U.S. Customs and Border Protection

CONCEPT OF OPERATIONS

For

Customs and Border Protection
Air and Marine

P-3 Airborne Early Warning (AEW)
and
Long Range Tracking (LRT) Aircraft

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CONCEPT OF OPERATIONS

1.0 PURPOSE

The purpose of this document is to detail the Concept of Operation (CONOPS) of the Surveillance Support Branches in carrying out the U.S. Customs and Border Protection Air and Marine (CBP AM) mission:

"Protect the American people and critical infrastructure by using an integrated and coordinated air and marine force to deter, interdict and protect against acts of terrorism and smuggling arising from unlawful movement of people and goods across the borders of the United States."

2.0 BACKGROUND

CBP AM Surveillance Branches (SBs) are based at Cecil Field, Jacksonville, FL (SB-EAST) and at NAS Corpus Christi, TX (SB-WEST). Both Branches utilize P-3A (ORION) Maritime Patrol Aircraft (MPA) in two distinct airframe and avionics configurations, the Airborne Early Warning (AEW a.k.a. Dome), and the Long Range Tracker (LRT a.k.a. Slick). They are operated in concert, Double Eagle, or individually to meet the specific primary and secondary CBP AM mission objectives.

Both P-3 configurations were designed to address the original CBP AM missions of drug interdiction and illegal immigration against airborne and maritime targets. The primary missions for both aircraft have changed and increased extensively since 9/11 to include Homeland Security and Counter Terrorism

There are presently 8 P-3 AEW and 8 P-3 LRT aircraft on-line at SB-East and SB-West. SB-East has 6 aircraft, 3 P-3 AEWs and 3 P-3 LRTs while SB-West has 10 aircraft, 5 P-3 AEWs and 5 P-3 LRTs. The 8 P-3 LRT aircrafts come in two configurations, Baseline and Upgraded, depending on their sensor payload and mission system. There are presently 4 Upgraded systems, 3 at SB-E and 1 at SB-W, and 4 Baseline LRTs, all stationed at SB-W. Aircraft profiles for both the P-3 AEW and the P-3 LRT are shown in Figures 1 and 2 respectively.

Fig.1. P-3 Airborne Early Warning (AEW)

Fig.2. P-3 Long Range Tracker (LRT)

3.0 MISSIONS

The primary and collateral missions of CBP AM P3 aircraft are given below:

Primary **DHS/CBP:**
Drug Interdiction
Illegal Immigration
Airspace Security
Protection of the President/ Vice-President
National Special Security Events
Nuclear Power/Chemical Plants
INTEL Special Missions and Communications Relay
Major Cities Airspace Protection - Major Events, Political, Sporting, etc.

Collateral **FEMA: National Disaster Survey**
Mapping / Optical Survey
Airspace Security over TFRs
Red Hen Situational Awareness Video

DoE: Worldwide Response to Radiological Emergencies
Reactor Failures / Reactor Fuel Accidents
Waste Contamination
Nuclear Weapons Accidents
Space Vehicle Re-entry (RTG).

DHS/CBP:
Maritime Surface Search
Search and Rescue (SAR)

DoD: C3I/ Communications Relay

On-Call: Direct Law Enforcement Support
High-risk Prisoner Transport

4.0 AIRCRAFT PERFORMANCE-SENSOR/AVIONICS/COMMUNICATIONS SUITES

4.1 AIRCRAFT PERFORMANCE

Both the P-3 AEW Dome and the P-3 LRT Slick have the same performance profile which is derived from the U.S. Navy P-3 "ORION" Maritime Patrol Aircraft (MPA). They have a maximum cruise range of approximately 4000 nmi at a cruise speed of 350 knots with an endurance of more than 12 hours. For long- range operations the crew consists of a total of eight: 3 Pilots, 2 Flight Engineers and 3 Detection Systems Specialists (DSS). For short-range operations the crew reduces to six: 2 Pilots, 1 Flight Engineer and 3 Detection Specialists. Non-CBP personnel routinely fly on special-ops missions. During transit, 1 DSS is performing operations. Upon reaching the area of operation, all 3 DSS become active continuously taking physiological breaks only when necessary. For the flight engineers, the rotation is 2 hours on and 2 hours off. The minimum rest time is 10 hours per any 24 hour period.

4.2 SENSOR/AVIONICS/COMMUNICATION SUITES

4.2.1 P-3 AEW DOME AIRCRAFT

All eight P-3 AEW aircraft are equipped with the APS-145 Air/Surface search radar, a Litton Weather radar, the TPX-54 IFF Interrogator and the radio relay and simulcast TCASII/ACASII. The APS-145 radar has 360 degree search with a maximum airborne search range of 250 nmi covering over 200,000 square nmi from surface to 100,000 ft every ten seconds. Against ½ square meter surface targets, the maximum search range is 80 nmi. The radar is Link 16 (S-TADL-J) capable with 2-way communication through a secure SATCOM radio.

The P-3 AEW's communication suite consists of 2 secure UHF SATCOM radios, 5 UHF/VHF (AM/FM) secure KY-58 radios, 2 Wulfsberg VHF FM radio, a COTHEN Customs secure capable HF radio (VP110 and ANDVT/KYV-5), and a Data Transfer System (DTS), which allows crews to provide near real-time tactical data, text and digital images with weather updates over UHF MILSATCOM to other DTS equipped aircraft or ground stations. Each aircraft is also equipped with an IRIDIUM Satellite Telephone.

4.2.2 P-3 LRT SLICK AIRCRAFT

4.2.2.1 UPGRADED CONFIGURATION

The 4 Upgraded P-3 LRTs are equipped with the APG-66V5 air intercept/sea search radar, Litton Weather radar and the radio relay and simulcast TCASII/ACASII. The APG-66V5 was originally designed for the USAF F-16 Fighter and was adapted by the Navy for use

on P-3 CDU aircraft. The radar has 3 modes of search, 30, 60 and 120 degrees with search range of 10, 20, 40 and 80 nmi depending on the search settings.

All LRT upgraded aircraft are equipped with a WESCAM MX20 EO/IR system which has a 360 degree field-of-view turret and can simultaneously display 3 fields of view. The Electro-optics has both a 'Narrow' Black & White mode and 'Wide' Color Mode. The 360 degree retractable turret is mounted internally just forward of the Bomb Bay. Fig. 3 shows the WESCAM turret deployed with its 3 EO/IR apertures. The WESCAM display console is shown in Fig.4.

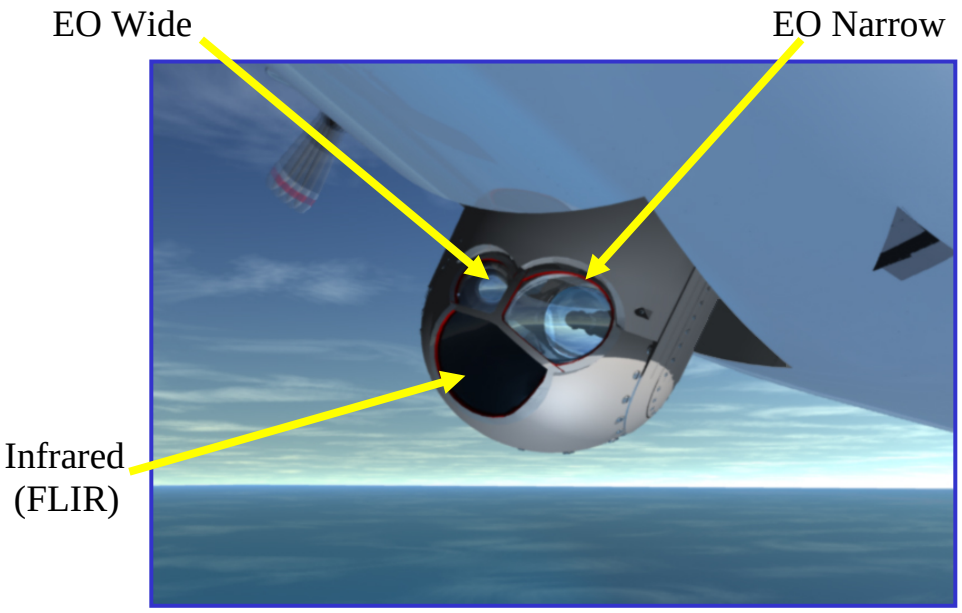

Fig. 3. Deployed WESCAM 360 degree turret & apertures

Fig 4. WESCAM display console

The Upgraded P-3 LRT's communication suite is basically the same as the AEWs. It consists of 2 secure UHF SATCOM radios, 5 UHF/VHF (AM/FM) secure KY-58 radios, 1 COTHEN Customs secure capable HF radio (VP110 and ANDVT/KYV-5), 2 VHF/FM Wulfsberg secure radios, and a Data Transfer System (DTS), which allows crews to provide near real-time tactical data, text and digital images with weather updates over UHF MILSATCOM to other DTS equipped aircraft or ground stations. Each aircraft is also equipped with an IRIDUM Satellite Telephone.

4.2.2.2 BASELINE CONFIGURATION

The 4 Baseline P-3 LRTs are equipped with the APG-63 search radar, a Litton Weather radar, a Customs Airborne Stabilized Optical System (CASOS) and a FSI FLIR system. The APG-63 radar, which was originally a fire-control radar, has 120 degree search with a range of approximately 80 nmi against airborne targets and very limited surface search capability.

CASOS is a line-of-sight optical system with zoom telescope, simultaneous monitoring and recording of the wide and narrow field of view color and high-resolution black & white. It is mounted at the forward port observation window on the aircraft thereby limiting the angular view to the port side only. It is further limited in azimuthal and elevation unobscured angular coverage, Field-of-Regard (FOR), by its mounting position and aircraft structure, i.e. relative position to the port wing. A photograph of the CASOS at the port observation window is shown in Fig. 5.

Fig.5. CASOS System

FSI FLIR replaced the IRDS on all the Baseline LRTs. It has a 360 degree field of view with the deployable turret mounted internally just forward of the Bomb Bay similar to the WESCAM turret on the Upgraded configuration. The FLIR has 4 fields-of-view; wide, medium, narrow, and 2x narrow, while the EO has a single, wide field-of view with zoom capability. The deployed FSI FLIR turret is shown in Fig. 6.

Fig.6 Deployed FSI FLIR 360 degree turret

The Baseline P-3 LRT's communication suite consists of 2 secure UHF SATCOM radios, 3 HF radios, 2 secure VHF/FM radios, 2 UHF radios, 2 VHF secure radios and a Data Transfer System (DTS), which allows crews to provide near real-time tactical data, text and digital images with weather updates over UHF MILSATCOM to other DTS equipped aircraft or ground stations. Each aircraft is also equipped with an IRIDIUM Satellite Telephone.

One of the 4 Baseline P-3 LRT's is equipped with a 'Big Pipe' communication system which is capable of transmitting live video/data via the INMARSAT satellite to a ground operations center. The external antenna radome is mounted topside on the aircraft just forward from the port access door.

5.0 MISSION DESCRIPTIONS

5.1 DRUG INTERDICTION AND ILLEGAL IMMIGRATION

5.1.1 DOUBLE EAGLE MISSION OPERATIONS

The Double Eagle mission involves the coordinated operations of a P-3 AEW and a P-3 LRT aircraft operating in concert. The mission is flown in known trafficking/contraband Zones identified by CBP as the Source Zone, the Transit Zone, the Arrival Zone (CONUS) and the Arrival Zone (Non-US). The Source Zone can be either a drug producing country or a known drug transit country and the Transit Zone is a large area covering the South Atlantic, the Caribbean, the Gulf of Mexico and South Pacific. The Arrival Zone (CONUS) includes all international ports of entry in the U.S., and the Arrival Zone (non-US) includes all non-U.S. ports of entry such as Canada. Fig. 7 shows the interdiction areas of responsibility for both SB-East and SB-West identifying all four zones including countries and ocean areas. Double Eagle missions are also initiated by queuing from ground C3ISR Centers such as Joint Inter-Agency Task Force South (JIATF-South), Law Enforcement Investigations, and Intelligence Agencies which collect data from specific systems such as long-range over-the-horizon radar or other national assets.

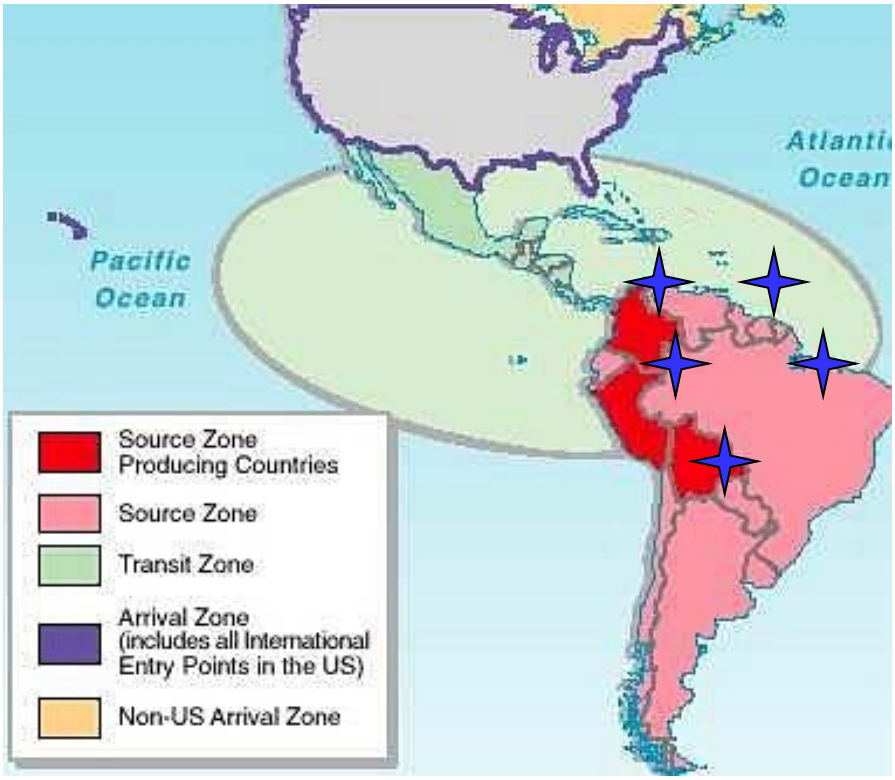

Fig.7. CBP AM Interdiction Area of Responsibility

The Double Eagle Interdiction mission involves 5 phases:

- **Detection:** Initial detection, localization and reporting of a suspect Target of Interest (TOI).
- **Interception**: Covert initial interception and closing on the suspect TOI
- **Recognition:** Reporting detailed description, characteristics and operations of the suspect TOI.
- **Identification:** Confirmed identification, recording and reporting of the TOI/contraband while maintaining continual positive contact.
- **Apprehension:** Facilitates apprehension of trafficker(s) and seizure of TOI / illegal contraband.

For a typical maritime search mission, the P-3 AEW and the P-3 LRT are deployed together with the P-3AEW maintaining high altitude, 12,500 feet to 18,000 feet while the P-3 LRT operates at low altitude, 500 feet to 2500 feet. For air interdiction, the AEW and

the LRT operate between 17,500 and 21,500 feet. The actual altitude of the P-3 AEW depends primarily on the proximity of the operating area to land. The aircraft will operate at lower altitudes within the envelope when close to land to due to radar performance changes when near land. Utilizing its APS-145 long-range radar, the high-altitude P-3 AEW initiates a search for air and/or surface TOIs that meet either certain suspect criteria or meet specific 'queuing' criteria. radar targets, both air and surface, are sorted by position, speed, course and altitude for the air TOI's. This data is continually reported and updated to the P-3 LRT via SATCOM and to the ground Command & Control via LINK-16. The P-3 AEW is the primary mission communications platform and relays all data, including those from the LRT, to JIATF-South and to all agencies that will be involved in the apprehension, i.e., Coast Guard, DEA, CBP, local law enforcement, etc.

The P-3 LRT is vectored to covertly intercept, close and identify suspect targets by the P3-AEW. Using its radar and EO/IR sensor suite, the P-3 LRT covertly intercepts and closes on the suspect target for positive identification. The covert range depends on the version of the P3-LRT, Baseline or Upgraded. When the TOI is identified as a positive suspect, the P-3 AEW takes total control of the operation and coordinates all participating agency assets in the final apprehension. This could involve fixed and/or rotary wing aircraft and one or more surface boats or any combination of them. Throughout the interdiction and apprehension, the P-3 LRT remains on-station recording and/or transmitting all events for evidence.

5.1.2 SINGLE LRT MISSION OPERATIONS

A single aircraft mission may involve only the P-3 LRT, which is then responsible for all phases of the mission from initial detection to apprehension and includes all communications. Based on the same type of 'queuing' as with the Double Eagle Mission, the aircraft transits to the Area of Interest (AOI) or Zone and initiates a large area geometrical search pattern, usually an optimized ladder pattern depending on the size of the AOI. Prior to initiating the search, the P-3 LRT will determine the specific altitude to optimize the radar's range and scan angle to that particular area size and ladder pattern. After initial detection, the P-3 LRT will covertly intercept and close on the TOI for recognition and identification using its EO/IR sensor suite. If interdiction and apprehension are involved in the mission, the P-3 LRT coordinates all assets and remains on-station for recording and/or transmitting all events for evidence.

5.1.3 JOINT FALCON INTERDICTION MISSION OPERATIONS (CHICKEN LITTLE)

A P3 combined with a Citation, Halcon, CHET, or other dissimilar interceptor aircraft.

5.2 AIRSPACE SECURITY MISSION OPERATIONS

Airspace Security is one of the primary missions of CBP AM since the events of 9/11. The P-3 AEW mission has grown extensively to provide national, regional and locally specific

airspace security in support of the missions outlined in Section 3 during periods of elevated alert levels. Airspace Security missions are provided for the President and Vice-President, National Security Special Events, major cities, and Weapons and Nuclear Facilities. Counter Terrorist missions involve both airborne and surface TOI detection, identification and enforcement procedures.

Tactics in a Temporary Flight Restriction (TFR) mission vary widely and are usually driven by the scenario, the specific location and mission intelligence. In a TFR mission, the P-3 AEW monitors the restricted airspace and its approaches for any airborne intrusion. Once an intruding aircraft is detected within or approaching a TFR by the P-3 AEW, its position, course, speed and altitude are communicated via Link-16 to both the CBP Air Marine Operations Center and the Dept. of Defense for sorting and for prosecution if required. If prosecution is required and interceptors are launched, the P-3 AEW will vector the interceptors to the target for airborne interdiction and possible 'splash'. If an airborne interdiction is not possible at that time, the P-3 AEW will track and trail the intruding target until intercept is possible or the target lands and is apprehended by federal, state or local law enforcement. Throughout the duration of the mission, the P-3 AEW maintains radio contact with the coordinating agencies and law enforcement agencies involved.

5.3 COLATTORAL MISSION OPERATIONS

5.3.1 FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) MISSIONS AND OPERATION

Both P-3 AEW and P-3 LRT aircraft are used in support of the Federal Emergency Management Agency after a national disaster has occurred. The P-3 AEW aircraft is often called upon to support FEMA with air traffic control in and around the disaster area where a Temporary Flight Restricted (TFR) air space has been established. The P-3 AEW will act as a communication relay platform between ground assets in the disaster area and all air assets supporting search and rescue and medical assistance, facilitate relief efforts by providing communications and information to first responders, and provide airspace management to all aircraft including any P-3 LRTs performing damage assessment.

The P-3 LRT aircraft support the FEMA disaster operations primarily by performing fly-over damage assessment. Imagery data is continually recorded from their EO/IR sensors for assessment by FEMA. At present, only one Baseline P-3 LRT is equipped with the Big Pipe communication system that is capable of transmitting streaming video/data via INMARSAT to a ground station. The P-3 LRTs also provide logistic support to FEMA by relocating personnel (medical, rescue and law enforcement) and equipments and supplies to and from the disaster area.

5.3.2 DEPARTMENT OF ENERGY (DOE) MISSIONS AND OPERATIONS

Support to the Department of Energy (DoE) is usually provided by P-3 LRT aircraft on a number of contingencies involving accidents or incidents such as nuclear reactor failures, reactor fuel accidents, radioactive waste contamination, nuclear weapons accidents and

space vehicle re-entry. In the event of an accident, failure, or release the P-3 LRT aircraft can perform a number of specific operational missions such as Plume Track surveys, Ground Deposition Mapping and Radiation Source Recovery Survey. For specific missions such as plume tracking, the DoE provides technical specialists and a roll-on roll-off (Ro-Ro) sensor suite with specialized sensors and equipment.

5.3.3 SPECIAL MISSION OPERATIONS

The CBP AM supports the DoD, the Coast Guard and Federal, State and Local Law Enforcement Agencies in a number of Special Operations. These include C3ISR when the P-3 AEW will act as a Communication Repeater Platform in multi-agency operations. Special missions involving the P-3 AEW and or the P-3 LRT include Surface Search, Overhead Ground Surveillance, Search and Rescue (SAR), Direct Agency Support on Controlled Delivery operations and High Risk Prisoner Transport.

6.0 TARGETS OF INTEREST (TOI)

6.1 DRUG INTERDICTION AND ILLEGAL IMMIGRATION

There are a wide variety of surface targets encountered during the Drug Interdiction and Illegal Immigration missions. The most common targets are provided in Table 1. The 'go-fast boat' is the choice of the drug runners because of its speed and low radar cross-section to inhibit detection by conventional radar sensors. Other vessels interdicted include sail boats, fishing boats, small coastal freighters and small row boats with some having outboard engines. CBP AM has found these vessels in the open sea, along coast lines, in harbors, and along the river routes. Many of the vessels differ widely in size, operating speeds, endurance ranges, and radar cross-sections. Traffickers use some vessels primarily to follow the coast line at slow speeds and others further out sea at high speed. Some vessels are used extensively at night only, while others are used both day and night.

On land, the surface targets interdicted include typical transport vehicles such as cars, trucks, or busses. CBP AM searches for these vehicles whether parked, moving slowly, or moving at highway speeds.

CBP AM also searches for airborne targets that normally limited to small single engine to larger twin engine aircrafts. The aircrafts are manufactured by different companies, have different speeds, altitude and endurance capabilities, and different radar cross-section.

6.2 AIRSPACE SECURITY

In the Airspace Security mission the airborne TOI can range from a small single engine private plane, to a helicopter, to a large commercial airliner. The aircrafts vary greatly in speed and radar cross-section. Typical TOI for Airspace Security are included as part of Table 1.

TABLE 1

Mission	Target Type	Target Dimensions (Length x Width)		Max Speed	Endurance Range
		(ft)	(ft)	(Kts)	(Nmi)
Counter Drug	Go Fast Boat	25-50	15	60	1100
Counter Drug	Fishing Boat	45	15	25	2150
Counter Drug	Cessna 172	26	36	125	550
Counter Drug	SUV/Trucks	17	6.5	80	350
Illegal Immigration	Trucks	24	8	80	365
Illegal Immigration	Boat	50-75	14-16	15-30	1500-2000
Airspace Security	Helicopters	33	6.5	115-130	374
Airspace Security	Embraer Jet	36	29	470	2300
Airspace Security	727 Airliner	153	33	549	2140

7.0 COMMUNCATIONS OPERATIONS

CBP AM employs a comprehensive set of radios to enable communication with the different agencies that may be involved during a mission operation. All of the communications equipment onboard the AEW and LRT are listed in section 4.2. CBP AM will utilize which ever radio that provides the best link during the communications, which may require using multiple radios and frequencies to maintain adequate link due to the change in range, weather and intensity of the radio traffic interference.

For a typical interdiction mission, CBP Air first uses the UHF SATCOM to report to the tasking agency during take off and throughout the mission. Simultaneously, CBP AM reports to their ground operations center using the UHF or COTHEN radio. Upon reaching the area of operation and obtaining a detection of a suspect TOI, CBP AM will contact the supporting ground agency, i.e. Coast Guard, Navy, or local LE, via the UHF SATCOM, UHF, VHF, Wulfsberg radios, or the Iridium Satellite phone based on the distance and the communications traffic on the radio's respective band. For voice traffic, CBP AM can select any of the radios during mission and post mission operations. For sending still pictures of the suspect TOI, CBP AM will use the UHF SATCOM which can currently take several minutes for sending a single digital picture.

For other operations, CBP AM uses the different communications equipment for different applications including:

- COTHEN radio for sending SOS and for voice communications when in Europe
- UHF or VHF for communicating with the FAA and with DoD fighter planes
- UHF Satcom to communicate with NORAD,
- TADIL J [Link-16] to send radar tracks to other DoD Agencies
- "Big Pipe" to provide high bandwidth transmission
- IRIDIUM for sending plume tracking data to DOE.

8.0 AIRCRAFT AVAILABILITY

The P-3 aircraft and supporting mission equipment follows a regular maintenance schedule as listed in Table 2. The maintenance covers the necessary inspection and services required to maintain air worthiness certification, crew safety, and optimum mission equipment operation.

TABLE 2

Inspection Interval	Service
28 Day	60 HZ Power Supply Clean LTN-92 Battery Unit CRYPTO Battery Check Avionics Equipment Cleaning EPIRB Check LST-5D Battery Check Star Safire Purge Lifepak 500 Defibrillator Mission Printer Cleaning Display Processor Keeper Batteries Aircraft Wash
30 Day	Wescam Meter Reading Wescam N2 Purge FMS Data Load
90 Day	ELT Inspection EPIRB Inspection
180 Day	PRC-90 Inspection PBE Inspection Rotodome Hyd Lines Port Fire Ext
301 Day	Phase 1-5 General Inspection
365 Day	ELT Inspection LTN 92 Rack Annual Inspection SATCOM RT Inspection LTN 92 Battery Inspection Wescam Rotary Seal ICA
730 Day	Lifepak 500 (R/R Batt and Pads) ELT Registration EPIRB Registration
1200 hours	Dome Props

TERMS AND ACRONYMS

AM	Air and Marine
AMOC	Air and Marine Operations Center
Big Pipe	Video/Data Communications System via INMARSAT
CASOS	Customs Airborne Stabilized Optical System
CBP	Customs and Border Protection
CDU	Counter Drug Unit (U.S. Navy)
C3I	Command, Control, Communications, and Intelligence
CONUS	Continental United States
COTHEN	Customs Secure Capable HF Radio
DHS	Department of Homeland Security
DoD	Department of Defense
DoE	Department of Energy
Dome	P-3 AEW Aircraft
Double Eagle	Mission involving P-3 AEW and P-3 LRT
DTS	Data Transfer System
ELT	Emergency Locator Transmitter
EO/IR	Electro-Optical / Infra-Red
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FLIR	Forward Looking Infra-Red
FoR	Field-of-Regard
ICA	Instrument for Continuous Airworthiness
JIATF-SOUTH	Joint Inter-Agency Task Force South
NORAD	North American Aerospace Defense Command
LE	Law Enforcement
Lone Eagle	Mission involving single P-3 LRT Aircraft
P-3 AEW	P-3 Airborne Early Warning
P-3 LRT	P-3 Long Range Tracker
PBE	Personal Breathing Equipment
Ro-Ro	Roll-on Roll-off
SAR	Synthetic Aperture Radar
SAR	Search and Rescue
Slick	P-3 LRT Aircraft
SSB-E	Surveillance Support Branch – East
SSB-W	Surveillance Support Branch – West
STOI	Surface Target-of-Interest
TFR	Temporary Flight Restriction
TOI	Target-of-Interest
UHF	Ultra-High Frequency
VHF	Very-High Frequency