



SENSORS

Modulated Microwave Position & Heading Reference Sensor

Jan Grothusen

Guidance Control Systems Limited (United Kingdom)

Session Chair – Steve Browne, Thales Geo Solutions

September 16-17, 2003
Houston, Texas

RadarScan

Modulated Microwave Position & Heading Sensor

Laser

- Passive retro-targets
- Little clutter
- High precision

Radar

- Weather independence
- Elevation coverage
- Widely recognized & trusted

Objectives

- Challenges
- Passive Targets
- Range Measurement
- Bearing Measurement
- Radar Clutter
- Embedded System
- Summary

RadarScan

Modulated Microwave Position & Heading Sensor

Passive Targets

- spectrum pollution
- narrow band
- low power

Radar Clutter

- short range
- behind target
- multi-system operation

Range & Bearing Measurement

- multi-target discrimination
- high accuracy

Embedded System

- low cost / low maintenance



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Objectives

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Challenges

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Passive Targets

•

Range

Measurement

•

Bearing

Measurement

•

Radar Clutter

•

Embedded

System

•

Summary

RadarScan

Modulated Microwave Position & Heading Sensor

Oct. 6, 1959

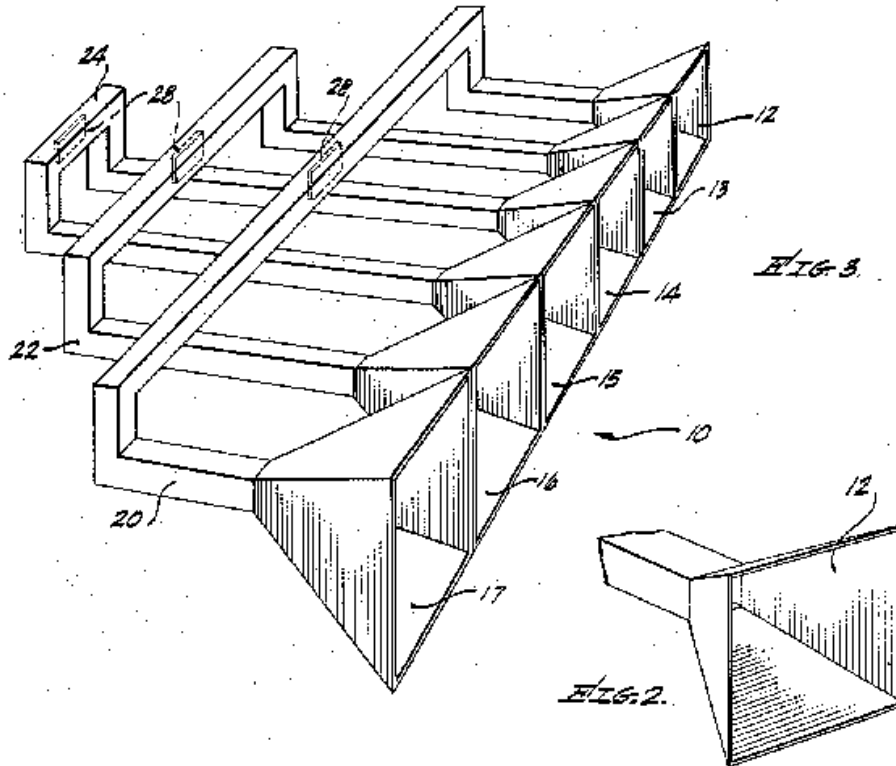
L. C. VAN ATTA

2,908,002

ELECTROMAGNETIC REFLECTOR

Filed June 8, 1955

3 Sheets-Sheet 1



Objectives

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Challenges

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Passive Targets

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Range

Measurement

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Bearing

Measurement

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Radar Clutter

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Embedded

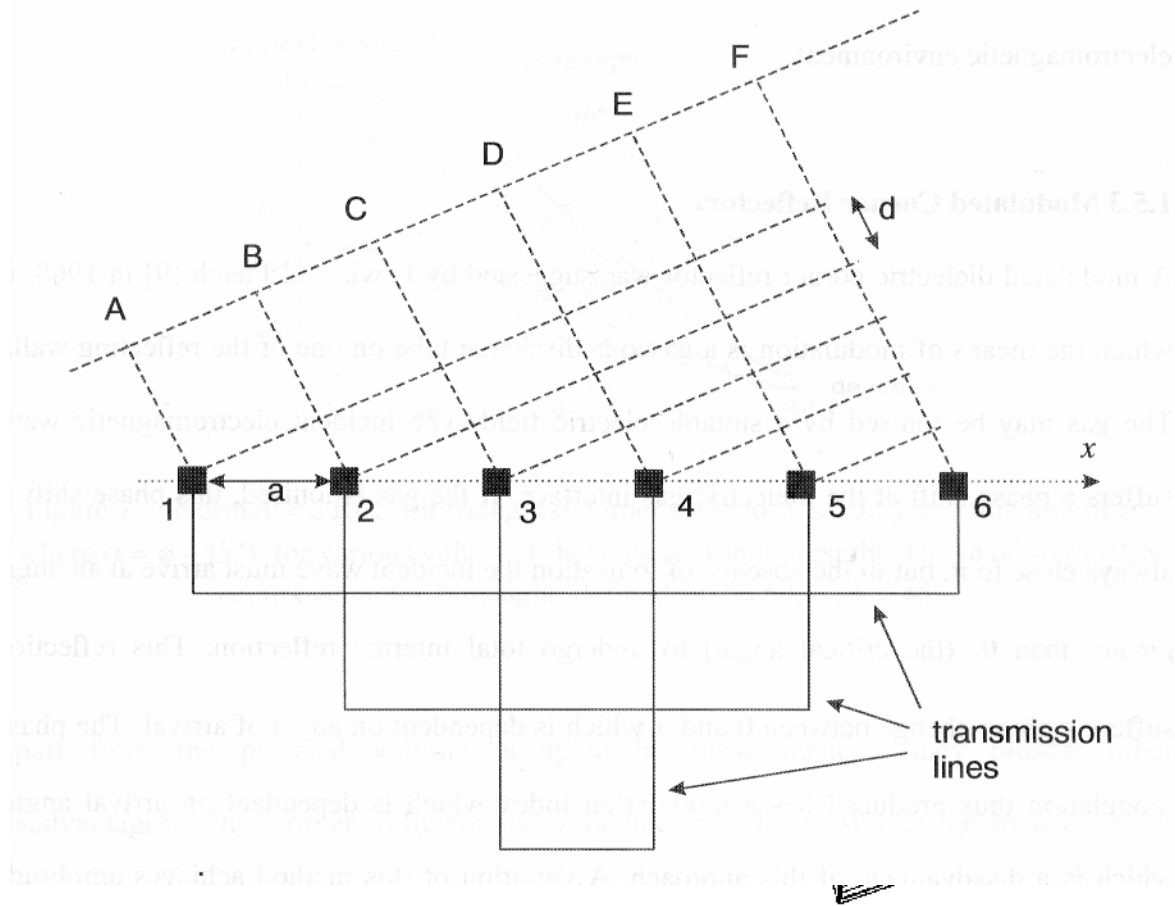
System

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Summary

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Modulated Microwave Position & Heading Sensor



Objectives

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Challenges

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Passive Targets

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Range
Measurement

•

Bearing
Measurement

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Radar Clutter

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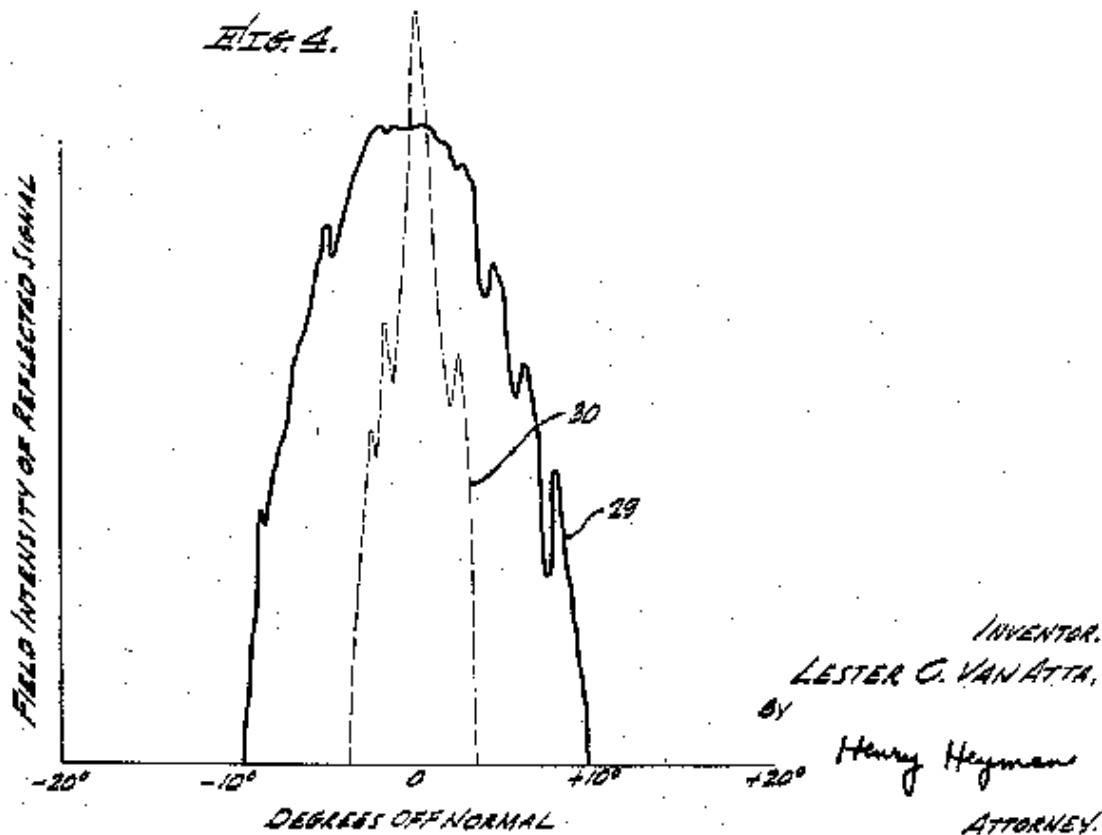
Embedded
System

•

Summary

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Objectives

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Challenges

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Range

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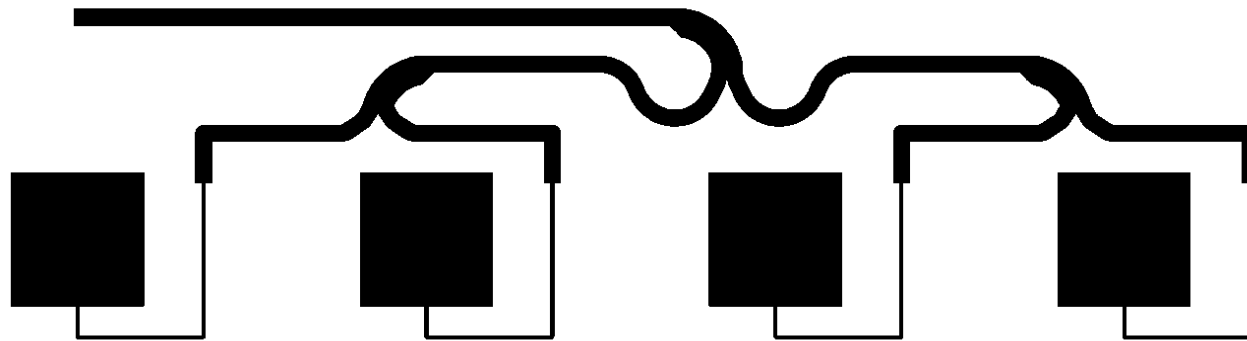
System

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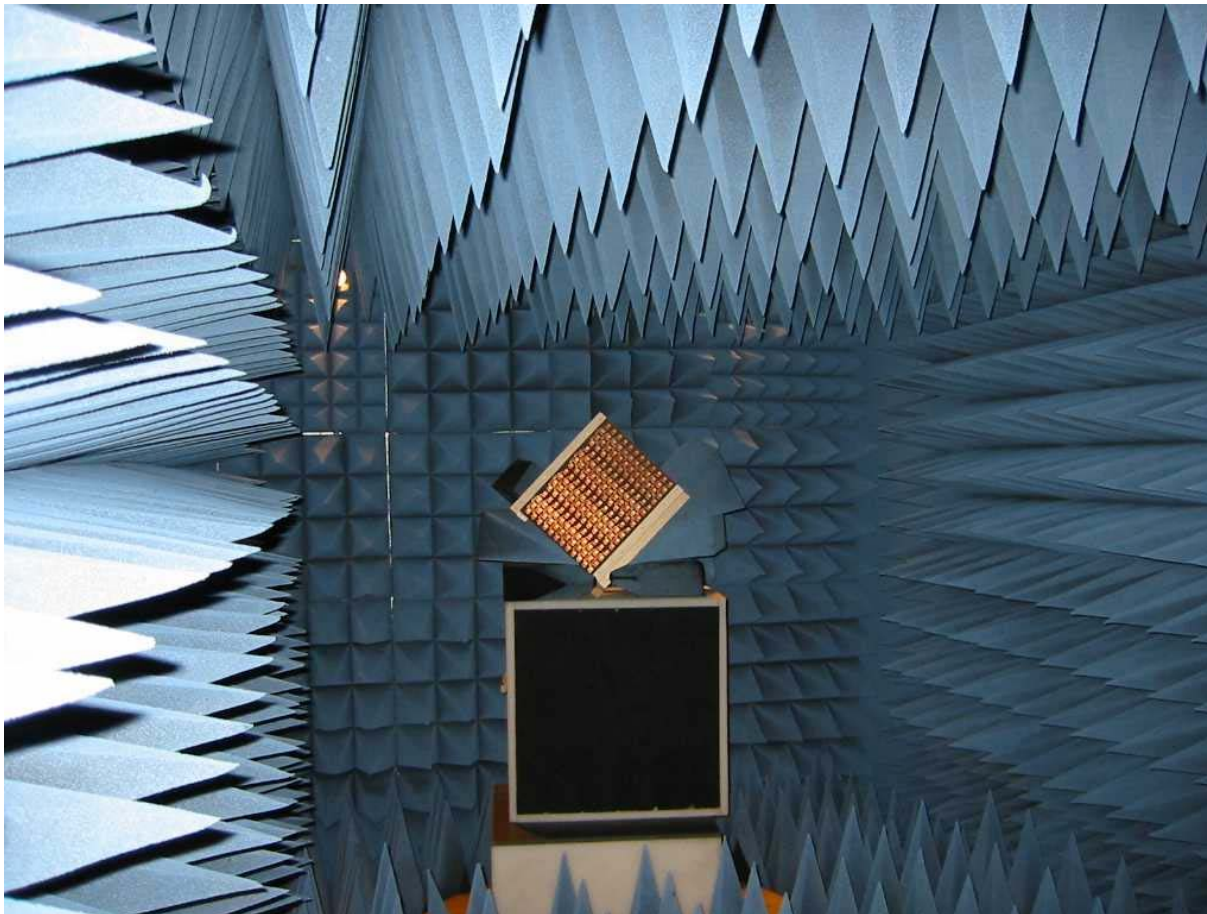
Embedded
System

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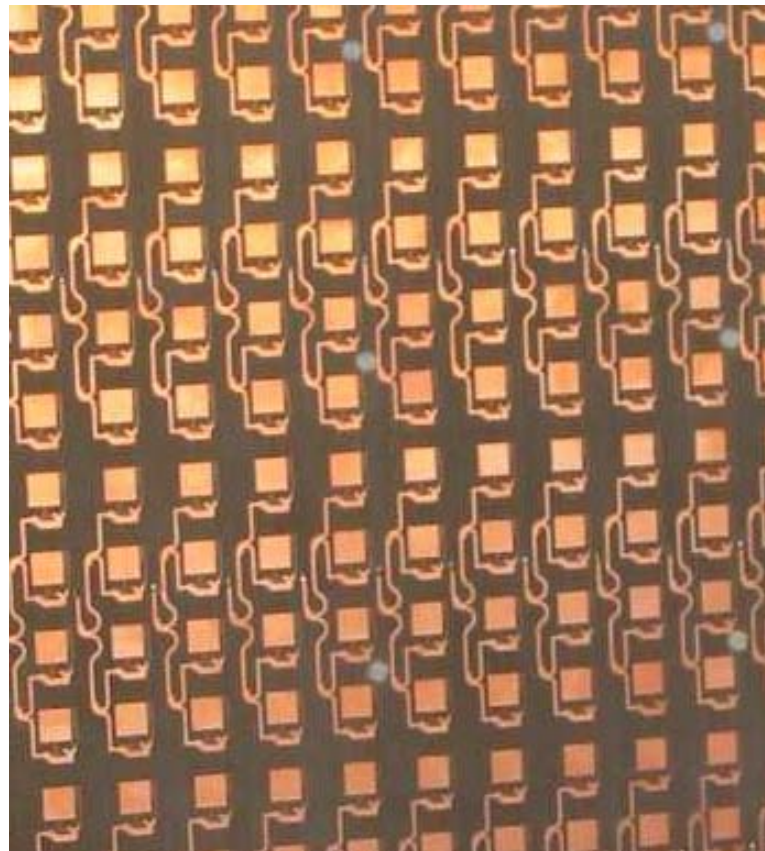
Embedded
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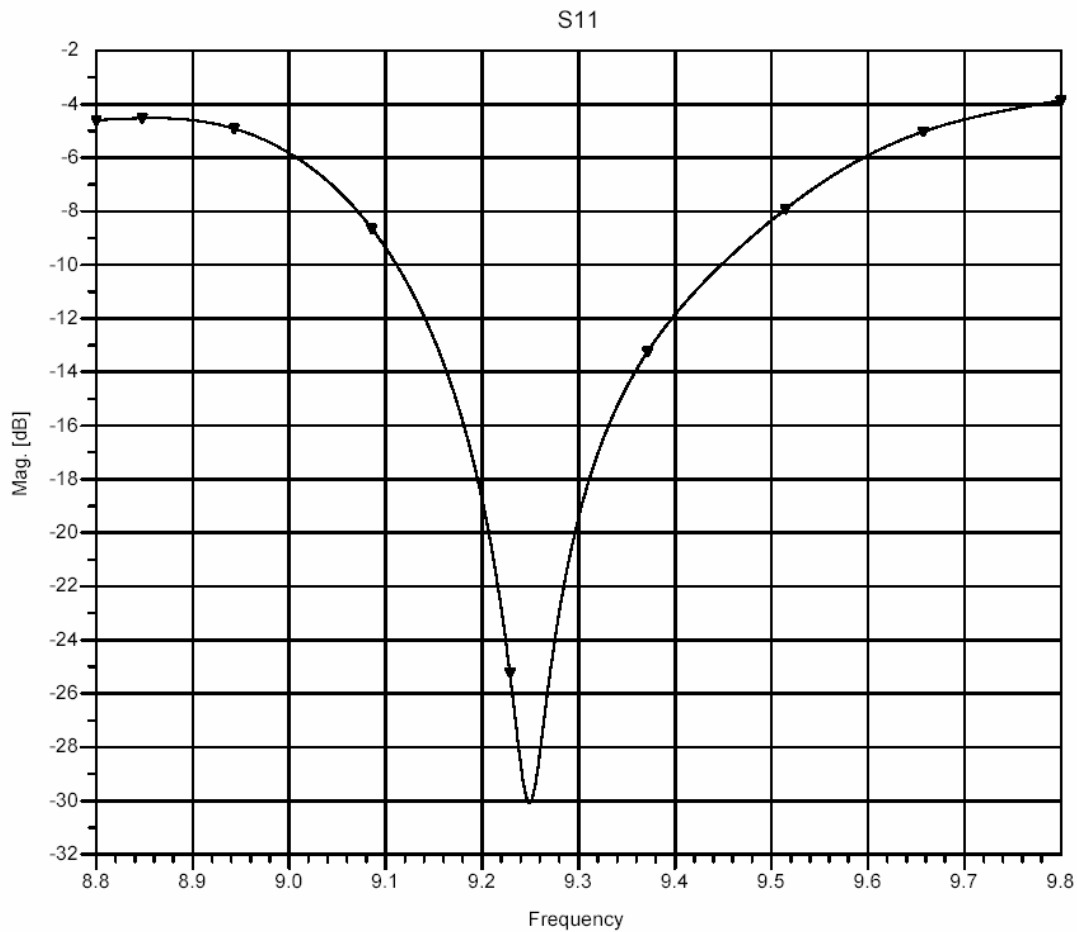
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Summary

RadarScan

Modulated Microwave Position & Heading Sensor

Tue Jun 03 2003 - Dataset: Lpoleant_4x1_feed_ext_feed_fc_2_XP_3_nv_4_9p25_adj_2_mom_a



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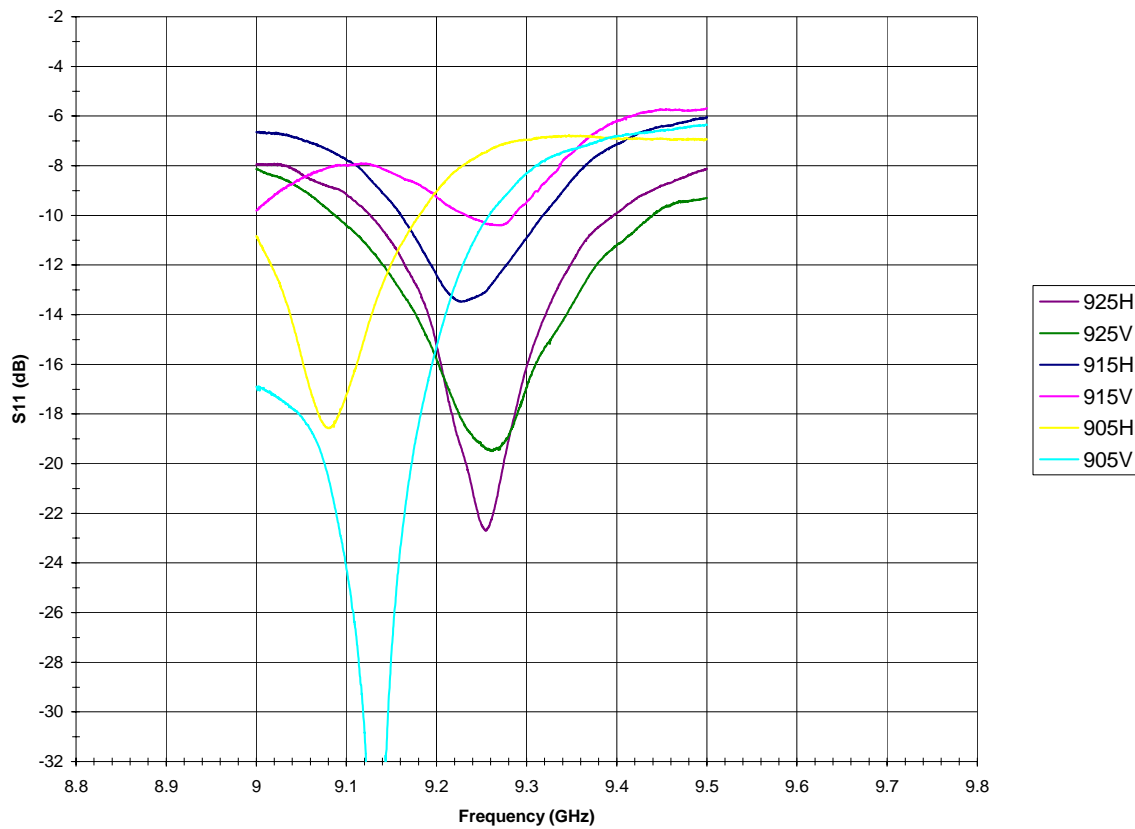
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Summary

RadarScan

Module

S11 Return Loss Measurements
(Both Layers)



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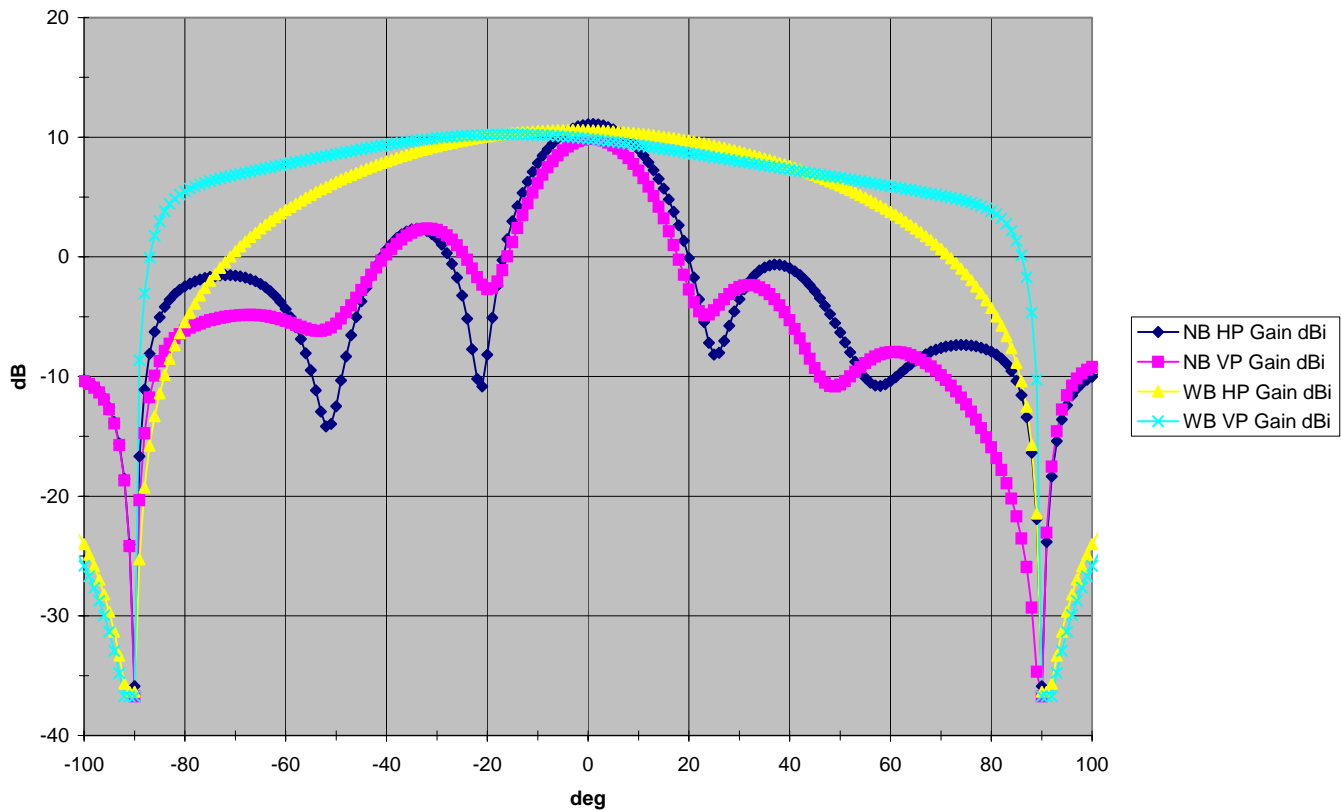
System

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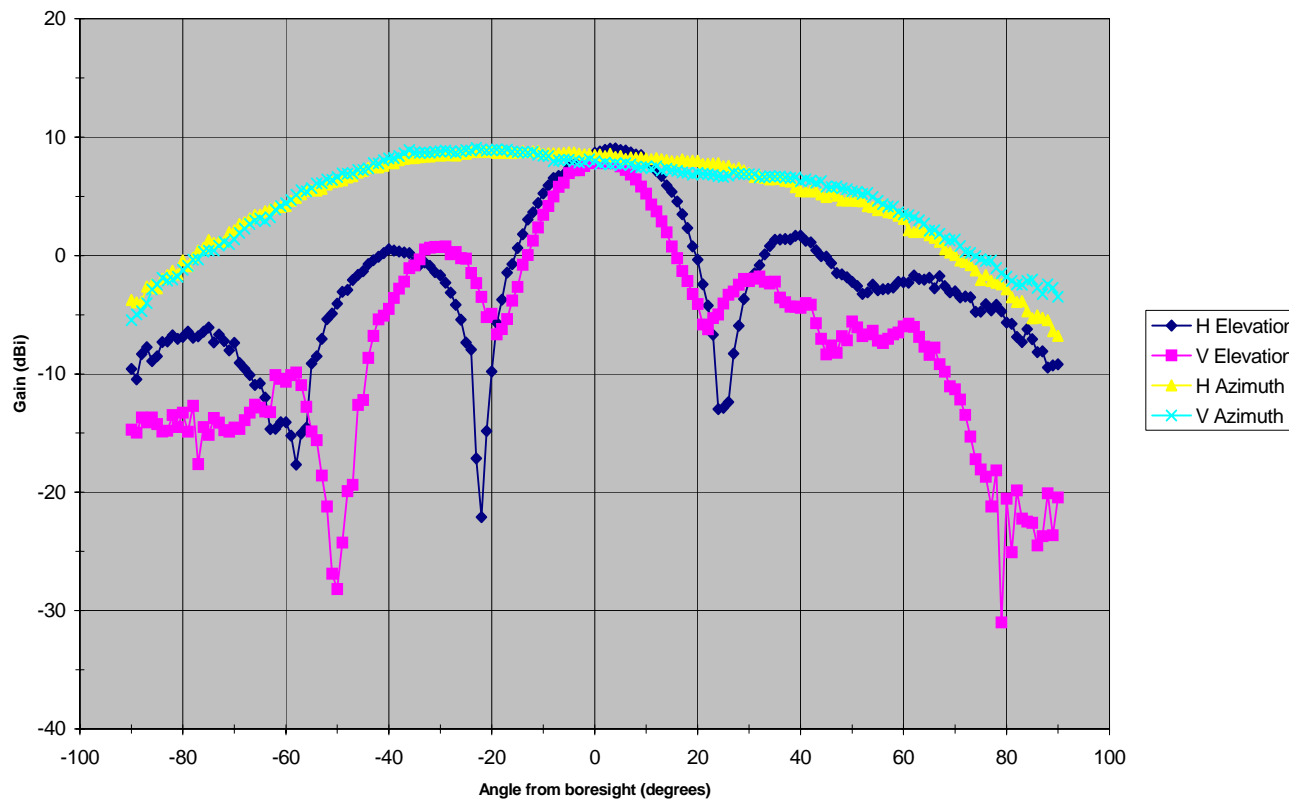
System

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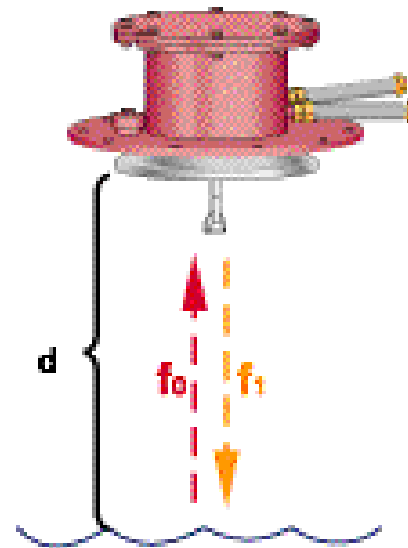
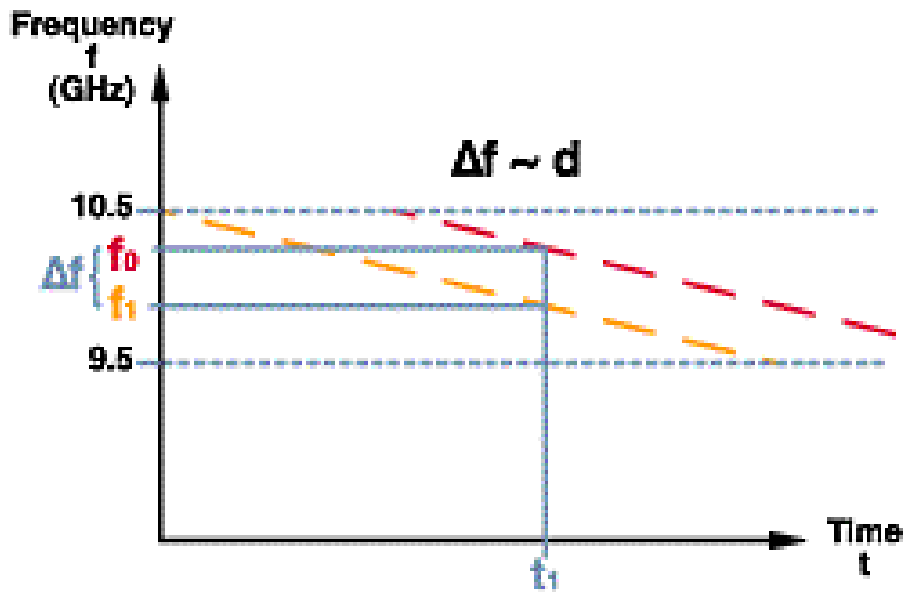
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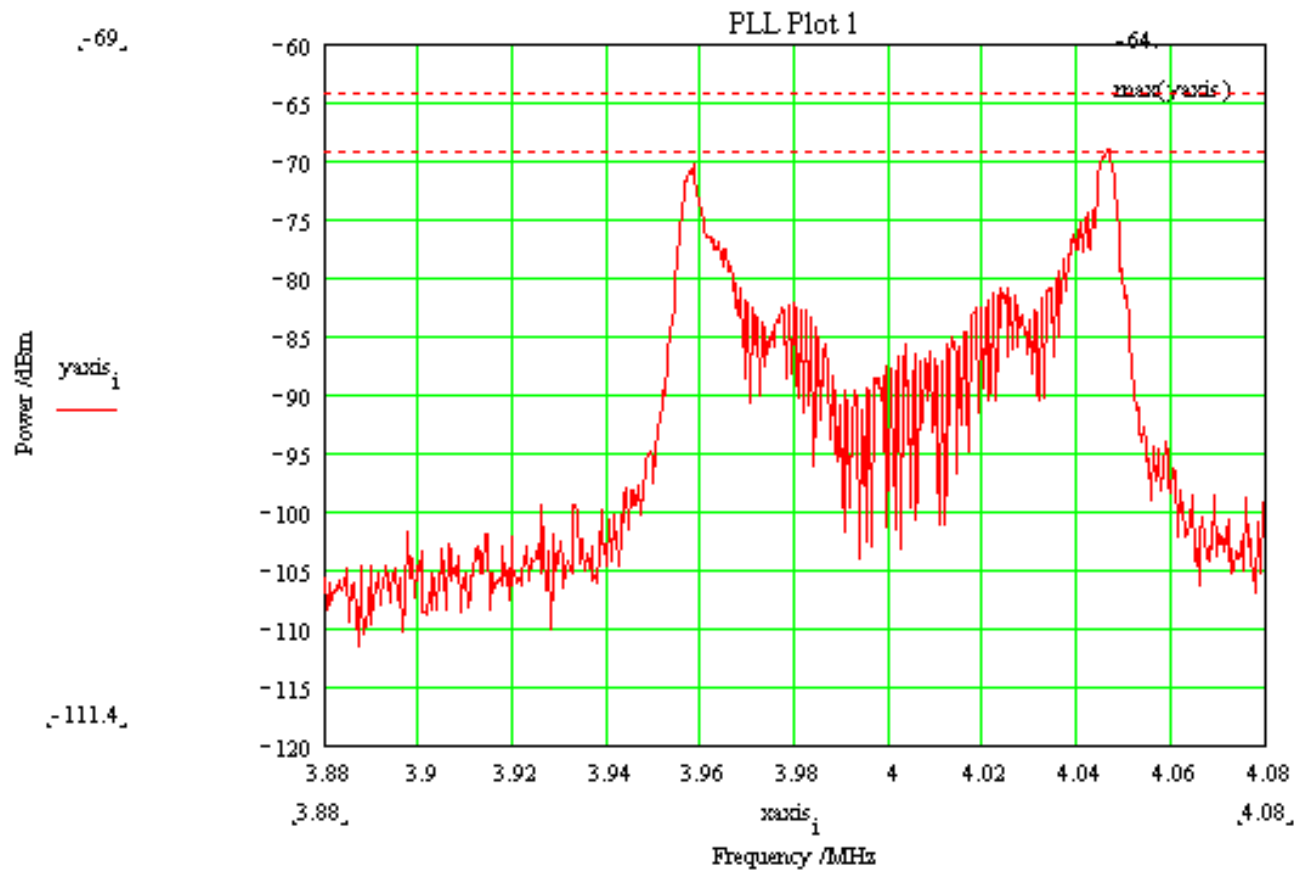
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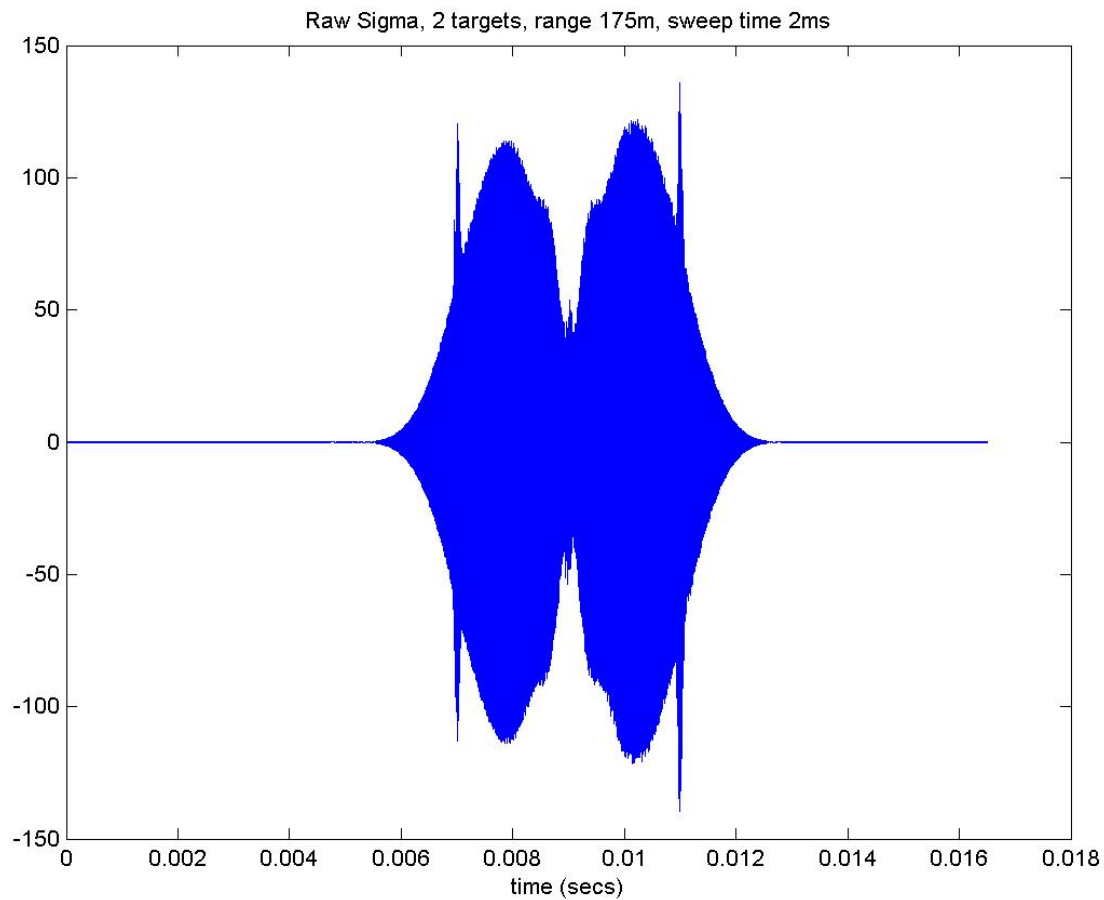
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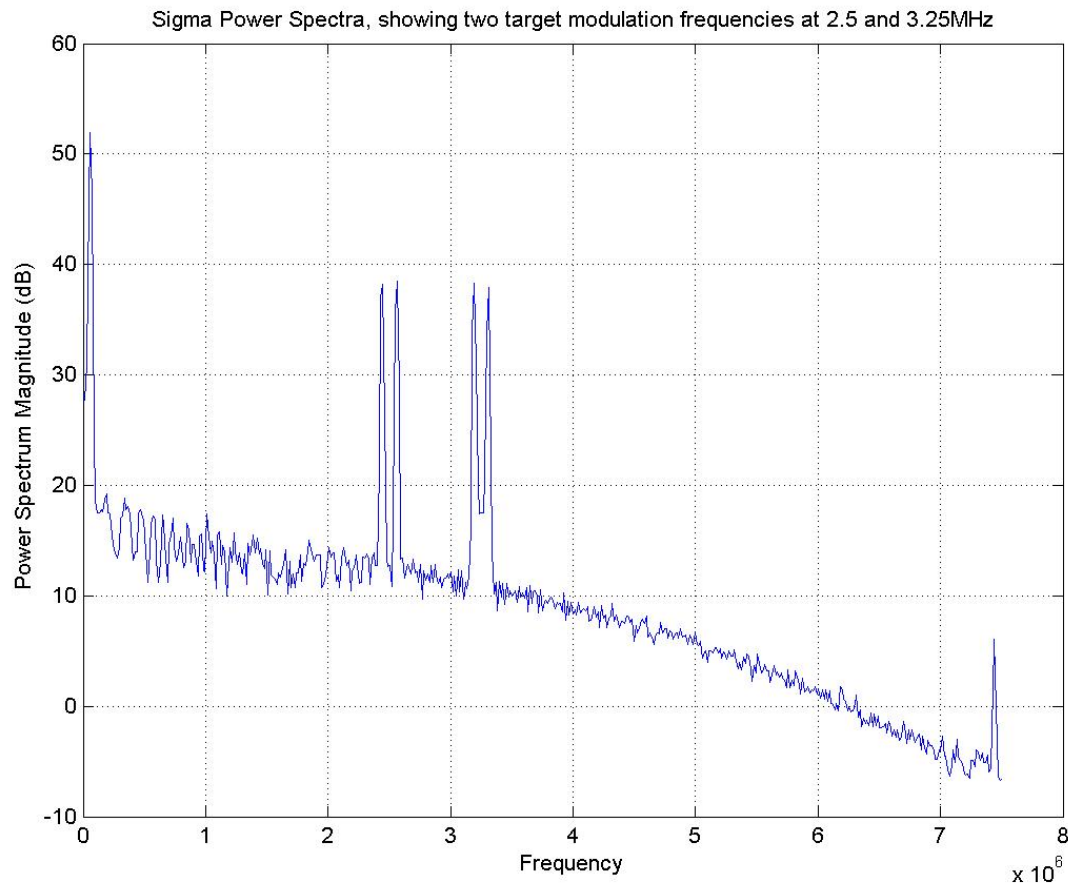


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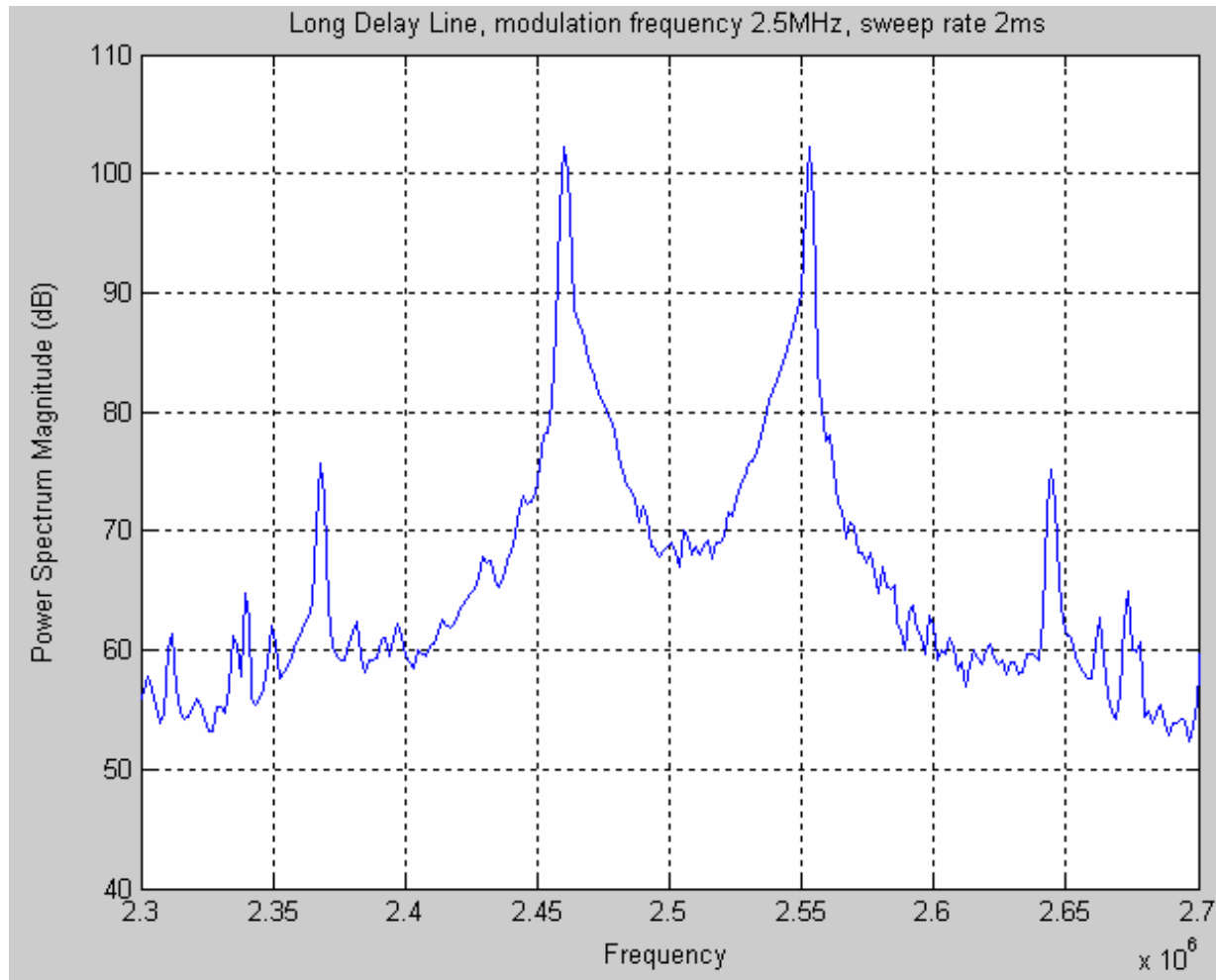
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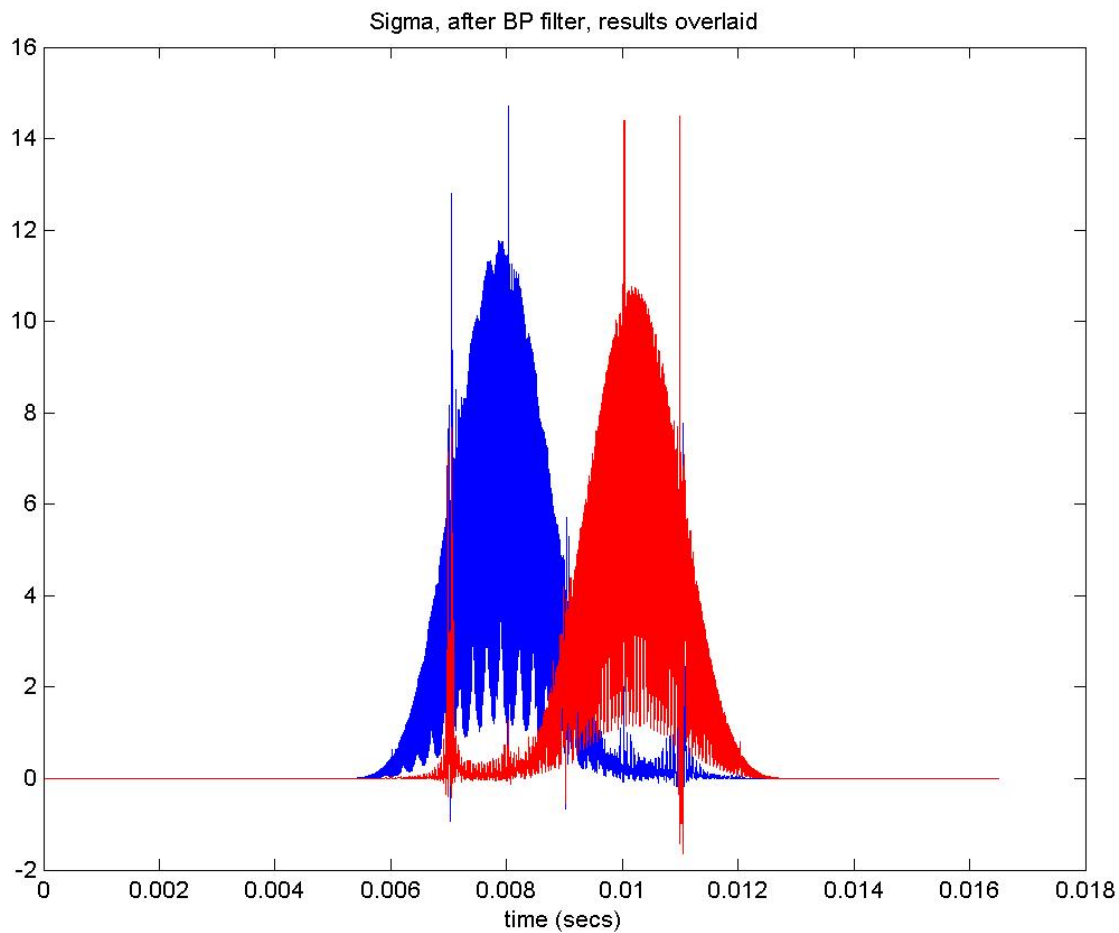
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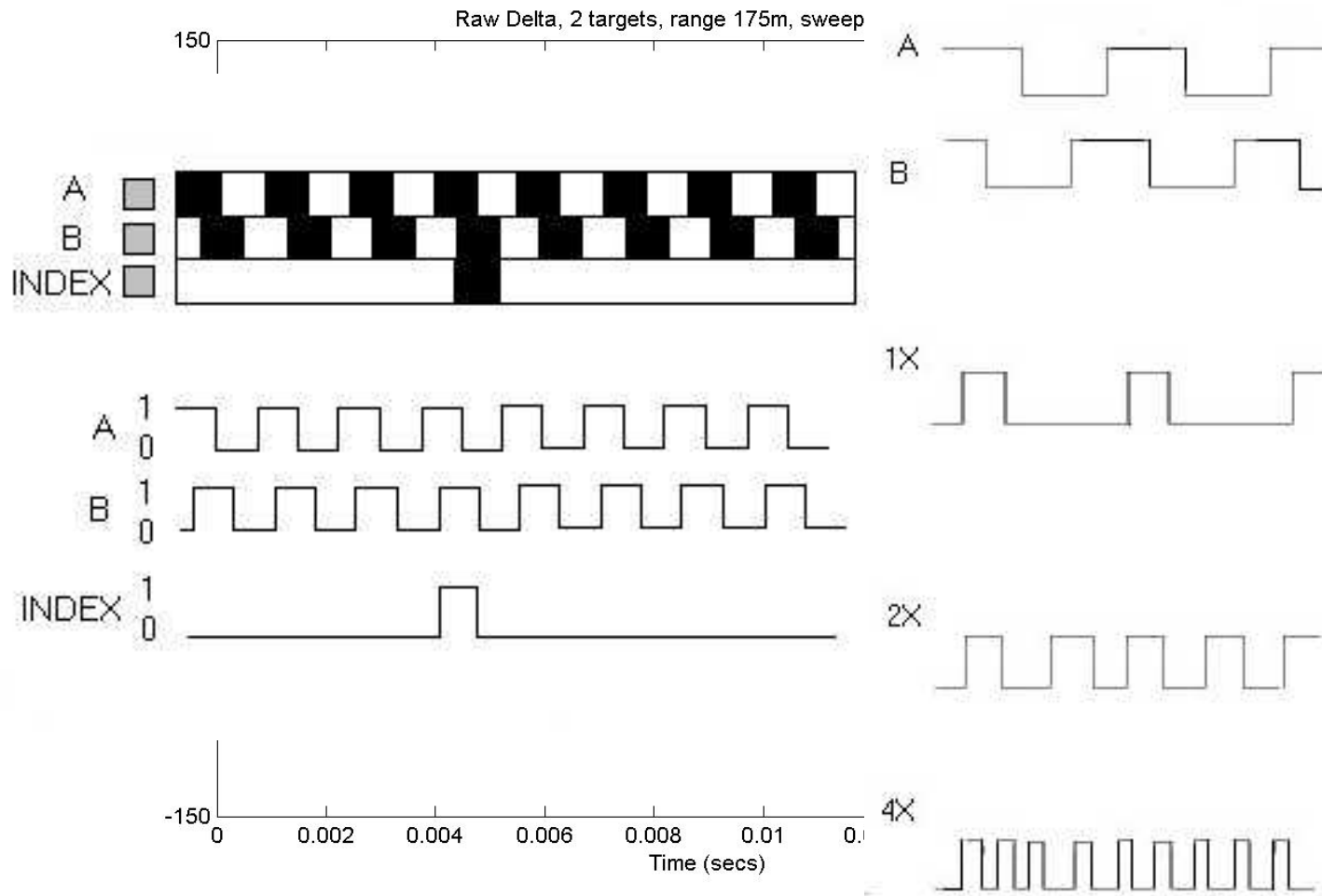
RadarScan

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RadarScan

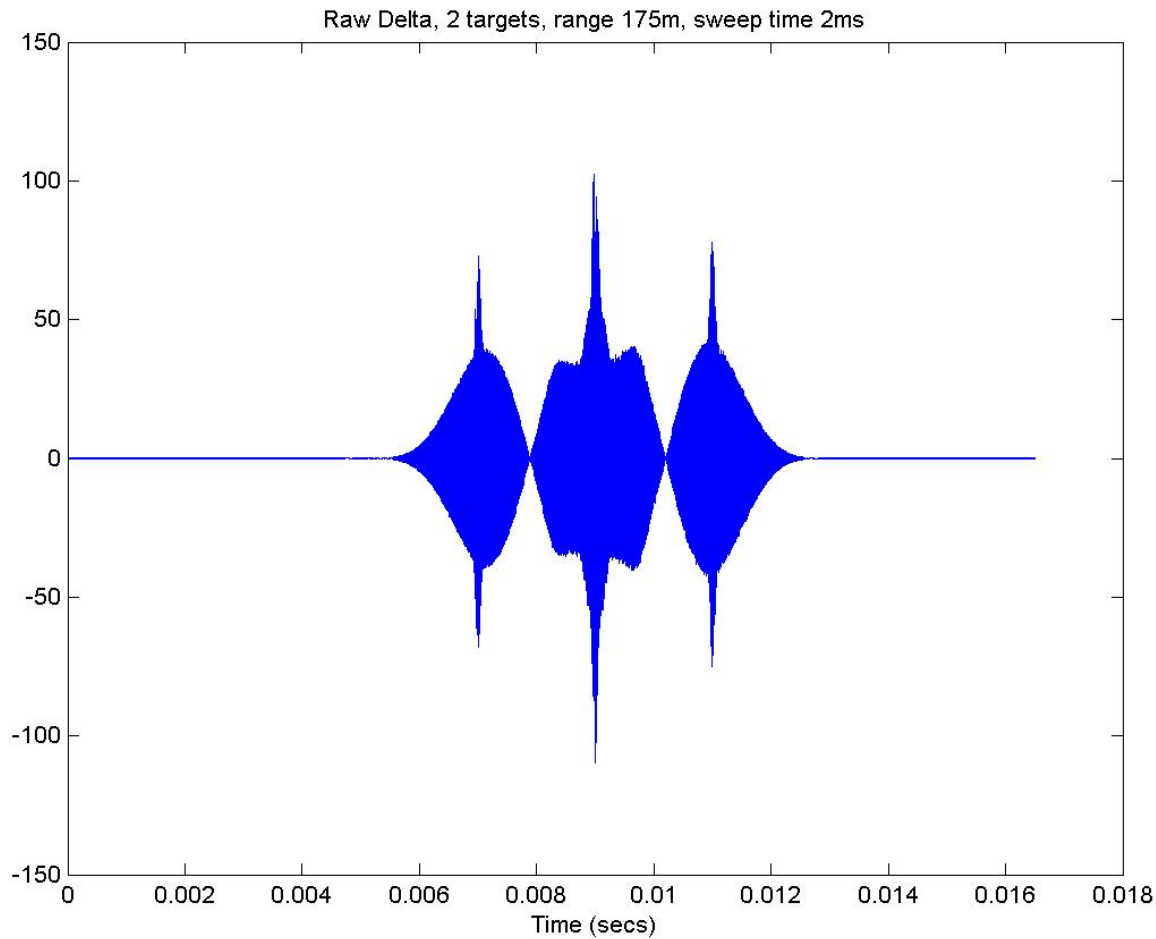
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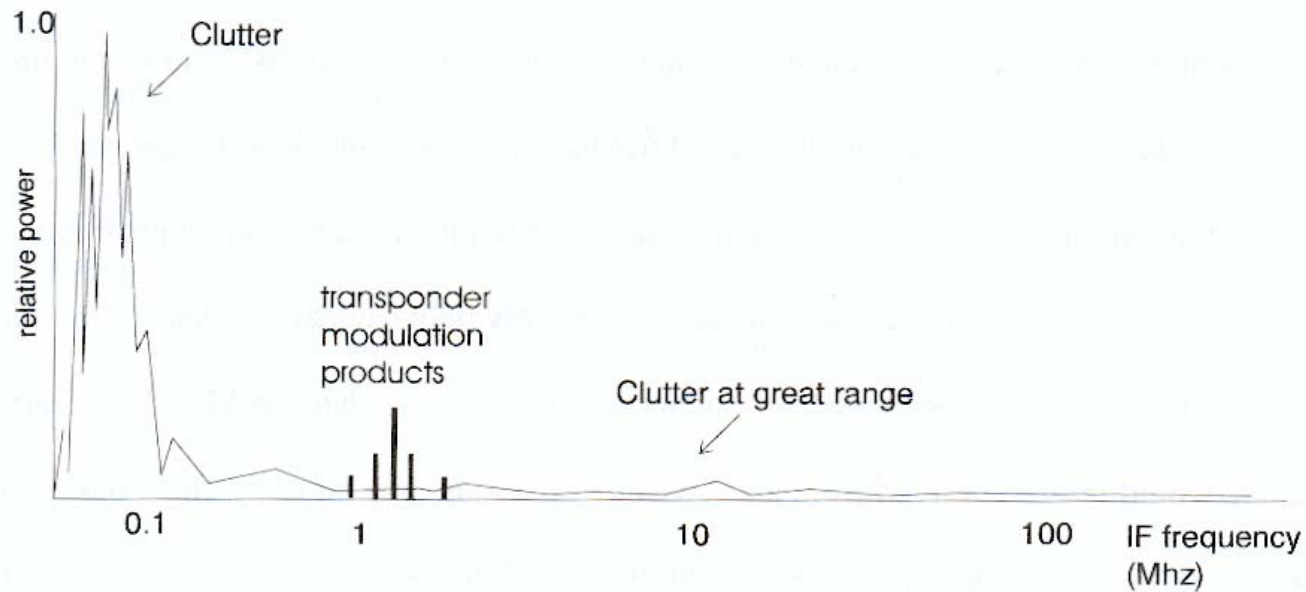
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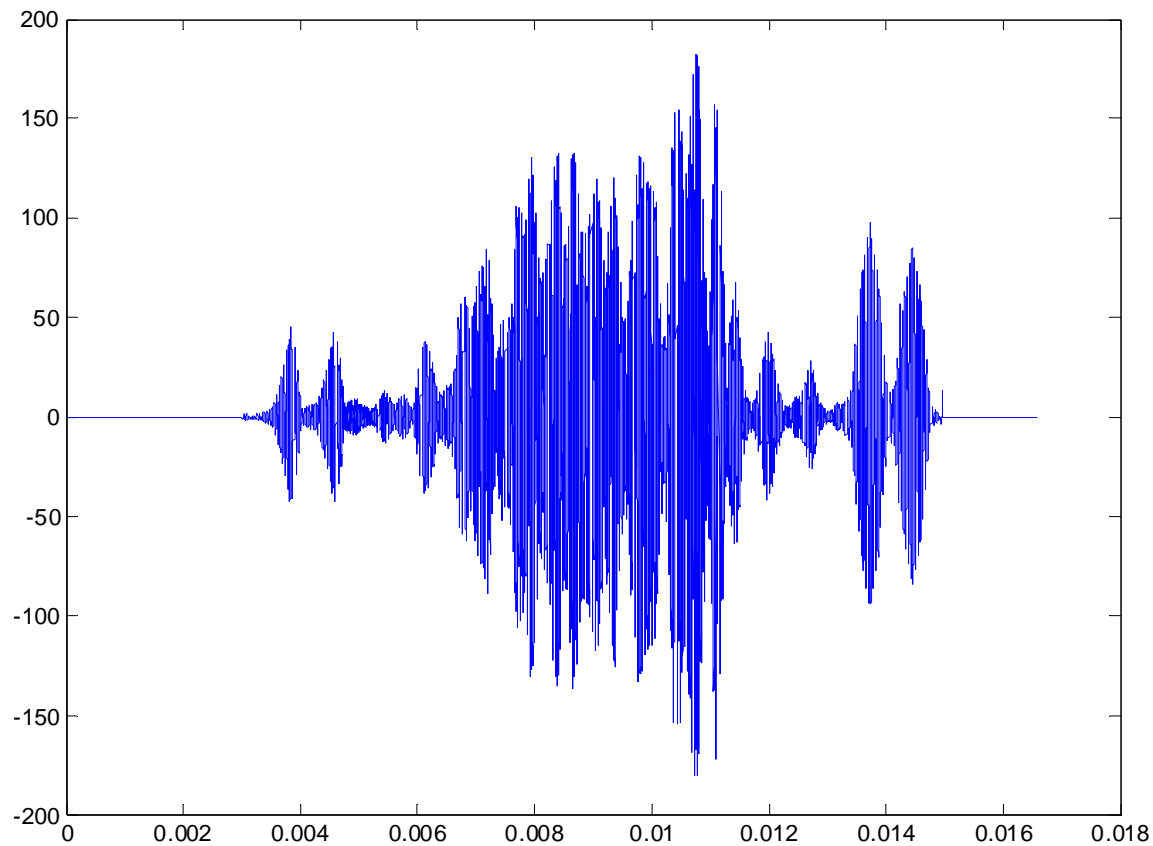
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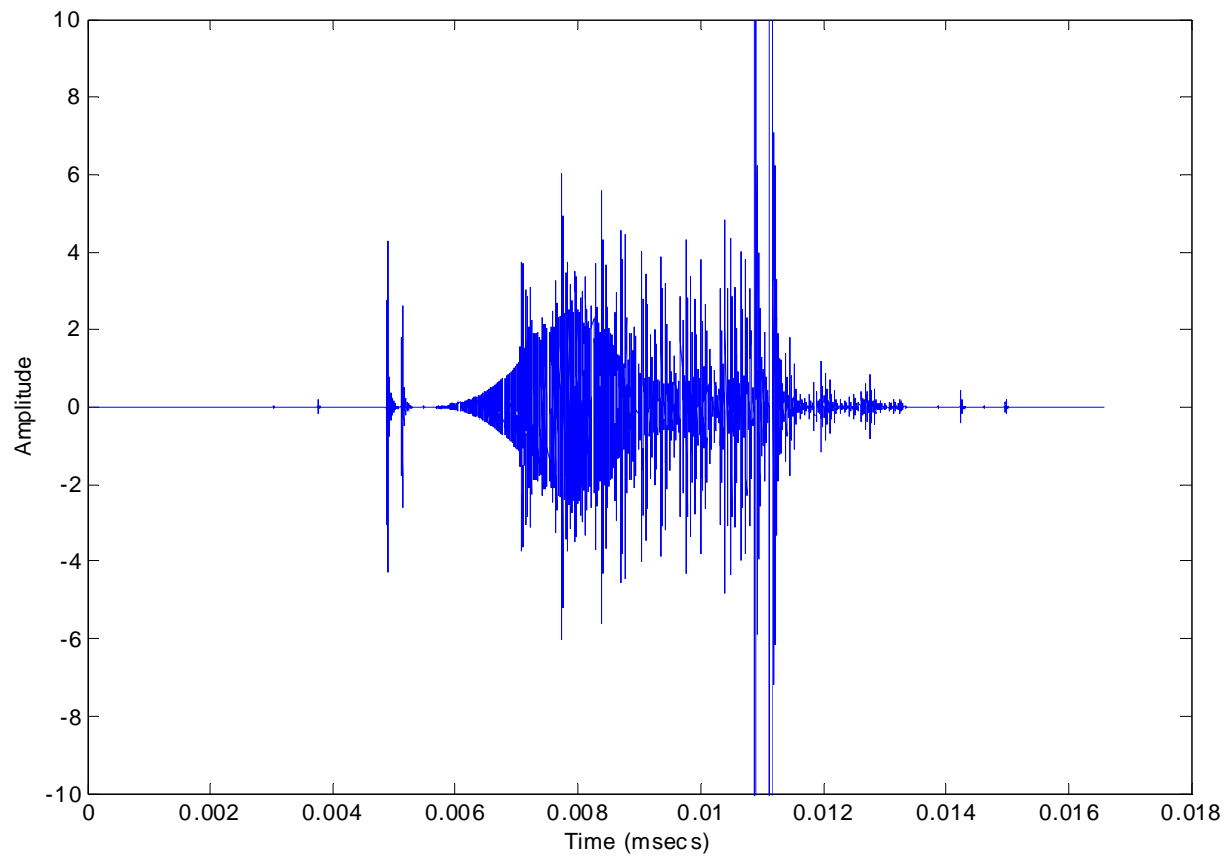
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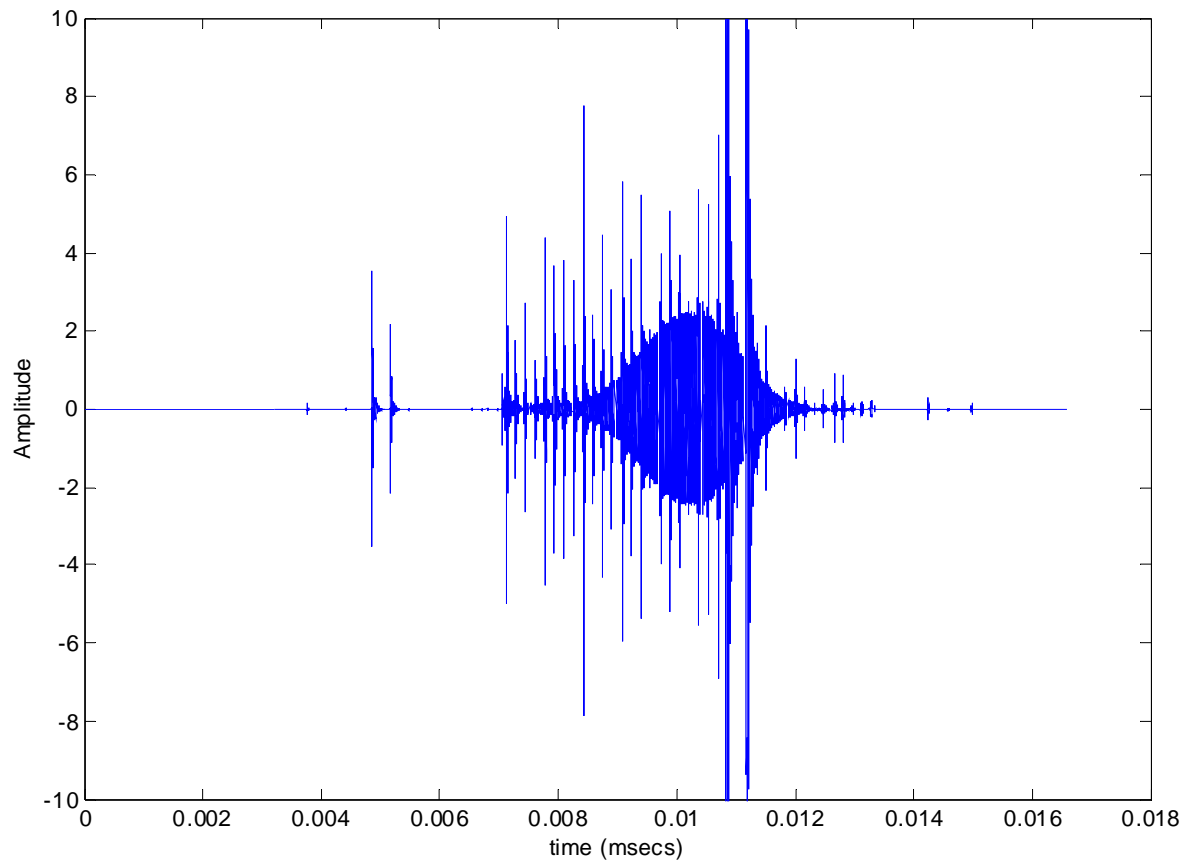
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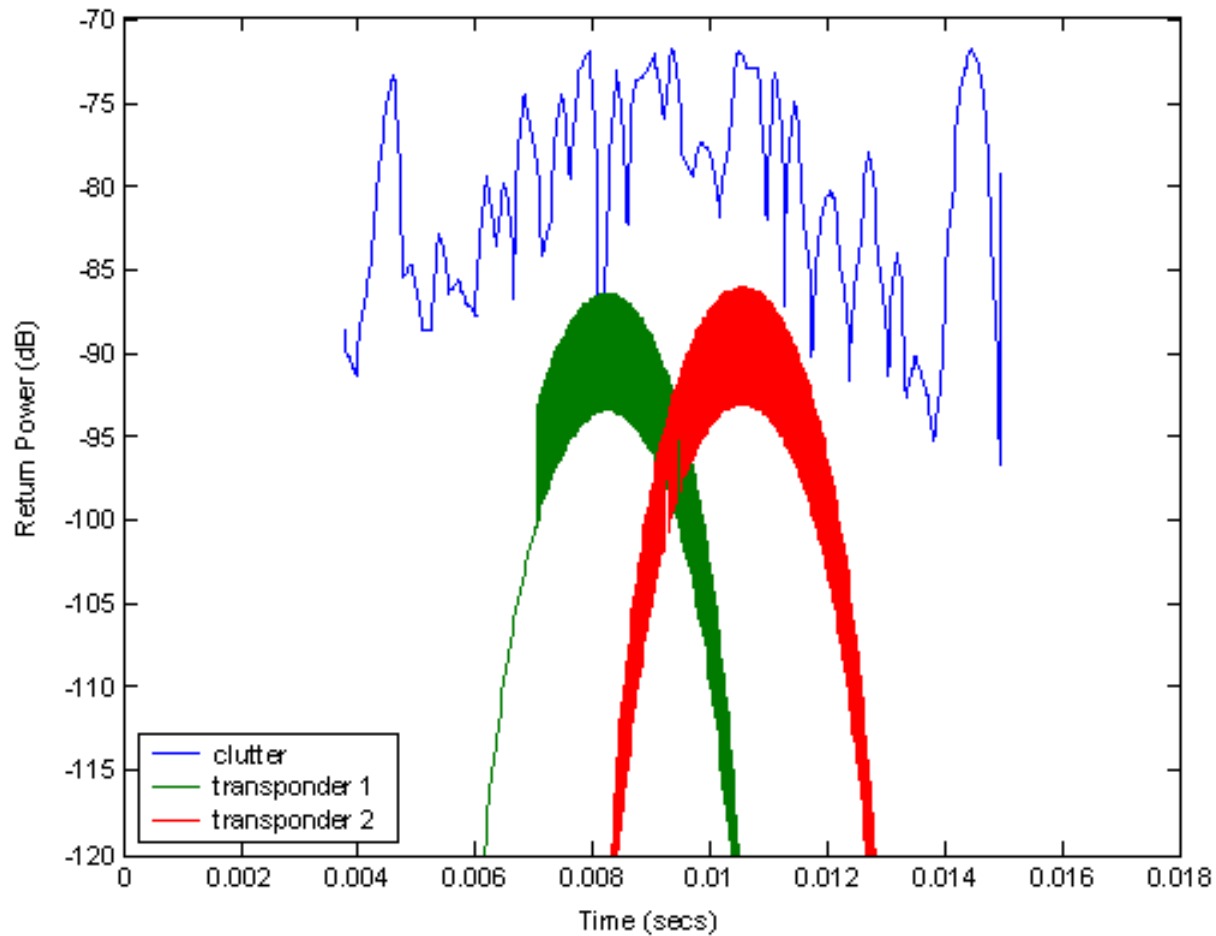
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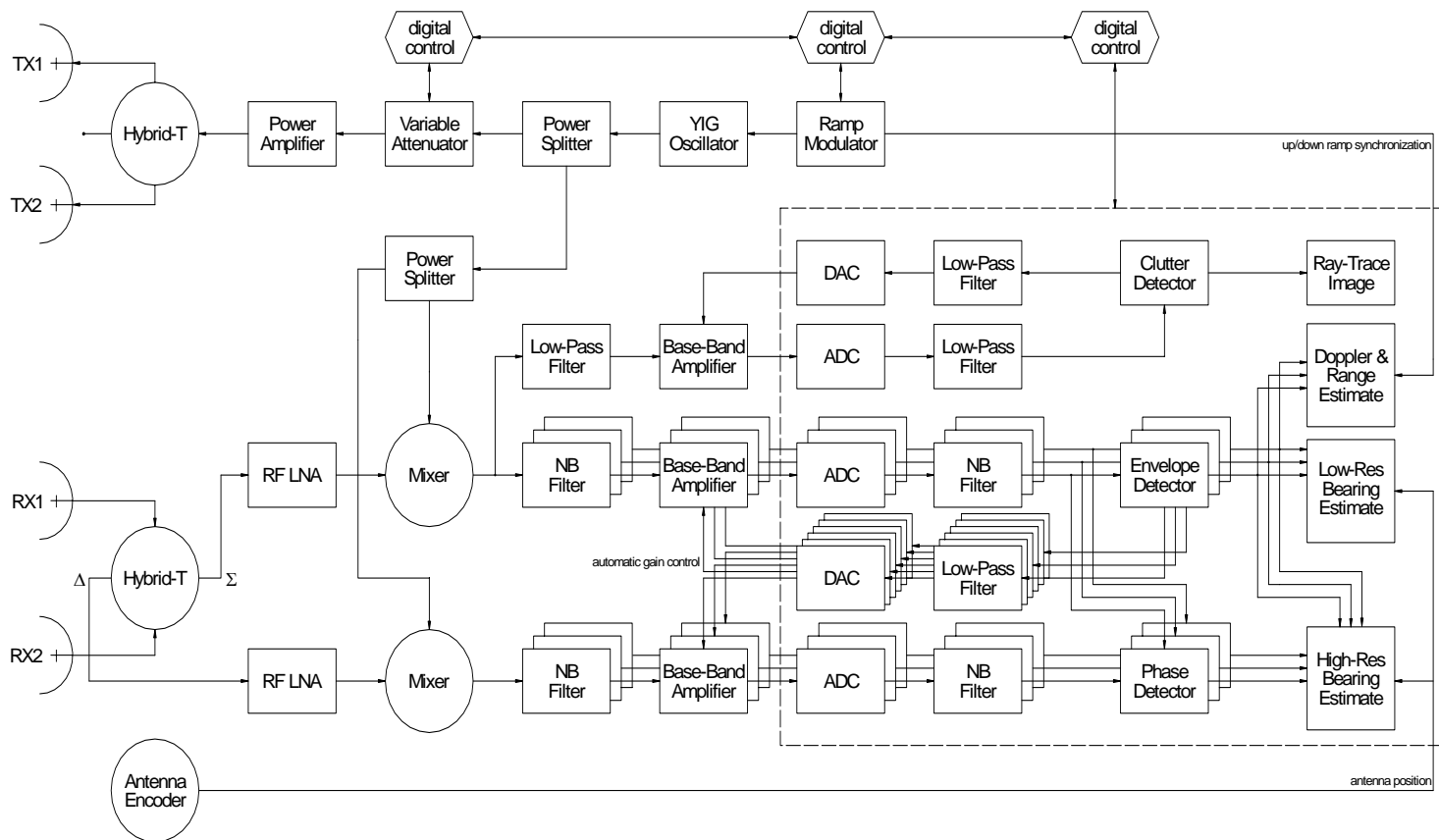
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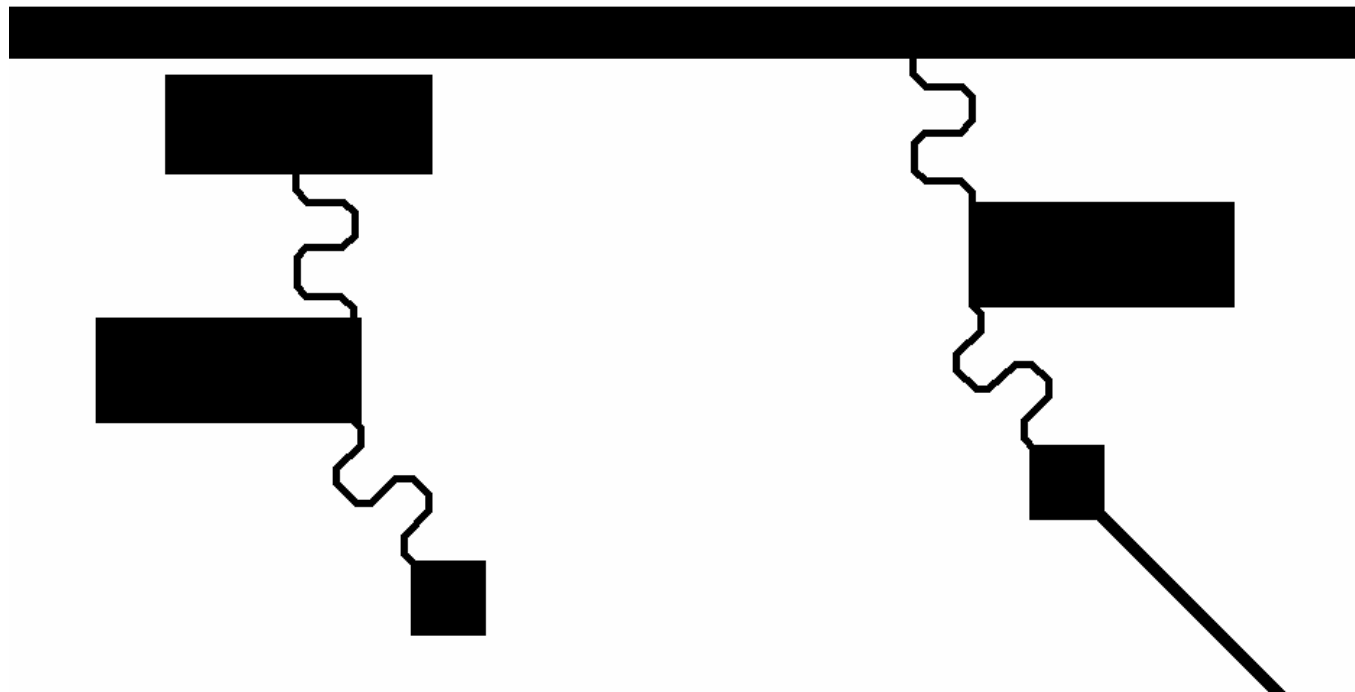


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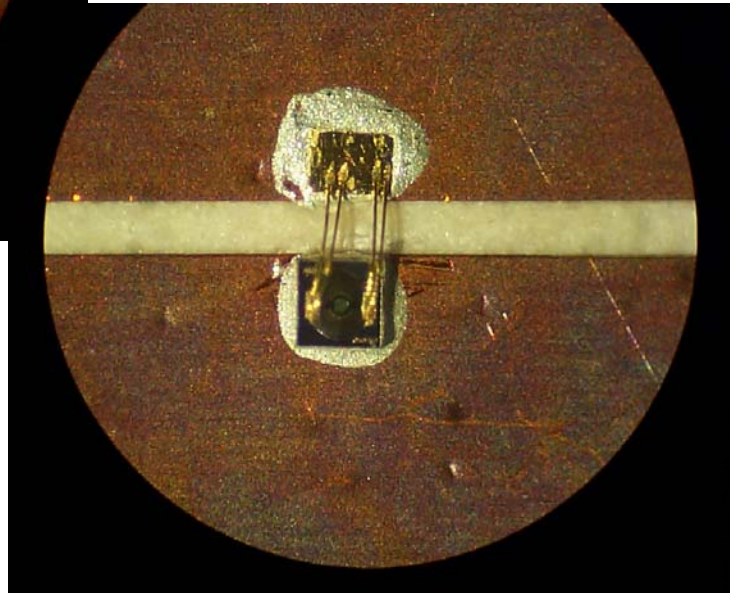
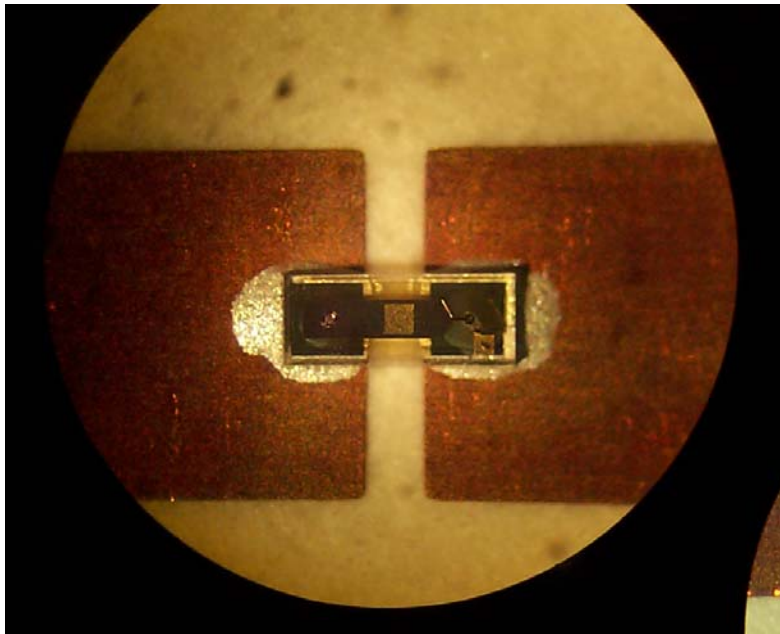
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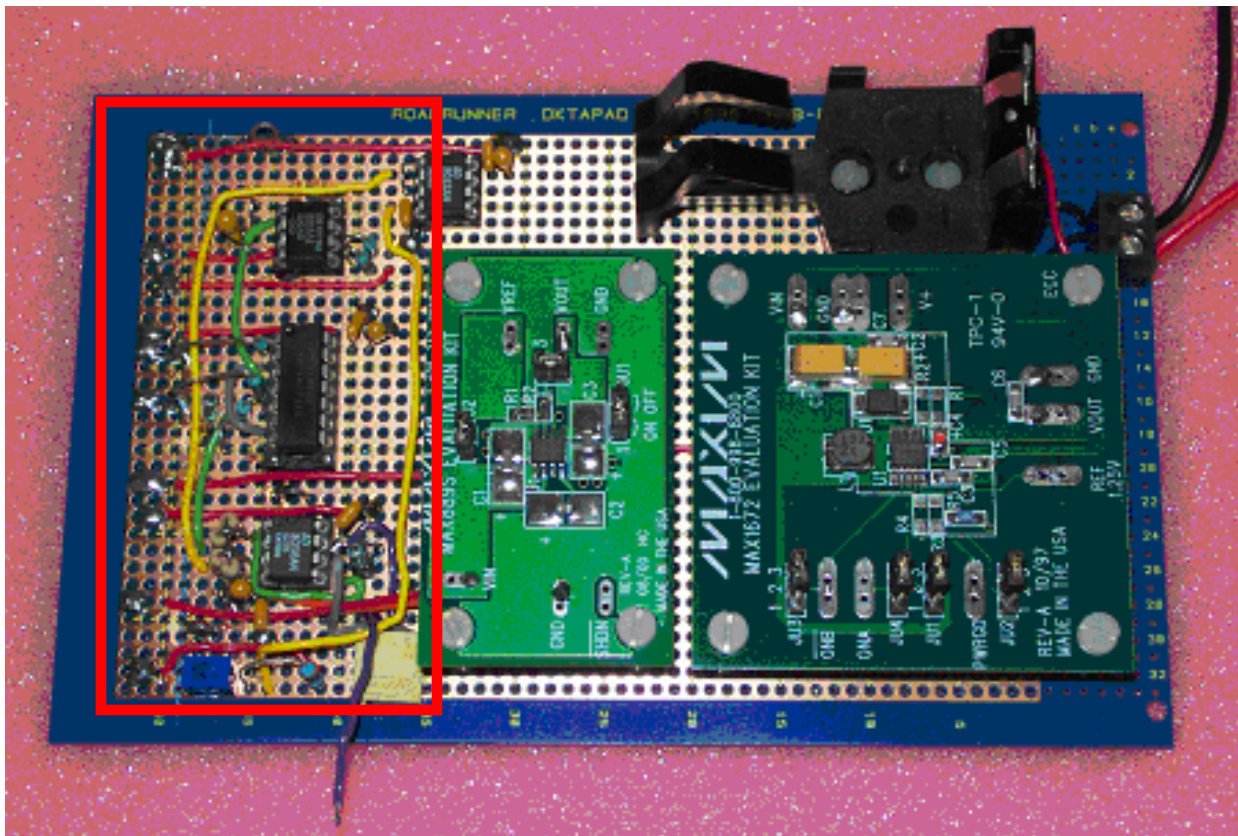
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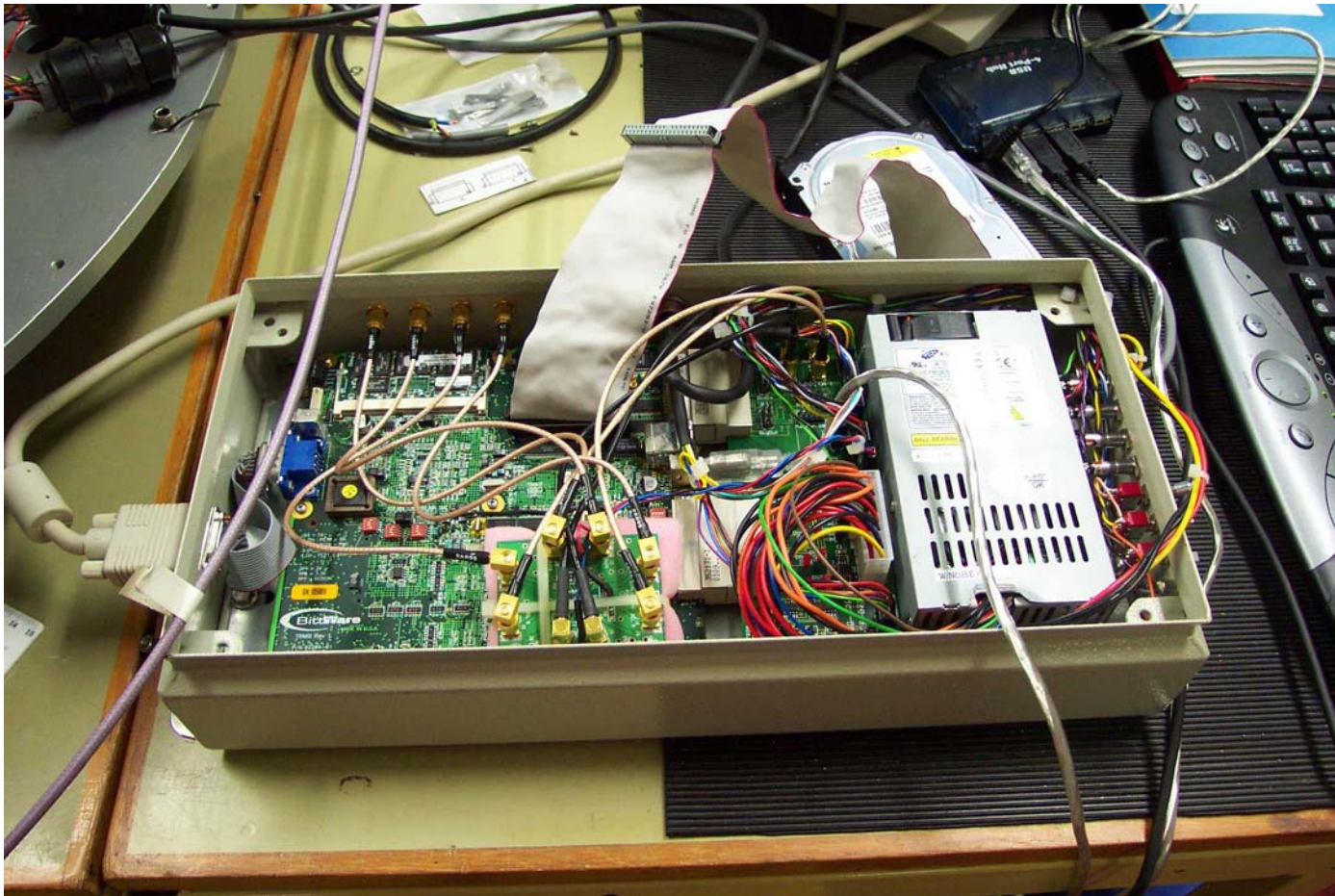
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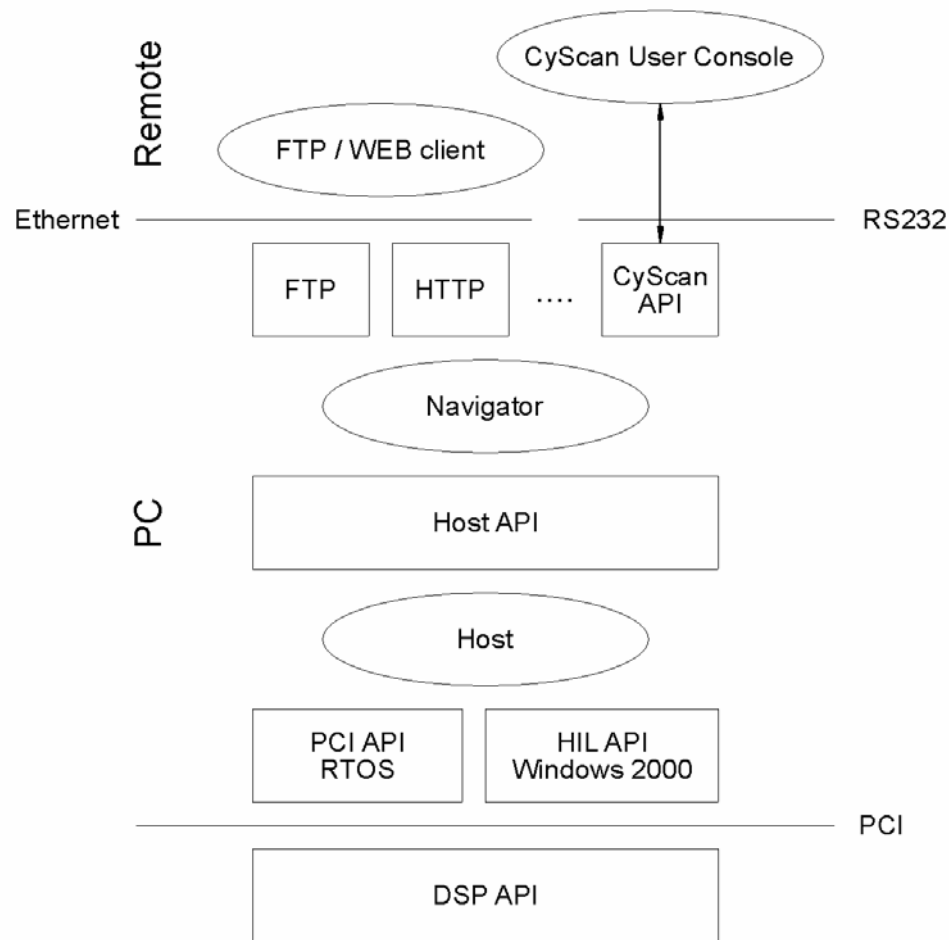
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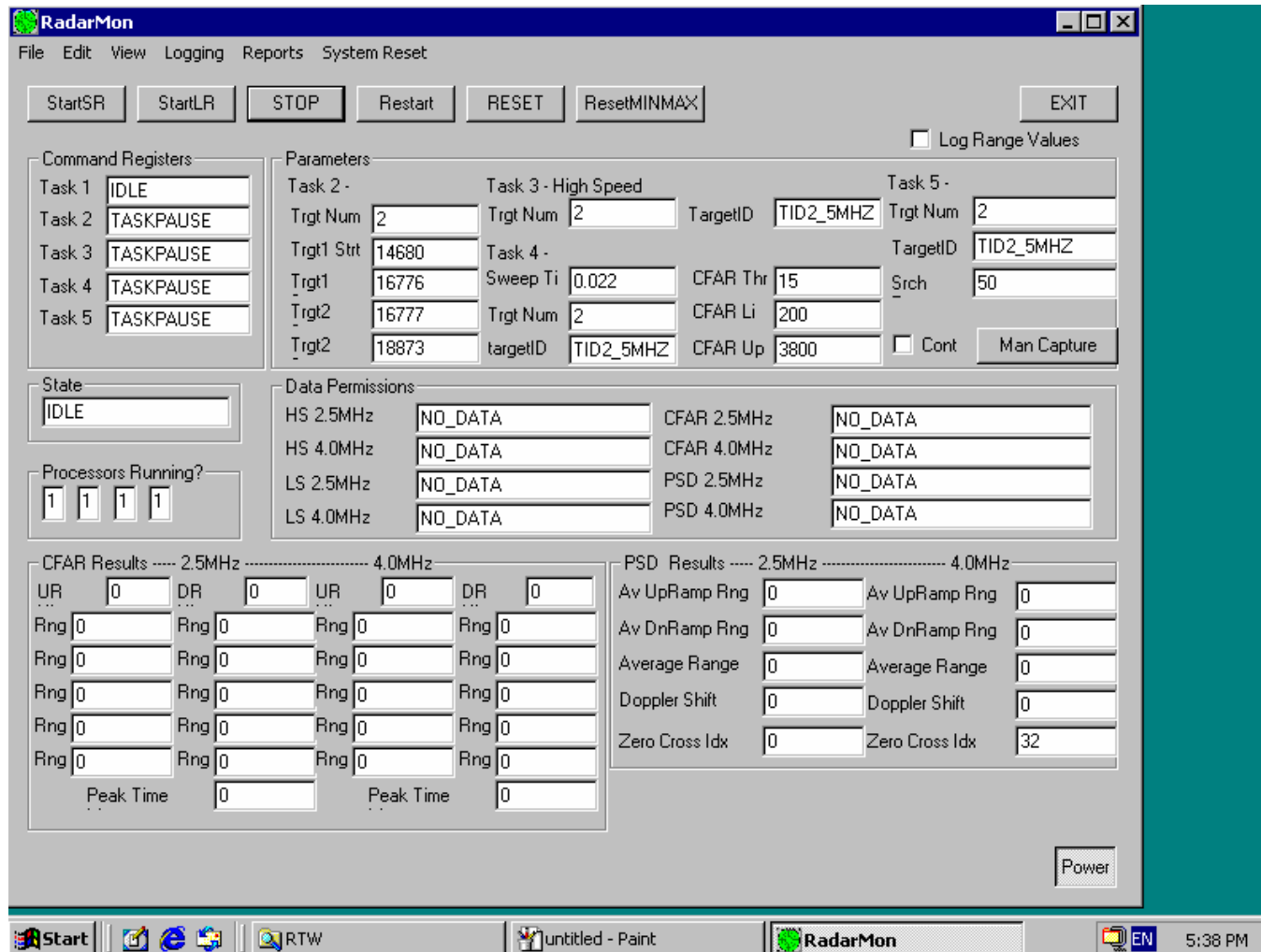
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The screenshot shows the RadarMon software interface. At the top, there is a menu bar with 'File', 'Edit', 'View', 'Logging', 'Reports', and 'System Reset'. Below the menu bar are several control buttons: 'StartSR', 'StartLR', 'STOP', 'Restart', 'RESET', 'ResetMINMAX', and 'EXIT'. A checkbox for 'Log Range Values' is also present.

The main interface is divided into several sections:

- Command Registers:** A table with 5 rows and 2 columns. Task 1 is 'IDLE', while Tasks 2-5 are 'TASKPAUSE'.
- Parameters:** A grid of input fields for various parameters. Task 2-3 (High Speed) and Task 5 have 'Trgt Num' set to 2 and 'TargetID' set to 'TID2_5MHZ'. Task 4 has 'Sweep Ti' set to 0.022. Other parameters include 'Trgt1 Strt' (14680), 'Trgt1' (16776), 'Trgt2' (16777, 18873), 'CFAR Thr' (15), 'CFAR Li' (200), 'CFAR Up' (3800), and 'Srch' (50). There are also checkboxes for 'Cont' and 'Man Capture'.
- State:** A dropdown menu currently showing 'IDLE'.
- Data Permissions:** A table with 4 rows and 4 columns. The rows are labeled 'HS 2.5MHz', 'HS 4.0MHz', 'LS 2.5MHz', and 'LS 4.0MHz'. The columns are labeled 'NO_DATA', 'CFAR 2.5MHz', 'CFAR 4.0MHz', and 'PSD 2.5MHz', 'PSD 4.0MHz'. All cells contain 'NO_DATA'.
- Processors Running?:** Four indicator lights, all of which are lit.
- CFAR Results:** Two sections for 2.5MHz and 4.0MHz. Each section has a grid of 'UR' and 'DR' values (all 0) and a 'Peak Time' field (0).
- PSD Results:** Two sections for 2.5MHz and 4.0MHz. Each section has a grid of 'Av UpRamp Rng', 'Av DnRamp Rng', 'Average Range', 'Doppler Shift', and 'Zero Cross Idx' values. The 4.0MHz 'Zero Cross Idx' is 32, while others are 0.

At the bottom right of the interface is a 'Power' button. The Windows taskbar at the bottom shows the Start button, several application icons (including RTW and Paint), and the system tray with the time 5:38 PM.

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Modulated Microwave Position & Heading Sensor

A Pos
1.6m

B Pos
19.3m

Heading
136.8°

Position Active
Heading Active

Levellor: Horizontal DP Feed: NMEA0183R

Tilt +0.00°

Navigation Started - Multiple Reflector Mode
(Alpha Platform - North Dock)

Type	Time	Description
Error	09:55:22	Serial thread timed out
Error	09:55:19	Hypothesizer thread timed out
Error	09:55:19	Datafeed thread timed out
Error	09:55:19	Estimator thread timed out
Error	09:55:19	Sensor thread timed out
Error	09:55:19	Hypothesizer thread timed out
Error	09:55:19	Datafeed thread timed out
Error	09:55:19	Serial thread timed out
Error	09:55:19	Estimator thread timed out
Error	09:55:19	Sensor thread timed out

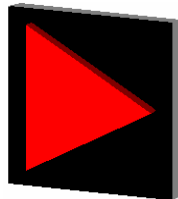
01/08/2002 09:55:19 Hypothesizer thread timed out

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RadarScan

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- X-Band FMCW multi-target tracking radar
- Position & Heading Update @ 4 Hz
- Weather independent range >> 2km
- Environment profile scan
- Unique & automatic target identification
- Passive non-radiating targets
- Patent pending



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