Exhibit No. 1
Narrative Statement Describing the Government Project

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PROBLEM STATEMENT

Multiband on-the-move tactical communications will provide significant benefits to all echelons of the Armed Forces. Most existing military and commercial wireless antennas generally operate over only one frequency band. As a result, numerous antennas are needed on most weapon platforms and command and control nodes. This is undesirable for several reasons; numerous antennas identify the location of command nodes as obvious targets, they require considerable area on the platform, the antennas block each other resulting in reduced range in some directions, they require numerous access holes in the platform, they require more switching between antennas when used with a multiband transceiver, and supplying multiple antenna models adds to the logistics burden.

The limited bandwidth of existing antennas also limits the data rate since it cannot provide higher bandwidth capacity when the demand exists. Bandwidth is sometimes increased by resistively loading the antenna, but this severely reduces the range of the radio communications.

In addition to the above-mentioned bandwidth problem, for some radio systems the existing antenna does not provide on-the-move capability but requires the vehicle to stop and the antenna manually pointed or, in the case of ships, may need a gyro-stabilized platform. Antennas that must be stationary are unacceptable in today's highly mobile battlefield environment.

A problem for SATCOM, especially at northern latitudes, is the satellite may be very close to the horizon, which results in reduced gain and unreliable communications using existing antennas. On-the-move antennas with directional beams, especially at low elevation angles, can improve antenna gain, background noise levels, and link margins.

Military communications systems are evolving toward multi-band, multi-mission, on-the-move transceivers and antennas, which will enhance the critical command and control communications on the battlefield. Existing legacy systems can also benefit immediately from multiband on-the-move, antennas to reduce the number of different antennas on each platform. Fewer antennas and smaller footprints will also reduce the surface required for mounting the antenna, a fact that will be of great value on board Naval vessels.

WHO COULD BENEFIT?

New ultra-wideband antennas developed by Magnetic Sciences can provide multi-frequency, multi-band, on-the-move capability and reduce the number of antennas on many types of platforms; land, air, surface ship, subsurface, and vehicular platforms. These antennas are therefore of benefit to Airborne, Maritime, and Ground Forces.

BASELINE TECHNOLOGY

Existing military radio antennas, for example whips and array antennas, generally operate over only one frequency band. Most commercial wireless systems are also generally single-band products. As a result numerous antennas are needed, each with limited frequency bandwidth, which results in the disadvantages described above. Some other existing antennas such as dishes and log-periodics generally do not provide on-the-move capability. SATCOM antennas may suffer from poor low-angle gain.

TECHNOLOGY DESCRIPTION AND COMPARISON WITH BASELINE

Innovative antennas developed at Magnetic Sciences can provide multi-band, multi-frequency, on-the-move radio frequency coverage. These antennas therefore enhance and make full use of the capabilities of new multi-mission transceivers such as the AN/PRC-117F, AN/PSC-5V Shadowfire, and Joint Tactical Radio System (JTRS) transceivers. The new antennas can also be used with existing radio equipment and to reduce the number of different antennas required.

One new on-the-move multi-mission antenna provides ultra-wide bandwidth which can be used for HAVEQUICK I/II frequency hopping for both the vertically polarized terrestrial LOS modes as well as for circularly polarized UHF SATCOM. Patented features reduce size and increase bandwidth. Innovative multiband vertically polarized omni antennas have also been developed. The following table summarizes the benefits of these new antennas.

New Antennas for Multi-Band On-the-Move Communications

ANTENNA FEATURE	ADVANTAGE	BENEFITS
Each antenna can be used for multiple frequency bands & modes	Reduces number of antennas on platform: one antenna instead of several.	Command nodes are less obvious, less space reqd., less blockage, fewer holes, reduced logistics, less switching, lower cost.
Low loss over very wide instantaneous frequency bandwidth	Extremely wide bandwidth. No need to trade-off gain for BW	Useable for wideband and freq. hop. Longer range for wideband systems
On-the-move operation	No need to stop and manually point antenna or gyro-stabilize platform	Uninterrupted communications while in motion
Compatible Joint Tactical Radio System (JTRS) and Multiband transceivers	Versatile wideband antennas; compatible with next generation systems	Can use with JTRS, AN/PRC-117F, AN/PSC-5V Shadowfire, and also with existing systems.
Directional beams (for SATCOM)	Narrower antenna beam has higher gain and picks up less external noise	More reliable SATCOM, including at northern latitudes
Electronic beam steering (for SATCOM)	Rapid tracking of satellites, faster than mechanical tracking	On-the-move SATCOM from fast-moving vehicles and other platforms
Industrial PC computer board and PCI interfaces (for SATCOM)	Commercial off-the-shelf subsystems for beam steering and controller	Reduced cost and delivery times; rugged.
Rugged	Withstands bumps, knocks, shocks	Can use in rough terrain
Reduced antenna size	Less space required on platform	Makes room for other equipment

These new multiband antennas may be used as a stand-alone antenna with several existing transceivers to cover multiple bands, or with multiband tranceivers. A system of several antennas with an antenna coupler is also being tested which will cover from 2 MHz to 2.5 GHz with some redundancy, allowing multiple existing transceivers to operate simultaneously, and it is also compatible with a JTRS transceiver. A software reprogrammable JTRS transceiver will have five to eight full duplex channels, each channel having access to each communications band and mode. Numerous modes listed in the JTR Operational Requirements Document (ORD) from 2 MHz to 2.5 GHz covered by this antenna system include satellite communications (SATCOM,) terrestrial line of sight (LOS,) beyond line of sight (BLOS,) and other voice, data, and video communications.

CURRENT STATE OF DEVELOPMENT

A Phase II SBIR demonstrating these antennas is underway and will be completed during the 2nd quarter of 2001. Tests on the wideband on-the-move dual-mode UHF SATCOM antenna have already demonstrated low insertion loss (0.3 dB typical) over most of the 225-400 MHz bandwidth, polarization and pattern tests will be completed during the 1st or 2nd quarter of 2001. The multiband vertically polarized antennas are also undergoing final testing during 1st quarter of 2001. The optional JTRS antenna coupler is expected to be completed as soon as the 3nd quarter 2001.

REFERENCES

Maj. James E. Devers, USMC JTRS Project Officer, Radio Systems, MarCorSysCom, is the program sponsor. Key documents and reports are:

1. Operational Requirements Document (ORD) for Joint Tactical Radio (JTR), 23 Mar 98, Unclassified.
2. Geo-Elliptical Phased Array Satellite Tracking System, Phase I Final Report on Topic N98-013, Magnetic Sciences Report AJKTR-98-1, November 1998.
3. Geo-Elliptical Phased Array Satellite Tracking System, Phase I Three-Month Option Final Report on Topic N98-013, Magnetic Sciences Report MSI-TR-99-1, July 1999

ABOUT THE COMPANY

Magnetic Sciences designs, manufactures, and sells antennas and sensors for communications, electromagnetic field measurements, and other uses at frequencies from DC to millimeter waves. Particular strengths are innovative antenna engineering. We offer custom solutions to specific military and commercial requirements, as well as off-the-shelf designs, and are developing a dual-use business plan for military and private sector applications. Magnetic Sciences is located in Acton, Massachusetts.