RI CASSINI
Operator
Training

Introduction

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Welcome to the Roos Instruments Inc.

CASSINI

RF ATE System Basic Operator Training

The objective of this seminar is to provide you, the operator of this system, the information you need to operate the Automated Test Equipment (ATE) in a production environment and handle daily administrative, maintenance, and troubleshooting tasks. This training only covers select lessons included in the Basic Training Seminar.

Basic Operator Training Outline

The major topics of this training seminar, with hands-on lab time.

1. RI 7100A & Cassini ATE Systems, Operation and Troubleshooting

Introduction to RI ATE system's design philosophy, typical hardware and software. Topics about the ATE system operating in a production environment, interfacing to handlers, and routine troubleshooting are covered.

Operations - Overview

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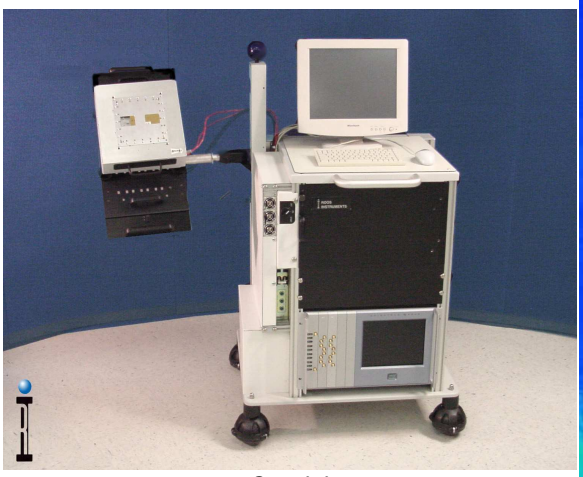
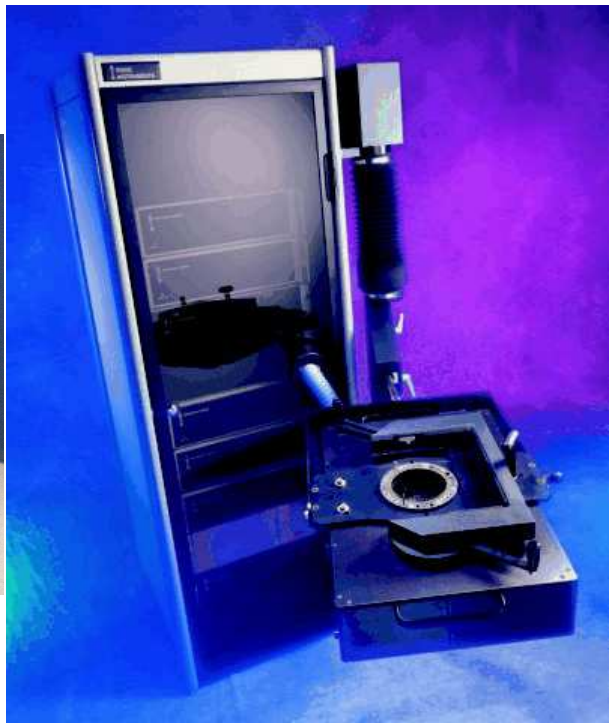
RI ATE System Basic Architecture



Cassini



RI7100A

Both Cassini and the RI7100A systems are based on a single channel receiver design . The system uses simple test and measurement hardware to perform all measurements and relies on its object-oriented system software to control the measurement process, analyze the data, and provide a graphical user interface .

The measurement process is simple and direct, signals to and from the device-under-test (DUT) are provided through several types of connection schemes:

- Independent On Wafer Coplanar Probes
- On Wafer Probe Cards or Membrane Probes
- A Device Contactor Assembly (socket) & DUT Interface board

These contact devices can be connected to the universal RF Test Head of the RI7100A through a hard dock Fixture or soft docked with individual cables .

The System Hardware

Cassini RF ATE System has 3 major components:

- Infrastructure
  - System Rack (Large or Small)
  - System Power Supply
  - System Controller with RIFL II
  - RF Test Head, Fixture and DUT Interface
- Rack Modules
  - System Receiver
  - RF Sources
- Test Instrument Modules (TIMs)
  - Testset
  - DC and RF Instruments

RI 7100A RF ATE System consists of 12 major components:

- System Rack
- System Power Supply
- Synthesized Microwave Sources
- RF System Matrix
- RF Test Fixture and DUT Interface
- Test Fixture Docking system
- Programmable DUT Controller
- RF Test Head
- System Receiver
- System Controller with RI Fiber Link (RIFL II)
- RI System Software Package

An overview of each of the ATE system's major components will be covered in later chapters with more detail. It is good to understand how the system is designed to get maximum efficiency when using the ATE system in production.

Operating the System

- **System power up sequence**
  - **Emergency Off**
- **Using Fixture and DUT Board**
- **Docking with a Handler**
- **Using the System Controller (RIFL, OS2)**
- **Start and Stop RI System software**
- **Using OS/2 and the RI System Software**

The following lessons describe how to use RI ATE systems and are designed to help you become familiar with the RI platform. After learning how to operate the system, the various instruments and hardware components are identified.

Operations - Starting and Stopping the System

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Check that all power cables are properly connected

Switch the MAIN POWER to ON to power the rack

-or-

Older systems require turning on the UPS to power the rack

Turn on the system controller and monitor(s)

Wait 20 minutes for the temperature to stabilize

Fixture should NOT be connected to the Test Head

When first installing a RI Test System, make sure all the instruments in the rack are connected to the internal 48 Volt distribution block or the AC Power Conditioning Unit (PCU) or Uninterruptible Power Supply (UPS). Check that any external safety devices, such as circuit breakers or emergency off switches, are set to the "On" or "Operate" mode and that the main AC power supply cable(s) is plugged into the correct type of outlet. The system is configured at the factory for either 230 volt international standard AC power or US domestic 115 volt AC power. The system controller should always be turned on after or simultaneously with the main system rack, never before.

The Microwave Sources and RFIC Test Head all contain heater ovens to maintain stable elevated temperatures within their critical components. The temperature will take a minimum of 20 minutes to stabilize within the units and we recommend a minimum of TWO HOURS warm up time before attempting a calibration or any precision measurements. Even if the power is shut off for only a very short amount of time, the ovens will corrupt any measurements while they go through a startup phase by increases the temperature to accelerate the warm-up process.

ATTENTION! The 20 minute warm up time is required before running test plans, a minimum 2 hours before any calibration.

The Fixture should not be connected when turning the system on for the first time. It could be possible to damage the Fixture because the System Controller has not yet reset the states of the Testhead. The Fixture can be freely swapped while the system is idle or off, but a fixture should not be connected during startup.

Switching the RI System On and Off

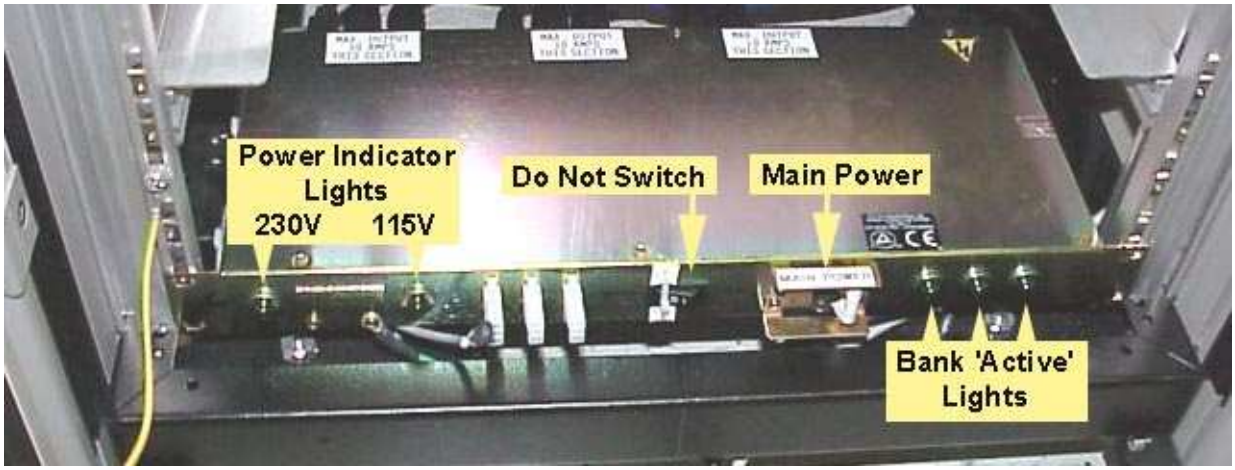
To turn the system on, first move the switch labeled "MAIN POWER" to the "ON" position on the front of the system.

After turning on the PCU, Cassini systems will automatically start the system controller and power on the monitor.

To turn the system off, follow the RI System Software shut down procedure (described later), move the switch on the front panel to the 'OFF' position, then turn Off the PCU from the back of the system and remove the Fixture from the Test Head.

WARNING! Fixture should NOT be attached to the Test Head while powering on the system.

Power Conditioning Unit (PCU)



The Power Conditioning Unit (PCU) is standard equipment for all Cassini ATE systems. The power indicator light will illuminate when connected to the AC power mains. The 'Active' lights will glow green when power is being supplied to the system. Do not toggle the local/remote switch that is "locked down" to prevent tampering.

Operations - Using the RF Fixture & DUT Board

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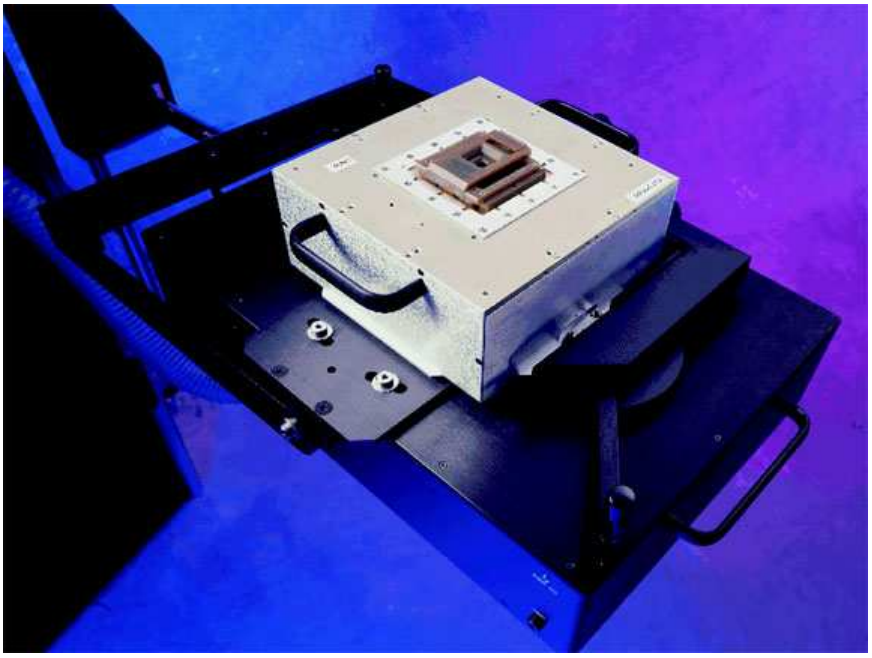
Typical "Packaged Part" Test Fixture

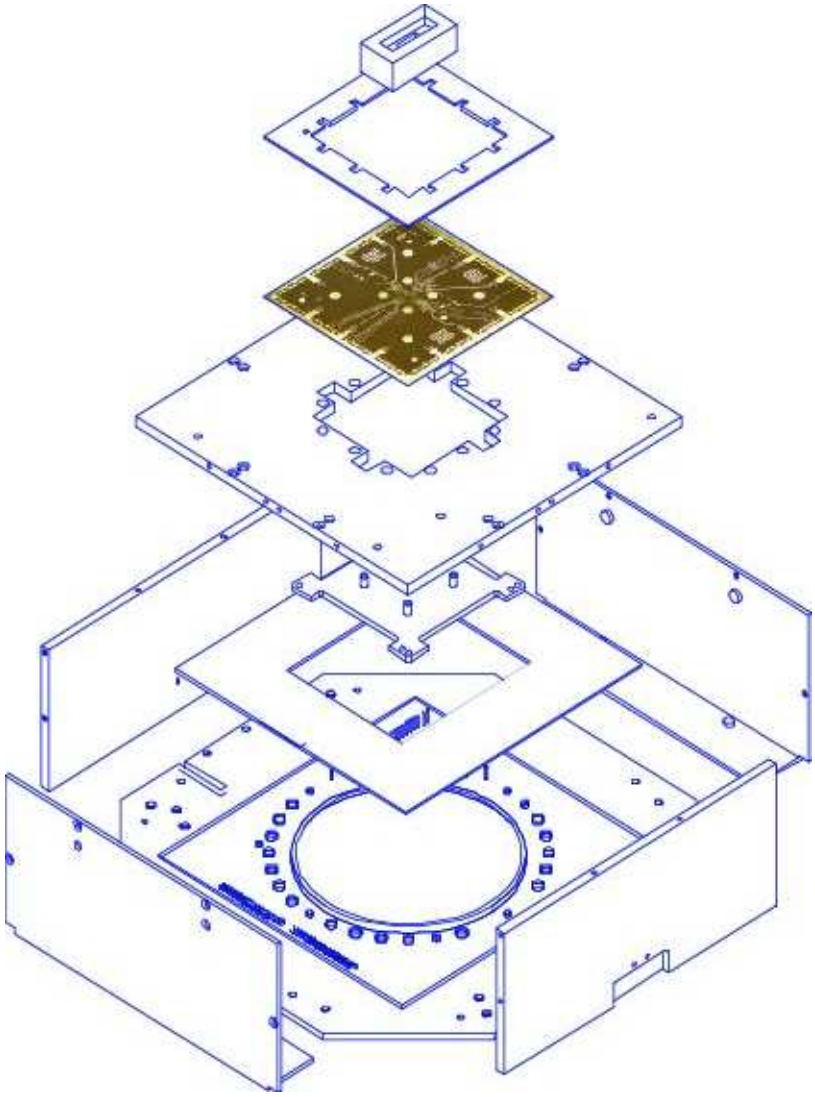


The RI 7100A and Cassini ATE Systems use an aluminum Test Fixture to interface the universal RI Test Head Pogo Ring to the Device Under Test (DUT) . The Fixture is designed to provide shielding as well as a convenient place to mount components and protect the custom RF and DC wiring for the DUT . In a production environment, the Fixture excels at providing a robust, quickly changed, repeatable method of customizing the ATE system for different DUTs while minimizing cost and maximizing system activity.

To connect a Fixture to the RI7100A Test Head, place the Fixture on the Test Head and pull the handles clockwise to tighten . To remove the fixture, open the handles (counter clockwise) and lift the Fixture off the Test Head .

To mount a Fixture to Cassini's Test Head, align the fixture with the mounting holes and push the Test Head handles inwards to secure the Fixture . The Fixture is properly connected when the green "Release Fixture" button illuminates . To remove the fixture, push the green "Release Fixture" button at the base of the Test Head Manipulator, pull the Test Head handles outward and lift the Fixture off the test head . The "Release Fixture" button will blink when it is pressed for more than 6 seconds to prevent solenoid wear.

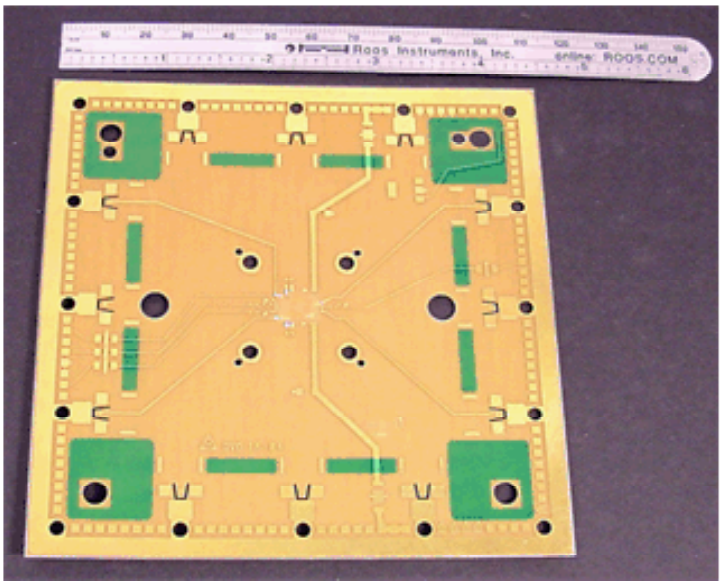
RF Test Fixture and DUT Interface Exploded View



The Test Fixture consists of a stiff precision bottom plate and pogo ring board that mates with RI's universal Test Head Pogo Ring. The Test Fixture clamping mechanism is designed with spring reliefs to guard against accidentally over torquing the interface. RF and DC cabling is user configurable and software programmable to form a unique custom designed hard dock solution from easily attainable RI Kits, or "RIK" parts. The DUT Interface Board (DIB) and backing plate stiffener are custom designed for each device. All the needed parts are all available from stock that can be ordered via our website: www.roos.com. RI also provides DUT board and Fixture design that is licensed for customers own use.

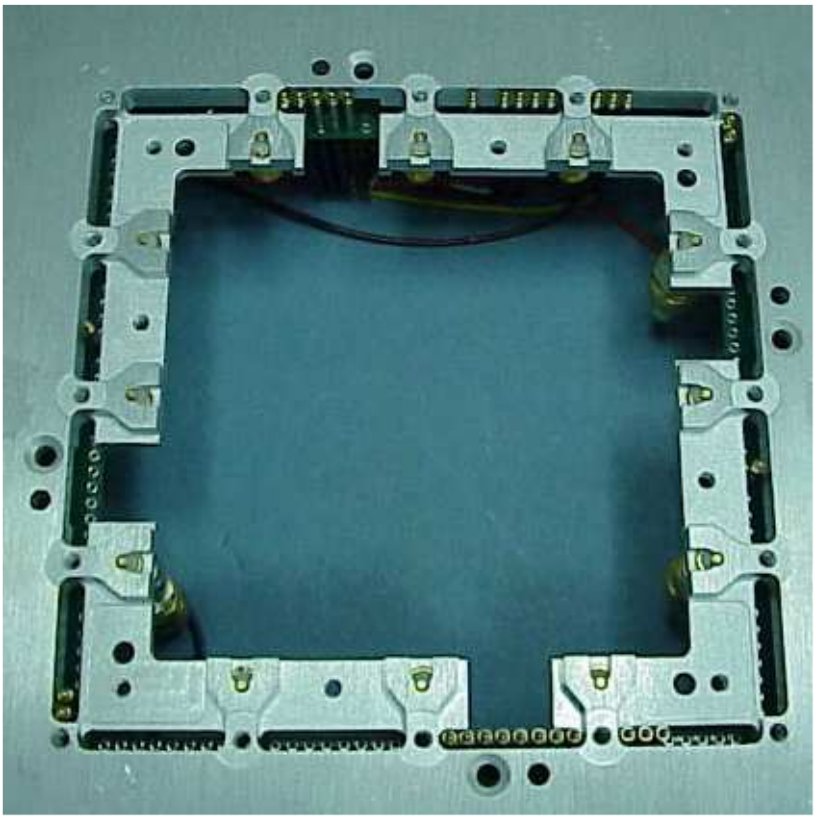
We will cover Test Fixture in greater detail later in the seminar.

RF DUT Interface Board



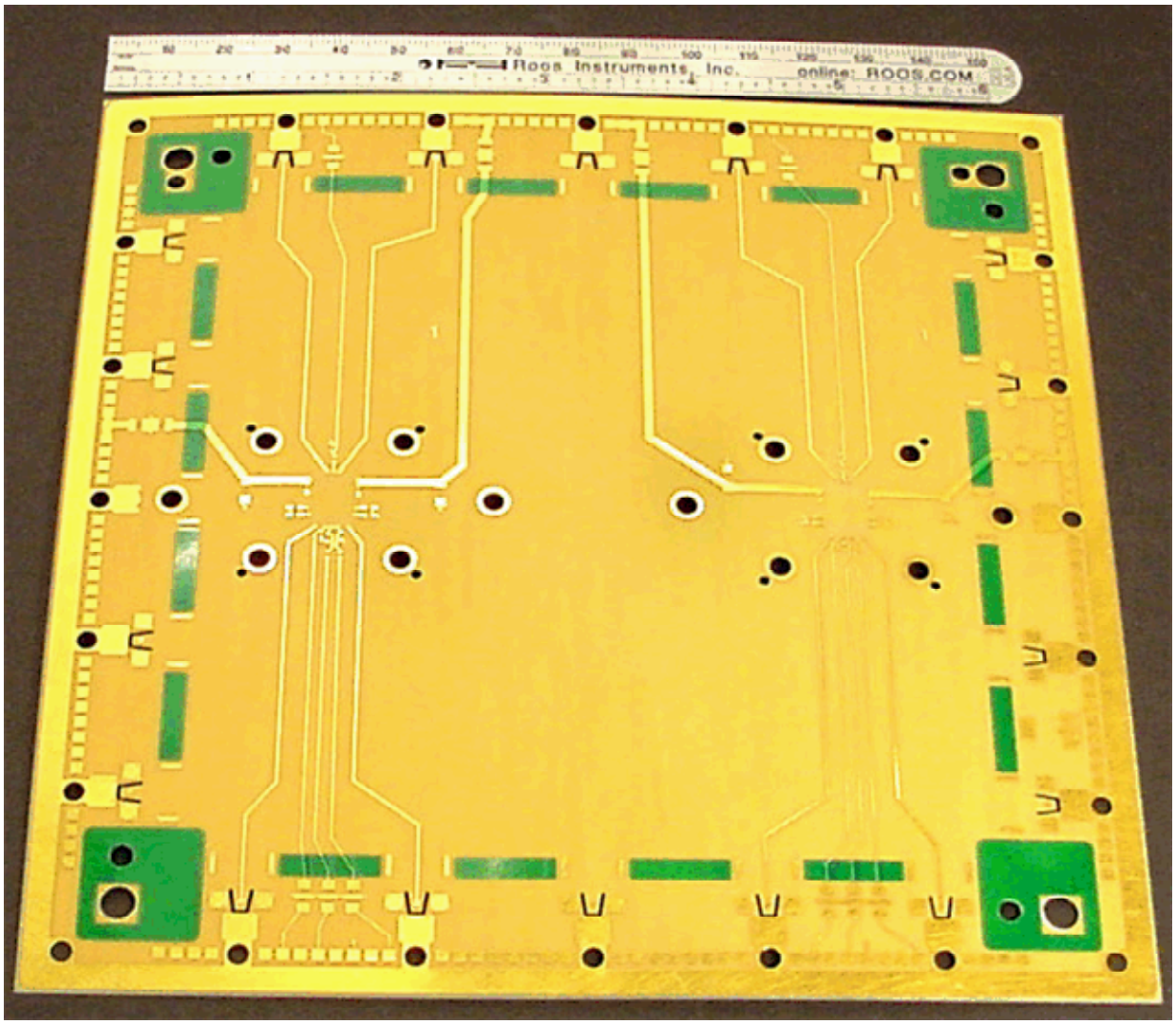
A thin DUT Interface Board, typically 8 mm and only two layers, is used to minimize RF parasitic interference. The picture shows the traces on the bottom side of a typical RF DUT Interface Board for a transceiver chip designed for the 12 RF Top Plate (RIK0012A). The DUT and socket are located on the shielded top side. The pads for the DC pogo pins are around the periphery and the 12 RF launches. The dielectric of the traces and "vias" that are used to pass the signal to the socket side are tuned for 50 ohms. The close physical proximity of the decoupling to the actual part is intended to get the best possible measurement fidelity . The dark areas are solder mask areas to allow DC signal traces to pass through the shielded pedestal and the DUT boards RF gasket material .

Test Fixture Top Plate



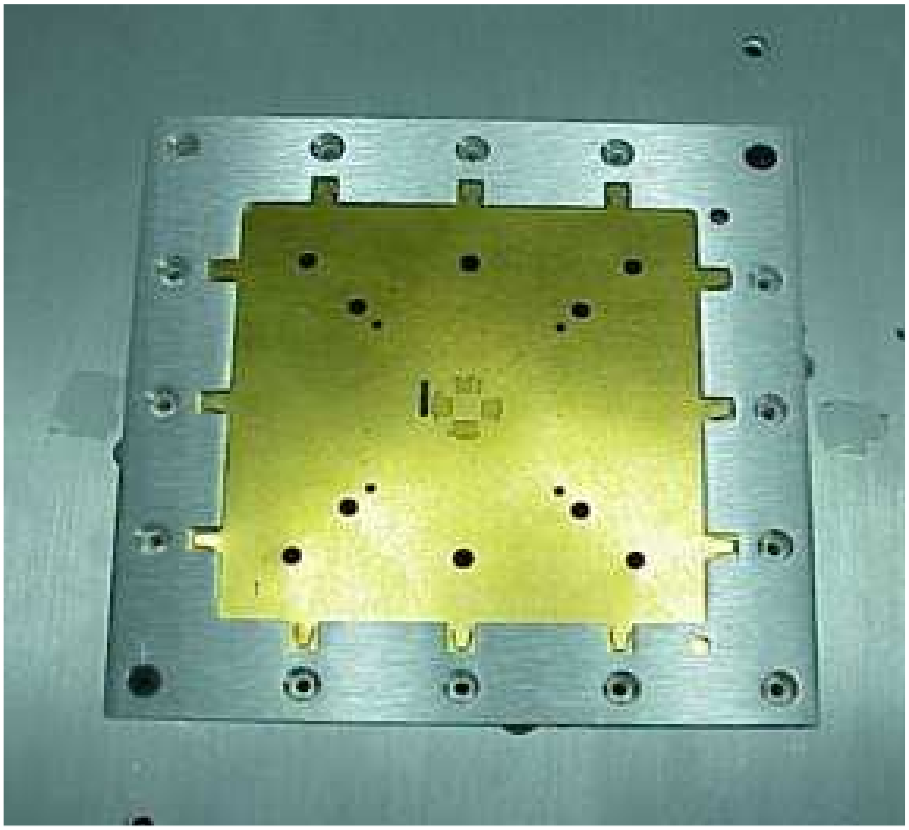
The Test Fixture Top Plate is shown with the DUT Interface Board removed. You can see the populated DC spring pogos coming through the cutout channel from the inside carrier board and the 12 RF SMA sparkplug launches. The RF launches are solid coax end launch connectors (no spring contact) to provide the best blind mate RF transition that is good for up to 12 GHz operation. The DUT Interface Board is placed inverted on the fixture top plate. There are two alignment pins and matching holes to insure proper orientation, these two are at 90 degree angles to each other (pins not installed here).

Typical Dual Site DUT Interface Board



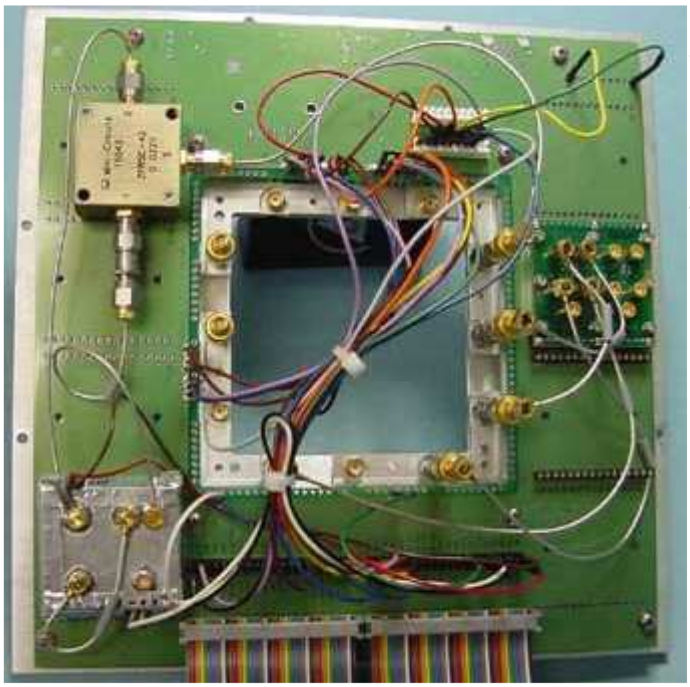
This is an example of a typical Dual Site DUT board for the RI 20 RF Test Fixture (RIK0074A). For each device, a custom pedestal mounts to this side of the DUT board and contacts the board at the four corners (see the dark mask points). The pedestal supports the Test Socket for each device with RF gasket material at the perimeter, outlined by the dark mask lines between the mask corner, with cut outs for the RF traces to pass through. All DC connections should have a dielectric mask on the DUT board at the pedestal interface crossing to insure proper isolation of the trace . The Pedestal acts as a shield to guard against unwanted signals coupling onto the exposed traces.

RF DUT Interface Board installed on the Test Fixture Top Plate



The quickly changeable RF DUT Interface Board (DIB) is held in place by a DUT Interface Clamp and, in the case of the RI 12 RF Top Plate, 16 screws. The DIB has small angled cuts by each RF launch to provide alignment. The board material itself helps create a good RF connection by acting as a spring to absorb any pressure created by the DUT. DIBs are calibrated with an available serial IC that can be attached to the board to provide fool-proof operation during production. The DIB's top ground plane and the aluminum Test Fixture produce an effective shield against RF noise commonly found in production floor environments. A test socket is then placed on top of the DUT Interface board without the need for special (and costly) alterations.

RI Custom Test Fixture Carrier Board Feature Expansion



RI offers a variety of reusable modules that are placed inside the Test Fixture or on the Top Plate Carrier Board to allow easy customization and expansion of the base ATE system's features for specific devices or family of device pinouts. These modules include: dual single-pull double-throw (SPDT) RF switches, single ended/differential adapters, delay lines, programmable attenuators, digital control lines and other signal conditioning modules. They will be discussed in detail later in the seminar and are available for purchase as RI Kits from our web site: www.roos.com.

Here is an example of a high performance 6 GHz dual SPDT RF switch module. These can be combined to expand the basic four full s-parameter measurement ports of RI 7100A or Cassini to more than 32 ports.

Operations - Docking with a Handler

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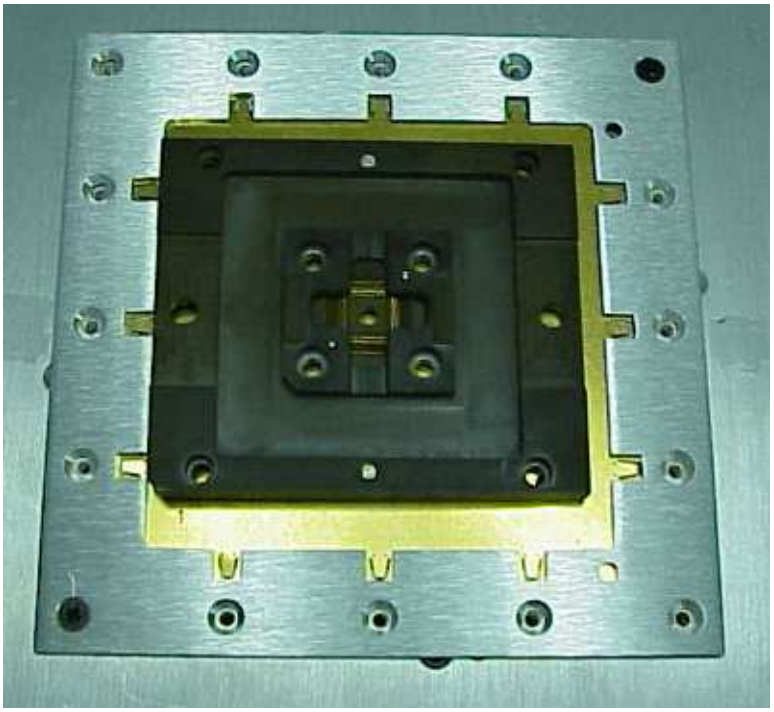
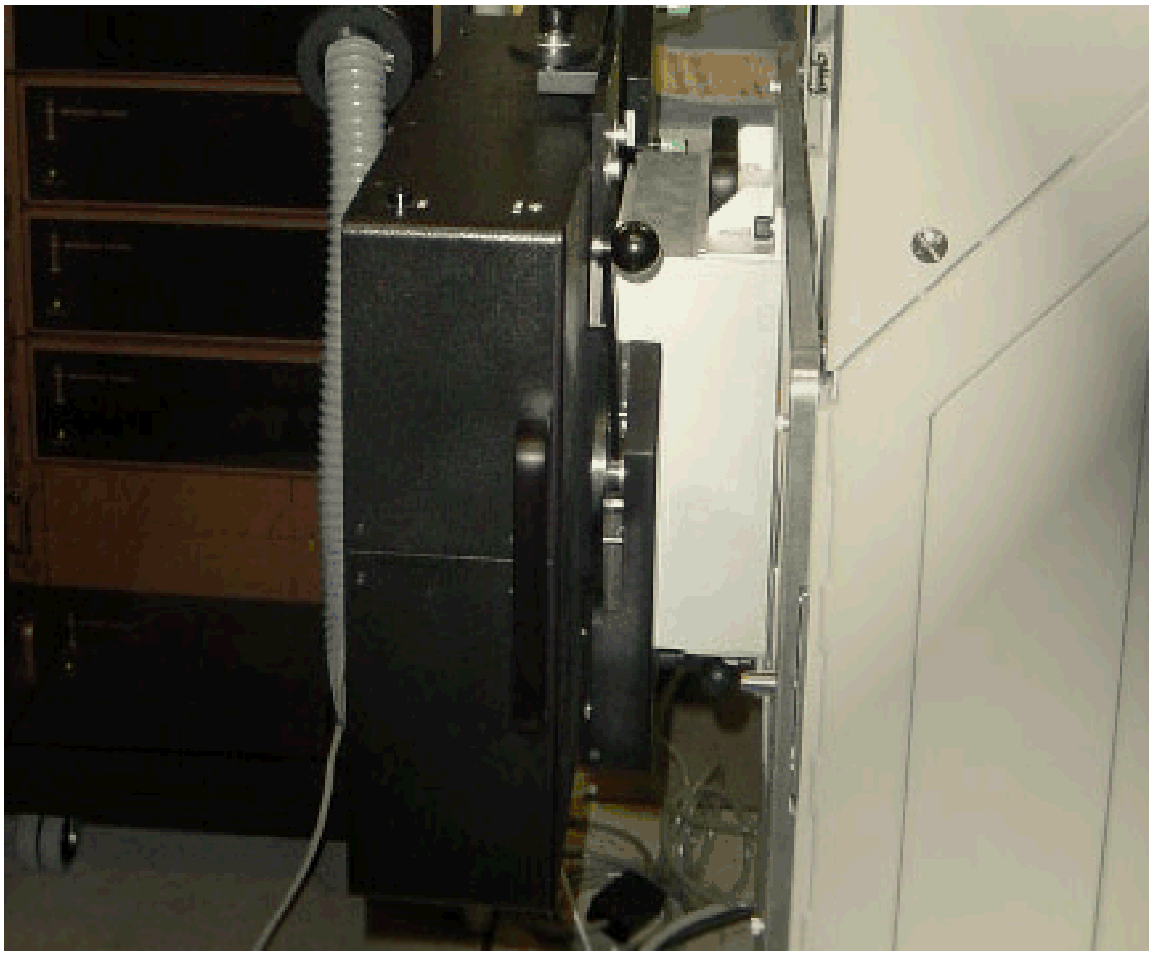
RI Fixture Top Plate with Socket



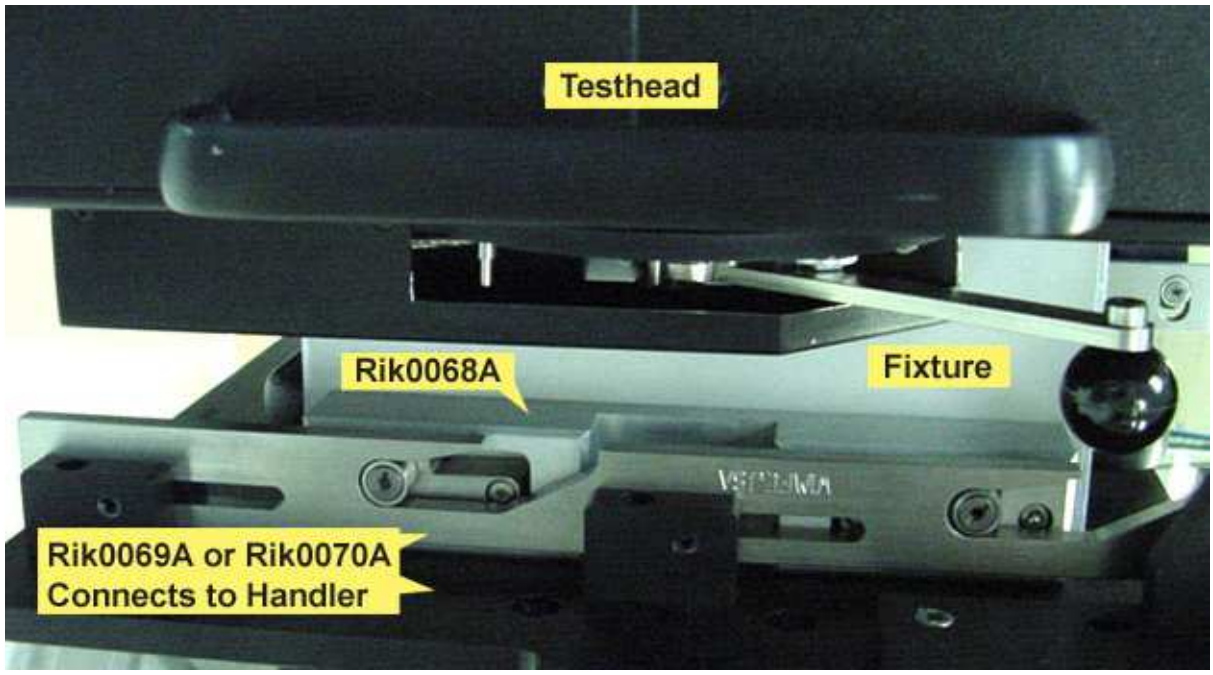
The RI Fixture docking system's Top Plate is customized for each handler manufacturer. The Top Plate provides the correct alignment pins and drilled connection holes required to mechanically interface to the desired handler, assuring a precise socket alignment. This ridged mechanical alignment is critical for consistent RF test performance and it decreases wear on DUT Interface Boards and sockets for higher mean-time between failures (MTBF). The service and repair of the consumable sockets and DUT Interface Boards is facilitated by precision alignment pins in all critical locations. The test socket is aligned to the DUT Interface Board, DUT Interface Board stiffener and Top Plate through alignment pins in the socket body.

RI ATE System Basic High Performance Handler Docking



The RI Fixture docking system eliminates any fine alignment issues that arise in small outline RF device packages by connecting the precision Fixture's Top Plate directly to the handler. The compact Test Head is then brought to the Fixture / Handler assembly using the built-in, neutrally weighted, Test Head manipulator. Three large alignment pins protruding from the Test Head guide the assembly together while the RI Test Head Docking Cam locks them down and guarontees the correct RI Universal Pogo Ring mating pressure.

RI 7100A ATE System Robust Cam Fixture / Handler Docking

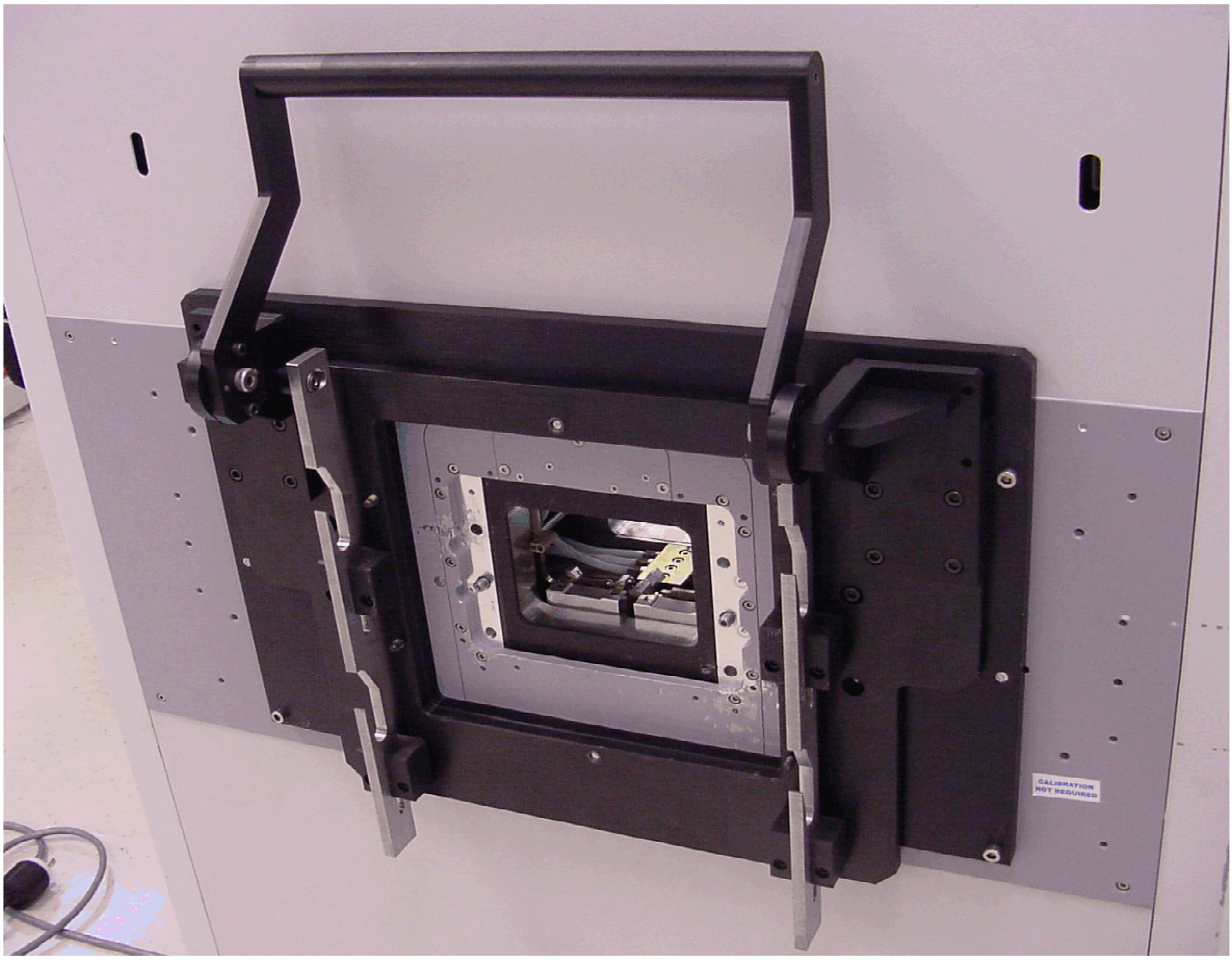


RI has introduced a robust Fixture to Handler docking system for reliable handler docking, developed with customers and proven in production. The universal dock plate for standard single site Fixtures (RIK0069A) and Multi-Site Fixtures (RIK0070A) mounts to the handler and is customized for that manufactures interface plate. The RI Fixture requires Docking Ears (RIK0068A) which contain smooth spring loaded roller bearing cams which mate to the handle docking plate.

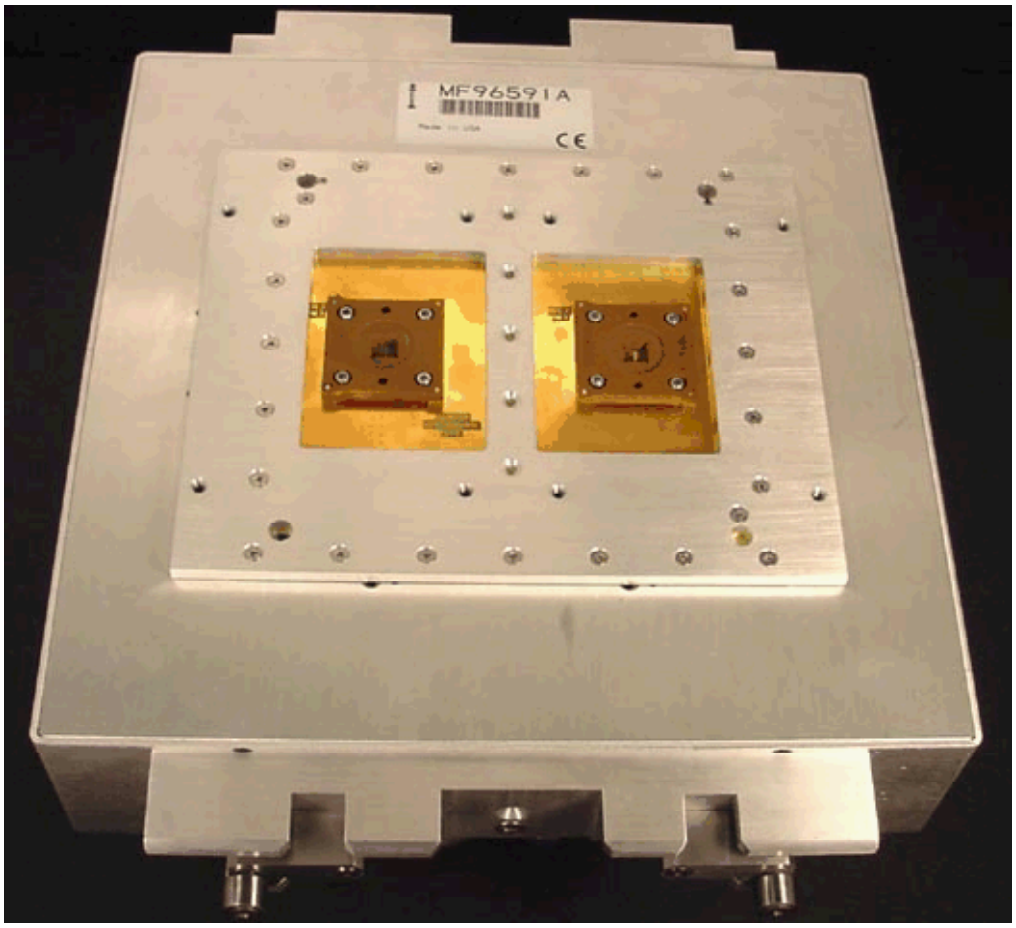

RIK0069A Docking Plate


RIK0068A Docking Ears

Example RIK0069A Docking Plate mounted on a Rasco Gravity Feed Handler



Example Dual Site Fixture Designed for a Rasco Gravity Feed Handler



Operations - Using the System Controller and RIFL

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RI ATE System Controller

Instead of a distributed processor approach, the RI7100A and Cassini ATE systems both use a single, high performance system controller and a proprietary high speed communication interface called RIFL (Roos Instruments Fiber Link) to control critical test sequence timing and ensure total execution time repeatability . This architecture takes full advantage of the rapid technology growth in the consumer computer market, allowing for relatively low cost system controller performance upgrades and ensuring a long product life cycle . RI typically offers several versions of System Controllers to address the varying needs and use case of our customers . The above photo is of the RIK0078A Dual Monitor System Controller and Development Station option targeted at Test Development and Characterization use .

System Controller

Functions:

- User Interface
- System Management
- Test Plan Generation & Execution
- Measurement Control and Signal Processing
- Data Analysis

Contents:

- x86 based Computer (embedded or tower)
- OS/2 Operating System
- RI System Software
- System RIFL II or III Interface

All of the user interface, system management, test plan generation, test plan execution, measurement control and data analysis is performed by the System Controller. The test system uses a high performance Intel processor-based server running OS/2, IBM's multitasking operating system. The system software contains over 100 man years of high level executable software written in an object oriented programming language called SMALLTALK. Less than 1% of the software is written in assembly language for vector math.

The RI Fiber Link (RIFL) found in early RI7100A systems used optical cables, but RIFL II uses shielded RJ45 cables (not typical "CAT5" network cables) and RIFL III uses a distinctive round 10 pin connector.

The RIFL ports are not ordered, so any device can be attached to any available port on the RIFL hub. To connect a RIFL cable, insert the RIFL II (shielded RJ45) or RIFL III (Round 10 pin) connector into an open RIFL port, until it clicks. To remove, press down on the tab along the top of the connector and pull. You can plug the cable into either the hub or the instrument first, the order does not matter. RIFL II to RIFL III cables are sometimes used to connect the different physical interfaces.

RI System Control Interface with RIFL II & RIFL III

Cassini & RI7100A Gen 3 RI ATE System Communication and Control

RIFL II and RIFL III connectors

RI Interface Dongle plugs into System Computer's Parallel Port

RI Instrument Control thru RIFL II Decoder Module

External GPIB control through RIFL II to GPIB Interface Pod

Plug and Play auto configuration of RIFL Nodes

Scheduled Timing and Event Control with 1 µsec resolution

For recent RI7100A and Cassini systems, the RI System interface and the RI Fiber Link 2 (RIFL II) provide the test system's internal low latency communication and instrumentation control link. The RI System interface state machine controller is an external dongle attached to the System Computer's parallel port. It provides the RIFL II interface connection and timing clock signal used throughout the system. The second generation RIFL "2" does not use fiber-optic cables any longer, but uses the efficient RIFL protocol with a proprietary bus that connects the System Interface to the RI instrumentation similar to a typical network hub configuration. RIFL II is not unshielded Category 5 (CAT5) cable typically used on computer network LANs. Each RI instrument contains a RIFL II interface connection and a RIFL II Decoder Module. RI instrumentation in the test system do not contain microprocessors for control. Control of all functions is provided by the System Computer through the RIFL II bus to the RIFL II Decoder in each RI instrument. A RIFL Decoder Module is an independent node on the RIFL II network bus.

ATTENTION! **RIFL II is not unshielded Category 5 (CAT5) cable typically used on computer network LANs.**

To control any GPIB instruments in the system, an RI System GPIB Pod contains a RIFL II Decoder Module, a RIFL II to GPIB Interface and GPIB connector for connecting GPIB cables between the RI System and any GPIB instruments.

The RIFL II bus is a self addressing (plug and play) interface. The RIFL interface transfers serial data, and provides the system with 1 µsec scheduled timing and event control. For Cassini systems, the RJ45 interface is replaced by a distinctive round 10 pin connector that is electrically identical to the RIFL II connectors.

RI7100A only: This page applies only to RI7100A ATE Systems!

RI7100A Gen 1 and Gen 2 System Control Interface with RIFL

1st and 2nd Generation RI ATE System Communication and Control

RI Fiber-optic Link (RIFL) Communication protocol

RI Interface ISA PC Card Plugs into System Computer ISA Bus

RI Instrument Control thru RIFL Decoder Modules

External GPIB control through RIFL to GPIB Interface in the System Receiver

Scheduled Timing and Event Control with 1 µsec resolution

The RI System Interface and the RI Fiber Link (RIFL) provide the test system's optically isolated internal high bandwidth communication and instrumentation control link . The RI System Interface state machine controller uses standard ISA interface on the System Controller (computer). It provides the RIFL interface connection and timing clock signal. The RI Fiber Link uses the efficient RIFL protocol in a daisy chain, or token ring, LAN type proprietary bus that connects the System Interface to each of the RI instruments. Each RI instrument contains a RIFL interface connection and a RIFL Decoder Module. RI instrumentation in the test system does not contain microprocessors for control. Control of all functions is provided by the System Computer through the RIFL bus to the RIFL Decoder in each RI instrument. Each RIFL Decoder Module is an independent node on the RIFL network bus and must have a unique Node Number.

To control a GPIB instruments in the system, an RI System GPIB connection is provided on the rear panel of the system receiver. The receiver contains a RIFL Decoder Module, a RIFL to GPIB Interface and GPIB connector for connecting GPIB cables between the Receiver and any GPIB instruments.

The RIFL interface is unidirectional and transfers high speed serial data that provides the system with both precise scheduled timing (1 µsec resolution) and event control .

Operations - Using the System Controller, OS/2

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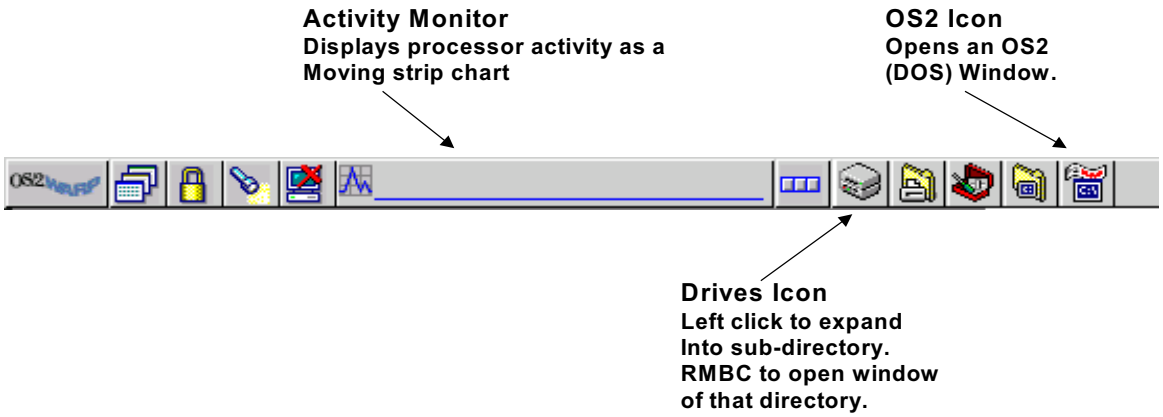
Main OS/2 Warp Menu Bar

The RI System Software uses IBM OS/2 Warp operating system for the graphical user interface and system control environment. The OS/2 Menu Bar provides easy access to popular operating system tasks such as moving data files, accessing network drives, monitoring the system's processor activity, and enables opening a window into OS/2 command line interface.



RI 7100A & Cassini System Software

- The Graphical User Interfaces
  - Test Plan Editor
  - Test Executive Editor
- Production Package Part Test Executive
- Production Wafer Test Executive
- Viewers and Data Saving
- Handler Control
- On Screen Help

All RI ATE Systems use a object oriented grafical editor to create and debug Test Plans and Test Executives. The Test Plan editor allows you to analyze test results and interact with the system's instrumentation. Test procedures are displayed graphically as panels. Measurements and measurement states are represented by "button" objects in the test plan. Test Plans are created by copying buttons from a library and pasting the buttons into the test panels. Use the Test Executive Editor by filling in blank items of a configuration page that defines how the packaged part or wafer test is performed. The Test Executive also controls the handler bin assignments. The editors provide extensive context sensitive on-screen help to aid a novice user and be referenced by an experienced test engineer.

Operations - Start Up and Shut Down the RI System Software

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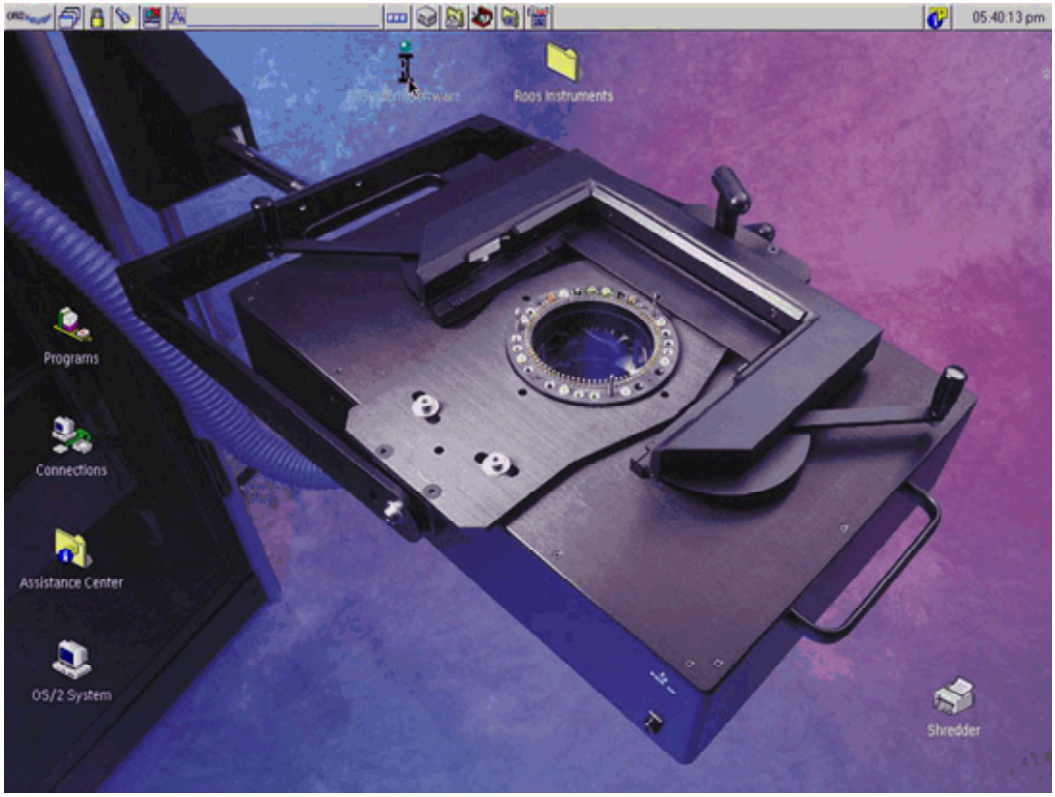
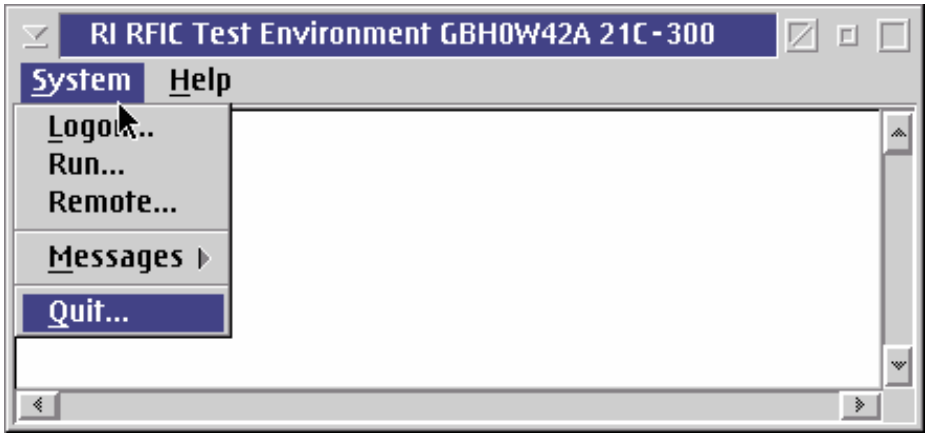
RI Desktop



Once the System Controller and is fully started, you will see the RI7100A Test Head as the screen desktop wallpaper. If the system controller has RI Guru installed, you must click the Guru **Logon** button before launching the RI System Software. Otherwise, the RI System Software can be started by double clicking with the left mouse button on the RI logo icon. RI Guru is launched automatically when the System Controller boots up and a control bar along the right hand side becomes visible.

Starting and Stopping the RI System

- Double-click icon to start
- System/Quit to exit
- Check that Tester is started
- Check that Fixture is docked

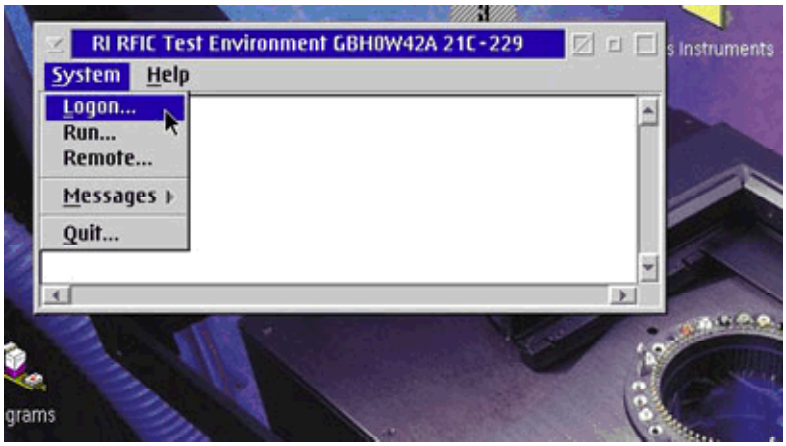


Starting the RI System Software is as simple as double-clicking on the "RI" logo icon . To quit the RI System Software just clicking on the "close" window box, or by choosing "System/Quit" from the main RI System Software window.

Once the System software is running, the user must "log on" and ensure the Tester object is started. (This is done automatically for operators if a "default" tester is defined.)

Finally, before starting a Test Executive, the operator must make sure the correct fixture is docked on the testhead. This should be done before opening the Test Executive, because the system will automatically check for the fixture hardware at that time.

RI System Logon Screen

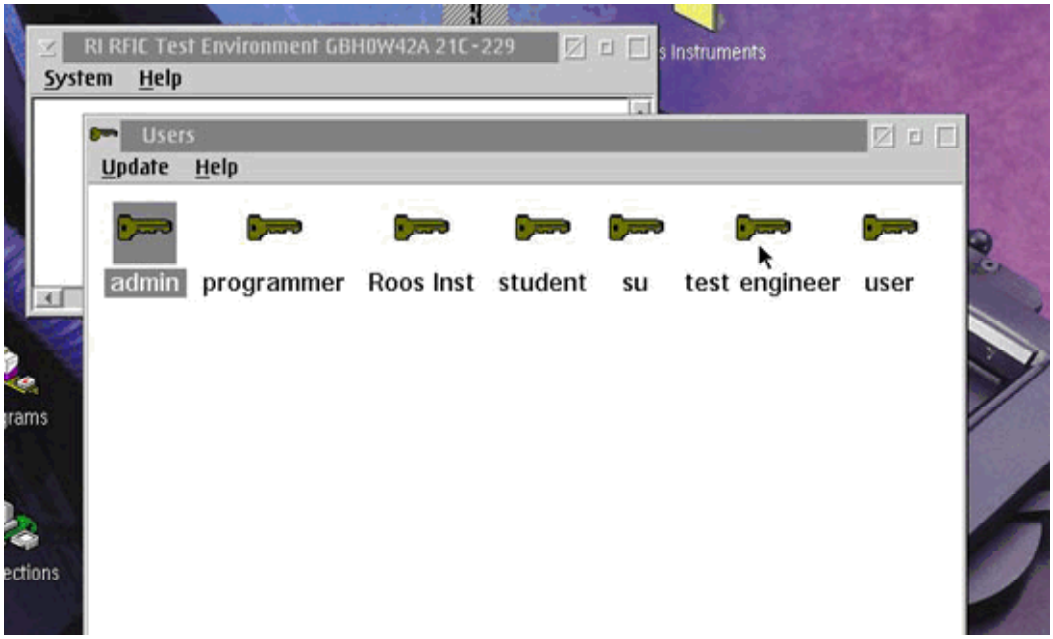


The main window of the RI system software environment is the RI Message Window. This window contains the menu bar that allows the user access (through a password protected user level hierarchy) to the system controls and graphical programming interfaces. All system messages that pertain to the operation of the tester will be displayed to the user through the Message Window; including run time issues, compiler issues, or system diagnostic messages.

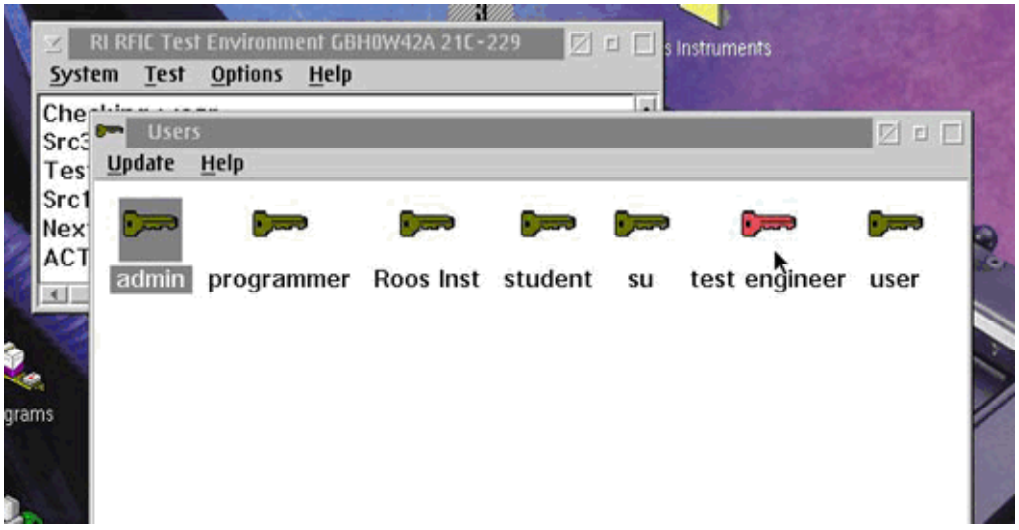
The main menu bar of the Message Window will always display the highest software patch installed in this version of software for a quick reference. In this example, the base version is "21C" and the patch level is "229".

Once the RI ATE System has been warmed up and is ready to be started, the user will need to identify themselves by Logging On to the system. You will notice that the only menu's that are present on the main RI Message Window are the System and Help menus. Left mouse button click on the `System` menu and select `Logon`...

RI System Users Window

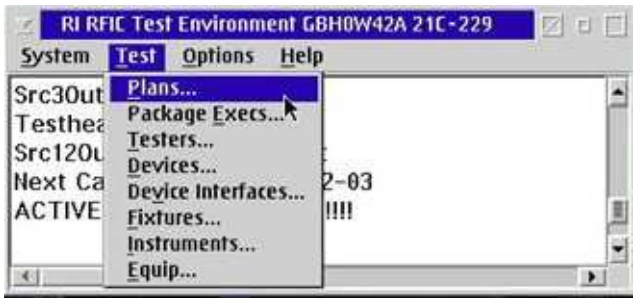


Select the icon with your username and enter the password for that account if prompted. The user icon will turn red if you were successful. If the login failed, look at the message window for assistance with what may be the problem.

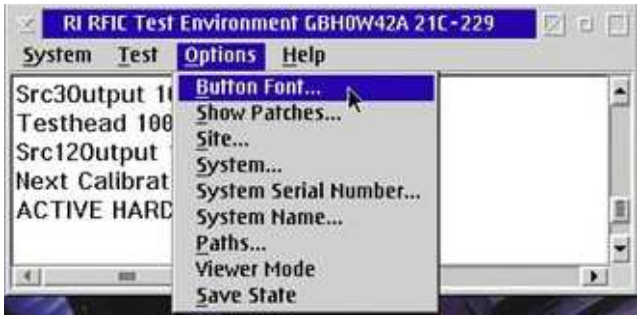


RI System Software Main Window

The main window of the RI system software environment is again the RI Message Window. Once logged on this window will provide the pull down menu access to the system controls and graphical programming interfaces.



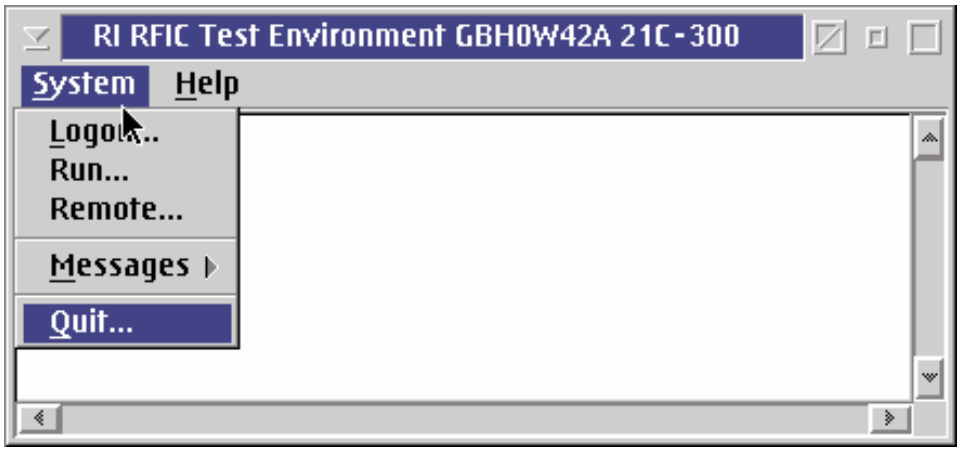
The Test menu allows opening of the container windows that allow the user to browse the valid files in a specific directory structure pertaining to topics such as Test Plans, Test Executives, Test Fixtures etc.



The Options menu allows control of Advanced Power User functions such as Font control, System Software Environment Version Patch control, ATE system name and serial number, or redirect the directory paths that are used for the system environment.

ATTENTION NONE of these items should be adjusted from the factory default under a normal environment. Please contact an RI applications engineer before attempting modifications to these system wide parameters!

RI RFIC System Software Shut Down



To prevent lost or corrupted data, NEVER shut the power off to the system controller. As with any multi-tasking operating system, all the running processes must be ended and any open files saved to the hard drive prior to turning the power off.

On the RI Message Window click with the left mouse button on the `System` pull down menu and then select `Quit`. The system will confirm with a dialog box that asks, "Are you sure you want to shut down the system?" Click `YES` and the RI system software will do some file maintenance and close, leaving the OS/2 desktop with the image of the RI Test Head. Now perform an OS shutdown by clicking on the Shutdown Icon (looks like a red X over a monitor) from the OS/2 Menu Bar. Answer "Yes" to exit any remaining programs and confirm the shutdown. OS/2 will present a message when it has safely shut down.

Remove the Test Fixture form the Test Head prior to starting up the system. You can safely shut down the system with the Fixture attached, but you MUST remove the fixture before starting up the test system to prevent any possible damage to the Fixture and DUT interface.

Operations - Control with the Mouse and Keyboard

Revised: 01/15/2007 Topic(s): Admin Doc ID:RBEH-6XGV4P

OS/2: Parts of a Window

- System Control Box
- Close Box
- Max, Min buttons
- Window List

Before getting into the RI System Software, we need to define some of the basic OS/2 and RI functions and terminology. For some of you this is already familiar, for others it will be new. The OS/2 operating system is very similar to the windowing operating systems you may already be using. The left mouse button is used for selection and the right mouse button is used to invoke a context sensitive menu. We will continually reinforce the information by repeatedly referencing this information throughout the training material.

Any OS/2 Window will be contained in a frame that has a control bar running across the top and possibly scroll bars running down the right side or across the bottom. The control bar has in it's left most corner a **System** pull down menu box that allows basic window controls such as window size, close, minimize, etc. Next to this **System** box is a **Title Bar** that provide some type of description of the content of the window. In the right hand corner are three boxes, going from right to left is the **Window Size Max /Normal** box, next the **Window Minimize** box (which removes the window from the active display screen but keeps the application running in the background), and then the **Window Close** box that closes the application and removes it from active memory. To see a list of all the Windows that are in the minimized state, place the mouse pointer on an open area of the desktop and click both right and Left mouse buttons simultaneously. A **Window List** window will appear showing the **Title Bar** of each of the applications running, hidden or not, and you can click in the window on the desired application and it will be place on top of any open windows for easy access.

To Copy and Paste text, first highlight the text to be copied/replaced by dragging button #1 across the text, then use **[CTRL] C** to copy the text. Place the cursor where you want the copied text and press **[CTRL] V** to paste the text that you just copied.

Using OS/2 : Mouse Movement Basics, Mouse Pointer

Mouse Button 1 and Button 2 (Left and Right) Definitions

The mouse pointer (usually an arrow or crosshair symbol) can be placed anywhere on the display screen(s) by moving the mouse in the physical direction desired . Typically (if the operator is right handed) the left mouse button is referred to as **Button #1** or **LMB** and the right mouse button is referred to as **Button #2** or **RMB**. A mouse **Click** is the action of placing the mouse pointer on an object on the screen and then, without physically moving the mouse, pressing and releasing quickly the desired mouse button . A mouse **Drag** is the action of placing the mouse pointer on an object on the screen and then pressing and holding the button down while physically moving the mouse in the direction you want to move or "drag" that object. The **Drag** is complete when the mouse button is released.

Button 1 - Left Mouse Button (typically)

Action	**Event**
Click	Selects an Object
Double Click (2 Clicks)	Opens an Object
Click, Hold & Drag (scross text)	Selects text ([CTRL] + C to copy, [CTRL] + V to paste)
[CTRL] + Click	*Copying a RI Button (only in RI System Software)*

Button 2 - Right Mouse Button (typically)

Action	**Event**
Click	Displays the Object's Pop-up Menu
Double Click (2 Clicks)	Opens an Object
Click, Hold & Drag	Moves an Object
[CTRL] + Click	*Copies a RI Button (only in RI System Software)*
Click + "Select" function	
Click + "Paste Button"	*Pastes a RI Button (after "select") (only in RI System Software)*

The main tasks of the Mouse interface are for:

Selecting an Object (highlight)
Opening an Object (click)
Moving an Object (drag)
Selecting the Active Window (click inside it)
Displaying the Objects Pop-up Menu (Button 2)
Displaying the Open Window's Pop-Up Menu (Button 2)
Copying an Object (Button 2)
Menu Bar Selection (click)
Scroll Bar (click on arrow or drag bar)
Closing the Window (click)

RI System Software Mouse Shortcuts

Button 1 - Left Mouse Button (typically)

Action	Event
[CTRL] + Click	Copying a RI Button

Button 2 - Right Mouse Button (typically)

Action	Event
[CTRL] + Click	Copies a RI Button (only in RI System Software)
Click + "Select" function	
Click + "Paste Button"	Pastes a RI Button (after "select") (only in RI System Software)

RI adds Special Features that are only valid in windows generated by the RI operating software

Selecting and Copying a RI Button or selection of Buttons to the special RI Paste Buffer can be accomplished two ways. First, by placing the mouse pointer on the desired button, click Button 2, then click "Select" from the menu. Second, by holding the [CRTL] button on the keyboard down while you click on the object with Button 1. Either of these actions places a copy of that button in the special RI Paste Buffer. Objects are highlighted in Black when in the buffer. You can select multiple buttons from the same window and they will all be placed in the RI Paste Buffer. Once you move to another window and attempt to copy more buttons into the RI Paste Buffer, it is automatically cleared of it's contents first, and then the new button is added.

Pasting a RI Button from the special RI Paste Buffer can be accomplished two way as well. First, by placing the mouse pointer on the desired place in the window where you wish the button(s) to be placed, click Button 2, then click "Paste Button" from the menu. Second by holding the [CRTL] button on the keyboard down while you click on the desired place in the window where you wish the button(s) to be placed with Button 1. Either of these actions places the contents of the special RI Paste Buffer on the screen centered around the place you specified.

Note: Be careful when using the [CRTL] button 1 click method of Selecting or Pasting since the same [CRTL] button 1 click can invoke either a copy or a paste determined by where your mouse pointer is at that moment. For example, while selecting multiple buttons to be placed in the buffer, you inadvertently miss a button and click on an empty place in the window so that the entire past buffer will be copied to the window instead of the selection of new buttons being copied.

Using OS/2 : Utilities : ZIP and UNZIP

Safe Transporting of RI Files

OS/2 allows Long File Names
- Long File Names may be truncated if transporting the files
- Special characters may cause issues with email or network sharing
- Compressing RI files before transport protects the attributes

ZIP/UNZIP utility provide from OS/2 command line interface
- OS/2 Command line similar to DOS
- CD, Dir, MD, etc, commands are valid
- Type: `ZIP <compressed file name> <file names to be compressed>`
- Type: `UNIZIP <compressed file name>`

Zip and Unzip are public domain command line utilities used to compress and group files together, typically used prior to transporting files . The OS/2 operating system extends the typical DOS file structure to add extended attributes that allow long file names and characters that are not normally supported. When attempting to transport these files from the RI system controller via removable media (floppy disk) or via the network, there is a good chance that some of the file information may be lost or corrupted, such as the file's name being truncated. To maintain file integrity during any type of file transport, RI recommends compressing the files with the provided ZIP utility . Please remember to make the names of the compressed file 8 characters or shorter so they will not have their names truncated as well.

Both ZIP and UNZIP are command line utilities that are accessible by opening an OS/2 command line window.

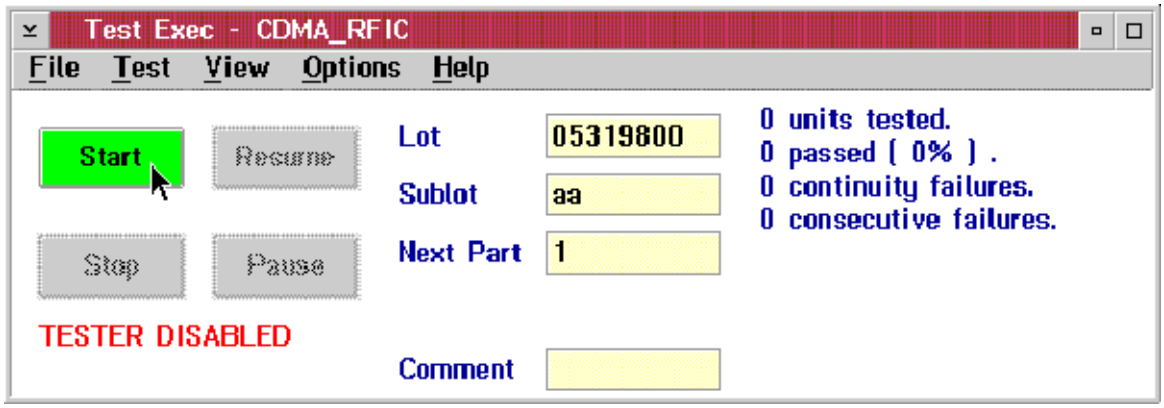
Type the command by itself to get a help list of usage and available control switches .

```
ZIP  -opt ... destfile source1 source2 ... -x source
      Recursive -r
      Ignore files after -x switch
UNZIP  -opt ... srcfile file1 file2 ... [-d destdir ]
      Ignore case option -C
```

Operations - Running Test Executives

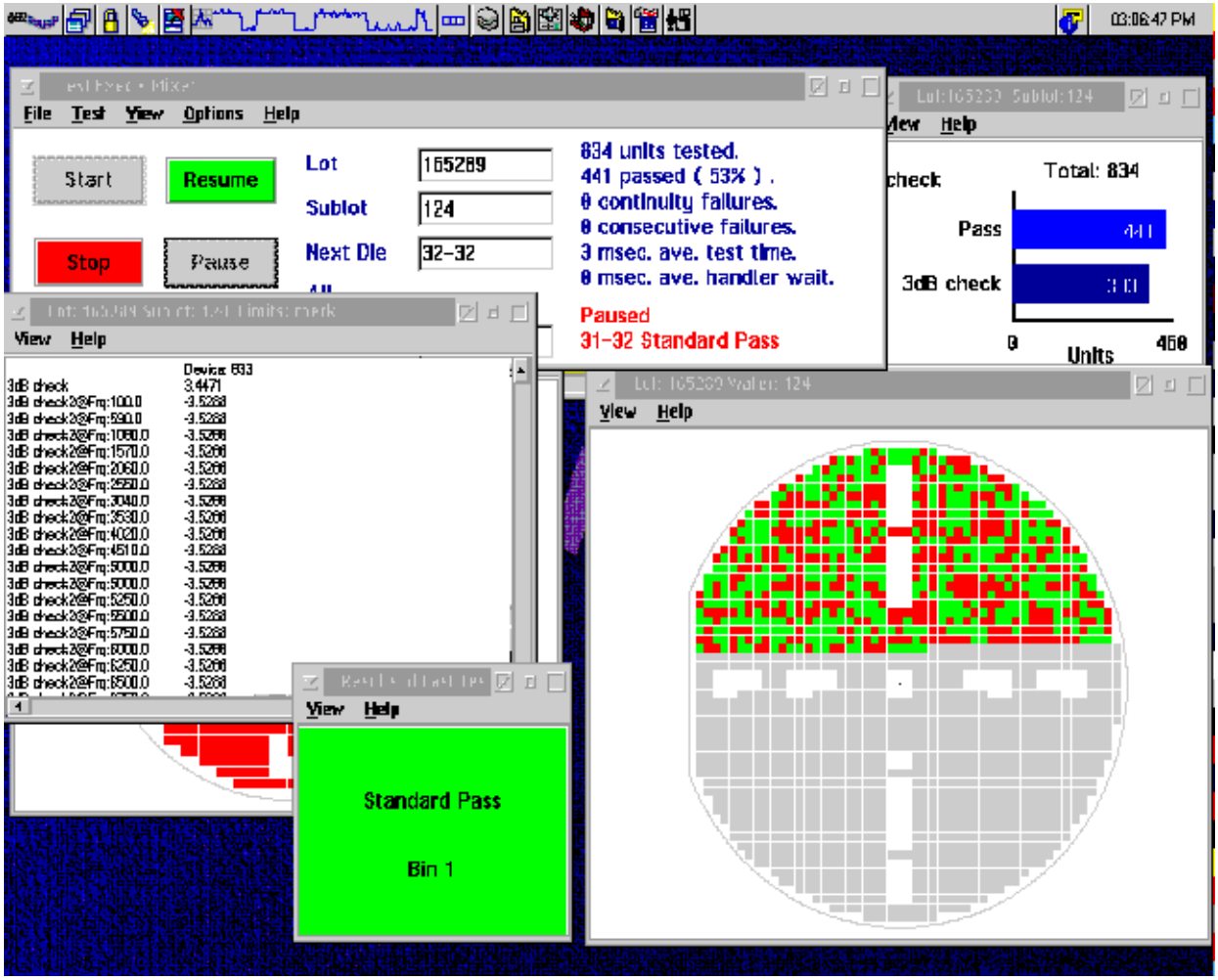
Revised: 01/15/2007 Topic(s): Admin Doc ID:RBEH-6XGV4K

RI Package Part Test Executive



A typical packaged part Test Executive panel is shown above for a production test named "CDMA_RFIC". This simple user interface controls a sophisticated set of measurement tools that are capable of completely testing a device with a package handler. This executive can run multiple Test Plans and test against multiple limits while controlling temperature and binning in user definable soft bins as well as hardware bins. Lot code data may be entered by keyboard, touch screen or bar code and test data can be simultaneously stored in multiple formats, including STDF, DList, and CSV. We will discuss this in detail later in the seminar .

RI Wafer Probe Test Executive



A typical Wafer Probe Test Executive panel is shown above for a production test named Mixer. This simple user interface is very close to the Packaged Part Test Exec interface and controls a sophisticated set of measurement tools that are capable of completely testing a device with a wafer prober and graphically displaying the wafer Map info. This executive can also run multiple Test Plans and test against multiple limits while controlling temperature and building an ink file as well as utilize the user definable soft bins for data analysis. Lot code data may be entered by keyboard, touch screen or bar code and test data can be streamed in multiple formats such as STDF, ATDF Dlist, and CSV simultaneously.

Extensive On-screen Help

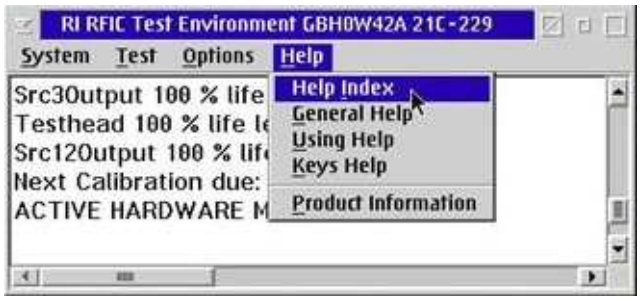
Context sensitive help for each object

Searchable help system for browsing

Function key support for pointer location

User notes are definable for every panel

Hierarchical buttons with user definable notes



On-screen help is provided through out the system software. There are several ways to request help.

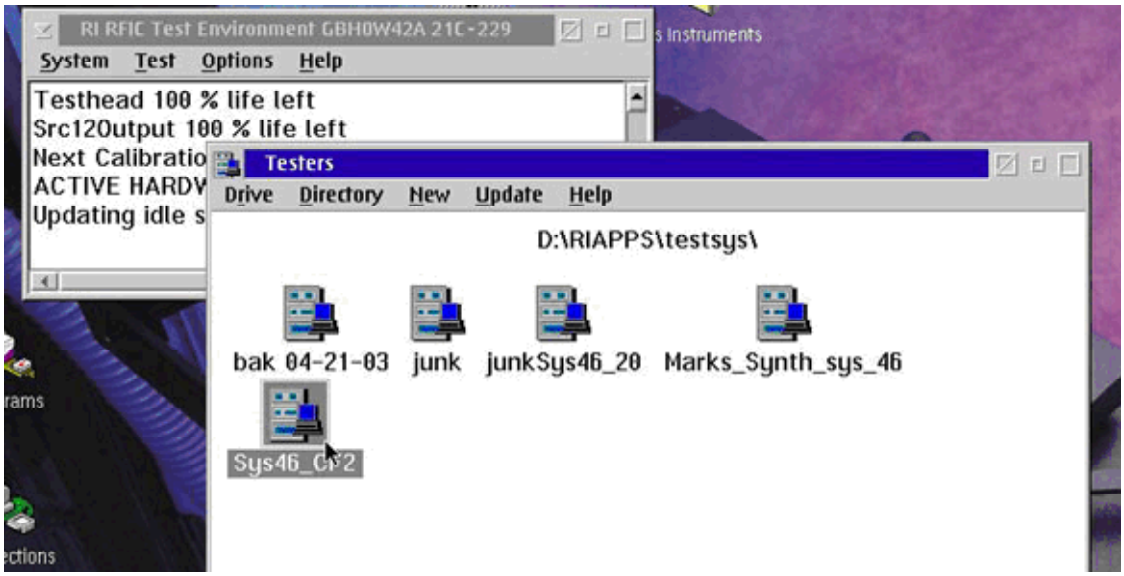
You can:

- Select `Help` from the menu bar
- Place the mouse pointer on the object, press and hold the Left mouse button and select the F1 key on the keyboard.
- Place the mouse pointer on an object, click the Right mouse button and select the pop-up menu choice: Help.

Panel Notes and Hierarchical Buttons discussed in detail later in the seminar .

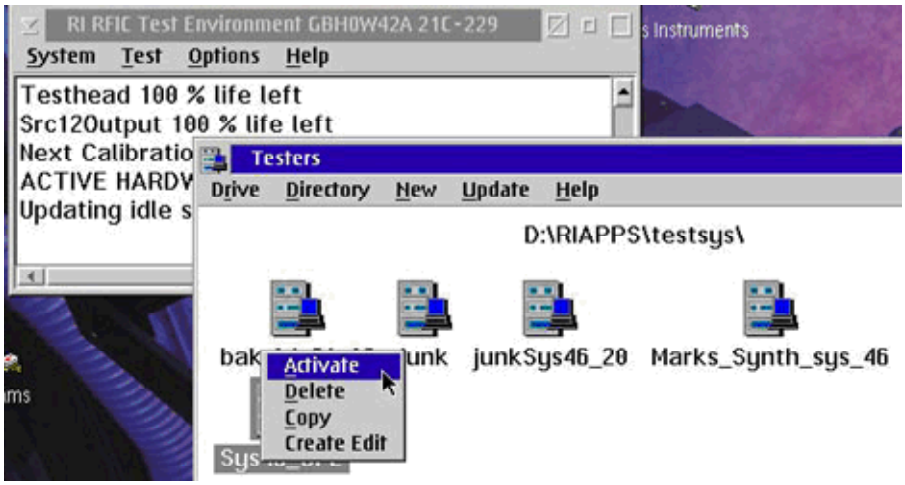
Operations - Activating the Tester and Handler

RI Testers Container Window



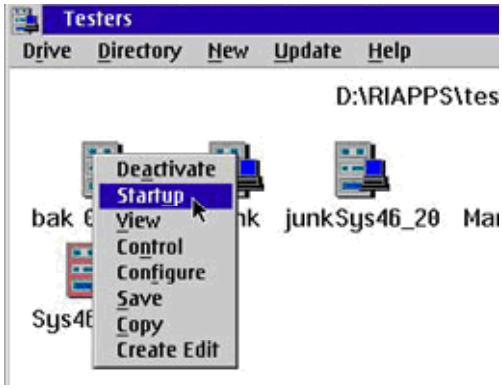
The system software loads the configuration and calibration information before operating the RI ATE System from the tester icons in the "RiApps\testsys" directory. To get to the Testers window, click on the Message Window **Test** menu and select **Testers**. The currently selected configuration is represented by a red tester icon.

Activate the Tester



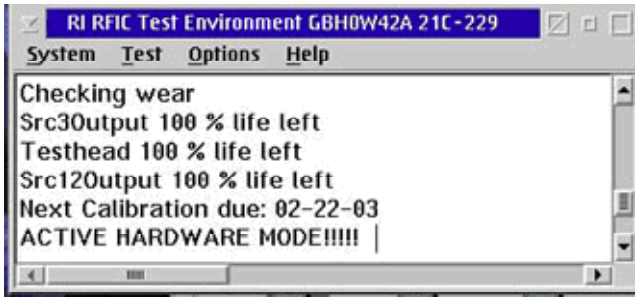
Now select the desired tester by clicking the Right Mouse Button (RMB) on the tester and selecting **Activate** or double click the Left Mouse button and it's icon will turn red, denoting that it has been successfully selected.

Start Up the Tester



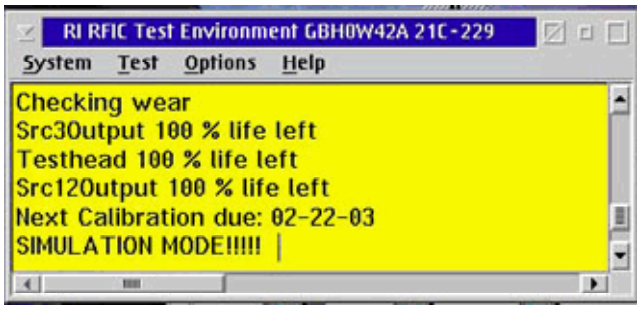
From either the tester Icon, RMB pop up menu, or from the **System** pull down menu pick on the Message Window, select **Startup**. This will cause the system to query all the RIFL nodes and determine what devices are connected, then upload device firmware and perform a self test on each device. The results for these operations are displayed in the Message Window.

Active Hardware Mode



When the startup is complete and all the self tests pass, the system displays the percentage of expected life remaining for the mechanical switches in the various system components. The startup window then states when the next system calibration is due (every 6 months) and announces that the tester is in Active Hardware Mode.

Simulation Mode



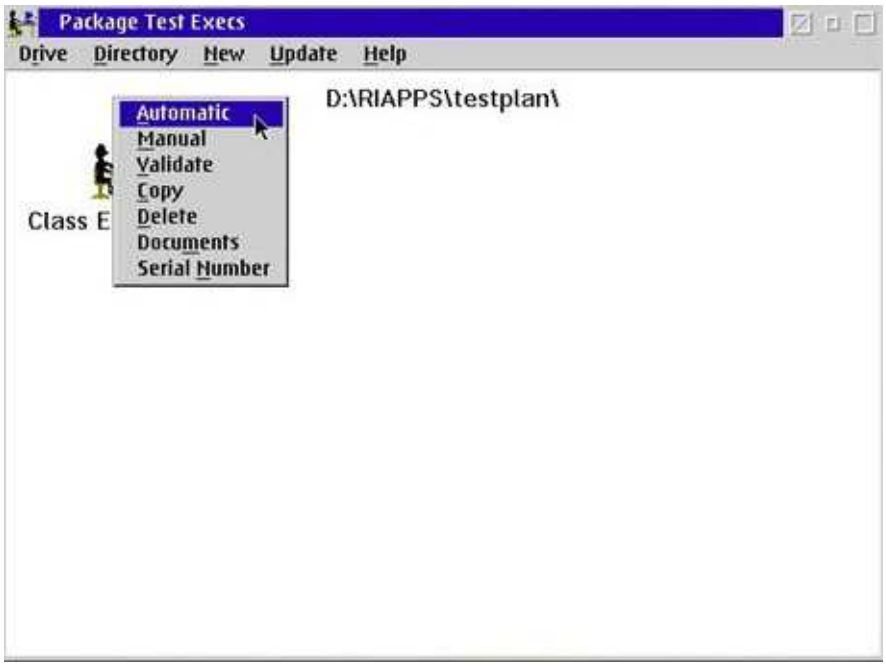
When the startup does not detect the presence of any RIFL nodes it enters into simulation mode and simulates the startup procedure. It then announces that the tester is in Simulation Mode and turns the background color of the Message Window yellow .

Operations - Locating and Opening Test Executives

Revised: 01/15/2007 Topic(s): Admin Doc ID:RBEH-6XGV4U

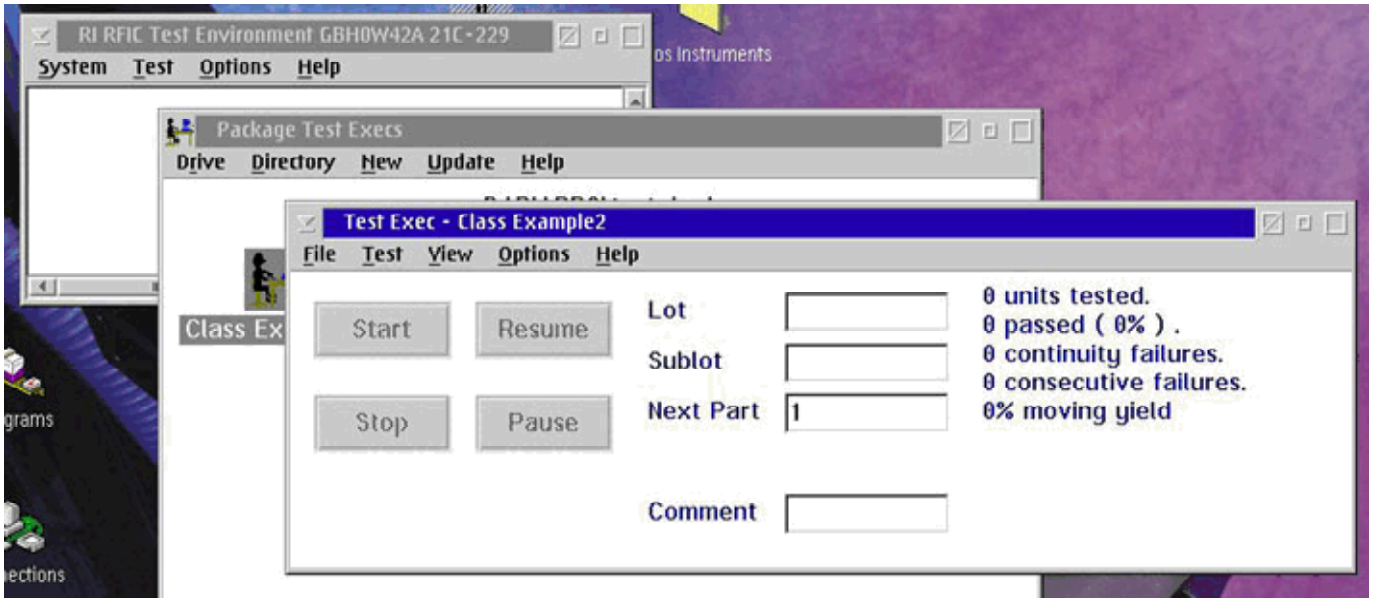
Package Test Executive Container Window

Locate the **Test** pull down menu pick on the Message Window, select **Package Execs** and the Package Executive container window will appear.



Select the desired Test Exec Icon, RMB click on it and its menu will appear. You may select either **Automatic** or **Manual** depending if you want to have the Test Exec control the device handler or if you want to manually insert the device with prompted from the system to insert a new device. The **Documents** feture allows reference information to be stored along with the Test Executive iIcon and is commonly used for storing application specific support assistance information.

RI Package Test Executive

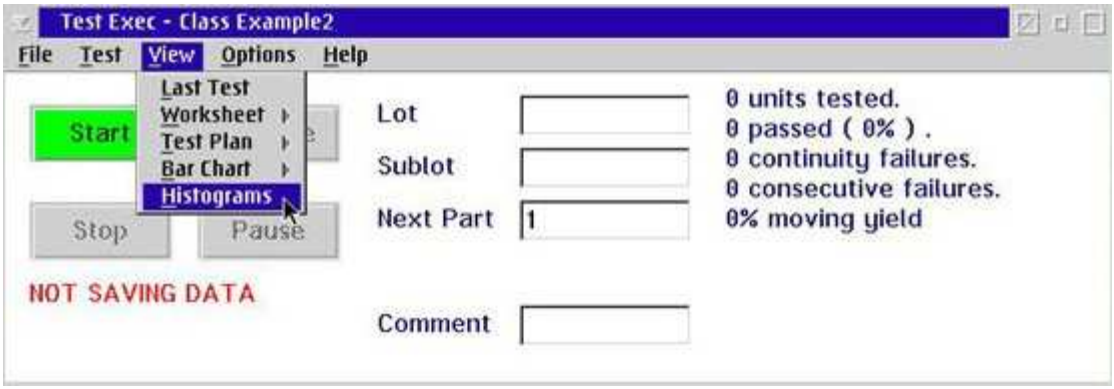


The Package Test Exec uses a simple user interface yet allows very sophisticated control over the production testing process. The test operator enters the **Lot** and **Sublot** information as well as the number of the **Next Part**; this allows the user to align data with previous runs. The **Comment** line allows you to enter as many lines of information that the operator may feel necessary to describe this specific run of devices. The small entry box will scroll to accommodate as much info as needed. This comment information is included with the test data for future reference.

Operations - Viewing Test Measurement Data

Test Execs Runtime Display

- **Colored Last Test Window**
- **Worksheet Based Detail and Stats Views**
- **Graphical Test Plan Viewer**
- **Bar Chart Viewers**
- **Multi - Histogram Viewer**



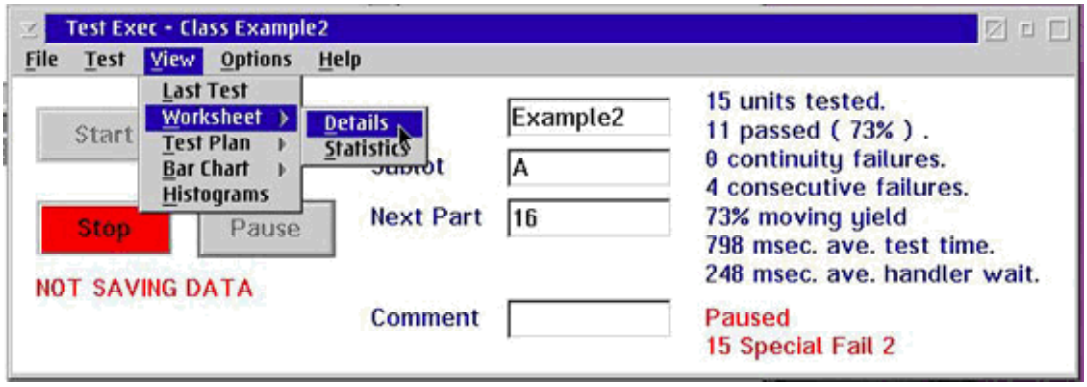
Several optional views are available during testing . These views can give the operator an up-to-date view of the progress of the lot.

Bar Chart views of the tests, categories (soft bins) and bins show up to the minute yield results. Worksheet views resemble a spreadsheet, with tests and devices appearing in rows and columns. The statistics view shows the mean and statistical measures for the entire lot, while the detail worksheet shows all of the tested parameters, color-coded for pass/fail status.

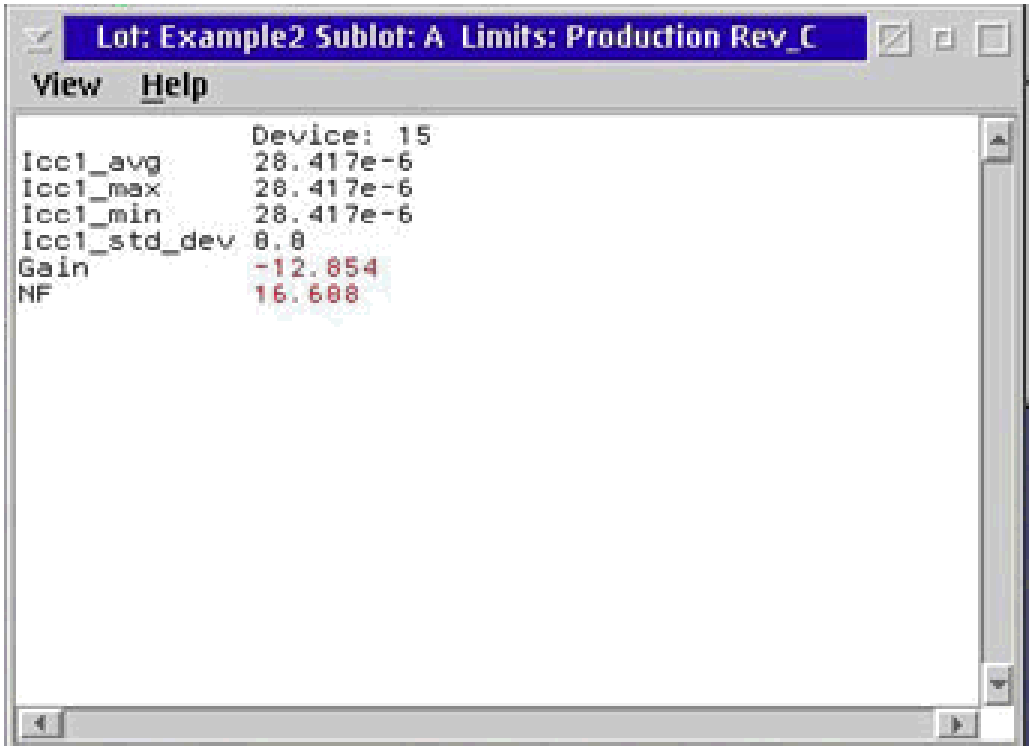
The testplan itself can be viewed during the run of the Test Exec, but it cannot be edited or compiled. Its parameters may be viewed in graphical form.

Worksheet Views

The RI Test Exec has numerous views that can be selected for a running Test Plan. The most popular is the Worksheet View.

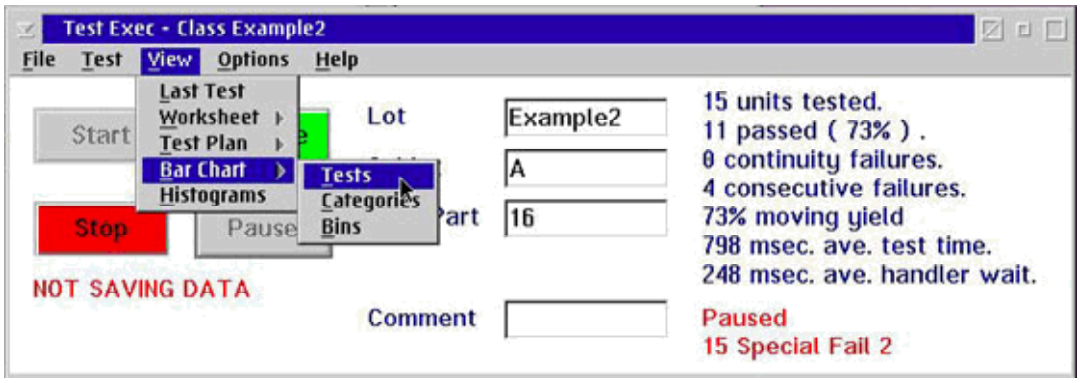


This view is a tabular spreadsheet style view of the test data and can be selected to just show the last test, a running sheet of all the tests, or the statistics of all the tests with the option to list the data in columns or rows. Data from failing parts is displayed in red only when "Limits" are turned on.

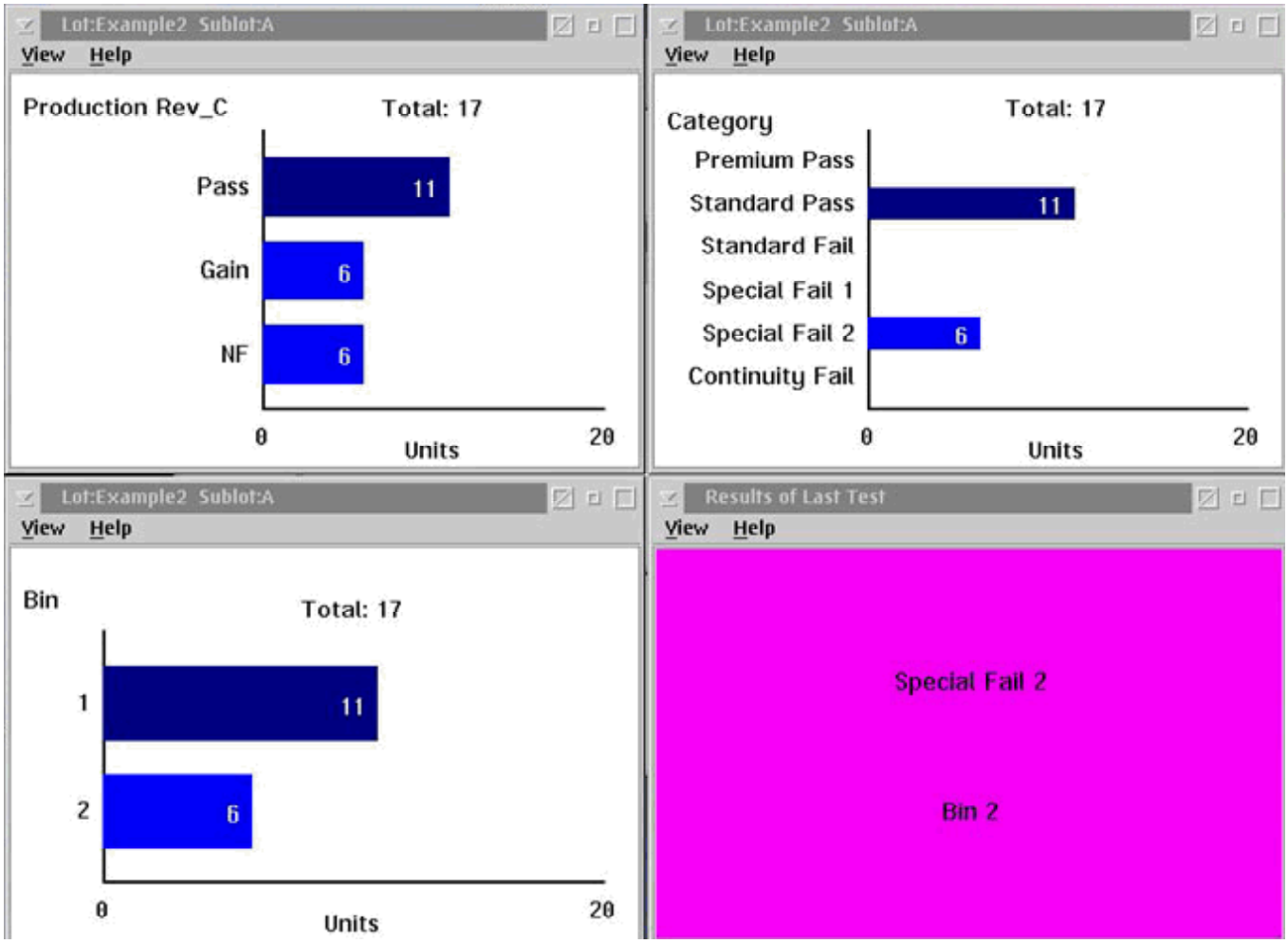


Barchart Viewers

The "Bar Chart" view shows horizontal bar charts for Tests, Special Fail Categories, or Handler Bins.

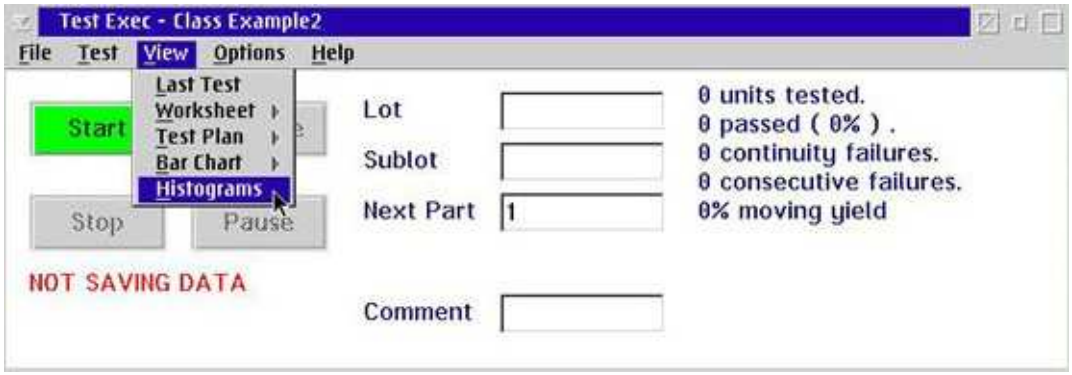


The "Last Test" view shows an area of Green when a part goes into a pass bin, Red for fail, or any defined color for special failures.



Many of these views can be simultaneously displayed and all update in real-time.

Histogram Viewer



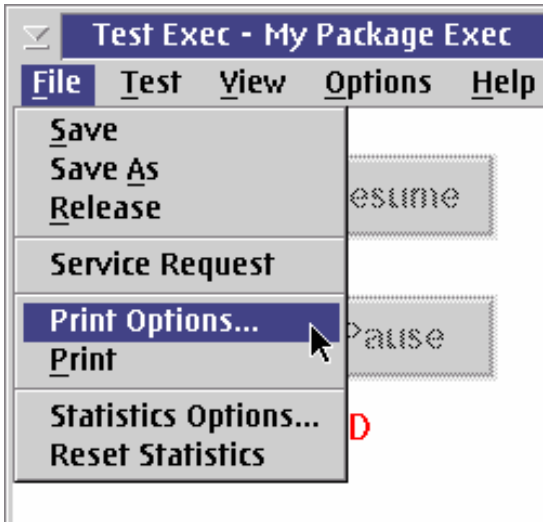
The RI ATE system software supports Real Time Histograms by utilizing the special set of test limits named "Histogram". The minimum and maximum test limits for each of the tests performed becomes the upper and lower boundaries for each of the Histograms.

Select the Test Executive Editor's menu bar choices: **View** and **Histogram**. The test system computer will open the Data Viewer for Histograms. The Histograms will be updated each time a part is tested. All the available histograms will be displayed. Depending on the amount of tests in the Test Plan you may have to increase the size of the Histogram window to see the histograms.

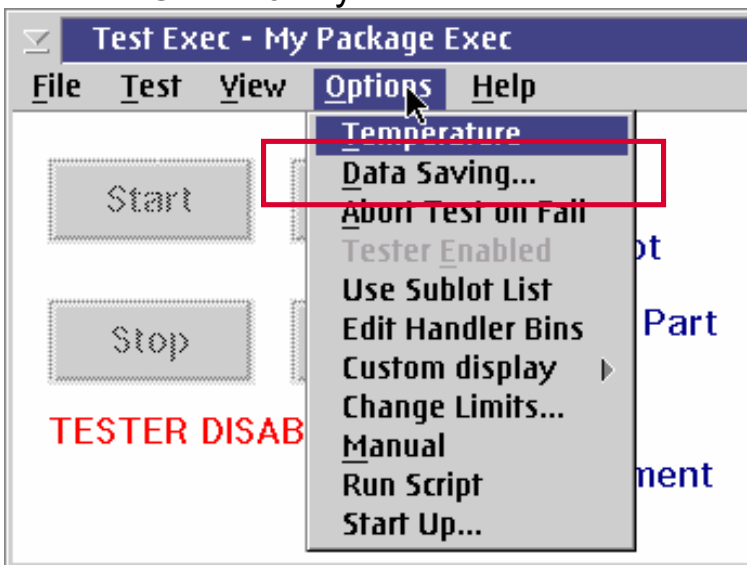
We will work with a Test Exec using these in the next lab.

Test Exec Reports

- Summary report
  - Printed version
  - Disk version



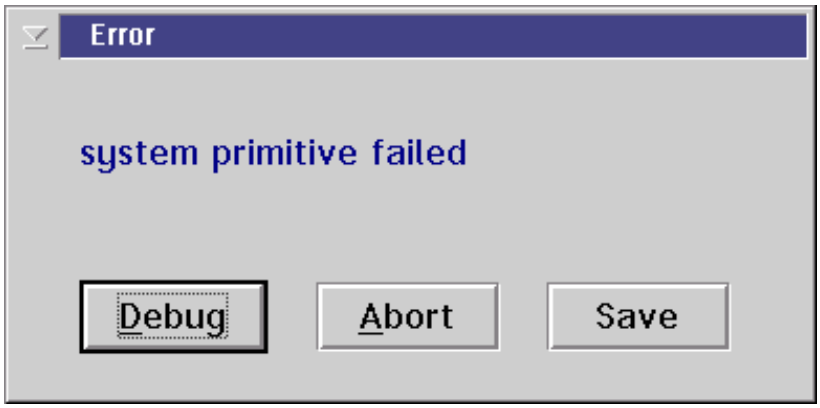
- Data files
  - CSV
  - STDF family



Several reports and data file format are available during running of the Test Exec . These will be covered in more detail in the Administration Section of the training .

Test Exec Messages

- Normal messages
- Error messages
- Software error display
- Service Request



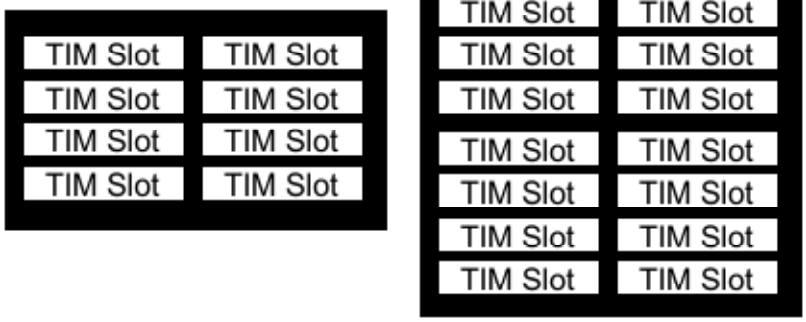
During the running of the Test Exec, the normal messages and error messages will be display in the RI System message window. In an unlikely event a software error occurs, the "Error" dialog box appears as shown above. When this happens, click **Save** to record the details of the error to a log file. Now create a Service Request by starting the Test Exec again and select "Service Request" from the "File" Menu. This guides you through providing a description of the request and it automatically builds a .Zip file containing the active Device, Device Interface, Test Fixture, and Tester as well as the Test Plans being used by the Test Exec. This file can then be sent via e-mail to support@roos.com for assistance.

Test Head Configurations

TIM

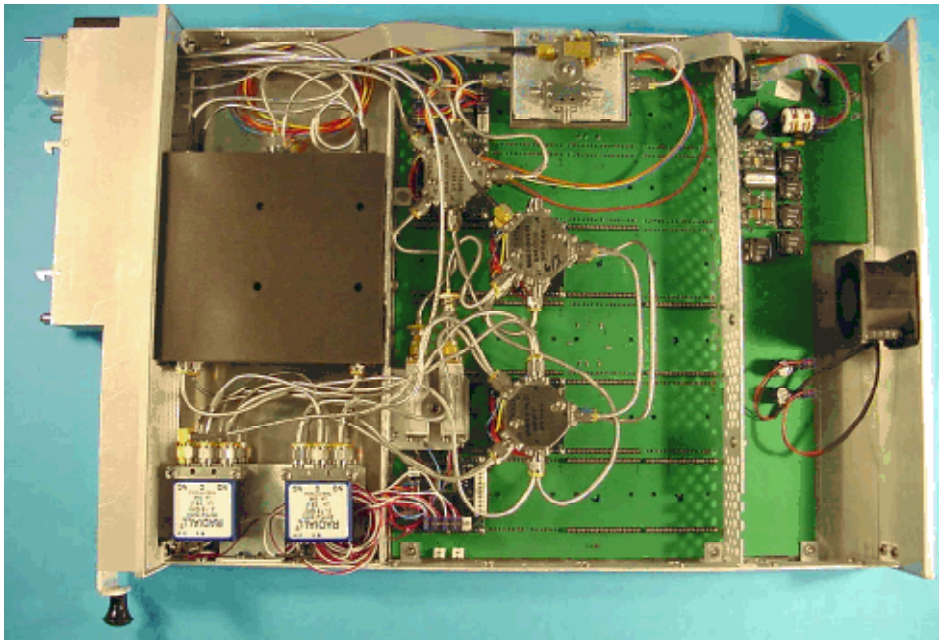
16 Slot

8 Slot

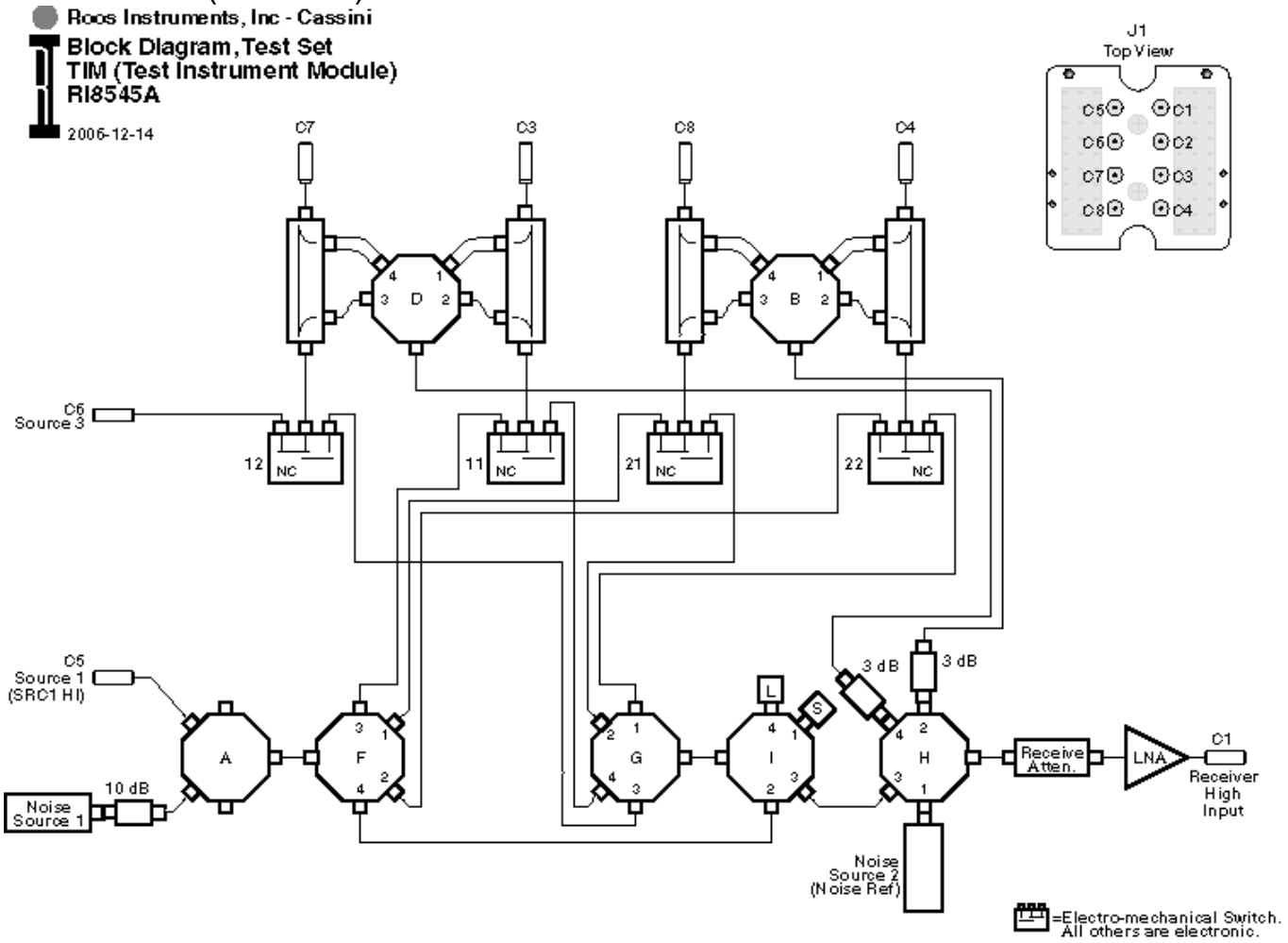


Testset TIM (Tester Instrument Module)

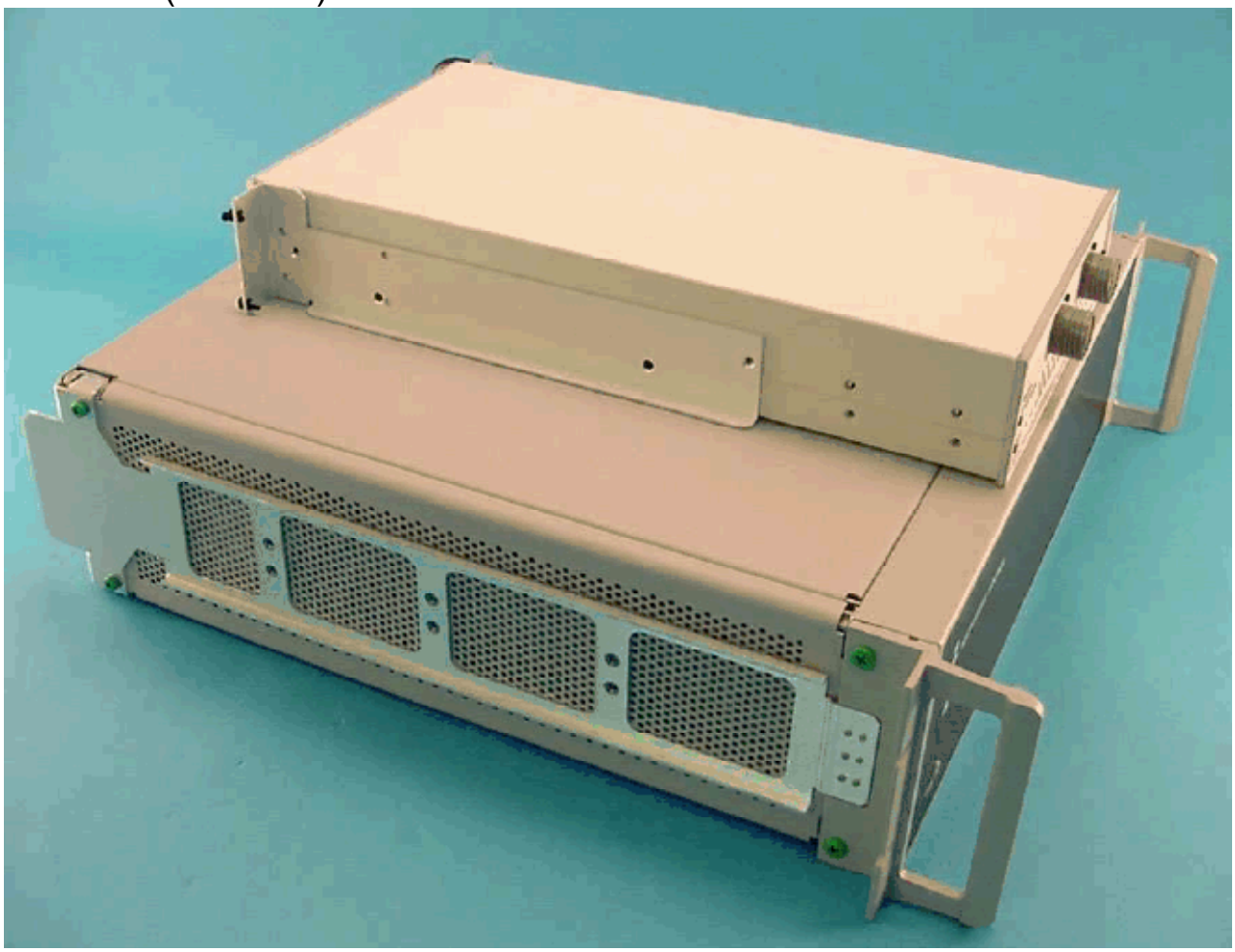
4 ports
External CW Synthesi
External DMSG
External Receiver
20 GHz RF Testset
Same Hardware as RI7100A RF



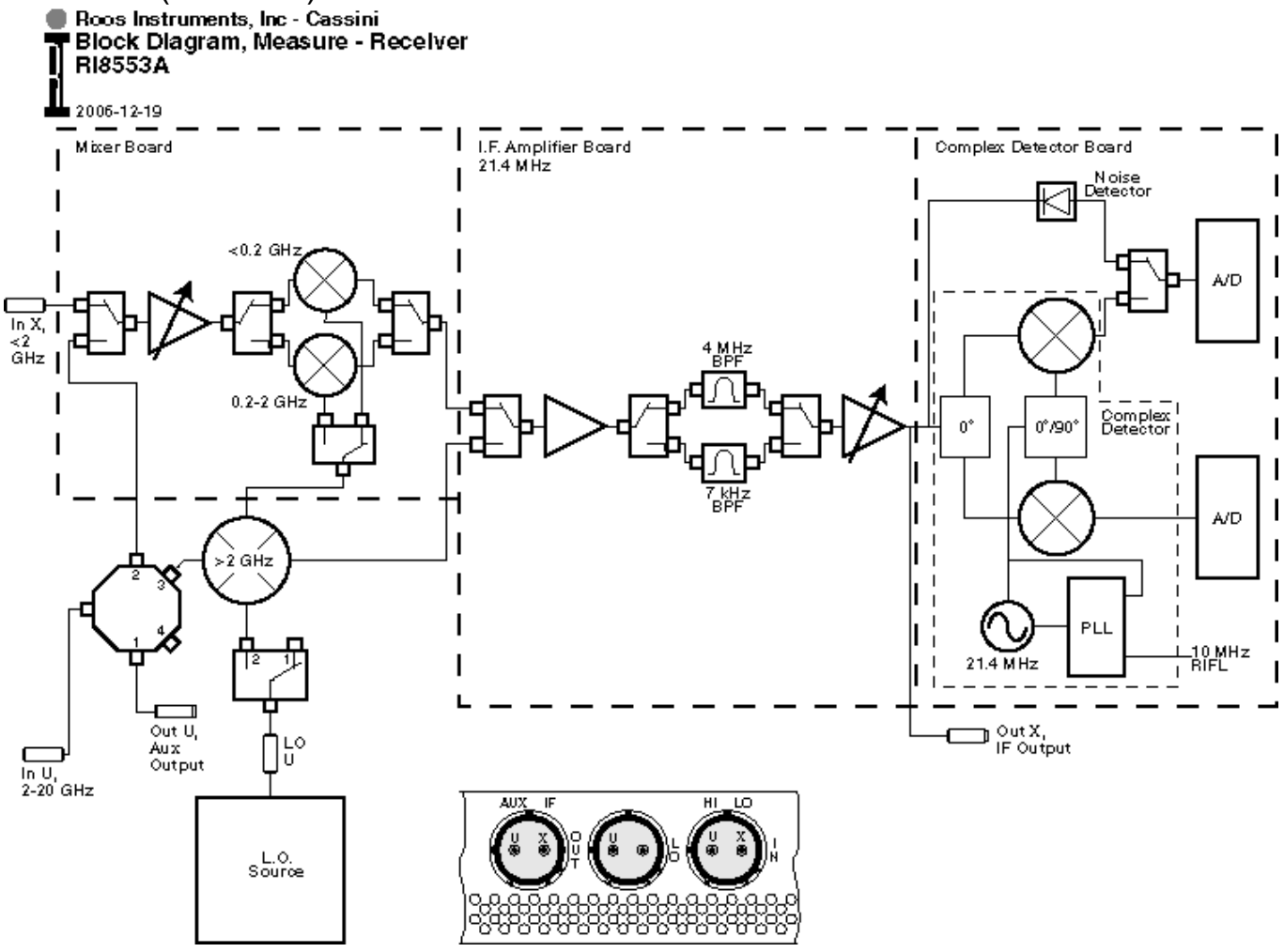
Testset TIM (RI8545A)



Receiver (RI8553A)



Receiver (RI8553A)

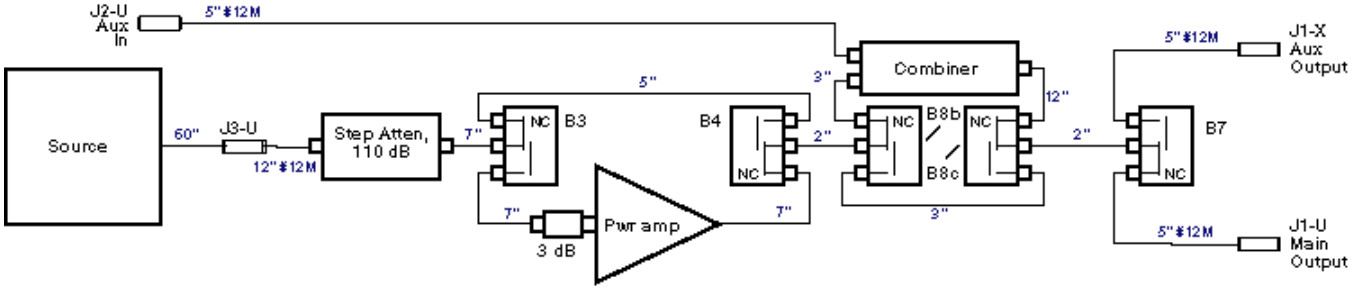


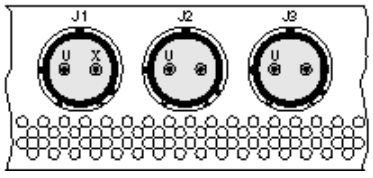
Source and Amp Attenuator Picture (RI8555A)

Source and Amp Attenuator Block Diagram (RI8555A)

Roos Instruments, Inc - Cassini
Block Diagram, Source/Amp Attenuator
RI8555A

2006-12-14

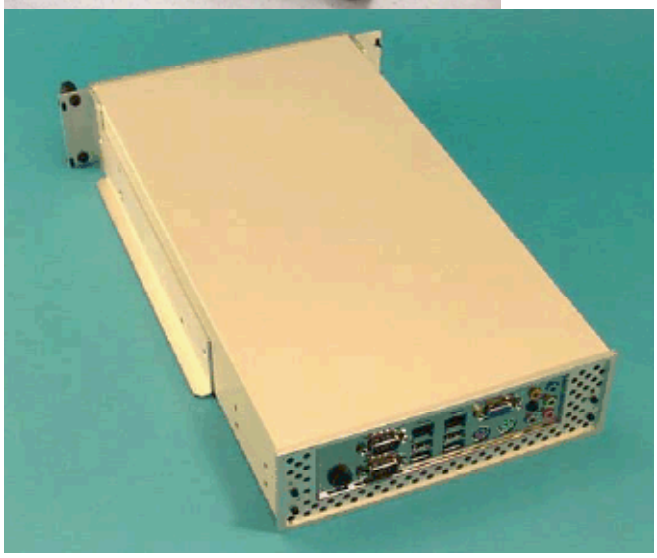


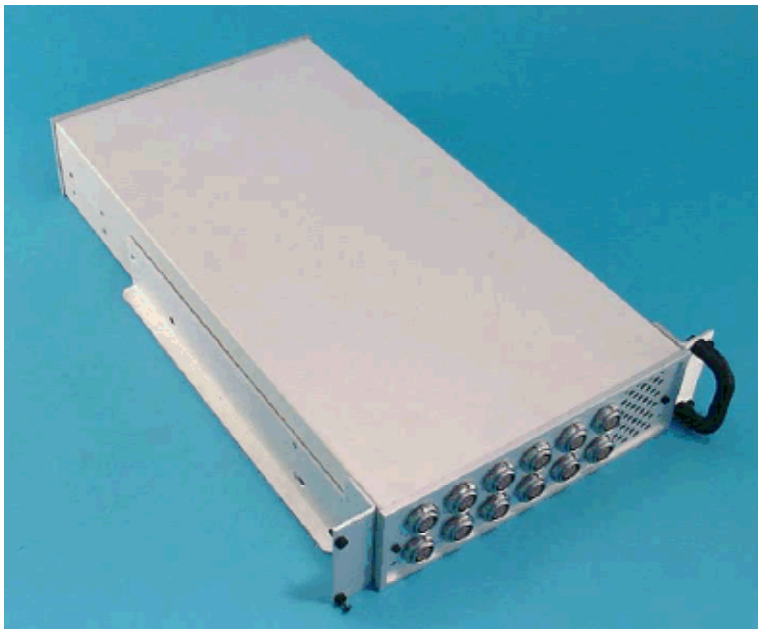


Unless otherwise noted, all cables are SMA, and all cables are M-M.

Small Cassini Infrastructure (RI8556A)

Includes Rack, Testhead clock, Manipulator, System Controller (1 .7 GHz Pentium PC), Power Supplies

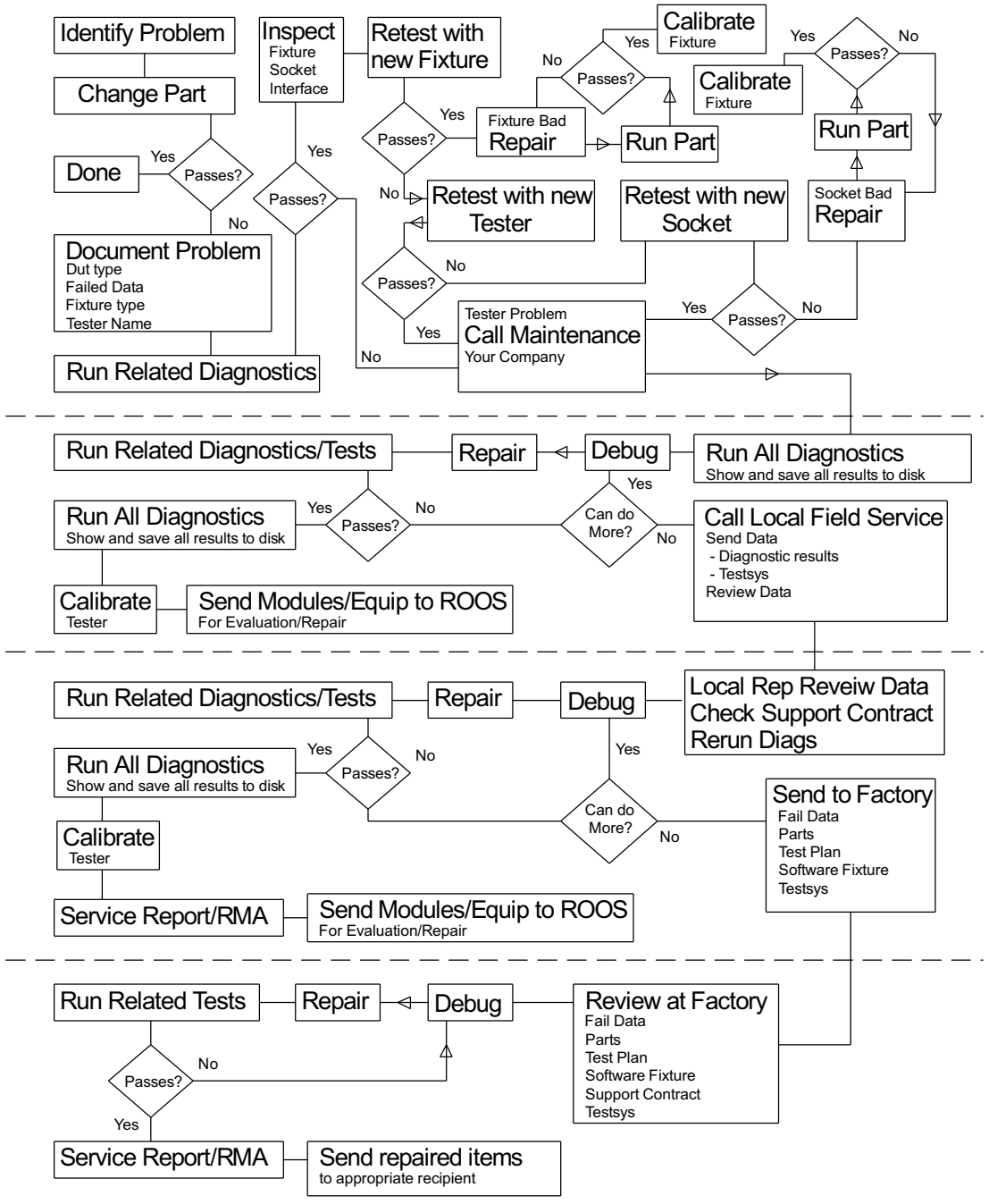




The System - Troubleshooting

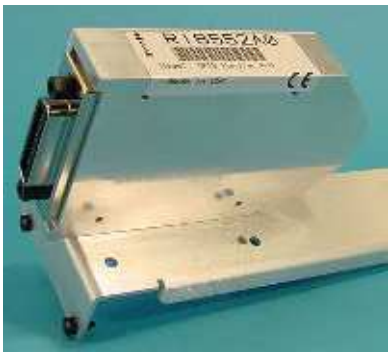
Revised: 01/15/2007 Topic(s): Admin Doc ID:RBEH-6XGV4D

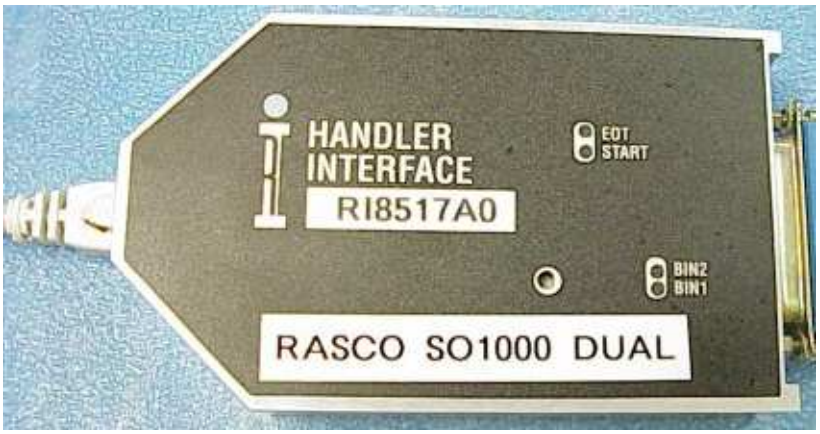
This general procedural document is to be used in the diagnoses and communication of system problems.



Handler Issues

- Handler cable wiring
- Handler Pod defines unique settings for a handler
- Signals exchanged by handler and system
  - Start test
  - End test
  - Bin part





The Hander Pod is configured at the factory and its configuration stored on the device iteslf. Hander Pods are available with different interface options: Parallel (RI8517A1), Serial (RI8516A1), or GPIB (RI8552A0). Handler issues are generally resolved by checking the connection between the handler and the RI ATE System or a re-configuring the handler. A ground wire may be necessary between the test system and the handler to prevent power spikes that the handler or tester misreads as a signal

Fixture Issues

- Auto-detection depends on serial number
- Fixture and DUT I/F have serial chip
- If both are new, Fixture must be "taught" before DUT IF
- Connector Hygiene

A RI Test Fixture typically has a serial ID stored as embedded flash that has a unique serial number that comes pre-programmed from the factory. The RI System Software reads this ID on system Startup and will attempt to locate a Test Fixture software file that matches that ID. If a Test Fixture file is found the RI Software will activate that Test Fixture File.

The RI System Software has the same auto detect feature with the Device Interface and can locate a specific Device Interface file bases on the ID read from the physical DUT board serial ID embedded flash.

The Test Exec when executed will check if the current Test Plan is able to use the active Test Fixture and Device Interface and give a warning message if there is not a match for either.

It is a good idea to always visually inspect the Test Fixture connectors prior to connecting to the ATE system looking for any damage or contamination.

GPIB Instrument Issues

- GPIB cable length limit
- Don't extend GPIB cables to make a longer run
- Instrument made "inactive" if it fails at Startup
- GPIB instruments must have a unique address
- GPIB address must match stored address in Tester software object

If there are any non-RI instruments that have been added to the RI ATE System that are controlled through the general purpose GPIB bus, then an inspection of the connections should be routinely made. These types of instruments have a tendency to be a shared resource and therefore the probability of an error being introduced is greater every time the instrument is reconnected. When a GPIB instrument is selected to be available to the system, a system startup should be executed to check if the instrument is connected correctly and it's GPIB address is correct. If there is any issue with the GPIB programming of the instrument, it will be marked "Inactive" and a warning message will be placed in the Message Window.

If there is a GPIB issue always check:

- The GPIB Address
- That there is no "Daisy Chain" of the GPIB Cables
- The correct driver was selected

Administration Tasks - System Software Errors & Recovery

Revised: 01/15/2007 Topic(s): Admin Doc ID:RBEH-6XH5KY

Execution Error Halt

- System software Error dialog box display
- Click "Save" to build vRtError.log file
- vRtError.log file is located in D:\RiApps\Testexec
- Perform a System "Reset"
- Send the vRtError.log file to Support@Roos.com

1) When an Error Dialog box appears select **Save** and E-mail Support@Roos.com the vRtErroor.log file located in the D:\RiApps\Testexec directory, that is automatically created by the error dialog box save command. This will assist Ri Engineers in recreating the conditions of the issue.

2) Now select the **RI Message Window** then select **System** and **RESET**.
This will reset all the system variables and terminates multi thread processes, if a hardware error exists, you must first clear the hardware error and then repeat the reset process.

3) Attempt your application again, if the issue persists, **contact RI Support.**

4) If error occurs while you are running Testplan or Test Exec, please utilize the Service Request automated script, located in the **File** pull down menu. This guides you through providing a description of the request and it automatically builds a zip file containing the active Device, Device Interface, Test Fixture, and Tester as well as the Test Plans being usedby the Test Exec. This file can then be e-mail to Support@Roos.com for assistance.

Software Recovery - First

- If System is not responding
- Press & Hold **Ctrl** Key and Press the **Break** Key
- RI System will halt and display Error dialog box
- Click **Abort** to close the Error dialog box
- RI Message Winodw menu Select **System** & **Reset**
- Attempt your application again, if the issue persists, send the vRtError .log file to Support@Roos.com
- RI Message Winodw menu Select **System** & **Quit**
- Select **Yes** to close RI System Software Image
- Restart RI System Software

The RI 7100A System software is a very robust mature product that is extremely stable and should run for months without a need to reboot the System Controller. In the event that a hardware issue is not resolved it may become necessary to interrupt the running RI software image.

1) Press and Hold the **Ctrl** Key and then Press and Hold the **Break** Key. This will halt any running RI Application program and display an Error Dialog Box.

2) Select **ABORT** to close the Error Dialog Box

3) Select the **RI Message Window** next select **System** and then **Reset**.

   This will reset all the system variables and terminates multi thread processes, if a hardware error exists, you must first clear the hardware error and then repeat the reset process starting at 1).

4) Attempt your application again, if the issue persists, repeat line number 1) and when the Error Dialog box appears select **Save**

5) E-mail support@roos.com the vRtError.log file located in the D:\RiApps\Testexec directory that is automatically created by the error dialog box save command. This will assist Ri Engineers in recreating the conditions of the issue.

6) Now select **the RI Message Window** then select **System** and **Quit**.

7) You will get dialog box that ask's are you sure? you answer **YES** and The RI Application environment will terminate.

8) Restart the RI System Software and follow the standard startup procedure.

Software Recovery - Second

- If System is not responding to **Ctrl** & **Break**
- Press & Hold **Ctrl** Key and Press the **Esc** Key
- OS/2 System will display Window List dialog box (may take many seconds to respond)
- RMBC on **RI RFIC Test Environment** and select **Close**
- Select **Yes** to close RI System Software Image
- Restart RI System Software

The IBM OS/2 operating system is a very robust mature product that is extremely stable and should run for months without a need to reboot the System Controller. In the event that a hardware or RI system software issue is not resolved it may become necessary to interrupt the frozen RI system software and have the OS/2 operating system terminate it's operation.

1) Press and Hold the **Ctrl** Key and then Press and Hold the **ESC** Key. This will initiate an OS/2 operating system check and after many seconds a Window List (system process) dialog box will be displayed.

2) RMBC (Right Mouse Button Click) on the **RI RFIC Test Environment** then select **Close** from the pop-up menu.

2) Click **Yes** to terminate the RI System software.

3) Once the system monitor goes to zero, restart the RI System Software.

Software Recovery - Last Choice

- If OS/2 System is not responding to **Ctrl** & **Esc**
- Press & Hold **Ctrl** & **Alt** & **Delete** Key
- This will **REBOOT** the system controller
- Restart the system controlle and the RI System Softwar

The IBM OS/2 operating system is a very robust mature product that is extremely stable and should run for months without a need to reboot the System Controller. In the event that a hard operation system crash occurs, it becomes necessary to interrupt the frozen OS/2 system software and have the Bios terminate the operating system.

1) Press and Hold the **Ctrl & ALT** Keys and then Press and Hold the **Delete** Key. This will initiate a basic computer system reboot

2) Once OS/2 boots back up, start the RI System Software again.

NOTE : The RI System saves each part's test data after all of that part's tests have been performed.

Documenting Software Issues

If you find what appears to be a software anomaly (Bug), please help us make the product better by e-mailing support@roos.com or faxing the following information:

1) Description of the issue found

2) Procedure to duplicate the issue.

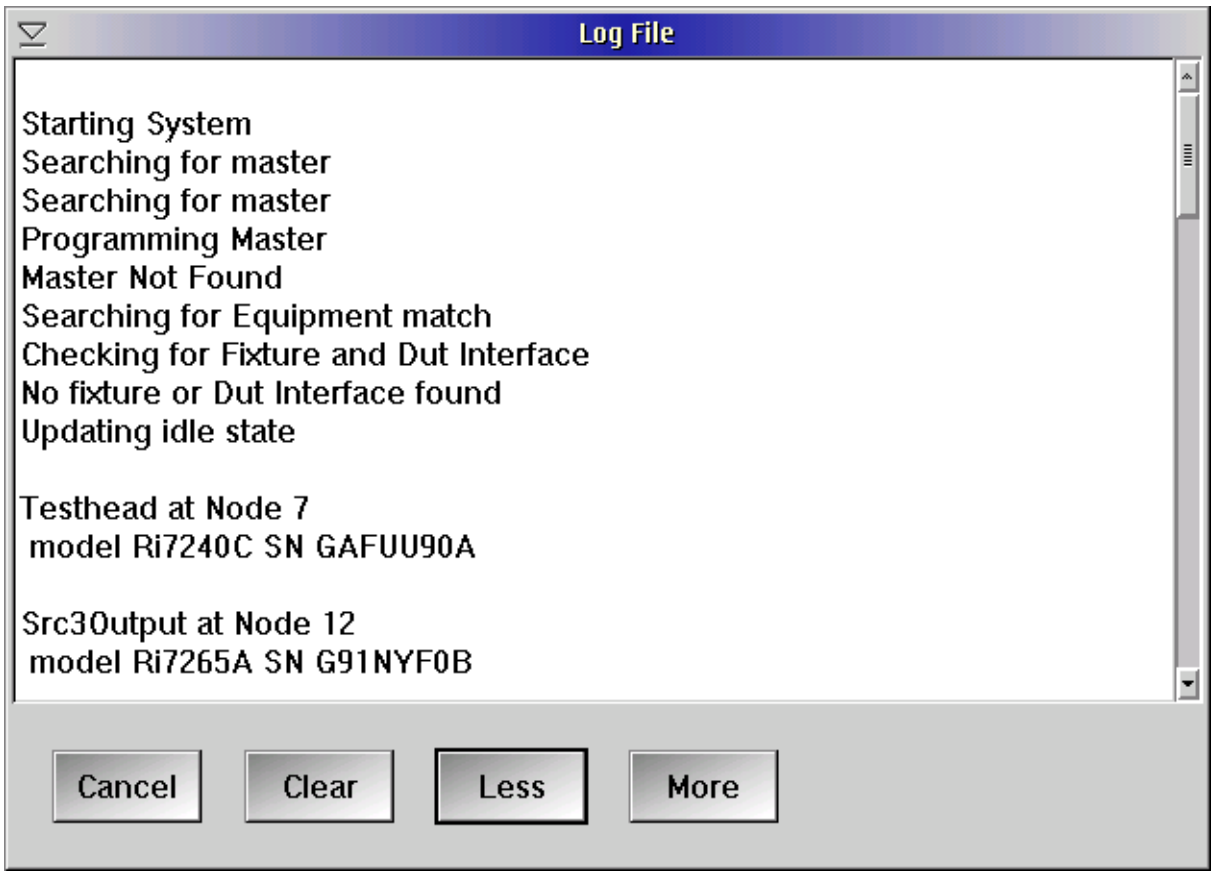
3) Txt copies of any error messages and the error save file vRtError.log from the RiApps\Testexec directory.

4) If error occurs while you are running Testplan or Test Exec, please use the Service Request automated script, located in the **File** pull down menu. This guides you through providing a description of the request and it automatically builds a zip file containing the active Device, Device Interface, Test Fixture, and Tester as well as the Test Plans being used by the Test Exec. This file can then be e-mail to support@roos.com for assistance.

Administration Tasks - Message Popup Window

Revised: 01/15/2007 Topic(s): Admin Doc ID:RBEH-6XH5L2

RI Software Message Window "Log File"



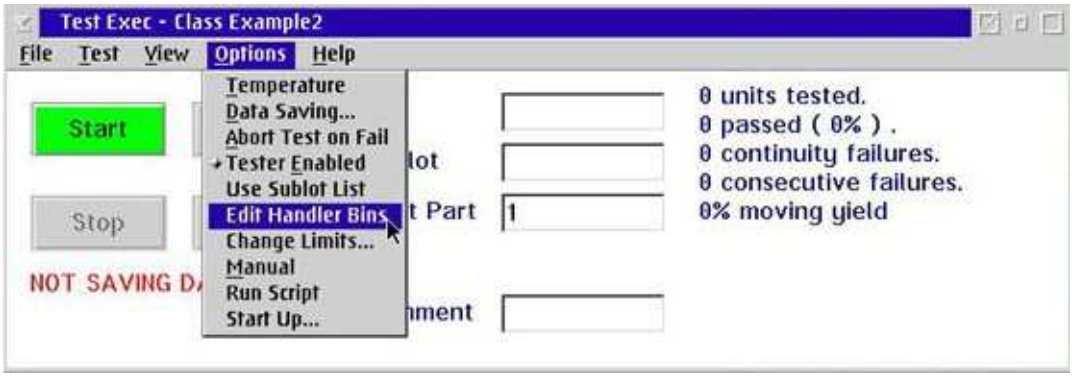
The RI System Software presents warning and error messages to this separate "log file" window that acts as the console for the RI System Software. This message window does not turn yellow when in Simulation Mode.

Administration Tasks - Handler Bin Definitions

Revised: 01/15/2007 Topic(s): Admin Doc ID:RBEH-6XH5KX

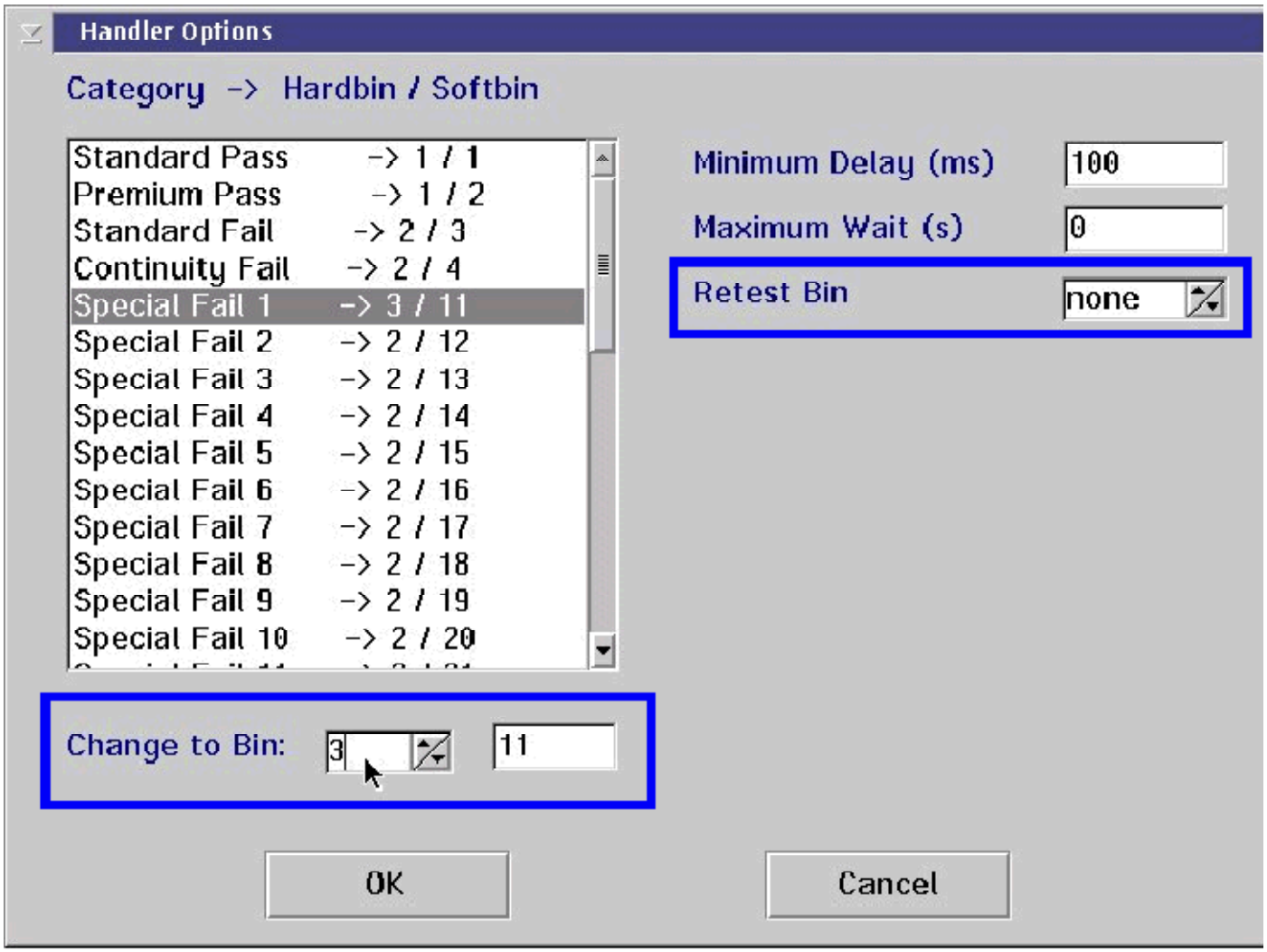
Set up Handler Bins

- **Choose "hard" or "soft" bin for each category**
- **Hard bin is the sort value sent to the handler**
- **Soft bin is stored in data logs (STDF)**
- **If using Retset Criteria, you should use a "re-plunge" capable hander**
- **Set the "retset bin" signal to cause a handler re-plunge**



Use the "Edit Handler Bins" item on the Test Executive "Options" pull down menu. The pop up window allows for setting of the actual handler hardware bins as well as RI software bins. These software bins allow for more granular characterization of the test data pass and fails on a test or group of test basis. For early RI 7100A systems, this information is contained in Handler Instruments panel.

Handler Bin Definitions



Set the "Hardware Bin" for each category of tested parts. The delay time the system waits until it looks for a valid start of test is user controllable in msec but normally set to 100 msec as a default. A maximum wait time is settable which will then prompt the operator providing options to force a test, abort, or continue to wait to allow for variation in handling times but provide a time-out in case the handler has a temporary error.

Handler Issues

- **Handler cable wiring**
- **Handler Pod defines unique settings for a handler**
- **Signals exchanged by handler and tester**
  - **Start Test**
  - **End Test**
  - **Bin Part**

The RI7100A and Cassini systems use plug-and-play Handler Interface Pods, no configuration is needed. These Pods contain a programmable ASIC that handles all the timing and signal level control to interface the system to any handler. RI supports many Handler Manufactures and we can always program a custom Pod for your handler. You will need to contact RI Support and furnish us with the handler programming manual to program the Pod at the factory. Some current supported handler manufacturers include: Atrium, Delta, Rasco, Multitest, Sekio-Epson, Soya, and Synax.

The wiring of the Handler Pod to the handler is the responsibility of the customer which is usually a custom cable that can contain some pull up resistors to supply digital control logic that is powered by either the Tester or the Handler for isolation reasons. Most handlers have an opto-isolator built into the tester interface that needs to be connected to Tester power through the interface cable. (see typical wire diagram at the end of the lesson)

Hander Pod Interface Troubleshooting

In the case of irregular handler operation, first check the custom cable that goes from the Handler Pod to the Handler's tester interface connection. Most handlers have an opto-isolator built into the tester interface that needs to be connected to Tester power through the interface cable. Use a volt meter to verify that the required voltages are present and that all the connections are made.

Make sure the Handler and ATE System are grounded to the same earth ground (same AC outlet) so that no ground potential exists between the Handler and Tester. If there is a possibility of ground potential, connect a 16 gauge or higher ground wire from the Handler Chassis to the ATE System's rack.

To test a Handler Interface Pod, connect the pod using the supplied RIFL II cable to the “HANDLER” connector on the Testhead and the handler to the pod with your custom handler cable.

If you have an “Monitor Handler Interface” (M6XHRF1A), you should attach it to the Handler pod and connect the handler to the Monitor.

Do a system startup.

From Message window, select “Test”/”Equip” to open the Equipment Pool window.

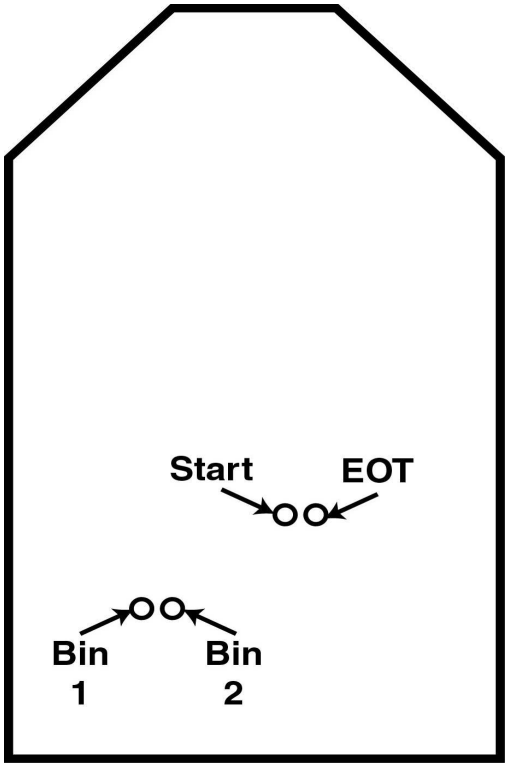
From Equipment Pool window, select “Nodes”/”Control Modules” to open the Module Browser window.

In the Module Browser window, in the left section find and highlight the Handler Interface Module “XXXXXXXX Name” (Name would be the name of the handler, "Delta" for example).

In the middle section highlight “Handler”

In the lower section there are 3 boxes in the lower left. These will be used to control the Handler pod signals and provide a way to test the control logic with the Handler attached.

Hander Pod Interface Troubleshooting



If you do not have a RI M6XHRF1A Monitor Handler Interface, you can check bins 1 and 2 as follows: Send a Bin and EOT signal to the handler by selecting the box marked “PULSE BIN”. In the “Choose” window, select a Bin (1 or 2). You can see the Bin and EOT lights flash.

If you have a RI M6XHRF1A Monitor Handler Interface, you can check bins as follows: Connect the Monitor Handler Interface. Send a Bin and EOT signal to the handler by selecting the box marked “PULSE BIN”. In the “Choose” window, select a Bin. You can see the Bin and EOT lights flash on the Monitor Handler Interface (and on the handler pod for bins 1 and 2).

If you have a means of sending a start signal to the handler pod, you can test if the handler is sending a start test signal to the ROOS system use the box marked “WAITFORSTART”. To use this feature click on the box. In the “Choose” window, select a Bin. This Bin number will be sent from the ROOS tester to the handler after the handler pod receives a start test from the handler. Enter 1 for “How many to run”. The ROOS system will now display in the main message window “waiting for start” and wait for a start of test signal from the handler. When the ROOS receives a start of test signal it will send the selected Bin and EOT to the handler.

Hander Pod Interface Troubleshooting

Connections for RI8503A0 Handler interface

25 Pin Female D Sub type

Connection	Function	Circuit type
Pin1	Bin1	Open Collector Output
Pin2	Bin2	Open Collector Output
Pin3	Bin3	Open Collector Output
Pin4	Bin4	Open Collector Output
Pin5	Bin5	Open Collector Output
Pin6	Bin6	Open Collector Output
Pin7	Bin7	Open Collector Output
Pin8	Bin8	Open Collector Output
Pin10	Start Test	TTL Input
Pin11	+V(H)	Handler +V for Pull Up SEE NOTE 1
Pin12	GND	Ground
Pin13	+5V	System +5V
Pin14	On RI8503A0 is +5V	System +5V
Pin15	Input2	Misc. TTL Input, not used
Pin16	Input3	Misc. TTL Input, not used
Pin17	Input4	Misc. TTL Input, not used
Pin22	Bin9	Open Collector Output
Pin23	Bin10	Open Collector Output
Pin24	Bin11	Open Collector Output
Pin25	EOT	Open Collector Output

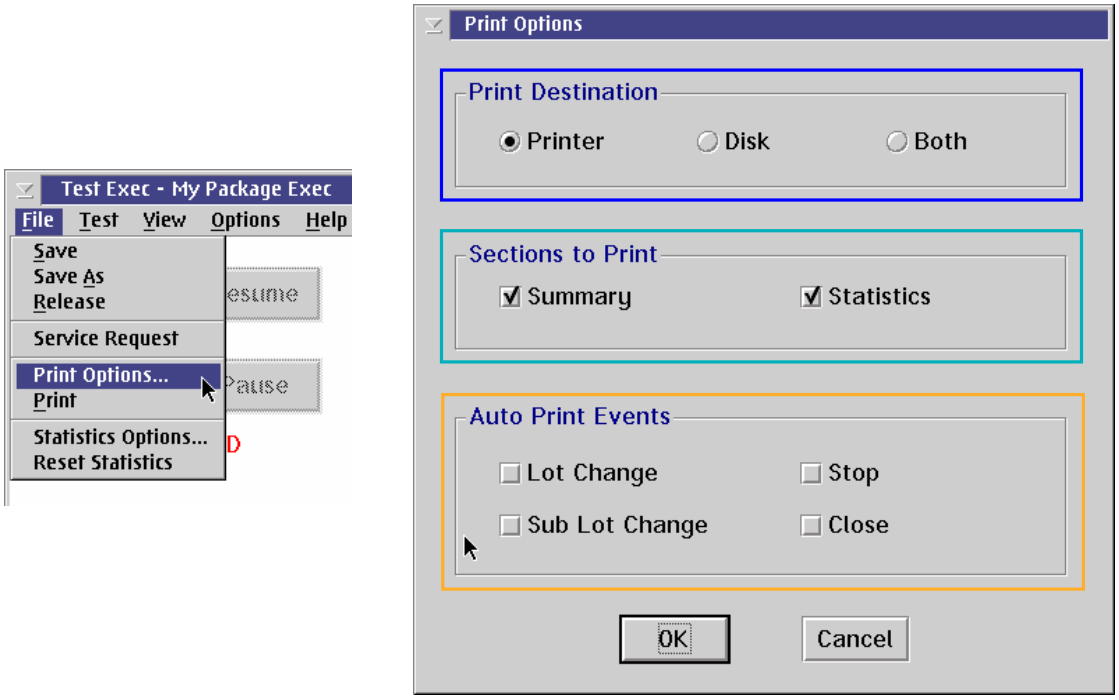
NOTE 1. Pin 11 MUST EITHER be connected to the +V from the handler or Pin 13(or Pin 14)

Administration Tasks - Test Exec Summary Reports

Revised: 01/15/2007 Topic(s): Admin Doc ID:RBEH-6XH5KZ

Test Exec Summary Reports

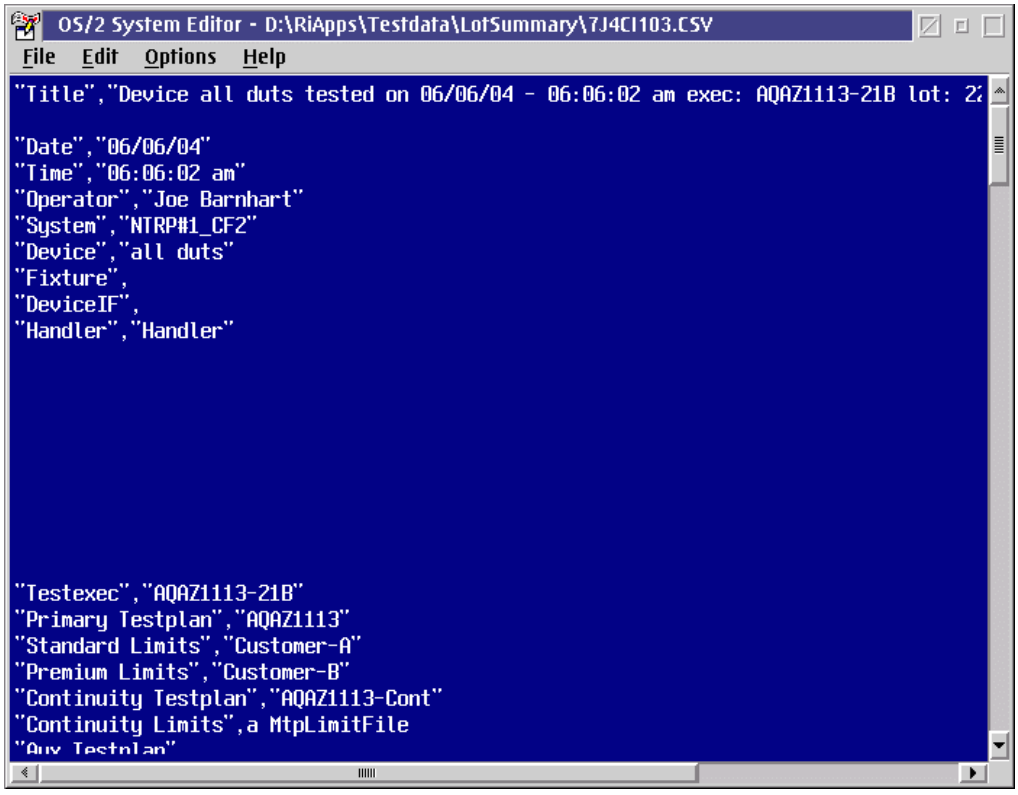
The RI Test Exec has numerous summary reports that can be printed automatically or sent to a disk file.



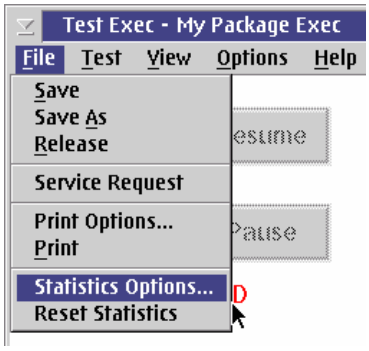
These summary reports can be programmed to automatically be printed/saved upon and operator pushing the Stop Test button, changing the Lot code, changing the Sub Lot code, or upon closing the Test Executive window itself. This is very useful as a traveler with the actual devices as they go through the manufacturing flow. The amount of data generated can be just the DUT statistics or a summary of the complete run.

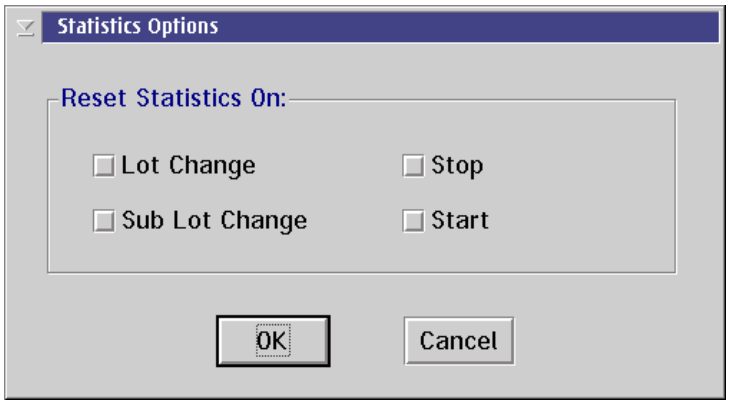
Test Exec Summary Report File

A tabular spreadsheet style report can be printed automatically or can be sent to the disk. This report contains all the pertinent info in regards to the test being executed: Date, Time, Operator, System ID, Device is use, Test Fixture and Device interface correction files in use, handler type, Test Exec and Test Plan with associated limit files.



Test Exec Statistic Reports





A view in a tabular spreadsheet style report that contains statistics of the test data generated can be sent to the disk and automatically manipulated. The data statistics calculations can be automatically reset on given events: A Lot Number change, Sub Lot Number change, and an operator initiated Stop or Start.

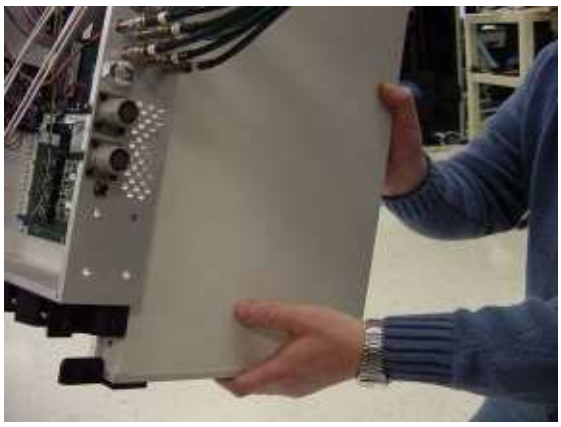
Administration Tasks - Exchanging Cassini Modules

Revised: 01/15/2007 Topic(s): Admin Doc ID:RBEH-6XH5L3

Cassini Test Instrument Module (TIM) Exchange

Cassini Test Instrument Modules (TIMs) can be easily removed while the system is powered without causing damage. Simply pull the handle at the top of the TIM to power it down and prepare it for removal. Remove the module by securly grabbing the module's side, then pulling the lower handle to release it from the Test Head.


TIMs can be just as easily replaced by sliding the module up into the slot until you hear it click. Then push in the top handle to power up the modules. The system may take up to 20 seconds before the new module is detected and can be used by the system.




Maintenance - Daily

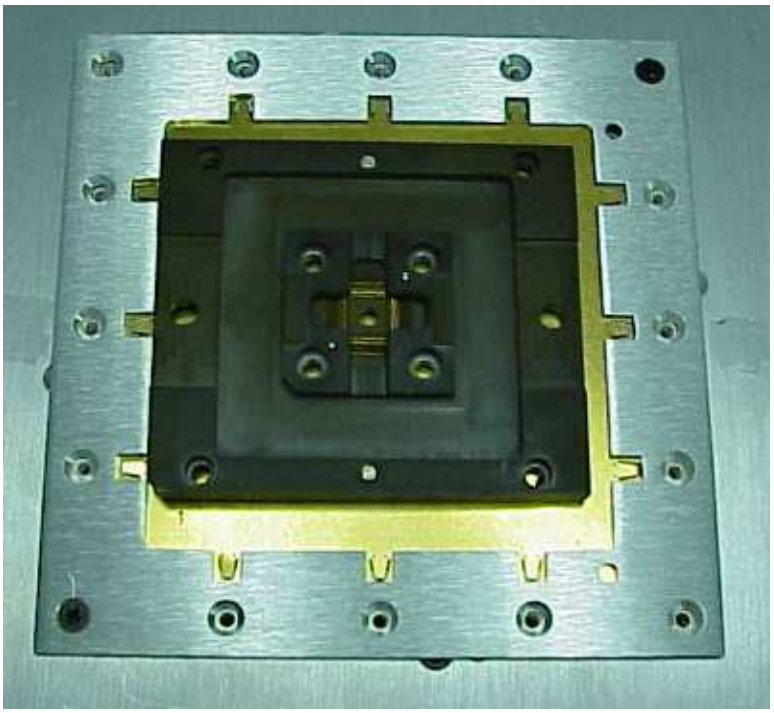
Revised: 01/15/2007 Topic(s): Admin Doc ID:RBEH-6XH5KU

Roos Instruments recommends that the following Preventive Maintenance Procedure be carried out once a day to keep the Cassini or RI 7100A ATE System at its peak performance.

1) Visually inspect the Test Socket and Load Board connectors. Look for any physical damage, bent pins or fingers, and contamination such as dirt, metal flakes, etc. If all looks good then continue on at step 4.

2) If any contamination looks to be present, carefully clean the socket with alcohol and blow dry with compressed air. If all looks good now, then continue on at step 4.

3) If the contamination is not removable or there is physical damage, the Test Fixture with the suspected socket or board should be brought down for maintenance. It may be necessay to replace the failing socket or load board assembly.

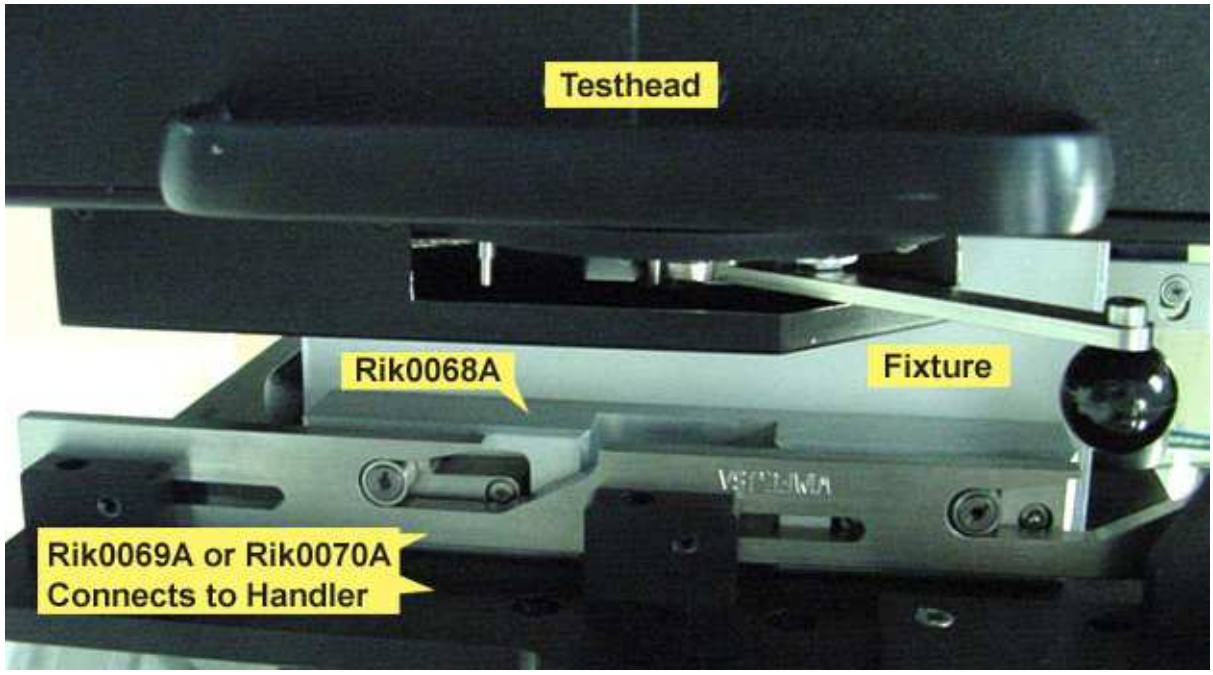


4) Visually inspect all of the Microwave connectors around the Test Fixture/ATE System mateing surface and the Pogo Ring. This is located on the bottom of the Test Fixture. Look for any physical damage, bent pins or damaged connectors, and contamination such as dirt, metal flakes, etc. If all looks good then continue on at step 7.

5) If any contamination looks to be present, carefully clean the connector with alcohol and blow dry with compressed air. If all looks good now, then continue on at step 7.

6) If the contamination is not removable or there is physical damage, theTest Fixture should be brought down for maintenance. It may be necessay to replace the failing connector/cable or PC Board assembly.

7) Visually inspect all of the Docking Hardware around the test head Pogo Ring. Look for any physical damage, bent pins or any misalignment, and contamination such as metal flakes. If all looks good then continue on to step 10.



9) If the contamination is not removable or there is physical damage, the system should be brought down for maintenance and a service call requested. It may be necessay to replace the failing docking assembly.

10) If all looks good, then run some know devices through the setup to check for correlation.

Maintenance - Weekly

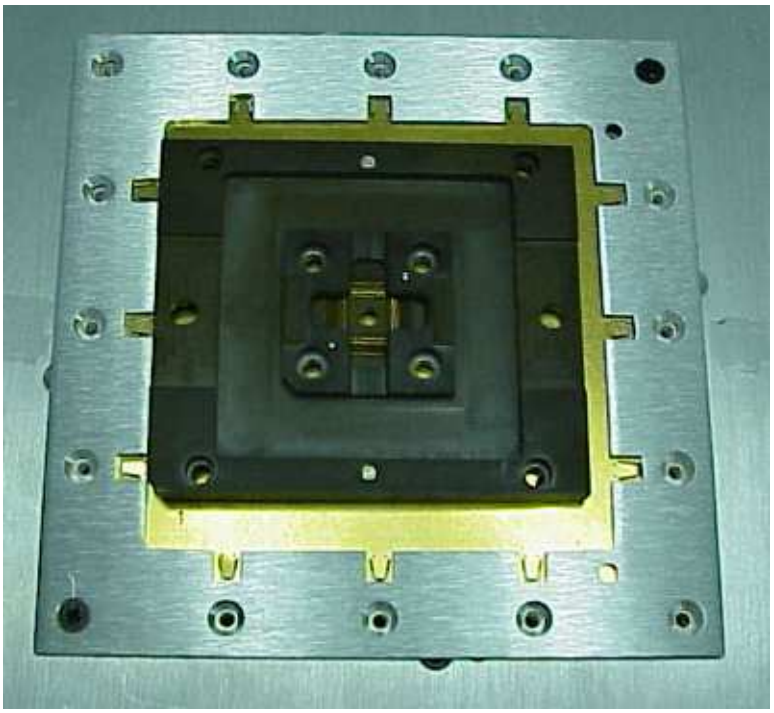
Revised: 01/15/2007 Topic(s): Admin Doc ID:RBEH-6XH5KV

Roos Instruments recommends that the following Preventive Maintenance Procedure be carried out once a week to keep the Casini and RI 7100A ATE System operating at peak performance.

1) Visually inspect the Test Socket and Load Board connectors. Look for any physical damage, bent pins or fingers, and contamination such as dirt, metal flakes, etc. If all looks good then continue on at step 4.

2) If any contamination looks to be present, carefully clean the socket with alcohol and blow dry with compressed air. If all looks good now, then continue on at step 4.

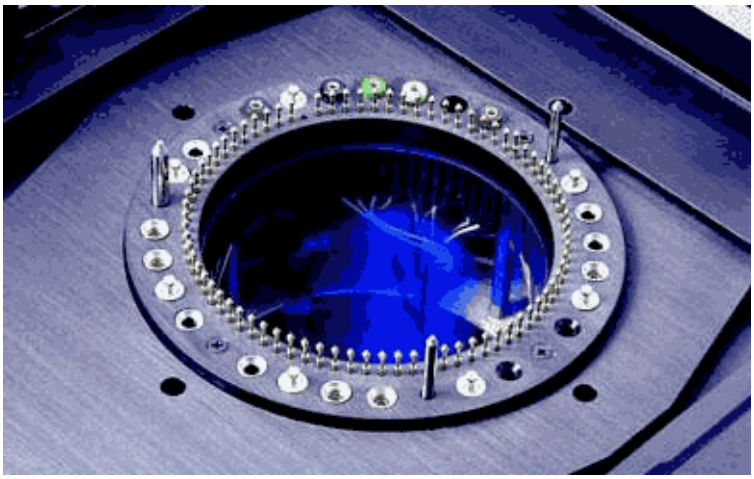
3) If the contamination is not removable or there is physical damage, the Test Fixture with the suspected socket or board should be brought down for maintenance. It may be necessay to replace the failing socket or load board assembly.



4) Visually inspect all of the Microwave connectors around the Test Fixture/ATE System mateing surface and the Pogo Ring. This is located on the bottom of the Test Fixture. Look for any physical damage, bent pins or damaged connectors, and contamination such as dirt, metal flakes, etc. If all looks good then continue on at step 6.

5) If the contamination is not removable or there is physical damage, theTest Fixture should be brought down for maintenance. It may be necessay to replace the failing connector/cable or PC Board assembly.

6) Visually inspect all of the Microwave connectors around the test head Pogo Ring. Look for any physical damage, bent pins or fingers, and contamination such as dirt, metal flakes, etc. If all looks good then continue on at step 9.



7) If any contamination looks to be present, carefully clean the connector with alcohol and blow dry with compressed air. If all looks good now, then continue on at step 9.

8) If the contamination is not removable or there is physical damage, the system should be brought down for maintenance and a service call requested. It will be necessay to replace the failing connector/cable assembly.

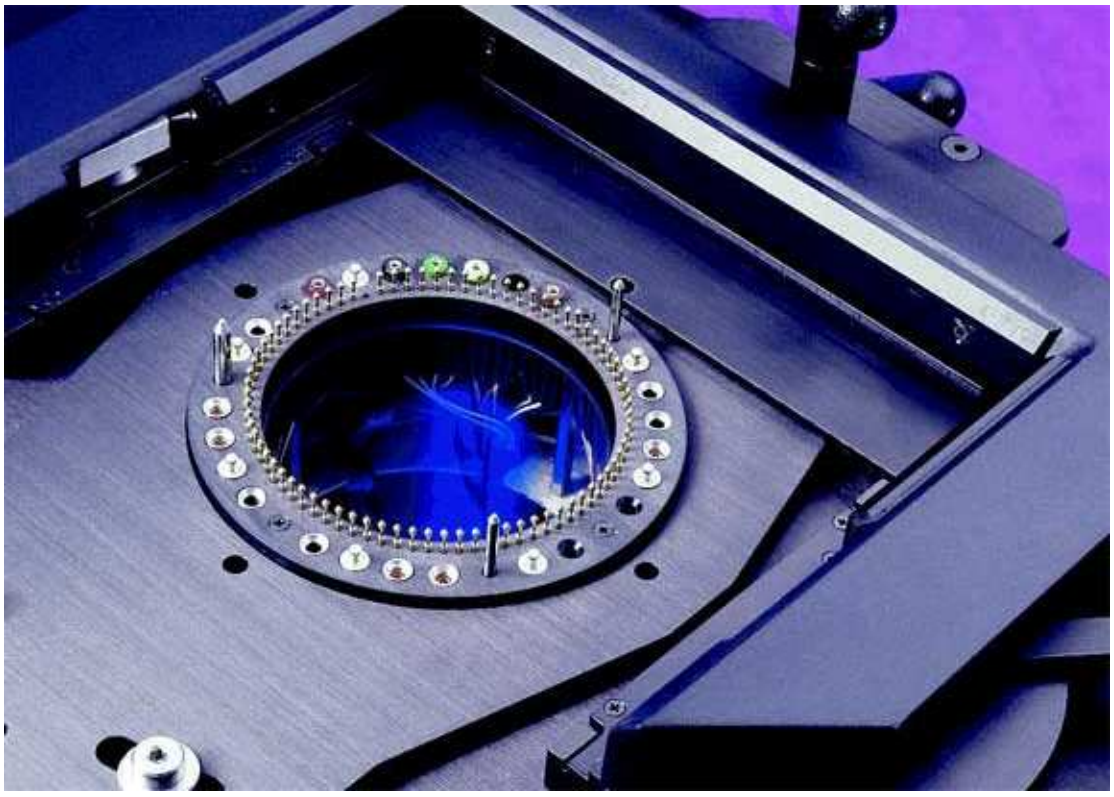
9) If all looks good then check the RIFL cable to the Handler Pod and inspect for any damage. Replace the RIFL cable if it is suspected of being damaged.

Maintenance - Monthly

Revised: 01/15/2007 Topic(s): Admin Doc ID:RBEH-6XH5KW

Roos Instruments recommends that the following Preventive Maintenance Procedure be carried out once a month to keep the Casini and RI 7100A ATE System operating at peak performance.

1) Visually inspect all of the Microwave connectors around the test head Pogo Ring. Look for any physical damage, bent pins or fingers, and contamination such as dirt, metal flakes, etc. If all looks good then continue on at step 4.



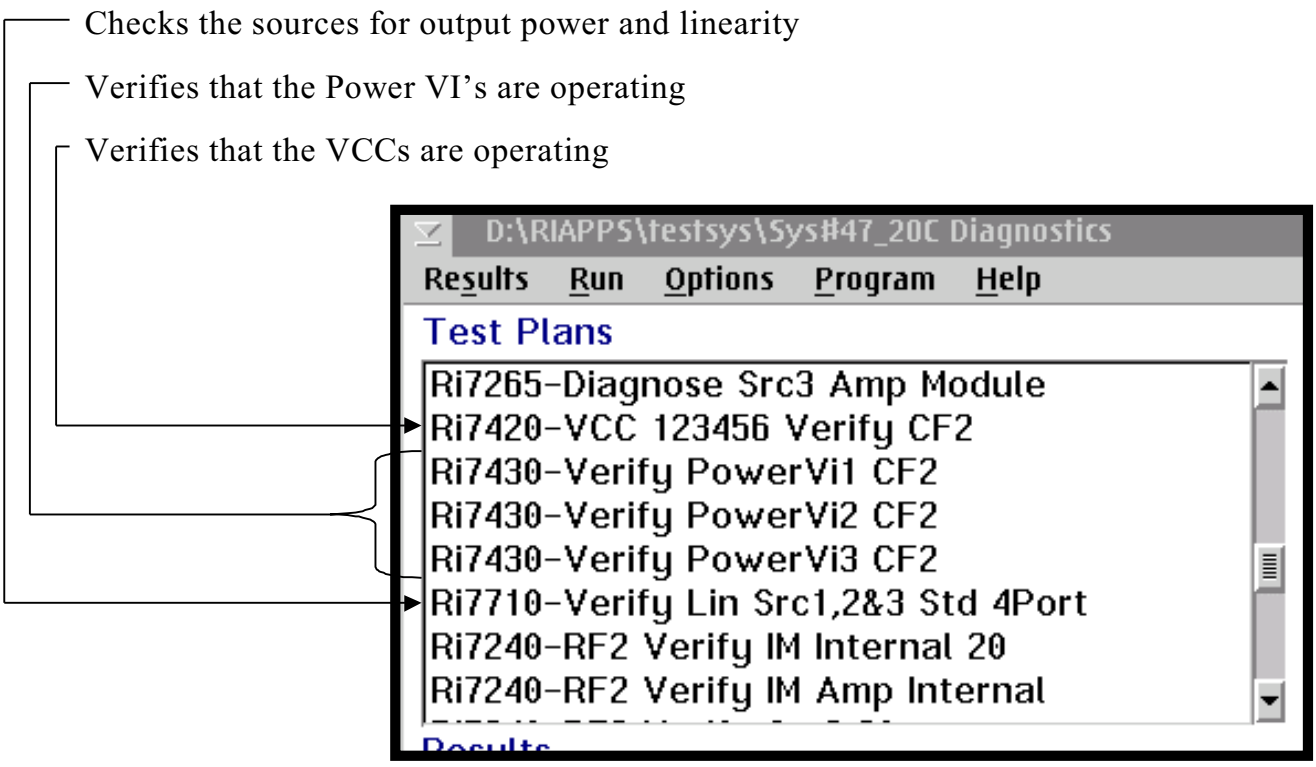
2) If any contamination looks to be present, carefully clean the connector with alcohol and blow dry with compressed air. If all looks good now, then continue on at step 4.

3) If the contamination is not removable or there is physical damage, the system should be brought down for maintenance and a service call requested. It will be necessay to replace the failing connector/cable assembly.

4) Connect the Calibration/Diagnostic Test Fixture to the RI Test Head using the (3) three guide pins in the RI Test Head to align the Calibration/Diagnostic Test Fixture with the RI Test Head. (Note: One of the guide pins is larger than the others.) Press the Fixture downward on to the Test Head and rotate the cam (locking) arms to hold the Fixture in place.

5) Perform a System Startup and read the "% Life Left" on the Test Head Relays in the RI Message Window. If the reading is 35% or lower the system should be scheduled for maintenance and a service call requested.

6) Perform the "System Verify Procedure". This will verify that the system is meeting it's calibrated perfromance specifications. If there are any failures, rerun that specific Verify and document the failure. The system should be scheduled for Calibration and a service call requested.

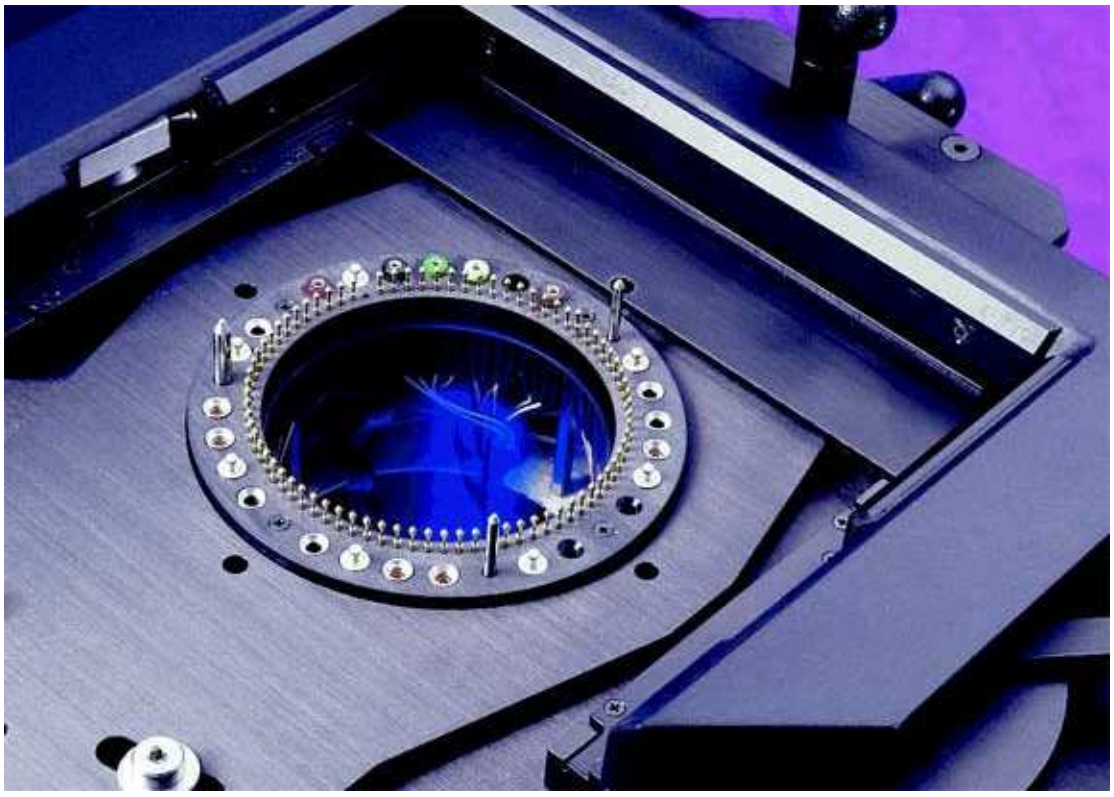


Maintenance - Bi-annual PMC

Revised: 01/15/2007 Topic(s): Admin Doc ID:RBEH-6XH5KT

Roos Instruments recommends that the following Preventive Maintenance Procedure be carried out once every six months to keep the Casini and RI 7100A ATE System operating at peak performance.

1) Carefully inspect all of the Microwave connectors around the test head Pogo Ring. Look for physical damage, bent pins or fingers, and contamination such as dirt, metal flakes, etc. If all looks good then continue on at step 5.

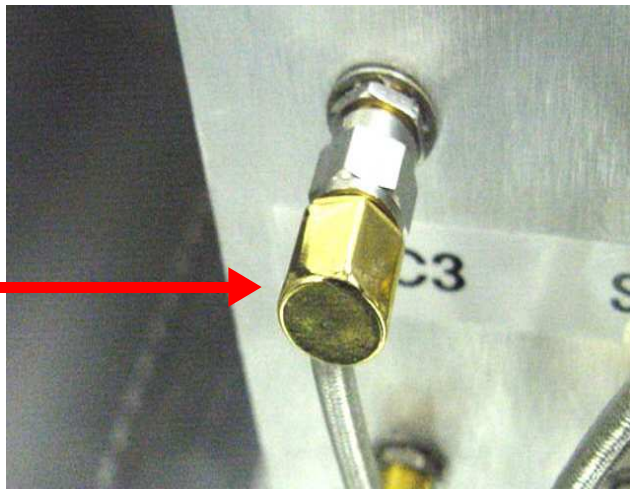


2) If any contamination looks to be present, carefully clean the connector with alcohol and blow dry with compressed air. If all looks good now, then continue on at step 5

3) If the contamination is not removable or there is physical damage, replace the failing connector/cable assembly. (see Connector Diagnostics section of Maintenance manual on how to replace Pogo Ring connectors)

4) Open the back of the system rack, inspect all the cable connections and check all SMA cable connectors for tightness.

- Always turn the coupling nut, do not spin the center conductor
- Do not twist the cable
- On rear panel cables, do not try to put a wrench on the gold trim cap



5) Clean the air filters on the back of all the RF sources per the RF Source Maintenance and Cleaning procedure.

6) Connect the Calibration/Diagnostic Test Fixture to the RI Test Head using the (3) three guide pins in the RI Test Head to align the Calibration/Diagnostic Test Fixture with the RI Test Head. (Note: One of the guide pins is larger than the others.) Press the Fixture downward on to the Test Head and rotate the cam (locking) arms to hold the Fixture in place.

7) Perform a System Startup and read the "% Life Left" on the Test Head Relays in the RI Message Window. If the reading is 35% or lower run the Diagnose Relays diagnostic test multiple times and consider replacing that relay.

8) Perform the "System Diagnostic Procedure". If there are any failures, rerun that specific Diagnostic and verify the failure. If you have sufficient resources, replace the most likely defective component and rerun the specific diagnostic.

Note: Contact Roos Instruments to report the failure and what work you performed.

RF Source Preventative Maintenance and Cleaning procedure

The RF sources have filters on the fans that require periodic inspection and cleaning. Even in a clean-room environment, the filters can become clogged with dust and debris. If this gets too thick, it can cause the source to run too hot, affecting the performance of the tester.

1) Open the back door of the tester and inspect the fans on all the RF sources. If there is dust or debris in the filters, proceed to step two.

2) With the system stopped (not running any tests), unplug the AC power cords at the sources to stop the fans.

3) Using a strong vacuum, vacuum the filters. Try to disturb the RF cabling as little as possible, to prevent performance changes in the tester.

   Note: NEVER use compressed air to clean the filters. This will embed the dust into the filter.

4) Using a soft-bristle brush, carefully brush dust off the plastic fan shield.

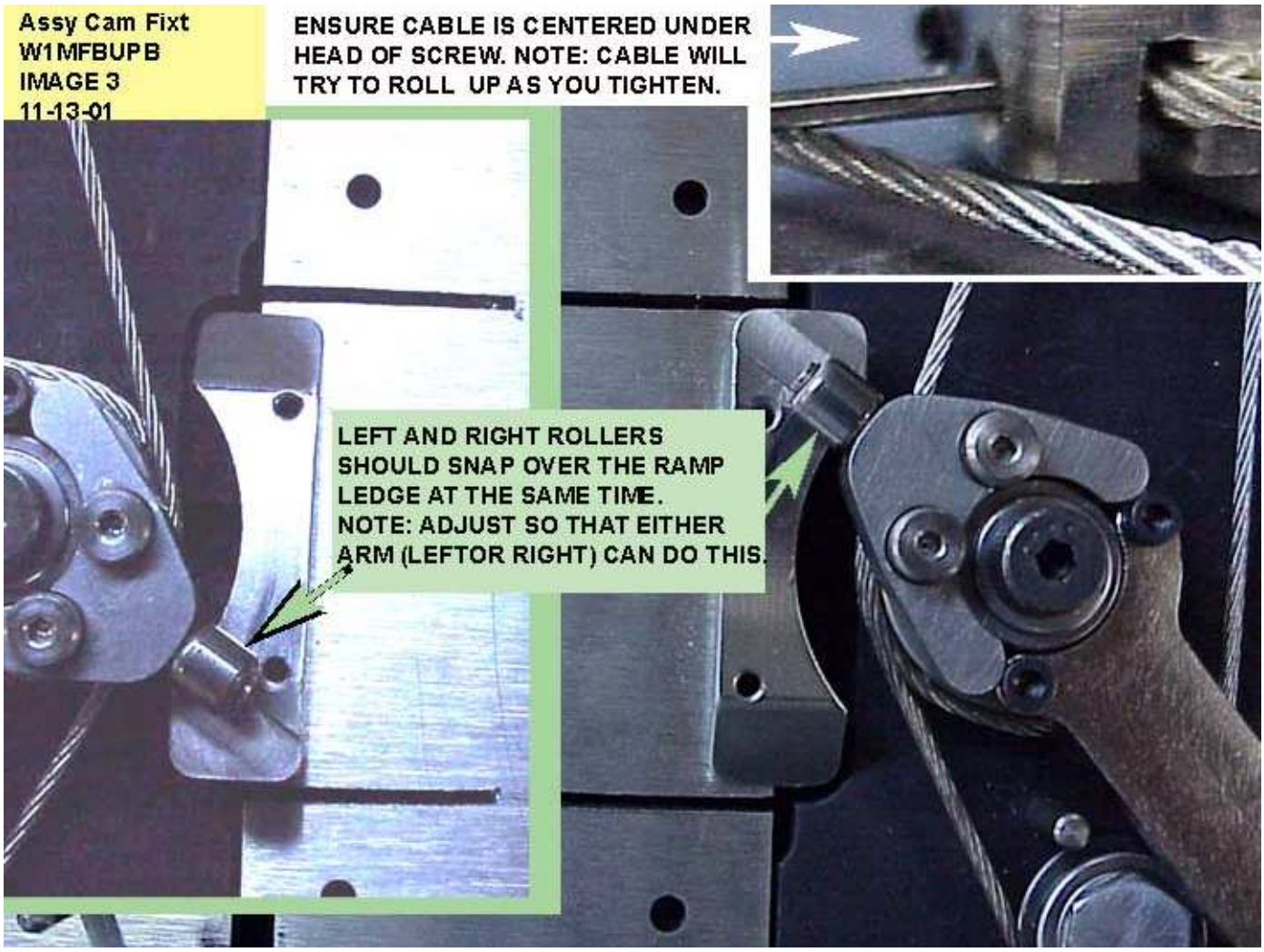
5) Plug the AC power cords back into the sources and perform a startup on the system. Confirm that the system is operating properly.

   Note: The LEDs on the sources will be red when the source is plugged in. After the system startup, they should be green.

Test Head Fixture Cam Assembly Preventative Maintenance

Install the Diagnostic / Calibration Test Fixture on the Test Head, lock it in place with the Cam Assembly and then carefully inspect the alignment of the left and right rollers of Test Head Fixture Cam Assembly. Look for both rollers to snap over the ramp ledge at the same time. Examine the condition of the rollers around the test head Pogo Ring. Look for any physical damage, bent pins etc., and contamination such as dirt, metal flakes, etc. If all looks, the PM is complete.

If the rollers are no longer aligned, remove the cover and adjust the cables so that the rollers are back in alignment. (See Photos below) Once the cover is removed inspect the cables for any damage. Repair or replace any damaged parts.



Calibration - Written Procedure for Complete Cassini System Cal

Revised: 01/15/2007 Topic(s): Admin; Diagnostics Doc ID:RBEH-6XH5L4

SYSTEM CALIBRATION SETUP PROCEDURE

Use the following procedure to prepare the Cassini Microwave Test System for system calibration. Typical Calibrations take about 4 hours for a 4 port system to complete.

1. If the system is not already running, Turn on the System's Main Power and the System Controller's monitor.
2. Connect the Calibration Test Fixture to the RI Test Head using the following procedure.
   a. Before connecting the Calibration Test Fixture to the Test head, visually inspect the Fixture and Test Head connectors so they are striat and all the RF pins are good.
   b. Use the four guide pins in the RI Test Head to align the calibration Test Fixture with the RI Test Head.
   c. Make sure that all calibration standards are working in good order, look for bent pins and overall cleanlyness.
   d. Press the Calibration Test Fixture downward on to the RI Test Head. Pressure should be applied evenly across the top of the Calibration Test Fixture.
   e. Slide the Fixture locking arms to hold the fixture in place.
3. Select "Logon" from the Guru Control Bar with a User with Admin privaleges and start the RI System Software by clicking "APPS" then select "Cassini vXX" to start the RI System Software to display the RI Message Window. (titled "RI Cassini <SoftwareRelease>")
4. Select "System", select the appropriate tester, then press "Activate" from the RI Message Window menu bar.
5. The System will perform an internal self-test and set all of the instrumentation in the Test System to their idle state. The RI Message window will display the status of each instrument and display "Fiber link connected and/or Hardware Mode" if the start-up was successful.
6. Check the status of each instrument in the test system RIFL status indicator lights should be Green. If the RIFL inticator is red, check the RIFL connection and try to reconnect the RIFL cable to another port on the RIFL hub.
7. If the RI Message Window displays an Error and/or a Warning message, please correct the problem and re-activate the system by repeating steps 4 thru 6. System Start-up is now complete.

PERFORMING THE SYSTEM CALIBRATION PROCEDURE

The RI System Software provides a Calibration Test Executive for each instrument in the system. The Calibration Test Exec loads and runs multiple calibration and verification test plans. The Calibration Test Exec automatically saves the calibration data with the tester. The calibration process will take approximately 4 hours for a 4 port RFIC Test System.

1. All of the calibration test plans are listed in the Calibration window under Test Plans. Run only a small group of four or less tests at a time by selecting the similarly named test plans. The System Controller saves the calibration data after they are run. Run the test plans for the following instruments in order:
    1. DC Instruments
        1. DutControl
        2. PowerVI
        3. StaticDigital
        4. Waveform (if installed)
        5. Oscilloscope (if installed)
    2. RF Instruments
        1. Receiver
        2. Source1, Source2
        3. Testhead
        4. SineGen (if installed)
2. Open the Instrument's Calibration window by selecting Test, Testers, Config .
3. Select "Options" from the Calibration Window menu and select "Add RF Power Mtr" and confirm that the Power Meter matches the GPIB Address, otherwise enter the correct value. Each time you open a calibration window that requires a Power Meter or Calibration Fixture you must add the instrument before running the cal plan.
4. Select and run Calibration and Validate test plans for each instruments in the order listed above.
    a. Highlight the test plans by clicking on the test plan name to select it .
    b. To run the selected tests, select "Run" and "Selected" from the menu bar .
    c. Follow the operator prompts provided by the test system while it runs the calibration plan.
    d. Repeat steps a through d until all of the test plans have been performed . If the validation test plan fails, run the Diagnostic tests for the Instrument that failed .
    e. Close the Calibration Test Executive and move on to the next Instrument from the list above.
5. After all instruments have been calibrated, the System Calibration is considered complete, you can close the calibration window.. Set the Calibration Due Date from

the Configuration window.

a. From the RI Message Window menu, select "Tester" and "Set Cal Due Date".

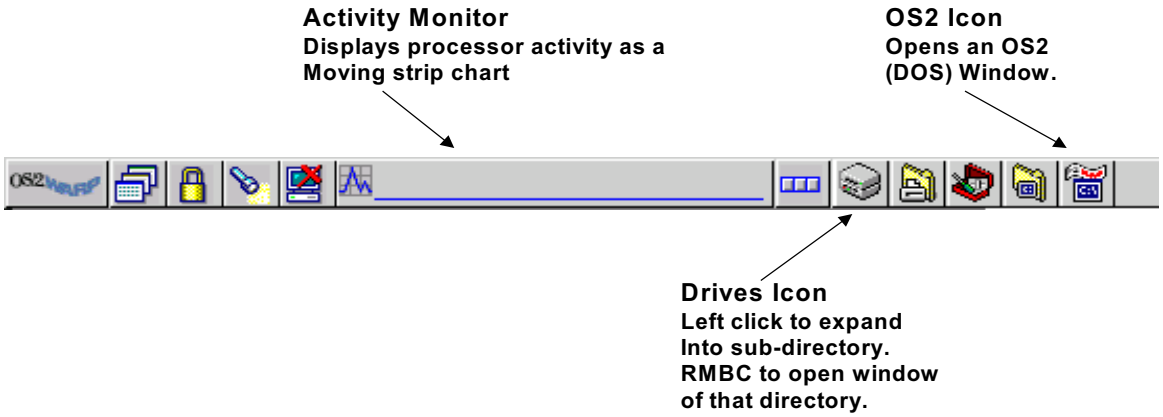
b. A window will pop up asking for a new due date. The new date entered should be 6 months from the date of the cal. Enter a date, the select "OK". Close all remaining windows.

c. To verify the calibration due date, select "System" and "start up". At the end of the start up, the new calibration due date should be displayed in the RI Message window.

Understanding OS/2

First let us explore the OS/2 Operating System and learn how to manipulate files using the graphical tools (similar to Microsoft Windows) . Next we can examine the OS/2 command line interface (similar to Microsoft DOS) for manipulating and compressing files.

1) Expand the **Drives Icon** to explore drives and their sub-directories by placing the mouse pointer on the Icon and by clicking the left mouse button 1 . You can continue to explore more levels of subdirectories by again clicking the left mouse button on the next sub-directory. If you click on a file it will attempt to open that file with a text editor.



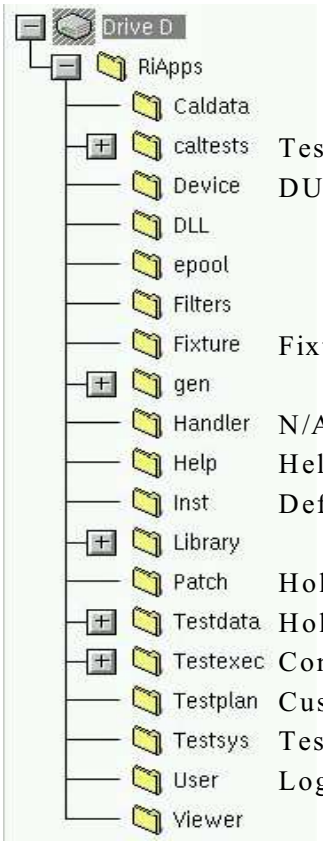
2) Open the **Drives Icon** into a stand alone window by placing the mouse pointer on the Icon and by clicking the right mouse button 2 and selecting "Open as" with the default as an Icon view. A new window with all the available drives represented as icons will appear . You can choose Tree or Details views as alternatives.

3) Copy the **"D" Drive Icon** to the Desktop by placing the mouse pointer on the "D" Drive Icon and by clicking and holding the right mouse button 2 (not the left mouse button 1 as in Windows), then drag the icon to the anywhere not occupied by another icon on the desktop. Next release the right mouse button and a copy of the original drive icon is now available on the desktop .

Understanding OS/2 continued

4) Double click the left mouse button 1 on the **"D" Drive Icon** you copied to open up another window that will display the main user drive partition directories and files. This is the drive that contains all of the RI Application Software under the directory RiApps. The "+" sign next to a directory indicates that there are sub-directories contained in that directory . Clicking with the left mouse button 1 on the "+" next to RiApps reveals the familiar RI directory structure.

RI System Software Components and Directory Structure



Test plans for calibration, diagnostics, etc.
DUT definitions and device interfaces
Fixture definitions
N/A (handler info resides in handler pod)
Help files
Definition and panel files for instruments
Holds patches for the image
Holds customer test data
Contains the 'image' (the test system program)
Customer test plans
Test System's 'soul' – cal data, instr files, hardware config., etc.
Log-on files

Explore these directories and get familiar with using the mouse

Look for the following file types:
xxx.TSY (Tester Calibration and Configuration) What's the system name .....?
xxx.DTP (Device Test Plans) Name some.....?
xxx.DUT (Device Under Test) Name one .....?
xxx.DIX (Device Interface) Are there any available .....?
xxx.SFX (System Fixture) Is there a Cal Fixture.....?

Copying files using drag and drop

OS/2 allows for drag and drop file moving and copying by clicking and holding the Right Mouse Button 2 and either dragging to move or in addition holding the Ctrl key as you drag for copying.

1) Practice file copying and moving by first opening up the D:/RiApps/Device directory and finding the file "all duts .dut". Copy this file to the desktop by first holding down the keyboard key "Ctrl" and then clicking and holding the right mouse button over the Icon (or file name depending on view) of the "all duts.dut" file. Now drag the file over to an open spot on the Desktop and release the mouse key. Once the file is copied you can release the "Crtl" key.

2) Now lets change the name of the copied file (on the Desktop) to "Junk" by opening the file's options list using the right mouse button click and selecting "Properties". A new window with multiple tabs for all the file attributes will be displayed. Select the "Icon" tab with the left mouse button and then type the new name in place of the original file name. Once you are finished close the new window and the new name will have been saved.

3) Next create a new sub-directory file folder. First open the OS/2 Programs Icon on the desktop. The "New Folder" object is a template, which is why it looks like a notepad. Locate the "New Folder" icon and drag it with the right mouse button to the Desktop. When a template object is dragged, it creates a new object instead of moving the template object.

4) Copy your new file from the desktop to your new folder by first holding down the keyboard key "Ctrl" and then clicking and holding the right mouse button over the Icon (or file name depending on view) of the allduts .dut file. Now drag the file over on top of the file folder on the Desktop and release the mouse key. Once the file is copied you can release the "Crtl" key. Now open the file folder and look to see that the file is located in the folder .

5) Now delete the desktop "junk" file by dragging it to the Shredder Icon and dropping it there.

Using the OS/2 Command Line

The OS/2 command line interface is very similar to the DOS command line interface and uses the same command syntax. Open a command line interface window from the menu bar.

1) Practice exploring the directories by first changing the drive to D: with the command "D:" enter. Now change the directory with the command "CD RiApps" Enter. Browse the directories with the "DIR" Command and finding the file "student.usr" in the User directory. The syntax for the zip utilities are command then resultant zip file name then the file name you wish to compress.

2) Now lets copy the zip file to the root directory D by typing the command "copy student.zip D:\ " This will copy the named file to the drive and directory path called out.

3) Next create a new sub-directory file folder by changing to the root directory: "cd .." (moves back one directory in a tree) and then typing "MD ..\Junk". This will create a subdirectory under drive D:\ called Junk .

4) Now close the OS/2 Command window by typing "EXIT"

NOTE: Any time you send a file by email or move it by a removable media, first zip it to maintain all the file's extended attributes like long file names etc .

Exploring the OS/2 Assistance Center

Locate the desktop icon named Assistance Center and double click to open it. Then select the Tasks folder inside and again double click to show the available tasks. Select the OS/2 Warp Desktop Guide to explore the features of the OS/2 operating system.

Opening the RI System Software Application

The RI System Software is a separate OS/2 Application with its own desktop Icon which is labeled: **RI System Software**. Use the following procedure to open the RI System Software application.

0) If your system is configured with **Guru**, click **Login** at the top of the **Guru Control Panel**.

1) Open the **RI System Software** Icon by placing the mouse pointer on the Icon & double clicking mouse button 1 (left mouse button). (**Hint**: Look for the desktop Icon with the RI Logo.)

2) The System Computer will display the **RI Message Window**.

The RI Message Window provides three basic functions . It provides the Log-on user interface, it offers the user access to the top level RI application windows and displays messages sent by the other RI application windows to the user . The title bar of the message window says "RI RFIC Test Environment <SERIAL NUMBER> <VERISON>". The <SERIAL NUMBER> is 8 digits and the <VERSION> is described as three digit base release ("21C") and a three digit patch number ("850").

User Log-on

The Test System offers the user several levels of accessibility to the System Software depending on the type of user (system administrator, system programmer, test plan developer, test operator, etc.) To obtain the appropriate level of access the user must first log-on to the System Computer with their name and password or use one of the standard access names and passwords. (Talk to your Test System Administrator about adding your name and password to your test system.) If you do not log-on, the System Software will restrict your access level. (You will only be able to view the **Help** text. You will not be able to access any program management, program generation, program execution or system administration functions.) Since we are going to be creating new tests in this lab, we will need the access required by a test engineer .

1) Select the RI Message Window's menu bar choices: **System** and **Logon...** .

2) The System Computer will open the **Users** Container Window.

3) Select the user name: test engr by placing the mouse pointer on the **test engr** Icon & double clicking mouse button 1 (left mouse button).

4) If the System displays the Password dialog box, use the keyboard to enter the password provided by your instructor. Select the **OK** button.
note: if no password is set then user icon will turn red

5) The **test engr** Icon will turn red to indicate that you now have test engr system access.

6) Return to the RI Message Window by selecting the RI Message Window's **title bar** or any other location on the RI Message Window.

7) Additional menu bar choices are displayed on the RI Message Window .

Testing Procedure for the Production Test Operator

The RI System Software provides custom Test Executives for testing parts. The Test Executive loads and runs Test Plans and Test Limits. The procedure for starting-up the Test System and running a Test Executive is described below.

1) Place the mouse pointer on the top level menu bar and click on the **Test** menu item with the LMB (left mouse button) to get a pull down menu. Double click mouse button 1 (left mouse button) on the **Package Execs** selection.

2) The System Computer will open the Package Test Execs Container Window.

3) Open the Test Executive object "Demo" by placing the mouse pointer on the Test Executive object and double clicking mouse button 1.

4) The System Computer will load the test plans, the limit files and the custom Test Executive saved in the Test Executive file.

Selecting the Lot, Sub Lot and Part Number for the Next Part to be Tested

The Test Executive Editor Window provides three entry fields for entering the **Lot** name or number, the **Sub Lot** name or number, and the part number for the **Next Part** you want to test. (The next part number default to 1 if you do not enter a value. The Lot and Sub Lot names will remain blank.) Practice selecting and entering names in the **Lot** and **Sub Lot** entry fields and selecting and entering a number for the next part to be tested.

Open Data Viewer Window

The Test Executive provides number of data display for testing parts. To open the Data Viewer Window, place the mouse pointer on the Test Executive Editor window's menu bar and click on the **View** then selected the desired viewer from the menu.

Running Your Test Executive

You have finished all of the hard parts. Now you can run the test plans and limit files you selected with your custom test executive.

1) To start testing select the green **Start** button on the custom Test Executive you have created. If you have not activated a handler the software will instruct you to select a handler. Follow the procedure displayed by the system computer and activate the Simulated Handler.

2) Each time a new part is tested, the Test Executive will update the test summary data and the summary plots in the Data Viewers you opened.

3) To stop testing select the red **Stop** button or the red **Pause** button.

4) To start testing again select the green **Start** button again or select the green **Resume** button to resume testing.

5) Select the red **Stop** button when you are finished testing.

6) Close the Data Viewers you have opened by placing the mouse pointer on the **down arrow** in the upper left corner of each Data Viewer Window and double clicking mouse button 1. Repeat this process for the other Data Viewer Windows.

7) Close the Test Executive Editor Window by placing the mouse pointer on the **down arrow** in the upper left corner of the Test Executive Editor Window and double clicking mouse button 1.

8) Continue experimenting with the Test Exec, try out the features and different data viewing options.....can you find a way to easily display the underlying test program???