

ADN436

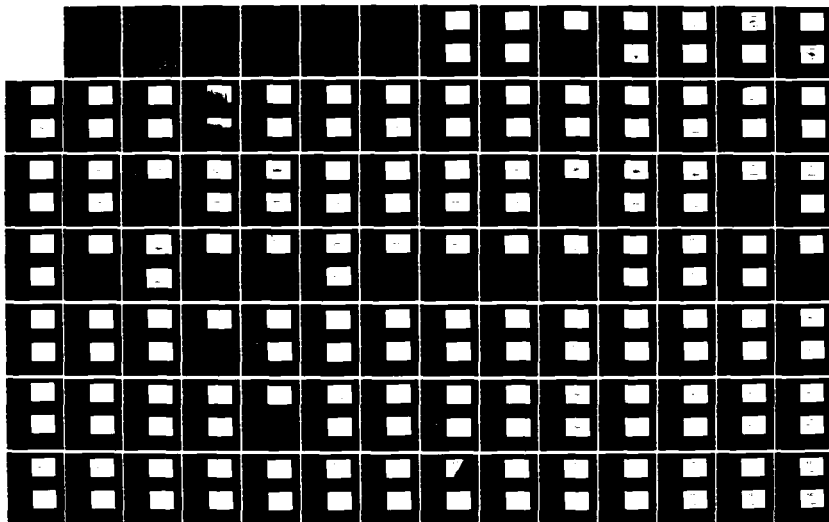
ELECTROMAGNETIC PULSE/TRANSIENT THREAT TESTING OF
PROTECTION DEVICES FOR (U) ELECTROSPACE SYSTEMS INC
ARLINGTON VA D BODSON ET AL 31 OCT 85

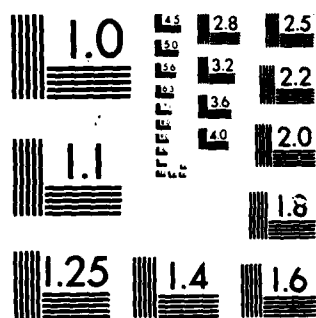
172

UNCLASSIFIED

NCS-T1B-85-10-VOL-3-SEC-5 DCA100-85-C-0010 F/G 20/14

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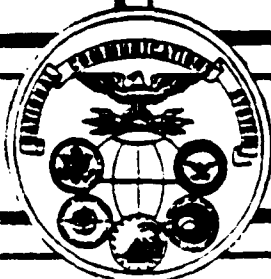




MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

2

NCS TIB 85-10



NATIONAL COMMUNICATIONS SYSTEM

VOLUME III

TEST DATA

ELECTROMAGNETIC PULSE TESTING
OF PROTECTION DEVICES

SECTION 5

EQUIPMENT AND DEVICES
OSCILLOSCOPE PHOTOGRAPHS

OCTOBER 1985

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REPORT DOCUMENTATION PAGE

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12 PERSONAL AUTHOR(S) 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, Electro- magnetic 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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22a NAME OF RESPONSIBLE INDIVIDUAL Dennis Bodson			22b TELEPHONE (Include Area Code) (202) 692-2124		22c OFFICE SYMBOL NCS/TS

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Block 19 Continued - ABSTRACT

(136 pages) contains supporting documentation including: the test plans for the two EMF 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

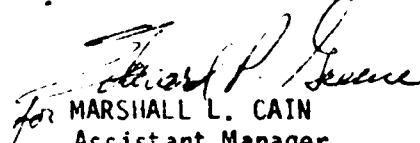
ELECTROMAGNETIC PULSE/TRANSIENT THREAT TESTING OF PROTECTION
DEVICES FOR AMATEUR/MILITARY AFFILIATE RADIO SYSTEM EQUIPMENT

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:

- o The exercise of their wartime and non-wartime emergency functions, and their planning and oversight responsibilities.
- o 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

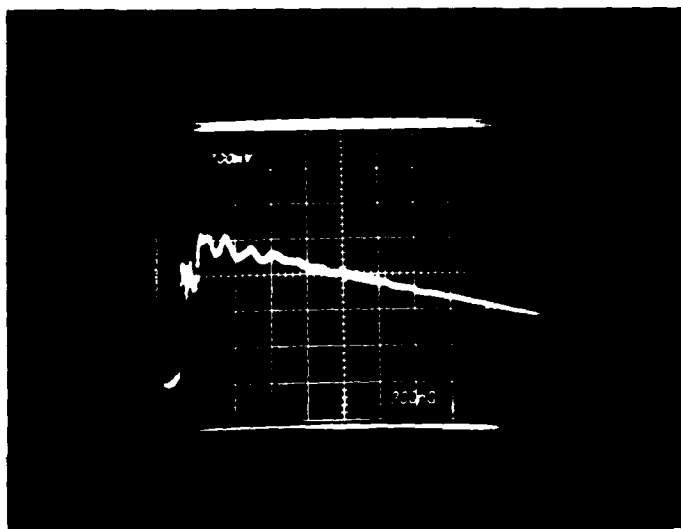
Date	7-29-85 11:25	
Test Point	TA.	
Amplification	dB	
Attenuation	dB	
Horizontal	200	ns/div 1
Vertical	200	mV/div 1
Horizontal	ns/div 2	
Vertical	ns/div 2	
Configuration	Pulse 1	
Pulse Level	25.3 KV	
Data Link	H-SENSOR	

Comments:

200 mA/div

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

OUTPUT 820 mV.



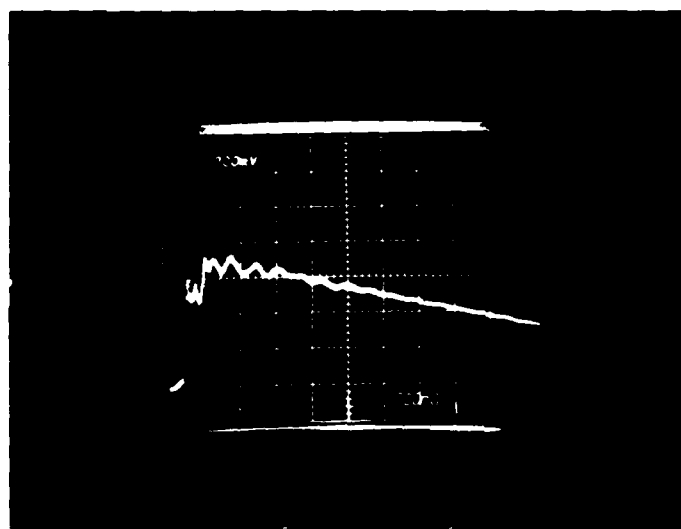
Date	7-29-85/1500	
Test Point	TB-L	
Amplification	dB	
Attenuation	dB	
Horizontal	200	ns/div 1
Vertical	200	mV/div 1
Horizontal	ns/div 2	
Vertical	ns/div 2	
Configuration	PULSE 2	
Pulse Level	25.3KV	
Data Link	H SENSOR	

Comments:

200 mA/div

41.2 KV/m SYSTEMS 1, 4, 10

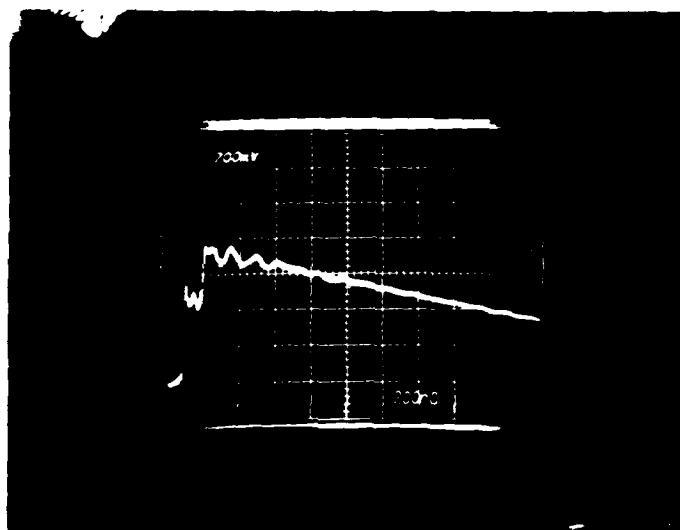
OUTPUT 700 mV



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 KV
 Pulser Level 25.3 CHARGE
 Data Link H SENSOR

Comments:

780 mV output
 45.9 KV/m

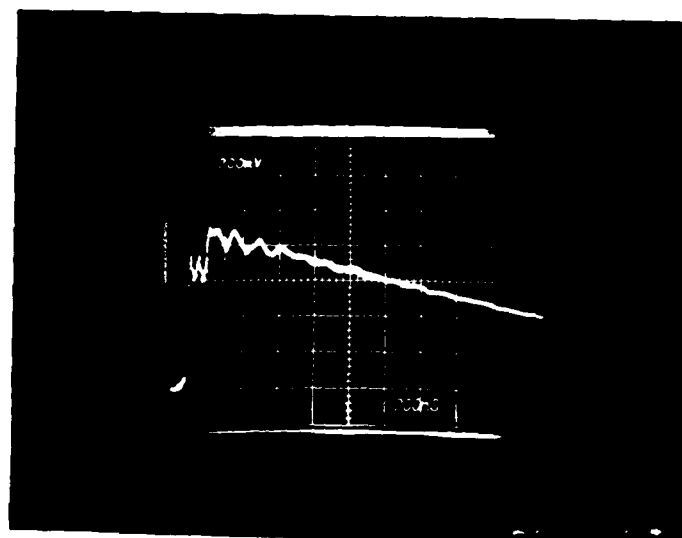


TA = 6, 7, 8, 12 + 13
 TB-2 = 1+4

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 -

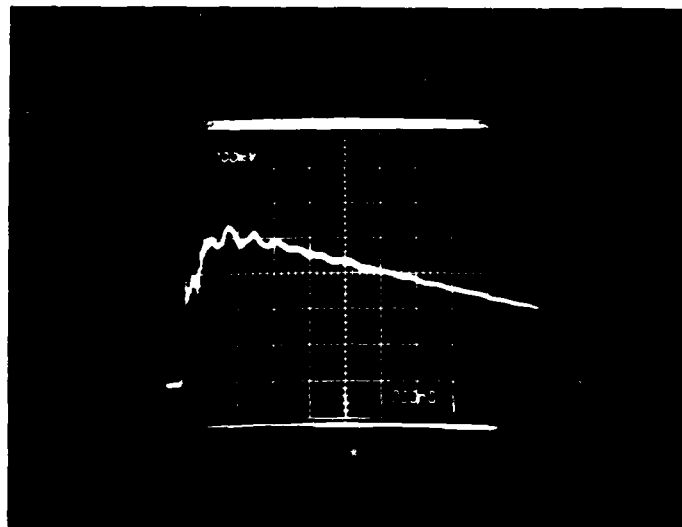


TA = 2, 3, 5, 9, 11 + 16

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	
Pulse Level	29 KV - CHARGE
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	
Pulse 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
 Pulsar Level 20KV CHARGE
 Data Link

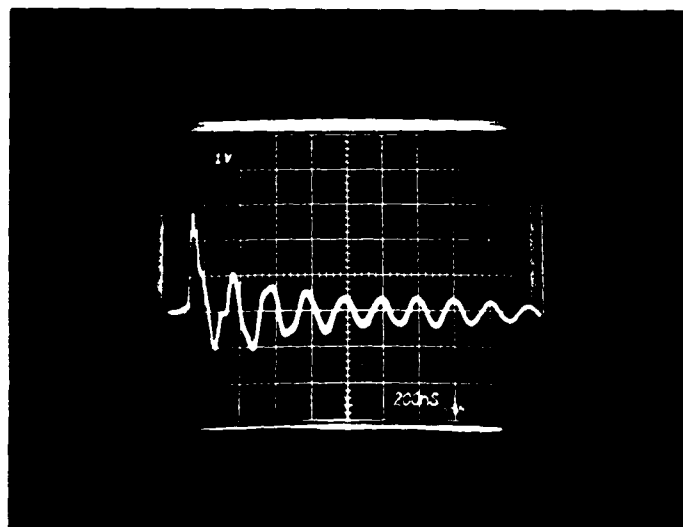
Comments:

- 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 200ns/div peak current 280 A (14KV)



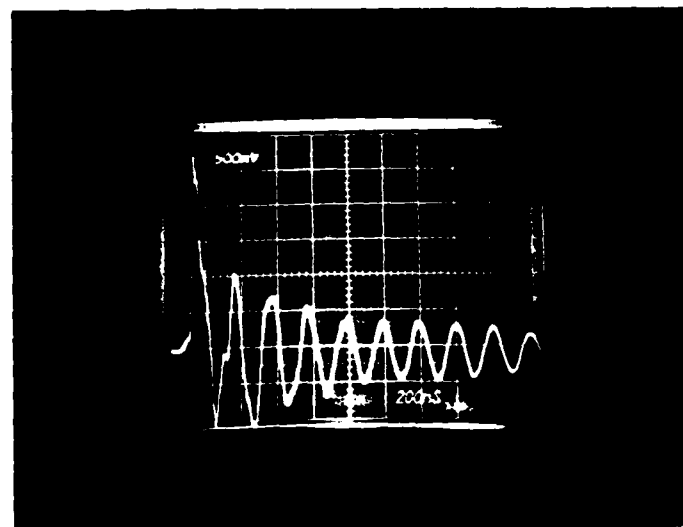
Date 7-31-85
 Test Point MOSLEY - 2
 Amplification dB
 Attenuation 40 dB
 Horizontal 200 ns/div 1
 Vertical 0.5 mV/div 1
 Horizontal ns/div 2
 Vertical ns/div 2
 Configuration
 Pulsar Level 20KV charge
 Data Link

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.

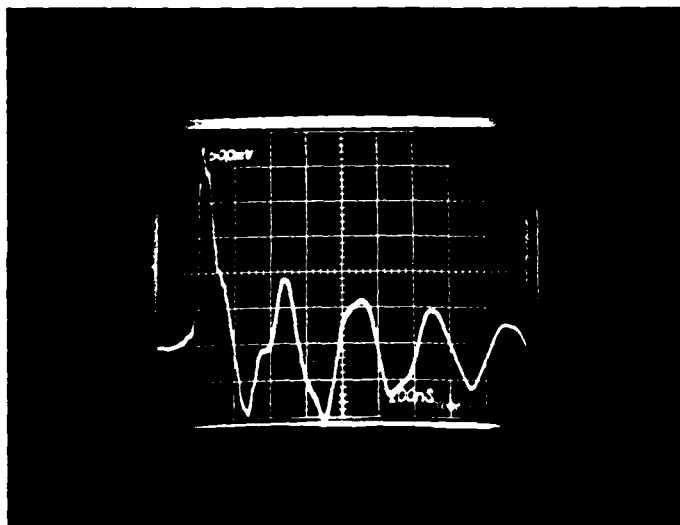


Date 7-31-85
 Test Point MOSLEY - 3
 Amplification dB
 Attenuation 40 dB
 Horizontal 100 ns/div 1
 Vertical 0.5 V/div 1
 Horizontal ns/div 2
 Vertical ns/div 2
 Configuration
 Pulsar Level 20KV CHARGE
 Data Link

Comments:

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

SET UP SAME AS MOSLEY 1 + 2.



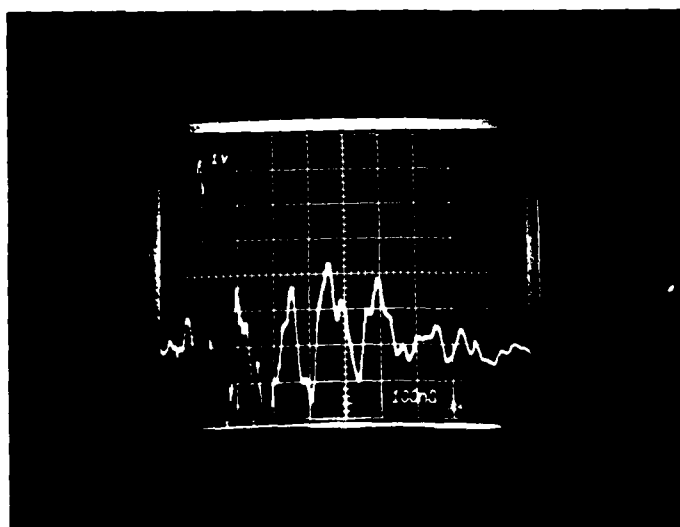
Date 7-31-85
 Test Point MOSLEY - 4
 Amplification dB
 Attenuation 26 dB
 Horizontal 100 ns/div 1
 Vertical 1 V/div 1
 Horizontal ns/div 2
 Vertical ns/div 2
 Configuration
 Pulsar Level 20KV-CHARGE
 Data Link

Comments:

PEAK CURRENT ¹⁰⁶ 53 A
 (5.4KV) (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 μ V/div 1
 Horizontal ns/div 2
 Vertical ns/div 2
 Configuration
 Pulsar Level 20 KV CHARGE
 Data Link

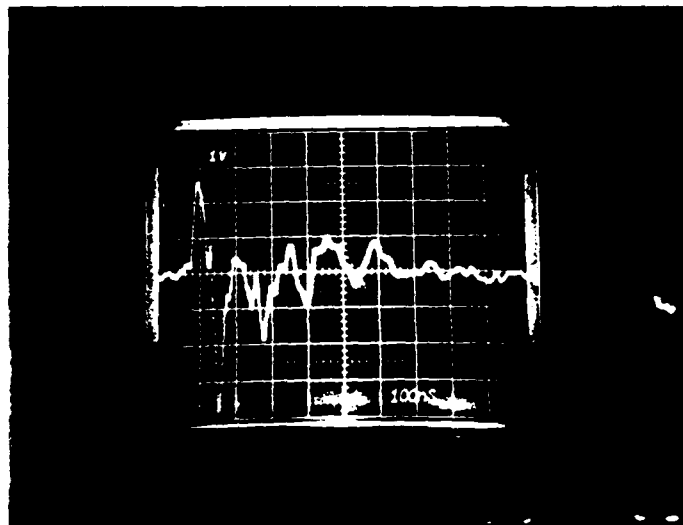
Comments:

PEAK CURRENT ^{-7.2} +52A, -76A

(3.9KV)

(5)

SET UP: SAME AS MOSLEY 4



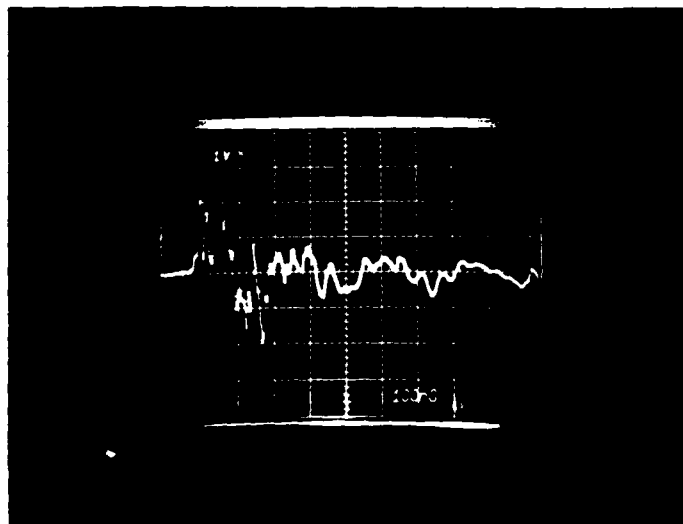
Date 7-31-85
 Test Point MOSLEY -6
 Amplification dB
 Attenuation 26 dB
 Horizontal 100 ns/div 1
 Vertical 1 μ V/div 1
 Horizontal ns/div 2
 Vertical ns/div 2
 Configuration
 Pulsar Level 20 KV CHARGE
 Data Link

Comments:

PEAK CURRENT: OFF SCALE

(6)

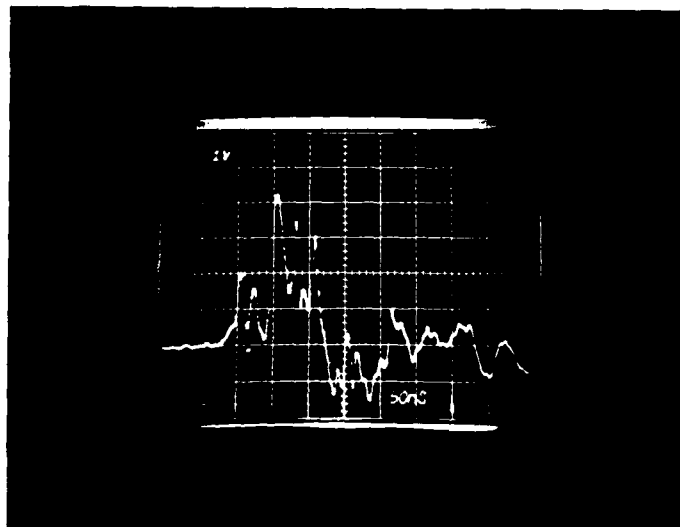
SET UP: USING 50 OHM DUMMY LOAD "ANTENNA"
 GROUNDED. CURRENT THROUGH CENTER CONDUCTORS.
 • SHIELDS GROUNDED.



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

Comments:

PEAK CURRENT 42 A
 (2.1 KV) (7)
 SET UP. SAME AS 6.



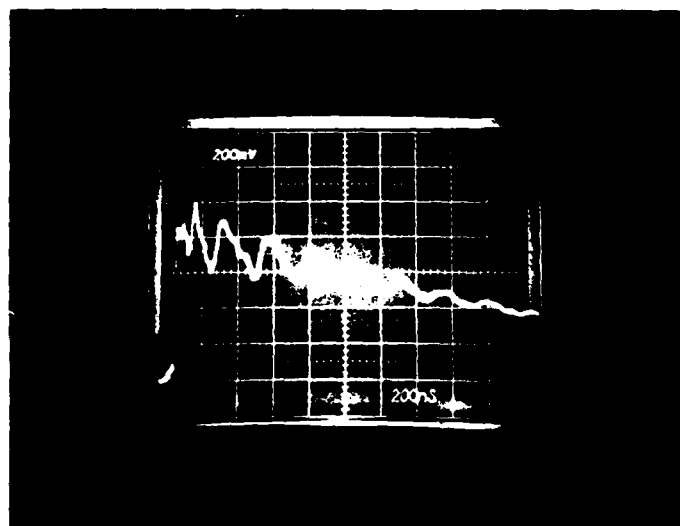
Date 7-31-85
 Test Point ~~MOSLEY-7~~ PROBE 1
 Amplification dB
 Attenuation dB
 Horizontal 200 ns/div 1
 Vertical 200 mV/div 1
 Horizontal ns/div 2
 Vertical ns/div 2
 Configuration
 Pulsar Level
 Data Link

Comments: PROBE CHECK 1

(8)

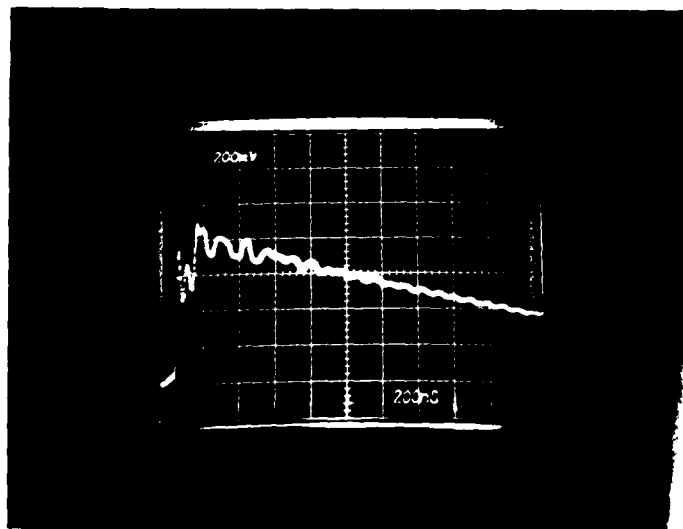
SET UP: REMOVED I PROBE - INSTALLED H PROBE

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			
Pulse Level	20KV CHARGE		
Data Link			

Comments:

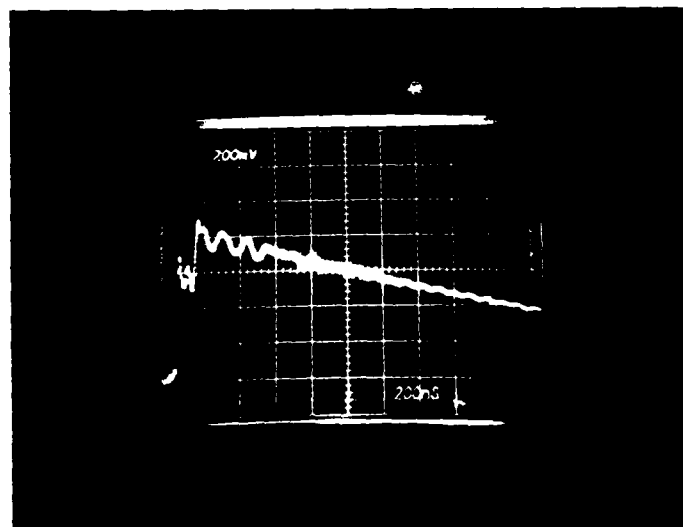


(9)

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			
Pulse Level	20KV CHARGE		
Data Link			

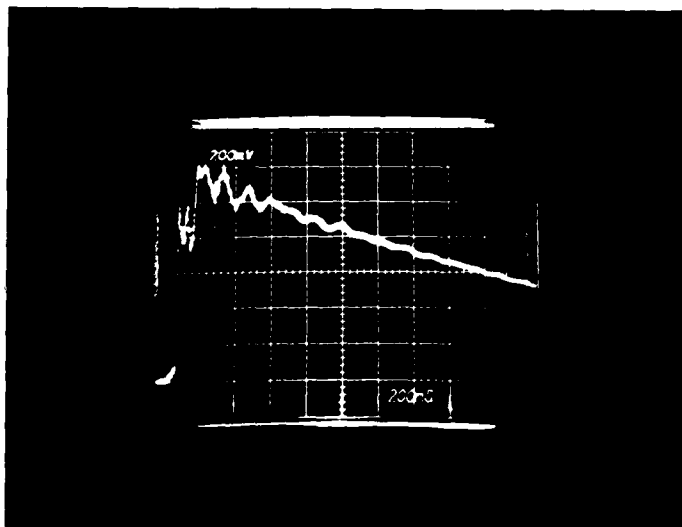
Comments:



(10)

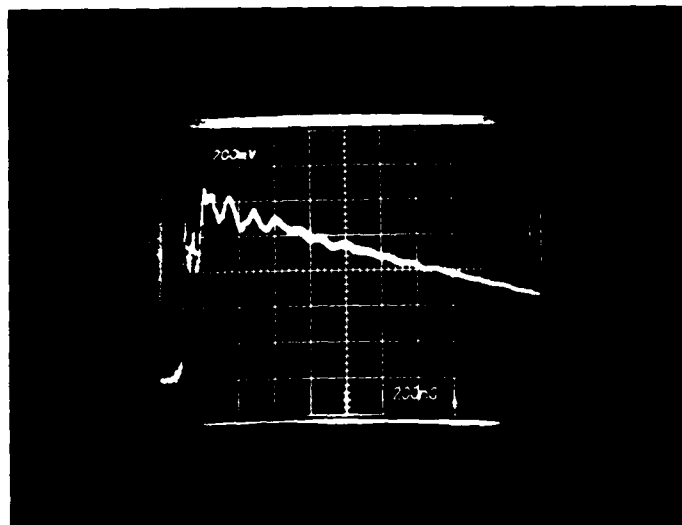
REPEAT 8+9 ANTENNA CABLE
TIED HIGH ON TO ANTENNA
POWER BREAKER DID NOT TRIP.

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:



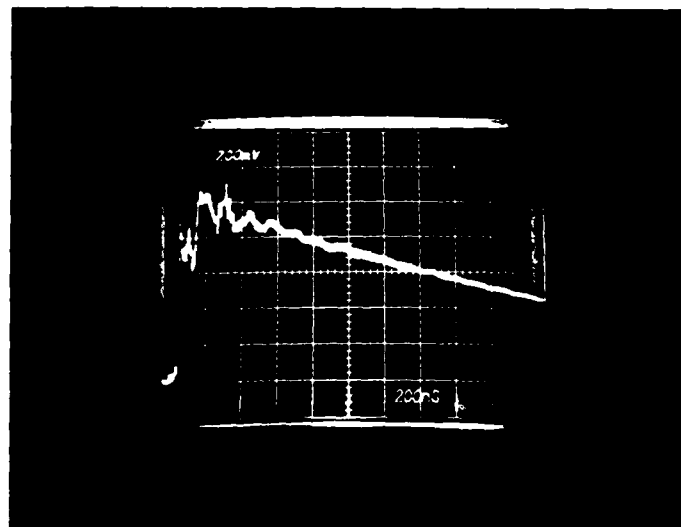
(11)
 SET UP: H FIELD SENSOR - ANTENNA REMOVED
~~MAN MAN MAN MAN~~

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
~~MAN MAN MAN MAN~~ -

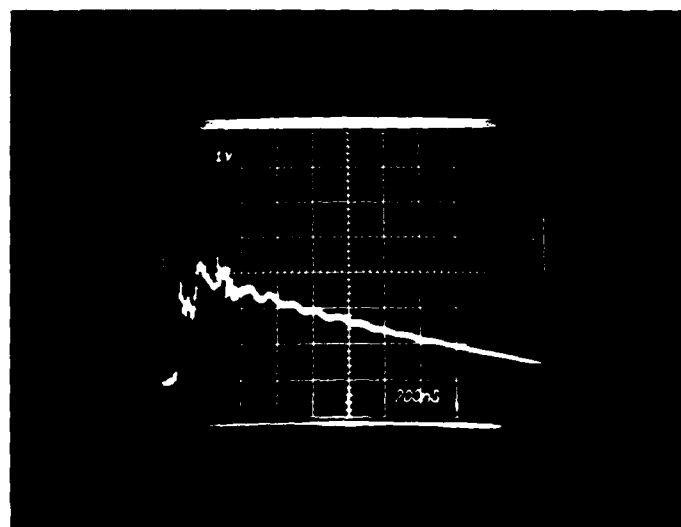
Date 7-31-85
 Test Point CAL - 13
 Amplification dB
 Attenuation dB
 Horizontal 200 ns/div 1
 Vertical 200 mV/div 1
 Horizontal ns/div 2
 Vertical ns/div 2
 Configuration
 Pulsar Level 25KV CHARGE
 Data Link



Comments:

~~1000mV~~ 1000mV → 58.8 KV/μs (13)

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
 Pulsar Level 25KV CHARGE
 Data Link



Comments:

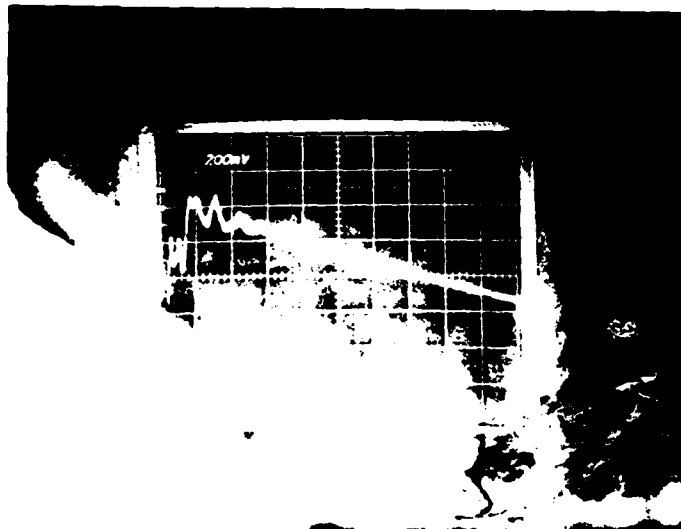
→ 3V → 56.6 KV/μs (14)

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
 Pulsar Level 25KV CHARGE
 Data Link
 Comments:

> 880 mV → 57.6 kV/m (15)

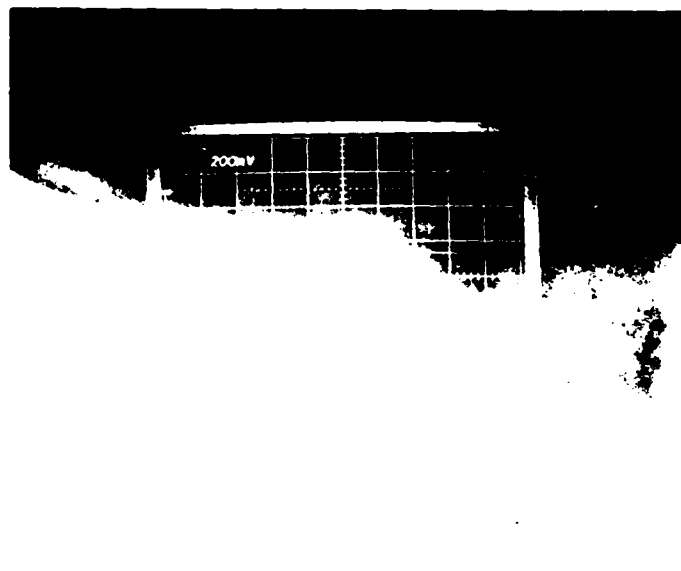
~~W/PROBES~~
 ROUND H SENSOR



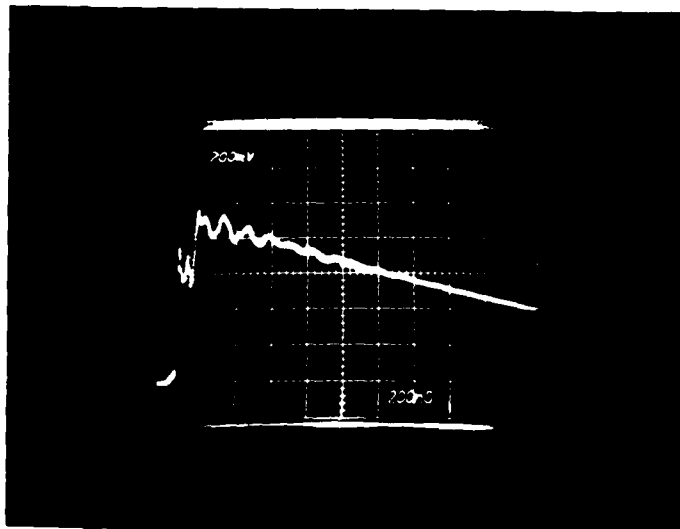
Date 7-31-85
 Test Point CAL-16
 Amplification dB
 Attenuation dB
 Horizontal 200 ns/div 1
 Vertical 200 mV/div 1
 Horizontal ns/div 2
 Vertical ns/div 2
 Configuration
 Pulsar Level 22KV CHARGE
 Data Link
 Comments:

(16)

ROUND H SENSOR



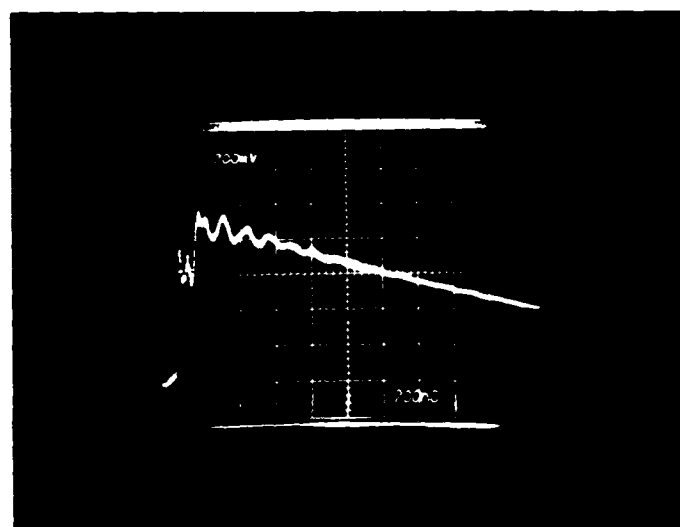
Date	7-31-85
Test Point	CAL - 17
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	ns/div 2
Configuration	
Pulse Level	22 KV CHARGE
Data Link	
Comments:	



17

ROUND H SENSOR

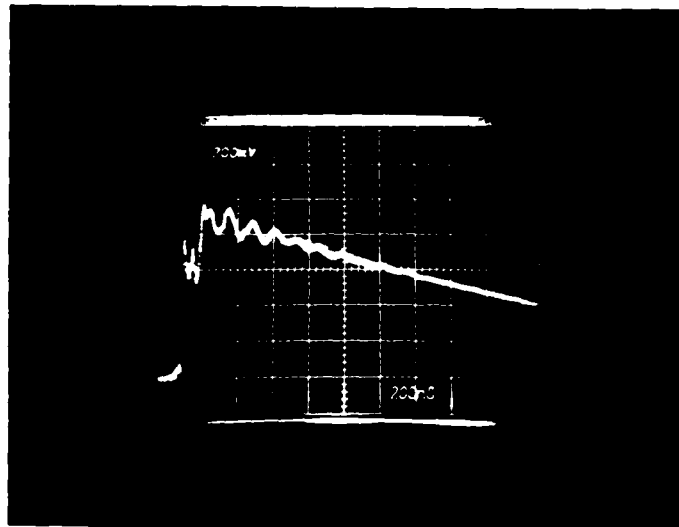
Date	7-31-85
Test Point	TB -
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	ns/div 2
Configuration	
Pulse Level	22 KV CHARGE
Data Link	
Comments:	



18

ROUND H SENSOR
EQUIP. IN FIELD
SYSTEM - 14

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

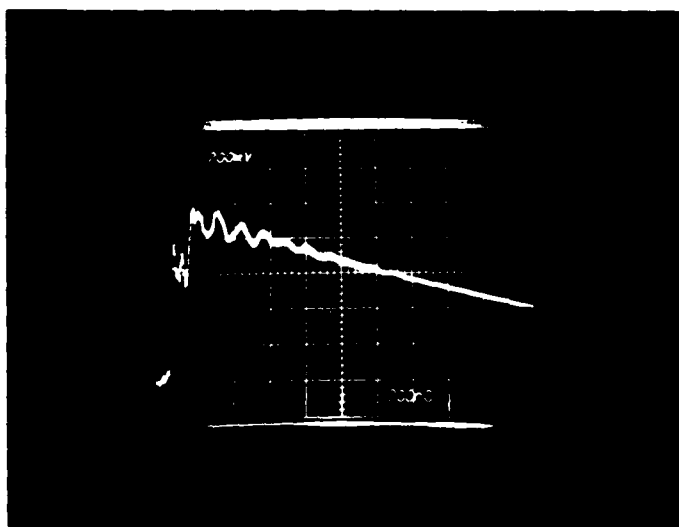


14/30PSI-~~MINI~~ -
H SENSOR

(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	
Pulse Level	22KV CHARGE
Data Link	
Comments:	

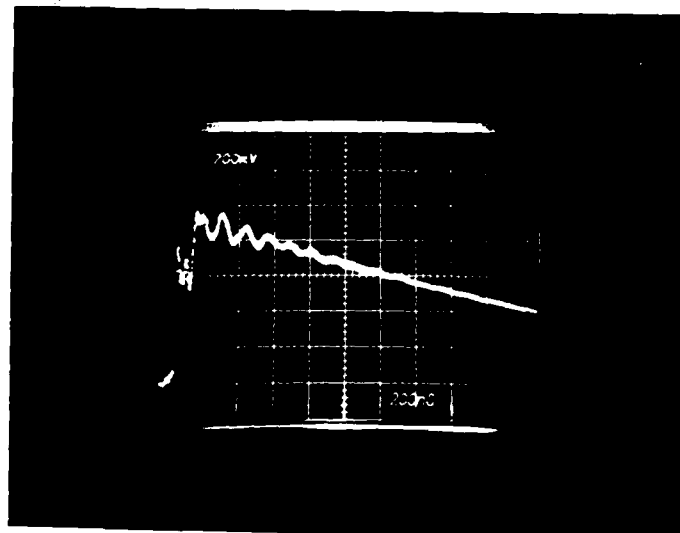


~~MINI~~ -
H - SENSOR

(20)

(SYSTEM 2)

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

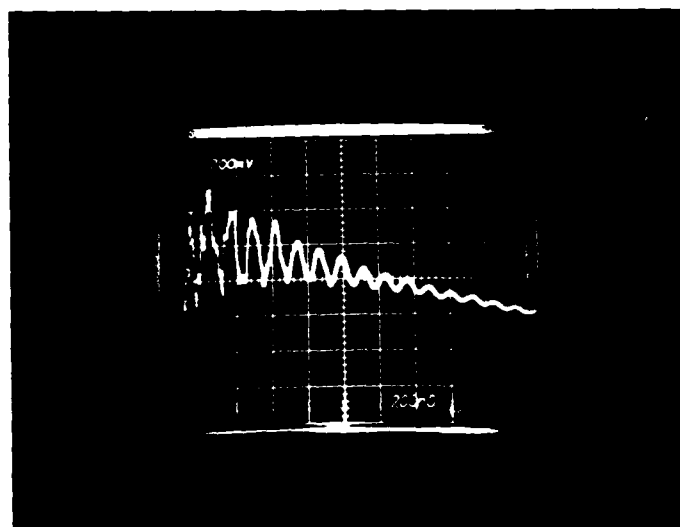


~~XXXXXXXXXX~~

(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
 Pulsar Level 22KV CHARGE
 Data Link
 Comments:

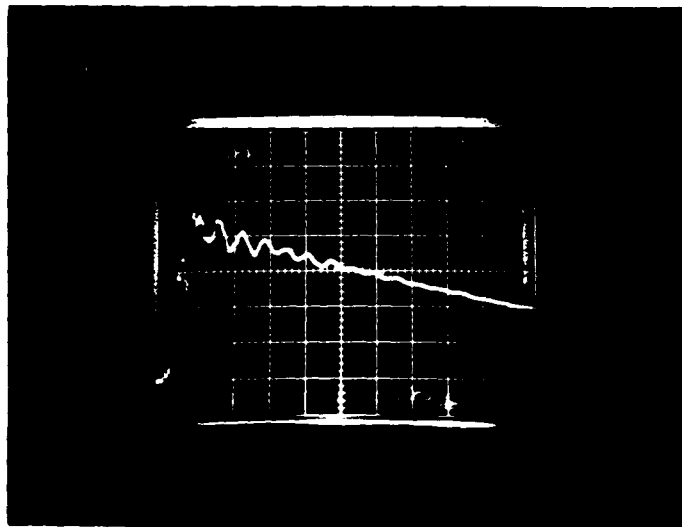


(24)

(SYSTEM 2) TC4 TEST

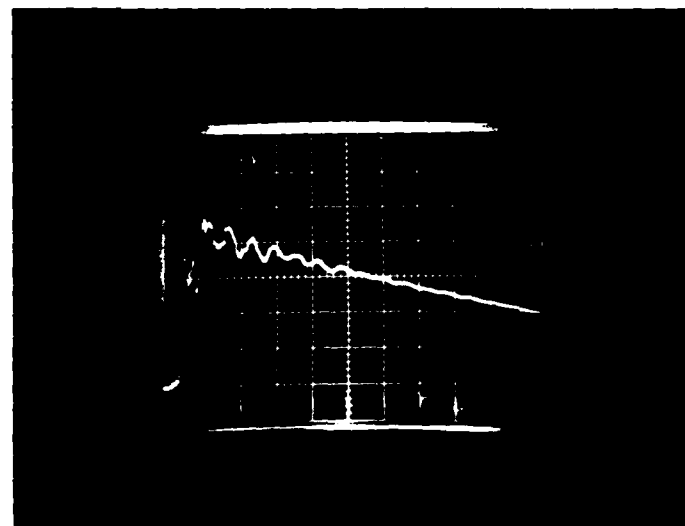
Date August 1, 1985
 Test Point PULSER CAL
 Amplification dB
 Attenuation dB
 Horizontal 200 ns/div 1
 Vertical 200 mV/div 1
 Horizontal ns/div 2
 Vertical mV/div 2
 Configuration
 Pulsar Level 22KV Charge
 Data Link
 Comments:

(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
 Pulsar 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

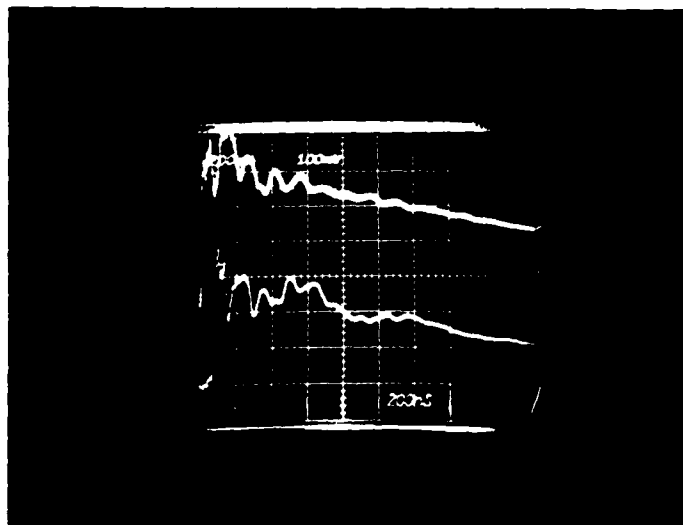
Configuration

Pulse Level 22KV 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

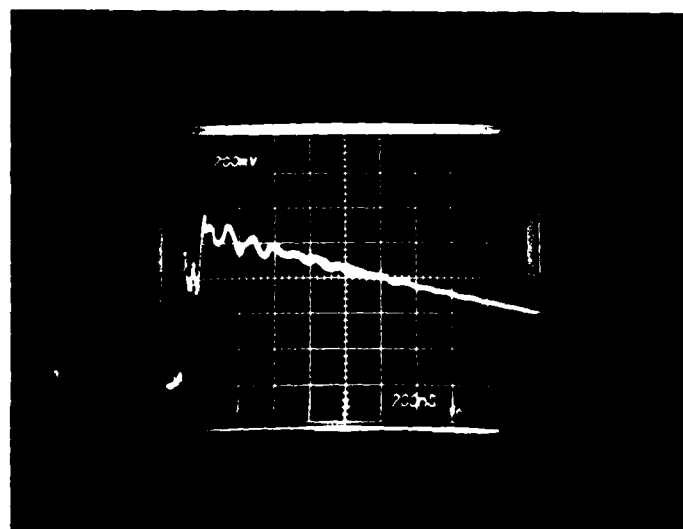
Configuration

Pulse Level 22KV charge

Data Link

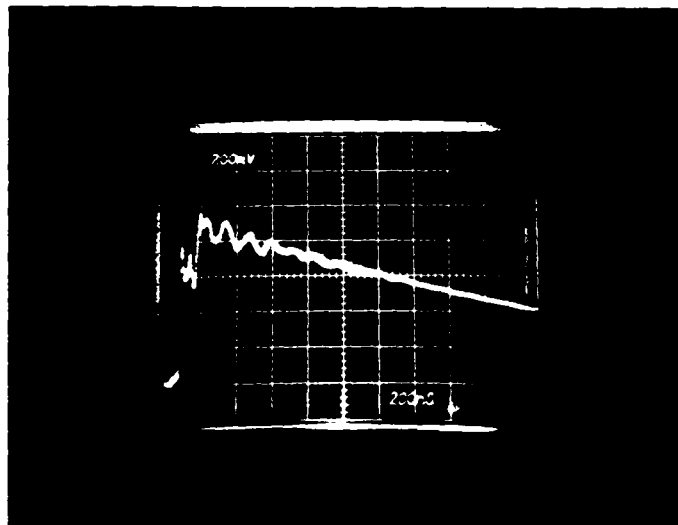
Comments:

(25)



NO OSC - NORMAL COND .

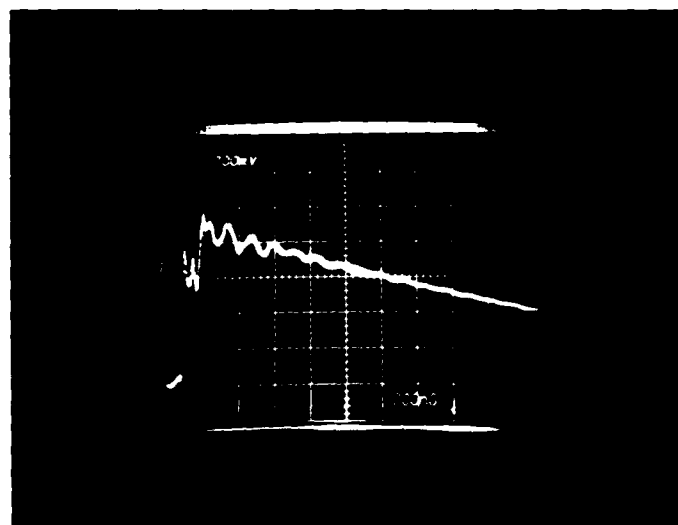
Date	August 1, 1985		
Test Point			
Amplification	dB		
Attenuation	dB		
Horizontal	200 ns/div	1	
Vertical	200 mV/div	1	
Horizontal	ns/div	2	
Vertical	mV/div	2	
Configuration			
Pulse Level	22KV Charge		
Data Link			
Comments:			



(26)

CORD STRETCHED 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			
Pulse Level	22KV Charge		
Data Link			
Comments:			

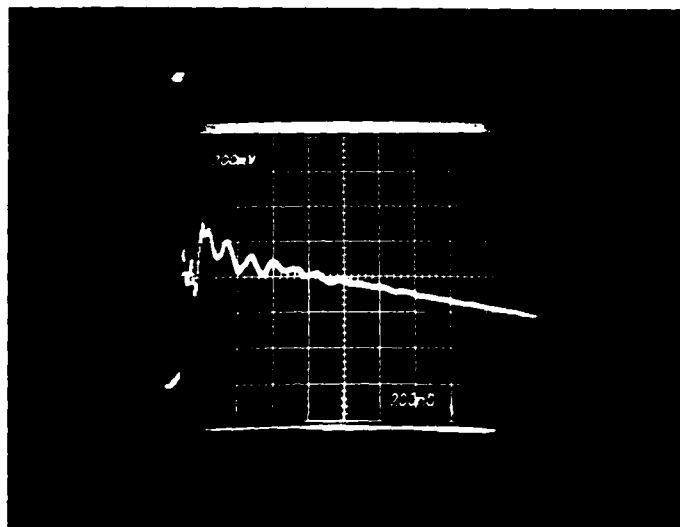


(27)

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
 Pulsor Level 22KV charge
 Data Link
 Comments:

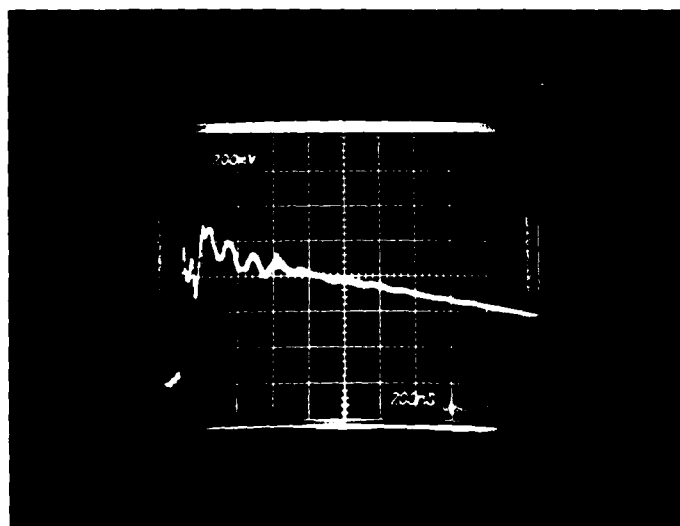
(28)



2 LOAD RESISTORS REMOVED
 FROM PULSER.

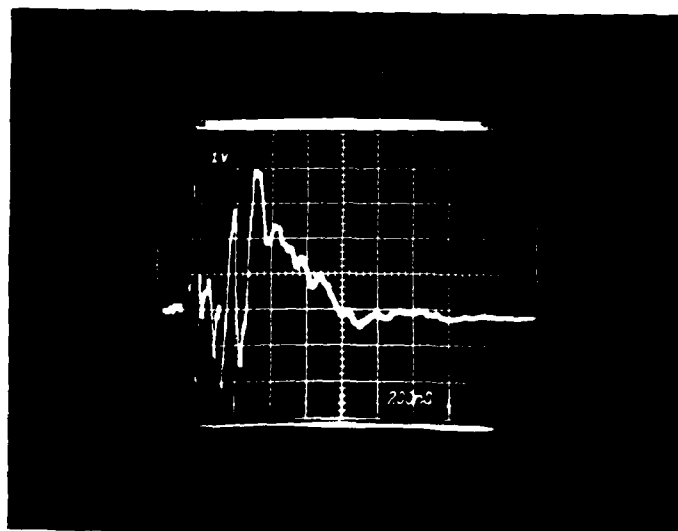
Date August 1, 1985
 Test Point PULSER CA
 Amplification dB
 Attenuation dB
 Horizontal 200 ns/div 1
 Vertical 200 mV/div 1
 Horizontal ns/div 2
 Vertical mV/div 2
 Configuration
 Pulsor Level 22KV charge
 Data Link
 Comments:

(29)



CAP. CLOSED 5 TURNS

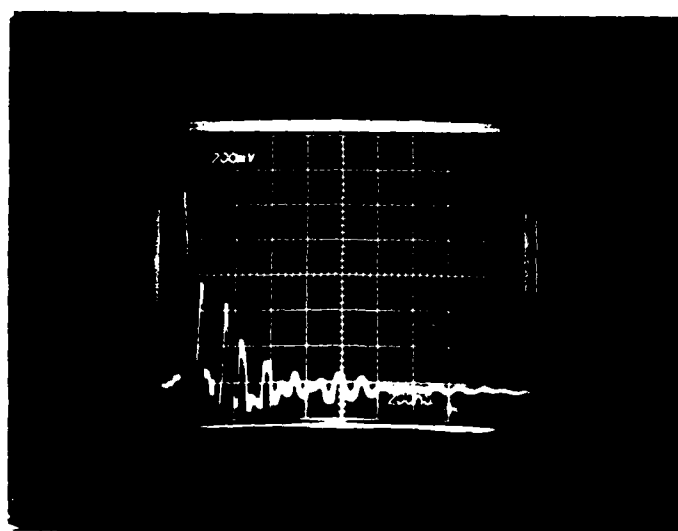
Date 8-1-85 / 1106
 Test Point WIRE ANTENNA
 Amplification dB
 Attenuation 26 dB
 Horizontal 200 ns/div 1
 Vertical 1 mV/div 1
 Horizontal ns/div 2
 Vertical ns/div 2
 Configuration
 Pulsar Level 22 KV - CHARGE
 Data Link
 Comments:



(30)

50 Ω LOAD TO GROUND
 WIRE ANTENNA (SHORT VERTICAL)
 FIRST SPIKE - 70 AMPS - (3.5 KV/)
 LARGE SPIKE - 80 AMPS - (4.0 KV/)

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
 Pulsar Level 22 KV CHARGE
 Data Link
 Comments:



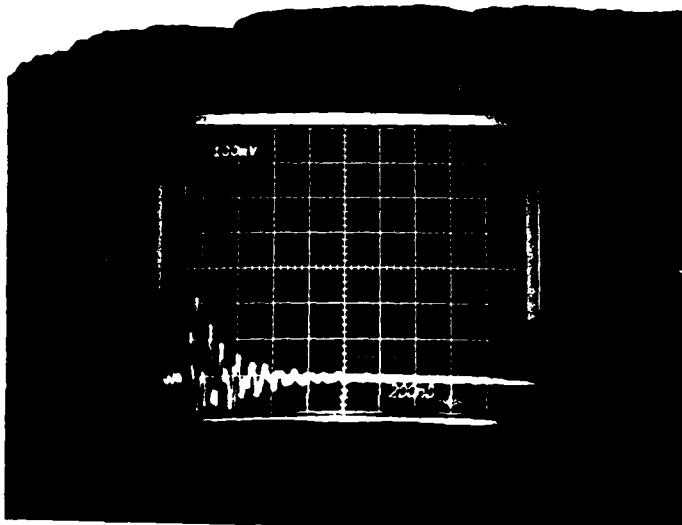
(31)

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

SPIKE - 220 AMPS $\rightarrow$ (11 KV/)

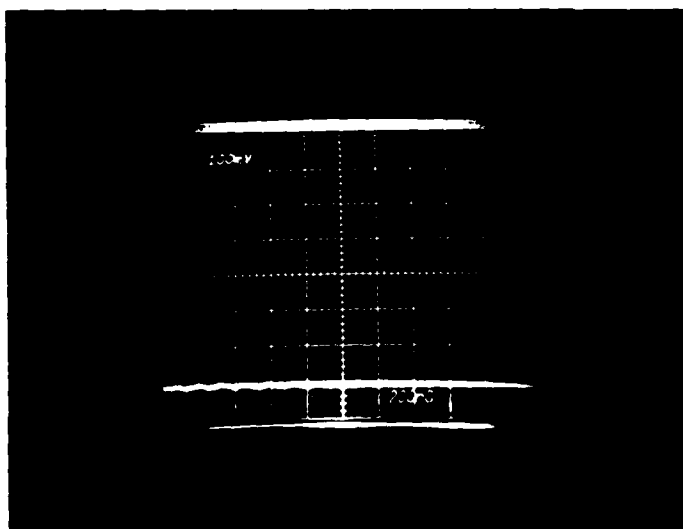
5.5 div $\times$ 200 = 1.1 volts $\times$ 200 = 220 A $\times$ 50 Ω = 11,000 V

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:



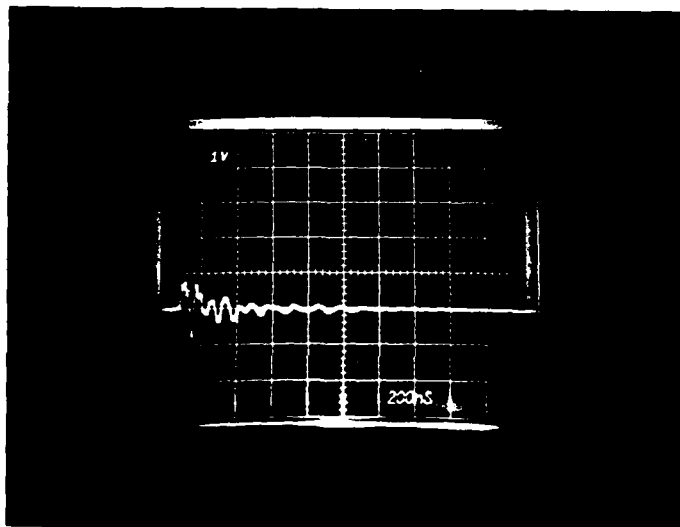
110 A
 (31)
 SHORT WIRE ANTENNA PULSE -
 SPIKE - 5.5 KV/
 ANTENNA SHORTENED AND
 ON SIDE OF PULSER

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 (PULSER) USED FOR SHORT
 WIRE ANTENNA MEASUREMENT ABOVE -

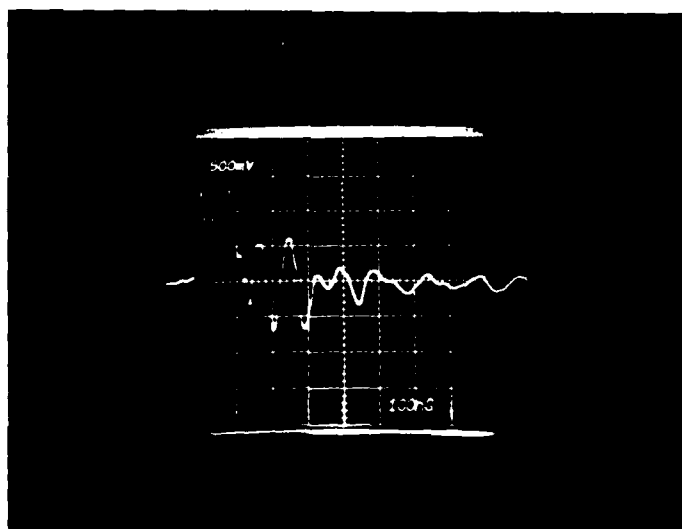
Date 8-1-85 / 1426
 Test Point CUSHCRAFT AV-5
 Amplification dB
 Attenuation 46 dB
 Horizontal 200 ns/div 1
 Vertical 1 mV/div 1
 Horizontal ns/div 2
 Vertical ns/div 2
 Configuration
 Pulsar Level 22KV CHARGE
 Data Link
 Comments:



33

CUSHCRAFT AV-5 CONNECTED TO (46dB 0.2V)
 ANTENNA (dummy load) Singer Probe -
 $160 \text{ A} \times 50 \Omega = 8 \text{ KV}$

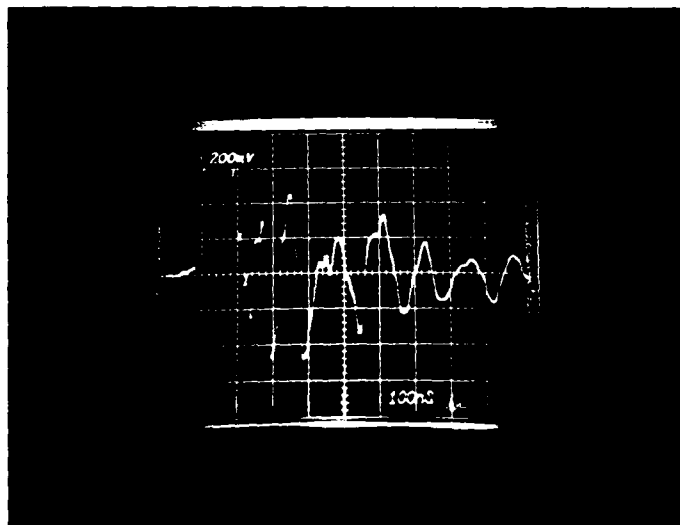
Date 8-1-85 - 1430
 Test Point CUSHCRAFT AV-5
 Amplification dB
 Attenuation 40 dB
 Horizontal 100 ns/div 1
 Vertical 500 mV/div 1
 Horizontal ns/div 2
 Vertical ns/div 2
 Configuration
 Pulsar Level 22KV CHARGE
 Data Link
 Comments:



34

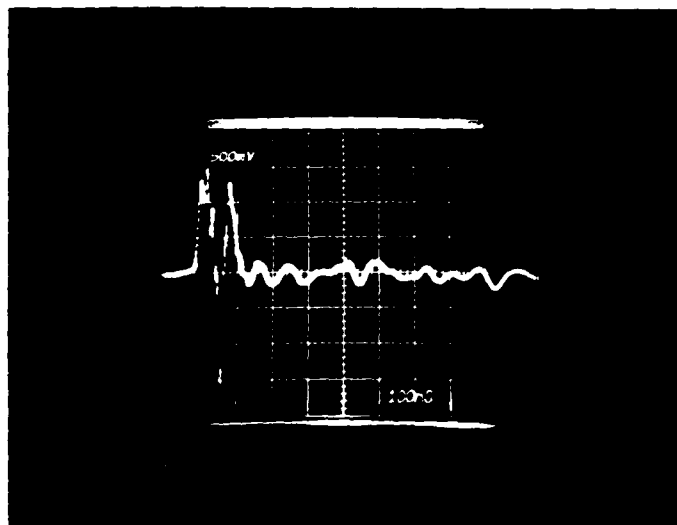
130 A (6.5KV)

Date August 1, 85
 Test Point CUSH CRAFT
 Amplification dB
 Attenuation dB
 Horizontal 100 ns/div 1
 Vertical 200 mV/div 1
 Horizontal ns/div 2
 Vertical mV/div 2
 Configuration
 Pulse Level 22 kV Charge
 Data Link
 Comments:



(34)

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

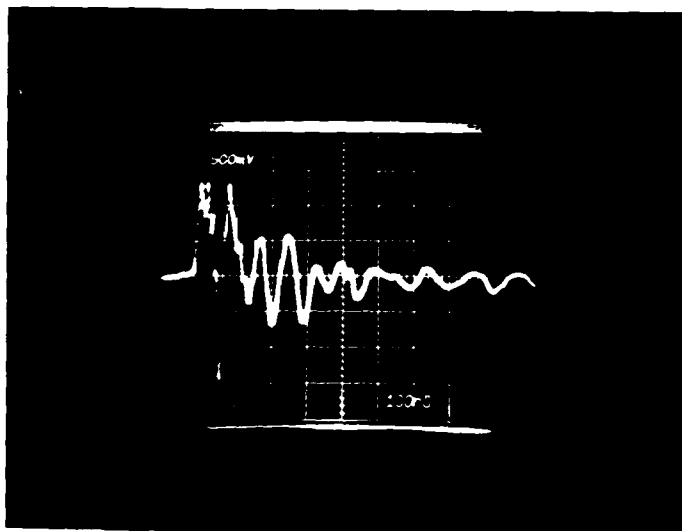


(35)

REPEAT - 34

150A (7.5KV)

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

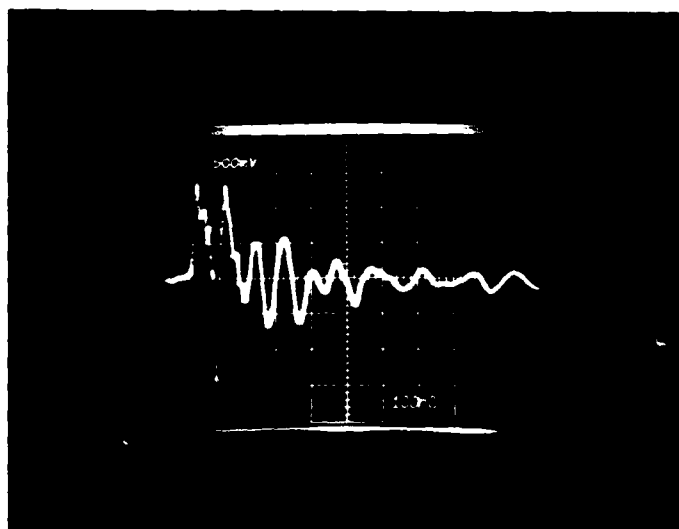


(36)

CUSH CRAFT/ANTENNA 40dB 0.5

-145 A (7.25 KV)

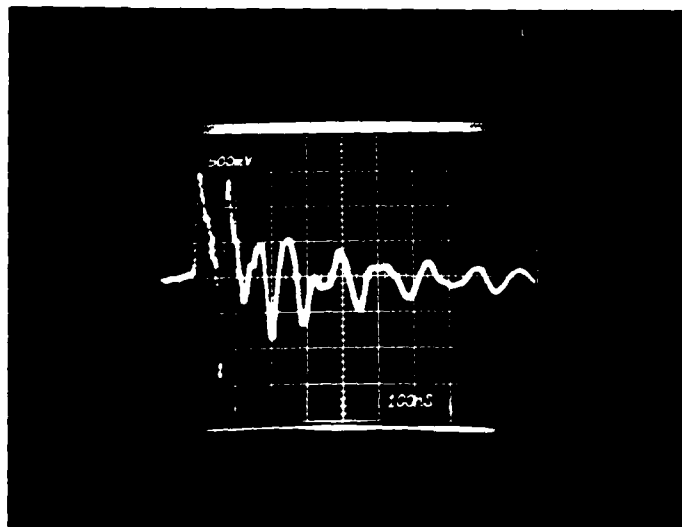
Date	August 1, 1985
Test Point	CUSH CRAFT
Amplification	dB
Attenuation	40 dB
Horizontal	100 ns/div 1
Vertical	500 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulse Level	22KV Charge
Data Link	
Comments:	



(37)

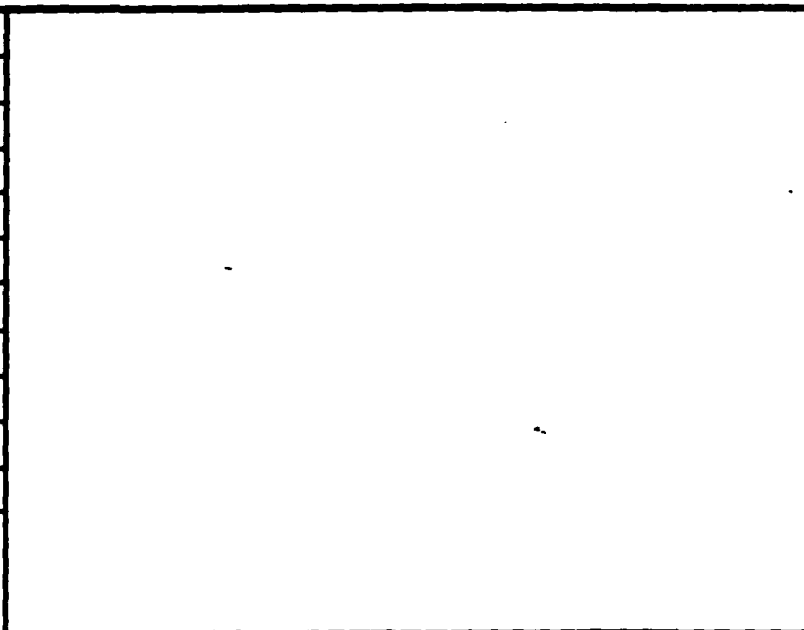
REMOVED EXTRA COPPER WIRE
N - 150 A (7.5 KV)

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	
Pulse Level	~~22~~ 22 KV
Data Link	
Comments:	



38
 REPLACED ANTENNA (DUMMY LOAD) WITH 50- Ω RESISTOR.
 150A (2.5KV)

Date	
Test Point	
Amplification	dB
Attenuation	dB
Horizontal	ns/div 1
Vertical	mV/div 1
Horizontal	ns/div 2
Vertical	ns/div 2
Configuration	
Pulse 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

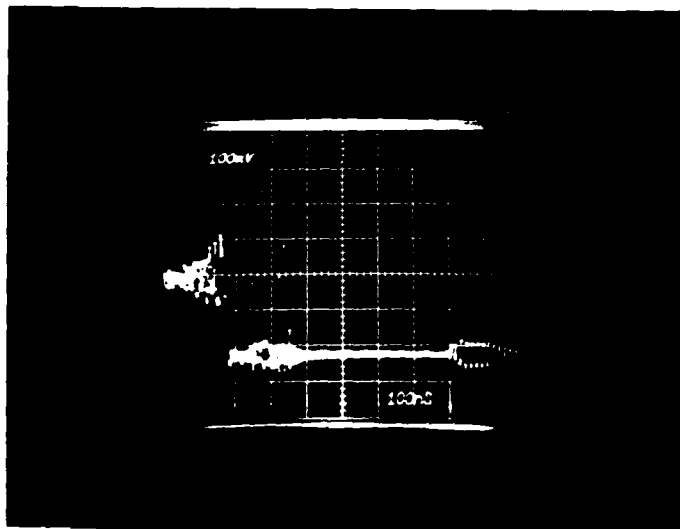
Vertical mV/div 2

Configuration

Pulse Level 22 KV Charge

Data Link

Comments:



(39)

60dB 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

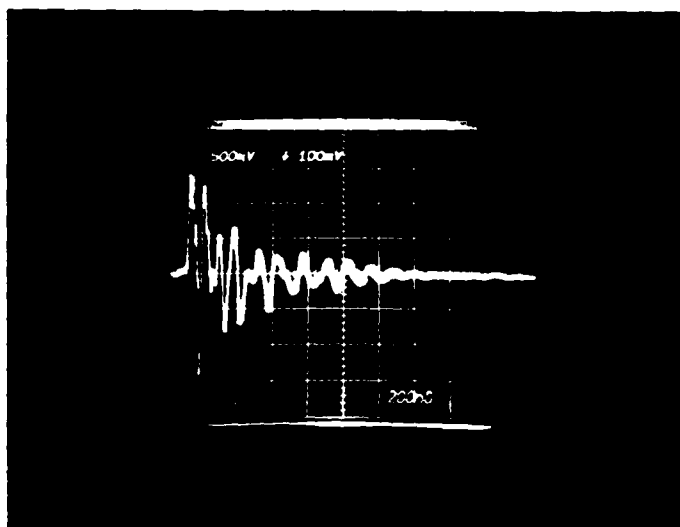
Vertical 100 mV/div 2

Configuration

Pulse Level 22 KV Charge

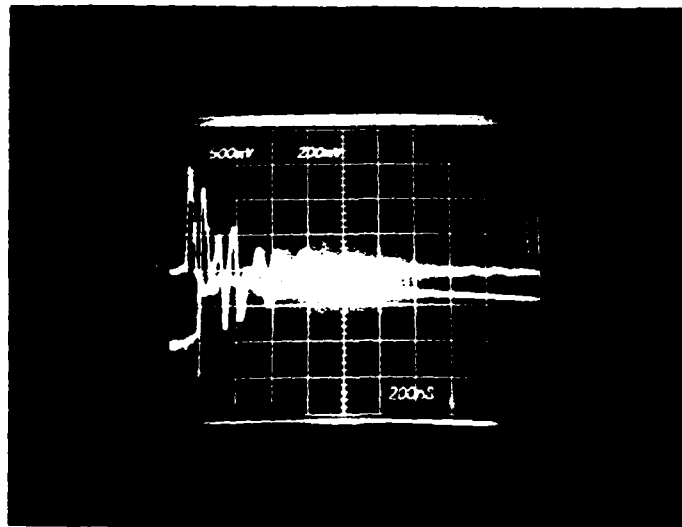
Data Link

Comments:



(40)

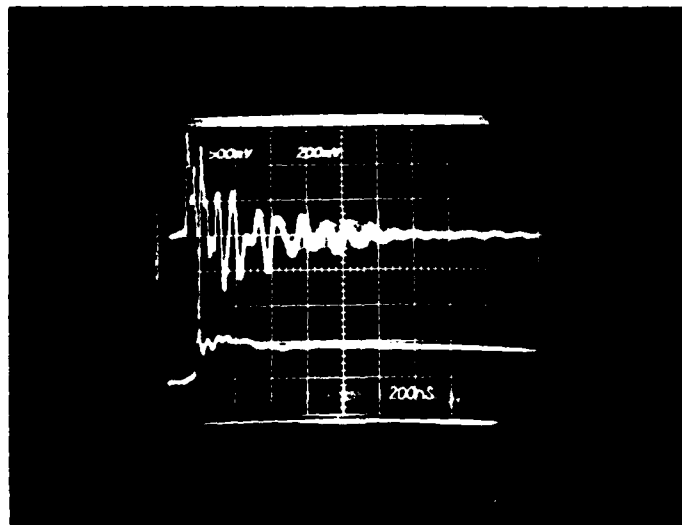
Date August 1, 1985
 Test Point
 Amplification dB
 Attenuation dB
 Horizontal 200 ns/div 1
 Vertical 500 mV/div 1
 Horizontal 200 ns/div 2
 Vertical 200 mV/div 2
 Configuration
 Pulse Level 22KV Charge
 Data Link
 Comments:



(41)

LOWER TRACE : FO.
 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
 Pulse 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

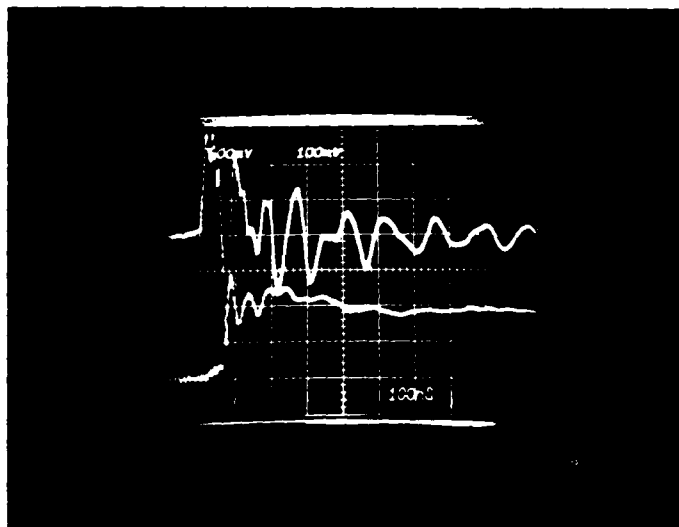
Vertical 100 mV/div 2

Configuration

Pulse Level 22 KV Charge

Date 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

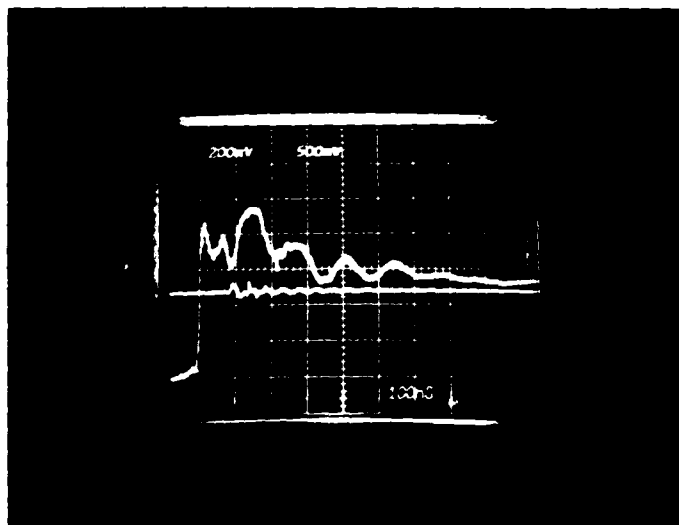
Vertical 500 mV/div 2

Configuration

Pulse Level 22 KV Charge

Date Link

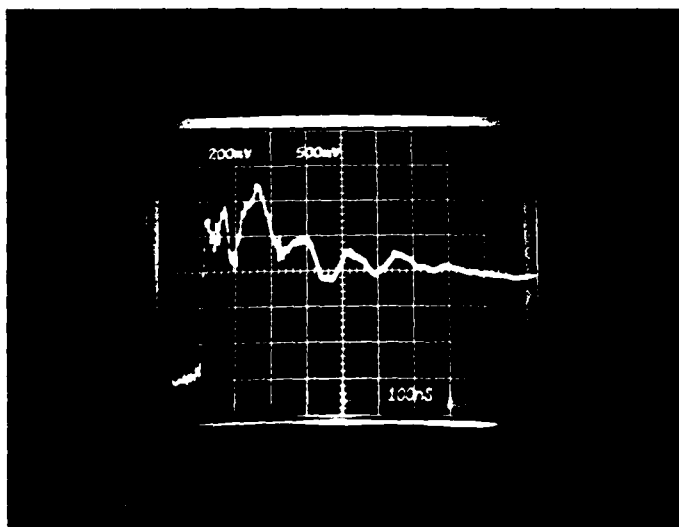
Comments:



(44)

LOWER TRACE - ROUND H SENSOR DIRECT 200 MV
UPPER - RECTANGULAR H SENSOR - 500 MV

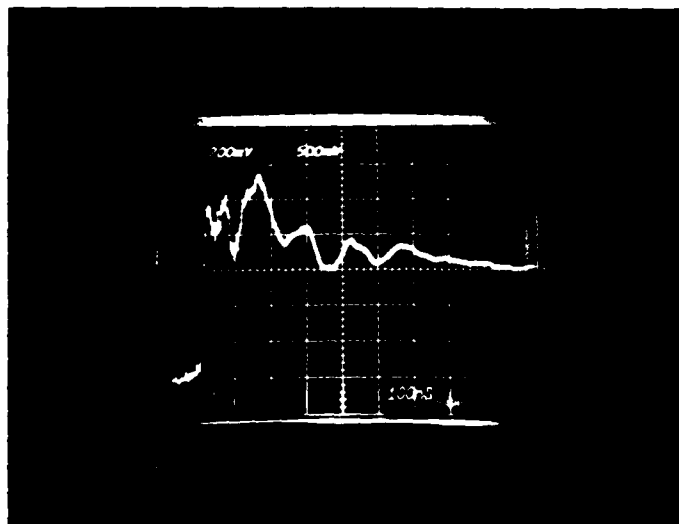
Date	August 2, 1985
Test Point	PULSER CAL
Amplification	dB
Attenuation	dB
Horizontal	100 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulser Level	28KV Charge
Data Link	
Comments:	



①

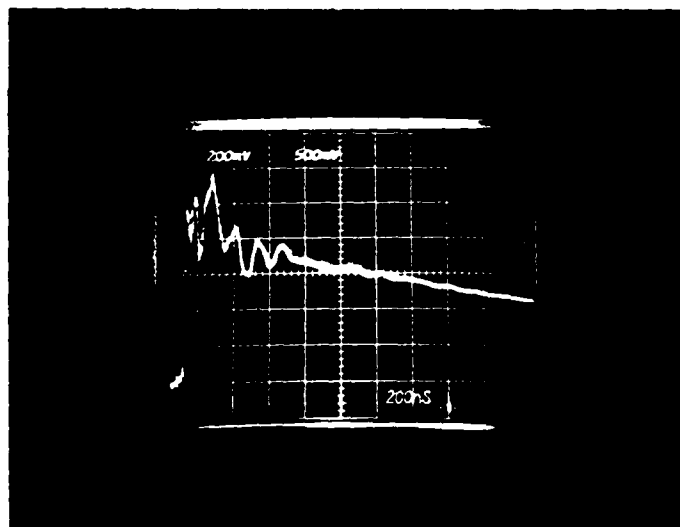
H SENSUR ~ 5 FT FROM FRONT

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

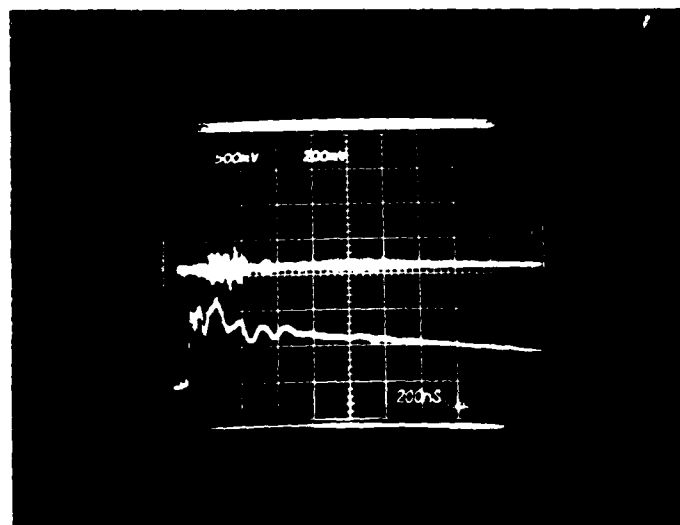
Date August 2, 1985
 Test Point PULSER CAL
 Amplification dB
 Attenuation dB
 Horizontal 200 ns/div 1
 Vertical 200 mV/div 1
 Horizontal ns/div 2
 Vertical mV/div 2
 Configuration
 Pulsar Level 30 KV charge
 Data Link
 Comments:



(3)

REPEAT 2

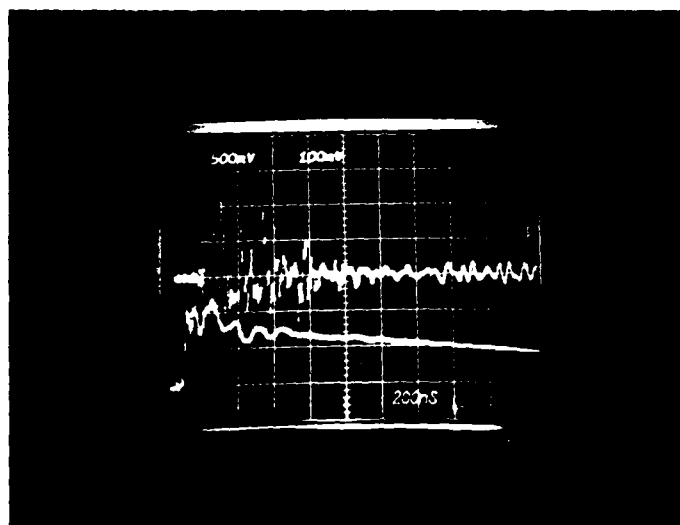
Date August 2, 1985
 Test Point PULSER CAL
 Amplification dB
 Attenuation dB
 Horizontal 200 ns/div 1
 Vertical 500 mV/div 1
 Horizontal 200 ns/div 2
 Vertical 200 mV/div 2
 Configuration
 Pulsar Level 30 KV charge
 Data Link
 Comments:



(4)

UPPER - F.O. (GAIN $\frac{76}{43}$) 60dB 200mV
 LOWER: ROUND H SENSOR 500 mV

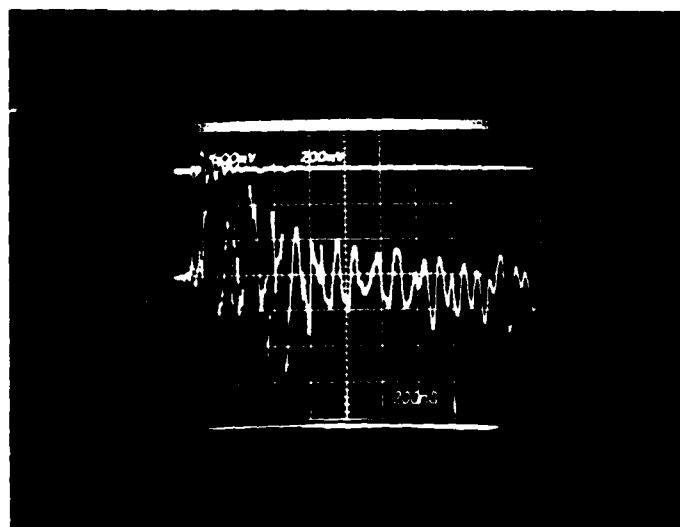
Date	August 2, 1985		
Test Point			
Amplification	dB		
Attenuation	dB		
Horizontal	200 ns/div	1	
Vertical	500 mV/div	1	
Horizontal	200 ns/div	2	
Vertical	100 mV/div	2	
Configuration			
Pulse Level	30KV Charge		
Data Link			
Comments:			



(5)

REPEAT (4) 40dB FO. 100mV

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			
Pulse Level	30KV Charge		
Data Link			
Comments:			

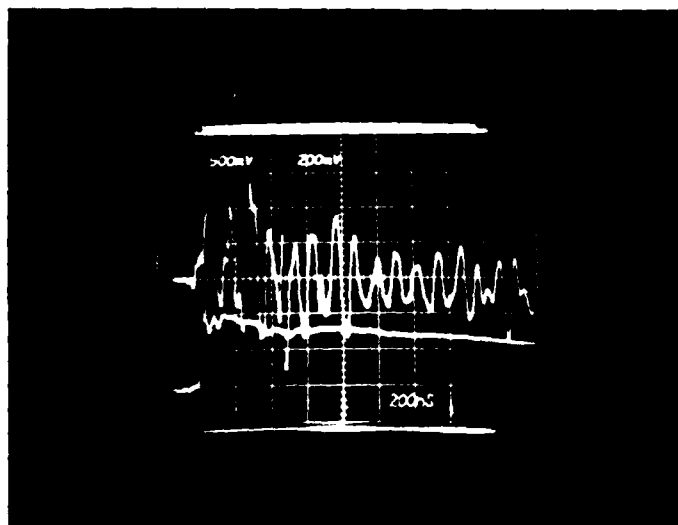


(6)

UPPER: FO. 6dB FO GAIN 1.0
 LOWER: DIRECT TO ANTENNA 20dB

off scale

Date	August 2, 1985
Test Point	CN54CRAFT
Amplification	dB
Attenuation	dB
Horizontal	200ns/div 1
Vertical	500 mV/div 1
Horizontal	200ns/div 2
Vertical	200mV/div 2
Configuration	
Pulse Level	30KV Charge
Data Link	
Comments:	



⑦

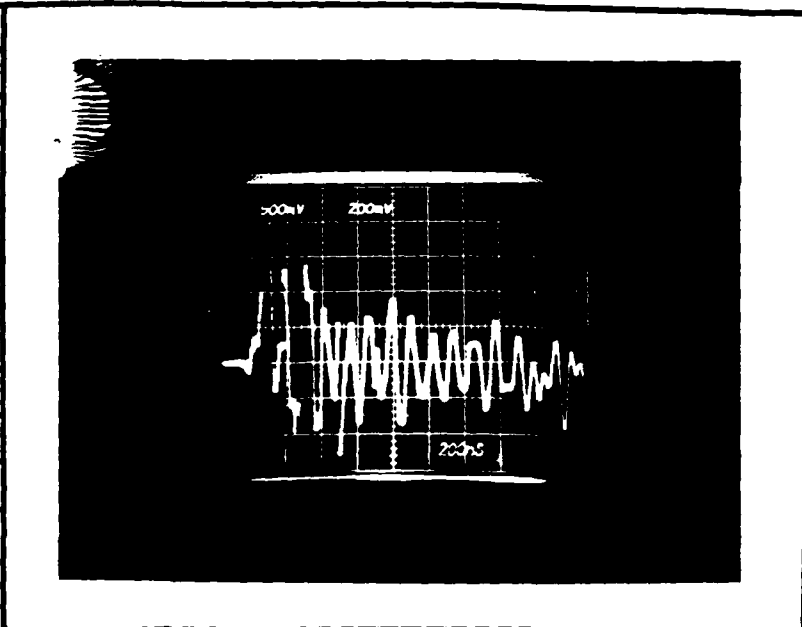
UPPER: ANTENNA 20dB

LOWER: F.D. FIELD - 6dB

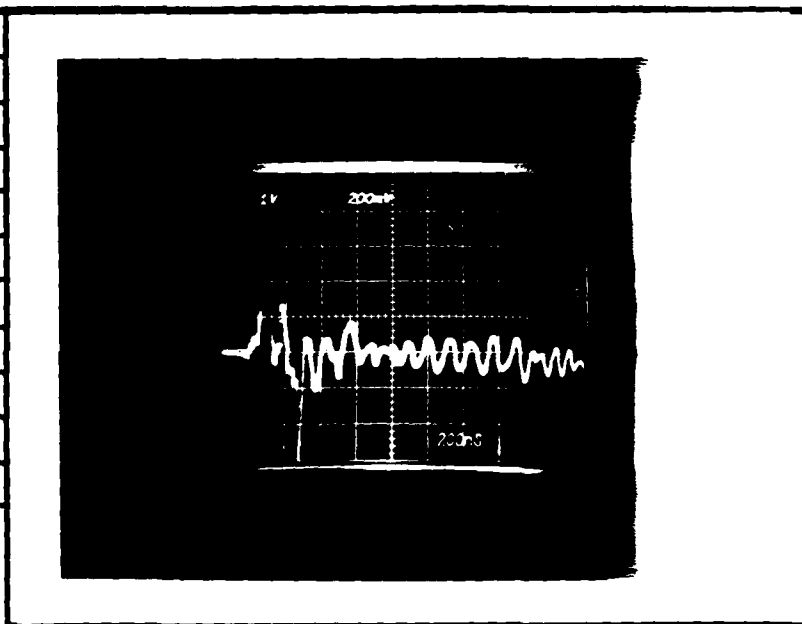
off scale

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

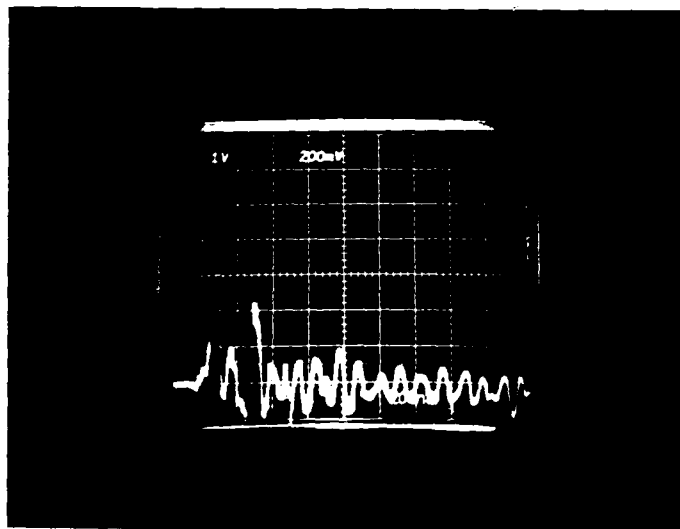
Date	August 2, 1985	
Test Point	ANTENNA	
Amplification	dB	
Attenuation	20	dB
Horizontal	200	ns/div 1
Vertical	500	mV/div 1
Horizontal	ns/div 2	
Vertical	mV/div 2	
Configuration		
Pulse Level	30KV charge	
Data Link		
Comments:	CUSHCRAFT off scale	



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		
Pulse Level	30KV charge	
Data Link		
Comments:	CUSHCRAFT off scale	



Date August 2, 1985
 Test Point CW54CRAFT
 Amplification dB
 Attenuation 40 dB
 Horizontal 200 ns/div 1
 Vertical 1000 mV/div 1
 Horizontal ns/div 2
 Vertical mV/div 2
 Configuration
 Pulse Level 30 KV charge
 Data Link
 Comments:

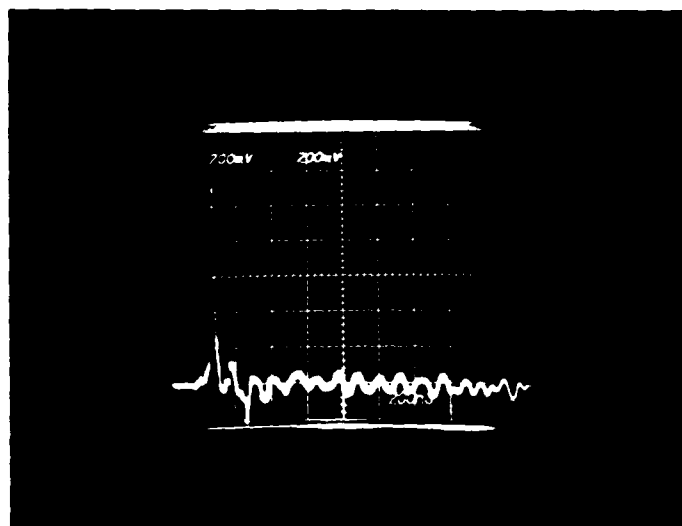


(11)

~~40~~ 20 dB IN LINE

off scale

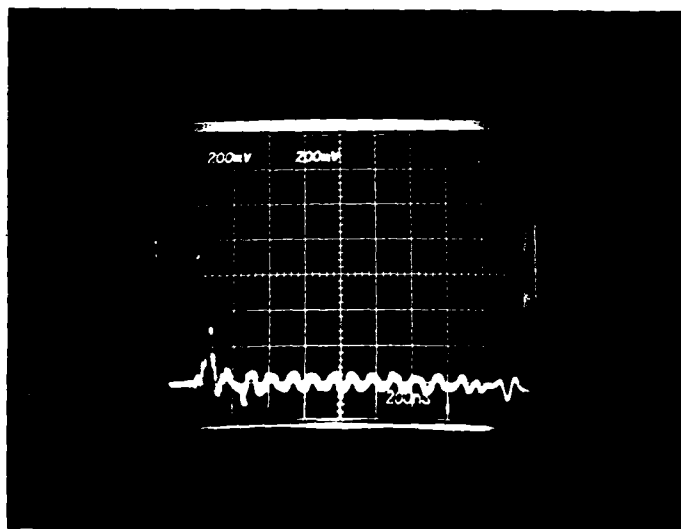
Date August 2, 1985
 Test Point CW54CRAFT
 Amplification dB
 Attenuation 40 dB
 Horizontal 200 ns/div 1
 Vertical 200 mV/div 1
 Horizontal ns/div 2
 Vertical mV/div 2
 Configuration
 Pulse Level 30 KV charge
 Data Link
 Comments:



(12)

40dB in LINE ANTENNA TRALE ONLY -
 SPIKE +110A -(5.5 KV)

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

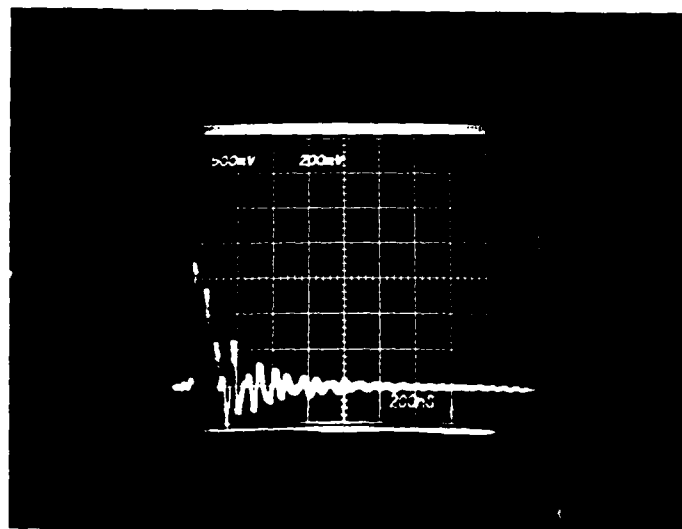


(13)

SENSOR CT2 SIGNAL OFF SCALE

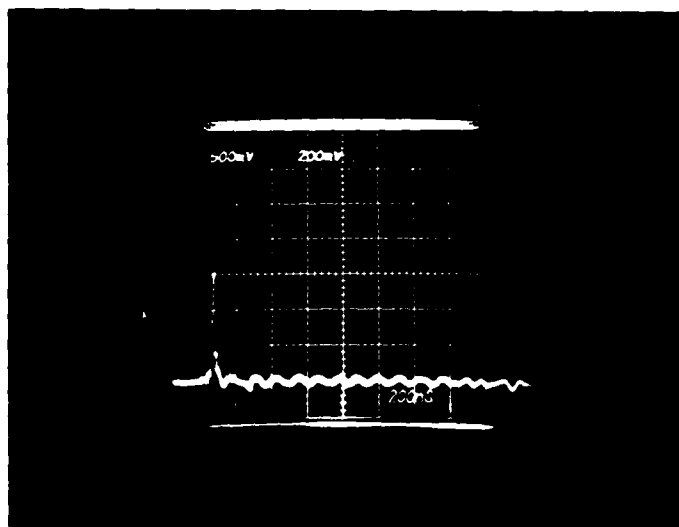
Date
 Test Point
 Amplification dB
 Attenuation dB
 Horizontal ns/div 1
 Vertical mV/div 1
 Horizontal ns/div 2
 Vertical mV/div 2
 Configuration
 Pulsar Level
 Data Link
 Comments:

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
 Pulse Level 30 KV CHARGE
 Data Link
 Comments: 6.4KV
 ~ 170 A (8.5KV) 15



VERTICAL "L" SHAPED FIELD WIRE - 50 OHMS
 TO GROUND
 PRELIMINARY POWER INJECT
~~APR 22 1985~~

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
 Pulse Level 30 KV CHARGE
 Data Link
 Comments: 150 A (7.5KV)
 14



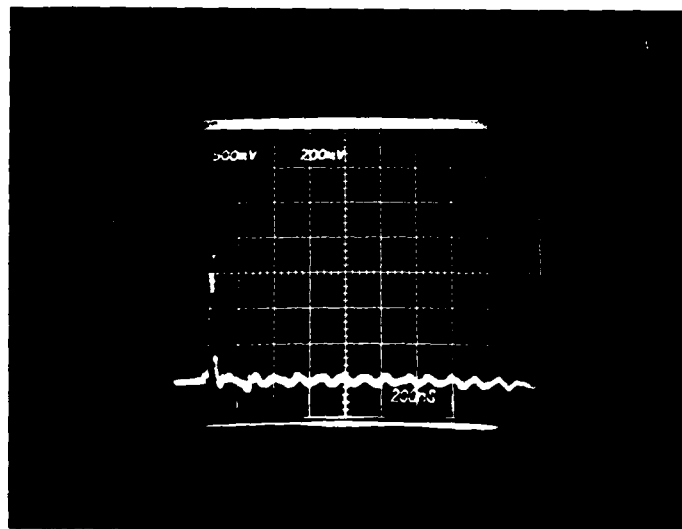
CUSHCRAFT AV-5 ANTENNA WITH RG-8 COAXIAL
 LINE 1 1/2 FOOT ABOVE FLOOR - SMALL CT.

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

Comments:

PEAK I = 170 A (8.67KV)
16

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



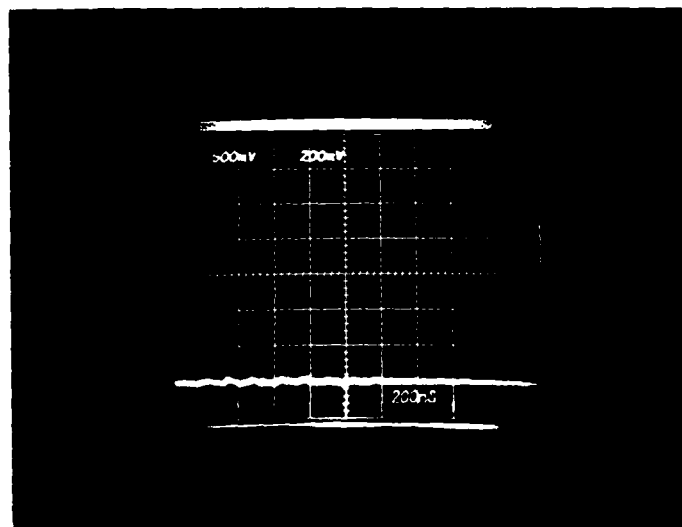
Date	8-2-85
Test Point	COAXIAL CABLE
Amplification	dB
Attenuation	40 dB
Horizontal	200 ns/div 1
Vertical	500 mV/div 1
Horizontal	ns/div 2
Vertical	ns/div 2
Configuration	
Pulse Level	30KV CHARGE
Data Link	

Comments:

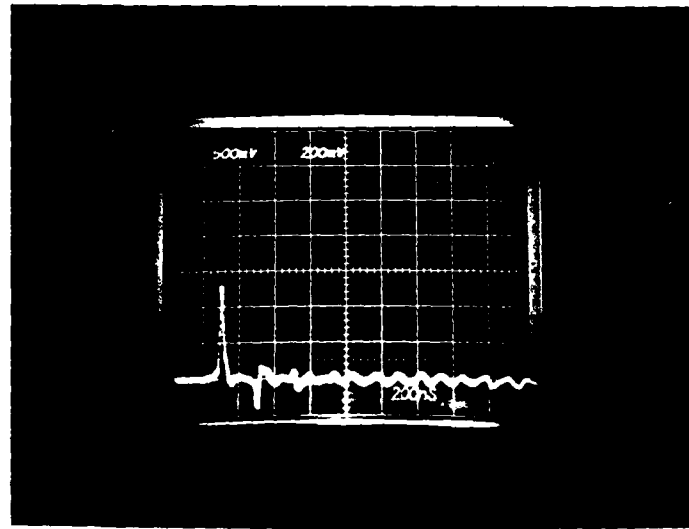
COAXIAL CABLE TEST 18

SET UP: ANTENNA DISCONNECTED-

COAXIAL CABLE RG-8 8' FOOT ABOVE FLOOR. CABLE SHIELD GROUNDED AT BOTH ENDS. SIGNAL FROM CENTER CONDUCTOR.
51Ω LOAD TO GROUND. SENSOR 91550



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

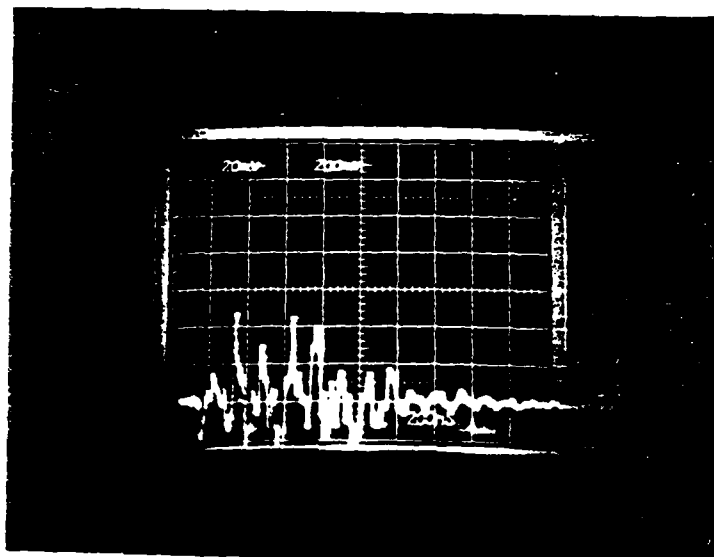


(17)

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

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

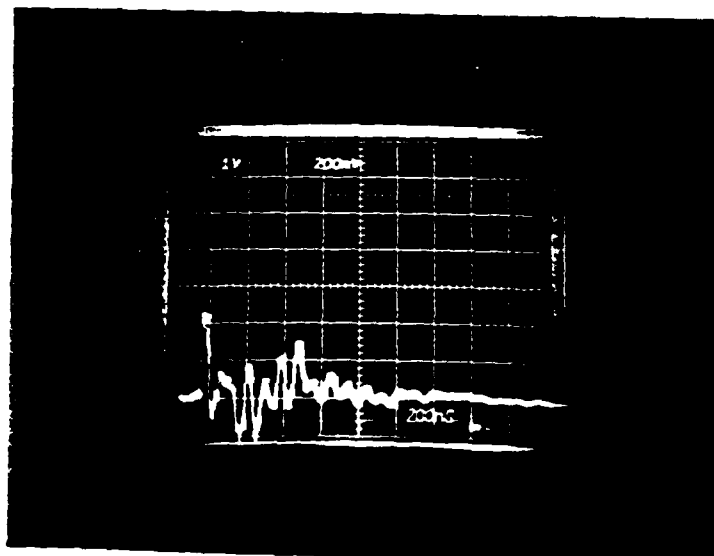
Date	August 2, 1985		
Test Point	RG8 CABLE		
Amplification	dB		
Attenuation	40	dB	
Horizontal	200	ns/div	1
Vertical	20	mV/div	1
Horizontal	ns/div	2	
Vertical	mV/div	2	
Configuration			
Pulse Level	30KV Charge		
Data Link			
Comments:			



(19)

REPEAT 15 - AT 20 MV - NO SPIKE NOISE ONLY

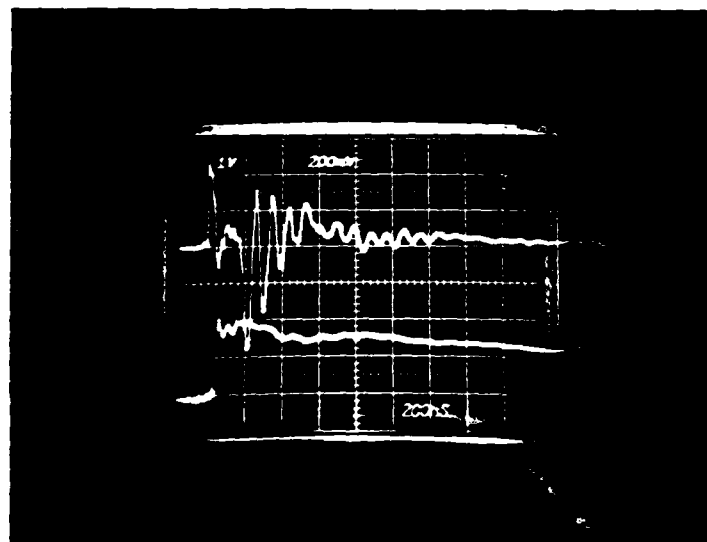
Date	August 2, 1985		
Test Point	WIRE ANTENNA		
Amplification	dB		
Attenuation	40	dB	
Horizontal	200	ns/div	1
Vertical	1000	mV/div	1
Horizontal	ns/div	2	
Vertical	mV/div	2	
Configuration			
Pulse Level	30KV Charge		
Data Link			
Comments:			



(20)

WIRE ANTENNA 50 OHMS TO GROUND - PULSE 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	
Pulse Level	30KV Charge
Data Link	
Comments:	

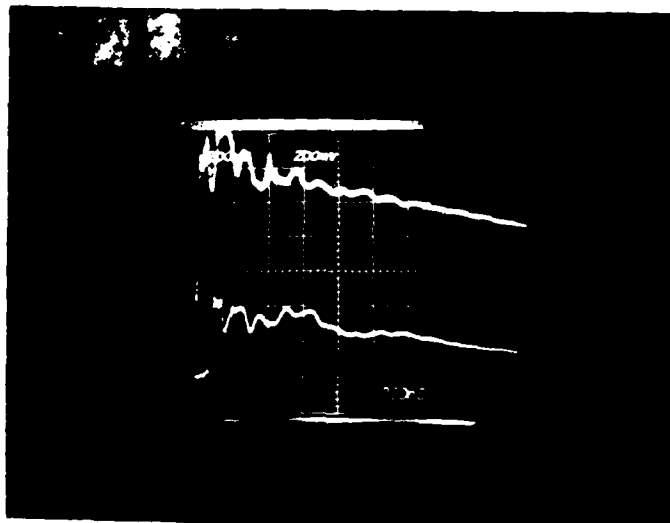


23

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 $360 \text{ mV} \times 2 = 720 \text{ mV}$
 $17 \text{ mV/KV/m} = 42.3 \text{ KV/m}$

Date	
Test Point	
Amplification	dB
Attenuation	dB
Horizontal	ns/div 1
Vertical	mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulse 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/div 2
Configuration	
Pulse Level	30 KV CHARGE
Data Link	
Comments:	



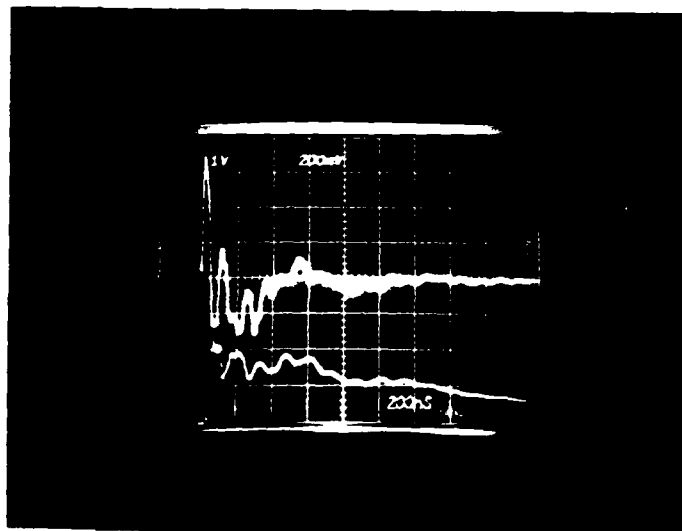
26

LOWER TRACE - RECTANGULAR SENSOR 20 dB ATTN/
 $2.8 \text{ DIV} (280 \text{ mV} \times 10 \times 1.1 \div 20 = 154 \text{ A/m} \rightarrow 58 \text{ KV/M}$
 UPPER TRACE - ROUND H SENSOR - DIRECT
 $4.1 \text{ div} \times 200 \text{ mV} = 820 \text{ m} \rightarrow 48.2 \text{ KV/M}$

Date	
Test Point	
Amplification	dB
Attenuation	dB
Horizontal	ns/div 1
Vertical	mV/div 1
Horizontal	ns/div 2
Vertical	ns/div 2
Configuration	
Pulse 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
 Pulsar Level 30KV - DRIVE
 Data Link



Comments:

LONG L SHAPED WIRE
 VERTICAL +74" HIGH 28
 90° TO PULSER ELEMENTS.

UPPER TRACE - CURRENT - RF DRIVE - (91550 SENSOR)

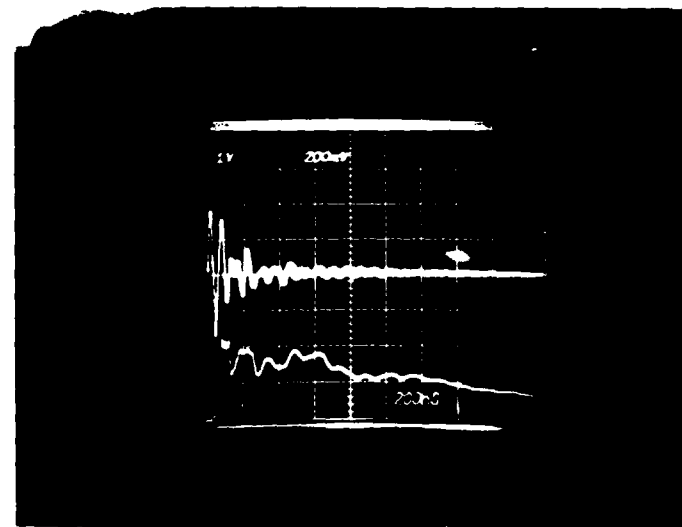
$$350 \text{ A} \times 50 \Omega = 17,500 \text{ V}$$

LOWER TRACE - REFERENCE - H FIELD -

$$\sim 50 \text{ KV/m}$$

1" 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
 Pulsar Level 30KV -
 Data Link



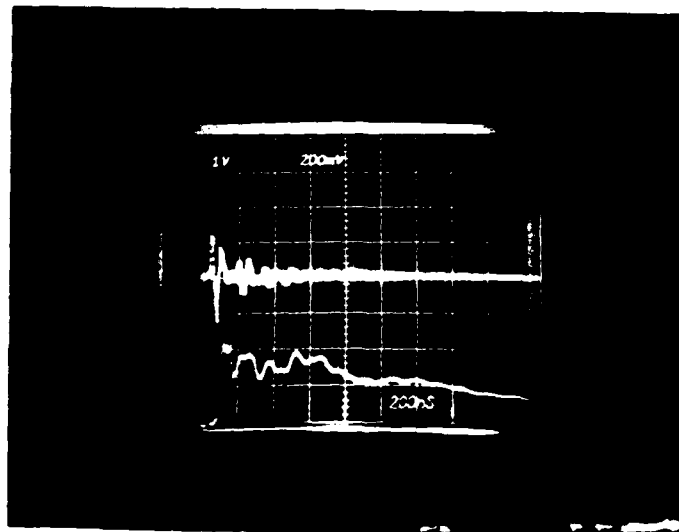
Comments:

UPPER TRACE - ²⁹CURRENT - A.C. DRIVE - PRELIMINARY TEST

LOWER TRACE - REFERENCE - H FIELD - $\sim 50 \text{ KV/m}$

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	
Pulse Level	30KV DRIVE
Data Link	



Comments:

SHORT "L" SHAPE WIRE
 55" VERTICAL + 72" HORIZ 30
 PARALLEL TO ELEMENTS OF PULSE

UPPER TRACE = A.C. DRIVE - $\frac{130 A}{\text{m}} \times 50 \text{ m} = 6500 \text{ V/m}$

LOWER TRACE = REF PULSE - $\sim 50 \text{ KV/m}$

55" x 72"

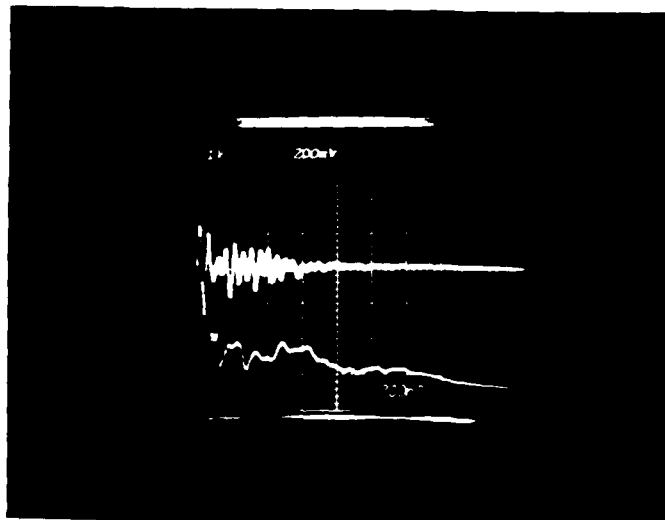
Date	
Test Point	
Amplification	dB
Attenuation	dB
Horizontal	ns/div 1
Vertical	mV/div 1
Horizontal	ns/div 2
Vertical	ns/div 2
Configuration	
Pulse Level	
Data Link	
Comments:	

Date **8-2-85**
 Test Point **D-L**
 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
 Pulsor Level **30KV CHARGE**
 Data Link **FIBER OPTIC + COAX**

Comments:

SYSTEM - 2

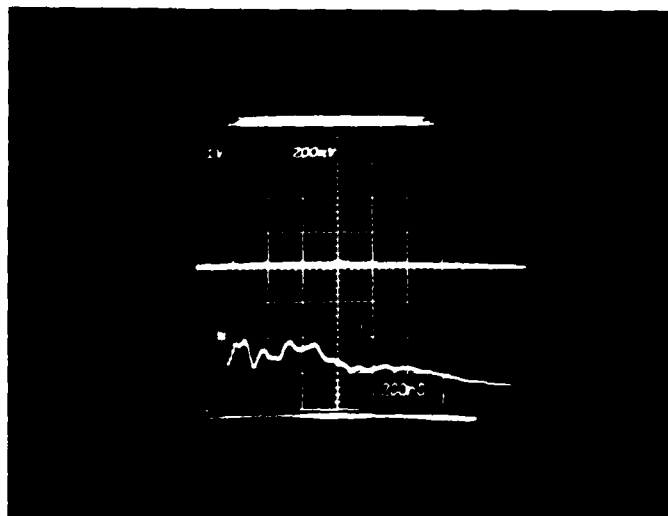
31



UPPER TRACE: AC ANTENNA CONNECTED TO "HOT" AC WIRE IN DUPLEX BOX. SINGER 915502 PROBE AROUND AC ANTENNA ABOVE BOX. $\pm 1/20 - 13A$, 25WATT LIGHT BULB CONNECTED AS LOAD HONDA GENERATOR THROUGH LONG CABLES + ISOLATION TRANSFORMER. 130A (6.5KV)
LOWER TRACE: REF PULSE $\sim 50KV/\mu$

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

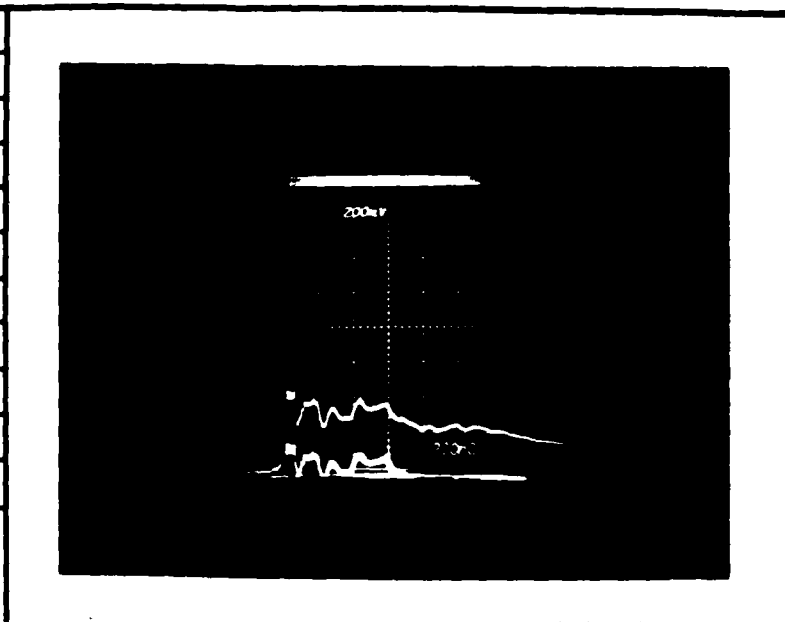
NO PHOTO

SYSTEM L

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

35

~ 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:	

NO PHOTO

SYSTEM 4

34

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
 Pulsar Level 30KV CHARGE
 Data Link

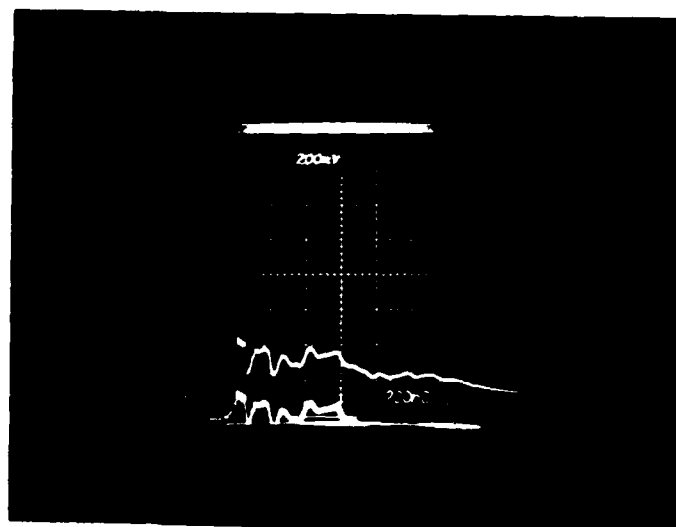
Comments:

SYSTEM-5

36

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/div 2
 Configuration
 Pulsar Level 30KV-CHARGE
 Data Link

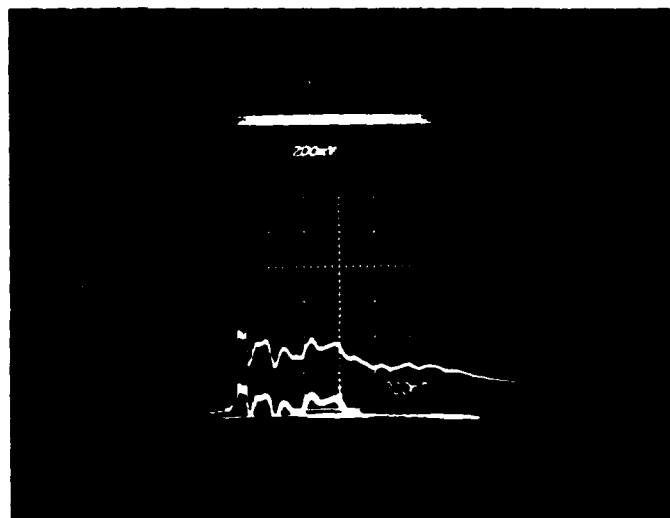
Comments:

SYSTEM-5

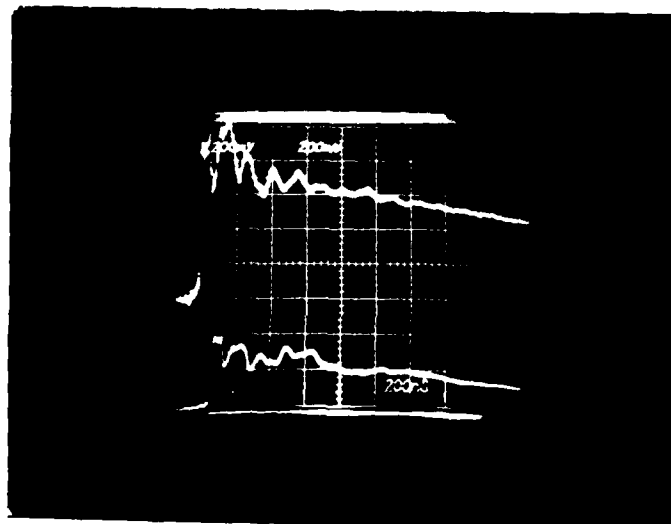
37

DOUBLE TRACE

50 KV/M

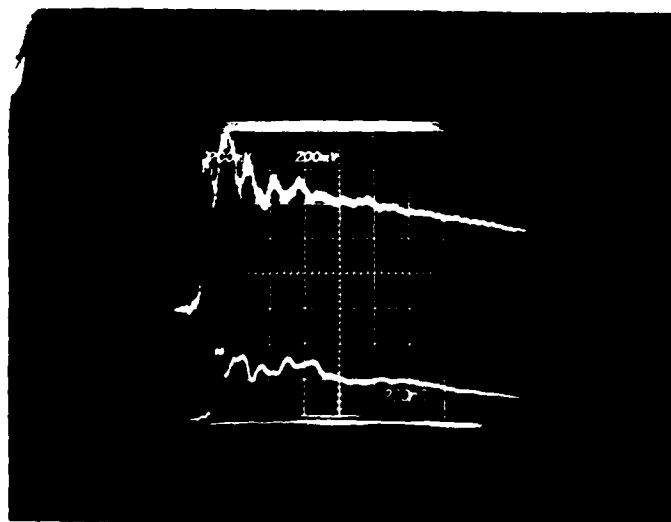


Date 8-5-85
 Test Point CALIBRATION
 Amplification dB
 Attenuation dB
 Horizontal 200 ns/div 1
 Vertical 200 mV/div 1
 Horizontal 200 ns/div 2
 Vertical 200 mV/div 2
 Configuration
 Pulsar Level 30KV CHARGE
 Data Link
 Comments:



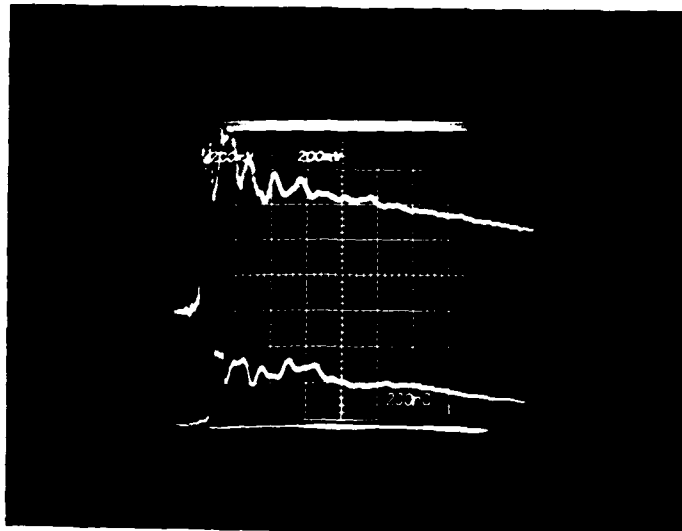
- 1
 1. LOWER TRACE: RECTANGULAR SENSOR -20dB INTO FIBER OPTIC
 2 UPPER TRACE: ROUND "H" SENSOR DIRECT NO ATTN.

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
 Pulsar Level
 Data Link
 Comments:



SYSTEM 10
 DEVICES: 5A + 39 2
 (TRACES
 SAME AS PHOTO 1

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/div	2
Configuration			
Pulse Level	30KV CHARGE		
Data Link			



Comments:

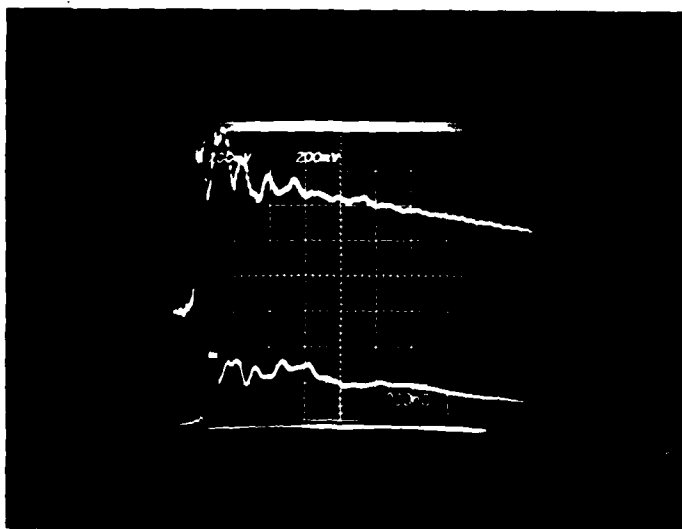
SYSTEM - 11

DEVICES: 5A + 39 3

~ 50KV/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	200mV	mV/div	2
Configuration			
Pulse Level	30KV CHARGE		
Data Link			



Comments:

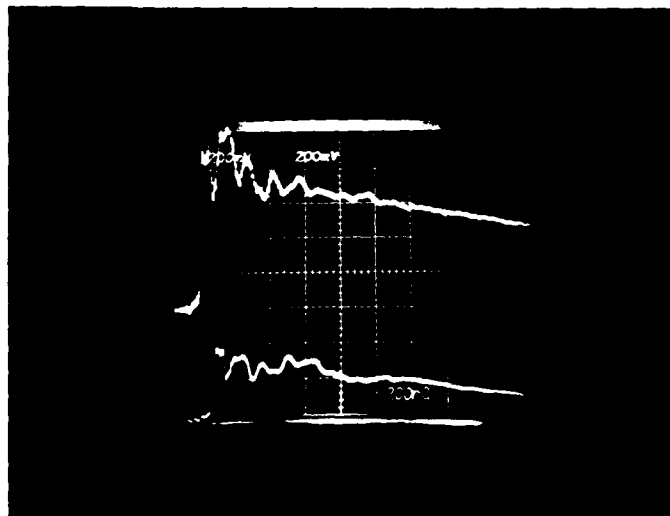
SYSTEM - 16

DEVICES - 4B + 39 4

~ 50KV/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			
Pulse Level	30KV CHARGE		
Data Link			



Comments:

SYSTEM-3

DEVICES: 7 + 39 5

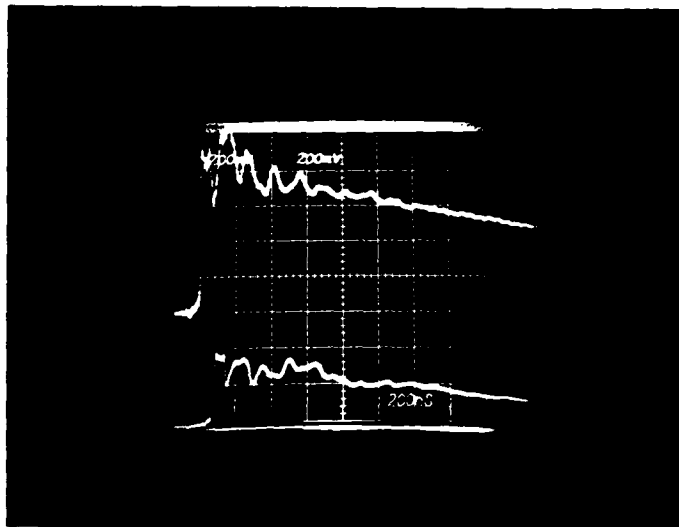
TRACES SAME AS PHOTO 1 8-5-85

~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			
Pulse Level			
Data Link			

Comments:

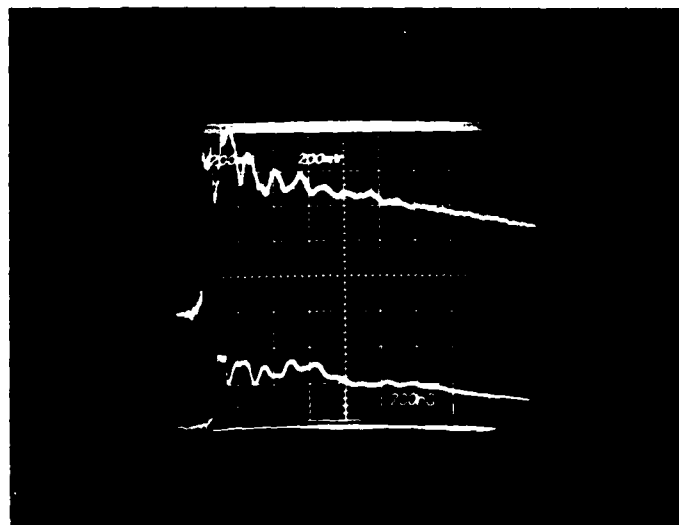
Date	8-5-85 - 1312	
Test Point	TEST D9	
Amplification	dB	
Attenuation	dB	
Horizontal	200	ns/div 1
Vertical	200	mV/div 1
Horizontal	200	ns/div 2
Vertical	200 mV	mV/div 2
Configuration		
Pulse Level	30 KV Charge	
Data Link		
Comments:	(SYSTEM 8)	



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		
Pulse Level	30KV CHARGE	
Data Link		
Comments:	(SYSTEM 9)	



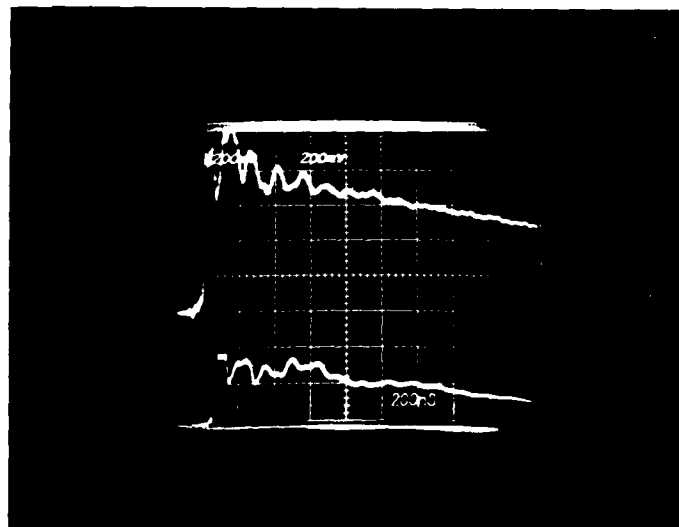
7

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/div 2
Configuration	
Pulse Level	30KV CHARGE
Data Link	

Comments:

(SYSTEM 6)

8

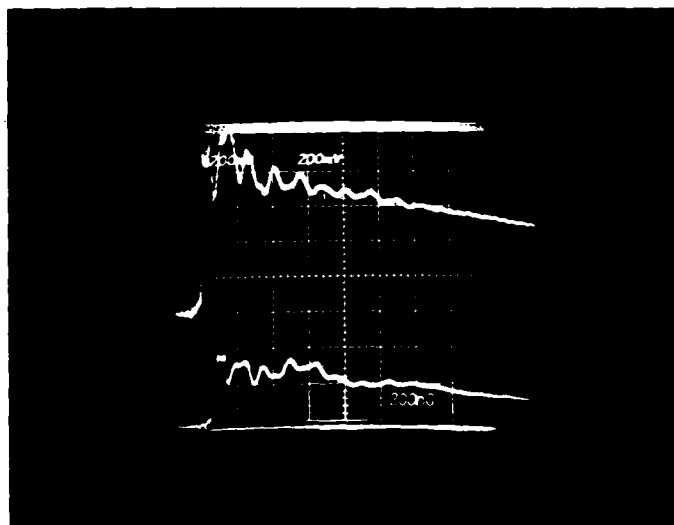


Date	8-5-85
Test Point	TEST D-12
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	200 ns/div 2
Vertical	200 mV/div 2
Configuration	
Pulse Level	30KV CHARGE
Data Link	

Comments:

(SYSTEM 12)

9



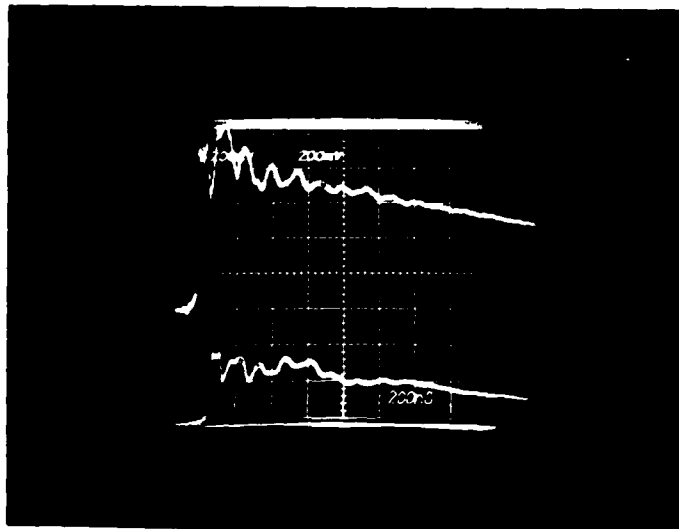
Date	8-5-85	
Test Point	TEST D-13	
Amplification	dB	
Attenuation	dB	
Horizontal	200	ns/div 1
Vertical	200	mV/div 1
Horizontal	200	ns/div 2
Vertical	200mV	ns/div 2
Configuration		
Pulse Level	30KV CHARGE	
Data Link		

Comments:

(SYSTEM 13)

10

50 KV/M

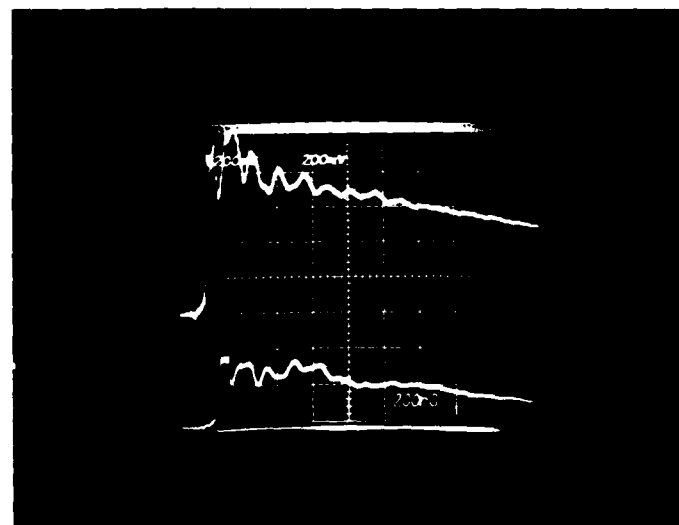


Date	8-5-85	
Test Point	TEST D 14	
Amplification	dB	
Attenuation	dB	
Horizontal	200	ns/div 1
Vertical	200	mV/div 1
Horizontal	200	ns/div 2
Vertical	200mV	ns/div 2
Configuration		
Pulse Level	30KV - CHARGE	
Data Link		

Comments:

(SYSTEM 7)

11



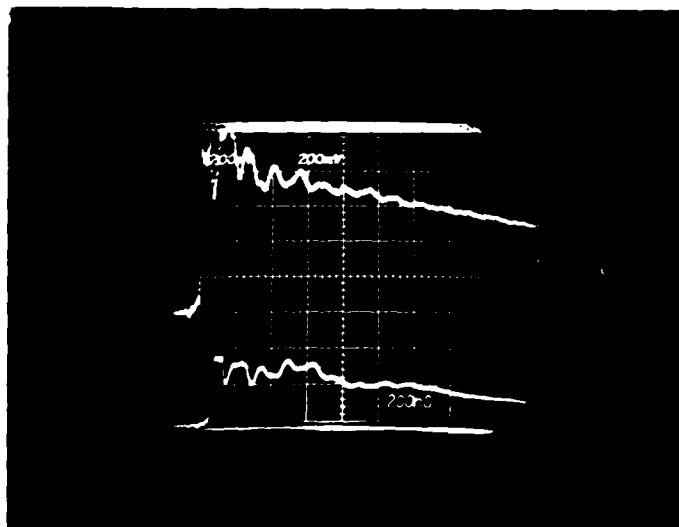
Date	8-5-85		
Test Point	TEST D-15		
Amplification	dB		
Attenuation	dB		
Horizontal	200	ns/div	1
Vertical	200	mV/div	1
Horizontal	200	ns/div	2
Vertical	200 MV	mV/div	2
Configuration			
Pulse Level	30KV-CHARGE		
Data Link			

Comments:

(SYSTEM 14)

12

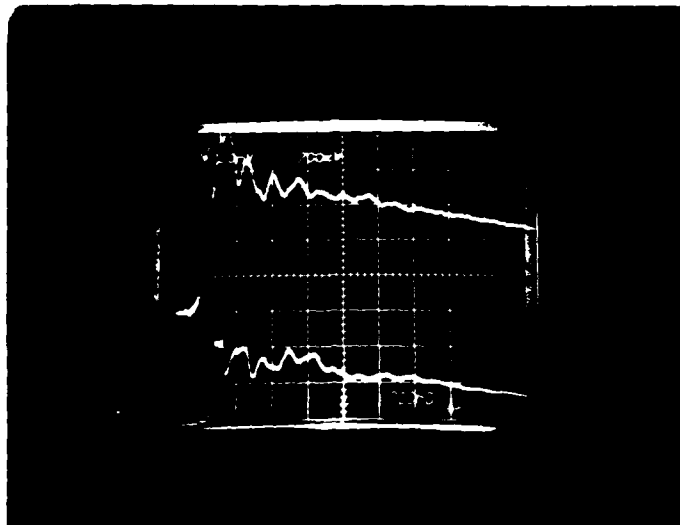
50 KV/m



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

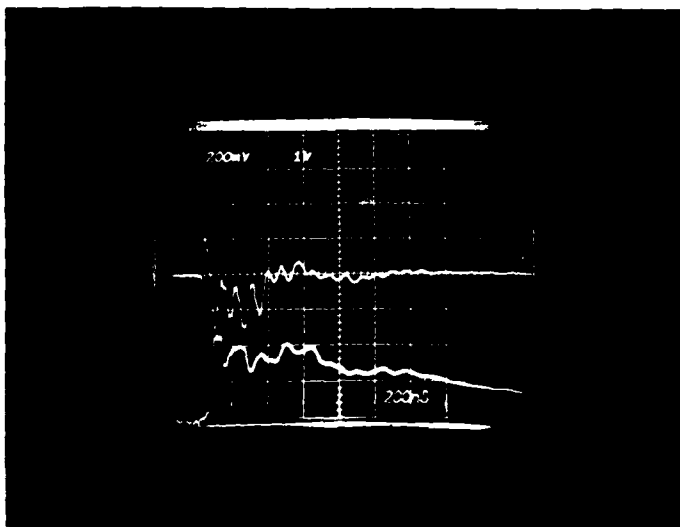
Date	August 6, 1985		
Test Point	Pulser Calibration		
Amplification	dB		
Attenuation	dB		
Horizontal	200 ns/div	1	
Vertical	200 mV/div	1	
Horizontal	200 ns/div	2	
Vertical	200 mV/div	2	
Configuration			
Pulser Level	30KV Charge		
Data Link			
Comments:			

①



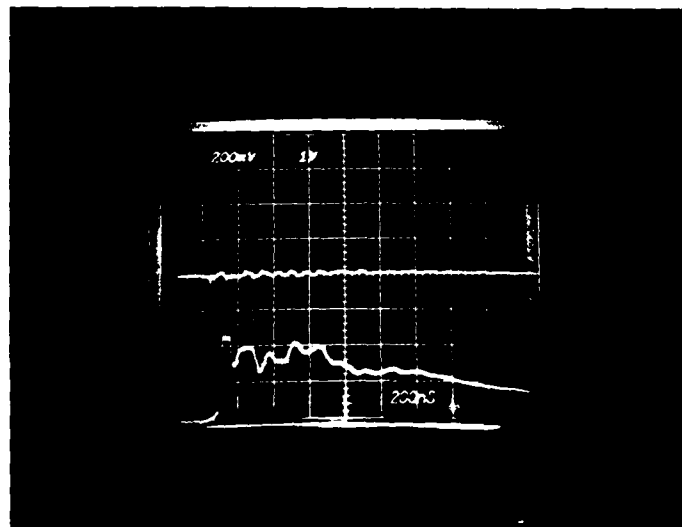
Date	August 6, 1985		
Test Point	S10V TEST BOX		
Amplification	dB		
Attenuation	dB		
Horizontal	200 ns/div	1	
Vertical	1000 mV/div	1	
Horizontal	200 ns/div	2	
Vertical	200 mV/div	2	
Configuration			
Pulser Level	30KV Charge		
Data Link			
Comments:			

②



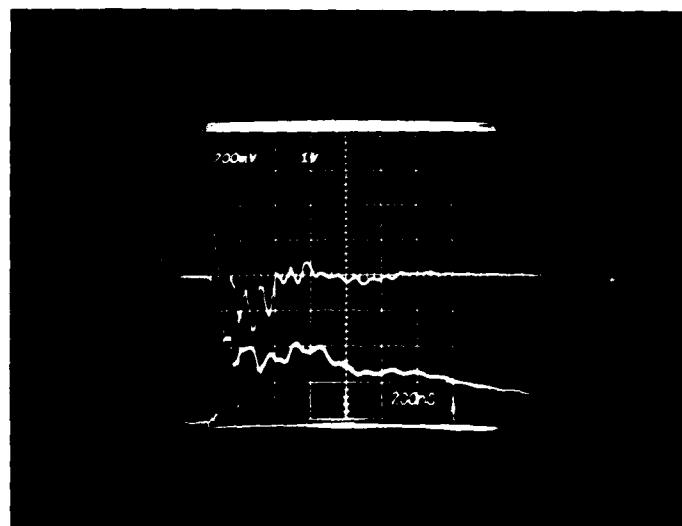
Date August 6, 1985
 Test Point S10V TEST Box
 Amplification dB
 Attenuation dB
 Horizontal 200 ns/div 1
 Vertical 1000 mV/div 1
 Horizontal 200 ns/div 2
 Vertical 200 mV/div 2
 Configuration
 Pulsar Level 30KV charge
 Data Link
 Comments:

(3)

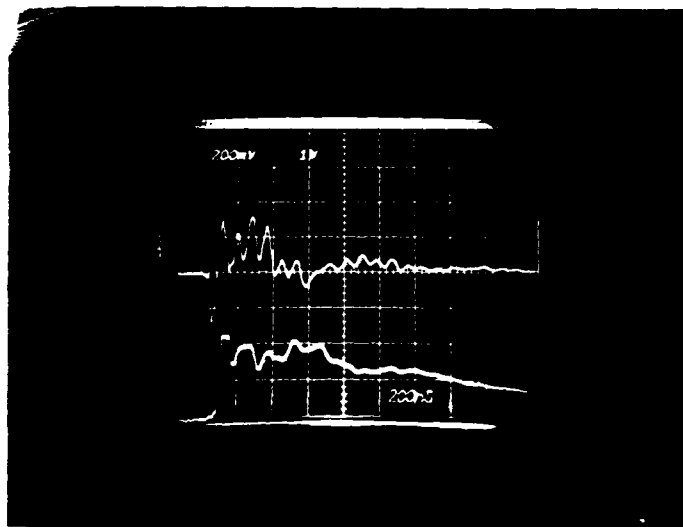


Date August 6, 1985
 Test Point S10V TEST BOX
 Amplification dB
 Attenuation dB
 Horizontal 200 ns/div 1
 Vertical 1000 mV/div 1
 Horizontal 200 ns/div 2
 Vertical 200 mV/div 2
 Configuration
 Pulsar Level 30 KV charge
 Data Link
 Comments:

(4)



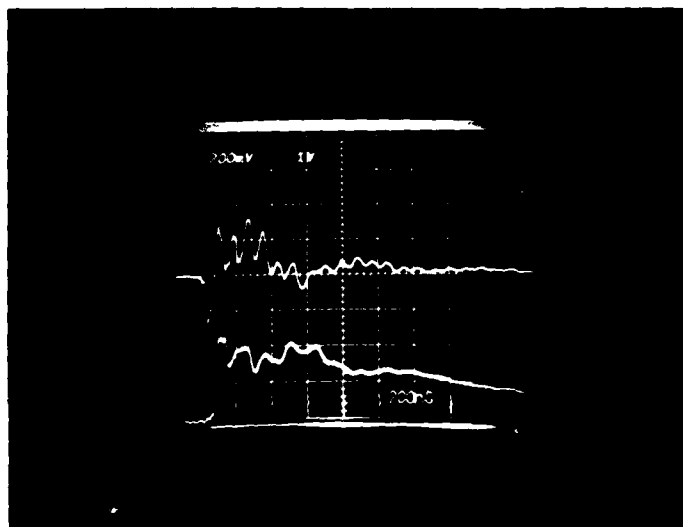
Date	August 6, 1985
Test Point	540V - Box Test
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	1000 mV/div 1
Horizontal	200 ns/div 2
Vertical	200 mV/div 2
Configuration	
Pulse Level	30 KV Charge
Data Link	
Comments:	



(5)

CT-2 Pickup - On bottom of 50 Ω Resistor to Ground
After 510V 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	
Pulse Level	30 KV Charge
Data Link	
Comments:	

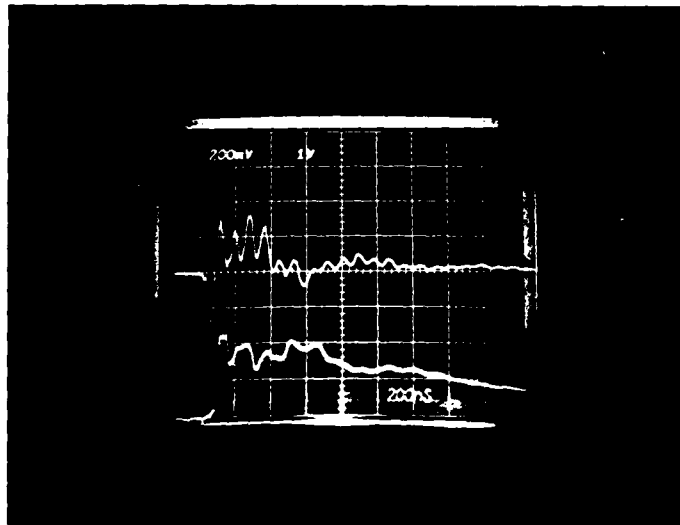


Fischer Device Test

(6)

CT-2 Same as above

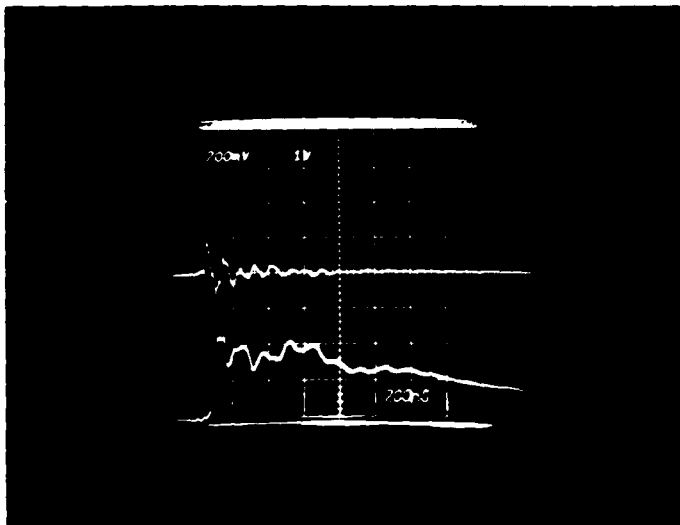
Date August 6, 1985
 Test Point REF ANTENNA
 Amplification dB
 Attenuation dB
 Horizontal 200 ns/div 1
 Vertical 1000 mV/div 1
 Horizontal 200 ns/div 2
 Vertical 200 mV/div 2
 Configuration
 Pulse Level 30KV charge
 Data Link
 Comments:



(7)

SAME AS 6 NO PROTECTION

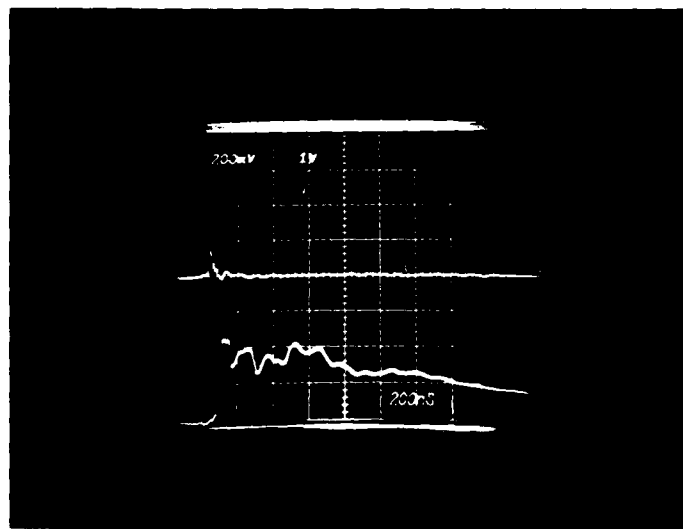
Date August 6, 85
 Test Point REF ANTENNA
 Amplification dB
 Attenuation dB
 Horizontal 200 ns/div 1
 Vertical 1000 mV/div 1
 Horizontal 200 ns/div 2
 Vertical 200 mV/div 2
 Configuration
 Pulse Level 30KV charge
 Data Link
 Comments:



(8)

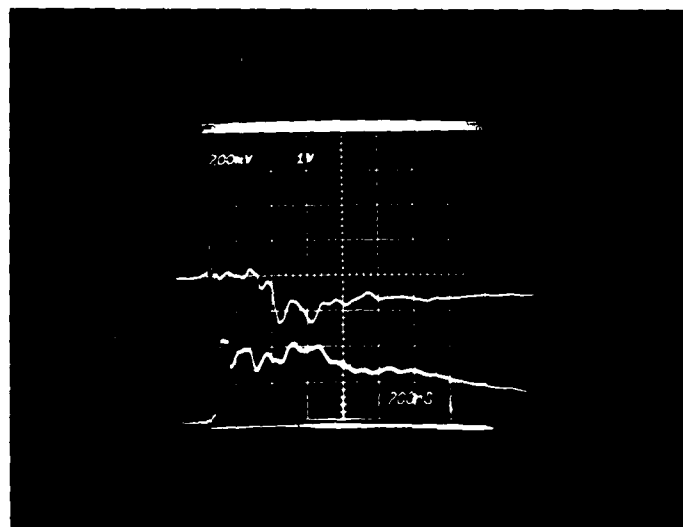
Date	August 6, 1985		
Test Point			
Amplification	dB		
Attenuation	dB		
Horizontal	200 ns/div	1	
Vertical	1000 mV/div	1	
Horizontal	200 ns/div	2	
Vertical	200 mV/div	2	
Configuration			
Pulse Level	30KV Charge		
Data Link			
Comments:			

(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			
Pulse Level	30KV Charge		
Data Link			
Comments:			

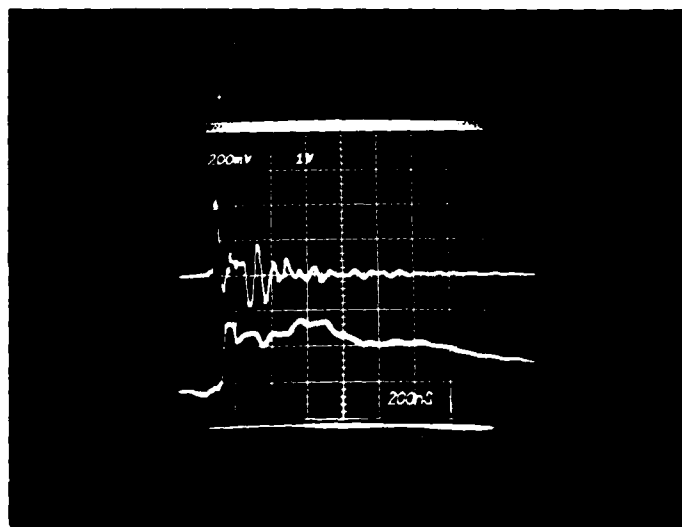
(10)



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
 Pulsar Level 30KV charge
 Data Link
 Comments:

(11)

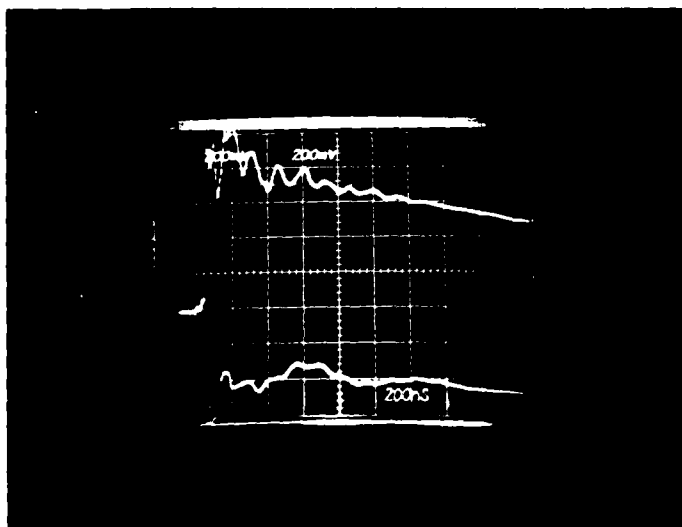
UPPER: RF ANTENNA - 100A/div - PROBE 91550 -
 PROBE OVER WIRE ABOVE RESISTOR -
 PEAK ~ 210 A (10.5 KV)
 40 dB



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
 Pulsar 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

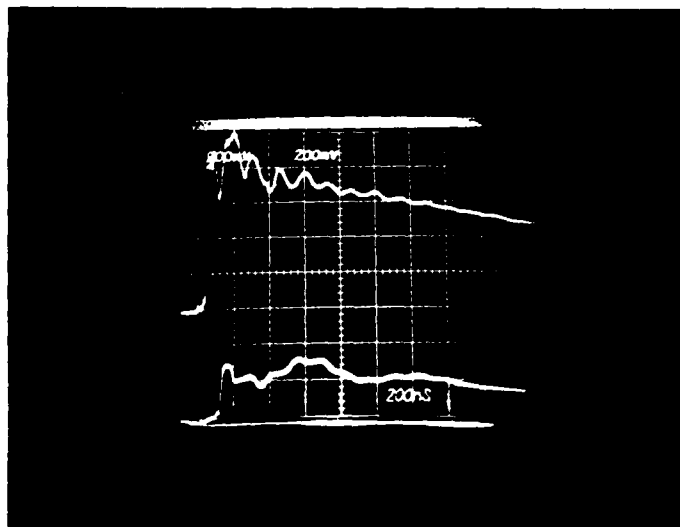
Configuration

Pulse Level 30KV 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

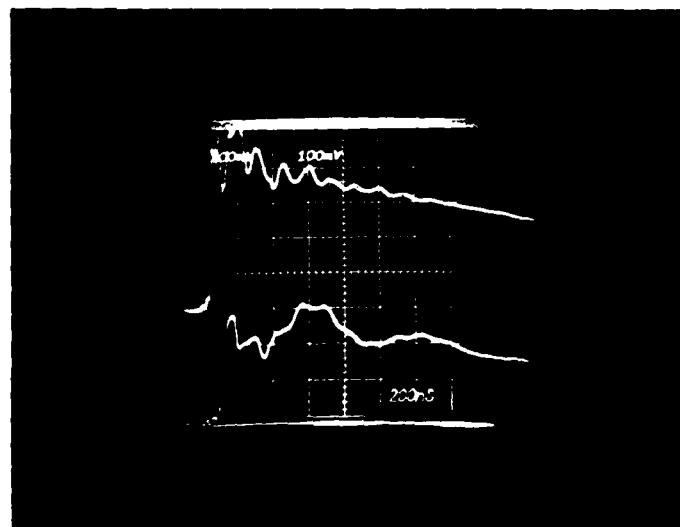
Configuration

Pulse Level 30KV 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

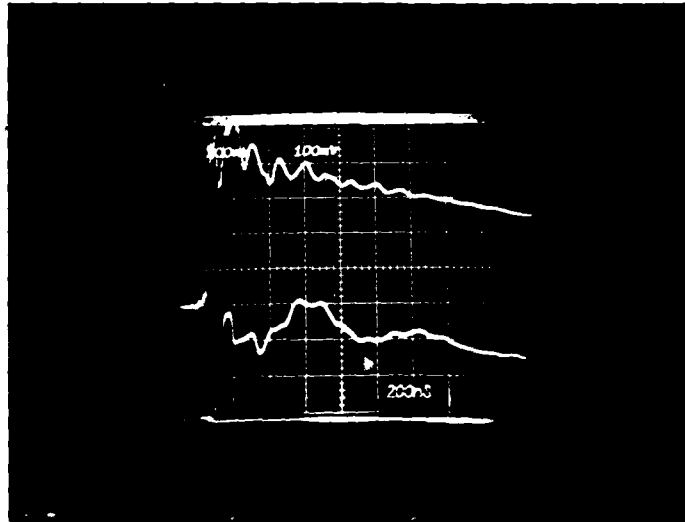
Vertical 200 mV/div 2

Configuration

Pulse 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

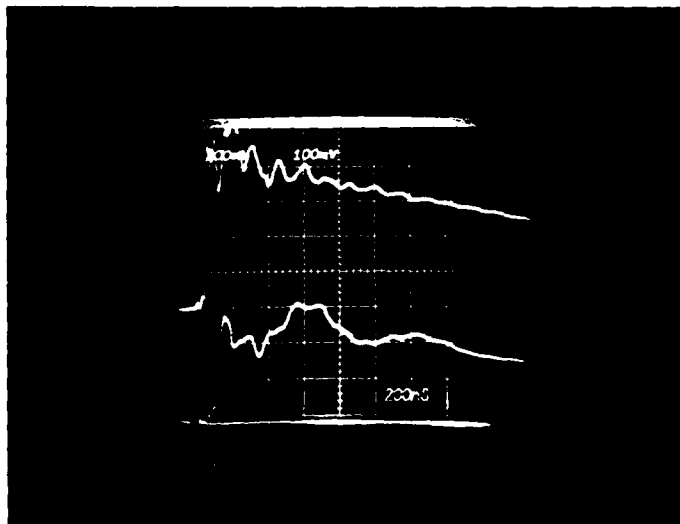
Vertical 200 mV/div 2

Configuration

Pulse Level 30 KV/charge

Data Link

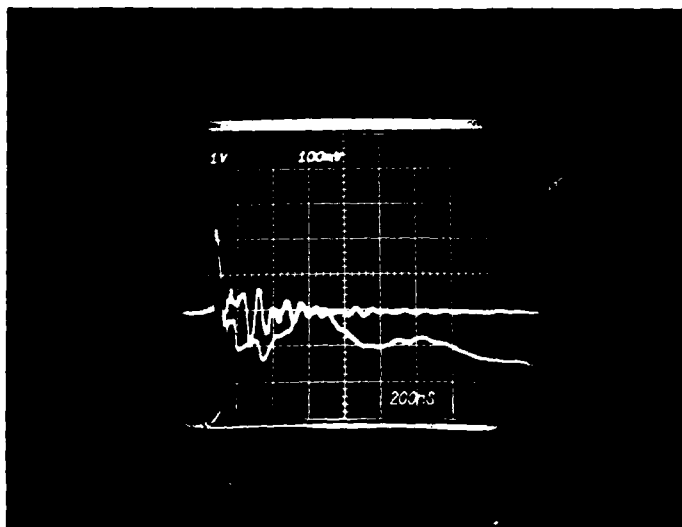
Comments:



(16)

REPEAT 14

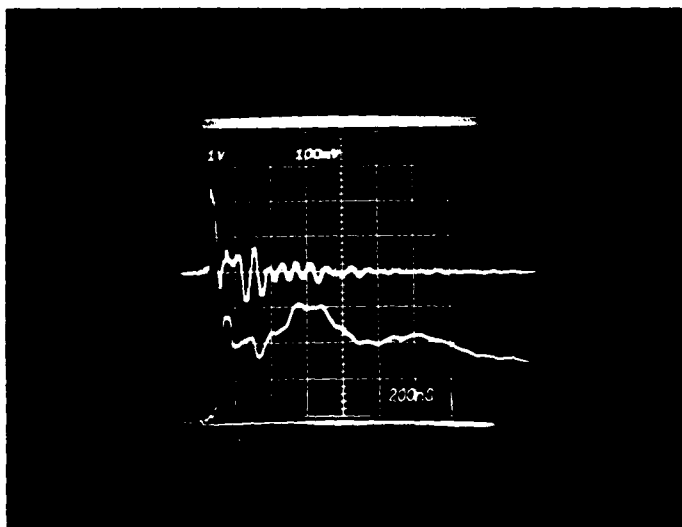
Date August 6, 1985
 Test Point RF ANTENNA
 Amplification dB
 Attenuation 40 dB
 Horizontal 200 ns/div 1
 Vertical 100 mV/div 1
 Horizontal 200 ns/div 2
 Vertical 1000 mV/div 2
 Configuration
 Pulse Level 30 KV Charge
 Data Link
 Comments:



(17)

UPPER: 91550 OVER RF ANTENNA ABOVE 50 OHM
 RESISTOR - 40 dB 1V/div
 230 A (11.5 KV)

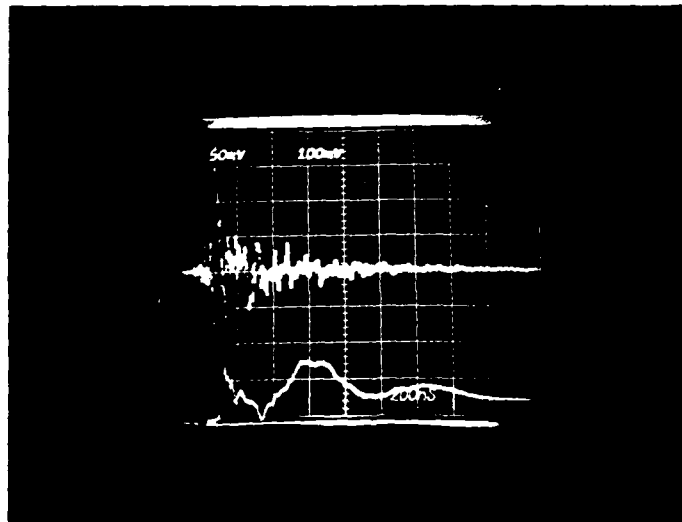
Date August 6, 1985
 Test Point RF ANTENNA
 Amplification dB
 Attenuation 40 dB
 Horizontal 200 ns/div 1
 Vertical 100 mV/div 1
 Horizontal 200 ns/div 2
 Vertical 1000 mV/div 2
 Configuration
 Pulse Level 30 KV Charge
 Data Link
 Comments:



(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
 Pulsar Level 30 KV charge
 Data Link
 Comments:

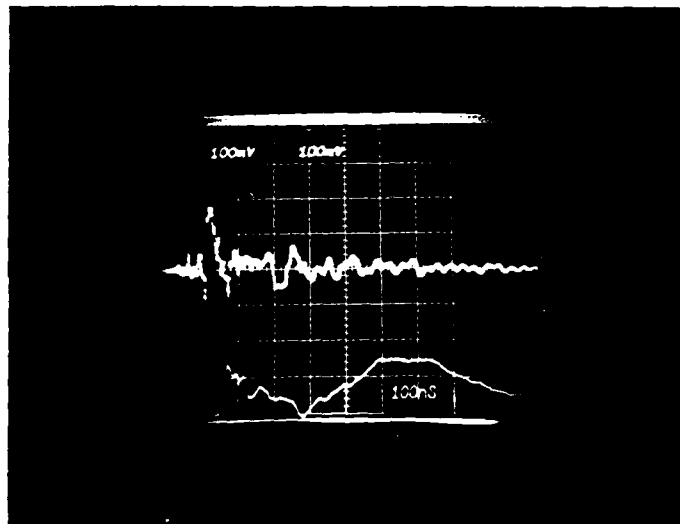


(19)

PEARSON 110 PROBE OVER RF ANTENNA ABOVE
 50 OHM RESISTOR

BAD TRIGGER

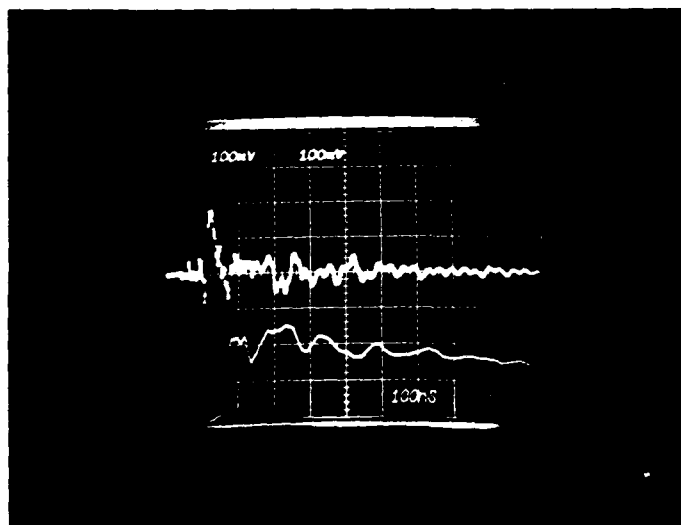
Date August 6, 1985
 Test Point RF ANTENNA
 Amplification dB
 Attenuation dB
 Horizontal 100 ns/div 1
 Vertical 100 mV/div 1
 Horizontal 100 ns/div 2
 Vertical 100 mV/div 2
 Configuration
 Pulsar Level 30KV charge
 Data Link
 Comments:



(20)

REPEAT 19

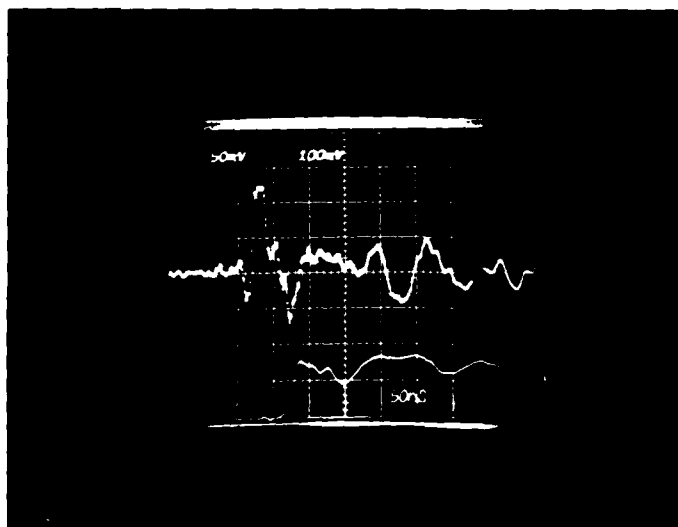
Date	August 6, 1985		
Test Point	RF ANTENNA		
Amplification	dB		
Attenuation	dB		
Horizontal	100 ns/div	1	
Vertical	100 mV/div	1	
Horizontal	100 ns/div	2	
Vertical	100 mV/div	2	
Configuration			
Pulse Level	30KV Charge		
Data Link			
Comments:			



(21)

LOWER TRACE - REPLACED F.O. TRANSMITTER

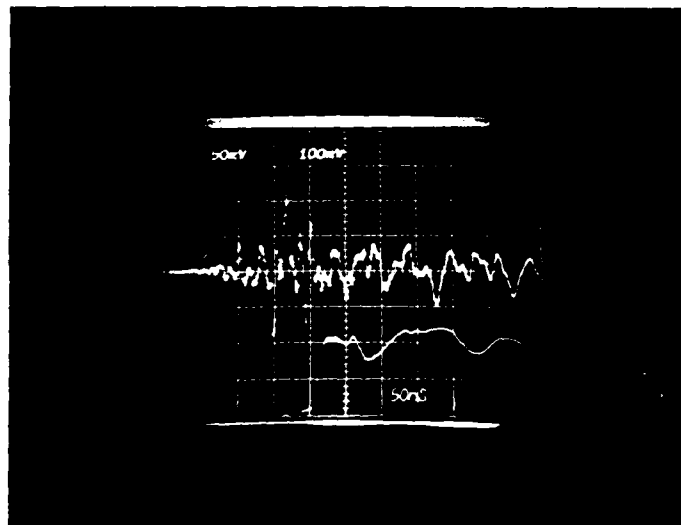
Date	August 6, 1985		
Test Point			
Amplification	dB		
Attenuation	dB		
Horizontal	50 ns/div	1	
Vertical	100 mV/div	1	
Horizontal	50 ns/div	2	
Vertical	50 mV/div	2	
Configuration			
Pulse Level	20KV Charge		
Data Link			
Comments:			



(22)

20KV CHARGE -

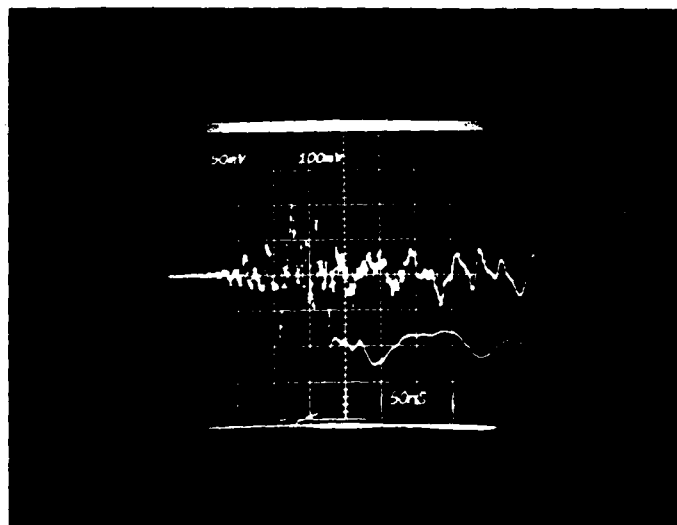
Date	August 6, 1985		
Test Point	SIN V RF TEST BOX		
Amplification	dB		
Attenuation	dB		
Horizontal	50 ns/div	1	
Vertical	100 mV/div	1	
Horizontal	50 ns/div	2	
Vertical	50 mV/div	2	
Configuration			
Pulse Level	30 KV/charge		
Data Link			
Comments:			



(23)

UPPER: PEARSON PROBE -
220 A

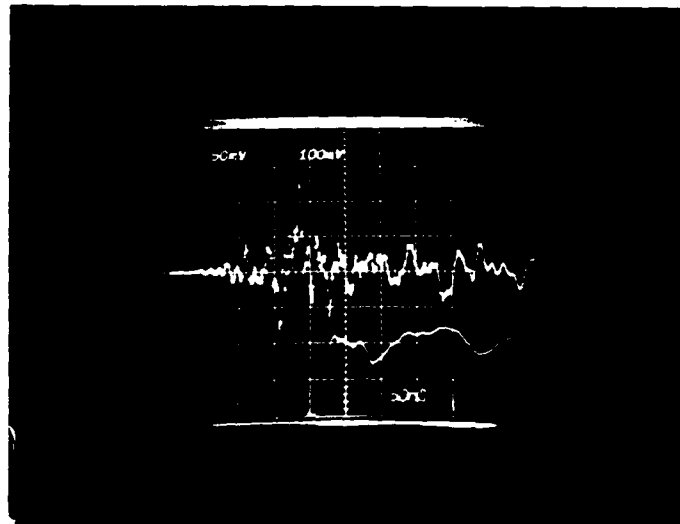
Date	August 6, 1985		
Test Point	FCC-250-300		
Amplification	dB		
Attenuation	dB		
Horizontal	50 ns/div	1	
Vertical	100 mV/div	1	
Horizontal	50 ns/div	2	
Vertical	50 mV/div	2	
Configuration			
Pulse Level	30 KV/charge		
Data Link			
Comments:			



(24)

FISCHER FCC-250-300 WIRE IN CIRCUIT
220 A

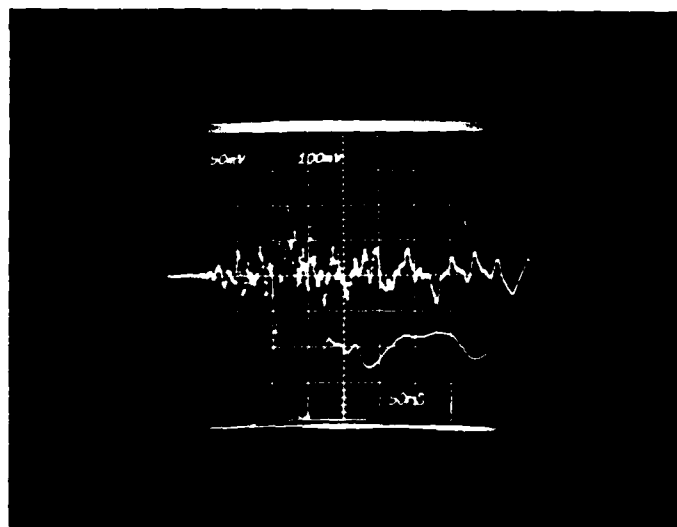
Date August 6, 1985
 Test Point PROBE
 Amplification dB
 Attenuation dB
 Horizontal 50 ns/div 1
 Vertical 100 mV/div 1
 Horizontal 50 ns/div 2
 Vertical 50 mV/div 2
 Configuration
 Pulsar Level 30KV/charge
 Data Link
 Comments:



(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
 Pulsar Level 30KV/charge
 Data Link
 Comments:



(26)

SAME AS (25)

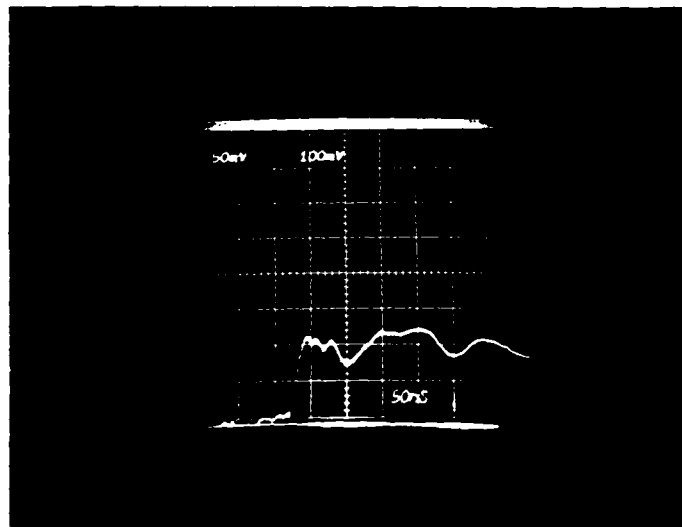
Date	August 6, 1985		
Test Point	E-1		
Amplification	dB		
Attenuation	dB		
Horizontal	50	ns/div	1
Vertical	100	mV/div	1
Horizontal		ns/div	2
Vertical		mV/div	2
Configuration			
Pulse Level	30KV Charge		
Data Link			
Comments:			

SYSTEM 2

(27)

510V 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			
Pulse Level	30KV Charge		
Data Link			
Comments:			

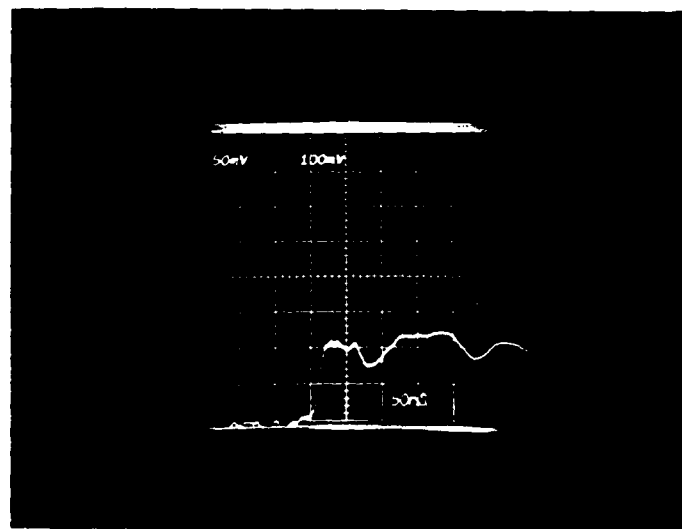
SYSTEM 2

(28)

REPEAT

(27)

10.374MHz TX



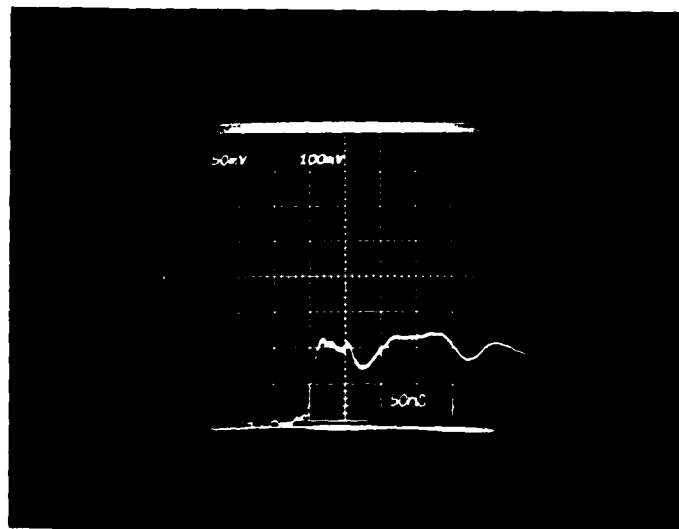
Date August 6, 1985
 Test Point E-3
 Amplification dB
 Attenuation dB
 Horizontal 50 ns/div 1
 Vertical 100 mV/div 1
 Horizontal ns/div 2
 Vertical mV/div 2
 Configuration
 Pulse Level 30KV Charge
 Data Link

Comments:

(SYSTEM 2)

(29)

FISCHER PROTECTIVE DEVICE FCC - 250-300-UMF



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

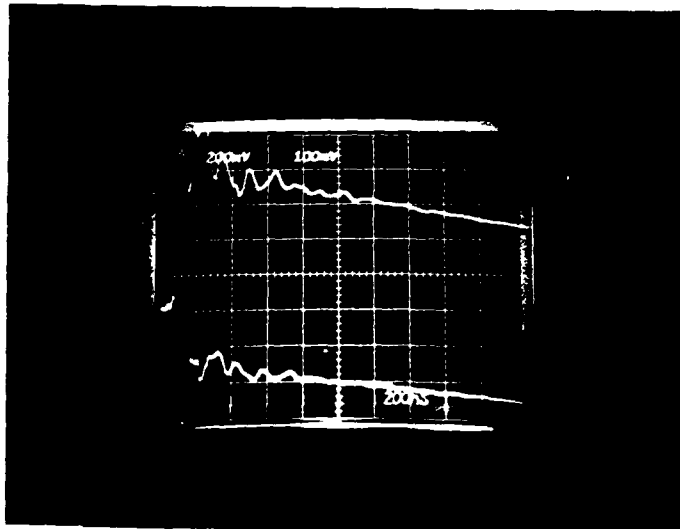
PULSER CALIBRATION

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/div 2
 Configuration
 Pulsar Level 30KV charge
 Data Link 1-COAX-2 F.O.

Comments:

F.O. ATTN-20dB

1

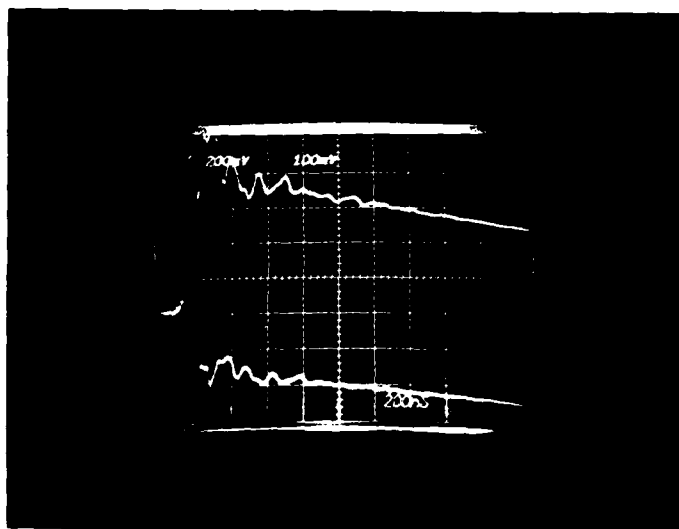


Date 8-7-85
 Test Point DAILY CALIBRATION
 Amplification dB
 Attenuation dB
 Horizontal 200 ns/div 1
 Vertical 200 mV/div 1
 Horizontal 200 ns/div 2
 Vertical 100 mV/div 2
 Configuration
 Pulsar Level 30KV-CHARGE
 Data Link

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
 Pulsar Level 30KV/charge
 Data Link

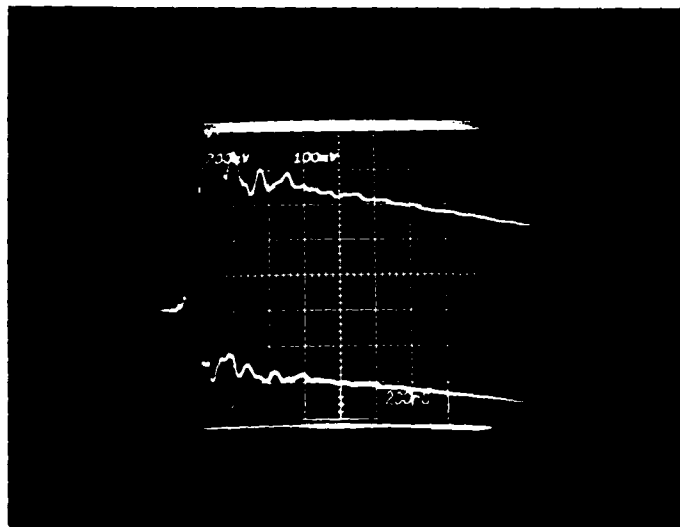
Comments:

SYSTEM 2

(3)

ALPHA DELTA RT - PROTECTIVE DEVICE

TRACES: PULSER FIELDS

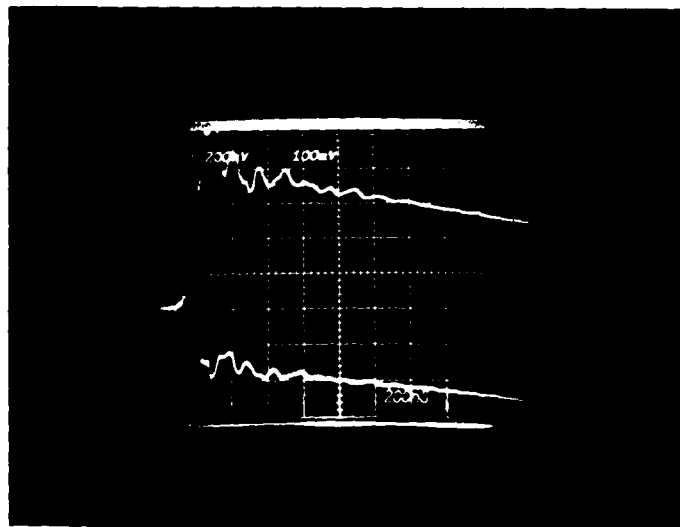


Date August 7, 1985
 Test Point D15T
 Amplification dB
 Attenuation dB
 Horizontal 200 ns/div 1
 Vertical 200 mV/div 1
 Horizontal 200 ns/div 2
 Vertical 100 mV/div 2
 Configuration
 Pulsar Level 30 KV/charge
 Data Link

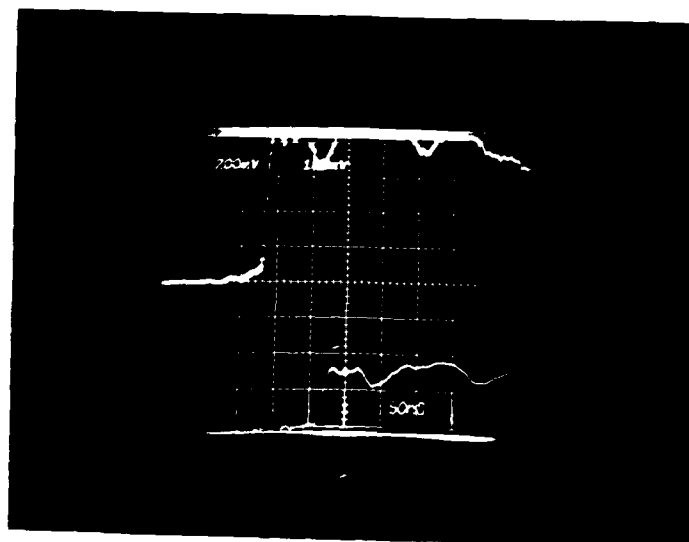
Comments:

SYSTEM 2

(4)



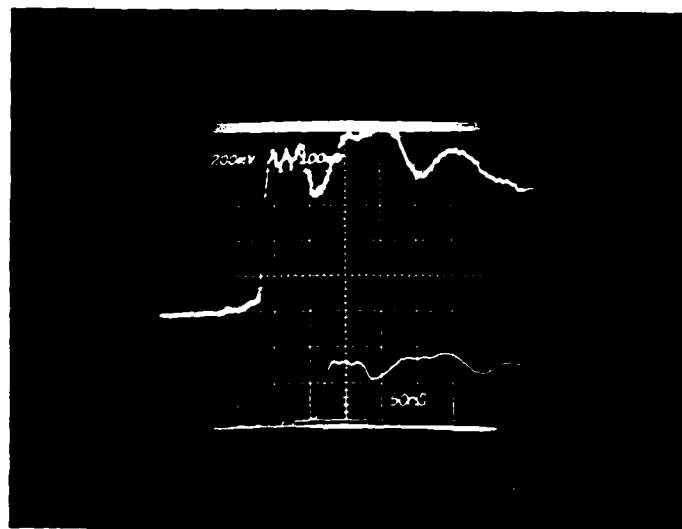
Date 8-7-85
 Test Point F-L
 Amplification dB
 Attenuation dB
 Horizontal 50 ns/div 1
 Vertical 200 mV/div 1
 Horizontal 50 ns/div 2
 Vertical 100 ns/div 2
 Configuration
 Pulsar Level 30 KV -CHARGE
 Data Link
 Comments:
 FIELD 50 KV/M



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/div 2
 Configuration
 Pulsar Level 30 KV -CHARGE
 Data Link
 Comments:
 FIELD 50 KV/M



21

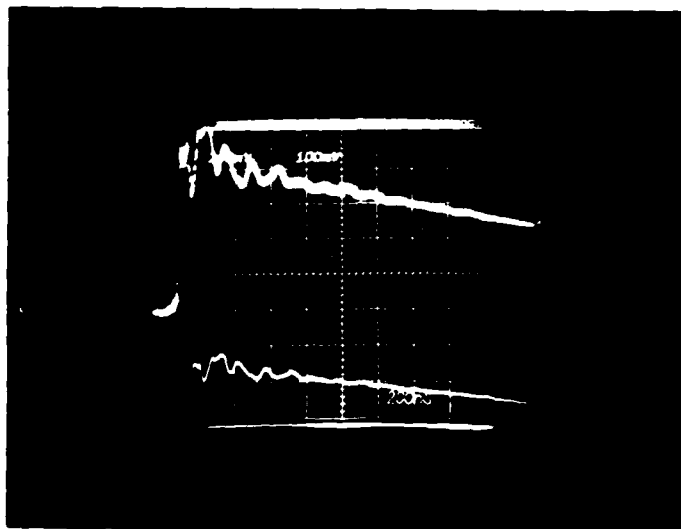
SYSTEM 2 POWER ON - TRANSMIT MODE
 A.C. POWER PROTECTION - DEVICE (TP 39)
 NO PROTECTION ON RF ANTENNA.
 TX - TUNED TO 10.374 MHz.

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/div 2
Configuration	
Pulse Level	30 KV DRIVE
Data Link	

Comments:

50 KV/M • FIELD

22



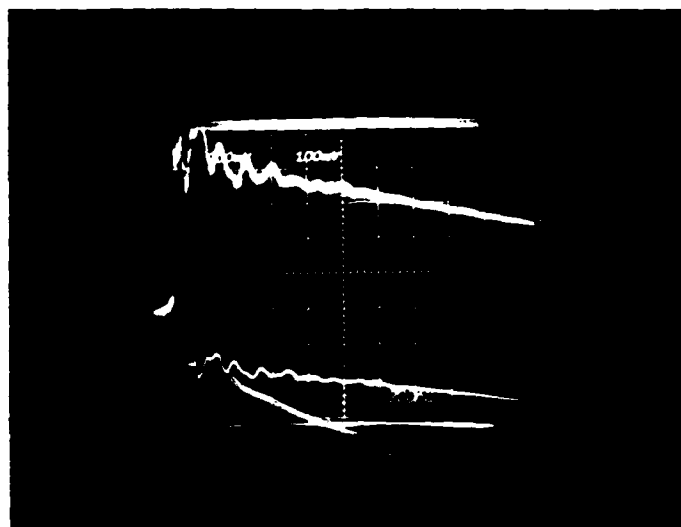
SYSTEM 2 - NO PROTECTION ON AC POWER OR RF ANTENNA
HONDA GENERATOR PROTECTED BY TP 39.
RECEIVE MODE

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/div 2
Configuration	
Pulse Level	30 KV - DRIVE
Data Link	

Comments:

50 KV/M FIELD

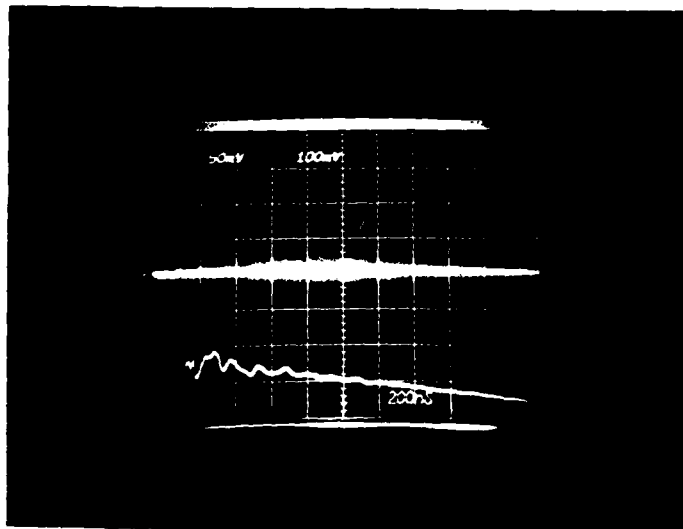
23



SYSTEM 2

TRANSMIT MODE - NO PROTECTION ON
AC POWER OR RF INJECT -
TUNED TO 10.374 MHz -

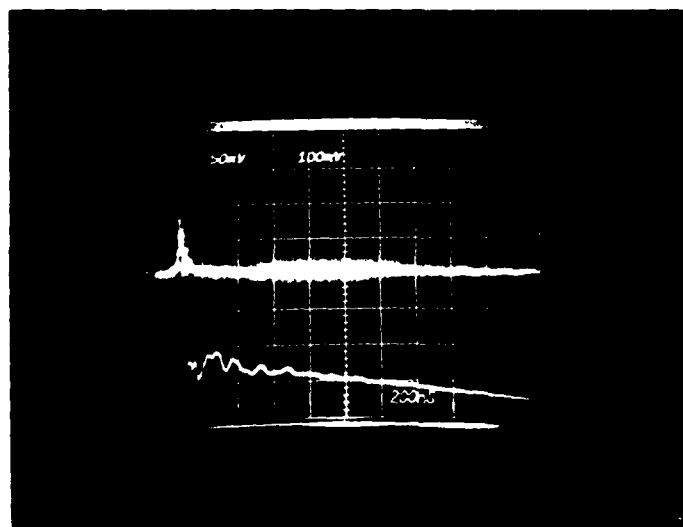
Date 8-7-85
 Test Point PROBE-91550-4
 Amplification dB
 Attenuation 40 dB
 Horizontal 200 ns/div 1
 Vertical 50 mV/div 1
 Horizontal 200 ns/div 2
 Vertical 100mV 40/div 2
 Configuration
 Pulsar Level 30KV - DRIVE
 Data Link
 Comments:



FIELD 50KV/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 40/div 2
 Configuration
 Pulsar Level 30KV - 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.

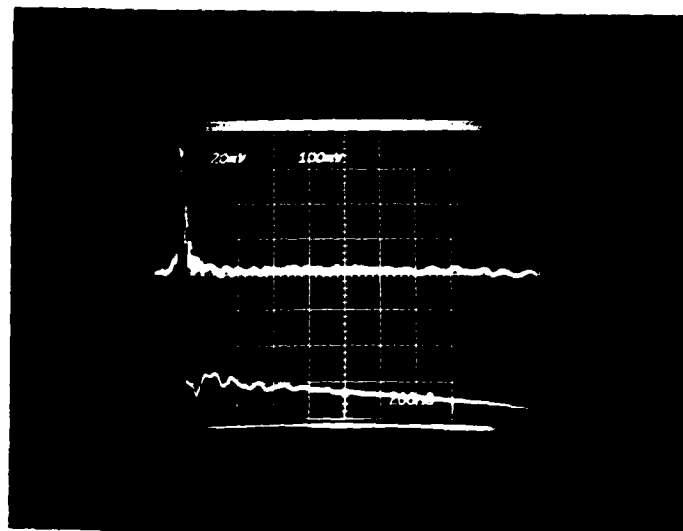
FIELD 1.6 divisions, CURRENT 1.6 div -

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 dB/div 2
 Configuration
 Pulsar Level 20KV-CHARGE
 Data Link

Comments:

FIELD 1.1 dw
 CURRENT 3.6 div 26
 $I = 80 \text{ A (4KV)}$

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

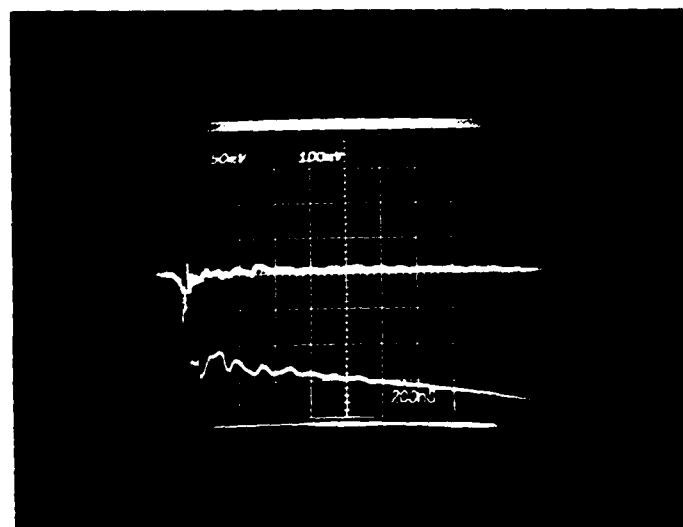


Date 8-7-85
 Test Point RF WIRE ANTENNA
 Amplification dB
 Attenuation dB
 Horizontal 200 ns/div 1
 Vertical 20 mV/div 1
 Horizontal 200 ns/div 2
 Vertical 100 MV dB/div 2
 Configuration
 Pulsar Level 30KV-CHARGE
 Data Link

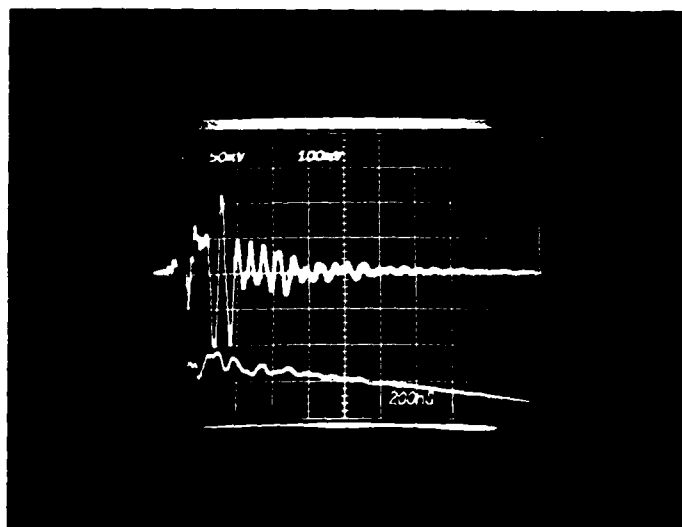
Comments:

FIELD - 1.6 divisions
 CURRENT - 1.6 div.
 $I = -80 \text{ A (4KV)}$ 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 100mV/div 2
 Configuration
 Pulsar Level 30KV-CHARGE
 Data Link



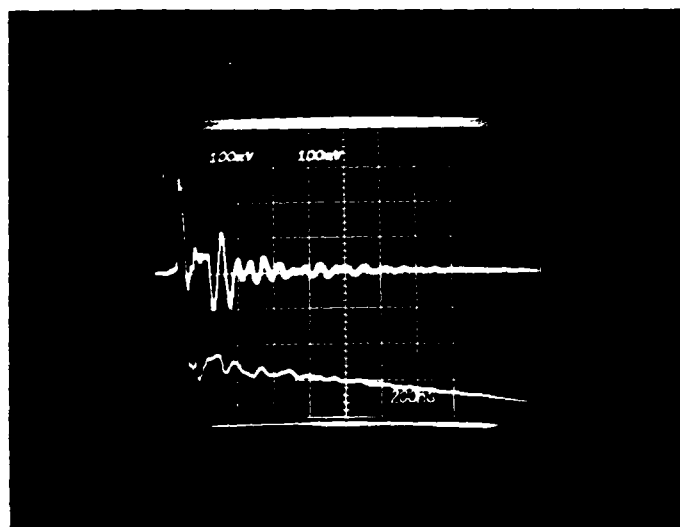
Comments:

FD 16cliv

28

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

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 100mV/div 2
 Configuration
 Pulsar Level 30KV charge
 Data Link



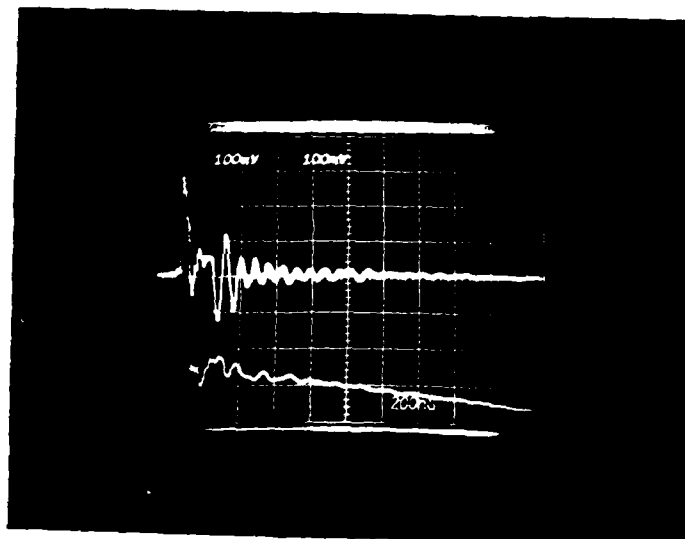
Comments:

29

270 A (13.5 KV)

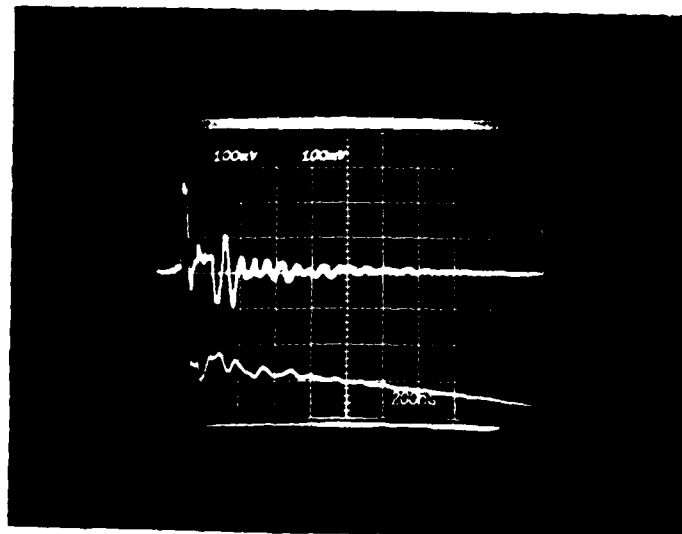
MEASUREMENT OF RF WIRE ANTENNA
 BEFORE COAX - ~~50.0HM~~ 50.0HM RESISTOR TO GND.

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
 Pulse Level 30 KV Charge
 Data Link
 Comments:



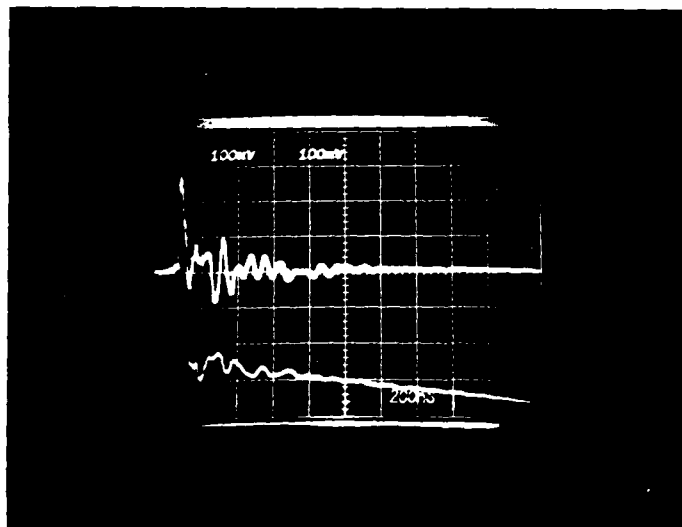
REPEAT (29) (30) - I = 290 A (14.5 KV)

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
 Pulse 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

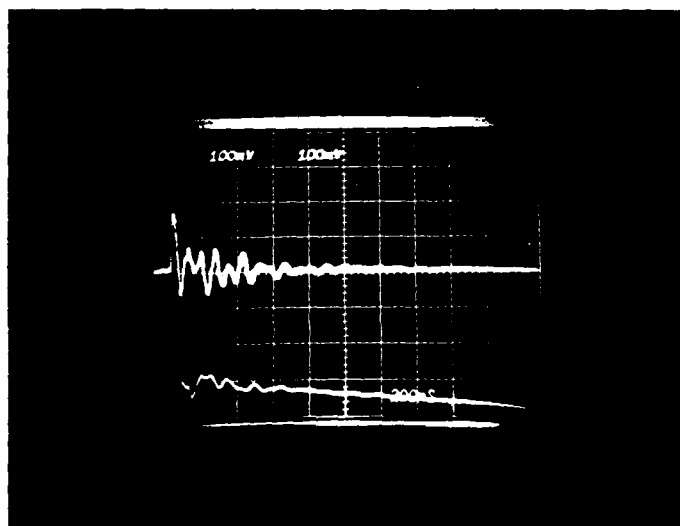
Date August 7, 1985
 Test Point RF WIRE ANT
 Amplification dB
 Attenuation dB
 Horizontal 200 ns/div 1
 Vertical 100 mV/div 1
 Horizontal 200 ns/div 2
 Vertical 100 mV/div 2
 Configuration
 Pulsar Level 30 KV Charge
 Data Link
 Comments:



(32)

REPEAT (31) BUT WITH ANTENNA DIRECT TO
 50 OHM RESISTOR TO GROUND. NO
 HARDWARE BETWEEN ANTENNA + RESISTOR
 275 A (13.75KV)

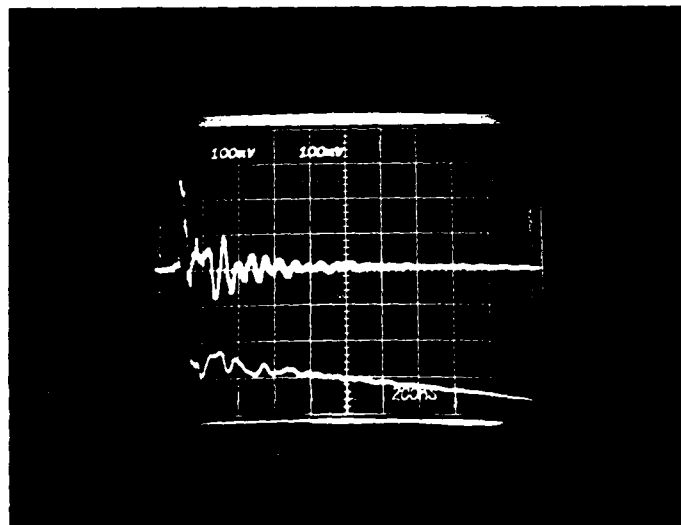
Date August 7, 1985
 Test Point RF WIRE ANT
 Amplification dB
 Attenuation dB
 Horizontal 200 ns/div 1
 Vertical 100 mV/div 1
 Horizontal 200 ns/div 2
 Vertical 100 mV/div 2
 Configuration
 Pulsar Level 20KV Charge
 Data Link
 Comments:



(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
 Pulsar Level 30KV Charge
 Data Link
 Comments:

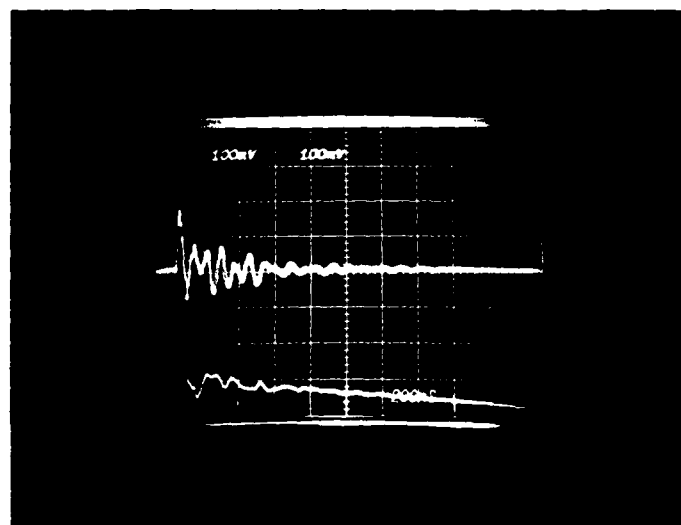


(34)

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
 Pulsar Level 20KV Charge
 Data Link
 Comments:

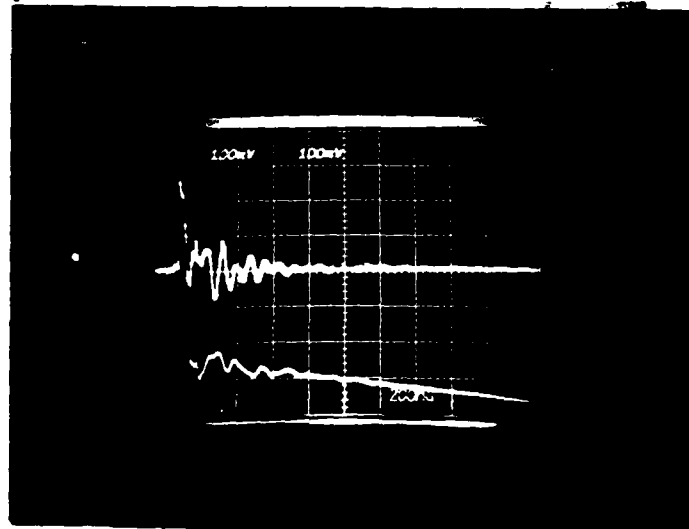


(35)

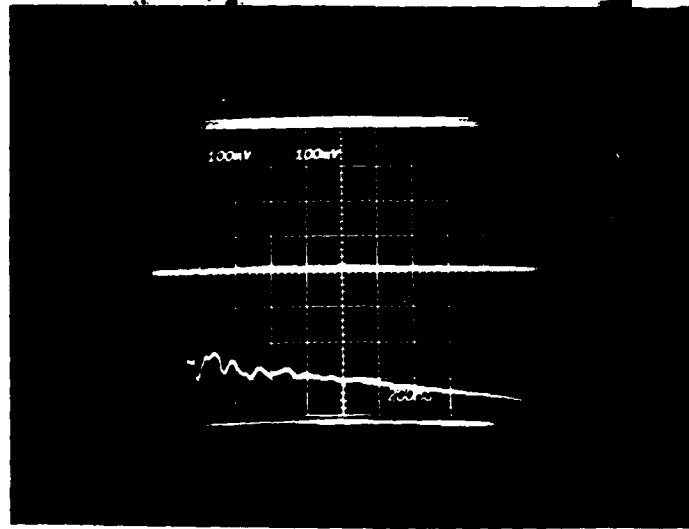
REPEAT (34) 20KV CHARGE

I = 180A (9.0KV)

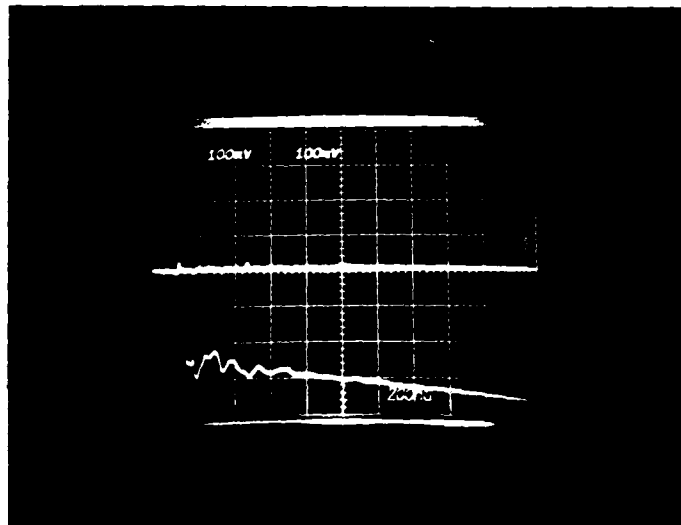
Date	August 7, 1985		
Test Point			
Amplification	dB		
Attenuation	dB		
Horizontal	200 ns/div	1	
Vertical	100 mV/div	1	
Horizontal	200 ns/div	2	
Vertical	100 mV/div	2	
Configuration			
Pulse Level	30KV Charge		
Data Link			
Comments:	(SYSTEM 11) (36)		



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			
Pulse Level	30KV Charge		
Data Link			
Comments:	(System 11) (37)		

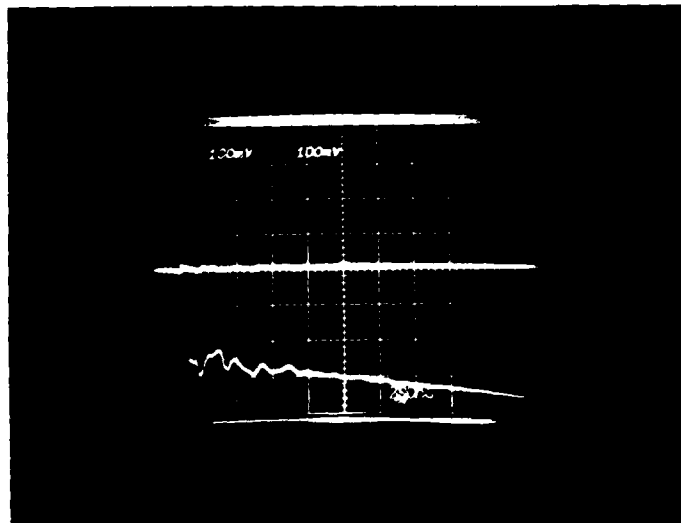


Date August 7, 1985
 Test Point D17T
 Amplification dB
 Attenuation dB
 Horizontal 200 ns/div 1
 Vertical 100 mV/div 1
 Horizontal 200 ns/div 2
 Vertical 100 mV/div 2
 Configuration
 Pulsar Level 30KV Charge
 Data Link
 Comments:



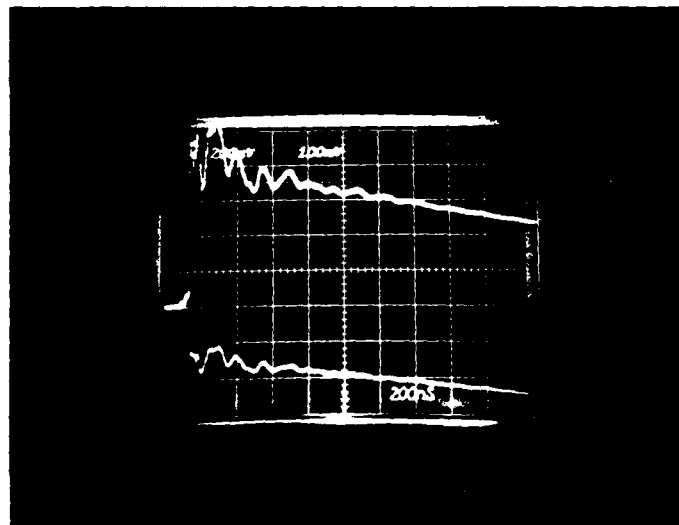
(38)
 REPEAT (37) TRANSMIT

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
 Pulsar Level 30KV Charge
 Data Link
 Comments:



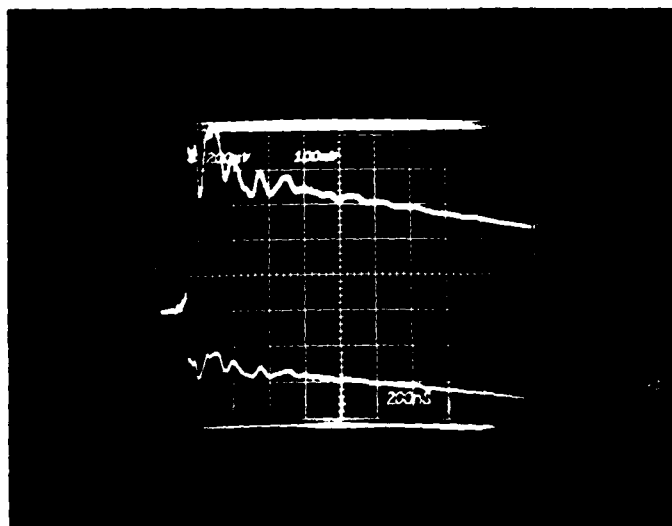
(SYSTEM 11) (39)

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	
Pulse Level	30 KV charge
Date 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	
Pulse Level	30 KV charge
Date Link	
Comments:	

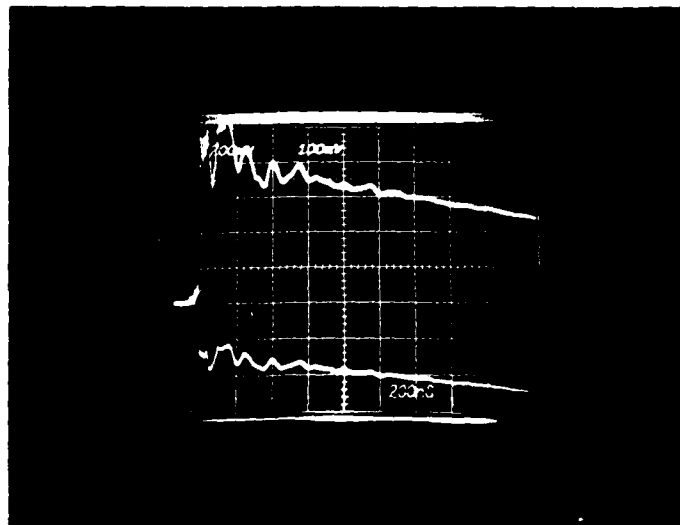


SYSTEM 11

(3)

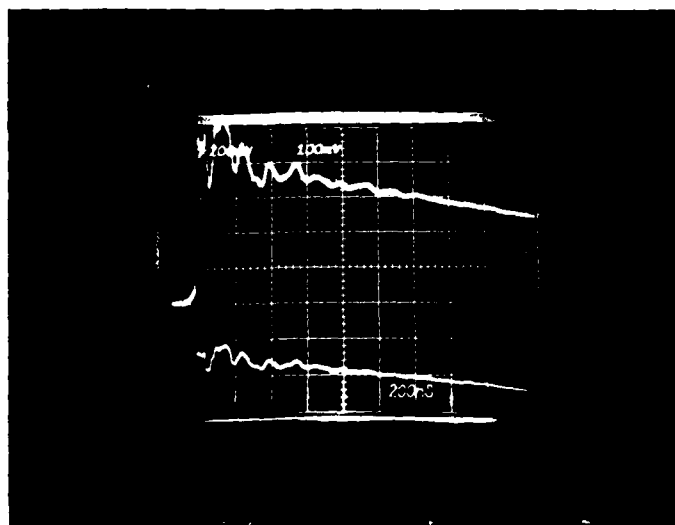
Date	August 8, 85		
Test Point	E6		
Amplification	dB		
Attenuation	dB		
Horizontal	200 ns/div	1	
Vertical	200 mV/div	1	
Horizontal	200 ns/div	2	
Vertical	100 mV/div	2	
Configuration			
Pulse Level	30KV Charge		
Data Link			
Comments:	SYSTEM 11		

(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			
Pulse Level	30KV Charge		
Data Link			
Comments:	SYSTEM 11		

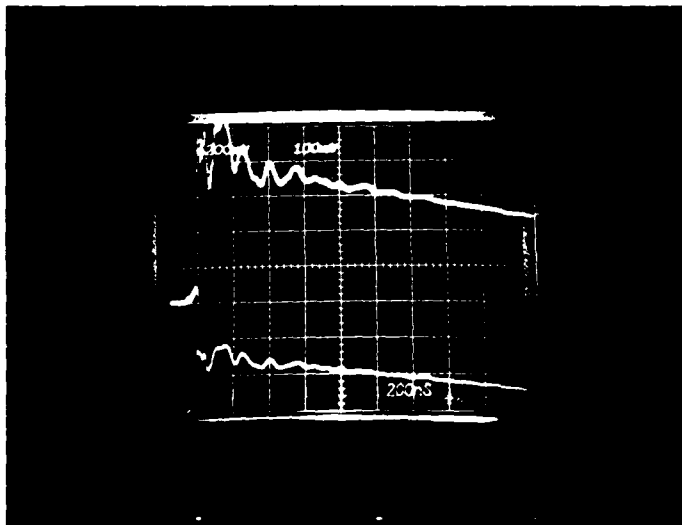
(5)



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
 Pulse Level 30KV Charge
 Data Link

Comments:
SYSTEM-11

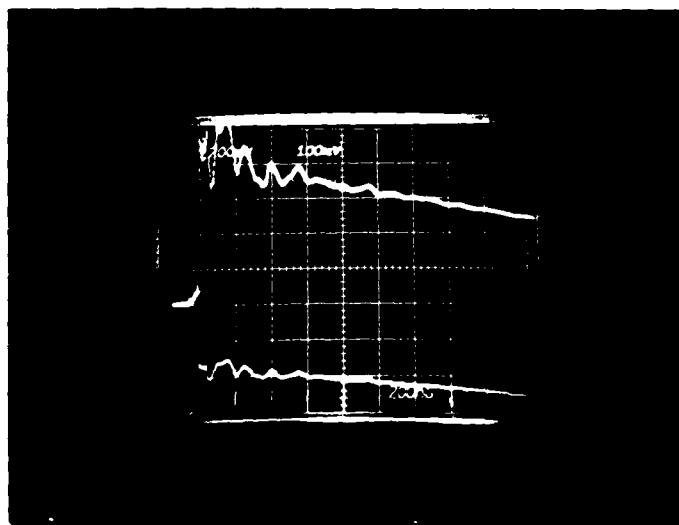
(6)



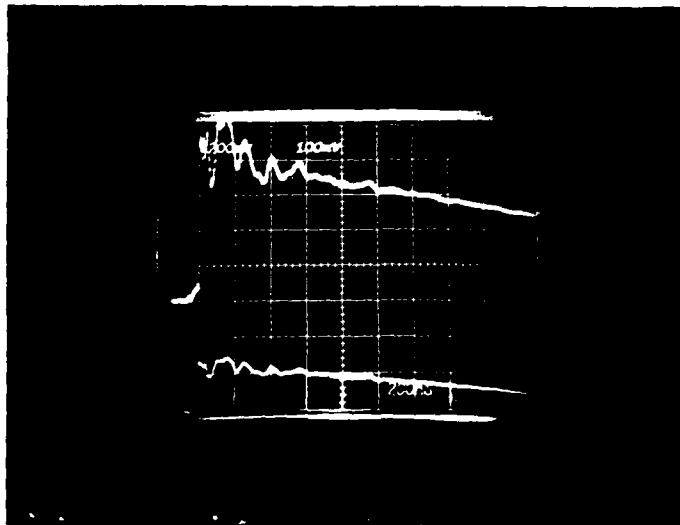
Date August 8, 1985
 Test Point E-9
 Amplification dB
 Attenuation dB
 Horizontal 200 ns/div 1
 Vertical 200 mV/div 1
 Horizontal 200 ns/div 2
 Vertical 100 mV/div 2
 Configuration
 Pulse Level 30KV Charge
 Data Link

Comments:

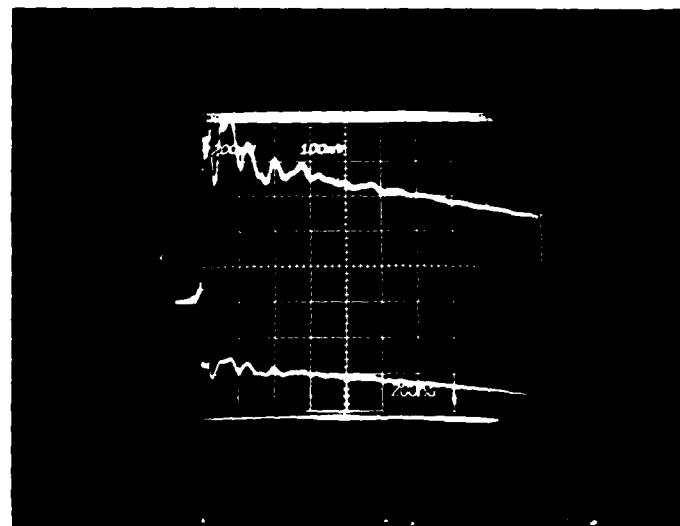
(7)



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	100mV/div 2
Configuration	
Pulse Level	30KV Charge
Data Link	
Comments:	(SYSTEM 11) (8)

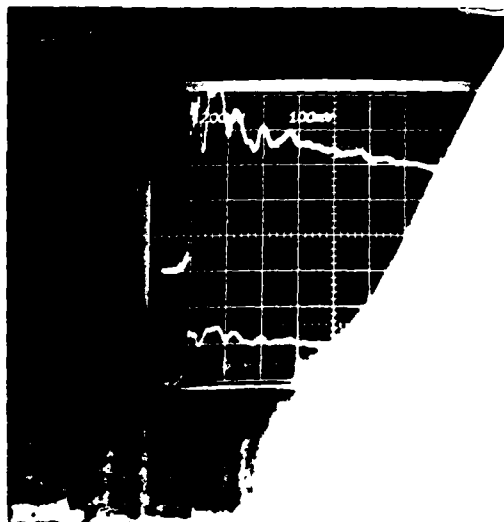


Date	August 8, 1985
Test Point	E-11
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	200 ns/div 2
Vertical	100mV/div 2
Configuration	
Pulse Level	30KV Charge
Data Link	
Comments:	SYSTEM 11 (9)



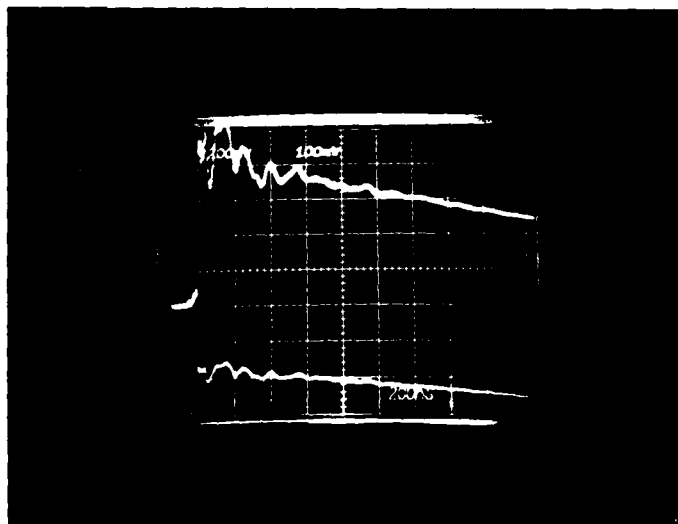
Date	August 8, 1985
Test Point	D18R
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	200 ns/div 2
Vertical	100 mV/div 2
Configuration	
Pulse Level	30KV charge
Data Link	
Comments:	SYSTEM 11

(10)

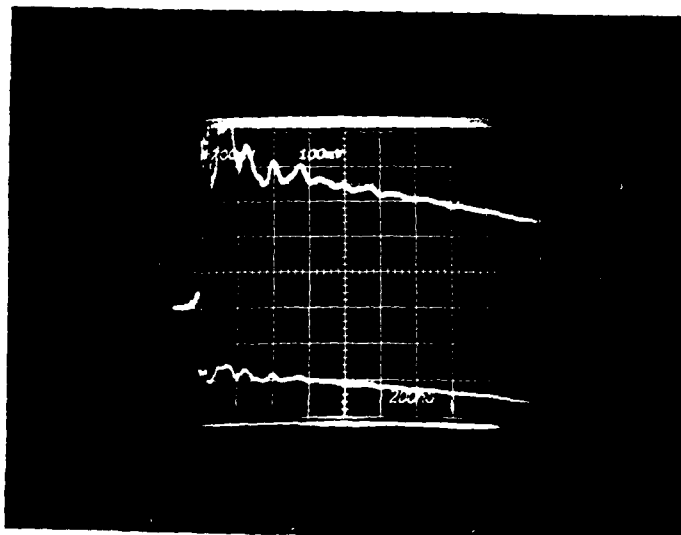


Date	August 8, 1985
Test Point	D18T
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	200 ns/div 2
Vertical	100 mV/div 2
Configuration	
Pulse Level	30KV charge
Data Link	
Comments:	SYSTEM 11

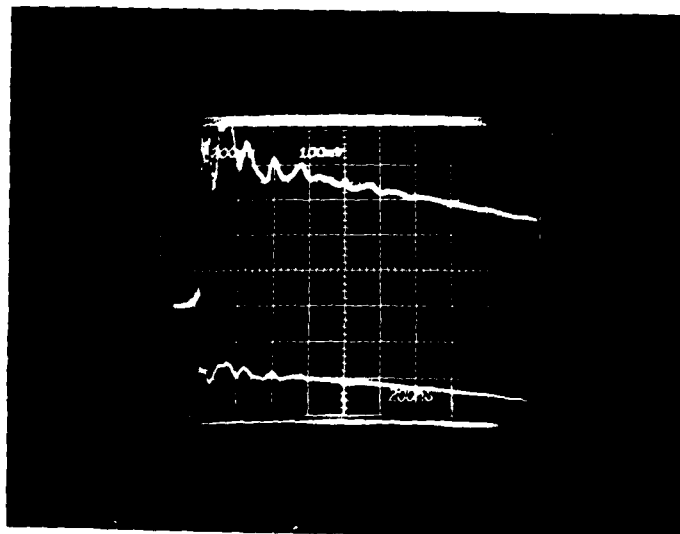
(11)



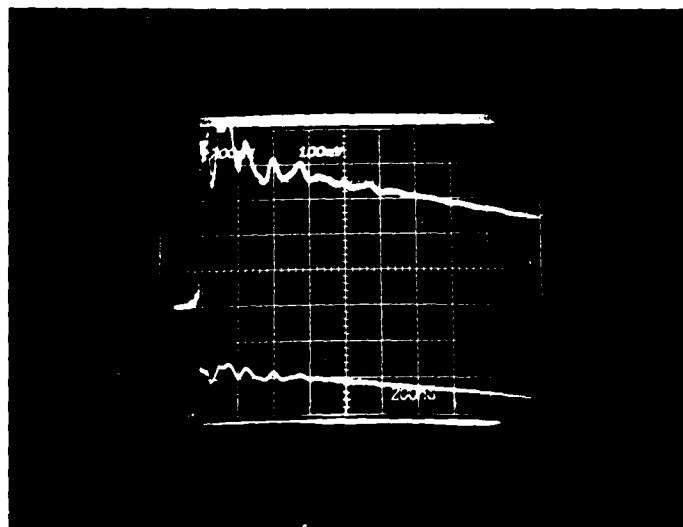
Date Aug 8, 1985
 Test Point D-19
 Amplification dB
 Attenuation dB
 Horizontal 200 ns/div 1
 Vertical 200 mV/div 1
 Horizontal 200 ns/div 2
 Vertical 100 mV/div 2
 Configuration
 Pulsar Level 30KV charge
 Data Link
 Comments:
 SYSTEM 3 (12)



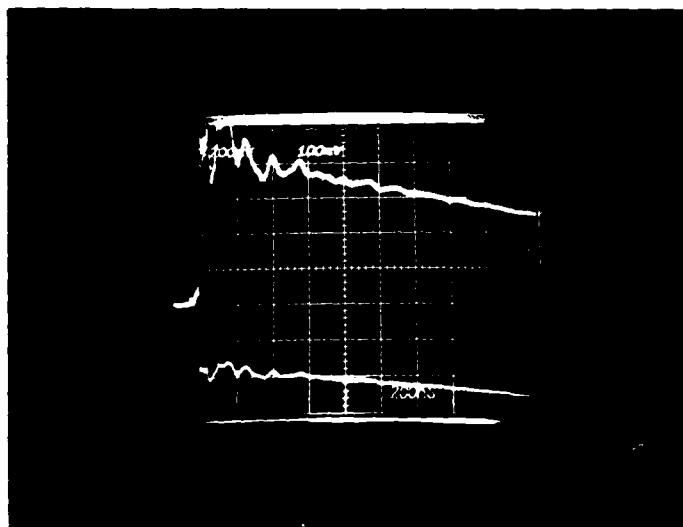
Date August 8, 1985
 Test Point D20
 Amplification dB
 Attenuation dB
 Horizontal 200 ns/div 1
 Vertical 200 mV/div 1
 Horizontal 200 ns/div 2
 Vertical 100 mV/div 2
 Configuration
 Pulsar Level 30KV charge
 Data Link
 Comments:
 SYSTEM 3 (13)



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			
Pulse Level	30KV charge		
Date Link			
Comments:	(SYSTEM 3) (14)		

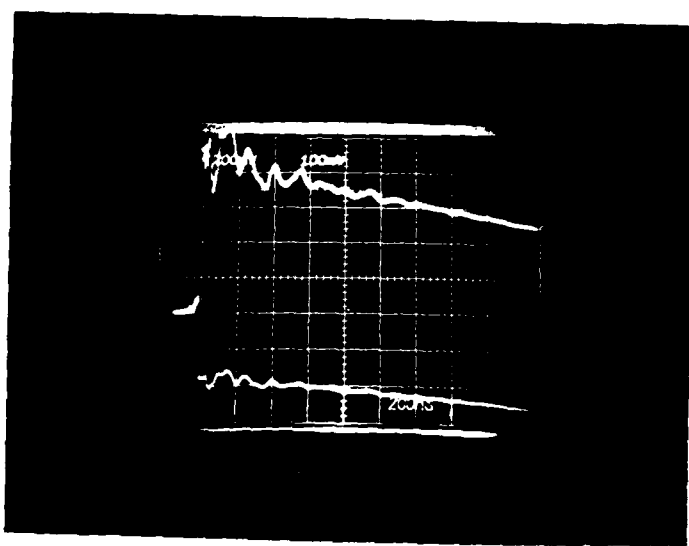


Date	August 8, 1985		
Test Point	D22		
Amplification	dB		
Attenuation	dB		
Horizontal	200 ns/div	1	
Vertical	200 mV/div	1	
Horizontal	200 ns/div	2	
Vertical	100 mV/div	2	
Configuration			
Pulse Level	30KV charge		
Date Link			
Comments:	(SYSTEM 3) (15)		



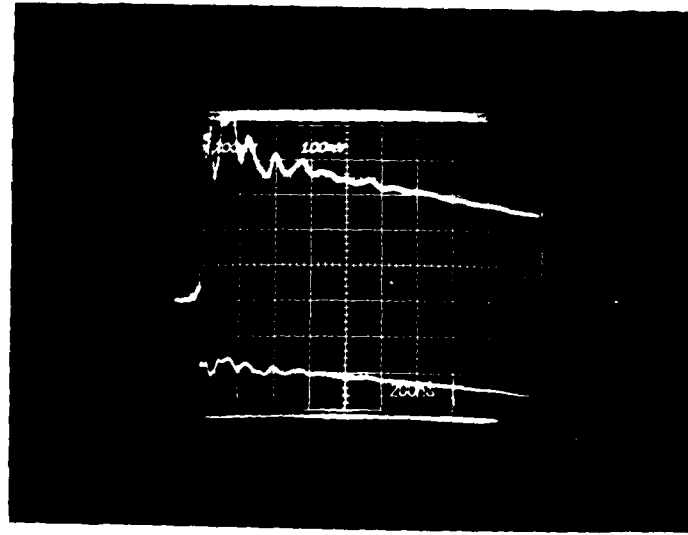
Date 8 August, 1985
 Test Point E12
 Amplification dB
 Attenuation dB
 Horizontal 200 ns/div 1
 Vertical 200 mV/div 1
 Horizontal 200 ns/div 2
 Vertical 100 mV/div 2
 Configuration
 Pulse Level 30KV Charge
 Data Link

Comments:
 (SYSTEM 3) (16)

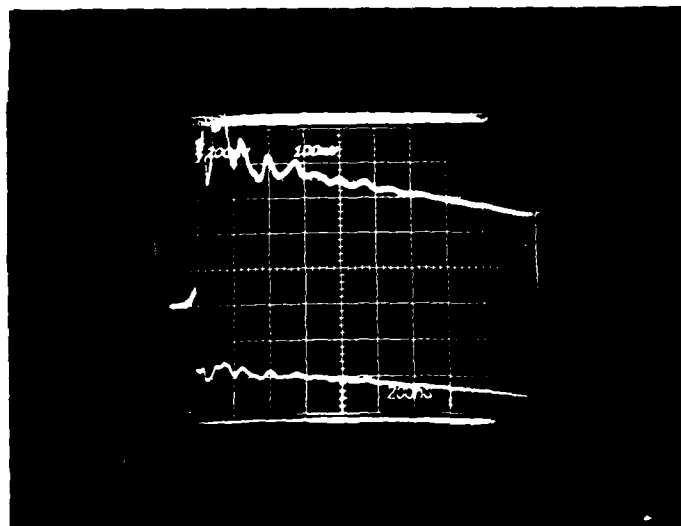


Date August 8, 1985
 Test Point E13
 Amplification dB
 Attenuation dB
 Horizontal 200 ns/div 1
 Vertical 200 mV/div 1
 Horizontal 200 ns/div 2
 Vertical 100 mV/div 2
 Configuration
 Pulse Level 30KV Charge
 Data Link

Comments:
 (SYSTEM 3) (17)

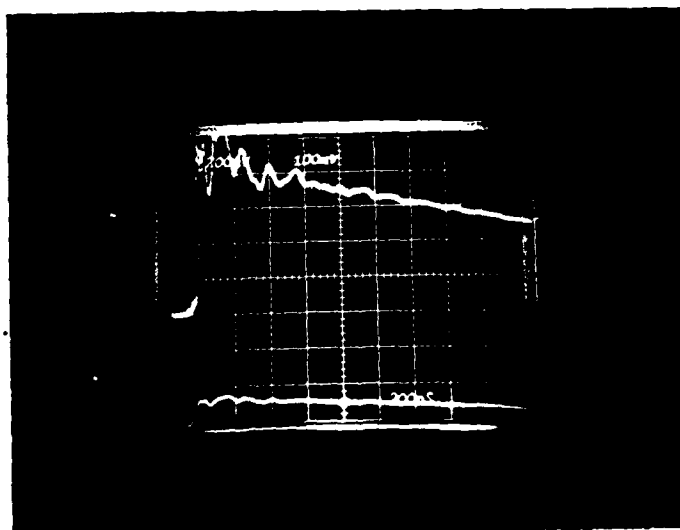


Date August 8, 1985
 Test Point E-14
 Amplification dB
 Attenuation dB
 Horizontal 200 ns/div 1
 Vertical 200 mV/div 1
 Horizontal 200 ns/div 2
 Vertical 100 mV/div 2
 Configuration
 Pulse Level 30KV/Charge
 Data Link
 Comments:
 (SYSTEM 3) (18)

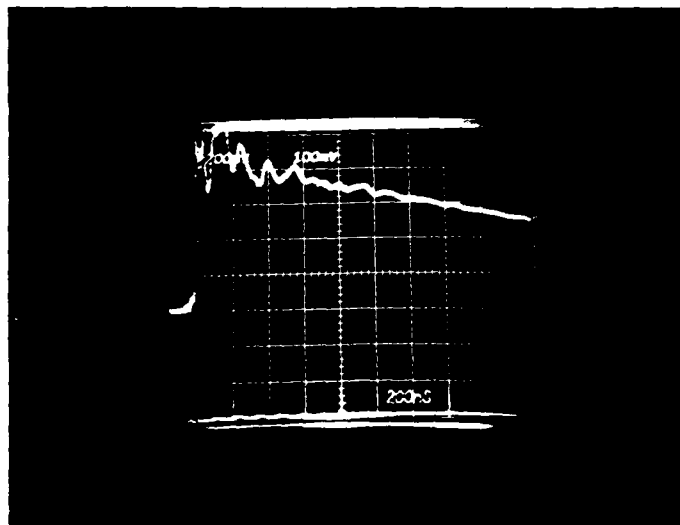


(TEST E15 NO PHOTO)

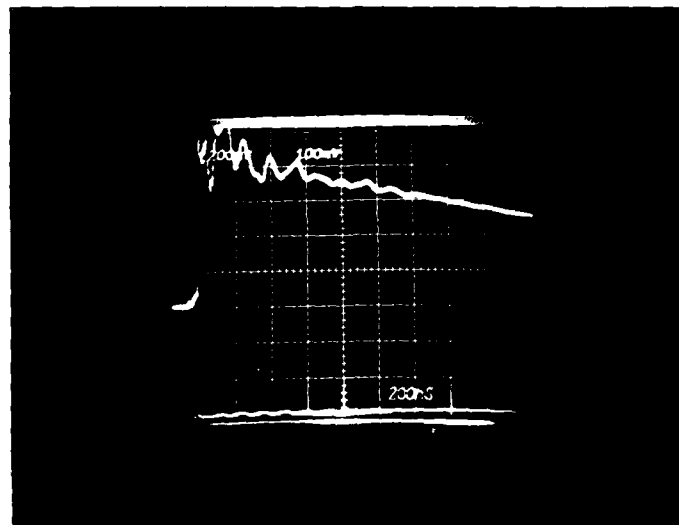
Date August 8, 1985
 Test Point E16
 Amplification dB
 Attenuation dB
 Horizontal 200 ns/div 1
 Vertical 200 mV/div 1
 Horizontal 200 ns/div 2
 Vertical 100 mV/div 2
 Configuration
 Pulse Level
 Data Link
 Comments:
 (SYSTEM 11) (19)



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
 Pulsar 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
 Pulsar 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

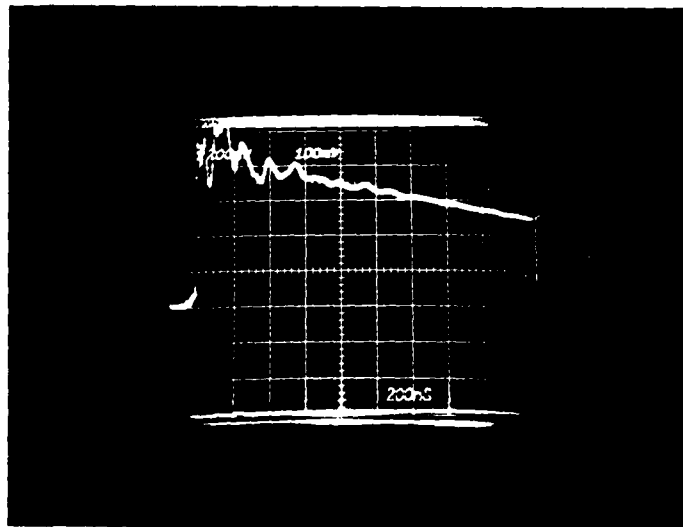
Pulse Level 30 KV/charge

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

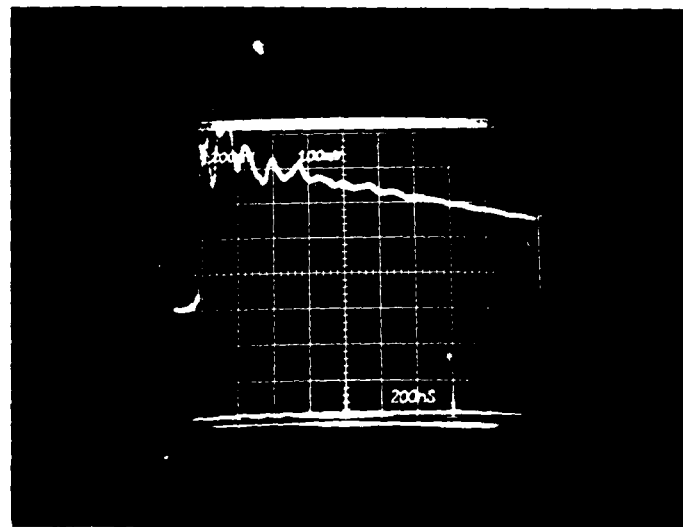
Pulse Level 30 KV/charge

Data Link

Comments:

(SYSTEM 10)

(23)



AD-A164 436

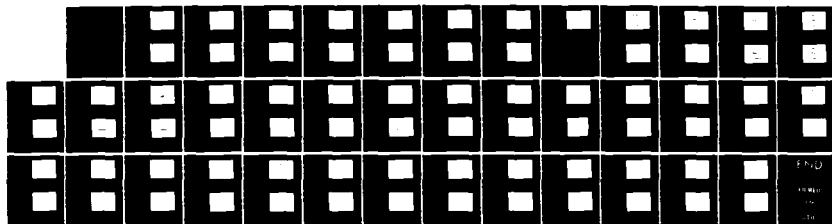
ELECTROMAGNETIC PULSE/TRANSIENT THREAT TESTING OF
PROTECTION DEVICES FOR. (U) ELECTROSPACE SYSTEMS INC
ARLINGTON VA D BODSON ET AL. 31 OCT 85

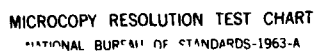
272

UNCLASSIFIED

NCS-T18-85-10-VOL-3-SEC-5 DCA100-85-C-0010 F/G 20/14

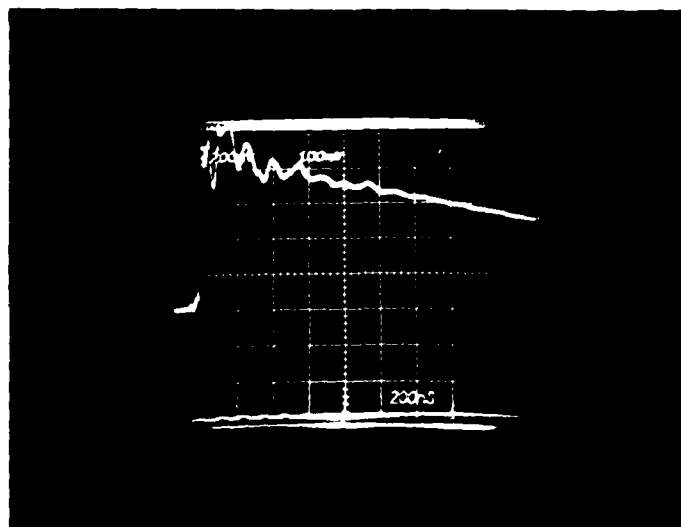
NL



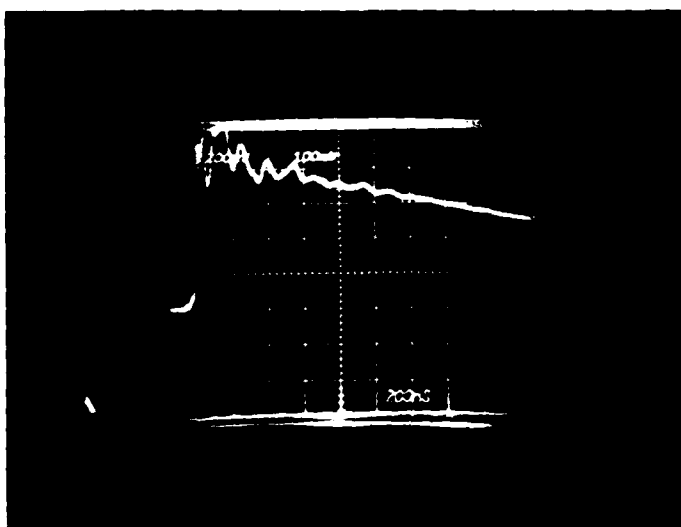


MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

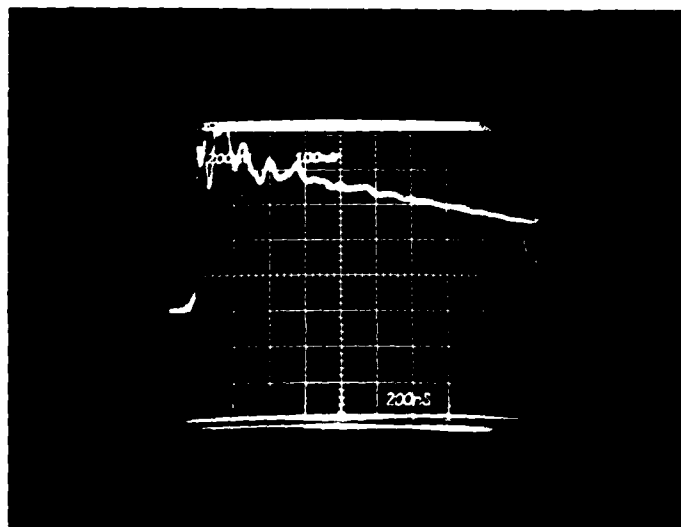
Date	August 8, 1985		
Test Point	F6T		
Amplification	dB		
Attenuation	dB		
Horizontal	200 ns/div	1	
Vertical	200 mV/div	1	
Horizontal	200 ns/div	2	
Vertical	100 mV/div	2	
Configuration			
Pulse Level	30KV Charge		
Data Link			
Comments:	(SYSTEM 10) (24)		



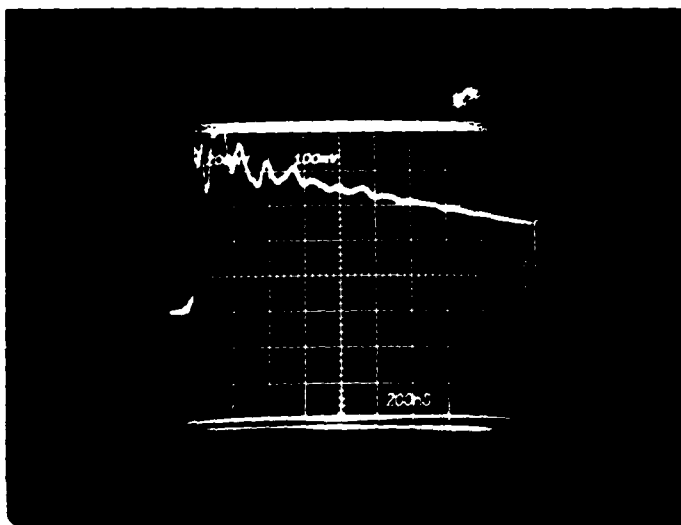
Date	August 8, 1985		
Test Point	F7R		
Amplification	dB		
Attenuation	dB		
Horizontal	200 ns/div	1	
Vertical	200 mV/div	1	
Horizontal	200 ns/div	2	
Vertical	100 mV/div	2	
Configuration			
Pulse Level	30KV Charge		
Data Link			
Comments:	(SYSTEM 11) (25)		



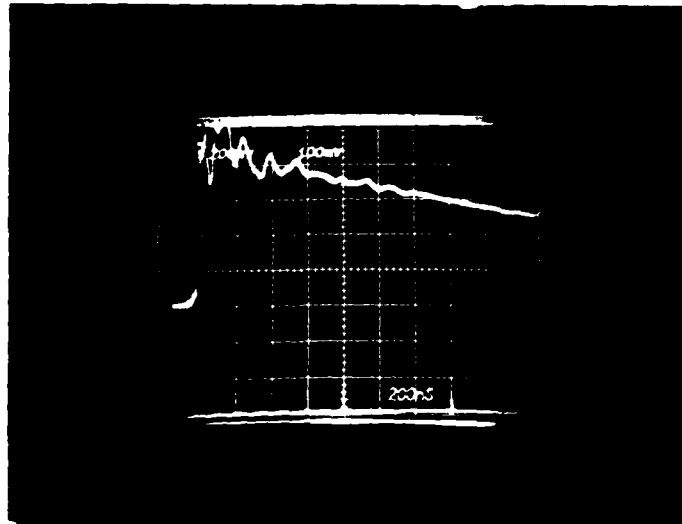
Date	August 8, 1985		
Test Point	E7T		
Amplification	dB		
Attenuation	dB		
Horizontal	200 ns/div	1	
Vertical	200 mV/div	1	
Horizontal	200 ns/div	2	
Vertical	100 mV/div	2	
Configuration			
Pulse Level	30KV Charge		
Data Link			
Comments:	(SYSTEM 11) (26)		



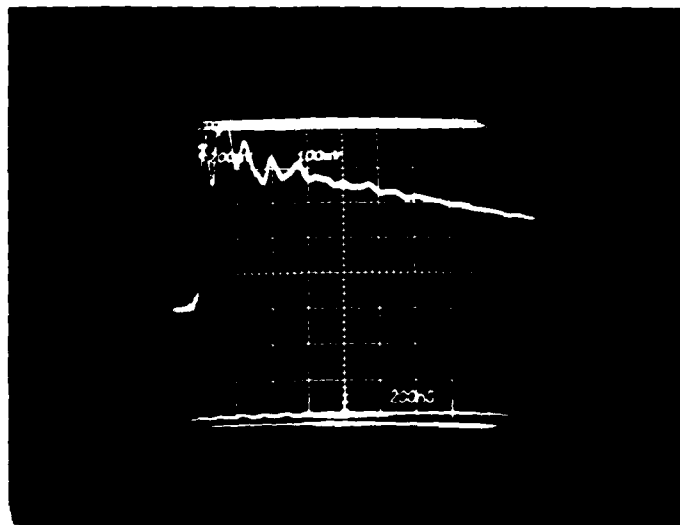
Date	August 8, 1985		
Test Point	F8R		
Amplification	dB		
Attenuation	dB		
Horizontal	200 ns/div	1	
Vertical	200 mV/div	1	
Horizontal	200 ns/div	2	
Vertical	100 mV/div	2	
Configuration			
Pulse Level	30KV Charge		
Data Link			
Comments:	(SYSTEM 1) (27)		



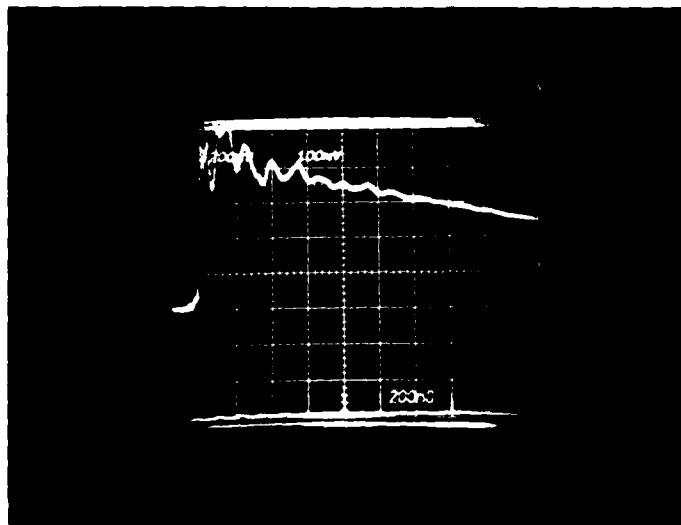
Date August 8, 1985
 Test Point F8T
 Amplification dB
 Attenuation dB
 Horizontal 200 ns/div 1
 Vertical 200 mV/div 1
 Horizontal 200 ns/div 2
 Vertical 100 mV/div 2
 Configuration
 Pulsar Level 30KV/charge
 Data Link
 Comments:
(SYSTEM L) (28)



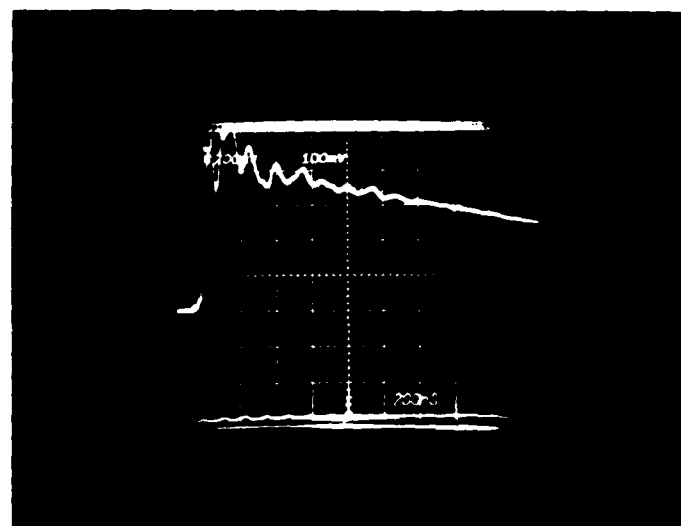
Date August 8, 1985
 Test Point F9R
 Amplification dB
 Attenuation dB
 Horizontal 200 ns/div 1
 Vertical 200 mV/div 1
 Horizontal 200 ns/div 2
 Vertical 100 mV/div 2
 Configuration
 Pulsar Level 30KV/charge
 Data Link
 Comments:
SYSTEM L (29)



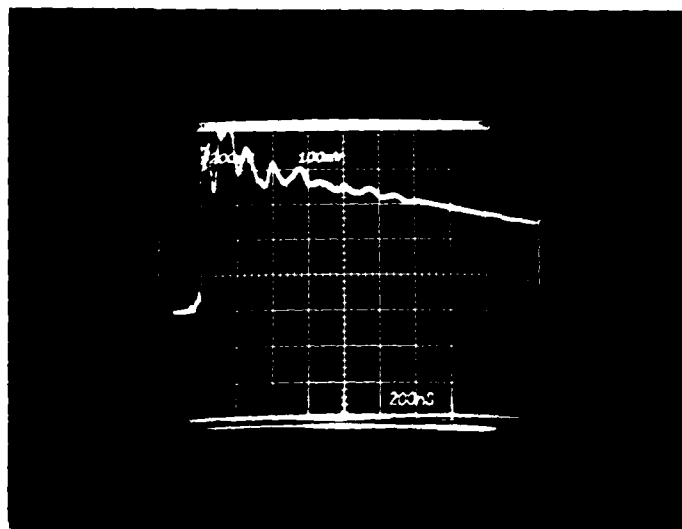
Date	August 8, 1985		
Test Point	F9T		
Amplification	dB		
Attenuation	dB		
Horizontal	200 ns/div	1	
Vertical	200 mV/div	1	
Horizontal	200 ns/div	2	
Vertical	100 mV/div	2	
Configuration			
Pulse Level	30KV/charge		
Date Link			
Comments:	(SYSTEM 1) (30)		



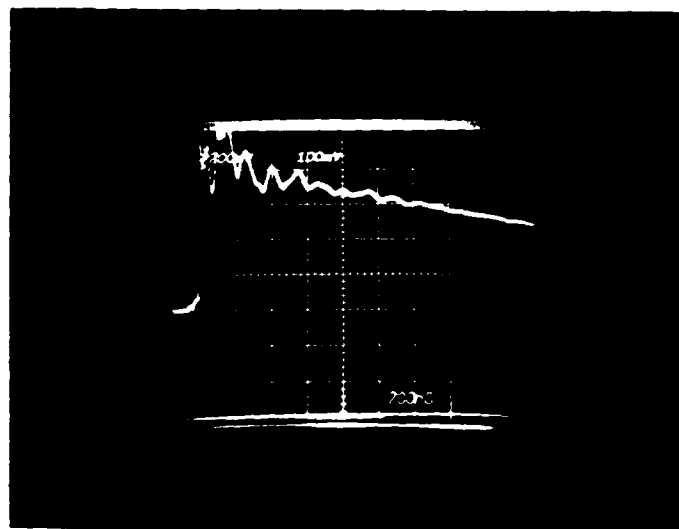
Date	August 8, 1985		
Test Point	F10R		
Amplification	dB		
Attenuation	dB		
Horizontal	200 ns/div	1	
Vertical	200 mV/div	1	
Horizontal	200 ns/div	2	
Vertical	100 mV/div	2	
Configuration			
Pulse Level	30KV/charge		
Date Link			
Comments:	(SYSTEM 5) (31)		



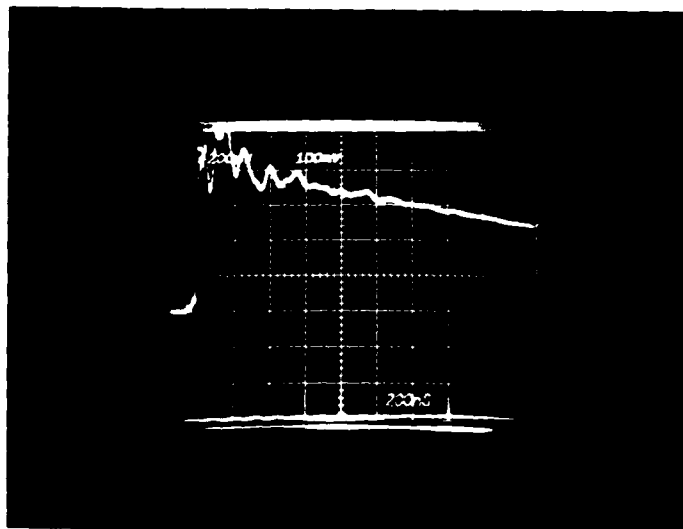
Date August 8, 1985
 Test Point F10T
 Amplification dB
 Attenuation dB
 Horizontal 200 ns/div 1
 Vertical 200 mV/div 1
 Horizontal 200 ns/div 2
 Vertical 100 mV/div 2
 Configuration
 Pulse Level 30KV charge
 Data Link
 Comments:
(SYSTEM 5) (32)



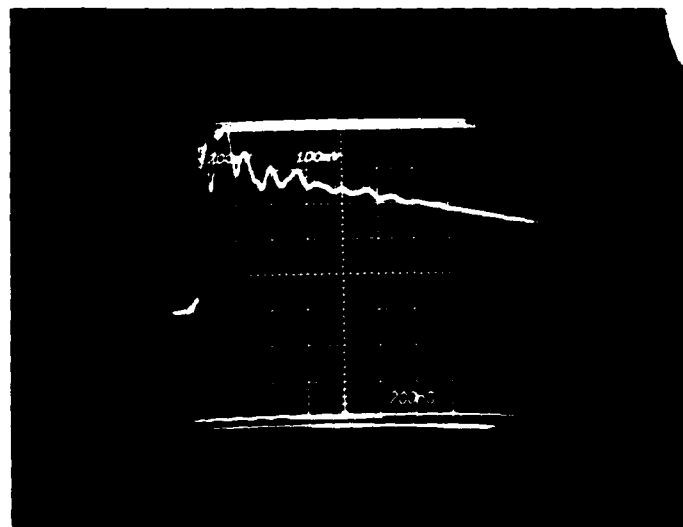
Date August 8, 1985
 Test Point F11R
 Amplification dB
 Attenuation dB
 Horizontal 200 ns/div 1
 Vertical 200 mV/div 1
 Horizontal 200 ns/div 2
 Vertical 100 mV/div 2
 Configuration
 Pulse Level 30KV charge
 Data Link
 Comments:
(SYSTEM 5) (33)



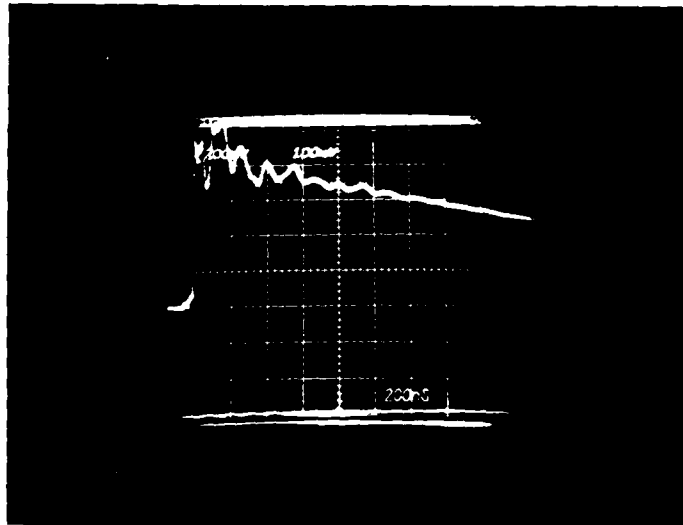
Date	August 8, 1985
Test Point	F11T
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	200 ns/div 2
Vertical	100 mV/div 2
Configuration	
Pulse Level	30KV charge
Data Link	
Comments:	(SYSTEM 5) (34)



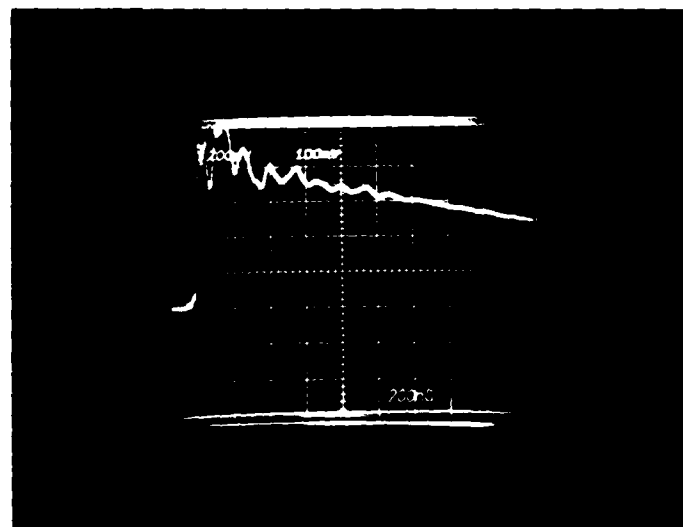
Date	August 8, 1985
Test Point	F12R
Amplification	dB
Attenuation	dB
Horizontal	200 ns/div 1
Vertical	200 mV/div 1
Horizontal	200 ns/div 2
Vertical	100 mV/div 2
Configuration	
Pulse Level	30KV charge
Data Link	
Comments:	(SYSTEM 4) (35)



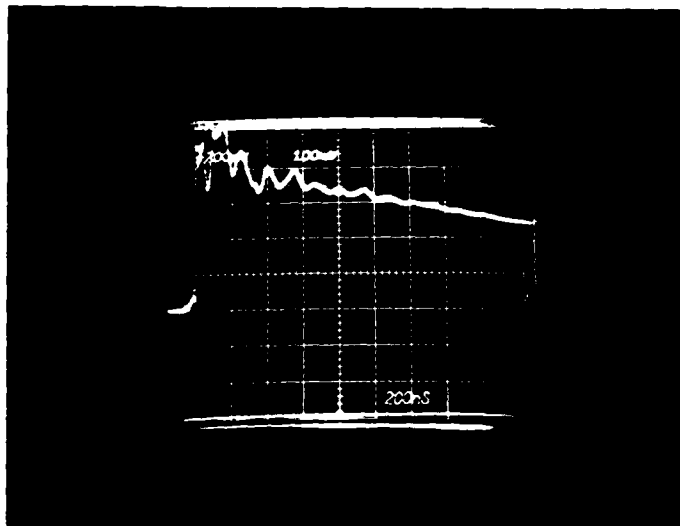
Date	August 8, 1985		
Test Point	F12T		
Amplification	dB		
Attenuation	dB		
Horizontal	200 ns/div	1	
Vertical	200 mV/div	1	
Horizontal	200 ns/div	2	
Vertical	100 mV/div	2	
Configuration			
Pulse Level	30KV charge		
Data Link			
Comments:	(SYSTEM 4) (36)		



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			
Pulse Level	30KV 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	
Pulse 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	
Pulse 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

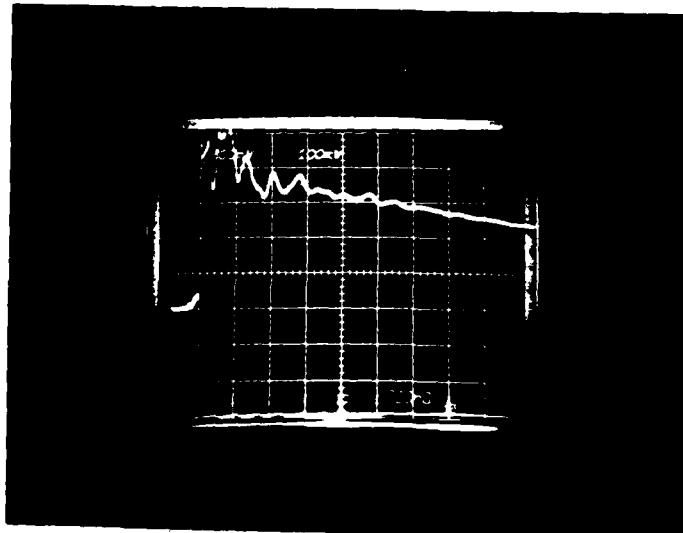
Vertical mV/div 2

Configuration

Pulse Level 30 kV Charge

Date Link

Comments:



①

ROUND 4 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

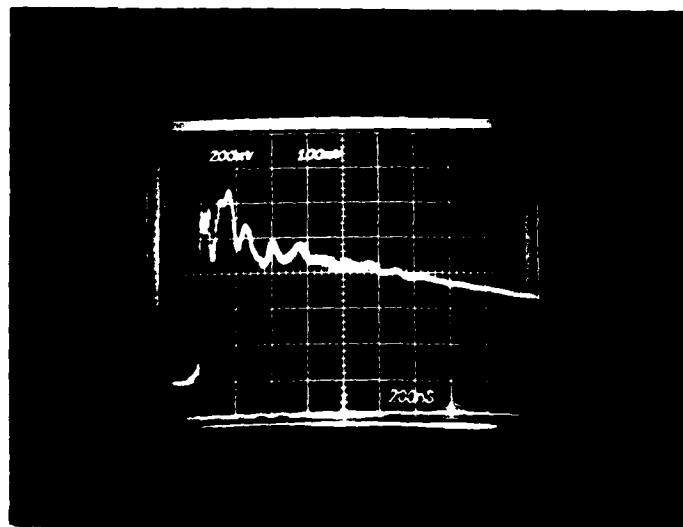
Pulse Level 30 kV Charge

Date Link

Comments:

(SYSTEM 16)

②

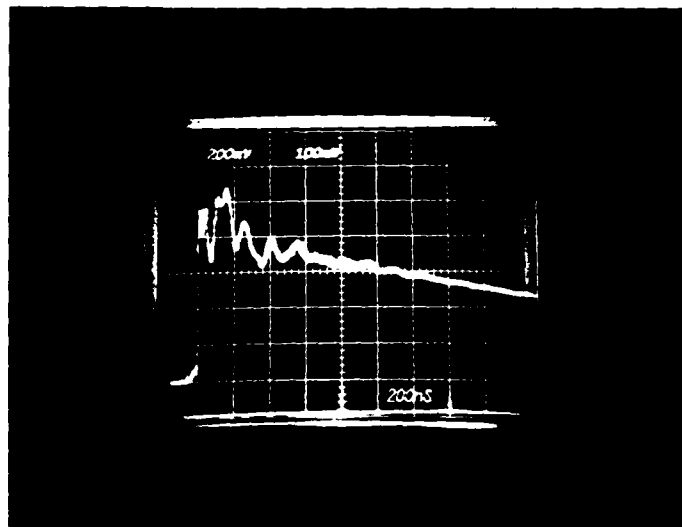


Date August 9, 1985
 Test Point F15R
 Amplification dB
 Attenuation dB
 Horizontal 200 ns/div 1
 Vertical 200 mV/div 1
 Horizontal ns/div 2
 Vertical mV-ns/div 2
 Configuration
 Pulsar Level 30 KV charge
 Data Link

Comments:

(SYSTEM 16)

③

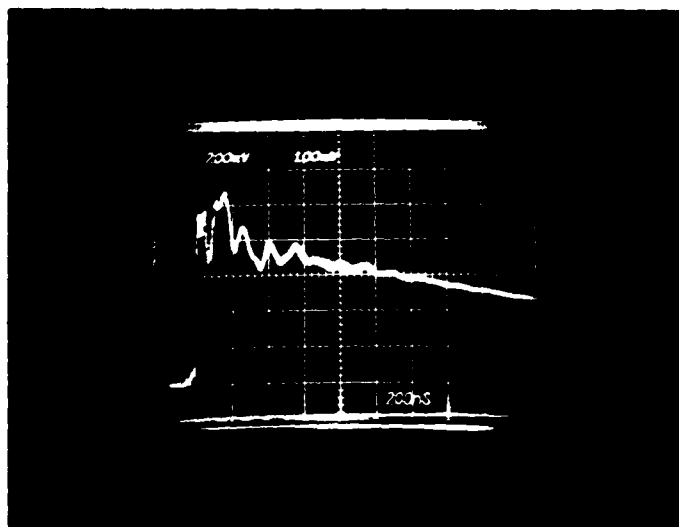


Date August 9, 1985
 Test Point F15T
 Amplification dB
 Attenuation dB
 Horizontal 200 ns/div 1
 Vertical 200 mV/div 1
 Horizontal ns/div 2
 Vertical mV-ns/div 2
 Configuration
 Pulsar Level 30 KV charge
 Data Link

Comments:

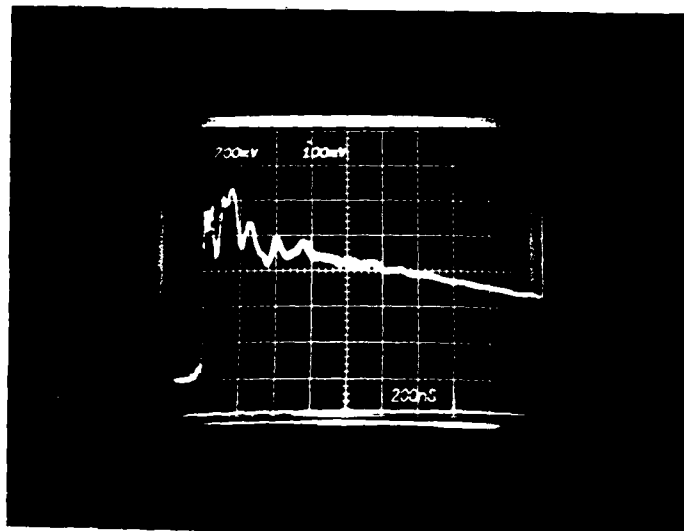
(SYSTEM 16)

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	
Pulse Level	30KV/charge
Date Link	
Comments:	

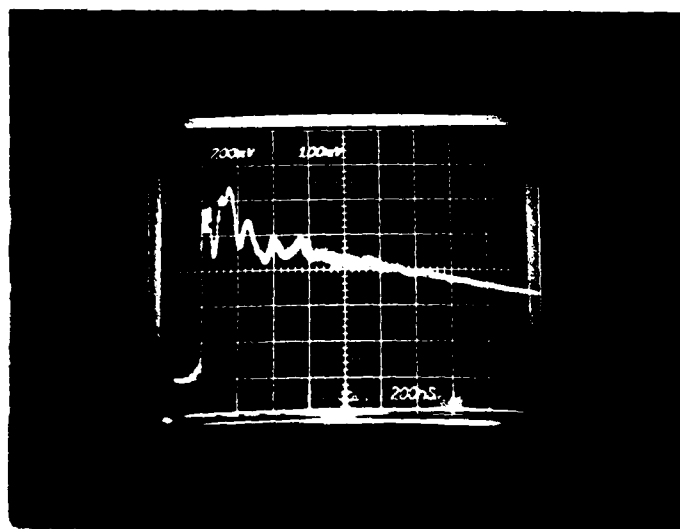
(SYSTEM 14) (5)



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	
Pulse Level	30KV/charge
Date Link	
Comments:	

(SYSTEM 14)

(6)

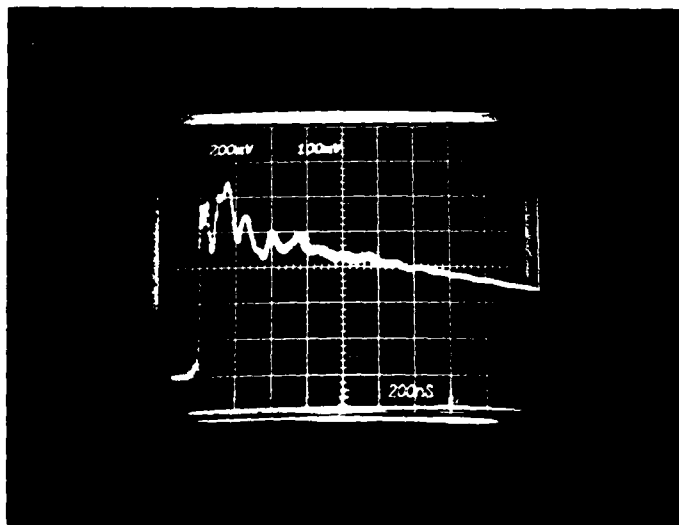


Date 9 August, 1985
 Test Point F17T
 Amplification dB
 Attenuation dB
 Horizontal 200 ns/div 1
 Vertical 200 mV/div 1
 Horizontal ns/div 2
 Vertical mV/div 2
 Configuration
 Pulse Level 30KV Charge
 Data Link

Comments:

(SYSTEM 14)

(7)

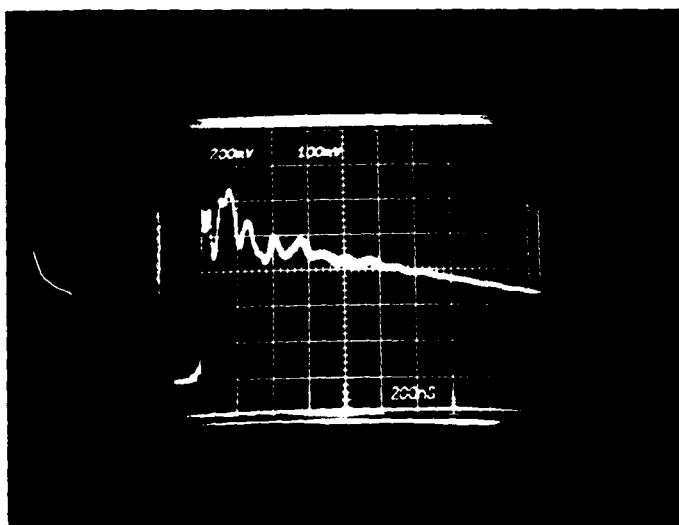


Date August 9, 1985
 Test Point F17R
 Amplification dB
 Attenuation dB
 Horizontal 200 ns/div 1
 Vertical 200 mV/div 1
 Horizontal ns/div 2
 Vertical mV/div 2
 Configuration
 Pulse Level 30KV Charge
 Data Link

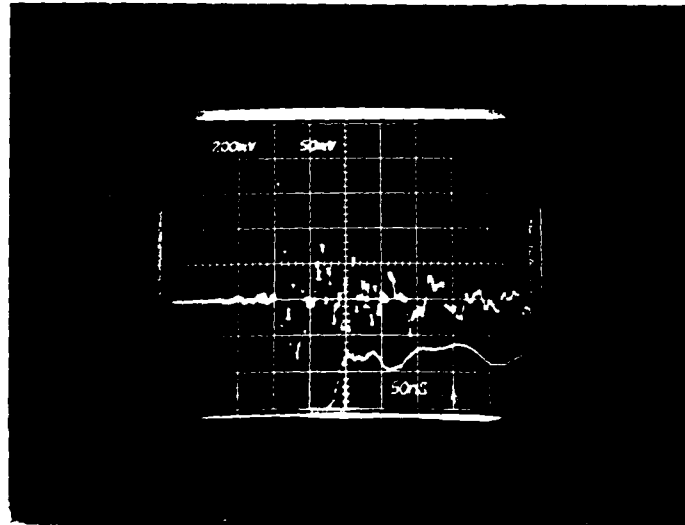
Comments:

(SYSTEM 14)

(8)



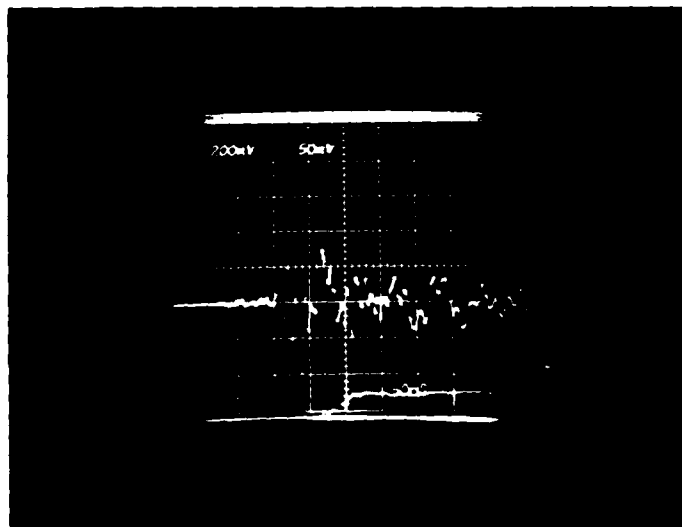
Date	August 9, 1985		
Test Point			
Amplification	dB		
Attenuation	20 dB		
Horizontal	50 ns/div	1	
Vertical	200 mV/div	1	
Horizontal	50 ns/div	2	
Vertical	50 ~~mV~~ ^{mV} /div	2	
Configuration			
Pulse Level	30KV charge.		
Date Link			
Comments:			



⑨

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

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 ~~mV~~ ^{mV} /div	2	
Configuration			
Pulse Level	30KV charge		
Date Link			
Comments:			

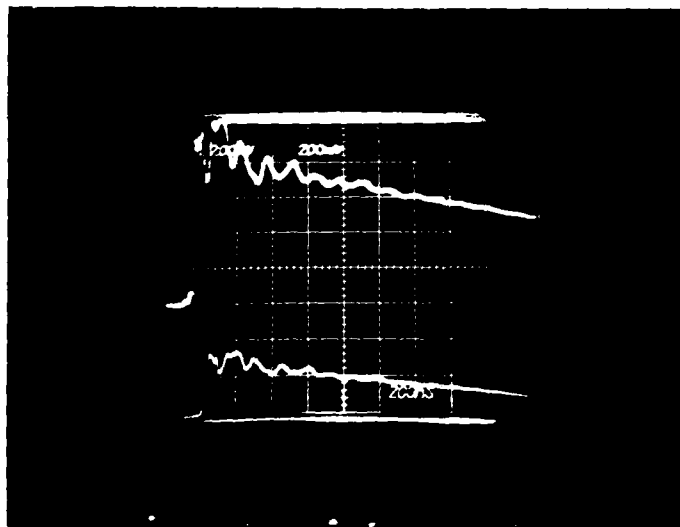


⑩

REPEAT ⑨ WITH FISCHER PROTECTOR -

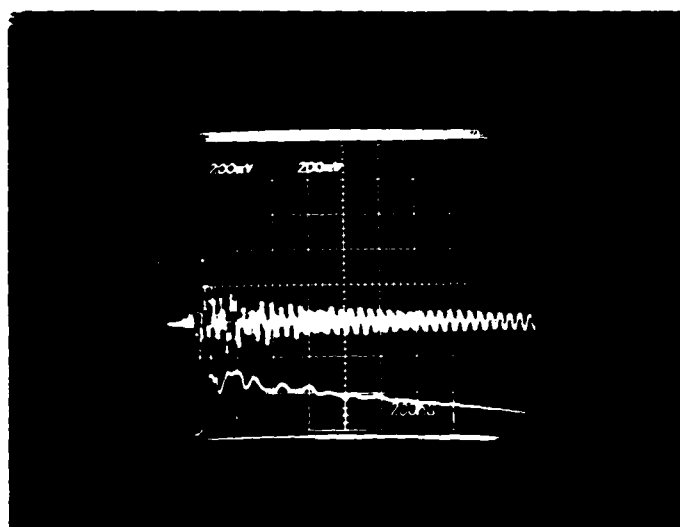
7.6A (380V)

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 $\frac{mV}{ns}$ /div	2	
Configuration			
Pulse Level	30KV Charge		
Data Link			
Comments:			



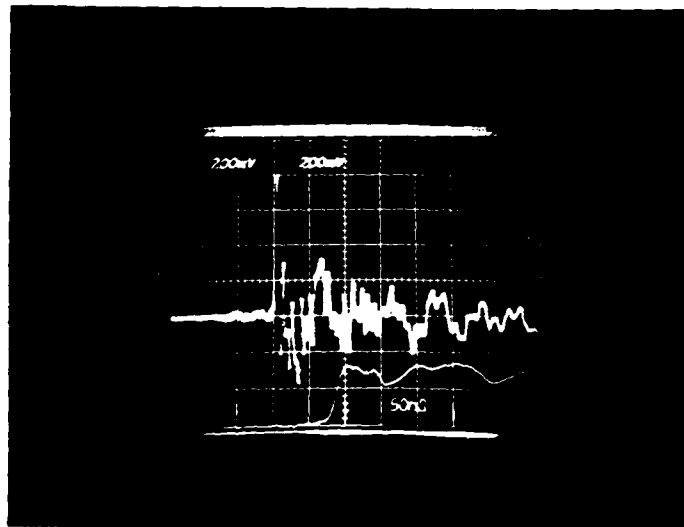
(11)
 H FIELD SENSORS - NEW F.O. TRANSMITTER -
 LOWER: RECT. + SENSOR F.O.
 UPPER: ROUND H SENSOR DIRECT -

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 $\frac{mV}{ns}$ /div	2	
Configuration			
Pulse Level	30KV Charge		
Data Link			
Comments:			



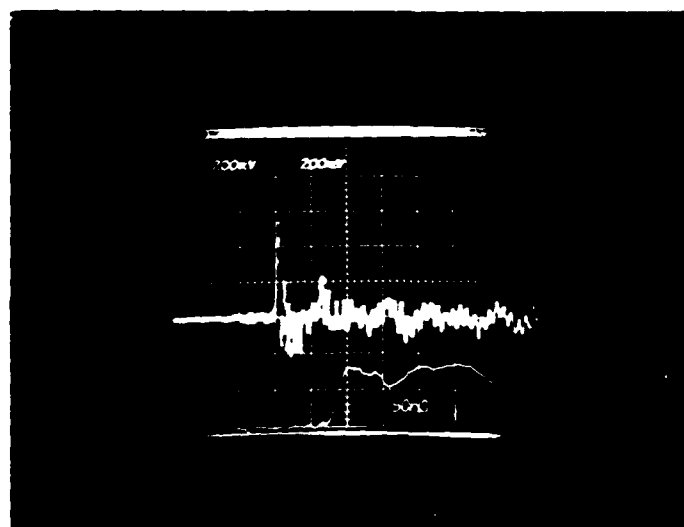
(12)
 RUBBER DUCK - FISCHER PROTECTOR
 CT-2 PROBE - 20dB ATTN
 2A/DIV I = 8A (400V)

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} ~~ns~~/div 2
 Configuration
 Pulse Level 30KV Charge
 Data Link
 Comments:



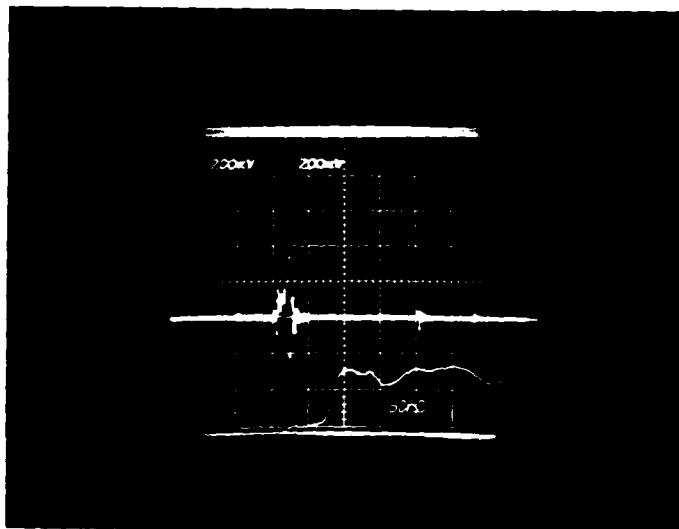
(13)
 REPEAT (12) w 50 ns/div I = 8 A (400V)
 FISCHER DEVICE

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} ~~ns~~/div 2
 Configuration
 Pulse Level 30KV Charge
 Data Link
 Comments:



(14)
 REPEAT (13) NO PROTECTOR I = ~ 5.5 A (275V)
 NO FISCHER DEVICE

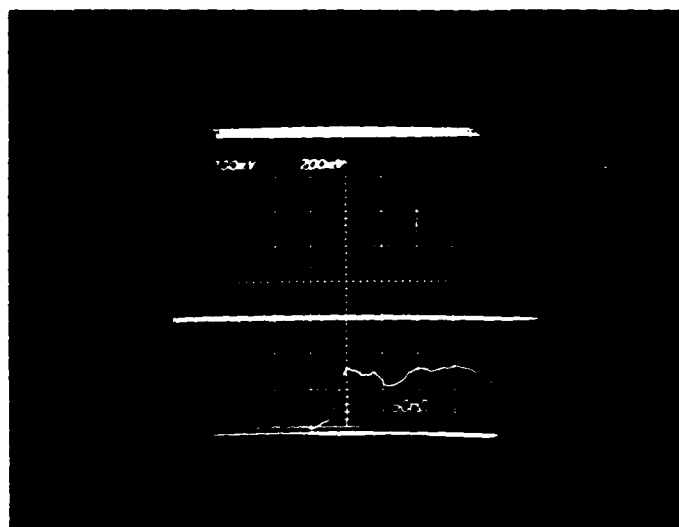
Date	August 9, 1985
Test Point	
Amplification	dB
Attenuation	dB
Horizontal	50 ns/div 1
Vertical	200 mV/div 1
Horizontal	50 ns/div 2
Vertical	200 ^{mV} ~~mV~~ /div 2
Configuration	
Pulse Level	30KV charge
Data Link	
Comments:	



(15)

FISLITER UNIT ON BOX - NO RUBBER DUCK ANTENNA
OPENING CAPPED, NOT GROUNDED - MADE WITH
CT2-SENSOR, NOT CONNECTED TO ANTENNA SHIELDS

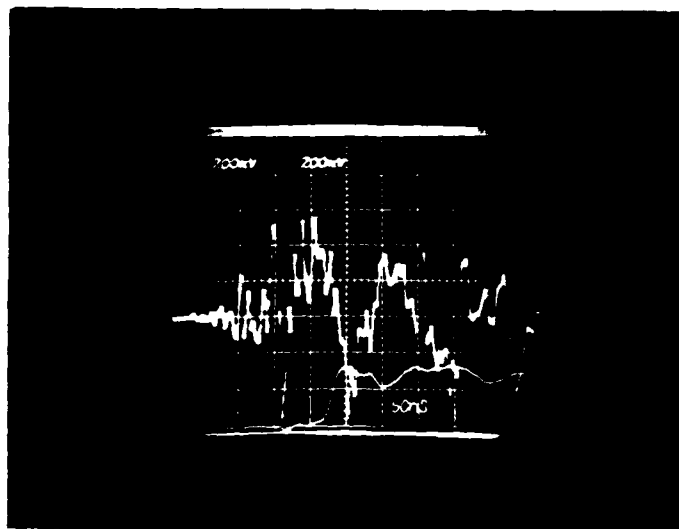
Date	August 9, 1985
Test Point	
Amplification	dB
Attenuation	dB
Horizontal	50 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	^{mV} ~~mV~~ /div 2
Configuration	
Pulse Level	30KV charge
Data Link	
Comments:	



(16)

AS IN (15) EXCEPT SHIELD CONNECTED TO
CT-2 SHIELD
NO NOISE

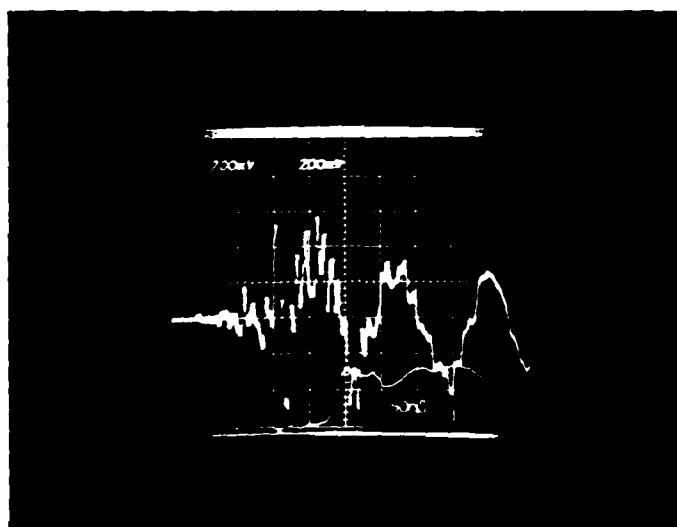
Date	August 9, 1985		
Test Point			
Amplification	dB		
Attenuation	20 dB		
Horizontal	50 ns/div	1	
Vertical	200 mV/div	1	
Horizontal	50 ns/div	2	
Vertical	200 mV/div	2	
Configuration			
Pulse Level	30 KV/charge		
Data Link			
Comments:			



(17)

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

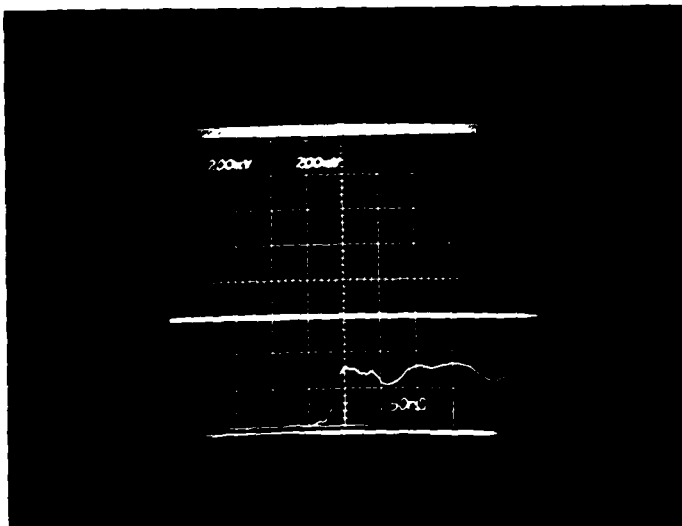
Date	August 9, 1985		
Test Point			
Amplification	dB		
Attenuation	20 dB		
Horizontal	50 ns/div	1	
Vertical	200 mV/div	1	
Horizontal	50 ns/div	2	
Vertical	200 mV/div	2	
Configuration			
Pulse Level	30 KV/charge		
Data Link			
Comments:			



(18)

ANTENNA WITHOUT FISCHER PROTECTOR -
5.6 A (280V)

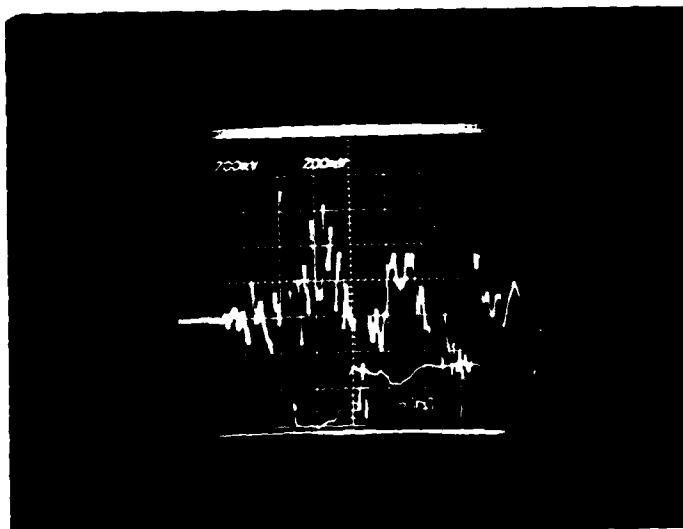
Date	August 9, 1985
Test Point	
Amplification	dB
Attenuation	20 dB
Horizontal	50 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulse Level	30KV/charge
Data Link	
Comments:	



(19)

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

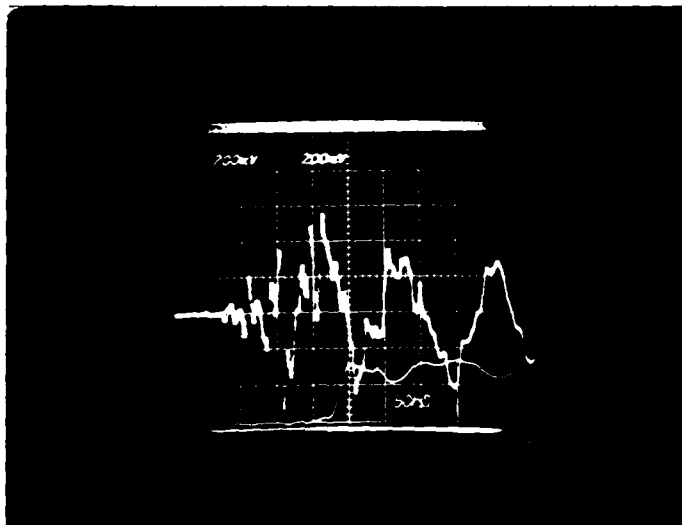
Date	August 9, 1985
Test Point	
Amplification	dB
Attenuation	20 dB
Horizontal	50 ns/div 1
Vertical	200 mV/div 1
Horizontal	50 ns/div 2
Vertical	200 mV/div 2
Configuration	
Pulse Level	30KV/charge
Data Link	
Comments:	



(20)

RE RUN OF (17) - ANTENNA, FISCHER, $I = +2A \cdot -6A$
 CONDUCTIVE TAPE OVER BNC CONNECTORS (2A/DIV)
 7.2A (360V)

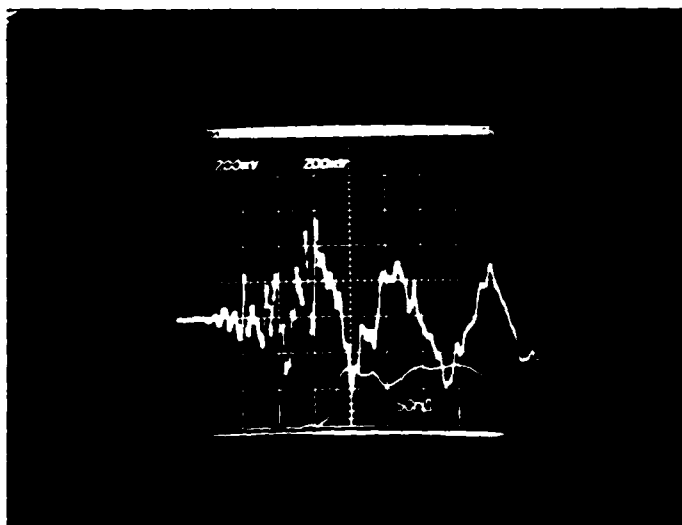
Date	August 9, 1985		
Test Point			
Amplification	dB		
Attenuation	20 dB		
Horizontal	50 ns/div	1	
Vertical	200 mV/div	1	
Horizontal	50 ns/div	2	
Vertical	200 mV/div	2	
Configuration			
Pulse Level	30KV charge		
Data Link			
Comments:			



(21)

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

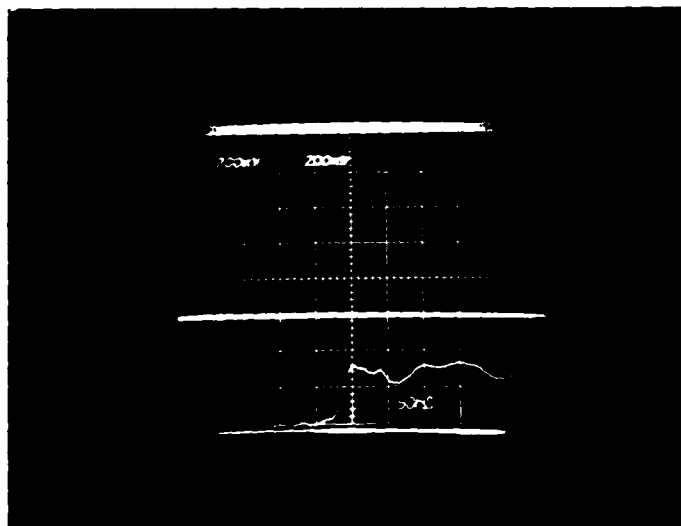
Date	August 9, 1985		
Test Point			
Amplification	dB		
Attenuation	20 dB		
Horizontal	50 ns/div	1	
Vertical	200 mV/div	1	
Horizontal	50 ns/div	2	
Vertical	200 mV/div	2	
Configuration			
Pulse Level	30KV charge		
Data Link			
Comments:			



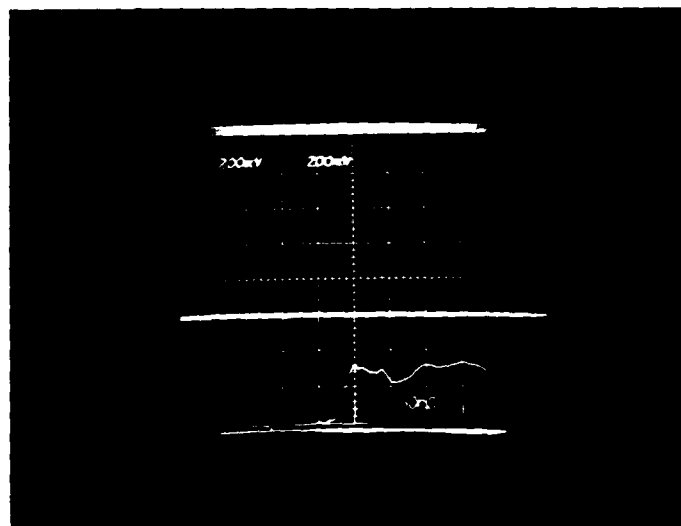
(22)

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

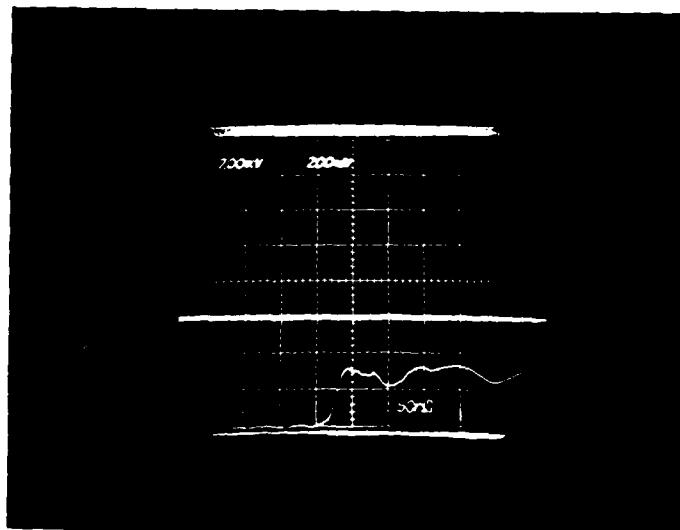
Date	August 9, 1985		
Test Point	F18R		
Amplification	dB		
Attenuation	dB		
Horizontal	50 ns/div	1	
Vertical	200 mV/div	1	
Horizontal	ns/div	2	
Vertical	mV/div	2	
Configuration			
Pulse Level	30KV/charge		
Date Link			
Comments:	(SYSTEM 7) (23) UNPROTECTED		



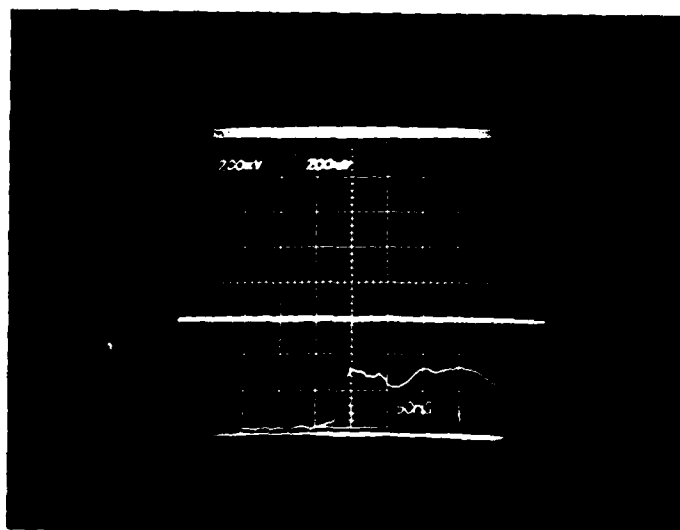
Date	August 9, 1985		
Test Point	F19R		
Amplification	dB		
Attenuation	dB		
Horizontal	50 ns/div	1	
Vertical	200 mV/div	1	
Horizontal	ns/div	2	
Vertical	mV/div	2	
Configuration			
Pulse Level	30KV/charge		
Date Link			
Comments:	(SYSTEM 13) (24)		



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	
Pulse Level	30KV charge
Date Link	
Comments:	(SYSTEMS 7 + 13) 25



Date	August 9, 1985
Test Point	F22T
Amplification	dB
Attenuation	dB
Horizontal	50 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulse Level	30KV charge
Date Link	
Comments:	(SYSTEM 13) 26



Date August 9, 1985

Test Point F23T

Amplification dB

Attenuation dB

Horizontal 50 ns/div 1

Vertical 200 mV/div 1

Horizontal ns/div 2

Vertical mV/div 2

Configuration

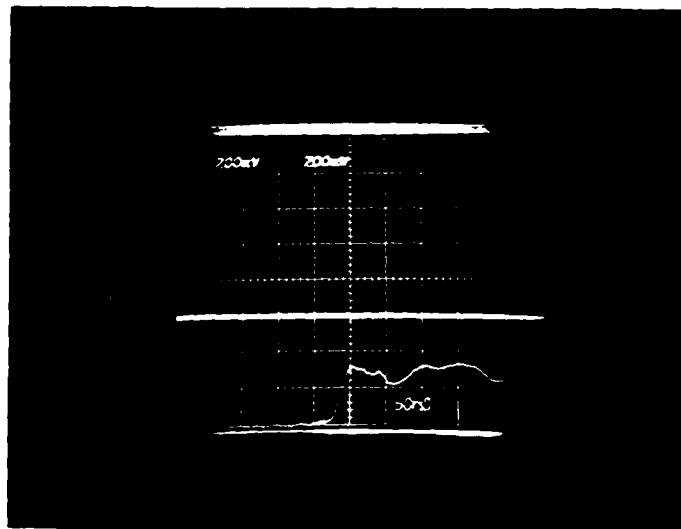
Pulse Level 30KV charge

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

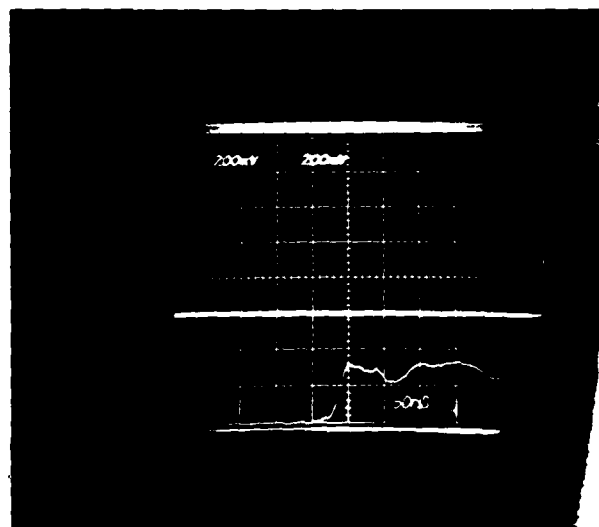
Pulse Level 30KV charge

Data Link

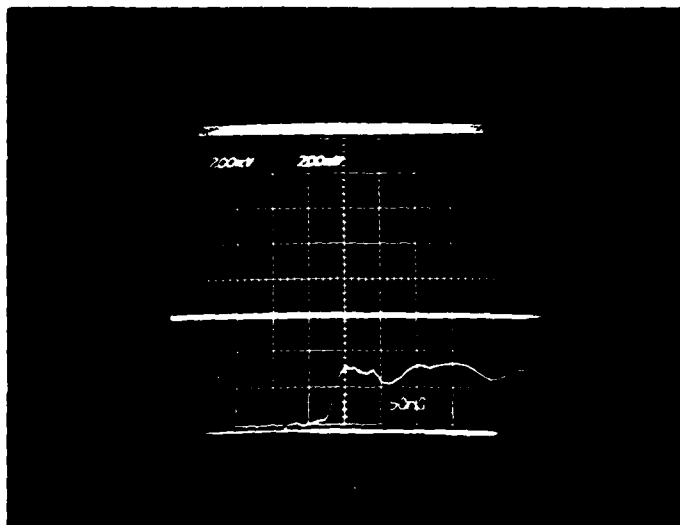
Comments:

(SYSTEM 7)

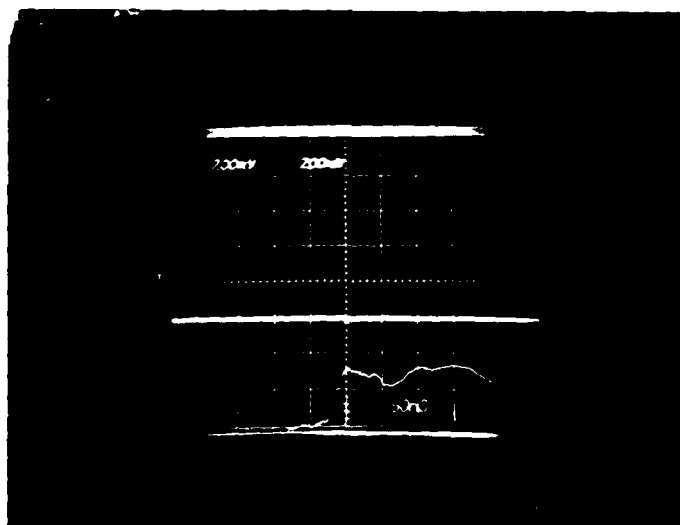
(28)



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
 Pulse Level 30 KV/charge
 Data Link
 Comments:
 (System 13) (29)



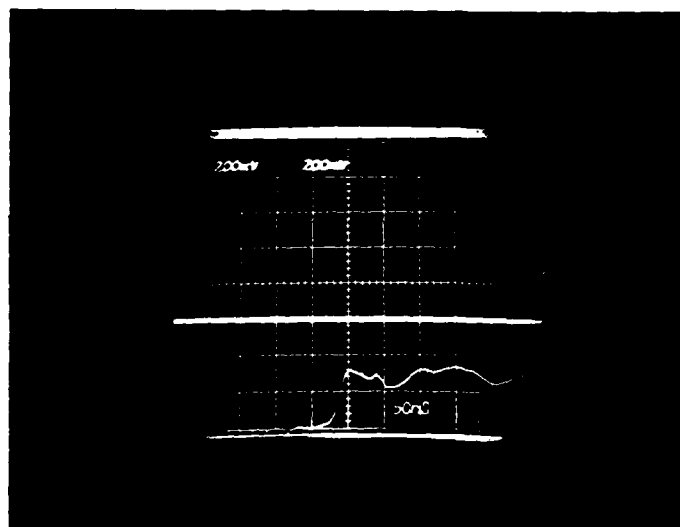
Date August 9, 1985
 Test Point F26
 Amplification dB
 Attenuation dB
 Horizontal 50 ns/div 1
 Vertical 200 mV/div 1
 Horizontal ns/div 2
 Vertical mV/div 2
 Configuration
 Pulse Level 30 KV/charge
 Data Link
 Comments:
 (SYSTEM 13)
 BATTERY CHARGER (30)



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
 Pulsar Level 30KV Charge
 Data Link

Comments:

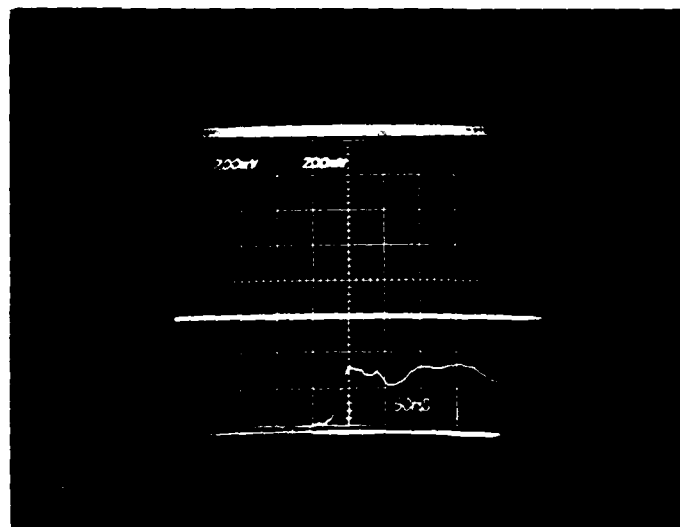
(SYSTEM 13)
 Battery Charger (31)



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
 Pulsar Level 30KV Charge
 Data Link

Comments:

(SYSTEM 13)
 Battery Charger (32)



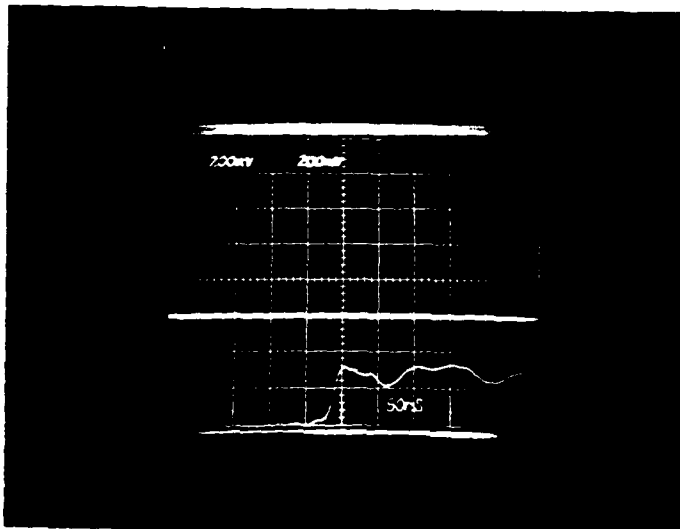
NO PHOTO 33

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
 Pulse Level 30 KV charge
 Data Link

Comments:

(SYSTEM 13)

(34)

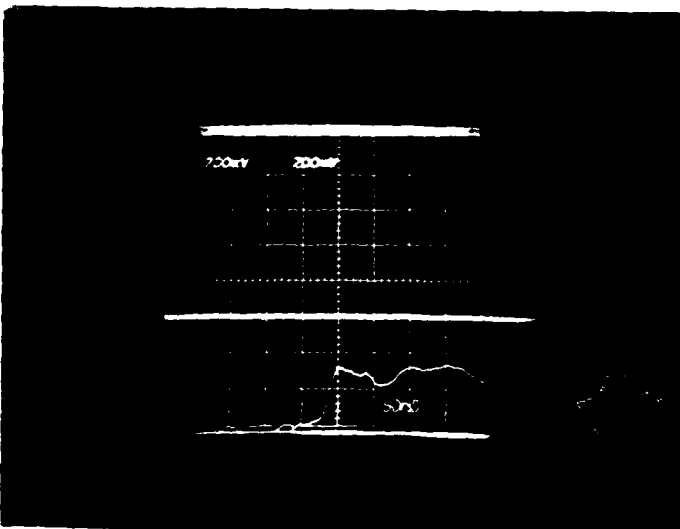


Date August 9, 1982
 Test Point F30
 Amplification dB
 Attenuation dB
 Horizontal 50 ns/div 1
 Vertical 200 mV/div 1
 Horizontal ns/div 2
 Vertical mV/div 2
 Configuration
 Pulse Level 30 KV charge
 Data Link

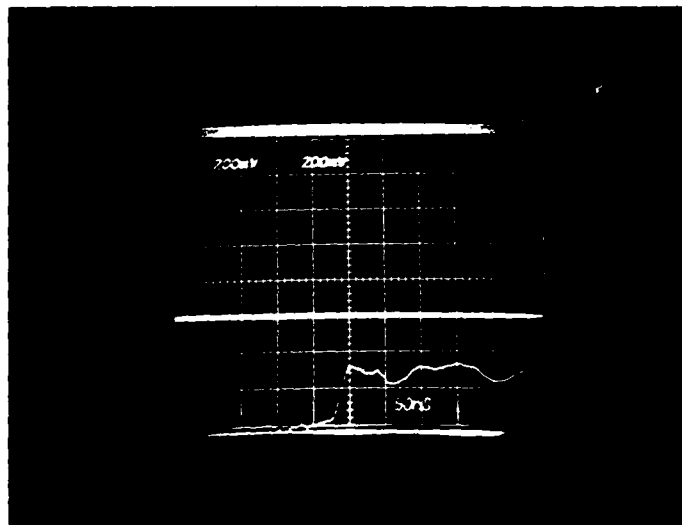
Comments:

(SYSTEM 7)

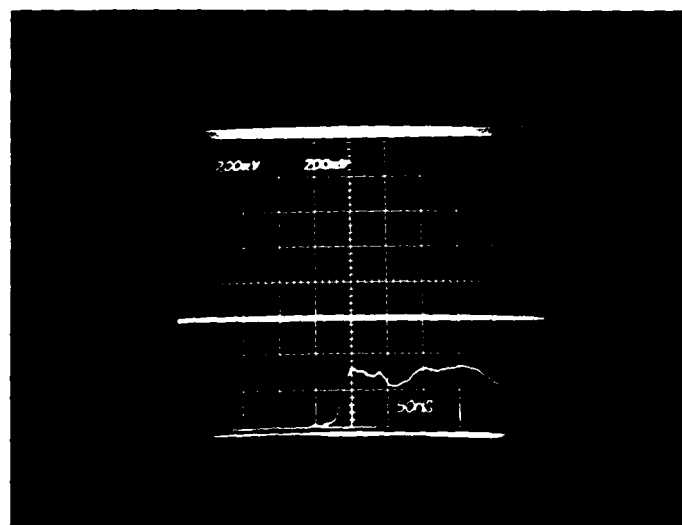
(35)



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			
Pulse Level	30KV/charge		
Data Link			
Comments:	(SYSTEM 7)		
	(36)		

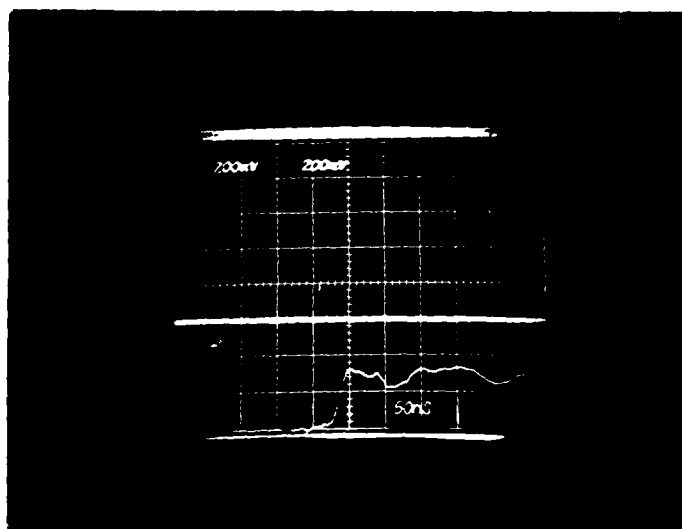


Date	August 9, 1985		
Test Point	F32R		
Amplification	dB		
Attenuation	dB		
Horizontal	50 ns/div	1	
Vertical	200 mV/div	1	
Horizontal	ns/div	2	
Vertical	mV/div	2	
Configuration			
Pulse Level	30KV/charge		
Data Link			
Comments:	(SYSTEM 12)		
	(37)		



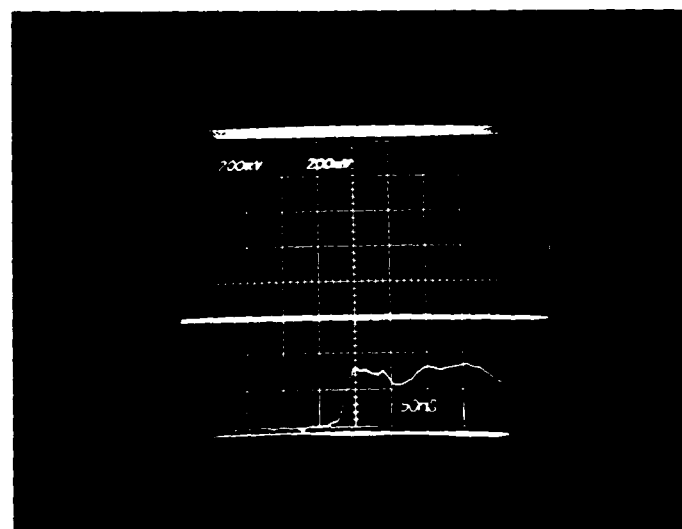
Date	August 9, 1985
Test Point	F32RL
Amplification	dB
Attenuation	dB
Horizontal	50 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulse Level	30 KV Charge
Data Link	
Comments:	(SYSTEM 12)

(38)

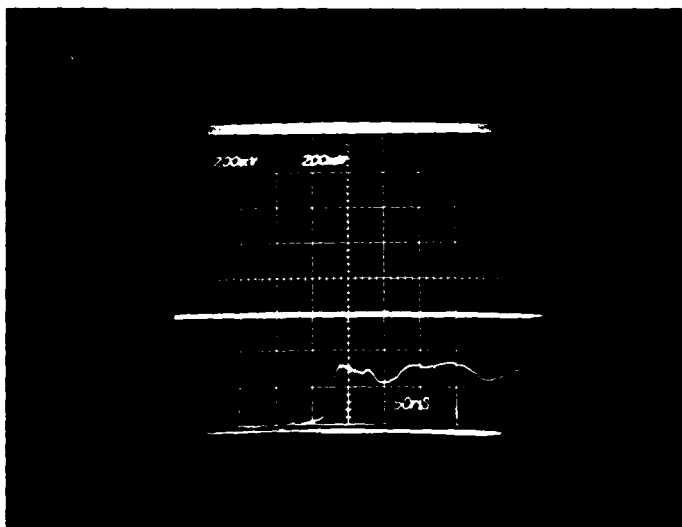


Date	August 9, 1985
Test Point	F33R
Amplification	dB
Attenuation	dB
Horizontal	50 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulse Level	30 KV Charge
Data Link	
Comments:	(SYSTEM 12)

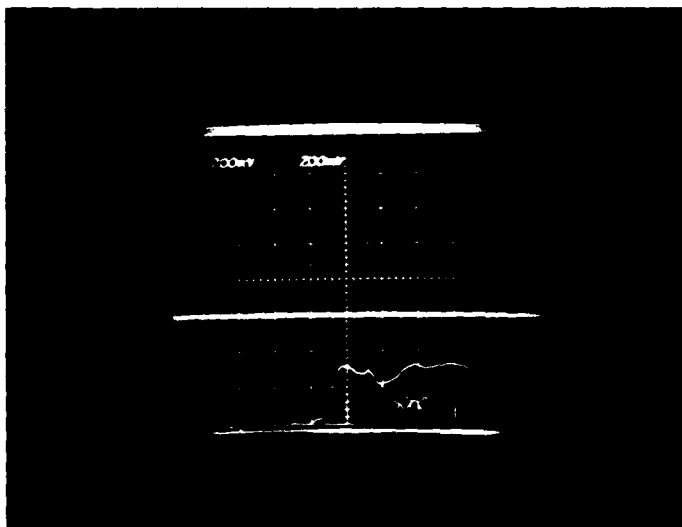
(39)



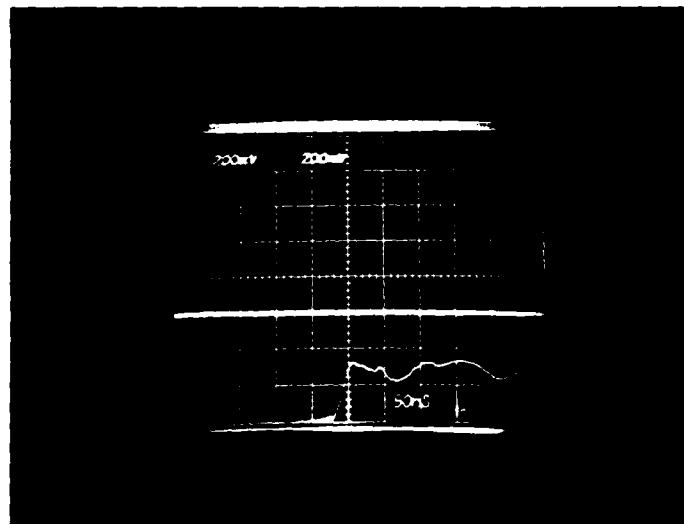
Date August 9, 1985
 Test Point F33T
 Amplification dB
 Attenuation dB
 Horizontal 50 ns/div 1
 Vertical 200 mV/div 1
 Horizontal ns/div 2
 Vertical mV/div 2
 Configuration
 Pulse Level 30KV charge
 Data Link
 Comments:
(SYSTEM 12) (41)



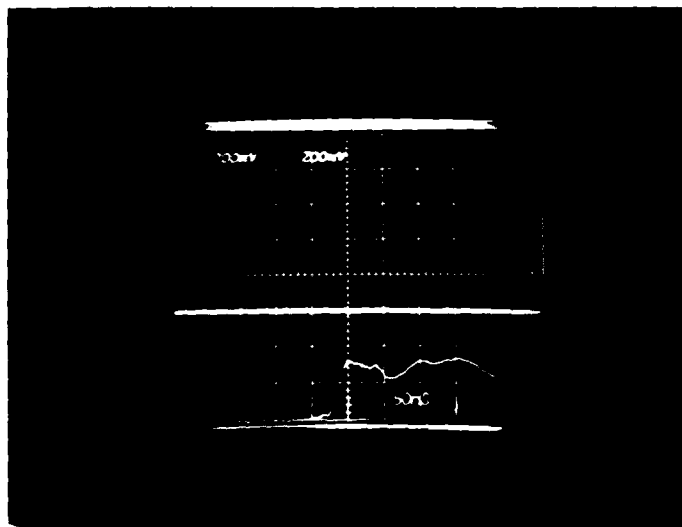
Date August 9, 1985
 Test Point F34R
 Amplification dB
 Attenuation dB
 Horizontal 50 ns/div 1
 Vertical 200 mV/div 1
 Horizontal ns/div 2
 Vertical mV/div 2
 Configuration
 Pulse Level 30KV charge
 Data Link
 Comments:
(SYSTEM 6) (42)



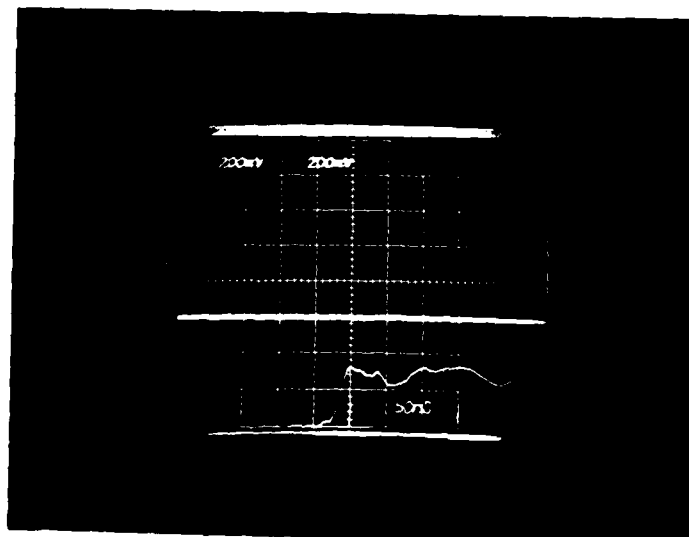
Date	August 9, 1985
Test Point	F34T
Amplification	dB
Attenuation	dB
Horizontal	50 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulse Level	30KV charge
Data Link	
Comments:	(SYSTEM 6) (43)



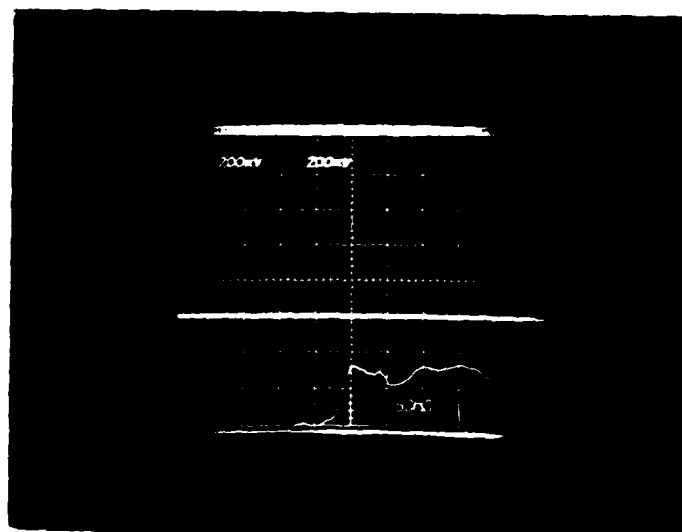
Date	August 9, 1985
Test Point	F35R
Amplification	dB
Attenuation	dB
Horizontal	50 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulse Level	30KV charge
Data Link	
Comments:	(SYSTEM 6) (44)



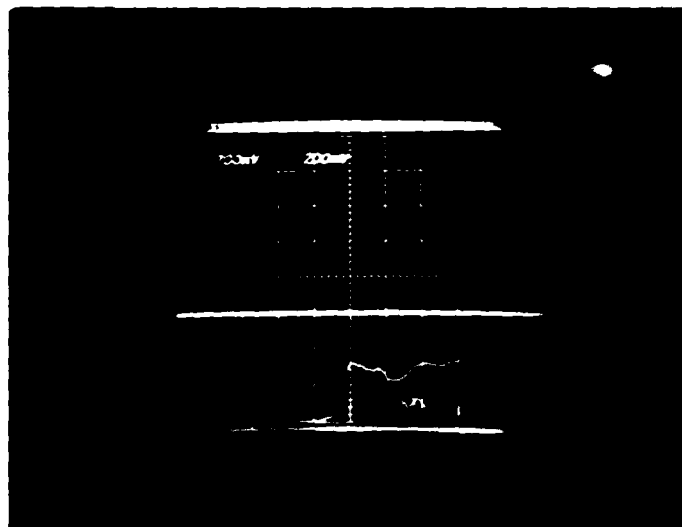
Date	August 9, 1985		
Test Point	F35T		
Amplification	dB		
Attenuation	dB		
Horizontal	50	ns/div	1
Vertical	200	mV/div	1
Horizontal		ns/div	2
Vertical		mV/div	2
Configuration			
Pulse Level	30KV/Charge		
Date Link			
Comments:	(SYSTEM 6) (45)		



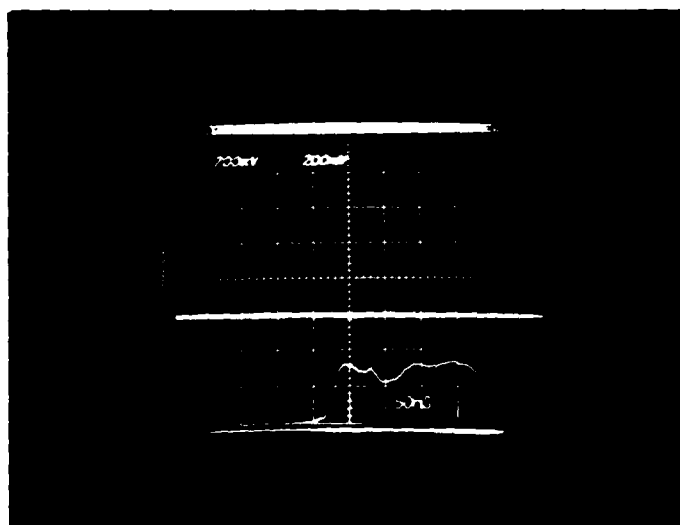
Date	August 9, 1985		
Test Point	F36R		
Amplification	dB		
Attenuation	dB		
Horizontal	50	ns/div	1
Vertical	200	mV/div	1
Horizontal		ns/div	2
Vertical		mV/div	2
Configuration			
Pulse Level	30KV/Charge		
Date Link			
Comments:	(SYSTEM 8) (46)		



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	
Pulse Level	30 KV Charge
Date 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	
Pulse Level	30 KV Charge
Date Link	
Comments:	(SYSTEM 8) (48)

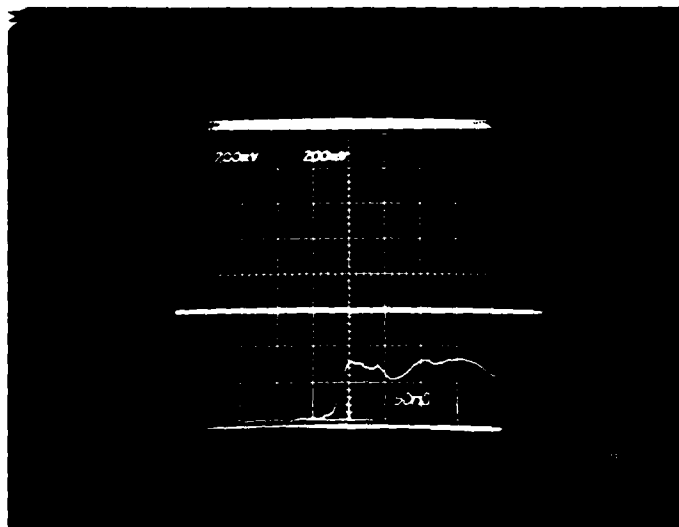


Date August 9, 1985
 Test Point F37R1
 Amplification dB
 Attenuation dB
 Horizontal 50 ns/div 1
 Vertical 200 mV/div 1
 Horizontal ns/div 2
 Vertical mV/div 2
 Configuration
 Pulse Level 30KV charge
 Data Link

Comments:

(SYSTEM 8)

(49)

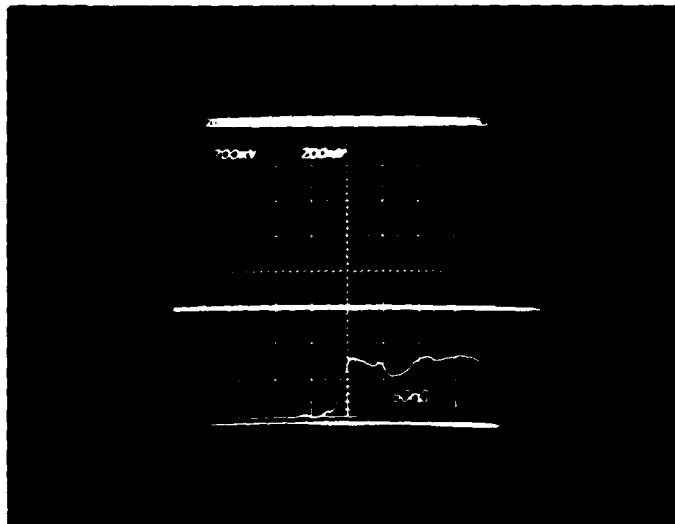


Date August 9, 1985
 Test Point F37T
 Amplification dB
 Attenuation dB
 Horizontal 50 ns/div 1
 Vertical 200mV/div 1
 Horizontal ns/div 2
 Vertical mV/div 2
 Configuration
 Pulse Level 30KV charge
 Data Link

Comments:

(SYSTEM 8)

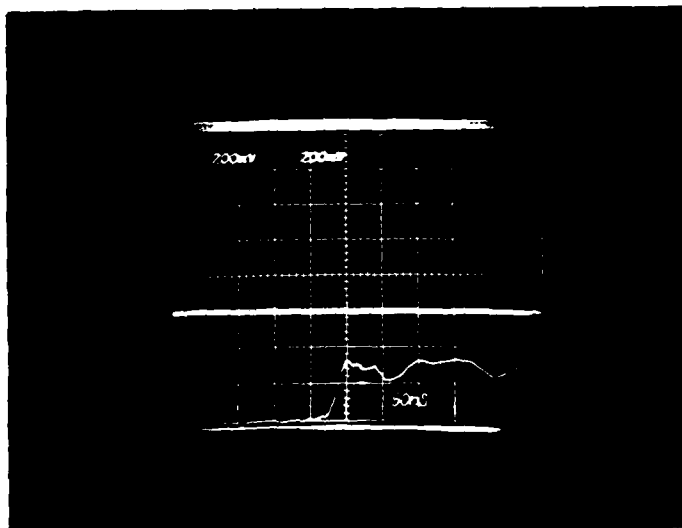
(50)



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	
Pulse Level	30KV charge
Date Link	
Comments:	

SYSTEM 9

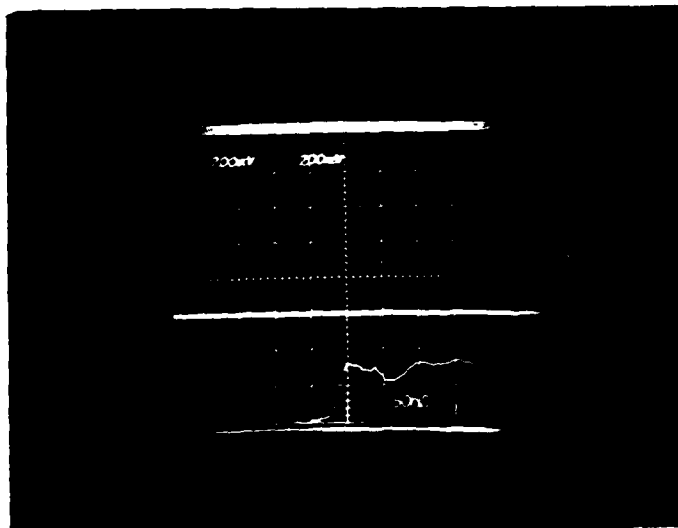
(51)



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	
Pulse Level	30KV charge
Date 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

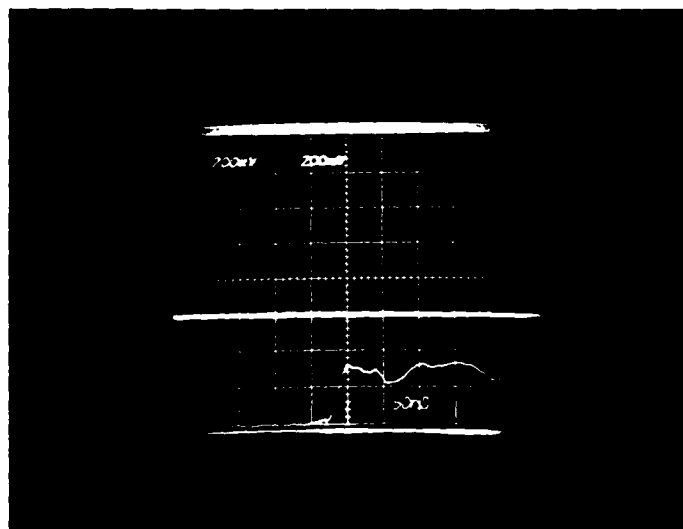
Pulse Level 30KV/charge

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

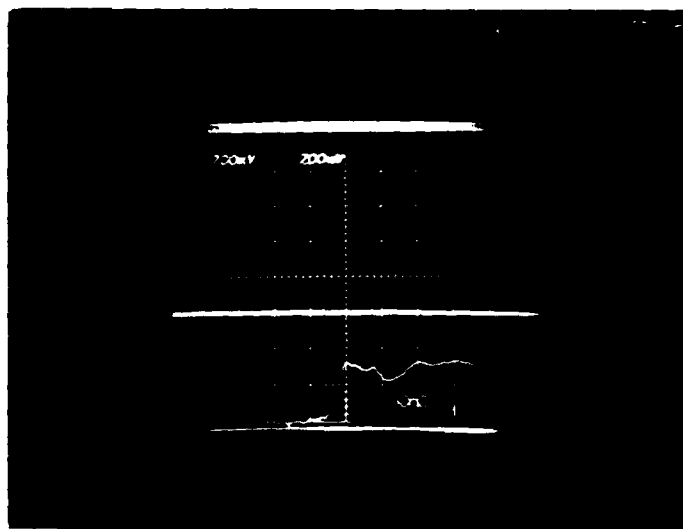
Pulse Level 30KV/charge

Data Link

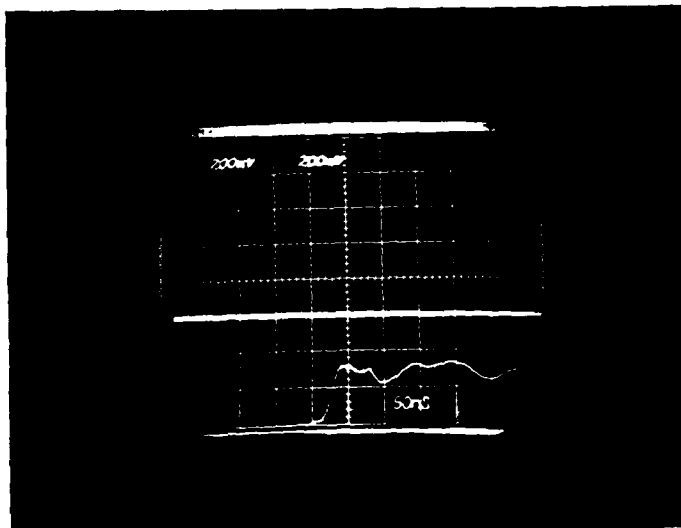
Comments:

(SYSTEM 9)

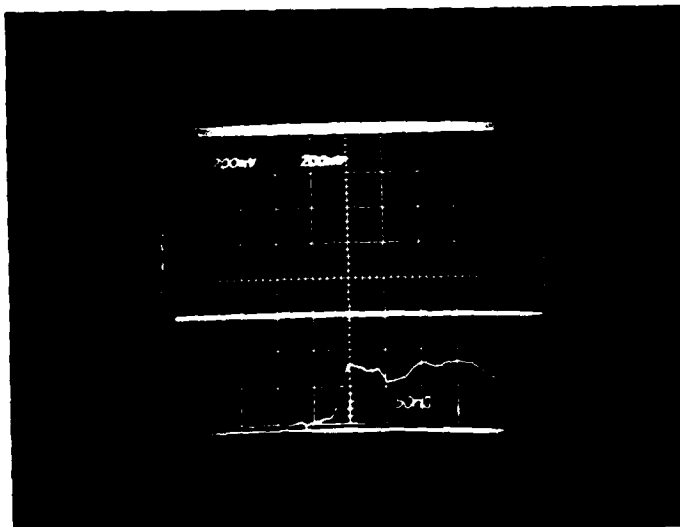
(54)



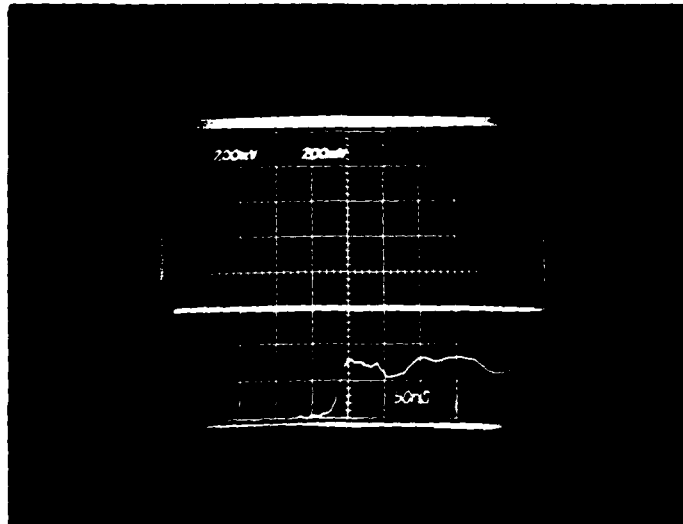
Date	August 9, 1985
Test Point	F39T
Amplification	dB
Attenuation	dB
Horizontal	50 ns/div 1
Vertical	200 mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulse Level	30KV charge
Data Link	
Comments:	(SYSTEM 9) (55)



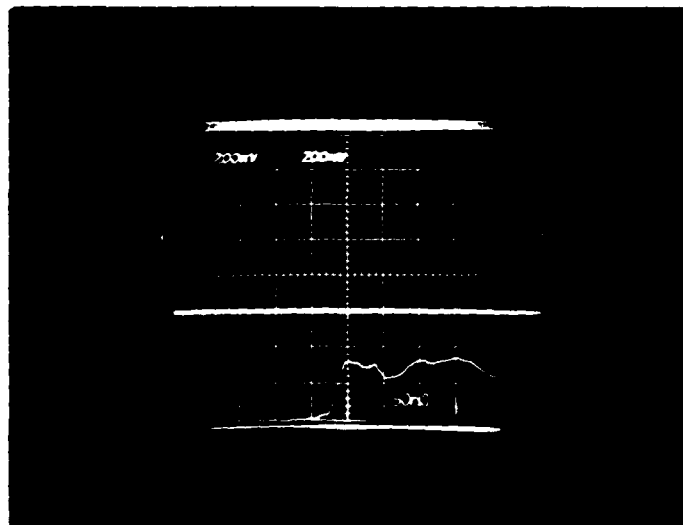
Date	August 9, 1985
Test Point	F40
Amplification	dB
Attenuation	dB
Horizontal	50 ns/div 1
Vertical	200mV/div 1
Horizontal	ns/div 2
Vertical	mV/div 2
Configuration	
Pulse Level	30KV charge
Data Link	
Comments:	DC POWER SUPPLY (56)



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	
Pulse Level	30KV 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	
Pulse Level	30KV Charge
Data Link	
Comments:	
HONDA (58)	

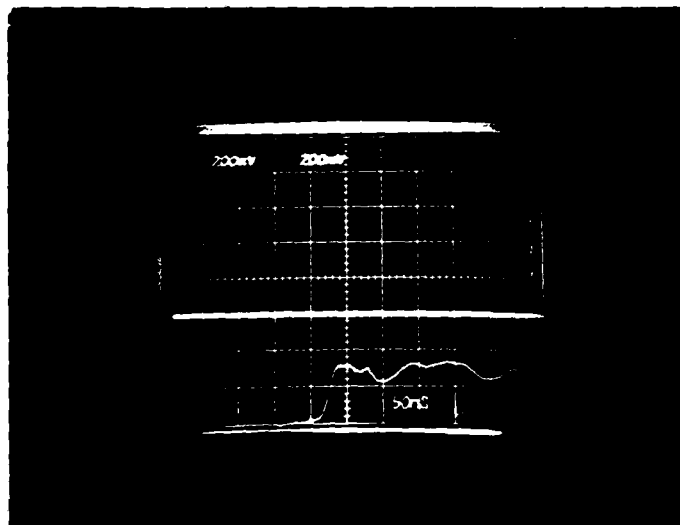


Date August 9, 1985
 Test Point F43
 Amplification dB
 Attenuation dB
 Horizontal 50 ns/div 1
 Vertical 200 mV/div 1
 Horizontal ns/div 2
 Vertical mV/div 2
 Configuration
 Pulsar Level 30KV Charge
 Data Link

Comments:

HONDA

(59)

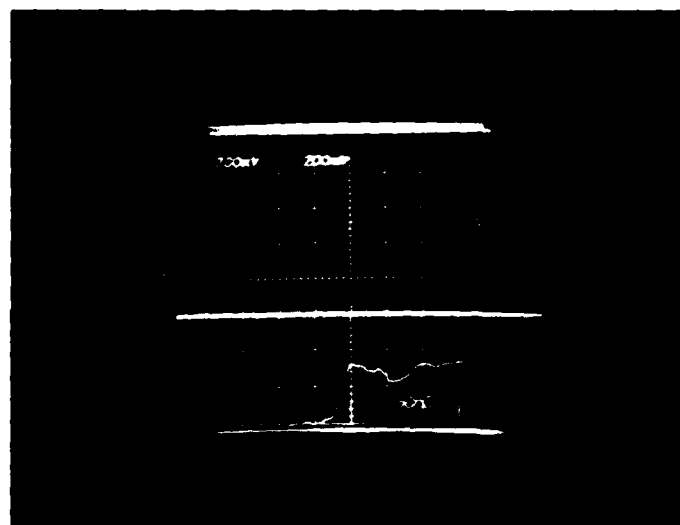


Date August 9, 1985
 Test Point F44
 Amplification dB
 Attenuation dB
 Horizontal 50 ns/div 1
 Vertical 200 mV/div 1
 Horizontal ns/div 2
 Vertical mV/div 2
 Configuration
 Pulsar Level 30KV Charge
 Data Link

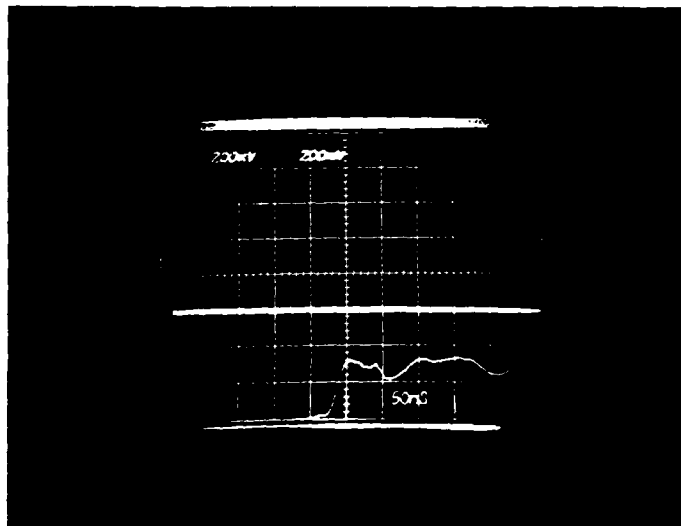
Comments:

HONDA

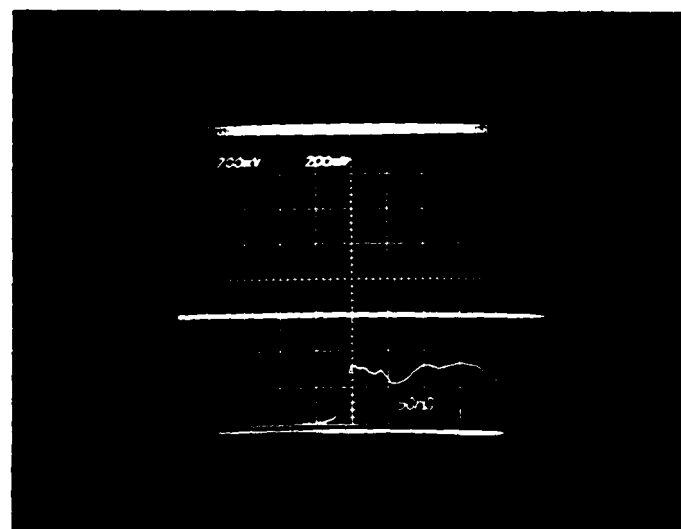
(60)



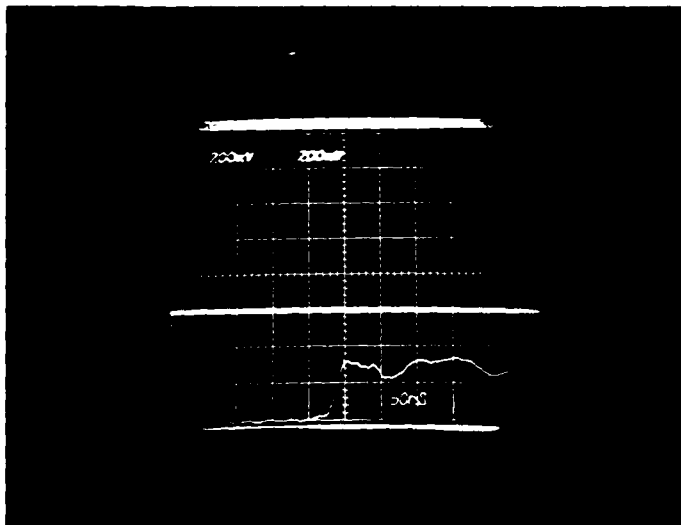
Date	August 9, 1985		
Test Point	F45		
Amplification	dB		
Attenuation	dB		
Horizontal	50 ns/div	1	
Vertical	200 mV/div	1	
Horizontal	ns/div	2	
Vertical	mV/div	2	
Configuration			
Pulse Level	30 KV Charge		
Data Link			
Comments:	HONDA (61)		



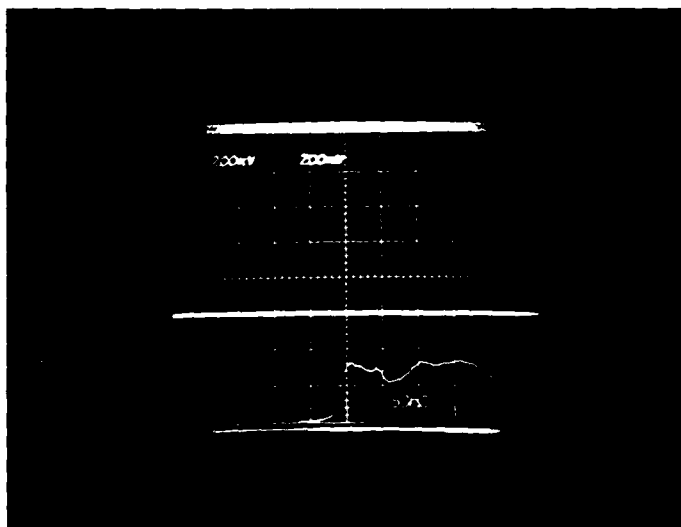
Date	August 9, 1985		
Test Point	F46		
Amplification	dB		
Attenuation	dB		
Horizontal	50 ns/div	1	
Vertical	200 mV/div	1	
Horizontal	ns/div	2	
Vertical	mV/div	2	
Configuration			
Pulse Level	30 KV Charge		
Data Link			
Comments:	(62)		



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			
Pulse Level	30KV Charge		
Date 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			
Pulse Level	30KV Charge		
Date Link			
Comments:	(SYSTEM II) (+ HONDA) (64)		



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