

3600D

SECTION 1 GENERAL INFORMATION

1.1 INTRODUCTION

The Wavetek Model 3600D Cellular Test System continues the Wavetek tradition of intuitive user-friendly operation. The 3600D offers simplicity of operation with a one touch automated test button. This allows unskilled personnel to run a complete Go/No Go test of a cellular phone.

Whichever mode of operation you use, your test will be displayed on a large easy to read LCD display, with soft key menu driven screens that provide a complete summary analysis of analog or digital performance to improve repair and testing times. The display screen has inverse video capability that's technician selectable. The 3600D gives technicians the widest range of testing variations, allowing for reprogramming channel parameters, base and mobile transmit power levels. All of these test features can be programmed from your personal computer, put on a 3.5 in. disk, and directly loaded into the 3600D via its PC compatible disk drive; this allows for uploading, downloading, and distribution of programs and test data using standard PC software.

The 3600D provides increased flexibility with a cross point switch that controls the input and output of internal generators and filter combinations. Engineers can configure the bandpass filters required to accurately measure signal distortion and technicians can implement non-standard modulation tests using the two internal 10Hz to 100kHz generators that are programmable in 1Hz steps.

The 3600D features Wavetek's unique cable loss calibration function, which enables the most accurate power, SINAD, and level dependent Bit Error Rate (BER) measurements in the cellular industry.

1.2 SPECIFICATIONS

1.2.1 Measurement Receiver Inputs

RF Input/Output:	Impedance	50 Ohms
	VSWR	< 1.30:1
	Connector Type	TNC Socket
	Frequency Range	824.040 MHz to 848.970 MHz in 10 kHz steps

		1850.04 MHz to 1909.98 MHz (extended frequency range)
External Audio Input:	Power Range	-20 dBm to +40 dBm
	Level	1 Vrms nominal, 7.5 V 0-p
	Frequency	50 Hz to 50 kHz
	Impedance	10 k Ohm
External Audio Output:	Level	1 Vrms nominal
	Frequency	Same as Filter Selection
	Load Impedance	≥ 600 Ohm
	Output Impedance	50 Ohm
DeMod Output:	Level	1 Vrms = 8 kHz deviation
	Frequency	20 Hz to 40 kHz
	Load Impedance	≥ 600 Ohm
	Output Impedance	50 Ohm
Frequency Modulation:	Rates	50 Hz to 25 kHz
	Deviations	to 20 kHz
	Accuracy	+/- 4% of full scale
SINAD:	45 dB @ 1 kHz, at 1 VRMS in to Audio	
Distortion:	0.6% @ 1 kHz, at 1 VRMS in to Audio	
Residual FM and Noise:	< 50 Hz RMS, 0.3 to 3 kHz	
Power Measurement:	Range	0.01 mW to 10 W
	Accuracy	± 0.65 dB + 0.003dB/dB below +40 dBm @ 25 C ± 1.2 dB @ 10 C - 40 C)

1.2.2 Frequency Counter

RF:	Range	± 100 kHz from channel center
	Accuracy	± 10 Hz relative to instrument frequency reference
	Resolution	10 Hz
SAT, ST Frequency:	Accuracy	± 1 Hz
	Resolution	1.0 Hz

1.2.3 Signal Generator

Level Range:	-30 to -125 dBm	
Level Accuracy:	+ 0.75 dB - 0.003 dB/dB below -30 dBm @ 25C ± 2 dB, -80 to -120 dBm, @ 10 C - 40 C)	
Level Resolution:	0.1 dB	
Frequency Range:	869.010 MHz to 893.970 MHz in 10 kHz steps	
Modulation:	Type	Frequency Modulation
	Modulating Frequency Range	50 Hz to 20 kHz
	Deviation Range	0 to 25 kHz
	Deviation Accuracy	5% from 300 Hz to 12 kHz rates ± FM residual

1.2.4 Reference Oscillator

Temperature Stability:	± 0.2 ppm, 0 to 50°C
Aging:	± 1 ppm per year

1.2.5 Audio Synthesizers

Frequency Range:	10 Hz to 100 kHz
Frequency Resolution:	1 Hz
Frequency Accuracy:	1 ppm
Level Range:	0 to 5 Vrms
Level Resolution:	5 mV rms
Distortion (sine wave):	<0.1%

1.2.6 Digital Transmitter Tests (TDMA Option)

Carrier Frequency

Range: +/- 500 Hz from channel center
Accuracy: +/- 2 Hz relative to instrument frequency reference
Resolution: 1 Hz
Modulation Tolerance: Any data pattern of pi/4 DQPSK
Measurement Sample: 157 maximum effect symbols

Carrier Power Measurement

Range: -20 to +40 dBm
Accuracy: +/- 0.7 dB
Measurement Sample: 157 maximum effect symbols

Burst Timing

Range: +5, -20 symbols relative to standard offset
Accuracy: +/- 1/8 symbol, 5 us

Error Vector Measurement

EVM Accuracy: +/- 0.4% +/- 2% of reading
Residual EVM: <2.8%
Residual Phase Error: <1.6 degrees
Residual Magnitude Error: <1.0%

I/Q Origin Offset Accuracy

+/- 0.5 dB for -40 dBc

1.2.7 Digital Receiver Tests (TDMA Option)

Signal Generator

Level Range: -50 to -127 dBm
Level Accuracy: +/- 2 dB
Level Resolution: 0.1 dB
Frequency Range: 824.040 to 848.970 MHz in 10 kHz steps
1850.04 to 1909.98 MHz extended frequency option
Frequency Accuracy: 0.2 ppm standard; 0.05 ppm optional
Duplex Offset: 45 MHz

Modulation Generator

Modulation Type:	pi/4 DQPSK $\alpha=0.35$
RMS Vector Error:	< 6%
Fading Simulation:	Two ray equal amplitude, 41.5 micro-second, selectable Doppler shift
Digital BER Test:	Pseudo-random user data sent to mobile and returned on the reverse channel, data is compared for bit error, static or fading simulation from above
BER Reporting:	RF level set and BER report from mobile is displayed. Deliberate errors can be inserted, static or fading simulation from above.
RSSI Characteristics:	RF level set, mobile reported RSSI is displayed in binary and nominal dBm.
MAHO RSSI:	RF level set, second carrier level set relative to digital carrier, mobile then reports RSSI for second carrier, display in Binary and dBm
Talk Back Test:	Speech transmitted by mobile is returned to mobile's receiver after 2 second delay, 15 seconds of user storable speech can be played back
VSELP CODEC:	yes

1.2.8 User Programmable Settings

System:	Selection Type	A or B AMPS, NAMPS
Controls Channels:	Wireline Non-Wireline	334-354 313-333
Voice Channels:	1-799, 991-1023	
SID:	00000-32767	
DCC:	0, 1, 2, 3	

1.2.9 Interface

Printer:	Centronics, parallel, Epson/IBM compatible
Control:	RS-232 (serial port)

General Information

GP1B: IEEE STD 488 Port (optional)

Disk Drive: 1.44 MB, 3.5" PC compatible

1.2.10 Power Requirements

AC: 85 to 264 VAC (no switching required), 5 Amps max
47 to 440 Hz

1.2.11 Physical Specifications

Height: 7 in.

Width: 19.5 in.

Depth: 16.5 in.

Weight: 37 lbs. net

1.2.12 Environmental Specifications

Temperature Range: Operating 10 to 40°C
Storage -20 to 70°C

Warm-up Time: Full accuracy after 20 min. warm up specified

Storage Humidity: 10-90% RH, non-condensing

Operating Humidity: 10-75% RH, non-condensing