Setting SDH Transmit Parameters

This section describes how to set the transmit rate, specify the AU under test, set the payload mapping and content, and set the overhead bytes for SDH signals.

The CTS850 SDH/PDH Test Set contains independent transmitter and receiver modules. One set of parameters controls the transmitter module and another set controls the receiver module. You can set the parameters that control the transmitter independently or you can choose to link the parameters to the receiver settings.

Tek Measurements Stopped	↔ STM-1E STM-1E		
TRANSMIT	CHOICES		
Transmit Rate STM-1 Electrical Transmit Clock Internal	STM-4		
SDH Structure AU-4 Bulk	STM-1		
Payload Structure	STM-0		
	140 Mb/s		
Tx/Rx Setup Independent	-more- 1 of 2		
TRANSMIT 54K TX DEFECTS & POINTEIRS JITTERS APS SETTINGS SETTINGS ANOMALIES & TIMING WANDER COMMANDS 1012			

Figure 3 26: Transmit Settings Menu

CTS850 SDH/PDH Test Set User Manual

Steps for Setting Parameters

The sequence of steps for setting transmit parameters varies with the type of signal to be transmitted. The figures that follow show the sequence of steps required to set the transmit parameters of an SDH signal without a mapped PDH signal and an SDH signal with a mapped PDH signal. See the next section for details on setting PDH signal parameters (for example 2 Mb/s).



Figure 3 27: Sequence for Setting SDH Signal Parameters



Figure 3 28: Sequence for Setting SDH Signal Parameters When Mapping a PDH Signal

Setting the Transmit Rate

To set the transmit rate:

Press Menu	Select Menu	Highlight	Select Choice
Button	Page	Parameter	
TRANSMIT	TRANSMIT SETTINGS	Transmit Rate (see Figure 3 29 on page 3 74)	as appropriate

3 72

- H Select **STM-1E or 0E**, **STM-1**, **STM-4**, **STM-0E**, or **STM-0** to transmit an SDH signal.
- H Select **2 Mb/s**, **34 Mb/s**, **140Mb/s** to transmit a PDH signal. See the next section for details on setting PDH signal parameters.
- H If your CTS 850 test set supports the **45 Mb/s** option, there is also a 45 Mb/s signal available for selection.

NOTE. Even though there are output connectors for both SDH and PDH signals on the CTS850 front panel, the CTS850 can transmit only one type of signal at a time.

Independent Transmit and Receive Settings

Generally, you can set the transmit and receive settings independently. For example, you can receive an electrical signal at the STM-1E or 0E rate while simultaneously transmitting an optical signal at the STM-4 rate.

Coupling Transmit and Receive Settings

If your application requires that the transmit settings and receive settings be identical, you can save time by coupling them together. After they are coupled, any change you make to a parameter on the TRANSMIT SETTINGS page will also be made to the corresponding setting in the RECEIVE SETTINGS page of the RECEIVE menu. The inverse is also true.

CTS850 SDH/PDH Test Set User Manual

	Available SD transmit rate	θH es
Tek Measurements Stopped	٨	↔ STM-1E ← STM-1E
Transmit Rate Transmit Clock Transmit Level SDH Structure Payload Structure Test Pattern	STM-1 Electrical Internal 0 dB AU-4 Bulk Bulk (Test Signal 0.181) PRBS 2A23-1 Normal	STM-4 STM-1 STM-0 140 Mb/s
Tx/Rx Setup	Independent	-more- 1 of 2
TRANSMIT 54k FX DEFECTS & SETTINGS FETTINGS ANOMAL 5	x POINTERS JITTER & A S & TIMING WANDES COMM	S (more)

Figure 3 29: SDH Transmit Rates

To couple the transmit and receive settings together from the TRANSMIT SETTINGS page:

Press Menu	Select Menu	Highlight	Select Choice
Button	Page	Parameter	
TRANSMIT	TRANSMIT SETTINGS	Tx/Rx Setup	Coupled

NOTE. When settings are coupled from the TRANSMIT SETTINGS page, the receive parameters are changed to match the transmit parameters. Conversely, when settings are coupled from the RECEIVE SETTINGS page, the transmit parameters are changed to match the receive parameters.

Notice that the signal status icons, in the upper-right corner of the display, changed to reflect the coupling of the settings.

CTS850 SDH/PDH Test Set User Manual

To change transmit and receive settings so that they are no longer coupled:

Press Menu	Select Menu	Highlight	Select Choice
Button	Page	Parameter	
TRANSMIT	TRANSMIT SETTINGS	Tx/Rx Setup	Independent

Notice that the signal status icons, in the upper-right corner of the display, changed to indicate that the settings are no longer coupled.

Through Mode

Use Through Mode to monitor a signal without changing it. In Through Mode, the rate and content of the transmitted signal is that of the received signal. You cannot make changes to pointers or timing, overhead bytes, or insert alarms or errors when the CTS850 is in Through Mode. Through Mode does not perform clock recovery before retransmitting the recovered signal. Through Mode is used for nonintrusive performance monitoring of the active signal.

To put the CTS850 into Through Mode:

Press Menu	Select Menu	Highlight	Select Choice
Button	Page	Parameter	
TRANSMIT	TRANSMIT SETTINGS	Tx/Rx Setup	Through Mode

To indicate when the CTS850 is in Through Mode, the transmit and receive icons at the upper-right corner of the display have an arrow linking them together and the parameters on the TRANSMIT SETTINGS page are replaced by a message stating that the CTS850 is in Through Mode (see Figure 3 30).

CTS850 SDH/PDH Test Set User Manual

To take the CTS850 out of Through Mode:

Press Menu	Select Menu	Highlight	Select Choice
Button	Page	Parameter	
TRANSMIT	TRANSMIT SETTINGS	Tx/Rx Setup	Independent

Throu	ugh Mode icon
Tek Measurements Stopped	o Sig
	CHOICES Independ – ent
The test set is in Through Mode.	
The transmitted signal is identical to the received signal. Transmitter changes will have no effect	Coupled
in this mode.	Through Mode
Tx/Rx Settings Through Mode	
TRANSMIT 34K.TX DEFECT: # POINTERS JITTER# SETTINGS SETTING ANOMAL 25 # TIMING WANDER	more 1 of 2

Figure 3 30: CTS850 in Through Mode

Setting the Transmit Clock

To specify the transmit clock:

Press Menu Button	Select Menu Page	Highlight Parameter	Select Choice
TRANSMIT	TRANSMIT SETTINGS	Transmit Clock	Internal
			Recovered
			External 2 Mb/s 2 MHz
			External 1.5 Mb/s BITS

- H Select **Internal** to set the transmit clock to the internal clock.
- H Select **Recovered** to use the clock recovered from an incoming signal.
- H Select External 2 Mb/s 2 MHz to use the clock signal from an external clock input (2 Mb/s or 2 MHz) data timing reference. Attach an external 2 Mb/s or 2 MHz reference to the External Clock Input connector on the rear panel.
- H Select **External 1.5 Mb/s BITS** to use the clock signal from an external 1.5 Mb/s BITS reference.

CTS850 SDH/PDH Test Set User Manual

Setting the Line Clock Offset

Line Clock offset is used for setting PDH Transmit Parameters. Range is ± 100 ppm.

Press Menu Button	Select Menu Page	Highlight Parameter	Select Choice
TRANSMIT	Transmit Settings	Line Clock Offset	Max: +100 ppm
			Stress: +20 ppm
			Stress 20ppm
			Default 0 ppm
			User Defined

Setting the value through the front panel knob will change to support setting the full valid range.

Setting the Transmit Level

Transmit Level is an option for STM 1E and STM 0E. Transmit Level will not be displayed for other rates.

Press Menu Button	Select Menu Page	Highlight Parameter	Select Choice
TRANSMIT	TRANSMIT SETTINGS	Transmit Level	0 dB
			6dB

H Select **0 dB** to set the line level to high.

H Select **6 dB** to set the line level to the cross-connect level.

CTS850 SDH/PDH Test Set User Manual

Specifying the AU to Test

AU under test is only displayed when the input rate is STM $\,4$ and the signal structure is 1 x AU $\,4$. To designate which AU to test:

Press Menu	Select Menu	Highlight	Select Choice
Button	Page	Parameter	
TRANSMIT	TRANSMIT SETTINGS	AU Under Test	1, 2, 3, 4

CTS850 SDH/PDH Test Set User Manual

Setting the SDH Structure

This selection sets the structure of the AU under Test (SDH input rates only). The VC4 $\,$ 4c choice requires a Transmit Rate of STM $\,$ 4.

Press Menu Button	Select Menu Page	Highlight Parameter	Select Choice
TRANSMIT	Transmit Settings	Structure STM 4	VC4 4cBulk AU 4Bulk AU 4140 Mb/s TU 3Async TU 12Async
		STM 1	AU 4Bulk AU 4140 Mb/s TU 3Async TU 12Async
		STM 0	AU 3 Bulk

Tek Measurements Stopped	🕞 STM-1 🕞 No Sig
TRANSMIT	CHOICES
Transmit Clock Internal	TUG-3:1
SDH Structure IU-12 Floating Async TU Under Test TUG-3:1	TUG 3:2
TU Background Fill Idle (11010101) Payload Structure	TUG-3:3
	All TU-12s
Tx/Rx Setup Independent	
TRANSMIT 54K TX DEFECTE & POINTERS JITTEN & SETTINGS ANOMALIES & TIMING WANDER	(more 1 of 2

Figure 3 31: Chosing TU Under Test from SDH Structure

Tek Measurements Stopped	[€]STM-4 STM-4
	CHOICES
Transmit Rate STM 4 Optical Transmit Clock Internal	VC4-4c
SDH Structure VC4-4c	AU-4 Bulk
Payload Structure	AU-4 140 Mb/s
Test Pattern PRBS 2023 – E. Normai	TU3 Async 34 Mb/s
Tx/Rx Setup Coupled	TU12 Async 2 Mb/s
TRANSMIT 54K IX DEFECTS & POINTERS JITTER & SETTINGS SETTING ANOMAL 25 & TIVING WANDES	more 1 of 2

Figure 3 32: Chosing VC 4c from SDH Structure

CTS850 SDH/PDH Test Set User Manual

TU Under Test

When STM 1 is chosen as the Transmit Rate, and TU 12 or TU 3 chosen as the Structure, the TU under test selection permits the choice of the following (Selections are mutually exclusive): exclusive.

TU 12:	TUG3: TUG3:1, TUG3:2, TUG3:3
	TUG2: 1,2,3,4,5,6,7
	TU 12:1,2,3
TU 3:	TU 3:1,2,3
	TU3:1, TU3:2, TU3:3

Setting the TU Background Fill

When STM 1 is chosen at the Transmit Rate, and TU 12 or TU 3 chosen as the SDH Structure, the TU Background Fill permits the user to select the pattern inserted into the inactive TU 12s. Supported values for TU 12 are PRBS 2^15 1 or IDLE. TU 3 background channels are always filled with the idle pattern.

Setting the SDH Ouput

SDH Output permits the test set to transmit a valid, bulk filled SDH signal when the primary test signal is PDH. The SDH output will be displayed whenever the Transmit Rate is 140 Mb/s or less. Output rate selections are STM 4, STM 1, STM 0 and Disabled. Output type is Optical or Electrical (Electrical is not available for STM 4).

Tek Measurements Stopped	➡]140 Mb/ ➡]140 Mb/
	CHOICES
Transmit Rate 140 Mb/s Transmit Clock Internal	Disabled
Line Clock Offset 0.0ppm SDH Output Disabled	STM-1
Payload Structure 2 Mb/s PCM30 CAS/CRC	STM-1
1 est Pattern PRBS 2A23 - 1 Normal 34Mb/s Active Channel 1 Background 2A15 - 1 8Mb/s Active Channel I Background 2A15 - 1	STM-0
2Mb/s Active Channel 1 Background 2A15-1 Tx/Rx Setup Coupled	
TRANSMIT 844 TX DEFECT: # POINTERS JITTER.# SETTINGS SETTING WANDER	(more 1 of 2

Figure 3 33: Choosing SDH Output

CTS850 SDH/PDH Test Set User Manual

Setting the Payload Structure

Payload sets the signal generation base rate. Because of the number of selections available, the rate and framing parameters have been split. If the payload rate is not the same as the mapping (SDH) or transmit (PDH) rate, then multiplexing is implied.

Table 3	7:TX Rates and Structures	

TX Rate	TX Structure	Multiplexing combinations
STM 4 STM 1	VC4 4c (only for STM 4) AU 4 TU 12 TU 3 140 Mb/s	Bulkfill (Equipped or Unequipped only) 2Mb/s, 64k 34Mb/s, 8Mb/s, 2Mb/s, 64k 140, 34, 8, 2 Mb/s, 64k
STM 0	AU 3	Bulk Equipped & Unequipped
140 Mb/s	Not Applicable	34Mb/s, 8Mb/s, 2Mb/s, 64k
34 Mb/s 45 Mb/s	Not Applicable	34 Mb/s, 8Mb/s, 2 Mb/s, 64k
2 Mb/s	Not Applicable	2Mb/s, 64k

Bulk fill of a TU 12, TU 3 or VC4 4c is not supported. To set the payload:

Press Menu	Select Menu	Highlight	Select Choice
Button	Page	Parameter	
TRANSMIT	TRANSMIT SETTINGS	Payload	As appropriate

CTS850 SDH/PDH Test Set User Manual

 Table 3
 8: Payload Framing/ Source

Payload	Allowable choices
140 Mb/s	Framed, Unframed, External Add
34 Mb/s	Framed, Unframed, External Add
45 Mb/s	C Bit, M13, Unframed
8 Mb/s	Framed, Unframed
2 MB/s	Unframed, External Add Balanced, External Add Unbalanced, PCM 30 CAS/CRC, PCM31 CRC, PCM 30 CAS, PCM 31
64k	PCM 30 CAS/CRC, PCM31 CRC, PCM 30 CAS, PCM 31

When 64k is the payload, framing can also be set from the 64k Tx SETTING menu.

Setting the Test Pattern

Test pattern is selectable when the TX payload is not an externally added signal.

Table 3 9: Test Patterns, Background Patterns

Test Patterns	Applicable choices
PRBS 2^9 1	STM 4;STM 1;STM 0;140Mb/s; 34 Mb/s; 8Mb/s; 2 Mb/s; 64k. Test Patterns: Normal (ITU); Inverted (Non ITU)
PRBS 2^11 1	140Mb/s; 34 Mb/s; 8Mb/s; 2 Mb/s; 64k. Test Patterns: Normal (ITU); Inverted (Non ITU)
PRBS 2^15 1	STM 4; STM 1; STM 0; 140Mb/s; 34 Mb/s; 8Mb/s; 2 Mb/s; 64k. Test Patterns: Normal (ITU); Inverted (Non ITU)
PRBS 2^20 1	STM 4; STM 1; STM 0; 140Mb/s; 34 Mb/s; 8Mb/s 2 Mb/s; 64k, Test Patterns: Normal (ITU); Inverted (Non ITU)

CTS850 SDH/PDH Test Set User Manual

Test Patterns	Applicable choices
PRBS 2^23 1	STM 4; STM 1; STM 0; 140Mb/s; 34 Mb/s; 8Mb/s; 2 Mb/s; 64k, Test Patterns: Normal (ITU); Inverted (Non ITU)
All Ones	STM 4; STM 1; STM 0; 140Mb/s; 34 Mb/s; 8Mb/s; 2 Mb/s; 64k
All Zeros	STM 4; STM 1; STM 0; 140Mb/s; 34 Mb/s; 8Mb/s; 2 Mb/s; 64k
10101010	140Mb/s; 34 Mb/s; 8Mb/s; 2 Mb/s; 64k
1 in 8	140Mb/s; 34 Mb/s; 8Mb/s; 2 Mb/s
8 bitfixed	STM 4; STM 1; STM 0; 140Mb/s; 34 Mb/s; 8Mb/s; 2 Mb/s
16 bitfixed	140Mb/s; 34 Mb/s; 8Mb/s; 2 Mb/s
24 bitfixed	140Mb/s; 34 Mb/s; 8Mb/s; 2 Mb/s
TS Idle	64k
1020 Hz 0 dBm	64k
Background Patter	ns
PRBS 2^23 1	34Mb/s; 8Mb/s
PRBS 2^20 1	34Mb/s; 8Mb/s
PRBS 2^15 1	34Mb/s; 8Mb/s; 2 Mb/s
All Ones	34Mb/s; 8Mb/s; 2 Mb/s
All Zeros	34Mb/s; 8Mb/s; 2 Mb/s
10101010	34Mb/s; 8Mb/s; 2 Mb/s

 Table 3
 9: Test Patterns, Background Patterns (Cont.)

CTS850 SDH/PDH Test Set User Manual

Selecting the Tx/Rx Setup

Tx/Rx Setup permits the operator to couple Transmit and Receive settings, or select Through Mode. When coupled mode is selected, from the Transmit Setting menu, applicable Transmit Settings are copied to the Receive side of the tester.

Mapping a PDH Signal

To map a tributary signal, you first set the SDH Structure to the appropriate PDH mapping (as described in the previous section). When mapping a signal, you must also specify the payload. The payload can be either an external signal connected to the appropriate IN connector on the front panel or an internally generated signal.

When you use the TU12 Floating Async or TU3 Floating Async mapping, you must also specify the tributary unit under test and payload (see next Figure).

Tek Measurements Stopped	[STM-1E
TRANSMIT		
Transmit Rate ST Transmit Clock In	FM 1 Electrical Iternal	VC4-4c Bulk
Transmit Level 0 SDH Structure T TU Under Test TU	dB U –12 Floating Async UG–3:1 TUG–2:1 TU–12:1	AU-4 Bulk
TU Background Fill Id Payload Structure	lle (11010101) Mb/s Unframed	AU-4 140 Mb/s
Test Pattern Pr	KB5 ZAZ3 - E NOTITAL	TU-3 Async 34 or 45 Mb/s
Tx/Rx Setup Co	oupled	TU-12 Async 2 Mb/s
SETTINGS SETTINGS ANOMAL ES	POINTERS JITTER & APS & TIMING WANDER COMMAND:	

Figure 3 34: Mapping a Tributary Signal

CTS850 SDH/PDH Test Set User Manual

To configure the CTS850 for mapping a signal:

1. Set the Structure as follows:

Press Menu Button	Select Menu Page	Highlight Parameter	Select Choice
TRANSMIT	TRANSMIT SETTINGS	Structure	TU12 Async
			TU3 Async
			140 Mb/s

- H Select **TU12 Async** to map an externally supplied or internally generated 2 Mb/s or 64k signal to the transmitted signal.
- H Select **TU3 Async** to map an externally supplied or internally generated 34 Mb/s, 45 Mb/s, 8 Mb/s, 2 Mb/s or 64k signal to the transmitted signal.
- H Select **140 Mb/s** to map an externally supplied or internally generated 140Mb/s, 34 Mb/s, 45 Mb/s, 8 Mb/s, 2 Mb/s, or 64k signal to the transmitted signal.
- **2.** If the Structure is set to TU-12, specify the TU Under Test by first specifying the Tributary Unit Group (TUG) as follows:

Press Menu Select Menu Button Page		Highlight Parameter	Select Choice
		TU Under Test (TUG3 #n)	TUG3 #1
			TUG3 #2
			TUG3 #3
			All TU12s

3. If TU12 Async is the selected Structure, specify the Tributary Unit (TU) as follows:

Press Menu	Select Menu	Highlight	Select Choice	
Button	Page	Parameter		
		TU Under Test (TU12 #n)	as appropriate	

4. If TU3 Async is the selected Structure, specify the Tributary Unit (TU) as follows:

Press Menu Button	Select Menu Page	Highlight Parameter	Select Choice
		TU3	TU3 #1
			TU3 #2
			TU3 #3
			All TU 3

- H Select TU3 #1, TU3 #2, or TU3 #3 to specify the TU Under Test.
- **5.** Specify the payload as follows:

Press Menu	Select Menu	Highlight	Select Choice
Button	Page	Parameter	
		Payload	as appropriate

NOTE. The choices available for Payload depend on the selected *Structure.*

CTS850 SDH/PDH Test Set User Manual

Setting the Test Pattern (User selectable)

You can select a test pattern to transmit in the TU.

To specify the test pattern to transmit (the choices available for Test Pattern depend on the selected Structure):

Press Menu	Select Menu	Highlight	Select Choice
Button	Page	Parameter	
TRANSMIT	TRANSMIT SETTINGS	Test Pattern	as appropriate

- H Select **1 in 8** to set the test pattern to 10000000.
- H For PDH Payloads only, select User Word 8 bit, User Word 16 bit, or User Word 24 bit to set a test pattern different from the preset choices. If you choose User Word, the test pattern description changes to display the byte selected.

If you select User Word 8 bit/16 bit/24 bit for the test pattern, set the value of the User Word as follows:

1. Set the contents of the User Word Byte(s) as follows (see Figure 3 35):

Press Menu Button	Select Menu Page	Highlight Parameter	Select Choice
		Test Pattern	Set to 00000000
			Set to 11111111
			Default 10101010
			EDIT BYTE/ Edit XX bits

- **2.** Select **EDIT BYTE/Edit XX bits** to specify a value different from the preset choices.
- 3. Select **DONE** when you are finished editing the pattern.

Tek Measurements Stopped	() → 2 Mb () → 2 Mb
TRANSMIT	CHOICES
Transmit Rate 2 Mb/s Transmit Clock Internal	AMI (Bal) Set to 00000000
Line Clock Offset 0.0ppm	Set to
Payload	Default nframed 10101010
	Edit 24 bits
Tx/Rx Setup Independent	Predefined Patterns
TRANSMIT 54K IX PATH SECTION A SETTINGS SETTINGS OVERHEAD OVERHEAD COMM	WS (more 2)

Figure 3 35: Editing the User Word Byte

Setting Overhead Bytes

To stress test a network, you sometimes need to simulate errors or alarms. Use the controls on the Defects & Anomalies page of the TRANSMIT menu to simulate errors or alarms. As an alternative, you can edit the transport overhead and path overhead bytes directly to simulate errors, alarms, and create other stress conditions. This section describes how to use the SECTION OVERHEAD and PATH OVERHEAD pages to edit overhead bytes.

How to Edit an Overhead Byte

The following procedure applies to editing either section overhead or path overhead bytes. However, when editing path overhead bytes, you must specify which overhead you want to edit (VC4, VC3, or VC12) before you can edit the overhead bytes.

CTS850 SDH/PDH Test Set User Manual

To edit overhead bytes:

1. Display the section overhead as follows, then select the columns you wish to edit. Press MORE 2 of 2 to see the Section Overhead Page choice.

Press Menu	Select Menu	Highlight	Select Choice
Button	Page	Parameter	
TRANSMIT	Section Overhead	Showing Overhead for	as appropriate

2. Turn the knob to highlight the byte you want to edit. See Figure 3 36.

When editing the S1 byte (shown in next figure), entering the following bits will result in the corresponding label in the line on the Section Overhead menu called Sync. Status Message (shown in next figure). This message line, showing the assignment of bit patterns, appears in both the **Transmit menu** and, and the **Receive menu** under the **Section Overhead** tab.

S1 bits b5 b8 Sync. Status Message

0000	Our liter United and
0000	Quality Unknown
0001	Reserved
0010	G.811 PRC
0011	Reserved
0100	G.812 transit
0101	Reserved
0110	Reserved
0111	Reserved
1000	G.812 local
1001	Reserved
1010	Reserved
1011	G.813 SETS
	(Synchronous Equipment Timing Source)
1100	Reserved
1101	Reserved
1110	Reserved
1111	Do not use

3 92

	Tek Measurements Stopped	[⊖]STM-1	
	TRANSMIT		
	Transmitting STM 1 AU 4 # 1 under test Showing Overhead for AU -4 #1 cols 1,4,7	Reset Overhead	
Bytes you can	External Add None J0 RS Trace TEK CTS850 S1 Sync. Status Message G.812 Transit	Set to 10101010	Connet edit
	Column 1 Column 4 Column 7 A1 11110110 42: 00101000 J0: USER B1: ********* E1: 000000000 F1: 000000000	Set to	because alarm is set
	D*: 00000000 D2: 00000000 D3: 00000000 H*: ******* H2: ******* H3: ******* B2: ******** H2: ******** H3: ******** B2: ******** H3: ******** H3: ******** B2: ******** H3: ********* H3: ********* D3: 00000000 D5: 00000000 D5: 00000000 D4: 000000000 D5: 000000000 D6: 000000000	Default 00000000	
S1 byte selected to	D7: 00000000 D8: 00000000 D9: 00000000 D*0 00000000 D11: 00000000 D12: 00000000 F S1: 00000100 D11: 00000000 E2: 00000000	EDIT BYTE	
edit	TRANSMIT 54K TX PATH SECTION AP OVERHEAD COMMANDS TFO	U more 2 of 2	

Figure 3 36: Editing the S1 Section Overhead Byte

There are several ways to edit the byte:

- H Select Reset Overhead to set all bytes in the overhead to their individual default values. However, Reset Overhead does not remove simulated error conditions that have been set using controls in the Defects & Anomalies page.
 A simulated error condition overrides the default value of the overhead byte that signals that particular error condition.
- H Select **Default (XXXXXXX)** to set the selected byte to its default value. The specific default value depends on the selected byte and on the rate and structure of the signal.
- **H** Select **EDIT BYTE** to define the byte as a value different from the preset choices.
- **3.** To edit the selected byte to a value of your choice:

Press Menu	Select Menu	Highlight	Select Choice
Button	Page	Parameter	
			EDIT BYTE

CTS850 SDH/PDH Test Set User Manual

- H Define your own byte with the buttons next to **1** and **0**. Use the left and right arrow buttons to move the cursor from one bit to the next. See Figure 3 37.
- H When you finish editing the byte, select **DONE**.

Tek M	Measurement	s Stop	ped					↔ STM-1E
- TR	ANSMIT							STM-TE
Transmitting STM-1E with AU-4 # 1 under test Showing Overhead for AU-4 #1 cols 1,4,7 External Add								
r arei	nai Add			ione				0
A1: 61: D1:	11110110	A2: E1: D2:	001(000(01000	C1: F1: D3:	000000001 000000000		\Box
H1: 62: D4:	********	H2: K1: D5:	**** 0000 0000		H3: K2 D6:	000000000 0000000000000000000000000000		
D7: D10: S1:	00000000 00000000 000 0 0000	D8: D11:	0000 0000 0000		D9: D12: E2:	000000000000000000000000000000000000000		
TRANS		POIN	ITERS	JITTER	3	APS SECT	ION	PATH
SETTIE	10s J	, ® TI	MING ,	WANDE	E CON	IMANDS OVER	HEAD	OVERHEAD

Figure 3 37: Editing an Overhead Byte

Editing the VC4, VC3, and VC12 Overhead Bytes

To edit the VC4, VC3 or VC12 overhead bytes:

Press Menu Button	Select Menu Page	Highlight Parameter	Select Choice
RECEIVE	PATH OVERHEAD	Overhead View	VC4 Overhead
			VC3 Overhead
			VC12 Overhead

NOTE. The choices available depend on the signal Structure.

If the signal Structure is set to TU-12, you can edit the V5, N2, and K4 bytes after displaying the VC12 Overhead. The J2 trace byte is fixed and cannot be edited. Note that only bits 5, 6, and 7 (the signal label bits) of the V5 byte are editable. See Table 3 10.

Choice
Unequip (000)
Equipped (001)
Async (010)
Bit Sync (011)
Byte Sync (100)
Reserved (101)
TSS4 (110)
VC AIS

Table 3 10: Choices for Bits 5, 6, and 7 of the V5 Byte

Bytes You Cannot Edit

Certain bytes in the section overhead and path overhead cannot be edited in the SECTION OVERHEAD or PATH OVERHEAD pages. These uneditable bytes have calculated values that are based on the payload and signal structure (see Table 3 11).

Table 3 11: Overhead Bytes That Cannot Be Edited

Overhead Byte	Function
B1	Section level parity byte
B2	MS level parity byte
B3	Path level parity byte
G1	Path status

CTS850 SDH/PDH Test Set User Manual

Overhead Byte	Function	
H1, H2, H3	Identify location of payload	
H4	Multiframe indicator	

Table 5 II. Overhead Dytes that cannot be Luited (cont.)
--

The bytes that cannot be edited are marked with a line of asterisks on the SECTION OVERHEAD or PATH OVERHEAD pages (see Figure 3 36 on page 3 93).

In addition, there are bytes you may not be able to edit depending on parameter settings in the CTS850. As shown in Figure 3 36, a short text string replaces the binary values in the byte field of the SECTION OVERHEAD and PATH OVERHEAD pages when a byte cannot be edited. Table 3 12 shows the affected bytes, the text string, and a description of the parameter setting that prevents the byte from being edited.

Table 3 12: Bytes You Cannot Edit Due to Parameter Settings

Section and Path Overhead Byte(s)	Text String that Replaces the Binary Values	Parameter Setting Affecting Byte-Edit Capability
A1, A2	LOF SET	Loss of Frame Failure is being simulated
D1, D2, D3	EXT ADD	RS Data Communication Chan- nel External Add is enabled
K1, K2	MS AIS SET	MS AIS is being simulated
	RDI SET	MS RDI is being simulated
D4, D5, D6, D7, D8, D9, D10, D11, D12	EXT ADD	MS Data Communication Chan- nel External Add is enabled
S1	REI SET	MS REI is being simulated

Section and Path Overhead Byte(s)	Text String that Replaces the Binary Values	Parameter Setting Affecting Byte-Edit Capability	
G1	HP RDI SET	HP RDI is being simulated	
	HP REI SET	HP REI is being simulated	
All path overhead bytes set to ones	AU AIS SET	AU AIS is being simulated	

Table 5 12. Dytes Tou Califiot Luit Due to Faralifeter Settings (Colli	Table 3	12: Bytes	You Cannot	Edit Due to	Parameter	Settings	(Cont
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Editing the J1 Path Trace Byte

The J1 Path Trace Byte carries a fixed-length, 16 or 64-byte string intended for sending user messages. The Path Trace Byte is a string consisting of ASCII characters (rather than the ones and zeros used to edit the other overhead bytes); the 16 byte format includes a CRC byte. 16 byte and 64 byte are two different formats.

To edit the J1 Path Trace Byte:

1. Display the Path Trace Byte as follows:

Press Menu Button	Select Menu Page	Highlight Parameter	Select Choice
TRANSMIT	PATH OVERHEAD	J1 byte	Reset Overhead
			64 byte Format
			16 byte Format
			Edit Trace
			Default Trace

The text string USER is shown in place of the actual byte value. There are five ways you can change the Path Trace message.

H Select **Reset Overhead** to set all bytes in the path overhead to their default values.

CTS850 SDH/PDH Test Set User Manual

NOTE. Reset Overhead does not remove simulated error conditions that have been set using controls in the Defects & Anomalies page.

- H Select **Null Trace** to set all the J1 bytes in the string to the null character.
- H Select **Default Trace** to set the J1 byte string to the default string "Tektronix CTS 850 SDH Test Set, hello, bonjour, guten tag."
- H Select **Default 64 Byte** to set the J1 byte string to the default string "Tektronix CTS 850 SDH Test Set, hello, bonjour, guten tag."
- H Select **User Trace** to set the J1 byte string to a string you can enter using the EDIT TRACE function.
- H Select **Default 16 Byte** to set the J1 byte string to the string "Tek CTS 750" padded with spaces and ending with a carriage return/line feed.
- H Select EDIT TRACE to define your own text string.
- **2.** Select **EDIT TRACE** to edit the path trace message (see Figure 3 38).

The string can contain a maximum of 64 characters, including spaces.

3. Select **DONE** when you have completed entering the string.

CTS850 SDH/PDH Test Set User Manual

TRANSMIT	
	CHOICES
Transmitting STM 1 AU 4 # 1 under test	Reset
Overhead View VC4 Overhead	Overhead
External Add None	
C2 Signal Label TUG Structure	64–Byte Format
Path Overhead Path Trace Message J1: USER(G4) → This is a Tektronix CTS8 E3: ******** 50 SDH Test Sel	16-Byte Format
C2: 00000010 %, G1: ****000* F2: 00000000 H4: 000000*	EDIT TRACE
K3: 01010001 K3: 01010111 N1: 00000000	-more- 1 of 2
TRANSMIT 54k TX PATH SECTICN APS OVERHEAD SETTINGS SETTINGS OVERHEAD OVERHEAD COMMANDS TEST	-more- 2 of 2

Figure 3 38: Editing the J1 Path Trace Byte

Adding DCC and User Channel Overhead Bytes

You can add data generated by an external protocol analyzer into the Data Communication Channel (DCC) and User Channel. The data from the protocol analyzer is added through the Overhead Add/Drop Port located on the rear panel. See *Appendix G* for detailed information on the port pin assignments.

To add external data into the DCC:

1. Connect an external protocol analyzer to the CTS850 using the Overhead Add/Drop Port on the rear panel of the CTS850.

CTS850 SDH/PDH Test Set User Manual

2. To configure the CTS850 to add the external data bytes:

Press Menu Button	Select Menu Page	Highlight Parameter	Select Choice
TRANSMIT	SECTION OVERHEAD	External Add	None
			D1 D3
			D4 D12
			F1
			E1
			E2
			E1 from Handset
			E2 from Handset

- H Select None if you do not want to add external data.
- H Select **D1 D3** to add data, generated by an external protocol analyzer, to the D1 D3 bytes of the DCC.
- H Select **D4 D12** to add data, generated by an external protocol analyzer, to the D4 D12 bytes of the DCC.
- H Select **F1** to add data, generated by an external protocol analyzer, to the F1 byte of the DCC.

As soon as you select which bytes to add data to, the CTS850 displays the words EXT ADD as the value for the selected bytes (see Figure 3 39).

CTS850 SDH/PDH Test Set User Manual

Tek Measuremen	ts Stopped		G STM-1E
TRANSMIT			© 2 MD/3
Transmitting ST Showing Overhea	M 1E AU 4.# ad for AU-4.#*	1 under test I cols 1,4,7	None
J0 RS Trace S1 Sync. Status M	Essage Quality	-D3 5850 Unknown	D1-D3
Column 1 A1 11110110 81: ********	Column 4 A2: 00101000 E1: 00000000	Column 7 J0: USER F1: 00000000	D4-D12
D : EXTADD H': ******** 52: ******** D4: 00000000	H2: ******* K1: 00000000 D5: 00000000	H3: ******** K2 00000000 D6: 00000000	F1
D7: 00000000 D10 00000000 S1: 00000000	D3: 00000000 D11: 00000000 00000000	D9: 00000000 D12: 00000000 E2: 00000000	-more- 1 of 2
TRANSMIT 54K IX PATH SECTION APS OVERHEAD TOTO SETTINGS SECTION OVERHEAD COMMANDS TEST 2 of 2			

Figure 3 39: Adding Data into the DCC

To add external data into the User Channel:

- **1.** Connect an external protocol analyzer to the CTS850 using the Overhead Add/Drop Port on the rear panel of the CTS850.
- 2. To configure the CTS850 to add the external data byte:

Press Menu Button	Select Menu Page	Highlight Parameter	Select Choice
TRANSMIT	PATH OVERHEAD	External Add	None
			F2

NOTE. The F2 byte cannot be externally generated for VC3 Overhead. However, the F2 byte can be edited from the PATH OVERHEAD page.

- H Select None if you do not want to add external data.
- H Select **F2** to add data, generated by an external protocol analyzer, to the User Channel.

CTS850 SDH/PDH Test Set User Manual

As soon as you select F2, the CTS850 displays the words EXT ADD as the value for F2 (see Figure 3 40).

Tek Measurements Stopped	G STM-1E 2 Mb/s
TRANSMIT	CHOICES
Transmitting STM_1E AU_4#_1_under test Overhead View VC4 Overhead	None
External Add F2 User Byte	
C2 Signal Laber Equipped Non-specific	F2
$ \begin{array}{c c} \mbox{Path Overhead} & \mbox{Path Trace Messaee} \\ \hline \mbox{USER (64)} & \longrightarrow & \mbox{Ihis is a lektronix CIS8} \\ \hline \mbox{S0000001} & & \mbox{S000000} \\ \hline \mbox{S1} & \times \times \times \times \times \times \times \\ \hline \mbox{S2} & \mbox{F31} & \mbox{O000000} \\ \hline \mbox{S2} & \mbox{F31} & \mbox{O000000} \\ \hline \mbox{S2} & \mbox{O0000000} \\ \hline \mbox{S3} & \mbox{O0000000} \\ \hline \mbox{S4} & \mbox{O0000000} \\ \hline \mbox{S4} & \mbox{O0000000} \\ \hline \mbox{S4} & \mbox{O00000000} \\ \hline \mbox{S4} & \mbox{O000000000} \\ \hline \mbox{S4} & \mbox{O0000000000000000} \\ \hline \mbox{S4} & O000000000000000000000000000000000000$	
TRANSMIT SHAK IX PATH SECTION APS OVERHEAD	U more 2 of 2

Figure 3 40: Adding Data into the User Channel

Trace Settings

The Trace Settings page available from the TRANSMIT Menu permits Trace Mismatch comparisons. This function is used for continuity testing. The J0 RS Trace can be chosen from the Section Overhead page of the TRANSMIT menu.

Table 3 13: Transmit TRACE SETTINGS Choices

Overhead Testing	Choices
Trace Select	Selects the trace for which information will be displayed. Valid selections depend on the current transmit and receive configurations. Values: J0, J1, J2
TX Trace	This displays the current TX trace.

3 102

Table 3	13: Transmit	TRACE	SETTINGS	Choices	(Cont.)
					··· · /

Overhead Testing	Choices
RX Trace	This displays the current RX trace. The display will be be updated as new data is received.
Expected Trace	This field displays the trace value used for trace mismatch comparisions. The user may edit the expected value trace, or copy the value from the value being transmitted or received. The J0 RS Trace can be chosen in the Section Overhead page of the TRANSMIT menu.



Figure 3 41: Choosing TRACE SETTINGS

CTS850 SDH/PDH Test Set User Manual

Signal Labels

The Signal Labels page available from the TRANSMIT Menu permits selection of the C2 HP Signal Label. The different Signal Label settings have a dependance on the menus accessible from **TRANSMIT, Transmit Setting, SDH Structure** choices (STM 4: VC4 4c Bulk, AU 4 Bulk, AU 4 140 Mb/s, TU 3 Async 34 Mb/s, TU 12 Async 2 Mb/s) and the **TRANSMIT, Path Overhead, C2 Signal Label** choices (Unequipped; Equipped; TUG; TU n; 34 Mb/s; 140 Mb/s; ATM; MAN (DQDB); FDDI; 0.181; VC AIS).

The C2 HP Signal Label choice (VC4 Overhead) is enabled when the HP Signal Label Mismatch Detection choice enabled at the RECEIVE, Analysis Config page. The C2 LP Signal Label choice (VC3 Overhead, TU3 Mapped) is enabled when the LP Signal Label Mismatch Detection choice enabled at the RECEIVE, Analysis Config page. The C2 V5 Signal Label choice (VC12 Overhead, TU12 Mapped) is enabled when the LP Signal Label Mismatch Detection choice enabled at the RECEIVE, Analysis Config page.



Figure 3 42: Choosing SIGNAL LABELS

3 104

Overhead PRBS Test

The Overhead PRBS Test page available from the TRANSMIT Menu permits PRBS insertion into a selected overhead byte. This function is used for continuity testing.



Figure 3 43: Choosing OVERHEAD PRBS TEST

Overhead Testing	Choices
TX Overhead PRBS Test	Sets up PRBS insertion into a selected overhead byte for continuity testing. Three fields select the byte, PRBS pattern, and pattern inversion. Byte selections: None, D1 D3, D4 D12, E1, E2, F1, F2. Patterns: PRBS15, PRBS20, PRBS23. Inversion: Standard, Inverted.
RX Overhead PRBS Test	Sets up PRBS insertion into a selected overhead byte for continuity testing. Three fields select the byte, PRBS pattern, and pattern inversion. Byte selections: None, D1 D3, D4 D12, E1, E2, F1, F2. Patterns: PRBS15, PRBS20, PRBS23. Inversion: Standard, Inverted.

CTS850 SDH/PDH Test Set User Manual

3 106