	
	:27:59	L Hard (+	
		R Hardover	
	:30:16	R Hardover → R Hard	
This pick-up a mess	:30:37	End	
	:31:10	R Hardover	} This is the cond.
	:31:44	Break jam	
	11:33:53	End	
Good one → B1.39.0928.708.1	11:37:60	L Hardover (+ Hard)	
	11:39:00	Unjam w/ pedals	
Good one → B1.39.0928.708.2	11:40:37	R Hard (- Hard)	
	11:40:45	Unjam w pedals	
	11:41:15	Hardover out	
TAPE OFF	11:49:23		

SHEET 3 OF 3	TITLE 737-200 Rudder Ground Testing		MODEL
RECORDER D. Neagel			AIRPLANE
TEST NO. 001-10	SI:	BOEING	DOC. NO.
DATE 3/4/96			PAGE

X-21094 REV. 4/93



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CHECK			CONDITION NO. 81.39.0928.701		
APR			TEST 001-10 TEST DATE 03/04/96	81.39.0928	
APR			THE BOEING COMPANY	PAGE	

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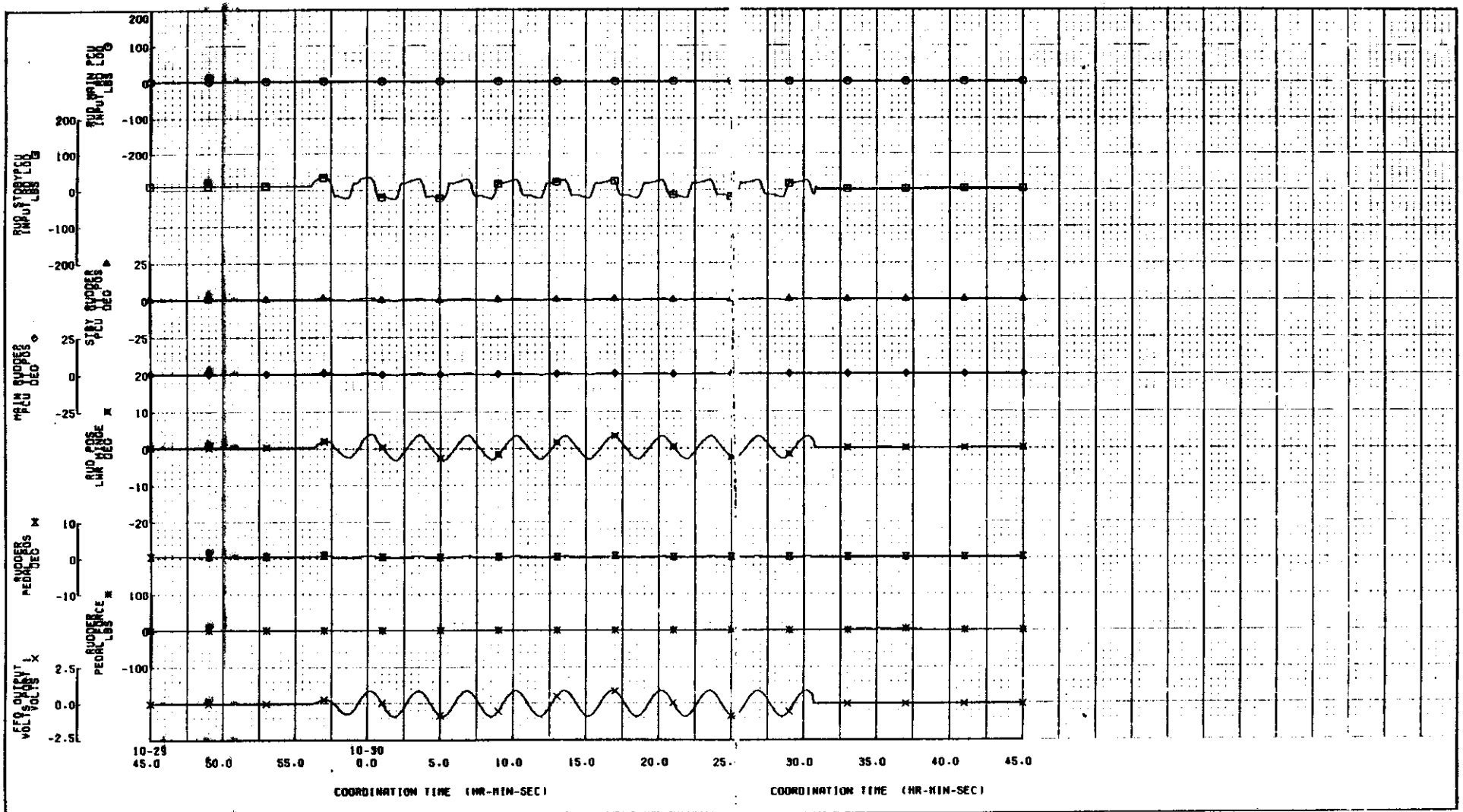
737-200. PG309. RUDDER SYSTEM GROUND TESTING



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APR					TEST 001-10 TEST DATE 03/04/96	B1.39.0928
APR					THE BOEING COMPANY	PAGE

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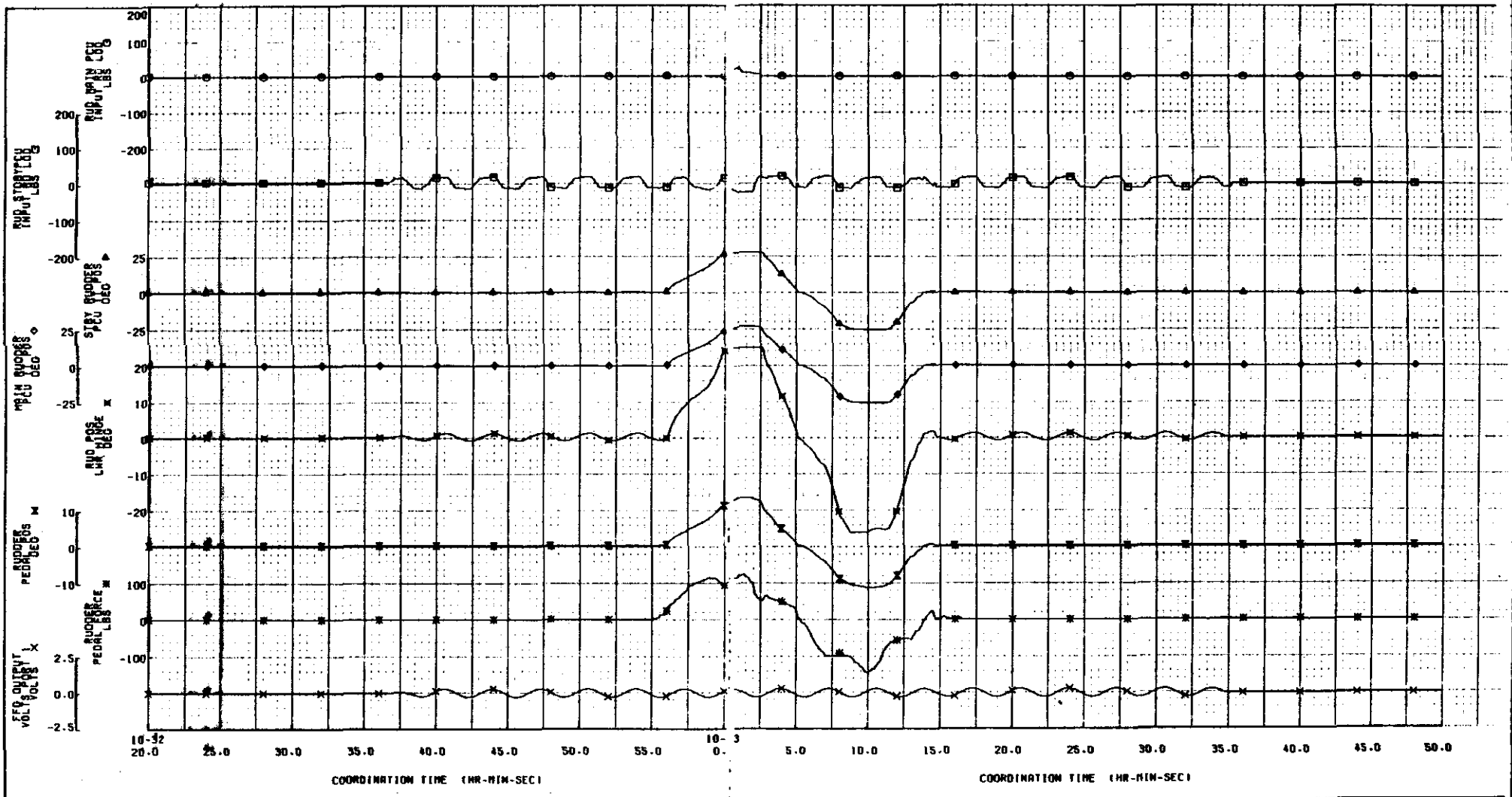

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APR				TEST 001-10 TEST DATE 03/04/96	B1-39-0928
APR				THE BOEING COMPANY	PAGE

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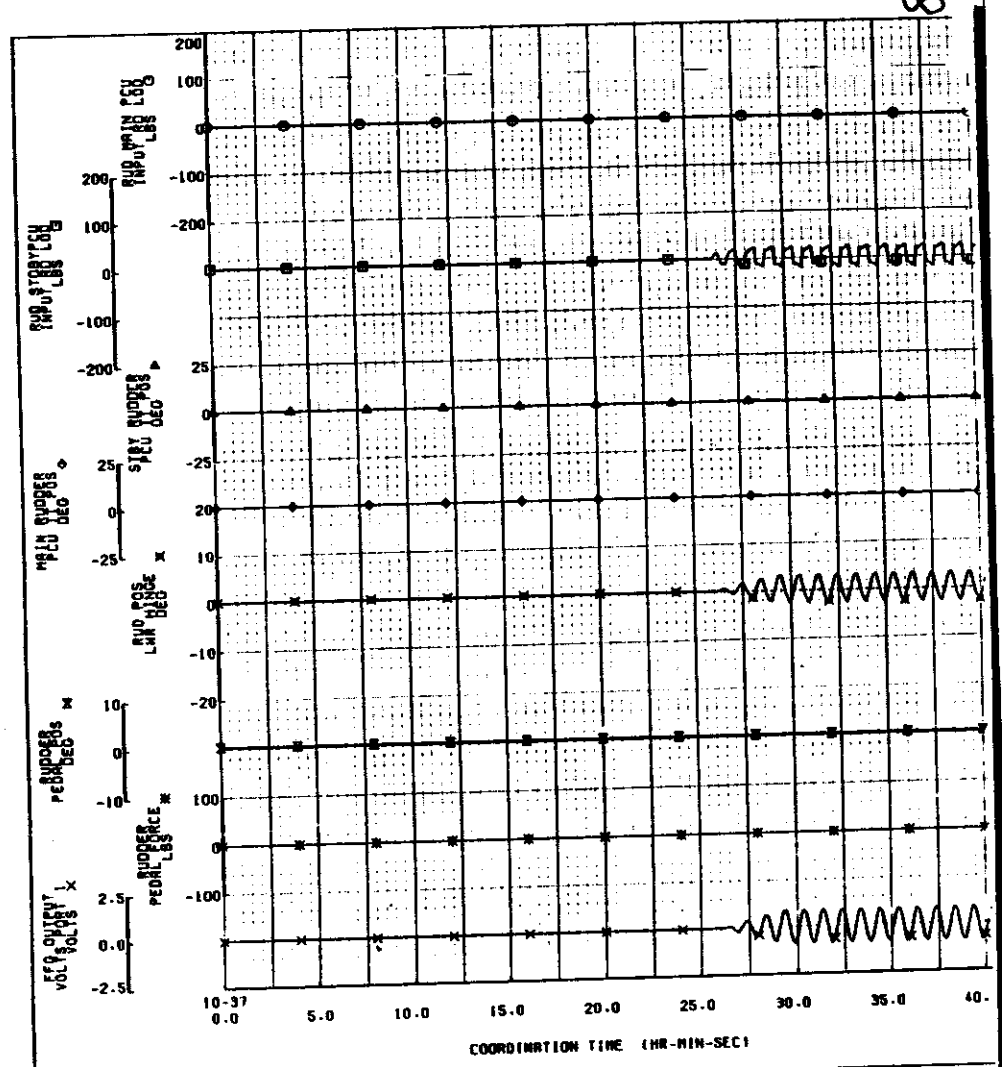

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CALC		REVISED	DATE		
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APR				TEST 001-10 TEST DATE 03/04/96	81.39.0928
APR				THE BOEING COMPANY	PAGE

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737-200, PG309, RUDDER SYSTEM GROUND TESTING

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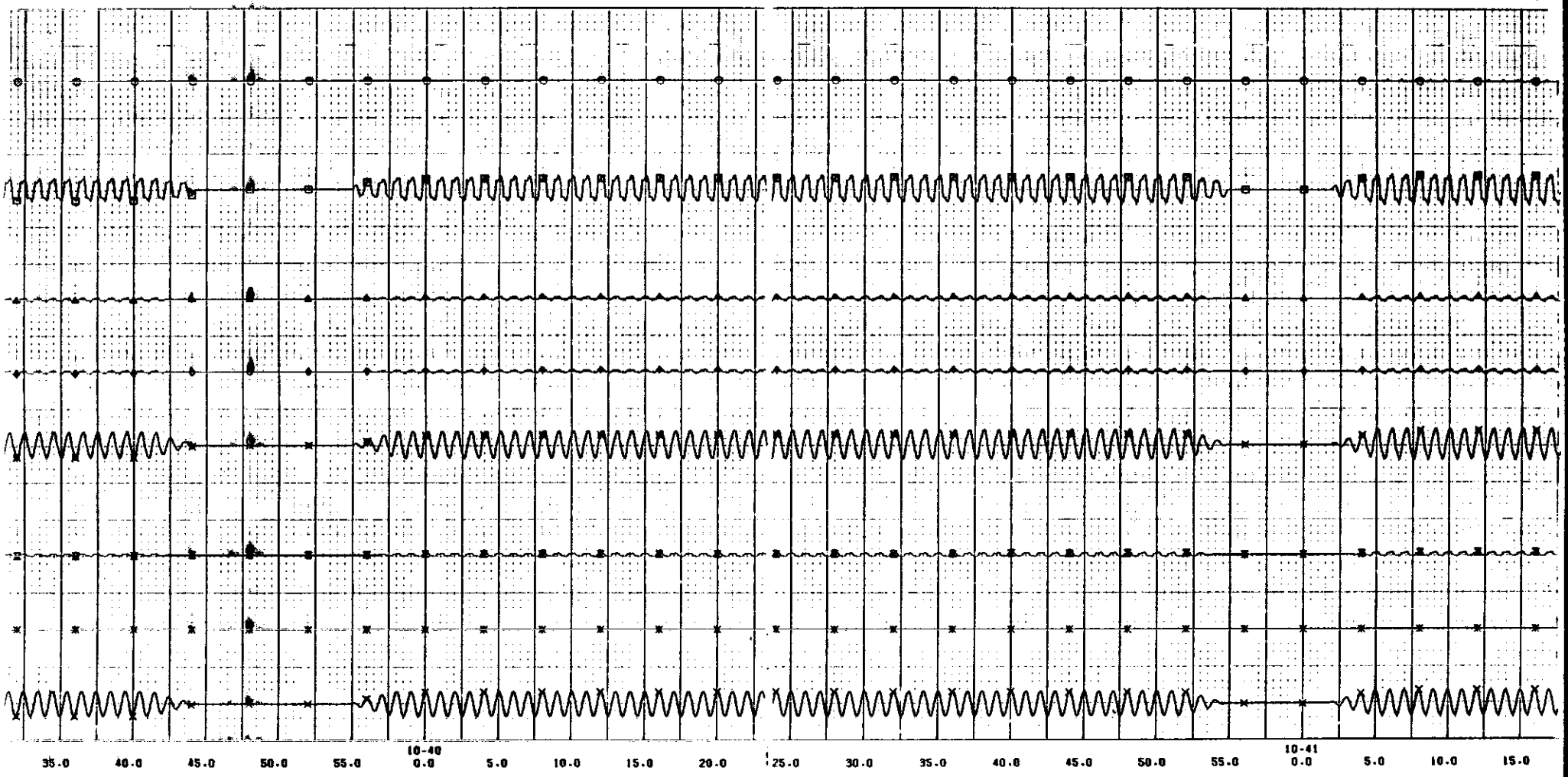
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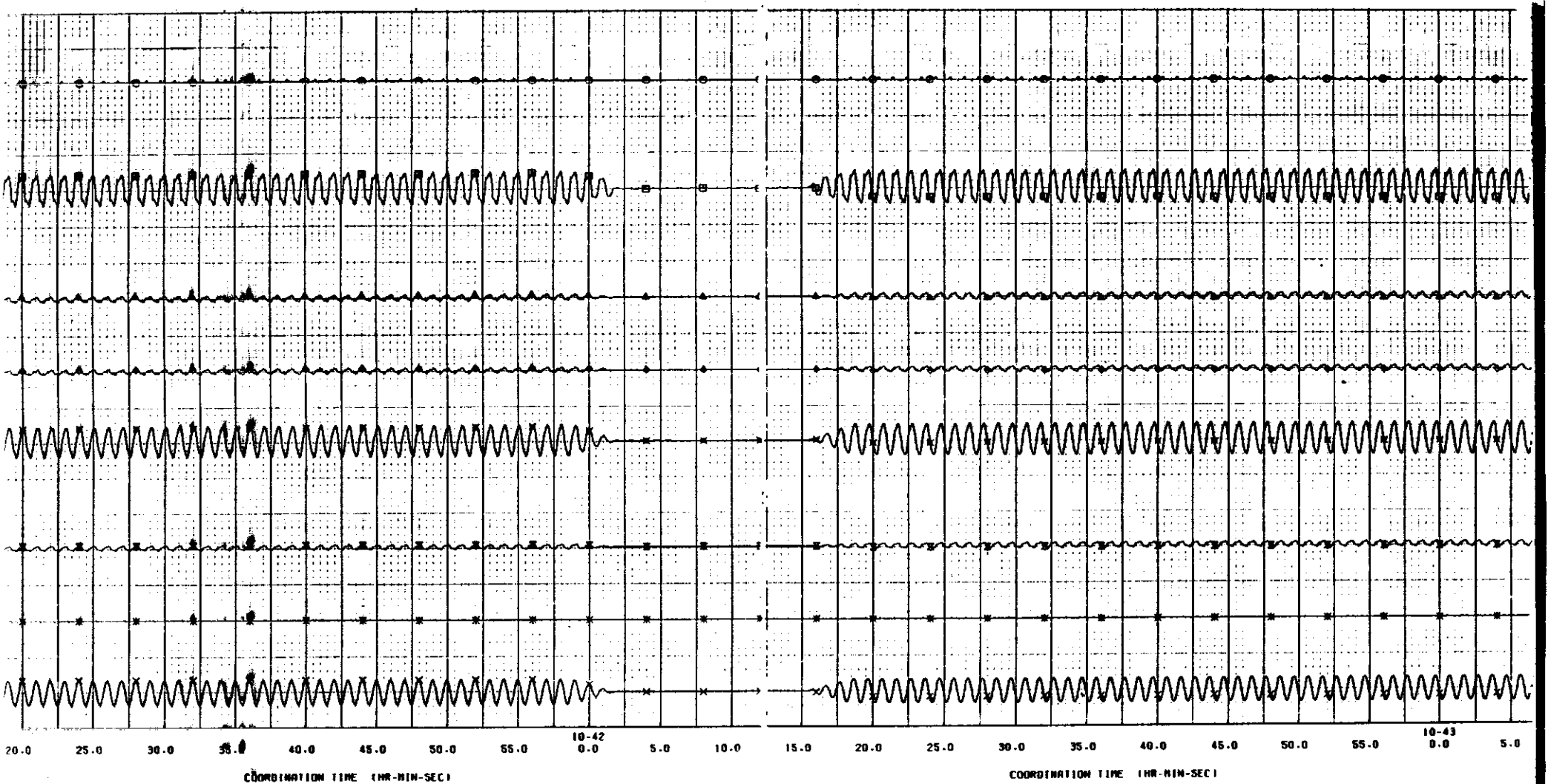
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COORDINATION TIME (HR-MIN-SEC)

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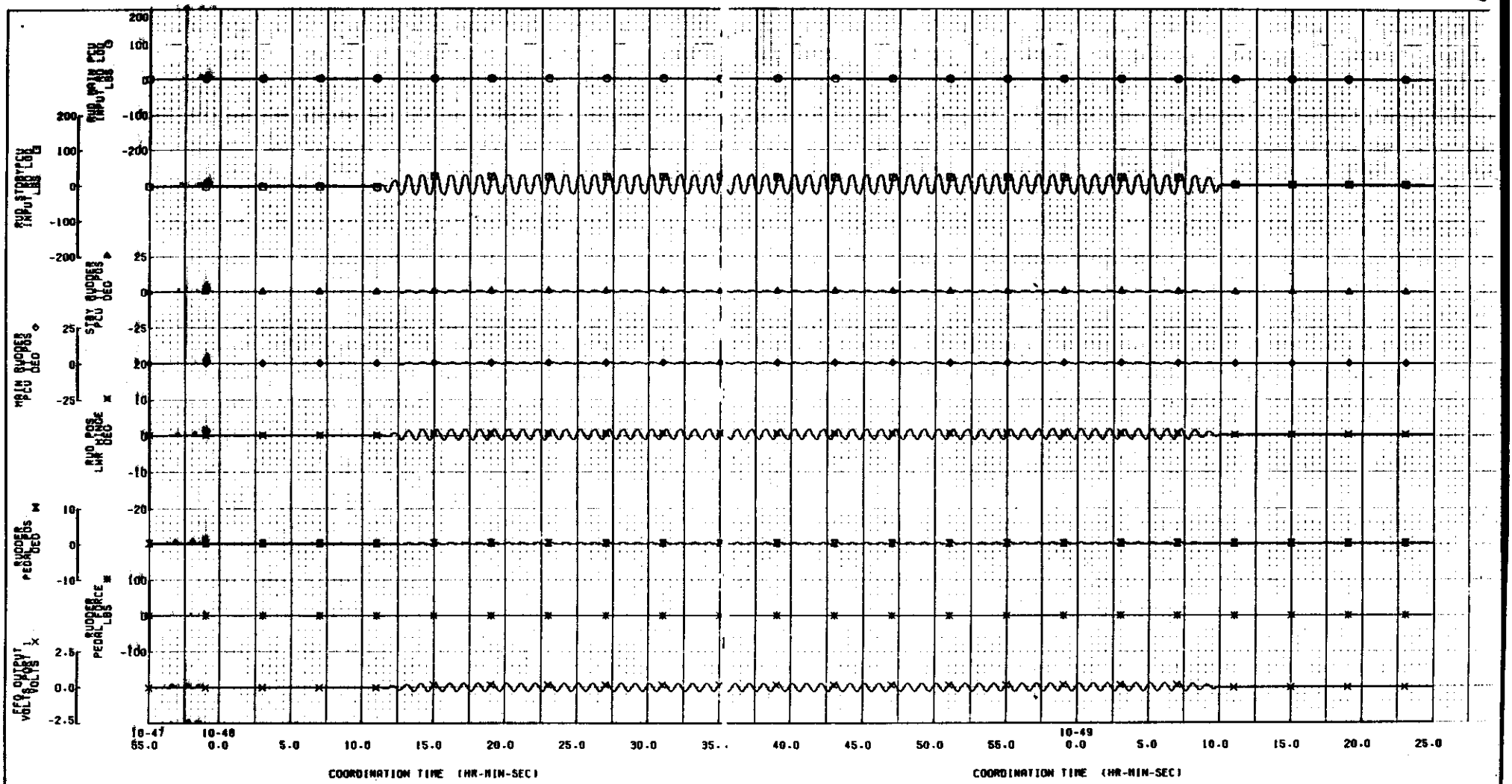

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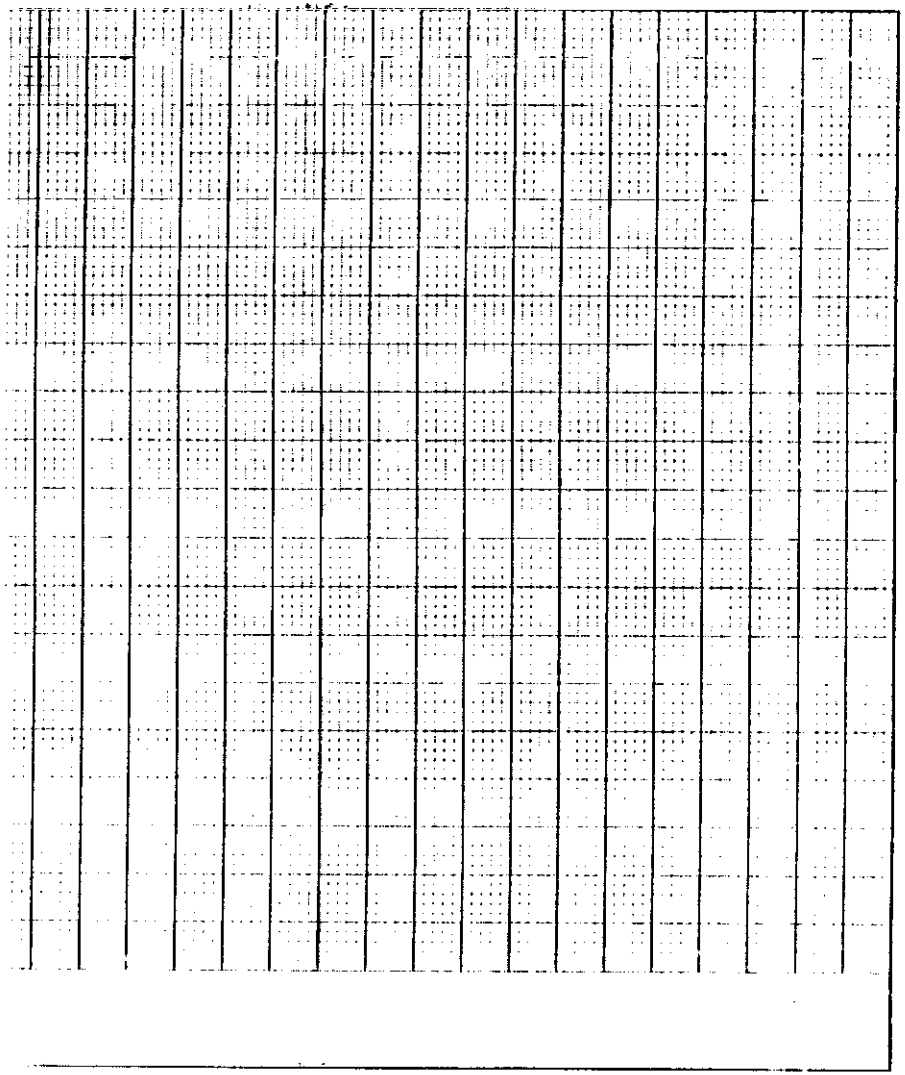

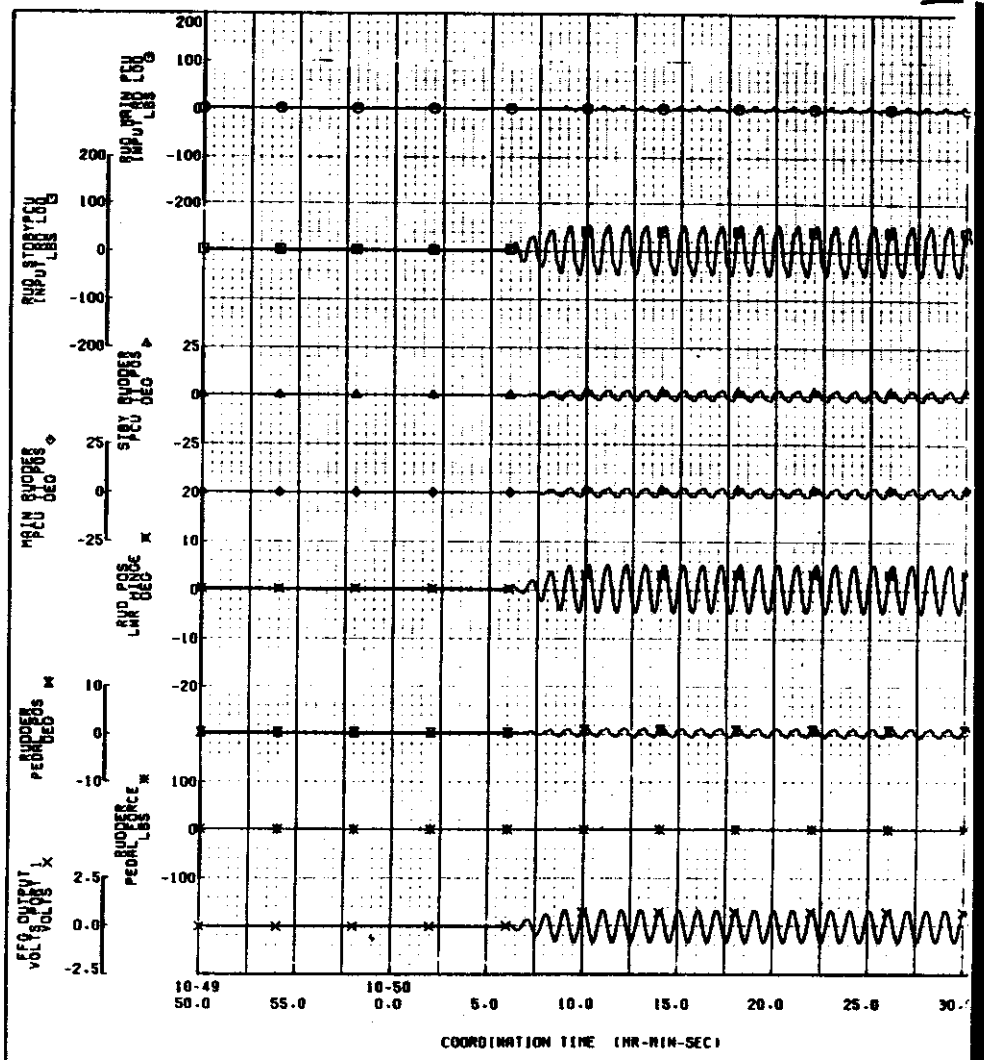

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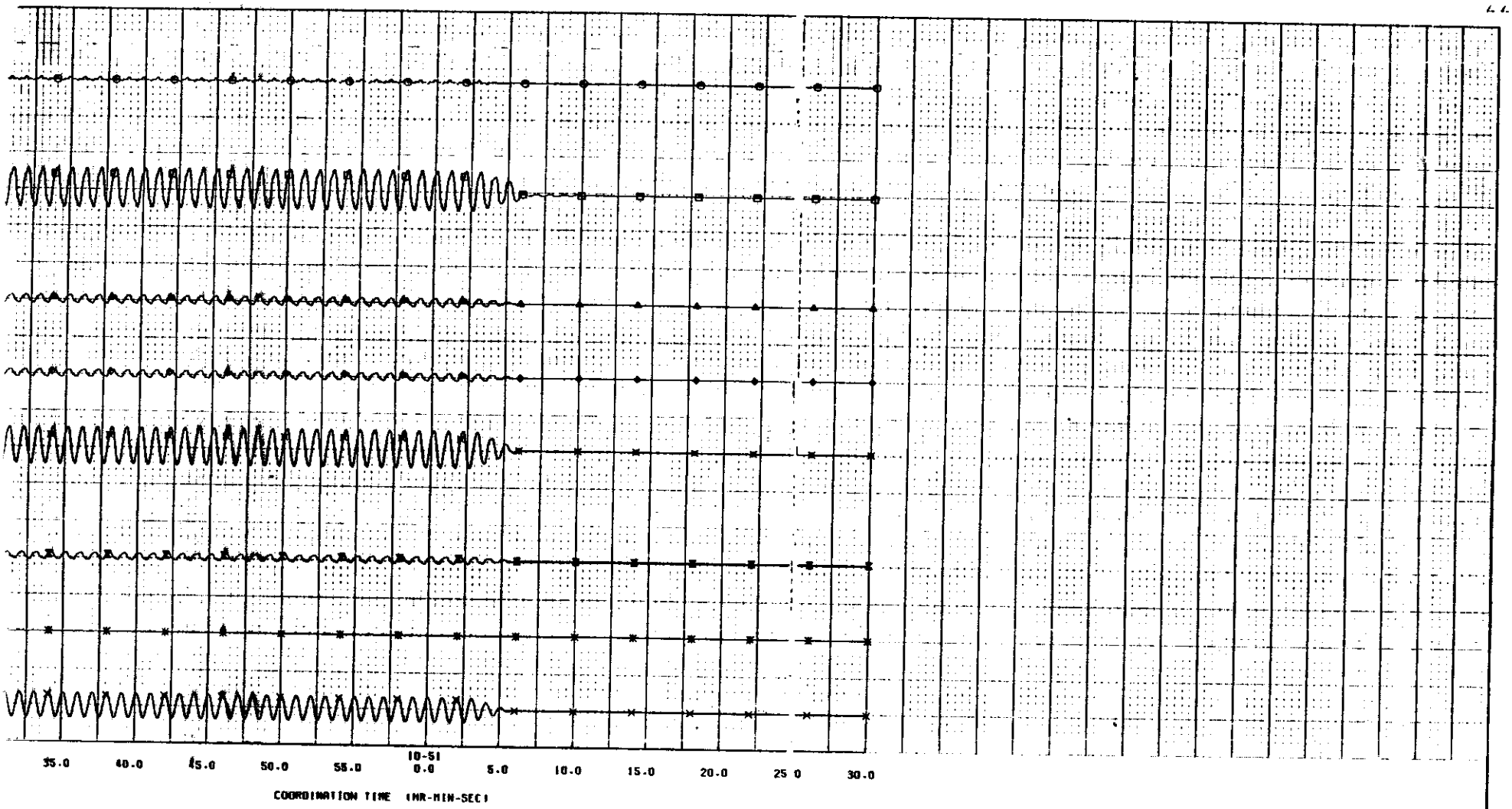
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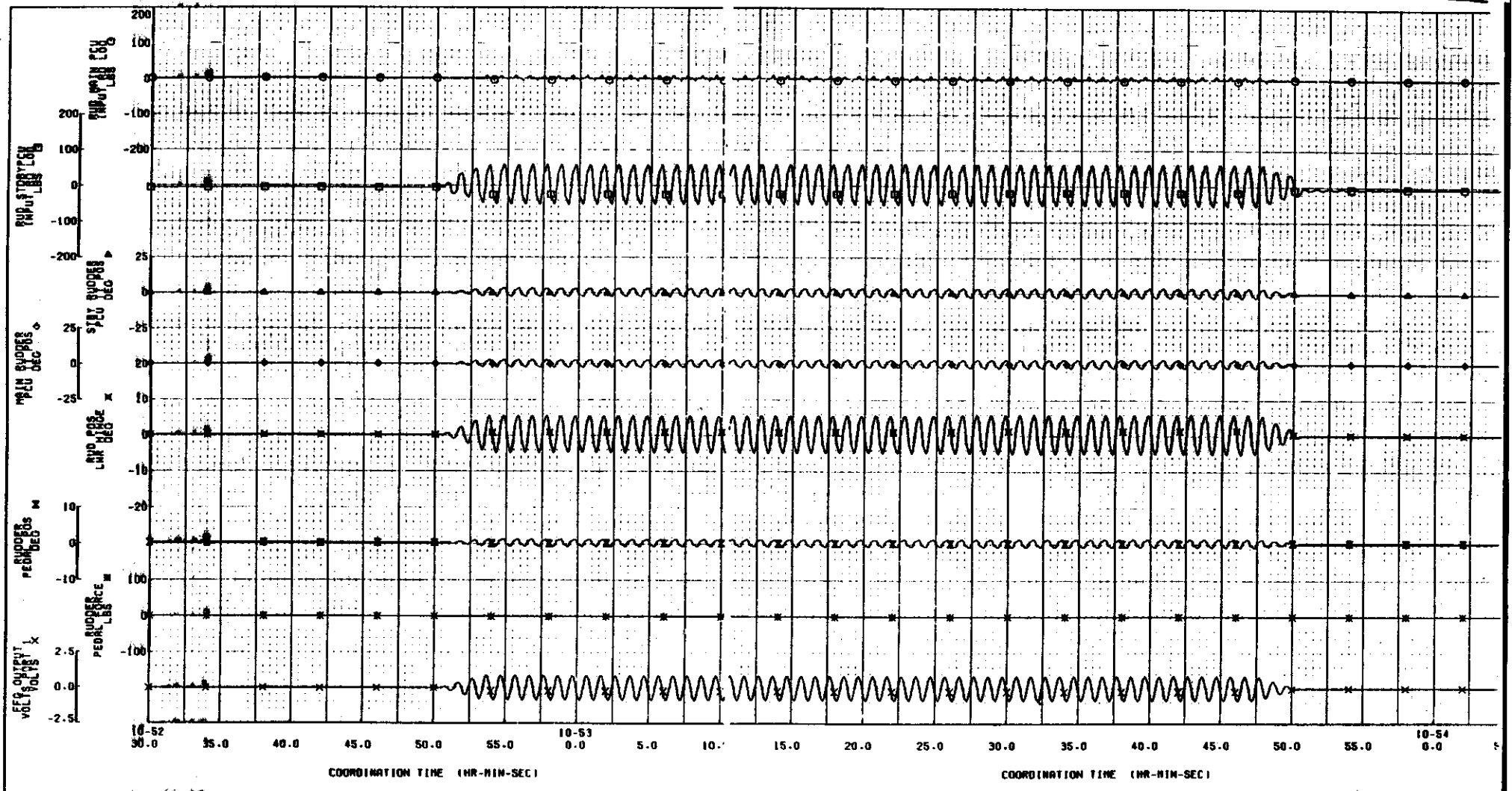

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APR					TEST 001-10 TEST DATE 03/04/96	BI.39.0928
APR					THE BOEING COMPANY	PAGE

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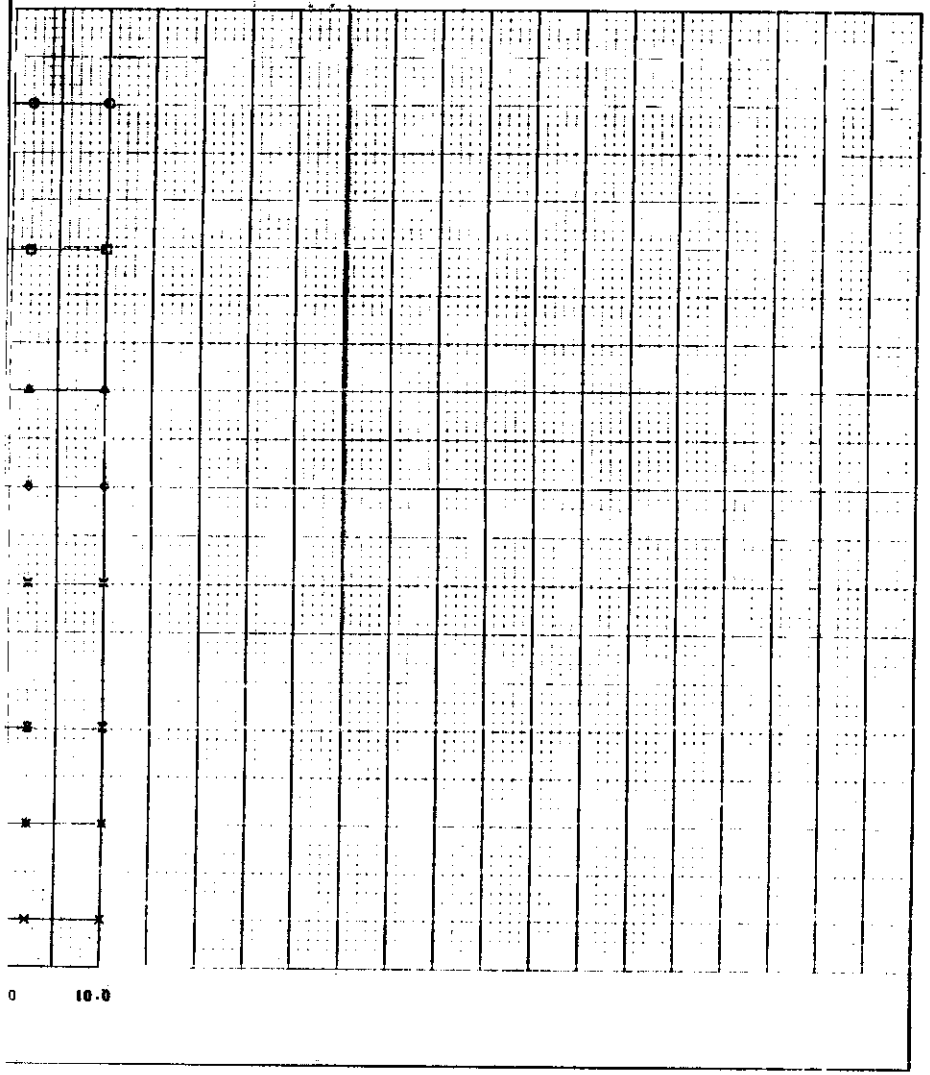

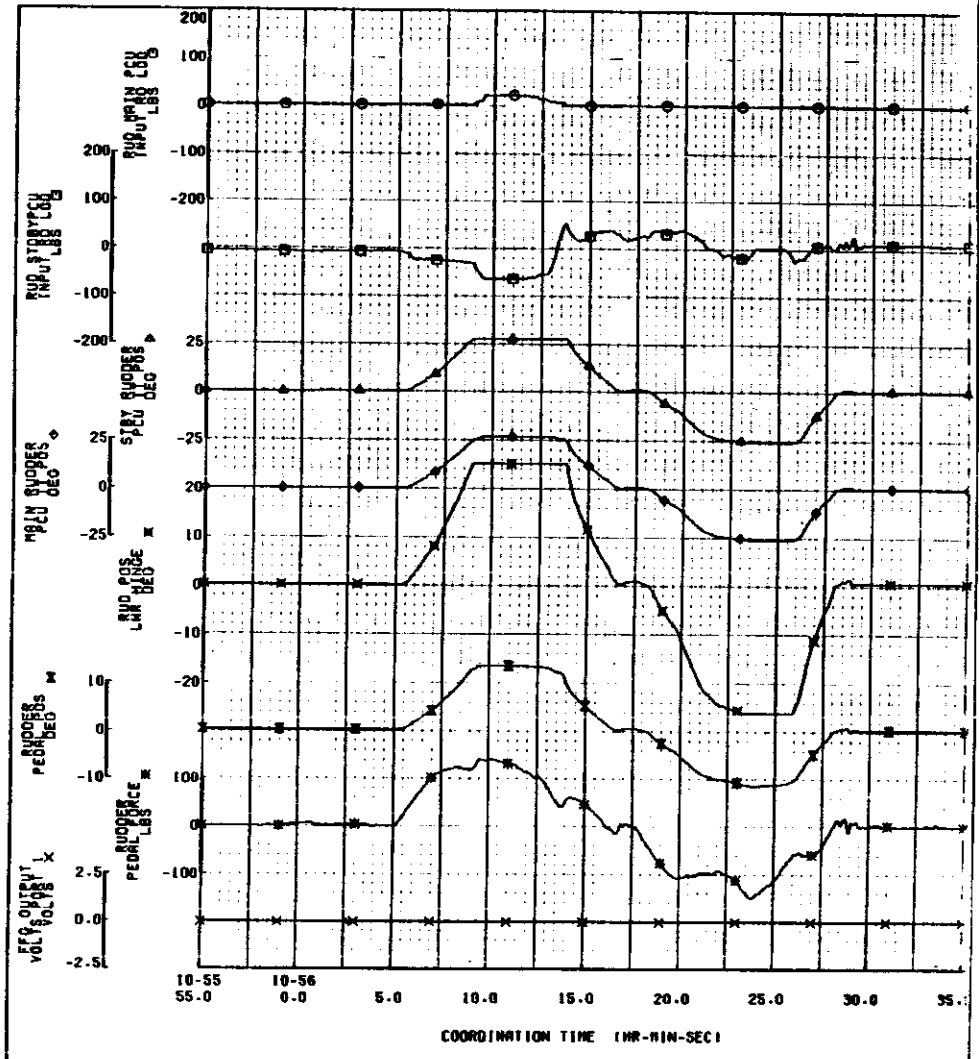

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CALC			REVISED	DATE	TIME HISTORY PLOT	PG309
CHECK					CONDITION NO. 81.39.0928.701-1	
APR					TEST 001-10 TEST DATE 03/04/96	81.39.0928
APR					THE BOEING COMPANY	PAGE

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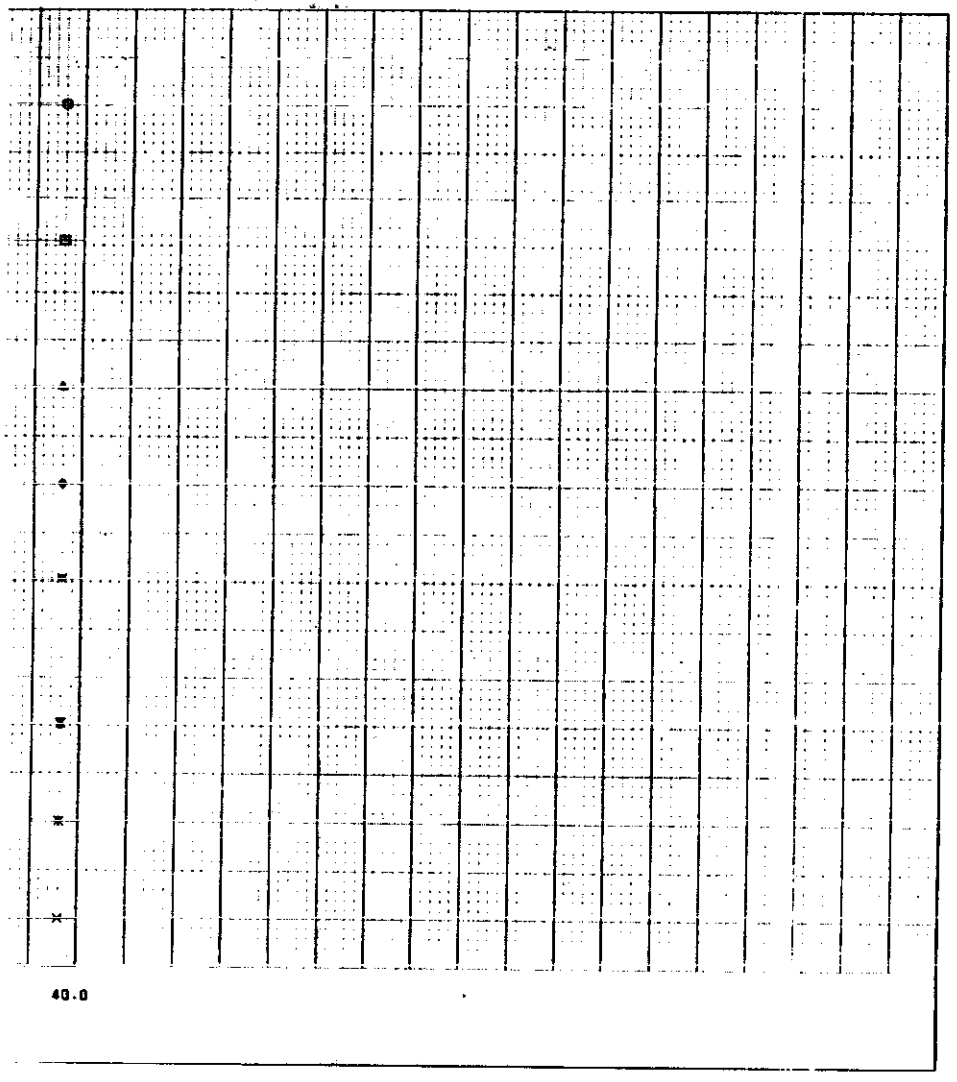
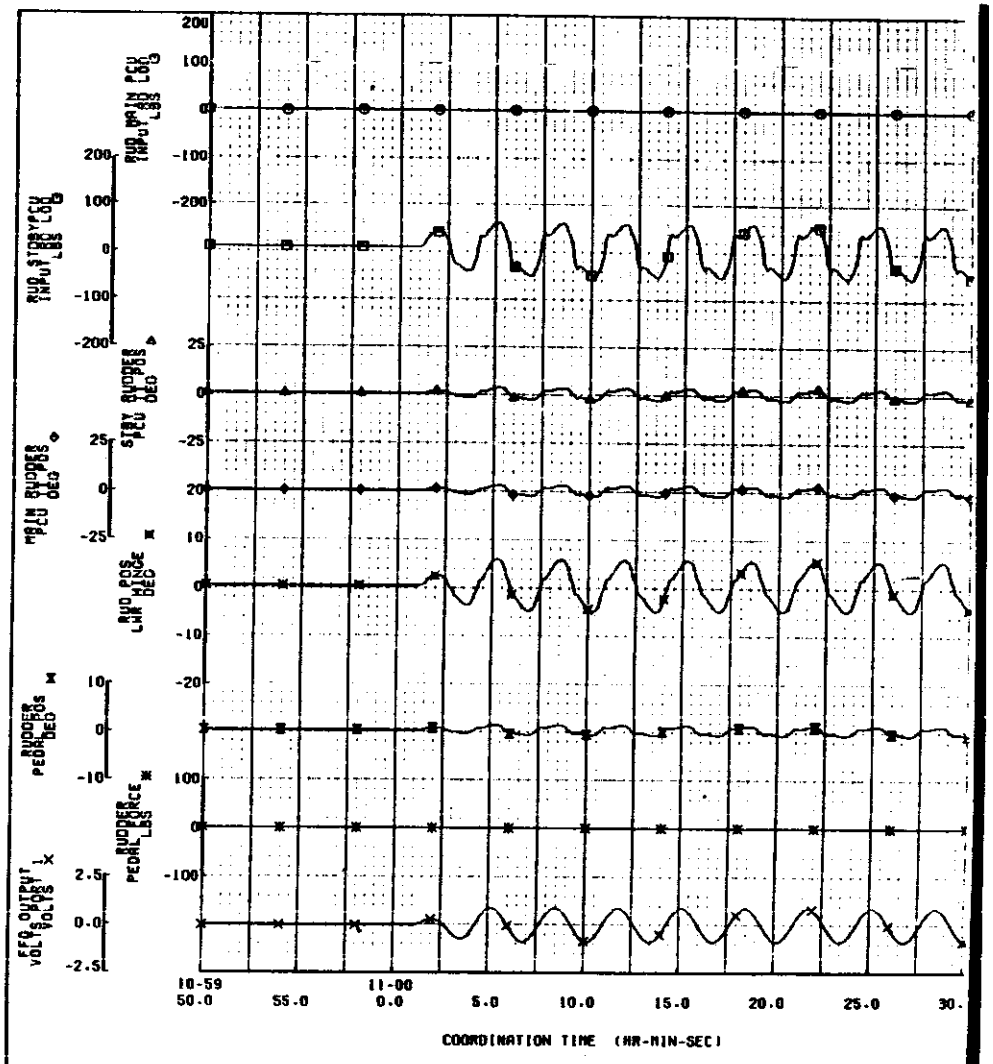
737-200, PG309, RUDDER SYSTEM GROUND TESTING





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CALC			REVISED	DATE		
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APR					THE BOEING COMPANY	PAGE
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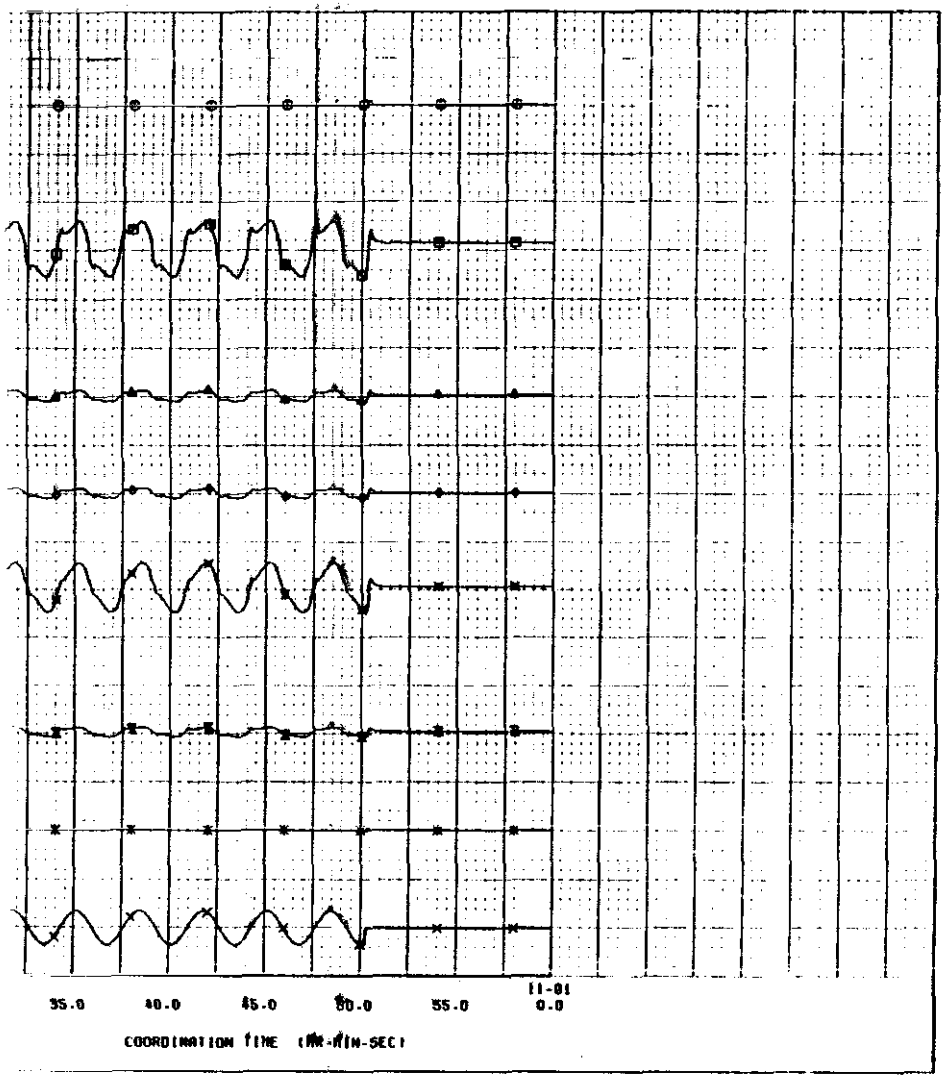
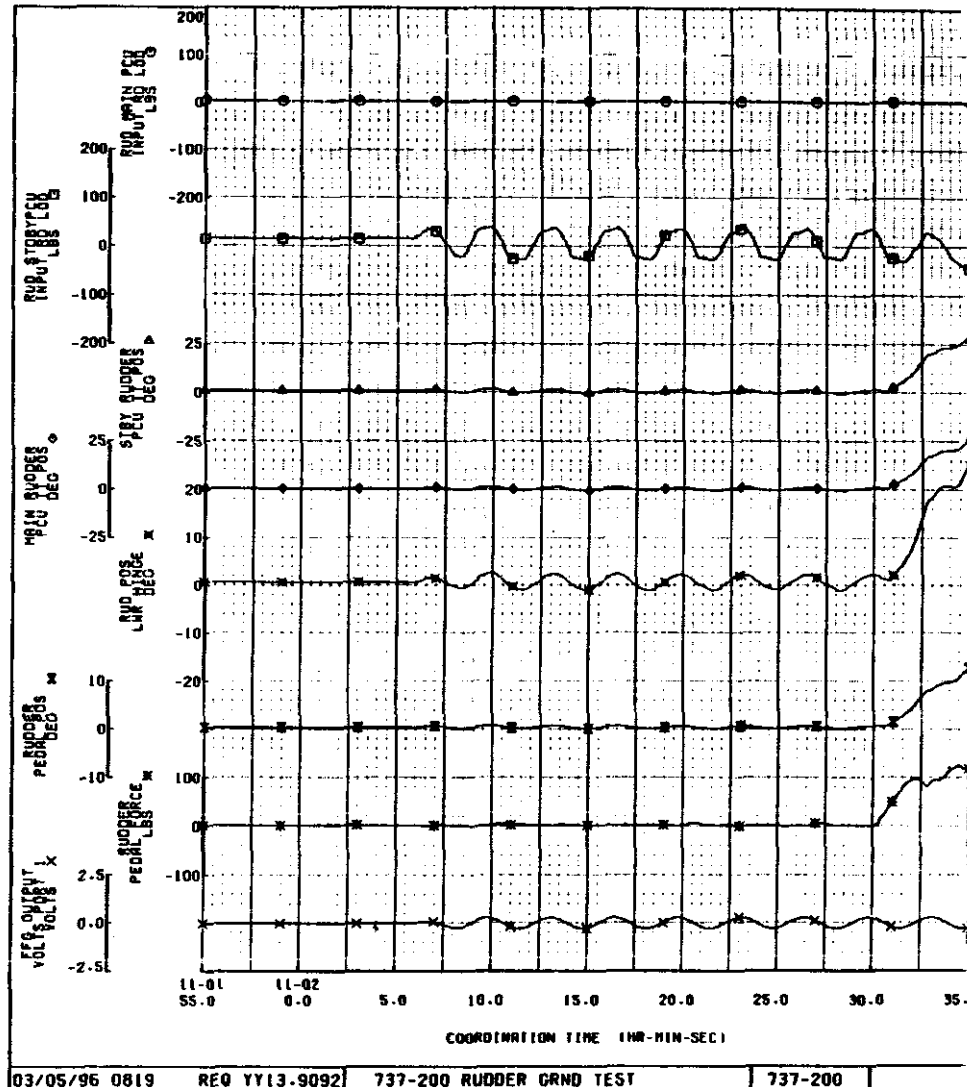
737-200. PG309. RUDDER SYSTEM GROUND TESTING





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APR					TEST 001-10 TEST DATE 03/04/96	B1.39.0928
APR					THE BOEING COMPANY	PAGE

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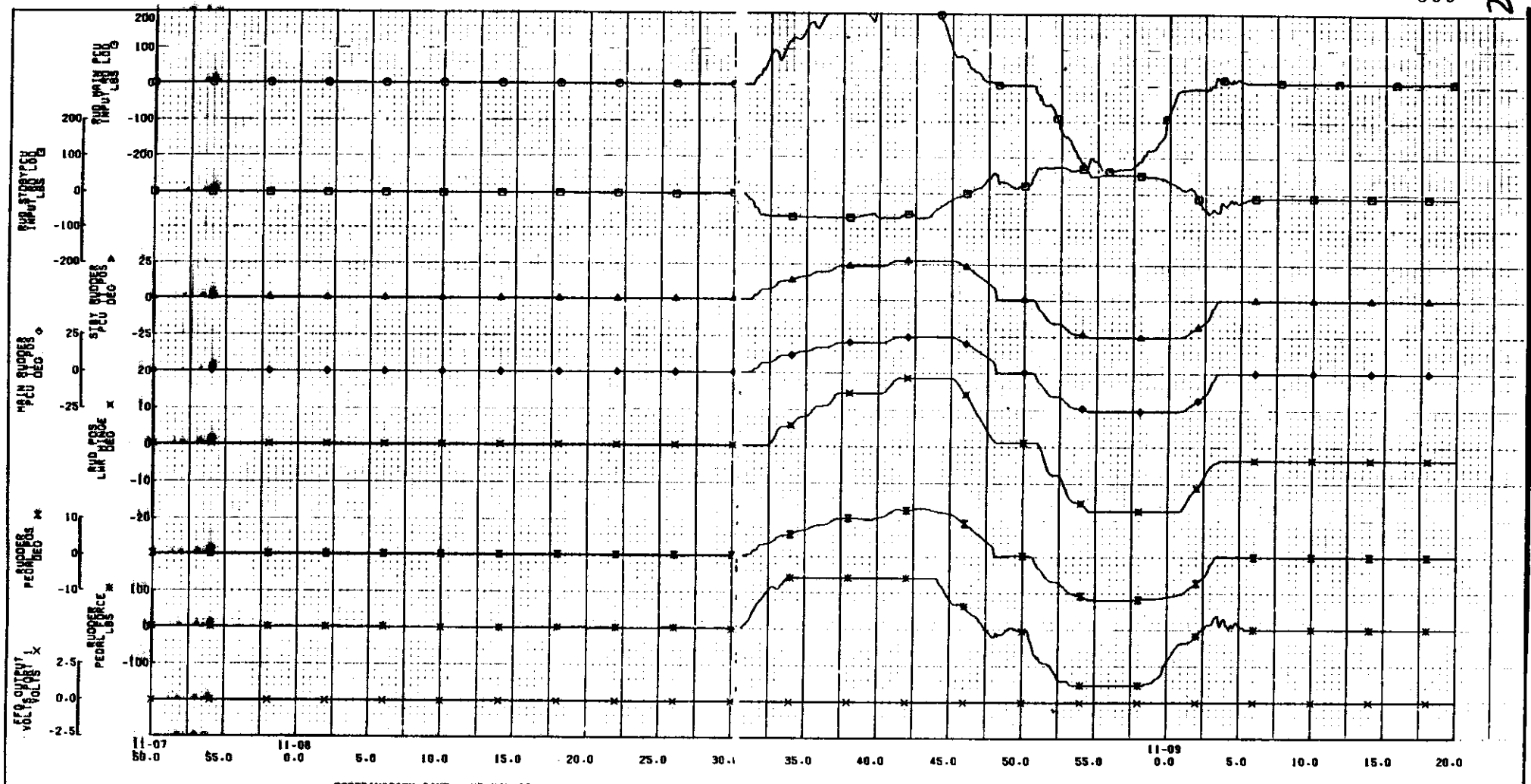
737-200, PG309, RUDDER SYSTEM GROUND TESTING



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CALC			REVISED	DATE		
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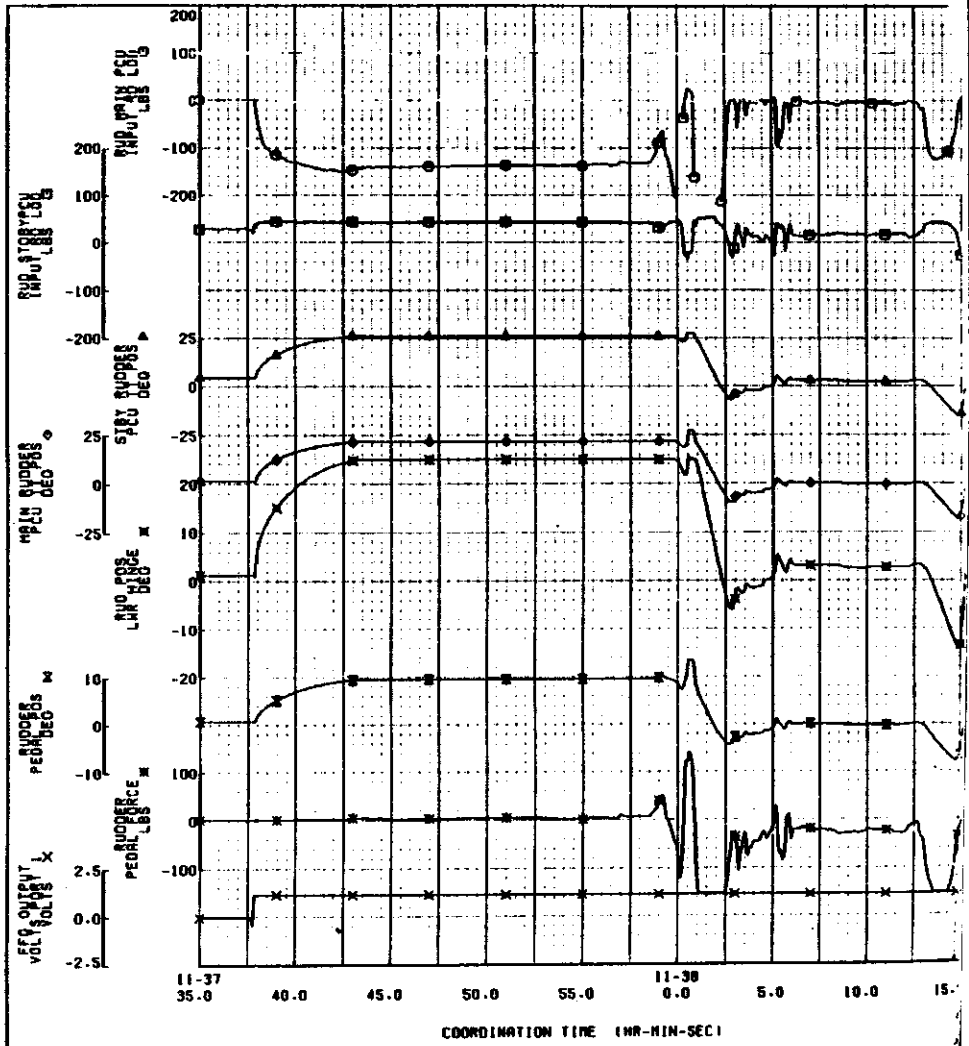
737-200, PG309, RUDDER SYSTEM GROUND TESTING



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APR					TEST 001-10 TEST DATE 03/04/96	81.39.0928
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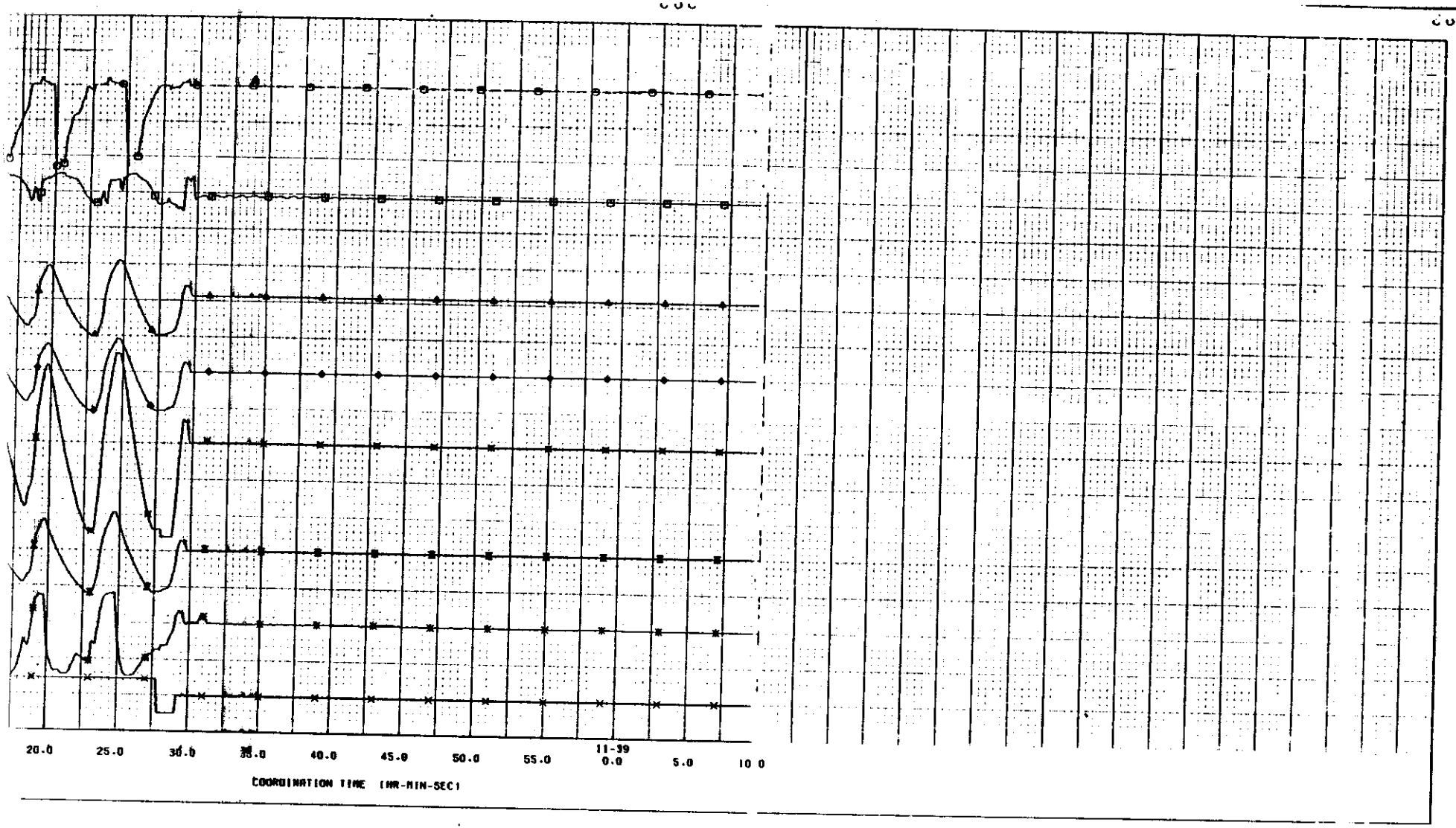
737-200, PG309, RUDDER SYSTEM GROUND TESTING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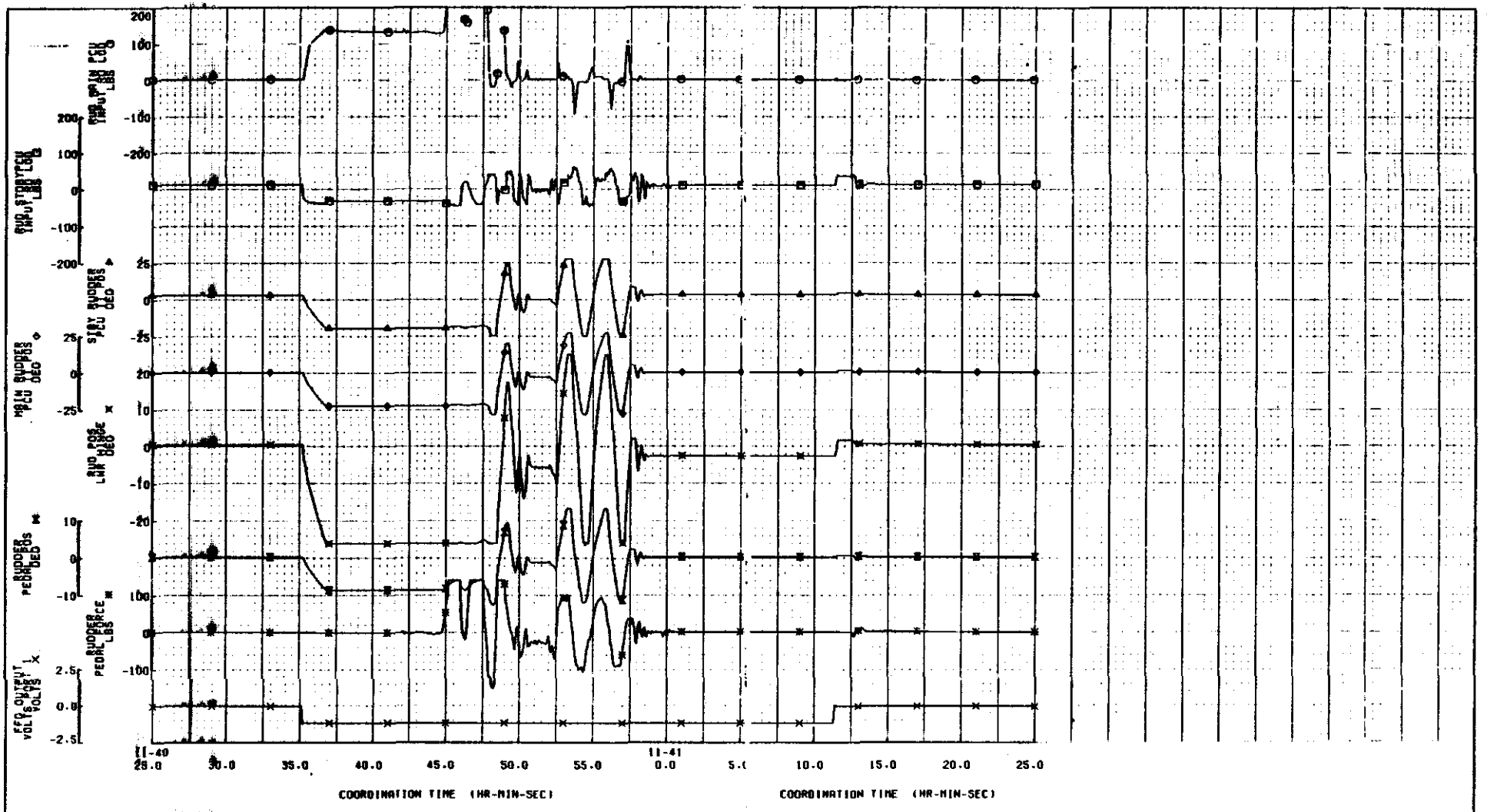

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APR					TEST 001-10 TEST DATE 03/04/96	81.39.0928
APR					THE BOEING COMPANY	PAGE

FORMAT 1
737-200. PG309. RUDDER SYSTEM GROUND TESTING

SCHEDULED TESTING

T.I. #	Test Item Title
B1.39.0928	737-200 STANDBY RUDDER ACTUATOR FAILURE GROUND TEST - B

PURPOSE OF TEST

Jams of the standby rudder PCU control valve lever will be introduced on the ground. The resulting rudder control system operational characteristics will be investigated with various initial conditions and subsequent yaw damper, rudder pedal, and rudder trim inputs. The intent is to allow evaluation of these characteristics with an actual airplane's flight control system compliance, backlash, control valve flow, and pressure gains.

TEST PARAMETERS

☐Hydraulic Power - Supplied to the A & B systems.

☐Electrical Power - ON

☐Nosewheel Steering - Disabled (either install nose gear steering lockout pin in nose gear steering depressurization valve per maintenance manual 32-00-01, or pull the nose gear air/ground circuit breaker on the P-6 panel).

TEST CONDITIONS

System Effects with a Naturally Galled Standby Rudder PCU Bearing

- *A Standby PCU with a naturally galled input linkage bearing will be installed. The bearing will be galled to about 60 pounds of input lever force.*
- *Set the Hydraulic System as noted.*
- *Minimize rudder pedal application with the galled bearing. Additional pedal cycles may increase the galling force and jeopardize the test results.*

Condition No.	Hyd Pressure	Operation
☐B1.39.0928.701	A & B	Cycle the rudder pedals through full deflection and note the system response.
☐.702	A & B	Input a ±3.0 degree yaw damper command at 0.3 Hz. Record the system response.
☐.703	A & B	Input a ±1.0 degree Yaw Damper Command at 0.3 Hz. Cycle the rudder pedals through full displacement during the frequency input. Record system response.
☐.704	- - - -	Confirm a simulated airload has been applied to the rudder trailing edge.