LV87-161101
Certification User's Manual
Cabin Wireless Access Point (CWAP)
(CWAP 186140-102)

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1 List of Abbreviations / Acronyms

Acronym / Abbreviation	Definition
A	Ampere
AC, ac	Alternating Current
ACB	Auxiliary Control Board
ACC	Aircraft Connectivity Controller
AES	Advanced Encryption Standard
AIC	Airborne Inhabited Cargo
AP	Access Point
ARINC	Aeronautical Radio, Incorporated
ATA	Air Transport Association
AWG	American Wire Gauge
BER	Bit Error Rate
BHM	Bit History Memory
BIT	Built In Test
BITE	Built In Test Equipment
BPSK	Binary Phase Shift Keying
C	Celsius
Cat, CAT	Category
CLI	Command Line Interface
CMD	Command
CTS	Component Technical Specification
CWAP	Cabin Wireless Access Point
dBm	decibel-milliwatts
DC, dc	Direct Current
DFS	Dynamic Frequency Selection
DHCP	Dynamic Host Configuration Protocol
DISC, Disc	Discrete
DSSS	Direct Sequence Spread Spectrum
DSU	Digital Server Unit
DTC	Design to Cost
DVT	Design Verification Test
DWG	Drawing
EAP	Extensible Authentication Protocol
ENET	Ethernet
ESD	Electro-Static Discharge
ESS	Environmental Stress Screening
ETH	Ethernet
EUT	Equipment under Test

FAA	Federal Aviation Administration
FAR	Federal Aviation Regulations
FCC	Federal Communications Commission
FVIN	Firmware Version Identification Number
FWD	Forward
Gbps	Gigabits per second
GFCI	Ground Fault Circuit Interrupter
GHz	Gigahertz
GND	Ground
GSE	Ground Support Equipment
GUI	Graphic User Interface
HALT	Highly Accelerated Life Test
HASS	Highly Accelerated Stress Screening
HI	High
HMN	Host Marketing Name
HRS	Hardware Requirements Specification
HVIN	Hardware Version Identification Number
HW	Hardware
Hz	Hertz
ISEDC	Innovation Science and Economic Development Canada
ID	Identity, Identification
IEEE	Institute of Electrical and Electronic Engineers
IP	Internet Protocol
IPv4	Internet Protocol version 4
Ipv6	Internet Protocol version 6
IUL	In-Use Light
kg	kilogram
LAN	Local Area Network
lbs	Pounds
LED	Light Emitting Diode
LISN	Line Impedance Stabilization Network
LO	Low
LRU	Line Replaceable Unit
MAC	Medium Access Control
Mbps	Megabits per second
MBU	Multiple Bit Upset
MCU	Master Control Unit
MHz	Megahertz
MIMO	Multiple Input Multiple Output
mm	millimeter

MPS	Multi-Purpose Server
MTBF	Mean Time Between Failures
MTBUR	Mean Time Between Unscheduled Removal
N/A	Not Applicable
NTS	National Technical Systems
OFDM	Orthogonal Frequency Division Multiplexing
PC	Personal Computer
PCB	Polychlorinated Biphenyl
PCU	Passenger Control Unit
PDR	Preliminary Design Review
PED	Passenger/Personal Electronic Device (mobile, tablet etc.)
PFDB	Power Floor Disconnect Box
PHY	Physical layer, from the OSI 7 layer model
PMN	Product Marketing Name
PN	Port Number
PoE	Power over Ethernet
POST	Power-On Self-Test
PVC	Polyvinyl-Chloride
QAM	Quadrature Amplitude Modulation
QPSK	Quadrature Phase Shift Keying
QUAL	Qualification
RDO	Remote Data Outlet (USB)
Rev, REV	Revision
RF	Radio Frequency
RFID	Radio Frequency Identification
RoHS	Restriction of Hazardous Substances
RPO	Remote Power Outlet
RSS	Radio Standard Specification (ISEDC)
RTN	Return
RX	Receive / Reception
SAC	Seat Actuator
SAL	Security Assurance Level
SCF	Single Phase, Constant Frequency (115 V)
SCFH	Single Phase, Constant Frequency (230 V)
SEU	Single Event Upset
SNMP	Simple Network Management Protocol
SPDB	Secondary Power Distribution Box
SPS	Small Power Supply
SRS	Software Requirements Specification
SRU	Shop Replaceable Unit

SSID	Service Set Identifier
SSS	System/Subsystem Specification
SVF	Single Phase, Variable Frequency (115 V)
SVFH	Single Phase, Variable Frequency (230 V)
SW	Software
TBC	To Be Confirmed
TBD	To Be Determined
TKIP	Temporal Key Integrity Protocol
TLS	Transport Layer Security
TPC	Transmit Power Control
TX	Transmit
UI	User Interface
UL	Underwriters Laboratories
U-NII	Unlicensed National Information Infrastructure
URD	Unit Requirement Document
USB	Universal Serial Bus
V	Volt
VA	Volt-Ampere
VAC	Volts Alternating Current
VLAN	Virtual Local Area Network
W	Watt
WEP	Wired Equivalent Privacy
W-IFE	Wireless In-Flight Entertainment
Wi-Fi, WiFi	Wireless networking technology
WPA	Wi-Fi Protected Access

2 Scope

This document is the User's Manual for the Cabin Wireless Access Point (CWAP) part number LV10-151001-103. It is used for setting up and operating the CWAP for certification testing. Additional requested information about the CWAP is also provided in this document.

Testing performed on the CWAP is to be conducted in accordance with the test methods and procedures of test facility. Interconnecting cable bundle definitions and power connection instructions are provided.

The test articles consist of the Cabin Wireless Access Point (CWAP), Thales Part Number LV10-151001-103.

LV10-151001-103 will be FCC, ISEDC, CE Mark, and ANATEL certified.

The CWAP is powered by aircraft 115 VAC, 400 Hz power.

2.1 Equipment Under Test (EUT) Identification

The EUT identification names and numbers are listed in Table 1.

Table 1: EUT Identification

Identification	Acronym	Value
Model Name	N/A	Cabin Wireless Access Point
Hardware Version Identification Number	HVIN	186140-102
Product Marketing Name	PMN	Cabin Wireless Access Point
Firmware Version Identification Number	FVIN	Switch: 0.9.5 Wi-Fi: 5.8.3.0-041R
Host Marketing Name	HMN	N/A

2.2 Certification Identifications

The CWAP Certification IDs for 186140-102 only are listed in Table 2.

Table 2: Certification ID's

FCC	2AGGY-CWAP
ISEDC	20826-CWAP

2.3 Explanation of Test Procedure Inputs

A **Bold** item is a selection available on the GUI screen. It is selected by clicking on the item.

A ***Bold Italic*** item is a physical key on the keyboard that needs to be pressed.

A "**Bold**" item in quotes is text that is to be entered/typed in exactly as shown, followed by pressing ***Enter***. The text entered is not bolded.

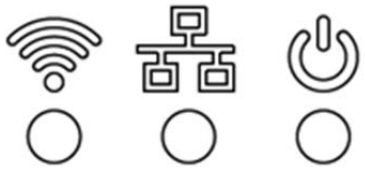
3 Hardware Installation

3.1 Power Up Unit and Connect Wiring

a) Obtain the items called out in Table 3: List of Equipment.
b) Set up the CWAP in the test chamber and run the cables to the outside.
c) Power on the laptop.
d) Connect the USB Hubs to the laptop USB ports as specified in Figure 1.
e) Install the J1, J2, and J3 connectors to the CWAP as specified in Figure 1.
f) Connect the two DB25 connectors.
g) De-activate all switches (switch is towards the black dot).
h) Connect the RJ-45 CAT5e (or CAT6) Ethernet cables to the laptop. The J1 Ethernet goes to the Ethernet port in the computer, the other goes to the Ethernet adapter on the USB Hub.
i) Connect the power supply to the 3 power wires going to J1.
j) Connect the serial connection(s) to the 4-Port Hub as specified in Figure 1.
k) Connect the Wi-Fi adapters to the 7-Port Hub as specified in Figure 1.
    1. Verify that the used 7 Port Hub indicator lights are blue.
    2. If not blue, check if the adapter is enabled (under Change Adapter Settings on the Network and Sharing Center screen).
l) Power on the 115VAC 400Hz power supply.
m) Activate the RF Enable Switch (away from black dot)
n) Activate Power-On Switch (away from black dot)
    1. Verify the behavior of the CWAP LED light pipe. For more information, see LED Indicators in the next section.
    2. The Access Point is ready to configure. For information on basic Access Point device configuration, see 4.1 Initial Setup.

3.2 LED Indicators

The CWAP has three lights on the front face next to the connectors. The light on the right is the main power light. This light should be illuminated once power is applied to the CWAP and the Power ON Switch is activated. The light in the middle is the wired Ethernet light. Once the J1 Ethernet wire is connected to the computer, this light will illuminate. This light blinks with Ethernet activity *. The left most light is the wireless light. This will be illuminated once the wireless radios begin emitting wireless signal. Once a wireless connection is established and data begins flowing, this light will blink *.



* **NOTE:** The LED blink rate is proportional to activity. The busiest traffic corresponds to the fastest blink, while the slowest traffic corresponds to the slowest blink.

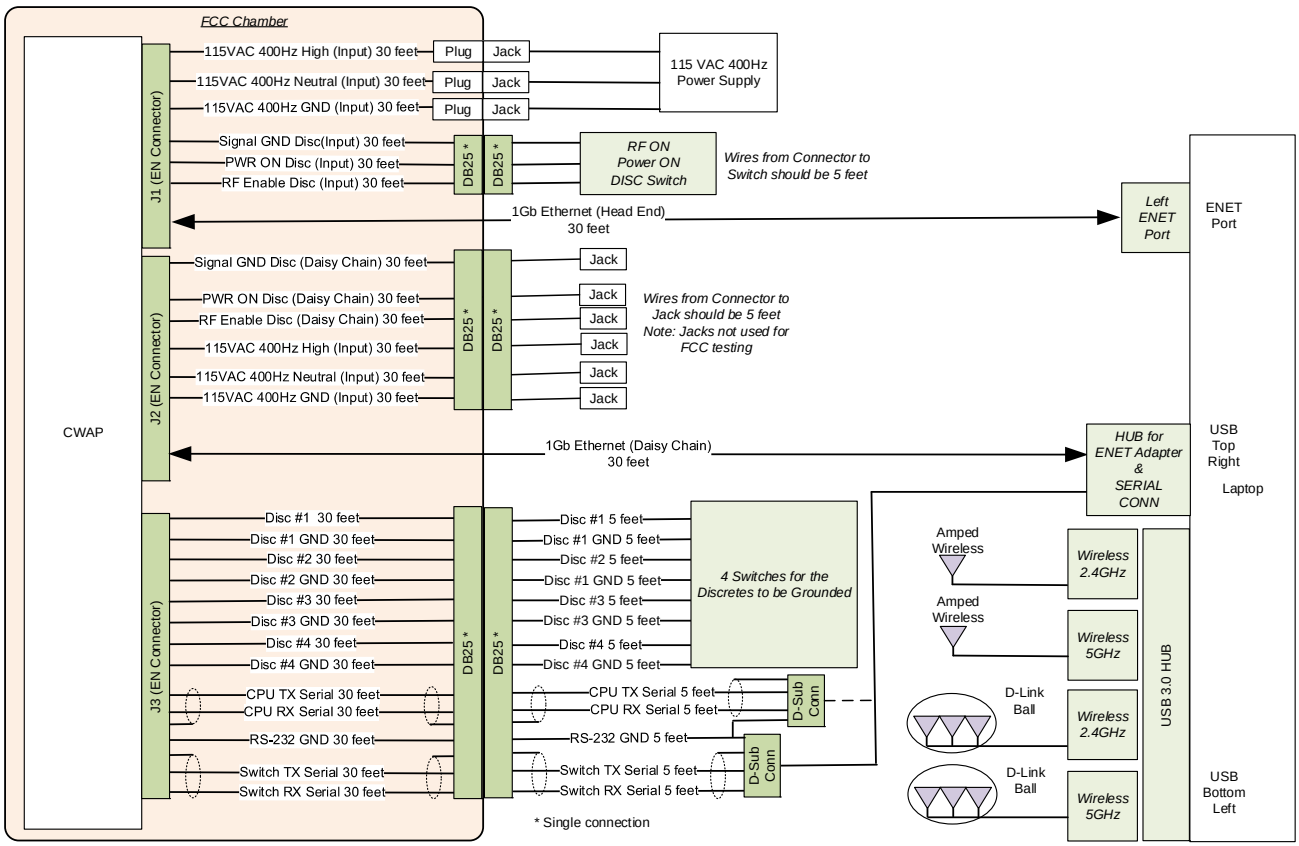


Figure 1: Functional Test: Test Setup

The CWAP uses the following clock frequencies: 175kHz, 300kHz, 3.6864 MHz, 12.2888 MHz, 19.2 MHz, 25 MHz, 25.54 MHz, 27 MHz, 68.25 MHz, 71 MHz, 72 MHz, 100 MHz

CWAP Operating Frequencies: 5180-5240 MHz, 5745-5825 MHz

Note: All DFS channels (5250-5350MHz and the 5470-5725MHz) are permanently disabled by the CWAP software.

Table 3: List of Equipment

Item	Description	Manufacturer & Part Number	Serial Number
1	CWAP	Thales 186140-102	
2	CWAP Cable Assembly FCC	Thales LV71-161103	
3	115VAC 400Hz Power Supply (*NTS provided)*		
4	CWAP User Input Cable Assembly	Thales LV71-160502	
5	Laptop Running Windows 7 Pro Service Pack 1	HP P0C00UT#ABA	
6	USB 3.0 7-Port Hub	Plugable USB3-HUB7-81X	
7	D-Link AC1900 ultra Wi-Fi USB Adapter	D-Link BWA192NAA1	
8	D-Link AC1900 ultra Wi-Fi USB Adapter	D-Link BWA192NAA1	
9	Wi-Fi USB Adapter	Amped Wireless UA230A	
10	Wi-Fi USB Adapter	Amped Wireless UA230A	
11	USB HUB	Amazon Basics GT0215610	
12	USB Serial Adapter	Trendnet TU-S9 (or equivalent)	
13	USB Serial Adapter	TrippLite U209-000-R	

NOTE: Equivalent items may be substituted for the items listed above with the approval of the Test Engineer. Spare items shipped are listed in Table 4.

Table 4: List of Spare Equipment

Item	Description	Manufacturer & Part No.	Serial Number
1	CWAP	Thales 186140-102	
2	CWAP Cable Assembly FCC	Thales LV71-161103	
3	CWAP User Input Cable Assembly	Thales LV71-160502	
4	Laptop Running Windows 10	Acer N16Q2	
5	USB 3.0 7-Port Hub	Plugable USB3-HUB7-81X	
6	D-Link AC1900 ultra Wi-Fi USB Adapter	D-Link BWA192NAA1	
7	D-Link AC1900 ultra Wi-Fi USB Adapter	D-Link BWA192NAA1	
8	Wi-Fi USB Adapter	Amped Wireless UA230A	
9	Wi-Fi USB Adapter	Amped Wireless UA230A	
10	USB HUB	Amazon Basics GT0215610	
11	USB Serial Adapter	Trendnet TU-S9 (or equivalent)	
12	USB Serial Adapter	TrippLite U209-000-R	

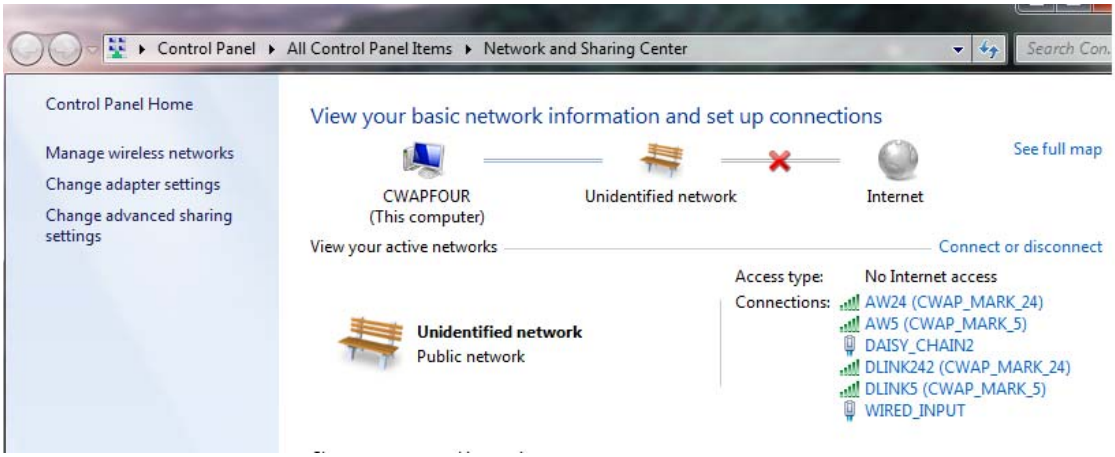
4 Functional Test Setup

4.1 Initial Setup

Once the CWAP is installed and powered on, complete the following steps to access management functions:

1. On the Laptop, open the Wireless Connection button in the lower right hand part of the screen. There should be 4 connections. Ensure two of the connections is connected to the 2.4GHz radio, and the other two are connected to the 5GHz radio. If these do not connect automatically, then find the wireless connection and connect it manually. Once this is done one time, it will automatically do it again in the future, as long as you click the box to connect automatically. See the Figure for Windows 7, below.

2. On the Laptop, access the **Network and Sharing Center**. Ensure there are 6 connections (2 wired and 4 wireless connections). See Figure for Windows 7, below.



3. Open each connection and make sure there is an IP address that will allow all 6 connections to talk. The example IP addresses below and names of the connections do not have to be as shown below, but they all have to match up as the ones below do.

   WIRED_INPUT: 169.254.1.4 (255.255.255.0 MASK)

   DAISY_CHAIN: 169.254.1.5 (255.255.255.0 MASK)

   AW24: 169.254.1.25 (255.255.255.0 MASK) - Needs to be connected to the 2.4GHz radio on CWAP. This connection will be CWAP_MARK_24.

   AW5: 169.254.1.55 (255.255.255.0 MASK) - Needs to be connected to the 5GHz radio on CWAP. This connection will be CWAP_MARK_5.

   DLINK242: 169.254.1.26 (255.255.255.0 MASK) - Needs to be connected to the 2.4GHz radio on CWAP. This connection will be CWAP_MARK_24.

   DLINK5: 169.254.1.56 (255.255.255.0 MASK) - Needs to be connected to the 5GHz radio on CWAP. This connection will be CWAP_MARK_5.

   a. The IP address used must have 169.254.1.X, where the X needs to be unique to each connection, and cannot be the same as the CWAP AP. This is what the Subnet Mask of 255.255.255.0 infers. The names and IP addresses do not have to be exactly what is shown above. Enter the names and IP addresses in the table on the next page (for future reference).
   b. To check these, left click on them. Then select **Details**. The IP address will be shown.
   c. If the IP address needs to be changed, then select **Properties**. Select the IPv4 item then select **Properties**. Select **Use the following IP address** and enter the IP address and Mask that you want to use.
   d. The IP address on the CWAP is shown below. This IP address has to have the same structure as the ones above.

      CWAP AP: 169.254.1.3
   e. The names of the connections can be changed by clicking on **Change Adapter Settings**, and then right clicking on the connection. There will be a selection to rename these if needed.

CONFIGURATION VALUES:

CONNECTION	NAME	X VALUE (169.254.1.X)	PORT
Amped Wireless 2.4 GHz			
Amped Wireless 5 GHz			
D-Link 2.4 GHz			
D-Link 5 GHz			
Input Wired Ethernet			N/A
Chain Wired Ethernet			
CWAP AP	N/A		N/A

RADIO CONNECTION	SSID
CWAP 2.4 GHz	
CWAP 5 GHz	

DEVICE SERIAL PORT	PORT
CWAP AP	
Vitesse Switch	

4. The IP address of the CWAP AP is 169.254.1.3. Connect the Test Laptop PC to the CWAP AP by opening a session: enter "**https:\\169.254.1.3**".
5. On the WiNG GUI, enter "**admin**" for the username
6. Enter "**admin**" for the password.
7. Select **Configuration** and then select **Wireless**. The web user interface (WiNG GUI) wireless connections will show the VLAN name and SSID for each connection.
8. If needed, change the SSIDs:
   a. Select the 2.4GHz wireless connection and change the SSID name to "**CWAP_MARK_24**" and then select **Apply**.
   b. Select the 5GHz wireless connection and change the SSID name to "**CWAP_MARK_5**" and then select **Apply**.
   c. Wait 30 seconds for the new names to show up.
   d. Then reconnect the wireless adapters to the newly named wireless connections (per Step 1 above).
9. Write the assigned SSIDs on the SSID table on the Configuration Values page.
10. Log out of WiNG and close the GUI.
11. Access the Scripts by going to the desktop and double clicking on **iperf3**.
12. For the following steps 13 through 17:
    a. *PN* is the assigned Port Number. It must match for each device's client (C) and server (S) bat files.
    b. *X* is the last number of the assigned IP Address (see values previously recorded in table).
    c. Change any values as needed.
13. <u>For the Amped Wireless 2.4 GHz:</u>
    a. Right Click on **WAP2 24C.bat** and select **EDIT**.
    b. Find iperf3 –c 169.254.1.*X* –p *PN* –B 169.254.1.4 –t "" – logfile Logs/24GHz.txt. Modify if needed. Save this file.
    c. Right Click on **WAP2 24S.bat** and select **EDIT**.
    d. Find iperf3 –s –p *PN* –B 169.254.1.*X*. Modify if needed. Save this file.
14. <u>For the D-Link 2.4 GHz:</u>
    a. Right Click on **WAP2 242C.bat** and select **EDIT**.
    b. Find iperf3 –c 169.254.1.*X* –p *PN* –B 169.254.1.4 –t "" – logfile Logs/242GHz.txt. Modify if needed. Save this file.
    c. Right Click on **WAP2 242S.bat** and select **EDIT**.
    d. Find iperf3 –s –p *PN* –B 169.254.1.*X*. Modify if needed. Save this file.
15. <u>For the Amped Wireless 5 GHz:</u>
    a. Right Click on **WAP2 5C.bat** and select **EDIT**.
    b. Find iperf3 –c 169.254.1.*X* –p *PN* –B 169.254.1.4 –t "" – logfile Logs/5GHz.txt. Modify if needed. Save this file.
    c. Right Click on **WAP2 5S.bat** and select **EDIT**.
    d. Find iperf3 –s –p *PN* –B 169.254.1.*X*. Modify if needed. Save this file.
16. <u>For the D-Link 5 GHz:</u>
    a. Right Click on **WAP2 52C.bat** and select **EDIT**.
    b. Find iperf3 –c 169.254.1.*X* –p *PN* –B 169.254.1.4 –t "" – logfile Logs/52GHz.txt. Modify if needed. Save this file.
    c. Right Click on **WAP2 52S.bat** and select **EDIT**.
    d. Find iperf3 –s –p *PN* –B 169.254.1.*X*. Modify if needed. Save this file.

17. <u>For the Chain Wired Ethernet:</u>
    a. Right Click on **WAP2 DAISYC.bat** and select **EDIT**.
    b. Find iperf3 –c 169.254.1.*X* –p *PN* –B 169.254.1.4 –t “” – logfile Logs/Daisychain.txt. Modify if needed. Save this file.
    c. Right Click on **WAP2 DAISYS.bat** and select **EDIT**.
    d. Find iperf3 –s –p *PN* –B 169.254.1.*X*. Modify if needed. Save this file.
18. In the desktop iperf3 folder, select **Start CWAP** to start the script.
19. Ensure data is getting passed on all five connections.
20. Determine Serial Port Assignments:
    a. Open the Control Panel
    b. Open the Device Manager.
    c. Expand Ports on the pull down. Make note of the available COM Ports.
    d. Go to PuTTY.exe on the desktop.
    e. Select one of the available COM Ports noted above.
    f. If the prompt includes “ap…..”, then this is the AP port; otherwise it is the switch port.
    g. Write the assigned ports on the port table on the Configuration Values page.
21. Now run the Status Monitoring sections of the Functional Test.

5 Functional Test

Functional testing, as defined in this section, is performed prior to certification testing to verify that the CWAP is operational and meets all applicable performance requirements. Functional testing is also performed prior to resuming certification testing if the CWAP test setup/location is changed and upon completion of testing to verify that the CWAP is fully operational.

As a diagnostic tool, the Functional Test should also be performed if an anomaly was detected during Certification Testing, once Certification Testing is halted. This will help determine if the CWAP caused the anomaly.

5.1 Status of AP with SNMP Walk

The SNMPWALK command is our BITE testing of the AP portion of the CWAP and will tell us if the AP is working correctly.

1. Connect the Test Laptop PC to the CWAP AP by opening a session: enter "**https:\\169.254.1.3**".
2. On the WiNG GUI, enter "**admin**" for the username
3. Enter "**admin**" for the password.
4. Select **Management.**
5. For each SNMP (V1, V2, V3), select (check) each box (if not already checked).
6. Select **ENABLE**.
7. Open a CMD window.
8. Navigate to the location of the SNMPWalk by entering the following commands:
   a. "**cd Desktop**"
   b. "**cd snmpsoft.com free cmd tools**"
   c. "**cd SnmpWalk**"
9. Once in the location, enter "**snmpwalk –r:*CWAP IP address* –csv >*name of file*.csv**". This will take several minutes, and will capture SNMP data from the AP.
10. Verify that the connections on the monitor tool continue to give passing results. We are putting more load on the connection by asking for this SNMP data.

5.2 CWAP Status Lights

Verify on the CWAP that the Power light (right most light) is steady and illuminated.

Verify on the CWAP that the Wireless and the Wired connection lights are blinking and illuminated.

5.3 CWAP Discretes Status

Set all of the J3 switches to Ground (away from black dot).

Double-click on the PuTTY icon on the Desktop.

On the Vitesse serial command window, enter "**platform debug allow**" and
then enter "**debug sym read ::gpio_in**". *Note there is a space between "read" and "::".*

On the serial verify the value shown is xxxx.1111.xxxx…(the x's are don't care values).

Set all of the J3 switches to Open (towards black dot).

Enter "**debug sym read ::gpio_in**".

On the serial verify the value shown is xxxx.0000.xxxx…(the x's are don't care values).

5.4 Serial Port Status

Go to **Putty.exe** on the desktop. Go to the Vitesse Serial port and open the file. Enter "**admin**" for the username and no password. Enter "**enable**". Then enter "**show vlan status**". This will give a bunch of data showing that the Vitesse Switch is good. Press ***Ctrl C*** to quit.

Verify that there is data given and that nothing says Fail.

Enter "**show version**" and press ***Tab*** then ***Enter***. Note: hitting Tab key will autofill rest of command if there is only one option. Otherwise, it will list what options are available to complete the command.

Specify the version number here:_____

Close the CMD screen.

If needed, move the Serial adapter to the other Serial Connector.

Go to **Putty.exe** on the desktop. Go to the AP Serial port and open the file. If needed, enter "**admin**" for the username and password. Enter "**enable**". Then enter "**show wireless ap detail**". This will give a bunch of data showing that the Access Point is good.

Verify that there is data given and that nothing says Fail.

Enter "**show version on ap**" and press ***Tab*** then ***Enter***.

Specify the version number here:_____

Close the CMD screen.

5.5 Throughput Testing

Monitor the Throughput Testing using the CMD screens that was setup in the Initial Setup section of this document. Need to check 5 screens. Periodically, verify there are no failures.

If any failures occur, note what is going on in the environmental chamber at the time of the failure and any activities outside of the chamber that are occurring. This will help with explaining the failure as well as the debugging of the failure.

5.6 Shutdown Procedure

At the end of the test, turn off the CMD screens that are monitoring the Throughput. The test results are captured in the desktop folder: iperf3\Iperf3\logs\. Find the latest logs and rename them after each test is run.

Flip the RF ON Discrete Switch to Open (towards the black dot).

Flip the Power ON Discrete Switch to Open (towards the black dot).

Turn off the AC power.

6 Operational Exercise

Operational exercising of the CWAP consists of interactively running the Certification Test Software during the application of certification testing. The Certification Test Software will provide the ability to control the Wi-Fi radio as follows:

- Transmission at or near 100% duty cycle.
- Operation in the following modes 2.4 GHz: 802.11 b/g/n20MHz/n40MHz, 5 GHz: 802.11a/n20MHz/n40MHz/acVHT80MHz.
- Transmission at maximum RF output power as described in the original grant of certification of the module for all the modes described above.
- Selection of the data rates for all modes of operation 2.4 GHz: 802.11 b/g/n20MHz/n40Hz, 5 GHz: 802.11a/n20MHz/n40MHz/acVHT80MHz
- Selection of the low, middle and high channels for the 2.4 GHz band for all modes of operation listed above
- Selection of the low, middle and high channels for the 5 GHz NII-1, NII-2A, NII-2C and NII-3 bands for all modes described above
- Configuration of the module to operate using both TX antenna chains simultaneously for the MIMO modes of operation

The CWAP is not required to be operationally verified during certification testing.

6.1 Certification Test Software Operation

Certification Test Software consists of operational instructions for Functional Commands to configure the CWAP.

For the following instructions:

1. Radio 1 is the 2.4GHz radio, and Radio 2 is the 5GHz radio.
2. Upon completion of each "commit write memory" command, verify that "[OK]" is displayed.
3. To see status of the AP settings, enter "**show wireless ap detail**".

6.2 Change Output Power Levels

1. Using the Serial connection via PuTTY, log into the Access Point. If needed, enter "**admin**" for both Username and Password.
2. Enter "**enable**", then "**configure self**".
3. The Settings are the following:
   a. Enter "**interface radio 1**" to interface with one of the radios.
   b. Can enter "**power ?**" to see all of the options.
   c. Enter "**interface radio 1**", then "**power 9**" then "**commit write memory**". This will configure 2.4GHz power output to 9dBm.
   d. Enter "**interface radio 2**", then "**power 9**" then "**commit write memory**". This will configure 5GHz power output to 9dBm.
   e. Enter "**interface radio 1**", then "**power 20**" then "**commit write memory**". This will configure 2.4GHz power output to 20dBm.
   f. Enter "**interface radio 2**", then "**power 20**" then "**commit write memory**". This will configure 5GHz power output to 20dBm.

6.3 Change Bandwidth and Channel Values

1. Using the Serial connection via PuTTY, log into the Access Point. If needed, enter "**admin**" for both Username and Password.
2. Enter "**enable**", then "**configure self**".
3. The Settings are the following:
   a. Enter "**interface radio 1**" to interface with one of the radios.
   b. Can enter "**channel ?**" to see all of the options.
   c. Enter "**interface radio 1**", then "**channel 6**" then "**commit write memory**". This will configure 2.4GHz to 20MHz Channel Width on Channel 6.
   d. Enter "**interface radio 1**", then "**channel 6w**" then "**commit write memory**". This will configure 2.4GHz to 40MHz Channel Width on Channel 6.
   e. Enter "**interface radio 2**", then "**channel 149**" then "**commit write memory**". This will configure 5GHz to 20MHz Channel Width on Channel 149.
   f. Enter "**interface radio 2**", then "**channel 149w**" then "**commit write memory**". This will configure 5GHz to 40MHz Channel Width on Channel 149.
   g. Enter "**interface radio 2**", then "**channel 149ww**" then "**commit write memory**". This will configure 5GHz to 80MHz Channel Width on Channel 149.

6.4 Change Module Scheme

1. Using the Serial connection via PuTTY, log into the Access Point. If needed, enter "**admin**" for both Username and Password.
2. Enter "**enable**", then "**configure self"**.
3. The Settings are the following:
   a. Enter "**interface radio 1**" to interface with one of the radios.
   b. Can enter "**data-rates ?**" to see all of the options.
   c. Enter "**interface radio 1**", then "**data-rates custom basic-2**" then "**commit write memory**". This will configure 2.4GHz to DSSS.
   d. Enter "**interface radio 2**", then "**data-rates custom basic-6**" then "**commit write memory**". This will configure 5GHz to BPSK.
   e. Enter "**interface radio 1**", then "**data-rates custom basic-18**" then "**commit write memory**". This will configure 2.4GHz to QPSK.
   f. Enter "**interface radio 2**", then "**data-rates an**" then "**commit write memory**". This will configure 5GHz to QPSK.
   g. Enter "**interface radio 1**", then "**data-rates default**" then "**commit write memory**". This will configure 2.4GHz to QAM.
   h. Enter "**interface radio 2**", then "**data-rates default**" then "**commit write memory**". This will configure 5GHz to QAM.

6.5 Change Data Rates

1. Using the Serial connection via PuTTY, log into the Access Point. If needed, enter "**admin**" for both Username and Password.
2. Enter "**enable**", then "**configure self**".
3. The Settings are the following:
   a. Enter "**interface radio 1**" to interface with one of the radios.
   b. Enter "**data-rates ?**" to see all of the options or "**data-rates custom ?**" to see all of the custom options.
   c. Enter "**interface radio 1**", then "**data-rates custom basic-2**" then "**commit write memory**". This will configure 2.4GHz to limit to 2Mbps max.

d. Enter "**interface radio 2**", then "**data-rates custom basic-6**" then "**commit write memory**". This will configure 5GHz to limit to 6Mbps max.
e. Enter "**interface radio 1**", then "**data-rates custom basic-18**" then "**commit write memory**". This will configure 2.4GHz to limit to 18Mbps max.
f. Enter "**interface radio 2**", then "**data-rates an**" then "**commit write memory**". This will configure 5GHz to 802.11a/n only.
g. Enter "**interface radio 1**", then "**data-rates bgn**" then "**commit write memory**". This will configure 2.4GHz to 802.11b/g/n only.
h. Enter "**interface radio 2**", then "**data-rates default**" then "**commit write memory**". This will configure 5GHz to all of the data rates available and all modulation schemes.

6.6 Change Antenna Usage

1. Using the Serial connection via PuTTY, log into the Access Point. If needed, enter "**admin**" for both Username and Password.
2. Enter "**enable**", then "**configure self**".
3. The Settings are the following:
   a. Enter "**interface radio 1**" to interface with one of the radios.
   b. Enter "**antenna-mode ?**" to see all of the options.
   c. Enter "**interface radio 1**", then "**antenna-mode 1x1**" then "**commit write memory**". This will configure 2.4GHz to 1x1 antenna mode.
   d. Enter "**interface radio 2**", then "**antenna-mode 2x2**" then "**commit write memory**". This will configure 5GHz to 2x2 antenna mode.
   e. Enter "**interface radio 1**", then "**antenna-mode default**" then "**commit write memory**". This will configure 2.4GHz to 3x3 antenna mode.

6.7 Shut Down the Wireless Radios

6.7.1 Turn 2.4GHz Transmitter OFF (802.11b/g/n)

1. Using the Serial connection via PuTTY, log into the Access Point. If needed, enter "**admin**" for both Username and Password.
2. Enter "**enable**", then "**configure self**".
3. Enter "**interface radio 1"**.
4. Enter "**shutdown".**
5. Enter "**commit write memory"**.

6.7.2 Turn 2.4GHz Transmitter ON (802.11b/g/n)

1. Using the Serial connection via PuTTY, log into the Access Point. If needed, enter "**admin**" for both Username and Password.
2. Enter "**enable**", then "**configure self**".
3. Enter "**interface radio 1"**.
4. Enter "**no shutdown".**
5. Enter "**commit write memory"**.

6.7.3 Turn 5GHz Transmitter OFF (802.11a/n/ac)

1. Using the Serial connection via PuTTY, log into the Access Point. If needed, enter "**admin**" for both Username and Password.
2. Enter "**enable**", then "**configure self**".
3. Enter "**interface radio 2"**.
4. Enter "**shutdown".**
5. Enter "**commit write memory"**.

6.7.4 Turn 5GHz Transmitter ON (802.11a/n/ac)

1. Using the Serial connection via PuTTY, log into the Access Point. If needed, enter "**admin**" for both Username and Password.
2. Enter "**enable**", then "**configure self**".
3. Enter "**interface radio 2"**.
4. Enter "**no shutdown".**
5. Enter "**commit write memory"**.

6.8 Change Beamforming

1. Using the Serial connection via PuTTY, log into the Access Point. If needed, enter "**admin**" for both Username and Password.
2. Enter "**enable**", then "**configure self**".
3. The Settings are the following:
   a. Enter "**interface radio 1**" to interface with one of the radios.
   b. Enter "**transmit-beamforming**" to enable the beam forming option.
   c. Enter "**no transmit-beamforming**" to disable the beam forming option.

7 Regulatory Information

This device is approved under Thales Avionics, Inc.

This guide applies to the following CWAP Model Numbers, subject to the certification(s) listed:

- 186140-102 (FCC, ISEDC, CE Mark, ANATEL)

This device is designed to be compliant with rules and regulations in locations the device is sold and will be labeled as required.

Warning: Changes or modifications to this device not expressly approved by Thales Avionics, Inc. could void the user's authority to operate the equipment.

Use only the supplied or an approved replacement antenna. Unauthorized antennas, modifications, or attachments could cause damage and may violate regulations.

7.1 Wireless Device Country Approvals

Regulatory markings, subject to certification, are applied to the device signifying the radio(s) is/are approved for use in the following countries: United States, Canada, Europe*, and Brazil.

*: Europe includes: Austria, Belgium, Bulgaria, Czech Republic, Cyprus, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liefcautionchtenstein, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, and the United Kingdom.

Warning: Operation of the device without regulatory approval is illegal.

7.1.1 Country Selection

The aircraft GPS provides location coordinates which the CWAP uses to modify the country code automatically without any manual intervention. The country code is adjusted automatically per geo-fencing protocols. When the Access Point is provided with location information, the settings are automatically configured for that location. Users do not have access to change the location specific settings.

7.1.2 Country Roaming

This device incorporates the International Roaming feature (IEEE 802.11d) which will ensure the product operates on the correct channels for the particular country of use.

7.1.3 Frequency of Operation – FCC and ISEDC

7.1.3.1 5 GHz Only

Caution: The device for the band 5150-5250 MHz is only for indoor usage to reduce potential for harmful interference to co-Channel mobile satellite systems.

Caution: High power radars are allocated as primary users (meaning they have priority) of 5250-5350 MHz and 5650-5850 MHz and these radars could cause interference and/or damage to LE-LAN devices.

Caution: To comply with FCC Antenna requirements, the Antenna must be adjusted such that the RF emission lobes are below 30 degrees elevation.

Attention: Cet équipement pour la bande 5150-5250 MHz est uniquement destiné à une utilisation en intérieur afin de réduire les risques d'interférences nuisibles aux systèmes satellites mobiles co-canaux.

Attention: Les radars de grande puissance sont assignés comme systèmes primaires (c'est-à-dire prioritaire) des bandes 5250-5350 MHz et 5650-5850 MHz et ces radars peuvent causer des interférences et/ou endommager les équipements LE-LAN.

Attention: pour se conformer aux exigences de l'antenne FCC, l'antenne doit être ajustée de manière à ce que
les lobes d'émission RF soient en dessous de 30 degrés d'élévation.

7.1.3.2 2.4 GHz Only

The available channels for 802.11bg operation in the US are Channels 1 to 11. The range of channels is limited by firmware.

7.2 RF Exposure Guidelines

7.2.1 Safety Information

Only operate the device in accordance with the instructions supplied.

7.2.2 International

The device complies with internationally recognized standards covering human exposure to electromagnetic fields from radio devices.

7.2.3 EU

To comply with EU RF exposure requirements, this device must operate with a minimum separation distance of 22 cm from a person's body.

7.2.4 US and Canada

To comply with FCC RF exposure compliance requirements, the antenna used for this transmitter must not be co-located or operating in conjunction with any other transmitter/antenna except those already approved in this filing.

To satisfy US and Canadian RF exposure requirements, a transmitting device must operate with a minimum separation distance of 22 cm from a person's body.

Pour satisfaire aux exigences Américaines et Canadiennes d'exposition aux radiofréquences, un dispositif de transmission doit fonctionner avec une distance de séparation minimale de 22 cm de corps d'une personne.

This equipment complies with ISEDC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 22 cm between the radiator and a person's body.

Cet équipement est conforme aux limites d'exposition aux rayonnements ISEDC établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 22 cm distance entre la source de rayonnement et de corps d'une personne.

7.2.5 Radio Frequency Interference Requirements – FCC

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy, and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/TV technician for help.

7.2.6 Radio Transmitters (Part 15)

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

7.3 Radio Frequency Interference Requirements – Canada

CAN ICES-3 (B)/NMB-3(B)

7.3.1 Radio Transmitters

For RLAN Devices:
The use of 5 GHz RLAN's, for use in Canada, have the following restrictions:

- Restricted Band 5.60 – 5.65 GHz

This device complies with Innovation Science and Economic Development Canada's license-exempt RSSs. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Label Marking: The term "IC:" before the radio certification only signifies that Innovation Science and Economic Development Canada specifications were met.

7.4 CE Marking and European Economic Area (EEA)

Warning: This is a Class B product. In a domestic environment, this product may cause radio interference, in which case, the user may be required to take adequate measures.

The use of 2.4 GHz RLAN's, for use through the EEA, have the following restrictions:

- Maximum radiated transmit power of 100 mW EIRP in the frequency range 2.400 – 2.4835 GHz.

7.5 Brazil – ANATEL

Declaracoes Regulamentares para AP-7532 – Brasil

Nota: A marca de certificação se aplica ao Transceptor, modelo AP-7532. Este equipamento opera em caráter secundário, isto é, não tem direito a proteção contra interferência prejudicial, mesmo de estações do mesmo tipo, e não pode causar interferência a sistemas operando em caráter primário. Para maiores informações sobre ANATEL consulte o site: www.anatel.gov.br

Este equipamento opera em caráter secundário, isto é, não tem direito a proteção contra interferência prejudicial, mesmo de estações do mesmo tipo, e não pode causar interferência a sistemas operando em caráter primário.

Este produto está homologado pela ANATEL, de acordo com os procedimentos regulamentados pela Resolução n°242/2000 e atende aos requisitos técnicos aplicados, incluindo os limites de exposição da Taxa de Absorção Especifica referente a campos elétricos, magnéticos e electromagnéticos de radiofrequência, de acordo com as Resoluções n° 303/2002 e 533/2009.

Este dispositivo está em conformidade com as diretrizes de exposição à radiofrequência quando posicionado pelo menos 22 centimetros de distância do corpo. Para maiores informacões, consulte o site da ANATEL.

7.6 Waste Electrical and Electronic Equipment (WEEE)

For EU customers: All products at the end of their life must be returned to Thales Avionics, Inc. for recycling. For information on how to return product, please contact Thales at 321-308-3900.

8 Wire Harness

8.1 Test Wire Harness

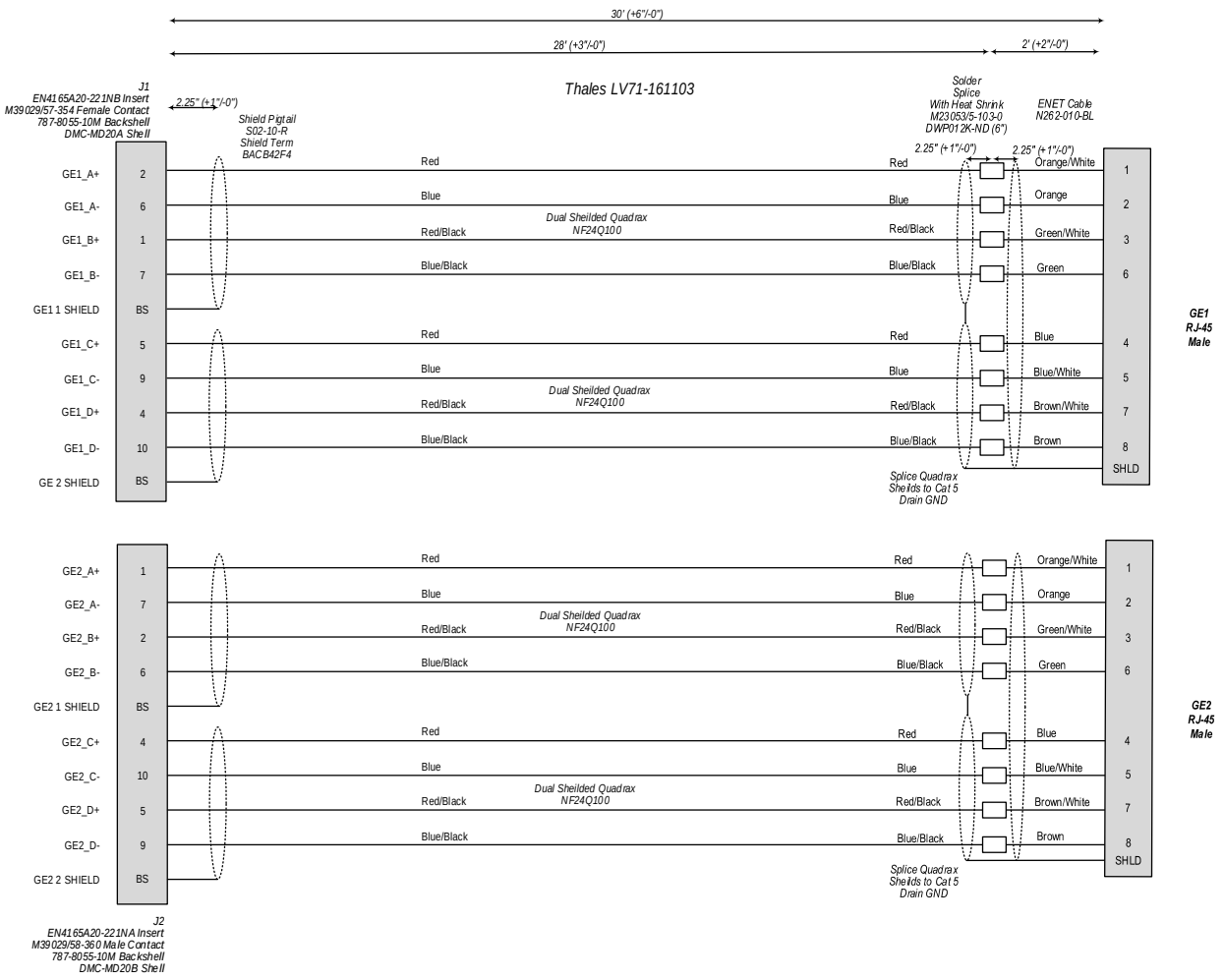


Figure 2: Ethernet Wire Harness – J1 and J2

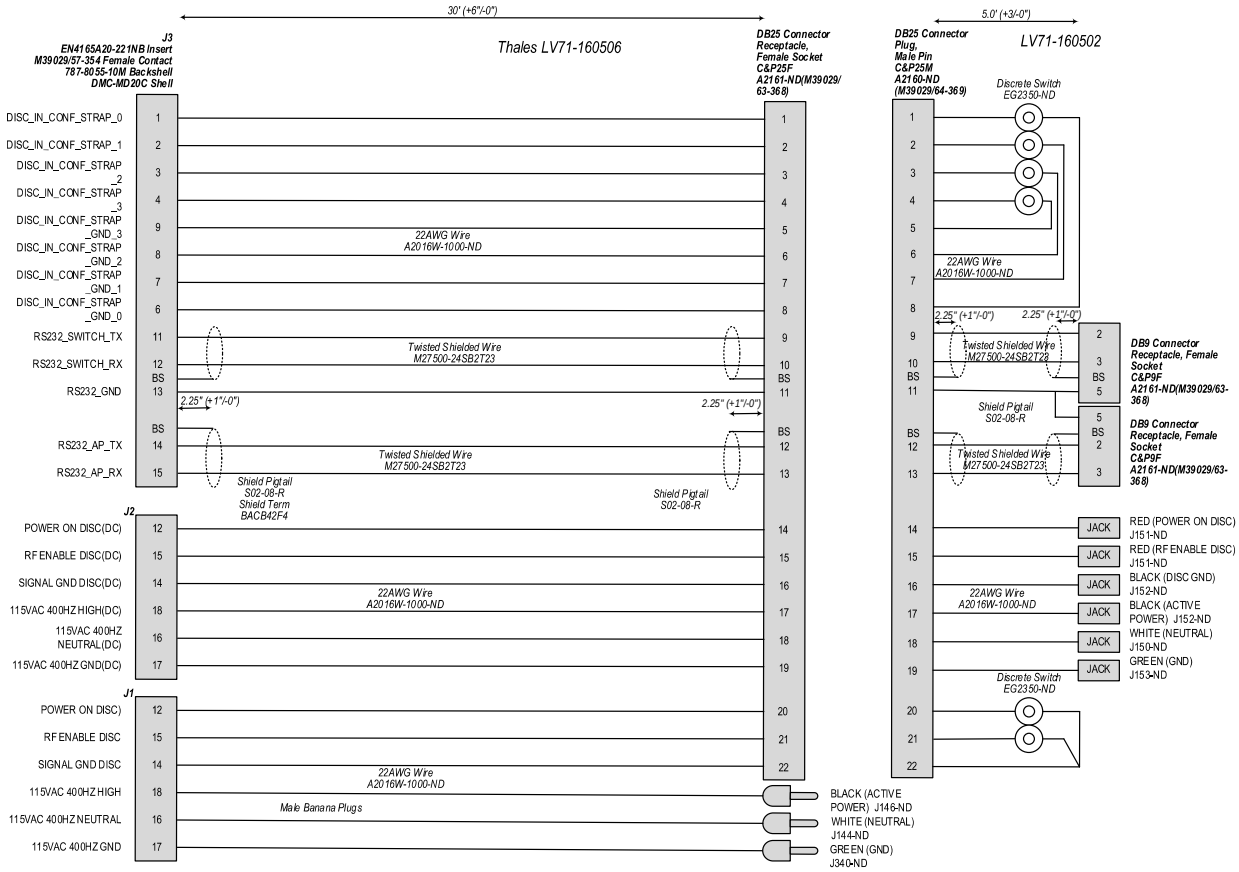


Figure 3: Control / Power Wire Harness – J1, J2, and J3

8.2 Pin Definitions

J1, J2, and J3 pins are provided below, for reference.

Table 5: J1 Pin Out

Pin ID	Signal Name	Description
1	ETH 1 BI_DB+	Ethernet 1 1000Base-T (Quad 1)
2	ETH 1 BI_DA+	Ethernet 1 1000Base-T (Quad 1)
3	ChGnd	Shield Quad 1
4	ETH 1 BI_DD+	Ethernet 1 1000Base-T (Quad 2)
5	ETH 1 BI_DC+	Ethernet 1 1000Base-T (Quad 2)
6	ETH 1 BI_DA-	Ethernet 1 1000Base-T (Quad 1)
7	ETH 1 BI_DB-	Ethernet 1 1000Base-T (Quad 1)
8	ChGnd	Shield Quad 2
9	ETH 1 BI_DC-	Ethernet 1 1000Base-T (Quad 2)
10	ETH 1 BI_DD-	Ethernet 1 1000Base-T (Quad 2)
11	Not Connected	
12	Power ON	GND = power on, OPEN = power off
13	Optional Reset	Not Connected in Aircraft
14	Signal GND	Reference for Discretes
15	RF Enable	GND = RF on, OPEN = RF off
16	115 Vac Return	AC Power Return
17	CH GND	Chassis ground
18	115 Vac	AC Power input (max. 5A)
19	Not Connected	
20	Not Connected	

Table 6: J2 Pin Out

Socket ID	Signal Name	Description
1	ETH 2 BI_DB+	Ethernet 2 1000Base-T (Quad 1)
2	ETH 2 BI_DA+	Ethernet 2 1000Base-T (Quad 1)
3	ChGnd	Shield Quad 1
4	ETH 2 BI_DD+	Ethernet 2 1000Base-T (Quad 2)
5	ETH 2 BI_DC+	Ethernet 2 1000Base-T (Quad 2)
6	ETH 2 BI_DA-	Ethernet 2 1000Base-T (Quad 1)
7	ETH 2 BI_DB-	Ethernet 2 1000Base-T (Quad 1)
8	ChGnd	Shield Quad 2
9	ETH 2 BI_DC-	Ethernet 2 1000Base-T (Quad 2)
10	ETH 2 BI_DD-	Ethernet 2 1000Base-T (Quad 2)
11	Not Connected	
12	Power ON	GND = power on, OPEN = power off
13	Not Connected	
14	Signal GND	Reference for Discretes
15	RF Enable	GND = RF on, OPEN = RF off
16	115 Vac Return	AC Power Return
17	CH GND	Chassis ground
18	115 Vac	AC Power input (max. 5A)
19	Not Connected	
20	Not Connected	

Table 7: J3 Pin Out

Pin ID	Function	Remark
1	DISC_IN_CONF_STRAP_0	Address Pin 1
2	DISC_IN_CONF_STRAP_1	Address Pin 3
3	DISC_IN_CONF_STRAP_2	Address Pin 2
4	DISC_IN_CONF_STRAP_3	Address Pin 4
5	Not Connected	
6	DISC_IN_CONF_STRAP_GND_0	Signal Ground
7	DISC_IN_CONF_STRAP_GND_2	Signal Ground
8	DISC_IN_CONF_STRAP_GND_1	Signal Ground
9	DISC_IN_CONF_STRAP_GND_3	Signal Ground
10	Not Connected	
11	Enet Switch TX	Serial Port TX
12	Enet Switch RX	Serial Port RX
13	GND	Ground
14	Access Point TX	Serial Port TX
15	Access Point RX	Serial Port RX
16	Switch RX	Serial Port RX
17	Switch TX	Serial Port TX
18	Not Connected	
19	Not Connected	
20	Not Connected	