



CTI VT2100-KLA1007 Die Retest Software Notes for Engineering

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Introduction

The "Die Retest" software retests bincodes defined in the planfile by shifting the test head over by one die, in order to (re)test with another test site.

This document describes information about the new VT2100-KLA Die Retest code which is of use to a process engineer. It is mostly a collection of information from various requirements and status memos, gathered into this single document for easier reference.

Previous documentation describing the project, project management, and technical information can be found under the KXF series of memos. Simply look for any memo containing the words "Die Retest".

Retest Entries in the Plan File

Retesting is controlled via the planfile [test_switches] entries:

RE_TEST <bin> <turn_on_consec> <cum_confirm_turn_off>

Where:

<bin>	Is the bin number that kicks off a retest
<turn_on_consec>	Is the number of times that this bin has appeared on the same site consecutively. Once this limit is reached, re-test keeps reoccurring.
<cum_confirm_turn_off>	The number of times retesting (with a different tester site) confirms the failing bin has really failed. When this (retest and it really was a failing bin) limit is reached, retesting is turned off for the this bin for the rest of the wafer.

RE_TEST_LIMITS <no_of_retests> <min_percent_lowered>

Where:

<no_of_retests>	After this number of retests ...
<min_percent_lowered>	... we should have at least this (integer) percentage of die bincodes lowered (due to retesting). - if not, turn off ALL retesting for the rest of this wafer (since retesting is wasting test time)

Note that:

if	<no_of_retests> = 0	then	this limit check is disabled
if	<min_percent_lowered> = 0	then	we turn off retesting after <no_of_retests>

Example:Retest bin
definitions

```

//-----
// Prober setup control switches
//-----
[interface_switches]
RDPIO_PROBER_SITES 4
//
// DISABLE_SITE 1
// DISABLE_SITE 2
// DISABLE_SITE 3

XMIN                1
YMIN                1
XSIZE               44
YSIZE               31
XMUL                1
YMUL                1
XOFS_1              0
YOFS_1              0           // remove for Master_Slave operation
XOFS_2              1
YOFS_2              1
XOFS_3              2
YOFS_3              2
XOFS_4              3
YOFS_4              3

// RETEST_BINS          3,7,8,10,11,12,13
RE_TEST 3 1 1000
RE_TEST 7 1 1000
RE_TEST 8 1 1000
RE_TEST 10 1 1000
RE_TEST 11 1 1000
RE_TEST 12 1 1000
RE_TEST 13 1 1000
RE_TEST_LIMITS 100 5

```

Processing Retest Information

The new Die Retest software uses the lowest bin number for retested die; i.e.,

After moving to the new touch-down and retest, a new set of test results will be available. The results having the lower (non-zero) bin numbers will be used for each die.

An exception to this logic is:

NOT_OVER_TURNABLE_BINS

The plan file [test_switches] entry:

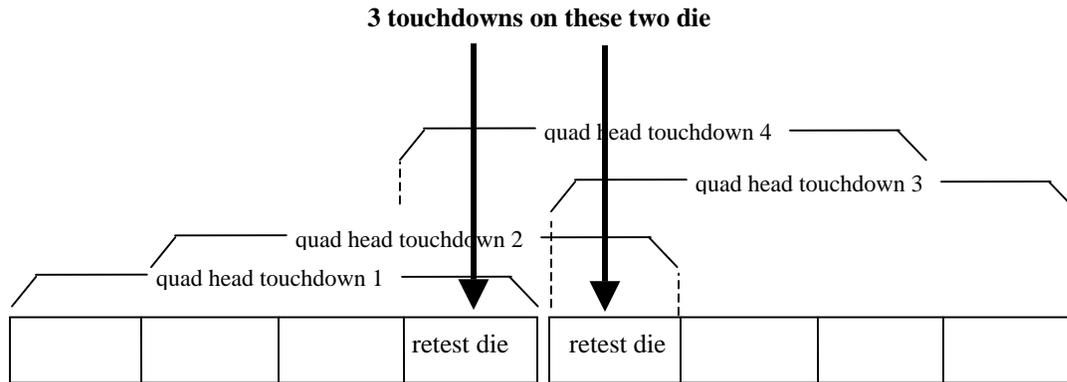
NOT_OVER_TURNABLE_BINS 5,6,7

means that anytime these bincodes are detected on a die they stay, and are not replaced with any other bincode (even another from this same list, if it comes along later as the result of a retest)

Three Touchdowns Maximum

Die retesting can touch down on a single die three times maximum under certain retest scenarios.

For example:



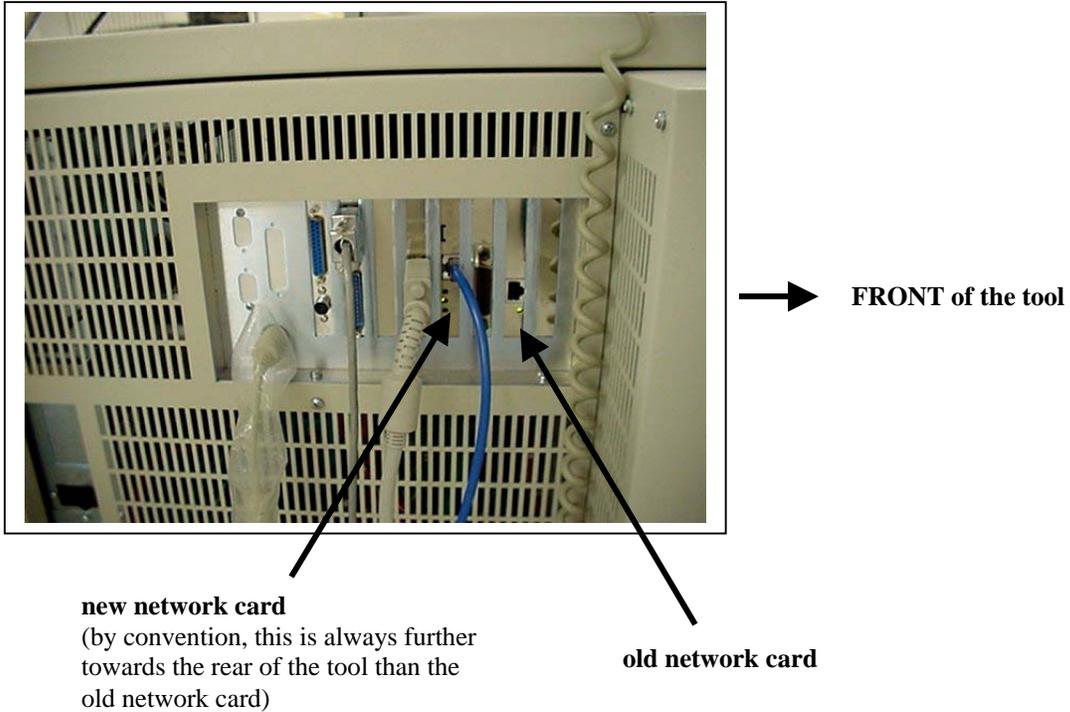
If the head is scanning from left to right and encounters the left "retest die", it will shift one die to the right (to put a different site over the die) for retesting.

When the head goes on to encounter the right "retest die", it will shift one die to the left for retesting -- hence the left "retest die" will experience (the maximum of) three touchdowns.

Changing between Old and New Software

Switching back and forth between old and new software consists of moving cables on:

1. Network Card Cable

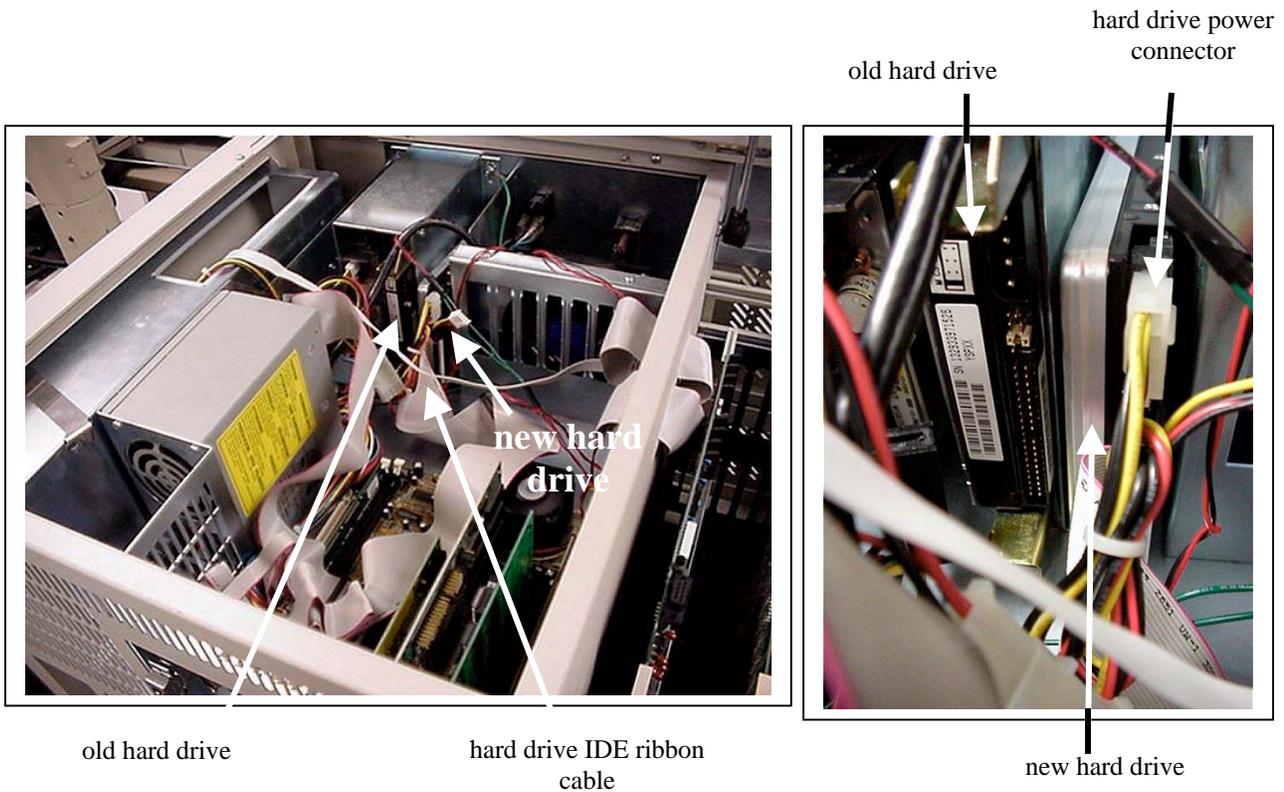


2. Hard Drive Cables

There is a second hard drive under the VT hood, which holds the "Die Retest" retrofitted software. It is next to the original (non-Die Retest) hard drive. Move the

- i) power connector (white, on top of the drive)
- ii) IDE cable: from the old to new drive.

Pictures below show the power and IDE cable connected to the new drive (which holds the "Die Retest" retrofitted software):



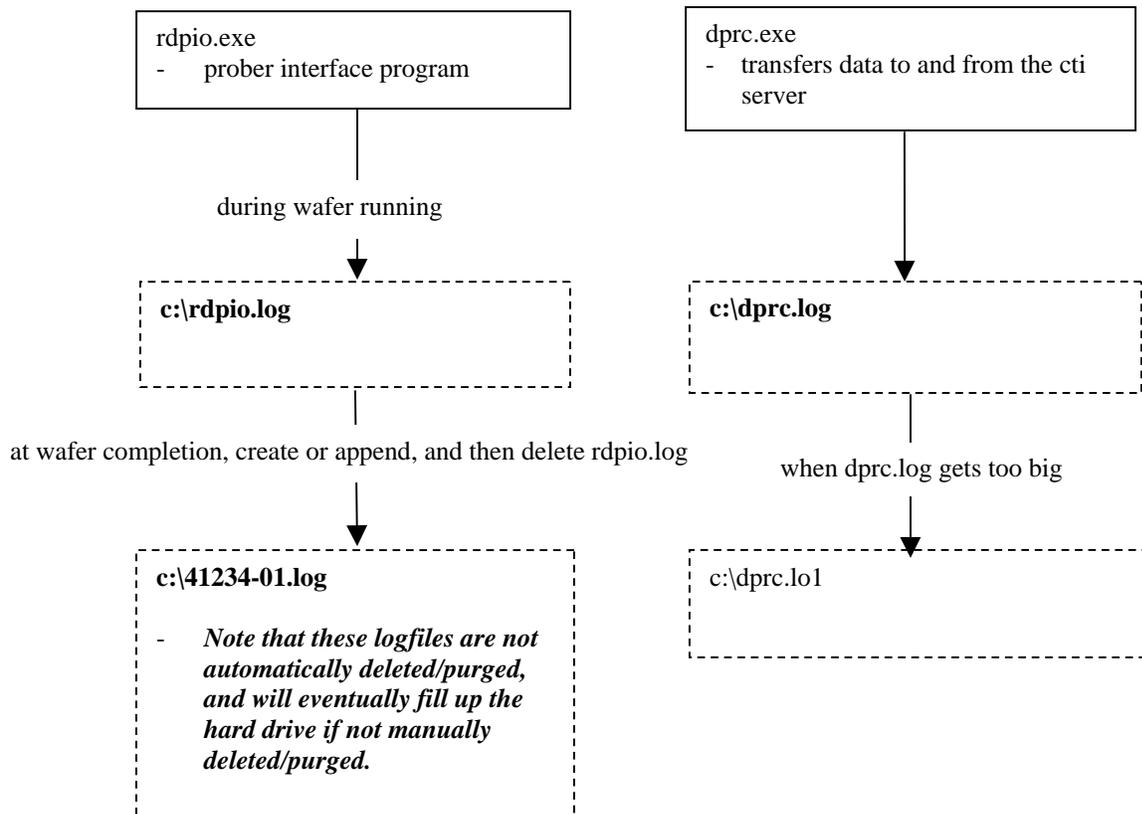
Getting and Analyzing Data

- When a wafer finishes on the VT tester, a logfile (containing the run information we are interested in) will be created. For wafer (e.g.) 251234-01, the logfile is called:
`c:\41234-01.log`
 - If a previous copy of `c:\41234-01.log` existed when wafer 2541234-01 finished (e.g.: a sort2 run), the log information is appended onto the end of the existing file; i.e.:

Log Files Holding Error and Warning Information

Two new logfiles have been created for Die Retest, corresponding to the two (dprc.exe data transfer, rdpio.exe prober interface) programs which were changed:

Data Flow:



Software Version Information Contained in the Logfile

Programs dprc.exe and rdpio.exe log their software versions to their respective (c:\dprc.log, c:\rdpio.log) logfiles every time they are started up; e.g.:

```
***** starting DPRC.EXE CTI Version 14Dec05 built Dec 14 2005
```

```
***** starting RDPIO.EXE CTI 14Dec05 release built Dec 14 2005
```

Logfile Information about Bin Zeros used if Retest Move Error

Retesting die consists of:

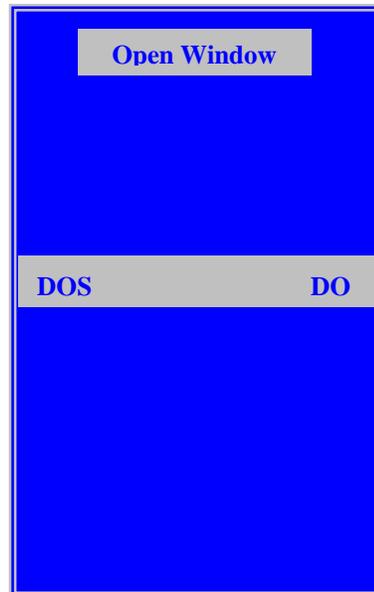
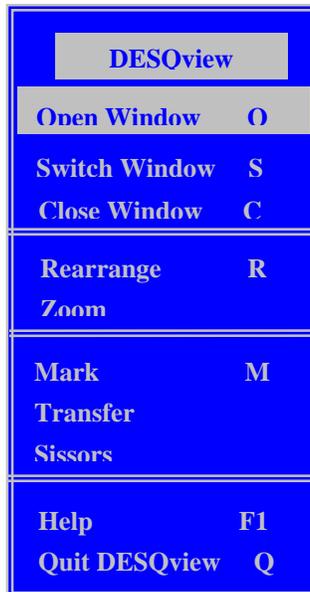
1. Shifting the test head
2. Touching down and getting another set of test results
3. Shifting the test head back to the original location
4. Telling the system what the bincodes are.

If an error occurs at step 3 above, then a **bincode of zero** will be issued/posted for all die in the original touchdown, and the software will then issue commands to proceed onward with testing.

- An accompanying message will appear in the logfile; e.g.:

```
WARNING at <15,6>, cannot move to pre-retest loc <14,5>, so zeroing test results
```

2. Getting the logfile(s) from the VT tester to your PC via ftp.
 - a) Create some directory on your PC to receive the log data, e.g. c:\VT15logs
 - b) Get the "ip address" of your PC by opening a Dos window and using the command "ipconfig".
 - c) When the VT is not running product:
 - i) Press the <alt> key,
 - ii) then select the "Open Window"
 - iii) then select the "Dos Window" option



- d) Within the Dos screen, issue the follow commands

```
c:\> cd \ncsaftp
c:\> ftp 157.95.4.178    use your PC's ip address here

National Center for Supercomputing Applications
      NCSA FTP 2.3.08 Nov '94
220 FTP Server ready
Username:      enter your PC's ftp server user name
331 Password required for .
Password:      enter your PC's ftp server password
230 User logged in.

ftp> cd \vt15logs    "cd" = change directory
250 CWD command successful
ftp> lcd \           "lcd" = local change directory
Local directory now C:\
ftp> mput *.log     "mput" = multiple file puts
mput rdpio.log (Yes/No/All/Quit) a

                        after all of the files have transferred:

ftp> quit

C:\> del *.log     to delete the logfiles

C:\> exit         to exit the Desqview Dos window
```

Note: You might have to get ahold of MIS to setup your ftp username and password on your PC

3. Analyzing the logfile

- a) To determine the total number of retests that were done on a wafer, "grep" the log file for the statement:

"Got RETEST results at"

The number of this times this message exists in the logfile corresponds to the total number of retests done on the wafer.

- b) To determine the number of bincodes which were lowered due to retesting, "grep" the log file for the statement:

"RETEST_CHANGE at"

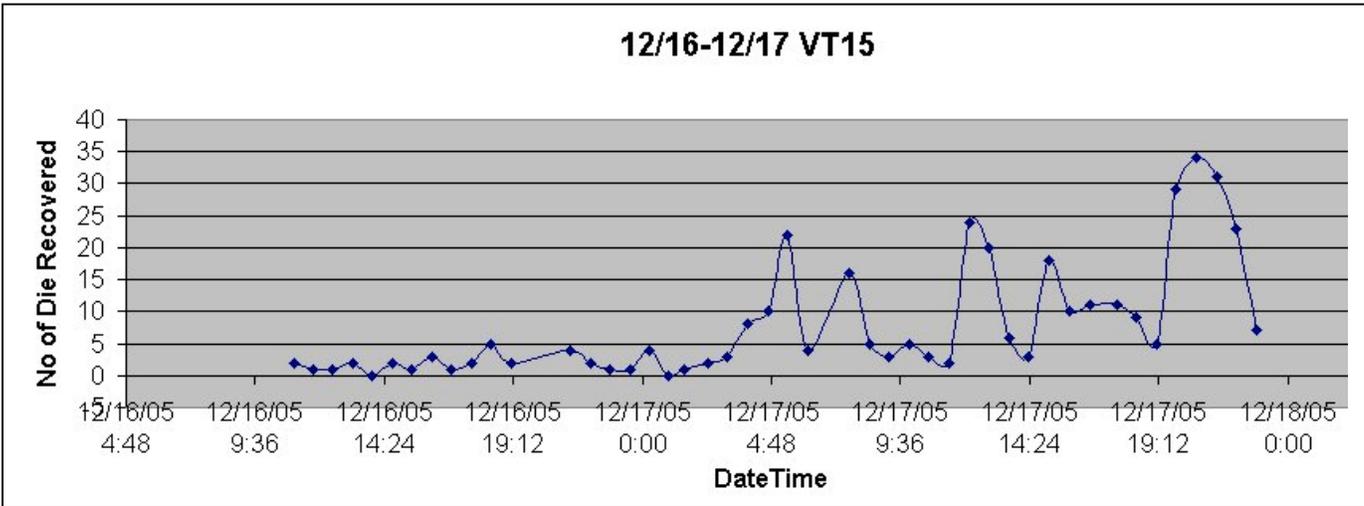
This will give every bincode lowered due to retesting, e.g.:

```

Fri Nov 18 12:43:59 RETEST_CHANGE at <34,8> site 2 data bin 8->1 for head move of <1,1>
Fri Nov 18 12:48:01 RETEST_CHANGE at <30,12> site 2 data bin 8->1 for head move of <-1,1>
Fri Nov 18 12:49:25 RETEST_CHANGE at <25,12> site 2 data bin 11->8 for head move of <-1,1>
Fri Nov 18 12:50:56 RETEST_CHANGE at <20,12> site 2 data bin 7->1 for head move of <-1,1>
Fri Nov 18 12:51:16 RETEST_CHANGE at <19,12> site 4 data bin 8->1 for head move of <1,1>
Fri Nov 18 12:53:17 RETEST_CHANGE at <12,12> site 2 data bin 7->1 for head move of <-1,1>
Fri Nov 18 12:56:46 RETEST_CHANGE at <3,16> site 1 data bin 10->1 for head move of <-1,-1>
    
```

e.g.: bincode 10 to 1 is represented by 10->1

- One can plot the "Number of Die Recovered" (which are the number of die turned into bin 1's) vs. "DateTime" in Excel to determine probe card performance for a series of wafers:



As presented in PCR4 (memo KXF-154 " CTI Die Retest 13Jan06 PCR4 and resulting ARs"), die recovered is only minimally related to either tester or device.

It is strongly related to probe card longevity, as demonstrated in the above graph.

Operator Instructions (Spec Updates)

The Die Retest updates to spec 001-02682 ("Fab2 Versatest V210X Operations Procedure") via ECN 417142 are summarized for convenience:

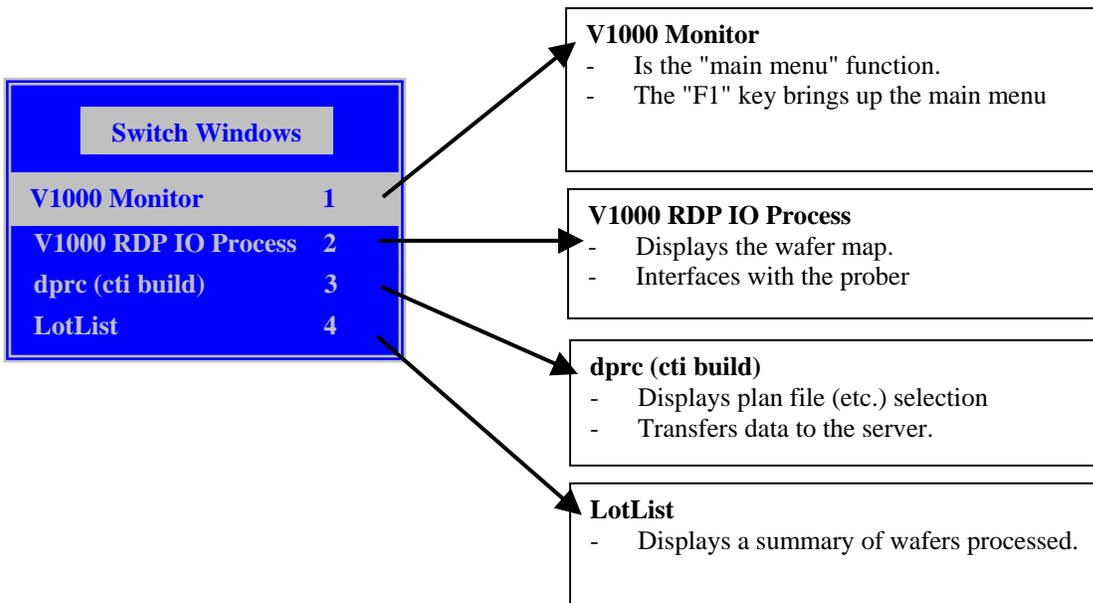
8.2.6 LOADING THE PROGRAM INTO THE VERSATEST:

Switching between sessions is done via the "Alt" key, which brings up the following popup:

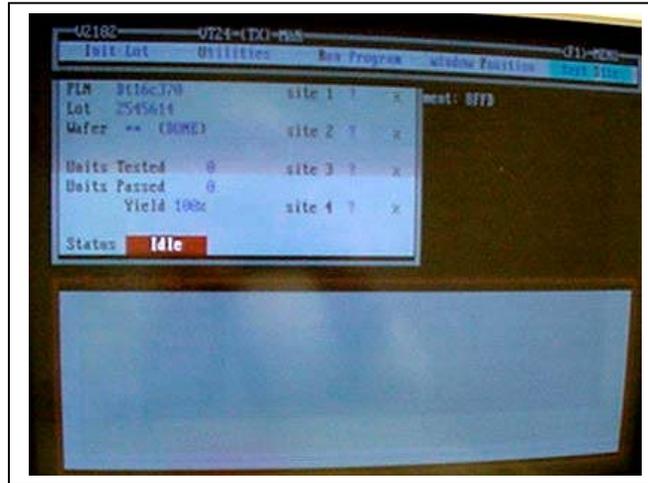


DESQview	
Open Window	O
Switch Window	S
Close Window	C
Rearrange	R
Zoom	
Mark	M
Transfer	
Scissors	
Help	F1
Quit DESQview	Q

Tab to "Switch Window S" (in inverse video above) and press the <enter> key. This brings up the next window, which permits you to move between the sessions:



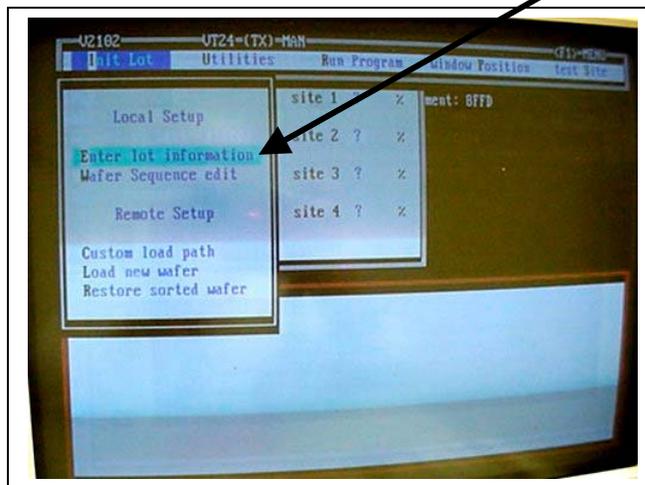
From the "V1000 Monitor" session, Press "F1" on the VT keyboard to bring up the "main menu" at the top of the screen:



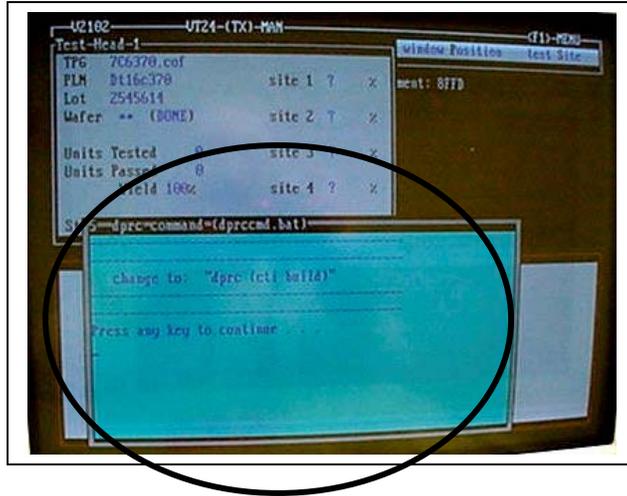
Main Menu (in "V1000 Monitor")



A submenu will appear. Select "ENTER LOT INFORMATION" and press "ENTER".



A popup will appear telling you to switch to the "dprc (cti build)" session. Press <enter> to get rid of this popup.

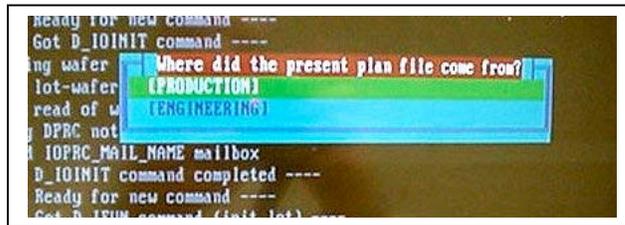


then press the <alt> key and change to the "dprc (cti build)" session.

DESQview	
Open Window	O
Switch Window	S
Close Window	C
Rearrange	R
Zoom	
Mark	M
Transfer	
Scissors	
Help	F1
Quit DESQview	Q

Switch Windows	
V1000 Monitor	1
V1000 RDP IO Process	2
dprc (cti build)	3
LotList	4

The first time (after rebooting or restarting the software) that this screen is called up, it will first ask you where the present plan file came from:



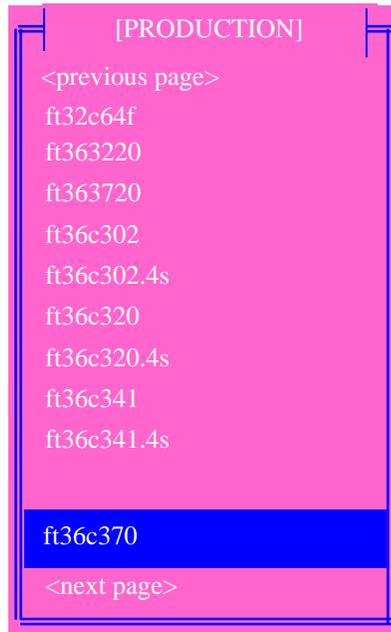
A new screen will appear on the VT monitor. Enter Option "1" (corresponding to "1) Test Plan") and press "ENTER".



A popup asking you which directory listing you want will appear, For production, use the up and down arrows to choose "Production" and then press the <Enter> key.



A listbox with the plan files will appear on the screen. Use the "<next page>" option to page through the entries, then arrow to the program that you entered in the program section of the Sort Versatest Traveler. This information can be obtained from 001-02963 (S23_F_A). When you have selected the correct program press "ENTER".



Selecting a plan file will clear all of the wafers. To enter a new set of wafer numbers to run, select option "E) Add Wafer" by typing in "E" and pressing <Enter>

ENTER OPTION ==> E

For each wafer two popups will appear. The first one asks for the wafer number

- Valid wafer numbers are 1 through 25 and 99
- The popup will be initialized with: the last wafer number entered + 1.

Wafer number:

The second popup asks for the type. We typically leave this blank and just press the <Enter> key

Wafer type:

Proceed as per the previous two examples, selecting option (numbers of letters), and filling in the appropriate information.

When finished, select the "G) >> Save << " option.

The VT monitor screen will display a listbox with two choices: "YES overlay old stuff" or "NO! keep what's there". Select "YES overlay old stuff" and press <Enter>.



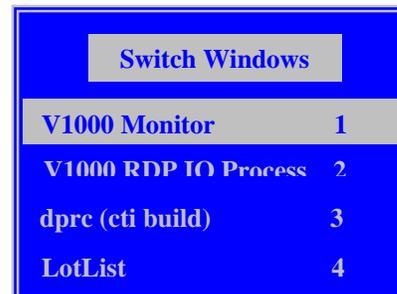
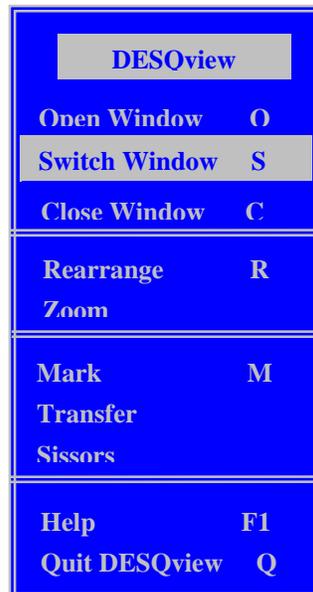
The system will fetch the appropriate files from the server, unpack and copy them, etc. When the bottom of the screen displays

"--- Ready for new command ----"

i.e.:

```
*** PLEASE WAIT *** (sending updates to VOS)
--- Ready for new command ---
--- Got D_NEW_LOT command ---
--- Ready for new command ---
```

Use the <alt> key to go back to the "V1000 Monitor" session



In the Monitor session, there will be a "Test Site" box at the bottom. This box (shown as "Test Site 01" below) will display information being loaded into the test board hardware. When this box display right pointing chevrons (i.e.: ">>"), the tester is ready to run.

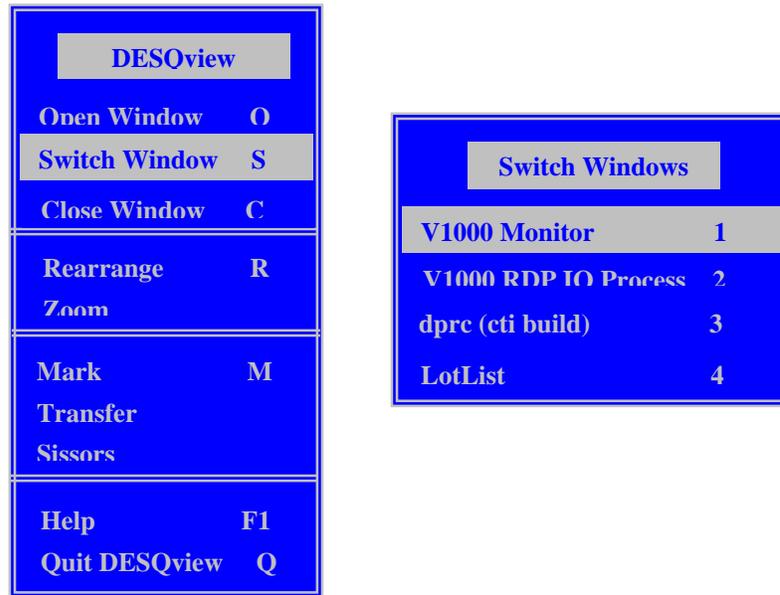


On this same screen, verify that the plan file (i.e. "PLN" in the "Test Head 1" box above) is correct for the device being run.

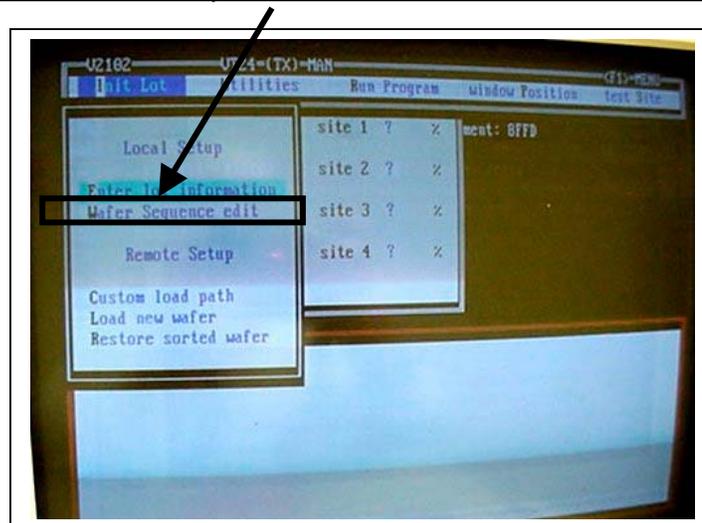
8.4 Production

8.4.1 EDITING WAFER SEQUENCE

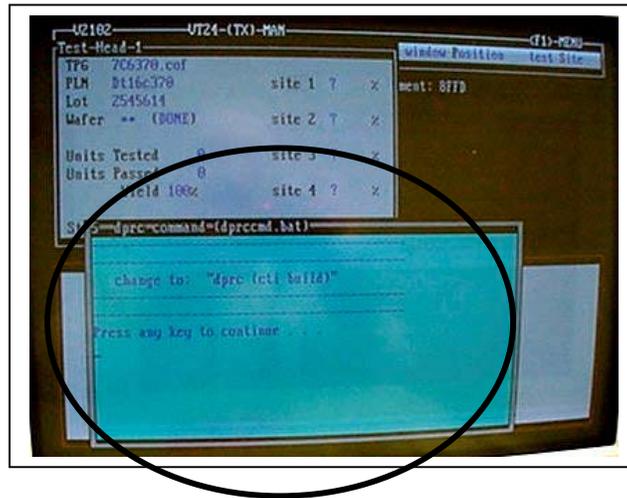
If necessary (or if in doubt as to which "Window" you're in), switch to the "V1000 Monitor" screen by pressing the <alt> key, then using the "Switch Windows" option.



Once in the "V1000 Monitor" session, press <F1> to bring up the main menu bar at the top of the screen (if necessary) and select "INIT LOT".



A popup will appear telling you to switch to the "dprc (cti build)" session. Press <enter> to get rid of this popup,



then press the <alt> key and change to the "dprc (cti build)" window.

DESQview	
Open Window	O
Switch Window	S
Close Window	C
Rearrange	R
Zoom	
Mark	M
Transfer	
Sissors	
Help	F1
Quit DESQview	Q

Switch Windows	
V1000 Monitor	1
V1000 RDP IO Process	2
dprc (cti build)	3
LotList	4

This should bring up a window similar to the following:

INITIALIZE TEST STATION SETUP	Wafer Sequence
Test Plan Ft36C370	[01] *
2) Lot Number 2541234	
3) Lot Split	
4) Operator ID kxf	
5) Load Board 10/36,12,14	
6) Probe Card xx	
7) Sort Type Wafer (prober XY)	
8) Datalog Capture test output	
File type make Local file copy	
A) Device Type 7C6370-QUAD-Sort1	
B) Test Pgm P:\VTONLINE\LOADDIR\7C6370.cof	
C) Option File -- NONE SPECIFIED --	
D) Prober File -- NONE SPECIFIED --	
E) Add Wafer H) Insert Wafer K) Next Wafer	
F) Remove Last Wfr I) Delete Wafer L) Prev Wafer	
G) >>SAVE<< J) Erase Sequence M) >>ABORT<<	
ENTER OPTION ==>	Wafer: 01 Type:

In the upper right hand corner of the Test Station Setup window will be another window titled "Wafer Sequence".

At the bottom of the "Test Station Setup" screen are the commands used to add wafer numbers to the system. Although this section will cover how to use the "E) Add Wafer" command, the "H) Insert Wafer", "I) Delete Wafer" and "F) Remove Last Wfr" commands work the same way.

If wafers are listed in the "Wafer Sequence" box and they are not correct, select "J) Erase Sequence" and press <Enter>".

To enter wafer numbers, select "E) Add Wafer" by entering the letter "E". The input should appear after the "ENTER OPTION ==>" field. Press <Enter>. Verify lot number is correct and wafers are in numerical order.

A new window will open. Type in the first wafer number and press <Enter>.

Wafer number:	2
---------------	---

A second window will open. We do not usually enter a "Wafer Type", so just press <Enter> to close the window and proceed.

Wafer type:	
-------------	--

Continue to use the “ADD WAFER” command to until the wafer numbers for every wafer to be tested has been entered.

When all wafer numbers have been entered, select “G) >>SAVE<<” by entering the letter "G" and press <Enter>.

8.4.3 PROCESSING THE LOT

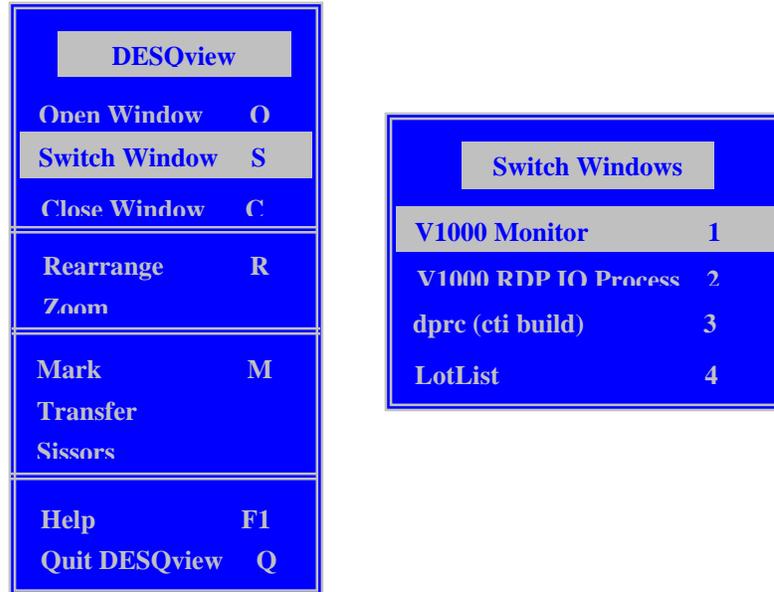
Refer to OPL 001-02698 (S03_3) FAB2 How to remove wafer from KLA prober for inspection.

Load the cassette of wafers to be tested into the KLA prober and press the “START” button.

The prober will prealign, load and test the wafer automatically.

If the wafer does not start testing automatically, do the following:

If necessary, switch to the "V1000 Monitor" screen by pressing the <alt> key, then using the "Switch Windows" option.



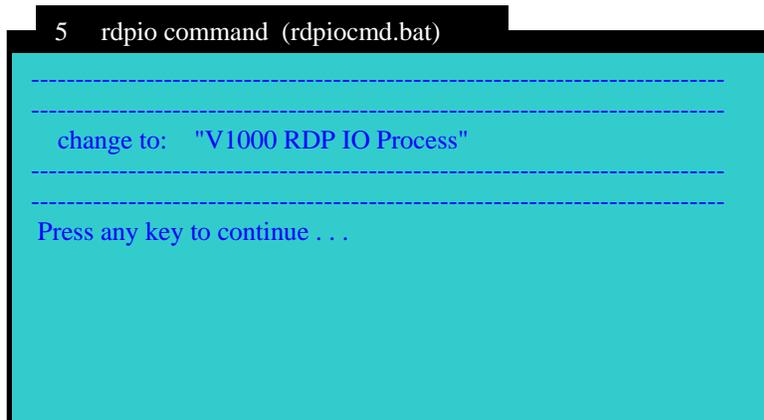
Once in the "V1000 Monitor" session, press <F1> to bring up the main menu bar at the top of the screen (if necessary) and arrow to “Utilities” and press <Enter>.



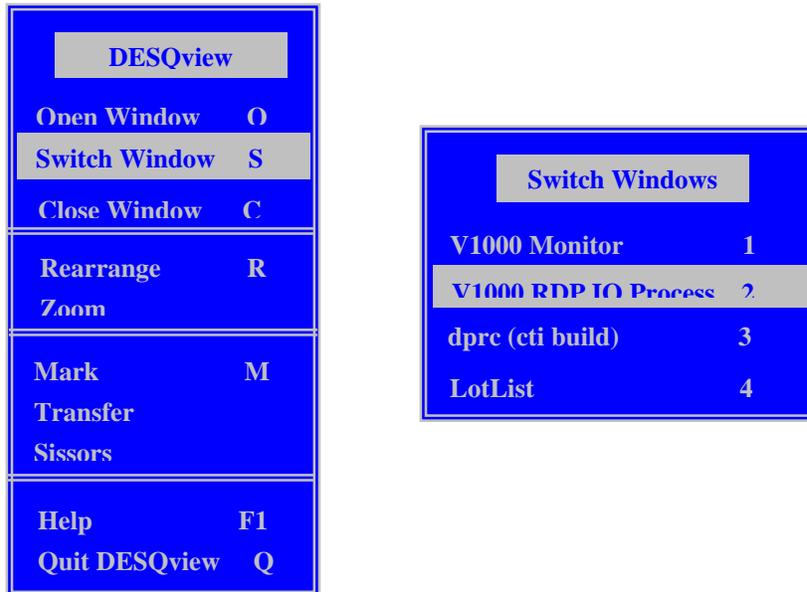
Arrow to "seNd IO Command and press <Enter>.



A popup will show you which session to go to (via the <alt> key, then the "Switch Window" option). Press <Enter> to clear this popup:



As per the previous popup's instructions, use the <alt> key and switch to the "V1000 RDP IO Process"

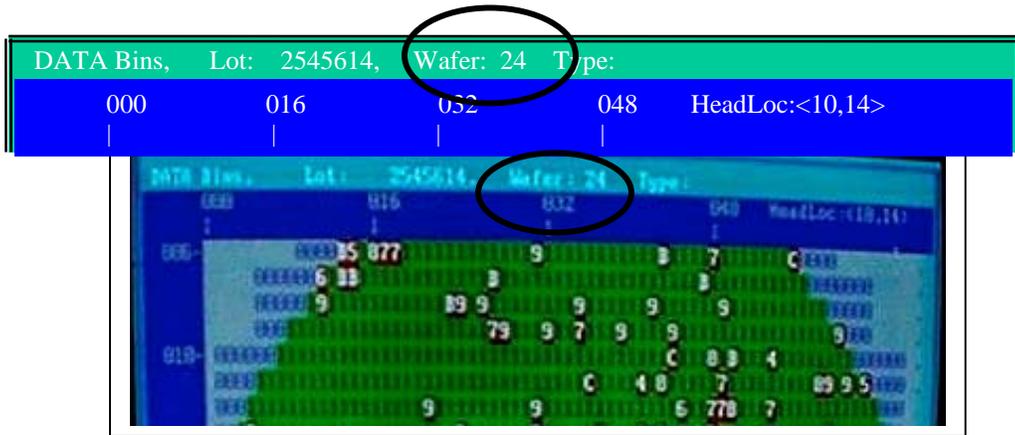


Arrow to "Begin Wafer Probing" and press <Enter>.



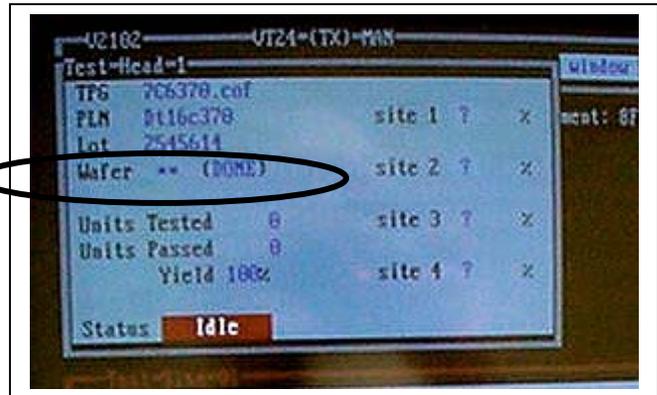
As the lot is testing, every 5th wafer must receive and pass a microscope inspection before the next 5 wafers can be tested. The purpose of the inspection is to insure that the setup is still good and that no drifting, mis-stepping, or probe damage has occurred.

The wafer number that the tool is on is shown at the top of the wafer map screen (see section 8.4.3 "Processing the Lot" for displaying this screen).



The wafer number shown on the "V1000 Monitor" screen is NOT valid:

- Since the new Die Retest software cannot write to this area of the screen, the "Wafer" number displayed here is **NOT Valid**.
- Use the Wafer number at the top of the wafer map display instead



To remove a wafer for inspection, follow instructions in OPL 001-02633 (S03_5).

DO NOT remove the cassette while the lot is in process.

If the 5th wafer fails inspection, inspect all wafers back to the last know good wafer, determine the cause of the failure and take the appropriate action (make adjustments to the setup, pull the probe card and restart the setup, put the VT down to maintenance, etc;)

NOTE: Any time adjustments are made to the set-up, set the KLA to unload after the wafer and do not continue probing until the wafer has been inspected and the set-up has been verified.

NOTE: All wafers that fail inspection must be noted on the Sort Versatest Traveler. Contact LPO/Supervisor for assistance with completing 001-02669 (S01_O_A) FAB2 Probe Damage OCAP.

If the 5th wafer passes inspection, the next 5 wafers may be processed.

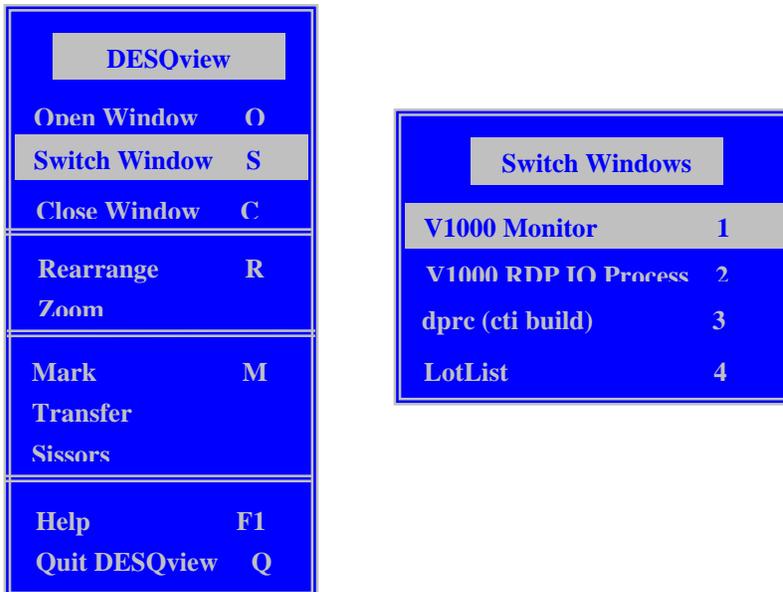
Continue this procedure – processing 5 wafers and inspecting every 5th – until all wafers in the lot have been processed.

NOTE: EVERY 5TH WAFER IN THE LOT MUST PASS THE MICROSCOPE INSPECTION, PER THE CRITERIA IN SPEC 001-03021 (S01), BEFORE THE NEXT 5 WAFERS CAN BE PROCESSED.

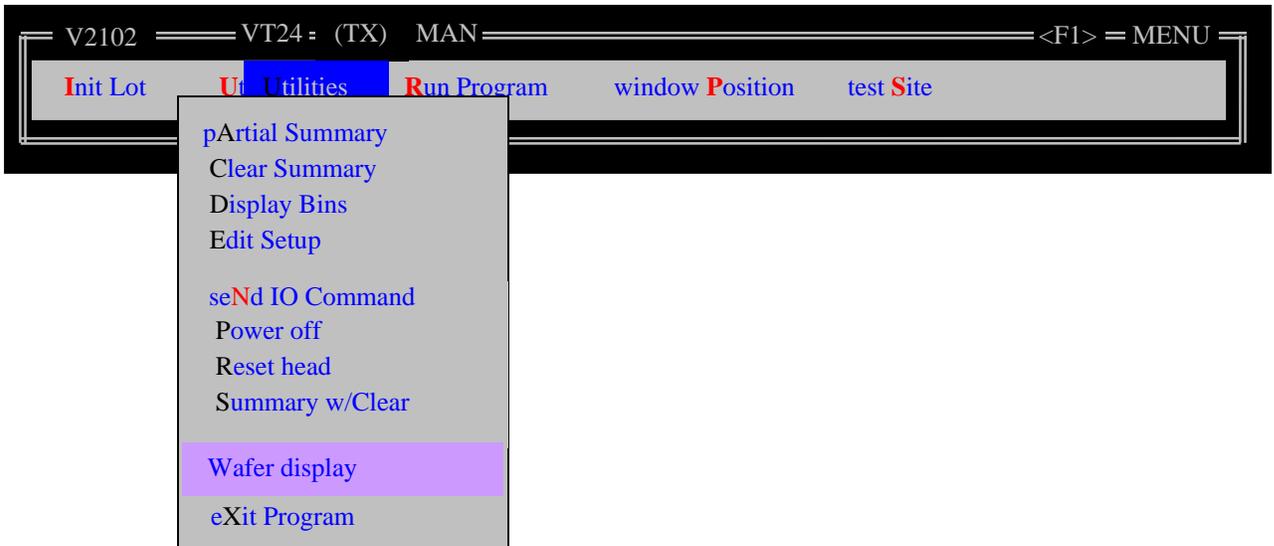
During processing, wafer data will be displayed on the VT monitor in the form of a line summary. The line summary will automatically appear when a wafer is processed and unloaded. If the line summary does not appear on the monitor, press the “ALT” and 4 on the VT keyboard.

Wafer maps should be viewed during processing. The wafer map provides a real-time display of bins for the current wafer being processed. The wafer map will alert the operator to any site to site issues before the wafer is finished testing. To view the wafer maps, do the following:

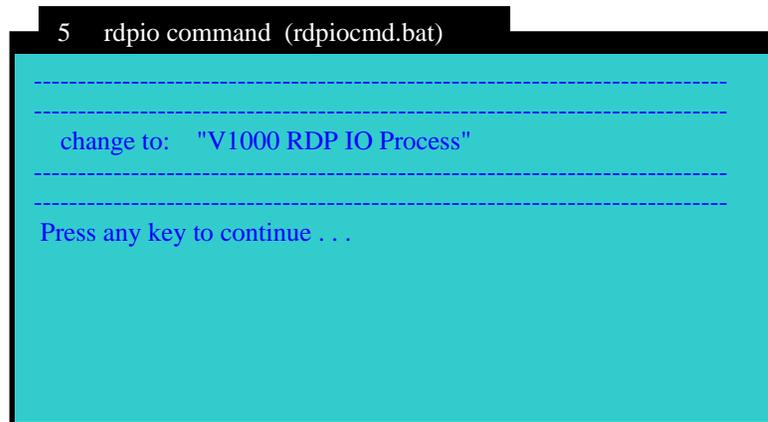
If necessary, switch to the "V1000 Monitor" screen by pressing the <alt> key, then using the "Switch Windows" option.



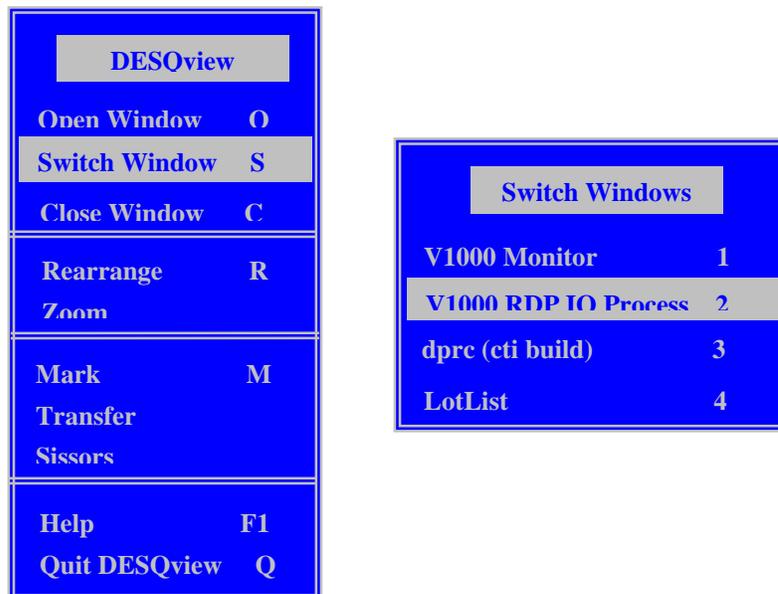
Once in the "V1000 Monitor" session, press <F1> to bring up the main menu bar at the top of the screen (if necessary) and arrow to “Utilities” and press <Enter>. The arrow down and select "Wafer display" and press <Enter>.



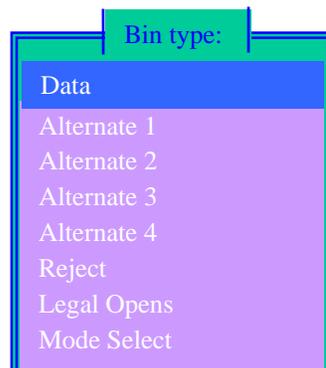
A popup will show you which session to go to (via the <alt> key, then the "Switch Window" option). Press <Enter> to clear this popup:



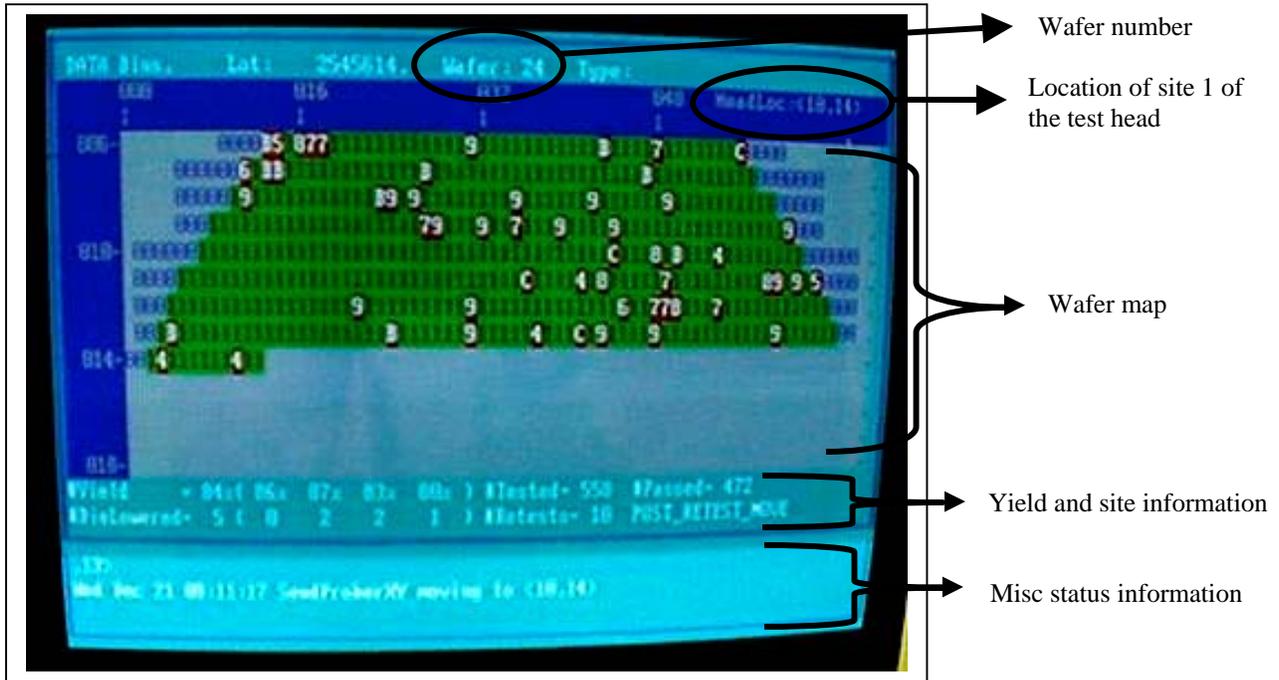
As per the previous popup's instructions, use the <alt> key and switch to the "V1000 RDP IO Process"



Arrow to "DATA" and press "ENTER".



A real-time wafer map will be displayed on the screen with bin information for the wafer being tested. Pressing <F3> will display the map in a more compressed (and easier to read) form, e.g.:



Wafermap Screen Yield and Site Information

