

## INTRODUCTION

This document describes the program configuration for the implementation of the Advanced Fiber Communication High Availability installation. This installation will be a collaborative effort between Andataco System Engineering, Technical Services, Applied Engineering, Qualix Engineering, and Advanced Fiber Communication.

## SYSTEM DESCRIPTION

The Advanced Fiber Communication (AFC) configuration is shown in figure 1. This configuration is a standard Qualix HA+ configuration. The Primary system (previously existing HP K460) is an Informix data base server providing services to the factory floor and production. Upon failure of the primary system the secondary (a new HP K460) system will assume responsibility for the Informix services. This will include the fail-over of the primaries IP address with the mounting of the dual initiated drives with the Informix data. This operation when properly configured will provide for minimal down time for the Fail-over. It is expected this down time will be less that the HP pre-configured NFS timeout.

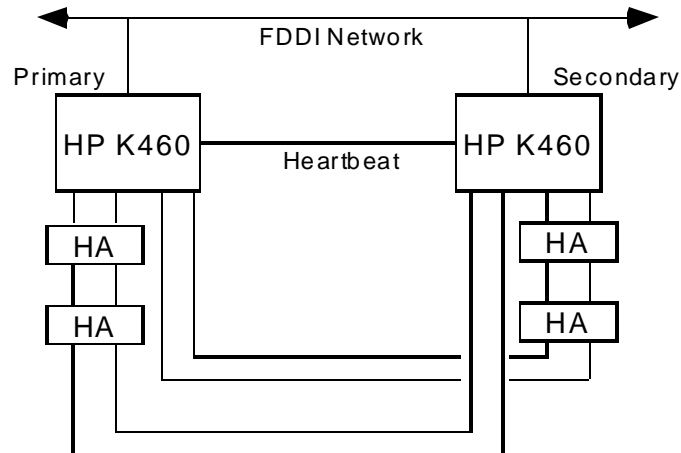


Figure 1

The system, will be rely on dual initiation of HA disks. In this dual initiation configuration Andataco will be connecting 4 HA's to both systems providing for the availability on both the Primary and Secondary hosts. The Qualix HA+ software provides for both host's (Primary and Secondary) to individually mount dual initiated file systems. Because of ability and HP's requirement of only one host having read/write Andataco will mount only the file systems on one host at a time. In the event of a Fail-Over, the file system will be unmounted from the processes primary system and then mounted on the processes secondary system.

One important detail in a dual initiation process is the placement of data. In discussing this fact with AFC figure 2 describes the data layout for the final configuration. In a nominal situation the primary system will have 3 HA's mounted. The number of file systems mounted by the systems will be set according to the RAID configuration of each HA. If one was to assume a RAID 5 configuration on each (this of course is not true but used as an illustration), Qualix HA+ would need to be configured to Fail-Over 6 mount points or file systems in this dual initiation.

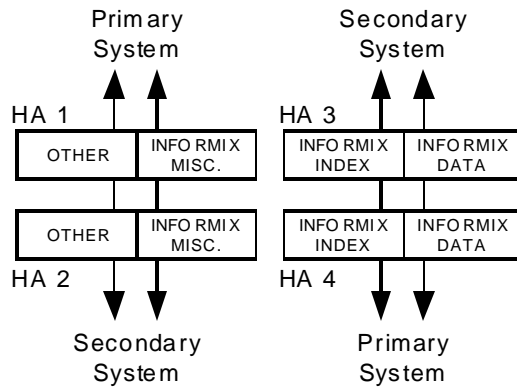


Figure 2

The next configuration issue is the alternate path for the HP operating system and fail-over. As has been shown in other installations, one can place multiple HA's on a controller and maintain alternate paths for Fail-Over (Reference Risk Data Install report dated December 22, 1997). Figure 3 shows the planned configuration of the path ID's for the primary path and the HP alternate path. For a detailed description of the path commands please refer to Appendix I.

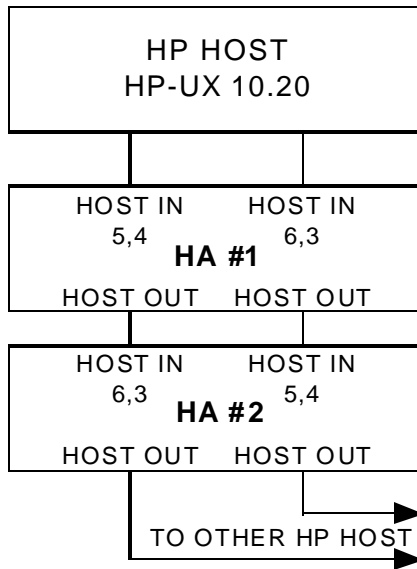


Figure 3

## INSTALLATION - DELIVERY

In the discussions with AFC it was made clear the Qualix HA+ for HP would not have a release prior to March 1, 1998 and would most likely be closer to April 1, 1998. This was accepted and it was decided that Andataco would deliver and configure the HP K640 and the 4HA's first with a latter delivery and implementation of Qualix HA+ upon it's release.

## **SCHEDULES**

### **PROGRAM DOCUMENT SUMMARY**

The following are a list of documents that will be produced for this program;

- AFC Program Plan
- AFC Pre-Installation Verification Test Plan
- AFC Pre-Installation Verification Test Report
- AFC Installation Plan

### **CONCLUSIONS**

Since that time it has become apparent HP K 460 delivery will not occur until May 1, 1998. This allows for a moth slippage in the Qualix HA+ HP version. Given this information I would suggest that we take a trip to Qualix in San Mateo and run through an installation of Qualix HA+ on the HP system as we do not have the resources in house to perform this.

## APPENDIX 1

### Alternate Path Commands

The commanding assumes only a single RAID 5 Logical unit has been created,

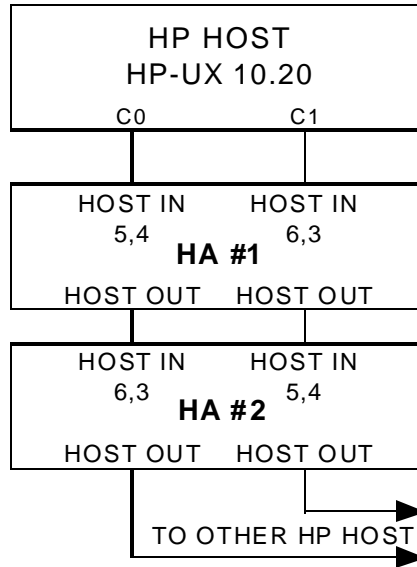


Figure 1

```
# mkdir /dev/vg01  
# mknod /dev/vg01 group c 64 0x010000  
# pvcreate -f /dev/rdisk/c0t5d0  
# vgcreate /dev/vg01 /dev/dsk/c0t5d0  
# vgextend /dev/vg01 /dev/dsk/c0t4d0
```

**APPENDIX 2**  
**Alternate Path Commands**

# **TEST PLAN**

## I OUTLINE

This document is comprised of the sections described below;

- Purpose
- System description
- Test setup configuration
- Test procedure
- Results
- Test equipment matrix

## II PURPOSE

The purpose of this test is to verify the ability of the proposed Advanced Fiber Communication High Availability cluster configuration. This test will show two HP K460 servers can be connected in a High Availability configuration for Informix data base utilizing both 10BaseT and FDDI connections.

## III SYSTEM DESCRIPTION

The Advanced Fiber Communication (AFC) configuration is shown in figure 1. This configuration is a standard Qualix HA+ configuration. The Primary system (previously existing HP K460) is an Informix data base server providing services to the factory floor and production. Upon failure of the primary system the secondary (a new HP K460) system will assume responsibility for the Informix services. This will include the fail-over of the primaries IP address with the mounting of the dual initiated drives with the Informix data. This operation when properly configured will provide for minimal down time for the Fail-over. It is expected this down time will be less that the HP pre-configured NFS timeout.

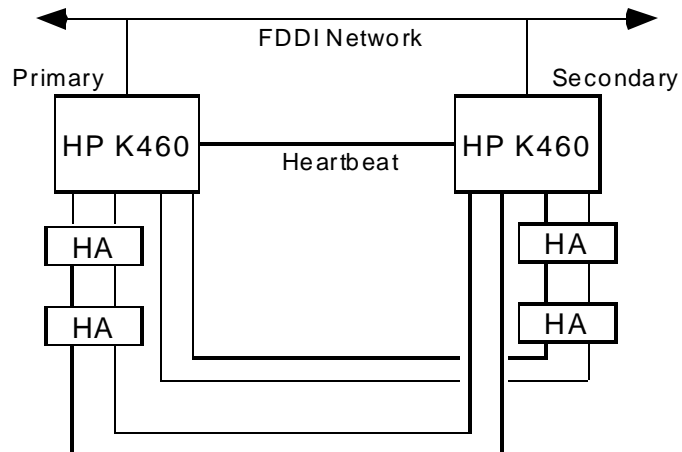


Figure 1  
System Layout

The system, will be rely on dual initiation of HA disks. In this dual initiation configuration Andataco will be connecting 4 HA's to both systems providing for the availability on both the Primary and Secondary hosts. The Qualix HA+ software provides for both host's (Primary and Secondary) to individually mount dual initiated file systems. Because of ability and HP's requirement of only one host having read/write Andataco will mount only the file systems on one host at a time. In the event of a Fail-Over, the file system will be un-mounted from the processes primary system and then mounted on the processes secondary system.

## IV TEST SETUP CONFIGURATION

### General Description

The test configuration shall be as described in Figure 1. This configuration is a representation of the true configuration utilized by AFC. This configuration is based upon a client/server data base functionality. The following sections describe each component of the test configuration

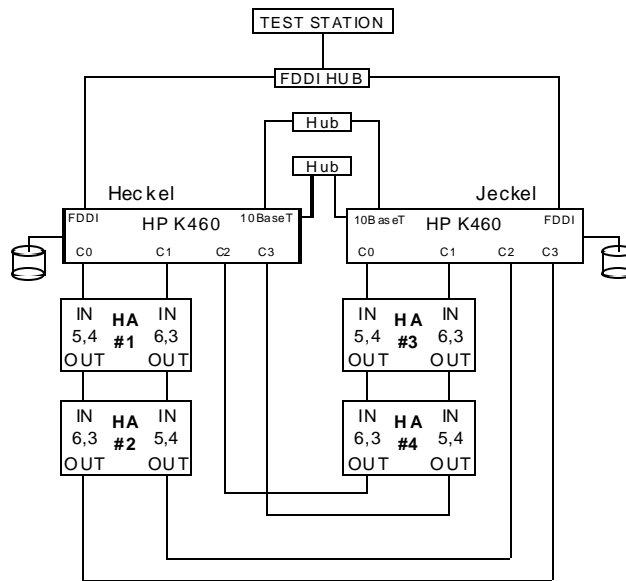


Figure 2  
HP Test Structure Layout

### HARDWARE CONFIGURATION

#### Servers

The two HP K460's shall be configured as described in table 3 and those network components found in table 4. The servers shall provide the backend data base server function. This data base server function shall be representative of that found at AFC. The servers shall also provide a host for NFS server functions also found at AFC.

#### Storage

The Storage shall consist of 4 Andataco HA's configured with 8 drives each (utilizing 1 in each as a global spare), 2 controllers each, and 128 MB cache.

#### Network Configuration

The network configuration shall be implemented in two pieces. Part one will be based on an FDDI ring representative of that found at AFC. The FDDI ring will connect both HP K460's with the NT test station via a FDDI hub or concentrator.

The second network interface shall provide a dual 10BaseT heartbeat interface to both HP K460's. This private network shall utilize separate and distinct IP addresses for each interface. The Private Heartbeat

network shall be in addition to the FDDI interface on each HP. The HP K460's will utilize the HP dual 10BaseT interface cards.

### Test Station

The test station shall be comprised of the equipment's specified in table 5. The prime function of the test station is to act as a client to the Informix data base hosted on the HP K460. This client will provide a user interface which is representative of that used at AFC. The test station shall have no other function.

## *INSTALLATION*

### Installation of K460 servers

The HP K460 servers shall be assembled in accordance with the HP K series assembly manual. The final assembly shall also be in accordance with this test plan and network configurations as well as Andataco internal assembly instructions.

### Installation of HP-UX

Installation of HP-UX 10.20 shall be implemented on each K460. The OS installation shall provide for NFS services as well as full network services.

### Installation of Storage/Data Placement

The 4 Andataco HA's shall be installed to the two HP K460 servers using SCSI Ultra Y-Cables. The HA's shall be set up in the standard Multi-LUN mode providing multiple LUN's to the HP host's. The data shall be placed on the 4 HA's in accordance with figure 3.

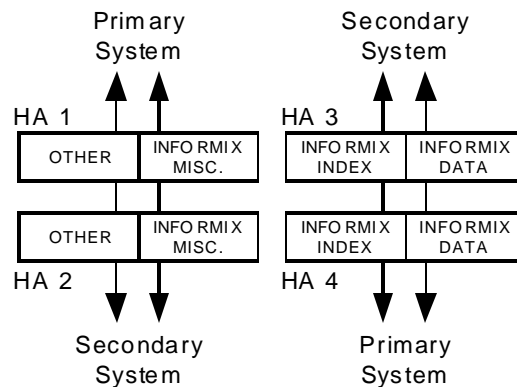


Figure 3  
HA Data Placement

### Installation of Informix

There shall be two instances of Informix 7.2 with one on the primary and the second being on the secondary. The data base information will not be co-located, but shall be placed on the primary system. The data base shall be populated with information in a manner that reflects data provided at AFC.

## Installation of Qualix HA

Qualix HA+ for HP-UX version 2.0 shall be utilized. If version 2.0 is not yet available the latest version of HA+ will be used. It shall be configured to provide for NIC-2-NIC fail over on each machine (for private network) as well as a FDDI-2-FDDI fail over for data paths.

Heckle shall be configured as the primary server for Informix with Jeckle being the backup server. NFS services shall be primary on Jeckle with Heckle being the backup server.

**Table 1**

<b>Machine Name</b>	<b>Primary service</b>	<b>Secondary Service</b>
Heckle	Informix	NFS Services
Jeckle	NFS Services	Informix

## Test Station

### **V TEST PROCEDURE**

#### 1. Introduction

2. The test set up will utilize two HP D Class servers known as Heckel (IP # TBD) and Jeckel (IP # TBD). They will share a network connection with a third HP D Class server who will act as a client for both Informix functions and NFS functions. The functions tested in this configuration will be NFS services (IP # TBD), Informix services (IP # TBD), LP services (IP # TBD), as well as NICtoNIC services.

#### 3. Setup

##### 3.1. Existing system backup

4. A backup of existing data will be performed on both Heckel and Jeckel to protect any pre-existing test data on both machines. This will be performed by the Qualix personnel prior to the initiation of the Andataco testing.

##### 4.1. Installation of FWD SCSI interfaces

5. Installation of the required FWD SCSI cards required for this test will be conducted by Qualix and Andataco personnel. There will be an addition of three cards per test server.

##### 5.1. Installation of clean version of HP-UX 10.2

6. Qualix personnel will re install both test machines with a "clean" operating system. No patches will be installed to insure we have a consistent test platform. This will be accomplished prior to test initiation.

##### **6.1.1. Installation of required patches**

7. Installation of all patches requires as directed by HP support and Andataco applications engineering. This will be conducted with Andataco test personnel.

### 7.1.1. Heartbeat Connectivity

8. The Heartbeat Connectivity will be accomplished via a crossover twisted pair supplied by Andataco. This will be done as a precautionary measure to reduce the possibility of a single point failure of a hub. This heartbeat will be connected via the secondary either connection found on the existing SCSI (FWD) HBA.

### 8.1.1. Configuration of NFS services

9. Qualix will have the NFS services configured prior to test initiation. The actual NFS files will be dummy files and be reconfigured to reflect the Andataco HA's latter in the test.

10. Single Initiator test

11. This test will establish the connectivity between a HP D Class server (Heckel) and the Andataco HA. It will insure the ability of the systems to continue with the primary test.

11.1. Review HA configurations

**11.1.1. A review of the Andataco HA's will be conducted to ensure no anomalies have occurred in shipping. This will be conducted as prescribed in the HA manual.**

11.2. Connect the Andataco HA systems

12. All HBA's on Heckel will be attached to the Andataco HA's ( 4 connections).

12.1. Reboot system, configure LVM, configure alternate path.

12.2. Establish file systems

12.3. Reconfigure NFS Services.

12.4. Test Failover

13. Dual Initiator test confirmation of HA code 10.0

13.1. Connect dual initiation of HA's

13.2. Boot Heckel

13.3. Boot Jeckel

13.4. Copy LVM files from Heckel to Jeckel

13.5. NFS Services

14. NFS services will remain on the original server (Heckel) and be shared around the test net to the specified client machine (TBD supplied by Qualix)

15. Installation of software

### 15.1. Informix Installation

16. This will be accomplished by the Qualix test engineer to support the Qualix functions. Informix 7.X will be utilized. Qualix will supply a sample data structure for this test. Informix will be installed on a dedicated LUN of dedicated Andataco HA. This LUN containing the Informix binaries will fail over as directed.

### 16.1. Bond Installation

17. Bond binaries will be placed on a dedicated Andataco HA LUN. This LUN as with the Informix binary will be available to both host's as a result of failover.

### 17.1. Install Qualix HA+ for HP-UX.

18. Qualix version 2.0 will be installed on both test machines. The Qualix Informix module will be also installed.

#### 18.1.1. Qualix Configuration

19. Default configurations will be used during this install except for the ones listed below.

##### 19.1.1.1. System Configuration

20. The basic system configuration will be set to include a NICtoNIC failover .

##### 20.1.1.1. LP Services

21. LP services will be configured on Heckel and assigned an IP #. A dedicated printer (HP) supplied by Qualix (a printer in the test lab) on existing network will support this test.

##### 21.1.1.1. NFS

22. NFS services will be configured under a specified IP #. The dedicated test station (TBD) will be provided by Qualix. This test station will act as a client for the NFS services. It will be another HP D Class server in the lab

##### 22.1.1.1. Informix Services

23. Informix services will be configured under a specified IP #.

24. Testing.

25. Basic testing will be performed by the failure of one server (Heckel) while all services are transferred to another.

### 25.1. Acceptance

26. Acceptance will be measured as described in the Qualix manual for HP-UX. The

**VI  
RESULTS**

Acceptance Verification Matrix

TBD

**VI  
EQUIPMENT MATRIX**

**Table 2 Software**

Description	Vendor	Version	Qty	Status
HP-UX	HP	10.02	2	A
Qualix HA+ For HP	Qualix	2.0	2	A
Informix Data Base	Informix	7.X	2	A

**Table 3 HP K460 Servers**

Nomenclature	Vendor	Part Number	Qty	Status
HP 460 K Class 9000 server 1 Processor	HP	A3284A	2	A
4 GB Internal Drive	HP	A3353A	2	A
128 MB Upgrade	HP	A3452A	2	A
HP-HSC SCSI 2 interface	HP	A2969A	8	A
I/O Channel Expansion slot for HP -HSC	HP	A2990A	2	A
CDROM	HP	A3416A	2	A
Monitor	HP	A4331A	2	A
Mouse & Keyboard	HP	A4030B	2	A

**Table 4 Network Hardware**

Description	Vendor	Version	Qty	Status
Network Hub (heartbeat)	COTS	10BaseT	2	A
Dual 10BaseT NIC for HP	HP		2	A
FDDI Cards for HP K class	COTS	FDDI	2	A
FIDDI "Hub/switch"	COTS	FDDI	1	A
Y-Cables for FWD SCSI	Andataco		4	I

**Table 5 Test Station**

Description	Vendor	Version	Qty	Status
Pentium CPU	Compaq	200MHz	1	A
FDDI Cards for PCI		FDDI	1	A

**Legend**

A - Must Acquire  
 I - In House  
 COTS – Commercial Off The Shelf