EXHIBIT I
FCC FORM 442 – Page 2, Item 4.(G); Page 3, Item 6.; Page 3, Item 10.

E-TCAS SYSTEM DESIGN/OPERATION

MILITARY COMMUNICATIONS ELECTRONICS BOARD (MCEB)

EQUIPMENT FREQUENCY ALLOCATION GUIDANCE

Military Department	Equipment	Stage
AIR FORCE	E-TCAS, Enhanced Traffic Alert and Collision Avoidance System	4-Operational

Section 1: ENCLOSURES

Enclosure Number	Description	Dated
1	J/F 12/7092	23 Jan 95

Section 2: EQUIPMENT APPLICATION INFORMATION

Frequency	Emission	Power PEAK	Type of Service	Operating Location
1.03 GHz TRANSMIT 1.09 GHz RECEIVE	10M0V1D 10M0K1D 14M0V1D 14M0K1D	158 W	Aeronautical Radionavigation	US&P, Rhein Main AB, GE, Kadena AB, JA, Yokota AB, JA, Mildenhall AB, UK, and Woodbridge AB, UK

Section 3: MCEB GUIDANCE

1. The enclosed application as described above is approved for operational use in the US&P subject to the guidance below.
2. For the intended use in the aeronautical radionavigation service, the subject equipment is in compliance with the US and ITU Tables of Frequency Allocations.
3. Based on the information provided, the subject equipment is in conformance with the provisions of MIL-STD-461D and NTIA Manual Section 5.1.
4. Based on the information provided, the subject equipment does not comply with the maximum repetition frequency, sensitivity, or IF bandwidth requirements of DoD AIMS 65-1000B. All practicable steps should be taken to bring this equipment within standards.
5. Operations of the subject equipment must be coordinated in accordance with ACP-190 US SUPP-1(C), Guide to Frequency Planning, prior to activation.
6. Host nation coordination has not been initiated. Use of the subject equipment is not authorized in locations other than the US&P without the appropriate CINC's statement of supportability.
7. Operations must be coordinated with the FAA in accordance with NTIA Manual Section 8.3.16.
8. SPS coordination was not requested.

Steering Member J-12 Working Group MCEB Frequency Panel	Signature	Date	Page
	Walter J Rader Jr	APR 05 1995	1 of 1

Downgrading Instructions	Distribution	MCEB J-12 Number
Classified by: NA Declassify on:	J-12 Holders	7092/1

APPLICATION FOR EQUIPMENT FREQUENCY ALLOCATION	CLASSIFICATION UNCLASSIFIED	DATE 01/23/95	J/F 12/07092 Page 1 of 13 Pages

DOD GENERAL INFORMATION

TO	FROM
USAF Frequency Management Agency/SCM 4040 N Fairfax Drive, Suite 203 Arlington, VA 22203-1613	AF Material Command AFMC/CSO/SCSF 4225 Logistics Avenue, Suite 20 Wright Patterson AFB, OH 45433-5759

1. APPLICATION TITLE (U) E-TCAS, Enhanced Traffic Alert and Collision Avoidance System

2. SYSTEM NOMENCLATURE (U) Integrated C130 IFF and Traffic Alert and Collision Avoidance System (TCAS-II)

3. STAGE OF ALLOCATION

(U) [ ] a. STAGE 1 CONCEPTUAL [ ] b. STAGE 2 EXPERIMENTAL [ ] c. STAGE 3 DEVELOPMENTAL [X] d. STAGE 4 OPERATIONAL

4. FREQUENCY REQUIREMENTS (U)

a. FREQUENCY(IES)

1.030 GHz 1.090 GHz

b. EMISSION DESIGNATOR(S) (See Remarks)

5. TARGET STARTING DATE FOR SUBSEQUENT STAGES

a. STAGE 2	b. STAGE 3	c. STAGE 4
(U) NA	(U) NA	(U) NA

6. EXTENT OF USE (U) Intermittent use, 24 hrs a day, 7 days a week

7. GEOGRAPHICAL AREA FOR

a. STAGE 2 (U) NA

b. STAGE 3 (U) NA

c. STAGE 4 (U) US&P and Specific Overseas Locations

8. NUMBER OF UNITS

a. STAGE 2	b. STAGE 3	c. STAGE 4
(U) NA	(U) NA	(U) 200

9. NUMBER OF UNITS OPERATING SIMULTANEOUSLY IN THE SAME ENVIRONMENT (U) 30

10. OTHER J/F 12 APPLICATION NUMBER(S) TO BE

(U) [ ] a. SUPERSEDED J/F 12/ NA

[X] b. RELATED J/F 12/ 7090 7091

11. IS THERE ANY OPERATIONAL REQUIREMENT AS DESCRIBED IN THE INSTRUCTIONS FOR PARAGRAPH 11?

(U) [X] a. YES [ ] b. NO [ ] c. NAVAIL

12. NAMES AND TELEPHONE NUMBERS

(U) a. PROGRAM MANAGER	Lt Col Kevin Rankin	(1) COMMERCIAL 513-255-6371	(2) DSN 785-6371
b. PROJECT ENGINEER	Lt Tom Thibault	(1) COMMERCIAL 513-255-6371	(2) DSN 785-6371

13. REMARKS (U)

4b. Transmit Emission Designators: 10M0K1D and 10M0V1D on 1030 MHz;
Receive Emission Designators: 14M0V1D and 14M0K1D on 1090 MHz.

11. Operational with IFF Mode S, TCAS, and E-TCAS systems used by DoD components, U.S. government agencies and or other nations.

-- Continued on Page 2 --

DOWNGRADING INSTRUCTIONS Classified By: NA Declassify On:	CLASSIFICATION UNCLASSIFIED	J/F 12/07092

-- Continued from Page 1 --

1. The E-TCAS system is an enhanced version of the Allied Signal TCAS-II system. The enhancements include the addition of a special Rendezvous Mode designed to be used in areas of low aircraft density. Rendezvous Mode is selectable by the flight crew and it is intended for refueling operations. The features of Rendezvous Mode are:

- 40 nautical mile range in all quadrants (as compared with the 40 front, 15 sides and 12 aft of the standard modes).
- Tracking of Mode-A transponders identification codes.
- Disabling of the standard interference limiting algorithm designed for use in high traffic density areas.

TCAS-II (or E-TCAS) is a commercial system designed to provide a reliable aircraft separation assurance function in traffic densities as high as 0.3 aircraft per square mile (24 transponder equipped aircraft within 5 nautical miles). This E-TCAS system tracks as many as 30 transponder equipped intruders at any time.

E-TCAS computes the range of the intruding aircraft by measuring transmission turn-around time. Altitude rate, bearing, range and range rate are computed by tracking the reply information.

The system has two operating modes: Traffic Advisories (TA) and Traffic/Resolution Advisories (TA/RA). In TA mode the system displays the position of proximate aircraft that are, or could become, collision threats. In TA/RA mode the system also provides resolution advisories (RAs). An RA can be a corrective advisory, which instructs the pilot to deviate from the current flight path, or a preventive advisory (e.g. "Don't climb" when the aircraft is in level flight).

In a TCAS-to-TCAS encounter (or E-TCAS), each aircraft transmits interrogations to the other via the Mode S data link. These "coordination" interrogations ensure that each aircraft selects complementary RAs. The coordination interrogations are transmitted once per second by each TCAS for the duration of the RA. The line diagram on page 12 shows the communication links during a TCAS-to-TCAS coordination.

When airborne, the E-TCAS system monitors the squitters transmitted by Mode S transponders. The system transmits periodic interrogations to Mode C and Mode S transponder equipped aircraft. In response to these interrogations, the transponders respond with signals reporting aircraft altitude. One of the most significant differences between Mode C (also referred to as Air Traffic Control Radar Beacon System (ATCRBS)) transponders and Mode S transponders is that Mode S transponders have unique addresses while Mode C transponders do not. For that reason Mode C interrogations are "all-call" broadcast type transmissions while Mode S interrogations are directed to individual aircraft. This poses a problem to many potential Mode C aircraft responding all at once with their replies stepping over each other. To handle this "synchronous garble" during surveillance interrogation of Mode C aircraft, E-TCAS utilizes a technique of interrogation sequences referred to as Whisper-Shout (WS).

MODE C SURVEILLANCE, WHISPER-SHOUT (WS) INTERROGATIONS

A WS sequence consists of incremental power steps. Each Mode C pulse train (P1, P2, P3, P4) is transmitted at approximately one dB more power than the previous transmission. The object of WS interrogations, as explained below, is to produce a "movable reply area" that looks like a 90 degree arc cutout from a donut shape that goes out further in range for each transmission within a WS sequence.

A key element in the mechanism of Whisper-Shout interrogations is the use of transponder Side Lobe Suppresion (SLS). Basically Mode C transponders will suppress (not reply) if the interrogation waveform has a pulse P2 with equal or greater amplitude than pulse P1 (Ref: RTCA/DO-181A section 2.2.5).

WS interrogations (except the first 2 lowest power interrogations in each WS sequence) include an additional suppression pulse S1. Pulses S1 to P4 are transmitted in a directional beam while P2 is transmitted omni-directionally. The directional beam has a gain of approximately 3 dB over the omni transmission. The antenna page contains the specific details of the 160 variable transmissions generated by the 8 WS sequences of the E-TCAS equipment.

The first transmission in each sequence is made at 30 dBm (1 watt). The separation between each transmission within a given WS sequence is 1.5 milliseconds. The spacing from one WS sequence to the other is approximately 100 milliseconds.

-- Continued on Page 3 --

-- Continued from Page 2 --

The result is that all Mode C equipped aircraft outside of the directional beam are suppressed and do not respond to any of the US interrogations. This is because those Mode C transponders see the omni-directionally trasmitted P2 pulse stronger than P1. Only those aircraft positioned within the directional beam (where P1 is 3 dB stronger than P2) are in position to respond. Within the directional beam, the S1 pulse and the incremental power steps come into play to elicit replies from different aircraft at different ranges. P2 is low in relative amplitude within the directional beam and does not cause suppression. But the S1-P1 pulse combination is spaced to look like a P1-P2 combination and can cause suppression to those transponders that are sensitive enough to detect the lower amplitude S1 pulse. The first two low power transmission (30 and 31 dBm) do not have S1 pulses. Any Mode C aircraft within a 2-3 mile range should detect and respond. Transponders that are further away in range do not see S1 or P1. As power is gradually increased, the closest target will detect both S1 and P1 and will go into suppression, while mid-range aircraft will see P1 but not detect S1 (below Minimum Triggering Level) so they respond. Far out aircraft still do not see either S1 or P1. Space losses and typical transponder sensitivity are such that at max. power (52 dBm) aircraft located up to 40 miles away reply to the TCAS interrogation.

MODE S SURVEILLANCE INTERROGATIONS

Mode S transponder equipped aircraft squitter with an average period of one per second (max. period = 1.2 sec). These squitters are short-format messages (56 data bits) with the downlink format (DF) field set to 11. E-TCAS detects the presence of Mode S equipped aircraft by listening at 1090 MHz to DF11 squitters. Each squitter data field contains the unique Mode S address of the transmitting transponder.

Once per second E-TCAS examines a list of received DF11 squitters to determine if there are new Mode S equipped aircraft within listening range that should be tracked. For each new Mode S target that is identified via its squitter, a series of short (56 bit) interrogations are conducted to establish its altitude and range. Four interrogation and replies are required to acquire and establish the target with its own surveillance track. The interrogation and replies are all short formats. The data contained in the replies includes max. airspeed and altitude. Range and bearing are determined from time of reponse and phase directionality of the received signal. The first interrogation in the 4 transmission-reply track acquisition cycle is conducted at full power (52 dBm). The remaining three interrogations are power-programmed as a function of the aircraft range determined from the first reply. Mode S acquisition interrogations are transmitted out of the antenna that the squitter was received from. Once a Mode S aircraft's track is established, E-TCAS will go back to that target once per second to maintain surveillance with a power programmed interrogation. If a target does not reply then a second attempt is made at full power.

The power managing algorithm is described in RTCA/DO-185 section 2.2.16.3.2. Basically, targets with ranges greater than 10 nautical miles are interrogated at full power. Other targets are interrogated with reduced power based on the formula:

Power = Max. Power (dBW) + 20 Log (range/10), where range < or = 10

The number of Mode S surveillance transmissions is not a constant number as in the case of Mode C US transmission. Mode S transmissions and the resulting average transmitted power vary as a fuction of number of Mode S targets and how many re-tries are required to establish a specific target.

Mode S surveillance for E-TCAS is essentially the same as TCAS-II from an electromagnetic emission perspective. The data contents of a few Mode S interrogations (once every 10 seconds) is different but the number of transmissions is the same as TCAS-II.

Since the E-TCAS is limited to tracking a maximum of 30 aircraft (Mode S or Mode C), the worst theoretical case is a scenario in which there are no Mode C aircraft in range and there are 30 Mode S targets all located at ranges exceeding 10 miles requiring max. power interrogations.

-- Continued on Page 4 --

— Continued from Page 3 —

E-TCAS BROADCAST INTERROGATIONS

E-TCAS uses long Mode S special surveillance interrogations (112 data bits) with a bradcast address. These special interrogations do not elicit replies from other TCAS. They are intended to provide every TCAS equipped aircraft a means of tracking the number of TCAS equipped aircraft in range. This number is used to minimize the power and number of interrogations that a TCAS can generate in high traffic density areas.

COLLISION AVOIDANCE, E-TCAS COORDINATION INTERROGATIONS

When E-TCAS declares another TCAS equipped aquipped aircraft to be a collision threat, interrogations to that aircraft are transmitted to arive at a Resolution Advisory (RA). Coordination transmissions are of the long (112 bit) type.

HOW E-TCAS HANDLES MODE A INTRUDERS

Mode A transponders respond to the Mode C (ATCRBS) Whisper-Shout (WS) interrogations with a "non-altitude reporting" reply. Mode A transponders insert their "Ident" code in place of altitude data. Because the altitude is unknown, E-TCAS can only generate Traffic Advisories (TA). The display symbology used for Mode A intruders is the same as for Mode C intruders except for altitude related numbers which do not appear next to the intruder symbol.

COMPLIANCE

The E-TCAS system is fully operational as a standard TCAS-II. It retains compatibility with other TCAS and it meets all the functionality requirements described in Document No. RTCA/DO-185 Minimum Operational Performance Standards. In both modes (standard TCAS-II and rendezvous) the system successfully passed the FAA required TCAS-to-TCAS Coordination Test and the High Density Surveillance Flight Test (in the Los Angeles basin). Both flight test requirements are outlined in FAA Advisory Circular 20-131A.

7c. US&P includes:

Anchorage AK;
Maxwell AFB, AL;
Oxnard, CA;
Dobbins AFB, GA;
Honolulu, HI;
Baltimore, MD;
St. Joseph, MO;
Niagara Falls ANGB, NY;
Youngstown, OH;
Willow Grove, PA;
Dallas, TX;
Charleston, WV;
Elmendorf AFB, AK;
Little Rock AFB, AR;
Peterson AFB, CO;
Savannah, GA;
Chicago, IL;
Selfridge ANGB, MI;
Charlotte IAP, NC;
Stratton ANGB, NY;
Howard AFB, Panama;
Quonset Point, RI;
Dyess AFB, TX;
Martinsburgh, WV;
Kulis ANGB, AK;
March AFB, CA;
Wilmington, DE;
Hickam AFB, HI;
Louisville, KY;
Minneapolis, MN;
Pope AFB, NC;
Mansfield, OH;
Pittsburgh, PA;
Nashville, TN;
Milwaukee, WI;
Cheyenne AP, WY.

Overseas Includes:

Rhein Mein AB, GE;
Mildenhall AB, UK;
Kadena AB, JA;
Woodbridge AB, UK.
Yokota AB, JA;

Foreign Disclosure paperwork has been initiated.

TRANSMITTER EQUIPMENT CHARACTERISTICS

1. NOMENCLATURE, MANUFACTURER'S MODEL NO.
(U) E-TCAS, Transmitter
P/N 066-50000-0910

2. MANUFACTURER'S NAME
(U) Allied Signal (See Remarks)

3. TRANSMITTER INSTALLATION
(U) C130H, C130J, MC130

4. TRANSMITTER TYPE
(U) Pulsed

5. TUNING RANGE
(U) 1.030 GHz

6. METHOD OF TUNING
(U) Fixed Crystal

7. RF CHANNELING CAPABILITY
(U) None

8. EMISSION DESIGNATOR
(U) 10M0K1D 10M0V1D

9. FREQUENCY TOLERANCE
(U) 20 ppm

12. EMISSION BANDWIDTH
[ ] CALCULATED [X] MEASURED

10. FILTER EMPLOYED
(U) [X] a. YES [ ] b. NO

a. -3 dB	(U)	3 MHz	(U)	(U)
b. -20 dB	(U)	10 MHz	(U)	(U)
c. -40 dB	(U)	20 MHz	(U)	(U)
d. -60 dB	(U)	35 MHz	(U)	(U)
e. OC-BW	(U)	23 MHz	(U)	(U)

11. SPREAD SPECTRUM
(U) [ ] a. YES [X] b. NO

13. MAXIMUM BIT RATE
(U) 4 Mbps

15. MAXIMUM MODULATION FREQUENCY
(U) 4 MHz

14. MODULATION TECHNIQUES AND CODING
(U) *

17. DEVIATION RATIO
(U) NA

16. PRE-EMPHASIS
(U) [ ] a. YES [X] b. NO

18. PULSE CHARACTERISTICS

a. RATE	(U)	See Remarks	(U)	(U)
b. WIDTH	(U)	See Remarks	(U)	(U)
c. RISE TIME	(U)	See Remarks	(U)	(U)
d. FALL TIME	(U)	See Remarks	(U)	(U)
e. COMP RATIO	(U)	NA	(U)	(U)

19. POWER

a. MEAN	(U)	100 mW	(U) 100 mW	(U)
b. PEP	(U)	158 W	(U) 158 W	(U)

20. OUTPUT DEVICE
(U) Transistor

21. HARMONIC LEVEL

a. 2nd	(U)	-81 dB
b. 3rd	(U)	-90 dB
c. OTHER	(U)	-90 dB

22. SPURIOUS LEVEL
(U) -90 dB

23. FCC TYPE ACCEPTANCE NO.
() AO19PGTPA-81A

24. REMARKS ()

2. Manufacturer's Name: Allied Signal Commercial Avionics System, Fort Lauderdale, FL.

8 & 14. Emission Designator: The two different modulation schemes used with these interrogation signals determine the emission designators: Pulse Amplitude Modulated (PAM) signals for Mode C transponders (10M0K1D) signals and mixed PAM and Differential Phase Shift Keying (DPSK) transmissions for Mode S transponders (10M0V1D) .

— Continued on Page 6 —

— Continued from Page 5 —

10. Filter Employed: Two filters are employed - First is a 3-pole ceramic bandpass filter with a 22 MHz band-pass centered at 1030 MHz (-45 dB band-pass of 120 MHz). Second filter is a 5-pole low pass printed Chebychev to attenuate all harmonics by a minimum of 20 dB. Total insertion loss of both filters is 1.5 dB max.

12. Emission Bandwidth: Item 12 shows measured values. These values meet the FAA output spectrum limits per document No RTCA/DO-185 paragraph 2.2.3.2.1. The modulation methods for Mode C and Mode S transponder requirements (as described in RTCA/DO-181A) were applied. The output spectrums were recorded for each of the four antenna ports.

12d. It was established that 99% of the total transmitted power was contained in a 23.08 MHz bandwidth, and that the remaining energy was equally distributed on both sides of the occupied band centered on 1030 MHz.

18 a,b. Pulse Rate & Width Characteristics: The rate of the 10M0K1D is dependent on whether it is interrogating a Mode A or Mode C platform. In a Mode A interrogation, there is a preamble of a P1 and P2 pulse pair which is seperated by 2.0 usec and followed by a P3 and P4 pulse pair which is 8.0 usec from leading edge of the P1 pulse. P3 and P4 pulses are seperated by 2.0 usec. In a Mode C interrogation the only difference is the P3 and P4 pulse pair are 21.0 usec from leading edge of the P1 pulse. Both Mode A and Mode C interrogations wait 2.5 usec from trailing edge of P4 pulse and repeat cycle beginning with P1. For the Mode S interrogation, the same preamble of the P1 and P2 pulse pair is present. The P1 and P2 pair are seperated from a P6 pulse by 1.5 usec and is 16.25 usec long. The pulse rate from one Mode S string (P1, P2, and P6) to the next Mode S string varies non-periodicly between 1 pulse per millisecond to 1 pulse every 10 seconds. These waveforms are shown in Figure XX on Page 7.

18 c,d. Pulse Rise & Fall Time Characteristics: The rise and fall time are based on the limits set by the specification document. For both Mode C and Mode S the rise and fall time values are .05 - .1 usec. The average is approximately .06 usec.

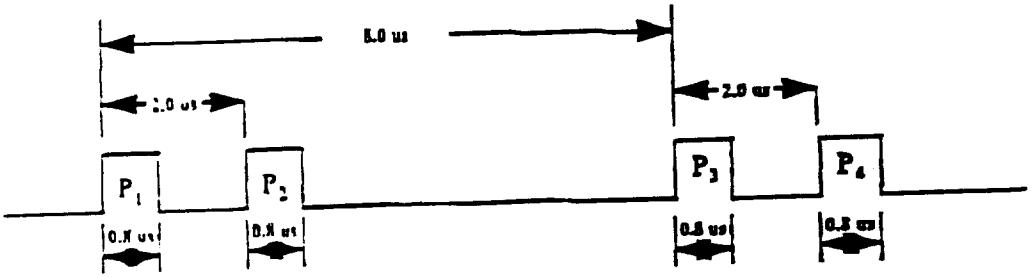
19a. Mean Power: Mode C and Mode A WS Transmissions (set A): For simplicity, assume that all 160 steps (antenna page) to be at maximum power of 195 watts: 160 x 195W x 4 pulses x 0.0000008 sec/pulse = 0.1W.

Mode S Surveillance Transmissions (set B): Assume worst case, 30 targets in track, all at maximum range requiring 195 W, 16.25 usec P6 pulse + 0.8 usec P1 pulse + 0.8 usec P2 = 17.85 usec: 30 transmissions x 195 watts x 0.00001785 sec/pulse = 0.1W.

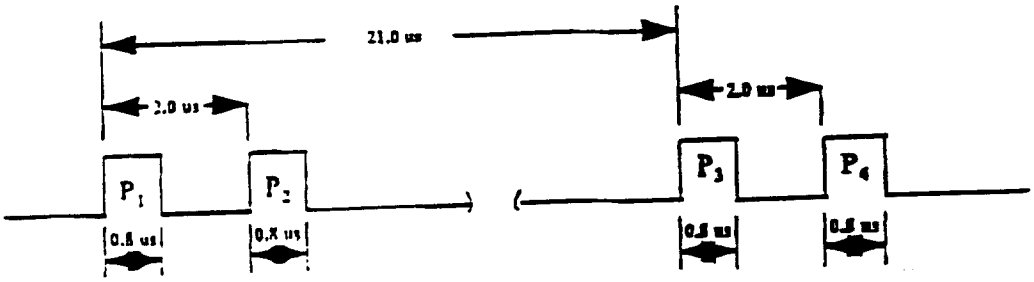
19b. Peak Power: The PEP output of the transmitter is 52 dBm (158 watts) at the terminals of the R/T. The nominal cable loss is 2.5 dB. The directional antenna has a gain of 3.6 dB which brings the radiated output within the antennas beam to (52 - 2.5 + 3.6 = 53.1 dBm (205 watts)). The effective power as related to an omni-directional antenna, using a beam width of 100 degrees, is 205 x (100/360) = 56.945 watts.

E-TCAS Waveform Descriptions

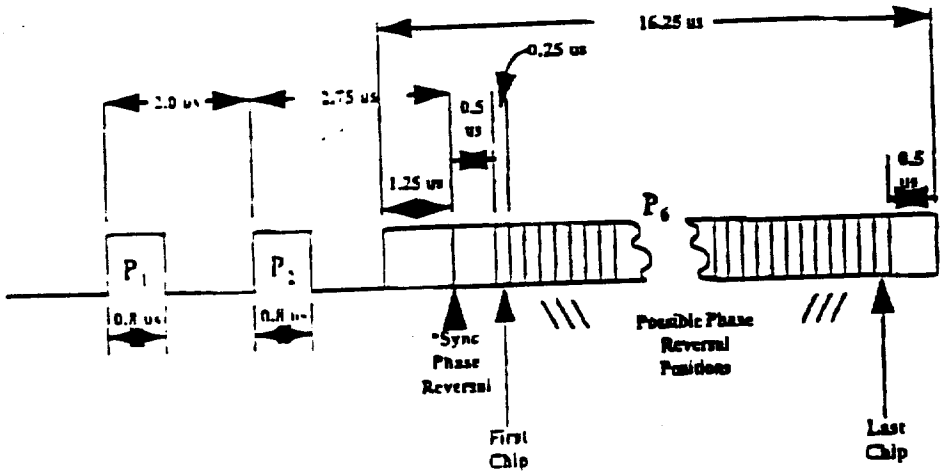
Mode A Interrogation



Mode C Interrogation



Mode S Interrogation



- The pulse rate from one Mode S string (P_1, P_2, and P_6) to the next Mode S string varies non-periodicly between 1 pulse per millisecond to 1 pulse every 10 seconds.

RECEIVER EQUIPMENT CHARACTERISTICS

1. NOMENCLATURE, MANUFACTURER'S MODEL NO.
(U) E-TCAS, Receiver
P/N 066-50300-0910

2. MANUFACTURER'S NAME
(U) Allied Signal (see page 5,#24)

3. RECEIVER INSTALLATION
(U) C130H, C-130J, HC-130

4. RECEIVER TYPE
(U) Single Conversion Pulse Logarithmic Amp

5. TUNING RANGE
(U) 1.090 GHz

6. METHOD OF TUNING
(U) Fixed Crystal

7. RF CHANNELING CAPABILITY
(U) NONE

8. EMISSION DESIGNATOR(S)
(U) 14M0V1D 14M0K1D

9. FREQUENCY TOLERANCE
(U) 2750 ppm

10. IF SELECTIVITY

	1st (U)	2nd (U)	3rd (U)
a. -3 dB	11 MHz	NA	NA
b. -20 dB	20 MHz	NA	NA
c. -60 dB	50 MHz	NA	NA

11. RF SELECTIVITY
[X] CALCULATED [ ] MEASURED

a. -3 dB	(U) 30 MHz
b. -20 dB	(U) 60 MHz
c. -60 dB	(U) 85 MHz
d. Preselection Type	(U) (See Remarks)

12. IF FREQUENCY
a. 1st (U) 60.0000 MHz
b. 2nd (U) NA
c. 3rd (U) NA

13. MAXIMUM POST DETECTION FREQUENCY
(U) NA

14. MINIMUM POST DETECTION FREQUENCY
(U) NA

15. OSCILLATOR TUNED

	1st (U)	2nd (U)	3rd (U)
a. ABOVE TUNED FREQUENCY			
b. BELOW TUNED FREQUENCY	X		
c. EITHER ABOVE OR BELOW THE FREQUENCY			

16. MAXIMUM BIT RATE
(U) 1 Mbps

17. SENSITIVITY

a. SENSITIVITY	(U) - 99 dBm
b. CRITERIA	(U) -77 dBm MTL
c. NOISE FIG	(U) 3 dB
d. NOISE TEMP	(U) NA

18. DE-EMPHASIS
(U) [ ] a. YES [X] b. NO

19. IMAGE REJECTION
(U) 70 dB

20. SPURIOUS REJECTION
(U) 70 dB

21. REMARKS (U)

10 & 11. IF / RF Selectivity: The receiver selectivity is essentially determined by the IF selectivity (single converter) since the RF preselector is wideband.

11d. Preselection Type: 6-pole Butterworth filter.

17a. Sensitivity: For reliable link operation the specification (document No. RTCA/DO-185) states that the minimum signal at the antenna input is -74 dBm (minimum triggering level(MTL)). The antenna has a zero dB gain in receive mode. With a cable loss of 3 dB max, the MTL input signal at the receiver is -77 dBm. The receiver sensitivity is -99 dBm. Reliable pulse detection requires a signal 15 dB above the noise floor. With -77 dBm input, this yields a signal margin of 99 - 77 = 22 dB.

17b. Criteria: For an input signal power level of - 80 dBm with a S/N ratio of 30 dB, the tracking error (bearing) is one degree.

CLASSIFICATION: UNCLASSIFIED

ANTENNA EQUIPMENT CHARACTERISTICS

(U) [ ] a. TRANSMITTING [ ] b. RECEIVING [X] c. TRANSMITTING AND RECEIVING

2. NOMENCLATURE, MANUFACTURER S MODEL NO.
(U) E-TCAS; Transmitting and Receiving Antenna 81A

3. MANUFACTURER'S NAME
(U) Sensor Systems Inc.

4. FREQUENCY RANGE
(U) 1.030 GHz - 1.090 GHz

5. TYPE
(U) Four element directional array

6. POLARIZATION
(U) Vertical

7. SCAN CHARACTERISTICS
a. TYPE (U) ELECTRONIC
b. VERTICAL SCAN ()
(1) Max Elev (U) 35 deg
(2) Min Elev (U) -5 deg
(3) Scan Rate (U) NA
c. HORIZONTAL SCAN ()
(1) Sector Scan () 360 degrees
(2) Scan Rate () one 360 degree scan per second

8. GAIN
a. MAIN BEAM
() (See Remarks)
b. 1st MAJOR SIDE LOBE
() (See Remarks)

9. BEAMWIDTH
a. HORIZONTAL
() 85 deg
b. VERTICAL
() (See Remarks)

d. SECTOR BLANKING () [ ] (1) YES [X] (2) NO

10. REMARKS ()

5. Type: Dual 4-element antennas are used (one on top of the aircraft and one on bottom). The following table discribes the E-TCAS Whisper Shout (WS) sequence steps which shows the antenna positioning through the entire 119 steps (takes four seconds to sweep) used in communicating with Mode C transponders:

SEQUENCE	STEPS	ANTENNA	BEAM	POWER
1	01 - 24	top	0 deg	30 - 52 dBm
2	25 - 34	bottom	0 deg	30 - 39 dBm
3	35 - 58	top	90 deg	30 - 49 dBm
4	58 - 68	bottom	90 deg	30 - 39 dBm
5	69 - 92	top	270 deg	30 - 49 dBm
6	93 -102	bottom	270 deg	30 - 39 dBm
7	102 -126	top	180 deg	30 - 44 dBm
8	127 -136	bottom	180 deg	30 - 39 dBm
9	137 -160	top	*	30 - 52 dBm

* Sequence 9 is a Mode A interrogation sequence conducted on a different beam every second.

For Mode S transponders: The system detects the squitters which are transmitted and transmits interrogation out the antenna (and angle) the squitter was received from.

7b and 9b. Vertical and Horizontal Scan: The maximum gain is at an elevation angle of 20 degrees. The lowest elevation 3 dB point is at approximately -5 degrees and the upper elevation 3 dB point is at +40 degrees.

8a. Main Beam Gain: 3.6 dB transmit, 0 dB receive.

-- Continued on Page 10 --

ANTENNA EQUIPMENT CONTINUATION PAGE

— Continued from Page 9 —

8b. 1st Major Side Lobe Gain: The gain is -11 dB relative to the main beam gain and located +/- 120 dB degrees from the main beam.

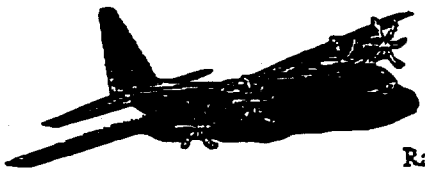
9a. Horizontal Beamwidth: The phase control software used by the TCAS processor results in a beamwidth of 85 degrees typical.

E-TCAS Surveillance Operation

Mode A Transponder Equipped

Mode C All Call (Mode A Code) Interrogation - 1030 MHz

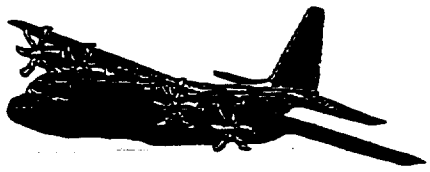
Range and Bearing - Mode A Code No Altitude) - 1090 MHz



E-TCAS + Mode S Transponder

Mode C "All Call" Interrogation - 1030 MHz

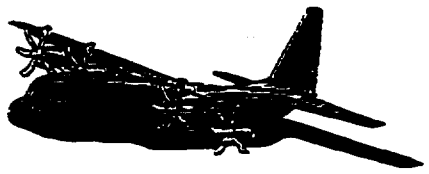
Range, Bearing and Altitude - Mode C Reply - 1090 MHz



Mode C Transponder Equipped

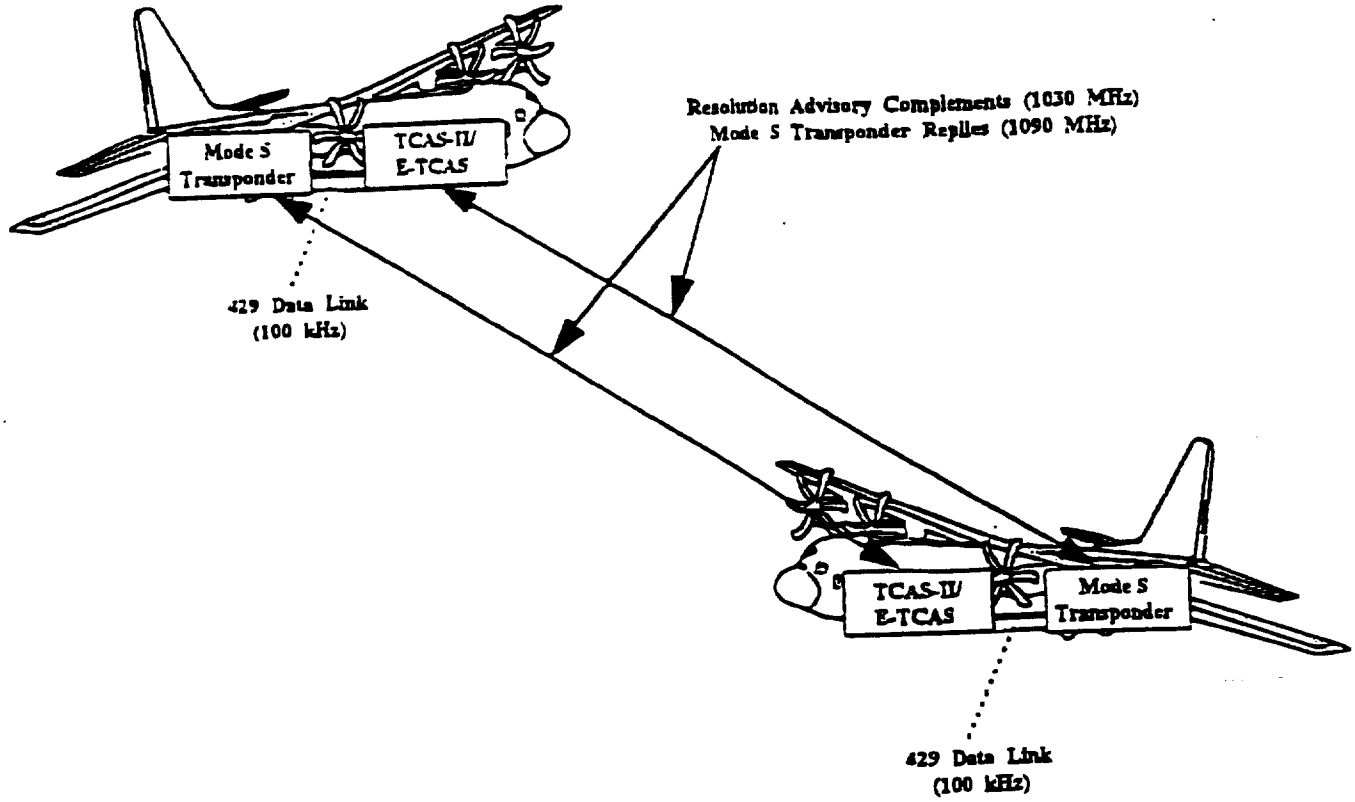
Mode S Interrogation with Unique Address - 1030 MHz

Range, Bearing, Altitude - Unique Mode S Reply - 1090 MHz



Mode S Transponder Equipped

E-TCAS Coordination Operation



Coordination Interrogations are transmitted once per second by each aircraft for the duration of the Resolution Advisory (RA). The information is a "complement" i.e. if one aircraft selects a climb RA, it transmits to the other aircraft a message restricting it to find a solution in the downward direction. The other aircraft selects the degree of resolution based on the geometry of the encounter.

If two aircraft select the same sense advisory, the aircraft with the highest Mode S address will detect the inconsistency and it will reverse the sense of its advisory. Usually, the highest address aircraft would have delayed display of the first advisory before the reversal (up to 3 seconds) to avoid issuing resolution reversals to the flight crew.

NTIA GENERAL INFORMATION

1. APPLICATION TITLE (U) E-TCAS, Enhanced Traffic Alert and Collision Avoidance System

2. SYSTEM NOMENCLATURE (U) Integrated C-130 IFF and Traffic Alert and Collision Avoidance System (TCAS-II)

3. STAGE OF ALLOCATION (U) [ ] a. STAGE 1 CONCEPTUAL [ ] b. STAGE 2 EXPERIMENTAL [ ] c. STAGE 3 DEVELOPMENTAL [X] d. STAGE 4 OPERATIONAL

4. FREQUENCY REQUIREMENTS (U)
a. FREQUENCY(IES)
1.030 GHz 1.090 GHz

b. EMISSION DESIGNATOR(S) (See Remarks)

5. PURPOSE OF SYSTEM, OPERATIONAL AND SYSTEM CONCEPTS (WARTIME USE) [X] a. YES [ ] b. NO

(U) Surveillance and tracking of other aircraft equipped with Mode A, C, or S transponders. The system is an enhanced TCAS-II designed to coordinate proximity flying such as in re-fueling scenarios. The standard TCAS-II capability and compatibility is retained

6. INFORMATION TRANSFER REQUIREMENTS

(U) Mode S transponder ID, own aircraft altitude, max airspeed, coordination maneuvers.

7. ESTIMATED INITIAL COST OF THE SYSTEM (U) $100,000 per system

8. TARGET DATE FOR

a. APPLICATION APPROVAL (U) 1 Jun 95 | b. SYSTEM ACTIVATION (U) 1 Jun 95 | c. SYSTEM TERMINATION (U) 2015

9. SYSTEM RELATIONSHIP AND ESSENTIALITY

(U) Surveillance and tracking of other aircraft equipped with Mode S, Mode C and Mode A transponders.

10. REPLACEMENT INFORMATION (U) NA

11. RELATED ANALYSIS AND/OR TEST DATA
(U) AS Doc 004-50043 Nov 89; RTCA/DO-185 MOPS Sept 83.

12. NUMBER OF MOBILE UNITS (U) 200

13. GEOGRAPHICAL AREA FOR

a. STAGE 2 (U) NA

b. STAGE 3 (U) NA

c. STAGE 4 (U) US&P and Specific Overseas Locations

14. LINE DIAGRAM (U) See Page(s) # (See Remarks)

15. SPACE SYSTEMS (U) See Page(s) # NA

16. TYPE OF SERVICE(S) FOR STAGE 4

(U) Aeronautical Radionavigation

17. STATION CLASS(ES) FOR STAGE 4

(U) RLB

18. REMARKS (U)

4b. Transmit Emission Designators: 10M0K1D and 10M0V1D on 1030 MHz;
Receive Emission Designators: 14M0V1D and 14M0P1D on 1090 MHz.

14. Line Diagram: Page 11 contains surveillance operation;
Page 12 contains coordination operation.

DOWNGRADING INSTRUCTIONS
Classified By: NA
Declassify On:

CLASSIFICATION UNCLASSIFIED

J/F 12/07092

EXHIBIT II
FCC FORM 442 - Page 3, Item 5(c)

Area of Operation:

Area A) Within a triangular area from Rome, GA (34-21.0 N, 085-09.5 W) to Nashville, TN (36-07.5 N, 086-40.7 W) to Memphis, TN (35-02.7 N, 089-58.7 W).

Area B) Off SE Georgia coast, warning areas W-132A/B, W-134, W-157A/B and W-158C.

Area C) Off South Florida coast, warning areas W-151A/B/C/D, W-155A/B, W-453 and W-470A/B/C.

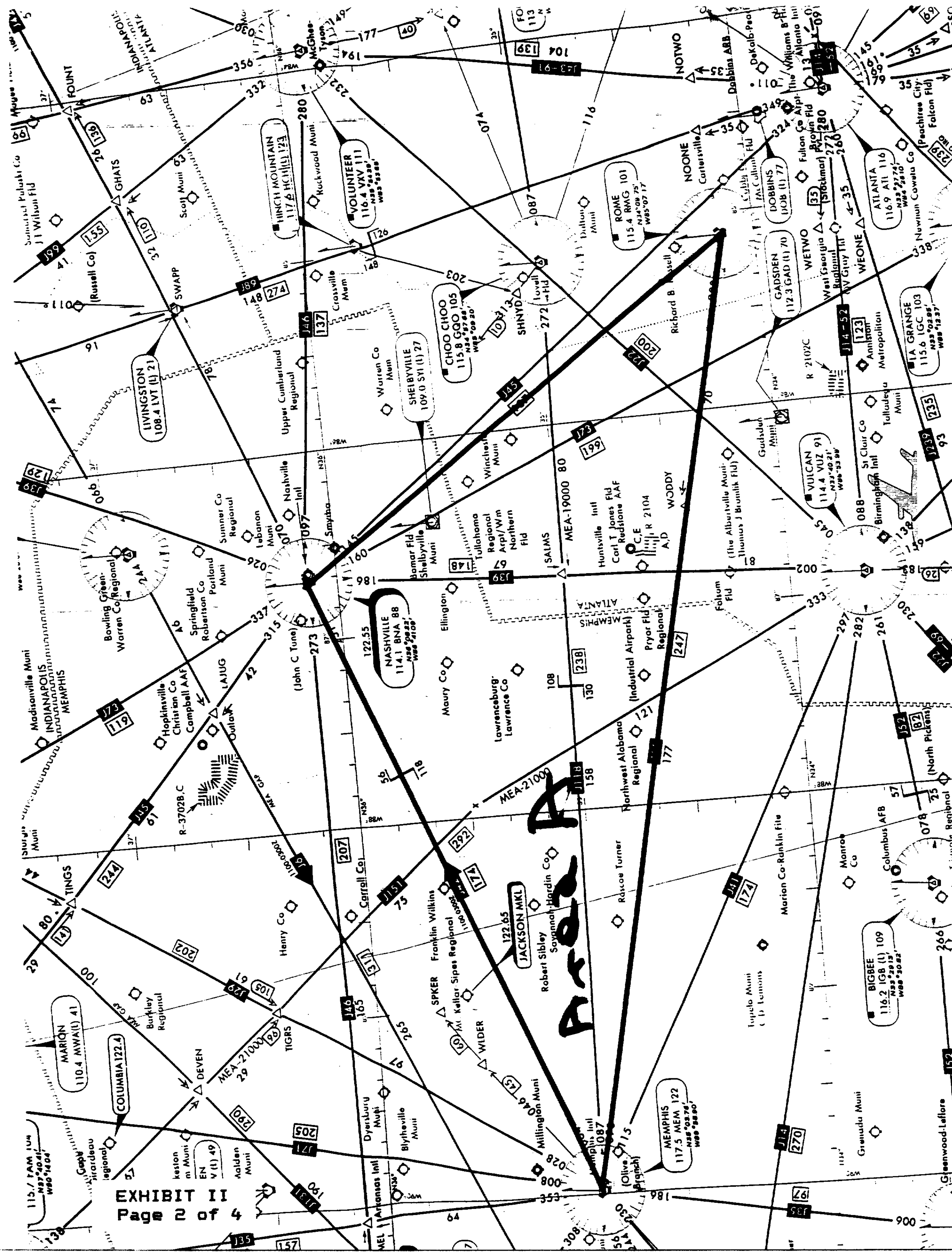


EXHIBIT II
Page 2 of 4

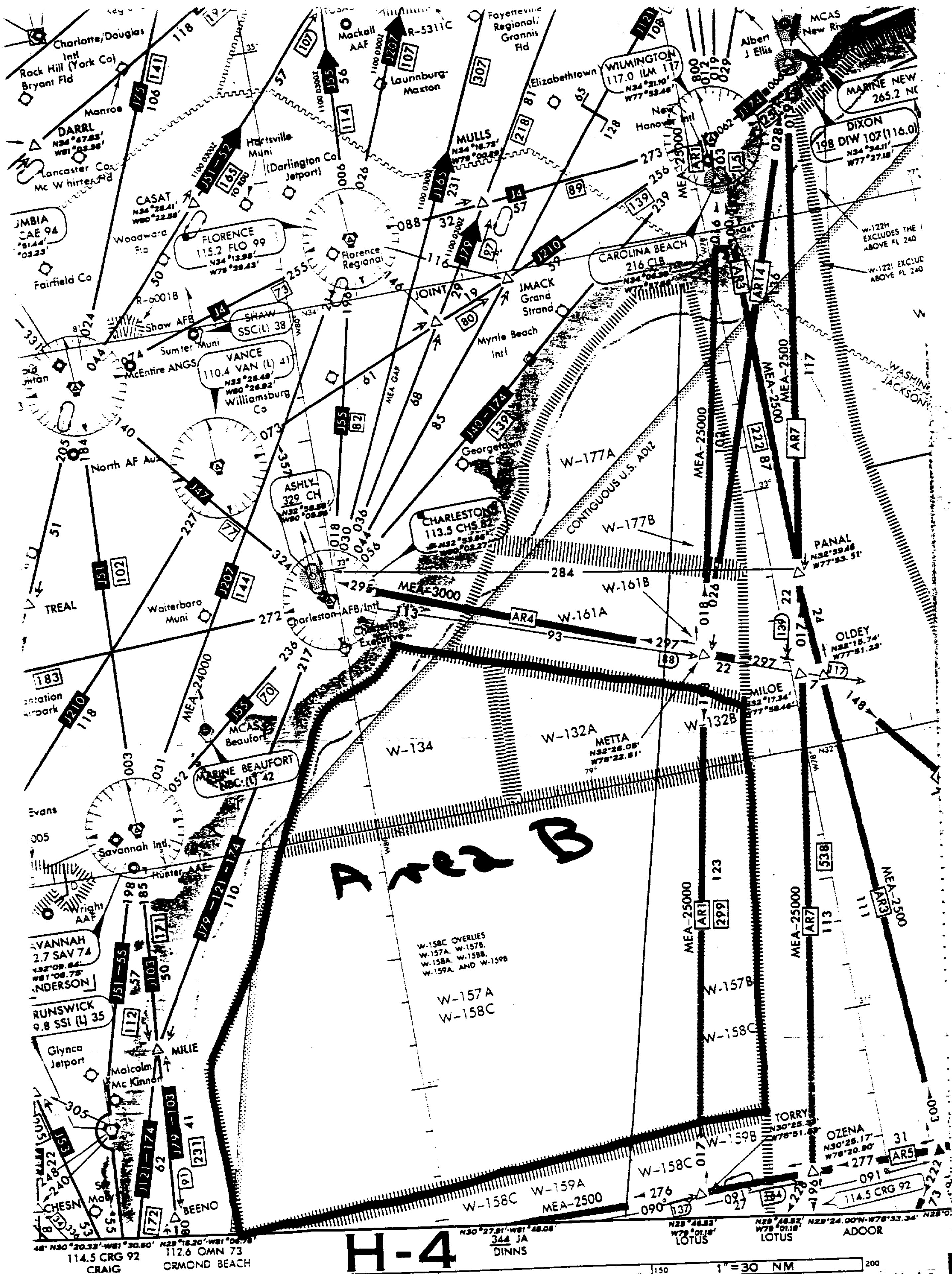


EXHIBIT II
Page 3 of 4

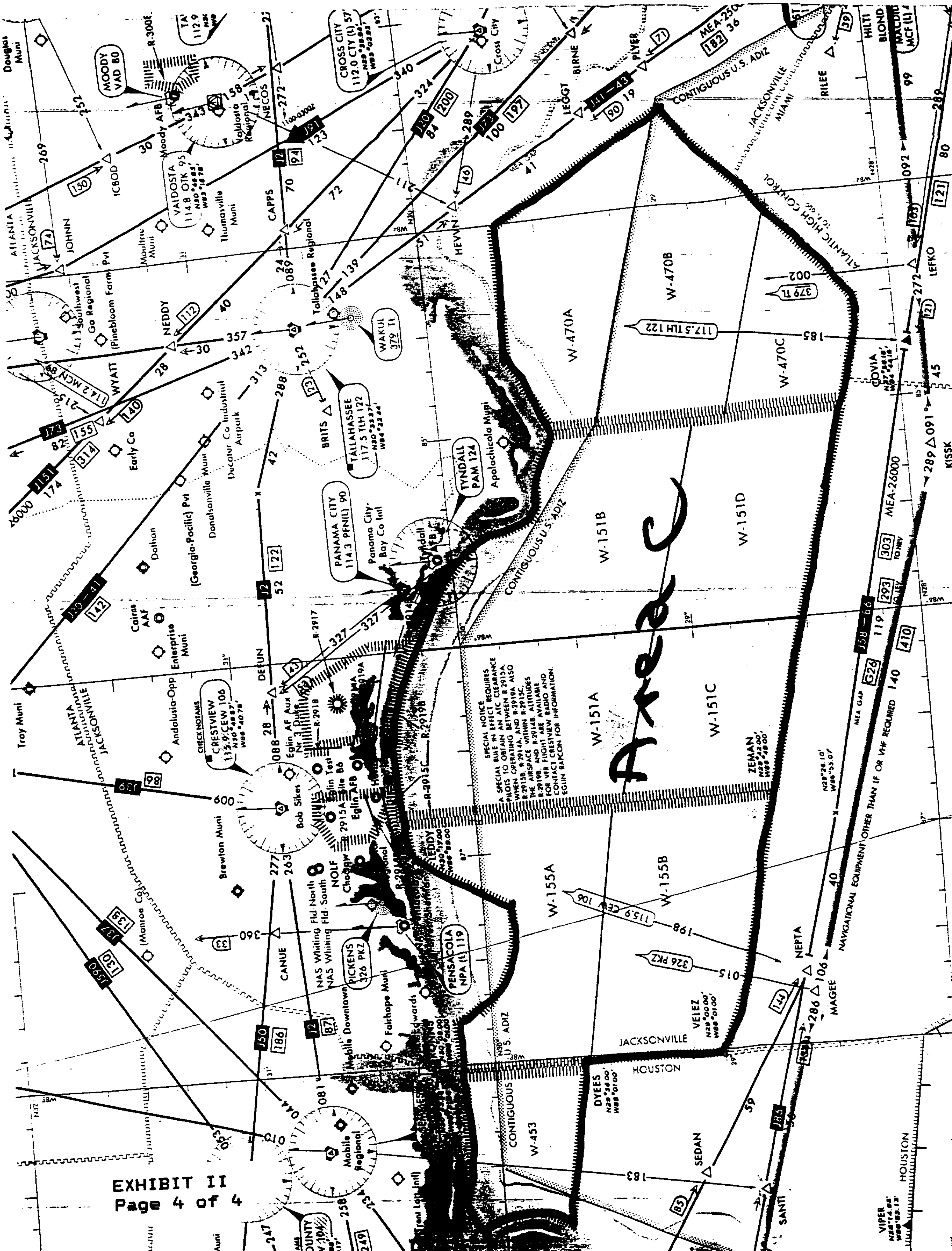


EXHIBIT II
Page 4 of 4

EXHIBIT III
FCC FORM 442 - Page 3, Item 8

Contract Number/Foreign Government:

A) A7a/2000(GLX-1042) -- U.K., RAF

B) GLX-1133 -- Australia, RAAF

EXHIBIT IV
FCC FORM 442 – Page 3, Item 10.

Program Description:

1) Testing Requirements.

2) Test Equipment.

3) Affected Aircraft (Ship Serial Numbers).

E-TCAS TESTING REQUIREMENTS

The following is a brief description of the testing requirements for E-TCAS. Note that E-TCAS operates in two modes: NORMAL and RENDEZVOUS. The E-TCAS NORMAL Mode of operation functions the same as commercial TCAS II systems.

1. E-TCAS NORMAL Mode. The first test of the E-TCAS NORMAL Mode utilizes the TCAS 201 Ramp Test Set. During this test, the E-TCAS transmitter transmits a normal TCAS II RF signal on 1030 MHz. It is received by the TCAS 201 Ramp Test Set. The TCAS 201 Ramp Test Set then responds on 1090 MHz. Both systems are ground based. This is the same test conducted by commercial airlines. This test will require one assignment for the ground based E-TCAS transmitter and one assignment for the ground based TCAS 201 Ramp Test Set. Only two TCAS 201 Ramp Test Sets are available at the Lockheed Marietta facility and no more than two tests will be conducted concurrently at any time. The frequencies to support this testing requirement are being proposed under AF 975706 and AF 975707.

a)	1030 MHz	TX	E-TCAS Transmitter
		RX	TCAS 201 Ramp Test Set
b)	1090 MHz	TX	TCAS 201 Ramp Test Set
		RX	E-TCAS Receiver

2. E-TCAS NORMAL Mode. The second test of the E-TCAS NORMAL Mode utilizes a target-of-opportunity. During this test, the E-TCAS transmitter transmits a normal TCAS II RF signal on 1030 MHz. It will be received by any aircraft in the vicinity of the E-TCAS transmitter. When a target-of-opportunity receives the 1030 MHz signal it will transmit a response on 1090 MHz. The E-TCAS transmitter is ground based and the target-of-opportunity is airborne. This test will require one assignment for the ground based E-TCAS transmitter. An assignment on 1090 MHz is not required since it is a normal airborne response. No unattended operation of this equipment will be permitted. Operation for test purposes will be limited to a maximum of 15 minutes during any four hour time interval. The frequency to support this testing is being proposed under AF 975708.

a)	1030 MHz	TX	E-TCAS Transmitter
		RX	Target-of-opportunity

3. E-TCAS NORMAL Mode. The third test of the E-TCAS NORMAL Mode utilizes a target-of-opportunity. During this test, the E-TCAS transmitter transmits a normal TCAS II RF signal on 1030 MHz. It will be received by any aircraft in the vicinity of the E-TCAS transmitter. Once the 1030 MHz signal is received a target-of-opportunity will transmit back on 1090 MHz. In this test, both the E-TCAS transmitter and the target-of-opportunity will be airborne. This test will require one assignment for the airborne E-TCAS transmitter. An assignment on 1090 MHz is not required since it is a normal airborne response. The frequency to support this testing is being proposed under AF 975709.

a) 1030 MHz TX E-TCAS Transmitter
RX Target-of-opportunity

4. E-TCAS RENDEZVOUS Mode. The first test of the E-TCAS RENDEZVOUS Mode utilizes a target-of-opportunity. During this test, the E-TCAS transmitter transmits an RF signal on 1030 MHz. It will be received by any aircraft in the vicinity of the E-TCAS transmitter. Once a target-of-opportunity is identified, the E-TCAS transmitter transmits a Mode A interrogation. The target-of-opportunity responds on 1090 MHz with its ID. Once E-TCAS receives the ID, the test is concluded. The E-TCAS station is ground based while the target-of-opportunity is airborne. No unattended operation of this equipment will be permitted. Operation for test purposes will be strictly limited to the minimum interval required to verify system performance. This test will require one assignment for the ground based E-TCAS transmitter. An assignment for the response by the target-of-opportunity is not required since it is the normal 1090 MHz Mode A airborne response. The frequency to support this testing is being proposed under AF 975710.

a) 1030 MHz TX E-TCAS Transmitter
RX Target-of-opportunity (any transponder)

5. E-TCAS RENDEZVOUS Mode. The second test of the E-TCAS RENDEZVOUS Mode utilizes a target-of-opportunity. During this test, the E-TCAS transmitter transmits an RF signal on 1030 MHz. It will be received by any aircraft in the vicinity of the E-TCAS transmitter. Once a target-of-opportunity is identified, the E-TCAS transmitter transmits a Mode A interrogation. The target-of-opportunity responds on 1090 MHz with its ID. Once E-TCAS receives the ID, the test is concluded. In this test both the E-TCAS station and the target-of-opportunity will be airborne. The test aircraft will strictly observe boundaries of the approved airspace in which these tests are permitted. No testing of the

RENDEZVOUS Mode will be permitted except to verify system performance. All tests will be conducted under the operational control and supervision of Lockheed flight crews. This test will require one assignment for the airborne E-TCAS transmitter. An assignment for the response by the target aircraft is not required since it is the normal 1090 MHz Mode A airborne response. The frequency to support this testing is being proposed under AF 975711.

a) 1030 MHz TX E-TCAS Transmitter
RX Target-of-opportunity (any transponder)

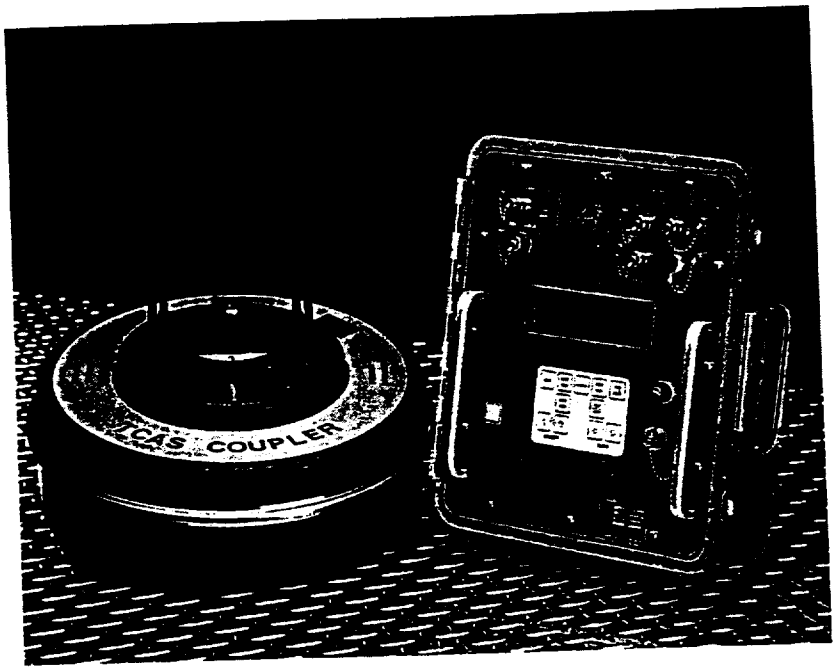
6. AN/APX-100(V)X Mode S Transponder. The first test of the AN/APX-100(V)X Mode S Transponder utilizes the ATC 601 Ramp Test Set. During this test, the ATC 601 Mode S Transponder Ramp Test Set generates a 1030 MHz interrogation. The AN/APX-100(V)X Mode S Transponder responds on 1090 MHz. Both systems are ground based. An assignment will be needed for both the ATC 601 Ramp Test Set and the AN/APX-100(V)X Mode S Transponder. Only two ATC 601 Ramp Test Sets are available at the Lockheed Marietta facility and no more than two tests will be conducted concurrently at any time. The frequencies to support this testing requirement are being proposed under AF 975712 and AF 975713.

a) 1030 MHz TX ATC 601 Mode S Transponder Ramp Test Set
RX AN/APX-100(V)X Mode S Transponder

b) 1090 MHz TX AN/APX-100(V)X Mode S Transponder
RX ATC 601 Mode S Transponder Ramp Test Set

7. AN/APX-100(V)X Mode S Transponder. The second test of the AN/APX-100(V)X Mode S Transponder will utilize any ground ATC interrogation facility. This test is to verify normal operation of the AN/APX-100(V)X Mode S Transponder while airborne. Since this is a normal response to a ground interrogation, no assignments are required.

TCAS-201
TCAS-201 Coupler



TCAS-201

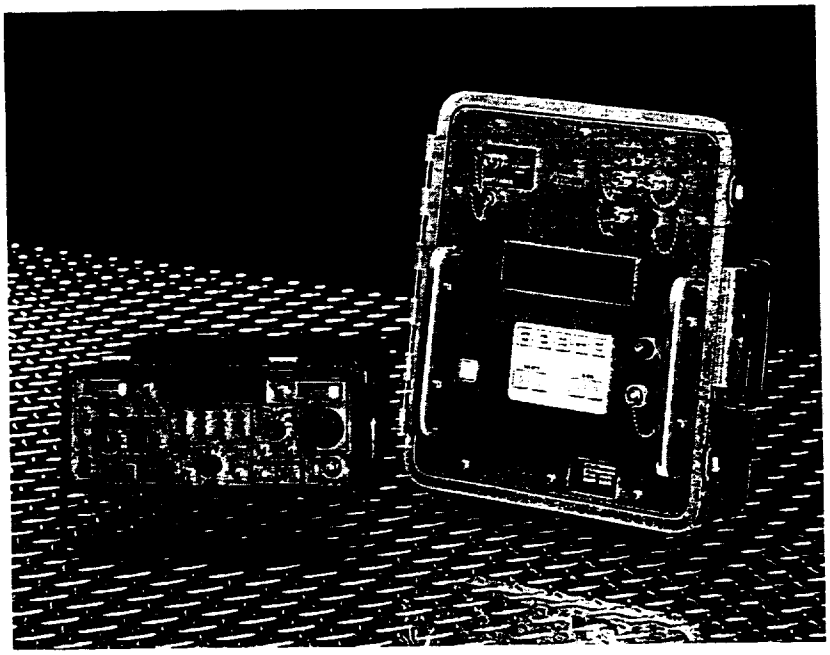
This TCAS reply generator and monitor offers 10 user programmable threat scenarios which permit dynamic or static simulation of intruder aircraft. It verifies bearing accuracy, TCAS traffic and resolution advisories, power and frequency, whisper/shout steps, and broadcast and surveillance interrogations.

- Generates ATCRBS and Mode S targets
- In monitor modes, displays TCAS discrete data
- Operating range of 0 to 500 feet from the aircraft under test
- Built-in self-test
- 1.5-hour battery operation
- FCC Type Acceptance approved
- CE compliant

TCAS-201 Coupler (Option)

By coupling directly to the TCAS directional antenna, the coupler allows the use of the TCAS-201 inside a maintenance facility. This reduces the effects of multipath and clutter of operational airborne traffic during testing of TCAS equipped aircraft.

ATC-600A
ATC-601



ATC-600A

The ATC-600A portable Transponder/DME ramp is designed to provide accurate testing and maintenance of ATC transponders. The test set will perform, with radiated signals, all ATCRBS tests required by the revised FAA Regulations (FAR 91.413 and 43 Appendix F as amended December 19, 1973).

- Direct reading XPDR code and altitude, binary pulse information for code and altitude displayed
- Measures transponder frequency and checks for correct DME channel
- Measures transponder receiver sensitivity and SLS tests
- Precision DME range and velocity signals in both X and Y channels
- Checks position of XPDR second framing pulse relative to F_1
- Front panel connector provided to verify output of altitude encoders
- CE compliant

ATC-601

Modes S/A/C transponder ramp test set performs all tests required by the revised FAR 91.172 and Part 43 Appendix F. The Auto Test function allows the operator to verify and certify the operation and installation of Mode S/A/C transponders with little or no intervention once the test has been commanded.

- Auto Test performs 20 discrete tests
- Twenty individual test can be run continuously for system malfunction analysis
- Antenna boot for diversity measurements
- Battery backup memory for storing last test results
- Built-in self-test
- Two-hour battery operation
- FCC Type Acceptance approved
- CE compliant

IFR Systems, Inc.
RF Division

10200 West York Street, Wichita, Kansas 67215-8999
316-522-4981 • 1-800-835-2352 • FAX 316-522-1360
http://www.ifrsys.com

GAR-A-1808
ISSUE NO. 227
OCTOBER 3, 1997

HERCULES AIRFRAME MASTER OPERATING SCHEDULE

Exhibit IV
Page 8 of 10

GENERAL NOTES

S - STORAGE COMPLETE

A - WEIGH AIRCRAFT

L - LMASC FURNISHED FUEL, OIL & LUBE

P - CUSTOMER PECULIAR MOD

- USAF SURVEILLANCE REQUIRED

SHIP SER	START STRUCT	CRG LND	QTR FUSE	TWD WING	MID FUSE	AFT BODY	QTR WING	FINAL MATE	P/U LND	PAINT & ASSY	ELEC TRIM	MOD ST	EC/O	FUEL	ENG RUN	CO SHK	CO FLT	CUST INSP (PAE)	CUST FLT & 489 & UP	ACCEP & 417 & UP	CUSTOMER (VERSION) & TAIL NUMBER		SHIP SER
5318											06/16	06/02	06/30	07/07	07/14	07/21	07/29		08/04	08/12	A	97-1317 TAIWAN C-130H (61F)	#	5318
5354											06/30	06/16	07/15	07/21	07/28	08/04	08/12		08/18	08/26	A	97-1318 TAIWAN C-130H (61F)	#	5354
5355	OUT OF SEQ Thru										09/30	09/16	10/14	10/20	10/27	11/03	11/11	1997	11/17	11/25	A	97-1319 TAIWAN C-130H (61F)	#	5355
5358	6444										1995 10/14	09/30	10/28	11/03	11/10	11/17	11/25		12/03	12/11	A	97-1320 TAIWAN C-130H (62F)	#	5358
5408	09/28/94										09/20	08/29	11/17	04/05	L 07/25	10/30	08/05		11/17	01/29	02/28	A	RAF C-130J-30 (49F)	#	5408
5413	11/16/94										10/18 P	09/27		04/29	05/23		08/06	10/07	10/15	02/20	07/02	09/07	A	FY94 ACC C-130J (48F)	#	5413
5414	11/29/94													05/17	05/28	05/29	L 12/01			03/30	03/31	06/19	09/08	A	RAF C-130J-30 (49F)	#	5414
5415														05/30	06/07	06/10	1997			02/18	05/13	1998	06/15	A	FY94 ACC C-130J (48F)	#	5415
5416																							RAF C-130J-30 (49F)	#	5416
5433																							PETERSON 96-7324 FY96 AFRES (57F)	#	5433
5434																							PETERSON 96-7326 FY96 AFRES (57F)	#	5434
5435																							JAPAN C-130H (60F)	#	5435
5440																							RAAF C-130J-30 (03J)		5440
5441																							RAAF C-130J-30 (03J)		5441
5442																							RAAF C-130J-30 (03J)		5442
5443																							RAF C-130J-30 (01J)	#	5443
5444																							RAF C-130J-30 (01J)	#	5444
5445																							RAF C-130J-30 (01J)	#	5445
5446																							RAF C-130J-30 (01J)	#	5446
5447																							RAAF C-130J-30 (03J)		5447
5448																							RAAF C-130J-30 (03J)		5448
5449																							RAAF C-130J-30 (03J)		5449
5450																							RAAF C-130J-30 (03J)		5450
5451																							FY96 AFRES WC-130J (04J)	#	5451
5452																							FY96 AFRES WC-130J (04J)	#	5452
5453																							FY96 AFRES WC-130J (04J)	#	5453

GAR-A-1808
ISSUE NO. 227
OCTOBER 3, 1997

HERCULES AIRFRAME MASTER OPERATING SCHEDULE

SHIP SET	START STRUCT	CTR LND	CTR WING	FWD FUSE	MID /AFT FUSE	BODY MATE	OTR WING MATE	OTR LND M/U	FINAL LND	PAINT & ASSY	TRIM	MOD	ELEC C/O	FUEL	ENG RUN	CO SHK	CO FLT	CO & CUST INSP (PAE)	PAE & CUST FLT (6480) & UP	ACCP (647) & UP	CUSTOMER (VERSION) & TAIL NUMBER	SER
5454	08/06	01/03	01/21	01/29	03/28	04/28	04/28	05/22	09/03	10/31	P 10/15		05/01	05/07	05/14	05/21	06/01			06/15 A	FY96 ACC C-130J (02J)	# 5454
										RAILS MOD ST 09/25			POST PT MOD CP 12/01/97							DEL PREP		
5455	08/20	01/23	02/10	02/18	04/17	05/15	05/15	06/11	09/24	11/14	P 10/10		06/02	06/08	06/15	06/22	06/30			07/15	FY96 ACC C-130J (02J)	# 5455
									ALUM/TRIM			K-MODS						FERRY	PT/MOD @ MAR			
5456	09/24	02/12	02/28	03/10	05/07	06/04	06/04	06/30	10/13	10/27	P 1997		11/17	11/21	L 12/02	12/09	12/17	06/26	09/07	A	RAF C-130J-30 (05J)	# 5456
									ALUM/TRIM									FERRY	PT/MOD @ MAR			
5457	10/14	03/04	03/20	03/28	05/28	06/23	06/23	07/18	10/30	11/13			12/01	12/04	L 12/10	12/17		01/06	07/13	09/08	RAF C-130J-30 (05J)	# 5457
									ALUM/TRIM									FERRY	PT/MOD @ MAR			
5458	11/01	03/24	04/09	04/17	06/17	07/11	07/11	08/06	11/18	12/04			01/06	01/12	L 01/19	01/26	02/03	07/27	09/22		RAF C-130J-30 (05J)	# 5458
									ALUM/TRIM									FERRY	PT/MOD @ MAR			
5459	11/21	04/11	04/29	05/07	07/08	07/30	07/30	08/25	12/09	12/23			01/23	01/29	L 02/05	02/12	02/20	08/10	10/06		RAF C-130J-30 (05J)	# 5459
									ALUM/TRIM									FERRY	PT/MOD @ MAR			
5460	12/13	05/01	05/19	05/28	07/28	08/18	08/18	09/23	01/07	01/21			02/11	02/17	L 02/24	03/03	03/11	08/24	10/20	A	RAF C-130J-30 (05J)	# 5460
									ALUM/TRIM									FERRY	PT/MOD @ MAR			
5461	01	21	06/09	06/17	08/15	09/16	09/16	10/15	01/26	02/09			03/02	03/06	L 03/13	03/20	03/30	09/08	11/04		RAF C-130J-30 (05J)	# 5461
									ALUM/TRIM									FERRY	PT/MOD @ MAR			
5462	01	11	06/27	07/08	09/15	10/10	10/10	11/03	02/12	02/26			03/19	03/25	L 04/01	04/08	04/16	09/22	11/18		RAF C-130J-30 (05J)	# 5462
									ALUM/TRIM									FERRY	PT/MOD @ MAR			
5463	02	01	07/18	07/28	10/09	11/03	11/03	11/20	03/03	03/17	1998		04/07	04/13	L 04/20	04/27	05/05	10/06	12/02		RAAF C-130J-30 (03J)	5464
																		DELIVERY	PAE&E			
5464	03	22	08/07	08/15	10/31	11/21	11/21	12/11	03/20	04/10			05/01	05/07	L 05/14	05/21	06/01		08/26	09/08 A	RAAF C-130J-30 (03J)	5465
																		DELIVERY	PAE&E			
5465	04	11	08/27	09/15	11/20	12/11	12/11	01/08	04/07	04/28			05/19	05/26	L 06/02	06/09	06/17		09/09	09/22	RAAF C-130J-30 (03J)	5466
																		DELIVERY	PAE&E			
5466	04	09	09/25	10/09	12/11	01/08	01/08	01/26	04/23	05/14			06/05	06/11	L 06/18	06/25	07/06		09/23	10/06	RAAF C-130J-30 (03J)	5467
																		DELIVERY	PAE&E			
5467	05/09	10/03	10/21	10/31	01/08	01/26	01/26	02/11	05/11	06/02			06/23	06/29	L 07/07	07/14	07/22		10/18	10/31	RAAF C-130J-30 (03J)	5468
																		DELIVERY	PAE&E			
5468	05/30	10/27	11/12	11/20	01/26	02/11	02/11	02/27	05/28	06/18		WC MOD CMP 9/16	07/09	07/15	L 07/22	07/29	08/06		11/17	11/30		
																				DEL PREP		
5469	06/19	11/14	12/04	12/11	02/11	02/27	02/27	03/17	06/15	07/21	P 06/29	WC MOD CMP 10/14	10/07	10/13	10/20	10/27	11/04		11/10	11/18 A	FY97 AFRES WC-130J (07J)	# 5469
																				DEL PREP		
5470	07/10	12/08	12/23	01/08	02/27	03/17	03/17	04/02	06/29	08/04	P 07/14		11/04	11/10	11/17	11/24	12/04		12/10	12/18	FY97 AFRES WC-130J (07J)	# 5470
												WC MOD CMP 11/4								DEL PREP		
5471	07/30	01/07	01/20	01/26	03/17	04/02	04/02	04/02	07/14	08/18	P 07/28		11/25	12/03	12/10	12/17	01/05	1999	01/11	01/19	FY97 AFRES WC-130J (07J)	# 5471
												WC MOD CMP 1/26								DEL PREP		
5472	08/19	01/26	02/05	02/11	04/02	04/20	04/20	04/20	07/28	09/01	P 08/11		12/18	01/04	01/11	01/18	01/26		02/01	02/09	FY97 AFRES WC-130J (07J)	# 5472
5473	09/09	02/11	02/23	02/27	04/20	05/06	05/06	05/06	08/10	09/17	P 08/26	RAILS MOD ST 09/11	09/30	10/06	10/13	10/20	10/28		11/03	11/11 A	FY97 ANG C-130J (08J)	# 5473
5474	09/29	02/27	03/11	03/17	05/06	05/22	05/22	05/22	08/21	09/30	P 09/09	RAILS MOD ST 09/24	10/12	10/16	10/23	10/30	11/09		11/13	11/23	FY97 ANG C-130J (08J)	# 5474
5475	10/17	03/17	03/27	04/02	05/22	06/10	06/10	06/10	09/03	10/13	P 09/22	RAILS MOD ST 10/04	10/23	10/28	11/04	11/11	11/19		11/25	12/07 A	FY97 ANG C-130J (08J)	# 5475
5476	11/06	04/02	04/14	04/20	06/10	06/26	06/26	06/26	09/17	10/26	P 10/05	RAILS MOD ST 09/19	11/05	11/10	11/16	11/23	12/03		12/09	12/17 A	FY97 ANG C-130J (08J)	# 5476
5477	11/26	04/20	04/30	05/06	06/26	07/15	07/15	07/15	09/30	10/21			11/02	11/05	11/10	11/17	11/25		12/03	12/11	FY97 ANG EC-130J (09J)	# 5477
5478	12/18	05/06	05/18	05/22	07/15	07/30	07/30	07/30	10/13	10/27	1998		11/06	11/11	L 11/16	11/23	12/03	12/23	01/29	A	RAF C-130J (06J)	# 5478
									ALUM/TRIM									FERRY	PT/MOD @ MAR			
5479	01/19	05/22	06/04	06/10	07/30	08/14	08/14	08/14	10/26	11/09			11/19	11/24	L 12/01	12/08	12/16	04/02	05/14		RAF C-130J (06J)	# 5479
									ALUM/TRIM									FERRY	PT/MOD @ MAR			
5480	02/06	06/10	06/22	06/26	08/14	08/31	08/31	08/31	11/06	11/20			12/04	12/09	L 12/14	12/21	01/07	05/04	06/16		RAF C-130J (06J)	# 5480

Exhibit IV
Page 9 of 10

GAR-A-1808
ISSUE NO. 227
OCTOBER 3, 1997

HERCULES AIRFRAME MASTER OPERATING SCHEDULE

SHIP SER	STRUCT	FWD FUSE	CTR WING	AFT FUSE	MID BODY MATE	AFT BODY M/U	OTR WING	FINAL ASSY	PAINT & ALUM/TRIM	ELEC (MOD)	C/O	FUEL	ENG RUN	CO SHK	CO FLT	CUST INSP (PAE)	CUST FLT ACCP & UP	CUST ACCP & UP	CUSTOMER (VERSION) & TAIL NUMBER		SHIP SER
5481	02/26	06/26	07/09	07/15	08/31	09/16	09/16	09/16	11/19	12/07	1998	12/17	12/22	L	01/05	01/12	01/20	06/03	07/16	RAF C-130J (06J)	#	5481
5482	03/18	07/15	07/24	07/30	09/16	10/01	10/01	10/01	12/04	12/18	P	01/08	01/13	L	01/18	01/25	02/02	07/06	08/17	A RAF C-130J (06J)	#	5482
5483	04/07	07/30	08/10	08/14	10/01	10/16	10/16	10/16	12/21	01/13	P	01/25	01/28	L	02/02	02/09	02/17	08/04	09/16	A RAF C-130J (06J)	#	5483
5484	04/27	08/14	08/25	08/31	10/16	11/02	11/02	11/02	01/14	01/28		02/09	02/12	L	02/17	02/24	03/04	09/02	10/15	A RAF C-130J (06J)	#	5484
5485	05/14	08/31	09/10	09/16	11/02	11/17	11/17	11/17	01/29	02/12		02/24	03/01	L	03/04	03/11	03/19	10/01	11/12	RAF C-130J (06J)	#	5485
5486	06/02	09/16	09/25	10/01	11/17	12/04	12/04	12/04	02/15	04/28	P	04/12	05/10		05/13	05/18	05/25	06/03	06/09	06/17	FY98 AFRES WC-130J (12J)	#	5486
5487	06/18	10/01	10/12	10/16	12/04	12/21	12/21	12/21	03/02	05/27	P	05/11	06/09		06/14	06/17	06/24	07/02	07/09	07/19	FY98 AFRES WC-130J (12J)	#	5487
5488	07/	6	10/27	11/02	12/21	01/14	01/14	01/14	03/17	04/06		04/16	04/26		04/29	05/11		08/13	08/27	09/13	A FY97 USMC KC-130J (11J)	#	5488
5489	07/	2	11/11	11/17	01/14	01/29	01/29	01/29	04/01	04/21	1999	05/03	05/11		05/14	05/26			09/27	09/29	A FY97 USMC KC-130J (11J)	#	5489
5490	08/	7	11/30	12/04	01/29	02/15	02/15	02/15	04/16	05/18	P	04/30	05/28		06/03	06/08	06/17		06/24	06/28	A (FY98 ANG C-130J)	#	5490
5491	08/	4	12/15	12/21	02/15	03/02	03/02	03/02	05/03	07/16	P	06/29	07/28		08/02	L	08/05	08/16	08/23	08/25	A RNoAF C-130J-30		5491
5492	09/	1	01/08	01/14	03/02	03/17	03/17	03/17	05/18	08/02	P	07/15	08/12		08/17	L	08/20	08/31	09/08	09/10	A RNoAF C-130J-30		5492
5493	09/	4	01/25	01/29	03/17	04/01	04/01	04/01	06/02	08/16	P	07/29	08/26		08/31	L	09/03	09/15	09/22	09/24	A RNoAF C-130J-30		5493
5494	10/07	01/29	02/09	02/15	04/01	04/16	04/16	04/16	06/16	08/30	P	08/12	09/10		09/15	L	09/20	09/29	10/06	10/08	A RNoAF C-130J-30		5494
5495	10/22	02/15	02/24	03/02	04/16	05/03	05/03	05/03	06/30	09/14	P	08/26	09/24		09/29	L	10/04	10/13	10/20	10/22	A RNoAF C-130J-30		5495
5496	11/06	03/02	03/11	03/17	05/03	05/18	05/18	05/18	07/15	09/28	P	09/10	10/08		10/13	L	10/18	10/27	11/03	11/05	A RNoAF C-130J-30		5496
5497	11/23	03/17	03/26	04/01	05/18	06/02	06/02	06/02	07/29	08/18		08/30	09/08		09/13	09/23			09/30	10/04	A FY97 USMC KC-130J (11J)	#	5497
5498	12/10	04/01	04/12	04/16	06/02	06/16	06/16	06/16	08/12	09/14		08/26	09/24		09/29	10/04	10/13		10/20	10/22	A (FY98 ANG C-130J)	#	5498
5499	01/05	04/16	04/27	05/03	06/16	06/30	06/30	06/30	08/26	09/14		09/24	09/29		10/04	10/13			10/20	10/22	A (FY98 ANG EC-130J)	#	5499
5500	01/20	04/30	05/11	05/18	06/30	07/15	07/15	07/15	09/10	09/28		10/08	10/13	L	10/18	10/27			11/03	11/05	A (IAF)		5500
5501	02/04	05/14	05/25	06/02	07/15	07/29	07/29	07/29	09/24	10/12	1999	10/22	10/27	L	11/01	11/10			11/17	11/19	A (IAF)		5501
5502	02/19	05/28	06/09	06/16	07/29	08/12	08/12	08/12	10/08	10/26		11/05	11/10	L	11/15	11/24			12/03	12/07	A (IAF)		5502
5503	03/05	06/14	06/23	06/30	08/12	08/26	08/26	08/26	10/22	11/05		11/17	11/22	L	11/29	12/08	12/16		01/04	02/15	02/29	A RAF C-130J (06J)	#	5503
5504	03/19	06/28	07/08	07/15	08/26	09/10	09/10	09/10	11/05	11/19		12/03	12/08	L	12/13	12/22	01/07	02/18	03/31	04/14	A RAF C-130J (06J)	#	5504
5505	04/02	07/13	07/22	07/29	09/10	09/24	09/24	09/24	11/19	12/13		12/23	01/10		01/13	01/25			02/01	02/03	A (FY98 USMC KC-130J)	#	5505
5506	04/16	07/27	08/05	08/12	09/24	10/08	10/08	10/08	12/07	01/04		01/14	01/24		01/27	02/08			02/15	02/17	A (FY98 USMC KC-130J)	#	5506

Exhibit IV
Page 10 of 10