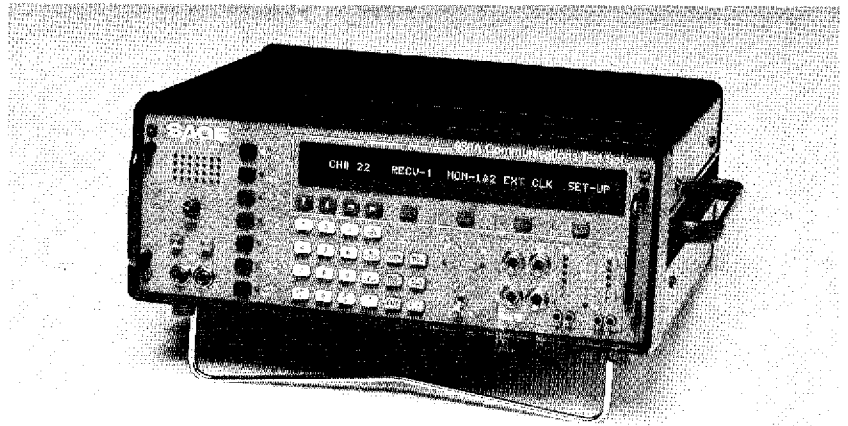


## 930A Communications Test Set

### Standard Features and Options



#### Standard Features

The Sage Instruments 930A Communications Test Set is a combination test instrument designed to meet all of the applications associated with testing Network Switching and DS1 Facilities.

##### Standard Features include:

- 2- and 4-Wire Access
- Loop & Ground Start
- Reverse Battery
- E&M Signaling Types I through V
- Level and Frequency (20 Hz to 5 kHz)
- C-MSG, C-Notch, 3 kHz Flat Noise

The standard 930A is a high performance, Signaling, TIMS and Return Loss Measuring Set with a built-in DP, MF and DTMF sender. Options allow the user to economically add functions which meet specific needs.

- Signal-to-Noise Ratio
- 2- and 4-Wire Return Loss
- DP, MF & DTMF Sender with Talk Battery
- DC Volt and Milli-ammeter
- Wink Timing
- Impedances 150, 600, 900 & 1200

#### Purchase Options

##### PCM Options

###### Option 930A-08E

DS-1 PCM Send/Receive (Single Direction)-  
ESF D4 Superframe

###### Option 930A-09E

DS-1 PCM Dual Direction Drop and Insert-  
ESF D4 Superframe

###### Option 930A-22

DS-1 & DS-0 Bit Error Rate Testing  
Detailed Error History  
Automatic Protection Switch Testing

###### Option 930A-24

Fractional T1 and Digital Data Services (DDS)  
(for use with Option 930A-08E)

###### Option 930A-25

FXO/FXS Supervision

###### Option 930A-34

Fractional T1 and Digital Data Services (DDS)  
(for use with Option 930A-09E)

###### Option 930A-44

Emulate T1 Customer Service Unit (CSU)

###### Option 930A-90

High Stability Clock for RSF

##### Transmission Measurement Options

###### Option 930A-06

Peak-to-Average Ratio (P/AR)

###### Option 930A-07

3-Level Impulse Noise

###### Option 930A-18

Bits, Amplitude & Phase Jitter

###### Option 930A-19

Envelope Delay Distortion

###### Option 930A-20

4 Tone Intermodulation Distortion

###### Option 930A-21

Absolute Delay (4-Wire only)

###### Option 930A-40

Wideband TIMS (20 Hz to 300 kHz)

###### Option 930A-44

Data Test Package - consists of Options  
930A-06, -07, -18, -19, -20

##### Signaling/Supervision Options

###### Option 930A-01

DP, MF, DTMF Receiver/Analyzer

###### Option 930A-02

SF Supervision

###### Option 930A-37

E-911 PSAP Simulation

##### Other

###### Option 930A-10C

RS-232C Remote Control/Printer Interface

###### Option 930A-12

Type 105 ROTI, Responder/Interrogator

###### Option 930A-13

Ring Generator (REN-3 Load)

###### Option 930A-16

-48 VDC Power

###### Option 930A-17

Remove Metallic Interface

###### Option 930A-28

Rear Panel Access

###### Option 930A-29

Batch Mode for (Multiple)

Automatic Trunk Testing

###### Option 930A-31

Digital Rear Panel Access

###### Option 930A-32

Add RAM Buffer

###### Option 930A-35

Near-End Responder for HLI 125

###### Option 930A-36

Extended Warranty

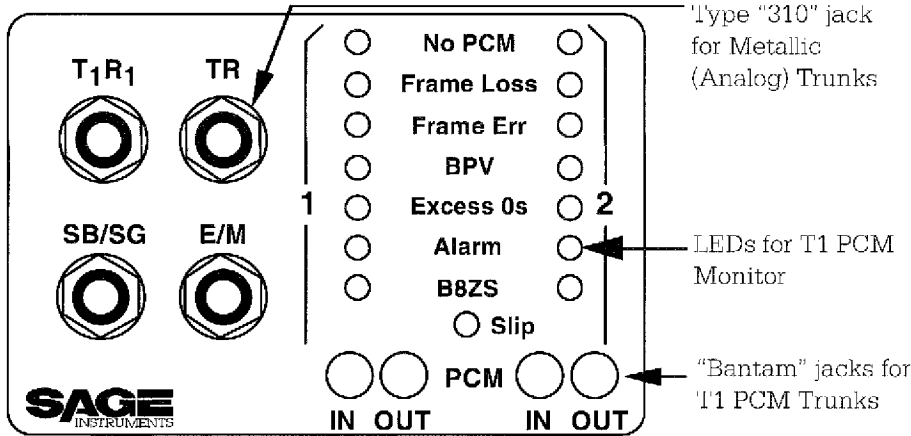
###### Option 930A-47

Remote Audio Monitor

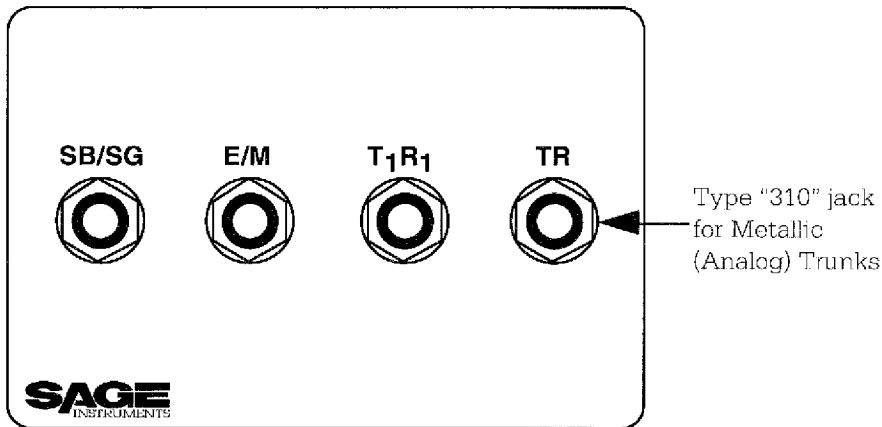
###### Option - Overseas

230 VAC, 50 Hz Power

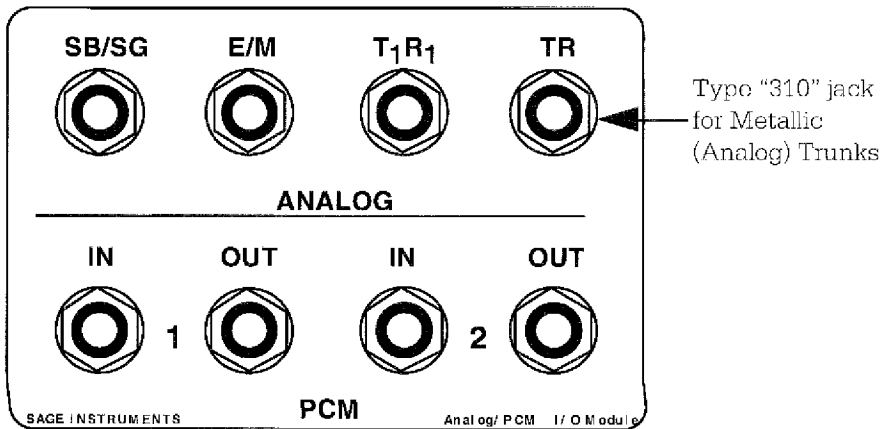
# Configurators



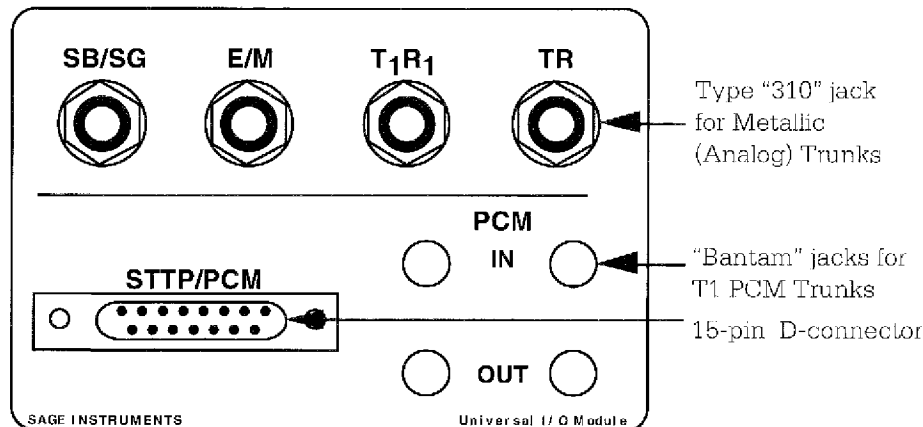
The **A/P Annunciator** is the standard configurator for analog and PCM units. If you are ordering Option 930A-14 (STTP/LTTP 1/1A ESS), see the description for the Universal Configurator below.



The **Analog Configurator** is the standard configurator for analog only units unless Option 930A-14 (STTP/LTTP 1/1A ESS) has been purchased, or the 310/AP Configurator has been specified.

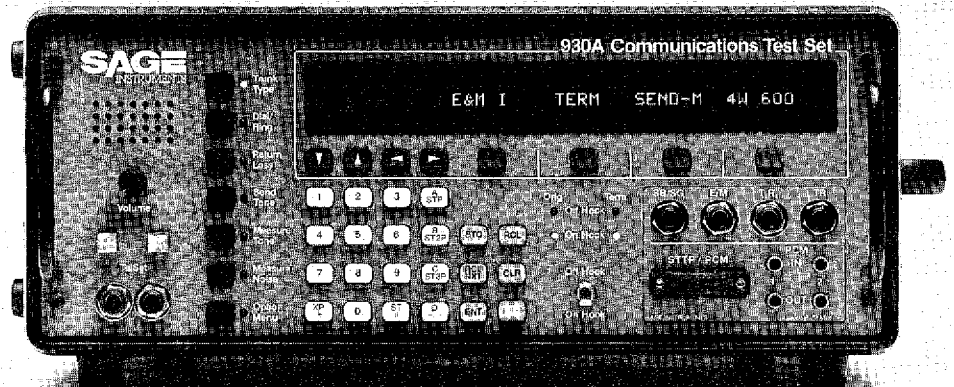


The **310 A/P Configurator** is available for customers not using "Bantam" jacks for PCM operation. To order this configurator, specify Part Number 7930-0290-01.



The **Universal Configurator** is provided when Option 930A-14 (STTP/LTTP 1/1A ESS) is purchased. The 15-pin D-connecter is *not* a T1 interface. To order this configurator without Option 930A-14, specify Part Number 7930-0390-01.

## 930A Communications Test Set Specifications



### Level/Frequency/ Noise

<b>Transmitter</b>	
Frequency Range	50 Hz to 5000 Hz
Resolution	1 Hz
Accuracy	±1.0 Hz
Output Stops	1 Hz, 10 Hz, 100 Hz, or 1000 Hz steps may be selected
Level Range	-60 dBm to +12 dBm
Resolution	0.1 dB
Accuracy	±0.1 dB @ 1004 Hz (0 to 19 dBm), ±0.2 dB at all other frequencies
Flatness	±0.2 dB (200 Hz to 5 kHz referenced to level at 1 kHz)
Distortion	-70 dB @ 1004 Hz, 0 dBm
<b>Receiver</b>	
Frequency Range	50 Hz to 5000 Hz
Resolution	1 Hz
Accuracy	±1.0 Hz
Level Range	-50 dBm to +12 dBm
Resolution	0.1 dB
Accuracy	±0.1 dB @ 1004 Hz (0 to 19 dBm), ±0.2 dB @ 200 Hz to 5 kHz
<b>Noise Measurements</b>	
Input	Balanced or Noise-to-Ground
Weighting Filters	C-Msg, C-Notch, 3 kHz Flat
Notch Filter	1010 Hz (995 Hz to 1025 Hz Notch); >50 dB Notch depth
Range	10 dBm to 100 dBm (Balanced) 50 dBm to 130 dBm (Noise-to-Ground)
Resolution	1.0 dB
Accuracy	±1.0 dB
<b>Signal-to-Noise Measurement</b>	
Level Range	-10 dBm to -50 dBm
Noise Range	10 dBm to 90 dBm
Signal-to-Noise Range	10 dB to 70 dB
Accuracy	±0.5 dB

### Return Loss Measurement

<b>General</b>	
Modes	ERL, SRL-Low, SRL-High, or Sinewave (OSC)
Transmitted Signal	Meets the specifications of Bell Publication 41009 (Tables D, E, and F, page 13) and IEEE Standard 743-1984
<b>2-Wire Return Loss</b>	
Transmitter Level	-10 dBm0
Receiver Range	0 dB to 40 dB
Resolution	1.0 dB
Accuracy	±0.5 dB
Internal Hybrid Impedance	600 or 900 Ohms ±0.1% in series with 2.16 µF ±1%
<b>4-Wire Return Loss</b>	
Impedance	150, 600, 900, or 1200 Ohms
Transhybrid Loss Compensation	-30 dB to +30 dB
Transmitter Level	10 dBm0 relative to TLP
Receiver Range	10 dB to +50 dB
Resolution	1.0 dB
Accuracy	±0.5 dB

## Supervision and Signaling

### Wink Timing

Resolution	5 ms
Accuracy	±5 ms
Wink Fail Event	Fails for wink period >600 ms
Off-Hook Fail Event	Fails for off-hook period <600 ms

### E/M Supervision

Types	I, II, III, IV, V
Battery	48 VDC current limited to 200 mA
Threshold Voltages	On-hook <-39 Volt E Lead >-11 Volt M Lead Off-hook >-11 Volt E Lead <-39 Volt M Lead

### Loop Supervision

Types	2- and 4-wire Loop Start, Ground Start, Loop Reverse Battery, and SX Supervision
Battery	-48 VDC series limited to 120 mA

### MF and DTMF Sender

Frequency Accuracy	±0.1% of Bell Standard Frequencies
Adjustment Range	Tone Frequencies adjustable in 0.1% steps to ±10% of Bell Standard Frequencies for Margin Testing Automatically adjusted to -7 dBm0 per tone
Level	Tone level adjustable in 0.1 dB steps from -60.0 dBm to +6.0 dBm
Level Adjustment Range	0.1 dB
Resolution	±0.2 dB
Accuracy	MF: 70 ms Tone On and Tone Off (KP is 100 ms Tone On) DTMF: 50 ms Tone On and Tone Off
Timing	Tone On and Tone Off times adjustable in 1 ms steps from 13 ms to 267 ms (KP adjustable from 45 to 300 ms)
Timing Adjustment Range	1 ms
Resolution	±1.0 ms
Accuracy	

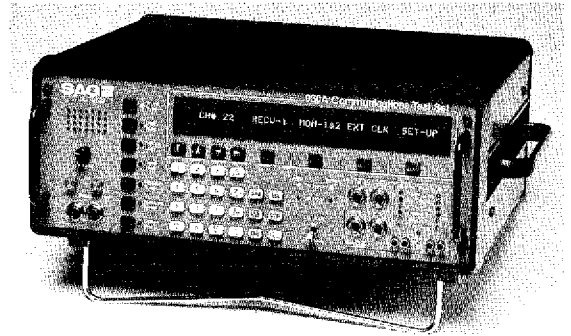
### Dial Pulse Sender

PPS:	
Range	2 to 50 PPS (PCM); 2 to 35 PPS (Analog)
Resolution	0.1 PPS
Accuracy	±1.0% at 10.0 PPS
% Break:	
Range	5 to 95% (PCM); 25 to 80% (Analog)
Resolution	0.1%
Accuracy	±1.0% for 25% to 75% BRK @ 10 PPS
Interdigit Timing:	
Range	40 to 990 ms
Resolution	10 ms
Accuracy	±6.0 ms

## General

Impedances	15, 600, 900, 1200 Ohms and >60 k Ohms bridging
Maximum DC Blocking	160 VDC
Audio Bandwidth	±3.0 dB 300 Hz to 3.0 kHz
Audio Volume	Adjustable by front panel control
Longitudinal Balance	90 dB at 60 Hz
Receiver Return Loss	>30 dB 200 Hz to 5 kHz (600, 900, 1200 Ohms) >30 dB 800 Hz to 5 kHz (150 Ohms)
Display	40 character vacuum fluorescent plus 4 LEDs for On/Off-hook status
AC Power Supply	115 VAC ±10%, 60 Hz
Operating Temperature	0° C to 50° C
Storage Temperature	-40° C to +70° C
Dimensions	5.79" H x 14.33" W x 14.25" D
Weight	16 lbs. to 18 lbs. depending upon options

# 930A Communications Test Set Fractional T1/DDS Specifications



## DDS

T1 Access to DDS / Switched 56 / 64 kbit circuits

DS0A and DS0B formats (all substrates) + 19.2 kbps

Standard network control and loopback codes  
(alternating and latching loopbacks)

Terminate/monitor/drop and insert operation

Primary and secondary channel (simultaneous)  
testing (secondary channel synchronous formats only)

Primary Test Patterns:

- $2^{23} - 1$
- $32767 (2^{15} - 1)$
- $2^{20} - 1$
- 2047
- 511
- 2-8 bit user
- Stress patterns 1/2/3/4/5

Secondary Test Patterns:

- 63
- 511
- 2047

Error injection:

- Primary and secondary channel
- Single bit
- 6 bit
- 2:5 and 3:5 inverted bytes (DS0A substrate)
- DS0B substrate framing bit

Error/alarm display additions:

- DS0A sync loss
- DS0A block error
- DS0B frame loss/frame bit error
- Pri/Sec channel bit errors
- Received network code

Selectable DS0A block error correction

## Fractional T1 Contiguous

N x 56 or N x 64 kbit

Any combination of channels (1-24) sequential or  
non-sequential (only restriction is increasing order)

V.54 FT1 CSU loopback codes

Terminate/monitor/drop and insert operation

Patterns:

- 511
- 2047
- $32767 (2^{15} - 1)$
- $2^{20} - 1$
- $2^{23} - 1$
- 2-8 bit user

## Fractional T1 Non-contiguous

N x 56 or N x 64 kbit

Sage Instruments' Fractional T1 option does *true*  
non-contiguous testing - each DS0 can have  
different delays from the others.

Display of per-DS0 sync and error status - the user  
does not have to go through each DS0 individually  
to determine which is failed.

Patterns:

- 511
- 2047
- $32767 (2^{15} - 1)$
- 2-8 bit user

Any combination of channels (1-24)

Terminate/monitor/drop and insert operation

## Long T1 Pattern

Option 24/34 enhances full rate T1 testing by adding  
long patterns:

- 54 Octet
- 55 Octet
- 55 Octet Daly
- 72 Octet (MIN/MAX)
- 96 Octet (Triptest)
- 120 Octet
- User pattern (1-256 bytes)

Long user patterns can be stored and recalled  
using the 930's STO-RCL function.

Specifications subject to change without notice © 1993 Sage Instruments

**SAGE**  
INSTRUMENTS

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FAX: (408) 761-1003

# Sage Instruments

## 930A Communications Test Set Configurations

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<b>Basic TIMS</b>	Basic 930A Communications Test Set	<b>\$3,995.</b>
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<b>General Purpose (Including PCM Channel Access)</b>	Add the following Options to the Basic Test Set:	\$3,995.
	930A-01 DP, MF, DTMF Receiver/Analyzer	1,200.
	930A-09E DS-1 PCM Dual Direction Drop & Insert	2,850.
	930A-12 ROTL Interrogator, Responder (for automated testing)	800.
	930A-22 DS-1 and DS-0 (56/64 kbps) BERT	1,000.
	<b>TOTAL:</b>	<b>\$9,845.</b>

**Note:** This is the most commonly ordered configuration for the 930A. In many cases, both Option 930A-25, FXO/FXS @ \$300, and Option 930A-10C, RS-232C Control/Printer Interface @ \$700 are added.

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<b>Wideband TIMS (Extends 930A Measurement Range to 20 Hz - 300 kHz; Covers HDSL, DDS, and ISDN Testing Ranges)</b>	Add the following Option to the Basic Test Set:	\$3,995.
	930A-40 Wideband TIMS includes: P/AR, 3-Level Impulse Noise, Phase/Amplitude Jitter and Hits, Envelope Delay Distortion, and 4-Tone Intermodulation Distortion	\$3,000.
	<b>TOTAL:</b>	<b>\$6,995.</b>

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<b>Bit Error Rate Test (BERT) Set</b>	Add the following Options to the Basic Test Set:	\$3,995.
	930A-08E* DS-1 PCM, Single Direction	1450.
	930A-17 Removes Analog Interface	-1000.
	930A-22 DS-1 and DS-0 (56/64 kbps) BERT	1000.
	<b>TOTAL:</b>	<b>\$5,445.</b>

**Note:** This package gives you the ability to send tone, measure tone, and examine all 24 signal bits (like the lid packs allow). It also provides error counters and all DS-1 and DS-0 BERT patterns. (Most Standard BERT sets don't perform DS-0 BERT.)

\*Option 930A-09E DS-1 PCM Dual Direction Drop & Insert is available @ \$2,850.

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<b>Digital Test Set (PCM )</b>	Add the following Options to the Basic Test Set:	\$3,995.
	930A-09E DS-1 PCM Dual Direction Drop & Insert	\$2,850.
	930A-22 DS-1/DS-0 (56/64 kbps) BERT	1,000.
	930A-25 FXO/FXS PCM Supervision	300.
	930A-34 Fractional T1/DDS	2,350.
	930A-44 Customer Service Unit (CSU)	600.
	<b>TOTAL:</b>	<b>\$11,095.</b>

**Note:** For a PCM only unit, the analog interface may be removed by ordering Option 930A-17 at a savings of \$1,000.