

SERVICE BULLETIN

SUBJECT: COMMUNICATIONS – ACARS & CPDLC – Modify unit software.

1. PLANNING INFORMATION

A. Effectivity

This change applies to the Dlink+ w/CPDLC units shown below. Units must be returned to Spectralux for performance of this Service Bulletin.

Part Number	Mod Level	Quantity
14114-1-01	none or 1	All
14114-1-02	none or 1	All
14114-1-05	none or 1	All

B. Concurrent Requirements

The configuration file in the personality module on the aircraft must be updated to work with a Mod 2 unit when the modified unit is re-installed.

This is a cumulative software update. It is not necessary to perform any previous Service Bulletins before this Service Bulletin is performed.

C. Reasons

(1) The conditions the Service Bulletin will correct or improve:

(a) ACARS

- 1) User defined messages generation – flexibility in interspersing free text with data parameters from ARINC 429 busses
- 2) Additional user input validity checks
- 3) Improvement to AOC downlink pages and formats including WXR and Engine Report Service Messages
- 4) Unsuccessfully transmitted messages due to lack of VDL coverage
- 5) Ability to delete ACARS messages
- 6) OOOI events in case transitions event transmissions missed
- 7) ARINC 739 interface improvements to allow for Dlink+ w/CPDLC to be used as a SATCOM dialer

(b) CPDLC

- 1) UM215 message format change so that number of degrees will not be interpreted as heading
- 2) Correction in printing of CPDLC messages
- 3) Robustness to null X.121 called address field from ground network
- 4) TSAP loading improvements

SERVICE BULLETIN

(c) General

- 1) ARINC 429 Source/Destination (SDI) usage – modified so SDI can be used for all labels. Corrected SDI usage for ARINC 429 OOOI discretes.
- 2) Optimization of the VDL Mode 0 and Mode 2 temperature compensation algorithm
- 3) Output discrete false failures due to high in-rush current when driving incandescent lamps
- 4) Internal temperature calculation algorithm

(2) Service or industry experience:

Interoperability testing was performed successfully at both ARINC and SITA network provider interoperability test labs. Formal Verification and Validation testing was performed at Spectralux labs for minor software mod.

(3) Consequences if the modification is not performed:

- (a) Potential loss of ACARS messages if VDL coverage not available
- (b) Improper behavior of discrete inputs utilizing ARINC 429 discrete labels
- (c) Inability to use Dlink interface as a SATCOM dialer
- (d) Improper printing of CPDLC messages
- (e) Potential communication problems with ground stations sending null X.121 address
- (f) Potential misinterpretation of UM215 CPDLC message
- (g) Potential false output discrete failures when driving incandescent lamps
- (h) Potential to not operate for the full 30 minutes at short term high operating temperature (70°C)

(4) Expected benefits:

This modification will result in improvement in message transmission success rates and robustness of VHF data link and system fault sensing. In addition, this modification adds significant flexibility for user defined message composition to meet an operator's individual needs.

D. Description

Software in the on-board flash memory is changed in-circuit by an external computer operating through a programming interface. The primary programming interface is the ethernet port available through a rear panel connector. The secondary interfaces are circuit board level connectors.

E. Compliance

No compliance time is given.

F. Approval

Not applicable. This modification is classified as Minor per 14 CFR Part 21, Subpart O.

SERVICE BULLETIN

G. Manpower

Sufficient time must be allowed to remove the LRU from an aircraft, return the unit to Spectralux, and install the modified unit on an aircraft.

H. Weight and Balance

Not changed.

I. Electrical Load Data

Not changed.

J. References

None.

K. Other Publications Affected

None.

L. Interchangeability or Intermixability of Parts

Not applicable.

2. MATERIAL INFORMATION

A. Material – Price and Availability

No material purchases are necessary.

B. Industry Support Information

This software modification is supplied at no charge to the customer and will be performed at the Spectralux facility in Redmond, WA, U.S.A.

C. Material Necessary for Each Component

None.

D. Material Necessary for Each Spare

None.

E. Re-identified Parts / Existing Parts Accountability

Part No.	Old Mod	New Mod	Disposition
14114-1-01	none or 1	2	RWK / R
14114-1-02	none or 1	2	RWK / R
14114-1-05	none or 1	2	RWK / R

RWK – Make the change given in this service bulletin

R – The Old Mod is the Mod level of the units on which the change is to be done and the New Mod is the Mod level of the units after the change is done.

SERVICE BULLETIN

F. Special Tooling and Software Necessary to do this Service Bulletin

Note: Equivalent alternatives may be used.

Note: One copy of each item is needed.

(1) Supplied by Spectralux

Part No.	Description	Source
"SB - 14114-23-05 Revision - .zip"	Programming and end unit software	Spectralux
ATP – 14114-1 Revision R	Dlink+ w/CPDLC Acceptance Test Procedure	Spectralux
96215-1 BOM Revision -	Jumper handle	Spectralux
Described in paragraph 7.B.	11-pin Power interface cable	Spectralux
Described in paragraph 7.C.	61-pin Ethernet/Loopback cable	Spectralux
12854-4 BOM Revision A	Personality module	Spectralux
USB-ML-PPCBDM	Power Architecture 5xx/8xx BDM Interface (USB), including USB cable.	P&E Micro
Latitude D820	Laptop PC with Windows XP	Dell
2122	Ethernet cable, Cat 5e, RJ45 male – RJ45 male, 3 ft (0.92 m)	Monoprice

(2) Expected shop equipment

Part No.	Description	Source
3306D	28 VDC power supply, 6 A	Topward
25-T-FN	Termination, 50 Ohm, 25 W N female (dummy load)	Bird Electronic Corp
PE3652-12	Cable, N male – TNC male, 50 Ohm, 1 ft (0.3 m) (adjust length as needed)	Pasternack Enterprises
CL-6500 + CLT-50 + BP-H5-#1-3.0-80mm	Torque screw driver, #1 Philips, (powered preferred)	Hios
R6K9	Acetone, 100%	Sherwin-Williams
50-700R	Legend Ink, Black	Enthone
F-150, WHITE	Marking Ink, White	Organic Products Company

SERVICE BULLETIN

3. EQUIPMENT SETUP (ONE TIME)

- A. Copy the folder “SB - 14114-23-05 Revision -.zip” to the Windows desktop. Drag the included Dlink_Configuration Loader folder and its contents to C:\.
- B. Do the following only if a pemicro folder does not exist in C:\.
- (1) Drag the included PE_Micro folder to the Windows desktop.
 - (2) Double click on setup.exe in the PE_Micro folder.
 - (3) Click YES in response to the query, “Install Spectralux Service Bulletin Files.”
 - (4) Click Next in response to the dialog box stating, “Welcome to the InstallShield Wizard for PE PowerPC kit– 32-bit.”
 - (5) Accept the terms of the license agreement and click Next.
 - (6) Enter your User Name and Organization, select the “Anyone who uses this computer” option, and click Next.
 - (7) Click Next to accept the default folder.
 - (8) Click Install to begin installation.
 - (9) If you receive a notification stating that WinDriver has not passed Windows Logo testing, click Continue Anyway.
 - (10) Click Quit without Registering. Click Yes in response to the query, “Are you sure you would like to quit without registering?”
 - (11) Click Finish.
 - (12) Click No in order to restart later.
 - (13) Click OK in response to Installation Complete message.
 - (14) Restart the PC.
 - (15) After the PC has rebooted, attach the USB-ML-PPCBDM to a USB port. The New Hardware Wizard will appear. Select “No, not this time” in response to the query, “Can Windows connect to Windows Update to search for software?” Click Next to continue.

Note: The New Hardware Wizard may occur any time a different USB port or programming pod is used.
 - (16) Select “Install the software automatically” and click Next to continue.
 - (17) If you receive a notification stating that USB Multilink 2.0 has not passed Windows Logo testing, click Continue Anyway.
 - (18) Click Finish when the Completing New Hardware Wizard message appears. The blue light on the USB-ML-PPCBDM will be lit.
 - (19) Delete the PE_Micro folder from the Windows desktop.
- C. Set the IP address of the PC to 192.168.255.12, subnet mask to 255.255.255.0.
- D. **CAUTION:** Use ESD precautions when installing the personality module.
Attach the personality module to the 11-pin cable.

SERVICE BULLETIN

- E. Attach the 50 Ohm dummy load to the TNC connector on the rear of a Spectralux Dlink+ w/CPDLC configured with Mod2 software.
- F. Attach the Spectralux Dlink+ w/CPDLC to the PC using the 11-pin J1 connector and 61-pin J2 connector plus ethernet cable.
Note: Finger tighten connectors. No need to engage the connector locking detent.
- G. Set the power supply to 28 V \pm 0.5 V with at least 1.5 A current limit.
- H. Attach the disabled power supply to the 11-pin connector, positive to the red banana plug and negative to the black banana plug.
- I. Double click on the Dlink_Configuration_Loader.exe file located in C:\Dlink_Configuration_Loader\Mod2.
- J. Enable power and wait until the connection status reported by the Configuration Loader changes from NOT CONNECTED to CONNECTED in both the server and client areas.
- K. Go to the Configuration tab of the Configuration Loader.
- L. Click Browse on the Write Configuration Line and navigate to C:\Dlink_Configuration_Loader\Mod2. Open file "ATP Config.dat". Click Write Configuration and wait until the unit has rebooted. A menu containing the following top line should be present on the Dlink display .

ATP_STP	TEST
---------	------

- M. Disable power.
- N. END

4. CPDLC SOFTWARE UPDATE INSTRUCTIONS (EACH UNIT)

The paragraphs identified with a letter give the general work instructions and the necessary tests. Referenced figures are in **5. FIGURES** section.

CAUTION: Make sure the power supply is set to 28 V \pm 0.5 V with at least 1.5 A current limit. Do not enable power until instructed in the following steps.

Note: Fill out the Conversion Results worksheet in **6. WORKSHEET** during the programming process.

A. Ethernet Programming (All Units)

- (1) Attach the 50 Ohm dummy load to the TNC connector on the rear of the customer's Dlink+ w/CPDLC.
- (2) Attach the Dlink+ w/CPDLC to the PC using the 11-pin J1 connector and 61-pin J2 connector plus ethernet cable.
Note: Finger tighten connectors. No need to engage the connector locking detent.
- (3) Set the power supply to 28 V \pm 0.5 V with at least 1.5 A current limit.
- (4) Attach the disabled power supply to the 11-pin connector, positive to the red banana plug and negative to the black banana plug.
- (5) Double click on the Dlink_Configuration_Loader.exe file located in C:\Dlink_Configuration_Loader\Mod2.

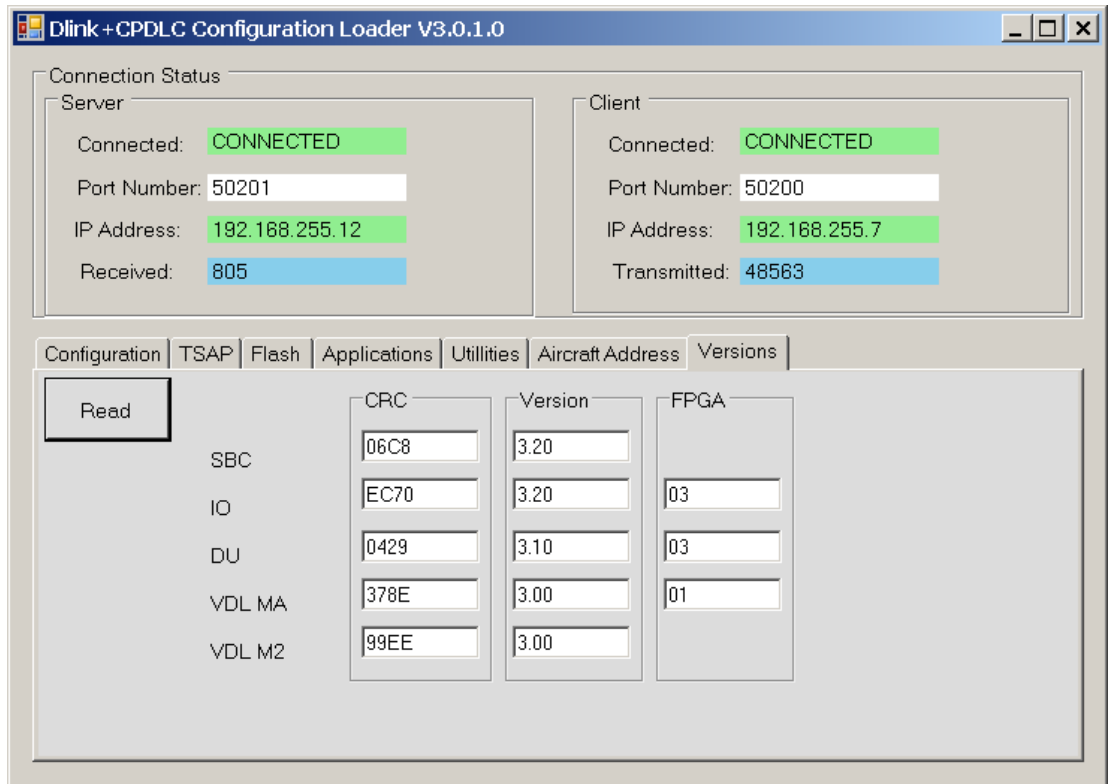
SERVICE BULLETIN

- (6) Enable power and wait until the connection status reported by the Configuration Loader changes from NOT CONNECTED to CONNECTED in both the server and client areas.
- (7) Go to the Applications tab of the Configuration Loader.
- (8) For each of the five Write lines, Browse to C:\Dlink_Configuration_Loader\Mod2 and open the files as indicated in the following table.

Write SBC	eSBCRom.bin
Write IO	eIORom.bin
Write DU	eDURom.bin
Write VDL MA	DSP_ModeA.bin
Write VDL M2	DSP_Mode2.bin

- (9) Click on each Write button in the order shown in the above table. Wait until the unit has rebooted and Configuration Loader connection status is CONNECTED until proceeding to the next line.
Note: The FAIL annunciator may turn on after the IO has been programmed, but will be off after all five files have been programmed.
Note: At the end of the programming process, the opened file names will be replaced by a "Finished – Rebooting" message. It is not necessary to Browse and re-open the same files again before programming another unit, so long as the Configuration Loader is not closed.
Note: If ethernet programming is unsuccessful, programming must be done internally. In that case, complete section **4.B. Internal Programming (Only As Required In the Previous Section)**, then return here and program VDL MA and VDL M2 through the ethernet port.
- (10) Go to the Versions tab of the Configuration loader and click Read. The programming has been successful if all numbers in the CRC, Version, and FPGA columns match the following picture.

SERVICE BULLETIN



(11) Proceed to section **4.C. Post-Programming Test.**

B. Internal Programming (Only As Required In the Previous Section)

Referenced figures are in **5. FIGURES** section.

CAUTION: Use ESD precautions when working inside the unit.

CAUTION: Do not unplug circuit board assemblies or disconnect wire harnesses except for the programmer.

Note: There may be Windows Security Alert(s) asking if you want to keep blocking the program the first time this section is performed by a PC. Click Unblock.

(1) Remove the cover from the Dlink+ w/CPDLC by removing 14 screws. See **Figure 1. Cover Removal/Attachment.**

(2) Attach the 50 Ohm dummy load to the TNC connector on the rear of the unit.

(3) Attach the 11-pin cable to the J1 connector on the rear of the unit.

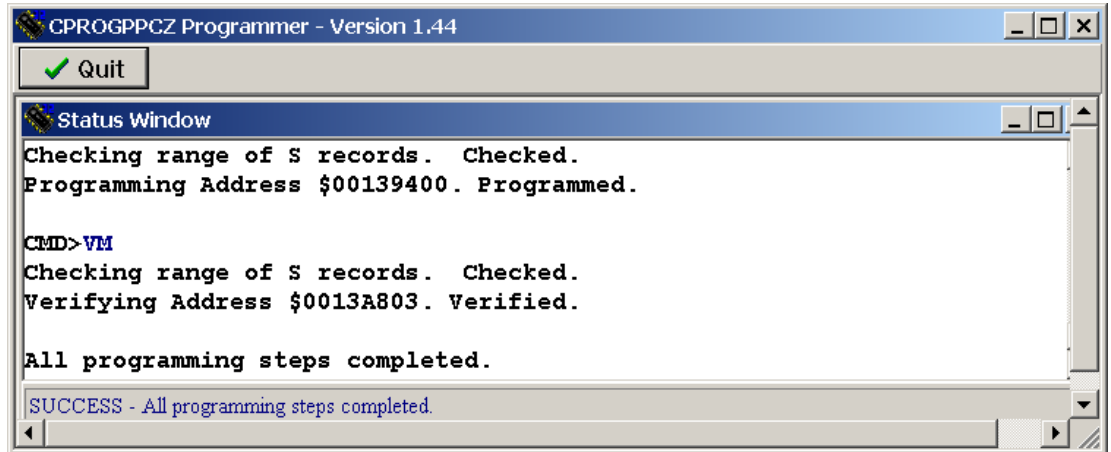
Note: Finger tighten. No need to engage the connector locking detent.

(4) Disable the watchdog by inserting the jumper handle onto J37 on the motherboard. See **Figure 2. Unit and Shorting Connectors.**

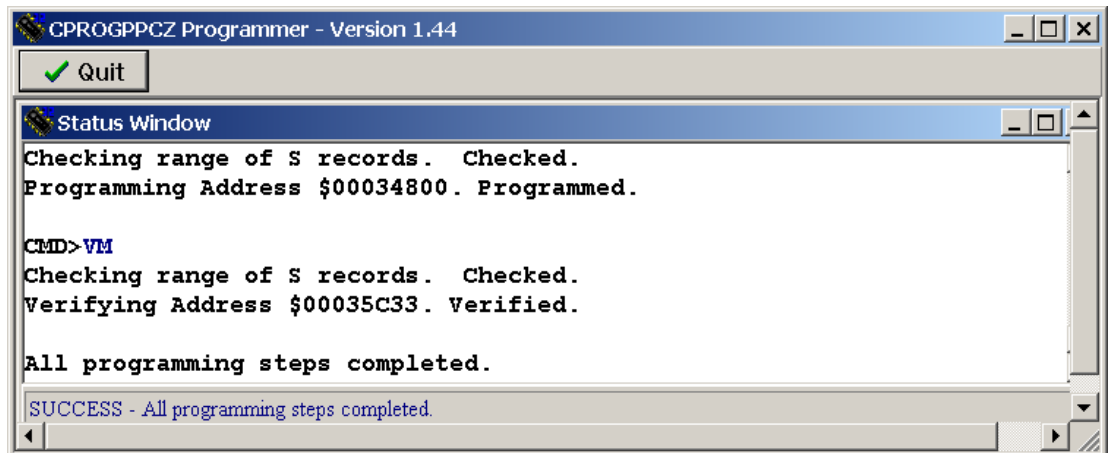
(5) Connect the 28 VDC power supply to the 11-pin cable, positive to red banana plug and negative to black banana plug.

SERVICE BULLETIN

- (6) Attach the USB-ML-PPCBDM ribbon cable to J3 on the SBC CBA (circuit board assembly). Install so that the red edge of the ribbon cable is nearer to pin 1. See **Figure 3. DU/PS and SBC Programming Connectors**.
- (7) Enable power.
- (8) Double click the ProgramSBC.exe shortcut in C:\Dlink_Configuration_Loader\Mod2. A programming window will appear showing status. If programming is successful, the following will appear in the programming window. Click Quit.



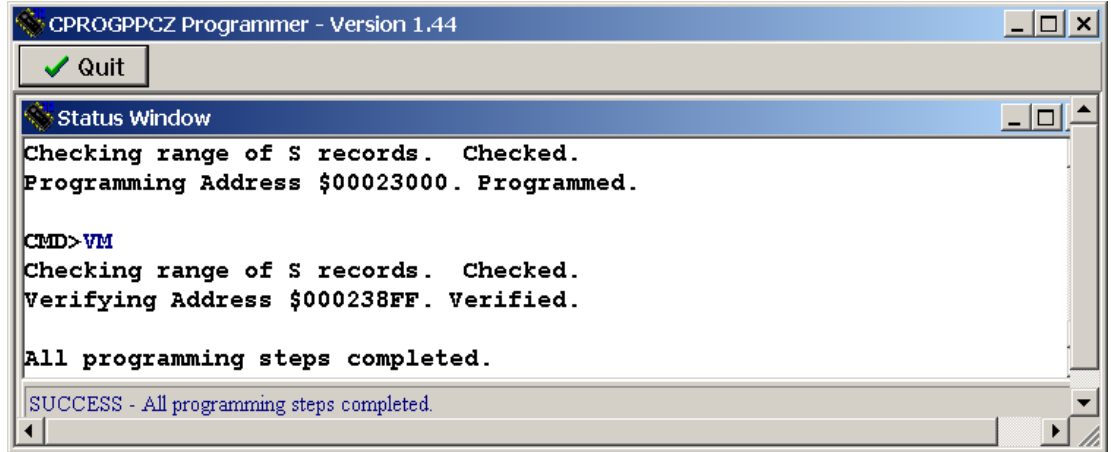
- (9) Disable power.
- (10) Remove the USB-ML-PPCBDM ribbon cable from the SBC and attach to P3 on the IO CBA. Install so that the red edge of the ribbon cable is nearer to pin 1. See **Figure 4. IO Programming Connector**.
- (11) Enable power.
- (12) Double click the ProgramIO.exe shortcut in C:\Dlink_Configuration_Loader\Mod2. A programming window will appear showing status. If programming is successful, the following will appear in the programming window. Click Quit.



- (13) Disable power.

SERVICE BULLETIN

- (14) Remove the USB-ML-PPCBDM ribbon cable from the IO and attach to P2 on the DU CBA. Install so that the red edge of the ribbon cable is nearer to pin 1. See **Figure 3. DU/PS and SBC Programming Connectors**.
- (15) Enable power.
- (16) Double click the ProgramDU.exe shortcut in C:\Dlink_Configuration_Loader\Mod2. A programming window will appear showing status. If programming is successful, the following will appear in the programming window. Click Quit.



- (17) Disable power.
- (18) Remove the USB-ML-PPCBDM ribbon cable.
- (19) Remove the watchdog jumper handle and confirm that the two pins of J37 are visible and not touching each other. See **Figure 2. Unit and Shorting Connectors**.
- (20) Reattach the cover to the unit with 14 screws torqued according to **Figure 1. Cover Removal/Attachment**. It may be necessary to remove the 11-pin cable and dummy load for this operation. If so, reattach them after the cover is secured.
- (21) Return to section **4.A. Ethernet Programming (All Units)**.

C. Post-Programming Test

Perform the full ATP-14114-1 if internal programming was required. If only ethernet programming was used, perform the following sections of ATP-14114-1:

- (1) Perform section 3.4.2 for software version verification logging.
- (2) Perform section 3.6 for test of ARINC429 and discrete IO.
- (3) Perform section 3.7 with ALL selected as Test Sequence # and Test Selection switches adjusted as shown in the following table.

Section	YES	NO
Tx Tests	RF Output Power	All others
Rx Tests	Sensitivity	All others
Phys Layer Tests	None	All

Proceed to **4.E. Return to Service**.

SERVICE BULLETIN

E. Return to Service

- (1) If all tests passed, mark the unit label according to **Figure 5. Label Marking**.
- (2) Complete and archive the automated test results and Conversion Results worksheet from **6. WORKSHEET**.
- (3) Place unit in service if all results on the Conversion Results worksheet are PASS, YES, or NA.
- (4) END

SERVICE BULLETIN

5. FIGURES

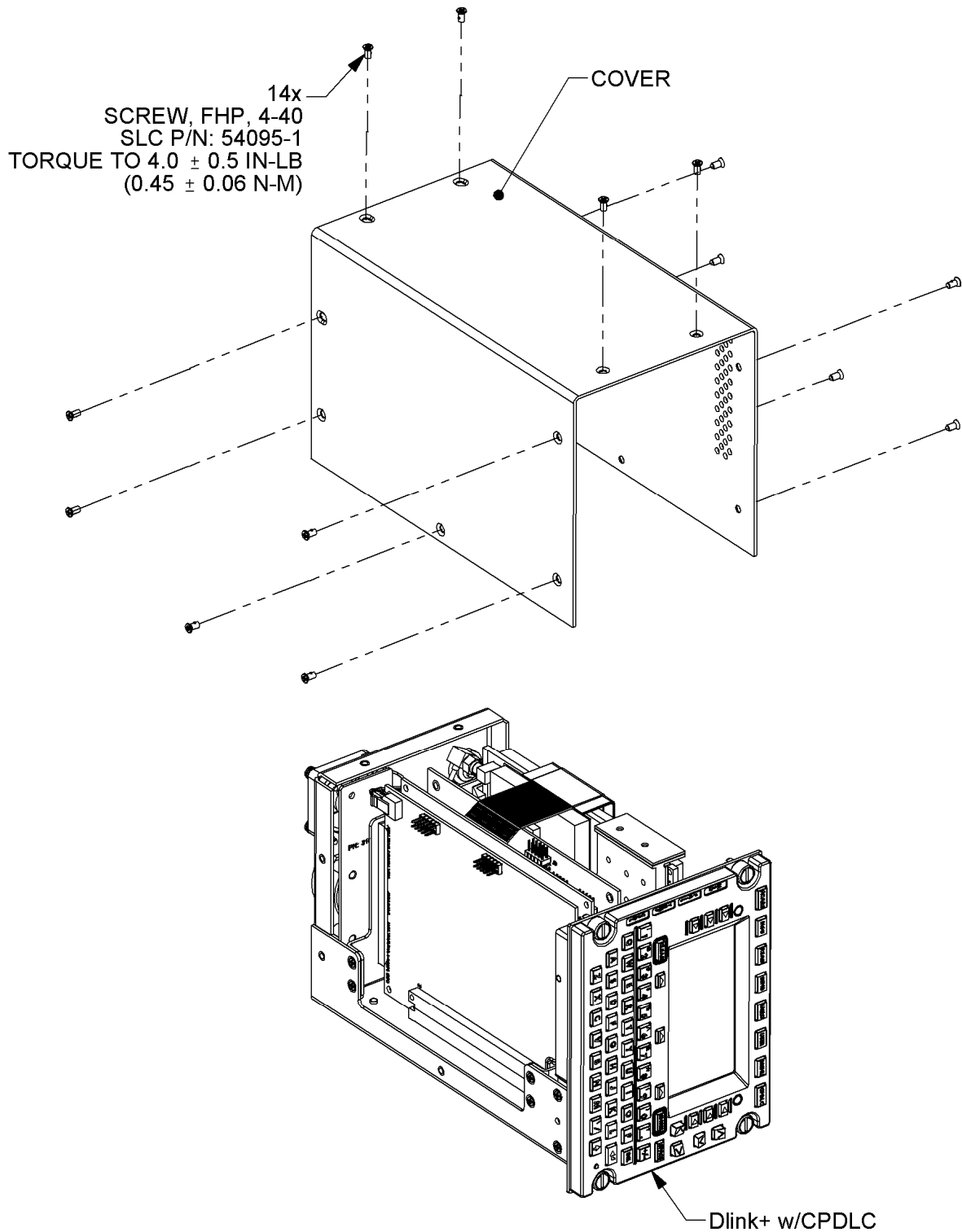


Figure 1. Cover Removal/Attachment

SERVICE BULLETIN

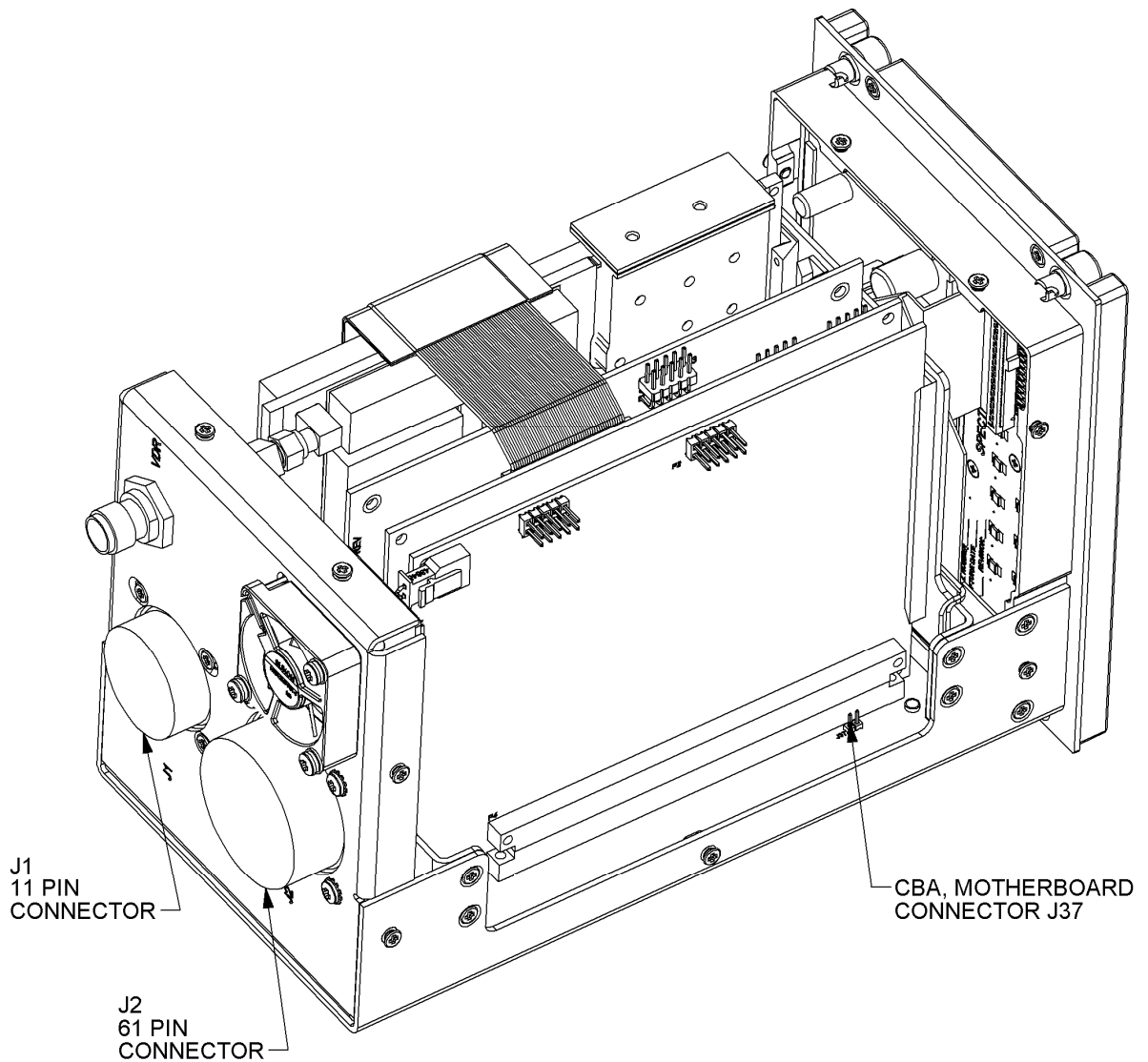


Figure 2. Unit and Shorting Connectors

SERVICE BULLETIN

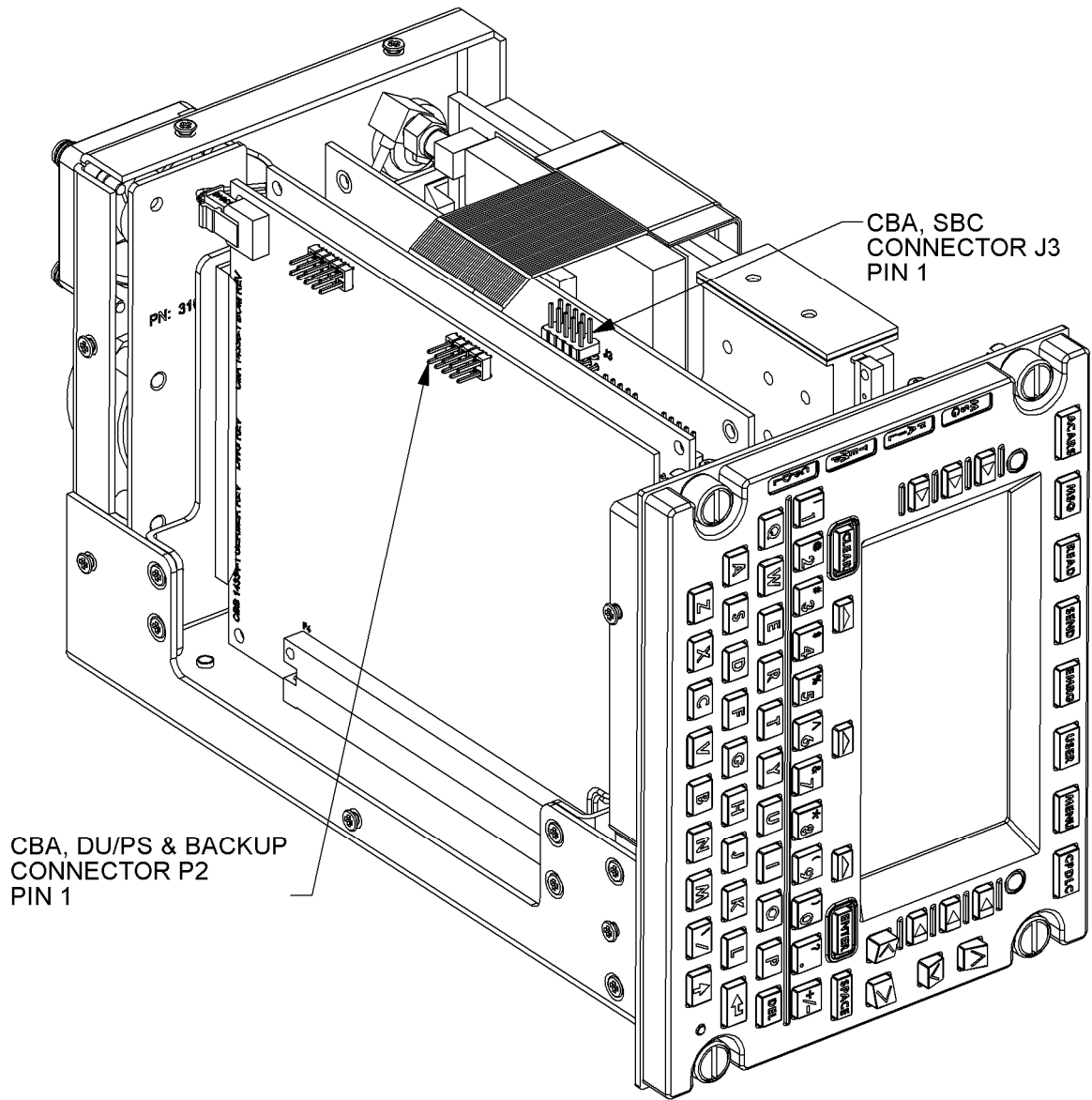


Figure 3. DU/PS and SBC Programming Connectors

SERVICE BULLETIN

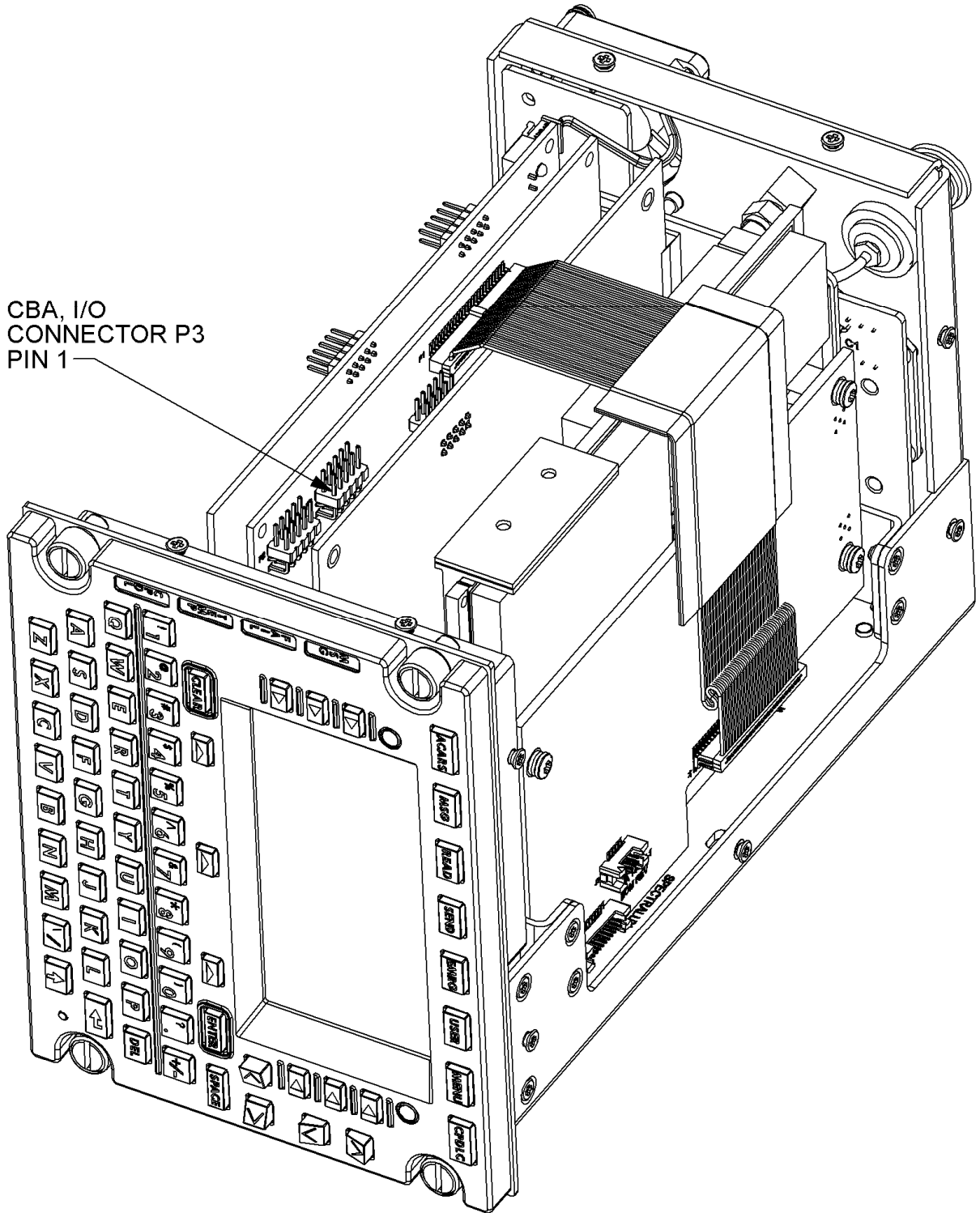


Figure 4. IO Programming Connector

SERVICE BULLETIN

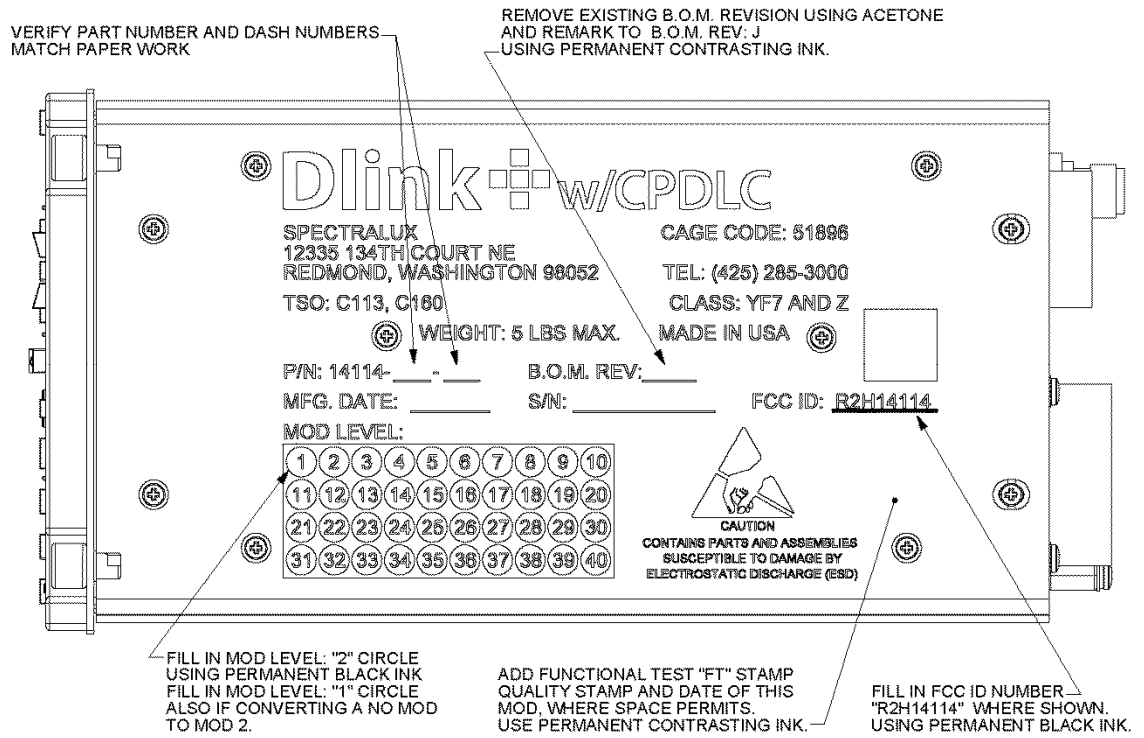


Figure 5. Label Marking

SERVICE BULLETIN

6. WORKSHEET

The Conversion Results worksheet is on the next page.

SERVICE BULLETIN

14114-1-xx to 14114-1-xx Mod 2 Conversion Results

Unit Part No. 14114-1-_____

Unit serial number: _____

Task	Result
Program SBC	PASS / FAIL
Program IO	PASS / FAIL
Program DU	PASS / FAIL
Program VDL MA	PASS / FAIL
Program VDL M2	PASS / FAIL
Remove jumper handle and confirm that pins are not shorting (only for internal programming)	YES / NO / NA
Reattach cover and properly torque 14 screws (only for internal programming)	YES / NO / NA
Post-programming test status	PASS / FAIL
Mark unit label	YES / NO

Repairman (signature) _____

Date _____

mm/dd/yyyy

Inspector (signature) _____

Date _____

mm/dd/yyyy

SERVICE BULLETIN

7. CABLES

Note: These cables are identical to the cables described in Section 7 of Service Bulletin 14114-23-01.

A. Crimping Tool

Note: Equivalent substitute may be used.

Tool	Manufacturer and Part Number
Crimping tool	Daniels Manufacturing Corp. M22520/1-01 + M22520/1-02 (#16) M22520/2-01 + M22520/2-02 (#20)

B. 11-Pin Cable

(1) Materials

Note: Equivalent substitutes may be used.

Component	Manufacturer and Part Number
Connector at Dlink+ w/ CPDLC end	Amphenol 1 x MS3476L18-11S
Connector socket contact, #16 (may be included with connector)	Amphenol 9 x M39029/5-116
Strain relief	Glenair M85049/52-1-18W
16 awg red stranded wire	Any manufacturer
20 awg black stranded wire	Any manufacturer
Banana wire-end connector	Any manufacturer 1 x red 1 x black
Connector housing	Molex 1 x 87369-0400
Connector contact	Molex 4 x 50212-8100
24 awg unshielded stranded wire	Any manufacturer
RTV	Dow Corning 3145

SERVICE BULLETIN

(2) Signals

Pin	Signal	Description	Length
A	28VDC_IN	16 awg red to a red banana plug	23 in ± 2 in (58 cm ± 5 cm)
B J	28V_RTN CGND	20 awg black to a common black banana plug	23 in ± 2 in (58 cm ± 5 cm)
C	PERSONALITY_CLK	24 awg unshielded To personality module pin 3	6 in ± 1 in (15.2 cm ± 2.5 cm)
D	PERSONALITY_DATA	24 awg unshielded To personality module pin 1	6 in ± 1 in (15.2 cm ± 2.5 cm)
E	+3.3V	24 awg unshielded To personality module pin 2	6 in ± 1 in (15.2 cm ± 2.5 cm)
F	GND	24 awg unshielded To personality module pin 4	6 in ± 1 in (15.2 cm ± 2.5 cm)

(3) Construction

Fold the 24 awg wire or use additional wire to fill the oversize MIL contacts.

Crimp the personality module wires into the Molex contacts and insert the contacts into the Molex housing. Apply RTV over where the wires enter the Molex housing for strain relief.

C. 61-Pin Cable

(1) Components

Note: Equivalent substitutes may be used.

Component	Manufacturer and Part Number
Connectors at Dlink+ w/ CPDLC	Amphenol 1 x MS3476L24-61S
Connector socket contact, #20 (may be included with connector)	Amphenol 40 x M39029/5-115
Sealing plug, #20	Amphenol 21 x MS27488-20
Heat shrink tubing, 0.125 in (0.32 cm)	Alpha Wire FIT-221
RJ-45 female connector/cable assembly	L-com ECJ504-8

SERVICE BULLETIN

Component	Manufacturer and Part Number
Banana wire-end connector	Any manufacturer 1 x red 1 x black
26 AWG unshielded wire	Any manufacturer
Epoxy	3M DP110
RTV	Dow Corning 3145
Heat shrink tubing, 1.5 in (3.8 cm)	3M FP-301

(2) Signals

(a) External Connections

Pass the four ethernet wires through 1 in (2.5 cm) of 0.125 in (0.32 cm) heat shrink tubing. Delay shrinking the tubing until the potting operation, below. Cut off the four unused ethernet wires at the RJ-45 connector.

61-Pin	RJ-45	Signal	Length
B	3	Ethernet Transmit +	6in ± 2 in (15 cm ± 5 cm)
C	6	Ethernet Transmit -	6in ± 2 in (15 cm ± 5 cm)
D	1	Ethernet Receive +	6in ± 2 in (15 cm ± 5 cm)
E	2	Ethernet Receive -	6in ± 2 in (15 cm ± 5 cm)

(b) Interconnections

Connect all the pins on the same row using 26 awg solid wire. Cut the wires to approximately 5" (13 cm). Connect two wires to one of the connections, then jumper one to each of the remaining two connections. Fold wires or use additional wire to fill the oversize MIL contacts.

Connection 1 Pin	Connection 2 Pin	Connection 3 Pin
TX1+ AA	RX3+ S	RX5+ W

SERVICE BULLETIN

Connection 1	Connection 2	Connection 3
Pin	Pin	Pin
TX1- BB	RX3- T	RX5- X
TX2+ P	RX6+ Y	RX7+ d
TX2- R	RX6- Z	RX7- e
TX3+ t	RX8+ b	RX1+ CC
TX3- u	RX8- c	RX1- DD
TX4+ v	RX2+ EE	RX4+ U
TX4- w	RX2- FF	RX4- V
OUT1 G	IN1 j	IN5 L
OUT2 H	IN2 k	IN6 M
OUT3 J	IN3 y	IN7 g
OUT4 K	IN4 n	IN8 h

(3) Construction

Insert sealing plugs into the unused contact locations. Pot wires using the epoxy after the cable has been tested. Locate and shrink the ethernet tubing so that it will extend approximately 0.5 in (1.3 cm) on either side of the epoxy-air boundary. The epoxy depth should be enough to cover all the loopback wires. Cover the potted block with 1.5 in (3.8 cm) heat shrink tubing.

Use RTV for strain relief where wires enter the RJ-45 connector.

SERVICE BULLETIN

8. APPROVAL

Prepared by: _____

Program Manager: _____

Director of Engineering: _____

Director of Quality: _____

Spectralux Corporation
12335 134th Court NE
Redmond, WA 98052
USA

Telephone: +1 425.285.3000