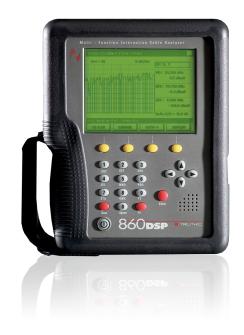
# Trilithic 860 DSP Specs

# Provided by www.AAATesters.com

# **Digital Field Analyzer**

- DSP Technology Allows for Quick, Accurate Level Measurements
- Measures Signal Levels in the 5 to 870 MHz Frequency Range
- QPSK and QAM Measurements, High-Resolution Spectrum Analyzer, and Reverse Path Tester
- Adaptable Platform Grows to Meet the Needs of Technicians at Every Tier
- Easy-to-Read Display and Simple Interface Get New Users Up and Running Quickly



The 860 DSP<sup>™</sup> provides all of the testing power needed to insure HFC networks operate to the highest standards. This includes balancing the distribution system, maintaining analog and digital signal quality, controlling return path ingress, and much more. Several options equip the 860 DSP cable analyzer for a variety of roles, and all configurations feature an attractive price.

#### 860 DSP Options

The 860 DSP is the first highperformance distribution analyzer designed specifically for the demands of HSD and VoIP. More than just a signal level meter, the 860 DSP makes full use of DSP (digital signal processing) techniques to perform a wide array of transmission and signal quality tests, on both analog and digital signals. With add-on option packages, the capabilities of the 860 DSP can be expanded to include high-resolution spectrum analysis, QAM and QPSK analysis, and a wide range of return path installation and distribution tests; all without impacting size, weight, or battery life.

The 860 DSP is fully compatible with Trilithic 9580 SST<sup>™</sup> and 9581 SST<sup>™</sup> reverse path analyzers and can emulate the functions of the Guardian 9580 SSR<sup>™</sup> return path maintenance field unit and Guardian RSVP<sup>2™</sup> reverse path tester.

#### **DSP: For Today and Tomorrow**

The unique architecture of the 860 DSP makes it easy to upgrade and expand over time in order to meet emerging measurement and data communication requirements. The 860 DSP achieves this adaptability by employing virtual instrument techniques, eliminating much of the analog circuitry of older instruments with cutting-edge digital signal processing (DSP) technologies. The flexibility of DSP means that applications that were not even available when the 860 DSP was originally purchased can be added later, usually by simply downloading firmware from the Internet.

DSP technology also gives the 860 DSP the measurement speed that modern conditions demand, refreshing all-channel displays and performing signal analyzes up to 12 times faster than any other analyzer.

Not only is the 860 DSP the most capable and flexible analyzer in its class; it is also the most cost-effective. The use of DSP technology reduces reliance on expensive and complex analog circuitry, giving the 860 DSP a starting price no greater than that of some installation meters.



# BGO DSP Digital Field Analyzer

#### Designed for Convenience, Designed for Durability

As with all Trilithic instruments, the 860's keyboard functions are simple and direct. Buttons are large and widely spaced, making it easy to operate the 860 DSP with heavy gloves. Most measurement or data communication functions can be accessed with a single keystroke, and soft keys simplify navigation through set up and operation menus.

Tests and other functions are selected from one of four convenient "desktops." Measurement results and received data are displayed on a high-resolution, 4.6" x 3.5" backlit LCD display. Detected audio can be heard through the built-in, waterproof loudspeaker.

Though the 860 DSP has the capabilities of a lab instrument, it is built for rugged, everyday use. The housing is constructed of strong shock-resistant plastic and further protected by an integral rubber boot and padded bag that minimize impact damage and increase water resistance. The 860 DSP weighs only 4pounds, and a hand strap makes it easy to hold the 860 DSP securely in all conditions with one hand. A shoulder strap allows for hands-free carriage.

#### SOFTWARE

#### ACTS™ (Advanced Communication Test System)



The ACTS server application enables a proprietary connection with the 860 DSP or 860 DSPi for communication and testing packet loss, latency, jitter and MOS of VoIP services. Includes separate pass/

fail results for forward and return path troubleshooting. In addition to the VoIP tests, this software enables high speed throughput tests using the 860 DSPi with speeds up to 40 Mbps, and can also be used as a ping test reflector. Located as close as possible to the PSTN gateway to ensure optimal testing that includes only the cable network. Runs on minimal hardware configuration (service is time sensitive, so it takes priority over other applications).

NOTE: Requires Ethernet upgrade kit (CI-4) plus an external cable MODEM for the 860 DSP.

#### WorkBench™



Software for the 860 DSP, 860 DSPi and 860 DSPh. Creates configuration packages for channel plans and auto tests. Performs firmware updates; retrieves, displays,

graphs, and exports technical data via the meter's Ethernet port, or serially with the included data cable (I/O-14).

NOTE: Requires Windows® 2000 or higher operating system.

# TDM<sup>™</sup> (Trilithic Data Manager) Component



For current users of WorkBench software. Activates the TDM component within the WorkBench software for uploading and downloading channel plans, auto-tests, firmware updates, and technical data to the TDM server.

NOTE: Requires WorkBench software, version 2.0 or higher.

#### **TDM Integrated Server Package**



Pre-configured server, integrating powerful software and hardware to provide remote access to channel plans, auto test, and firmware updates; supports data uploads via the internet.

Measurement data and work order management tracking and reporting features are compatible with major WFM systems. The server hardware comes pre-configured with six WorkBench software packs. TDM Ingegrated Server Package server can store more than 10 million data logs (average data log is 34 kB).

#### WorkBench/TDM<sup>™</sup> Software Package



Includes WorkBench software with TDM Component software for uploading and downloading information to TDM server.



# think ahead



#### **FS-1** Forward Sweep Option

- Enables a forward sweep display
- Compatible with the SpeedSweep System for forward sweep balancing and troubleshooting

Forward Sweep : default.plan 🛛 🕅			
Ref = 30	Ref: 8.sref	Avg Low	10 dB/div
10110		· •	
TP: Mar	uai	TAP	: 0 dB
Marker A 699.000 MHz, -0.5 dB			Peak 0.7
Marker B 241.250 MHz, -0.2 dB			Valley -1.0
Delta -457.750 MHz, 0.3 dB Delta		Delta 1.7	
Msg:			Avg 0 / 0
SAVE REF	CH PLAN	USE REF	
-			

#### **SA-1 Spectrum Analysis**

- Full-featured DSP alternative to analog analyzers
- Adds multiple resolution bandwidth settings from 10 kHz to 3 MHz
- Adds zero span mode

Adv. S	pectrur	n Analyzer	Mode	×
Ref = 30	Avg 16	RB₩ 300 kHz	Lim = 60	10 dB/div
$\vdash$				
<u> </u>			t h	<u> </u>
m.Aller	MmM	had had	-Alinth	Mu
		· • •		
	0.000 MHz		Stop : 550.0	
Marker A : 4.000 MHz, -,- dBmV Peak Marker B : 1000.000 MHz, -,- dBmV 505.100 MHz Delta : 996.000 MHz, -,- dB -8.4 dBmV				
Msg:			DS	р ок
DETECTO	R MA	RKER TU	NING H	IOLD

#### **TC-1 TraffiControl Option**

 Allows viewing of in-channel spectrum characteristics for upstream data channels

 TraffiControl
 Upstream

 Ref=15
 10 dB/div
 Upstream

 DIG: 34.400 MHz
 BW: 6.4000 MHz
 BW: 6.4000 MHz

 S0.400 MHz, -18.7 dBmV
 Traffic
 5.3 dBmV

 30.400 MHz, -18.7 dBmV
 Trig = -18
 Delta
 33.0 dB

 Dette:16=U052008 at 1155241
 DSP 0K
 DSP 0K

# VP-1 Return Tester RSVP Option

- Adds RSVP<sup>2™</sup> Installer's Return Tester functions to the 860
- Expands the 860 to allow testing of eight frequencies at once
- Compatible with 9581
   SST

RSVP : Return Installation Mode 🛛 🔀		
Ref = 30 10	dB/div	
30	1: PASS 21, C/I 40	
20	2:	
10	3: PASS 21, СЛ 40	
0	4:	
-10	5: PASS 21, C/I 40	
-20 -30 \\m	· · · · ·	
-40		
6 12 18 24 30 36 42 48	7: PASS 21, C/I 40	
	8:	
Ingress Samples = 16 of 16 Link : 31 %		
RSVP : Return Installation M	ode DSP OK	
GOTO Tx FREQS	Rx LINK START	

#### QA-1 QAM Option

- Analyzes QPSK and all common QAM formats
- Presents constellation diagrams, MER, EVM, and calculated BER both pre and post FEC

Ref = 20	CH 109	256 Q	AM-Annex B	10 dB/div
MER 35	.8			
manyou	~~~	and the second second	man	umma.
		SR: 5.36053 MHz48.2		JU MHZ Peak
		MHz, -48.4		4.979 MHz
Delta :	5.340 MH	z, -0.3 d	в.	42.9 dB
QAM Error	Vector Sp	pectrum		DSP OK
	1	an Í	1	

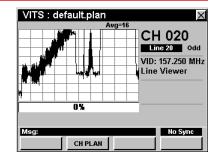
#### **SR-1 Return Sweep Receiver**

- Compatible with the 9581 SST
- Useful for return path balancing and troubleshooting

32					Ref: 3	12 dBmV
12					Node	: Auto - 2 Keenland Cri
-18	ma	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	Tx : 2	1 dBmV
Loc	5 10 15 3	0 25 30 35	40 45 50	55 6D	M : O.	375 MHz
30 20	Trilithic E	erno VPN			M1:-*	l28 dBm∖
10	Coporate	Demo SST	1		M2 : -2	28 dBmV
-10						
-20-	~~~~~~~~		wwimi	nî mîr		
Sst 📗	5 10 15 2	0 25 30 35	40 45 50	55 6D	Link :	32 %
Msg:						DSP OK

#### VITS Vertical Interval Test Signal<sup>™</sup> Option

 Enables testing of baseband video parameters on active analog channels with active VITS



#### VSB Vestigial Sideband<sup>™</sup> Modulation Option

Feature enables analysis of off-air digital video transmissions, including levels, constellation, equalizer taps, and BER

VSB	×
(1) The set of the	HDTV DIG: 659.000 MHz 8 VSB SR: 5.381190 MS/s BW: 6.0000 MHz LEVEL: 11.7 dBmV MER: 31.2 dB Pre BER: 0.0E 00
(1) The second second second second seco	LEVEL: 11.7 dBmV MER: 31.2 dB Pre BER: 0.0E 00 Post BER: 0.0E 00
8 VSB and 16 VSB Mode	DSP OK
DISPLAY	ZOOM IN ZOOM OUT



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### **SPECIFICATIONS**

Frequency Range	5 MHz to 1 GHz	
Level Measurement		
Range	-40 to +50 dBmV	
Resolution	0.1 dB	
Accuracy	@ 25° C (77° F): ±0.75 dB Over temp -18° to +50° C (0° to 122° F): ± 2.0 dB (analog), ± 2.5 dB (digital)	
Carrier-to-Noise (In-service, r	non-scrambled standard channels only)	
Minimum Input Level for Full Range	+10 dBmV	
Dynamic Range	50 dB	
Resolution	<0.5 dB	
Hum (In-service, non-scramble	ed standard channels only)	
Minimum Input Level	0 dBmV	
Range	0 to 5%	
Resolution	0.1%	
Accuracy	±0.5%	
Depth of Modulation (In-servi	ice, non-scrambled standard channels only)	
Range	50 to 100%	
Resolution	0.5%	
Audio Demodulation	FM carriers	
Tilt		
Max Number of Carriers	10	
High/Low Delta Resolution	0.1 dB	
Scan	Video, audio, pilot, and digital carriers; includes total power measurement	

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### Spectrum Mode

Display Spans	User-selectable in 10 kHz steps
Display Scale	1, 2, 5, or 10 dB/division
Display Range	7 vertical lines
Sweep Rate (78 Channels)	~500 ms
Detection and Dwell	Selectable detector modes (Narrow or Wide) and dwell time
Spurious Free Dynamic Range	60 dB @ 25° C (77° F) (+50 dBmV)
Sensitivity	-40 dBmV (4 MHz to 1 GHz)
Zero Span Mode	
Video Bandwidth	Digital averaging
Resolution Bandwidth	10, 30, 100, and 300 KHz; 1, 3 MHz
Pulse Measurement Accuracy	Nominal level in <7ms, ±2 dB from nominal in 4ms (300 kHz RBW)
Sweep Times	50 µs to 20 sec in 1, 2, 5 settings
Intermodulation Distortion (CSO/CTB)	
Range	≥60 dB
Resolution	0.1 dB



#### QAM Measurements

Modulation Types	ITU J.83 annex A, B, C; QPSK, 16, 32, 64, 128, and 256 QAM (at symbol rates from 2 MSPS to 6.9 MSPS)
Measurable Input (Lock) Range	<b>64 QAM:</b> -20 to +50 dBmV (typical) <b>256 QAM:</b> -15 to +50 dBmV (typical)
Frequency Tuning	5 MHz to 1 GHz
BER; 64 and 256 on all modulations	10 <sup>-4</sup> to 10 <sup>-10</sup>
MER	64 and 256 QAM, 6 MHz channel bandwidth: Range: 21 to 38 dB Accuracy (typical): ±1.5 dB 64 and 256 QAM, 8 MHz channel bandwidth: Range: 21 to 35 dB Accuracy (typical): ±2.0 dB
EVM	<b>64 QAM, 6 or 8 MHz channel</b> Range: 1.1% to 8.1% Accuracy: ±0.5% (1.1 to 2.0%) ±1.0% (2.1 to 4.2%) ±1.6% (4.3 to 8.1%) <b>256 QAM, 6 or 8 MHz channel</b> Range: 1.1% to 5.3% Accuracy: ±0.5% (1.1 to 2.0%) ±0.8% (2.1 to 4.2%)

### **QAM Level Measurement**

Signal Types	QPSK; QAM (16, 32, 64, 128, & 256)
Range	-40 to +50 dBmV
Accuracy @ 25° C	±1.25 dB
Bower Source	

# **INCLUDES THE FOLLOWING:** 5 MHz to 1 GHz analyzer (customer-

specified options) Protective carrying case Shoulder strap Universal charger, 90 to 220 VAC, U.S. plug User's manual

## **OPTIONAL ACCESSORIES:**

External battery charger P/N 2010986000

Vehicle power adaptor (CL-5) P/N 2070704002

Precision test cable (I/O-15) **P/N 2071527048** 

Protective display shields P/N 2230521001

I-Stop probe P/N 2010838001

TLB-60 filter **P/N 20110666000** 

Utility bag (CC-23) P/N 2131221000

VoIP RTP™ server software P/N 0930110000

WorkBench<sup>™</sup> software **P/N 0930083000** 

ACTS<sup>™</sup> software **P/N 0930144000** 

TDM software P/N 2011092100

**Power Source** 

Charging Time	4 hours
Operating Time, Continuous Use	4 to 6 hours
Physical	
Weight	5.85 lbs (2650 g)
Operating Temperature Range	-18° to +50° C (0° to 122° F)

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