Chapter 1

VAX 6000 CALYPSO series

This chapter assembled by Pete Griffin, JAN'93

If you are likely to work on 6000s and were trained before the 6500 was released; please make sure you are happy with all the platform differences listed here.

It is easy to order and fit an incorrect power supply FRU!!
It is easy to fit something like an MS65, which must have an uprated CPU to support it!!
It is easy to use the UPDATE command to render CPU modules useless!!

1.1 Sources of Information

On the 6200, 6300 and 6400 there was a complete set of manuals (Technical Users Guide, Options and Maintenance etc) dedicated to each CPU which covered the CPU and all the options. When the new platform came out they altered the system , so some manuals are generic (Platform etc) and others are specific.
Here, I've listed the ones I think you should have, the rest are obsolete. The manuals for the 6000 series are grouped thus :-

- 6000 Series documentation, generic CPU and cabinet material.
- 6000 Model Level documentation, CPU specific material.
- System Options

1.1.1 6000 Series documentation

- *6000 Series Owners Manual*
  This used to be "per CPU" (eg 6400 Owners Manual).
  The 6500 documentation called this out as EK-600EA-OM, but now the 6600 documentation calls it out as EK-600EB-OM.
  I don't have it on fiche, and can only guess that the latest includes all the previous variants.

  The earlier versions were particularly usefull as they contained real good descriptions of the console commands and messages.

- *6000 Series Installation Guide*

  The 6500 documentation called this out as EP-600EA-IN, but now the 6600 documentation calls it out as EP-600EB-IN. The latter one includes a big DSSI section.
  Site Prep; Unpacking; Connecting/configuring controllers.
  POWER; SELF-TEST and Acceptance Testing.
  RDC; Module handling; BI expansion.

- *6000 Platform Service Manual* EP-600EA-MG

  General; Specification; PART NUMBERS
  XMI and BI card cage replacement
  XTC, CONTROL PANEL, FILTER, TOY BATTERY and TK replacement
  POWER SUPPLY, specification and replacement
  CABINET and AIRFLOW component replacement
  CABLE LIST; XMI connections; Module handling; XMI1 and XMI2 differences

- *6000 Platform Technical Users Guide* EP-600EA-TM

  Overview; XMI; DWMBB; POWER and COOLING functional descriptions

- *6000 Series Upgrade Manual* EP-600EB-UP

  Upgrading within a model (eg 6310 to 6320)
  Upgrading to a new model (eg 6310 to 6410)
  Upgrading to a VECTOR processor

- *6000 Series XMI conversion* EP-650EB-UP

  The instructions for a full PLATFORM UPGRADE

- *6200/6300/6400 ROM upgrade instructions* EP-60ROM-UP

  But also see information in this Chapter for ROM UPGRADE information.

- *RACK MOUNTING, Installation guide* EP-RM600-IN

  Enclosures; Power supplies; Installation
  Removal and replacement procedures, Part Numbers

1.1.2 6000 model level documentation

1.1.2.1 VAX 6600

- *VAX 6000 Model 600 Mini Reference* EK-660EA-HR
- *VAX 6000 Model 600 Service Manual* EK-660EA-MG

  This is the main Service document
  Trouble shooting system; Comprehensive diagnostic operating instructions
  For the CPU, VECTOR, MEMORY, DWMBB it covers :-

  Description; Configuration; Power up sequences;
  RBDs; Diagnostic Supervisor;
  Handling; Replacing; Adding; Registers;
  Boot CPU selection; Machine Checks, EVUCA
  Consol commands; Consol error messages;
  LEDs; Parse Tree; Corrupted EEPROM recovery
- *VAX 6000 Model 600 Technical Users Guide* EK-660EA-TM

  CPU, VECTOR and MEMORY (MS65A) functional description
- *VAX 6000 Installing Model 600 Processors* EK-660EA-UP

  Upgrade paths to 6600
  Upgrading CPU, memory and DWMBA modules
  Easiest possible cab upgrade
  Partial upgrade
  System verify; 6600 configuration rules; 6600 LEDs

1.1.2.2 VAX 6500

- *VAX 6000 Model 500 Mini Reference* EP-650EA-HR
- *VAX 6000 Model 500 Service Manual* EP-650EA-MG

  This is the main Service document
  Trouble shooting system; Comprehensive diagnostic operating instructions
  For the CPU, VECTOR, MEMORY, DWMBB it covers :-

  Description; Configuration; Power up sequences;
  RBDs; Diagnostic Supervisor;
  Handling; Replacing; Adding; Registers;
  Boot CPU selection; Machine Checks, EVUCA
  Consol commands; Consol error messages;
  LEDs; Parse Tree; Corrupted EEPROM recovery
- *VAX 6000 Model 500 Technical Users Guide* EP-650EA-TM

  CPU, VECTOR and MEMORY (MS65A) functional description
- *VAX 6000 Installing Model 500 Processors* EP-KA65A-UP

  6200/6300/6400 to 6500 upgrade paths
  Upgrading CPU, memory and DWMBA modules
  Easiest possible cab upgrade
  Partial upgrade
  System verify; 6500 configuration rules; 6500 LEDs

1.1.2.3 VAX 6400

- *VAX 6000-400 Mini Reference* EK-640EA-HR
- *VAX 6000-400 Proprietary Technical Info.* EP-640EA-TD

  Contains some information supplementary to the Technical Users Guide.
- *VAX 6000-400 System Technical Users Guide* EP-640EB-TM

  XMI, CPU, VECTOR, MEMORY (MS62), DWMBA, POWER & COOLING functional desc.
- *VAX 6000-400 Options and Maintenance* EP-640EB-MG

  This is the main Service document for an original platform.
  It contains everything a field engineer needs to know.
  Printed under the original document scheme (following the precedent set by the VAX 6200/6300 Options and Sertvice Manual), it contains all the stuff now found in the CPU Service Manual and Platform Service Manuals.
- *VAX 6000 Models 300 and 400 Service Man.* EP-624EA-MG

  This is the main Service document for a new platform.
  In conjunction with the Platform Service manual.
  Trouble shooting system; Comprehensive diagnostic operating instructions
  For the CPU (6300, 6400), VECTOR, MEMORY (MS65), DWMBB it covers :-

  Description; Configuration; Power up sequences;
  RBDs; Diagnostic Supervisor;
  Handling; Replacing; Adding; Registers;
  Boot CPU selection; Machine Checks,
  Consol commands; Consol error messages;
- *VAX 6000 Installing Model 200/300/400* EP-6234A-UP

  Upgrading within a model (eg 6310 to 6320)
  Upgrading to a new model (eg 6310 to 6410)

1.1.2.4 VAX 6300 and VAX 6200

- *VAX 6200/6300 Upgrade Installation Guide* EP-623AA-UP
  6200 to 6300; 6310 to 6320; also 6300 fileserver to timeshare
- *VAX 6200/6300 VAXserver 6200/6300 Options and Maintenance* EP-620AB-MG
  This is the main Service document for the system.
  Comprehensive diagnostic operating instructions
  For the CPU, MEMORY, DWMBA, it covers :-
  Description; Configuration; Power up sequences;
  RBDs; Diagnostic Supervisor;
  Handling; Replacing; Adding; Registers;
  Machine Checks, Boot CPU selection etc;
  XMI card cage component replacement
  VAXBI card cage component replacement
  Control System component replacement
  Power System component replacment
  Cabinet and Airflow component replacement
  Cable list; Troubleshooting
- *VAX 6200/6300 VAXserver 6200/6300 System Technical Users Guide* EP-620AB-TM
  XMI, CPU, VECTOR, MEMORY (MS62), DWMBA, POWER & COOLING functional desc.
- *VAX 6300 VAXserver 300 Installation Guide* EP-620AC-IN
  Site prep; Unpacking;
  Connecting Disks, Tapes, CI
  Powering up
  Self Test; acceptance; UETP
  Installing a VAXBI expansion cabinet.

1.1.2.5 VAX 6200

- *VAX 6200 Option and Maintenance* EP-620AA-MG
  Same as VAX 6200/6300 VAXServer 6200/6300 Option and Maintenance
- *VAX 6200 System Technical Users Guide* EP-620AA-TM
  Same as VAX 6200/6300 VAXServer 6200/6300 System Technical Users Guide
- *VAX 6200 Proprietary Technical Information* EP-620AA-TD
  Information supplementary to the Technical Users guide.
  Not re-issued for the 6200/6300, so keep hold of it.
- *VAX 6200 System Upgrade Installation Guide* EP-620AA-UP
  Adding a cpu or memory
- *VAXServer 6200 System Upgrade Installation Guide* EP-620AA-UP
  Server to time-share
  Single to multi cpu
- *VAX 6200 Installation guide* EP-620AA-IN
  Same as VAX 6300 Fileserver 6300 Installation Guide

1.1.3 System Options

The XMI Handbook *EK-XMIAD-HB "XMI Adapters Handbook"* contains most information needed by a Field Engineer, but currently it only covers the CIXCD, DEMNA and DWMBA. Hopefully it will eventually be updated to include those newer gizzmos (CIXCD, DEMFA, DWMVA and KDM70) that have snuck in.

1.1.3.1 Cabinet mounted Disk drives

- *RA90/6000 Cabinet Series Upgrade Installation Manual* EK-RA9CK-IN.
- *SA70/6000 Cabinet Series Upgrade Installation Guide* EP-SA7CK-IN.
- *VAX 6000/SF72, Embedded Storage Installation Guide* EP-EMBED-IN
- *VAX 6000, CI/EMBEDDED Storage Manual* EP-62X34-IN

1.1.3.2 CIXCD, XMI to CI controller, sources of information

- *XMI Adapters Handbook* EK-XMIAD-HB

  Block and description; Part Numbers; Specification; Documentation
  Jumpers; Self Test and RBDs
  EVGAA, EVGAB, EVGAC, EVXCI (standard CI diagnostics)
  EVGEA, CIXCD repair level
  EVGEB, CIXCD ucode utility
  Registers - full bit descriptions

- *CIXCD Interface Technical Manual* EP-CIXCD-TM

  Overview; XMI overview; Level 2 functional description
  Registers
  Micro Programming;
  Self Test, Level 2 descriptions
  Error codes in PDFLT field of PDCSR
  Micro word
  Error detection and handling
  Interupts
  PESR miscellaneous errors

- *CIXCD Interface Users Guide* EP-CIXCD-UG

  General description and specification
  Header card assembly; Bulkhead assembly
  Installation; Acceptance testing; Self Test; RBDs
  EVGEA, repair level diagnostic and EEPROM Utility
  EVGAB and EVGAC functional diagnostics
  Functional description
  Registers
  Cluster Upgrade, minimum revisions and tick times.

1.1.3.3 DEMNA, XMI to Ethernet, sources of information

- *XMI Adapters Handbook* EK-XMIAD-HB

  Block and description; Specification; Documentation
  Part Numbers; Cabling; Self Test and RBDs
  EEPROM error log
  Troubleshooting
  EVDWC, EVDYE level 2R diagnostics
  EVGDB EEPROM Utility
  Consol Monitor program (in EEPROM), I suggest you need a network course to understand this feature.
  Registers - full bit descriptions
  Flows for DEMNA initialization, halt and shutdown
  Error Handling and History log

- *DECLAN 400 Installation Guide* EP-DEMNA-IN

  Overview and block diagram, Installation, Self Test; LEDs and errors
  Registers
  Ethernet / DECNet addresses
  EEPROM flags :- Remote Boot, Remote DEMNA consol, Promiscuous mode.
  Protocol types
  Ethernet addresses assignments; SAP and SNAP assignments
  Reading the DEMNA's own ethernet address

- *DEMNA Controller Technical Manual* EP-DEMNA-TM

  Overview and block diagram; Level 2 functional description
  Registers
  Power up, reset, Shutdown sequences
  Self Tests; Diagnostics and troubleshooting
  Errors and handling, EEPROM error logging
  Updating DEMNA EEPROM
  Consol Monitor program

- *DECLAN Controller 400, Consol Users Guide* EP-DEMNA-UG

  All about the consol program

1.1.3.4 DEMFA, XMI to FDDI, sources of information

- I havn't seen the proper list of stuff yet but this is what I know :-

  Called a DEMFA-AA on 6000s, and a DEMFA-AB on 9000s.
  Fiber Distributed Data Interface (FDDI)
  Second generation LAN (ie replaces Ethernet)
  10 times the data rate of ethernet
  Enormously increased LAN distances
  See Chapter 9 of the FDDI Primer for possible topologies

- *DEC FDDIcontroller 400, Installation/Problem Solving* EP-DEMFA-IP

  Overview of Self Test, Specification and Description
  Installation and Verification (includes NCP)
  Problem Solving and FRU replacing
  Line Counters, Errorlog entries, SDA troubleshooting

  The Comms people have come out of the closet in a big way - this book looks the absolute dogs whatsits for us field engineers!

- *DEC FDDIcontroller 400, Technical Description* EP-DEMFA-TD

  Mainly Jim Burnley level stuff, but some information on errors, LEDs and testing.

1.1.3.5 DWMBA, XMI to BI, sources of information

- *XMI Adapters Handbook* EK-XMIAD-HB
  Block diagram and description; Documentation; Installation
  RBDs (really in the CPU)
  Registers - full bit descriptions
  IBUS signals
- *DWMBA, XMI to BI maintenance advisory* EP-DWMBA-MA
  Configuration rules
  Cables, including part numbers
  Removal and replacement
  Simplified description
  Registers
  IBUS signals
  Self test and RBDs

1.1.3.6 DWMVA, XMI to VME, sources of information

- My general description
  32 Address bits and 32 Data bits
  Asynchronous
  Bandwidth is 40 Mb/s (slightly less on a 6000)
  DMA and programmed I/O capabilities
  DWMVA module on the XMI
  6U module in the VME bus in an expansion cabinet
  Cables between the DWMVA and 6U modules
- DWMVA RELEASE NOTE, Shipped with option defines VMS and consol ROM versions.
- *DWMVA Subsystem Technical User Guide* EK-DWMVA-TM
  Related Documentation; Block diagram and description
  Address space(s) and mapping
  VME bus control; VME bus transactions
  CPU transactions; DMA transaction
  VME bus interface; Interupts
  Registers
  Initialisation; Signals; Byte swapping
- *DWMVA Subsystem Installation Guide* EK-DWMVA-IN
  Related documentation; Block diagram; Part numbers; Description
  Pre-requisites; Installation
  EVCLA
  EVCLC (needs a special test module)
- *BA62 VME Enclosure Installation Manual* EK-VME01-IN
- *BA62 VME Enclosure Pocket Service Guide* EK-VME01-PS
- *DECmpp 12000 Parallel VME Reference Manual* EP-DECAA-PM

1.1.3.7 H7236-A, Battery Backup Unit, sources of information

- *Installing the H7236-A, Battery Backup Unit* EP-60BBA-IN
  All the Installation, Indicators and Switch information.
- Also see "Section 1.8, PSU"

1.1.3.8 KDM70, XMI to SDI/STI, sources of information

- *KDM70 Controller User Guide* EP-KDM70-UG

  SPD (KDM70 software), Hardware and Software pre-requisites
  Configuration guidelines
  Specification; Part Numbers; Functional Description Overview
  Installation; Self Test
  ILEXER under DS, VMS and ULTRIX
  Self Test error codes
  EVRLM microcode Update utility
  EVRLM errors

- *KDM70 Controller Service Manual* EP-KDM70-SV

  Related Documentation
  Level 1 Block Diagram and description
  Level 1 MSCP, TMSCP and DUP protocols
  Level 2 Block Diagram and functional description
  Level 2 Initialization sequence
  Troubleshooting; Self Test errors; Errorlog packets
  Invoking KDM70 resident diagnostics under DS (EVRLN) or VMS (FYDRIVER)
  FORMAT & VERIFY, ILEXER, ILDEVO, DKUTL
  EVRAE, EVRLJ, EVRLM (including EEPROM error codes), PATCH
  Bugcheck codes; Error codes
  Registers
  Power up and Self test diagnostic descriptions

1.1.3.9 KFMSA, XMI to DSSI, sources of information

- *KFMSA Service Guide* EP-KFMSA-SV

  Overview; Fuses and LEDs; Specification; Theory of operation
  Troubleshooting; Errorlog entry analysis
  EVRAE, the disk exerciser and EVMDA, the tape exerciser
  EVCXF, device parameter utility and exerciser
  EVUCM, KFMSA EEPROM utility
  EVCXD, KFMSA exerciser (no drives)
  EVCXD/SEC:UTIL1, display errorls logged in EEPROM
  Replacing a KFMSA; Replacing a cable
  DSSI configuration and naming concepts

- *KFMSA Installation and User Manual* EP-KFMSA-IM **Make sure you have version 004 or later to include the KFMSA-AB**

  Special notes; Specification; Installing module and cables
  Self Test error codes
  Configuring sub-system - node numbers, software params, EVXCE and EVXCF parameter utilities.
  Booting DSSI devices
  EVXCF, deyice parameter utility and exerciser
  EVUCM, KFMSA EEPROM utility

- *DSSI VAXcluster Installation & Troubleshooting Manual* EP-410AA-MG

  Brilliant for the beginner.

- *DSSI Warm Swapping guide* EP-457AA-SG

  Take Eggy's advice, set FORCEUNI=0, and drive's UNITNUM so that it is NOT 0-7!!

- *ISE Installation Manual, Service Guide, User Guide* EP-RF72D-IM, -SV, -UG.

1.1.3.10 MS65A

- *MS65A, Installation* EP-MS65A-UP
  General description; ROM pre-requisites; Installation
  Power up Self tests
  ROM kit numbers
  Interleaving

1.1.3.11 UNIBUS

- *VAX 6200 DWMUA UNIBUS Installation Guide* EP-620AA-UN.

1.1.3.12 VECTOR processor

- *Installing the FV64A Vector* EP-60VEA-IN, on fiche.
- *VECTOR Processing Handbook* EC-H0739-46, available in Sales library.
- *VAX 6000 Series Vector Processor Owners Manual* EK-60VAA-OM, I've never seen.
- *VAX 6000 Series Vector Processor Programmers Guide* EK-60VAA-PG, ditto.

1.1.3.13 VAXBI, sources of information

- *Installing the VAXBI Option* EP-60BIA-IN
  Description; Tools; Part Numbers
  Installation of card cage, H7214, H7215 into CPU cab.
  DWMBB modules; Self Test; VAXBI troubleshooting
  H7206-B LEDS (the cabinet power controller)
  Installing a TK70 into CPU cabinet
  TK operating instructions
- *8200/8300 Installation Guide* AZ-GN5AC-TE
  Contains instructions and information relating to the earlier VAXBI options
- DATADOC, the VAXBI Chapter
- *6000 Series Installation Guide* EP-600EA-IN
  Contains information about the VAXBI expansion cabinet
- Various BI option manuals
  CIBCA User guide EK-CIBCA-UG
  DEC LANcontroller 200 Installation Guide EK-DEBNI-IN
  KDB50 User Guide EK-KDB50-UG

1.1.4 Various sources of information for Engineers on the Network

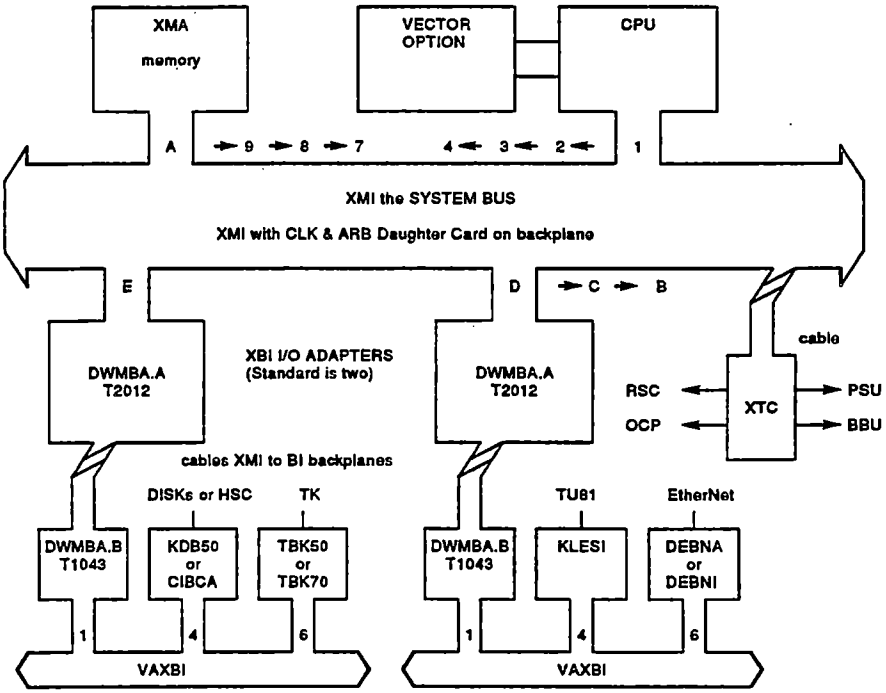
Dyfrig's COOKBOOK is SEDSWS::SYS$PUBLIC:CALYPSO_V3.PS

Various manuals and diagnostics are on :-

COMICS::DISK$TECH:[CALYPSO]
COMICS::DISK$TECH:[RIGEL]
COMICS::DISK$TECH:[MARIAH]
COMICS::DISK$TECH:[NEPTUNE]

1.2 6000 series, CPU roundup

Figure 1–1: Original CALYPSO Block diagram



The Original Platform (in its Standard Form) had two XBI adapters as shown above.

The New Platform (in its Standard Form) has no BI buses, and uses I/O adapters on the XMI.

- CIXCD - XMI to CI controller
- DEMFA - XMI to FDDI (fibre optic LAN) controller
- DEMNA - XMI to ETHERNET controller
- DWMVA - XMI to VME Bus controller
- KDM70 - XMI to SDI and STI controller
- KFMSA - XMI to DSSI controller

However the platform is very flexible, one variant seen had a 6500, KDM70, DEMNA, one DWMBA and a 12 slot BI with just a TK70!

Platforms without a TK ("consol media") use an Infoserver on the Ethernet as the Initial System Loader (ISL) to load diagnostics and EEPROM updates for all the options.

1.2.1 6000 series, CPU summary

VAX 6000-200	Calypso/CVAX	3 x 11780	Either platform
VAX 6000-300	Hyperion	4 x 11780	Either platform
VAX 6000-400	Calypso/RIGEL	7 x 11780	Either platform
VAX 6000-500	Mariah	12 x 11780	New platform
VAX 6000-600	Neptune	24 x 11780	New platform

Hyperion is a CMOS2 version of the CVAX.
Rigel is a CMOS2 "8800 on a chip (almost)".
Mariah is a CMOS3 version of the Rigel with writeback cache.
Neptune is a CMOS4 version of something.

1.2.2 SYS_TYPE register differentiates VAXs, VAXServers, Fileservers

The SYS_TYPE register is really bits "blown" into a location of the CONSOL ROM.
It can be broken down into four bytes:-

<D31:D24> = SYSTEM FAMILY (02 is the 6000 range)
<D23:D16> = CONSOL REVISION (10 means ROM revision 1.0)
<D15:D08> = SYSTEM VARIANT (01 normally, but the 6300 was called a KA62B and had 02 in this field)
<D07:D00> = Licensing information (timeshare or fileserver) :-

VAXServers/Fileservers are functionally the same as "timesharing VAX" but considerably cheaper and VMS will only allow two users. One user is via the consol whilst the other would be (typically) over the ethernet.
<D07:D00> = 1 for a Timeshare system.
<D07:D00> = 2 for a Server.
This is the only difference between a Timeshare and Fileserver module, apart from the part number.
These bits are copied into the XDEV register at power up.
You can see what VMS thinks of it all by doing :-

$ WRITE SYS$OUTPUT F$GETSYI("hw_name")
You will get something like **VAX 6000-420** or **FILESERVER 6000-310**

A typical SYSTYPE on a 6600 is 02100101.

1.2.3 SID register differentiates VAXs and revisions

To examine a SID whilst in consol mode :-
>>> SET CPU n (n is the XMI slot number of the CPU)
>>> E/I 3E

To examine a SID under VMS :-
$ A = F$GETSYI("SID")
$ SHOW SYM A
Remember to look at the HEX value!

The VMS chapter in DataDoc describes all the SIDs.

Some usefull values for the 6400 are :-
Rev L = 0B000006, Rev K = 0B000005, Rev H & J = 0B000004.

1.3 PART NUMBERS

1.3.1 XMI modules

XBI, XMI1 to BI	T2012 **	device code 2001
XBI+, XMI2 to BI	T2018 **	device code 2002
MS62A, 32Mb memory	T2014-B	device code 4001
MS65A-BA, 32 Mb memory	T2053-BA	device code 4001
MS65A-CA, 64 Mb memory	T2053-CA	
MS65A-DA, 128 Mb memory	T2053-DA	
XCP, KA62A 6200 processor	T2011	device code 8001
XCP, VAX Fileserver 6200	T2011-YB	
XCP, KA62B 6300 processor	T2011-YA	device code 8001
XCP, VAX Fileserver 6300	T2011-YC	
XRP, KA64A 6400 processor	T2015	device code 8082
XRP, VAX Fileserver 6400	T2015-YA	
XMP, KA65A 6500 processor	T2052-AA	device code 8080
XMP, VAX Fileserver 6500	T2052-AB	
XNP, KA66A 6600 processor	T2054	device code 8087
XRV, VECTOR co-processor	T2017 ***	
CIXCD, XMI to CI	T2080	device code 0C05
CIXCD-AC, VAX 7000 to CI	T2080-YA	May work on VAX6000 one day
DEMFA, XMI to FDDI	T2027	
DEMNA, XMI to NI	T2020	device code 0C03
DWMVA, XMI to VME	T2018 *	
KDM70, XMI to SDI/STI	T2022/T2023	device code 0C22
KFMSA, XMI to DSSI	T2036-x ****	device code 0810

* The part number for the module on the VME bus is -C3200-00

** The T1043 is the BI end (XBIB) for both the T2012 and the T2018.

*** The T2017 is the same VECTOR processor for the 6400 and the 6500

**** See "Section 1.3.3, KFMSA parts".

1.3.2 PLATFORM parts

PART	OLD PLATFORM	NEW PLATFORM	DOWNWARD COMPATABLE
Cabinet	70-24900	H9657-CA	
XMI cage	70-24373-01	70-24902-02	NO, new power bars
XTC	20-29176-01	20-29176-02	NO, new BBU sequence
REG A	H7215-A	H7215A	YES, exactly the same
REG B	H7214-A	H7214-A rev C	YES, extra current
REG C	H7214-A	H7242A	NO, now 3.3 volt
BBU	H7231-N	H7236 **1**	NO, different concept
PWR BOX	H405-F	H405-E rev H07	YES, they say
PAL BOX	H7206-A	H7206-B	NO, very different
XARB	54-18172-01	54-18172-01	YES, exactly the same

1 The new BBU (H7236) consists of three FRUs :-

29-28262-01 Battery (suggested life is 4-5 earth years)
29-28263-01 End cover and fan
29-28264-01 BBU case and logic

The "modular upgrade" uses a H7114A; this is a bunch of stuff, including a T2019 (called the XREG) which sits in XMI slot 2 (but also covers slot 1) and delivers the 3.3 volts.

1.3.3 KFMSA parts

There is a massive confusion factor here.
The original KFMSA-AA was based on the T2036, the latter KFMSA-BA is based on the T2036-AA.
There are three variants of the KFMSA controller module :-

1. The T2036 has hard-wired terminating resistors on it, this only works as a DSSI 'end-node' and crashes the DSSI bus if powered down.
   The bulkhead had two sockets (BUS0-OUT and BUS1-OUT).
   KFMSA node numbers are set by diagnostic software.
2. The T2036-AA has removable terminating resistor packs on it which can be stored in non-active onboard sockets (take them OUT of the active sockets near the edge connectors and put them IN the non-active sockets near the front of the module) when not in use.
   Leave the resistor packs in the active sockets if using a T2036-AA to replace a T2036. Put the resistor packs in the non-active sockets if working as a mid-string node, OR you are using the bus terminator packages in the DSSI bus bulkhead sockets (normal).
   The bulkhead has four sockets (BUS0-IN, BUS0-OUT, BUS1-IN, BUS1-OUT).
   KFMSA programmed node numbers are over-ridden by two dial switches on the bulkhead.
3. The T2036-AB has no resistors; so you must use bus terminators in the bulkhead sockets.

The T2036-Ax also supports extended XMI addressing (greater than 512Mb memory, which will be supported by VMS someday).

The use of bulkhead-mounted terminators (supplied with power from both VAXs at once) allows a VAX to be powered down without crashing the DSSI bus ("warm-swap").

The cabinet kit for a KFMSA-BA (CK-KFMSA-LN) comprises :-

4 off 12-31281-01 (terminators)
1 off 70-27661-04 (dual cable assembly), made up from :-
1 off 74-43797-01 (bulkhead with 4 sockets and two switches)
2 off 17-03181-02 (double cable harnesses joined to bulkhead)

The cabinet kit for a KFMSA-AA comprises :-

1 off 70-27661-01 (dual cable assembly), made up from :-
1 off 74-40758-01 (bulkhead with 2 sockets)
2 off 17-02678-01 (single cable harnesses joined to bulkhead)

1.3.4 Sources for other part numbers, apart from the IPBs

The INSTALLATION MANUALS reveal most parts for add-ons and upgrades.

In the OPTIONS & MAINTENANCE MANUAL, the FRU specification tables and replacement procedures list lots of numbers.
A Cable List is in OPTIONS & MAINTENANCE MANUAL, Appendix A.

The PLATFORM, 6500 and 6200/6300/6400 SERVICE MANUALs replace the O & M manual.

In the office/network, the System Advisory and PRODUCT NOTIFICATION PLAN (PNP) give the RSL.

See "Chapter 20" for all the BI parts, including "Table 20–10, BI Module List" for the BI module part numbers etc.

The logistics box is 99-08536-01 or -02

The OCP sticker (in ENGLISH) is 36-23595-01

The small backplane jumpers are 12-14314-01

The torque wrench is 29-17381

1.4 Platform differences

The new platform has to accomodate a +3.3V PSU. A yellow cable runs from a new socket in the backplane, down to the PAL to inhibit the 3.3 PSU if someone inadvertantly puts an 'old' cpu in by mistake. This means new variants of several power subsystem components (including a new XMI card cage to accept the wiring harness changes).
The 6500 CPU uses extra XMI commands and address lines, this does not need any extra lines on the backplane as it uses existing "spare" ones, but the MS65 and XBIA+ are needed to accept these commands.
This 'uprated' XMI specification is referred to a as XMI2 or XMI+.

1.4.1 Part numbers

See "Section 1.3.2, PLATFORM parts".

1.4.2 6200/6300/6400 CPUs in NEW Platform

The new platform has a special little cable at the H7242 (3.3V PSU), it goes in series with the normal flat, grey control cable :-

- This cable is OUT for a system with 6500 or 6600 CPUs which require 3.3V.
  The H7242 PSU will normally cycle up.
  But if an "old style" module is inserted, or there is no 3.3V load, the PSU will not cycle up - see H7206B LEDs.
- This cable is IN for a 6200/6300/6400 system.
  The 3.3 volt PSU will be inhibited from coming up (because its not needed), the cable also "fools" the H7206B into thinking all is well.
  But some say you will still see the fault code in the H7206B LEDs, saying that a 6400 module is in situ (monitored by yellow wire in J8 of new backplane?)

1.4.3 SHOW FIELD so RDC can identify the type of Platform

An original platform can be upgraded in two different ways, see the section "Section 1.9.5, Upgrade to 6500".

Because (due to different upgrade methods) we have various configurations, on a 6500 or 6600, there are some new console commands so that RDC can identify the platform.

- [ESC] [DEL] SET POWER [RETURN]
  A identifies it as "modular" upgraded.
  B identifies it as "Full" upgrade, or NEW cab, with BBU.
  C identifies it as "Full" upgrade, or NEW cab, without BBU.
- **SHOW FIELD**
  Lists the EEPROM site-specifics you need to know when changing a module, (including the platform identifier).

1.4.4 Battery Backup principles

The new BBU works on a different concept than before :-

- OLD one, at power loss :-
  VMS does saving, tidies up, and "pauses".
  All the normal DC voltages went away.
  The dedicated 5VBB line supplies voltage to critical circuits (RAM etc).
  If power returns within 10 minutes VMS does a warm restart.
  If power is missing for more than 10 minutes, all is lost.
- NEW one, at power loss :-
  The BBU keeps everything going for 1 second (ride thru).
  After 1 second, VMS does its saving and "pauses".
  All the XMI supplies are kept going, but the BI supplies are dropped.
  If power returns within 10 minutes VMS does a warm restart.
  If power is missing for more than 10 minutes, all is lost.

1.4.5 What works where?

Option	Old Platform	Partial Upgrade	New Platform
KA62A/B	Yes	Yes	Yes, if inhibit 3.3V
KA64A	Yes	Yes	Yes, if inhibit 3.3V
KA65A	No	Yes	Yes, must have 3.3V
KA66A	No	Yes	Yes, must have 3.3V
MS62A	Yes	CPU dependant	Yes, if inhibit 3.3V also CPU dependant
DWMBA	Yes	Memory size dependant	No
DWMBB	Yes	Yes	Yes, 3.3V is optional
MS65A	Yes	Yes	Yes, 3.3V is optional
CIXCD	Yes	Yes	Yes, 3.3V is optional
DEMNA	Yes	Yes	Yes, 3.3V is optional
DEMFA	Yes	Yes	Yes, 3.3V is optional
KDM70	Yes	Yes	Yes, 3.3V is optional

Notes :-
The table assumes you have CPU consol ROMs which support the relevant option!
You can mix MS65s with MS62s - may be usefull when adding a new memory to an old platform.
You cannot mix DWMBA and DWMBB - methinks RBDs get confused!

Explanations :-
KA65A and KA66A won't work in old platform due to lack of 3.3 Volts!
MS62A will never work with a KA65A or KA66A, as it doesn't support the Write-Thru cache protocol.
DWMBA will not work with more than 512 Mbyte as it does not have extended addressing capability. It will not work in a New Platform because there is a Pin-Out conflict with the XMI backplane over some Grounding.

1.5 30, 32 and 40 bit Physical Addressing

Name		Number of bytes	Power of two
KILO-BYTE	1Kb	1024 bytes	A10 (00 0000 03FF is 1Kb - 1)
MEGA-BYTE	1Mb	1Kb x 1Kb	A20 (00 000F FFFF is 1Mb - 1)
GIGA-BYTE	1Gb	1Kb x 1Mb	A30 (00 3FFF FFFF is 1Gb - 1)
TERA-BYTE	1Tb	1Mb x 1Mb	A40 (FF FFFF FFFF is 1Tb - 1)

The 30-bit physical addressing system works in the time honoured VAX way.
The msb A29 defines whether you are in memory space (when A29=0) or I/O space (when A29=1).

Implementation of the 32 and 40 bit addressing modes is achieved by emulating an I/O SELECT line.

The backplane line that used to carry A29 in 30 bit mode is looked on as "I/O SELECT".
In 32 bit mode, the CPU asserts this line only if <A31:A29> are all ones.

All the address decoders on an XMI node looking for an I/O address only look at the rest of the address lines if this backplane line is asserted. In fact they only look at A00 to A28 as these are defined as the only meaningfull ones and ignore <A31:A29>.

This way an adapter built to decode 30 bit addresses will still respond properly to a 32 bit or 40 bit address - it is up to the CPU to drive I/O SELECT if it is actually addressing I/O space.

All the address decoders on an XMI node looking for a MEMORY address only look at the rest of the address if this line is not asserted. A new line is used to carry the "real" A29, as well as A31 and A30.

Maybe a 32 bit specific explanation will help :-

XMI D LINE <28:00> get CPU address lines <28:00>.
XMI D LINE <29> gets asserted by CPU if CPU address lines <31:29> all asserted.
XMI D LINE <50:48> get CPU address lines <31:29>.

I/O ADAPTERS look at XMI <28:00> only if XMI <29> = 1.
MEMORIES look at XMI <28:00> and <50:48> only if XMI <29> = 0.

1.5.1 30-bit physical addressing

As per 6200, 6300 and 6400 on "original" platform, this splat (or is it splitted?) the physical area thus:-

0000 0000 thru 1FFF FFFF is 512Mb RAM (ie 0.5 Gigabyte memory area)
2000 0000 thru 3FFF FFFF is 512Mb I/O

The addresses of individual Nodes etc are in your Mini-Reference.

The 6600 can also work in 30-bit mode, here it sign extends <A29> thru to <A30> and <A31>. So for an address of 2000 0000 - 3FFF FFFF it actually generates E000 0000 - EFFF FFFF for the XMI.

1.5.2 32-bit physical addressing

As found on the 6500 and 6600, with XMI2, it is split thus :-

0000 0000 thru 1FFF FFFF is 512 Mb RAM
2000 0000 thru 3FFF FFFF is 512 Mb RAM
4000 0000 thru 5FFF FFFF is 512 Mb RAM
6000 0000 thru 7FFF FFFF is 512 Mb RAM
8000 0000 thru 9FFF FFFF is 512 Mb RAM
A000 0000 thru BFFF FFFF is 512 Mb RAM
C000 0000 thru DFFF FFFF is 512 Mb RAM, making a total of 3.5Gb RAM.
E000 0000 thru FFFF FFFF is 512 Mb I/O space

The actual I/O addresses which will be of interest to you are :-

1.5.2.1 XMI Private Space, I/O addresses E000 0000 thru E17F FFFF

This is the area within the CPU module, these are I/O addresses and are "intercepted" on the module to prevent them being passed to the XMI.

1.5.2.2 XMI Nodespace, I/O addresses E1800 0000 thru FFFF FFFF

These addresses are used to address XMI nodes and their Window Space (I/O sub-buses).
Note the gaps which would have been used by slot 0 and slot 15 had they existed. (ie E1800 0000 thru E187 FFFF and E1F8 0000 thru E1FF FFFF)
Also gaps where Slots 6, 7, 8, 9 cannot support I/O cables!

SLOT	NODE	Nodespace ("BB")	I/O Window Space
1	1	E188 0000 - E18F FFFF	E200 0000 - E3FF FFFF
2	2	E190 0000 - E197 FFFF	E400 0000 - E5FF FFFF
3	3	E198 0000 - E19F FFFF	E600 0000 - E7FF FFFF
4	4	E1A0 0000 - E1A7 FFFF	E800 0000 - E9FF FFFF
5	5	E1A8 0000 - E1AF FFFF	EA00 0000 - EDFF FFFF
6	6	E1B0 0000 - E1B7 FFFF	N/A
7	7	E1B8 0000 - E1BF FFFF	N/A
8	8	E1C0 0000 - E1C7 FFFF	N/A
9	9	E1C8 0000 - E1CF FFFF	N/A
10	A	E1D0 0000 - E1D7 FFFF	F400 0000 - F5FF FFFF
11	B	E1D8 0000 - E1DF FFFF	F600 0000 - F7FF FFFF
12	C	E1E0 0000 - E1E7 FFFF	F800 0000 - F9FF FFFF
13	D	E1E8 0000 - E1EF FFFF	FA00 0000 - FBFF FFFF
14	E	E1F0 0000 - E1F7 FFFF	FC00 0000 - FDFF FFFF

1.5.3 40-bit physical addressing

This is possible on XMI2 and addresses 1 terabyte.

00 0000 0000 thru 7F FFFF FFFF is 512 gigabyte RAM
80 0000 0000 thru FF FFFF FFFF is 512 gigabyte I/O

The actual addresses which will be of interest to you are :-

1.5.3.1 XMI Private Space, I/O addresses 80 0000 0000 thru 80 017F FFFF

This is the area within the CPU module, these are I/O addresses and are "intercepted" on the module to prevent them being passed to the XMI.

1.5.3.2 XMI Nodespace

These addresses are used to address XMI nodes and their Window Space (I/O sub-buses).

SLOT	NODE	Nodespace ("BB")	I/O Window Space
1	1	80 0188 0000 - 80 018F FFFF	80 0200 0000 - 80 03FF FFFF
2	2	80 0190 0000 - 80 0197 FFFF	80 0400 0000 - 80 05FF FFFF
3	3	80 0198 0000 - 80 019F FFFF	80 0600 0000 - 80 07FF FFFF
4	4	80 01A0 0000 - 80 01A7 FFFF	80 0800 0000 - 80 09FF FFFF
5	5	80 01A8 0000 - 80 01AF FFFF	80 0A00 0000 - 80 0DFF FFFF
6	6	80 01B0 0000 - 80 01B7 FFFF	N/A
7	7	80 01B8 0000 - 80 01BF FFFF	N/A
8	8	80 01C0 0000 - 80 01C7 FFFF	N/A
9	9	80 01C8 0000 - 80 01CF FFFF	N/A
10	A	80 01D0 0000 - 80 01D7 FFFF	80 1400 0000 - 80 15FF FFFF
11	B	80 01D8 0000 - 80 01DF FFFF	80 1600 0000 - 80 17FF FFFF
12	C	80 01E0 0000 - 80 01E7 FFFF	80 1800 0000 - 80 19FF FFFF
13	D	80 01E8 0000 - 80 01EF FFFF	80 1A00 0000 - 80 1BFF FFFF
14	E	80 01F0 0000 - 80 01F7 FFFF	80 1C00 0000 - 80 1DFF FFFF

1.6 DIAGNOSTICS

1.6.1 Diagnostic TKs for CALYPSOs

I have made up an RL02, with the specific files for CALYPSO, to simplify the generation of the diagnostic tapes on WELSWS. I will keep the files at the latest revision.

1. Put the special CALYPSO pack in the RL02 and a scratch media in the TK50.
2. Then $ MOUNT DLA0: CALYPSO
3. Then $ SET DEF DLA0:[CALYPSO]
4. Invoke the command file by $ @CALYPSO_TK_DIAGS_BUILD
5. You will be given a choice of which group of diagnostics you want at the front of the tape.

1.6.2 CPU Self Tests (SFTs), and ROM-Based-Diagnostics (RBDs), general info

Make sure you are in the correct book. **each CPU is different.**

1.6.2.1 Self Tests

"SELF-TESTs" are a sequence of tests (based in a ROM) which get run at power up, init etc. and test the module itself.
See OWNERS MANUAL for full printout, also O&M 2.2.
Self Test can appear 'hung', failure timeout takes several minutes.
A missing BI NODE ID plug defaults to F, check any ID=F!

1.6.2.2 Extended Self Tests

"EXTENDED SELF-TESTs" follow the self-tests, but check-out the module's ability to communicate with other modules, and checks the XBI adapter.

1.6.2.3 Rom Based Diagnostics

"RBDs" Are all the tests in the ROM (ie SELF, EXTENDED and OTHERS), and are invoked specifically by the engineer.

RBD failures are logged in the CPU's EEPROM "History Area", and can be dumped out by the enterprising engineer :-

On a 6200, >>>START 2007C000
On a 6300, >>>START 2007C000
On a 6400, >>>START 20060010
On a 6500, >>>START E0060010
On a 6600, >>>START E0060010

1.6.3 RBDs on the 6200/6300, 6400, and Memory; see Options and Maint. Manual

Select a specific node with Z command and enter the RBD monitor with TEST/RBD

- RBD> ST0/TR/HE does internal part of test on XCP/XRP see O&M 3.9
- RBD> ST1/TR/HE does extended part of test on XCP/XRP see O&M 3.10
- RBD> ST4/T=1:8/TR/HE does cache test XCP ONLY! see O&M 3.11
- RBD> ST2/TR/HE x does XBI 'x' see O&M 5.4
- RBD> ST3/TR/HE does all XMAs (default is short test) see O&M 4.10

1.6.4 RBDs on the 6500, memory and VECTOR, see Service Manual

Select a specific node with Z and enter the RBD monitor with TEST/RBD

- RBD> ST0/TR/HE does internal part of test on XMP/XRV
- RBD> ST1/TR/HE does extended part of test on XMP/XRV to XMA
- RBD> ST2/TR/HE does extended part of test on XMP/XRV to XBI
- RBD> ST3/TR/HE/C does destructive memory test (23 minutes per 32Mb)
- RBD> ST3/TR/HE/C A does memory in slot A only.
- RBD> ST4/TR/HE does XMP backup cache test.
- RBD> ST5/TR/HE/T=1:7 does multi-processor test.

1.6.5 RBDs on the 6600 and memory, see Service Manual

Select a specific node with Z and enter the RBD monitor with TEST/RBD

- RBD> ST0/TR/HE does internal part of test on XNP
- RBD> ST1/TR/HE does extended part of test on XNP to XMA
- RBD> ST2/TR/HE does extended part of test on XNP to XBI
- RBD> ST3/TR/HE/C does destructive memory test (26 minutes per 32Mb)
- RBD> ST3/TR/HE/C A does memory in slot A only.
- RBD> ST4/TR/HE/T=n does XNP backup cache test, n must be 1,2 or 3..
- RBD> ST5/TR/HE/T=1:7 does multi-processor test.

1.6.6 RBDs on the CIXCD, see XMI Handbook

Select the node using the Z command, and enter RBD using TEST/RBD

- RBD> ST [0 thru 6] /HE/TR

1.6.7 RBDs on the DEMFA, see EP-DEMFA-IP

1.6.8 RBDs on the DEMNA, see the XMI Handbook

Select the node using the Z command, and enter RBD using TEST/RBD

- RBD> ST [0 thru 3] /HE/TR
- To get an EEPROM error log dump :-
  RBD> D 20150100 2004C010
  RBD> XFC

1.6.9 RBDs and LEDs on the DWMBA, see CPU

There are no 'on-board' RBDs. It is really the RBDs in the CPU which check-out the DWMBA.

LED on DWMBA/A, the XMI module; controlled by CPU-based RBDs via XBER(10).

LED on DWMBA/B, the BI module; controlled by CPU-based RBDs via BCSR(01).

1.6.10 RBDs on the DWMVA, none, self-test only

1.6.11 RBDs on the KDM70, see Service Manual

These are called KDM70 resident diagnostics, and are a different nature to previous RBDs. You have to use the diagnostic Supervisor (L2) to invoke them (includes ILEXER etc).

1.6.12 RBDs on the KFMSA, none, self test only

1.6.13 RBDs on a VAXBI node, only the DEBNK/DEBNI is supported

Select the node (e.g. >>>Z/BI:6 E) and enter the RBD monitor with TEST/RBD

- D0 is self-test, D1 is ENET, D2 is TK
- RBD> D1/TR/T=1 does ENET using loop connector
- RBD> D2/TR/T=6/DS/C does write then read test

1.6.14 VAX Diagnostic Supervisor

1.6.14.1 Using the TK50

The TK has been called different things by VDS. It started as MUA6, but ended as MUC6.
If you boot VDS via the TK, the load path is automatically set up.
But sometimes you boot from a 'big disk' and then need to SET LOAD to the TK (ie when upgrading ucode, it is quickest to use this sequence).
So, either RUN EVSBA or manually attach the TK (see "Section 1.6.14.4, Attaching and running TK on BI" then
LOAD EVGDA - SET LOAD MUB6: - START

1.6.14.2 Attaching and running CPU tests

```
DS> ATTACH KA6tt HUB KAx x Y     ! tt is 2A, 2B, 4A, 5A or 6A.
                                 ! x is the XMI NODE number.
                                 ! Y was because we have a FP chip,
                                 ! but is now only Y if VECTOR present

        Run EVKAQ, EVKAR              - Basic Instruction tests
            EVKAS, EVKAT              - Floating Point Instruction tests
            EVKAU, EVKAV              - Privileged Instruction tests
            ELKAX/ERKAX/EMKAX/EXKAX   - Manual tests
            ELKMP/ERKMP               - Multi-processor tests
```

In a multi-processor system, the Diagnostic Supervisor and selected diagnostic will be running on the Primary CPU; use a DS> BOOT n command to get it to run in one of the others.

1.6.14.3 Attaching and running TU81 on BI

```
**** TU81 - on XMI:D, BI:5

For EVMBA (Level 2R) under VMS
DS> ATTACH TU81 HUB MUA0 774500 260 5

For EVMBB, (Level 3) standalone
First attach XBI or XBI+, then :-
DS> ATTACH DWBLA DWMBx0 BLA0 5          ! Klesi at slot 5 of BI slot D
DS> ATTACH TU81 BLA0 MUA0 774500 260 5
```

1.6.14.4 Attaching and running TK on BI

```
EVMDA (Level 2R) runs under VMS, EVMDD is standalone.
First attach XBI or XBI+, then :-

DS> ATTACH TBK50 DWMBx0 MUC 6           ! TBK50 at slot 6 of BI slot E
DS> ATTACH TK50 MUC MUC6
```

1.6.14.5 Attaching and running DEBNA or DEBNI on BI

```
EVDWC and EVDYD run under VMS, EVDYC runs standalone.
Device name can be DEBNA or DEBNI
First attach XBI or XBI+, then :-

DS> ATTACH DEBNa DWMBx0 ETA 6           ! DEBNA/DEBNI at slot 6 of BI D
DS> ATTACH LANCE ETA ETA0
```

1.6.14.6 Attaching CDROMs

You must (DS V14.4) be booted via the Infoserver.

```
DS> ATTACH ESS EXA0 DAD                 ! ESS = Ethernet System Server
                                        ! EXA0 may be ETA
DS> ATTACH NIDISK DAD DAD1              ! adding the disk
```

1.6.14.7 Attaching and running the CIBCA and CIBCB

```
DS> ATTACH DWMBA HUB DWMBA1 x 1          ! x=XMI, y=BI, z=CI node numbers
DS> ATTACH CIBCA DWMBA1 PAA0 x y z       !                    in decimal
```

EVGCA, EVGCB, EVGCC, EVGCD, EVGCE are the **CIBCA** repair level tests.

EVGEE, EVGEF, EVGEG are the **CIBCB** repair level tests.

EVGAA, EVGAB, EVGAC are the **generic CI** functional tests.

EVGDA is the **CIBCA and CIBCB** microcode utility.

1.6.14.7.1 EVGDA, the CIBCA/B Update Utility

You cannot run EVGDA if the CI is also the load path!
The CIBCA.BIN or CIBCB.BIN file must be on the load path media.
You can alter the load path to the Tk after booting from a big-disk see "Section 1.6.14.1, Using the TK50"

The CIBCA has an 8K EEPROM which holds the self-test and start-up code. The control store RAM is loaded with the functional ucode from a file on the consol media.

The CIBCB has an 8K EEPROM which holds the self-test and start-up code. The control store RAM is loaded with the functional ucode from a further 24K EEPROM whenever the CIBCB is initialised.

Normal usage (by an engineer to install the latest level of ucode) is LOAD EVGDA, SET TRACE, START.

```
DS> help evgda

   EVGDA is a Lev 3 EEprom Programming/Update Utility for the CIBCA-A&B.
   This diagnostic utility uses the microcode file to Program or Update
   the EEprom, or load the functional microcode into RAM.

DS> help evgda sections

   PROGRAM            Writes the EEprom ucode for the first time.
                      Sets "program count" equal 1.
   DEFAULT            Runs UPDATE, VERIFY, SELF-TEST, then LOAD
   UPDATE             Update the EEprom ucode.
                      Increments "program count", assumes the EEprom
                      contents are correct before applying the update.
   VERIFY             Does READ then verifies the checksum.
   SELF-TEST          Execute and Check Selftest Status.
   LOAD_UCODE         Loads Control Store RAM with functional ucode.
   VERIFY_UCODE       Check Control Store RAM Against Functional ucode.
```

I don't know why we need Update AND Program.

Watch out, when it reports the version of the ucode from the File Header, it is talking about the .BIN file - not the actual EEPROM. Also, the verification seems to be a 'scan for parities' rather than a data comparison.

1.6.14.8 Attaching and running the CIXCD, see the XMI HANDBOOK

```
DS> ATTACH CIXCD HUB PAZ0 x z          ! x=XMI, z=CI node numbers
```

Because this is new stuff, checkout "Section 1.10, Tech-Tips, Problem reports, FCO and REVISION information".

EVGAA, EVGAB, EVGAC are the generic CI functional tests.

EVGEA is the CIXCD repair level test, although this seems to do all the functions of EVGEB nowadays.

EVGEB is the CIXCD micro-code utility.

1.6.14.8.1 EVGEB, the CIXCD Update Utility

```
DS> help evgeb

    EVGEB is a Level 3 utility to provide Update and Verification
    functions for the CIXCD EEPROM.

DS> help evgeb sections

    UPDATE    Writes the EEPROM from a file on the load media.
    VERIFY    Verifies the EEPROM against the file (reports versions).
    RVERIFY   Verifies the EEPROM against the Backup EEPROM area.
    REPLACE   Primary EEPROM area is written to the Backup area.
    RESTORE   Primary EEPROM area is rewritten from the Backup area.
    DEFAULT   Does UPDATE section.
    RBD       Allows engineer to enter RBD mode on the CIXCD.
    ERRORLOG  Prints the errorlog header information from EEPROM.
    EXAM      Prints the errorlog data information from EEPROM.
    UNLOCK    Disables hardware data protection - ruins pre-rev E board.
    LOCK      Reenables protection - do not use on pre-rev E boards.

  EVENT FLAG 2 Inhibits test failure entries to EEPROM.

**** EVENT FLAG 3 MUST BE SET FOR pre-rev E modules
```

WORKAROUND to fix corrupted EEPROM on pre-rev E module

1. Clear EVENT 3
2. Start/Section:unlock
3. Power down the CIXCD
4. Power up the CIXCD
5. Boot VDS, LOAD EVGEB, SET EVENT 3
6. Start/Section:update

1.6.14.9 Attaching and running the DEMFA, see EP-DEMFA-IP

1.6.14.10 Attaching and running the DEMNA, see the XMI HANDBOOK

DS> ATTACH DEMNA HUB EXA0 n ! DEMNA in slot n

EVDWC Exerciser

EVDYE Functional

EVGDB EEPROM Utility

See RBDs for EEPROM error log dump.

1.6.14.11 Attaching the DWMBA (XBI) or DWMBB (XBI+), XMI to BI interface

DS> ATTACH DWMBA HUB DWMBA0 D 1 ! XBI in XMI slot D

DS> ATTACH DWMBA HUB DWMBA0 E 1 ! XBI in XMI slot E

DS> ATTACH DWMBA HUB DWMBB0 D 1 ! XBI+ in XMI slot D

DS> ATTACH DWMBA HUB DWMBB0 E 1 ! XBI+ in XMI slot E

1.6.14.12 Attaching and running the DWMVA, see Installation Manual

DS> ATT DWMVA HUB DWMVA0 n ! DWMVA in slot n

EVCLA runs T1 thru T18 on T2018, and remaining tests on both modules.

EVCLC needs a special test module.

1.6.14.13 Attaching and running the KDB50

First attach the XBI or XBI+

DS> ATT KDB50 DWMBx1 DUA 4 ! KDB50 in slot 4 of BI at slot E

DS> ATT RA82 DUA DUA1 ! Test drive 1

EVRLF is the KDB50 basic subsystem test

EVRLG is the KDB50 disk exerciser

EVRLJ is the KDB50 subsystem exerciser

1.6.14.14 Attaching and running the KDM70, see Service Manual

DS> ATT KDM70 HUB DUA n 5 ! KDM70 in slot n at BR 5

DS> ATT RA90 DUA DUAn ! disk unit n

EVRAE - generic disk exerciser

EVRLJ - subsystem diagnostic (**will overwrite customer data**)

EVRLM - EEPROM update and ERRORLOG Utility

1.6.14.15 Attaching and running the KFMSA, see the Installation Manual or Service Guide

This is too complex to summarize here.

EVXCE/EVXCF - DSSI Device parameter utility and exerciser.

EVUCM - KFMSA EEPROM Utility, uses EVUCM.BIN for firmware updates. Currently EVUCM3.BIN is rev 3.14 and EVUCM5.BIN is rev 5.6.

EVCXD - KFMSA diagnostic (includes EEPROM error log dump)

1.7 CPU ROMS and EEPROM

There are two ROMs, one contains the CONSOL program and the other contains the DIAGNOSTIC programs.

The EEPROM on the CPU module contains Console parameters (modified by the SET command), patches to the console and diagnostic code, new boot primitives and some module specific information.

When the system inits, it reports :- **ROM 0 = Va.b ROM 1 = Vc.d EEPROM = e.f/g.h**

a.b gives the major.minor version of ROM 0, the consol rom.
c.d gives the major.minor version of ROM 1, the diagnostic rom.

Probably overkill. So far minor normally = 0, and both ROMs have been at same rev.

e.f gives the major.minor version of the EEPROM header area.
g.h gives the major.minor version of the EEPROM patch area.

The major revisions of the EEPROM patch area must be equal to the major revision of the ROM, else the patches will not work.

Originally, the TK was used for saving, restoring and patching the EEPROM, it was very important not to have multiple cpus with different revisions.
With the advent of Infoserver based systems a new procedure was adapted which uses a diagnostic called EVUCA to update the eeprom.
Consol Patch tapes will no longer be generated (even for 6200/6300/6400s).
Also, it looks like adjacent versions of ROM will always be compatable from now on (as long as they have the relevant patches).
EVUCA installs the relevant patch to make them compatable.
EVUCA also lists the devices supported by the particular ROMs.

Do not use the UPDATE command anymore - it will screw up systems containing different versions of the ROM.

"Section 1.10, Tech-Tips, Problem reports, FCO and REVISION information" gives a list of the current status of ROMs and EEPROM patches.

1.7.1 Procedure for changing 6200, 6300, 6400 CPU console ROMs

The EEPROMs contain software patches and routines to be called by the main console program residing in the ROM. When you insert new ROMs, the software patches in the eeprom will be for the old ROMs and cause the consol software to go horribly berserk.
So we have to replace ROMs in a very specific fashion.
On a 6200/6300, the DIAGNOSTIC ROM is the one nearest the TOP edge of the module.
On a 6400, the CONSOL ROM is the one nearest the BOTTOM edge of the module.

Prior to starting this procedure, you will need :-

A new Console ROM (and maybe Diagnostic ROM) for each CPU module.
Instructions on how to alter the module revision at **POINT "A" in STEP 7**
Instructions on how to run the routine which initializes the eeprom (to its default image) at **POINT "B" in STEP 12**

So, here you go :-

1. Do a >>> **SHOW ALL** and record the saved consol parameters.
2. Do a >>> ESC DEL **SHOW SYSTEM SERIAL** and record it.
3. Set the OCP switch to **UPDATE**.
4. For each CPU in the system :-
   Do a >>> ESC DEL **SHOW MANUFACTURING** and record the rev and serial number of the module, these will need to be re-entered at Step 12.

Do a >>> D/U 20080000 0, which effectivly corrupts the EEPROM header area and subsequently disables console patching when we power up after fitting the new ROMs.
Do a >>> SET CPU n to the next CPU and repeat Step 4.

Out of interest, on a 6400, EEPROM 2.03/2.00 and 2.03/3.00, location 20080000 contains D5C4478C. You might be glad to know this one day!

5. Set the OCP switch to **HALT** so you don't Auto-Boot when you switch the system back on
6. Power off the system and set up your anti-static station.
7. On each CPU in the system :-

   Replace Diagnostic ROM
   Replace Console ROM
   POINT "A" - Alter the module label
8. Set the consol terminal to 1200 baud, this is the default used by the new ROMs.
   If you have a VCS, it will be easier to switch to a local terminal.
9. Power on the system.
10. Ignore the "EEPROM is corrupt" messages.
    I've seen some funnies here, after the Self-Test messages and the "EEPROM is corrupt" message, the terminal refuses to accept input.
    To fix this, power-cycle the terminal and then try different baud rates.
    300 and 600 seem favourite - continue at this new baud rate, the cpu will revert to 1200 when initialized after the EEPROM is rewritten at point "B".
11. Set OCP switch to **UPDATE**
12. Do the following **for each CPU** in the system.

    But be very carefull, DELETE does not work!
    If you foul up, you will need to press RESET and restart on the specific CPU.

    POINT "B" (run the routine to initialize the EEPROM) -

    Do a >>> **JSB** xxxxxxxx and respond to any prompts to rewrite the EEPROM.
    The value of xxxxxxxx and the answers to any prompts must have been given to you before you started, it can vary from ROM to ROM as it is actually a sub-routine in the ROM's console code.
    A series of *'s are printed to give you a sense of activity.

    Do a >>> D/U/P/L 200800A0 F to enable RBD error logging.

    Do a >>> ESC DEL **SET MANUFACTURING**

    Use the information you recorded at Step 4 to answer the relevant questions to reinstall the module serial number and rev level.
    When prompted Update EEPROM? answer Y.

    Do a >>> ESC DEL **SET SYSTEM SERIAL.**

    Do a >>> **SET CPU n** to the next CPU, and restart this step.
13. Get back to talking to the boot processor.
14. Do a >>> **SET BOOT** and **SET TERMINAL** and rewrite all the site-specifics.
    These automatically do ALL the CPUs in the system.
15. When you boot VMS, you may notice that the EEPROM gets a couple of locations written to, its o/k.

1.7.2 Procedure for altering ROMs on a 6500

E10 (nearest the Berg on the outside edge) holds the CONSOL ROM;
E8 (next to E10 on the outside edge) holds DIAG ROM 2;
E4 (next to E8 on the outside edge) holds DIAG ROM 1.

See PROXY::PROXY_PUBLIC:[T2052_CON.RELEASE]V30_RELEASE_NOTE.MEM

First, you do some examinations to make sure none of the CPUs have dodgy clocks; I won't list them here, get the notes yourself if necessary.

At Step 4, to see what-is-what, do a SHOW FIELD and record the information.

At Step 4, to disable patching before removing the ROMs, on each CPU do :-
ESC DEL PATCHOFF
(It also said to zero the eeprom by JSB E0040040, but I don't see why this is necessary)

At Step 12, to re-initialize the EEPROM after powering back on (with the new ROMs), on each CPU do :-
ESC DEL PATCHOFF
JSB E0040044
There was no mention of prompts, so I guess its all automatic.

At Step 12, you re-enable RBD errorlogging by D/P/U E00A7A0C 20000007.

At Step 12, you need to enter the ESC DELSET POWER command.

1.7.3 Procedure for altering ROMs on a 6600

Again, I hav'nt seen this in writing, but I know the re-init address is the same as a 6500. So maybe the rest is the same as well.

1.7.4 Normal CCL sequences which alter the EEPROM

- SET

  Alters consol parameters and bootspecs (see OWNER MANUAL)

- ESC DEL SET SYSTEM SERIAL RET

  Not SID! Consol code puts to CCA. VMS puts to error log entries.
  A user can read with f$getsyi("xsid")

- UPDATE - not recommended!!!!

  Copies primary EEPROM to secondaries (see OWNER MANUAL)
  Used after using SET commands. Or as a "quickie restore"
  An UPDATE ALL can take several minutes.
  If the ROMs on a secondary processor are a different revision than the primary, you may put the wrong patches in the secondary's EEPROM, and the secondary will CEASE TO FUNCTION (look BUST to me and you).

- SAVE / RESTORE (not on 6500s)

  Was for use in emergencies, not recommended!!!!

- PATCH (not on 6500s)

  For 'FCO' type of improvements to consol, diag and boot code
  See OPTIONS AND MAINTENANCE manual
  Do a SAVE first!

- /U qualifier

  Typically used as part of PATCH procedures

- ERROR messages

  These are different on each cpu. They are generally self explanatary, but if you need to look them up, make sure you get the correct book for the specific CPU.

The following table is an extract from L1 COURSE GUIDE showing which areas are modified by which commands. In the event of a specific area being corrupted, you may be able to fix it by a simple SET command.

Type	Area	SET	UPDATE	RESTORE	PATCH
0	Vector	N	N	Y	Y
1	Module specific	N*	N	N	N
2	Consol parameters	Y	Y	Y	N
3	Saved bootspecs	Y	Y	Y	N
4	Diagnostic patches	N	Y	Y	Y
5	Consol patches	N	Y	Y	Y
6	SFT history	N	N	N	N
7	Boot primitives	N	Y	Y	Y
8	System serial no.	N*	Y	Y	N
9	VMS	N?	Y?	Y?	Y?

* means a special SET sequence is needed. ? means I'm guessing.

1.7.5 Recovery from 6400 EEPROM corruption, using RESTORE

Note from editor :- This procedure is historical, as we no longer say that SAVEing the EEPROM is mandatory. However it is still usefull in highlighting the problems involved in identifying and correcting a corrupt EEPROM. A more probable fix is to use the procedure of Initializing the EEPROM using a ROM-based sub-routine, and then install the latest patches using EVUCA.

This is from Peter Beddall - P.T.G. 07-Feb-1990

EEPROM contents can be restored from TK tape using the RESTORE EEPROM command, but the command MUST BE EXECUTED ON THE AFFECTED PROCESSOR.

If the RBDs indicate the EEPROM failure (typically RBD 0 T0009) then a RESTORE EEPROM should be attempted.

If, in a single CPU environment, the only processor fails its self test (again, at T0009), then little or no printout would be obtained and the console would appear dead. In this case the command >>n, where n is the CPU node number, would force the console to that node, and then normal console commands and RBDs can be used, including RESTORE EEPROM.

However, if the terminal was not at 1200 baud and the Console were unable to read the correct baud rate from the EEPROM, then it would default to 1200 Baud. In this case the >>n command would be scrambled and consequently not work, so the terminal would have to be changed to 1200 baud before continuing. It is recommended that all consoles are set and left at 1200 Baud.

In summary, please try and identify further all CPU failures by running RBDs, and if necessary attach to the CPU by means of >>n and possibly setting the baud rate to 1200 Bd. If EEPROM corruption is a possibility then please try and restore it. Details on the console commands and RBD failures are to be found in the VAX 6000-400 Options and Maintenance Guide.

1.7.6 Altering a 6400 from rev H to J (so it works alongside rev K or L)

This came from Brian Lindley, August '90.
Note from editor, May'91, a better policy is now to apply FCO 64XMX-0002 to each module

The problem is that the console is V2 on a rev K or L (which are coming from logistics) but V1 on rev H which are found in most systems in the field.
These different consol revisions are incompatable.

So, if we have a multi-processor system (all at rev H), and we need to replace one of them with a rev K or L, we first have to raise the other CPUs in the system to rev J. Then we can put in the rev K or L which came from logistics.

The upgrade from H to J is all done by replacing the two ROMs.
Get the two ROMs needed for each rev H module. (23-026E9 Diagnostic ROM for E97 and 23-027E9 Consol ROM for E77) by ordering the upgrade kit A2-01456-10.

Now follow "Section 1.7.1, Procedure for changing 6200, 6300, 6400 CPU console ROMs".

At POINT "A" (altering the module label) -

The revision changes from H to J (eg H05 to J05)

At POINT "B" (initializing the EEPROM) -

Use JSB 20054600
And answer the prompt 'Source Address' with 20054A00

1.7.7 Recovery from EEPROM 2.03/3.03 on 6400 causing HSC boot failure

This EEPROM contains an error which prevents booting thru a "secondary" HSC.
Instead, it HALTs with PC = 20105261.
The ROM should be V3.00 (I don't guarantee that the initialization address is the same for any other version of ROM).

Record all the details from

>>> SHOW ALL
>>> ESC DEL SHOW MANUFACTURING
>>> ESC DEL SHOW SYSTEM SERIAL

Set everything to 1200 baud.
Re-initialize the EEPROM (ie make it not 3.03)

by doing **>>>JSB 20055C00**
then answer Source Address? with **20056000**

Re-enable RBD error logging **>>>D/U/P/L 200800A0 F**

Restore all the details recorded earlier.

Now use EVUCA to install patches to make it 2.03/3.02.

1.7.8 Recovery from EEPROM 2.0/4.80 on 6300 causing HSC boot failure

This has the same problem as the 6400 above.
Record all the details from

>>> SHOW ALL
>>> ESC DEL SHOW MANUFACTURING
>>> ESC DEL SHOW SYSTEM SERIAL

Set everything to 1200 baud.

Re-init the EEPROM,

Use **JSB 20055000**
And answer :-

Source address **20055400**
Destination address **20080000**
Length **8000**
EEPROM size **32**

Restore all the details recorded earlier.

Now use EVUCA to install different patches. e.g. 4.70 from VAXPAX 42.

1.7.9 Recovery from EEPROM corruption on 6500 with ROM V2.00

This eeprom can get corrupted due to PSU failures.
The 6500 Maintenance Advisory Appendix B says it can be re-initialized by **>>> JSB E0040044**
This address looks funny because the 6500 has 32 bit Physical Addressing!!!

Now use EVUCA to bring it to the latest revision.

1.7.10 Recovery from EEPROM corruption on 6600

A corrupted EEPROM is indicated if you see a :-

?0053 EEPROM header is corrupt
?0055 Failed to locate EEPROM area
?0057 EEPROM area checksum error
?0061 EEPROM header or area has bad format
?006B Error changing EEPROM

The 6600 Service Manual, Appendix F says it can be re-initialized by >>> JSB E0040044

Then do a SET MANUFACTURING, SET POWER, SET SYSTEM SERIAL. Now use EVUCA to bring it to the latest revision. Also set up the site-specific stuff.

1.7.11 EVUCA - VAX 6000 EEPROM Utility, for all ROMS

This will be used instead of the TK based SAVE, RESTORE and PATCH commands.

Do not use the console UPDATE command anymore, in case one CPU ROMs are a different revision to another's.

EVUCA will determine the revision of the ROM on the CPU, and load the required EEPROM image.
It is o/k to have "ROM mismatch" warning messages during system initialization, as long as the revisions fall within a compatability window.
New versions of ROM code (since Oct '90) will each be compatable with the immediatly earlier release - eg on a 6400, rev 3 will work with rev 2 and rev 4, but not with rev 1 or rev 5.

EVUCA needs V14.0 (or later) of the Diagnostic Supervisor.
This will be available at VAXPAX 43, meanwhile try :-
PROXY::PROXY_PUBLIC:[HYP_CONSOLE.PATCHES] (for 62xx and 63xx)
PROXY::PROXY_PUBLIC:[RIG_CONSOLE.PATCHES] (for 64xx)
PROXY::PROXY_PUBLIC:[T2052_CON.PATCHES] (for 65xx)

EVUCA uses different binary files for each type of CPU - EXUCA.BIN (6600), EMUCA.BIN (6500), ERUCA.BIN (6400), ELUCB.BIN (6300), ELUCA.BIN (6200), but there is no problem as it 'defaults' to the correct one.

There are two sections, UPDATE (the default), and SHOW.

The UPDATE section does :-

TEST 2 - loads the appropriate binary file and creates the patch images for the revisions of ROMs found.
TEST 3 - works out which areas need patching.
TEST 4 - updates the relevant ares in EEPROM - **if you say YES to the prompt.**
TEST 5 - lists the devices now supported by each CPU consol ROM/EEPROM code.
CLEANUP - lists the ROM and PATCH revision of each CPU.

Sometimes there are too many new boot routines to fit the available space, it gives you the capability to select just the ones relevant to your system. But maybe the real answer is to fit latter ROMs in this case.

The SHOW section reports the revision of all the systems ROMs and EEPROMs.

1.8 PSU

1.8.1 General tips

- H7206-A CHANNEL INHIBIT signals must be LO to enable their DC regulator.
- H7214 needs a reference wire.
- H7214, if you use 7/16" long (instead of 5/16 long) screws for the bus cable, you will cause internal damage to the H7214!
- H7214 needs a 1 amp drain (however I know the XMI comes on without nodes)
- H7215, an output noise of 0.3v is excessive. Noise may cause H7215 to shutdown.
- +/-150volts, capacitors can maintain this for 1-2 minutes! Pulling the 300v to a DC reg, then pushing it back in, can blow the fuse.
- H7236 (new BBU) fan, this only runs when the BBU is called into use.

1.8.2 PSU LEDs

- H7206-A (Original platform PAL box)

  RED LED indicates a partial or complete shutdown due to H7215 overtemp (75 Celsius), airflow fault or cover interlock switch.
  The RESET switch must be pushed after the problem has been rectified.
  BOTTOM LEFT GREEN LED means internal voltage is present on Power board.
  TOP RIGHT GREEN LED means internal voltage is present on Logic board.

- H7206-B (New platform PAL box)

  RED LED 9, **top of group of 9.** Airflow, Interlock or Overtemp fault.
  The RESET switch must be pushed after the problem has been rectified.
  RED LED 8, XMI1 module in XMI2 configuration.
  RED LED 7, H7214 or H7242 installed incorrectly.
  RED LED 6, BI H7214 faulty.
  RED LED 5, BI H7215 faulty.
  RED LED 4, XMI H7242 faulty.
  RED LED 3, XMI H7214 faulty.
  RED LED 2, XMI H7215 faulty.
  GRN LED 1, **bottom of group of 9.** means internal voltage is present on Logic board.

  BOTTOM LEFT GREEN LED means internal voltage is present on Power board.

- H7214 GREEN LED says something is at 5V output only (not the +13.5V)
- H7215 GREEN LED says the 4 outputs are o/k
- T2019, (XREG) in XMI slot 1/2, part of H7114 on partial upgrade

  RED LED SHUTDOWN (fault condition, overtemp or overvoltage on T2019)
  RED LED (3.3V bad)
  AMBER LED (5V o/k)
  AMBER LED (3.3V o/k)

1.8.3 H7236-A, New Platform Battery Backup, LEDs and switches

LED 1, green, BBU ON

BBU producing power.

LED 2, green, BBU CHARGE

If steady, battery is 98% charged or producing power.
If blinking at 1 Hz, battery is being charged.
If blinking at 10 Hz, the BBU needs service (huh?)

LED 3, red, OVER TEMP

Blinks if external temperature exceeds 40 degrees C.
Blinks if fan fails whilst BBU is supplying power.

LED 4, red, ELECTRONIC FAIL

Internal fault detected by BBU logic.

LED 5, red, BATTERY SERVICE

Blinks at 1 Hz, if battery below 40%.
Blinks at 1 Hz, if battery failed outright or disconnected.
Blinks at 1 Hz, if front cover opened.

Externally mounted, Voltage Selection switch.

Externally mounted, AC Power switch.

The LEDs will cycle for a 60 second self test at switch-on.

Internally mounted, fan Panel Interlock switch.

Internally mounted, Alarm Reset switch.

Resets the latched condition for LED 3 and LED 5.

Internally mounted, Battery Life switch

Increases battery life by reducing reserve time.

Internally mounted, New Battery Reset switch.

Resets battery information in the EEPROM.
Used when a new battery has been installed.
The Battery Life switch must be in the ENABLED position.

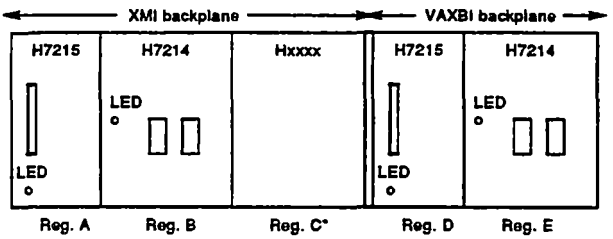
1.8.4 PSU regulator distribution, use and layout

- Regulator A (H7215) for XMI backplane
  - -5.2V @ 20A for ECL devices
  - -2.1V @ 7A for ECL terminators
  - +12V @ 4A for COMMS and TK
  - -12V @ 2.5A for COMMS
- Regulator B (H7214-A) for XMI backplane
  - +5.1V @ 120A for main logic
  - +13V for Ethernet Transceiver
- Regulator C (H7214-A) for old platform XMI backplane
  - +5.1VB @ 120A, the memories run off this
  - +13V for Ethernet Transceiver
- Regulator C (H7242) for new platform XMI backplane
  - +3.3V for logic on new CPUs (CMOS3 and CMOS4).
- Regulator D and Regulator E (H7215-As) for BI backplanes

Outputs are as Regulator A, but used "as you like" by BI nodes.

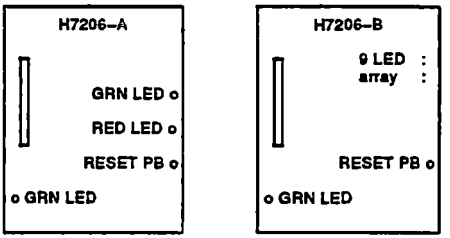
Figure 1–2: PSU layout

DC Power Regulators (viewed from rear).



* Reg. C is a H7214 on an old platform, H7242 on a new platform.

H7206 Power And Logic unit (viewed from front) – known as the PAL BOX.



1.8.5 PSU Trouble-shooting flows - original Platform

Q1 **START HERE**

What is the state of the five regulator LEDS?

ALL OFF - Go to Q2
ONE OFF - Go to Q3
ALL BI SIDE OFF [ie Reg. D and E off] - Go to Q4
ALL XMI SIDE OFF [ie Reg. A, B and C off] - Go to Q4
ALL ON - Go to Q5
ALL ON EXCEPT Regs B and C - Go to Q6
OTHER [more than 1 off] - Go to Q7

Q2 **ALL OFF**

Does the CONTACTOR [in H405] "clunk" when going from OFF *to* STANDBY*?*

NO - Go to Q2A
YES - Go to Q2B

Q2A **NO**

Does the CONTACTOR [in H405] "clunk" when going from STANDBY *to* ENABLE*?*

YES - Go to Q2A1
NO - Go to Q2A2

Q2A1 **YES**

- You have a problem with the STANDBY signal.
  This goes OCP to XTC J2, XTC J3 to H7206 J16, and finally H7206 J13 to H405 J1.

Q2A2 **NO**

- Check the H405 circuit breaker is pushed in
- Check all three phases are being supplied from wall socket.
- You may have a forced shutdown condition.
  Bypass the THERMAL SENSOR in the roof of the cabinet (this is the smaller device near the airflow sensor) - this is done by peeling back the insulation on the lead. Or remove the cable in J8 of the H405 and short J8 p1 to p3, you will need to move the H405 slightly to get at J8.
  If the contactor comes in, you have a bad sensor (or a fire)
- You may have lost the PB signal.
  Simulate its presence into the H405 by pulling the cable from J13 of the H7206 and shorting p4 to p5 ON THE CABLE (these are the bottom two pins).
  If the contactor comes in, check out the PB signal. The PB signal is routed OCP to XTC J2, XTC J3 to H7206 J16, and finally H7206 J13 to H405 J1.
- Or you have a bad H405

Q2B **YES**

Check the H7206 LEDs.

Both GREEN and single RED all ON - Go to Q2B1
Both GREEN on, single RED off - Go to Q2B2
Only the BOTTOM LEFT GREEN on - Go to Q2B3
Only the TOP RIGHT GREEN on - Go to Q2B4
All off - Go to Q2B5

Q2B1 Both GREEN and single RED all on

Switch OFF then ON again, is it o/k for 30 seconds?

- **YES**
  Bad airflow. Checkout the air-movers!
  The two air-movers and the small fan in the H7206 are driven by 24V DC which is generated by the H7206.
  The air-movers have electronics in them, and it has been known for BOTH air-movers AND the H7206 to be blown up!
  There are two versions of the airflow senser scheme :-

  1. The original system of a sensor mounted in the top of the CPU
     You can circumvent the sensor by breaking the cable at the transition piece near the sensor and shorting p2 to p3 (grey to orange) on the cable leading down to the H7206.
     If this fixes the problem, sensor is bust or *genuine airflow problem* (not getting enough airflow). Check both the fans (one may be free-wheeling), and try moving the sensor around to make sure it is in the flow.
     If this does not fix the problem, bad cable or bad H7206.

  2. The newer system uses two sensors, one in each blower enclosure.
     To remove the rear sensor: remove grill by loosening the four screws: disconect the wire from the pcb to the PAL box: disconnect the wire from the pcb to the front sensor: loosen the Phillips screw holding the sensor bracket: remove the bracket and sensor assembly. TURNING THE SLOTTED HEAD SCREW WILL DAMAGE THE BLOWER HOUSING!!!!

     To remove the front sensor: remove wire from pcb at rear sensor to front sensor: loosen the Phillips screw holding the sensor bracket: remove the bracket and sensor assembly. TURNING THE SLOTTED HEAD SCREW WILL DAMAGE THE BLOWER HOUSING!!!!
     These sensors are 12-25024-15 and -16 (it is rumoured).

- **NO**
  Check the H7206 peewee fan

  - If the fan is o/k, you have a bad H7206 Logic board.
  - If the fan is stopped, you have a bad H7206 Power board.

Q2B2 **Both GREEN on, single RED off**

Check that you have +/- 150 volts at DC regs.

- **YES** - You have a bad H7206 Logic board.
- **NO** - you have a bad H7206 Power board.

Q2B3 **Only the BOTTOM LEFT GREEN on**

- Bad H7206 Power board, Logic board or internal cable.

Q2B4 **Only the TOP RIGHT GREEN on**

- Bad H7206 Power board

Q2B5 **All off**

Use the interconnect diagram to check all 3 phases at:-

1. H405 J2 (if missing the H405 is bust).
2. H7206 J1 (if missing the transformer/cables are suspect).
3. Else the H7206 is bust.

Q3 **One regulator off**

- Probably bad regulator.
  Check it has the +/-150 volt input
  Check its control cable input (can be upside down) try interchanging with another of the same type regulator
  Check its sense and return cables are tight
  Check its bus-bar connections are tight
- Possibly H7206 Logic board, check by interchanging control cable to regulator.

Q4 **BI [or XMI] set of regulators off**

Note that the platform may be missing the BI PSUs and/or BI front cover - the interlock light will always be on but it will not cause a problem.

Check the H7206 RED LED

- **OFF** - Check the +/-150volts at the regulator end.
  - If missing, bad H7206 Power or cable to H7206 J3 [J4 if XMI]
  - If o/k, bad H7206 Logic or cable to H7206 J8 [J14 if XMI]
- **ON** - Try RESET to clear it, if still a problem:-
  - Either a module cover is not positioned correctly.
  - Or BAD INTERLOCK, frig by pulling the cable from the H7205 and shorting the interlock pins on the cable, (not on the H7215's socket), then try RESET.
  - Or Bad or hot H7215.
  - Or Bad H7206 Logic board.
  - Or Bad cable H7215 J2 to H7206 J8 [J14 if XMI].

Q5 All on

A regulator can appear on, but its output is bad (see Q3)
The ethernet bulkhead power is not checked, try plugging into a different H7214.
The system may appear to work on only 2 phases, but it would be sensitive to dips'n'sags, check all 3 phases at H7206 J1.

Q6 All on except Reg B and C

We have seen this. If Reg C does not come on, it inhibits Reg B.
Switch off and pull the small control cable out of Reg C, then switch on.
If Reg B comes on, then Reg C is bad.
If Reg B stays off, repeat the procedure the other way round.
If neither still comes on, replace the H7206.

Q7 More than one off, but not A&B&C or D&E or B&C

Check the points in Q3 for each failing regulator.
You may have multiple failing regulators, or some funny cable problem where signals are shorted together.
Try changing or interchanging one of them.
Note that the +/-150V is "daisy-chained" thru the internals of each reg.

DISCLAIMER:-
This trouble shooting flow is an attempt to assist L1 engineers to fix PSU problems.
It is not official, it is not supported, it won't be thanked!
If you spot a "hole" please notify me.
Modified Dec'90 - fixed bug in Q2B1. Modified Jul'92 - added air-mover info.

1.8.6 PSU Trouble-shooting flows - new Platform

I havn't done too much in this area (I was overwhelmed by the apathy my original troubleshooting flow generated).
NEW Q1 Go and look at the H7206-B LEDs.

- BOTTOM LEFT GREEN LED OFF (all OFF, I guess)

  No Internal volts on Power Board
  NEW Q2 Does CONTACTOR [in H405] "clunk" when going from OFF to STANDBY?

  YES - Go to Q2B5
  NO - Go to Q2A

- Bottom GREEN LED in 9-LED array OFF

  No Internal volts on Logic Board
  Bad Power Board within the H7206-B

- Top RED LED in 9-LED array is on

  Airflow, Interlock or Temperature problem.
  NEW Q3 Switch off, then on. Is it o/k for only about 30 seconds?

  YES- Airflow problem, follow advice in Q2B1 YES
  NO- Interlock or Temperature problem, follow advice in Q4 ON

- Any RED LED 2 thru 8 in 9-LED array is on

  Look up the meaning of these LEDs in the earlier section (PSU LEDs)

1.9 UPGRADE, ADD-ON, INSTALL, SUPPORT and CONFIGURATION information

1.9.1 VMS minimum revisions

- 6200 needs at least VMS 5.01
- 6300 needs at least VMS 5.1
- 6400 needs at least VMS 5.2
- 6500 needs at least VMS 5.4-0A, other cluster nodes must be 5.3-1 *****
- 6600 needs at least VMS 5.5

1.9.2 Consol Terminal

- Any terminal, should be 1200 baud, 8 bit, no parity

- DECWRITER 3 console terminal setups. Rx/Tx=1200, A=0, B=1, C=1, D=1, E=0, F=66, G=1, H=10, J=1, K=0, L=0, M=1, N=1, O=1, P=8or2, Q=0, R=1, S=0, U=1, V=6, W=1, X=1, Y=0, Z=1.

- Rumour is that VT320 should be set to VT100 so can "set serial"

1.9.3 References for add-ons

The Instructions for some add-ons are not easy to find if there is not an Installation Manual.

Check the "Section 1.9.10, SUPPORTED XMI options and CONFIGURATION RULES".
6200/6300/6400 CPU and MS62 add-ons are covered in the Options and Maintenance Manual.
VECTOR, see the 6400 Options and Maintenance manual.
XBI add-on is in the 6200 Installation Guide.
DRB32 (and other VAXBI stuff) is in the 8200/8300 Installation Guide.

1.9.4 Upgrade to 6300

There is an error in the 6300 upgrade instructions!
You must not SAVE the 6200 eeprom then RESTORE the image to the 6300 eeprom.

1.9.5 Upgrade to 6500

The simplest upgrade is when you already have a "new" platform, say going from a 6400 to 6500. Just remove the +3.3 volt inhibit cable.
If you are going from an "original" to "new" platform, you will need either "modular" or "full" upgrade package.

- Modular :-

  New PSU (H7114) means a T2019 (XREG) in XMI slots 2 (but it covers slot 1), so you can only use 14 XMI slots.
  BBU must be removed - this configuration does not support BBU.
  Restriction to four CPUs.

- Full :-

  New XMI cardcage.
  Lots of new bits for power sub-system.
  Check H7214 is minimum rev C08, and H405 is minimum rev H07 first.

- Both Full and Modular (or you already have a new platform) :-

  New CPU modules (Upgrade part number gets as many as needed)
  New XBIA+ modules (Upgrade comes with two XBIA+s, order more if needed), the manual says a modular upgrade to a 6500/6600 will still work with the old XBIA modules - I don't know whether to believe it!
  New MEMORY modules (these have to be ordered separatly).

Note

XMP (6500) processor does not support CIBCA-A.

1.9.6 Upgrade to 6600

Basicly, as the 6500, except the H7242 output must measure between 3.265 and 3.430 on the backplane.

1.9.7 BBU installation on original platform

See Options and Maintenance Manual 9.17
See TT#5, needs H7206 rev E6 or later
See Speedy 555 for FCO to CD kit))

1.9.8 BBU installation on new platforms

See EK-60BBA-IN, H7236 Battery Backup Option Installation Manual
See "Section 1.10.33.1, BBU inhibited by mis-wired cable(s)".

1.9.9 RDC Installation

The RDC installation comprises two main components. First, the RSC, Remote Services Console, order as MDS01. Second, the modem, order as +L-10561

1.9.9.1 Cable connections to MDS01, Remote Services Consol

The MDS01 has four cable connections

1. Plug A1, connects to the TERMINAL (via BC22F-25)
2. Plug A2, connects to the CONSOLE_PORT of the cpu (via BC22D-25, the original cable supplied with the system)
3. Plug B1, may be connected to any COMMS_PORT on the system
4. Plug B2, connects to the MODEM (via BC22F-25)

A1 and A2 can be patched together to bypass the RSC. I'm told the BC22F-25 is replaced by a 17-00323-02

1.9.9.2 Switches and Indicators on the MDS01, Remote Services Consol

1. REMOTE, connects MODEM to CONSOLE_PORT of CPU.

   However it is not a simple connection. The innards of the RSC has a protocol which needs the same at the other end of the telephone line, this protocol is used to retry errors etc. The LED blinks until the protocol handshake is complete.

2. REMOTE USER, connects MODEM to any COMMS_PORT, but also connects the TERMINAL to the CONSOL_PORT

   Again protocol is involved twixt RSC and other end of the telephone line; LED blinks 'till handshake is complete.

3. USER PORT, connects TERMINAL to CONSOLE_PORT, but also connects MODEM directly to COMMS_PORT (no protocol)
4. LOCKOUT, prevents any use of the MODEM

The LOCAL COPY SWITCH copies MODEM activity onto the TERMINAL.

The FAULT LED goes out once the RSC passes its self test

The BAUDT and BAUDM switches set the speed of the TERMINAL and MODEM. 300=ALL OUT : 1200=I,O,O : 2400= O,I,O : 4800=O,O,I : 9600=ALL IN

The TERMINAL and MODEM may have different speeds, this will work o/k.

1.9.9.3 Setting up the modem

1. Ordinarily, the MODEM can be set from its keypad
   1. POWER ON, it displays 'WAIT' then 'IDLE'.
   2. PRESS [OPTION]
   3. PRESS [1] [ENTER] [1] [ENTER]
   4. PRESS [2] [ENTER] [3] [ENTER]
   5. PRESS [3] [ENTER] [2] [ENTER]
   6. PRESS [19] [ENTER] [3] [ENTER]
   7. PRESS [ENTER]
   8. It displays 'RESET' then 'IDLE'
   9. It is now set up for life.
2. HOWEVER, sometimes the MODEM can have been fiddled with to such a degree you think its in a real knot. So you have to force it into a total 'factory settings' state using a terminal. Look at the [Fact-Flash] from Jim Burnley for this procedure.

1.9.9.4 After Installation

Phone your own number to make sure it Auto-Answers.

Get all the system details, then ring the RDC for a link test. Tell them its a NEW INSTALLATION, and they will REGISTER it for you.

Show the customer how to use it, preferably write some instructions?

Fill out the Acceptance forms etc.

1.9.9.5 MODEM troubleshooting notes

If you leave the modem off (in other words, you have the piggy-back cable installed at the telephone wall socket with the telephone on its back but the other end of the cable is not connected to the modem), the line will appear dead.

If you try to dial out, but it goes to RESET instead of DIALING, press DISPLAY on the modem and check that DTR is present.

1.9.10 SUPPORTED XMI options and CONFIGURATION RULES

Most of the original information about options in this section is extracted from a document called VAX 6200 System Specification SP-62AMB-YE.
Updates for the new platform are from SASE:: note 711.1

Remember, when a customer asks "is it supported" they often mean "if I fit it, can I use it?". The DEC document that tells us what the software is guaranteed to do is called the Software Product Description (SPD). So if they are running VMS V5.2, you must look in that SPD to see if a card reader will work on their Unibus!
Be extra cautious with ULTRIX, it tends to lag VMS eg Nov'90 ULTRIX 4.0 does not support the CIXCD, MS65 or new DWMBB. .

1.9.10.1 XMI Backplane

Beware of references to XMI1 and XMI2.
Basically the new XMI cardcages (sometimes called XMI2s) have a different power harness. The new XMI protocol (sometimes also called XMI2), to support write-back cache and extended physical addressing, does not need physical changes to the XMI backplane.

1. The slots are numbered 1 to 14, right to left.
2. The XMI needs someone to drive the lines on "null cycles" to maintain good parity. The XARB assigns either slot 1 or slot 14 to do this job. So a capable module (non-memory) must be in a slot 1 or 14.
3. Conflicting information as to whether a MS65 can go in slot 1 and 14, I would avoid doing it for now!
4. Any XMI NODE that ties XCLOCKEN to +5VB, or powers its XLATCHes on +5V cannot use the end slots (ie MS62A)
5. A 6600 put into a slot with KFMSA cables will blow up, *do not put any module in a slot which is already cabled up for a different type of module*
6. XARB module physically prevents I/O cables going into slot 6 to 9 (but 5 and 10 are also really tight!
7. 6200, 6300, 6400 cpus only have enough logic to handle interupts from XMI slots 1, 2, 3, 4, B, C, D, E.
8. 6500 and 6600 cpus have the full set of logic to handle interupts from all XMI slots.

1.9.10.2 CPUs

1. Electrically limited to 8, it is dependant on the number of MSs and XBIs.
2. Requires 1 XMI slot, no IO panels.
3. But MARKETING say 4x6200, 6x6300, 6x6400, 6x6500, 6x6600
4. See recommended memory configuration.
5. You cannot mix CPUs.
6. 6500s will only work in new (or upgraded) platform with MS65s.
7. 6200/6300/6400 will support 8 I/O adapters.
8. 6500 will support 10 I/O adapters.
9. 6500 will not support MS62s or CIBCA-A.
10. 6600, as 6500 but will not support Vector processor.

1.9.10.3 MEMORY

1. Uses one XMI slot, no IO panels.
2. MS62A-AB is 32 Mb
3. MS65A-BA is 32 Mb
4. MS65A-CA is 64 Mb
5. MS65A-DA is 128 Mb
6. Must not be in XMI end slots. Otherwise it will attempt to default the XMI as soon as +5VB is up, this rule goes along with the backplane change which tied XMI HOLD L pullup to the +5VB
7. Can have 1-8, but need interleaving for performance, so go for 2,4,6,8.
8. VMS 4.4 has a memory size restriction of 512 Mb.
9. MS62s will not work with a 6500.
10. Can mix'n'match MS65/MS62 on 6200/6300/6400, **but you need new consol ROMs**, the ROM kit numbers are in the MS65A Installation Manual.
11. MS65s need VMS 5.4 or latter.
12. Different size MS65s can be used, they will be interleaved.

1.9.10.3.1 Recommended memory configuration

Dec '91 For a specific CPU configuration, there is a recommended MINIMUM interleave and size of memory :-

6310, needs 1x32 Mb; 6410 needs 1x64 Mb; 6410 with 1 VECTOR needs 2x32 Mb
6510 needs 1x64 Mb; 6520/6530 needs 1x128 Mb; 6540/6550/6560 needs 2x128 Mb
6510 with 1 VECTOR needs 1x128 Mb; 6520/6530 with 1 VECTOR needs 2x64 Mb
6540 with 1 VECTOR needs 2x128 Mb; 6520 with 2 VECTORs needs 2 x 128 Mb
6610, needs 1x64 Mb; 6620/6630 needs 2x128 Mb; 6640/6650/6660 needs 2x128 Mb

1.9.10.4 CIXCD, the XMI to CI controller

1. Uses one XMI slot, two IO panels.
2. Maximum of 4 per system.
3. Cannot mix with CIBCA-A or CIBCA-B controllers under VMS.
4. Dual port, dual path controller with 3 times performance of CIBCA.
5. To use a CIXCD on a 6400, you need :-
   VMS V5.4 or higher.
   Correct consol ROM/Patch levels.
   L0100 rev E or L0118
   HSC50 cronic V400, HSC40/70 cronic V50A
6. Ten-Tick set up on rest of cluster. See Speedy 683 for FCO number.

1.9.10.5 DEMFA, the XMI to FDDI controller

1. Uses one XMI slot, two IO panels.
2. Maximum of 2 per system

1.9.10.6 DEMNA, the XMI to ETHERNET controller

1. Uses one XMI slot, one IO panel.
2. Maximum of 6 per system (including BI Ethernet controllers).
3. Three to four times the performance of a DEBNI.

1.9.10.7 DWMBA, the XMI to BI controller

1.9.10.7.1 BI expansion

1. Two BI channels are shipped as standard
2. Mechanical limits say only 6 x XBIs allowed (too many cables?), but 6500 Product Description says can only have five.
3. Add-on BI channels are shipped as 6 slot BIs. These can be made into 12, 18, or 24 slots using H9657-EUs
4. XBIs cannot be put in middle 6 XMI slaots.
5. Only 1 x DWMBA-BA/BB (exp.cab.) [cable length?]
6. Can put the last 3 DWMBA-CAs into the DWMBA-BA/BB
7. Maximum 6 XMI commanders if BIIC is a pass 5
8. Maximum 12 XMI commanders if BIIC is a pass 5B

1.9.10.7.2 XBI+, or DWMBB, the new XMI to BI controller

1. This is needed on "new" systems, i.e. 6500s, instead of XBI module.
2. Needs VMS V5.4.
3. Only supported by latter revision ROMs.

1.9.10.8 DWMVA, the XMI to VME bus controller

1. Uses one XMI slot
2. Maximum of 2 per system
3. Needs VMS 5.4-3 or later
4. On 6200 needs ROM V7 or later
5. On 6300 needs ROM V8 or later
6. On 6400 needs ROM V4 or later
7. On 6500 needs ROM V3 or later
8. ROMs can be upgraded via FCO, but see Section 1.10.35, CPU ROM and EEPROM

1.9.10.9 KDM70, the XMI to SDI/STI controller

1. Uses two XMI slots, four IO panels.
2. Maximum of 3 per system.
3. Supports 8 ports, with a mixture of Tapes and Disks.
4. Only 2 ports can have tapes in them.
5. The TA90 uses two ports.
6. TA90 must have ucode V2.2 or better.
7. Supports all RAs and TAs and ESE200
   SAxxx = storage array with mixture of disks
   ESE200 = 120 Mb, RA81 = 456Mb, RA70 = 280 Mb, RA71 = 700 Mb, RA72 = 1 Gb
   RA90 = 1.2Gb, RA92 = 1.5 Gb
8. VAX 6000 cab-kit is CK-KDM00-LF.

1.9.10.10 KFMSA, the XMI to DSSI controller

1. Uses one XMI slot.
2. Supports two DSSI buses (allows 14 (2 x 7) devices), 12 disks and 2 tapes.
3. Each DSSI bus must have a terminator at BOTH ends.
4. Maximum of 4 (or 6 if dual hosting).
5. Supports RF72 (1Gb), RF73(2Gb), (not RF71s), TF85(2.6Gb), TF857(18.2Gb)
6. See the notesfile, SASE::CALYPSO Note 889!
7. Needs VMS 5.4-1B or later.
8. Will not work with CIBCA-A, upgrade to a CIBCA-B.
9. Will give Maintenance Timer Expired if KLESI also present, just ignore.
10. SFxxx is a storage array with mixtures of tapes and drives.

1.9.10.11 VECTOR PROCESSOR - T2017

The Vector Option release notes list the restrictions due to problems.
A single VECTOR system may have a T2017 at revision E.
On dual VECTOR systems, the T2017 must be revision F or better.
All 6400s (T2015) **paired** with a Vector must be revision K or better.
All 6400s (T2015) **not paired** with a Vector must be revision J or better.
ONLY a MEMORY module should be placed to the LEFT of a VECTOR module.
VECTOR modules must be shipped in ESD box 99-08536-02.
See recomended memory configuration.
Can have up to 2 VECTORS on 6400 systems
Can have up to 4 VECTORS on 6500 systems.
DEC'91 VECTOR not supported on 6600 systems.
VECTOR diagnostics are on VOLKS::RIGEL$DIAG_VECTORS:

1.9.11 VAXBI Configuration Rules

1.9.11.1 VAXBI conventions

To ensure all Calypso systems are assembled and configured in a consistent manner; BI slots are numbered consecutivly from 1 thru 6.

1. The XBIB must be in Slot 1 to provide clock signals to the rest of the VAXBI
2. A NODE ID plug (1-6) is installed in each slot
3. Convention is that if it is a multi-module BI option then the module with the BIIC is put in the R-H slot
4. Multi-module options must have both modules in the same cardcage.
5. At Oct'91, BR6 should NOT be used. There is a problem on all BIs but because no-one uses BR6 we are not going to make an issue of it!!

1.9.11.2 CIBCI, CIBCA-A, CIBCA-B

1. The CIBCI is not supported (console?)
2. Cannot mix CI controller types under VMS.
3. Only one allowed prior to VMS 5.4, but now can have four!!!!!
4. Needs 2 x BI slots and quad IO pnel
5. Standard config is to put in K2J4/K2J5
6. The CIBCA-A needs its ucode loaded from TK.
7. The CIBCA-B loads its ucode from on-board EEPROMs
8. the CIBCA-A is not supported on 6500s (console?).

1.9.11.3 DEBNA/DEBNI

1. On the old platform, maximum of 4 per system, only 2 per BI
2. On the new platform, it says can have 6 per system, 4 per BI.
3. Requires one BI slot, and single IO panel. CPU cabinet kit is CK-DEBNA-LD. Exp cabinet kit is CK-DEBNA-LJ.
4. Standard config is to put in K3J6, IO panel location is A2. Additional cab kits must use a quad sized hole
5. There are only 3 x +13.5V pigtails.
6. The BI Exp cab also has two pigtails.
7. DEC LANController 200 (DEBNI) needs VMS 5.2 or Ultrix 3.1

1.9.11.4 DMB32/DHB32

1. Maximum of 8 total (DMB32 and DHB32) per system
2. Maximum of 4 per external BI.
3. Maximum of 2 in the system cabinet.
4. Maximum of 1 DHB32-EIA232 in the CPU cabinet. Needs a CK-DHB32-AJ cab kit
5. The DMB32 requires a CK-DMB32-LJ cab kit ? why
6. The DHB32-DEC423 requires a CK-DMB32-LJ cab kit ?same

1.9.11.5 DRB32

1. Maximum of 8 DRB32s per system
2. New platform, maximum of 2 per BI.
3. Old platform, Maximum of 4 DRB32-Ms per BI.
4. Both, Maximum of 2 (DRB32-E and DRB32-W) per BI.
5. Both, Maximum of 2 DRB32s in the CPU cabinet.
6. DRB32-M requires 1 x BI slot, and no IO panel.
7. DRB32-E (includes -M) uses 2 x BI slots, and quad IO
8. DRB32-W (includes -M) uses 2 x BI slots, and no IO
9. CPU and Exp. kit is CK-DRB32-LJ

1.9.11.6 DSB32

1. New platform, maximum 8 per system.
2. New platform, maximum 3 per CPU cabinet.
3. New platform, maximum 4 per external BI.

1.9.11.7 DWMUA Unibus Expander Cabinet

1. Maximum of one DWMUA-AA/AB (includes H9652 cabinet), it must have a private and external BI channel. No other devices allowed on the same BI as a DWBUA
2. Requires 1 BI slot, no IO panel.
3. Maximum of 1 x BA11 with 2 x DD11-DKs
4. Maximum of 5 XMI commanders on systems with a DWMUA this means a 6230 or 6240 cannot have a Unibus
5. Supported Unibus options :- 3 x DUP11s, 4 x DR11-Ws, 4 x LP11s
6. A DMA device with a SSYN timeout of less than 80uS may fail if driver uses byte offset or auto-purge A device with a SSYN timeout of less than 40uS may fail anyway.
7. Any Unibus devices that rely on a DATIP/DATO(B) sequence may fail as KA62 generates DATI/DATO(B)

NOTE that SYSGEN> SHOW/UNIBUS will crash a 6400, this will be fixed in VMS 5.3.

1.9.11.8 KDB50

1. Old platform, maximum of 8 per system, 2 per BI.
2. New platform says maximum of 12 per system, 4 per BI.
3. Requires 2 x BI slots, quad IO panel
4. Standard on non-cluster systems
5. CPU and Exp. cabs use the KDB50-C
6. Quad IO panels should be used before Octal IO panels
7. The 3' cable is 70-22970-03

1.9.11.9 KLESI/TU81+,RBV

1. Old platform, maximum of 4 per system, 2 per BI.
2. New platform says maximum of 4 per system, 4 per BI.
3. Requires 1 x BI slot, single IO panel
4. Can go in CPU or Exp. cabinet

1.9.11.10 RA90

1. See SASE Note 463, all about the in-cabinet RA90

1.9.11.11 TBK50/TK50 TBK70/TK70

1. Maximum of one per system.
2. Standard is put in K2J6 (XBI:E, BI:6) but a sniffer should find it for booting.
3. The TK70 is 296 Mbyte.

1.9.12 Operating Environment

With the TK in use, DEC Standard Class A environment.
Temperature - 15'C to 32'C (59'F to 90'F).
Humidity - 20% to 80%.
Altitude - 8000 ft.
Max. Heat dissipation - 5,440 BTU/hr.
I/P volts - 208VRMS (60Hz), 380/416VRMS (50Hz)
Frequency - 46-63 Hz
Phases - 3
Surge current - 60A
Running current - 4A
Max power - 1.6kW
Height 60.5"(154cm), Width 30.5"(78cm), Depth 30"(76cm)
Weight 700lb (318Kg)

1.9.13 DC current requirements for XMI options

The PSUs and backplane can handle any combination of options (they say).

1.9.14 DC current requirements for VAXBI options

Each VAXBI backplane can only handle:- 50A @ +5V, 3A @ +12V, 15A @ -5.2.
The "available" figure is the total for both BIs

	+5	+5B	+12	-12	-5.2	-2
AVAILABLE	120.0	0	4.0	2.5	20.0	7.0
CIBCA-A	8.0	0.0	0.0	0.0	2.0	1.0
CIBCA-B	9.0	0.0	0.0	0.0	2.0	1.0
DEBNx	6.72	0.0	0.5	0.0	0.0	0.0
DHB32-M	5.34	0.0	0.42	0.42	0.0	0.0
DMB32-M	6.75	0.0	0.29	0.42	0.0	0.0
DRB32-E	9.8	0.0	0.0	0.0	0.0	0.0
DRB32-M	8.0	0.0	0.0	0.0	0.0	0.0
DRB32-W	11.8	0.0	0.0	0.0	0.0	0.0
DSB32	4.5	0.0	0.08	0.08	0.0	0.0
DWBUA-M	8.29	0.0	0.0	0.04	0.0	0.0
DWMBA-B	6.0	0.0	0.0	0.1	0.0	0.0
KDB50-C	11.94	0.0	0.03	0.0	3.76	0.14
KLESI-B	7.0	0.0	0.0	0.0	0.0	0.0
TBK70-CA	5.5	0.0	0.0	0.0	0.0	0.0
BI-TERM	0.5 (each)	0.0	0.0	0.0	0.0	0.0

1.10 Tech-Tips, Problem reports, FCO and REVISION information

1.10.1 Corporate Tech-Tips

1. TK50 is called MUC6 by STB, MUB6 by VMS, MUA6 by VDS!
2. Standalone Backup bugchecks, set NPAGEDYN to 800000
3. CPU intermittent failures
4. VDS 'SET BOOT' does not work
5. BBU (H7231-N) needs VMS5.1 plus H7206 Rev E6
6. VMS 5.0 kits
7. VMS 5.0 needs console ROMS at V3.1
8. Confusion over correct input on transformer, in the UK we use the outside sockets
9. ACDCOK cable (17-01569-01) from H7206-J11 to BI is miswired, may cause hangs.
10. Get VMB from TK50 if one on system disk is lost
11. Where to find Calypso diags on the Network. See SASE note 93.
12. DWMBA cable connections wrong in 6200 Installation Guide

1.10.2 Console escape hatches

BREAK, this changes the CPU baud rate to the next one up.
It will not work if the CPU consol EEPROM parameter has been set up to **NOBREAK**.
This will respond with three chevrons eventually, but it is only temporary, use **SET TERM** to make it stick.

The recommended baud rate is 1200, and if a CPU is unable to read it's EEPROM, it will **default to 1200**.

>>n, to force a connection to CPU node **n** in the situation where none of the CPUs have volunteered to be the BOOT cpu.
This situation is reached in the case of 'wedged console code' when the man who wrote the code has thrown his hand in, i.e. no primary, no memory or no CCA (Consol Communication Area).
On a 6200 or 6300, the RED LEDS will be FLASHING.
On a 6600, the yellow STP and top two RED LEDs (number 7 and 8) come on as normal, but number 2, 3 or 4 also come on.

1.10.3 Consol Terminal ESC DEL sequences

Older terminals actually had a [ESCAPE] key.
Rumour says you have to set a VT320 up into VT100 mode.
If I can't see an [ESCAPE] key, I use [SHIFT + CTRL + [].
Others tell me [CTRL + 3] works as [ESCAPE].
The terminal echoes [$^?] on [ESCAPE] [DELETE].

1.10.4 Decoding Nexus numbers reported by SYSGEN

This tip is from an entry by Denis St. Jean, in the SASE notes file.

Convert the Nexus number from decimal to hex.
The upper digit is the XMI Node number.
The lower digit is the BI Node number.

Here is an example :-

```
SYSGEN> SHOW/ADAPTER

  Nexus Generic name or description
   209  BI - XMI Adapter (DWMBA/B)
   212  BI Combo board (DMB32)
   213  BI - LESI Adapter (KLESI-B)
   214  BI - NI Adapter (DEBNA)
   225  BI - XMI Adapter (DWMBA/B)
   226  BI - Disk Adapter (KDB50)
   228  BI - Disk Adapter (KDB50)
   230  BI - TK50 Adapter (TBK50)

SYSGEN>
```

For instance, take the TBK50 entry. 230 converts to E6, which means the TBK50 is on XMI Node E, BI Node 6. S'easy ain't it.

1.10.5 VMS assigning Controller Letters

- Starts at lowest XMI slot
- Starts at lowest BI slot
- KDM70 is special, VMS assigns the SAME letter to disk and tape, so it may skip some letters to bring both into line.

1.10.6 LKUPVER consol command

This explanation is by C.Norton on the SASE notefile.

If you type ESC DEL LKUPVER, you get a string of numbers output. e.g.:-

VER 81 0106 10 0106 0100 0100 0000000000

- 81 is the status code of the command.
  53 means EEPROM header area checksum failed.
  57 means some other EEPROM area checksum failed.
  81 means all is o/k with the EEPROM.
- 0106 is the EEPROM format revision (may change).
- 10 is the console ROM revision.
- 0106 is the console PATCH revision.
- 0100 is the console parameter revision (huh??).
- 0100 is the console bootspec area revision.
- 0000000000 is the system serial number.

1.10.7 Disabling modules using consol commands

This is by our own Ken Robb on the SASE notesfile.

To inhibit a memory, use a >>> **SET MEMORY** and leave the specific memory out of the command. The EEPROM gets modified so set the OCP switch to UPDATE, and remember to put it all back to square one when you finish.
e.g. To inhibit Node A, in a system with memories at Node A, 9, 8, 7.
>>> SET MEMORY/INTERLEAVE:(7, 8+9)

To set the memory back online :-
>>> SET MEMORY/INTERLEAVE:DEFAULT

To inhibit a CPU, use a >>> **SET CPU/NOENABLE n.**
To put it back online, use a >>> **SET CPU/ENABLE n.**

Remember, though, that these modules are still on the XMI, so may continue to interfere with the system if that is their wont.

1.10.8 XMI and BI backplane and edge connector cleaning

See " Section 20.3.4, Backplane and edge connector cleaning" for the latest philosophy, concept, guess, directive, experiment, cheap, or safe method.

1.10.9 INFOSERVER

1.10.9.1 How to BOOT a CD on an INFOSERVER

1. The BOOT PRIMITIVE in the Calypso console software needs to know the name of the primary boot file which it is going to read in from the Infoserver.
   This would equate to VMB.EXE in previous boot flows.

   The name of this file was originally ISL_LVAX (Initial System Load, Large VAX).
   But, as new variants of support come out, the file name is changed so you know which version of ISL_LVAX will support the particular configuration you have.
   By adding the version to the name, you ensure you get the version of ISL_LVAX that you want, instead of just getting the copy from the Infoserver that happens to respond first.

   There appears to be **two naming conventions**.
   Diagnostic CDs will add a revision letter to the end of the filename. So, for instance, you must use **ISL_LVAX_J** for 6600 with the current revision of the CD (Jun'92).
   VMS CDs will add revision numbers to the filename. So, for instance, you must use **ISL_LVAX_055** for VMS 5.5 CDs.

   I don't know for sure how to walk up to an Infoserver to check this file's name. But you could try **INFOSERVER > SHOW PARTITION DK1:** and see which Partitions have the MOP Services listed against their name.

2. The initial command at the 6x00 is:-
   - Booting Standalone Backup on a 6200/6300/6400 with DEMNA in slot E,
     BOOT/XMI:E/R5:E0000100 EX0
     You will be prompted for the filename, respond with ISL_LVAX_n
   - Booting Diagnostics on a 6200/6300/6400 with DEMNA in slot E,
     BOOT/XMI:E/R5:110 EX0
     You will be prompted for the filename, respond with ISL_LVAX_n
   - Booting Standalone Backup on a 6500/6600 with DEMNA in slot E,
     BOOT/XMI:E/R5:E0000000/FILENAME:ISL_LVAX_n EX0
   - Booting Diagnostics on a 6500/6600 with DEMNA in slot E,
     BOOT/XMI:E/R5:10/FILENAME:ISL_LVAX_n EX0
   - A 6x00 with a DEBNI in BI Slot 4 on XMI at slot E,
     Use the same procedures as above, except use **/XMI:E/BI:4** instead of just XMI:E, and use **ET0** instead of EX0.
3. You get the "ETHERNET INITIAL SYSTEM LOAD FUNCTION" menu.
4. Enter a FUNCTION ID of 3 (to choose a service).
5. Enter a SERVICE OPTION of 1 (to find services).
6. You will get a list of servers and services found. Each one is numbered,.
7. You are prompted for a number.
8. Inspect the service names (eg VMS054 or VAXPAX or CDBIN06JUL21), and enter the number associated with the one you require.
9. Away she goes.

1.10.9.2 Infoserver CD BOOT flow

1. The 6000 series system Boot code in ROM issues a MOP request over the Ethernet looking for the file ISL_LVAX.
2. All "owners" of the file respond (the file is on the CDROM in an Infoserver).
3. The Boot code picks a node and loads ISL_LVAX over the Ethernet to 6000 series main memory.
4. The Boot code sets up registers (a la VMB) and fires off ISL_LVAX code.
5. ISL_LVAX provides the menus to allow the 6000 series operator a choice of options.
6. The operator identifies the target for the following load sequence to the ISL_LVAX code.
7. ISL_LVAX code loads the secondary bootstrap and starts it.

1.10.9.3 Hints and tips about Infoservers

1. The Infoserver manual tells you how to connect it up, and what should happen when you first power it on.
2. It also tells you how to install and setup the Infoserver software from the CD ROM.
3. You need to borrow a terminal to use as a Infoserver consol to begin with.
4. The Winchester will have the software on when it is delivered.
5. If it asks for a password, respond with ESS
6. At the INFOSERVER> prompt, SHOW SERVICE will tell you what is on a CD.
7. The ethernet connector must have heartbeat enabled (the Infoserver can't cope with this signal being absent).
8. Find a terminal and get to the LOCAL> prompt
   SHOW SERVICE and look for LAD_xxxxxxxx, where the xs are the Infoserver ethernet address, it should be AVAILABLE.
   CONNECT LAD_xxxxxxxx
   You should get messages from the Infoserver
   If it times out and then becomes un-available, check the heartbeat
9. Damon Parsons says if you are installing VMS 5.5 from a CD, it gets confused if there is two Ethernets or an Ethernet and FDDI. You have to remove the extra controller so you just have the one Ethernet which is connected to the Infoserver

1.10.9.4 Using ISL_LVAX off a VAX-VMS system, instead of from an Infoserver

This could be a good move when you can't boot the Infoserver for whatever reason, to see if the Calypso can see anything on the Ethernet generally.

You must have already put ISL_LVAX onto a VAX-VMS system, in MOM$SYSTEM.

The VAX-VMS system must be running DECnet. Do a $ SHOW SYSTEM, and look for the processes NETACP, REMACP and EVL.

DECnet service must be enabled.
Do a NCP> SHOW KNOWN CIRC CHAR, and look for Service: Enabled on the Ethernet circuit.

Now when you do your "infoserver type" boot command on your Calypso, this VAX-VMS system will push ISL_LVAX to you.
Obviously the name of ISL_LVAX must be the same in the BOOT command as in MOM$SYSTEM.

You should find a copy of ISL_LVAX in SYS$SYSTEM to copy to MOM$SYSTEM.

One way of getting ISL_LVAX into MOM$SYSTEM is to have done it previously from a CD on a working Infoserver :-
$ SHOW DEV DAD
If DAD is not present, load it:- $ @SYS$STARTUP:ESS$STARTUP CLIENT
$ MCR ESS$LADCP BIND "cd_label"
You will get a one-liner telling you that DADn: has been "bound".
$ MOUNT/OVER=ID DADn:
$ DIR DADn:[SYS0.SYSEXE]ISL*.*
You will now know the name of your ISL_LVAX file.
$ COPY DADn:[SYS0.SYSEXE]ISL_LVAX MOM$SYSTEM:*.*
And there (on a good day with a fair wind, a well sorted motorbike and a dry, open road) you have it.

1.10.9.5 Putting VAXPAX diagnostics on the INFOSERVER Winchester disk

This system has the advantage that we can get the latest VAXPAX on-site quicker than waiting for CDROMs, and we can make minor adjustments like inserting new releases of micro-code.

The concept can be broken into two sections.
First, all the diagnostics have to be put into an area that looks like a normal VMS disk - called a virtual disk.
Secondly, the Primary Boot file ISL_LVAX has to be positioned in a special maintenance protocol area of the winnie, the alternative is to leave a CD inserted with ISL_LVAX on it.

After you have done this, when you boot via the Infoserver, you will see the VAXPAX_S service being offered, just select it to boot the diagnostics.

1.10.9.5.1 First, putting the diagnostics on the winnie

Unfortunatly there is a problem with the VMS driver for the Infoserver which may crash the VAX that you are using to do the copy on.
To avoid this, copy your VAXPAX TK to the local disk of a Workstation, then use VMS on this workstation to copy the VAXPAX files to the Infoserver.

So, first, we create a "virtual disk" area on the Winchester from the Infoserver> prompt, these areas are called partitions. I have chosen 20,000 blocks because I keep a copy of the CALYPSO TK tape on an RL02 at WELWYN, so I know this size is adequate.

INFOSERVER > CREATE PARTITION DK1:VAXPAX_P BLOCKS 20000

Then we setup an Infoserver service aligned with this partition.

INFOSERVER > CREATE SERVICE VAXPAX_S FOR DK1:VAXPAX_P

On your Workstation, check that the "client software" is loaded :-

$ SHOW DEVICE DAD

If DAD0 is not present, load it :-

$ @SYS$STARTUP:ESS$STARTUP CLIENT

Then, on the Workstation we use VMS to initialize this area as an ODS-2 disk, and copy diagnostics into a [SYSMAINT] directory on this ODS2 disk.

$ MCR ESS$LADCP BIND/WRITE_ENABLE VAXPAX_S
You will get a one-liner telling you that DADn: has been "bound"
$ INIT DADn: VAXPAX
$ MOUNT DADn: VAXPAX
$ CREATE/DIR DADn:[SYSMAINT]
$ COPY/LOG *.* DADn:[SYSMAINT]*.*

DIAGBOOT.EXE and the DIAGNOSTIC SUPERVISORS must be made contiguous.
Use $ SET DEFAULT DADn:[SYSMAINT] and then COPY/CONTIGUOUS commands.

1.10.9.5.2 Second, putting the Primary Boot program on the winnie

Make sure you don't already have it!
INFOSERVER > SHOW PARTITION DK1

If it isn't already present, prepare the area to accept it :-
INFOSERVER > CREATE PARTITION DK1:ISL_LVAX_n BLOCKS 200
INFOSERVER > CREATE SERVICE TEMP1 FOR DK1:ISL_LVAX_n

The file ISL_LVAX_n is available on Consol and VMS CDs, so you put one of these into the Infoserver, lets say its the one of the first CDs I ever saw, 6000_CONS_C.

$ MCR ESS$LADCP BIND 6000_CONS_C
You will get a one-liner telling you that DADx: has been "bound"
$ MOUNT DADx: 6000_CONS_C
$ MCR ESS$LADCP BIND/WRITE_ENABLE TEMP1
You will get a one-liner telling you that DADy: has been "bound"
$ MOUNT/FOR DADy
$ COPY/CONTIG DADx:[SYS0.SYSEXE]ISL_LVAX_n.SYS DADy:*.*
$ DISM DADx
$ DISM DADy
INFOSERVER > DELETE SERVICE TEMP1
INFOSERVER > SET PARTITION DK1:ISL_LVAX_n MOP ENABLE
INFOSERVER > SAVE
INFOSERVER > SHOW PARTITION DK1:
You should see the Partition ISL_LVAX_n with the MOP Service.

1.10.10 How to BOOT diagnostics and STABACKUP on a TF857 via the KFMSA

e.g. >>> BOOT /R5:10 /XMI:D /DSSI_NODE:0 /PORT:1 MI0

- The ROM/EEPROM console code must support the TF857/KFMSA combination.
- VMB.EXE on the TK tape must be from VAXPAX 45 or later (88 blocks).
- DIAGBOOT.EXE on the TK tape must be from VAXPAX 44 or later.
- DIAGNOSTIC SUPERVISOR on the TK tape must be from VAXPAX 45 or later.
- EVSBA from VAXPAX 44 is known not to pick up the TF857.
- A STABACKIT built on TK50 from VMS 5.4-3 is known to work.
- The KFMSA supports 2 DSSI buses (also known as Ports) Port 1 and Port2.
- B CSA1 will work if the TF857 is on :-

  First KFMSA on the XMI
  DSSI port 1 on the KFMSA
  DSSI node number 0

1.10.11 How to BOOT with a bad bootblock (ie missing) on the system disk

If a VAXen gets VMB locally from the console device, it is not necessary to write a boot block on your system disk. However the VAX 6200 console rom gets VMB off a KDB50, KDM70, KFMSA or HSC (as long as it is not via a CIBCA-A) system disk using the pointers in the boot block (block 0). These pointers are written to the boot block using the WRITEBOOT mechanism.

It is not possible to get VMB off the system disk if the system disk is accessed thru a CIBCA-A controller, because a CIBCA-A needs its ucode loaded first (in this case VMB comes off the TK and then VMB loads the ucode into the CI controller).

If you have a system with a KDB50, KDM70 or CIBCA-B (no uCode required, ergo no console tape), and you have not done a WRITEBOOT to the particular disk you are trying to use, you will find you cannot boot the system.

In this case we need a workround to get VMB in and boot the system.

1. First do a SHOW CONFIG, to see the XMI/BI NODE for the KDB, KDM or CI
2. Boot a TK50 which starts with VMB, (e.g. the "consol" tape)

```
>>> B/R5:20 CSA1
```

3. At the XDELTA breakpoint, you now have VMB in memory, type ^P.
4. Set up the registers to fake a disk boot:

```
R0      = 21 for KDB, 20 for HSC, 43 for KDM
R1<0:3> = BI node number of KDB50 or CI or zero if KDM
  <4:7> = XMI node number of KDB50, CI or KDM.
R2      = 0  [or CI node number of HSC]
R3      = unit number of disk
R4      = 0
R5      = VMB boot flags (as desired)
R7      = CCA Address in memory.
          Barring hard memory errors, this will be 7 pages
          below the top of physical memory:
               32 MB system = 1FFF200
               64 MB system = 3FFF200
SP = 200
```

5. Restart VMB by typing:

```
>>>START 200
```

6. VMB will now load the secondary boot program from the KDB50 disk
7. After you have got VMS up, do a $ MCR WRITEBOOT sequence.

NOTE :- The following are the register setups believed to be required for a RF72 on a KFMSA.

```
R0      = 20 for KFMSA
R1<0:3> = zero
  <4:7> = XMI node number of KFMSA
R2      = x000n
            x = 2 for KFMSA port 1, 3 for KFMSA port 2
            n = DSSI node ID for the boot device
R3      = unit number of RF disk
Setup the rest of the registers as before.
```

1.10.12 PM procedures

- Check TOY battery
- Check PAL box fan
- Check that neither blower is 'free-wheeling'
- Build a 'load path' TK50
- Check all 3 phases present (AC ripple on +/-150v is 360Hz?)
- Check for mis-wired cable :-

  Inspect the terminations of the two wires on the power cable (17-02521-01) at the XMI-2 backplane. The RED wire should be terminated at the +5V bus bar. The BLACK wire should be terminated at the DC RETURN bus bar.
  If the two wires are terminated WRONGLY :-

  Connect the RED wire to the +5V bus bar.
  Connect the BLACK wire to the DC RETURN bus bar.
  Measure the output voltage across J6 of the H405-E/F pin. (Yellow and blue cable)
  If the output voltage in not 14V, then the H405 is damaged.
  Recorded this damaged H405-E/F into the customer account and ENSURE that the H405-E/F is supplied with future BBU's upgrades.

- On multi CPU 6400 or 6500 systems, check for faulty interval timer crystal using XTLCHK_VDS.EXE.

  There were a small number of bad Interval timer crystals running slowly.
  6200 and 6300 CPUs will not initialize properly.
  Primary 6400 and 6500 CPUs will give a warning message that the system is running at an accelerated clock speed.
  Secondary 6400 and 6500 CPUs need checking :-

  Get a copy of PROXY::PROXY_PUBLIC:[CAMPBELL]XTLCHK_VDS.EXE
  Boot Diag. Supervisor and ATTACH the CPUs manually.
  Run XTLCHK_VDS

- Any other suggestions?

1.10.13 Module identification problems when replacing 6200 or 6300 CPUs

This input from Mike Rhodes.

There have been several cases of the modules getting mixed up - possibly due to the labels falling off (a 6300 now looks like a 6200), or after an upgrade a 6200 module ends up in a 6300 box.

The 6200 and 6300 use the same etched pcb, but with some different components. The original 6200 CPU was a T2011. The 6300 CPU is a T2011-YA.

Unfortunatly the -YA identifier is just a paper sticker attached to the flat surface of the module.

On a uni-processor system, you may end up by downgrading, or upgrading it by mistake. Also, if you RESTORE the EEPROM image off TK, you could end up with an apparently DOA module.

On a multi-processor system you will get some fatal consol condition due to the incompatability (as I've never seen it I don't know the symptom).

One way of identifying the module is to look at the crystals. There are three on each module, they are the silver tin capsules about 1.5 cm square.

On a 6200 (T2011), one of the crystals will be 50 MHz.

On a 6300 (T2011-YA), one of the crystals will be 66.667 MHz.

1.10.14 SOFTWARE bugs

1.10.14.1 VMS 5.2 Machine Check Handler causing non-existant memory

If the system encounters an INT54 error, for example an XMI parity error, the system should simply snapshot the XMI register contents to the errorlog and continue. Unfortunately there is an error in the code such that it machine checks whilst accessing the address of what would be the first memory nodes XFADR. This is fatal. This problem is fixed in VMS 5.3. For customers experiencing this problem I have a patch that can be made available. For further information please contact either Peter Beddall, Ken Robb or Brian Lindley.

1.10.14.2 Operating System's time clock running slow

6000 systems can experience a system time loss ($ show time) of a few minutes to hours per day. The loss can appear to be erratic and can vary depending on the number of users on the system. This could be due to lost clock interrupts (IPL 22) caused by an excessive number of ECC errors, reported via an INT54 (IPL 26). It is also possible that these ECC errors will not be logged in the errorlog, as the machine check handler only records an entry if 16 ECC errors occur at the same location. If the errors are dispersed throughout memory then no errors are recorded in the errorlog unless the system suffers a machine check or is shutdown when the buffers are flushed. In cases of slow system clocks, check for ECC memory errors first, before replacing CPU modules.

1.10.14.3 VMS shows Adapter errors with no error bits set

These errors appear on either or both XMI (DWMBA) for any 6000 system. This problem is also as a result of memory ECC errors.
When the XBI interrupts and the only error is a CRD error VMS does not make a direct entry in the error log. Instead it includes the error information in its internal CRD buffers, and clears down the error bits. However if the XBI receives another CRD response before the first interrupt has been serviced, then the XBI remembers this fact and causes a second interrupt. Unfortunately by this time VMS has cleared down the error bits, (it can't stop the second interrupt) and it will therefore receive an error interrupt with no error bits set. This it treats as an error and logs it immediately. The SW Flags for the entry will report "NO ERROR FOUND". As mentioned previously, there may or may not be an associated ECC errorlog entry, depending upon whether its threshold of 16 errors for a single location has been reached.

1.10.14.4 VMS 5.2 errorlog reports XFADR contents as C76 or a similar low value

In cases where this is relevant (e.g. timeouts etc) it should be the same address as that contained in the PCERR. This is a bug in the errorlog formatter and is fixed in VMS 5.3. The correct contents of the XFADR can be obtained using $anal/err/brief.

1.10.14.5 VMS 5.3 gives Fatal Bug Check - INVEXCEPTION

This occurrs when booting a 6410 as a new cluster member.
This is due to the new root having DUMPBUG =1, VAXCLUSTER =2, but no SYSDUMP.DMP.
Fix by SYSGEN> CREATE SYS$SYSDEVICE:

1.10.14.6 VMS 5.4 CD ROM does not support KFMSA

You need the VMS 5.4-2 CD ROM to build VMS from the INFOSERVER.

1.10.14.7 VMS 5.4-1 crashes with INVEXCEPTN on a 64xx

Use 5.4-1A, 5.4-1A will mix in a cluster with 5.4 and 5.4-1.

1.10.14.8 VMS 5.5 runs slow on 6200 or 6300 with KLESI or UNIBUS

Get a patch to stop VMS disabling the primary cache.

1.10.14.9 UETP LOAD Phase fails

Fails if Vector CPU is present - fixed in VMS 5.4-1

1.10.14.10 VAXPORT (etc) BUGCHECKs on VMS 5.4-3 with VMS 5.4-2

If there are multiple CIXCDs in a cluster there will be problems during a "rolling upgrade". The symptom will be typically VAXPORT BUGCHECKS.

1.10.14.11 VMS or Standalone Backup cannot configure the CIBCA

This will not configure properly unless it was booted via the CIBCA.
The problem occurs if a DEBNx or TK is in the BI slot just before the CIBCA, or in the last BI slot of XMI node E, or the first slot of XMI node D.
The symptom is PAA0, Port timeouts.

1.10.14.12 Standalone Backup will not configure disks thru the CIXCD

There is a timing problem configuring HSC disks thru the CIXCD.
Symptom is 50 messages saying "%PAA0, Port is re-initializing"
Fixed by slowing down CPU by disabling the cache.

1. Method 1 for DEC released media

   Do a conversational boot by setting R5 D0 as a 1.
   SYSBOOT> SET USERD2 3
   SYSBOOT> CONTINUE

2. Method 2 for @STABACKIT built media

   Boot Standalone Backup and wait for it to ask the time.
   ^P
   >>> DEPOSIT/I 7F 0
   >>> DEPOSIT/I 72 6
   >>> CONTINUE

1.10.14.13 Diagnostic Supervisor will not boot on a 6500

EMSAA V14.0-561 has a bug which stops it booting if there is a device in slot 3.

1.10.14.14 EVSBA, Diagnostic Autosizer looses the load path

This occurs if you are booted thru a CI, but you have a KFMSA present.
If the KFMSA is in a lower XMI slot than the CI, the KFMSA becomes PAA0 and PAB0, the CI becomes PAC0!
Do a:-

```
LOAD EVSBA
DEATTACH/ADAPTER=HUB ALL
START EVSBA
```

1.10.14.15 ULTRIX fails to boot on new platform

V4.0 fails with %BOOT-F-No such device, use V4.1

1.10.14.16 Standalone Backup and VMS 5.4-0A problems if 512Mb of memory

It is not explained what the symptom is, but they tell us to do a conversational boot and set PHYSICALPAGES to 1047552 (this is less than 512 Mb).

1.10.15 6200

- FCO-62XMX-F001, New FDE cable for consol terminal
- FCO-62XMX-F002, Speedy 603, updates TBK50 controller
- FCO-62XMX-I003, Speedy 705, DWMVA support, EQ-01630-01 (new module rev AL)

1.10.16 6300

- FCO-63XMX-F001, Speedy 603, updates TBK50 controller.
- FCO-63XMX-S002, alteration to cabinet?
- FCO-63XMX-F003, Speedy 668, 672, fixes duplicate Tag PEs.
  EQ-01596-01, T2011-YA becomes rev AE01.
  EQ-01596-02, T2011-YC becomes rev AD01.
  EQ-01596-03, a TK50 with the cache checkout program (FA-04928-02).
  Just put the TK in and type BOOT CSA1
  It automatically tests the Primary and any other CPUs.
  It automatically prints the number of errors found on each node.
- FCO-63XMX-I004, Speedy 705, DWMVA support, EQ-01630-02 (new module rev AF)

BLITZ; EQ-01596-03 tapes will not work with Consol ROM V6 or V8 on a multi-cpu system.
A modified version is available (VOLKS::HYPERIO$:TAGRM_V2.EXE)
Do a $INIT MUxx TAGRM
Then $MOUNT/RECORD=512/BLOCK=512 MUxx TAGRM
Before copying the .EXE file to the TK.

CACHE TAG PEs - this should be a soft error, but there is some evidence pointing to dodgy components causing not only this error but also Fatal Bug Checks (INVEXCEPTION etc) due to a cache coherency problem.
So if you see Cache Tag PEs, it is best to replace the CPU module - see FCO-63XMX-F003.

1.10.17 6400

VMS 5.4-1 crashes with INVEXCEPTN on a 64xx, use 5.4-1A
VMS 5.3 gives INVEXCEPTION when booting a 6410 as a new cluster member - see "Section 1.10.14.5, VMS 5.3 gives Fatal Bug Check - INVEXCEPTION"

- FCO-64XMX-S001, alteration to cabinet?
- FCO-64XMX-O002, Speedy 668.
  This FCO achieves 3 objectives :-
  1. New chip-set to fix various bugs (MOVC5 and CMPC5 and PC+/-4 and XRP) makes module rev "L" (normally "L05").
  2. New ROMs to enhance consol software (rev 3) make module rev "AL".
  3. New vendors to fix "dendrytic growth", so (even if rev "AL"):-
     Module must not have MEPSCO terminators.
     There are 20 terminators on side 2 of the pcb.
     MEPSCO terminators have 1 or 2 horizontal black lines painted on them.

So if your module(s) are less than "L" - replace them (EQ-01591-01).
Or if they are "L" or "AL" but with MEPSCO terminators - replace them (EQ-01591-01).
And if they are "L" without MEPSCO terminators (ie probably SPRAGUE terminators), fit the new ROMs to make them "AL" (EQ-01591-06).

In EQ-01591-01, we are mainly seeing rev "L05", but some have come as rev "L04".

The FCO documentation is on COMICS::DISK$TECH:[MARIAH]

- FCO-64XMX-I003, Speedy 705, DWMVA support, EQ-01630-03 (new module rev AM)
  I don't get this, surely the "procedure" said it would be rev BL?

1.10.18 6500

DEC'90, fails Test 3 of SFT1, or hangs, if terminal is not connected.
EMSAA V14.0-561 will not boot if there is a device in Slot 3.
EEPROM 2.03 fails Test 56 if Vector CPU is present.

- FCO-65XMX-I001, Speedy 705, DWMVA support, EQ-01630-04 (new module rev K)

1.10.19 6600

The 6600 is a fourth generation CMOS cpu with both micro and macro pipelining.
It has a IBOX, EBOX, FBOX, MBOX and CBOX block diagram and runs at 12nS cycle time (the 6500 was 16nS and the 6400 was 28nS).
RBDs and booting the Infoserver is different.

The H7242 must deliver between 3.265 and 3.430 volts for this fussy chip when measured at the backplane, else replace the H7242.
If booting Standalone Backup on TK and EEPROM = 1.0, you must use BOOT/R5=0 CSA1

VMS 5.5 problems

If a Power Fail and recovery occurs, a subsequent system error causes a HALT.
If a multi-processor system bugchecks, it sometimes asks for the DATA and TIME on a reboot.
SYSGEN> SHOW ADAPTER gets it wrong.

1.10.20 CIBCA

Ucode rev 5.2 (seen as 40054002) has been around since about '89, VAXPAX 45 will have 7.2 (seen as 40074002).
VMS or Standalone Backup, **cannot configure the CIBCA** properly unless it was booted via the CIBCA.
The problem occurs if a DEBNx or TK is in the BI slot just before the CIBCA, or in the last BI slot of XMI node E, or the first slot of XMI node D.
The symptom is PAA0, Port timeouts.
At Feb'90; may have bad ucode in CIBCA-B EEPROM causing various crashes. Look at the revision with EVGDA or $ SHOW CLUSTER/CONTIG and the ADD RP_REV. The bad revision is 40024001, good is 40054002. Use EVGDA to update the EEPROM.

1.10.21 CIXCD

Needs VAXSIM version 1.6 or better.
Microcode identification :-

OLD system, major/minor fields were 'formatted', eg 2.05
NEW system, major/minor fields reported in hex, eg 45
Both these examples are for the same revision.

At LAZER release (VAX 7000 "ALPHA ready") Nov'92

Ucode version 46 needed for LAZER.
But it also uses a T2080-YA, so watch out you don't get one!
This may be supported in a VAX 6000 one day.
Some LAZER software reports the Ucode in decimal (well we've tried BCD and HEX) so hex 46 gets reported as 70.
Ucode 45 and 46 are perfectly compatable (said the CI Engineering Manager)

At March '92
"Minimum supported" ucode is 2.05
You will see 45xx0C05 in the XDEV register (xx is module revision and the 45 says microcode revision 2.05)
You will see the XDEV reported by the console SHOW CONF command, but the hi and lo words are reversed - (0C05) 4554 is really 45540C05.

At October '91;
Revision E04 and earlier used EEPROMs, revision E06 and later use FLASHPROMs.
The XDEV register looks like yyxx0C05, where xx=56 to signify revision E06 and xx=54 for E04.
Old diagnostics (which write EEPROMs) will destroy FLASHPROMs.
Use EVGEA 4.1, EVGEB 4.1.

At September '91;
In VMS 5.4-3, RDP (Resequencing Dual Path) is switched on. This used to be switched off. So if this version of VMS is talking to an older version (ie VMS 5.4-2 during a rolling upgrade) the CI packets are delivered out of sequence, typically resulting in a VAXPORT BUGCHECK.

At August '90;
The module should be rev E02 (old one was E01 which did not have a rework on side 2), with a ucode rev 22.

XDEV shows the module and microcode revision, yyxx0C05

xx, XDEV<23:16> gives the revision of the module.

52 = rev E2
53 = rev E3
FF = diagnostic EVGEA, section INIT_DCB needs running!

yy, XDEV<31:24> gives the revision of the ucode

bit 31 is set if the code is "experimental".
bits 30:29 give the "major revision" (can be 0 thru 3).
bits 28:24 give the "minor revision (can be 00 thru 1F).

VAXPAX 42 should have these diagnostics, but the latest stuff can be got by @IOENG::XMVDSK:[CIXCD.DIAG]RETRIEVE.
When the command file asks "Diagnostic or Operational", just press RETURN and you will get all the files. Then type out the Update text for all the gory details.

The later copies of EVGEA and EVGEB will corrupt the EEPROM in pre-rev E modules.

At Nov'90;
After updating the micro-code, EVGEA fails EEPROM region checksum and EVGEB will fail the VERIFY section! Good here ain't it?
The CIXCD must be set for 10 tick Quiet Slot Delta time (not the default, its delivered at 7 tick), this means all the other nodes must also be set 10 tick.

The "tick time" used to depend on the number of nodes.

1-5 nodes, set 7 tick on all nodes,
6-15 nodes, set 10 tick on all nodes,
16 plus nodes, set 10 tick on all nodes.

CIBCxs are set up using backplane jumpers E09-E39, E10-E40, E11-E41

CI750, CI780, and HSCs fitted with L0118s, are set up using L0118 switches.

16 Node, 7 tick; SW3-1 OFF, SW3-2 OFF, SW3-3 OFF, SW3-4 OFF.
16 Node, 10 tick; SW3-1 OFF, SW3-2 OFF, SW3-3 OFF, SW3-4 ON.
32 Node, 7 tick; SW3-1 ON, SW3-2 OFF, SW3-3 OFF, SW3-4 OFF.
32 Node, 10 tick; SW3-1 ON, SW3-2 OFF, SW3-3 OFF, SW3-4 ON.

CI750, CI780, and HSCs fitted with L0100 Rev E2, set up using L0100 swtchs.

7 tick, SW3-1 OFF, SW3-2 OFF.
10 tick, SW3-1 ON, SW3-2 ON.

CI750, CI780, and HSCs fitted with L0100 Rev E1, set up using L0100 links.

7 tick, jumper E177p11 to E177p12.
10 tick, jumper E177p9 to E177p10.

CI750, CI780, and HSCs fitted with L0100 Rev D, are 7 tick only (need to fit a L0118) - see Speedy 683 for FCO information to replace module.

1.10.22 Console cable 17-01567-01

See SPEEDY 581, FA-04849-01 brings cable to REV "C1" (VDE problems)

1.10.23 DEBNA/DEBNK, T1034, TK50 or ETHERNET controller on BI

The T1034 was a dual purpose module, called a DEBNA if on the ETHERNET, called DEBNK if on a TK50.

The TK cable plugs into slot D2, and causes the DEBNK's green LED to come on.

The Ethernet cable plugs into slot E2, and a jumper can go into slot E1. On a DEBNA, this jumper allows a MOP request to cause a system boot.

SASE Note 117 explains why need both DEBNA and DEBNK, instead of using both internal capabilities simultaneously.

FCO-62XMX-F002 or FCO-63XMX-F001, EQ-01552-00.
See SPEEDY 603, fixes various tape errors (mainly compatability). Brings T1034 to "K3", "K4" or "K5".

There was a BAD BATCH shipped in the first half of '89
They are marked "K4" but not ECO'ed correctly (6 bad ROMS)
GOOD E2 = 23-445E6-00 BAD E2 = 23-413E6-00
GOOD E6 = 23-446E6-00 BAD E6 = 23-414E6-00 etc,etc

1.10.24 DEBNI, T1034-YA, Ethernet controller on BI

This is a 'upgraded' DEBNA (4 new ROMs and a different label), which now only supports Ethernet (cannot be used for TK50 anymore).
The "Consol Monitor Program" SHOW STATUS command can corrupt VMS. A future FCO will bring firmware to Revision 300.
Look at the DEBNI DTYPE register, 03000118 is good.
The jumper in E1 is needed (as a security measure) to allow the DEBNI to enter consol mode.

1.10.25 DEMNA, T2020, Ethernet controller on XMI

To see a DEMNA's ucode revision :-
>>> SHOW CONFIG
You get something like E+ DEMNA (0C03) 0608
This shows ucode revision 6.08 (needed for VMS 5.5)

1.10.26 DWMBA and DWMBB, aka XBI/XBI+, the BI Adapter on XMI

Naming :-

XBI, the original combination was a DWMBA-A on the XMI, DWMBA-B on the BI. Also known as XBIA and XBIB.
XBI+, the new combination is a DWMBB-A and still a DWMBA-B.

The consol software will only turn on the DWMBA-B buffer if:-

1. The rev in XMI XDEV reg is 2 (Rev B) or later
2. The rev in BI DTYPE reg is 0A (Rev J) or latr
3. There is no DWBUA on that channel

The BI FAULT line is passed thru to the XMI FAULT line
Pullups on the BI backplane make BI AC/DC okay, even if it isn't connected!
The RED LED on the new (T2018) DWMBB-A is an OR of some bits in the XBER.

T1043 (XBIB) EQ-01539-01. See Speed Bulletin 663
The XBIBs must be at least rev J1 if there are more than 6 XMI Commanders.
INT60,NAK TO MULTI-RESPONDER CMD RCVD, and MEMORY CONTROLLER errors on T1043 rev J caused by 23-007L5 at E18. Fixed by T1043 at rev L with 23-050L5 at E18.

1.10.27 KDB50, T1002, EQ-01507-01

New PROMs, especially important for UNIX/ULTRIX sites. Etch "C" becomes CS "M1", Etch "D" becomes "M2", firmware becomes "19".

1.10.28 KDM70

The KDM70 novice should read the comprehensive Fact-Flash by Richard Penn, which is filed at the end of Chapter 1, introducing said controller.
At Nov'90; the ucode must be at least V2.4
At May'91; V2.4 needs patches.
At Jul'94; V4.4 is latest. (Update tape kept in Datadoc Media Cabinet at Welwyn).

1.10.29 KFMSA

When installed, this will log a Maintenance Sanity Timer expired error if a KLESI is also present.
See "Section 1.3.3, KFMSA parts".

Recent modules that have revision B3A6 confuse VMS, it needs to be fooled.
Use EVUCM/SEC:MFG to alter the EEPROM parameters to set a new revision value of 0000A4A6.

The KFMSA XDEV register is xxyy0810
xx (D31-D24) gives the revision of the pcb.
yy (dD23-D16) gives the revision of the firmware.
The xxyy part will be reported by RP_REVIS in SHOW CLUSTER/CONT.
The ms 3 bits of yy give the major revision, the ls 5 bits of yy give the minor revision e.g. 6A = 3.14 and A6 = 5.6
To determine the revision of EVUCM.BIN, dump the first block and look at the indicated byte in the first line :-
....yy.... ....

1.10.30 PSU H7206-B, new PAL box

There was a BAD BATCH, only fitted to 6500s.
H7206-Bs between GA131xxxxx and GA144xxxxx need re-working and marking with a yellow dot.
FCO H7206-B-F001 covered by EQ-01639-01

1.10.31 PSU H7214, +5volt regulator

There was a TIMA BLITZ about a BAD BATCH. If transformer (16-26664-01, this is the largest, about in the middle) has date code 8830 to 8852; then replace H7214 and label it "T3 has bad date code".

There is an FCO to stop "intermittent shutdown", see Speedy 665.

1.10.32 PSU, H7215A

Made more reliable, see Speedy 589, FCO to CD kit

1.10.33 PSU, H7236 (BBU) on new platform

1.10.33.1 BBU inhibited by mis-wired cable(s)

1. The +5V power cable (17-02521-01) which runs from the XMI-2 backplane to the H405-E (rev F07) at connector J7 may have been reverse wired (+5V on RTN and RTN on +5V). This de-asserts the signal FSE (Fail Safe Enable) from the H405-F to the BBU (H7236-A). Also, two components on the Isolation board (54-18456) - Q2 (D44H8) and D3 (Zener diode 2.4V) - may be blown.

   If the FSE signal is deasserted the BBU will NOT supply power to the system during a power failure.

   When installing a BBU on systems shipped prior to 20-3-91, the following steps MUST BE TAKEN:

   1. Inspect the terminations of the two wires on the power cable (17-02521-01) at the XMI-2 backplane. The RED wire should be on the +5V bus bar and the BLACK wire on the DC RETURN bus bar.
   2. If the two wires are terminated WRONGLY :-
      1. Connect the RED wire to the +5V bus bar.
      2. Connect the BLACK wire to the DC RETURN bus bar.
      3. Replaced the A/C input box H405-F unit.
      4. Install the BBU as per installation guides.
   3. If the two wires are terminated CORRECTLY.
      1. Install the BBU as per installation guides.
      2. Check that the BBU's fan operate during BBU selftest. (A period of 5 to 10 seconds.)
      3. If the fan does not run, the FSE signal is deasserted. Replace the faulty H405-F
      4. Install the BBU as per installation guides.
2. The other cable problem seen was the 17-02475-01 which goes into J6 on the H7206 had pins 1 and 2 reversed.
   Pin 1 should be 300 volt feed, and pin 2 should be 300 volt return.

1.10.33.2 BBU, H7236 failure LEDs if low AC input

This is fixed by raising the whole unit from revision D02 to E01.

1.10.34 VECTOR processor

Systems with dual Vector Processors need the Vector Processor (T2017) to be rev J02 or J03 or better.

F A C T F L A S H

Options Affected: 6000 series consol EEPROM matrix
Submitted By: Dave Bazley
Date: 07-Feb-1995
Filing Instructions: Keep at the end of Chapter 1,

This lists the versions of the EEPROM images supplied on the different recent VAXPAXs. Note that VAXPAX 56 has somehow got the same images as VAXPAX 54, so **VAXPAX 55 actually has the latest .**

6600 ROM	VAXPAX 56	VAXPAX 55	VAXPAX 54/53/52
V1.0	1.05	1.06	1.05

6500 ROM	VAXPAX 56	VAXPAX 55	VAXPAX 54/53/52
V3.0	3.07	3.08	3.07
V2.0	2.0A	2.0A	2.0A

6400 ROM	VAXPAX 56	VAXPAX 55	VAXPAX 54/53/52
V4.0	4.03	4.04	4.03
V3.0	3.08	3.08	3.07
V2.0	2.08	2.08	2.08
V1.0	1.08	1.08	1.08

6300 ROM	VAXPAX 56	VAXPAX 55	VAXPAX 54/53/52
V8.0	8.3	8.4	8.3
V6.0	6.8	6.8	6.7
V4.1	4.D	4.D	4.D

6200 ROM	VAXPAX 56	VAXPAX 55	VAXPAX 54/53/52
V7.0	7.3	7.4	7.3
V5.0	5.8	5.8	5.7
V3.1	3.E	3.E	3.E

F A C T F L A S H

Options Affected: 6000 series consol EEPROM matrix
Submitted By: Dave Bazley
Date: 22-Apr-1994
Filing Instructions: Keep at the end of Chapter 1, throw the one dated 8-Jul-1993

This lists the versions of the EEPROM images supplied on the different recent VAXPAXs the only addition at **VAXPAX 52** was to bring the **6600 to 1.05.**

6600 ROM	VAXPAX 51	VAXPAX 50	VAXPAX 48
V1.0	1.04	1.03	1.02

6500 ROM	VAXPAX 51	VAXPAX 50	VAXPAX 48
V3.0	3.07	3.05	3.04
V2.0	2.0A	2.0A	2.0A

6400 ROM	VAXPAX 51	VAXPAX 50	VAXPAX 45
V4.0	4.03	4.02	4.01
V3.0	3.08	3.08	3.07
V2.0	2.08	2.08	2.08
V1.0	1.08	1.08	1.08

6300 ROM	VAXPAX 51	VAXPAX 50	VAXPAX 48
V8.0	8.3	8.2	8.1
V6.0	6.8	6.8	6.7
V4.1	4.D	4.D	4.D

6200 ROM	VAXPAX 51	VAXPAX 50	VAXPAX 45
V7.0	7.3	7.2	7.1
V5.0	5.8	5.8	5.7
V3.1	3.E	3.E	3.E

F A C T F L A S H

Options Affected:	**CALYPSO**
Submitted By:	**Peter Beddall - Product and Technology Group**
Date:	**16-FEB-1990**
Filing Instructions:	**Keep at the end of the CALYPSO chapter**

6000-400 diagnosis

As I have mentioned previously we have a critical parts shortage of T2015 modules, due in the main to higher than predicted utilisation of spares. In a effort to minimise the usage of T2015 modules, I would ask you to urge all field engineers who suspect they have a T2015 problem to solicit a second opinion, from the Diagnosis Group within the Customer Support Center, before replacing any T2015 modules, not initially diagnosed by that group.

I fully appreciate that at certain peak times this may entail a long wait for a response, but unless the need is critical, then this procedure must be followed, as there will undoubtedly be a wait for parts also. By the same token however, the diagnosis group will make every effort to supply an experienced 6000 engineer to diagnose these 6000-400 calls. By requesting another engineers opinion, especially on the intermittent failures, we may help reduce the current parts shortage, and also reduce unnecessary module repairs, that currently cost Customer Services many thousands of dollars.

Feedback is also required in four main areas:-

i) Feedback directly to the Diagnosis Group on the effectiveness of their diagnosis

ii) Feedback to myself (DTN 781-4158, or DDI 0256-794158) or Brian Lindley (DTN 781-4170, or DDI 0256-794170) on ANY DOA modules, or modules that arrive physically damaged, quoting the failing module serial number.

iii) To myself or the Diagnosis Group on how useful this procedure is, both good and bad experiences please, or also on any other ways to reduce the high rate of "No Problem Found" module returns.

iv) To the module repair center. Please ensure all fault tags are accurately completed, appending error log, bugchecks, RBD summaries or diagnostics reports as necessary.

F A C T F L A S H

Options Affected: 6000 series systems
Submitted By: Peter Griffin
Date: 13-FEB-1990
Filing Instructions: Keep at the end of the CALYPSO chapter

CALYPSO hit-list

There are several CURRENT ISSUES on CALYPSO systems. I have written a "start-up" CALYPSO chapter, but this FACTFLASH will highlight the problems you should be aware of.

6400 HANDLING - the RIGEL CPU module (T2015) is extra-ordinarily sensitive to both static and mechanical shocks. The VAX 6000-400 Maintenance Advisory devotes 4 pages to "handling", but a good tip is to store modules in a spare XMI slot during the replacement procedure. The BOX that the T2015 is shipped in does not offer 100% protection, so the module will NOT BE KEPT IN THE KIT. It will be closetted in a seperate cocoon, remember this when you are asking for parts from Borehamwood. If an empty box is required for shipping, the part number is 99-08536-01.

A design problem is causing engineers to replace 6400 CPUs, it only happens on multi-processor systems, but we need to stop it. The symptom is various FATAL BUGCHECKS occur (mainly SSRVEXCEPT), the footprint in the crashdump can be recognised by the RDC as "The PC+/-4 scenario". The RDC can install a VMS patch to prevent this happening

We are returning 6400 CPU modules as "low revision", but they are really o/k. Some modules were ECOed to H04, but the label was left as F04. E26 is a 21-25087-01 on a F04 revision, it is a 21-25087-05 on a H4 revision.

Returned 6400 CPU modules are found to only have a corrupted EEPROM. We don't know how it's getting corrupted, but this is "field fixable". The instructions for recognizing and fixing this scenario are in the DATADOC CALYPSO chapter. A TK with the copy of each EEPROM will be put into the kit at Logistics.

The current XMI backplane and module edge connector cleaning instructions are also in the DATADOC CALYPSO chapter.

Because of the electronic complexity of the CPU modules, it will help the MRC to give them as much information as possible (include printouts) relating to the fault symptom.

Some CIBCA-Bs were shipped with the wrong micro-code in their EEPROMs. This may cause hangs, Packet Size Violation errors to be logged or SSRVEXCEPT Fatal Bugchecks on other nodes. To check the revision; you can use EVGDA, or use ADD RP_REV during a SHOW CLUSTER/CONTIN. The bad revision shows as 40024001, the good revision is 40054002. Use EVGDA to update the EEPROM.

F A C T F L A S H

Options Affected: 64xx Systems
Submitted By: Brian Lindley, Product and Technology Group
Date: 11-APR-1990
Filing Instructions: Keep at the end of Chapter 25, Calypso

6400 Current Issues

To help reduce the consumption of 6400 modules, I have included a list of new issues and problems detailed below. If any of you have any further questions or problems regarding 6000 systems then please call Peter Beddall (DTN 833 3804) or myself.

1. VMS version 5.2 Machine Check Handler bug
2. System clock running slow
3. No-error errorlog problem
4. Incorrect XFADR contents
5. Bent pins on Rigel chips
6. Self-test fails test 35 (Floating Point)
7. Fault tags and module serial numbers

1/ VMS Version 5.2 Machine Check Handler bug

There is currently a problem within the V5.2 Rigel machine check handler. If the system encounters an INT54 error, for example an XMI parity error, the system should simply snapshot the XMI register contents to the errorlog and continue. Unfortunately there is an error in the code such that it machine checks whilst accessing the address of what would be the first memory nodes XFADR, this is fatal. This problem is fixed in VMS 5.3. For customers experiencing this problem I have a patch that can be made available. For further information please contact either Peter Beddall, Ken Robb or myself.

2/ System Clock Running slow

6000 systems can experience a system time loss ($ show time) of a few minutes to hours per day. The loss can appear to be erratic and can vary depending on the number of users on the system. This could be due to lost clock interrupts (IPL 22) caused by an excessive number of ECC errors, reported via an INT54 (IPL 26). It is also possible that these ECC errors will not be logged in the errorlog, as the machine check handler only records an entry if 16 ECC errors occur at the same location. If the errors are dispersed throughout memory then no errors are recorded in the errorlog unless the system suffers a machine check or is shutdown when the buffers are flushed. In cases of slow system clocks check for ECC memory errors first, before replacing CPU modules.

3/ No error errorlog problem

Adapter errors can appear in errorlog entries with no error bits set. These errors appear on either or both XMI (DWMBA) for any 6000 system. This problem is also as a result of memory ECC errors.

When the XBI interrupts and the only error is a CRD error VMS does not make a direct entry in the error log. Instead it includes the error information in its internal CRD buffers, and clears down the error bits. However if the XBI receives another CRD response before the first interrupt has been serviced, then the XBI remembers this fact and causes a second interrupt. Unfortunately by this time VMS has cleared down the error bits, (it can't stop the second interrupt) and it will therefore receive an error interrupt with no error bits set. This it treats as an error and logs it immediately. The SW Flags for the entry will report "NO ERROR FOUND".

As mentioned previously, there may or may not be an associated ECC errorlog entry, depending upon whether its threshold of 16 errors for a single location has been reached.

4/ Incorrect XFADR Contents

Many of you may have noticed how on several errorlog entries the XFADR address is often reported as C76 or a similar low value. In cases where this is relevant (e.g. timeouts etc) it should be the same address as that contained in the PCERR. This is a bug in the errorlog formatter and is fixed in VMS 5.3. When using a lower version the correct contents of the XFADR can be obtained using $anal/err/brief.

5/ Bent Pins on Rigel Chips

We are still seeing cases of bent pins on Rigel CPU modules. It is not clear if these have been present since the system was shipped, or were introduced later. I would just urge all of you to continue to treat all Rigel CPU modules with extra care, even the module is defective.

The pins in question are those on the very large VLSI chips. The wire is so fine they bend very easily (25 mil).

Before installing any Rigel CPU module I strongly recommend that you give the module a good visual inspection before placing the module in the system.

If any pins are touching, or are potentially touching then do not use that module. Please contact your local 6000 specialist, Peter Beddall, Ken Robb or myself. The pins that are normally subject to damage are the corner pins of the chips particularly those to the edge of the module and if any modifications are present on the module, the pins which are close to wire runs.

6/ Self-test fails test 35 (Floating Point)

We are receiving reports of a higher than expected incidence of Rigel CPU modules failing self-test at test 35 (Floating Point). Peter and I would be very interested to hear of any instances of this failure. Would all engineers replacing CPU modules therefore check the failing test number, either from the printout or led code, and call us as necessary, quoting CPU Module and System serial numbers. This will enable to track the module through the repair loop.

7/ Fault tags, module serial numbers, and shipping boxes.

To ensure quality modules are returned to the field after repair, could I once again ask that all fault tags be filled in with as much detail as possible, and attach system printout/errorlogs as necessary. These are really used, and applies to any module.

When trying to investigate problems, the module serials numbers are especially useful. Could engineers when replacing modules please record the old (faulty) module's serial number in the site log.

The 6400 module should only go in the NEW BLUE shipping boxes for proper protection, part number 99-08536-01.

F A C T F L A S H

Options Affected: 6410 thru 6460
Submitted By: Pete Griffin
Date: 4-SEP-1990
Filing Instructions: Keep at the end of Chapter 25, Calypso. Throw away the previous one dated 17-JUN-1990

6400 CPU MODULE revision H, J, K and L incompatability.

Rev K is the minimum revision to support the Vector Processor.
The Rev K and L CPU modules are **incompatable** with the existing Revision H CPU modules.
Rev K and L are compatable between each other.

This is bad news if replacing a CPU in a multi-CPU system.
Mixing revisions will result in the usual EEPROM revision incompatability message but also a **ROM revision incompatability.**
Do not issue a **UPDATE** command, else the EEPROM will become so corrupted that **you will never be able to use the module again.**

Any Revision H module(s) already in a system when you want to add a Rev K or L module **must be upgraded to Revision J first.**

For the moment you can order several different things depending on your specific requirement, **but beware, because we seem to be getting a random offering from logistics.**

- Part number 23-026E9-00 is the new diagnostic ROM for E97.
- Part number 23-027E9-00 is the new consol ROM for E77.
- Part number A2-01456-10 is the H-to-J upgrade kit.

The upgrade is complicated and instructions must be followed exactly.
Briefly the complication is that on a Revision H CPU module you will have an EEPROM containing patches to the existing V1 ROM code. When you put in the new ROMs, these patches will be silly, so before you insert the new ROMS, you have to do some DEPOSITs to disable the patching routines in the EEPROM. Then, once the new ROMs are fitted, you have to re-vamp the EEPROM for the new ROM code. **This has to be done on each module.**

This incompatability issue could even be serious if you were replacing a CPU module on a single-CPU system.
If you **RESTORE EEPROM** from a SAVE copy of a Rev H module on TK, **you will never be able to use the module again.**

The whole usefulness of a SAVED EEPROM was already in question prior to this incompatability issue. Generally a replacement module will have latter (and better) patches to the Diagnostic and Console software in its EEPROM anyway.
I recommend that you insert a hard copy of the output of a SHOW ALL command into the configuration section of the SMG, and forget about using SAVED copies of the EEPROM from TK.