DIGITAL	FCO	CATEGORY [O]	PAGE 1 of 13

FIELD CHANGE ORDER - NUMBER: KN02-AA-O001

APPLICABILITY: All Systems containing KN02-AA CPU's manufactured before
27-AUG-1990 including but not limited to the following:
  PM361-BD PM361-BE PM361-BG PM361-BH PM361-BK PM361-BL PM361-MD PM369-PZ
  PM361-ME PM361-MG PM361-MH PM361-MK PM361-ML PM362-BK PM362-BL PM371-BY
  PM362-DK PM362-DL PM362-MK PM362-ML PM362-PK PM362-PL PM369-PY PM372-BY

PROBLEM & SYMPTOM:
1. Firmware Spec too Complex for the Open Systems Environment
2. TURBOChannel Modules Lift Out of System I/O Connectors
3. Excessive Resistance Build up in the 5V Power Connector

SOLUTION: 1. Replace (4) socketed ROM's on system module and (1) socketed
    ROM on each TURBOchannel option present.
2. Add six standoffs to system module which the options bolt to.
3. Clean 5V and GND connectors with a "Gold-Wipe" towelette containing PPE.

QUICK CHECK:If the firmware revision displayed during power-up is below 5.3c
install the FCO.

PRE/CO-REQUISITE FCO: None | MTTI 1.5 hr

TOOL/TEST EQUIPMENT:
ROM Extraction Tool: 29-28497-01   (included in EQ Kit)
ESD Kit: 29-26246-00   or equivalent

FCO PARTS INFORMATION

FCO KIT NO.	DESCRIPTION OF CONTENTS	EQ KIT VARIATION APPLICABILITY
EQ-01589-01	Quantity Part Number Description (See Page 6 for Contents of EQ Kit)	None
FA-04919-01	1 FA Document	

FCO CHARGING INFORMATION

WARRANTY/CONTRACT		NONWARRANTY/NONCONTRACT		
ON-SITE	OFF-SITE	ON-SITE	OFF-SITE	MATERIAL ONLY
TRAVEL/ | EQ | INSTALL | KIT	INSTALL | EQ KIT	TRAVEL/ | EQ | INSTALL | KIT	INSTALL | EQ KIT	ORDER-ADMIN,HANDLING PKG,SHIPPING & EQ KIT
DEC | DEC | DEC | DEC		CUS | CUS | CUS | CUS		CUS

APPROVALS

CSSE ENG	FSHQ LOGISTICS	FS PRODUCT SAFETY
Dave Oliver	Carol Sarasin	Robert Brister

| CSSE MANAGER | FS. MICROFICHE LIBRARIES | FCO RELEASE DATE |
| Jay Nagro | | 27 Aug 1990 |
|_____| VAXDOC EP-CSVDC-LB |_____|
| MICROMEDIA | VAX/PDP EP-CSMST-LB | FCO REVISION |
| Diane MacDonald | | A |
|_____| VAX Notes |_____|
POPULATION	STARS	PARTS AVAILABILITY
2,557		August, 1990
_____	_____	_____

```
 _ _ _ _ _ _ _                    |        FCO   KN02-AA-O001
| | | | | | | |                   |
|d|i|g|i|t|a|l|                   |        PAGE 2  OF  13
|_|_|_|_|_|_|_|                   |
                                  |
_____|_____
```

```
**********************************************************************
*                        ** IMPORTANT **                            *
*                                                                   *
*    The purpose of this document is to provide the engineer        *
*    with an  overview of  the procedure used to install            *
*    the FCO.                                                        *
*                                                                   *
*    The installation is described in detail in the                 *
*    DECstation 5000 FCO Upgrade Manual (EK-FSFCO-RO)               *
*    included in the EQ Kit.                                         *
*                                                                   *
**********************************************************************
```

TABLE OF CONTENTS

```
 _ _ _ _ _ _ _                  |         FCO   KN02AA-O001
| | | | | | | | |               |
|d|i|g|i|t|a|l|                 |         PAGE  3  OF  13
|_|_|_|_|_|_|_|                 |
                                |
_____|_____
```

OVERVIEW

The primary reason for the FCO is to implement a new firmware architecture into the DECstation 5000/Model 200 workstation and DECsystem 5000/Model 200 server. The firmware fix involves replacing four socketed ROMs on the system module and one socketed ROM on each TURBOChannel option present in the system. While on site, service personnel will perform two additional tasks:

    o   Add six standoffs to the system enclosure which the
        TURBOChannel modules will bolt to. This will prevent modules
        from lifting out the system I/O connectors.

    o   Clean the 5V power connectors with a "Gold-Wipe". A Gold-Wipe
        is a towelette treated with PPE (Polyphenyl Ether), an
        anti-oxidant/lubricant. This will extend the life of the
        power connector.

```
 _ _ _ _ _ _ _                  |         FCO   KN02-AA-O001
| | | | | | | | |               |
|d|i|g|i|t|a|l|                 |         PAGE  4  OF  13
|_|_|_|_|_|_|_|                 |
                                |
_____|_____
```

FCO PROCEDURE OVERVIEW

The purpose of this section is to provide the engineer with an overview
of the procedure used to install the FCO. The installation is described
in detail in the DECstation 5000 FCO Upgrade Manual (EK-FSFCO-RO)
included in the EQ Kit.

    1.   Determine if a system is a candidate for the FCO.   If the
         firmware revision displayed during power-up is below 5.3c
         install the FCO.

    2.   From the console, display and record all System Environmental
         Variables contained in the current firmware. This information
         will be needed later (see step 9) to reset the Environmental
         Variables.

    3.   Remove cover and clean 5V Power connectors with a Gold-Wipe.
         Place the used Gold-Wipe in the zip lock bag provided, for
         disposal.

    4.   Add standoffs if needed.   Bolt the six standoffs   into
         pre-drilled and tapped holes in the system module. Use the
         machine screws to secure each TURBOChannel option.

    5.   Remove ALL 4 ROMs from the base system module plus ALL ROMs in
         the TURBOChannel option modules. (For ease of installation
         you may need to remove the power supply)

    6.   Install the 2 base system ROMs (High, Low) and verify with
         power-up selftest.   The diagnostic LED's on the back of the
         system will blink on and off as self test runs. If the LEDs
         stay lit for more than 30 seconds self test has failed.

    7.   Replace the two remaining base system ROMs (NI, SCSI) and any
         ROMs in the TURBOChannel options modules. Use power-up self
         test to verify the total system is operational.

    8.   Apply new revision labels to all updated modules.

    9.   Reset the environmental variables including the boot path.
         (use the information recorded in step 2)

    10. Verify that the system boots Ultrix.

    11. Leave customer documentation packet on site.

FIRMWARE CHANGES

This new Firmware incorporates major changes to the console and
diagnostic commands. If you have experience working with the DECstation
5000/Model 200 workstation or DECsystem 5000/Model 200 server you will
find the new console and diagnostics radically different. The console
has adopted the industry standard UNIX - C language look and feel.


```
        ********************************************************************
        *                         ** IMPORTANT **                         *
        *                                                                  *
        *   It is important for the service engineer to understand how    *
        *   the console has changed. For example a new command string is  *
        *   used to define the boot path.                                 *
        *                                                                  *
        ********************************************************************
```


As an educational aid we have included a copy of the revised DECstation
5000/Model 200 Maintenance Guide in the EQ kit. This manual is for
service engineers. Please take it with you when you leave the site and
use it to familiarize yourselves with the new interface. This document
describes in detail the usage of the new console and diagnostic
commands.

MATERIALS

This section contains a description of the material contained in the EQ
kit.

                          FCO KIT CONTENTS

   Table #1

```
    Part Number      Description              QTY
    -----------      -----------              ---
    (70-28331-01, Pre-packaged FCO Parts as listed below)

    70-28330-01      ROM Assembly             2*
    70-28332-01      Gold-Wipe Assembly       1  ...with zip lock bag...
    70-28329-01      Screw/Standoffs          1

    36-34442-01      REV Labels               1
    29-28497-01      ROM Extraction Tool      1  ...used on 2da only...

    EK-FSFCO-DK      Service Doc Kit          1
    EK-CUFCO-DK      Customer Doc Kit         1
    ----------------------------------------------------------------
```

Note #1: (* Two sets of ROMs)

Each kit contains two complete sets of ROMs. Customers may have system
configurations with duplicate options. There are also spare ROMs in the
event of a problem during installation.

```
    *********************************************************************
    *                         ** CAUTION **                            *
    *                                                                  *
    *   The ROMs contained in the EQ Kit are sensitive to electrostatic *
    *   discharge.  Use ESD kit (29-26246-00) or equivalent during the  *
    *   ROM installation.  Following standard ESD procedures will       *
    *   minimize the possibility of damaging system components.         *
    *                                                                  *
    *********************************************************************
```

ROM LOCATIONS

                        ROM CROSS REFERENCE TABLE
    Table #2

ROM Part Number	Description	OPTION PART #	MODULE PART #	Board Location
23-096E8-00	Base ROM High	KN02-AA	54-19811-01	E17
23-097E8-00	Base ROM Low	KN02-AA	54-19811-01	E61

```
23-578E6-00*    NI ROM                  KN02-AA     54-19811-01     E188
23-579E6-00**   SCSI ROM                KN02-AA     54-19811-01     E220


23-241E7-00     CFB ROM                 PMAG-B      54-19815-01     E30
23-185E9-00     2DA ROM                 PMAG-C      54-20314-01     E28
23-578E6-00*    NI ROM                  PMAD-A      54-19874-01     E3
23-579E6-00**   SCSI ROM                PMAZ-A      54-19876-01     E15
---------------------------------------------------------------------
```

Example #1

Install the ROM labeled with part number "23-096E8-00" in location E17
on the KN02-AA system module.   (See the FCO Installation Guide for
diagrams)

Example #2

Install the ROM labeled with part number "23-241E7-00" in location E30
on the 54-19815-01 board. (See the FCO Installation Guide for diagrams)

Note #2: (Duplicate Part Number)

*   The same NI diagnostic ROM is used on both the base KN02-AA and
     the PMAD-A module.

** The same SCSI diagnostic ROM is used on both the base KN02-AA
   and the PMAZ-A module.


```
       _ _ _ _ _ _ _           |        FCO   KN02-AA-O001
      | | | | | | | |          |
      |d|i|g|i|t|a|l|          |        PAGE 8  OF  13
      |_|_|_|_|_|_|_|          |
                               |
 _____|_____
```


REVISION CONTROL

This kit contains a sheet of Revision Labels.   After each module is
upgraded place a new Revision Label over the old one.


```
        *****************************************************************
        *                                                              *
        *    The FCO Installation Guide (EK-FSFCO-RO), contained in  *
        *    the EQ Kit, has diagrams of each module which show the   *
```

```
            *    location of the Revision label.                          *
            *                                                             *
            *************************************************************


                        ROM REVISION TABLE
Table #3

Module            Option                              Current       FCO
Part Number       Part Number    Description          REV           Rev
-----------       -----------    -----------          ----------    -----------
54-19811-01       KN02-AA        System Module        B09,C09       D09,D09*
54-19815-01       PMAG-B         CFB                  A06,B06,B07   C06,D06,D07
54-20314-01       PMAG-C         2DA                  D03,E03       F03,H03
54-19874-01       PMAD-A         NI                   A06,A07,B07   C06,C07,D07
54-19876-01       PMAZ-A         SCSI                 A05,A06       B05,B06


Example  #3

If you upgrade a Rev "B06" CFB Module place a new Rev "D06" sticker over
the old revision label of the 54-19815-01


Note #3: (* Duplicate Revision)

* Yes this is correct; the only difference between the KNO2-AA Rev "B09"
and  Rev  "C09"  was the firmware.  When the new code is added to either
revision of the system module, the new revision becomes "D09".
```

```
     _ _ _ _ _ _ _           |       FCO   KN02-AA-O001
    | | | | | | | |          |
    |d|i|g|i|t|a|l|          |       PAGE 9  OF  13
    |_|_|_|_|_|_|_|          |
                             |
 _____|_____
```

DOCUMENTATION

                        EQ KIT DOCUMENTATION

      Table #4

                                         Qty of
      Part Number   Description   Manuals   Intended Audience
      -----------   -----------   -------   -----------------
      EK-FSFCO-DK   Service Documentation   3   Services Engineer
      EK-CUFCO-DK   Customer Documentation   5   Customer

                EK-FSFCO-DK SERVICE DOCUMENTATION KIT CONTENTS

Table #5

```
Part Number     Description
-----------     -----------
EK-FSFCO-RO     DECstation 5000 FCO Upgrade Manual
EK-370AA-MG     Maintenance Guide
EK-FSFCO-RC     Console Command Reference Card
---------------------------------------------
```

CUFCO-DK CUSTOMER DOCUMENTATION KIT CONTENTS

Table #6

```
Part Number     Description
-----------     -----------
EK-CUFCO-CC     Console Commands
EK-CUFCO-CL     Read Me First
EK-367AA-IC     Installation Card
EK-FCOIN-UG     Hardware Installation Guide Update
EK-FSFCO-WS     Ultrix Boot Commnads
--------------------------------------------------
```

```
    ****************************************************************
    *                                                              *
    *   Leave the Customer Documentation Kit with the customer    *
    *                                                              *
    ****************************************************************
```

LARS INFORMATION

CATEGORY O	USA	GIA	EUROPE
Activity -			
(a) Contract and Warranty	W	U	W
In-DEC Contract	W	Country Specific	W
Hardware Segment Code	111	111	111
RTD/Off-site Agreement Servicenter	(b)	(b)	(b)

```
DEC Option                       KN02-AA       KN02-AA       KN02-AA
Type of Call                     M             M             M
Action Taken                     D             D             D
Fail Area-Module-FCO-Comments    KN02-AA-0001  KN02-AA-0001  KN02-AA-0001
Material Used                    EQ-01589-01   EQ-01589-01   EQ-01589-01
```

(a) First revenue ship of the DECstation 5000/Model 200 and
     the DECsystem 5000/Model 200 occurred in April 1990. Systems
     shipped after September 1, 1990, have been built with the
     new firmware. All systems shipped within this time frame,
     whether sold with List Warranty or Standard Warranty are
     covered by the FCO.

(b) Due to the nature of this FCO, CSSE does not recommend it
     be performed in the Servicenter. To verify that the firmware
     has been properly installed the customer must bring the entire
     system including the monitor and external mass storage into
     the servicenter.

     Transportation and storage of bulky systems can be burdensome
     to both the customer and the Servicenter and can cause
     significant customer satisfaction problems. This is only a
     recommendation, the final decision is a local one.

```
       _ _ _ _ _ _ _          |        FCO   KN02AA-0001
      | | | | | | | | |        |
      |d|i|g|i|t|a|l|          |        PAGE 11   OF   13
      |_|_|_|_|_|_|_|          |
                               |
 _____|_____
```


SCRAP MATERIAL

Upon successful completion of the FCO please remove the old ROMs from
the customer site and destroy them. This will prevent the old ROMs from
being accidentally installed in a system. Make sure the system has
booted ULTRIX and is fully operational before destroying the ROMs.
Please follow local policies and procedures for the disposal of scrap
material.

The EQ kit contains two sets of new ROMs. After successful installation
of the FCO, Customer Service Engineers may find them selves with unused
ROMs. The disposition of this material is left up to the engineer.   EQ
kits are an expensed item there is no logistics credit for returned
ROMs.

TECHNICAL BACKGROUND

PROBLEM 1

     "Firmware Spec too Complex for the Open Systems Environment"

A review of the DECstation 5000/Model 200 firmware has revealed that the
current firmware implementation is unnecessarily complex and cumbersome
to implement.

SOLUTION:

The firmware has been redesigned. It is now substantially easier for
both Digital and Third Party TURBOChannel hardware developers to
understand and implement.

FCO IMPLEMENTATION:

Replace four socketed ROMs on the system module and one socketed ROM on
each of the TURBOChannel options present in the system.

PROBLEM 2

       "TURBOChannel Modules Lift Out of System I/O Connectors"

DECStandard 102 ESS testing, of the DECstation 5000/Model 200 with the
2DA graphics accelerator and 3D graphics modules, revealed that these
TURBOChannel modules will lift out of the system I/O connectors.   2DA
External Field Test also identified this as a problem.

SOLUTION:

Add Standoffs to the system enclosure.

FCO IMPLEMENTATION:

Bolt six standoffs to the system enclosure. Then use a machine screw to
attach all the TURBOChannel Module to the standoff. The CPU, enclosure
and TURBOChannel modules are all pre-drilled and tapped to accept
standoffs and machine screws.

PROBLEM 3

        "Excessive Resistance Build up in the 5V Power Connector"

Power supply life testing revealed that over time excessive contact
resistance will build up on the 5V connectors. This resistance causes
excessive heat build up and can result in a voltage drop across the
power connector, sufficient to impact reliable system operation.

Corporate safety has reviewed this problem and has determined that there
are no safety issues.

SOLUTION:

Apply PPE An anti-oxidant/lubricant to the 5V connectors of the power
supply.

FCO IMPLEMENTATION:

Clean the power Connectors with a "Gold-Wipe".   A Gold-Wipe is a
towelette treated with PPE. They are used widely in both Manufacturing
and Customer Service. Place the used Gold-Wipe in the zip lock bag
provided, for disposal.

```
\\DS5000
\\3MAX
\\3max
\\ds5000
\\DECstation

\^ KN02
\\KN02
\\KN02-AA
\\OLIVER
\\1990
\\AUG
\\FCO_DOCS
```