

A_3900.EXE**STI Driver for Aeroflex 3900 Digital Radio Test Set**[To Index](#)

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Overview

The A_3900.EXE driver (STI Driver) is an interface between Field Test 6 and the Aeroflex 3900 series Digital Radio Test Sets. The 3900 is controlled by the STI Driver through either an RS-232 or Ethernet serial interface. The RS-232 cable used is a straight through, F-F, 9 pin cable. The Ethernet cable is a standard through a direct connection to the PC using either a crossover adaptor or through a Ethernet switch with a standard cable.

Standards in this Manual

Words contained between the less-than and greater-than signs, < >, are variables that are set by the user. The exception is the application of < and > inside the .REC file where they enclose values used by the A_3900.EXE driver.

Note: paragraphs contain important operational information about the operation of the STI Driver.

Measurement Overview

Measurements to be made by the 3900 and the STI Driver are controlled by <name>.REC and V6A_3900.INI files. These files contain:

- Settings used internally by the STI Driver,
- commands which can be used to modify the initial conditions of the 3900, and
- frequencies which at which signal measurements will be made.

The 3900 and the STI Driver are designed to make signal power measurements on Analog Duplex, P25 or TETRA systems and bit error rate measurements on P25 or TETRA systems. These measurements may be made on one or more channels during a single drive test.

Measurement Process

The field test measurement process is continuous. The STI Driver first reads the contents of the <name>.REC file and communication with the 3900 is established. Then initial commands are sent to the 3900 to establish its initial settings then the following continuous measurement process is started.

1. A series of receiver frequencies are set in the 3900 and the measured signal strength and BER for each channel is queried and received from the 3900.

2. All measurement values are then formatted and sent to the Field Test 6 main program for display and logging by appending a record to the measurement database.

This process repeats as rapidly as the 3900 will supply measurements until stopped by the user selecting the Stop Receiver control.

STI Driver Control Files

Two files are used by the STI Driver as a source for parameters to control the measurement process.

The <name>.REC file contains project specific information and is located in the <Current Project> directory. More details are in the <name>.REC File section below.

The V6A_3900.INI file contains global information related to the operation of the 3900 hardware and is located in the C:\STI REC Files directory. More details are in the V6A_3900.INI File section below.

Setting Up the 3900 Instrument

The 3900 should be initialized to a known state before starting tests with the STI Driver. This is a two step process. Load an STI 3900 Test.SAV file and setting up either the RS-232 or Ethernet interface parameters.

STI 3900 Test.SAV File

The STI 3900 Test.SAV file is used to initialize the Aeroflex 3900 to a predetermined state. This file is found on the floppy disk supplied with the STI Driver. It is also copied to C:\STI Rec Files\STI 3900 Test.SAV when the A_3900.EXE driver is installed by the Field Test 6 software.

Initialize the 3900 by installing a floppy with the STI 3900 Test.SAV file into the 3900 floppy slot. Then make the following selections from the 3900 front panel.

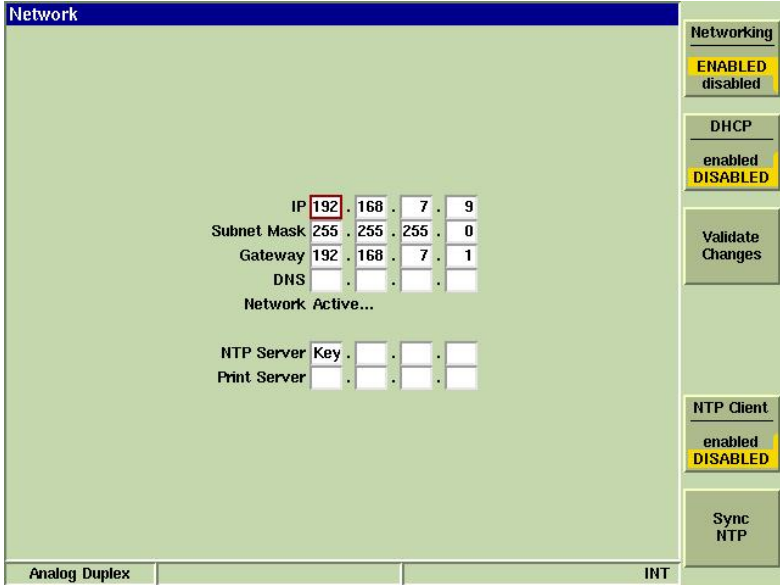
1. Hit the Utils button.
2. Select File Management from the menu.
3. Select the Ext: Floppy button.
4. Select the STI 3900 Test.SAV file from the Menu.
5. Select the File Copy soft key on the right to copy the STI 3900 Test.SAV from the floppy to the instrument.
6. Hit the Utils button again.
7. Select Store/Recall from the menu.
8. Select the STI 3900 Test.SAV from the Menu.
9. Select Recall to initialize the 3900 to the STI 3900 Test.SAV setup.

Ethernet Setup

The Ethernet connection is made to the 3900 with a network crossover cable or crossover adaptor on a network cable.

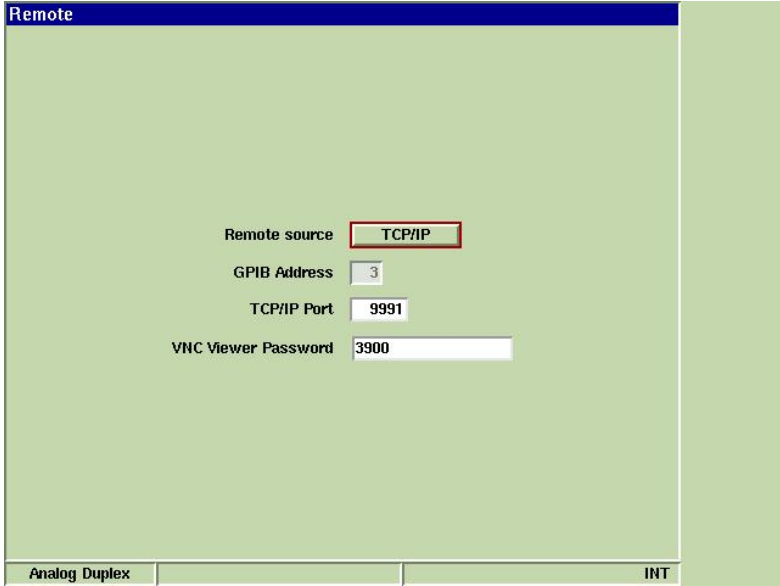
Setup the 3900 for communication through the Ethernet port by selecting the Utils control then selecting Hardware Settings then Network.

The IP address can be any set of 4 numbers that is compatible with the operation of the PC and its firewall such as shown below. Enter the Subnet Mask parameters as indicated.



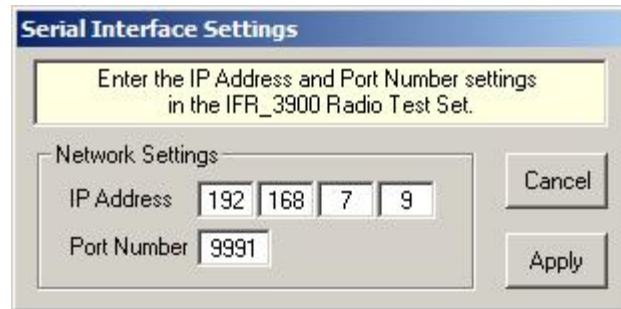
Next open the Remote screen by selecting the Utils control then selecting Hardware Settings then Remote. Choose TCP/IP for the Remote Source.

The suggested TCP/IP Port setting for the A_3900.EXE driver is 9991 as shown below.



A_3900.EXE Communication Setup

When the A_3900.EXE driver is started for the first time and after any communication failure the dialog box below will be presented.



This allows you to enter the same IP Address and Port Number as is entered into the 3900.

When the settings are completed select Done to start the receiver operation.

<name>.REC File

<Name>.REC files for the A_3900.EXE driver are ASCII files that are the source for parameters and RCI commands to control the project specific measurement operation of the 3900 and STI Driver. These files contain sections as follows:

- [Compatibility]
- [Global Settings]
- [Freq List]
- [RSSI Initial Commands]
- [RSSI Measurement Commands]
- [P25 Initial Commands]
- [P25 Measurement Commands]
- [TETRA Initial Commands]
- [TETRA Measurement Commands]

The [<MeasType> Initial Commands] and [<MeasType> Measurement Commands] sections are used to list the separate sets of commands for testing RSSI on Analog Duplex systems; RSSI and BER on P25 systems, or RSSI and BER or BaseID values on TETRA systems.

[Compatibility]

The [Compatibility] section contains the name of the STI Driver with which this .REC file is compatible. The required entries are:

Driver=A_3900.exe

File Version 6=True

These entries are used by Field Test 6 and must not be changed.

[Global Settings]

There is one entry in the Global Settings section. It identifies the measurement type that will be used in the project. For example:

Measurement Type(P25,RSSI,TETRA)=P25

will cause commands to be sent to the 3900 to implement measurements on a P25 system. Values for this parameter can be either: P25 or RSSI or TETRA.

This parameter selects which [<MeasType> Initial Commands] and [<MeasType> Measurement Commands] sections will be used.

[<MeasType> Initial Commands]

The [<MeasType> Initial Commands] section contains a list of RCI commands to setup the 3900 for the required measurements. These commands along with the settings in the STI 3900 Test.SAV file will supply the necessary initialization for the 3900.

The commands in this section are sent once at the start of the test session. Each command must be preceded with a line number. The format of parameter setting commands in the [Init Section] is as follows:

<Line Number>=<RCI Command> <Parameter>

Commands in this section are sent in order of their line numbers.

The 3900 does not acknowledge the receipt and implementation of a parameter setting command. As the user should watch the screen of the 3900 for error messages indicating rejection of a command.

System Load Command

The first command in each of the [<MeasType> Initial Commands] sections is the:

1=:SYST:LOAD <SysType> command.

Where <SysType> is "P25" or "Analog Duplex" or "TETRA xx".

The :SYST:LOAD command requires a minimum of 10 seconds to implement. Therefore, if the 3900 has been previously initialized in the required system type this command can be commented out of the <name>.REC file.

Other Initial Commands

Other are included in the to assure that a specific setting value is implemented before measurements are made. Or allow the user to change a measurement setting. The general types of commands included in the [<MeasType> Initial Commands] sections are:

- Connect the input to the receiver to the high sensitivity Antenna port.
- Disable all signal generators.
- Set the number of measurement samples to average for each logged value.
- Define the expected signal type to be measured.
- Define the IF bandwidth of the measurement.
- Turn on the 3900 preamplifier for maximum sensitivity.

[<MeasType> Measurement Commands]

The commands in the [<MeasType> Measurement Commands] section control the measurement process. Commands are executed in this section once for each frequency in the frequency list. For each frequency in the [Freq List] section

1. the 3900 receiver frequency is set.
2. The STI Driver waits for the 3900 to stabilize the measurement, usually 1 to 1.5 seconds.
3. The 3900 receiver frequency is queried and checked.
4. An RSSI and, optionally, BER values are queried from the 3900.

After the above steps are performed for each frequency in the [Freq List] section the results are formatted and sent to the main Field Test 6 program for display and logging in the measurement database.

Special Parameters <F>, <C>, <Mn>, and <Sn> cause specific actions in the STI Driver.

Special Parameter, <F>

The <F> parameter is replaced by the currently active frequency in the [Freq List] section. The frequency value in the [Freq List] lines must be a frequency value in MHz followed by the text 'MHz'. When it is used in a query command this frequency is compared with the value returned by the 3900.

Special Parameter, <C>

The parameter <C> is replaced by the currently active channel in the [Freq List] section. When it is used in a query command this channel is compared with the value returned by the 3900.

Special Parameter, <Mn>

The <Mn> parameter is a place holder for a measurement returned by the 3900. Measurement results from the 3900 are contained in a multi-field array in which other data is included along with the desired measurement result. The 'n' in the <Mn> parameter defines the number of the field in which the desired measurement resides.

Note:

The sum of the <Mn> parameters encountered while making measurements on a single frequency must equal the number of lines in the [Freq List] section for each frequency.

Special Parameter, <Sn>

The <Sn> parameter is a place holder for a Status Byte in the data returned by the 3900. The 'n' in the <Sn> defines the field in which the status byte resides. When the <Sn> parameter is used its value is used to determine if the measurement data is valid. If the data pointed to by <Mn> parameter(s) is valid then it is logged and displayed. If the data is not valid then the measurement data is replaced by a Null Value and the measurement is ignored.

Note: Pointing to the status byte with an <Mn> parameter will cause the status byte to be logged as another measured value. No data validity filtering will be performed. In this case the extra measurement must correspond to an extra line in the [Freq List] section.

Wait 1500

The command Wait 1500 causes the STI Driver to wait for 1500 milli-seconds while the 3900 makes the signal strength measurement before it continues to the next command. The number of milli-seconds in the wait command should be set to the minimum time required for the 3900 to complete a repeatable measurement. Extra time will reduce measurement density and inadequate time will result in inaccurate measurements.

[Freq List]

The [Freq List] section contains a listing of the measurement names and frequency or channel values. Frequency or channel values can be replaced with other text when the measurement to be made is not an RSSI value. The type of measurement is determined by the commands in the [Measurement Commands] section. There is a one-to-one correspondence between the lines in the frequency list and the fields in the Field Test 6 Measurement Database, and the bars on the Field Test 6 Signals display.

A realistic limit on the number of frequencies that can be measured is determined by the time required to make a complete set of measurements. It will take approximately 2 seconds to make a set of measurements (RSSI and BER) on a single frequency.

Note: In some cases, measurements are internally averaged by the 3900 over a period of 1 to 1.5 seconds. Attempting to shorten the Wait time may cause some residual from the previous measurement to be retained in the current measurement.

The format of the lines in the [Freq List] section is:

<Line Number>=<Channel Name>,[<Channel Definition>] or
[Other],[Signals Bottom],[Signals Top]

Line Number defines the order in which the frequency list is used.

Channel Name is used to name the corresponding field in the Measurement Database and is also used to name files. As a result these must conform to windows naming conventions and must not be duplicated.

Channel Definition is used by the STI Driver to set the tuned frequency of 3900 receiver and make a signal power measurement. The channel definition can be either the channel frequency in MHz or the channel number for the current 3900 channel plan.

If channel number is used then there must be a corresponding <C> parameter in the [<Meas Type> Measurement Commands] section.

If channel frequency, MHz is used then there must be a corresponding <F> in the [<Meas Type> Measurement Commands] section.

Other will cause the STI Driver to insert another measurement for this line. The measurement returned is defined by the type of 3900 query and the field selected from the query response. In this case any text can be placed in this field of the [Freq List] line.

Signals Bottom and Signals Top are optional extra parameters used to redefine the bottom and top of the signals display bar for a particular signal. For example: While RSSI can have an 80 dB range from -120 to -40 dBm on the signals display the BER bar can be redefined to have a range from 0 to 8 or 1% per division.

Note: Right clicking on a bar in the signals display will cause its digital value, along with the values of the bars next to it, to be displayed.

3900_Exmple.REC File Example

Following is the contents of the 3900_Exmple.REC file. It is setup to measure signal power and BER on two P25 channels. Note the complete set of sections for setting up measurements on P25, RSSI (Analog Duplex) systems are included in this file.

The semicolon (;) may be used at the beginning of a line to comment out that line. This can be used to eliminate a command line or to create a line for notes.

The apostrophe (') is used to separate a command from a trailing note on the same line.

```
[Compatibility]
Driver=A_3900.exe
File Version 6=True
```

```
[Global Settings]
Measurement Type(P25,RSSI,TETRA)=P25
```

```
[Freq List]
;Format is LineNum=Name,Frequency(MHz),Signals Bottom,Signals Top
1=Ch1_RSSI,154.0125
2=Ch1_BER,BER,0,8
3=Ch2_RSSI,154.000
4=Ch2_BER,BER,0,8
```

```
==== Sections for P25 Measurements ====
```

```
[P25 Initial Commands]
1=:SYST:LOAD "P25"
2=:PTF:RF:Analyzer:Port ANT
3=:PTF:RF:Generator:Enable 1
2=:PTF:Meter:BER:Ch1:Pattern STD1011
3=:PTF:Meter:BER:Ch1:Averaging 1
4=:PTF:Meter:Power:Ch1:Averaging 1
```

```
[P25 Measurement Commands]
0=:PTF:RF:Analyzer:Ch1:Freq <F>
1=:PTF:RF:Analyzer:Ch1:Freq? <F>
;2=:PTF:Meter:BER:Ch1:Clear:AVG
;3=:PTF:Meter:POWER:Ch1:Clear:AVG
4=Wait 1500
5=:PTF:Meters:POWER:Ch1:Status? <M5>
6=:PTF:Meters:BER:Ch1:Status? <M5>
```

==== Sections for Analog RSSI Measurements ====

[RSSI Initial Commands]

1=:SYST:LOAD "Analog Duplex"

2=:ANDX:RF:Generator:Enable 0

3=:ANDX:RF:Analyzer:Port ANT

4=:ANDX:SA:Trace:Average:Value 5

6=:ANDX:RF:Analyzer:FMIF 12.5

[RSSI Measurement Commands]

1=:ANDX:RF:Analyzer:Frequency <F>

2=:ANDX:RF:Analyzer:Frequency? <F>

3=Wait 1000

4=:ANDX:Fetch:RF:Analyzer:AIpower? <M4>

3900_TETRA_Exmple.REC File Example

Following is the contents of the 3900_TETRA_Exmple.REC file. It is setup to measure signal power and Base ID values on two TETRA frequencies.

The semicolon (;) may be used at the beginning of a line to comment out that line. This can be used to eliminate a command line or to create a line for notes.

The apostrophe (') is used to separate a command from a trailing note on the same line.

[Compatibility]

Driver=A_3900.exe
File Version 6=True

[Global Settings]

Measurement Type(P25,RSSI,TETRA)=TETRA

[Freq List]

;Format is LineNum=Name,Frequency(MHz),[Signals Bottom],[Signals Top]
1=Ch1_RSSI,454.0125MHz
2=Ch1_MCC,MCC,0,1000
3=Ch1_MNC,MNC,0,17000
4=Ch1_BCC,BCC,0,70
5=Ch1_LA,LA,0,17000
6=Ch2_RSSI,456.3750MHz
7=Ch2_MCC,MCC,0,1000
8=Ch2_MNC,MNC,0,17000
9=Ch2_BCC,BCC,0,70
10=Ch2_LA,LA,0,17000

[TETRA Initial Commands]

0=:SYST:LOAD "TETRA BS"
1=Wait 10000
2=:RF:Analyzer:Port ANT
3=:RF:Analyzer:Receiver:AMP ON
4=:conf:chplan:load "No Plan"
5=:conf:pow:samp:ts12 1

[TETRA Measurement Commands] 'Frequency example

1=:RF:Analyzer:Frequency <F>
2=:RF:Analyzer:Frequency?
3=Wait 1000
4=:Fetch:Power:ts12? <S1>,<M4>
;Gets average power during T1 or T2, qualified by the Status Byte. (Byte 1)
5=:PROTocol:BSIDentity? <S1>,<M2>,<M3>,<M4>,<M5>
;Returns MCC, MNC, BCC and LA, qualified by the Status Byte. (Byte 1)

V6A_3900.INI File

Below is the contents of the V6A_3900.INI file with default values. This file contains characteristics related to communication with the 3900. **Settings in this file are either maintained by the STI Driver or only need to be changed if related RCI commands change in the future.**

```
[[Global Settings]
Company Name=Aeroflex
Response Timeout=5000
Net Timeout=2000
ID Timeout=2000
Net Message Termination=10
Measurement Delay=1200
```

```
[Serial Port Settings]
Net Address=192.168.7.9
Net Port=9991
Select Hardware=True
Hardware=Net
```

Cables and Connections

The serial connection to the 3900 is made through the Ethernet port on the back of the 3900. The Ethernet connection directly between the 3900 and the laptop must be an RJ-45 network crossover cable or crossover adaptor (included).

When connecting from the STI-9400 computer to the 3900 through a network switch the cable is a standard RJ-45 network cable.

Customer Support

Survey Technologies is available for consultation regarding system operation during the initial warranty period at 503 848-8500. Often questions can be resolved by a phone call.

When the questions about system operation are more complex, a zipped copy of status and history files will assist us to quickly diagnose the problem. The Project Copy utility program will zip up these files into a single Support File that you can attach to your Email.

Follow these directions to create a Support File to Email to us.

- Select the Project Copy icon on your desk top or go through the Start menu to Programs then Survey Technologies Inc.
- In Project Copy, select a location for the Support File. Desktop is suggested as a convenient location.
- Click the support button and select the project from the list that has the problem.
- Select the Apply button. Progress bars will indicate the progress of the Support File creation. The name of the Support File will be:

<Project Name>-Spt.Zip
- Attach this Support File to an Email and send it to support@surveytech.com.
- Delete the Support File after you have emailed it to us as it is no longer useful.

We will analyze the problem you observe and respond with a recommended course of action as quickly as possible.