Cellular Antenna Quick Start Guide
HP 8712ET/ES and HP 8714ET/ES

This quick start guide provides basic instructions on how to verify the performance of cellular antenna systems. Refer to the *Option 100 Fault Location and Structural Return Loss Measurement User's Guide Supplement* for more detailed information. Also, please refer to your analyzer's *User's Guide* for safety, warranty, and assistance information.

NOTE This quick start guide assumes the use of an HP 8712ET or HP 8714ET. If you are using an HP 8712ES or HP 8714ES, some key presses and displays will be slightly different.

To Make a Fault Location Measurement

1. Choose the measurement parameters or recall an instrument state.

(PRESET) (BEGIN) **Cable** **Fault Location**

Start Distance (XX) (ENTER) **Stop Distance** (XX) (ENTER)

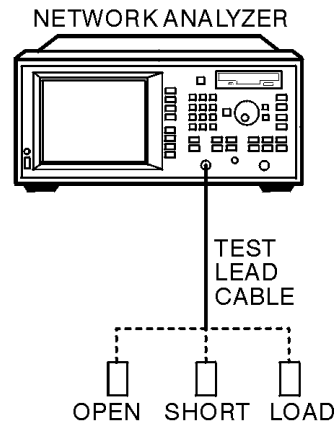### 2. Reduce the interference.

(BEGIN) **Cable** **Fault Location**
Band Pass **Center Frequency** (900)
MHz

(FREQ) **Fault Loc Frequency**
Band Pass Max Span (300) **MHz**
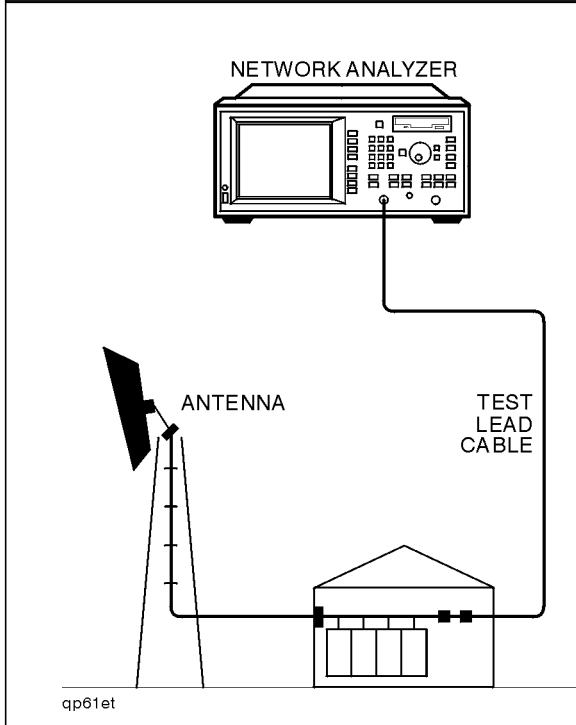
(AVG) **System Bandwidth**
Narrow 250 Hz
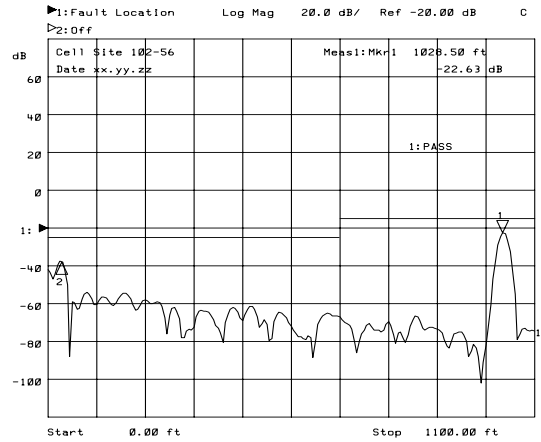
3. Calibrate the analyzer.

(CAL) **Full Band Cal**

NETWORK ANALYZER

TEST
LEAD
CABLE

OPEN   SHORT   LOAD

qp62et

4. Connect the equipment.	5. Interpret the measurement / save results.

4. Connect the equipment.

NETWORK ANALYZER

ANTENNA

TEST
LEAD
CABLE

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5. Interpret the measurement / save results.

(MARKER) **Marker Search   Max Search
Mkr –> Max**

▶1:Fault Location   Log Mag   20.0 dB/   Ref -20.00 dB   C
▷2:Off

dB   Cell Site 102-56   Meas1:Mkr1   1028.50 ft
        Date xx.yy.zz   -22.63 dB
60

40

20   1:PASS

0

1: ▶

-40   ⌃
       2

-60

-80   1

-100

Start   0.00 ft   Stop   1100.00 ft

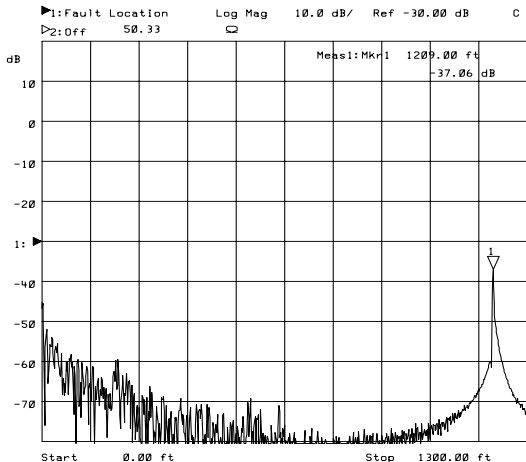(SAVE RECALL) **Define Save   Data ON
Prior Menu   Save State**

If Measurement Results Were Poor

The following results indicate a specific problem you may encounter. Refer to your *Option 100 User's Guide Supplement* for more information.
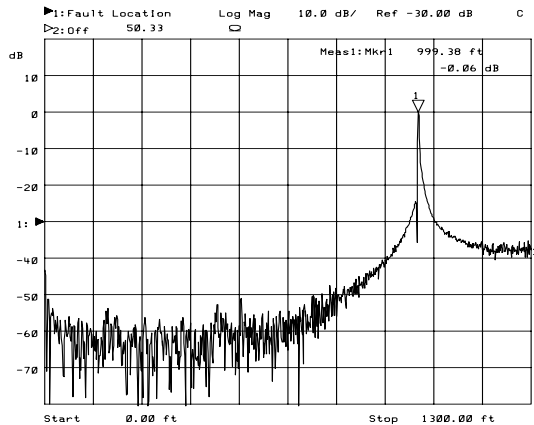
Problem	Solution

Problem

The measured amplitude and distance of a 1000 ft. cable are wrong. (Cable is not terminated in this example.)

▶1:Fault Location   Log Mag   10.0 dB/   Ref -30.00 dB   C
▷2:Off   50.33

dB   Meas1:Mkr1   1209.00 ft
                                                     -37.06 dB
10

0

-10

-20

1: ▶

-40

-50

-60

-70   1

Start   0.00 ft   Stop   1300.00 ft

Solution

Change the "velocity factor" and "cable loss" values to the values specified by the cable manufacturer.

▶1:Fault Location   Log Mag   10.0 dB/   Ref -30.00 dB   C
▷2:Off   50.33

dB   Meas1:Mkr1   999.38 ft
                                                      -0.06 dB
10

0   1

-10

-20

1: ▶

-40

-50

-60

-70

Start   0.00 ft   Stop   1300.00 ft

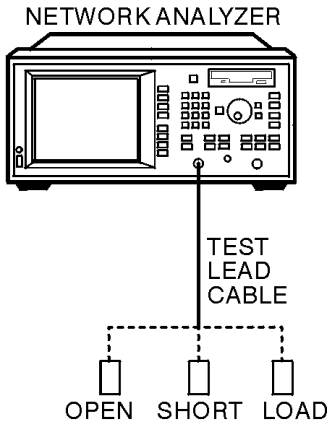(CAL) **Velocity Factor   Cable Loss**

To Make a Return Loss Measurement

1. Choose the measurement parameters or recall an instrument state.

(PRESET) (MEAS 1) **Reflection** (or **S11**) (AVG) **System Bandwidth** **Narrow 250 Hz**
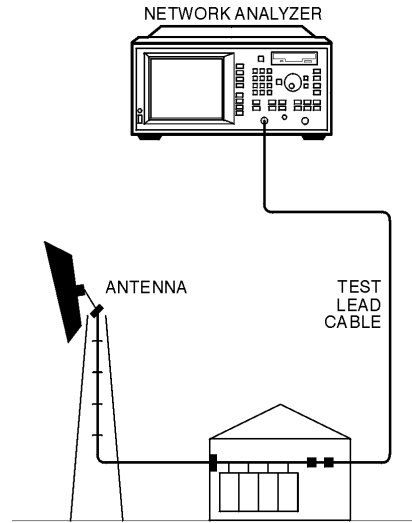
2. Calibrate the analyzer.

(CAL) **1-Port** (or **User 1-Port**)

NETWORK ANALYZER

TEST
LEAD
CABLE

OPEN   SHORT   LOAD

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3. Connect the equipment.

NETWORK ANALYZER

ANTENNA

TEST
LEAD
CABLE

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4. Interpret the measurement / save results.

(MARKER) **Marker Search** **Min Search**
Mkr –> Min

```
▶1:Reflection        Log Mag    5.0 dB/  Ref -15.00 dB
▷2:Off
dB      Cell Site 102-56        Meas1:Mkr1  903.500 MHz
5       Date xx.yy.zz                       -25.655 dB
0
                                            1:PASS
-5                                                    M1
-10
1: ▶
-20
-25                           1
-30
-35
        Center 900.000 MHz        Span 200.000 MHz
```
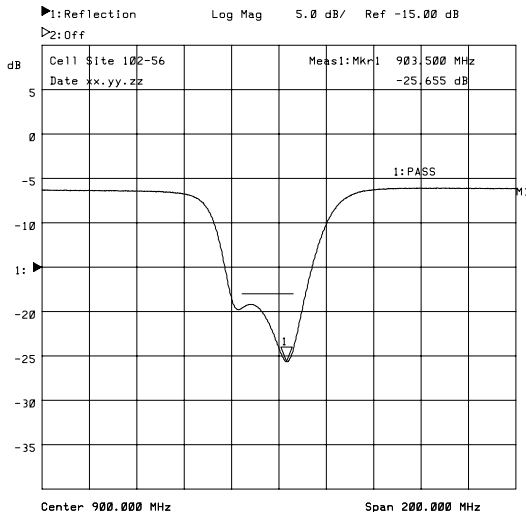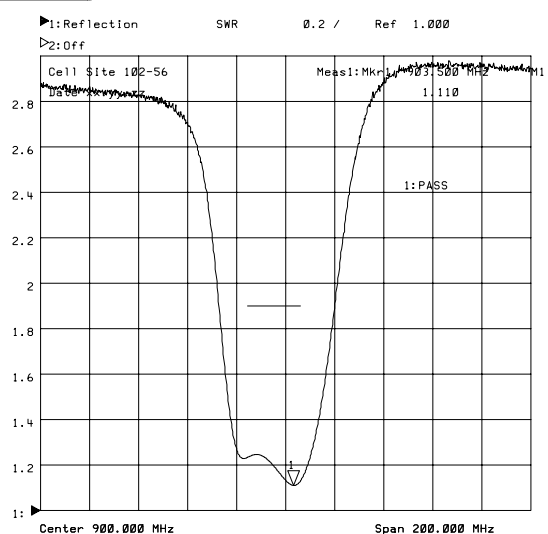
(SAVE RECALL) **Define Save** **Data ON**
Prior Menu **Save State**

5. View SWR / save results.

(FORMAT) **SWR** (SCALE) **Scale/Div** (0.2)
(ENTER)

```
▶1:Reflection        SWR       0.2 /   Ref  1.000
▷2:Off
        Cell Site 102-56        Meas1:Mkr1  903.500 MHz   M1
2.8     Date xx.yy.zz                       1.110
2.6
2.4                                         1:PASS
2.2
2
1.8
1.6
1.4
1.2                           1
1:
        Center 900.000 MHz        Span 200.000 MHz
```

(SAVE RECALL) **Save State**

To Make an Insertion Loss Measurement
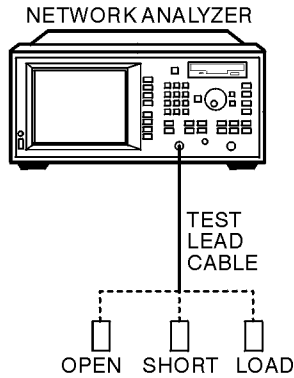
1. Choose the measurement parameters or recall an instrument state.	

PRESET MEAS 1 **Reflection** (or **S11**) AVG
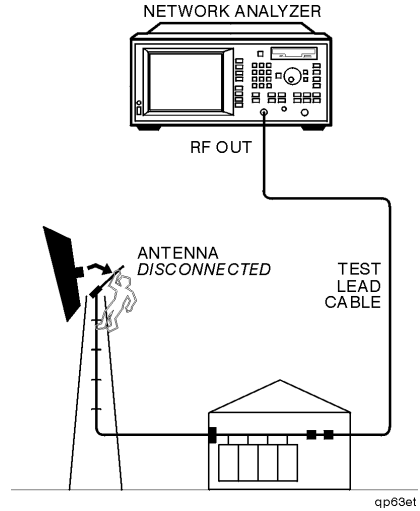**System Bandwidth**   **Narrow 250 Hz**

2. Calibrate the analyzer.	**3. Connect the equipment.**

CAL **1-Port** (or **User 1-Port**)

NETWORK ANALYZER

TEST
LEAD
CABLE

OPEN   SHORT   LOAD

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NETWORK ANALYZER

RF OUT

ANTENNA
DISCONNECTED   TEST
LEAD
CABLE

qp63et

4. Interpret the measurement / save results.	**5. Calculate insertion loss and end of cable.**

MARKER 900 **MHz**

▶1:Reflection   Log Mag   5.0 dB/   Ref –10.00 dB
▷2:Off

| dB | Call Site 102–56 | Meas1:Mkr 1 900.000 MHz |
| | Date: xx.yy.zz | –7.357 dB |

10
5
0
–5
1: ▶
–15
–20
–25
–30

Center 900.000 MHz   Span 200.000 MHz

SAVE RECALL **Define Save**   **Data ON**
Prior Menu   **Save State**

Insertion Loss Calculation

$= \text{marker value} \div 2$

$= 7.36 \text{ dB} \div 2 = 3.68 \text{ dB}$

End of Cable Calculation

$= \lambda \div 2$ where:

λ (wavelength) $= c \times V_f \div \Delta f$

$\Delta f = 10$ MHz between bumps

V_f (velocity factor) ≈ 1.0

$c \approx 10^9$ ft/sec

$\lambda = 10^9 \text{ ft/sec} \div 10^7 \text{ cycles/sec} = 100 \text{ ft}$

$= 100 \text{ ft} \div 2 = 50 \text{ ft}$