Functional Overview

This section describes how to use and navigate through the basic functions of the CTS850, including:

- Controls, indicators, and connectors
- Elements of the display
- Menu structure
- On-line help
- Connecting signals
- Parameter selection and editing
- Disk drive operation

This section also details conceptual information important to the use of the CTS 850, in particular:

- Difference between Synchronous, Plesiochronous, and Asynchronous
- PDH Hierarchy
- Definitions Anomaly, Defect, Failure and Alarm
- SDH Multiplexing Principles
- Difference between Add/Drop, Map/Demap and Multplex/ Demultiplex
- 45 Mb/s Map/Demap Implementation

Front-Panel Controls, Indicators, and Connectors

Figures 2 1 and 2 2 identify the controls, indicators, and connectors located on the front panel of the CTS850 SDH/PDH Test Set.

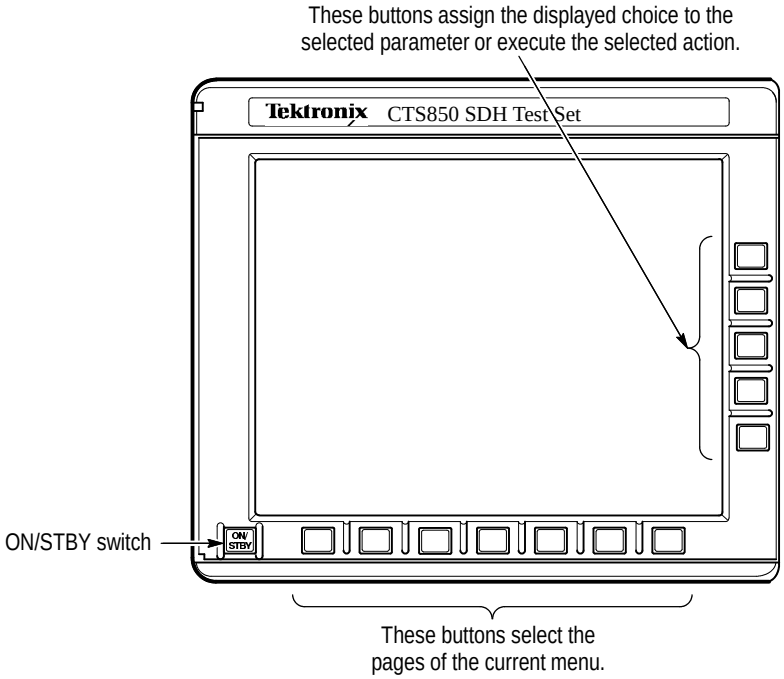


Figure 2 1: Controls Located Around the Display

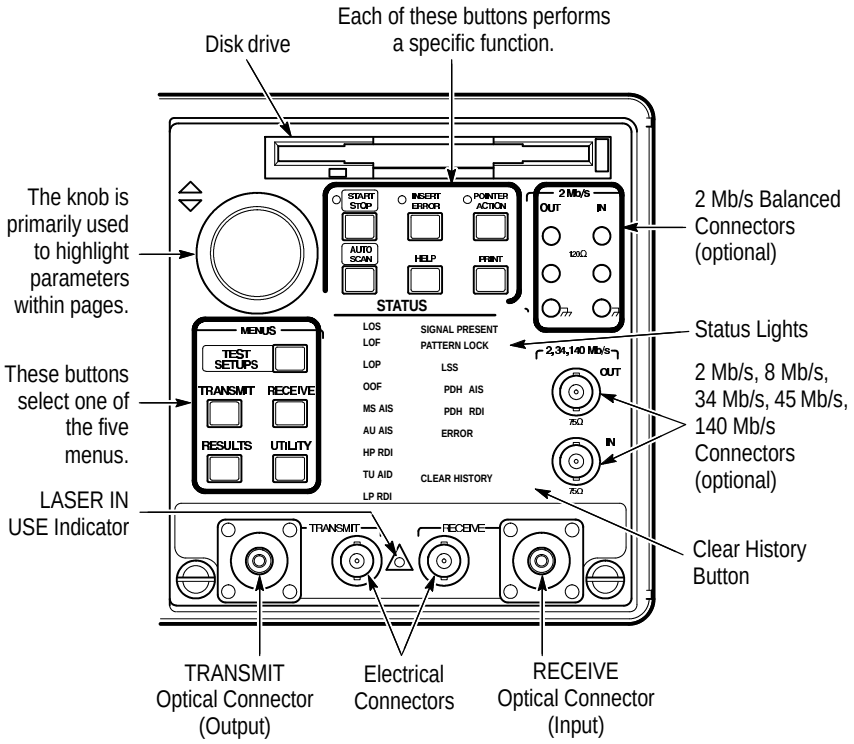


Figure 2 2: Front-Panel Controls, Indicators, and Connectors

Rear-Panel Controls and Connectors

See the appendix on Rear Panel Connections for a more comprehensive explanation of the rear panel connectors.

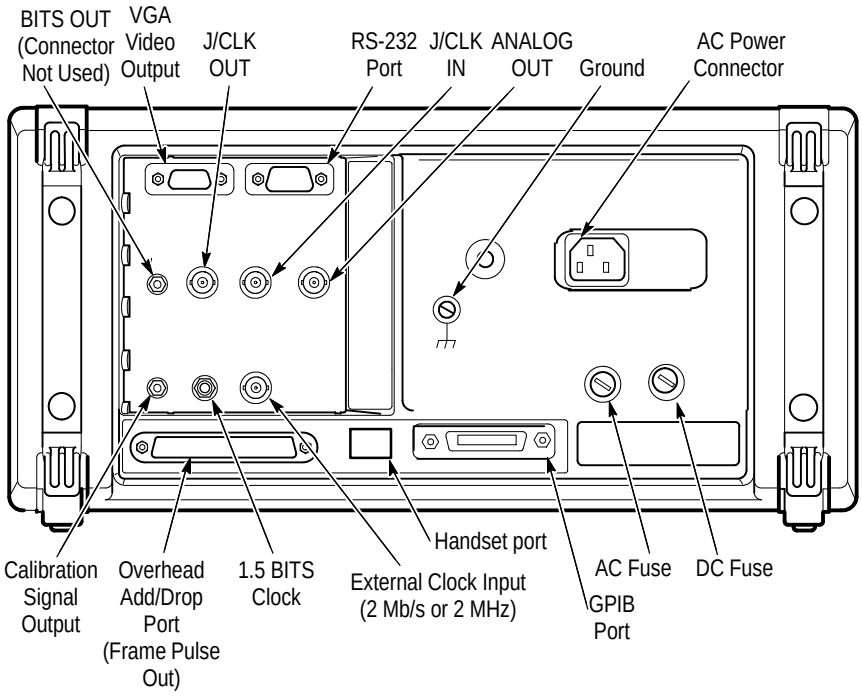


Figure 2 3: Rear-Panel Controls and Connectors

Front-Panel Status Lights

The status lights make it easy to quickly determine the condition of the received signal. There are three types of front-panel status lights.

H Green status lights. Green lights indicate whether a signal is present and whether the CTS850 has locked onto the signal.

- **H** Red status lights. When a red status light is on, it means that the indicated event is occurring. When the red light is off, no event is occurring.
- **H** Yellow history lights. Once an event has been detected, a yellow history light is turned on. The yellow history light shows that the associated event occurred at some time in the past. Yellow history lights remain on until you reset the event history by pressing the CLEAR HISTORY button, starting a new test, or changing the Receive Configuration settings (Receive Rate, Receive Pattern, etc.).

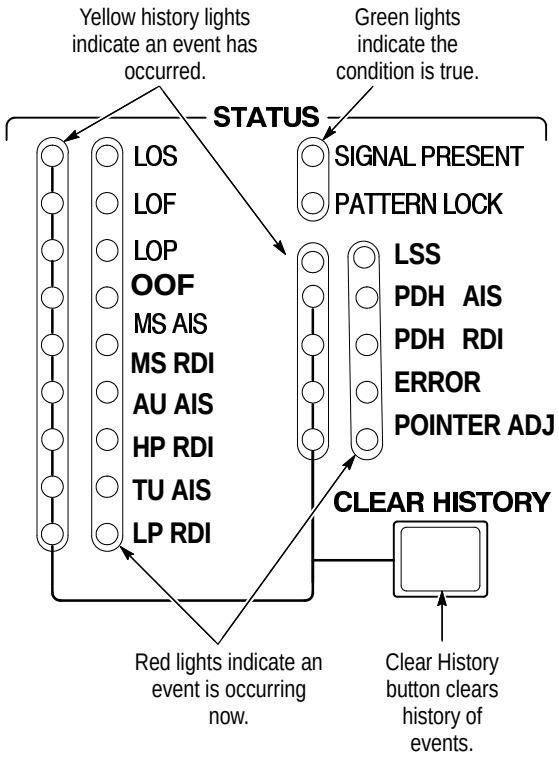


Figure 2 4: Status Lights

Reading the Display

There are several major areas that make up the CTS850 display (see Figure 2 5).

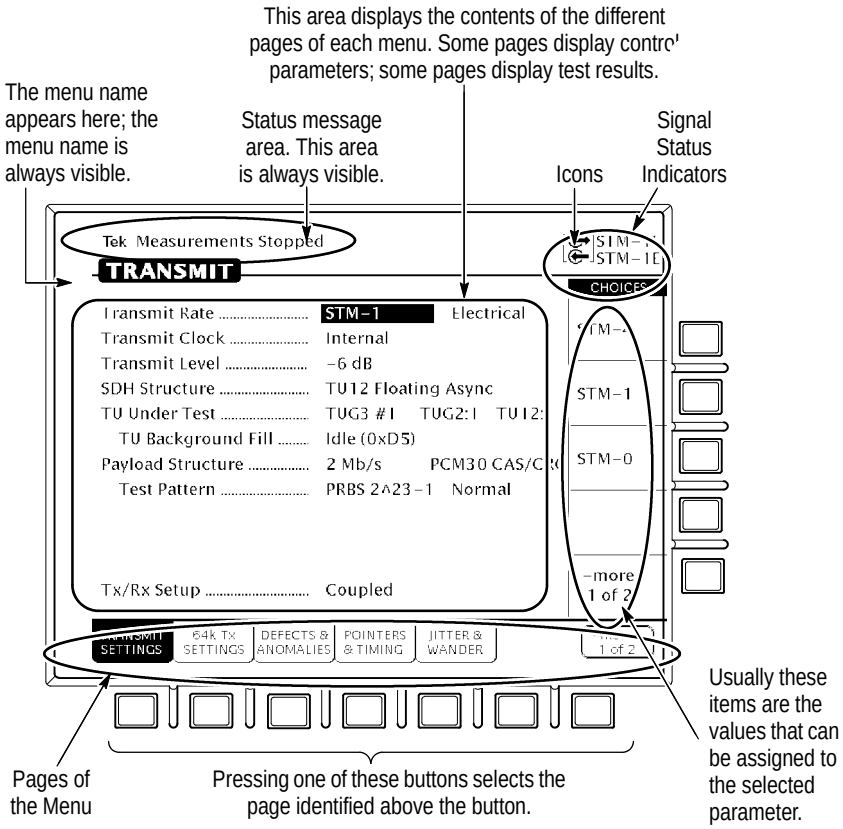


Figure 2 5: Major Areas of the Display

Figure 2 6 provides a guide to specific areas of the display.

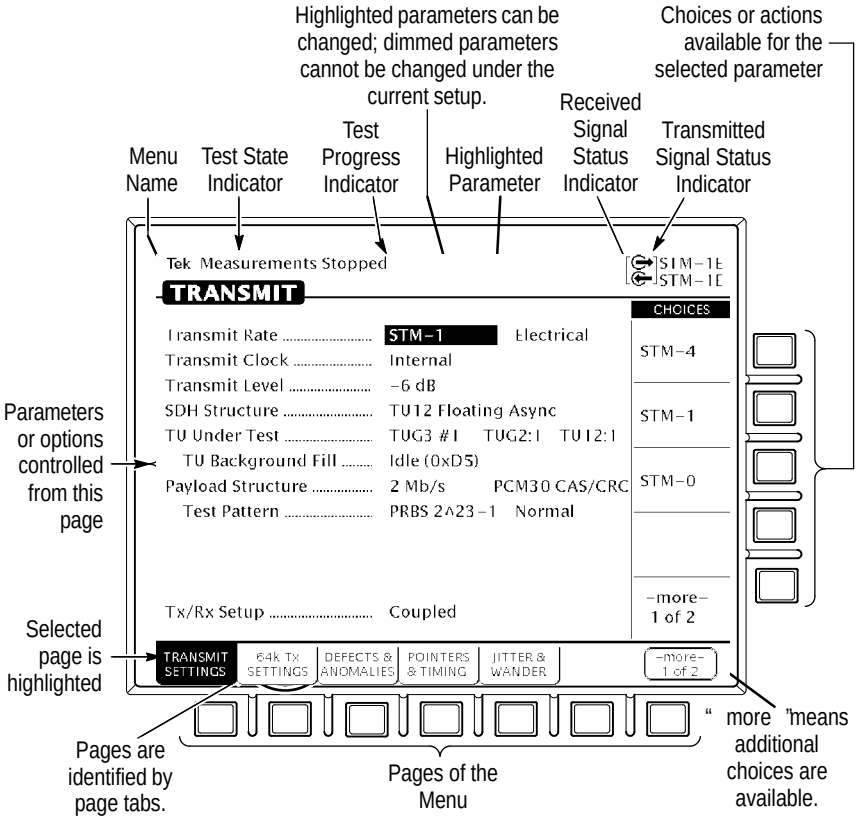


Figure 2 6: Specific Elements of the Display

Table 2 1 provides a list of icons that appear on the display. Icons are used to identify information, indicate instrument status, and clarify available actions.

Table 2 1: Icons that Appear in the Display

Icon	Meaning
	Transmitted signal
	Received signal
	CTS850 is in through mode
	CTS850 is in coupled mode
	Use the knob
	Not allowed
	File stored on disk
	File stored in memory
	Message or warning identifier
	Press the button to perform the indicated action
	The CTS850 is busy

The Basic Menu Structure

The CTS850 is controlled primarily through its menu system. Though several controls are located on the front panel, such as INSERT ERROR, most functions are controlled from one of the five menus. Figure 2 7 shows the five menus.

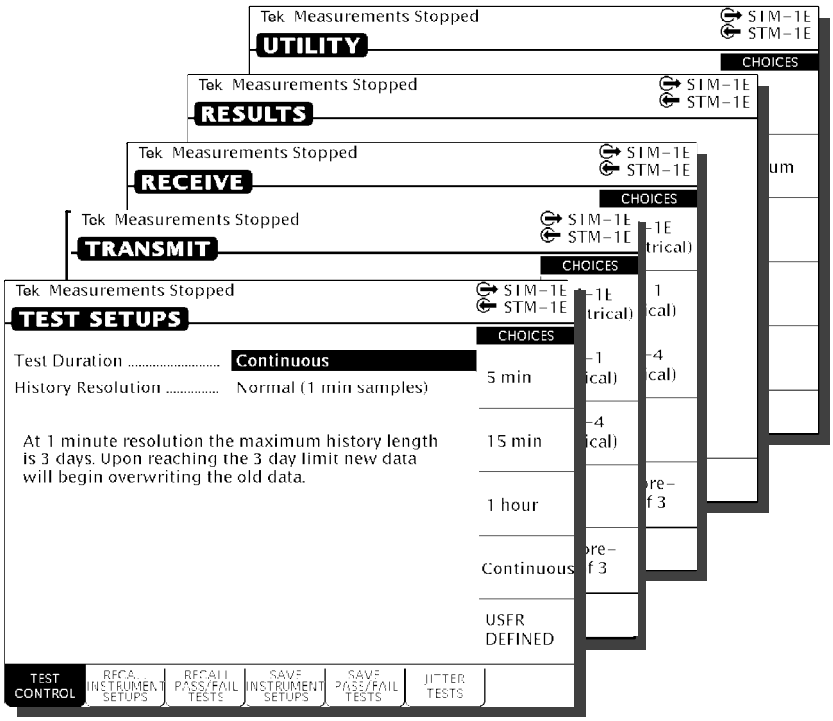


Figure 2 7: The Five Menus

What is a Menu?

A menu groups related functions together. For example, all settings that affect the signal transmitted by the CTS850 are located in the TRANSMIT menu. Each menu is made up of pages. A page is identified by a page tab located at the bottom of the display (see Figure 2 8).

If the choice is not available, it is not displayed or it is not highlighted.

The CTS850 always displays a menu. The name of the current menu is shown near the top of the display. To change to another menu, press a menu button on the front panel.

TEST SETUPS						
Test Control	Recall Instrument Settings	Recall Pass/Fail Tests	Save Instrument Setups	Save Pass/Fail Tests	Jitter Tests	
TRANSMIT						
Transmit Settings	64k Tx Settings	Defects & Anomalies	Pointers & Timing	Jitter & Wander	APS Commands	More 1 of 2
Transmit Settings	Section Overhead	Path Overhead	Trace Settings	Signal Labels	Overhead PRBS Test	More 2 of 2
RECEIVE						
Receive Settings	64k Rx Settings	Signal Status	Analysis Config	Jitter & Wander		More 1 of 2
Receive Settings	64k Rx Settings	Section Overhead	Path Overhead	RX CAS & Voice		More 2 of 2
RESULTS						
Test Summary	SDH Results	PDH Results	Jitter & Wander	Error Analysis	Perf Analysis	More 1 of 2
Test Summary	SDH Results	PDH Results	History Graphs	Save Results	Recall Results	More 2 of 2
UTILITY						
Misc. Settings	Printer Setup	Remote Control	Instr Config	Self Test	Jitter Cal	

Figure 2 8: Menus and Pages

***NOTE**. The only time pressing a menu button does not change menus is when a dialog box is displayed or when you are entering a value for a parameter. You must first exit the dialog box or finish entering the value before you can change menus.*

A page usually provides control over a related group of instrument functions or parameters. For example, the TRANSMIT SETTINGS page in the TRANSMIT menu controls the rate, format, and active channels of the signal transmitted by the CTS850. However, some pages display information rather than provide control over settings; for example, the pages of the RESULTS menu display various test results.

Selecting Menus

To display a menu, press the button with the same on the front panel with the same name (see Figure 2 9).

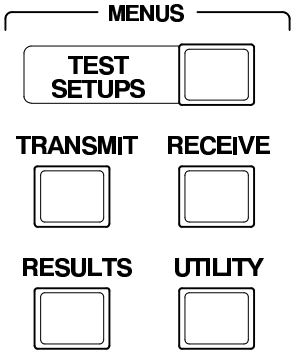


Figure 2 9: Menu Select Buttons

Selecting Pages

To select a page within a menu, press the button beneath the page tab located at the bottom of the display (see Figure 2 10).

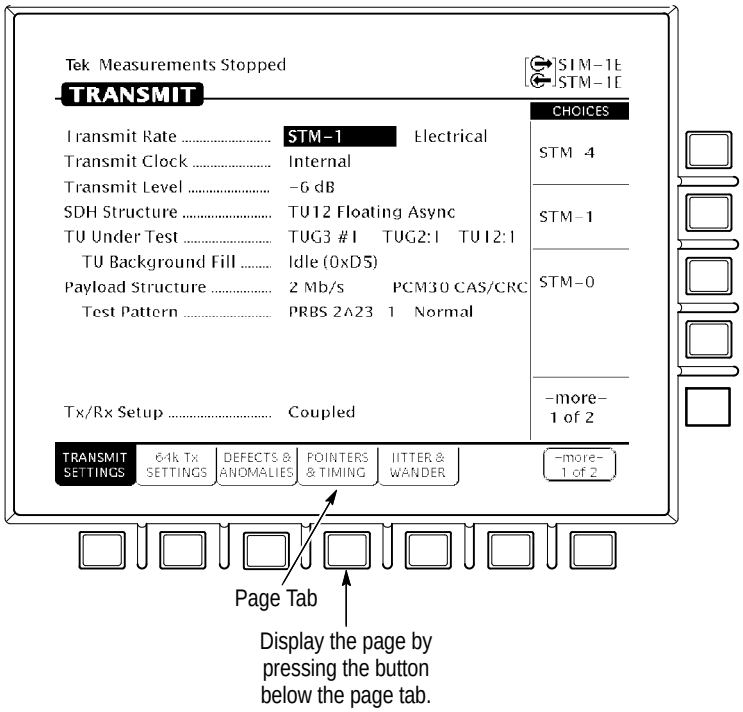


Figure 2 10: How to Display a Page

Displaying Help

To display help, press the **HELP** front-panel button.

When the HELP dialog box appears, use the knob to select the topic you wish to view (see Figure 2 11). After you select the topic to view, select **View Help** to see the help screen.

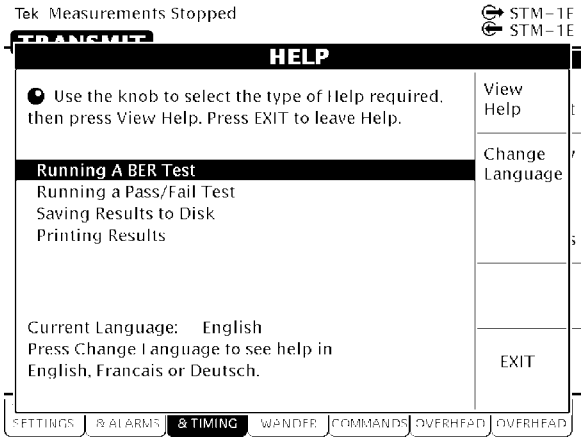


Figure 2 11: Help Dialog Box

Once you press View Help, the help screen for that topic is displayed. If a help topic covers more than one page, you can display the next page by selecting **Page Down**. To display the previous page, select **Page Up**.

To display help in a different language, select **Change Language**. Then, to display help in French, select **Francais**. To display help in German, select **Deutsch**. To display help in Spanish, select **Espanol**. To display help in Portuguese, select **Portugues.**

When you finish reading the help text, you can exit the help dialog box by selecting **EXIT**. If you wish to read additional help topics, select **Help Menu** to return to the main help screen.

Connecting Signals

To connect signals to the CTS850, use the electrical and optical connectors located at the bottom and right side of the front panel.

For optical connections, the CTS850 accepts both single mode and multimode fiber. For electrical connections, the CTS850 accepts 75 coaxial cable with BNC connectors for SDH rates and 2 Mb/s Unbalanced, 8 Mb/s, 34 Mb/s, and 140 Mb/s rates. The CTS850 accepts Siemens connectors for 2 Mb/s Balanced signals.

Connecting Optical Signals

***NOTE**. The optical TRANSMIT output is produced by a Class 1 laser device. The output from a Class 1 laser is safe to view without special eye protection. However, because other optical signals in your environment may exceed the Class 1 limits, we recommend eye protection as a precaution.*

***NOTE**. When performing a loopback test with the CTS 850 and using the 1550 nm laser, always use 10 dB of attenuation. Always pad the input level to less than 10 dBm.*

To connect optical signals to the CTS850:

1. Unscrew the dustcap that covers the optical port on the CTS850.
2. Remove the dustcap (if present) covering the connector on the optical fiber.
3. Carefully insert the transmit end of the optical fiber into the **RECEIVE** port on the CTS850. Line up the key on the optical fiber connector with the cutout on the optical port connector. Make sure that the optical fiber connector is fully inserted into the optical port.
4. Tighten the optical fiber connector so it does not accidentally come loose during use.

5. Carefully insert the receive end of the optical fiber into the **TRANSMIT** port on the CTS850 line up key. Make sure that the optical fiber connector is fully inserted into the optical port.
6. Tighten the optical fiber connector so it does not accidentally come loose during use. Tighten the connectors only finger tight; do not use a tool to tighten the connectors.

CAUTION. *To prevent damage to the optical port connectors and to keep them clean, always replace the dustcaps on the optical port connectors when not using the optical ports.*

Connecting SDH Electrical Signals

To connect SDH electrical signals to the CTS850:

1. Connect the transmit end of the cable to the **RECEIVE** connector on the CTS850.
2. Connect the receive end of the cable to the **TRANSMIT** connector on the CTS850.

Connecting PDH Electrical Signals

To connect electrical signals to the CTS850:

1. Connect the transmit end of the cable to the **IN** connector for the appropriate rate on the CTS850.
2. Connect the receive end of the cable to the **OUT** connector for the appropriate rate on the CTS850.

Initiating Autoscan

Autoscan is a feature that automatically scans the received signal and changes the CTS850 receive settings to match the received signal.

To initiate the autoscan feature, press the **AUTOSCAN** front-panel button. For detailed information on the AUTOSCAN function, see *Checking Signal Status* in Chapter 3 Reference. One limitation to be aware of is when the CTS 850 autoscans a TU. It is unable to directly recognize signals created by lower rate PDH signals (but can in later Autoscan steps).

Changing Parameters

Most of the menu pages in the CTS850 contain parameters (or settings) that you can change. The choices available for a parameter appear in four ways (examples in parentheses):

- As a list (Test Pattern: PRBS 2^23 1, PRBS 2^20 1, ...)
- As a decimal number (Frequency Offset: 74.3 ppm)
- As a binary number (Z1 Byte: 10101111)
- As a text string (File Name: TEST_34)

Selecting Parameters

To change a parameter, use the knob to highlight it. As you turn the knob, the highlight moves from parameter to parameter (see Figure 2 12).

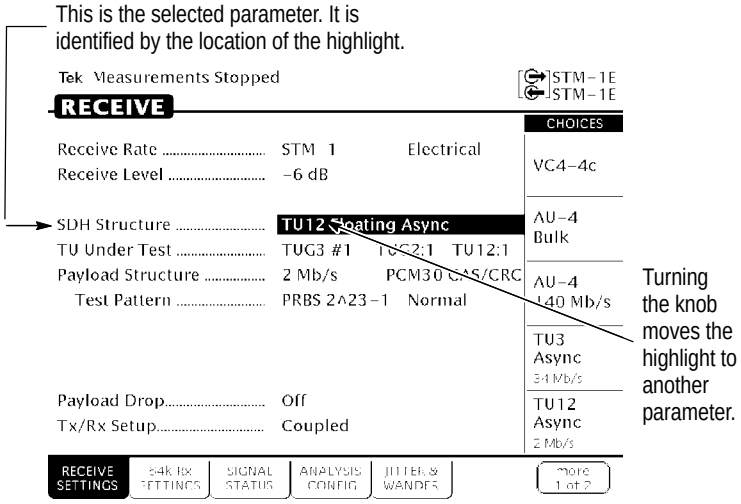


Figure 2 12: Selecting a Parameter

The parameter values displayed in high-intensity text indicate parameters that you can change. If a parameter is displayed in dimmed text, it cannot be selected under the current setup.

Selecting from Lists

Most parameters have a group of choices available. The choices are presented as a list, located along the right side of the display. Press the button next to the choice to assign that choice to the highlighted parameter.

Sometimes parameters have more than five choices available. When more than five choices are available, the bottom choice changes to more . Selecting **more** displays additional choices. Each time you press more the next list of choices is displayed. Below more is a line that shows which list of choices is displayed. When the last list of choices is displayed, pressing **more** displays the first list of choices again (see Figure 2 13).

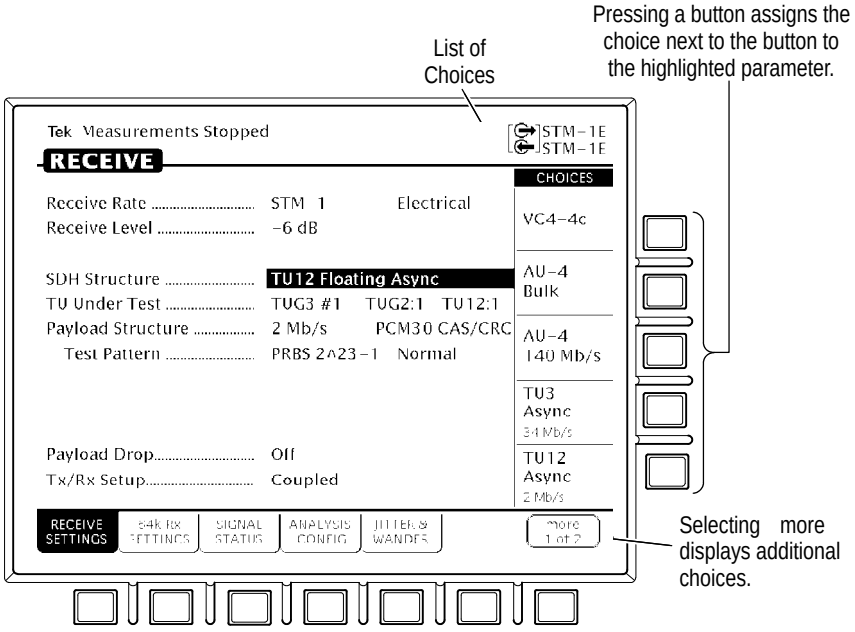
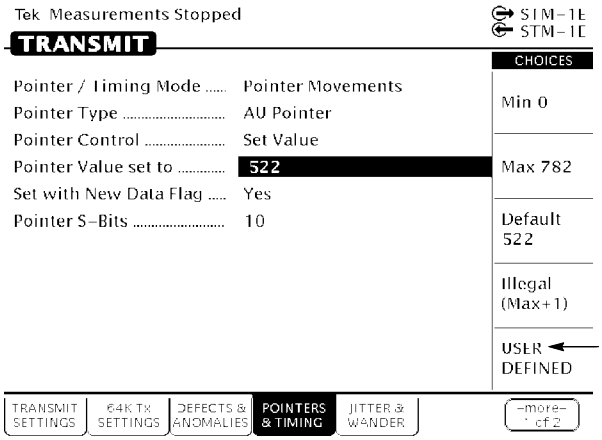


Figure 2 13: Selecting Choices From a List

Changing Decimal Numbers

Some parameters allow you to set a numeric value for them. For these parameters, preset choices are always provided to save you time. However, if the preset choices are not appropriate for your needs, you can set specific values by selecting the **USER DEFINED** choice (see Figure 2 14).



Selecting USER DEFINED allows you to enter a numeric value.

Figure 2 14: Selecting USER DEFINED

After you select USER DEFINED, the buttons at the right side of the display are reassigned, as shown in Figure 2 15.

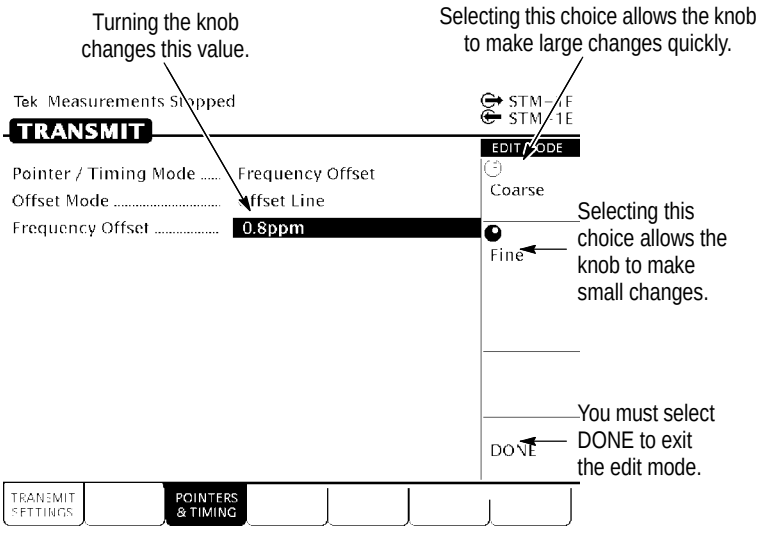


Figure 2 15: Entering a Numeric Value

After you press USER DEFINED, the CTS850 enters edit mode. In edit mode, you change the value of the highlighted parameter by turning the knob. When you have set the parameter to the desired value, select **DONE** to enter the value and exit edit mode.

***NOTE**. The new value does not take effect until DONE is selected.*

When in edit mode, the knob can work in several ways. As shown in Figure 2 15, the knob can be assigned to make either coarse or fine adjustments to the highlighted parameter. For other parameters, the knob is assigned to change different elements of the selected parameter. For example, when setting a test time, rather than making coarse or fine adjustments, the knob is assigned to change days, hours, minutes, or seconds.

The knob icon is displayed in solid form to indicate which function it is currently assigned to. The knob icon is displayed in outline form next to other possible choices.

Changing Binary Numbers

There are two kinds of binary numbers that can be changed in the CTS850: payload patterns and overhead bytes. As with other numerical values, you can select preset values or enter specific values by selecting Edit Byte.

To change a byte:

1. Highlight the byte with the knob (see Figure 2 16).
2. Change the byte by selecting one of the preset choices at the right side of the display or to enter a different bit pattern, select **EDIT BYTE**. This places the CTS850 into edit mode.

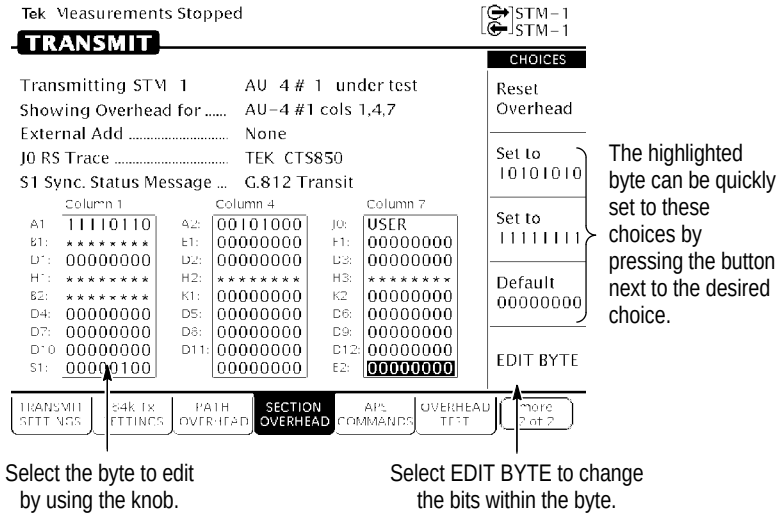


Figure 2 16: Selecting a Byte for Editing

When in edit mode, the choices along the right side of the display change (see Figure 2 17). The highlight now applies to a single bit.

3. To change the value of the highlighted bit, select either **1** or **0**. Each time you select 1 or 0, the highlighted bit is changed and the highlight moves to the next bit.
4. To select a different bit for editing, select either the right or left arrow to move the highlight. When the desired bit is highlighted, select either **1** or **0**.
5. When you are finished editing the byte, select **DONE**. This enters the changes to the byte and exits edit mode.

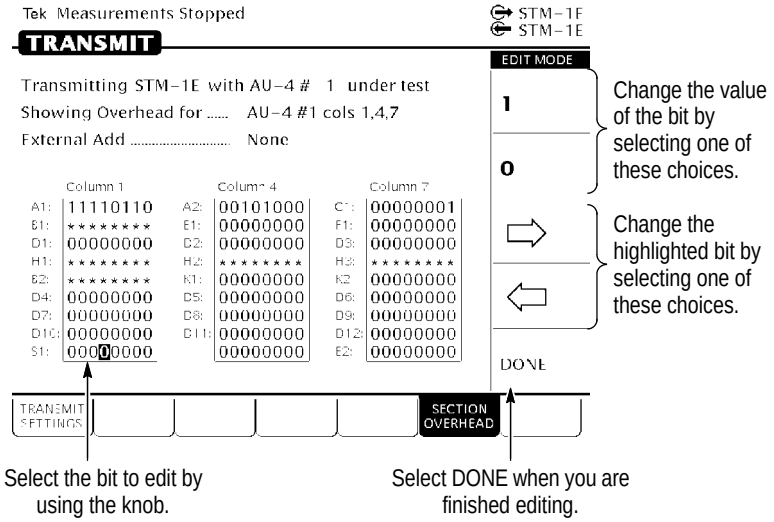


Figure 2 17: Editing a Byte

Entering Text

Several parameters, such as file names, operator prompts, and path trace messages, consist of text strings. You can set text strings to preset choices or enter your own text string. When you highlight a text parameter using the knob, the choices at the right side of the display change to present predefined text strings (if appropriate) and the option to edit the text string (see Figure 2 18).

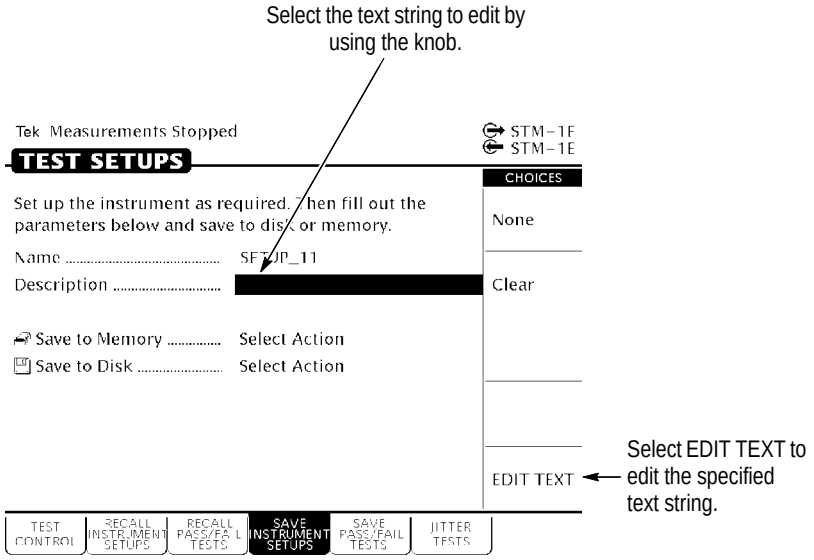


Figure 2 18: Selecting a Text String for Editing

Text strings (not file names) may contain both upper and lower case characters. Moving the selected characters (with the knob on the front panel) off the end of the selection string changes between upper and lower case.

To edit a text string:

1. Select the text string by turning the knob until the desired text string is highlighted (see Figure 2 18).
2. Select **EDIT TEXT**. This places the CTS850 into edit mode.

   When in edit mode, the choices along the right side of the display change (see Figure 2 19). In edit mode, the status line at the top of the display is replaced with a line that displays the characters available for placing into the text string. (Some characters available for message text are not available for file names.)
3. To change the highlighted character or enter a new one, select the character to enter by turning the knob.

4. To enter the selected character, select **Enter <character>**.

   To delete a character already entered, use the arrows to highlight the character. Select **Delete** to delete the character.

5. When you are finished editing the text string, select **DONE**.

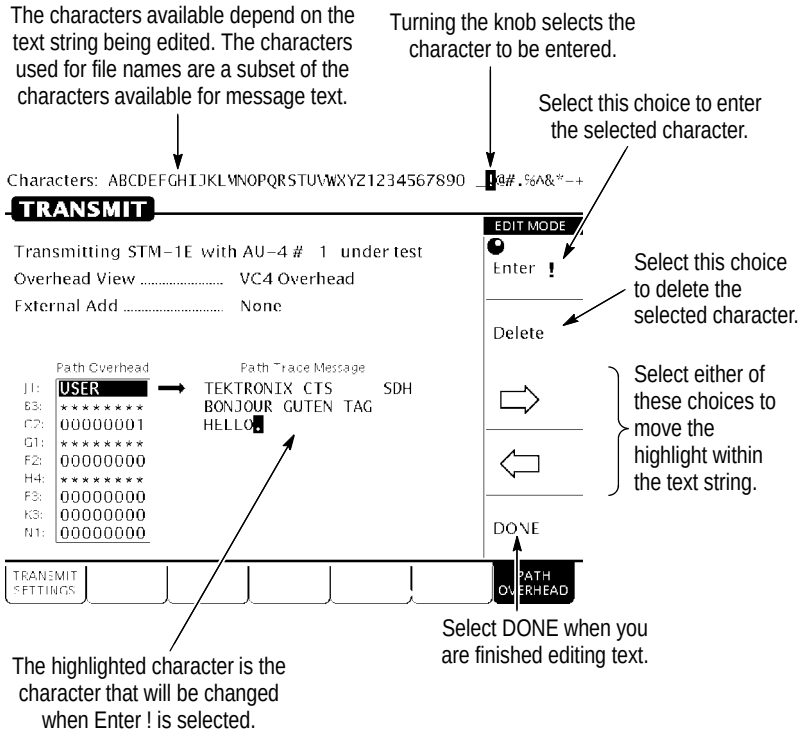


Figure 2 19: Editing a Text String

Working with the Disk Drive

Use the disk drive in the CTS850 to save instrument setups, pass/fail tests, measurement results and measurement histories. The CTS850 reads disks formatted in MS-DOS format. It reads only 1.44 MB disks. The CTS850 does not format disks. Files written to disk consist of four types, as shown in Table 2 2.

Table 2 2: CTS850 Disk File Types

File Type	Description	File Extension
Instrument Setups	Complete instrument settings	.SET
Pass/Fail Tests	Complete instrument settings, operator prompts, and Fail If conditions	.TST
Measurement Results[1]	ASCII file listing the results of a test	.RES
Measurement History[1]	Binary file containing history of test results	.HIS
Jitter Tolerance Conformance Tests	ASCII file listing results of a conformance test	.JTL
	Microsoft Excel-compatible file containing test and mask data	.XTL
Jitter Transfer Conformance Tests	ASCII file listing results of a conformance test	.JTR
	Microsoft Excel-compatible file containing test and mask data	.XTR
Pointer Jitter Conformance Tests	ASCII file listing results of a conformance test	.PTR
Output Jitter Conformance Tests	ASCII file listing results of a conformance test	.OUT

1 **The CTS850 creates two files (with extensions .RES and .HIS) when you save measurement test results.**

The CTS850 displays only file names with the extensions shown in Table 2 2. Disk files with any other extensions do not appear in file name displays.

Reading Files on Disk

You can display disk file names in three places: the RECALL INSTRUMENT SETUPS page and the RECALL PASS/FAIL TESTS page of the TEST SETUPS menu, and the RECALL RESULTS page of the RESULTS menu.

To view instrument setups files on a disk:

1. Insert the disk into the disk drive.
2. Press the **TEST SETUPS** front-panel button to display the TEST SETUPS menu.
3. Select the **RECALL INSTRUMENT SETUPS** page.
4. Select **Disk** to display the instrument setups on disk.

To view pass/fail files on a disk:

1. Insert the disk into the disk drive.
2. Press the **TEST SETUPS** front-panel button to display the TEST SETUPS menu.
3. Select the **RECALL PASS/FAIL TESTS** page.
4. Select **Disk** to display the pass/fail tests on disk.

To view test results files on a disk:

1. Insert the disk into the disk drive.
2. Press the **RESULTS** front-panel button to display the RESULTS menu.
3. Select the **RECALL RESULTS** page.
4. Select **Disk** to display the test results files on disk.

***NOTE**. Disk operations may take several seconds if there are many files on the disk. The light on the front of the disk drive turns off when the disk operation is complete.*

Synchronous, Plesiochronous, Asynchronous

To understand correctly the concepts and details of SDH, it is important to be clear about the meaning of *Synchronous*, *Plesiochronous*, and *Asynchronous*.

In a set of **Synchronous** signals, the digital transitions in the signals occur at exactly the same rate. There may however be a phase difference between the transitions of the two signals, and this would lie within specified limits. These phase differences may be due to propagation time delays, or wander introduced in the transmission network. In a synchronous network, all the clocks are traceable to one Primary Reference Clock (PRC). The accuracy of the PRC is better than ± 1 in 10^{11} and is derived from a cesium atomic standard.

If two digital signals are **Plesiochronous**, then their transitions occur at ”almost” the same rate, with any variation being constrained within tight limits. These limits are set down in ITU T recommendation G.811. For example, if two networks need to interwork, their clocks may be derived from two different PRCs. Although these clocks are extremely accurate, there is a small frequency difference between one clock and the other. This is known as a plesiochronous difference.

In the case of **Asynchronous** signals, the transitions of the signals do not necessarily occur at the same nominal rate. Asynchronous, in this case, means that the difference between two clocks is much greater than a plesiochronous difference. For example, if two clocks are derived from free running quartz oscillators, they could be described as asynchronous.

Plesiochronous Digital Hierarchy (PDH)

Traditionally, digital transmission systems and hierarchies have been based on multiplexing signals which are plesiochronous (running at almost the same speed). Also, various parts of the world use different hierarchies which lead to problems of international interworking, for example, between those countries using 1.544 Mbit/s systems (U.S.A. and Japan) and those using the 2.048 Mbit/s system.

In the PDH, tributaries and higher order bit streams are allowed to deviate from a pre defined bit rate by a specified amount. The justification (bit stuffing) process is required which brings all the tributaries up to the same bit rate before multiplexing takes place. However, the justification method makes it impossible to identify the location of specific tributary channels within a higher order bit stream, without demultiplexing back down to the 2 Mb/s tributaries.

To recover a 64 kbit/s channel from a 140 Mbit/s PDH signal, it is necessary to demultiplex the signal all the way down to the 2 Mbit/s level before the location of the 64 kbit/s channel can be identified. PDH requires ”steps” (140 34, 34 8, 8 2 demultiplex; 2 8, 8 34, 34 140 multiplex) to drop out or add an individual speech or data channel. This is due to the bit stuffing used at each level. Extra bits are added (stuffed) in to the digital tributaries which increases the speed of the tributaries until they are all identical.

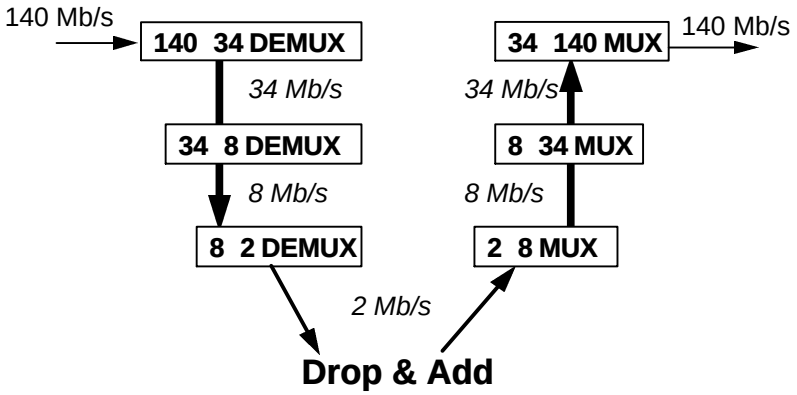


Figure 2 20: PDH Multiplexing by steps showing add/drop function

Anomaly, Defect, Failure, Alarm

Anomaly The smallest discrepancy which can be observed between the actual and desired characteristics of an item. The occurrence of a single anomaly does not constitute an interruption in the ability to perform a required function.

Defect The density of anomalies has reached a level where the ability to perform a required function has been interrupted. Defects are used as input for performance monitoring, the control of consequent actions, and the determination of fault cause.

Failure The inability of a function to perform a required action persisted beyond a maximum time allocated.

Alarm The maintenance signal used in the digital network to alert downstream equipment that a defect or equipment failure has been detected.

SDH Multiplexing Principles

The multiplexing principles of SDH follow:

- **Mapping** A process used when tributaries are adapted into Virtual Containers (VCs) by adding justification bits and Path Overhead (POH) information.
- **Aligning** This process takes place when a pointer is included in a Tributary Unit (TU) or an Administrative Unit (AU), to allow the first byte of the Virtual Container to be located.
- **Multiplexing** This process is used when multiple lower order path layer signals are adapted into a higher order path signal, or when the higher order path signals are adapted into a Multiplex Section.
- **Stuffing** SDH has the ability to handle various input tributary rates from PDH. As the tributary signals are multiplexed and aligned, some spare capacity has been designed into the SDH frame to provide enough space for all these various tributary rates. Therefore, at certain points in the multiplexing hierarchy, this space capacity is filled with ”fixed stuffing” bits that carry no information, but are required to fill up the particular frame.

The figure on the next page illustrates the ITU T SDH multiplexing structure. The notations in the boxes, such as C 1, VC 3, and AU 4, are explained in the table after the figure. Not all containers and rates shown in this figure are specifically handled by the CTS 850 test unit.

At the lowest level, containers (C) are input to virtual containers (VC). The purpose of this function is to create a uniform VC payload by using bit stuffing to bring all inputs to a common bit rate ready for synchronous multiplexing. Various containers (ranging from VC 11 at 1.728 Mb/s to VC 4 at 139.264 Mb/s) are covered by the SDH hierarchy. Next, VCs are aligned into tributary units (TUs), where pointer processing operations are implemented.

These initial functions allow the payload to be multiplexed into TU groups (TUGs). As the figure illustrates, the xN label indicates the multiplexing integer used to multiplex the TUs to the TUGs. The next step is the multiplexing of the TUGs to higher level VCs, and TUG 2 and TUG 3 are multiplexed into VC 3 (ANSI mappings) and VC 4. These VCs are multiplexed with fixed byte stuffing to form administration units (AUs) which are finally multiplexed into the AU group (AUG). This payload then is multiplexed into the Synchronous Transport Module (STM).

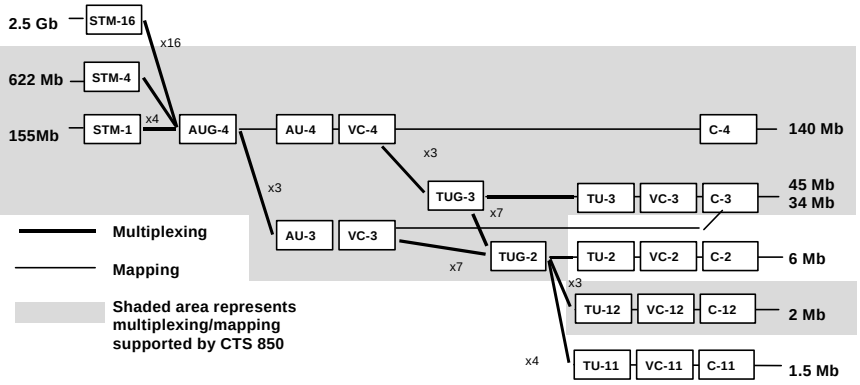


Figure 2 21: SDH Multiplexing Hierarchy

Table 2 3: SDH Multiplexing Structure

Term	Contents	Description
C n	n = 1 to 4	payload at lowest multiplexing level
VC n	n = 1,2	single C n plus VC POH
VC n	n = 3,4	C n, TUG 2s or TU 3s, plus POH for the specific level
TU n	n = 1 to 3	VC plus tributary unit pointer
TUG 2	(TU n) = 1,3,4	various TU ns
TUG 3	TU 3, 7 TUG 2s	TU 3, 7 TUG 2s
AU n	n = 3,4	VCs plus AU pointer
STM n	n = 1, 3 AUGs	n synchronously multiplexed STM 1 signals

POH = Path Overhead; C = Container; TU = Tributary Unit; AU = Administrative Unit; VC = Virtual Container; TUG = Tributary Unit Group; STM = Synchronous Transport Module

Difference in Telecommunications Terms

Three sets of terms are listed here because it is important to see that they are not equivalent terms, which is how they get used in normal discussions. They are:

Add/ Drop

The process where a part of the information carried in a transmission system is extracted (dropped) at an intermediate point and different information is inserted (added) for subsequent transmission. The remaining traffic passes straight through the multiplexer without additional processing.

Map/ Demap

For the CTS 850, this term refers to putting PDH signals into and getting PDH signals out of a SDH signal.

Multiplex/ Demultiplex

Multiplex (MUX) To transmit two or more signals over a single channel. Demultiplex (DEMUX) To separate two or more signals previously combined by compatible multiplexing equipment.

45 Mbit/s Map/Demap Implementation

If your CTS 850 test set supports the 45 Mb/s map/demap option (Option 55), the following is an overview of what the 45 Mb/s option offers.

To determine if Option 55 is present in the CTS 850 test set, press the Utility button on the front panel, then press the Instrument Configuration (INST CONFIG) softkey. In the menu that is displayed after pressing this button and softkey, there is a line that says Options. In this line, should be the number 55, for Option 55. Also, in the line that says PDH Options, should be the number 45, for 45 Mb/s.

45 Mbit/s is transmitted or received as a B3ZS or HDB3 encoded line rate, and mapped or demapped into a VC 3 structure into an STM 1. Mapping and demapping has the same configuration, options and nomenclature as the current TU 3 mapping/demapping selections available for 34 Mbit/s signals.

An external 45 Mbit/s payload is added when the signal is being mapped into an SDH output. The user can insert the same defects and anomalies as are supported in a 34 Mbit/s externally added signal.

Demapped payloads are dropped out through the front panel as a 45 Mbit/s line rate.

The payload for 45 Mbit/s is PRBS, a fixed 8, 16, or 24 bit pattern, or externally added data only. The payload can not be muxed or demuxed from or into DS1 or any PDH rates. The same PRBS patterns as for 34 Mbit/s are supported. Overhead bytes are the same as for TU 3 mapping and demapping. The default C2 value is the same for 34 Mbit/s (0x04).

There is no support for 45 Mbit/s bit slip measurements.

G.821, G.826 and M.2100 analysis is performed on the received 45 Mbit/s signal, subject to the same restrictions as other PDH signals.

Because of architectural limitations, the PDH rates (2 Mbit/s, 8 Mbit/s, 34 Mbit/s, and 140 Mbit/s) are not supported at the same time as 45 Mbit/s. The RX and TX sides of the tributary card are “linked” at 45 Mbit/s. The tributary board will run RX and TX at 45

Mbit/s or RX and TX at any of the existing PDH rates, but 45 Mbit/s and 2/8/34/140 Mbit/s cannot be turn simultaneously.

The framing for 45 Mbit/s is C Bit, M13 or Unframed. From the user interface, external add will be handled as a framing option, in the same manner as the other PDH rates are handled.

RX signal level for 45 Mbit/s are Normal and Monitor.

Defect insertion for 45 Mbit/s is: Pattern Bit; Framed Bit (framed only); Frame Bit Burst; C bit parity (C bit framing only); P bit parity (M13 framing only); and, Code violations (45 Mbit/s only)

Anomaly insertion for 45 Mbit/s is RDI (frame signals only); AIS (framed only) and Idle (framed only).

Failure insertion for 45 Mbit/s is LOS (only when 45 Mbit/s is the TX line rate).