Series 5400A
Scalar Measurement System
Instrument Driver
for LabWindows

(Part No. 2300-18)

User's Guide

Version 1.01

Locate the Serial Number decal sheet packaged with the manual, and paste the driver software serial number here.

Serial Number

You will be asked for this number when you call Wiltron Customer Service for support.

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Preface

The 54XXA LabWindows Instrument Driver User's Guide provides a tutorial and both general and detailed descriptions of the various functional panels displayed in the LabWindows environment. The user should be familiar with measurements using the applicable WILTRON instrument and with MS- or PC-DOS conventions. A knowledge of LabWindows, while helpful, is not essential. The WILTRON Instrument Drivers software can be used to create executable stand-alone application programs.

Manual Organization

The manual is divided into three sections:

Section 1, General, provides general information and a tree structure for the Instrument Driver function panels.

Section 2, Using the 54XXA Driver with LabWindows, provides description and a tutorial for using the driver within the LabWindows environment.

Section 3, Driver References, provides detailed descriptions of the function panels and instrument controls. It also provides sample syntax and a listing of variable-types used in the program.

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Section 1

Introduction to the
54XXA Scalar
Measurement System
Driver
for LabWindows

Section 1
Introduction to the 54XXA
Scalar Measurement System (SMS)
Driver for LabWindows

General

WILTRON Instrument Drivers software provides an easy-to-use tool for developing application programs for applicable microwave systems via the General Purpose Interface Bus (IEEE-488 Bus).

This software contains modules that automatically configure an applicable WILTRON instrument for use on the bus, along with high-level instrument control commands that save you the time required to learn and program the GPIB commands of the instrument. The software automatically checks for proper bus functioning. If a command is sent to a bus instrument and no error is reported, the bus can be assumed to be working correctly.

Requirements

The WILTRON Instrument Driver software is written specifically for the model 54XXA SNA.

The WILTRON Instrument Driver requires an IBM PC AT, PS/2, or compatible computer running MS- or PC-DOS, Version 3.0 or later.

The software is delivered on 5-1/4 inch 1.2 Mb Floppy disks and 3-1/2 inch 1.4 Mb floppy disks.

At least 2 MB of memory is required to run the LabWindows program — 4 Mb is recommended.

The WILTRON Instrument Driver software requires National Instruments LabWindows version 2.2 or later.

For Microsoft QuickBASIC*, Professional BASIC, Visual BASIC for DOS, C, Quick C, and Borland C++ and Turbo C++ users, you can use the 54XXA Instrument Driver software to produce compatible instrument-control-program code.

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* Wiltron strongly recommends that QuickBASIC not be used. Instead, use Microsoft Professional BASIC 7.1, or later, or Visual BASIC for DOS.

Installing Instrument Drivers

This section provides instructions for installing the WILTRON Instrument Drivers. Proceed as follows:

☐ Insert the WILTRON driver diskette in your A: or B: drive, as appropriate.

☐ Change to the LabWindows, Instruments directory (*drive*\LW\INSTR), and type the following DOS command: COPY A: (B:) *.*. This copies the following eight files to the target subdirectory: W5400A.LBW, W5400A.LWI, W5400A.FP, W5400A.DOC, W5400CAL.LBW, W5400CAL.LWI, W5400CAL.FP, W5400CAL.DOC (All of these files MUST reside within the same subdirectory.)

☐ Once the copying is completed, return the driver diskette to a safe storage location.

Overview For LabWindows Users

LabWindows is a software development system for BASIC, C, and C++ programs (see page 1-3 for listing of supported languages). It contains an interactive environment for developing programs with drivers and libraries (functions) for creating data acquisition and instrument control applications. LabWindows contains a comprehensive set of software tools for data analysis, data presentation, and high level instrument control.

The interactive program is an environment for editing and debugging BASIC and C (C++) programs. In the LabWindows environment, you can use the functions in the instrument drivers or libraries to write your program. In addition each function has an interface called a function panel that lets you interactively execute the function or generate code for calling the function.

The interactive program uses extended memory. Programs executed in the interactive program can use up to 16 megabytes of memory, depending on your computer configuration. Programs that run in the interactive program, however, must adhere to the LabWindows subsets for BASIC, C and C++.

Programs developed with the drivers and library functions can be run within the interactive program, or they can be compiled and linked into a stand-alone applicaton (*.EXE) or run-time application (*.RTM) file. To help you create a stand-alone program, LabWindows incorporates utilities that automate the compile and link processes.

The real power of LabWindows lies in the libraries. They have functions for developing all phases of your data acquisition and instrument control system. For controlling the 54XXA , Lab Windows has the Instrument Drivers Library. Programs that call this library can be developed with the interactive program. This program has tools that make program development quicker and easier.

LabWindows gives you the capability to execute instrument drivers with the aid of panels and thereby create programs easily. The panels contain items that can be selected to build and execute a driver. The drivers are separately declared in the Instrument Drivers Library.

Two advantages of using LabWindows are:

☐ When writing an application program you do not have to remember all of the parameters that belong to the driver.

☐ Error reporting is shown automatically in the panels.

Overview for Non-LabWindows Users

Programmers who do not use LabWindows will also benefit from the WILTRON Instrument Driver software:

☐ You will not have to know all of the GPIB codes needed to program applications for the 54XXA SNA. The driver software effectively manages low-level GPIB I/O operations and native instrument control.

☐ You will see greater program reliability because of the driver's extensive error-checking routines.

☐ You will see reductions in the time required to develop, test, and debug applications.

Section 2

Using the 54XXA Instrument Driver with LabWindows

Section 2
Using the 54XXA Instrument Driver with LabWindows

Introduction

This section provides an introduction to the LabWindows environment and a tutorial describing the use of the 54XXA driver within LabWindows. This section assumes that you have read Part 1 of the National Instruments *Getting Started with LabWindows* manuals and are generally familiar with the LabWindows screen and principles of navigation within the environment.

The 54XXA driver consists of two separate instrument modules. The first, W5400A.FP, contains all of the general setup, display, analysis, measurement, and I/O functions. The second, W5400CAL.FP, contains all of the calibration and self test functions.

General

The following procedure describes how to access LabWindows and load files.

☐ Move to the directory containing the LabWindows executable (*.EXE) files. (This directory is usually named \LW.)

☐ Type LW.
   This places you in the PROGRAM window of the LabWindows environment (below).

```
   File  Edit  Program  Instruments  Libraries  View  Options
  ┌PROGRAM═════════════════════════════════════════════QuickBASIC═┐
  │                                                               │
  │                                                               │
  │                                                               │
  │                                                               │
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  │                                                               │
  │   Line    1/1      Column 1       INSERT     ←▪▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓→│
  └───────────────────────────────────────────────────────────────┘
```

Loading 54XXA Driver As Instrument Module

The following procedure describes how to load the 54XXA Driver as an instrument module.

☐ Select **Instruments,** on the top menu bar (below), to display the pull-down menu.

```
   File  Edit  Program  Instruments Libraries  View  Options
  PROGRAM                                                         QuickBASIC
                          Load...
                          Unload...




   Line    1/1      Column 1       INSERT
```

Select **Load,** then change to the \LW\INSTR subdirectory (below).

☐ Move the cursor to **w5400a.fp** and select **Load.**

```
   File  Edit  Program  Instruments  Libraries  View  Options
  PROGRAM                                                       QuickBASIC
                            Load Instrument
    Filename: w5400a.fp

    C:\LW\INSTR

        ..
        w5400a.fp                                    [-A-]
        w5400cal.fp                                  [-B-]
        w562sna.fp                                   [-C-]
                                                     [-D-]
                                                     [-H-]
                                                     [-I-]




             Load                        Cancel


   Line    1/1      Column 1       INSERT
```
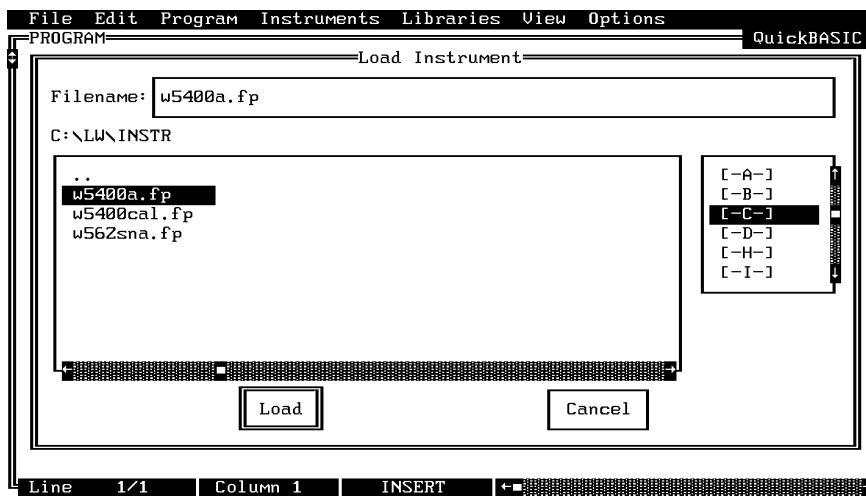
☐ Repeat the previous two steps to load the **w5400cal.fp** file.

☐ Move the cursor to Instruments to display the pull-down men. The "Wiltron 54XXA SNA" and Wiltron 54XXA Calibration titles display showing that the instrument modules are now loaded.

```
 File  Edit  Program  Instruments  Libraries  View  Options
PROGRAM                                                          QuickBASIC
                    Wiltron 54XXA SNA
                    Wiltron 54XXA SNA Calibration

                    Load...
                    Unload...




    Line     1/1     Column 1      INSERT    ←■
```

☐ Select **Wiltron 54XXA SNA,** and observe that the 54XXA main panel appears (below).

```
 File  Edit  Program  Instruments  Libraries  View  Options
PROGRAM                                                          QuickBASIC

                     Wiltron 54XXA SNA
         Initialize                      Select
         Source...
         Network Analyzer...
         Data Analysis...
         Data I/O...
         Save/Recall...
         Video Configuration
         CRT Functions                   Cancel
         Secure Mode
         Close
                                          Help


    Line     1/1     Column 1      INSERT    ←■
```
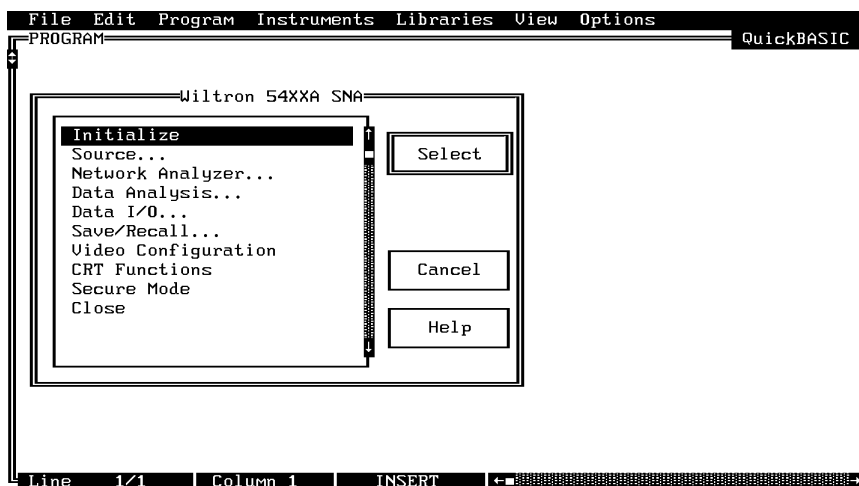
☐ Repeat the above two steps to observe that the Wiltron 54XXA Calibration driver appears.

☐ You are now ready to proceed with developing control code using the 54XXA instrument drivers.

Loading 54XXA Driver At Start-up

The 54XXA driver can be automatically loaded each time LabWindows is started. The procedure for making this happen is given below.

☐ Place yourself into the LabWindows PROGRAM window as was described on page 2-3.

☐ Select Options, on top menu bar, to display the pull-down menu.

```
 File  Edit  Program  Instruments  Libraries  View │ Options │            C
┌─PROGRAM                                         ┌──────────────────────────┐
                                                  │  User Interface Editor   │
                                                  │                          │
                                                  │  Function Panel Editor   │
                                                  │  Function Tree Editor    │
                                                  │                          │
                                                  │  Edit Instr Program...   │
                                                  │  Save as Instr Program...│
                                                  │                          │
                                                  │  Screen Options...       │
                                                  │ ▓Startup Defaults...▓     │
                                                  │  Library Panel Options...│
                                                  │  Hardcopy Options...     │
                                                  │                          │
                                                  │  About LabWindows...     │
                                                  └──────────────────────────┘



  Line    1/1      Column 1       INSERT
```
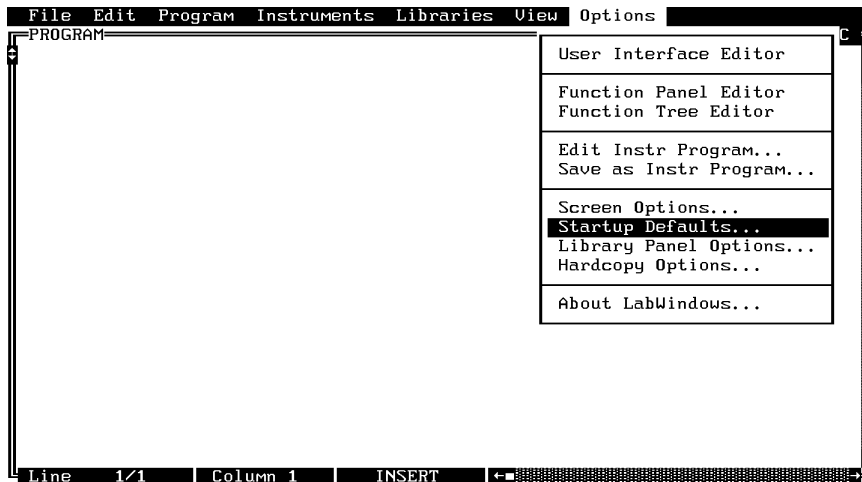
☐ Select **Startup Defaults.**

☐ Choose **Select** to locate the 54XXA SNA drivers (W5400A.FP and W5400CAL.FP); alternatively, type in the path and file names.

```
 File  Edit  Program  Instruments  Libraries  View  Options
┌─P                                                           C
   ┌──────────────────────────────────────────────────────┐
   │      Instrument Modules          LabWindows Libraries │
   │    ┌──────────────────┐       ┌──────────────────────┐│
   │    │1:                │       │[√] Data Aquisition    ││
   │    │2:                │       │[√] Advanced Analysis  ││
   │    │3:                │       │[√] VXI                ││
   │    │4:                │       └──────────────────────┘│
   │    │5:                │            User Libraries      │
   │    │6:                │       ┌──────────────────────┐│
   │    │7:                │       │1:                     ││
   │    │8:                │       │2:                     ││
   │    │9:                │       │3:                     ││
   │    │10:               │       │4:                     ││
   │    │11:               │       │5:                     ││
   │    │12:               │       │                       ││
   │    │13:               │       │ ┌──────┐   ┌──────────┐│
   │    │14:               │       │ │Select│   │Clear List││
   │    └──────────────────┘       │ └──────┘   └──────────┘│
   │    ┌──────┐  ┌──────────┐     └──────────────────────┘│
   │    │Select│  │Clear List│       ┌────┐     ┌────────┐  │
   │    └──────┘  └──────────┘       │ OK │     │ Cancel │  │
   │                                 └────┘     └────────┘  │
   └──────────────────────────────────────────────────────┘
  Line    1/1      Column 1       INSERT
```
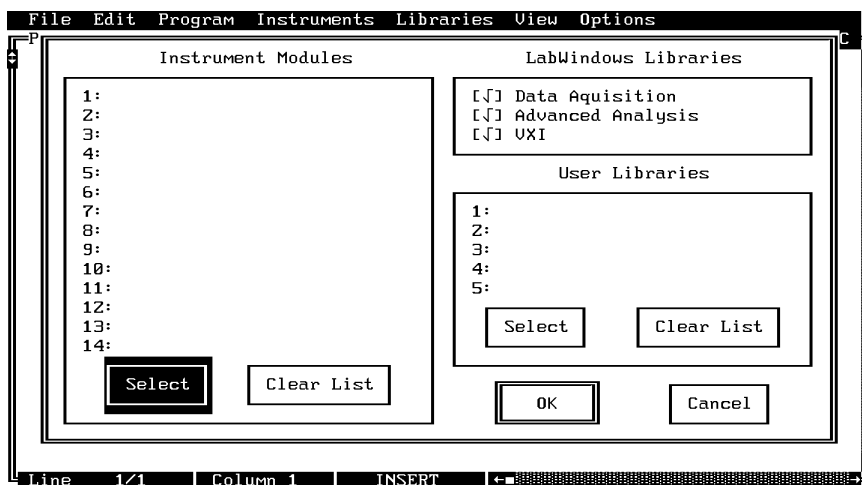
☐ Choose the **\LW\INSTR** subdirectory from the file list.

```
 File  Edit  Program  Instruments  Libraries  View  Options
┌P┌                                                          ┐C
↕│              ═══════Select Instrument to Preload═══════
 │   Filename: │ INSTR                                     │
 │
 │   C:\LW
 │  ┌                                             ┐  ┌──────┐
 │  │  ..                                         │  │[-A-] │↕
 │  │  FONTS                                      │  │[-B-] │
 │  │  INCLUDE                                    │  │[-C-] │
 │  │  INSTR█                                     │  │[-D-] │
 │  │  LIBRARY                                    │  │[-E-] │
 │  │  PROGRAMS                                   │  │[-F-] │
 │  │  SWP                                        │  └──────┘
 │  │                                             │
 │  └                                             ┘
 │
 │           ┌──────┐              ┌────────┐
 │           │ Load │              │ Cancel │
 │           └──────┘              └────────┘
 │
 └
   Line   1/1   │  Column 1   │   INSERT   │←■
```
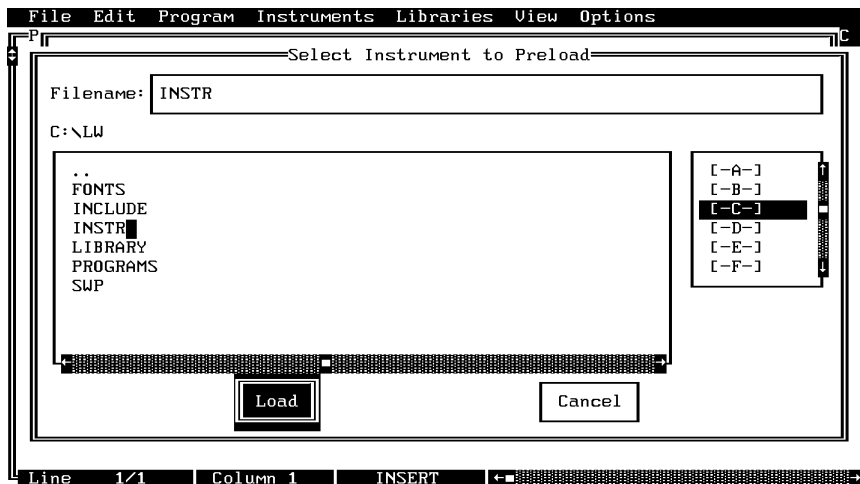
☐ Choose **W5400A.FP** from the displayed file list, and click on **Load.**

☐ Repeat the above process for the **W5400CAL.FP** file.

☐ The appropriate path will now be displayed in the INSTRUMENT MOD-ULES window. Select **OK** to exit. The W5400A and W5400CAL drivers will now be loaded automatically each time LabWindows is entered.

```
 File  Edit  Program  Instruments  Libraries  View  Options
┌PROGRAM══════════════════════════════════════QuickBASIC ┐
↕│ ┌─── Instrument Modules ───┐  ┌── LabWindows Libraries ──┐
 │ │ 1:  C:\LW\INSTR\W5400A.FP │  [√] Data Aquisition        │
 │ │ 2:  C:\LW\INSTR\W5400CAL.FP  [√] Advanced Analysis      │
 │ │ 3:                       │  [√] VXI                     │
 │ │ 4:                       │  [√] AT-DSPZZ00              │
 │ │ 5:                       │  ┌──── User Libraries ────┐  │
 │ │ 6:                       │  │ 1:                     │  │
 │ │ 7:                       │  │ 2:                     │  │
 │ │ 8:                       │  │ 3:                     │  │
 │ │ 9:                       │  │ 4:                     │  │
 │ │ 10:                      │  │ 5:                     │  │
 │ │ 11:                      │  └────────────────────────┘  │
 │ │ 12:                      │  ┌────────┐   ┌────────────┐  │
 │ │ 13:                      │  │ Select │   │ Clear List │  │
 │ │ 14:                      │  └────────┘   └────────────┘  │
 │ │ ┌────────┐ ┌────────────┐│  ┌────┐      ┌────────┐      │
 │ │ │ Select │ │ Clear List ││  │ OK │      │ Cancel │      │
 │ │ └────────┘ └────────────┘│  └────┘      └────────┘      │
 │ └──────────────────────────┘
 └
   Line   1/1   │  Column 1   │   INSERT   │←■
```
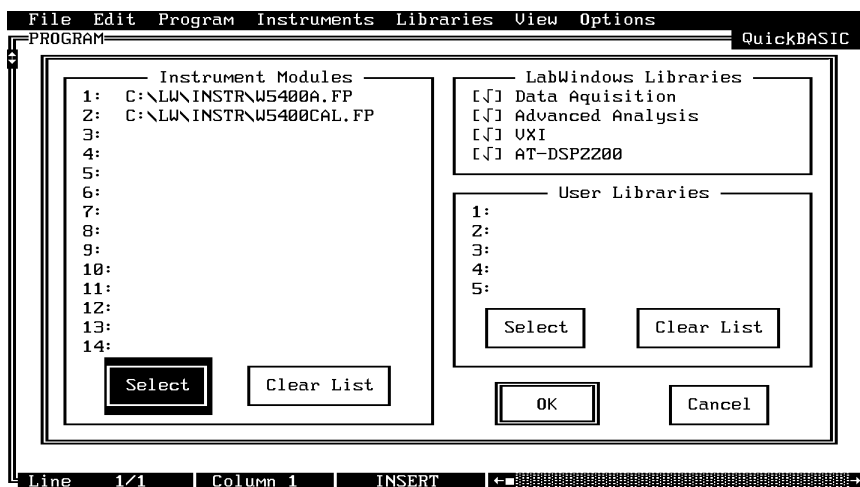
Debug Utility

The 54XXA LabWindows driver incorporates a unique Debug utility, which should be used for program developement only. It should be disabled when compiling stand alone applications.

```
 Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!

 Wiltron 54XXA SNA                        Initialize              Page 1/1

      Address                        Model Number               Firmware Rev

    6                              ┌──────────────┐            ┌──────────────┐
 ┌──────────────────┐             └──────────────┘            └──────────────┘

                                                               Software Rev

                                                             ┌──────────────┐
                                                             └──────────────┘

       Debug                                                      Error
      On
      Off ■                                                    0
                                                             ┌──────────────┐

 CALL W54XXA.init (6)

 Line    1/1    Column 1      OPERATE    ←■
```
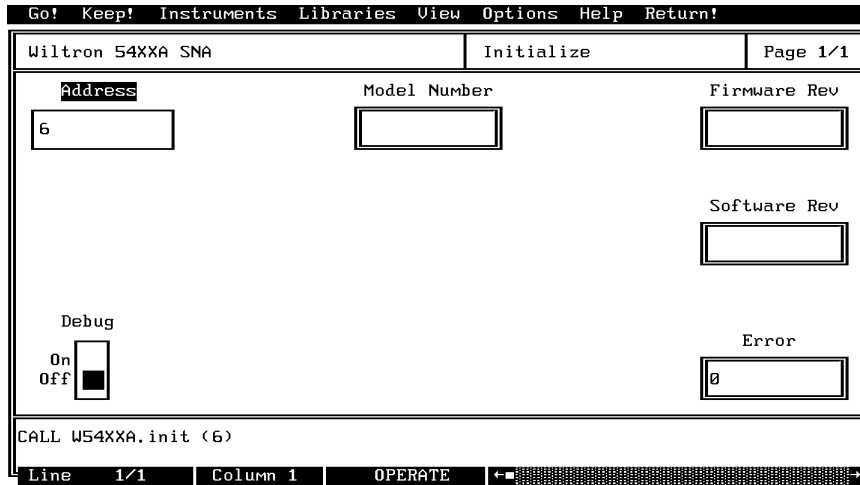
The 54XXA driver generates five different error values with the **Debug** switch set to **Off** (Debug%=0). These errors are 4000, 303, 305, 308, and 314. Error 4000 indicates that the instrument has generated a warning message. All commands are processed.

Error 305 is returned when the instrument has generated an unexpected SRQ. To determine the cause of the SRQ set the **Debug** switch to **On** (Debug%=1), the driver will respond with error codes 300, 304, 309, 311, 312, 313, 317 or 321 thru 327.

Error code 314 is an action-not-possible error. *This error means that the instrument is being operated in a non allowed configuration.*

To determine the nature of error message, set the **Debug** switch to **On** (Debug%=1), the driver will respond with a specific 4XXX or 3XX error code (Table 2-1).

Table 2-1. Model 54XXA Error Table (1 of 4)

Error Code	Description
	Warning Messages
4001 4002	Calibration Start Error, Channel 1 Calibration Start Error, Channel 2
4003 4004	Calibration Stop Error, Channel 1 Calibration Stop Error, Channel 2 *Problem:* The new frequency range includes frequencies outside the current calibrated range for the indicated channel. If a start error, the new start frequency is below the calibration start frequency. If a stop error, the new stop frequency is above the calibration stop frequency. *Remedy:* Recalibrate using the new start/stop frequency values, or adjust the new current-frequency range to fall within the existing calibration range.
4005 4006	Not Calibrated, Channel 1 Not Calibrated, Channel 2 *Problem:* The 54XXA was calibrated with a different input connector selected for channel. *Remedy:* Recalibrate the 54XXA with current settings, or proceed with caution: measurement results must be interpreted to compensate for the problem.
4007	Invalid Calibration Data *Problem:* Subtract Trace Memory feature presently selected. *Remedy:* Recalibrate, or de-select Subtract Trace Memory from measurement setup.
4008 4009	Trace Memory Start Error, Channel 1 Trace Memory Start Error, Channel 2
4010 4011	Trace Memory Stop Error, Channel 1 Trace Memory Stop Error, Channel 2 *Problem:* The current frequency range includes frequencies outside of the range covered by the specified Trace Memory. *Remedy:* Adjust current frequency range or cancel use of the specified Trace Memory.
4012 4013	Calibration Power Error, Channel 1 Calibration Power Error, Channel 2 *Problem:* The current output power is different from the power value used during the last calibration. *Remedy:* Recalibrate using new power level or adjust current power level to calibration value.

Table 2-1. Model 54XXA Error Table (2 of 4)

Error Code	Description
	Warning Messages (Continued)
4014	Keypad Entry Error *Problem:* The last keypad input is not within credible limits for the current data parameter. *Remedy:* Re-enter valid data value via keypad or spinwheel. **Note:** This error is catastrophic. Further use of the instrument is not possible until the condition causing the error has been corrected.
4015 4016	No Calibration Data, Channel 1 No Calibration Data, Channel 2 *Problem:* No calibration data exists for the indicated channel. *Remedy:* Perform calibration including designated channel or change measurement type for the channel.
4017 4018	Calibration Data Only for Transmission, Channel 1 Calibration Data Only for Transmission, Channel 2 *Problem:* Channel is set to measure Return Loss or SWR, but the calibration data for channel is for Transmission. *Remedy:* Perform calibration for current measurement type or change channel measurement type.
4019 4020	Calibration Data Only for Return Loss or SWR, Channel 1 Calibration Data Only for Return Loss or SWR, Channel 2 *Problem:* Channel set to measure Transmission, but the calibration data for channel is for Return Loss or SWR. *Remedy:* Perform calibration for current measurement type or change channel measurement type.
4021	Cursor Search Failed *Problem:* The last cursor search command was unable to find the requested value(s) on the current trace. *Remedy:* Amend search targets, search type, or cursor mode. (Reminder: if Relative Mode Cursor is enabled, target values are interpreted as relative to the value at the current cursor.)
4022 4023	Trace Memory Invalid Display Resolution, Channel 1 Trace Memory Invalid Display Resolution, Channel 2
	Problem: The requested trace memory was captured with a resolution inconsistent with current settings. *Remedy:* Recall a different trace memory, change resolution, or disable trace memory subtraction.

Table 2-1. Model 54XXA Error Table (3 of 4)

Error Code	Description
	Warning Messages (Continued)
4024	External ALC Uncalibrated *Problem:* External ALC selected, but has not yet been rescaled. *Remedy:* Perform External ALC calibration.
4025	N/A (Reserved)

4026	Frequency Calibration Fault
	
	Problem:
	A serious fault condition has been detected during the frequency calibration process. The error codes (nnn) that are displayed with the Frequency Calibration Fault warning message are:
	   201: General, no 500 MHz markers.
	   202: Start DAC main band, 500 MHz marker(s) missing; or, top or bottom frequency(s) not correctly set.
	   203: Start DAC main band, 1st MHz markers (top) wrong.
	   204: Start DAC main band, 500 MHz marker size error.
	   205: Error DAC, 25 MHz marker spacing wrong.
	   206: Width DAC main band, 500 MHz marker(s) missing.
	   207: Width DAC main band, 1st MHz markers (top) wrong.
	   208: Width DAC main band, 500 MHz marker size error.
	   209: Width DAC fm, 25 MHz marker spacing wrong.
	   210: HET band, 500 MHz marker missing.
	   211: HET band, 25 MHz and 500 MHz marker spacing wrong.
	   212: HET band, 25 MHz marker spacing wrong.
	
	Remedy:
	Report the problem to your WILTRON Service Center.

4027	Invalid Calibration Mode *Problem:* Attempting to use Frequency Scaling mode with standard calibration data. *Remedy :* Perform a new calibration, or cancel Frequency Scaling mode.
	Unexpected SRQ and other 300-series Error Messages
300	No response or timeout
301	Not Available
303	Invalid file name
304	File not found
305	Unexpected SRQ
306	For future use

Table 2-1.   Model 54XXA Error Table (4 of 4)

Error Code	Description
308	File failure (cannot open file)
309	No active marker
311	Syntax Error
312	Warning Condition Encountered
313	Calibration Step Finished
314	Action not possible
317	Hardcopy Error
321	Reserved
322	Unlevelled Indicator
323	Instrument is uncalibrated
324	Instrument is in Calibration mode
325	Instrument is in Secret mode
326	Instrument failed Self Test
327	Instrument is in Preview mode

Tutorial

This tutorial takes you through the development of a simple program. This program initializes the 54XXA SNA and defines a start/stop sweep. It sets start and stop frequency values, data points, and power levels. Then, it steps you through a calibration, and takes you to a measurement menu. When you have finished the tutorial, you will have a BASIC program that can be compiled as a DOS executable (*.EXE) file. A Microsoft C program could be produced in the exact same manner by switching the native language to C (under the **Program** menu). *(Note: To demonstrate the calibration sequence, you will need to have a 54XXA connected to your computer.)*

In stepping through the program, you will be creating code to perform a calibration for transmission and return loss measurements. After completing the tutorial, you will have an executable file that you can run from the DOS prompt. When you run the program, you will be asked to make connections to a 54XXA. Figure 2-1 shows an overview of the test equipment setup.
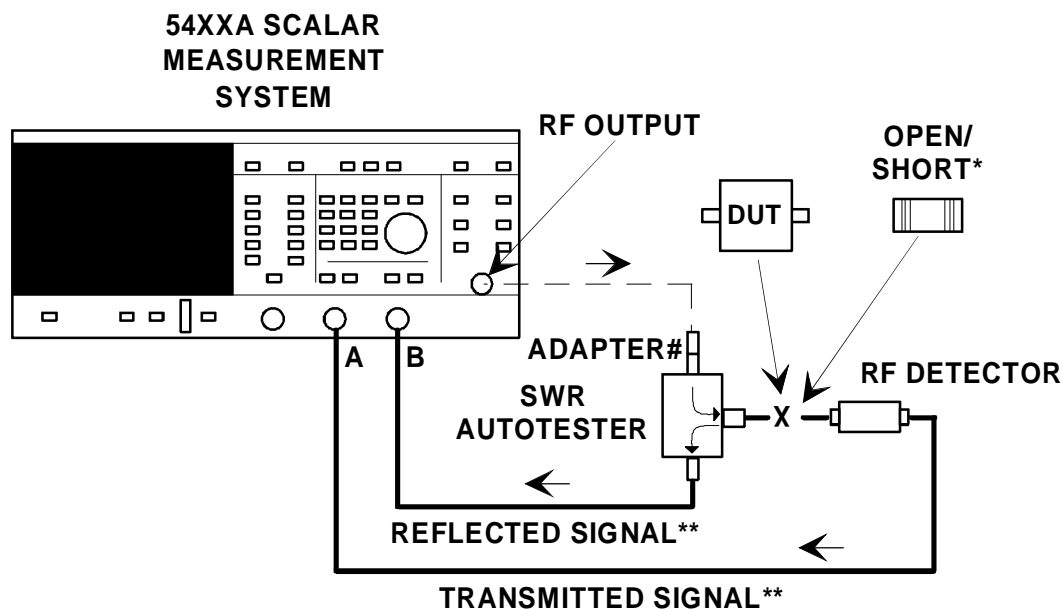
Figure 2-1. Test Equipment Setup for Running the Program Created Using the Calibration Tutorial

☐ Move cursor to **Instruments** in the top menu bar, select **Wiltron 54XXA SNA,** and press <ENTER>. This will display the main instrument menu shown below.

```
    File  Edit  Program  Instruments  Libraries  View  Options
  ┌PROGRAM══════════════════════════════════════════════QuickBASIC─┐
  │                                                                 │
  │              ╒════Wiltron 54XXA SNA════╕                        │
  │         ┌───────────────────────────┐                          │
  │         │ Initialize             ▲│  ┌──────────┐              │
  │         │ Source...               │  │  Select  │              │
  │         │ Network Analyzer...     │  └──────────┘              │
  │         │ Data Analysis...        │                            │
  │         │ Data I/O...             │                            │
  │         │ Save/Recall...          │                            │
  │         │ Video Configuration     │  ┌──────────┐              │
  │         │ CRT Functions           │  │  Cancel  │              │
  │         │ Secure Mode             │  └──────────┘              │
  │         │ Close                  ▼│                            │
  │         │                         │  ┌──────────┐              │
  │         └───────────────────────────┘  │   Help   │           │
  │                                       └──────────┘             │
  │                                                                 │
  │   Line    1/1     Column 1      INSERT   ◄■▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒     │
  └─────────────────────────────────────────────────────────────────┘
```
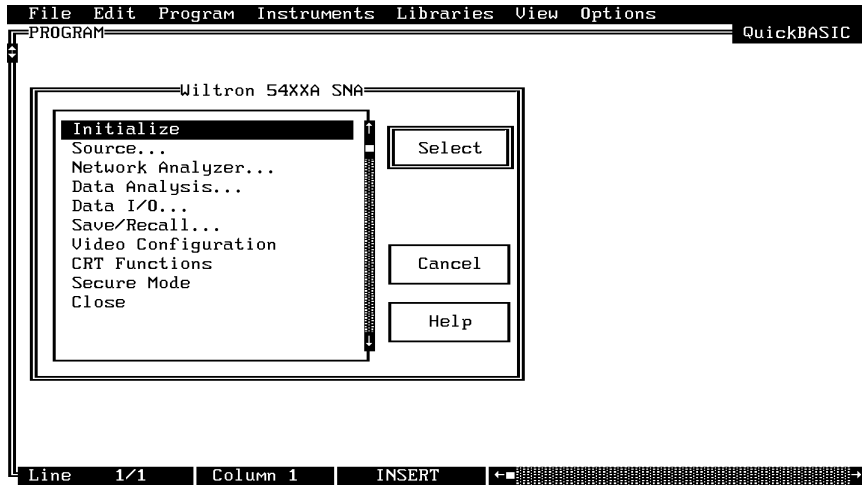
☐ Choose **Select** to display the Initialize panel (below).

```
    Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!
  ┌────────────────────────────────────────────────────────────────┐
  │ Wiltron 54XXA SNA                │ Initialize    │ Page 1/1     │
  │   ┌─────────┐                                                   │
  │   │ Address │         Model Number            Firmware Rev      │
  │   ┌─────────────┐    ┌─────────────┐        ┌─────────────┐    │
  │   │ 6           │    │             │        │             │    │
  │   └─────────────┘    └─────────────┘        └─────────────┘    │
  │                                                                 │
  │                                               Software Rev      │
  │                                             ┌─────────────┐    │
  │                                             │             │    │
  │                                             └─────────────┘    │
  │                                                                 │
  │        Debug                                    Error           │
  │    On ┌──┐                                  ┌─────────────┐    │
  │   Off │██│                                  │ 0           │    │
  │       └──┘                                  └─────────────┘    │
  │ CALL W54XXA.init (6)                                            │
  │   Line    1/1     Column 1      OPERATE   ◄■▒▒▒▒▒▒▒▒▒▒▒▒▒▒     │
  └────────────────────────────────────────────────────────────────┘
```
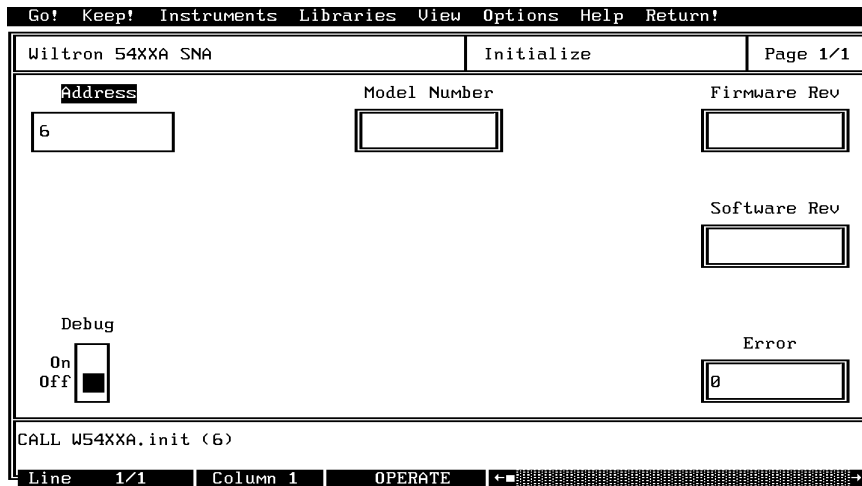
☐ With the **SNA Address** highlighted as shown, enter the 54XXA SNA address (a number between 1 and 30; 6 is the default).

☐ If a 54XXA is connected and set to address 6, select **Go!** (below) in the top menu bar. The 54XXA will respond by resetting itself and returning an identification string that will fill the **Model Number** and **Firmware Rev** fields.

☐ Leave the **Debug** switch set to **Off**. This switch is discussed on page 2-8.

```
 Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!
┌──────────────────────────────────────┬──────────────────┬──────────┐
│ Wiltron 54XXA SNA                     │ Initialize       │ Page 1/1 │
├──────────────────────────────────────┴──────────────────┴──────────┤
│    Address                    Model Number              Firmware Rev│
│ ┌──────────────┐          ┌──────────────┐          ┌──────────────┐│
│ │6             │          │              │          │              ││
│ └──────────────┘          └──────────────┘          └──────────────┘│
│                                                                     │
│                                                        Software Rev │
│                                                     ┌──────────────┐│
│                                                     │              ││
│                                                     └──────────────┘│
│     Debug                                                           │
│                                                         Error       │
│    On                                               ┌──────────────┐│
│   Off ■                                             │0             ││
│                                                     └──────────────┘│
├─────────────────────────────────────────────────────────────────────┤
│ CALL W54XXA.init (6)                                                │
├─────────────────────────────────────────────────────────────────────┤
│  Line    1/1   │  Column 1   │   OPERATE   │ ←■                     │
└─────────────────────────────────────────────────────────────────────┘
```

☐ Move the cursor to **Keep!**, in the top menu bar, then choose **Keep** from the next window (below) to select the default option. This transfers the code shown at the bottom of the panel to the PROGRAM window of the LabWindows environment.

```
  Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!
┌──────────────────────────────────────┬──────────────────┬──────────┐
│ Wiltron 54XXA SNA                     │ Initialize       │ Page 1/1 │
├──────────────────────────────────────┴──────────────────┴──────────┤
│    Address                    Model Number              Firmware Rev│
│ ┌──────────────┐          ┌──────────────┐          ┌──────────────┐│
│ │6             │          │              │          │              ││
│ └──────────────┘     ┌───────────────────────────────────┐────────┘│
│                      │ TO:  [√] PROGRAM WINDOW  [ ] Interactive Window│Software Rev
│                      │                                   │──────────┐│
│                      │     ┌──────┐          ┌──────┐    │          ││
│                      │     │ Keep │          │Cancel│    │──────────┘│
│                      └─────└──────┘──────────└──────┘────┘           │
│     Debug                                                           │
│                                                         Error       │
│    On                                               ┌──────────────┐│
│   Off ■                                             │0             ││
│                                                     └──────────────┘│
├─────────────────────────────────────────────────────────────────────┤
│ CALL W54XXA.init (6)                                                │
├─────────────────────────────────────────────────────────────────────┤
│  Line    1/1   │  Column 1   │   OPERATE   │ ←■                     │
└─────────────────────────────────────────────────────────────────────┘
```

☐ Repeat the above steps to initialize the **Wiltron 5400A Calibration** driver.

☐ Select **Return!,** in the top menu bar, to return to the PROGRAM screen.

☐ Add an optional remark to each line of program code, as shown below.

```
 File  Edit  Program  Instruments  Libraries  View  Options
┌PROGRAM══════════════════════════════════════!!════════QuickBASIC┐
│CALL W54XXA.init (6) 'initialize main driver
│CALL W54XXcal.init (6) 'initialize calibration driver




                                        ▮




│ Line    3/7    │  Column 1   │    INSERT    │◄■
```

☐ Select **Instruments,** in the top menu bar, then **Wiltron 54XXA SNA** to return to the 54XXA Driver main panel.

☐ Select **Source,** from the main menu, then **Sweep Type,** and **Start/Stop or Cent/Span** from the follow-on menus as they appear (below).

```
 Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!
┌──────────────────────────────────────────────────────────────┐
│ Wiltron 54XXA SNA                    │ Initialize     │ Page 1/1 │
├──────────────────────────────────────┤                │          │
│   ┌═══════Wiltron 54XXA SNA═══════┐           Firmware Rev
│   │        ┌═Source═┐
│   │ Initia │        ┌═══════Sweep Type═══════┐
│   │ Source │ Sweep  │                         │
│   │ Networ │ Power  │ Start/Stop or Cent/Span │    ┌────────┐
│   │ Calibr │        │ C.W. Sweep              │    │ Select │
│   │ Data A │        │ Alternate Sweep         │    └────────┘
│   │ Data I │        │ User Scaling            │
│   │ Save/R │        │ Data Points             │    ┌────────┐
│   │ Self T │        │ Hold Functions          │    │Previous│
│   │ Video  │        │                         │    └────────┘
│   │ CRT Fu │        │                         │
│   │ Secure │        │                         │    ┌────────┐
│   │ Close  │        │                         │    │ Cancel │  Error
│   │        │        │                         │    └────────┘
│   │        │        │                         │    ┌────────┐
│   │        │        │                         │    │  Help  │
│   └        └        └─────────────────────────┘    └────────┘
│ CALL W54XXA.init (6)
│ Line   1/1    │  Column 1   │    OPERATE   │◄■
```

☐ Select **Start/Stop** (below).

☐ Select **Start/Cent,** and enter **2** (or the low-end frequency) from the keyboard.

☐ Select **Stop/Span,** and enter **6** (or the high-end frequency) from the keyboard.

```
 Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!
┌─────────────────────────────────────────┬──────────────────────┬───────────┐
│ Wiltron 54XXA SNA                        │ Start/Stop or Cent/Span │ Page 1/1 │
├──────────────────────────────────────────────────────────────────────────── │
│   Source Control          Start/Center              Stop/Span              ▲ │
│                                                                              │
│    Cent/Span┌─┐       ┌────────────┐         ┌────────────┐                  │
│    Start/Stop│■│       │ 2          │ GHz     │ 6          │ GHz             │
│             └─┘       └────────────┘         └────────────┘                  │
│                                                                              │
│                                                                              │
│                                                              Error           │
│                                                         ┌────────────┐       │
│                                                         │ 0          │       │
│                                                         └────────────┘     ▼ │
├──────────────────────────────────────────────────────────────────────────── │
│ CALL W54XXA.src.ststs (0, 2, 6)                                              │
├────────────┬───────────┬───────────────┬──────────────────────────────────  │
│ Line   1/1 │ Column 1  │   OPERATE     │ ←■                                  │
└────────────┴───────────┴───────────────┴───────────────────────────────────┘
```
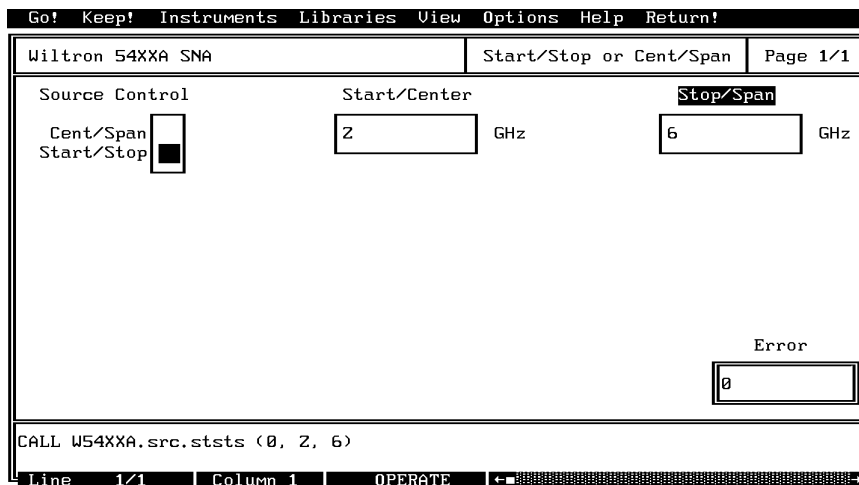
☐ Select **Keep!**, in the top menu bar; then choose **Keep** again when the next menu appears.

☐ Select **Return!,** in the top menu bar, to return to the PROGRAM screen.

☐ Add an optional remark ('frequency range) to the program code, as shown below

```
  File  Edit  Program  Instruments  Libraries  View  Options
┌─PROGRAM══════════════════════════════════════!!══════════QuickBASIC─┐
│CALL W54XXA.init (6) 'initialize main driver                         ▲│
│CALL W54XXcal.init (6) 'initialize calibration driver                 │
│CALL W54XXA.src.ststs (0, 2, 6) 'frequency range                      │
│                                                                      │
│                                                                      │
│                                                                      │
│                                   ■                                  │
│                                                                      │
│                                                                      │
│                                                                      │
│                                                                      │
│                                                                     ▼│
├────────────┬───────────┬───────────────┬──────────────────────────  │
│ Line   4/6 │ Column 1  │   INSERT      │ ←■                          │
└────────────┴───────────┴───────────────┴───────────────────────────┘
```

☐ Select **Instruments,** in the top menu bar, then **Wiltron 54XXA SNA** to return to the 54XXA Driver main panel.

☐ Select **Source, Power Control,** then **Output Power** from the menus as they appear (below).

```
 Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!
┌───────────────────────────────────┬─────────────────┬──────────┐
│ Wiltron 54XXA SNA                 │ Data Points     │ Page 1/1 │
├───────────────────────────────────┴─────────────────┴──────────┤
│ ╔══════════════Wiltron 54XXA SNA══════════════╗               ↑│
│ █                        ═══Source═══                 ╗        ││
│   ┌─────────┐        ┌──────════Power Control════╗             ││
│   │ Initia  │  ┌──────────┐                                    ││
│   │ Source  │  │ Sweep    │  ┌──────────────┐                  ││
│   │ Networ  │  │ Power    │  │ Output Power │  ┌─────────┐      ││
│   │ Calibr  │  │          │  │ Output Leveling│ │ Select  │    ││
│   │ Data A  │  │          │  │ Amplifier    │  └─────────┘      ││
│   │ Data I  │  │          │  │              │                  ││
│   │ Save/R  │  │          │  │              │  ┌─────────┐      ││
│   │ Self T  │  │          │  │              │  │Previous │      ││
│   │ Video   │  │          │  │              │  └─────────┘      ││
│   │ CRT Fu  │  │          │  │              │  ┌─────────┐      ││
│   │ Secure  │  │          │  │              │  │ Cancel  │      ││
│   │ Close   │  │          │  │              │  └─────────┘ Error ││
│   └─────────┘  └──────────┘  │              │  ┌─────────┐      ││
│                              └──────────────┘  │  Help   │      ││
│                                                └─────────┘      ││
├─────────────────────────────────────────────────────────────────┤
│ CALL W54XXA.sf.dp (4)                                          ↓│
├──────────┬───────────┬───────────┬──────────────────────────────┤
│ Line  1/1│ Column 1  │  OPERATE  │ ←■░░░░░░░░░░░░░░░░░░░░░░░░░→  │
└──────────┴───────────┴───────────┴──────────────────────────────┘
```
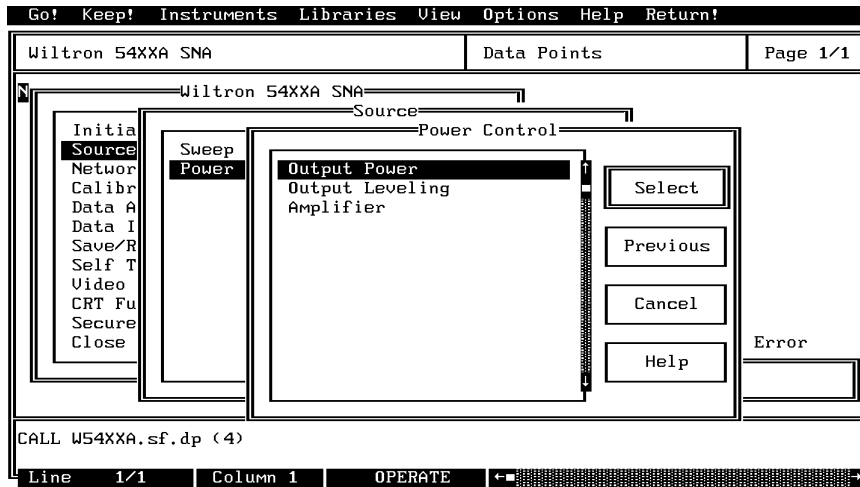
☐ On the **RF On/Off** control (below). move the slide to **On.**

☐ Move the cursor to **Power Level**, and enter **5** from the keyboard.

```
 Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!
┌───────────────────────────────────┬─────────────────┬──────────┐
│ Wiltron 54XXA SNA                 │ Output Power    │ Page 1/1 │
├───────────────────────────────────┴─────────────────┴──────────┤
│  RF On/Off                              Power Level            ↑│
│                                                                ││
│       On ┌──┐                           ┌──────────┐           ││
│          │ ■│                           │5         │ dBм       ││
│      Off └──┘                           └──────────┘           ││
│                                                                ││
│                                                                ││
│                                                                ││
│                                                                ││
│                                                                ││
│                                                                ││
│                                              Error             ││
│                                         ┌──────────┐           ││
│                                         │0         │           ││
│                                         └──────────┘           ││
├─────────────────────────────────────────────────────────────────┤
│ CALL W54XXA.pc.pwr (1, 5)                                      ↓│
├──────────┬───────────┬───────────┬──────────────────────────────┤
│ Line  1/1│ Column 1  │  OPERATE  │ ←■░░░░░░░░░░░░░░░░░░░░░░░░░→  │
└──────────┴───────────┴───────────┴──────────────────────────────┘
```

☐ Select **Keep!,** from the top menu bar, and then **Keep** again to add the code to your program.

☐ Select **Return!,** in the top menu bar, to return to the PROGRAM screen

☐ Add an optional remark ('power level) to the program code, as shown be-
low

```
  File  Edit  Program  Instruments  Libraries  View  Options
┌─PROGRAM─────────────────────────────────────────!!──────QuickBASIC─
│CALL W54XXA.init (6) 'initialize main driver
│CALL W54XXcal.init (6) 'initialize calibration driver
│CALL W54XXA.src.ststs (0, 2, 6) 'frequency range
│CALL W54XXA.pc.pwr (1, 5) 'power level

│■



  Line    5/9     Column 1       INSERT   ←■▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒
```

☐ Select **Instruments,** in the top menu bar, then **Wiltron 54XXA SNA** to
return to the 54XXA Driver main panel.

☐ Select **Source, Sweep Type,** then **Data Points** from the menus as
they appear (below).

```
  Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!

│ Wiltron 54XXA SNA                    │ Data Points        │ Page 1/1 │

┌───────────Wiltron 54XXA SNA═══════════════┐
│             ══════Source══════
│   Initia ┌─Sweep─┐  ═════Sweep Type═════
│   Source │ Sweep │
│   Networ │ Power │  Start/Stop or Cent/Span      ┌──────────┐
│   Calibr           C.W. Sweep                    │  Select  │
│   Data A           Alternate Sweep
│   Data I           User Scaling
│   Save/R           Data Points                   ┌──────────┐
│   Self T           Hold Functions                │ Previous │
│   Video
│   CRT Fu                                          ┌──────────┐
│   Secure                                          │  Cancel  │
│   Close                                  Error
│                                          ┌──────────┐
│                                          │   Help   │
│
│ CALL W54XXA.sf.dp (1)
  Line    1/1     Column 1       OPERATE   ←■▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒
```

☐ Select **401** on the **Number of Data Points** control (below).

```
 Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!

 Wiltron 54XXA SNA                        Data Points              Page 1/1

 Number of Data Point
      101
      201
      401

                                          =


                                                              Error

                                                              0


 CALL W54XXA.sf.dp (4)

 Line    1/1      Column 1       OPERATE
```

☐ Select **Keep!,** in the top menu bar; then choose **Keep** again to add the code to the program window.

☐ Select **Return!,** in the top menu bar, to return to the PROGRAM screen.

☐ Add an optional remark ('data points) to the program code, as shown below.

```
 File  Edit  Program  Instruments  Libraries  View  Options
 PROGRAM                                          !!          QuickBASIC
 CALL W54XXA.init (6) 'initialize main driver
 CALL W54XXcal.init (6) 'initialize calibration driver
 CALL W54XXA.src.ststs (0, 2, 6) 'frequency range
 CALL W54XXA.pc.pwr (1, 5) 'power level
 CALL W54XXA.sf.dp (4) 'data points
 'measurements to be taken
 'transmission loss










 Line    8/12     Column 1       INSERT
```

☐ Add two optional remarks ("measurements to be taken" and "transmission loss") to preface the measurement-type declarations that will come next. Press <ENTER> following the last remark.

☐ Select **Instruments,** in the top menu bar, then **Wiltron 54XXA SNA** to return to the 54XXA Driver main panel.

☐ Select **Network Analyzer,** from the main menu, and **Channel Meas/Disp,** from the next menu (below).

```
  File  Edit  Program  Instruments  Libraries  View  Options
┌PROGRAM══════════════════════════════════════════════════QuickBASIC═┐
│                                                                     │
│     ┌────────────Wiltron 54XXA SNA══════════════════┐               │
│     │                  ═Network Analyzer═            │               │
│     │  Initia │  ┌─────────────────────┐   ┌──────────────┐         │
│     │  Source │  │ Channel Meas/Disp    │   │    Select    │         │
│     │  Networ │  │ Channel Titles       │   └──────────────┘         │
│     │  Data A │  │ Scale                │                            │
│     │  Data I │  │ Avg/Smoothing        │   ┌──────────────┐         │
│     │  Save/R │  │ Trace Functions      │   │   Previous   │         │
│     │  Video  │  │ Single Line Limits   │   └──────────────┘         │
│     │  CRT Fu │  │ Complex Limits       │                            │
│     │  Secure │  │                      │   ┌──────────────┐         │
│     │  Close  │  │                      │   │    Cancel    │         │
│     │         │  │                      │   └──────────────┘         │
│     │         │  │                      │                            │
│     │         │  │                      │   ┌──────────────┐         │
│     │         │  │                      │   │     Help     │         │
│     │         │  └──────────────────────┘   └──────────────┘         │
│     └───────────────────────────────────────────────┘               │
│                                                                     │
│  Line     1/1    │  Column 1   │    INSERT   │←■                     │
└─────────────────────────────────────────────────────────────────────┘
```

☐ Select the default control positions as shown on Channel Meas/Disp panel (below). This declares your intent for making a transmission measurement. This declaration is needed for the measurement calibration that you will do in a later step.

```
  Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!
┌─────────────────────────────────────────────────────────────────────┐
│ Wiltron 54XXA SNA              │  Channel Meas/Disp  │  Page 1/1     │
│                                                                     │
│ Channel Select    Measurement Trace    Select Input    Display Mode │
│    CH 1▓█▓        Transmission▓█▓         A▓█▓         Channel 1     │
│    CH 2▓▓         Return Loss▓▓           B▓▓          Channel 2▓▓   │
│                   SWR▓▓                   R▓▓        Dual Channel▓█▓  │
│                   Power▓▓                 A/R▓▓                      │
│                   View Cal▓▓              B/R▓▓                      │
│                                                                     │
│                                                                     │
│                   Trace Display     Trace Memory Storage            │
│                   View Trace▓█▓          None▓█▓                     │
│                   View TR Mem▓▓     Trace To Mem▓▓                   │
│                   View TR-Mem▓▓      HLIM to Mem▓▓       Error       │
│                                      LLIM to Mem▓▓     ┌─────────┐   │
│                                                        │0        │   │
│                                                        └─────────┘   │
│ CALL W54XXA.na.vnad (1, 1, 1, 0, 1, 0)                              │
│  Line     1/1    │  Column 1   │   OPERATE   │←■                     │
└─────────────────────────────────────────────────────────────────────┘
```
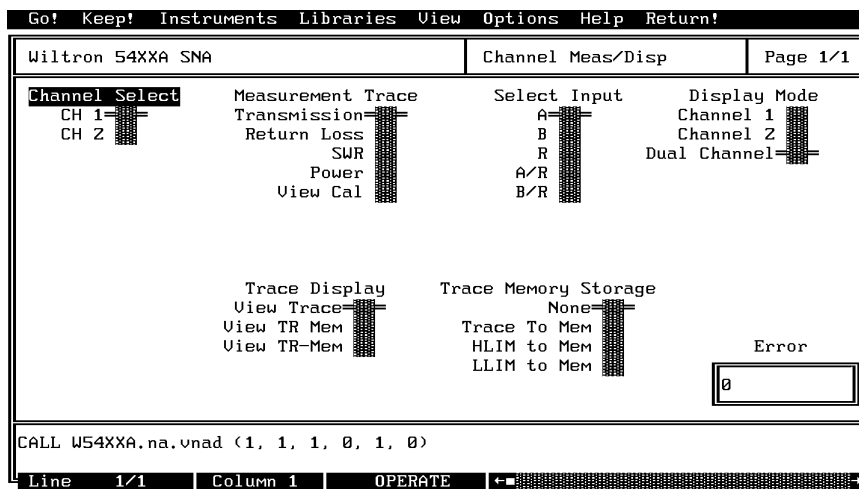
☐ Select **Keep!,** in the top menu bar; then choose **Keep** again to add the code to the program window.

☐ Select **Return!,** in the top menu bar, to return to the PROGRAM screen.

☐ Add an optional remark ('return loss, below) to the program code and press the <ENTER> key.

```
 File  Edit  Program  Instruments  Libraries  View  Options
┌PROGRAM════════════════════════════════════════════‼══════════QuickBASIC┐
│CALL W54XXA.init (6) 'initialize main driver                             │
│CALL W54XXcal.init (6) 'initialize calibration driver                   │
│CALL W54XXA.src.ststs (0, 2, 6) 'frequency range                        │
│CALL W54XXA.pc.pwr (1, 5) 'power level                                   │
│CALL W54XXA.sf.dp (4) 'data points                                       │
│'measurements to be taken                                                │
│'transmission loss                                                       │
│CALL W54XXA.na.vnad (1, 1, 1, 0, 1, 0)                                   │
│'return loss                                                             │
│                                                                         │
│                                                                         │
│                                                                         │
│                                                                         │
│                                                                         │
│                                                                         │
│                                                                         │
│                                                                         │
│                                                                         │
│  Line    9/13    Column 13      INSERT                                  │
└─────────────────────────────────────────────────────────────────────────┘
```
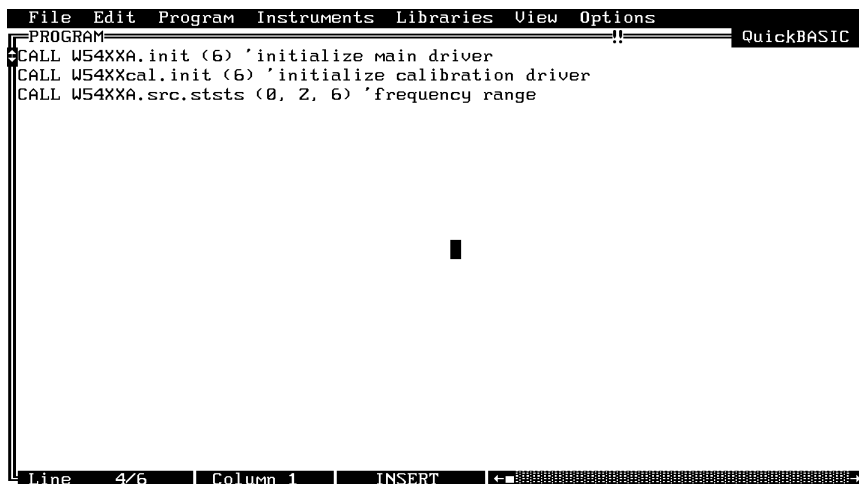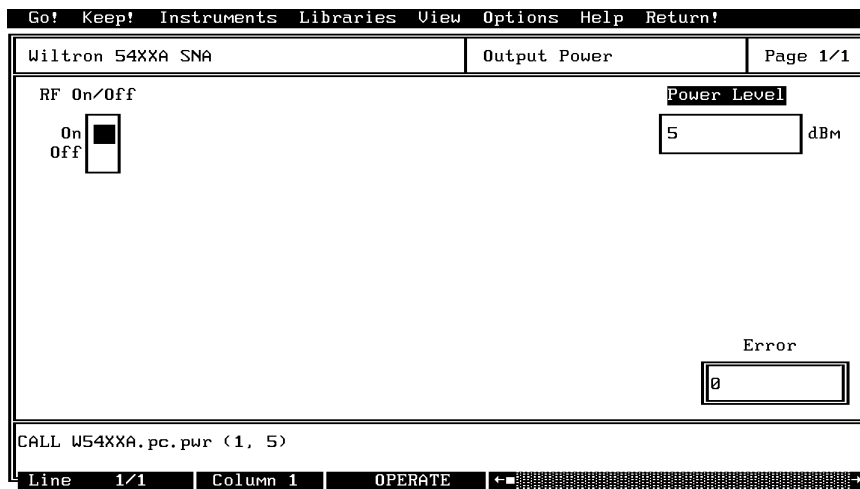
☐ Select **Instruments,** in the top menu bar, then **Wiltron 54XXA SNA** to return to the 54XXA Driver main panel.

☐ Select **Network Analyzer,** from the main menu, and **Channel Meas/Disp,** from the next menu (below).

```
 File  Edit  Program  Instruments  Libraries  View  Options
┌PROGRAM═══════════════════════════════════════════════════════QuickBASIC┐
│                                                                         │
│          ┌══════Wiltron 54XXA SNA══════════┐                           │
│          │          ┌Network Analyzer─────────┐                        │
│     Initia │          │                          │                      │
│     Source │ ┌Channel Meas/Disp────┐  ┌────────┐ │                     │
│     Networ │ │ Channel Meas/Disp   │  │ Select │ │                     │
│     Data A │ │ Channel Titles      │  └────────┘ │                     │
│     Data I │ │ Scale               │             │                     │
│     Save/R │ │ Avg/Smoothing       │  ┌────────┐ │                     │
│     Video  │ │ Trace Functions     │  │Previous│ │                     │
│     CRT Fu │ │ Single Line Limits  │  └────────┘ │                     │
│     Secure │ │ Complex Limits      │             │                     │
│     Close  │ │                     │  ┌────────┐ │                     │
│            │ │                     │  │ Cancel │ │                     │
│            │ │                     │  └────────┘ │                     │
│            │ │                     │             │                     │
│            │ │                     │  ┌────────┐ │                     │
│            │ └─────────────────────┘  │  Help  │ │                     │
│            │                          └────────┘ │                     │
│            └────────────────────────────────────┘                      │
│  Line    1/1     Column 1       INSERT                                  │
└─────────────────────────────────────────────────────────────────────────┘
```

☐ Move the **Channel Select** slide to **CH2,** the **Measurement Trace** slide to **Return Loss,** and the **Select Input** slide to **B**. This declares your intent for making a return loss measurement. This declaration is needed for the measurement calibration that you will do in a later step.

```
 Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!
┌─────────────────────────────────┬───────────────────────┬──────────┐
│ Wiltron 54XXA SNA               │ Channel Meas/Disp     │ Page 1/1 │
├─────────────────────────────────┴───────────────────────┴──────────┤
│ Channel Select    Measurement Trace    Select Input    Display Mode │
│    CH 1 ▓▓         Transmission ▓▓         A ▓▓         Channel 1 ▓▓ │
│    CH 2 ▓▓         Return Loss ▓▓          B ▓▓         Channel 2 ▓▓ │
│                          SWR ▓▓           R ▓▓       Dual Channel ▓▓ │
│                        Power ▓▓          A/R ▓▓                      │
│                     View Cal ▓▓          B/R ▓▓                      │
│                                                                     │
│                                                                     │
│                   Trace Display     Trace Memory Storage            │
│                   View Trace ▓▓          None ▓▓                     │
│                   View TR Mem       Trace To Mem                     │
│                   View TR-Mem ▓▓     HLIM to Mem ▓▓       Error      │
│                                      LLIM to Mem ▓▓    ┌──────────┐  │
│                                                       │0         │  │
│                                                       └──────────┘  │
├─────────────────────────────────────────────────────────────────────┤
│ CALL W54XXA.na.vnad (2, 2, 2, 0, 1, 0)                              │
├──────────┬──────────────┬──────────────┬───────────────────────────┤
│ Line  1/1│  Column 1    │   OPERATE    │ ←■                         │
└──────────┴──────────────┴──────────────┴───────────────────────────┘
```

☐ Select **Keep!,** in the top menu bar; then choose **Keep** again to add the code to the program window.

☐ Select **Return!,** in the top menu bar, to return to the PROGRAM screen.

☐ Add an optional remark ('start calibration routines, below) to the program code, and press the <ENTER> key.

```
 File  Edit  Program  Instruments  Libraries  View  Options
┌═PROGRAM══════════════════════════════════════════!!═══┬─QuickBASIC─┐
│CALL W54XXA.init (6) 'initialize main driver           │            │
│CALL W54XXcal.init (6) 'initialize calibration driver  │            │
│CALL W54XXA.src.ststs (0, 2, 6) 'frequency range       │            │
│CALL W54XXA.pc.pwr (1, 5) 'power level                 │            │
│CALL W54XXA.sf.dp (4) 'data points                     │            │
│'measurements to be taken                              │            │
│'transmission loss                                     │            │
│CALL W54XXA.na.vnad (1, 1, 1, 0, 1, 0)                 │            │
│'return loss                                           │            │
│CALL W54XXA.na.vnad (2, 2, 2, 0, 1, 0)                 │            │
│                                                       │            │
│'start calibration routines                            │            │
│                                                       │            │
│                                                       │            │
│                                                       │            │
│                                                       │            │
│                                                       │            │
├──────────┬──────────────┬──────────────┬──────────────────────────┤
│ Line 13/14│  Column 1   │   INSERT     │ ←■                        │
└──────────┴──────────────┴──────────────┴──────────────────────────┘
```
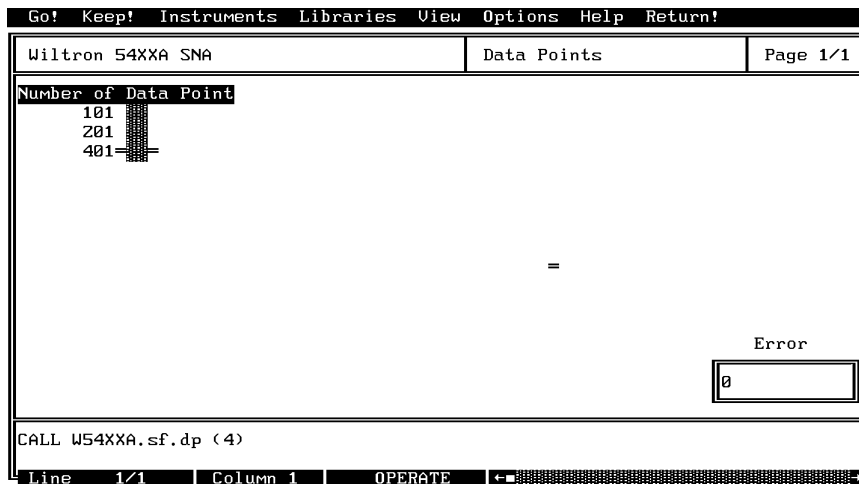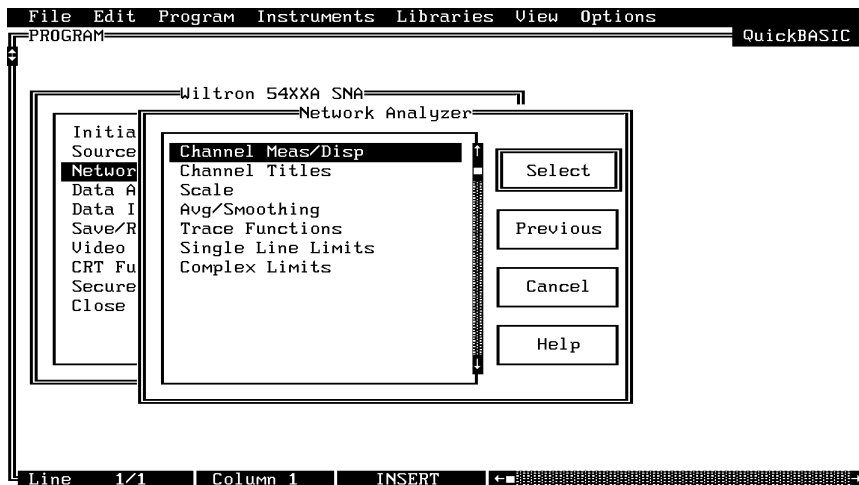
☐ Select **Instruments,** in the top menu bar, then **Wiltron 54XXA SNA Calibration** to open the 54XXA Calibration Driver panel.

☐ Select **Calibration** from the next menu (below).

```
   File  Edit  Program  Instruments  Libraries  View  Options
 ┌PROGRAM════════════════════════════════════════!!═══════QuickBASIC ┐↑
 │CALL W54XXA.init (6) 'initialize main driver                        ║↑
 │CALL W54XXcal.init (6) 'initialize calibration driver              ║
 │C┌════Wiltron 54XXA SNA Calibration════════════┐e                  ║
 │C│                                             │                   ║
 │C│  ┌─────────────────────────┐  ┌───────────┐ │                   ║
 │C│  │ Initialization          │  │           │ │                   ║
 │'│  │ Self Test               │↑ │  Select   │ │                   ║
 │,│  │ Calibration             │  │           │ │                   ║
 │ │  │ Detector Offsets        │  └───────────┘ │                   ║
 │C│  │ DC Calibration          │                │                   ║
 │,│  │ Close                   │                │                   ║
 │C│  │                         │  ┌───────────┐ │                   ║
 │ │  │                         │  │  Cancel   │ │                   ║
 │,│  │                         │█ └───────────┘ │                   ║
 │ │  │                         │                │                   ║
 │ │  │                         │  ┌───────────┐ │                   ║
 │ │  │                         │  │   Help    │ │                   ║
 │ │  │                         │↓ └───────────┘ │                   ║
 │ │  └─────────────────────────┘                │                   ║
 │ └─────────────────────────────────────────────┘                  ║
 │                                                                   ║↓
 └▀ Line   13/14 │ Column 1  │   INSERT  │ ←▀▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓→┘
```

☐ Select **Start Cal,** from the **Cal Step** switch (below). (This is the same
as pressing the CALIBRATION key on the 54XXA front panel.)

```
   Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!
 ┌──────────────────────────────────────────────────────────────────┐
 │ Wiltron 54XXA SNA Calibration          │ Calibration    │ Page 1/1│
 ├────────────────────────────────────────┴────────────────┴─────────┤
 │          ┌Cal Step┐                                              ↑│
 │ Start Cal.═▐██▌═                                                 ↓│
 │ Meas. Std. ▐██▌                                                   │
 │  Done Cal. ▐██▌                                                   │
 │                                                                   │
 │                                                                   │
 │                                                                   │
 │                                                                   │
 │                                                                   │
 │                                                      Error        │
 │                                                   ┌────────────┐  │
 │                                                   │0           │  │
 │                                                   └────────────┘  │
 ├───────────────────────────────────────────────────────────────────┤
 │ CALL W54XXcal.na.cal (1)                                          ↑│
 │                                                                   ↓│
 └▀ Line   1/1  │ Column 1  │  OPERATE  │ ←▀▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓→┘
```
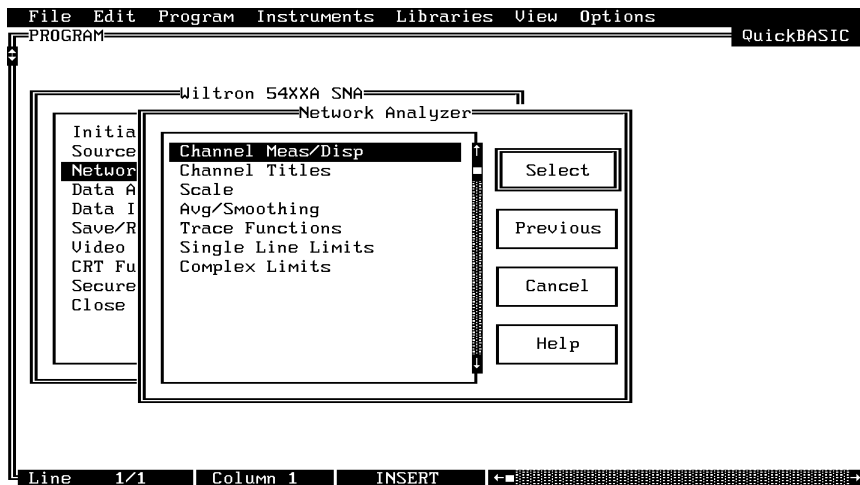
☐ Select **Keep!,** in the top menu bar; then choose **Keep** again to add the
code to the program window.

☐ Select **Return!,** in the top menu bar, to return to the PROGRAM
screen.

☐ Add an optional remark ('prompt for standard, below) to the program code, and press the <ENTER> key.
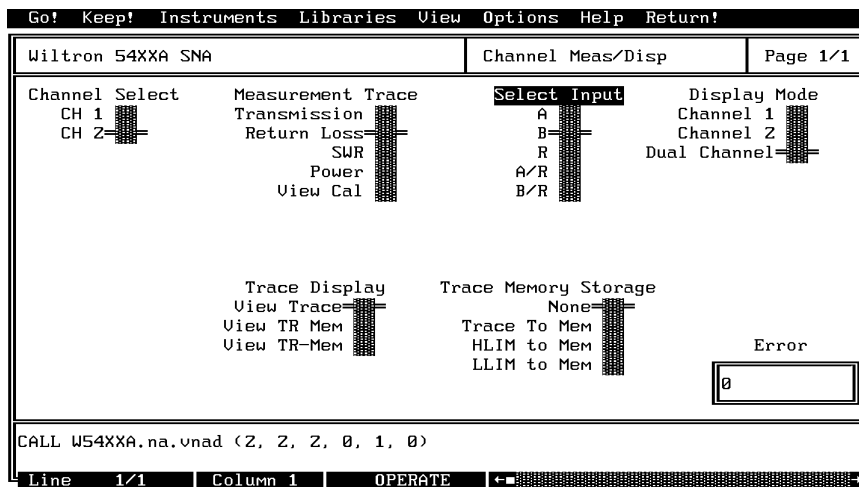
```
 File  Edit  Program  Instruments  Libraries  View  Options
┌─PROGRAM══════════════════════════════════════════!!════════════QuickBASIC─┐
│CALL W54XXA.init (6) 'initialize main driver                               ↑│
│CALL W54XXcal.init (6) 'initialize calibration driver                      ▓│
│CALL W54XXA.src.ststs (0, 2, 6) 'frequency range                          ▓│
│CALL W54XXA.pc.pwr (1, 5) 'power level                                     ▓│
│CALL W54XXA.sf.dp (4) 'data points                                        ▓│
│'measurements to be taken                                                  │
│'transmission loss                                                         │
│CALL W54XXA.na.vnad (1, 1, 1, 0, 1, 0)                                     │
│'return loss                                                               │
│CALL W54XXA.na.vnad (2, 2, 2, 0, 1, 0)                                     │
│                                                                           │
│'start calibration routines                                                │
│CALL W54XXcal.na.cal (1)                                                   │
│'prompt for standard                                                       │
│                                                                           │
│                                                                           │
│                                                                           ↓│
│                                                                          ▓│
│                                                                          ↓│
├─ Line   14/15  │  Column 21  │   INSERT   ├←▒▒▒▒▒▒■▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒→┘
```
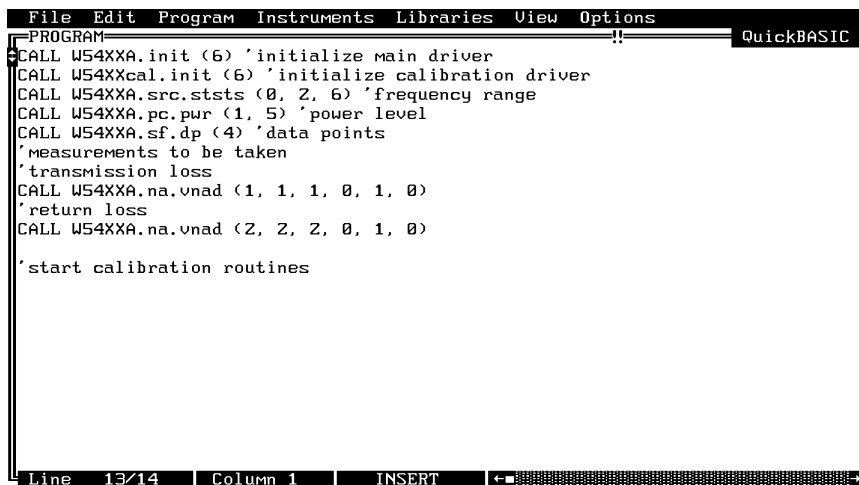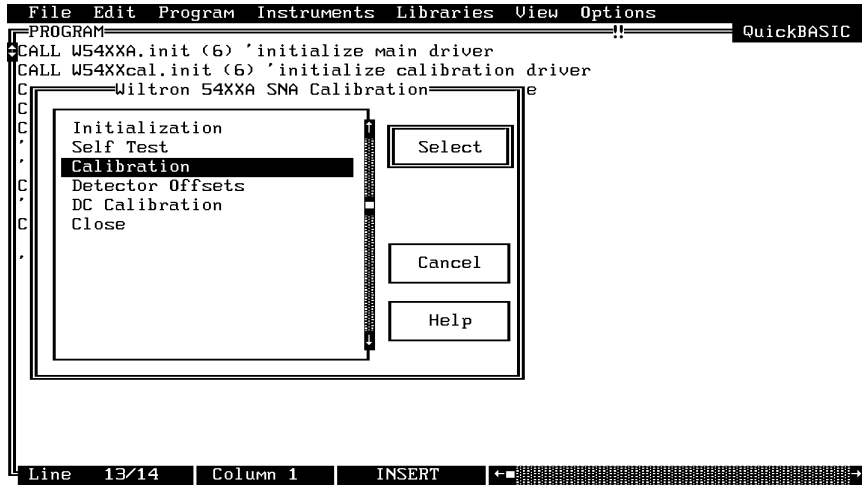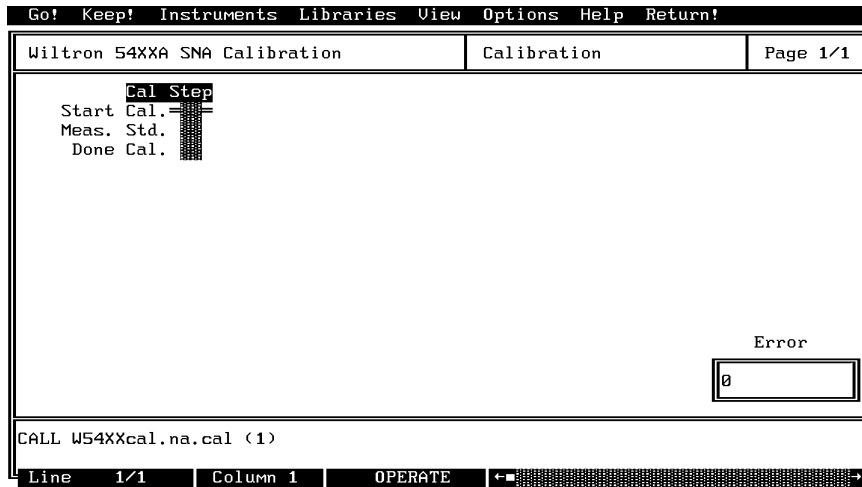
☐ Select **Libraries,** in the top menu bar.

☐ Select **User Interface** from the drop-down menu.

```
 File  Edit  Program  Instruments │ Libraries │ View  Options │
┌─PROGRAM═══════════════════════════┌─────────────────────────┐─QuickBASIC─┐
│CALL W54XXA.init (6) 'initialize m │ Formatting and I/O...    │          ↑│
│CALL W54XXcal.init (6) 'initialize │ User Interface...        │          ▓│
│CALL W54XXA.src.ststs (0, 2, 6) 'f │ Analysis...              │          ▓│
│CALL W54XXA.pc.pwr (1, 5) 'power l │ Data Acquisition AT...   │          ▓│
│CALL W54XXA.sf.dp (4) 'data points │ RS-232...                │          ▓│
│'measurements to be taken          │ VXI...                   │          │
│'transmission loss                 │ GPIB Functions...        │          │
│CALL W54XXA.na.vnad (1, 1, 1, 0, 1 │ GPIB CALLs...            │          │
│'return loss                       │ GPIB 488.2...            │          │
│CALL W54XXA.na.vnad (2, 2, 2, 0, 1 │ AT-DSP2200...            │          │
│                                   │ Utility...               │          │
│'start calibration routines        │ System...                │          │
│CALL W54XXcal.na.cal (1)           └─────────────────────────┘          │
│'prompt for standard                                                     │
│                                                                         │
│                                                                         │
│                                                                        ↓│
│                                                                       ▓│
│                                                                       ↓│
├─ Line   14/15  │  Column 21  │   INSERT   ├←▒▒▒▒▒▒■▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒→┘
```

☐ Select **Pop-up Panel**, then **Message Popup** from the next menus to appear (below).

```
   File  Edit  Program  Instruments  Libraries  View  Options
 ┌PROGRAM════════════════════════════════════════!!═══════════QuickBASIC ┐
 │CALL W54XXA.init (6) 'initialize main driver                            │
 │CALL W54XXcal.init (6) 'initialize calibration driver                   │
 │C┌════════════User Interface Library════════════╗e                      │
 │C│                   ┌════════Pop-up Panels════════╗                     │
 │C│   ┌Interf│        │ Install Popup               │                    │
 │C│   │Menu B│        │ Get Popup Event             │   ┌─────────┐       │
 │, │   │Panels│        │ Remove Popup                │   │ Select  │       │
 │C│   │Pop-up│        │ Message Popup               │   └─────────┘       │
 │, │   │Contro│        │ Prompt Popup                │                    │
 │C│   │List C│        │ Confirm Popup               │   ┌─────────┐       │
 │  │   │Graph │        │ File Select Popup           │   │Previous │       │
 │, │   │User I│        │ X Graph Popup               │   └─────────┘       │
 │C│   │Screen│        │ Y Graph Popup               │                    │
 │, │   │Hardco│        │ X-Y Graph Popup             │   ┌─────────┐       │
 │  │   │      │        │ Waveform Graph Popup        │   │ Cancel  │       │
 │  │   └──────┘        │                             │   └─────────┘       │
 │  │                   └─────────────────────────────┘                     │
 │  │                                                      ┌─────────┐      │
 │  │                                                      │  Help   │      │
 │  │                                                      └─────────┘      │
 │  └────────────────────────────────────────────────┘                     │
 │                                                                          │
 │ Line   14/15  │ Column 21 │    INSERT    │←▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓→ │
 └──────────────────────────────────────────────────────────────────────────┘
```

☐ In the **Message** area (below), enter text between the displayed quote marks as shown at the bottom of the panel ("Connect RF INPUT on Autotester to RF OUTPUT on 54XXA").
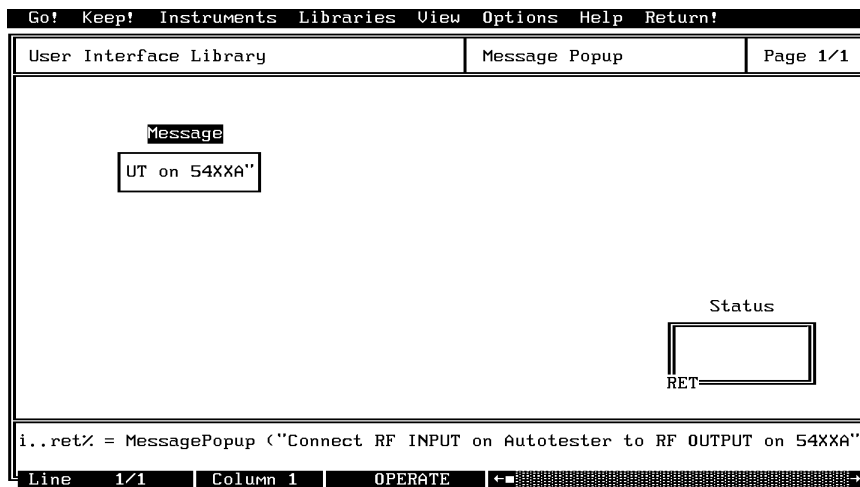
```
   Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!
 ┌───────────────────────────────────────────────────────────────────┐
 │ User Interface Library              │ Message Popup      │ Page 1/1 │
 ├─────────────────────────────────────┴────────────────────┴──────────┤
 │                                                                    ↑│
 │        ┌───────┐                                                    │
 │        │Message│                                                    ║│
 │        └───────┘                                                    ║│
 │        ┌──────────────┐                                             ║│
 │        │ UT on 54XXA" │                                             ║│
 │        └──────────────┘                                             │
 │                                                                    │
 │                                                                    │
 │                                            Status                  │
 │                                         ┌──────────┐               │
 │                                         │          │               │
 │                                         │          │               │
 │                                         └──────────┘               │
 │                                         RET════════                │
 │                                                                   ↓│
 ├────────────────────────────────────────────────────────────────────┤
 │i..ret% = MessagePopup ("Connect RF INPUT on Autotester to RF OUTPUT on 54XXA"↑│
 │ Line   1/1  │ Column 1 │   OPERATE   │←▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓→│
 └────────────────────────────────────────────────────────────────────┘
```

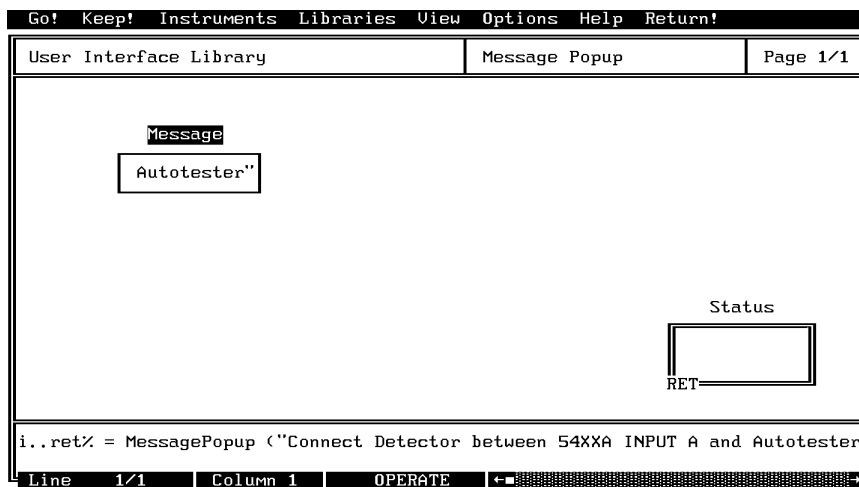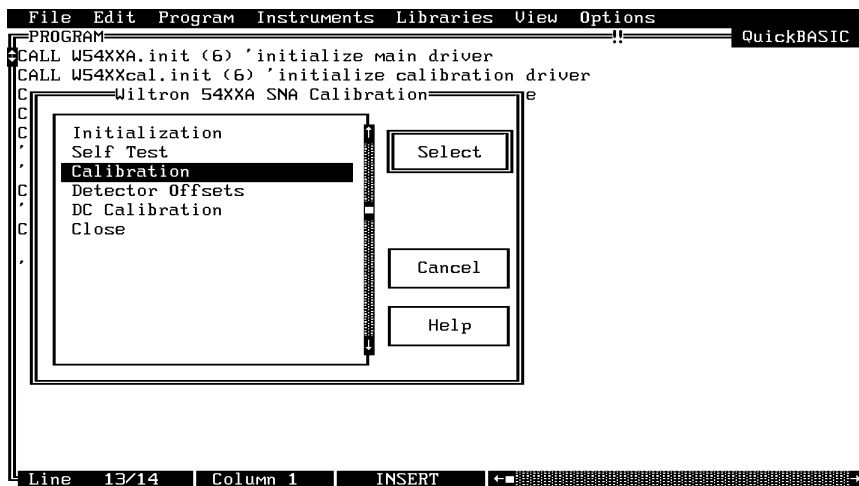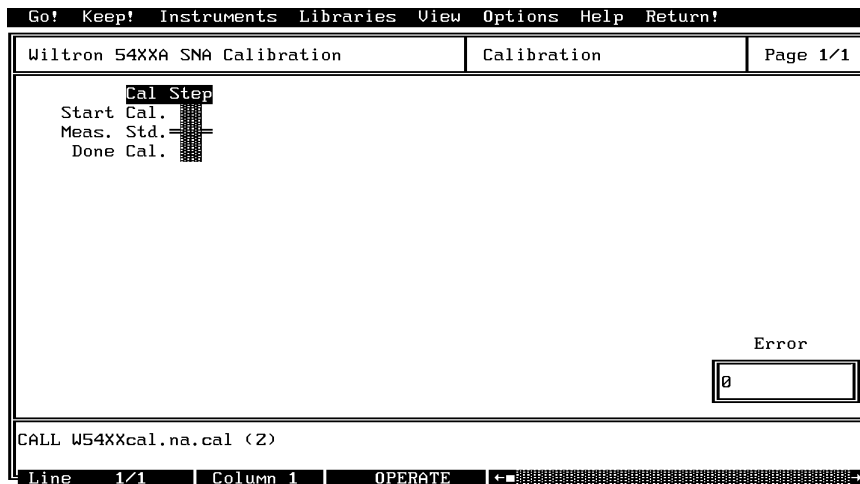☐ Select **Keep!,** in the top menu bar; then choose **Keep** again to add the code to the program window.

☐ In the **Message** area (below), enter text between the displayed quote marks as shown at the bottom of the panel ("Connect Detector between 54XXA INPUT A and Autotester test port").
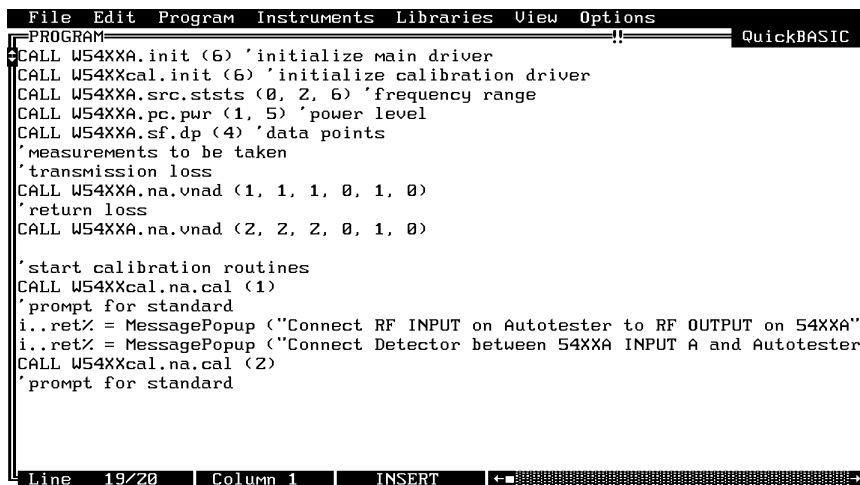
```
 Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!
┌─────────────────────────────────┬──────────────────────┬─────────────┐
│ User Interface Library          │ Message Popup        │ Page 1/1    │
├─────────────────────────────────┴──────────────────────┴───────────┬─┤
│                                                                     │▓│
│                                                                     │ │
│         ┌─────────┐                                                 │ │
│         │ Message │                                                 │ │
│       ┌─┴─────────┴──┐                                              │ │
│       │ Autotester"  │                                             │ │
│       └──────────────┘                                             │ │
│                                                                     │ │
│                                                                     │ │
│                                              Status                 │ │
│                                           ┌──────────┐              │ │
│                                           │          │              │ │
│                                           │          │              │ │
│                                           RET──────────              │ │
│                                                                     │▓│
├─────────────────────────────────────────────────────────────────────┤
│ i..ret% = MessagePopup ("Connect Detector between 54XXA INPUT A and Autotester│
├─────────────────────────────────────────────────────────────────────┤
│ Line    1/1   │  Column 1   │    OPERATE    │ ←▪▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓│
└─────────────────────────────────────────────────────────────────────┘
```
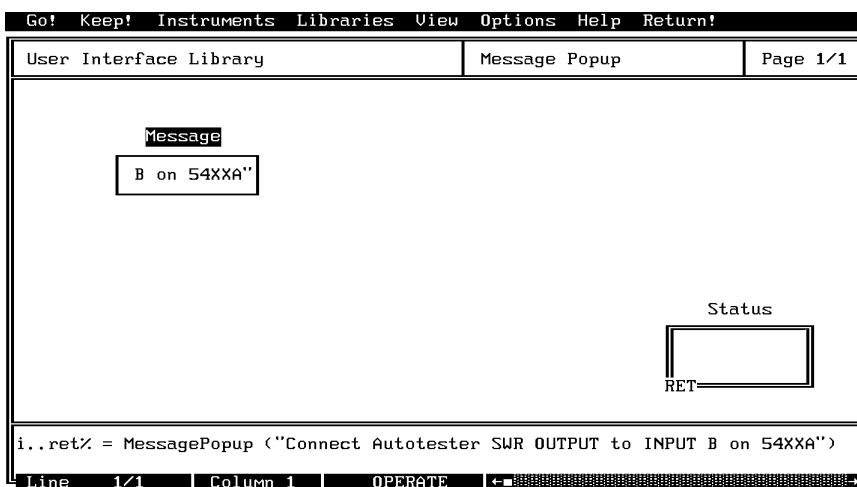
☐ Select **Keep!,** in the top menu bar; then choose **Keep** again to add the code to the program window.

☐ Select **Instruments,** in the top menu bar, then **Wiltron 54XXA SNA Calibration** to return to the 54XXA Calibration Driver panel.

☐ Select **Calibration** from the next menu (below).

```
  File  Edit  Program  Instruments  Libraries  View  Options
┌─PROGRAM══════════════════════════════════════════!!══════════QuickBASIC═┐
│CALL W54XXA.init (6) 'initialize main driver                            ↑│
│CALL W54XXcal.init (6) 'initialize calibration driver                    │
│C┌──────Wiltron 54XXA SNA Calibration═══════════e                        │
│C│                                                                       │
│C│   ┌─────────────────────┐     ┌────────────┐                          │
│C│   │ Initialization      │     │   Select   │                          │
│.│   │ Self Test           │     └────────────┘                          │
│ │   │ Calibration         │▓                                            │
│C│   │ Detector Offsets    │     ┌────────────┐                          │
│.│   │ DC Calibration      │                                             │
│C│   │ Close               │     │            │                          │
│.│   │                     │     │   Cancel   │                          │
│ │   └─────────────────────┘     └────────────┘                          │
│ │                               ┌────────────┐                          │
│ │                               │    Help    │                          │
│ │                               └────────────┘                          │
│ └───────────────────────────────────────────────┘                      │
│                                                                        ↓│
├─────────────────────────────────────────────────────────────────────────┤
│ Line   13/14  │  Column 1   │    INSERT     │ ←▪▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓│
└─────────────────────────────────────────────────────────────────────────┘
```

☐ Move the **Cal Step** slide switch to **Meas Std** (below).

```
 Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!
┌──────────────────────────────────────────────────────────────────┐
│ Wiltron 54XXA SNA Calibration          │ Calibration    │ Page 1/1│
├────────────────────────────────────────┴────────────────┴─────────┤
│          Cal Step                                                ↑ │
│    Start Cal. ▓                                                  ↓ │
│    Meas. Std.═▓▓═                                                  │
│     Done Cal. ▓                                                    │
│                                                                    │
│                                                                    │
│                                                                    │
│                                                                    │
│                                                                    │
│                                           Error                    │
│                                        ┌──────────┐                │
│                                        │ 0        │                │
│                                        └──────────┘                │
├────────────────────────────────────────────────────────────────↑──┤
│ CALL W54XXcal.na.cal (2)                                          ↓ │
├──────────────────────────────────────────────────────────────────┤
│ Line   1/1   │ Column 1   │   OPERATE   │←■▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓→│
└──────────────────────────────────────────────────────────────────┘
```

☐ Select **Keep!,** in the top menu bar; then choose **Keep** again to add the code to the program window.

☐ Select **Return!,** in the top menu bar, to return to the PROGRAM screen.

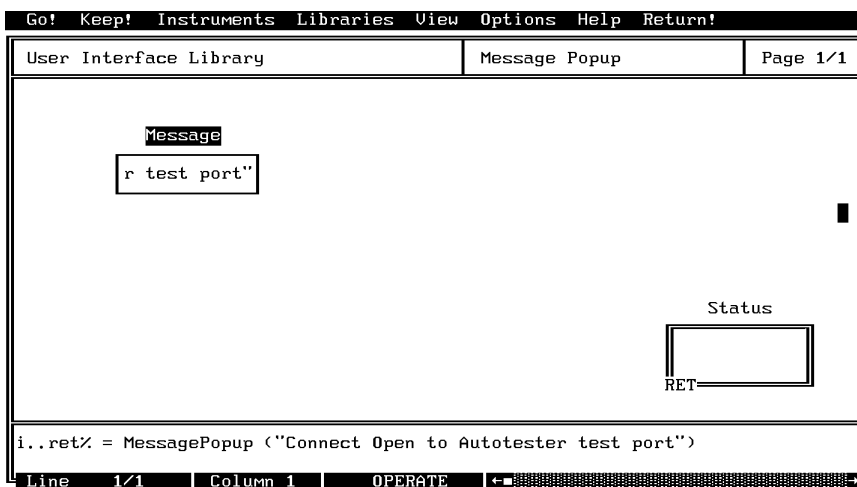☐ Add an optional remark ('prompt for standard, below) to the program code, and press the <ENTER> key.

```
   File  Edit  Program  Instruments  Libraries  View  Options
┌─PROGRAM═══════════════════════════════════════!!════════QuickBASIC─┐
│CALL W54XXA.init (6) 'initialize main driver                      ↑ │
│CALL W54XXcal.init (6) 'initialize calibration driver               │
│CALL W54XXA.src.ststs (0, 2, 6) 'frequency range                   │
│CALL W54XXA.pc.pwr (1, 5) 'power level                             │
│CALL W54XXA.sf.dp (4) 'data points                                 │
│'measurements to be taken                                          │
│'transmission loss                                                 │
│CALL W54XXA.na.vnad (1, 1, 1, 0, 1, 0)                             │
│'return loss                                                       │
│CALL W54XXA.na.vnad (2, 2, 2, 0, 1, 0)                             │
│                                                                   │
│'start calibration routines                                       │
│CALL W54XXcal.na.cal (1)                                           │
│'prompt for standard                                              │
│i..ret% = MessagePopup ("Connect RF INPUT on Autotester to RF OUTPUT on 54XXA"│
│i..ret% = MessagePopup ("Connect Detector between 54XXA INPUT A and Autotester│
│CALL W54XXcal.na.cal (2)                                           │
│'prompt for standard                                               │
│                                                                 ↓ │
├──────────────────────────────────────────────────────────────────┤
│ Line  19/20  │ Column 1   │   INSERT   │←■▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓→│
└──────────────────────────────────────────────────────────────────┘
```

☐ Select **Libraries,** in the top menu bar.

☐ Select **User Interface** from the drop-down menu.

☐ Select **Pop-up Panel**, then **Message Popup** from the next menus to appear.

☐ In the **Message** area (below), enter text between the displayed quote marks as shown at the bottom of the panel ("Connect Autotester SWR OUTPUT to INPUT B on 54XXA").
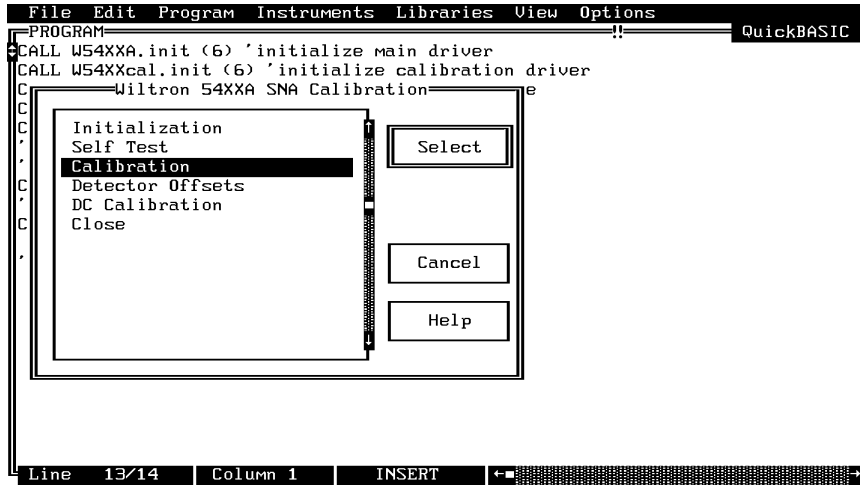
```
 Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!
┌─────────────────────────────────┬──────────────────────┬───────────┐
│ User Interface Library          │ Message Popup        │ Page 1/1  │
├─────────────────────────────────┴──────────────────────┴───────────┤
│                                                                     ↑│
│         ▐Message▌                                                   ││
│        ┌───────────┐                                                ││
│        │ B on 54XXA"│                                               ││
│        └───────────┘                                                ││
│                                                                     ││
│                                                                     ││
│                                                         Status      ││
│                                                    ┌──────────┐     ││
│                                                    │          │     ││
│                                                    │          │     ││
│                                                  RET└──────────┘    ↓│
├─────────────────────────────────────────────────────────────────────┤
│i..ret% = MessagePopup ("Connect Autotester SWR OUTPUT to INPUT B on 54XXA")│
├─────────────────────────────────────────────────────────────────────┤
│ Line    1/1  │  Column 1   │   OPERATE   │ ←■▨▨▨▨▨▨▨▨▨▨▨▨▨▨▨▨▨▨▨▨▨▨▨ │
└─────────────────────────────────────────────────────────────────────┘
```

☐ Select **Keep!,** in the top menu bar; then choose **Keep** again to add the code to the program window.

☐ In the **Message** area (below), enter text between the displayed quote marks as shown at the bottom of the panel ("Connect Open to Autotester test port").

```
 Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!
┌─────────────────────────────────┬──────────────────────┬───────────┐
│ User Interface Library          │ Message Popup        │ Page 1/1  │
├─────────────────────────────────┴──────────────────────┴───────────┤
│                                                                     ↑│
│         ▐Message▌                                                   ││
│        ┌───────────┐                                                ││
│        │ r test port"│                                              ││
│        └───────────┘                                                ││
│                                                                 ▮   ││
│                                                                     ││
│                                                         Status      ││
│                                                    ┌──────────┐     ││
│                                                    │          │     ││
│                                                    │          │     ││
│                                                  RET└──────────┘    ↓│
├─────────────────────────────────────────────────────────────────────┤
│i..ret% = MessagePopup ("Connect Open to Autotester test port")      │
├─────────────────────────────────────────────────────────────────────┤
│ Line    1/1  │  Column 1   │   OPERATE   │ ←■▨▨▨▨▨▨▨▨▨▨▨▨▨▨▨▨▨▨▨▨▨▨▨ │
└─────────────────────────────────────────────────────────────────────┘
```
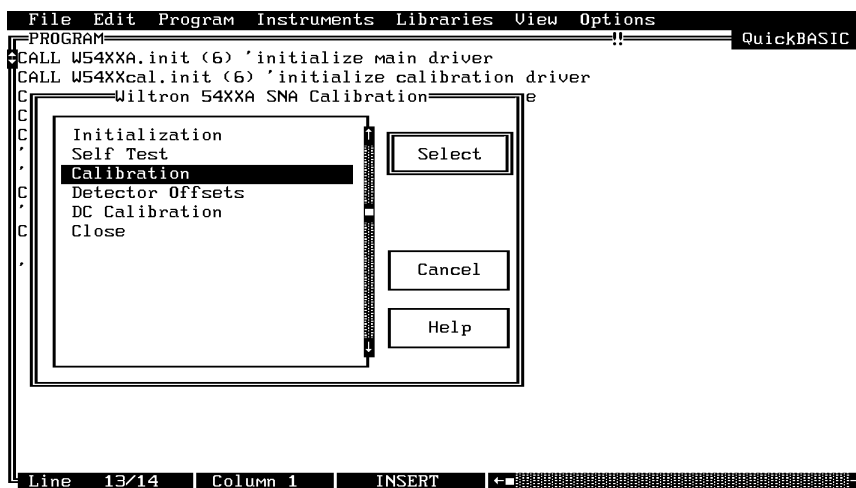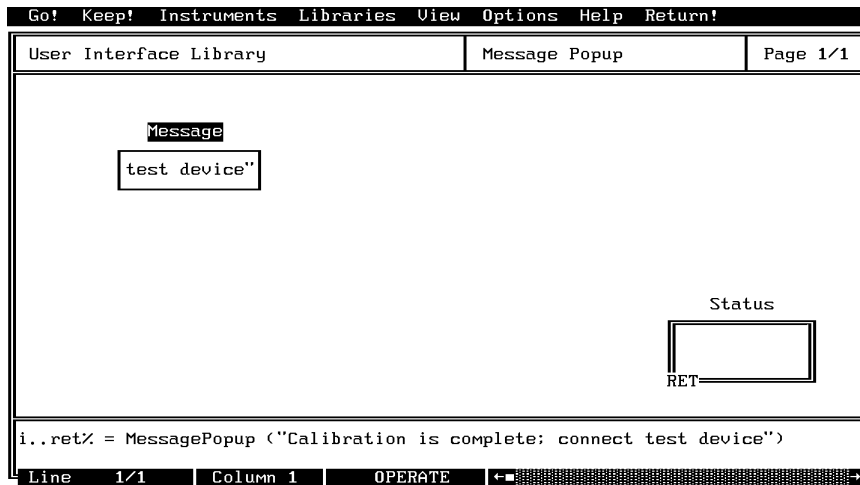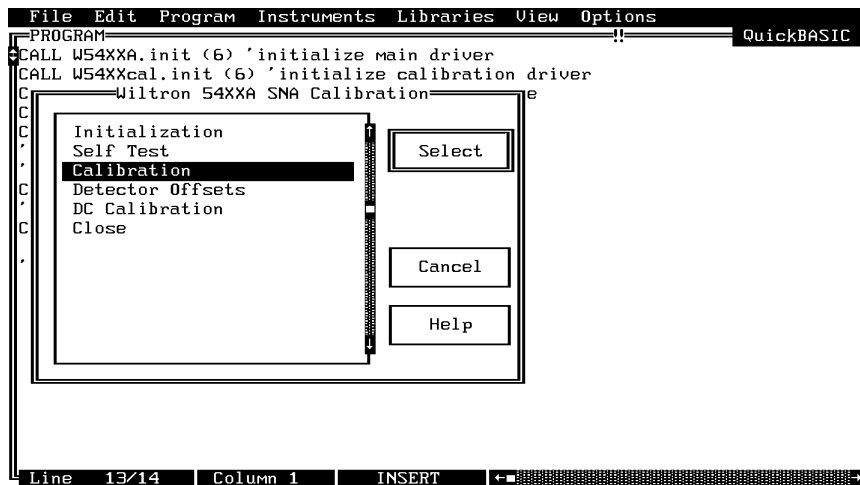
☐ Select **Keep!,** in the top menu bar; then choose **Keep** again to add the code to the program window.

☐ Select **Instruments,** in the top menu bar, then **Wiltron 54XXA SNA Calibration** to return to the 54XXA Calibration Driver panel.

☐ Select **Calibration** from the next menu (below).

```
  File  Edit  Program  Instruments  Libraries  View  Options
┌PROGRAM══════════════════════════════════════════!!═══════QuickBASIC┐
│CALL W54XXA.init (6) 'initialize main driver                        ↑
│CALL W54XXcal.init (6) 'initialize calibration driver
│C┌══════Wiltron 54XXA SNA Calibration══════════┐e
│C│                                             │
│C│   Initialization                            │
│C│   Self Test                ┌──────────────┐ │
│C│   Calibration              │    Select    │ │
│C│   Detector Offsets         └──────────────┘ │
│C│   DC Calibration                            │
│C│   Close                                     │
│.│                            ┌──────────────┐ │
│ │                            │    Cancel    │ │
│ │                            └──────────────┘ │
│ │                            ┌──────────────┐ │
│ │                            │     Help     │ │
│ │                            └──────────────┘ │
│ │                                             │
│ └═════════════════════════════════════════════┘
│
│
└ Line  13/14 │ Column 1 │ INSERT │←■▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓→┘
```

☐ Ensure that the **Cal Step** slide switch is still set to **Meas Std** (below).

```
  Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!
┌──────────────────────────────────────────────────────────────────┐
│ Wiltron 54XXA SNA Calibration      │ Calibration      │ Page 1/1  │
├────────────────────────────────────┴──────────────────┴───────────┤
│           Cal Step                                              ↑
│   Start Cal. ▓▓                                                 ↓
│   Meas. Std.═▓▓═
│    Done Cal.  ▓▓
│
│
│
│
│
│
│
│                                              Error
│                                            ┌────────────────┐
│                                            │0               │
│                                            └────────────────┘
│ CALL W54XXcal.na.cal (Z)
│ Line  1/1 │ Column 1 │ OPERATE │←■▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓→
└──────────────────────────────────────────────────────────────────┘
```

☐ Select **Keep!,** in the top menu bar; then choose **Keep** again to add the code to the program window.

☐ Select **Libraries,** in the top menu bar.

☐ Select **User Interface** from the drop-down menu.

☐ Select **Pop-up Panel**, then **Message Popup** from the next menus to appear.

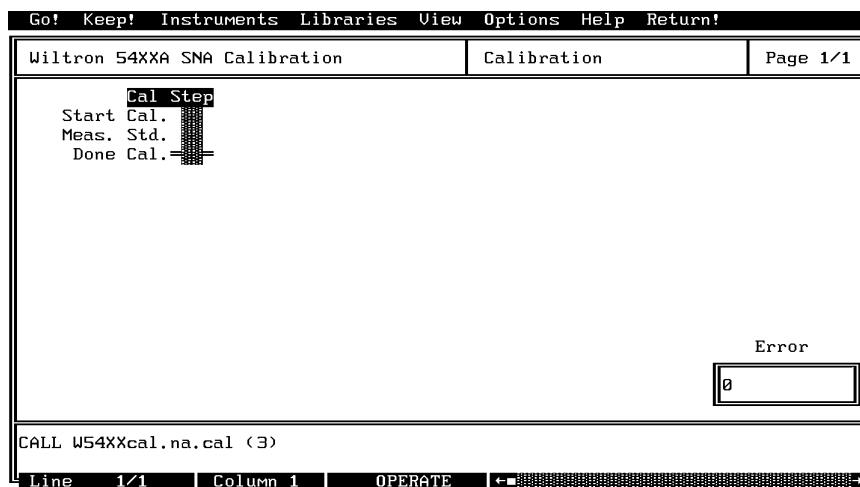☐ In the **Message** area (below), enter text between the displayed quote marks as shown at the bottom of the panel ("Remove Open and Connect Short to Test Port").

```
 Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!
┌─────────────────────────────────────────────────────────────────┐
│ User Interface Library            │ Message Popup    │ Page 1/1  │
├───────────────────────────────────┴──────────────────┴───────────┤
│                                                                ▲  │
│                                                                ▒  │
│          ▐Message▌                                                │
│         ┌───────────┐                                             │
│         │ test port"│                                             │
│         └───────────┘                                             │
│                                                                   │
│                                                                   │
│                                              Status               │
│                                            ┌──────┐               │
│                                            │      │               │
│                                            │      │               │
│                                            RET────┘               │
│                                                                ▼  │
├───────────────────────────────────────────────────────────────┬──┤
│ i..ret% = MessagePopup ("Remove Open and connect Short to test port")│
├───────────────────────────────────────────────────────────────┴──┤
│ Line    1/1  │  Column 1  │    OPERATE    │ ◄■▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒►│
└───────────────────────────────────────────────────────────────────┘
```

☐ Select **Keep!,** in the top menu bar; then choose **Keep** again to add the code to the program window.

☐ Select **Instruments,** in the top menu bar, then **Wiltron 54XXA SNA Calibration** to return to the 54XXA Calibration Driver panel.

☐ Select **Calibration** from the next menu (below).

```
  File  Edit  Program  Instruments  Libraries  View  Options
┌─PROGRAM══════════════════════════════════════!!═══════QuickBASIC─┐
│CALL W54XXA.init (6) 'initialize main driver                      ↑│
│CALL W54XXcal.init (6) 'initialize calibration driver             │
│C┌────Wiltron 54XXA SNA Calibration───────┐e                      │
│C│                                         │                       │
│C│   Initialization         ┌──────────┐  │                       │
│C│   Self Test              │  Select  │  │                       │
│'│  ▐Calibration▌           └──────────┘  │                       │
│ │   Detector Offsets                     │                       │
│C│   DC Calibration                       │                       │
│'│   Close                                │                       │
│C│                                        │                       │
│ │                          ┌──────────┐  │                       │
│ │                          │  Cancel  │  │                       │
│ │                          └──────────┘  │                       │
│ │                          ┌──────────┐  │                       │
│ │                          │   Help   │  │                       │
│ │                          └──────────┘  │                       │
│ └────────────────────────────────────────┘                      │
│                                                                  │
├──────────────────────────────────────────────────────────────────┤
│ Line   13/14  │  Column 1  │    INSERT    │ ◄■▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒►│
└──────────────────────────────────────────────────────────────────┘
```

☐ Ensure that the **Cal Step** slide switch is still set to **Meas Std** (below).

```
 Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!
┌──────────────────────────────────────────────────────────────────┐
│ Wiltron 54XXA SNA Calibration      │ Calibration      │ Page 1/1  │
├──────────────────────────────────────────────────────────────────┤
│          Cal Step                                              ▲   │
│  Start Cal. ▓▓                                                 ▼   │
│  Meas. Std.▓▓▓                                                     │
│   Done Cal. ▓▓                                                     │
│                                                                    │
│                                                                    │
│                                                                    │
│                                                                    │
│                                                   Error            │
│                                              ┌─────────────┐       │
│                                              │0            │       │
│                                              └─────────────┘       │
├──────────────────────────────────────────────────────────────────┤
│ CALL W54XXcal.na.cal (Z)                                       ▲   │
│                                                                ▼   │
│ Line   1/1    │ Column 1     │   OPERATE   │←▪▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒ │
└──────────────────────────────────────────────────────────────────┘
```

☐ Select **Keep!,** in the top menu bar; then choose **Keep** again to add the code to the program window.

☐ Select **Libraries,** in the top menu bar.

☐ Select **User Interface** from the drop-down menu.

☐ Select **Pop-up Panel**, then **Message Popup** from the next menus to appear.

☐ In the **Message** area (below), enter text between the displayed quote marks as shown at the bottom of the panel.

```
 Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!
┌──────────────────────────────────────────────────────────────────┐
│ User Interface Library             │ Message Popup    │ Page 1/1  │
├──────────────────────────────────────────────────────────────────┤
│                                                                ▲   │
│            Message                                             ▼   │
│         ┌────────────┐                                             │
│         │test device"│                                             │
│         └────────────┘                                             │
│                                                                    │
│                                                                    │
│                                                   Status           │
│                                              ┌───────────┐         │
│                                              │           │         │
│                                              │           │         │
│                                              RET─────────┘         │
├──────────────────────────────────────────────────────────────────┤
│ i..ret% = MessagePopup ("Calibration is complete; connect test device") ▲ │
│                                                                ▼   │
│ Line   1/1    │ Column 1     │   OPERATE   │←▪▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒ │
└──────────────────────────────────────────────────────────────────┘
```

☐ Select **Keep!,** in the top menu bar; then choose **Keep** again to add the code to the program window.

☐ Select **Instruments,** in the top menu bar, then **Wiltron 54XXA SNA Calibration** to return to the 54XXA Calibration Driver panel.

☐ Select **Calibration,** from the main menu, and **Calibration!,** from the next menu (below).

```
  File  Edit  Program  Instruments  Libraries  View  Options
┌PROGRAM══════════════════════════════════════!!═══════════QuickBASIC ┐
CALL W54XXA.init (6) 'initialize main driver
CALL W54XXcal.init (6) 'initialize calibration driver
C┌───────Wiltron 54XXA SNA Calibration═══════════╖e
C│
C│ ┌───────────────────────────────┐  ┌─────────┐
C│ │ Initialization                │  │         │
.│ │ Self Test                     │  │ Select  │
│  │ Calibration                   │  │         │
C│ │ Detector Offsets              │  └─────────┘
.│ │ DC Calibration                │
C│ │ Close                         │  ┌─────────┐
.│ │                               │  │ Cancel  │
  │ │                               │  └─────────┘
  │ │                               │  ┌─────────┐
  │ │                               │  │ Help    │
  │ └───────────────────────────────┘  └─────────┘
  │
  └──────────────────────────────────────────────┘

  Line   13/14  │  Column 1   │   INSERT   │ ←▪
```

☐ Now move the **Cal Step** slide switch to **Done Cal** (next page).

```
  Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!
┌─────────────────────────────────────┬──────────────┬──────────────┐
│ Wiltron 54XXA SNA Calibration       │ Calibration  │ Page 1/1     │
├─────────────────────────────────────┴──────────────┴──────────────┤
│           ┌─Cal Step─┐                                        ↑
│ Start Cal.│          │
│ Meas. Std.│          │
│  Done Cal.═          ═
│
│
│
│
│                                              Error
│
│                                            ┌──────────┐
│                                            │ 0        │
│                                            └──────────┘
├────────────────────────────────────────────────────────────────────┤
│ CALL W54XXcal.na.cal (3)                                           ▪
└────────────────────────────────────────────────────────────────────┘
  Line   1/1   │  Column 1   │  OPERATE   │ ←▪
```

☐ Select **Keep!,** in the top menu bar; then choose **Keep** again to add the code to the program window.

☐ Select **Instruments,** in the top menu bar, then **Wiltron 54XXA SNA Calibration** to return to the driver panel.

2-33

Changed: October 1994

☐ Move cursor to **Close** (below), and choose **Select** to display the Close panel.

```
 Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!
┌────────────────────────────────────────────────────────────────────┐
│ Wiltron 54XXA SNA Calibration         │ Calibration     │ Page 1/1 │
│ ┌════Wiltron 54XXA SNA Calibration════┐                          ↑↓│
│ │                                     │                            │
│ │   Initialization              ┌──────────┐                      │
│ │   Self Test                   │  Select  │                      │
│ │   Calibration                 └──────────┘                      │
│ │   Detector Offsets                                              │
│ │   DC Calibration                                                │
│ │  ▓Close▓▓▓▓▓▓▓▓▓▓▓▓▓▓                                           │
│ │                               ┌──────────┐                      │
│ │                               │  Cancel  │                      │
│ │                               └──────────┘                      │
│ │                               ┌──────────┐        Error         │
│ │                               │   Help   │                      │
│ │                               └──────────┘      ┌────────────┐  │
│ └─────────────────────────────────────┘          │0           │  │
│                                                   └────────────┘  │
│ CALL W54XXcal.na.cal (3)                                         ↑│
│ Line    1/1  │ Column 1  │    OPERATE    │ ←▪▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓→ ↓│
└────────────────────────────────────────────────────────────────────┘
```
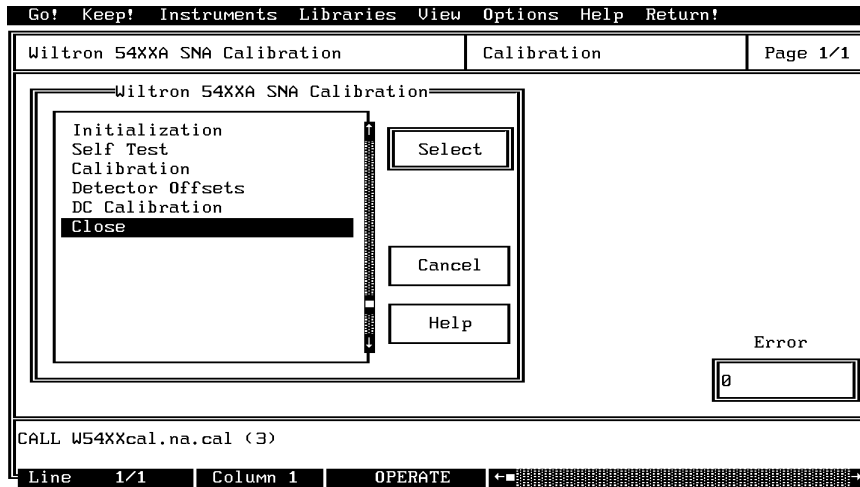
☐ There is nothing you need to do with the Close panel (below), except to select **Keep!,** in the top menu bar; then choose **Keep** again to add the code to the program window.

```
 Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!
┌────────────────────────────────────────────────────────────────────┐
│ Wiltron 54XXA SNA Calibration         │ Close           │ Page 1/1 │
│                                                                   ↑↓│
│                                                                     │
│                                                                     │
│                                                                     │
│                                                                     │
│                                                                     │
│                                                                     │
│                                                             ▓Error▓ │
│                                                   ┌────────────┐    │
│                                                   │0           │    │
│                                                   └────────────┘    │
│ CALL W54XXcal.close                                             ↑│
│ Line    1/1  │ Column 1  │    OPERATE    │ ←▪▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓→ ↓│
└────────────────────────────────────────────────────────────────────┘
```

☐ Select **Instruments,** in the top menu bar, then **Wiltron 54XXA SNA** to open the 54XXA Driver main panel.

☐ Repeat the above steps to close the main driver.

☐ Select **Return!,** on the menu panel, to return to the PROGRAM area.

☐ Add an optional remarks to the program code, as shown below. A listing of the program is shown in Figure 2-2.

```
 File  Edit  Program  Instruments  Libraries  View  Options
┌PROGRAM════════════════════════════════════‼═══════════QuickBASIC ─┐
│'transmission loss                                                  ↑│
│CALL W54XXA.na.vnad (1, 1, 1, 0, 1, 0)                              ││
│'return loss                                                        ││
│CALL W54XXA.na.vnad (2, 2, 2, 0, 1, 0)                              ││
│                                                                    ││
│'start calibration routines                                        ││
│CALL W54XXcal.na.cal (1)                                            ││
│'prompt for standard                                               ││
│i..ret% = MessagePopup ("Connect RF INPUT on Autotester to RF OUTPUT on 54XXA"││
│i..ret% = MessagePopup ("Connect Detector between 54XXA INPUT A and Autot▪ster││
│CALL W54XXcal.na.cal (2)                                            ││
│'prompt for standard                                               ││
│i..ret% = MessagePopup ("Connect Autotester SWR OUTPUT to INPUT B on 54XXA") ││
│CALL W54XXcal.na.cal (2)                                            ││
│i..ret% = MessagePopup ("Remove Open and connect Short to test port")        ││
│CALL W54XXcal.na.cal (2)                                            ││
│i..ret% = MessagePopup ("Calibration is complete; connect test device")      ││
│CALL W54XXcal.na.cal (3)                                            ││
│CALL W54XXcal.close 'closes calibration driver                     ││
│CALL W54XXA.close 'closes main driver. You must use initialize panels to     ││
│                    'initialize main and calibration drivers       ↓│
│ Line   28/30  │ Column 19  │   INSERT  │◄▒▒▒▒■▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒►│
└───────────────────────────────────────────────────────────────────┘
```

```
CALL W54XXA.init (6) 'initialize the main driver
CALL W54XXCAL.init (6) 'initialize the calibration driver
CALL W54XXA.src.ststs (0, 2, 6) 'frequency range
CALL W54XXA.pc.pwr (1, 5) 'power level
CALL W54XXA.sf.dp (4) 'data points
'measurements to be taken
'transmission loss
CALL W54XXA.na.vnad (1, 1, 1, 0, 1, 0) 'return loss
CALL W54XXA.na.vnad (2, 2, 2, 0, 1, 0)

'start calibration routines
CALL W54XXcal.na.cal (1)
'prompt for standard
i..ret%= MessagePopup ("Connect Autotester RF INPUT to RF OUTPUT on 54XXA")
i..ret%= MessagePopup ("Connect Detector between 54XXA INPUT A and Autotester")
CALL W54XXcal.na.cal (2)
'prompt for standard
i..ret%= MessagePopup ("Connect Autotester SWR OUTPUT to INPUT B on 54XXA")
i..ret%= MessagePopup ("Connect Open to Autotester test port")
CALL W54XXcal.na.cal (2)
i..ret%= MessagePopup ("Remove Open and Connect Short to Test Port")
CALL W54XXcal.na.cal (2)
i..ret%= MessagePopup ("Calibration is complete; connect test device") CALL W54XXA.na.cal
(3)
CALL W54XXcal.close  'closes calibration driver.
CALL W54XXA.close  'closes main driver. You must use initialize panels to
                   'initialize main and calibration drivers
```

Figure 2-2. Sample BASIC Program Listing

Changed: October 1994

☐ If you have a 54XXA connected, you can test the program by moving the cursor to **Program,** in the top menu bar, and selecting **Run** (below).

NOTE
Do not choose Run if you don't have a 54XXA
connected; doing so may cause your computer
to hang.

```
  File  Edit   Program  Instruments  Libraries  View  Options
 PROGRAM                                              !!        QuickBASIC
'transmissio      Compile              ^C
CALL W54XXA.      Run                  ^R
'return loss      Continue Execution   F4
CALL W54XXA.      Halt Execution       ^Break

'start calib      Single Step Mode
CALL W54XXca      Insert Breakpoint
'prompt for
i..ret% = Me      Exclude Lines        ^E   utotester to RF OUTPUT on 54XXA"
i..ret% = Me      Include Lines        ^I   een 54XXA INPUT A and Autotester
CALL W54XXca
'prompt for       Clear
i..ret% = Me      Insert All INCLUDEs       R OUTPUT to INPUT B on 54XXA")
CALL W54XXca    √ Portability Checking
i..ret% = Me      Change Languages...       ct Short to test port")
CALL W54XXca
i..ret% = MessagePopup ("Calibration is complete; connect test device")
CALL W54XXcal.na.cal (3)
CALL W54XXcal.close 'closes calibration driver
CALL W54XXA.close 'closes main driver. You must use initialize panels to
                  'initialize main and calibration drivers

  Line   28/30  │  Column 19  │    INSERT    │
```

☐ If there are no program errors, you will see the 54XXA SNA respond to the program code.

☐ After you are satisfied that the program runs correctly, you can use the **Create EXE** option, on the File menu, to create a stand-alone DOS executable (*.EXE) file. Alternatively, you can use the **Create RTM** option, on the file menu, to create a run-time version (*.RTM) file. That operation is described in the next heading.

☐ To continue with this tutorial, save this program as \LW\PROGRAMS\5400SAMP.BAS.

Creating a Compiled Program

Most programs developed with LabWindows can be compiled with the Microsoft C or BASIC compiler. Some program modules, however, exceed the 64 KB BASIC memory limit and must be run within LabWindows or the LabWindows Run-Time System. The LabWindows Run-Time System includes a DOS extender so programs can access up to 16 MB of memory during execution. Programs executed in the run-time system can make calls to any of the LabWindows libraries and instrument drivers. Programs distributed with the run-time system are in a binary format, so the programs cannot be edited. A stand-alone application (*.EXE or *.RTM) that incorporates the 54XXA Driver may be created using the Microsoft C or BASIC compilers or LabWindows Run-Time System.

Tip: Copy the driver, W5400A.BAS, as "W5400A.SAV" before running the LabWindows FUNNEL.EXE utility, as mentioned below.

To avoid OUT OF MEMORY errors when using the Microsoft BASIC compiler, you must first optimize the 54XXA Driver (W5400A.BAS) memory usage with the LabWindows FUNNEL.EXE utility (See *LabWindows User's Manual* for instructions).

The LWMAKE option on the file menu can be used to create an executable file in either BASIC or C. The following provides a step-by-step tutorial for creating a *.EXE file using the BASIC 7.1 compiler. This tutorial assumes that you have read and are familiar with the LWMAKE utility description in the *Lab Windows User's Manual* and with the Microsoft BASIC compiler and linker. (It also assumes that you have already run the FUNNEL.EXE used to optimize the W5400A.BAS files.)

We will start with the program that you completed in the preceding tutorial. If you did not complete the tutorial, you can create the program listing shown on the preceding page, and save it as *drive*\LW\PROGRAMS\5400SAMP.BAS.

☐ Load *drive*\LW\PROGRAMS\5400SAMP.BAS, if it is not already loaded.

☐ Move the cursor to **Instruments,** in the top menu bar, and ensure that the **Wiltron 54XXA SNA** driver is loaded. If not, refer to pages 2-4 and 2-5 for instructions.

☐ Move the cursor to **File,** in the top menu bar, and select **Create EXE** from the pull-down menu (below).

```
 File  Edit  Program  Instruments  Libraries  View  Options
                                                 ‼               QuickBASIC
   New
   Load...                         1, 0, 1, 0)
   Save...
                                   2, 0, 1, 0)
   Create EXE...
   Create RTM...
   Instr to Source File...

   Print...                        nnect RF INPUT on Autotester to RF OUTPUT on 54XXA"
                                   nnect Detector between 54XXA INPUT A and Autotester
   DOS Shell

   Quit                            nnect Autotester SWR OUTPUT to INPUT B on 54XXA")
 i..ret% = MessagePopup ("Remove Open and connect Short to test port")
 CALL W54XXcal.na.cal (2)
 i..ret% = MessagePopup ("Calibration is complete; connect test device")
 CALL W54XXcal.na.cal (3)
 CALL W54XXcal.close 'closes calibration driver
 CALL W54XXA.close 'closes main driver. You must use initialize panels to
                   'initialize main and calibration drivers
 Line   28/30      Column 19      INSERT    ←▒▒▒▒■▒▒▒▒▒→
```

☐ Choose **Compile,** when the next prompt appears. This will insure that the program does not contain any errors.

NOTE
This menu may not appear, depending upon
previous menu selections.)

```
 File  Edit  Program  Instruments  Libraries  View  Options
 PROGRAM                                         ‼               QuickBASIC
 'transmission loss
 CALL W54XXA.na.vnad (1, 1, 1, 0, 1, 0)
 'return loss
 CALL W54XXA.na.vnad (2, 2, 2, 0, 1, 0)

 'start calibration routines
 CALL W54XXcal.na.ca
 'prompt for standar  ┌───────────────────────────────────┐
 i..ret% = MessagePo  │ Your program must be compiled before │RF OUTPUT on 54XXA"
 i..ret% = MessagePo  │ continuing with 'Create EXE'.        │UT A and Autotester
 CALL W54XXcal.na.ca  │                                      │
 'prompt for standar  │                                      │
 i..ret% = MessagePo  │  ┌─────────┐        ┌────────┐       │NPUT B on 54XXA")
 CALL W54XXcal.na.ca  │  │ Compile │        │ Cancel │       │
 i..ret% = MessagePo  │  └─────────┘        └────────┘       │est port")
 CALL W54XXcal.na.cal (2)                   └───────────────┘
 i..ret% = MessagePopup ("Calibration is complete; connect test device")
 CALL W54XXcal.na.cal (3)
 CALL W54XXcal.close 'closes calibration driver
 CALL W54XXA.close 'closes main driver. You must use initialize panels to
                   'initialize main and calibration drivers
 Line   28/30      Column 19      INSERT    ←▒▒▒▒■▒▒▒▒▒→
```

☐ Answer **OK** to the next prompt. This will place include calls to the two required files shown in the file list. These files contain code needed to run your application.

```
 File  Edit  Program  Instruments  Libraries  View  Options
┌PROGRAM═══════════════C:\LW\5400SAMP.BAS═══════════════════QuickBASIC┐
│CALL W54XXA.sf.dp (4) 'data points
│
│'me┌────────────────────────────────────────────────────────────────┐
│'tr│  'include' statements for the following files are needed and will│
│CAL│  be inserted at the top of your program:                         │
│'re│ ┌──────────────────────────────────────────────────────────────┐▲│
│CAL│ │C:\LW\INCLUDE\LWSYSTEM.INC                                      │ │
│   │ │C:\LW\INCLUDE\USERINT.INC                                       │ │
│'st│ │C:\LW\INSTR\w5400A.inc                                          │ │
│CAL│ │                                                                │ │
│'pr│ │                                                                │ │ r")
│i..│ │                                                                │ │
│CAL│ │                                                                │ │
│'pr│ │                                                                │ │
│i..│ │                                                                │▼│
│i..│ └──────────────────────────────────────────────────────────────┘ │
│CAL│        ┌────────┐                    ┌──────────┐                  │
│i..│        │   OK   │                    │  Cancel  │                  │
│CAL└────────└────────┘────────────────────└──────────┘──────────────────┘
│CALL W54XXA.close  'closes the driver. You must use the Initialize panel
│                   'to reinitialize the driver.
│
└ Line  24/26 │ Column 21 │  INSERT  │ ◄▓▓▓█▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓► ┘
```

☐ Choose **Save** for the next prompt, below.

```
 File  Edit  Program  Instruments  Libraries  View  Options
┌PROGRAM═══════════════C:\LW\5400SAMP.BAS════════════!!═════QuickBASIC┐
│CALL W54XXA.sf.dp (4) 'data points
│
│'measurements to be taken
│'transmission measurement
│CALL W54XXA.na.vnad (1, 1, 1, 0, 1, 0)
│'return loss measurement
│CALL W54XXA.na.┌────────────────────────────────────────────┐
│               │                                            │
│'start calibrat│  The file in the Program Window must be saved│
│CALL W54XXA.na.│  to disk before continuing with 'Create EXE'.│
│'prompt for sta│                                            │
│i..ret% = Messa│   ┌────────┐          ┌──────────┐        │ WR Autotester")
│CALL W54XXA.na.│   │  Save  │          │  Cancel  │        │
│'prompt for sta│   └────────┘          └──────────┘        │
│i..ret% = Messa└────────────────────────────────────────────┘
│i..ret% = MessagePopup ("Connect Open to Test Port on SWR Autotester")
│CALL W54XXA.na.cal (2)
│i..ret% = MessagePopup ("Calibration complete, connect DUT")
│CALL W54XXA.na.cal (3)
│CALL W54XXA.close  'closes the driver. You must use the Initialize panel
│                   'to reinitialize the driver.
│
└ Line  28/30 │ Column 21 │  INSERT  │ ◄▓▓▓█▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓► ┘
```

☐ Choose **Save,** again, (below).

```
 File  Edit  Program  Instruments  Libraries  View  Options
┌PROGRAM═══════════════C:\LW\5400SAMP.BAS════════════!!═════QuickBASIC┐
│DEFDBL A│═══════════════════Save File════════════════════│
│REM $INC│                                                 │
│REM $INC│  FILENAME: ┌─────────────────────────────────┐  │
│REM $INC│            │5400SAMP.BAS                     │  │
│CALL W54│                                                 │
│CALL W54│  C:\LW                                          │
│CALL W54│  ┌──────────────────────────┐   ┌──────────┐   │
│CALL W54│  │..                        │   │ [-A-]    │▲  │
│'measure│  │ FONTS                    │   │ [-B-]    │   │
│'transmi│  │ INCLUDE                  │   │[-C-]     │   │
│CALL W54│  │ INSTR                    │   │ [-D-]    │   │
│'return │  │ LIBRARY                  │   │ [-E-]    │   │
│CALL W54│  │ PROGRAMS                 │   │ [-F-]    │▼  │
│        │  │ SWP                      │   └──────────┘   │
│'start c│  │                          │   ┌──────────┐   │
│CALL W54│  │                          │   │[√] Source│   │
│'prompt │  │                          │   │[ ] Include│  │
│i..ret% │  └──────────────────────────┘   └──────────┘   │
│CALL W54│  ┌──────┐  ┌────────┐  ┌────────────────┐       │ tester")
│'prompt │  │ Save │  │ Cancel │  │ Make Directory │       │
│i..ret% │  └──────┘  └────────┘  └────────────────┘       │
│i..ret% = MessagePopup ("Connect Open to Test Port on SWR Autotester")
└ Line  9/29 │ Column 1 │  INSERT  │ ◄▓█▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓► ┘
```

Choose **Update** for the next prompt, below. (This screen will not appear on the first run through of CREATE.EXE.)

```
 File  Edit  Program  Instruments  Libraries  View  Options
┌PROGRAM══════════════C:\LW\5400SAMP.BAS══════════!!═════════QuickBASIC ┐
│CALL W54XXA.sf.dp (4) 'data points                                     ↑
│                                                                       │
│'measurem┌──────────────────────────────────────────────┐             │
│'transmis│ An application profile will now be created for use with    │
│CALL W54X│ LWMAKE.EXE.  However, the file                 │            │
│'return l│                                                │            │
│CALL W54X│                  C:\LW\5400SAMP.APP             │            │
│         │                                                │            │
│'start ca│ already exists.                                │            │
│CALL W54X│                                                │            │
│'prompt f│ You may choose to update the existing file, to create a    │
│i..ret% =│ new application profile under a different name, or to  totester") │
│CALL W54X│ cancel this operation.                          │            │
│'prompt f│                                                │            │
│i..ret% =│  ┌────────┐      ┌────────┐      ┌────────┐   │            │
│i..ret% =│  │ Update │      │  New   │      │ Cancel │   │  ")        │
│CALL W54X│  └────────┘      └────────┘      └────────┘   │            │
│i..ret% =└──────────────────────────────────────────────┘             │
│CALL W54XXA.na.cal (3)                                                 │
│CALL W54XXA.close  'closes the driver. You must use the Initialize panel│
│                   'to reinitialize the driver.                        ↓
│ Line   28/30  │ Column 21  │  INSERT  │ ←▓▓▓▓▓▓■▓▓▓▓▓▓▓▓▓▓▓▓▓→         │
└───────────────────────────────────────────────────────────────────────┘
```

☐ Choose **Run LWMAKE,** in the next prompt.

```
 File  Edit  Program  Instruments  Libraries  View  Options
┌PROGRAM══════════════C:\LW\5400SAMP.BAS══════════!!═════════QuickBASIC ┐
│CALL W54XXA.sf.dp (4) 'data points                                     ↑
│                                                                       │
│'measurements to be taken                                              │
│'transmission measurement                                              │
│CALL W54XXA.na.vnad (1, 1, 1, 0, 1, 0)                                 │
│'return loss measurement                                               │
│CALL W54XXA.na.vnad┌──────────────────────────────────┐               │
│                   │                                  │               │
│'start calibration │ Do you want to run LWMAKE.EXE now?│               │
│CALL W54XXA.na.cal  │                                  │               │
│'prompt for standar│  ┌────────────┐   ┌────────┐     │               │
│i..ret% = MessagePo│  │ Run LWMAKE │   │ Cancel │   on SWR Autotester")│
│CALL W54XXA.na.cal  │  └────────────┘   └────────┘     │               │
│'prompt for standar└──────────────────────────────────┘               │
│i..ret% = MessagePopup ("Connect SWR Autotester to Input 'B'")         │
│i..ret% = MessagePopup ("Connect Open to Test Port on SWR Autotester") │
│CALL W54XXA.na.cal (2)                                                 │
│i..ret% = MessagePopup ("Calibration complete, connect DUT")           │
│CALL W54XXA.na.cal (3)                                                 │
│CALL W54XXA.close  'closes the driver. You must use the Initialize panel│
│                   'to reinitialize the driver.                        ↓
│ Line   28/30  │ Column 21  │  INSERT  │ ←▓▓▓▓▓▓■▓▓▓▓▓▓▓▓▓▓▓▓▓→         │
└───────────────────────────────────────────────────────────────────────┘
```

☐ Move cursor to **Build** and choose **Make** from the pull-down menu.

```
 File  Edit  Build  Options  Help
                                                          BASIC 7.1
 Build Optio  Make                      F4
 Output Type  Generate Batch File...  Sh-F4
 Output File  Compile Selected File     F5

              Build Options...          F6          LabWindows Libraries

  1.   C:\LW\5400SAMP.BAS              ↑ √    Formatting and I/O
  2.   C:\LW\INSTR\W5400A.BAS          ▓ √    User Interface
  3.                                   ▓      Graphics
  4.                                   ▓      Hardcopy:
  5.                                   ▓         Printer
  6.                                   ▓         GPIB Plotter
  7.                                   ▓         RS-232 Plotter
  8.                                   ▓         Plot File
  9.                                   ▓      Analysis           (387 Only)
 10.                                   ▓      Data Acquisition     (AT Bus)
 11.                                   ▓ √    GPIB
 12.                                   ▓      RS-232
 13.                                   ▓      VXI                (AT-MXI)
 14.                                   ▓      AT-DSP2200
 15.                                   ▓      Utility
 16.                                   ↓
```

☐ At the conclusion of the Make process, the DOS executable file
5400SAMP.EXE will appear in the subdirectory containing the like-
named BASIC file. Press <ENTER> to return to the LWMAKE screen.
To return to the LabWindows PROGRAM window, select **QUIT-Return
to LabWindows** from the **File** menu.

☐ To check your program, choose **DOS SHELL** or **QUIT** from the **File**
menu. At the ensuing DOS prompt, type 5400SAMP to run the program.

54XXA Instrument Driver Overview

The following pages provide an overview description of the 54XXA Instrument Driver and includes listings and descriptions of the instrument panels.

Source

The Source functions control the internal source frequency output. They let the user generate the RF output frequency using the first three function panels shown within the Sweep Type sub-class (Table 2-1). The remaining three panels have other functions, as described below.

☐ *User Scaling:* Lets users offset displayed frequency. It is typically used when measuring mixers or other frequency translating devices.

☐ *Data Points:* Determines the number of displayed data points.

☐ *Hold Function:* Let users place the 54XXA display into a hold mode following the current sweep.

The Power Control sub-class functions control the output power level and provide power control, as follows:

☐ *Output Power:* Lets users turn the RF output on or off and set the source to a user-entered power level.

☐ *Output Leveling:* Lets users select either internal or external source leveling.

☐ *Amplifier:* Lets users specify inputs for testing amplifier gain compression.

Table 2-1.   Source Functions

Sub-Class	Function Name	Function Syntax	Page
Sweep Type	Start/Stop or Cent/Span	src.ststs	3-78
	C.W. Sweep	setup.cw	3-60
	Alternate Sweep	fc.delta	3-24
	User Scaling	sa.scl	3-52
	Data Points	sf.dp	3-64
	Hold Functions	setup.hf	3-62
Power Control	Output Power	pc.pwr	3-48
	Output Leveling	pc.lvl	3-46
	Amplifier	sa.amp	3-50

Network Analyzer:

The Network Analyzer functions control the measurement and display of the measured data. The function panels are listed in Table 2-2 and described below.

☐ *Channel Meas/Disp:* Lets users define the measurement and display formats.

☐ *Channel Titles:* Lets users provide titles for the CRT display.

☐ *Scale:* Lets users scale the CRT display.

☐ *Averaging/Smoothing:* Lets apply averaging and/or smoothing to the measured data.

☐ *Trace Functions:* Let users select various hold data functions for the current measurement.

☐ *Single Line and Complex Limits:* These two panels let users set limits and check measured data against these limits. The pass-fail variable is a global variable (W54PF) and is passed as a string. It will return as PASS if the limit test passes. It will be set to FAIL if the limit test fails. If the test fails, the frequency where the failure first occurred will also be returned. The variable will be NOTS if the limit test is not turned on (not set) and will generate an Action Not Possible error code 314.

If complex limits are being used, users must define the limit segment first. Users must then select test limits to test against the user entered limits.

Table 2-2. Network Analyzer Functions

Sub-Class	Function Name	Function Syntax	Page
None	Channel Meas/Disp	na.vnad	3-42
	Channel Titles	sa.tit	3-54
	Scale	na.scc	3-40
	Avg/Smoothing	enh.avg	3-22
	Trace Functions	sa.trs	3-56
	Single Line Limits	na.lim	3-34
	Complex Limits	na.limc	3-36

Calibration

NOTE
The Calibration Class functions are contained
in the driver labeled W5400CAL.FP.

The Calibration functions (Table 2-3) are used to perform transmission, return loss, and power calibration routines for the given measurement defined in the Network Analyzer class. They lead users through the calibration process by displaying prompts within the 54XXA CRT menu area. Detector offsets and DC zero is also accessed thru this class.

Table 2-3. Calibration Functions

Sub-Class	Function Name	Function Syntax	Page
None	Calibration !	na.cal	3-32
	Detector Offsets	cal.deto	3-8
	DC Calibration	cal.dc	3-6

Data Analysis

The Data Analysis functions (Table 2-4) let users set and retrieve information from the scalar 54XXA marker and cursor functions. They also let users set and retrieve marker and cursor information. Users can measure values as absolute or relative between two markers (Delta mode).

Table 2-4. Data Analysis Functions

Sub-Class	Function Name	Function Syntax	Page
None	Set Markers	set.mark	3-58
	Read Markers	get.mark	3-26
	Cursor	cf.abs	3-10

Data I/O

The Data I/O functions (Table 2-5) let users save and retrieve trace data from the default directory on their computer. Users must select the channel and enter or select a file name to distinguish it as a data trace. The output trace data function saves trace data to the disk, while the input trace data command inputs the trace data back to the 54XXA. All of the information required to send the trace back to the 54XXA is part of this file. The data file contains header information, number of data points, and data values. The data values will be saved in the global array W54TRDATA#(). The printer function lets users define the printout.

NOTE
Use care when sending trace data to the 54XXA; it will be reconfigured to match the header information saved in the data file.

Table 2-5. Data I/O Functions

Sub-Class	Function Name	Function Syntax	Page
None	Input Trace Data	dio.itd	3-18
	Output Trace Data	dio.otd	3-20
	Printer	hd.print	3-28

Save/Recall

☐ *Save/Recall:* These functions (Table 2-6) let users save and recall instrument states from the 54XXA internal memory. The kind of information that is saved and recalled is defined in Section III of the 54XXA Operation manual.

☐ *Preview:* Lets users view the contents of the save and recall registers on the 54XXA CRT.

☐ *Save:* Lets users save instrument states to a selected register.

☐ *Recall:* Lets users recall instrument state from the user selected register.

Table 2-6. Save/Recall Functions

Sub-Class	Function Name	Function Syntax	Page
None	Preview	sr.prv	3-70
	Save	sr.sv	3-76
	Recall	sr.rc	3-72

Self Test

NOTE

The Self Test functions are contained in the driver labeled W5400CAL.FP.

The Self Test function (Table 2-7) performs an instrument self test. If the instrument passes the self test, the Pass-Fail variable (W54PF$) is set to PASS. If the self test fails, the Pass-Fail variable is set according to the test that failed. Test results are returned in the Extended Status Byte (page 2-13).

Video Configuration

The Video Configuration function (Table 2-7)lets users define pixel planes on an external CRT to be used with the 54XXA. Refer to the RBG command in the 54XXA GPIB User's Guide for further information.

CRT Functions

The CRT Functions (Table 2-7) let users turn on and off the 54XXA CRT and set the intensity levels for the display and graticule.

Secure Mode

The Secure Mode function (Table 2-7) lets users select the secure mode of operation.

NOTE
If the 54XXA is set to a secure mode of operation, turning the secure mode off resets the it.

Table 2-7. Self Test, Video Configuration, CRT Functions, and Secure Mode Functions

Sub-Class	Function Name	Function Syntax	Page
None	Self Test	sf.self	3-66
	Video Configuration	sf.video	3-68
	CRT Functions	crt	3-16
	Secure Mode	sc.src	3-74

Section 3
Driver References

Table 3-1. Model 54XXA Driver Functional Panels

Panel Name	Page No.	Panel Name	Page No.
Alternate Sweep	3-24	Output Leveling	3-46
Amplifier	3-50	Output Trace Data	3-20
Avg/Smoothing	3-22	Output Power	3-48
C.W. Sweep	3-60	Preview	3-70
Calibration !	3-32	Printer	3-28
Channel Titles	3-54	Read Markers	3-26
Channel Meas/Disp	3-42	Recall	3-72
Close	3-14	Save	3-76
Complex Limits	3-36	Scale	3-40
CRT Functions	3-16	Secure Mode	3-74
Cursor	3-10	Self Test	3-66
Data Points	3-64	Set Markers	3-58
DC Calibration	3-6	Single Line Limits	3-34
Detector Offsets	3-8	Start/Stop or Cent/Span	3-78
Hold Functions	3-62	Trace Functions	3-56
Initialize	3-30	User Scaling	3-52
Input Trace Data	3-18	Video Configuration	3-68

Section 3
Driver References

Introduction

This section lists all the 54XXA Instrument Driver function panel routines in alphabetical order.

Function Panel Descriptions

The 54XXA Labwindows Driver contains 34 panels that provide an intuitive method for coding instrument functions. Figure 3-1 shows the hierachial structure of the functional panels. Table 3-1 (facing page) lists these panels and shows the page number on which they are described.

Global and Local Variables and Bus Commands Supported By the Driver

Table 3-2 provides a listing of the global and local variables used by the 54XXA drive and Table 2-3 provides a listing of the supported 54XXA IEEE 488 (GPIB) Bus commands.

Table 3-2.   Variable Parameters

Gobal Variables: W54SNA.ERR%	Error Variable
W54DEBUG%	Debug flag used for program developement.
W54MNUM$	54XXA Model Number
W54REV$	54XXA Firmware Revision Level
W54PF$	54XXA Pass/Fail String
Local Variables: BD%	Contains device descriptor returned by the OPENDEV BASIC or C command.
CMD$	Command String Sent To the Analyzer
W54TRDATA#()	Trace Data Array
HDR$	Trace Header Information

Table 3-3.   GPIB Commands Support by 54XXA Instrument Driver

Command	Command	Command	Command	Command	Command
ALT	CRF	GOF	MK	Q	SM
ASC	CRM	GON	NUL	RCC	SMC
AVC	CRP	HCH	OAT	RCF	SOF
AVF	CRT	HMF	OBW	RCP	SON
BC	CSB	HMM	OCF	RCS	SP
CAL	CSR	HMN	OCP	RCT	SQ
CAM	CTN	HMX	OCR	RCW	SQS
CBM	DCC	HOF	ODF	REF	SSM
CBW	DLT	HON	ODR	RF	SSS
CF	DMR	HWM	OEB	RGB	ST
CH	DOA	IEM	OFF	ROF	SUS
CHI	DOB	ILV	OID	RON	SUT
CLH	DOF	INT	OLT	RS	SVC
CLL	DON	IPM	OPB	RST	SVS
CLM	DOR	LDA	ORF	SAC	SW
CLO	DP	LDE	ORP	SAP	TM
CLT	ELV	LHF	ORR	SAT	TMD
CMK	FLO	LHI	OSE	SAW	TMH
CMM	FM	LID	PRV	SC	TML
CMN	GCM	LLF	PT	SCL	TMO
CMX	GCS	LLO	PTL	SFB	TSS
CN	GIN	LUS	PWR	SI	TST
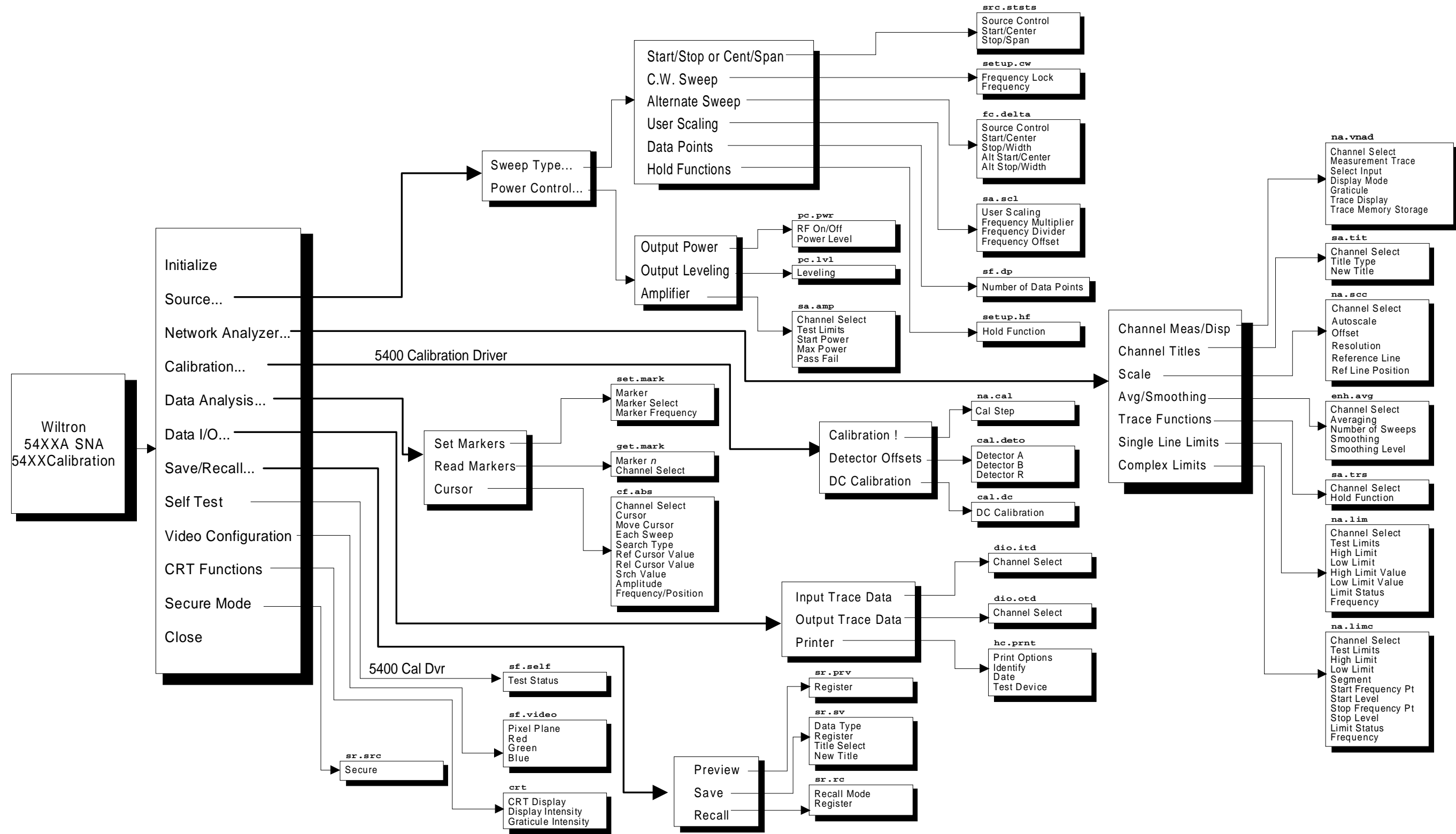
Figure 3-1. Function Panel Tree

cal.dc

Function Panel Name: DC Calibration

Description: This function lets users set the 54XXA to perform (power) measurements with the autozero function of each active (i.e., POWER measurement) channel disabled. The autozero correction voltage for each active channel is held at the value in effect with the DC Calibration function was enabled.

```
 Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!
┌─────────────────────────────────┬───────────────────┬──────────┐
│ W5400 Calibration               │ DC Calibration    │ Page 1/1 │
├─────────────────────────────────┴───────────────────┴──────────┤
│┌DC Calibration┐                                                 │
││ On │                                                           │
││ Off│■│                                                         │
││    └─┘                                                         │
│                                                                 │
│                                                                 │
│                                                                 │
│                                                     Error       │
│                                                   ┌─────────┐   │
│                                                   │0        │   │
│                                                   └─────────┘   │
├─────────────────────────────────────────────────────────────── │
│ CALL w5400cal.cal.dc (0)                                        │
└─────────────────────────────────────────────────────────────── │
  Line    1/1  │  Column 1  │   OPERATE   │ ←■
```

Controls:

DC Calibration:

On: Configures the 54XXA to perform power measurements with the Autozero function off.

Off: Turns the DC Calibration function off.

Input Parameters: (D) is default setting.

Variable Name	Variable Type	Description	Details
DCCAL%	Integer	Turn DC Calibration On or Off.	0 = Off (D) 1 = On

Output Parameters: None.

Error: DEBUG%=0: Labwindows Errors 200, Unexpected SRQ=305, Warning Error=4000.
DEBUG%=1: Labwindows Errors 200, Inst Errors=3XX, Warning Error=40XX.

Program Examples:

Quick BASIC:

```
REM Turn DC calibration on or off.
CALL W54XXcal.cal.dc (DCCAL%)
```

Microsoft C:

```
/* Turn DC calibration on or off. */
W54XXcal_cal_dc (DCCAL)
```

cal . det o

Function Panel Name: Detector Offsets

Description: This function lets users specify an offset (in dB) for the detector used on inputs A, B, or R. The offset can be cleared by reselecting the function and using 0 dB for the value.

```
 Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!
┌─────────────────────────────────────────────────────────────────┐
│ W5400 Calibration              │ Detector Offsets │  Page 1/1     │
├────────────────────────────────┴──────────────────┴─────────────┤
│   Detector A            Detector B            Detector R        ↑│
│  ┌──────────┐          ┌──────────┐          ┌──────────┐        │
│  │0         │ dB       │0         │ dB       │0         │ dB     │
│  └──────────┘          └──────────┘          └──────────┘        │
│                                                                   │
│                                                                   │
│                                                                   │
│                                                     Error         │
│                                                  ┌──────────┐     │
│                                                  │0         │     │
│                                                  └──────────┘     │
├───────────────────────────────────────────────────────────────┬─┤
│ CALL w5400cal.cal.deto (0, 0, 0)                              │↑│
├──────────────┬───────────────┬──────────────┬────────────────┴─┤
│  Line   1/1  │  Column 1     │   OPERATE    │ ←▪▪▪▪▪▪▪▪▪▪▪▪▪▪▪→ │
└──────────────┴───────────────┴──────────────┴──────────────────┘
```
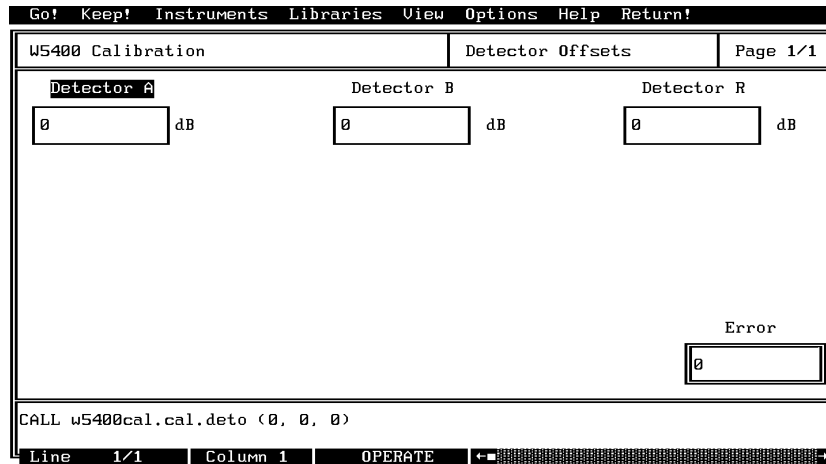
Controls:

Dector A: Allows entry of an offset value for the detector connected to Input A.

Dector B: Allows entry of an offset value for the detector connected to Input B.

Dector R   Allows entry of an offset value for the detector connected to Input R.

Input Parameters: (D) is default setting.

Variable Name	Variable Type	Description	Details	Range
DOA#	Double Precision	Detector A Offset Value	0(D)	
DOB#	Double Precision	Detector B Offset Value	0(D)	
DOC#	Double Precision	Detector R Offset Value	0(D)	

Output Parameters: None.

Error: DEBUG%=0: Labwindows Errors 200, Unexpected SRQ=305, Warning Error=4000.
DEBUG%=1: Labwindows Errors 200, Inst Errors=3XX, Warning Error=40XX.

Program Examples:

Quick BASIC:

```
REM Assign offset values for detectors connected to Input A, B,
and R.
CALL W54XXcal.cal.deto (DOA#, DOB#, DOC#)
```

Microsoft C:

```
/* Assign offset values for detectors connected to Input A, B,
and R. */
W54XXcal_cal_deto (DOA, DOB, DOC)
```

cf.abs

Function Panel Name: Cursor

Description: This function lets users set and read cursor information.

```
 Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!
┌──────────────────────────────────────────────────────────────────┐
│ Wiltron 54XXA SNA              │ Cursor            │ Page 1/1      │
├──────────────────────────────────────────────────────────────────┤
│Channel Select     Cursor      Move Cursor   Each Sweep   Search Type │
│   CH 1▓▓                                              Absolute▓▓ Ref!│
│   CH 2▓▓       � On      Position  ▓       On  ▓          Max  ▓    │
│               Off ▓   Frequency ▓        Off ▓          Min  ▓    │
│                                                         Left  ▓ Src! │
│                                                        Right  ▓ Src! │
│Ref Cursor Val     Rel Cursor Val     Srch Value    Acive Marker      │
│                                                       Relative ▓ Rel!│
│┌──────┐ Ref! ┌──────┐ Rel! ┌──────┐ Src!  BW Norm ▓ Src!│
││0     │      │0     │      │0     │              BW Max  ▓ Src!│
│└──────┘      └──────┘      └──────┘           Left Max  ▓ Src!│
│     ^-Frequency or Position-^                 Right Max ▓ Src!│
│                                                Min-Max  ▓      │
│   Amplitude                   Frequency/Position      Error   │
│┌──────┐ <-   Returned Values !   -> ┌──────┐        ┌──────┐  │
││      │ <- If = -1 Search Failed -> │      │        │0     │  │
│└──────┘                             └──────┘        └──────┘  │
├──────────────────────────────────────────────────────────────────┤
│CALL W54XXA.cf.abs (1, 0, 10, 0, 0, 0, , , 0, 0)                   │
├──────────────────────────────────────────────────────────────────┤
│ Line    1/1   │  Column 1  │   OPERATE  │ ←■▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓→│
└──────────────────────────────────────────────────────────────────┘
```

Controls:

Channel Select: Selects the active channel, Channel 1 or 2.

Cursor: Turns the cursor control on or off.

Move Cursor: Select whether cursor movement will be Position or Frequency. The control works in conjunction with the Ref Cursor Val input fields described below.

Each Sweep: Selects whether cursor will be on or off for each frequency sweep.

Search Type:

Absolute (Ref!)   Moves the trace to the Ref Cursor Val field value.

Max, Min: Moves the trace to the respective maximum or minimum value of the measurement trace data.

Left, Right : (Src!)   Sets up a dB search to the respective left or right of the present main cursor position. The search value is entered in the Search Value (Src) field.

Active Marker: Moves the cursor to the active frequency marker.

Relative
(Rel!)   Moves the cursor to the Rel Cursor Val field value.

BW Norm
(Src!):   Displays the bandwidth value using the Srch Value field setting.

BW Max
(Src!):   Positions the reference and active cursors to the Srch Value field dB points to the left and right of the maximum point on the applicable channel trace.

Left, Right Max
(Src!)   Positions the reference cursor at the maximum point on the applicable channel trace and the active cursor to the respective left or right of the maximum point.

Min-Max   Positions the reference cursor at the minimum point on the applicable channel trace and the active cursor at the maximum point.

Ref Cursor Val
(Ref!):   Allows entry of a value for the Ref(erence) Cursor.

Ref Cursor Val
(Rel!):   Allows entry of a value for the Rel(ative) Cursor.

Srch Value
(Src!)   Allows entry of a value for which to search.

Amplitude: Displays the returned amplitude value of the trace when a search function is implemented.

Frequency/Position: Displays the returned frequency or position value of the trace when a search function is implemented.

Input Parameters: (D) is default setting.

Variable Name	Variable Type	Description	Details
CHSEL%	Integer	Channel Select	1 = Channel 1 (D) 2 = Channel 2
MOVC%	Integer	Move Cursor to Frequency or Position	o = Frequency (D) 1 = Position
STYP%	Integer	Search Type	1 = Left 2 = Right 3 = BW Norm 4 = Min - Max 5 = Active Marker 6 = Left Max 7 = BW Max 8 = Right Max 9 = Not Used 10 = Absolute (D) 11 = Relative 12 = Max 13 = Min
CON%	Integer	Cursor On/Off	0 = Off (D) 1 = On
SVAL#	Double Precision	Search Value	0 (D)
ESW%	Integer	Each Sweep	0 = Off (D) 1 = On
PF#	Double Precision	Reference Cursor Position/Frequency	
PF1#	Double Precision	Delta Cursor Position/Frequency	

Output Parameters:

Variable Name	Variable Type	Description
MAMP#	Double Precision	Returned Amplitude Value
MDFREQ#	Double Precision	Returned Frequency value

Error: DEBUG%=0: Labwindows Errors 200, Unexpected
SRQ=305, Warning Error=4000.
DEBUG%=1: Labwindows Errors 200, Inst Errors=3XX,
Warning Error=40XX.

Program Examples:

Quick BASIC:

```
REM Set cursor parameters.
CALL W54XXA.cf.abs (CHSEL%, MOVC%, STYP%, SVAL#, CON%, ESW%,
MAMP#, MDFREQ#, PF#, PF1#)
```

Microsoft C:

```
/* Set cursor parameters. */
W54XXA_cf_abs (CHSEL, MOVC, STYP, SVAL, CON, ESW, MAMP, MDFREQ, PF, PF1)
```

cl ose

Function Panel Name: Close

Description: This function closes the GPIB communications with the 54XXA.

```
   Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!
┌──────────────────────────────────┬──────────────┬──────────────┐
│ Wiltron 54XXA SNA                │ Close        │ Page 1/1     │
├──────────────────────────────────┴──────────────┴────────────┤▲
│                                                               │█
│          █                                                    │ 
│                                                               │ 
│                                                               │ 
│                                                               │ 
│                                                               │ 
│                                                               │ 
│                                                               │ 
│                                                     Error     │ 
│                                                  ┌─────────┐  │ 
│                                                  │0        │  │▼
├───────────────────────────────────────────────────────────────┤▲
│ CALL W54XXA.close                                             │ 
│                                                               │▼
└─────────────────────────────────────────────────────────────┘
   Line   1/1   │  Column 1   │    OPERATE   │←■▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒→
```

```
   Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!
┌──────────────────────────────────┬──────────────┬──────────────┐
│ Wiltron 54XXA SNA Calibration    │ Close        │ Page 1/1     │
├──────────────────────────────────┴──────────────┴────────────┤▲
│                                                               │█
│                                                               │↓
│                                                               │ 
│                                                               │ 
│                                                               │ 
│                                                               │ 
│                                                               │ 
│                                                               │ 
│                                                     Error     │ 
│                                                  ┌─────────┐  │ 
│                                                  │0        │  │▼
├───────────────────────────────────────────────────────────────┤▲
│ CALL W54XXcal.close                                           │ 
│                                                               │▼
└─────────────────────────────────────────────────────────────┘
   Line   1/1   │  Column 1   │    OPERATE   │←■▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒→
```

Controls: This panel has no controls.

Input Parameters: None.

Output Parameters: None.

Error:

Program Examples:

Quick BASIC:

```
REM Close the 54XXA (54XXcal) Instrument Driver.
CALL W54XXA.close
CALL W54XXcal.close
```

Microsoft C:

```
/* Close the 54XXA Instrument Driver. */
W54XXA_close()
W54XXcal_close()
```

crt

Function Panel Name: CRT Functions

Description: This function lets users turn on and set the intensity of the graticule and trace.

```
  Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!
 ┌─────────────────────────────────────────────────────────────────────┐
 │ Wiltron 54XXA SNA                    │ CRT Functions        │ Page 1/1│
 ├──────────────────────────────────────┴──────────────────────┴────────┤
 │ CRT Display     Graticule    Display Intensity    Graticule Intensity ↑│
 │                                 Min ▓                   Min ▓        │ │
 │    On  ■            On  │        1  ▓                    1  ▓        ↓ │
 │    Off │            Off ■        2  ▓                    2  ▓          │
 │                                 3  ▓                    3  ▓          │
 │                                 4  ▓                    4  ▓          │
 │                                 5 ▓▓                    5  ▓          │
 │                                 6  ▓                    6  ▓          │
 │                                 7  ▓                    7  ▓          │
 │                                 8  ▓                    8  ▓          │
 │                                Max ▓                   Max ▓          │
 │                                                                       │
 │                                                       Error           │
 │                                                      ┌─────────────┐  │
 │                                                      │ 0           │  │
 │                                                      └─────────────┘  │
 ├───────────────────────────────────────────────────────────────────── │
 │ CALL W54XXA.crt (1, 5, 0, 0)                                         ↑│
 │                                                                      ↓│
 ├────────────┬────────────┬─────────────┬───────────────────────────────┤
 │ Line   1/1 │  Column 1  │   OPERATE   │ ←■▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓→    │
 └────────────┴────────────┴─────────────┴───────────────────────────────┘
```
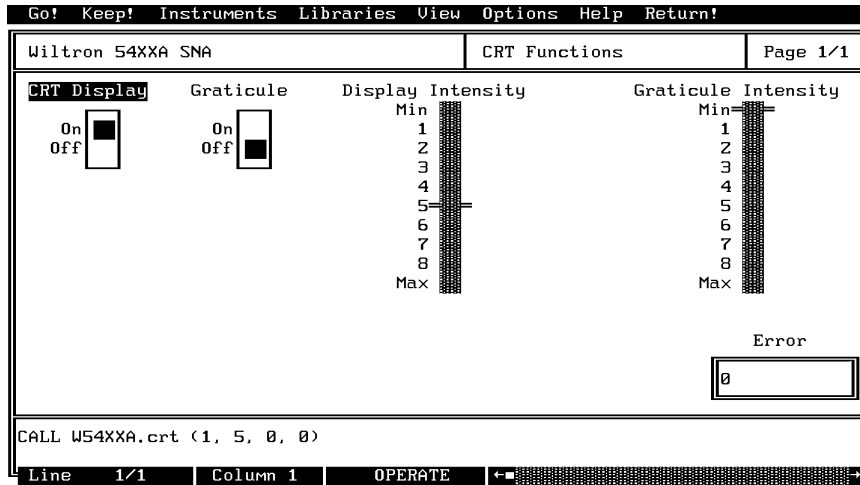
Controls:

CRT Display: Turns the CRT display graticule on and off.

Graticule: Turns the display graticule on or off.

Display Intensity: Controls the display intensity when the CRT Display control is switched to On.

Graticule Intensity: Controls the intensity of the graticule when the CRT Display control is switched to On.

Input Parameters: (D) is the default setting.

Variable Name	Variable Type	Description	Details
DISP%	Integer	Display	0 = Off 1 = On (D)
GRT%	Integer	Graticule	0 = Off (D) 1 = On
TINT%	Integer	Trace Intensity	0 = Min 9 = Max 5 (D)
GINT%	Integer	Graticule Intensity	0 = Min 9 = Max

Output Parameters: None.

Error: DEBUG%=0: Labwindows Errors 200, Unexpected SRQ=305, Warning Error=4000.
DEBUG%=1: Labwindows Errors 200, Inst Errors=3XX, Warning Error=40XX.

Program Examples:

Quick BASIC:

```
REM Set CRT functions.
CALL W54XXA.crt(DISP%, TINT%, GRT%, GINT%)
```

Microsoft C:

```
/* Set CRT functions. */
W54XXA_crt (DISP, TINT, GRT, GINT)
```

di o. i t d

Function Panel Name:	Input Trace Data
Description:	This function lets users input trace data that has been saved to the current directory. All saved files have a user defined name and a .STR file extension.

```
 Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!
┌─────────────────────────────────────┬──────────────────────┬──────────┐
│ Wiltron 54XXA SNA                    │ Input Trace Data     │ Page 1/1 │
├─────────────────────────────────────┴──────────────────────┴──────────┤
│Channel Select                                            File Name     │
│   CH 1                                                   ┌────────────┐ │
│   CH 2         ▮                                         │ ""         │ │
│                                                          └────────────┘ │
│                                                                         │
│                                                                         │
│                                                                         │
│                                                          Error          │
│                                                          ┌────────────┐ │
│                                                          │ 0          │ │
│                                                          └────────────┘ │
├─────────────────────────────────────────────────────────────────────┤
│CALL W54XXA.dio.itd (1, "")                                            │
├──────────────┬──────────────┬────────────┬──────────────────────────┤
│ Line   1/1   │ Column 1     │  OPERATE   │ ←                        │
└──────────────┴──────────────┴────────────┴──────────────────────────┘
```

Controls:

Channel Select:	Selects the active channel, Channel 1 or 2.
File Name:	Allows for entry of a file name.

Input Parameters: (D) is the default setting.

Variable Name	Variable Type	Description	Details
CHSEL%	Integer	Select Active Channel	1 = Channel 1 (D) 2 = Channel 2
FAME$	String	Filename	8 characters maximum

Output Parameters: None.

Error: DEBUG%=0: Labwindows Errors 200, Unexpected SRQ=305, Warning Error=4000.
DEBUG%=1: Labwindows Errors 200, Inst Errors=3XX, Warning Error=40XX.

Program Examples:

Quick BASIC:

```
REM Set parameters for trace data input.
CALL W54XXA.dio.itd (CHSEL%, FAME$)
```

Microsoft C:

```
/* Set parameters for trace data input. */
W54XXA_dio_itd (CHSEL, FAME)
```

di o. ot d

Function Panel Name: Output Trace Data

Description: This function lets users output trace data saved to the current directory. All saved files have a user defined name and a .STR file extension.

```
 Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!
┌──────────────────────────────────┬──────────────────────┬──────────┐
│ Wiltron 54XXA SNA                │ Output Trace Data    │ Page 1/1 │
├──────────────────────────────────┴──────────────────────┴──────────┤
│ Channel Select                                        File Name    ▲│
│    CH 1                                                             ││
│    CH 2            ▌                                   ┌──────────┐ ││
│                                                       │ ""       │  │
│                                                       └──────────┘  │
│                                                                     │
│                                                                     │
│                                                                     │
│                                                       Error         │
│                                                       ┌──────────┐  │
│                                                       │ 0        │  │
│                                                       └──────────┘  │
├─────────────────────────────────────────────────────────────────┤
│ CALL W54XXA.dio.otd (1, "")                                       ▲│
├──────────┬──────────┬─────────────┬──────────────────────────────┼─┤
│ Line  1/1│ Column 1 │  OPERATE    │ ←■▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓│▼│
└──────────┴──────────┴─────────────┴──────────────────────────────┴─┘
```

Controls:

Channel Select: Selects the active channel, Channel 1 or 2.

File Name: Allows for entry of a file name.

Input Parameters: (D) is the default setting.

Variable Name	Variable Type	Description	Details
CHSEL%	Integer	Select Active Channel	1 = Channel 1 (D) 2 = Channel 2
FAME$	String	Filename	8 characters maximum

Output Parameters: None.

Error: DEBUG%=0: Labwindows Errors 200, Unexpected SRQ=305, Warning Error=4000.
DEBUG%=1: Labwindows Errors 200, Inst Errors=3XX, Warning Error=40XX.

Program Examples:

Quick BASIC:

```
REM Set parameters for trace data output.
CALL W54XXA.dio.otd (CHSEL%, FAME$)
```

Microsoft C:

```
/* Set parameters for trace data output. */
W54XXA_dio_otd (CHSEL, FAME)
```

enh. avg

Function Panel Name: Avg/Smoothing

Description: This function lets users set averaging and/or smoothing functions for the current measurements.

```
 Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!
┌──────────────────────────────────────────────────────────────────────┐
│ Wiltron 54XXA SNA                    │ Avg/Smoothing      │ Page 1/1   │
├──────────────────────────────────────────────────────────────────────┤
│ Channel Select  Averaging   Number of Sweeps   Smoothing   Smoothing Level │
│   CH 1                          2                             5         │
│   CH 2            On            4              On            4         │
│   Both           Off           8              Off           3         │
│                               16                             2         │
│                               32                             1         │
│                               64                                      │
│                              128                                      │
│                              256                                      │
│                                                                        │
│                                                      Error             │
│                                                    ┌──────┐            │
│                                                    │0     │            │
│                                                    └──────┘            │
├──────────────────────────────────────────────────────────────────────┤
│ CALL W54XXA.enh.avg (1, 0, 1, 0, 5)                                    │
├──────────────────────────────────────────────────────────────────────┤
│ Line   1/1  │  Column 1  │    OPERATE    │                            │
└──────────────────────────────────────────────────────────────────────┘
```
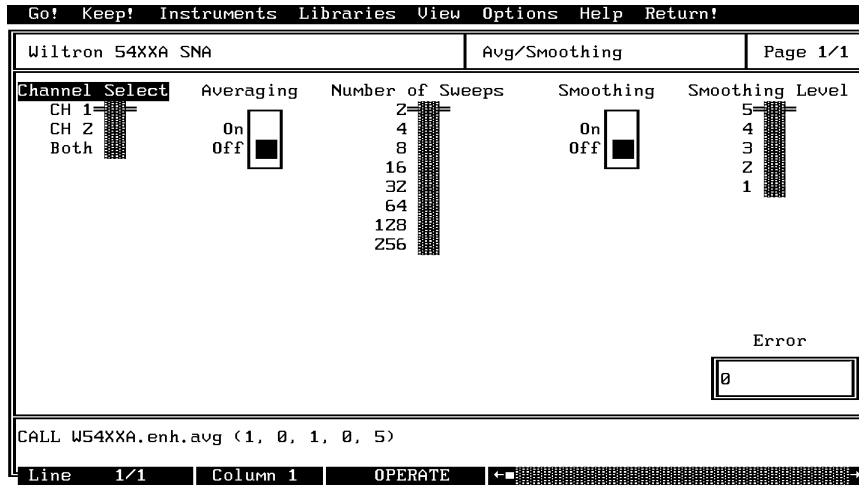
Controls:

Channel Select: Selects the active channel: Channel 1, 2, or both.

Averaging: Turns averaging on or off.

Number of Sweeps: Selects the number of sweeps to be averaged, from 2 to 256.

Smoothing: Turns smoothing on or off.

Smoothing Level: Selects the smoothing level, from 1 to 5.

Input Parameters: (D) is the default setting.

Variable Name	Variable Type	Description	Details
CHSEL%	Integer	Select Active Channel	1 = Channel 1 (D) 2 = Channel 2 3 = Both
AVON%	Integer	Averaging	0 = Off (D) 1 = On
NUMS%	Integer	Number of Sweeps to Average	Averaging is 2 to the "I" power (2^I) I = 1 to 8
SMON1%	Integer	Smoothing	0 - Off (D) 1 = On
SMAP1%	Integer	Smoothing Level	1 to 5

Output Parameters: None.

Error: DEBUG%=0: Labwindows Errors 200, Unexpected SRQ=305, Warning Error=4000.
DEBUG%=1: Labwindows Errors 200, Inst Errors=3XX, Warning Error=40XX.

Program Examples:

Quick BASIC:

```
REM Set averaging and smoothing parameters.
CALL W54XXA.enh.avg(CHSEL%, AVON%, NUMS%, SMON1%, SMAP1%)
```

Microsoft C:

```
/* Set averaging and smoothing parameters. */
W54XXA_enh_avg(CHSEL, AVON, NUMS, SMON1, SMAP1)
```

fc.delta

Function Panel Name: Alternate Sweep

Description: This function lets users set parameters for alternating sweeps 1 and 2.

```
  Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!
┌──────────────────────────────────────────────────────────────────────┐
│ Wiltron 54XXA SNA                    │ Alternate Sweep     │ Page 1/1  │
├──────────────────────────────────────────────────────────────────────┤
│┌Source Control┐    Start/CGHzer                 Stop/Width          ↑ │
││              │                                                      ▓ │
││ Cent/Span │  │   ┌─────────────┐                ┌─────────────┐     ▓ │
││ Start/Stop│█ │   │0            │ GHz  Channel 1! │0            │ GHz  │
│└──────────────┘   └─────────────┘                └─────────────┘      │
│                    Alt. Start/Center             Alt. Stop/Width      │
│                   ┌─────────────┐                ┌─────────────┐      │
│                   │0            │ GHz  Channel 2! │0            │ GHz  │
│                   └─────────────┘                └─────────────┘      │
│                                                                       │
│                                                         Error         │
│                                                      ┌─────────────┐  │
│                                                      │0            │  │
│                                                      └─────────────┘  │
├──────────────────────────────────────────────────────────────────────┤
│ CALL W54XXA.fc.delta (0, 0, 0, 0, 0)                                ↑ │
│                                                                     ▓ │
├──────────────────────────────────────────────────────────────────────┤
│  Line   1/1   │  Column 1  │    OPERATE    │ ←■▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓→│
└──────────────────────────────────────────────────────────────────────┘
```
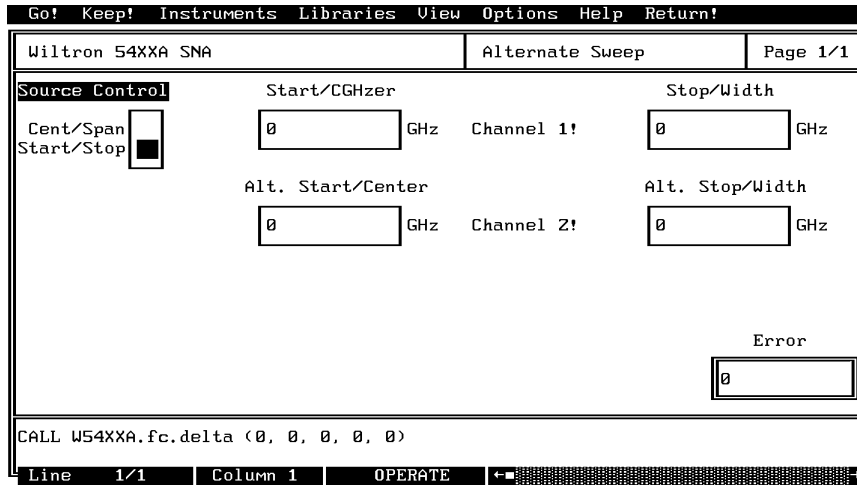
Controls:

Source Control: Selects between Center/Span and Start/Stop sweeps. The Start/Stop sweep appears on Channel 1, while the Center/Span sweep appears on Channel 2.

Cent/Span: Selects Center/Span sweep. This choice sweeps the chosen width symmetically about a center frequency, 1/2 of the sweep width on either side.

Start/Stop   Selects Start/Stop sweep. This choice sweep between chosen start and stop frequencies.

Start/Center: Allows for entering a Start frequency, if Start/Stop (above) is selected. Or it allows for entering a Center frequency, if Cent/Span (above) is selected.

Stop/Width: Allows for entering a Stop frequency, if Start/Stop (above) is selected. Or it allows for entering a sweep (span) width, if Cent/Span (above) is selected.

Alt. Start/Center: Sames a described for Start/Center, above, except it applies to Channel 2.

Alt. Stop/Width: Sames a described for Stop/Width, above, except it applies to Channel 2.

Input Parameters: (D) is the default setting.

Variable Name	Variable Type	Description	Details	Range
SCNTRL%	Integer	Source Control	0 = Start/Stop(D) 1 = Center/Span	
SC#	Double Precision	Start/Center	Frequency	Start: Model Dependent Center: Model Dependent
SS#	Double Precision	Stop/Width	Frequency	Start: Model Dependent Center: Model Dependent
ASCE#	Double Precision	Alternate Start/Center	Frequency	Start: Model Dependent Center: Model Dependent
ASS#	Double Precision	Alternate Stop/Width	Frequency	Start: Model Dependent Center: Model Dependent

Output Parameters: None.

Error: DEBUG%=0: Labwindows Errors 200, Unexpected SRQ=305, Warning Error=4000.
DEBUG%=1: Labwindows Errors 200, Inst Errors=3XX, Warning Error=40XX.

Quick BASIC:

```
REM Output trace data.
CALL W54XXA.fc.delta (SCNTRL%, SC#, SS#, ASCE#, ASS#)
```

Microsoft C:

```
/* Output trace data. */
W54XXA_fc_delta (SCNTRL, SC, SS, ASCE, ASS)
```

get.mark

Function Panel Name: Read Markers

Description: This function lets users read the returned values of all active markers. Non-active markers return 000.00.

```
 Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!

 Wiltron 54XXA SNA                    Read Markers              Page 1/1

   Marker 1            Marker 2            Marker 3    Channel Select
                                                         CH 1
  ┌─────────┐     ▌   ┌─────────┐        ┌─────────┐      CH 2
  └─────────┘         └─────────┘        └─────────┘

   Marker 4            Marker 5            Marker 6
  ┌─────────┐         ┌─────────┐        ┌─────────┐
  └─────────┘         └─────────┘        └─────────┘

   Marker 7            Marker 8
                                                           Error
  ┌─────────┐         ┌─────────┐
  └─────────┘         └─────────┘                      ┌─────────┐
                                                       │0        │
                                                       └─────────┘

 CALL W54XXA.get.mark (1, , , , , , , , )

 Line   1/1      Column 1        OPERATE
```
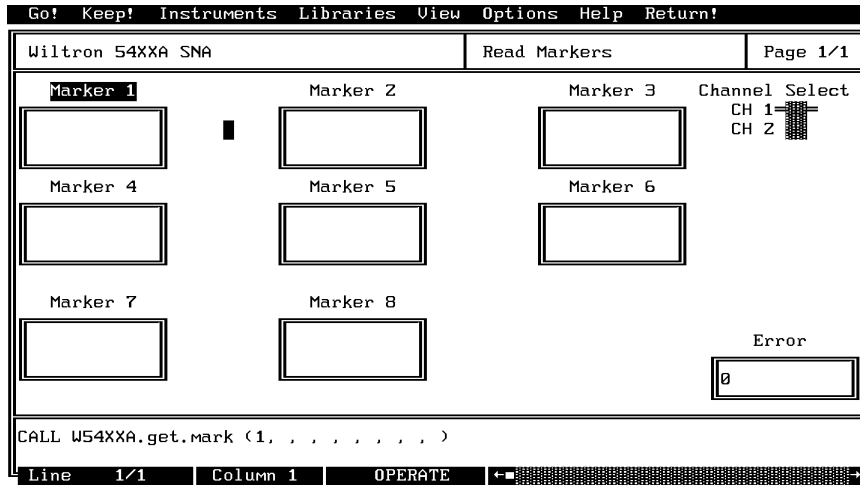
Controls:

Marker *n*   Returns the Marker *n* value.

Channel Select: Selects the active channel, Channel 1 or 2.

Input Parameters: (D) is the default setting.

Variable Name	Variable Type	Description	Details
CHSEL%	Integer	Select Active Channel	1 = Channel 1 (D) 2 = Channel 2

Output Parameters:

Variable Name	Variable Type	Description
M1V# thru M8V#	Double Precision	Returned values for markers 1 thru 8.

Error: DEBUG%=0: Labwindows Errors 200, Unexpected SRQ=305, Warning Error=4000.
DEBUG%=1: Labwindows Errors 200, Inst Errors=3XX, Warning Error=40XX.

Program Examples:

Quick BASIC:

```
REM Get the values for up to eight markers.
CALL W54XXA.get.mark (CHSEL%, M1V#, M2V#, M3V#, M4V#, M5V#,
M6V#, M7V#, M8V#)
```

Microsoft C:

```
/* Get the values for up to eight markers. */
W54XXA_get_mark (CHSEL, M1V, M2V, M3V, M4V, M5V, M6V, M7V, M8V)
```

hd. pr nt

Function Panel Name: Printer

Description: This function lets users create a title and select the type for hard-copy output.

```
 Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!

 Wiltron 54XXA SNA                        Printer            Page 1/1

   Print Options        Identify            Date           Test Device
      Graph
  Tab 26 pts.          ┌────┐            ┌────┐           ┌────┐
  Tab 51 pts.          │""  │            │""  │           │""  │
 Tab 101 pts.          └────┘            └────┘           └────┘
 Tab 201 pts.
 Tab 401 pts.
     Markers
      Limits
                                                          Error
                                                         ┌────┐
                                                         │0   │
                                                         └────┘
 CALL W54XXA.hd.prnt (6, "", "", "")

 Line    1/1    Column 1      OPERATE
```
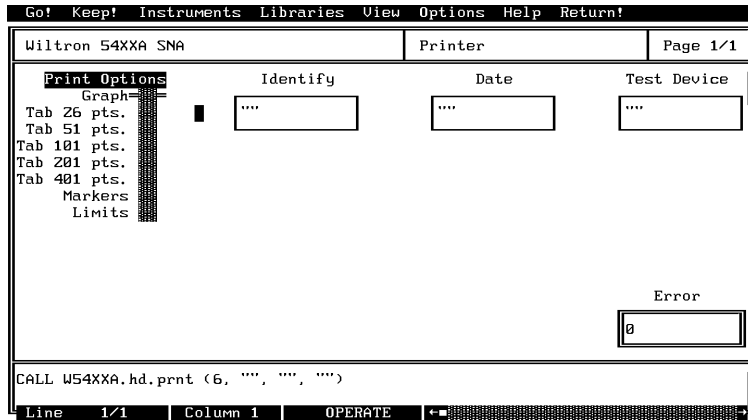
Controls:

Print Options:

Graph: Prints the measurement screen display on an attached printer.

Tab xx pts: Selects the number of data points to be printed per measurement channel.

Markers: Prints only the frequency-marker data points.

Limits: Prints only the measurement limits data.

Identify: Allows for entry of a name for the hardcopy printout.

Date: Allows for a date entry.

Test Device: Allows for entry of a name for the test device.

Input Parameters: (D) is the default setting.

Variable Name	Variable Type	Description	Details
PROO%	Integer	Print Options	0 = 401 pts 1 = 201 pts 2 = 101 pts 3 = 51 pts 4 = 26 pts 5 = Markers 6 = Graph (D) 7 = Limits
IDENT$	String	Identify Printout	8 characters maximum
DTE$	String	Date	8 characters maximum
TDEV$	String	Test Device Name	8 characters maximum

Output Parameters: None.

Error: DEBUG%=0: Labwindows Errors 200, Unexpected SRQ=305, Warning Error=4000.
DEBUG%=1: Labwindows Errors 200, Inst Errors=3XX, Warning Error=40XX.

Program Examples:

Quick BASIC:

```
REM Select printer options.
CALL W54XXA.hd.prnt(PROO%, IDENT$, DTE$, TDEV$)
```

Microsoft C:

```
/* Select printer options. */
W54XXA_hd_prnt(PROO, IDENT, DTE, TDEV)
```

init

Function Panel Name:	Initialize

Description: This function opens the GPIB communication with the 54XXA and sets it to its preset state. The device configuration must already be completed. System configuration parameters — such as model number and firmware revision — are returned and displayed.

```
┌─────────────────────────────────────────────────────────────────────┐
│ Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!     │
├──────────────────────────────────┬───────────────────┬──────────────┤
│ Wiltron 54XXA SNA                │ Initialize        │ Page 1/1     │
├──────────────────────────────────┴───────────────────┴──────────────┤
│    Address               Model Number          Firmware Rev         │
│  ┌──────────────┐      ┌──────────────┐       ┌──────────────┐       │
│  │6             │      │              │       │              │       │
│  └──────────────┘      └──────────────┘       └──────────────┘       │
│                                                                      │
│                                               Software Rev          │
│                                               ┌──────────────┐       │
│                                               │              │       │
│                                               └──────────────┘       │
│                                                                      │
│      Debug                                         Error            │
│     On                                         ┌──────────────┐      │
│     Off ■                                       │0             │      │
│                                                └──────────────┘      │
├──────────────────────────────────────────────────────────────────────┤
│ CALL W54XXA.init (6)                                                 │
├──────────────────────────────────────────────────────────────────────┤
│ Line   1/1  │ Column 1  │   OPERATE  │ ←■▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒       │
└──────────────────────────────────────────────────────────────────────┘
```

```
┌─────────────────────────────────────────────────────────────────────┐
│ Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!     │
├──────────────────────────────────┬───────────────────┬──────────────┤
│ Wiltron 54XXA SNA Calibration    │ Initialization    │ Page 1/1     │
├──────────────────────────────────┴───────────────────┴──────────────┤
│    Address                                                           │
│  ┌──────────────┐                                                    │
│  │6             │                                                    │
│  └──────────────┘                                                    │
│                                                                      │
│                                                                      │
│                                                                      │
│                                                    Error            │
│                                                ┌──────────────┐      │
│                                                │0             │      │
│                                                └──────────────┘      │
├──────────────────────────────────────────────────────────────────────┤
│ CALL W54XXcal.init (6)                                               │
├──────────────────────────────────────────────────────────────────────┤
│ Line   1/1  │ Column 1  │   OPERATE  │ ←■▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒       │
└──────────────────────────────────────────────────────────────────────┘
```

Controls:

Address: GPIB Address for 54XXA. Address can be 0 to 31; 6 is the default.

Model Number: Returned instrument model number.

Firmware Rev: Returned firmware revision level.

Debug: Sets the DEBUG status to On or Off. Refer to the discussion on the DEBUG Feature in Chapter 2, page 2-6

Input Parameters: (D) is the default setting.

Variable Name	Variable Type	Description	Range
ADDR%	Integer	GPIB Address	0 – 31 6 (D)

Output Parameters:

Variable Name	Variable Type	Description
W54REV$	String	Returned firmware revision number
W54MNUM$	String	Returned model number

Error: DEBUG%=0: Labwindows Errors 200, Unexpected
SRQ=305, Warning Error=4000.
DEBUG%=1: Labwindows Errors 200, Inst Errors=3XX,
Warning Error=40XX.

Program Examples:

Quick BASIC:

```
REM Open communications with the 54XXA.
CALL W54XXA.init(ADDR%)
CALL W54XXcal.init (ADDR%)
```

Microsoft C:

```
/* Open communications with the 54XXA */
W54XXA_init(ADDR)
W54XXcal_init(ADDR)
```

na. cal

Function Panel Name: Calibration!

Description: This function provides a prompted calibration routine for the current instrument set-up.

```
 Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!
┌─────────────────────────────────────────────────────────────────┐
│ W5400 Calibration                    │ Calibration    │ Page 1/1 │
│       ▛▀▀▀▀▀▀▜                                                  ↑ │
│       ▌Cal Step▐                                                ↓ │
│  Start Cal.▗▄▄▖                                                  │
│  Meas. Std.▐  ▌                                                  │
│   Done Cal.▐▄▄▌                                                  │
│                                                                  │
│                                                                  │
│                                                                  │
│                                                                  │
│                                               Error              │
│                                             ┌──────────┐         │
│                                             │0         │         │
│                                             └──────────┘         │
├─────────────────────────────────────────────────────────────────┤
│ CALL w5400cal.na.cal (1)                                        ↑ │
│                                                                 ↓ │
├──────────┬──────────┬──────────────┬────────────────────────────┤
│ Line   1/1 │ Column 1 │   OPERATE   │←■▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓→│
└──────────┴──────────┴──────────────┴────────────────────────────┘
```

Controls:

Cal Step:

Start Cal: Starts the 54XXA measurement calibration sequence. Choosing this selection is the same as pressing the 54XXA front panel START CAL key.

Meas Std: Starts the calibration measurement. After connecting the first component, as directed by the 54XXA, move the slide switch to this option and select Go!

Done Cal: Calibration is completed. After the progressing through the 54XXA calibration menu sequence, move the slide switch to this selection and select Go!.

Input Parameters: None.

Variable Name	Variable Type	Description	Details
CSTP%	Integer	Calibration Step	1= Start Cal (D) 2 = Meas Std 3 = Done Cal

Output Parameters: None.

Error: DEBUG%=0: Labwindows Errors 200, Unexpected SRQ=305, Warning Error=4000.
DEBUG%=1: Labwindows Errors 200, Inst Errors=3XX, Warning Error=40XX.

Program Examples:

Quick BASIC:

```
REM Start calibration routine.
CALL W54XXcal.na.cal(CSTP%)
```

Microsoft C:

```
/* Start calibration routine. */
W54XXcal_na_cal(CSTP)
```

na.lim

Function Panel Name: Single Line Limits

Description: This function lets users both set limit lines and test to user entered limits.

```
┌──────────────────────────────────────────────────────────────────┐
│  Go!  Keep!  Instruments  Libraries  View  Options  Help  Return! │
├──────────────────────────────────────────────────────────────────┤
│ ┌──────────────────────────┬────────────────────────┬──────────┐ │
│ │ Wiltron 54XXA SNA        │ Single Line Limits     │ Page 1/1 │ │
│ └──────────────────────────┴────────────────────────┴──────────┘ │
│  Channel Select     Test Limits              Limit Status         │
│    CH 1                                    ┌──────────────┐       │
│    CH 2             On                     │              │       │
│                    Off ■                   └──────────────┘       │
│                                                                   │
│                                              Frequency            │
│    High Limit       Low Limit              ┌──────────────┐       │
│                                            │              │       │
│    On               On                     │              │       │
│    Off ■            Off ■                   └──────────────┘       │
│                                                                   │
│  High Limit Value   Low Limit Value              Error            │
│  ┌────────────┐     ┌────────────┐         ┌──────────────┐       │
│  │ 0          │     │ 0          │         │ 0            │       │
│  └────────────┘     └────────────┘         └──────────────┘       │
│ ┌──────────────────────────────────────────────────────────────┐ │
│ │ CALL W54XXA.na.lim (1, 0, 0, 0, 0, 0, )                       │ │
│ └──────────────────────────────────────────────────────────────┘ │
│ ┌─────────┬──────────┬─────────────┐                             │
│ │Line  1/1│ Column 1 │   OPERATE   │ ←■                          │
│ └─────────┴──────────┴─────────────┘                             │
└──────────────────────────────────────────────────────────────────┘
```
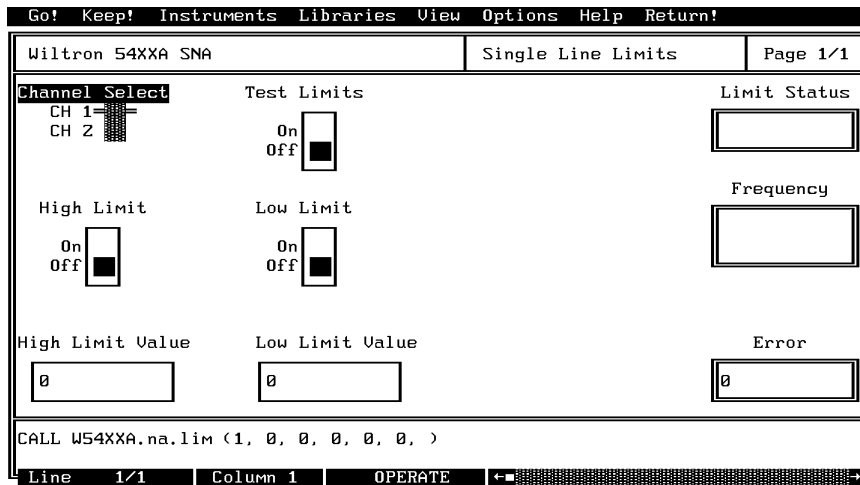
Controls:

Channel Select: Selects the active channel, Channel 1 or 2.

Test Limits: Turns limit testing on or off. When On, the measured signal is tested to determine whether it is within the high and low limit values. If so, it returns the Limit Status. If not, it returns the frequency where the signal exceeded the limit.

Limit Status: Returned pass/fail status of limit testing.

High Limit: Turns High Limit line on or off. When on, control allows a value to be entered in High Limit Value field, below.

Low Limit: Turns Low Limit line on or off. When on, control allows a value to be entered in Low Limit Value field, below.

Frequency: Returned frequency value, if limits fail. Returns "0," if limits pass.

High Limit Value: Allows for entry of high-limit value, in dB.

Low Limit Value: Allows for entry of low-limit value, in dB.

Input Parameters: (D) is default setting.

Variable Name	Variable Type	Description	Details	Range
CHSEL%	Integer	Select Active Channel	1 = Channel 1 (D) 2 = Channel 2	
HL%	Integer	High Limit	0 = Off (D) 1 = On	
HLV#	Double Precision	High Limit Value		Model Dependent
LL%	Integer	Low Limit	0 = Off (D) 1 = On	
LLV#	Double Precision	Low Limit Value		Model Dependent
TLIM%	Integer	Test Limits	0 = Off (D) 1 = On	

Output Parameters:

Variable Name	Variable Type	Description
FFREQ#	Double Precision	Returned Failed Frequency Value

Error: DEBUG%=0: Labwindows Errors 200, Unexpected SRQ=305, Warning Error=4000.
DEBUG%=1: Labwindows Errors 200, Inst Errors=3XX, Warning Error=40XX.

Program Examples:

Quick BASIC:

```
REM Sets single limit lines and tests to user entered limits.
CALL W54XXA.na.lim(CHSEL%, HL%, HLV#, LL%, LLV#, TLIM%, FFREQ#)
```
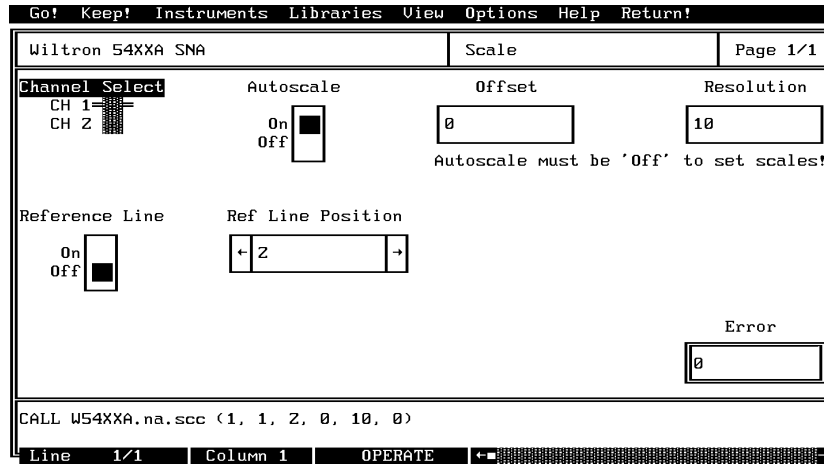
Microsoft C:

```
/* Sets single limit lines and tests to user entered limits. */
W54XXA_na_lim(CHSEL, HL, HLV, LL, LLV, TLIM, FFREQ)
```

na.limc

Function Panel Name: Complex Limits

Description: This function lets users set complex limit lines and to test to user entered limits. Complex limits can have up to 10 line segments across the measurement band. Each segment can be a different frequency.

```
 Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!
┌─────────────────────────────────────────────────────────────────────┐
│ Wiltron 54XXA SNA              │ Complex Limits      │ Page 1/1      │
├────────────────────────────────┴─────────────────────┴───────────────┤
│Channel Select    Test Limits    High Limit   Low Limit               │
│   CH 1              On                                                │
│   CH 2              Off           On           On                     │
│              Define Seg          Off          Off      Limit Status   │
│              Define Done                                              │
│                Clear All                                              │
│                                                                       │
│                                                        Frequency      │
│                                                                       │
│                     Start Frequency Pt.   Start Level                 │
│         Segment          0                  0                         │
│      ┌─┬───────────┬─┐                                                │
│      │←│ 1         │→│   Stop Frequency Pt.   Stop Level      Error   │
│      └─┴───────────┴─┘        0                  0            0       │
│                                                                       │
│ CALL W54XXA.na.limc (1, 0, 0, 0, 0, 2, 1, 0, 0, )                     │
├───────────────────────────────────────────────────────────────────────┤
│  Line   1/1  │  Column 1  │   OPERATE   │                             │
└───────────────────────────────────────────────────────────────────────┘
```
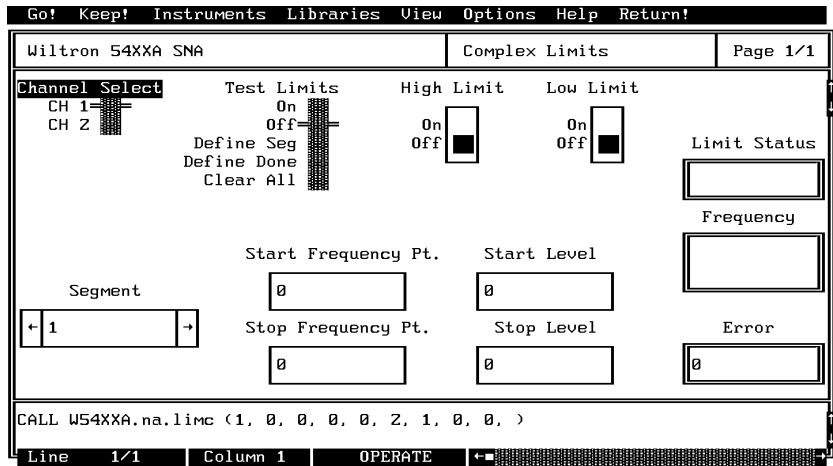
Controls:

Channel Select: Selects the active channel, Channel 1 or 2.

Test Limits:

On, Off: Turns testing-to-limits on or off. When On, the measured signal is tested to determine whether it is within the high and low limit values. If not, it returns the frequency where the signal exceeded the limit.

Define Seg: Provides for defining segments. Segments should be ordered from lowest to highest frequency and not overlap.

Define Done: Completes segment data definition.

Clear All: Deletes the frequency and level values for the limit-line segments. Control should be set to this position only after executing the limits function with the Test Limit control set to On.

High Limit: Turns High Limit on or off.

Low Limit: Turns Low Limit on or off.

Limit Status: Returns pass/fail status of limit testing.

Frequency: Returns frequency where limits test fails. Returns "0," if limits pass.

Segment: Allows for entering the segment number, if Define Seg is selected on Test Limits control.

Start Frequency Pt: Allows for entry of start frequency for limit-line segment.

Stop Frequency Pt: Allows for entry of stop frequency for limit-line segment.

Start Level: Allows for entry of start power level for limit-line segment.

Stop Level: Allows for entry of stop power level for limit-line segment.

Input Parameters: (D) is default setting.

Variable Name	Variable Type	Description	Details	Range
CHSEL%	Integer	Select Active Channel	1 = Channelt 1 (D) 2 = Channel 2	
HL%	Integer	High Limit	0 = Off (D) 1 = On	
STALVL#	Double Precision	Start Level		Model Dependent
STOLVL#	Double Precision	Stop Level		Model Dependent
LL%	Integer	Low Limit	0 = Off (D) 1 = On	
TLIM%	Integer	Test Limits	1 = On 2 = Off (D) 3 = Define Seg 4 = Define Done 5 = Clear All	
SEGM%	Integer	Segment		1 to 10
STARF#	Double Precision	Start Frequency Point		Model Dependent
STOPF#	Double Precision	Stop Frequency Point		Model Dependent

Output Parameters:

Variable Name	Variable Type	Description	Details
FFREQ#	Double Precision	Returned Failed Frequency Value	
W54PF	String	Pass/Fail	Returns words "Pass" or "Fail." If no limits are set, variable returns NOTF and an error number.

Error: DEBUG%=0: Labwindows Errors 200, Unexpected
                                    SRQ=305, Warning Error=4000.
                                    DEBUG%=1: Labwindows Errors 200, Inst Errors=3XX,
                                    Warning Error=40XX.

Program Examples:

Quick BASIC:

```
REM Sets complex limit lines and tests to user entered limits.
CALL W54XXA.na.limc (CHSEL%, HL%, STALVL#, STOLVL#,
LL%, TLIM%, SEGM%, STARF#,STOPF#, FFREQ#)
```

Microsoft C:

```
/* Sets complex limit lines and tests to user entered limits. */
W54XXA_na.limc (CHSEL, HL, STALVL, STOLVL, LL, TLIM, SEGM,
STARF,STOPF, FFREQ)
```

54XXA LabWindows Driver User's Guide

na. scc

Function Panel Name: Scale

Description: This function lets users scale the measurements.

```
 Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!
┌──────────────────────────────┬──────────────────┬──────────────┐
│ Wiltron 54XXA SNA            │ Scale            │ Page 1/1     │
├──────────────────────────────┴──────────────────┴──────────────┤
│Channel Select      Autoscale        Offset          Resolution  │
│   CH 1                                                           │
│   CH 2               On ■          ┌──────────┐    ┌──────────┐ │
│                      Off           │ 0        │    │ 10       │ │
│                                    └──────────┘    └──────────┘ │
│                                    Autoscale must be 'Off' to set scales!│
│                                                                 │
│ Reference Line    Ref Line Position                             │
│                                                                 │
│    On            ┌─┬──────────┬─┐                               │
│    Off ■         │←│ 2        │→│                               │
│                  └─┴──────────┴─┘                               │
│                                                      Error      │
│                                                   ┌──────────┐  │
│                                                   │ 0        │  │
│                                                   └──────────┘  │
├─────────────────────────────────────────────────────────────────┤
│ CALL W54XXA.na.scc (1, 1, 2, 0, 10, 0)                         │
├─────────────────────────────────────────────────────────────────┤
│ Line   1/1  │  Column 1  │   OPERATE  │ ←■                     │
└─────────────────────────────────────────────────────────────────┘
```

Controls:

Channel Select: Selects the active channel, Channel 1 or 2.

Autoscale: Turns Autoscale on and off. When on, autoscale sets the screen display for optimum offset and resolution values.

Offset: When Autoscale is set to Off, this field allows entry for an Offset level value, in dB.

Resolution: When Autoscale is set to Off, this field allows entry for a Resolution value, in dB.

Reference Line: Turns the Reference Line on the CRT on and off.

Ref Line Position: Select a graticule position, from 1 to 10, for the reference line

3-40

Input Parameters: (D) is default setting.

Variable Name	Variable Type	Description	Details	Range
CHSEL%	Integer	Select Active Channel	1 = Channel 1 (D) 2 = Channel 2	
ASCL%	Integer	Autoscale	0 = Off 1 = On (D)	
REFLP%	Integer	Reference Line Position	0 to 10 2 (D)	0 to 10
REFL%	Integer	Reference Line	0 = Off (D) 1 = On	
OFFS#	Double Precision	Display Offset Values	0 (D)	Model Dependent
RES#	Double Precision	Display Resolution	0 (D)	Model Dependent

Output Parameters: None.

Error: DEBUG%=0: Labwindows Errors 200, Unexpected SRQ=305, Warning Error=4000.
DEBUG%=1: Labwindows Errors 200, Inst Errors=3XX, Warning Error=40XX.

Program Examples:

Quick BASIC:

```
REM Close the 54XXA Instrument Driver.
CALL W54XXA.na.scc(CHSEL%, ASCL%, REFLP%, REFL%, RES#, OFFS#)
```

Microsoft C:

```
/* Close the 54XXA Instrument Driver. */
W54XXA_na_scc(CHSEL, ASCL, REFLP, REFL, RES, OFFS)
```

na. vnad

Function Panel Name: Channel Meas/Disp

Description: This function lets user define a measurement type and select how the trace will be displayed.

```
 Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!
┌──────────────────────────────┬────────────────────────┬───────────────┐
│ Wiltron 54XXA SNA            │ Channel Meas/Disp      │ Page 1/1     │
├──────────────────────────────┴────────────────────────┴───────────────┤
│ Channel Select    Measurement Trace     Select Input    Display Mode  ↑│
│    CH 1═▒▒═      Transmission═▒▒═          A═▒▒═        Channel 1 ▒▒   ↓│
│    CH 2 ▒▒       Return Loss ▒▒            B  ▒▒        Channel 2 ▒▒    │
│                        SWR  ▒▒            R  ▒▒    Dual Channel═▒▒═    │
│                      Power  ▒▒           A/R ▒▒                        │
│                   View Cal  ▒▒           B/R ▒▒                        │
│                                                                        │
│                                                                        │
│                    Trace Display    Trace Memory Storage               │
│                   View Trace═▒▒═            None═▒▒═                   │
│                   View TR Mem ▒▒      Trace To Mem                     │
│                   View TR-Mem ▒▒       HLIM to Mem         Error       │
│                                        LLIM to Mem     ┌─────────────┐ │
│                                                        │0            │ │
│                                                        └─────────────┘ │
├────────────────────────────────────────────────────────────────────────┤
│ CALL W54XXA.na.vnad (1, 1, 1, 0, 1, 0)                                ↑│
│                                                                       ↓│
├──────────┬───────────┬──────────────┬──────────────────────────────────┤
│ Line  1/1│ Column 1  │   OPERATE    │ ←■▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒→    │
└──────────┴───────────┴──────────────┴──────────────────────────────────┘
```

Controls:

Channel Select: Selects the active channel, Channel 1 or 2.

Measurement Trace:

    Transmission: Configures the measurement trace for a transmission measurement.

    Return Loss: Configures the measurement trace for a return loss measurement.

    SWR: Configures the measurement trace for an SWR measurement.

Power: Configures the measurement trace for a power measurement.

View Cal: Displays the calibration data for the channel associated with the measurement trace.

Select Input: Selects the front panel port that will supply the input signals: A, B, or R

 A/R: Provides for ratio measurement, whereby the signal on Input R is substracted from the signal on Input A.

 B/R: Same as above, except Input R signal is substracted from Input B signal.

Display Mode: Select display mode: Channel 1 only, Channel 2 only, or both together.

Trace Display:

 View Trace: Displays current measurement trace without active-trace memory applied.

 View TR Mem: Displays currently stored active TRace memory.

 View TR-Mem: Displays current measurement trace substracted by active TRace memory.

Trace Memory Storage:

 None: Trace Memory Storage function disabled.

 Trace to Mem: Loads active-trace memory with current measurement data.

 Hlim to Mem: Loads active-trace memory with current high-limit data.

 Llim to Mem: Loads active-trace memory with current low-limit data.

Input Parameters: (D) is default setting.

Variable Name	Variable Type	Description	Details
CHSEL%	Integer	Select Active Channel	1 = Channel 1 (D) 2 = Channel 2
MTRC%	Integer	Measurement Trace	1 = Transmission (D) 2 = Return Loss 3 = SWR 4 = Power 5 = View Cal
INSEL%	Integer	Input Select	1 = Input A (D) 2 = Input B 3 = Input R 4 = Input A/R 5 = Input B/R
CHDISP%	Integer	Display Mode	0 = Dual Channel (D) 1 = Channel 1 2 = Channel 2
TRCDSP%	Integer	Trace Display	1 = View Data (D) 2 = View TR Mem 3 = View TR – Mem
TRCM%	Integer	Trace Memory Storage	1 = Trace to Mem (D) 2 = Hlim to Mem 3 = Llim to Mem

Output Parameters: None.

Error: DEBUG%=0: Labwindows Errors 200, Unexpected
SRQ=305, Warning Error=4000.
DEBUG%=1: Labwindows Errors 200, Inst Errors=3XX,
Warning Error=40XX.

Program Examples:

Quick BASIC:

```
REM Define measurement type, storage, and display.
CALL W54XXA.na.vnad(CHSEL%,MTRC%,INSEL%,CHDISP%,TRCDSP%, TRCM)
```

Microsoft C:

```
/* Define measurement type, storage, and display. */
W54XXA_na_vnad(CHSEL,MTRC,INSEL,CHDISP,,TRCDSP, TRCM)
```

pc. l evel

Function Panel Name: Output Leveling

Description: This function lets users select the source leveling functions.

```
 Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!
┌──────────────────────────────────────┬──────────────────────┬──────────┐
│ Wiltron 54XXA SNA                     │ Output Leveling      │ Page 1/1 │
├──────────────────────────────────────┴──────────────────────┴──────────┤
│     Leveling                                                          ↑ │
│ Internal                                                              ↕ │
│ External                                                               │
│                                                                        │
│                                                                        │
│                                                                        │
│                                                                        │
│                                                             Error       │
│                                                           ┌──────────┐  │
│                                                           │0         │  │
│                                                           └──────────┘  │
├─────────────────────────────────────────────────────────────────────┬──┤
│ CALL W54XXA.pc.level (1)                                             │↑ │
├───────────┬──────────┬────────────┬─────────────────────────────────┴──┤
│ Line  1/1 │ Column 1 │  OPERATE   │ ←■▨▨▨▨▨▨▨▨▨▨▨▨▨▨▨▨▨▨▨▨▨▨▨▨▨▨▨▨▨▨→   │
└───────────┴──────────┴────────────┴────────────────────────────────────┘
```
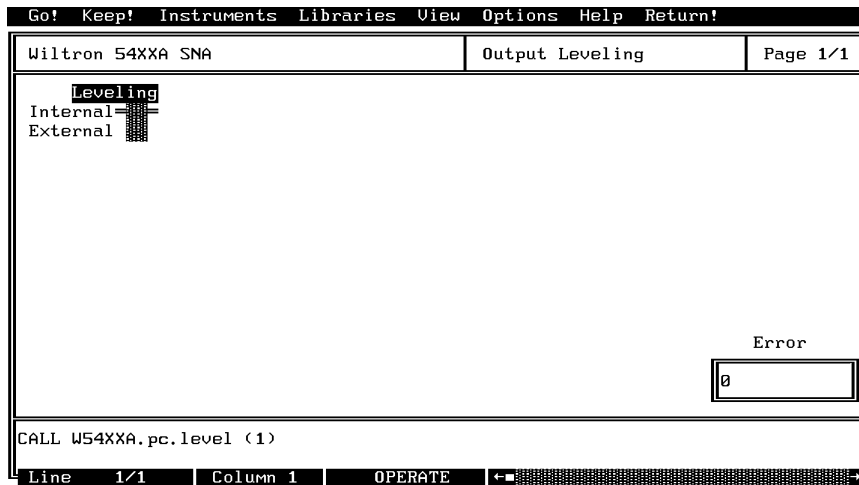
Controls:

Leveling:

Internal: Connects the 54XXA internal RF output detector to the 54XXA power leveling circuit.

External: Connect an external RF detector — via the rear panel EXTERNAL ALC INPUT connector — to the 54XXA power leveling circuit.

Input Parameters: (D) is the default setting.

Variable Name	Variable Type	Description	Details
INEX%	Integer	Leveling Select	1 = Internal (D) 2 = External

Output Parameters: None.

Error: DEBUG%=0: Labwindows Errors 200, Unexpected SRQ=305, Warning Error=4000.
DEBUG%=1: Labwindows Errors 200, Inst Errors=3XX, Warning Error=40XX.

Program Examples:

Quick BASIC:

```
REM Select internal or external leveling input.
CALL W54XXA.pc.level(INEX%)
```

Microsoft C:

```
/* Select internal or external leveling input. */
W54XXA_pc_level(INEX)
```

pc. pwr

Function Panel Name: Output Power

Description: This function lets users set the output power of the internal 54XXA source.

```
 Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!

 Wiltron 54XXA SNA                    Output Power           Page 1/1

 RF On/Off                                          Power Level
                                                    0              Dbm
      On ■
     Off




                                                         Error
                                                    0

 CALL W54XXA.pc.pwr (1, 0)

 Line   1/1      Column 1        OPERATE
```
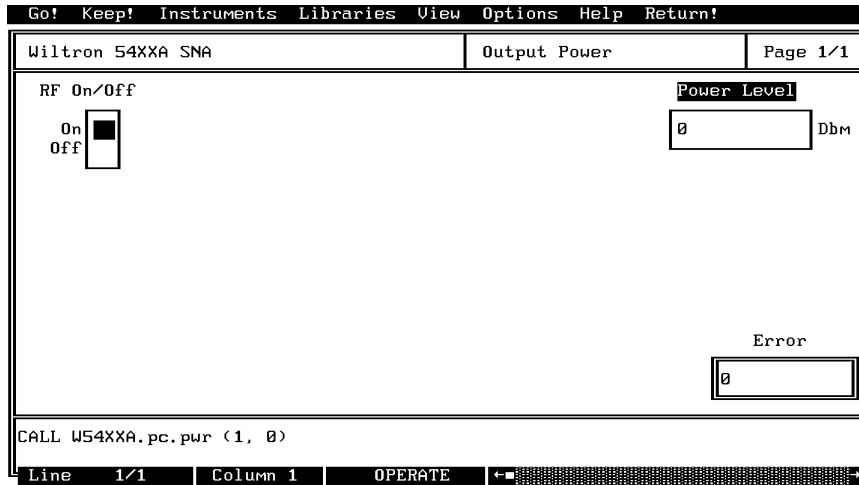
Controls:

RF On/Off   Turns the RF output power on or off.

Power Level: Allows for entering an output power level, in dBm.

Input Parameters: (D) is the default setting.

Variable Name	Variable Type	Description	Details	Range
RFOF%	Integer	RF On/Off	0 = Off (D) 1 = On	
PWRL#	Double Precision	Power Level		Model Dependent

Output Parameters: None.

Error: DEBUG%=0: Labwindows Errors 200, Unexpected SRQ=305, Warning Error=4000.
DEBUG%=1: Labwindows Errors 200, Inst Errors=3XX, Warning Error=40XX.

Program Examples:

Quick BASIC:

```
REM Set display limits.
CALL W54XXA.pc.pwr(RFOF%,PWRL#)
```

Microsoft C:

```
/* Set display limits. */
W54XXA_pc_pwr(RFOF,PWRL)
```

sa. amp

Function Panel Name: Amplifier

Description: This function lets users set up and run the amplifier measurement routine.

```
  Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!

  Wiltron 54XXA SNA                    Amplifier              Page 1/1

 Channel Select    Start Power           Max Power
    CH 1                                                            
    CH 2              0          dBm        0          dBm


                      Channel limits must be set
                      before executing this panel

                                         Frequency
                  Pass Fail
                                                                  

                                                              Error

                                                               0

  CALL W54XXA.sa.amp (1, 0, 0, )

  Line   1/1      Column 1         OPERATE
```
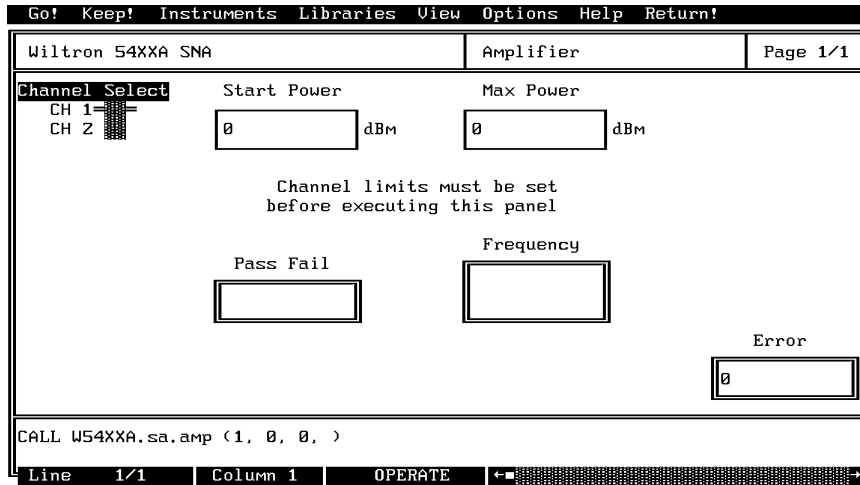
Controls:

Channel Select: Selects the active channel, Channel 1 or 2.

Start Power: This field allows entry of a starting power level.

Max Power: This field allows entry of a maximum power level.

Pass Fail: Returned pass/fail status of limit testing.

Frequency: Returned frequency value, if limits fail. Returns "0," if limits pass.

Input Parameters: (D) is the default setting.

Variable Name	Variable Type	Description	Details	Range
CHSEL%	Integer	Select Active Channel	1 = Channel 1 (D) 2 = Channel 2	
SARP#	Double Precision	Start Power		Model Dependent
MPWR#	Double Precision	Max Power		Model Dependent

Output Parameters:

Variable Name	Variable Type	Description
FFREQ#	Double Precision	Returned Failed Frequency Value

Error: DEBUG%=0: Labwindows Errors 200, Unexpected
SRQ=305, Warning Error=4000.
DEBUG%=1: Labwindows Errors 200, Inst Errors=3XX,
Warning Error=40XX.

Program Examples:

Quick BASIC:

```
REM Define the amplifier measurement routine.
CALL W54XXA.sa.amp(CHSEL%,SARP#,MPWR#,FFREQ#)
```
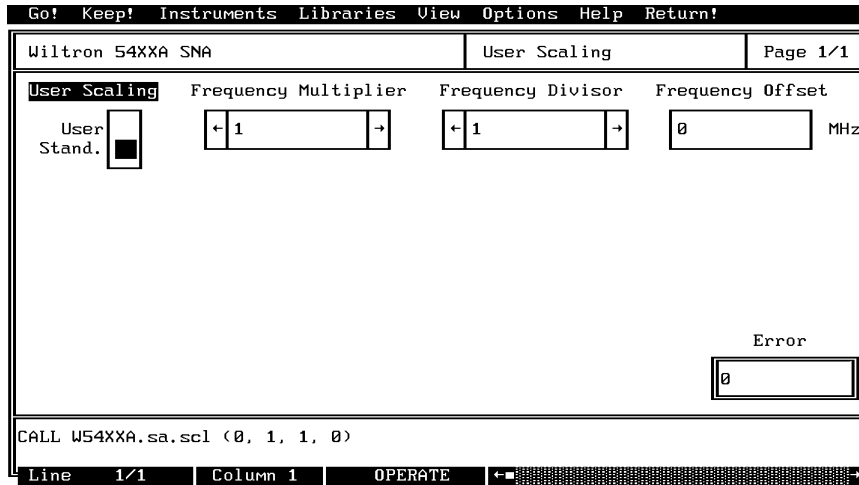
Microsoft C:

```
/* efine the amplifier measurement routine. */
W54XXA_sa.amp(CHSEL,SARP,MPWR,FFREQ#)
```

sa.scl

Function Panel Name: User Scaling

Description: This function lets users scale the frequency display.

```
  Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!

  Wiltron 54XXA SNA                        User Scaling           Page 1/1

  User Scaling    Frequency Multiplier   Frequency Divisor   Frequency Offset
     User   ┌─┐   ┌─┐┌─────────┐┌─┐      ┌─┐┌─────────┐┌─┐   ┌─────────┐
    Stand.  │■│   │←││1        ││→│      │←││1        ││→│   │0        │  MHz
            └─┘   └─┘└─────────┘└─┘      └─┘└─────────┘└─┘   └─────────┘


                                                              Error
                                                          ┌─────────┐
                                                          │0        │
                                                          └─────────┘

  CALL W54XXA.sa.scl (0, 1, 1, 0)

   Line    1/1      Column 1        OPERATE
```

Controls:

User Scaling:

     User: Turns on frequency scaling mode.

     Stand.   Cancels frequency scaling mode.

Frequency Multiplier: Selects frequency multiplier value of from 1 to 10.

Frequency Divisor: Selects frequency divisor value of from 1 to 10.

Frequency Offset: Allows entry of a frequency offset value.

Input Parameters: (D) is the default setting.

Variable Name	Variable Type	Description	Details	Range
USCL%	Integer	User Scaling	1 (D)	1 to 10
FMULT%	Integer	Frequency Multiplier	1 (D)	1 to 10
FDIV%	Integer	Frequency Divisor	1 (D)	1 to 10
FOFF#	Double Precision	Frequency Offset		Model 5407/09/11: ±99.9999 MHz All others: ±99.9999 GHz

Output Parameters: None.

Error: DEBUG%=0: Labwindows Errors 200, Unexpected SRQ=305, Warning Error=4000.
DEBUG%=1: Labwindows Errors 200, Inst Errors=3XX, Warning Error=40XX.

Program Examples:

Quick BASIC:

```
REM Scale the frequency display.
CALL W54XXA.sa.scl(USCL%, FMULT%, FDIV%, FOFF#)
```
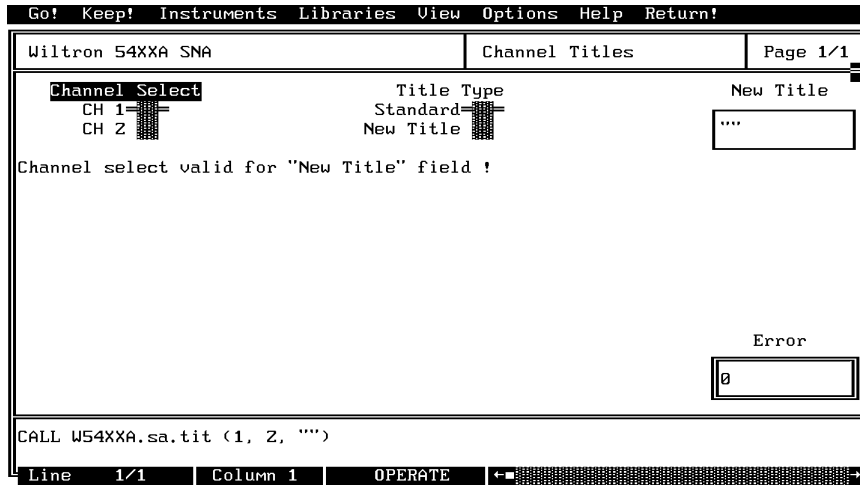
Microsoft C:

```
/* Scale the frequency display. */
W54XXA_sa_scl(USCL, FMULT, FDIV, FOFF)
```

sa.tit

Function Panel Name: Channel Titles

Description: This function lets users create a title for the current
display.

```
  Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!
 ┌────────────────────────────┬──────────────────────┬──────────────┐
 │ Wiltron 54XXA SNA          │ Channel Titles       │  Page 1/1    │
 ├────────────────────────────┴──────────────────────┴──────────────┤
 │   Channel Select              Title Type               New Title   ▲
 │      CH 1▓▓▓                Standard▓▓▓▓            ┌──────────┐ ▌
 │      CH 2 ▓▓▓               New Title ▓▓▓           │ ....     │ ▼
 │                                                    └──────────┘
 │ Channel select valid for "New Title" field !
 │
 │
 │
 │
 │
 │
 │                                                        Error
 │                                                    ┌──────────┐
 │                                                    │ 0        │
 │                                                    └──────────┘
 ├────────────────────────────────────────────────────────────────┐
 │ CALL W54XXA.sa.tit (1, 2, "")                                   │
 ├──────────┬──────────┬─────────────┬───────────────────────────┤
 │ Line  1/1│ Column 1 │   OPERATE   │ ←■▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒→ │
 └──────────┴──────────┴─────────────┴───────────────────────────┘
```

Controls:

Channel Select: Selects the active channel, Channel 1 or 2.

Title Type:

    Standard: Causes CRT to display standard titles (TRANSMIS-
SION, RETURN LOSS, etc.).

    New Title: Opens the New Title field for entry.

New Title: Allows entry of title text, 8 characters maximum.

Input Parameters: (D) is the default setting.

Variable Name	Variable Type	Description	Details
CHSEL%	Integer	Selects Active Channel.	1 = CH1 (D) 2 = CH2
TITT%	Integer	Title Type	2 = Standard Titles (D) 3 = User Titles
TIT$	String	New Title Name	8 characters maximum

Output Parameters: None.

Error: DEBUG%=0: Labwindows Errors 200, Unexpected SRQ=305, Warning Error=4000.
DEBUG%=1: Labwindows Errors 200, Inst Errors=3XX, Warning Error=40XX.

Program Examples:

Quick BASIC:

```
REM Provide measurement title.
CALL W54XXA.sa.tit(CHSEL%, TITT%, TIT$)
```
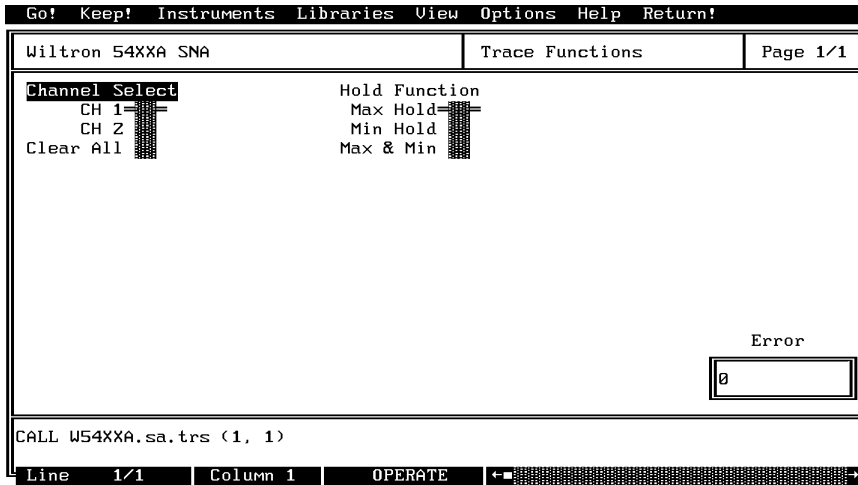
Microsoft C:

```
/* Provide measurement title. */
W54XXA_sa_tit(CHSEL, TITT, TIT)
```

sa.trs

Function Panel Name: Trace Functions

Description: This function lets users define various trace functions.

```
 Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!

 Wiltron 54XXA SNA                      Trace Functions         Page 1/1

 Channel Select          Hold Function
      CH 1                  Max Hold
      CH 2                  Min Hold
 Clear All                  Max & Min




                                                        Error

                                                     0

 CALL W54XXA.sa.trs (1, 1)

  Line    1/1      Column 1         OPERATE
```

Controls:

Channel Select: Selects the active channel, Channel 1 or 2, or clea;rs both channels of previously held data.

Hold Function:

Max Hold: Captures, displays, and holds the maximum measurement values for selected channel during successive sweeps.

Min Hold: Captures, displays, and holds the minimum measurement values for selected channel during successive sweeps.

Max & Min: Alternately hold maximum and minimum trace values.

Input Parameters: (D) is the default setting.

Variable Name	Variable Type	Description	Details
CHSEL%	Integer	Selects Active Channel	1 = Channel 1 (D) 2 = Channel 2
HLDF%	Integer	Hold Function	1 = Max Hold 2 = Min Hold 3 = Max & Min

Output Parameters: None.

Error: DEBUG%=0: Labwindows Errors 200, Unexpected SRQ=305, Warning Error=4000.
DEBUG%=1: Labwindows Errors 200, Inst Errors=3XX, Warning Error=40XX.

Program Examples:

Quick BASIC:

```
REM Define hold functions for active trace.
CALL W54XXA.sa.trs(CHSEL%,HLDF%)
```
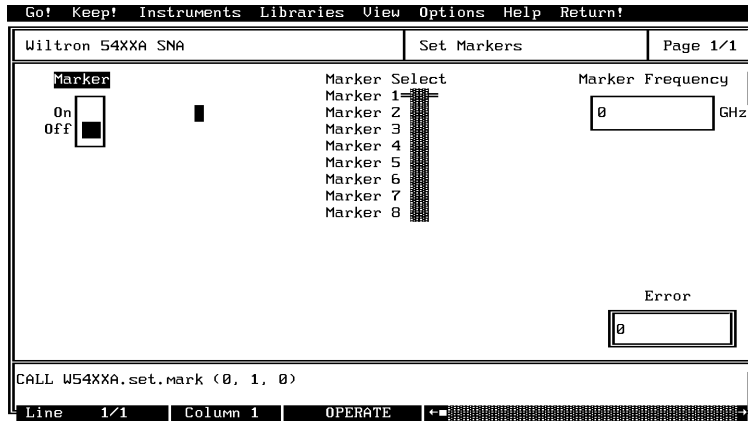
Microsoft C:

```
/* Define hold functions for active trace. */
W54XXA_sa_trs(CHSEL,HLDF)
```

set.mark

Function Panel Name: Set Markers

Description: This function lets users set display markers.

```
  Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!
┌─────────────────────────────────────┬────────────────────┬──────────┐
│ Wiltron 54XXA SNA                    │ Set Markers        │ Page 1/1 │
├─────────────────────────────────────┴────────────────────┴──────────┤
│      Marker                 Marker Select          Marker Frequency  │
│                             Marker 1                                 │
│    On                       Marker 2              ┌──────────┐   GHz │
│    Off ■                     Marker 3             │ 0        │       │
│                             Marker 4                                 │
│                             Marker 5                                 │
│                             Marker 6                                 │
│                             Marker 7                                 │
│                             Marker 8                                 │
│                                                                      │
│                                                     Error            │
│                                                  ┌──────────┐        │
│                                                  │ 0        │        │
│                                                  └──────────┘        │
├──────────────────────────────────────────────────────────────────── │
│ CALL W54XXA.set.mark (0, 1, 0)                                       │
├──────────────┬────────────┬─────────────┬───────────────────────────┤
│ Line   1/1   │ Column 1   │   OPERATE   │ ←■                         │
└──────────────┴────────────┴─────────────┴───────────────────────────┘
```

Controls:

Marker: Turns marker on and off.

Marker Select: Selects markers 1 to 8 for setting frequency.

Marker Frequency: Allows for entry of marker frequency, in GHz.

Input Parameters: (D) is the default setting.

Variable Name	Variable Type	Description	Details	Range
MKFUNC%	Integer	Marker Function	0 = Off (D) 1 = On	
MKSEL%	Integer	Marker Select	1 to 8 1 (D)	
MKFREQ#	Double Precision	Marker Frequency		Model Dependent

Output Parameters: None.

Error: DEBUG%=0: Labwindows Errors 200, Unexpected SRQ=305, Warning Error=4000.
DEBUG%=1: Labwindows Errors 200, Inst Errors=3XX, Warning Error=40XX.

Program Examples:

Quick BASIC:

```
REM Set marker frequency.
CALL W54XXA.set.mark(MKFUNC%, MKSEL%, MKFREQ#)
```
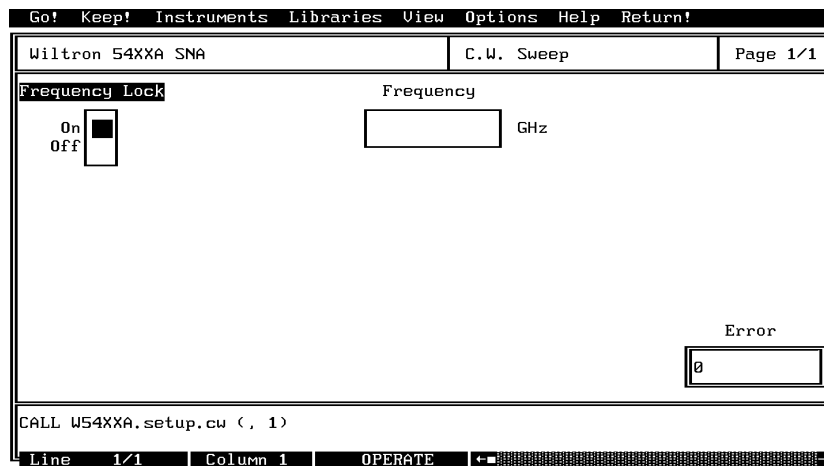
Microsoft C:

```
/* Set marker frequency. */
W54XXA_set_mark(MKFUNC, MKSEL, MKFREQ)
```

set up. cw

Function Panel Name: C.W. Sweep

Description: This function lets users operate the source in a locked or unlocked CW mode.

```
 Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!
┌──────────────────────────────────┬──────────────────┬──────────┐
│ Wiltron 54XXA SNA                │ C.W. Sweep       │ Page 1/1 │
├──────────────────────────────────┴──────────────────┴──────────┤
│Frequency Lock                  Frequency                       ▓│
│    On ███                    ┌───────────┐                     ▓│
│    Off│  │                   │           │  GHz                 │
│       └──┘                   └───────────┘                      │
│                                                                 │
│                                                                 │
│                                                       Error     │
│                                                    ┌──────────┐ │
│                                                    │0         │ │
│                                                    └──────────┘ │
├─────────────────────────────────────────────────────────────── │
│ CALL W54XXA.setup.cw (, 1)                                     ▓│
├──────────────┬──────────────┬───────────┬──────────────────────┤
│ Line   1/1   │  Column 1    │  OPERATE  │ ←▪▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓ │
└──────────────┴──────────────┴───────────┴──────────────────────┘
```

Controls:

Frequency Lock: Turns Frequency Lock on or off.

Frequency: Allows for entry of lock frequency value, in GHz.

Input Parameters: (D) is the default setting.

Variable Name	Variable Type	Description	Details	Range
FREQ#	Double Precision	Frequency		Model Dependent
LCK%	Integer	Frequency Lock	0 = Off 1 = On (D)	

Output Parameters: None.

Error: DEBUG%=0: Labwindows Errors 200, Unexpected SRQ=305, Warning Error=4000.
DEBUG%=1: Labwindows Errors 200, Inst Errors=3XX, Warning Error=40XX.

Program Examples:

Quick BASIC:

```
REM Set source for lock or unlocked CW mode.
CALL W54XXA.setup.cw(FREQ#, LCK%)
```
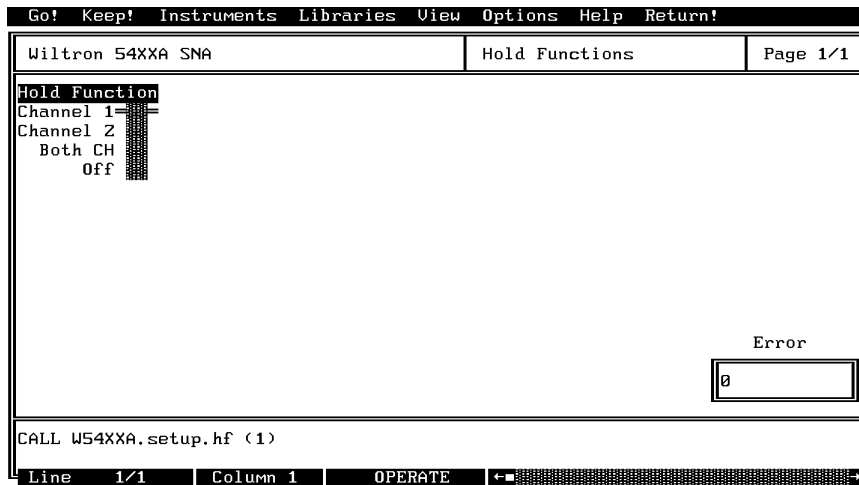
Microsoft C:

```
/* Set source for lock or unlocked CW mode. */
W54XXA_setup.cw(FREQ, LCK)
```

set up. hf

Function Panel Name: Hold Functions

Description: This function lets users select and hold specific chan-
nels.

```
 Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!

  Wiltron 54XXA SNA                    Hold Functions        Page 1/1

 Hold Function                                                        ↑
 Channel 1=                                                           ↓
 Channel Z
   Both CH
     Off




                                                    Error

                                                    0



  CALL W54XXA.setup.hf (1)                                            ↑
                                                                     ↓
  Line   1/1    Column 1        OPERATE   ←■
```

Controls:

Hold Function:

Channel 1:   Hold (freezes) the measurement data on Channel 1
trace.

Channel 2:   Hold (freezes) the measurement data on Channel 2
trace.

Both CH: Hold (freezes) the measurement data on both channel
traces.

Off: Turns the Hold mode off.

Input Parameters: (D) is the default setting.

Variable Name	Variable Type	Description	Details
HOLDF%	Integer	Hold Functions	1 = Hold Channel 1 (D) 2 = Hold Channel 2 3 = Hold Both Channels 4 = Off

Output Parameters: None.

Error: DEBUG%=0: Labwindows Errors 200, Unexpected SRQ=305, Warning Error=4000.
DEBUG%=1: Labwindows Errors 200, Inst Errors=3XX, Warning Error=40XX.

Program Examples:

Quick BASIC:

```
REM Hold mode functions.
CALL W54XXA.setup.hF(HOLDF%)
```
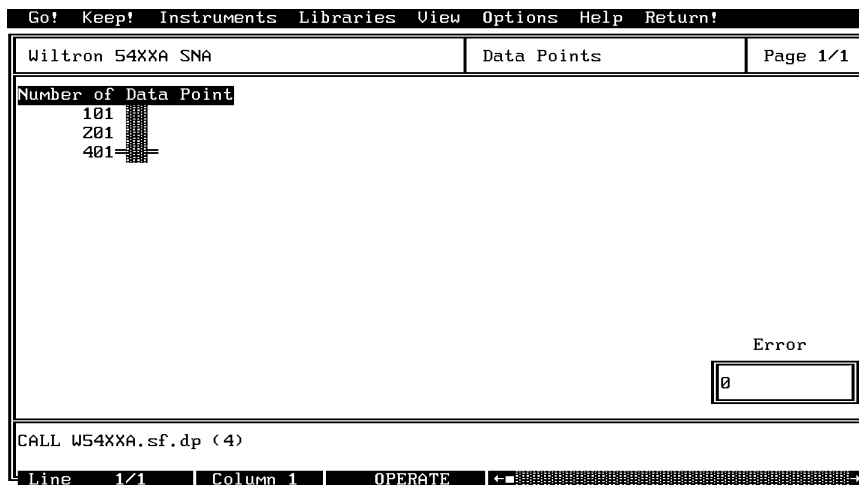
Microsoft C:

```
/* Hold mode functions. */
W54XXA_setup_hF(HOLDF)
```

sf.dp

Function Panel Name: Data Points

Description: This function lets users select the number of displayed data points.

```
 Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!
┌─────────────────────────────────────┬─────────────────────┬──────────┐
│ Wiltron 54XXA SNA                    │ Data Points         │ Page 1/1 │
├──────────────────────────────────────────────────────────────────────┤
│Number of Data Point                                                   ↑│
│      101                                                              ↓│
│      201                                                               │
│      401                                                               │
│                                                                        │
│                                                                        │
│                                                                        │
│                                                                        │
│                                                            Error        │
│                                                          ┌────────────┐ │
│                                                          │0           │ │
│                                                          └────────────┘ │
├──────────────────────────────────────────────────────────────────────┤
│CALL W54XXA.sf.dp (4)                                                  ↑│
│                                                                       ↓│
├──────────────┬──────────────┬──────────────┬──────────────────────────┤
│ Line   1/1   │  Column 1    │   OPERATE    │ ←■▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓→     │
└──────────────┴──────────────┴──────────────┴──────────────────────────┘
```

Controls:

Number of Data Point: Selects between 101, 201, and 401 data points.

Input Parameters: (D) is default setting.

Variable Name	Variable Type	Description	Details
DPTS%	Integer	Data Points	1 = 101 (D) 2 = 201 3 = 401

Output Parameters: None.

Error: DEBUG%=0: Labwindows Errors 200, Unexpected SRQ=305, Warning Error=4000.
DEBUG%=1: Labwindows Errors 200, Inst Errors=3XX, Warning Error=40XX.

Program Examples:

Quick BASIC:

```
REM Select data points.
CALL W54XXA.sf.dp(DPTS%)
```
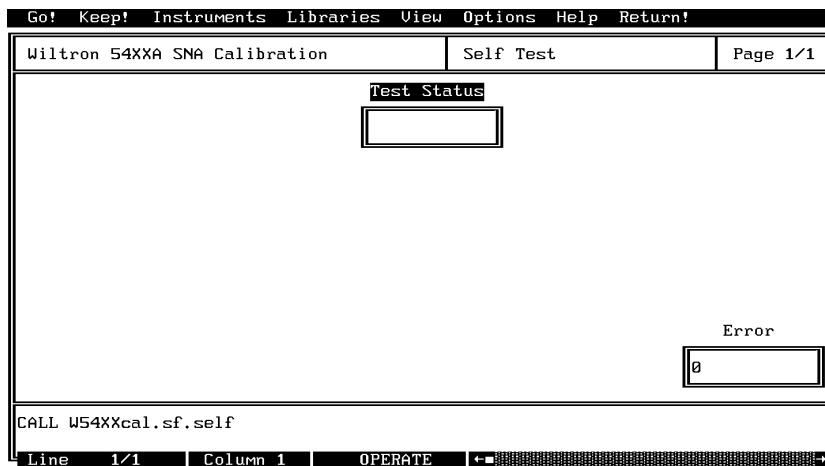
Microsoft C:

```
/* Select data points. */
W54XXA_sf_dp(DPTS)
```

sf.self

Function Panel Name: Self Test

Description: This function lets users have the instrument perform a self test and get the returned instrument status.

```
 Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!
┌──────────────────────────────┬──────────────────┬──────────────┐
│ Wiltron 54XXA SNA Calibration │ Self Test        │ Page 1/1     │
├──────────────────────────────┴──────────────────┴──────────────┤
│                        Test Status                              │
│                       ┌──────────┐                              │
│                       │          │                              │
│                       └──────────┘                              │
│                                                                 │
│                                                                 │
│                                                                 │
│                                                                 │
│                                                                 │
│                                                    Error        │
│                                                   ┌──────────┐  │
│                                                   │0         │  │
│                                                   └──────────┘  │
├─────────────────────────────────────────────────────────────── │
│ CALL W54XXcal.sf.self                                           │
├──────────────┬──────────────┬──────────────┬───────────────────┤
│ Line   1/1   │  Column 1    │   OPERATE    │ ←■                 │
└──────────────┴──────────────┴──────────────┴───────────────────┘
```

Controls:

Test Status: Returned Pass or Fail self test status.

Input Parameters: None

Output Parameters: None.

Error: DEBUG%=0: Labwindows Errors 200, Unexpected
                          SRQ=305, Warning Error=4000.
                          DEBUG%=1: Labwindows Errors 200, Inst Errors=3XX,
                          Warning Error=40XX.

Program Examples:

Quick BASIC:

```
REM Returns self test status.
CALL W54XXcal.sf.self
```
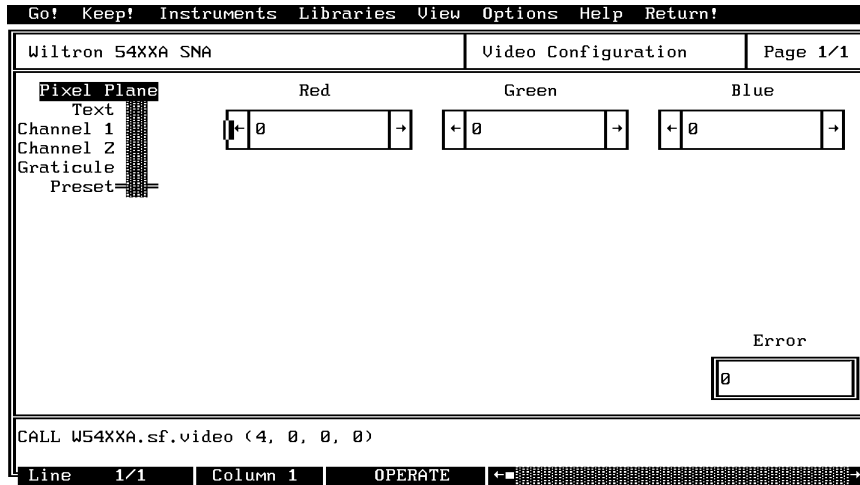
Microsoft C:

```
/* Returns self test status. */
W54XXcal_sf_self
```

sf.video

Function Panel Name:	Video Configuration

Description: This function lets users configure the display for an external monitor.

```
┌─────────────────────────────────────────────────────────────────┐
│  Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!│
│ ┌─────────────────────────────────────────────────────────────┐ │
│ │ Wiltron 54XXA SNA              │ Video Configuration │Page 1/1│ │
│ │                                                               │↑│
│ │ Pixel Plane       Red           Green           Blue        │ │ │
│ │    Text      ┌┤←┤0     ├→┐ ┌←┤0     ├→┐ ┌←┤0     ├→┐       │ │ │
│ │ Channel 1    │                                              │ │ │
│ │ Channel 2                                                     │ │ │
│ │ Graticule                                                     │ │ │
│ │    Preset                                                     │ │ │
│ │                                                               │ │ │
│ │                                            Error              │ │ │
│ │                                         ┌──────────┐          │ │ │
│ │                                         │0         │          │ │ │
│ │                                         └──────────┘          │ │ │
│ └─────────────────────────────────────────────────────────────┘ │
│ │ CALL W54XXA.sf.video (4, 0, 0, 0)                          │ │↑│
│ └─────────────────────────────────────────────────────────────┘ │
│  Line    1/1  │  Column 1   │   OPERATE   │←■▒▒▒▒▒▒▒▒▒▒▒▒▒→     │
└─────────────────────────────────────────────────────────────────┘
```

Controls:

Pixel Plane:

    Text: Sets color of text on external monitor, based on entries in Red, Green, and Blue fields.

    Channel 1:   Sets color of Channel 1 on external monitor, based on entries in Red, Green, and Blue fields.

    Channel 2:   Sets color of Channel 2 on external monitor, based on entries in Red, Green, and Blue fields.

    Graticule: Sets color of graticule on external monitor, based on entries in Red, Green, and Blue fields.

    Preset: Resets the colors on the external monitor to the default values.

  Red: Allows for entry of from 0 to 15, to set red color.

  Green: Allows for entry of from 0 to 15, to set green color.

  Blue: Allows for entry of from 0 to 15, to set blue color.

Input Parameters: (D) is default setting.

Variable Name	Variable Type	Description	Details	Range
PSEL%	Integer	Pixel Plane	0 = Text 2 = Channel 1 3 = Channel 2 4 = Preset (D)	
R%	Integer	Red	0 (D)	0 to 15
G%	Integer	Green	0 (D)	0 to 15
B%	Integer	Blue	0 (D)	0 to 15

Output Parameters: None.

Error: DEBUG%=0: Labwindows Errors 200, Unexpected SRQ=305, Warning Error=4000.
DEBUG%=1: Labwindows Errors 200, Inst Errors=3XX, Warning Error=40XX.

Program Examples:

Quick BASIC:

```
REM Set colors on external monitor.
CALL W54XXA.sf.video(PSEL%, R%, G%, B%)
```

Microsoft C:

```
/* Set colors on external monitor. */
W54XXA_sf_video(PSEL, R, G, B)
```

sr.prv

Function Panel Name: Preview

Description: This function lets users preview the front panel setups stored in internal 54XXA registers.

```
  Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!
┌─────────────────────────────────┬───────────────────┬─────────────┐
│ Wiltron 54XXA SNA               │ Preview           │ Page 1/1    │
├─────────────────────────────────┴───────────────────┴─────────────┤
│     Register                                                    ▲  │
│Prev Off                                                         ▓  │
│   Reg 1                █                                            │
│   Reg 2                                                            │
│   Reg 3                                                            │
│   Reg 4                                                            │
│   Reg 5                                                            │
│   Reg 6                                                            │
│   Reg 7                                                            │
│   Reg 8                                                            │
│   Reg 9                                                            │
│                                                                   │
│                                                    Error          │
│                                             ┌─────────────────┐   │
│                                             │0                │   │
│                                             └─────────────────┘   │
├───────────────────────────────────────────────────────────────────┤
│CALL W54XXA.sr.prv (0)                                           ▲  │
├─────────────┬─────────────┬───────────┬───────────────────────────┤
│ Line   1/1  │  Column 1   │  OPERATE  │ ←■▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓  │
└─────────────┴─────────────┴───────────┴───────────────────────────┘
```

Controls:

Register:

Prev Off: Turns the Preview mode off.

Reg *n*:   Selects the register for previewing, from 1 to 9.

Input Parameters: (D) is default setting.

Variable Name	Variable Type	Description	Details
REG%	Integer	Register	0 = Prev Off (D) 1 = Reg 1 2 = Reg 2 3 = Reg 3 4 = Reg 4 5 = Reg 5 6 = Reg 6 7 = Reg 7 8 = Reg 8 9 = Reg 9

Output Parameters: None.

Error: DEBUG%=0: Labwindows Errors 200, Unexpected SRQ=305, Warning Error=4000.
DEBUG%=1: Labwindows Errors 200, Inst Errors=3XX, Warning Error=40XX.

Program Examples:

Quick BASIC:

```
REM Preview stored front panel setups.
CALL W54XXA.sr.prv (REG%)
```
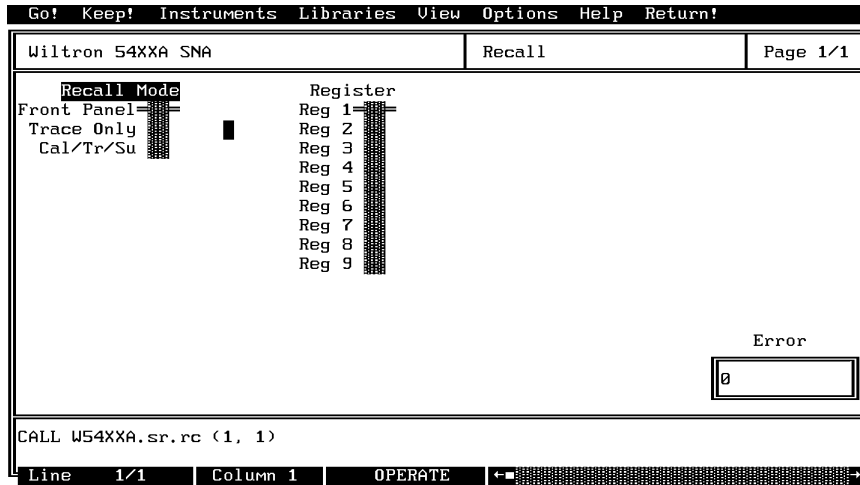
Microsoft C:

```
/* Preview stored front panel setups. */
W54XXA_sr_prv (REG)
```

sr.rc

Function Panel Name: Recall

Description: This function lets users access the internal recall registers.

```
┌──────────────────────────────────────────────────────────────────────┐
│ Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!       │
├──────────────────────────────────┬──────────────────────┬────────────┤
│ Wiltron 54XXA SNA                │ Recall               │ Page 1/1   │
├──────────────────────────────────┴──────────────────────┴───────────┤│
│     ▛Recall Mode▜         Register                                  ▲││
│ Front Panel▛▜▟       Reg 1▛▜▟                                       ░││
│  Trace Only▛▟        Reg 2▛▟                                          │
│    Cal/Tr/Su▟    ▐   Reg 3▟                                           │
│                      Reg 4▟                                           │
│                      Reg 5▟                                           │
│                      Reg 6▟                                           │
│                      Reg 7▟                                           │
│                      Reg 8▟                                           │
│                      Reg 9▟                                           │
│                                                                      │
│                                                          Error       │
│                                                        ┌──────────┐  │
│                                                        │0         │  │
│                                                        └──────────┘  │
├──────────────────────────────────────────────────────────────────────┤
│ CALL W54XXA.sr.rc (1, 1)                                           ▲││
│                                                                    ░││
├──────────────┬──────────────┬───────────────┬────────────────────────┤
│ Line   1/1   │  Column 1    │    OPERATE    │←▪░░░░░░░░░░░░░░░░░░░░→  │
└──────────────┴──────────────┴───────────────┴────────────────────────┘
```

Controls:

Recall Mode:

     Front Panel: Recalls a previously stored front panel setup from internal 54XXA storage register 1 thru 9.

     Trace Only: Recalls a previously stored calibration trace from internal 54XXA storage register 1 thru 9.

     Cal/Tr/Su: Recalls a previously stored calibration trace and front panel setup from internal 54XXA storage register 1 thru 9.

   Register: Selects the register for recall, from 1 to 9.

Input Parameters: (D) is the default setting.

Variable Name	Variable Type	Description	Details
DTYP%	Integer	Recall Mode	1 = Front Panel (D) 2 = Trace Only
REGN#	Double Precision	Register	1 = Reg 1 (D) 2 = Reg 2 3 = Reg 3 4 = Reg 4 5 = Reg 5 6 = Reg 6 7 = Reg 7 8 = Reg 8 9 = Reg 9

Output Parameters: None.

Error: DEBUG%=0: Labwindows Errors 200, Unexpected SRQ=305, Warning Error=4000.
DEBUG%=1: Labwindows Errors 200, Inst Errors=3XX, Warning Error=40XX.

Program Examples:

Quick BASIC:

```
REM Recall a front panel setup, calibration trace, or both.
CALL W54XXA.sr.rc(DTYP%, REGN#)
```
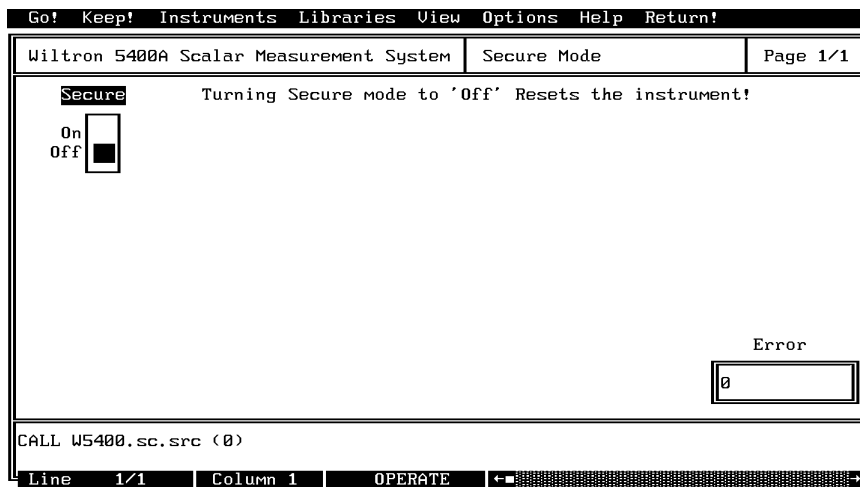
Microsoft C:

```
/* Recall a front panel setup, calibration trace, or both. */
W54XXA_sr_rc(DTYP, REGN)
```

sc.src

Function Panel Name: Secure Mode

Description: This function lets users select the secure-data mode of
                           operation.

```
 Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!
┌─────────────────────────────────────┬──────────────────────┬──────────┐
│ Wiltron 5400A Scalar Measurement System │ Secure Mode        │ Page 1/1 │
├─────────────────────────────────────┴──────────────────────┴──────────┤
│   ┌──────┐     Turning Secure mode to 'Off' Resets the instrument!  ▲  │
│   │Secure│                                                          │  │
│   ┌──┐                                                              ▼  │
│ On│  │                                                                 │
│Off│██│                                                                 │
│   └──┘                                                                 │
│                                                                        │
│                                                                        │
│                                                                        │
│                                                            Error        │
│                                                          ┌──────────┐   │
│                                                          │0         │   │
│                                                          └──────────┘   │
├────────────────────────────────────────────────────────────────────────┤
│ CALL W5400.sc.src (0)                                                 ▲ │
│                                                                       ▼ │
├──────────┬──────────┬────────────┬────────────────────────────────────┤
│ Line  1/1│ Column 1 │  OPERATE   │ ←■░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░→ │
└──────────┴──────────┴────────────┴────────────────────────────────────┘
```

Controls:

   Secure: Turns the secure-data mode on or off.

Input Parameters: (D) is the default setting.

Variable Name	Variable Type	Description	Details
SECM%	Integer	Secure-Data Mode	0 = Off (D) 1 = On

Output Parameters: None.

Error: DEBUG%=0: Labwindows Errors 200, Unexpected SRQ=305, Warning Error=4000.
DEBUG%=1: Labwindows Errors 200, Inst Errors=3XX, Warning Error=40XX.

Program Examples:

Quick BASIC:

```
REM Secure-data mode on or off.
CALL W54XXA.sc.src(SECM%)
```

Microsoft C:

```
/* Secure-data mode on or off. */
W54XXA_sc.src(SECM%)
```

sr.sv

Function Panel Name: Save

Description: This function lets users access the internal save registers.

```
  Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!

 Wiltron 54XXA SNA                     │ Save              │ Page 1/1

        Data Type           Register      Title select      New Title    ↑
   Front Panel▓▓▓          Reg 1▓▓▓                       ┌──────────┐   ▓
    Trace Only ▓          Reg 2▓           New            │ ....     │   ▓
     Cal/Tr/Su ▓          Reg 3▓        Last One ■        └──────────┘   ▓
                          Reg 4▓
                          Reg 5▓
                          Reg 6▓
                          Reg 7▓
                          Reg 8▓
                          Reg 9▓

                                                           Error
                                                        ┌──────────┐
                                                        │0         │
                                                        └──────────┘

 CALL W54XXA.sr.sv (1, 1, 0, "")                                        ↑
   Line   1/1   │  Column 1  │    OPERATE    ←■▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓→   ↓
```
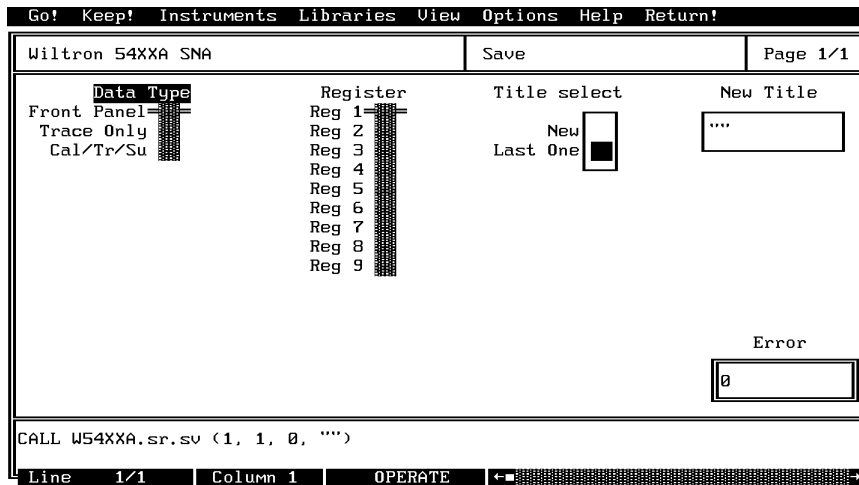
Controls:

Data Type:

    Front Panel: Saves the current front panel setup to internal 54XXA storage register 1 thru 9.

    Trace Only: Saves only the current calibration trace to internal 54XXA storage register 1 thru 4.

    Cal/Tr/Su: Saves both the current calibration trace and the front panel setup to internal 54XXA storage register 1 thru 4.

Register: Selects the register to which data will be saved, from 1 to 9.

Title Select: Select new title or display the old title.

New Title: Allows entry of new title name, 8 characters maximum.

Input Parameters: (D) is the default setting.

Variable Name	Variable Type	Description	Details
DTYP%	Integer	Data Type	1 = Front Panel (D) 2 = Trace Only 3 = Cal/Tr/Setup 4 = Register 1-4 only
REGN%	Integer	Register	1 = Reg 1 (D) 2 = Reg 2 3 = Reg 3 4 = Reg 4 5 = Reg 5 6 = Reg 6 7 = Reg 7 8 = Reg 8 9 = Reg 9
TITS%	Integer	Title Select	0 = Last One (D) 1 = New Title
TIT$	String	New Title	8 characters maximum

Output Parameters: None.

Error: DEBUG%=0: Labwindows Errors 200, Unexpected
SRQ=305, Warning Error=4000.
DEBUG%=1: Labwindows Errors 200, Inst Errors=3XX,
Warning Error=40XX.

Program Examples:

Quick BASIC:

```
REM Setup to save front panel setup, calibation trace, or both.
CALL W54XXA.sr.sv(DTYP%, REGN%, TITS%, TIT$)
```
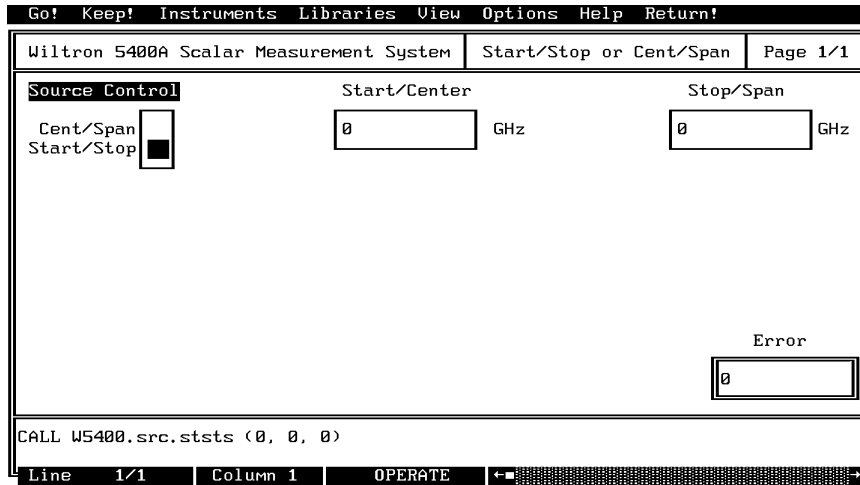
Microsoft C:

```
/* Setup to save front panel setup, calibation trace, or both. */
W54XXA_sr_sv(DTYP, REGN, TITS, TIT)
```

src. st st s

Function Panel Name: Start/Stop or Cent/Span

Description: This function let users set the start and stop frequencies.

```
┌──────────────────────────────────────────────────────────────────────┐
│  Go!  Keep!  Instruments  Libraries  View  Options  Help  Return!     │
│ ┌───────────────────────────────────┬─────────────────────┬─────────┐ │
│ │ Wiltron 5400A Scalar Measurement System │ Start/Stop or Cent/Span │ Page 1/1 │ │
│ ├─Source Control─────────────────────────────────────────────────────┤ │
│ │                          Start/Center              Stop/Span       ▲│ │
│ │   Cent/Span┌─┐           ┌──────────┐              ┌──────────┐     ▓│ │
│ │   Start/Stop│■│          │0         │ GHz          │0         │ GHz ▼│ │
│ │            └─┘           └──────────┘              └──────────┘      │ │
│ │                                                                      │ │
│ │                                                                      │ │
│ │                                                    Error             │ │
│ │                                                    ┌──────────┐      │ │
│ │                                                    │0         │      │ │
│ │                                                    └──────────┘      │ │
│ ├──────────────────────────────────────────────────────────────────┬─┤ │
│ │ CALL W5400.src.ststs (0, 0, 0)                                    │▲│ │
│ ├──────────┬──────────┬──────────────┬─────────────────────────────┴─┤ │
│ │ Line  1/1│ Column 1 │   OPERATE    │←■▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓→│ │
│ └──────────┴──────────┴──────────────┴───────────────────────────────┘ │
└──────────────────────────────────────────────────────────────────────┘
```

Controls:

   Source Control:

      Cent/Span: Selects Center/Span sweep mode. In this mode, the frequency sweeps one-half of the selected width (span) on each side of the selected center frequency.

      Start/Stop: Selects the Start/Stop sweep mode. In this mode, the frequency sweeps between a selected start frequency and a selected stop frequency.

   Start/Center: Allows for entry of a start or center frequency, depending on the Source Control slide switch setting.

   Stop/Span: Allows for entry of a stop frequency or frequency width (span) value, depending on the Source Control slide switch setting.

Input Parameters: (D) is the default setting.

Variable Name	Variable Type	Description	Details	Range
SCNTRL%	Integer	Source Control	0 = Start/Stop 1 = Center/Span	
SC#	Double Precision	Start/Center		Model Dependent
SS#	Double Precision	Stop/Span		Model Dependent

Output Parameters: None.

Error:

DEBUG%=0: Labwindows Errors 200, Unexpected SRQ=305, Warning Error=4000.
DEBUG%=1: Labwindows Errors 200, Inst Errors=3XX, Warning Error=40XX.

Program Examples:

Quick BASIC:

```
REM Set source sweep parameters: cent/span or stop/start.
CALL W54XXA.src.ststs(SCNTRL%, SC#, SS#)
```

Microsoft C:

```
/* Set source sweep parameters: cent/span or stop/start. */
W54XXA_src_ststs(SCNTRL, SC, SS)
```