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VHF/UHF Antenna-to-Antenna Coupling Test Report

Kenneth R. Siarkiewicz
Robert L. White

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AIR FORCE SYSTEMS COMMAND
GRIFFISS AIR FORCE BASE, NEW YORK 13441

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Chief, Compatibility Branch
Reliability & Compatibility Division

APPROVED:

JOSEPH J. NARESKY
Chief, Reliability & Compatibility Division

FOR THE COMMANDER:

JOHN P. HUSS
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This report presents the results of coupling measurements made between pairs of commonly used communications antennas (i.e., AT-197, AS-1018, AS-1097, and AS-1181). The coupling was measured as a function of the horizontal and vertical separation distances between the antennas. The measurements were made over a frequency range of 100 MHz to 400 MHz, and the coupling is presented as a function of frequency on oscillographs.

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I. INTRODUCTION

The objective of this effort is to provide coupling data on four communications antennas utilizing specified antenna geometries of horizontal separation and vertical displacement. Three of the antennas operate in the UHF band, while the fourth operates in the VHF band.

The remainder of this report is divided as follows. Section II outlines the background of the problem and the requirement for the data. The following three sections provide descriptions of the antennas, test site and test equipment (including test procedures), respectively. Section VI discusses the system calibration data to be used in conjunction with the measured antenna coupling data to obtain the antenna-to-antenna coupling. The final section provides oscilloscope photographs of the measured antenna coupling data.

II. BACKGROUND

The Air Force Communications Service (AFCS) is responsible for the design, installation and maintenance of Air Force ground communication systems. As such, it is frequently faced with the task of locating more than one system at the same location. Although the systems may be operating at widely separated frequencies, the possibility of mutual interference is still great. This is due to the fact that no system transmits

just one frequency and no system is sensitive to just one frequency.

There are three principal methods that can be used to reduce the risk and the effects of mutual incompatibility. These are frequency separation, time separation and spatial separation.

The AFCS installations make use of both frequency and spatial separations. However, data is lacking on the antenna-to-antenna coupling as a function of frequency and horizontal separation and vertical displacement between transmitting and receiving antennas. The data contained in this report provide the spatial information for specific geometrics and antennas in the VHF and UHF frequency bands.

III. DESCRIPTION OF ANTENNAS

This section contains a summary of the characteristics of each antenna tested. Photographs of the antennas are included as well as a table outlining the most relevant characteristics.

Type AT-197/GR (Figure 1.)

The AT-197/GR is a vertically polarized disc-cone antenna operating in the 225-400 Mhz frequency range. It possesses a radiation pattern which is circular within 0.5 dB and a 1.6:1, maximum, standing wave ratio to a 50-ohm system.

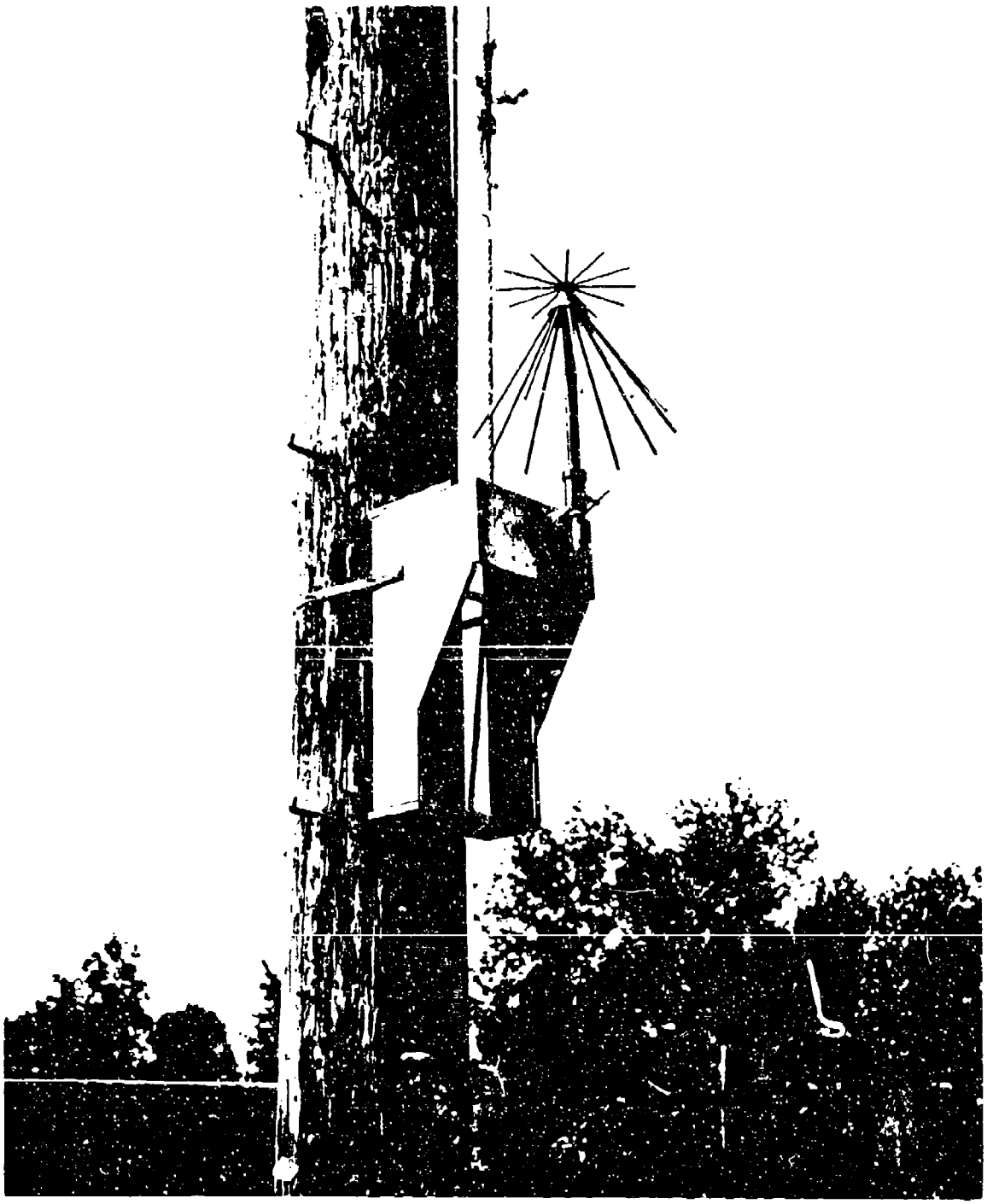


Figure 1. Type AT-197/GR

Type AS-1018/URC (Figure 2.)

The AS-1018/URC antenna assembly is a vertically polarized, broadband communications antenna used in the 225-400 MHz frequency range. The horizontal radiation pattern is circular to within ±1.0 dB. The input impedance is 50 ohms, with a standing wave ratio of 2.0:1.0. The gain of the antenna is +5 dB above an isotropic source.

Type AS-1097/GR (Figure 3.)

The AS-1097/GR antenna is a vertically polarized, four-element stacked array designed to operate in the frequency range 225 MHz to 400 MHz. The input VSWR is less than 2:1 to a 50-ohm transmission line. The horizontal radiation pattern is circular within ±0.75 dB. Antenna gain is a minimum 4 dB above a half-wave dipole.

Type AS-1181/UR (Figure 4.)

The AS-1181/UR antenna is a vertically polarized half-wave dipole encased in a Fiberglas radome making it completely waterproof. The antenna is designed to operate throughout the 100-156 MHz frequency range without field adjustments. The VSWR is less than 2.0 to 1.0, maximum, across the entire frequency range. The horizontal pattern of the antenna is circular within ±0.5 dB for any angle in azimuth.

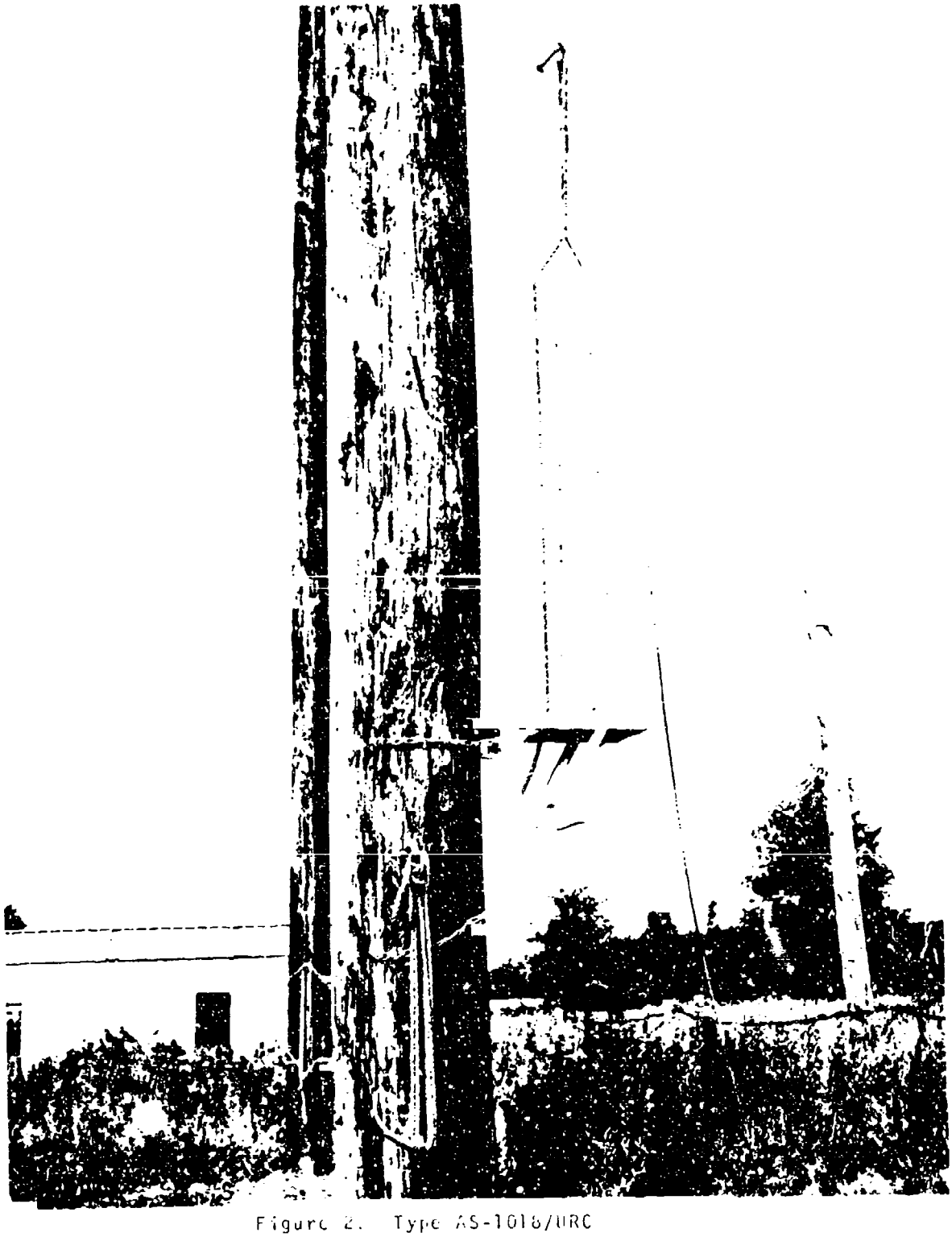


Figure 2. Type AS-1018/URC

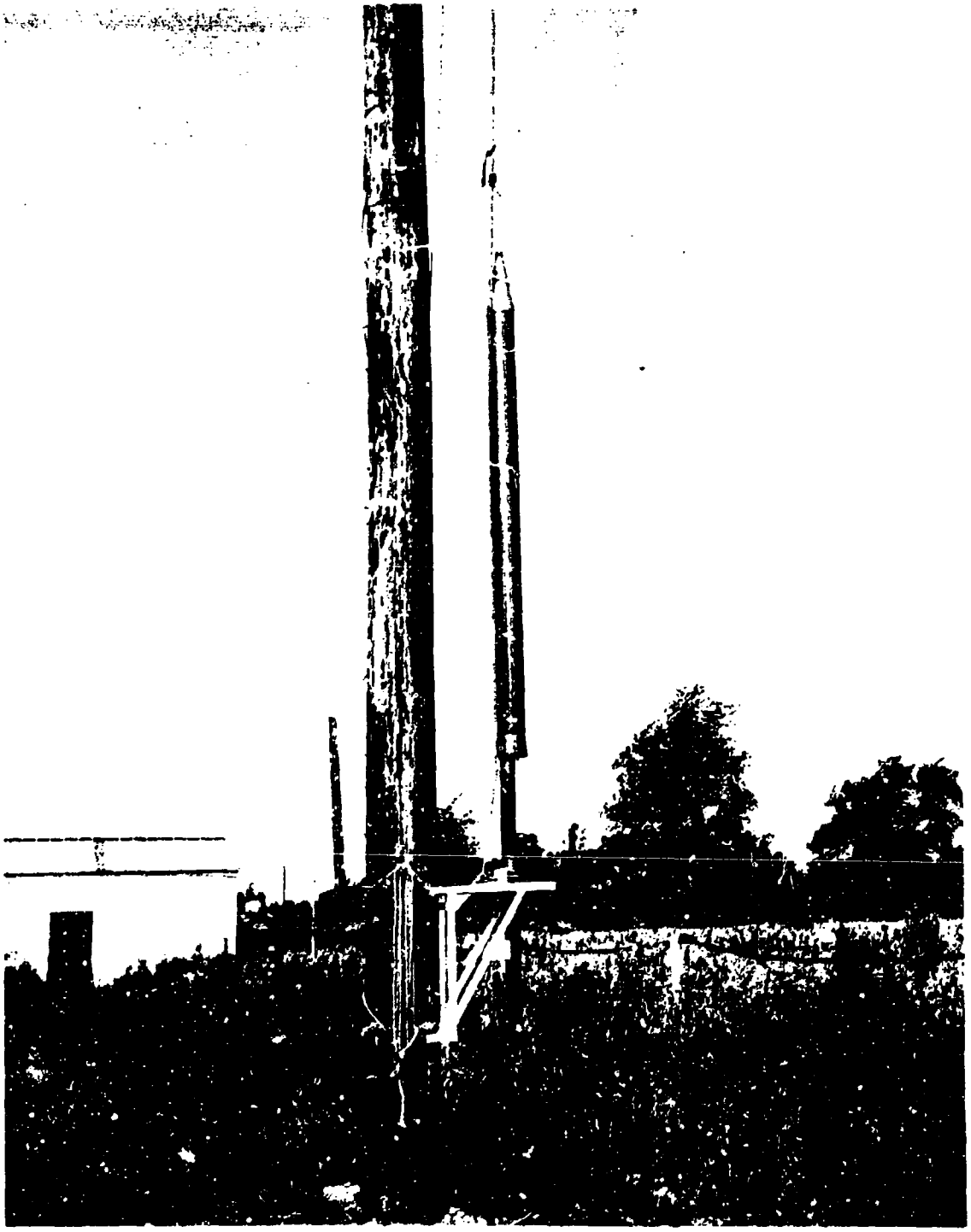


Figure 3. Type AS-1097/GR

Figure 4. Type AS-1181/UR

TABLE 1

TEST ANTENNA

TABLE OF SPECIFICATIONS

ANTENNA TYPE	FREQ. RANGE (MHz)	POLAR.	GAIN (dB above isotropic)	IMPEDANCE (ohms)
AS-1018/URC	225-400	Vertical	5	50
AS-1181/UR	100-156	Vertical	*	*
AT-197/GR	225-400	Vertical	0.3	52
AS-1097/GR	225-400	Vertical	4.0	*

* Not listed

NOTE: All beam patterns are circular

IV. DESCRIPTION OF TEST SITE

This section contains a summary of the test site and the location of the mounting poles with respect to each other. Also described are the mounting arrangements of the four antennas on the three poles to simulate the specified horizontal and vertical separation distances.

All field tests for the antenna coupling program were conducted at the Stockbridge Test Annex located twenty-five miles southwest of Griffiss Air Force Base.

Three sixty-foot telephone poles were erected and aligned to provide straight-line horizontal separation distances of 6, 7, 8 and 20 feet.

The antennas were mounted on any of the three telephone poles (which were unguyed). The poles were standing in line with approximate center-to-center separations as shown:

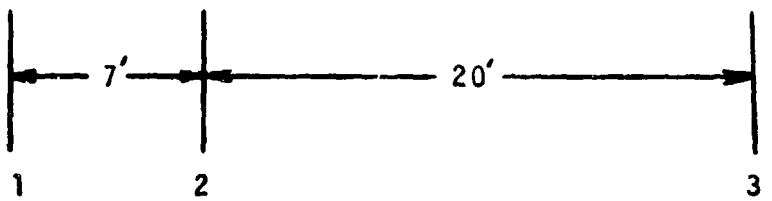


Figure 5. Pole Numbering and Positioning

In the first series of tests (single pole), two antennas were mounted on the same pole. In all cases the top of the lower antenna was positioned to be 36.5 feet above the ground. The bottom of the upper antenna was then mounted to be either 41.5 or 46.5 feet above the ground. This simulated a separation distance of 5 or 10 feet, respectively. Any one of the four antenna types could be used for the bottom antenna and matched against any of the four antenna types mounted at the higher level.

In the second series of tests, poles 1 and 2 were used to effect horizontal separation distances of 6, 7 and 8 feet. This was accomplished by rotating the antenna brackets (Figures 1-4) around the poles. Any one of the four antennas was mounted on one pole so that its top was 36.5 feet above

ground. Another antenna was mounted on the second pole similarly to effect a zero vertical displacement, or it was mounted such that its base was 41.5 or 46.5 feet above the ground, simulating a vertical displacement of 5 feet or 10 feet, respectively.

In a final series of tests, the antennas were mounted on poles 2 and 3, effecting a separation distance of 20 feet. The positioning of the antennas on the poles to simulate vertical displacements of 0, 5 and 10 feet was identical to that used when the antennas were mounted on poles 1 and 2.

During the test which involved a vertical displacement, first the lower antenna was excited and the upper antenna loaded and then the upper antenna was excited and the lower antenna loaded for second case.

The quantity measured in all cases was the power received compared to the power out of the signal generator. This also includes the loss in the cables between signal generator and antenna and between measurement equipment and antenna. Each of these cables was seventy-two feet long and nomenclatured as RG-214. The total loss in both lengths of cables is shown in Figure 7.

The test equipment was housed in a transportable shelter located 20' from the telephone poles.

Ninety percent of the measurements were conducted on dry ground, with the daily temperature in the 50 to 80 degree range.

V. TEST PROCEDURES

This section lists in step-by-step form the measurement procedure used to obtain the coupling data shown in the following sections. The block diagram of the measurement setup is also provided in this section, as well as a table showing name, manufacturer and model number of the measurement equipment.

Antenna Coupling Calibration and Test Procedures
(to be used in conjunction with figure 6.)

1. All test equipment turned on for at least one-half hour prior to test and calibration.
2. Place RF coaxial switches in position #1.
3. The signal generator is in automatic leveling (ALC).
4. Sweep selection in CW.
5. Increase the generator power output until the Network Analyzer REF CHANNEL LEVEL is in the (OPERATE) range.
6. Position the generator (start/cw) and (stop/ΔF) dial indicators to the limits of the desired frequency range to be measured.
7. Place the generator sweep selector switch in the MANUAL position and the manual sweep knob in ccw position.
8. Turn the manual sweep knob clockwise across the desired frequency range. Observe that the REF. CHANNEL LEVEL meter remains in the OPERATE range, indicating the ALC is working properly.

9. Adjust the AMPLITUDE TEST CHANNEL GAIN DB of the Network Analyzer so that the signal level will coincide with the zero reference of the scope display (topmost line).

10. Place the sweep selector in the TRIG position.

11. Press the TRIG button. The zero trace of the display will be the calibrating reference of the signal straight thru the switches.

12. Place the coax switches in position #2. This places the Tx and Rx antenna circuits in the gain test circuit of the harmonic frequency converter.

13. Press the TRIG button. The display trace will show the attenuation of the Tx to Rx antenna circuits from coax switch to coax switch. This also includes the loss in the two 72 foot cables. The known attenuation of these RG-214 cables must be removed from the attenuation of the display of the frequencies of interest. The result is then the antenna-to-antenna coupling in decibels.

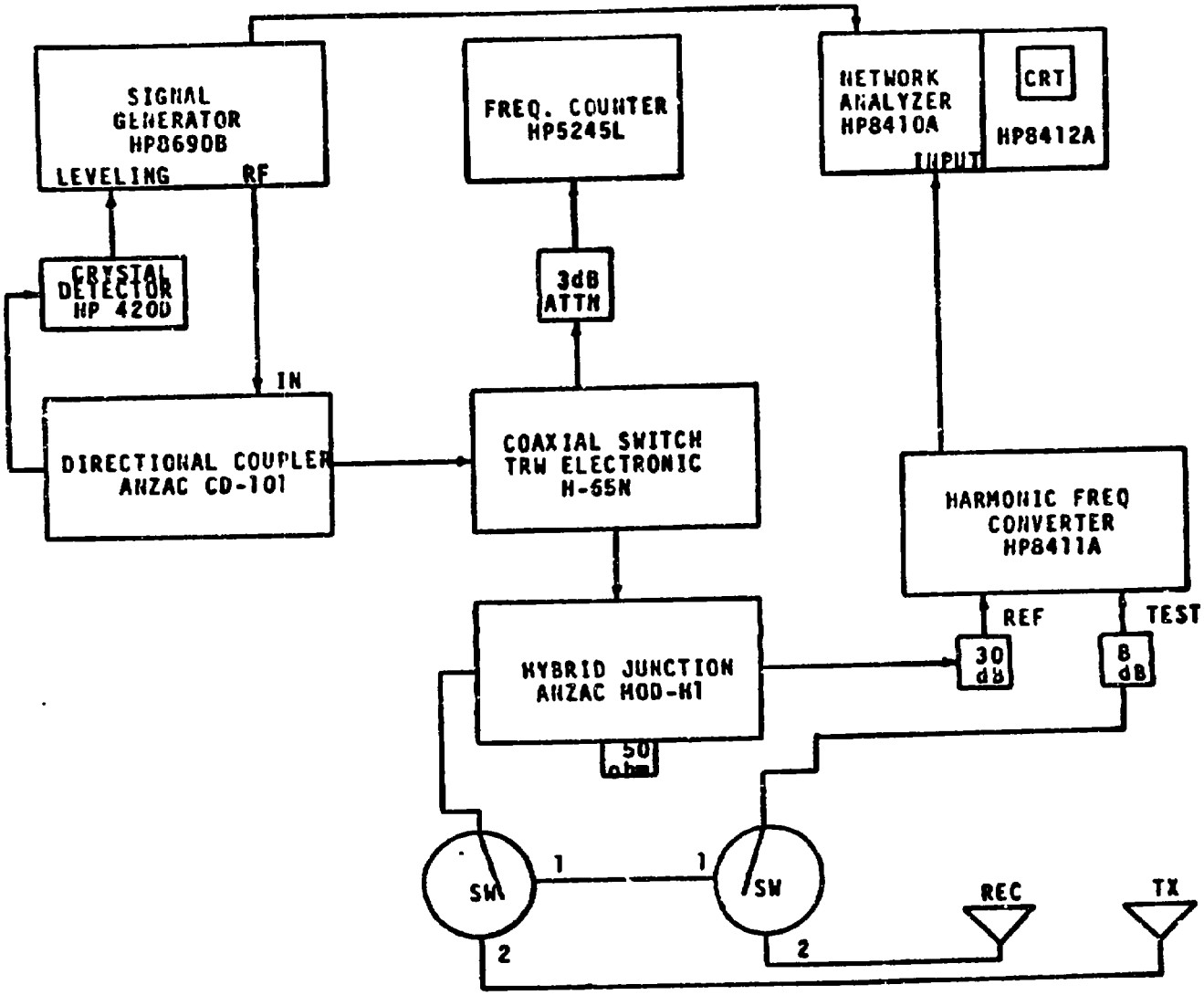


Figure 6
Antenna Coupling Measurement Setup

TABLE II

TEST EQUIPMENT LIST

NAME	MANUFACTURER	MODEL
Signal Generator	Hewlett Packard	8690B
Frequency Counter	Hewlett Packard	5245L
Network Analyzer	Hewlett Packard	8410A
Harmonic Freq. Converter	Hewlett Packard	8411A
Display Unit	Hewlett Packard	8412A
Crystal Detector	Hewlett Packard	420D
Directional Coupler	Anzac	CD-101
Coaxial Switch	TRW	H-65N
Hybrid Junction	Anzac	H1

VI. SYSTEM CALIBRATION

This section discusses the linearity and dynamic range of the coupling measurement system and provides the calibration data needed to arrive at the figure for antenna-to-antenna coupling using the data presented in the following section. An example of this calculation is also given.

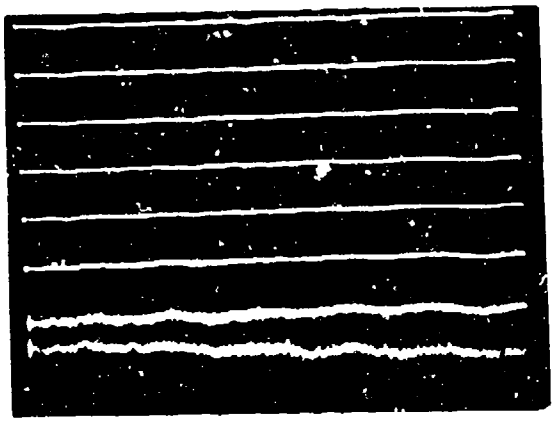
On Figure 7 photo #1 indicates the 70 db dynamic range of the system. It also shows the excellent linearity of the system over the 100-400 MHz frequency range.

Photos 2A and 2B show the loss in both lengths of RG-214/u cable in the 100-200MHz frequency range. Photo 2A is calibrated at 10 dB/cm, photo 2B is calibrated at 1 dB/cm.

Figure 7.

SYSTEM CALIBRATION SHOWING DYNAMIC RANGE OF 0 to 70 dB.

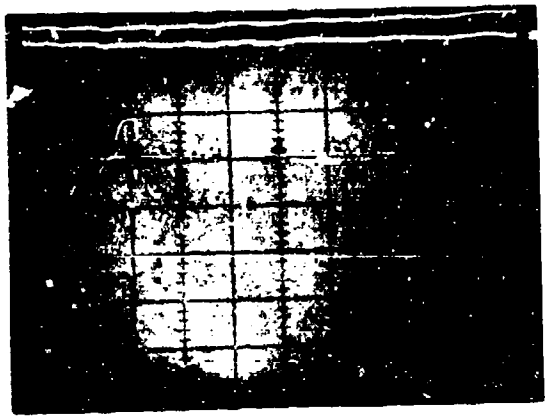
1



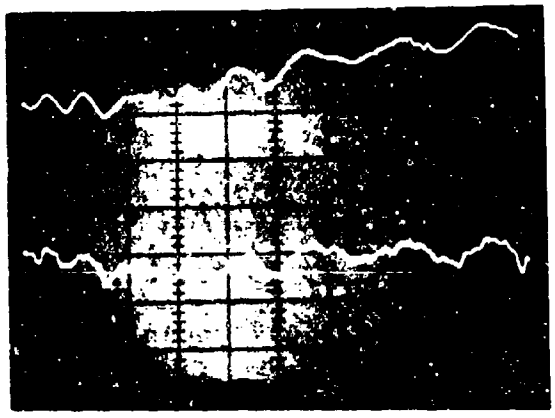
RG-214/U 72 FEET
FREQUENCY RANGE 100-200 MHz
A. 10 dB/CM
B. 1 dB/CM

RG-214/U 72 FEET
FREQUENCY RANGE 200-400 MHz
A. 10 dB/CM
B. 1 dB/CM

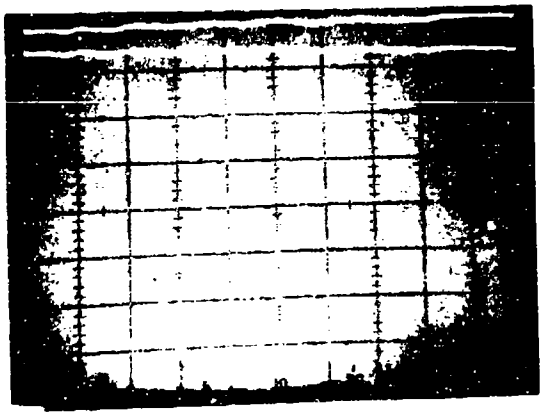
2A



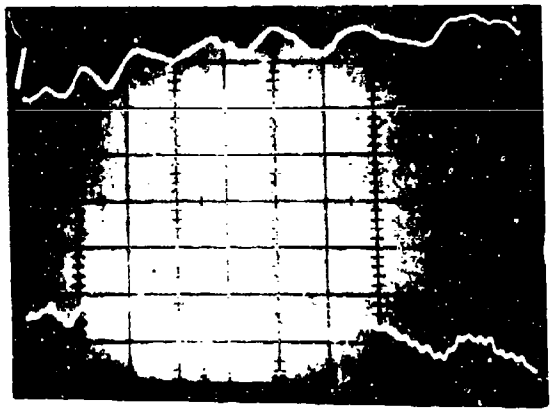
2B



3A



3B



Photos 3A and 3B show the loss in both lengths of RG-214/u cable in the 200-400 MHz frequency range. Photo 3A is calibrated at 10 dB/cm, photo 3B is calibrated at 1 dB/cm.

These figures of cable loss must be taken out of the photographic data presented in section VII.

For example, assume the AT-197 is the transmitting antenna and is located 36.5 feet above ground. If the other AT-197 is the receiving antenna and is also located 36.5 feet above the ground, then Plate 21 shows the coupling between these antennas as a function of frequency for a separation distance of 7 feet. At a frequency of 300 MHz, Photograph 1 on this plate indicates a value of approximately -27.5 dB.

From Figure 7, photograph 3B, the attenuation of the two 72-foot cables is found to be about -6 dB. Thus, the antenna-to-antenna coupling can be calculated as -27.5 - (-6) = -21.5 dB.

VII. TEST RESULTS

This section presents the results of the field tests performed. The data is divided into three sections. The first section contains the data obtained when both antennas are located on the same pole.

The second section contains data for horizontal separation distances of 6, 7 and 8 feet. Data were primarily obtained for 7 feet. Conversion factors relating this data to the other

two distances are given, and their use is shown by example.

The final section contains data for a horizontal separation of 20 feet.

All sections contain data for vertical displacements of 0, 5 and 10 feet, except the first which shows data for only the latter two vertical displacement distances.

For ease in locating the data for a particular pair of antennas, an index of test photos is provided immediately following the textual description of the test results.

Coupling levels between different test antennas can be read directly from the photographs. Frequency is indicated in MHz/cm on the x axis. Antenna coupling in dB is indicated on the y axis. Figure 7 shows the loss of 144 feet of RG-214 cable over the 100-400 MHz frequency range. The cable loss at a particular frequency must be subtracted from the coupling level on the photograph to indicate the actual antenna to antenna coupling. An example of this calculation is shown in the preceding section.

Data for the single-pole measurements can be obtained directly from the plates in section 1. Briefly, the plates are arranged in numerical order, based on the model number of the transmitting antenna. Four additional plates are included for the AS-1181 antenna showing coupling data in the VHF range.

For example, assume the transmitting antenna is the AS-1018 and the receiving antenna is the AS-1097. The heights of the antenna are 36.5 feet and 46.5 feet, respectively.

The frequency of interest is 270 MHz. From plate 7, photo 3, the coupling is found to be -49 dB. The cable attenuation shown in photo 3B of figure 7 is -5.6 dB. The antenna-to-antenna coupling is calculated as -49 - (-5.6) = -43.4 dB.

Section 2 presents coupling data and calibration factors for horizontal separation distances of 6, 7 and 8 feet. This data is presented on two separate plates for all antenna pairs except for the following two cases:

1. AS-1181 transmit to AS-1097 receive (Plate 49). The calibration factor is shown in the first photo instead of on a separate plate.

2. AS-1181 transmit to AS-1181 receive (Plate 58). The frequency range measured is out of band for this antenna. The data will be used to validate future predictive efforts and is included only for completeness.

Use of the data in this section involves one additional step in the process previously shown for the single-pole measurements. First the coupling is found for the specified antenna pair, the specific frequency and the particular antenna heights from the first plate of each pair. This provides data on coupling for a horizontal separation distance of 7 feet (for example, Plate 39). If data is required for either 6-foot or 8-foot separation distances, a correction factor must be obtained from the second plate in each pair (for example, Plate 40).

Either one of two formats for the correction data is presented

on the second plate. In the first format (for example, Plate 22), three curves are displayed on a single photograph. At the left, the upper line provides coupling data for a six-foot horizontal separation distance. The middle curve shows data for a seven-foot separation distance, and it is a repeat of the data shown in photograph 1 on the first plate of the pair (for example, Plate 21). The bottom line is the coupling that occurs when the antennas are separated by eight feet. When both antennas are at the same height, coupling data can be obtained from the calibration photograph directly, without reference to the first plate of the pair.

In the second format, two correction photographs are on the second plate of the pair (for example, Plate 40). One photograph shows coupling for a 6-foot separation distance, and the second displays coupling for an 8-foot separation distance. Data for a 7-foot distance must be obtained from the first plate of the pair (for example, Plate 39).

If the data is required for vertical displacements of either five feet or ten feet and a horizontal separation of six feet or eight feet, then the difference between the coupling for six or eight feet and seven feet respectively must be applied to the coupling on the respective height photo given on the first plate of the pair.

As an example, assume that the AS-1097 is used as the transmitting antenna, and the AS-1018 is used as the receiving antenna. The data on Plate 39 shows that when both antennas

are at the same height, the coupling at 220 MHz for a separation distance of 7 feet is -31 dB. On Plate 40, the photo listed as six-foot separation indicates a coupling level of -30 dB. The eight-foot coupling level on the same plate is -33.5 dB. The correction factors for six-foot and eight-foot separation distances are +1 dB and -2.5 dB, respectively.

Therefore, when the AS-1097 is located at 41.5 feet above the ground, and the AS-1018 is located 36.5 feet above the ground (transmitter and receiver separated by 5 feet with the former higher), the coupling is found from photo 3 on Plate 39 as -47 dB for a six-foot separation, -48 dB for the seven-foot separation and -50.5 dB for an eight-foot horizontal separation distance. The respective calculations are:

6-foot: -48 + 1 + -47 dB

7-foot: read directly as -48 dB

8-foot: -48 - 2.5 = -50.5 dB

To obtain the antenna-to-antenna coupling, these figures must be corrected for the cable losses in the transmit and receive equipment chains. From photo 3B of Figure 7, the attenuation in the cables is found to be -5 dB. Thus, the antenna-to-antenna coupling for each separation distance is:

6-foot: -47 - (-5) = -42 dB

7-foot: -48 - (-5) = -43 dB

8-foot: -50.5 - (-5) = -45.5 dB

Finally, section 3 provides coupling data for a horizontal separation distance of 20 feet. Use of the data in this section

is identical to that in section 1 on the single-pole measurements. See the previous example for those measurements as a guide to the handling of the data in section 3.

TABLE III - INDEX OF TEST PHOTOS

Section 1 - Single Pole Measurements

Plate 1 -	TX ANT AT-197 (36.5') FREQ. RANGE 200-400 MHz	RX ANT (41.5')	AT-197	(1)
			AS-1018	(2)
			AS-1097	(3)
			AS-1181	(4)
Plate 2 -	TX ANT AT-197 (41.5') FREQ. RANGE 200-400 MHz	RX ANT (36.5')	AT-197	(1)
			AS-1018	(2)
			AS-1097	(3)
			AS-1181	(4)
Plate 3	TX ANT AT-197 (36.5') FREQ. RANGE 200-400 MHz	RX ANT (46.5')	AT-197	(1)
			AS-1018	(2)
			AS-1097	(3)
			AS-1181	(4)
Plate 4 -	TX ANT AT-197 (46.5') FREQ. RANGE 200-400 MHz	RX ANT (36.5')	AT-197	(1)
			AS-1018	(2)
			AS-1097	(3)
			AS-1181	(4)
Plate 5 -	TX ANT AS-1018 (36.5') FREQ. RANGE 200-400 MHz	RX ANT (41.5')	AT-197	(1)
			AS-1018	(2)
			AS-1097	(3)
			AS-1181	(4)
Plate 6 -	TX ANT AS-1018 (41.5') FREQ. RANGE 200-400 MHz	RX ANT (36.5')	AT-197	(1)
			AS-1018	(2)
			AS-1097	(3)
			AS-1181	(4)
Plate 7 -	TX ANT AS-1018 (36.5') FREQ. RANGE 200-400 MHz	RX ANT (46.5')	AT-197	(1)
			AS-1018	(2)
			AS-1097	(3)
			AS-1181	(4)
Plate 8 -	TX ANT AS-1018 (46.5') FREQ. RANGE 200-400 MHz	RX ANT (36.5')	AT-197	(1)
			AS-1018	(2)
			AS-1097	(3)
			AS-1181	(4)
Plate 9 -	TX ANT AS-1097 (36.5') FREQ. RANGE 200-400 MHz	RX ANT (41.5')	AT-197	(1)
			AS-1018	(2)
			AS-1097	(3)
			AS-1181	(4)
Plate 10-	TX ANT AS-1097 (41.5') FREQ. RANGE 200-400 MHz	RX ANT (36.5')	AT-197	(1)
			AS-1018	(2)
			AS-1097	(3)
			AS-1181	(4)

Plate 11 - TX ANT AS-1097 (36.5') FREQ. RANGE 200-400 MHz	RX ANT (46.5')	AT-197 (1) AS-1018 (2) AS-1097 (3) AS-1181 (4)
Plate 12 - TX ANT AS-1097 (46.5') FREQ. RANGE 200-400 MHz	RX ANT (36.5')	AT-197 (1) AS-1018 (2) AS-1097 (3) AS-1181 (4)
Plate 13 - TX ANT AS-1181 (36.5') FREQ. RANGE 200-400 MHz	RX ANT (41.5')	AT-197 (1) AS-1018 (2) AS-1097 (3)
Plate 14 - TX ANT AS-1181 (41.5') FREQ. RANGE 200-400 MHz	RX ANT (36.5')	AT-197 (1) AS-1018 (2) AS-1097 (3)
Plate 15 - TX ANT AS-1181 (36.5') FREQ. RANGE 200-400 MHz	RX ANT (46.5')	AT-197 (1) AS-1018 (2) AS-1097 (3)
Plate 16 - TX ANT AS-1181 (46.5') FREQ. RANGE 200-400 MHz	RX ANT (36.5')	AT-197 (1) AS-1018 (2) AS-1097 (3)
Plate 17 - TX ANT AS-1181 (36.5') FREQ. RANGE 100-160 MHz	RX ANT (41.5)	AT-197 (1) AS-1018 (2) AS-1097 (3) AS-1181 (4)
Plate 18 - TX ANT AS-1181 (41.5') FREQ. RANGE 100-160 MHz	RX ANT (36.5')	AT-197 (1) AS-1018 (2) AS-1097 (3) AS-1181 (4)
Plate 19 - TX ANT AS-1181 (36.5') FREQ. RANGE 100-160 MHz	RX ANT (46.5')	AT-197 (1) AS-1018 (2) AS-1097 (3) AS-1181 (4)
Plate 20 - TX ANT AS-1181 (46.5') FREQ. RANGE 100-160 MHz	RX ANT (36.5')	AT-197 (1) AS-1018 (2) AS-1097 (3) AS-1181 (4)

Section II - Horizontal Separation of 6, 7, 8 feet.

Plate 21 -	TX ANT AT-197	RX ANT AT-197
	HEIGHT 36.5'	HEIGHT 36.5'
	36.5'	41.5'
	36.5'	46.5'
	41.5'	36.5'
	46.5'	36.5'
	FREQ. RANGE 200-400 MHz	
Plate 22 -	TX ANT AT-197	RX ANT AT-197
	HEIGHT 36.5'	HEIGHT 36.5'
	HORZ. SEPARATION 6' - 7' - 8'	
	FREQ. RANGE 200-400 MHz	
Plate 23 -	TX ANT AT-197	RX ANT AS-1018
	HEIGHT 36.5'	HEIGHT 36.5'
	36.5'	41.5'
	36.5'	46.5'
	41.5'	36.5'
	46.5'	36.5'
	FREQ. RANGE 200-400 MHz	
Plate 24 -	TX ANT AT-197	RX ANT AS-1018
	HEIGHT 36.5'	HEIGHT 36.5'
	HORZ. SEPARATION 6' - 7' - 8'	
	FREQ. RANGE 200-400 MHz	
Plate 25 -	TX ANT AT-197	RX ANT AS-1097
	HEIGHT 36.5'	HEIGHT 36.5'
	36.5'	41.5'
	36.5'	46.5'
	41.5'	36.5'
	46.5'	36.5'
	FREQ. RANGE 200-400 MHz	
Plate 26 -	TX ANT AT-197	RX ANT AS-1097
	HEIGHT 36.5'	HEIGHT 36.5'
	HORZ. SEPARATION 6' - 7' - 8'	
	FREQ. RANGE 200-400 MHz	
Plate 27 -	RX ANT AT-197	RX ANT AS-1181
	HEIGHT 36.5'	HEIGHT 36.5'
	36.5'	41.5'
	36.5'	46.5'
	41.5'	36.5'
	46.5'	36.5'
	FREQ. RANGE 200-400 MHz	

Plate 28 -	TX ANT AT-197 HEIGHT 36.5' HORZ. SEPARATION 6' - 8' FREQ. RANGE 200-400 MHz	RX ANT AS-1181 HEIGHT 36.5'
Plate 29 -	TX ANT AS-1018 HEIGHT 36.5' 36.5' 36.5' 41.5' 46.5' FREQ. RANGE 200-400 MHz	RX ANT AT-197 HEIGHT 36.5' 41.5' 46.5' 36.5' 36.5'
Plate 30 -	TX ANT AS-1018 HEIGHT 36.5' HORZ. SEPARATION 6' - 8' FREQ. RANGE 200-400 MHz	RX ANT AT-197 HEIGHT 36.5'
Plate 31 -	TX ANT AS-1018 HEIGHT 36.5' 36.5' 36.5' 41.5' 46.5' FREQ. RANGE 200-400 MHz	RX ANT AS-1018 HEIGHT 36.5' 41.5' 46.5' 36.5' 36.5'
Plate 32 -	TX ANT AS-1018 HEIGHT 36.5' HORZ. SEPARATION 6' - 8' FREQ. RANGE 200-400 MHz	RX ANT AS-1018 HEIGHT 36.5'
Plate 33 -	TX ANT AS-1018 HEIGHT 36.5' 36.5' 36.5' 41.5' 46.5' FREQ. RANGE 200-400 MHz	RX ANT AS-1097 HEIGHT 36.5' 41.5' 46.5' 36.5' 36.5'
Plate 34 -	TX ANT AS-1018 HEIGHT 36.5' HORZ. SEPARATION 6' - 8' FREQ. RANGE 200-400 MHz	RX ANT AS-1097 HEIGHT 36.5'
Plate 35 -	TX ANT AS-1018 HEIGHT 36.5' 36.5' 36.5' 41.5' 46.5' FREQ. RANGE 200-400 MHz	RX ANT AS-1181 HEIGHT 36.5' 41.5 46.5' 36.5' 36.5'

Plate 36 - TX ANT AS-1018
HEIGHT 36.5'
HORZ. SEPARATION 6' - 8'
FREQ. RANGE 200-400 MHz

RX ANT AS-1181
HEIGHT 36.5'

Plate 37 - TX ANT AS-1097
HEIGHT 36.5'
36.5'
36.5'
41.5'
46.5'
FREQ. RANGE 200-400 MHz

RX ANT AT-197
HEIGHT 36.5'
41.5'
46.5'
36.5'
36.5'

Plate 38 - TX ANT AS-1097
HEIGHT 36.5'
HORZ. SEPARATION 6' - 8'
FREQ. RANGE 200-400 MHz

RX ANT AT-197
HEIGHT 36.5'

Plate 39 - TX ANT AS-1097
HEIGHT 36.5'
36.5'
36.5'
41.5'
46.5'
FREQ. RANGE 200-400 MHz

RX ANT AS-1018
HEIGHT 36.5'
41.5'
46.5'
36.5'
36.5'

Plate 40 - TX ANT AS-1097
HEIGHT 36.5'
HORZ. SEPARATION 6' - 8'
FREQ. RANGE 200-400 MHz

RX ANT AS-1018
HEIGHT 36.5'

Plate 41 - TX ANT AS-1097
HEIGHT 36.5'
36.5'
36.5'
41.5'
46.5'
FREQ. RANGE 200-400 MHz

RX ANT AS-1097
HEIGHT 36.5'
41.5'
46.5'
36.5'
36.5'

Plate 42 - TX ANT AS-1097
HEIGHT 36.5'
HORZ. SEPARATION 6' - 8'
FREQ. RANGE 200-400 MHz

RX ANT AS-1097
HEIGHT 36.5'

Plate 43 - TX ANT AS-1097
HEIGHT 36.5'
36.5'
36.5'
41.5'
46.5'
FREQ. RANGE 200-400 MHz

RX ANT AS-1181
HEIGHT 36.5'
41.5'
46.5'
36.5'
36.5'

Plate 44 - TX ANT AS-1097
HEIGHT 36.5'
HORZ. SEPARATION 6' - 8'
FREQ. RANGE 200-400 MHz

RX ANT AS-1181
HEIGHT 36.5'

Plate 45 - TX ANT AS-1181
HEIGHT 36.5'
36.5'
36.5'
41.5'
46.5'
FREQ. RANGE 100-200 MHz

RX ANT AT-197
HEIGHT 36.5'
41.5'
46.5'
36.5'
36.5'

Plate 46 - TX ANT AS-1181
HEIGHT 36.5'
HORZ. SEPARATION 6' - 7' - 8'
FREQ. RANGE 100-200 MHz

RX ANT AT-197
HEIGHT 36.5'

Plate 47 - TX ANT AS-1181
HEIGHT 36.5'
36.5'
36.5'
41.5'
46.5'
FREQ. RANGE 100-200 MHz

RX ANT AS-1018
HEIGHT 36.5'
41.5'
46.5'
36.5'
36.5'

Plate 48 - TX ANT AS-1181
HEIGHT 36.5'
HORZ. SEPARATION 6' - 7' - 8'
FREQ. RANGE 100-200 MHz

RX ANT AS-1018
HEIGHT 36.5'

Plate 49 - TX ANT AS-1181
HEIGHT 36.5'
36.5'
36.5'
41.5'
46.5'
FREQ. RANGE 100-200 MHz

RX ANT AS-1097
HEIGHT 36.5'
41.5'
46.5'
36.5'
36.5'

Plate 50 - TX ANT AS-1181
HEIGHT 36.5'
36.5'
36.5'
41.5'
46.5'
FREQ. RANGE 100-200 MHz

RX ANT AS-1181
HEIGHT 36.5'
41.5'
46.5'
36.5'
36.5'

Plate 51 - TX ANT AS-1181
HEIGHT 36.5'
HORZ. SEPARATION 6' - 7' - 8'
FREQ. RANGE 100-200 MHz

RX ANT AS-1181
HEIGHT 36.5'

Plate 52 -	TX ANT AS-1181	RX ANT	AT-197
	HEIGHT 36.5'	HEIGHT	36.5'
	36.5'		41.5'
	36.5'		46.5'
	41.5'		36.5'
	46.5'		36.5'
	FREQ. RANGE 200-400 MHz		
Plate 53 -	TX ANT AS-1181	RX ANT	AT-197
	HEIGHT 36.5'	HEIGHT	36.5'
	HORZ. SEPARATION 6' - 8'		
	FREQ. RANGE 200-400 MHz		
Plate 54 -	TX ANT AS-1181	RX ANT	AS-1018
	HEIGHT 36.5'	HEIGHT	36.5'
	36.5'		41.5'
	36.5'		46.5'
	41.5'		36.5'
	46.5'		36.5'
	FREQ. RANGE 200-400 MHz		
Plate 55 -	TX ANT AS-1181	RX ANT	AS-1018
	HEIGHT 36.5'	HEIGHT	36.5'
	HORZ. SEPARATION 6' - 8'		
	FREQ. RANGE 200-400 MHz		
Plate 56 -	TX ANT AS-1181	RX ANT	AS-1097
	HEIGHT 36.5'		36.5'
	36.5'		41.5'
	36.5'		46.5'
	41.5'		36.5'
	46.5'		36.5'
	FREQ. RANGE 200-400 MHz		
Plate 57 -	TX ANT AS-1181	RX ANT	AS-1097
	HEIGHT 36.5'	HEIGHT	36.5'
	HORZ. SEPARATION 6' - 8'		
	FREQ. RANGE 200-400 MHz		
Plate 58 -	TX ANT AS-1181	RX ANT	AS-1181
	HEIGHT 36.5'	HEIGHT	36.5'
	36.5'		41.5'
	36.5'		46.5'
	41.5'		36.5'
	46.5'		36.5'
	FREQ. RANGE 200-400 MHz		

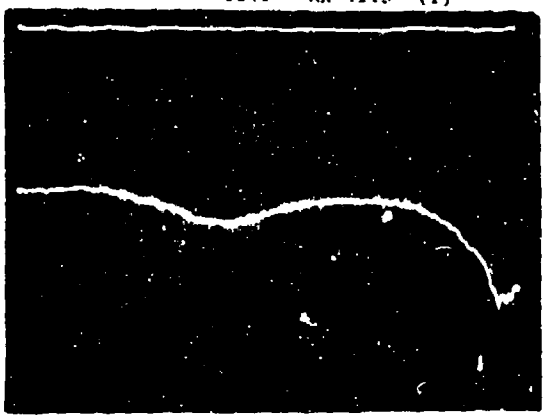
Section III - Horizontal Separation of 20 Feet

Plate 59 -	TX ANT	AT-197	RX ANT	AT-197
	HEIGHT	36.5'	HEIGHT	36.5'
		36.5'		41.5'
		36.5'		46.5'
		41.5'		36.5'
		46.5'		36.5'
	FREQ. RANGE 200-400 MHz			
Plate 60 -	TX ANT	AT-197	RX ANT	AS-1018
	HEIGHT	36.5'	HEIGHT	36.5'
		36.5'		41.5'
		36.5'		46.5'
		41.5'		36.5'
		46.5'		36.5'
	FREQ. RANGE 200-400 MHz			
Plate 61 -	TX ANT	AT-197	RX ANT	AS-1097
	HEIGHT	36.5'	HEIGHT	36.5'
		36.5'		41.5'
		36.5'		46.5'
		41.5'		36.5'
		46.5'		36.5'
	FREQ. RANGE 200-400 MHz			
Plate 62 -	TX ANT	AT-197	RX ANT	AS-1181
	HEIGHT	36.5'	HEIGHT	36.5'
		36.5'		41.5'
		36.5'		46.5'
		41.5'		36.5'
		46.5'		36.5'
	FREQ. RANGE 200-400 MHz			
Plate 63 -	TX ANT	AS-1018	RX ANT	AT-197
	HEIGHT	36.5'	HEIGHT	36.5'
		36.5'		41.5'
		36.5'		46.5'
		41.5'		36.5'
		46.5'		36.5'
	FREQ. RANGE 200-400 MHz			
Plate 64 -	TX ANT	AS-1018	RX ANT	AS-1018
	HEIGHT	36.5'	HEIGHT	36.5'
		36.5'		41.5'
		36.5'		46.5'
		41.5'		36.5'
		46.5'		36.5'
	FREQ. RANGE 200-400 MHz			

Plate 65 -	TX ANT AS-1018	RX ANT AS-1097
	HEIGHT 36.5'	HEIGHT 36.5'
	36.5'	41.5'
	36.5'	46.5'
	41.5'	36.5'
	46.5'	36.5'
	FREQ. RANGE 200-400 MHz	
Plate 66 -	TX ANT AS-1018	RX ANT AS-1181
	HEIGHT 36.5'	HEIGHT 36.5'
	36.5'	41.5'
	36.5'	46.5'
	41.5'	36.5'
	46.5'	36.5'
	FREQ. RANGE 200-400 MHz	
Plate 67 -	TX ANT AS-1097	RX ANT AT-197
	HEIGHT 36.5'	HEIGHT 36.5'
	36.5'	41.5'
	36.5'	46.5'
	41.5'	36.5'
	46.5'	36.5'
	FREQ. RANGE 200-400 MHz	
Plate 68 -	TX ANT AS-1097	RX ANT AS-1018
	HEIGHT 36.5'	HEIGHT 36.5'
	36.5'	41.5'
	36.5'	46.5'
	41.5'	36.5'
	46.5'	36.5'
	FREQ. RANGE 200-400 MHz	
Plate 69 -	TX ANT AS-1097	RX ANT AS-1097
	HEIGHT 36.5'	HEIGHT 36.5'
	36.5'	41.5'
	36.5'	46.5'
	41.5'	36.5'
	46.5'	36.5'
	FREQ. RANGE 200-400 Mhz	
Plate 70 -	TX ANT AS-1097	RX ANT AS-1181
	HEIGHT 36.5'	HEIGHT 36.5'
	36.5'	41.5'
	36.5'	46.5'
	41.5'	36.5'
	46.5'	36.5'
	FREQ. RANGE 200-400 MHz	
Plate 71 -	TX ANT AS-1181	RX ANT AT-197
	HEIGHT 36.5'	HEIGHT 36.5'
	36.5'	41.5'
	36.5'	46.5'
	41.5'	36.5'
	46.5'	36.5'
	FREQ. RANGE 200-400 MHz	

Plate 72 -	TX ANT AS-1181	RX ANT AS-1018
	HEIGHT 36.5'	HEIGHT 36.5'
	36.5'	41.5'
	36.5'	46.5'
	41.5'	36.5'
	46.5'	36.5'
	FREQ. RANGE 200-400 MHz	
Plate 73 -	TX ANT AS-1181	RX ANT AS-1097
	HEIGHT 36.5'	HEIGHT 36.5'
	36.5'	41.5'
	36.5'	46.5'
	41.5'	36.5'
	46.5'	36.5'
	FREQ. RANGE 200-400 MHz	
Plate 74 -	TX ANT AS-1181	RX ANT AS-1181
	HEIGHT 36.5'	HEIGHT 36.5'
	36.5'	41.5'
	36.5'	46.5'
	41.5'	36.5'
	46.5'	36.5'
	FREQ. RANGE 200-400 MHz	
Plate 75 -	TX ANT AS-1181	RX ANT AT-197
	HEIGHT 36.5'	HEIGHT 36.5'
	36.5'	41.5'
	36.5'	46.5'
	41.5'	36.5'
	46.5'	36.5'
	FREQ. RANGE 100-200 MHz	
Plate 76 -	TX ANT AS-1181	RX ANT AS-1018
	HEIGHT 36.5'	HEIGHT 36.5'
	36.5'	41.5'
	36.5'	46.5'
	41.5'	36.5'
	46.5'	36.5'
	FREQ. RANGE 100-200 MHz	
Plate 77 -	TX ANT AS-1181	RX ANT AS-1097
	HEIGHT 36.5'	HEIGHT 36.5'
	36.5'	41.5'
	36.5'	46.5'
	41.5'	36.5'
	46.5'	36.5'
	FREQ. RANGE 100-200 MHz	
Plate 78 -	TX ANT AS-1181	RX ANT AS-1181
	HEIGHT 36.5'	HEIGHT 36.5'
	36.5'	41.5'
	36.5'	46.5'
	41.5'	36.5'
	46.5'	36.5'
	FREQ. RANGE 100-200 MHz	

HEIGHT TX 36.5' RX 41.5' (1)



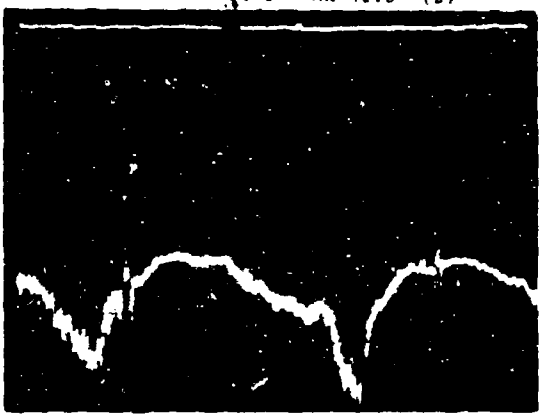
SINGLE POLE MEASUREMENTS
TX ANT AT-197 RX ANT AT-197 (1)
AS-1018 (2)
AS-1097 (3)
AS-1181 (4)

REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 dB

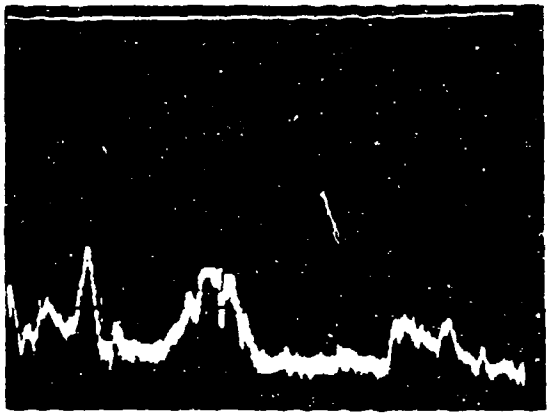
FREQUENCY RANGE 200-400 MHz

FREQUENCY SCALE 20 MHz/CM

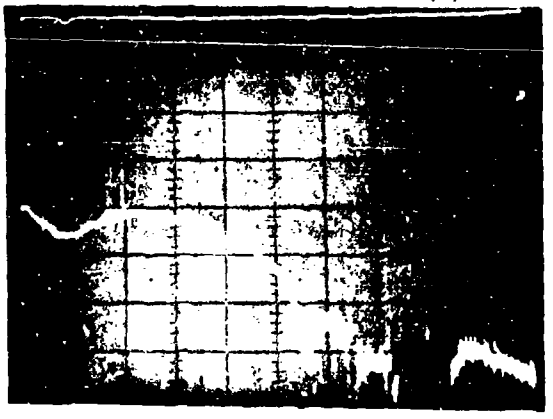
HEIGHT TX 36.5' RX 41.5' (2)



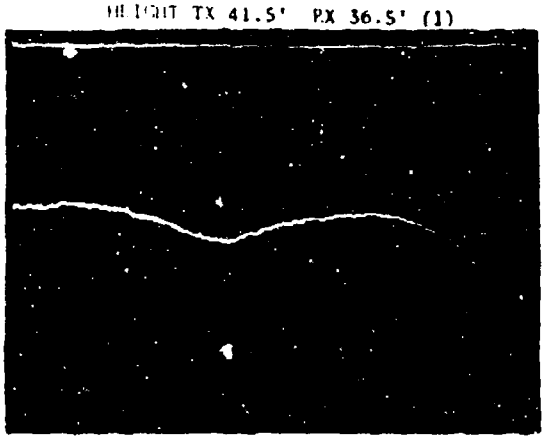
HEIGHT TX 36.5' RX 41.5' (3)



HEIGHT TX 36.5' RX 41.5' (4)



HEIGHT TX 41.5' RX 36.5' (1)



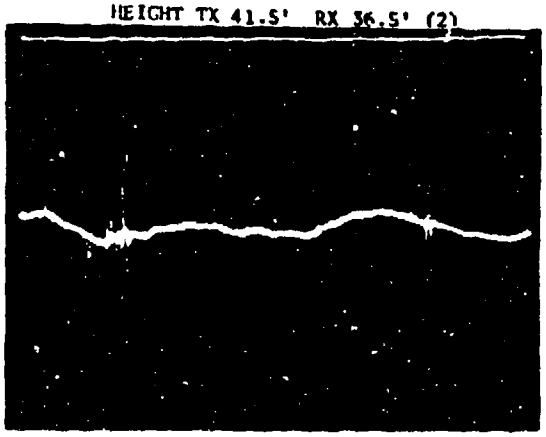
SINGLE POLE MEASUREMENTS
TX ANT AT-197 RX ANT AT-197 (1)
AS-1018 (2)
AS-1097 (3)
AS-1181 (4)

REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 dB

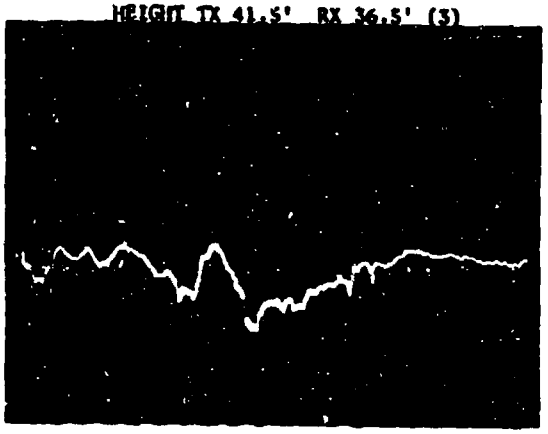
FREQUENCY RANGE 200-400 MHz

FREQUENCY SCALE 20 MHz/CM

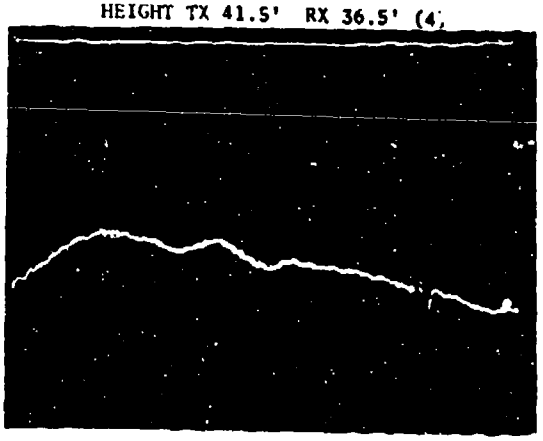
HEIGHT TX 41.5' RX 36.5' (2)



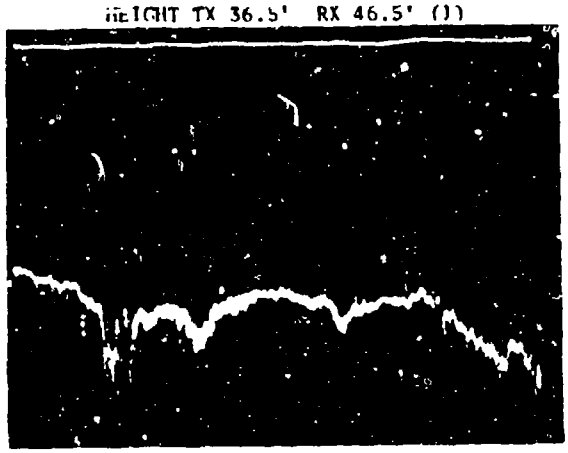
HEIGHT TX 41.5' RX 36.5' (3)



HEIGHT TX 41.5' RX 36.5' (4)



HEIGHT TX 36.5' RX 46.5' (1)



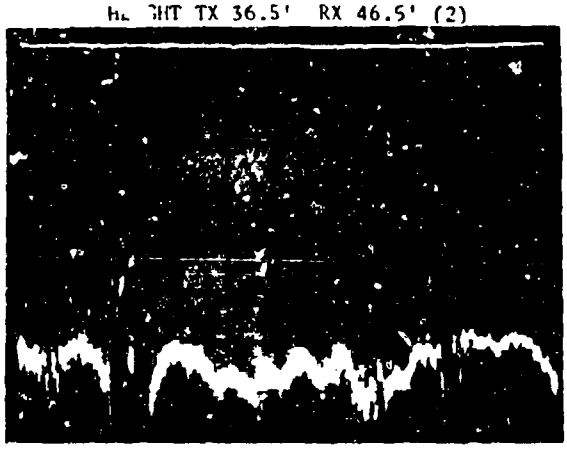
SINGLE POLE MEASUREMENTS
TX ANT AT-197 RX ANT AT-197 (1)
AS-1018 (2)
AS-1097 (3)
AS-1181 (4)

REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 db

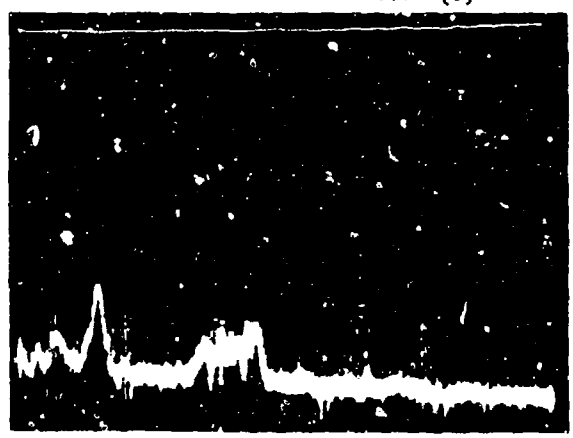
FREQUENCY RANGE 200-400 MHz

FREQUENCY SCALE 20 MHz/CM

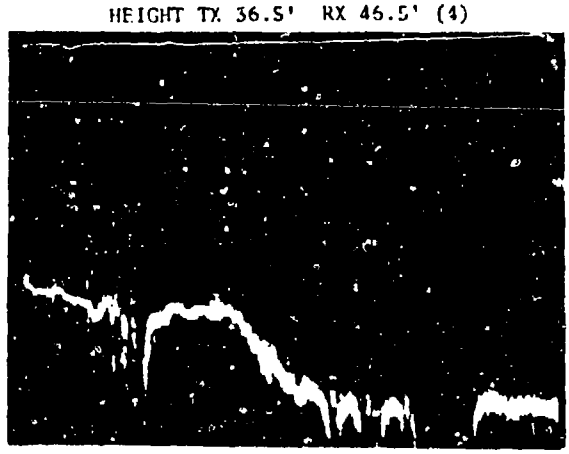
HEIGHT TX 36.5' RX 46.5' (2)



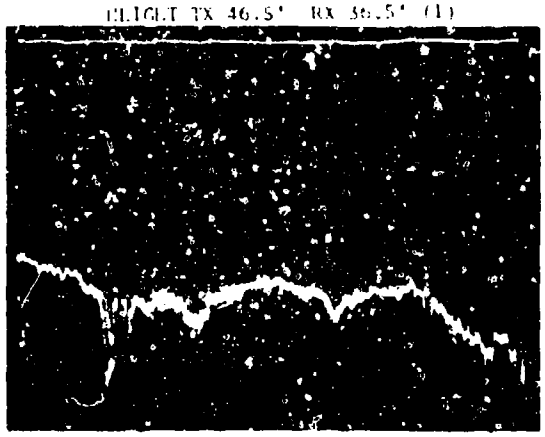
HEIGHT TX 36.5' RX 46.5' (3)



HEIGHT TX 36.5' RX 46.5' (4)



HEIGHT TX 46.5' RX 36.5' (1)



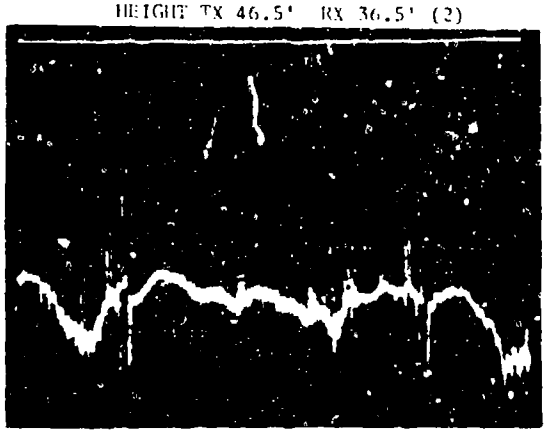
SINGLE POLE MEASUREMENTS
TX ANT AT-197 RX ANT AT-197 (1)
AS-1018 (2)
AS-1097 (3)
AS-1181 (4)

REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 dB

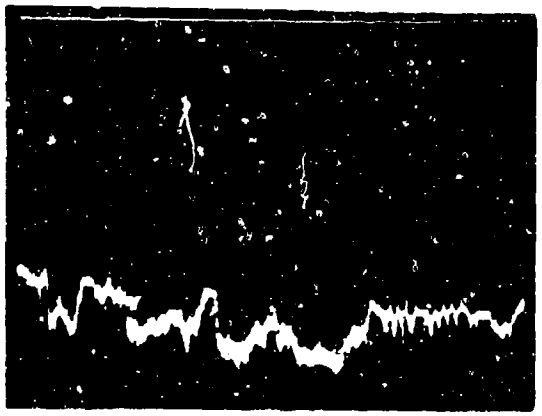
FREQUENCY RANGE 200-400 MHz

FREQUENCY SCALE 20 MHz/CM

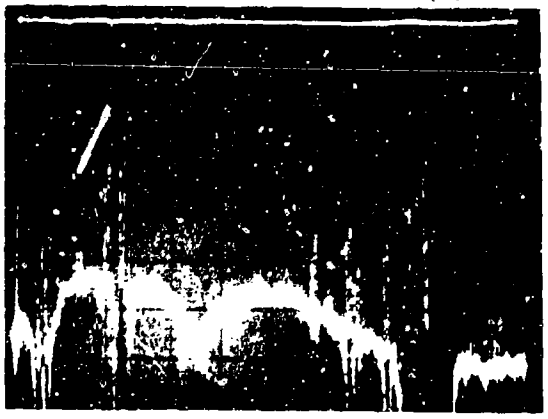
HEIGHT TX 46.5' RX 36.5' (2)



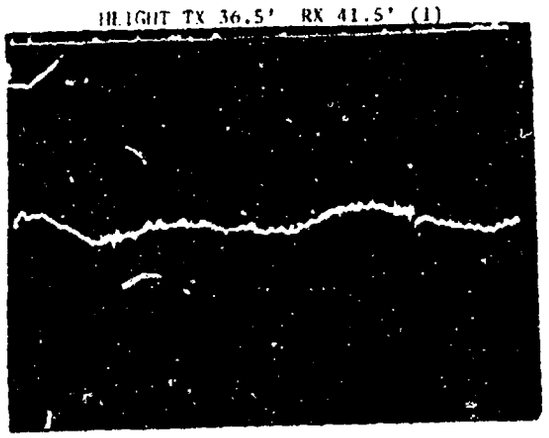
HEIGHT TX 46.5' RX 36.5' (3)



HEIGHT TX 46.5' RX 36.5' (4)



HEIGHT TX 36.5' RX 41.5' (1)



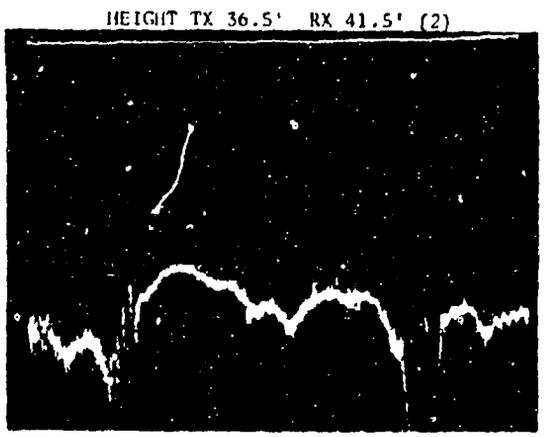
SINGLE POLE MEASUREMENTS
TX ANT AS-1018 RX ANT AT-117 (1)
AS-1018 (2)
AS-1097 (3)
AS-1181 (4)

REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 dB

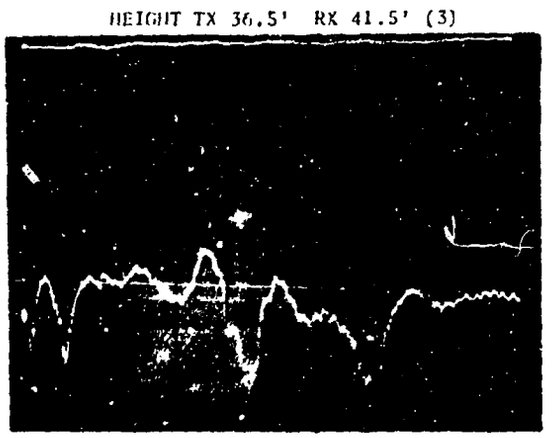
FREQUENCY RANGE 200-400 MHz

FREQUENCY SCALE 20 MHz/CM

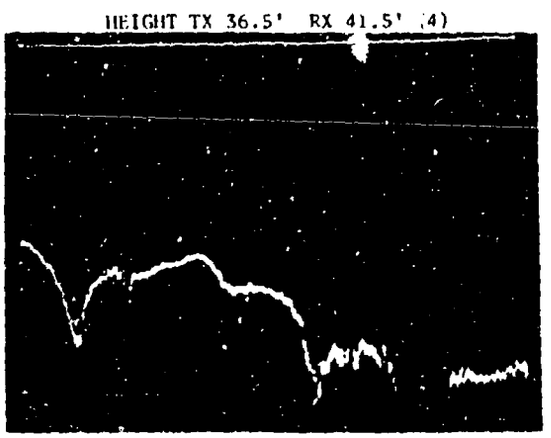
HEIGHT TX 36.5' RX 41.5' (2)



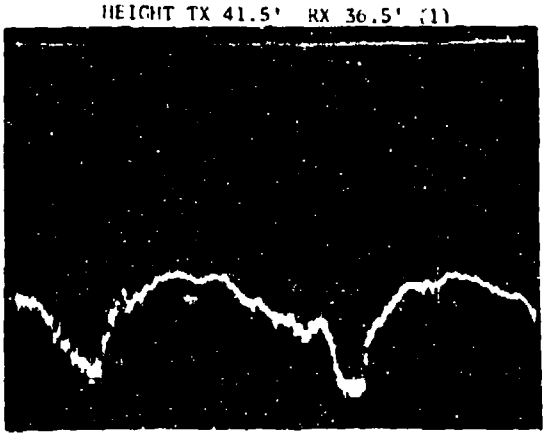
HEIGHT TX 36.5' RX 41.5' (3)



HEIGHT TX 36.5' RX 41.5' (4)



HEIGHT TX 41.5' RX 36.5' (1)



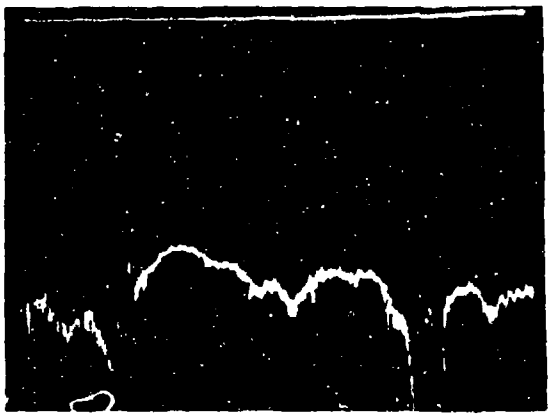
SINGLE POLE MEASUREMENTS
TX ANT AS-1018 RX ANT AT-197 (1)
AS-1018 (2)
AS-1097 (3)
AS-1181 (4)

REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 dB

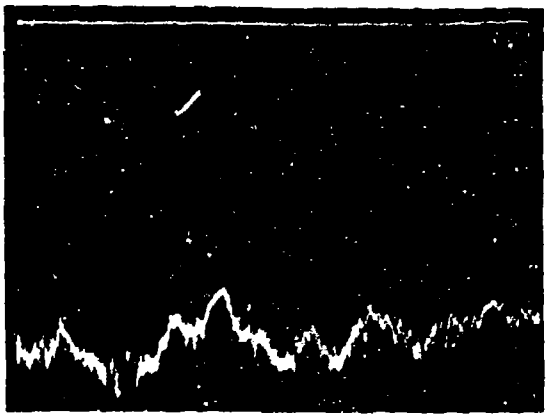
FREQUENCY RANGE 200-400 MHz

FREQUENCY SCALE 20 MHz/CM

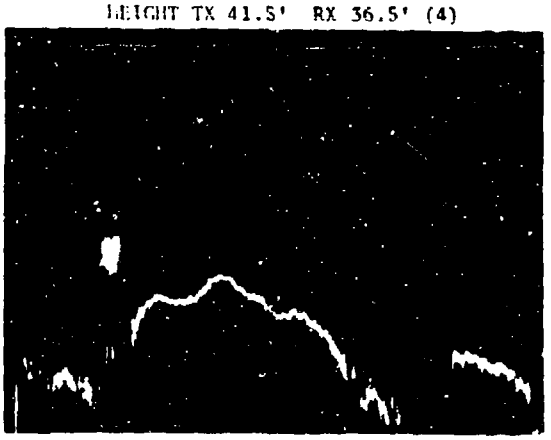
HEIGHT TX 41.5' RX 36.5' (2)



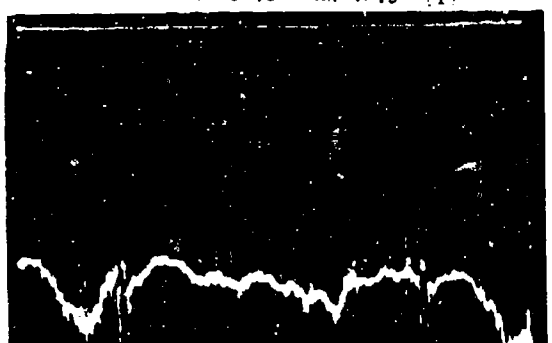
HEIGHT TX 41.5' RX 36.5' (3)



HEIGHT TX 41.5' RX 36.5' (4)



HEIGHT TX 36.5' RX 46.5' (1)



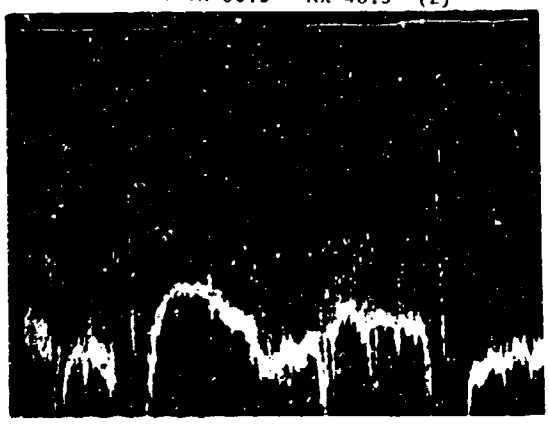
SINGLE POLE MEASUREMENTS
TX ANT AS-1018 RX ANT AT-127 (1)
AS-1018 (2)
AS-1097 (3)
AS-1181 (4)

REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.07-7.7 dB

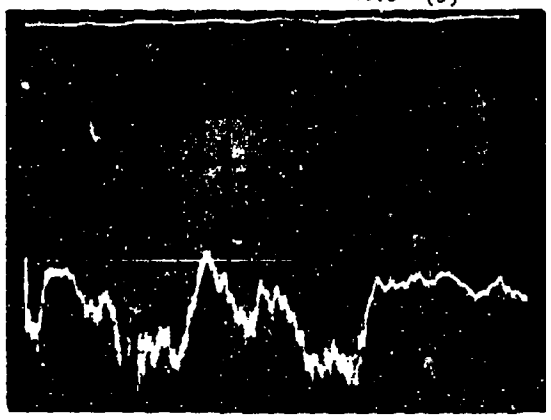
FREQUENCY RANGE 200-400 MHz

FREQUENCY SCALE 20 MHz/CM

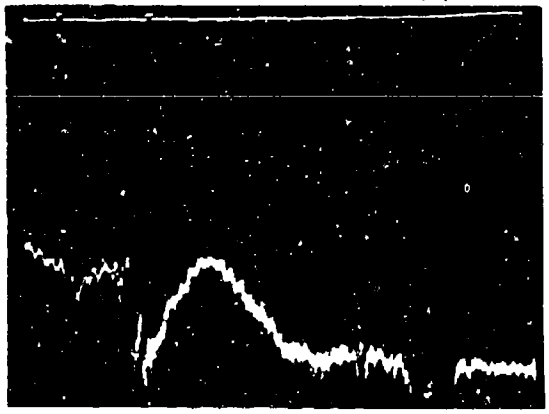
HEIGHT TX 36.5' RX 46.5' (2)



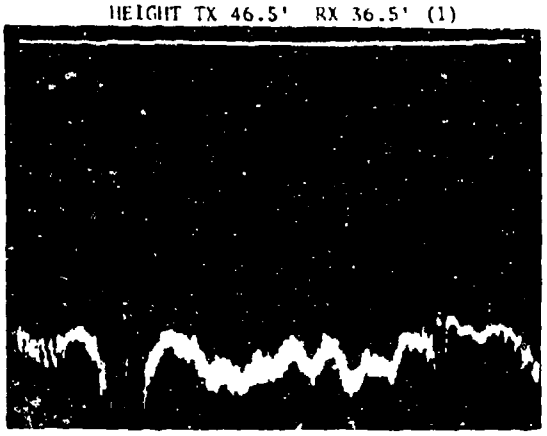
HEIGHT TX 36.5' RX 46.5' (3)



HEIGHT TX 36.5' RX 46.5' (4)



HEIGHT TX 46.5' RX 36.5' (1)



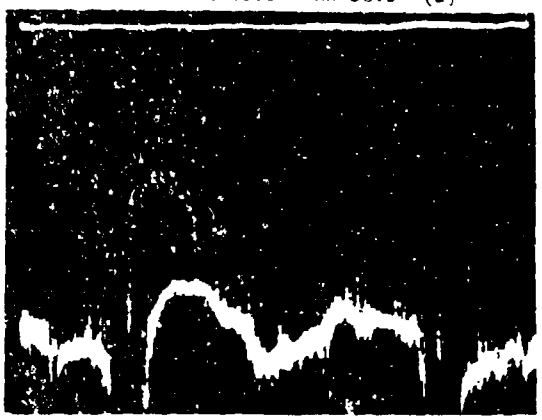
SINGLE POLE MEASUREMENTS
TX ANT AS-1018 RX ANT AT-197 (1)
AS-1018 (2)
AS-1097 (3)
AS-1101 (4)

REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 dB

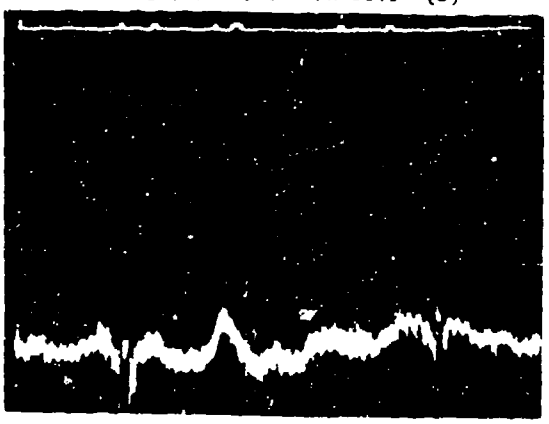
FREQUENCY RANGE 200-400 MHz

FREQUENCY SCALE 20 MHz/CM

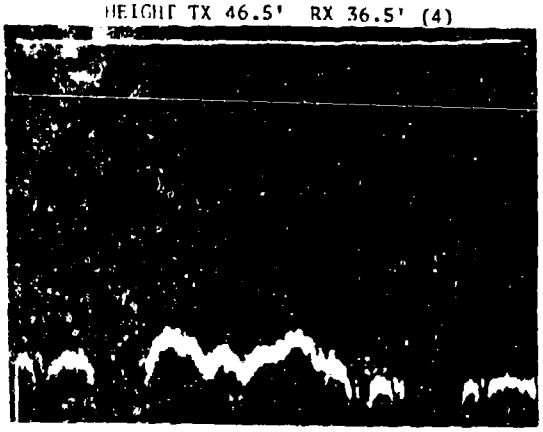
HEIGHT TX 46.5' RX 36.5' (2)



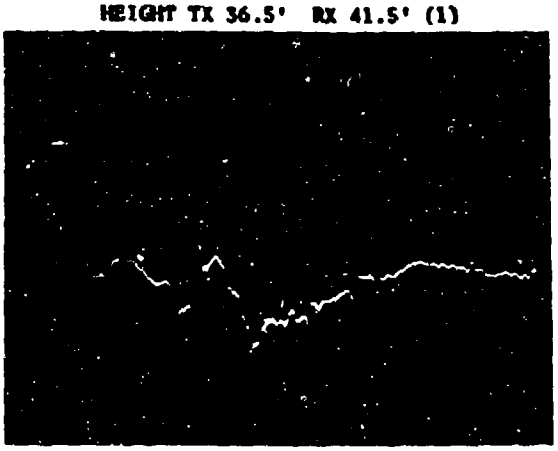
HEIGHT TX 46.5' RX 36.5' (3)



HEIGHT TX 46.5' RX 36.5' (4)



HEIGHT TX 36.5' RX 41.5' (1)



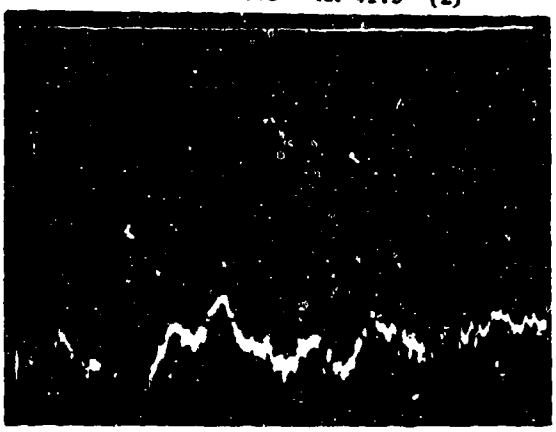
SINGLE POLE MEASUREMENTS
TX ANT AS-1097 RX ANT AT-197 (1)
AS-1018 (2)
AS-1097 (3)
AS-1181 (4)

REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 dB

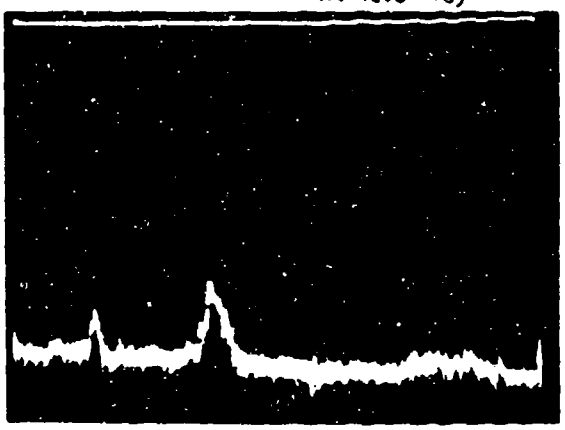
FREQUENCY RANGE 200-400 MHz

FREQUENCY SCALE 20 MHz/CM

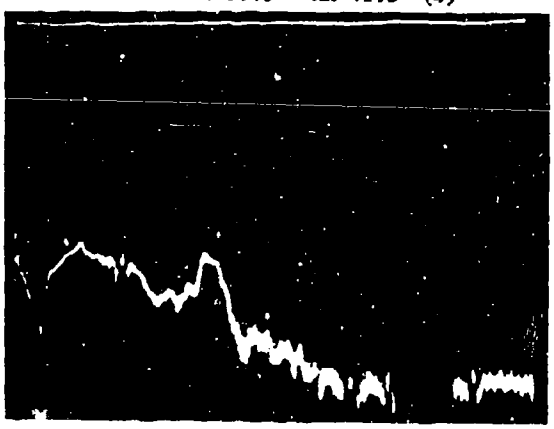
HEIGHT TX 36.5' RX 41.5' (2)



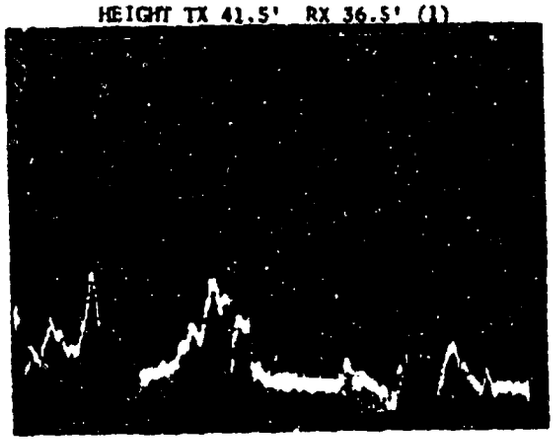
HEIGHT TX 36.5' RX 41.5' (3)



HEIGHT TX 36.5' RX 41.5' (4)



HEIGHT TX 41.5' RX 36.5' (1)



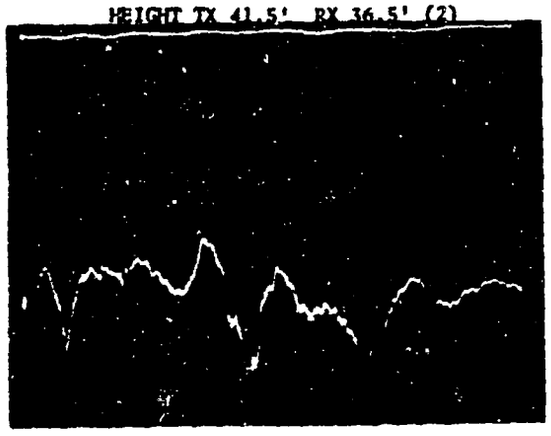
SINGLE POLE MEASUREMENTS
TX ANT AS-1097 RX ANT AT-197 (1)
AS-1018 (2)
AS-1097 (3)
AS-1181 (4)

REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 dB

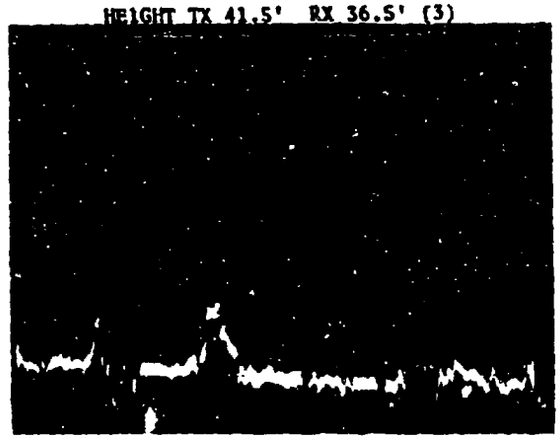
FREQUENCY RANGE 200-400 MHz

FREQUENCY SCALE 20 MHz/CM

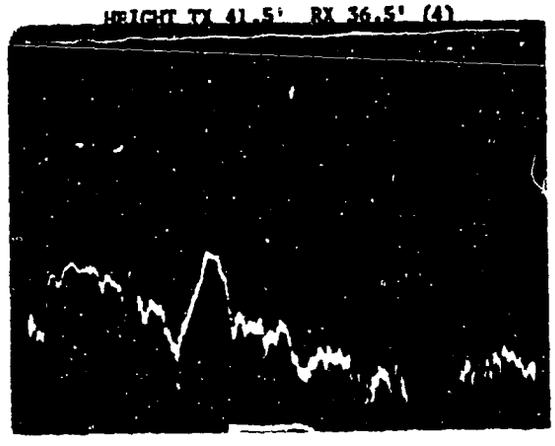
HEIGHT TX 41.5' RX 36.5' (2)



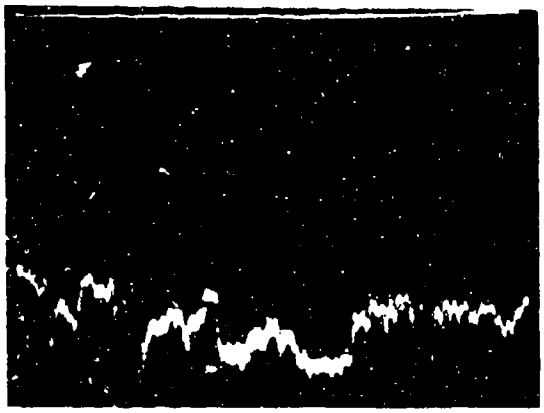
HEIGHT TX 41.5' RX 36.5' (3)



HEIGHT TX 41.5' RX 36.5' (4)



HEIGHT TX 36.5' RX 46.5' (1)



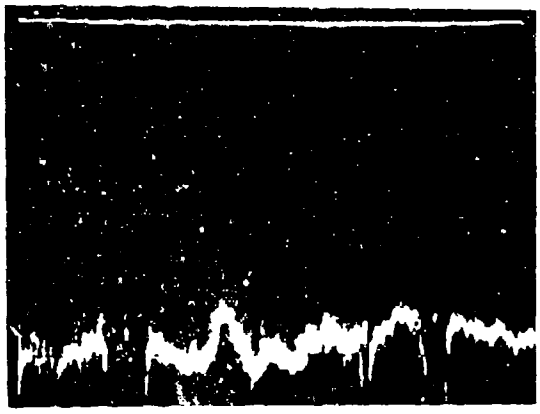
SINGLE POLE MEASUREMENTS
TX ANT AS-1097 RX ANT AT-197 (1)
AS-1018 (2)
AS-1097 (3)
AS-1181 (4)

REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 dB

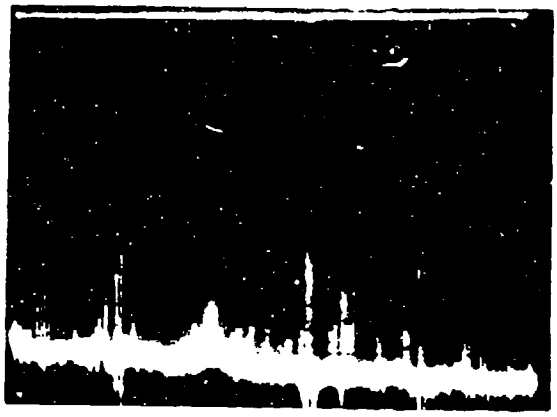
FREQUENCY RANGE 200-400 MHz

FREQUENCY SCALE 20 MHz/CM

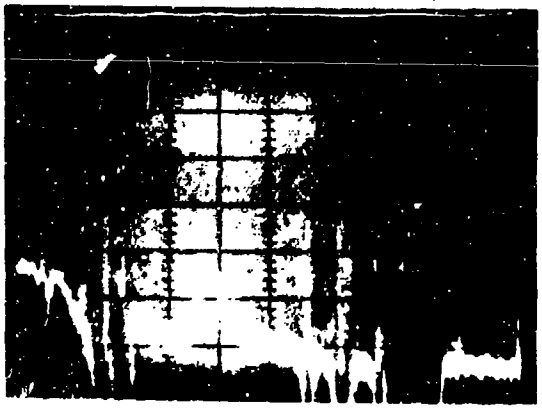
HEIGHT TX 36.5' RX 46.5' (2)



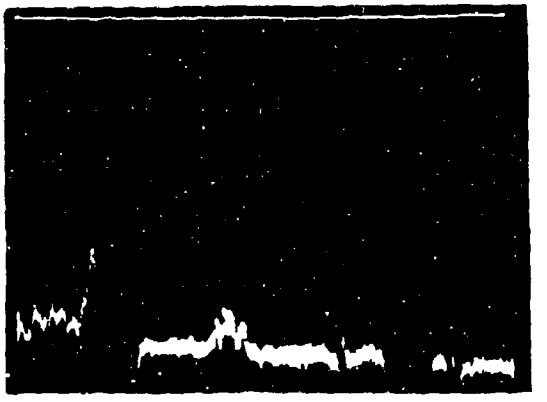
HEIGHT TX 36.5' RX 46.5' (3)



HEIGHT TX 36.5' RX 46.5' (4)



HEIGHT TX 46.5' RX 36.5' (1)



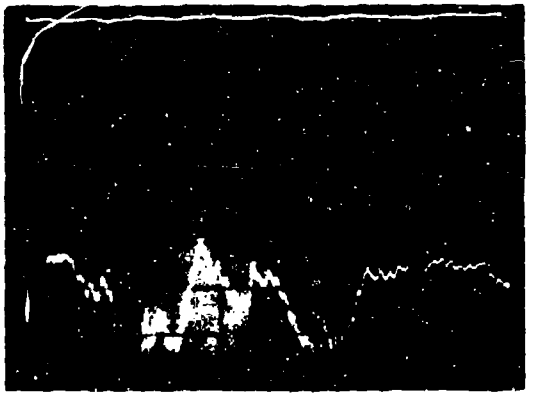
SINGLE POLE MEASUREMENTS
TX ANT AS-1097 RX ANT AT-197 (1)
AS-1018 (2)
AS-1097 (3)
AS-1181 (4)

REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 dB

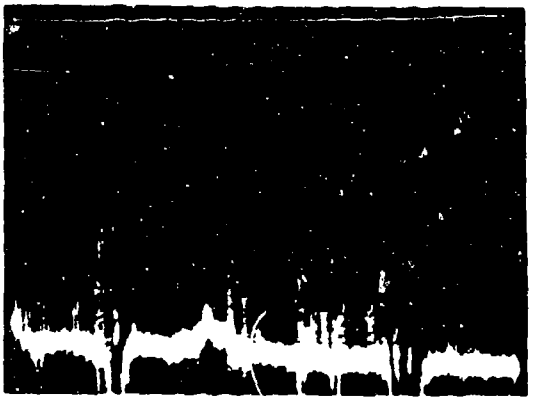
FREQUENCY RANGE 200-400 MHz

FREQUENCY SCALE 20 MHz/CM

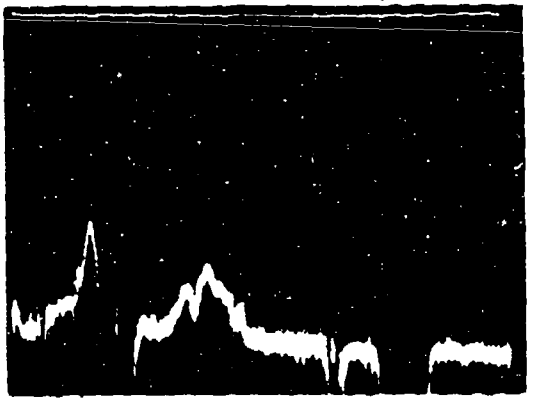
HEIGHT TX 46.5' RX 36.5' (2)



HEIGHT TX 46.5' RX 36.5' (3)



HEIGHT TX 46.5' RX 36.5' (4)



HEIGHT TX 36.5' RX 41.5' (1)

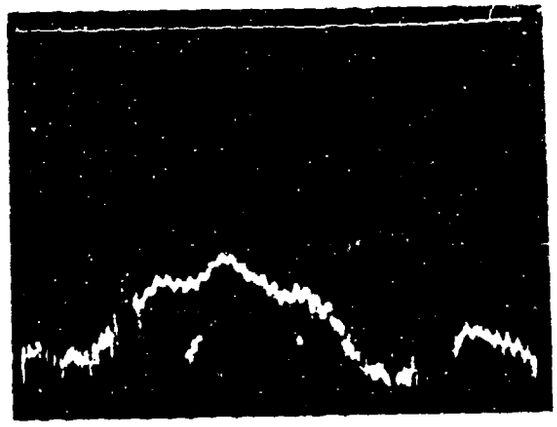
SINGLE POLE [illegible]
TX ANT AS-1181 RX ANT [illegible]
[illegible]
[illegible]

REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 dB

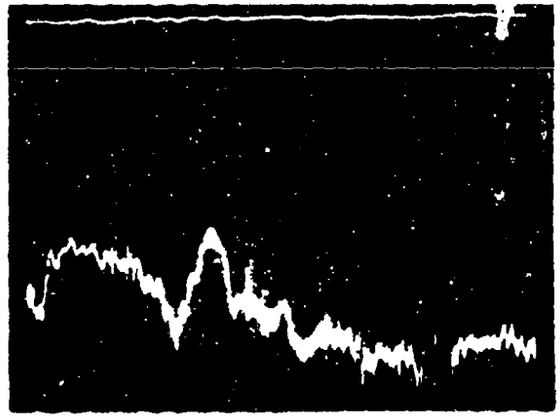
FREQUENCY RANGE 200-400 MHz

FREQUENCY SCALE 20 MHz/CM

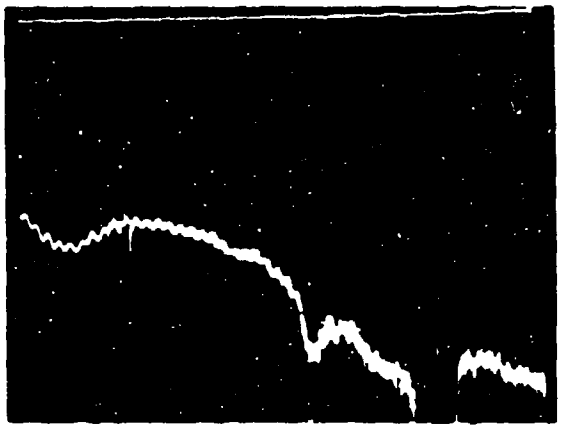
HEIGHT TX 36.5' RX 41.5' (2)



HEIGHT TX 36.5' RX 41.5' (3)



HEIGHT TX 41.5' RX 36.5' (1)



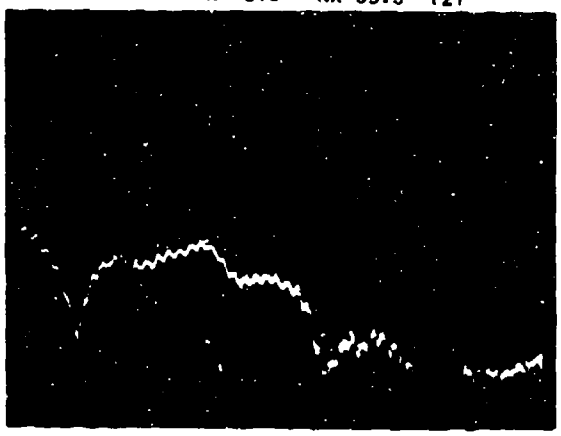
SINGLE POLE MEASUREMENTS
TX ANT AS-1181 RX ANT AT-197 (1)
AS-1018 (2)
AS-1097 (3)

REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 dB

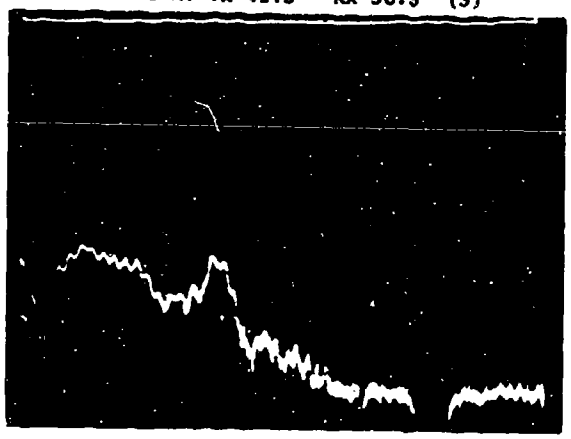
FREQUENC Y RANGE 200-400 MHz

FREQUENCY SCALE 20 MHz/CM

HEIGHT TX 41.5' RX 36.5' (2)



HEIGHT TX 41.5' RX 36.5' (3)



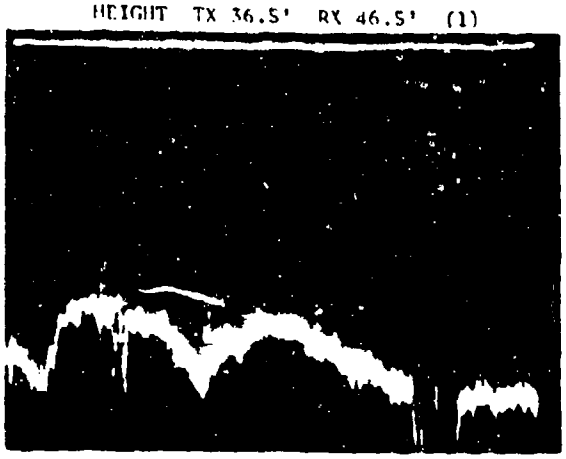
SINGLE POLE MEASUREMENTS
TX ANT AS-1181 RX ANT AT-197 (1)
AS-1018 (2)
AS-1097 (3)

REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 dB

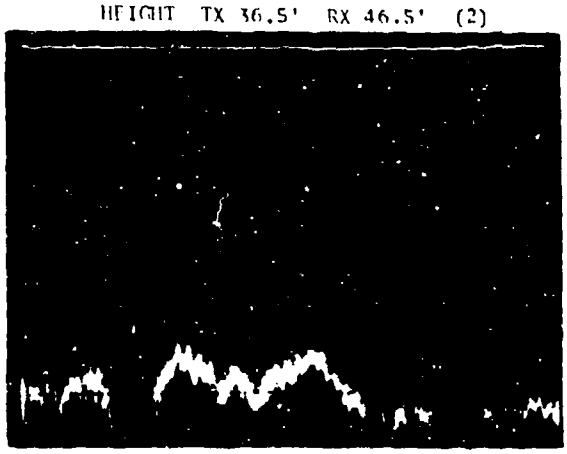
FREQUENCY RANGE 200-400 MHz

FREQUENCY SCALE 20 MHz/CM

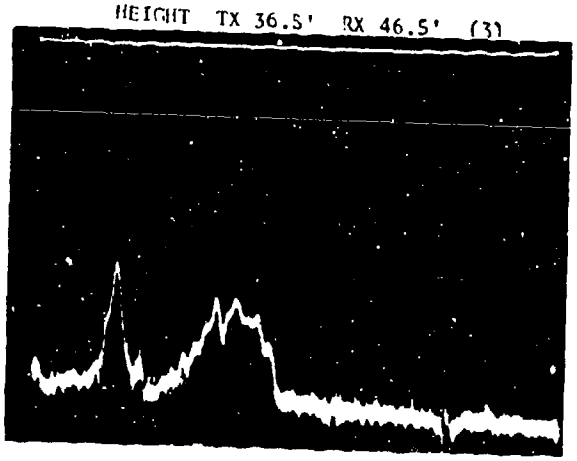
HEIGHT TX 36.5' RX 46.5' (1)



HEIGHT TX 36.5' RX 46.5' (2)



HEIGHT TX 36.5' RX 46.5' (3)



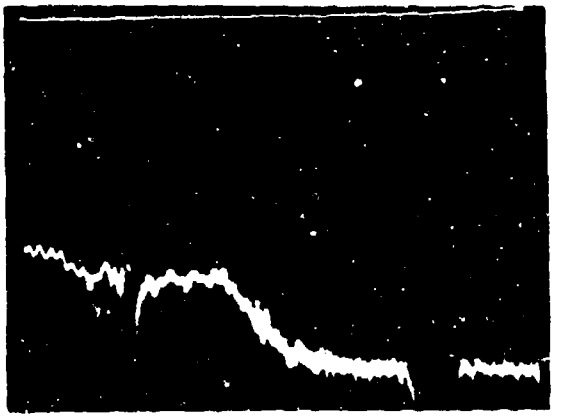
SINGLE POLE MEASUREMENTS
TX ANT AS-1181 RX ANT AT-197 (1)
AS-1018 (2)
AS-1097 (3)

REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 dB

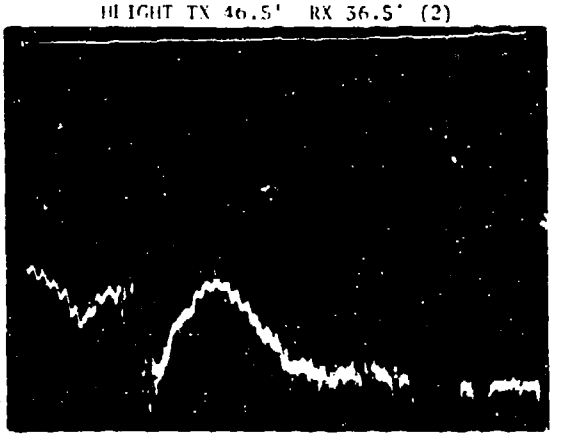
FREQUENCY RANGE 200-400 MHz

FREQUENCY SCALE 20 MHz/CM

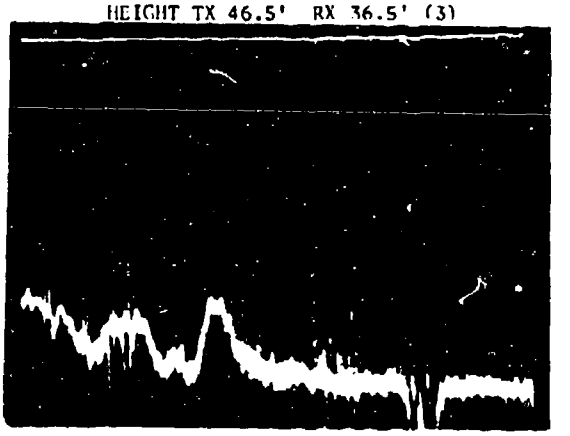
HEIGHT TX 46.5' RX 36.5' (1)



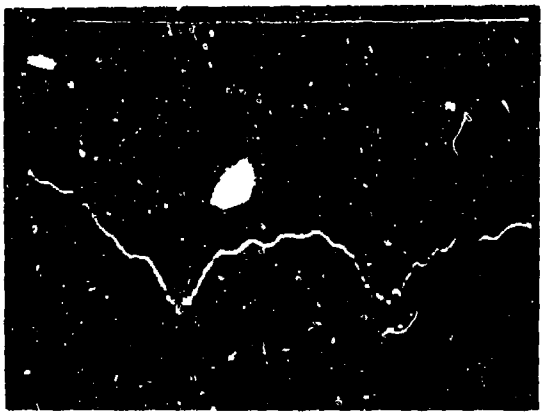
HEIGHT TX 46.5' RX 36.5' (2)



HEIGHT TX 46.5' RX 36.5' (3)



HEIGHT TX 36.5' RX 41.5' (1)



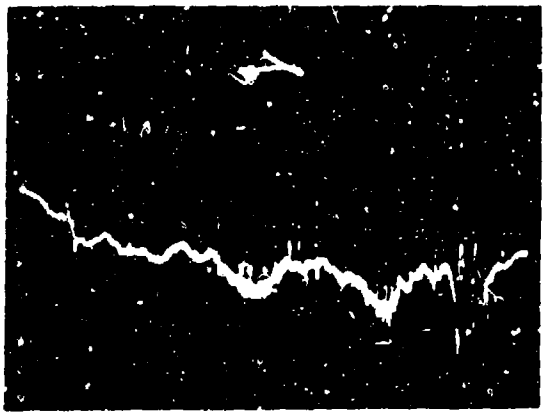
SINGLE POLE MEASUREMENTS
TX ANT AS-1181 RX ANT AT-197 (1)
AS-1018 (2)
AS-1097 (3)
AS-1181 (4)

REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 3.46-4.74 dB

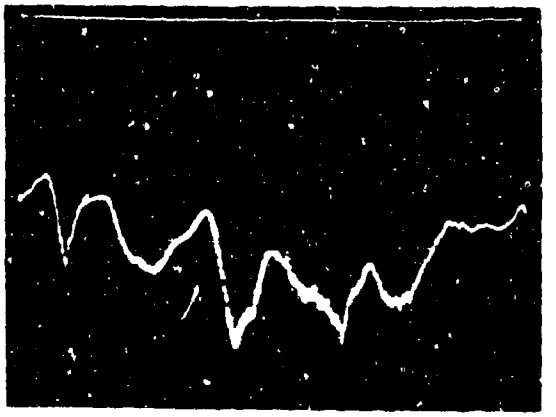
FREQUENCY RANGE 100-160 MHz

FREQUENCY SCALE 16 MHz/CM

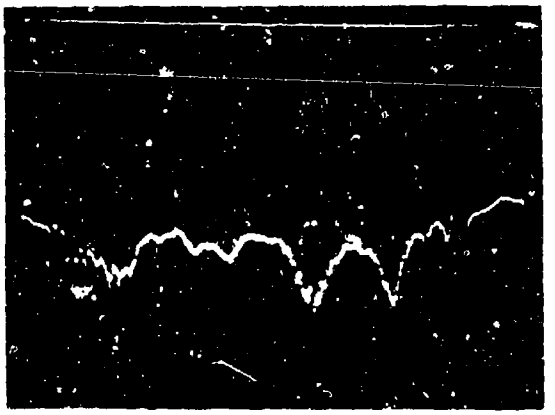
HEIGHT TX 36.5' RX 41.5' (2)



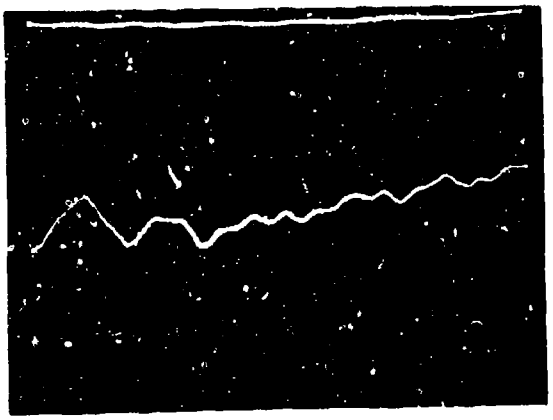
HEIGHT TX 36.5' RX 41.5' (3)



HEIGHT TX 36.5' RX 41.5' (4)



HEIGHT TX 41.5' RX 36.5' (1)



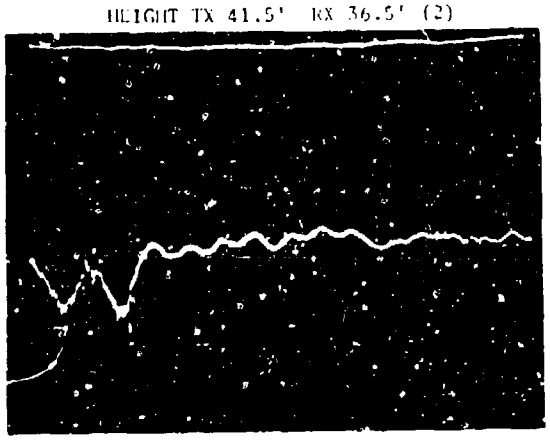
SINGLE POLE MEASUREMENTS
TX ANT AS-1181 RX ANT AT-197 (1)
AS-1818 (2)
AS-1997 (3)
AS-1181 (4)

REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 3.46-4.74 dB

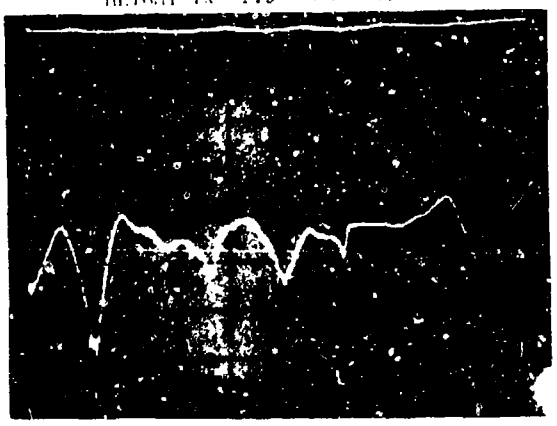
FREQUENCY RANGE 100-160 MHz

FREQUENCY SCALE 16 MHz/CM

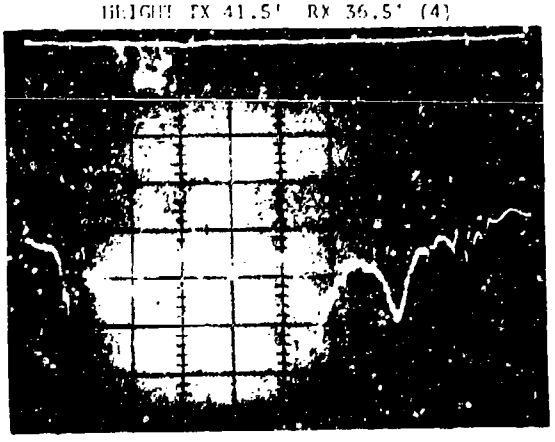
HEIGHT TX 41.5' RX 36.5' (2)



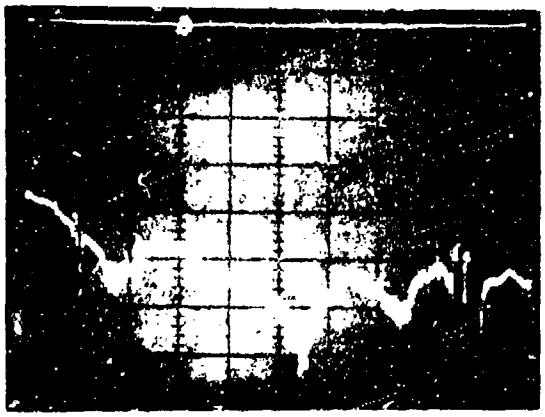
HEIGHT TX 41.5' RX 36.5' (3)



HEIGHT TX 41.5' RX 36.5' (4)



HEIGHT TX 36.5' RX 46.5' (1)



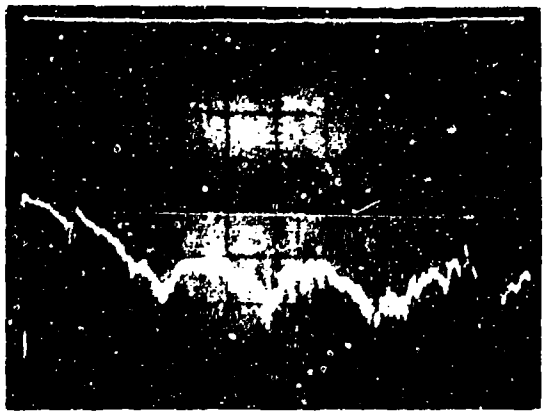
SINGLE POLE MEASUREMENTS
TX ANT AS-1181 TX ANT AT-197 (1)
AS-1018 (2)
AS-1097 (3)
AS-1181 (4)

REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 3.46-4.74 dB

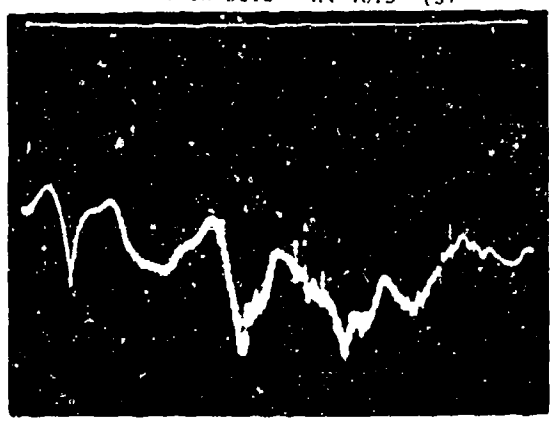
FREQUENCY RANGE 100-160 MHz

FREQUENCY SCALE 16 MHz/CM

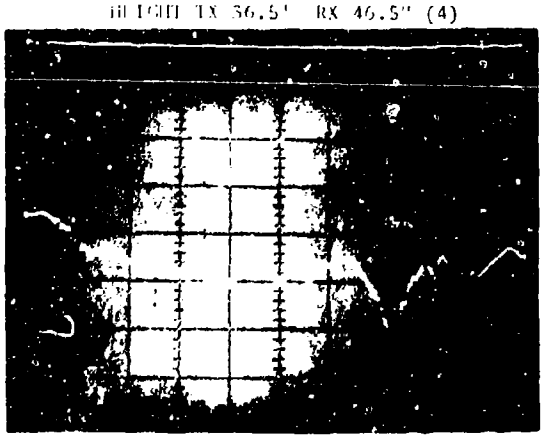
HEIGHT TX 36.5' RX 46.5' (2)



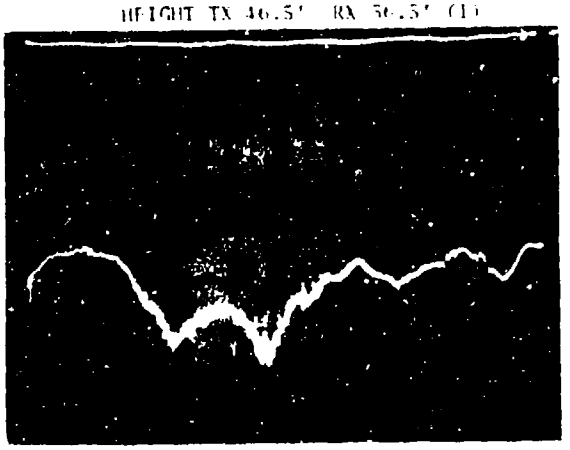
HEIGHT TX 36.5' RX 46.5' (3)



HEIGHT TX 36.5' RX 46.5' (4)



HEIGHT TX 46.5' RX 36.5' (1)



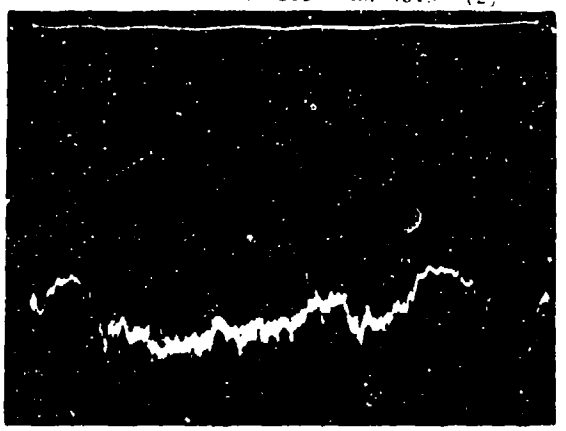
SINGLE POLE [illegible]
TX ANT AS-1181 RX ANT AS-1[illegible] (1)
AS-1018 (2)
AS-109[illegible] (3)
AS-1181 (4)

REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 3.46-4.74 dB

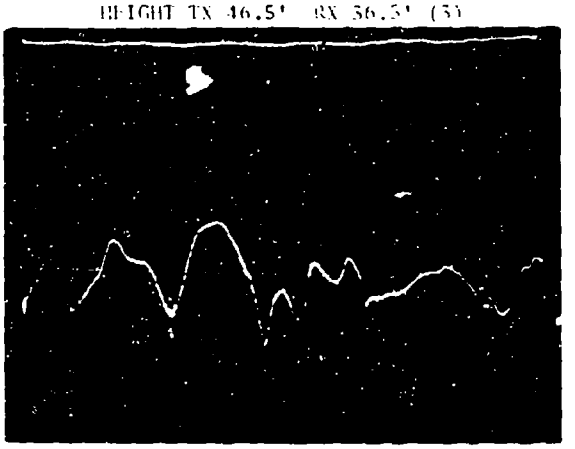
FREQUENCY RANGE 100-160 MHz

FREQUENCY SCALE 16 MHz/CM

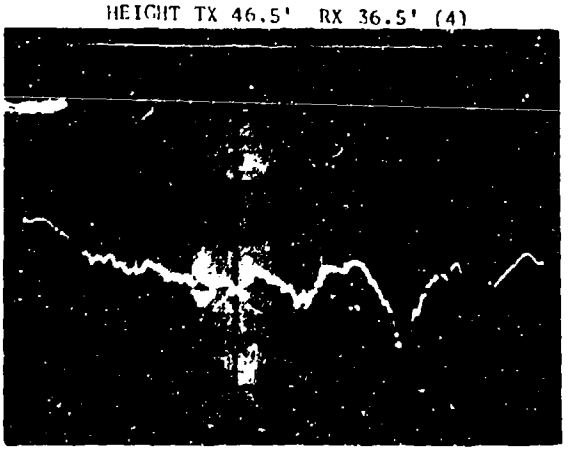
HEIGHT TX 46.5' RX 36.5' (2)



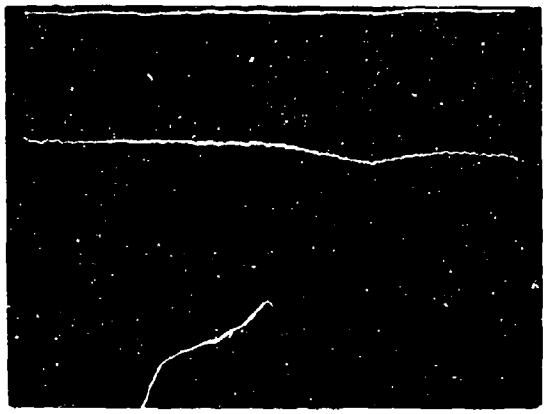
HEIGHT TX 46.5' RX 36.5' (3)



HEIGHT TX 46.5' RX 36.5' (4)



HEIGHT TX 36.5' RX 36.5'



ANTENNA

TRANSMIT	RECEIVE
AT-197	AT-197

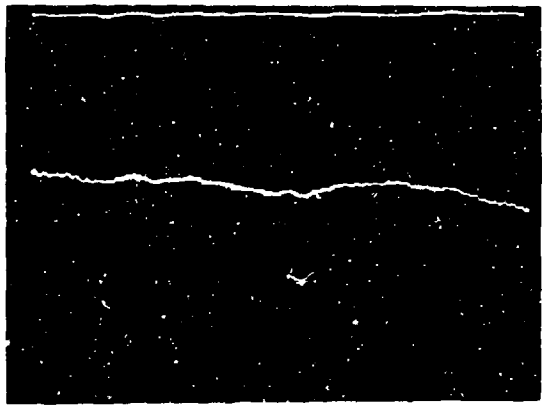
HORZ. SEPARATION - 7 FT.

REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 dB

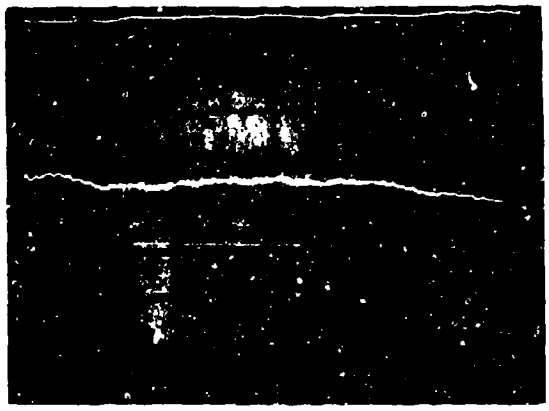
FREQUENCY RANGE 200-400 MHz

FREQUENCY SCALE 20 MHz/CM

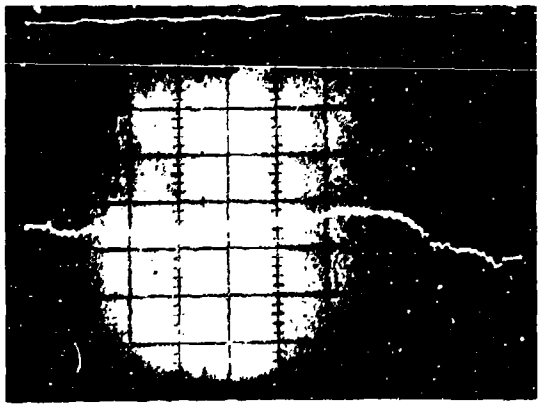
HEIGHT TX 36.5' RX 41.5'



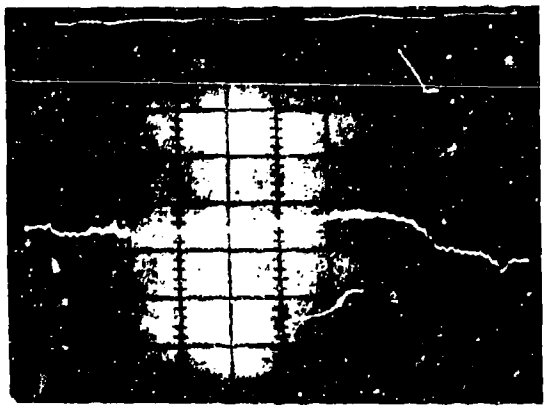
HEIGHT TX 41.5' RX 36.5'



HEIGHT TX 36.5' RX 46.5'



HEIGHT TX 46.5' RX 36.5'



ANTENNA

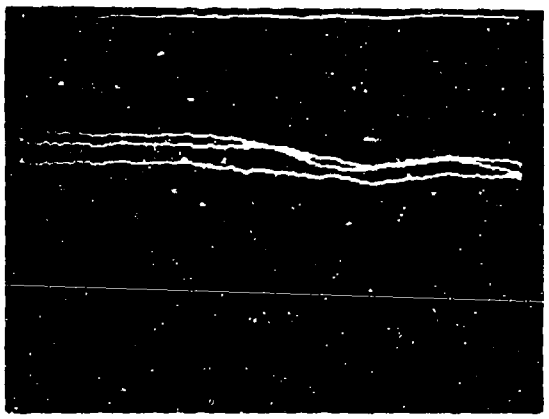
TRANSMIT	RECEIVE
AT-197	AT-197

REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 dB

FREQUENCY RANGE 200-400 MHz

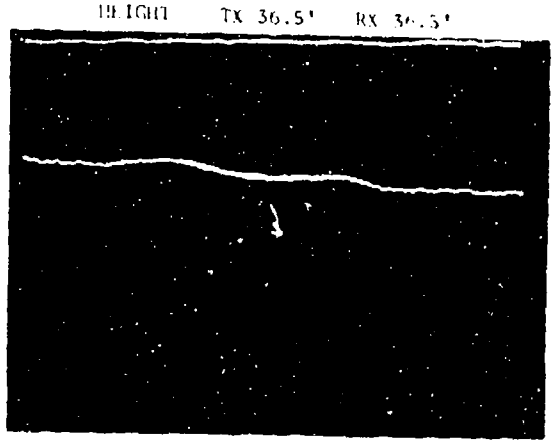
FREQUENCY SCALE 20 MHz/CM

HEIGHT TX 36.5' RX 36.5'



HORIZONTAL SEPARATION 6'-7'-8'

HEIGHT TX 36.5' RX 36.5'



ANTENNA

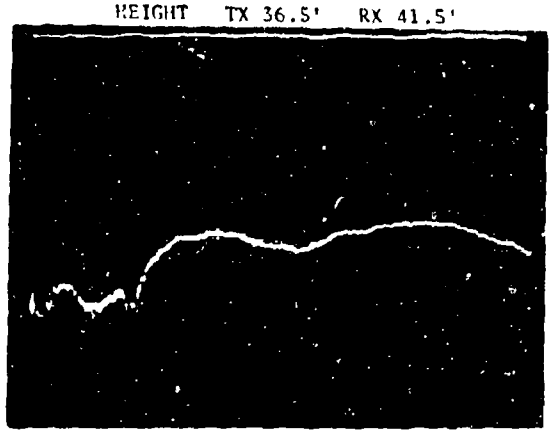
TRANSMIT	RECEIVE
AT-197	AS-1918

HORZ. SEPARATION - 7 FT.

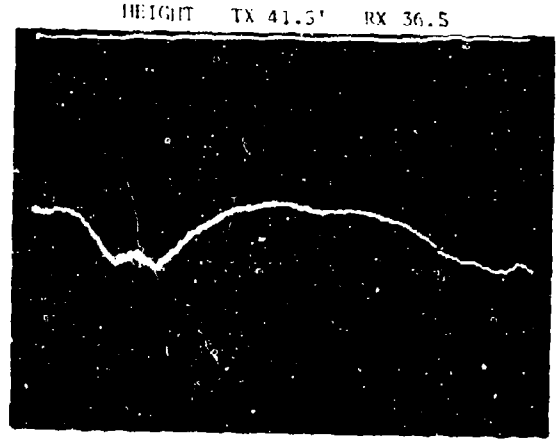
REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 dB

FREQUENCY RANGE	200-400 MHz
FREQUENCY SCALE	20 MHz/CM

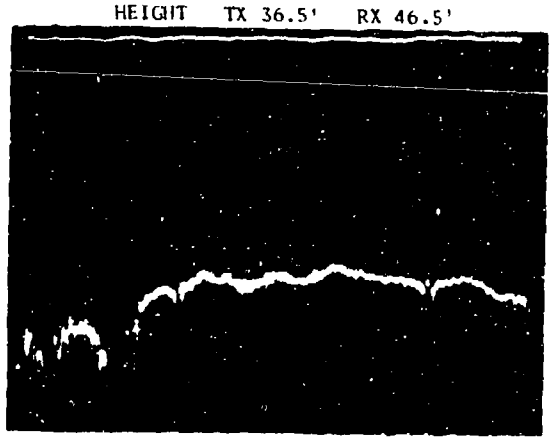
HEIGHT TX 36.5' RX 41.5'



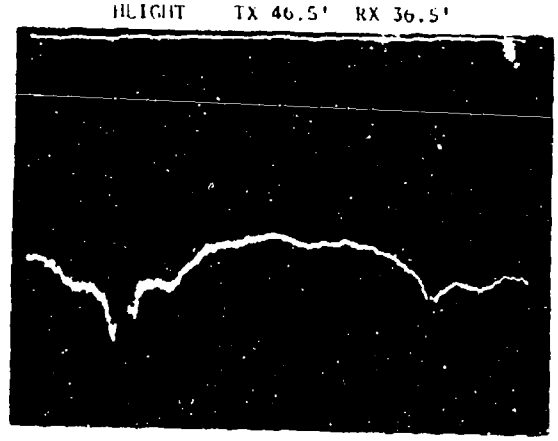
HEIGHT TX 41.5' RX 36.5



HEIGHT TX 36.5' RX 46.5'



HEIGHT TX 46.5' RX 36.5'



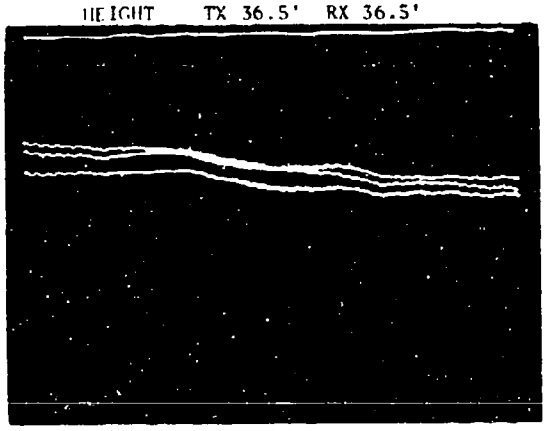
ANTENNA

TRANSMIT	RECEIVE
AT-197	AS-1018

REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 dB

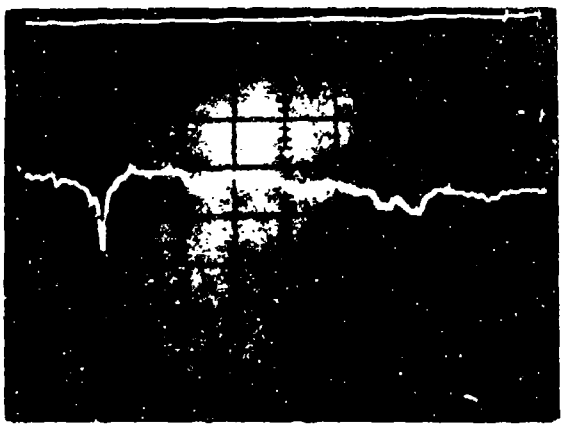
FREQUENCY RANGE	200-400 MHz
FREQUENCY SCALE	20 MHz/CM

HEIGHT TX 36.5' RX 36.5'



HORIZONTAL SEPARATION - 6'-7'-8'

HEIGHT TX 36.5' RX 36.5'



ANTENNA

TRANSMIT	RECEIVE
AT-197	AS-1097

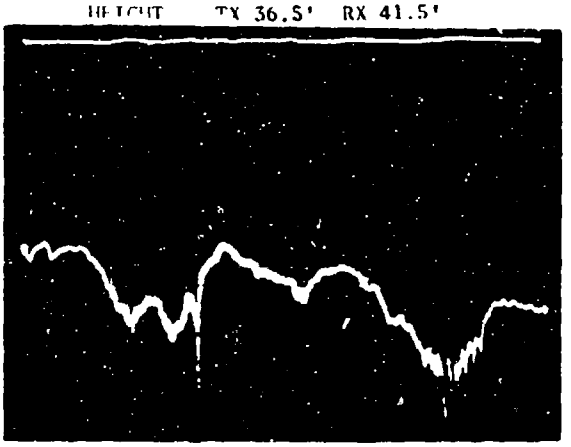
HORZ. SEPARATION - 7 FT.

REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 dB

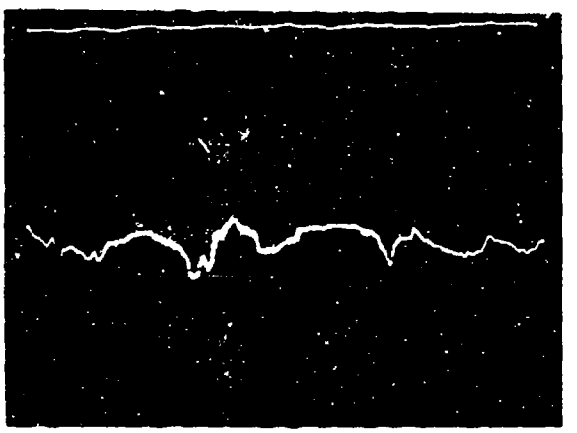
FREQUENCY RANGE 200-400 MHz

FREQUENCY SCALE 20 MHz/CM

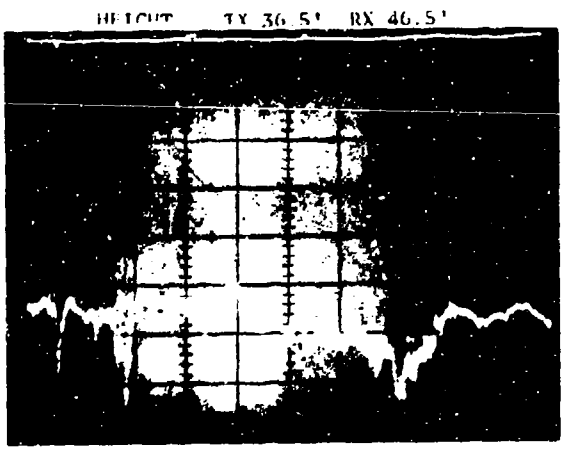
HEIGHT TX 36.5' RX 41.5'



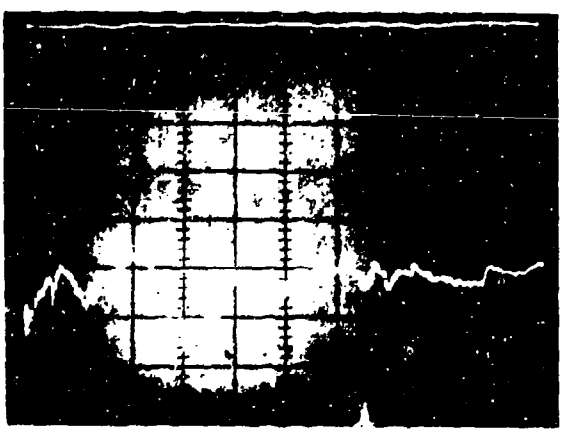
HEIGHT TX 41.5 RX 36.5'



HEIGHT TX 36.5' RX 46.5'



HEIGHT TX 46.5' RX 36.5'



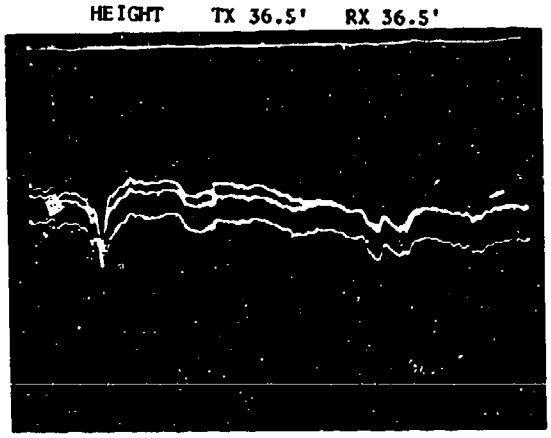
ANTENNA

TRANSMIT	RECEIVE
AT-197	AS-1097

REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 dB

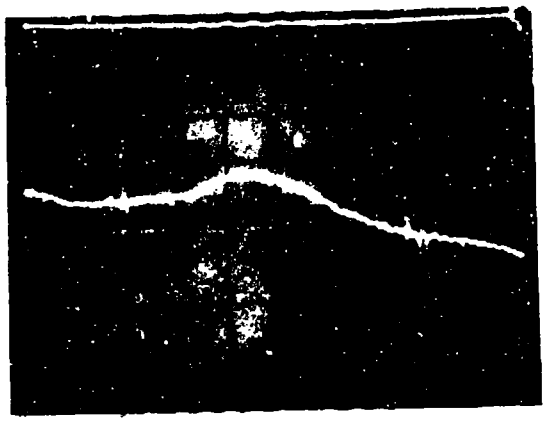
FREQUENCY RANGE	200-400 MHz
FREQUENCY SCALE	20 MHz/CM

HEIGHT TX 36.5' RX 36.5'



HORIZONTAL SEPARATION - 6'-7'-8'

HEIGHT TX 36.5' RX 36.5'



ANTENNA

TRANSMIT	RECEIVE
AT-197	AS-1181

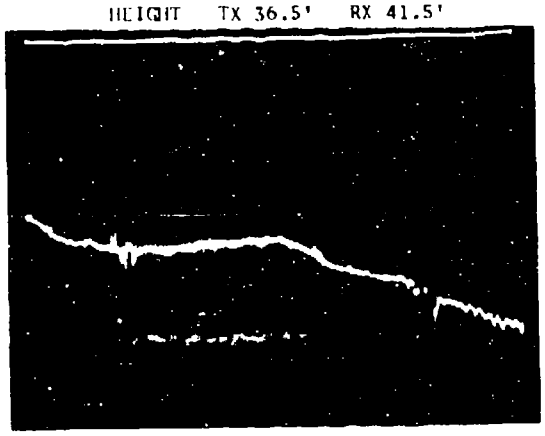
HORZ. SEPARATION - 7 FT.

REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.2 dB

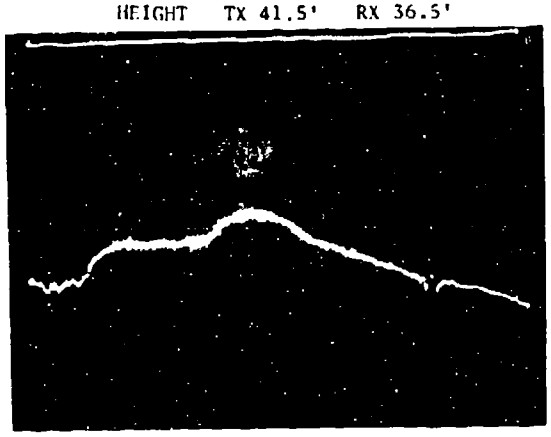
FREQUENCY RANGE 200-400 MHz

FREQUENCY SCALE 20 MHz/CM

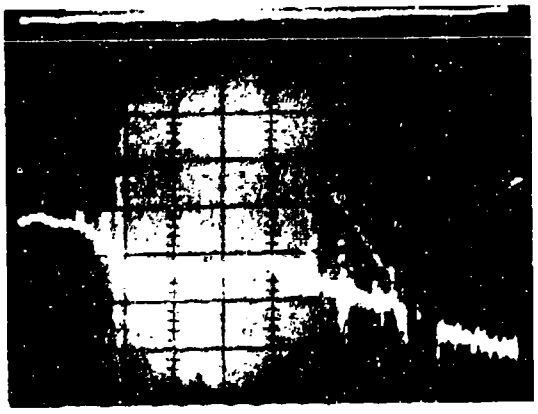
HEIGHT TX 36.5' RX 41.5'



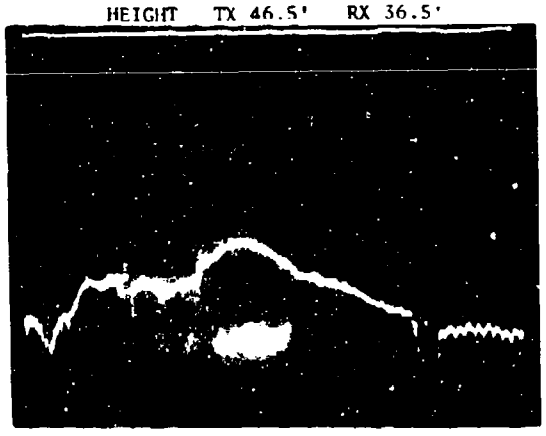
HEIGHT TX 41.5' RX 36.5'



HEIGHT TX 36.5' RX 46.5'



HEIGHT TX 46.5' RX 36.5'



ANTENNA

TRANSMIT	RECEIVE
AT-197	AS-1181

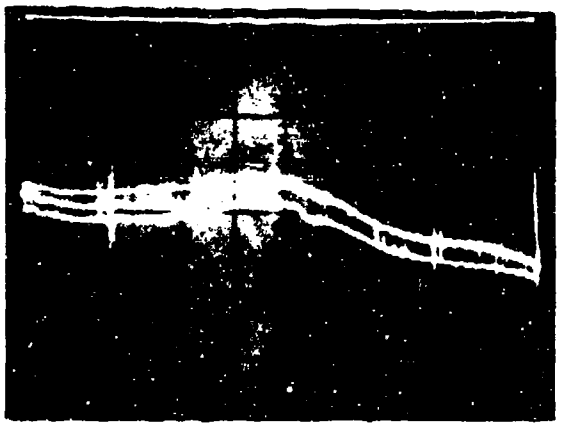
REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 dB

FREQUENCY RANGE 200-400 MHz

FREQUENCY SCALE 20 MHz/CM

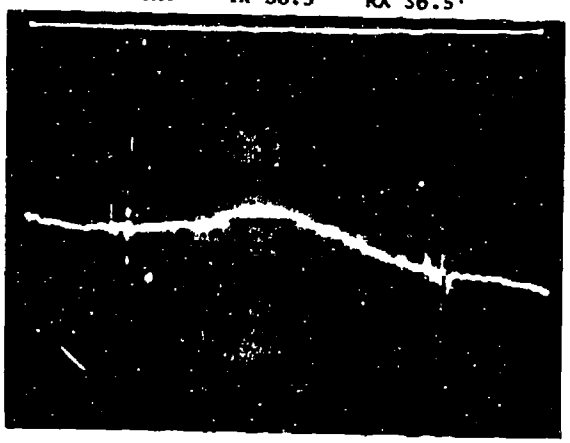
HORIZONTAL SEPARATION - 6'

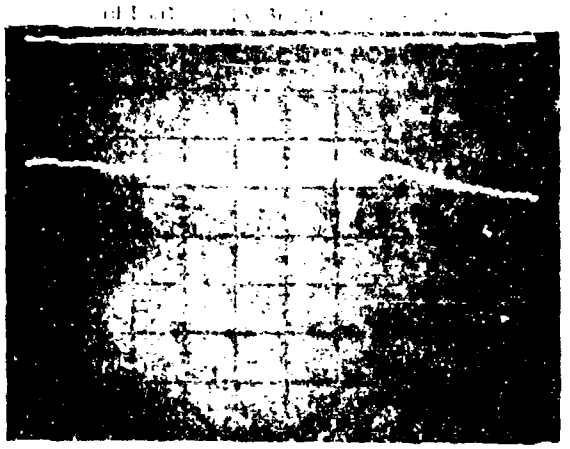
HEIGHT TX 36.5' RX 36.5'



HORIZONTAL SEPARATION - 8'

HEIGHT TX 36.5' RX 36.5'





ANTENNA

TRANSMIT	RECEIVE
AS-1018	AT-197

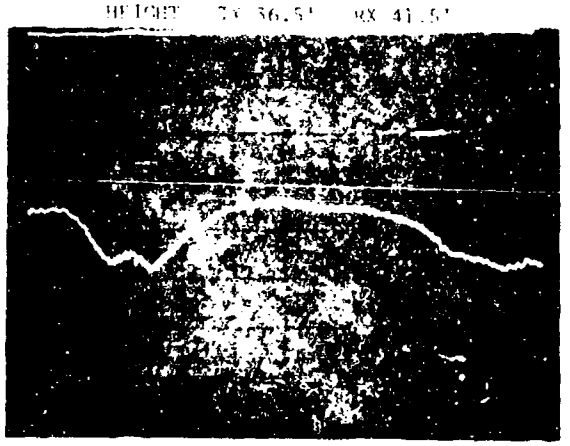
HORZ. SEPARATION - 7 FT.

REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 dB

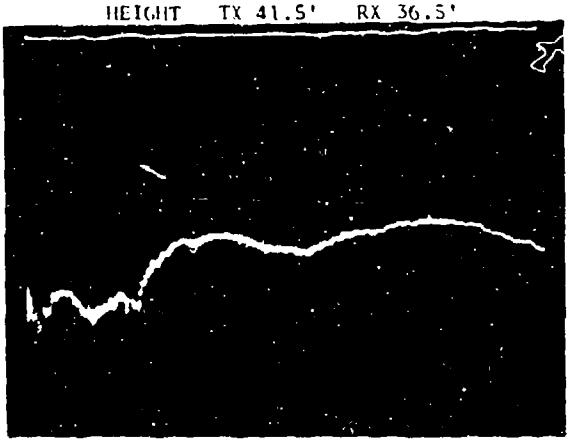
FREQUENCY RANGE 200-400 MHz

FREQUENCY SCALE 20 MHz/CM

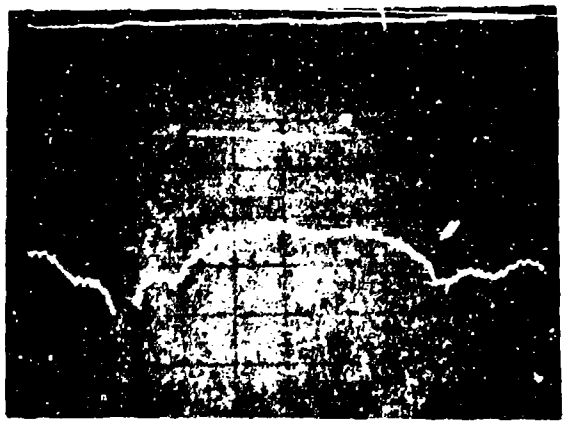
HEIGHT TX 36.5' RX 41.5'



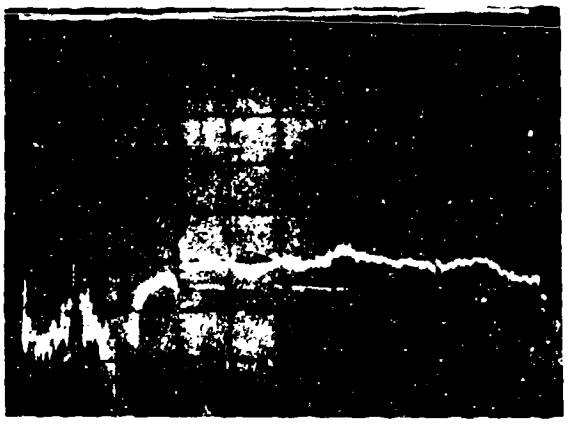
HEIGHT TX 41.5' RX 36.5'



HEIGHT TX 36.5' RX 46.5'



HEIGHT TX 46.5' RX 36.5'



ANTENNA

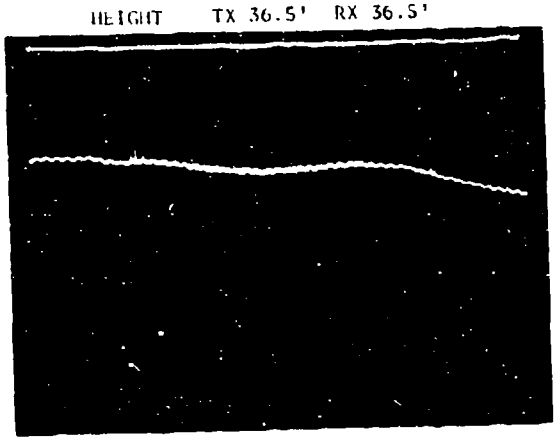
TRANSMIT	RECEIVE
AS-1018	AT-197

REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 dB

FREQUENCY RANGE	200-400 MHz
FREQUENCY SCALE	20 MHz/CM

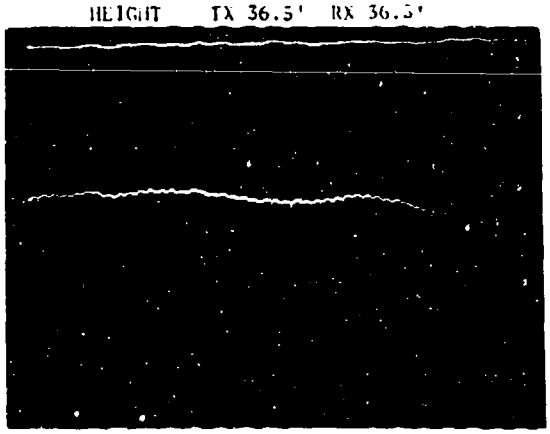
HORIZONTAL SEPARATION - 6'

HEIGHT TX 36.5' RX 36.5'

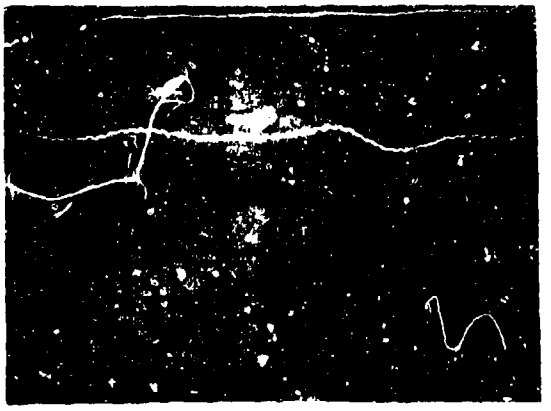


HORIZONTAL SEPARATION - 8'

HEIGHT TX 36.5' RX 36.5'



HEIGHT TX 36.5' RX 36.5'



ANTENNA

TRANSMIT	RECEIVE
AS-1018	AS-1018

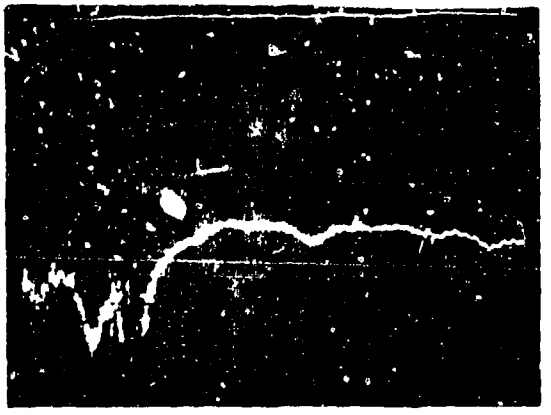
HORZ. SEPARATION - 7 FT.

REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 dB

FREQUENCY RANGE 200-400 MHz

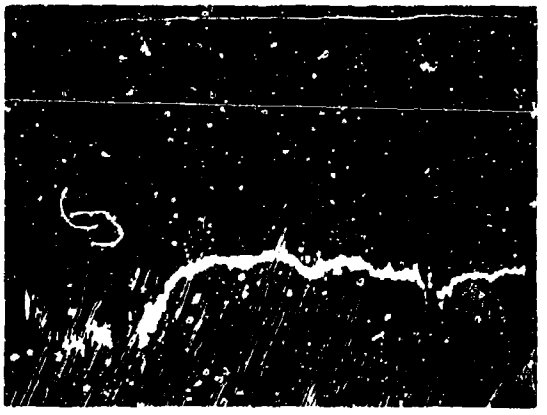
FREQUENCY SCALE 20 MHz/CM

HEIGHT TX 36.5' RX 41.5'

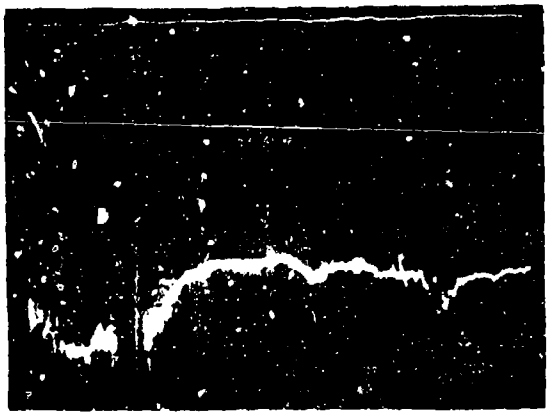


HEIGHT TX 41.5' RX 36.5'

HEIGHT TX 36.5' RX 46.5'



HEIGHT TX 46.5' RX 36.5'



32'

ANTENNA

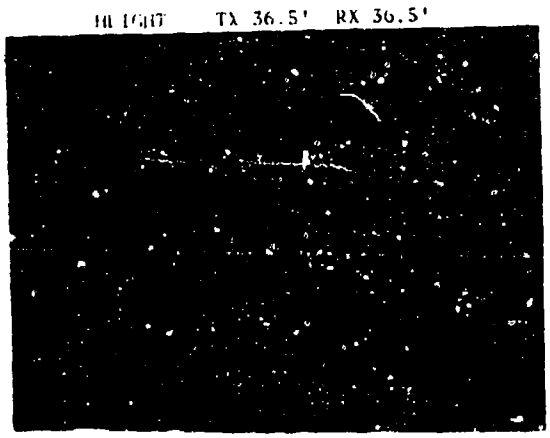
TRANSMIT	RECEIVE
AS-1018	AS-1018

REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 dB

FREQUENCY RANGE	200-400 MHz
FREQUENCY SCALE	20 MHz/CM

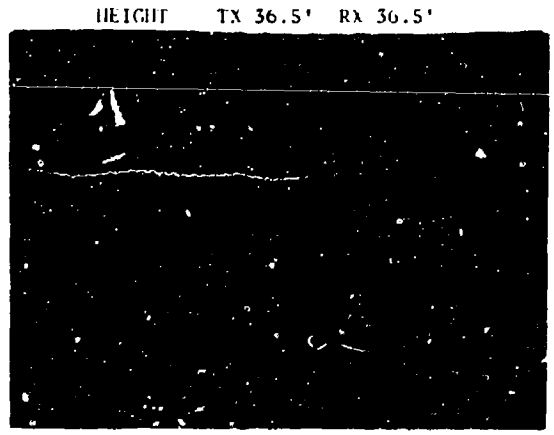
HORIZONTAL SEPARATION - 6'

HEIGHT TX 36.5' RX 36.5'

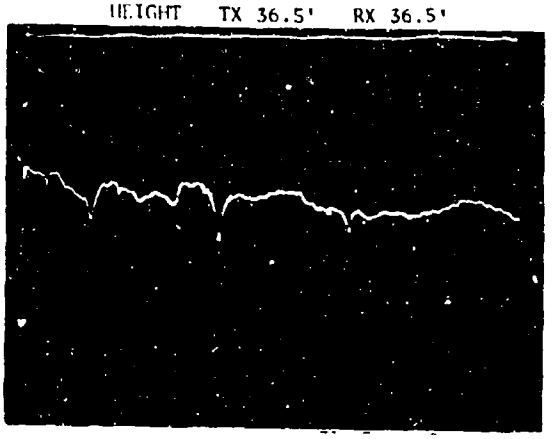


HORIZONTAL SEPARATION - 8'

HEIGHT TX 36.5' RX 36.5'



HEIGHT TX 36.5' RX 36.5'



ANTENNA

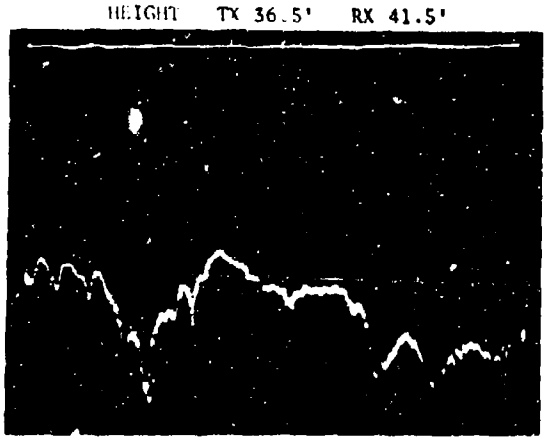
TRANSMIT	RECEIVE
AS-1018	AS-1097

HORZ. SEPARATION - 7 FT.

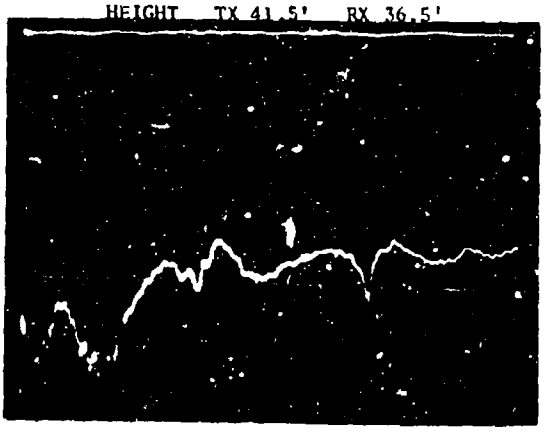
REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 dB

FREQUENCY RANGE	200-400 MHz
FREQUENCY SCALE	20 MHz/CM

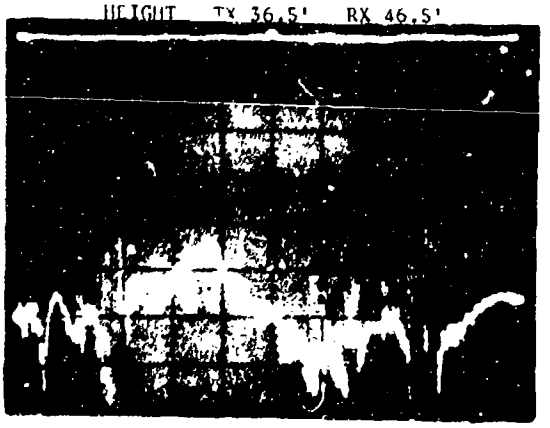
HEIGHT TX 36.5' RX 41.5'



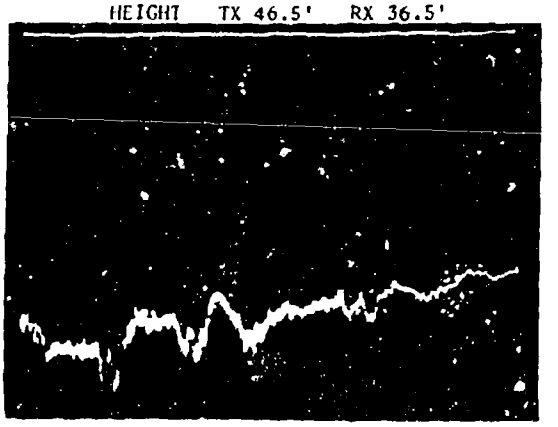
HEIGHT TX 41.5' RX 36.5'



HEIGHT TX 36.5' RX 46.5'



HEIGHT TX 46.5' RX 36.5'



ANTENNA

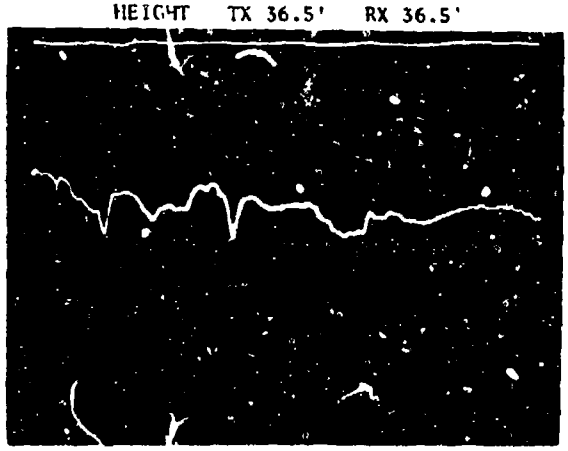
TRANSMIT	RECEIVE
AS-1018	AS-1097

REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 dB

FREQUENCY RANGE	200-400 MHz
FREQUENCY SCALE	20 MHz/CM

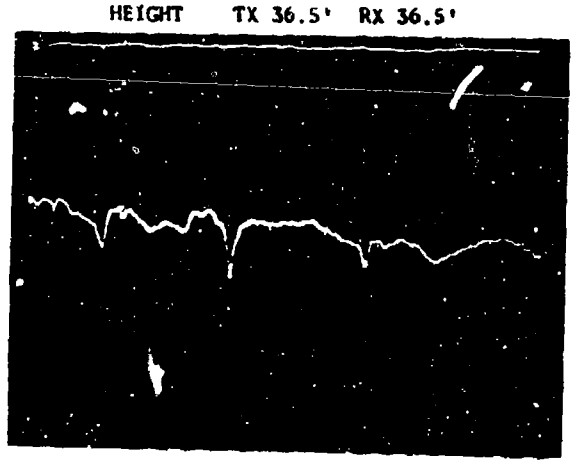
HORIZONTAL SEPARATION - 6'

HEIGHT TX 36.5' RX 36.5'

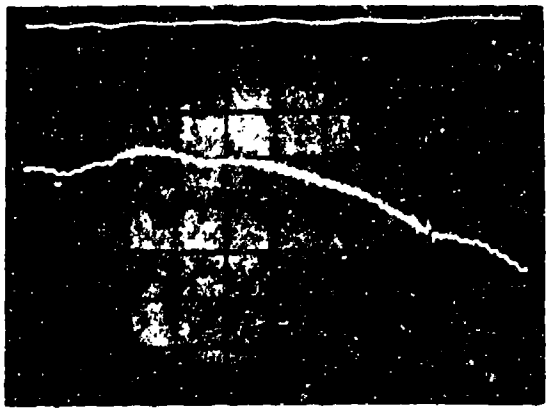


HORIZONTAL SEPARATION - 8'

HEIGHT TX 36.5' RX 36.5'



HEIGHT TX 36.5' RX 36.5'



ANTENNA

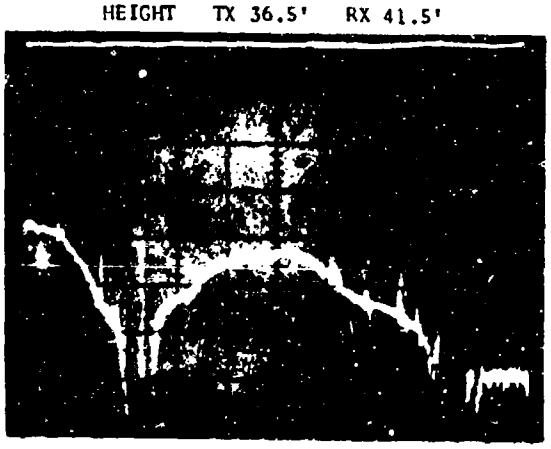
TRANSMIT	RECEIVE
AS-1018	AS-1181

HORZ. SEPARATION - 7 FT.

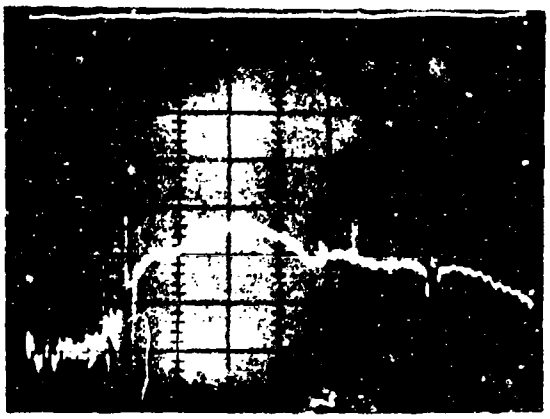
REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 dB

FREQUENCY RANGE	200-400 MHz
FREQUENCY SCALE	20 MHz/CM

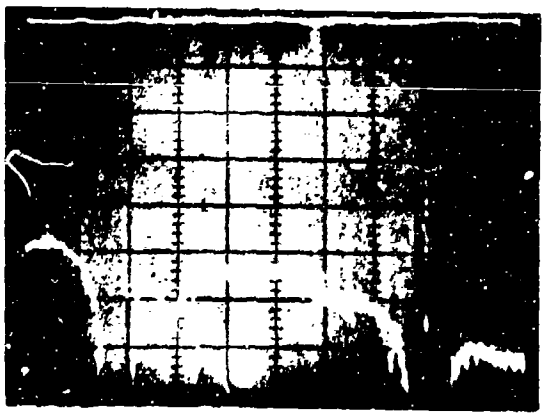
HEIGHT TX 36.5' RX 41.5'



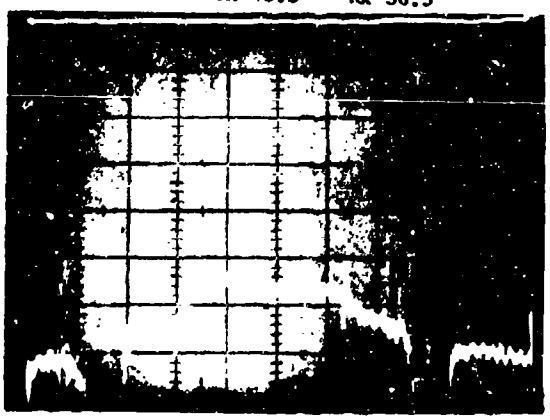
HEIGHT TX 41.5' RX 36.5'



HEIGHT TX 36.5' RX 46.5'



HEIGHT TX 46.5' RX 36.5'



ANTENNA

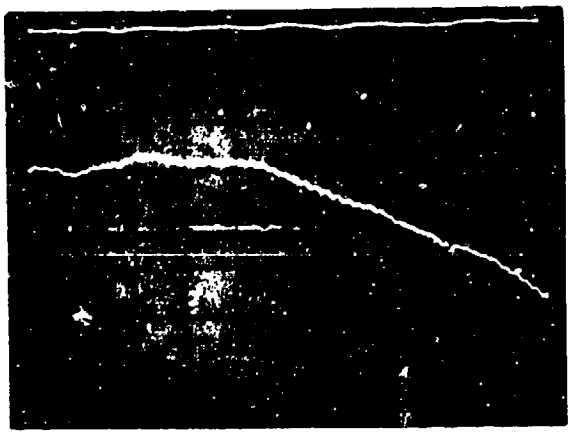
TRANSMIT	RECEIVE
AS-1018	AS-1181

REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 dB

FREQUENCY RANGE	200-400 MHz
FREQUENCY SCALE	20 MHz/CM

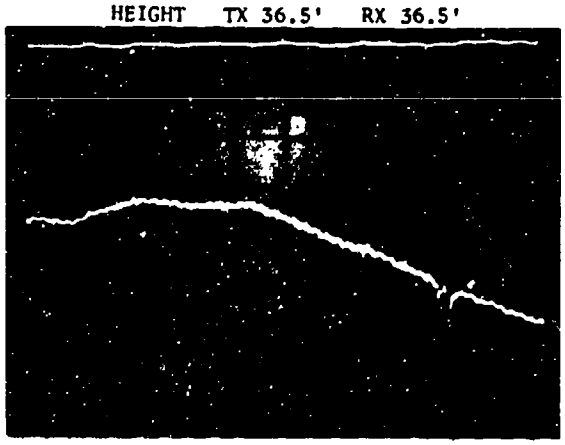
HORIZONTAL SEPARATION - 6'

HEIGHT TX 36.5' RX 36.5'

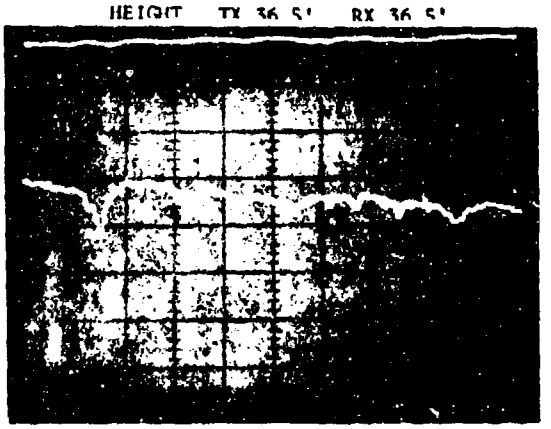


HORIZONTAL SEPARATION - 8'

HEIGHT TX 36.5' RX 36.5'



HEIGHT TX 36.5' RX 36.5'



ANTENNA

TRANSMIT	RECEIVE
AS-1097	AT-197

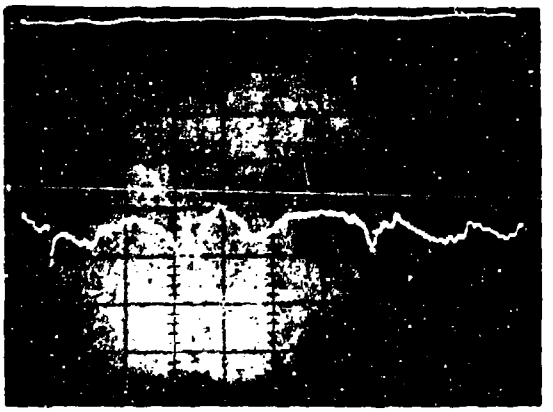
HORZ. SEPARATION - 7 FT.

REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 dB

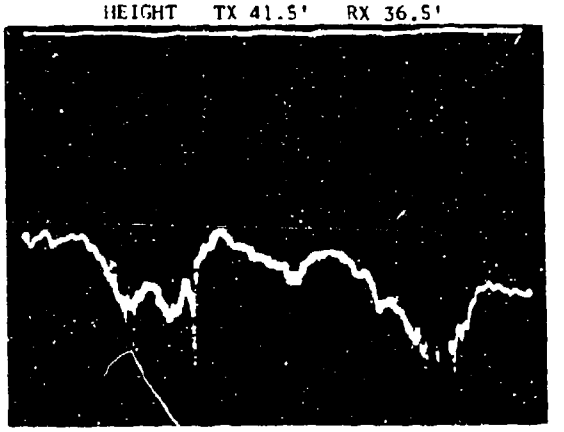
FREQUENCY RANGE 200-400 MHz

FREQUENCY SCALE 20 MHz/CM

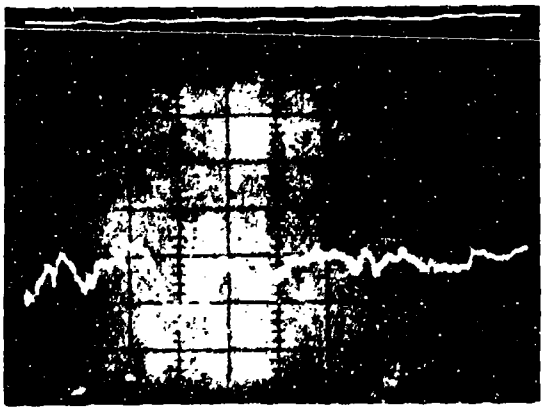
HEIGHT TX 36.5' RX 41.5'



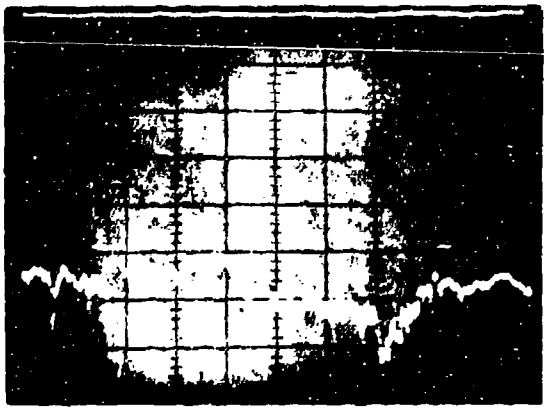
HEIGHT TX 41.5' RX 36.5'



HEIGHT TX 36.5' RX 46.5'



HEIGHT TX 46.5' RX 36.5'



ANTENNA

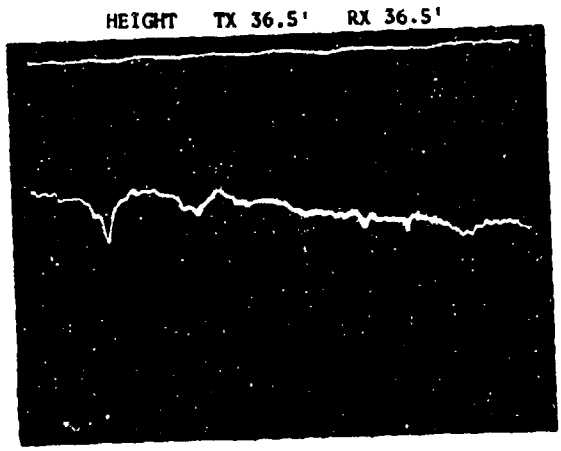
TRANSMIT	RECEIVE
AS-1097	AT-197

REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 dB

FREQUENCY RANGE	200-400 MHz
FREQUENCY SCALE	20 MHz/CM

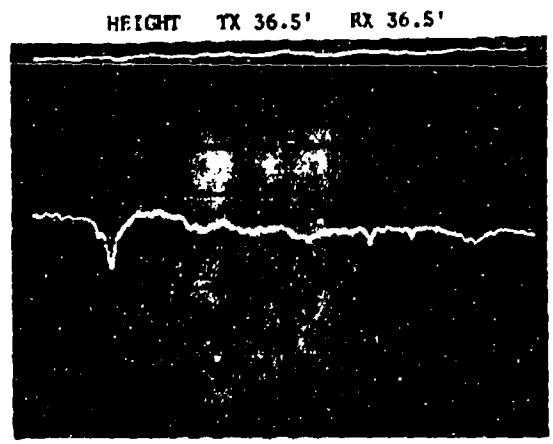
HORIZONTAL SEPARATION - 6'

HEIGHT TX 36.5' RX 36.5'

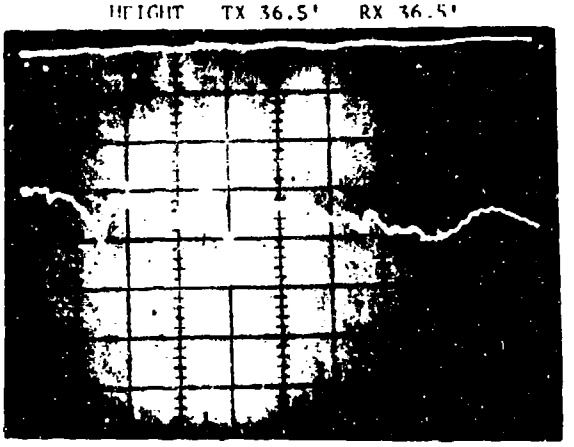


HORIZONTAL SEPARATION - 8'

HEIGHT TX 36.5' RX 36.5'



HEIGHT TX 36.5' RX 36.5'



ANTENNA

TRANSMIT	RECEIVE
AS-1097	AS-1018

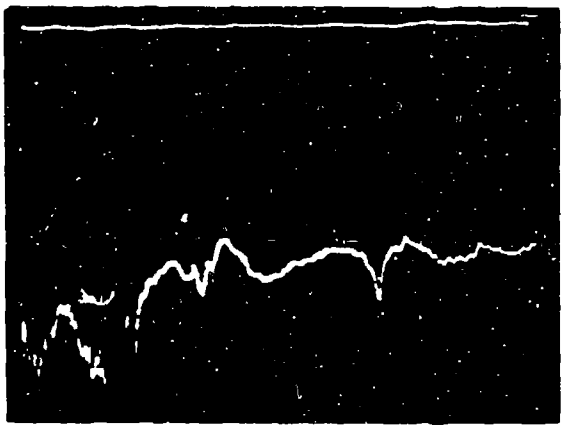
HORZ. SEPARTION - 7 F.T

REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 dB

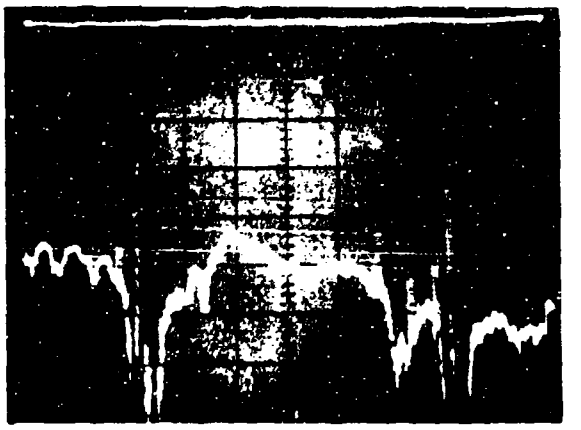
FREQUENCY RANGE 200-400 MHz

FREQUENCY SCALE 20 MHz/CM

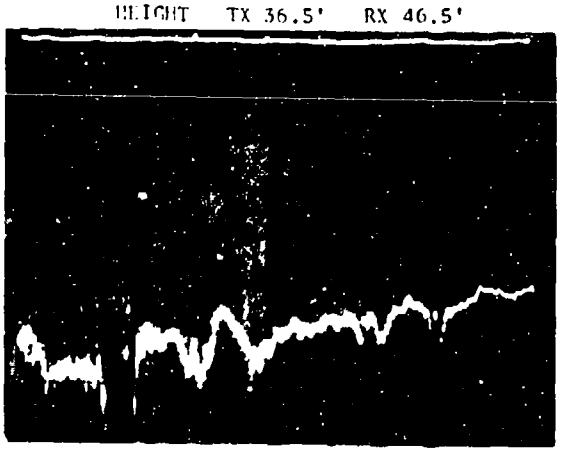
HEIGHT TX 36.5' RX 41.5'



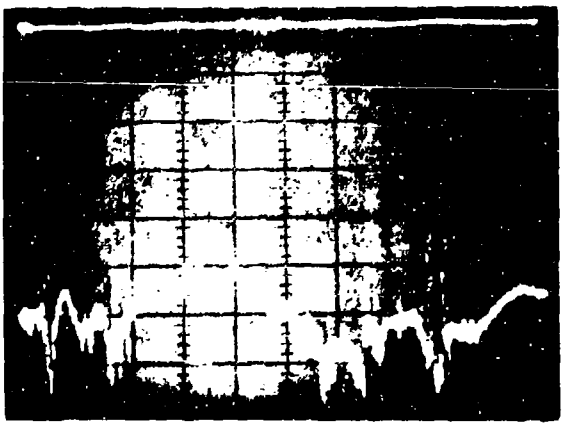
HEIGHT TX 41.5' RX 36.5'



HEIGHT TX 36.5' RX 46.5'



HEIGHT TX 46.5' RX 36.5'



ANTENNA

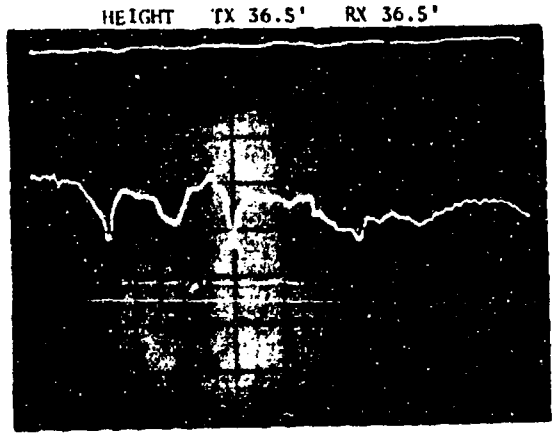
TRANSMIT	RECEIVE
AS-1097	AS-1018

REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 dB

FREQUENCY RANGE	200-400 MHz
FREQUENCY SCALE	20 MHz/CM

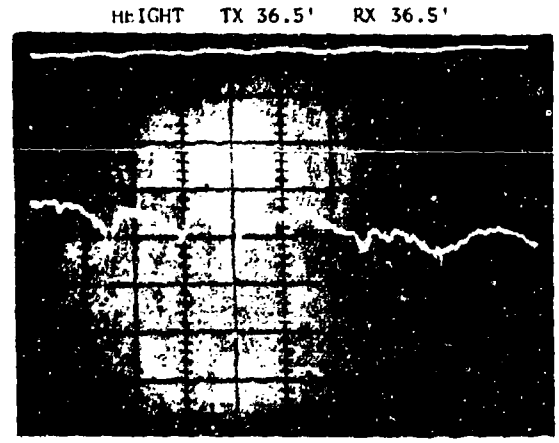
HORIZONTAL SEPARATION - 6'

HEIGHT TX 36.5' RX 36.5'

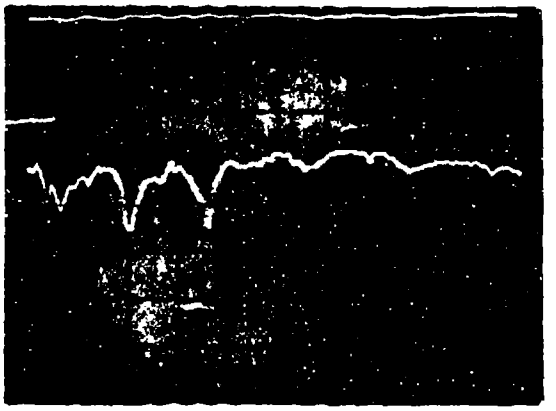


HORIZONTAL SEPARATION - 8'

HEIGHT TX 36.5' RX 36.5'



HEIGHT TX 36.5' RX 36.5'



ANTENNA

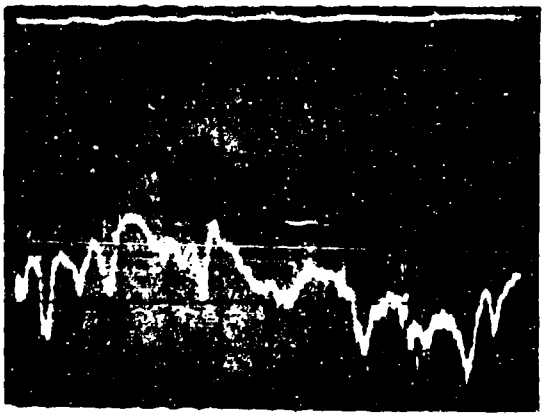
TRANSMIT	RECEIVE
AS-1097	AS-1097

HORZ. SEPARATION - 7 FT.

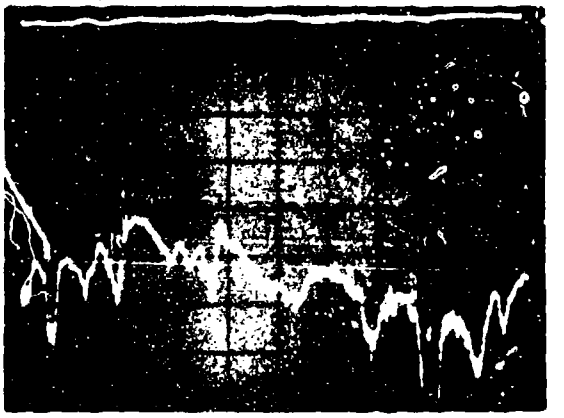
REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 dB

FREQUENCY RANGE	200-400 MHz
FREQUENCY SCALE	20 MHz/CM

HEIGHT TX 36.5' RX 41.5'

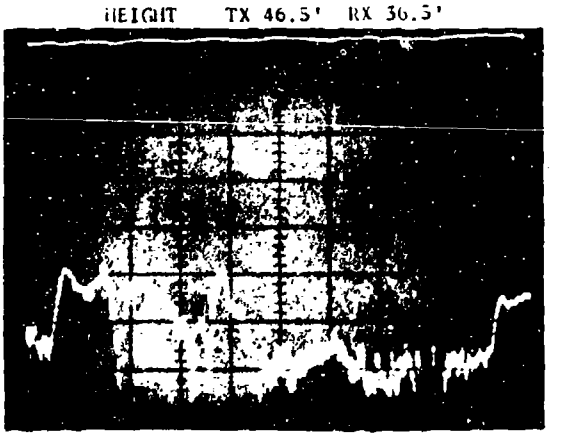


HEIGHT TX 41.5' RX 36.5'



HEIGHT TX 36.5' RX 46.5'

HEIGHT TX 46.5' RX 36.5'



ANTENNA

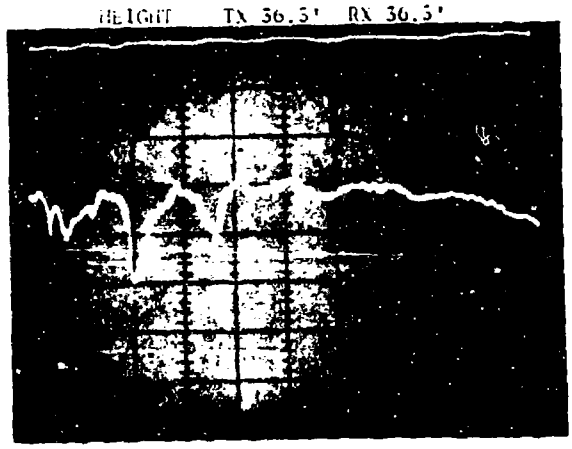
TRANSMIT	RECEIVE
AS-1097	AS-1097

REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 dB

FREQUENCY RANGE	200-400 MHz
FREQUENCY SCALE	20 MHz/CM

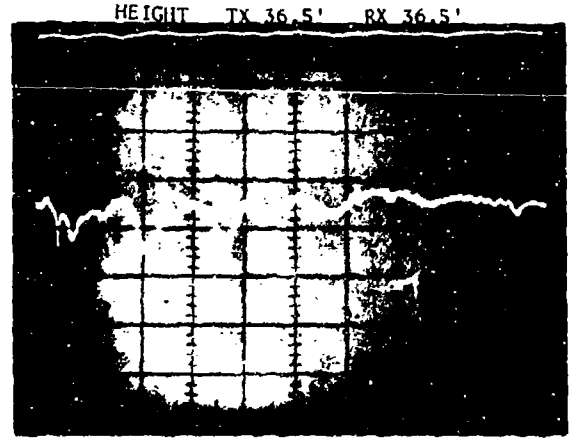
HORIZONTAL SEPARATION - 6'

HEIGHT TX 36.5' RX 36.5'

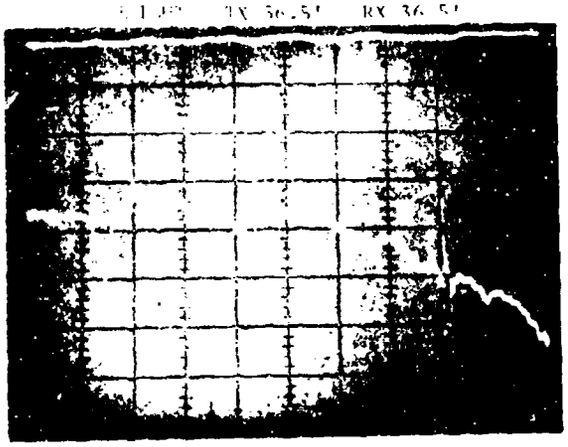


HORIZONTAL SEPARATION - 8'

HEIGHT TX 36.5' RX 36.5'



HEIGHT TX 36.5' RX 36.5'



ANTENNA

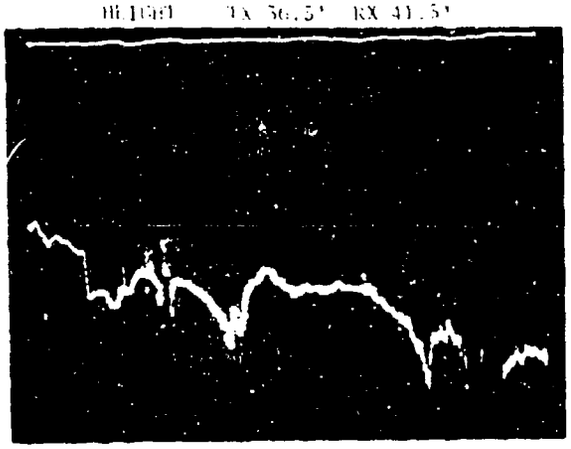
TRANSMIT	RECEIVE
AS-1917	AS-2181

HORZ. SEPARATION - 7 FT.

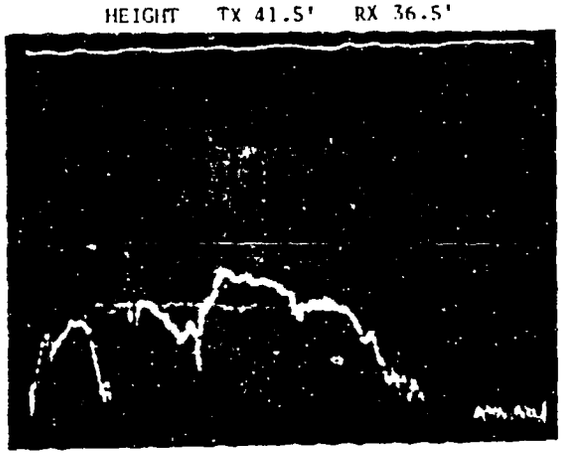
REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 dB

FREQUENCY RANGE	200-400 MHz
FREQUENCY SCALE	20 MHz/CM

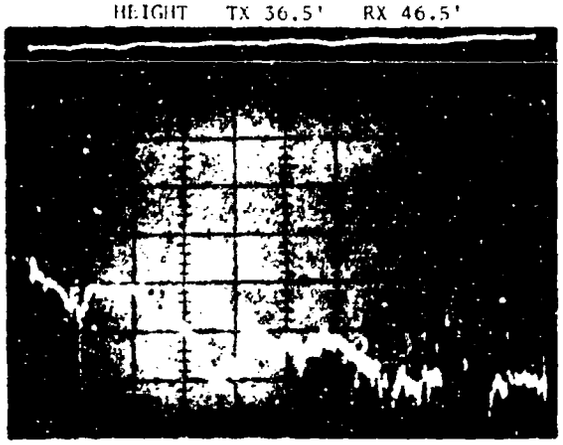
HEIGHT TX 36.5' RX 41.5'



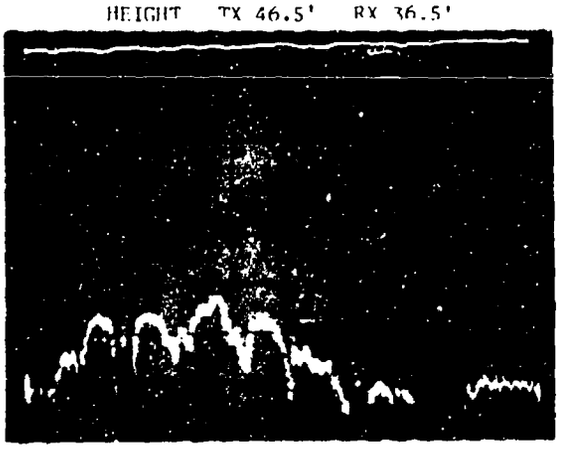
HEIGHT TX 41.5' RX 36.5'



HEIGHT TX 36.5' RX 46.5'



HEIGHT TX 46.5' RX 36.5'



ANTENNA

TRANSMIT	RECEIVE
AS-1097	AS-1181

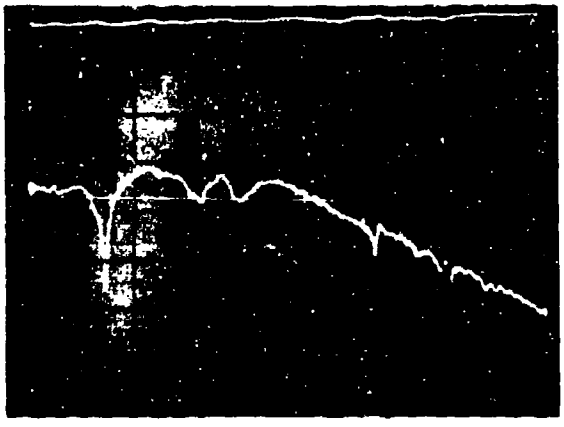
REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 dB

FREQUENCY RANGE 200-400 MHz

FREQUENCY SCALE 20 MHz/CM

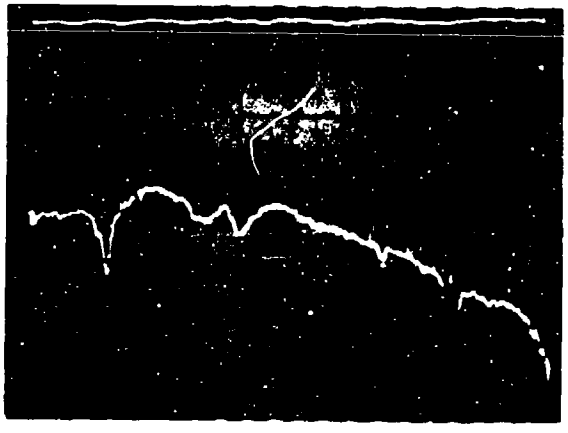
HORIZONTAL SEPARATION - 6'

HEIGHT TX 36.5' RX 36.5'

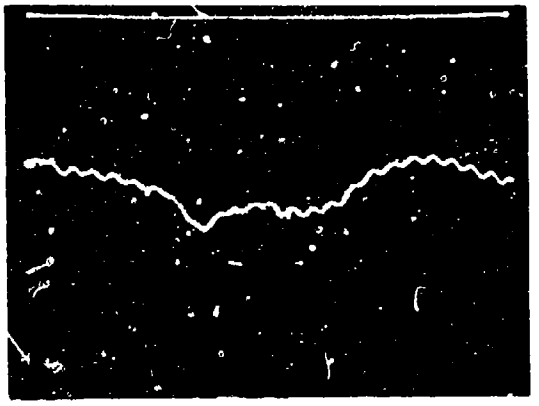


HORIZONTAL SEPARATION - 8'

HEIGHT TX 36.5' RX 36.5'



HEIGHT TX 36.5' RX 36.5'



ANTENNA

TRANSMIT	RECEIVE
AS-1181	AT-197

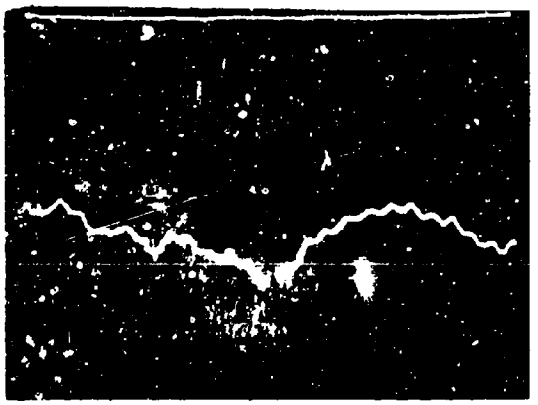
HORZ. SEPARATION - 7 FT.

REC. PWR/GEN. PWR
10dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 3.4-5.0 dB

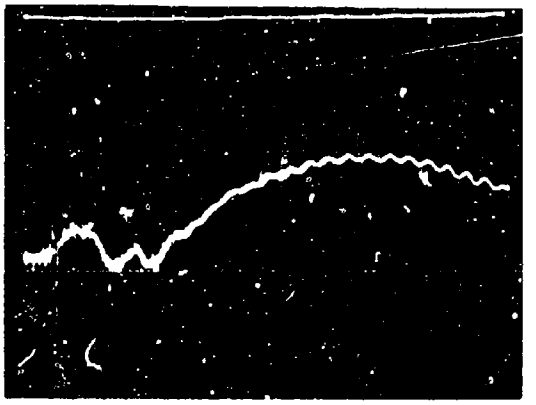
FREQUENCY RANGE 100-200 MHz

FREQUENCY SCALE 10 MHz/CM

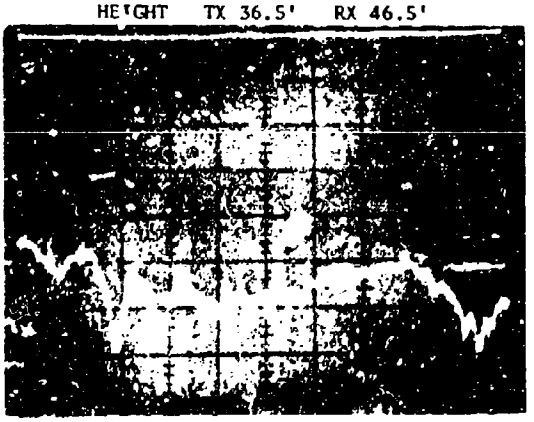
HEIGHT TX 36.5' RX 41.5'



HEIGHT TX 41.5' RX 36.5'



HEIGHT TX 36.5' RX 46.5'



HEIGHT TX 46.5' RX 36.5'

ANTENNA

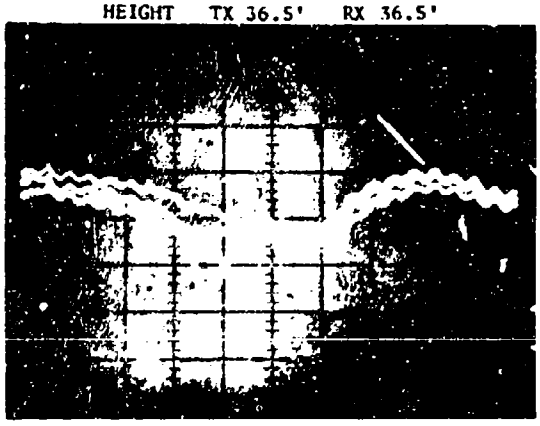
TRANSMIT	RECEIVE
AS-1181	AT-197

REC. PWR/GEN. PWR
10dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 3.4-5.0 dB

FREQUENCY RANGE 100-200 MHz

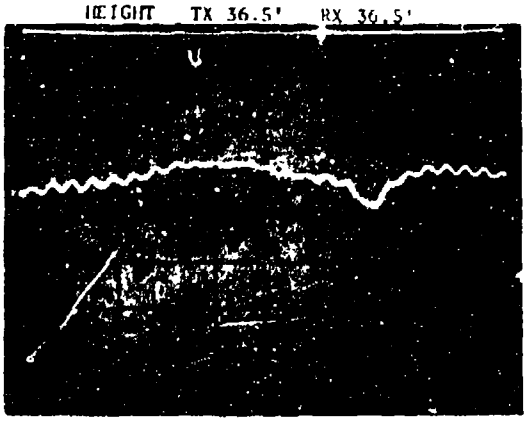
FREQUENCY SCALE 10 MHz/CM

HEIGHT TX 36.5' RX 36.5'



HORIZONTAL SEPARATION - 6'-7'-8'

HEIGHT TX 36.5' RX 36.5'



ANTENNA

TRANSMIT	RECEIVE
AS-1181	AS-1018

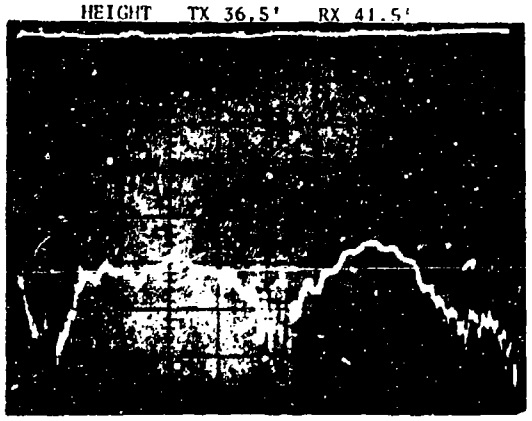
HORZ. SEPARATION - 7 FT.

REC. PWR/GEN. PWR
10dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 3.4-5.0 dB

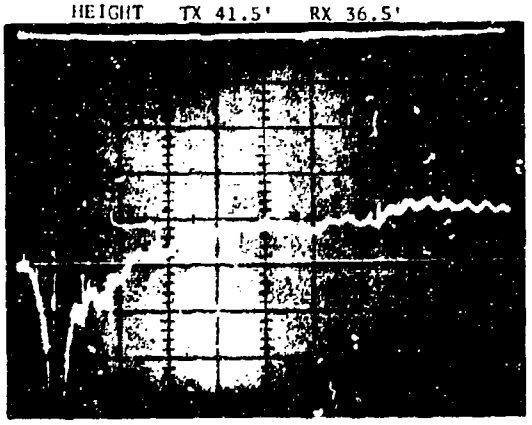
FREQUENCY RANGE 100-200 MHz

FREQUENCY SCALE 10 MHz/MC

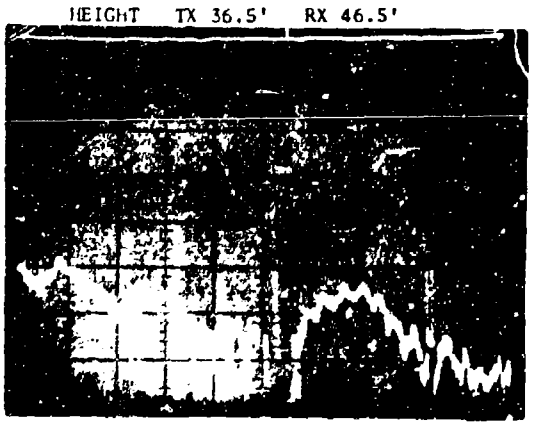
HEIGHT TX 36.5' RX 41.5'



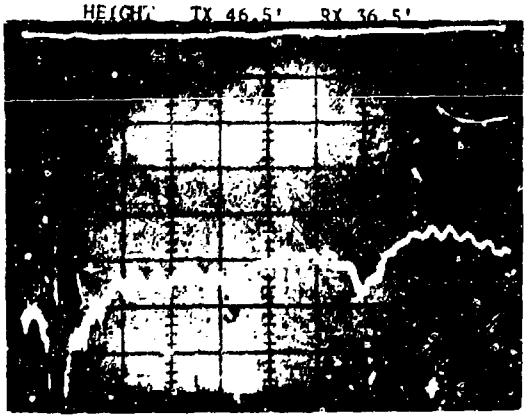
HEIGHT TX 41.5' RX 36.5'



HEIGHT TX 36.5' RX 46.5'



HEIGHT TX 46.5' RX 36.5'



ANTENNA

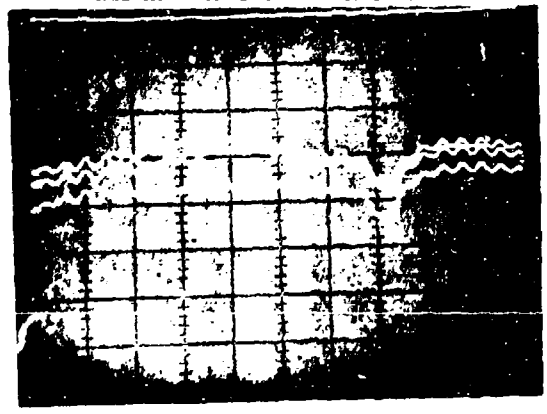
TRANSMIT	RECEIVE
AS-1181	AS-1018

REC. PWR/GEN. PWR
10dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 3.4-5.0 dB

FREQUENCY RANGE 100-200 MHz

FREQUENCY SCALE 10 MHz/CM

HEIGHT TX 36.5' RX 36.5'



HORIZONTAL SEPARATION - 6'-7'-8'

HEIGHT TX 36.5' RX 36.5'

ANTENNA

TRANSMIT	RECEIVE
AS-1181	AS-1097

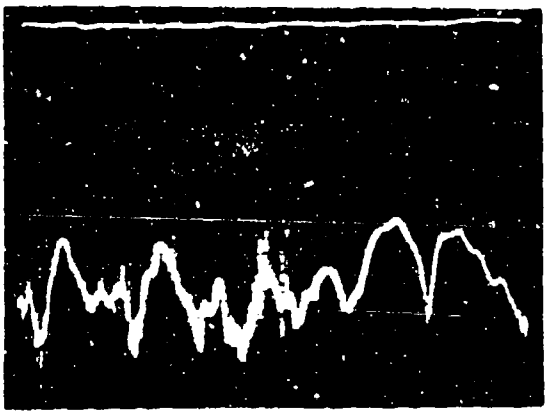
HORZ. SEPARATION - 7 FT.

REC. PWR/GEN. PWR
10dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 3.4-5.0 dB

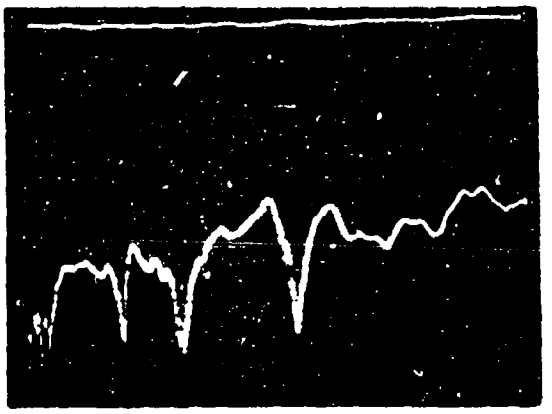
FREQUENCY RANGE 100-200 MHz

FREQUENCY SCALE 10 MHz/CM

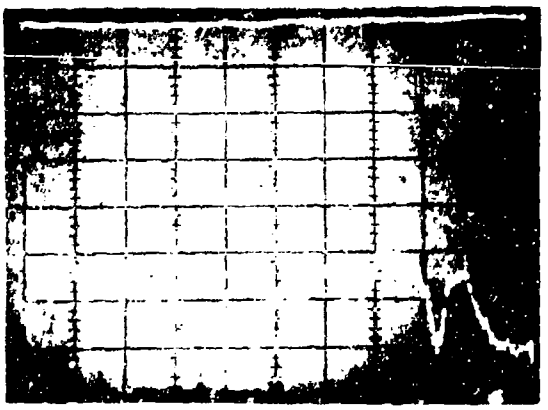
HEIGHT TX 36.5' RX 41.5'



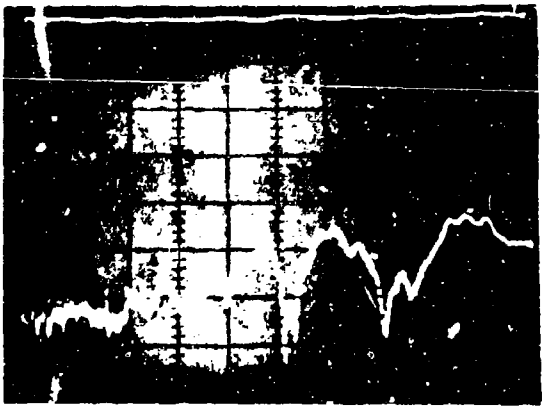
HEIGHT TX 41.5' RX 36.5'



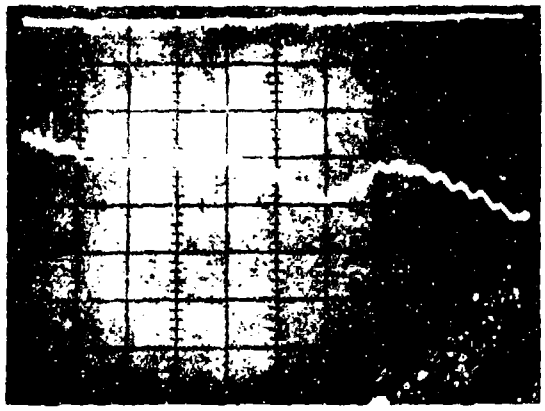
HEIGHT TX 36.5' RX 46.5'



HEIGHT TX 46.5' RX 36.5'



HEIGHT TX 36.5' RX 36.5'



ANTENNA

TRANSMIT	RECEIVE
AS-1181	AS-1181

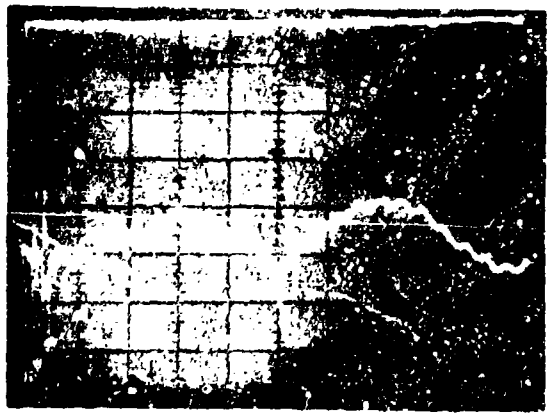
HORZ. SEPARATION - 7 FT.

REC. PWR/CEN PWR
10 DB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 3.4-5.0 dB

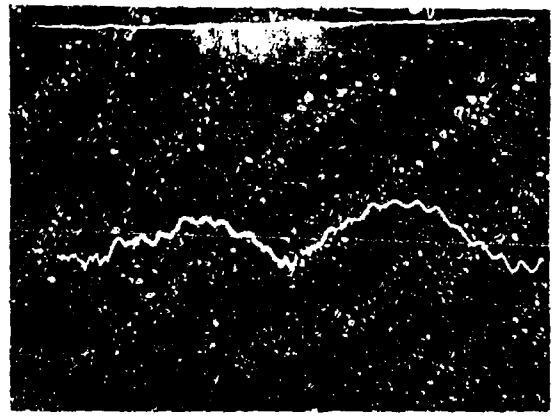
FREQUENCY RANGE 100-200 MHz

FREQUENCY SCALE 10 MHz/CM

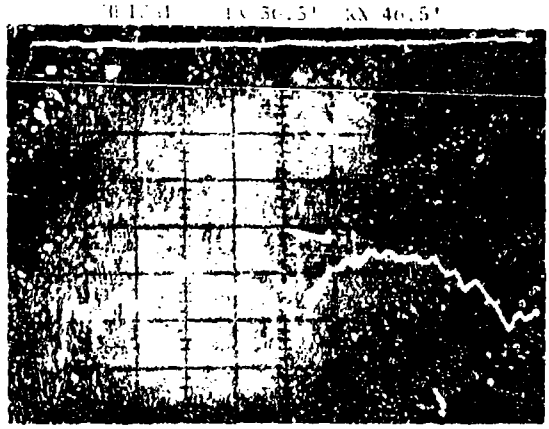
HEIGHT TX 36.5' RX 41.5'



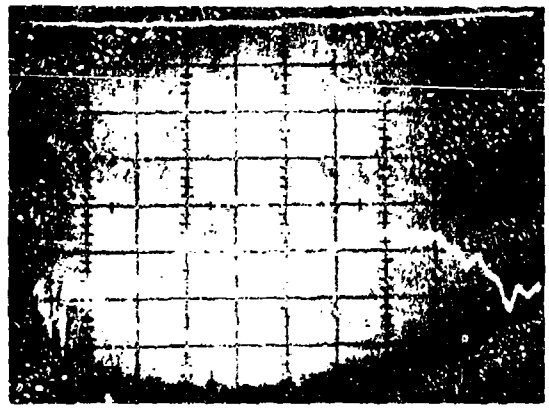
HEIGHT TX 41.5' RX 36.5'



HEIGHT TX 36.5' RX 46.5'



HEIGHT TX 46.5' RX 36.5'



ANTENNA

TRANSMIT	RECEIVE
AS-1181	AS-1181

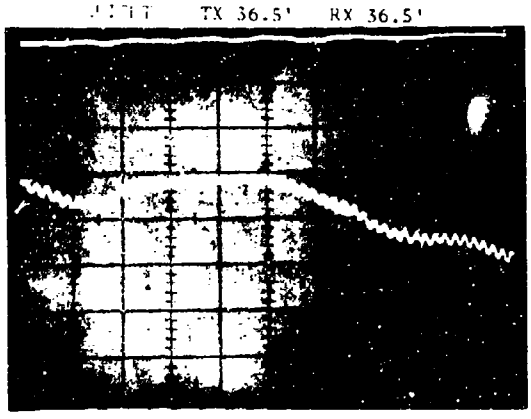
REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 3.4-5.0 dB

FREQUENCY RANGE 100-200 MHz

FREQUENCY SCALE 10 MHz/CM

HORIZONTAL SEPARATION - 6'-7'-8'

HEIGHT TX 36.5' RX 36.5'



ANTENNA

TRANSMIT	RECEIVE
AS-1181	AT-197

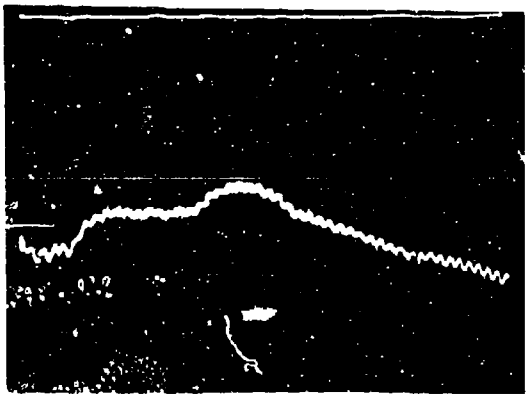
HORZ. SEPARATION - 7 FT.

REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 dB

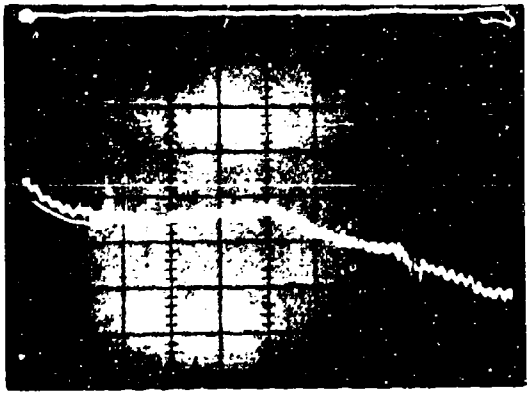
FREQUENCY RANGE 200-400 MHz

FREQUENCY SCALE 20 MHz/CM

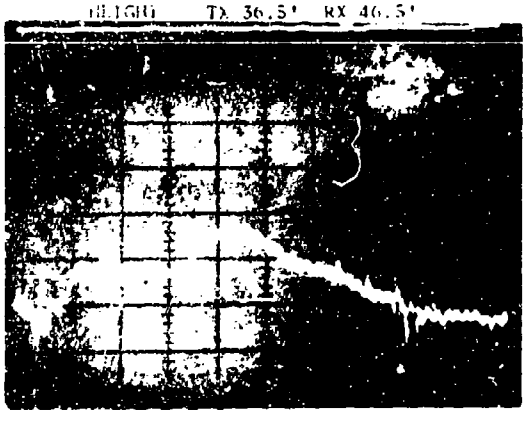
HEIGHT TX 36.5' RX 41.5'



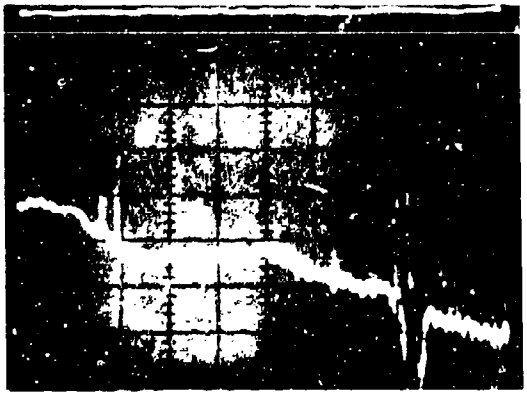
HEIGHT TX 41.5' RX 36.5'



HEIGHT TX 36.5' RX 46.5'



HEIGHT TX 46.5' RX 36.5'



ANTENNA

TRANSMIT	RECEIVE
AS-1181	AT-197

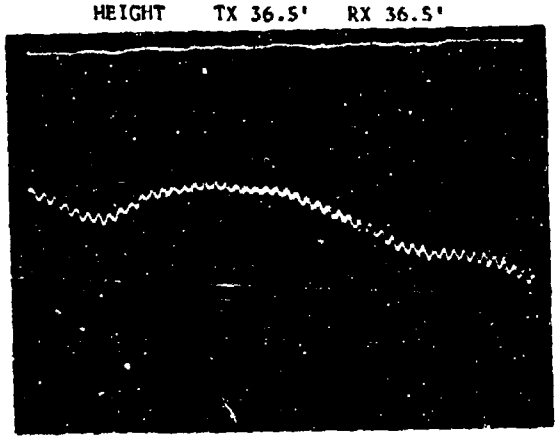
REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 dB

FREQUENCY RANGE 200-400 MHz

FREQUENCY SCALE 20 MHz/CM

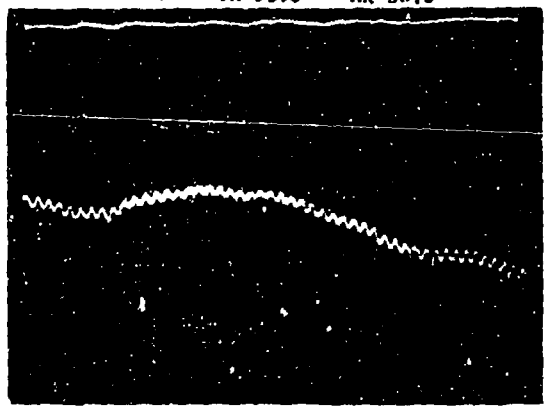
HORIZONTAL SEPARATION - 6'

HEIGHT TX 36.5' RX 36.5'

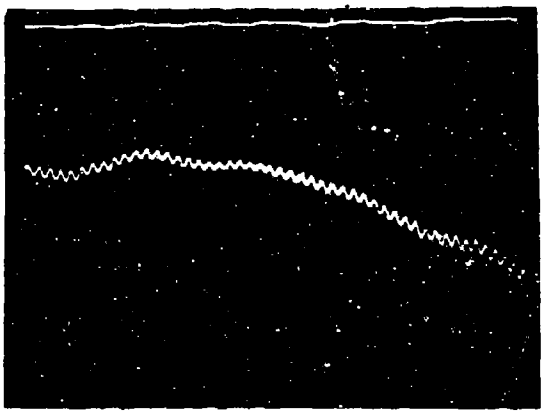


HORIZONTAL SEPARATION - 8'

HEIGHT TX 36.5' RX 36.5'



HEIGHT TX 36.5' RX 36.5'



ANTENNA

TRANSMIT	RECEIVE
AS-1181	AS-1018

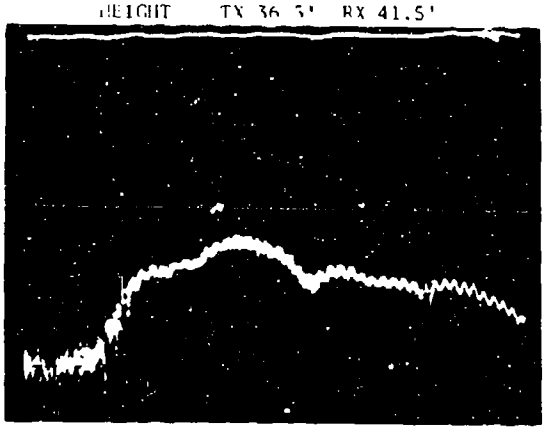
HORZ. SEPARATION - 7 FT.

REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 dB

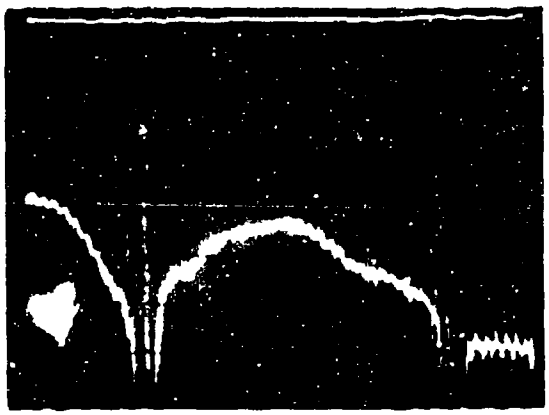
FREQUENCY RANGE 200-400 MHz

FREQUENCY SCALE 20 MHz/CM

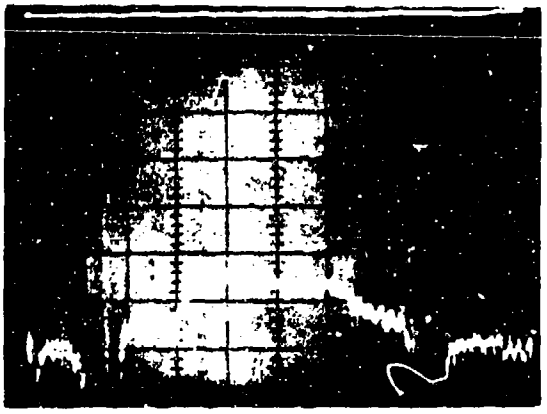
HEIGHT TX 36.5' RX 41.5'



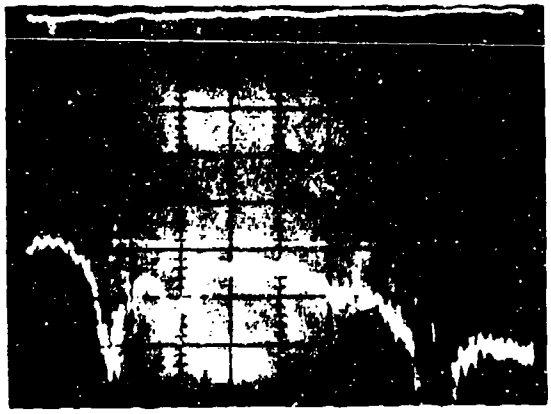
HEIGHT TX 41.5' RX 36.5'



HEIGHT TX 36.5' RX 46.5'



HEIGHT TX 46.5' RX 36.5'



ANTENNA

TRANSMIT	RECEIVE
AS-1181	AS-1018

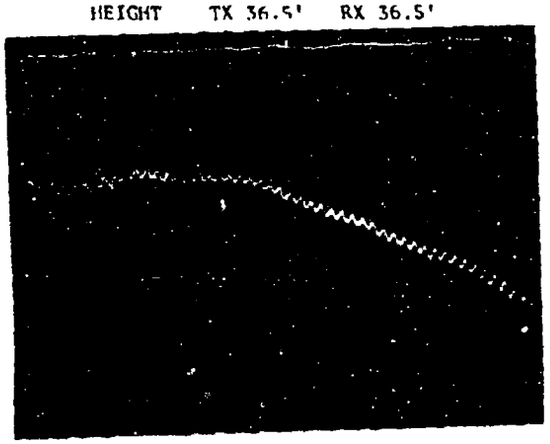
REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 dB

FREQUENCY RANGE 200-400 MHz

FREQUENCY SCALE 20 MHz/CM

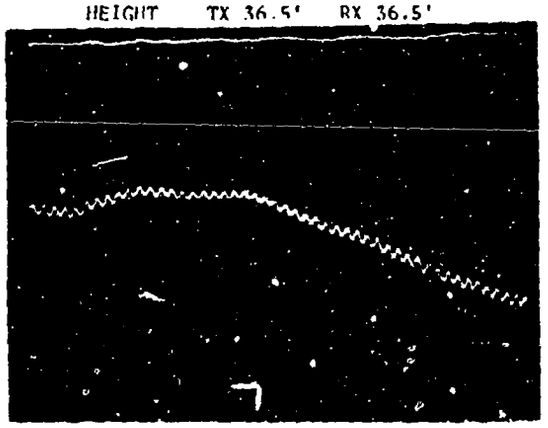
HORIZONTAL SEPARATION - 6'

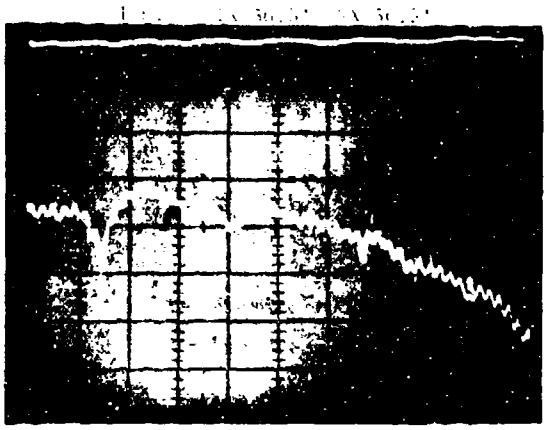
HEIGHT TX 36.5' RX 36.5'



HORIZONTAL SEPARATION - 8'

HEIGHT TX 36.5' RX 36.5'





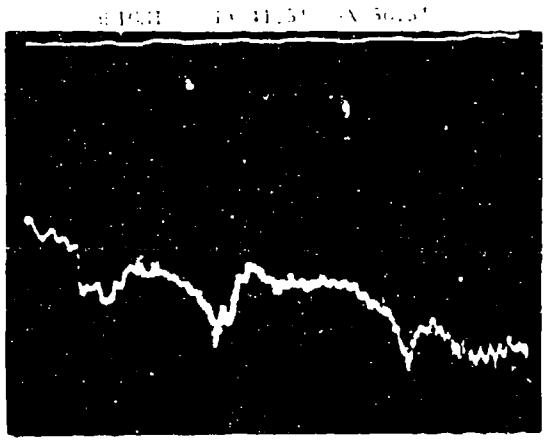
ANTENNA

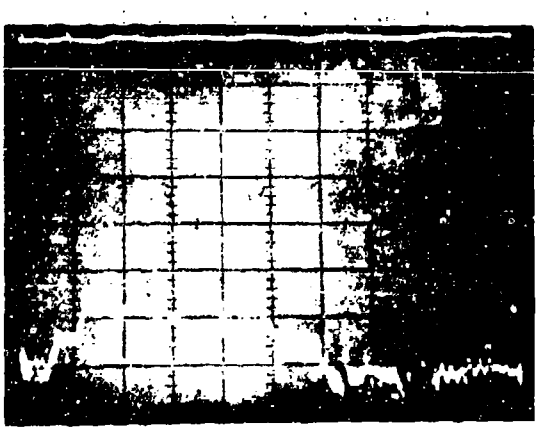
TRANSMIT	RECEIVE
AS-1181	AS-1097

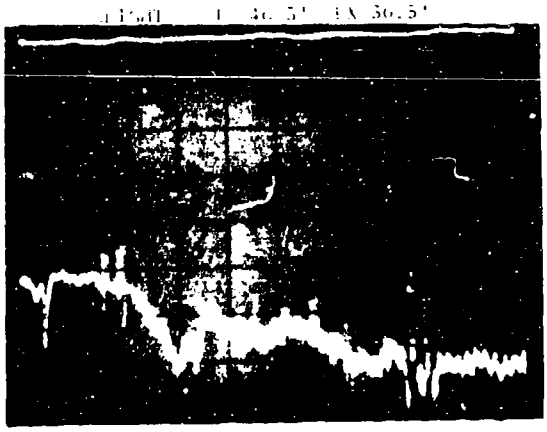
HORZ. SEPARATION - 7 FT.

REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 dB

FREQUENCY RANGE	200-400 MHz
FREQUENCY SCALE	20 MHz/CM







ANTENNA

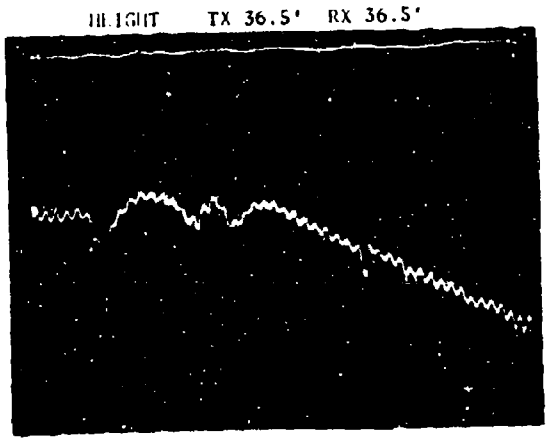
TRANSMIT	RECEIVE
AS-1181	AS-1097

REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 dB

FREQUENCY RANGE	200-400 MHz
FREQUENCY SCALE	20 MHz/CM

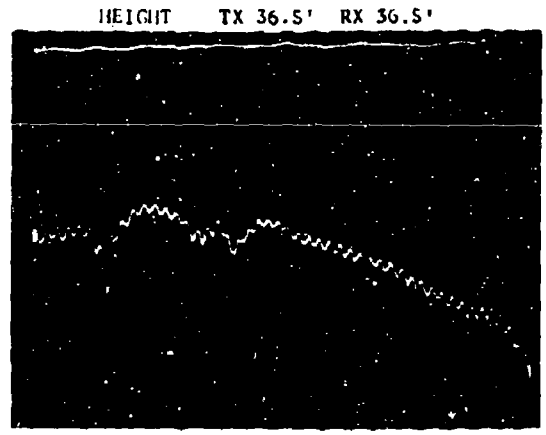
HORIZONTAL SEPARATION - 6'

HEIGHT TX 36.5' RX 36.5'

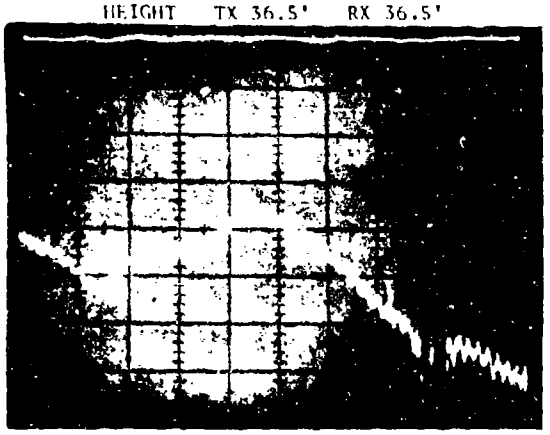


HORIZONTAL SEPARATION - 8'

HEIGHT TX 36.5' RX 36.5'



HEIGHT TX 36.5' RX 36.5'



ANTENNA

TRANSMIT	RECEIVE
AS-1181	AS-1181

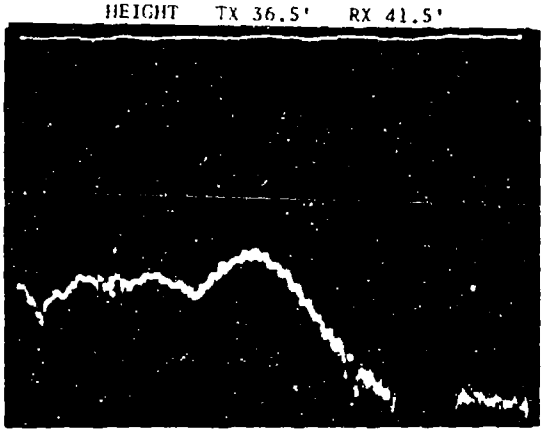
HORZ. SEPARATION - 7 FT.

REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 dB

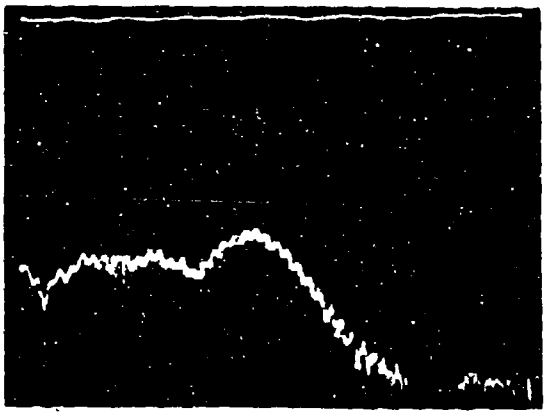
FREQUENCY RANGE 200-400 MHz

FREQUENCY SCALE 20 MHz/CM

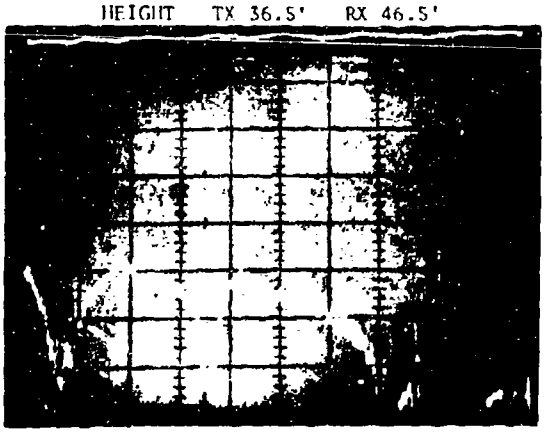
HEIGHT TX 36.5' RX 41.5'



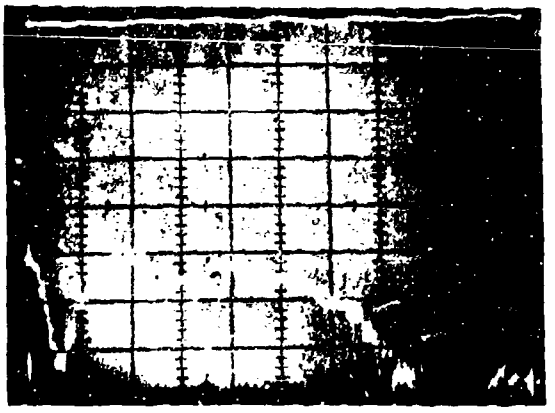
HEIGHT TX 41.5' RX 36.5'



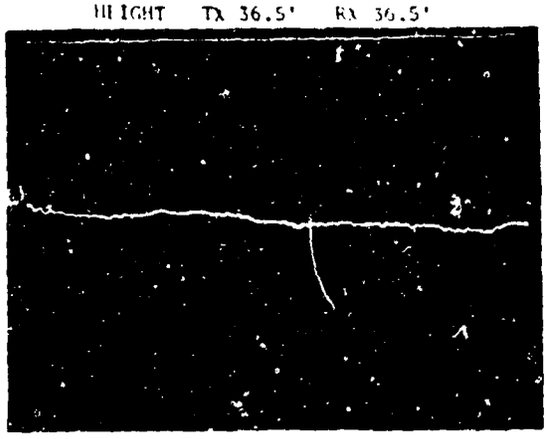
HEIGHT TX 36.5' RX 46.5'



HEIGHT TX 46.5' RX 36.5'



HEIGHT TX 36.5' RX 36.5'



ANTENNA

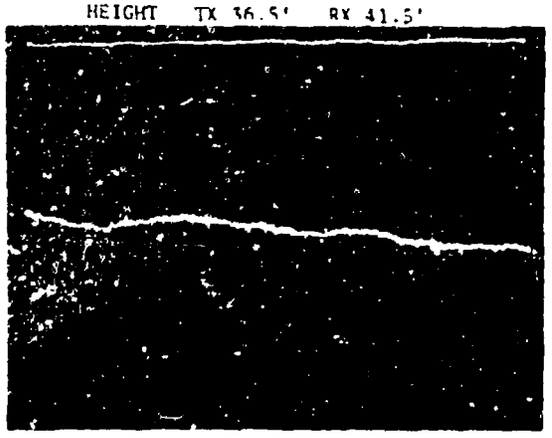
TRANSMIT	RECEIVE
AT-197	AT-197

HORZ. SEPARATION - 20 FT.

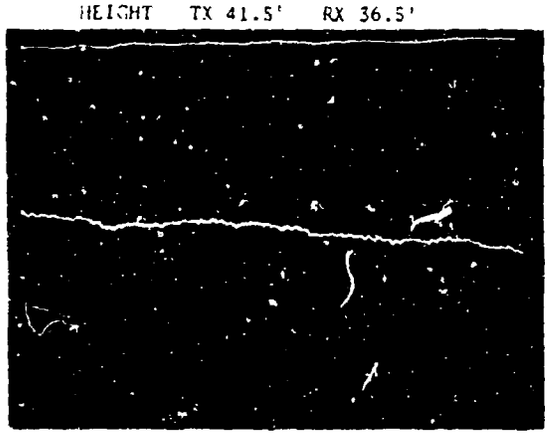
REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 dB

FREQUENCY RANGE	200-400 MHz
FREQUENCY SCALE	20 MHz/CM

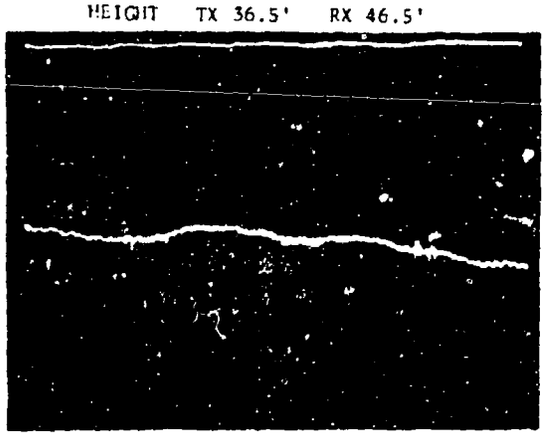
HEIGHT TX 36.5' RX 41.5'



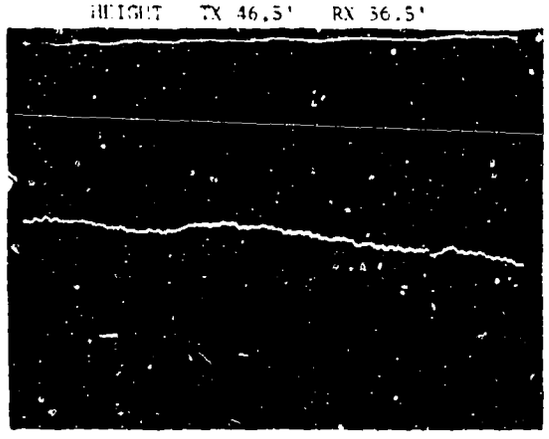
HEIGHT TX 41.5' RX 36.5'



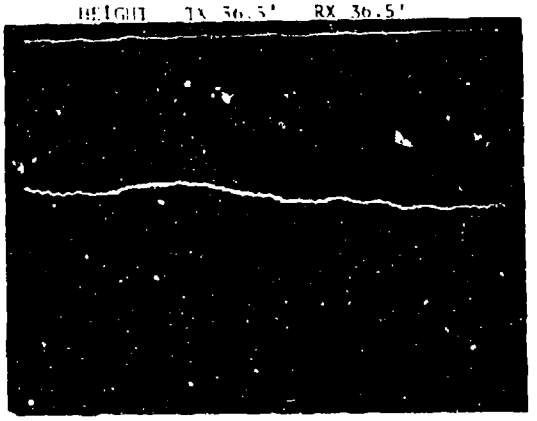
HEIGHT TX 36.5' RX 46.5'



HEIGHT TX 46.5' RX 36.5'



HEIGHT TX 36.5' RX 36.5'



ANTENNA

TRANSMIT	RECEIVE
AT-197	AS-1018

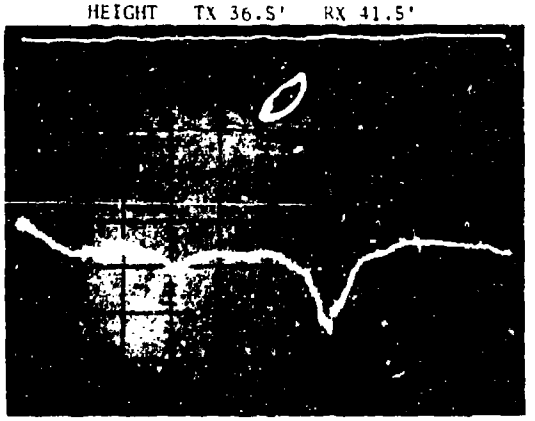
HORZ. SEPARATION - 20 FT.

REC. PWR/GEN PWR
10 db/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 db

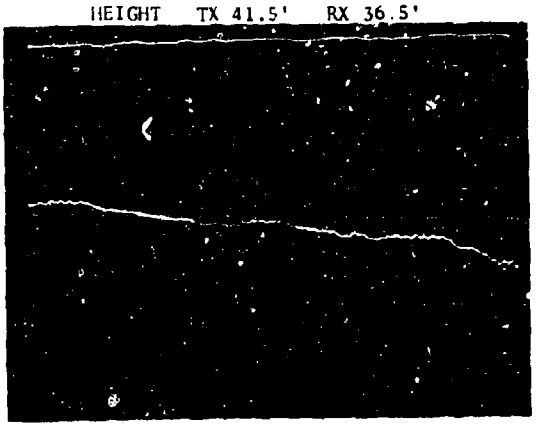
FREQUENCY RANGE 200-400 MHz

FREQUENCY SCALE 20 MHz/CM

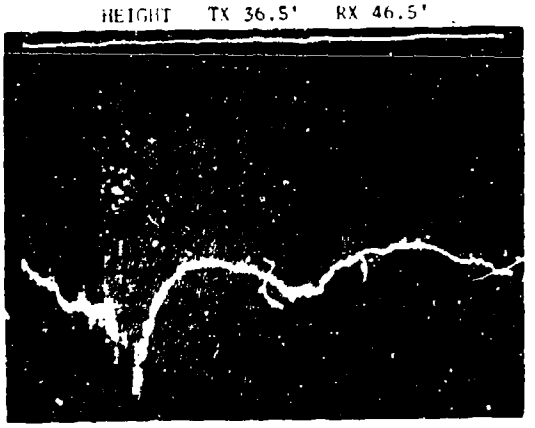
HEIGHT TX 36.5' RX 41.5'



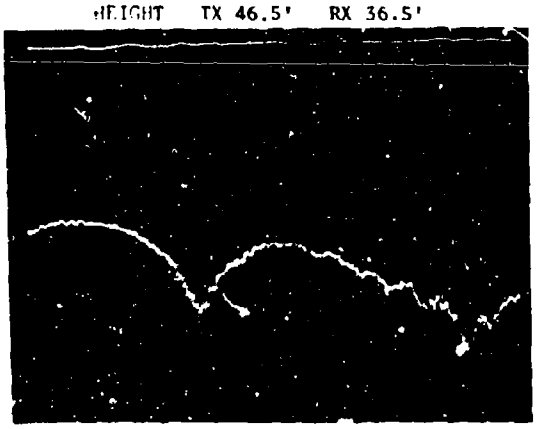
HEIGHT TX 41.5' RX 36.5'



HEIGHT TX 36.5' RX 46.5'



HEIGHT TX 46.5' RX 36.5'



ANTENNA

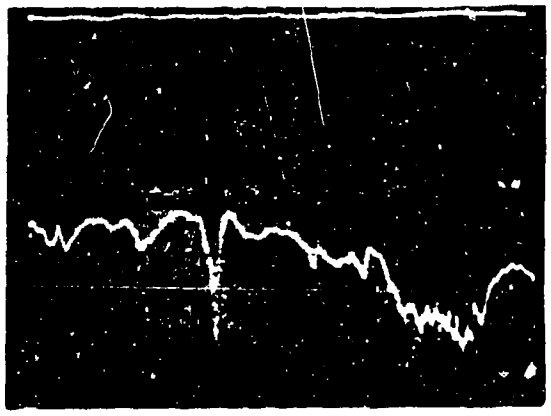
TRANSMIT	RECEIVE
AT-197	AS-1097

HORZ. SEPARATION - 20 FT.

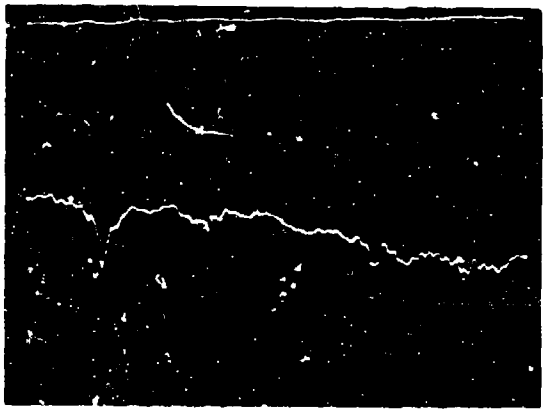
REC. PWR/GEN PWR
10 db/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 dB

FREQUENCY RANGE	200-400 MHz
FREQUENCY SCALE	20 MHz/CM

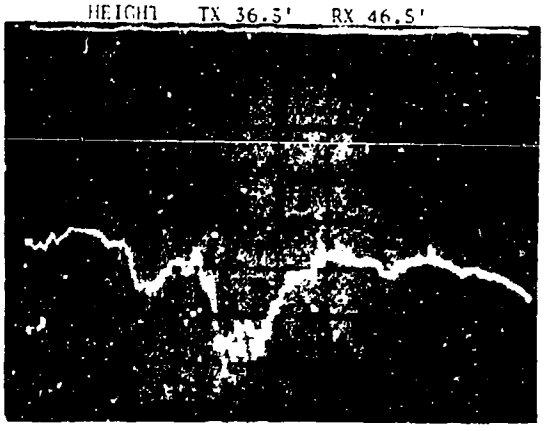
HEIGHT TX 36.5' RX 41.5'



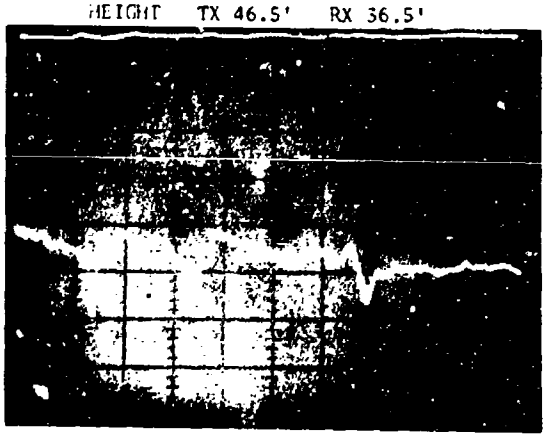
HEIGHT TX 41.5' RX 36.5'



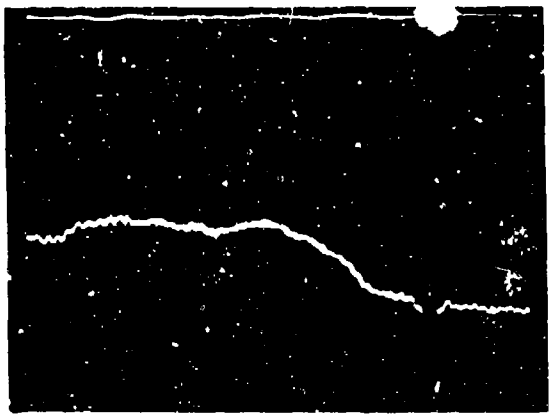
HEIGHT TX 36.5' RX 46.5'



HEIGHT TX 46.5' RX 36.5'



HEIGHT TX 36.5' RX 36.5'



ANTENNA

TRANSMIT	RECEIVE
AT-197	AS-1181

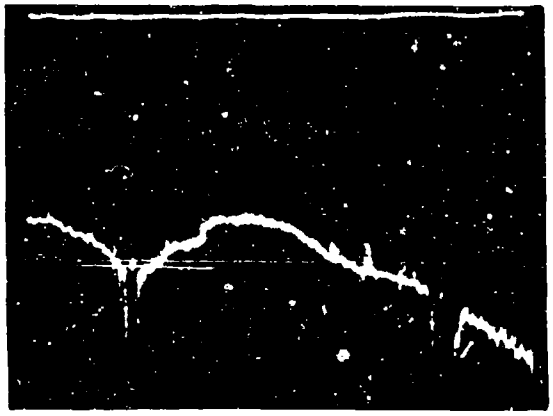
HORZ. SEPARATION - 20 FT

REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 dB

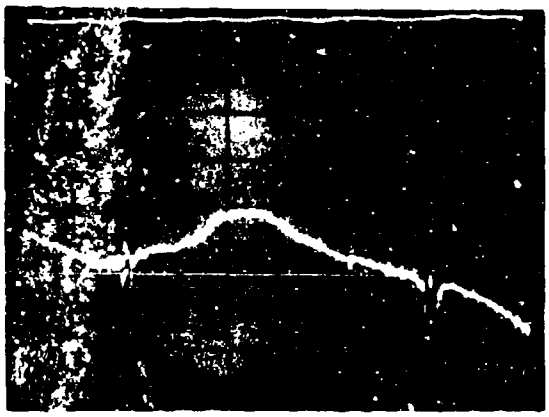
FREQUENCY RANGE 200-400 MHz

FREQUENCY SCALE 20 MHz/CM

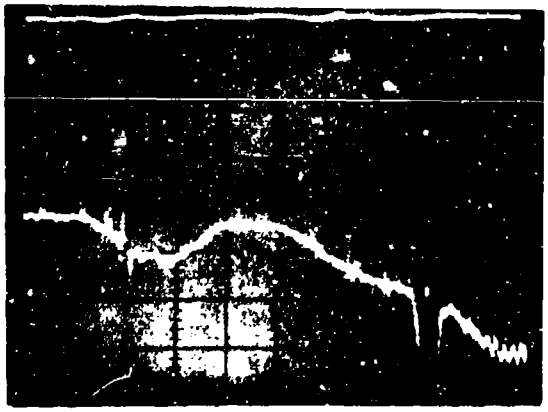
HEIGHT TX 36.5' RX 41.5'



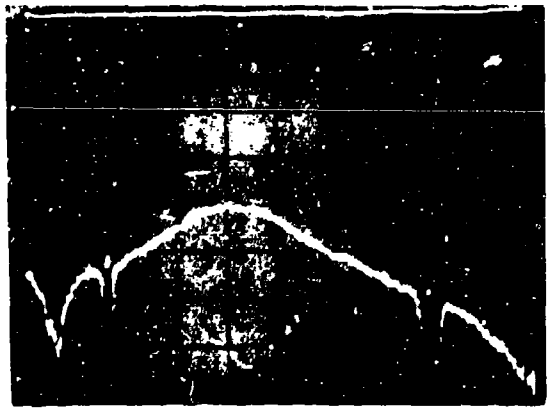
HEIGHT TX 41.5' RX 36.5'



HEIGHT TX 36.5' RX 46.5'



HEIGHT TX 46.5' RX 36.5'



ANTENNA

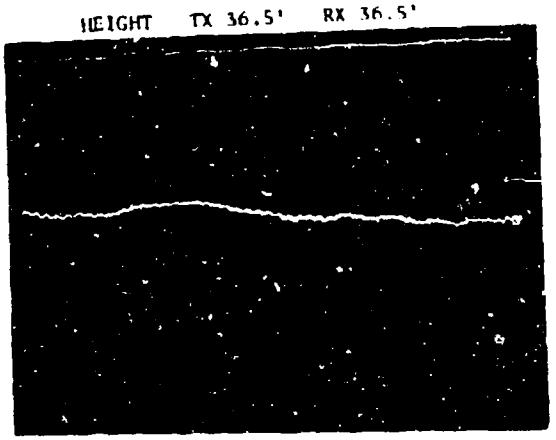
TRANSIT AS-1018
RECEIVE AT-197
HORIZ. SEPARATION - 20 FT.

REC. PWR/CEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 dB

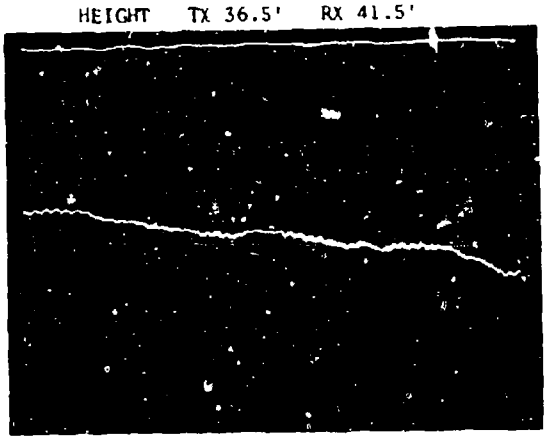
FREQUENCY RANGE 200-400 MHz

FREQUENCY SCALE 20 MHz/CM

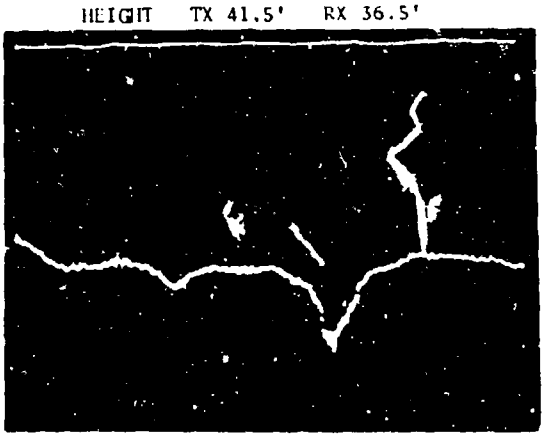
HEIGHT TX 36.5' RX 36.5'



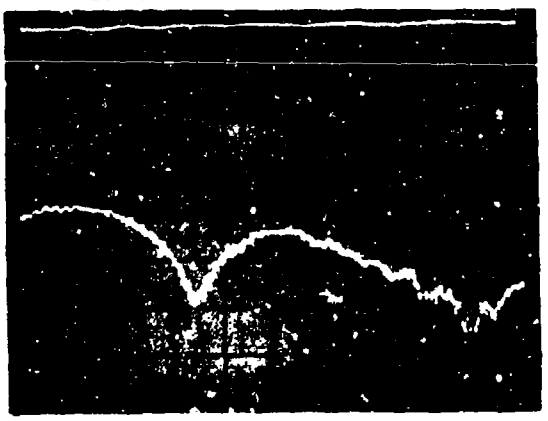
HEIGHT TX 36.5' RX 41.5'



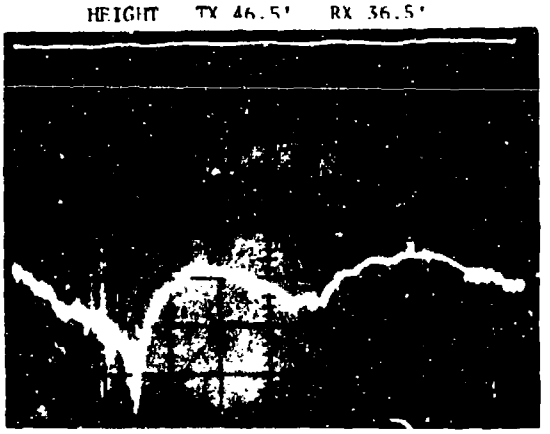
HEIGHT TX 41.5' RX 36.5'



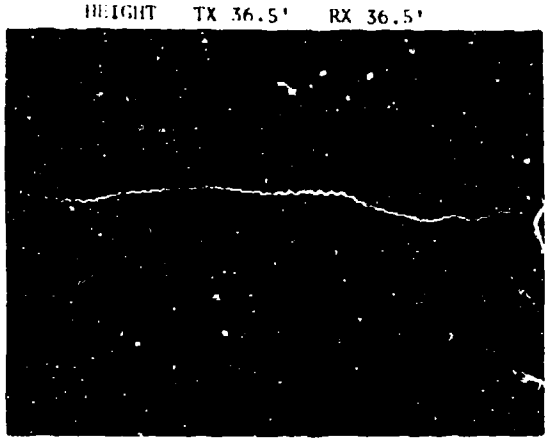
HEIGHT TX 36.5' RX 46.5'



HEIGHT TX 46.5' RX 36.5'



HEIGHT TX 36.5' RX 36.5'



ANTENNA

TRANSIT AS-1018

RECEIVE AS-1018

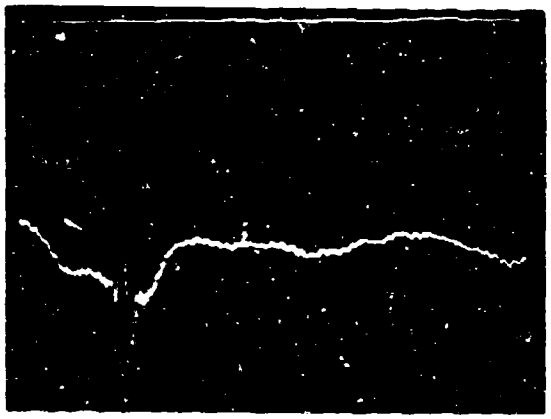
HORZ. SEPARATION - 20 FT.

REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 dB

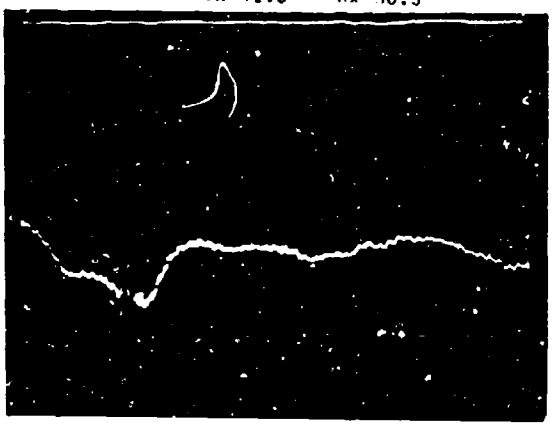
FREQUENCY RANGE 200-400 MHz

FREQUENCY SCALE 20 MHz/CM

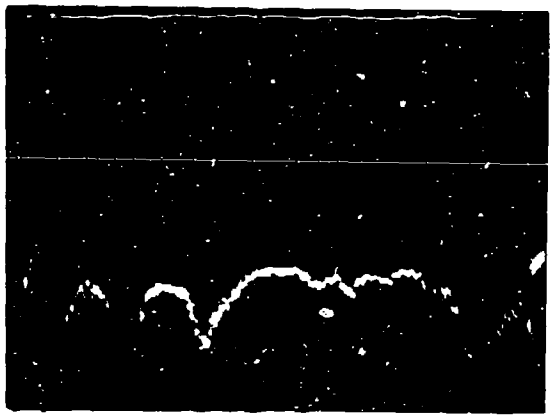
HEIGHT TX 36.5' RX 41.5'



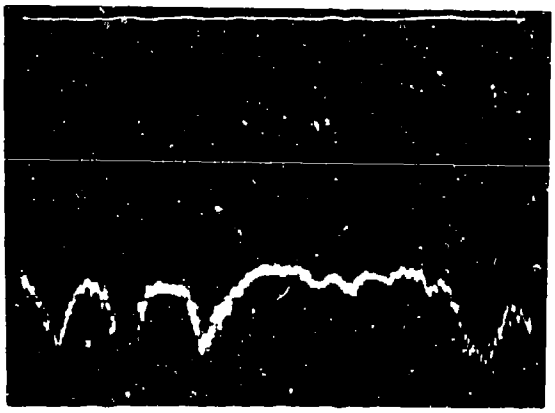
HEIGHT TX 41.5' RX 36.5'



HEIGHT TX 36.5' RX 46.5'



HEIGHT TX 46.5' RX 36.5'



ANTENNA

TRANSIT AS-1018 — RECEIVE AS-1097

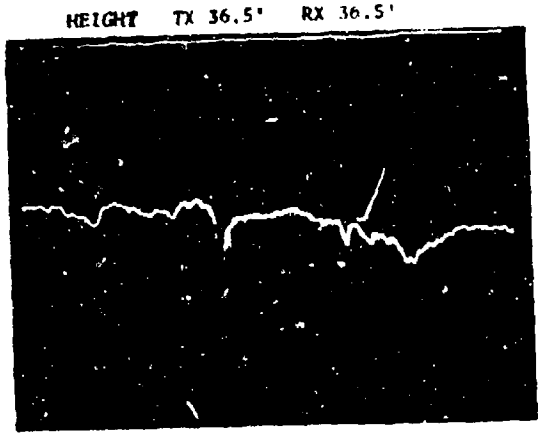
HORZ. SEPARATION - 20 FT.

REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 db

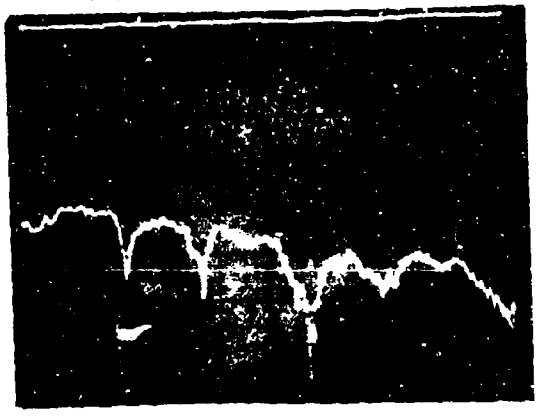
FREQUENCY RANGE 200-400 Mhz

FREQUENCY SCALE 20 Mhz/CM

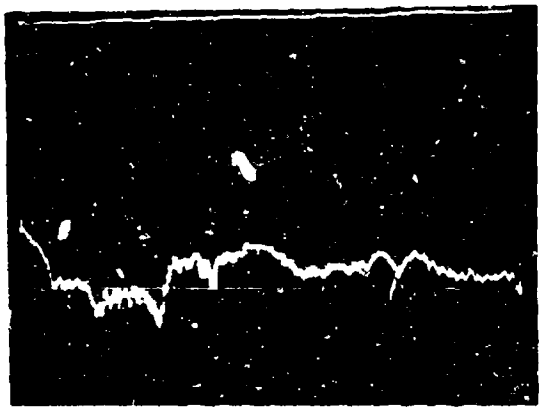
HEIGHT TX 36.5' RX 36.5'



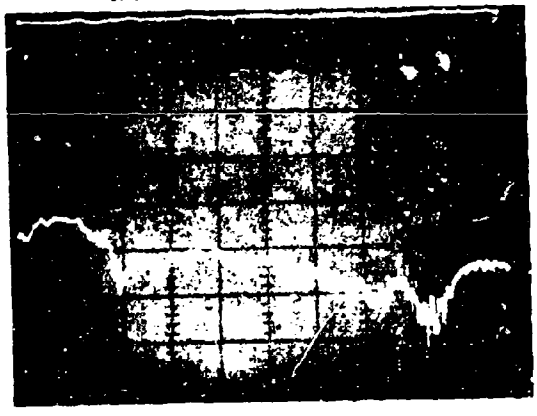
HEIGHT TX 36.5' RX 41.5'



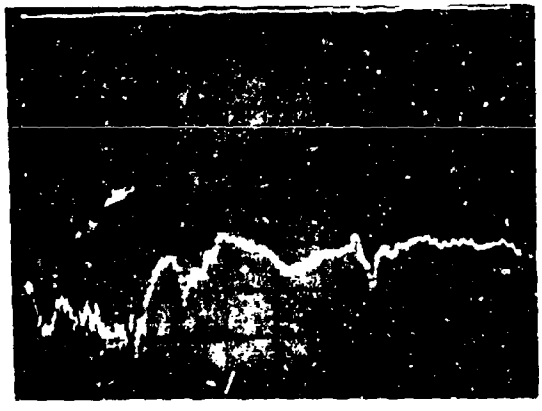
HEIGHT TX 41.5' RX 36.5'



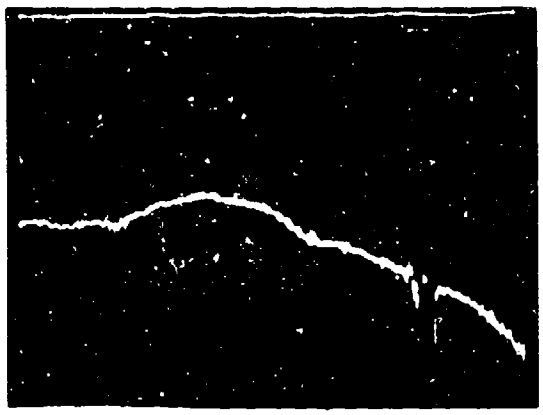
HEIGHT TX 36.5' RX 46.5'



HEIGHT TX 46.5' RX 36.5'



HEIGHT TX 36.5' RX 36.5'



ANTENNA

TRANSIT AS-1018 — RECEIVE AS-1181

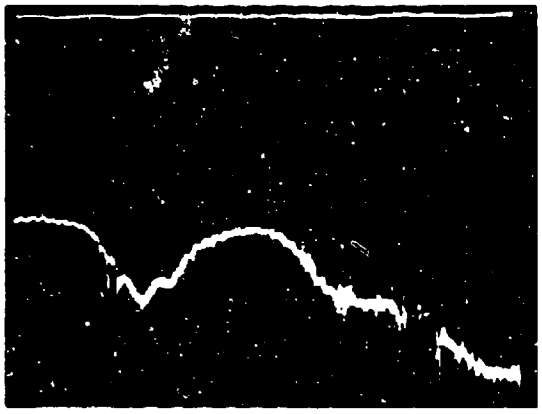
HORZ. SEPARATION - 20 FT.

REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 dB

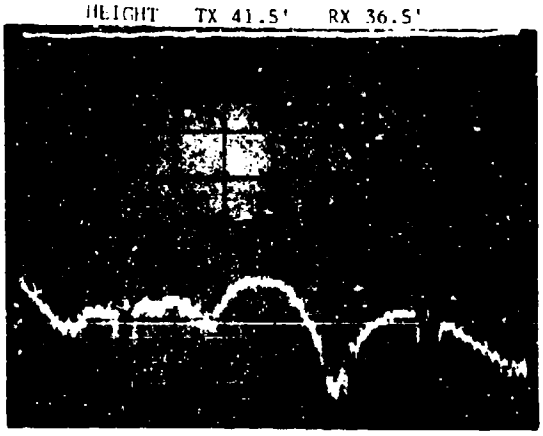
FREQUENCY RANGE 200-400 MHz

FREQUENCY SCALE 20 MHz/CM

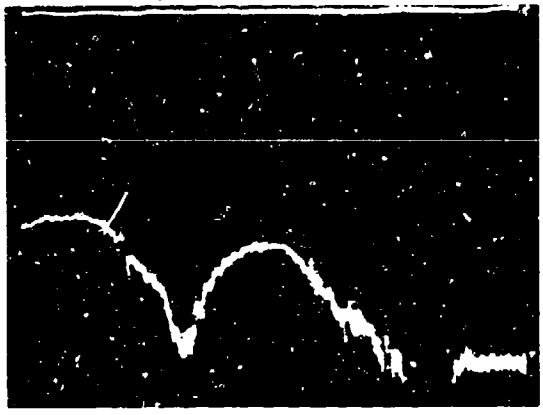
HEIGHT TX 36.5' RX 41.5'



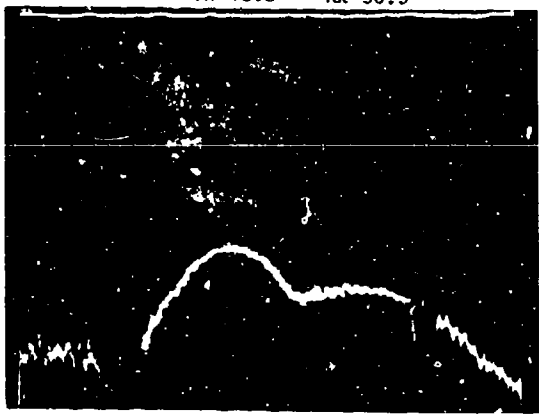
HEIGHT TX 41.5' RX 36.5'



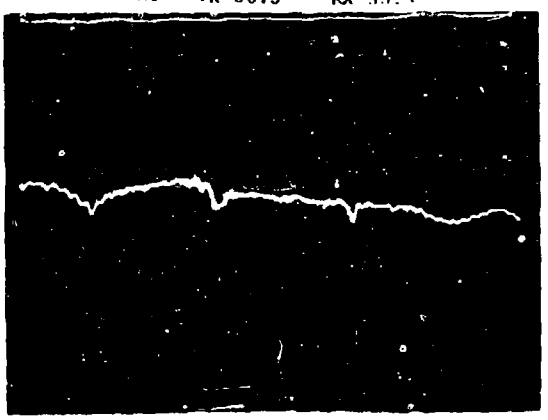
HEIGHT TX 36.5' RX 46.5'



HEIGHT TX 46.5' RX 36.5'



HEIGHT TX 36.5' RX 36.5'



ANTENNA

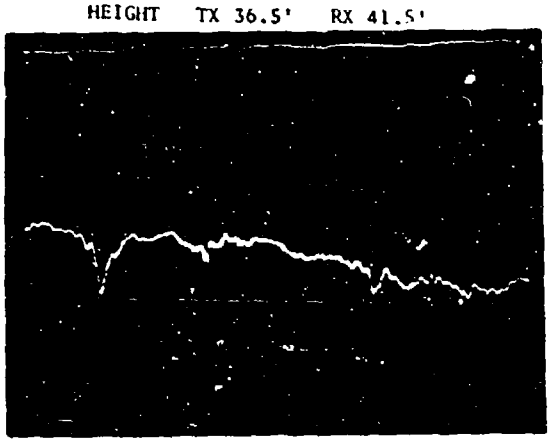
TRANSMIT	RECEIVE
AS-1097	AT-197

HORZ. SEPARATION - 20 FT.

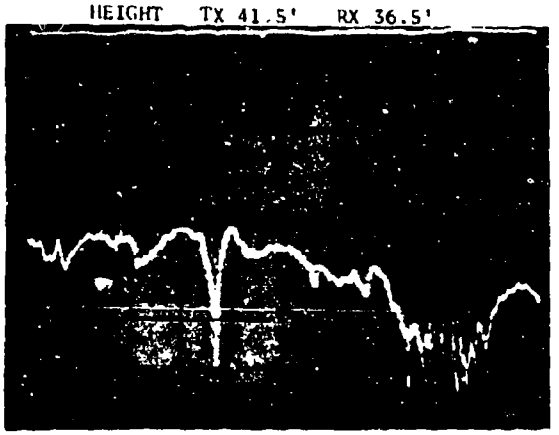
REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 dB

FREQUENCY RANGE	200-400 MHz
FREQUENCY SCALE	20 MHz/CM

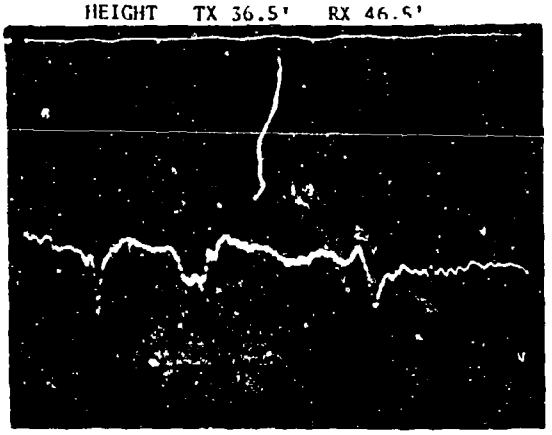
HEIGHT TX 36.5' RX 41.5'



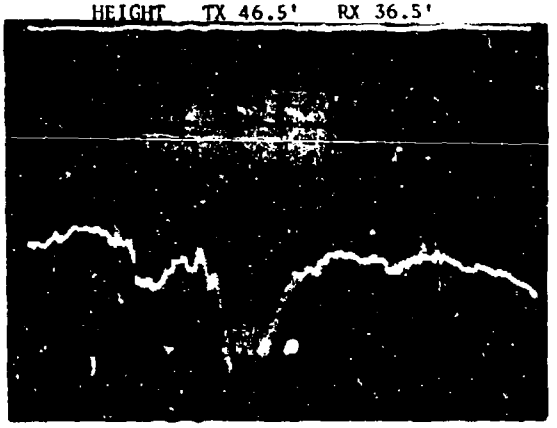
HEIGHT TX 41.5' RX 36.5'



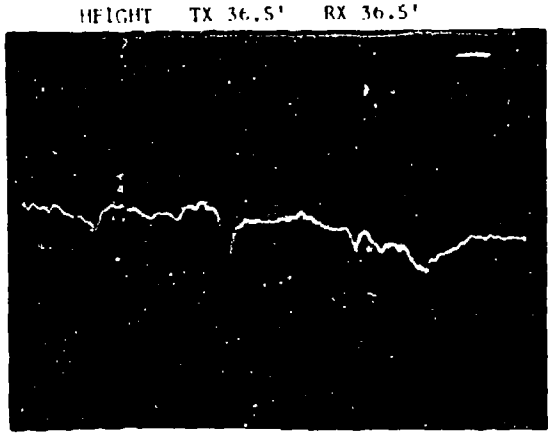
HEIGHT TX 36.5' RX 46.5'



HEIGHT TX 46.5' RX 36.5'



HEIGHT TX 36.5' RX 36.5'



ANTENNA

TRANSMIT	RECEIV
AS-1097	AS-1018

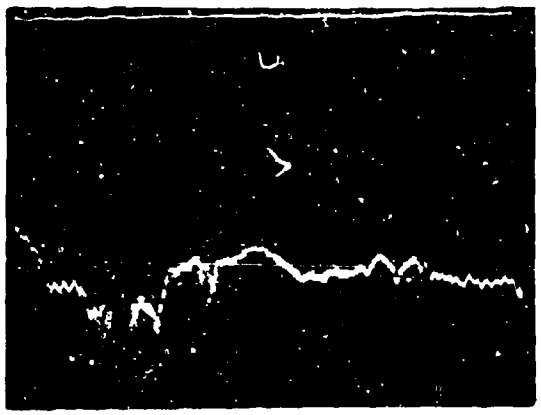
HORZ. SEPARATION - 20 FT.

REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 db

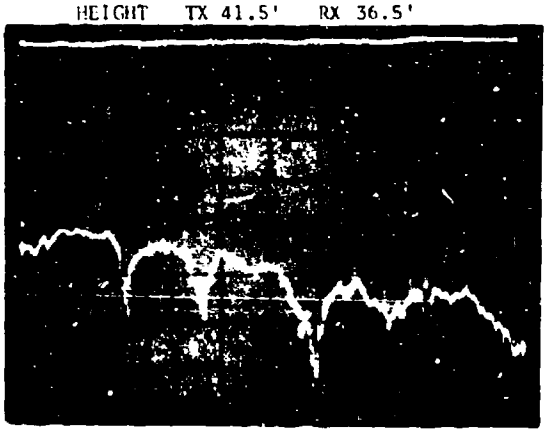
FREQUENCY RANGE 200-400 MHz

FREQUENCY SCALE 20 MHz/CM

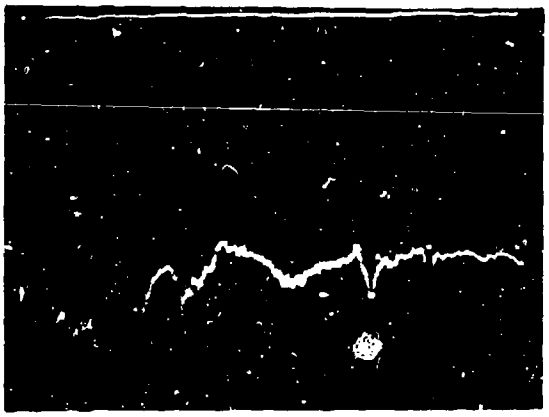
HEIGHT TX 36.5' RX 41.5'



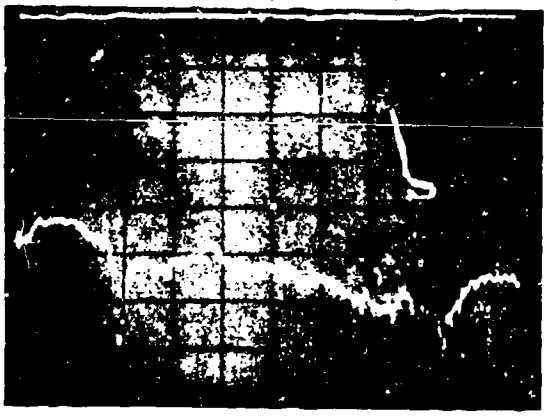
HEIGHT TX 41.5' RX 36.5'



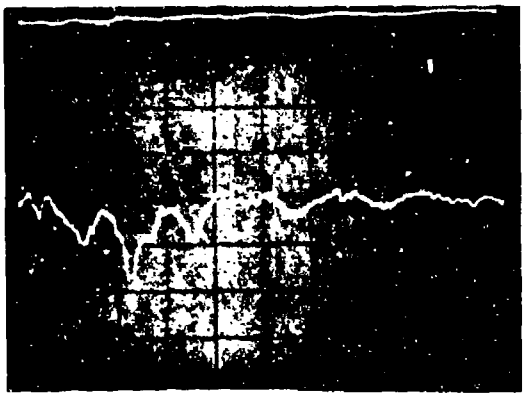
HEIGHT TX 36.5' RX 46.5'



HEIGHT TX 46.5' RX 36.5'



HEIGHT TX 36.5' RX 36.5'



ANTENNA

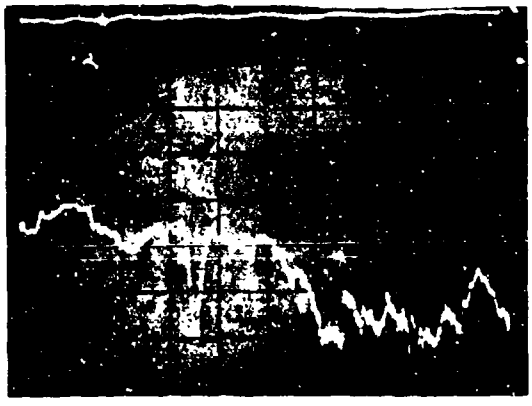
TRANSMIT	RECEIVE
AS-1097	AS-1097

HORZ. SEPARATION - 20 FT.

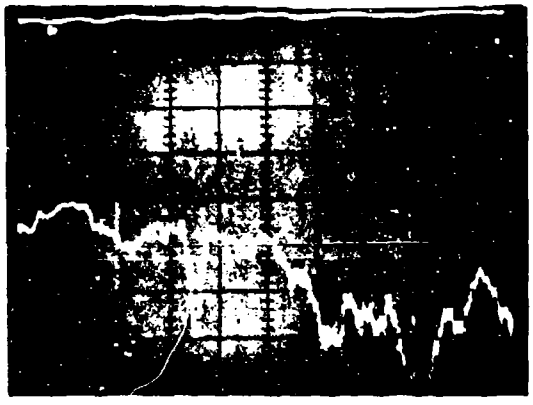
REC. PWR/GEN PWR
10 db/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 db

FREQUENCY RANGE	200-400 MHz
FREQUENCY SCALE	20 MHz/CM

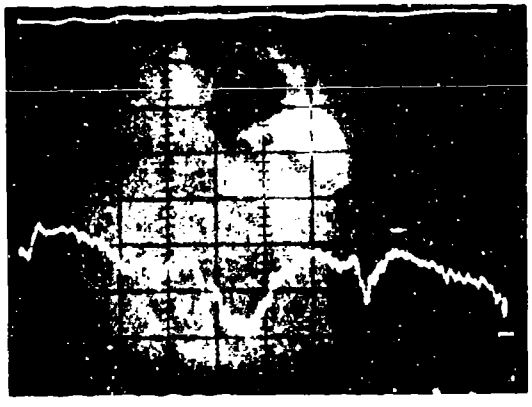
HEIGHT TX 36.5' RX 41.5'



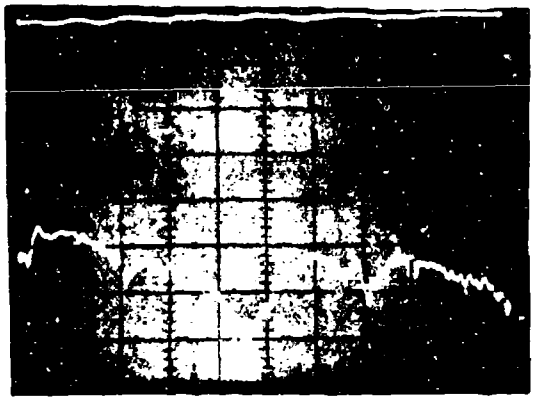
HEIGHT TX 41.5' RX 36.5'



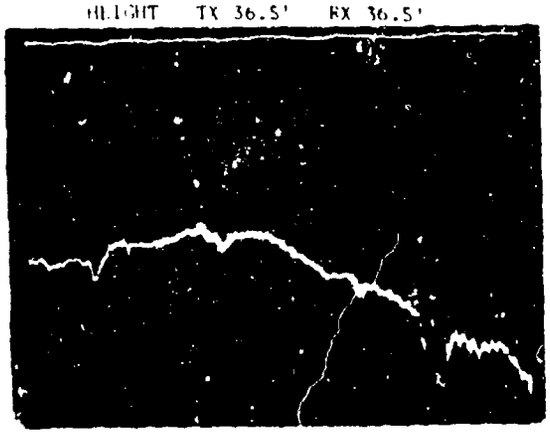
HEIGHT TX 36.5' RX 46.5'



HEIGHT TX 46.5' RX 36.5'



HEIGHT TX 36.5' RX 36.5'



ANTENNA

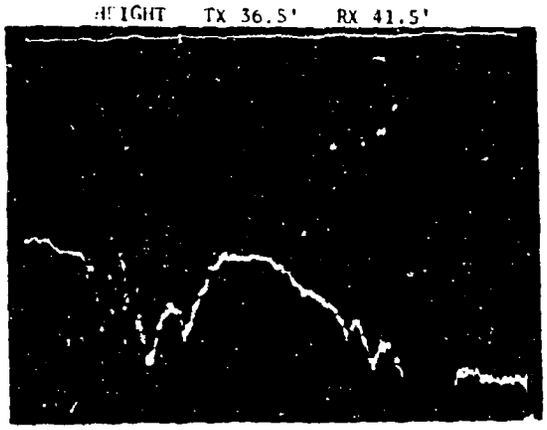
TRANSMIT	RECEIVE
AS-1007	AS-1181

HORZ. SEPARATION - 20 FT.

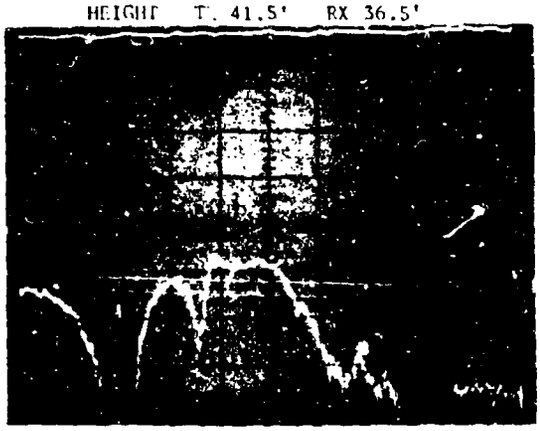
REC. PWR/GEN PWR
10 db/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 dB

FREQUENCY RANGE	200-400 MHz
FREQUENCY SCALE	20 MHz/CM

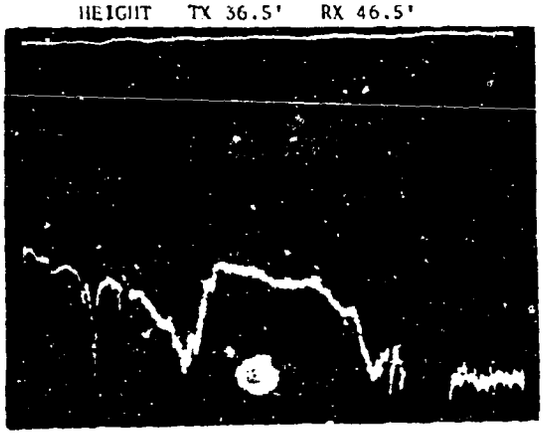
HEIGHT TX 36.5' RX 41.5'



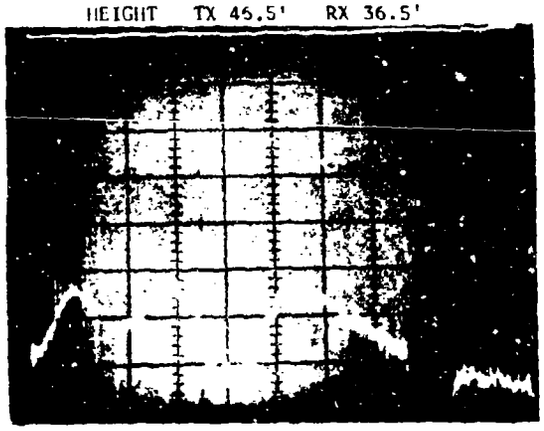
HEIGHT TX 41.5' RX 36.5'



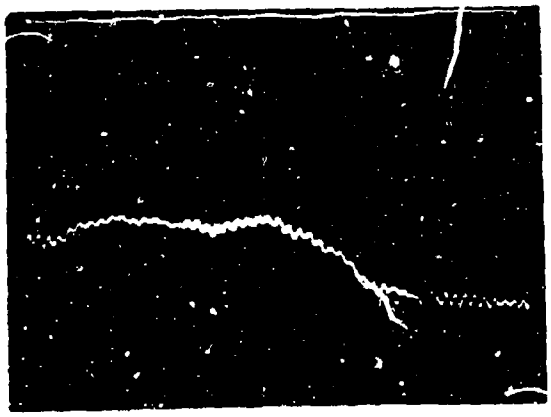
HEIGHT TX 36.5' RX 46.5'



HEIGHT TX 46.5' RX 36.5'



HEIGHT TX 36.5' RX 36.5'



ANTENNA

TRANSMIT	RECEIVE
AS-1181	AT-197

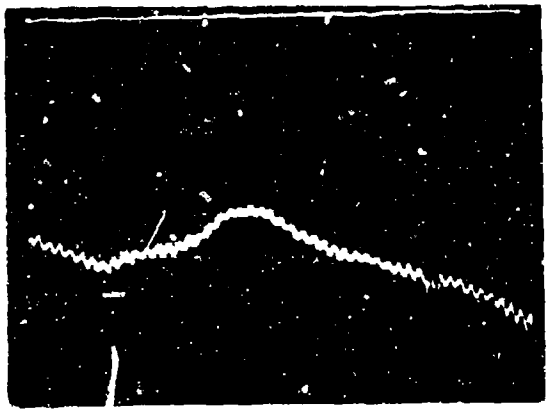
HORZ. SEPARATION - 20FT.

REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 dB

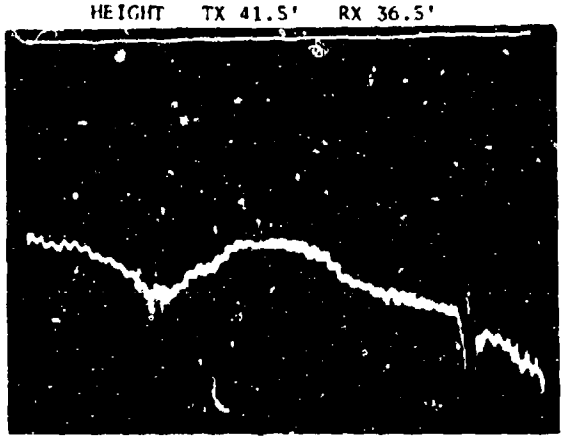
FREQUENCY RANGE 200-400 MHz

FREQUENCY SCALE 20 MHz/CM

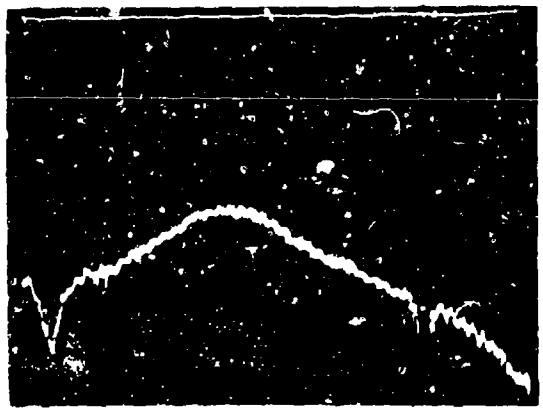
HEIGHT TX 36.5' RX 41.5'



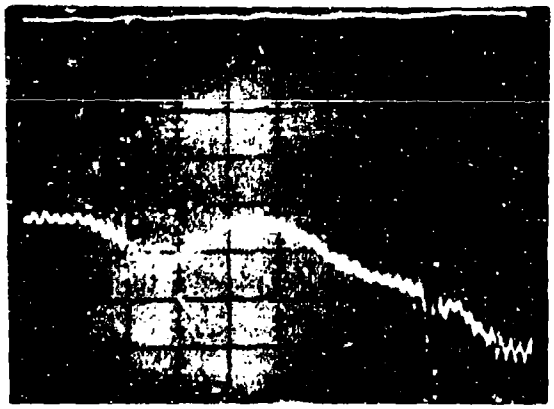
HEIGHT TX 41.5' RX 36.5'



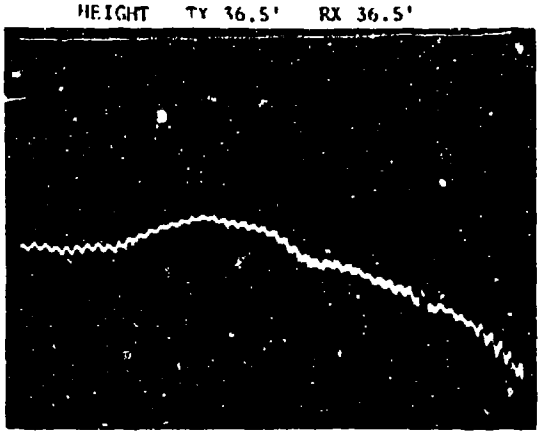
HEIGHT TX 36.5' RX 46.5'



HEIGHT TX 46.5' RX 36.5'



HEIGHT TX 36.5' RX 36.5'



ANTENNA

TRANSMIT	RECEIVE
AS-1181	AS-1018

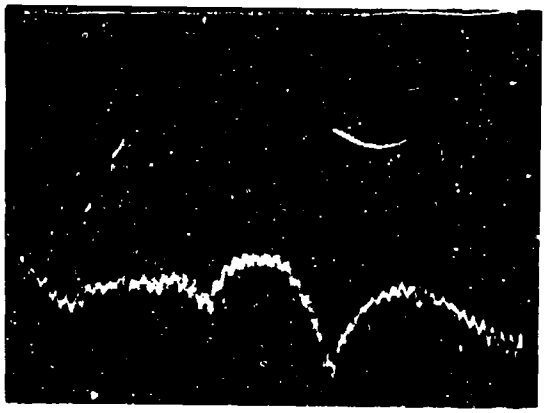
HORZ. SEPARATION - 20 FT.

REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LEVEL
CABLE ATTN. INCLUDED 5.0-7.7 dB

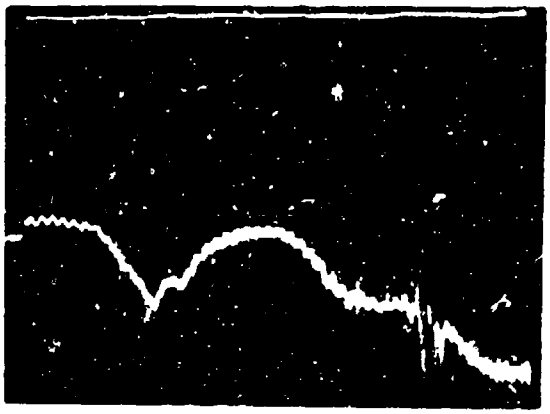
FREQUENCY RANGE 200-400 MHz

FREQUENCY SCALE 20 MHz/CM

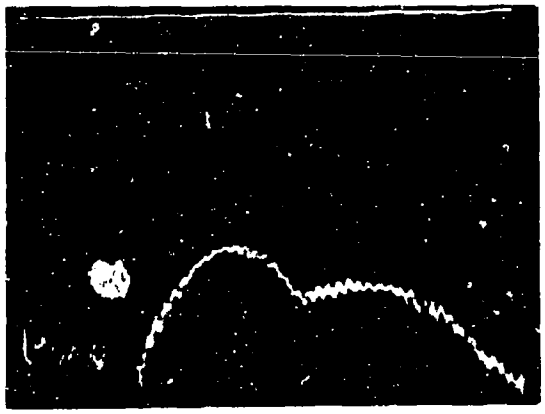
HEIGHT TX 36.5' RX 41.5'



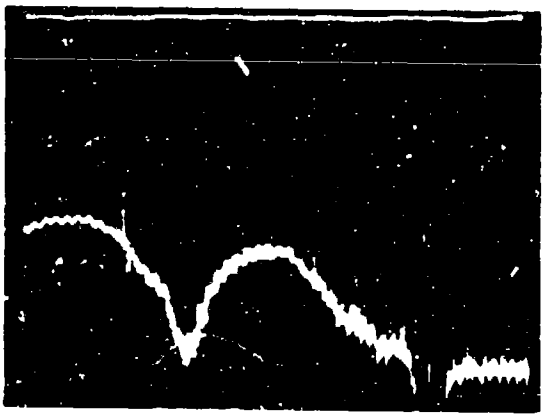
HEIGHT TX 41.5' RX 36.5'



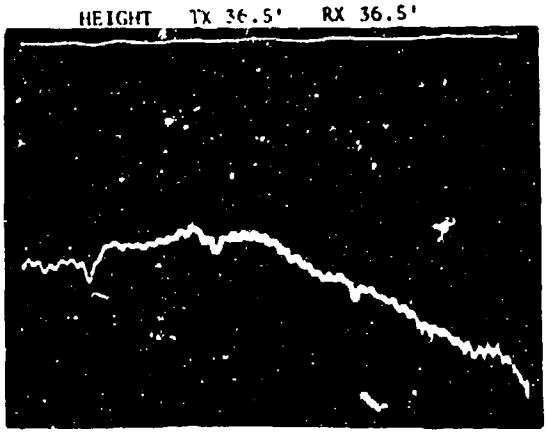
HEIGHT TX 36.5' RX 46.5'



HEIGHT TX 46.5' RX 36.5'



HEIGHT TX 36.5' RX 36.5'



ANTENNA

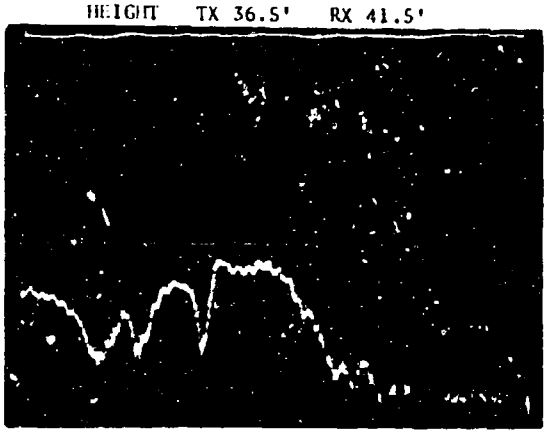
TRANSMIT	RECEIVE
AS-1181	AS-1097

HORZ. SEPARATION - 20 FT.

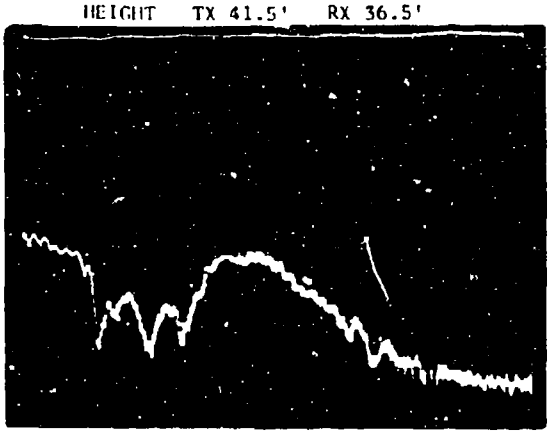
REC. PWR/GEN PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 5.0-7.7 dB

FREQUENCY RANGE	200-400 MHz
FREQUENCY SCALE	20 MHz/CM

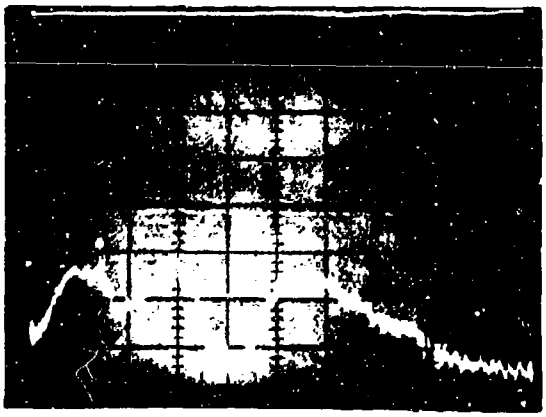
HEIGHT TX 36.5' RX 41.5'



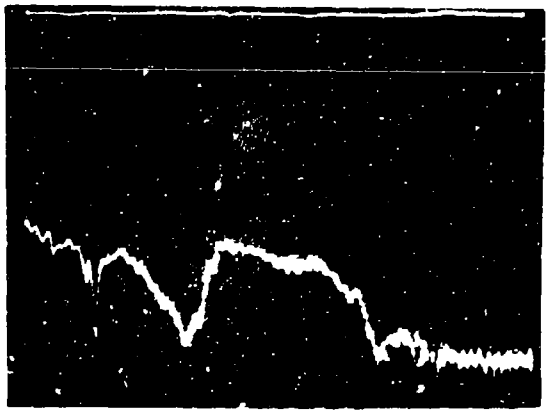
HEIGHT TX 41.5' RX 36.5'



HEIGHT TX 36.5' RX 46.5'



HEIGHT TX 46.5' RX 36.5'



ANTENNA

TRANSMIT	RECEIVE
AS-1181	AS-1181

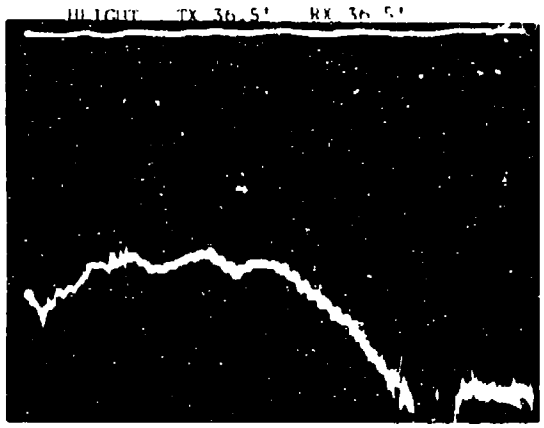
HORZ. SEPARATION - 20 FT.

REC. PWR/GEN PWR
10 db/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 3.0-7.7 db

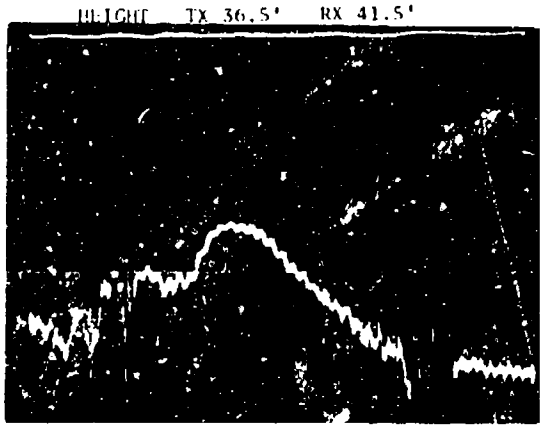
FREQUENCY RANGE 200-400 MHz

FREQUENCY SCALE 20 MHz/CM

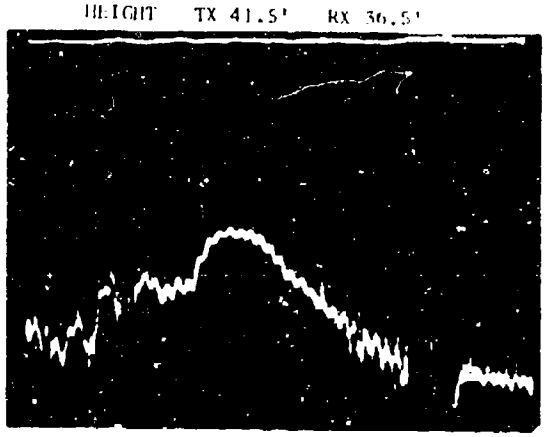
HEIGHT TX 36.5' RX 36.5'



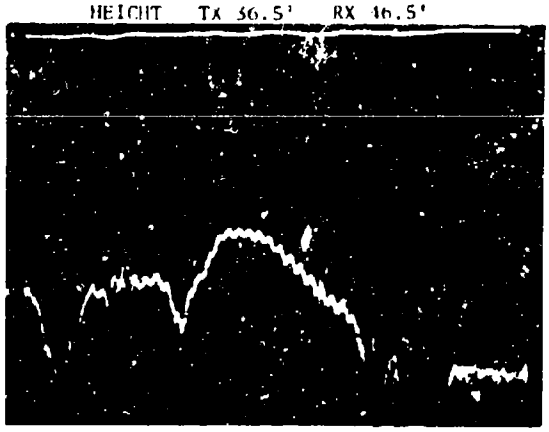
HEIGHT TX 36.5' RX 41.5'



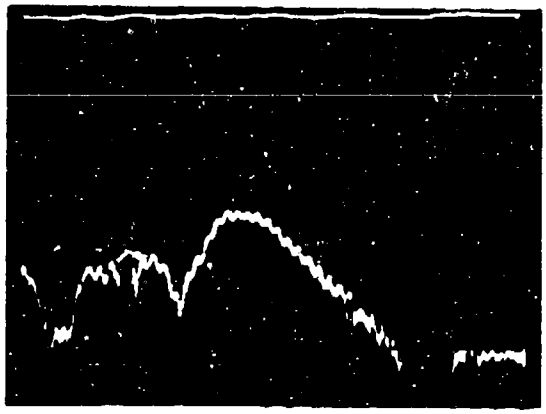
HEIGHT TX 41.5' RX 36.5'



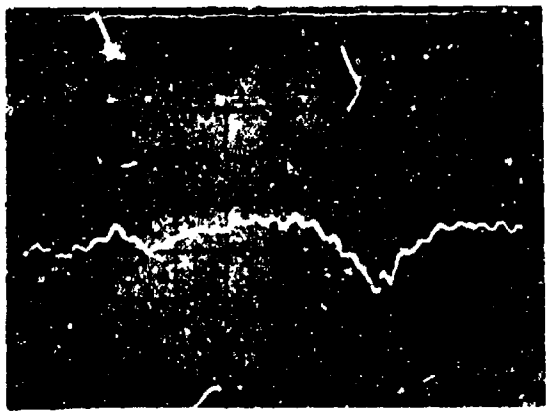
HEIGHT TX 36.5' RX 46.5'



HEIGHT TX 46.5' RX 36.5'



HEIGHT TX 36.5' RX 36.5'



ANTENNA

TRANSMIT	RECEIVE
AS-1181	AT-197

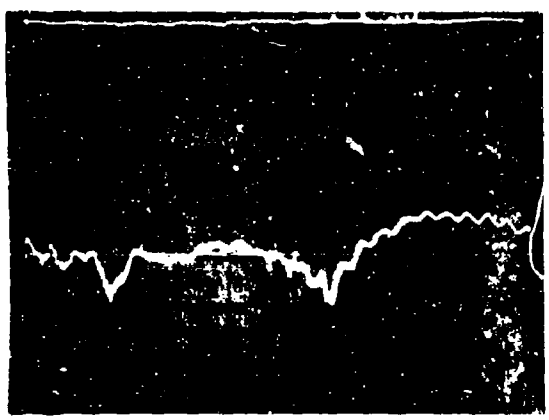
HORZ. SEPARATION - 20 FT

REC. PWR/GEN. PWR
10dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 3.4-5.0 dB

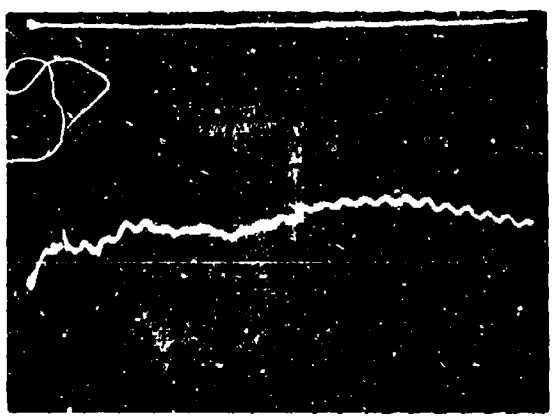
FREQUENCY RANGE 100-200 MHZ

FREQUENCY SCALE 10 MHZ/CM

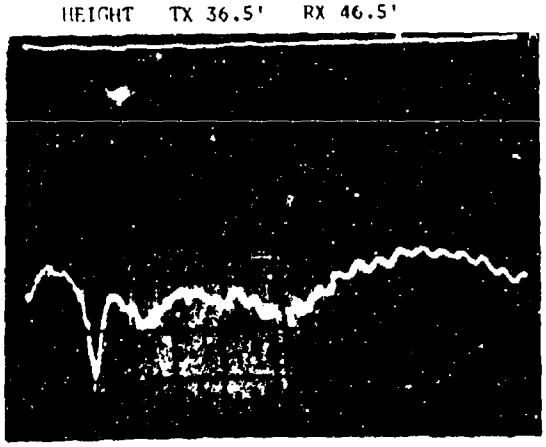
HEIGHT TX 36.5' RX 41.5'



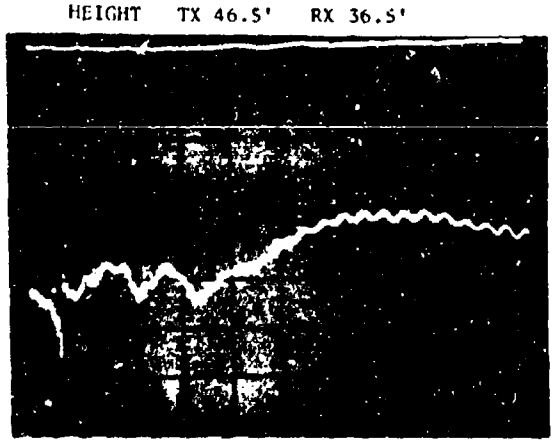
HEIGHT TX 41.5' RX 36.5'



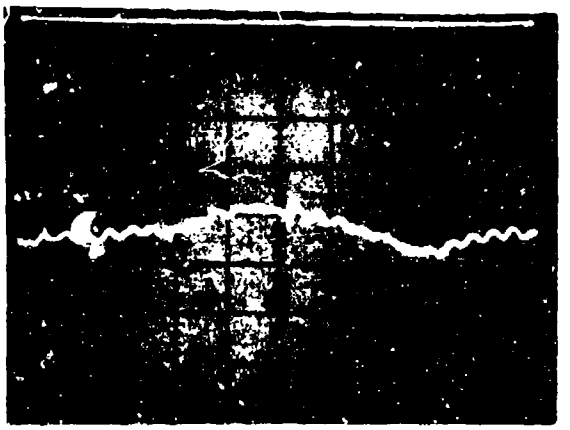
HEIGHT TX 36.5' RX 46.5'



HEIGHT TX 46.5' RX 36.5'



HEIGHT TX 36.5' RX 36.5'



ANTENNA

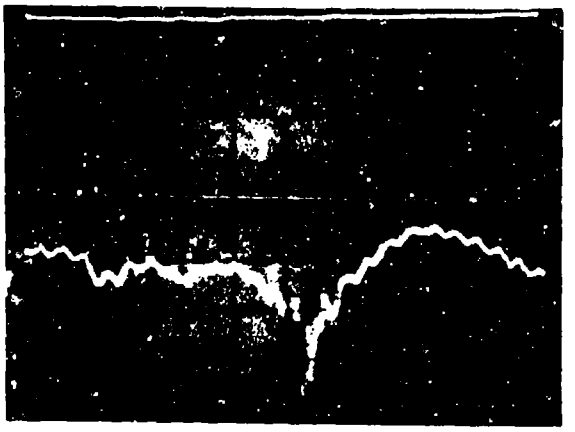
TRANSMIT	RECEIVE
AS-1181	AS-1018

HORZ. SEPARATION - 20 FT.

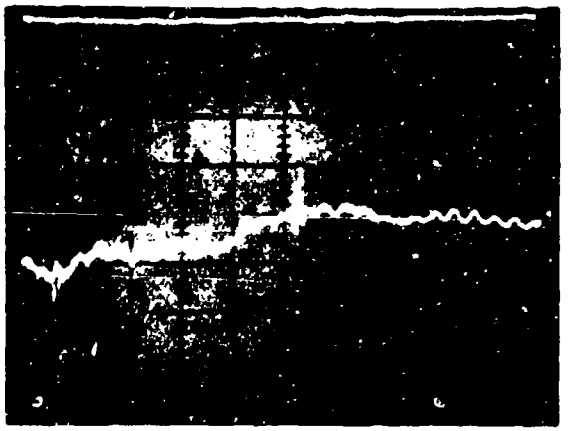
REC. PWR/GEN. PWR
10dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 3.4-5.0 dB

FREQUENCY RANGE	100-200 MHZ
FREQUENCY SCALE	10 MHZ/CM

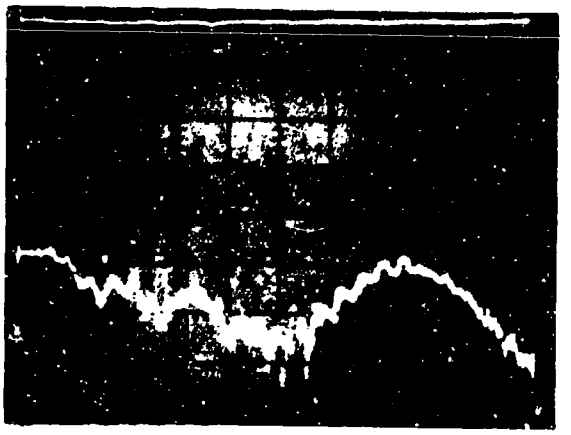
HEIGHT TX 36.5' RX 41.5'



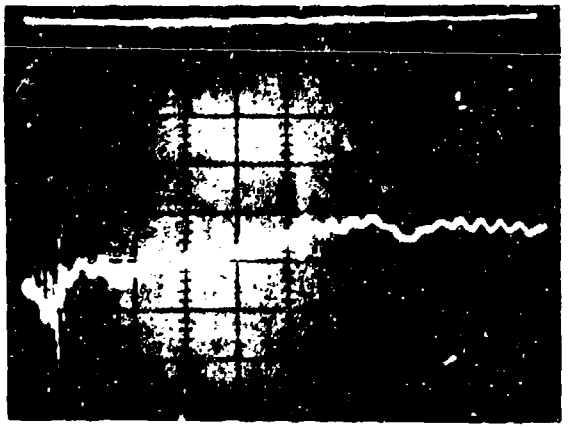
HEIGHT TX 41.5' RX 36.5'



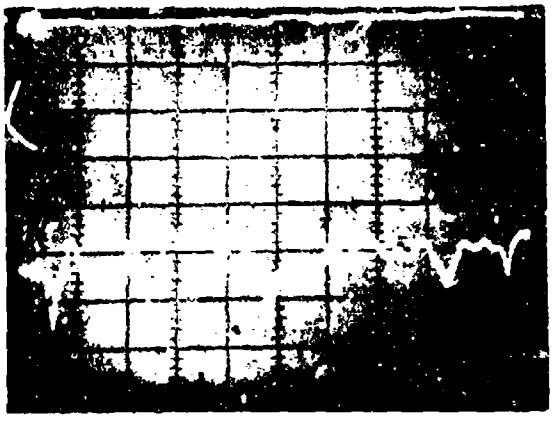
HEIGHT TX 36.5' RX 46.5'



HEIGHT TX 46.5' RX 36.5'



HEIGHT TX 36.5' RX 36.5'



ANTENNA

TRANSMIT	RECEIVE
AS-1181	AS-1097

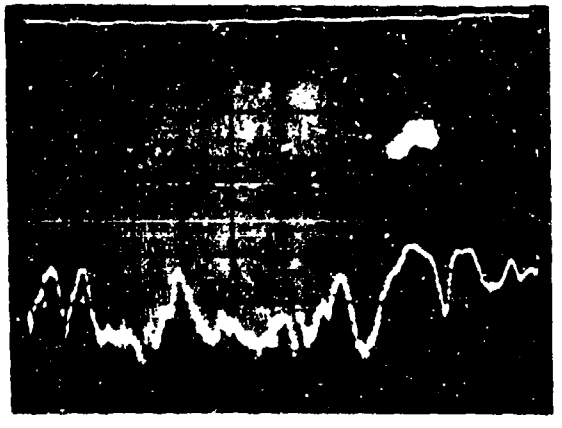
HORZ. SEPARATION - 20 FT.

REC. PWR/GEN. PWR
10dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 3.4-5.0 dB

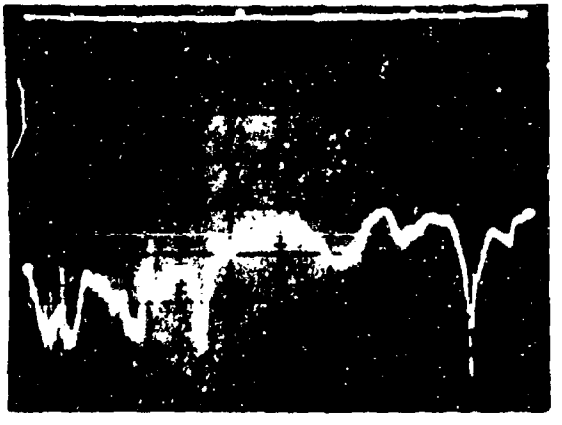
FREQUENCY RANGE 100-200 MHZ

FREQUENCY SCALE 10 MHZ/CM

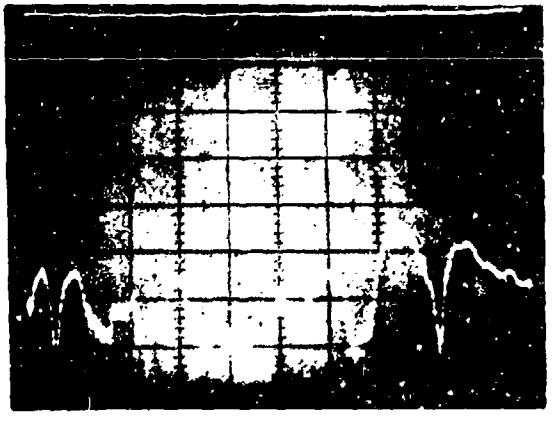
HEIGHT TX 36.5' RX 41.5'



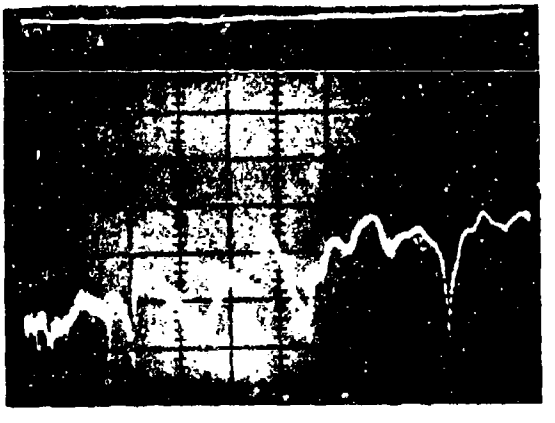
HEIGHT TX 41.5' RX 36.5'



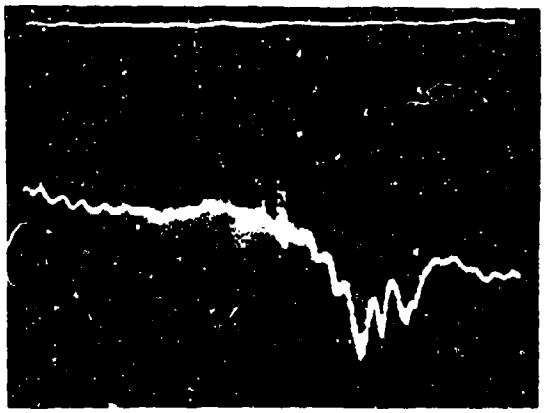
HEIGHT TX 36.5' RX 46.5'



HEIGHT TX 46.5' RX 36.5'



HEIGHT TX 36.5' RX 36.5'



ANTENNA

TRANSMIT	RECEIVE
AS-1181	AS-1181

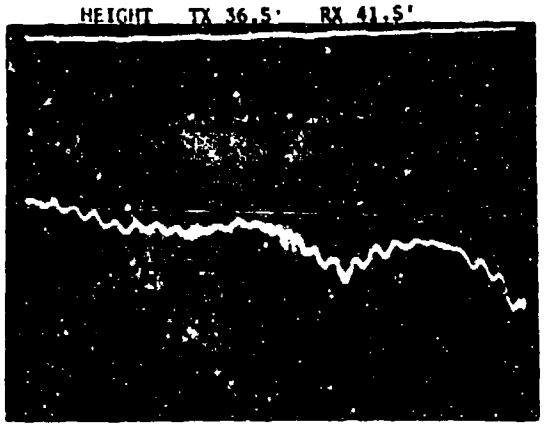
HORZ. SEPARATION - 20 FT.

REC.PWR/GEN. PWR
10 dB/CM BELOW ZERO
REFERENCE LINE
CABLE ATTN. INCLUDED 3.4-5.0 dB

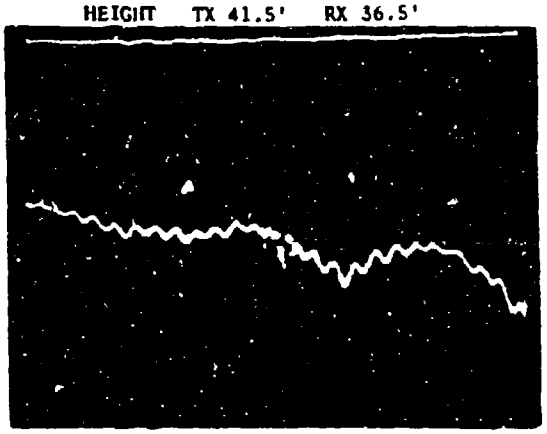
FREQUENCY RANGE 100-200 MHZ

FREQUENCY SCALE 10 MHZ/CM

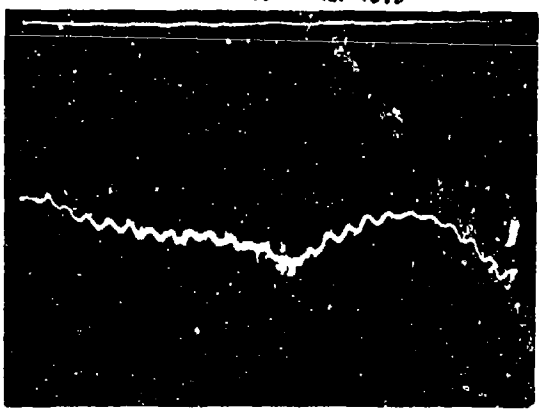
HEIGHT TX 36.5' RX 41.5'



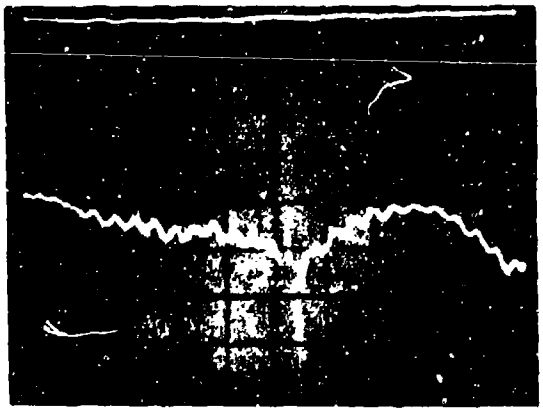
HEIGHT TX 41.5' RX 36.5'



HEIGHT TX 36.5' RX 46.5'



HEIGHT TX 46.5' RX 36.5'



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