



U.S. Department of Transportation
Federal Aviation Administration
Washington, D.C.

Flight Standardization Board (FSB) Report

Revision: 2
Date: 11/26/2013

Lockheed L-382, EC130Q Lockheed L-382/L-100/EC-130Q

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RECORD OF REVISIONS

Revision Number	Pages Affected	Date
0	Original	02/02/2002
1	All Pages	01/04/2010
2	1,2,4,5,9-12,52-59	11/26/2013

HIGHLIGHTS OF CHANGE

REVISION 2: This revision introduces the EC-130Q model. The EC-130Q is a new type design based upon the C-130 platform just as the L-382. The EC-130Q holds a new Type Certificate Data Sheet (TCDS) issued by the Los Angeles Aircraft Certification Office. Appendix 5 has been added as a Supplemental Type Certificate (STC) for a Retardant Delivery System. This system is installed on the new EC-130Q only.

This revision also reformats the report for standardization purposes only.

REVISION 1: Document reformatted, no content change.

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[SA15543LA-T]

GENERAL SECTION

1. PURPOSE AND APPLICABILITY

1.1 This report specifies master training, checking, and currency requirements applicable to crews operating Lockheed L-382 aircraft (equipped as specified in Appendices 1 through 5) and Lockheed EC-130Q aircraft as under Title 14 of the Code of Federal Regulations (14 CFR) part 121, 135, or 91. The report also addresses specific issues regarding the operation of Lockheed L-382, EC-130Q aircraft other than under 14 CFR part 121, 135, or 91. Provisions of this report:

- a) Define a common pilot "type rating" assigned to the Lockheed L-382 and EC-130Q.
- b) Describe any unique requirement applicable to initial or recurrent training.
- c) Describe "Master Difference Requirements (MDR)" for crews requiring differences qualification for mixed-fleet-flying or transition,
- d) Provide examples of acceptable "Operator Difference Requirements (ODR)" tables,
- e) Describe acceptable training device characteristics when necessary to establish compliance with pertinent MDRs,
- f) Sets checking and currency standards that must be administered by FAA or operators and,

1.2 This report addresses both the Lockheed L-382 and Lockheed EC-130Q aircraft as specified in the FAA Type Certificate Data Sheets (TCDS),

1.3 The provisions of this Flight Standardization Board (FSB) report are effective until amended, superseded, or withdrawn by subsequent revisions to this report.

1.4 Determinations made in this report are based on the evaluations of specific Lockheed L-382 and EC-130Q aircraft equipped in a given configuration and in accordance with current regulations and guidance. Modifications and upgrades made to the model(s) described herein, or introduction of new related aircraft, may require amendment of the findings in this report. The FSB reserves responsibility/authority to re-evaluate and modify this report based on new or revised Advisory Circular (AC) material, 14 CFR, aircraft operating experience, or the testing of new or modified aircraft under the provisions of AC 120-53, Guidance for Conduction and Use of Flight Standardization Board Evaluations.

1.5 Relationship between this FSB report and an AQP program: Differences between this FSB report and an operator's proposed training, checking, and currency requirements under an Advanced Qualification Program (AQP), must be justified and documented as part of the applicant's AQP approval process. Program approvals under AQP need to ensure the basic provisions and requirements of this report have been addressed and, where necessary, coordination with the appropriate Flight Standardization Board has been completed.

1.6 Terminology. The term "must" is used in this FSB report and certain MDR footnotes. This terminology acknowledges the need for operators to fully comply with this FSB report and MDR and ODR provisions if AC 120-53 is to be used by the operator as the means of complying with 14 CFR part 121, 135, or 91. Operators who choose this method must comply with each applicable MDR provision, including any footnotes.

1.7 This report includes:

- a) Minimum requirements which must be applied by FAA field offices, (e.g. MDRs, Type Rating designations, etc.),
- b) Information which is advisory in general, but is mandatory for particular operators if the designated configurations apply and if approved for that operator (e.g. MDR footnotes, acceptable ODR tables), and
- c) Information which is used to facilitate FAA review of an aircraft type or related aircraft that is proposed for use by an operator (e.g. compliance checklist).

Various portions of this report are qualified as to whether compliance (considering the provisions of AC 120-53) is required or is advisory in nature.

1.8 Relevant acronyms are defined as follows:

AC	Advisory Circular
ACO	Aircraft Certification Office
ADF	Automatic Direction Finder
AFM	Airplane Flight Manual
AFMS	Advanced Flight Management System
AFCS	Autoflight Control System
AFGS	Advanced Flight Graphics Server
AP	Autopilot
AQP	Advanced Qualification Program
ASC	Aircraft Service Change
ATA	Air Transport Association
CAP	Consolidated Annunciator Panel
CCD	Cursor Control Device
CDH	Command and Data Handling
CDH	Clearance Delivery Head
CDS/R	Control Display System Retrofit
5 DU CDS/R	5 Display Unit Control Display System Retrofit
CDU	Central Display Unit
CFR	Code of Federal Regulations
CHDO	Certificate Holding District Office
DC	Display Controller
DME	Distance Measuring Equipment
DU	Display Units
EDM	Emergency Descent Maneuver

EFIS	Electronic Flight Instrument System
EFVS	Enhanced Flight Vision System
EGPWS	Enhanced Ground Proximity Warning System
EICAS	Engine Indicating and Crew Alerting System
EVS	Enhanced Vision System
FAA	Federal Aviation Administration
FADEC	Full Authority Digital Engine Control
FGS	Flight Guidance System
FMA	Flight Mode Annunciator
FMS	Flight Management System
FSB	Flight Standardization Board
FTD	Flight Training Device
GPWS	Ground Proximity Warning System
I-NAV	Integrated Navigation Display
INS	Inertial Navigation System
IRS	Inertial Reference System
LNAV	Lateral Navigation
MADC	Micro Air Data Computer
MMEL	Master Minimum Equipment List
MCDU	Multi-Function Control Display Units
MCR	Master Common Requirements
MDR	Master Differences Requirements
ND	Navigation Display
ODR	Operator Differences Requirements
PFD	Primary Flight Display
POI	Principal Operations Inspector
QRH	Quick Reference Handbook
RAAS	Runway Awareness Advisory System
RADS	Retardant Aerial Delivery System
RFMU	Radio Frequency Management Unit
RMU	Radio Management Unit
RTA	Receiver/Transmitter/Antenna
STC	Supplemental Type Certificate
TACAN	Tactical Air Navigation
TAWS	Terrain Awareness and Warning System
TC	Type Certificate
TCDS	Type Certificate Data Sheet
TCAS	Traffic Alert and Collision Avoidance System
TCE	Training Center Evaluator
TCPM	Training Center Program Manager
TIT	Turbine Inlet Temperature
VGS	Visual Guidance System
VHF COMM	Very High Frequency Communication
VHF NAV	Very High Frequency Navigation
VNAV	Vertical Navigation
VSI/TRA	Vertical Speed Indicator/Traffic Resolution Advisory
WAAS/LPV	Wide Area Augmentation System/Localizer Precision Vertical

2. PILOT TYPE RATING REQUIREMENT

2.1 In accordance with the provisions of FAA Order 8900.1 and AC 120-53, the same pilot type rating is assigned to the Lockheed L-382, L-283B, L-382E, L-382F, and L-382G aircraft, and is designated “L-382”.

2.2 The EC-130Q has been Type Certificated under a different TCDS and therefore stands alone as a new type of aircraft. However, due to the relationship shared with the L-382 aircraft, a common type rating has been determined by the Flight Standardization Board. This designation shall be “L382, EC-130Q”. This evaluation was completed by analysis using guidance found within AC 120-53. A pilot who possesses an L-382 type rating and completes the requisite differences as defined by this report may obtain the common type rating of L-382, EC-130Q. Possession of an L-382 type rating does not automatically qualify the airman of adding an EC-130Q. That must be earned through appropriate training as designated by this report.

2.3 This FSB report includes the evaluation of modifications made by STC ST01162LA (as amended), to the L-382G model aircraft. Although each appendix of this report [Appendix 1, Appendix 2, Appendix 3, and Appendix 4] defines a particular modification, the type rating designation for the L-382G, with any or all STC’s applied, remains “L-382”.

2.4 This FSB report includes the evaluation of the Retardant Aerial Delivery System I (RADS I) [Appendix 5] as installed by STC SA15543LA-T. This installation is unique to the Lockheed EC-130Q.

3. MASTER DIFFERENCE REQUIREMENTS (MDR)

MASTER DIFFERENCE REQUIREMENTS

<u>Master Differences Requirements (MDR) Table</u>			
AIRPLANE TYPE RATING: L-382		<u>FROM AIRPLANE</u>	
		L-382	EC-130Q
TO AIRPLANE	L-382	Not Applicable	Not Evaluated
	EC-130Q	A/-/-	Not Applicable

4. OPERATOR DIFFERENCE REQUIREMENTS (ODR) TABLES

ACCEPTABLE OPERATOR DIFFERENCE REQUIREMENTS (ODR)
TABLES

DIFFERENCE AIRCRAFT: Lockheed EC-130Q BASE AIRCRAFT: Lockheed L-382				COMPLIANCE METHOD					
APPROVED BY (POI) _____				TRAINING				CHKG/CURR	
DESIGN	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D	CHK	CURR
Airplane Configuration	Dimensions	No	No	TND HND OUT				-	-
Panel Layout	General Panel Differences	No	No	TND HND OUT				-	-

NOTE: The following abbreviations may be used in these tables.

AVT*	-	Audio Visual Tape presentation
CBT*	-	Computer Based Training
CHK	-	Checking
CURR	-	Currency
FTD	-	Flight Training Device
FLT CHK	-	Flight Check
LEC*	-	Lecture
SIM	-	Simulator specifies minimum level
TNG HND OUT	-	Training Hand Out

*Any one form of presentation or any combination may be acceptable.

5. FSB SPECIFICATIONS FOR TRAINING

5.1 Operators training programs should emphasize the differences in Air Transport Association (ATA) Chapter 34 and the methods prescribed in the ODR System Differences Table (Appendix 1, Appendix 2). With training set at Level is D, an L-382 airplane with the Honeywell Epic Control Display System Retrofit installed and operative, may be used for training in lieu of a Level 6-7 Flight Training Device (FTD) or a Level A or B Simulator. These are the minimum medium for training delivery. Ground training must also include be a review of the AFM Supplement, the CDS/R Pilot's Manual, and completion of System Review Exercises from the Pilot's Manual.

Training for the EC-130Q is established as Level A based upon possession of an L-382 type rating.

6. FSB SPECIFICATIONS FOR CHECKING

6.1 Checking level is set at Level D. Level D requires a full proficiency check in the variant aircraft [L-282 CDS/R]. there is no required checking for the EC-130Q, to obtain a common type rating with the L-382, level A training must be completed and documented.

7. FSB SPECIFICATIONS FOR CURRENCY

7.1 Currency level is set at D. Operators should schedule crews to operate L-382 CDS/R aircraft at least every 90 days, or re-establish currency by completing the minimum requirements outlined in the FSB Specifications For Training referenced in this report and receiving a full proficiency check in the L-382 CDS/R airplane.

8. AIRCRAFT REGULATORY COMPLIANCE CHECKLIST

8.1 Aircraft regulatory compliance checklists were not developed, nor accomplished, for any of the modifications to the L-382G airplane as defined in Appendices 1, 2, 3 or 4. As a result, no compliance checklists are contained in this report. No compliance checklist for the EC-130Q is included in this report.

9. FSB SPECIFICATIONS FOR TRAINING DEVICES AND SIMULATORS

9.1 Training and checking should be accomplished in a maneuver device that replicates the layout and functions of the L-382 CDS/R airplane. Use of an L-382 CDS/R airplane cockpit, with ground power applied, or an L-382 CDS/R airplane in flight, are accepted as a Level D maneuver devices.

10. APPLICATION OF FSB REPORT

10.1 Relevant parts of this report (e.g. Type Rating Designation, training requirements, checking maneuvers, etc.) are effective when the report is approved by the FAA.

11. ALTERNATE MEANS OF COMPLIANCE

11.1 Approval Level and Approval Criteria: Alternate means of compliance to differences requirements of 14 CFR part 121, subparts N and O, for mixed fleet operations other than as specified in provisions of this report or as approved under an AQP, must be approved by the Flight Standards, Air Transportation Division (AFS-200). Any differences petitioned under AQP must be coordinated with AFS-280, the POI, and the FSB. If alternate means of compliance is sought, operators will be required to establish that the proposed alternate means provides an equivalent level of safety to the provisions of AC 120-53, and this FSB report. Analysis, demonstrations, proof of concept testing, differences documentation, or other evidence may be required.

11.2 Equivalent Safety: In the event alternate means of compliance is sought, training program hour reductions, simulator approvals, and device approvals, may be significantly limited and reporting requirements may be increased to assure equivalent safety. AFS-200 will generally not consider relief by alternate means of compliance unless sufficient lead time has been planned by an operator to allow for any necessary testing and evaluation.

11.3 Interim Programs: In the event unforeseen circumstances make it impossible for an operator to comply with MDR provisions, the operator may seek interim program approval rather than a permanent, alternate compliance method. Financial arrangements, scheduling adjustments, and similar justifications are not considered to be "unforeseen circumstances" for the purposes of this provision.

12. MISCELLANEOUS (Reserved)

APPENDIX 1:

Lockheed L-382 with Honeywell Epic Control Display System Retrofit [CDS/R] installed in an L-382G airplane.

APPLICABLE STC: ST01162LA

DESCRIPTION:

This installation [Honeywell Epic Control Display System Retrofit] replaces analog instrumentation for the left seat pilot with 2 digital display units (DU), and replaces analog instrumentation for the right seat pilot with 1 digital display unit.

An aircraft with this installation shall be referenced in this report as the “**L-382 CDS/R**”.

1. "MASTER COMMON REQUIREMENTS" (MCRs)

1.1 The L-382 CDS/R is an L-382 with a different avionics suite only. As such, takeoff and landing performance and flight characteristics are identical.

2. MASTER DIFFERENCES REQUIREMENTS (MDR's)

2.1 MDR'S are as depicted in the MDR table in Appendix 1, Table 1A. The base aircraft (from airplane) is the L-382. The variant (to airplane) is the L-382 CDS/R. In summary, the MDR for the L-382 CDS/R is D/D/D. This denotes D level training requiring training in a maneuver device, D Level checking requiring a demonstration of proficiency in the use of the CDS/R avionics system, and D level currency requiring operation of the system every 90 days.

3. ACCEPTABLE OPERATOR DIFFERENCE REQUIREMENTS (ODR'S)

3.1 ODR tables, included in Appendix 1, Table 1B, consist of Design, System, and Maneuver Differences.

4. FSB SPECIFICATION FOR TRAINING

4.1 Operators training programs should emphasize the differences in ATA Chapter 34 and the methods prescribed in the ODR System Differences Table (Appendix 1, Table 1B). With training set at Level is D, an L-382 airplane with the Honeywell Epic Control Display System Retrofit installed and operative, may be used for training in lieu of a Level 6-7 Flight Training Device (FTD) or a Level A or B Simulator. These are the minimum medium for training delivery.

Ground training must also include be a review of the AFM Supplement, the CDS/R Pilot's Manual, and completion of System Review Exercises from the Pilot's Manual.

5. FSB SPECIFICATION FOR CHECKING

5.1 Checking level is set at Level D. Level D requires a full proficiency check in the variant aircraft [L-282 CDS/R].

6. FSB SPECIFICATION FOR CURRENCY

6.1 Currency level is set at D. Operators should schedule crews to operate L-382 CDS/R aircraft at least every 90 days, or re-establish currency by completing the minimum requirements outlined in the FSB Specifications For Training referenced in this report and receiving a full proficiency check in the L-282 CDS/R airplane.

7. FSB SPECIFICATION FOR DEVICES OR SIMULATORS

7.1 Training and checking should be accomplished in a maneuver device that replicates the layout and functions of the L-382 CDS/R airplane. Use of an L-382 CDS/R airplane cockpit, with ground power applied, or an L-382 CDS/R airplane in flight, are accepted as a Level D maneuver devices.

8. SUPPLEMENTAL BOARD REPORT

8.1 In addition to the information contained in this report the following information is kept on file at the Long Beach Aircraft Evaluation Group, (LGB-AEG) 3960 Paramount Boulevard, Suite 100, Lakewood, CA 90712-4137:

- L-382 FAA FSB Order (FSB member list)
- L-382 training syllabus of FSB members
- Primus Epic CDS/Retrofit (CDS/R) Pilots Manual
- Honeywell PC-FMS training program
- Honeywell FMZ Flight Management System Pilots Manual

9. BACKGROUND OF THE INSTALLATION

9.1 Prior to modification, the Radios (i.e. ADF, DME, VHF NAV, VHF COMM, TACAN and Transponders) were all operated from individual controllers located in the forward and aft pedestal area. All of these systems (except the TACAN and the VHF/UHF Comm 3) have been replaced by the Honeywell Primus II Integrated Radio System. This system consists of dual Comm/ Transponder Units, dual Nav Units (with internal VHF NAV, DME, ADF, Marker Beacon), dual Radio Management Units (RMU) and a single Clearance Delivery Head (CDH).

In the Primus II system the RMU controls all of the Radio operation functions (except Audio). Each RMU can control both #1 and #2 radio systems. The remaining LRU operations are transparent to the flight crew.

The Clearance Delivery Head can take the place of RMU #1 for Comm #1 and VHF Nav 1 Audio for use in the Audio system. Nav 2 audio operation is standard. The CDH can also be used for Emergency Communications (refer to AFMS for emergency operation). Each RMU controls the Mode "S" Transponder system and is capable of TCAS Control.

The existing TACAN is channeled from Nav 1 as in the previous installation.

The TCAS system consists of a TCAS processor, dual VSI/ TRA Indicators, a Top Directional Antenna, and a bottom Omni-Directional Antenna.

The TCAS system also works in conjunction with both Mode "S" Transponders and the RMUs. Each VSI/ TRA Indicator provides visual TCAS indications and warnings in addition to being a Vertical Speed Indicator. TCAS aural warnings are heard from the overhead Cockpit Warn Speaker, and as a direct input through the aircraft's audio system for Headset Audio. No switch action is required.

The Air Data system consists of dual AZ850 Micro Air Data Computers(MADC) , dual digital Altimeters, dual VSI/ TRA Indicators, and dual Airspeed Indicators.

Each Altimeter is fed digital information from its prospective MADC. Baro-setting information is fed from each altimeter to its prospective MADC. Pilot /Altimeter operation is normal. Each VSI/ TRA is fed digital information from its prospective MADC and from the TCAS Computer. Pilot/ VSI operation is normal. Existing Airspeed Indicator operation is unchanged.

MADC digital information is interfaced with the following additional systems: FMS, EGPWS, Transponders, IRS, and Radar.

Air Data Instrumentation is standard and familiarization requirements negligible.

The Weather Radar System consists of a Honeywell Primus 880 Receiver/Transmitter/Antenna (RTA) with a 24" flatplate and a WI-880 Radar Indicator. This replaces the existing Bendix RDR-4a system.

The operation of the Primus 880 system is similar to the replaced Bendix RDR-4a. The main differences are the updated technology and a different indicator for display and control.

The WI-880 Radar Indicator is also capable of displaying EGPWS Terrain Maps from the EGPWS Computer.

The subject aircraft did not have GPWS prior to this installation, even though aircraft of the same model/type have had TC'd/ factory installations. In addition to the standard GPWS warning modes, an enhanced version of the Honeywell Mark VII is installed to provide additional terrain

warnings, both visual and aural. This includes a Terrain map displayed on the Radar Indicator. Windshear warnings are not available on this aircraft, which is operated under 14 CFR part 125.

EGPWS Aural warnings are heard from the overhead Cockpit Warn Speaker and as a direct input to the aircraft's audio system for Headset Audio. No switch action is required, except Radio Altitude callouts can be inhibited from the pilot's panel. Refer to both the AFMS and the Honeywell Pilot's Guide[#060-4241-000] for detailed Aural callouts for EGPWS operation. Terrain display information is optionally displayed on the Radar Indicator and is automatically switched with the Radar data in event of a Terrain warning. It can also be manually selected or inhibited from being displayed. Aircraft position inputs from the GPS sensor and #1 FMS system must be available to display a terrain map.

The electronic standby instrument display consists of a BF Goodrich GH3000 Indicator, ADC3000 Air Data Computer, and a MAG3000 Magnetometer. Also part of the system is a backup battery, Securaplane XL-249 Standby Battery.

The GH3000 Indicator displays Standby Attitude, Standby Airspeed, Standby Altimeter and Standby Compass information. The GH3000 replaces the existing Standby Attitude Indicator/Gyro. The GH3000 is also capable of displaying #1 VHF Nav/DME information and #1 FMS information when selected.

The Emergency Battery operates when the aircraft DC power drops too low or is manually activated. The battery should be armed prior to takeoff, and turned off prior to shutting off power from the aircraft. Once the system is active, there are two normal ways to reset it; reapply power to the aircraft and turn the arm switch off (this resets the battery, because sufficient power is available and the arm switch is off; if the arm switch is in the "on" position, the system resets to the inactive state until power drops again.) and the other way is to reset CB1 (20 amp circuit breaker) on the front of the XL-249 battery unit with the "arm switch" in the off position. (Note: It is assumed that the manual "on" switch and the Emergency Comm switch are also in the "off" positions.)

Also located on the Emergency switch panel is an Emergency Comm Power switch. This activates Comm 1 and the CDH, which are powered from the XL-249 battery for emergency communications.

Honeywell FMZ2000 Flight Management System (FMS) consists of dual NZ-2000 Nav Computers, dual CD820 Control Display Units (CDU), and dual Analog Interface Units. The FMS CDUs replace the existing Litton 92 Inertial Navigation System (INS) Control Display Units. (CDU)

The remaining LTN-92 LRU's are dual Inertial Navigation Units and their prospective Mode Selectors. These units now make up Inertial Reference Sensors (IRS) for the FMS via a digital interface for LNAV information. They also supply digital and analog information as they did in the previous installation, plus digital information to the Radar and EGPWS.

Also supplying Navigation information to the FMS are dual GPS Sensors Units via a digital bus. GPS information normally has priority in the FMS. The GPS also supplies other systems position information, i.e. EGPWS, Clocks, and the existing ELT.

Supplying the FMS with short range navigation information is the Primus II Radio System. This includes VOR and DME information, when autotune is enabled. Manual Nav/Comm and DME tuning is optional with the FMS CDU's. These tune options work through the Primus II RMUs.

The FMS instrumentation is similar to the previous INS interface. The FMS is switchable between VHF Nav/ILS and FMS mode to the primary flight instruments, Flight Director, and Autopilot. The main difference is that the FMS is capable of non-precision approaches (lateral coupled only, with advisory VNAV needle), with additional approach mode annunciators.

To summarize the main operational difference between the previous INS installation and the new FMS installation is the following:

<u>INS</u>	<u>FMS</u>
A. Enroute and Long Range	Enroute, Long Range, and non-precision Approach
B. Single inertial sensor per side.	Four sensors (IRS #1, IRS #2, GPS #1, and GPS#2) that feed both sides, plus short range VOR/ DME inputs with radio tune options.
C. External Database unit	Internal Database, one per computer. Updated through a floppy drive in Observers Panel.

One significant difference is the use of the "joystick" as a cursor control device on the Primary Flight Display [PFD] and Multifunction Display [MFD]. The joystick is used to activate and select drop down menus for the setting of V speeds.

10. FSB COMPOSITION

10.1 The Board consisted of one FAA inspector and the FSB Chair. The Board member was current in the L-382.

11. APPLICANT'S PROPOSAL

11.1 The applicant submitted MCR and ODR tables and the differences training proposed at D/D/D levels.

12. TESTS

12.1 As a result of the applicant's proposal, the T-1 test was waived since some differences training was proposed. T-2 was waived as the flight handling qualities were proposed as identical and the Board could see no reason why they should not be. As a result, AC 120-53 dictates a T-3 test in this case. The Board member completed the training as proposed by the applicant, which consisted of four hours of ground in a classroom, four hours in the aircraft with ground power applied (used as an FTD), and 4 hours in the air in the aircraft (used as a level D simulator). The training was provided by the applicant. The Board member completed a practical test for a type rating in the L-382 CDS/R airplane. The FSB Chair administered the test.

13. TEST RESULTS

13.1 No significant differences were noted in the conduct of the maneuvers by the subject Board member. As such the FSB accepted the applicant's proposal for Level D training, Level D checking, and Level D currency.

TABLE 1A
MASTER DIFFERENCE REQUIREMENTS

<u>Master Differences Requirements (MDR) Table</u>			
AIRPLANE TYPE RATING: L-382		<u>FROM AIRPLANE</u>	
		L-382	L-382CDS/R
TO AIRPLANE	L-382	Not Applicable	Not Evaluated
	L-382CDS/R	D/D/D	Not Applicable

TABLE 1B
ACCEPTABLE OPERATOR DIFFERENCE REQUIREMENTS (ODR)
TABLES

Definitions

(HO) = Handout
 (TCBI) = Tutorial Computer Based Instruction
 (SU) = Stand-up Instructors
 (ICBI) = Interactive Computer Based Instruction
 (FTD) = Flight Training Device
 (SIM A-D) = Simulators
 (ACFT) = Aircraft

DIFFERENCE AIRCRAFT: Lockheed L-382 CDS/R BASE AIRCRAFT: Lockheed L-382				COMPLIANCE METHOD					
APPROVED BY (POI) _____				TRAINING				CHKG/CURR	
DESIGN	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D	CHK	CURR
None	Not Applicable	No							

DIFFERENCE AIRCRAFT: Lockheed L-382 CDS/R BASE AIRCRAFT: Lockheed L-382				COMPLIANCE METHOD					
APPROVED BY (POI) _____				TRAINING				CHKG/CURR	
MANEUVER	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D	CHK	CURR
None	Not Applicable	No							

DIFFERENCE AIRCRAFT: Lockheed L-382 CDS/R BASE AIRCRAFT: Lockheed L-382 APPROVED BY (POI) _____				COMPLIANCE METHOD					
				TRAINING				CHKG/CURR	
SYSTEM	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D	CHK	CURR
22.1 Autopilot	Change to Mode Annunciation	No	NORM		SU HO			B	B
22.2 Flight Director	Change to Mode Annunciation Change to EFIS Display	No	NORM				FTD 6-7 SIM A/B ACFT	D	D
22.3 Yaw Damper	Change to Mode Annunciation	No	NORM		SU HO			B	B
22.4 Auto Throttle	No System Installed	-	-						
23.1 HF Comm.	Change to Tuning Control Location	No	NORM	HO				A	A
23.2 VHF Comm No. 1/2	Change to Tuning Control Heads	No	NORM/ ABNML		SU HO			B	B
23.3 Satellite Comm	System Installed	No	NORM	HO				A	A
23.4 ACARS	No System Installed	-	-						
23.5 SELCAL	Revised SELCAL Audio	No	NORM	HO				A	A
23.6 Public Address	No System Installed	-	-						
23.7 Interphone	Change to Tuning Control Heads	No	NORM	HO				A	A
24.1 DC Standby Pwr	New Standby Battery Instrument Sys	No	EMER		SU HO			B	B
24.2 AC Pwr Dist	Revised CB Installation	No	NORM	HO				A	A
24.3 DC Pwr Dist	Revised CB Installation	No	NORM		SU HO			B	B
25 Equip and Furnishings	No Change	-	-						
31.1 Inst Panels	Revised Pilot/Copilot Panels	No	NORM	HO				A	A
31.2 Indep Inst	Revised Digital Clocks	No	NORM	HO				A	A

DIFFERENCE AIRCRAFT: Lockheed L-382 CDS/R BASE AIRCRAFT: Lockheed L-382				COMPLIANCE METHOD					
APPROVED BY (POI) _____				TRAINING				CHKG/CURR	
SYSTEM	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D	CHK	CURR
31.3 EFIS	Electronic Display Units (DU's)	No	NORM/ ABNML/ EMER		ICBI		FTD 6-7 SIM A/B ACFT	D	D
33.1 Lights	Change to Pilot/Copilot Inst Lights	No	NORM	HO				A	A
33.2 Lights	Change to Various Mode Annunciator Lights	No	NORM	HO				A	A
34.1 Air Tmp/ Thrust Lim	No Change	-	-						
34.2 Vertical Speed	Vertical Speed Disp on EFIS	No	NORM		ICBI		FTD 6-7 SIM A/B ACFT	D	D
34.3 Airspeed/ Mach Indicator	Airspeed Disp on EFIS	No	NORM		ICBI		FTD 6-7 SIM A/B ACFT	D	D
34.4 Overspeed Warn	No Change	-	-						
34.5 Altimeter	Altimeter Display on EFIS	No	NORM		ICBI		FTD 6-7 SIM A/B ACFT	D	D
34.6 Altitude Alert	Altitude Alert Added	No	NORM	HO				A	A
34.7 Stall Warning	No Change	-	-						
34.8 Speed Command	Displayed on EFIS	No	NORM		ICBI		FTD 6-7 SIM A/B ACFT	D	D
34.9 Altitude	Flight Dir Displayed on EFIS	No	NORM/ ABNML		ICBI		FTD 6-7 SIM A/B ACFT	D	D

DIFFERENCE AIRCRAFT: Lockheed L-382 CDS/R BASE AIRCRAFT: Lockheed L-382 APPROVED BY (POI) _____				COMPLIANCE METHOD					
				TRAINING				CHKG/CURR	
SYSTEM	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D	CHK	CURR
34.10 Gyro Compass	HSI Display on EFIS. Basic Compass system Unchanged	No	NORM/ABNML		ICBI		FTD 6-7 SIM A/B ACFT	D	D
34.12 Standby Attitude	New Standby Attitude System is Installed	No	NORM		SU HO			B	B
34.13 Instrument Comparator	Incorporate in EFIS	No	NORM/ABNML				FTD 6-7 SIM A/B ACFT	D	D
34.14 Localizer	2 New Loc Receivers Replace Old System	No	NORM		SU HO			B	B
34.15 Localizer	Pilot/Copilot Display on EFIS	No	NORM/ABNML				FTD 6-7 SIM A/B ACFT	D	D
34.16 Glideslope	2 New Glideslope Receivers Replace old System	No	NORM/ABNML		SU HO			B	B
34.17 Glideslope	Pilot/Copilot Display on EFIS	No	NORM/ABNML				FTD 6-7 SIM A/B ACFT	D	D
34.18 Mkr Beacon	2 New Marker Beacon Receivers Replace Old System	No	NORM		SU HO			B	B
34.19 Windshear Detection	None Installed	-	-						
34.20 Radar Altimeter	2 New Radar Altimeters Replace Old System	No	NORM/ABNML		SU HO			B	B
34.21 Inertial Nav	2 Old Inertial Nav Systems Removed	-	-						
34.22 Inertial Ref	2 Old IRS Gyros Utilized as Inputs to New EFIS/FMS	No	NORM/ABNML		SU HO			B	B
34.23 WXR Radar	WXR System replaces Old System, Displayed on PFD & MFD	No	NORM	HO				A	A

DIFFERENCE AIRCRAFT: Lockheed L-382 CDS/R BASE AIRCRAFT: Lockheed L-382 APPROVED BY (POI) _____				COMPLIANCE METHOD					
				TRAINING				CHKG/CURR	
SYSTEM	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D	CHK	CURR
34.24 Grd Prox Warning	New Enhanced Grd Prox Warning system	No	NORM				FTD 6-7 SIM A/B ACFT	D	D
34.25 TCAS	New TCAS II System	No	NORM				FTD 6-7 SIM A/B ACFT	D	D
34.26 DME	2 New DME Transceivers Replace Old System	No	NORM		SU HO			B	B
34.27 ATC Transponder	2 New Mode S Transponders Systems Replace Old Mode C System	No	NORM		SU HO			B	B
34.28 VOR	2 New VOR Receivers Replace Old VOR System	No	NORM		SU HO			B	B
34.29 ADF	2 New ADF Receivers Replace Old ADF System	No	NORM/ ABNML		SU HO			B	B
34.30 GPS	Dual External GPS Tied to New FMS which Replaces old IRS	No	NORM/ ABNML		ICBI		FTD 6-7 SIM A/B ACFT	D	D
34.31 FMS	Dual NZ-2000 Replaces old IRS FMS	No	NORM/ ABNML		ICBI		FTD 6-7 SIM A/B ACFT	D	D

- END OF APPENDIX 1

APPENDIX 2:

Lockheed L-382 with Honeywell Epic Control Display System Retrofit [CDS/R] with Electronic Engine Display Unit (DU) and second Multifunction Display (MFD) installed in an L-382G aircraft.

APPLICABLE STC: ST01162LA

DESCRIPTION:

This installation modifies the L-382 CDS/R airplane by replacing the electro-mechanical engine instruments with an electronic engine display unit (DU), adds a second multifunction display (MFD) on the right seat pilot's side, relocates the standby instrument system and adds a second standby instrument system, modifies the reversionary control panel, and relocates the landing gear handle.

An aircraft with this installation shall be referenced in this report as the "**L-382 5 DU CDS/R**".

1. "MASTER COMMON REQUIREMENTS" (MCRs)

1.1 The L-382 5 DU CDS/R is an L-382 airplane equipped with the Honeywell Epic Control Display System Retrofit (CDS/R) avionics suite, with an added electronic engine display unit, multifunction display (MFD) for the right seat pilot, and a second standby attitude display. Takeoff and landing performance and flight characteristics are identical for the L-382 CDS/R aircraft and L-382 5 DU CDS/R aircraft.

2. MASTER DIFFERENCES REQUIREMENTS (MDR's)

2.1 MDR's are as depicted in the MDR table in Appendix 2, Table 2A. The base aircraft (from airplane) is the L-382 CDS/R. The variant airplane is the L-382 5 DU CDS/R. The MDR for the L-382 5 DU CDS/R is C/B/B. This denotes C level training requiring training in a systems device, B Level checking requiring a task or system check in the use of the L-382 5 DU CDS/R avionics system, and B level currency requiring periodic review of material identified by the operator.

3. ACCEPTABLE OPERATOR DIFFERENCE REQUIREMENTS (ODR'S)

3.1 ODR tables, included in Appendix 2, Table 2B, consist of Design, System, and Maneuver Difference Tables.

4. FSB SPECIFICATION FOR TRAINING

4.1 Operator's training programs should emphasize the differences in prescribed in the ODR System Difference Table (Appendix 2, Table 2B). With training required at Level C, a Level 5 Flight Training Device (FTD), or a L-382 5 DU CDS/R airplane with ground power applied, is considered the minimum medium for training delivery. Ground training must included a review of the AFM Supplement, the L-382 5 DU CDS/R Pilot's Manual, and completion of the System Review Exercises of the Pilot's Manual.

5. FSB SPECIFICATION FOR CHECKING

5.1 Checking is set at level B. Level B requires a task or system check on the differences between the L-382 CDS/R and L-382 5 DU CDS/R aircraft.

6. FSB SPECIFICATION FOR CURRENCY

6.1 Currency level is set at B. Operators should identify material to be reviewed and the frequency that it must be reviewed.

7. FSB SPECIFICATION FOR DEVICES OR SIMULATORS

7.1 Training and checking should be accomplished in a systems device that replicates the layout and functions of the L-382 5 DU CDS/R installation. Use of the L-382 5 DU CDS/R airplane with ground power applied is acceptable as a Level C systems device.

8. BACKGROUND OF THE INSTALLATION

8.1 This modification (ST01162LA) replaces the electromechanical engine instruments with an electronic engine display, adds a second MFD on the co-pilot's side, relocates the standby instrument system and adds a second standby instrument system, modifies the reversionary control panel, and relocates the landing gear handle.

9. FSB COMPOSITION

9.1 The Board consisted of one L-382 rated FAA inspector and the FSB Chair

10. APPLICANT'S PROPOSAL

10.1 For transitioning from the L-382 with CDS/R to the L-382 5 DU CDS/R, the applicant proposed training, checking, and currency at C/B/B levels.

11. TESTS

11.1 As a result of the applicant's proposal, the T-1 test was waived since some differences training was proposed. T-2 was waived since the flight handling qualities, as proposed, were identical to the L-382 CDS/R aircraft, and the Board agreed with this assessment. It was determined that T-3 testing would be conducted in accordance with AC 120-53.

11.2 The Board member completed the training as proposed by the applicant, which consisted of two hours of ground instruction in a classroom, two hours of training in the aircraft under ground power (used as a system training device), and 3 hours in the air including a take-off and a landing to observe engine display operations and indications.

11.3 No evaluation was made by the board in comparison to a L-382 with analog instruments to the L-382 5 DU CDSR aircraft. As such, training, checking, and currency requirements for this transition is not contained in this report.

12. TEST RESULTS

12.1 No significant differences were noted in the conduct of the maneuvers by the subject Board member. As such the FSB accepted the applicant's proposal for training, checking, and currency levels [C/B/B].

TABLE 2A
MASTER DIFFERENCE REQUIREMENTS

<u>Master Differences Requirements (MDR) Table</u>			
AIRPLANE TYPE RATING: L-382		<u>FROM AIRPLANE</u>	
		L-382CDS/R	L-382 5 DU CDS/R
TO AIRPLANE	L-382CDS/R	Not Applicable	Not Evaluated
	L-382 5 DU CDS/R	C/B/B	Not Applicable

TABLE 2B
ACCEPTABLE OPERATOR DIFFERENCE REQUIREMENTS (ODR)
TABLES

Definitions

(HO) = Handout
 (TCBI) = Tutorial Computer Based Instruction
 (SU) = Stand-up Instructors
 (ICBI) = Interactive Computer Based Instruction
 (SIM C-D) = Simulators (level C or D)
 (ACFT) = Aircraft
 (SYS) = Systems Device

DIFFERENCE AIRCRAFT: Lockheed L-382 5 DU CDS/R				COMPLIANCE METHOD					
BASE AIRCRAFT: Lockheed L-382 CDS/R									
APPROVED BY (POI) _____				TRAINING				CHKG/CURR	
DESIGN	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D	CHK	CURR
None	Not Applicable	No							

DIFFERENCE AIRCRAFT: Lockheed L-382 5 DU CDS/R				COMPLIANCE METHOD					
BASE AIRCRAFT: Lockheed L-382 CDS/R									
APPROVED BY (POI) _____				TRAINING				CHKG/CURR	
MANEUVER	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D	CHK	CURR
None	Not Applicable	No							

DIFFERENCE AIRCRAFT: Lockheed L-382 5 DU CDS/R				COMPLIANCE METHOD					
BASE AIRCRAFT: Lockheed L-382 CDS/R									
APPROVED BY (POI) _____				TRAINING				CHKG/CURR	
SYSTEM	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D	CHK	CURR
24.2 AC Power Dist	Revised CB Installation	No	NORM	HO				A	A
24.3 DC Power Dist	Revised CB Installation	No	NORM		SU HO			B	B
31.1 Inst Panels	Revised Pilot/Copilot Panels	No	NORM	HO				A	A
31.3 EFIS	Added co-pilot's MFD DU	No	NORM/ ABNML/ EMER		HO	SYS		B	B
32 Landing Gear	Landing gear handle re-location. Otherwise, no change.	-	-						
33.1 Lights	Change to Pilot/Copilot Inst Lights	No	NORM	HO				A	A
34.12 Standby Attitude	Second New Standby Instrument System display is Installed	No	NORM		SU HO			B	B
75.1 Engine Anti-Ice annunciation	Engine anti-ice annunciation displayed on engine display DU. No change in operation	No	NORM EMER		SU HO	SYS		B	B
77.1 Torque	Torque displayed on engine display DU. No change in operation	No	NORM EMER		SU HO	SYS		B	B
77.2 RPM	RPM displayed on engine display DU. No change in operation	No	NORM EMER		SU HO	SYS		B	B
77.3 TIT	TIT displayed on engine display DU. No change in operation	No	NORM EMER		SU HO	SYS		B	B
77.4 Fuel Flow	Fuel flow displayed on engine display DU. No change in operation	No	NORM EMER		SU HO	SYS		B	B
77.5 Engine Oil Temperature	Engine oil temperature displayed on engine display DU. No change in operation	No	NORM EMER		SU HO	SYS		B	B
77.6 Gear Box Oil Pressure	Gear box oil pressure displayed on engine display DU. No change in operation	No	NORM EMER		SU HO	SYS		B	B

DIFFERENCE AIRCRAFT: Lockheed L-382 5 DU CDS/R				COMPLIANCE METHOD					
BASE AIRCRAFT: Lockheed L-382 CDS/R									
APPROVED BY (POI) _____				TRAINING			CHKG/CURR		
SYSTEM	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D	CHK	CURR
77.7 Engine Oil Pressure	Engine oil pressure displayed on engine display DU. No change in operation	No	NORM EMER		SU HO	SYS		B	B
77.8 Engine Oil Quantity	Engine oil quantity displayed on engine display DU. No change in operation	No	NORM EMER		SU HO	SYS		B	B
77.9 Engine Cooler Flap Position	Engine cooler flap position displayed on engine display DU. No change in operation	No	NORM EMER		SU HO	SYS		B	B
77.10 BETA Annunciation	BETA annunciation displayed on engine display DU. No change in operation	No	NORM EMER		SU HO	SYS		B	B
77.11 LSGI Annunciation	LSGI annunciation displayed on engine display DU. No change in operation	No	NORM EMER		SU HO	SYS		B	B
77.12 Gear Box Oil Pressure LOW Annunciation	Gear box oil pressure LOW annunciation displayed on engine display DU. No change in operation	No	NORM EMER		SU HO	SYS		B	B
77.13 Engine Oil Pressure LOW Annunciation	Engine oil pressure LOW annunciation displayed on engine display DU. No change in operation	No	NORM EMER		SU HO	SYS		B	B
77.14 Engine Oil Quantity LOW Annunciation	Engine oil quantity LOW annunciation displayed on engine display DU. No change in operation	No	NORM EMER		SU HO	SYS		B	B
77.15 PROP OIL LOW annunciation	PROP oil LOW quantity annunciation displayed on engine display DU. No change in operation	No	NORM EMER		SU HO	SYS		B	B
77.16 Reversionary Panel	Added engine display reversionary panel	No	NORM EMER		SU HO	SYS		B	B
77.17 EFC Annunciation	EFC annunciation displayed on engine display DU. No change in operation	No	NORM EMER		SU HO	SYS		B	B

- END OF APPENDIX 2 -

APPENDIX 3:

Lockheed L-382 5 DU (display unit) CDS/R with Advanced File Graphics Server (AFGS) installed in an L-382G aircraft.

APPLICABLE STC: ST01162LA

DESCRIPTION:

Advanced file graphics server provides data to the integrated computers and display units of the L-382 CDS/R system to display navigational charts and map functions on the MFD. Each AFGS is interconnected to its on-side FMS (flight management system). This allows the charts CDS/R function to pre-load the airport diagrams, departures, enroute, arrival, approach, and destination airport diagrams for the active route.

An aircraft with this installation shall be referenced in this report as the “**L-382 5 DU CDS/R with AFGS**”.

1. "MASTER COMMON REQUIREMENTS" (MCRs)

1.1 The L-382 5 DU CDS/R with AFGS has added Electronic Flight Bag [EFB] capability over the L-382 5 DU CDS/R. Takeoff and landing performance and flight characteristics are identical for L-382 CDS/R, L-382 5 DU CDS/R, and L-382 5 DU CDS/R with AFGS.

2. MASTER DIFFERENCES REQUIREMENTS (MDR's)

2.1 MDR'S are as depicted in the MDR table in Appendix 3, Table 3A. The base aircraft (from airplane) is the L-382 5 DU CDS/R. This L-382 5 DU CDS/R version includes the electronic engine display and dual MFD displays as described in Appendix 2 of this report. The variant (to airplane) is the L-382 5 DU CDS/R with dual advanced file graphics server (AFGS).

2.2 In summary, the MDR for the L-382 CDS/R with AFGS is C/B/B. This denotes C level training requiring training in a systems device; B Level checking requiring a task or system check in the use of the CDS/R advanced file graphics server charts function; and B level currency requiring self review.

3. ACCEPTABLE OPERATOR DIFFERENCE REQUIREMENTS (ODR'S)

3.1 ODR tables, included in Appendix 3, Table 3B, consist of Design, System, and Maneuver Differences Tables.

4. FSB SPECIFICATION FOR TRAINING

4.1 Operators training programs should emphasize the differences using the methods prescribed in the ODR System Differences Table. Note that training is at Level C. An L-382 5 DU CDS/R with AFGS airplane with ground power applied to the cockpit, is an acceptable systems training device. As a minimum, ground training must include, a review of the AFM Supplement, and associated pilot manuals or user guides that pertain to the operation of the AFGS installation.

4.2 Special emphasis training must be placed on Crew Resource Management (CRM) in the use and display of chart functions, i.e. screen control, approach duties, monitoring duties, etc.

5. FSB SPECIFICATION FOR CHECKING

5.1 Checking is set at Level B. Level B requires a task or systems check for L-382 5 DU CDS/R aircraft with AFGS. Checking may be limited to the knowledge of and use of the AFGS functions [EFB flight information and charting.]

6. FSB SPECIFICATION FOR CURRENCY

6.1 Currency is set at Level B. Operators should confirm the flight crews annually review the L-382 5 DU CDS/R with AFGS charts retrieval functions, operations, and procedures.

6.2 In addition, initial flight crew qualification for currency will be required. This will be considered complete when each individual flight crew member (pilot, co-pilot, flight engineer) has logged 3 flights where the paper charts were on board for those flights that required the use of charts, but the electronic charts were used to supply the needed navigational and charting flight information*.

* (14 CFR part 121 and 135 operators will require operational approval from their POI before paperless operation may commence.)

7. FSB SPECIFICATION FOR DEVICES OR SIMULATORS

7.1 Training and checking should be accomplished in a system training device that replicates the layout and functions of the L-382 5DU CDS/R with AFGS. Systems Devices may include interactive computer based instruction, part task trainers, cockpit procedures trainers, or Flight Training Devices (FTD).

7.2 Using an L-382 5DU CDS/R with AFGS airplane cockpit that is electrically powered on the ground, is an acceptable Level C training device.

8. BACKGROUND OF THE INSTALLATION

8.1 Prior to this modification, the dual advanced file graphics server (AFGS) was not installed and electronic display of Jeppesen supplied charts and maps was not a CDS/R system function. With this approval under FAA amendment to STC ST01162LA, the integrated computers and display units of the CDS/R system now have the capability to display the charts and map function. The MFD controller was also upgraded to provide the needed human interface capability. With the installation of the AFGS, the previously approved MFD soft menus now have a CHART main menu selection. This selection, like the MFD menu selections of the baseline system, is selected using the MFD controller joystick. The CHART main menu selection leads to a sub menu that is designed to allow data selections by phase of flight. More specialized menus are made available for each phase of flight. When appropriate for the displayed chart, the own ship's position is displayed in all but the approach vertical profile views.

Each AFGS is interconnected to its on-side FMS (flight management system). This allows the charts CDS/R function to pre-load the airport diagrams, departures, enroute, arrival, approach, and destination airport diagrams for the active route. In turn, this allows the flight crew charts retrieval workload to be reduced. In addition, the system allows selection of any stored chart data item by the use of a virtual alpha –numeric keyboard. The typical chart retrieval time is nearly instantaneous. Items that require a large amount of memory typically take less than 2 seconds after selection to be displayed.

The AFGS units, like the MFDs and their controllers, are powered by independent D.C. electrical buses. This allows system redundancy for the AFGS stored data to be retrieved from at least one AFGS, and displayed on its MFD, even after a major aircraft power failure.

This added function to the MFD does not impact its ability to be selected as either a back up PFD or back up engine display, as selected by the flight crew. Further the installation of the dual AFGS units does not impact the operation of any of the other components of the baseline STC.

9. FSB COMPOSITION

9.1 The Board consisted of two FAA inspectors and the FSB Chair. The Board members were qualified in the L-382.

10. APPLICANT'S PROPOSAL

10.1 The applicant submitted MCR and ODR tables and the differences training proposed at C/B/B levels. The FSB verified and accepted these levels during the FSB evaluation process.

11. TESTS

11.1 As a result of the applicant's proposal, the T-1 test was waived since some difference training was proposed. T-2 was waived as the flight handling qualities were proposed as identical to the L-382 5 DU CDS/R aircraft and the Board agreed with this assessment. As a result, AC 120-53 dictates a T-3 test. Board members completed the training as proposed by the applicant, which consisted of six hours of ground instruction in a classroom, followed by two hours in an AFGS equipped L-382 5 DU CDS/R aircraft operated on ground power. [The L-382 5 DU CDS/R with AFGS airplane was used in this instance as a system training device.] All training was provided by the applicant. Board members validated the training by flying an AFGS equipped L-382 5 DU CDS/R airplane and testing EFB functions as provided by the AFGS installation.

11.2 Enroute and Map functions associated with the capabilities of the dual AFGS system were not evaluated during the FSB. Only charts functions used in the terminal area were evaluated.

12. TEST RESULTS

12.1 The functionality and operation of the L-382 5 DU CDS/R with AFGS was conducted by FSB members during taxi, departure, arrival, and instrument approaches at Mojave Airport, Burbank Airport, Palm Springs Airport, and Victorville Airport (California). Electronic approach plates and airport diagrams were displayed on selected MFDs, provided by the dual AFGS system, for use by the crew in conducting multiple approaches and landings.

12.2 The FSB only evaluated acceptability of the charts information and not the maps portion of any EFB function. Charts evaluated include: airport diagrams, taxi diagrams, departure and arrival procedures, and approach procedures. Map information, in paper form, will still be required to be provided to the aircrew on-board the aircraft.

12.3. Electronic representations of chart information as described in Para. 12.2 and as provided by the dual AFGS system, was found to be an acceptable alternative to the same information provided by paper documents in accordance with AC 120-76A. (Although the functionality and operation of the L-382 5 DU CDS/R airplane with AFGS was found to be operationally suitable, approval to conduct paperless operations in accordance with 14 CFR part 121 or 135 must be authorized by Operations Specification.)

TABLE 3A
MASTER DIFFERENCE REQUIREMENTS

<u>Master Differences Requirements (MDR) Table</u>			
AIRPLANE TYPE RATING: L-382		<u>FROM AIRPLANE</u>	
		L-382 5 DU CDS/R	L-382 5 DU CDS/R with AFGS <small>[Advanced File Graphics Server]</small>
TO AIRPLANE	L-382 5 DU CDS/R	Not Applicable	Not Evaluated
	L-382 5 DU CDS/R with AFGS <small>[Advanced File Graphics Server]</small>	C/B/B	Not Applicable

TABLE 3B
ACCEPTABLE OPERATOR DIFFERENCE REQUIREMENTS (ODR)
TABLES

Definitions

(HO) = Handout
 (TCBI) = Tutorial Computer Based Instruction
 (SU) = Stand-up Instructors
 (ICBI) = Interactive Computer Based Instruction
 (SIM C-D) = Simulators (level C or D)
 (ACFT) = Aircraft
 (SYS) = System Device

DIFFERENCE AIRCRAFT: Lockheed L-382 5 DU CDS/R with AFGS				COMPLIANCE METHOD					
BASE AIRCRAFT: Lockheed L-382 5 DU CDS/R				TRAINING				CHKG/CURR	
APPROVED BY (POI) _____				TRAINING				CHKG/CURR	
DESIGN	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D	CHK	CURR
None	Not Applicable	No							

DIFFERENCE AIRCRAFT: Lockheed L-382 5 DU CDS/R with AFGS				COMPLIANCE METHOD					
BASE AIRCRAFT: Lockheed L-382 5 DU CDS/R				TRAINING				CHKG/CURR	
APPROVED BY (POI) _____				TRAINING				CHKG/CURR	
MANEUVER	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D	CHK	CURR
None	Not Applicable	No							

DIFFERENCE AIRCRAFT: Lockheed L-382 5 DU CDS/R with AFGS BASE AIRCRAFT: Lockheed L-382 5 DU CDS/R APPROVED BY (POI)_____					COMPLIANCE METHOD				
					TRAINING			CHKG/CURR	
SYSTEM	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D	CHK	CURR
24.3 DC Power Dist	Revised CB Installation	No	NORM		SU HO			B	B
31.3 EFIS	Added CHART/UPWX as MFD main menu selection	No	No			SYS		B	B
34.31 FMS	Electronic interconnect between on side FMS active flight plan and on side MFD CHART function	No	No		HO	SYS		B	B

- END OF APPENDIX 3 -

APPENDIX 4:

Lockheed L-382 5 DU (display unit) CDS/R and Integrated Autoflight Control System (AFCS) Upgrade installed in an L-382G aircraft.

APPLICABLE STC: ST01162LA

DESCRIPTION:

This installation replaces the existing autopilot with a digital autopilot and flight director system that is integrated with the CDS/R electronic display system installed under the baseline STC, ST01162LA. This autopilot upgrade is intended only for those aircraft that have the 5 DU version of the CDS/R installed. Some of these aircraft will also have the advanced file graphic server (AFGS) installed as described in Appendix 3 of this report.

An aircraft with this installation shall be referenced in this report as the “**L-382 5 DU CDS/R-AFCS**”.

1. "MASTER COMMON REQUIREMENTS" (MCRs)

1.1 The L-382 5 DU CDS/R with integrated autoflight control system [AFCS] is a L-382 5 DU CDS/R aircraft with a digital autopilot and flight director system (Honeywell Primus) with associated components, and an upgrade to the Honeywell FMS with 6.1 software. . Takeoff and landing performance and flight characteristics are identical for the L-382, L-382 CDS/R, and L-382 5DU CDS/R (with or without AFGS).

2. MASTER DIFFERENCES REQUIREMENTS (MDR's)

2.1 MDR'S are as depicted in the MDR table in Appendix 4, Table 4A. The base aircraft (from airplane) is the L-382 5 DU CDS/R. This L-382 5 DU CDS/R version includes the electronic engine display and dual MFD displays as described in Appendix 2 of this report. The variant (to airplane) is the L-382 5 DU CDS/R with integrated autoflight control upgrade (L-382 5 DU CDS/R-AFCS).

2.2 In summary, the MDR for the L-382 5 DU CDS/R-AFCS is C/B/B. This denotes C level training requiring training in a systems device; B Level checking requiring a task or system check in the use of the CDS/R with integrated AFCS; and B level currency requiring periodic self review.

3. ACCEPTABLE OPERATOR DIFFERENCE REQUIREMENTS (ODR'S)

3.1 ODR tables, included in Appendix 4, Table 4B, consist of Design, System, and Maneuver Difference Tables.

4. FSB SPECIFICATION FOR TRAINING

4.1 Operators training programs should emphasize the differences using the methods prescribed in the ODR System Differences Table. Note that training is at Level C. An L-382 5 DU CDS/R-AFCS airplane with ground power applied to the cockpit, is an acceptable systems training device. As a minimum, ground training must include, a review of the AFM Supplement, and associated pilot manuals or user guides that pertain to the operation of the AFCS installation.

4.2 Special emphasis training should include Vertical Navigation [VNAV] capabilities and limitations for use during climb-out, enroute, descent, and approach.

5. FSB SPECIFICATION FOR CHECKING

5.1 Checking is set at Level B. Level B requires a task or systems check for L-382 5 DU CDS/R-AFCS aircraft. Checking may be limited to the knowledge of and use of the AFCS functions and capabilities with special emphasis on VNAV operations.

6. FSB SPECIFICATION FOR CURRENCY

6.1 Currency is set at Level B. Operators should confirm the flight crews periodic review of the CDS/R-AFCS operations and procedures. Operational use of the L-382 5 DU CDS/R with the original autopilot and flight director is very similar to that with the CDS/R-AFCS integrated installation. Thus, once training and checking are completed, flight crews are qualified to operate the installed system.

7. FSB SPECIFICATION FOR DEVICES OR SIMULATORS

7.1 Training and checking should be accomplished in a system training Device that replicates the layout and functions of the L-382 5DU CDS/R-AFCS installation. Use of the airplane cockpit, with ground power attached and the L-382 5DU CDS/R-AFCS installed, on the ground, is acceptable as a Level C system device.

8. BACKGROUND OF THE INSTALLATION

8.1 This installed auto flight system is a legacy Honeywell P 1000 AFCS. Further, the P 1000 system has its heritage in the Honeywell SPZ 4000 and later SPZ 4500 AFCS. These systems have been previously installed and certified in several different corporate, regional and special mission aircraft types. Thus, its basic design philosophy, and the functional and operational design goals for the specific integrated flight director modes, have a considerable history of operational experience to draw upon.

When engaged, the selected autopilot (left or right), controls the servos to satisfy the engaged flight director modes. As with the original autoflight system, these servos connect to the control cables which, in turn, connect to the respective control surface's dual powered hydraulic actuators. In addition, the system's flight director function, from the same IC 1080 as the selected autopilot, provides the inputs to the on side selected autopilot and controls the flight director command bars on both PFD displays.

The various installed sensor interfaces, including navigation receivers, provide the needed inputs to the Integrated Computers (IC). Like the selected flight director function, the sensors from the selected side provide the inputs for their AP's functions computations. The IC 1080 with the selected flight director function then performs the computations needed to satisfy the pilot's (Guidance Controller) GC 550 inputs and selections so that the command bars will provide the desired guidance.

The autopilot function provides fail passive operation. That is, the all digital AP function is designed such that, if, using its internal capabilities, an AP processing fault is detected, the AP function is designed to disengage its servos and return aircraft control to the pilot. The AP internal capabilities include: dissimilar and separate digital processing paths of the same command request; and various performance monitors. This internal capability also includes monitoring of two independent attitude inputs from the suite of installed IRS units. Conversely, in order to engage the AP, the aircraft installation interlocking relays must be in the proper state. When this is the case, the AP/YD can be engaged. Thus protection from undesired engagement is also provided.

The AFCS function uses the existing aircraft elevator trim control system to trim the pitch axis. The existing aircraft pilot actuated aileron and rudder manual trim systems remain as the trim mechanisms for those axes.

Because of its importance to safe aircraft operation, an AP change in engage or disengage status is annunciated. This is accomplished using a combination of visual annunciation on the PFD and in the Consolidated Annunciator Panel (CAP); and, for disengagement, an aural and voice annunciation.

9. FSB COMPOSITION

9.1 The Board consisted of two FAA inspectors rated in the L-382 and the FSB chair.

10. APPLICANT'S PROPOSAL

10.1 The applicant submitted MCR and ODR tables and the differences training proposed at C/B/B levels. The FSB verified and accepted these levels during the FSB evaluation process.

11. TESTS

11.1 As a result of the applicant's proposal, the T-1 test was waived since some difference training was proposed. T-2 was waived as the flight handling qualities were proposed as identical to the L-382 5 DU CDS/R aircraft and the Board agreed with this assessment. As a result, AC 120-53 dictates a T-3 test. Board members completed the training as proposed by the applicant, which consisted of two hours of ground instruction in a classroom, followed by two hours in an AFCS equipped L-382 5 DU CDS/R aircraft operated on ground power. [The L-382 5 DU CDS/R-AFGS airplane was used in this instance as a system training device.] All training was provided by the applicant. Board members validated the training by flying an AFCS equipped L-382 5 DU CDS/R airplane and evaluating autopilot and flight director functionality as provided by the AFCS installation.

12. TEST RESULTS

12.1 The functionality and operation of the L-382 5 DU CDS/R-AFCS was conducted by FSB members during taxi, departure, arrival, and multiple instrument approaches at Mojave Airport, Burbank Airport, Palm Springs Airport, and Victorville Airport (California).

12.2 The ground and flight evaluation of the upgrade to the autoflight system and FMS 6.1 software was found to be operationally suitable and compatible with installed electronic CDS/R display systems.

TABLE 4A
MASTER DIFFERENCE REQUIREMENTS

<u>Master Differences Requirements (MDR) Table</u>			
AIRPLANE TYPE RATING: L-382		<u>FROM AIRPLANE</u>	
		L-382 5 DU CDS/R	L-382 5 DU CDS/R- AFCS [Autoflight Control System] [With or without Advanced Flight Graphics Server installed]
TO AIRPLANE	L-382 5 DU CDS/R	Not Applicable	Not Evaluated
	L-382 5 DU CDS/R -AFCS [Autoflight Control System] [With or without Advanced Flight Graphics Server installed]	C/B/B	Not Applicable

TABLE 4B
ACCEPTABLE OPERATOR DIFFERENCE REQUIREMENTS (ODR)
TABLES

Definitions

(HO) = Handout
 (TCBI) = Tutorial Computer Based Instruction
 (SU) = Stand-up Instructors
 (ICBI) = Interactive Computer Based Instruction
 (SIM C-D) = Simulators (level C or D)
 (ACFT) = Aircraft
 (SYS) = System Device

DIFFERENCE AIRCRAFT: Lockheed L-382 5 DU CDS/R and integrated AFCS [Autoflight Control System]				COMPLIANCE METHOD					
BASE AIRCRAFT: Lockheed L-382 5 DU CDS/R									
APPROVED BY (POI)_____				TRAINING				CHKG/CURR	
DESIGN	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D	CHK	CURR
None	Not Applicable	No							

DIFFERENCE AIRCRAFT: Lockheed L-382 5 DU CDS/R and integrated AFCS [Autoflight Control System]				COMPLIANCE METHOD					
BASE AIRCRAFT: Lockheed L-382 5 DU CDS/R									
APPROVED BY (POI)_____				TRAINING				CHKG/CURR	
MANEUVER	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D	CHK	CURR
None	Not Applicable	No							

DIFFERENCE AIRCRAFT: Lockheed L-382 5 DU CDS/R and integrated AFCS [Autoflight Control System] BASE AIRCRAFT: Lockheed L-382 5 DU CDS/R APPROVED BY (POI)_____				COMPLIANCE METHOD					
				TRAINING				CHKG/CURR	
SYSTEM	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D	CHK	CURR
22.1 Autopilot	Replaced autopilot computers, controller , servos	No	Yes			HO SU SYS		B	B
22.2 Flight Director	Updated for AFCS . New modes added Replaced controller.	No	Yes			HO SU SYS		B	B
22.3 Yaw Damper	Computer and servo replaced	No	Yes			HO SU		B	B
22.5 Aural Warning	Added	No	No			HO SU SYS		B	B
24.3 DC Power Dist	Revised CB Installation	No	NORM			SU HO		B	B
31.3 EFIS	Added AFCS annunciations	No	Yes			SYS		B	B
34.4 Overspeed Warn	Sub-system replaced	No	No			HO SU SYS		B	B
34.6 Altitude Alert	Sub-system replaced	No	No			HO SU SYS		B	B
34.8 Speed Command	FLC, VFLC modes added	No	Yes			HO SU SYS		B	B
34.31 FMS	FMS update. WAAS/LPV approach capability added. Coupled FMS VNAV added.	No	Yes			HO SU SYS		B	B

-END OF APPENDIX 4-

APPENDIX 5:

Coulson EC-130Q with RADS I

APPLICABLE STC: SA15543LA-T

DESCRIPTION: The Retardant Aerial Delivery System (RADS) I is installed in the EC-130Q as a firefighting tool by the Coulson Companies. This installation has been utilized extensively in public use aircraft and this is the first installation in a non-public use aircraft.

1. "MASTER COMMON REQUIREMENTS" (MCRs)

1.1 Takeoff and landing performance and flight characteristics are identical for the EC-130Q aircraft and EC-130Q Tanker aircraft.

2. MASTER DIFFERENCES REQUIREMENTS (MDR's)

2.1 MDR's are as depicted in the MDR table in Appendix 5, Table 5A. The base aircraft (from airplane) is the EC-130Q. The variant airplane is the EC-130Q Tanker. The MDR for the EC-130Q Tanker is E/-/E. This denotes E level training requiring training in a systems device, no E level checking requirement, and E level currency requiring periodic review of material identified by the operator. E level training and currency are needed as there are no simulators that fully replicate the handling characteristics of a fluid drop.

3. ACCEPTABLE OPERATOR DIFFERENCE REQUIREMENTS (ODR'S)

3.1 ODR tables, included in Appendix 5, Table 5B, consist of Design, System, and Maneuver Difference Tables.

4. FSB SPECIFICATION FOR TRAINING

4.1 Operator's training programs should emphasize the differences in prescribed in the ODR System Difference Table (Appendix 5, Table 5B). With training required at Level E a flight training program in an EC-130Q Tanker is considered the minimum medium for training delivery. Ground training must include a review of the AFM Supplement and the EC-130Q Pilot's Manual.

5. FSB SPECIFICATION FOR CHECKING

5.1 No checking requirements are necessary for the RADS I installation.

6. FSB SPECIFICATION FOR CURRENCY

6.1 Currency level is set at level E as prescribed in AC 120-53. Operators should demonstrate aerial delivery of the system annually in the aircraft.

7. FSB SPECIFICATION FOR DEVICES OR SIMULATORS

7.1 Training and currency should be accomplished in a systems device that replicates the layout and functions of the EC-130Q RADS I installation. Use of the EC-130Q RADS I airplane with ground power applied is acceptable as a Level C systems device.

8. BACKGROUND OF THE INSTALLATION

8.1 This modification (SA 15543LA-T) installs the Retardant Aerial Delivery System (RADS I) in the EC-130Q. This system has been installed on previous aircraft and deployed successfully for many years. This installation is the first in a civilian version of the Lockheed C-130 family of aircraft.

9. FSB COMPOSITION

9.1 The Board consisted of the FSB chair.

10. APPLICANT'S PROPOSAL

10.1 For transitioning from the L-382 to the EC-130Q with RADS I, the applicant proposed training, checking, and currency at E/-/E levels. At the time of this report no simulator existed for the EC-130Q with RADS I installed. Training and currency must be conducted in the aircraft to assess the handling characteristics and established procedures.

11. TESTS

11.1 As a result of the applicant's proposal, the T-1 test was waived since some differences training was proposed. T-2 test to evaluate the flight handling qualities, as proposed, were identical to the L-382 and EC-130Q aircraft, and the Board agreed with this assessment. It was determined that T-3 testing would be conducted in accordance with AC 120-53.

11.2 The Board member completed the training as proposed by the applicant, which consisted of one hour of ground instruction in a classroom and in the aircraft. Followed by a flight with a water drop which simulated a firefighting event. The drop was conducted no lower than 500' above ground level (AGL).

12. TEST RESULTS

12.1 No significant differences were noted in the conduct of the maneuvers by the subject Board member. As such the FSB accepted the applicant's proposal for training, checking, and currency levels [E/-/E].

TABLE 5A
MASTER DIFFERENCE REQUIREMENTS

<u>Master Differences Requirements (MDR) Table</u>		
AIRPLANE TYPE RATING: EC-130Q		<u>FROM AIRPLANE</u>
		L-382
TO AIRPLANE	EC-130Q TANKER	E / - / E

|

TABLE 5B
ACCEPTABLE OPERATOR DIFFERENCE REQUIREMENTS (ODR)
TABLES

Definitions

AVT*	-	Audio Visual Tape presentation
CBT*	-	Computer Based Training
CHK	-	Checking
CURR	-	Currency
FTD	-	Flight Training Device
FLT CHK	-	Flight Check
LEC*	-	Lecture
SIM	-	Simulator specifies minimum level
TNG HND OUT	-	Training Hand Out

*Any one form of presentation or any combination may be acceptable

DIFFERENCE AIRCRAFT: EC-130Q w/ RADS I BASE AIRCRAFT: Lockheed L-382 APPROVED BY (POI) _____				COMPLIANCE METHOD					
				TRAINING				CHKG/CURR	
DESIGN	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D	CHK	CURR
Cockpit Config.	RADS I cockpit displays and controls	No	No			LEC			

DIFFERENCE AIRCRAFT: EC-130Q w/ RADS I				COMPLIANCE METHOD					
BASE AIRCRAFT: Lockheed L-382									
APPROVED BY (POI) _____				TRAINING				CHKG/CURR	
MANEUVER	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL E	CHK	CURR
Water Drop	Simulated firefighting event at 500' AGL	Yes	No				In aircraft	-	Every 12 months

DIFFERENCE AIRCRAFT: EC-130Q w/ RADS I				COMPLIANCE METHOD					
BASE AIRCRAFT: Lockheed L-382 CDS/R									
APPROVED BY (POI) _____				TRAINING				CHKG/CURR	
SYSTEM	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D	CHK	CURR
29 Hydraulic system	Change to add RADS I	No	No		LEC			-	-
31 Inst Panels	Revised Pilot/Copilot Panels	No	No		LEC	In aircraft		-	-

DIFFERENCE AIRCRAFT: EC-130Q w/ RADS I					COMPLIANCE METHOD					
BASE AIRCRAFT: Lockheed L-382										
APPROVED BY (POI) _____					TRAINING				CHKG/CURR	
SYSTEM	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D	CHK	CURR	
29 Hydraulic system	Change to add RADS I	No	No		LEC			-	-	
31 Inst Panels	Revised Pilot/Copilot Panels	No	No		LEC			-	-	

- END OF APPENDIX 5-