

Attachment 3
Test 001-07, 2/27/96

Materials contained in attachment 3

~~Test data tracking form~~

Test engineer's notes

Test sequence

Time-history data plots for:

Conditions B1.39.0935.001.4-001.6

Conditions B1.39.0935.004-005

Conditions B1.39.0935.004.1-.004.2

Condition B1.39.0935.101

Conditions B1.39.0935.103-104

Condition B1.39.0935.106

Conditions B1.39.0935.201-.209

Conditions B1.39.0935.209.1-.209.5

FLIGHT TEST DATA SHEET

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

Bl. 39.0935.001	07:59:00	Rig Leads:	Cable	RA - 143 lbs RA - 148 lbs RA - 148 lbs
				S/N - 2203A
Bl. 39.0935.002	08:03:00	Actuator Part Nos:	Main - 65-44861-3 Standby - 10-60797-2 S/N - 2973A	
Bl. 39.0935.003	08:05:00	Nosewheel Steering confirmed disabled		
Bl. 39.0935.001.1	08:20:00	Rig Pin No. 5:	in (off quadrant)	
TAPE ON	08:22:40	TAPE ON		
Bl. 39.0935.001.2	08:29:25	Rig Pin No 5 coming out		
Bl. 39.0935.001.3	08:30:19	Pressurize A & B Hydraulics		
Bl. 39.0935.001.4	08:30:38	Rig Pin Solid in & out w/ A & B Pressurized		
Bl. 39.0935.001.5	08:41:38	Full L	Rudder	+24.98°, 21.75"
	08:42:15	Zero	Rudder	
	08:42:53	Full R	Rudder	-25.36° & R, 20.75'
	08:43:16	Zero	Rudder	
Bl. 39.0935.001.6	08:50:59	Full L	Rudder	+24.96° & R, 21.75"
	08:51:23	Neutral		0.15° & R
	08:52:00	Full R	Rudder	-25.25° & R, 20.75"
	08:52:31	Neutral		0.02° & R
Bl. 39.0935.004	09:04:00	Start Sweep, L Rudder		
	09:04:39	Full L		
	09:04:46	Full R		
	09:04:50	Ø R		
Bl. 39.0935.004.1	09:05:09	Full L	& Hold	
	09:05:24	Full R	& Hold	
	09:05:38	Ø R		

SHEET 1 OF 4	TITLE 737 Rudder Cable Cut	MODEL
RECORDER D. Nagel	GT.	AIRPLANE
TEST NO. 001-07	BOEING	DOC. NO.
DATE 2/27/96		PAGE

FLIGHT TEST DATA SHEET

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

Bl.39.0935.005	09:07:45	Rudder L Kick						
	09:08:00	Rudder R Kick						
Bl.39.0935.201	09:12:20	50 lbs on Cable RA	0° SR					
Bl.39.0935.202	09:15:15	100 lbs " "	0° SR					
Bl.39.0935.203	09:14:45	150 lbs " "	-2.1° SR					
Bl.39.0935.204	09:16:34	200 lbs " "	-2.3° SR					
Bl.39.0935.205	09:17:20	250 lbs " "	-3.2° SR					
Bl.39.0935.206	09:19:30	200 lbs on Cable RA	1.07° SR					
Bl.39.0935.207	09:20:23	250 lbs on	RA, 2.28° SR					
Bl.39.0935.208	09:22:45	Shake out the rudder system						
	09:23:01	Handy						
Bl.39.0935.209	09:24:15	Begin slow rudder sweep						
	1:24:29	Full L to R						
	1:24:53	Full R to L						
	09:25:09	0° R, "No binding", "seems loose"	"right travel"					
Bl.39.0935.1004.2	09:38:15	125 Kts on Rudder Pitots						
	09:38:15	Begin Rudder Pedal Sweep						
	09:38:48	End Sweep						
Bl.39.0935.101	09:40:30	125 Kts on Rudder Pitots						
	1:40:35	Pitots feet on floor						
	1:40:55	"Cut", Pedals went to -12°, Rudder did not move						
	09:42:36	Break radio silence						
Bl.39.0935.102		Take still photos of Cable ends						
		Find Cable, BS 357						
		Aft cable, BS 392						
	09:43:50	??						
Bl.39.0935.103	09:45:15	Begin Sweep						
	09:46:27	End	"Higher forces, L Rudder"					
			"Release, zero force"					
TAPE OFF	09:49:30	TAPE OFF						

SHEET 2 OF 4	TITLE 737 Rudder Cable	MODEL
RECORDER P. Noyes	Cut G.T.	AIRPLANE
TEST NO. 001-07	BOEING	DOC. NO.
DATE 2/27/96		PAGE

FLIGHT TEST DATA SHEET

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

TAPE ON	14:00:55	TAPE ON	
	14:01:00	Note: A new rudder cable has been installed.	
		The cable rig loads are:	
		158 lbs RA @ 63.6°F	
		158 lbs RB	
	14:12:52	A & B ON	
	14:14:47	Rig Pin 5 in/out with A & B Hydr Oil	
	14:22:19	A & B ON again	
209.1	14:22:55	Begin Rudder Pedal Sweep	
	14:23:32	End	
209.2	14:23:59	Begin Sweep	
	14:24:52	End	
Trouble Shoot High Rudder Pedal Forces	14:57:37	Looked for trouble with cables	
		Looked for trouble with airspeed	
	15:00:00	Begin 50 Sweep (IRIG ???)	
	15:02:31	End	
		• Note: cable jumping around	
		• Note: intro (TT Position had a problem)	
	15:06:38	A & B ON	
	1:09:56	20° RA, 90 lbs	
	1:10:28	20° RB, 70 lbs	
	1:11:57	20° RA, 84 lbs	
	15:12:24	19° RB, 65 lbs	
209.3	Rudder Sweep	15:25:45 Sweep, 12.5 knots 12.5 knots	
		15:27:38 End	
	15:48:40	Re-adjust cable forces to 147/145 lbs tension	
209.4	Rudder Sweep	15:49:53 A & B ON	
		50-15 L Rudder / R Rudder	
		51:00 End	
209.5		51:02 L Rudder / R Rudder	
	15:51:39	End	

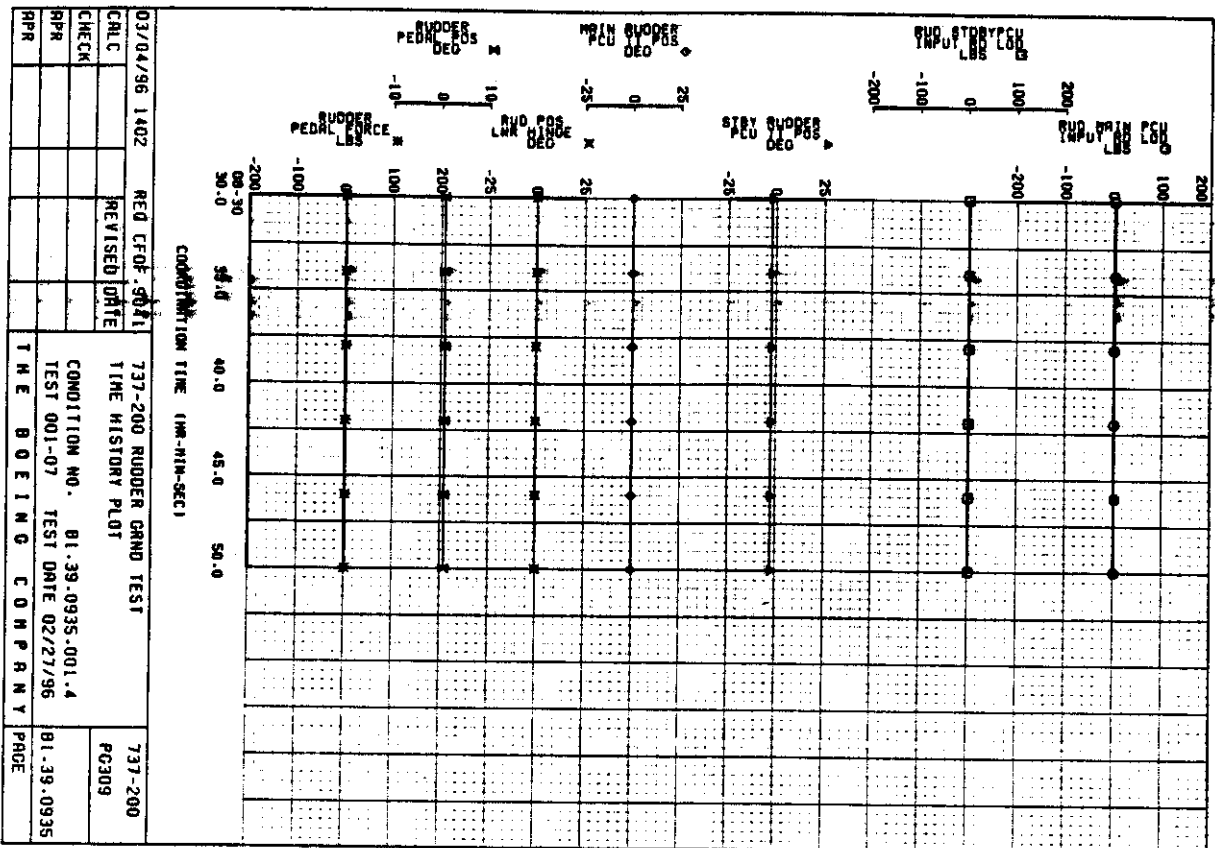
SHEET 3 OF 4	TITLE 737 Rudder Cable Cut	MODEL
RECORDER D. Nage	Control Test	AIRPLANE
TEST NO. 001-07	BOEING	DOC. NO.
DATE 2/27/96		PAGE

FLIGHT TEST DATA SHEET

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

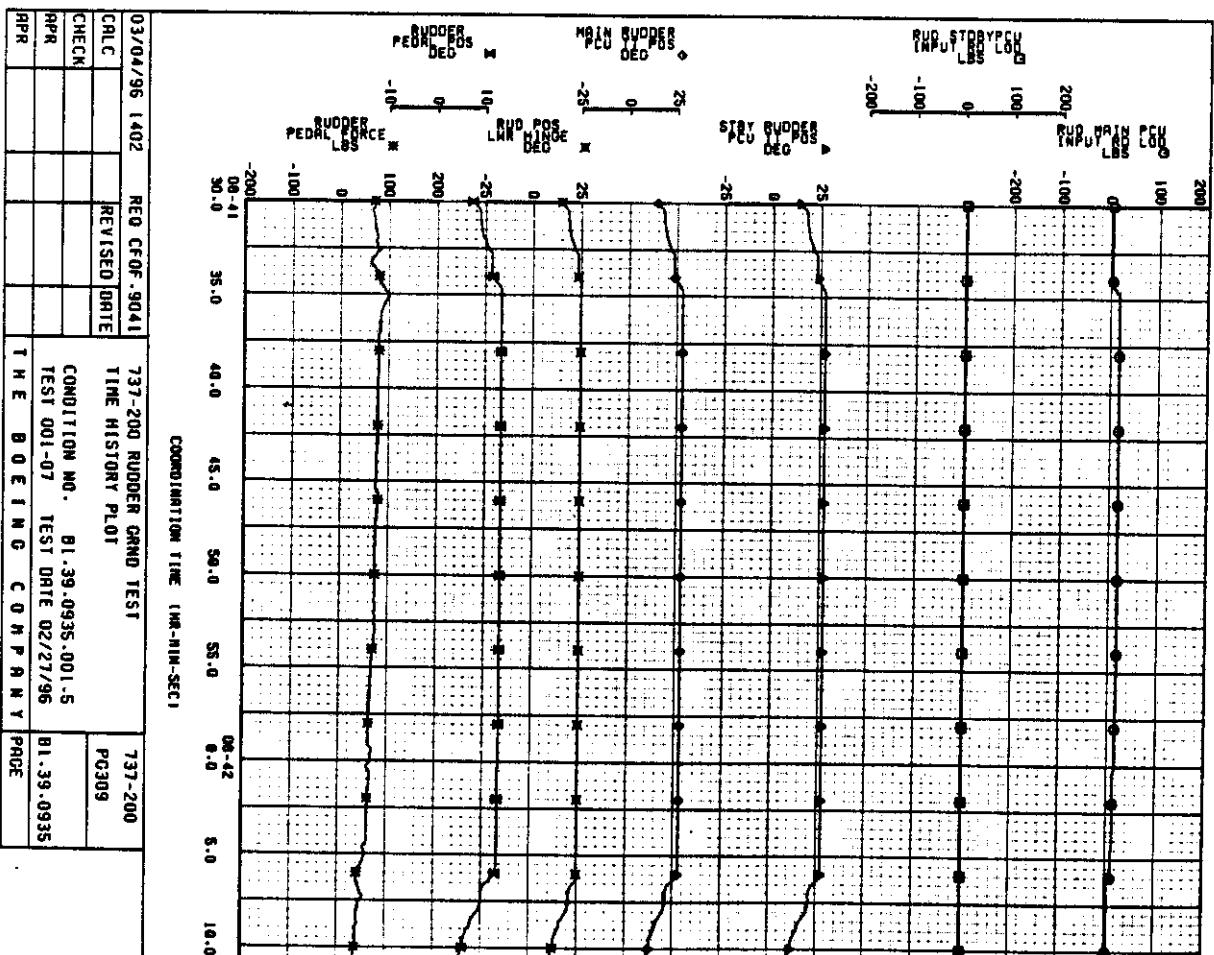
B1.39.00035.104	15:56:15	CVR C/B in	
	1:56:33	Pilot's feet on Pedals	
	1:57:00	"cut"	
	15:57:49	Pilot comment	"felt some foot back"
			"surprised @ motion"
			"cvt basically non-existent"
			"no sharp contact noise"
	16:00:25	CVR C/B pulled	
.105	162500	FWD CABLE, BS	COULD NOT FIND
		AFT CABLE, BS	
.106	162625	LEFT SIDE FIRST	
	162644	FULL LEFT RUDDER	
	162703	NEUTRAL	
	162714	FULL RIGHT	
	162727	NEUTRAL	
	162750	HYD OFF	
	163015	TAPE OFF	

SHEET 4 OF 4	TITLE 737 Rubber Cable cut	MODEL
RECORDER O. Nagel	Ground test	AIRPLANE
TEST NO. 001-07	BOEING	DOC. NO.
DATE 2/27/96		PAGE



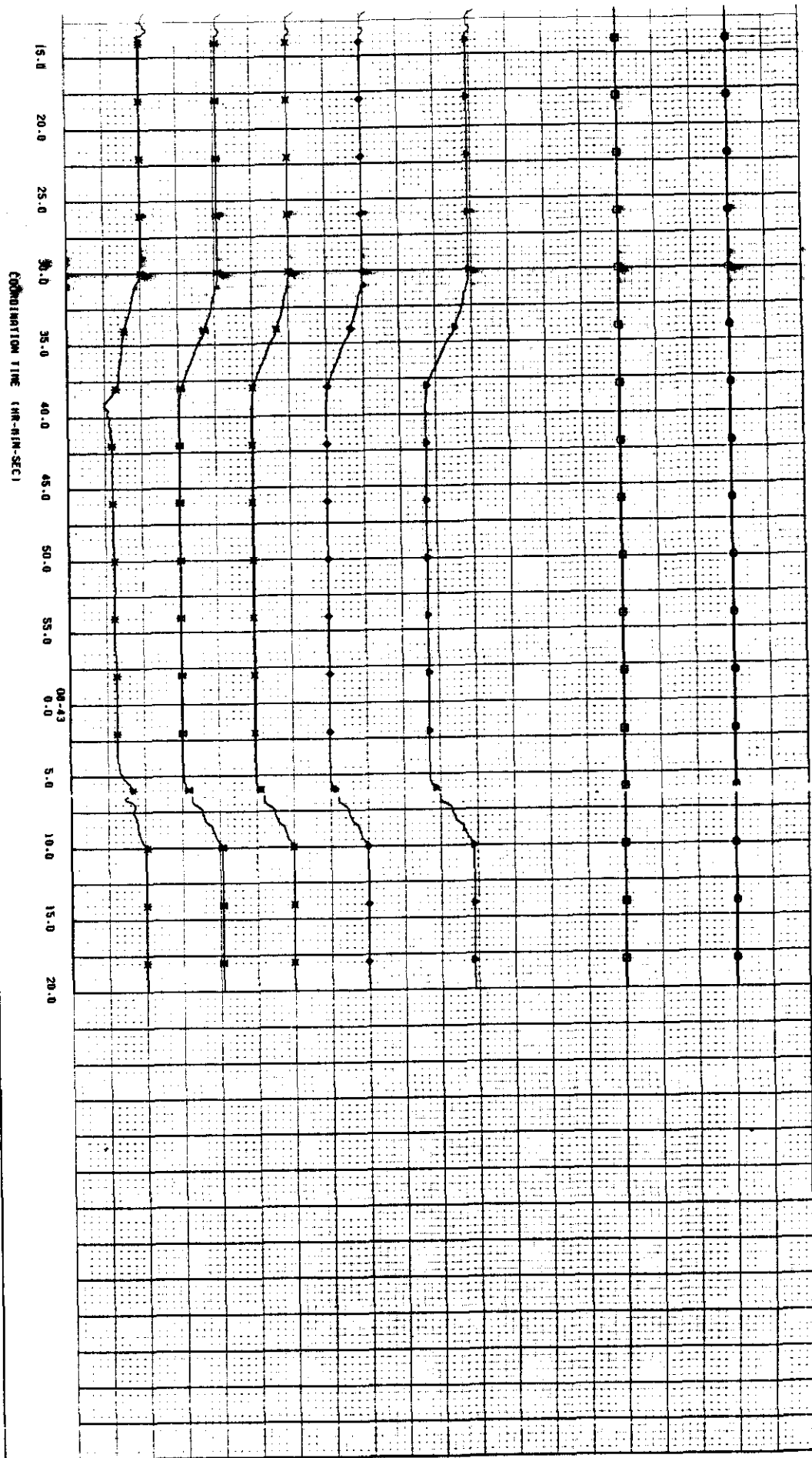
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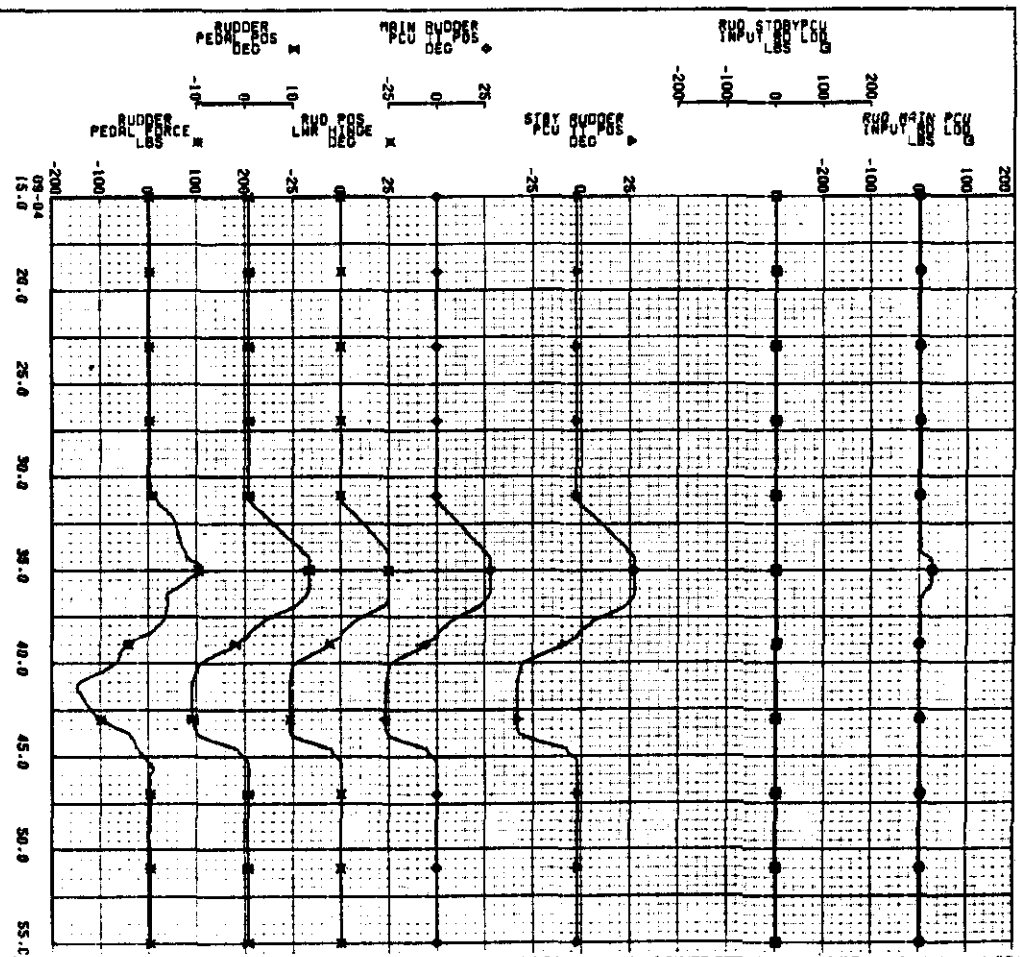
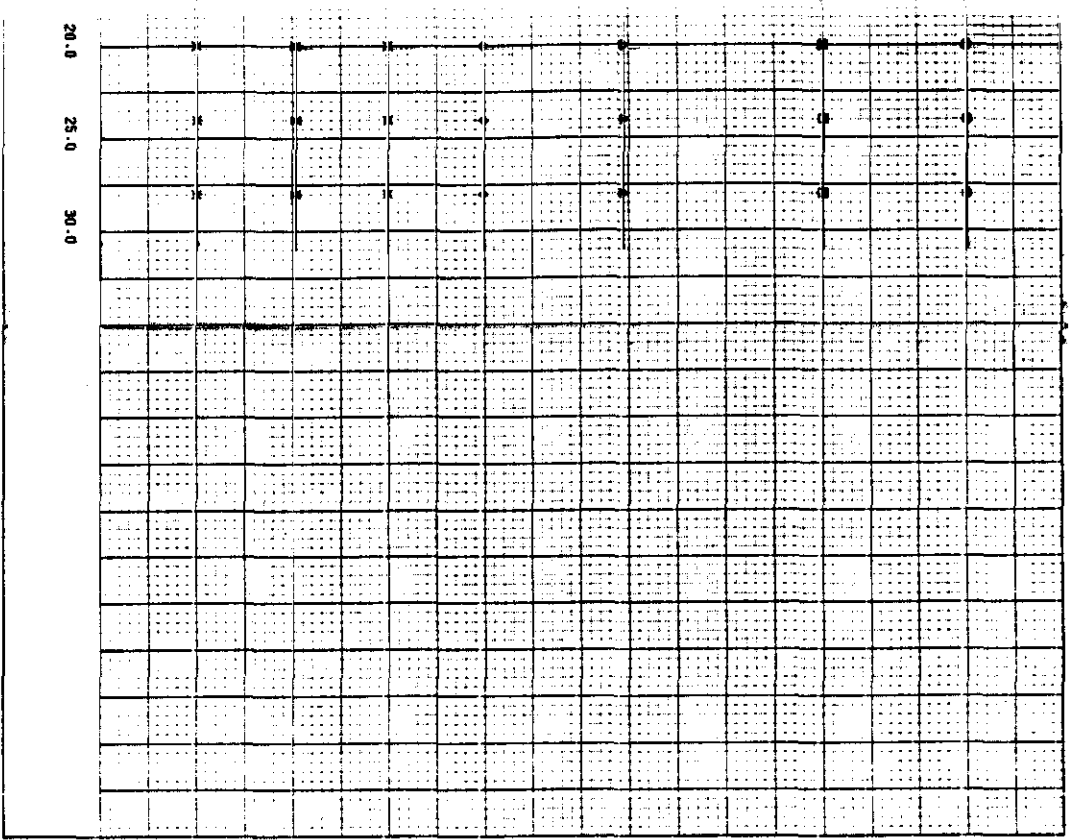
737-200, PG309, RUDDER CABLE LOADING AND CUT GROUND TESTS



FORM 1

737-200, PG309, RUDDER CABLE LOADING AND CUT GROUND TESTS

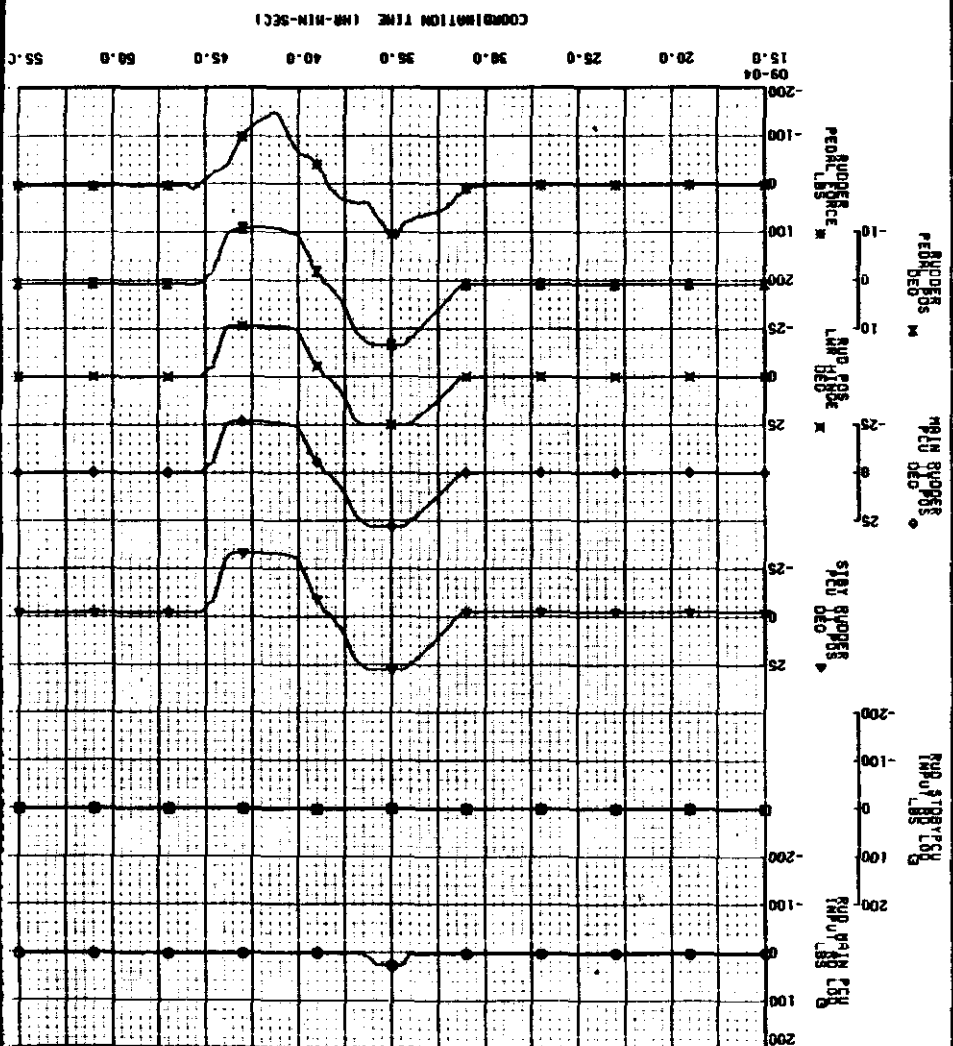




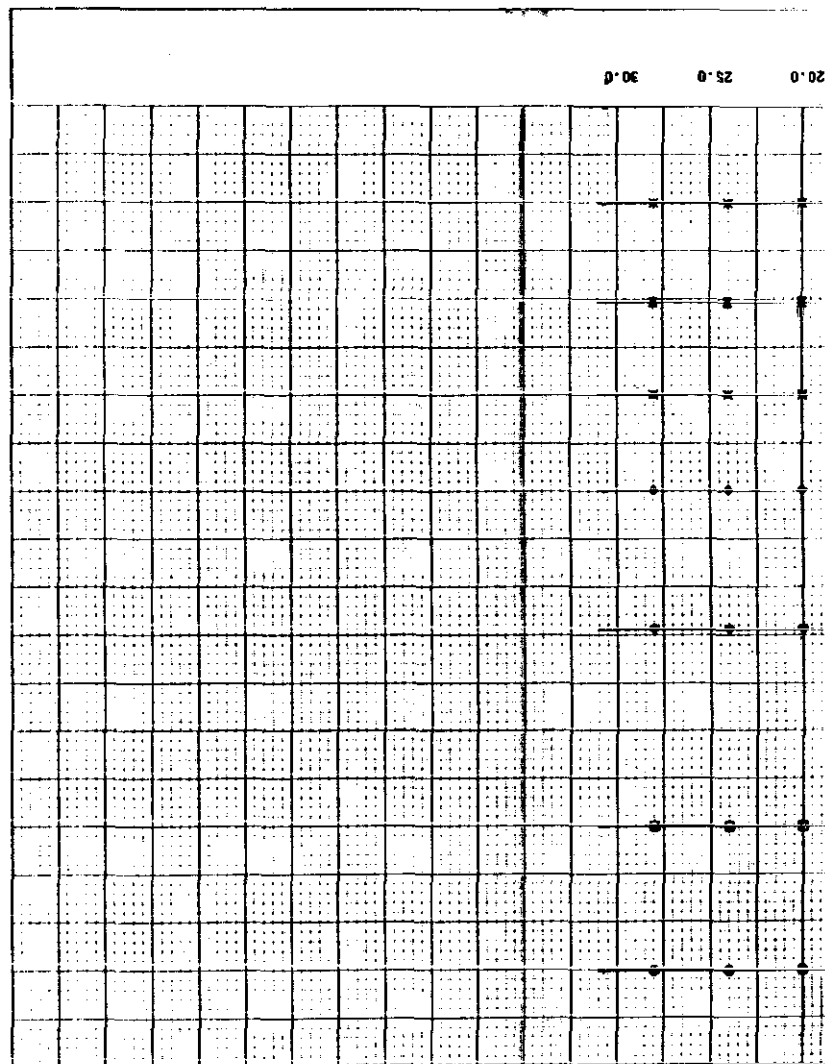
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APR		TEST DATE 02/27/96	81-39-0935
		TIME 001-07	
		COMPANY	PAGE

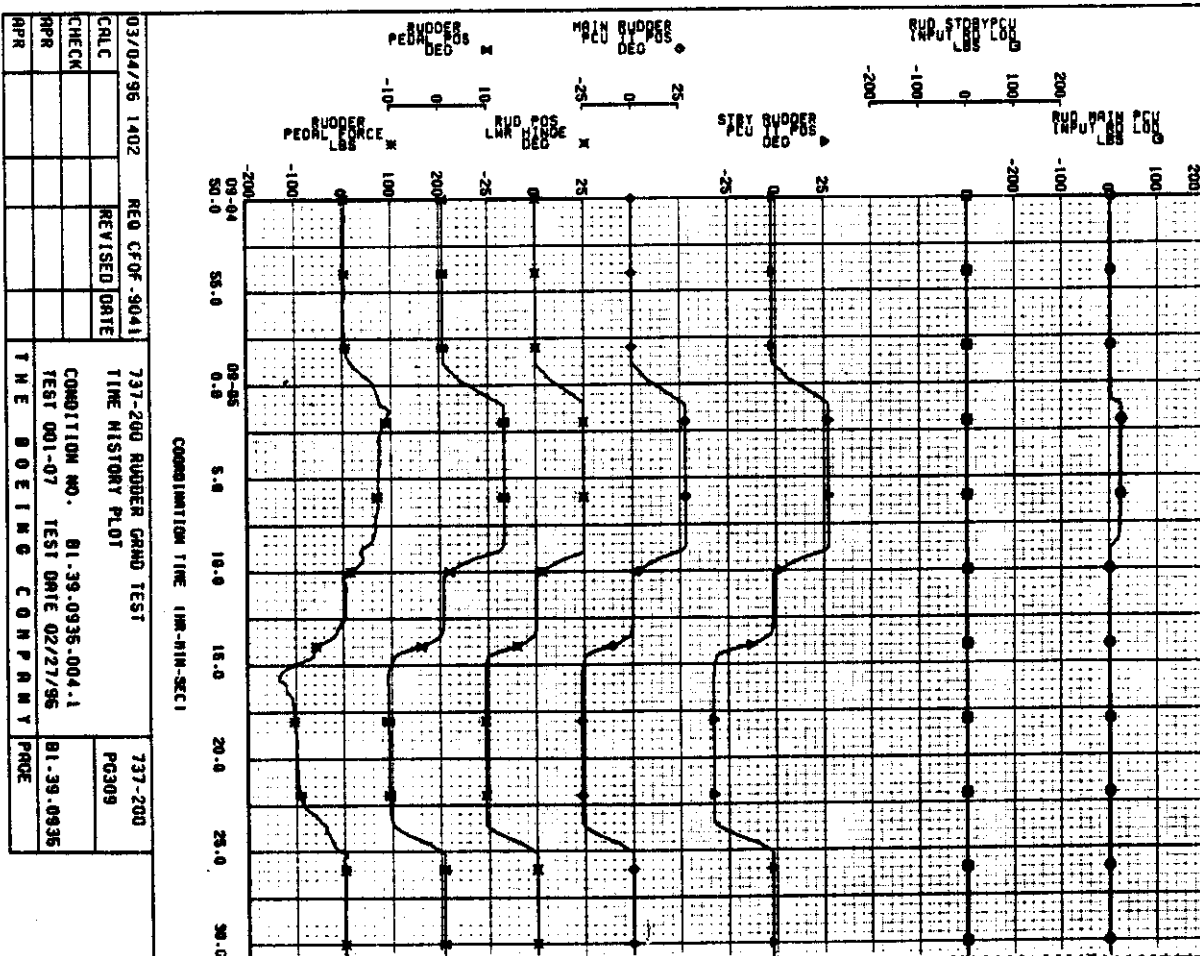
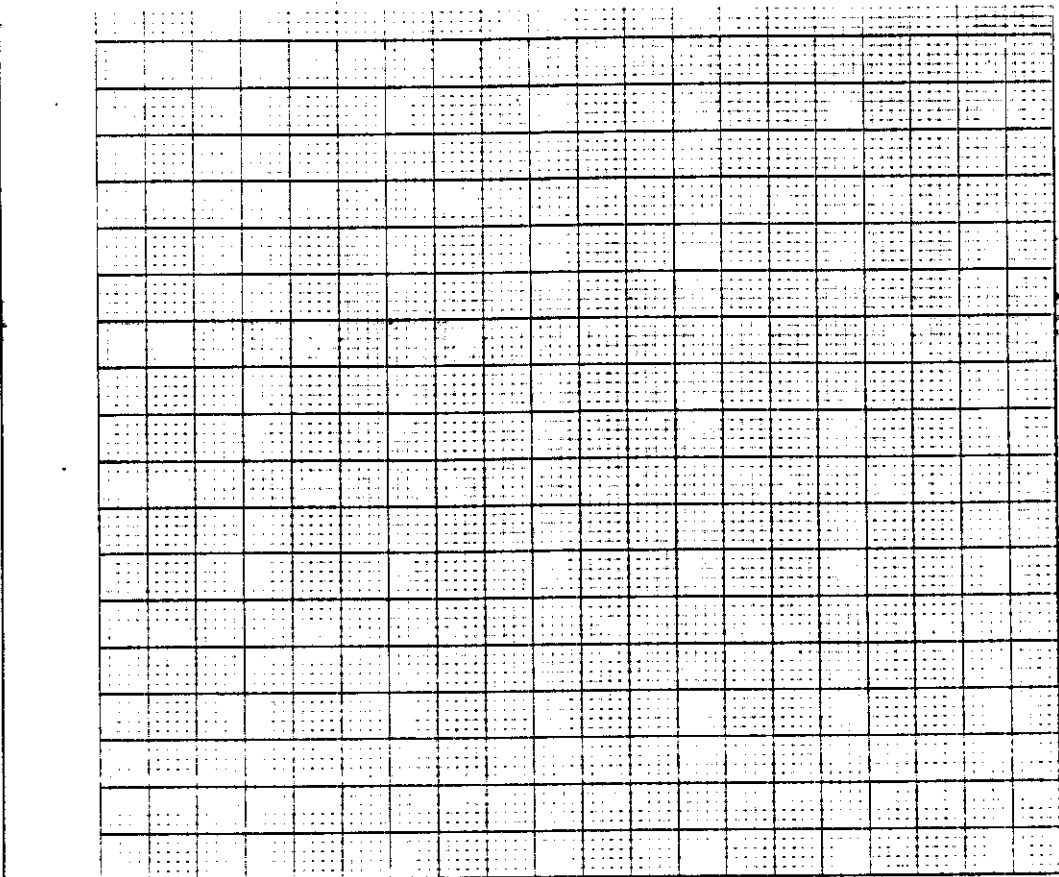
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737-200, PG309, RUDDER CABLE LOADING AND CUT AROUND TESTS

737-200, PG309, RUDDER CABLE LOADING AND CUT GROUND TESTS

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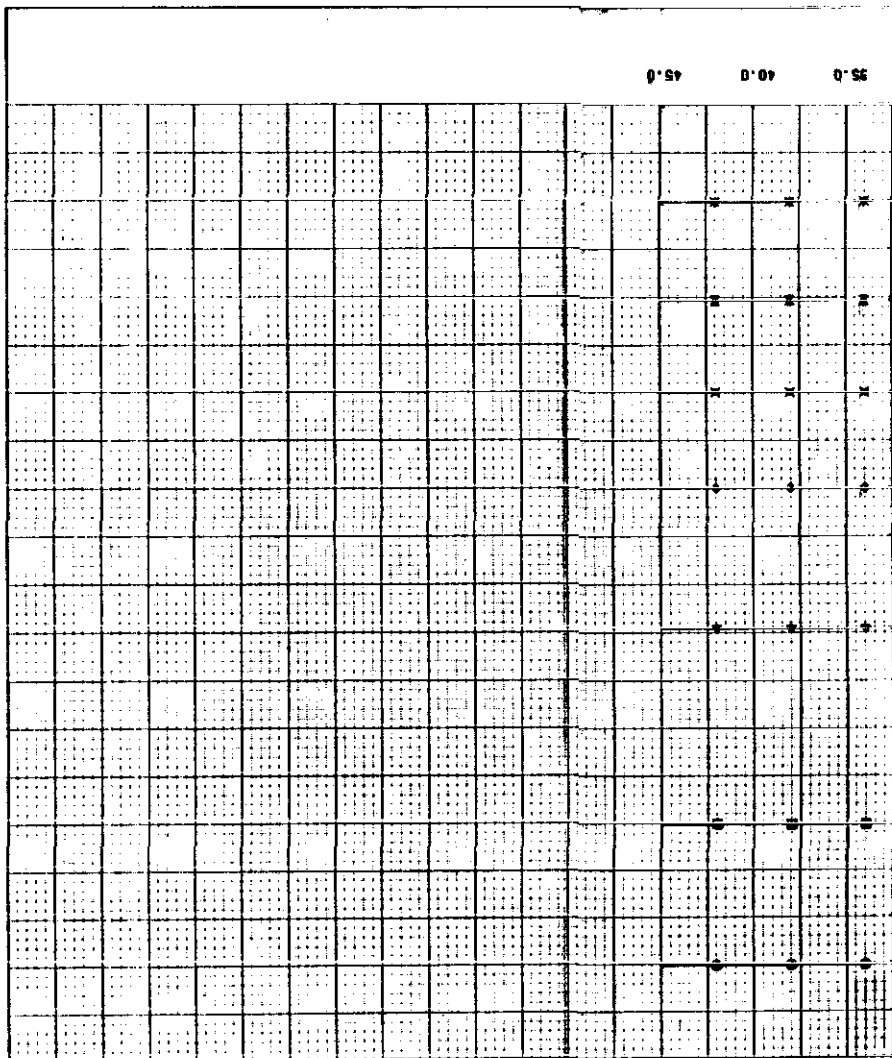
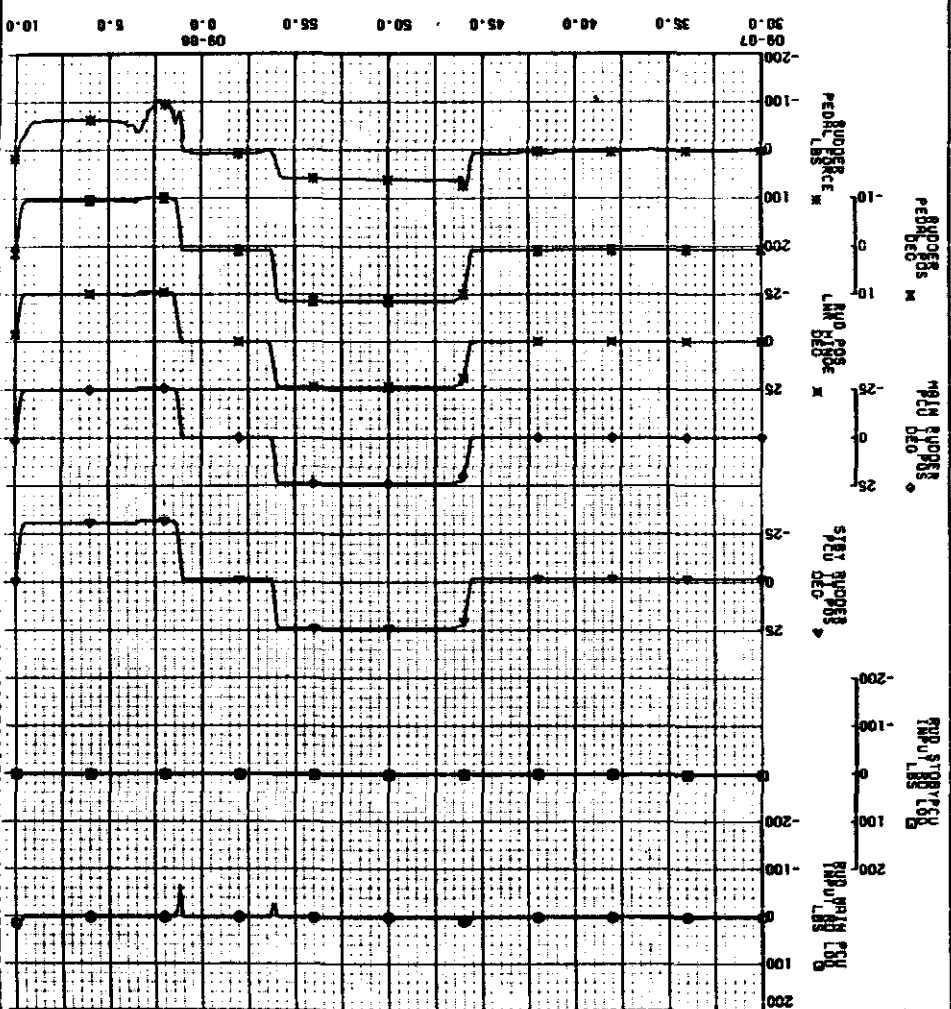
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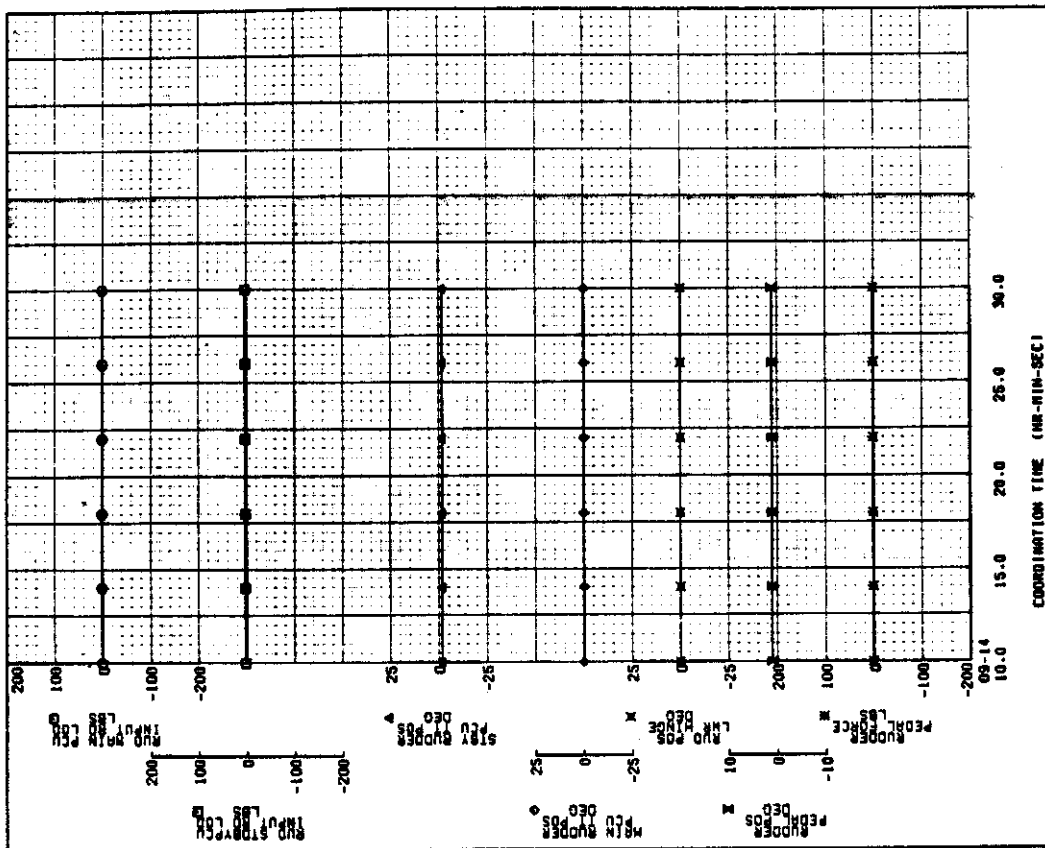
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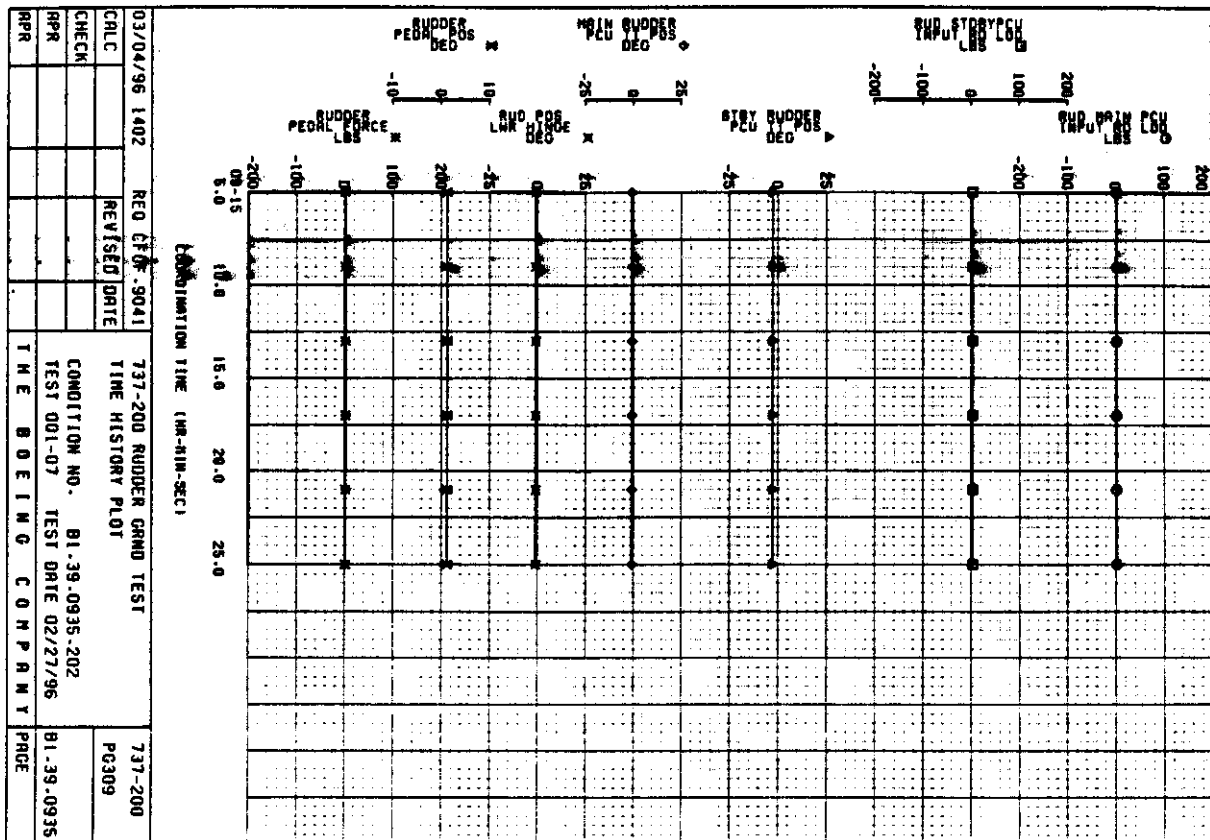
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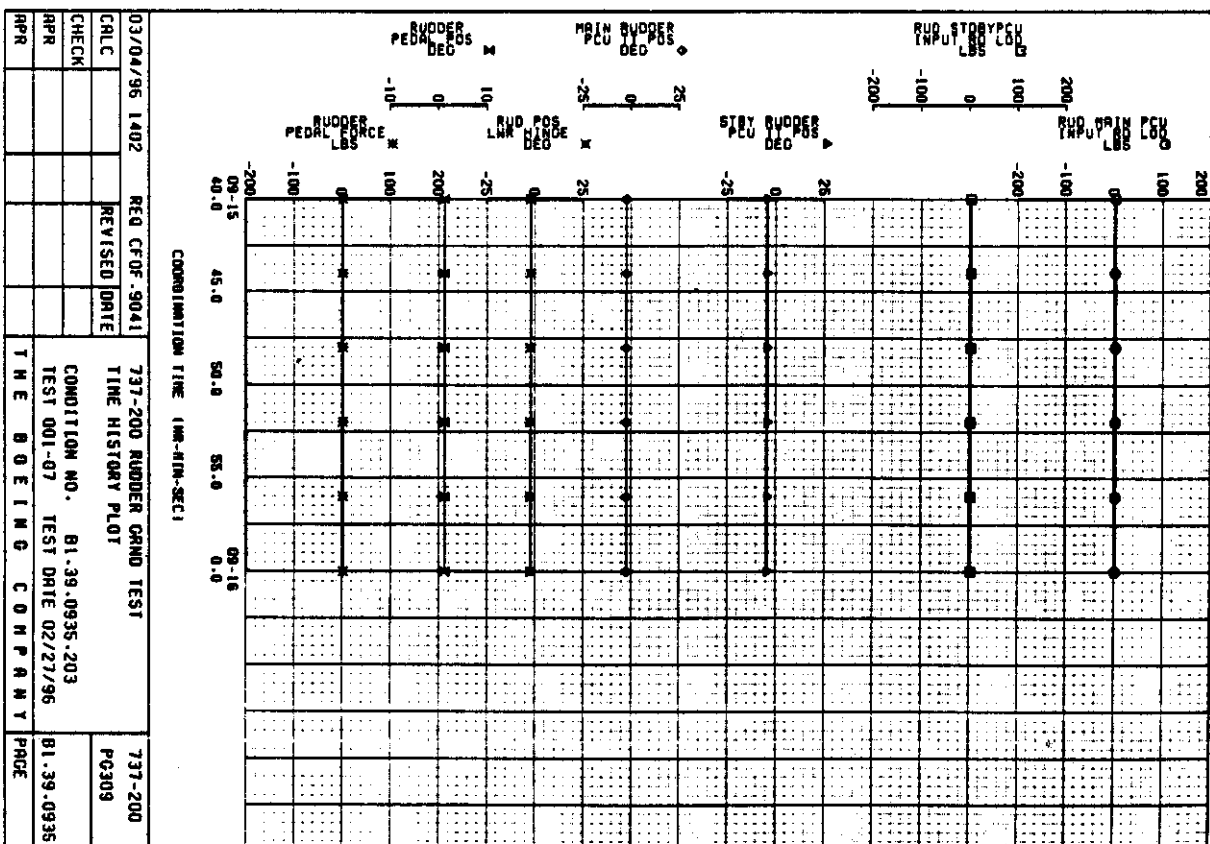


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		THE BOEING COMPANY	PAGE

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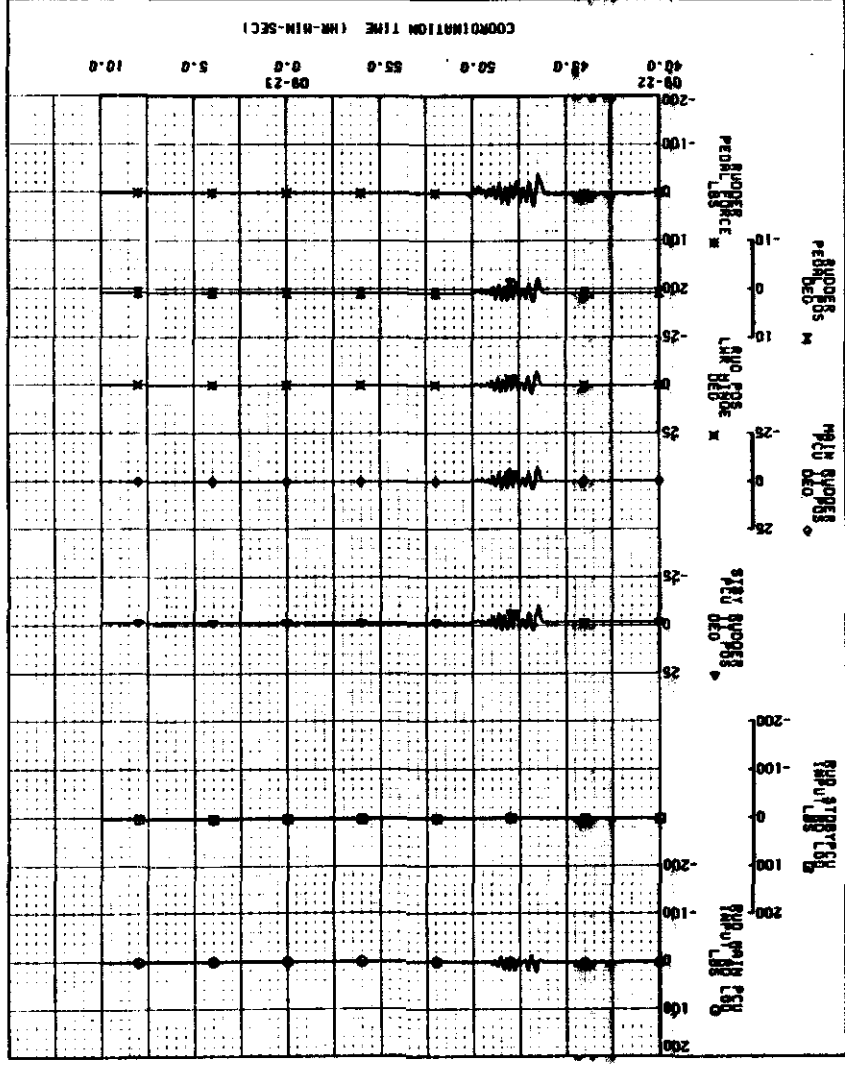
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737-200, PG309, RUDDER CABLE LOADING AND CUT GROUND TESTS



FORM 1
737-200, PG309, RUDDER CABLE LOADING AND CUT GROUND TESTS

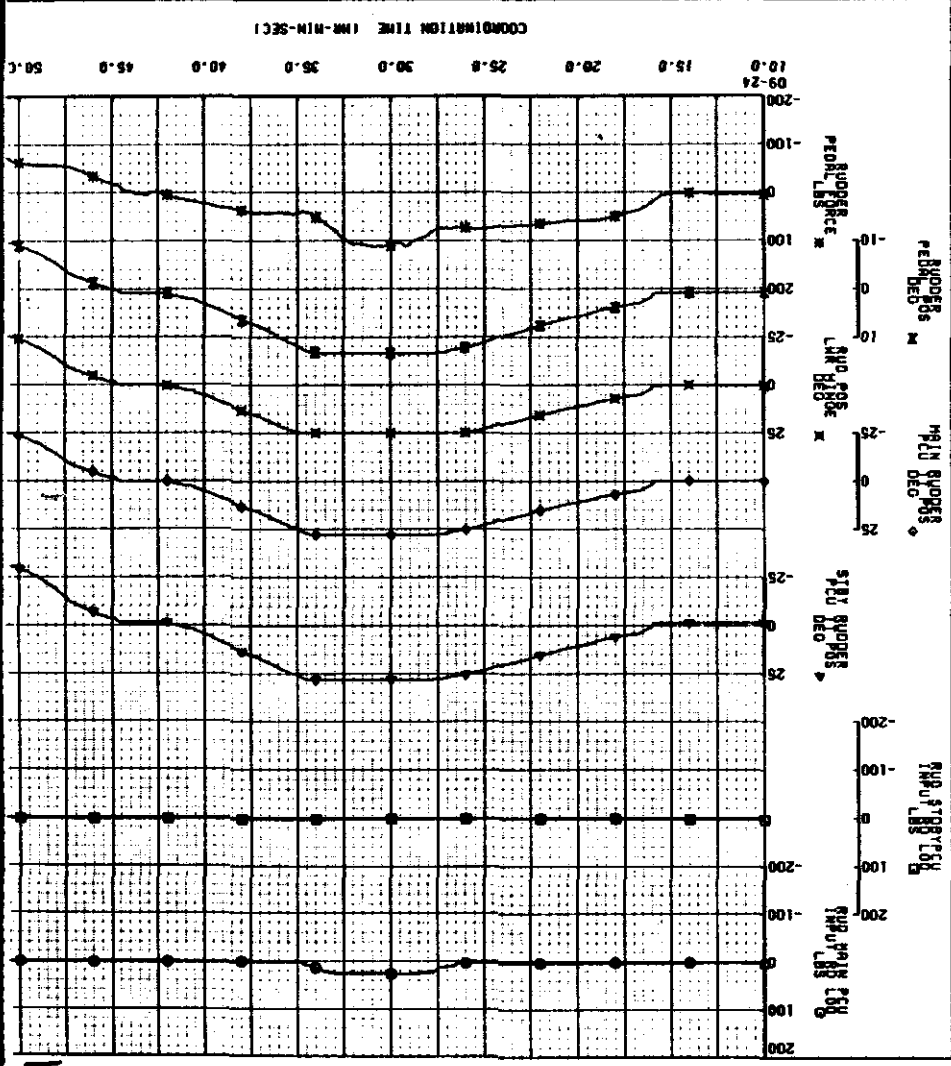
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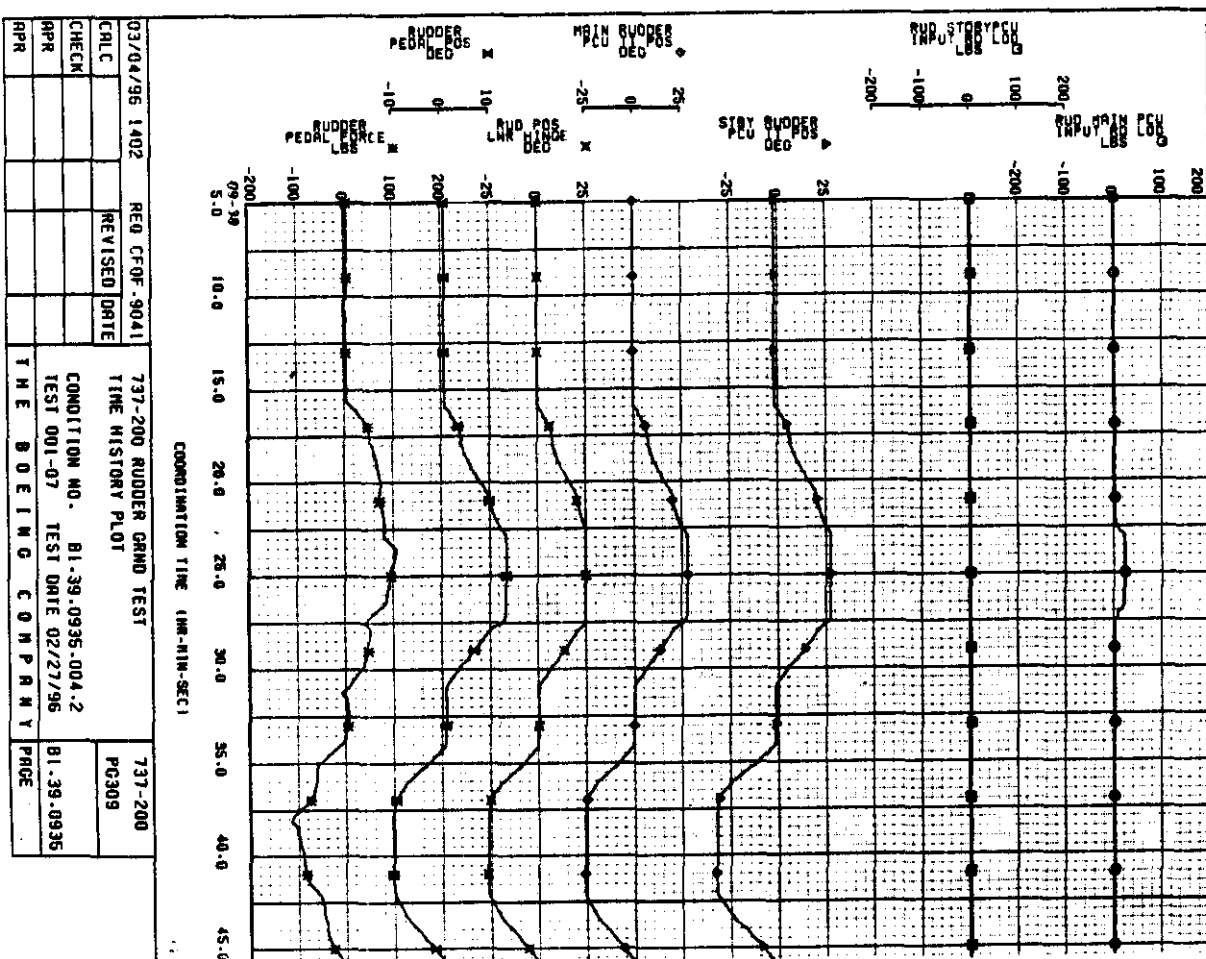
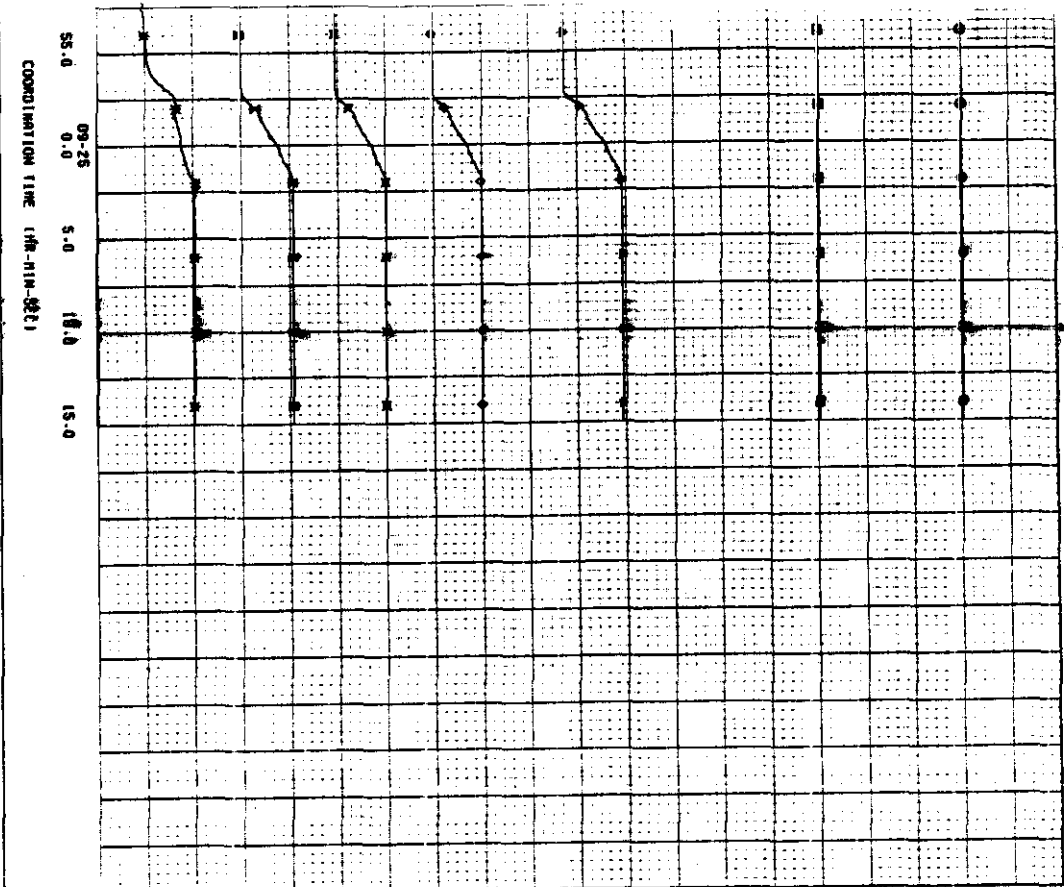
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CALC		REVISED DATE			
CHECK					
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APR			THE BOEING COMPANY		
APR			PAGE		



737-200, PG309, RUDDER CABLE LOADING AND CUT GROUND TESTS

03/04/96 1402		REQ C/F: 9041	737-200 RUDDER GRAND TEST	TIME HISTORY PLOT	PG309
CALC		REVISED DATE			
CHECK					
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APR			THE BOEING COMPANY		
APR			PAGE		





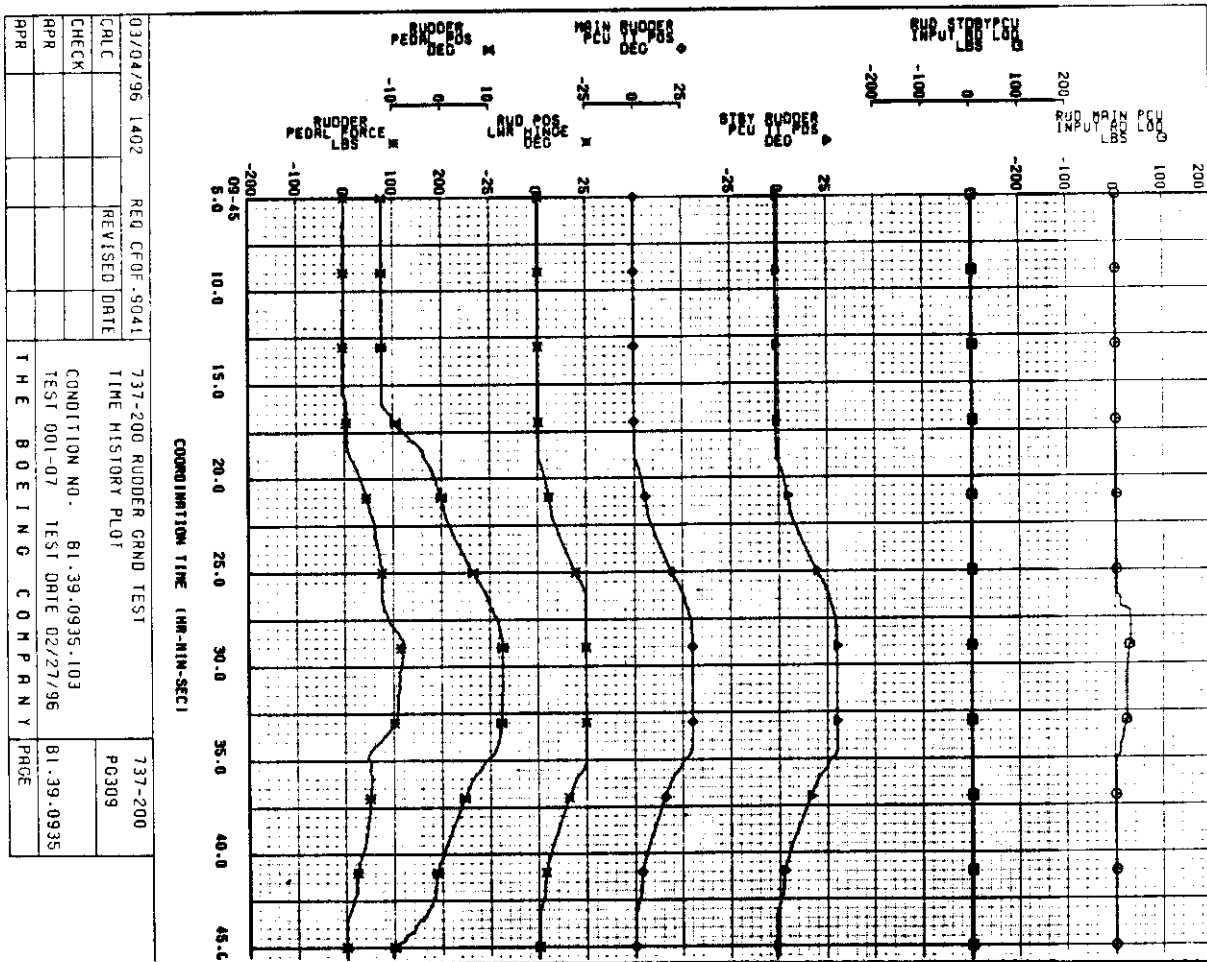
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CALC	REVISED DATE	TIME HISTORY PLOT	PG309
CHECK		CONDITION NO. B1-39-0935-004.2	
RPR		TEST 001-07 TEST DATE 02/27/96	B1-39-0935
RPR		THE BOEING COMPANY	PRICE



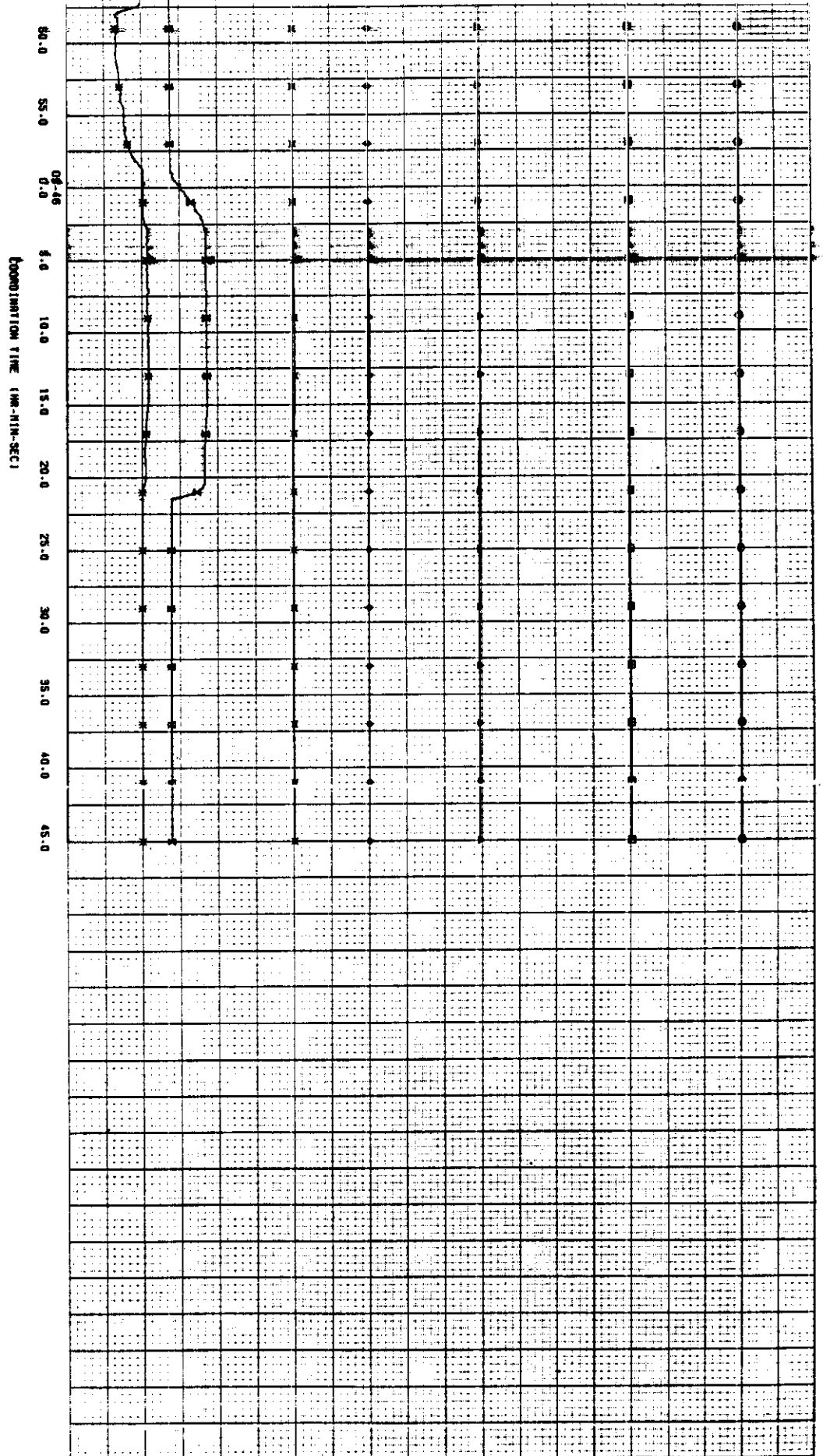
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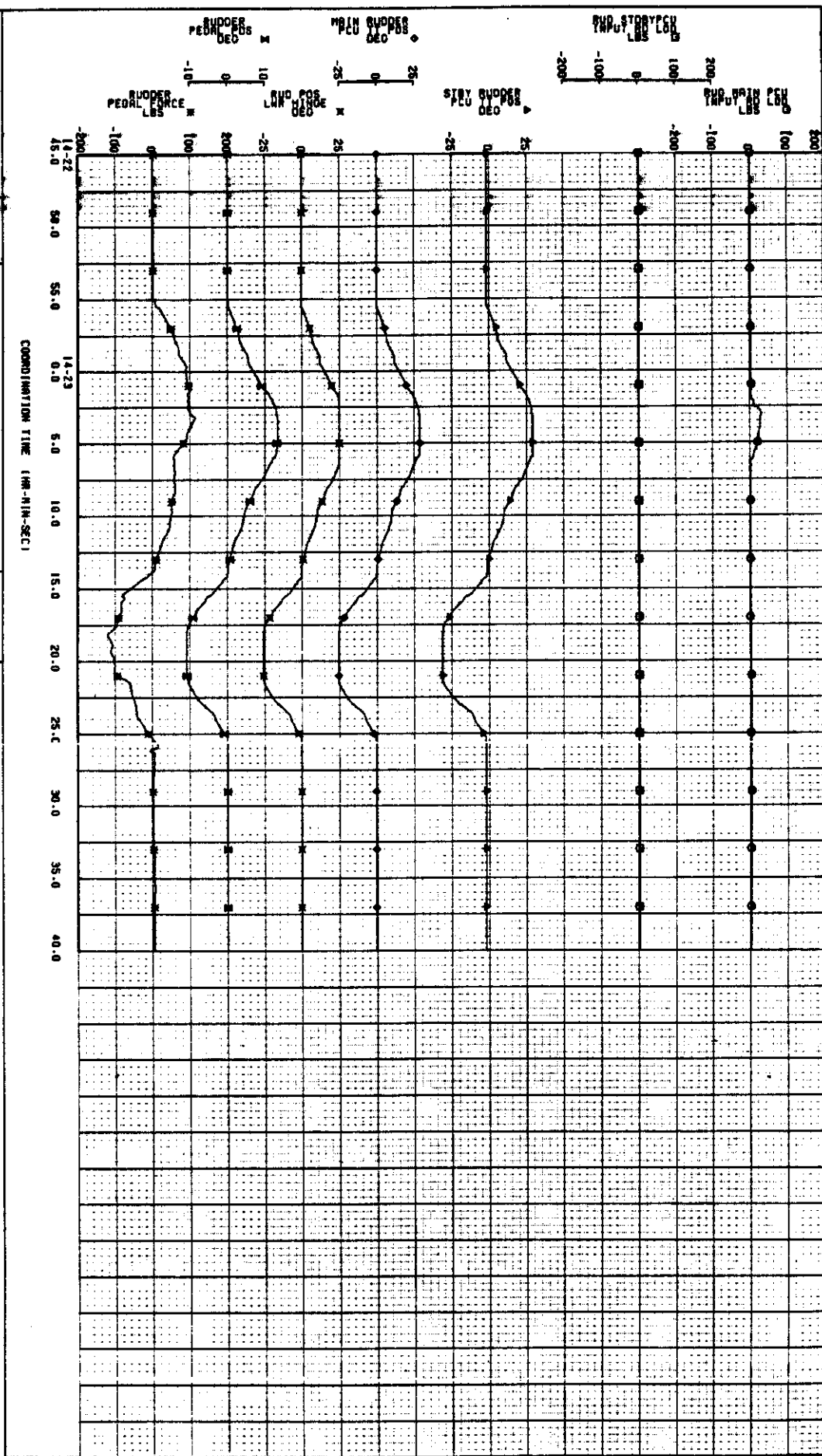
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FORM 1
737-200, PG309, RUDDER CABLE LOADING AND CUT GROUND TESTS

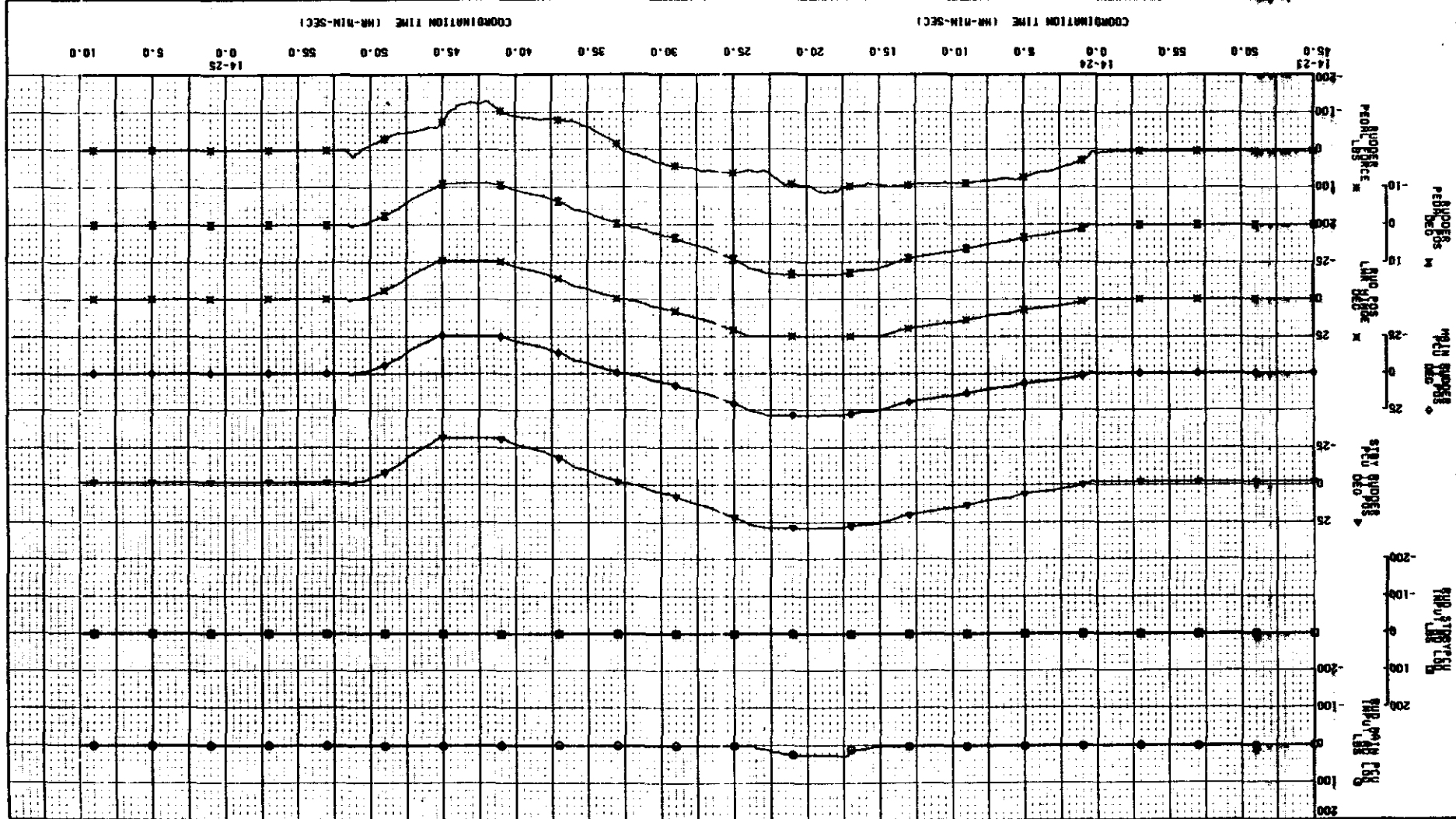
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APR		TEST 001-07 TEST DATE 02/27/96	81.39.0935
APR		THE BOEING COMPANY	PAGE



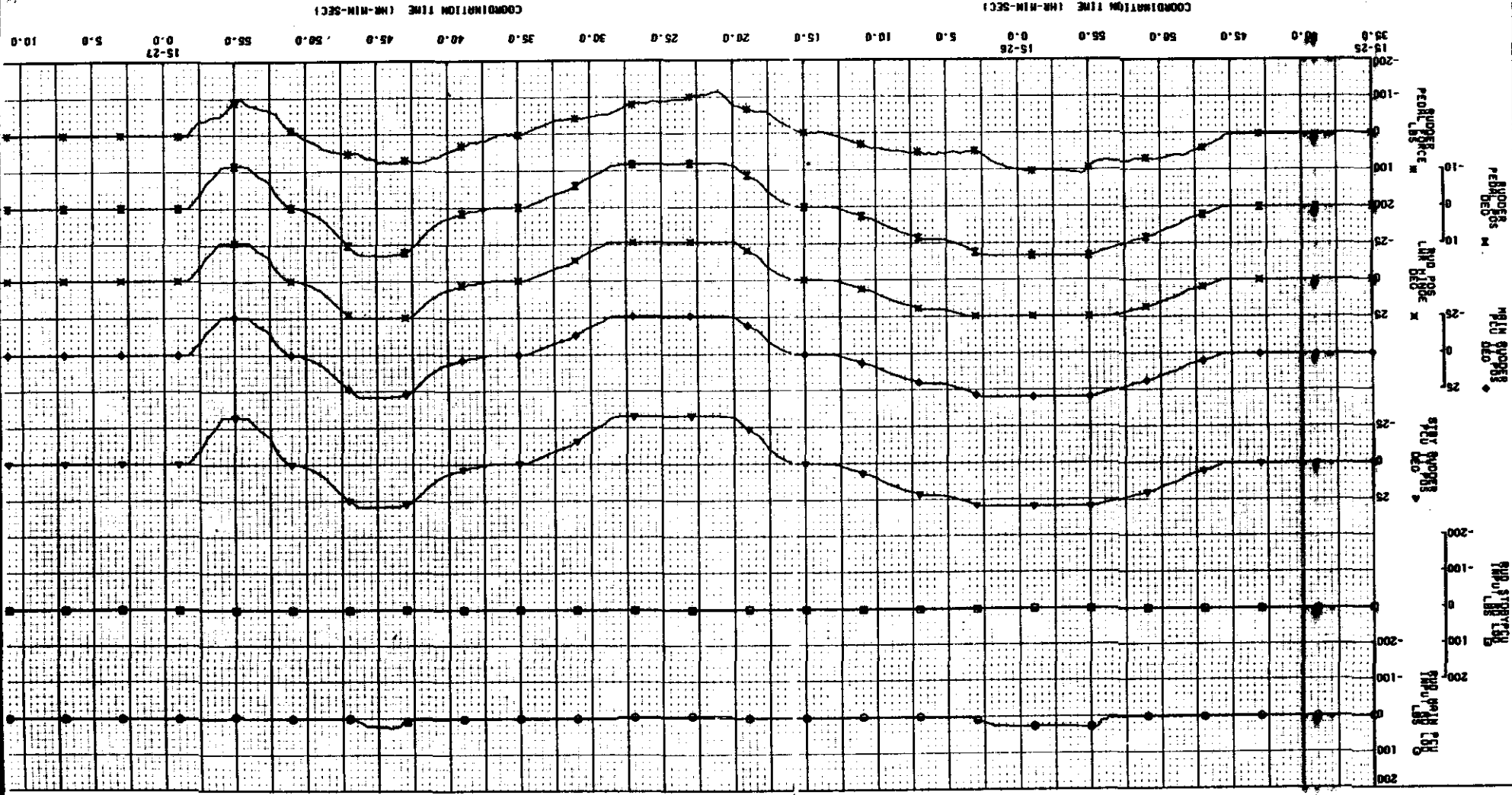


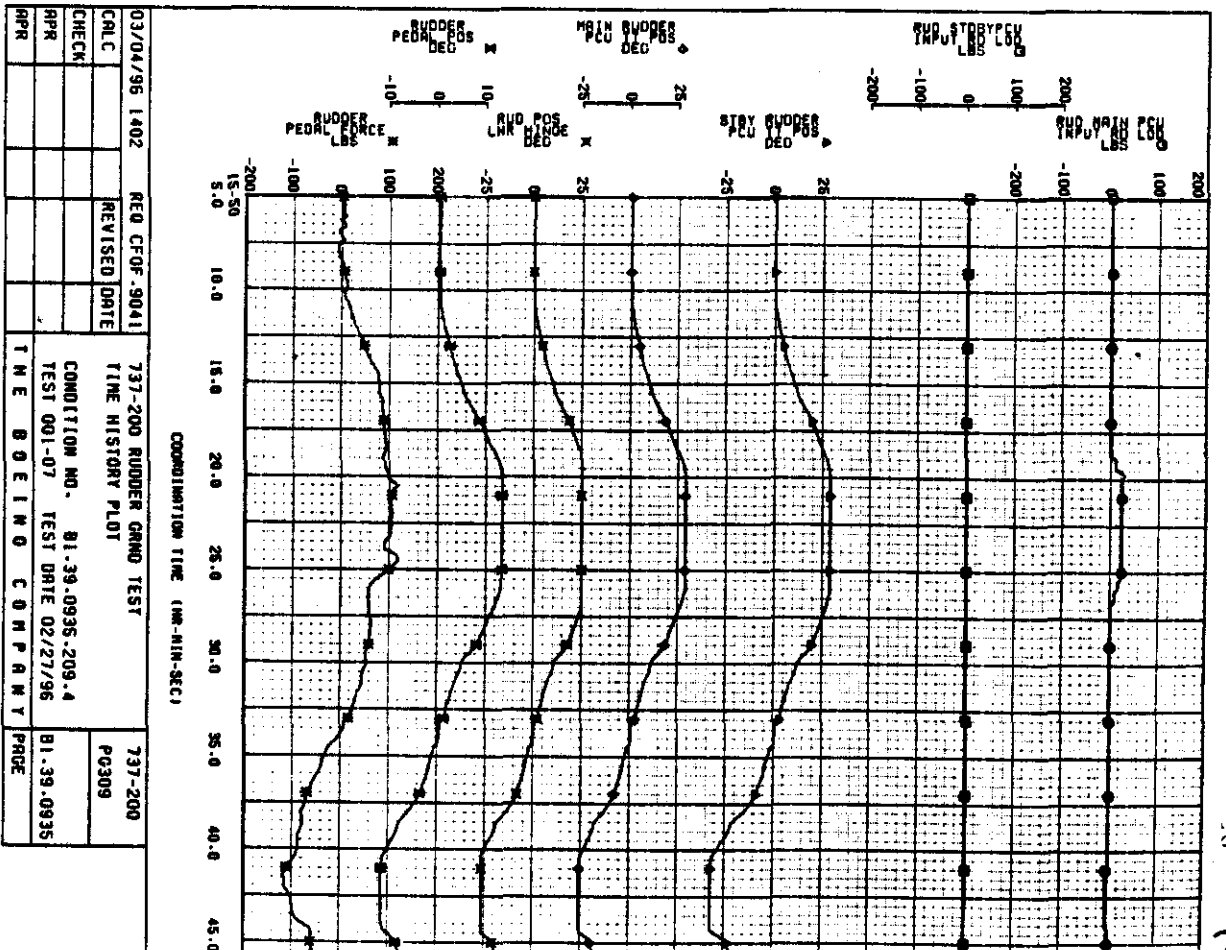
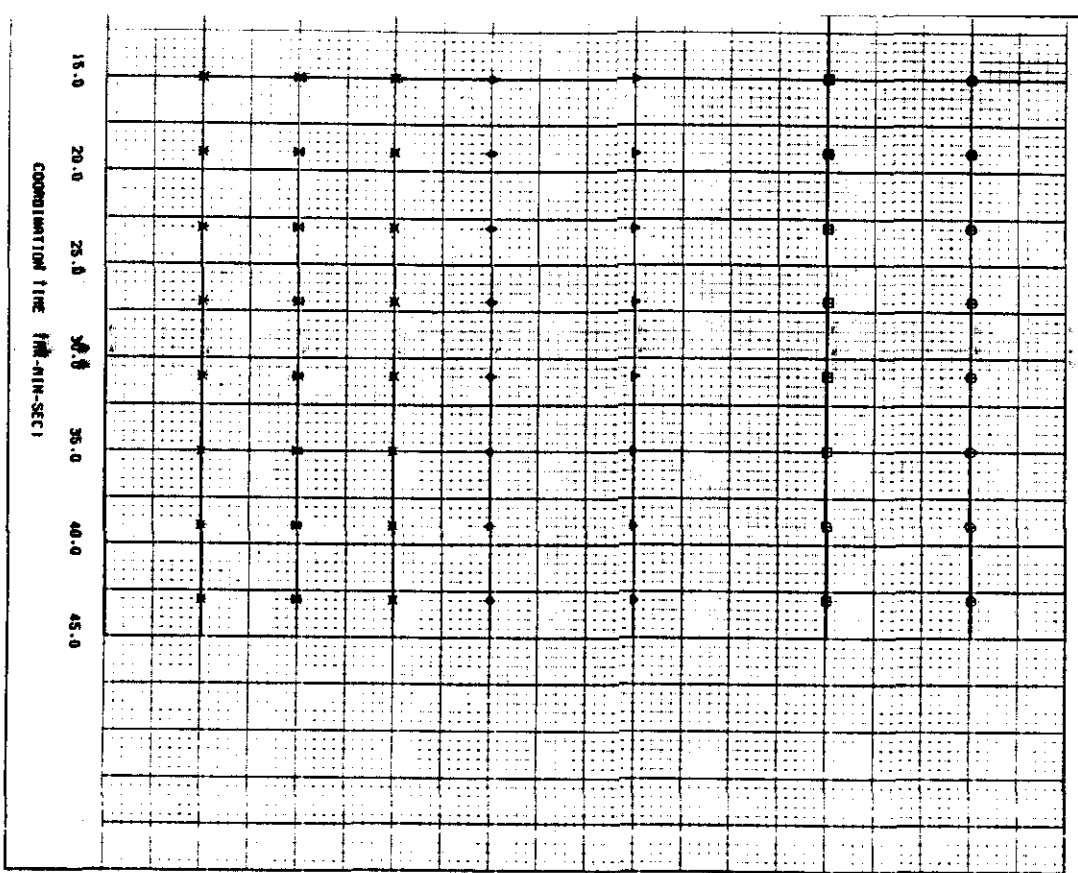
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APR		TEST 001-07 TEST DATE 02/27/96	81.39.0935
APR		THE BOEING COMPANY	PRC

FORMAT 1
737-200, PG309, RUDDER CABLE LOADING AND CUT GROUND TESTS

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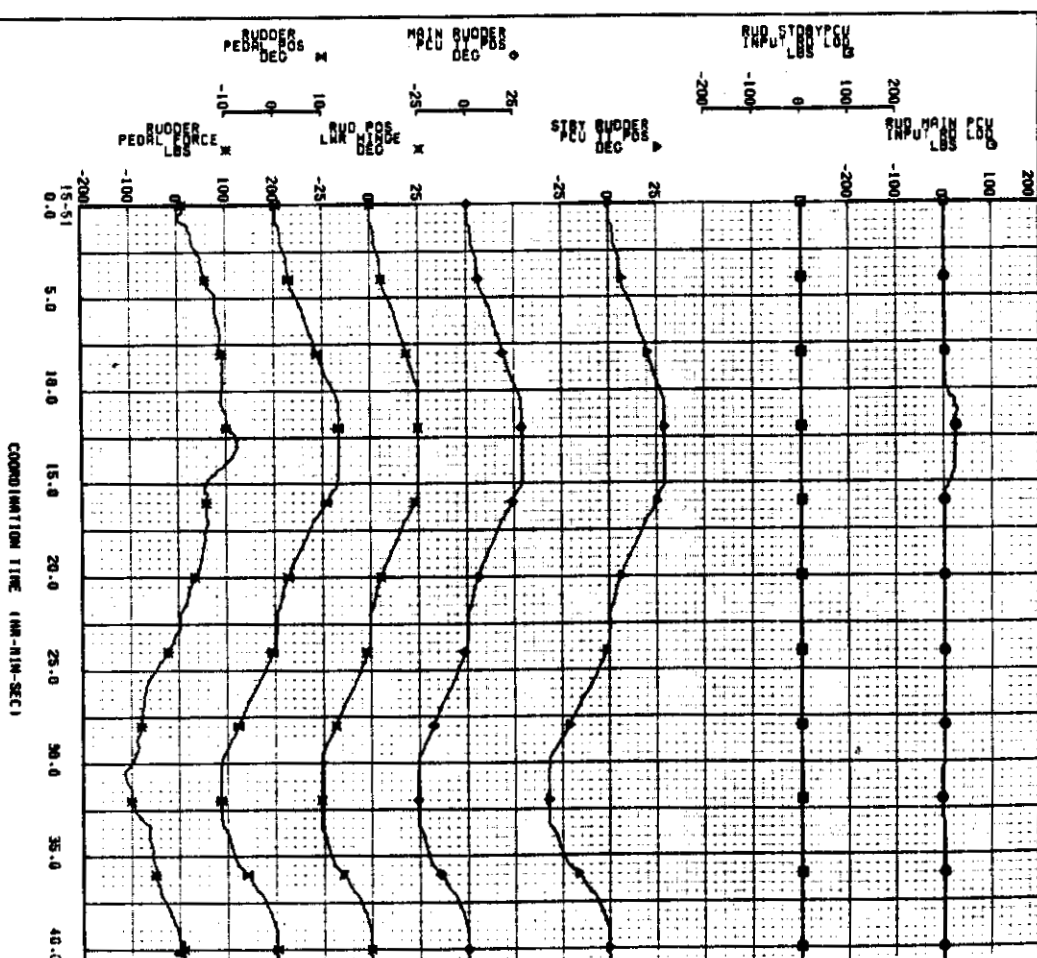
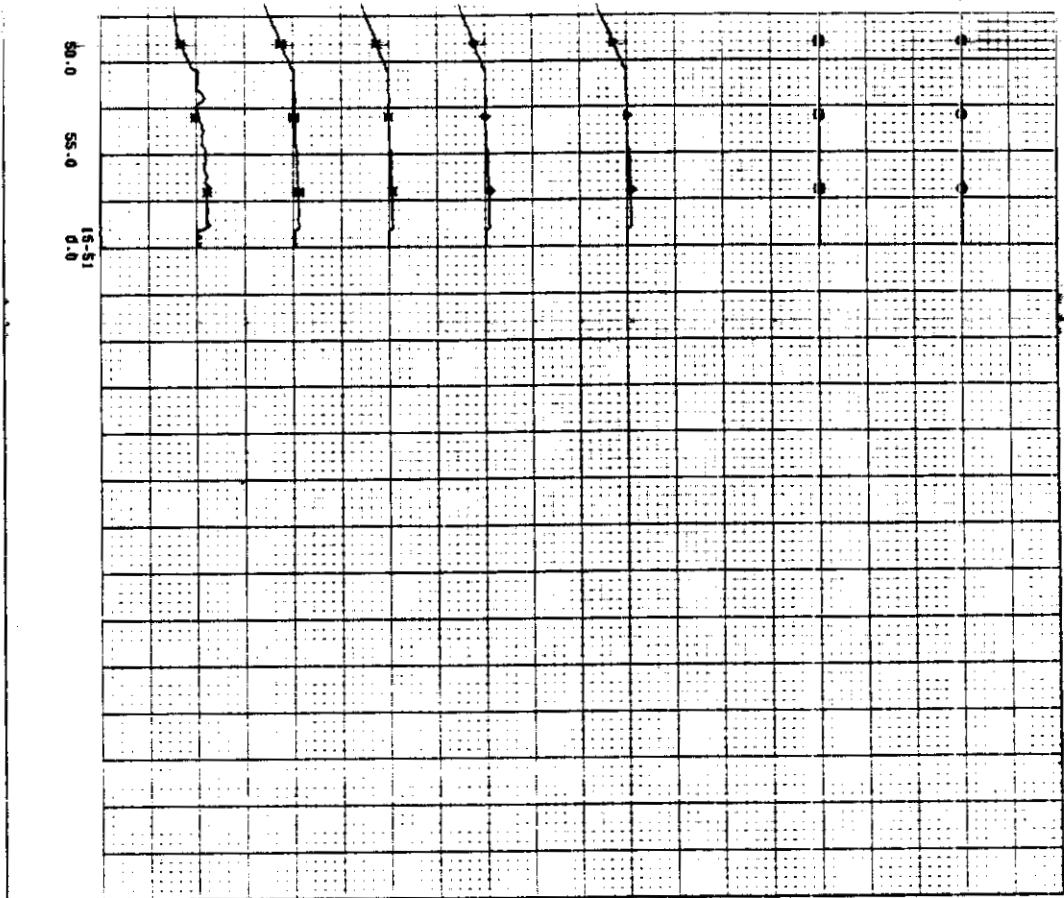
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APR		TEST 001-07		
APR		TEST DATE 02/27/96		
		TIME BOEING COMPANY		PAGE





FORM 1
737-200, RUDDER CABLE LOADING AND CUT GROUND TESTS

03/04/96 1402	REC C/F OF 9041	737-200 RUDDER GRND TEST	737-200
CALC	REVISED DATE	TIME HISTORY PLOT	PG 309
CHECK		CONDITION NO. 81-39-0935-209.4	
APR		TEST 001-07 TEST DATE 02/27/96	81-39-0935
APR		TIME BEING COMPARED	PAGE



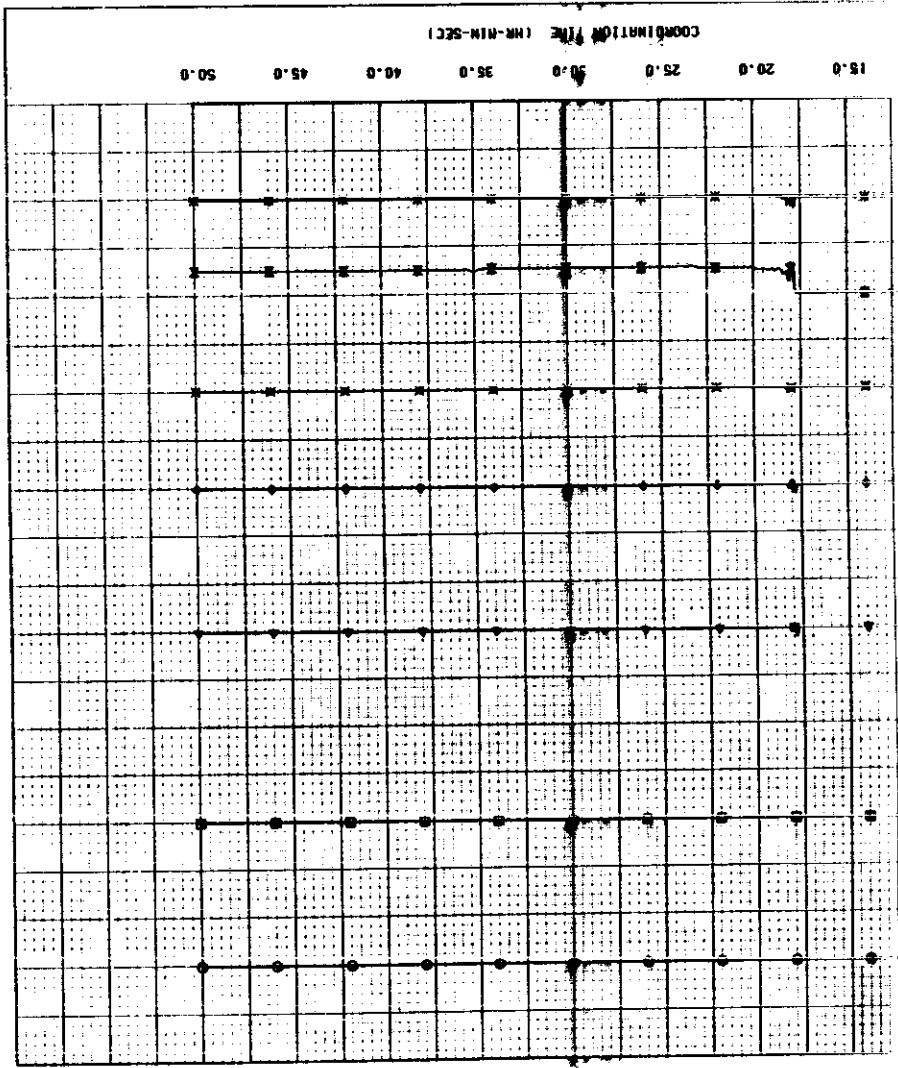
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CHECK			PO309
RPR		CONDITION NO. B1.39.0935.209.5	
RPR		TEST DATE 02/27/96	
RPR		TEST 001-07	
TIME		BOEING COMPANY	PAGE

FORM 1
737-200, PG309, RUDDER CABLE LOADING AND CUT GROUND TESTS



737-200, PG309. RUDDER CABLE LOADING AND CUT GROUND TESTS

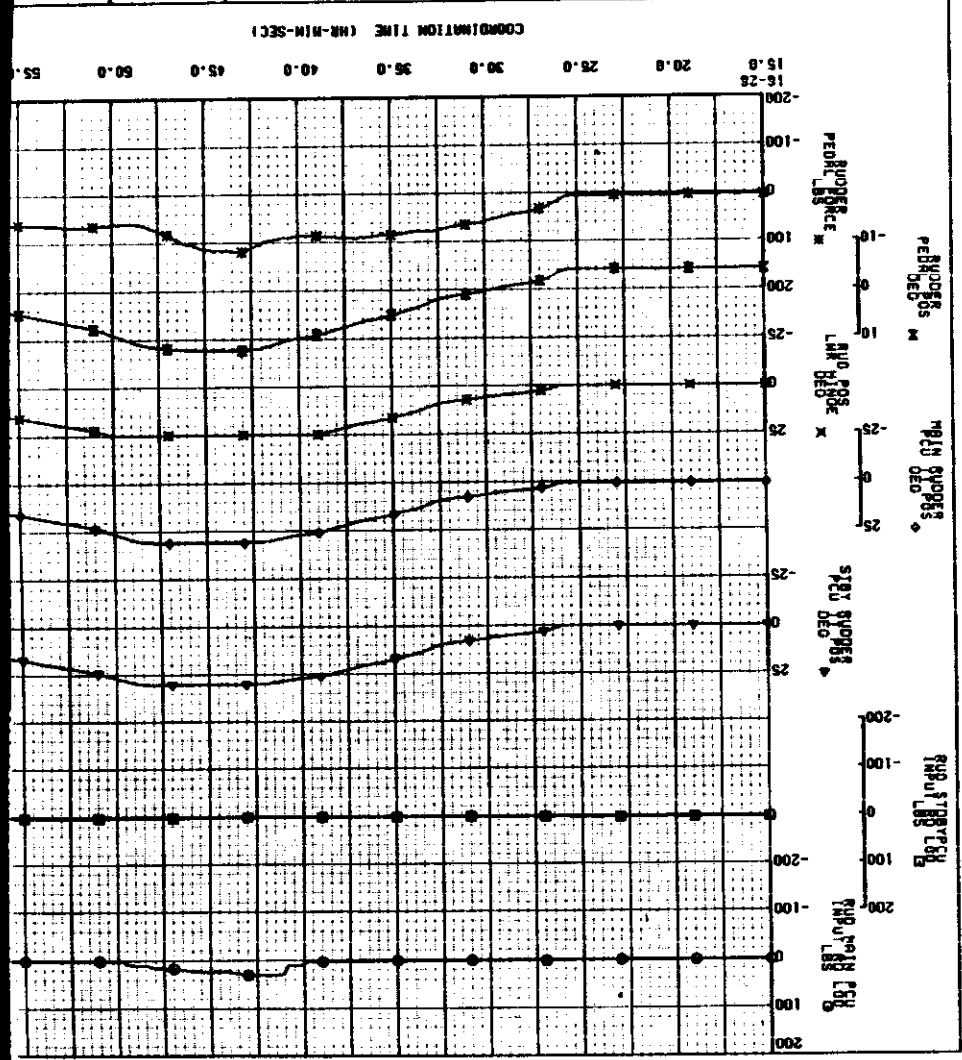




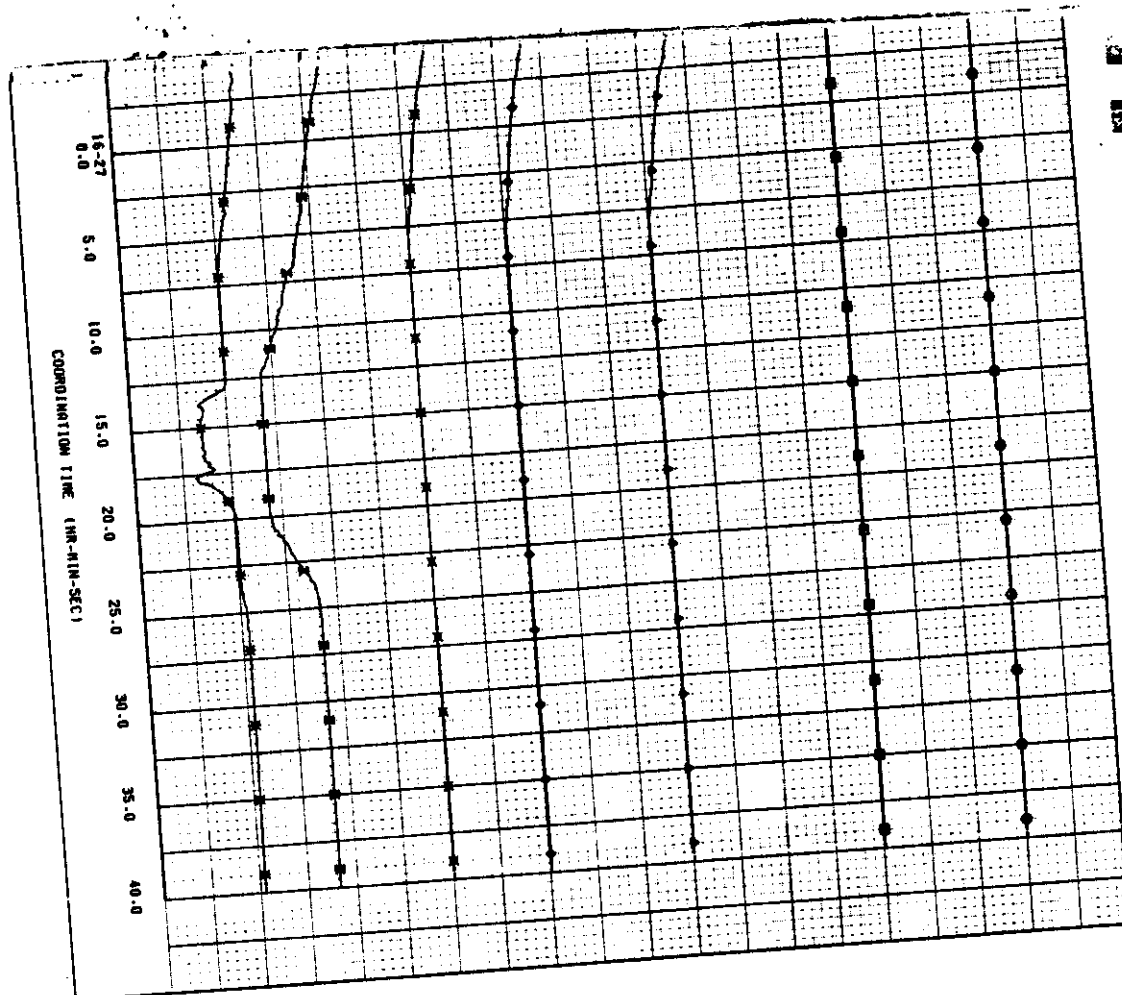
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03/04/96 1402	REQ CTOF .9041	737-200 RUDDER GRAND TEST	PG309	TIME HISTORY PLOT	CONDITION NO. 81.39.0935.106	TEST DATE 02/27/96	81.39.0935	PG309
CALC	REVISIO	DATE	TIME HISTORY PLOT	CONDITION NO. 81.39.0935.106	TEST DATE 02/27/96	81.39.0935	PG309	THE BOEING COMPANY
CHECK								
APR								
APR								

FORMAT 1
737-200, PG309, RUDDER CABLE LOADING AND CUT GROUND TESTS



32



SCHEDULED TESTING

T.I. #	Test Item Title
B7.39.0935	737-200 RUDDER CABLE DISCONNECT GROUND TEST - B

PURPOSE OF TEST

The rudder cable will be cut to determine the rudder offset after failure, the rudder pedal offset after failure, the rudder pedal loads reacted onto the pilot's feed, and the noise signature of the event.

DATA REQUIRED

- ADAMS - Available
- HSPCM - ON
- Manual Notes - Correlate events of ground test with time.
- Video - Record the motion of the rudder pedals and rudder during the cable cut.

TEST PARAMETERS

- Hydraulic Power - Supplied to the A and B systems.
- Electrical Power - ON
- Nosewheel Steering - Disabled

TEST CONDITIONS

Rudder Rigging Checks Test Conditions

<u>Condition No.</u>	<u>Operation</u>
☒ B7.39.0935.001	Perform various rigging checks of the rudder control system. Note cable rig loads (150 pounds at 70°F), rig pin fit, PCU force tight, and control surface alignment with the index mark. $R_A - 143 \text{ LBS}$, $R_B - 148 \text{ LBS}$. @ 61.2°F
☒ 002	Record the actuator part numbers. MAIN SN 2203A, STDY SN 2973A
☒ 003	Disable the nose wheel steering.
☒ 004	Perform rudder control sweeps to verify surface travels, rudder pedal forces, and instrumentation operation.
☒ 005	Perform a rudder kick to one-half input in both directions and record data.

Rudder Cable External Input Test Conditions

<u>Condition No.</u>	<u>Operation</u>
☐ B1.39.0935.201	With the rudder pedals free, hang 50 pounds from rudder cable RB at Station 295. Allow the rudder system to respond.
☒ 202	With the rudder pedals free, hang 100 pounds from rudder cable RB at Station 295. Allow the rudder system to respond.
☒ 203	With the rudder pedals free, hang 150 pounds from rudder cable RB at Station 295. Allow the rudder system to respond.
☒ 204	With the rudder pedals free, hang 200 pounds from rudder cable RB at Station 295. Allow the rudder system to respond.
☒ 205	With the rudder pedals free, hang 250 pounds from rudder cable RB at Station 295. Allow the rudder system to respond.
☒ 206	With the rudder pedals free, hang 200 pounds from rudder cable RA at Station 295. Allow the rudder system to respond.
☒ 207	With the rudder pedals free, hang 250 pounds from rudder cable RA at Station 295. Allow the rudder system to respond.

Rudder Cable Disconnect Test Conditions

<u>Condition No.</u>	<u>Operation</u>
☒ B1.39.0935.101	Confirm that the pilot's feet are on the floor. Cut the rudder cable RB at Body Station 360. Record the noise signature of the event.
☒ 102	Record locations of cable ends.
☒ 103	Perform a slow, full pedal rudder sweep.
☒ 104	Replace the rudder cable with Part Number BACC2C4C09512EG and re-rig the rudder control system. Confirm that the pilot's feet are on the rudder pedals. Cut the new rudder cable RB at Body Station 259.5. Record the noise signature of the event.
☒ 105	Record locations of cable ends.
☒ 106	Perform a slow, full pedal rudder sweep.
☐ 107	If required for NTSB, or other personnel, replace the rudder cable with Part Number BACC2C4C09512EG and re-rig the rudder control system. Confirm that the pilot's feet are on the rudder pedals. Cut the new rudder cable RB at Body Station TBD. Record the noise signature of the event.

NOT
REQUIRED