# Manual Supplement

# Agilent Technologies ESG-D Series Option H98 Signal Generators

**Serial Number Prefixes**

(Affix Label Here)


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# Contents

# Contents

# 1 In–Channel, Base Station and Mobile Receiver Testing

This manual supplement provides operating and service information applicable to the Agilent Technologies ESG-D Series Option H98 Signal Generator. Use this information to supplement the ESG Family manual set.

# Option H98 Product Overview

W-CDMA is a third-generation (3G) wireless technology designed to deliver high transport capacity for high-speed data and low-cost voice services. The ESG-D Series Option H98 Signal Generator enables you to accelerate the development of W-CDMA base station and mobile receivers by fully exercising the receiver to ensure it meets performance requirements.

Option H98 provides real-time data on downlink or uplink signals.

- For downlink simulation, you can generate up to two coded channels (Perch 1 and 2, plus one user-selected logical channel), and select the data pattern, symbol rate, long code, and short code. Figure 1-1 shows the Option H98 downlink block diagram; Figure 1-2 on page 1-3 shows more detail of the logical channels (Channel 1) with the downlink state selected.
- For uplink simulation, you can generate up to three independent channels, or three multicode channels, for sensitivity-testing needs. Figure 1-3 on page 1-3 through Figure 1-6 on page 1-6 shows more detail of the uplink mode.

Typically better than 63 dBc adjacent channel power ratio (ACPR) performance, with less than 1.25 percent error vector magnitude (EVM), ensures that the signal will meet performance requirements for W-CDMA (see Chapter 2 for Option H98 specifications).

**Figure 1-1 Downlink Block Diagram**

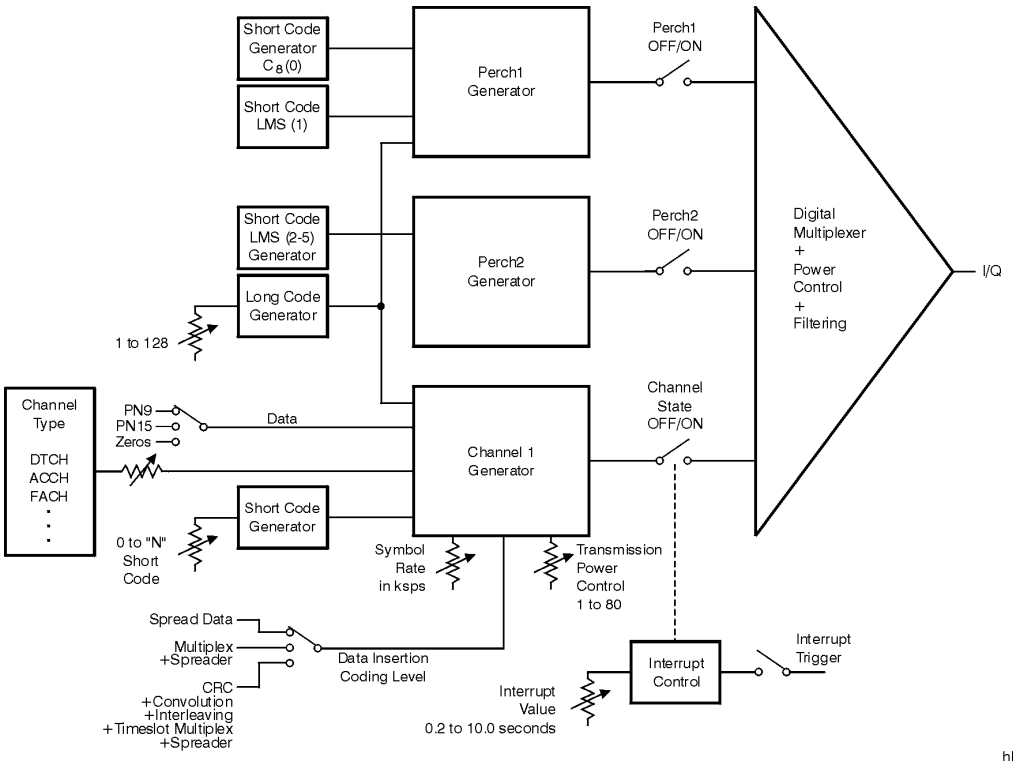


**Figure 1-2 Downlink Channel 1 Block Diagram**

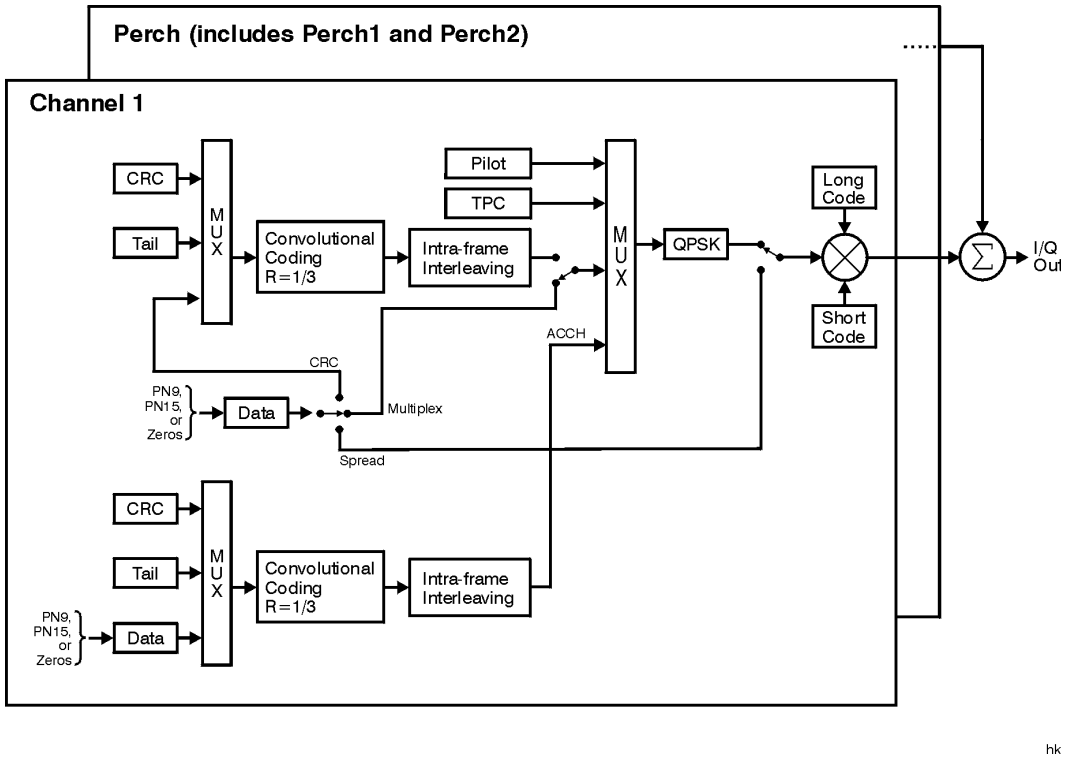



**Figure 1-3 Uplink Multicode Block Diagram**

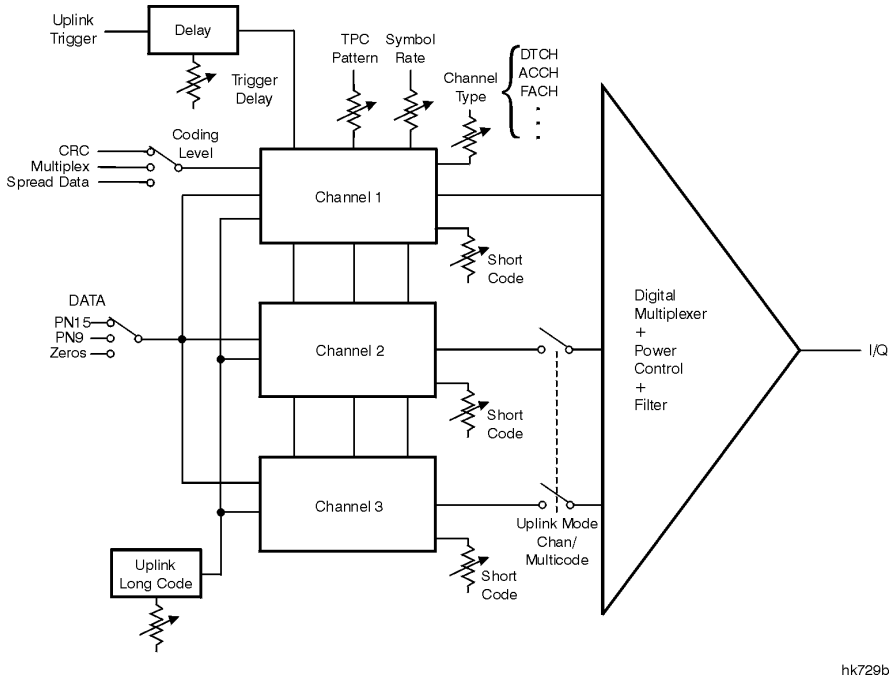
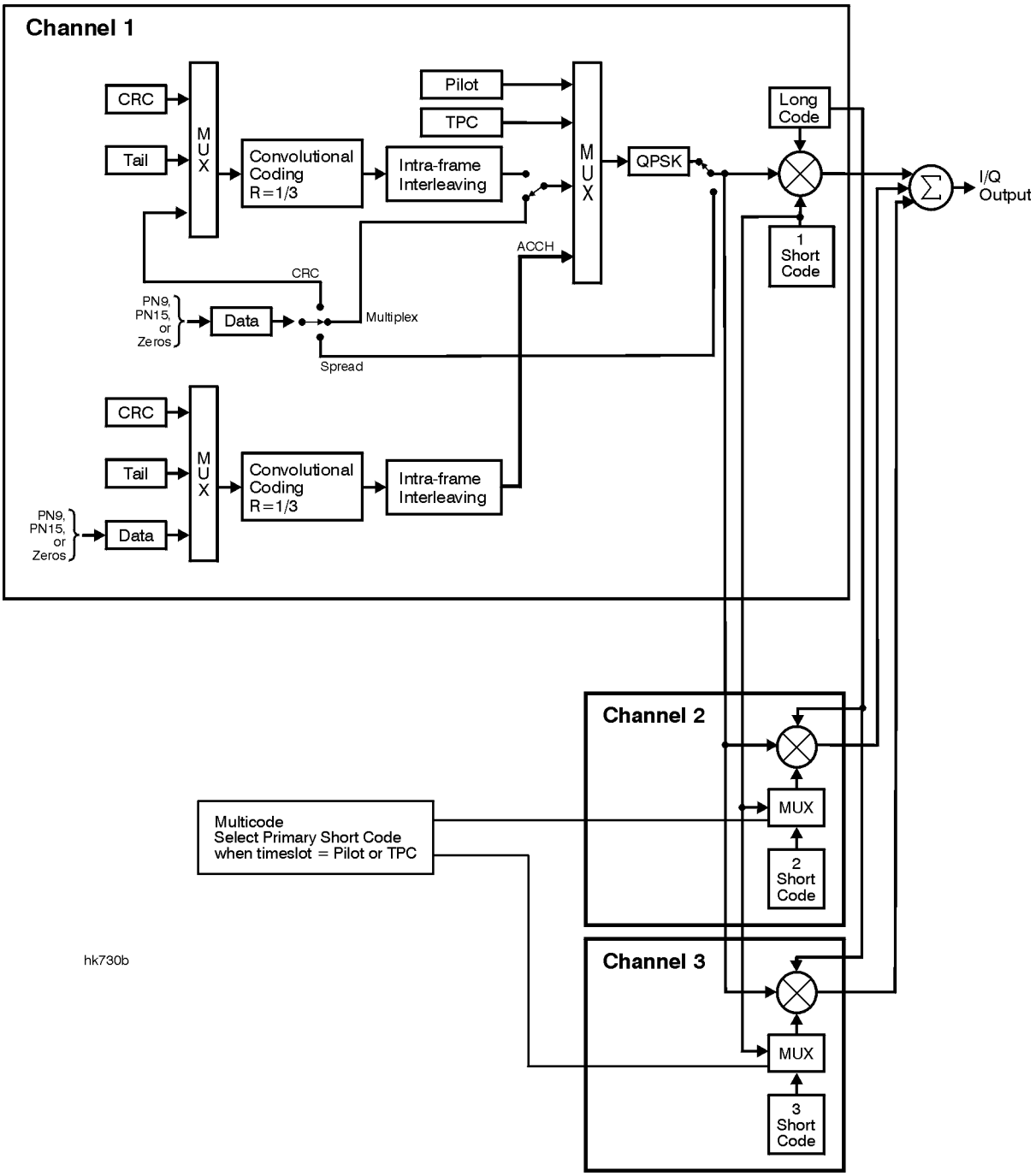


**Figure 1-4 Uplink, Multicode Channels Block Diagram**



## Figure 1-5 Uplink Multichannel Block Diagram

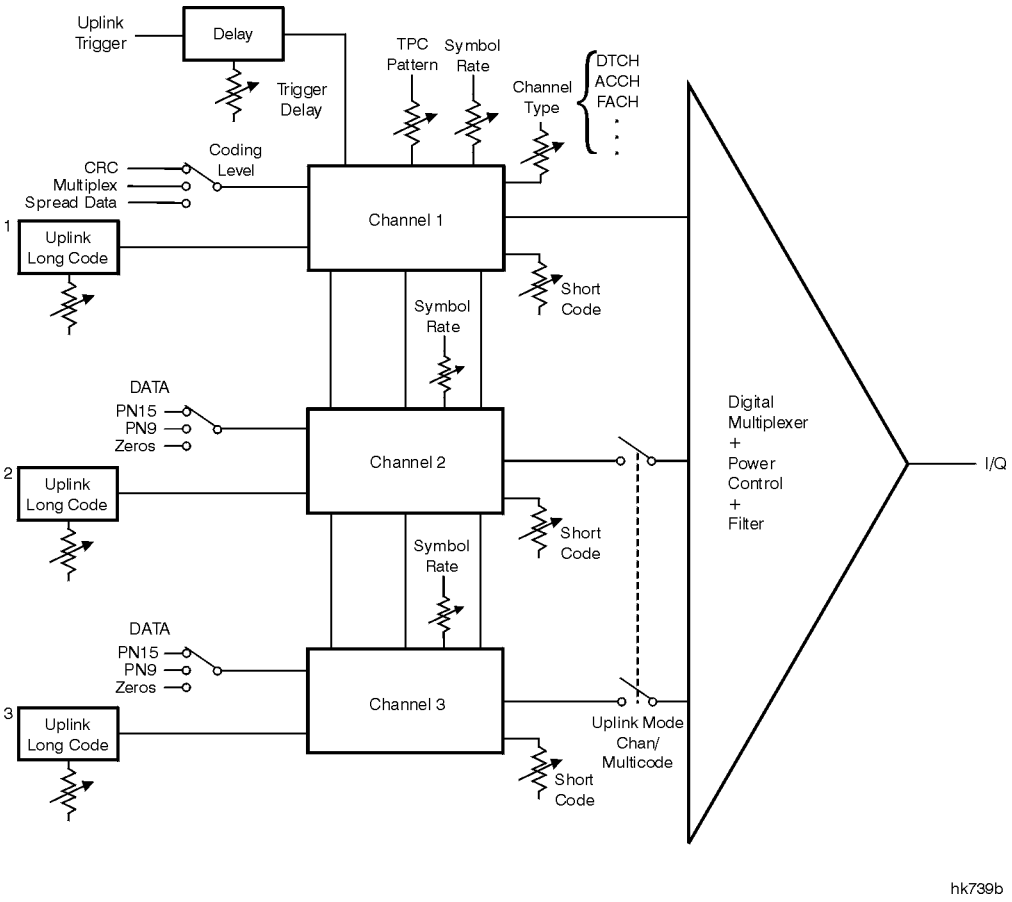
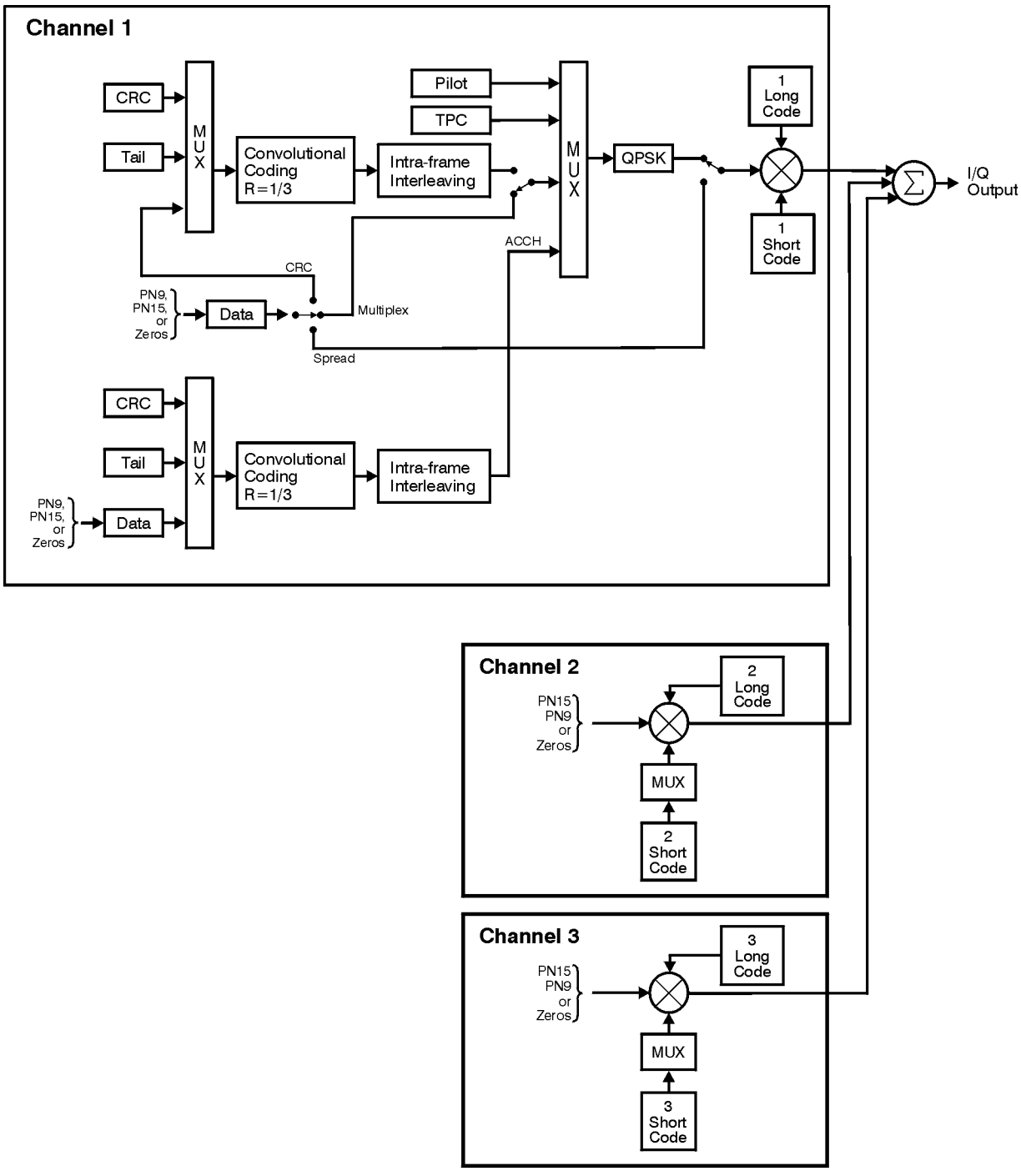


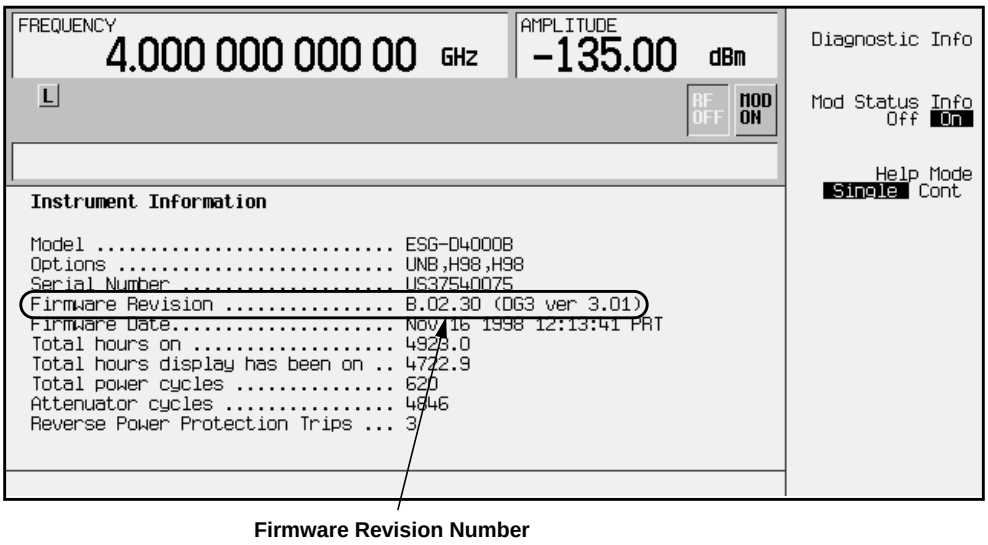
**Figure 1-6 Uplink, Multichannel Channels Block Diagram**



# Reconciling New Firmware Revisions with Earlier Revisions

Remote and front-panel operation of firmware revision B.02.30 and greater is quite different from earlier firmware revisions. This section documents the remote operation commands from earlier firmware revisions that are still valid in revision B.02.30.

To determine the firmware revision of your instrument, press **Utility** > **Instrument Info/Help Mode** > **Diagnostic Info**. To locate the firmware revision information on the display, see the following illustration.




## Remote Operation

The following SCPI commands were used in previous versions of firmware. Although they are different than the commands for the current firmware, they can still be used.

### System Frame Number Query

This command query retrieves the current value of System Frame Number from the wideband CDMA hardware.

```
[:SOURce]:RADio:WCDMa[:BBG]:SFN?
```

### Wideband CDMA Off On

This command sets the wideband CDMA modulation operating state to on or off. The command query will retrieve wideband CDMA operating state information from the signal generator.

```
[:SOURce]:RADio:WCDMa[:BBG][:STATe] ON|OFF|1|0
```

```
[:SOURce]:RADio:WCDMa[:BBG][:STATe]?
```

# 2 Specifications

This chapter provides the specifications and supplemental characteristics for the ESG–D Series Option H98 Signal Generator. This chapter, as with the rest of this supplement, provides only the information unique to the Option H98. Use this information to supplement the ESG Family manual set.

## Frequency Range:

E4432B: 20 MHz to 3 GHz
E4433B: 20 MHz to 4 GHz

## Chip Rate:

4.096 MHz

## Frame Duration:

10 ms

## Modulation:

QPSK with long and short code spreading

## Filtering:

Root raised cosine with alpha of 0.22

## Downlink

### Channel Structure

Symbol Rate: 32, 64, 64 voice, 128, 256 kilosymbols per second (ksps)

Short Code: Selectable over the full range of available short codes at each symbol rate.

Data: PN9, PN15, or zeros

Data Insertion at: CRC, multiplexing, or spreading

Power Control: *n* up/down, *n* selectable from 1 to 80

Long Code: 1 to 128

Channel Type: DTCH + ACCH, ACCH[1], DTCH[1], DTX[1], FACH-L, SDCCH, UPCH

Channel Power Level: ± 30 dB with respect to Perch1 power

Channel Interrupt: 20 ms to 10 seconds, in 20 ms steps

Time Offset Range:
- TSector 0 to 2560 chips
- TSlot 0 to 159 symbols, limited by symbol rate
- TFrame 0 to 15 slots

Phase Polarity: Normal, Invert

*Perch 1 Structure*

Control: On/Off

BCCH Type: 1 or 2

Data: 0 to 11111111, repeating

System Frame Number (SFN): Increment (0 to $2^{16} - 1$) or Fixed (0 to FFFE hexadecimal, even numbers only)

Tx Power Bits: 0 to 127

Uplink I/F Bits: 0 to 63

W Bits: 0 to 3

*Perch 2 Structure*

Control: On/Off

Long Code Mask (LCM): Yes

Short Code Number for LCM Symbols: 2 to 5, coupled to long code selection

## Uplink

| | |
|---|---|
| Mode: | Channel or Multicode |
| Trigger Delay: | –50 to +204 chips |
| Long Code: | 00000000000 to IFFFFFFFFFF hexadecimal<br>(0 to 2,199,023,255,551 decimal) |
| Short Code: | Selectable over the full range of available short codes at each symbol rate. |

**Channel Mode:** Channel 1, 2 or 3

*Channel 1 Setup*

| | |
|---|---|
| Channel Type: | DTCH+ACCH, ACCH[1], DTCH[1], DTX[1], RACH-L, SDCCH, UPCH |
| Symbol Rate: | 32, 64, 64 voice, 128, 256 ksps |
| Data: | PN9, PN15, or zeros |
| Data Insertion at: | CRC, multiplexing or spreading |
| Power Control: | *n* up/down, *n* selectable from 1 to 80 |
| Time Offset: | • TSector 0 to 2560 chips<br>• TSlot 0 to 159 symbols, limited by symbol rate<br>• TFrame 0 to 15 slots |
| Phase Polarity: | Normal, Invert |

*Channel 2 or 3 setup* (long and short code spreading of selected data)

| | |
|---|---|
| Symbol Rate: | 32, 64, 128, 256 ksps |
| Data: | PN9, PN15, or zeros |
| Power Level: | ± 30 dB with respect to channel 1 |
| Long Code & Short Code: | Set independently for each channel |

**Multicode Mode (generates 3–channel multicode transmission)**

*Code 1 Setup*

| | |
|---|---|
| Multicode Type: | DTCH + ACCH, UPCH |
| Symbol Rate: | 32 ksps, 64 ksps, 128 ksps, 256 ksps |
| Pilot – TPC Power: | 1 to 3 |
| Data: | PN9, PN15, or zeros |
| Power Control: | *n* up/down, *n* selectable from 1 to 80 |
| Time Offset: | • TSector 0 to 2560 chips<br>• TSlot 0 to 159 symbols, limited by symbol rate<br>• TFrame 0 to 15 slots |
| *Code 2 or 3 Setup* | Short code can be selected over the full range of available short codes at each symbol rate. |

## ACP Specifications:

–61 dBc (–63 dBc, amplitude range ≤0 dBm, Option H99)

**EVM Specification:** 1.75% (1.25%, amplitude range ≤4 dBm)

**Input:** System Frame Number Reset in

**Outputs:**

- Frame Sync out
- Transmission Power Control out
- System Frame Number Reset out
- 8 kHz out
- Super Frame Reset out

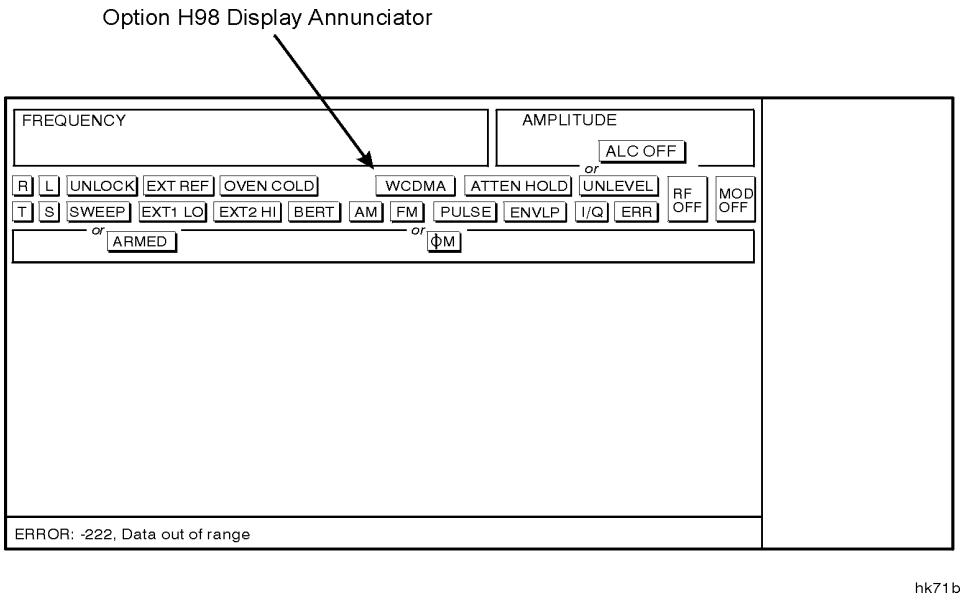
1. Burst (discontinuous) transmissions. DTX = Pilot and TPC symbols only.

# 3 Using Wideband CDMA

This chapter contains basic front-panel operating instructions for the Option H98, setup information, and rear-panel changes. For remote operation, see Chapter 5. Use this information to supplement the ESG Family manual set.

# Display Annotation

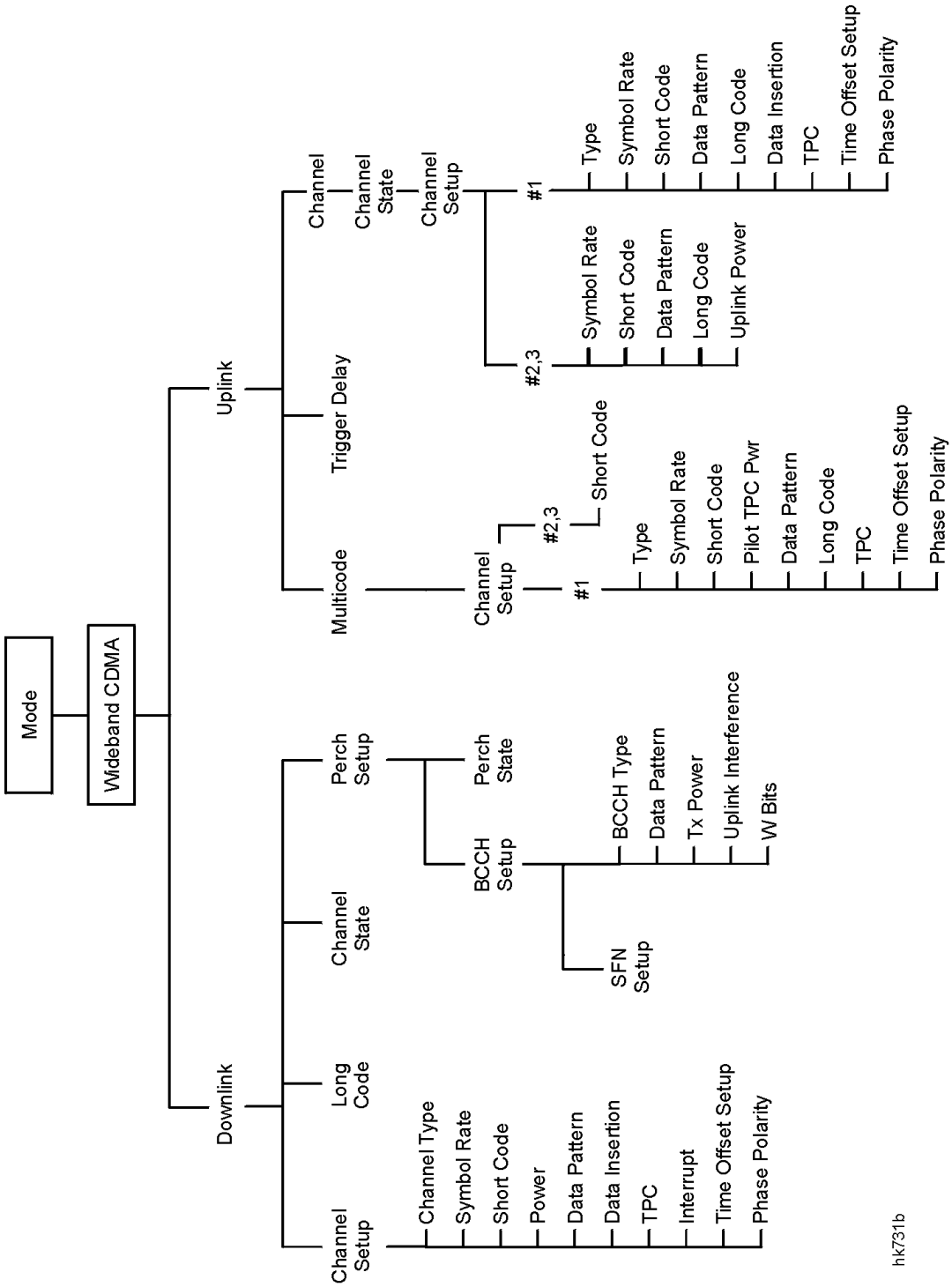
The Option H98 display is identical to the standard signal generator display in all respects, except for the annunciator shown in the following figure. In the Option H98, the WCDMA annunciator is displayed in this position when wideband CDMA is enabled. In a standard signal generator, this annunciator position is used for other purposes.




hk71b

# Wideband CDMA Menu Tree

The following figure provides an overview of the Wideband CMDA softkey menus. This is not intended to be an exhaustive description of each menu; rather, it is provided as a navigation aid. For softkey descriptions, see Chapter 4.

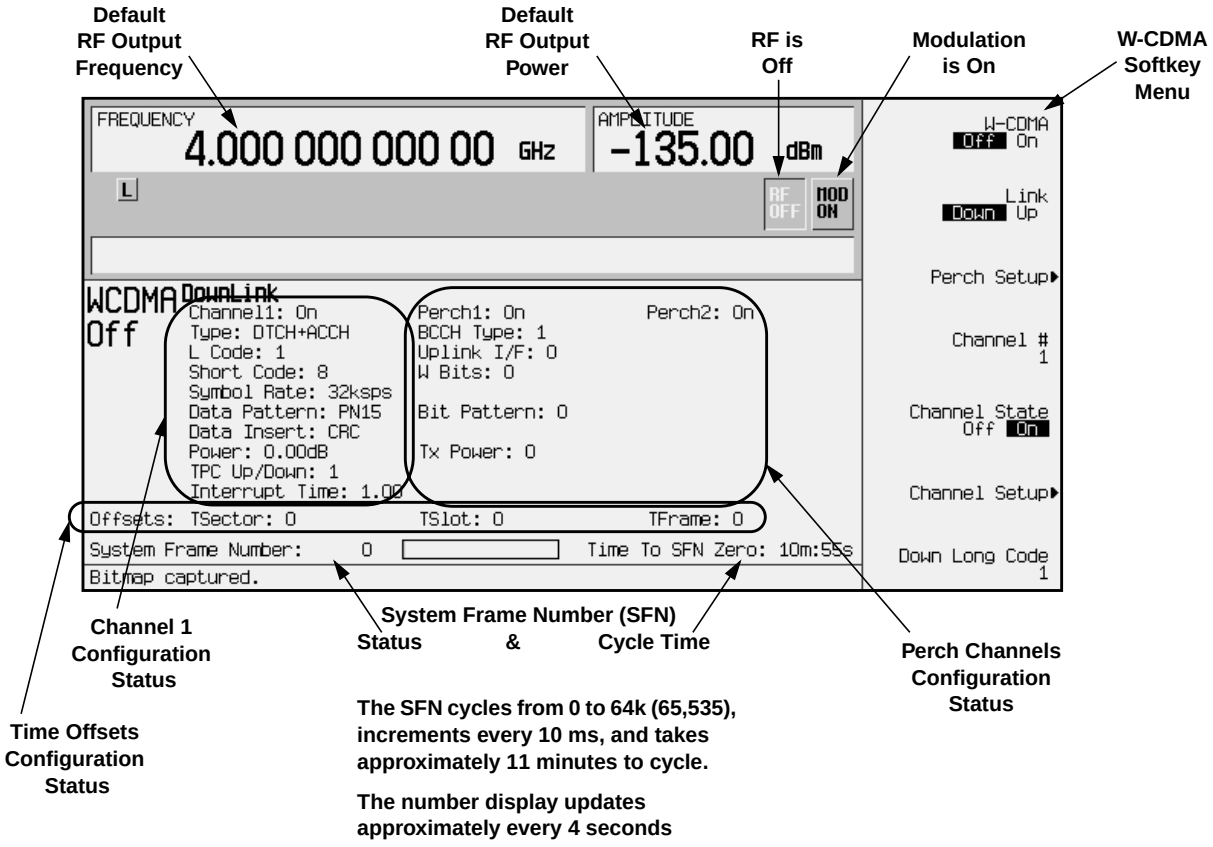


# Front-Panel Operation

The following procedure is an example of how to set up and turn on a wideband CDMA signal simulating a downlink condition. Use the following steps to configure a Perch1 channel and a single dedicated traffic channel (DTCH) with a downlink long code of 50 and a short code of 15.

## Accessing the Wideband CDMA Menu

1. Preset the signal generator.
2. Press the front-panel **Mode** key.
3. Press **Wideband CDMA**. The Wideband CDMA menu appears. The display you see will be similar to the following illustration.



## Setting Channels, Long Code, and Short Code

**1. Turn on Channel 1.**

Channel 1 defaults to **On** after a normal instrument preset. Since this is the desired condition for this example, no action is necessary (the **Channel State Off On** softkey toggles the operating state of Channel 1).

**2. Turn off Perch2.**

The Perch1 and Perch2 channels also default to **On** after a normal instrument preset. In this example, only the Perch1 channel is required to be on. To turn off Perch2, first press **Perch Setup**, then press the **Perch2 Off On** softkey until **Off** is highlighted.

**3. Set the downlink long code to 50.**

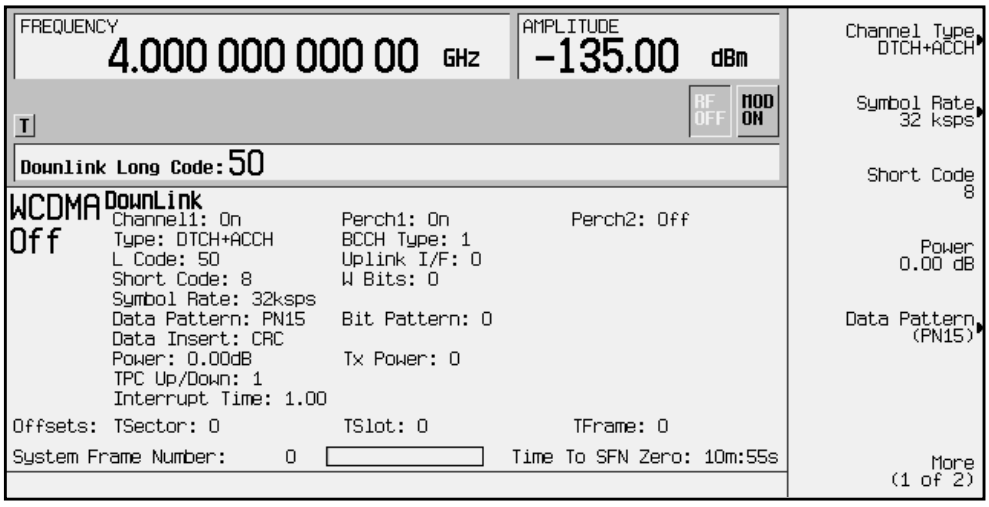
The downlink long code is applied to both the Perch1 channel and the traffic channel.

First press the **Return** hardkey to display the Wideband CDMA menu, then press the **Down Long Code** softkey.

Use the numeric keypad to enter **50**, then press the **Enter** softkey to terminate the entry.

**4. Set the short code to 15.**

After a normal instrument preset, the Channel 1 short code default value is 8. To change it, first press the **Channel Setup** softkey to open the Channel Setup menu (shown in the following illustration), then press **Short Code**, set the short code to **15**, and press **Enter** to terminate the entry.




**5. Set the channel type to DTCH.**

After a normal instrument preset, the default channel type is **DTCH+ACCH**. To change it, first press the **Channel Type** softkey, then press **DTCH**.

## Setting the Carrier Frequency and Power

1. **Set the RF output frequency to 2.17 GHz.**

   Press the front-panel **Frequency** key, enter **2.17**, then terminate the entry with the **GHz** softkey.

2. **Set the output power to –10 dBm.**

   Press the front-panel **Amplitude** key, enter **–10**, then terminate the entry with the **dBm** softkey (see "Understanding RF Power Levels" on page 3-7).

## Enabling and Outputting the Signal

1. **Turn on wideband CDMA.**

   Press the **Return** hardkey to display the wideband CDMA menu.

   Press the **W-CDMA Off On** softkey to highlight **On** (it takes a moment to change).

   The WCDMA and I/Q annunciators turn on, and as the waveform is generated, the System Frame Number status and cycle time (located at the bottom of the display) become active.

**NOTE** You do not have to wait for the waveform to complete before you continue with the next step.

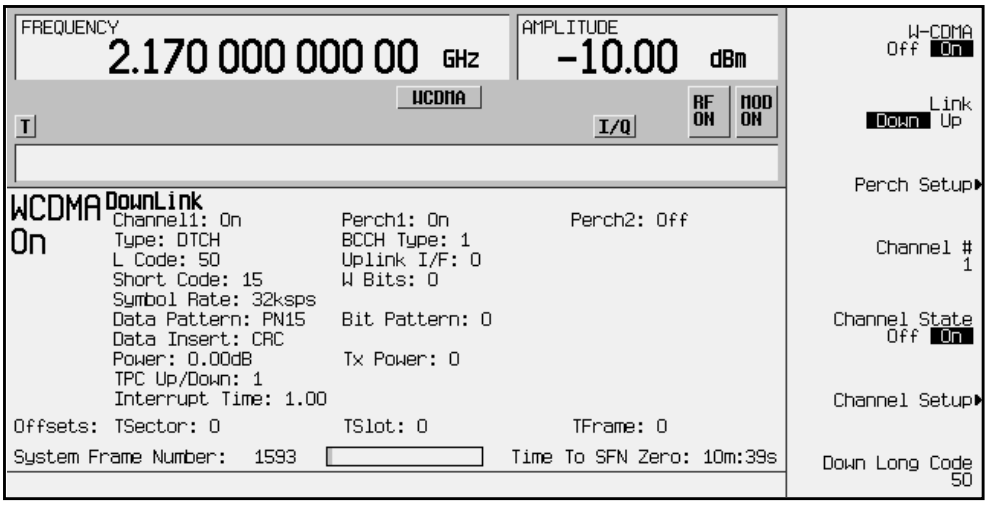
2. **Turn on the RF output.**

   Toggle the front-panel **RF On/Off** key so that the display annunciator displays RF ON.

3. **Ensure that modulation is on.**

   Modulation should be turned on as a default condition (the display annunciator shows MOD ON). If modulation is off, toggle the front-panel **Mod On/Off** key.

   The wideband CDMA signal is now present at the RF OUTPUT connector. The following illustration shows the display with the current configuration.



# Understanding RF Power Levels

When the automatic leveling control (ALC) is turned on, the average RF output power is held constant at the selected amplitude. When you select a modulation that varies the RF output level, if amplitude variation effects your measurement, you can turn off the ALC.

For example, with the following settings:

*Mode*: Downlink

*Channel 1 Power*: +3 dB relative to Perch1 and Perch2

*Interrupt Time*: 1 second

*Interrupt*: Triggered

When ALC is on, the average RF power during the Channel 1 interrupt time (when Channel 1 power is turned off) is regulated to the same level as when Channel 1 is turned on. This increases the average RF level of the Perch1 and Perch2 channels during the interrupt period.

For the Perch1 and Perch2 levels to remain constant, you must turn off the ALC.

### Turning Off the ALC

When you turn off the ALC, you must also perform a manual power search, and set the ALC bandwidth, as follows:

1. Set up the modulation. The settings given above are used in this example.
2. Press the front-panel **Ampl** key to display the amplitude menu.
3. Press the **ALC Off On** softkey to select **Off**.

   The ALC OFF annunciator appears on the display, and **(manual)** appears below the **Power Search** softkey.
4. Press **Power Search**, then press **Power Search Reference Fixed Mod** to select **Mod**.
5. Press **Return**, then press **ALC BW Normal Narrow** to select **Narrow**.
6. Ensure that the modulation channels are set appropriately for the desired reference power level.

**NOTE** Power search uses the current channel modulation setup as the reference power level. In this example, Channel 1, Perch1, and Perch2 are all on.

7. Press **Do Power Search**.

**NOTE** The power level will drift with time. You can press **Do Power Search** as needed, to reset the RF amplitude to the selected value.

# Understanding Time Offsets

## TSector

Adjustment range: 0 to 2560 chips
Default: 0 chips

### TSector in Downlink Mode

Refer to Figure 3-1 on page 3-9. In downlink mode, TSector adjusts the Perch radio frame timing and long code relative to the BTS reference System Frame Number Reset output at the DATA OUT rear-panel connector. This is accomplished by adjusting the offset (in number of chips) from the falling edge of the System Frame Number Reset to the first symbol of the Perch radio frame and long code phase zero, measured at the RF output.

### TSector in Uplink Mode

Refer to Figure 3-2 on page 3-10. In uplink mode, TSector adjusts the channel 1, 2 and 3 radio frame timing and long code phase relative to the BTS reference System Frame Number Reset input at the PATTERN TRIG IN rear-panel connector. This is done by adjusting the offset (in number of chips) of the falling edge of the System Frame Number input to the long code phase 1280 of channels 1, 2 and 3 (measured at the RF output). The *total* offset is equal to uplink trigger delay (propagation delay) plus TSector.

## TSlot

Adjustment range: 0 to 159 symbols, depending on symbol rate (see the table to the right).

Default: 0 symbols

| Symbol Rate | TSlot Values |
|---|---|
| 32 ksps | 0 to 19 |
| 64 ksps | 0 to 39 |
| 64 ksps voice | 0 to 39 |
| 128 ksps | 0 to 79 |
| 256 ksps | 0 to 159 |

### TSlot in Downlink Mode

Refer to Figure 3-1 on page 3-9. In downlink mode, TSlot adjusts the number of symbols that channel 1 radio frame is offset from both the Perch radio frame, and the long code phase zero. The *total* offset is equal to TSlot plus TFrame.

### TSlot in Uplink Mode

Refer to Figure 3-2 on page 3-10. In uplink mode, TSlot adjusts the number of symbols channels 1, 2, and 3 radio frames are offset from the long code phase 1280. The *total* offset is equal to TSlot plus TFrame.

## TFrame

Adjustment range: 0 to 15 slots
Default: 0 slots

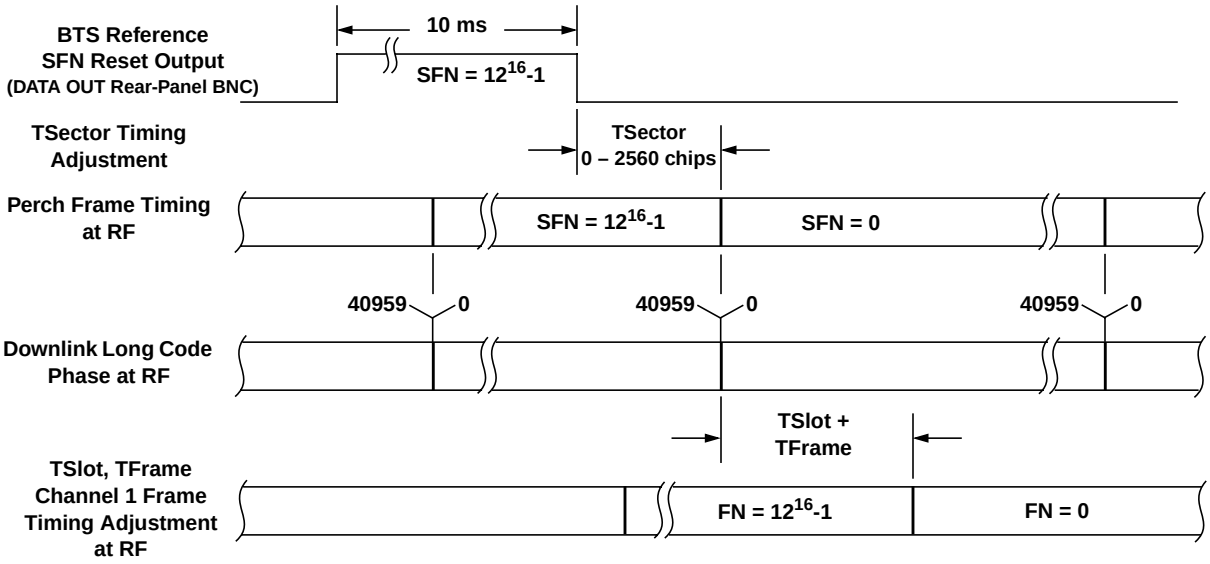
### Downlink Mode

Refer to Figure 3-1. In downlink mode, TFrame adjusts the number of timeslots that the channel 1 radio frame is offset from both the Perch radio frame and the long code phase zero. The total offset is equal to TFrame plus TSlot.

### TFrame in Uplink Mode

Refer to Figure 3-2 on page 3-10. In uplink mode, TFrame adjusts the number of timeslots channels 1, 2, and 3 radio frames are offset from long code phase 1280. Total offset is equal to TFrame plus TSlot.

**Figure 3-1 Time Offsets in Downlink Mode**



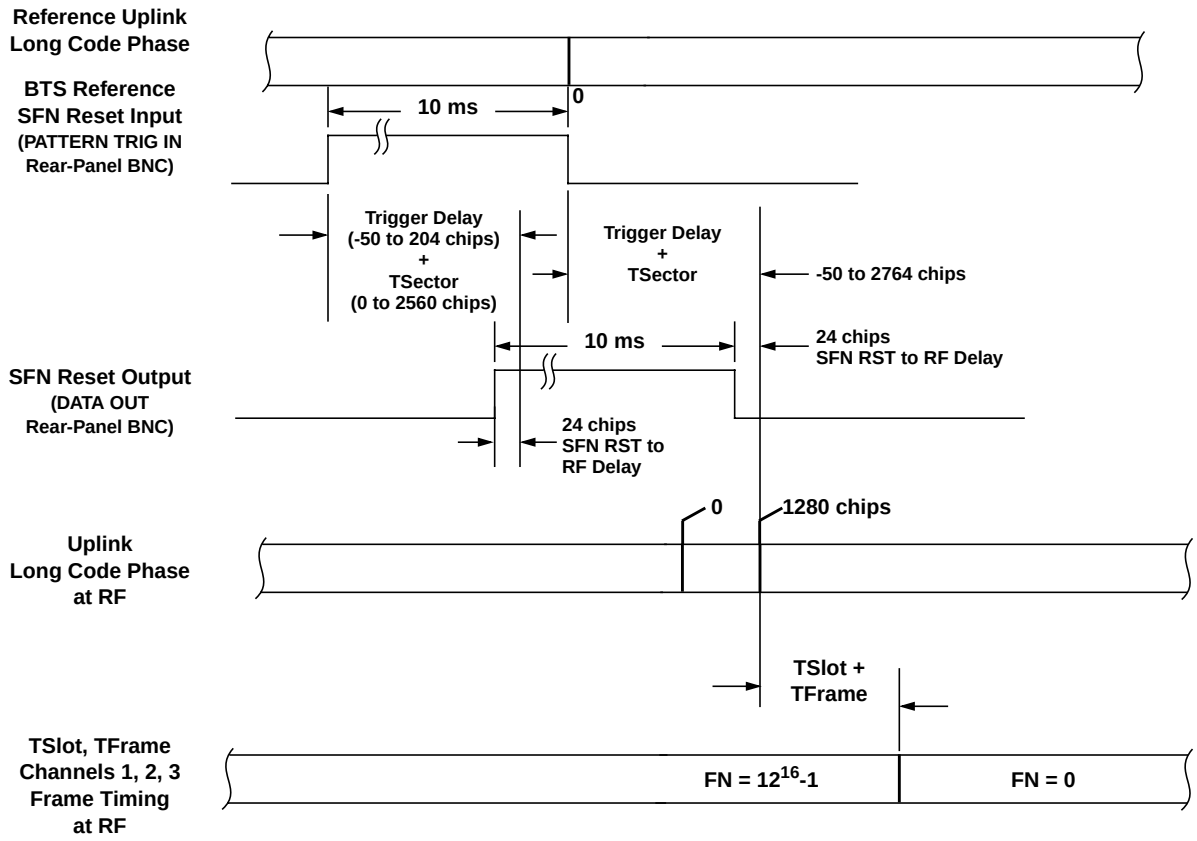

**TSlot Range:**

| | | |
|---|---|---|
| 32 ksps | 0 to | 19 symbols |
| 64 ksps | 0 to | 39 symbols |
| 128 ksps | 0 to | 79 symbols |
| 256 ksps | 0 to | 159 symbols |

**TFrame Range:** 0 to 15 slots

**TSector Range:** 0 to 2560 chips

## Figure 3-2 Time Offsets in Uplink Mode




**TSlot Range:** 32 ksps 0 to 19 symbols
64 ksps 0 to 39 symbols
128 ksps 0 to 79 symbols
256 ksps 0 to 159 symbols

**TFrame Range:** 0 to 15 slots

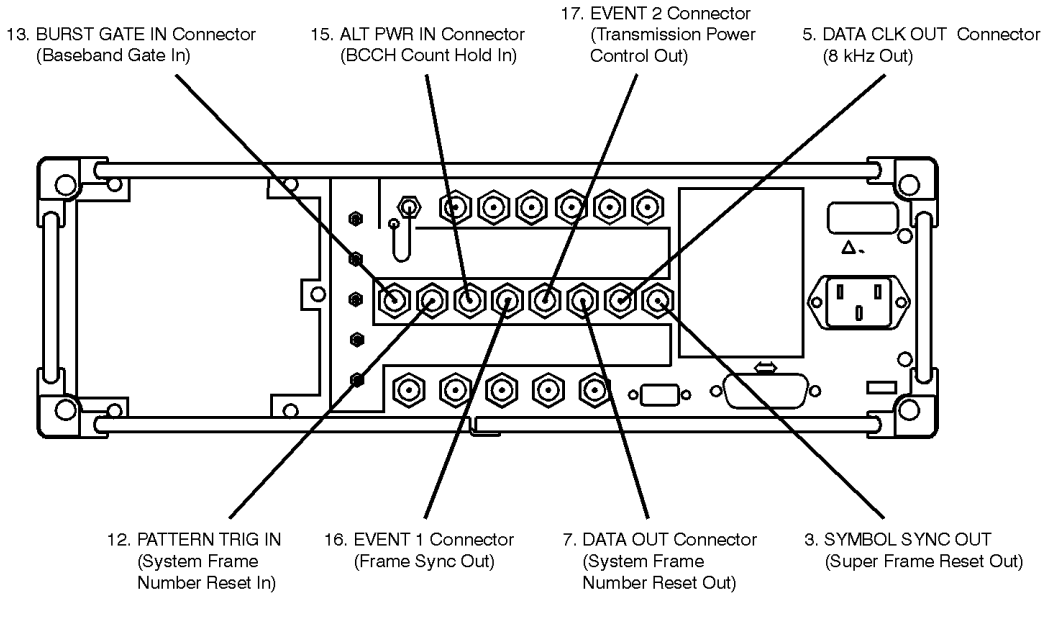
**TSector Range:** 0 to 2560 chips

**Trigger Delay Range:** -50 to 204 chips

# Rear-Panel Overview

This section contains descriptions of the rear-panel connectors. This information supplements the information in the standard manual set.

**Figure 3-3 Rear-Panel Connector Changes**

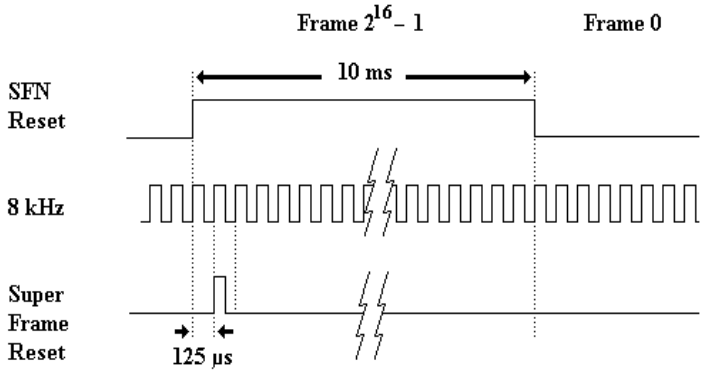



## 3. SYMBOL SYNC OUT Connector (Super Frame Reset Out)

This is a 125 µs high signal, output every 64 frames. The high is delayed 125 µs (or one 8 kHz cycle) from the start of the frame.

**NOTE** The signal edges are referenced to the output of the data generator, *not* to the outputs of the baseband generator or the RF section. The delay from the data generator output to the RF section output is approximately 24 chips.

**Figure 3-4 Super Frame Reset, 8 kHz, and SFN Reset Output Waveforms**



## 5. DATA CLK OUT Connector (8 kHz Out)

This signal is high during half (62.5 µs) of the 125 µs cycle.

**NOTE** The signal edges are referenced to the output of the data generator, *not* to the outputs of the baseband generator or the RF section. The delay from the data generator output to the RF section output is approximately 24 chips.

## 7. DATA OUT Connector (System Frame Number Reset Out)

This signal goes high for 10 ms during frame number "$2^{16} - 1$" (65,535). The signal goes low the following frame (frame number 0), and remains low until frame number "$2^{16} - 1$" occurs again.

**NOTES** In uplink mode, signal edges are referenced to the output of the data generator, *not* to the outputs of the baseband generator or the RF section. The delay from the data generator output to the RF section output is approximately 24 chips (see Figure 3-2 on page 3-10).

In downlink mode, signal edges are referenced to the output of the RF section (see Figure 3-1 on page 3-9).

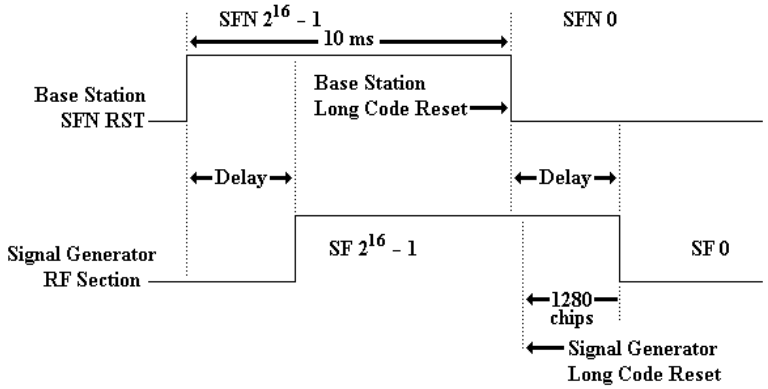
The System Frame Number Reset out timing, referenced to long code phase, varies with the TSector adjustment.

# 12. PATTERN TRIG IN Connector (System Frame Number Reset In)

During uplink mode, this input receives the System Frame Number Reset (SFN RST) from the base station for synchronization. This input is not used during downlink mode.

The instrument triggers on the leading edge of the Base Station SFN RST signal. This input is a TTL or CMOS signal (not a V.11 signal). The instrument's 10 MHz reference input must be locked to the base station's data recovery reference signal. Note that the instrument long code is always reset 1280 chips before the first timeslot of system frame 0 (SF0) on the instrument.

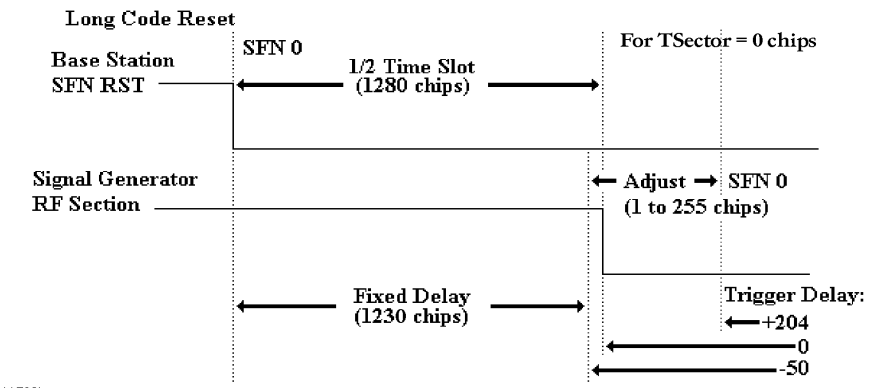
**Figure 3-5 System Frame Number Reset Input Waveforms**




The instrument trigger delay has the affects shown in the following table. These are approximate propagation delays to within 3 chips.

| Uplink Trigger Delay Value | Total Propagation Delay Value (Half Time Slot + Uplink Trigger Delay) | Time Change (Δ from Half Time Slot) |
|---|---|---|
| –50 chips | 1280 – 50 = 1230 chips + TSector | –12 µs + TSector × 1⁄4.096 MHz |
| 0 chips | 1280 + 0 = 1280 chips + TSector | + TSector × 1⁄4.096 MHz |
| 204 chips | 1280 + 204 = 1484 chips + TSector | +50 µs + TSector × 1⁄4.096 MHz |

**Figure 3-6 Propagation Delay Timing**



## 13. BURST GATE IN Connector (Baseband Gate In)

During downlink mode, a high or open at this input is the normal condition. When a TTL or CMOS low is detected, the DTCH, Perch1, and Perch2 channels are set to zero power on the baseband. During uplink mode, this input is left high or open.

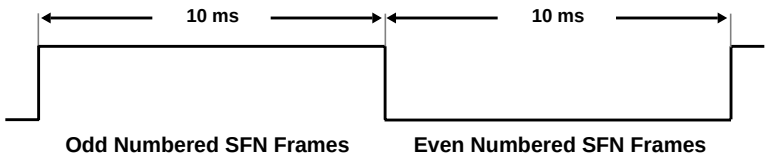
## 15. ALT PWR IN Connector (BCCH Count Hold In)

The normal condition at this input is a high. When a TTL or CMOS low is detected, the System Frame Number in the Broadcast Control Channel (BCCH) is set and held at zero. The internal System Frame Number continues to count.

## 16. EVENT 1 Connector (Frame Sync Out)

This signal alternates between low and high every 10 ms. This signal is high during odd-numbered frames and low during even-numbered frames.

**Figure 3-7 Frame Sync Out Waveform**



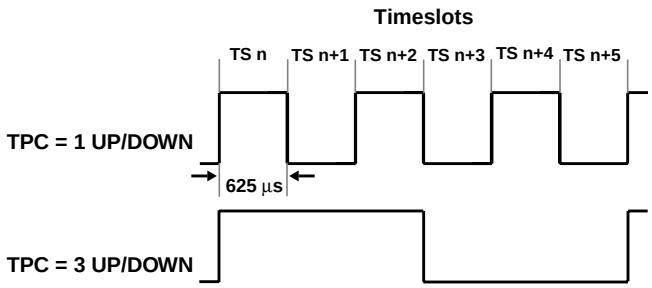

**NOTE** The signal edges are referenced to the output of the data generator, *not* to the outputs of the baseband generator or the RF section. The delay from the data generator output to the RF section output is approximately 24 chips.

## 17. EVENT 2 Connector (Transmission Power Control Out)

This signal is high during timeslots that the Transmission Power Control (TPC) is in the up condition, and low during timeslots that the TPC is in the down condition. The TPC range can vary between 1 and 80 timeslots. The Transmission Power Control Out updates at the beginning of the timeslot.

**NOTE** The signal edges are referenced to the output of the data generator, *not* to the outputs of the baseband generator or the RF section. The delay from the data generator output to the RF section output is approximately 24 chips.

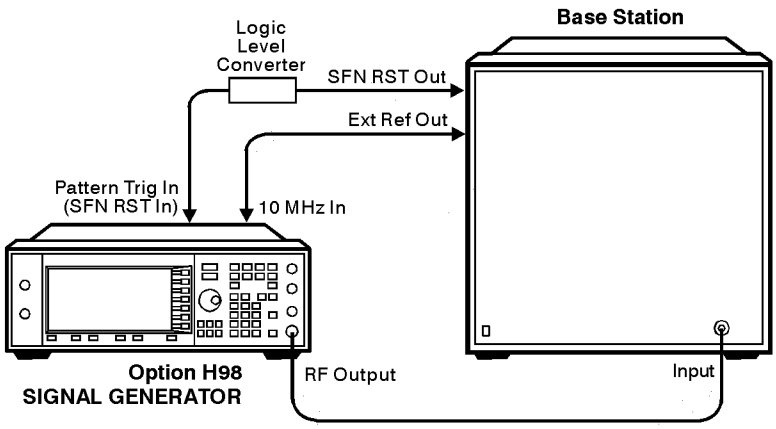
**Figure 3-8 Example TPC Output Waveform**



# System Configuration

The following illustration shows a typical system setup using the Option H98 signal generator to test a base station in the uplink mode.

**Figure 3-9 System Configuration for Wideband CDMA in the Uplink Mode**




You must provide a logic level converter, as shown in the illustration above. The logic level converter converts the SFN RST signal from the base station to a TTL signal that can be used by the SFN RST Input connector on the rear panel of the Option H98 signal generator. The base station's 10 MHz reference output must be frequency-locked to its internal baseband modulation.

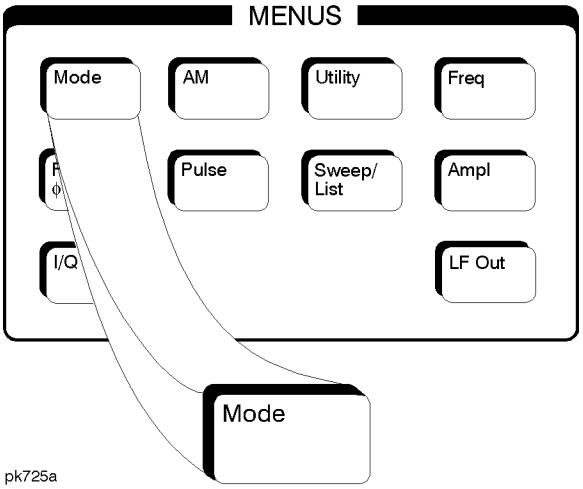
# 4 Softkey Reference

The information in this chapter supplements the **Mode** key documentation in the ESG Family manual set.

# Wideband CDMA Softkeys

Pressing the front-panel **Mode** key accesses a menu of softkeys. To display the Wideband CDMA menu, press the **Wideband CDMA** softkey.

The softkeys in the Wideband CDMA menu are described in this section in alphabetical order. The SCPI commands (and their associated command queries) that duplicate these softkeys remotely are provided in this section also. For detailed information relating to SCPI commands, see Chapter 5, "Programming Information," on page 5-1.




## 32 ksps

Press this softkey to set the symbol rate to 32 kilosymbols per second.

Softkey Location: **Mode** > **Wideband CDMA** > **Channel Setup** > **Symbol Rate** > **32 ksps**

SCPI Commands and Command Queries:

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:SRATe SR32K
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:SRATe?

[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]|2|3:
SRATe SR32K
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]|2|3:SRATe?

[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:SRATe SR32K
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:SRATe?
```

## 64 ksps

Press this softkey to set the symbol rate to 64 kilosymbols per second.

Softkey Location: **Mode** > **Wideband CDMA** > **Channel Setup** > **Symbol Rate** > **64 ksps**

SCPI Commands and Command Queries:

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:SRATe SR64K
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:SRATe?

[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]|2|3:
SRATe SR64K
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]|2|3:SRATe?

[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:SRATe SR64K
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:SRATe?
```

## 64 ksps voice

Press this softkey to set the symbol rate to 64 kilosymbols per second voice.

Softkey Location: **Mode** > **Wideband CDMA** > **Channel Setup** > **Symbol Rate** > **64 ksps voice**

SCPI Commands and Command Queries:

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:SRATe SRV64K
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:SRATe?

[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:SRATe SRV64K
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:SRATe?
```

## 128 ksps

Press this softkey to set the symbol rate to 128 kilosymbols per second.

Softkey Location: **Mode** > **Wideband CDMA** > **Channel Setup** > **Symbol Rate** > **128 ksps**

SCPI Commands and Command Queries:

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:SRATe SR128K
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:SRATe?

[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]|2|3:
SRATe SR128K
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]|2|3:SRATe?

[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:SRATe SR128K
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:SRATe?
```

## 256 ksps

Press this softkey to set the symbol rate to 256 kilosymbols per second.

Softkey Location: **Mode** > **Wideband CDMA** > **Channel Setup** > **Symbol Rate** > **256 ksps**

SCPI Commands and Command Queries:

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:SRATe SR256K
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:SRATe?

[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]|2|3:
SRATe SR256K
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]|2|3:SRATe?

[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:SRATe 256ksps
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:SRATe?
```

## ACCH

Press this softkey to set the downlink/uplink channel type to an Associated Control Channel (ACCH).

Softkey Location: **Mode** > **Wideband CDMA** > **Channel Setup** > **Channel Type** > **ACCH**

SCPI Commands and Command Queries:

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:TYPE ACCH
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:TYPE?

[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:TYPE ACCH
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:TYPE?
```

## BCCH Setup

Press this softkey to display the BCCH (Broadcast Control Channel) Setup menu. Within this menu you can define:

- BCCH type,
- data pattern,
- System Frame Number setup,
- Tx power bits,
- uplink interference bits, and
- W bits.

Softkey Location: **Mode** > **Wideband CDMA** > **Perch Setup** > **BCCH Setup**

## BCCH Type

Press this softkey to set the downlink channel BCCH type.

Softkey Location: **Mode** > **Wideband CDMA** > **Perch Setup** > **BCCH Setup** >**BCCH Type**

Choices: **1** or **2**

Status after Normal Preset: 1

SCPI Command and Command Query:

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1]:BCCH[:TYPE] 1|2
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1]:BCCH[:TYPE]?
```

## Channel #

Press this softkey to set the downlink/uplink channel number.

Softkey Location: **Mode** > **Wideband CDMA** > **Channel #**

Downlink Choice: **1**

Uplink Choices: **1**, **2**, or **3**

Status after Normal Preset: 1

SCPI Commands and Command Queries:

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel?
```

```
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]|2|3
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel?
```

## Channel Setup

Press this softkey to display the Channel Setup menu. From this menu, you can define channel type and parameters.

Softkey Location: **Mode** > **Wideband CDMA** > **Channel Setup**

## Channel State Off On

Press this softkey to toggle the operating state of the active channel. Note that channels cannot be turned off when operating in uplink multicode mode.

Softkey Location: **Mode** > **Wideband CDMA** > **Channel State Off On**

Downlink Channel 1 Choices: **Off** or **On**

Uplink Channels 1, 2 or 3 Choices: **Off** or **On**

Status after Normal Preset: On

SCPI Commands and Command Queries:

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1][:STATe]
ON|OFF|1|0
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1][:STATe]?

[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]|2|3[:STATe]
ON|OFF|1|0
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]|2|3[:STATe]?
```

## Channel Type

Press this softkey to select the channel type.

### Downlink Channel Types

The following downlink channel types are assigned by pressing one of the following softkeys:

**ACCH** Sets the downlink channel type to an Associated Control Channel (ACCH).

**DTCH+ACCH** Sets the downlink channel type to a Dedicated Traffic Channel plus Associated Control Channel (DTCH+ACCH).

**DTCH** Sets the downlink channel type to a Dedicated Traffic Channel (DTCH).

**DTX** Sets the downlink channel type to a Discontinuous Transmission Channel (DTX).

**FACH** Sets the downlink channel type to a Forward Access Channel Long (FACH-L).

**SDCCH** Sets the downlink channel type to a Stand-Alone Dedicated Control Channel (SDCCH).

**UPCH** Sets the downlink channel type to a User Packet Traffic Channel (UPCH).

Status after Normal Preset: DTCH+ACCH

### Uplink Channel Types

In uplink mode, channel type for channels 2 and 3 is set by channel 1, but each channel can be turned off independently.

The following uplink channel types are assigned by pressing one of the following softkeys:

**ACCH** Sets the uplink channel type to an Associated Control Channel (ACCH).

**DTCH+ACCH** Sets the uplink channel type to a Dedicated Traffic Channel plus Associated Control Channel (DTCH+ACCH).

**DTCH** Sets the uplink channel type to a Dedicated Traffic Channel (DTCH).

**DTX** Sets the uplink channel type to a Discontinuous Transmission Channel (DTX).

**RACH** Sets the uplink channel type to a Random Access Channel Long (RACH-L).

**SDCCH** Sets the uplink channel type to a Stand-Alone Dedicated Control Channel (SDCCH).

**UPCH** Sets the uplink channel type to a User Packet Traffic Channel (UPCH).

Status after Normal Preset: DTCH+ACCH

Symbol rate is coupled to channel type. Table 4-1 shows *actual* symbol rates set as a function of channel type and *selected* symbol rate.

Illegal combinations are not selectable via the front panel; assignments via remote commands will default as shown in the following table.

**Table 4-1 Actual Symbol Rate as a Function of Channel Type versus Selected Symbol Rate**

| Channel Type | Selected Symbol Rate (in ksps) | | | | |
|---|---|---|---|---|---|
| | 32 | 64 | 64 voice | 128 | 256 |
| DTCH+ACCH | 32 | 64 | 64 voice | 128 | 256 |
| ACCH | 32 | 64 | 64 | 128 | 256 |
| DTCH | 32 | 64 | 64 voice | 128 | 256 |
| DTX | 32 | 64 | 64 | 128 | 256 |
| FACH | 64 | 64 | 64 | 64 | 64 |
| RACH | 64 | 64 | 64 | 64 | 64 |
| SDCCH | 32 | 32 | 32 | 32 | 32 |
| UPCH | 32 | 64 | 64 | 128 | 256 |

Softkey Location: **Mode** > **Wideband CDMA** > **Channel Setup** > **Channel Type**

Status after Normal Preset: DTCH+ACCH

SCPI Commands and Command Queries:

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:TYPE
DA|ACCH|DTCH|DTX|FACH|SDCCH|UPCH

[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:TYPE?

[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:TYPE
DA|ACCH|DTCH|DTX|RACH|SDCCH|UPCH

[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:TYPE?
```

## CRC

Press this softkey to select CRC data insertion. When **CRC** is chosen, the selected data pattern is appended to the back of the CRC. This combination is then convolved, interleaved, and segmented into timeslots.

Softkey Location: **Mode** > **Wideband CDMA** > **Channel Setup** > **More (1 of 2)** > **Data Insertion** > **CRC**

SCPI Commands and Command Queries:

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:INSert CRC
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:INSert?

[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:INSert CRC
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:INSert?
```

## Data Insertion

Press this softkey to select how and where the data pattern is inserted into channel 1.

**CRC** Appends the selected data pattern to the back of the CRC. This combination is then convolved, interleaved, and segmented into timeslots.

**Multiplex** Segments the selected data pattern directly into timeslots with Pilot, TPC symbols, and CRC, but without convolution or interleaving.

**Spread** Directly spreads the selected data pattern without segmentation.

The selected data insertion value is bolded. Data insertion is not selectable for uplink channels 2 and 3.

Softkey Location: **Mode** > **Wideband CDMA** > **Channel Setup** > **More (1 of 2)** > **Data Insertion**

Choices: **CRC**, **Multiplex**, or **Spread**

Status after Normal Preset: CRC

SCPI Commands and Command Queries:

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:INSert
CRC|MULTiplex|SPREad
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:INSert?
```

```
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:INSert
CRC|MULTiplex|SPREad
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:INSert?
```

# Data Pattern

Press this softkey to change the transmitted data pattern. The selected value is bolded.

### Downlink and Uplink Traffic Channel Data Patterns

Select one of the following softkeys to configure a data pattern:

**ZEROS** Sets the data pattern to a continuous stream of 0's.

**PN9** Sets the data pattern to a 9-bit ITU pseudo-random bit pattern.

**PN15** Sets the data pattern to a 15-bit ITU pseudo-random bit pattern.

Softkey Location: **Mode** > **Wideband CDMA** > **Channel Setup** > **Data Pattern**

Status after Normal Preset: PN9

SCPI Commands and Command Queries:

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:
DATA:PATTern <value>
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:
DATA:PATTern?
```

```
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]|2|3:
DATA[:PATTern] PN9|PN15|ZEROs
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]|2|3:
DATA[:PATTern]?
```

```
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:
DATA[:PATTern] PN9|PN15|ZEROs
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:
DATA[:PATTern]?
```

### Downlink Perch1 BCCH Data Patterns

For Perch1, BCCH data, the range of values is 00000000 through 11111111 (binary). The eight bit pattern is repeated thirteen times for a total of 104 bits.

Softkey Location: **Mode** > **Wideband CDMA** > **Perch Setup** > **Data Pattern**

Range: 00000000 to 11111111 (binary)

Status after Normal Preset: 11111111

SCPI Command and Command Query:

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1]:
DATA:PATTern <value>
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1]:
DATA:PATTern?
```

## Down Long Code

Press this softkey to assign a specific long code to the Perch channels and the dedicated traffic channel when the instrument is set to the downlink state. To enter the downlink long code value, rotate the front-panel knob until the desired value is displayed, use the up and down arrow keys, or enter the value using the numeric keypad and press the **Enter** terminator softkey. The **Down Long Code** softkey is displayed only when the **Link Down Up** softkey is set to **Down**.

Softkey Location: **Mode** > **Wideband CDMA** > **Down Long Code**

Range: 1 to 128

Status after Normal Preset: 1

SCPI Command and Command Query:

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:LCODe <value>
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:LCODe?
```

## DTCH

Press this softkey to select a Dedicated Traffic Channel (DTCH).

Softkey Location: **Mode** > **Wideband CDMA** > **Channel Setup** > **Channel Type** > **DTCH**

SCPI Commands and Command Queries:

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:TYPE DTCH
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:TYPE?

[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:TYPE DTCH
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:TYPE?
```

## DTCH+ACCH

Press this softkey to select a DTCH+ACCH channel type.

Softkey Location: **Mode** > **Wideband CDMA** > **Channel Setup** > **Channel Type** > **DTCH+ACCH**

Or: **Mode** > **Wideband CDMA** > **Channel Setup** > **Multicode Type** > **DTCH+ACCH**

SCPI Commands and Command Queries:

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:TYPE DA
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:TYPE?

[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:TYPE DA
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:TYPE?

[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:TYPE DA
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:TYPE?
```

## DTX

Press this softkey to select a Discontinuous Transmission (DTX) channel type.

Softkey Location: **Mode** > **Wideband CDMA** > **Channel Setup** > **Channel Type** > **DTX**

SCPI Commands and Command Queries:

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:TYPE DTX
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:TYPE?

[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:TYPE DTX
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:TYPE?
```

## FACH

Press this softkey to select a Forward Access Channel Long (FACH-L). This selection is only available for a downlink traffic channel.

Softkey Location: **Mode** > **Wideband CDMA** > **Channel Setup** > **Channel Type** > **FACH**

SCPI Command and Command Query:

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:TYPE FACH
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:TYPE?
```

## Fixed

Press this softkey to select a fixed System Frame Number format for the Perch1 channel.

Softkey Location: **Mode** > **Wideband CDMA** > **Perch Setup** > **BCCH Setup** > **SFN Setup** > **System Frame No.** > **Fixed**

SCPI Command and Command Query:

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1]:
SFNumber[:TYPE] FIX
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1]:
SFNumber[:TYPE]?
```

## Increment

Press this softkey to select an increment System Frame Number format for the Perch1 channel.

Softkey Location: **Mode** > **Wideband CDMA** > **Perch Setup** > **BCCH Setup** > **SFN Setup** > **System Frame No.** > **Increment**

SCPI Command and Command Query:

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1]:
SFNumber[:TYPE] INCR
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1]:
SFNumber[:TYPE]?
```

## Interrupt Trigger

Press this softkey to interrupt downlink channel 1. Channel 1 is interrupted for the duration specified by the interrupt value. Pressing the **Interrupt Trigger** softkey is equivalent to turning the **Channel State Off On** softkey off for the duration of the interrupt value and then back on. The **Interrupt Trigger** softkey is available only when the **Link Down Up** softkey is set to **Down.**

Softkey Location: **Mode** > **Wideband CDMA** > **Channel Setup** > **More (1 of 2)** > **Interrupt Trigger**

SCPI Command:

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:INTerrupt:
TRIGger
```

## Interrupt Value

Press this softkey to change the duration that the Interrupt Trigger will interrupt downlink channel 1. To enter the interrupt value, rotate the front-panel knob until the desired value is displayed, use the up and down arrow keys, or enter the value using the numeric keypad and press either the **msec** or **sec** terminator softkey.

Softkey Location: **Mode** > **Wideband CDMA** > **Channel Setup** > **More (1 of 2)** > **Interrupt Value**

Range: 20 milliseconds to 10 seconds, in 20 millisecond steps

Status after Normal Preset: 1.000 seconds

SCPI Command and Command Query:

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:
INTerrupt[:TIMe] <value>
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:
INTerrupt[:TIMe]?
```

## Link Down Up

Press this softkey to toggle the transmission direction between downlink and uplink. The selected value is bolded. When uplink is selected, the **Perch Setup** softkey is not displayed, and the **Down Long Code** softkey is replaced by the **Uplink Trig Delay** softkey. When the signal generator is in the uplink mode, it must be frequency-locked to the base station receiver using the uplink trigger feature. Refer to "System Configuration" on page 3-16 and "Rear-Panel Overview" on page 3-11 for additional information.

Softkey Location: **Mode** > **Wideband CDMA** > **Link Down Up**

Choices: **Down** or **Up**

Status after Normal Preset: Down

SCPI Command and Command Query:

```
[:SOURce]:RADio:WCDMa[:BBG]:CCHannel DLINK|ULINK
[:SOURce]:RADio:WCDMa[:BBG]:CCHannel?
```

## Long Code

Press this softkey to enter the long code for the uplink channels.

In multicode mode, all of the multicodes use the same long code. To enter the long code value, rotate the front-panel knob until the desired value is displayed, use the up and down arrow keys, or enter the value using the numeric keypad and press the **Enter** terminator softkey.

Long code value changes are not applied to the waveform until long code reset, 1280 chips before the end of System Frame Number $2^{16}$–1.

Long code reset only occurs when:

- the W-CDMA operating state (**W-CDMA Off On**) is toggled,
- the transmission link direction (**Link Down Up**) is toggled,
- the internal System Frame Number transitions from SFN $2^{16}$–1 to SFN 0,
- or when externally triggered by a BTS reference SFN reset input (a low to high transition at the PATTERN TRIG IN rear-panel connector).

Other setup changes in uplink mode, such as short code, data rate, channel type, or time offset, do not affect the long code or long code phase.

Softkey Location: **Mode** > **Wideband CDMA** > **Channel Setup** > **Long Code**

Range: 0 to 1FFFFFFFFF (hexadecimal)

Status after Normal Preset: 1

SCPI Commands and Command Queries:

```
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]|2|3:
LCODe <value>
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]|2|3:LCODe?

[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD:LCODe <value>
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD:LCODe?
```

## Multicode #

Press this softkey and enter a number to activate a multicode channel.

Softkey Location: **Mode** > **Wideband CDMA** > **Multicode #**

Choices: **1**, **2** or **3**

Status after Normal Preset: 1

## Multicode Type

Press this softkey to select the multicode type.

**DTCH+ACCH** Sets the multicode type to a Dedicated Traffic Channel plus an Associated Control Channel.

**UPCH** Sets the multicode type to a User Packet Traffic Channel.

Softkey Location: **Mode** > **Wideband CDMA** > **Channel Setup** > **Multicode Type**

Choices: **DTCH+ACCH** or **UPCH**

Status after Normal Preset: DTCH+ACCH

SCPI Command and Command Query:

```
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:TYPE DA|UPCH
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:TYPE?
```

## Multiplex

Press this softkey to select a data insertion point prior to multiplex. When **Multiplex** is chosen, the selected data pattern is segmented directly into timeslots with Pilot and TPC symbols but without CRC, convolution, or interleaving. Filler bits consisting of 0's are inserted in place of the bits normally produced by convolutional coding.

Softkey Location: **Mode** > **Wideband CDMA** > **Channel Setup** > **More (1 of 2)** > **Data Insertion** > **Multiplex**

SCPI Commands and Command Queries:

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:DATA:
INsert MULTiplex
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:DATA:
INsert?

[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:DATA:
INsert MULTiplex
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:DATA:
INsert?
```

## Perch Setup

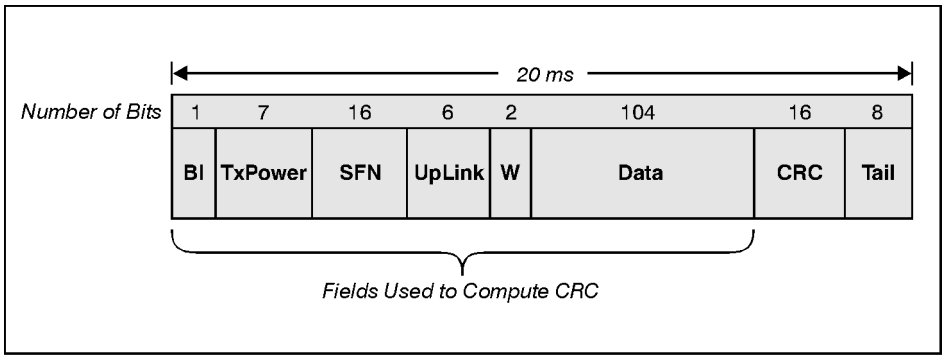
Press this softkey to display the Perch Setup menu which enables you to set the operating state of the Perch1 and Perch2 channels, and define the BCCH setup.

Softkey Location: **Mode** > **Wideband CDMA** > **Perch Setup**

## Perch1 Off On

Press this softkey to toggle the operating state of the Perch1 logical channel for synchronization. The Perch1 channel can be enabled alone, with any combination of the Perch2 channel and channel 1, or it can be turned off. A short code of C8(0) is automatically assigned to the Perch1 channel. The **W-CDMA Off On** softkey must be enabled in order for this signal to be generated. The **Perch1 Off On** softkey is only displayed when the **Link Down Up** softkey is selected to the downlink direction.

**Figure 4-1 Perch1(BCCH) Frame**




All fields in the Perch1 (BCCH) frame are selectable except:

- SFN, which increments by 2 every 20 milliseconds,
- CRC, which is computed based on all fields plus the SFN value.

The Perch1 (BCCH) frame is made up of the following fields:

- BI: BCCH Identification Bit, selectable
- Tx Power: Transmit Power Indicator, selectable
- SFN: System Frame Number Fixed Value, selectable
- UpLink: Base Station Measured Uplink Interference Power Amount, selectable
- W: Message Confirmation Indicator Bits, selectable
- Data: BCCH Data Field, selectable
- CRC: Cyclic Redundancy Check
- Tail: 8 Bits; All Zeros.

Softkey Location: **Mode** > **Wideband CDMA** > **Perch Setup** > **Perch1 Off On**

Choices: **Off** or **On**

Status after Normal Preset: On

SCPI Command and Command Query:

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1][:STATe]
ON|OFF|1|0
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1][:STATe]?
```

## Perch2 Off On

Press this softkey to toggle the operating state of the Perch2 logical channel for synchronization. The Perch2 channel can be enabled alone, with any combination of the Perch1 channel and channel 1, or it can be turned off. The short code for Perch2 is set based on the long code masked set (LMS) of the selected long code. Refer to Table 4-2 for the Perch2 short code. The **W-CDMA Off On** softkey must be enabled in order for this signal to be generated. The **Perch2 Off On** softkey is only displayed when the **Link Down Up** softkey is set to **Down**.

**Table 4-2 Long Code Range Versus the Perch2 Long-Code Masked Set (LMS)**

| Long Code Range | Perch2 Short Code LMS |
|---|---|
| 1 to 32 | 2 |
| 33 to 64 | 3 |
| 65 to 96 | 4 |
| 97 to 128 | 5 |

Softkey Location: **Mode** > **Wideband CDMA** > **Perch Setup** > **Perch2 Off On**

Choices: **Off** or **On**

Status after Normal Preset: On

SCPI Command and Command Query:

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh2[:STATe]
ON|OFF|1|0
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh2[:STATe]?
```

## Phase Polarity Normal Invert

Press this softkey to reverse the phase rotation of the wideband CDMA signal.

**Normal** Sets the polarity to a normal state.

**Invert** Inverts the internal Q signal, reversing the direction of phase rotation. Required by some radio standards, phase polarity inversion is also useful for lower sideband mixing applications.

Softkey Location: **Mode** > **Wideband CDMA** > **Channel Setup** > **More (1 of 2)** > **Phase Polarity Normal Invert**

Choices: **Normal** or **Invert**

Status after Normal Preset: Normal

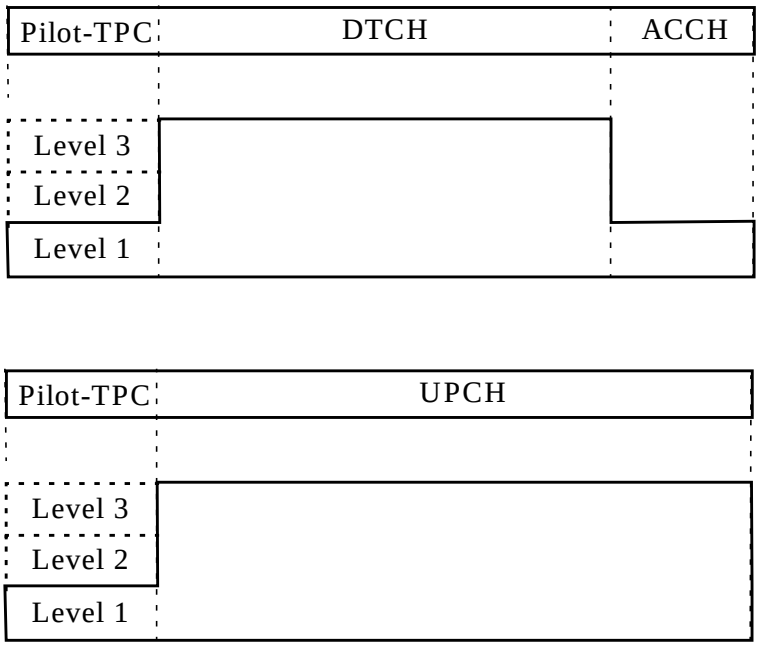
SCPI Command and Command Query:

```
[:SOURce]:RADio:WCDMa[:BBG]:POLarity[:ALL] NORMal|INVert
[:SOURce]:RADio:WCDMa[:BBG]:POLarity[:ALL]?
```

## Pilot-TPC Power

Press this softkey to set the pilot-TPC power to one of three levels for the active multicode.

**Figure 4-2 Channel 1 Pilot-TPC Power Levels During Multicode Transmission**




Softkey Location: **Mode** > **Wideband CDMA** > **Channel Setup** > **Pilot-TPC Power**

Range: 1 to 3

Status after Normal Preset: 1

SCPI Command and Command Query:

```
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD:NPOWer <value>
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD:NPOWer?
```

## PN9

Press this softkey to set the selected channel's data to an ITU PN9 bit pattern.

Softkey Location: **Mode** > **Wideband CDMA** >**Channel Setup** > **Data Pattern** > **PN9**

SCPI Commands and Command Queries:

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:PATTern PN9
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:PATTern?

[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:
PATTern PN9
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:PATTern?

[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:PATTern PN9
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:PATTern?
```

## PN15

Press this softkey to set the selected channel's data to an ITU PN15 bit pattern.

Softkey Location: **Mode** > **Wideband CDMA** > **Channel Setup** > **Data Pattern** > **PN15**

SCPI Commands and Command Queries:

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:
PATTern PN15
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:PATTern?

[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:
PATTern PN15
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:PATTern?

[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:PATTern PN15
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:PATTern?
```

## Power

Press this softkey to set the downlink channel's power relative to the power of the Perch1 and Perch2 channels.

Softkey Location: **Mode** > **Wideband CDMA** > **Channel Setup** > **Power**

Range: ±30 dB of Perch1 and Perch2 power setting

Status after Normal Preset: 0.00 dB

SCPI Command and Command Query:

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:
POWer <value>
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:POWer?
```

## RACH

Press this softkey to select a Random Access Channel Long (RACH-L) type for the uplink channel. This selection is only available for an uplink channel.

Softkey Location: **Mode** > **Wideband CDMA** > **Channel Setup** > **Channel Type** > **RACH**

SCPI Command and Command Query:

```
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:TYPE
RACH
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:TYPE?
```

## SDCCH

Press this softkey to select a Stand-Alone Dedicated Control Channel (SDCCH) type.

Softkey Location: **Mode** > **Wideband CDMA** > **Channel Setup** > **Channel Type** > **SDCCH**

SCPI Commands and Command Queries:

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:TYPE SDCCH
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:TYPE?
```

```
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:TYPE
SDCCH
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:TYPE?
```

## SFN Fixed Value

Press this softkey to select the value for a fixed System Frame Number. Only even numbered values are allowed.

Softkey Location: **Mode** > **Wideband CDMA** > **Perch Setup** > **BCCH Setup** > **SFN Setup** > **SFN Fixed Value**

Range: 0000 to 0FFE (hexadecimal, evens only)

Status after Normal Preset: 0000 (hexadecimal)

SCPI Command and Command Query:

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1]:
SFNumber[:TYPE]:FIX <value>
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1]:
SFNumber[:TYPE]:FIX?
```

## SFN Setup

Press this softkey to display the SFN Setup menu, where you can define the System Frame Number (fixed or increment) and the value of the fixed System Frame Number.

Softkey Location: **Mode** > **Wideband CDMA** > **Perch Setup** > **BCCH Setup** > **SFN Setup**

# Short Code (Channel 1)

Press this softkey to set the short code for channel 1. To enter the short code value, rotate the front-panel knob until the desired value is displayed, use the up and down arrow keys, or enter the value using the numeric keypad and press the **Enter** terminator softkey. The range of values allowed is dependent on the symbol rate.

If the symbol rate is changed to a new value, and the short code value does not fall into the allowed short code range for the new symbol rate value, the short code value is automatically set to the maximum short code value that corresponds to the new rate. See Table 4-3.

**Table 4-3 Symbol Rate Versus Channel 1 Short Code Range**

| Symbol Rate | Short Code Range |
|---|---|
| 32 ksps | 0 to 127 |
| 64 ksps | 0 to 63 |
| 64 ksps voice | 0 to 63 |
| 128 ksps | 0 to 31 |
| 256 ksps | 0 to 15 |

Softkey Location: **Mode** > **Wideband CDMA** > **Channel Setup** > **Short Code**

Range: See Table 4-3

Status after Normal Preset: 8

SCPI Commands and Command Queries:

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:SCODe <value>
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:SCODe?

[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:SCODe <value>
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:SCODe?
```

## Short Code (Channels 2 and 3)

Press this softkey to set the short code for uplink channels 2 or 3. To enter the short code value, rotate the front-panel knob until the desired value is displayed, use the up and down arrow keys, or enter the value using the numeric keypad and press the **Enter** terminator softkey. This short code value is used for uplink channels 2 and 3, except in multicode mode during the Pilot and TPC symbols, when the primary channel short code value is used.

The range of values for channels 2 and 3 short code are coupled to their symbol rates, as previously described for Short Code (Channel 1).

Softkey Location: **Mode** > **Wideband CDMA** > **Channel Setup** > **Short Code**

Range: See Table 4-3

Status after Normal Preset: 9 (channel 2)
10 (channel 3)

SCPI Command and Command Query:

```
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel2|3:SCODe <value>
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel2|3:SCODe?
```

## Spread

Press this softkey to select spread data insertion. When **Spread** is chosen, the selected data pattern is spread directly without segmentation.

Softkey Location: **Mode** > **Wideband CDMA** > **Channel Setup** > **More (1 of 2)** > **Data Insertion** > **Spread**

SCPI Commands and Command Queries:

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:DATA:
INsert SPREad
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:DATA:
INsert?
```

```
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:DATA:
INsert SPREad
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:DATA:
INsert?
```

# Symbol Rate

Press this softkey to set the symbol rate in kilosymbols per second (ksps). The selected value is bolded.

**32 ksps** Sets the symbol rate to 32 kilosymbols per second.

**64 ksps** Sets the symbol rate to 64 kilosymbols per second.

**64 ksps voice** Sets the symbol rate to 64 kilosymbols per second voice. Not available in multicode mode and uplink channels 2 and 3.

**128 ksps** Sets the symbol rate to 128 kilosymbols per second.

**256 ksps** Sets the symbol rate to 256 kilosymbols per second.

**NOTE**

Symbol rate is coupled to channel type. Table 4-4 shows *actual* symbol rates set as a function of channel type and *selected* symbol rate.

Illegal combinations are not selectable via the front panel. Illegal assignments via remote (SCPI) commands will default as shown in the following table.

**Table 4-4 Actual Symbol Rate as a Function of Channel Type versus Selected Symbol Rate**

| Channel Type | Selected Symbol Rate (in kilosymbols per second) | | | | |
|---|---|---|---|---|---|
| | **32** | **64** | **64 voice** | **128** | **256** |
| DTCH+ACCH | 32 | 64 | 64 voice | 128 | 256 |
| ACCH | 32 | 64 | 64 | 128 | 256 |
| DTCH | 32 | 64 | 64 voice | 128 | 256 |
| DTX | 32 | 64 | 64 | 128 | 256 |
| FACH | 64 | 64 | 64 | 64 | 64 |
| RACH | 64 | 64 | 64 | 64 | 64 |
| SDCCH | 32 | 32 | 32 | 32 | 32 |
| UPCH | 32 | 64 | 64 | 128 | 256 |

The following table provides some details about the parameters at each symbol rate.

**Table 4-5 Parameters versus Symbol Rate**

| Parameter | Symbol Rate | | | | |
|---|---|---|---|---|---|
| | **32 ksps** | **64 ksps** | **64 ksps voice** | **128 ksps** | **256 ksps** |
| Data Bits per Radio Frame | 88 + 16 bit CRC | 320 + 13 bit CRC | 320 + 13 bit CRC | 723 + 13 bit CRC | 1446 + 2 by 13 bit CRC |
| Dummy Bits | 48 | 1 | 1 | 8 | 8 |
| Interleave Method | 16 × 24 | 16 × 64 | 16 × 64 | 16 × 140 | 16 × 278 |
| Bits per Radio Frame | 384 | 1024 | 1024 | 2240 | 4448 |
| Data Bits per Timeslot | 24 | 64 | 64 | 140 | 278 |

Softkey Location: **Mode** > **Wideband CDMA** > **Channel Setup** > **Symbol Rate**

Choices: **32 ksps, 64 ksps, 64 ksps voice, 128 ksps, 256 ksps**

Status after Normal Preset: 32 ksps

SCPI Commands and Command Queries:

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:SRATe
SR32K|SR64K|SRV64K|SR128K|SR256K
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:SRATe?
```

```
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:SRATe
SR32K|SR64K|SRV64K|SR128K|SR256K
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:SRATe?
```

```
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel2|3:SRATe
SR32K|SR64K|SR128K|SR256K
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel2|3:SRATe?
```

```
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:SRATe
SR32K|SR64K|SR128K|SR256K
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:SRATe?
```

## System Frame No.

Press this softkey to setup the System Frame Number format for the Perch1 channel.

**Fixed** Selects a fixed System Frame Number format for the Perch1 channel. To set the System Frame Number fixed value, press **SFN Fixed Value** and enter the desired value.

**Increment** Selects an increment System Frame Number format for the Perch1 channel.

Softkey Location: **Mode** > **Wideband CDMA** > **Perch Setup** > **BCCH Setup** > **SFN Setup** > **System Frame No.**

Choices: **Fixed** or **Increment**

Status after Normal Preset: Increment

SCPI Command and Command Query:

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1]:
SFNumber[:TYPE] INCR|FIX
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1]:
SFNumber[:TYPE]?
```

## TFrame

Press this softkey to enter the downlink/uplink channel or the uplink multicode time offset TFrame value.

### TFrame in Downlink Mode

TFrame adjusts the number of timeslots that the channel 1 radio frame is offset from the Perch radio frame and long code phase zero. Total offset is equal to TFrame plus TSlot. For additional information, see "Understanding Time Offsets" on page 3-8.

### TFrame in Uplink Mode

TFrame adjusts the number of timeslots that the radio frames for channels 1, 2 and 3 are offset from long code phase 1280. Total offset is equal to TFrame plus TSlot. For additional information, see "Understanding Time Offsets" on page 3-8.

Softkey Location: **Mode** > **Wideband CDMA** > **Channel Setup** > **More (1 of 2)** > **Time Offset** > **TFrame**

Range: 0 to 15 timeslots

Status after Normal Preset: 0 slots

SCPI Commands and Command Queries:

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:TIME:
OFFSet:TFRAme <value>
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:TIME:
OFFSet:TFRAme?

[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:TIME:
OFFSet:TFRAme <value>
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:TIME:
OFFSet:TFRAme?

[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:TIME:
OFFSet:TFRAme <value>
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:TIME:
OFFSet:TFRAme?
```

## Time Offset

Press this softkey to open a submenu that enables you to set up time offset values for TSector, TSlot, and TFrame. For additional information, see "Understanding Time Offsets" on page 3-8.

Softkey Location: **Mode** > **Wideband CDMA** > **Channel Setup** > **More (1 of 2)** > **Time Offset**

## Transmit Pwr Ctrl

Press this softkey to set the number of 1 dB steps that the transmit power control (TPC) field of the DTCH channel is first incremented and then decremented. To enter the TPC value, rotate the front-panel knob until the desired value is displayed, use the up and down arrow keys, or enter the value using the numeric keypad and press the **Enter** terminator softkey.

Softkey Location: **Mode** > **Wideband CDMA** > **Channel Setup** > **Transmit Pwr Ctrl**

Range: 1 to 80

Status after Normal Preset: 1 UP/DOWN

SCPI Commands and Command Queries:

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:
UPDOwn <value>
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:UPDOwn?

[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:
UPDOwn <value>
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:UPDOwn?

[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:UPDOwn <value>
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:UPDOwn?
```

# TSector

Press this softkey to enter the downlink/uplink channel or uplink multicode time offset TSector value.

### TSector in Downlink Mode

TSector adjusts the Perch radio frame timing and long code relative to the BTS reference System Frame Number Reset output at the DATA OUT rear-panel connector. This is accomplished by adjusting the offset (in number of chips) from the falling edge of the System Frame Number Reset to the first symbol of the Perch radio frame and long code phase zero, measured at the RF output. For additional information, see "Understanding Time Offsets" on page 3-8.

### TSector in Uplink Mode

TSector adjusts the channel 1, 2 and 3 radio frame timing and long code phase relative to the BTS reference System Frame Number Reset input at the PATTERN TRIG IN rear-panel connector. This is accomplished by adjusting the offset (in number of chips) from the falling edge of the System Frame Number input to the long code phase 1280 of channels 1, 2 and 3 measured at the RF output. Total offset is equal to uplink trigger delay (propagation delay) plus TSector. For additional information, see "Understanding Time Offsets" on page 3-8.

Softkey Location: **Mode** > **Wideband CDMA** > **Channel Setup** > **More (1 of 2)** > **Time Offset** > **TSector**

Range: 0 to 2560 chips

Status after Normal Preset: 0 chips

SCPI Commands and Command Queries:

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:TIME:
OFFSet:TSECtor <value>
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:TIME:
OFFSet:TSECtor?
```

```
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:TIME:
OFFSet:TSECtor <value>
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:TIME:
OFFSet:TSECtor?
```

```
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:TIME:
OFFSet:TSECtor <value>
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:TIME:
OFFSet:TSECtor?
```

# TSlot

Press this softkey to enter the downlink/uplink channel or uplink multicode time offset TSlot value.

### TSlot in Downlink Mode

TSlot adjusts the number of symbols channel 1 radio frame is offset from the Perch radio frame and long code phase zero. Total offset is equal to TSlot plus TFrame. For additional information, see "Understanding Time Offsets" on page 3-8.

### TSlot in Uplink Mode

TSlot adjusts the number of symbols channels 1, 2 and 3 radio frames are offset from long code phase 1280. Total offset is equal to TSlot plus TFrame. For additional information, see "Understanding Time Offsets" on page 3-8.

Softkey Location: **Mode** > **Wideband CDMA** > **Channel Setup** > **More (1 of 2)** > **Time Offset** > **TSlot**

Range: see Table 4-6

Status after Normal Preset: 0 symbols

**Table 4-6 Symbol Rate Versus TSlot Range**

| Symbol Rate | TSlot Values |
|---|---|
| 32 ksps | 0 to 19 |
| 64 ksps | 0 to 39 |
| 64 ksps voice | 0 to 39 |
| 128 ksps | 0 to 79 |
| 256 ksps | 0 to 159 |

SCPI Commands and Command Queries:

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:TIME:
OFFSet:TSlot <value>
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:TIME:
OFFSet:TSlot?

[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:TIME:
OFFSet:TSlot <value>
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:TIME:
OFFSet:TSlot?

[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:TIME:
OFFSet:TSlot <value>
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:TIME:
OFFSet:TSlot?
```

## Tx Power Bits

Press this softkey to enter the Perch1 Tx power bit value.

Softkey Location: **Mode** > **Wideband CDMA** > **Perch Setup** > **BCCH Setup** > **Tx Power Bits**

Range: 0 to 127

Status after Normal Preset: 0

SCPI Command and Command Query:

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1]:TXPower <value>
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1]:TXPower?
```

## Ulink I/F Bits

Press this softkey to enter the Perch1 uplink interference bit value.

Softkey Location: **Mode** > **Wideband CDMA** > **Perch Setup** > **BCCH Setup** > **Ulink I/F Bits**

Range: 0 to 63

Status after Normal Preset: 0

SCPI Command and Command Query:

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1]:UPIF <value>
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1]:UPIF?
```

## UPCH

Press this softkey to change the uplink/downlink channel or multicode type to a User Packet Traffic Channel (UPCH).

Softkey Location: **Mode** > **Wideband CDMA** > **Channel Setup** > **Channel Type** > **UPCH**

Or: **Mode** > **Wideband CDMA** > **Channel Setup** > **Multicode Type** > **UPCH**

SCPI Commands and Command Queries:

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:TYPE UPCH
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:TYPE?

[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:TYPE UPCH
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:TYPE?

[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:TYPE UPCH
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:TYPE?
```

## Uplink Mode Chan Multicode

Press this softkey to toggle the uplink operating mode between channel and multicode mode.

**Chan** Selects channel as the uplink transmission mode.

In channel mode, three uplink channels are available. Channel 1 includes the following selectable parameters:

- operating state,
- channel type,
- symbol rate,
- short code,
- data pattern,
- long code,
- data insertion,
- transmission power control,
- time offset adjustments (TSector, TFrame, TSlot),
- uplink trigger delay, and
- phase polarity.

Channels 2 and 3 use the same channel type, uplink trigger delay, time offset adjustments, and phase polarity as channel 1. Channels 2 and 3 include the following selectable parameters:

- operating state,
- symbol rate,
- power (relative to channel 1),
- data pattern, and
- long code.

**Multicode** Selects multicode as the uplink transmission mode.

In multicode mode, three multicodes are available. Multicode channel 1 includes the following selectable parameters:

- multicode type,
- symbol rate,
- short code,
- pilot-TPC power,
- data pattern,
- long code,
- transmission power control,
- time offset adjustments (TSector, TFrame, TSlot)
- uplink trigger delay, and
- phase polarity.

Multicode channels 2 and 3 use the same parameters as multicode channel 1 with the exception of their short codes, which are individually selectable.

Softkey Location: **Mode** > **Wideband CDMA** > **Uplink Mode Chan Multicode**

Choices: **Chan** or **Multicode**

Status after Normal Preset: Chan

SCPI Command and Command Query:

```
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MODE CHANnel|MCOD
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MODE?
```

## Uplink Power

Press this softkey to set the power level of the uplink channels 2 and 3 relative to uplink channel 1.

Softkey Location: **Mode** > **Wideband CDMA** > **Channel Setup** > **Uplink Power**

Range: ±30 dB of the uplink channel 1 power level

Status after Normal Preset: 0.00 dB

SCPI Command and Command Query:

```
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel2|3:POWer <value>
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel2|3:POWer?
```

## Uplink Trig Delay

Press this softkey to change the propagation delay timing between the trigger from the base station and the RF output of the instrument. To enter the uplink trigger delay value, rotate the front-panel knob until the desired value is displayed, use the up and down arrow keys, or enter the value using the numeric keypad and press the **Enter** terminator softkey. For additional information, see "Understanding Time Offsets" on page 3-8.

Softkey Location: **Mode** > **Wideband CDMA** > **Channel Setup** > **Uplink Trig Delay**

Range: –50 to +204 chips

Status after Normal Preset: 0 chips

SCPI Command and Command Query:

```
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:TRIGger:DELAy <value>
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:TRIGger:DELAy?
```

## W Bits

Press this softkey to set the value of the Perch1 W bits.

Softkey Location: **Mode** > **Wideband CDMA** > **Perch Setup** > **BCCH Setup** > **W Bits**

Range: 0 to 3

Status after Normal Preset: 0

SCPI Command and Command Query:

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1]:WBITs <value>
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1]:WBITs?
```

## W-CDMA Off On

Press this softkey to enable Option H98 wideband CDMA functionality. Activating the feature configures the internal hardware to generate the structure defined by the W-CDMA experimental system specification. A 10 ms radio frame is constructed for each dedicated traffic channel consisting of 16 timeslots which include pilot symbols, transmit power control bits, ACCH fields filled with zeroes, and data fields filled with selected data (zeros, PN9, or PN15). The `WCDMA` and `I/Q` annunciators appear in the display when this softkey is toggled on.

In addition to enabling the **W-CDMA Off On** softkey, you must enable at least one of the individual channel softkeys (**Perch1 Off On**, **Perch2 Off On**, and **Channel State Off On**) in order to wideband CDMA waveform output. If none of these channel softkeys are enabled, the output is an unmodulated carrier.

Softkey Location: **Mode** > **Wideband CDMA** > **W-CDMA Off On**

Choices: **Off** or **On**

Status after Normal Preset: Off

SCPI Command and Command Query:

```
[:SOURce]:RADio:WCDMa[:BBG][:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa[:BBG][:STATe]?
```

# ZEROS

Press this softkey to set the selected channel's data to a bit pattern of continuous 0's.

Softkey Location: **Mode** > **Wideband CDMA** > **Channel Setup** > **Data Pattern** > **ZEROS**

SCPI Commands and Command Queries:

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:PATTern ZEROs
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:PATTern?

[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:PATTern ZEROs
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:PATTern?

[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:PATTern ZEROs
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:PATTern?
```

# 5 Programming Information

This chapter includes a brief overview of the Standard Commands for Programmable Instruments (SCPI) programming language (including a command syntax description) and a listing of all of the Wideband CDMA subsystem SCPI commands in alphabetical order. The descriptions include syntax requirements, command queries, variable choices, variable ranges, restrictions, and status after *RST. Use this information to supplement the ESG Family manual set.

# Getting Started with SCPI

This section includes some basic reference material for the Standard Commands for Programmable Instruments language (SCPI). For more detailed information, see the programming guide.

## Understanding Common Terms

The following terms are used throughout the remainder of this chapter.

| | |
|---|---|
| Controller | A controller is any computer used to communicate with a SCPI instrument. A controller can be a personal computer, a minicomputer, or a plug-in card in a card cage. Some intelligent instruments can also function as controllers. |
| Instrument | An instrument is any device that implements SCPI. Most instruments are electronic measurement or stimulus devices, but this is not a requirement. Similarly, most instruments use an GPIB or RS-232 interface for communication. The same concepts apply regardless of the instrument function or the type of interface used. |
| Program Message | A program message is a combination of one or more properly formatted SCPI commands. Program messages always go from a controller to an instrument. Program messages tell the instrument how to make measurements and output signals. |
| Response Message | A response message is a collection of data in specific SCPI formats. Response messages always go from an instrument to a controller or listening instrument. Response messages tell the controller about the internal state of the instrument and about measured values. |
| Command | A command is an instruction in SCPI. You combine commands to form messages that control instruments. In general, a command consists of mnemonics (keywords), parameters, and punctuation. |
| Query | A query is a special type of command. Queries instruct the instrument to make response data available to the controller. Query mnemonics always end with a question mark. |

## Standard Notation

This section uses several forms of notation that have specific meaning:

**Command Mnemonics** — Many commands have both a long and a short form and you must use either one or the other (SCPI does not accept a combination of the two). Consider the FREQuency command, for example. The short form is FREQ and the long form is FREQUENCY. This notation type is a shorthand to document both the long and short form of commands. SCPI is not case sensitive, so fREquEnCy is just as valid as FREQUENCY, but FREQ and FREQUENCY are the only valid forms of the FREQuency command.

**Angle Brackets** — Angle brackets indicate that the word or words enclosed represent something other than themselves. For example, <new line> represents the ASCII character with the decimal value 10. Similarly, <END> means that EOI is asserted on the GPIB interface. Words in angle brackets have much more rigidly defined meaning than words shown in ordinary text. For example, this section uses the word "message" to talk about messages generally. But the bracketed words <program message> indicate a precisely defined element of SCPI. If you need them, you can find the exact definitions of words such as <program message> in a syntax diagram.

## More About Commands

### Query and Event Commands

You can query any value that you can set. For example, the presence of the signal generator FREQuency:OFFSet command implies that a FREQuency:OFFSet? also exists. If you see a command ending with a question mark, it is a query-only command. Some commands are events and cannot be queried. An event has no corresponding setting if it causes something to happen inside the instrument at a particular instant.

### Implied Commands

Implied commands appear in square brackets. If you send a subcommand immediately preceding an implied command, but do not send the implied command, the instrument assumes you intend to use the implied command and behaves just as if you had sent it. Notice that this means that the instrument expects you to include any parameters required by the implied command. The following example illustrates equivalent ways to program the signal generator using explicit and implied commands.

An example signal generator command, FREQuency[:CW], with and without the implied command:

```
FREQuency:CW 500 MHz        using explicit commands
FREQuency 500 MHz           using implied commands
```

### Optional Parameters

Optional parameter names are enclosed in square brackets. If you do not send a value for an optional parameter, the instrument chooses a default value. The instrument's command reference documents the values used for optional parameters.

## Command Syntax

Following the heading for each programming command entry is a syntax statement showing the proper syntax for the command. An example syntax statement is shown here:

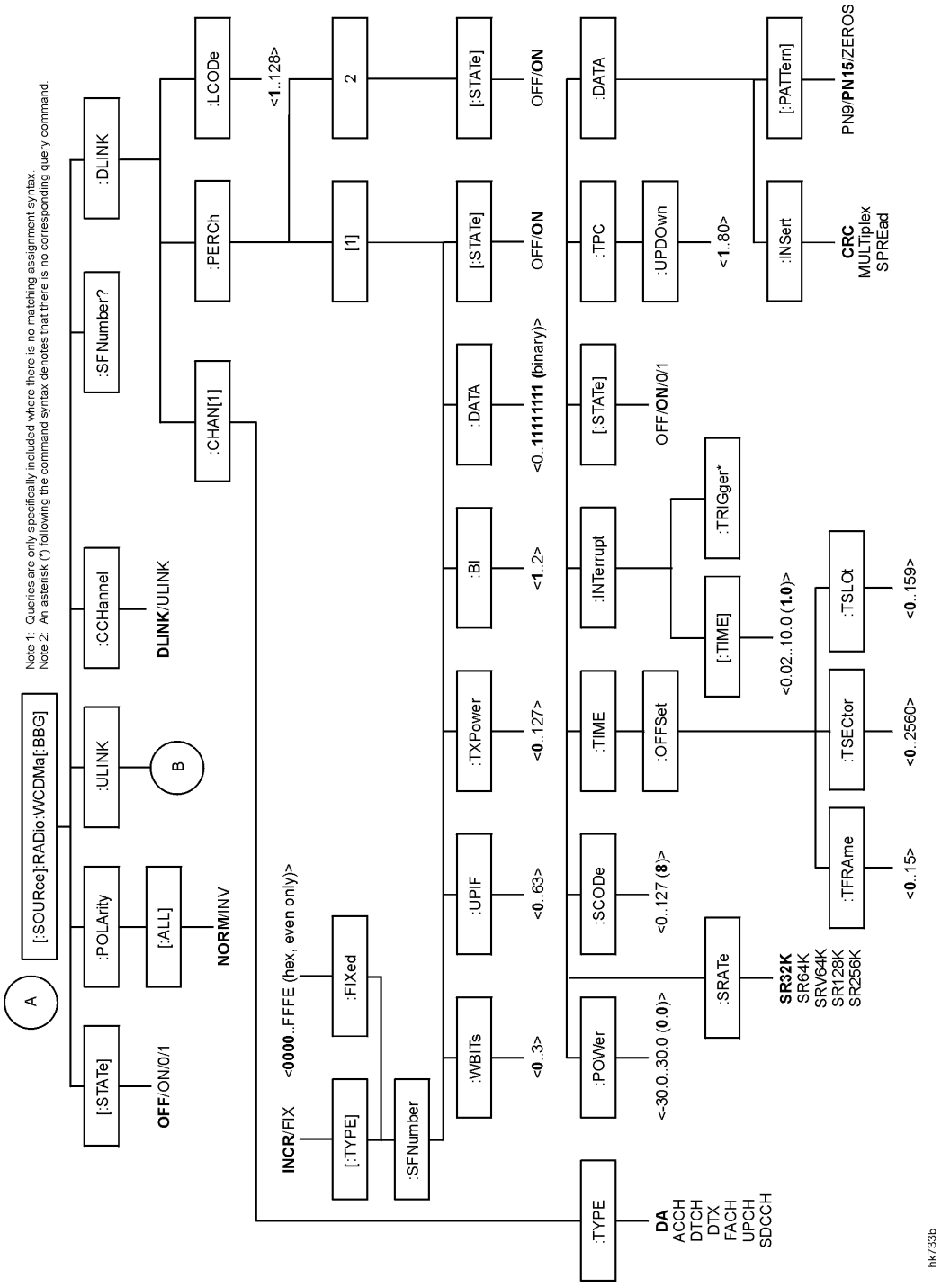
```
POWer[:LEVel] MAXimum|MIN
```

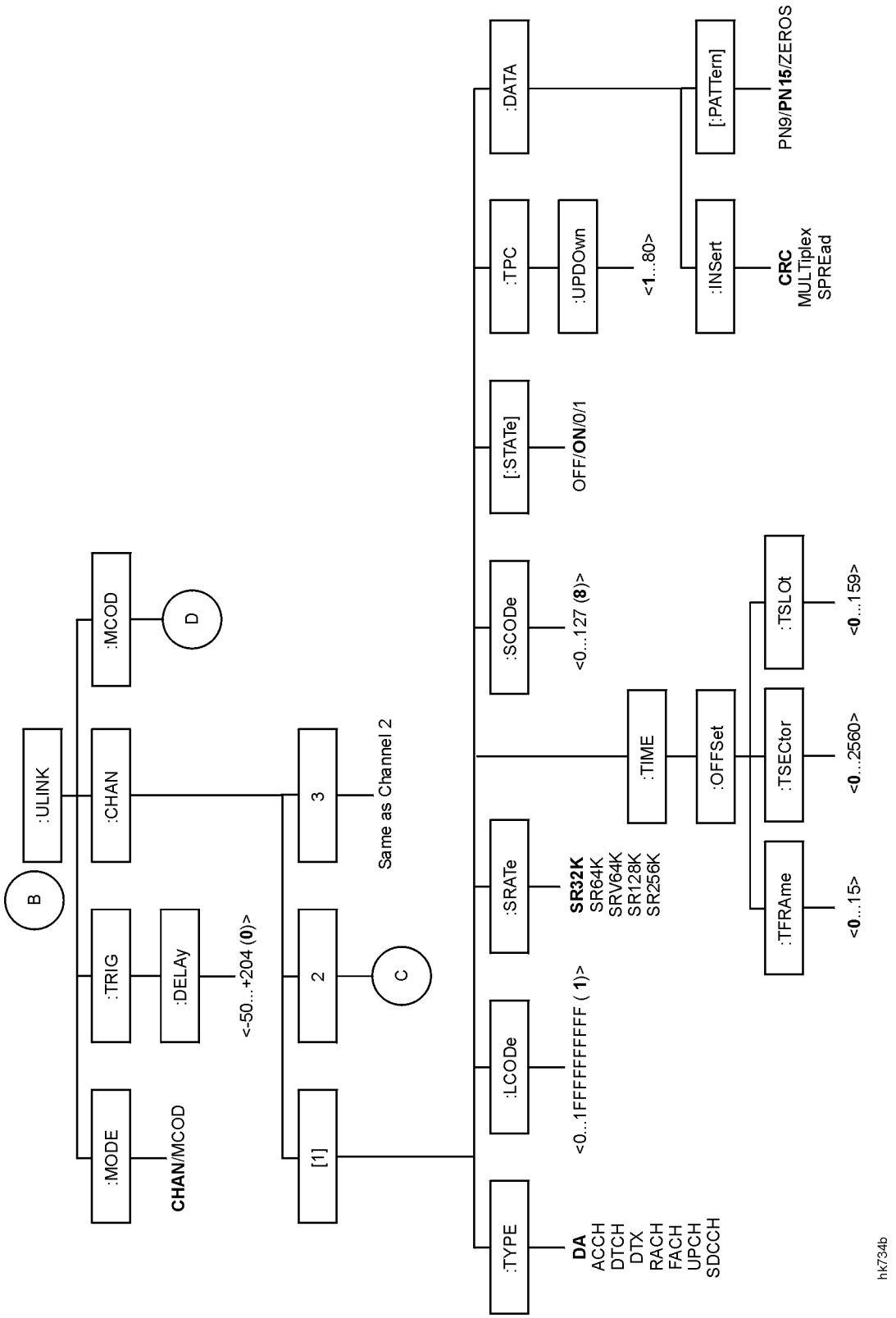
Syntax statements read from left to right. In this example, the `[:LEVel]` portion of the statement immediately follows the `POWer` portion of the statement with no separating space. A separating space is legal only between the command and its argument. In this example, the portion following the `[:LEVel]` portion of the statement is the argument. Additional conventions used in the syntax statements are defined as follows:

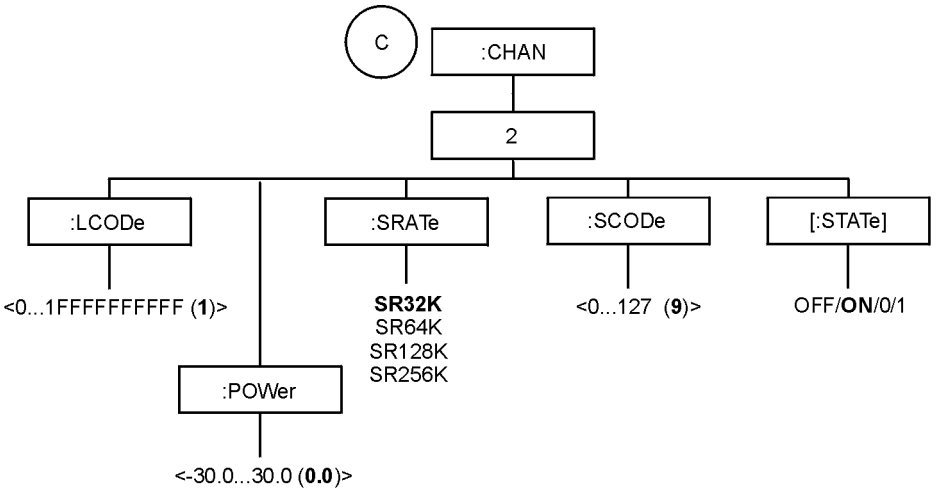
- Italics are used to symbolize a program code parameter or query response.
- ::= means "is defined as."
- | (vertical bar) indicates a choice of one element from a list. For example, <A>|<B> indicates <A> or <B> but not both.
- {} (braces or curly brackets) indicate that the enclosed items may be included zero or more times.
- [] (square brackets) indicate that the enclosed items are optional.
- Upper-case lettering indicates that the upper-case portion of the command is the minimum required for the command. For example, in the command `FREQuency`, `FREQ` is the minimum requirement.
- Lower-case lettering indicates that the lower-case portion of the command is optional; it can either be included with the upper-case portion of the command or omitted. For example, in the command `FREQuency`, either `FREQ`, or `FREQUENCY` is correct.
- ? after a subsystem command indicates that the command is a query.

# SCPI Command Tree

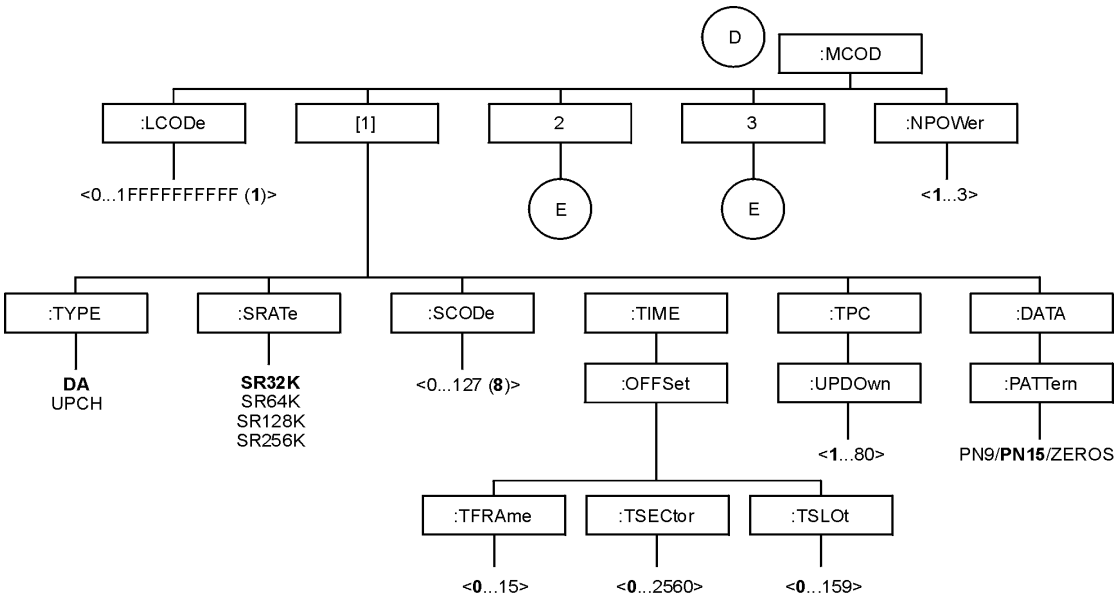
This command tree illustrates every valid SCPI command for Option H98. Values in bold type represent defaults. For information regarding SCPI common terms, queries, implied commands, command strings, and command syntax, see "Getting Started with SCPI" on page 5-2.



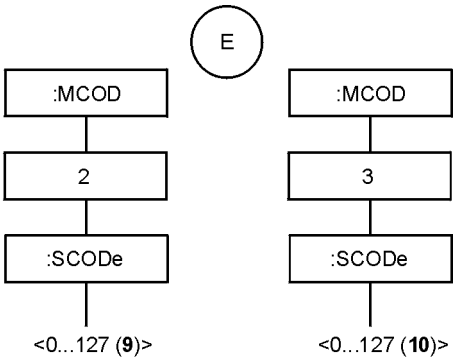

B
:ULINK
:MODE
CHAN/MCOD
:TRIG
:DELAy
<-50...+204 (0)>
:CHAN
:MCOD
D
[1]
2
C
3
Same as Channel 2
:TYPE
DA
ACCH
DTCH
DTX
RACH
FACH
UPCH
SDCCH
:LCODe
<0...1FFFFFFFFFF (1)>
:SRATe
SR32K
SR64K
SRV64K
SR128K
SR256K
:TIME
:OFFSet
:TFRAme
<0...15>
:TSEQtor
<0...2560>
:TSLOt
<0...159>
:SCODe
<0...127 (8)>
[:STATe]
OFF/ON/0/1
:TPC
:UPDOwn
<1...80>
:DATA
:INSert
[:PATTern]
CRC
MULTiplex
SPREad
PN9/PN15/ZEROS
hk734b




hk735b




hk736b




hk737b

# Wideband CDMA Subsystem SCPI Command Reference

The Wideband CDMA subsystem SCPI commands are used to set the controls and parameters associated with the third generation mobile communications standard via a remote controller (Option H98 required). Their associated command queries are used to query the signal generator which, in turn, transmits the queried data back to the controller. These commands and command queries are for use only with Option H98 signal generators.

## BCCH Type

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1]:BCCH[:TYPE] 1|2
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1]:BCCH[:TYPE]?
```

Execute this command to set the downlink channel BCCH type.

Choices: `1` or `2`

Status after *RST: 1

## Channel Number

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel?

[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]|2|3
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel?
```

Execute this command to set the downlink/uplink channel number.

Downlink Choices: `1`

Uplink Choices: `1`, `2`, or `3`

Status after *RST: 1

## Channel Operating State

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1][:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1][:STATe]?

[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]|2|3[:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]|2|3[:STATe]?
```

Execute this command to toggle the operating state of the different channels. Note that channels cannot be turned off when operating in uplink multicode mode.

Downlink Choices: `ON` (`1`) or `OFF` (`0`) for channel 1

Uplink Choices: `ON` (`1`) or `OFF` (`0`) for channels 1, 2, or 3

Status after *RST: On

# Channel Type

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:TYPE
DA|ACCH|DTCH|DTX|FACH|SDCCH|UPCH

[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:TYPE?

[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:TYPE
DA|ACCH|DTCH|DTX|RACH|SDCCH|UPCH

[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:TYPE?
```

Execute this command to select the channel type.

### Downlink Channel Types

The following downlink channel types are assigned by appending the `[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:TYPE` command with one of the following variables:

| | |
|---|---|
| `ACCH` | Sets the downlink channel type to an Associated Control Channel (ACCH). |
| `DA` | Sets the downlink channel type to a Dedicated Traffic Channel plus Associated Control Channel (DTCH+ACCH). |
| `DTCH` | Sets the downlink channel type to a Dedicated Traffic Channel (DTCH). |
| `DTX` | Sets the downlink channel type to a Discontinuous Transmission Channel (DTX). |
| `FACH` | Sets the downlink channel type to a Forward Access Channel Long (FACH-L). |
| `SDCCH` | Sets the downlink channel type to a Stand-Alone Dedicated Control Channel (SDCCH). |
| `UPCH` | Sets the downlink channel type to a User Packet Traffic Channel (UPCH). |

Status after *RST: DTCH+ACCH

### Uplink Channel Types

In uplink mode, channel type for channels 2 and 3 is set by channel 1, but each channel can be turned off independently via its own state command.

The following uplink channel types are assigned by appending the `[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:TYPE` command with one of the following variables:

`ACCH` Sets the uplink channel type to an Associated Control Channel (ACCH).

`DA` Sets the uplink channel type to a Dedicated Traffic Channel plus Associated Control Channel (DTCH+ACCH).

`DTCH` Sets the uplink channel type to a Dedicated Traffic Channel (DTCH).

`DTX` Sets the uplink channel type to a Discontinuous Transmission Channel (DTX).

`RACH` Sets the uplink channel type to a Random Access Channel Long (RACH-L).

`SDCCH` Sets the uplink channel type to a Stand-Alone Dedicated Control Channel (SDCCH).

`UPCH` Sets the uplink channel type to a User Packet Traffic Channel (UPCH).

Status after *RST: DTCH+ACCH

### Channel Type versus Symbol Rate

Symbol rate is coupled to channel type. Table 5-1 shows *actual* symbol rates set as a function of channel type and *selected* symbol rate.

Illegal combinations are not selectable from the front panel; assignments via remote commands default as shown in Table 5-1.

**Table 5-1 Actual Symbol Rate as a Function of Channel Type versus Selected Symbol Rate**

| Channel Type | Selected Symbol Rate (in ksps) | | | | |
|---|---|---|---|---|---|
| | **32** | **64** | **64 voice** | **128** | **256** |
| DTCH+ACCH | 32 | 64 | 64 voice | 128 | 256 |
| ACCH | 32 | 64 | 64 | 128 | 256 |
| DTCH | 32 | 64 | 64 voice | 128 | 256 |
| DTX | 32 | 64 | 64 | 128 | 256 |
| FACH | 64 | 64 | 64 | 64 | 64 |
| RACH | 64 | 64 | 64 | 64 | 64 |
| SDCCH | 32 | 32 | 32 | 32 | 32 |
| UPCH | 32 | 64 | 64 | 128 | 256 |

## Data Insertion

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:INSert CRC|MULTiplex|SPREad
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:INSert?

[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:INSert CRC|MULTiplex|SPREad
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:INSert?
```

Execute this command to select how and where the data pattern is inserted into channel 1. The three choices are:

| | |
|---|---|
| `CRC` | Appends the selected data pattern to the back of the CRC. This combination is then convolved, interleaved, and segmented into timeslots. |
| `MULTiplex` | Segments the selected data pattern directly into timeslots with Pilot, TPC symbols and CRC, but without convolution or interleaving. Filler bits of 0's are inserted in place of the bits normally produced by convolutional coding. |
| `SPREad` | Directly spreads the selected data pattern without segmentation. |

Status after *RST: CRC

**NOTE** Data insertion is not selectable for uplink channels 2 and 3.

## Data Pattern

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1]:DATA:PATTern <value>
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1]:DATA:PATTern?

[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:DATA:PATTern <value>
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:DATA:PATTern?

[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]|2|3:DATA[:PATTern]
PN9|PN15|ZEROs
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]|2|3:DATA[:PATTern]?

[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:DATA[:PATTern] PN9|PN15|ZEROs
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:DATA[:PATTern]?
```

Execute this command to set the transmitted data pattern.

#### Downlink Perch1 Data Patterns

Perch1, BCCH data, downlink data patterns are assigned by appending the `[:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1]:DATA:PATTern` command with any binary value from `00000000` to `11111111`. The eight bit pattern is repeated thirteen times for a total of 104 bits.

Status after *RST: 11111111

### Downlink Channel 1 Data Patterns

The following downlink data patterns are assigned by appending the `[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:DATA:PATTern` command with one of the following variables:

`PN9` Sets the downlink channel 1 data pattern to a 9-bit ITU pseudo-random bit pattern.

`PN15` Sets the downlink channel 1 data pattern to a 15-bit ITU pseudo-random bit pattern.

`ZEROS` Sets the downlink channel 1 data pattern to a bit stream of continuous 0's.

Status after *RST: PN9

### Uplink Channel 1 Data Patterns

The following uplink channel 1 data patterns are assigned by appending the `[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:DATA:PATTern` command with one of the following variables:

`PN9` Sets the uplink channel 1 data pattern to a 9-bit ITU pseudo-random bit pattern.

`PN15` Sets the uplink channel 1 data pattern to a 15-bit ITU pseudo-random bit pattern.

`ZEROS` Sets the uplink channel 1 data pattern to a bit stream of continuous 0's.

Status after *RST: PN9

### Uplink Multicode Data Patterns

The following uplink multicode data patterns are assigned by appending the `[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:DATA:PATTern` command with one of the following variables:

`PN9` Sets the uplink multicode data pattern to a 9-bit ITU pseudo-random bit pattern.

`PN15` Sets the uplink multicode data pattern to a 15-bit ITU pseudo-random bit pattern.

`ZEROS` Sets the uplink multicode data pattern to a bit stream of continuous 0's.

Status after *RST: PN9

## Downlink Channel Power

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:POWer <value>
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:POWer?
```

Execute this command to set the downlink channel's power relative to the power of the Perch1 and Perch2 channels.

Range: ±30 dB of Perch1 and Perch2 power setting

Status after *RST: 0.00 dB

## Downlink Long Code

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:LCODe <value>
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:LCODe?
```

Execute this command to assign a specific long code to the Perch channels and the dedicated traffic channel when the signal generator is in downlink mode.

Range: `1` to `128`

Status after *RST: 1

## Interrupt Trigger

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:INTerrupt:TRIGger
```

Execute this command to interrupt downlink channel 1. Channel 1 is interrupted for the duration specified by the interrupt value. Executing this command is equivalent to turning the channels off for the duration of the interrupt value and then back on. This command may only be executed while the signal generator is in downlink mode.

## Interrupt Time

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:INTerrupt[:TIMe] <value>
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:INTerrupt[:TIMe]?
```

Execute this command to change the time duration that the Interrupt Trigger will interrupt downlink channel 1. This command may only be executed while the signal generator is in downlink mode.

Range: `0.020` to `10.00` seconds, in 20 millisecond steps

Status after *RST: 1.000 second

## Multicode Type

```
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:TYPE DA|UPCH
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:TYPE?
```

Execute this command to select the multicode type. The following multicode types are assigned by appending the `[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:TYPE` command with one of the following variables:

`DA` Sets the multicode type to a Dedicated Traffic Channel plus Associated Control Channel (DTCH+ACCH).

`UPCH` Sets the multicode type to a User Packet Traffic Channel (UPCH).

Status after *RST: DTCH+ACCH

## Perch1 Operating State

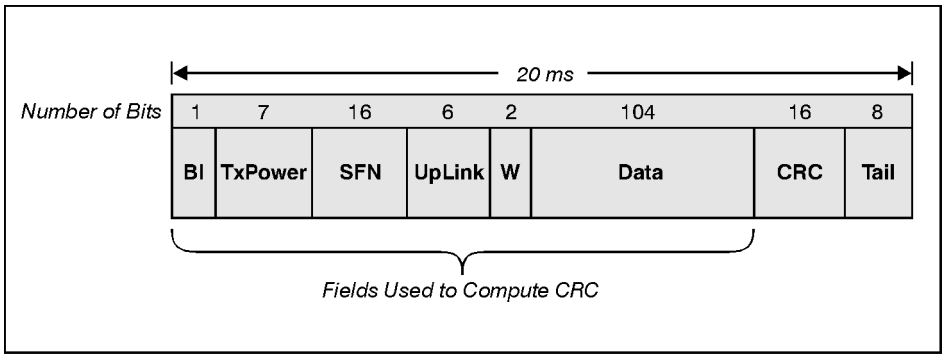
```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1][:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1][:STATe]?
```

Execute this command to toggle the operating state of the Perch1 logical channel for synchronization. The Perch1 channel can be enabled alone, with any combination of the Perch2 channel and channel 1, or it can be turned off. A short code of C8(0) is automatically assigned to the Perch1 channel. The W-CDMA mode must be activated in order for this signal to be generated.

Choices: `ON` (`1`) or `OFF` (`0`)

Status after *RST: On

**Figure 5-1 Perch1(BCCH) Frame**




All fields in the Perch1 (BCCH) frame are selectable except:

- SFN in increment mode, which increments by 2 every 20 milliseconds,
- CRC, which is computed based on all fields plus the SFN value.

The Perch1 (BCCH) frame is made up of the following fields:

- BI: BCCH Identification Bit, selectable
- Tx Power: Transmit Power Indicator, selectable

- SFN: System Frame Number Fixed Value, selectable
- UpLink: Base Station Measured Uplink Interference Power Amount, selectable
- W: Message Confirmation Indicator Bits, selectable
- Data: BCCH Data Field, selectable
- CRC: Cyclic Redundancy Check
- Tail: 8 Bits; All Zeros.

## Perch2 Operating State

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh2[:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh2[:STATe]?
```

Execute this command to toggle the operating state of the Perch2 logical channel for synchronization. The Perch2 channel can be enabled alone, with any combination of the Perch1 channel and channel 1, or it can be turned off. The short code for Perch2 is set based on the long code masked set (LMS) of the selected long code. Refer to Table 5-2 for the Perch2 short code. The W-CDMA mode must be activated in order for this signal to be generated.

Choices: `ON` (`1`) or `OFF` (`0`)

Status after *RST: On

**Table 5-2 Long Code Range Versus the Perch2 Long-Code Masked Set (LMS)**

| Long Code Range | Perch2 Short Code LMS |
|---|---|
| 1 to 32 | 2 |
| 33 to 64 | 3 |
| 65 to 96 | 4 |
| 97 to 128 | 5 |

## Phase Polarity

```
[:SOURce]:RADio:WCDMa[:BBG]:POLarity[:ALL] NORMal|INVert
[:SOURce]:RADio:WCDMa[:BBG]:POLarity[:ALL]?
```

Execute this command to normalize or invert the internal Q signal, reversing the direction of phase rotation. Required by some radio standards, phase polarity inversion is also useful for lower sideband mixing applications. The following polarity types are assigned by appending the `[:SOURce]:RADio:WCDMa[:BBG]:POLarity[:ALL]` command with one of the following variables:

`NORMal` Sets the polarity to normal (no inversion of the Q signal).

`INVert` Sets the polarity to inverted. This inverts Q signal, reversing the direction of phase rotation.

Status after *RST: Normal

## Pilot-TPC Power

```
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD:NPOWer <value>
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD:NPOWer?
```

Execute this command to set the pilot-TPC power level for the active multicode.

Range: 1 to 3

Status after *RST: 1

## SFN Fixed Value

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1]:SFNumber[:TYPE]:FIX <value>
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1]:SFNumber[:TYPE]:FIX?
```

Execute this command to select the value for a fixed System Frame Number. Only even numbered values are allowed.

Range: 0000 to 0FFE (hexadecimal, evens only)

Status after *RST: 0000 (hexadecimal)

## Short Code (Channel 1)

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:SCODe <value>
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:SCODe?

[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:SCODe <value>
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:SCODe?
```

Execute this command to set the short code for channel 1. The range of values allowed depends on the symbol rate, as shown in Table 5-3.

If the symbol rate is changed to a new value, and the short code value does not fall into the allowed short code range for the new symbol rate value, the short code value is automatically set to the maximum short code value that corresponds to the new rate.

Status after *RST: 1

**Table 5-3 Symbol Rate Versus Channel 1 Short Code Range**

| Symbol Rate | Short Code Range |
|---|---|
| 32 ksps | 0 to 127 |
| 64 ksps | 0 to 63 |
| 64 ksps voice | 0 to 63 |
| 128 ksps | 0 to 31 |
| 256 ksps | 0 to 15 |

## Short Code (Channels 2 and 3)

```
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel2|3:SCODe <value>
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel2|3:SCODe?
```

Execute this command to set the short code for uplink channel 2 or 3. This short code value is used for channel 2 except in multicode during the Pilot and TPC symbols when the primary channel short code value is used.

The range of values for channel 2 and 3 short code are coupled to the channel 1 symbol rate, as previously described for Short Code (Channel 1). See Table 5-3.

**NOTE**

Remote coupling between symbol rate and short code will fail to clamp channels 2 and 3 short code to the correct upper limit.

To insure proper coupling between channels 2 and 3 short code and symbol rate, always check the short code from the front-panel interface and manually reconfigure any illegal values using the appropriate softkeys.

Range: See Table 5-3

Status after *RST: 9

## Symbol Rate

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:SRATe
SR32K|SR64K|SRV64K|SR128K|SR256K
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:SRATe?

[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:SRATe
SR32K|SR64K|SRV64K|SR128K|SR256K
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:SRATe?

[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel2|3:SRATe
SR32K|SR64K|SR128K|SR256K
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel2|3:SRATe?

[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:SRATe SR32K|SR64K|SR128K|SR256K
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:SRATe?
```

Execute this command to set the symbol rate in kilosymbols per second (ksps). The symbol rate choices are 32 ksps, 64 ksps, 64 ksps voice (not available in multicode mode and uplink channels 2 and 3), 128 ksps, or 256 ksps.

### Downlink Channel 1 Symbol Rates

The following downlink channel 1 symbol rates are assigned by appending the `[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:SRATe` command with one of the following variables:

| | |
|---|---|
| `SR32K` | Sets the downlink channel 1 symbol rate to 32 kilosymbols per second. |
| `SR64K` | Sets the downlink channel 1 symbol rate to 64 kilosymbols per second. |
| `SRV64K` | Sets the downlink channel 1 symbol rate to 64 kilosymbols per second voice. |
| `SR128K` | Sets the downlink channel 1 symbol rate to 128 kilosymbols per second. |
| `SR256K` | Sets the downlink channel 1 symbol rate to 256 kilosymbols per second. |

Status after *RST: 32 ksps

### Uplink Channel 1 Symbol Rates

The following uplink channel 1 symbol rates are assigned by appending the `[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:SRATe` command with one of the following variables:

| | |
|---|---|
| `SR32K` | Sets the uplink channel 1 symbol rate to 32 kilosymbols per second. |
| `SR64K` | Sets the uplink channel 1 symbol rate to 64 kilosymbols per second. |
| `SRV64K` | Sets the uplink channel 1 symbol rate to 64 kilosymbols per second voice. |
| `SR128K` | Sets the uplink channel 1 symbol rate to 128 kilosymbols per second. |
| `SR256K` | Sets the uplink channel 1 symbol rate to 256 kilosymbols per second. |

Status after *RST: 32 ksps

### Uplink Channel 2 and 3 Symbol Rates

The following uplink channel 2 and 3 symbol rates are assigned by appending the `[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel2:SRATe` and `[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel3:SRATe` commands with one of the following variables:

| | |
|---|---|
| `SR32K` | Sets uplink channels 2 or 3 symbol rate to 32 kilosymbols per second. |
| `SR64K` | Sets uplink channels 2 or 3 symbol rate to 64 kilosymbols per second. |
| `SR128K` | Sets uplink channels 2 or 3 symbol rate to 128 kilosymbols per second. |
| `SR256K` | Sets uplink channels 2 or 3 symbol rate to 256 kilosymbols per second. |

Status after *RST: 32 ksps

**NOTE** 64 ksps voice is not available for channels 2 or 3.

### Multicode Symbol Rates

The following uplink multicode symbol rates are assigned by appending the `[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:SRATe` command with one of the following variables:

`SR32K` Sets the multicode symbol rate to 32 kilosymbols per second.

`SR64K` Sets the multicode symbol rate to 64 kilosymbols per second.

`SR128K` Sets the multicode symbol rate to 128 kilosymbols per second.

`SR256K` Sets the multicode symbol rate to 256 kilosymbols per second.

Status after *RST: 32 ksps

64 ksps voice is not available in multicode mode.

**NOTE**

Symbol rate is coupled to channel type. Table 5-4 shows *actual* symbol rates set as a function of channel type and *selected* symbol rate.

Illegal assignments via remote (SCPI) commands default as shown in Table 5-4.

**Table 5-4 Actual Symbol Rate as a Function of Channel Type versus Selected Symbol Rate**

| Channel Type | Selected Symbol Rate (in ksps) | | | | |
|---|---|---|---|---|---|
| | **32** | **64** | **64 voice** | **128** | **256** |
| DTCH+ACCH | 32 | 64 | 64 voice | 128 | 256 |
| ACCH | 32 | 64 | 64 | 128 | 256 |
| DTCH | 32 | 64 | 64 voice | 128 | 256 |
| DTX | 32 | 64 | 64 | 128 | 256 |
| FACH | 64 | 64 | 64 | 64 | 64 |
| RACH | 64 | 64 | 64 | 64 | 64 |
| SDCCH | 32 | 32 | 32 | 32 | 32 |
| UPCH | 32 | 64 | 64 | 128 | 256 |

Table 5-5 provides some details about the parameters at each symbol rate.

**Table 5-5 Parameters versus Symbol Rate**

| Parameter | Symbol Rate | | | | |
|---|---|---|---|---|---|
| | 32 ksps | 64 ksps | 64 ksps voice | 128 ksps | 256 ksps |
| Data Bits per Radio Frame | 88 + 16 bit CRC | 320 + 13 bit CRC | 320 + 13 bit CRC | 723 + 13 bit CRC | 1446 + 2 by 13 bit CRC |
| Dummy Bits | 48 | 1 | 1 | 8 | 8 |
| Interleave Method | 16 × 24 | 16 × 64 | 16 × 64 | 16 × 140 | 16 × 278 |
| Bits per Radio Frame | 384 | 1024 | 1024 | 2240 | 4448 |
| Data Bits per Timeslot | 24 | 64 | 64 | 140 | 278 |

## System Frame Number Type

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1]:SFNumber[:TYPE] INCR|FIX
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1]:SFNumber[:TYPE]?
```

Execute this command to setup the System Frame Number format.

The following System Frame Number types are assigned by appending the `[:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1]:SFNumber[:TYPE]` command with one of the following variables:

`INCR` Sets the System Frame Number type to increment.

`FIX` Sets the System Frame Number type to fixed.

Status after *RST: Increment

## TFrame Offset

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:TIME:OFFSet:TFRAme <value>
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:TIME:OFFSet:TFRAme?

[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:TIME:OFFSet:TFRAme <value>
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:TIME:OFFSet:TFRAme?

[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:TIME:OFFSet:TFRAme <value>
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:TIME:OFFSet:TFRAme?
```

Execute this command to enter the downlink/uplink channel or uplink multicode time offset TFrame value.

#### TFrame in Downlink Mode

TFrame adjusts the number of timeslots that the channel 1 radio frame is offset from the Perch radio frame and long code phase zero. Total offset is equal to TFrame plus TSlot. For additional information, see "Understanding Time Offsets" on page 3-8.

Range: `0` to `15` timeslots

Status after *RST: 0 slots

#### TFrame in Uplink Mode

TFrame adjusts the number of timeslots channels 1, 2 and 3 radio frames are offset from long code phase 1280. Total offset is equal to TFrame plus TSlot. For additional information, see "Understanding Time Offsets" on page 3-8.

Range: `0` to `15` timeslots

Status after *RST: 0 slots

## Transmission Direction, Uplink or Downlink

```
[:SOURce]:RADio:WCDMa[:BBG]:CCHannel DLINK|ULINK
[:SOURce]:RADio:WCDMa[:BBG]:CCHannel?
```

Execute this command to toggle the transmission direction between downlink and uplink. When the signal generator is in the uplink mode, it must be frequency-locked to the base station receiver using the uplink trigger feature. Refer to "System Configuration" on page 3-16 and "Rear-Panel Overview" on page 3-11 for additional information.

Choices: `DLINK` or `ULINK`

Status after *RST: Downlink

## Transmission Power Bits

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1]:TXPower <value>
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1]:TXPower?
```

Execute this command to enter the Perch1 Tx power bit value.

Range: `0` to `127`

Status after *RST: 0

## Transmission Power Control

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:UPDOwn <value>
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:UPDOwn?

[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:UPDOwn <value>
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:UPDOwn?

[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:UPDOwn <value>
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:UPDOwn?
```

Execute this command to set the number of 1 dB steps the transmit power control (TPC) field of the DTCH channel is first incremented and then decremented.

Range: `1` to `80`

Status after *RST: 1 UP/DOWN

## TSector Offset

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:TIME:OFFSet:TSECtor <value>
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:TIME:OFFSet:TSECtor?

[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:TIME:OFFSet:TSECtor <value>
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:TIME:OFFSet:TSECtor?

[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:TIME:OFFSet:TSECtor <value>
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:TIME:OFFSet:TSECtor?
```

Execute this command to enter the downlink/uplink channel or uplink multicode time offset TSector value.

#### TSector in Downlink Mode

TSector adjusts the Perch radio frame timing and long code relative to the BTS reference System Frame Number Reset output at the DATA OUT rear-panel connector. This is accomplished by adjusting the offset (in number of chips) from the falling edge of the System Frame Number Reset to the first symbol of the Perch radio frame and long code phase zero, measured at the RF output. For additional information, see "Understanding Time Offsets" on page 3-8.

Range: `0` to `2560` chips

Status after *RST: 0 chips

#### TSector in Uplink Mode

TSector adjusts channels 1, 2 and 3 radio frame timing and long code phase relative to the BTS reference System Frame Number Reset input at the PATTERN TRIG IN rear-panel connector. This is accomplished by adjusting the offset (in number of chips) from the falling edge of the System Frame Number input to the long code phase 1280 of channels 1, 2 and 3 measured at the RF output. Total offset is equal to uplink trigger delay (propagation delay) plus TSector. For additional information, see "Understanding Time Offsets" on page 3-8.

Range: `0` to `2560` chips

Status after *RST: 0 chips

## TSlot Offset

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:TIME:OFFSet:TSlot <value>
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:TIME:OFFSet:TSlot?

[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:TIME:OFFSet:TSlot <value>
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:TIME:OFFSet:TSlot?

[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:TIME:OFFSet:TSlot <value>
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:TIME:OFFSet:TSlot?
```

Execute this command to enter the downlink/uplink channel or uplink multicode time offset TSlot value.

#### TSlot in Downlink Mode

TSlot adjusts the number of symbols channel 1 radio frame is offset from the Perch radio frame and long code phase zero. Total offset is equal to TSlot plus TFrame. For additional information, see "Understanding Time Offsets" on page 3-8.

Range: see Table 5-6

Status after *RST: 0 symbols

### TSlot in Uplink Mode

TSlot adjusts the number of symbols channels 1, 2 and 3 radio frames are offset from long code phase 1280. Total offset is equal to TSlot plus TFrame. For additional information, see "Understanding Time Offsets" on page 3-8.

Range: see Table 5-6

Status after *RST: 0 symbols

**Table 5-6 Symbol Rate Versus TSlot Range**

| Symbol Rate | TSlot Values |
|---|---|
| 32 ksps | 0 to 19 |
| 64 ksps | 0 to 39 |
| 64 ksps voice | 0 to 39 |
| 128 ksps | 0 to 79 |
| 256 ksps | 0 to 159 |

## Uplink Channel Power

```
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel2|3:POWer <value>
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel2|3:POWer?
```

Execute this command to set the power level of the uplink channel 2 and 3 relative to uplink channel 1.

Range: ±30 dB of the uplink channel 1 power level

Status after *RST: 0.00 dB

## Uplink Interference Bits

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1]:UPIF <value>
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1]:UPIF?
```

Execute this command to enter the Perch1 uplink interference bit value.

Range: `0` to `63`

Status after *RST: 0

## Uplink Long Code

```
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]|2|3:
LCODe <value>
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]|2|3:LCODe?

[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD:LCODe <value>
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD:LCODe?
```

Execute this command to enter the long code for the uplink channels.

In multicode mode, all of the multicodes use the same long code.

Long code number changes are not applied to the waveform until long code reset, 1280 chips before the end of System Frame Number $2^{16}$–1.

Long code reset only occurs when:

- the W-CDMA operating state is toggled,
- the transmission link direction is toggled,
- the internal System Frame Number transitions from SFN $2^{16}$–1 to SFN 0,
- or when externally triggered by a BTS reference SFN reset input (a low to high transition at the PATTERN TRIG IN rear-panel connector).

Other setup changes in uplink mode such as short code, data rate, channel type, or time offset will not affect the long code or long code phase.

Range: `0` to `1FFFFFFFFF` (hexadecimal)

Status after *RST: 1

## Uplink Mode, Channel or Multicode

```
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MODE CHANnel|MCOD
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MODE?
```

Execute this command to toggle the uplink operating mode between channel and multicode mode.

`CHANnel` Selects channel as the uplink transmission mode.

In channel mode, three uplink channels are available. Channel 1 includes the following selectable parameters:

- operating state,
- channel type,
- symbol rate,
- short code,
- data pattern,

- long code,
- data insertion,
- transmission power control,
- time offset adjustments (TSector, TFrame, TSlot),
- uplink trigger delay, and
- phase polarity.

Channels 2 and 3 use the same channel type, uplink trigger delay, time offset adjustments, and phase polarity as channel 1. Channels 2 and 3 include the following selectable parameters:

- operating state,
- symbol rate,
- power (relative to channel 1),
- data pattern, and
- long code.

`MCOD` Selects multicode as the uplink transmission mode.

In multicode mode, three multicodes are available. Multicode channel 1 includes the following selectable parameters:

- multicode type,
- symbol rate,
- short code,
- pilot-TPC power,
- data pattern,
- long code,
- transmission power control,
- time offset adjustments (TSector, TFrame, TSlot)
- uplink trigger delay, and
- phase polarity.

Multicode channels 2 and 3 use the same parameters as multicode channel 1 with the exception of their short codes, which are individually selectable.

Choices: `CHANnel` or `MCOD`

Status after *RST: Chan

## Uplink Trigger Delay

```
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:TRIGger:DELAy <value>
[:SOURce]:RADio:WCDMa[:BBG]:ULINK:TRIGger:DELAy?
```

Execute this command to change the propagation delay timing between the trigger from the base station and the RF output of the signal generator. For additional information, see "Understanding Time Offsets" on page 3-8.

Range: –50 to 204 chips

Status after *RST: 0 chips

## W Bits

Execute this command to set the value of the Perch1 W bits.

```
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1]:WBITs <value>
[:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1]:WBITs?
```

Range: 0 to 3

Status after *RST: 0

## W-CDMA Operating State

```
[:SOURce]:RADio:WCDMa[:BBG][:STATe] ON|OFF|1|0
[:SOURce]:RADio:WCDMa[:BBG][:STATe]?
```

Execute this command to enable Option H98 wideband CDMA functionality. Activating the feature sets up the internal hardware to generate the structure defined by the W-CDMA experimental system specification. A 10 ms radio frame is constructed for each dedicated traffic channel consisting of 16 timeslots which include pilot symbols, transmit power control bits, ACCH fields filled with zeroes, and data fields filled with selected data (zeros, PN9, or PN15). The WCDMA and I/Q annunciators appear on the display when the W-CDMA operating state is enabled.

In addition to theW-CDMA mode being enabled, the individual channels must be enabled before each channel is output. If none of these channel are enabled, the output is an unmodulated carrier.

Choices: ON (1) or OFF (0)

Status after *RST: Off

# Softkey to SCPI Command Cross-Reference

This section lists the Option H98 softkeys and their corresponding SCPI commands and command queries. For a list of the standard signal generator hardkeys and softkeys, and their corresponding SCPI commands and command queries, refer to the programming guide.

**Table 5-7 Wideband CDMA Softkeys and Corresponding SCPI Commands**

| Softkey | Corresponding SCPI Commands and Command Queries |
|---|---|
| **32 ksps** | [:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:SRATe SR32K<br>[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:SRATe?<br><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]\|2\|3:SRATe SR32K<br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]\|2\|3:SRATe?<br><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]\|2\|3:SRATe SR32K<br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]\|2\|3:SRATe?<br><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:SRATe SR32K<br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:SRATe? |
| **64 ksps** | [:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:SRATe SR64K<br>[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:SRATe?<br><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]\|2\|3:SRATe SR64K<br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]\|2\|3:SRATe?<br><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:SRATe SR64K<br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:SRATe? |
| **64 ksps voice** | [:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:SRATe SRV64K<br>[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:SRATe?<br><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:SRATe SRV64K<br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:SRATe? |
| **128 ksps** | [:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:SRATe SR128K<br>[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:SRATe?<br><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]\|2\|3:SRATe SR128K<br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]\|2\|3:SRATe?<br><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:SRATe SR128K<br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:SRATe? |
| **256 ksps** | [:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:SRATe SR256K<br>[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:SRATe?<br><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]\|2\|3:SRATe SR256K<br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]\|2\|3:SRATe?<br><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:SRATe 256ksps<br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:SRATe? |

| Softkey | Corresponding SCPI Commands and Command Queries |
|---|---|
| **ACCH** | [:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:TYPE ACCH<br>[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:TYPE?<br><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:TYPE ACCH<br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:TYPE? |
| **BCCH Type** | [:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1]:BCCH[:TYPE] 1\|2<br>[:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1]:BCCH[:TYPE]? |
| **Channel #** | [:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]<br>[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel?<br><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]\|2\|3<br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel? |
| **Channel State Off On** | [:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1][:STATe] ON\|OFF\|1\|0<br>[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1][:STATe]?<br><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]\|2\|3[:STATe] ON\|OFF\|1\|0<br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]\|2\|3? |
| **Channel Type** | [:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:TYPE<br>DA\|ACCH\|DTCH\|DTX\|FACH\|SDCCH\|UPCH<br>[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:TYPE?<br><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:TYPE<br>DA\|ACCH\|DTCH\|DTX\|RACH\|SDCCH\|UPCH<br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:TYPE? |
| **CRC** | [:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:INSert CRC<br>[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:INSert?<br><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:INSert CRC<br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:INSert? |
| **Data Insertion** | [:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:INSert CRC\|MULTiplex\|SPREad<br>[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:INSert?<br><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:INSert CRC\|MULTiplex\|SPREad<br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:INSert? |
| **Data Pattern** | [:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1]:DATA:PATTern <value><br>[:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1]:DATA:PATTern?<br><br>[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:DATA:PATTern <value><br>[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:DATA:PATTern?<br><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]\|2\|3:DATA[:PATTern]<br>PN9\|PN15\|ZEROs<br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]\|2\|3:DATA[:PATTern]?<br><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:DATA[:PATTern] PN9\|PN15\|ZEROs<br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:DATA[:PATTern]? |
| **Down Long Code** | [:SOURce]:RADio:WCDMa[:BBG]:DLINK:LCODe <value><br>[:SOURce]:RADio:WCDMa[:BBG]:DLINK:LCODe? |
| **DTCH** | [:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:TYPE DTCH<br>[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:TYPE?<br><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:TYPE DTCH<br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:TYPE? |

| Softkey | Corresponding SCPI Commands and Command Queries |
|---|---|
| **DTCH+ACCH** | [:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:TYPE DA<br>[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:TYPE?<br><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:TYPE DA<br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:TYPE?<br><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:TYPE DA<br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:TYPE? |
| **DTX** | [:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:TYPE DTX<br>[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:TYPE?<br><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:TYPE DTX<br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:TYPE? |
| **FACH** | [:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:TYPE FACH<br>[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:TYPE? |
| **Fixed** | [:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1]:SFNumber[:TYPE] FIX<br>[:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1]:SFNumber[:TYPE]? |
| **Increment** | [:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1]:SFNumber[:TYPE] INCR<br>[:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1]:SFNumber[:TYPE]? |
| **Interrupt Trigger** | [:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:INTerrupt:TRIGger |
| **Interrupt Value** | [:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:INTerrupt[:TIMe] <value><br>[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:INTerrupt[:TIMe]? |
| **Link Down Up** | [:SOURce]:RADio:WCDMa[:BBG]:CCHannel DLINK\|ULINK<br>[:SOURce]:RADio:WCDMa[:BBG]:CCHannel? |
| **Long Code** | [:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]\|2\|3:LCODe <value><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]\|2\|3:LCODe?<br><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD:LCODe <value><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD:LCODe? |
| **Multicode Type** | [:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:TYPE DA\|UPCH<br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:TYPE? |
| **Multiplex** | [:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:DATA:INsert MULTiplex<br>[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:DATA:INsert?<br><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:DATA:INsert MULTiplex<br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:DATA:INsert? |
| **Perch1 Off On** | [:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1][:STATe] ON\|OFF\|1\|0<br>[:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1][:STATe]? |
| **Perch2 Off On** | [:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh2[:STATe] ON\|OFF\|1\|0<br>[:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh2[:STATe]? |
| **Phase Polarity Normal Invert** | [:SOURce]:RADio:WCDMa[:BBG]:POLarity[:ALL] NORMal\|INVert<br>[:SOURce]:RADio:WCDMa[:BBG]:POLarity[:ALL]? |
| **Pilot-TPC Value** | [:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD:NPOWer <value><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD:NPOWer? |

| Softkey | Corresponding SCPI Commands and Command Queries |
|---|---|
| **PN9** | [:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:PATTern PN9<br>[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:PATTern?<br><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:PATTern PN9<br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:PATTern?<br><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:PATTern PN9<br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:PATTern? |
| **PN15** | [:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:PATTern PN15<br>[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:PATTern?<br><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:PATTern PN15<br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:PATTern?<br><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:PATTern PN15<br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:PATTern? |
| **Power** | [:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:POWer <value><br>[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:POWer? |
| **RACH** | [:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:TYPE RACH<br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:TYPE? |
| **SDCCH** | [:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:TYPE SDCCH<br>[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:TYPE?<br><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:TYPE SDCCH<br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:TYPE? |
| **SFN Fixed Value** | [:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1]:SFNumber[:TYPE]:FIX <value><br>[:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1]:SFNumber[:TYPE]:FIX? |
| **Short Code** (Channel 1) | [:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:SCODe <value><br>[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:SCODe?<br><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:SCODe <value><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:SCODe? |
| **Short Code** (Channels 2 and 3) | [:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel2\|3:SCODe <value><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel2\|3:SCODe? |
| **Spread** | [:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:DATA:INsert SPREad<br>[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:DATA:INsert?<br><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:DATA:INsert SPREad<br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:DATA:INsert? |

| Softkey | Corresponding SCPI Commands and Command Queries |
|---|---|
| **Symbol Rate** | [:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:SRATe SR32K\|SR64K\|SRV64K\|SR128K\|SR256K<br>[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:SRATe?<br><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:SRATe SR32K\|SR64K\|SRV64K\|SR128K\|SR256K<br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:SRATe?<br><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel2\|3:SRATe SR32K\|SR64K\|SR128K\|SR256K<br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel2\|3:SRATe?<br><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:SRATe SR32K\|SR64K\|SR128K\|SR256K<br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:SRATe? |
| **System Frame No.** | [:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1]:SFNumber[:TYPE] INCR\|FIX<br>[:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1]:SFNumber[:TYPE]? |
| **TFrame** | [:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:TIME:OFFSet:TFRAme <value><br>[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:TIME:OFFSet:TFRAme?<br><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:TIME:OFFSet:TFRAme <value><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:TIME:OFFSet:TFRAme?<br><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:TIME:OFFSet:TFRAme <value><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:TIME:OFFSet:TFRAme? |
| **Transmit Pwr Ctrl** | [:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:UPDOwn <value><br>[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:UPDOwn?<br><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:UPDOwn <value><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:UPDOwn?<br><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:UPDOwn <value><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:UPDOwn? |
| **TSector** | [:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:TIME:OFFSet:TSECtor <value><br>[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:TIME:OFFSet:TSECtor?<br><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:TIME:OFFSet:TSECtor <value><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:TIME:OFFSet:TSECtor?<br><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:TIME:OFFSet:TSECtor <value><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:TIME:OFFSet:TSECtor? |
| **TSlot** | [:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:TIME:OFFSet:TSlot <value><br>[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:TIME:OFFSet:TSlot?<br><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:TIME:OFFSet:TSlot <value><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:TIME:OFFSet:TSlot?<br><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:TIME:OFFSet:TSlot <value><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:TIME:OFFSet:TSlot? |
| **Tx Power Bits** | [:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1]:TXPower <value><br>[:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1]:TXPower? |
| **Ulink I/F Bits** | [:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1]:UPIF <value><br>[:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1]:UPIF? |

| Softkey | Corresponding SCPI Commands and Command Queries |
|---|---|
| **UPCH** | [:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:TYPE UPCH<br>[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:TYPE?<br><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:TYPE UPCH<br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:TYPE?<br><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:TYPE UPCH<br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:TYPE? |
| **Uplink Mode Chan Multicode** | [:SOURce]:RADio:WCDMa[:BBG]:ULINK:MODE CHANnel\|MCOD<br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MODE? |
| **Uplink Power** | [:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel2\|3:POWer <value><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel2\|3:POWer? |
| **Uplink Trig Delay** | [:SOURce]:RADio:WCDMa[:BBG]:ULINK:TRIGger:DELAy <value><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:TRIGger:DELAy? |
| **W Bits** | [:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1]:WBITs <value><br>[:SOURce]:RADio:WCDMa[:BBG]:DLINK:PERCh[1]:WBITs? |
| **W-CDMA Off On** | [:SOURce]:RADio:WCDMa[:BBG][:STATe] ON\|OFF\|1\|0<br>[:SOURce]:RADio:WCDMa[:BBG][:STATe]? |
| **ZEROS** | [:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:PATTern ZEROs<br>[:SOURce]:RADio:WCDMa[:BBG]:DLINK:CHANnel[1]:PATTern?<br><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:PATTern ZEROs<br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:CHANnel[1]:PATTern?<br><br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:PATTern ZEROs<br>[:SOURce]:RADio:WCDMa[:BBG]:ULINK:MCOD[1]:PATTern? |

# Example Program: Creating a Wideband CDMA Waveform

The following example program remotely performs the same tasks as "Front-Panel Operation" on page 3-4.

This program creates a wideband CDMA waveform, modulated at a carrier frequency of 2.17 GHz, at a power level of –10 dBm. The Perch2 channel is disabled, the downlink long code is set to 50, the channel 1 short code is set to 15, and the channel 1 type is set to a Dedicated Traffic Channel. After the setup is complete, the output is activated and the signal is present at the signal generator's RF output.

After executing the program, press **Mode** > **Wideband CDMA** to review the waveform parameters.

```
10  !*************************************************************
20  ! NAME: WCDMA Program
30  !
40  ! DESCRIPTION: The following HPBASIC program remotely performs the same
50  !              tasks as the procedure titled, "Front-Panel Operation" in
60  !              Chapter 3 of this guide. A WCDMA waveform is created and
70  !              and modulated at a carrier frequency of 2.17 GHz, at a -10 dBm
80  !              power level.
90  !
100 ! CLEAR and RESET the controller, input the following commands and RUN the
110 ! program.
120 !
130 !*************************************************************
140 !
150 Sig_gen=719
160 LOCAL Sig_gen
170 CLEAR Sig_gen
180 CLEAR SCREEN
190 OUTPUT Sig_gen;"*RST"
200 OUTPUT Sig_gen;"*CLS"
210 !************************************
220 OUTPUT Sig_gen;"FREQ 2.17 GHZ"
230 OUTPUT Sig_gen;"POW -10 DBM"
240 OUTPUT Sig_gen;"SOUR:RAD:WCDM:BBG:DLINK:PERC2 OFF"
250 OUTPUT Sig_gen;"SOUR:RAD:WCDM:BBG:DLINK:LCOD 50"
260 OUTPUT Sig_gen;"SOUR:RAD:WCDM:BBG:DLINK:CHAN1:SCOD 15"
270 OUTPUT Sig_gen;"SOUR:RAD:WCDM:BBG:DLINK:CHAN1:TYPE DTCH"
280 OUTPUT Sig_gen;"SOUR:RAD:WCDM:BBG:STAT ON"
290 !************************************
300 OUTPUT Sig_gen;"OUTP ON"
310 !************************************
320 LOCAL Sig_gen
330 WAIT 5
340 PRINT
350 PRINT "... the signal generator waveform setup is now complete. Press [Mode],"
360 PRINT "[Wideband CDMA] to review the waveform parameters."
370 END
```

## Program Comments

| | |
|---|---|
| 10 to 140: | Title and program description |
| 150: | Assigns the signal generator's GPIB address to a variable. |
| 160 to 180: | Sets the signal generator to LOCAL mode, and clear the controller's display. |
| 190: | Sets the signal generator to a defined state for programming. |
| 200: | Clears the signal generator's Status Byte Register. |
| 210: | Program border |
| 220: | Sets the carrier frequency to 2.17 GHz. |
| 230: | Sets the carrier power level to −10 dBm. |
| 240: | Turns off Perch2 channel. |
| 250: | Selects 50 as the downlink long code. |
| 260: | Selects 15 as the downlink channel 1 short code. |
| 270: | Selects a Dedicated Traffic Channel as the downlink channel 1 channel type. |
| 280: | Activates the wideband CDMA mode. |
| 290: | Program border |
| 300: | Turns on the signal generator's RF output. |
| 310: | Program border |
| 320: | Returns the signal generator to LOCAL mode. |
| 330: | Waits five seconds. |
| 340 to 360: | Prints a message to the controller's display. |
| 370: | Ends the program. |

# 6 Service

The Option H98 can be serviced using the calibration guide that is part of the standard ESG Family manual set, and the optional service guide. This chapter provides supporting documentation for servicing only the assemblies unique to Option H98 (the A7 Baseband Generator Board and the A8 Data Generator Board). For information on servicing other assemblies, refer to the calibration guide, and the optional service guide.

# Replaceable Parts

For Option H98, the following parts change from the standard instrument:

- A7 Baseband Generator Board part number changes to E4400-60070.
- A8 Data Generator Board part number changes to E4400-60154.

# Post Repair Procedures

**NOTE** If an assembly other than the A7 Baseband Generator Board or the A8 Data Generator Board is repaired or replaced, refer to the *ESG Family Signal Generators Service Guide* for the adjustments and performance tests required for that assembly.

## Adjustments

If the A7 Baseband Generator Board is repaired or replaced, perform the I/Q Gain/Offset Quadrature adjustment.

No adjustments are required after the A8 Data Generator Board is repaired or replaced.

## Performance Tests

**NOTE** Refer to the *ESG Family Signal Generators Calibration Guide* for information on using the service software.

### Option H98 Only

If either the A7 Baseband Generator Board *or* the A8 Data Generator Board is repaired or replaced, the following three automated performance tests are required:

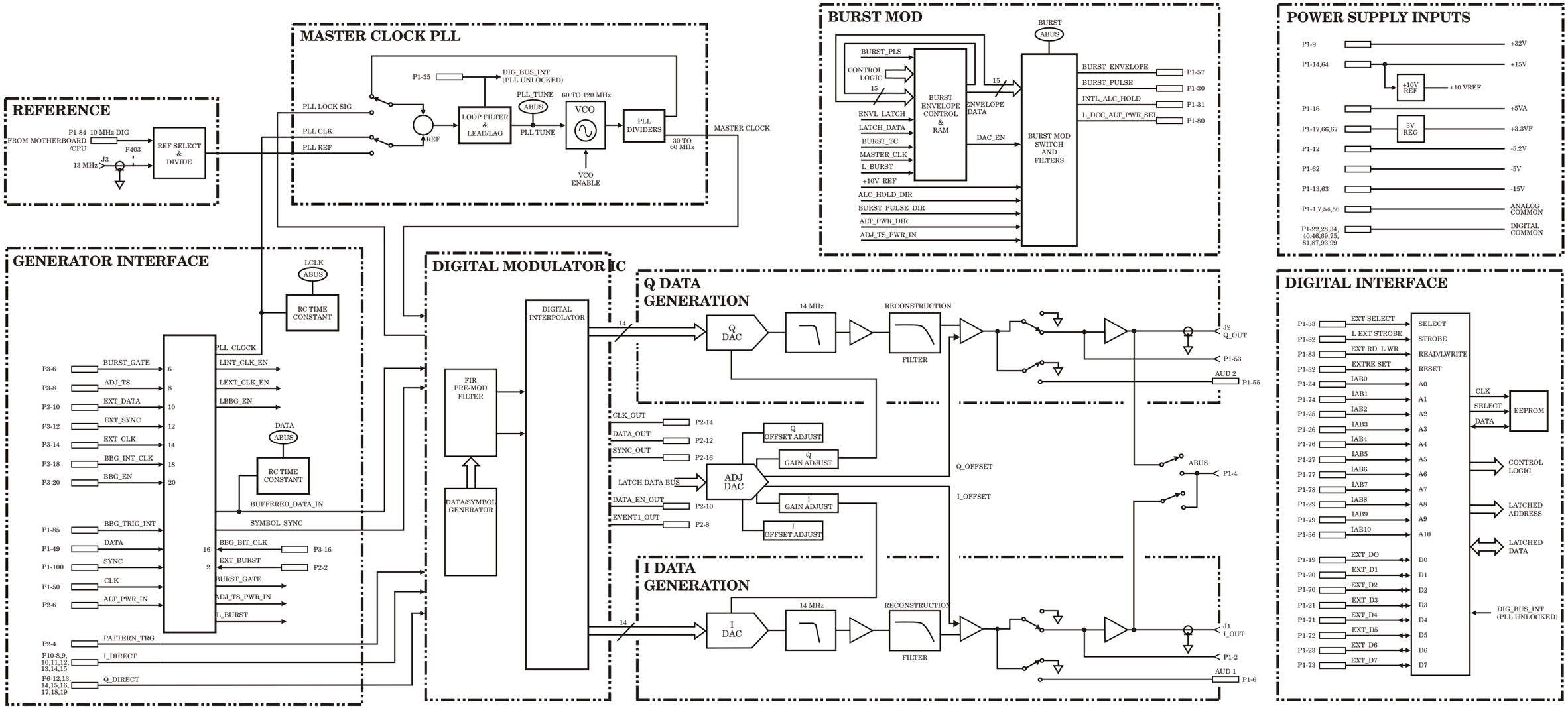
- Nonharmonics
- Digital Mod: Internal I/Q Quality
- Relative Power Level Accuracy

### With Option H99

If the instrument also has Option H99, and the A7 Baseband Generator Board is repaired or replaced, perform the following *additional* automated performance test, located in the *ESG-D Series Option H99 Signal Generators Manual Supplement*:

- WCDMA ACP (H99)

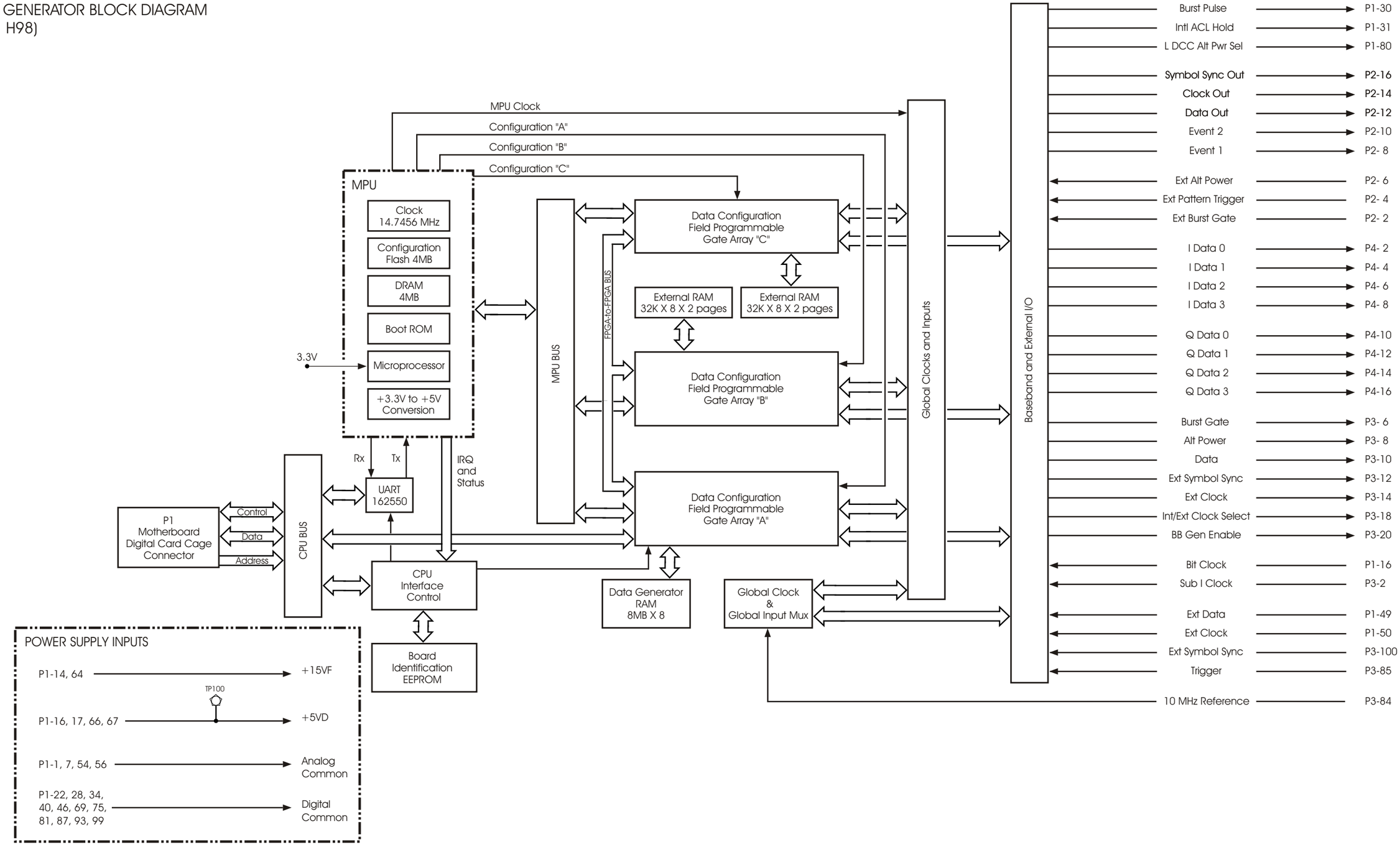
# A7 DBMIC BASEBAND GENERATOR BLOCK DIAGRAM (OPTION H98)






A7 DBMIC BASEBAND GENERATOR BLOCK DIAGRAM (OPTION H98)

# A8 DATA GENERATOR BLOCK DIAGRAM (OPTION H98)




hk79b

A8 DATA GENERATOR BLOCK DIAGRAM (OPTION H98)

# Glossary

**ACCH** Associated Control Channel.

**Access Channel** A reverse channel that a mobile station uses to communicate with a base station for short signaling message exchanges (such as call originations, responses to pages, and registrations).

**ACPR** Adjacent Channel Power Ratio.

**Base Station** A fixed station used for communicating with mobile stations.

**bps** Bits per second.

**Chip** Informal term used to refer to either a binary element of a spreading sequence, or the time interval that it occupies, or 1/1.4.096 MHz = 244.1 ns, or, at the speed of light, a distance of c/f = (0.3 m/ns)/1.2288 MHz = 244.1 meters.

**Code Division Multiple Access (CDMA)** A technique for spread-spectrum multiple access digital communication that creates channels through the use of noise-like carriers.

**Convolutional Code** An error-correcting code that is generated by finite-field division of the data sequence, regarded as a polynomial over a finite field, by a generator polynomial. Such a division resembles a discrete convolution.

**CRC** *See "Cyclic Redundancy Code (CRC)"*

**Cyclic Redundancy Code (CRC)** A class of linear error-detecting codes that generate parity check bits as the remainder of a polynomial division of the data, regarded as a polynomial, by a generator polynomial.

**Data Insert** The point of data insertion for WCDMA coding.

**Data Pattern** The type of data encoded on a WCDMA channel.

**DTCH** Dedicated Traffic Channel. A point-to-point, bidirectional channel that transmits user information.

**DTX** Discontinuous Transmission.

**Encoder Tail Bits** Fixed value bits appended to a block of data in order to flush a convolutional encoder so that it is left in a known state. Leaving the encoder in a known state aids the decoding.

**EVM** Error Vector Magnitude.

**FACH** Forward Access Channel. A forward link transport channel used to transmit control information from a base station to a mobile station when the system knows the location cell of the mobile station. May also carry short user packets.

**Forward Channel** A channel transmitted from a base station to mobile stations. The Forward Channel comprises one or more code channels that are transmitted on a WCDMA frequency assignment using a particular long code.

**Interleaving** The process of reordering code symbols for transmission. Interleaving decorrelates channel fading between adjacent symbols as they enter the decoder, thereby improving the effectiveness of the code.

**Interrupt Time** The duration of time during which the data channel is suppressed.

**ksps** Kilosymbols per second ($10^3$ symbols per second).

**Long Code** A maximal length sequence with period $2^{41}$–1. A unique phase of the long code identifies each mobile station.

**Perch** Wideband CDMA forward link channel used to establish synchronization with mobile units.

**PN Sequence** Pseudorandom sequence. A periodic binary sequence approximating, in some sense, a Bernoulli (coin tossing) process with outcomes that are equally probable.

**Reverse Channel** The channel from a mobile station to a base station. From the base station's perspective, the Reverse Channel is the sum of all mobile station transmissions on a frequency assignment.

**SDCCH** Stand-Alone Dedicated Control Channel.

**SFN** System Frame Number.

**SFN RST** System Frame Number Reset. For more information, see "12. PATTERN TRIG IN Connector (System Frame Number Reset In)" on page 3-13.

**Short Code** Channelization code for a WCDMA channel. One of a set of orthogonal waveforms used as orthogonal cover to create independent transmission channels.

**TPC** Transmission Power Control. For more information, see "17. EVENT 2 Connector (Transmission Power Control Out)" on page 3-15.

**UPCH** User Packet Channel.

**WCDMA** Wideband Code Division Multiple Access. A technique for spread-spectrum multiple access digital communication that creates channels through the use of noise-like carriers.

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