

Engineering Programming in a Microsoft Environment

John Effland
Central Development Lab

Summary

- Why use Microsoft Products?
- Overall Architecture Schema
- Mixer Bias Measurement System
- Mixer Noise Temperature Measurement System
- Limitations of this Approach

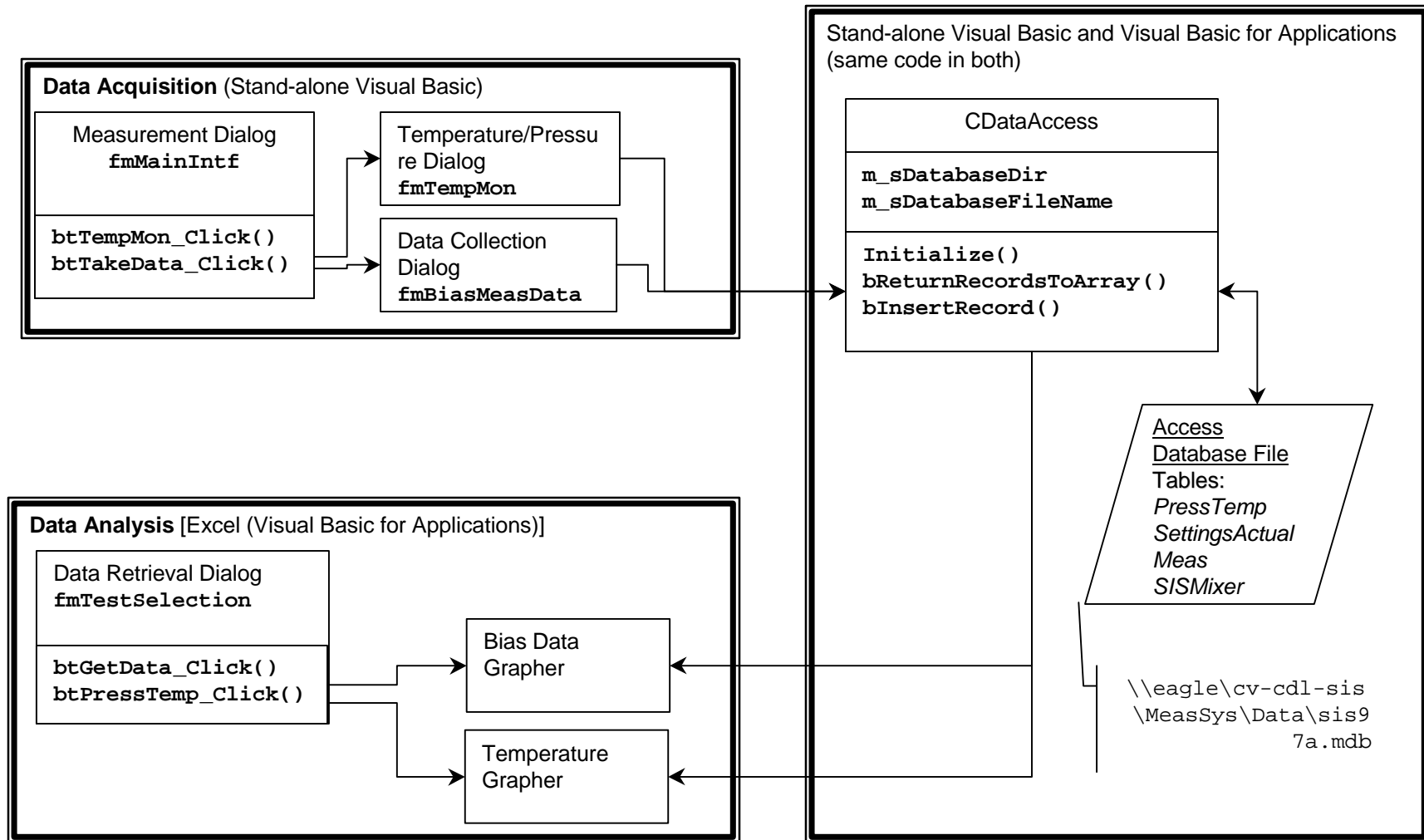
Why Microsoft?

- All MS applications include “Visual Basic for Applications (VBA)”
 - Allows code sharing between VBA and stand-alone Visual Basic (VB) applications
- Advanced debugging tools
 - VBA and stand-alone VB use nearly the same user interface
 - Can step through Excel VBA code into stand-alone VB DLL
 - Can also step through VBA into Visual C++ DLL

Overall Architecture Schema

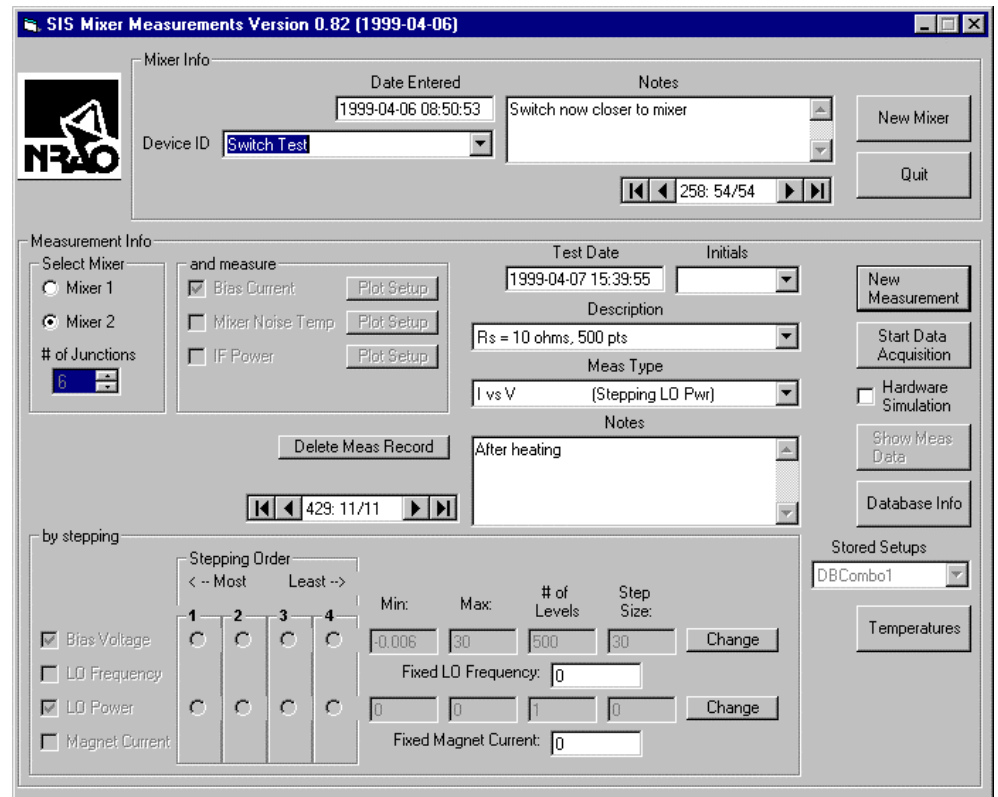
- Code low-level (e.g. instrument control) routines in stand-alone Visual Basic
- Store data in Access database file on shared NT server
- Plot and analyze data using Excel *via* add-ins written in Visual Basic for Applications

Mixer Bias Measurement and Analysis Software Architecture (subset)



Mixer Bias Data Acquisition System

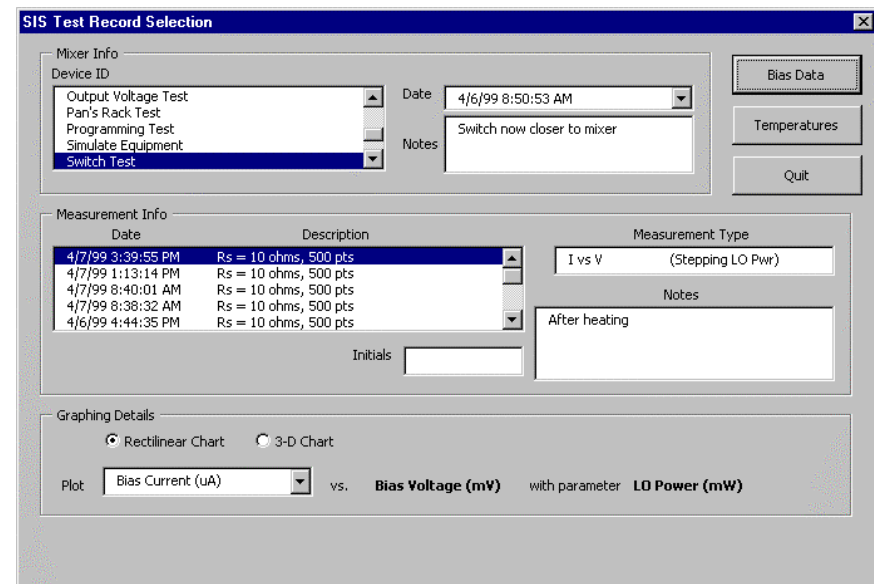
- User interface grouped by mixer and measurement
- Course plot of data available during acquisition



Mixer Bias

Data Analysis User Interface

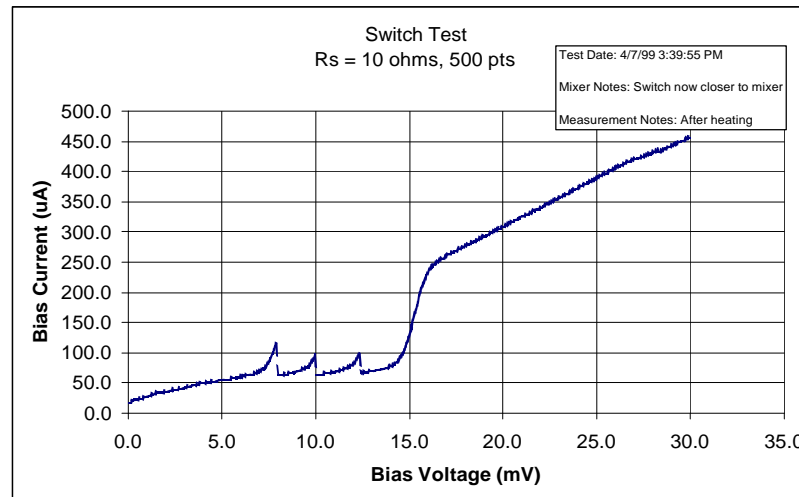
- Written as Excel add-in using VBA
 - Add-in creates menus when loaded
- Currently supports only bias data and Dewar temperatures
 - Will be expanded to include noise temperature data



- Dialog box init routines query database to fill drop-down boxes

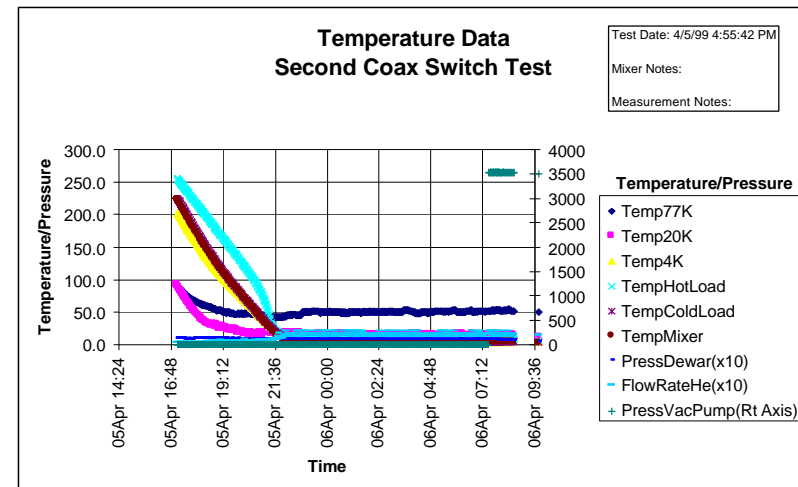
Data Analysis Results

- Graph drawn in Excel using VBA
- User modifies graph by using standard Excel commands



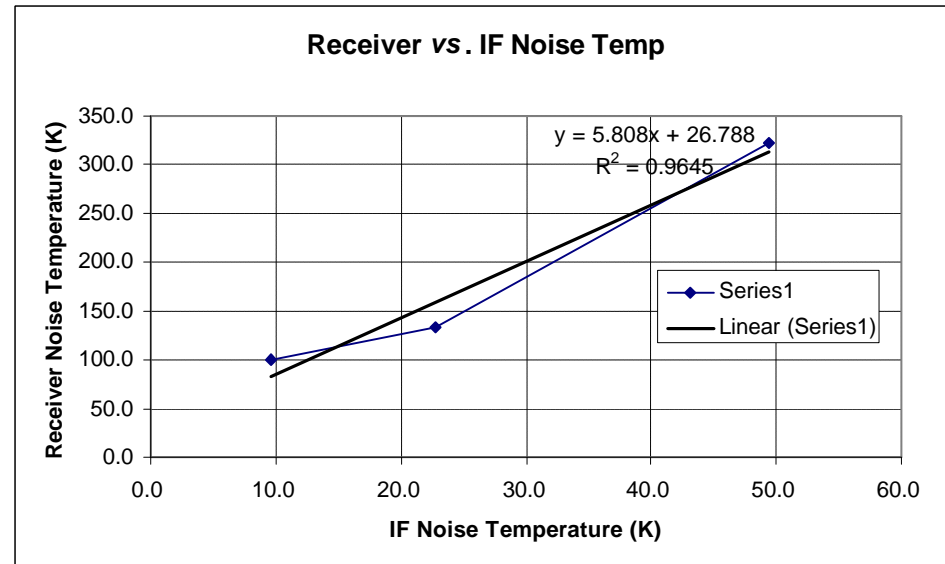
Dewar Temperature Strip Chart

- Included with bias measurement routine
- Plots Dewar temperature and pressure data
- Data are retrieved from Access database via Excel
- Can update in “real-time”

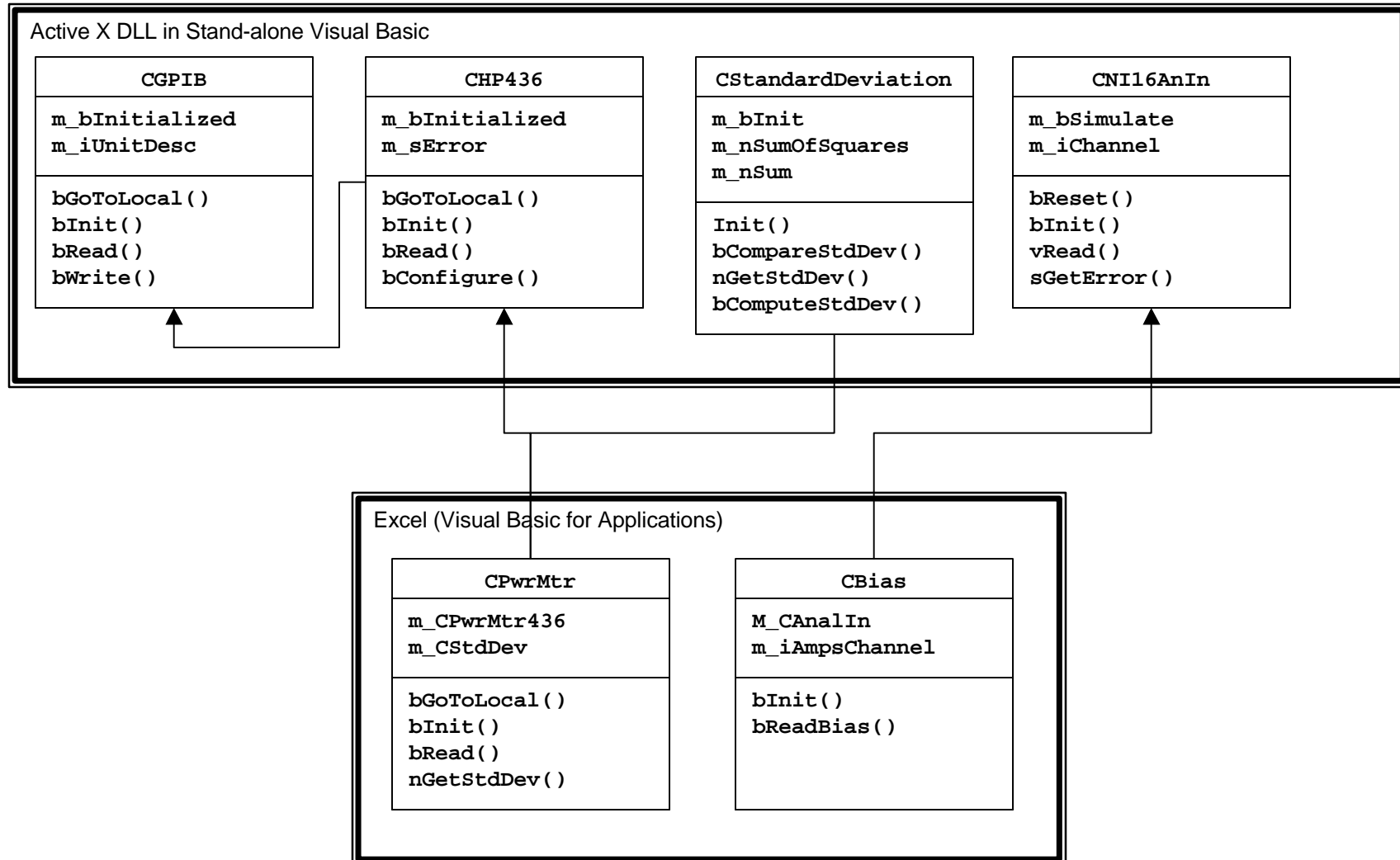


Noise Temperature Measurement System

- Records data into Excel spreadsheet
- Calls Active X DLL for all instrument control routines (written with VB)
- Injects three different noise powers into IF to distinguish receiver and mixer noise temperatures. Least squares routines determine mixer noise temp and IF loss



Noise Temperature Measurement System Architecture



Noise Temperature Measurement User Interface

Frequency = 250 GHz

Frequency: Previous Next

Bias Points

Noise Source Attn:

- Auto
- Off
- 7 dB
- 4 dB

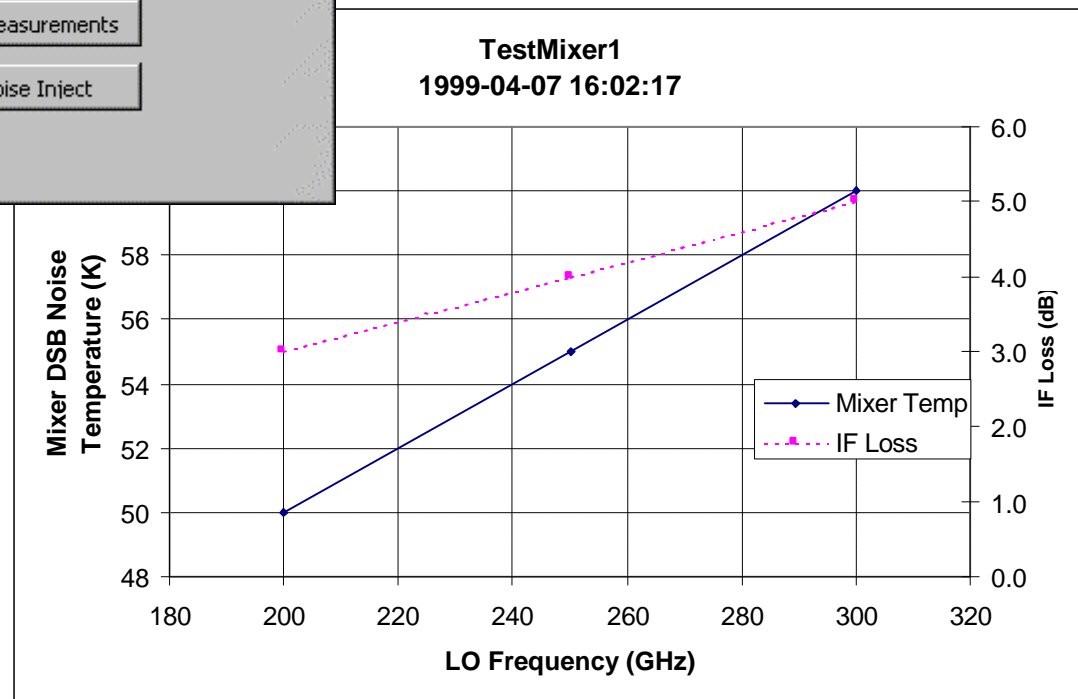
RF Hot Load

RF Cold Load

IF Measurements

Noise Inject

Quit



Limitations of this Approach

- Locked into Wintel monopoly
- Active X DLL requires periodic registry cleanup
 - *via* a call to `DLLUnregisterServer()`
- No true inheritance for classes
- Code sharing between stand-alone Visual Basic and VBA is poor
 - VBA can't use VB's external files containing code modules -- they must be imported into the spreadsheet file

“Inheritance” with Visual Basic

