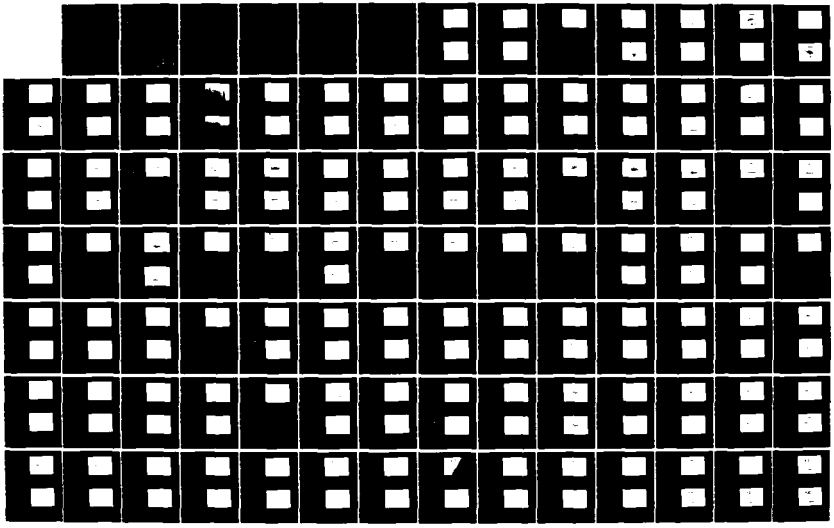
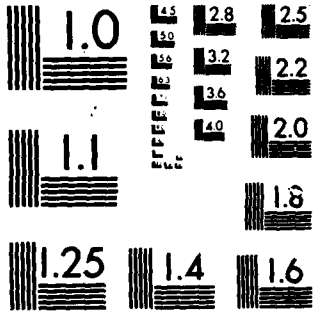
AD-A164 436 ELECTROMAGNETIC PULSE/TRANSIENT THREAT TESTING OF PROTECTION DEVICES FOR..(U) ELECTROSPACE SYSTEMS INC ARLINGTON VA D BODSON ET AL. 31 OCT 85 1/1

UNCLASSIFIED NCS-TIB-85-10-VOL-3-SEC-5 DCA100-85-C-0010 F/G 20/14 NL





MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

2

NCS TIB 85-10

NATIONAL COMMUNICATIONS SYSTEM

AD-A164 436

VOLUME III

TEST DATA

ELECTROMAGNETIC PULSE TESTING OF PROTECTION DEVICES

SECTION 5

EQUIPMENT AND DEVICES

OSCILLOSCOPE PHOTOGRAPHS

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OCTOBER 1985

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Electromagnetic Pulse ~~Transient Threat~~ Testing of Protection Devices for ~~Amateur/Military Affiliate Radio System Equipment~~ (U) Section 5, Equipment & Devices Oscilloscope Photographs

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Dennis Bodson, NCS; Joseph Frizzell and Thomas Higdon (ESI); Walter Rabke (Consultant)

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FIELD	GROUP	SUB-GROUP	Amateur Radio Equipment EMP, Lightning Protection, Electromagnetic Pulse (EMP) Protection Devices Test, EMP, Lightning, Transient Electrical/Magnetic Pulses

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

This technical report discusses the vulnerability of equipment used by amateur/MARS radio operators in the United States to disruption or damage by transient electromagnetic effects such as lightning, voltage surges, and electromagnetic pulse (EMP) waves. It also reports the results of two test programs; one to evaluate existing transient suppression devices and components, and one to evaluate the response of amateur radio equipment to an EMP transient environment.

Based on the test results, the report recommends procedures and a low-cost installation scheme which will significantly increase the operational survivability of amateur type communications equipment in a lightning or EMP environment.

This report consists of three volumes. Volume I (200 pages) contains the test results and recommendations for transient protection of amateur radio equipment. Volume II

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SECURITY CLASSIFICATION OF THIS PAGE
UNCLASSIFIED

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Block 19 Continued - ABSTRACT

(136 pages) contains supporting documentation including: the test plans for the two EMP tests, descriptions/specifications of the tested transient suppression devices and the amateur radio equipment, and photographs of the test facilities and test set-ups. Volume III (1290 pages) contains the raw test data in the form of oscilloscope photographs attached to the test data sheets for both test programs, as well as, written test descriptions and bench check measurements from the equipment test program. For most purposes Volume I should provide sufficient information. Volume II would be required to obtain more detailed descriptions of the test programs and tested devices and equipment. Volume III would only be required if a separate analysis of the test data is being made.

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NCS TECHNICAL INFORMATION BULLETIN 85-10

ELECTROMAGNETIC PULSE/TRANSIENT THREAT TESTING OF PROTECTION DEVICES FOR AMATEUR/MILITARY AFFILIATE RADIO SYSTEM EQUIPMENT

OCTOBER 1985

PROJECT OFFICER

DENNIS BODSON
Senior Electronics Engineer
Office of Technology
and Standards

APPROVED FOR PUBLICATION:

for MARSHALL L. CAIN
Assistant Manager
Office of Technology
and Standards

FOREWORD

The National Communications System (NCS) is an organization of the Federal government whose membership is comprised of 22 Government entities. Its mission is to assist the President, National Security Council, Office of Science and Technology Policy, and Office of Management and Budget in:

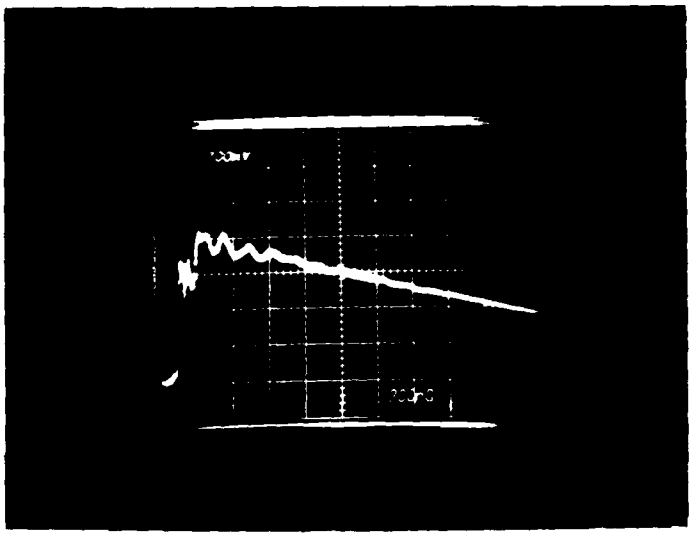
- The exercise of their wartime and non-wartime emergency functions, and their planning and oversight responsibilities.
- The coordination of the planning for and provision of National Security/Emergency Preparedness communications for the Federal government under all circumstances including crisis or emergency.

In support of this mission the NCS has executed a Memorandum of Understanding with the American Radio Relay League. Its purpose is to establish a broad framework for a cooperative and close working relationship with volunteer radio amateurs for support of national emergency communications functions. It is intended through joint coordination and exercise of the resources of both organizations, to enhance the nation-wide posture of telecommunications readiness for any conceivable national emergency. This particular Technical Information Bulletin is one of a series aimed at developing an awareness in the radio amateur community of practical, low cost EMP protective procedures, devices, and equipment which may if utilized significantly enhance the probability of amateur radio resources escaping serious damage during emergency situations involving EMP events.

Comments, on this TIB are welcome, and should be addressed to:

Office of the Manager
National Communications System
ATTN: NCS-TS
Washington, DC 20305-2010
(202) 692-2124

Date	7-29-85 11:55		
Test Point	TA.		
Amplification		dB	
Attenuation		dB	
Horizontal	200	ns/div	1
Vertical	200	mV/div	1
Horizontal		ns/div	2
Vertical		ns/div	2
Configuration	Pulse 1		
Pulser Level	25.3 KV		
Data Link	H-SENSOR		



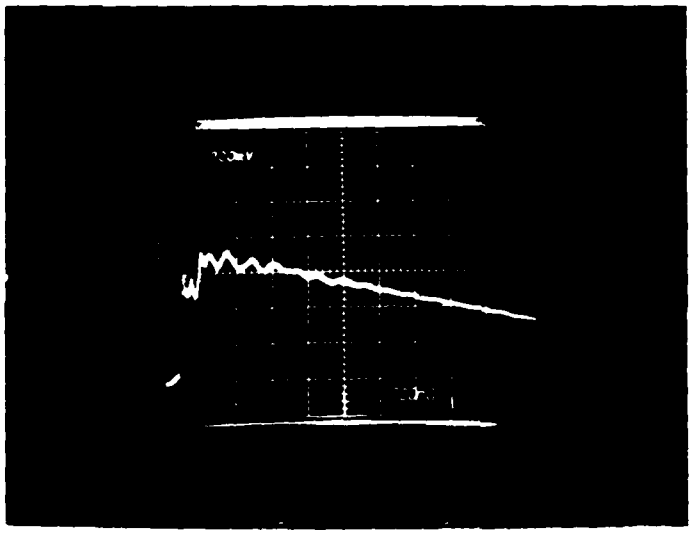
Comments:

200 ma/div

48.2 KV/m SYSTEMS 1, 4, 10, 14.

OUTPUT 820 mV-

Date	7-29-85/1500		
Test Point	TB-1		
Amplification		dB	
Attenuation		dB	
Horizontal	200	ns/div	1
Vertical	200	mV/div	1
Horizontal		ns/div	2
Vertical		ns/div	2
Configuration	PULSE 2		
Pulser Level	25.3kV		
Data Link	H SENSOR		



Comments:

200 mA/div

41.2 KV/m SYSTEMS 1,4,10

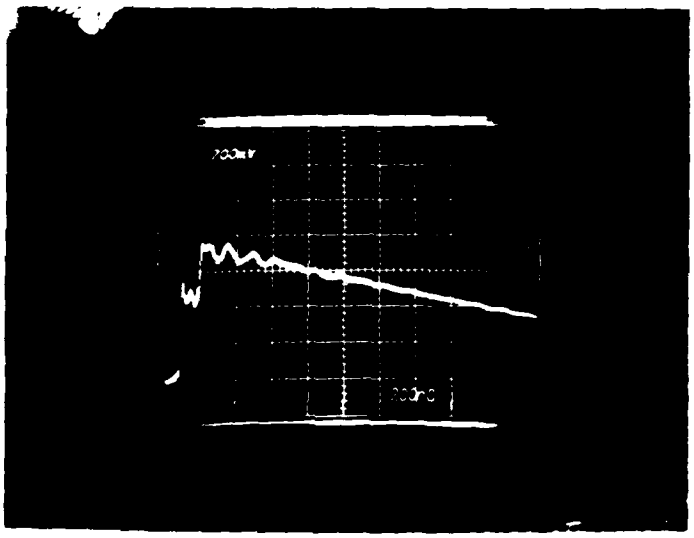
OUTPUT 700 mV

Date	7-29-85 / 1625
Test Point	TB-2 + TA
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	ns/div 2
Configuration	PULSE 3
Pulser Level	25.3 KV CHARGE
Data Link	H SENSOR

Comments:

780 mV output

45.9 KV/m



TA = 6, 7, 8, 12 + 13

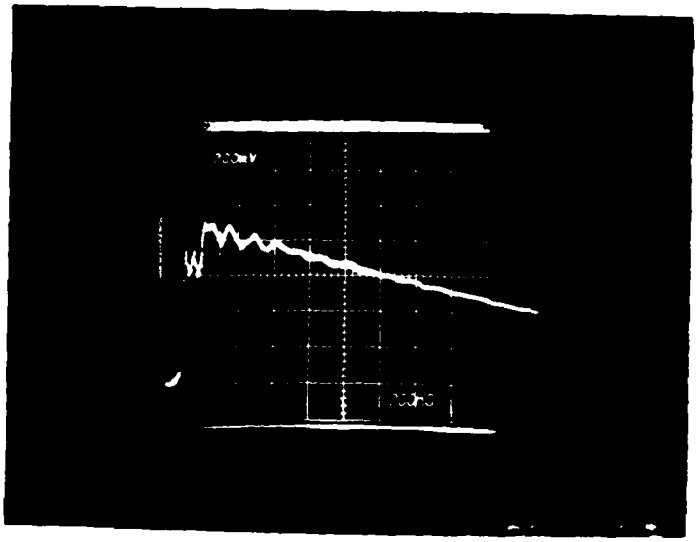
TB-2 = 1+4

Date	7-30-85 / 1204
Test Point	TA-
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	ns/div 2
Configuration	PULSE 4
Pulser Level	29 KV
Data Link	H SENSOR

Comments:

880 mV output

51.8 KV/m -

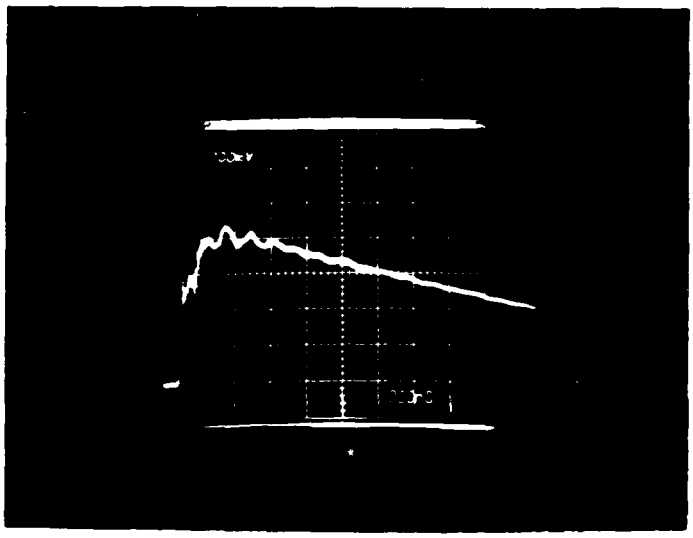


TA = 2, 3, 5, 9, 11 + 16

Date	7-30-85 / 1523	
Test Point	TB	
Amplification	dB	
Attenuation	dB	
Horizontal	ns/div	1
Vertical	mV/div	1
Horizontal	ns/div	2
Vertical	ns/div	2
Configuration		
Pulser Level	29 KV - CHARLIE	
Data Link		

Comments:

OUTPUT 850 MV →
50.0 KV/M



SYSTEMS - 2, 3, 5, 9, 11 + 16

Date		
Test Point		
Amplification	dB	
Attenuation	dB	
Horizontal	ns/div	1
Vertical	mV/div	1
Horizontal	ns/div	2
Vertical	ns/div	2
Configuration		
Pulser Level		
Data Link		

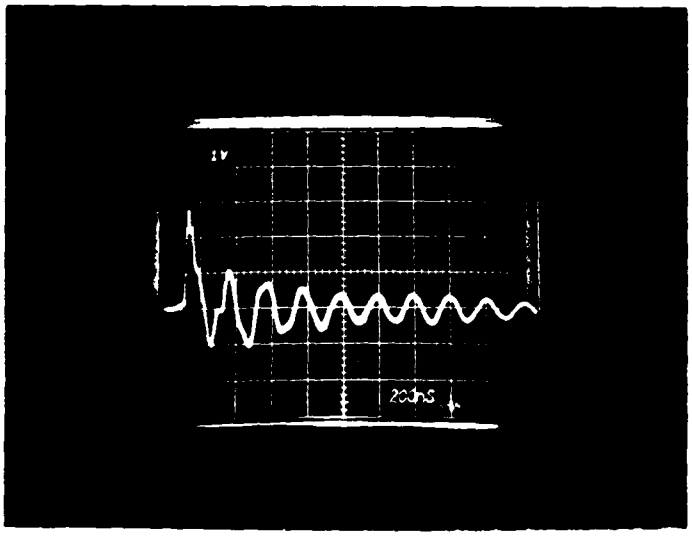
Comments:

Date	7-31-85	
Test Point	MOSLEY - 1	
Amplification		dB
Attenuation	40	dB
Horizontal	200	ns/div 1
Vertical	1	mV/div 1
Horizontal		ns/div 2
Vertical		ns/div 2
Configuration		
Pulser Level	20KV CHARGE	
Data Link		

Comments:

- CURRENT FROM ANTENNA
- CURRENT THROUGH BOTH CENTER + SHIELD DIRECT TO GND 20KV CHARGE 91550-2 (1Ω) PROBE

1

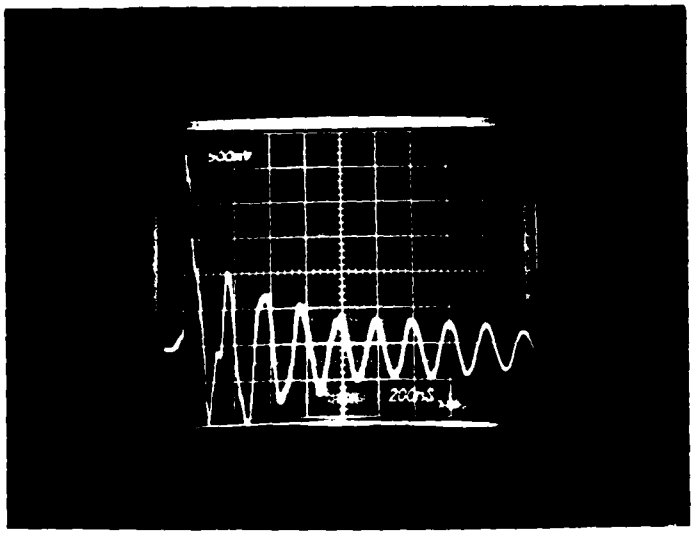


MOSLEY TA33 JR ANTENNA - 8' FROM GRND - ANTENNA ELEMENTS WERE AT RIGHT ANGLE TO DRIVE LINE.

① 40dB, 1 V/div 200 ns/div peak current 280 A (14KV)

Date	7-31-85	
Test Point	MOSLEY - 2	
Amplification		dB
Attenuation	40	dB
Horizontal	200	ns/div 1
Vertical	0.5	mV/div 1
Horizontal		ns/div 2
Vertical		ns/div 2
Configuration		
Pulser Level	20KV charge	
Data Link		

Comments:
peak current 260 A (13KV) 2



SET UP: MOSLEY TA 33 JR. ANTENNA 8' ABOVE GND.

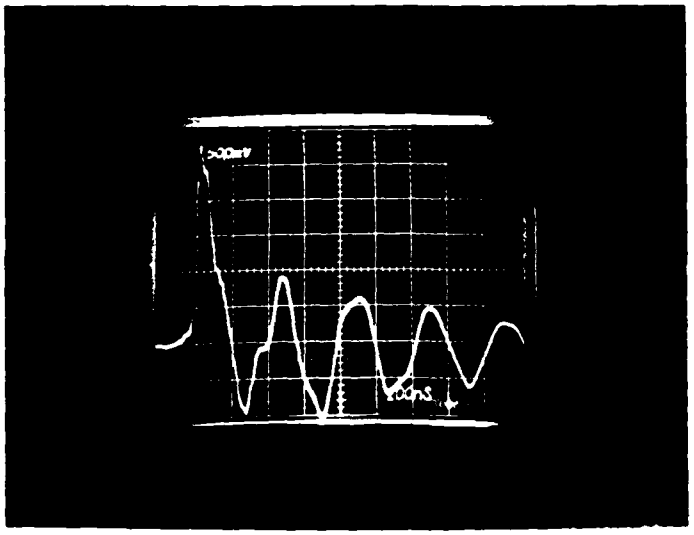
- ANTENNA ELEMENTS AT RIGHT ANGLE TO PULSER DRIVE LINES
- CURRENT THROUGH BOTH CENTER + SHIELD DIRECT TO GND.
- 20 KV CHARGE • 91550-2 (1Ω) PROBE.

Date	7-31-85
Test Point	MOSLEY - 3
Amplification	dB
Attenuation	40 dB
Horizontal	100 ns/div 1
Vertical	0.5 mV/div 1
Horizontal	ns/div 2
Vertical	ns/div 2
Configuration	
Pulser Level	20KV CHARGE
Data Link	

Comments:

PEAK CURRENT = 275 A (13.75 KV) (3)

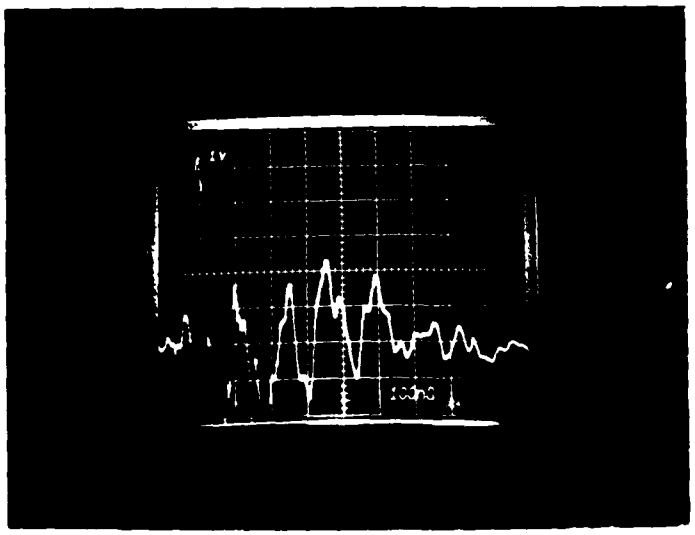
SET UP SAME AS MOSLEY 1 + 2.



Date	7-31-85
Test Point	MOSLEY - 4
Amplification	dB
Attenuation	26 dB
Horizontal	100 ns/div 1
Vertical	1 mV/div 1
Horizontal	ns/div 2
Vertical	ns/div 2
Configuration	
Pulser Level	20KV-CHARGE
Data Link	

Comments:

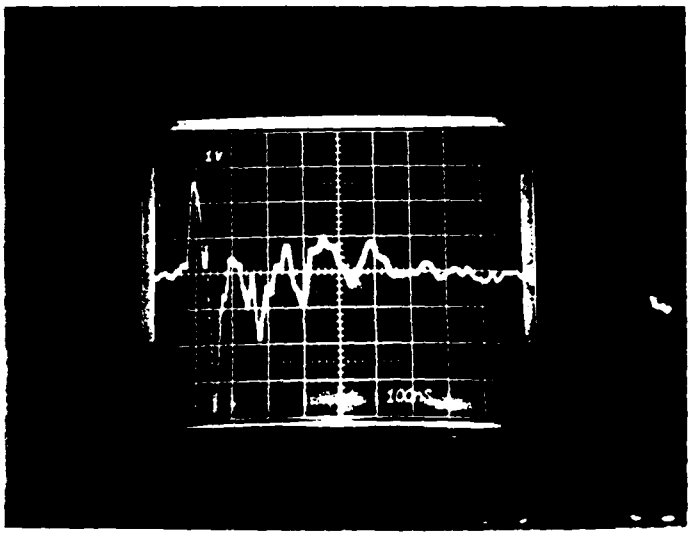
PEAK CURRENT ~~53~~ 106 A (5.4 KV) (4)



SET UP: • GROUNDED SHIELD OF RG8 TO PLATE • CENTER WIRE OF RG-8 THROUGH CURRENT (I) PROBE TO GROUND THROUGH 51 OHM RESISTOR.

• 20 dB + 6 dB SMA - HEWETT PACKARD ATTENUATORS

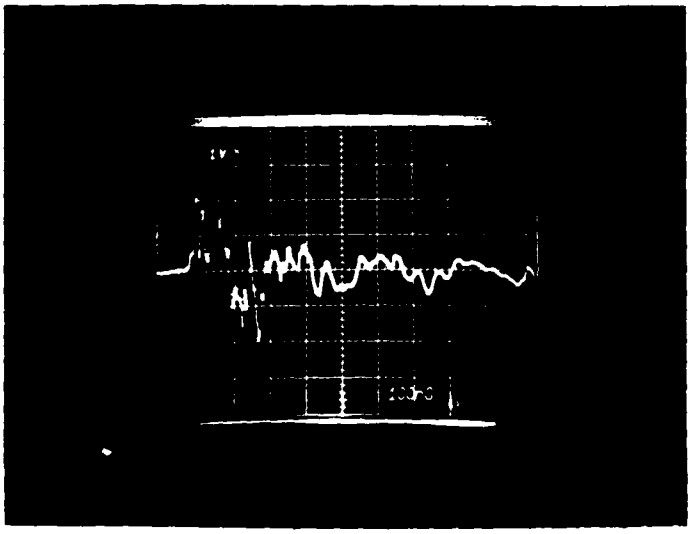
Date	7-31-85
Test Point	MOSLEY -5
Amplification	dB
Attenuation	26 dB
Horizontal	100 ns/div 1
Vertical	1 mV/div 1
Horizontal	ns/div 2
Vertical	ns/div 2
Configuration	
Pulser Level	20 KV CHARGE
Data Link	



Comments:
PEAK CURRENT +52A, -76A
(3.9KV) 5

SET UP: SAME AS MOSLEY 4

Date	7-31-85
Test Point	MOSLEY -6
Amplification	dB
Attenuation	26 dB
Horizontal	100 ns/div 1
Vertical	1 mV/div 1
Horizontal	ns/div 2
Vertical	ns/div 2
Configuration	
Pulser Level	20 KV CHARGE
Data Link	



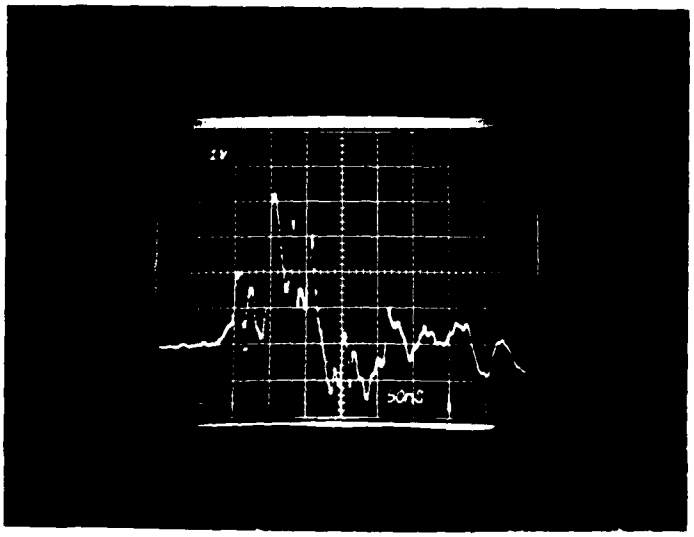
Comments:
PEAK CURRENT : OFF SCALE
6

SET UP: USING 50 OHM DUMMY LOAD "CANTENNA" GROUNDED. CURRENT THROUGH CENTER CONDUCTORS. SHIELDS GROUNDED.

Date	7-31-85		
Test Point	MOSLEY-7		
Amplification		dB	
Attenuation	20	dB	
Horizontal	50μ	s/div	1
Vertical	1	V/div	1
Horizontal		ns/div	2
Vertical		ns/div	2
Configuration			
Pulser Level	20 KV CHARGE.		
Data Link			

Comments:
PEAK CURRENT 42A
(2.1 KV) 7

SET UP. SAME AS 6.



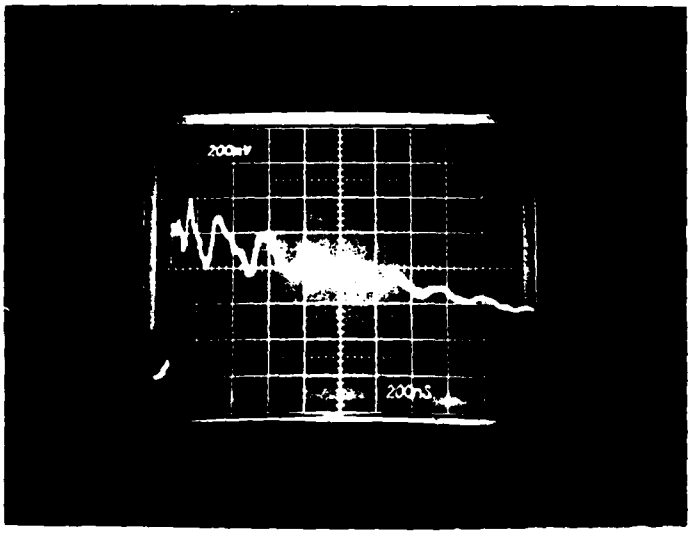
Date	7-31-85		
Test Point	[redacted] PROBE I		
Amplification		dB	
Attenuation		dB	
Horizontal	200	ns/div	1
Vertical	200	mV/div	1
Horizontal		ns/div	2
Vertical		ns/div	2
Configuration			
Pulser Level			
Data Link			

Comments: PROBE CHECK I

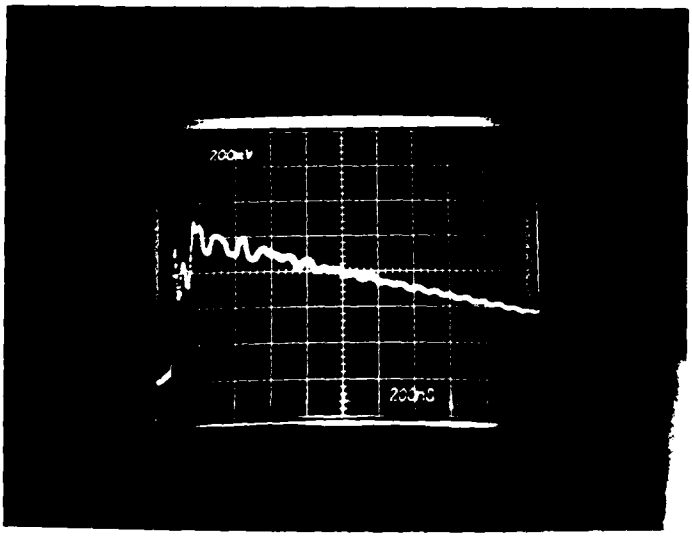
8

SET UP: REMOVED I PROBE - INSTALLED H PROBE

NOTE: CABLE GROUNDED - BREAKER TRIPPED.



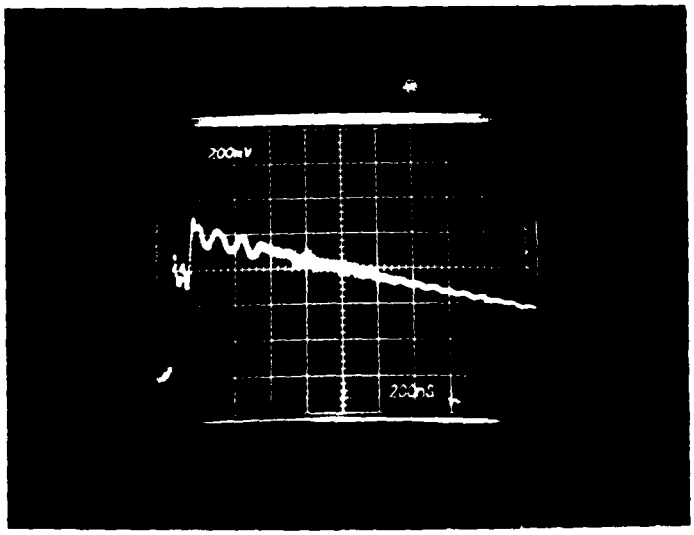
Date	7-31-85		
Test Point	PROBE CHECK-9		
Amplification		dB	
Attenuation		dB	
Horizontal	200	ns/div	1
Vertical	200	mV/div	1
Horizontal		ns/div	2
Vertical		ns/div	2
Configuration			
Pulser Level	20 KV CHARGE		
Data Link			
Comments:			



9

REPEAT 8 CABLE FROM ANTENNA ISOLATED - POWER BREAKER TRIPPED.

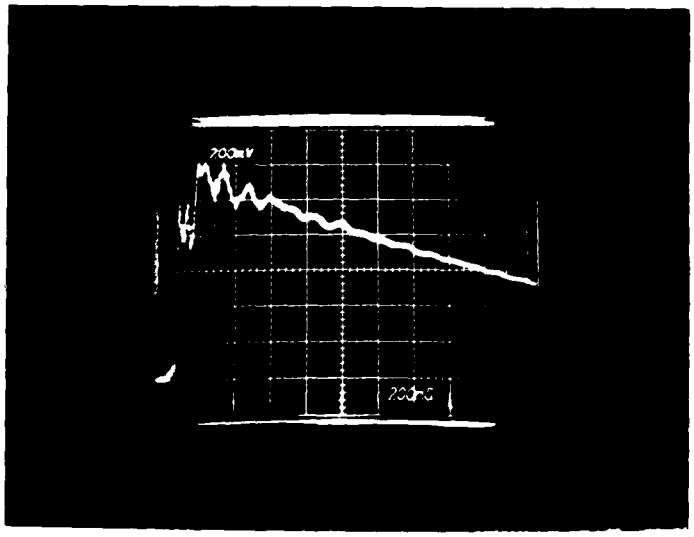
Date	7-31-85		
Test Point	PROBE-CALIBRATION		
Amplification		dB	10
Attenuation		dB	
Horizontal	200	ns/div	1
Vertical	200	mV/div	1
Horizontal		ns/div	2
Vertical		ns/div	2
Configuration			
Pulser Level	20 KV CHARGE		
Data Link			
Comments:			



10

REPEAT 8+9 ANTENNA CABLE TIED HIGH ON TO ANTENNA POWER BREAKER DID NOT TRIP.

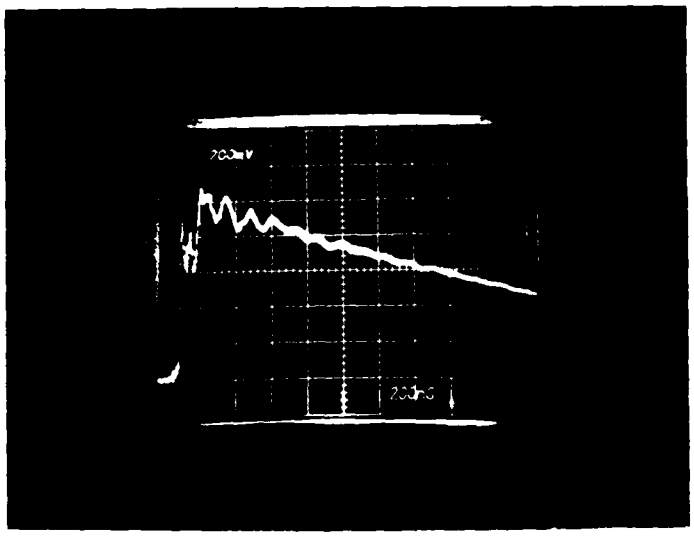
Date	7-31-85		
Test Point	PROBE - CAL - 11		
Amplification		dB	
Attenuation		dB	
Horizontal	200	ns/div	1
Vertical	200	mV/div	1
Horizontal		ns/div	2
Vertical		ns/div	2
Configuration			
Pulser Level	29 KV CHARGE		
Data Link			
Comments:			



11

SET UP: H FIELD SENSOR - ANTENNA REMOVED

Date	7-31-85		
Test Point	CALIBRATION 12		
Amplification		dB	
Attenuation		dB	
Horizontal	200	ns/div	1
Vertical	200	mV/div	1
Horizontal		ns/div	2
Vertical		ns/div	2
Configuration			
Pulser Level	25 KV CHARGE		
Data Link			
Comments:			



1000 mV → 58.8 KV 12

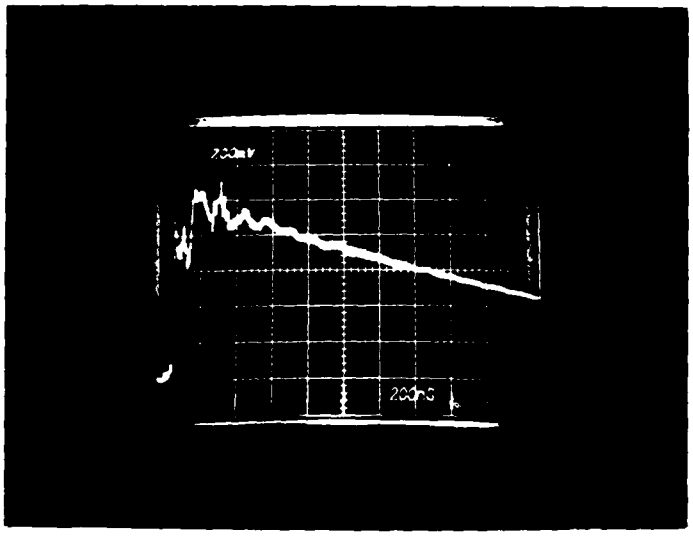
-

Date	7-31-85		
Test Point	CAL - 13		
Amplification		dB	
Attenuation		dB	
Horizontal	200	ns/div	1
Vertical	200	mV/div	1
Horizontal		ns/div	2
Vertical		ns/div	2
Configuration			
Pulser Level	25KV CHARGE		
Data Link			

Comments:

13

1000 mV → 58.8 KV/

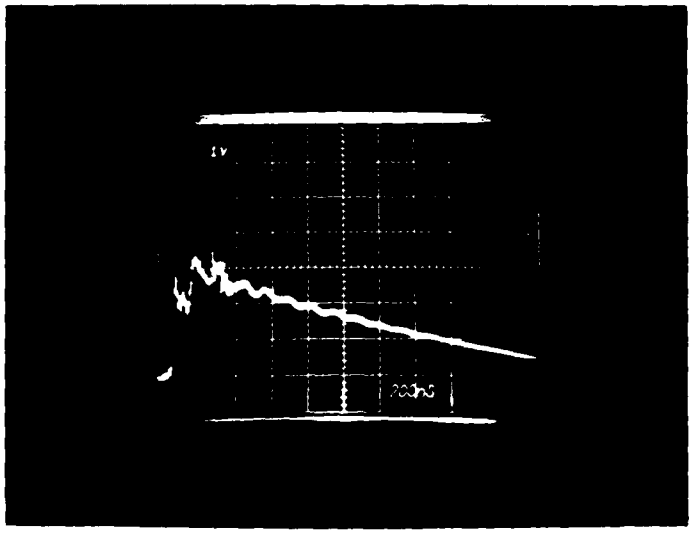


Date	7-31-85		
Test Point	CAL - 14		
Amplification		dB	
Attenuation		dB	
Horizontal	200	ns/div	1
Vertical	1	mV/div	1
Horizontal		ns/div	2
Vertical		ns/div	2
Configuration			
Pulser Level	25KV CHARGE		
Data Link			

Comments:

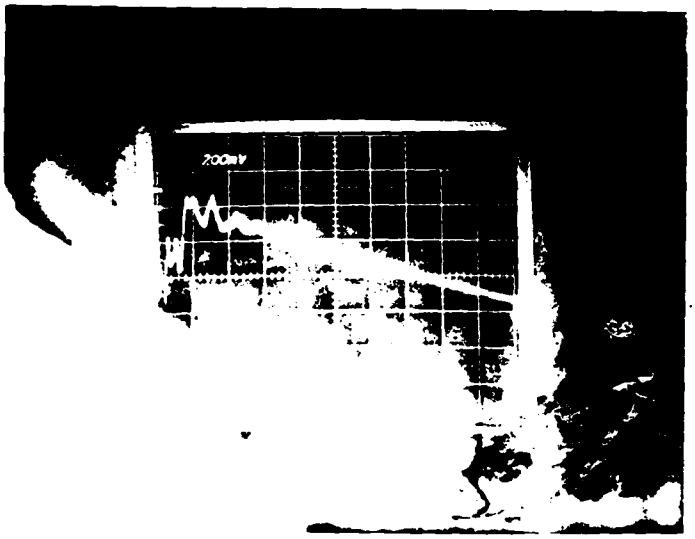
→ 3V → 56.6 KV/

14



RECTANGULAR H SENSOR

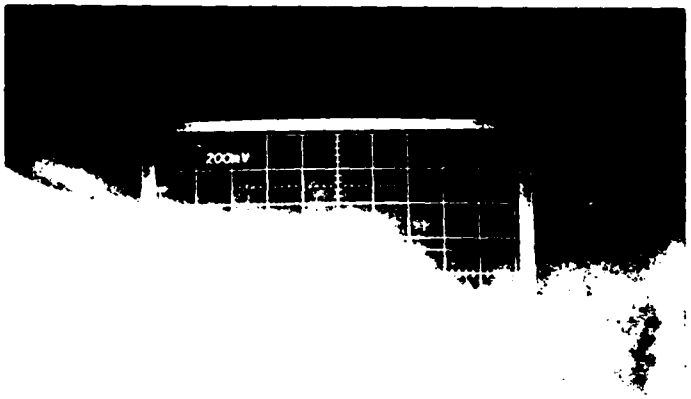
Date	7-31-85
Test Point	CAL - 15
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	ns/div 2
Configuration	
Pulser Level	25KV CHARGE
Data Link	
Comments:	



→ 880 mV → 57.6 kV/m (15)

ROUND H SENSOR

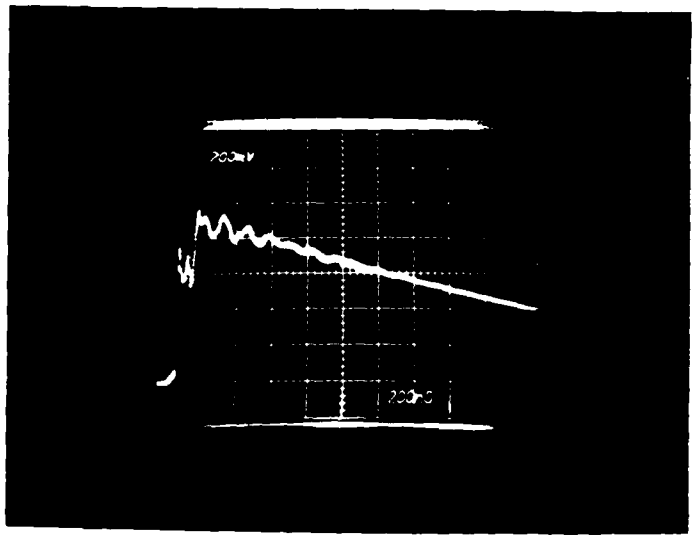
Date	7-31-85
Test Point	CAL -16
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	ns/div 2
Configuration	
Pulser Level	22KV CHARGE
Data Link	
Comments:	



(16)

ROUND H SENSOR

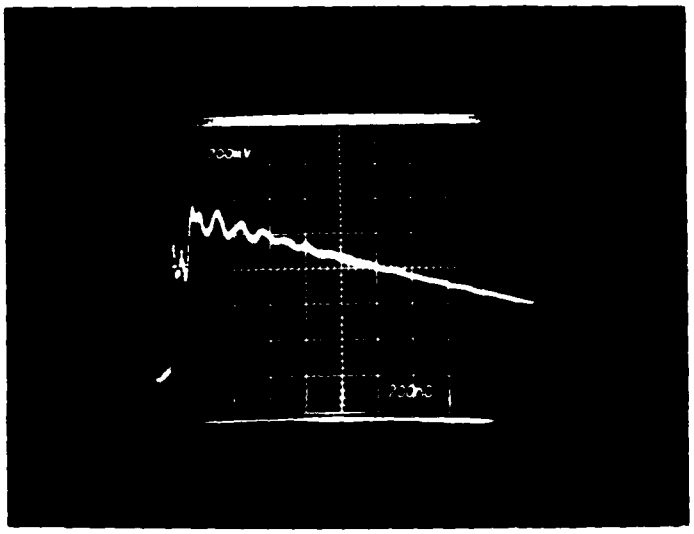
Date	7-31-85
Test Point	CAL - 17
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	ns/div 2
Configuration	
Pulser Level	22 KV CHARGE
Data Link	
Comments:	



17

ROUND H SENSOR

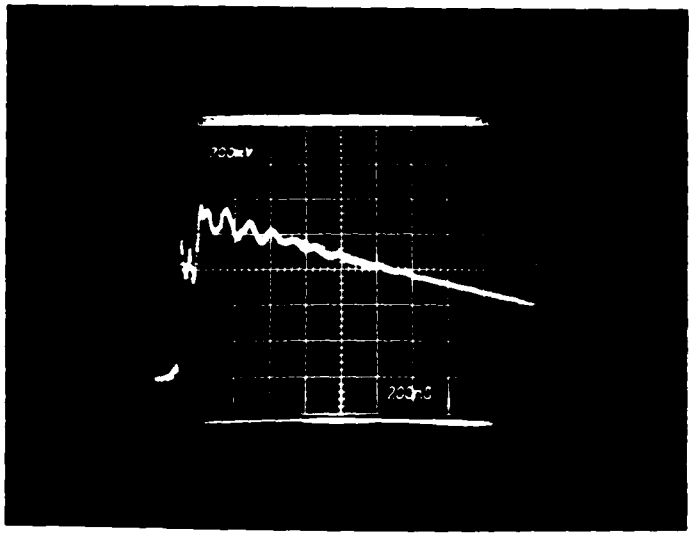
Date	7-31-85
Test Point	TB -
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	ns/div 2
Configuration	
Pulser Level	22 KV CHARGE
Data Link	
Comments:	



18

ROUND H SENSOR
EQUIP IN FIELD
SYSTEM - 14

Date	7-31-85 1505
Test Point	TC1
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	ns/div 2
Configuration	
Pulser Level	22KV CHARGE
Data Link	
Comments:	



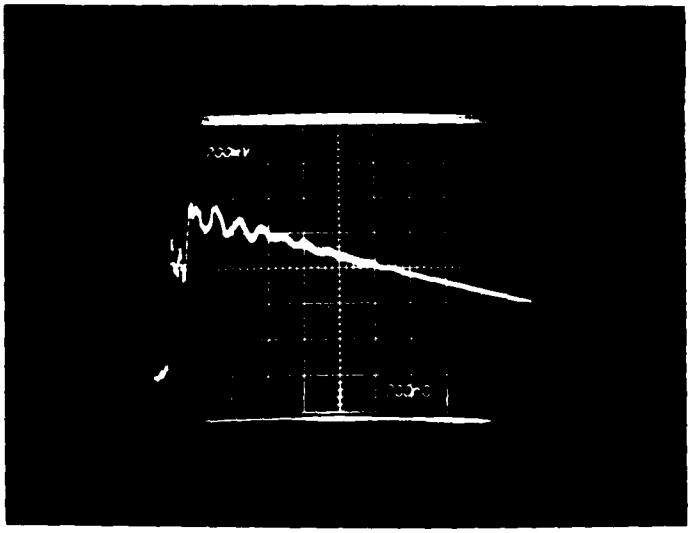
14/30PSI - [redacted] -

H SENSOR

(19)

(SYSTEM 2) GROUNDED

Date	7-31-85
Test Point	TC-2
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	ns/div 2
Configuration	
Pulser Level	22 KV CHARGE
Data Link	
Comments:	



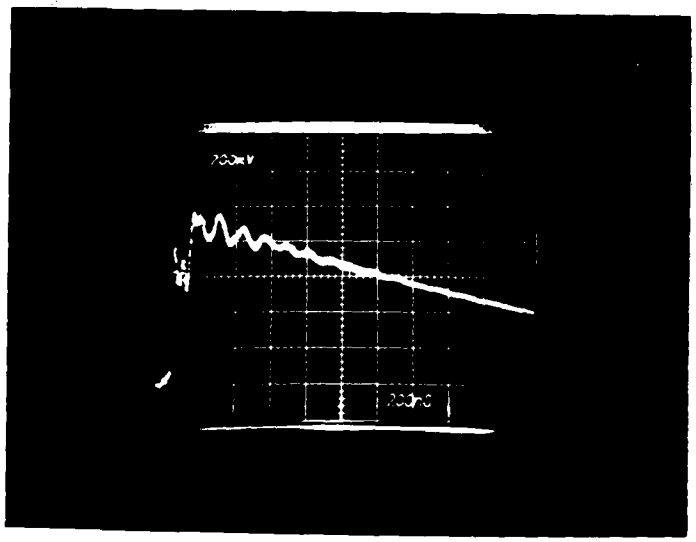
[redacted] -

H - SENSOR

(20)

(SYSTEM 2)

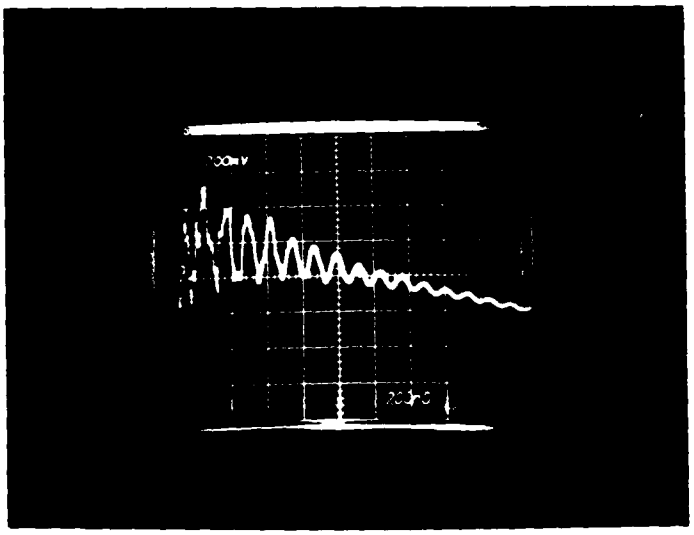
Date	7-31-85		
Test Point	TC-3		
Amplification		dB	
Attenuation		dB	
Horizontal	200	ns/div	1
Vertical	200	mV/div	1
Horizontal		ns/div	2
Vertical		ns/div	2
Configuration			
Pulser Level	22KV -CHARGE		
Data Link			
Comments:			



(21)

(SYSTEM 2) - TC-3 (TEST)

Date	8-1-85		
Test Point	TC-4		
Amplification		dB	
Attenuation		dB	
Horizontal	200	ns/div	1
Vertical	200	mV/div	1
Horizontal		ns/div	2
Vertical		ns/div	2
Configuration			
Pulser Level	22KV CHARGE		
Data Link			
Comments:			

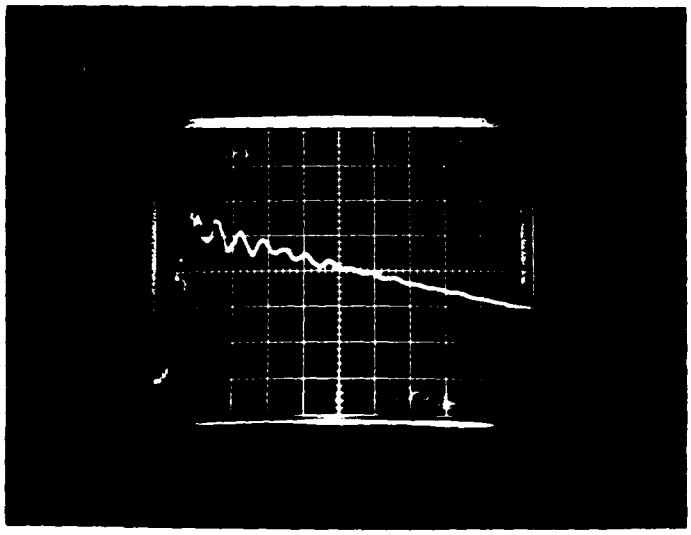


(24)

(SYSTEM 2) TC4 TEST

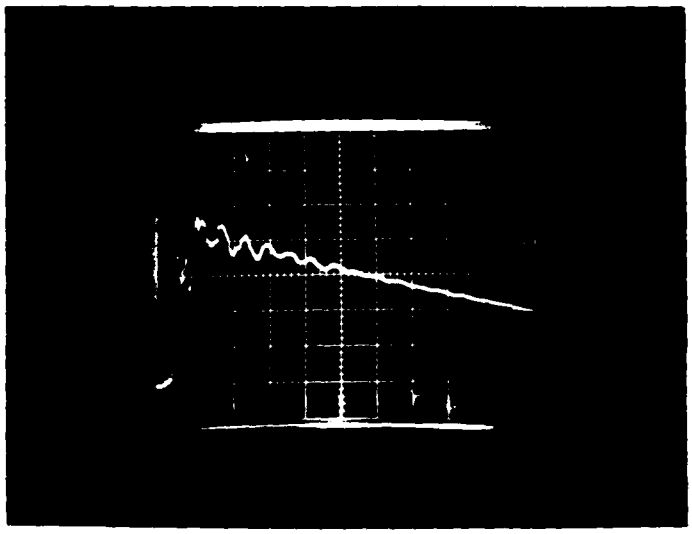
Date	August 1, 1985
Test Point	PULSER CAL
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulser Level	22KV Charge
Data Link	
Comments:	

22



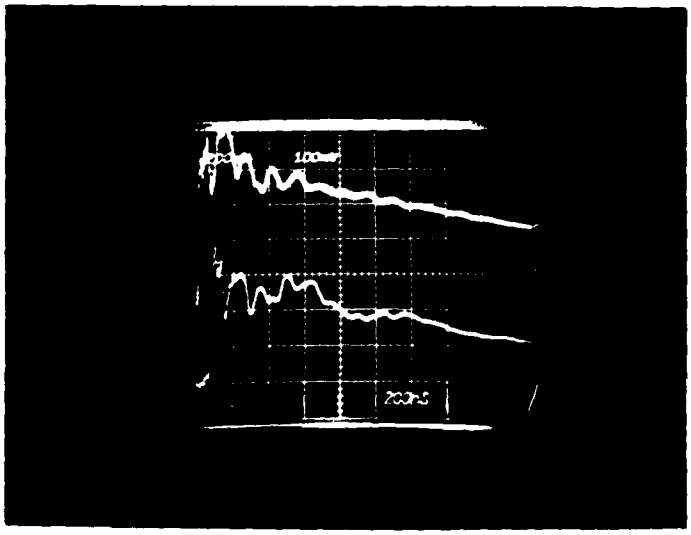
Date	August 1, 1985
Test Point	PULSER CAL
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulser Level	22KV Charge
Data Link	
Comments:	

23



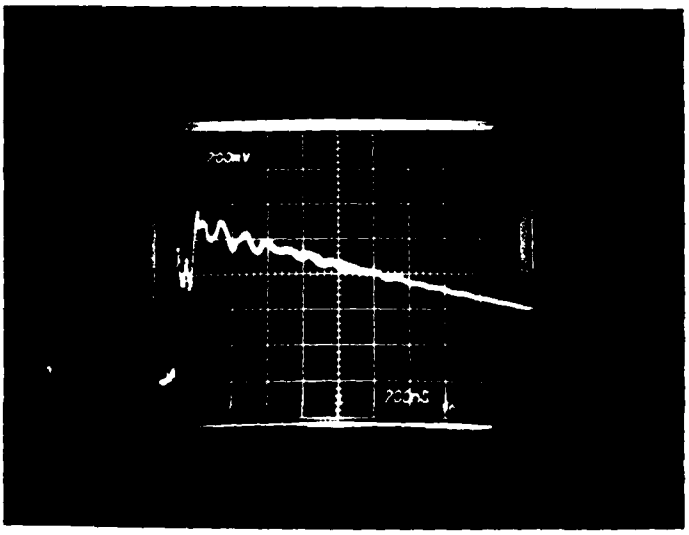
4.3 div

Date	August 1, 1985
Test Point	
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	200 ns/div 2
Vertical	100 mV/div 2
Configuration	
Pulser Level	22 KV Charge
Data Link	
Comments:	



24

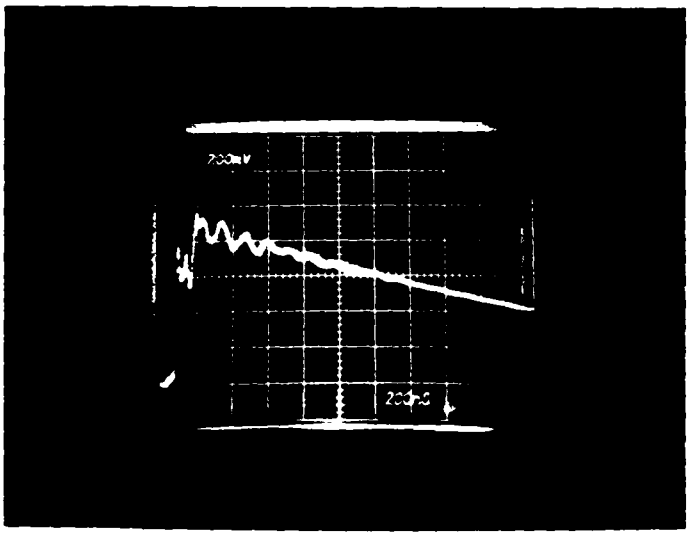
Date	August 1, 1985
Test Point	
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulser Level	22 KV Charge
Data Link	
Comments:	



25

NO OSC - NORMAL COND.

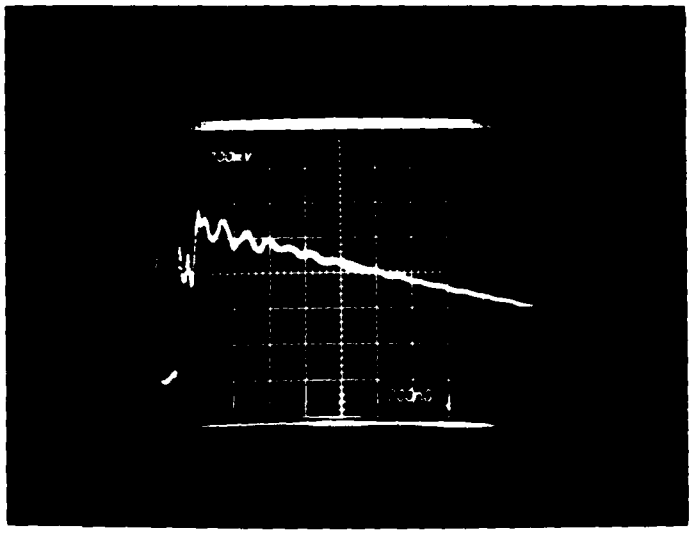
Date	August 1, 1985
Test Point	
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulser Level	22 KV Charge
Data Link	
Comments:	



(26)

CORD STRECHED TOWARD GEN

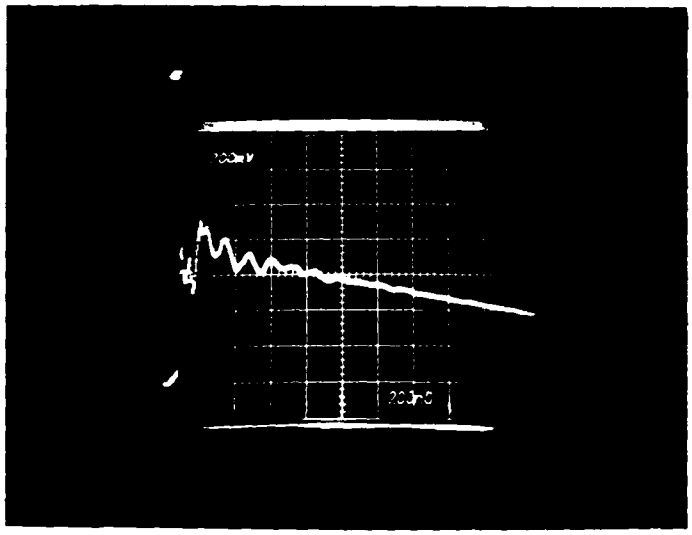
Date	August 1, 1985
Test Point	GENERATOR TEST
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulser Level	22 KV Charge
Data Link	
Comments:	



(27)

GEN ON - CONNECTED.

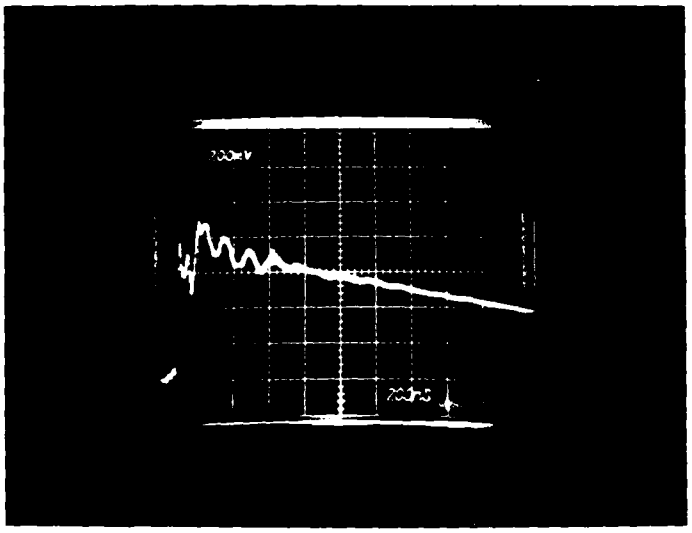
Date	August 1, 1985
Test Point	PULSER CAL
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulser Level	22KV Charge
Data Link	
Comments:	



28

2 LOAD RESISTORS REMOVED FROM PULSER -

Date	August 1, 1985
Test Point	PULSER CAL
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulser Level	22KV Charge
Data Link	
Comments:	



29

CAP. CLOSED 5 TURNS

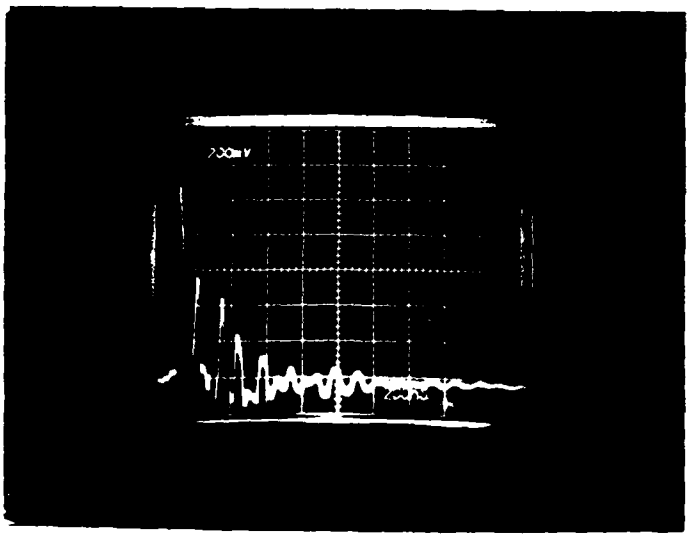
Date	8-1-85 / 1106		
Test Point	WIRE ANTENNA		
Amplification		dB	
Attenuation	26	dB	
Horizontal	200	ns/div	1
Vertical	⊥	mV/div	1
Horizontal		ns/div	2
Vertical		ns/div	2
Configuration			
Pulser Level	22 KV - CHARGE		
Data Link			
Comments:			

30

50 Ω LOAD TO GROUND
WIRE ANTENNA (SHORT VERTICAL)

FIRST SPIKE - 70 AMPS - (3.5 KV/[redacted])
LARGE SPIKE - 80 AMPS - (4.0 KV/[redacted])

Date	8-1-85 / 1155		
Test Point	WIRE ANTENNA		
Amplification		dB	
Attenuation	46	dB	
Horizontal	200	ns/div	1
Vertical	200	mV/div	1
Horizontal		ns/div	2
Vertical		ns/div	2
Configuration			
Pulser Level	22 KV CHARGE		
Data Link			
Comments:			



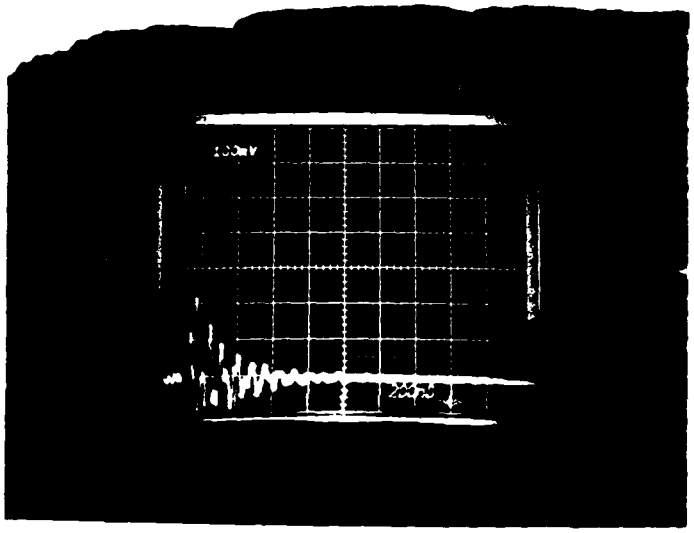
[redacted]

ANTENNA - SHORT VERTICAL + LONG HORIZONTAL
50 Ω LOAD TO GROUND

SPIKE - 220 AMPS → (11 KV/[redacted]

5.5 div x 0.200 = 1.1 volts x 200 = 220 A x 50 Ω = 11,000 V[redacted]

Date	8-1-85
Test Point	POWER INJECT PULSE
Amplification	dB
Attenuation	46 dB
Horizontal	200 ns/div 1
Vertical	100 mV/div 1
Horizontal	ns/div 2
Vertical	ns/div 2
Configuration	
Pulser Level	22KV-
Data Link	
Comments:	110 A



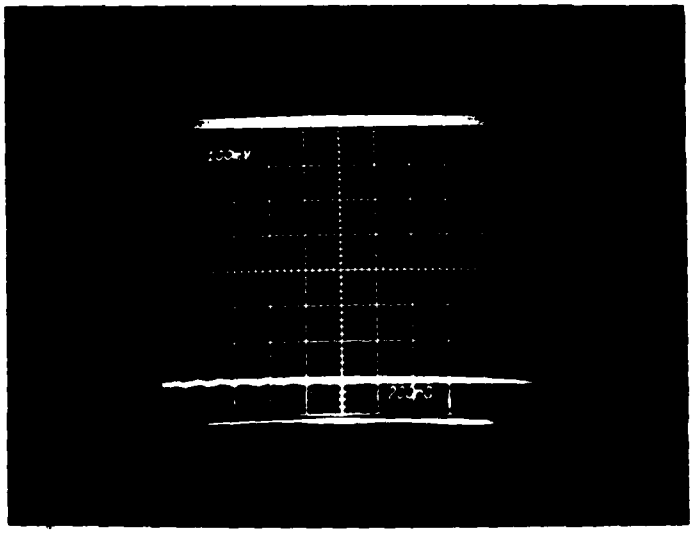
(31)

SHORT WIRE ANTENNA PULSE -

SPIKE - 5.5 KV/

ANTENNA SHORTENED AND ON SIDE OF PULSER

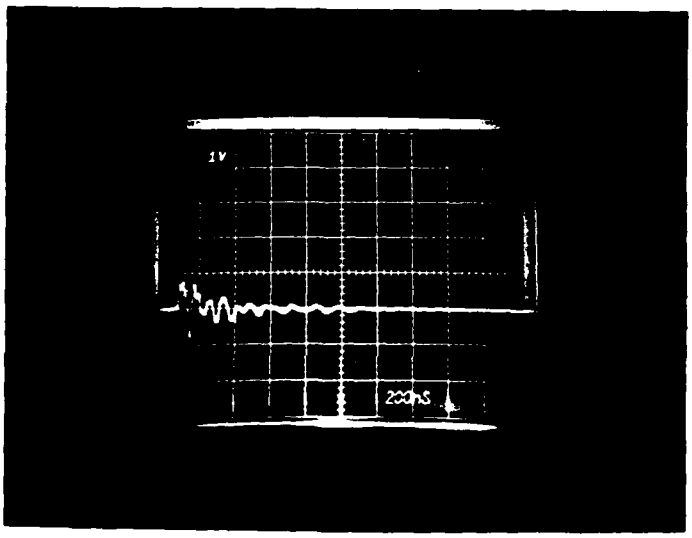
Date	8-1-85
Test Point	POWER - PROBE -
Amplification	dB
Attenuation	46 dB
Horizontal	200 ns/div 1
Vertical	100 mV/div 1
Horizontal	ns/div 2
Vertical	ns/div 2
Configuration	
Pulser Level	22KV
Data Link	
Comments:	



(32)

PROBE CALIBRATION USED FOR SHORT WIRE ANTENNA MEASUREMENT ABOVE -

Date	8-1-85 / 1426
Test Point	CUSHCRAFT AV 5
Amplification	dB
Attenuation	46 dB
Horizontal	200 ns/div 1
Vertical	1 mV/div 1
Horizontal	ns/div 2
Vertical	ns/div 2
Configuration	
Pulser Level	22 KV CHARGE
Data Link	
Comments:	

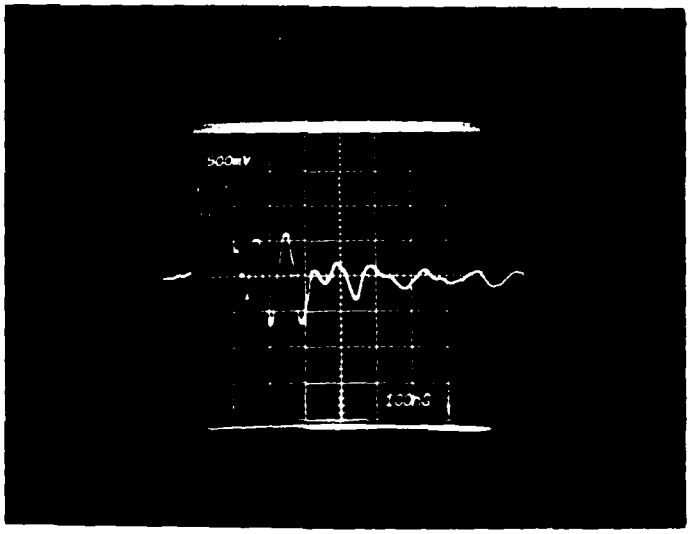


33

CUSHCRAFT AV-5 CONNECTED to (46dB 0.2V)
CANTENNA (dummy load) singer Probe -

160 A × 50 Ω = 8 KV

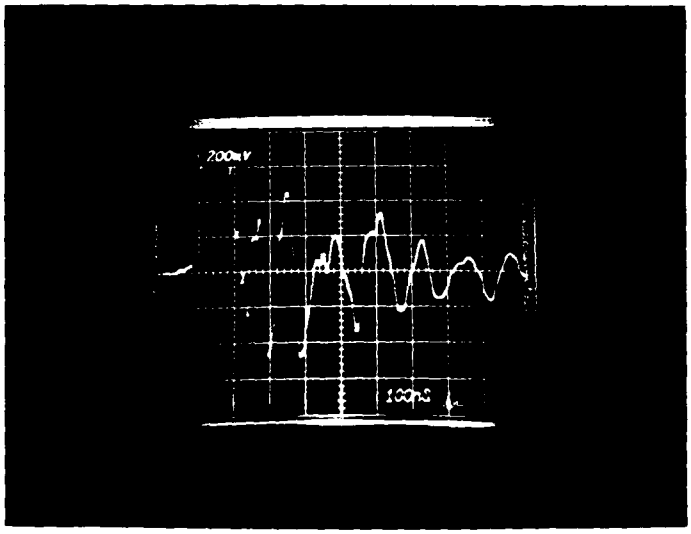
Date	8-1-85 - 1430
Test Point	CUSHCRAFT AV-5
Amplification	dB
Attenuation	40 dB
Horizontal	100 ns/div 1
Vertical	500 mV/div 1
Horizontal	ns/div 2
Vertical	ns/div 2
Configuration	
Pulser Level	22KV CHARGE
Data Link	
Comments:	



34

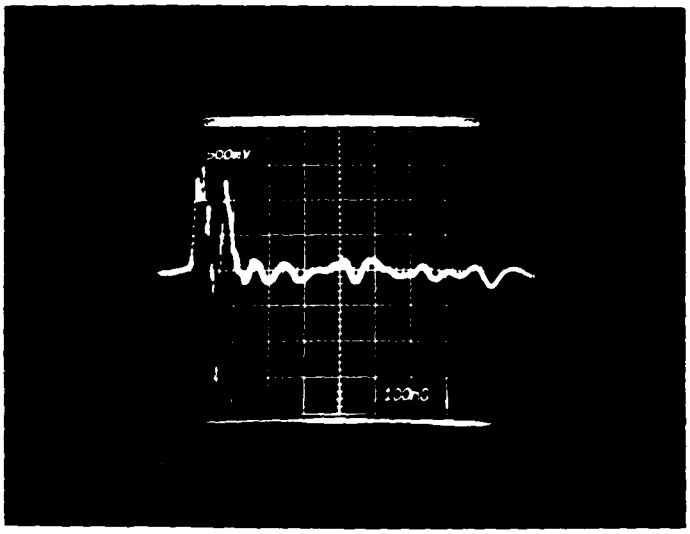
130 A (6.5 KV)

Date	August 1, 85		
Test Point	CUSHCRAFT		
Amplification		dB	
Attenuation		dB	
Horizontal	100	ns/div	1
Vertical	200	mV/div	1
Horizontal		ns/div	2
Vertical		mV/div	2
Configuration			
Pulser Level	22 KV Charge		
Data Link			
Comments:			



34

Date	August 1, 85		
Test Point	CUSHCRAFT		
Amplification		dB	
Attenuation	40	dB	
Horizontal	100	ns/div	1
Vertical	500	mV/div	1
Horizontal		ns/div	2
Vertical		mV/div	2
Configuration			
Pulser Level	22 KV Charge		
Data Link			
Comments:			

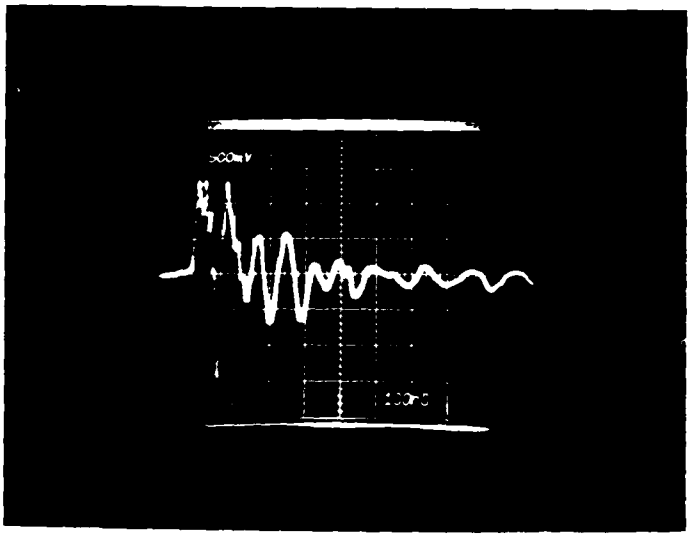


35

REPEAT - 34

150A (7.5 KV)

Date	August 1, 1985
Test Point	CUSHCRAFT
Amplification	dB
Attenuation	40 dB
Horizontal	100 ns/div 1
Vertical	500 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulser Level	22KV Charge
Data Link	
Comments:	

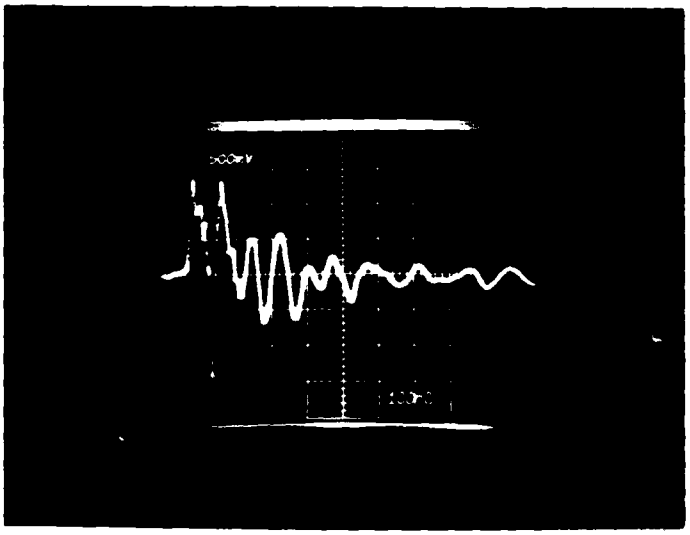


36

CUSH CRAFT/ANTENNA 40 dB 0.5

-145 A (7.25 KV)

Date	August 1, 1985
Test Point	CUSHCRAFT
Amplification	dB
Attenuation	40 dB
Horizontal	100 ns/div 1
Vertical	500 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulser Level	22KV Charge
Data Link	
Comments:	



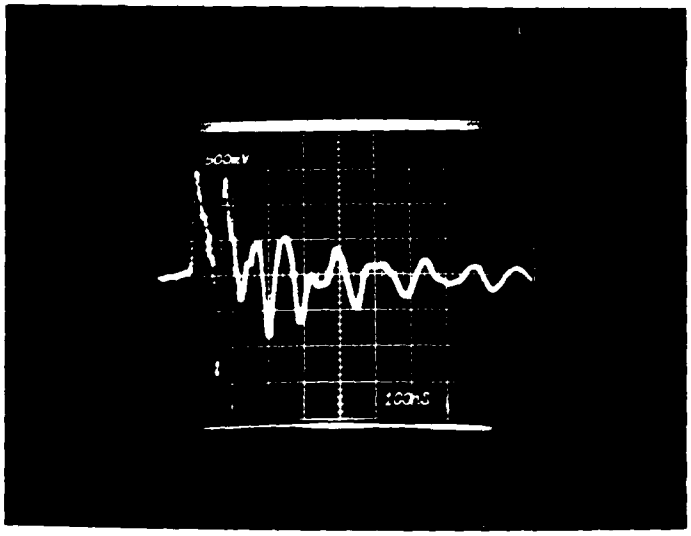
37

REMOVED EXTRA COPPER WIRE

~ -150 A (7.5 KV)

Date	8-1-85	
Test Point	CUSHCRAFT AV-5	
Amplification		dB
Attenuation	40	dB
Horizontal	100	ns/div 1
Vertical	500	mV/div 1
Horizontal		ns/div 2
Vertical		ns/div 2
Configuration		
Pulser Level	22 KV	
Data Link		

Comments:



38

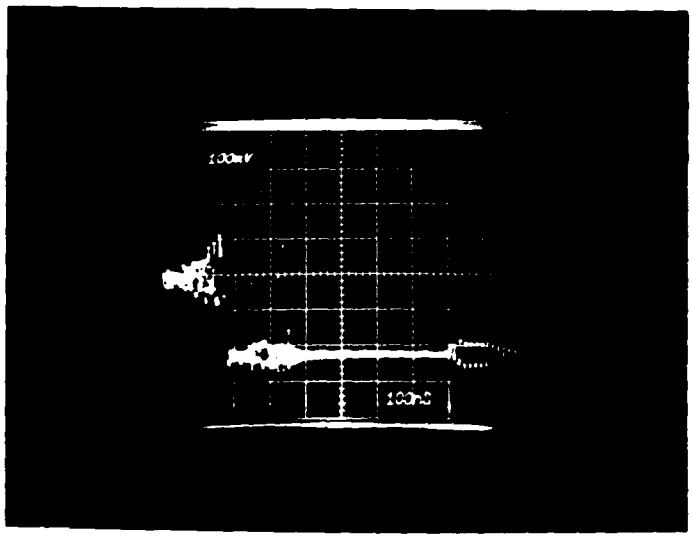
REPLACED CANTENNA (DUMMY LOAD) WITH 50 Ω RESISTOR.

150A (7.5KV)

Date		
Test Point		
Amplification		dB
Attenuation		dB
Horizontal		ns/div 1
Vertical		mV/div 1
Horizontal		ns/div 2
Vertical		ns/div 2
Configuration		
Pulser Level		
Data Link		

Comments:

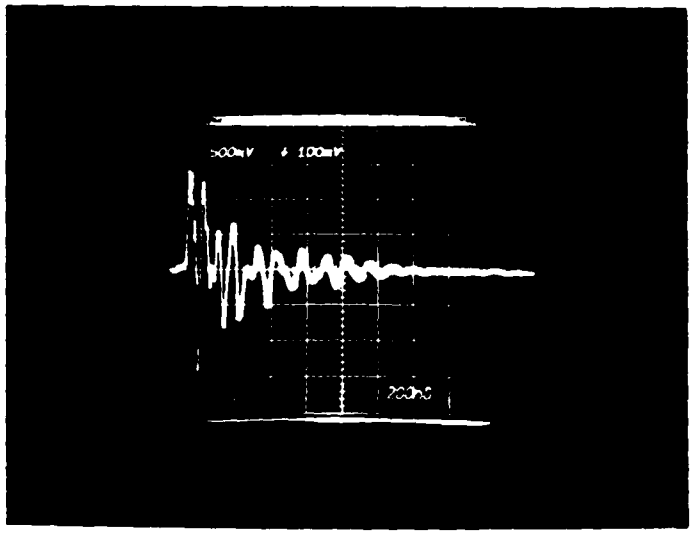
Date	August 1, 1985		
Test Point			
Amplification		dB	
Attenuation		dB	
Horizontal	100	ns/div	1
Vertical	100	mV/div	1
Horizontal		ns/div	2
Vertical		mV/div	2
Configuration			
Pulser Level	22 KV Charge		
Data Link			
Comments:			



39

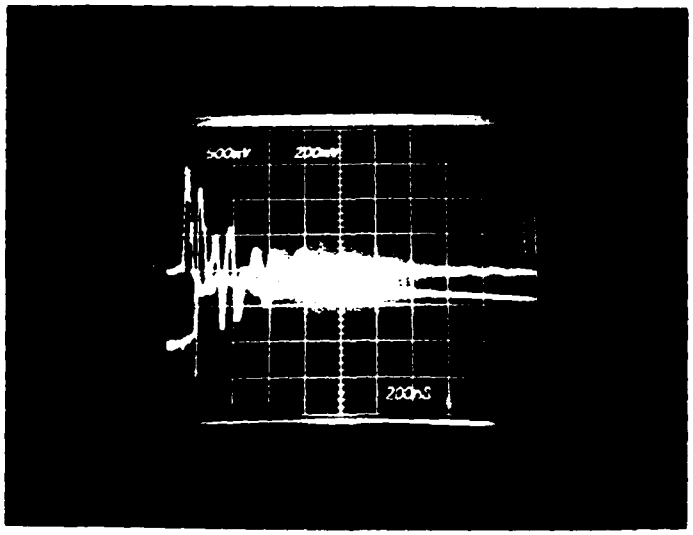
60 dB FIBER OPTIC COUPLING

Date	August 1, 1985		
Test Point			
Amplification		dB	
Attenuation		dB	
Horizontal	200	ns/div	1
Vertical	500	mV/div	1
Horizontal	200	ns/div	2
Vertical	100	mV/div	2
Configuration			
Pulser Level	22 KV Charge		
Data Link			
Comments:			



40

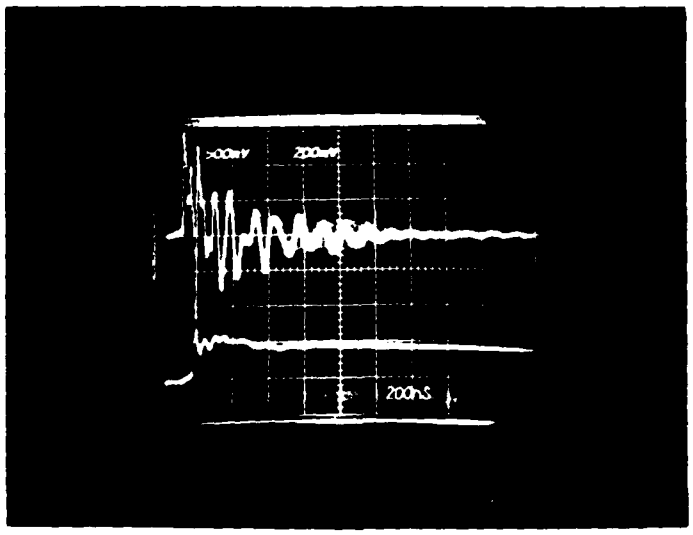
Date	August 1, 1985
Test Point	
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	500 mV/div 1
Horizontal	200 ns/div 2
Vertical	200 mV/div 2
Configuration	
Pulser Level	22KV Charge
Data Link	
Comments:	



41

LOWER TRACE : E.O.
UPPER TRACE : ANTENNA SIGNAL

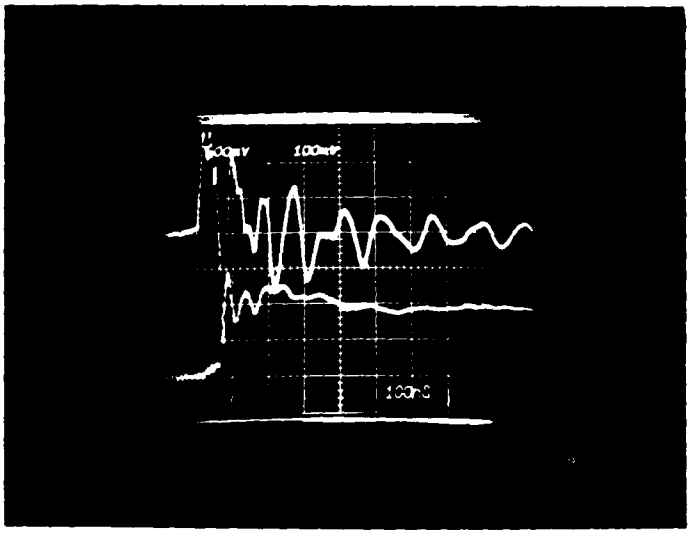
Date	August 1, 1985
Test Point	
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	500 mV/div 1
Horizontal	200 ns/div 2
Vertical	200 mV/div 2
Configuration	
Pulser Level	22KV Charge
Data Link	
Comments:	



42

REPEAT

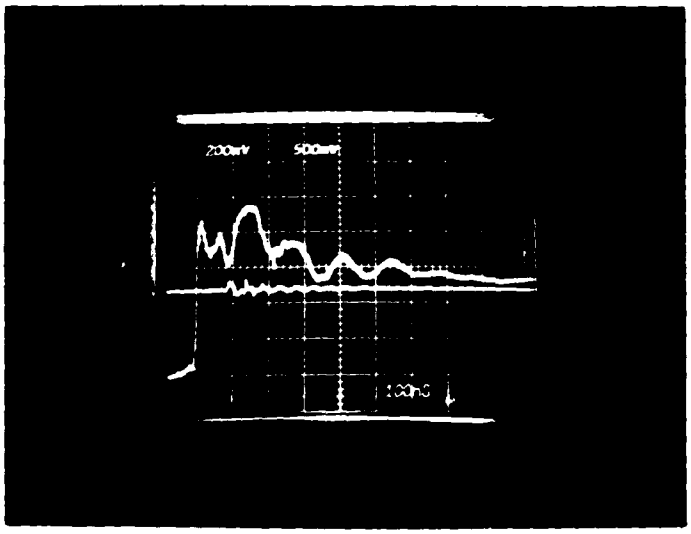
Date	August 1, 1985	
Test Point		
Amplification		dB
Attenuation		dB
Horizontal	100	ns/div 1
Vertical	500	mV/div 1
Horizontal	100	ns/div 2
Vertical	100	mV/div 2
Configuration		
Pulser Level	22 KV Charge	
Data Link		
Comments:		



43

REPEAT

Date	August 1, 1985	
Test Point		
Amplification		dB
Attenuation		dB
Horizontal	100	ns/div 1
Vertical	200	mV/div 1
Horizontal	100	ns/div 2
Vertical	500	mV/div 2
Configuration		
Pulser Level	22 KV Charge	
Data Link		
Comments:		

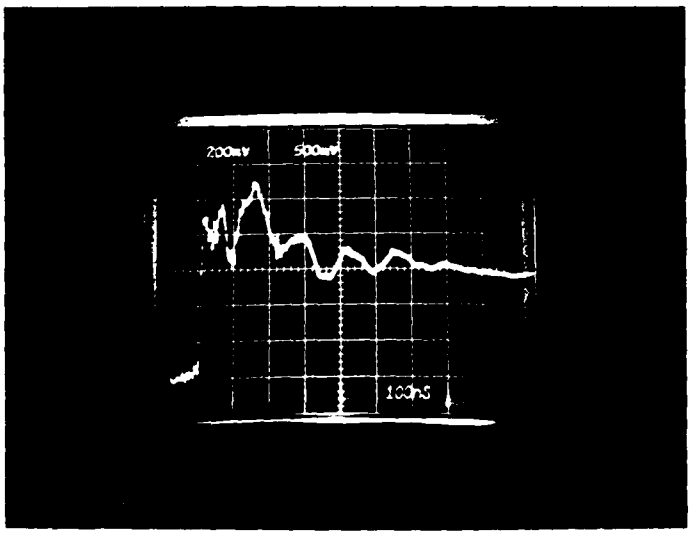


44

LOWER TRACE - ROUND H SENSOR DIRECT 200 MV

UPPER - RECTANGULAR H SENSOR - 500 MV

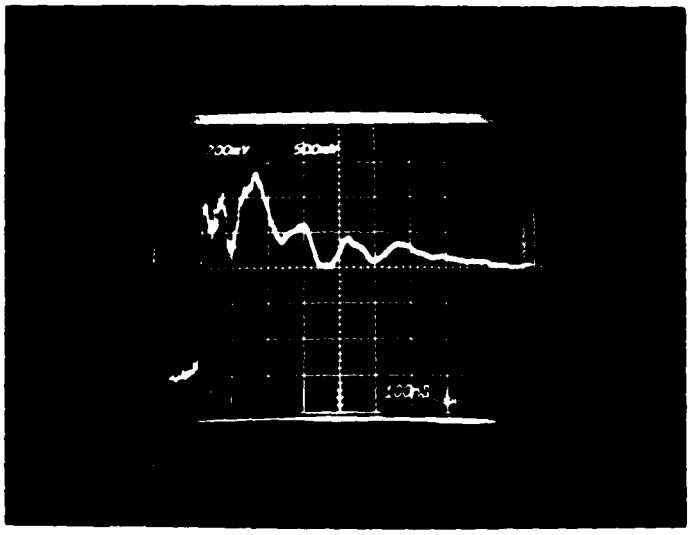
Date	August 2, 1985	
Test Point	PULSER CAL	
Amplification		dB
Attenuation		dB
Horizontal	100	ns/div 1
Vertical	200	mV/div 1
Horizontal		ns/div 2
Vertical		mV/div 2
Configuration		
Pulser Level	28KV Charge	
Data Link		
Comments:		



1

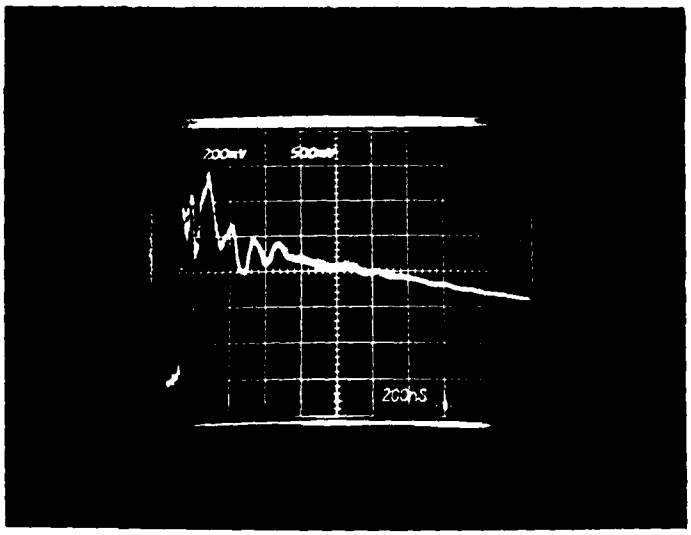
H SENSOR ~ 5 FT FROM FRONT

Date	August 2, 1985	
Test Point	PULSER CAL	
Amplification		dB
Attenuation		dB
Horizontal	100	ns/div 1
Vertical	200	mV/div 1
Horizontal		ns/div 2
Vertical		mV/div 2
Configuration		
Pulser Level	30KV Charge	
Data Link		
Comments:		



2

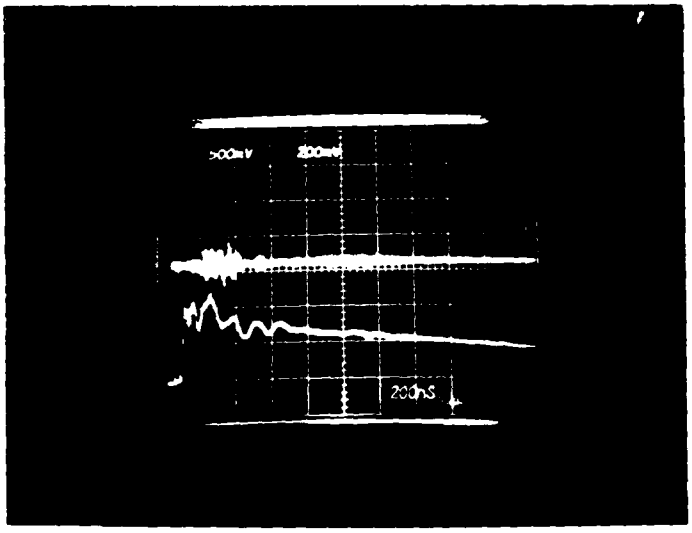
Date	August 2, 1985		
Test Point	PULSER CAL		
Amplification		dB	
Attenuation		dB	
Horizontal	200	ns/div	1
Vertical	200	mV/div	1
Horizontal		ns/div	2
Vertical		mV/div	2
Configuration			
Pulser Level	30 KV Charge		
Data Link			
Comments:			



3

REPEAT 2

Date	August 2, 1985		
Test Point	PULSER CAL		
Amplification		dB	
Attenuation		dB	
Horizontal	200	ns/div	1
Vertical	500	mV/div	1
Horizontal	200	ns/div	2
Vertical	200	mV/div	2
Configuration			
Pulser Level	30 KV Charge		
Data Link			
Comments:			

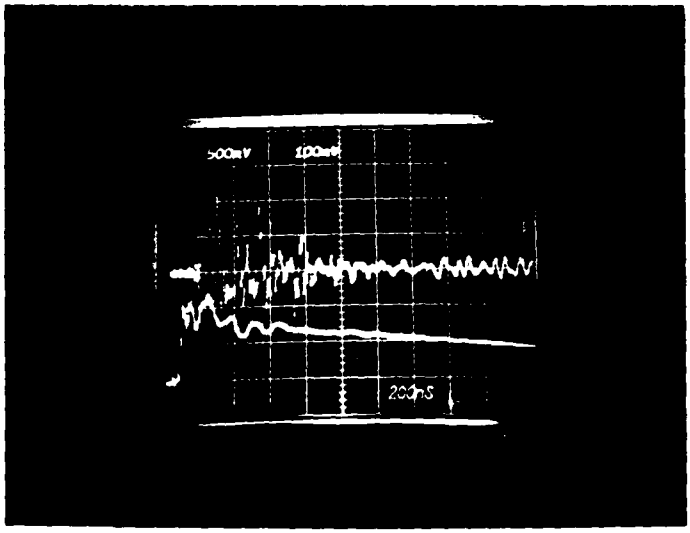


4

UPPER - F.O. (GAIN 76/43) 60dB 200mV

LOWER: ROUND H SENSOR 500 mV

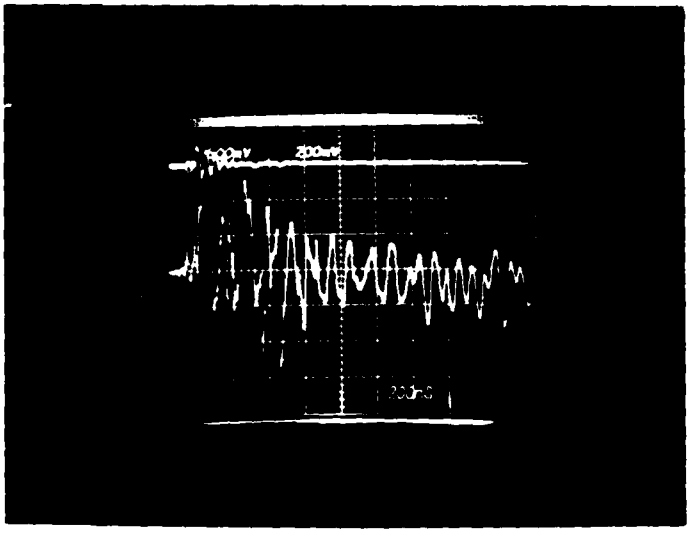
Date	August 2, 1985
Test Point	
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	500 mV/div 1
Horizontal	200 ns/div 2
Vertical	100 mV/div 2
Configuration	
Pulser Level	30KV Charge
Data Link	
Comments:	



(5)

REPEAT (4) 40 dB F.O. 100 mV

Date	August 2, 1985
Test Point	CUSHCRAFT
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	500 mV/div 1
Horizontal	200 ns/div 2
Vertical	200 mV/div 2
Configuration	
Pulser Level	30KV Charge
Data Link	
Comments:	



(6)

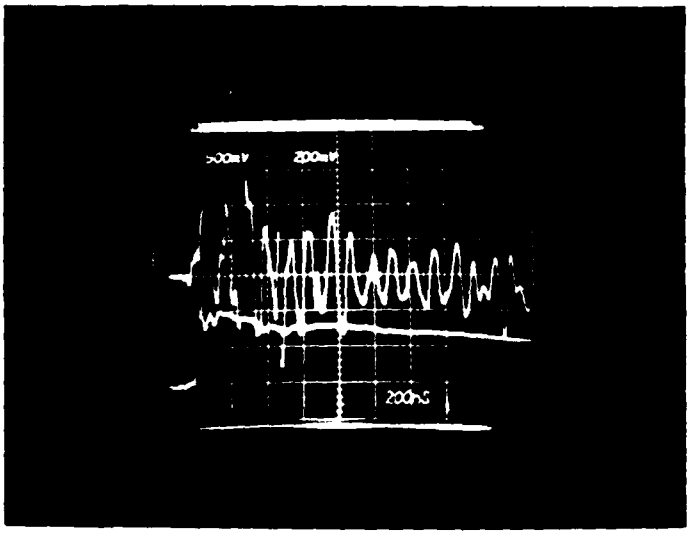
UPPER: F.O. 6dB FO GAIN 1.0

LOWER: DIRECT TO ANTENNA 20 dB

off scale

Date	August 2, 1985	
Test Point	CRAFT	
Amplification	dB	
Attenuation	dB	
Horizontal	200ns/div	1
Vertical	500 mV/div	1
Horizontal	200ns/div	2
Vertical	200mV/div	2
Configuration		
Pulser Level	30KV Charge	
Data Link		

Comments:



7

UPPER: ANTENNA 20dB

LOWER: f.o. FIELD - 6dB

offscale

Date		
Test Point		
Amplification	dB	
Attenuation	dB	
Horizontal	ns/div	1
Vertical	mV/div	1
Horizontal	ns/div	2
Vertical	mV/div	2
Configuration		
Pulser Level		
Data Link		

Comments:

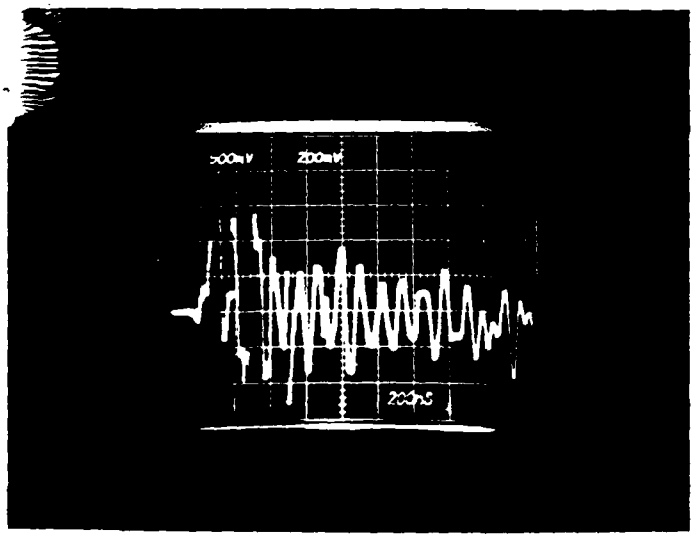
Date	August 2, 1985		
Test Point	ANTENNA		
Amplification		dB	
Attenuation	20	dB	
Horizontal	200	ns/div	1
Vertical	500	mV/div	1
Horizontal		ns/div	2
Vertical		mV/div	2
Configuration			
Pulser Level	30KV Charge		
Data Link			

Comments:

CUSHCRAFT

(9)

off scale



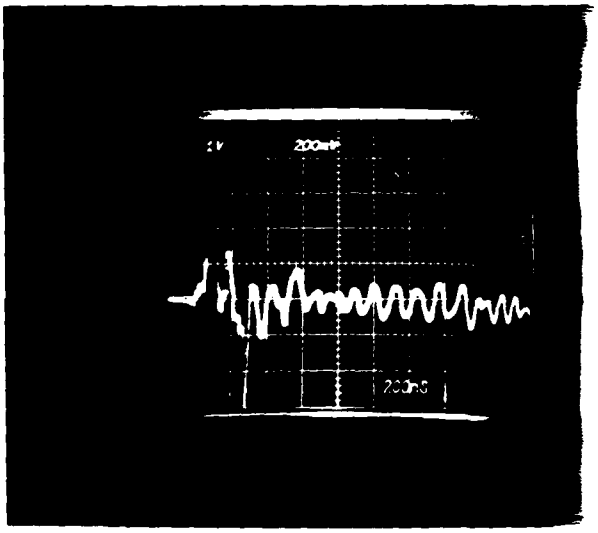
Date	August 2, 1985		
Test Point	ANTENNA -		
Amplification		dB	
Attenuation	20	dB	
Horizontal	200	ns/div	1
Vertical	1000	mV/div	1
Horizontal		ns/div	2
Vertical		mV/div	2
Configuration			
Pulser Level	30KV Charge		
Data Link			

Comments:

CUSHCRAFT

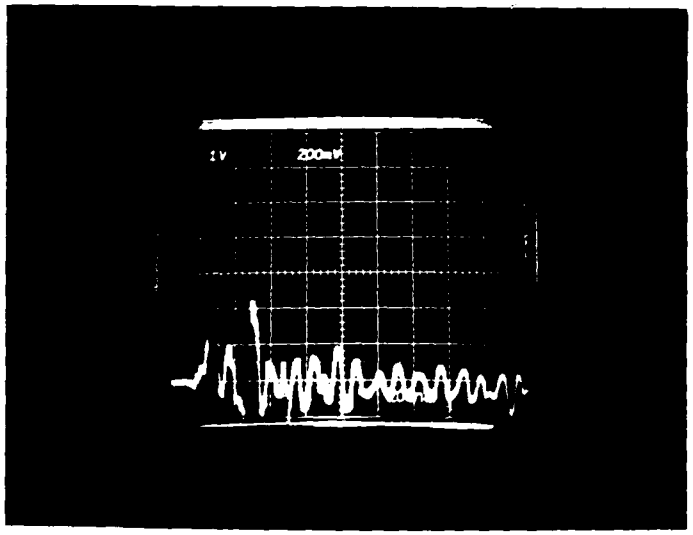
(10)

off scale



Date	August 2, 1985		
Test Point	CUSHCRAFT		
Amplification		dB	
Attenuation	40	dB	
Horizontal	200	ns/div	1
Vertical	1000	mV/div	1
Horizontal		ns/div	2
Vertical		mV/div	2
Configuration			
Pulser Level	30 KV Charge		
Data Link			

Comments:



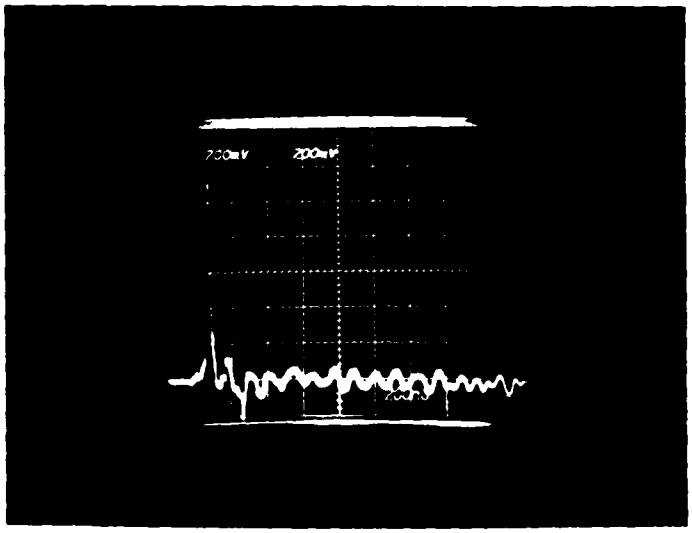
(11)

~~40~~ 20 dB IN LINE

off scale

Date	August 2, 1985		
Test Point	CUSHCRAFT		
Amplification		dB	
Attenuation	40	dB	
Horizontal	200	ns/div	1
Vertical	200	mV/div	1
Horizontal		ns/div	2
Vertical		mV/div	2
Configuration			
Pulser Level	30 KV Charge		
Data Link			

Comments:



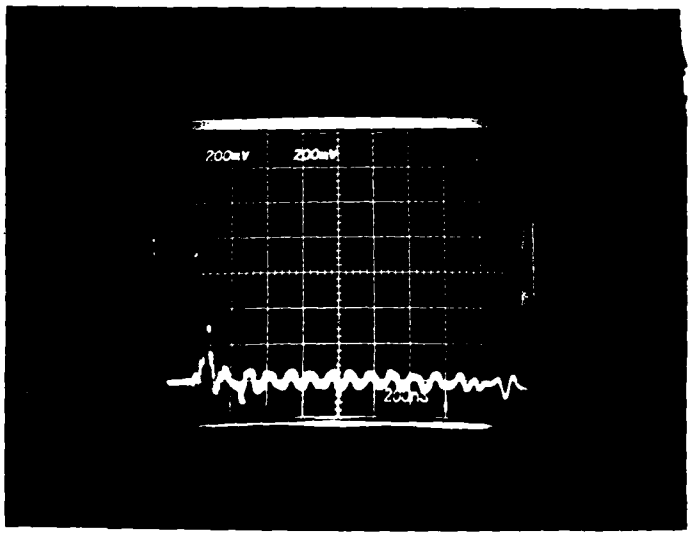
(12)

40dB in LINE ANTENNA TRACE ONLY -
SPIKE +110A -(3.5 KV)

Date	August 2, 1985	
Test Point	CUSHCRAFT	
Amplification		dB
Attenuation		dB
Horizontal	200	ns/div 1
Vertical	200	mV/div 1
Horizontal		ns/div 2
Vertical		mV/div 2
Configuration		
Pulser Level	30KV Charge	
Data Link		

Comments:

13



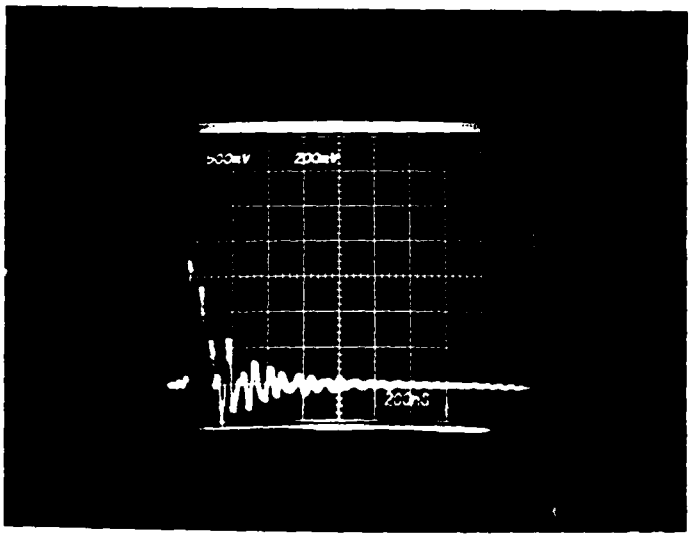
SENSOR CT2 SIGNAL OFF SCALE

Date		
Test Point		
Amplification		dB
Attenuation		dB
Horizontal		ns/div 1
Vertical		mV/div 1
Horizontal		ns/div 2
Vertical		mV/div 2
Configuration		
Pulser Level		
Data Link		

Comments:

Date	8-2-85
Test Point	POWER INJECT
Amplification	dB
Attenuation	40 dB
Horizontal	200 ns/div 1
Vertical	500 mV/div 1
Horizontal	ns/div 2
Vertical	ns/div 2
Configuration	
Pulser Level	30 KV CHARGE
Data Link	
Comments:	6.4 KV

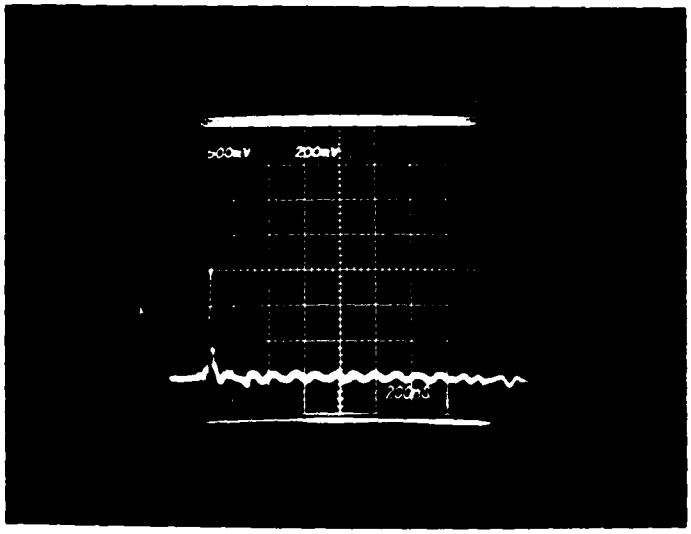
~ 170 A (8.5KV) 15



VERTICAL "L" SHAPED FIELD WIRE - 50 OHMS TO GROUND PRELIMINARY POWER INJECT

~~[illegible]~~

Date	8-2-85
Test Point	CUSHCRAFT AV-5
Amplification	dB
Attenuation	40 dB
Horizontal	200 ns/div 1
Vertical	500 mV/div 1
Horizontal	ns/div 2
Vertical	ns/div 2
Configuration	
Pulser Level	30 KV CHARGE
Data Link	
Comments:	150 A (7.5KV) 14



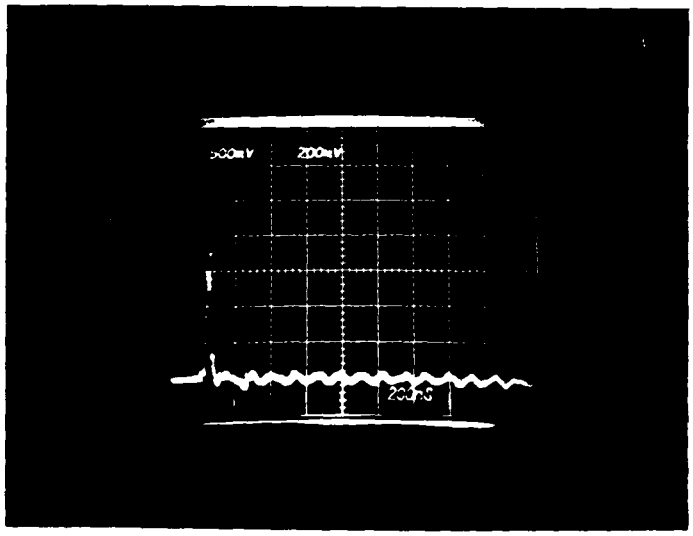
CUSHCRAFT AV-5 ANTENNA WITH RG-8 COAXIAL LINE 1½ FOOT ABOVE FLOOR - SMALL CT.

Date	8-2-85		
Test Point	CUSHCRAFT AN-5		
Amplification		dB	
Attenuation		dB	
Horizontal	200	ns/div	1
Vertical	500	mV/div	1
Horizontal		ns/div	2
Vertical		ns/div	2
Configuration			
Pulser Level	30 KV CHARGE		
Data Link			

Comments:

PEAK I = 170 A (8.67KV)

16

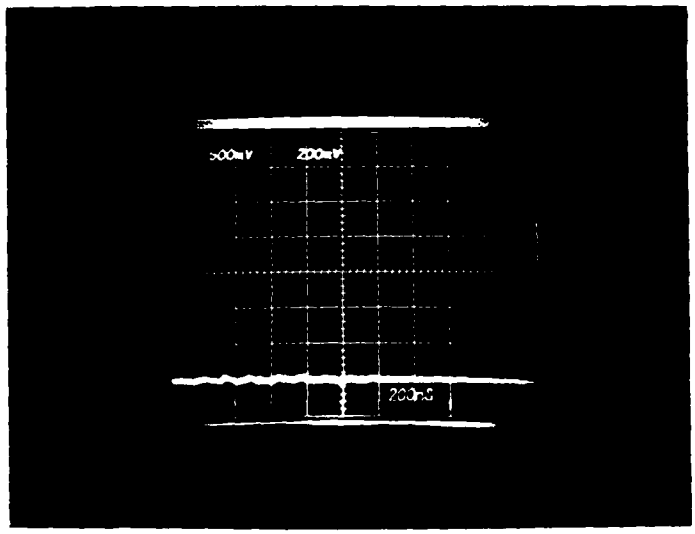


SET UP: CUSHCRAFT AN-5 DIAGONAL TO PULSE FIELD. 75' RG-8 COAXIAL CABLE AT ABOUT 8' (FOOT) HIGH LEVEL. 51 Ω LOAD ON CENTER CONDUCTOR TO GROUND. CABLE SHIELD GROUNDED. SMALL CT USED. 50 Ω LOAD TO GND

Date	8-2-85		
Test Point	COAXIAL CABLE		
Amplification		dB	
Attenuation	40	dB	
Horizontal	200	ns/div	1
Vertical	500	mV/div	1
Horizontal		ns/div	2
Vertical		ns/div	2
Configuration			
Pulser Level	30KV CHARGE		
Data Link			

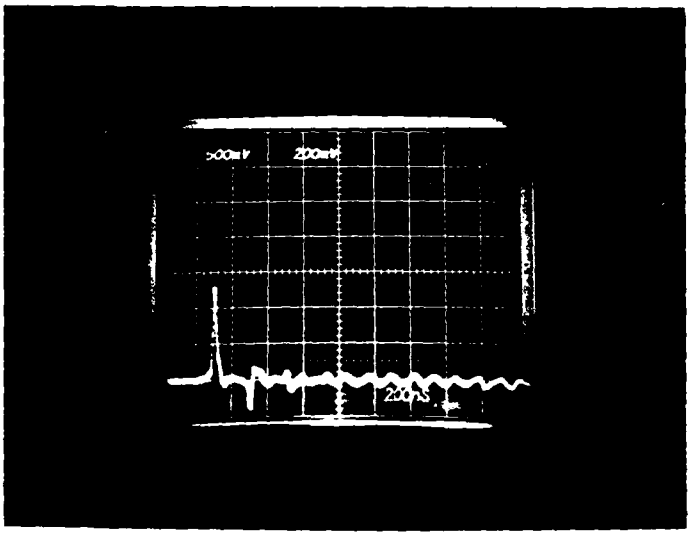
Comments:

COAXIAL CABLE TEST 18



SET UP: ANTENNA DISCONNECTED-
COAXIAL CABLE RG-8 8' FOOT ABOVE FLOOR. CABLE SHIELD GROUNDED AT BOTH ENDS. SIGNAL FROM CENTER CONDUCTOR. 50 Ω LOAD TO GROUND. SENSOR 91550

Date	August 2, 1985	
Test Point	CRASHCRAFT	
Amplification		dB
Attenuation		dB
Horizontal	200	ns/div 1
Vertical	500	mV/div 1
Horizontal		ns/div 2
Vertical		mV/div 2
Configuration		
Pulser Level	30KV Charge	
Data Link		
Comments:		

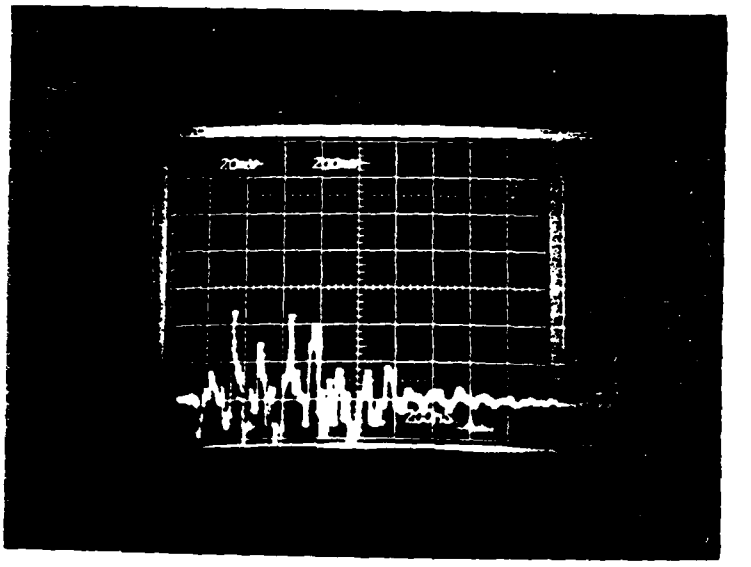


(17)

REPEAT (16) SENSOR 91550 ~ 125A (6.375 KV)

Date		
Test Point		
Amplification		dB
Attenuation		dB
Horizontal		ns/div 1
Vertical		mV/div 1
Horizontal		ns/div 2
Vertical		mV/div 2
Configuration		
Pulser Level		
Data Link		
Comments:		

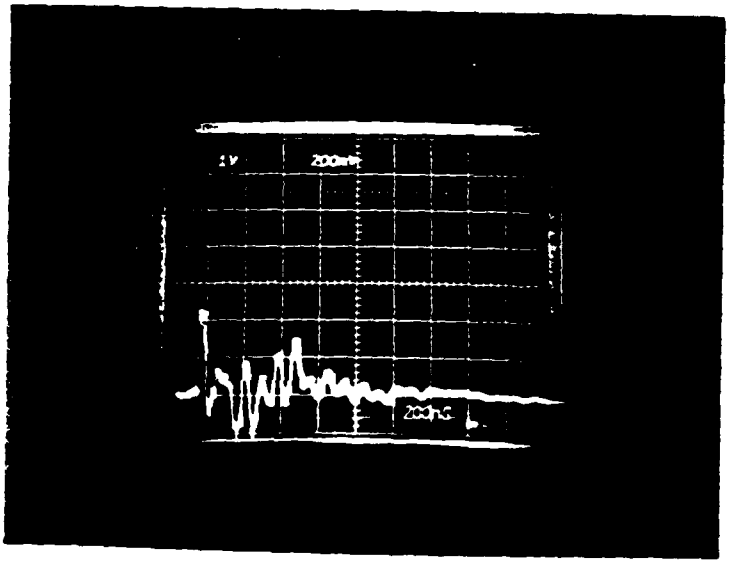
Date	August 2, 1985	
Test Point	RG8 CABLE	
Amplification		dB
Attenuation	40	dB
Horizontal	200	ns/div 1
Vertical	20	mV/div 1
Horizontal		ns/div 2
Vertical		mV/div 2
Configuration		
Pulser Level	30KV Charge	
Data Link		
Comments:		



(19)

REPEAT 15 - AT 20 MV - NO SPIKE NOISE ONLY

Date	August 2, 1985	
Test Point	WIRE ANTENNA	
Amplification		dB
Attenuation	40	dB
Horizontal	200	ns/div 1
Vertical	1000	mV/div 1
Horizontal		ns/div 2
Vertical		mV/div 2
Configuration		
Pulser Level	30KV Charge	
Data Link		
Comments:		

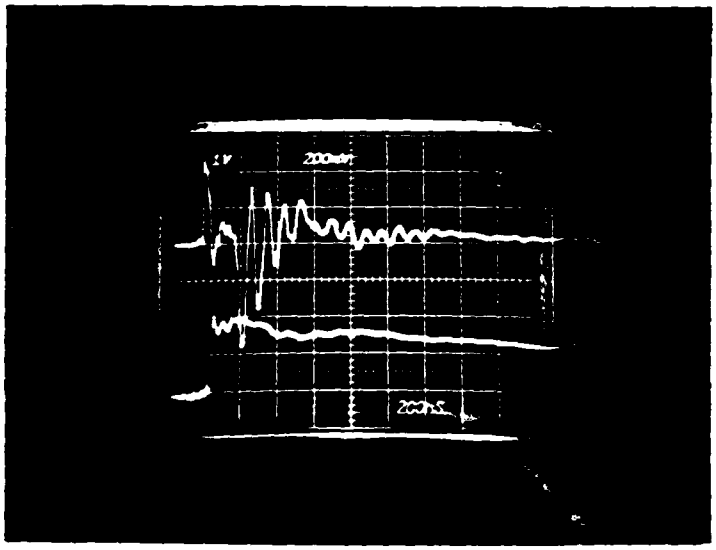


(20)

WIRE ANTENNA 50 OHMS TO GROUND - PROBE 91550

40 dB 100 A/div 230 A PEAK. (11.5 KV)

Date	August 2, 1985	
Test Point	WIRE ANTENNA	
Amplification		dB
Attenuation		dB
Horizontal	200	ns/div 1
Vertical	1000	mV/div 1
Horizontal	200	ns/div 2
Vertical	200	mV/div 2
Configuration		
Pulser Level	30KV Charge	
Data Link		
Comments:		



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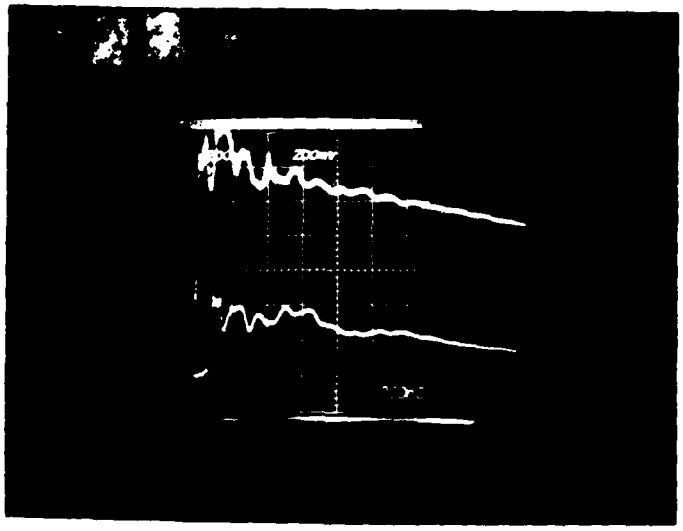
UPPER: WIRE ANTENNA 50 OHMS TO GROUND - PROBE 91550
40 dB 100A/div 230 A PEAK - (11.5 KV)
LOWER - F.O. TO H FIELD - FIELD 360 MV x 2 = 720 MV
17 MV/KV/m = 42.3 KV/m

Date		
Test Point		
Amplification		dB
Attenuation		dB
Horizontal		ns/div 1
Vertical		mV/div 1
Horizontal		ns/div 2
Vertical		mV/div 2
Configuration		
Pulser Level		
Data Link		
Comments:		

Date	8-2-85		
Test Point	CALIBRATION		
Amplification		dB	
Attenuation		dB	
Horizontal	200	ns/div	1
Vertical	200	mV/div	1
Horizontal	200	ns/div	2
Vertical	200 MV	ns/div	2
Configuration			
Pulser Level	30 KV CHARGE		
Data Link			

Comments:



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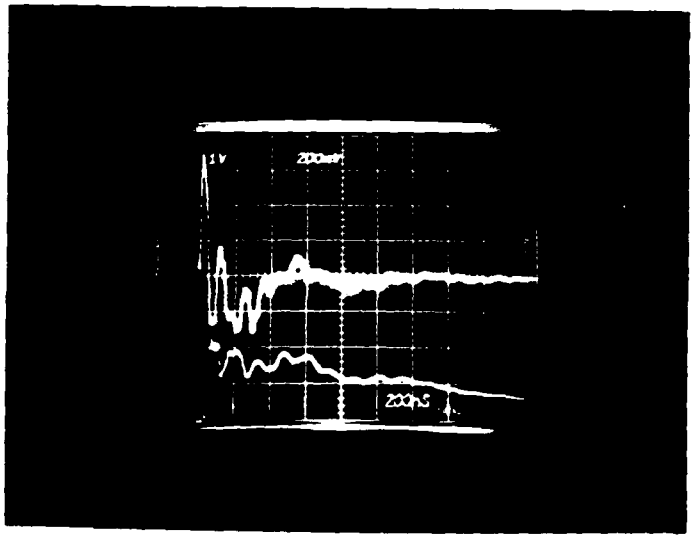
LOWER TRACE - RECTANGULAR SENSOR 20 dB ATTN
2.8 DIV (280 mV x 10 x 1.1 ÷ 20 = 154 A/m → 58 KV/M
UPPER TRACE - ROUND H SENSOR - DIRECT
4.1 div x 200 MV = 820 m → 48.2 KV/m

Date			
Test Point			
Amplification		dB	
Attenuation		dB	
Horizontal		ns/div	1
Vertical		mV/div	1
Horizontal		ns/div	2
Vertical		ns/div	2
Configuration			
Pulser Level			
Data Link			

Comments:

R F. DRIVE - REFERENCE -

Date	8-2-85
Test Point	RF DRIVE -
Amplification	dB
Attenuation	40 dB
Horizontal	200 ns/div 1
Vertical	1000 mV/div 1
Horizontal	200 ns/div 2
Vertical	200 mV/div 2
Configuration	
Pulser Level	30KV - DRIVE
Data Link	



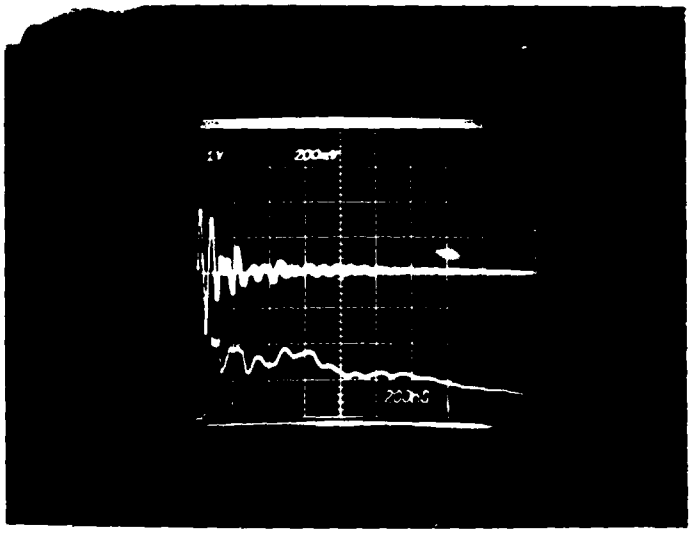
Comments:
LONG L SHAPE WIRE
VERTICAL +74" HIGH 28
90° TO PULSER ELEMENTS.

UPPER TRACE - CURRENT - RF DRIVE - (91550 SENSOR)
350 A x 50Ω = 17,500 V

LOWER TRACE - REFERENCE - H FIELD - ~ 50 KV/m

"L" WIRE = 74" HIGH x 15' (FEET) LONG.

Date	8-2-85
Test Point	A.C. DRIVE (1)
Amplification	dB
Attenuation	40 dB
Horizontal	200 ns/div 1
Vertical	1000 mV/div 1
Horizontal	200 ns/div 2
Vertical	200 mV/div 2
Configuration	
Pulser Level	30 KV -
Data Link	



Comments:

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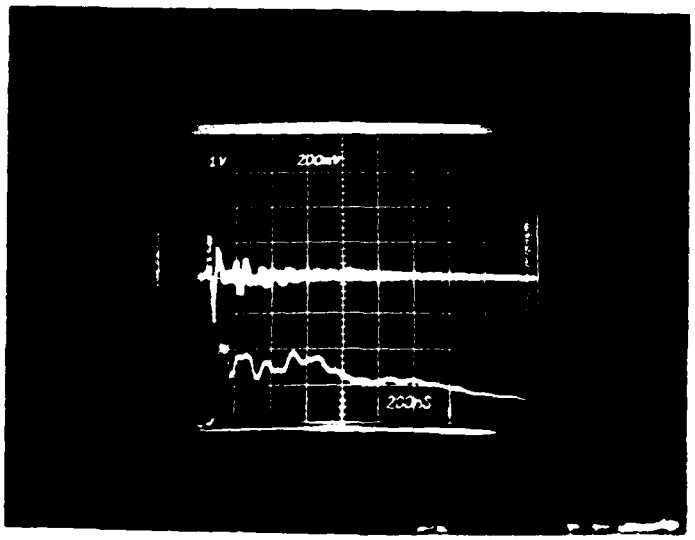
UPPER TRACE - CURRENT - A.C. DRIVE - PRELIMINARY TEST

LOWER TRACE - REFERENCE - H FIELD - ~ 50 KV/m

REFERENCE AC DRIVE

Date	8-2-85	
Test Point	A.C. DRIVE - R	
Amplification		dB
Attenuation	40	dB
Horizontal	200	ns/div 1
Vertical	1000	mV/div 1
Horizontal	200	ns/div 2
Vertical	200	mV/div 2
Configuration		
Pulser Level	30KV DRIVE	
Data Link		



Comments:
SHORT "L" SHAPE WIRE
55" VERTICAL + 72" HOZ 30
PARALLEL TO ELEMENTS OF PULSER

UPPER TRACE = A.C. DRIVE – 130 A × 50Ω = 6500 V/

LOWER TRACE = REF PULSE – ~ 50 KV/m

55" × 72"

Date		
Test Point		
Amplification		dB
Attenuation		dB
Horizontal		ns/div 1
Vertical		mV/div 1
Horizontal		ns/div 2
Vertical		ns/div 2
Configuration		
Pulser Level		
Data Link		

Comments:

Date	8-2-85	
Test Point	D-1	
Amplification		dB
Attenuation	40	dB
Horizontal	200	ns/div 1
Vertical	1V	mV/div 1
Horizontal	200	ns/div 2
Vertical	200MV	ns/div 2
Configuration		
Pulser Level	30KV CHARGE	
Data Link	FIBER OPTIC + COAX	

Comments:
SYSTEM-2

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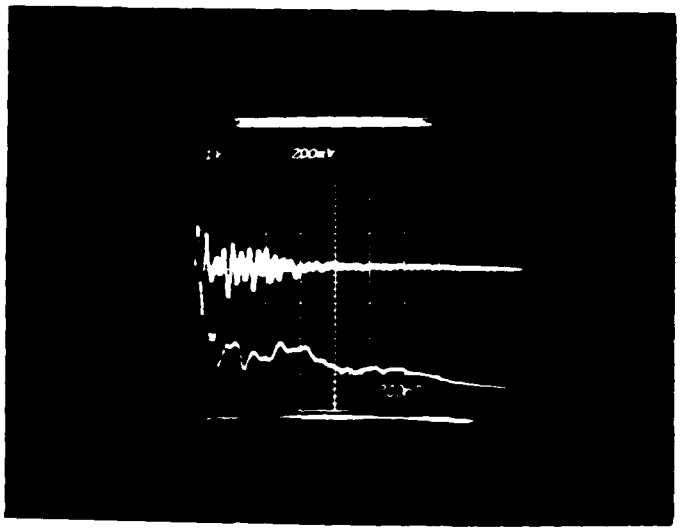


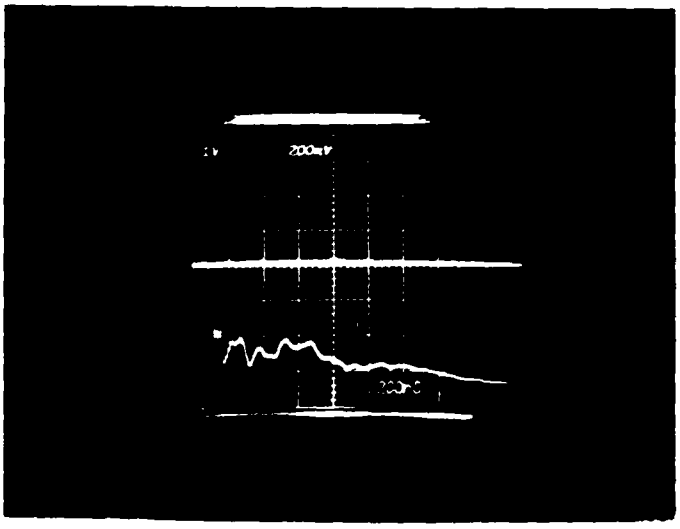
UPPER TRACE: AC ANTENNA CONNECTED TO "HOT" AC WIRE IN DUPLEX BOX. SINGER 915502 PROBE AROUND AC ANTENNA ABOVE BOX. ±120-13A, 25WATT LIGHT BULB CONNECTED AS LOAD HONDA GENERATOR THROUGH LONG CABLES + ISOLATION TRANSFORMER. 130A (6.5KV)

LOWER TRACE: REF PULSE ~ 50KV/m

Date		
Test Point		
Amplification		dB
Attenuation		dB
Horizontal		ns/div 1
Vertical		mV/div 1
Horizontal		ns/div 2
Vertical		ns/div 2
Configuration		
Pulser Level		
Data Link		

Comments:

Date	8-2-85		
Test Point	D-1		
Amplification		dB	
Attenuation	20	dB	
Horizontal	200	ns/div	1
Vertical	200	mV/div	1
Horizontal		ns/div	2
Vertical		ns/div	2
Configuration			
Pulser Level	30KV-CHARGE		
Data Link	FIBER OPTICS		



Comments:

SYSTEM - 2 32

DRIVE - ANT + AC POWER

DEVICES - 3, 39

~ 50KV/M

Date	8-2-85		
Test Point	D-2		
Amplification		dB	
Attenuation		dB	
Horizontal		ns/div	1
Vertical		mV/div	1
Horizontal		ns/div	2
Vertical		ns/div	2
Configuration			
Pulser Level			
Data Link			

NO PHOTO

Comments:

SYSTEM 1 33

SAME AS 32

Date	8-2-85	
Test Point	D-3	
Amplification		dB
Attenuation	20	dB
Horizontal		ns/div 1
Vertical		mV/div 1
Horizontal	200	ns/div 2
Vertical	200 MV	ns/div 2
Configuration		
Pulser Level	30KV CHARGE	
Data Link	FIBER OPTICS	

Comments:
SYSTEM-4

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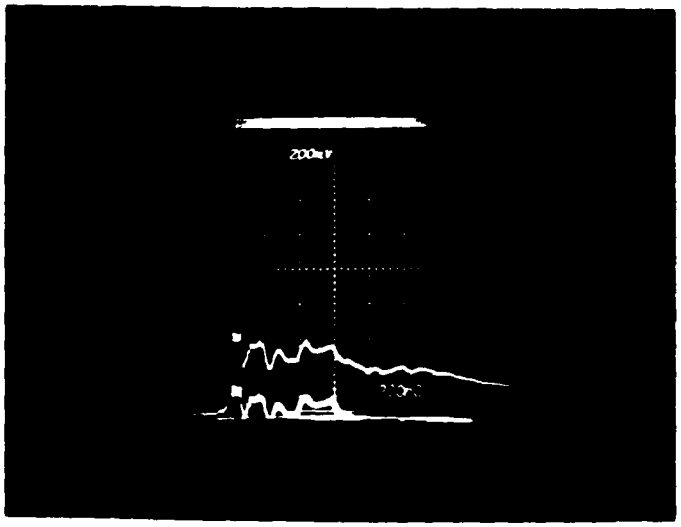
~ 50 KV/m



Date	8-2-85	
Test Point		
Amplification		dB
Attenuation		dB
Horizontal		ns/div 1
Vertical		mV/div 1
Horizontal		ns/div 2
Vertical		ns/div 2
Configuration		
Pulser Level		
Data Link		

Comments:
SYSTEM 4

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NO PHOTO

Date	8-2-85		
Test Point	D-4 (1)		
Amplification		dB	
Attenuation	20	dB	
Horizontal	200	ns/div	1
Vertical	200	mV/div	1
Horizontal		ns/div	2
Vertical		ns/div	2
Configuration			
Pulser Level	30KV CHARGE		
Data Link			

Comments:
SYSTEM-5

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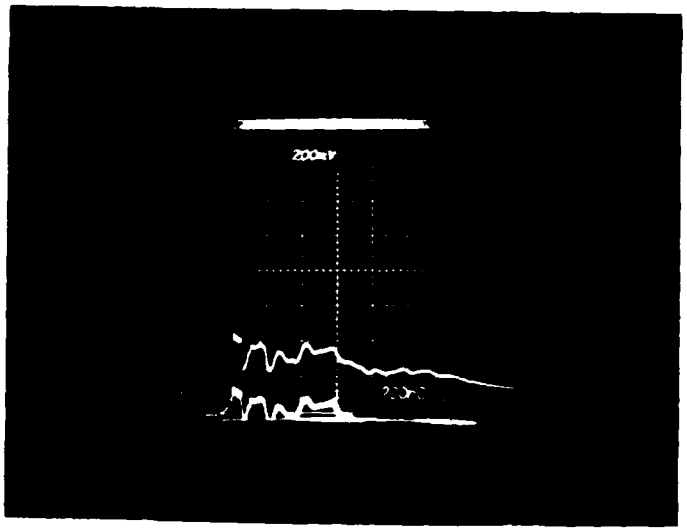

DOUBLE TRACE

50 KV/M

Date	8-2-85		
Test Point	D-4 (2)		
Amplification		dB	
Attenuation	20	dB	
Horizontal		ns/div	1
Vertical		mV/div	1
Horizontal	200	ns/div	2
Vertical	200 MV	ns/div	2
Configuration			
Pulser Level	30KV-CHARGE		
Data Link			

Comments:
SYSTEM-5

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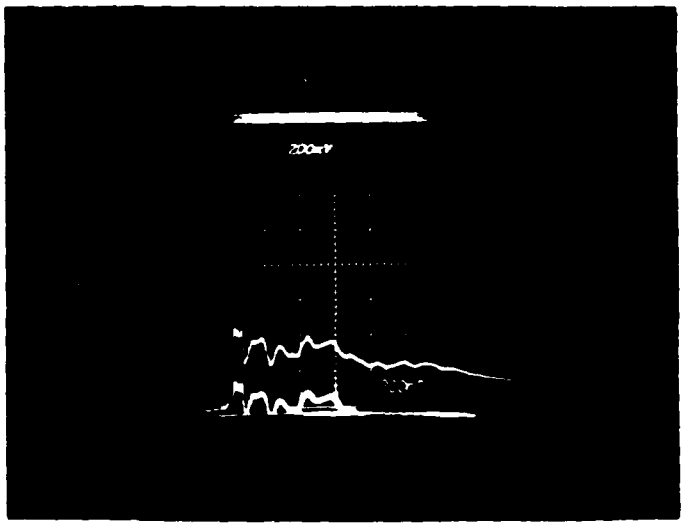
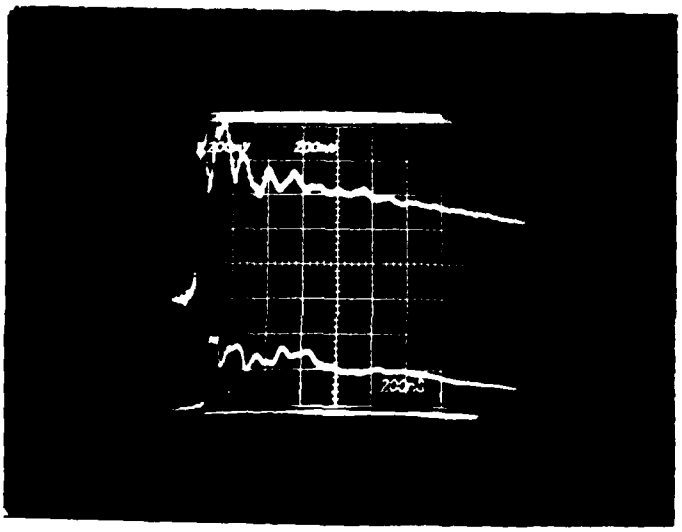


DOUBLE TRACE

50 KV/M

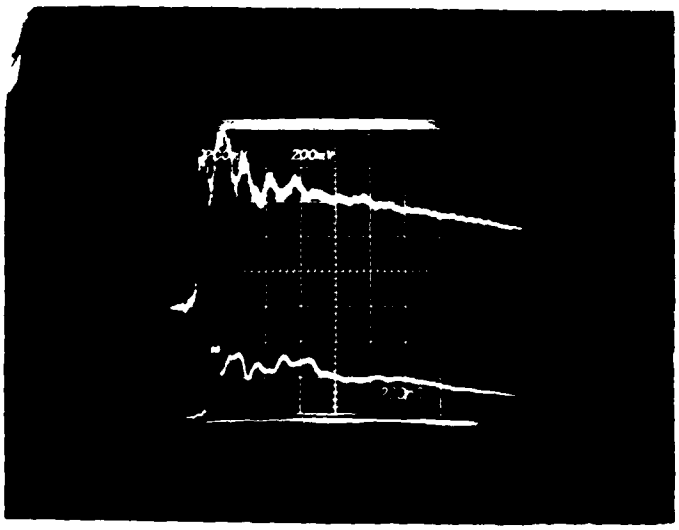
Date	8-5-85	
Test Point	CALIBRATION	
Amplification		dB
Attenuation		dB
Horizontal	200	ns/div 1
Vertical	200	mV/div 1
Horizontal	200	ns/div 2
Vertical	200 MV	ns/div 2
Configuration		
Pulser Level	30KV CHARGE	
Data Link		
Comments:		



1

1. LOWER TRACE: RECTANGULAR SENSOR -20dB INTO FIBER OPTIC
2. UPPER TRACE: ROUND "H" SENSOR DIRECT NO ATTN.

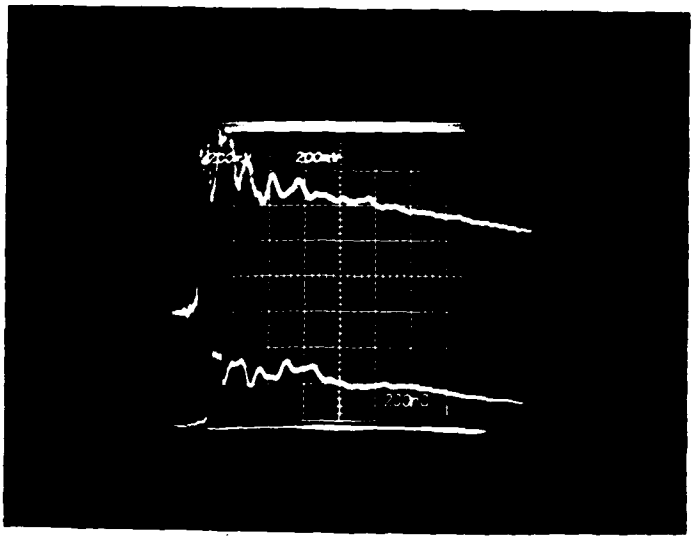
Date	8-5-85	
Test Point	TEST D-5	
Amplification		dB
Attenuation		dB
Horizontal		ns/div 1
Vertical		mV/div 1
Horizontal		ns/div 2
Vertical		ns/div 2
Configuration		
Pulser Level		
Data Link		
Comments:		



SYSTEM 10
DEVICES: 5A + 39
(TRACES SAME AS PHOTO 1

2

Date	8-5-85
Test Point	TEST-D6
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	200 ns/div 2
Vertical	200 mV ~~ns~~/div 2
Configuration	
Pulser Level	30 KV CHARGE
Data Link	



Comments:

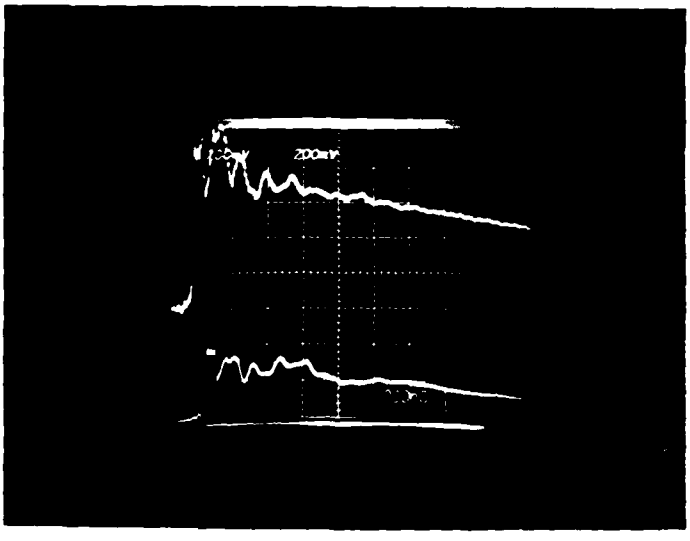
SYSTEM - 11

DEVICES: 5A + 39 3

~ 50 KV/M

TRACES SAME AS PHOTO 1 - 8-5-85

Date	8-5-85
Test Point	TEST-D7
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	200 ns/div 2
Vertical	200 MV ~~ns~~/div 2
Configuration	
Pulser Level	30 KV CHARGE
Data Link	



Comments:

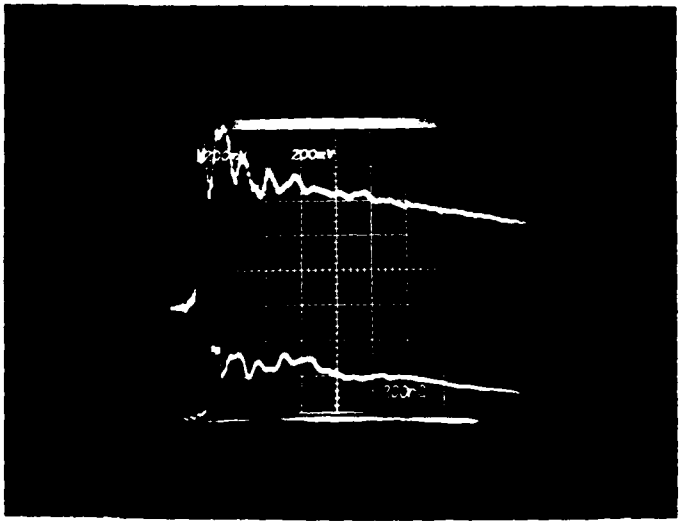
SYSTEM - 16

DEVICES - 4B + 39 4

~ 50 KV/M

TRACES SAME AS PHOTO 1 8-5-85

Date	8-5-85		
Test Point	TEST D-8		
Amplification		dB	
Attenuation		dB	
Horizontal	200	ns/div	1
Vertical	200	mV/div	1
Horizontal	200	ns/div	2
Vertical	200 MV	~~ns~~/div	2
Configuration			
Pulser Level	30 KV CHARGE		
Data Link			



Comments:

SYSTEM-3

DEVICES: 7 + 39 5

TRACES SAME AS PHOTO 1 8-5-85

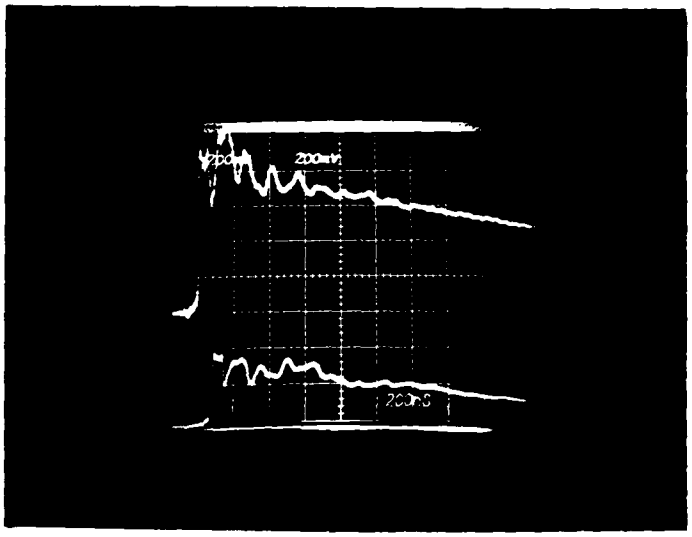
~50 KV/M

Date			
Test Point			
Amplification		dB	
Attenuation		dB	
Horizontal		ns/div	1
Vertical		mV/div	1
Horizontal		ns/div	2
Vertical		ns/div	2
Configuration			
Pulser Level			
Data Link			

Comments:

Date	8-5-85 - 1312		
Test Point	TEST D9		
Amplification		dB	
Attenuation		dB	
Horizontal	200	ns/div	1
Vertical	200	mV/div	1
Horizontal	200	ns/div	2
Vertical	200 mV	mV/div	2
Configuration			
Pulser Level	30 KV Charge		
Data Link			

Comments:
(SYSTEM 8)



6

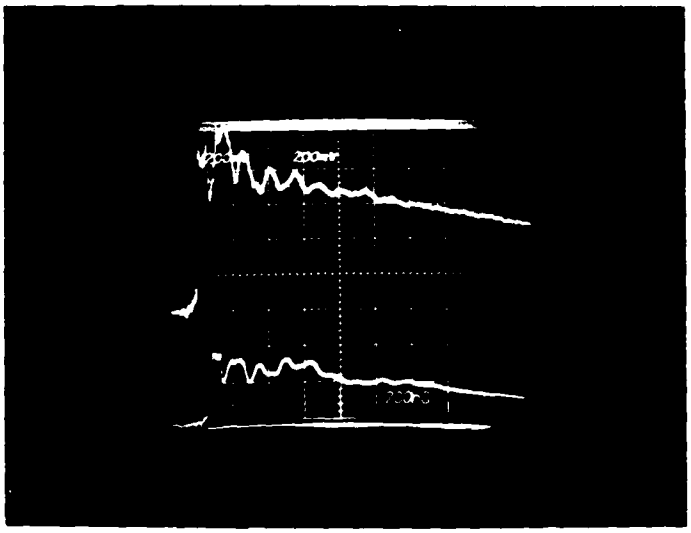
UPPER - H FIELD DIRECT

LOWER - RECTANGULAR PROBE - FIBER OPTIC

~ 50KV/M -

Date	8-5-85		
Test Point	TEST D10		
Amplification		dB	
Attenuation		dB	
Horizontal	200	ns/div	1
Vertical	200	mV/div	1
Horizontal	200	ns/div	2
Vertical	200 mV	mV/div	2
Configuration			
Pulser Level	30 KV CHARGE		
Data Link			

Comments:
(SYSTEM 9)

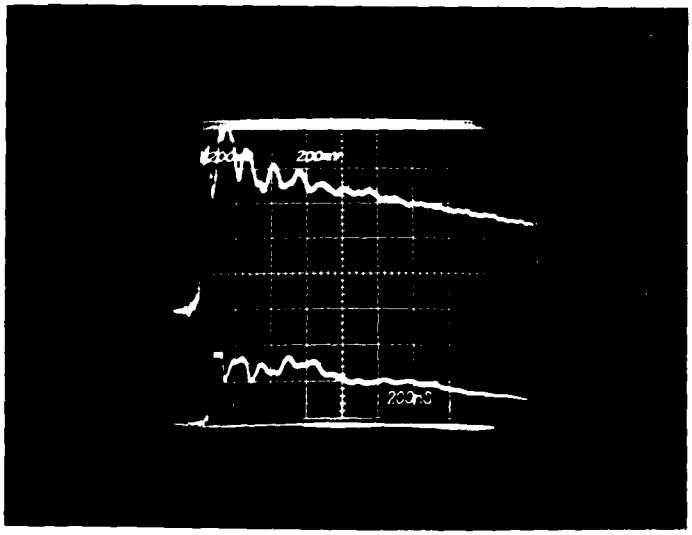


7

Date	8-5-85		
Test Point	TEST D-11		
Amplification		dB	
Attenuation		dB	
Horizontal	200	ns/div	1
Vertical	200	mV/div	1
Horizontal	200	ns/div	2
Vertical	200 mV	mV/div	2
Configuration			
Pulser Level	30KV CHARGE		
Data Link			

Comments:
(SYSTEM 6)

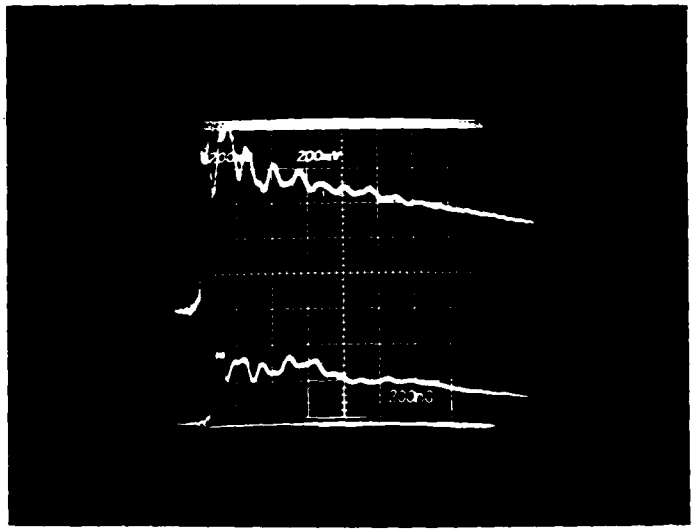
8



Date	8-5-85		
Test Point	TEST D-12		
Amplification		dB	
Attenuation		dB	
Horizontal	200	ns/div	1
Vertical	200	mV/div	1
Horizontal	200	ns/div	2
Vertical	200 mV	mV/div	2
Configuration			
Pulser Level	30KV CHARGE		
Data Link			

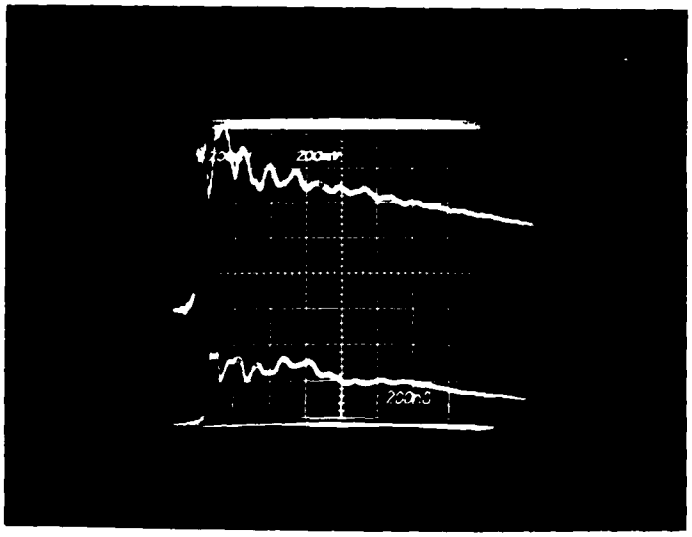
Comments:
(SYSTEM 12)

9



Date	8-5-85		
Test Point	TEST D-13		
Amplification		dB	
Attenuation		dB	
Horizontal	200	ns/div	1
Vertical	200	mV/div	1
Horizontal	200	ns/div	2
Vertical	200 mV	ns/div	2
Configuration			
Pulser Level	30 KV CHARGE		
Data Link			

Comments:
(SYSTEM 13)

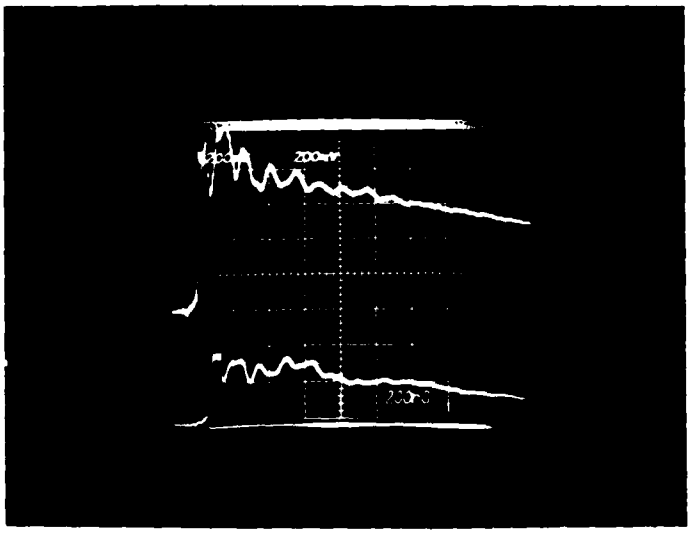


10

50 KV/M

Date	8-5-85		
Test Point	TEST D 14		
Amplification		dB	
Attenuation		dB	
Horizontal	200	ns/div	1
Vertical	200	mV/div	1
Horizontal	200	ns/div	2
Vertical	200 mV	ns/div	2
Configuration			
Pulser Level	30KV -CHARGE		
Data Link			

Comments:
(SYSTEM 7)



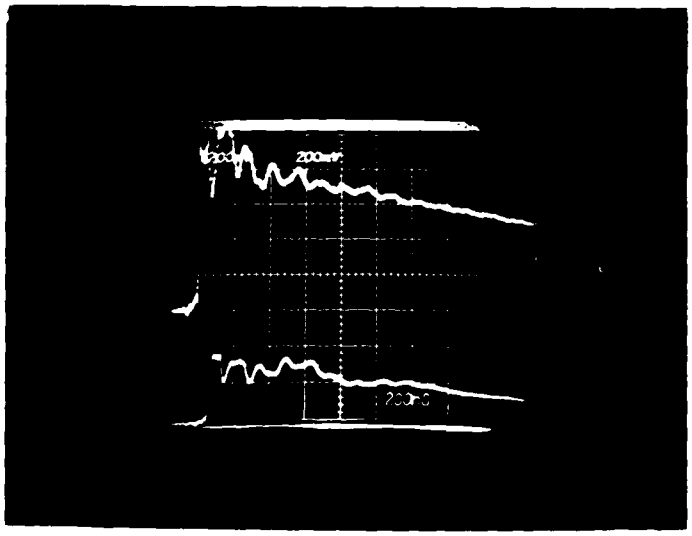
11

Date	8-5-85		
Test Point	TEST D-15		
Amplification		dB	
Attenuation		dB	
Horizontal	200	ns/div	1
Vertical	200	mV/div	1
Horizontal	200	ns/div	2
Vertical	200 MV	ns/div	2
Configuration			
Pulser Level	30KV-CHARGE		
Data Link			

Comments:
(SYSTEM 14)

12

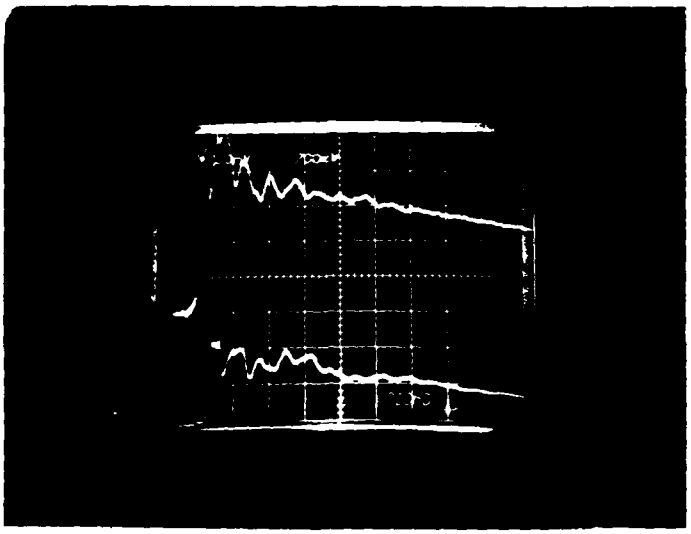
50 KV/m



Date			
Test Point			
Amplification		dB	
Attenuation		dB	
Horizontal		ns/div	1
Vertical		mV/div	1
Horizontal		ns/div	2
Vertical		ns/div	2
Configuration			
Pulser Level			
Data Link			

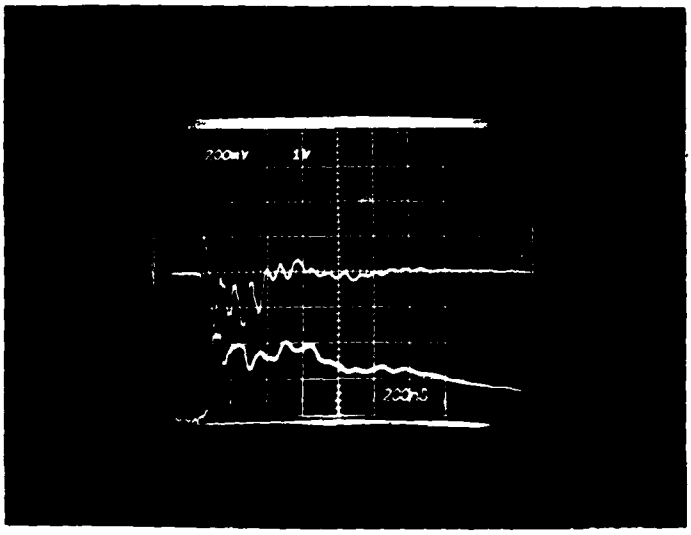
Comments:

Date	August 6, 1985
Test Point	Pulser Calibration
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	200 ns/div 2
Vertical	200 mV/div 2
Configuration	
Pulser Level	30KV Charge
Data Link	
Comments:	



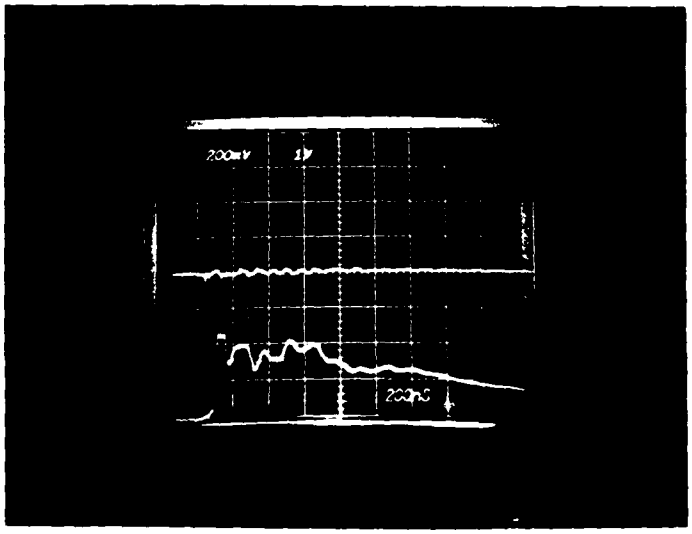
1

Date	August 6, 1985
Test Point	S10V [redacted] TEST BOX
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	1000 mV/div 1
Horizontal	200 ns/div 2
Vertical	200 mV/div 2
Configuration	
Pulser Level	30KV Charge
Data Link	
Comments:	



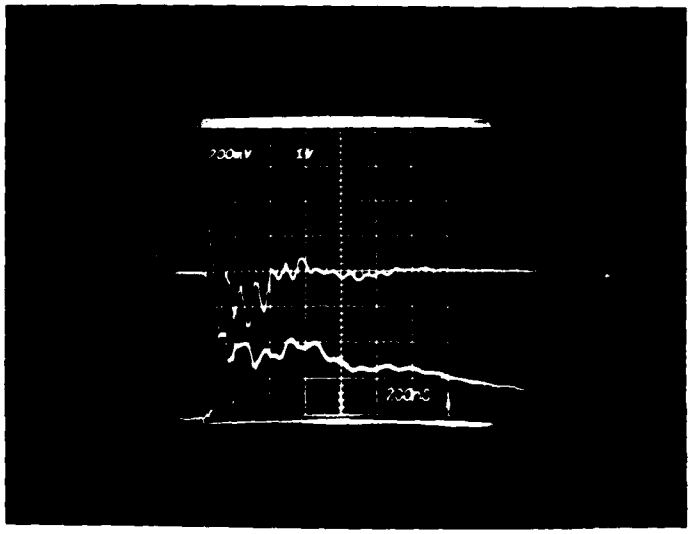
2

Date	August 6, 1985		
Test Point	S/OV TEST BOX		
Amplification		dB	
Attenuation		dB	
Horizontal	200	ns/div	1
Vertical	1000	mV/div	1
Horizontal	200	ns/div	2
Vertical	200	mV/div	2
Configuration			
Pulser Level	30KV Charge		
Data Link			
Comments:			



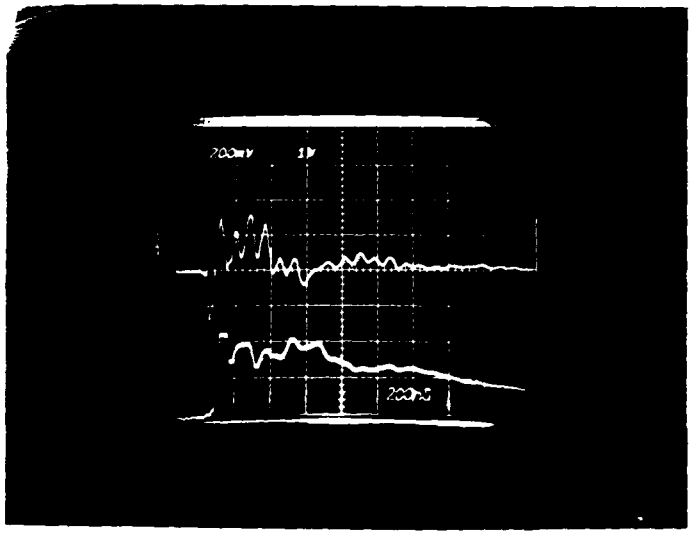
3

Date	August 6, 1985		
Test Point	S/OV TEST BOX		
Amplification		dB	
Attenuation		dB	
Horizontal	200	ns/div	1
Vertical	1000	mV/div	1
Horizontal	200	ns/div	2
Vertical	200	mV/div	2
Configuration			
Pulser Level	30 KV Charge		
Data Link			
Comments:			



4

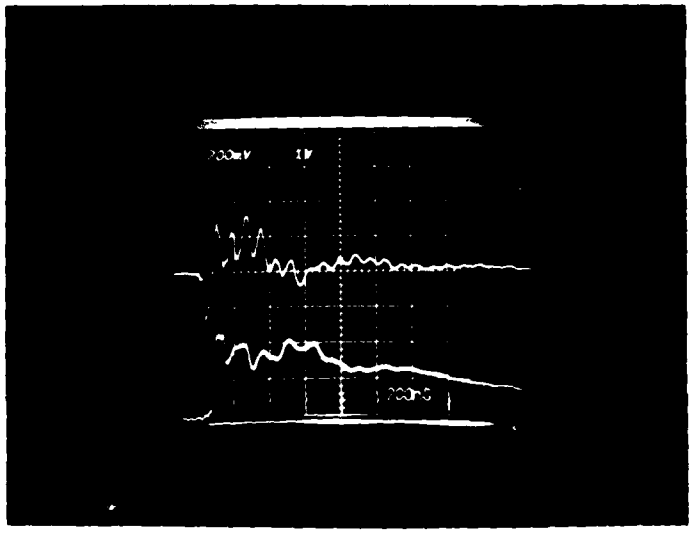
Date	August 6, 1985	
Test Point	S40V - Box Test	
Amplification		dB
Attenuation		dB
Horizontal	200	ns/div 1
Vertical	1000	mV/div 1
Horizontal	200	ns/div 2
Vertical	200	mV/div 2
Configuration		
Pulser Level	30 KV Charge	
Data Link		
Comments:		



(5)

CT-2 Pickup - On bottom of 50 Ω Resistor to Ground After S10V Box

Date	August 6, 1985	
Test Point	FCC -250-300	
Amplification		dB
Attenuation		dB
Horizontal	200	ns/div 1
Vertical	1000	mV/div 1
Horizontal	200	ns/div 2
Vertical	200	mV/div 2
Configuration		
Pulser Level	30 KV Charge	
Data Link		
Comments:		

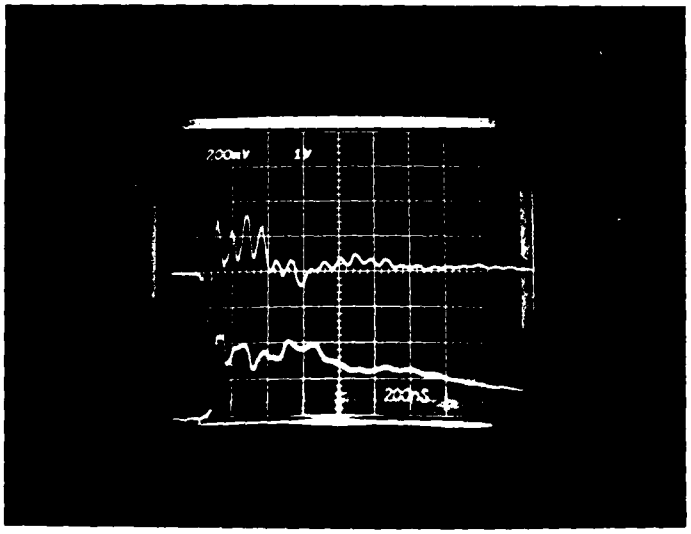


Fischer Device Test

(6)

CT-2 Same as above

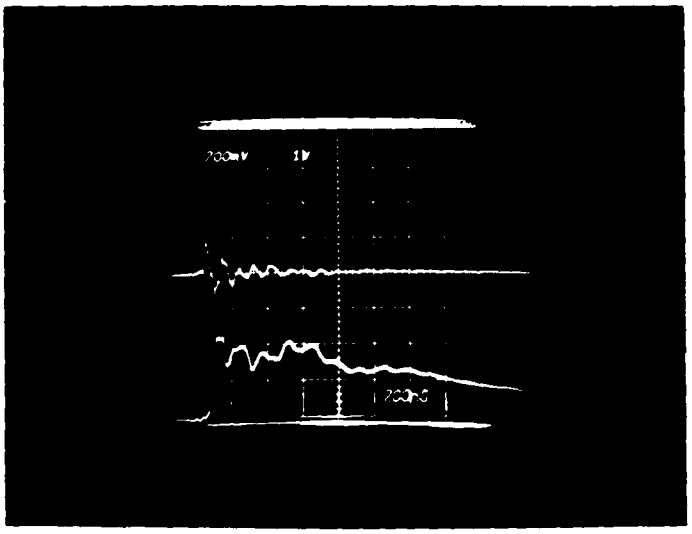
Date	August 6, 1985
Test Point	RF ANTENNA
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	1000 mV/div 1
Horizontal	200 ns/div 2
Vertical	200 mV/div 2
Configuration	
Pulser Level	30KV Charge
Data Link	
Comments:	



7

SAME AS 6 NO PROTECTION

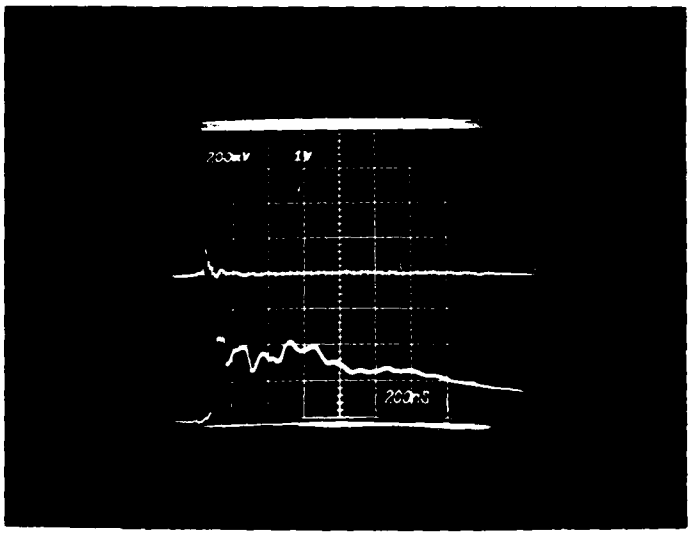
Date	August 6, 85
Test Point	RF ANTENNA
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	1000 mV/div 1
Horizontal	200 ns/div 2
Vertical	200 mV/div 2
Configuration	
Pulser Level	30 KV Charge
Data Link	
Comments:	



8

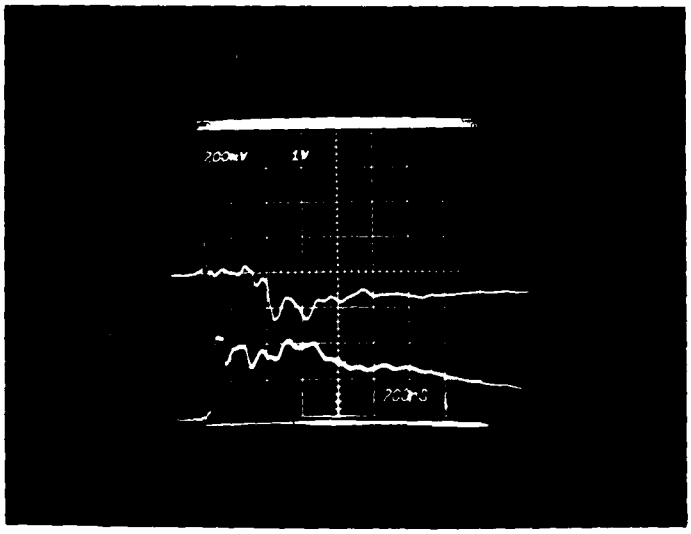
Date	August 6, 1985	
Test Point		
Amplification		dB
Attenuation		dB
Horizontal	200	ns/div 1
Vertical	1000	mV/div 1
Horizontal	200	ns/div 2
Vertical	200	mV/div 2
Configuration		
Pulser Level	30KV Charge	
Data Link		
Comments:		

(9)

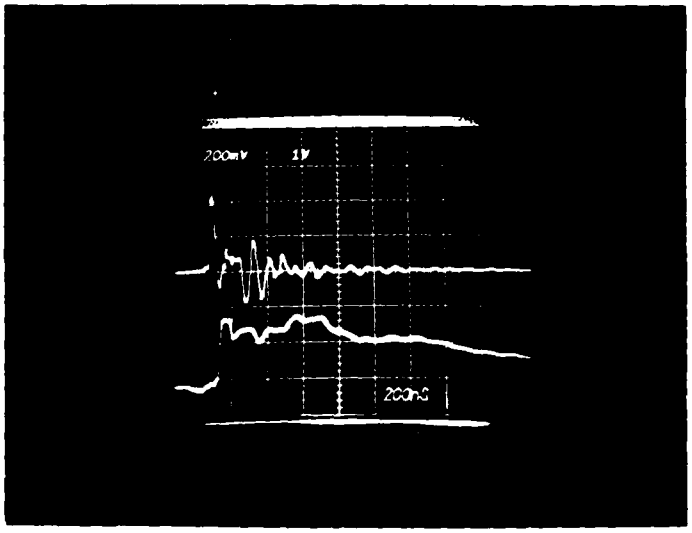


Date	August 6, 1985	
Test Point		
Amplification		dB
Attenuation		dB
Horizontal	200	ns/div 1
Vertical	1000	mV/div 1
Horizontal	200	ns/div 2
Vertical	200	mV/div 2
Configuration		
Pulser Level	30KV Charge	
Data Link		
Comments:		

(10)



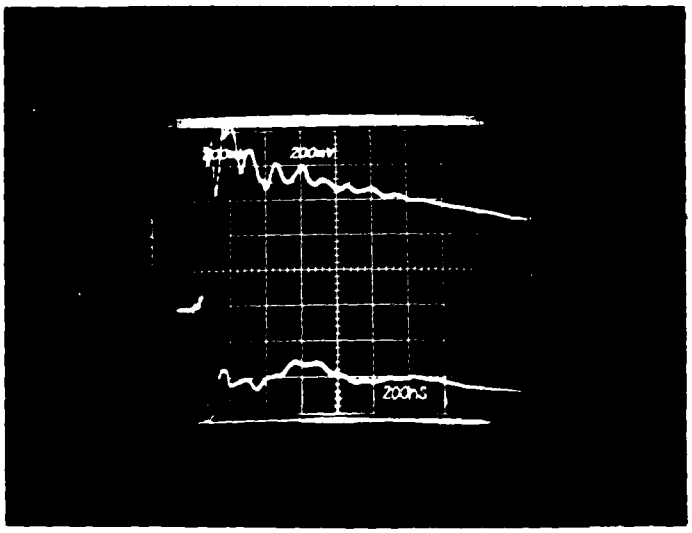
Date	August 6, 1985	
Test Point	RF ANTENNA	
Amplification		dB
Attenuation	40	dB
Horizontal	200	ns/div 1
Vertical	1000	mV/div 1
Horizontal	200	ns/div 2
Vertical	200	mV/div 2
Configuration		
Pulser Level	30KV Charge	
Data Link		
Comments:		



(11)

UPPER: RF ANTENNA - 100 A/DIV - PROBE 91550 -
PROBE OVER WIRE ABOVE RESISTOR -
PEAK ~ 210 A (10.5 KV)
40 dB

Date	August 6, 1985	
Test Point	PULSER	
Amplification		dB
Attenuation		dB
Horizontal	200	ns/div 1
Vertical	200	mV/div 1
Horizontal	200	ns/div 2
Vertical	200	mV/div 2
Configuration		
Pulser Level	30KV Charge	
Data Link		
Comments:		

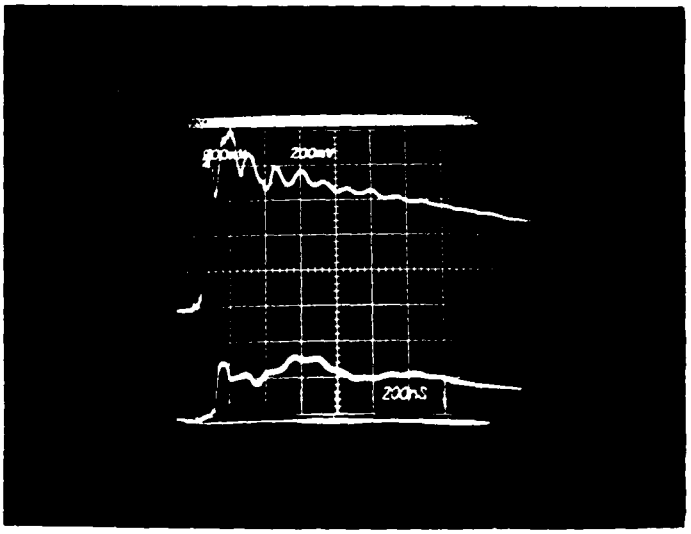


(12)

UPPER: ROUND H SENSOR DIRECT 0.2V/div.
LOWER: RECTANGULAR H SENSOR F.O. 0.2V/div.

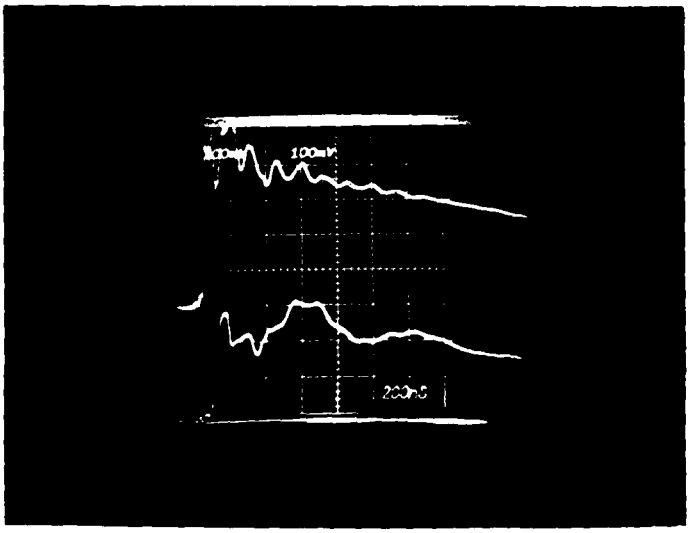
Date	August 6, 1985	
Test Point		
Amplification		dB
Attenuation		dB
Horizontal	200	ns/div 1
Vertical	200	mV/div 1
Horizontal	200	ns/div 2
Vertical	200	mV/div 2
Configuration		
Pulser Level	30 KV Charge	
Data Link		
Comments:		

(13)



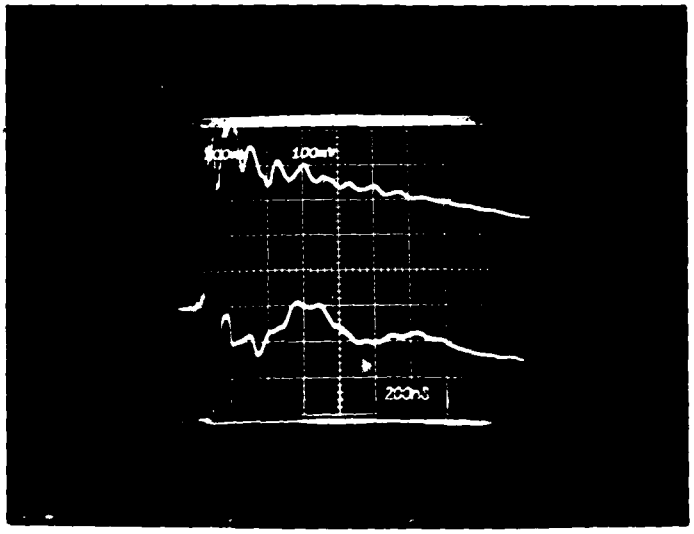
Date	August 6, 1985	
Test Point		
Amplification		dB
Attenuation		dB
Horizontal	200	ns/div 1
Vertical	100	mV/div 1
Horizontal	200	ns/div 2
Vertical	200	mV/div 2
Configuration		
Pulser Level	30 KV Charge	
Data Link		
Comments:		

(14)



LOWER: F.O. RECT. SENSOR

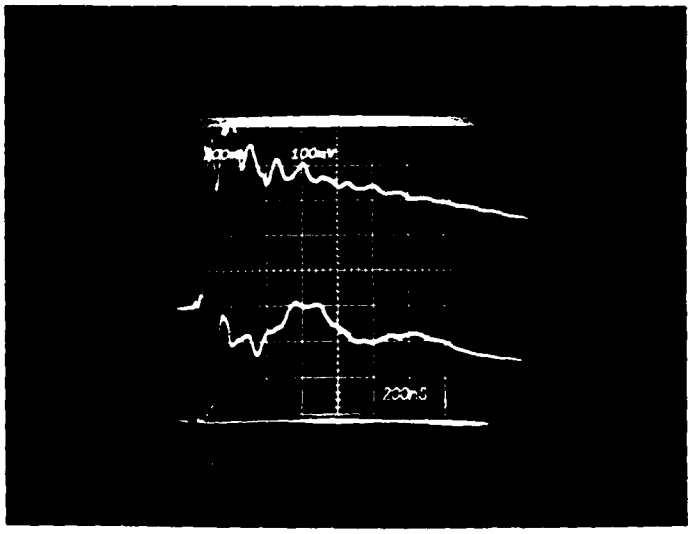
Date	August 6, 1985
Test Point	
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	100 mV/div 1
Horizontal	200 ns/div 2
Vertical	200 mV/div 2
Configuration	
Pulser Level	30 KV Charge
Data Link	
Comments:	



15

REPEAT 14

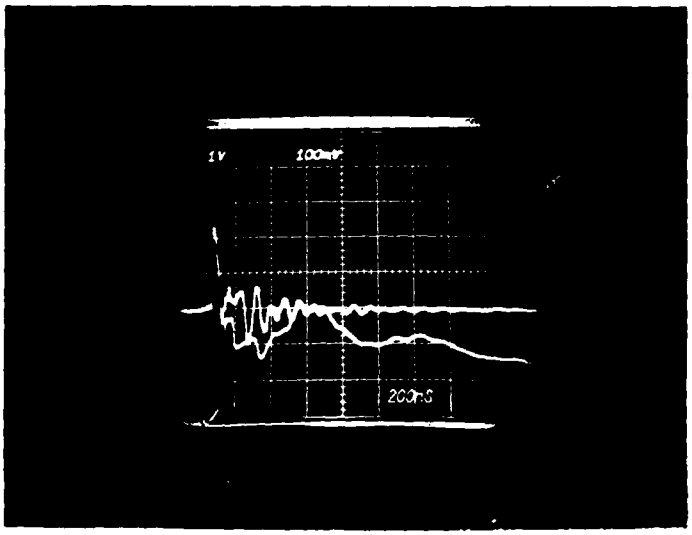
Date	August 6, 1985
Test Point	
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	100 mV/div 1
Horizontal	200 ns/div 2
Vertical	200 mV/div 2
Configuration	
Pulser Level	30 KV Charge
Data Link	
Comments:	



16

REPEAT 14

Date	August 6, 1985	
Test Point	RF ANTENNA	
Amplification		dB
Attenuation	40	dB
Horizontal	200	ns/div 1
Vertical	100	mV/div 1
Horizontal	200	ns/div 2
Vertical	1000	mV/div 2
Configuration		
Pulser Level	30 KV Charge	
Data Link		
Comments:		

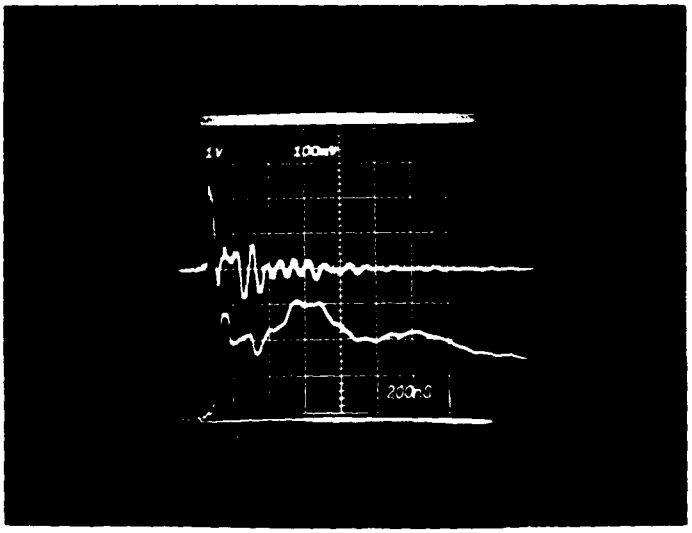


(17)

UPPER: 9/550 OVER RF ANTENNA ABOVE 50 OHM RESISTOR – 40 dB 1V/div

230 A (11.5 KV)

Date	August 6, 1985	
Test Point	RF ANTENNA	
Amplification		dB
Attenuation	40	dB
Horizontal	200	ns/div 1
Vertical	100	mV/div 1
Horizontal	200	ns/div 2
Vertical	1000	mV/div 2
Configuration		
Pulser Level	30 KV Charge	
Data Link		
Comments:		

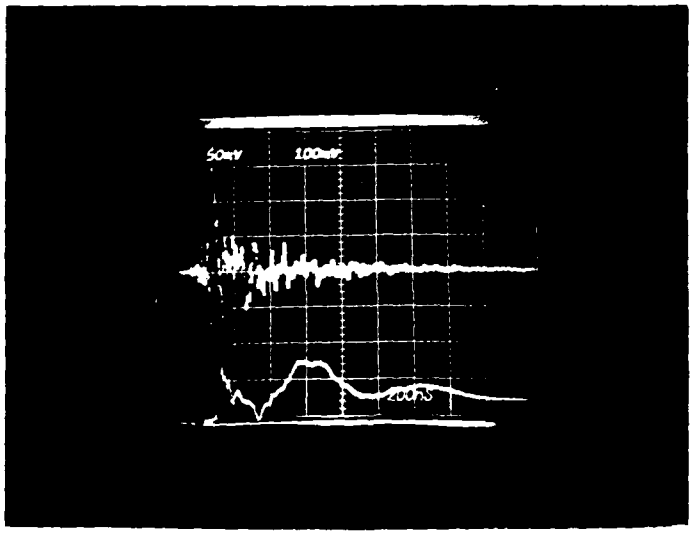


(18)

REPEAT (17)

240 A (12 KV)

Date	August 6, 1985	
Test Point	RF ANTENNA	
Amplification		dB
Attenuation		dB
Horizontal	200	ns/div 1
Vertical	100	mV/div 1
Horizontal	200	ns/div 2
Vertical	50	mV/div 2
Configuration		
Pulser Level	30 KV Charge	
Data Link		
Comments:		

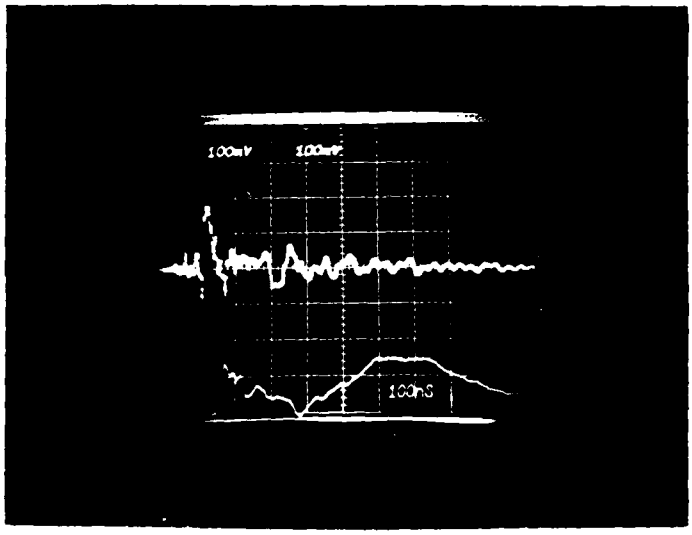


(19)

PEARSON 110 PROBE OVER RF ANTENNA ABOVE 50 OHM RESISTOR

BAD TRIGGER

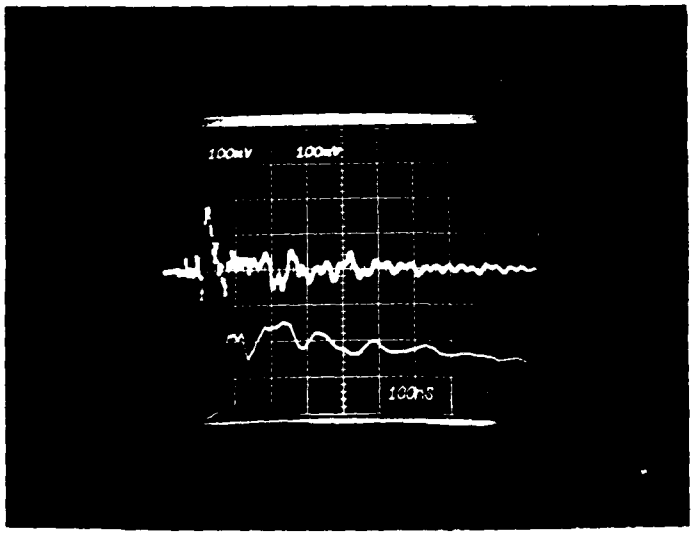
Date	August 6, 1985	
Test Point	RF ANTENNA	
Amplification		dB
Attenuation		dB
Horizontal	100	ns/div 1
Vertical	100	mV/div 1
Horizontal	100	ns/div 2
Vertical	100	mV/div 2
Configuration		
Pulser Level	30 KV Charge	
Data Link		
Comments:		



(20)

REPEAT 19

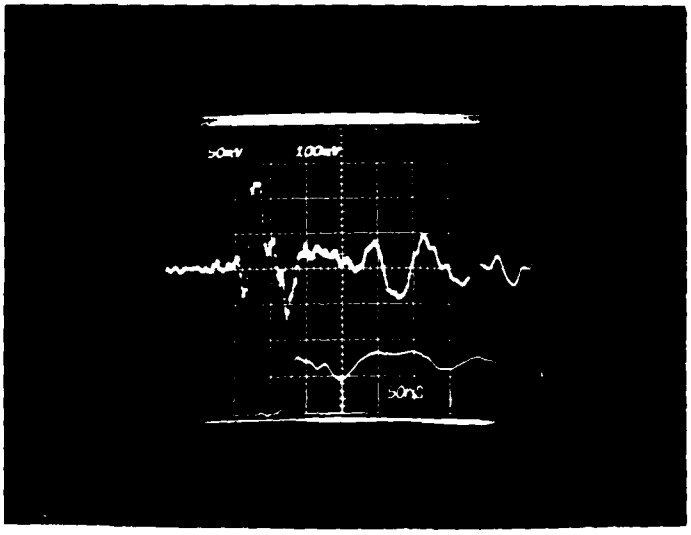
Date	August 6, 1985	
Test Point	RF ANTENNA	
Amplification		dB
Attenuation		dB
Horizontal	100	ns/div 1
Vertical	100	mV/div 1
Horizontal	100	ns/div 2
Vertical	100	mV/div 2
Configuration		
Pulser Level	30KV Charge	
Data Link		
Comments:		



(21)

LOWER TRACE - REPLACED F.O. TRANSMITTER

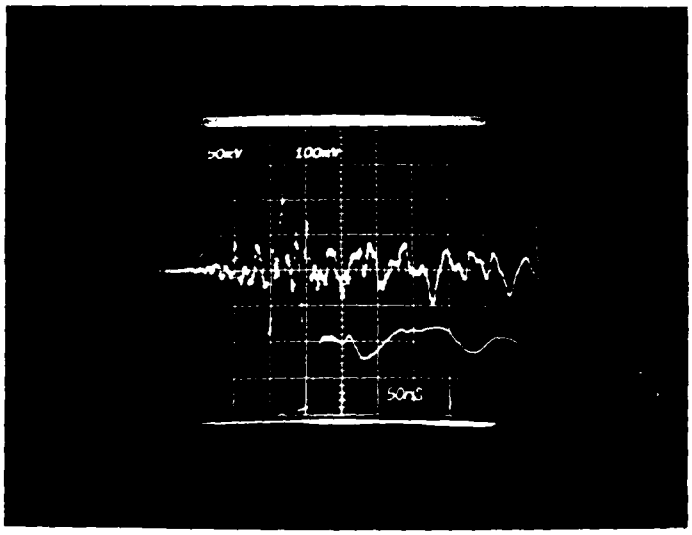
Date	August 6, 1985	
Test Point		
Amplification		dB
Attenuation		dB
Horizontal	50	ns/div 1
Vertical	100	mV/div 1
Horizontal	50	ns/div 2
Vertical	50	mV/div 2
Configuration		
Pulser Level	20 KV Charge	
Data Link		
Comments:		



(22)

20 KV CHARGE -

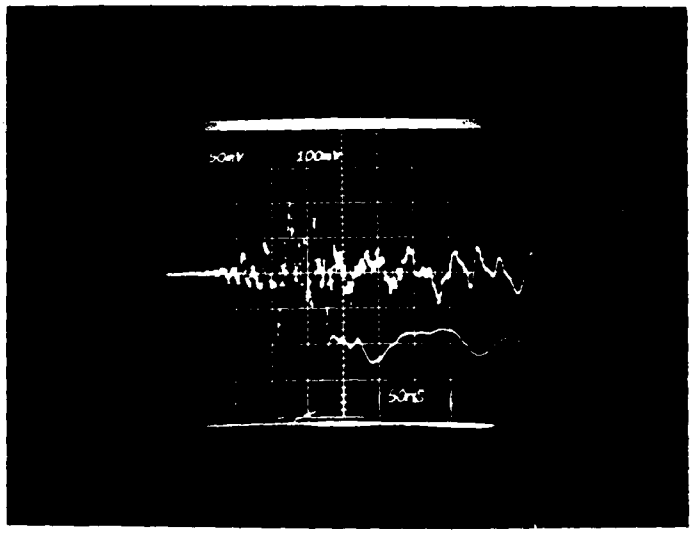
Date	August 6, 1985	
Test Point	SINV RF TEST BOX	
Amplification		dB
Attenuation		dB
Horizontal	50	ns/div 1
Vertical	100	mV/div 1
Horizontal	50	ns/div 2
Vertical	50	mV/div 2
Configuration		
Pulser Level	30 KV Charge	
Data Link		
Comments:		



23

UPPER: PEARSON PROBE -
220 A

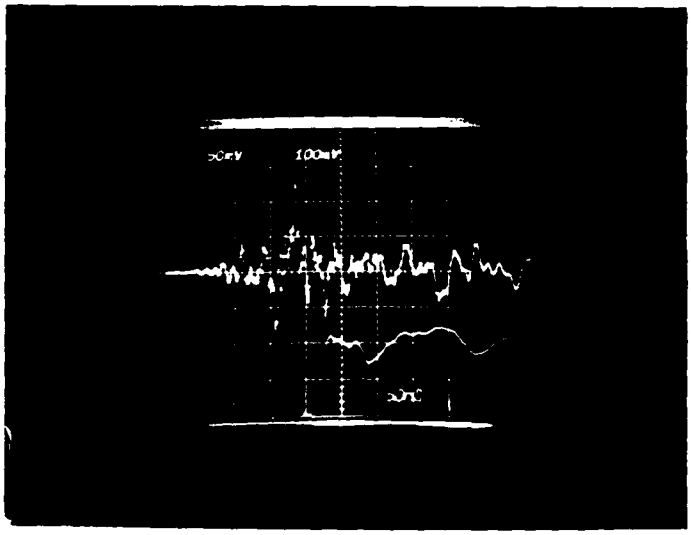
Date	August 6, 1985	
Test Point	FCC-250-300	
Amplification		dB
Attenuation		dB
Horizontal	50	ns/div 1
Vertical	100	mV/div 1
Horizontal	50	ns/div 2
Vertical	50	mV/div 2
Configuration		
Pulser Level	30 KV Charge	
Data Link		
Comments:		



24

FISCHER FCC-250-300 UHF IN CIRCUIT
220 A

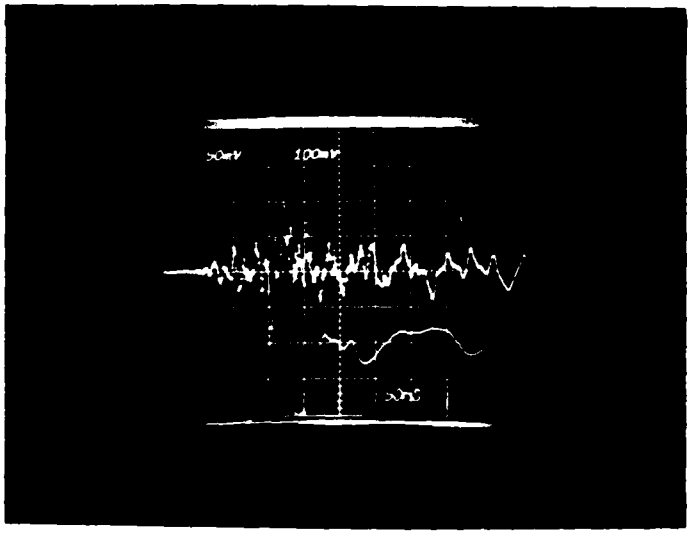
Date	August 6, 1985
Test Point	PROBE
Amplification	dB
Attenuation	dB
Horizontal	50 ns/div 1
Vertical	100 mV/div 1
Horizontal	50 ns/div 2
Vertical	50 mV/div 2
Configuration	
Pulser Level	30KV Charge
Data Link	
Comments:	



25

PROBE CHECK - NO DEVICE IN CIRCUIT - WIRE ANTENNA THROUGH COAX + PROBE
PULSER PRE FIRED -

Date	August 6, 1985
Test Point	
Amplification	dB
Attenuation	dB
Horizontal	50 ns/div 1
Vertical	100 mV/div 1
Horizontal	50 ns/div 2
Vertical	50 mV/div 2
Configuration	
Pulser Level	30KV Charge
Data Link	
Comments:	



26

SAME AS 25

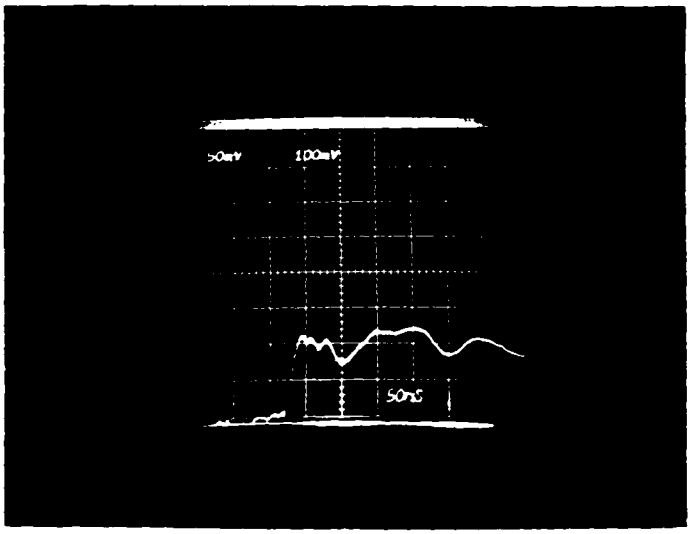
Date	August 6, 1985
Test Point	E-1
Amplification	dB
Attenuation	dB
Horizontal	50 ns/div 1
Vertical	100 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulser Level	30 KV Charge
Data Link	

Comments:

SYSTEM 2 (27)

S10V RF TEST BOX

H FIELD TRACE

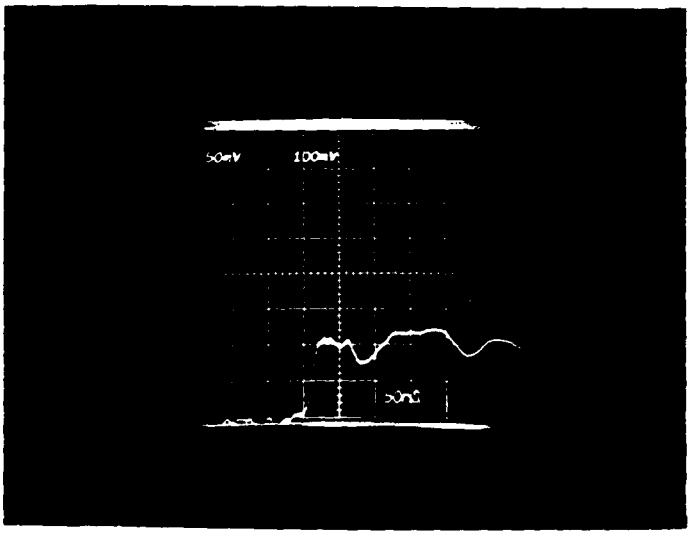


Date	August 6, 1985
Test Point	E-2
Amplification	dB
Attenuation	dB
Horizontal	50 ns/div 1
Vertical	100 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulser Level	30KV Charge
Data Link	

Comments:

SYSTEM 2 (28)

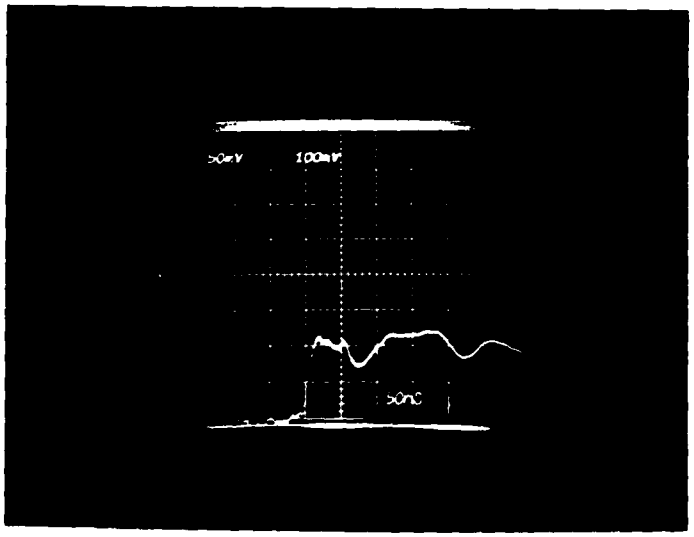
REPEAT (27) 10.374MHZ TX



Date	August 6, 1985	
Test Point	E-3	
Amplification		dB
Attenuation		dB
Horizontal	50	ns/div 1
Vertical	100	mV/div 1
Horizontal		ns/div 2
Vertical		mV/div 2
Configuration		
Pulser Level	30 KV Charge	
Data Link		

Comments:
(SYSTEM 2)

29



FISCHER PROTECTIVE DEVICE FCC-250-300-UHF

Date		
Test Point		
Amplification		dB
Attenuation		dB
Horizontal		ns/div 1
Vertical		mV/div 1
Horizontal		ns/div 2
Vertical		mV/div 2
Configuration		
Pulser Level		
Data Link		

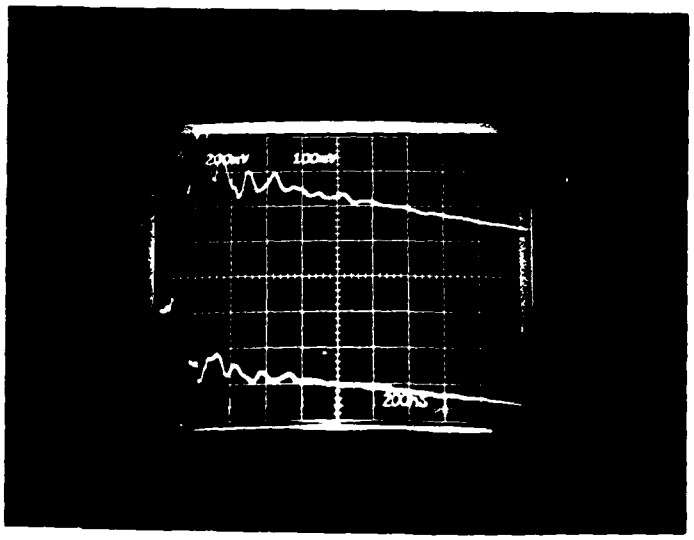
Comments:

PULSER CALIBRATION

Date	8-7-85		
Test Point	DAILY CALIBRATION		
Amplification		dB	
Attenuation	—	dB	
Horizontal	200	ns/div	1
Vertical	200	mV/div	1
Horizontal	200	ns/div	2
Vertical	100 mV	mV/div	2
Configuration			
Pulser Level	30KV charge		
Data Link	1-COAX-2 F.O.		

Comments:
F.O. ATTN-20 dB

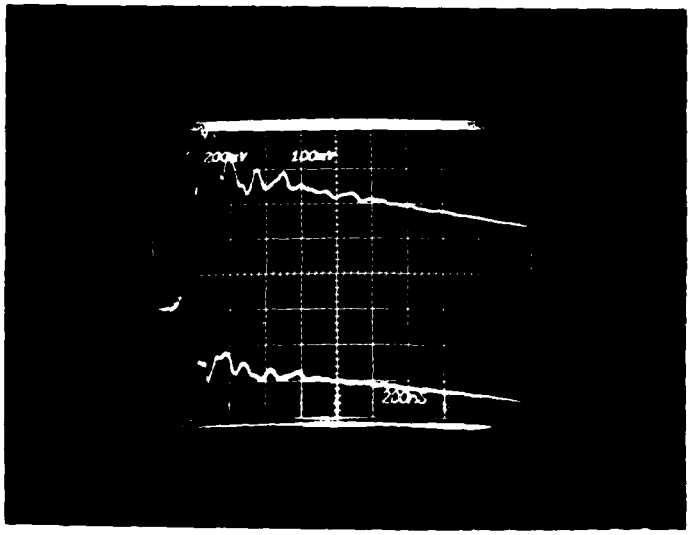
1



Date	8-7-85		
Test Point	DAILY CALIBRATION		
Amplification		dB	
Attenuation		dB	
Horizontal	200	ns/div	1
Vertical	200	mV/div	1
Horizontal	200	ns/div	2
Vertical	100 mV	mV/div	2
Configuration			
Pulser Level	30KV-CHARGE		
Data Link			

Comments:
F.O. ATTN 20dB-

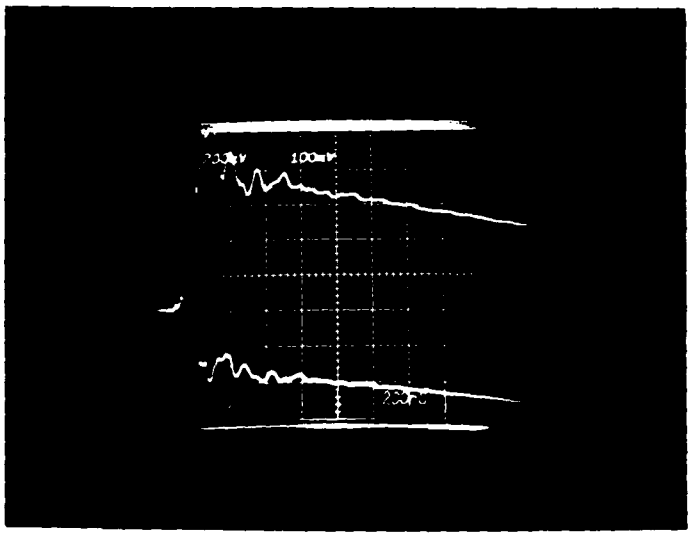
2



Date	August 7, 1985
Test Point	D-15
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	200 ns/div 2
Vertical	100 mV/div 2
Configuration	
Pulser Level	30 KV Charge
Data Link	

Comments:
SYSTEM 2

(3)



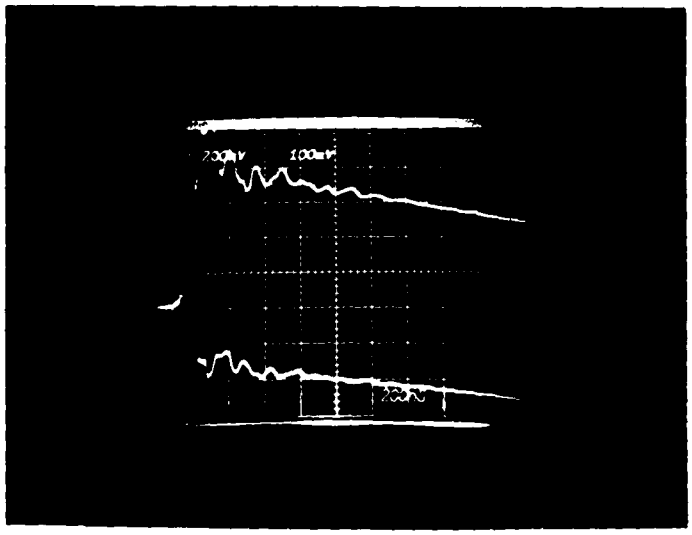
ALPHA DELTA RT - PROTECTIVE DEVICE

TRACES: PULSER FIELDS

Date	August 7, 1985
Test Point	D15T
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	200 ns/div 2
Vertical	100 mV/div 2
Configuration	
Pulser Level	30 KV Charge
Data Link	

Comments:
SYSTEM 2

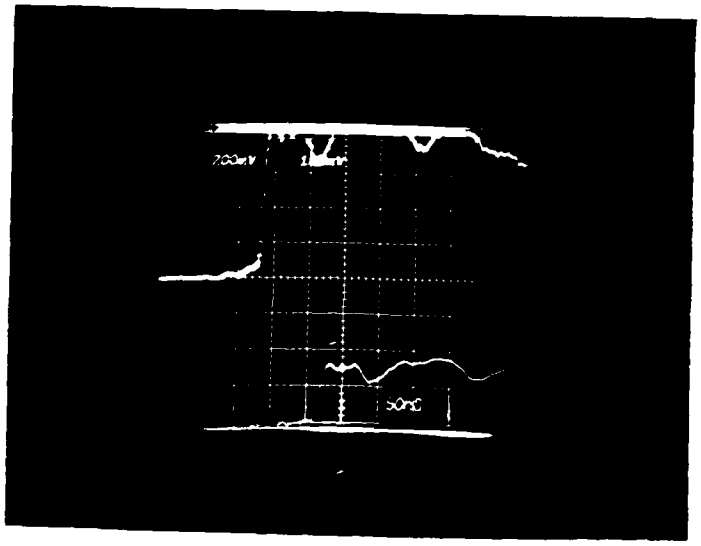
(4)



Date	8-7-85		
Test Point	F-1		
Amplification		dB	
Attenuation		dB	
Horizontal	50	ns/div	1
Vertical	200	mV/div	1
Horizontal	50	ns/div	2
Vertical	100	ns/div	2
Configuration			
Pulser Level	30 KV -CHARGE		
Data Link			

Comments:
FIELD 50 KV/M

20

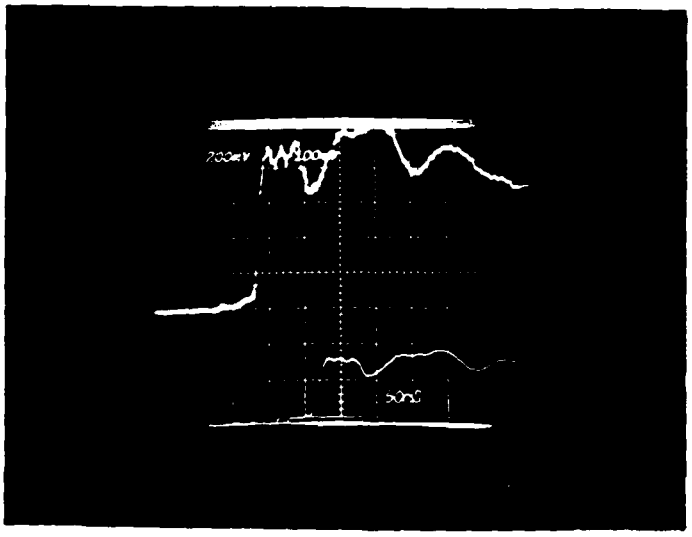


SYSTEM 2 - Power on - RECEIVE MODE -
PROTECTION ON A.C. POWER - DEVICE (TP 39)
NO PROTECTION ON R.F. ANTENNA INJECT.

Date	8-7-85		
Test Point	F-2		
Amplification		dB	
Attenuation		dB	
Horizontal	50	ns/div	1
Vertical	200	mV/div	1
Horizontal	50	ns/div	2
Vertical	100 MV	ns/div	2
Configuration			
Pulser Level	30 KV -CHARGE		
Data Link			

Comments:
FIELD 50 KV/M

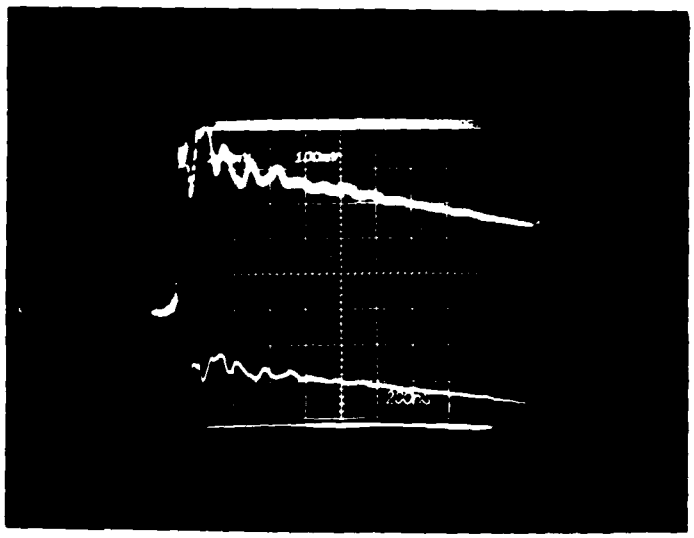
21



SYSTEM 2 POWER ON - TRANSMIT MODE
A.C. POWER PROTECTION - DEVICE (TP 39)
NO PROTECTION ON RF ANTENNA.
TX - TUNED TO 10.374 MHZ.

Date	8-7-85	
Test Point	F-3	
Amplification		dB
Attenuation		dB
Horizontal	200	ns/div 1
Vertical	200	mV/div 1
Horizontal	200	ns/div 2
Vertical	100 MV	ns/div 2
Configuration		
Pulser Level	30 KV DRIVE	
Data Link		

Comments:
50 KV/M FIELD

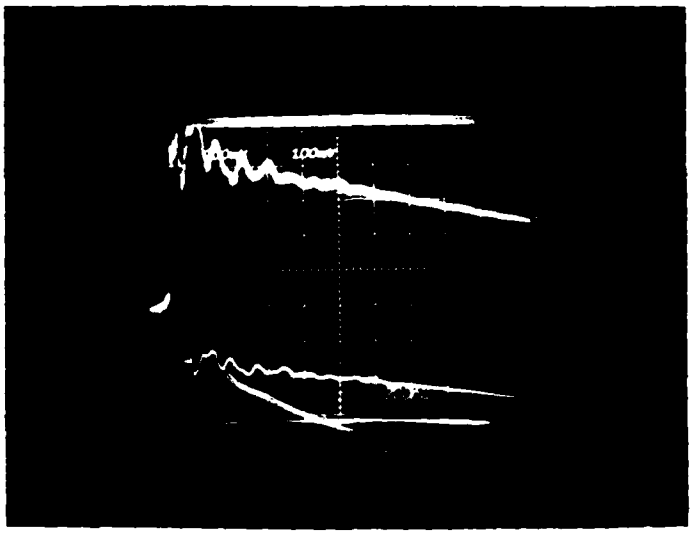


22

SYSTEM 2 - NO PROTECTION ON AC POWER OR RF ANTENNA
HONDA GENERATOR PROTECTED BY TP 39.
RECEIVE MODE

Date	8-7-85	
Test Point	F-4	
Amplification		dB
Attenuation		dB
Horizontal	200	ns/div 1
Vertical	200	mV/div 1
Horizontal	200	ns/div 2
Vertical	100 MV	ns/div 2
Configuration		
Pulser Level	30 KV - DRIVE	
Data Link		

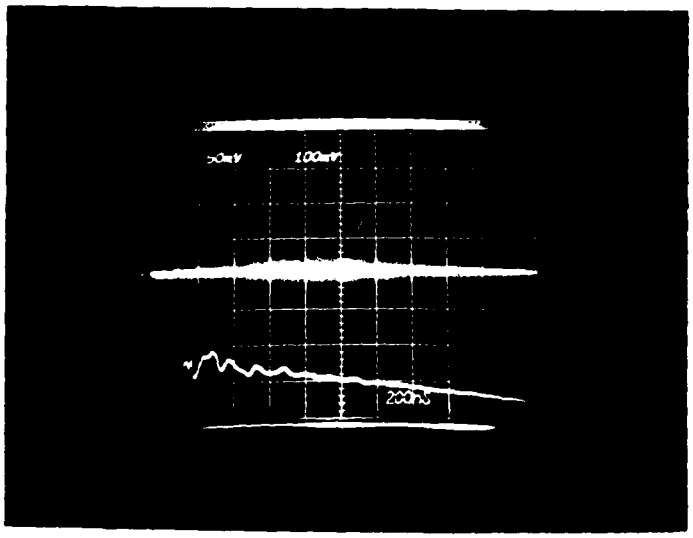
Comments:
50 KV/M FIELD



23

SYSTEM 2 TRANSMIT MODE - NO PROTECTION ON
AC POWER OR RF INJECT -
TUNED TO 10.374 MHZ -

Date	8-7-85
Test Point	PROBE -91550-4
Amplification	dB
Attenuation	40 dB
Horizontal	200 ns/div 1
Vertical	50 mV/div 1
Horizontal	200 ns/div 2
Vertical	100MV ~~ms~~/div 2
Configuration	
Pulser Level	30KV - DRIVE
Data Link	



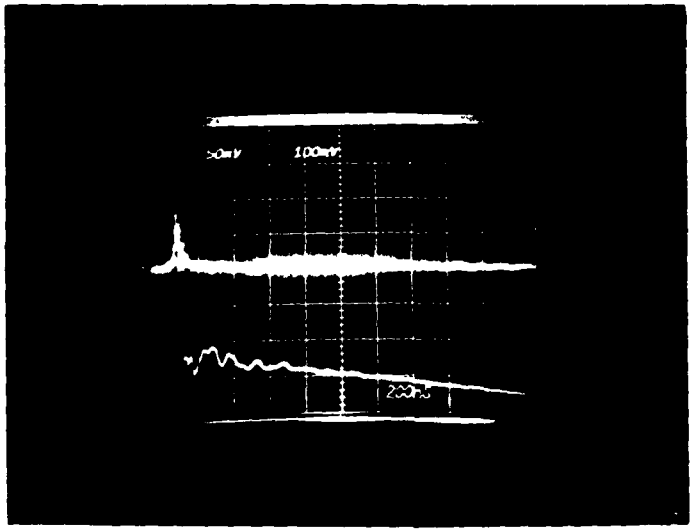
Comments:

FIELD 50 KV/M 24

100 A per DIVISION

PROBE TEST - WITH NO WIRE THROUGH CENTER -

Date	8-7-85
Test Point	RF WIRE ANTENNA
Amplification	dB
Attenuation	40 dB
Horizontal	200 ns/div 1
Vertical	50 mV/div 1
Horizontal	200 ns/div 2
Vertical	100 MV ~~ms~~/div 2
Configuration	
Pulser Level	30 KV - CHARGE
Data Link	



Comments:

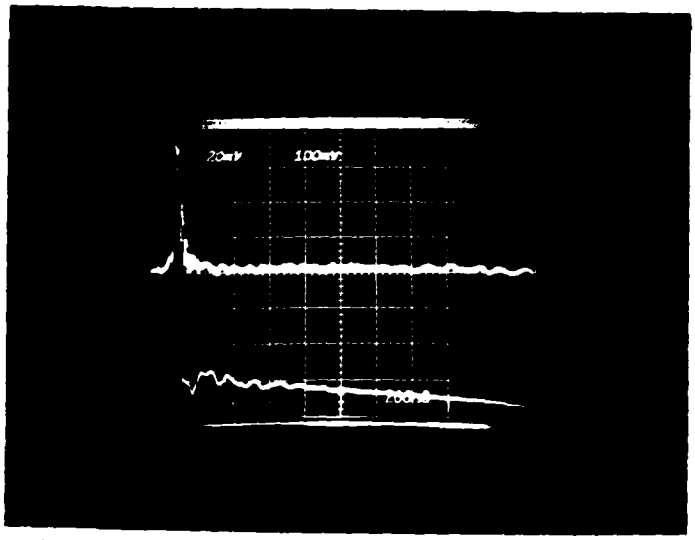
FIELD 50 KV/M

UPPER TRACE 80A 25 (4.0KV)

PROBE 91550-4 - WITH RF ANTENNA THROUGH CENTER WITH 50 Ω RESISTOR TO GROUND.

FIELD 1.6 divisions, CURRENT 1.6 div -

Date	8-7-85		
Test Point	RF-WIRE ANTENNA		
Amplification		dB	
Attenuation		dB	
Horizontal	200	ns/div	1
Vertical	20	mV/div	1
Horizontal	200	ns/div	2
Vertical	100 MV	[redacted]/div	2
Configuration			
Pulser Level	20 KV - CHARGE		
Data Link			



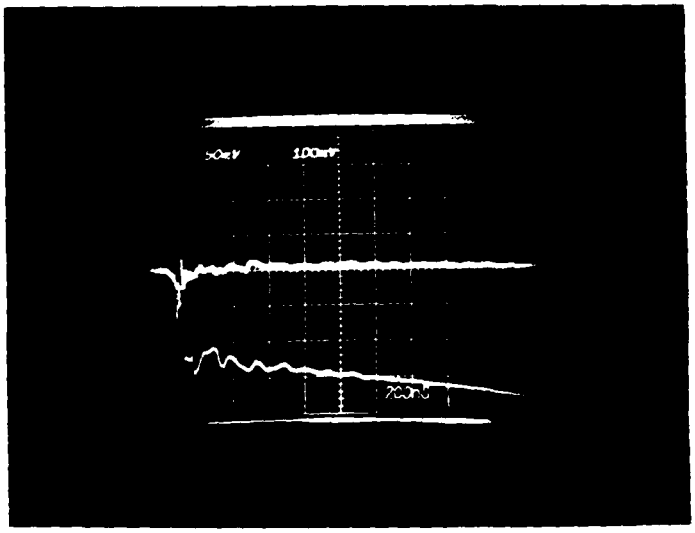
Comments:

FIELD 1.1 div
CURRENT 3.6 div
I = 80 A (4 KV)

26

RF WIRE ANTENNA THROUGH 50 Ω RESISTOR TO GROUND
MEASURED WITH SINGER I PROBE 91550-4.

Date	8-7-85		
Test Point	RF WIRE ANTENNA		
Amplification		dB	
Attenuation		dB	
Horizontal	200	ns/div	1
Vertical	20	mV/div	1
Horizontal	200	ns/div	2
Vertical	100 MV	[redacted]/div	2
Configuration			
Pulser Level	30 KV - CHARGE		
Data Link			



Comments:

FIELD - 1.6 divisions
CURRENT - 1.6 div.
I = -80 A (4 KV)

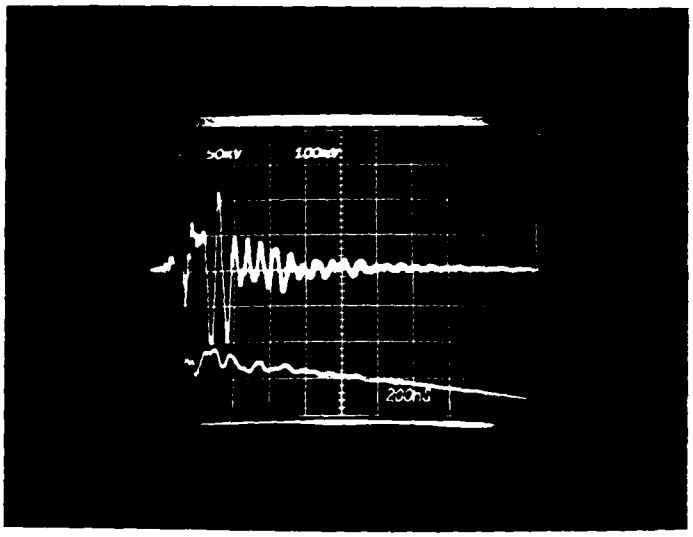
27

REVERSED PROBE TEST SAME AS PHOTO 25

Date	8-7-85		
Test Point	RF ANTENNA		
Amplification		dB	
Attenuation		dB	
Horizontal	200	ns/div	1
Vertical	50	mV/div	1
Horizontal	200	ns/div	2
Vertical	100 mV	mV/div	2
Configuration			
Pulser Level	30 KV-CHARGE		
Data Link			

Comments:
PD 1.6 div

28

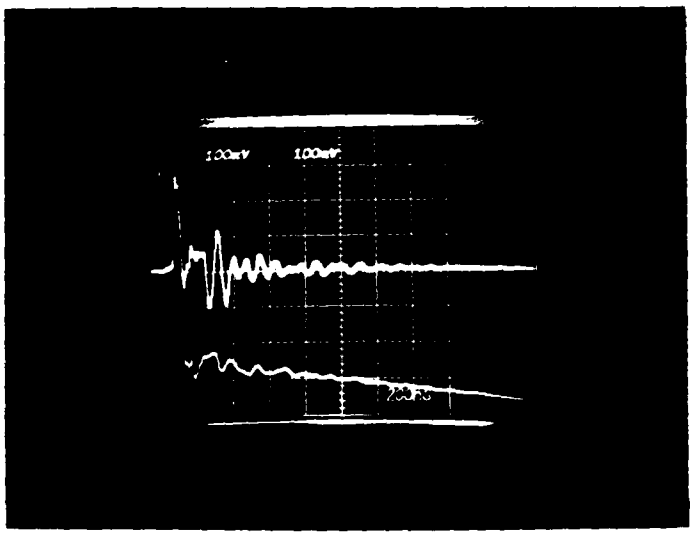


RF ANTENNA CURRENT TO GROUND - THROUGH COAX + 50 Ω RESISTOR - DIRECTLY OVER RF ANTENNA IN FRONT OF COAX -
CURRENT - OFF SCALE - 200 A (10 KVA)

Date	8-7-85		
Test Point	RF WIRE ANT -		
Amplification		dB	
Attenuation		dB	
Horizontal	200	ns/div	1
Vertical	100	mV/div	1
Horizontal	200	ns/div	2
Vertical	100 MV	mV/div	2
Configuration			
Pulser Level	30 KV Charge		
Data Link			

Comments:

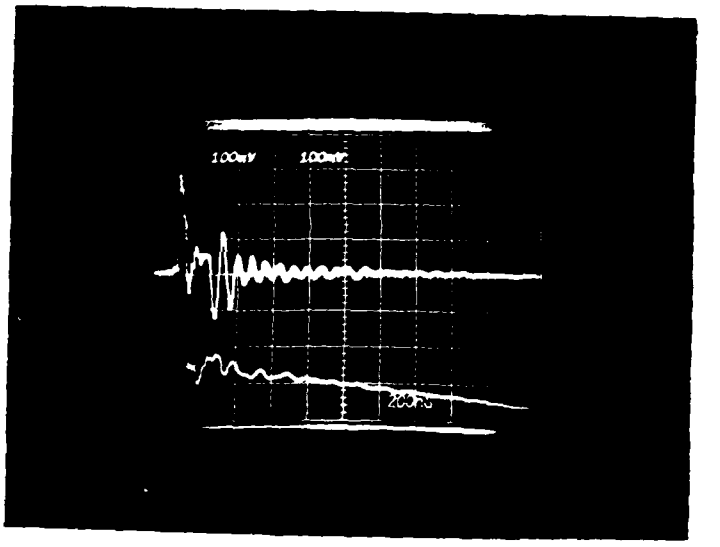
29



270 A (13.5 KV)

MEASUREMENT OF RF WIRE ANTENNA BEFORE COAX - [redacted] 50 OHM RESISTOR TO GND.

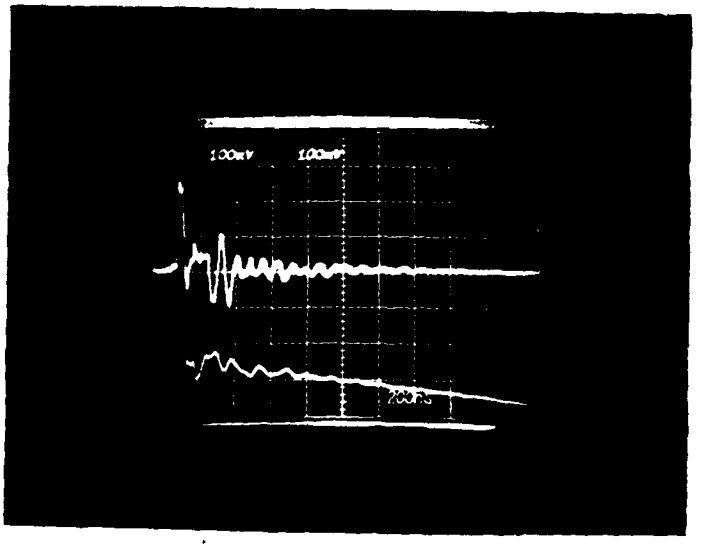
Date	August 7, 1985
Test Point	RF WIRE ANTENNA
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	100 mV/div 1
Horizontal	200 ns/div 2
Vertical	100 mV/div 2
Configuration	
Pulser Level	30 KV Charge
Data Link	
Comments:	



30

REPEAT 29 — I = 290 A (14.5 KV)

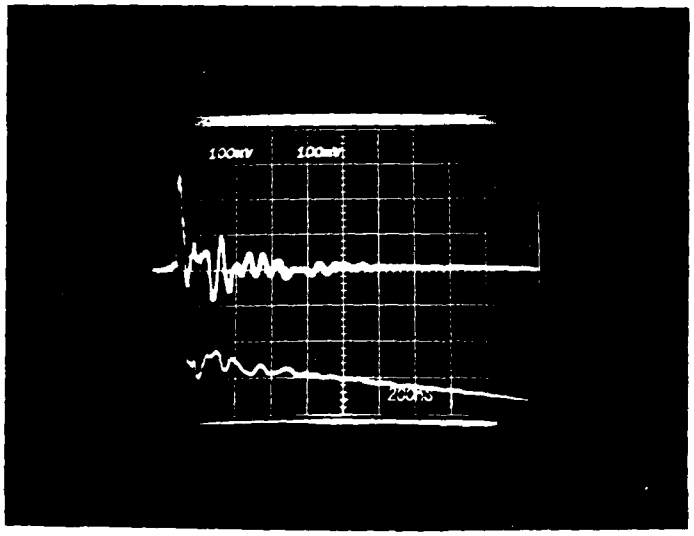
Date	August 7, 1985
Test Point	RF WIRE ANTENNA
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	100 mV/div 1
Horizontal	200 ns/div 2
Vertical	100 mV/div 2
Configuration	
Pulser Level	30 KV Charge
Data Link	
Comments:	(13.25 KV)



265 A 31

REMOVED COAX FROM CIRCUIT - LOOKING AT RF ANTENNA - UHF CONNECTOR STILL IN CIRCUIT

Date	August 7, 1985		
Test Point	RF WIRE ANT		
Amplification		dB	
Attenuation		dB	
Horizontal	200	ns/div	1
Vertical	100	mV/div	1
Horizontal	200	ns/div	2
Vertical	100	mV/div	2
Configuration			
Pulser Level	30 KV Charge		
Data Link			
Comments:			

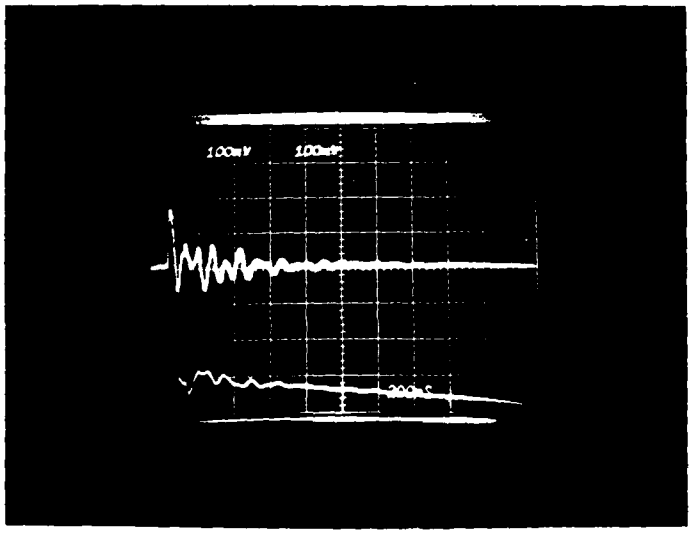


(32)

REPEAT (31) BUT WITH ANTENNA DIRECT TO 50 OHM RESISTOR TO GROUND. NO HARDWIRE BETWEEN ANTENNA + RESISTOR

275 A (13.75 KV)

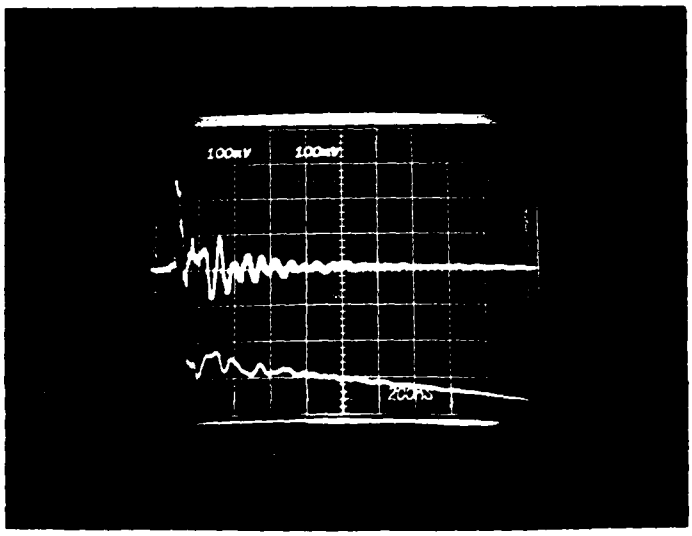
Date	August 7, 1985		
Test Point	RF WIRE ANT		
Amplification		dB	
Attenuation		dB	
Horizontal	200	ns/div	1
Vertical	100	mV/div	1
Horizontal	200	ns/div	2
Vertical	100	mV/div	2
Configuration			
Pulser Level	20 KV Charge		
Data Link			
Comments:			



(33)

REPEAT (32) 20KV-CHARGE - I = 170A (8.5KV)

Date	August 7, 1985
Test Point	RF ANTENNA
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	100 mV/div 1
Horizontal	200 ns/div 2
Vertical	100 mV/div 2
Configuration	
Pulser Level	30KV Charge
Data Link	
Comments:	

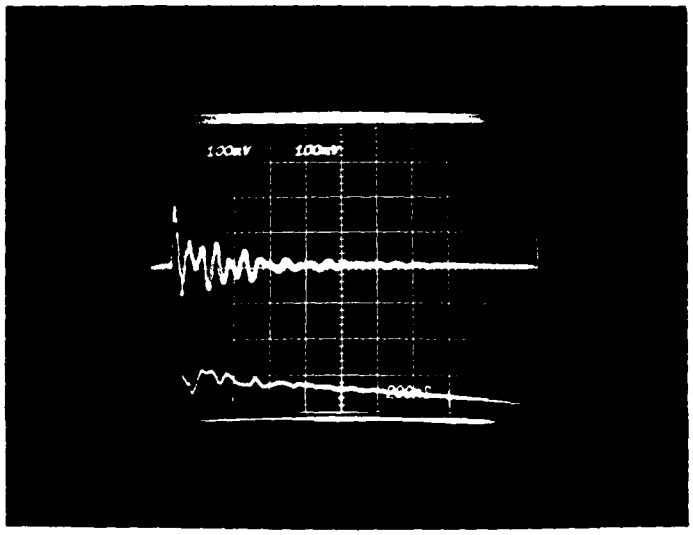


(34)

PROBE 94456-3

I = 260A (13.0KV)

Date	August 7, 1985
Test Point	RF ANTENNA
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	100 mV/div 1
Horizontal	200 ns/div 2
Vertical	100 mV/div 2
Configuration	
Pulser Level	20KV Charge
Data Link	
Comments:	



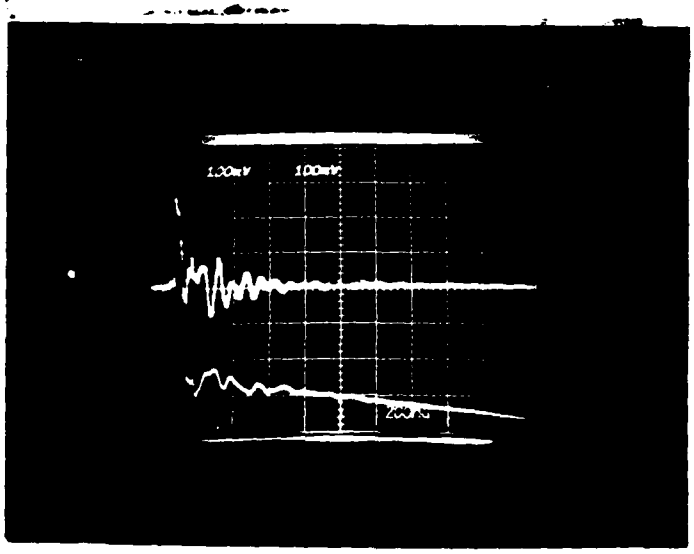
(35)

REPEAT (34) 20KV CHARGE I = 180A (9.0KV)

Date	August 7, 1985
Test Point	
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	100 mV/div 1
Horizontal	200 ns/div 2
Vertical	100 mV/div 2
Configuration	
Pulser Level	30KV Charge
Data Link	

Comments:
(SYSTEM 11)

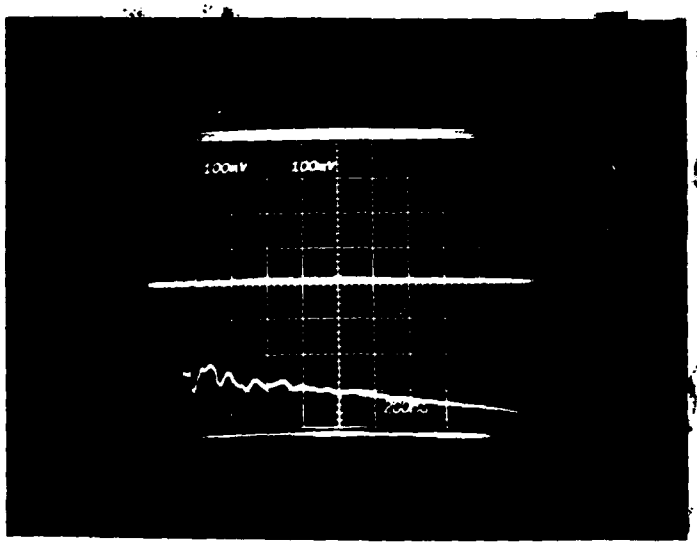
36



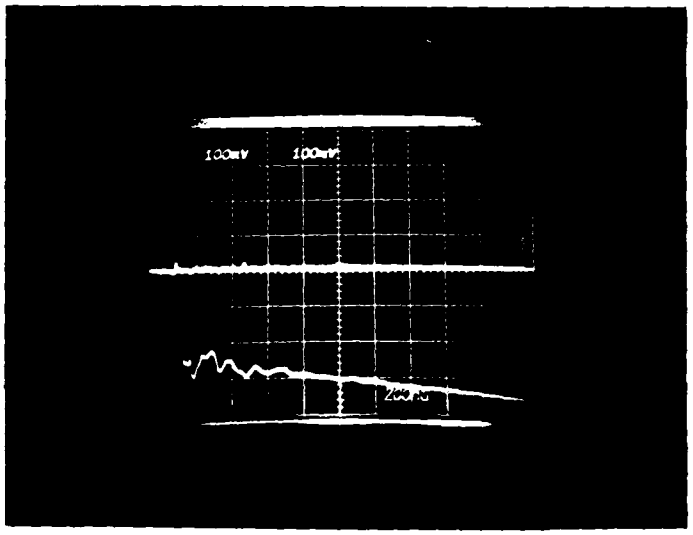
Date	August 7, 1985
Test Point	D17R
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	100 mV/div 1
Horizontal	200 ns/div 2
Vertical	100 mV/div 2
Configuration	
Pulser Level	30KV Charge
Data Link	

Comments:
(System 11)

37



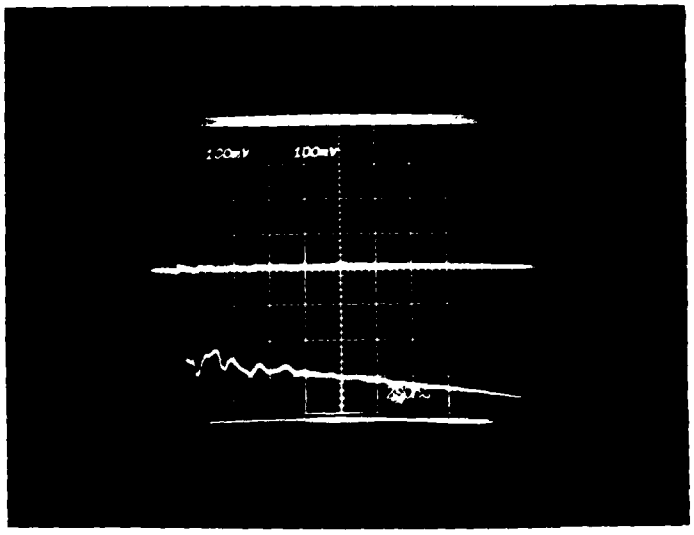
Date	August 7, 1985
Test Point	D17T
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	100 mV/div 1
Horizontal	200 ns/div 2
Vertical	100 mV/div 2
Configuration	
Pulser Level	30 KV Charge
Data Link	
Comments:	



38

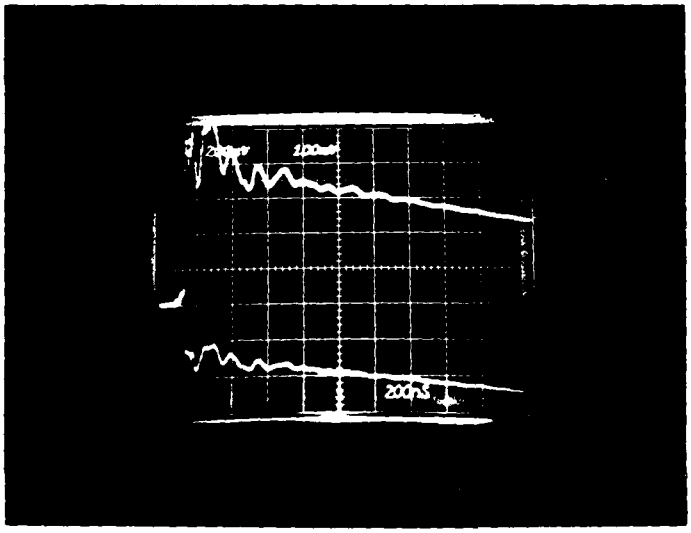
REPEAT 37 TRANSMIT

Date	August 7, 1985
Test Point	D17R2
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	100 mV/div 1
Horizontal	200 ns/div 2
Vertical	100 mV/div 2
Configuration	
Pulser Level	30 KV Charge
Data Link	
Comments:	(SYSTEM 11)



39

Date	August 8, 1985
Test Point	CALIBRATION
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	200 ns/div 2
Vertical	100 mV/div 2
Configuration	
Pulser Level	30 KV Charge
Data Link	
Comments:	

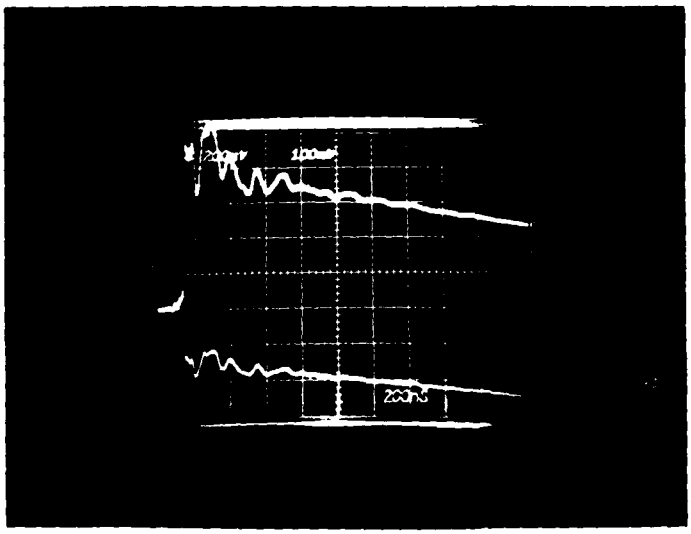


2

PULSER CALIBRATION -

Date	August 8, 1985
Test Point	E-5
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	200 ns/div 2
Vertical	100 mV/div 2
Configuration	
Pulser Level	30 KV Charge
Data Link	
Comments:	

SYSTEM 11

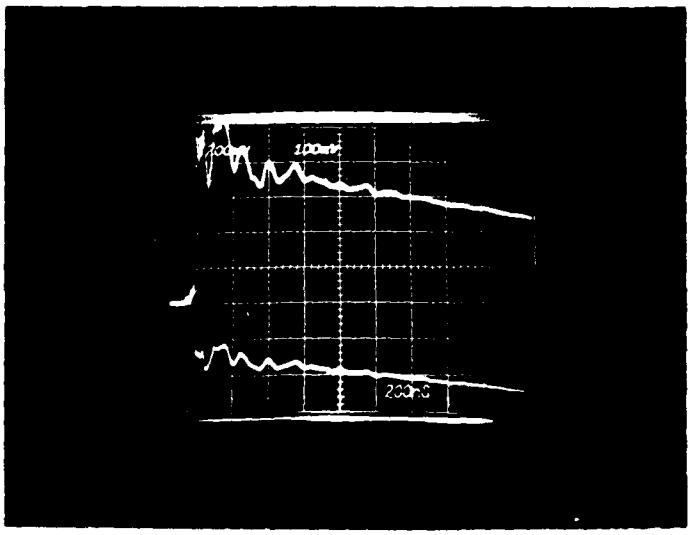


3

Date	August 8, 85
Test Point	E6
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	200 ns/div 2
Vertical	100 mV/div 2
Configuration	
Pulser Level	30 KV Charge
Data Link	

Comments:
SYSTEM 11

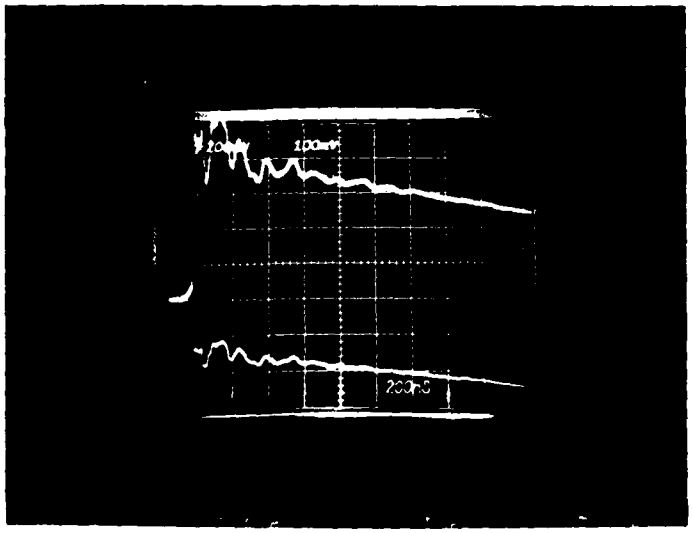
4



Date	August 8, 1985
Test Point	E7
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	200 ns/div 2
Vertical	100 mV/div 2
Configuration	
Pulser Level	30 KV Charge
Data Link	

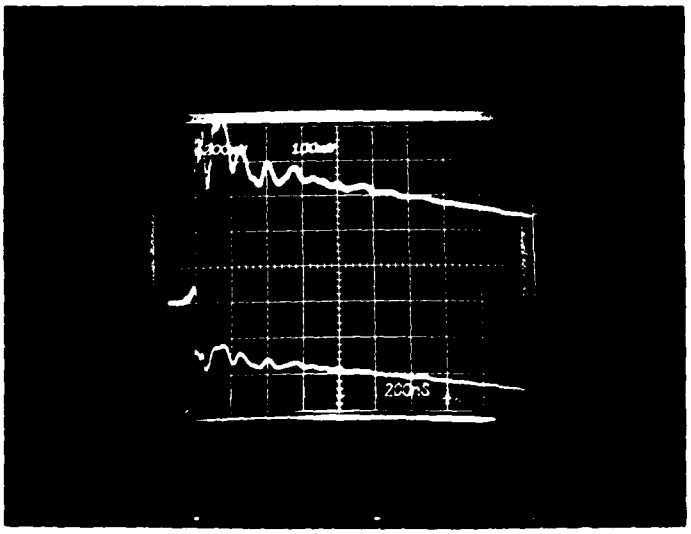
Comments:
SYSTEM 11

5



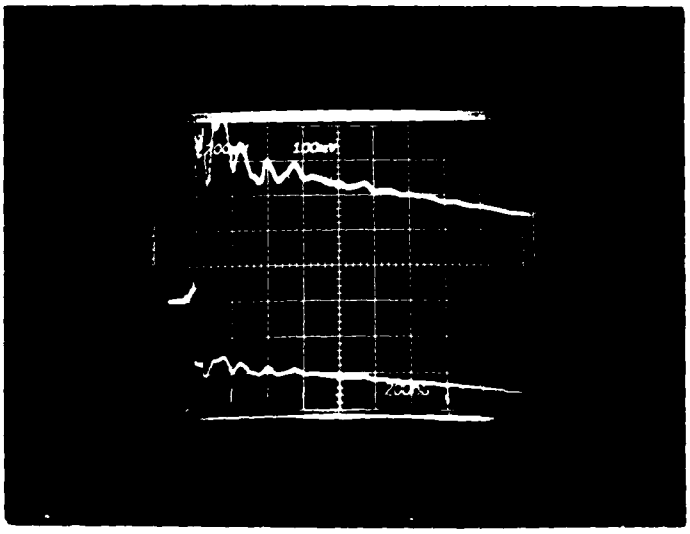
Date	August 8, 1985
Test Point	E8
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	200 ns/div 2
Vertical	100 mV/div 2
Configuration	
Pulser Level	30KV Charge
Data Link	
Comments:	SYSTEM - 11

6



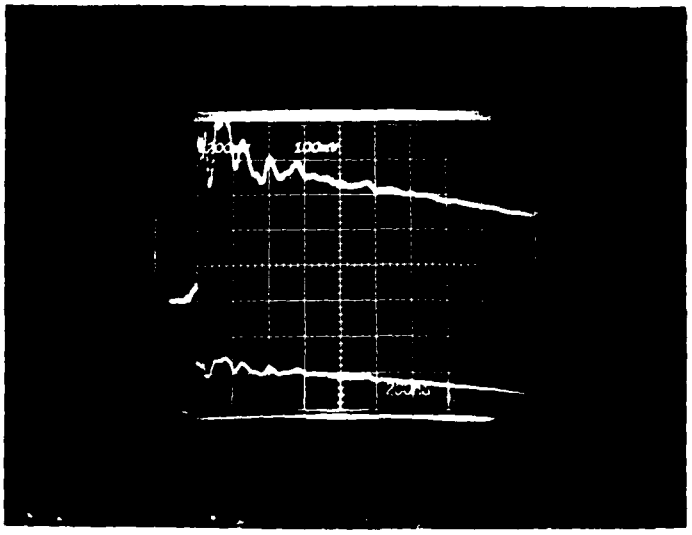
Date	August 8, 1985
Test Point	E-9
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	200 ns/div 2
Vertical	100 mV/div 2
Configuration	
Pulser Level	30KV Charge
Data Link	
Comments:	

7



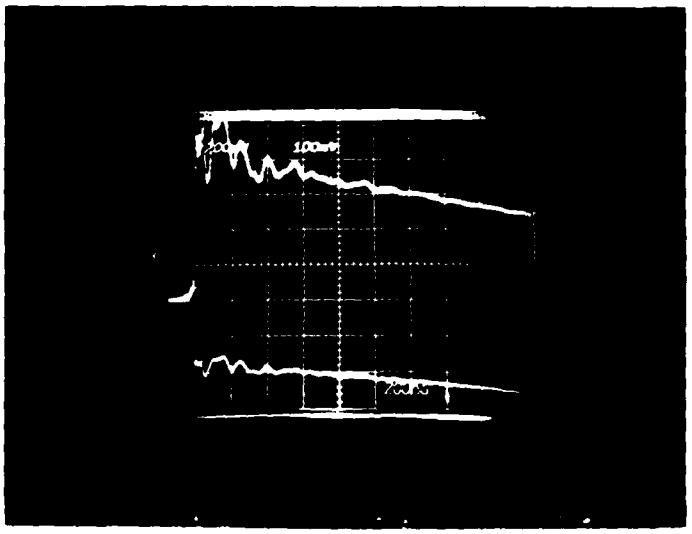
Date	8 August, 1985
Test Point	E-10
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	200 ns/div 2
Vertical	100 mV/div 2
Configuration	
Pulser Level	30 KV Charge
Data Link	
Comments:	(SYSTEM 11)

(8)



Date	August 8, 1985
Test Point	E-11
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	200 ns/div 2
Vertical	100 mV/div 2
Configuration	
Pulser Level	30 KV Charge
Data Link	
Comments:	SYSTEM 11

(9)

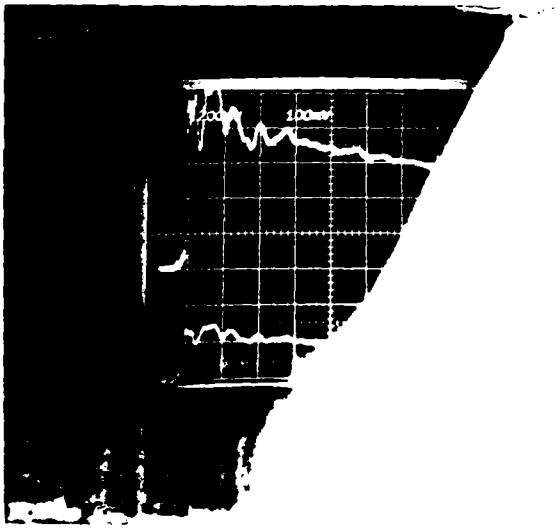


Date	August 8, 1985
Test Point	D18R
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	200 ns/div 2
Vertical	100 mV/div 2
Configuration	
Pulser Level	30KV Charge
Data Link	

Comments:

SYSTEM 11

(10)

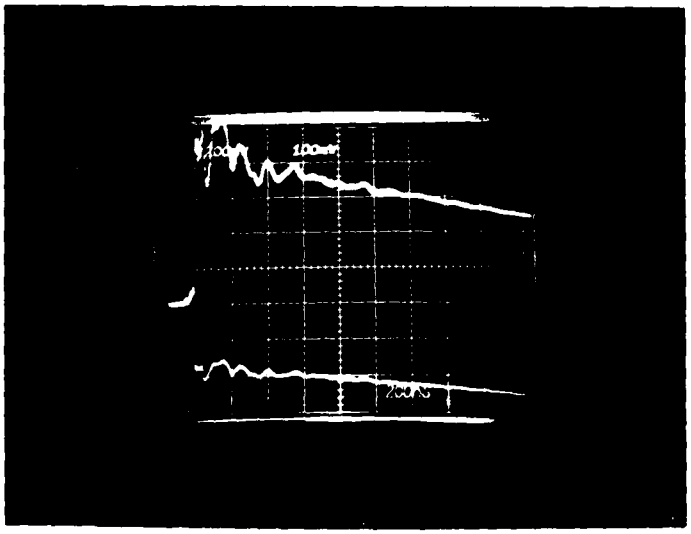


Date	August 8, 1985
Test Point	D18T
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	200 ns/div 2
Vertical	100 mV/div 2
Configuration	
Pulser Level	30 KV Charge
Data Link	

Comments:

SYSTEM 11

(11)

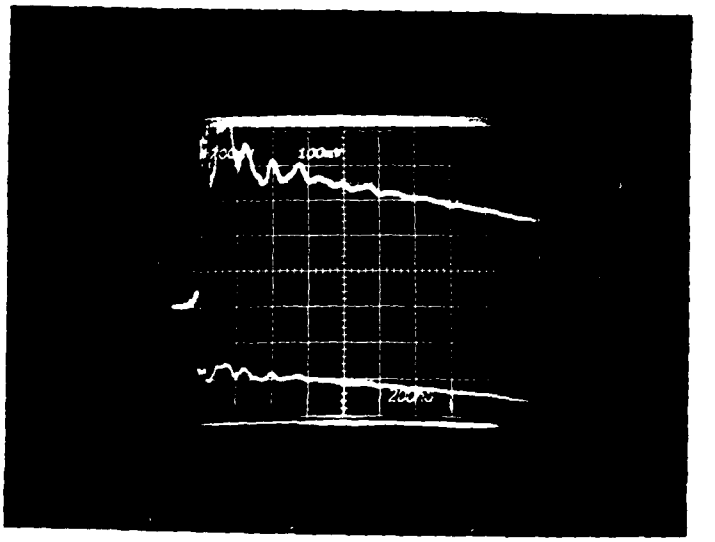


Date	Aug 8, 1985
Test Point	D-19
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	200 ns/div 2
Vertical	100 mV/div 2
Configuration	
Pulser Level	30KV Charge
Data Link	

Comments:

SYSTEM 3

(12)

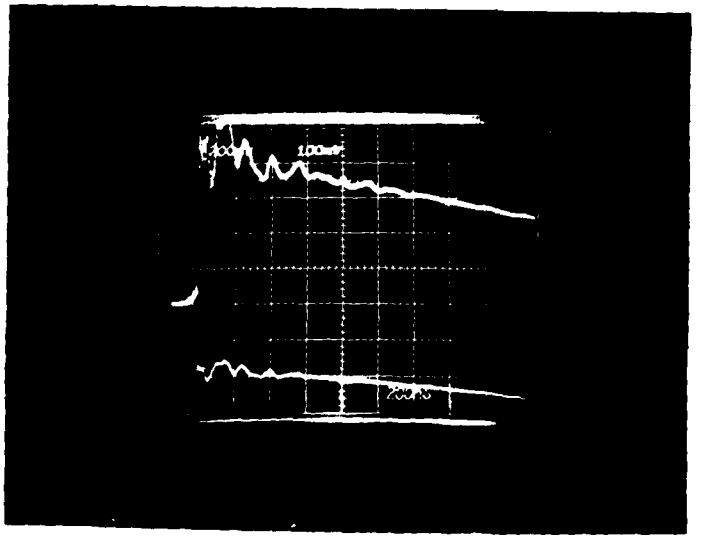


Date	August 8, 1985
Test Point	D20
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	200 ns/div 2
Vertical	100 mV/div 2
Configuration	
Pulser Level	30 KV Charge
Data Link	

Comments:

SYSTEM 3

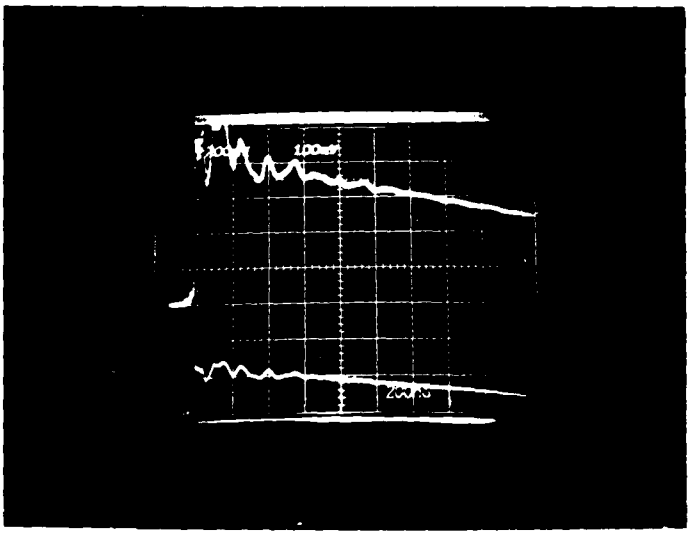
(13)



Date	August 8, 1985
Test Point	D21
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	200 ns/div 2
Vertical	100 mV/div 2
Configuration	
Pulser Level	30 KV Charge
Data Link	

Comments:
(SYSTEM 3)

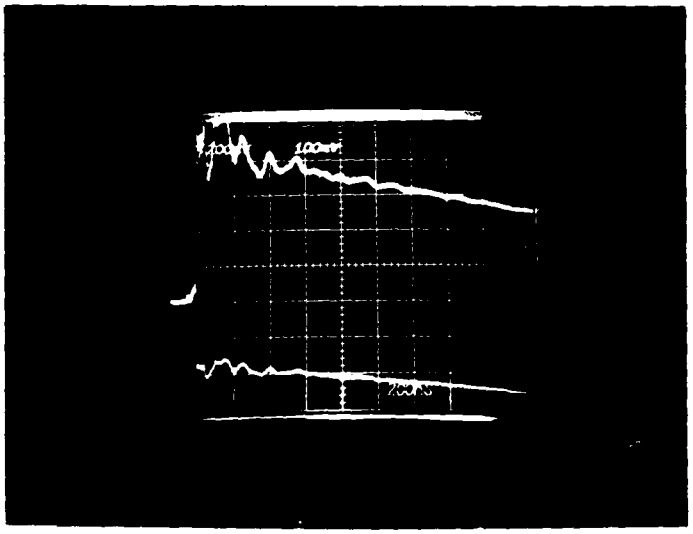
(14)



Date	August 8, 1985
Test Point	D22
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	200 ns/div 2
Vertical	100 mV/div 2
Configuration	
Pulser Level	30 KV Charge
Data Link	

Comments:
(SYSTEM 3)

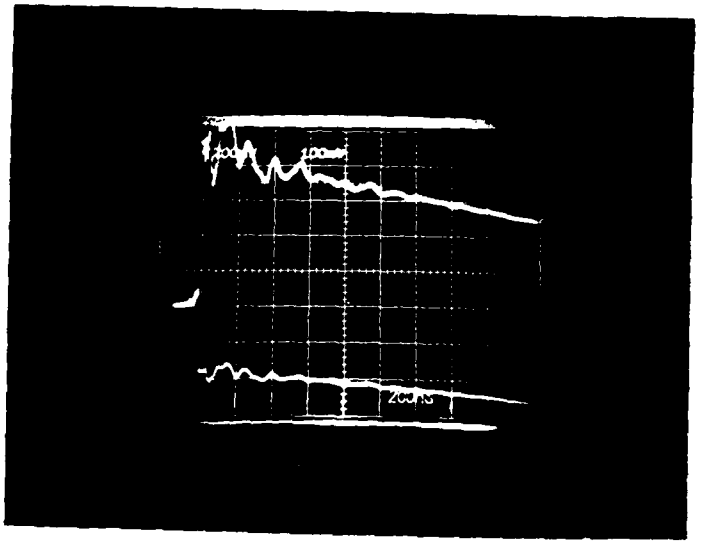
(15)



Date	8 August, 1985
Test Point	E12
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	200 ns/div 2
Vertical	100 mV/div 2
Configuration	
Pulser Level	30KV Charge
Data Link	

Comments:
(SYSTEM 3)

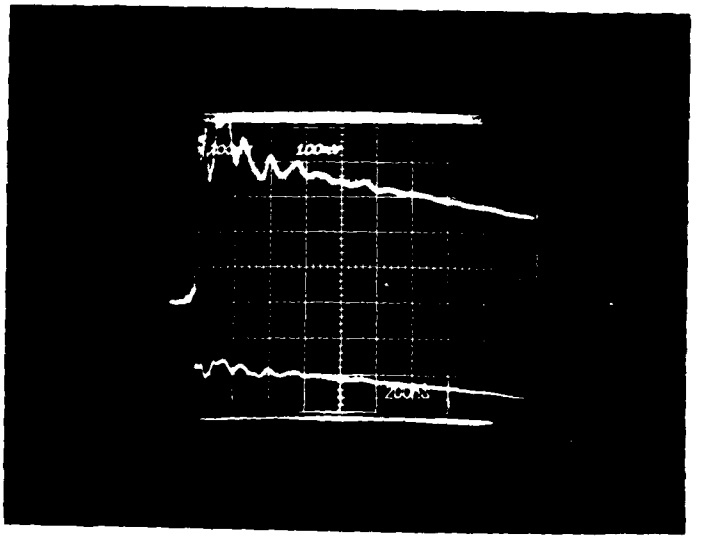
(16)



Date	August 8, 1985
Test Point	E13
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	200 ns/div 2
Vertical	100 mV/div 2
Configuration	
Pulser Level	30KV Charge
Data Link	

Comments:
(SYSTEM 3)

(17)

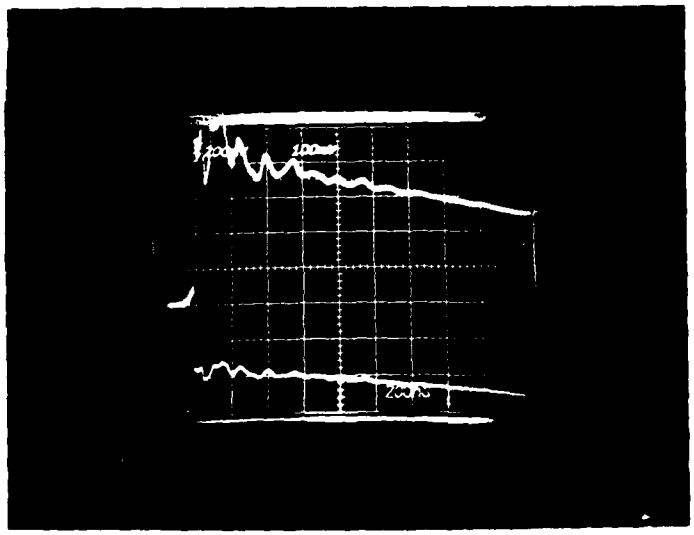


Date	August 8, 1985
Test Point	E-14
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	200 ns/div 2
Vertical	100 mV/div 2
Configuration	
Pulser Level	30 KV Charge
Data Link	

Comments:

(SYSTEM 3)

(18)



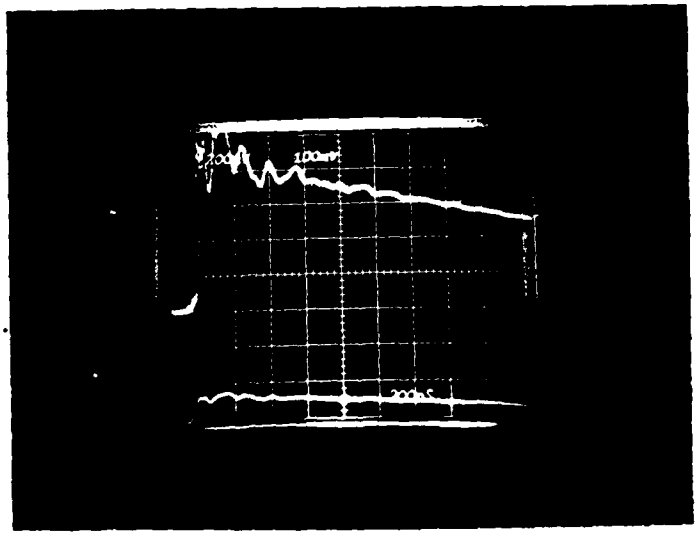
(TEST E15 NO PHOTO)

Date	August 8, 1985
Test Point	E16
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	200 ns/div 2
Vertical	100 mV/div 2
Configuration	
Pulser Level	
Data Link	

Comments:

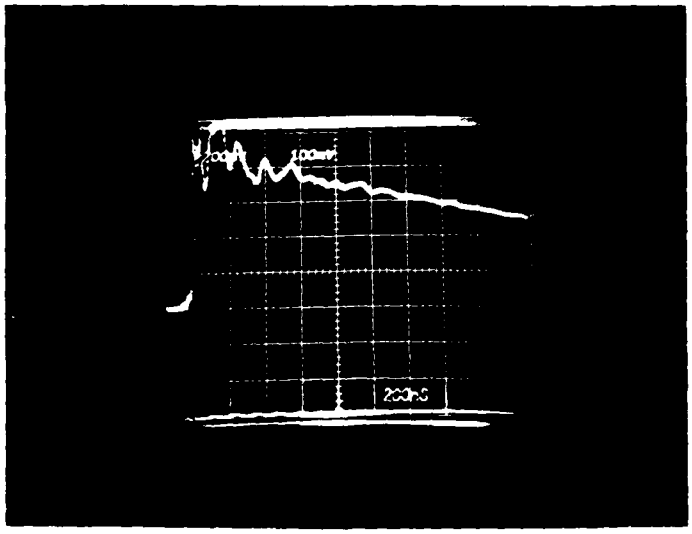
(SYSTEM 11)

(19)



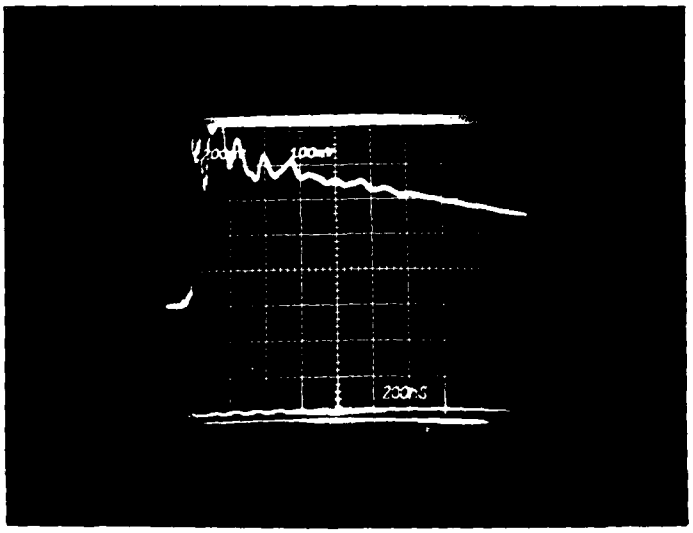
Date	August 8, 1985
Test Point	E17
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	200 ns/div 2
Vertical	100 mV/div 2
Configuration	
Pulser Level	30 KV Charge
Data Link	
Comments:	(SYSTEM 10)

20



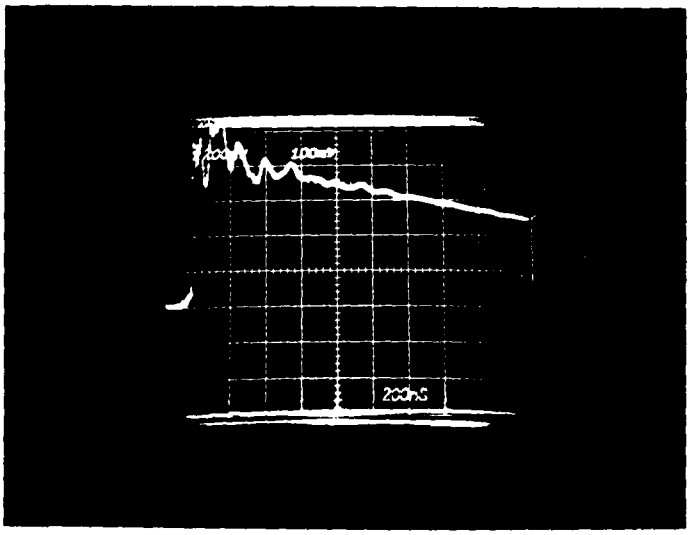
Date	August 8, 1985
Test Point	F5R
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	200 ns/div 2
Vertical	100 mV/div 2
Configuration	
Pulser Level	30 KV Charge
Data Link	
Comments:	(SYSTEM 10)

21



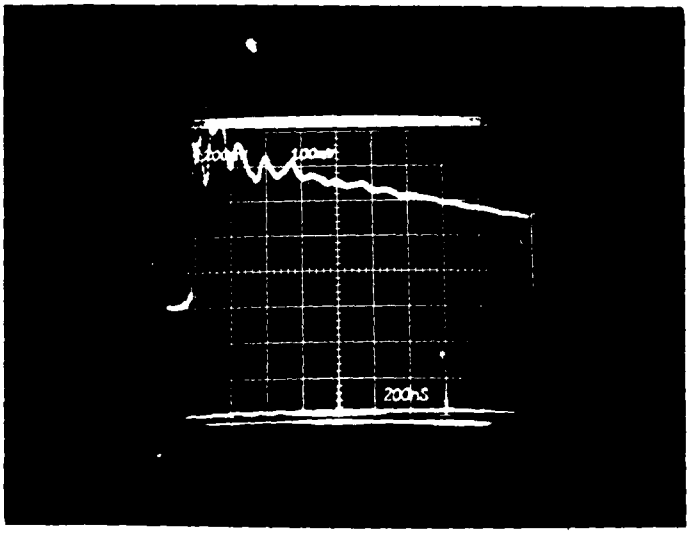
Date	August 8, 1985
Test Point	F5T
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	200 ns/div 2
Vertical	100 mV/div 2
Configuration	
Pulser Level	30 KV Charge
Data Link	
Comments:	(SYSTEM 10)

22



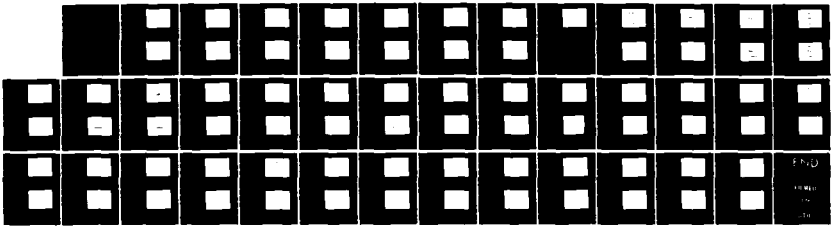
Date	August 8, 1985
Test Point	F6R
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	200 ns/div 2
Vertical	100 mV/div 2
Configuration	
Pulser Level	30 KV Charge
Data Link	
Comments:	(SYSTEM 10)

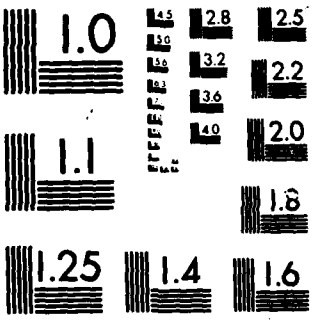
23



AD-A164 436 ELECTROMAGNETIC PULSE/TRANSIENT THREAT TESTING OF PROTECTION DEVICES FOR..(U) ELECTROSPACE SYSTEMS INC ARLINGTON VA D BODSON ET AL. 31 OCT 85 2/2

UNCLASSIFIED NCS-TIB-85-10-VOL-3-SEC-5 DCA100-85-C-0010 F/G 20/14 NL



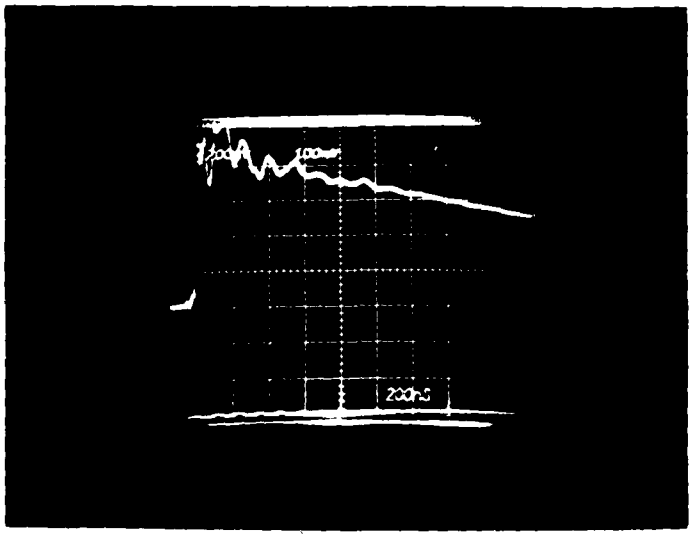


MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

Date	August 8, 1985
Test Point	F6T
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	200 ns/div 2
Vertical	100 mV/div 2
Configuration	
Pulser Level	30KV Charge
Data Link	

Comments:
(SYSTEM 10)

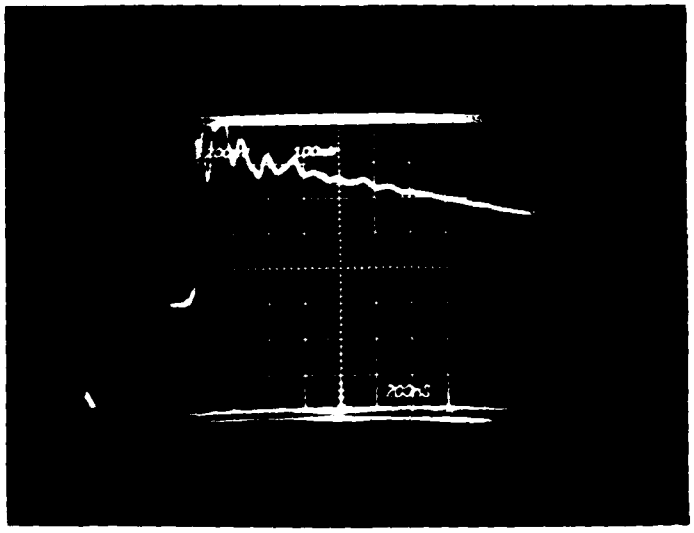
24



Date	August 8, 1985
Test Point	F7R
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	200 ns/div 2
Vertical	100 mV/div 2
Configuration	
Pulser Level	30KV Charge
Data Link	

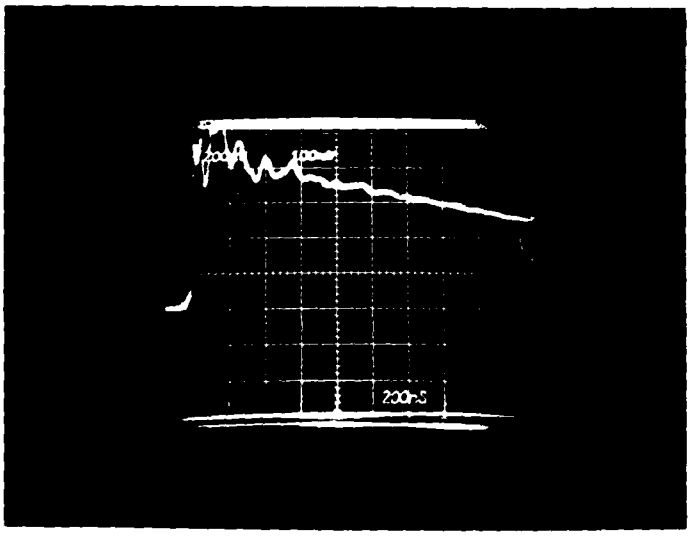
Comments:
(SYSTEM 11)

25



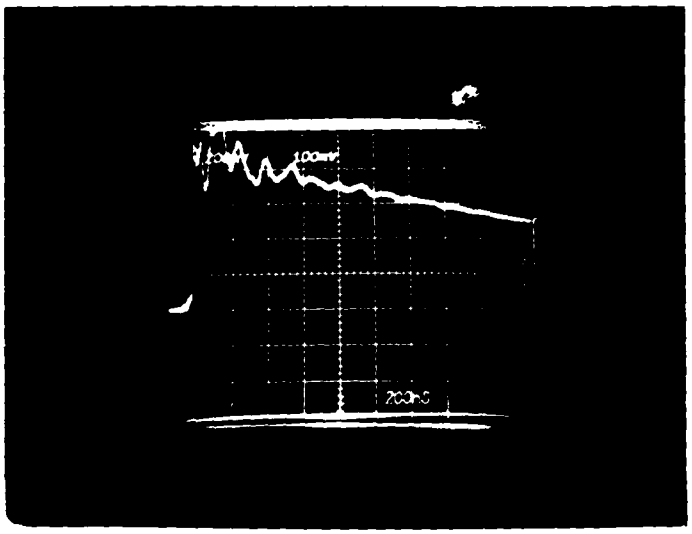
Date	August 8, 1985
Test Point	E7T
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	200 ns/div 2
Vertical	100 mV/div 2
Configuration	
Pulser Level	30KV Charge
Data Link	
Comments: (SYSTEM II)	

(26)



Date	August 8, 1985
Test Point	E8R
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	200 ns/div 2
Vertical	100 mV/div 2
Configuration	
Pulser Level	30KV Charge
Data Link	
Comments: (SYSTEM I)	

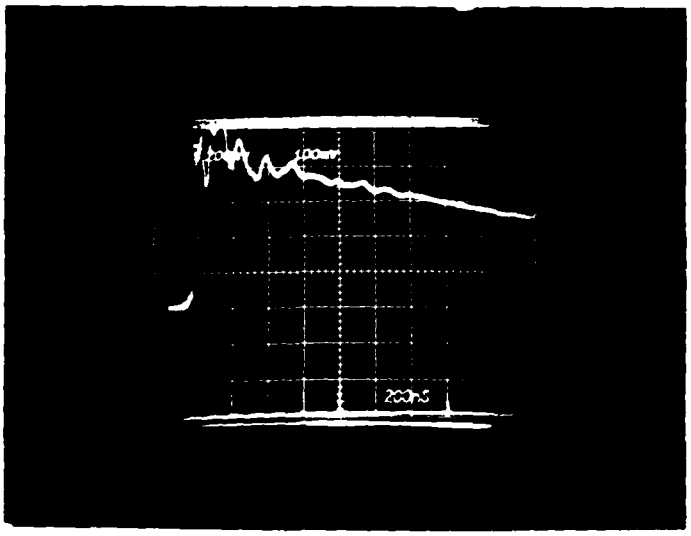
(27)



Date	August 8, 1985	
Test Point	F8T	
Amplification		dB
Attenuation		dB
Horizontal	200 ns/div	1
Vertical	200 mV/div	1
Horizontal	200 ns/div	2
Vertical	100 mV/div	2
Configuration		
Pulser Level	30KV Charge	
Data Link		

Comments:
(SYSTEM 1)

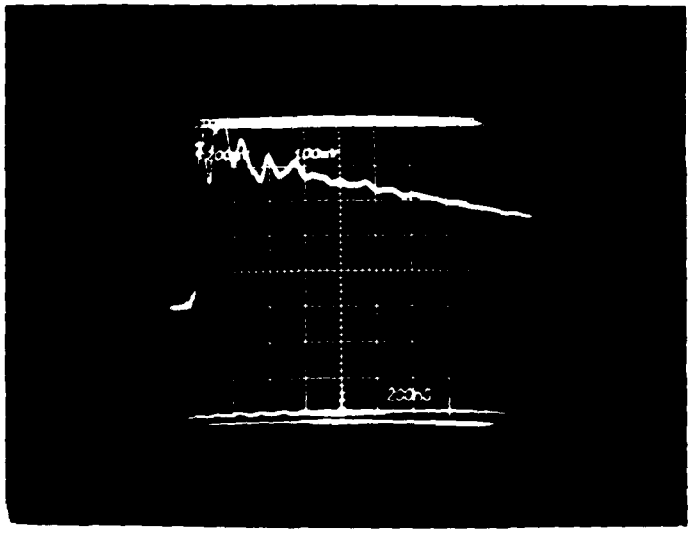
28



Date	August 8, 1985	
Test Point	F9R	
Amplification		dB
Attenuation		dB
Horizontal	200 ns/div	1
Vertical	200 mV/div	1
Horizontal	200 ns/div	2
Vertical	100 mV/div	2
Configuration		
Pulser Level	30KV Charge	
Data Link		

Comments:
SYSTEM 1

29

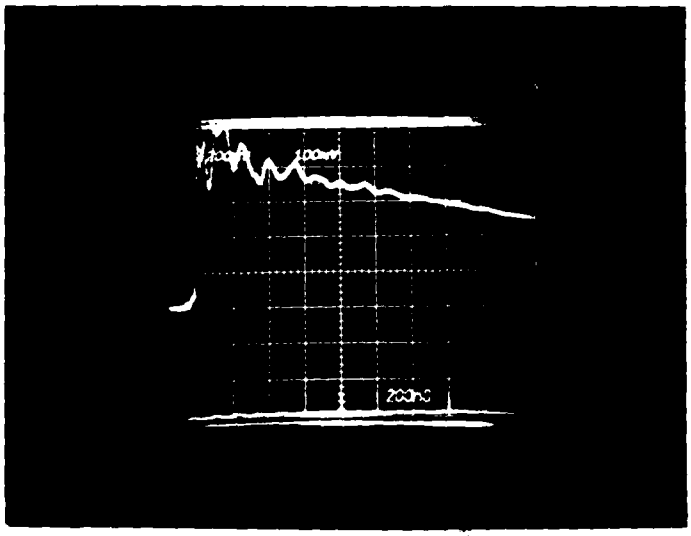


Date	August 8, 1985
Test Point	F9T
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	200 ns/div 2
Vertical	100 mV/div 2
Configuration	
Pulser Level	30KV Charge
Data Link	

Comments:

(SYSTEM 1)

30

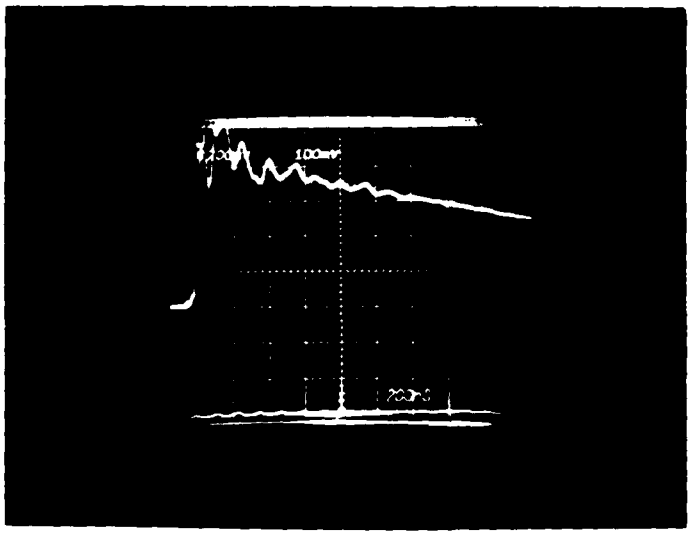


Date	August 8, 1985
Test Point	F10R
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	200 ns/div 2
Vertical	100 mV/div 2
Configuration	
Pulser Level	30 KV Charge
Data Link	

Comments:

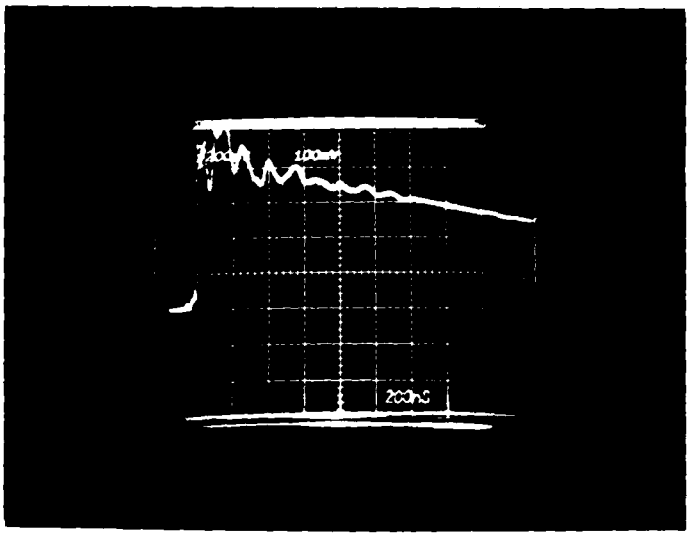
(SYSTEM 5)

31



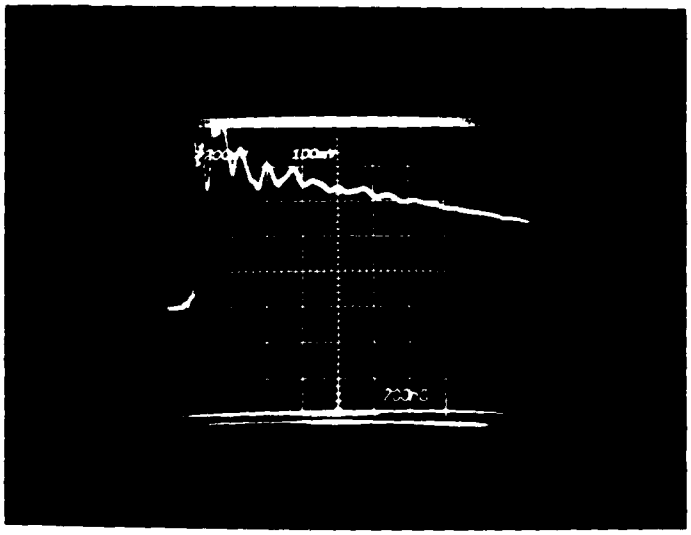
Date	August 8, 1985
Test Point	F10T
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	200 ns/div 2
Vertical	100 mV/div 2
Configuration	
Pulser Level	30 KV Charge
Data Link	
Comments:	(SYSTEM 5)

32



Date	August 8, 1985
Test Point	F11R
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	200 ns/div 2
Vertical	100 mV/div 2
Configuration	
Pulser Level	30 KV Charge
Data Link	
Comments:	(SYSTEM 5)

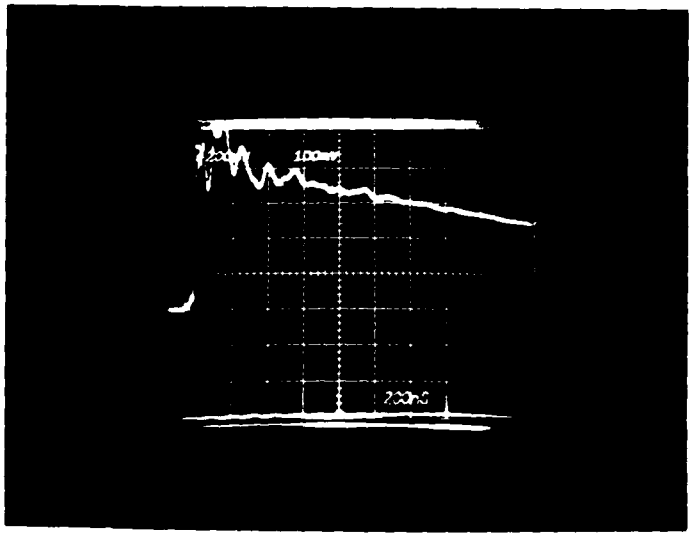
33



Date	August 8, 1985
Test Point	F11T
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	200 ns/div 2
Vertical	100 mV/div 2
Configuration	
Pulser Level	30KV Charge
Data Link	

Comments:
(SYSTEM 5)

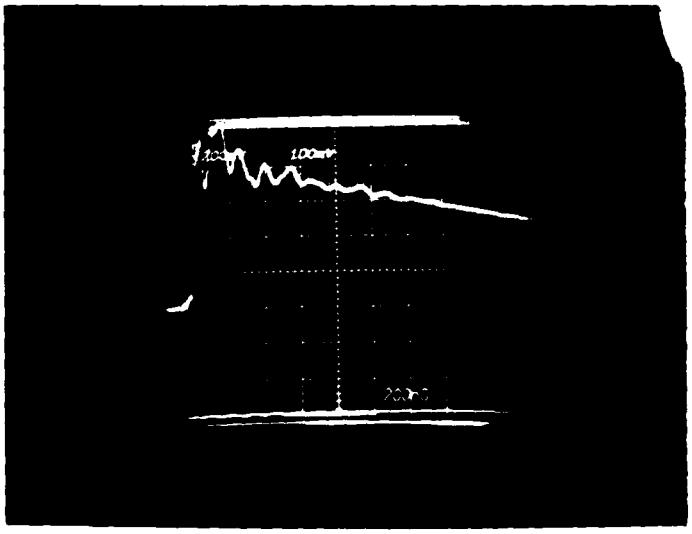
34



Date	August 8, 1985
Test Point	F12R
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	200 ns/div 2
Vertical	100 mV/div 2
Configuration	
Pulser Level	30KV Charge
Data Link	

Comments:
(SYSTEM 4)

35

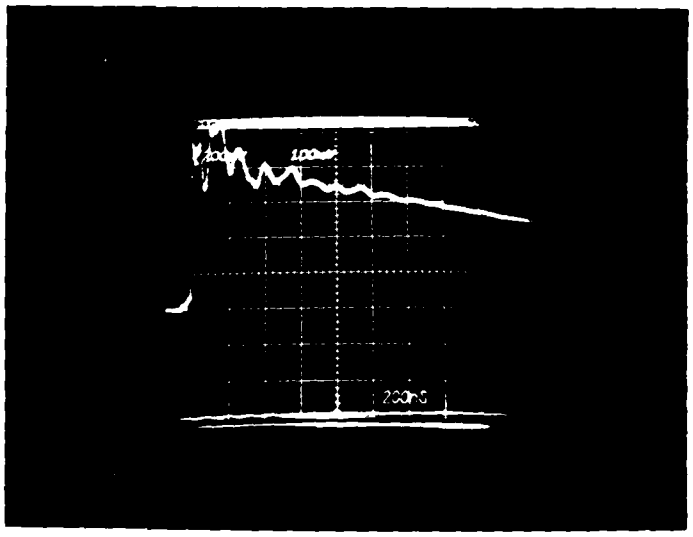


Date	August 8, 1985
Test Point	F12T
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	200 ns/div 2
Vertical	100 mV/div 2
Configuration	
Pulser Level	30 KV Charge
Data Link	

Comments:

(SYSTEM 4)

36

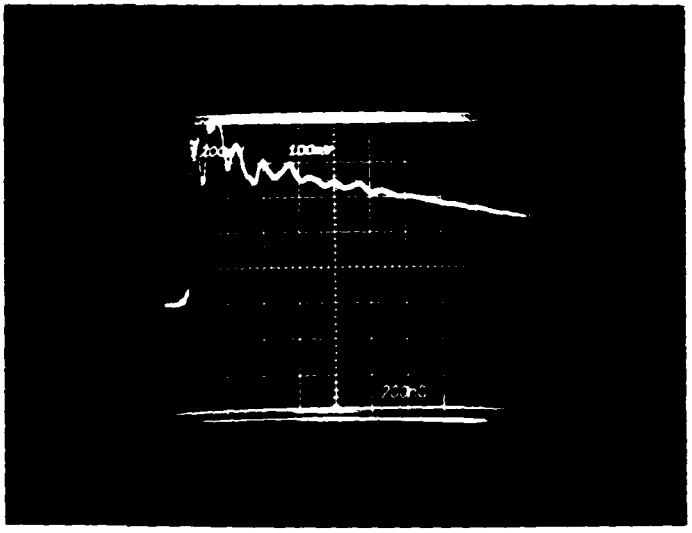


Date	August 8, 1985
Test Point	F13R
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	200 ns/div 2
Vertical	100 mV/div 2
Configuration	
Pulser Level	30 KV Charge
Data Link	

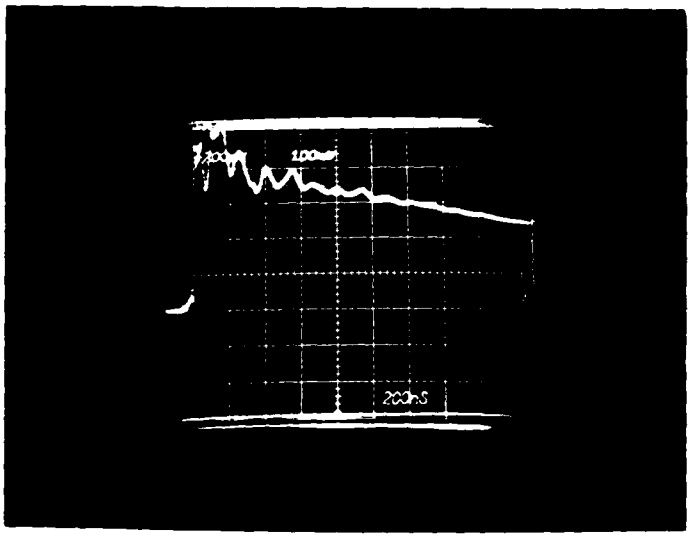
Comments:

(SYSTEM 3)

37



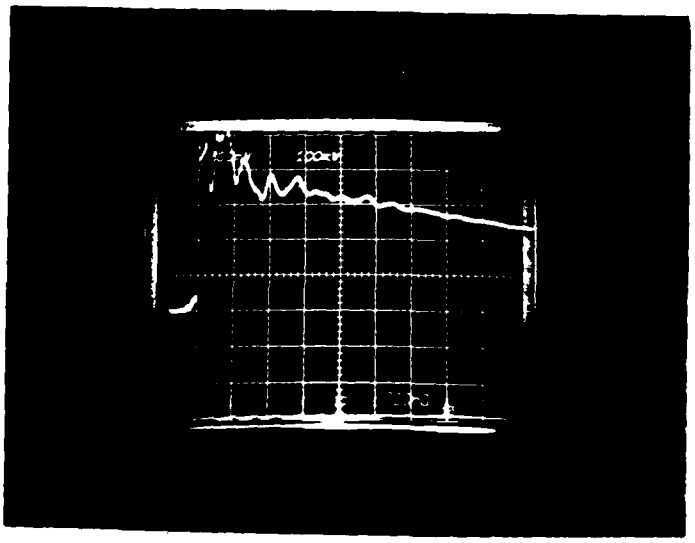
Date	August 8, 1985	
Test Point	F13T	
Amplification	dB	
Attenuation	dB	
Horizontal	200 ns/div	1
Vertical	200 mV/div	1
Horizontal	200 ns/div	2
Vertical	100 mV/div	2
Configuration		
Pulser Level	30KV Charge	
Data Link		
Comments: (SYSTEM 3)		



38

Date		
Test Point		
Amplification	dB	
Attenuation	dB	
Horizontal	ns/div	1
Vertical	mV/div	1
Horizontal	ns/div	2
Vertical	mV/div	2
Configuration		
Pulser Level		
Data Link		
Comments:		

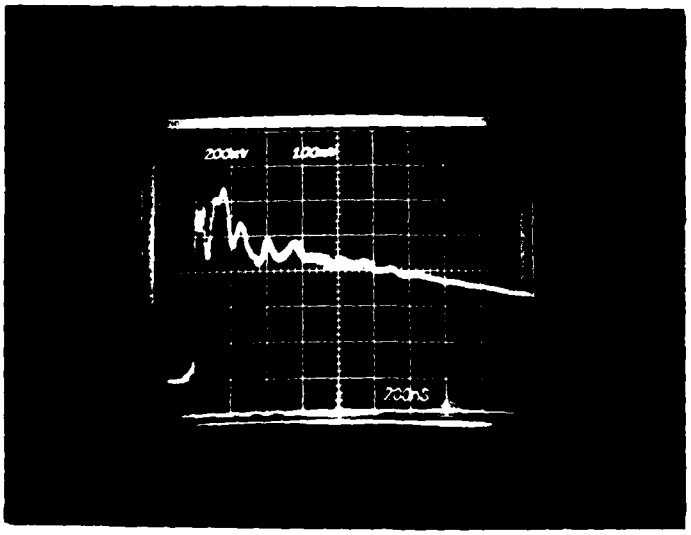
Date	August 9, 1985		
Test Point	CALIBRATION		
Amplification		dB	
Attenuation		dB	
Horizontal	200	ns/div	1
Vertical	200	mV/div	1
Horizontal		ns/div	2
Vertical		mV/div	2
Configuration			
Pulser Level	30 kV Charge		
Data Link			
Comments:			



1

ROUND H SENSOR - DIRECT

Date	August 9, 1985		
Test Point	F14R		
Amplification		dB	
Attenuation		dB	
Horizontal	200	ns/div	1
Vertical	200	mV/div	1
Horizontal		ns/div	2
Vertical		mV/div	2
Configuration			
Pulser Level	30 kV Charge		
Data Link			
Comments: (SYSTEM 16)			

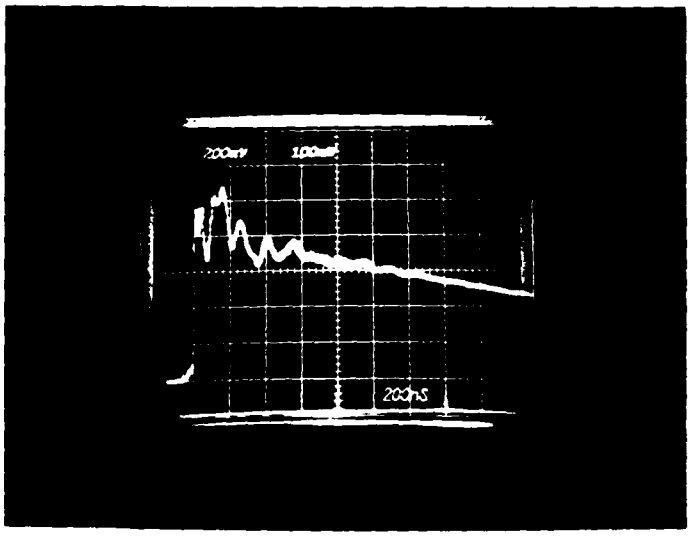


2

Date	August 9, 1985
Test Point	F15R
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	mV ~~ns~~/div 2
Configuration	
Pulser Level	30 KV Charge
Data Link	

Comments:
(SYSTEM 16)

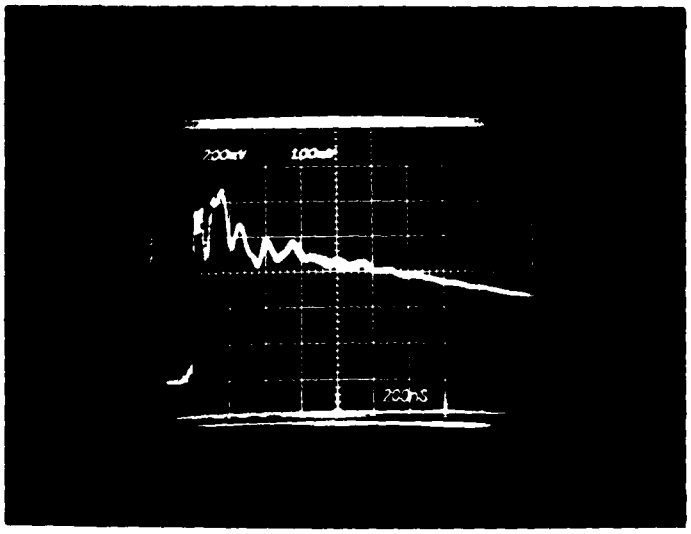
3



Date	August 9, 1985
Test Point	F15T
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	mV ~~ns~~/div 2
Configuration	
Pulser Level	30 KV Charge
Data Link	

Comments:
(SYSTEM 16)

4

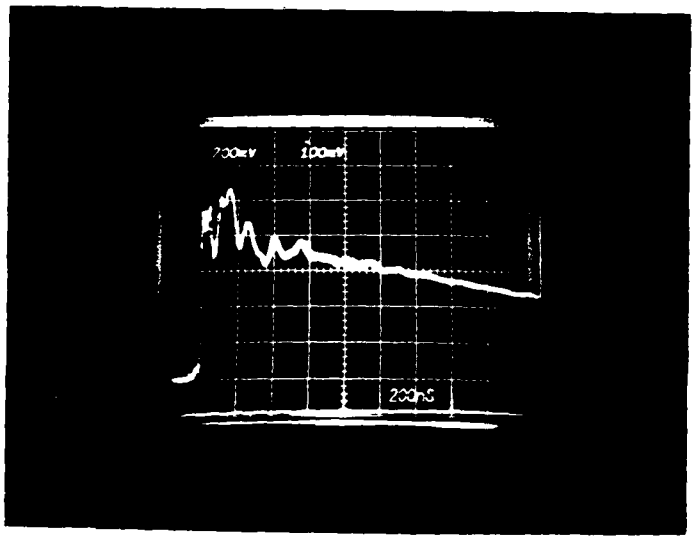


Date	August 9, 1985
Test Point	F16R
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulser Level	30KV Charge
Data Link	

Comments:

(SYSTEM 14)

5

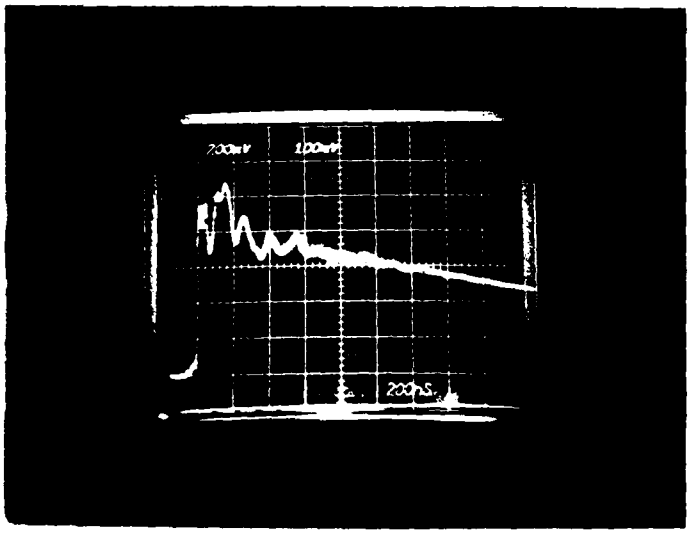


Date	August 9, 1985
Test Point	F16T
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulser Level	30KV Charge
Data Link	

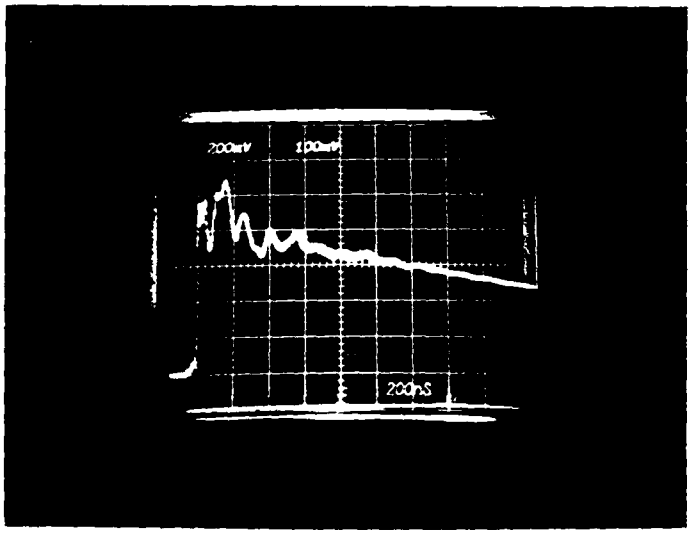
Comments:

(SYSTEM 14)

6

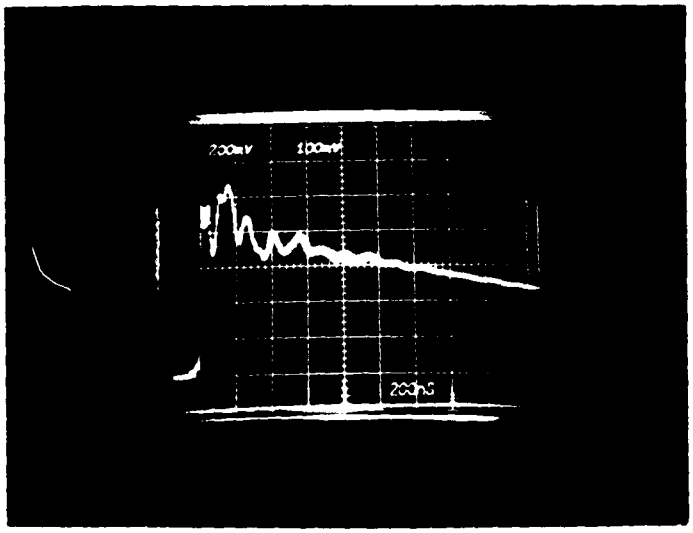


Date	9 August, 1985	
Test Point	F17T	
Amplification	dB	
Attenuation	dB	
Horizontal	200 ns/div	1
Vertical	200 mV/div	1
Horizontal	ns/div	2
Vertical	mV/div	2
Configuration		
Pulser Level	30KV Charge	
Data Link		
Comments: (SYSTEM 14)		



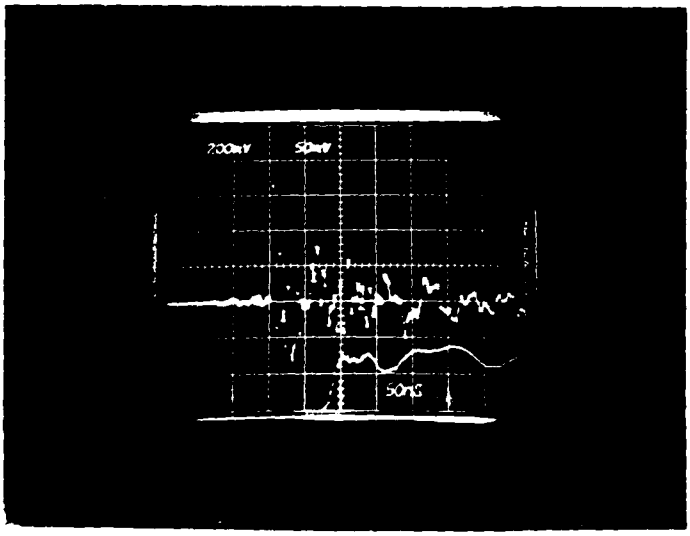
(7)

Date	August 9, 1985	
Test Point	F17R	
Amplification	dB	
Attenuation	dB	
Horizontal	200 ns/div	1
Vertical	200 mV/div	1
Horizontal	ns/div	2
Vertical	mV/div	2
Configuration		
Pulser Level	30KV Charge	
Data Link		
Comments: (SYSTEM 14)		



(8)

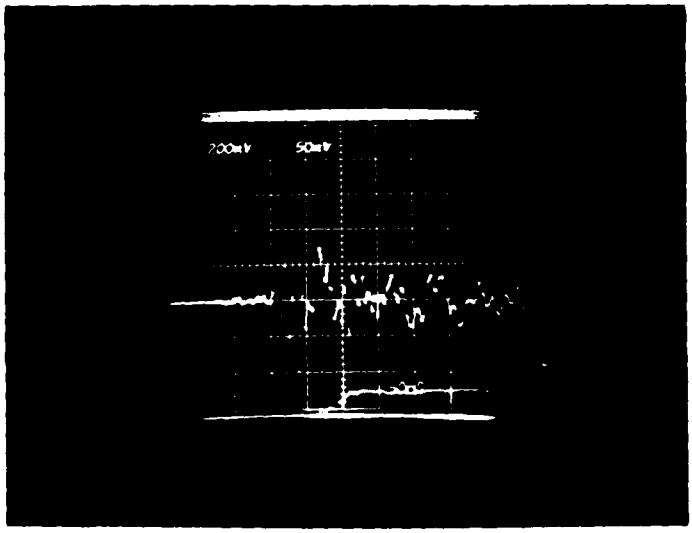
Date	August 9, 1985
Test Point	
Amplification	dB
Attenuation	20 dB
Horizontal	50 ns/div 1
Vertical	200 mV/div 1
Horizontal	50 ns/div 2
Vertical	50 ~~ns~~ mV/div 2
Configuration	
Pulser Level	30KV Charge.
Data Link	
Comments:	



(9)

CURRENT THROUGH PORTABLE RUBBER DUCK ANTENNA
NO PROTECTION - PROBE CT-2 - 50 OHMS TO GROUND
20 dB ATTN - 200 mV/dW 2 A div 50 ns dw +6.5 A
(325V)

Date	August 9, 1985
Test Point	
Amplification	dB
Attenuation	20 dB
Horizontal	50 ns/div 1
Vertical	200 mV/div 1
Horizontal	50 ns/div 2
Vertical	50 ~~ns~~ mV/div 2
Configuration	
Pulser Level	30KV Charge
Data Link	
Comments:	

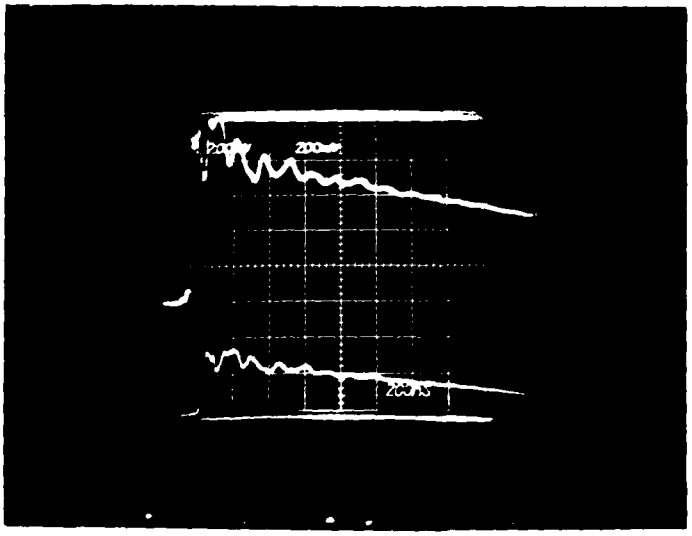


(10)

REPEAT (9) WITH FISCHER PROTECTOR -

7.6A (380V)

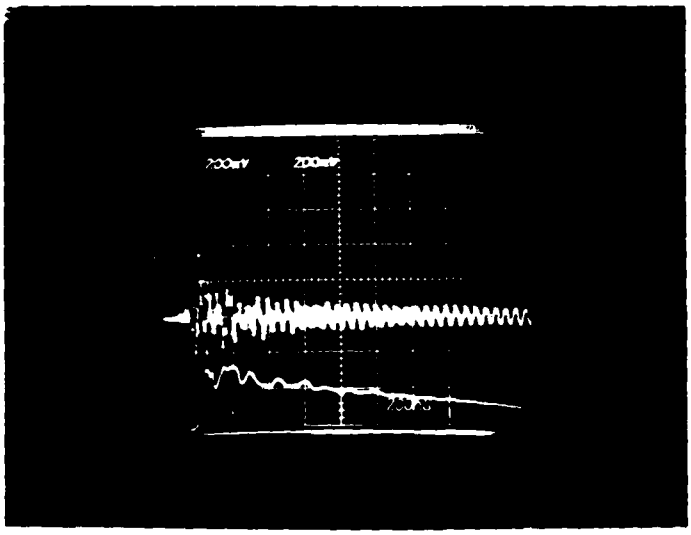
Date	August 9, 1985
Test Point	H FIELD SENSORS
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	200 ns/div 2
Vertical	200 ~~ns~~ mV/div 2
Configuration	
Pulser Level	30KV Charge
Data Link	
Comments:	



(11)

H FIELD SENSORS - NEW F.O. TRANSMITTER -
LOWER: RECT. H SENSOR F.O.
UPPER: ROUND H SENSOR DIRECT -

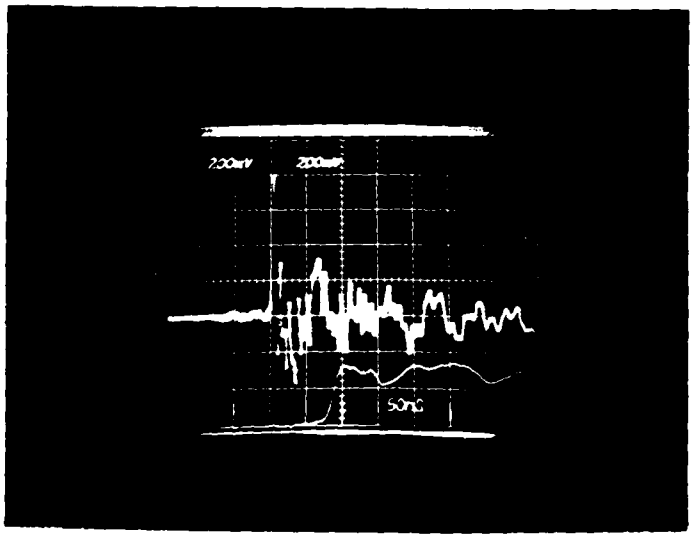
Date	August 9, 1985
Test Point	
Amplification	dB
Attenuation	20 dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	200 ns/div 2
Vertical	200 ~~ns~~ mV/div 2
Configuration	
Pulser Level	30KV Charge
Data Link	
Comments:	



(12)

RUBBER DUCK - FISCHER PROTECTOR
CT-2 PROBE - 20dB ATTN
2A/DIV I = 8A (400V)

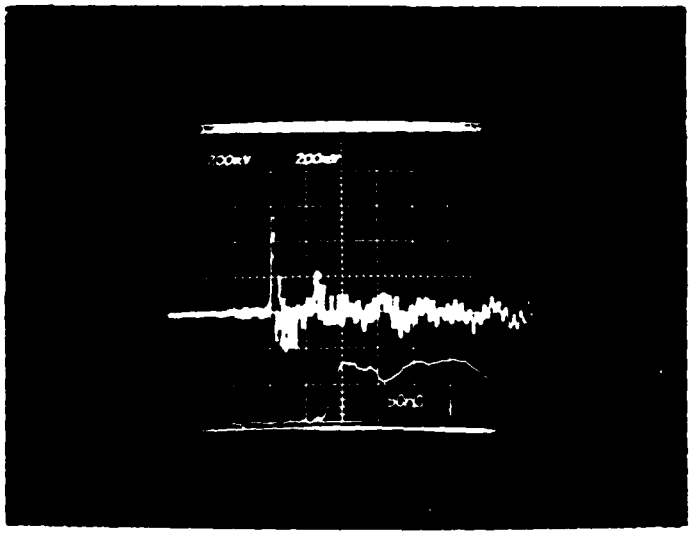
Date	August 9, 1985
Test Point	RUBBER DUCK
Amplification	dB
Attenuation	20 dB
Horizontal	50 ns/div 1
Vertical	200 mV/div 1
Horizontal	50 ns/div 2
Vertical	200 mV/div 2
Configuration	
Pulser Level	30KV Charge
Data Link	
Comments:	



(13)

REPEAT (12) w 50 ms/div I = 8A (900V)
FISCHER DEVICE

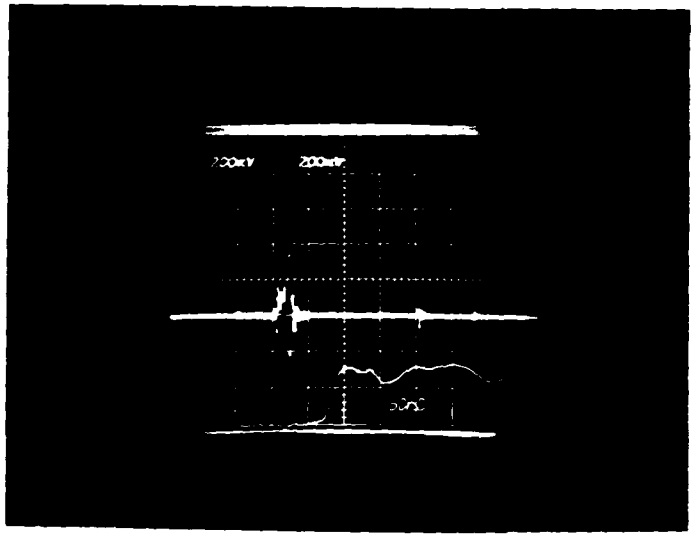
Date	August 9, 1985
Test Point	RUBBER DUCK
Amplification	dB
Attenuation	20 dB
Horizontal	50 ns/div 1
Vertical	200 mV/div 1
Horizontal	50 ns/div 2
Vertical	200 mV/div 2
Configuration	
Pulser Level	30KV Charge
Data Link	
Comments:	



(14)

REPEAT (13) NO PROTECTOR I=~ 5.5 A (275V)
NO FISCHER DEVICE

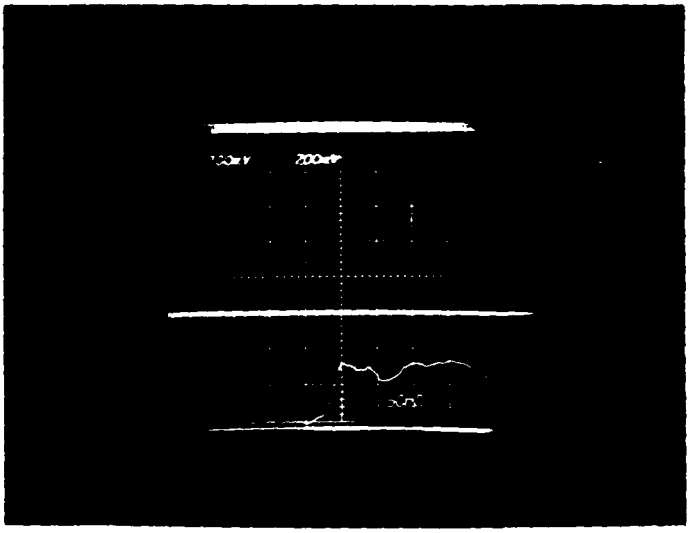
Date	August 9, 1985
Test Point	
Amplification	dB
Attenuation	dB
Horizontal	50 ns/div 1
Vertical	200 mV/div 1
Horizontal	50 ns/div 2
Vertical	200 mV/div 2
Configuration	
Pulser Level	30KV Charge
Data Link	
Comments:	



(15)

FISCHER UNIT ON BOX - NO RUBBER DUCK ANTENNA OPENING CAPPED, NOT GROUNDED - MADE WITH CT 2-SENSOR, NOT CONNECTED TO ANTENNA SHIELDS

Date	August 9, 1985
Test Point	
Amplification	dB
Attenuation	dB
Horizontal	50 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulser Level	30KV Charge
Data Link	
Comments:	

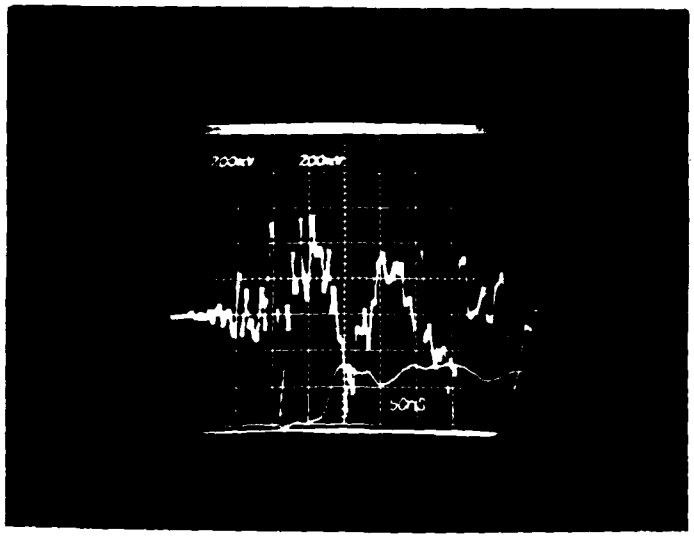


(16)

AS IN (15) EXCEPT SHIELD CONNECTED TO CT-2 SHIELD

NO NOISE

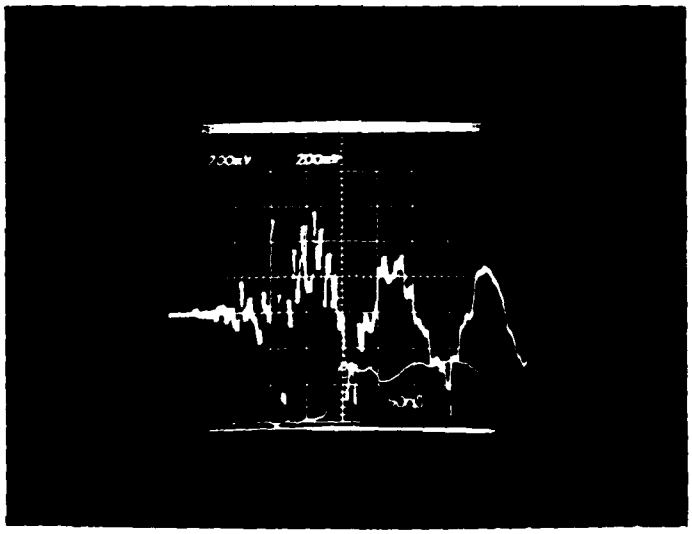
Date	August 9, 1985
Test Point	
Amplification	dB
Attenuation	20 dB
Horizontal	50 ns/div 1
Vertical	200 mV/div 1
Horizontal	50 ns/div 2
Vertical	200 mV/div 2
Configuration	
Pulser Level	30 KV Charge
Data Link	
Comments:	



(17)

ADDED RUBBER DUCK ANTENNA INCLUDING FISCHER CT-2 GROUNDED - 5.6A (280V)

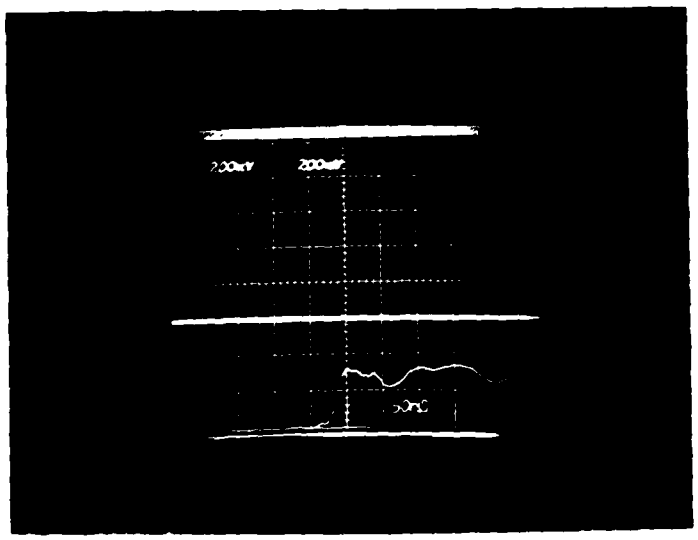
Date	August 9, 1985
Test Point	
Amplification	dB
Attenuation	20 dB
Horizontal	50 ns/div 1
Vertical	200 mV/div 1
Horizontal	50 ns/div 2
Vertical	200 mV/div 2
Configuration	
Pulser Level	30 KV Charge
Data Link	
Comments:	



(18)

ANTENNA WITHOUT FISCHER PROTECTOR - 5.6A (280V)

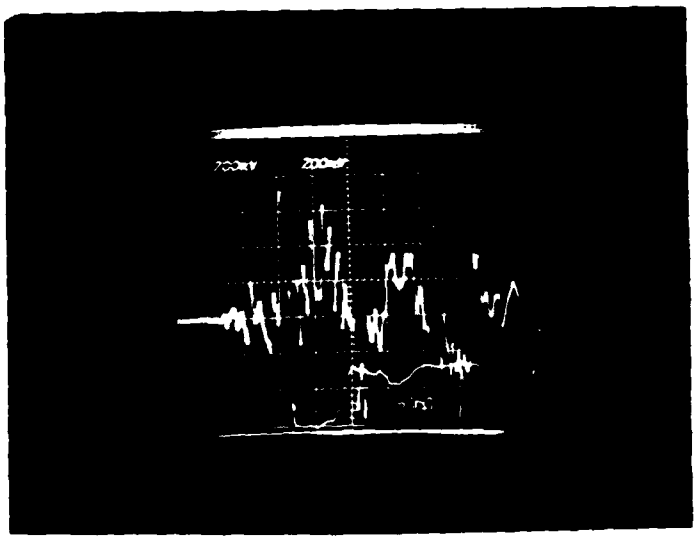
Date	August 9, 1985
Test Point	
Amplification	dB
Attenuation	20 dB
Horizontal	50 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulser Level	30 KV Charge
Data Link	
Comments:	



(19)

FISCHER IN PLACE, USED BNC NON-SHORTING CAP FOR BACKGROUND.

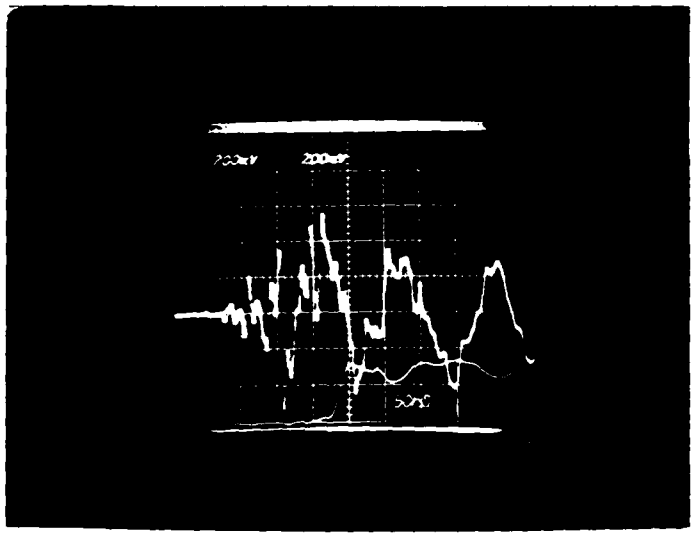
Date	August 9, 1985
Test Point	
Amplification	dB
Attenuation	20 dB
Horizontal	50 ns/div 1
Vertical	200 mV/div 1
Horizontal	50 ns/div 2
Vertical	200 mV/div 2
Configuration	
Pulser Level	30KV Charge
Data Link	
Comments:	



(20)

RERUN OF (17) - ANTENNA, FISCHER, I = +2A & -6A
CONDUCTIVE TAPE OVER BNC CONNECTORS (2A/DIV)
7.2A (3600V)

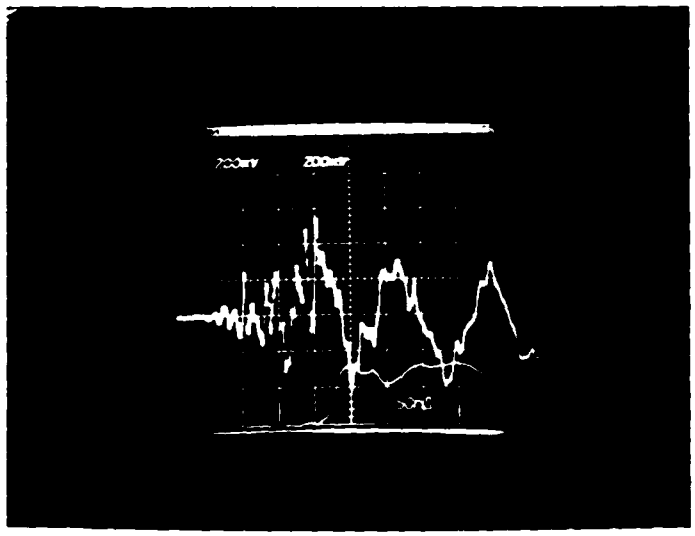
Date	August 9, 1985
Test Point	
Amplification	dB
Attenuation	20 dB
Horizontal	50 ns/div 1
Vertical	200 mV/div 1
Horizontal	50 ns/div 2
Vertical	200 mV/div 2
Configuration	
Pulser Level	30 KV Charge
Data Link	
Comments:	



(21)

RUBBER DUCK ANTENNA, BNC T, I=5A PEAK
(2 A/div) 5.6A (280V)

Date	August 9, 1985
Test Point	
Amplification	dB
Attenuation	20 dB
Horizontal	50 ns/div 1
Vertical	200 mV/div 1
Horizontal	50 ns/div 2
Vertical	200 mV/div 2
Configuration	
Pulser Level	30 KV Charge
Data Link	
Comments:	



(22)

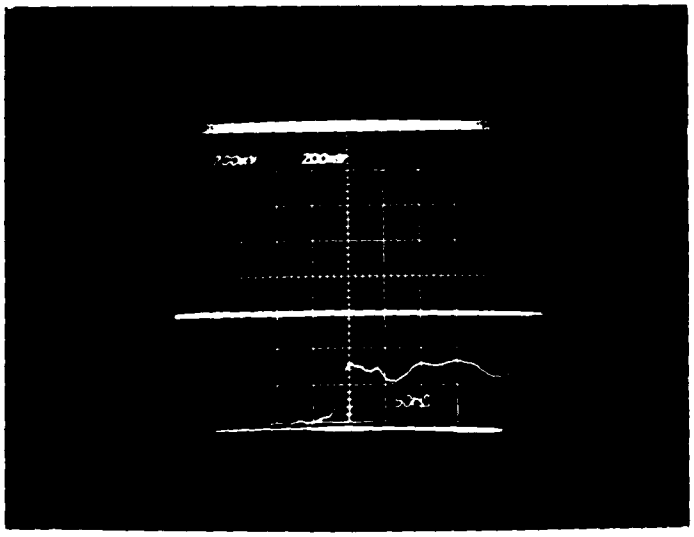
RUBBER DUCK ANTENNA - THROUGH GAS GAP PROTECTOR IN BNC T
(2A/DIV) - (5.6A) (280V)

Date	August 9, 1985
Test Point	F18R
Amplification	dB
Attenuation	dB
Horizontal	50 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulser Level	30KV Charge
Data Link	

Comments:
(SYSTEM 7)

23

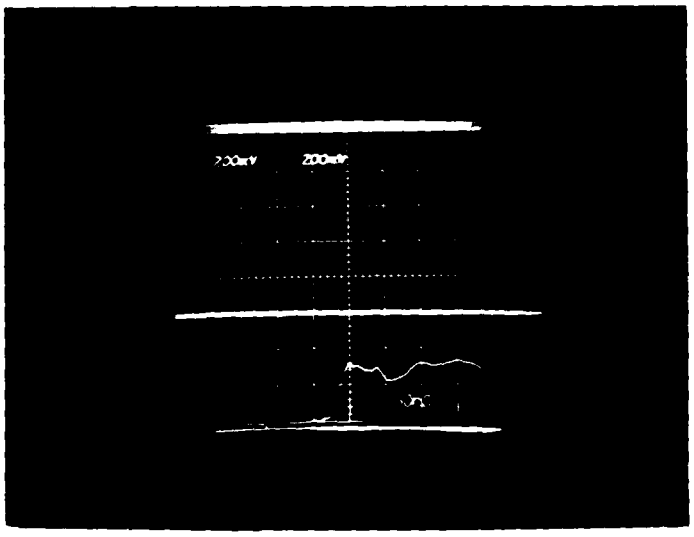
UNPROTECTED



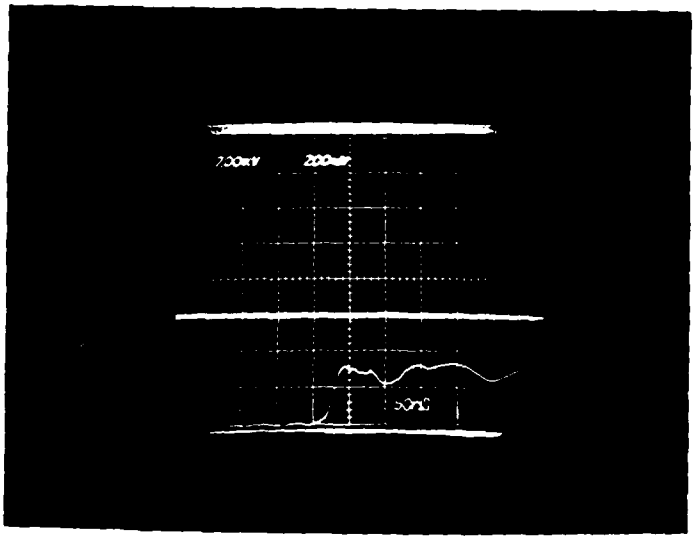
Date	August 9, 1985
Test Point	F19R
Amplification	dB
Attenuation	dB
Horizontal	50 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulser Level	30KV Charge
Data Link	

Comments:
(SYSTEM 13)

24

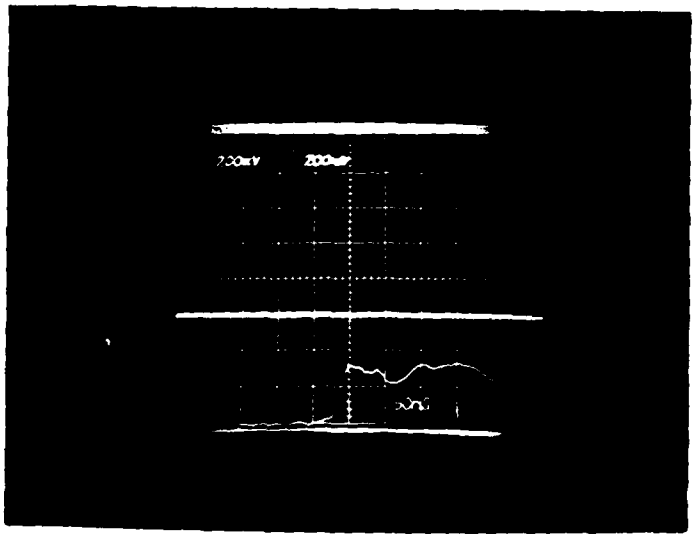


Date	August 9, 1985
Test Point	F20R, F21R
Amplification	dB
Attenuation	dB
Horizontal	50 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulser Level	30KV Charge
Data Link	
Comments:	(SYSTEMS 7 + 13)



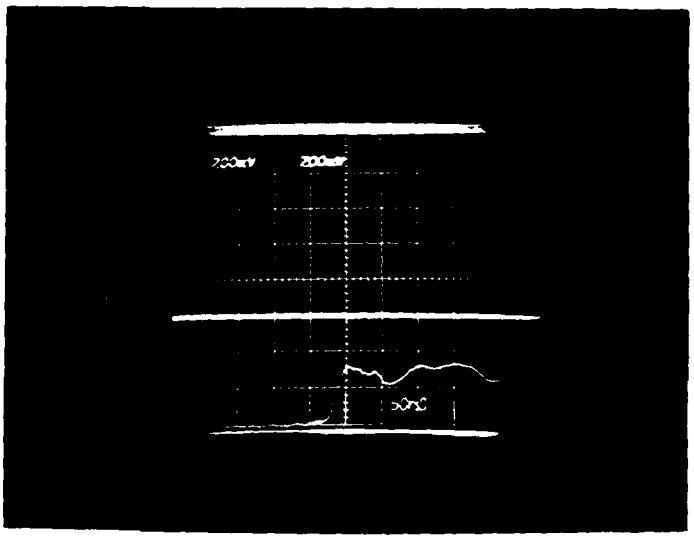
25

Date	August 9, 1985
Test Point	F 22T
Amplification	dB
Attenuation	dB
Horizontal	50 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulser Level	30KV Charge
Data Link	
Comments:	(SYSTEM 13)



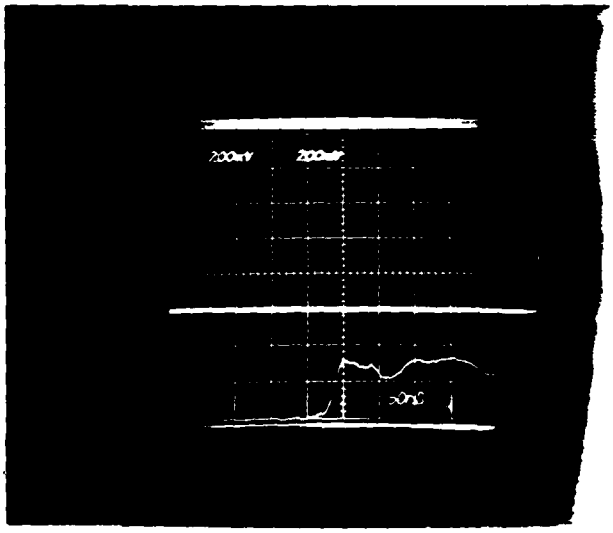
26

Date	August 9, 1985
Test Point	F 23T
Amplification	dB
Attenuation	dB
Horizontal	50 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulser Level	30 KV Charge
Data Link	
Comments:	(SYSTEM 7)



27

Date	August 9, 1985
Test Point	F24R
Amplification	dB
Attenuation	dB
Horizontal	50 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulser Level	30 KV Charge
Data Link	
Comments:	(SYSTEM 7)

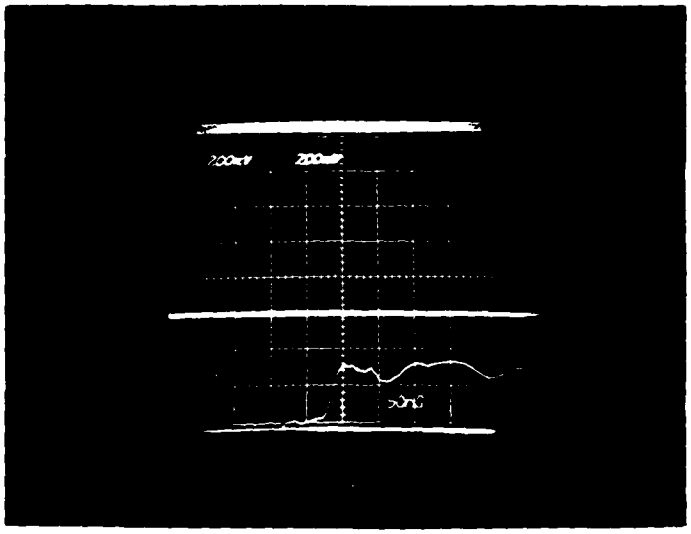


28

Date	August 9, 1985
Test Point	F25R
Amplification	dB
Attenuation	dB
Horizontal	50 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulser Level	30 KV Charge
Data Link	

Comments:
(System 13)

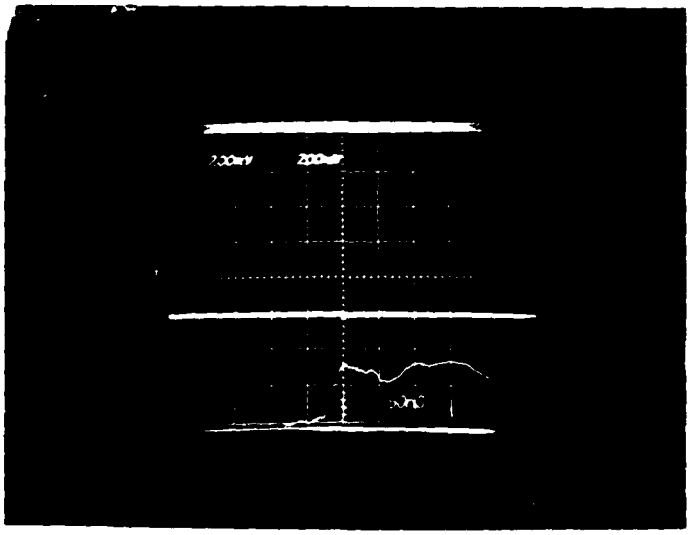
(29)



Date	August 9, 1985
Test Point	F26
Amplification	dB
Attenuation	dB
Horizontal	50 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulser Level	30 KV Charge
Data Link	

Comments:
(SYSTEM 13)
BATTERY CHARGER

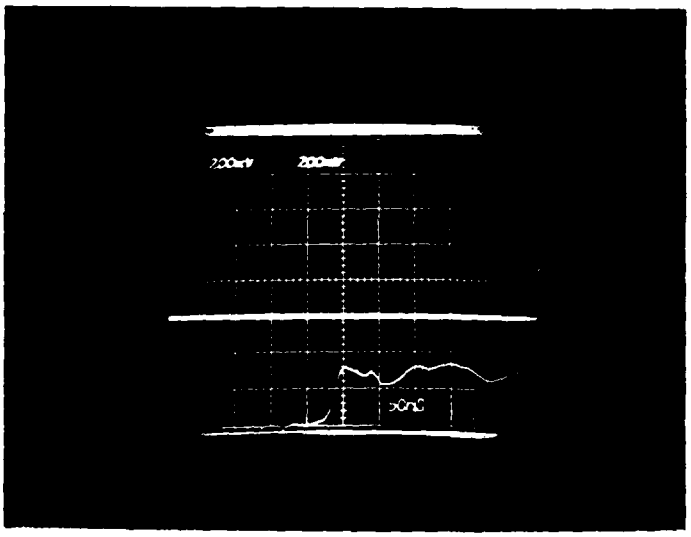
(30)



Date	August 9, 1985
Test Point	F27
Amplification	dB
Attenuation	dB
Horizontal	50 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulser Level	30KV Charge
Data Link	

Comments:
(SYSTEM 13)
Battery Charger

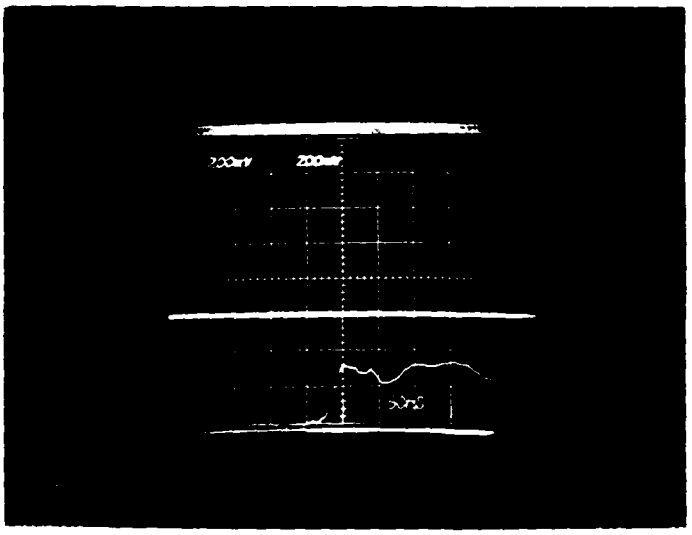
(31)



Date	August 9, 1985
Test Point	F28
Amplification	dB
Attenuation	dB
Horizontal	50 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulser Level	30KV Charge
Data Link	

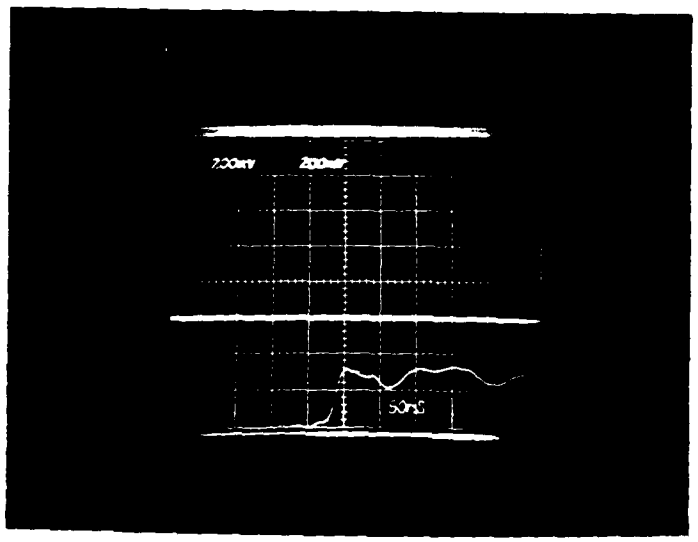
Comments:
(SYSTEM 13)
Battery Charger

(32)



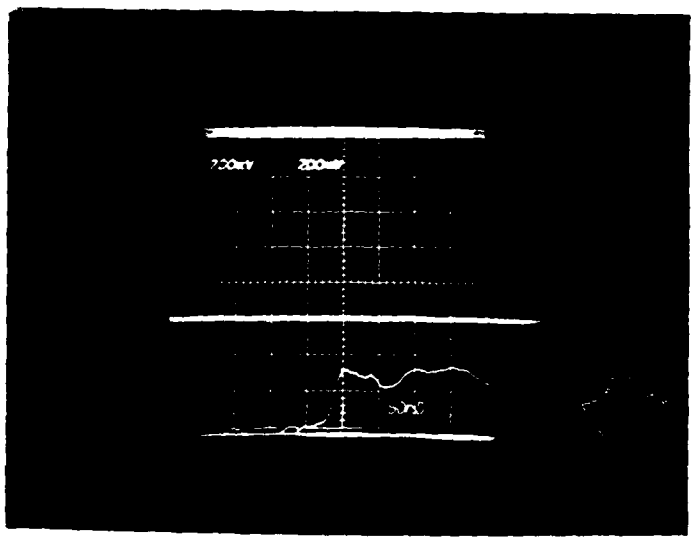
NO PHOTO 33

Date	August 9, 1985
Test Point	F29
Amplification	dB
Attenuation	dB
Horizontal	50 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulser Level	30 KV Charge
Data Link	
Comments: (SYSTEM 13)	



34

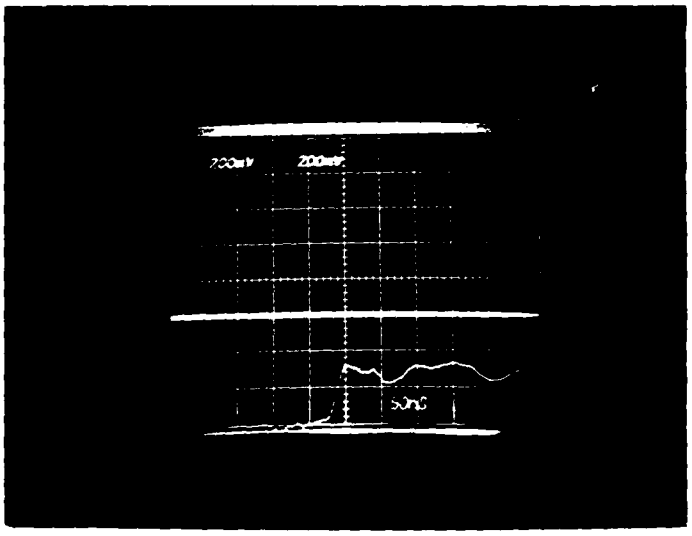
Date	August 9, 1982
Test Point	F30
Amplification	dB
Attenuation	dB
Horizontal	50 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulser Level	30 KV Charge
Data Link	
Comments: (SYSTEM 7)	



35

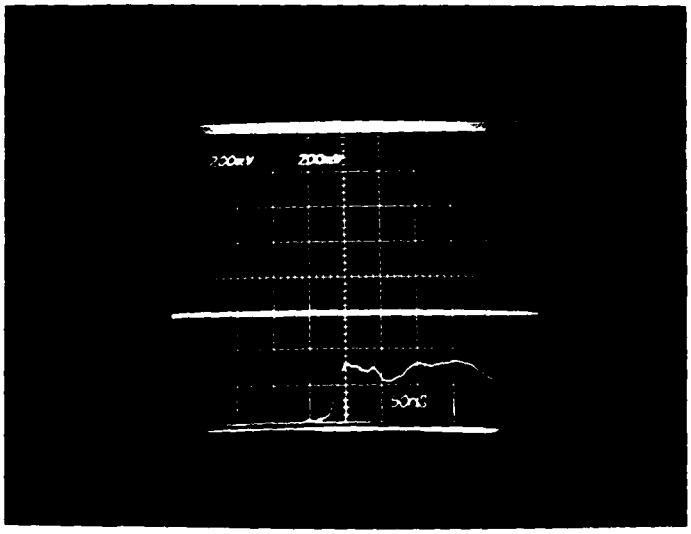
Date	August 9, 1985
Test Point	F31
Amplification	dB
Attenuation	dB
Horizontal	50 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulser Level	30KV Charge
Data Link	
Comments: (SYSTEM 7)	

36



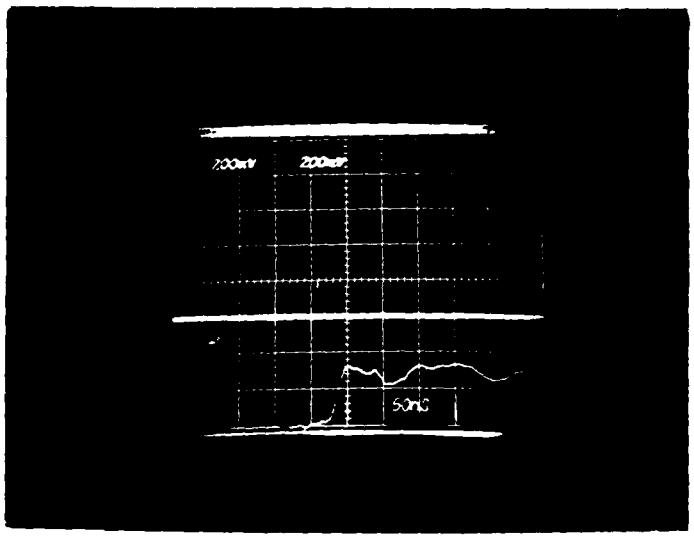
Date	August 9, 1985
Test Point	F32R
Amplification	dB
Attenuation	dB
Horizontal	50 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulser Level	30KV Charge
Data Link	
Comments: (SYSTEM 12)	

37



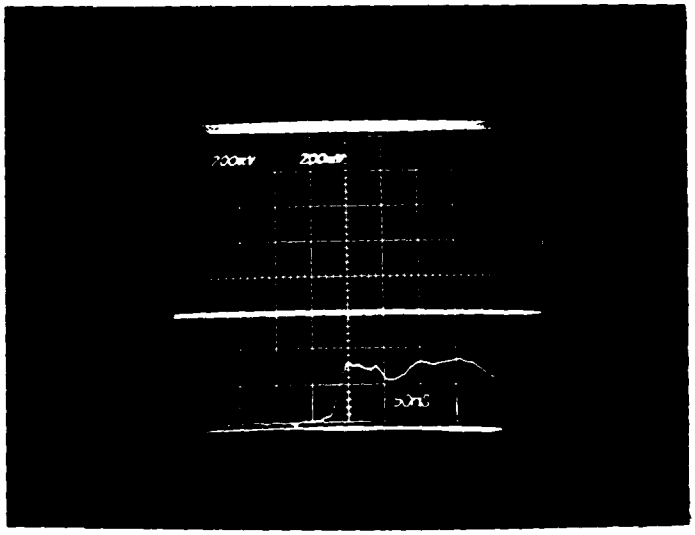
Date	August 9, 1985
Test Point	F32RL
Amplification	dB
Attenuation	dB
Horizontal	50 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulser Level	30 KV Charge
Data Link	
Comments: (SYSTEM 12)	

38



Date	August 9, 1985
Test Point	F33R
Amplification	dB
Attenuation	dB
Horizontal	50 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulser Level	30 KV Charge
Data Link	
Comments: (SYSTEM 12)	

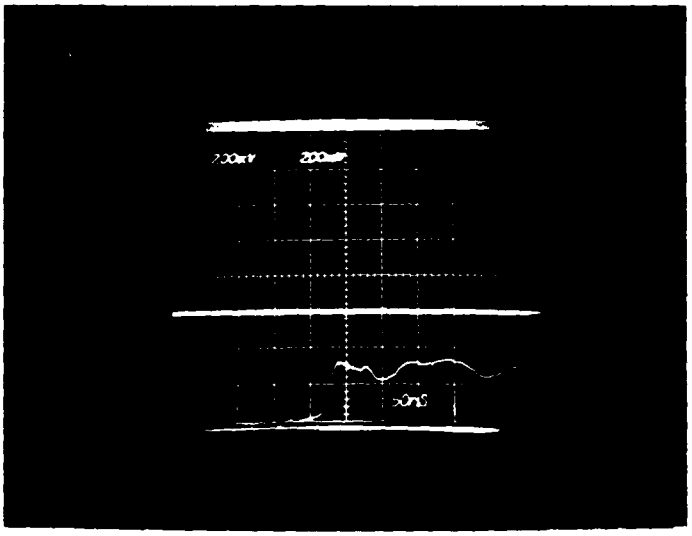
39



Date	August 9, 1985
Test Point	F33T
Amplification	dB
Attenuation	dB
Horizontal	50 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulser Level	30KV Charge
Data Link	

Comments:
(SYSTEM 12)

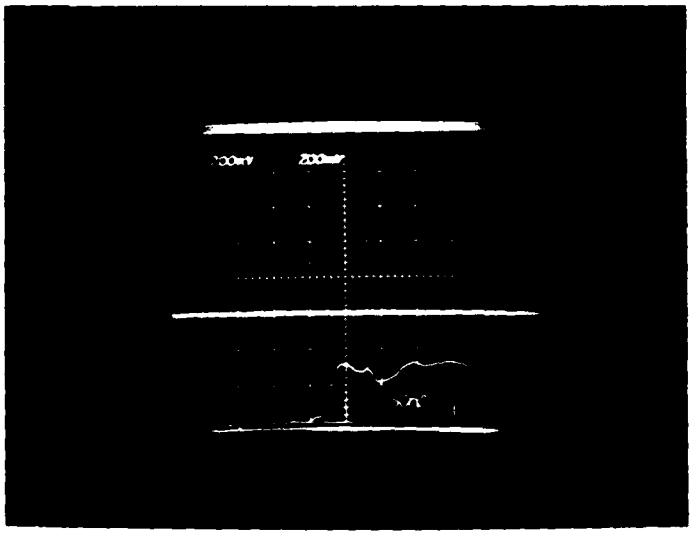
41



Date	August 9, 1985
Test Point	F34R
Amplification	dB
Attenuation	dB
Horizontal	50 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulser Level	30KV Charge
Data Link	

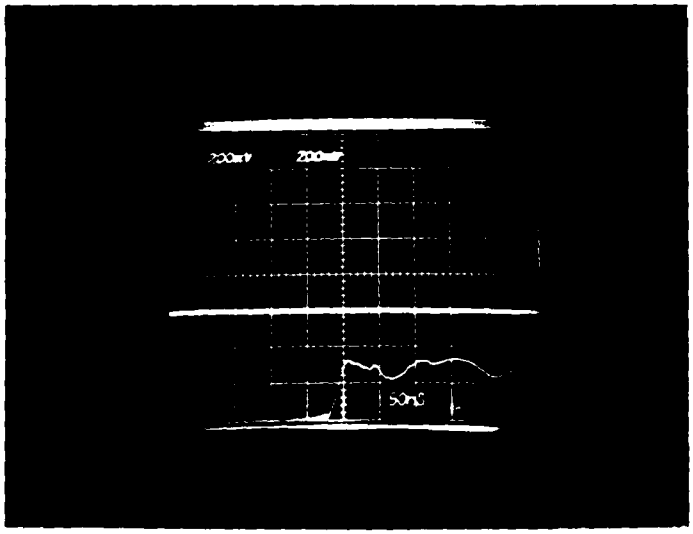
Comments:
(SYSTEM 6)

42



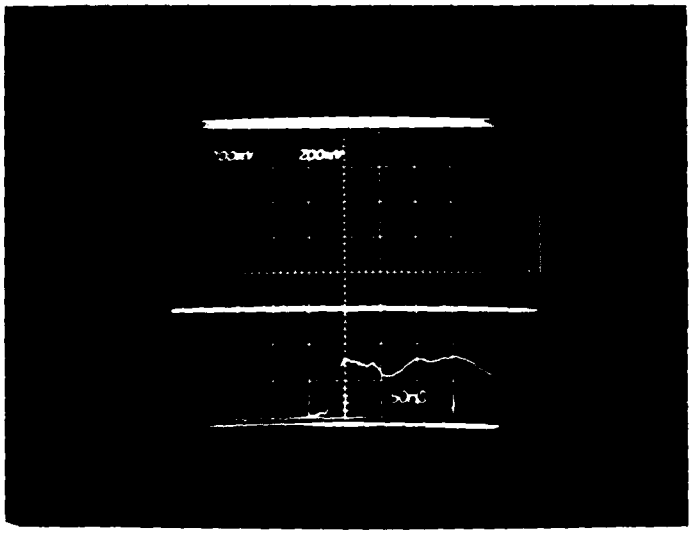
Date	August 9, 1985
Test Point	F34T
Amplification	dB
Attenuation	dB
Horizontal	50 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulser Level	30KV Charge
Data Link	
Comments:	(SYSTEM 6)

43



Date	August 9, 1985
Test Point	F35R
Amplification	dB
Attenuation	dB
Horizontal	50 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulser Level	30KV Charge
Data Link	
Comments:	(SYSTEM 6)

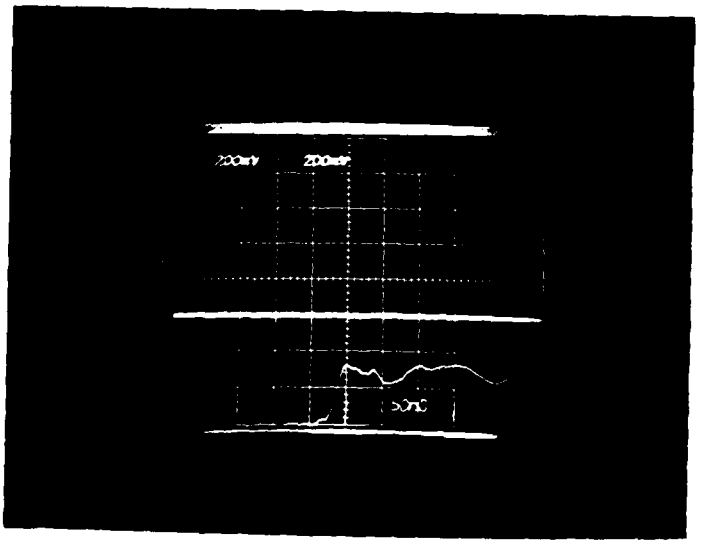
44



Date	August 9, 1985		
Test Point	F35T		
Amplification		dB	
Attenuation		dB	
Horizontal	50	ns/div	1
Vertical	200	mV/div	1
Horizontal		ns/div	2
Vertical		mV/div	2
Configuration			
Pulser Level	30 KV Charge		
Data Link			

Comments:
(SYSTEM 6)

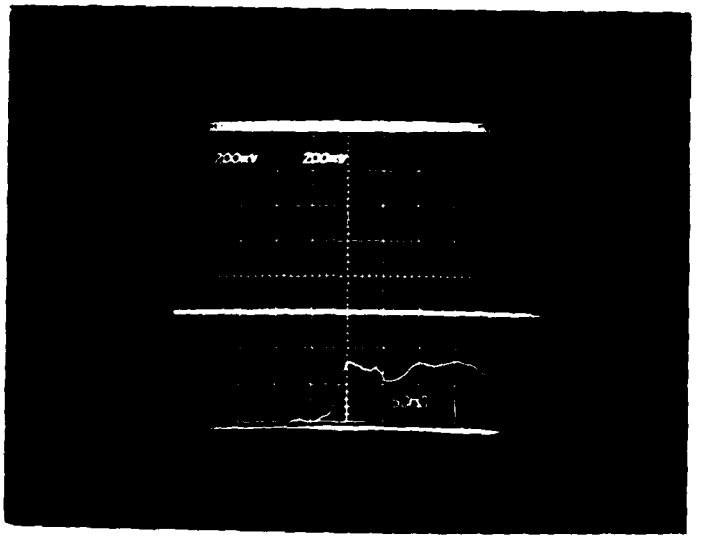
45



Date	August 9, 1985		
Test Point	F36R		
Amplification		dB	
Attenuation		dB	
Horizontal	50	ns/div	1
Vertical	200	mV/div	1
Horizontal		ns/div	2
Vertical		mV/div	2
Configuration			
Pulser Level	30 KV Charge		
Data Link			

Comments:
(SYSTEM 8)

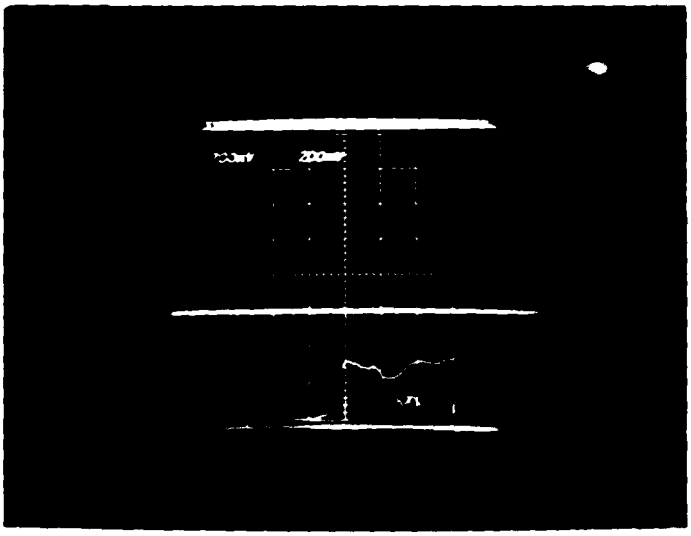
46



Date	August 9, 1985	
Test Point	F36T	
Amplification		dB
Attenuation		dB
Horizontal	50	ns/div 1
Vertical	200	mV/div 1
Horizontal		ns/div 2
Vertical		mV/div 2
Configuration		
Pulser Level	30 KV Charge	
Data Link		

Comments:
(SYSTEM 8)

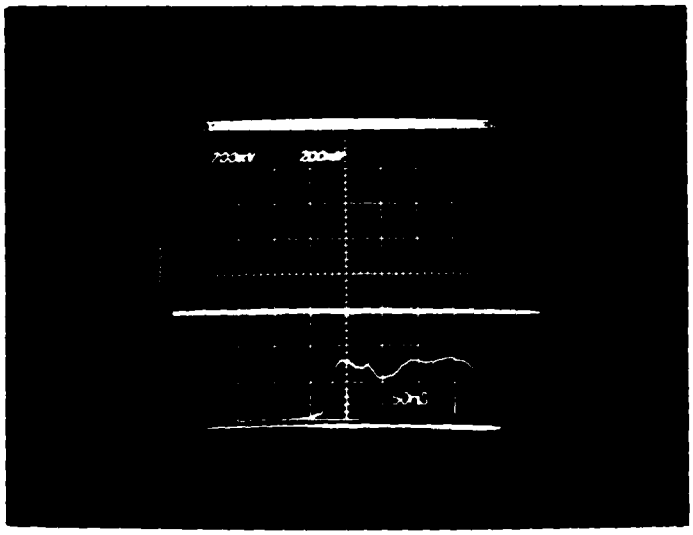
47



Date	August 9, 1985	
Test Point	F37R	
Amplification		dB
Attenuation		dB
Horizontal	50	ns/div 1
Vertical	200	mV/div 1
Horizontal		ns/div 2
Vertical		mV/div 2
Configuration		
Pulser Level	30 KV Charge	
Data Link		

Comments:
(SYSTEM 8)

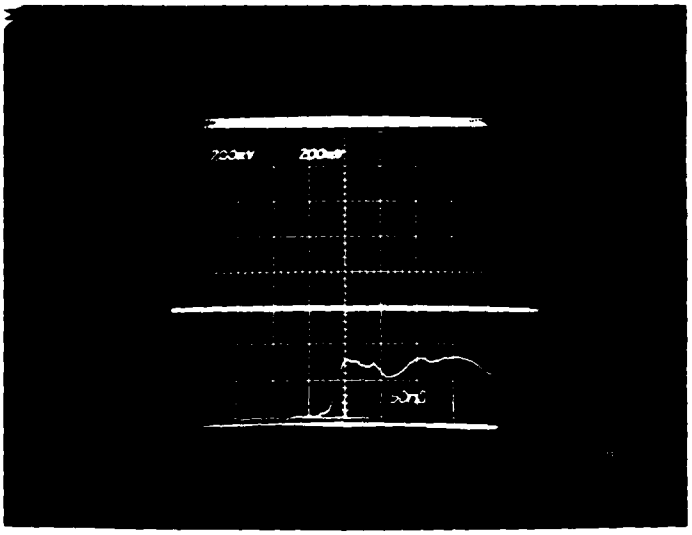
48



Date	August 9, 1985	
Test Point	F 37R1	
Amplification		dB
Attenuation		dB
Horizontal	50	ns/div 1
Vertical	200	mV/div 1
Horizontal		ns/div 2
Vertical		mV/div 2
Configuration		
Pulser Level	30 KV Charge	
Data Link		

Comments:
(SYSTEM 8)

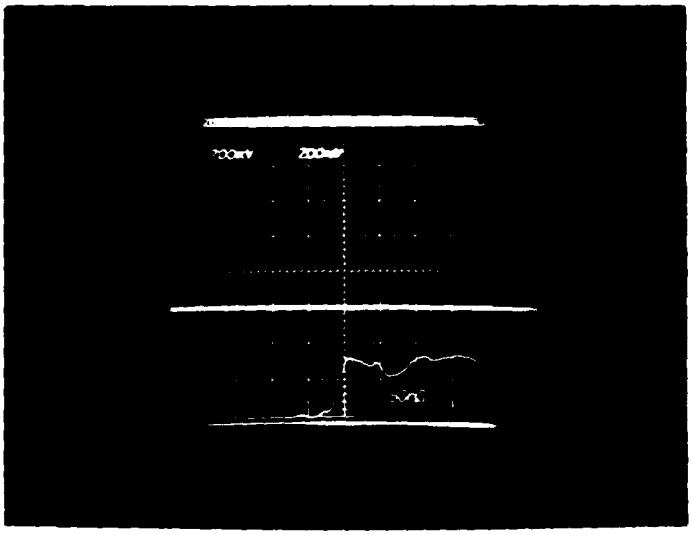
49



Date	August 9, 1985	
Test Point	F 37T	
Amplification		dB
Attenuation		dB
Horizontal	50	ns/div 1
Vertical	200	mV/div 1
Horizontal		ns/div 2
Vertical		mV/div 2
Configuration		
Pulser Level	30 KV Charge	
Data Link		

Comments:
(SYSTEM 8)

50

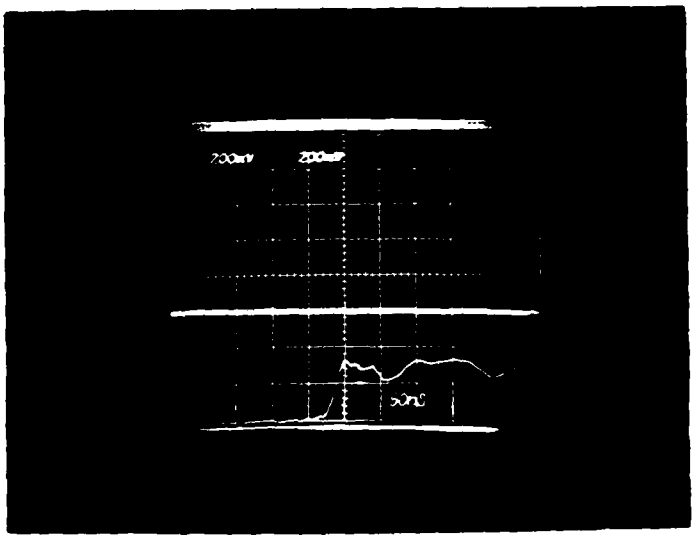


Date	August 9, 1985
Test Point	F38R
Amplification	dB
Attenuation	dB
Horizontal	50 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulser Level	30 KV Charge
Data Link	

Comments:

SYSTEM 9

(51)

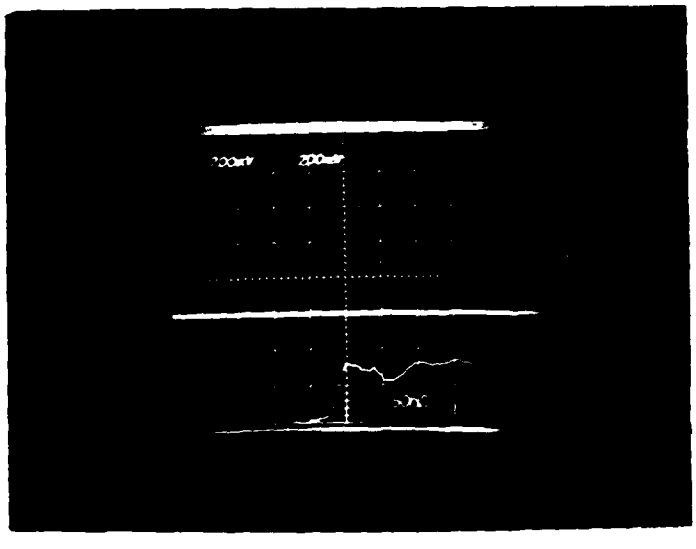


Date	August 9, 1985
Test Point	F38T
Amplification	dB
Attenuation	dB
Horizontal	50 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulser Level	30 KV Charge
Data Link	

Comments:

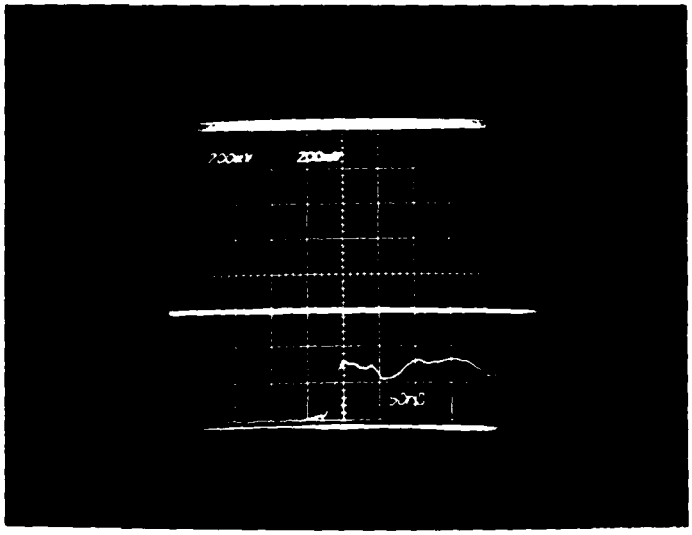
(SYSTEM 9)

(52)



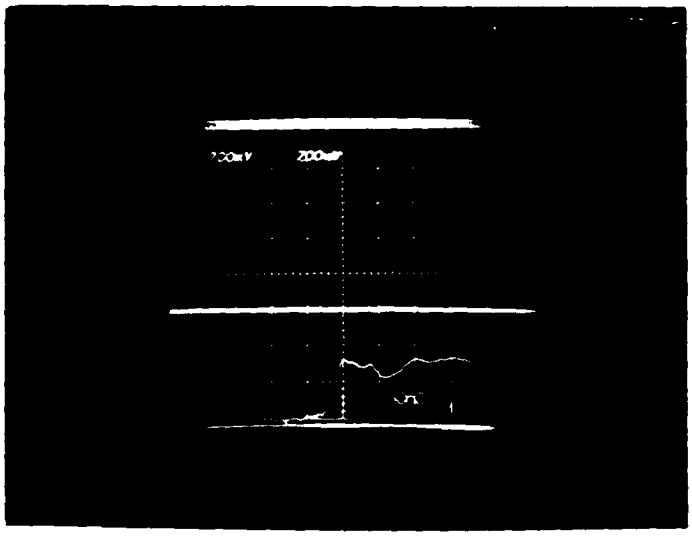
Date	August 9, 1985
Test Point	F39R
Amplification	dB
Attenuation	dB
Horizontal	50 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulser Level	30 KV Charge
Data Link	
Comments:	(SYSTEM 9)

53



Date	August 9, 1985
Test Point	F39RL
Amplification	dB
Attenuation	dB
Horizontal	50 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulser Level	30 KV Charge
Data Link	
Comments:	(SYSTEM 9)

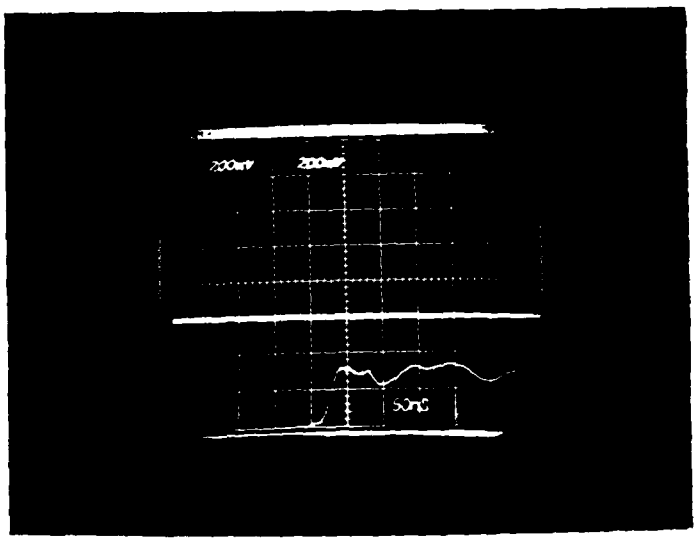
54



Date	August 9, 1985
Test Point	F39T
Amplification	dB
Attenuation	dB
Horizontal	50 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulser Level	30 KV Charge
Data Link	

Comments:
(SYSTEM 9)

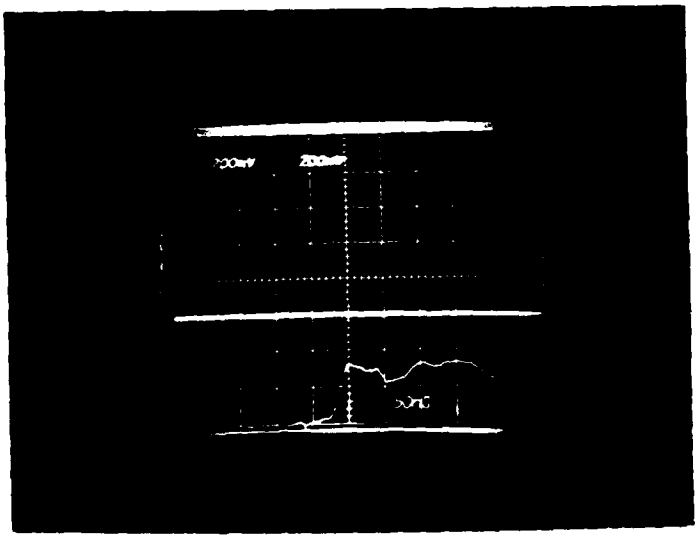
55



Date	August 9, 1985
Test Point	F 40
Amplification	dB
Attenuation	dB
Horizontal	50 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulser Level	30 KV Charge
Data Link	

Comments:
DC POWER SUPPLY

56

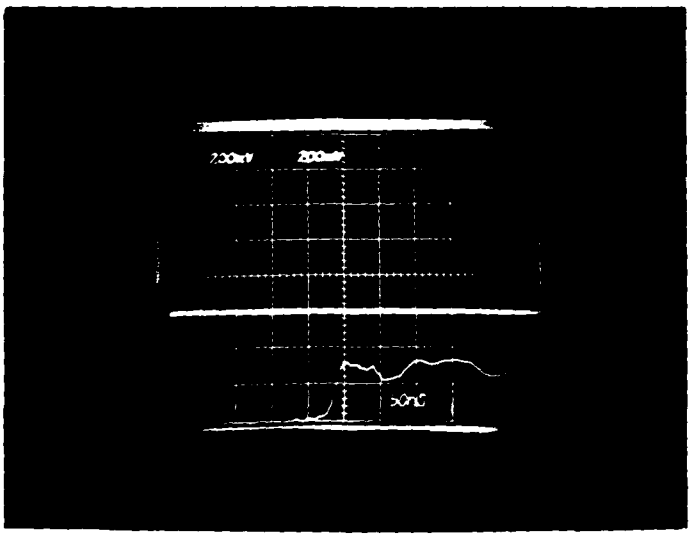


Date	August 9, 1985
Test Point	F41
Amplification	dB
Attenuation	dB
Horizontal	50 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulser Level	30 KV Charge
Data Link	

Comments:

DC POWER SUPPLY

57

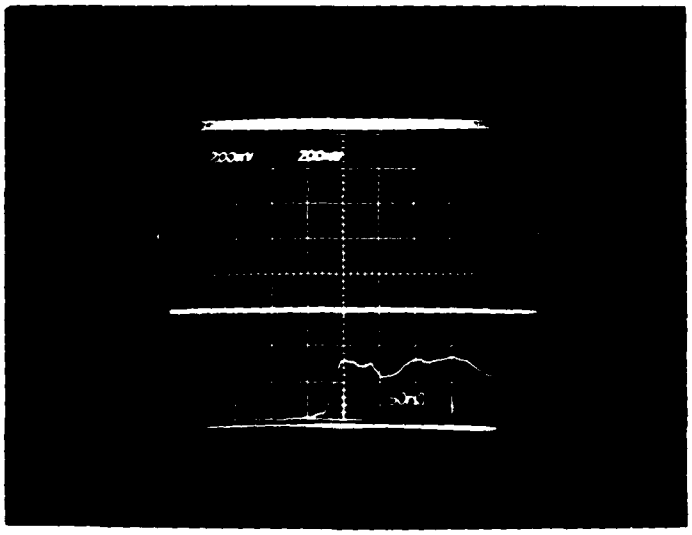


Date	August 9, 1985
Test Point	F42
Amplification	dB
Attenuation	dB
Horizontal	50 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulser Level	30 KV Charge
Data Link	

Comments:

HONDA

58

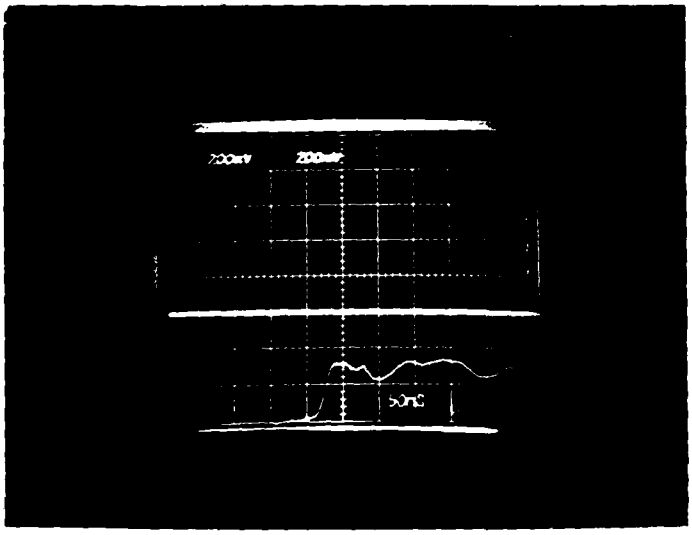


Date	August 9, 1985
Test Point	F43
Amplification	dB
Attenuation	dB
Horizontal	50 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulser Level	30KV Charge
Data Link	

Comments:

HONDA

59

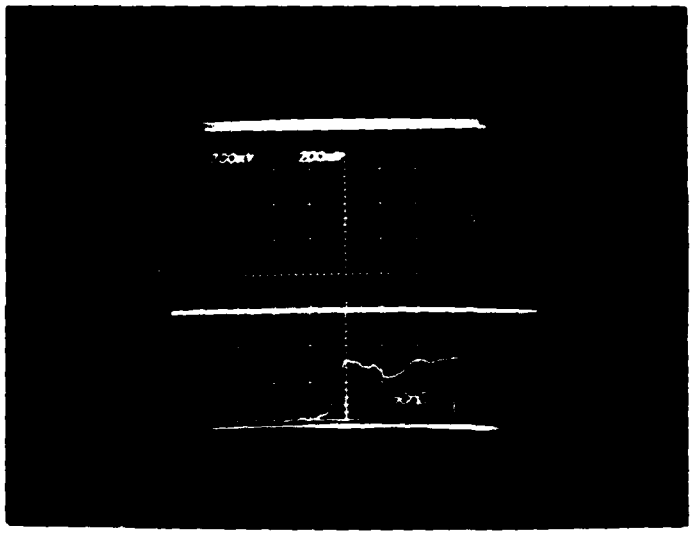


Date	August 9, 1985
Test Point	F44
Amplification	dB
Attenuation	dB
Horizontal	50 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulser Level	30KV Charge
Data Link	

Comments:

HONDA

60

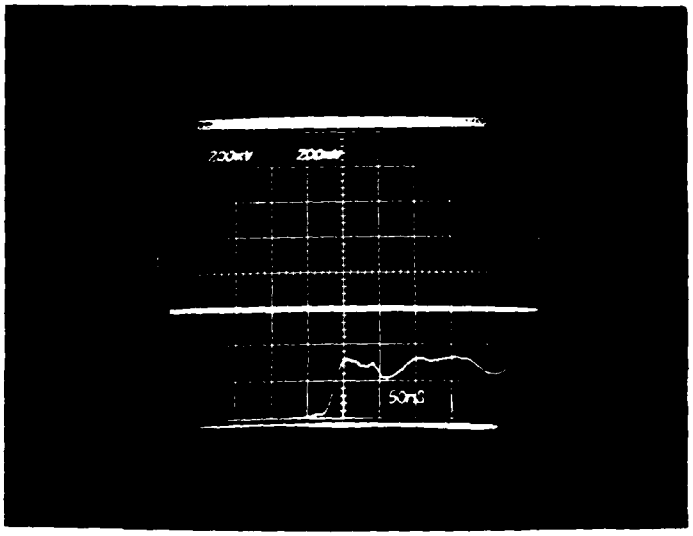


Date	August 9, 1985
Test Point	F45
Amplification	dB
Attenuation	dB
Horizontal	50 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulser Level	30 KV Charge
Data Link	

Comments:

HONDA

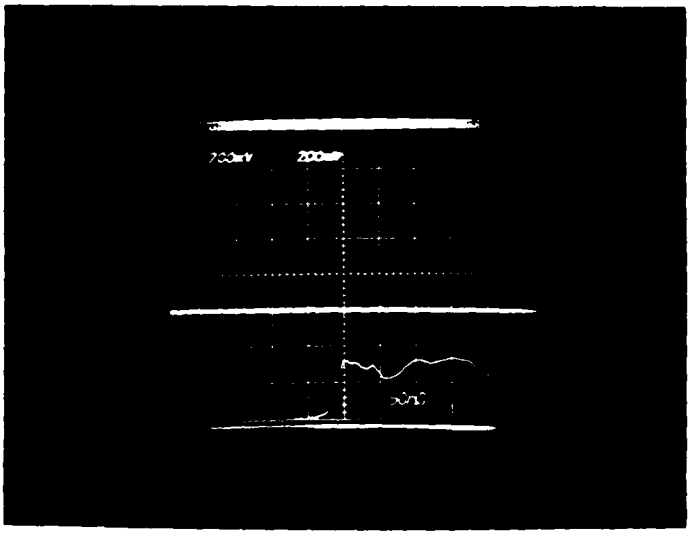
(61)



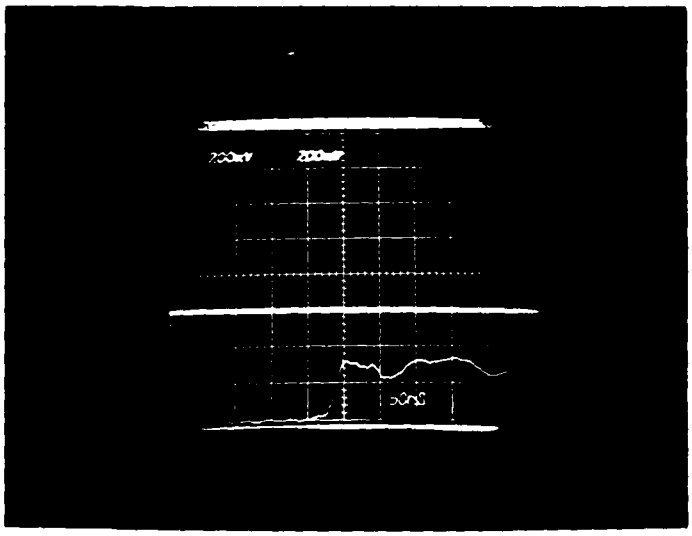
Date	August 9, 1985
Test Point	F46
Amplification	dB
Attenuation	dB
Horizontal	50 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulser Level	30 KV Charge
Data Link	

Comments:

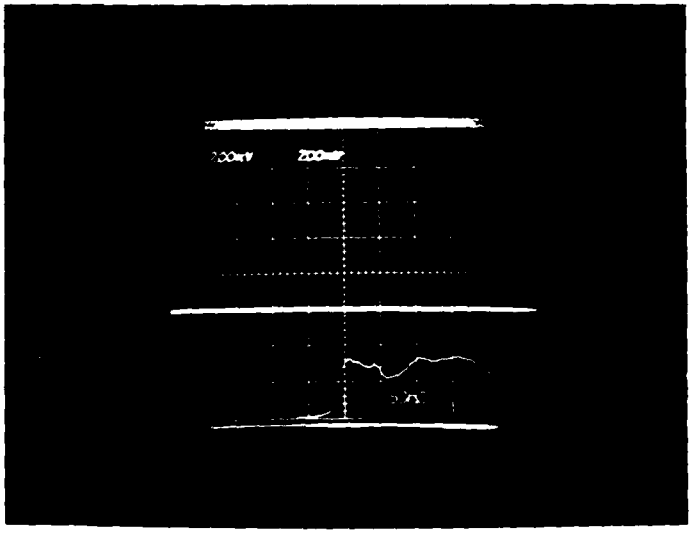
(62)



Date	9 August, 1985
Test Point	F47R
Amplification	dB
Attenuation	dB
Horizontal	50 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulser Level	30KV Charge
Data Link	
Comments:	(SYSTEM II + HONDA) (63)



Date	August 9, 1985
Test Point	F47T
Amplification	dB
Attenuation	dB
Horizontal	50 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulser Level	30KV Charge
Data Link	
Comments:	(SYSTEM II + HONDA) (64)



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