

Purpose of Special Temporary Authorization (STA) Application

This STA application is in support of MIL-STD-188-125-2 Continuous Wave Immersion (CWI) testing. Transmission will be conducted at the location given in Figure 1 (29°55'20.7"N, 95°36'42.0"W). Transmission occurs from a fixed antenna system.

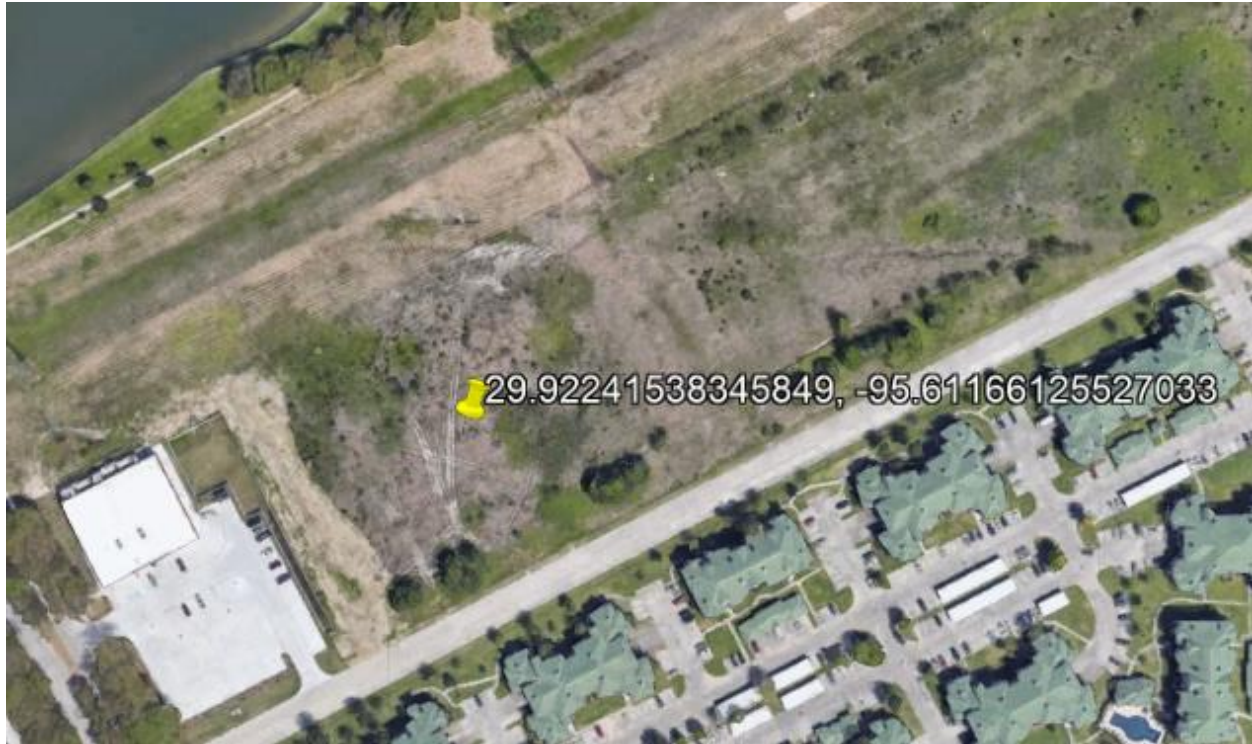


Figure 1: Location of transmission site.

This CWI testing is in support of a U.S. Government contract with the Defense Threat Reduction Agency (DTRA). The contractual details are as follows.

Contract Number: HDTRA1-14-D-0003-HDTRA1-18-F-0059

Contracting Officer Representative (COR):

Michael Bak
(571)-616-4033
michael.t.bak.civ@mail.mil

Overview of CWI Testing and Equipment

CWI testing is a component of MIL-STD-188-125 Volume 1 and Volume 2 Verification Testing. CWI characterizes both the free field electromagnetic environment at a device under test (DUT) and the currents coupled to the DUT cabling from that environment. As a result of this testing, transfer functions can be calculated which allow threat level extrapolations and other analysis.

CWI requires transmission from 100kHz to 1GHz. ARA's CWI system accomplishes this by transmitting in two ranges: 100kHz to 30MHz and 30MHz to 1GHz. In each of these ranges, 1601 discrete frequencies are logarithmically spaced between the first and last frequency. No modulation is included and

transmission at any one frequency occurs for about a 0.1 seconds. Any frequencies that conflict with other organizations can be excluded during transmission.

The CWI test method is essentially an insertion loss or attenuation measurement technique. A list of typical equipment used is shown in Table 1, and links to the manufacturers data sheets for the equipment that will actually be used can be found in in section Equipment Data Sheets.

Table 1: CWI testing requirements from MIL-STD-188-125-2 Appendix C. this is a copy of Table C-1 on page 110 of the standard.

Equipment	Characteristics
Network Analyzers or Equivalent	100 kHz - 1 GHz; minimum sensitivity as required for measurement sensitivity
Power Amplifiers ¹	100 kHz - 1 GHz; power output as required for dynamic range
Antennas ²	100 kHz - 1 GHz
Sensors	100 kHz - 1 GHz; free-field, surface current density, and current
Preamplifiers ³	100 kHz - 1 GHz; amplification and noise figure as required for measurement sensitivity
Data Recorder	Multichannel
Computer and GPIB Control Interfaces ⁴	As required
Fiber Optic Links ⁵	100 kHz - 1 GHz; up to 100 m in length
Instrumentation Shield (or Van) and Power Supplies	As required
Miscellaneous Cables, Attenuators, and Coaxial Switches	As required

CWI typically begins with an initial measurement of the signal level at the location the DUT will be fielded. Derivative magnetic and electric field sensors, colloquially called B-Dot and D-Dot sensors, are used to make these field measurements. This is called field mapping. Following these measurements, the actual device is outfitted with current probes and transmission is conducted again. Testing is conducted in both the horizontal and vertical polarizations of the transmitting antenna. Figure 2 shows a simplified experimental setup.

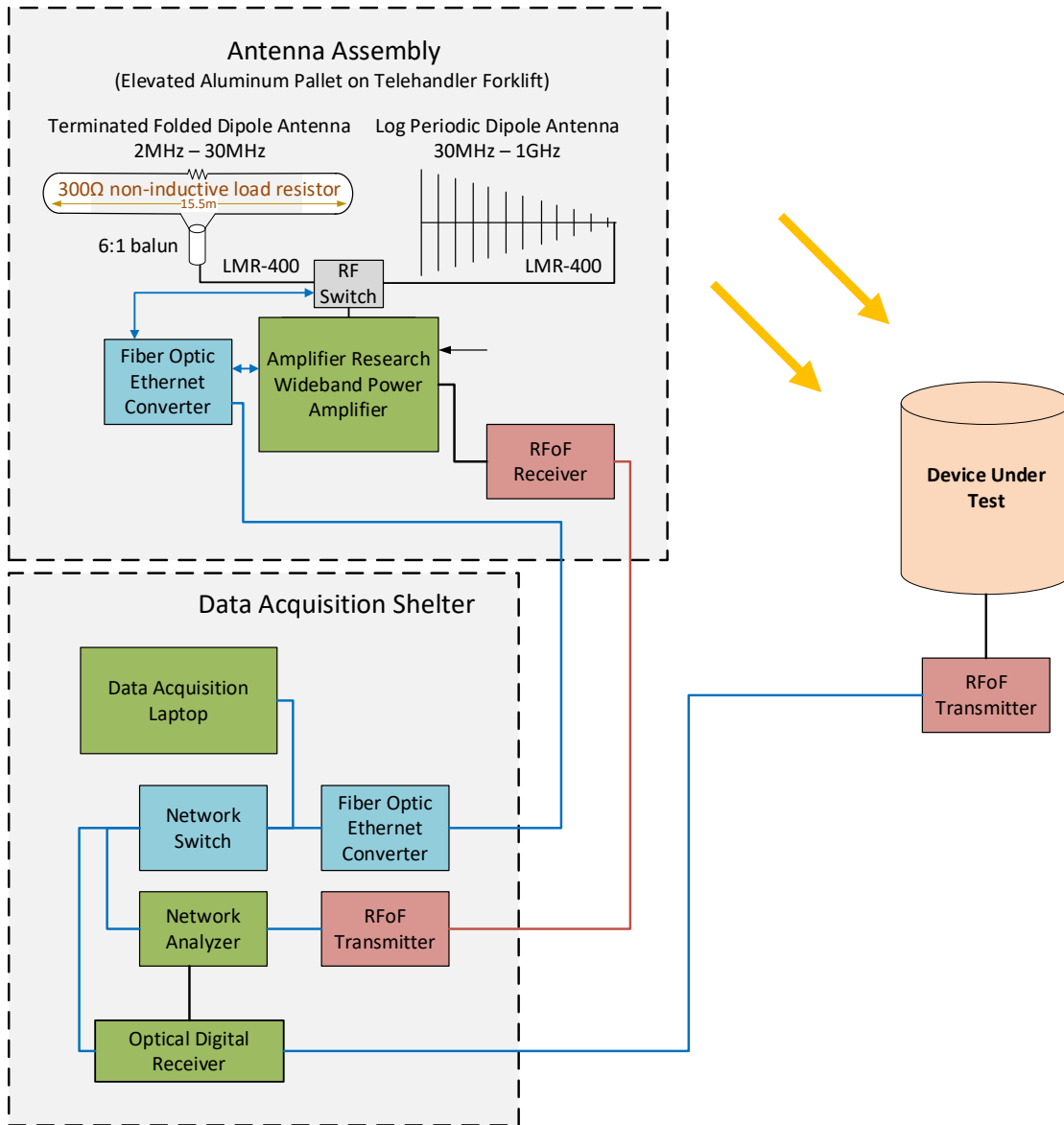


Figure 2: Simplified diagram of the CWI experimental setup.

The CWI antenna assembly consisted of an LPDA and a terminated folded dipole antenna. The assembly is raised by a telehandler such that the tip of the LPDA is 14m from the ground and 38m away from the test article. As seen in Figure 3, this gives a transmit angle of 20°.

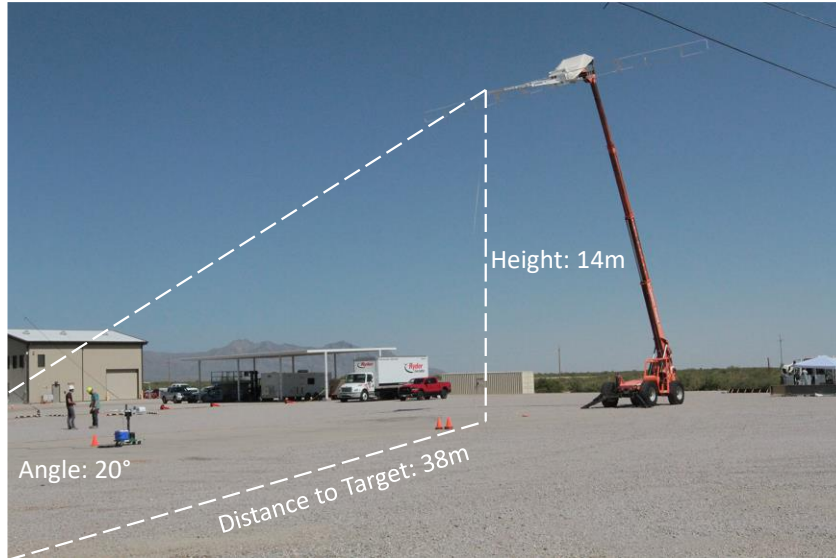


Figure 3: The tip of the CWI antenna is 14 m above the ground and 38 m away from the target on the ground. This yields an angle of 20 degrees.

ARA Stop Buzzer Points of Contact

Mr. Kyle Lyke

Office: (210) 681-8208 Ext. 3

Cell: (845) 803-4030

Email: klyke@ara.com

Mr. Steven Niederhaus

Office: (210) 681-8208 Ext. 1

Cell: (210) 721-2265

Email: sniederhaus@ara.com

Dr. Jonathan Morrow-Jones

Office: (919) 582-3460

Cell: (805) 570-7393

Email: jmorrow-jones@ara.com

Mr. Charles

Dudley

Office: (210) 681-8208 Ext. 2

Cell: (858) 444-5755

Email: cdudley@ara.com

Equipment Data Sheets

Rohde&Schwarz ZNBT 8 VNA can be found [here](#).

Amplifier Research 100U1000 power amplifier can be found [here](#).

Amplifier Research 10W1000 power amplifier can be found [here](#).

United States Antenna Products LP1018BA Log Periodic antenna can be found [here](#).