

Keysight M9485A PXIe Multiport Vector Network Analyzer

M9300A, Frequency Reference
M9389A, PXIe Vector Network Analyzer Source
M9309A, PXIe Vector Network Analyzer Synthesizer
M9340A, PXIe Vector Network Analyzer RF Distributor
M9376A, PXIe Vector Network Analyzer Receiver
M9377A, PXIe Vector Network Analyzer Direct Access Receiver
M9378A/B, PXIe Vector Network Analyzer Directional Coupler

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1 Service Guide Introduction

Structure of This Document

- **“M9485A Overview” on page 3:** This section shows the overview of modules in M9485A and module's configuration.
- **“Installation” on page 11:** This section highlights the installation procedure for starting up M9485A.
- **“Troubleshooting” on page 13:** This section provides an overall view on how M9485A operates and provide guides for user to troubleshoot their M9485A.
- **“Performance Verification and Adjustment” on page 17:** This section shares information regarding to performance test and adjustment test for M9485A.
- **“Service” on page 21:** This section provides information on parts replacement and post-repair procedure.

Related Documentation

In addition to this Service Guide, the related documentation for the M9485A includes:

- Startup Guide: The startup guide provides instruction to unpack, inspect, installing the NA modules and software, configuration of the modules and also verifying the operation of NA.
- Data Sheet: The Data Sheet provides full product specification.
- Brochure: The Brochure shows the overall performance and features of M9485A.
- Configuration Guide: The Configuration Guide provides steps on configuring the M9485A.
- Web Help: Web Help is a browser based help system which the contents are the same as HTML help. The M9485A help includes the information of Quick Start, Specification, Operation and Programming.

All the product documentation noted above is available in Keysight.com. To find the latest versions of the documentation, go to the product web site www.keysight.com/find/M9485A and download the files from the Document Library (go to Support > Document Library).

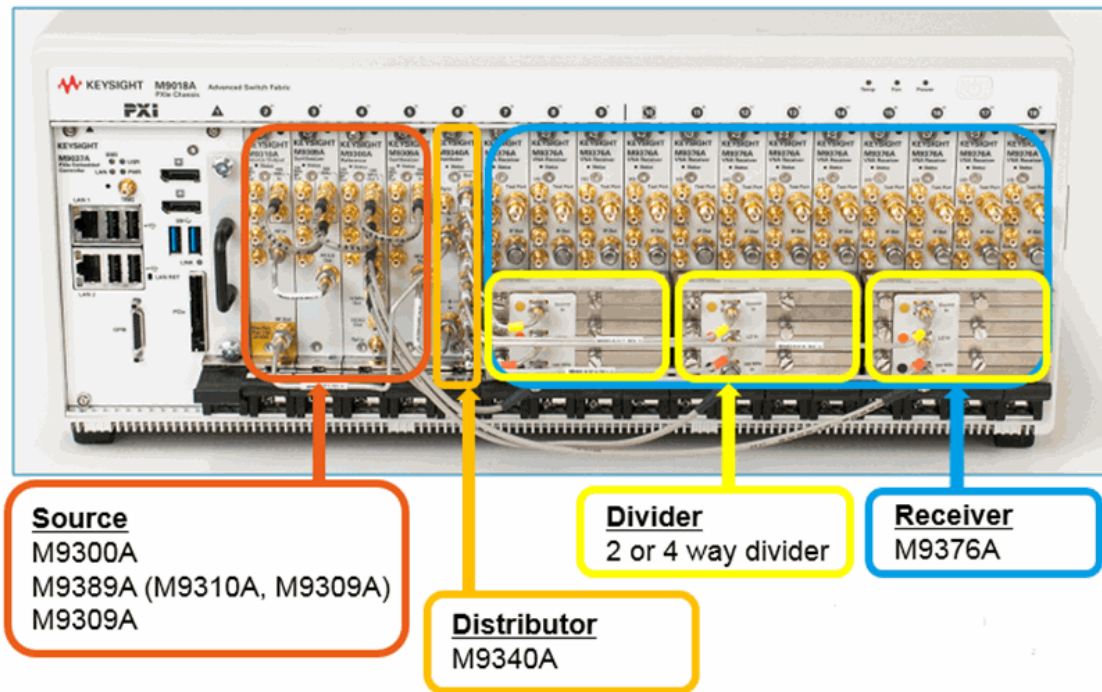
2 M9485A Overview

Module Configuration

M9485A's number of port configuration is reflected on the option M9485A-1XX, where the "XX" represents the number of port configuration. For example, M9485A-112 is a 12 port receiver configuration. Additional option 009 (Frequency Offset Mode), 010 (Time Domain Analysis) and 551 (N-port calibrated measurement) are also available and is transportable license. For more information regarding to M9485A's option, visit M9485A Configuration Guide.

M9485A system consists of few modules which include the Source Modules, Distributor Module, Divider Module and the Receiver Module. M9485A does not have system level specification, the specification is only available for each module. Therefore, M9485A level Certificate of Calibration (CoC) is not available. Users should search module's CoC in Keysight's Infoline by using Module's Model and Module's Serial Number. The details of each module is discussed below. You could refer to **Figure 2-6 on page 7** on modules' physical differences.

Figure 2-1 M9485A 12-Port Module Configuration



Source

The M9485A is made up of 3 source modules, namely M9300A Frequency Reference Module, M9309A Synthesizer Module and VNA Source Module.

M9300A Frequency Reference Module

M9300A provides multiple outputs: Five 100MHz output, one 10MHz output and one 10MHz OCXO output. For M9300A details, visit [Keysight's M9300A PXIe Frequency Reference: 10MHz and 100 MHz website](#).

M9309A Synthesizer Module

M9309A provides frequency coverage from 187.5M to 6GHz. Refer to [Keysight's M9309A PXIe Vector Network Analyzer Synthesizer: 187.5MHz to 6GHz website](#) for more information.

M9389A VNA Source Module

M9389A VNA Source Module consists of M9310A Source Output and M9309A Synthesizer. Both cover the frequency range from 1MHz to 6GHz and power range from -130dBm to +20dBm. You could also refer to [Keysight's M9389A PXIe Vector Network Analyzer Source: 1MHz to 6GHz website](#).

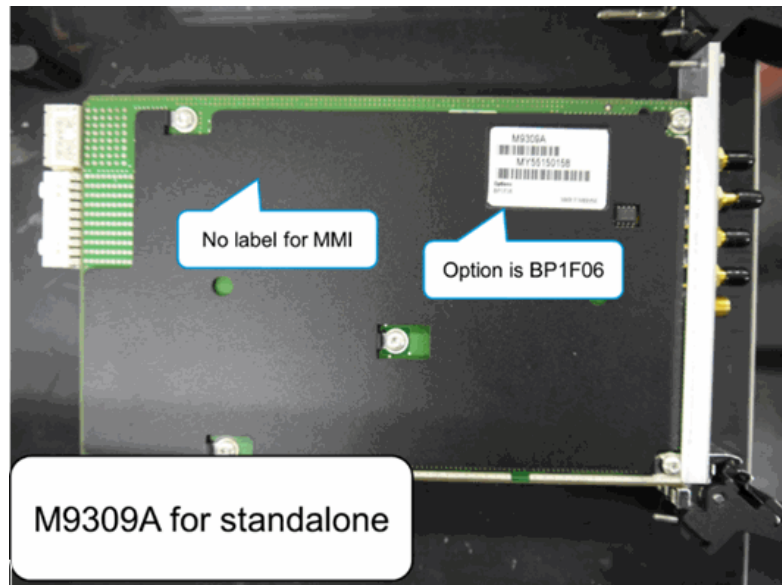
NOTE

M9309A Synthesizer Module and M9389A's Synthesizer are not identical. Refer to **Figure 2-2** and **Figure 2-3** below.

Figure 2-2 M9389A's Module (M9309A MMI Label is stuck after calibration)



Figure 2-3 Standalone M9309A



Distributor

M9340A is the RF Distributor Module for M9485A. Refer to **Keysight's M9340A PXIe Vector Network Analyzer RF Distributor website** for more details.

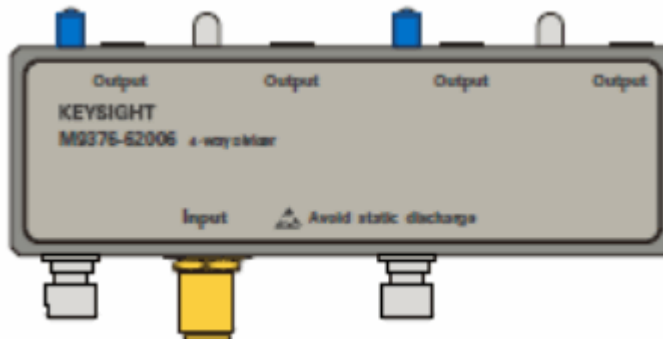
Divider

M9485A could hold up to three 4-way divider. There will be 2-way or 4-way divider available for installation depending on the port configuration for M9485A. For example, when customers upgrade their 2 port configuration to 4 port configuration, the 2-way divider must be replaced by the 4-way divider due to design constraint. Refer to **M9485A Startup Guide** on Divider installation.

Figure 2-4 M9376-62004 (2-Way Divider)



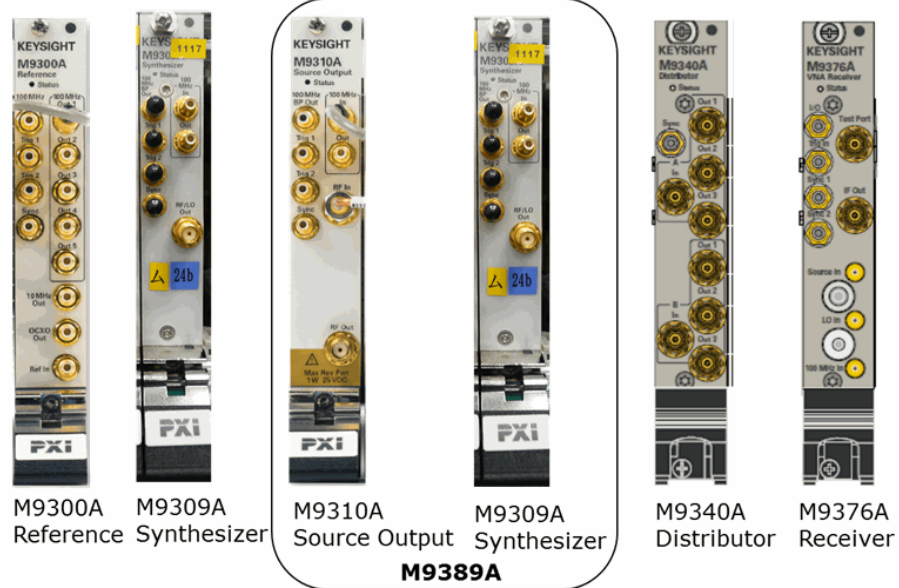
Figure 2-5 M9376-62006 (4-Way Divider)



Receiver

M9376A Receiver Module is used in M9485A. All M9376A are identical and can be used to swap with each other for troubleshooting. Refer to **M9485A Startup Guide** on port configuring.

Figure 2-6 Module's Physical Differences



Software

M9485A PXIe Multiport Vector Network Analyzer firmware controls all of the modules to work as one complete network analyzer. The firmware can be downloaded from <http://www.keysight.com/support/m9485a>. Refer to **M9485A Startup Guide** for further details.

Repair Strategy

The Repair Strategy for M9485A is to repair each module independently by replacing with calibrated module (as core exchange replacement procedure). In other words, user is expected to send only their defective module instead of whole system for repair. Users could use Operator's Check function to isolate the defective module.

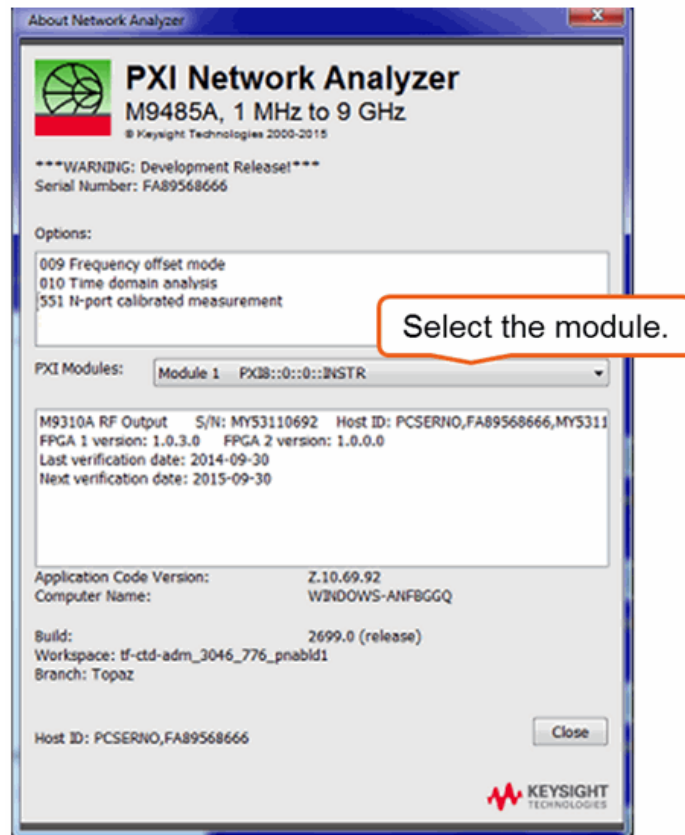
- M9389A (modified version of M9380A) follows the existing M9380A support strategy.
- M9309A (modified version of M9301A) follows the existing M9301A support strategy.

No calibration is required after module replacement (except for M9389A). For M9389A, after performing calibration, stick the MMI label on both module of M9389A to differentiate between the standalone M9309A and M9389A's M9309A.

The Performance Test is provided for each module and no calibration is required after replacements (except for M9389A) as the calibration has been done in factory and the Certificate of Calibration is furnished. Refer to **Chapter 4, "Troubleshooting."** section for more information. For Performance Test and Adjustment, refer to **Chapter 5, "Performance Verification and Adjustment."** section. You could also refer to **Chapter 6, "Service."** section for replaceable parts, module repair/replacement procedure and post-repair procedure.

Each module will have its own warranty. For the divider, it is an accessory therefore will follow M9485A's warranty. Each module has its individual Calibration due date. The Calibration due date could be seen on M9485A System Software by clicking System > Help > About NA.

Figure 2-7 Calibration Due Date shown in About NA



3 Installation

For M9485A module installation, port configuration, software installation and so on, refer to **M9485A Startup Guide**

4 Troubleshooting

This section contains three parts, a simplified block diagram with M9485A's overall operation theory, Operator's Check and also System Verification troubleshooting. The M9485A software will show errors when the module is placed in the wrong location.

Block Diagram

Figure 4-1 Simplified Block Diagram for M9485A

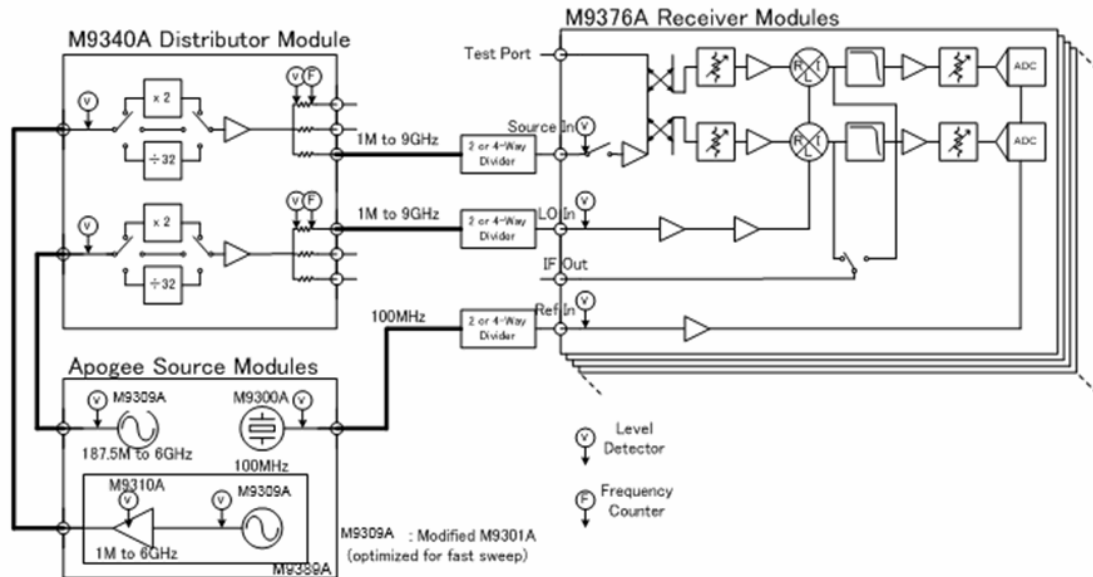


Figure 4-1 shows the simplified block diagram for M9485A system. In the source section, M9300A is the frequency reference with the output of 100MHz connected to 2 or 4-way divider and to Ref In of the receiver module. M9309A outputs the LO frequency signal covering from 187.5MHz to 6GHz while M9389A outputs the RF signal from 1MHz to 6GHz. The Distributor Module extends the signal, covering frequency range from 1MHz to 9GHz and the output will be connected to the Divider Module. The Divider Module will then distribute all the signals to the Receiver Module. The Level Detector and Frequency Counter are used in Operator's Check to detect any fault cause by the respective module.

Operator's Check

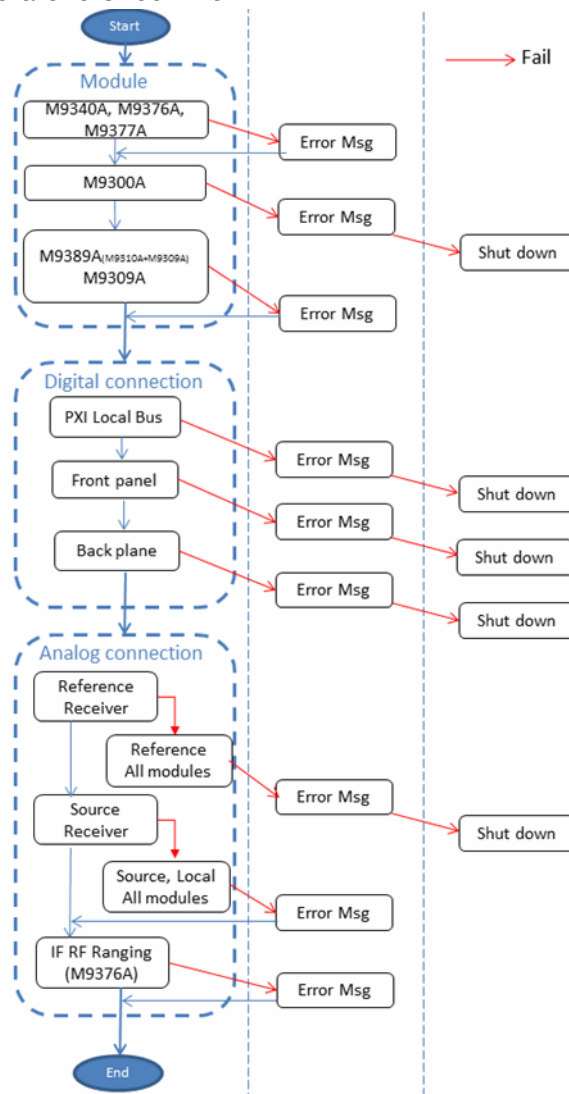
The Operator's Check is a self-test that performs check on module, digital connection and analog connection. The Operator's Check is by default performed on power on. Every failed information is stored in log file. You could go to System > Service > Operator's Check to execute the test. You could also refer to [Help File](#) for more information.

NOTE

This operator's check procedure is used for high-level troubleshooting- a rough diagnostic to ascertain if the module is functioning properly.

Figure 4-2

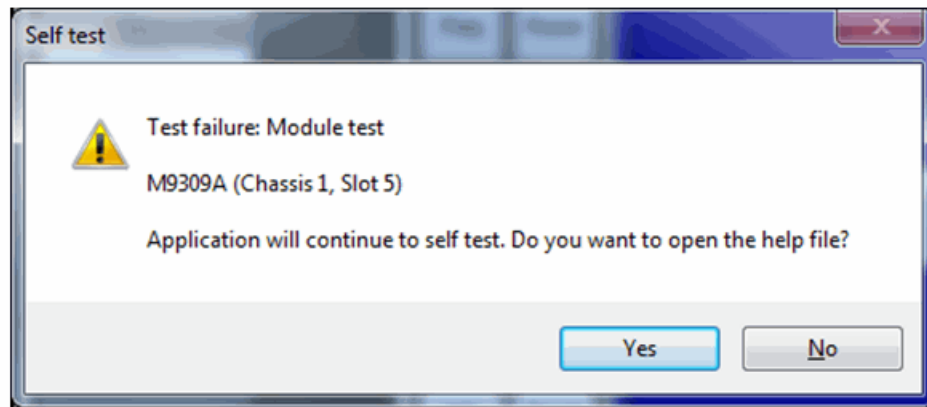
Operator's Check Flow



Firstly, the Operator's Check will check on modules' condition using built-in level detector and frequency counter (refer to Block Diagram [Figure 4-1 on page 4-14](#)). If there is any defective module, the error message will pop up as

shown in **Figure 4-3** below. For M9376A Receiver Module, user could swap with another Receiver Module to further confirm whether the Receiver Module is defective.

Figure 4-3 Error Message during Operator's Check



During the digital connection check, the Operator's check will perform test on PXI Local Bus, front panel and also back plane. When you are having PXI Local Bus error, try to replace the module into the other slot. If the failed slot is still the same, the chassis might be defective. If the front panel is having error, perform check on the front panel connections. If the back plane is having error, check on the connection expert to confirm that the chassis is detected correctly. For non-Keysight chassis setup, refer to **M9485A FAQ-Setup for Non-Keysight PXI Chassis M9485A FAQ**.

If you are having multiple failures in Module and Analog Connection Test, refer to **Help File-Troubleshooting Hint for M9485A** for more information.

System Verification

The procedure for System Verification, refer to **Help File-System Verification** for more information.

5 Performance Verification and Adjustment

TME

For M9389A, M9300A and M9309A, the performance verification together with adjustment test is available in TME platform. Refer to the respective TME N7800A Application for ETE list, test list and so on.

M9389A - Keysight N7870A PXI Signal Generator Calibration Application Software

M9300A- Keysight N7873A PXI Frequency Reference Calibration Application Software

M9309A- Keysight N7877A PXI Modular Synthesizer Calibration Application Software

For M9376A and M9340A, only performance verification test is available in TME platform. The adjustment test for M9376A and M9340A is in VEE platform. Refer to the respective TME N7800A Application for ETE list, test list and so on.

M9376A - Keysight N7878A PXI Multiport Vector Network Analyzer

M9340A- Keysight N7878A PXI Multiport Vector Network Analyzer

VEE Adjustment

The VEE adjustment test is available for M9340A Distributor Module and M9376A Receiver Module. For any failed adjustment test, we recommend to replace the module respectively. The list required test equipment and test list are as below:

ETE Requirements

Due to the limitation of M9485A Software, the following items are needed to setup a system.

Chassis/Module Needed	M9340A Adjustment Test	M9376/77A Adjustment Test
M9300A	YES	YES
M9309A	YES	YES
M9389A (M9310A + M9309A)	YES	YES
M9340A	UUT Only	YES
M9376A + 2-way divider	YES (2 modules)	YES excluding UUT**
M9018A/B, M9019A (PXIe Chassis)	YES	YES

*For Option 002, Y9485A Kit to add 2-port receivers is required.

*For Option 011, Y9485A Cables for single chassis configuration are required.

**One M9376A/77A is required as ETE.

The items below are required to execute the calibration:

- E4419B Power Meter
- E9304A (Opt. H18) Power Sensor
- E5071C (Opt. 4K5, 008) Network Analyzer (20GHz model and FOM option are required)
- Z5623A (Opt. H01) Dynamo ET
- 8496H Step Attenuator (Calibrated at 1 MHz, 1.195 GHz is required)
- 85052C 3.5mm Calibration Kit
- E8257D (Opt. 513 or 520) PSG Signal Generator
- M9376-65001 SMP-SMA adapter fixture for Receiver Module

Adjustment Test List

The Adjustment Test list for M9340A Distributor Module:

- AdjSysCalBackup
- Adj_DSA
- Adj_Cal
- Adj_Source
- Adj_Local
- Adj_DetSen
- Adj_InOut
- AdjVerification

The Adjustment Test list for M9376A Receiver Module:

- AdjSysCalBackup
- Adj_SrcFGain
- Adj_SrcLin
- Adj_LclLvl
- Adj_Compression
- Adj_RFRng
- Adj_VtlBdg
- AdjVerification

Refer to **“Write Serial Procedure” on page 23** for writing serial number on module.

Performance Verification and Adjustment
VEE Adjustment

6 Service

Replaceable Parts

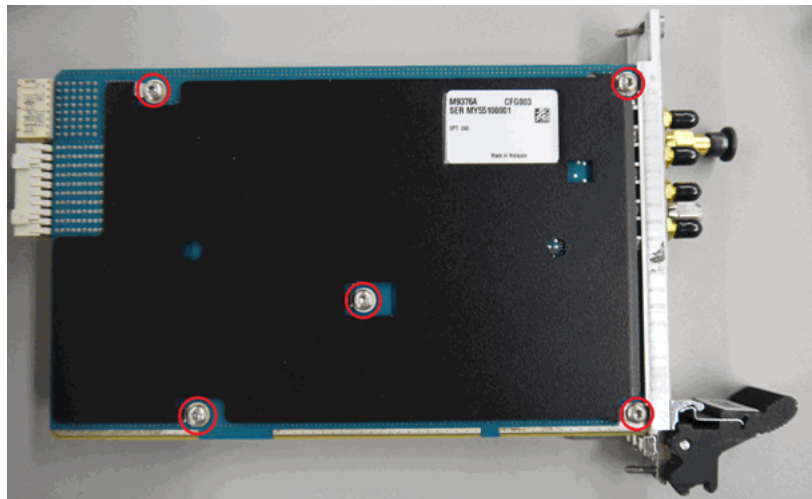
Refer to M9485A Part List for the parts that could be replaced.

Module Core Replacement

As mentioned previously, the repair strategy for M9485A is calibrated core exchange replacement. The module will have the Certificate of Calibration furnished. After receiving the replacement, proceed for the following steps:

1. Power down the chassis.
2. Remove the defective module from the chassis.
3. Swap the side cover which contains the serial number label to the new replacement.

Figure 6-1 Side cover which contains the serial number label



4. Put the VOID label on the center screw.

Figure 6-2 Void label on the center screw



5. Execute the serial number write software to burn the original serial number into the replacement module. (Refer to **“Write Serial Procedure” on page 23**)
6. Verify that the correct serial number has been written in the replacement module.
7. No calibration is required after module replacement (except for M9389A). For M9389A, after performing calibration, stick the MMI label on both module of M9389A to differentiate between the standalone M9309A and M9389A's M9309A. Refer to **Figure 2-2 on page 5** and **Figure 2-3 on page 5**

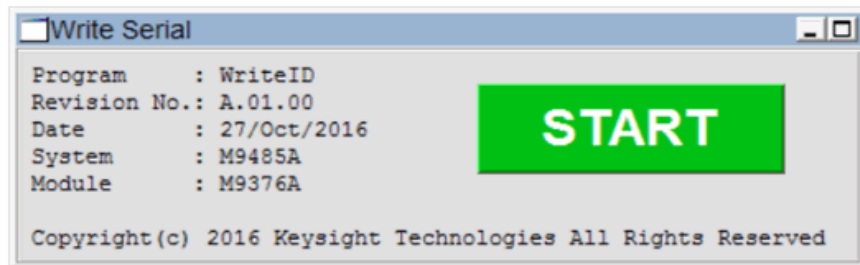
NOTE

In the label, option 090 is showed. However, it is not necessary to write the option on the memory for M9376A and M9340A.

Write Serial Procedure

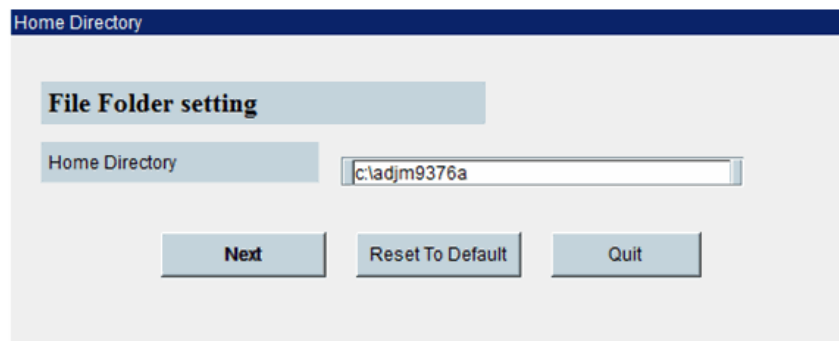
1. After launching the Write Serial Program, there will be a pop-up stating the Program, Revision No., Date, System and Module. Press “START” to proceed.

Figure 6-3 Pop-up box after launching Write Serial Program



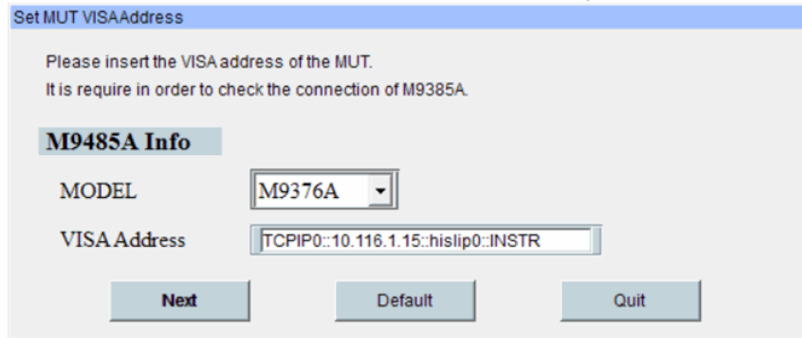
2. In the next screen, input the directory for the Write Serial Program and press “Next”.

Figure 6-4 Screen to input Home Directory of the Write Serial Program



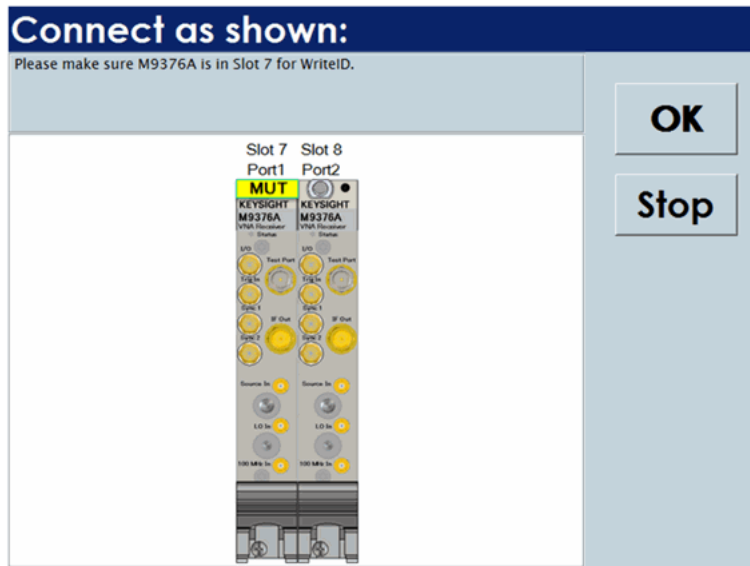
3. After that, make sure the Model of the module is selected correctly with the correct VISA Address. Press “Next” to proceed.

Figure 6-5 Screen to input VISA Address and Module of the module



4. Next, the screen will show the connection for the Write Serial. Make sure that the connection is correct and press “OK” to proceed.

Figure 6-6 Connections of Module



5. The screen will then shows the Model and Serial Number to be written on the module (highlighted in orange). Make sure that the Serial Number is correct before pressing “OK”.

Figure 6-7 Serial Number input

ID data:

Model	Serial Number
M9376A	MY00000029

CAUTION:
When you click OK, serial number is overwritten.
Before clicking OK, check the serial number again.

OK [F1] Cancel [F4]

6. The screen will show "PASSED" if the serial number is written successfully.
The screen will show "FAILED" when the Cancel button is pressed.

Post-Module Replacement (On-site)

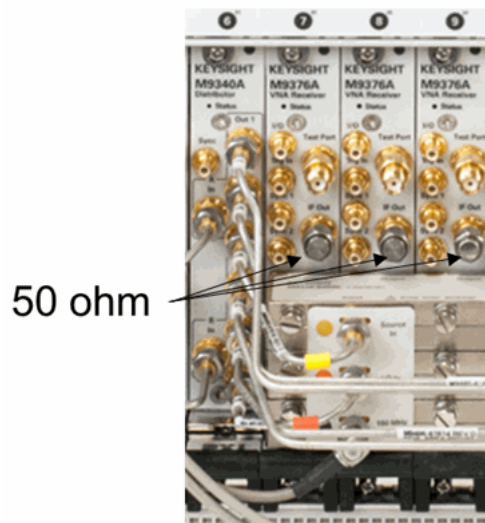
After module replacement with customer's serial number written, proceed with the following steps if you have a customer's system:

1. Install the replacement module.
2. Power up the chassis.
3. Execute the Operator's Check
4. Execute the System Power Calibration

System Power Calibration compensates the power level at port output. It takes about 5 minutes for 4-port configuration and about 30 minutes for 24-port configuration. The 50 Ohm termination is located on the IF OUT port of the VNA receiver and will be required for this calibration. Refer to [Figure 6-8](#). The calibrated data will be stored in your PC and it will be valid until any changes on the configuration. The M9485A software will prompt for System Power Calibration if the software detects any changes on your configuration. To achieve more accurate on output power level, one could use power sensor during the System Power Calibration. However, the time taken to complete this calibration will be longer. You could refer to [Help File-System Power Calibration](#) for more details.

Figure 6-8

Location of the 50 Ohm Termination



This information is subject to change without notice. Always refer to the Keysight website for the latest revision.

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