Pre-Production Test Plan

Electromagnetic Interference

And Susceptability Tests

High Level Multicoder

Model HDA4M-839

Manufactured By

Fifth Dimension, Inc.

Princeton, New Jersey

CONTENTS

PART III - ELECTROMAGNETIC INTERFERENCE AND SUSCEPTIBILITY TESTS

COMPONENT TYPE QUALIFICATION PROCEDURE

PART III - ELECTROMAGNETIC INTERFERENCE AND SUSCEPTIBILITY TESTS

1.0 GENERAL. This part of the document contains procedures for measuring electromagnetic interference and for determining susceptibility in accordance with Electromagnetic Interference Specifications MIL-I-26600 and MSC-ASPO-EMI-10A. The tests are to be conducted on Fifth Dimension Multicoder, Model No. HDA4M-039.

The primary purpose of these tests is to determine that the levels and frequencies of Conducted and Radiated Interference emanating from the component are within established limits; and to establish the susceptible condition and evaluate the possible degrading effects of externally generated electrical stimuli upon the unit. The exact susceptibility levels will be established only when susceptibility is below specification limits. The operation and calibration of the test equipment shall conform to vendor's Operating Instructions.

The Test Sample is deemed not to be susceptible when: (1) no more than specified change in indication and (2) no malfunction and no more than specified degradation of data. If susceptibility is established, the results shall be recorded at the test voltage and threshold levels and at random levels between the two. The test procedure must be conducted as outlined herein and the data thus secured for each step recorded on respective Data Sheets. Each step of the procedure should be read in its entirety prior to starting the test.

All tests shall be conducted under test conditions as delineated in MIL-I-26600, paragraph 4.2, and outlined herewith. The test sample and measuring equipment shall be mounted on and bonded to a ground plane installed within a shielded enclosure. The power supplied to the test sample shall be measured at the terminals of the line impedance stabilization network (LISN).

2.0 TEST EQUIPMENT (as specified or equivalent):

Line Impedance Stabilization Network	Stoddart	Model 91221-1
Current Probe	Stoddart	Model 91550-1
Rod Antenna	Stoddart	Model 92197-3
Antenna Coupler	Stoddart	Model 92198-3
Counter Poise (Gnd Plane)	Stoddart	Model 92199-3
Dipole Antenna	Stoddart	Model 91865-2
Dipole Antenna	Stoddart	Model 91870-2
Dipole Antenna	Stoddart	Model 91598-2
Horn Antenna	Stoddart	Model 91888-1
Horn Antenna	Stoddart	Model 91889-1
Horn Antenna	Stoddart	Model 91890-1
Horn Antenna	Stoddart	Model 91891-1
Reflector Antenna	Stoddart	Model 21892-1
RFI Meter	Stoddart	Model NM 40A
RFI Meter	Stoddart	Model NM 10A
RFI Meter	Stoddart	Model NM 22A
RFI Meter	Stoddart	Model NM 30A
RFI Meter	Stoddart	Model NM 52A
RFI Meter	Stoddart	Model NM 62A
Signal Generator	Hewlett-Packard	Model HP 200CD
Signal Generator	Hewlett-Packard	Model HP 606A
Signal Generator	Hewlett-Packard	Model HP 608C
Signal Generator	Hewlett-Packard	Model HP 612A
Signal Generator	Hewlett-Packard	Model HP 614A
Signal Generator	Hewlett-Packard	Model HP 616B
Signal Generator	Hewlett-Packard	Model HP 618A
Signal Generator	Hewlett-Packard	Model HP 620A
Digital Voltmeter	Hewlett-Packard	Model HP 405BR
Audio Amplifier, 200 watts	McIntosh	Model MI 200A/B
Oscilloscope	Tektronix	Model 555

NOTE: This list includes recommended instrumentation necessary for the performance of the required interference and susceptibility measurements. The actual equipments to be used will appear in the Test Report.

2.1 All equipment used in performance of these tests will be listed as follows:

Test	Para.	Data Sheet Page
Conducted Interference	4.1	1
Radiated Interference	4.2	8
Conducted Susceptibility	4.3	12
Radiated Susceptibility	4.4	21

3.0 REFERENCE DOCUMENTS:

IESD Document 19-18	Development Flight Instrumentation Environmental Type and Flight Specification (1 April 65), Part
IESD Document 19-3	Interference Control Requirements for Spacecraft Equipment (Dec. 64)

4.0 PROCEDURE: The test frequency scan shall be made slowly and carefully. All detected signal levels shall be attenuated as required in order to maintain meter indications on scale.

A. During the interference tests, the outputs of the multicoder shall be monitored to assure that all outputs are present.

B. During the susceptibility tests, the multicoder shall be operated and performance monitored for the following parameters.

4.2.1 Sampling rate; Ref; para. 2.2.1 of ATP.
4.2.2 Input Current; Ref; para. 2.2.2 of ATP.
4.2.3 PAM Noise; Ref. para. 2.2.3 of ATP.
4.2.4 PDM Jitter; Ref. para. 2.2.4 of ATP.
4.2.5 DPDM Amplitude; Ref. para. 2.2.5 of ATP.
4.2.6 Channel Presence; Ref. para. 2.2.6 of ATP.

C. Subsequent to the susceptibility tests the multicoder shall be tested for the following performance characteristics: (Record data on data sheet No. 27.)

4.3.1 Sampling rate; Ref. para. 2.3.1 of ATP.
4.3.2 Input Current; Ref. para. 2.3.2 of ATP.
4.3.3 PAM Zero and full scale Output; Ref. para. 2.3.3 of ATP.
4.3.4 PDM Zero and full scale pulse width; Ref. para. 2.3.4 of ATP.
4.3.5 DPDM Output; Ref. para. 2.3.5 of ATP.
4.3.6 PAM Noise; Ref. para. 2.3.6 of ATP.
4.3.7 PDM Jitter; Ref. para. 2.3.7 of ATP.
4.3.8 Channel Presence; Ref. para. 2.3.8 of ATP.

4.1 Conducted Interference

4.1.1 LISN

4.1.1.1 Connect test equipment and test sample as shown in Figure 1.

4.1.1.2 Energize and operate test equipment in accordance with vendor's instruction manual.

4.1.1.3 Energize test sample. SCAN frequency range from 150 KC to 25 MC and RECORD the level and frequency of all detected signals on Data Sheets page 2 and 3.

4.1.1.4 De-energize test sample. SCAN frequencies where measurable signals were detected (para. 4.1.1.3) and RECORD the level and frequency of all detected ambient signals on Data Sheets page 2 and 3.

4.1.1.5 Photograph test setup.

4.1.2 Current Probe (DC Power Leads)

4.1.2.1 Connect test equipment and test sample as shown in Figure 2.

4.1.2.2 Energize and operate test equipment in accordance with vendor's instruction manual.

4.1.2.3 Energize test sample. SCAN frequency range from 30 cps to 150KC and RECORD the level and frequency of all detected signals on Data Sheets page 4 and 5.

NOTE: The current probe shall be positioned at the point of maximum interference on the lead being tested. This point shall be located and recorded for each frequency by moving the probe along the lead while monitoring the measuring equipment. The limits established are dependent upon the current carried in the lead. Reference MSC-ASPO-EMI-10A, Figure 4B. This test shall be made on each power lead.

4.1.2.4 De-energize test sample. SCAN frequencies where measurable signal levels were detected (para. 4.1.2.3) and RECORD the level and frequency of all detected ambient signals on Data Sheets page 4 and 5.

4.1.2.5 Photograph test setup.

4.1.3 Current Probe (Signal Leads)

4.1.3.1 Connect test equipment and test sample as shown in Figure 3.

4.1.3.2 Energize and operate test equipment in accordance with vendor's instruction manual.

4.1.3.3 Energize test sample. SCAN frequency range from 15 KC to 25 MC and RECORD the level and frequency of all detected signals on Data Sheets page 6 and 7.

NOTE: The current probe shall be positioned at the point of maximum interference on the lead being tested. This point shall be located and recorded for each frequency by moving the probe along the lead while monitoring the measuring equipment. The limits established are depicted in MSC-ASPO-EMI-10A, Figures 4 and 5. This test shall be made on each input signal and inter-connecting lead.

4.1.3.4 De-energize test sample. SCAN frequencies where measurable signal levels were detected (para. 4.1.2.3) and RECORD the level and frequency of all detected ambient signals on Data Sheets page 6 and 7.

4.1.3.5 Photograph test setup.

4.2 Radiated Interference

4.2.1 Rod Antenna

4.2.1.1 Connect test equipment and test sample as shown in Figure 4.

4.2.1.2 Energize and operate test equipment in accordance with vendor's instruction manual.

4.2.1.3 Energize test sample. SCAN frequency range from 15 KC to 25 MC and RECORD the level and frequency of all detected signals on Data Sheet page 9 and 10.

4.2.1.4 De-energize test sample. SCAN frequencies where measurable signals were detected (para. 4.2.1.3) and RECORD the level and frequency of all detected ambient signals on Data Sheets page 9 and 10.

4.2.1.5 Photograph test setup.

4.2.2 Dipole Antenna

4.2.2.1 Connect test equipment and test sample as shown in Figure 5.

4.2.2.2 Energize and operate test equipment in accordance with vendor's instruction manual.

4.2.2.3 Energize test sample. SCAN frequency range from 25 MC to 1 GC and RECORD the level and frequency of all detected signals on Data Sheet page 9 and 10.

NOTE: The antenna shall be tuned to 35 mc for the frequency range of 25 - 35 mc and retuned to the proper length twice per octave over the range 35 mc to 1 gc. Whenever interference is detected, the antenna shall be tuned to the exact interference frequency.

4.2.2.4 De-energize test sample. SCAN frequencies where measurable signals were detected (para. 4.2.1.3) and RECORD the level and frequency of all detected ambient signals on Data Sheets page 9 and 10.

4.2.2.5 Photograph test setup.

4.2.3 **Directive Antenna**

4.2.3.1 **Connect test equipment and test sample as shown in Figure** 6.

4.2.3.2 **Energize and operate test equipment in accordance with vendor's instruction manual.**

4.2.3.3 **Energize test sample. SCAN frequency range** from 1 GC to 10 GC and **RECORD the level and frequency of all detected signals on Data Sheet** page 11.

NOTE: The antenna shall be replaced for one properly tuned for each band of frequencies, i.e., band 1: 1.0 - 2.3 gc; band 2: 2.3 - 4.9 gc; band 3: 4.9 - 7.3 gc; and band 4: 7.3 - 10.0 gc.

4.2.3.4 **De-energize test sample. SCAN frequencies where measurable signals were detected (para. 4.2.1.3) and RECORD the level and frequency of all detected ambient signals on Data Sheets** page 11.

4.2.1.5 **Photograph test setup.**

4.3 Conducted Susceptibility

4.3.1 Audio Frequency

4.3.1.1 Connect test equipment and test sample as shown in Figure 7.

4.3.1.2 Energize and operate test equipment in accordance with vendor's instruction manual.

4.3.1.3 Energize test sample. Insert 3 volts rms (open circuited) onto each ungrounded power lead. SCAN frequency range 30 cps to 50 kc while monitoring the test sample for proper operation. If the test sample indicates susceptibility, RECORD the frequency and threshold level on Data Sheets page 13 and 14. (Threshold is found by slowly reducing the AC voltage inserted on the power leads until the susceptibility condition is corrected).

4.3.1.4 Photograph test setup.

4.3.2 Radio Frequency

4.3.2.1 Connect test equipment and test sample as shown in Figure 8.

4.3.2.2 Energize and operate test equipment in accordance with vendor's instruction manual.

4.3.2.3 Energize test sample. Insert 3 volts rms (open circuited) onto each ungrounded power lead. SCAN frequency range 50 cps to 50 kc while monitoring the test sample for proper operation. If the test sample indicates susceptibility, RECORD the frequency and threshold level on Data Sheets page 15 and 16. (Threshold is found by slowly reducing the AC voltage inserted on the power leads until the susceptibility condition is corrected).

4.3.2.4 Photograph test setup.

4.3.2.5 Connect test equipment and test sample as shown in Figure 9.

4.3.2.6 Energize and operate test equipment in accordance with vendor's instruction manual.

4.3.2.7 Energize test sample. Insert 100,000 microvolts onto each ungrounded power lead. SCAN frequency range 150 kc to 1 gc with the 100,000 microvolt signal modulated 30% with 400 cps (sine wave) while monitoring the test sample for proper operation. SCAN frequency range 1.0 - 10.0 gc with the 100,000 microvolt signal modulated 100% with a 1000 cps square wave. If the test sample indicates susceptibility, RECORD the frequency and threshold level on Data Sheets pages 17 and 18.

4.3.2.8 Photograph test setup.

4.3.3 Transient

4.3.3.1 Connect test equipment and test sample as shown in Figure 10.

4.3.3.2 Energize and operate test equipment in accordance with vendor's instruction manual.

4.3.3.3 Energize test sample. Insert positive or negative pulses on each ungrounded power lead for a duration of 2 minutes. The pulses shall be 50 volts in amplitude, 10 microseconds in width and have a repetition rate of 10 PPS. Monitor the test sample for proper operation and verify that no temporary or permenent damage results. If susceptibility is indicated, RECORD the voltage (P-P), polarity and indication on Data Sheets pages 19 and 20.

4.3.3.4 Photograph test setup.

4.4 Radiated Susceptibility

4.4.1 Loop Antenna

4.4.1.1 Connect test equipment and test sample as shown in figure 11.

4.4.1.2 Energize and operate test equipment in accordance with vendor's instruction manual.

4.4.1.3 Energize test sample. SCAN frequency range 15- 150 kc with a 10,000 microvolt signal modulated 30% with 400 cps.

NOTE: The signal shall not be modulated over the range 15 - 50 kc. The voltage shall be the open-circuited value applied to the antenna terminals.

Monitor the test sample during the scan and if susceptibility is established, RECORD the frequency and threshold level on Data Sheets pages 22 and 23.

NOTE: The loop antenna shall be used as a hand held probe to determine the position of greatest susceptibility.

4.4.1.4 Photograph test setup.

4.4.2 Rod Antenna

4.4.2.1 Connect test equipment and test sample as shown in figure 12.

4.4.2.2 Energize and operate test equipment in accordance with vendor's instruction manual.

4.4.2.3 Energize test sample. SCAN frequency range 150 kc to 25 mc with a 100,000 microvolt signal modulated 30% with 400 cps. Monitor the test sample during the scan and if susceptibility is established, RECORD the frequency and threshold level on Data Sheets pages 22 & 24.

4.4.2.4 Photograph test setup.

4.4.3 **Dipole Antenna**

4.4.3.1 Connect test equipment and test sample as shown in figure 13 .

4.4.3.2 Energize and operate test equipment in accordance with vendor's instruction manual.

4.4.3.3 Energize test sample. SCAN frequency range 25 mc to 1 gc with a 100,000 microvolt signal modulated 30% with 400 cps. Monitor the test sample during the scan and if susceptibility is established, RECORD the frequency and threshold level on Data Sheet s pages 22 and 25.

NOTE: The antenna shall be tuned to 35 mc during the scan from 25 - 35 mc and retuned to the proper length every 50 mc over the remaining frequencies.

4.4.3.4 Photograph test setup.

4.4.4 Directive Antenna

4.4.4.1 Connect test equipment and test sample as shown in figure 14.

4.4.4.2 Energize and operate test equipment in accordance with vendor's instruction manual.

4.4.4.3 Energize test sample. SCAN frequency range 1 - 10 gc with a 100,000 microvolt signal modulated 100% with a 1000 cycle square wave. Monitor the sample during the scan and if susceptibility is established, RECORD the frequency and threshold level on Data Sheets pages 22 and 26.

NOTE: The antenna shall be replaced for one properly tuned for each band of frequencies, i.e.:

Band 1: 1 - 2.3 gc

Band 2: 2.3 - 4.9 gc

Band 3: 4.9 - 7.3 gc

Band 4: 7.3 - 10.0 gc

4.4.4.4 Photograph test setup.

5.0

DATA SHEETS

CONDUCTED INTERFERENCE EQUIPMENT LIST

2.1 List all test equipment used in performance of tests specified in para. 4.1; Care must be taken to supply all of the following information:

Nomenclature (Name and Model)	Serial #	Manufacturer	Date of Last Calibration	Date of Next Calibration

Issue Date _____ DATA SHEET 2 OF 27 Rev. Date _____

Type of Test: Conducted Interference Using LISN (CW) Component _____

NASA Type No. _____ Mfgr.Model No. _____

NASA Serial No. _____ Mrgr. Serial No. _____

Component Range _____ Component Run Time _____

NASA/MSC Inspection _____ GAEC or Other Inspection _____

Date Tested _____ Tested By _____

FREQ mc	METER READING dbuv	CORRECTION FACTORS db	CORRECTED READING dbuv	SPEC LIMIT dbuv	AMBIENT dbuv	REMARKS

Issue Date __________ DATA SHEET 3 OF 27 Rev. Date __________

Type of Test Conducted Interference Using LISN (BB) Tested By __________

FREQ mc	METER READING dbuv/mc	CORRECTION FACTORS db	CORRECTED READING dbuv/mc	SPEC LIMIT dbuv/mc	AMBIENT dbuv/mc	REMARKS

Issue Date ____________ DATA SHEET 4 OF 27 Rev.Date ____________

Type of Test Conducted Interference Using Current Probe on Power Lines (CW)

Tested By ____________

FREQ kc	METER READING dbuv	CORRECTION FACTORS db	CORRECTED READING dbui	SPEC LIMIT dbui	AMBIENT dbui	REMARKS

Issue Date ____________ DATA SHEET 5 OF 27 Rev. Date ____________

Type of Test Conducted Interference Using Current Probe on Power Leads (BB) Tested By ____________

FREQ mc	METER READING dbuv/mc	CORRECTION FACTORS db	CORRECTED READING dbui/mc	SPEC LIMIT dbui/mc	AMBIENT dbui/mc	REMARKS

Issue Date ____________ DATA SHEET 6 OF 27 Rev. Date ____________

Type of Test Conducted Interference Using Current Probe on Signal Leads (CW) Tested By ____________

FREQ mc	METER READING dbuv	CORRECTION FACTORS db	CORRECTED READING dbui	SPEC LIMIT dbui	AMBIENT dbui	REMARKS

Issue Date ________ DATA SHEET 7 OF 27 Rev. Date ________

Type of Test Conducted Interference Using Current Probe on Signal Leads (BB) Tested By ________

FREQ mc	METER READING dbuv/mc	CORRECTION FACTORS db	CORRECTED READING dbui/mc	SPEC LIMIT dbui/mc	AMBIENT dbui/mc	REMARKS

RADIATED INTERFERENCE EQUIPMENT LIST

2.1 List all test equipment used in performance of tests specified in para. 4.2; Care must be taken to supply all of the following information:

Nomenclature (Name and Model)	Serial #	Manufacturer	Date of last Calibration	Date of Next Calibration

Issue Date ____________ DATA SHEET 9 OF 27 Rev. Date ____________

Type of Test Radiated Interference Using Rod and Dipole Antenna (CW) Tested By ____________

FREQ mc	METER READING dbuv	CORRECTION FACTORS db	CORRECTED READING dbuv	SPEC LIMIT dbuv	AMBIENT dbuv	REMARKS

Issue Date ____________ DATA SHEET 10 OF 27 Rev. Date ____________

Type of Test Radiated Interference Using Rod and Dipole Antenna (BB or Pulsed CW) Tested By ____________

FREQ mc	METER READING dbuv	CORRECTION FACTORS db	CORRECTED READING dbuv/mc	SPEC LIMIT dbuv/mc	AMBIENT dbuv/mc	REMARKS

Issue Date ____________ DATA SHEET 11 OF 27 Rev. Date ____________

Type of Test Radiated Interference Using Directive Antenna (BB or Pulsed CW) Tested By ____________

FREQ gc	METER READING dbuv/mc	CORRECTION FACTORS db	CORRECTED READING dbus/mc	SPEC LIMIT dbue/mc	AMBIENT dbue/mc	REMARKS

CONDUCTED SUSCEPTIBILITY EQUIPMENT LIST

2.1 List all test equipment used in performance of tests specified in para. 4.3. Care must be taken to supply all of the following information:

Nomenclature (Name and Model)	Serial #	Manufacturer	Date of Last Calibration	Date of Next Calibration

Issue Date ______ DATA SHEET 13 OF 27 Rev. Date ______

Type of Test Conducted Susceptibility Using Audio Transformer Tested By ______

FREQ	THRESHOLD LEVEL ▼	SPEC LIMIT ▼				REMARKS
		3.0				

ENVIRONMENTAL TEST DATA SHEET

Conducted Susceptibility Using Audio Transformer

MODEL NO. _____ DATE _____

SERIAL NO. _____ TESTED BY _____

PERFORMANCE DURING EMI TESTS

PARA. REF.	TEST	DATA
2.2.1.	Sampling Rate @ 28.0VDC	_____
2.2.2.	Input Current @ 28.0VDC	_____
2.2.3.	PAM Noise	_____
2.2.4.	PDM Jitter	_____
2.2.5.	DPDM Output	_____
2.2.6.	Channel Presence	_____

Issue Date ________ DATA SHEET 15 OF 27 Rev. Date ________

Type of Test Conducted Susceptibility Using Coil and Condensor Tested By ________

FREQ kc	SCAN LEVEL OPEN CIRCUIT uv	THRESHOLD LEVEL-OPEN CIRCUIT uv				REMARKS
	$3x10^6$					

ENVIRONMENTAL TEST DATA SHEET

Conducted Susceptibility Using Coil And Condenser

MODEL NO. _____ DATE _____

SERIAL NO. _____ TESTED BY _____

PERFORMANCE DURING EMI TESTS

PARA. REF.	TEST	DATA
2.2.1.	Sampling Rate @ 28.0VDC	_____
2.2.2.	Input Current @ 28.0VDC	_____
2.2.3.	PAM Noise	_____
2.2.4.	PDM Jitter	_____
2.2.5.	DPDM Output	_____
2.2.6.	Channel Presence	_____

Issue Date ________ DATA SHEET 17 OF 27 Rev. Date ________

Type of Test Conducted Susceptibility Radio Frequency

Tested By ________

FREQ mc	SCAN LEVEL uv	SUSCEPTIBLE LEVEL uv				REMARKS

ENVIRONMENTAL TEST DATA SHEET

Conducted Susceptibility Radio Frequency

MODEL NO. _____ DATE _____

SERIAL NO. _____ TESTED BY _____

PERFORMANCE DURING EMI TESTS

PARA. REF.	TEST	DATA
2.2.1.	Sampling Rate @ 28.0VDC	_____
2.2.2.	Input Current @ 28.0VDC	_____
2.2.3.	PAM Noise	_____
2.2.4.	PDM Jitter	_____
2.2.5.	DPDM Output	_____
2.2.6.	Channel Presence	_____

Issue Date ________ DATA SHEET 19 OF 27 Rev. Date ________

Type of Test Conducted Susceptibility Using Transient Generator Tested By ________

VOLTS	POLARITY	UNIT OR CIRCUIT				REMARKS

ENVIRONMENTAL TEST DATA SHEET

Conducted Susceptibility Using Transient Generator

MODEL NO. _____ DATE _____

SERIAL NO. _____ TESTED BY _____

PERFORMANCE DURING EMI TESTS.

PARA. REF.	TEST	DATA
2.2.1.	Sampling Rate @ 28.0VDC	_____
2.2.2.	Input Current @ 28.0VDC	_____
2.2.3.	PAM Noise	_____
2.2.4.	PDM Jitter	_____
2.2.5.	DPDM Output	_____
2.2.6.	Channel Presence	_____

RADIATED SUSCEPTIBILITY EQUIPMENT LIST

2.1 List all test equipment used in performance of tests specified in para. 4.4; Care must be taken to supply all of the following information:

Nomenclature (Name and Model)	Serial #	Manufacturer	Date of Last Calibration	Date of Next Calibration

Issue Date ____________ DATA SHEET 22 OF 27 Rev. Date ____________

Type of Test Radiated Susceptibility Using Loop, Rod, Dipole and Directive Antennas Tested By ____________

FREQ	SCAN LEVEL uv	THRESHOLD LEVEL uv	SPEC LIMIT uv	ANTENNA		REMARKS

ENVIRONMENTAL TEST DATA SHEET

Radiated Susceptibility Using Loop Antenna

MODEL NO. _____ DATE _____

SERIAL NO. _____ TESTED BY _____

PERFORMANCE DURING EMI TESTS.

PARA. REF.	TEST	DATA
2.2.1.	Sampling Rate @ 28.0VDC	_____
2.2.2.	Input Current @ 28.0VDC	_____
2.2.3.	PAM Noise	_____
2.2.4.	PDM Jitter	_____
2.2.5.	DPDM Output	_____
2.2.6.	Channel Presence	_____

ENVIRONMENTAL TEST DATA SHEET

Radiated Susceptibility Using Rod Antenna

MODEL NO. _____ DATE _____

SERIAL NO. _____ TESTED BY _____

PERFORMANCE DURING EMI TESTS

PARA. REF.	TEST	DATA
2.2.1.	Sampling Rate @ 28.0VDC	
2.2.2.	Input Current @ 28.0VDC	
2.2.3.	PAM Noise	
2.2.4.	PDM Jitter	
2.2.5.	DPDM Output	
2.2.6.	Channel Presence	

ENVIRONMENTAL TEST DATA SHEET

Radiated Susceptibility Using Dipole Antenna

MODEL NO. _____ DATE _____

SERIAL NO. _____ TESTED BY _____

PERFORMANCE DURING EMI TESTS.

PARA. REF.	TEST	DATA
2.2.1.	Sampling Rate @ 28.0VDC	_____
2.2.2.	Input Current @ 28.0VDC	_____
2.2.3.	PAM Noise	_____
2.2.4.	PDM Jitter	_____
2.2.5.	DPDM Output	_____
2.2.6.	Channel Presence	_____

ENVIRONMENTAL TEST DATA SHEET

Radiated Susceptibility Using Directive Antenna

MODEL NO. _____ DATE _____

SERIAL NO. _____ TESTED BY _____

PERFORMANCE DURING EMI TESTS

PARA. REF.	TEST	DATA
2.2.1.	Sampling Rate @ 28.0VDC	_____
2.2.2.	Input Current @ 28.0VDC	_____
2.2.3.	PAM Noise	_____
2.2.4.	PDM Jitter	_____
2.2.5.	DPDM Output	_____
2.2.6.	Channel Presence	_____

ENVIRONMENTAL TEST DATA SHEET

MODEL NO. _____ DATE _____

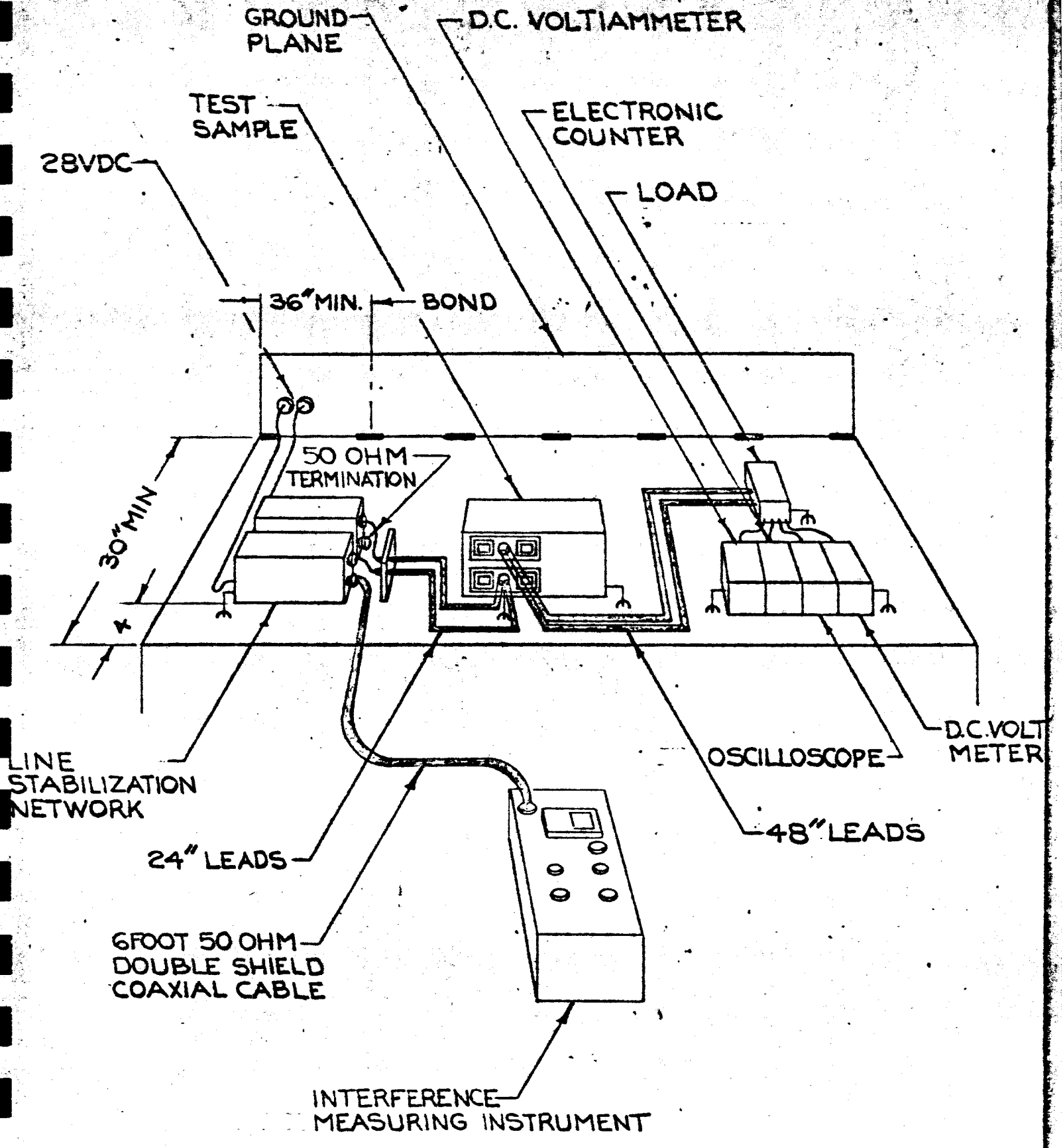
SERIAL NO. _____ TESTED BY _____

PERFORMANCE DATA AFTER EMI TESTS

PARA. REF.	TEST	DATA
2.3.1	Sampling Rate @ 22.0 VDC	
	@ 24.0 VDC	
	@ 28.0 VDC	
	@ 32.0 VDC	
	@ 28.0 VDC	
2.3.2	Input Current @ 28.0 VDC	
2.3.3	PAM Output AMP: Zero	
	Full Scale	
2.3.4	PDM Pulse Width: Zero	
	Full Scale	
2.3.5	DPDM Amplitude	
2.3.6	PAM Noise	
2.3.7	PDM Jitter	
2.3.8	Channel Presence	

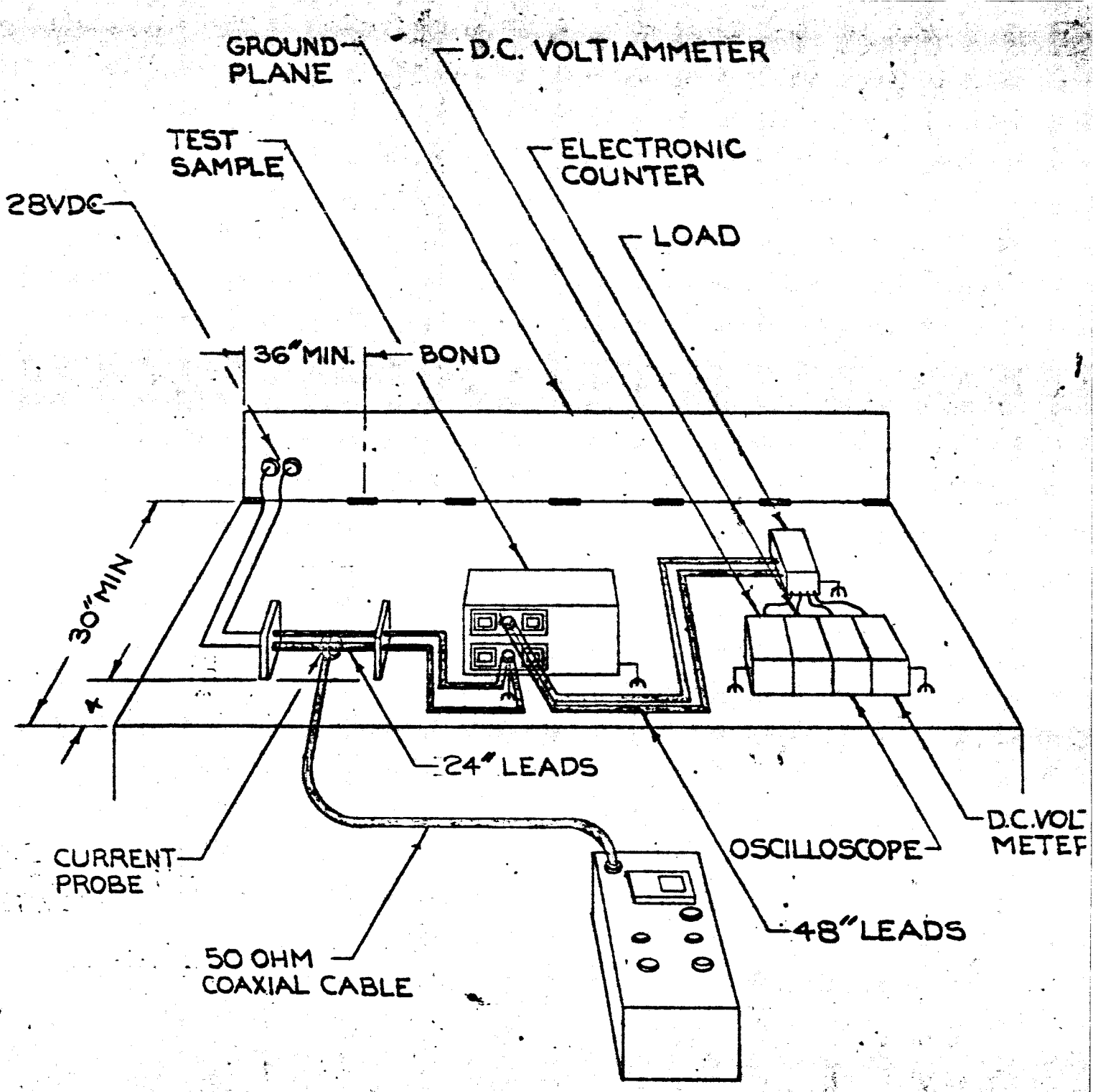
6.0

DRAWINGS



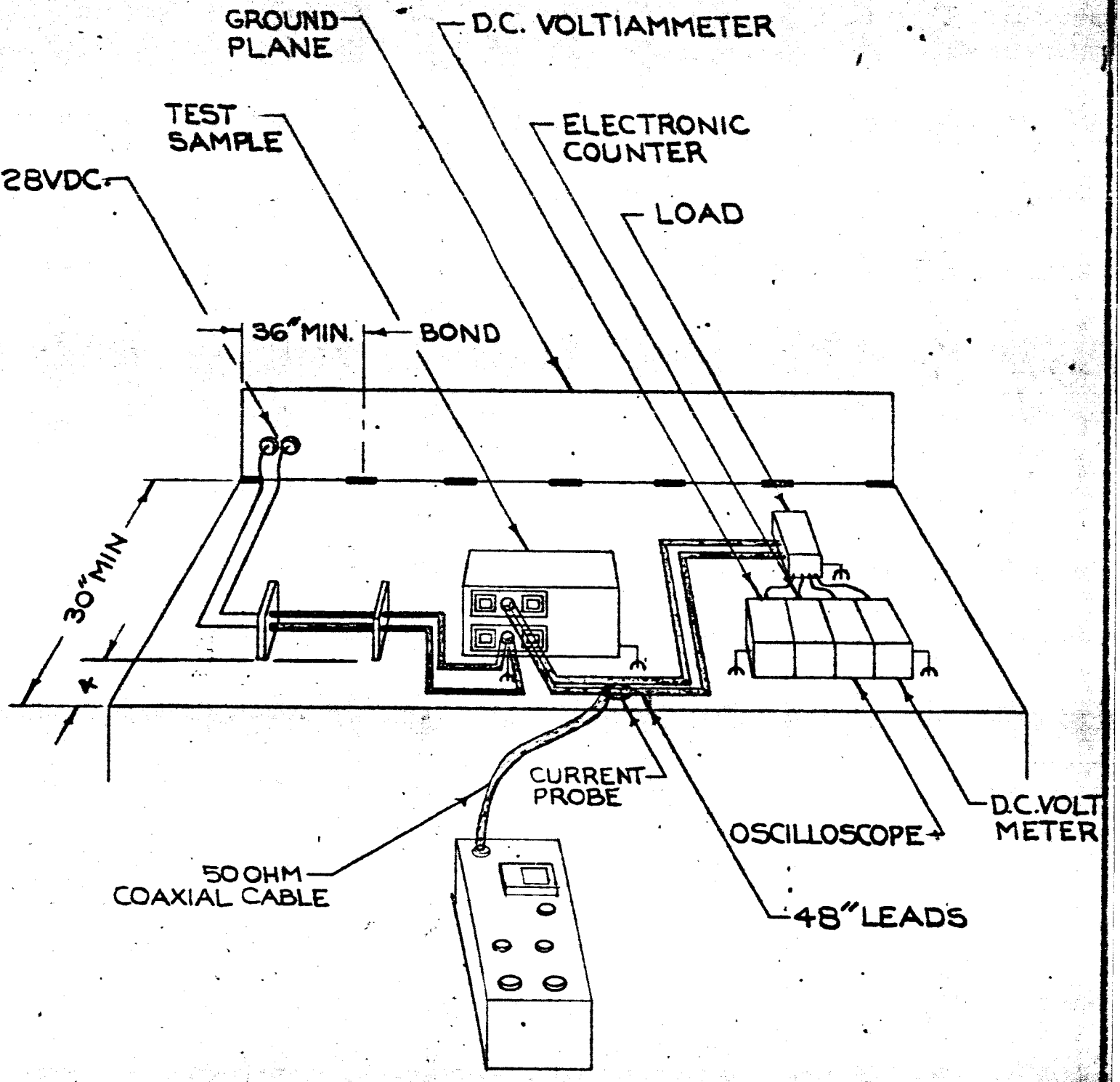
TYPICAL TEST SETUP FOR
CONDUCTED INTERFERENCE MEASUREMENTS

FIGURE 1



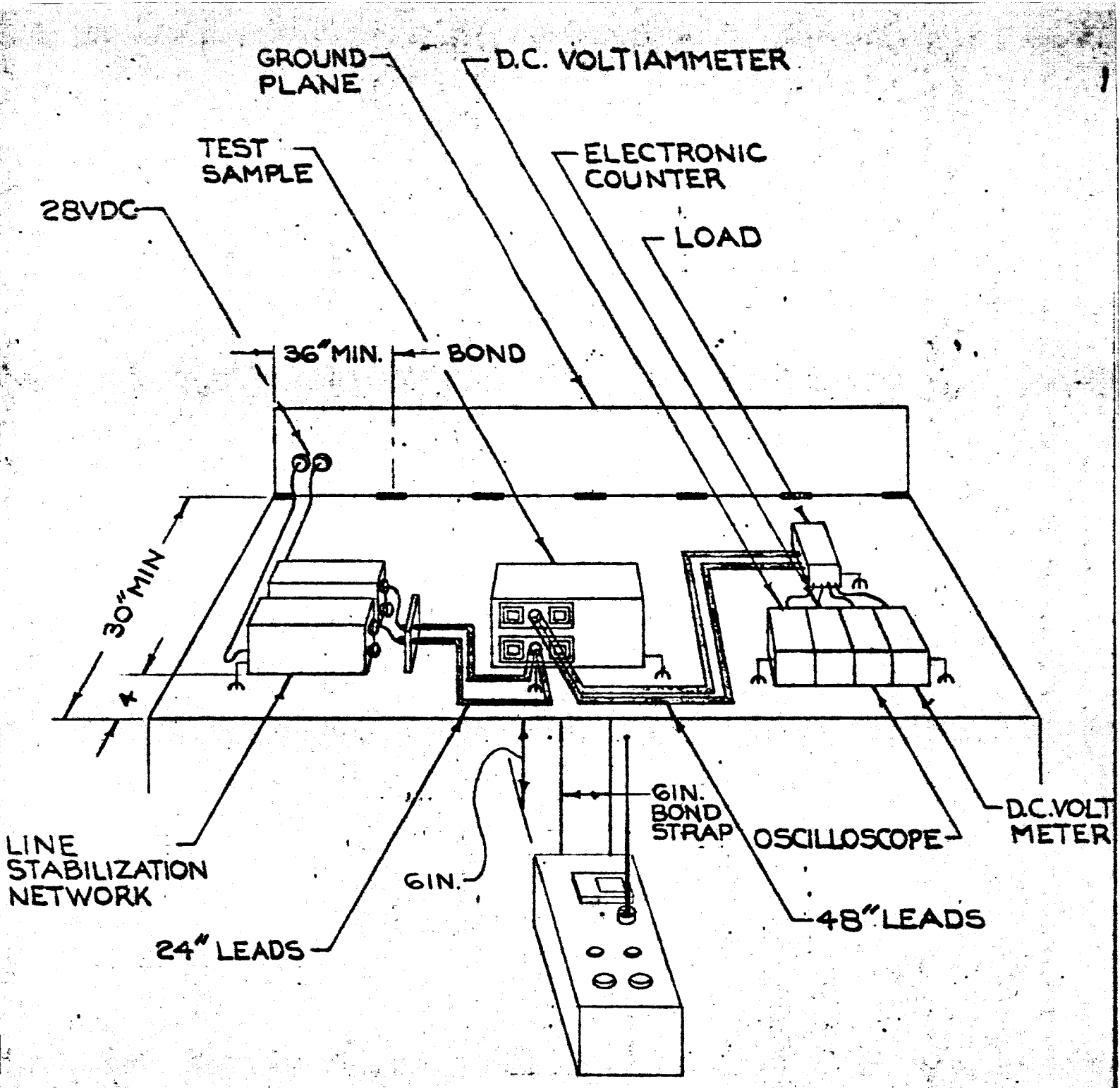
TYPICAL TEST SETUP FOR
CONDUCTED INTEREERENCE MEASUREMENTS
USING CURRENT PROBE - POWER LEADS

FIGURE 2



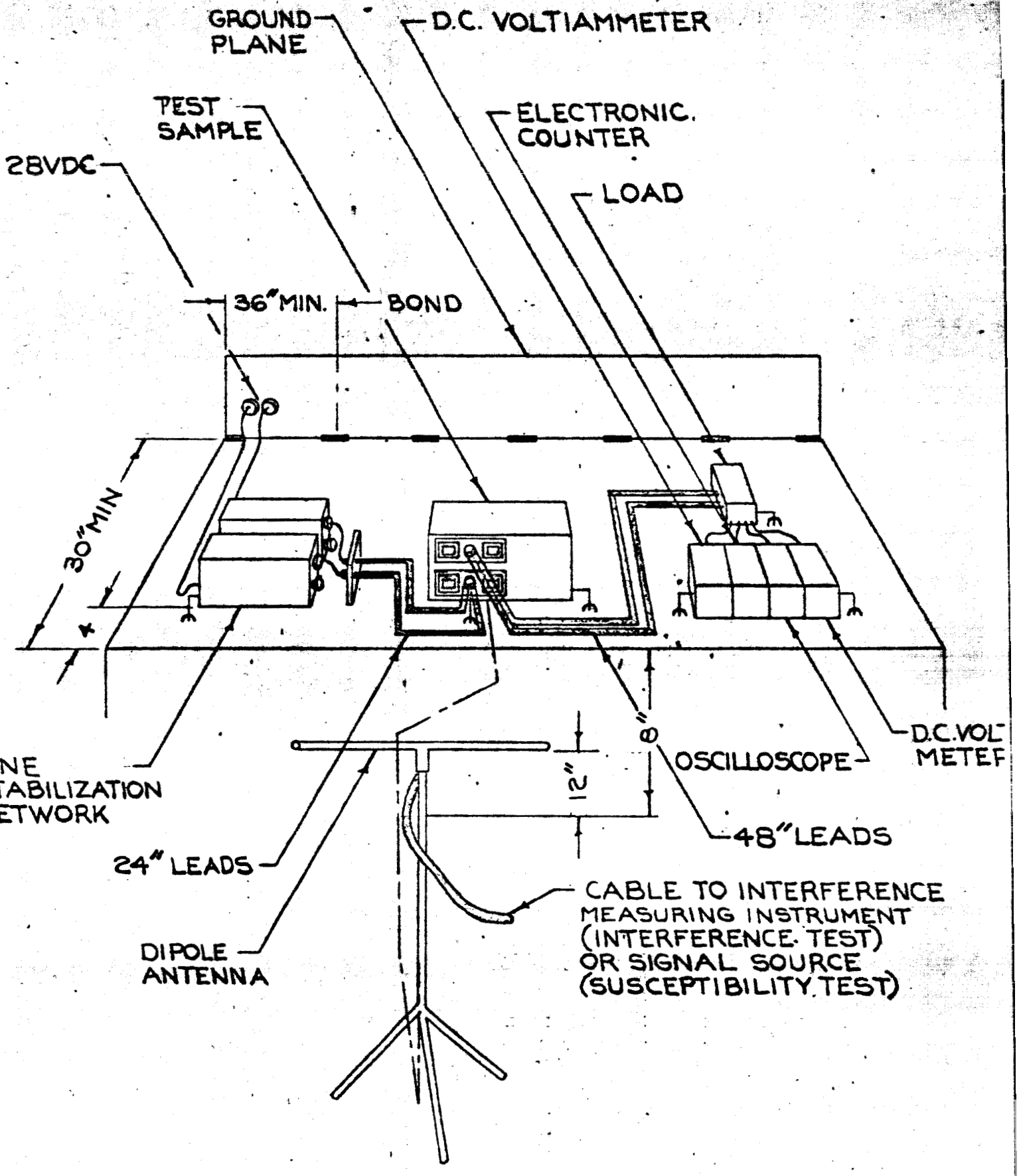
TYPICAL TEST SETUP FOR
CONDUCTED INTERFERENCE MEASUREMENTS
USING CURRENT PROBE - SIGNAL LEADS

FIGURE 3



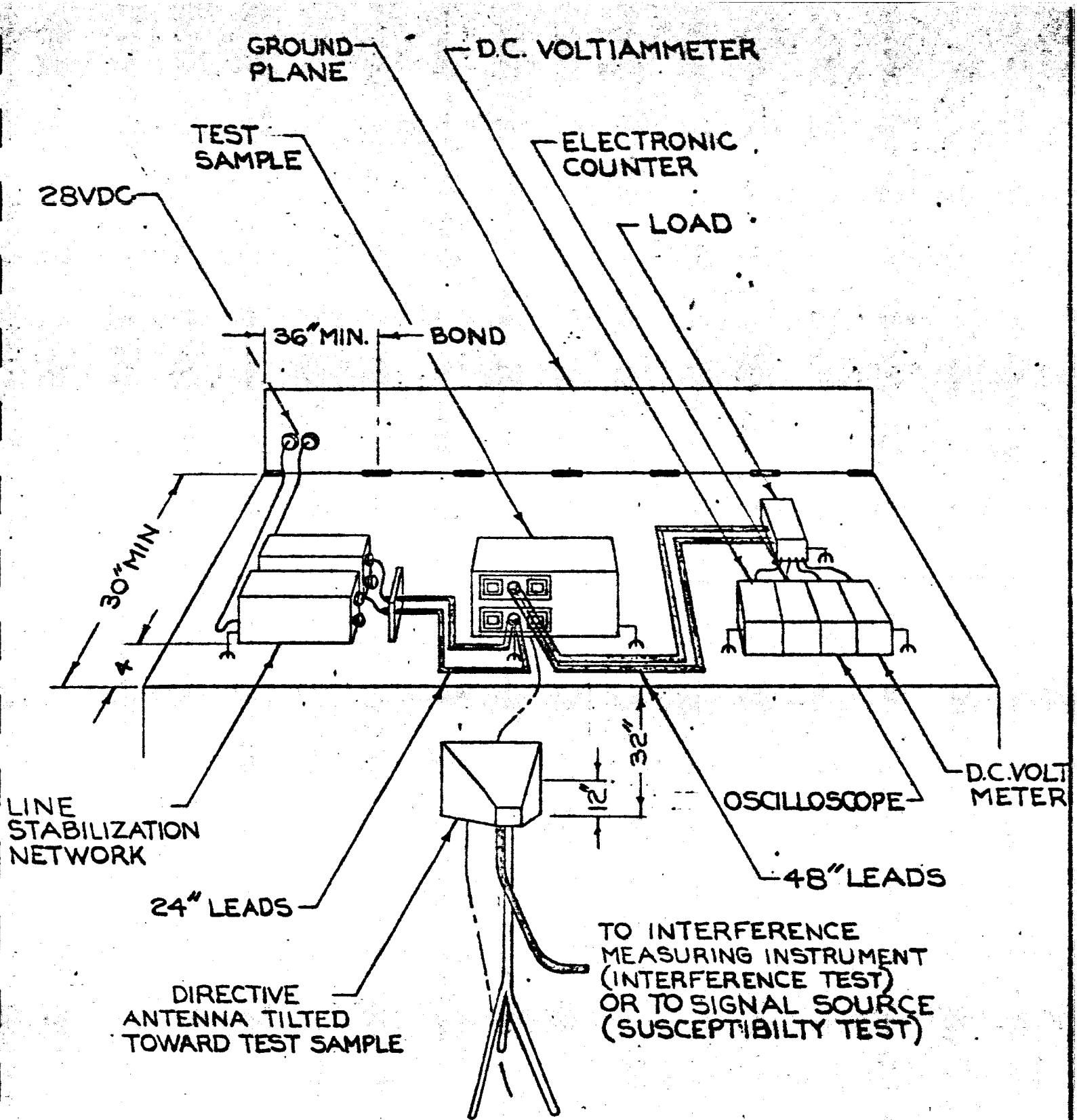
TYPICAL TEST SETUP FOR
RADIATED MEASUREMENTS (ROD ANTENNA)

FIGURE 4



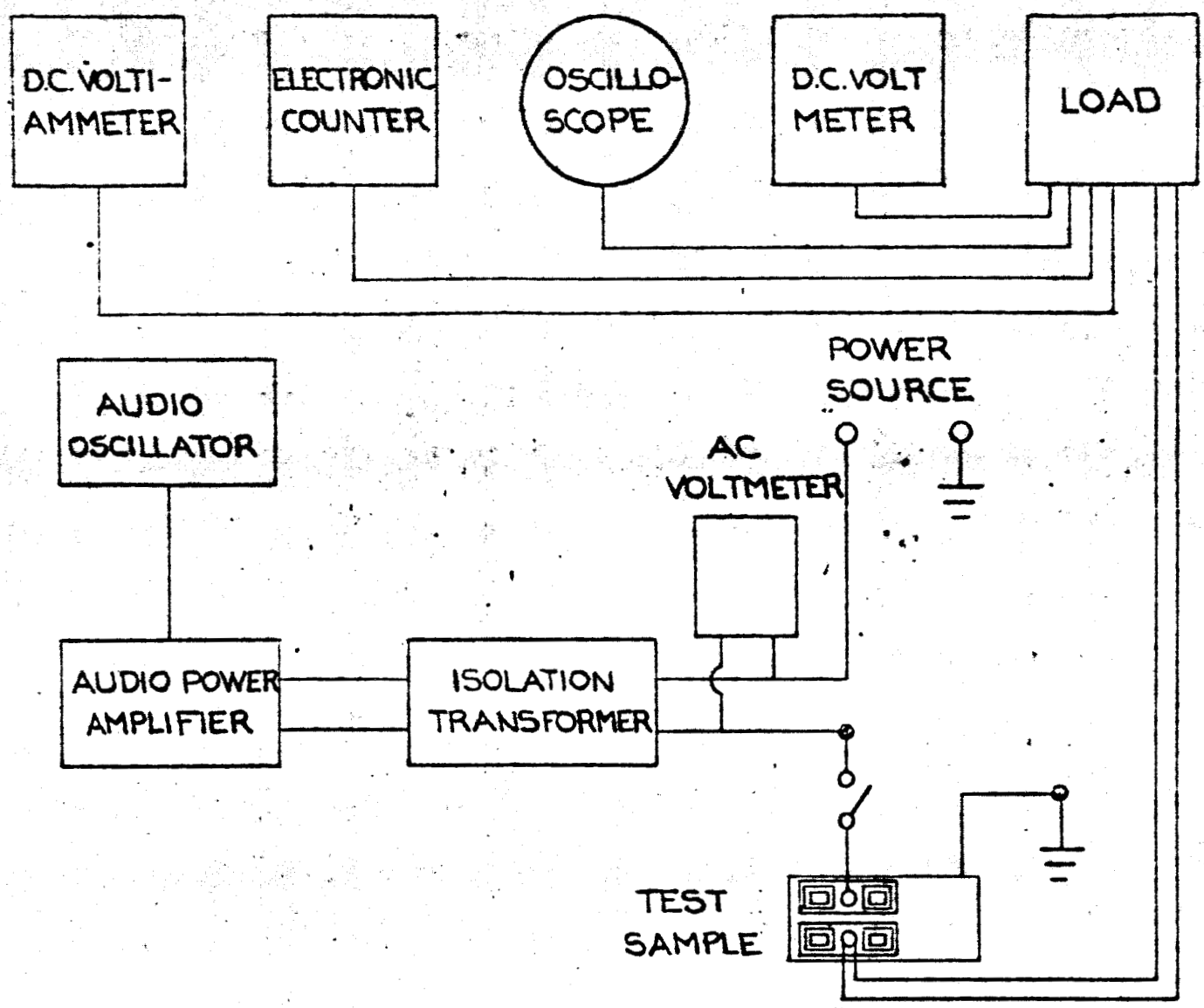
TYPICAL TEST SETUP FOR
RADIATED MEASUREMENTS (DIPOLE ANTENNA)

FIGURE 5



TYPICAL TEST SETUP FOR
RADIATED MEASUREMENTS (DIRECTIVE ANTENNA)

FIGURE 6



1. Audio amplifier shall be 30 - 50 watts and shall have a low impedance output of 5 ohms or less.

2. Transformer shall carry all currents without saturation.

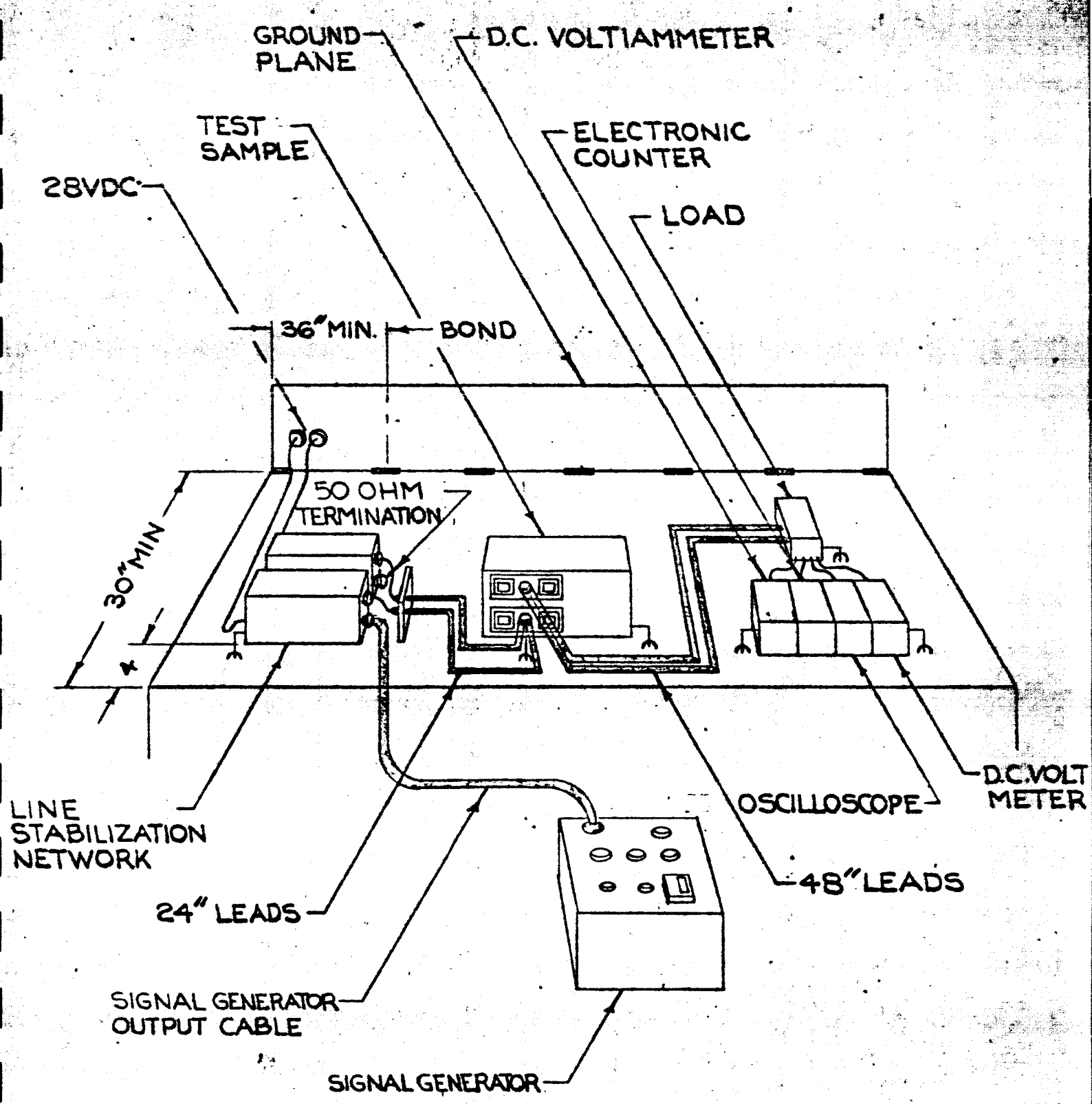
   Turns ratio $\frac{\text{primary}}{\text{secondary}} = \frac{2}{1}$.

3. Series capacitor on AC voltmeter shall have reactance not greater than 1/10 meter impedance.

4. The 3 volts AC signal is an open circuit voltage and is measured across the secondary of the isolation transformer, while the test sample and power source are disconnected.

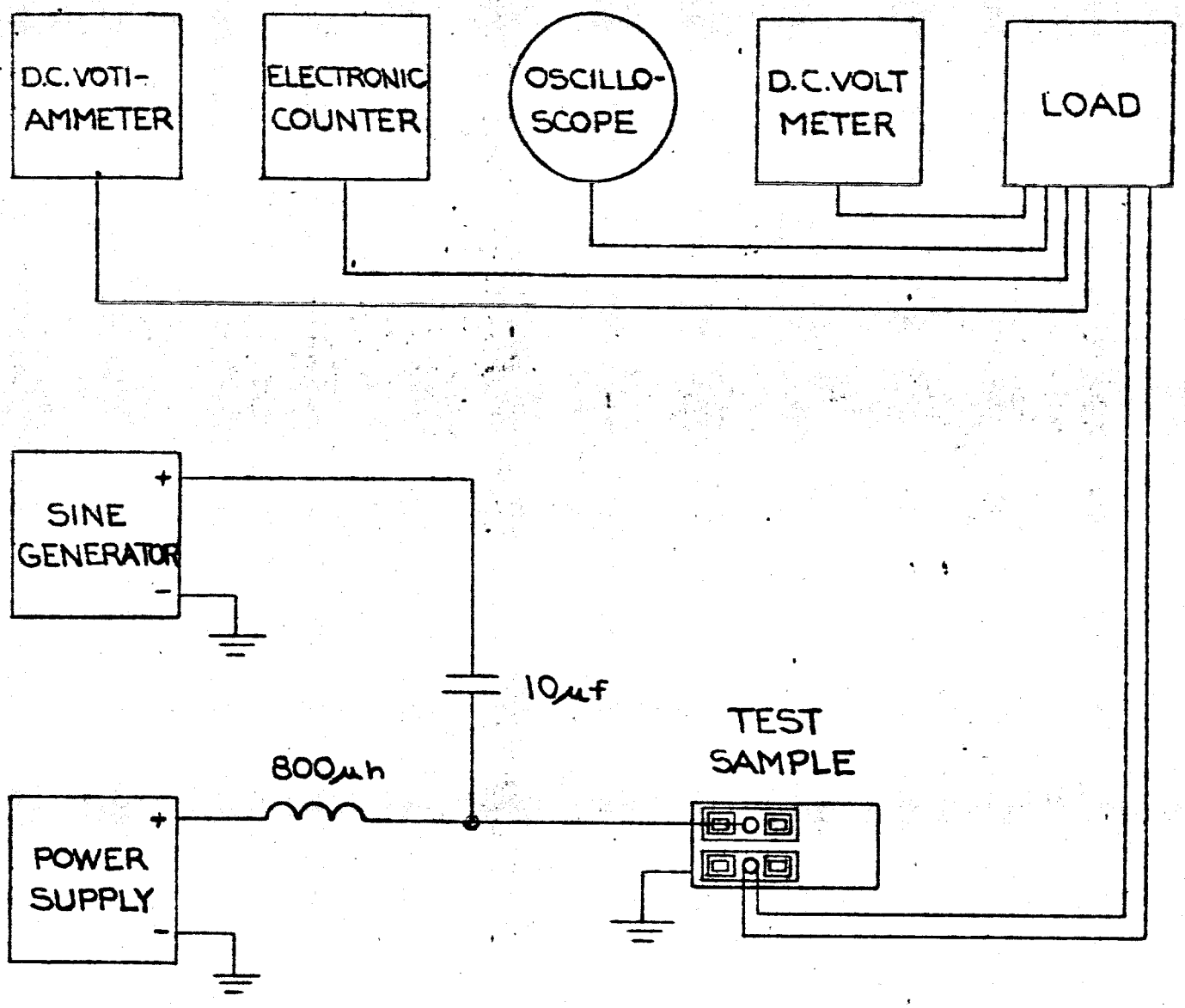
AF SUSCEPTIBILITY TEST SETUP

FIGURE 7



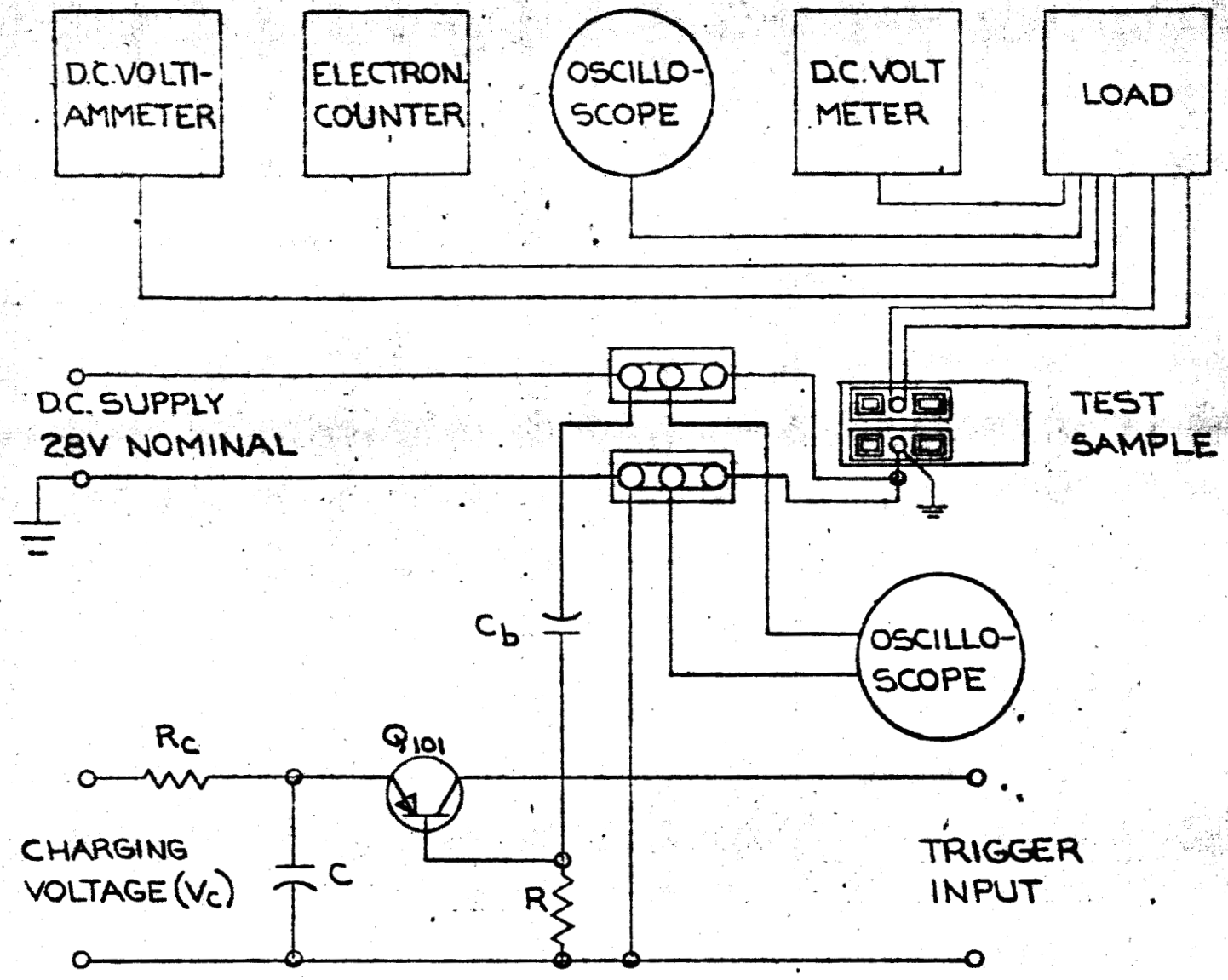
RF SUSCEPTIBILITY TEST SETUP (CONDUCTED)

FIGURE 8



RF SUSCEPTIBILITY TEST SETUP (CONDUCTED)

FIGURE 9



TRIGGER SPECIFICATIONS:

Duration:	Less than 20 microseconds
Rate:	10 PPS
Amplitude:	50 to 85 milliamps into zero resistance load
Rise Time:	0.5 microsecond or less

R (Stabilizing Resistor) = nominal 5 ohms, carbon, $\frac{1}{2}$ watt

C = nominal one mfd, paper, 600 WVDC

R_c = nominal 10 k, carbon, one watt

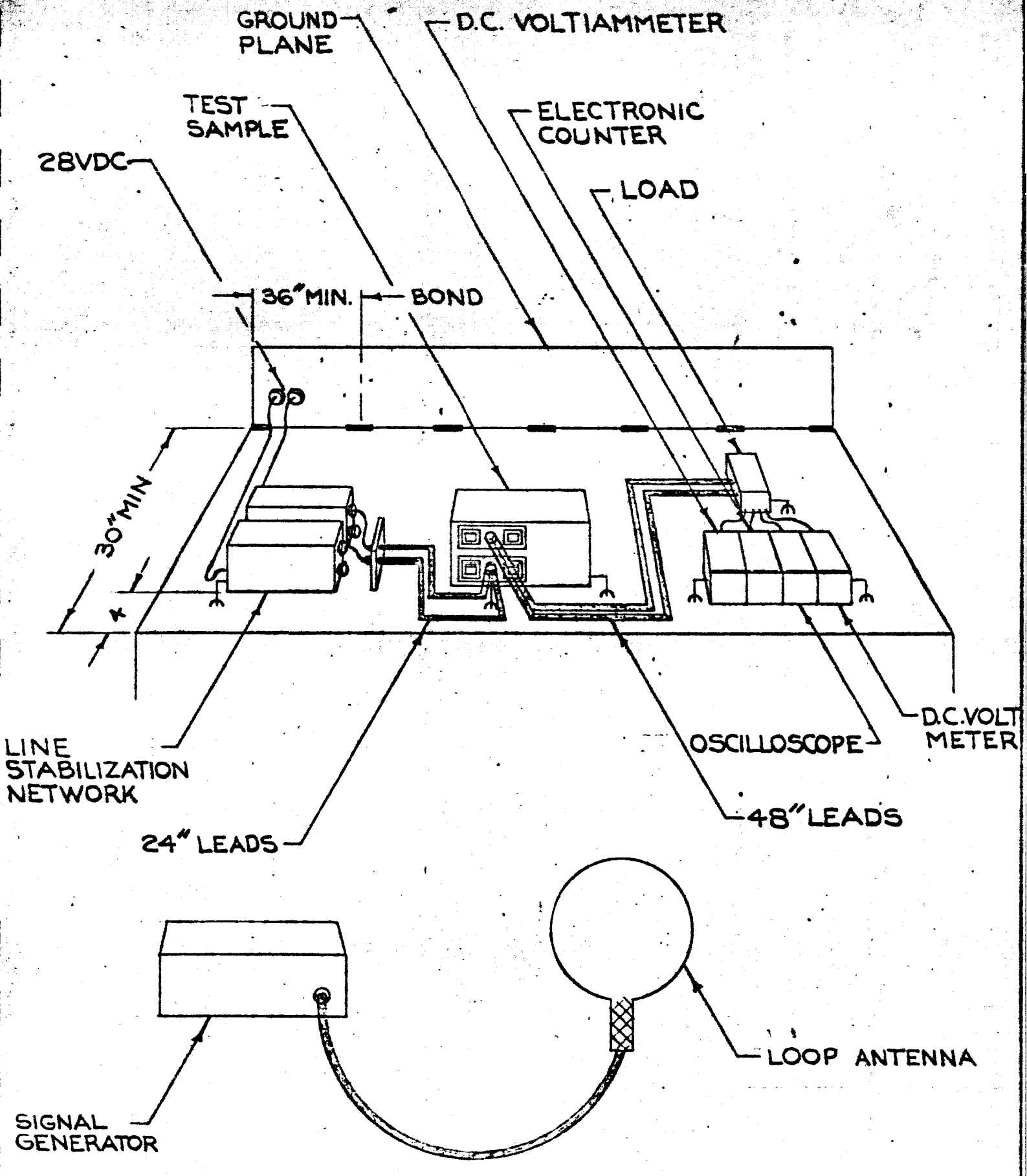
C_b = 10 mfd, paper, 200 WVDC

Q_{101} = silicon controlled recitfier, minimum ratings: 10 amps, 200 volts. (General Electric ZJ39L or equivalent)

V = DC source, 100 to 150 volts (100 volts nominal), 15 MA

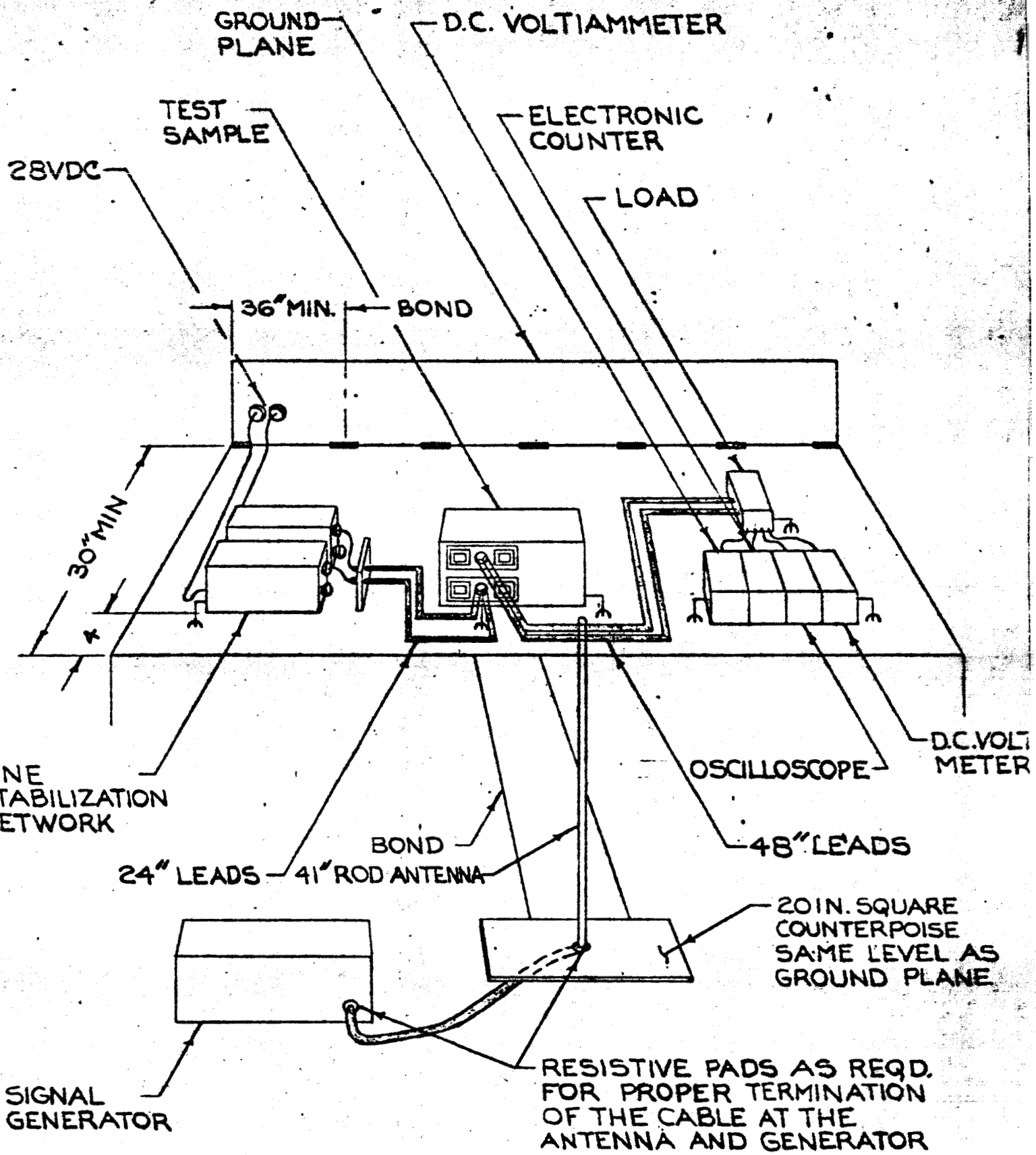
CONDUCTED TRANSIENT SUSCEPTIBILITY ARRANGEMENT

FIGURE 10



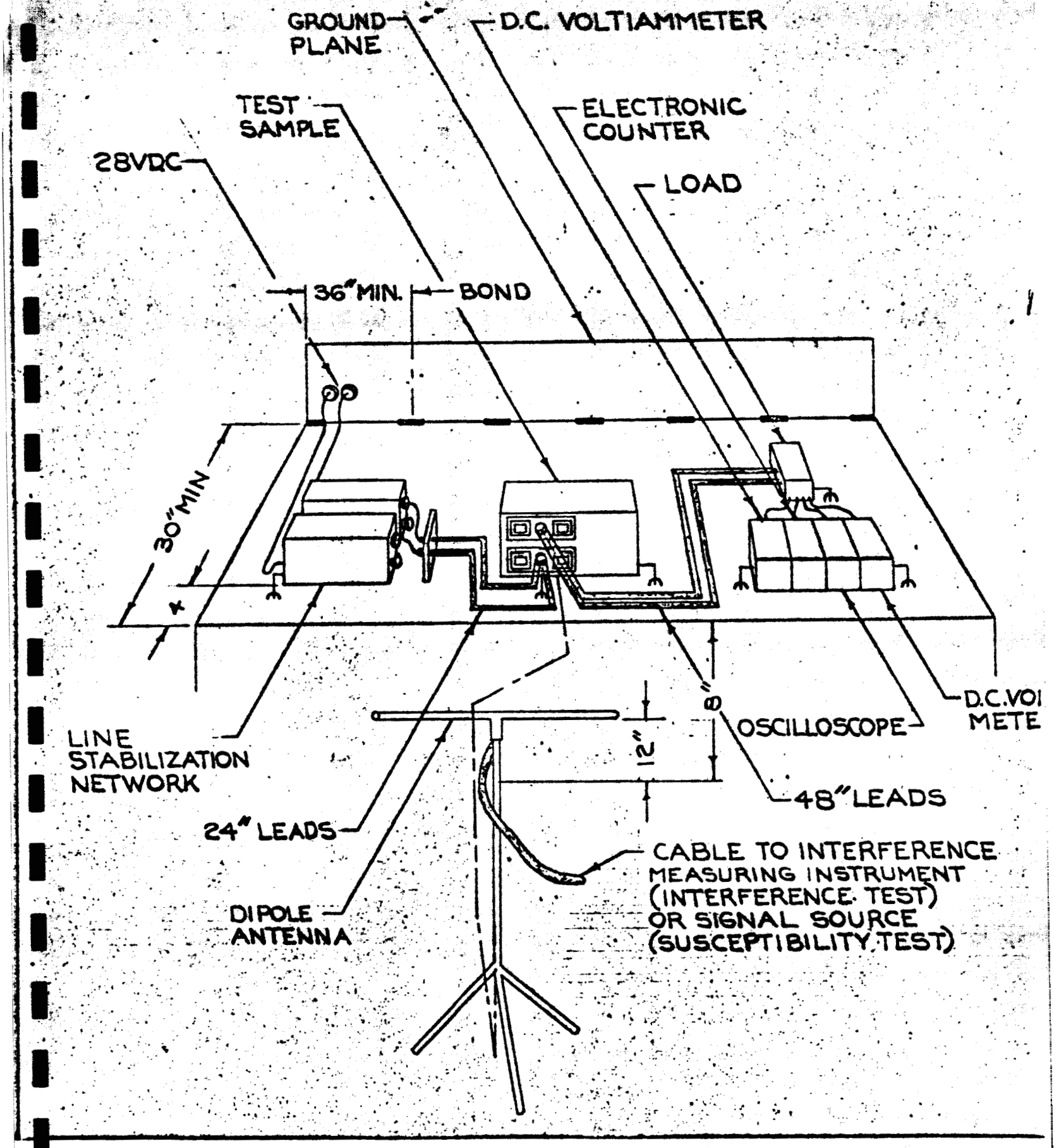
TYPICAL TEST SETUP FOR RADIATED SUSCEPTIBILITY TEST (LOOP ANTENNA)

FIGURE 11



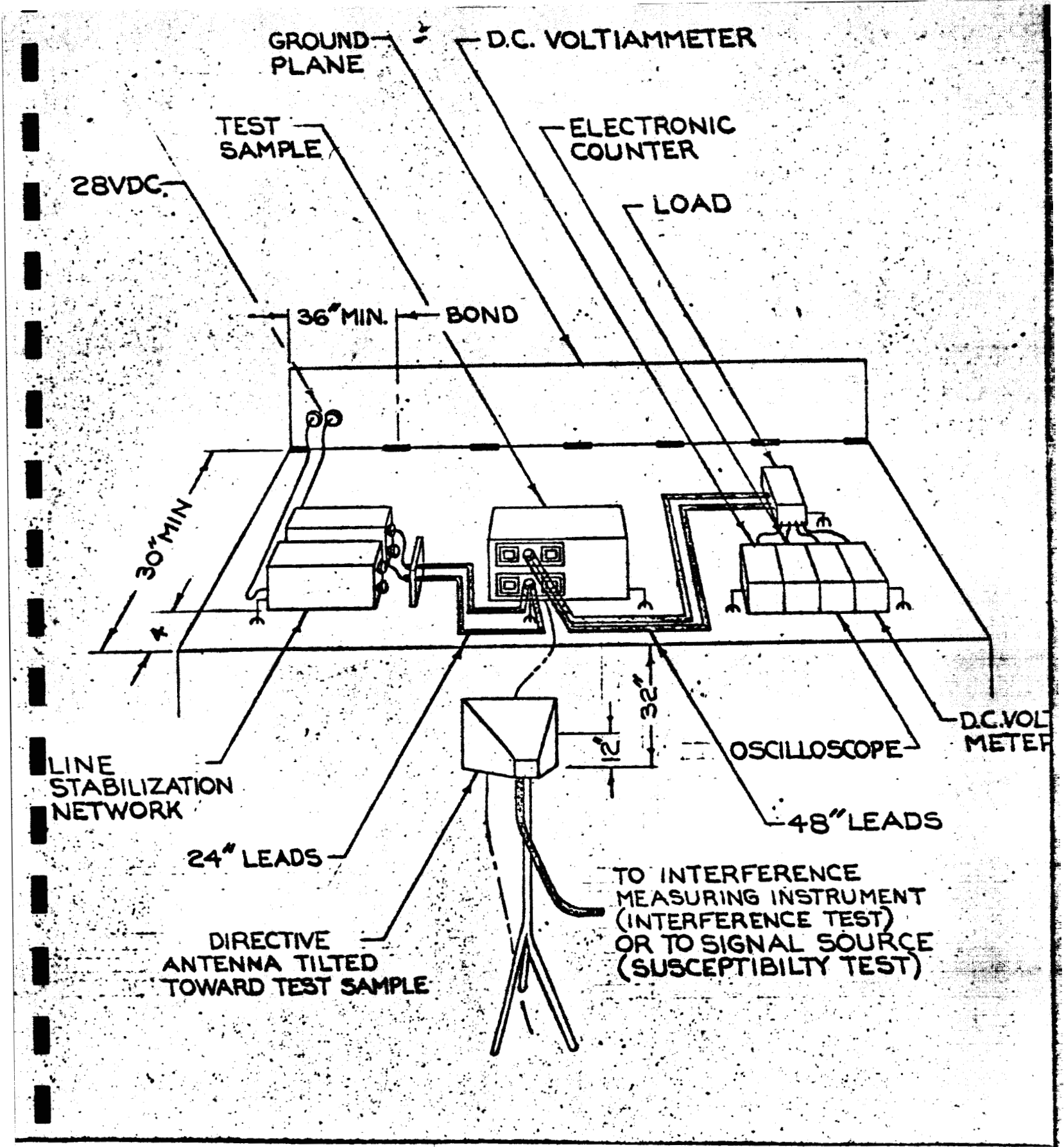
RADIATED SUSCEPTIBILITY
TEST SETUP (ROD ANTENNA)

FIGURE 12



RADIATED SUSCEPTIBILITY TEST SETUP
(DIPOLE ANTENNA)

FIGURE 13



RADIATED SUSCEPTIBILITY TEST SETUP
(DIRECTIVE ANTENNA)

FIGURE 14