



# CRANE DIVISION

## NAVAL SURFACE WARFARE CENTER



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# Precise and Portable Antenna Test System PAPATS

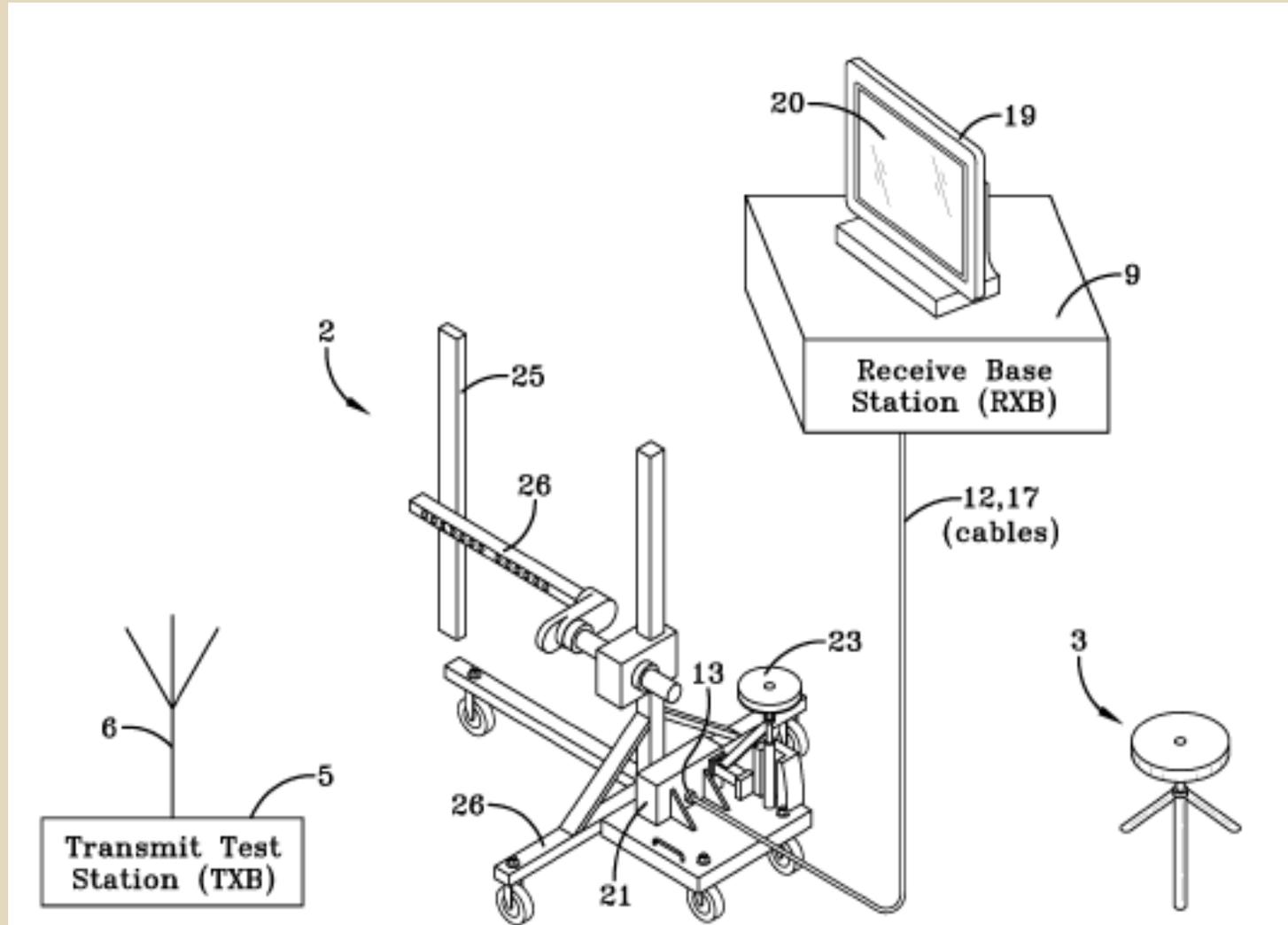
**Presented by  
Jeff Snow**

**Patent Application:  
# 12/347,659 and # 12/121,346**

- **PAPATS**
  - **Precise And Portable Antenna Test System**
- **Hardware, software, and method to quickly and accurately measure antenna patterns in the field.**
- **Uses combination of:**
  - **Real Time Kinematic (RTK) GPS**
  - **Inertia Measurement Unit (IMU)**
  - **Real time position and orientation indication**
  - **RF data links**
  - **RF probe**

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- **RF probe precisely and continuously located and orientated**
  - **Inertial measurement unit provides pointing accuracy with 1/2 degree for probe correction and phase center positioning.**
  - **RTK GPS provides location with 1 cm**
  - **Probe offset corrections**

# Diagram



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# Picture



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# Interface

The screenshot displays the software interface for a test system. The main window is titled "rga\_2007Oct12\_valver LOADED - V1.0.0". It features a menu bar (File, View, Misc, Help) and a toolbar with buttons for "100 M ZOOM", "NO GRID", "TEST PARAMS", "RIGHT MENU", "NAV SCREEN", "VEHICLE", "TXANTENNA", "RXANTENNA", and "TEST POINT".

The central area is a map showing a probe location (a blue circle with a crosshair) and a series of red test points arranged in a semi-circle. A red arrow points from the probe towards the test points.

Below the map is a table titled "TEST PROGRESS: 12102007\_141632\_453 LOADED: (27 OF 29)".

Test Point	Action #	Description	# COLL PTS	RXHeight	RXPolar
	0	RX CAL ACTION	0	1.750000	HOR
	0.1	TX CAL ACTION	0	1.750000	HOR
PT000_0020	1	FDFG	1:11	1.750000	HOR
PT005_0020	1	FDFG	1:11	1.750000	HOR
PT010_0020	1	FDFG	1:11	1.750000	HOR
PT020_0020	1	FDFG	1:11	1.750000	HOR
PT030_0020	1	FDFG	1:11	1.750000	HOR
PT040_0020	1	FDFG	1:11	1.750000	HOR
PT050_0020	1	FDFG	1:11	1.750000	HOR
PT060_0020	1	FDFG	1:11	1.750000	HOR
PT070_0020	1	FDFG	1:11	1.750000	HOR

Below the table is a red "CANCEL TEST RUN" button.

To the right of the map is a "MAIN MENU" with buttons for "CONFIGURE", "VEHICLES", "ANTENNAS", and "TEST POINTS".

Below the main menu is a "RUN TEST DIALOG" window showing "11 OF 11 FREQS - 00:00:00". It contains a table of frequency data:

Freq	Floor	Amplitude
700.000	-90.588	-61.739
710.000	-91.075	-62.991
720.000	-90.511	-65.015
730.000	-89.941	-64.844
740.000	-91.273	-65.340
750.000	-90.202	-67.311
760.000	-91.764	-67.255
770.000	-90.270	-68.510
780.000	-92.428	-70.432
790.000	-92.573	-70.505

Below the frequency table are "START TEST" and "MOVE TO NEXT ACTION" buttons.

At the bottom right is an "EXIT PROGRAM" button.

The status bar at the bottom shows "Ready", "GPS0: STATE NOT SET", "TEST RUN MODE", "PHASE CENTER", "UTM:N 16 513136.236 4304870.159", and "NUM".

Screen showing desired test points, probe location and orientation, frequency lists, measured amplitude and noise floor, vehicle, test point list

# COMMERCIAL APPLICATIONS

- 
- **Find antenna patterns in real environment**
  - **Define desired test points, record actual**
  - **Correct for probe offset from GPS antenna**
  - **1 cm horizontal location accuracy (2 cm vertical)**
  - **0.5 degree pointing accuracy**
  - **Other applications requiring precise probe location and orientation outdoors**