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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF SECRETARY

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
COMSAT RSI, Inc.	)	File Nos. 4797-EX-ML-95
	)	4798-EX-ML-95
Application for Modification of	)	
Experimental Radio Licenses	)	
Call Signs KM2XRE and KK2XFV	)	

To: The Office of Engineering and Technology
Experimental Licensing Branch

MOTION FOR ACCEPTANCE OF SUPPLEMENTAL FILING TO A CONSOLIDATED PETITION FOR LIMITED RECONSIDERATION

COMSAT RSI, Inc. ("CRSI"), by its attorneys, hereby moves the Commission to accept the attached Supplemental Filing to the Consolidated Petition for Limited Reconsideration ("Petition") CRSI filed on November 13, 1995, pursuant to Section 1.106 of the Commission's Rules, 47 C.F.R. § 1.106 (1994). The engineering analyses included in the Supplemental Filing were not available when the Petition was filed. No parties have filed in opposition to CRSI's Petition. Accordingly, no parties will be prejudiced by this Supplemental Filing.

Respectfully submitted,
COMSAT RSI, Inc.

By: _____

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February 29, 1996

Before the
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COMSAT RSI, Inc.	)	File Nos. 4797-EX-ML-95
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To: The Office of Engineering and Technology
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SUPPLEMENTAL FILING TO
CONSOLIDATED PETITION FOR LIMITED RECONSIDERATION

COMSAT RSI, Inc. ("CRSI"), by its attorneys, respectfully submits this Supplemental Filing to its Consolidated Petition for Limited Reconsideration ("Petition") filed on November 13, 1995, pursuant to Section 1.106 of the Commission's Rules, 47 C.F.R. § 1.106 (1994). The Petition sought, in part, reconsideration of the Branch's decision to deny use of the frequencies 1088 MHz and 1213 MHz in the above-captioned experimental licenses. As indicated in the Petition, the addition of 1088 MHz and 1213 MHz will further the public interest by facilitating CRSI's program of testing the TACAN antennas of the FAA and U.S. Navy, as well as associated commercial and foreign customers. These tests will ensure that newly deployed TACAN antennas will operate to promote air traffic safety. CRSI respectfully requests that the Commission grant the Petition and authorize the use of 1088 MHz and 1213 MHz by adding these frequencies to the above-captioned licenses.

There is little chance that the proposed test signals, which would not be modulated, could interfere with airborne IFF receivers, which are designed to detect pulse-modulated IFF radar

signals. Even in the unlikely event that an unmodulated signal would confuse an IFF receiver, the analysis attached in Exhibit 1 demonstrates that, if authorized, CRSI experimental operations at the Arcola test range in the band 1080 - 1100 MHz and at 1213 MHz would not produce detectable signal levels in airborne IFF receivers. Specifically, Exhibit 1 shows that an airplane would have to fly at an extremely low altitude -- less than 500 ft. -- at approximately 6000 feet from the test sites, for its IFF receiver to even *detect* a signal from the proposed experimental operations. Similarly, an airplane would have to fly below 500 ft. at a distance of about 17,000 feet for its TACAN receiver to detect CRSI's operations. It would not be reasonable to assume that an airplane would be in such positions, because the test antenna is pointed away from the nearest airport (Dulles), seven miles away. Signals from operations at the Sterling plant would be even further attenuated -- at least 40 dB -- because all operations are indoors.[1/]

Similarly, the chances of a TACAN receiver even detecting the proposed test signal is extremely remote because the Arcola site is approximately 90 miles from the closest TACAN site tuned to frequencies within the range 1080 - 1100 MHz. The Dulles airport TACAN frequency is 1169 MHz and, thus, airborne receivers in the vicinity of the test sites would be tuned to this frequency, not the frequencies requested herein.[2/] The nearest facility using the 1213 MHz frequency is Westminister, MD (EMI), which is 55 miles distant. As noted above, the operations at the Sterling plant, which is only a few miles from the Arcola site, are even less likely to be detectable. Accordingly, CRSI's experimental operations would not interfere with airborne TACAN receivers.

1/ *See* Exhibit 2.

2/ *See* Exhibit 1.

Additionally, CRSI notes that on January 25, 1996, the FAA acceded to CRSI's request for special temporary authorization to operate in the 1080 - 1100 MHz band at the Sterling and Arcola sites at power levels of 4 watts ERP and 2 watts ERP, respectively. Subject to the special condition that the "authorization may be subject to further modification if deemed necessary to avoid interference," the Commission therefore granted an STA to CRSI on January 26, 1996.[3/]

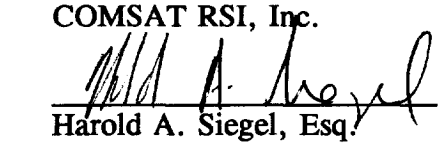
In sum, CRSI believes the enclosed analysis further demonstrates that use of the 1088 MHz and 1213 MHz frequencies, as proposed in CRSI's application for experimental authority, would not cause any harmful interference to IFF or TACAN operations and, therefore, should be permitted. The recent grant of an STA to CRSI to use the 1080 - 1100 MHz band at the Sterling and Arcola sites is further evidence that the proposed frequencies would be acceptable.

[3/] *See* Exhibit 3.

CRSI respectfully requests that the Branch reconsider the denial of the use of these frequencies and add 1088 MHz and 1213 MHz to the above-captioned experimental licenses.

Respectfully submitted,

COMSAT RSI, Inc.

By: 

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February 29, 1996

COMSAT RSI
Interference Analysis on IFF Source Antenna

I. INTRODUCTION

COMSAT RSI has sought expanded use of frequencies associated with the testing of its secondary radar (IFF) antennas in the 1025 to 1100 MHz band and two additional frequencies, 1088 and 1213 MHz, for testing its TACAN antennas. It is assumed that is the principal area of concern in coordinating use of these frequencies is possible interference between COMSAT RSI's source antenna and nearby aircraft. The IFF frequencies (1030 $\pm$5 MHz and 1090 $\pm$10 MHz) are within the TACAN frequency band (962 to 1215 MHz). This analysis shows that, given the power levels that COMSAT RSI is proposing to use, it is unlikely that any nearby aircraft would detect any interference with either its IFF or TACAN receiver.

In addition to examining the possible interference effects of transmitting in the IFF band, COMSAT RSI also looked at the 1213 MHz TACAN frequency. This frequency was requested in COMSAT RSI's application, but was denied with a frequency of 1214 MHz being granted. Information is presented which seems to indicate that interference will be unlikely on the 1213 MHz frequency.

II. ANALYSIS

In order to determine the possibility of interference between a signal which COMSAT RSI would transmit from its Arcola test range using a 15 ft. source antenna, the following method was used.

1. COMSAT RSI contacted ARINC in Annapolis, MD, to determine the typical sensitivities of airborne IFF and TACAN receivers. (ARINC conducts EMI/EMC studies and is intimately familiar with aircraft communications/navigation equipment.) Typical IFF and TACAN receivers were reported to have sensitivities of -77 and -92 dBm respectively.

2. Aircraft were assumed to have an omni-directional receiving antennas (i.e., with 0 dB gain) and no losses between the antenna and the receivers. Potential interference was assumed to be co-channel and, thus, with no filter losses.

3. The radiated power level of COMSAT RSI's 15 ft. source antenna was determined using the pattern envelope and an input power level of 1 mW. This source antenna is stationary and is located on COMSAT RSI's range to point at an azimuth of approximately 345°, which is almost directly away from Dulles Airport.

4. A slant range was determined for varying angles off of the boresight of the source antenna that would result in a free space path loss which would just permit detection of the radiated signal by the aircraft receiver.

III. RESULTS

The results of the foregoing analysis are shown in Figures 1 and 2 (for an IFF receiver) and Figures 3 and 4 (for a TACAN receiver). Each graph shows the range of detection as a function of slant range, boresight angle, or height. Aircraft below the lines on the graphs could detect the radiated signal. For example, as shown in Figure 1, the IFF receiver on an aircraft at a range of approximately 17,000 ft. from COMSAT RSI's antenna and at an angle of $\approx 0°$ to the antenna boresight would detect the signal. The height of the aircraft at this position would be less than 500 ft.

A. 1025 - 1035 MHz and 1080 - 1100 MHz

COMSAT RSI's analysis indicates the regions in which a 1030 ± 5 MHz or 1090 ± 10 MHz signal transmitted by COMSAT RSI's test range could be detected by a typical airborne IFF receiver. The results show, for example, that an aircraft 17,000 ft. from the antenna and at a height of 500 ft. could detect the signal with its IFF receiver. Since the range is 7 miles from Dulles International Airport, with the boresight of the source antenna directed ***away*** from the airport, it is rare that an aircraft would be at this extremely low altitude. Furthermore, COMSAT RSI's test signal is transmitted in a continuous wave (CW) form -- as opposed to the pulsed form employed by IFF radar -- and, thus, an IFF receiver is unlikely to be confused were it to detect the testing signal.

Because an aircraft's TACAN receiver is more sensitive than its IFF receiver, a TACAN set tuned within the 1030 ± 5 MHz or 1090 ± 10 MHz frequency bands could detect a signal over a greater region than the IFF receiver. However, COMSAT RSI has obtained local air navigation maps and determined that the closest TACAN site tuned to frequencies within the possible test frequencies of 1025 to 1035 or 1080 to 1100 MHz is located approximately 90 miles away in Garrett County, MD (GRV). Consequently, it is expected that any aircraft using this beacon would be at an altitude well above the maximum level of 2750 ft. required for detection as shown in Figure 2.

B. 1213 MHz

Figure 5 displays the results of COMSAT RSI's analysis at 1213 MHz. The closest TACAN site using this frequency is Westminister, MD (EMI), which is approximately 55 miles from COMSAT RSI's Arcola test range. This graph shows that COMSAT RSI's radiated signal could be detected by an aircraft below an altitude of approximately 2000 ft. and within a distance of about 15.5 miles of the source antenna. It is unlikely that an aircraft using the Westminister, MD TACAN site would travel through this beam.

C. Pointing Considerations

All of these analyses are performed assuming the aircraft in a worst-case position relative to COMSAT RSI's non-rotating radiating antenna. The 15 ft. diameter antenna is mounted such that it is always pointed at an approximate azimuth of 345°. Thus, for an aircraft to detect COMSAT RSI's radiated signal, it would have to fly through the point in space where the radiating antenna beam peak occurs. Since the antenna does not move, this effectively reduces even further the small chance that interference would be detected.

D. Relative Power Considerations

Finally, it should be noted that actual TACAN and IFF signals are radiated at power levels considerably in excess of those at the test range. The table below shows a comparison between the effective incident radiated power (EIRP) of COMSAT RSI's test antenna and typical TACAN and IFF transmitter antennas. The levels for the navigation/control antennas are significantly (> 30 dB) greater than the maximum EIRP for the range test antenna. In the majority of cases for the foreseeable future, COMSAT RSI expects that the source antenna will transmit at an even lower EIRP of 26 dBm.

EIRPs of Various Antennas

Antenna	EIRP (dBm)	Level at 1 Mile* (dBm)
COMSAT RSI Range	30.0	-67.1
TYPICAL TACAN	68.4	-28.7
TYPICAL IFF	74.0	-23.0

* Signal levels at other distances may be calculated by the equation $P = P_{1mile} -- 20 \log(d)$

where P = power level at desired distance (dBm)
$P_{1\ mile}$ = antenna power level at 1 mile distance (dBm)
d = distance (miles)

FIGURE 1

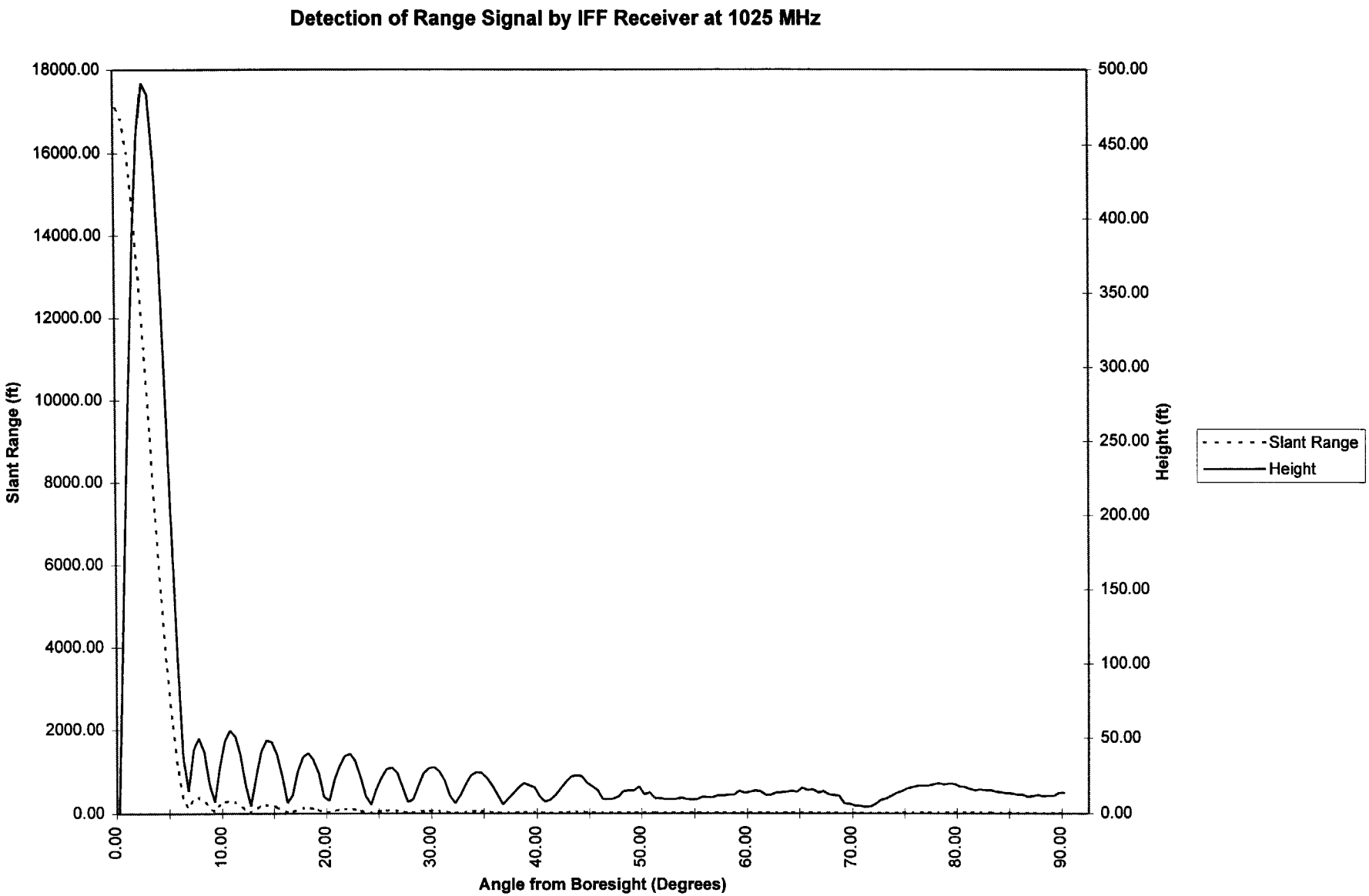

Detection of Range Signal by IFF Receiver at 1025 MHz
Slant Range (ft)
18000.00
16000.00
14000.00
12000.00
10000.00
8000.00
6000.00
4000.00
2000.00
0.00
Height (ft)
500.00
450.00
400.00
350.00
300.00
250.00
200.00
150.00
100.00
50.00
0.00
0.00
10.00
20.00
30.00
40.00
50.00
60.00
70.00
80.00
90.00
Angle from Boresight (Degrees)
Slant Range
Height

FIGURE 2

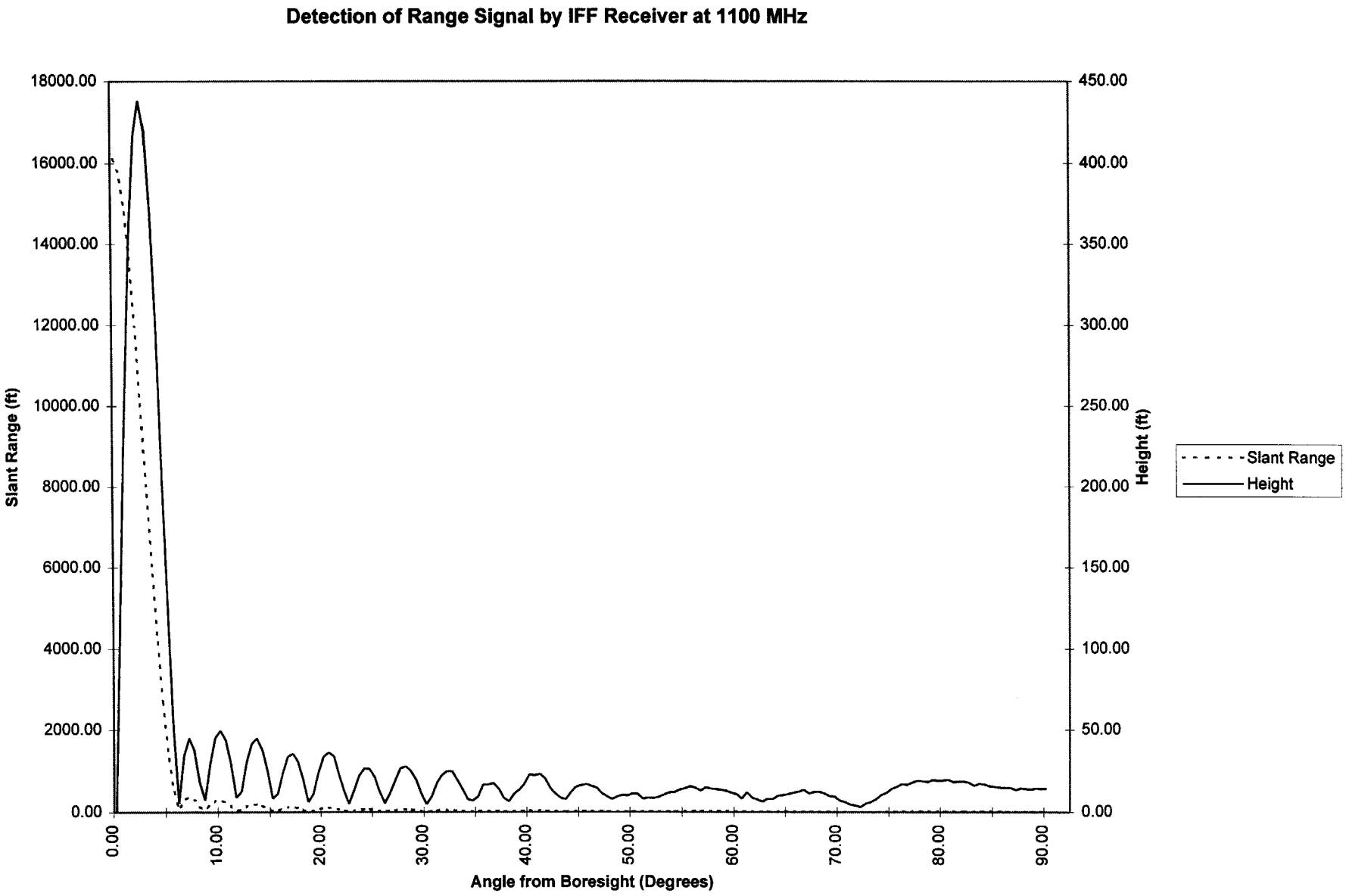

Detection of Range Signal by IFF Receiver at 1100 MHz
Slant Range (ft)
18000.00
16000.00
14000.00
12000.00
10000.00
8000.00
6000.00
4000.00
2000.00
0.00
Height (ft)
450.00
400.00
350.00
300.00
250.00
200.00
150.00
100.00
50.00
0.00
0.00
10.00
20.00
30.00
40.00
50.00
60.00
70.00
80.00
90.00
Angle from Boresight (Degrees)
Slant Range
Height

FIGURE 3

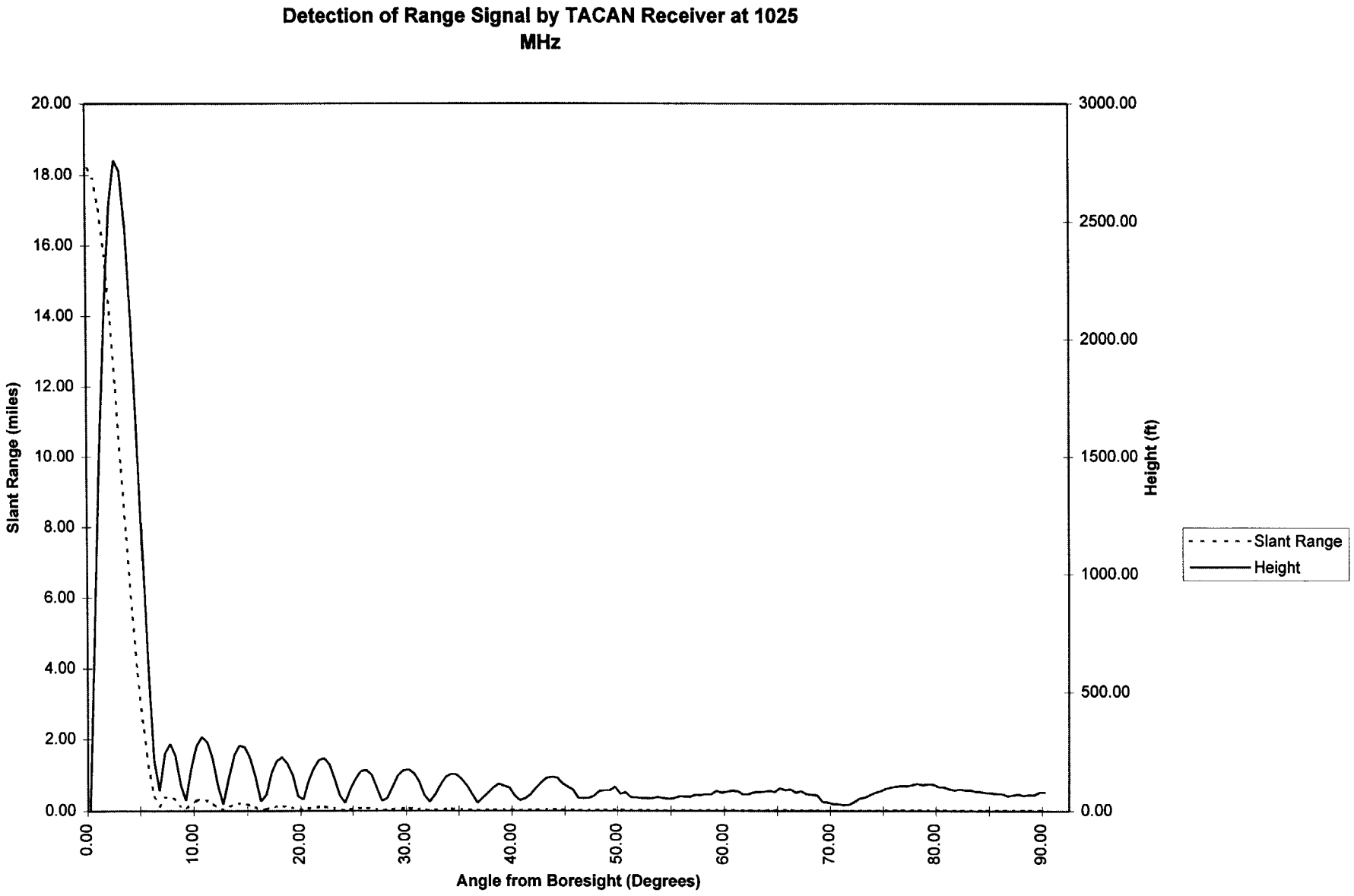

Detection of Range Signal by TACAN Receiver at 1025 MHz
Slant Range (miles)
Height (ft)
Angle from Boresight (Degrees)
20.00
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
3000.00
2500.00
2000.00
1500.00
1000.00
500.00
0.00
0.00
10.00
20.00
30.00
40.00
50.00
60.00
70.00
80.00
90.00
Slant Range
Height

FIGURE 4

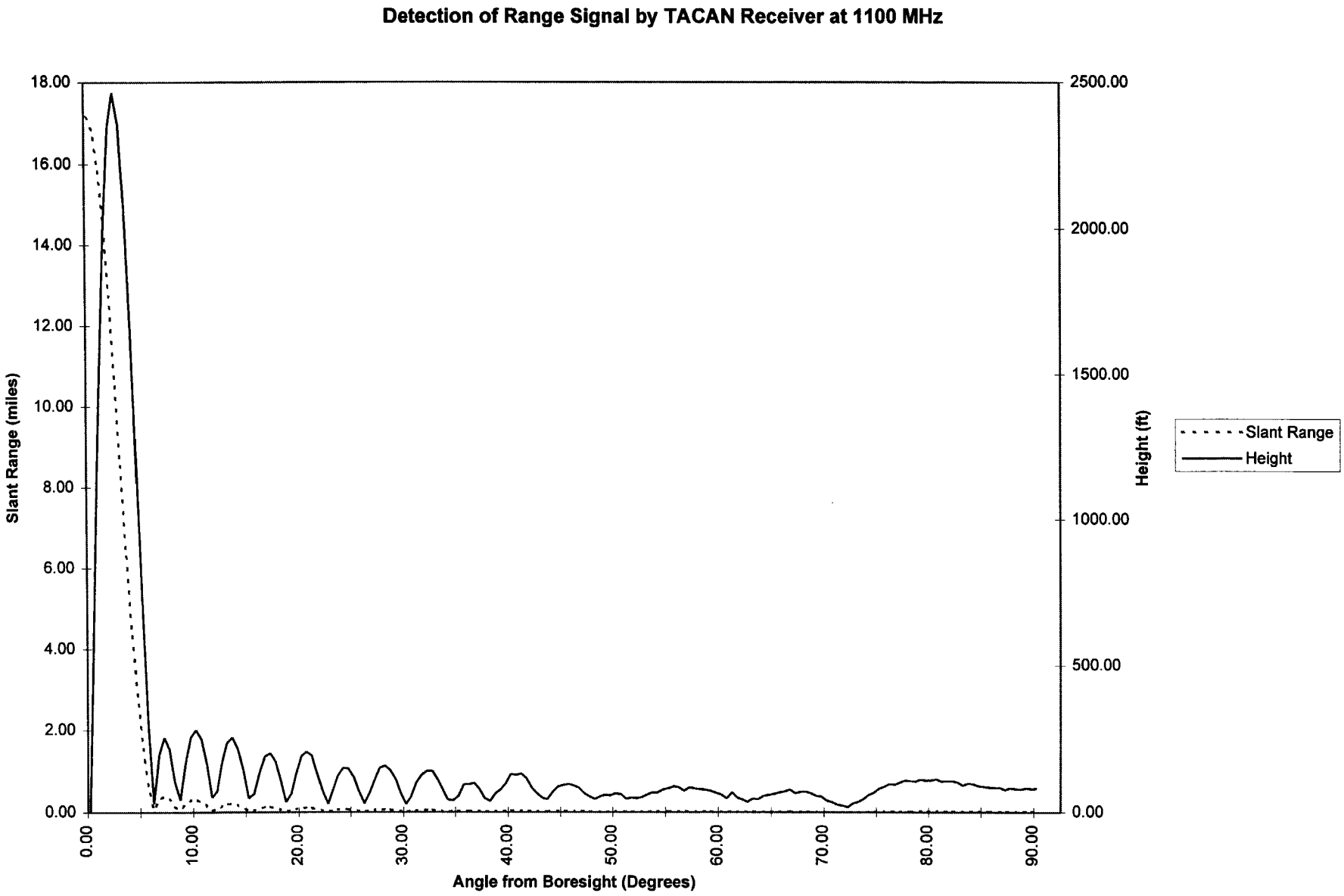
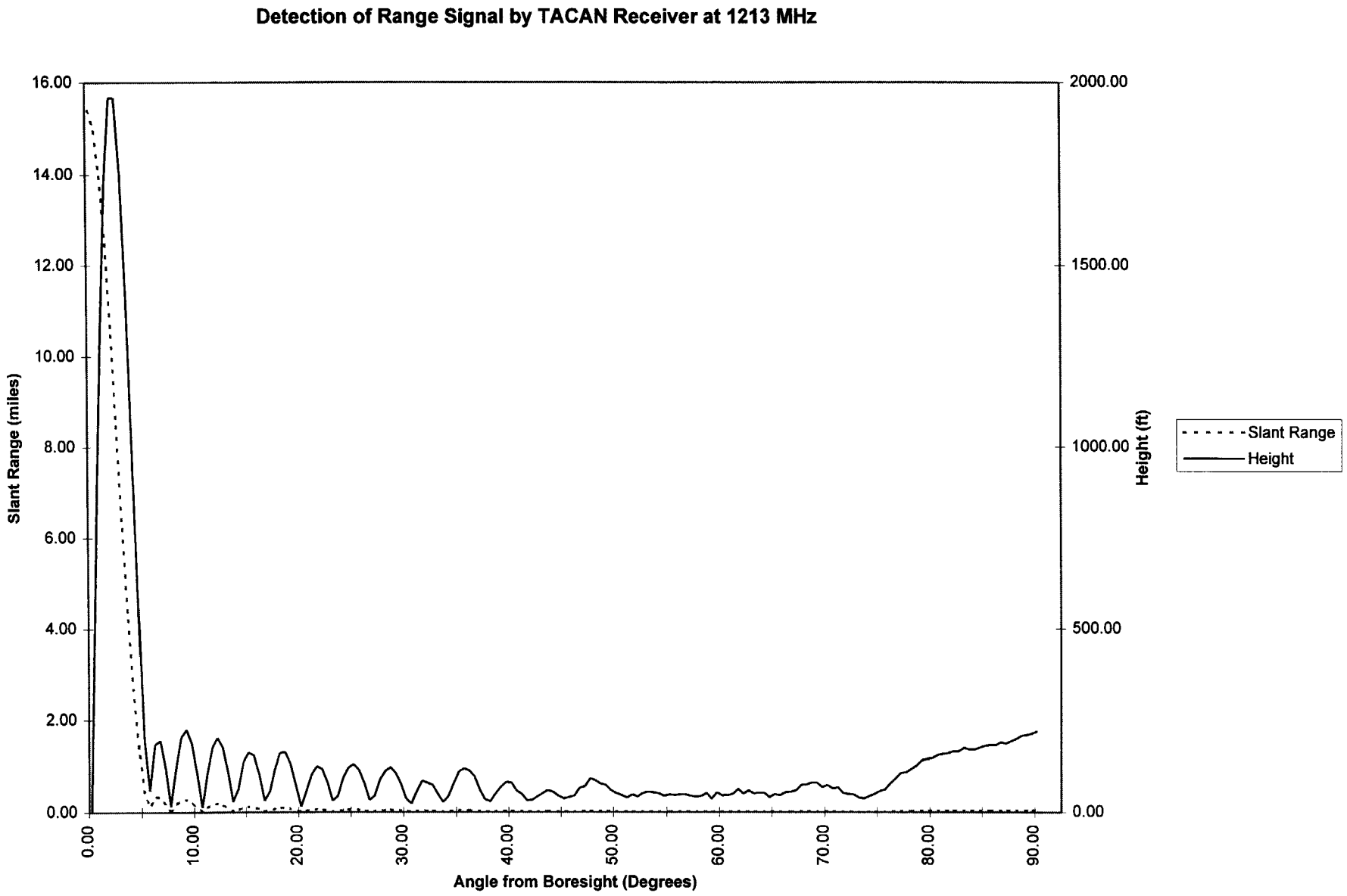

Detection of Range Signal by TACAN Receiver at 1100 MHz
Slant Range (miles)
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
Height (ft)
2500.00
2000.00
1500.00
1000.00
500.00
0.00
0.00
10.00
20.00
30.00
40.00
50.00
60.00
70.00
80.00
90.00
Angle from Boresight (Degrees)
Slant Range
Height

FIGURE 5


Detection of Range Signal by TACAN Receiver at 1213 MHz
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
Slant Range (miles)
2000.00
1500.00
1000.00
500.00
0.00
Height (ft)
0.00
10.00
20.00
30.00
40.00
50.00
60.00
70.00
80.00
90.00
Angle from Boresight (Degrees)
Slant Range
Height