

<pre> - - - - -             d   i   g   i   t   a   l     -   -   -   -   -   -   </pre>	FCO	Level of Urgency +---+   I   +---+	Page_1_ Of_12
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FIELD CHANGE ORDER	Number: CI780-I006
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Applicability: The L0118 Rev B\* module should be installed on all CI750, CI780, CIBCI, & HSCxx nodes used in VAXclusters of 6 (six) or more CI/HSC nodes connected to a common SC008 Star Coupler. L0118s should replace all L0100 Rev D\* link modules; L0100 Rev E\* can coexist with L0118s except in greater than 16 node environment.

Problem/Symptom: Clusters of 6 or more CI/HSC nodes on SC008 may exhibit CI-PATH NO\_RSP or NAK, ARB-TIMEOUTS, and VC-CLOSURE. L0118 (& L0100 Rev E\*) corrects adjacent-node collision & arb problems. \* FIX DETAILS ON PAGE 2. \*

Quick Check: Check that link module is part number L0118.

Compatibility/Prerequisite FCO: CI750-I005, CIBCI-I002, HSC50-I009, HSC70-I001	Est. Time to Install: 1 hour per node
---	--

Special Tools or Test Equipment: See page 2.

#### FCO Parts Information

Order by FCO Kit#:	Quantity:	Part Number:	Description:
EQ-01454-05	1	L0118 (Rev B)	Link Module
EQ-01454-04	1		FA-04740-01/05
FA-04740-02	1		FCO Document

EQ Kit Variation System/Option Applic: N/A

#### Approvals

CSSE Engineer  
Bob Brassard

F.S. Product Safety  
Robert Brister

F.S. Logistics  
Ed Duggan

CSSE Manager  
Jan Sicard

F.S. Microfiche Libraries  
EP-FSNVX-LB VAX

Affected Population:  
12,000/2,000

MicroMedia Pub.  
Ray LeBlanc

VAXnotes  
STARS

Initial Kitting:  
12,000/2,000

Revision:

A

FCO Release Date

2-JUN-88

Hardcopy Publication:

2,000

Parts Availability:

May 1988

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FCO CI780-I006

PAGE 2 OF 12

PROBLEMS/SYMPTOMS: Continued from Page 1.

-----  
SOLUTION SUMMARY - L0118 DESIGN AND L0100 E\* ECOS

# - Denotes changes incompatible with L0100-D1, or CIBCA  
"7-tick DELTA-TIME mode; and controlled by "COMPATIBILITY  
7/10-tick" switch on L0100-E1/E2 or L0118.

- 1.# BASIC QUIET-SLOT extended from 7 to 10 ticks (tick=byte=114 ns., change = 800 ns. to 1140 ns.) to fix adjacent node collision problem at 40% CI-path utilization caused by L0100 Tx-start/Rx-detect logic delays when such nodes simultaneously arbitrate.
- 2.# HIGH/LOW-PRIORITY (Round-ROBIN) ARBITRATION COUNTER logic fixed to prevent "false BEATEN-BY-NODE-0" detection during ACK-TURNAROUND carrier-delay, resulting in biasing arb-wins to low-nodes. Fix requires QUIET-SLOT change, and must be applied to all L0100 to prevent arbitration biasing.
3. # EXTEND ACK-TURNAROUND TIME (INFO-to-ACK PACKET delay) to ensure CI-sender (INFO-PKT) ready to receive ACK, under worst-case (short,fast) propagation delays, such as with SC004 (dual-CI750) and short-CI-cables (6-10 meter). Fix requires QUIET-SLOT change.
4. Fix SYNC-DETECT "PAL" to prevent lock-up during CI-carrier "flood", an infrequent CI-LINK failure mode.
5. EXTEND "TRAILER TRANSMIT TIME" to ensure at least 5 bytes of trailer (after CRC) sent, instead of 3.5 bytes.
6. EXTEND HEADER JUMPER (not used in current CI applic.) was non-functional: Fix.
7. ALTER-DELTA-TIME JUMPER (7/16-tick quiet-slot) was non-functional: Fix. Not currently used, but intended for extended CI-cabling lengths, or fiber.
8. ARBITRATION STATUS REPORTING enhanced to distinguish ARB-TIMEOUT from "fail to xmit after successful ARB".

9. CI20 ONLY: CRC-COUNT RESET failed on SELF-DIRECTED packets: Fix.

10. MISCELLANEOUS L0100 Print-Set logic-drawing clean-up, marginal logic-design improvement, for benefit of future CIxxx chip-designs (CIBCA...) based on L0100.

SPECIAL TOOLS: Continued from page 1.

-----  
 Field Service Tool Kit  
 VELOSTAT Electrostatic Field Service Kit (P/N 29-26246-00)  
 Loopback Attenuators (12-19907-01)

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FCO CI780-I006

PAGE 3 OF 12

PARTS LIST: Continued from page 1.

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Order by	Quantity:	Part Number:	Description:
FCO Kit#:			
EQ-01454-05	1	L0118 (Rev B1/B2)	Link Module
FA-04740-06	1		Inst. sheet for ordering kits
EQ-01454-04	1	FA-04740-01	CI750 FCO Doc.
	1	FA-04740-02	CI780 FCO Doc
	1	FA-04740-03	CIBCI FCO Doc
	1	FA-04740-04	HSC50 FCO Doc.
	1	FA-04740-05	HSC70 FCO Doc.

CI780 OPTION LEVEL REVISION CHART

-----

CI780	C1	D1	E1, (**EE1)	F1
L0100 ***	D1, (B2*)	D1, (B2*)	D1, (B2*)	D, (B2*), E
L0118 ***	B1, B2	B1, B2	B1, B2	B1, B2
L0101	H1	H1	H1, **HH1	J, K
L0102	C1	C1, D1	C1, D1	C, D
L0104	C, C1, D1	C, C1, D1	C, C1, D1	C, D
Microcode				
CI780.BIN	Rev 3.0	Rev 4.0	Rev 5.0	Rev 7, 8
AS-T213*-ME	F	G	H	J, O

BACKPLANE

70-17654

A

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\* (Note) "B2" is being marked on "B" etch and is equal to "D1".

\*\* (Note) Rev 6.0 ucode and the "HH1" module are used only if CI780-EE1-I-005 FCO needs to be installed making the CI780 Rev EE1.

\*\*\* (Note) L0118 is enhanced L0100 replacement, and can be used as "universal spare". L0118 is required to support >16 node functionality.

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FCO CI780-I006

PAGE 4 OF 12

LINK MODULE UTILIZATION/SWITCH SETTINGS MATRIX

OPTION	1 - 5 NODES	6 - 16 NODES
	MODULE/REV/SLOT-COUNT	MODULE/REV/SLOT-COUNT
CI7XX, CIBCI, HSCXX	L0100 REV "D" L0100 REV "E" @ 7 TICK L0118 @ 7 TICK	L0100 REV E @ 10 TICK L0118 @ 10 TICK
CIBCA-AA	T1025 @ 7 TICK	T1025 @ 10 TICK

NOTE: If all nodes in the VAXcluster system have 10 tick capability (I.E., L0118, L0100 Rev "E" and/or CIBCA-AA and NO L0100 Rev "D"), then all nodes should be set to 10 tick mode regardless of the VAXcluster system size.

L0100 - Rev "E" - See page 7, step 7 for 7/10-TICK Switch setup.

L0118 - Rev "B" - See page 7, step 7 for 7/10-TICK, Cluster-size Switch set-up, & Misc. Function Jumpers.

CIBCA-AA - Add Jumper from E11 to E41 on VAXBI Backplane for "10-TICK INCOMPATIBLE" mode operation. Verify no jumpers D29-D59 and D30-D60 for cluster-size (NODE-COUNT) of 16 or less. Refer to CIBCA User Guide Pg. 2-10 to 2-13 for set-up.

```

*****
*          INCOMPATIBILITY WARNING - L0100-E1/E2 & L0118          *
*          -----                                                *
*  The new L0100-E1/E2 and L0118 "10-TICK-MODE" design changes are *
*  *** INCOMPATIBLE *** with current L0100-D1 design, and CI/HSC- *
*  LINK modules (L0100-E, CIBCA, L0118) set to "7-TICK-MODE".    *
*  Mixed "7 and 10-TICK-MODE" CI-LINK operation can have severe  *
*  impact on CI-arbitration performance and collision-rate (NO_RSP). *
*  For this reason, DEC does not support "10-TICK-MODE" CI-LINK  *
*  ROLLING-UPGRADES, thus requiring a CLUSTER SHUTDOWN to "ENABLE" *
*  10-TICK-MODE ** ONLY ** after all CI/HSC-nodes have been FCO'd. *
*                                                                    *
*  NOTE: High-availability customer exceptions to CLUSTER-        *
*  SHUTDOWN "rule" should be referred to CSSE for advice on      *
*  minimizing risks; but DEC will not assume any liabilities      *
*  for lost data/time with such CLUSTER upgrade programs.        *
*****

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FCO CI780-I006

PAGE 5 OF 12

- o Forecast and obtain sufficient CI/HSCxx L0100 FCO kits for all CI7x0, CIBCI, HSCxx Cluster Nodes, ensuring availability of 1 (one) spare for every 10 (ten) FCO kits. FCO kits should NOT BE "P1 ORDERED", but should be ordered according to the Corporate Implementation Plan. CIxxx Functional Diags (EVGAA/B) from VAX Diag. Rel #31 are also recommended for checkout.
- o Study SWITCH/JUMPER SET-UP Procedures for L0100, L0118, and CIBCA T1025 modules for adjusting the following CI-LINK functions/modes:
  - "7/10-TICK" DELTA-TIME/QUIET-SLOT:
    - + L0118 Page 7. Step 7
    - + L0100-E Page 7, Step 7
    - + T1025/CIBCA Page 7, Step 7 and CIBCA USER'S GUIDE Pg. 2-12
  - CLUSTER-SIZE of 16/32 NODES:
    - + L0118 Page 7, Step 7
    - + L0100-E NOT APPLICABLE
    - + T1025/CIBCA Page 7, Step 7 and CIBCA USER'S GUIDE Pg. 2-13
  - L0118 CI-LINK-MODE JUMPERS: Page 7, Step 7.
- o Install L0118 set to "7-TICK/COMPATIBLE-MODE" in all CI780, CI750, CIBCI, and HSC50/70 Cluster nodes. There are no prerequisite/co-requisite CIxxx or HSCxx FCOs (modules or microcode) required for L0118 upgrade in "7-TICK 16-NODE MODE", but CI780.BIN Version V8.0

and CIBCA.BIN Version V5.3 are recommended.

- o Schedule and perform cluster shutdown after all non-CIBCA nodes are upgraded/FCO'd, and have been tested and verified to function in "7-TICK-MODE" operation under VMS. VMS system-testing is important to early detection and repair of any DOA FCO modules, prior to disrupting VAXcluster for CI-LINK 7-to-10-TICK mode-change.

```
*****
*           IMPORTANT NOTE   ==  IMPORTANT NOTE           *
*   Customer should be involved or perform all CLUSTER-   *
*   wide or node-specific VAX and HSC STARTUPS, BOOTS,    *
*   and SHUTDOWNS.                                       *
*****
```

- o Switch all L0100-E, L0118, and T1025/CIBCA to "10-TICK-MODE" "INCOMPATIBLE" operation. Ensure all CIs & HSCs are powered-off before changing switches/jumpers. Refer to appropriate FCO steps. Any planned CI-NODE-ADDRESS changes should also be made at this time, with consideration of VMS SYSGEN and DECNET parameter changes required on reboot.
- o Reboot cluster, with customer consent, starting with HSCs.

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FCO    CI780-I006
PAGE  6  OF  12

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CI-LINK MODULE FCO INSTALLATION PROCEDURE

1. Shutdown the system by executing the Shutdown Command Procedure, CUSTOMER SHOULD PERFORM THIS.

```
$ "@SYS$SYSTEM:SHUTDOWN.COM"
```

2. Set the five position keyswitch on the controller panel to the "OFF" position. For the 11/78X set all memory power supplies to the "OFF" position. The memory power supplies can be identified by the label "Memory Power Supply" affixed to the top of the H7100s which are used for that purpose.

```
*****
*           NOTE                                           *
*   If Memory Power Supply switch is "ON" and circuit     *
*   Breaker on Power Controller is set to "OFF", the      *
*   Battery Backup Unit (if installed as an option) will  *
*   be turned "ON". To turn off Battery Backup Unit,     *
*   Memory Power Supply and Battery Backup must be turned *
*****
```

\* "OFF" . \*

3. Set the circuit breaker CB1 on the 869D power controller to the "OFF" position in the 1178X CPU cabinet; 876A CPU cabinet for the 8600 and SBI expander cabinets.

4. Disconnect all four BNCIA cables for this VAX-11/780 node at the SC008. Using the loopback attenuators connect:

Transmit Path "A" (TA) to Receive Path "A" (RA)  
Transmit Path "B" (TB) to Receive Path "B" (RB)

\*\*\*\*\*  
\* C A U T I O N \*  
\* The L0118 module, as all VAX 11/7X0 modules, \*  
\* contains electrostatic discharge sensitive \*  
\* devices (ESDS). The use of the VELOSTAT kit \*  
\* is essential to prevent damage which may not \*  
\* be noticed immediately. \*  
\* \*  
\*\*\*\*\*

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FCO CI780-I006  
PAGE 7 OF 12

- 5. Set up VELOSTAT KIT
  - a. Unfold the VELOSTAT mat to full size (24" x 24").
  - b. Attach the 15 foot ground cord to the VELOSTAT snap fastener on the mat.
  - c. Attach the alligator clip end of the ground cord to a good ground on the VAX-11/780 system.
  - d. Attach the wrist strap to either wrist and the alligator clip to a convenient portion of the mat.

- 6. Remove the L0100 or L0118 module from its CIxxx module slot and place it on the mat. Check the revision and module type:
  - L0100-E1/E2, or L0118, reinstall in same slot, and go to step 11 (no upgrade needed).
  - L0100 below Rev. E1/E2, go to step 7 to continue with upgrade.

Record old CI-NODE ADDRESS settings on SW1 and SW2 switches (8-switch DIP on module handle).

7. With L0118 (EQ-01454-05) on ESD Mat, configure and verify CI-LINK mode jumpers/switches for "7-TICK COMPATIBLE" MODE operation.

The L0118 also contains CLUSTER-SIZE switch and 4 (four) jumpers for MISC-FUNCTIONAL-MODES which should be checked. Install the new L0118 in the CIxxx option slot.

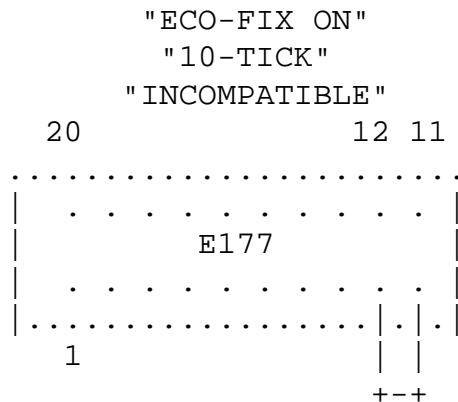
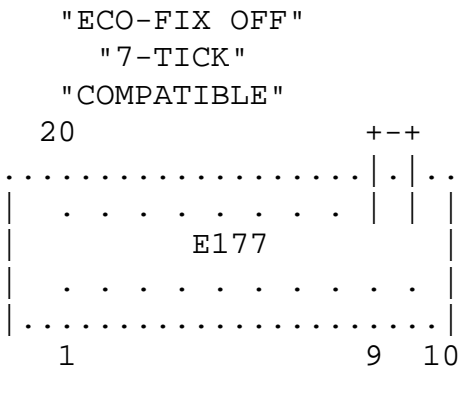
\*\*\*\*\*  
\*  
\* IMPORTANT - NOTE \*  
\* Copy old CI-NODE ADDRESS to new L0100/L0118. \*  
\* Ensure "7-TICK COMPATIBLE" mode is ENABLED/SET to avoid \*  
\* CI-PATH errors with L0100-D1 or other "7-TICK" CI/HSC \*  
\* nodes. The "10-TICK INCOMPATIBLE" mode cannot be used \*  
\* with L0100-D1 in cluster. Default L0100/L0118 manif. \*  
\* switch setting should be "7-TICK COMPATIBLE" mode. \*  
\*\*\*\*\*

SET L0100-E1 COMPATIBILITY JUMPER AS FOLLOWS:  
-----

- o 7/10-TICK COMPAT. MODE SET BY 1 JUMPER and E177 stake-pins.
  - "7-TICK COMPAT.-MODE": jumper E177-11 to E177-12
  - "10-TICK INCOMPAT.-MODE": jumper E177-9 to E177-10
- o NO CLUSTER-SIZE OR FUNCTION-MODE JUMPERS/SWITCHES.
- o L0100-E1 QUICK-CHECK (PART-REVISION VERIFY):
  - ECO wires at E177-13 and E177-9.
  - STAKE-PINS (for jumper) and E177-9,10,11,12.
  - ETCH REV-C: P/N "50-14430C-0" marking.

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FCO CI780-I006  
PAGE 8 OF 12



SET L0100-E2 SWITCH SETTINGS AS FOLLOWS:  
-----

- o 7/10-TICK COMPAT. MODE SET BY DIP-SWITCH SW3-1 LOCATED AT TOP CENTER OF L0100-E2 TO RIGHT OF E118:



- "7-TICK COMPAT.,ECO OFF": SW3-1 SWITCH "OFF"
- "10-TICK INCOMPAT.,ECO ON": SW3-1 SWITCH "ON" .  
NOTE: SW3-2 IS NOT USED, BUT SET SAME AS SW3-1 TO AVOID CONFUSION.

o NO CLUSTER-SIZE OR FUNCTION-MODE JUMPERS/SWITCHES.

o L0100-E2 QUICK-CHECK (PART-REVISION VERIFY):

- SW3 DUAL-SWITCH-DIP-PACK AT TOP-CENTER, RIGHT OF E118.
- ETCH REV-D: P/N "50-14430-0-0 D1-P4" marking.

SET L0118 SWITCH/JUMPER SETTINGS AS FOLLOWS:

-----

```
*****
* NOTE: REFER TO L0118 FIGURES ON FCO PAGE 11 and *
* 12 FOR SW3 & JUMPERS W1-W4 LOCATIONS.          *
*****
```

o 7/10-TICK COMPAT. MODE SET BY DIP-SWITCH SW3-4 LOCATED AT TOP CENTER OF L0118 TO LEFT (BELOW IF VERTICAL) OF 2 CI-NODE-ADDRESS 8-SWITCH PACKS.

- "7- TICK COMPAT.,ECO OFF": SW3-4 SWITCH "OFF".
- "10-TICK INCOMPAT.,ECO ON" : SW3-4 SWITCH "ON" .
- SWITCHES SW3-2 & SW3-3 MUST BE "OFF" (AFFECTS DELTA-TIME/QUIET-SLOT).

o CLUSTER-SIZE FOR 16/32-NODE ADDRESSING AND ARBITRATION IS CONTROLLED BY SWITCH SW3-1. DEFAULT = 16-NODE-MODE = "OFF".

- 16-NODE MODE (DEFAULT WITH NO CISCE): SW3-1 "OFF".
- 32-NODE MODE (CISCE 24-NODE CLUSTER): SW3-1 "ON" .

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FCO CI780-I006

PAGE 9 OF 12

o L0118 FUNCTION-MODE JUMPERS W1-W4 DEFAULT SETTINGS CHECK:

View module with HANDLE-UP and FINGERS-DOWN.  
Refer to L0118 Figures on FCO pages 11 and 12.

- L0118-B1 HAS ECO-WIRES ON E83-3 and E150-1:
  - = W1 located left of E2: plugged on left 2 stake-pins, marked with "box".
  - = W3 located between E54 & E75: plugged on horizontal stake-pins, marked with "box".
  - = W2 & W4 located as 4 stake pins below E24 and E62: W2 & W4 "OUT".

- L0118-B2 HAS NO ECO-WIRES TO E83-3 AND E150-1:
  - = W1 located left of E2: W1 on left 2

- stake-pins, marked with "box".
- = W3 located between E54 & E75: W3 on horizontal stake-pins, marked with "box".
- = W2 located below junction of E24 & E62: W2 on left 2 stake-pins marked with "box".
- = W4 located below E24: W4 plugged on left 2 stake-pins marked with "box".

SET CIBCA BACKPLANE JUMPER SETTINGS AS FOLLOWS:(FOR QUICK REFERENCE)

-----  
 Refer to CIBCA Users Guide Pg. 2-10 to 2-13.  
 All jumpers are located behind T1015 Module.  
 Jumper changes DO NOT take effect until SELF-TEST EXECUTED.

- o "7/10-TICK ALTER-DELTA-TIME" CONTROLLED BY JUMPER ON T1015 BACKPLANE PINS E11-E41, E09-E39, and E10-E40:
    - ENSURE E09-E39 and E10-E40 JUMPERS "OUT".
    - "7 -TICK COMPAT., ECO-OFF": Jumper OUT E11-E41.
    - "10-TICK INCOMPAT.,ECO-ON" : Jumper IN E11-E41.
  - o CLUSTER-SIZE FOR 16/32-NODE ADDRESSING AND ARBITRATION IS SET BY JUMPER ON T1015 PINS D30-D60 and D29-D59:
    - Ensure E29-E59 out for both 16 or 32-NODE mode.
    - 16-NODE mode (default no CISCE): D30-D60 "OUT".
    - 32-NODE mode (CISCE 24-NODE ): D30-D60 "IN" .
8. Set the circuit breaker CB1 on the 869D power controller to the "ON" position in the 1178X CPU cabinet; 876A CPU cabinet for the 8600 and SBI expander cabinets.
  9. Power-up the system.
  10. Run the following Level III (offline) diagnostics under the DIAG. SUPV. (DS>) E\*SAA-10.8 to verify that the CI780 is functional.

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FCO CI780-I006

PAGE 10 OF 12

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DIAGNOSTIC	MINIMUM VERSION	TITLE
-----	-----	-----
EVGAA	4.1	CI Functional Diag Part I
EVGAB	4.1	CI Functional Diag Part II

WARNING: EVGAA/B may report "false errors" when connected to "live" CLUSTER due to receipt of SCS START-DATAGRAMS from VMS.

11. Remove the loopback attenuators and reconnect the BNCIA cables

to their original SC008 ports.

- 12. Boot system into VAXcluster, using customer's "standard operating procedures". IT IS PREFERRED THAT THE CUSTOMER PERFORM THIS STEP.

EVERY UPGRADED CI/HSC NODE WITH NEW L0100-E\*/L0118 SHOULD BE TESTED UNDER VMS IN "7-TICK ECO-OFF MODE" TO SYSTEM-TEST NEW FCO PARTS PRIOR TO CLUSTER-WIDE CI-LINK-MODE TRANSITION.

- 13. UPGRADE remaining CI750, CI780, CIBCI, HSC50, and HSC70 nodes that do not contain L0100-E1/E2 or L0118 CI-LINK module.

\*\*\* REPEAT STEP 1 UNTIL ALL NODES ARE COMPLETED. \*\*\*

- 14. Set all CI/HSC nodes to "10-TICK, INCOMPATIBLE, ECO-ENABLED MODE" operation. \*\*\* THIS REQUIRES ENTIRE CLUSTER-SHUTDOWN TO AVOID CI-PATH FAILURES, CLUSTER-MEMBER LOSS, AND RISKS TO DATA-INTEGRITY. \*\*\* Ensure each CI is powered off when changing jumpers.

Set "10-TICK, INCOMPATIBLE, ECO-ENABLED MODE" by referring to Page 7, Step 7; or use following quick reference chart:

	L0100-E1	L0100-E2	L0118	CIBCA
	E177	SW3-1	SW3-4	T1015
	JUMPER	SWITCH	SWITCH	E11-E41
	-----	-----	-----	-----
7 -TICK:	11-12 IN	"OFF"	"OFF"	"OUT"
10-TICK:	9-10 IN	"ON"	"ON"	"IN"

Only L0100 Rev E\* needs to be removed in order to set to 10-TICK.

- 15. Boot all systems back into VAXcluster, starting with HSCs, using customer's "standard operating procedures". IT IS PREFERRED THAT THE CUSTOMER PERFORM THIS STEP.
- 16. Report the FCO activity on the LARS form in the "module/fail/area/FCO" column as "FCO CI780-I006" as indicated. (See page 11)
- 17. Update Site Management Guide.

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FCO CI780-I006  
PAGE 11 OF 12

LARS

USA

GIA

EUROPE

Contract and Warranty	W	U	Y
Non Contract/Non Warranty	F	F	F
DEC Option	CI780	CI780	CI780
Type of Call	M	M	M
Action Taken	D	D	I
Fail Area-Module-FCO-Comments	CI780-I006	CI780-I006	CI780-I006
Material Used	EQ-01454-05	EQ-01454-05	EQ-01454-05
	EQ-01454-04	EQ-01454-04	EQ-01454-04

FIGURE 1 - L0118 LINK MODULE SWITCHES

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d i g i t a l	PAGE	12 OF 12
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FIGURE 2 - L0118 LINK MODULE SETTINGS

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\^ CI780
\\CI780
\\BRASSARD
\\1988
\\JUN
\\FCO_DOCS

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