Agilent Technologies
E6393A CDMA MS Test Set
User's Guide

Serial Numbers
This manual applies directly to instruments with serial number prefix
JP1MJ, or firmware revision A.01.00 and above.

Agilent Technologies

Safety Information

The following general safety precautions must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions or with specific WARNINGS elsewhere in this manual violates safety standards of design, manufacture, and intended use of the instrument. *Agilent Technologies assumes no liability for the customer's failure to comply with these requirements.*

NOTE:

The Agilent Technologies E6393A complies with INSTALLATION CATEGORY II and POLLUTION DEGREE 2 in IEC61010-1. Agilent E6393A is an INDOOR USE product.

Ground the Instrument

To minimize electric shock hazard, the instrument chassis and cabinet must be connected to an electrical protective earth ground. The instrument must be connected to ac power through a grounded power cable, with the ground wire firmly connected to an electrical ground (safety ground) at the power outlet. Any interruption of the protective (grounding) conductor or disconnection of the protective earth terminal will cause a potential shock hazard that could result in personal injury.

DO NOT Operate In An Explosive Atmosphere

Do not operate the instrument in the presence of flammable gasses or fumes. Operation of any electrical instrument in such an environment constitutes a definite safety hazard.

Keep Away From Live Circuits

Operating personnel must not remove instrument covers. Component replacement and internal adjustments must be made by qualified maintenance personnel. Do not replace components with the power cable connected. Under certain conditions, dangerous voltages may exist even with the power cable removed. To avoid injuries, always disconnect power and discharge circuits before touching them.

DO NOT Service Or Adjust Alone

Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.

DO NOT Substitute Parts Or Modify Instrument

Because of the danger of introducing additional hazards, do not install substitute parts or perform unauthorized modifications to the instrument. Return the instrument to an Agilent Technologies Sales and Service Office for service and repair to ensure that safety features are maintained.

Safety Symbols
General definitions of safety symbols used on equipment or in manuals are listed below.

⚠ Refer to the instruction manual when you see this symbol.

∿ Alternating current.

⎓ Direct current.

| On (Supply).

O Off (Supply).

⊐ In position of push-button switch.

⊓ Out position of push-button switch.

WARNING: **This WARNING notice denotes a hazard. It calls attention to a procedure, practice, condition or the like, which, if not correctly performed or adhered to, could result in injury or death to personnel.**

CAUTION: This CAUTION notice denotes a hazard. It calls attention to a procedure, practice, condition or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the product.

NOTE: *NOTE* denotes important information. It calls attention to a procedure, practice, condition or the like, which is essential to highlight.

Manufacturer's Declaration

DECLARATION OF CONFORMITY
According to ISO/IEC Guide 22 and CEN/CENELEC EN 45014

Manufacturer's Name: Agilent Technologies Japan, Ltd.

Manufacturer's Address: 1-3-2, Murotani, Nishi-ku, Kobe-shi,
Hyogo, 651-2241 Japan

Declares, that the product:

Product Name: CDMA MS TEST SET

Model Number: E6393A

Product Options: This declaration covers all options of the above product

Conforms with the following product standards:

EMC: Standard   Limit

IEC 61326-1:1997 +A1:1998 / EN 61326-1:1997 +A1:1998
  CISPR 11:1997 / EN 55011:1998 / AS/NZS 2064.1/2   Group 1, Class A [1]
  IEC 61000-4-2:1995 / EN 61000-4-2:1995 +A1:1998   4 kV CD, 4 kV AD
  IEC 61000-4-3:1995 / EN 61000-4-3:1996 +A1:1998   3 V/m 80% AM 80 - 1000 MHz
  IEC 61000-4-4:1995 / EN 61000-4-4:1995   0.5 kV signal lines, 1 kV power lines
  IEC 61000-4-5:1995 / EN 61000-4-5:1995   0.5 kV line-line, 1 kV line-ground
  IEC 61000-4-6:1996 / EN 61000-4-6:1996   3 V 80% AM 0.15 - 80 MHz
  IEC 61000-4-11:1994 / EN 61000-4-11:1994   1 cycle, 100%
  Canada: ICES-001

Safety: IEC 61010-1:1990 +A1:1992 +A2:1995 / EN 61010-1:1993 +A2:1995
        CAN / CSA C22.2 No. 1010.1-92

Conformity / Supplementary Information:

The product herewith complies with the requirements of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC (including 93/68/EEC) and carries the CE-marking accordingly (European Union).

[1] The product was tested in a typical configuration with Agilent Technologies test systems.

Kobe, Japan   Jan. 23, 2001
               Date   Name   Teruo Takeda / Quality Manager

For further information, please contact your local Agilent Technologies sales office, agent or distributor.

ACOUSTIC NOISE EMISSION

LpA < 70 dB
operator position
normal operation
per ISO 7779

GERXUSCHEMISSION

LpA < 70 dB
am Arbeitsplatz
normaler Betrieb
nach DIN 45635 T. 19

In this Book   This guide describes how to use the Agilent Technologies E6393A CDMA MS Test Set. Throughout this manual the term "Test Set" is used to refer to the Agilent E6393A. This Test Set provides a variety of test functions to validate the performances of IS-95A, TSB-74, ARIB T53, J-STD-008, PCS US, AMPS, PCS Korea P0, and PCS Korea P1 mobile phones.

This guide contains the following information:

Chapter 1, "Preparing for Use"

This chapter explains the procedures you must perform before running tests.

Chapter 2, "Using Functions"

This chapter explains several basic test procedures, to help the first time users to become familiar with the Test Set.

Chapter 3, "Screen Reference"

This chapter provides detailed information on the functions and softkeys of each screen.

Chapter 4, "Functionality/Operation"

This chapter introduces technical information on CDMA and AMPS mobile phones including call processing, initializing process flow diagram, and the typical block diagrams of CDMA and AMPS mobile phones.

Chapter 5, "Specifications"

This chapter lists the performance characteristics of the Test Set.

Appendix A, "Input Fields and Allowable Ranges"

This appendix provides the allowable ranges and choices for all input fields.

Contents

Contents

Contents

Contents

1 Preparing for Use

This chapter provides an overview of the Test Set's major functions. It also describes the steps you must perform before starting your actual tests.

Major Functions

The Agilent E6393A CDMA MS Test Set (the Test Set) is an easy-to-use, flexible, programmable, low cost mobile phone test solution.

Figure 1-1   **Agilent E6393A CDMA MS Test Set**
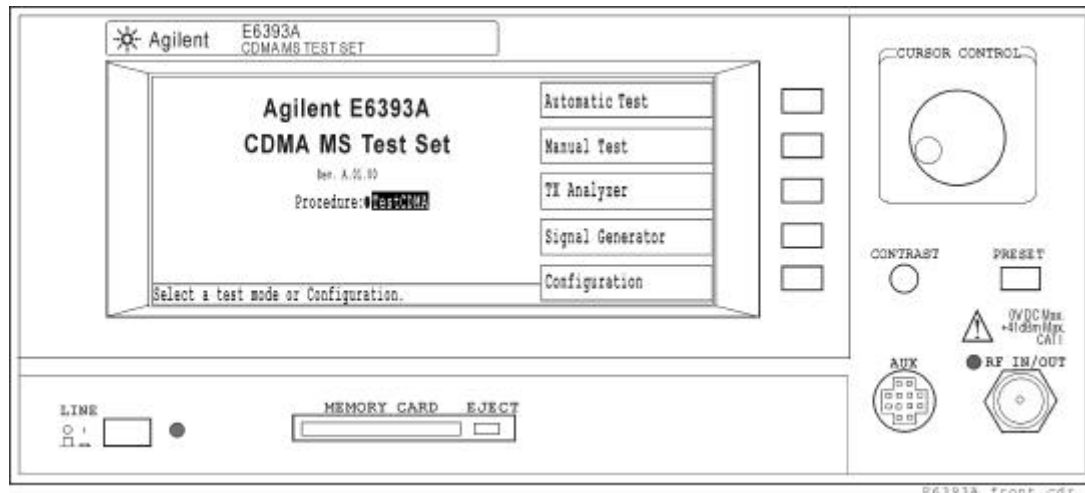
The Test Set acts as both a base station, for making phone calls, and a measurement system for testing. The Test Set provides the following function modes for testing CDMA (Cellular and PCS) and AMPS mobile phones:

- The Automatic Test mode automatically executes a test sequence that is configured for individual testing requirements. You can test on three different traffic channels for each of three radio systems. Multi-mode mobile phones such as CDMA with AMPS and CDMA (PCS) with AMPS can be quickly tested with this feature (the AMPS test function is available for the Test Set with Option 003).

- The Manual Test mode is designed to make real-time tests and measurements that facilitate troubleshooting and adjusting mobile phones, including those with multi-mode capability. In this mode, the mobile phone should be set to its test mode. Tests are made with the Test Set and the mobile phone networked to communicate with each other. This is used to test mobile phones during the Talk/RF Test step of a test flow.

- The TX Analyzer mode is available for the Test Set with Option 002. In this mode, the mobile should be set to its talk mode. Tests are made without networking the Test Set and the mobile phone under test with each other. This function is used to test the RF transmission characteristics of mobile phones.

- The Signal Generator mode is available for the Test Set with Option 002. This mode generates an RF signal with or without modulation. In this mode, the mobile should be set to its receiver mode. Tests are made without networking the Test Set and the mobile phone under test with each other. This function is used to test the RF receiver characteristics of mobile phones.

- The Configuration mode is used to configure the fundamental parameters of the Test Set, auto test sequence, test conditions for Pass/Fail tests, and to manage test setup files in an SRAM memory card.

1. Preparing for Use

Installing the Test Set

This section contains the proper installation procedure of the Test Set as follows;

- "Checking the Shipment" on page 16,

- "Power Cable" on page 17,

- "Meeting Electrical and Environmental Requirements" on page 19,

- "Replacing the Line Power Fuse" on page 20,

- "Warm-Up Time" on page 20.

Checking the Shipment

1. Inspect the shipping container for damage.

   Look for any signs of damage such as a dented or torn shipping container, or cushioning material that shows signs of unusual stress or compacting from shipment.

2. Carefully remove all contents from the shipping container and verify that your order is complete. Refer to Table 1-1, "Shipment Verification List," for the list of items that are shipped standard with the Test Set., and Table 1-2, " Additional Option List," for the list of options you may have ordered.

Table 1-1   **Shipment Verification List**

Item	Qty	Part Number
Universal DC/Audio Adapter	1	E6393-60001
User's Guide (this book)	1	E6393-90001
Programmer's Guide	1	E6393-90002
Quick Reference Guide	1	E6393-90003
AC Power Cord[a]	1	
Calibration Certificate	1	

a. The part number depends on the country where the instrument is used. See "Power Cable" on page 17.

Table 1-2   **Additional Option List**

Option	Description	Part Number
001	Add Antenna Coupler	E6392-60002
002	Add TX Analyzer and Signal Generator Capabilities	
003	Add AMPS Test Capability	
004	Add PCS Test Capability (furnished)	
005	Add Memory Card (PCMCIA SRAM)	E6393-85001
010	Add High Level Signal Output and Low Power Measurement Capabilities	
0B0	Delete Manual Set	
0B1	Add Manual Set	
202	RF Cable for Nokia 51xx, 61xx, 71xx mobile phones	E6392-61603
UK6	Test Report	

1. Preparing for Use
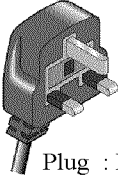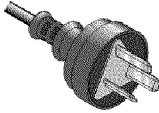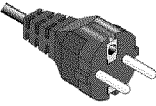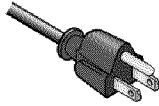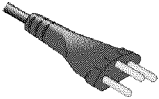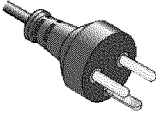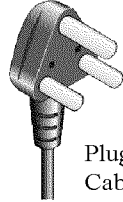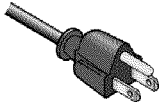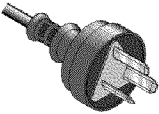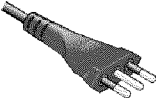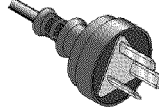
Power Cable

In accordance with international safety standards, this instrument is equipped with a three-wire power cable. When connected to an appropriate ac power outlet, this cable grounds the instrument frame. The type of power cable shipped with each instrument depends on the country of destination. Refer to Figure 1-2, "Power Cable Supplied," for the part number of the power cables available.

WARNING   **For protection from electrical shock, the power plug must be plugged into an outlet that provides a protective earth ground connection.**

Figure 1-2   **Power Cable Supplied**

OPTION 900 United Kingdom Plug : BS 1363/A, 250V, 10A Cable: HP 8120-1351	**OPTION 901** Australia/ New Zealand Plug : AS 3112, 250V, 10A Cable: HP 8120-1369
OPTION 902 Continental Europe Plug : CEE 7 Standard Sheet VII, 250V, 10A Cable: HP 8120-1689	**OPTION 903** U.S./ Canada Plug : NEMA 5-15P, 125V, 10A Cable: HP 8120-1378
OPTION 904 U.S./ Canada Plug : NEMA 6-15P, 250V, 6A Cable: HP 8120-0698	**OPTION 906** Switzerland Plug : SEV Type 12, 250V, 10A Cable: HP 8120-2104
OPTION 912 Denmark Plug : SR 107-2-D, 250V, 10A Cable: HP 8120-2956	**OPTION 917** India/ Republic of S.Africa Plug : IEC 83-B1, 250V, 10A Cable: HP 8120-4211
OPTION 918 Japan Plug : JIS C 8303, 125V, 12A Cable: HP 8120-4753	**OPTION 920** Argentina Plug : Argentine Resolution 63, Annex IV, 250V, 10A Cable: HP 8120-6870
OPTION 921 Chile Plug : CEI 23-16, 250V, 10A Cable: HP 8120-6978	**OPTION 922** China Plug : GB 1002, 250V, 10A Cable: HP 8120-8376
NOTE: Each option number includes a 'family' of cords and connectors of various materials and plug body configurations (straight, 90° etc.).	

OPT9XXE

Meeting Electrical and Environmental Requirements

Line Settings

The available ac power source must meet the following requirements:

CAUTION   Even though this product has an autorange line voltage input, be sure that the supply voltage is within the specified range.

> Voltage:
>
> •   100 to 240 V nominal (88 to 264 V range)
>
> Frequency:
>
> •   50/60 Hz (47 to 63 Hz range) nominal for 100 to 240 V
>
> Power:
>
> •   250 VA maximum

Verify that the power cord is not damaged and that the power outlet provides a protective earth contact.

WARNING   **This is a Safety Class 1 product provided with a protective earthing ground incorporated in the power cord. The main plug shall only be inserted in a socket outlet provided with a protective earth contact. Any interruption of the protective conductor inside or outside of the product is likely to make the product dangerous. Intentional interruption is prohibited.**

CAUTION   Always use the three-prong ac power cord supplied with this product. Failure to ensure adequate earth grounding by not using this cord may cause product damage.

Environment

This product is designed for use in the following environmental conditions (refer to Chapter 5, "Specifications," for details):

•   Indoor use

•   0° to 40°C operating temperature unless otherwise specified

•   −20° to 60°C storage temperature unless otherwise specified

•   EMC: complies with IEC 61326-1:1997 and Amendment 1:1998
        CISPR11: 1997+A1 / EN 55011:1998 Group 1, Class A

•   Safety: certified to CAN/CSA C22.2 No. 1010.1-92
        Complies with IEC 61010-1:1990, Amendment 1 and 2

•   Altitude: Less than 2000 meters

1. Preparing for Use

Providing Adequate Ventilation

Cooling holes are located on the bottom cover and the rear panel of the instrument. To facilitate air flow through the product, do not allow these holes to become obstructed.

CAUTION   Ventilation Requirement: When installing the product in a system cabinet, the convection into and out of the product must not be restricted. The ambient temperature (outside the cabinet) must be less than the maximum operating temperature of the product by 4°C for every 100 watts dissipated in the cabinet. If the total power dissipated in the cabinet is greater than 800 watts, then forced convection must be applied.

Instructions for Cleaning

For cleaning the surface of the instrument, gently wipe with soft, damp cloth.

Replacing the Line Power Fuse ⚠

The line power fuse holder is located on the right side of the Test Set's rear panel. Before replacing the fuse, disconnect the line power cable from the Test Set. To replace the fuse, use a small flat blade screwdriver to push in on the fuse cap and rotate it counterclockwise. Remove the fuse cap and replace the fuse with the appropriate type. Re-install the fuse cap and apply power.

The type and rating of this fuse are as follows:

   UL/CSA type, time delay, 3.15 A, 250 Vac

Warm-Up Time

In order for the Test Set to meet its specifications, allow the Test Set to warm up for 30 minutes after being turned on before attempting to make any measurements.

Preparation for Each Test

Perform the following procedures before starting each test.

System Requirement ⚠

The following equipment is required to construct a test system with the mobile phone under test (UUT or Unit Under Test):

- The Agilent E6393A CDMA MS Test Set

- RF Antenna Coupler (P/N: E6392-60002) to connect the RF signal to the UUT, or an RF cable to connect the RF signal to the UUT

- Universal DC/Audio Adapter (P/N: E6393-60001) and appropriate cables to connect the dc power supply and audio signals to the UUT (optional)

  o Use a pair of binding posts, "DC Output", to supply the dc power to the UUT.

  o Use a pair of BNC connectors (female), "Analog Audio In/Out", to connect the audio input and output signals with the UUT for AMPS measurements.

  o Use the D-sub 9-pin connector, "AUX", to connect both the dc power supply and the audio input and output signals with the UUT for AMPS measurements.

- A printer with a connecting cable (optional)

Figure 1-3   **Typical Test Setup for a Mobile Phone**
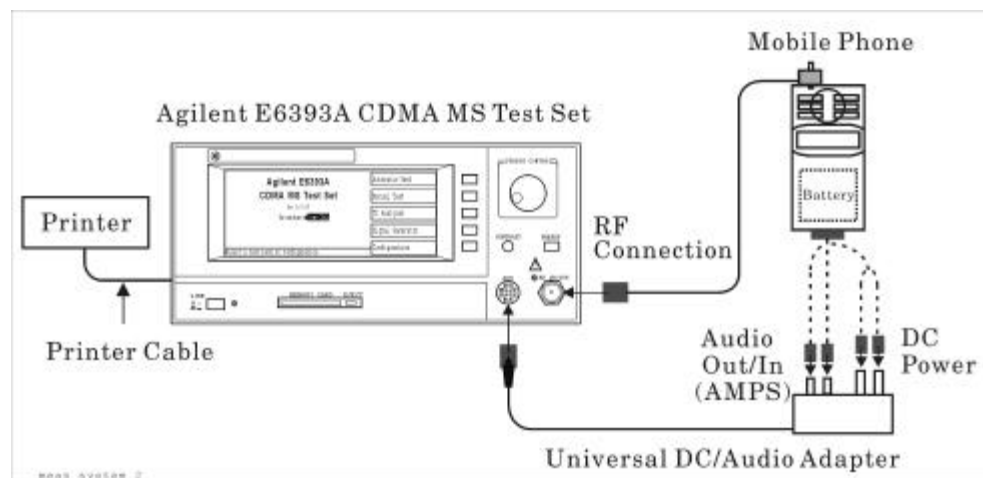
Adjusting the Display Contrast

You can adjust the display contrast by rotating the CONTRAST knob on the front panel.

Rotate the CONTRAST knob counterclockwise to gradually darken the display background in comparison to the text.

UUT Connections

Connect the mobile phone under test (UUT) to the Test Set using either of the following methods:

Using the Antenna Coupler

Connect the Antenna Coupler to the RF IN/OUT port on the front panel of the Test Set with the cable supplied. Insert the UUT's antenna into the Antenna Coupler hole as deeply as possible.

Using a User-Supplied Cable

If you have the cable set which connects the UUT's RF port and the RF IN/OUT port of the Test Set, you can use it instead of the Antenna Coupler.

Entering Losses

Depending on the connection methods between the Test set and the UUT, different losses may be caused in both the RF input and RF output paths, resulting in inaccurate measurement data. To improve your test accuracy, determine and enter the appropriate attenuations caused by the antenna coupler or cable you use to connect the UUT to the Test Set.

Step 1. Press the Configuration softkey to obtain the Configuration screen.

Step 2. Rotate the CURSOR CONTROL knob to move to the Loss field, then press the knob once to select the field. Notice that the round cursor changes to a triangle. This indicates that the cursor has changed to selection mode.

Step 3. Rotate the CURSOR CONTROL knob until the On option appears, then press the knob again to select this option and apply attenuations in your tests. If you do not want to apply attenuations to your tests, select the Off option. The cursor returns to a circle, and you can again move from field to field.

Step 4. Using the CURSOR CONTROL knob, move to each of the input fields for RF In/RF Out and radio systems.

Step 5. Using the CURSOR CONTROL knob, enter the appropriate loss values caused by the antenna coupler or cable you use.

Step 6. Press the Return softkey to return to the initial screen.

Connecting a Printer (optional)

To print an image of the screen, connect a printer to the Test Set as shown in Figure 1-4, "Connecting a Printer." Use an appropriate interface cable between the printer connector and the PRINTER port (female, parallel port) on the rear panel of the Test Set.

Figure 1-4   **Connecting a Printer**
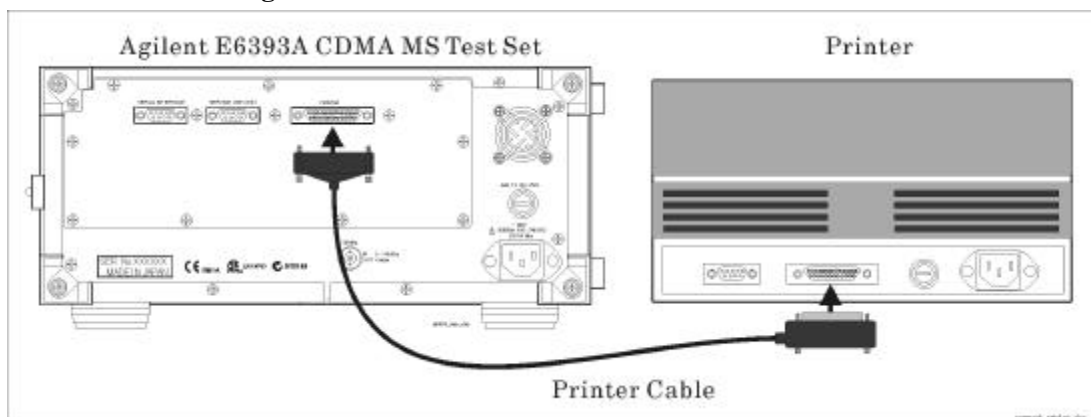
2   Using Functions

This chapter covers several typical test procedures. These procedures may assist
first time users to become familiar with the basic Test Set capabilities.

Testing a Mobile Phone with the Test Set

Each procedure in this chapter includes step-by-step explanations along with appropriate screen illustrations. The information about the radio systems supported is provided in Chapter 3, "Screen Reference." This chapter contains the following procedures:

Testing a Dual-Mode Mobile Phone by Automatic Test

This procedure explains how to test a dual-mode (CDMA and AMPS) mobile phone using the Automatic Test mode.

NOTE   This procedure applies to the Test Set with Option 003, "AMPS Test Capability", and Option 010, "High Level Signal Output and Low Power Measurement Capabilities".

Step 1. Turn the Test Set on and wait for the selftest routine to finish.

```
Agilent E6393A                    Automatic Test

CDMA MS Test Set                  Manual Test
      Rev. A.01.00
   Procedure: ●TestCDMA            TX Analyzer

                                   Signal Generator

                                   Configuration
Select a test mode or Configuration.
                                          initial_screen
```

Step 2. Refer to "Preparation for Each Test" on page 21 and perform the required procedures before starting the test.

Step 3. Use the Universal DC/Audio Adapter and appropriate cables to supply dc power from the Test Set to the mobile and to measure dc currents at the idle and talk states.

Step 4. Use the Universal DC/Audio Adapter and appropriate cables to connect the Analog Audio In and Out ports with the mobile. This connection enables to measure TX Distortion, FM Deviation, RX Distortion, and RX SINAD for AMPS mobiles.

Step 5. Press the **PRESET** key to reset the Test Set to the factory defaults.

NOTE   The instrument default state after power-on is the same state as just before power-off. The previous state is stored in the internal memory.

Step 6. If you are using an SRAM memory card with predefined test procedures, continue with this step, otherwise proceed to Step 7 on page 28.

   a. Insert the SRAM memory card into the MEMORY CARD slot. Up to four file names are displayed in the Procedure field.

   b. Press the CURSOR CONTROL knob and rotate the knob to select one of the files.

2. Using Functions

c. Press the CURSOR CONTROL knob again to recall the test procedure into the Test Set by pressing Yes softkey.

d. Proceed to Step 36 on page 33.

Step 7. Press the Configuration softkey to access the Configuration screen.

Step 8. Use the CURSOR CONTROL knob to set the Auto Test Run mode to Pause. This will cause the test to stop if a failure occurs. Notice that the circular cursor changes form.

Step 9. In the Loss fields, enter the appropriate loss values depending on the radio system and the coupler or cable you are using to connect the mobile to the Test Set. Refer to "Entering Losses" on page 22.

NOTE   Set the Loss field to On for automatic loss compensation.

Step 10. Press the Auto Test Sequence softkey.

Step 11. Use the CURSOR CONTROL knob to select Cellr/IS95A, AMPS, and Off in the Sequence No. 1, 2, and 3 fields, as shown below.

Step 12. Set the Sequence No. field (on the third line) to 1.

Step 13. Set the second test flow field to Paging. The third step changes to RF Test, the fourth to BS Release, the fifth to MS Origination, the sixth to Voice Echo, and the ninth to MS Release, as shown below.

Step 14. Reset the second test flow field to MS Origination.

Step 15. Set the following fields to Run: Registration, MS Origination, Voice Echo, RF Test, Softer Handoff, and Hard Handoff.

Step 16. Set the three RFCH fields to the appropriate channel numbers and set each cell of the test item table to Run. Note that the idle dc current measurement is allowed only at the first RF channel, therefore the second and third channels are skipped.

NOTE   Min TX Power is not available for the Test Set without Option 010, "High Level Signal Output and Low Power Measurement Capabilities".

2. Using Functions

Step 17. Set the Amplitude fields for the sensitivity and other tests to the appropriate power levels, and the Service Option fields for the voice echo and other tests to the appropriate values, according to the mobile.

```
Test  Setup  :Test  Sequence       2001/01/20 12:34
Sequence No.  1: Cellr/IS95A    2: AMPS       3: Off

Sequence No.: 1
                            Detail of RF Test
1 Registration:    Run    RFCH            991   384   799
2 Paging:          Run    Max TX Power    Run   Run   Run
3 RF Test:         Run    Min TX Power    Run   Run   Run
4 BS Release:      Run    Frequency Error Run   Run   Run
5 MS Origination:  Run    Rho             Run   Run   Run
6 Voice Echo:      Run    Time Offset     Run   Run   Run
7 Softer Handoff:  Run    Sensitivity/FER Run   Run   Run
8 Hard Handoff:    Run    DC Current(Idle) Run  ---   ---
9 MS Release:      ---    DC Current(Talk) Run  Run   Run              Messages

Amplitude:                 Service Option:
  Sensitivity:   -104.0 dBm   Voice Echo:        1
  Other Tests:    -75.0 dBm   Other Tests:       2            Return

                                                 config_rf_seqno_1
```

Step 18. After all parameters are set, press the Messages softkey.

```
Test  Setup  :Messages                 2001/01/20 12:34
Sequence No.1: Cellr/IS95A

1 Registration:    Run                          Editor:
2 MS Origination:  Run                          Position
3 Voice Echo:      Run                          Delete
4 MS Release:      Run                          Del End
5 Paging:          Run                          A
6 RF Test:         Run                          B
7 Softer Handoff:  Run                          C
8 Hard Handoff:    Run                          D
9 BS Release:      ---                          E
                                                F
                                                G
                                                H
                                                I
                                                J

Message for Step No.01                          Return
Wait-for-call-to-end.
                                         config_rf_seqno_msg_1
```

Step 19. Press and rotate the CURSOR CONTROL knob to check the message for each step number.

```
Test  Setup  :Messages                 2001/01/20 12:34
Sequence No.1: Cellr/IS95A

1 Registration:    Run                          Editor:
2 MS Origination:  Run                          Position
3 MS Release:      Run                          Delete
4 Paging:          Run                          Del
5 Voice Echo:      Run                          a
6 Softer Handoff:  Run                          b
7 RF Test:         Run                          c
8 BS Release:      Run                          d
9 Hard Handoff:    ---                          e
                                                f
                                                g
                                                h
                                                i
                                                j

Message for Step No.8                           Cancel
Wait for call to end.
                                         config_rf_seqno_msg_read
```

Step 20. Press Cancel, then Return to return to the Test Setup: Test Sequence screen.

Step 21. Set the Sequence No. field to 2.

Step 22. Set the Registration, MS Origination, and RF/AF Test steps to Run.

Step 23. Set the three RFCH fields to the appropriate channels and set each cell in the test item table to Run. Note that the idle dc current measurement is made only at the first RF channel, therefore the second and third channels are skipped.

Step 24. Set the Amplitude fields for the sensitivity and other tests to the appropriate power levels, and the Audio Out fields to the appropriate mode and level, according to the mobile.

Step 25. After all parameters are set, press the Messages softkey.

Step 26. Press and rotate the CURSOR CONTROL knob to check the message for each step number.

Step 27. Press Cancel, then Return to return to the Test Setup: Test Sequence screen.

Step 28. Press the Return softkey to access the Configuration screen.

Step 29. Press the Test Condition softkey to access the Test Setup: Test Condition screen.

NOTE Min TX Power is not available for the Test Set without Option 010, "High Level Signal Output and Low Power Measurement Capabilities".

Step 30. Use the CURSOR CONTROL knob to set the highlighted test parameter fields as shown above in the left side of the screen. The SID and Rgstr SID fields need to be set to the values specified for the mobile phone.

Step 31. Enter the appropriate limit values in the cells of the test item table, shown in the right side of the above screen.

Step 32. Change the Radio System to AMPS. Use the CURSOR CONTROL knob to set the highlighted test parameter fields as shown in the left side of the above screen. The Control Channel field needs to be set to the value specified for the mobile.

Step 33. Enter the appropriate limit values in the cells of the test item table, shown in the right side of the above screen.

Step 34. After all parameters are set, press the Return softkey to return to the Configuration screen.

Step 35. Press the Return softkey to return to the initial screen in .

Step 36. Press the Automatic Test softkey to access the Automatic Test: Stand-by screen.

NOTE Min TX Power is not available for the Test Set without Option 010, "High Level Signal Output and Low Power Measurement Capabilities".

Step 37. Press the More (1 of 2), Screen >> (Simple), and then Value softkeys to obtain the above screen.

Step 38. Set the DC Power supply mode and voltage according to the mobile phone.

Step 39. Turn the mobile on. Wait for the mobile to initialize with the Test Set.

Step 40. Press the Start softkey to begin your test. As each test step runs, the step blinks in the test flow table. When the test is complete, either P (for Pass) or F (for Fail) will appear in the column to the right of the step.

Step 41. If the Registration step is successful, P (for Pass) appears in the column to the right of the test step. and the Phone Number and ESN (electronic serial number) are automatically displayed.
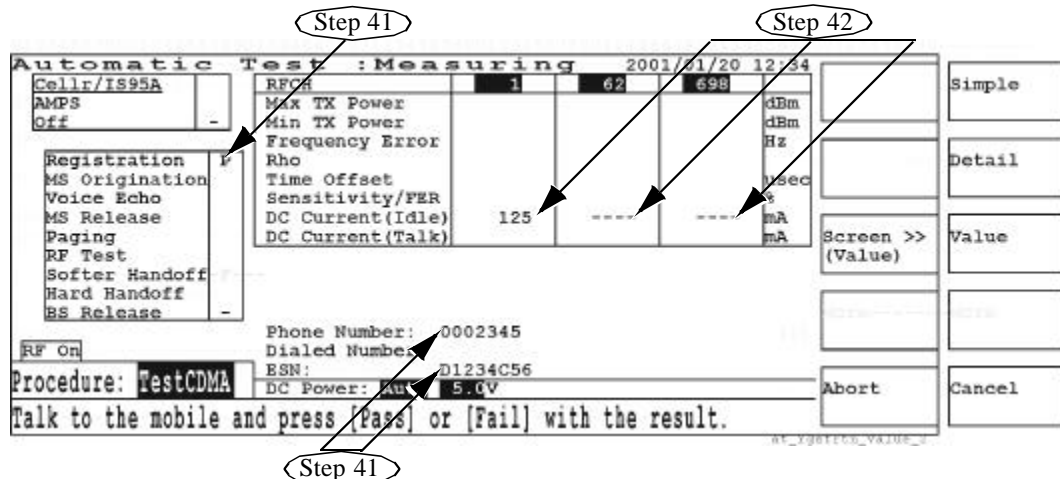
Step 42. After completing the Registration, the dc current is measured at the idle stage. Note that the result is displayed in the DC Current (Idle) cell of the test item table only for the first RF channel, when the dc power is supplied from the Test Set to the mobile phone.

Step 43. At the MS Origination step, you are asked to make a call from the mobile phone. For example, dial a number and press the **Call** or **Send** key of the mobile phone.

Step 44. If the MS Origination step is successful, P (for Pass) appears to the right of the step and the Dialed Number is displayed.
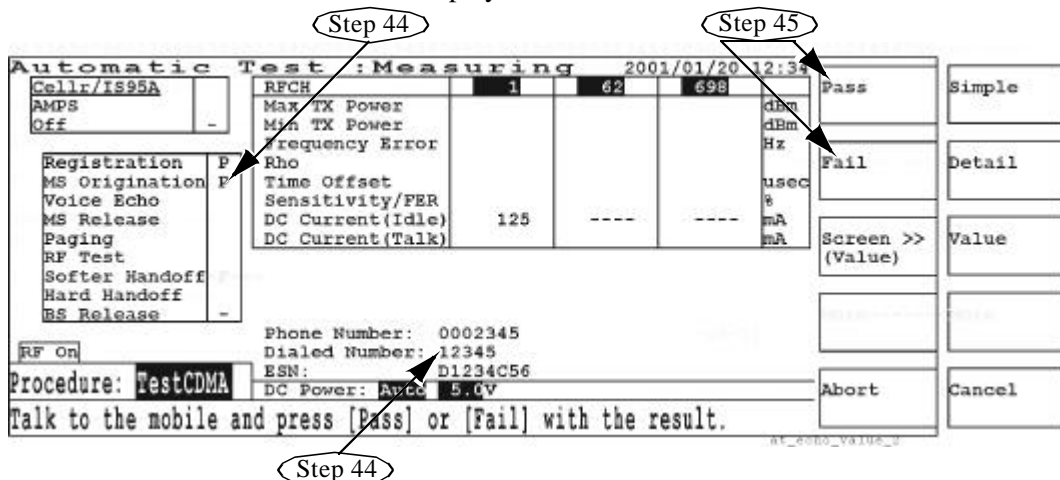
Step 45. At the Voice Echo step, make a talk test and press the Pass or Fail softkey according to the talk test result.

Step 46. When the MS Release step starts blinking, press the `End` key of the mobile to terminate the call.

Step 47. As the RF Test step blinks, each test item is measured. The screen below shows that the measurement results up to the Time Offset item are obtained and the Sensitivity/FER item is being measured.

```
Automatic  Test  :Measuring    2001/01/20 12:34
 Cellr/IS95A        RFCH            1    62    698              Simple
 AMPS               Max TX Power   +24.8              dBm
 Off            -   Min TX Power   -58.8              dBm
                    Frequency Error  -18              Hz       Detail
 Registration   P   Rho            0.983
 MS Origination P   Time Offset    +0.15              usec
 Voice Echo     P   Sensitivity/FER                   %
 MS Release     P   DC Current(Idle)   125   ----  ----  mA
 Paging         P   DC Current(Talk)                   mA     Screen >>   Value
 RF Test                                                      (Value)
 Softer Handoff
 Hard Handoff
 BS Release     -

 RF On              Phone Number:  0002345
                    Dialed Number: 12345
 Procedure: TestCDMA ESN:          D1234C56            Abort       Cancel
                    DC Power: Auto 5.0V

                                          at_rf_test_value_3
```

Step 48. If, for example, a test failure occurs at the Sensitivity/FER test, the test process stops at that moment and the screen changes as the Auto Test Run mode is set to Pause in .

```
        Step 48                          Step 49
Automatic  Test  :Measuring    2001/01/20 12:34
 Cellr/IS95A        RFCH            1    62    698    Continue  Simple
 AMPS               Max TX Power   +24.8              dBm
 Off            -   Min TX Power   -58.8              dBm
                    Frequency Error  -18              Hz
 Registration   P   Rho            0.983              Manual    Detail
 MS Origination P   Time Offset    +0.15         usec Test
 Voice Echo     P   Sensitivity/FER 0.50010           %
 MS Release     P   DC Current(Idle)   125   ----  ----  mA
 Paging         P   DC Current(Talk)                   mA     Screen >>   Value
 RF Test                                                      (Value)
 Softer Handoff
 Hard Handoff
 BS Release     -

 RF On              Phone Number:  0002345
                    Dialed Number: 12345
 Procedure: TestCDMA ESN:          D1234C56            Abort       Cancel
                    DC Power: Auto 5.0V

                                          at_rf_test_value_3a
```

Now you can choose one of the following:

- Press the Continue softkey to proceed to the next test.

- Press the Manual Test softkey to further investigate the failure with the Manual Test mode.

Step 49. If you press the Continue softkey, the measurement re-starts from DC Current (Talk) to the end of one test.

2. Using Functions

Step 50. At the completion of the Cellr/IS95A test sequence, all test results are displayed. In this example, the Sensitivity/FER item at the first RF channel has failed, resulting in a failure (shown with the highlighted "F") for the Cellr/IS95A sequence in the upper left table.

at_cdma_result_value_4

Step 51. After the CDMA test is complete, the AMPS test starts automatically at MS Release. Press the **END** key of the mobile, for example, to release the mobile from the Test Set, and then the Test set starts Paging.

Step 52. As the RF/AF Test step blinks, each test item is measured as shown below. This screen shows that the test results up through the second RF channel are obtained and the third RF channel is going to be tested.

Step 53. When all measurements are complete, the test results are shown as in the next screen. In this example, all tests have passed.

Step 54. If a printer is connected to the Test Set, print the test results. Press the More (1 of 2) softkey to reveal the printing softkey menu.

- Press the Print Screen softkey to make a hardcopy of the current screen.

- Press the Print All softkey to print the detailed test results including the test condition and test sequence. To add a title to your test results, edit the Print Header field in .

Step 55. Press the Previous Page softkey to return to the screen in . To repeat the test, press the Start softkey.

Step 56. To change the test sequence and condition, press the Return softkey and select the Configuration mode to obtain the Test Setup: Test Sequence and Test Setup: Test Condition screens.

Step 57. To run a different test, press the Return softkey to return to the initial screen with function modes.

Step 58. After your tests are complete, disconnect the mobile from the Test Set.

2. Using Functions

Testing a Dual-Mode Mobile Phone by Manual Test

The following procedure explains how to test dual-mode (Cellular IS-95A and AMPS) mobile phone using the Manual Test mode.

NOTE   This procedure applies to the Test Set with Option 003, "AMPS Test Capability", and Option 010, "High Level Signal Output and Low Power Measurement Capabilities".

Step 1. Turn the Test Set on and wait for the selftest routine to finish.

Step 2. Refer to "Preparation for Each Test" on page 21 and perform the required procedures before starting the test.

Step 3. Use the Universal DC/Audio Adapter and appropriate cables to supply dc power from the Test Set to the mobile and to measure dc currents at the idle and talk states.

Step 4. Use the Universal DC/Audio Adapter and appropriate cables to connect the Analog Audio In and Out ports with the mobile. This connection enables to measure TX Distortion, FM Deviation, RX Distortion, and RX SINAD for AMPS mobiles.

Step 5. Press the **PRESET** key to reset the Test Set to the factory defaults.

NOTE   The instrument default state after power-on is the same state as just before power-off. The previous state is stored in the internal memory.

Step 6. If you are using an SRAM memory card with predefined test procedures, continue with this step, otherwise proceed to Step 7 on page 39.

a. Insert the SRAM memory card into the MEMORY CARD slot. Up to four file names appear in the Procedure field.

b. Press the CURSOR CONTROL knob and rotate the knob to select one of the files.

c. Press the CURSOR CONTROL knob again to recall the test procedure into the Test Set by pressing Yes softkey.

d. Proceed to Step 15 on page 41.

Step 7. Press the Configuration softkey to access the Configuration screen.

Step 8. In the Loss fields, enter the appropriate losses depending on the radio system and the coupler or cable you are using to connect the mobile to the Test Set. Refer to "Entering Losses" on page 22.

NOTE   Set the Loss field to On for automatic loss compensation.

Step 9. Press the Test Condition softkey to access the Test Setup: Test Condition screen.

Step 10   Step 11

```
Test Setup : Test Condition   2001/01/20 12:34        Print
                                                       Screen
Radio System:●Cellr/IS95A
Sector B Pwr: Off    -5 dB    Test Item    Lo Limit  Hi Limit  Unit
Base Station                  Max TX Power  +23.0     +30.0    dBm
  NID:     1 Rgstr NID:   12   Min TX Power  -99.9     -50.0    dBm
  SID:     7 Rgstr SID:   12   Freq Error    -300      +300     Hz
  Power Up Rgstr:      On      Rho          0.944     1.000
  Max Slot Cycle Index: 0      Time Offset   -1.00     +1.00    usec
Access Probe                   Sens/FER               0.5      %
  Nom Pwr:  0    Init Pwr:  0   DC Curr(Idle)    0     1000     mA
  Pwr Step: 3   Num Step:  4    DC Curr(Talk)    0     1000     mA
  Max Req Seq,Max Rsp Seq: 1
FER                            Freq Error Avg No.:      4
  Max Frames:   10000                                          Return
  Confidence: 95%
DC Current Avg Time
  Idle: 1.28 sec Talk:0.02sec
```

Step 10. Using the CURSOR CONTROL knob, set the Radio System field to Cellr/IS95A and then set the highlighted test parameter fields as shown in the left side of the above screen. The SID and Rgstr SID fields under Base Station need to be set to the values specified for the mobile phone.

Step 11. Enter the appropriate limit values in the cells of the test item table as shown in the right side of the above screen.

NOTE   Min TX Power is not available for the Test Set without Option 010, "High Level Signal Output and Low Power Measurement Capabilities".

Step 12. Set the Radio System field to AMPS. Use the CURSOR CONTROL knob to set the highlighted test parameter fields as shown in the left side of the above screen. The Control Channel field needs to be set to the value specified for the mobile.

Step 12   Step 13

```
Test Setup : Test Condition   2001/01/20 12:34        Print
                                                       Screen
Radio System:●AMPS
                              Test Item    Lo Limit  Hi Limit  Unit
Control Channel: 321          TX Power      +23.0     +30.0    dBm
                              Freq Error    -2.50     +2.50    ppm
SID:          231             FM Dev Limit   1.00     12.00    kHz
                              TX Distortion            5.0     %
Power Level:   0              RX Distortion            5.0     %
                              RX SINAD      12.0                dB
SAT:          5970 Hz         SAT Deviation  1.80     2.20     kHz
                              SAT Freq Err   -1.0     +1.0     Hz
                              ST Deviation   7.20     8.80     kHz
DC Current Avg Time           ST Frequency  9999.0  10001.0   Hz
  Idle:  0.02sec Talk:0.02sec DC Curr(Idle)    0     1000     mA
                              DC Curr(Talk)    0     1000     mA

                                                               Return
```

Step 13. Enter the appropriate limit values in the cells of the test item table, shown in the right side of the above screen.

Step 14. Press the Return softkey twice to return to the initial screen in Step 1 on page 38.

Step 15. Press the Manual Test softkey to access the Manual Test: Stand-by screen as shown below.

NOTE Min TX Power is not available for the Test Set without Option 010, "High Level Signal Output and Low Power Measurement Capabilities".

Step 16. Set the Radio System field to Cellr/IS95A and its RFCH field to the appropriate value, the Handoff field to AMPS and its RFCH field to the appropriate value. Set other highlighted fields to the desired values, including the Service Option field to the value specified to the mobile.

Step 17. Set all highlighted fields in the test item table to On.

Step 18. Turn the mobile on. Wait for the mobile to initialize with the Test Set.

Step 19. Press the Registration softkey to cause the mobile to perform a registration process with the Test Set. During registration, the screen is titled Manual Test: Measuring and the softkey menu shows only the Abort softkey.

2. Using Functions

Step 20. When registration is completed, the screen title returns to Manual Test: Stand-by and the Registration step is judged as PASS. Press the Trigger softkey to measure the idle dc current.

Step 21. Press the Paging softkey to call the mobile from the Test Set. This establishes a connection between the mobile and the Test Set.

Step 22. As the Connection step blinks, the RF tests will be repeatedly made if the trigger mode is set to Cont (for continuous).

Step 23. Note that in the previous screen, the RF On and Meas annunciators are available in the middle left side of the screen, and the softkeys except for Release, Trigger Sing/Cont, and More are disabled. You can change the RFCH, Amplitude, and Pwr Cntl Bit fields to modify the test condition.

Step 24. Press the Trigger Sing/<u>Cont</u> softkey to change the trigger mode to <u>Sing</u> (for single) and wait until one measurement is made.

Step 24   Step 25

```
Manual  Test      :Measuring     2001/01/20 12:34
  Registration                                            Release    Max & Min   Print
  MS Origination     On  TX Power          +25.5dBm  ----            Power       Screen
  MS Release
  Paging          PASS On  Frequency Error    +220Hz   Pass
  BS Release                                                Trigger   Softer
  Connection          On  Rho                 0.990   Pass   Sing/Cont Handoff
  Softer Handoff          ┌Err Cnt        0┐
  Hard Handoff        On  FER│Frm Cnt      600│ 0.00000%  Pass
                          On  Time Offset      -0.30usec  Pass  Trigger   Hard
                          On  DC Current         752mA    Pass            Handoff
                              Max TX Power
  RF On  Meas                 Min TX Power
                      Amplitude:     -75.0dBm Max Frames:     1000 Clear     MS Info
Procedure: TestCDMA   Pwr Cntl Bit: Open LoopConfidence: 95%        Status
                      Service Option:      2
Radio System: Cellr/IS95A Handoff: AMPS  DC Power: On    5.0V
  RFCH:● 384:836.52MHz   RFCH:  991:824.04MHz             More      More      More
Press the desired softkey.                                (1 of 3)  (2 of 3)  (3 of 3)
```
mt_meas_rf_test_cdma_2a

Step 25. In the screen above, note that the different softkey menus are now available. To start another single measurement, press the Trigger softkey. For measuring FER (frame error rate), it takes time to count the number of test frames. If there are no errors within the initial 600 frames, the FER measurement will finish at 600.

Step 26. Press the More (1 of 3) and Max & Min Power softkeys to measure the maximum and minimum TX power levels.

Step 26   Step 27

```
Manual  Test      :Measuring     2001/01/20 12:34
  Registration                                            Release    Max & Min   Print
  MS Origination     On  TX Power          +25.5dBm  ----            Power       Screen
  MS Release
  Paging          PASS On  Frequency Error    +220Hz   Pass
  BS Release                                                Trigger   Softer
  Connection          On  Rho                 0.990   Pass   Sing/Cont Handoff
  Softer Handoff          ┌Err Cnt        0┐
  Hard Handoff        On  FER│Frm Cnt      600│ 0.00000%  Pass
                          On  Time Offset      -0.30usec  Pass  Trigger   Hard
                          On  DC Current         752mA    Pass            Handoff
                              Max TX Power        +25.8dBm  Pass
  RF On  Meas                 Min TX Power        -52.8dBm  Pass
                      Amplitude:     -75.0dBm Max Frames:     1000 Clear     MS Info
Procedure: TestCDMA   Pwr Cntl Bit: Open LoopConfidence: 95%        Status
                      Service Option:      2
Radio System: Cellr/IS95A Handoff: AMPS  DC Power: On    5.0V
  RFCH:● 384:836.52MHz   RFCH:  991:824.04MHz             More      More      More
Press the desired softkey.                                (1 of 3)  (2 of 3)  (3 of 3)
```
mt_meas_rf_test_cdma_2

NOTE   If Option 010 is not installed with the Test Set, the Max & Min Power softkey is labeled as Max Power and only Max TX Power can be measured.

2. Using Functions

Step 27. Press the Softer Handoff softkey to perform a softer handoff test. The Test Set outputs the sector B power. If the mobile can receive this signal, the softer handoff test is successful. During this process, the Connection step stops blinking but the Softer Handoff step blinks. The softkey menu has only one of Abort.

mt_meas_shandoff_cdma_1

Step 28. If the Softer Handoff test is successful, PASS is shown to the right of the step and the Connection step starts blinking again. The Test Set returns to the normal base station simulator for further tests.

mt_meas_shandoff_cdma_2

Step 29. Press the Hard Handoff softkey to make a hard handoff test from Cellr/IS95A to AMPS. The screen changes to Manual Test: Measuring, the Radio System to AMPS, and the RFCH field to the specified value as shown below. The Connection step is blinking.

Step 30. In the above screen, press the Trigger Sing/Cont softkey to change to <u>Cont</u> (for continuous) to make continuous measurements.

Step 31. Press the Trigger Sing/<u>Cont</u> softkey to change the trigger mode to <u>Sing</u> (for single) and wait until one measurement is made.

Step 32. Press the Audio Out Adjust softkey to automatically control the audio output level for 8 kHz FM deviation.

Step 33. To start a new single measurement, press the Trigger softkey.

2. Using Functions

Step 34. Press the Release softkey in the above illustration to access the next screen.

Step 35. Or, end the call from the mobile to obtain the next screen with successful MS Release test.

Step 36. Press the More (1 of 3), More (2 of 3), and Previous Radio System softkeys. The Cellr/IS95A result screen in is shown.

Step 37. Press the Trigger softkey to make a new single measurement on this radio system.

Step 38. After your tests are complete, disconnect the mobile phone from the Test Set.

Testing a CDMA Mobile Phone by TX Analyzer

The following procedure explains how to test a CDMA mobile phone with the TX Analyzer.

NOTE
This procedure applies to the Test Set with Option 002, "TX Analyzer and Signal Generator Capabilities", and Option 010, "High Level Signal Output and Low Power Measurement Capabilities".

Step 1. Turn the Test Set on and wait for the selftest routine to finish.
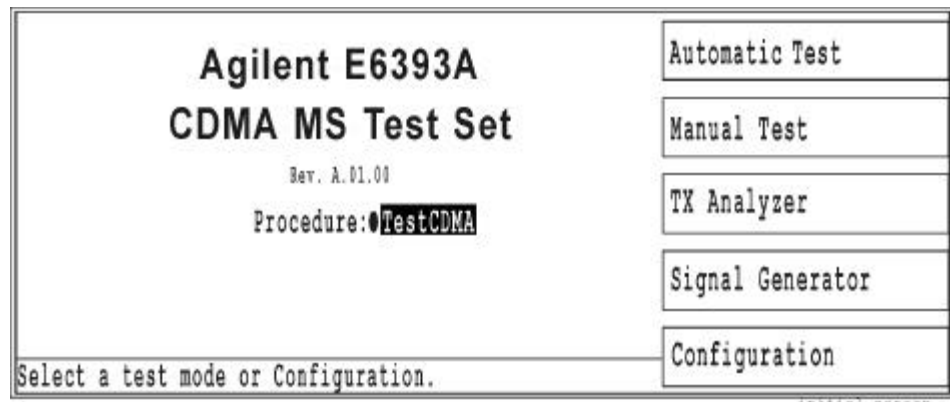
Step 2. Refer to "Preparation for Each Test" on page 21 and perform the required procedures before starting the test.

Step 3. Use the Universal DC/Audio Adapter and appropriate cables to supply dc power from the Test Set to the mobile and to measure dc currents at the idle and talk states.

Step 4. Press the **PRESET** key to reset the Test Set to the factory defaults.

NOTE
The instrument default state after power-on is the same state as just before power-off. The previous state is stored in the internal memory.

Step 5. If you are using an SRAM memory card with predefined test procedures, continue with this step, otherwise proceed to Step 6 on page 48.

  a. Insert the SRAM memory card into the MEMORY CARD slot. Up to four file names appear.

  b. Press the CURSOR CONTROL knob and rotate the knob to select one of the files.

2. Using Functions

    c. Press the CURSOR CONTROL knob again to recall the test procedure into the Test Set by pressing Yes softkey.
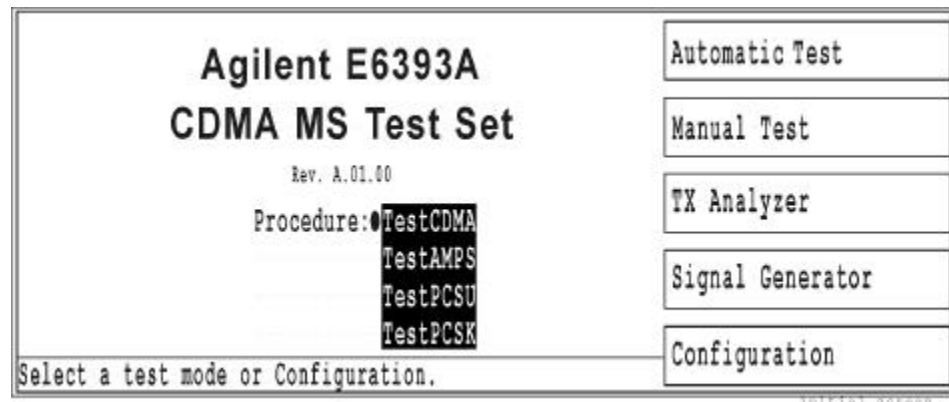
    d. Proceed to .

Step 6. Press the Configuration softkey to access the Configuration screen.
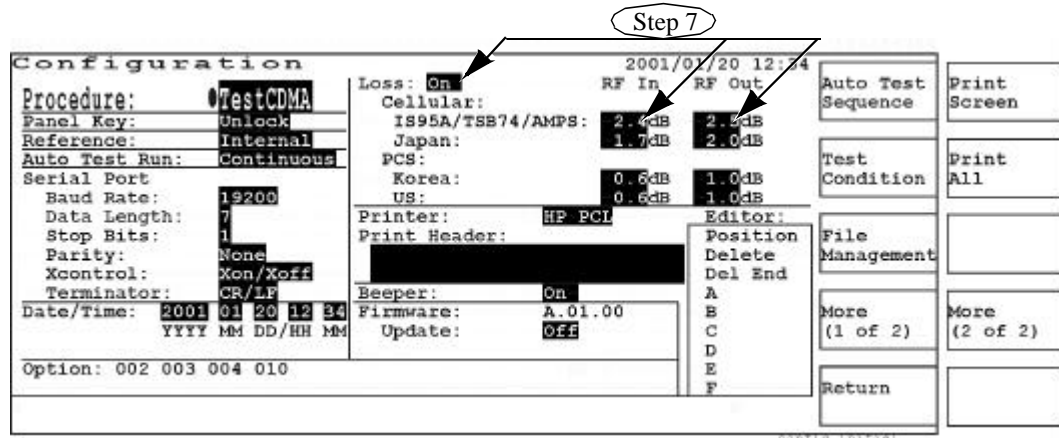
Step 7. In the Loss fields, enter the appropriate losses depending on the radio system and the coupler or cable you are using to connect the mobile to the Test Set. Refer to .

NOTE   Set the Loss field to On for automatic loss compensation.

Step 8. Press the Test Condition softkey to access the Test Setup: Test Condition screen. Using the CURSOR CONTROL knob, set the Radio System field to Cellr/IS95A and then set the Idle field for DC Current Avg Time.

Step 9. In the test item table shown in the right side of the above screen, enter the appropriate limit values.

NOTE Min TX Power is not available for the Test Set without Option 010, "High Level Signal Output and Low Power Measurement Capabilities".

Step 10. Press the Return softkey repeatedly until you return to the initial screen in Step 1 on page 47.

Step 11. Set the mobile phone to transmit the RF signal.

Step 12. Press the TX Analyzer softkey to access the TX Analyzer screen. Because the trigger mode defaults to Cont (for continuous), the measurement starts at once.

Step 13. If the RFCH channel number does not match the transmission channel number of the mobile, the measurement results will show "----" and "Fail".

Step 14. Press the Trigger Sing/<u>Cont</u> softkey to change the trigger mode to <u>Sing</u> (for single) and wait until one measurement is made.

Step 15. You can change any of the highlighted fields for parameters and test items. Set the RFCH channel number to the transmission channel number of the mobile.

Step 16. Press the Trigger softkey to begin a new single measurement.

Step 17. For example, if you want to precisely tune the transmission frequency of the mobile, you may turn off other test items but Frequency Error and use the continuous trigger mode to monitor your adjustment.

Step 18. After your measurement is complete, set the mobile phone not to transmit the RF signal and disconnect it from the Test Set.

Step 19. Press the Return softkey to return to the initial softkey screen.

Testing an AMPS Mobile Phone by TX Analyzer

This procedure explains how to test an AMPS mobile phone using the TX Analyzer mode.

NOTE   This procedure applies to the Test Set with Option 002, "TX Analyzer and Signal Generator Capabilities", Option 003, "AMPS Test Capability", and Option 010, "High Level Signal Output and Low Power Measurement Capabilities".

Step 1. Turn the Test Set on and wait for its selftest routine to finish.

Step 2. Refer to "Preparation for Each Test" on page 21 and perform the required procedures before starting the test.

Step 3. Use the Universal DC/Audio Adapter and appropriate cables to supply dc power from the Test Set to the mobile and to measure dc currents at the idle and talk states.

Step 4. Use the Universal DC/Audio Adapter and appropriate cables to connect the Analog Audio In and Out ports with the mobile. This connection enables to measure TX Distortion, FM Deviation, RX Distortion, and RX SINAD for AMPS mobiles.

Step 5. Press the **PRESET** key to reset the Test Set to the factory defaults.

NOTE   The instrument default state after power-on is the same state as just before power-off. The previous state is stored in the internal memory.

Step 6. If you are using an SRAM memory card with predefined test procedures, continue with this step, otherwise proceed to Step 7 on page 52.

   a. Insert the SRAM memory card into the MEMORY CARD slot. Up to four file names appear.

   b. Press the CURSOR CONTROL knob and rotate the knob to select one of the files.

2. Using Functions

     c. Press the CURSOR CONTROL knob again to recall the test procedure into the Test Set by pressing Yes softkey.

     d. Proceed to .

Step 7. Press the Configuration softkey to access the Configuration screen.

Step 8. In the Loss fields, enter the appropriate losses depending on the radio system and the coupler or cable you are using to connect the mobile to the Test Set. Refer to "Entering Losses" on page 22.

NOTE   Set the Loss field to On for automatic loss compensation.

Step 9. Press the Test Condition softkey to access the Test Setup: Test Condition screen.

Step 10. Using the CURSOR CONTROL knob, set the Radio System field to AMPS, and then set the highlighted fields for Power Level and SAT in the left side of the above screen.

Step 11. In the test item table shown in the right side of the above screen, enter the appropriate limit values.

Step 12. Press the Return softkey repeatedly to return to the initial screen in .

Step 13. Set the mobile phone to transmit the RF signal.

Step 14. Press the TX Analyzer softkey to access the TX Analyzer screen. Because the trigger mode defaults to Cont (for continuous) the measurements start at once.

Step 15. If the RFCH channel number does not match the transmission channel number of the mobile, the measurement results will show "----" and "Fail".

2. Using Functions

Step 16. Press the Trigger Sing/Cont softkey to change the trigger mode to Sing (for single) and wait until one measurement is made.
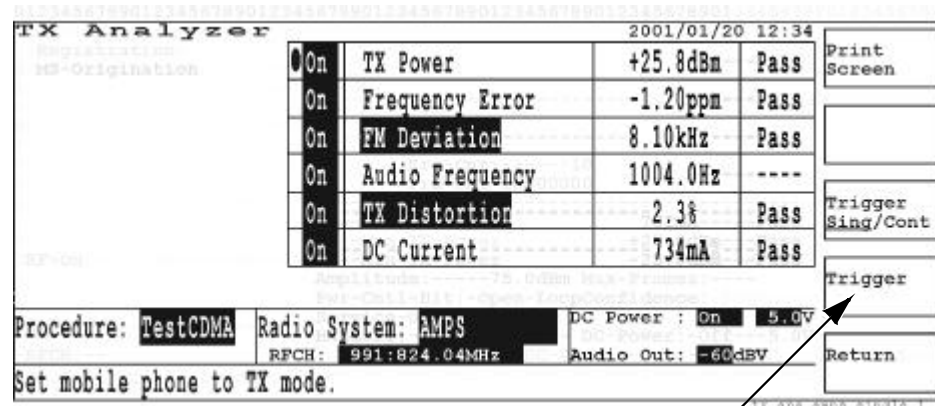
Step 17. You can change any of the highlighted fields for parameters and test items. Set the RFCH channel number to the transmission channel number of the mobile.

Step 18. Press the Trigger softkey to begin a new single measurement.

Step 19. For example, if you want to precisely tune the transmission frequency, you may turn off other test items but Frequency Error and use the continuous trigger mode to monitor your adjustment.

Step 20. After the measurements are complete, set the mobile phone not to transmit the RF signal and disconnect it from the Test Set.

Step 21. Press the Return softkey to return to the initial screen.

3   Screen Reference

In this chapter, the features and softkeys of each screen are explained in detail.

General Operation Guide

This section outlines how to operate the Test Set.

Front Panel Overview ⚠

The Test Set front panel is designed for flexibility, measurement speed and easy operation.

Figure 3-1   Front Panel of Agilent E6393A CDMA MS Test Set
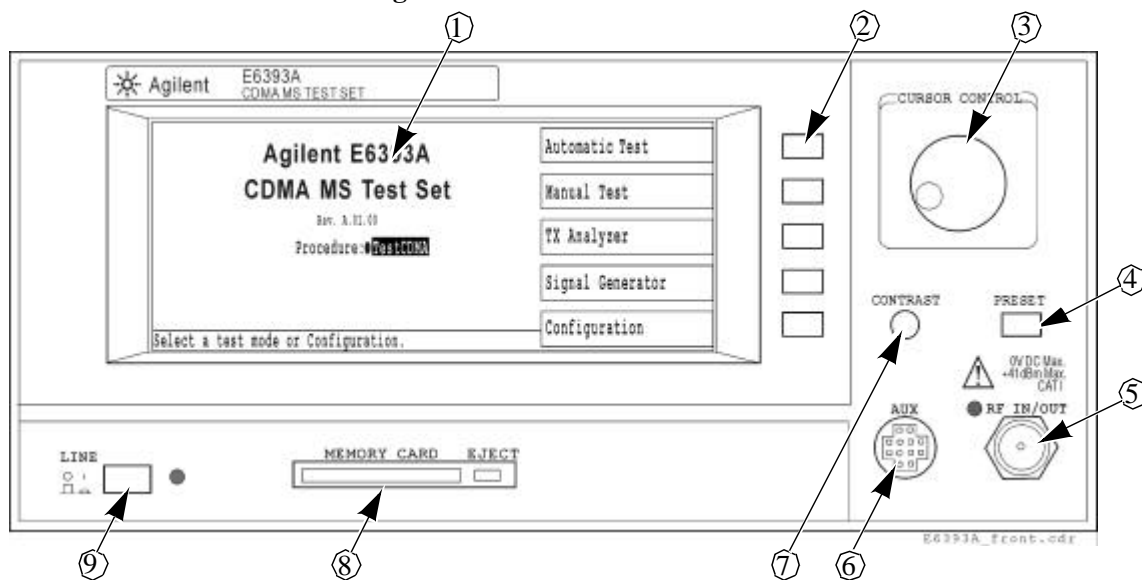
1. The LCD screen displays all testing conditions, procedures, and test results.

2. Five softkeys, adjacent to the softkey labels shown in the LCD screen, are individually defined according to each test mode and test sequence.

3. The CURSOR CONTROL knob has two major functions:

    • **To move the cursor**: Rotate the CURSOR CONTROL knob to move the blinking round cursor from one input field to another. Valid input fields are highlighted, however, read-only fields are not highlighted.

    • **To select an entry for an input field**: Press the CURSOR CONTROL knob once at an input field to change the blinking round cursor to the triangle selection cursor. Then rotate the CUSOR CONTROL knob to see the values defined for the input field.

    When the desired value is shown, press the knob again to enter the selected value in this field. The round cursor can now be moved to another input field.

4. The **PRESET** key resets the Test Set and displays the initial screen.

5. The RF IN/OUT N-type female connector is provided to connect the RF output signal to the mobile under test or to receive the input signal from the mobile. While the RF signal is output from or input to this connector, the green LED is lit. (This LED is INSTALLATION CATEGORY II.)

6. The AUX connector is provided for Universal DC Power Adaptor (P/N: E6393-60001) to supply dc power to the mobile under test through a cable assembly provided by the user.

7. The CONTRAST knob controls the brightness of the LCD screen.

8. The MEMORY CARD slot and the **EJECT** key are provided to save the test configuration and results to or load the test configuration from an SRAM memory card. Using the firmware update card, the current firmware can be updated to the new version.

9. The **LINE** key toggles the power on and off. The green LED is lit when the power is on. (This LED is INSTALLATION CATEGORY II.)

3. Screen Reference

Rear Panel Overview

The following illustration shows the rear panel of the Test Set.

Figure 3-2   **Rear Panel of Agilent E6393A CDMA MS Test Set**
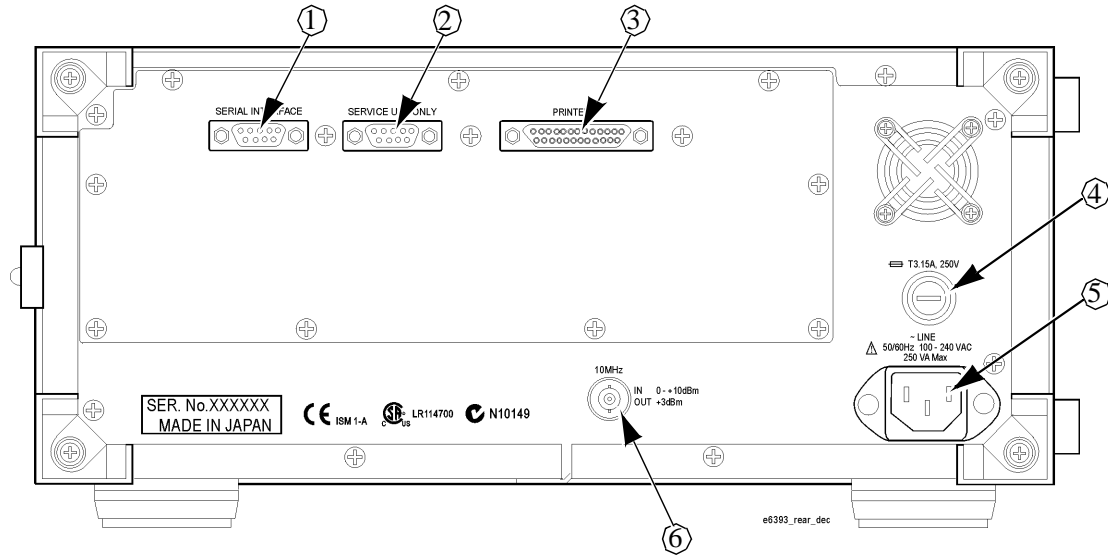
1. The DB-9 male connector is the RS-232 serial interface port which can be used to remotely control the Test Set.

2. The DB-9 male connector is for Agilent's service use only and cannot be used by the user.

3. The DB-25 female connector is a printer port.

4. The fuseholder contains a slowblow-type line fuse.

5. The AC power receptacle accepts a three-pronged power cord which is shipped with the Test Set.

6. The 10 MHz IN/OUT BNC-type female connector is provided to input or output the 10 MHz reference frequency signal.

Display Annotation

Depending on functions and test situations there are several types of LCD screens. The next illustration shows the common screen areas.

Figure 3-3   **LCD Display Annotation**
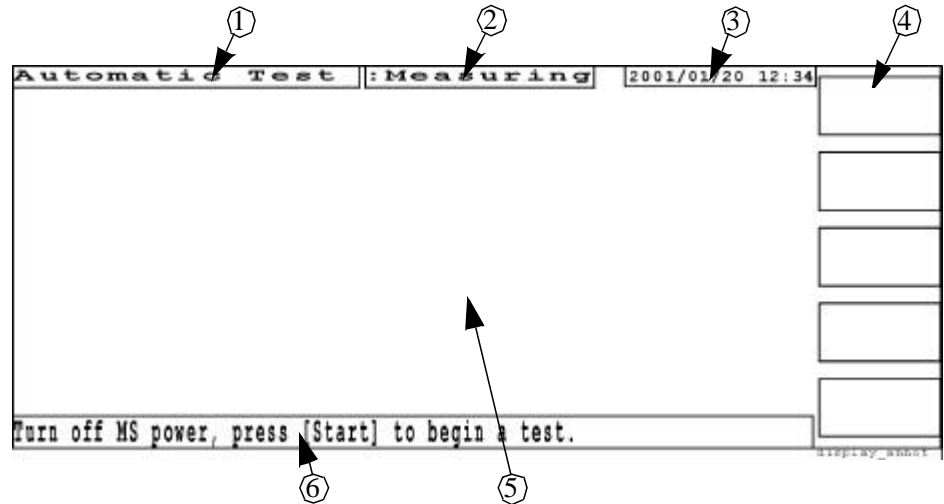
1. The current function mode is shown in this area.

2. The current operation status in the Automatic Test, Manual Test, TX Analyzer, and Configuration modes is shown here. This status includes Stand-by, Measuring, Aborted, Passed or Failed, Test Condition, and Test Sequence.

3. The current date and time are shown here.

4. The softkey labels are shown in this area. Each label defines the function of the corresponding softkey immediately to the right of the label.

5. This area is used to display the test flow, a test item table, test parameters, input fields, and test results.

6. Operation messages or customer configurable instruction messages for test flow steps are shown in this area.

3. Screen Reference

Screen Flow Chart

The following illustration shows the screens available for each function mode. Each rectangle represents a different screen.

Figure 3-4 **Screen Flow Chart**
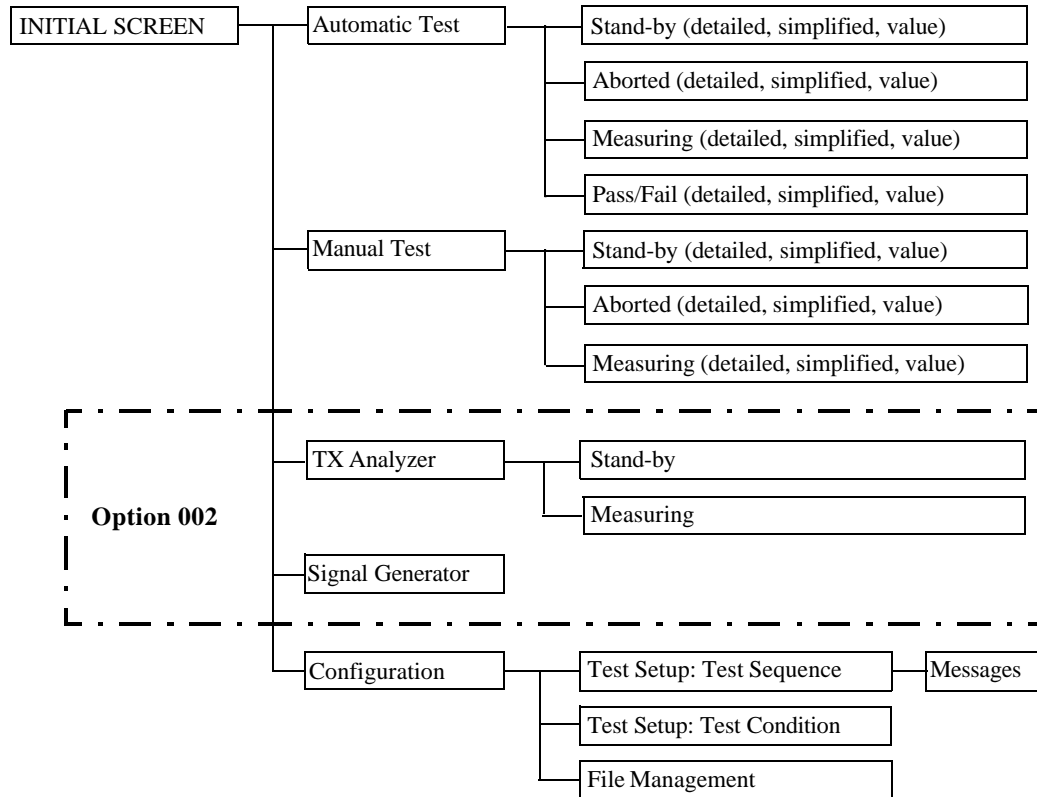
Available Functions

Depending on the options installed with the Test Set, the available function modes, available radio systems, and power measurement ranges are different. This chapter assumes the Test Set installed with Option 002, 003, 004, and 010 unless otherwise denoted.

- Option 002: Adds TX Analyzer and Signal Generator Function Capabilities

- Option 003: Adds AMPS Test Capability

- Option 010: Adds High Level Signal Output and Low Power Measurement Capabilities

Radio Systems Supported

The following radio systems are currently available.

Cellr/IS95A: EIA/TIA IS-95A Standard

Cellr/TSB74: TSB-74 Standard

Cellr/T53: ARIB T53 Standard

PCS Korea P0: PCS Korea P0

PCS Korea P1: PCS Korea P1

PCS US: PCS USA and J-STD-008 Standards

AMPS: EIA/TIA-553A AMPS Standard

Test Parameters, Test Items and Allowable Ranges

Depending on the function mode and radio system, there are a number of input fields for the test flow, test sequence and test condition. The allowable ranges for these input fields are explained in the latter parts of this guide. (Refer to Chapter A, "Input Fields and Allowable Ranges.")

Selecting an Input Field and Specifying a Value

All input fields are highlighted. You can move the blinking round cursor to select one of them.

Follow this procedure to select an input field and then specify a value for that input field:

Step 1. Rotate the CURSOR CONTROL knob clockwise to move the cursor down or right, or rotate it counterclockwise to go up or left, and place it at the field you want to change.
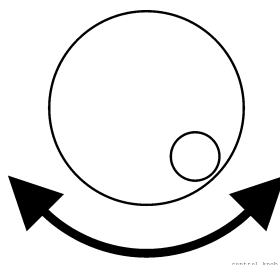
Step 2. Press the CURSOR CONTROL knob once. The cursor shape changes from a circle to a triangle, and the field to the right of the triangle is ready for input.
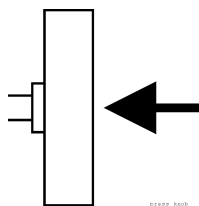
Step 3. Rotate the CURSOR CONTROL knob to see the values defined for the field.

Step 4. Press the CURSOR CONTROL knob to enter the selected value in the field. The cursor shape returns to a circle and starts blinking again.

Variable Increment/Decrement Softkey

When you place the cursor at an input field that accepts a numeric value, such as RF channel number or amplitude, a softkey with variable increments/decrements is activated, as shown in Figure 3-5.

Pressing this softkey changes the multiplier from 1 to 1000, and each click of the CURSOR CONTROL knob varies the value by an increment when rotated clockwise, or by a decrement when rotated counterclockwise. The following multipliers are available:

- ×1: Increment/decrement by 1,

- ×10: Increment/decrement by 10,

- ×100: Increment/decrement by 100,

- ×1000: Increment/decrement by 1000.

Storing the Numeric Values

For input fields such as channel numbers and amplitudes, you can store two numeric values using the memory softkey menus as shown in Figure 3-5. The following procedure is an example of how to store numeric values.

Figure 3-5 **Variable Increment/Decrement & Memory Softkeys**

At fields: Channel   Amplitude

Step 2 to 4   Step 5
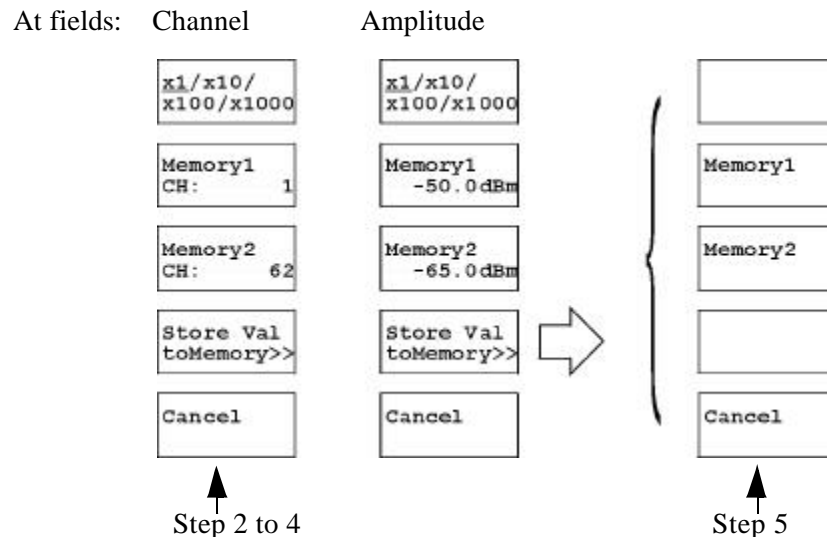
Step 1. Move the cursor to a channel field.

Step 2. Press the CURSOR CONTROL knob to select the field. The softkey menu shown in the first column of Figure 3-5 is activated. The two memory softkeys show the channel numbers previously stored in memory (if any).

Step 3. Select a numeric value in the input field using the CURSOR CONTROL knob.

Step 4. Press the Store Val to Memory >> softkey to reveal another softkey menu for Memory1 and Memory2.

3. Screen Reference

Step 5. Press either of the memory softkeys to store that value. The memory softkey menu returns to the state in Step 2 showing the newly stored value.

Step 6. Press the CURSOR CONTROL knob to enter the value into the field. The softkey menu returns to that of Step 1.

Recalling Numeric Values Stored in Memory Softkeys

For fields such as channel numbers and amplitudes, you can recall two numeric values stored in the memories (if any) using the following procedure:

Step 1. Move the cursor to one of the numeric input fields of channels or amplitudes.

Step 2. Press the CURSOR CONTROL knob to select the field. The softkey menu as shown in Figure 3-5 is activated. The two memory softkeys show the numeric values previously stored in memory (if any).

Step 3. Press either the Memory1 or Memory2 softkey to enter the stored value into the input field. The value is entered into the field and the softkey menu returns to that of Step 1.

Initial Screen and Softkey Menu

The initial screen is used to select one of the function modes as shown in Figure 3-6. The current firmware revision name and the procedure selection field are displayed.

NOTE   It takes about one minute for power-on initializing and the self testing processes to complete before the initial screen appears.

The instrument default state after power-on is the same state as just before power-off. The previous state is stored in the internal memory. Press the PRESET key to rest the Test Set to the factory default state.

To update the firmware with the most recent version, refer to "Firmware Update" on page 148.

To recall one of the test procedures from your SRAM card, refer to "Recalling a Test Setup File" on page 146.

To return to the initial display from any function mode, press the Return softkey (multiple times if necessary).

NOTE   For Test Sets without Option 002, the TX Analyzer and Signal Generator softkeys are not available.

Figure 3-6   **Initial Screen**
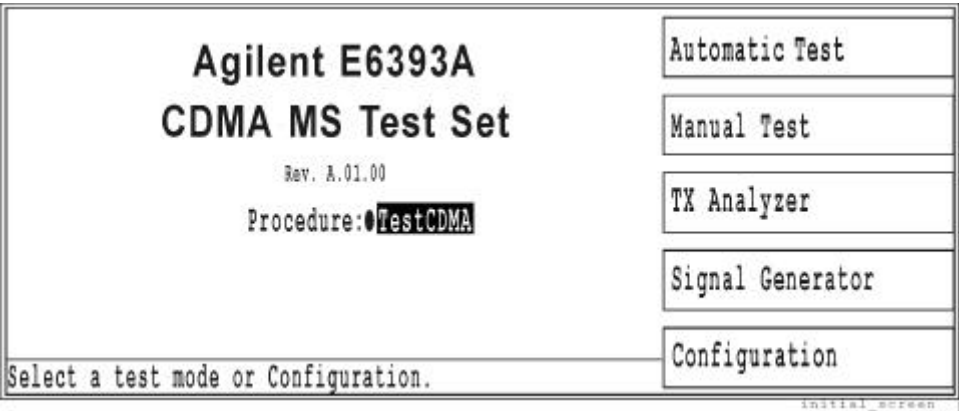
Initial Softkey Menu

o   Automatic Test: Displays the Automatic Test: Stand-by screen and its softkey menu. Refer to "Automatic Test Mode" on page 67.

o   Manual Test: Displays the Manual Test: Stand-by screen and its softkey menu. Refer to "Manual Test Mode" on page 85.

o   TX Analyzer: Displays the TX Analyzer screen and its softkey menu. Refer to "TX Analyzer Mode (Option 002)" on page 109.

o Signal Generator: Displays the Signal Generator screen and its softkey menu. Refer to "Signal Generator Mode (Option 002)" on page 117.

o Configuration: Displays the Configuration screen and its softkey menu. Refer to "Configuration" on page 120.

Automatic Test Mode

In this test mode, Pass/Fail test results on all test items in the table are automatically obtained by configuring the Test Setup: Test Sequence screen and the Test Setup: Test Condition screen in the Configuration mode.

NOTE   The instrument default state after power-on is the same state as just before power-off. The previous state is stored in the internal memory. Press the **PRESET** key to reset the Test Set to the factory default state.

CDMA Test Screens

The following screens are typical examples displayed during the Automatic Test mode for measuring CDMA formats: Cellr/IS95A, Cellr/TSB74, Cellr/T53, PCS US, PCS Korea P0, or PCS Korea P1.

Stand-by Screens

When the Automatic Test softkey is pressed, one of the following Stand-by screens is displayed, depending on the previous setting of the Screen >> ( ) softkey.

Figure 3-7   **CDMA Stand-by Simple Screen**

3. Screen Reference
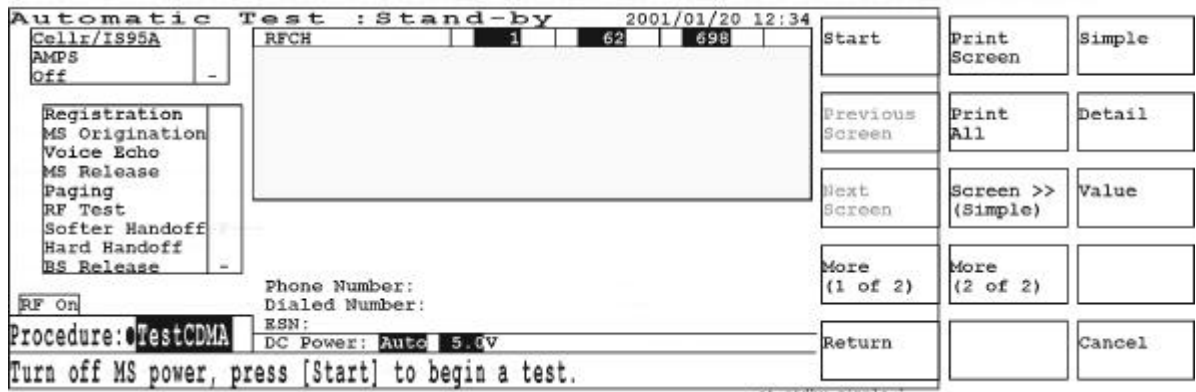
Figure 3-8   **CDMA Stand-by Detail Screen**

Figure 3-9   **CDMA Stand-by Value Screen**

Softkey Menu 1

o   Start: Begins testing the mobile with Automatic Test.

o   Previous Screen: Returns to the previous screen if any, otherwise this key is disabled.

o   Next Screen: Proceeds to the next screen if any, otherwise this key is disabled.

o   More (1 of 2): Displays the next softkey menu.

o   Return: Displays the initial screen with the initial softkey menu.

Softkey Menu 2

•   Print Screen: Makes a hardcopy of the current screen.

•   Print All: Makes a hardcopy of all test results.

•   Screen >> ( ): Displays the screen selection menu with the Simple, Detail, Value, and Cancel softkeys.

•   More (2 of 2): Returns to softkey menu 1.

Stand-by Screen Fields

Radio System. Three radio systems are shown in the upper left table of the screen. During the stand-by state, the radio system on the top line is underscored, otherwise the radio system being tested is underscored. The overall Pass/Fail results are shown in the right column of the table.

Test Flow. The test flow steps are shown in the left table. The tests to be executed can be set in the Test Setup: Test Sequence screen in the Configuration mode. According to the selection of the first call setup, the combination of the test sequence is different as described in "Test Flow" on page 125. The test flow steps with "-" are skipped. Pass or Fail is shown for each flow step executed.

3. Screen Reference

Input Fields. The following fields need to be set for a new test.

Field Name	Description
Procedure.	Displays a list of measurement setup files that are stored on an SRAM memory card. If there are no files on the card, this field remains blank.
RFCH	Accepts up to three traffic channel numbers according to the radio systems. • Cellr/IS95A, Cellr/TSB74, AMPS: 1 to 799 (825.03 to 848.97 MHz), 991 to 1023 (824.04 to 825.00 MHz) • Cellr/T53: 1 to 799 (915.0125 to 924.9875 MHz), 801 to 1039 (898.0125 to 900.9875 MHz), 1041 to 1199 (887.0125 to 888.9875 MHz) • PCS US: 0 to 1199 (1850.00 to 1909.95 MHz) • PCS Korea P0: 0 to 1300 (1715.00 to 1780.00 MHz) • PCS Korea P1: 1 to 600 (1750.05 to 1780.00 MHz), 601 to 1300 (1715.00 to 1750.00 MHz)
DC Power:[a]	Selects the dc voltage supply mode. o Auto: Supplies dc voltage to the mobile only during a test cycle. o On: Always supplies dc voltage to the mobile. o Off:[b] Disables to supply dc voltage to the mobile. This is the default value. Accepts a dc voltage value ranging from 3.0 to 12.0 V in 0.1 V steps. The default value is 3.0 V. This value is used for all four test modes.

a. This field is valid if Universal DC/Audio Adapter and the appropriate cables are used to supply dc power to the mobile under test.

b. When DC Power is set to Off, dc current cannot be measured.

Test Items. If either Detail or Value is selected in the Screen >> ( ) menu, the test items are shown in the table below. If Detail is selected, Pass/Fail test results are also shown. If Value is selected, the measured values are shown in the table.

If some items are skipped to test on the Test Setup: Test Sequence screen, or if the DC Power field is set to Off, "----" is shown in those cells and the corresponding steps in the test flow.

Test Item	Description
RFCH	Defines up to three RF channel numbers according to the radio system to be tested. The first RF channel should be always used but other two RF channels can be skipped ("---" shown) for single or two RF channels tests.
Max TX Power	Measures and displays the maximum transmission power levels. The range is from −60.0 (with Option 010) to +39.0dBm.
Min TX Power[a]	Measures and displays the minimum transmission power levels. The range is from −60.0 (with Option 010) to +39.0dBm.
Frequency Error	Measures and displays the center frequency error of an OQPSK modulated signal. The range is from −10,000 to +10,000 Hz.
Rho	Measures and analyzes the ratio (waveform quality) of the correlated power in a single coded channel to the total signal power. The range is from 0.900 to 1.000.
Time Offset	Measures and displays the timing offset derived from the Rho measurement. This indicates how well the mobile is synchronized to the pilot pseudorandom noise sequence. The range is from −3.25 to +3.25 μsec.
Sensitivity/FER	Measures and analyzes the sensitivity level with the frame error rate. The range is from 0 to 100%. This test is made under the condition of the maximum number of frames and confidence rate set in the Test setup: Test Condition screen.
DC Current (Idle)[b]	Measures and displays the dc current consumed at idling state only for the first RFCH channel. The range is from 0 to 1,000 mA.
DC Current (Talk)[b]	Measures and displays the dc current consumed at talking state. The range is from 0 to 1,000 mA.

a. This test item is available for the Test Set with Option 010, "High Level Signal Output and Low Power Measurement Capabilities".
b. DC power must be supplied to the mobile under test using the appropriate cable assembly from Universal DC/Audio Adapter.

3. Screen Reference

Explanation. The RF On annunciator on the left side of the screen is displayed only when the RF signal from the Test Set is present at the RF IN/OUT connector. When measuring RF test items, the Meas annunciator is also displayed to the right of RF On.

Operation and instruction messages are displayed at the bottom of the screen. You can create instruction messages that correspond to each test flow step. To edit the instruction messages, refer to "Test Setup: Messages" on page 129.

Voice Echo Measuring Screens

While the measurements are in progress, one of the following three screens is displayed depending on the previous setting of the Screen >> ( ) menu. The following examples illustrate the screens shown during the Voice Echo step of the test flow.

Figure 3-10   Voice Echo Measuring Simple Screen

Figure 3-11   Voice Echo Measuring Detail Screen

Figure 3-12   Voice Echo Measuring Value Screen

3. Screen Reference

Softkey Menu

o Pass: Press this softkey if your talk to the mobile is echoed back in good quality. This softkey is activated at the time of the Voice Echo step and becomes unavailable after being pressed.

o Fail: Press this softkey if your talk to the mobile is echoed back in poor quality. This softkey is activated at the time of the Voice Echo step and becomes unavailable after being pressed.

o Screen >> ( ): Displays the screen selection menu with Simple, Detail, Value, and Cancel softkey.

o Abort: Stops the measurement and returns to the Stand-by screen.

Explanation. After you press the Start softkey the Measuring screen is displayed, and the measurement begins.

While making measurements, respond to operation or instruction messages by pressing the appropriate softkeys or by operating the mobile's keys. As any modification of parameter values and test conditions is not allowed, the cursor is not available.

Each test flow step blinks as that step is performed. While the RF Test step is blinking, each of the test items blinks sequentially.

The dc current measurements are made when DC Power is set to Auto or On and dc power is supplied from the Test Set to the mobile. DC Current (Idle) is measured at the initialization complete stage (a part of the registration step) and DC Current (Talk) is measured at the last stage of RF tests.

Pause-On-Failure Screens

If the Auto Test Run field of the Configuration screen is set to Pause and a failure occurs, one of the following pause-on-failure screens is displayed depending on the previous setting of the Screen >> ( ) softkey.

Figure 3-13   Pause-On-Failure Simple Screen

Figure 3-14   Pause-On-Failure Detail Screen

Figure 3-15   Pause-On-Failure Value Screen

3. Screen Reference

Softkey Menu

o   Continue: Restarts the test after the paused step.

o   Manual Test: Activates the Manual Test: Stand-by screen to manually restart the test on the failed test item.

o   Screen >> ( ): Displays the screen selection menu with the Simple, Detail, Value and Cancel softkeys.

o   Abort: Exits the test process and returns to the Stand-by screen.

Continuous Measurement at Pause-On-Failure. If the Continue softkey is pressed, the rest of the tests at other RF channels are made. The next screen is displayed depending on the previous setting of the Screen >> ( ) softkey.

Figure 3-16   **Pause-On-Failure Continuous Measurement**
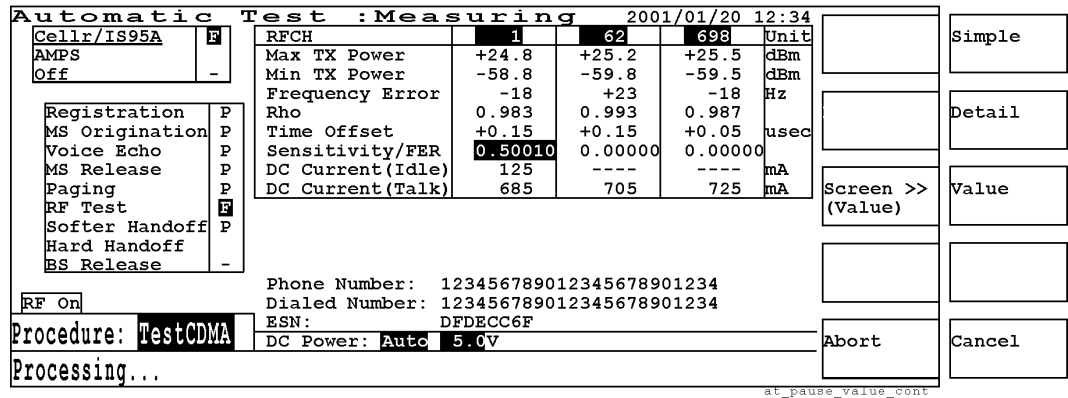
Aborted Screens

If the Abort softkey is pressed in the previous screen, the next screen displayed depends on the previous setting of the Screen >> ( ) softkey.

Figure 3-17   **Aborted Simple Screen**
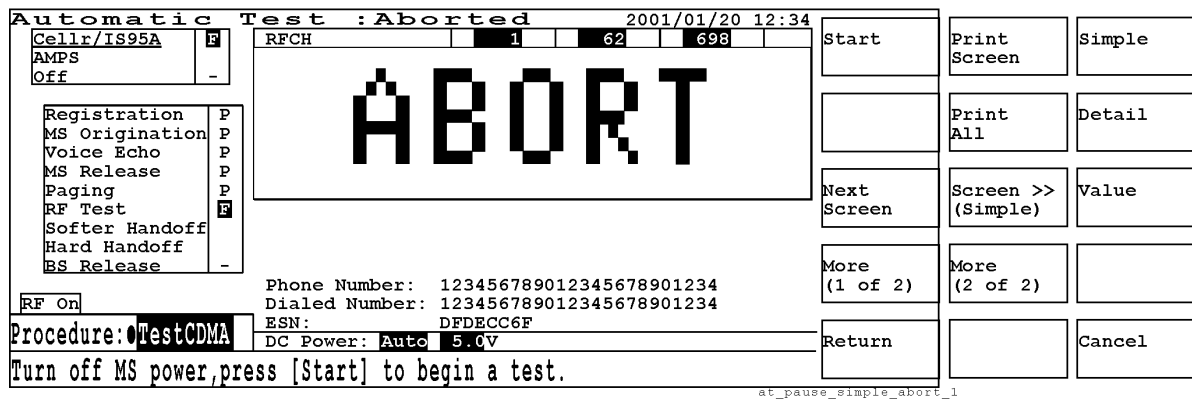
Pass/Fail Results Screens

When a test is complete, one of the following Passed (Figure 3-18) or Failed (Figure 3-19) results screens is displayed depending on the previous setting of the Screen >> ( ) softkey.

Figure 3-18   Passed Results Detail Screen

```
Automatic  Test  :Passed          2001/01/20 12:34
Cellr/IS95A  P  RFCH          1      62     698    Start    Print    Simple
AMPS            Max TX Power   Pass   Pass   Pass            Screen
Off          -  Min TX Power   Pass   Pass   Pass
                Frequency Error Pass  Pass   Pass            Print    Detail
Registration  P Rho            Pass   Pass   Pass            All
MS Origination P Time Offset   Pass   Pass   Pass
Voice Echo    P Sensitivity/FER Pass  Pass   Pass
MS Release    P DC Current(Idle) Pass ----   ----           Screen >> Value
Paging        P DC Current(Talk) Pass Pass   Pass            (Detail)
RF Test       P
Softer Handoff P
Hard Handoff  P
BS Release    -                                             More     More
                Phone Number:  123456789012345678901234     (1 of 2) (2 of 2)
RF On           Dialed Number: 123456789012345678901234
                ESN:           DFDECC6F
Procedure:●TestCDMA DC Power: Auto 5.0V                     Return            Cancel
Turn off MS power, press [Start] to begin a test.
                                              at_passed_detail_1
```

Figure 3-19   Failed Results Value Screen

```
Automatic  Test  :Failed          2001/01/20 12:34
Cellr/IS95A  F  RFCH          1      62     698   Unit Start Print    Simple
AMPS            Max TX Power  +24.8  +25.2  +25.5 dBm        Screen
Off          -  Min TX Power  -58.8  -59.8  -59.5 dBm
                Frequency Error -18   +23    -18  Hz   Previous Print  Detail
Registration  P Rho           0.983  0.993  0.987      Screen   All
MS Origination P Time Offset  +0.15  +0.15  +0.05 usec
Voice Echo    P Sensitivity/FER 0.50010 0.00000 0.00000%
MS Release    P DC Current(Idle) 125   ----   ----  mA        Screen >> Value
Paging        P DC Current(Talk) 685   705    725   mA        (Value)
RF Test       F
Softer Handoff P
Hard Handoff  P
BS Release    -                                              More     More
                Phone Number:  123456789012345678901234      (1 of 2) (2 of 2)
RF On           Dialed Number: 123456789012345678901234
                ESN:           DFDECC6F
Procedure:●TestCDMA DC Power: Auto 5.0V                      Return            Cancel
Turn off MS power, press [Start] to begin a test.
                                              at_failed_value_1
```

Softkey Menu 1

o   Start: Begins testing the mobile with Automatic Test.

o   Previous Screen: Returns to the previous screen if any, otherwise this key is disabled.

o   Next Screen: Proceeds to the next screen if any, otherwise this key is disabled.

o   More (1 of 2): Displays the next softkey menu.

o   Return: Displays the initial screen with the initial softkey menu.

Softkey Menu 2

•   Print Screen: Makes a hardcopy of the current screen.

•   Print All: Makes a hardcopy of all test results.

- Screen >> ( ): Displays the screen selection menu with the Simple, Detail, Value, and Cancel softkeys.

- More (2 of 2): Returns to softkey menu 1.

Explanation. In the Pass/Fail detailed screen, the test item cells are filled with either Pass or Fail. If some items are skipped in the Test Sequence screen and/or the DC Power field is set to Off, "-" is shown in the corresponding steps of the test flow and "----" is shown in those cells.

AMPS Test Screens (Option 003)

The AMPS test flow steps and test items are different from those of the CDMA test. The following are examples of screens displayed during the Automatic Test mode.

Stand-by Screens

When the test sequence proceeds to the AMPS tests following the CDMA tests, the Automatic Test: Stand-by detail or value screen is displayed as shown in Figure 3-20 or Figure 3-21, depending on the previous setting of the Screen >> ( ) softkey.

Figure 3-20   AMPS Stand-by Detail Screen

Figure 3-21   AMPS Stand-by Value Screen

Softkey Menu 1

o Start: Begins testing the mobile with Automatic Test.

o Previous Screen: Returns to the previous screen if any, otherwise this key is disabled.

o Next Screen: Proceeds to the next screen if any, otherwise this key is disabled.

o More (1 of 2): Displays the next softkey menu.

o Return: Displays the initial screen with the initial softkey menu.

3. Screen Reference

Softkey Menu 2

- Print Screen: Makes a hardcopy of the current screen.

- Print All: Makes a hardcopy of all test results.

- Screen >> ( ): Displays the screen selection menu with the Simple, Detail, Value, and Cancel softkeys.

- More (2 of 2): Returns to softkey menu 1.

Stand-by Screen Fields

Radio System. Up to three radio systems can be displayed in the upper left table of the screen. These radio systems are set in the Test Setup: Test Sequence screen (refer to "AMPS Test Sequence (Option 003)" on page 131). The overall Pass/Fail results for each radio system are shown in the right column of the table.

Test Flow. The test flow steps are shown in the lower left table. The individual tests to be executed are set in the Test Setup: Test Sequence screen in the Configuration mode. According to the selection of the first call setup, the combination of the test sequence is different as described in "Test Flow" on page 131. The test flow steps with "-" are skipped. The Pass/Fail results for each test flow are shown in the right column of the table.

Input Fields. The following fields need to be set for a new test.

Field Name	Description
Procedure:	Displays a list of measurement setup files that are stored on an SRAM memory card. If there are no files on the card, this field remains blank.
RFCH	Accepts up to three traffic channel numbers. 1 to 799 (825.03 to 848.97 MHz), 991 to 1023 (824.04 to 825.00 MHz)
DC Power:[a]	Selects the dc voltage supply mode. o Auto: Supplies dc voltage to the mobile only during a test cycle. o On: Always supplies dc voltage to the mobile. o Off:[b] Disables to supply dc voltage to the mobile. This is the default value. Accepts a dc voltage value ranging from 3.0 to 12.0 V in 0.1 V steps. The default value is 3.0 V. This value is used for all four test modes.

a. This field is valid if Universal DC/Audio Adapter and the appropriate cables are used to supply dc power to the mobile under test.

b. When DC Power is set to Off, dc current cannot be measured.

Test Items. If either Detail or Value is selected in the Screen >> ( ) softkey menu, the test items in the table below are shown. If Detail is selected, Pass/Fail test results are also shown. If Value is selected, the measured values are shown in the table.

If some items are skipped to test on the Test Setup: Test Sequence screen, or if the DC Power field is set to Off, "----" is shown in those cells and the corresponding steps in the test flow.

Test Item	Description
RFCH	Defines up to three RF channel numbers for AMPS. The first RF channel should be always used but other two RF channels can be skipped ("---" shown) for single or two RF channels tests.
TX Power	Measures and displays the transmission power levels. The range is from −20 to +39 dBm.
Frequency Error	Measures and displays the center frequency error. The range is from −12.50 to +12.50 ppm in 0.05 ppm steps.
FM Dev Limit[a]	Measures and displays the limiting function performance of the transmitter's peak frequency modulation deviation. The range is from 1.00 to 25.00 kHz.
TX Distortion[a]	Measures and analyzes the demodulated carrier's audio distortion. The range is from 0.0 to 100.0%.
RX Distortion[b]	Measures and displays the distortion from the receiver when a standard test tone is applied to the mobile. The range is from 0.0 to 100.0%.
RX SINAD[b]	Measures and analyzes the ratio (in dB) of (Signal + Noise + Distortion) to (Noise + Distortion). The range is from 0.0 to 40.0dB.
SAT Deviation	Measures and displays the peak frequency deviation of the supervisory audio tone (SAT). The range is from 1.00 to 25.00 kHz.
SAT Freq Error	Measures and analyzes the frequency accuracy of the supervisory audio tone (SAT). The range is from −600.0 to +600.0 Hz.
ST Deviation	Measures and displays the signaling tone's peak frequency deviation only for the first RFCH channel. The range is from 1.00 to 25.00 kHz.

3. Screen Reference

Test Item	Description
ST Frequency	Measures and analyzes the signaling tone's frequency accuracy only for the first RFCH channel. The range is from 9,000.0 to 11,000.0Hz.
DC Current (Idle)[c]	Measures and displays the dc current consumed at idling state only for the first RFCH channel. The range is from 0 to 1000 mA.
DC Current (Talk)[c]	Measures and displays the dc current consumed at talking state. The range is from 0 to 1000 mA.

a. The Analog Audio In port of Universal DC/Audio Adapter must be connected to the mobile under test with the appropriate cable assembly.

b. The Analog Audio Out port of Universal DC/Audio Adapter must be connected to the mobile under test with the appropriate cable assembly.

c. DC power must be supplied to the mobile under test using the appropriate cable assembly from Universal DC/Audio Adapter.

Explanation. The RF On annunciator on the left side of the screen is displayed only when the RF signal from the Test Set is present at the RF IN/OUT connector. When measuring RF/AF test items, the Meas annunciator is also displayed to the right of RF On.

Operation and instruction messages are displayed at the bottom of the screen. You can create instruction messages that correspond to each test flow step. To edit these instruction messages, refer to "Test Setup: Messages" on page 135.

Pass/Fail Results Screen

When a test is complete, one of the following Passed (Figure 3-22) or Failed (Figure 3-23) results screens is displayed depending on the previous setting of the Screen >> ( ) softkey.

Figure 3-22   **AMPS Passed Results Simple Screen**
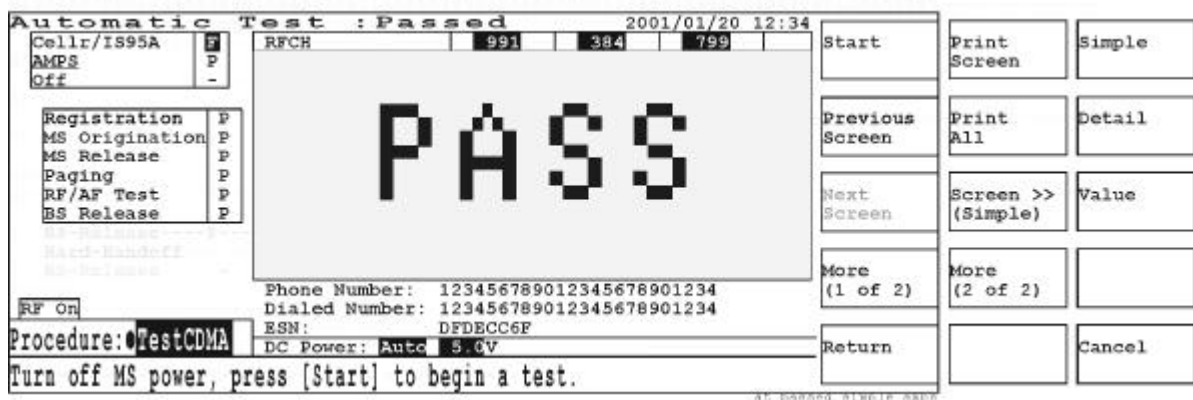
Figure 3-23   **AMPS Passed Results Value Screen**

Softkey Menu 1

o   Start: Begins testing the mobile with Automatic Test.

o   Previous Screen: Returns to the previous screen if any, otherwise this key is disabled.

o   Next Screen: Proceeds to the next screen if any, otherwise this key is disabled.

o   More (1 of 2): Displays the next softkey menu.

o   Return: Displays the initial screen with the initial softkey menu.

Softkey Menu 2

•   Print Screen: Makes a hardcopy of the current screen.

•   Print All: Makes a hardcopy of all test results.

- Screen >> ( ): Displays the screen selection menu with the Simple, Detail, Value, and Cancel softkeys.

- More (2 of 2): Returns to softkey menu 1.

Explanation. In the Pass/Fail detailed screen, the test item cells are filled with either Pass or Fail. If some test items are skipped in the Test Sequence screen, or if the DC Power field is set to Off, "----" are shown in those cells and the corresponding steps in the test flow.

Print Execution Screen

If either the Print Screen or Print All softkey is pressed, the screen changes as follows to confirm that you are ready to print.

Figure 3-24 **Print Execution Screen**

```
Automatic   Test  :Failed              2001/01/20 12:34
Cellr/IS95A  F | RFCH            1      62     698 |Unit|Yes
AMPS         P | Max TX Power  +24.8  +25.2  +25.5 |dBm
Off          - | Min TX Power  -58.8  -59.8  -59.5 |dBm
               | Frequency Error -18    +23    -18 |Hz
   Registration  P | Rho       0.983  0.993  0.987 |     |No
   MS Origination P | Time Offset +0.15 +0.15 +0.05|usec
   Voice Echo     P | Sensitivity/FER 0.50010 0.00000 0.00000|%
   MS Release     P | DC Current(Idle)  125   ----   ----|mA
   Paging         P | DC Current(Talk)  685    705    725|mA
   RF Test        F |
   Softer Handoff P
   Hard Handoff   P
   BS Release     -
                       Phone Number:  123456789012345678901234
 RF On                 Dialed Number: 123456789012345678901234
                       ESN:           DFDECC6F
Procedure:OTestCDMA    DC Power: Auto  5.0V
OK to print?
                                              at failed value print
```

Softkey Menu

o   Yes: Begins to print the screen image or all test results.

o   No: Cancels the printing process and returns to the previous screen.

Manual Test Mode

In the Manual Test mode, each test item is measured and analyzed with the test limits defined in the Test Setup: Test Condition screen of the Configuration mode.

In the Manual Test mode, tests are made while the Test Set and the mobile phone are networked to communicate with each other. This is used to test mobile phones in real time during the Connection step of a test flow.

NOTE   The instrument default state after power-on is the same state as just before power-off. The previous state is stored in the internal memory. Press the **PRESET** key to reset the Test Set to the factory default state.

NOTE   The RF On annunciator is always displayed on the left side of the screen as it is not allowed to manually control the RF signal output from the RF IN/OUT connector in the Manual Test mode.

CDMA Test Screens

For measuring one of the CDMA formats (Cellular IS-95A, Cellular TSB-4, Cellular Japan, PCS US, PCS Korea P0, or PCS Korea P1), the following screens are displayed during the Manual Test mode.

Stand-by Screen

Pressing the Manual Test softkey displays the following screen with the Stand-by state.

Figure 3-25   CDMA Manual Test Stand-by Screen


```
Manual  Test         :Stand-by        2001/01/20 12:34
  Registration                                          Registra-  Trigger   Print
  MS Origination     On  TX Power              ----      tion       Sing/Cont Screen
  MS Release
  Paging             On  Frequency Error
  BS Release
  Connection         On  Rho                             Paging     Trigger
  Softer Handoff         ┌Err Cnt
  Hard Handoff       On  FER├Frm Cnt
                     On  Time Offset                     Clear      MS Info
                     On  DC Current                      Status
                     ---  Max TX Power
  RF On              ---  Min TX Power
                     Amplitude:    -75.0dBm Max Frames:      1000 More       More      More
Procedure:●TestCDMA  Pwr Cntl Bit: Open LoopConfidence: 95%       (1 of 3)   (2 of 3)  (3 of 3)
                     Service Option:      2
Radio System: Cellr/IS95A Handoff: Cellr/TSB74  DC Power: On   5.0V
  RFCH:  384:836.52MHz     RFCH:  991:824.04MHz                   Return
Press [Registration], [Paging] or dial and call from the mobile.
                                                      mt_stndby_cdma_1
```

Softkey Menu 1

o   Registration: Press this softkey to register the mobile with the Test Set. This softkey is disabled while the idling dc current measurements are in progress.

o   Paging: Press this softkey instead of MS Origination to page the mobile from the Test Set. If this step is successful, the Connection step begins blinking. This softkey is disabled while the idling dc current measurements are in progress.

o   Clear Status: Erases the PASS/FAIL results from the flow table. This softkey is disabled while the idling dc current measurements are in progress.

o   More (1 of 3): Displays the next softkey menu.

o   Return: Displays the initial screen with function modes. This softkey is disabled while the idling dc current measurements are in progress.

Softkey Menu 2

•   Trigger Sing/Cont: Toggles the trigger mode between Sing (single) and Cont (continuous). To exit from the continuous measurement mode, press this softkey to change to Sing and wait for a single measurement to finish.

•   Trigger: Starts a single or continuous measurement of the idling dc current after initialization according to the trigger mode selected. This softkey is disabled while measurements are in progress.

•   MS Info: Changes the screen to show the mobile station information including the phone number, dialed number, and ESN (electronic serial number). This softkey is disabled while the idling dc current measurements are in progress.

•   More (2 of 3): Displays the next softkey menu.

Softkey Menu 3

o   Print Screen: Makes a hardcopy of the current screen. This softkey is disabled while the idling dc current measurements are in progress.

o   Prev Radio System: Returns to the radio system test screen prior to making the hard handoff. The test results are erased for a new test. If no hard handoff is previously made or if you are measuring the idling dc current, this softkey is disabled.

o   More (3 of 3): Returns to softkey menu 1.

Screen Fields. The call processing status and results are displayed in the table on the left side of the screen. Softer Handoff and Hard Handoff tests are executed only when the corresponding softkeys are pressed. The following fields need to be set for a new test.

Field Name	Description
Procedure:	Displays a list of measurement setup files that are stored on an SRAM memory card. If there are no files on the card, this field remains blank.
Radio System:	Sets the radio system to Cellr/IS95A, Cellr/TSB74, Cellr/T53, PCS US, PCS Korea P0, PCS Korea P1, or AMPS. If set to AMPS, the screens are different from those of other radio systems.
RFCH	Accepts a traffic channel number along with its defined frequency value according to the radio system selected. • Cellr/IS95A, Cellr/TSB74: 1 to 799 (825.03 to 848.97 MHz), 991 to 1023 (824.04 to 825.00 MHz) • Cellr/T53: 1 to 799 (915.0125 to 924.9875 MHz), 801 to 1039 (898.0125 to 900.9875 MHz), 1041 to 1199 (887.0125 to 888.9875 MHz) • PCS US: 0 to 1199 (1850.00 to 1909.95 MHz) • PCS Korea P0: 0 to 1300 (1715.00 to 1780.00 MHz) • PCS Korea P1: 1 to 600 (1750.05 to 1780.00 MHz), 601 to 1300 (1715.00 to 1750.00 MHz)
Amplitude:	Sets the test power level ranging from −110.0 to −40.0dBm (−20.0 dBm with Option 010) in 0.1 dB steps.
Pwr Cntl Bit:	Sets the power control bit pattern to Open Loop, Alwy (Always) Up, or Alwy (Always) Down.

3. Screen Reference

Field Name	Description
Service Option:	Sets the service option to one of the following: 1: Normal voice loopback 2: Data loopback at 9600 bps 3: Voice loopback using EVRC (enhanced variable rate coder) at 9600 bps 9: Data loopback at 14.4 kbps 32768: Voice loopback at 14.4 kbps
Handoff:	Sets another radio system with which to perform a handoff If Cellr/T53 or AMPS is set in the Radio System field, no handoff is allowed and this field is not shown.
RFCH:	Sets a channel number along with its defined frequency value to be handoff from Radio System RFCH.
Max Frames:	For FER tests, sets the maximum number of frames to be tested ranging from 25 to 10,000,000.
Confidence:	For FER tests, toggles the confidence value between 95% and Off.
DC Power:[a]	Selects the dc voltage supply mode. o On: Always supplies dc voltage to the mobile. o Off:[b] Disables to supply dc voltage to the mobile. This is the default value. Accepts a dc voltage value ranging from 3.0 to 12.0 V in 0.1 V steps. The default value is 3.0 V. This value is used for all four test modes.

a. This field is valid if Universal DC/Audio Adapter and the appropriate cables are used to supply dc power to the mobile under test.

b. When DC Power is set to Off, dc current cannot be measured.

Test Items. The following test items are shown in the test items table. Tests from TX Power to DC Current are measured continuously until the trigger mode is changed to single or the Return softkey is pressed. With the Test Set installed with Option 010, Max TX Power and Min TX Power are measured only when the Max & Min Power softkey is pressed.

Test Item	Description
TX Power	Measures and displays the transmission power levels. The range is from −20 (−60 with Option 010) to +39 dBm.
Frequency Error	Measures and displays the center frequency error of an OQPSK modulated signal. The range is from −10,000 to +10,000 Hz.
Rho	Measures and analyzes the ratio (waveform quality) of the correlated power in a single coded channel to the total signal power. The range is from 0.900 to 1.000.
FER	Measures and analyzes the frame error rate based on the error counts and frame counts specified. The range is from 0.0 to 5.0%.
Err Cnt	Shows the actual number of frame errors. The range is from 0.0 to 10,000,000.
Frm Cnt	Shows the actual number of frames. The range is set in the Max Frames field. If there are no frame errors in the initial 600 frames, then the test proceeds to the next item.
Time Offset	Measures and displays the timing offset derived from the Rho measurement. This indicates how well the mobile is synchronized to the pilot pseudorandom noise sequence. The range is from −3.25 to +3.25 µsec.
DC Current[a]	Measures and displays the dc current consumed at idling state for Registration and Paging, then at RF test state for Connection. The range is from 0 to 1,000 mA.
Max TX Power	Measures and displays the maximum transmission power when the Max & Min Power softkey is pressed. The range is from −20 (−60 with Option 010) to +39 dBm.
Min TX Power[b]	Measures and displays the minimum transmission power when the Max & Min Power softkey is pressed. The range is from −60 to +39 dBm.

a. DC power must be supplied to the mobile under test using the appropriate cable assembly from Universal DC/Audio Adapter.
b. This test item is available for the Test Set with Option 010, "High Level Signal Output and Low Power Measurement Capabilities".

When measuring RF test items, the Meas annunciator is displayed to the right of RF On.

3. Screen Reference

Measuring Screens

Depending on the test flow steps and current trigger mode, different screens are displayed.

Registration Screen. If the Registration softkey is pressed, the screen state changes to Measuring and the Registration step blinks to register the mobile with the Test Set. Once the mobile is registered, PASS is shown in the test flow table, and the screen returns to the Stand-by state. In the example below, the trigger mode is previously set to Sing (single).

Figure 3-26   **Registered Stand-by Screen**
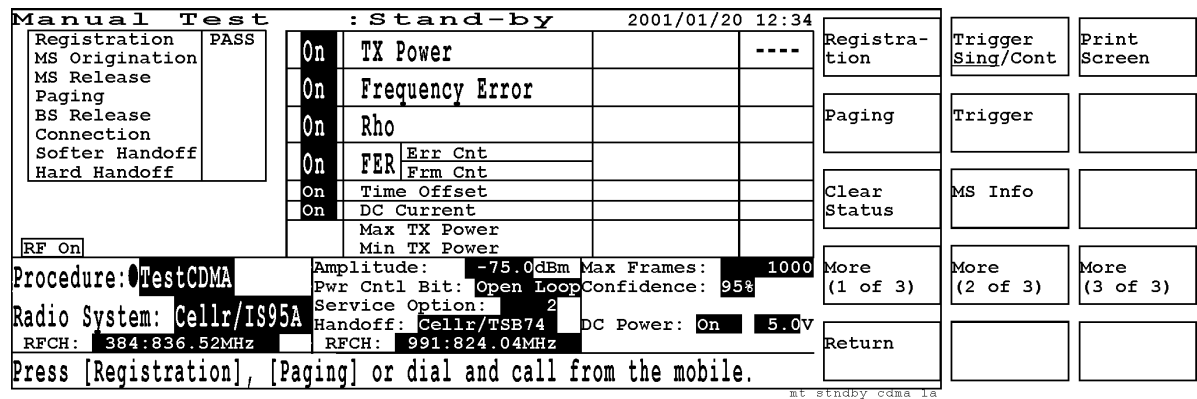
MS Origination Measuring Screens. To begin the MS Origination step, place a call from the mobile. If MS Origination is successful, PASS is shown in the test flow table as shown below. The screen shows the state just prior to starting RF tests with the single trigger mode. The RF On and Meas annunciators are shown in the left side of the screen.

Figure 3-27   **MS Origination Measuring Screen (1/3)**
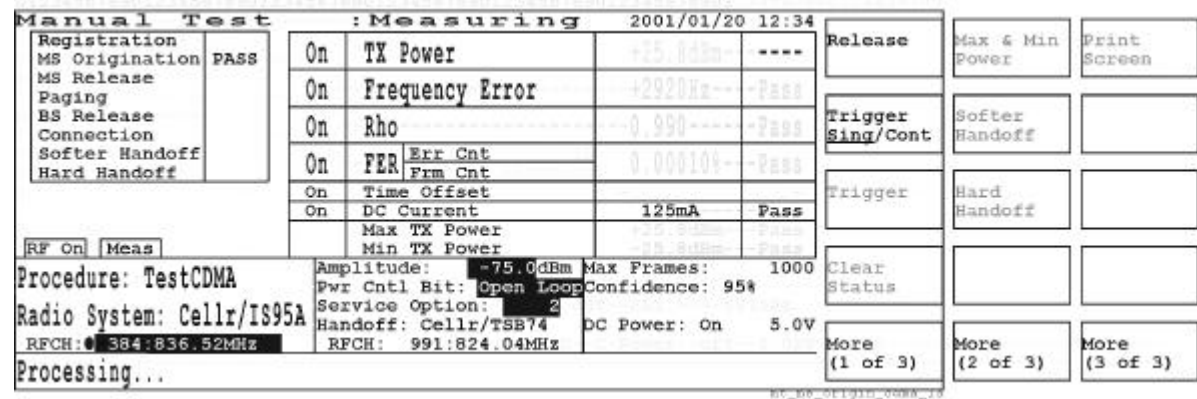
The next screen shows the state just prior to making Time Offset measurements.

Figure 3-28   MS Origination Measuring Screen (2/3)

At the completion of one measurement cycle, all of the test items are measured and Pass or Fail are shown in the right column of the test item table. The softkey menus are all valid now.

Figure 3-29   MS Origination Measuring Screen (3/3)

Softkey Menu 1

o Release: Press this softkey to release the mobile from the Test Set. If this step is successful, PASS or FAIL is shown in the right column of the BS Release and Connection steps.

o Trigger Sing/Cont: Toggles the trigger mode between Sing (single) and Cont (continuous). To exit from the continuous measurement mode, press this softkey to change to <u>Sing</u> and wait for a single measurement to finish.

o Trigger: Starts a single or continuous measurement of RF tests according to the trigger mode selected. This softkey is disabled while measurements are in progress.

o Clear Status: Erases the PASS/FAIL results from the flow table. This softkey is disabled while measurements are in progress.

o More (1 of 3): Displays the next softkey menu.

3. Screen Reference

Softkey Menu 2

- Max & Min Power: Measures the maximum TX power level (with the standard Test Set) or the maximum and minimum TX power levels (with the Test Set with Option 010). This softkey is labeled as Max Power for the standard Test Set. This softkey is disabled while measurements are in progress.

- Softer Handoff: Performs the Softer Handoff step. This softkey is disabled while measurements are in progress.

- Hard Handoff: Performs the Hard Handoff step. This softkey is disabled while measurements are in progress.

- MS Info: Displays the mobile information, including the phone number, dialed number, and ESN (electronic serial number). This softkey is disabled while measurements are in progress.

- More (2 of 3): Displays the next softkey menu.

Softkey Menu 3

o Print Screen: Makes a hardcopy of the current screen. This softkey is disabled out while measurements are in progress.

o More (3 of 3): Returns to softkey menu 1.

Max and Min TX Power Measuring Screen. For the Test Set with Option 010, press the Max & Min Power softkey to measure the maximum and minimum TX power levels. For the standard Test Set, this measures only the maximum TX power level. While this measurement is in progress, the Meas annunciator is shown in the left side of the screen. The softkey menus are the same as the previous screen.

Figure 3-30   **Max and Min TX Power Measuring Screen**

Softer Handoff Test Screen. Pressing the Softer Handoff softkey causes the mobile to search for other cells to synchronize with. If this test is successful, the next screen is shown. While the softer handoff test is in progress, the Connection step stops blinking and the Softer Handoff step blinks. If the softer handoff is successful, PASS is shown in the right column of the step and the Connection step begins blinking again. The softkey menus are the same as the previous screen.

Figure 3-31   Softer Handoff Result Screen

MS Information Screen. Pressing the MS Info softkey displays the following screen with the information associated with the mobile under test. If the connection with the mobile is made by the Paging step, the dialed number is blank.

Figure 3-32   MS Information Screen

Item	Description
Phone Number:	Shows the phone number of the mobile under test.
Dialed No.:	Shows the number dialed by the mobile under test, if the connection is made by the MS Origination step. If the connection is made by the Paging step, however, no information is shown in this field.
ESN:	Shows the electronic serial number of the mobile under test.

Softkey Menu

o   Print Screen: Makes a hardcopy of the current screen.

o   Return: Returns to the measuring screen.

Paging Measuring Screens. Press the Paging softkey to page the mobile from the Test Set instead of executing MS Origination. If this process is successful, PASS is shown to the right column of the test flow table and the RF measurements start. In the example below, the trigger mode is set to Cont (continuous) so the measurement is made repeatedly.

Figure 3-33   Paging Measuring Screen (1/2)

To exit from the continuous measurement mode, press the Trigger Sing/Cont softkey to change to Sing and wait for a single measurement to finish as shown below.

Figure 3-34   Paging Measuring Screen (2/2)

Softkey Menu 1

o   Release: Press this softkey to release the mobile from the Test Set. If this step is successful, PASS or FAIL is shown in the right column of the BS Release and Connection steps.

o   Trigger Sing/Cont: Toggles the trigger mode between Sing (single) and Cont (continuous). To exit from the continuous measurement mode, press this softkey to change to <u>Sing</u> and wait for a single measurement to finish.

o   Trigger: Starts a single or continuous measurement of RF tests according to the trigger mode selected. This softkey is disabled while measurements are in progress.

o   Clear Status: Erases the PASS/FAIL results from the flow table. This softkey is disabled while measurements are in progress.

o   More (1 of 3): Displays the next softkey menu.

Softkey Menu 2

•   Max & Min Power: Measures the maximum TX power level (with the standard Test Set) or the maximum and minimum TX power levels (with the Test Set with Option 010). This softkey is labeled as Max Power for the standard Test Set. This softkey is disabled while measurements are in progress.

•   Softer Handoff: Performs the Softer Handoff step. This softkey is disabled while measurements are in progress.

•   Hard Handoff: Performs the Hard Handoff step. This softkey is disabled while measurements are in progress.

•   MS Info: Displays the mobile information, including the phone number, dialed number, and ESN (electronic serial number). This softkey is disabled while measurements are in progress.

•   More (2 of 3): Displays the next softkey menu.

Softkey Menu 3

o   Print Screen: Makes a hardcopy of the current screen. This softkey is disabled out while measurements are in progress.

o   More (3 of 3): Returns to softkey menu 1.

3. Screen Reference

Hard Handoff to AMPS Screen. Pressing the Hard Handoff softkey causes the mobile to make a hard handoff from one radio system to another, such as from Cellr/IS95A to AMPS in the example below. While this hard handoff test is in progress, its flow step blinks and then stops blinking with PASS or FAIL result.

Once the radio system switches to AMPS, its measurements can begin immediately depending on the trigger mode previously set.

Figure 3-35   Hard Handoff from Cellr/IS95A to AMPS Screen

Softkey Menu 1

o   Release: Press this softkey release the mobile from the Test Set. The BS Release and Connection steps are judged as PASS or FAIL.

o   Trigger Sing/Cont: Toggles the trigger mode between Sing (single) and Cont (continuous). To exit from the continuous measurement mode, press this softkey to change to Sing and wait for a single measurement to finish.

o   Trigger: Starts a single or continuous measurement of RF tests according to the trigger mode selected. This softkey is disabled while measurements are in progress.

o   Clear Status: Erases the PASS/FAIL results from the flow table. This softkey is disabled while measurements are in progress.

o   More (1 of 3): Displays the next softkey menu.

Softkey Menu 2

•   Audio Out Adjust: Adjusts the audio signal output level to have 8 kHz FM deviation for TX distortion measurements. This softkey is disabled while measurements are in progress.

•   MS Info: Changes the screen to show the information on the mobile station. The information includes the phone number, dialed number, and ESN (electronic serial number). This softkey is disabled while measurements are in progress.

•   More (2 of 3): Displays the next softkey menu.

Softkey Menu 3

o Print Screen: Makes a hardcopy of the current screen. This softkey is disabled while measurements are in progress.

o More (3 of 3): Returns to softkey menu 1.

3. Screen Reference

AMPS Test Screens (Option 003)

For measuring AMPS systems, the following screens are available for the Manual Test mode.

NOTE   This radio system test capability is available for the Test Set installed with Option 003 'AMPS Test Capability.'

Stand-by Screen

When the Manual Test mode is selected, the following Stand-by screen is displayed.

Figure 3-36   **Manual Test Stand-by Screen**

Softkey Menu 1

o   Registration: Press this softkey to register the mobile with the Test Set. This softkey is disabled while the idling dc current measurements are in progress.

o   Paging: Press this softkey to page the mobile from the Test Set. If this process is successful, the Connection step begins blinking for RF measurements. This softkey is disabled while the idling dc current measurements are in progress.

o   Clear Status: Erases the PASS/FAIL results from the flow table. This softkey is disabled while the idling dc current measurements are in progress.

o   More (1 of 3): Displays the next softkey menu.

o   Return: Displays the initial screen with function modes. This softkey is disabled while the idling dc current measurements are in progress.

Softkey Menu 2

o   Trigger Sing/Cont: Toggles the trigger mode between Sing (single) and Cont (continuous). To exit from the continuous measurement mode, press this softkey to change to Sing and wait for a single measurement to finish.

- Trigger: Starts a single or continuous measurement of the idling dc current after registration according to the trigger mode selected. This softkey is disabled while measurements are in progress.

- MS Info: Displays the mobile information including the phone number, dialed number, and ESN (electronic serial number). This softkey is disabled while the idling dc current measurements are in progress.

- More (2 of 3): Displays the next softkey menu.

Softkey Menu 3

o Print Screen: Makes a hardcopy of the current screen. This softkey is disabled while the idling dc current measurements are in progress.

o Prev Radio System: Returns to the radio system test screen prior to making the hard handoff. The test results are erased for a new test. If no hard handoff is previously made or if you are measuring the idling dc current, this softkey is disabled.

o More (3 of 3): Returns to softkey menu 1.

3. Screen Reference

Screen Fields. The call processing status and results are displayed in the left table. Softer Handoff and Hard Handoff tests are executed only when the corresponding softkeys are pressed. The following fields need to be set for a new test.

Field Name	Description
Procedure:	Displays a list of measurement setup files that are stored on an SRAM memory card. If there are no files on the card, this field remains blank.
Radio System:	Sets the radio system to AMPS. If set to Cellr/IS95A, Cellr/TSB74, Cellr/T53, PCS US, PCS Korea P0, or PCS Korea P1, the screens are different from those for AMPS.

RFCH:	Accepts a traffic channel number along with its defined frequency value as follows:
	
	• AMPS:
	
	   1 to 799 (825.03 to 848.97 MHz),
	   991 to 1023 (824.04 to 825.00 MHz)

Amplitude:	Sets the test power level. The range is from -120.0 to -40.0 dBm in 0.1dB steps. The default value is -75.0 dBm.
Audio Out:	Sets the amplitude of the audio frequency signal of 1.004kHz which is available through the AUX connector on the front panel. The range is from -60 to 0 dBV in 1 dB steps. The default value is -60 dBV.
Power Level:	Sets the TX output power level to 0 (+36 dBm) through 7 (+8dBm). See Table A-1 and Table A-2 in Appendix A, "Input Fields and Allowable Ranges."
SAT:	Sets the supervisory audio tone to either of 5970, 6000, or 6030Hz. The default selection is 5970 Hz.
DC Power:[a]	Selects the dc voltage supply mode. o On: Always supplies dc voltage to the mobile. o Off:[b] Disables to supply dc voltage to the mobile. This is the default value. Accepts a dc voltage value ranging from 3.0 to 12.0 V in 0.1V steps. The default value is 3.0 V. This value is used for all four test modes.

a. This field is valid if Universal DC/Audio Adapter and the appropriate cables are used to supply dc power to the mobile under test.
b. When DC Power is set to Off, dc current cannot be measured.

Test Items. The following test items are shown in the table. All tests are made continuously until the trigger mode is changed to single or the Return softkey is pressed.

Test Item	Description
TX Power	Measures and displays the transmission power levels. The range is from −20 to +39 dBm.
Frequency Error	Measures and displays the center frequency error. The range is from −12.5 to +12.5 ppm in 0.01 ppm steps.
FM Deviation[a], or ST Deviation, or SAT Deviation	Select from FM Deviation, ST Deviation, or SAT Deviation. ST Deviation can be selected only in the Stand-by screen and this measurement is made between the Paging and Connection steps. Measures and displays its frequency deviation. The range is from 1 to 25 kHz.
Audio Frequency	Measures and displays the audio frequency. The range is from 20 Hz to 20 kHz.
TX Distortion[a], or RX Distortion[b], or RX SINAD[b]	Select from TX Distortion, RX Distortion, or RX SINAD. Measures and displays the transmitter or receiver distortion level. The range is from 0 to 100%. The range for RX SINAD is from 0 to 40 dB.
DC Current[c]	Measures and displays the dc current consumed at the idle or RF tests. The range is from 0 to 1000 mA.

  a. The Analog Audio In port of Universal DC/Audio Adapter must be connected to the mobile under test with the appropriate cable assembly.
  b. The Analog Audio Out port of Universal DC/Audio Adapter must be connected to the mobile under test with the appropriate cable assembly.
  c. DC power must be supplied to the mobile under test using the appropriate cable assembly from Universal DC/Audio Adapter.

When measuring RF/AF test items, the Meas annunciator is displayed to the right of RF On.

3. Screen Reference

Measuring Screens

Depending on the test flow steps and trigger mode, the different screens are displayed.

Registration Screens. If the Registration softkey is pressed, the Test Set begins register the mobile. While registering, the screen state changes to Measuring and the Registration flow step blinks. Once the mobile is registered, PASS is shown in the test flow table, and the screen returns to the Stand-by state. In this example, the trigger mode is set to Sing (single).

Figure 3-37   **Registered Stand-by Screen**
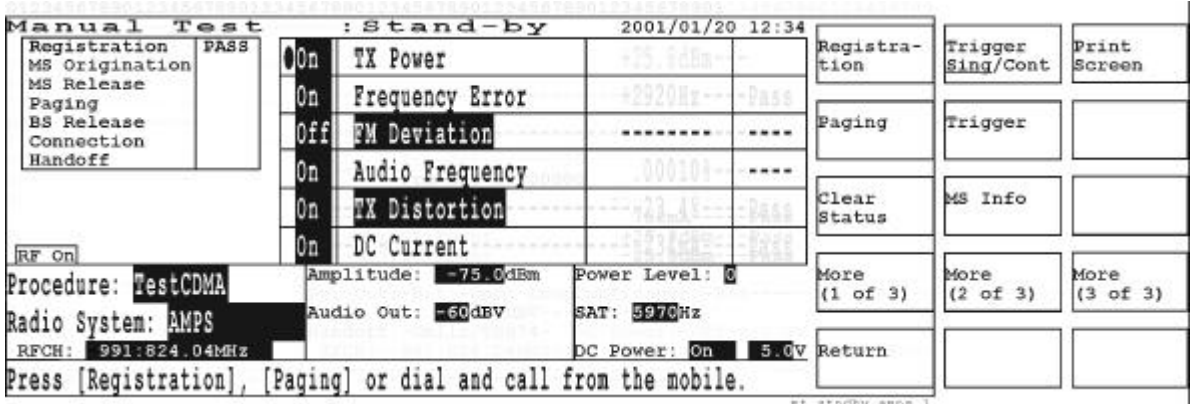
MS Origination Measuring Screens. To activate the MS Origination step, place a call from the mobile. If MS Origination is successful, PASS is shown in the test flow table as shown below. The screen shows the state just prior to starting RF tests with the single trigger mode. The RF On and Meas annunciators are shown in the left side of the screen.

Figure 3-38   **MS Origination Measuring Screen (1/3)**
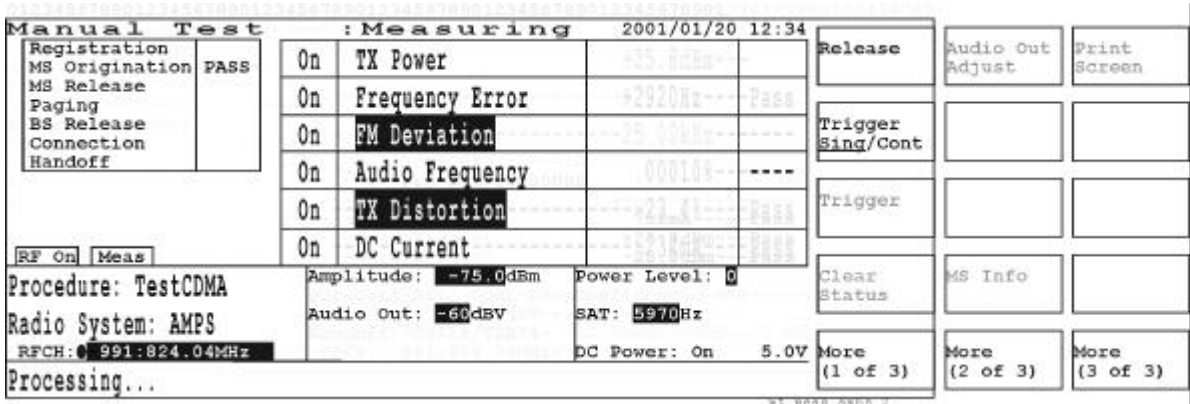
The next screen shows the measurement results up to Audio Frequency. All of the softkeys but Trigger Sing/Cont and More are disabled.

Figure 3-39   **MS Origination Measuring Screen (2/3)**

At the completion of one measurement cycle, all of the test items are measured and Pass or Fail is shown in the right column of the test item table. The softkey menus are all valid now.

Figure 3-40   **MS Origination Measuring Screen (3/3)**

Softkey Menu 1

o Release: Press this softkey to release the mobile from the Test Set. The BS Release and Connection steps are judged as PASS or FAIL.

o Trigger Sing/Cont: Toggles the trigger mode between Sing (single) and Cont (continuous). To exit from the continuous measurement mode, press this softkey to change to <u>Sing</u> and wait for a single measurement to finish.

o Trigger: Starts a single or continuous measurement of RF tests according to the trigger mode selected. This softkey is disabled while measurements are in progress.

o Clear Status: Erases the PASS/FAIL results from the flow table. This softkey is disabled while measurements are in progress.

o More (1 of 3): Displays the next softkey menu.

3. Screen Reference

Softkey Menu 2

- Audio Out Adjust: Executes to adjust the audio signal output level to have 8kHz FM deviation for TX distortion measurements. This softkey is disabled while measurements are in progress.

- MS Info: Changes the screen to show the information on the mobile station. The information includes the phone number, dialed number, and ESN (electronic serial number). This softkey is disabled while measurements are in progress.

- More (2 of 3): Displays the next softkey menu.

Softkey Menu 3

o Print Screen: Makes a hardcopy of the current screen. This softkey is disabled while measurements are in progress.

o More (3 of 3): Returns to softkey menu 1.

Paging and Handoff Screens. If you press the Paging softkey instead of MS Origination, the Test Set places a call to the mobile. If this process is successful, PASS is shown in the right column of the test flow table and the RF measurements begin. ST Deviation is measured between these Paging and Connection processes, therefore, either FM Deviation or SAT Deviation can be selected during the Connection step.

For example, if the RFCH channel value is changed to 993: 824.10 MHz, the Test Set executes a handoff test. The next screen shows a successful handoff. In this example, the trigger mode is set to Cont (continuous) so the measurement is made repeatedly.

Figure 3-41   **Paging and Handoff Screens (1/2)**

To exit from the continuous measurement mode, press the Trigger Sing/Cont softkey to change to <u>Sing</u> (single) and wait for a single measurement to finish.

Figure 3-42   Paging and Handoff Screens (2/2)

Softkey Menu 1

o   Release: Press this softkey to release the mobile station from the Test Set. The BS Release and Connection steps are judged as PASS or FAIL.

o   Trigger Sing/Cont: Toggles the trigger mode between Sing (single) and Cont (continuous). To exit from the continuous measurement mode, press this softkey to change to <u>Sing</u> and wait for a single measurement to finish.

o   Trigger: Starts a single or continuous measurement of RF tests according to the trigger mode selected. This softkey is disabled while measurements are in progress.

o   Clear Status: Erases the PASS/FAIL results from the flow table. This softkey is disabled while measurements are in progress.

o   More (1 of 3): Displays the next softkey menu.

Softkey Menu 2

•   Audio Out Adjust: Adjusts the audio signal output level to have 8 kHz FM deviation for TX distortion measurements. This softkey is disabled while measurements are in progress.

•   MS Info: Displays the mobile information including the phone number, dialed number, and ESN (electronic serial number). This softkey is disabled while measurements are in progress.

•   More (2 of 3): Displays the next softkey menu.

Softkey Menu 3

o   Print Screen: Makes a hardcopy of the current screen. This softkey is disabled while measurements are in progress.

o   More (3 of 3): Returns to softkey menu 1.

3. Screen Reference

MS Information Screen. If the MS Info softkey is pressed, the screen changes to show the information associated with the mobile under test. If the connection with the mobile is made by the Paging step, the dialed number is blank.

Figure 3-43 **MS Information Screen**

Item	Description
Phone Number:	Shows the phone number of the mobile under test.
Dialed No.:	Shows the number dialed by the mobile under test, if the connection is made by the MS Origination step. If the connection is made by the Paging step, however, no information is shown in this field.
ESN:	Shows the electronic serial number of the mobile under test.

Softkey Menu

o Print Screen: Makes a hardcopy of the current screen.

o Return: Returns to the measuring screen.

BS Released Stand-by Screen. If the Release softkey is pressed, the Test Set releases the mobile from the Test Set and finishes the connection state. Both the BS Release and Connection steps are judged as PASS or FAIL, and the Stand-by screen is displayed as shown below. Any failed test results are highlighted.

Figure 3-44   **BS Released Stand-by Screen**

Softkey Menu 1

o   Registration: Press this softkey to register the mobile station with the Test Set. This softkey is disabled while the idling dc current measurements are in progress.

o   Paging: Press this softkey to page the mobile from the Test Set. If this process is successful, the Connection step begins blinking for RF measurements. This softkey is disabled while the idling dc current measurements are in progress.

o   Clear Status: Erases the PASS/FAIL results from the flow table. This softkey is disabled while the idling dc current measurements are in progress.

o   More (1 of 3): Displays the next softkey menu.

o   Return: Displays the initial screen with function modes. This softkey is disabled while the idling dc current measurements are in progress.

Softkey Menu 2

•   Trigger Sing/Cont: Toggles the trigger mode between Sing (single) and Cont (continuous). To exit from the continuous measurement mode, press this softkey to change to <u>Sing</u> and wait for a single measurement to finish.

•   Trigger: Starts a single or continuous measurement of the idling dc current after registration according to the trigger mode selected. This softkey is disabled while measurements are in progress.

•   MS Info: Displays the information associated with the mobile phone under test including the phone number, dialed number, and ESN (electronic serial number). This softkey is disabled while the idling dc current measurements are in progress.

- More (2 of 3): Displays the next softkey menu.

Softkey Menu 3

o Print Screen: Makes a hardcopy of the current screen. This softkey is disabled while the idling dc current measurements are in progress.

o Prev Radio System: Returns to the radio system test screen prior to making the hard handoff. The test results are erased for a new test. If no hard handoff is previously made or if you are measuring the idling dc current, this softkey is disabled.

o More (3 of 3): Returns to softkey menu 1.

TX Analyzer Mode (Option 002)

In the TX Analyzer mode, each test item can be measured and analyzed with the test limits configured in the Test Setup: Test Condition screen of the Configuration mode.

In this mode, tests are made without networking the Test Set and the mobile phone each other. To test mobiles, set the mobile to transmit RF power independently (for instance, by controlling the mobile with a special command according to the manufacturer's design). This mode is used to characterize the RF transmission performances of mobiles in a real-time manner.

NOTE   The instrument default state after power-on is the same state as just before power-off. The previous state is stored in the internal memory. Press the **PRESET** key to reset the Test Set to the factory default state.

CDMA Test Screens

For measuring one of the CDMA formats (Cellr/IS95A, Cellr/TSB74, Cellr/T53, PCS US, PCS Korea P0, or PCS Korea P1), the following screens are displayed during the TX Analyzer mode.

Initial Screens

Depending on the previous trigger mode, the initial screens differ as follows:

Single Trigger Mode. If the trigger mode is set to <u>Sing</u> (single) before activating the TX Analyzer mode, the following screen is displayed. Here you can select which measurements to perform by specifying either On or Off in the left column of the table. Modify any other test parameters, and then press the Trigger softkey to begin the measurements.

Figure 3-45   **Single Measurement Screen**
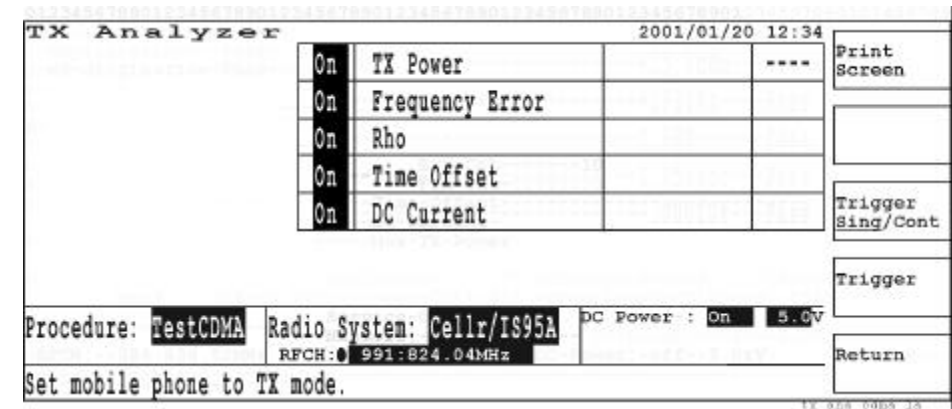
Continuous Trigger Mode. If the trigger mode is set to Cont (continuous) before activating the TX Analyzer mode, the measurements begin immediately. The continuous measuring screen is displayed as shown below. In the continuous measurement mode only RFCH can be modified.

Figure 3-46   **Continuous Measurement Screen**

Single Measurement Screen

To exit from the continuous measurement mode, press the Trigger Sing/Cont softkey to change to Sing and wait for a single measurement to finish.

Figure 3-47   **Single Measurement Screen**

Softkey Menu

o   Print Screen: Makes a hardcopy of the current screen. This softkey is disabled while making continuous measurements.

o   Trigger Sing/Cont: Toggles the trigger mode between Sing (single) and Cont (continuous). To exit from the continuous measurement mode, press this softkey to change to Sing and wait for a single measurement to finish.

o   Trigger: Starts measuring according to the Trigger mode setup. This softkey is disabled while making continuous measurements.

o   Return: Displays the initial screen with function modes.

Screen Fields

The following parameters need to be specified for a new test:

Field Name	Description
Procedure:	Displays a list of measurement setup files that are stored on an SRAM memory card.
	If there are no files on the card, this field remains blank.
Radio System:	Sets the radio system to Cellr/IS95A, Cellr/TSB74, Cellr/T53, PCS US, PCS Korea P0, PCS Korea P1, or AMPS. If set to AMPS, the screens are different from those for other radio systems.
RFCH	Accepts a traffic channel number along with its defined frequency value according to the radio systems as follows:
	• Cellular/IS-95A, Cellular/TSB-74:
	1 to 799 (825.03 to 848.97 MHz), 991 to 1023 (824.04 to 825.00 MHz)
	• Cellular/T53:
	1 to 799 (915.0125 to 924.9875 MHz), 801 to 1039 (898.0125 to 900.9875 MHz), 1041 to 1199 (887.0125 to 888.9875 MHz)
	• PCS US:
	0 to 1199 (1850.00 to 1909.95 MHz)
	• PCS Korea P0:
	0 to 1300 (1715.00 to 1780.00 MHz)
	• PCS Korea P1:
	1 to 600 (1750.05 to 1780.00 MHz), 601 to 1300 (1715.00 to 1750.00 MHz)
DC Power:[a]	Selects the dc voltage supply mode.
	o On: Always supplies dc voltage to the mobile.
	o Off:[b] Disables to supply dc voltage to the mobile. This is the default value.
	Accepts a dc voltage value ranging from 3.0 to 12.0 V in 0.1V steps. The default value is 3.0 V. This value is used for all four test modes.

a. This field is valid if Universal DC/Audio Adapter and the appropriate cables are used to supply dc power to the mobile under test.
b. When DC Power is set to Off, dc current cannot be measured.

3. Screen Reference

Test Items

The following items are shown in the test item table. All tests are made continuously until the trigger mode is changed to <u>Sing</u> (single) or the Return softkey is pressed.

Test Item	Description
TX Power	Measures and displays the transmission power levels. The range is from −20 (−60 with Option 010) to +39 dBm.
Frequency Error	Measures and displays the center frequency error of an OQPSK modulated signal. The range is from −10,000 to +10,000 Hz.
Rho	Measures and analyzes the ratio of the correlated power (waveform quality) in a single coded channel to the total signal power. The range is from 0.900 to 1.000.
Time Offset	Measures and displays the timing offset derived from the Rho measurement. This indicates how well the mobile is synchronized to the pilot pseudorandom noise sequence. The range is from −3.25 to +3.25 μsec.
DC Current[a]	Measures and displays the dc current consumed at the idle or RF tests. The range is from 0 to 1000 mA.

a. DC power must be supplied to the mobile under test using the appropriate cable assembly from Universal DC/Audio Adapter.

AMPS Test Screens (Option 003)

For measuring the AMPS format, the following screens are displayed during the TX Analyzer mode.

Initial Screens

Depending on the previous trigger mode, the initial screens differ as follows:

Single Trigger Mode. If the trigger mode is set to <u>Sing</u> (single) before activating the TX Analyzer mode, the following screen is displayed. Here you can select which measurements to perform by specifying either On or Off in the left column of the table. Modify any other test parameters, and then press the Trigger softkey to begin the measurements.

Figure 3-48   **Single Measurement Screen**

Continuous Trigger Mode. If the trigger mode is set to <u>Cont</u> (continuous) before activating the TX Analyzer mode, the measurements begin immediately. The continuous measuring screen is displayed as shown below. In the continuous measurement mode only RFCH can be modified.

Figure 3-49   **Continuous Measurement Screen**

Single Measurement Screen

To exit from the continuous measurement mode, press the Trigger Sing/Cont softkey to change to <u>Sing</u> and wait for a single measurement to finish.

Figure 3-50   **Single Measurement Complete Screen**

Softkey Menu

o   Print Screen: Makes a hardcopy of the current screen. This softkey is
     disabled while making continuous measurements.

o   Trigger Sing/Cont: Toggles the trigger mode between Sing (single) and
     Cont (continuous). To exit from the continuous measurement mode, press
     this softkey to change to <u>Sing</u> and wait for a single measurement to finish.

o   Trigger: Starts measuring according to the Trigger mode setup. This softkey
     is disabled while making continuous measurements.

o   Return: Displays the initial screen with function modes.

Screen Fields

The following parameters need to be specified for a new test:

Field Name	Description
Procedure:	Displays a list of measurement setup files that are stored on an SRAM memory card. If there are no files on the card, this field remains blank.
Radio System:	Sets the radio system to AMPS. If set to Cellr/IS95A, Cellr/TSB74, Cellr/T53, PCS US, PCS Korea P0 or P1, the screens are different from those for AMPS.
RFCH	Accepts a traffic channel number along with its defined frequency value as follows: • AMPS: 1 to 799 (825.03 to 848.97 MHz), 991 to 1023 (824.04 to 825.00 MHz)
Audio Out:	Sets the audio frequency signal level of 1.004 kHz. The range is from −60 to 0 dBV in 1 dB steps.
DC Power:[a]	Selects the dc voltage supply mode. o On: Always supplies dc voltage to the mobile. o Off:[b] Disables to supply dc voltage to the mobile. This is the default value. Accepts a dc voltage value ranging from 3.0 to 12.0 V in 0.1 V steps. The default value is 3.0 V. This value is used for all four test modes.

a. This field is valid if Universal DC/Audio Adapter and the appropriate cables are used to supply dc power to the mobile under test.
b. When DC Power is set to Off, dc current cannot be measured.

3. Screen Reference

Test Items

The following items are shown in the test item table. All tests are made continuously until the trigger mode is changed to <u>Sing</u> (single) or the Return softkey is pressed.

Test Item	Description
TX Power	Measures and displays the transmission power levels. The range is from −20 to +39 dBm.
Frequency Error	Measures and displays the center frequency error. The range is from −12.50 to +12.50 ppm in 0.01 ppm.
FM Deviation[a], or ST Deviation, or SAT Deviation	Selects from FM Deviation, ST Deviation, or SAT Deviation. The range is from 1 to 25kHz.
Audio Frequency	Measures and displays the audio frequency. The range is from 20 Hz to 20 kHz.
TX Distortion[a], or RX Distortion[b], or RX SINAD[b]	Selects from TX Distortion, RX Distortion (based on the audio performance), or RX SINAD (based on the audio performance). The distortion's range is from 0 to 100%. The range for RX SINAD is from 0 to 40 dB.
DC Current[c]	Measures and displays the dc current consumed at the idle or RF tests. The range is from 0 to 1000 mA.

    a. The Analog Audio In port of Universal DC/Audio Adapter must be connected to the mobile under test with the appropriate cable assembly.
    b. The Analog Audio Out port of Universal DC/Audio Adapter must be connected to the mobile under test with the appropriate cable assembly.
    c. DC power must be supplied to the mobile under test using the appropriate cable assembly from Universal DC/Audio Adapter.

Signal Generator Mode (Option 002)

The Signal Generator mode is used to characterize amplifier devices, RF filter components, or to test the receiver performance characteristics of mobiles.

NOTE   The instrument default state after power-on is the same state as just before power-off. The previous state is stored in the internal memory. Press the **PRESET** key to reset the Test Set to the factory default state.

CDMA Screen

When the Signal Generator softkey is pressed, the following screen is displayed for the Cellr/IS95A radio system.

Figure 3-51   **CDMA Signal Generator Screen**

AMPS (Option 002 and 003) Screen

When the Radio System field is changed to AMPS, the following screen is displayed.

Figure 3-52   **AMPS (Option 002 and 003) Signal Generator Screen**

Softkey Menu

o   Print Screen: Makes a hardcopy of the current screen.

o   RF Output On/Off: Toggles the RF output control function between On and Off. The default selection is Off.

o   Return: Displays the initial screen with function modes.

Screen Fields

The following parameters need to be set to generate RF signal from the Test Set.

Field Name	Description
Radio System:	Sets the radio system to Cellr/IS95A, Cellr/TSB74, Cellr/T53, PCS US, PCS Korea P0, PCS Korea P1, or AMPS. The factory default is set to Cellr/IS95A. If set to AMPS, the modulation selections are different from those for other radio systems.

RFCH:	Accepts a traffic channel number along with its defined frequency value according to the radio systems as follows:
	
	• Cellr/IS95A, Cellr/TSB74, AMPS:
	   1 to 799 (870.03 to 893.97 MHz),
	   991 to 1023 (869.04 to 870.00 MHz)
	
	• Cellr/T53:
	   1 to 799 (860.0125 to 869.9875 MHz),
	   801 to 1039 (843.0125 to 845.9875 MHz),
	   1041 to 1199 (832.0125 to 833.9875 MHz)
	
	• PCS US:
	   0 to 1199 (1930.00 to 1989.95 MHz)
	
	• PCS Korea P0:
	   0 to 1300 (1805.00 to 1870.00 MHz)
	
	• PCS Korea P1:
	   1 to 600 (1840.05 to 1870.00 MHz),
	   601 to 1300 (1805.05 to 1840.00 MHz)

Amplitude:	Sets the test power level. The ranges are different for CDMA and AMPS as follows. The default value is -40.0 dBm. CDMA: -110.0 to -40.0dBm in 0.1 dB steps, or -110.0 to -20.0dBm in 0.1 dB steps with Option 010 AMPS: -120.0 to -40.0 dBm in 0.1 dB steps

Field Name	Description
Modulation:	CDMA: Sets the modulation function to Off, Normal, or Pilot Only. The default value is Off. AMPS: Sets the modulation function to Off or Normal. The default value is Off.
Procedure:	Displays a list of measurement setup files that are stored on an SRAM memory card. If there are no files on the card, this field remains blank.
DC Power:[a]	Selects the dc voltage supply mode. o On: Always supplies dc voltage to the mobile. o Off:[b] Disables to supply dc voltage to the mobile. This is the default value. Accepts a dc voltage value ranging from 3.0 to 12.0 V in 0.1 V steps. The default value is 3.0 V. This value is used for all four test modes.

a. This field is valid if Universal DC/Audio Adapter and the appropriate cables are used to supply dc power to the mobile under test.
b. When DC Power is set to Off, dc current cannot be measured.

3. Screen Reference

Configuration

In this mode there are four major functions: Configuration, Auto Test Sequence, Test Condition, and File Management.

Configuration Screen

When the Configuration softkey is pressed, the following screen is displayed:

Figure 3-53   **Configuration Screen**

Softkey Menu 1

o   Auto Test Sequence: Displays the Test Setup: Test Sequence screen. Refer to "Auto Test Sequence Screen" on page 124.

o   Test Condition: Displays the Test setup: Test Condition screen. Refer to "Test Condition" on page 137.

o   File Management: Displays the File Management screen. Refer to "File Management" on page 142.

o   More (1 of 2): Displays the next softkey menu.

o   Return: Displays the initial screen with function modes.

Softkey Menu 2

•   Print Screen: Makes a hardcopy of the current screen.

•   Print All: Makes a hardcopy of the contents for the Configuration, Test Sequence, and Test Condition screens for all radio systems configured.

•   More (2 of 2): Returns to softkey menu 1.

Screen Fields

The following parameters need to be configured. The parameters are set using the CURSOR CONTROL knob as explained in "Front Panel Overview" on page 56.

Field Name	Description
Procedure:	Displays a list of measurement setup files that are stored on an SRAM memory card. If there are no files on the card, this field remains blank.
Panel Key:	Toggles the panel lock function between Lock and Unlock. If set to Lock, the Test Set is protected from any attempts to change the front-panel settings. The initial softkey menu includes only Automatic Test and Configuration, and the test parameters are not allowed to change, except for Procedure.
Reference:	Selects either INT (internal) or EXT (external). If EXT is selected, the 10 MHz reference signal must be supplied to the 10 MHz Reference connector on the rear panel.
Auto Test Run:	Sets the execution mode to Continuous or Pause when a fail result occurs during the Automatic Test mode. • Continuous: Continues testing even if a fail result has occurred. • Pause: Stops testing at a fail result, so you can select the Continue or Manual Test softkey.
Serial Port	Sets the following items for the serial interface port: o Baud Rate: Sets to either 9600 or 19200 bps. o Data Length: Sets to either 7 or 8 bits. o Stop Bits: Sets to either 1 or 2 bits. o Parity: Sets to either None, Odd, or Even. o Xcontrol: Sets to either None or Xon/Xoff. o Terminator: Sets to either CR, LF, or CR+LF.

3. Screen Reference

Field Name	Description
Date/Time:	Specifies the current date and time with the following formats: o YYYY: Accepts an entry for the year ranging from 1990 to 2089. o MM: Accepts an entry for the month ranging from 01 to 12. o DD: Accepts an entry for the date ranging from 01 to 31. o HH: Accepts an entry for the hour ranging from 00 to 23. o MM: Accepts an entry for the minute ranging from 00 to 59.

Loss:
Cellular:
  IS95A/TSB74/
  AMPS:
  Japan:
PCS:
  Korea:
  US:
	Toggles the attenuation function between On and Off.
	
	Specifies the insertion losses caused by the coupler or cable used to connect the RF signal from/to the mobiles with different radio systems. Depending on transmitter and receiver testing, set the appropriate values in the RF In and RF Out fields as follows:
	
	o RF In: Accepts the attenuations for transmitter testing ranging from 0.0 to 99.9 dB in 0.1 dB steps. The default values are 0.0dB.
	
	o RF Out: Accepts the attenuations for receiver testing ranging from 0.0 to 99.5 dB in 0.5 dB steps. The default values are 0.0dB.

Printer:	Toggles the printer selection between HP PCL and ESC/P.
Print Header:	Allows you to edit a two-line header message (up to 28 characters per line) that appears on all printouts. If this field is selected, the Editor table is activated and the edit control softkey menu is shown. Refer to "Test Setup: Messages" on page 129 or "Test Setup: Messages" on page 135
Editor:	Using this scrolling window, edit a print header message by rotating and pressing the CURSOR CONTROL knob to select commands, alphanumeric characters, and symbols from the scrolling window.
Beeper:	Toggles the beeping function between On and OFF. If set to On, there is a beep for each operation. If set to Off, beeps are suppressed except for noticing some errors and warnings.
Firmware:	Shows the current firmware revision name stored in the Test Set.

Field Name	Description
Update:	Toggles the update function between On (enable to update) and Off (disable to update). For On, refer to "Firmware Update" on page 148.
New Firmware:	If the Update field is set to On, the new firmware revision name stored in the firmware update card is shown.
Option:	Displays the options currently installed.

3. Screen Reference

Auto Test Sequence Screen

If the Auto Test Sequence softkey is pressed, the Test Setup: Test Sequence screen is displayed. There are two individual screens for CDMA and AMPS.

CDMA Test Sequence

For CDMA radio systems, you can set the sequence of the radio systems to be tested, test flow for each sequence, three-channel RF test details, amplitude levels, and service options.

Figure 3-54 **CDMA Test Sequence Screen**
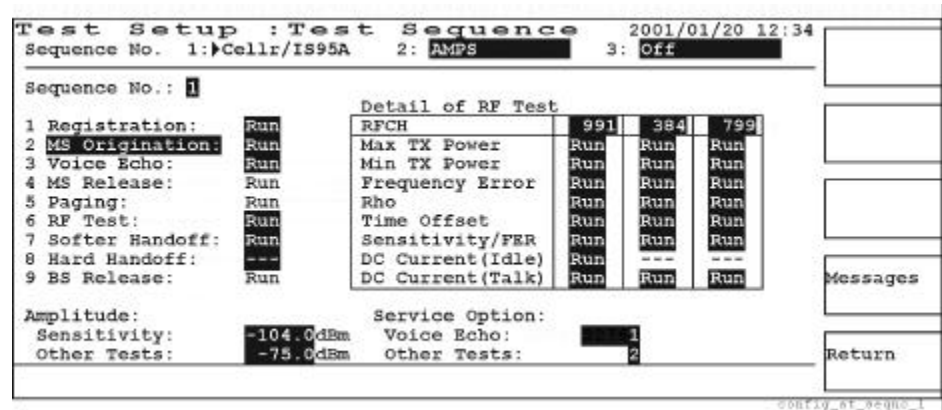
Softkey Menu 1

o Messages: Displays the Test Setup: Messages screen. Refer to "Test Setup: Messages" on page 135.

o Return: Displays the Configuration screen.

Test Flow. For creating a test flow, select either MS Origination or Paging in the second step of the test flow. This automatically sets the third through sixth, and ninth steps. Refer to Table 3-1, "Setting CDMA Test Flow.".

To select the second step, place the cursor in front of the second input field and press the CURSOR CONTROL knob one time to activate this input field. Select either MS Origination or Paging by rotating the CURSOR CONTROL knob, and then press the knob once more.

Table 3-1   **Setting CDMA Test Flow**

Step	Test Flow	Action	Test	Action
1	Registration:		Run|---	<Select either Run or --->
2	MS Origination | Paging:	<Select either MS Origination or Paging>	Run|---	<Select either Run or --->
3	Voice Echo | RF Test:	<Determined by Step 2>	Run|---	<Select either Run or --->
4	MS | BS Release:	<Determined by Step 2>	Run	
5	Paging | MS Origination:	<Determined by Step 2>	Run	
6	RF Test | Voice Echo:	<Determined by Step 2>	Run|---	<Select either Run or --->
7	Softer Handoff:		Run|---	<Select either Run or --->
8	Hard Handoff:		Run|---	<Select either Run or --->
9	BS | MS Release:	<Determined by Step 2>	Run	

3. Screen Reference

Test Flow Step Run/Skip Combinations. To configure a test flow, select Run to include a step in a test flow, or select "---" (skip) to exclude a step from a test flow. The following tables show the valid combinations for the first call setup by MS Origination and Paging, respectively.

Table 3-2   **Run/Skip Combination for First Call Setup by MS Origination**

Test Flow						
1 Registration:	Run	Run	Run	Run	---	---
2 MS Origination:	Run	Run	---	---	Run[a]	Run[a]
3 Voice Echo:	Run/---	Run/---	---	---	Run/---	Run/---
4 MS Release:	Run	Run	---	---	Run	Run
5 Paging:	Run	Run	Run	Run	Run	Run
6 RF Test:	Run/---	Run/---	Run/---	Run/---	Run/---	Run/---
7 Softer Handoff:	Run/---	Run/---	Run/---	Run/---	Run/---	Run/---
8 Hard Handoff:	Run	---	Run	---	Run	---
9 BS Release:	---	Run	---	Run	---	Run

a. If Registration is skipped, MS Origination should be made first.

Table 3-3   **Run/Skip Combination for First Call Setup by Paging**

Test Flow						
1 Registration:	Run	Run	Run	Run	---	---
2 Paging:	Run	Run	---	---	---	---
3 RF Test:	Run/---	Run/---	---	---	---	---
4 BS Release:	Run	Run	---	---	---	---
5 MS Origination:	Run	Run	Run	Run	Run[a]	Run[a]
6 Voice Echo:	Run/---	Run/---	Run/---	Run/---	Run/---	Run/---
7 Softer Handoff:	Run/---	Run/---	Run/---	Run/---	Run/---	Run/---
8 Hard Handoff:	Run	---	Run	---	Run	---
9 MS Release:	---	Run	---	Run	---	Run

a. If Registration is skipped, MS Origination should be made first.

Screen Fields. The following parameters need to be configured using the CURSOR CONTROL knob as explained in "Front Panel Overview" on page 56.

Field Name	Description
Sequence No. 1: 2: 3:	Sets the first, second, and third radio systems to be tested from Cellr/IS95A, Cellr/TSB74, Cellr/T53, PCS US, PCS Korea P0, PCS Korea P1, or AMPS. If no radio system is tested, sets to Off, however, the first sequence can not be set to Off.
Sequence No.:	Select one of the sequence numbers from 1 to 3. The default value is 1.
Amplitude:	
Sensitivity: Other Tests:	Sets the amplitude levels for sensitivity tests and other tests. The range is from -110.0 to -40.0 dBm (-20.0 dBm with Option 010) in 0.1dB steps. The default values are -104.0dBm and -75.0 dBm, respectively.
Service Option:	
Voice Echo:	Select one of the following service options for voice echo tests. The default value is 1. 1: Normal voice loopback 3: Voice loopback using EVRC (enhanced variable rate coder) at 9600 bps 32768: Voice loopback at 14.4 kbps
Other Tests:	Select one of the following service options for other tests. The default value is 2. 2: Data loopback at 9600 bps 9: Data loopback at 14.4 kbps

3. Screen Reference

Test Items. The following items in the test item table need to be set to either Run, to execute a Pass/Fail test, or to "---" (skip) to exclude the test.

Test Item	Description
RFCH	Defines up to three RF channel numbers according to the radio system to be tested. The first RF channel should be always used but other two RF channels can be skipped ("---" shown) for single or two RF channels tests. The default values for radio systems are: • Cellr/IS95A and Cellr/TSB74: 991, 384, and 799 • Cellr/T53: 1041, 1039, and 799 • PCS US: 0, 600, and 1199 • PCS Korea P0: 0, 650, and 1300 • PCS Korea P1: 601, 1250, and 600
Max TX Power	Defines whether to run or skip the maximum TX power test for each channel. The default values are all Run.
Min TX Power[a]	Defines whether to run or skip the minimum TX power test for each channel. The default values are all Run.
Frequency Error	Defines whether to run or skip the frequency error test for each channel. The default values are all Run.
Rho	Defines whether to run or skip the rho (waveform quality) test for each channel. The default values are all Run.
Time Offset	Defines whether to run or skip the time offset test for each channel. The default values are all Run.
Sensitivity/FER	Defines whether to run or skip the sensitivity/FER test for each channel. The default values are all Run.
DC Current (Idle)[b]	Defines whether to run or skip the idling dc current test. This is tested at the first RF channel only. The default values are Run, ---, and ---, respectively.
DC Current (Talk)[b]	Defines whether to run or skip the talking dc current test for each channel. The default values are all Run.

a. This test item is available for the Test Set with Option 010, "High Level Signal Output and Low Power Measurement Capabilities".
b. DC power must be supplied to the mobile under test using the appropriate cable assembly from Universal DC/Audio Adapter.

Test Setup: Messages. You can create an instruction message with up to 69 characters, including spaces and symbols, for each step of a test flow. The step number corresponds to each step. Instead of using the factory installed messages, use the following procedure to create a custom message:

Step 1. Move the cursor to the Message for Step No. input field.

```
Test  Setup  :Messages            2001/01/20 12:34
Sequence No.1: Cellr/IS95A

1 Registration:      Run                        Editor:
2 MS Origination:    Run                        Position
3 Voice Echo:        Run                        Delete
4 MS Release:        Run                        Del End
5 Paging:            Run                        A
6 RF Test:           Run                        B
7 Softer Handoff:    Run                        C
8 Hard Handoff:      Run                        D
9 BS Release:        ---                        E
                                                F
                                                G
                                                H
                                                I
                                                J
Message for Step No.01                          Return
Wait-for-call-to-end.
```

Step 2. Press and rotate the CURSOR CONTROL knob until the desired step number is shown, and press the CURSOR CONTROL knob to select the step. The cursor shape changes to triangle. The whole message line is highlighted, with the rectangular cursor on the first position, showing any previously stored message.

Step 3. The round cursor should be next to Position in the Editor scrolling window.

```
Test  Setup  :Messages            2001/01/20 12:34    Done
Sequence No.1: Cellr/IS95A

1 Registration:      Run                        Editor:
2 MS Origination:    Run                        ●Position
3 Voice Echo:        Run                        Delete        Cancel
4 MS Release:        Run                        Del End
5 Paging:            Run                        A
6 RF Test:           Run                        B
7 Softer Handoff:    Run                        C             Caps
8 Hard Handoff:      Run                        D             On/Off
9 BS Release:        ---                        E
                                                F
                                                G             Over/Ins
                                                H
                                                I
                                                J
Message for Step No.▶8                          Back
Wait-for-call-to-end.                                         Space
```

Softkey Menu

o Done: Enters the newly created message in the instruction message field.

o Cancel: Exits the editing function without changing the message.

o Caps On/Off: Enables you to select upper case (<u>On</u>) or lower case (<u>Off</u>) characters for editing a message.

o Over/Ins: Selects either <u>Over</u> (overwrite) or <u>Ins</u> (insert). <u>Over</u> allows you to overwrite (erase and replace) the selected alphanumeric character. <u>Ins</u> allows you to insert characters at the rectangular cursor position without erasing the existing characters.

3. Screen Reference

o   Back Space: Erases one alphanumeric character behind the rectangular cursor with each press.

Step 4. Create a message by rotating and pressing the CURSOR CONTROL knob to select commands, alphanumeric characters, and symbols in the scrolling window.

The following commands and characters are available in the scrolling window:

o   Position: Enables you to move the rectangular cursor to any position in the message.

o   Delete: Deletes the alphanumeric character selected by the rectangular cursor.

o   Del End: (Delete to the End) Deletes all alphanumeric characters from the rectangular cursor to the end of a message line.

o   Available alphanumeric characters and symbols:

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z _ 0 1 2 3 4 5 6 7 8 9 (space) ! " # $ % & ' ( ) * + , - . / : ; < = > ? @ [\ ] ^ { | } ~

The next screen shows the editing screen about to enter "d" to spell out "end".
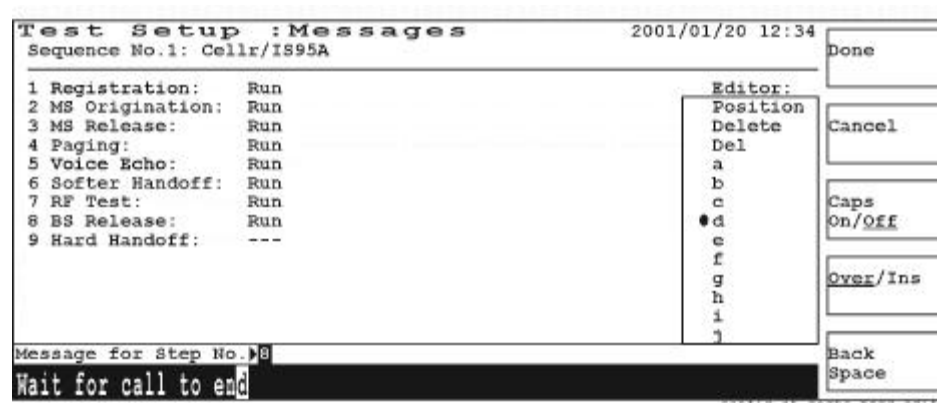
Step 5. If the created message is correct, press the Done softkey. The round cursor returns to the step number field, and the message line is highlighted.

AMPS Test Sequence (Option 003)

For AMPS radio systems, you can set the sequence, test flow for each sequence, three-channel RF test details, amplitude levels, and audio output levels.

Figure 3-55   **AMPS Test Sequence Screen**

Test Flow. For creating a test flow, select either MS Origination or Paging in the second step of the test flow. This automatically sets the third, fourth, and sixth steps. Refer to Table 3-4, "Setting AMPS Test Flow."

To select the second step, place the cursor in front of the second input field and press the CURSOR CONTROL knob one time to activate this input field. Select either MS Origination or Paging by rotating the CURSOR CONTROL knob, and then press the knob once more.

Table 3-4   **Setting AMPS Test Flow**

Step	Test Flow	Action	Test	Action
1	Registration:		Run|---	<Select either Run or --->
2	MS Origination | Paging:	<Select either MS Origination or Paging>	Run|---	<Select either Run or --->
3	MS | BS Release:	<Determined by Step 2>	Run|---	<Determined by Step 2>
4	Paging | MS Origination:	<Determined by Step 2>	Run	
5	RF/AF Test:		Run|---	<Select either Run or --->
6	BS | MS Release:	<Determined by Step 2>	Run	

Test Flow Step Run/Skip Combinations. To configure a test flow, select Run to include a step in a test flow, or select "---" (skip) to exclude a step from a test flow. The following tables show the valid combinations for the first call setup by MS Origination and Paging, respectively.

Table 3-5   **Run/Skip Combination for First Call Setup by MS Origination**

Test Flow			
1 Registration:	Run	Run	---
2 MS Origination:	Run	---	Run[a]
3 MS Release:	Run	---	Run
4 Paging:[b]	Run	Run[c]	Run
5 RF/AF Test:	Run/---	Run/---	Run/---
6 BS Release:	Run	Run	Run

     a. If Registration is skipped, MS Origina-
       tion should be made first.
     b. Paging is required to make RF/AF Test.
     c. Only Paging tests are to be made.

Table 3-6   **Run/Skip Combination for First Call Setup by Paging**

Test Flow			
1 Registration:	Run	Run	---
2 Paging:[a]	Run	---	---
3 RF/AF Test:	Run/---	---	---
4 BS Release:	Run	---	---
5 MS Origination:	Run	Run	Run[b]
6 MS Release:	Run	Run	Run

     a. Paging is required to make RF/AF Test.
     b. Only MS Origination tests are to be
       made.

Screen Fields. The following parameters need to be configured using the
CURSOR CONTROL knob as explained in "Front Panel Overview" on page 56.

Field Name	Description
Sequence No. 1: 2: 3:	Sets the first, second, and third radio systems to be tested from Cellr/IS95A, Cellr/TSB74, Cellr/T53, PCS US, PCS Korea P0, PCS Korea P1, or AMPS. If no radio system is tested, sets to Off, however, the first sequence can not be set to Off.
Sequence No.:	Select one of the sequence numbers from 1 to 3. The default value is 1.
Amplitude:	
Sensitivity:	Sets the amplitude levels for sensitivity tests and other tests. The range is from −120.0 to −40.0 dBm in 0.1 dB steps. The default values are −104.0dBm and −75.0 dBm, respectively.
Other Tests:	
Audio Out:	
Mode:	Select one of the following modes: Auto: Executes a test after automatically adjusting the audio signal level. This is the default value. • For TX Distortion tests, adjusts the level to set the FM deviation to 8 kHz. • For FM Dev Limit tests, adjusts the level by +20 dB from that for 8 kHz FM deviation. Manual: Executes a test at the specified audio signal level. • For FM Dev Limit tests, adjusts the level by +20 dB from which specified in the Level field.
Level:	Sets the audio signal level ranging from −60 to 0 dBV. The default value is −60 dBV.

3. Screen Reference

Test Items. The following items in the test item table need to be set to either Run, to execute a Pass/Fail test, or to "---" (skip) to exclude the test.
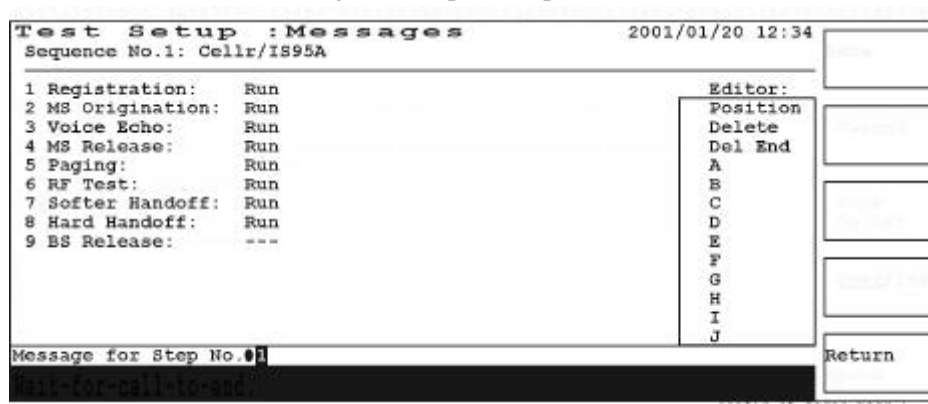
Test Item	Description
RFCH	Defines up to three RF channel numbers according to AMPS. The first RF channel should be always used but other two RF channels can be skipped ("---" shown) for single or two RF channels tests. The default values are 991, 384, and 799.
TX Power	Defines whether to run or skip the TX power test for each channel. The default values are all Run.
Frequency Error	Defines whether to run or skip the frequency error test for each channel. The default values are all Run.
FM Dev Limit[a]	Defines whether to run or skip the FM deviation limiting function test for each channel. The default values are all Run.
TX Distortion[a]	Defines whether to run or skip the TX distortion test for each channel. The default values are all Run.
RX Distortion[b]	Defines whether to run or skip the RX distortion test for each channel. The default values are all Run.
RX SINAD[b]	Defines whether to run or skip the RX SINAD test for each channel. The default values are all Run.
SAT Deviation	Defines whether to run or skip the supervisory audio tone deviation test for each channel. The default values are all Run.
SAT Freq Error	Defines whether to run or skip the supervisory audio tone frequency error test for each channel. The default values are all Run.
ST Deviation	Defines whether to run or skip the signaling tone deviation test. This is tested at the first RF channel only. The default values are Run, ---, and ---, respectively.
ST Frequency	Defines whether to run or skip the signaling tone frequency test. This is tested at the first RF channel only. The default values are Run, ---, and ---, respectively.
DC Current (Idle)[c]	Defines whether to run or skip the idling dc current test. This is tested at the first RF channel only. The default values are Run, ---, and ---, respectively.
DC Current (Talk)[c]	Defines whether to run or skip the talking dc current test for each channel. The default values are all Run.

a. The Analog Audio In port of Universal DC/Audio Adapter must be connected to the mobile under test with the appropriate cable assembly.
b. The Analog Audio Out port of Universal DC/Audio Adapter must be connected to the mobile under test with the appropriate cable assembly.

c. DC power must be supplied to the mobile under test using the appropriate cable assembly from Universal DC/Audio Adapter.
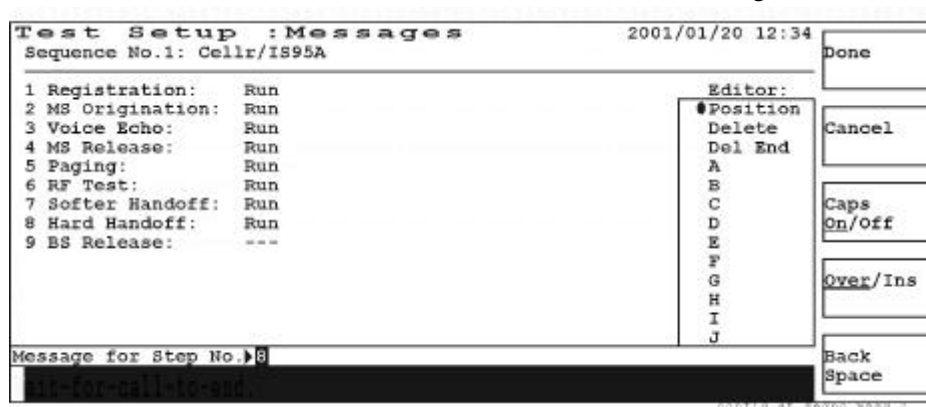
Test Setup: Messages. You can create an instruction message with up to 69 characters, including spaces and symbols, for each step of a test flow. The step number corresponds to each step. Instead of using the factory installed messages, use the following procedure to create a custom message:

Step 1. Move the cursor to the Message for Step No. input field.

Step 2. Press and rotate the CURSOR CONTROL knob until the desired step number is shown, and press the CURSOR CONTROL knob to select the step. The cursor shape changes to triangle. The whole message line is highlighted, with the rectangular cursor on the first position, showing any previously stored message.

Step 3. The round cursor should be next to Position in the Editor scrolling window.

Softkey Menu

o Done: Enters the newly created message in the instruction message field.

o Cancel: Exits the Editor scrolling window without changing the message.

o Caps On/Off: Enables you to select upper case (On) or lower case (Off) characters for editing a message.

o   Over/Ins: Selects either Over (overwrite) or Ins (insert). <u>Over</u> allows you to overwrite (erase and replace) the selected alphanumeric character. <u>Ins</u> allows you to insert characters at the rectangular cursor position without erasing the existing characters.

o   Back Space: Erases one alphanumeric character behind the rectangular cursor with each press.

Step 4.   Create a message by rotating and pressing the CURSOR CONTROL knob to select commands, alphanumeric characters, and symbols in the scrolling window.

The following commands and characters are available in the scrolling window:

o   Position: Enables you to move the rectangular cursor to any position of the message for editing.

o   Delete: Deletes the alphanumeric character selected by the rectangular cursor.

o   Del End: (Delete to the End) Deletes all alphanumeric characters from the rectangular cursor to the end of a message line.

o   Available alphanumeric characters and symbols:

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z _ 0 1 2 3 4 5 6 7 8 9 (space) ! " # $ % & ' ( ) * + , - . / : ; < = > ? @ [\ ] ^ { | } ~

The next screen shows the editing screen about to enter "d" to spell out "end".

```
Test  Setup   :Messages              2001/01/20 12:34   Done
Sequence No.1: AMPS

1 Registration:      Run                       Editor:      Position
2 MS Origination:    Run                       Position
3 MS Release:        Run                       Delete       Cancel
4 Paging:            Run                       Del
5 RF/AF Test:        Run                       a
6 BS Release:        Run                       b
                                               c            Caps
                                             ●d            On/Off
                                               e
                                               f
                                               g            Over/Ins
                                               h
                                               i
                                               j
Message for Step No.▶6                                      Back
Wait for call to end.                                       Space
                                        config_seqno_amps_msg_edit
```
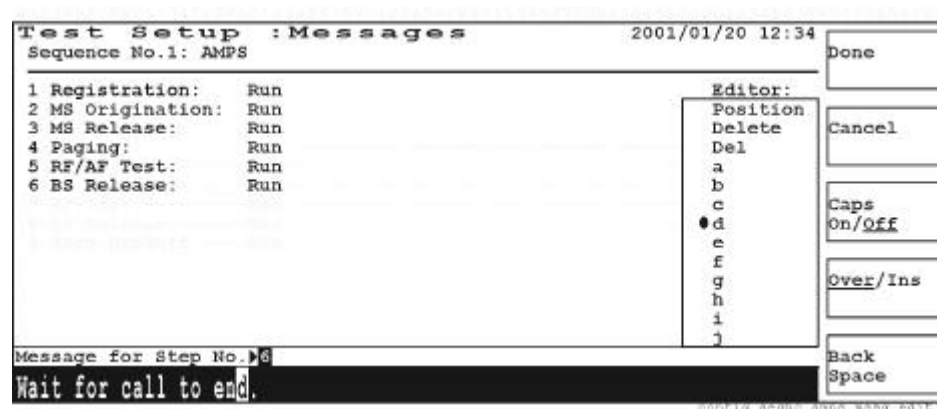
Step 5.   If the created message is correct, press the Done softkey. The round cursor returns to the step number field, and the message line is highlighted.

Test Condition

To configure a test condition for CDMA or AMPS mobile, it is required to specify the test parameters associated with the base station and mobiles. Also, the lower and upper limits for each test item should be specified for Pass/Fail tests.

CDMA Test Condition Screen

If the Test Condition softkey in Figure 3-53, "Configuration Screen," is pressed, the Test Setup: Test Condition screen is displayed. If you set the Radio System field to one of the CDMA radio systems, the following screen is displayed:

Figure 3-56   **CDMA Test Condition Screen**

Softkey Menu

o   Print Screen: Makes a hardcopy of the current screen.

o   Return: Displays the Configuration screen.

Screen Fields. The following parameters need to be defined with the appropriate values for mobile tests using the CURSOR CONTROL knob as explained in "Front Panel Overview" on page 56.

Field Name	Description
Radio System:	Sets the radio system to Cellr/IS95A, Cellr/TSB74, Cellr/T53, PCS US, PCS Korea P0, or PCS Korea P1. If set to AMPS, the screens are different from those for other radio systems.
Sector B Pwr:	Toggles the sector B power mode between On and Off. Also sets the sector B power level for softer handoff tests. The range is from −15 to −3 dB relative to the amplitude level (sector A power). The default values are Off and −5 dB.
Base Station	
NID:	Sets the network ID (16 bits) value for the base station. The range is from 0 to 65535. The default value is 1.

3. Screen Reference

Field Name	Description
Rgstr NID:	Sets the network ID (16 bits) value for the zone-based registration. The range is from 0 to 65535. The default value is 12.
SID:	Sets the system ID (15 bits) value for the base station. The range is from 0 to 32767. The default value is 7.
Rgstr SID:	Sets the system ID for the zone-based registration. The range is from 0 to 32767. The default value is 12.
Power Up Rgstr:	Note that this function does not work in the current version. (Toggles the power-up registration mode between On and Off.)
Max Slot Cycle Index:	Sets the maximum slot cycle index which is a part of the variable-length message format for a Registration Message. The range is from 0 to 7 (3-bit binary).
Access Probe	
Nom Pwr:	Sets the nominal transmit power offset for the access probe power. The range is from −8 to 7dB. The default value is 0 dB.
Init Pwr:	Sets the initial power offset for the access probe power. The range is from −16 to 15 dB. The default value is 0 dB.
Pwr Step:	Sets the power increase step for the access probe power. The range is from 0 to 7 dB. The default value is 3 dB.
Num Step:	Sets the number of steps to increase the transmitter power level for the access probe power. The range is from 0 to 15 steps. The default value is 4.
Max Req Seq, Max Rsp Seq:	Sets the maximum numbers of both the request sequence and the response sequence for the access probe power. The range is from 1 to 15. The default value is 1.
FER	
Max Frames:	Sets the maximum number of frames to be tested. The range is from 25 to 10,000,000. The default value is 10,000.
Confidence:	Sets to either 95% or Off. The default value is 95%.
DC Current Avg Time	
Idle:	Sets the averaging time to either 1.28, 2.56, or 10.24 sec for measuring the idling dc current. The default value is 1.28 sec.
Talk:	This is fixed to 0.02 sec.
Freq Error Avg No.:	Sets the averaging number for the frequency error measurements. The range is from 1 to 100. The default is 4.

Test Limits. The Lo Limit and Hi Limit values for each test item in the table need to be set for the Pass/Fail tests. All test items should be specified with limits even if some items are skipped to make tests in the Test Setup: Test Sequence screen.

Test Item	Description
Max TX Power:	Sets the lower and upper limits for the maximum TX power tests. The range is from −99.9 to +99.9dBm. The default values are +23.0 dBm (Lo) and +30.0 dBm (Hi).
Min TX Power:[a]	Sets the lower and upper limits for the minimum TX power tests. The range is from −99.9 to +99.9dBm. The default values are −99.9 dBm (Lo) and −50.0 dBm (Hi).
Freq Error:	Sets the lower and upper limits for the frequency error tests. The range is from −10.000 to +10.000kHz. The default values are −300.0 Hz (Lo) and +300.0 Hi (Hi).
Rho:	Sets the lower and upper limits for the waveform quality ρ (rho) tests. The range is from 0.900 to 1.000. The default values are 0.944 (Lo) and 1.000 (Hi).
Time Offset:	Sets the lower and upper limits for the timing offset tests. The range is from −10.00 to +10.00 μsec in 0.05 steps. The default values are −1.00 μsec (Lo) and +1.00 μsec (Hi).
Sens/FER:	Sets the upper limit for the sensitivity/FER tests. The range is from 0.0 to 5.0%. The default value is 0.5% (Hi).
DC Curr (Idle):[b]	Sets the lower and upper limits for the idling dc current tests. The range is from 0 to 1000 mA. The default values are 0 mA (Lo) and 1000 mA (Hi).
DC Curr (Talk):[b]	Sets the lower and upper limits for the talk dc current tests. The range is from 0 to 1000 mA. The default values are 0 mA (Lo) and 1000 mA (Hi).

a. This test item is available for the Test Set with Option 010, "High Level Signal Output and Low Power Measurement Capabilities".

b. DC power must be supplied to the mobile under test using the appropriate cable assembly from Universal DC/Audio Adapter.

3. Screen Reference
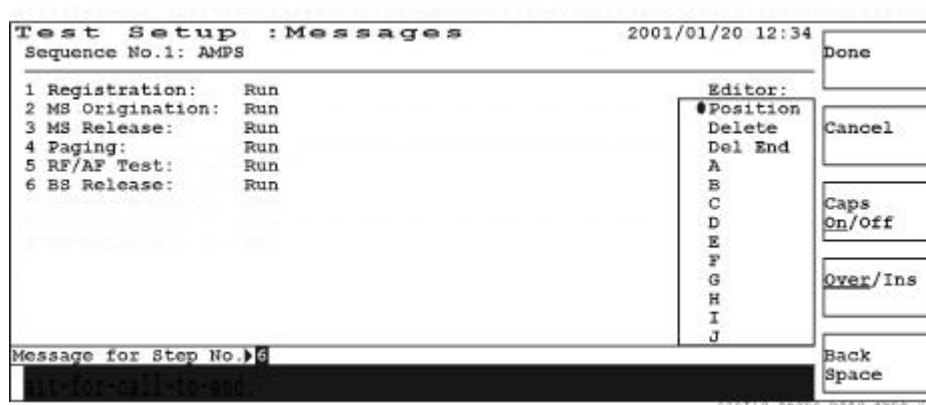
AMPS Test Condition Screen (Option 003)

If the Test Condition softkey in Figure 3-53, "Configuration Screen," is pressed, the Test Setup: Test Condition screen is displayed. If you set the Radio System field to AMPS, the following screen is displayed:

Figure 3-57   **AMPS Test Condition Screen**

Softkey Menu

o   Print Screen: Makes a hardcopy of the current screen.

o   Return: Displays the Configuration screen.

Screen Fields. The following parameters need to be defined with the appropriate values for mobile tests using the CURSOR CONTROL knob as explained in "Front Panel Overview" on page 56.

Field Name	Description
Radio System:	Sets the radio system to AMPS. If set to Cellr/IS95A, Cellr/TSB74, Cellr/T53, PCS US, PCS Korea P0, or PCS Korea P1, the screens are different from those for AMPS.
Control Channel:	Sets the control channel number. The range is from 313 to 333 for System A, or from 334 to 354 for System B. The default value is 321.
SID:	Sets the system ID (15 bits) of the mobile. The range is from 0 to 32767. The default value is 231.
Power Level:	Sets the transmission power level. The range is from 0 (+36 dBm) to 7 (+8 dBm). The default value is 0 (+36 dBm). Refer to Table A-3 in Appendix A, "Input Fields and Allowable Ranges."
SAT:	Sets the supervisory audio tone frequency to either 5970, 6000, or 6030 Hz. The default value is 5970 Hz.
DC Current Avg Time	Shows the averaging times for measuring the idling and talk dc currents. Both are fixed to 0.02 sec.

Test Limits. The Lo Limit and Hi Limit values for each test item in the table need to be set for the Pass/Fail tests. All test items should be specified with limits even if some items are skipped to make tests in the Test Setup: Test Sequence screen.

Test Item	Description
TX Power:	Sets the lower and upper limits for the TX power tests. The range is from −99.9 to +99.9dBm. The default values are +23.0 dBm (Lo) and +30.0 dBm (Hi).
Freq Error:	Sets the lower and upper limits for the frequency error tests. The range is from −12.5 to +12.5 ppm in 0.5 ppm steps. The default values are −2.5 ppm (Lo) and +2.5 ppm (Hi).
FM Dev Limit:[a]	Sets the lower and upper limits for the FM deviation limiting function tests. The range is from 0.00 to 25.00kHz. The default values are 0.00 kHz (Lo) and 12.00 kHz (Hi).
TX Distortion:[a]	Sets the upper limit for the TX distortion tests. The range is from 0.0 to 100.0%. The default value is 5.0% (Hi).
RX Distortion:[b]	Sets the upper limit for the receiver distortion tests. The range is from 0.0 to 100.0%. The default value is 5.0% (Hi).
RX SINAD:[b]	Sets the lower limit for the receiver SINAD tests. The range is from 0.0 to 40.0 dB. The default value is 12.0 dB (Lo).
SAT Deviation:	Sets the lower and upper limits for the supervisory audio tone frequency deviation tests. The range is from 0.00 to 25.00kHz. The default values are 1.80 kHz (Lo) and 2.20 kHz (Hi).
SAT Freq Error:	Sets the lower and upper limits for the supervisory audio tone frequency error tests. The range is from −600.0 to +600.0 Hz. The default values are −1.0 Hz (Lo) and +1.0 Hz (Hi).
ST Deviation:	Sets the lower and upper limits for the signaling tone frequency deviation tests. The range is from 0.00 to 25.00 kHz. The default values are 7.20 kHz (Lo) and 8.80 kHz (Hi).
ST Frequency:	Sets the lower and upper limits for the signaling tone frequency tests. The range is from 9000.0 to 11000.0 Hz. The default values are 9999.0 Hz (Lo) and 10001.0 Hz (Hi).
DC Current (Idle):[c]	Sets the lower and upper limits for the idling dc current tests. The range is from 0 to 1000 mA. The default values are 0 mA (Lo) and 1000 mA (Hi).
DC Current (Talk):[c]	Sets the lower and upper limits for the talk dc current tests. The range is from 0 to 1000 mA. The default values are 0 mA (Lo) and 1000 mA (Hi).

a. The Analog Audio In port of Universal DC/Audio Adapter must be connected to the mobile under test with the appropriate cable assembly.
b. The Analog Audio Out port of Universal DC/Audio Adapter must be connected to the mobile under test with the appropriate cable assembly.

c. DC power must be supplied to the mobile under test using the appropriate cable assembly from Universal DC/Audio Adapter.

File Management

If the File Management softkey in Figure 3-53, "Configuration Screen," is pressed, the following screens are displayed. This function is for managing test setup files in an SRAM memory card, including to initializing SRAM memory cards.

If an SRAM memory card with test setup files is inserted in the MEMORY CARD slot, the setup files are listed in the table.

Figure 3-58   **File Management Screen**

Softkey Menu 1

o Save: Stores a new test setup file to an SRAM memory card. If an appropriate SRAM memory card is not inserted, this softkey is disabled. Refer to "Saving a Test Setup File" on page 143.

o Recall: Loads one of the test setup files from an SRAM memory card into the Test Set. If an appropriate SRAM memory card is not inserted, this softkey is disabled. Refer to "Recalling a Test Setup File" on page 146

o Delete: Deletes the selected file from an SRAM memory card. If an appropriate SRAM memory card is not inserted, this softkey is disabled.

o More (1 of 2): Displays the next softkey menu. If an appropriate SRAM memory card is not inserted, this softkey is disabled.

o Return: Displays the previous screen and then the initial screen with function modes.

Softkey Menu 2

• Print Screen: Makes a hardcopy of the current screen.

• Print All: Makes a hardcopy of the list of test setup files on the SRAM memory card.

• Format SRAM Card: Initializes a new SRAM memory card or a used card erasing all information in it.

NOTE   The memory cards which contain the firmware update revisions for the Test Set can not be initialized using the Format SRAM Card softkey.

• More (2 of 2): Returns to softkey menu 1.

Saving a Test Setup File

Use the following procedure to save a new test setup file to an SRAM memory card.

Step 1. Insert the SRAM memory card into the MEMORY CARD slot.

Step 2. If you are using a new SRAM memory card, press the Format SRAM Card softkey to initialize it.

Step 3. Move the cursor to the number next to the last filename.

Step 4. Press the Save softkey. The Filename and Comment fields are highlighted and the default file name is displayed ("File + No.").

Softkey Menu

o Save Now: Press this softkey after entering your filename and comment to store your file to an SRAM card.

o Cancel: Exits the save execution process and returns to the screen in Step 3.

Step 5. Press the CURSOR CONTROL knob once to activate the Editor scrolling window with the round cursor at Position. The Over/Ins softkey is automatically set to Over (overwrite). The rectangular cursor is placed at the first position of the Filename field enabling to enter the first character of your filename.

Softkey Menu

o   Done: Enters the newly created filename in the Filename field.

o   Cancel: Exits the Editor scrolling window without changing the filename.

o   Caps On/Off: Enables you to select upper case (Caps On) or lower case (Caps Off) characters for editing a filename.

o   Over/Ins: Selects either Over (overwrite) or Ins (insert). Over allows you to overwrite (erase and replace) the selected alphanumeric character. Ins allows you to insert characters at the position of the rectangular cursor without erasing the existing characters.

o   Back Space: Erases one alphanumeric character behind the rectangular cursor.

Step 6. Use the CURSOR CONTROL knob to select alphanumeric characters and symbols and create a filename. This screen illustrates at the time when the character 'e' is entered with the Caps Off softkey.

Step 7. Press the Done softkey to enter the completed filename.

Step 8. Move the cursor to the Comment field and enter a comment with the same manner from Step 5 to Step 7.

```
File  Management                        2001/01/20 12:34   Save Now
  Procedure:TestCDMA
 No. Filename    Date     Time        Comment        Editor:
 001 TestCDMA  2001/01/10 09:15  IS-95A Test B       Position
 002 TestAMPS  2001/01/12 10:20  AMPS Test A         Delete
 003 Sample-1                   ●Sample Test for PCS-A Del End
 004                                                 A
 005                                                 B
 006                                                 C
 007                                                 D
 008                                                 E
 009                                                 F
 010                                                 G
 011                                                 H
 012                                                 I
 013                                                 J
 014                                                 K
 015                                                 L         Cancel

                                                    file_mgmnt_9
```

Softkey Menu

o Save Now: Displays the message "OK to save?" Refer to Step 9.

o Cancel: Exits the current screen, and returns to the screen in Step 3.

Step 9. Press the Save Now softkey and respond to the message "OK to save?" by pressing the Yes softkey. If you want to revise your entry, press the No softkey to go back to Step 4.

```
File  Management                        2001/01/20 12:34   Yes
  Procedure:TestCDMA
 No. Filename    Date     Time        Comment        Editor:
 001 TestCDMA  2000/01/10 09:15  IS-95A Test B       Position
 002 TestAMPS  2000/01/12 10:20  AMPS Test A         Delete
 003 Sample-1                    Sample Test for PCS-A Del End  No
 004                                                 A
 005                                                 B
 006                                                 C
 007                                                 D
 008                                                 E
 009                                                 F
 010                                                 G
 011                                                 H
 012                                                 I
 013                                                 J
 014                                                 K
 015                                                 L
OK to save?
                                                    file_mgmnt_5
```

Softkey Menu

o Yes: Stores a new setup file to the SRAM memory card. The operation message "Saving..." is shown while saving. After saving, the screen in Step 3 is displayed.

o No: Returns to Step 4 to restart editing Filename and Comment.

Step 10. If the new filename and comment have been correctly created, the operation message "Saving...." is shown for a while, and then returns to the File Management screen.

Step 11. When the file has been saved, the operation message "File saved" is displayed and the new filename is shown in the table. The Date and Time data are automatically taken from the internal clock of the Test Set.

3. Screen Reference

Step 12. If the Save Now softkey and the Yes softkey are pressed when the filename has
been left blank, the message "The filename is improper. Press [Cancel]." is shown
and the Test Set beeps. Press the OK softkey to stop the beeps and go back to Step
4.

Recalling a Test Setup File

Use the following procedure to recall one of the test setup files from an SRAM
memory card:

Step 1. Insert the SRAM memory card into the MEMORY CARD slot.

Step 2. Move the cursor to the file number you want to recall.

Step 3. Press the Recall softkey. The Filename, Date, Time, and Comment fields are
highlighted.

Step 4. Respond to the operation message "OK to recall?" by pressing the Yes softkey.

Step 5. When the recall process is complete, the message "File recalled" is displayed and the filename is shown in the Procedure field above the table.

```
File Management                          2001/01/20 12:34   ┌─────────┐ ┌─────────┐
  Procedure:PCS-Try3                                        │Save     │ │Print    │
  ┌───┬────────┬──────────┬─────┬────────────────┬────────┐│         │ │Screen   │
  │No.│Filename│  Date    │Time │    Comment     │Editor: │└─────────┘ └─────────┘
  │001│TestCDMA│2001/01/10│09:15│CDMA Test       │Position│
  │002│Test-PCS│2001/01/12│10:20│PCS Test        │Delete  │┌─────────┐ ┌─────────┐
  │003│PCS-Try1│2001/01/13│11:40│PCS Trial Test1 │Del End ││Recall   │ │Print    │
  │004│PCS-Try2│2001/01/13│12:20│PCS Trial Test2 │A       ││         │ │All      │
  │005│PCS-Try3│2001/01/13│13:40│PCS Trial Test3 │B       │└─────────┘ └─────────┘
  │006│PCSATest│2001/01/14│09:45│PCS Revision A  │C       │
  │007│PCSBTest│2001/01/14│10:20│PCS Revision B  │D       │┌─────────┐ ┌─────────┐
  │008│        │          │     │                │E       ││Delete   │ │Format   │
  │009│        │          │     │                │F       ││         │ │SRAM Card│
  │010│        │          │     │                │G       │└─────────┘ └─────────┘
  │011│        │          │     │                │H       │
  │012│        │          │     │                │I       │┌─────────┐ ┌─────────┐
  │013│        │          │     │                │J       ││More     │ │More     │
  │014│        │          │     │                │K       ││(1 of 2) │ │(2 of 2) │
  │015│        │          │     │                │L       │└─────────┘ └─────────┘
  └───┴────────┴──────────┴─────┴────────────────┴────────┘
File recalled.                                              ┌─────────┐
                                          file_mgmt_recall_3│Return   │
                                                            └─────────┘
```

Firmware Update

There are two ways of updating the firmware using the appropriate update card set, through the Firmware Update screen or by using the Power-up Update function.

Using the Firmware Update Screen

If the Test Set is turned on, use the following procedure to update the firmware.

Step 1. Insert the firmware update card #1 in the MEMORY CARD slot.

Step 2. Press the Configuration softkey in the initial screen.

Step 3. Use the CURSOR CONTROL knob to move the cursor to the Update field and change its value from Off to On.

The revision number of the new firmware is displayed in the New Firmware field. If a firmware update card is not inserted or an improper card is inserted, "?.??.??" is shown in this field.

Softkey Menu

o Yes: Initiates the updating process.

o No: Cancels the updating process and changes the Update: field from On to Off without updating the current firmware.

Step 4. Respond to the instruction message "OK to update?" by pressing the Yes softkey in Step 3. The Firmware Update screen is displayed.

Softkey Menu

o Update FW Now: Begins updating the current firmware to the new revision firmware. Following the update card #1, insert the update card #2 according to the instruction message.

o Cancel: Exits the updating process and returns to the Configuration screen.

NOTE Before pressing the Update FW Now softkey, make sure the proper update card is inserted in the memory card slot.

If a proper update card is not inserted when the Update FW Now softkey is pressed, the operation message "Insert the proper update card. Press [Abort]." is shown with warning beeps.

Step 5. When the update process has been successful, the new firmware revision number is shown in the Firmware field and the Update field automatically changes from On to Off.

Using the Power-up Update Function

Use this procedure to update the firmware if the Test Set is currently turned off.

Step 1. Make sure the power of the Test Set is turned off.

Step 2. Insert the update card #1 into the MEMORY CARD slot.

Step 3. Turn on the Test Set power.

Step 4. Use the CURSOR CONTROL knob to move the cursor to the Update field and change its value from Off to On.

The revision number of the new firmware is displayed in the New Firmware field. If a firmware update card is not inserted or an improper card is inserted, "?.??.??" is shown in this field.

Softkey Menu

o   Yes: Initiates the updating process.

o   No: Cancels the updating process and changes the Update: field from On to Off without updating the current firmware.

Step 5. Respond to the instruction message "OK to update?" by pressing the Yes softkey in Step 4. The next screen is displayed.

Step 6. When the update process has been successful, the new firmware revision number
is shown in the Firmware field and the Update field automatically changes from
On to Off.

```
Configuration                        2001/01/20 12:34   Auto Test  Print
                                           RF In   RF Out  Sequence  Screen
Procedure:        TestCDMA    Loss: On
Panel Key:        Unlock        Cellular:
Reference:        Internal        IS95A/TSB74/AMPS:  2.4dB  2.5dB   Test      Print
Auto Test Run:    Continuous      Japan:             1.7dB  2.0dB   Condition All
Serial Port                     PCS:
  Baud Rate:      19200           Korea:             0.6dB  1.0dB
  Data Length:    7               US:                0.6dB  1.0dB   File
  Stop Bits:      1             Printer:         HP PCL    Editor:  Management
  Parity:         None          Print Header:              Position
  Xcontrol:       Xon/Xoff                                 Delete
  Terminator:     CR/LF                                    Del End  More
Date/Time:   2001 01 20 12 34  Beeper:          On         A        (1 of 2)  More
             YYYY MM DD/HH MM   Firmware:        A.01.03    B                  (2 of 2)
                                 Update:         Off        C
Option: 002 003 010                                         D
                                                            E        Return
                                                            F
```

3. Screen Reference

4   Functionality/Operation

This chapter introduces general information, key features and measurement requirements, and typical block diagrams for CDMA and AMPS mobile phones.

CDMA Mobile General Information

The adoption of the IS-95-A Air Interface standard by the Telecommunications Industry Association has thrust Code Domain Multiple Access (CDMA) technology into the world of cellular telephone service. The IS-95-A standard provides an alternative digital system for the cellular market. This new technology also brings with it new challenges for those who must design, produce, install, and maintain CDMA systems. The nature of CDMA is such that the methodologies of traditional radio test must be thrown out and new ones must be learned.

System Key Features

Many of the facets of CDMA are different from analog or even TDMA digital cellular systems. A few key aspects of CDMA drive many of its unique testing requirements.

- **Powerful Error Correction Codes:** Unlike most TDMA digital cellular systems, CDMA's wideband transmission system allows powerful error correction codes to be applied to all of the encoded voice data bits. This means that CDMA does not need tests designed to examine transmission quality for different types of data bits (classes).

- **Processing Gain:** The processing gain (error correction codes + spreading codes) of CDMA makes the CDMA system very tolerant of transmission errors. What would appear as gross errors in the transmitted signal of any other cellular system are normal for a properly operating CDMA mobile.

- **New Modulation Format:** Traditional tests that examine modulation quality (error vector magnitude) and receiver performance (bit error rate) do not provide meaningful insight into a CDMA mobile's performance. Frame error rate (FER) is the true measure of CDMA receiver performance as bit errors on the physically received signal are usually repaired by the error correcting action of the CDMA codes. Corrupted frames in CDMA are not retransmitted and the voice decoder must either interpolate the missing data or mute the audio output. Confidence limit testing uses a specific statistical distribution to model the random nature of the errors. Each test is given a specified frame error rate that must be met with a specified level of confidence. For example, a mobile must meet 0.5% FER with 95% confidence level. For transmitter measurements, rho (ρ) is the figure of merit for the quality of a OQPSK (offset quadrature phase shift keying) modulated transmission from a CDMA mobile. For example, a mobile must meet 0.944 rho. This is also referred to as the waveform quality or power correlation coefficient, and gives an indication of the increased interference that will be caused by modulation errors in a CDMA transmitter.

- **High Interference Environment:** The fact that CDMA is designed to operate with high levels of interference also drives new measurements that must duplicate the normal interference levels experienced by a CDMA mobile.

Mobile on a Simulated Link

In order to test a CDMA mobile on a simulated link, the Test Set functions as a base station simulator providing specific signals and protocol messages to establish and maintain a CDMA link. The Test Set provides the following signals:

- Pilot Channel: Allows the mobile to get short code timing alignment and frequency alignment,

- Sync Channel: Broadcasts the state of the long code and system time to establish proper time alignment,

- Paging Channel: Calls the mobile via this channel signal and direct the mobile to create a link and to activate Service Option 002 for voice channel tests,

- Traffic Channel: Maintains the link by passing any required protocol messages to the mobile during testing, once on a simulated traffic channel,

- OCNS (Orthogonal Channel Noise Source): Simulates the noise from other users in the same cell. Since other users in the same cell are encoded with orthogonal Walsh codes, OCNS noise must use a different Walsh code than the one used for the simulated traffic channel link.

Mobile Call Processing Flow

A typical power-up call processing flow diagram is shown in Figure 4-1. This flow contains frequent references to the messages that flow between the mobile and the base station.

Figure 4-1   **Mobile Call Processing Flow Diagram**
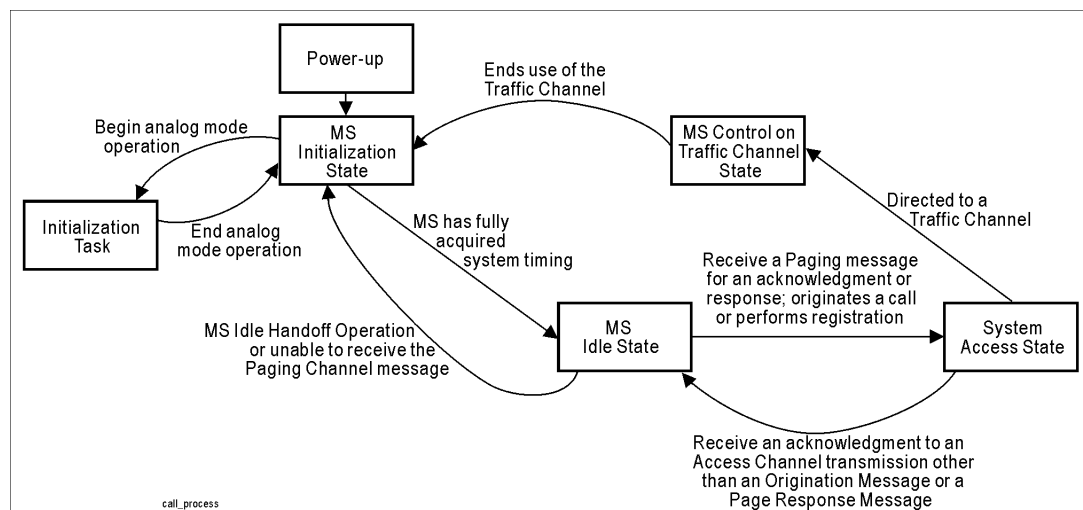
The following states are included in the mobile call processing:

- MS Initialization State: The mobile selects and acquires a system.

- MS Idle State: The mobile monitors messages on the Paging Channel.

- System Access State: The mobile sends messages to the base station on the Access Channel.

4. Functionality / Operation

- MS Control on the Traffic Channel State: The mobile communicates with the base station using the Forward and Reverse Traffic Channels.

Mobile Block Diagram

Figure 4-2 shows the typical block diagram of a CDMA mobile phone. The upper part of this diagram represents the mobile's receiver blocks and the lower part represents the transmitter blocks. For simplicity, the digital circuitry is eliminated even though there are certain important parts such as EEPROM's at I/Q Modulator and Ramp Control for compensating with correction coefficients.

Figure 4-2   **Typical CDMA Mobile Block Diagram**
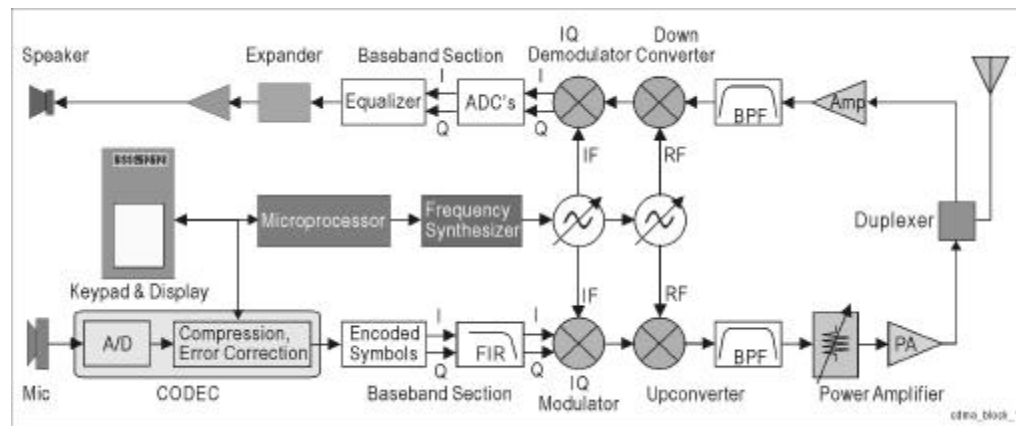
AMPS Mobile General Information

There are several systems in use around the world which utilize analog technology for communications. The Advanced Mobile Phone Service (AMPS) is used primarily in the U.S. and Canada, as well as by other countries such as Australia. The Total Access Communications System (TACS) in the U.K. has also been adopted by other countries, most notably China.

These systems operate in the frequency range around 800 to 900 MHz. Enhancements to these systems have been made, with the addition of narrowband versions of AMPS (NAMPS) and TACS (NTACS).

System Key Features

There are many reasons why cellular has attained its current popularity, and will continue to grow throughout the world.

- **Mobility Over Large Geographic Areas:** The cellular concept is the ability to travel over large coverage areas and maintain phone service. A user should be able to drive anywhere there is a system and gain service, this is called roaming. Cell-to-cell handoff tests are required.

- **Worldwide Telephone System Access:** A cellular phone must be able to access to standard phone lines. This makes it possible to call anywhere in the world from your mobile phone. whether in a car, walking in a city, or travelling on public transportation.

- **Portability:** Phones currently available are very portable, small enough to fit in your pocket. There are phones being developed which can be worn like a wristwatch. Frequency accuracy, transmission power and its control, battery life may be the major factors in achieving portability.

- **Spectral Efficiency:** The greatest advantage of a cellular system is its spectral efficiency. There are more and more radio communications every day, and the ability to re-use the limited number of frequencies will continue to be the goal for developing any new communication system.

Frequency Spectrum

A cellular mobile phone system divides a service area into small, low power radio frequency coverage areas called cells. The system consists of a more or less continuous pattern of those cells, varying in size from 1.5 to 130 kilometers in diameter (typically 15 to 30 km). Each cell contains its own cell site.

Each cell contains one or more low-power transmitters (or base stations) specifically designed to cover only that area. Its antenna may be omnidirectional, bi-directional, or a focused beam, depending on the terrain. The use of the beamed antennas produces sectors inside a cell. The antennas no longer radiate in all directions but have a beam that can vary in width depending on the design, and are specifically called a sectored antenna. Each sector has different channels.

The cellular radio frequency spectrum is divided into two equal segments. This arrangement known as System A and System B allows two independent carriers to coexist and compete in the same geographic area. The signaling channel frequencies have been pre-assigned to each segment. Figure 4-3 shows how these channels with their associated frequencies have been assigned.

Figure 4-3   **Frequency Spectrum**
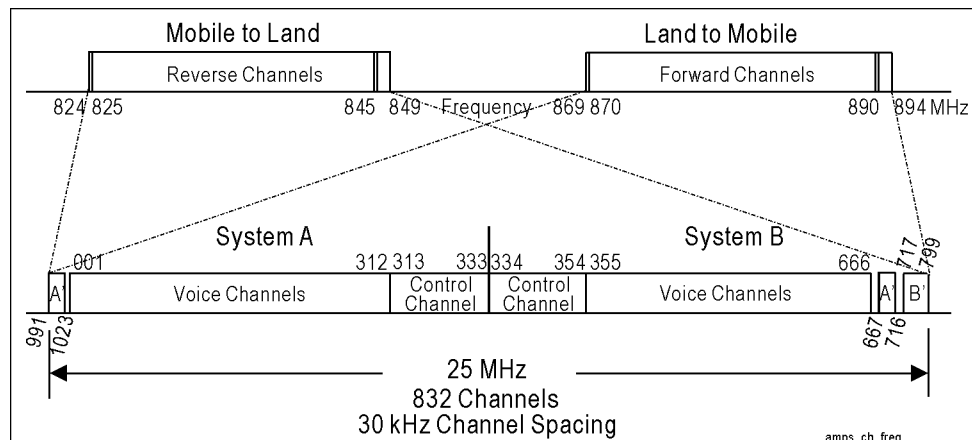
Channel Types

There are four different types of channels in a cellular system. Along with reverse and forward channels, there are also dedicated control channels and voice channels.

- Forward and Reverse Control Channels: These are dedicated solely to call setup. All of the digital signaling to initiate calls, collect user information, and switch the caller to an initial voice channel takes place on these control channels.

  o   Forward Control Channel (FOCC): This is the first channel the mobile will look for on power up. Overhead messages, initial voice channel designation, and mobile station control are included in this channel.

> o   Reverse Control Channel (RECC): The mobile uses the RECC to respond to anything that the cell site has sent on the FOCC. Page response, registration information, call origination, and mobile control confirmation are included in this channel.

• Forward and Reverse Voice Channels: These are used for voice communication where all conversation takes place. The only digital signals found on the voice channel are handoff and power control messages.

A cellular phone in the cellular system is under the indirect control of the switch or central controller. The central control uses dedicated control channels to provide basic information such as system ID, and to send other operating orders. The control channels send and receive only digital protocol data between the base station and the cellular phone. There are 21 control channels in each band.

Initialization Process

When the mobile is turned on, it performs the initialization tasks and enters the idle mode. It stays in the idle mode whenever it is not actively involved in processing a phone call. The following sequence of events occurs in this operation phase:

Step 1. Dedicated Control Channels transmit system configuration data including system ID number, number of Paging Channels, number of Access Channels, and so forth.

Step 2. The mobile scans dedicated Control Channels for its preferred system, A or B, selects the strongest and reads the system data. If it is unsuccessful with its preferred system, it may switch to the other system.

amps_initiallize_process

4. Functionality / Operation
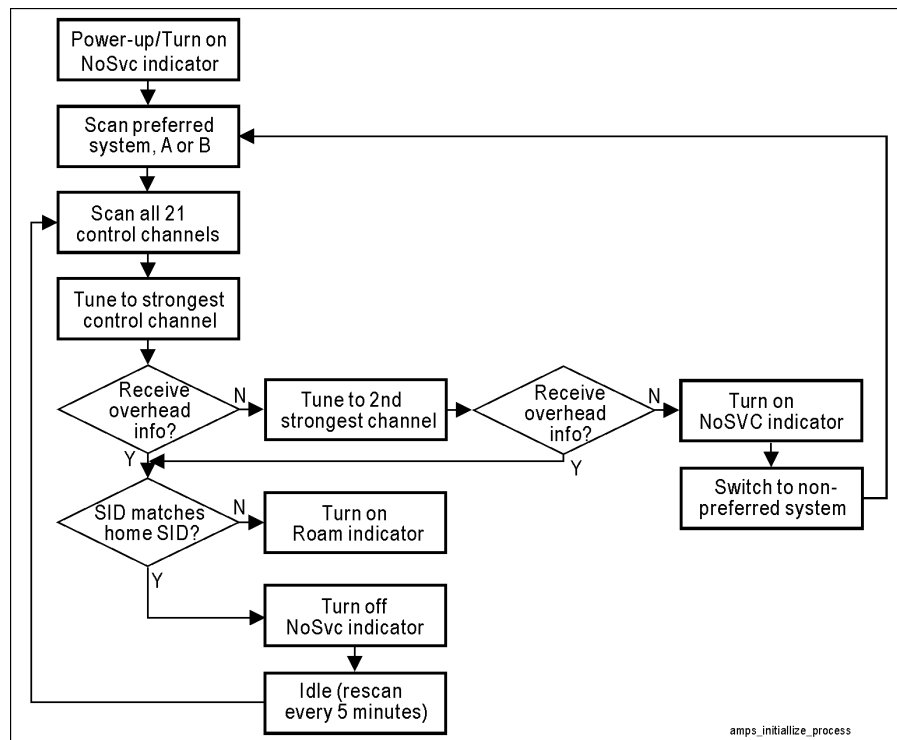
Step 3. The mobile determines Paging Channel number, scans them and locks onto the strongest one.

Step 4. Paging Channels transmit the system configuration information.

Step 5. The mobile makes the Home/Roam decision based on the transmitted system ID number and the mobile's stored Home System ID number in its Number Assignment Module (NAM).

Step 6. The mobile determines Access Channel numbers.

Step 7. The mobile monitors the Paging Channel, and updates system information as needed, while watching for orders directed at it. This is called the Idle state.

Step 8. Now the mobile is ready to make a call (origination) or to receive a call from a base station.

Mobile Block Diagram

Figure 4-4 shows the typical block diagram of an AMPS mobile phone. The upper part of this diagram represents the mobile's receiver blocks and the lower part represents the transmitter blocks. For simplicity, the digital circuitry is eliminated even though there are certain important parts.

Figure 4-4   **Typical AMPS Mobile Block Diagram**
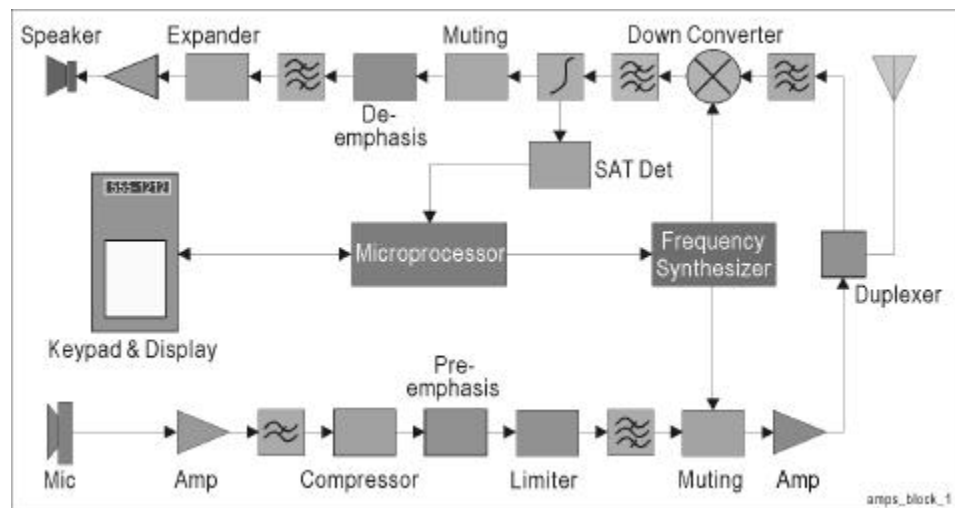
Power Level Control

The output power levels for Power Class I radios should be maintained within the range of +2 dB and −4 dB of the nominal values over the temperature range. The power level and the lower and upper limits for AMPS are defined as follows:

Table 4-1   **AMPS Power Level**

Power Level	0	1	2	3	4	5	6	7
Nominal Value (dBm)	+36	+32	+28	+24	+20	+16	+12	+8
Lower Limit (dBm)	+32	+28	+24	+20	+16	+12	+8	+4
Upper Limit (dBm)	+38	+34	+30	+26	+22	+18	+14	+10

4. Functionality /
Operation

5 Specifications

This chapter provides the specifications for the Agilent E6393A CDMA MS Test Set.

General Information

The specifications represent the standard performance limits with which the Agilent E6393A CDMA MS Test Set is verified at the factory.

Non-warranted Characteristics

For applying the product in more extensive circumstances, some of the useful information is provided as non-warranted performance characteristics. In such cases, performance characteristics are denoted as *typical*, *supplemental characteristic*, *nominal* or *approximate*.

Recommended Environment

The product will meet specifications at the input and output connectors under the following conditions:

• Ambient Temperature: 0 to +40°C

• Warm-up Time: >30 minutes

• Cables: Those supplied with the product

CDMA Mode

CDMA Call Processing Functionality

These specifications for the CDMA call processing functionality for Automatic Test and Manual Test are shown in Table 5-1.

Table 5-1 **CDMA Call Processing Specifications**

Radio System Support:	IS-95A (Cellr/IS95A), TSB-74 (Cellr/TSB74), ARIB T53 (Cellr/T53), J-STD-008 (PCS US, PCS Korea P0, PCS Korea P1)
Call Processing Support:	Registration, MS Origination, MS Release, Paging, BS Release
Service Option Support:	1 (normal voice loopback), 2 (9.6 kbps data loopback), 3 (9.6 kbps voice loopback using EVRC), 9 (14.4 kbps data loopback), 32768 (14.4 kbps voice loopback)

Handoff Support:	Softer handoff between two sectors (A and B)
	Hard handoff between any two RF channels,
	Multi-mode hard handoff between two radio systems:
	    Cellr/IS95A to PCS US,
	    Cellr/TSB74 to PCS US

CDMA RF Signal Generator

These specifications for the CDMA RF Signal Generator are shown in Table 5-2.

Table 5-2   **CDMA RF Signal Generator Specifications**

CDMA Channels	
Sector A:	Pilot, Sync, Paging, Traffic, OCNS
Sector B:	Pilot, Traffic, OCNS
Frequency	
Range:	869 to 894 MHz (for Cellr/IS95A and Cellr/TSB74),
	832 to 834 MHz, 843 to 846 MHz, and 860 to 870 MHz (for Cellr/T53),
	1805 to 1870 MHz (for PCS Korea P0 and P1),
	1930 to 1990 MHz (for PCS US)
Resolution:	30 kHz (for Cellr/IS95A and Cellr/TSB74),
	12.5 kHz (for Cellr/T53),
	50 kHz (for PCS US, PCS Korea P0 and P1)
Accuracy:	Same as Reference oscillator
Output Amplitude	
Range:	-110.0 to -40.0 dBm
Accuracy:[a][b]	± 1.0 dB at ≤ -50 dBm, ± 2.0 dB at > -50 dBm
Resolution:	± 0.1 dB
CDMA Modulation	
Type:	QPSK based on IS-95A
Residual rho:	≥ 0.912 *(typically >0.950)*
Data Generation Pattern:	PN9
Power Control Bit:	Always up, Always down, Open loop

a. To achieve the specified output amplitude accuracy when inputting power at the RF IN/OUT port of the E6393A, the input power level must be less than or equal to $-$(output amplitude level) $- 25$ dB. Example: ≤ -5 dBm input level for -20 dBm output amplitude.
b. These specifications are not applicable to the output level modulated with Pilot Only.

CDMA RF Analyzer

These specifications for the CDMA RF Analyzer functions such as Automatic Test, Manual Test, and TX Analyzer are shown in Table 5-3.

Table 5-3   CDMA RF Analyzer Specifications

Input Frequency	
Range:	824 to 849 MHz (for Cellr/IS95A and Cellr/TSB74), 887 to 889 MHz, 898 to 901 MHz, and 915 to 925 MHz (for Cellr/T53), 1715 to 1780 MHz (for PCS Korea P0 and P1), 1850 to 1910 MHz (for PCS US)
Power Measurement	
Range:	−20 to +39 dBm
Accuracy:	±1.0 dB *(typically ±0.6 dB)* at ≥0 dBm, ±2.0 dB *(typically ±1.2 dB)* at <0 dBm
Resolution:	0.2 dB
Modulation Measurement	
Input Range:	−20 to +39 dBm
Modulation Type:	OQPSK based on IS-95A
Rho Measurement:	Range: 0.9 to 1.0
	Accuracy: ±0.01 at ≥0.950, ±0.02 at <0.950
	Resolution: 0.001
Frequency Error Measurement:	Range: ±10 kHz
	Accuracy: ±(30 Hz + Reference oscillator accuracy) for 4 average measurements
	Resolution: 1 Hz
Transmit Time Error measurement	*(supplemental characteristics)*
Frame Error Rate Measurement	
Method:	Data loopback at full rate with Service Option 002 or Service Option 009 supporting confidence limits (95% or off) as outlined in TIA/EIA-98A Appendix A.1.
Range:	0 to 100%
Resolution:	0.00001%
Displayed Results:	Measured FER, Number of frame errors, Number of test frames
	Pass, or Fail, or ---- (unable to judge with 95% confidence)

TX Analyzer and Signal Generator (Option 002)

These specifications for the TX Analyzer and Signal Generator functions with Option 002 are shown in Table 5-4.

Table 5-4   **TX Analyzer and Signal Generator Specifications**

TX Analyzer	
Input Frequency Range	
CDMA Mode:	See "CDMA RF Analyzer" on page 167
AMPS Mode (Option 003):	See "AMPS RF Analyzer" on page 172
Power Measurement:	
CDMA Mode	See "CDMA RF Analyzer" on page 167
AMPS Mode (Option 003):	See "AMPS RF Analyzer" on page 172
Frequency Error Measurement:	
CDMA Mode	See "CDMA RF Analyzer" on page 167
AMPS Mode (Option 003):	See "AMPS RF Analyzer" on page 172
CDMA Modulation Measurement:	See "CDMA RF Analyzer" on page 167
CDMA Rho Measurement:	See "CDMA RF Analyzer" on page 167
CDMA Transmit Time Error Measurement:	See "CDMA RF Analyzer" on page 167
AMPS FM Measurement (Option 003):	See "AMPS RF Analyzer" on page 172
AMPS Audio Source (Option 003):	See "AMPS Audio Source" on page 171
AMPS Audio Analyzer (Option 003):	See "AMPS Audio Analyzer" on page 173
Signal Generator	
Frequency:	
CDMA Mode	See "CDMA RF Signal Generator" on page 166
AMPS Mode (Option 003)	See "AMPS RF Signal Generator" on page 170
Amplitude:	
CDMA Mode	See "CDMA RF Signal Generator" on page 166
AMPS Mode (Option 003)	See "AMPS RF Signal Generator" on page 170
Modulation:	QPSK based on IS-95A, Frequency modulation (Option 003), or Off (CW)

AMPS Mode (Option 003)

AMPS Call Processing Functionality

These specifications for the AMPS call processing functionality for Automatic Test and Manual Test with Option 003 are shown in Table 5-5.

Table 5-5   **AMPS Call Processing Specifications**

Radio System Support:	IS-95A AMPS
Call Processing Support:	Registration, MS Origination, MS Release, Paging, BS Release

Handoff Support:	Hard handoff between two RF channels for AMPS,
	Hard handoff between two radio systems:
	    Cellr/IS95A to AMPS,
	    Cellr/TSB74 to AMPS,
	    PCS US to AMPS

AMPS RF Signal Generator

These specifications for the AMPS RF Signal Generator with Option 003 are shown in Table 5-6.

Table 5-6   **AMPS RF Signal Generator Specifications**

Frequency	
Range:	869 to 894 MHz
Accuracy:	Same as Reference oscillator
Resolution:	30 kHz
Output Amplitude	
Range:	−120.0 to −40.0 dBm
Accuracy:	±1.0 dB at >−110 dBm, ±2.0 dB at ≤−110 dBm
Resolution:	0.1 dB
Modulation	
Type:	Frequency modulation (FM)
FM Distortion: (THD + Noise, C-message filter)	<1% at 8 kHz deviation with 1.004 kHz rate

AMPS Audio Source

These specifications for the AMPS Audio Source with Option 003 are shown in Table 5-7.

Table 5-7   **AMPS Audio Source Specifications**

Frequency	
Range:	1.004 kHz
Accuracy:	±0.025%
Output Level	
Range:	1 mVrms (−60 dBV) to 1 Vrms (0 dBV)
Accuracy:	±1 dB at ≥−30 dBV, ±2 dB *(typically ±1.2 dB)* at ≤−31 dBV
Resolution:	1 dB
Impedance:	<10 Ω

AMPS RF Analyzer

These specifications for the AMPS RF Analyzer functions such as Automatic Test, Manual Test, and TX Analyzer with Option 003 are shown in Table 5-8.

Table 5-8   **AMPS RF Analyzer Specifications**

Input Frequency Range:	824 to 849 MHz
Input Level Range:	−20 to +39 dBm
Frequency Error Measurement	
Range:	±12.5 ppm
Accuracy:	±(0.01 ppm + Reference oscillator accuracy)
Resolution:	0.01 ppm
Power Measurement	
Range:	−20 to +39 dBm
Accuracy:[a]	±1.0 dB *(typically ±0.6 dB)* at ≥0 dBm, ±2.0 dB *(typically ±1.2 dB)* at <0 dBm
Resolution:	0.2 dB
FM Measurement	
Frequency Measurement:	Range: 1.004 kHz ± 5%, 6 kHz ± 5%, 10 kHz ± 5%
	Accuracy: ±(0.02% of reading + Resolution + Reference oscillator accuracy)
	Resolution: 1 Hz
Deviation Measurement:	Range: 2 to 25 kHz
	Accuracy: ±4%
	Resolution: 0.01 kHz
	Displayed Value: (+peak to −peak)/2

a. To measure the RF power at the RF IN/OUT port of the E6393A with the specified accuracy, the AMPS signal generator level must be less than −50 dBm.

AMPS Audio Analyzer

These specifications for the AMPS Audio Analyzer functions for Automatic Test, Manual Test, and TX Analyzer with Option 003 are shown in Table 5-9.

Table 5-9   **AMPS Audio Analyzer Specifications**

SINAD Measurement	
Frequency:	1.004 kHz
Audio Input Range:	30 mV to 3 Vrms
Range:	0 to 40 dB
Accuracy:	±1.0 dB *(typically ±0.6 dB)*
Resolution:	0.1 dB

High Level Signal Output and Low Power Measurement (Option 010)

These specifications for the CDMA RF Signal Generator and RF Analyzer functions with Option 010 are shown in Table 5-10.

Table 5-10   **High Level Signal Output and Low Power Measurement Specifications**

CDMA Signal Generator Output Amplitude	
Range:	−110.0 to −20.0 dBm
Accuracy:[a][b]	±1.0 dB at ≤−50 dBm, ±2.0 dB at >−50 dBm
Resolution:	0.1 dB
CDMA Analyzer Power Measurement	
Range:	−60 to +39 dBm
Accuracy:	±1.0 dB *(typically ±0.6 dB)* at ≥0 dBm, ±2.0 dB *(typically ±1.2 dB)* at ≥−40 dBm to <0 dBm, ±3.0 dB *(typically ±1.8 dB)* at <−40 dBm

a. To achieve the specified output amplitude accuracy when inputting power at the RF IN/OUT port of the E6393A, the input power level must be less than or equal to −(output amplitude level) − 25 dB. Example: ≤−5 dBm input level for −20 dBm output amplitude.
b. These specifications are not applicable to the output level modulated with Pilot Only.

Table 5-12   **Other Functions Specifications (continued)**

Reference Oscillator	
Frequency:	10 MHz
Frequency Accuracy:	$\pm$[(Time since calibration $\times$ Aging rate) + Temperature effects + Accuracy of calibration]
Aging Rate:	$\pm$0.1 ppm per year
Temperature Stability:	$\pm$0.1 ppm at 0°C to 40°C
Reference Output Level:	*+3 dBm, 50 **W**, supplemental characteristics*
Reference Input Level:	*0 to +10 dBm, 50 **W**, supplemental characteristics*
Connector:	BNC female

General Specifications

These specifications for the Agilent E6393A CDMA MS Test Set are shown in

Table 5-13   **General Specifications**

Dimensions:	350 (W) × 150 (H) × 400 (D) mm
Weight:	<15 kg
Operating Temperature:	0 to +40°C
Storage Temperature:	−20 to +60°C
Operating Humidity:	15%RH to 95%RH at +40°C
Power Voltage:	88 to 264 VAC
Power Frequency:	47 to 63 Hz
Power Consumption:	<250 VA

Safety:	European Council Directive 73/23/EEC
	IEC 61010-1:1990+A1+A2 / EN 61010-1:1993+A2
	  INSTALLATION CATEGORY II, POLUTION DEGREE 2
	  INDOOR USE
	IEC 60825-1:1994 CLASS 1 LED PRODUCT
	CAN/CSA C22.2 No. 1010.1-92

EMC:	European Council Directive 89/336/EEC
	EN 61326-1:1997+A1
	  CISPR 11:1997+A1 / EN 55011:1998 Group 1, Class A
	  IEC 61000-4-2:1995+A1 / EN 61000-4-2:1995+A1
	      4 kV CD / 4 kV AD
	  IEC 61000-4-3:1995+A1 / EN 61000-4-3:1996+A1
	      3 V/m, 80 MHz to 1000 MHz, 80% AM
	  IEC 61000-4-4:1995 / EN 61000-4-4:1995
	      1 kV Power / 0.5 kV Signal
	  IEC 61000-4-5:1995 / EN 61000-4-5:1995
	      0.5 kV Normal / 1 kV Common
	  IEC 61000-4-6:1996 / EN 61000-4-6:1996
	      3 V, 0.15 MHz to 80 MHz, 80% AM
	  IEC 61000-4-11:1994 / EN 61000-4-11:1994
	      100% 1 cycle
	AS/NZS 2064.1/2 Group 1, Class A

Altitude:	<2000 meters

A   Input Fields and Allowable Ranges

This appendix lists the input fields and allowable value ranges for test parameters and test items. Use this information to configure the Test Setup: Test Sequence and Test Setup: Test Condition screens.

Input Fields

There are a number of input fields for test items, parameters, test limits, and so forth. Depending on the radio system to be tested, the input fields have different allowable ranges or choices. The following tables show those relationships between parameters and values. N/A means "not applicable". The test modes are abbreviated as follows:

- AT: Automatic Test

- MT: Manual Test

- TA: TX Analyzer

- SG: Signal Generator

- Conf: Configuration

- Seq: Test Setup: Test Sequence

- Cond: Test Setup: Test Condition

Table A-1   Input Fields and Allowable Choices or Ranges

Test Mode	Test Item, Parameter	Radio System			
		Cellr/IS95A	Cellr/TSB74	Cellr/T53	AMPS
AT:	RFCH:	1 to 799, 991 to 1023	1 to 799, 991 to 1023	1 to 799, 801 to 1039, 1041 to 1199	1 to 799, 991 to 1023
	Procedure:	Default (previous setting), User			
	DC Power:				
	Mode:	Off, On			
	Voltage:	3.0 to 12.0 V in 0.1 V steps			
MT:	Procedure:	Default (previous setting), User			
	RFCH:	1: 825.03 MHz to 799: 848.97 MHz, 991: 824.04 MHz to 1023: 825.00 MHz	1: 825.03 MHz to 799: 848.97 MHz, 991: 824.04 MHz to 1023: 825.00 MHz	1: 915.0125 MHz to 799: 924.9875 MHz, 801: 898.0125 MHz to 1039: 900.9875 MHz, 1041: 887.0125 MHz to 1199: 888.9875 MHz	1: 825.03 MHz to 799: 848.97 MHz, 991: 824.04 MHz to 1023: 825.00 MHz
	Amplitude:	−110.0 to −40.0 dBm, or −110.0 to −20.0 dBm, in 0.1 dB			−120.0 to −40.0 dBm in 0.1 dB
	Pwr Cntl Bit:	Open Loop, Alwy Up, Alwy Down			N/A
	Service Option:	1: Normal voice, 2: 9600 bps data loopback, 3: EVRC 9600 bps voice, 9: 14.4 kbps data loopback, 32768: 14.4 kbps voice			N/A

Handoff:	Cellr/TSB74, PCS US, PCS Korea P0, PCS Korea P1	Cellr/IS95A, PCS US, PCS Korea P0, PCS Korea P1	N/A	N/A
RFCH:	For Cellr/IS95A and Cellr/TSB74 for example: 1: 825.03 MHz to 799: 848.97 MHz, 991: 824.04 MHz to 1023: 825.00 MHz		N/A	N/A
FER				N/A
Max Frames:	25 to 10,000,000 frames			
Confidence:	Off, 95%			
Audio Out:	N/A			−60 to 0 dBV in 1 dB steps
Power Level:	N/A			0 (+36 dBm) to 7 (+8dBm)
SAT:	N/A			5970, 6000, 6030 Hz
DC Power:				
Mode:	Off, On			
Voltage:	3.0 to 12.0 V in 0.1 V steps			
Test Item Execution				
	TX Power: Off, On			TX Power: Off, On
	Frequency Error: Off, On			Frequency Error: Off, On
	Rho: Off, On			FM Deviation, SAT Deviation, or ST Deviation: Off, On
	FER: Off, On			Audio Frequency: Off, On
	Time Offset: Off, On			TX Distortion, RX Distortion, or RX SINAD: Off, On
	DC Current: Off, On			DC Current: Off, On
	(with Option 010): Max TX Power & Min TX Power: Measures when the Max & Min Power softkey is pressed after making other measurements (without Option 010): Max TX Power: Measures when the Max Power softkey is pressed after making other measurements			
TA:	Procedure:	Default (previous setting), User		
	RFCH:	1: 825.03 MHz to 799: 848.97 MHz, 991: 824.04 MHz to 1023: 825.00 MHz	1: 825.03 MHz to 799: 848.97 MHz, 991: 824.04 MHz to 1023: 825.00 MHz	1: 915.0125 MHz to 799: 924.9875 MHz, 801: 898.0125 MHz to 1039: 900.9875 MHz, 1041: 887.0125 MHz to 1199: 888.9875 MHz	1: 825.03 MHz to 799: 848.97 MHz, 991: 824.04 MHz to 1023: 825.00 MHz
	DC Power:			
	Mode:	Off, On		
	Voltage:	3.0 to 12.0 V in 0.1 V steps		
	Test Item Execution			

		TX Power: Off, On			TX Power: Off, On
		Frequency Error: Off, On			Frequency Error: Off, On
		Rho: Off, On			FM Deviation, SAT Deviation, or ST Deviation: Off, On
		Time Offset: Off, On			Audio Frequency: Off, On
		DC Current: Off, On			TX Distortion, RX Distortion, or RX SINAD: Off, On
					DC Current: Off, On
SG:	RFCH:	1: 870.03 MHz to 799: 893.97 MHz, 991: 869.04 MHz to 1023: 870.00 MHz	1: 870.03 MHz to 799: 893.97 MHz, 991: 869.04 MHz to 1023: 870.00 MHz	1: 860.0125 MHz to 799: 869.9875 MHz, 801: 843.0125 MHz to 1039: 845.9875 MHz, 1041: 832.0125 MHz to 1199: 833.9875 MHz	1: 870.03 MHz to 799: 893.97 MHz, 991: 869.04 MHz to 1023: 870.00 MHz
	Amplitude:	−110.0 to −40.0 dBm, or −110.0 to −20.0 dBm, in 0.1 dB steps			−120.0 to −40.0 dBm in 0.1 dB steps
	Modulation:	Off, Normal, Pilot Only			Off, Normal
	DC Power:				
	Mode:	Off, On			
	Voltage:	3.0 to 12.0 V in 0.1 V steps			
Conf:	Procedure:	Default (previous setting), User			
	Panel Key:	Lock, Unlock			
	Reference:	Internal, External			
	Auto Test Run:	Continuous, Pause			
	Serial Port				
	Baud Rate:	9600, 19200			
	Data Length:	7, 8			
	Stop Bits:	1, 2			
	Parity:	None, Odd, Even			
	Xcontrol:	None, Xon/Xoff			
	Terminator:	CR, LF, CR+LF			
	Date/Time:	1990 to 2089 (YYYY), 01 to 12 (MM), 01 to 31 (DD), 00 to 23 (HH), 00 to 59 (MM)			
	Loss:	Off, On			
	Cellular: IS95A/TSB74/ AMPS: T53:	RF In: 0.0 to 99.9 dB in 0.1 dB steps RF Out: 0.0 to 99.5 dB in 0.1 dB steps			
	PCS: Korea: US:	RF In: 0.0 to 99.9 dB in 0.1 dB steps RF Out: 0.0 to 99.5 dB in 0.1 dB steps			
	Printer:	HP PCL, ESC/P			
	Print Header:	Editable up to 28 alphanumeric characters per line in 2 lines			
	Beeper:	Off, On			

	Firmware: Update: New Firmware:	X.XX.XX Off, On Y.YY.YY (if the proper card inserted)			
	Option:	002, 003, 004, 010			
Seq:	Sequence No. 1:	Cellr/IS95A, Cellr/TSB74, Cellr/T53, PCS US, PCS Korea P0 or P1			AMPS
	2:	Cellr/IS95A, Cellr/TSB74, Cellr/T53, PCS US, PCS Korea P0 or P1, Off			AMPS, Off
	3:	Cellr/IS95A, Cellr/TSB74, Cellr/T53, PCS US, PCS Korea P0 or P1, Off			AMPS, Off
	Sequence No.:	1, 2, 3			
	(Test flow steps)	1 Registration: 2 MS Origination//Paging: 3 Voice Echo//RF Test: 4 MS Release//BS Release: 5 Paging//MS Origination: 6 RF Test//Voice Echo: 7 Softer Handoff: 8 Hard Handoff: 9 BS Release//MS Release: Refer to Table A-4 and Table A-5 for Run/Skip combinations.			1 Registration: 2 MS Origination// Paging: 3 MS Release// RF/AF Test: 4 Paging//BS Release: 5 RF/AF Test// MS Origination: 6 BS Release// MS Release: Refer to Table A-6 and Table A-7 for Run/Skip combinations.
	Amplitude:				
	Sensitivity:	−110.0 to −40.0 dBm, or −110.0 to −20.0 dBm, in 0.1 dB steps			−120.0 to −40.0 dBm in 0.1 dB steps
	Other Tests:	−110.0 to −40.0 dBm, or −110.0 to −20.0 dBm, in 0.1 dB steps			−120.0 to −40.0 dBm in 0.1 dB steps
	Service Option:				N/A
	Voice Echo:	1 for normal voice, 3 for EVRC 9600 bps voice, 32768 for 14.4 kbps voice			
	Other Tests:	2 for 9600 bps data loopback, 9 for 14.4 kbps data loopback			
	Audio Out:				
	Mode:	N/A			Auto, Manual
	Level:	N/A			−60 to 0 dBV
	Detail of RF Test				
	RFCH:	1 to 799, 991 to 1023, ----	1 to 799, 991 to 1023, ----	1 to 799, 801 to 1039, 1041 to 1199, ----	1 to 799, 991 to 1023, ----
		(up to 3 but the first channel can not be skipped)			

	(Test items)	Max TX Power: Run, ---	TX Power: Run, ---
		Min TX Power: Run, ---	Frequency Error: Run, ---
		Frequency Error: Run, ---	FM Dev Limit: Run, ---
		Rho: Run, ---	TX Distortion: Run, ---
		Time Offset: Run, ---	RX Distortion: Run, ---
		Sensitivity/FER: Run, ---	RX SINAD: Run, ---
		DC Current(Idle): Run, ---, ---, --- (the second and third channels are skipped)	SAT Deviation: Run, ---
		DC Current(Talk): Run, ---	SAT Freq Error: Run, ---
			ST Deviation: Run, ---, ---, --- (the second and third channels are skipped)
			ST Frequency: Run, ---, ---, --- (the second and third channels are skipped)
			DC Current(Idle): Run, ---, ---, --- (the second and third channels are skipped)
			DC Current(Talk): Run, ---
Cond:	Sector B Pwr:	Off, On; −15 to −3 dB in 1 dB steps	N/A
	Base Station		N/A
	NID:	0 to 65535	N/A
	Rgstr NID:	0 to 65535	N/A
	SID:	0 to 32767	0 to 32767
	Rgstr SID:	0 to 32767	N/A
	Power Up Rgstr:	Off, On	N/A
	Max Slot Cycle Index:	0 to 7	N/A
	Access Probe		N/A
	Nom Pwr:	−8 to +7 dB in 1dB steps	
	Init Pwr:	−16 to +15 dB in 1 dB steps	
	Pwr Step:	0 to 7 dB in 1 dB steps	
	Num Step:	0 to 15	
	Max Req Seq, Max Rsp Seq:	1 to 15	
	FER		N/A
	Max Frames:	25 to 10,000,000	
	Confidence:	Off, 95%	
	DC Current Avg Time		

Idle:	1.28, 2.56, 5.12, 10.24 sec	0.02 sec (fixed)
Talk:	0.02 sec (fixed)	0.02 sec (fixed)
Freq Error Avg No.:	1 to 100	N/A
Control Channel:	N/A	System A 313 to 333, System B 334 to 354
Power level:	N/A	0 (+36 dBm) to 7 (+8 dBm)
SAT:	N/A	5970, 6000, 6030 Hz
(Test Limits)	Max TX Power: −99.9 to +99.9 dB	TX Power: −99.9 to +99.9 dB
	Min TX Power: −99.9 to +99.9 dB	Frequency Error: −12.50 to +12.50 ppm
	Frequency Error: −10000 to +10000 Hz	FM Dev Limit: 1.00 to 25.00 kHz
	Rho: 0.800 to 1.000	TX Distortion: 0.0 to 100.0%
	Time Offset: −10.00 to +10.00 μsec	RX Distortion: 0.0 to 100.0%
	Sensitivity/FER: 0.0 to 5.0	RX SINAD: 0.0 to 40 dB
	DC Current(Idle): 0 to 1000 mA	SAT Deviation: 1.00 to 25.00 kHz
	DC Current(Talk): 0 to 1000 mA	SAT Freq Error: −600.0 to +600.0 Hz
		ST Deviation: 1.00 to 25.00 kHz
		ST Frequency: 9000.0 to 11000.0 Hz
		DC Current(Idle): 0 to 1000 mA
		DC Current(Talk): 0 to 1000 mA

A. Input Fields and Allowable Ranges

Table A-2   Input Fields and Allowable Choices or Ranges

Test Mode	Test Item, Parameter	Radio System		
		PCS US	PCS Korea P0	PCS Korea P1
AT:	RFCH:	0 to 1199	1 to 1300	1 to 1300
	Procedure:	Default (previous setting), User		
	DC Power:			
	Mode:	Off, On, Auto		
	Voltage:	3.0 to 12.0 V in 0.1 V steps		
MT:	Procedure:	Default (previous setting), User		
	RFCH:	0: 1850.00 MHz to 1199: 1909.95 MHz	0: 1715.00 MHz to 1300: 1780.00 MHz	1: 1750.05 MHz to 600: 1780.00 MHz, 601: 1715.00 MHz to 1300: 1750.00 MHz
	Amplitude:	−110.0 to −40.0 dBm, or −110.0 to −20.0 dBm, in 0.1 dB		
	Pwr Cntl Bit:	Open Loop, Alwy Up, Alwy Down		
	Service Option:	1: Normal voice, 2: 9600 bps data loopback, 3: EVRC 9600 bps voice, 9: 14.4 kbps data loopback, 32768: 14.4 kbps voice		
	Handoff:	Cellr/IS95A, Cellr/TSB74, PCS Korea P0, PCS Korea P1, AMPS	Cellr/IS95A, Cellr/TSB74, PCS US, PCS Korea P1	Cellr/IS95A, Cellr/TSB74, PCS US, PCS Korea P0
	RFCH:	For Cellr/IS95A and Cellr/TSB74 for example: 1: 825.03 MHz to 799: 848.97 MHz, 991: 824.04 to 1023: 825.00 MHz		
	FER			
	Max Frames:	25 to 10,000,000		
	Confidence:	Off, 95%		
	DC Power:			
	Mode:	Off, On		
	Voltage:	3.0 to 12.0 V in 0.1 V steps		
	Test Item Execution			
		TX Power: Off, On		
		Frequency Error: Off, On		
		Rho: Off, On		
		FER: Off, On		
		Time Offset: Off, On		
		DC Current: Off, On		
		Max TX Power/Min TX Power: when the Max & Min Power softkey is pressed after making other measurements		
TA:	Procedure:	Default (previous setting), User		

A. Input Fields and Allowable Ranges

	RFCH:	0: 1850.00 MHz to 1199: 1909.95 MHz	0: 1715.00 MHz to 1300: 1780.00 MHz	1: 1750.05 MHz to 600: 1780.00 MHz, 601: 1715.00 MHz to 1300: 1750.00 MHz
	DC Power:			
	Mode:	Off, On		
	Voltage:	3.0 to 12.0 V in 0.1 V steps		
	Test Item Execution			
		TX Power: Off, On		
		Frequency Error: Off, On		
		Rho: Off, On		
		Time Offset: Off, On		
		DC Current: Off, On		
SG:	RFCH:	0: 1930.00 MHz to 1199: 1989.95 MHz	0: 1805.00 MHz to 1300: 1870.00 MHz	1: 1840.05 MHz to 600: 1870.00 MHz, 601: 1805.05 MHz to 1300: 1840.00 MHz
	Amplitude:	−110.0 to −40.0 dBm, or −110.0 to −20.0 dBm, in 0.1 dB steps		
	Modulation:	Off, Normal, Pilot Only		
	DC Power:			
	Mode:	Off, On		
	Voltage:	3.0 to 12.0 V in 0.1 V steps		
Conf:	Procedure:	Default (previous setting), User		
	Panel Key:	Lock, Unlock		
	Reference:	Internal, External		
	Auto Test Run:	Continuous, Pause		
	Serial Port			
	Baud Rate:	9600, 19200		
	Data Length:	7, 8		
	Stop Bits:	1, 2		
	Parity:	None, Odd, Even		
	Xcontrol:	None, Xon/Xoff		
	Terminator:	CR, LF, CR+LF		
	Date/Time:	1990 to 2089 (YYYY), 01 to 12 (MM), 01 to 31 (DD) 00 to 23 (HH), 00 to 59 (MM)		
	Loss:	Off, On		
	Cellular: IS95A/TSB74/ AMPS: T53:	RF In: 0.0 to 99.9 dB in 0.1 dB steps RF Out: 0.0 to 99.5 dB in 0.1 dB steps		
	PCS: Korea: US:	RF In: 0.0 to 99.9 dB in 0.1 dB steps RF Out: 0.0 to 99.5 dB in 0.1 dB steps		

	Printer:	HP PCL, ESC/P
	Print Header:	Editable up to 28 alphanumeric characters per line in 2 lines
	Beeper:	Off, On

	Firmware:
	  Update:
	  New
	  Firmware:
		X.XX.XX
		Off, On
		
		Y.YY.YY (if the proper card inserted)

	Option:	002, 003, 004, 010
Seq:	Sequence No. 1:	Cellr/IS95A, Cellr/TSB74, Cellr/T53, PCS US, PCS Korea P0 or P1
	2:	Cellr/IS95A, Cellr/TSB74, Cellr/T53, PCS US, PCS Korea P0 or P1, Off
	3:	Cellr/IS95A, Cellr/TSB74, Cellr/T53, PCS US, PCS Korea P0 or P1, Off
	Sequence No.:	1, 2, 3
	(Test flow steps)	1 Registration: 2 MS Origination//Paging: 3 Voice Echo//RF Test: 4 MS Release//BS Release: 5 Paging//MS Origination: 6 RF Test//Voice Echo: 7 Softer Handoff: 8 Hard Handoff: 9 BS Release//MS Release: Refer to Table A-4 and Table A-5 for Run/Skip combinations
	Amplitude:	
	Sensitivity:	−110.0 to −40.0 dBm, or −110.0 to −20.0 dBm, in 0.1 dB steps
	Other Tests:	−110.0 to −40.0 dBm, or −110.0 to −20.0 dBm, in 0.1 dB steps
	Service Option:	
	Voice Echo:	1 for normal voice, 3 for EVRC 9600 bps voice, 32768 for 14.4 kbps voice
	Other Tests:	2 for 9600 bps data loopback, 9 for 14.4 kbps data loopback
	Detail of RF Test	
	RFCH:	0 to 1199, ---- 0 to 1300, ---- 0 to 1300, --- (up to 3 but the first channel can not be skipped)
	(Test items)	Max TX Power: Run, ---
		Min TX Power: Run, ---
		Frequency Error: Run, ---
		Rho: Run, ---
		Time Offset: Run, ---
		Sensitivity/FER: Run, ---
		DC Current(Idle): Run, ---, ---, --- (the second and third channels are skipped)
		DC Current(Talk): Run, ---
Cond:	Sector B Pwr:	Off, On, −15 to −3 dB in 1 dB steps
	Base Station	
	NID:	0 to 65535

Rgstr NID:	0 to 65535
SID:	0 to 32767
Rgstr SID:	0 to 32767
Power Up Rgstr:	Off, On
Max Slot Cycle Index:	0 to 7
Access Probe	
Nom Pwr:	−8 to +7 dB in 1 dB steps
Init Pwr:	−16 to +15 dB in 1 dB steps
Pwr Step:	0 to 7 dB in 1 dB steps
Num Step:	0 to 15
Max Req Seq, Max Rsp Seq:	1 to 15
FER	
Max Frames:	25 to 10,000,000
Confidence:	Off, 95%
DC Current Avg Time	
Idle:	1.28, 2.56, 5.12, 10.24 sec
Talk:	0.02 sec (fixed)
(Test Limits)	Max TX Power: −99.9 to +99.9 dB
	Min TX Power: −99.9 to +99.9 dB
	Frequency Error: −10000 to +10000 Hz
	Rho: 0.800 to 1.000
	Time Offset: −10.00 to +10.00 μsec
	Sensitivity/FER: 0.0 to 5.0
	DC Current(Idle): 0 to 1000 mA
	DC Current(Talk): 0 to 1000 mA

Hard Handoff Between Radio Systems

Depending on the radio system currently tested, the radio systems allowed to make hard handoff to are different. (Y: capable, N: incapable, -: soft handoff)

Table A-3   Hard Handoff Capability between Radio Systems

To From	Cellr/IS95A	Cellr/TSB74	Cellr/T53	PCS US	PCS Korea P0	PCS Korea P1	AMPS
Cellr/IS95A	-	Y	N	Y	Y	Y	Y
Cellr/TSB74	Y	-	N	Y	Y	Y	Y
Cellr/T53	N	N	-	N	N	N	N
PCS US	Y	Y	N	-	Y	Y	Y
PCS Korea P0	Y	Y	N	Y	-	Y	N
PCS Korea P1	Y	Y	N	Y	Y	-	N
AMPS	N	N	N	N	N	N	-

Test Run/Skip Combinations

Two kinds of test flows can be configured for each radio system.

CDMA Test

Table A-4 shows the Run/Skip combinations for CDMA mobile tests if the first call setup is made by MS Origination.

Table A-4   Run/Skip Combination for First Call Setup by MS Origination

Test Flow						
1 Registration:	Run	Run	Run	Run	---	---
2 MS Origination:	Run	Run	---	---	Run	Run
3 Voice Echo:	Run/---	Run/---	---	---	Run/---	Run/---
4 MS Release:	Run	Run	---	---	Run	Run
5 Paging:	Run	Run	Run	Run	Run	Run
6 RF Test:	Run/---	Run/---	Run/---	Run/---	Run/---	Run/---
7 Softer Handoff:	Run/---	Run/---	Run/---	Run/---	Run/---	Run/---
8 Hard Handoff:	Run	---	Run	---	Run	---
9 BS Release:	---	Run	---	Run	---	Run

Table A-5 shows the Run/Skip combinations for CDMA mobile tests if the first call setup is made by Paging.

Table A-5   Run/Skip Combination for First Call Setup by Paging

Test Flow						
1 Registration:	Run	Run	Run	Run	---	---
2 Paging:	Run	Run	---	---	---	---
3 RF Test:	Run/---	Run/---	---	---	---	---
4 BS Release:	Run	Run	---	---	---	---
5 MS Origination:	Run	Run	Run	Run	Run	Run
6 Voice Echo:	Run/---	Run/---	Run/---	Run/---	Run/---	Run/---
7 Softer Handoff:	Run/---	Run/---	Run/---	Run/---	Run/---	Run/---
8 Hard Handoff:	Run	---	Run	---	Run	---
9 MS Release:	---	Run	---	Run	---	Run

AMPS Test

Table A-6 shows the Run/Skip combinations for AMPS mobile tests if the first call setup is made by MS Origination.

Table A-6   Run/Skip Combination for First Call Setup by MS Origination

Test Flow			
1 Registration:	Run	Run	---
2 MS Origination:	Run	---	Run
3 MS Release:	Run	---	Run
4 Paging:	Run	Run	Run
5 RF/AF Test:	Run/---	Run/---	Run/---
6 BS Release:	Run	Run	Run

Table A-7 shows the Run/Skip combinations for AMPS mobile tests if the first call setup is made by Paging.

Table A-7   Run/Skip Combination for First Call Setup by Paging

Test Flow			
1 Registration:	Run	Run	---
2 Paging:	Run	---	---
3 RF/AF Test:	Run/---	---	---
4 BS Release:	Run	---	---
5 MS Origination:	Run	Run	Run
6 MS Release:	Run	Run	Run

Numerics

10 MHz IN/OUT connector 58

A

Abort softkey 74, 76
Aborted Screen 76
AC power receptacle 58
Access Probe field 138
Accessories 16
Amplitude field 87, 100, 118, 127, 133
AMPS 61, 157
AMPS Test Screen
  Automatic Test 79
  Manual Test 98
  Signal Generator 117
  TX Analyzer 113
Antenna Coupler 17, 21
Audio Frequency test 101, 116
Audio Out Adjust softkey 96, 104, 105
Audio Out field 100, 115, 133
audio signal 21
Auto Test Run field 121
Auto Test Sequence Screen 124
Auto Test Sequence softkey 120
Automatic Test Mode 14, 27, 67
  AMPS Test Screen 79
  CDMA Test Screen 67
  Measuring Screen 73
  Stand-by Screen 67, 79
Automatic Test softkey 65
AUX connector 57

B

Back Space softkey 130, 136, 144
Base Station field 137
Baud Rate field 121
Beeper field 122
BS Released 107

C

Cancel softkey 63, 129, 135, 143, 144, 145, 149
Caps On/Off softkey 129, 135, 144
CDMA 154
CDMA Test Screen
  Automatic Test 67
  Manual Test 85
  Signal Generator 117
  TX Analyzer 109
Cellr/IS95A 61
Cellr/T53 61
Cellr/TSB74 61
Cellular field 122
Cleaning 20
Clear Status softkey 86, 91, 95, 96, 98, 103, 105, 107
Confidence field 88, 138
Configuration Mode 15, 120
Configuration Screen 120
Configuration softkey 66
Connection
  Printer 23
  UUT 22
Continue softkey 76
Continuous Trigger Mode 110, 113
CONTRAST knob 57
Control Channel field 140
CURSOR CONTROL knob 56, 62

D

Data Length field 121
Date/Time field 122
DC Curr (Idle) Test Limits 139, 141
DC Curr (Talk) Test Limits 139, 141
DC Current (Idle) test 71, 82, 128, 134
DC Current (Talk) test 71, 82, 128, 134
DC Current Avg Time field 138, 140

DC Current test 89, 101, 112, 116
DC Power field 70, 80, 88, 100, 111, 115, 119
dc power supply 21
DD field 122
Del End command 130, 136
Delete command 130, 136
Delete softkey 142
Dialed No. 93, 106
Display Annotation 59
Display Contrast, Adjusting 22
Done softkey 129, 135, 144

E

Editor field 122
Editor window 130, 136
Electrical Requirements 19
Environmental Requirements 19
Err Cnt display 89
ESN 93, 106

F

Fail softkey 74
FER field 138
FER test 89
File Management 142
  Recalling a Test Setup File 146
  Saving a Test Setup File 143
File Management softkey 120
Firmware field 122
Firmware Update 65, 148
  Power-up Update Function 150
Firmware Update Screen 148
FM Dev Limit test 81, 134
FM Dev Limit Test Limits 141
FM Deviation test 101, 116
Format SRAM Card softkey 142
frame error rate test 71, 89, 128
Freq Error Avg No. field 138
Freq Error Test Limits 139, 141

US field 122
UUT Connections 22

V

Variable Increment/Decrement soft-
key 63
Ventilation 20
Voice Echo field 127
Voice Echo test 73

W

Warm-up Time 20
waveform quality test 71, 89, 112,
128

X

x1/x10/x100/x1000 softkey 63
Xcontrol field 121

Y

Yes softkey 84, 145, 148, 150
YYYY field 122