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13. ABSTRACT (Maximum 200 words) New smart conformal antenna concepts where passive and electrically active materials are integrated to generate multifunction, adaptive and compact conformal arrays are being considered and developed. Besides, advanced electromagnetic field simulation tools for the design and analysis of conformal active integrated arrays are developed. In addition, novel phased array concepts are being examined.				
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REPORT TITLE: **Enhancement of Capabilities in Smart Electromagnetic Systems**

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SUBMITTED FOR PUBLICATION TO (applicable only if report is manuscript):

Sincerely,

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Project Final Report

I. Statement of the Problem Studied

Antennas in various forms make up a large component of our nation's defense. As the communication needs of the modern battlefield change, new antennas with the capabilities to adapt to these needs must be produced. In order to adjust to the intelligence and counter intelligence demands placed on the military in war or peace, many military vehicles are equipped with multiple antennas. Furthermore, antennas that can perform several functions simultaneously are becoming necessary. There are two important problems that need to be addressed: 1) Lack of space needed to locate these antennas and the electromagnetic interference between them and 2) the protection of information disseminated to ground troops. One potential solution is the development of a new generation of smart multifunctional antennas/arrays where passive as well as electrically and mechanically active materials are integrated. Each of these multifunction antennas can thus replace a number of the current antennas. From this proposal four pieces of capital equipment will be needed to enhance the current research. The first piece of equipment is a MTS hydraulic material testing system (figure 1). This MTS testing system will be used to check force vs. voltage curves for actuators as well as tension and fatigue testing of the reflectors. The second piece of equipment is a circuit board prototyping system called Quick Circuit that will be used to cut and manufacture high quality print microwave antennas (figure 2). The third piece of equipment will be an advanced network analyzer for radiation parameter measurements (figure 3). The fourth piece of equipment is a microcontroller based control and instrumentation system (figure 4). It will be used to control the individual bias voltages on each of the antenna systems mentioned in this proposal. The fifth piece of equipment was an oven. The oven replaced the hot press from the proposal. This piece of equipment will be used to make reflector systems with integrated actuator components.

The five pieces of equipment mentioned in the previous paragraph will enhance the current state of research in three areas: The development of advanced ferroelectric antennas and the development of high deflection mechanically actuated reflector systems and testing of antenna systems.

II. Summary of the Most Important Results

The four pieces of equipment was ordered and has been received. In addition some supplementary equipment was ordered. This equipment was needed to make the capital equipment function (power supplies, calibration kit, computer to control the data acquisition). A comprehensive listing of all pieces of equipment is shown below

EQUIP -	12/29/00 AGILENT TECHNOLOGIES	\$4,204.00
EQUIP	11/27/00 AGILENT TECHNOLOGIES	\$68,391.54
EQUIP -	3/20/01 AGILENT TECHNOLOGIES	\$9,360.00
EQUIP	11/2/01 C/S PO#872697 MTS SY	\$5,867.0
EQUIP	7/24/00 DSPACE	\$13,445.00
EQUIP	10/5/01 MTS SYSTEMS CORPORAT	\$7,603.00
EQUIP	2/14/01 MTS SYSTEMS CORPORAT	\$59,992.00
EQUIP -	11/27/00 MTS SYSTEMS CORPORAT	\$23,996.80
EQUIP -	3/28/01 MTS SYSTEMS CORPORAT	(\$23,996.80)
EQUIP -	1/2/02 QUANSER	\$2,455.48
EQUIP -	1/2/02 QUANSER	\$832.37
EQUIP -	1/2/02 QUANSER	\$2,080.92

EQUIP -	1/2/02 QUANSER	\$207.05
EQUIP -	1/2/02 QUANSER	\$998.84
EQUIP -	1/2/02 QUANSER	\$1,612.71
EQUIP -	1/2/02 SPECTRAL DYNAMICS	\$8,012.20
EQUIP -	7/7/00 T-TECH INC.	\$17,660.00
EQUIP -	12/3/01 TESTEQUITY INC	\$30.00
EQUIP -	12/3/01 TESTEQUITY INC	\$990.00
EQUIP -	3/3/02 TESTEQUITY INC	(\$3,830.00)
EQUIP -	12/3/01 TESTEQUITY INC	\$379.00
EQUIP -	12/3/01 TESTEQUITY INC	\$2,840.00
EQUIP -	9/18/00 THE GRIEVE CORPORATI	\$6,326.83
EQUIP	12/16/00 THE GRIEVE CORPORATI	\$671.90

III. List of Publications

A. Published Journal Articles

Please check the reports for grants EG-37394 and EG-40169.

B. Journal Articles Accepted for Publication

Please check the reports for grants EG-37394 and EG-40169.

IV. Scientific Personnel

Gregory Washington

V. Report of Inventions

None

VI. Bibliography

VII. Appendixes

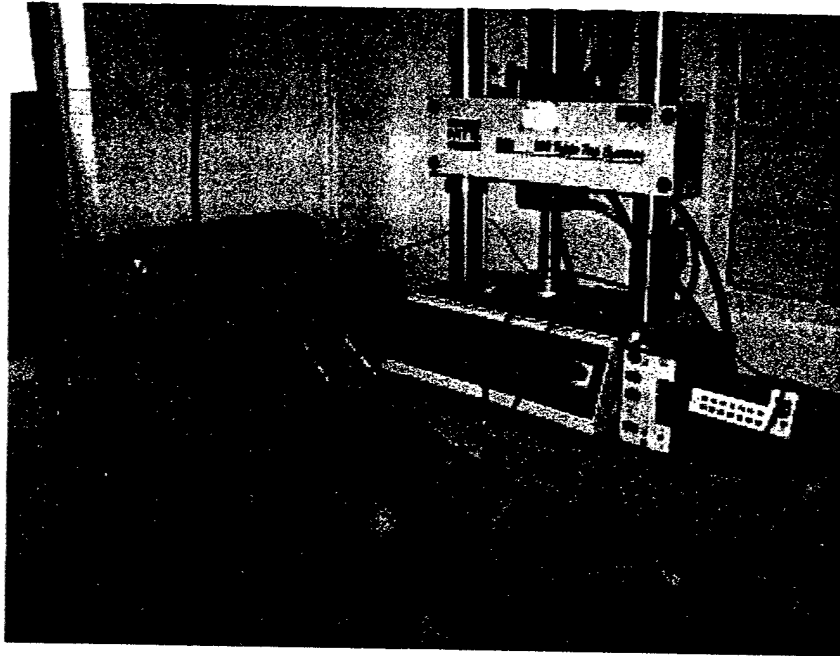


Figure 1. MTS System

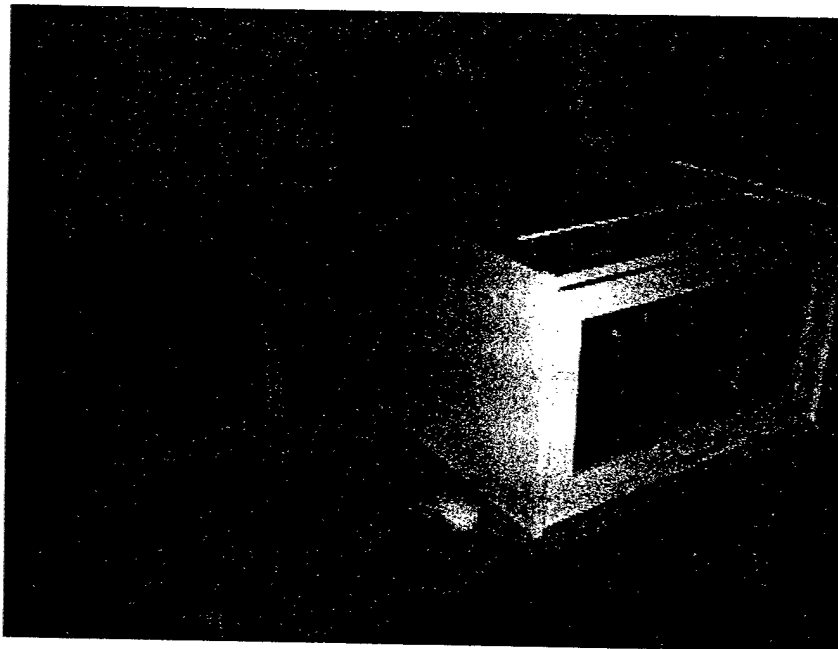


Figure 2. Quick Circuit: Circuit Board maker

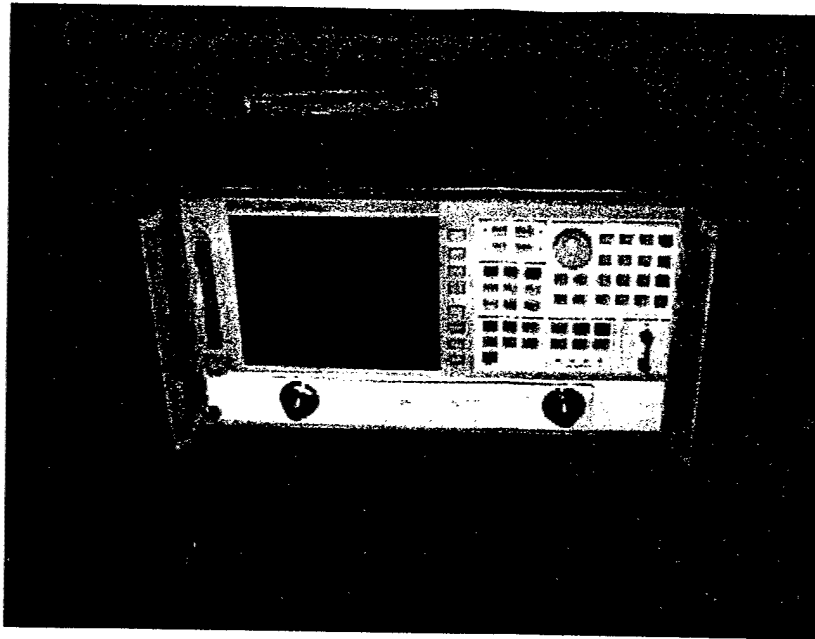


Figure 3. HP Automatic Network Analyzer

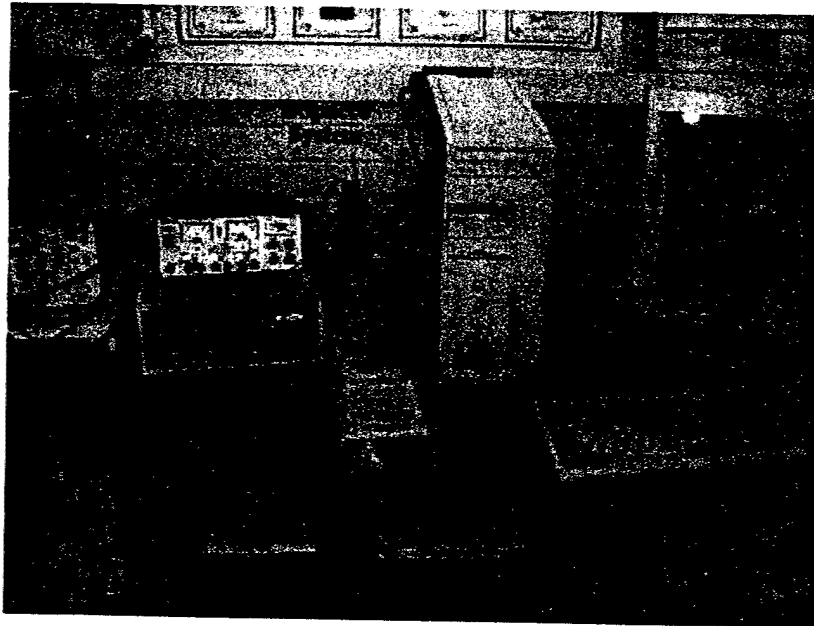


Figure 4. Dspace System