


LOCKHEED MARTIN

Lockheed Martin Enterprise Information Systems
Radio Frequency Management Office
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14 pages, incl. cover

January 28, 2003

To: Office of Engineering & Technology
Experimental License Branch

202-418-1918

From: Claude E. Wells
Lockheed Martin Corporation

Subject: Documents to be used as attachments for 0022-EX-PL-2003

You will find attached paperwork completed by the site for the filing of this application for a new station authorization. As these papers were unavailable in electronic format I am submitting them in their paper format, as received by this office. There may be technical questions to be resolved on this application and I suggest contacting the site personnel, Terri Dempksi, to resolve any issues.

Very Truly Yours,

Claude E. Wells
Corporate
Tech. Support Analyst

P.S. - This application has been filed electronically,
Please ref. the above file number.
includes exhibits for frequency and other technical
parameters.

~~LOCKHEED MARTIN~~ 

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January 28, 2003

Federal Communications Commission
Experimental Radio Services
P. O. Box 358320
Pittsburgh, PA 15251-5320

Attn: Office of Science & Technology
Experimental License Branch
Re: New station Authorization Application
Attachments to be included in filing.

You will please find enclosed the completed FCC Form 442 and the required FCC License Processing fees, **\$50.00**, attached. I am also including attachments to accompany the application for communications and data transmissions in and around the facilities located near, Owego, Tioga County, NY.

I am faxing the exhibits for this application as they are not available in electronic format and need to accompany this application to explain several technical aspects of this application. If you have questions relating to the program, please contact **Terri Dempski on (607) 751-4839** or by email at terri.dempski@lmco.com and questions relating to the application can be directed to the undersigned on (410) 682-2156.

Very Truly Yours,

Claude E. Wells
Corporate
Tech. Support Analyst

JAN-21-2003 TUE 03:57 PM

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5(a). Proposed location of transmitter and transmitting antenna (check only one box to indicate type of operation):
☒ FIXED/BASE ☐ MOBILE ☐ BASE AND MOBILE

5(b). If permanently located at a FIXED location, give below:
 State NY County TIOGA City or Town Dix
 Number and street (or other indication of location) 1801 State Route 17C

5(c). If mobile, describe the exact area of operation.

5(d). Enter geographical coordinates exact to the nearest second (See instruction 10)
 North Latitude (DD-MM-SS) N 42° 06' 05" West Longitude (DD-MM-SS) W 076° 13' 10"

5(e). Enter geographical coordinates of the approximate center of mobile operation (See instruction 10)
 North Latitude ° West Longitude °

5(f). Datum (see instruction 10): ☐ NAD 27 ☒ NAD 83

6. Is a directional antenna (other than radar) used? ☐ YES ☒ NO
 If "YES", give the following information:
 (a) Width of beam in degrees at the half-power point: _____
 (b) Orientation in horizontal plane: _____ (c) Orientation in vertical plane: _____

7. Is this authorization to be used for fulfilling the requirement of a government contract with an agency of the United States Government? ☒ YES ☒ NO
 If "YES", attach as EXHIBIT No. _____ a narrative statement describing the government project.

8. Is this authorization to be used for the exclusive purpose of developing radio equipment for export to be employed by stations under the jurisdiction of a foreign government? ☐ YES ☒ NO
 If "YES", attach as EXHIBIT No. _____ the following information: Provide the contract number and the name of the foreign government concerned.

9. Is this authorization to be used for providing communications essential to a research project? (The radio communication is not the objective of the research project.) ☐ YES ☒ NO
 If "YES", attach as EXHIBIT No. _____ a narrative statement providing the following information:
 (a) A description of the nature of the research project being conducted.
 (b) A showing that the communications facilities requested are necessary for the research project involved.
 (c) A showing that existing communications facilities are inadequate.

10. If all the answers to Items 7, 8, and 9, are "NO", attach as EXHIBIT No. 2 a narrative statement describing in detail the following:
 (a) The complete program of research and experimentation proposed including description of equipment and theory of operation.
 (b) The specific objectives sought to be accomplished.
 (c) How the program of experimentation has a reasonable promise of contribution to the development, extension, expansion, or utilization of the radio art, or is along line not already investigated.

11(a). Give an estimate of the length of time that will be required to complete the program of experimentation proposed in this application: 2003 - 2006 (3 yrs)
 (b) If less than 2 years give the length of time in months that the authorization requested in this application will be required: _____

12. Would a Commission grant of this application come within Section 11307 of the FCC Rules, such that it may have a significant environmental impact (see instruction 11)? ☐ YES ☒ NO
 If "YES", attach as EXHIBIT No. _____ an Environmental Assessment as required by Section 11311.

13. List below transmitting equipment to be installed (if experimental so state):

MANUFACTURER	MODEL NUMBER	NO. OF UNITS
SDU MFG # 55939 (Honeywell)	PN 7516118-24010 (MCS-4000C)	1
HQA MFG # 55939 (Honeywell)	PN 7516251-60060 (MCS 4000C)	1
DILNA MFG # 55939 (Honeywell)	PN 7516193-901 (MCS 4000C)	1
16A. Antenna MFG # 55939 (Honeywell)	PN 7516194-901 (MCS-4000C)	1

AERO-SATCOM
System.

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KAO address
to assigned
by [signature]
[signature]

12. Is the equipment listed in Item 18 capable of station identification pursuant to Section 515? ☒ YES ☐ NO
13. Will the antenna extend more than 6 meters above the ground, or if mounted on an existing building, will it extend more than 6 meters above the building, or will the proposed antenna be mounted on an existing structure other than a building? ☐ YES ☒ NO
- If "YES", give the following (see instruction 9):
- (a) Overall height above ground to tip of antenna is _____ meters
- (b) Elevation of ground at antenna site above mean sea level is _____ meters
- (c) Distance to nearest aircraft landing area is _____ kilometers
- (d) List any natural formations of existing man-made structures (hills, trees, water tanks, towers, etc) which, in the opinion of the applicant, would tend to shield the antenna from aircraft and thereby minimize the aeronautical hazard of the antenna.

(e) Submit as EXHIBIT No. _____ a vertical profile sketch of total structure including supporting building, if any, giving heights in meters above ground for all significant features. Clearly indicate existing portion, noting particulars of aviation obstruction lighting already available.

13. Applicant is (check only one box)

- ☐ INDIVIDUAL ☐ ASSOCIATION ☐ PARTNERSHIP ☒ CORPORATION
- ☐ OTHER (describe in space provided below)

14. Is applicant a foreign government or a representative of a foreign government? ☐ YES ☒ NO

15. Has applicant or any party to this application had any FCC station license or permit revoked or had any application for permit, license or renewal denied by this Commission?

If "YES", attach as EXHIBIT No. _____ a statement giving full sign of license or permit revoked and relate circumstances. ☐ YES ☒ NO

16. Will applicant be owner and operator of the station? ☒ YES ☐ NO

17. Give name, title, and telephone number (include area code), and Internet e-mail address (if applicable) of person who can best handle inquiries pertaining to this application.

Terri Dempster, CS Manager, 607-751-4839, terri.dempster@lmc.com
LMC Corp. Claude Wells

18. APPLICANT ANTI-DRUG ABUSE CERTIFICATION:

By checking "YES", the individual applicant certifies that he or she is eligible for this license. This requires that no or she is not subject to a denial of federal benefits, including FCC benefits, as a result of a drug offense conviction pursuant to Section 8601 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 862. A non-individual applicant, e.g., corporation, partnership or other unincorporated association, certifies that no party to the application is subject to a denial of federal benefits pursuant to that section. For definition of a "party" for these purposes see 47 CFR 1.2002(b).

☒ YES ☐ NO

19. List below all exhibits in numerical sequence and the item number of form requiring the exhibit identified.

EXHIBIT NUMBER	ITEM NO. OF FORM	EXHIBIT NUMBER	ITEM NO. OF FORM	EXHIBIT NUMBER	ITEM NO. OF FORM
1	4				
2	10				
3	14				

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CERTIFICATION:

Attention: Read this certification carefully before signing this application.

THE APPLICANT CERTIFIES THAT:

- (a) Copies of FCC Rule Parts 2 and 5 are on hand; and
- (b) Adequate financial appropriations have been made to carry on the program of experimentation which will be conducted by qualified personnel; and
- (c) All operations will be on an experimental basis in accordance with Part 5 and other applicable rules, and will be conducted in such a manner and at such a time as to preclude harmful interference to any authorized station; and
- (d) Grant of the authorization requested herein will not be construed as a finding on the part of the Commission:
 - (1) that the frequencies and other technical parameters specified in the authorization are the best suited for the proposed program of experimentation, and
 - (2) that the applicant will be authorized to operate on any basis other than experimental, and
 - (3) that the Commission is obligated by the results of the experimental program to make provision in its rules including its table of frequency allocations for applicant's type of operation on a regularly licensed basis.

APPLICANT CERTIFIES FURTHER THAT:

- (a) All the statements in the application and attached exhibits are true, complete and correct to the best of the applicant's knowledge; and
- (b) The applicant is willing to finance and conduct the experimental program with full knowledge and understanding of the above limitations; and
- (c) The applicant waives any claim to the use of any particular frequency or of the electromagnetic spectrum as against the regulatory power of the USA.

Signed and dated this _____ day of _____, 19 _____

Name of Applicant _____
(must correspond with name given on page 1)By _____
(print) (signature)

Title _____

Check appropriate classification:

- ☐ Individual applicant ☐ Member of applicant partnership
- ☐ Authorized employee ☐ Office of applicant corporation or association

USEFUL FALSE STATEMENTS MADE ON THIS FORM ARE PUNISHABLE BY FINE AND/OR IMPRISONMENT (U.S. Code, Title 18, Section 1001), AND/OR REVOCATION OF ANY STATION LICENSE OR CONSTRUCTION PERMIT (U.S. Code, Title 47, Section 312(a)(1)), AND/OR FORFEITURE (U.S. Code, Title 47, Section 503).

**NOTIFICATION TO INDIVIDUALS UNDER PRIVACY ACT OF 1974
AND THE PAPERWORK REDUCTION ACT OF 1980**

Information requested through this form is authorized by the Communications Act of 1934, as amended, and specified by Section 008 therein. The information will be used by Federal Communications Commission staff to determine eligibility for issuing authorizations in the use of the frequency spectrum and to effect the provisions of regulatory responsibilities rendered by the Commission by the Act. Information requested by this form will be available to the public unless otherwise requested pursuant to 47 CFR 0.450 of the FCC Rules and Regulations. Your response is required to obtain this authorization.

Public reporting burden for this collection of information is estimated to average four (4) hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden to the Federal Communications Commission, Records Management Branch, Paperwork Reduction Project (3060-0065), Washington, DC 20554. DO NOT send completed applications to this address. Individuals are not required to respond to this collection unless it displays a currently valid OMB control number.

THE FOREGOING NOTICE IS REQUIRED BY THE PRIVACY ACT OF 1974, PL 93-579, DECEMBER 31, 1974, 5 U.S.C. 552a(e)(3), AND THE PAPERWORK REDUCTION ACT OF 1980, PL 96-511, DECEMBER 11, 1980, 44 U.S.C. 3507.

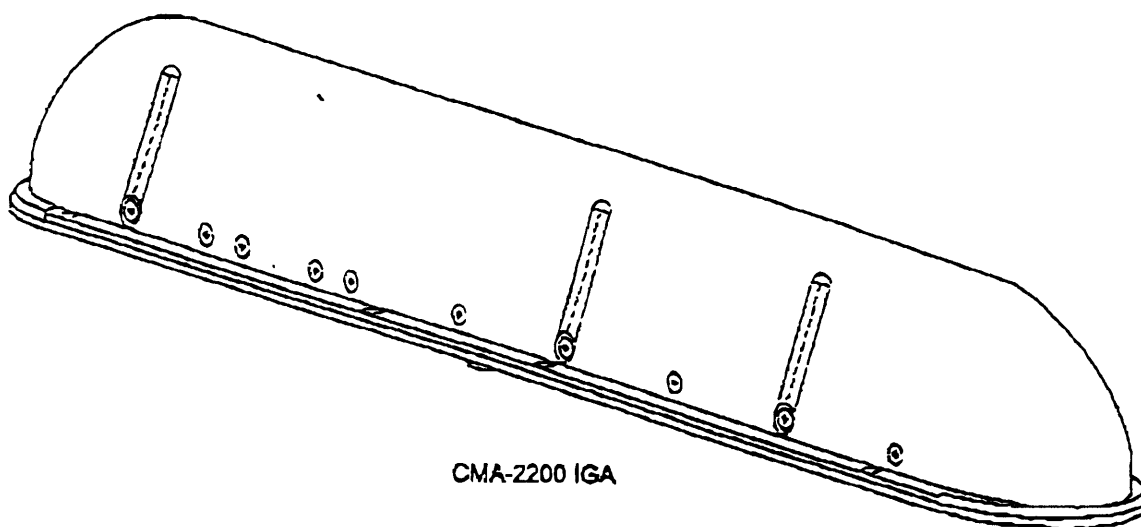
FCC Form 442 - Page 5
March 1998

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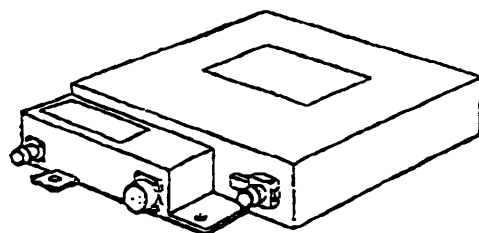
FAX NO.

P. 08

Exhibit 1 - Aero-I SATCOM
Antenna System
CMA-2200 SATCOM SYSTEM
INSTALLATION/FLIGHT LINE MANUAL
Technical Data.



CMA-2200 IGA



LNA/DIPLEXER FOR USE WITH CMA-2200 IGA

Typical CMA-2200 Configuration
Figure 1

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*Exhibit***CMA-2200 SATCOM SYSTEM
INSTALLATION/FLIGHT LINE MANUAL**

NOMENCLATURE	PUBLICATION NO.
Intermediate Gain Antenna, Maintenance Manual	2200-GEN-1202
Diplexer/Low Noise Amplifier, Maintenance Manual	2102-GEN-1204

List of Related Publications
Figure 2**4. EQUIPMENT IDENTIFICATION**

The equipment nomenclature, common name and Canadian Marconi Company (CMC) part numbers for the SATCOM system are listed in Figure 3. Throughout this manual, the units are referred to by their common name. The equipment meets the requirements of ARINC-751 and RTCA DO-150C to the extent specified herein.

EQUIPMENT NOMENCLATURE	COMMON NAME	CMC PART NUMBER	<i>HF AN</i>
Top Mounted Intermediate Gain Antenna Diplexer/Low Noise Amplifier	IGA D/LNA	100-602372-000 100-602200-001	<i>751694-901 7516193-901</i>

Equipment Identification
Figure 3**5. SYSTEM CONFIGURATION**

The CMA-2200 antenna subsystem consists of the Intermediate Gain Antenna (IGA), and the Diplexer/Low Noise Amplifier (D/LNA). The antenna subsystem has external interfaces for beam steering and status information transfers (BITE) via RS-422 serial communication lines and discretes to the Satellite Terminal Unit (STU). Throughout this publication, reference is made to the Satellite Terminal Unit (STU) which, for the purpose of the Aero-1 airborne system description, consists of all of the subsystems related to the Aero-1 installation and interface requirements. The STU contains circuits for conversion of audio and digital inputs to a baseband or intermediate frequency and interfaces at radio frequency with the CMA-2200 Airborne Antenna subsystem and High Power Amplifier (HPA). A complete system block diagram is illustrated in Figure 4.

*STU is now an SDU***23-10-00** Page 3
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*Exhibit F***CMA-2200 SATCOM SYSTEM
INSTALLATION/FLIGHT LINE MANUAL****6. EQUIPMENT SPECIFICATIONS**

Figure 5 lists the basic physical, environmental and electrical parameters of the SATCOM system.
Figure 6 lists the interface specifications of the SATCOM system.

CHARACTERISTICS	SPECIFICATION
<u>DESIGN SPECIFICATIONS</u>	
<u>ARINC DOCUMENTS</u>	ARINC Characteristic 761, Aircraft Installation Provisions
<u>PHYSICAL SPECIFICATIONS</u>	
INTERMEDIATE GAIN ANTENNA	
Size	29.92 in (759.9 mm) long, 4.25 in (107.9 mm) wide, 3.82 in (97 mm) high when not installed (total height of installed IGA above aircraft top surface centerline is dependent on adapter plate thickness, if used)
Weight	10.0 lbs (4.5 kg) maximum, excluding adapter plate
<u>DIPLEXER/LOW NOISE AMPLIFIER</u>	
Size	11.05 in (280.7 mm) long, 7.75 in (197.1 mm) wide, 1.97 in (50 mm) high
Weight	6.5 lbs. (2.95 kg) Max.

Equipment Specifications
Figure 5 (Sheet 1 of 3)

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Exhibit 1

CMA-2200 SATCOM SYSTEM
INSTALLATION/FLIGHT LINE MANUAL

CHARACTERISTICS	SPECIFICATION
<u>D/LNA - STU/RFU RF INTERFACE</u>	
Frequency of Operation:	Receive 1525-1559 MHz
D/LNA VSWR:	Receive 1.5:1 max
D/LNA Gain:	52-60dB, including ripple, 57dB nominal
<u>D/LNA - ANTENNA INTERFACE</u>	
Frequency of Operation:	Receive 1525-1559 MHz Transmit 1626.5-1660.5 MHz
Antenna Input VSWR:	Receive 1.5:1 max Transmit 1.5:1 max
Antenna Input Power:	Transmit 20W max
D/LNA Input VSWR:	Receive 1.3:1 max Transmit 1.3:1 max
D/LNA Insertion Loss:	0.8 dB
<u>SATELLITE ANTENNA RF INTERFACE</u>	
Frequency of Operation:	Receive 1525-1559 MHz Transmit 1626.5-1660.5 MHz
Polarization:	Right hand circular as defined by CCIR recommendation 573.
Axial Ratio:	Less than 6 dB typical, unless compensated by excess antenna gain.
Antenna Gain:	+6dBic typical for all steering angles and all frequencies of operation.
<u>D/LNA - SATELLITE TERMINAL INIT/HPA RF INTERFACE</u>	
Frequency of Operation:	Transmit 1626.5-1660.5 MHz
D/LNA Input VSWR:	Transmit 1.3:1 max
D/LNA Input Power:	Transmit 60W max

Interface Specifications
Figure 6 (Sheet 1 of 5)

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Exhibit 1

~~CMC~~SATCOM SYSTEM
INSTALLATION/FLIGHT LINE MANUAL

D. Location of the Intermediate Gain Antenna (IGA)

A suitable location can only be selected after a careful study is made of the particular aircraft. The IGA is top mounted either to an adapter plate on the fuselage or directly on the aircraft fuselage with the exact location by the customer. The adapter plate is not supplied by CMC. CMC should be consulted prior to IGA location selection.

E. Intermediate Gain Antenna (IGA) Installation Notes

- (1) The IGA may impose loading factor to the airframe structure, therefore it is recommended that a structural engineer familiar with the airframe be involved in selecting the proper installation or mounting location and antenna/airframe mechanical
- (2) The location selected will depend on the particular airframe. In addition to structural reasons, this may be due to internal space requirements for other components of the SATCOM system.
- (3) The IGA is mounted on top of the aircraft as far forward from the tail or other obstructions to minimize signal blockage by the airframe.
- (4) The IGA shall be mounted in a location in a swept stroke zone with a low possibility of lightning arc channel hang-on (Zone 2A per DO-160 C).
- (5) The IGA shall be aligned with fore/aft axis of aircraft within ± 1 degree. The FWD marking on the antenna radome shall be positioned towards the front of the aircraft.
- (6) The IGA should be installed to within ± 1 degree of horizontal in both the pitch and roll axis.

F. Intermediate Gain Antenna (IGA) Cabling Notes

- (1) The maximum combined resistance of the STU (HPA) to IGA power feed and return lines including all connectors, wire and interconnects must not exceed values given in notes of Figure 401.

G. Coaxial Cable Losses

- (1) The insertion loss for the D/LNA unit is 0.8 dB.
- (2) The coaxial cable loss between the IGA and the D/LNA should not exceed 0.3 dB.
- (3) The loss between the STU (HPA) and the D/LNA should not exceed 1.4 dB at 25 °C.
- (4) The total loss between the STU (HPA) and the IGA connector should not exceed 2.5 dB (0.8 dB + 0.3 dB + 1.4 dB), including the D/LNA and any other loss.
- (5) The loss between the D/LNA output and the RFU input should not exceed 25 dB, including the cable, combiner and connectors.

H. Intermediate Gain Antenna (IGA) Interference

- (1) The IGA should be installed at least 3 meters from a GPS antenna to prevent any interference with the GPS receiver.

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Glenn,

Please contact Claude, LMCRF Tech Support, and brief your projects (or programs), and copy me. Based on your specifications, he will give you a proper approach to obtain a frequency range.

Thanks, Wonjune

Wonjune Hong

Safety, Chemical & Environmental Programs

Tel: 607)751-2452

Fax: 607)751-4730

Exhibit 2

-----Original Message-----

From: Wells, Claude

Sent: Monday, January 13, 2003 1:25 PM

To: Hong, Wonjune

Subject: RE: C5 STACOM License

Wonjune,

The two way voice communications testing, what frequencies are we talking about?
[Terri Dempski]

→ The Aero I INMARSAT SATCOM is already has a commercially approved frequency range by the FCC. It has range of 1525-1559MHz for receive and 1626.5 - 1660.5 for transmit.

Will these tests be in support of a program or is the two way units being tested the program?
[Terri Dempski]

→ This is in support of the C5 AMP program in Owego.
Give me or have someone send a brief explanation of what they are trying to do.
[Terri Dempski]

→ We are working w/ ARINC as the service provider to test the installation of Aero-I SATCOM as part of the Comm/Nav/Surveillance of the C5 program. Placing a call, receiving a call as well as data link communication are all part of the integration and Test of testing the OFP within the VIA/AIU (the control software). The Aero-I SATCOM is commercial and in full production as well as installed on commercial airliners. We set program pins and configuration design of the wiring to apply it to C5. We do not change the SATCOM software or its frequency protocol. The testing is for the interface to the government C5 aircraft system.

→ Testing occurs Jan '03 through support of '06.
That may help in deciding what type of license to file. We can request a Special Temporary License to try and get some frequency for them to use until the regular authorization is approved. But I need to know some details of what they are trying to do. Is it for a specific DoD type contract or is it company R&D? Where are they wanting to use the systems?

Claude

Claude E. Wells

Tech. Support Analyst

LMCRF Management Office

(410) 682-2156 Office

(410) 682-0300 FAX

claude.wells@lmco.com <mailto:claude.wells@lmco.com>

-----Original Message-----

From: Hong, Wonjune

Sent: Monday, January 13, 2003 1:16 PM

To: Wells, Claude

Subject: FW: C5 STACOM License

JAN-21-2003 TUE 04:00 PM

FAX NO.

P. 14



DEPARTMENT OF THE AIR FORCE
HQ WARNER ROBINS AIR LOGISTICS CENTER
ROBINS AIR FORCE BASE GEORGIA

Exhibit 3

4 Nov 2002

MEMORANDUM FOR ARINC

Attn: Gary Pokodner
Fax: 562-593-7280

FROM: DoD International AIMS Program Office
380 Richard Ray Blvd., Ste. 104
Robins AFB GA 31098-1638

SUBJECT: ICAO 24-Bit Address Code Assignment

1. The ICAO 24-bit address code (in octal format) reflected in the attachment is hereby assigned to ARINC for SIL test lab purposes in support of the C-5 SPO.
2. Point of contact for code distribution is the undersigned, (478) 926-6123, e-mail: Roger.Shoemaker@robins.af.mil.

ROGER L. SHOEMAKER
DoD International AIMS Program Office
Independent contractor for logistics

Enclosed:

1. ICAO Address Code Assignment
(1 page, 1 assignment)

*TAIL Number**LMSI 100*

JAN 24 '03 11:30

FROM BALT-MARCALL

TO 82024181918

PAGE.014

JAN-21-2003 TUE 04:00 PM

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P.2

Exhibit 3

Assignment of 24-bit ICAO address code for use on the SIL test bed

OCIAL CODE 53403361	REQUESTING MAJCOM ARWIC	AIRCRAFT TYPE test bed	TAIL NUMBER r/s	AIRCRAFT HOME BASE Owego NY	DY 4	MON /lov	YR 92	S 1	C NUMBER NEW TAIL	DATE
---------------------------	-------------------------------	------------------------------	--------------------	--------------------------------	---------	-------------	----------	--------	----------------------	------

To be used on C-5 SIL test bed.

should
be
100
LMSITW

11/4/2002