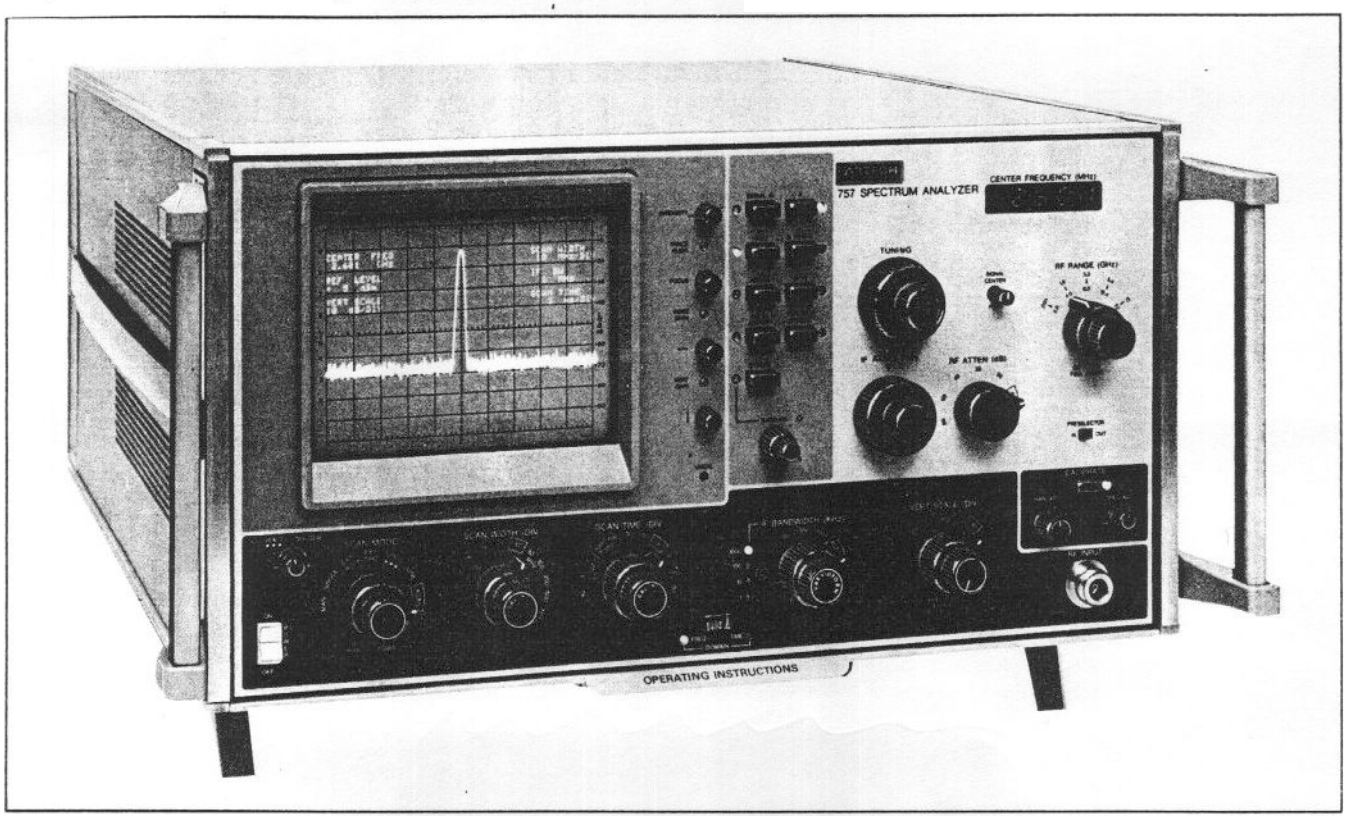
Model 757 Spectrum Analyzer

Superior Performance gives you Confidence in your rements



Designed for your Application

Communications

- High Sensitivity —
  −125 dBm/kHz up to 2 GHz
  −90 dBm/kHz from 12 GHz to 22 GHz
- Full Range Dispersion — up to 12 GHz
- Narrow Dispersion — down to 100 Hz/Div.

Radar

- High Selective Filters with 5:1 Shape Factors, Produce Well Defined Nulls
- Digital Storage — 1024 Horizontal Points and 512 Vertical Points Assures a Sharp, Accurate, Non-blooming Image
- Adjustable Video Trigger for ease of Synchronizing Modulation measurements

Production Test

- Remote Tuning
- Digitized Outputs
- Internal Calibration — All Bands
- Alphanumeric Readout of Controls on CRT

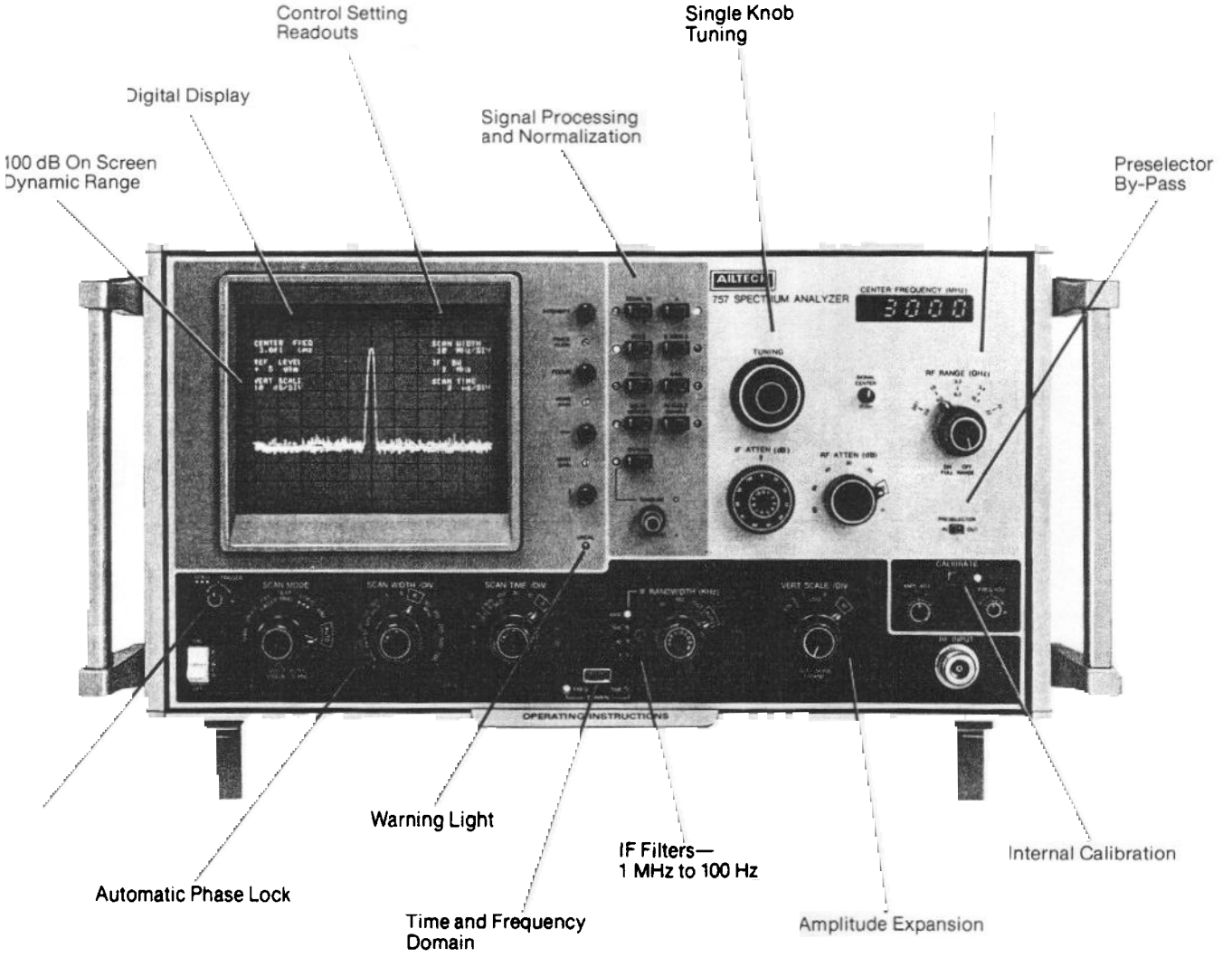
EMI/RFI

- 100 dB On-Screen Dynamic Range
- Very Low Spurious & Distortion Responses
- Wide Scans — Up to 12 GHz, Flicker Free Display
- Variable Bandwidth Selection

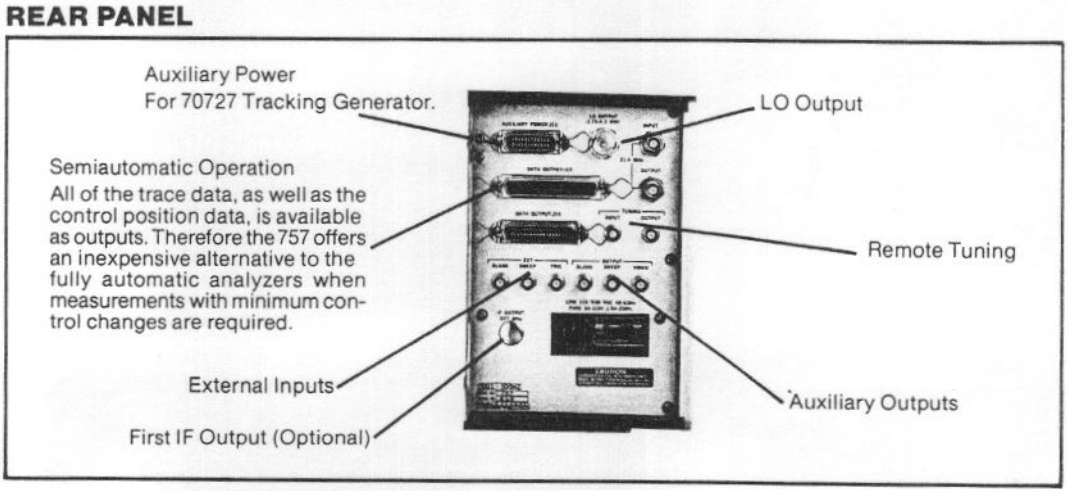
General Purpose

- Easy to Use
- Automatic Bandwidth Selection and Automatic Phase Lock
- Power Reference — Readout Follows Attenuators
- Uncal Light — reduces Chance of Operator Error
- Preselector Bypass — Increases Sensitivity by 10 dB
- Companion Tracking Generator — to 12 GHz

spectrum analyzer



REAR PANEL



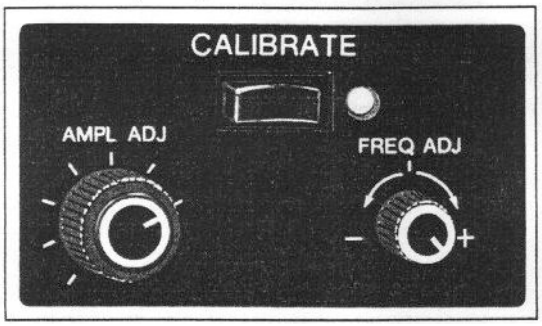
Features:

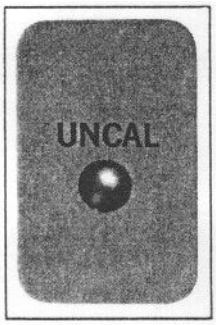
INTERNAL FREQUENCY AND AMPLITUDE CALIBRATION

ides more precise measurements with the addition of an internal 100 MHz Comb Generator. Calibration signals are generated in exact (±.005 percent) multiples of 100 MHz throughout the entire 22 GHz range of the analyzer. Signal frequencies can be typically measured to within ±1 MHz.

Also, the power level of the 1, 3, 5.8, 8.9 and 16 GHz calibration signals are specified to ±0.5 dBm, providing amplitude calibration for each frequency band. These values are noted on a calibration chart attached to the instrument.

Internal Frequency and Amplitude Calibration





Warning Light

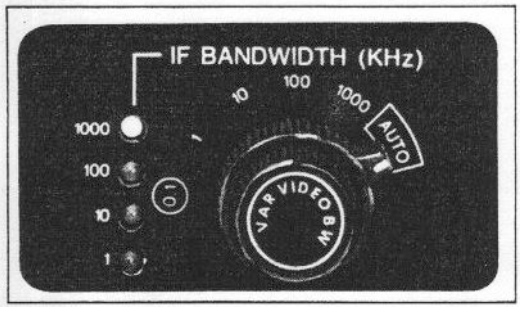
WARNING LIGHT

The 757 automatically cautions the operator when the display may be in an uncalibrated mode. Data misinterpretation is virtually eliminated, and an overall savings in measurement time is assured.

AUTOMATIC FEATURES

Complex measurements are made more easily with the 757 since it automatically stabilizes itself for narrow scan widths, and also selects the correct IF and video bandwidths. Thus, the operator has greater freedom to concentrate on the measurement data.

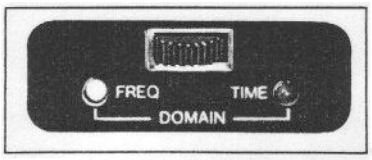
Automatic Features and LED Switch Indicator



LED SWITCH INDICATOR

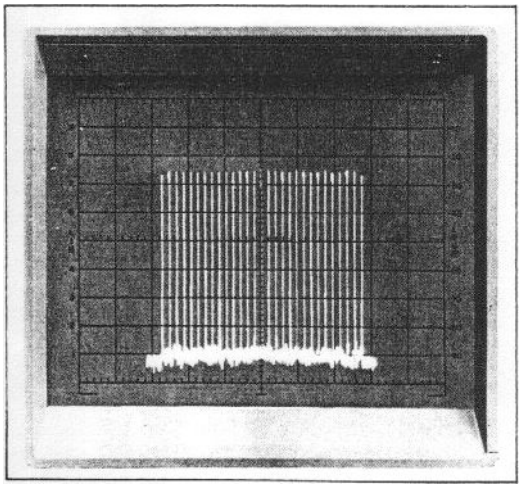
The status of the 757 controls is readily apparent, even from a distance, adding to the simplicity of operation that has always been a key feature in AILTECH spectrum analyzers.

TIME AND FREQUENCY DOMAIN



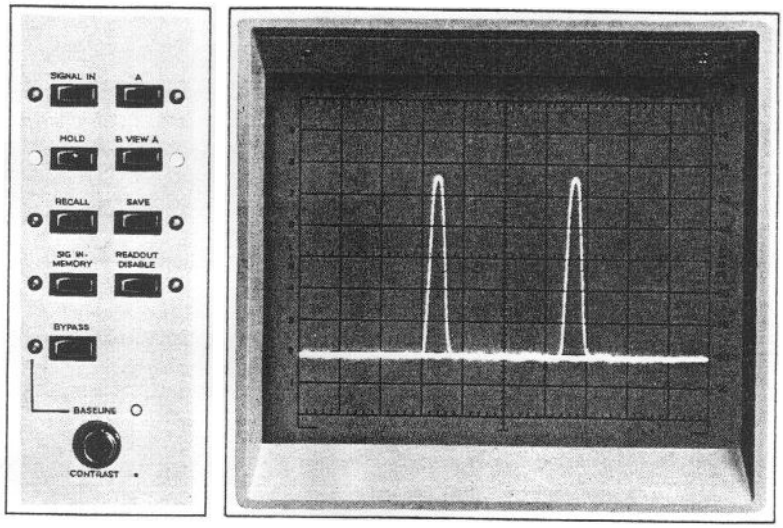
Converts the instrument from a standard swept frequency analyzer to a fixed frequency receiver displaying the signal's amplitude as a function of time. Very useful for AM and pulse analysis.

End of Band Blanking



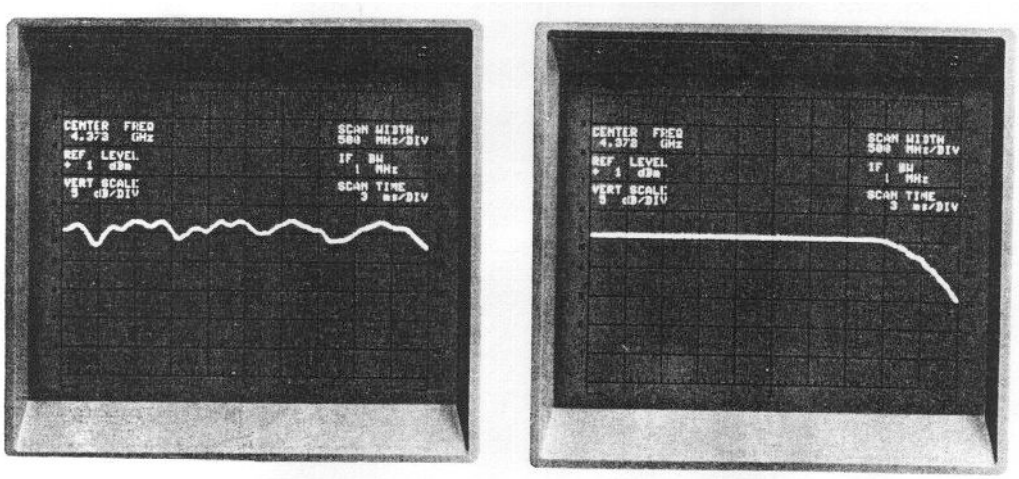
END OF BAND BLANKING

An erroneous signal from "out-of-band" can never be present on the 757 to confuse an inexperienced operator, because all frequencies beyond the band of interest are blanked.



SIGNAL PROCESSING

A modern, versatile display, incorporating the latest digital techniques, increases the usefulness of the 757. A flicker-free presentation is obtainable at all scan rates, through the temporary storage of the signal data in memory. Increased flexibility is provided for multiple trace analysis, by the addition of a second memory which allows the "infinite" storage of data for thorough analysis.



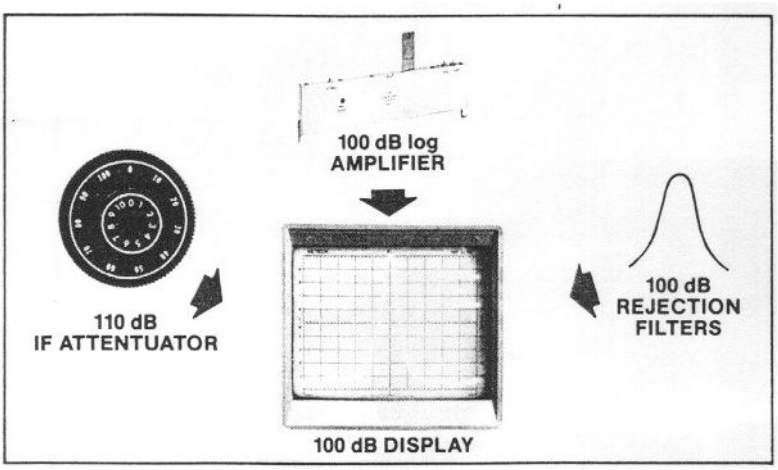
NORMALIZED DISPLAY

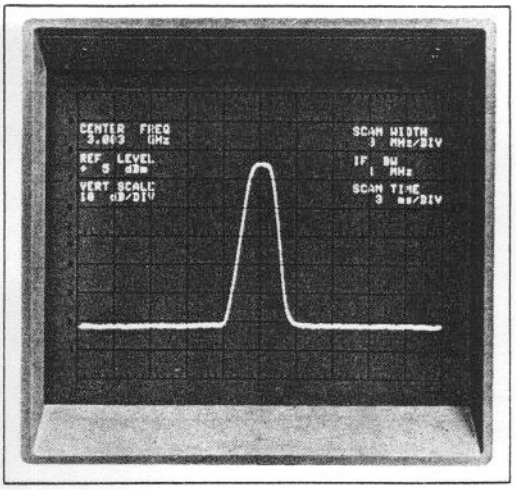
Improved accuracy results from the ability to normalize a measurement to the actual test set-up in use. The photos (above) illustrate a typical frequency response measurement of a low pass filter using the AILTECH 70727 Tracking Generator with the 757 Spectrum Analyzer. The left photo depicts the distorted response that normally results, due to the frequency response and mismatch errors of the test equipment. When these errors are placed in memory, by taking a calibration measurement with the filter short circuited, the normalizing feature allows the true response of the right photo to be obtained.

ALPHANUMERIC READOUT OF CONTROLS ON CRT

Operator convenience is enhanced with a CRT readout of the following analyzer operating conditions: Center-Frequency, Scan Width, Scan Time, IF Bandwidth, Reference Level and

Amplitude Scale. Rapid, permanent records of any measurement may easily be made by photographing the CRT. A "disable" pushbutton control is also provided to remove the data from the CRT, at the discretion of the operator.

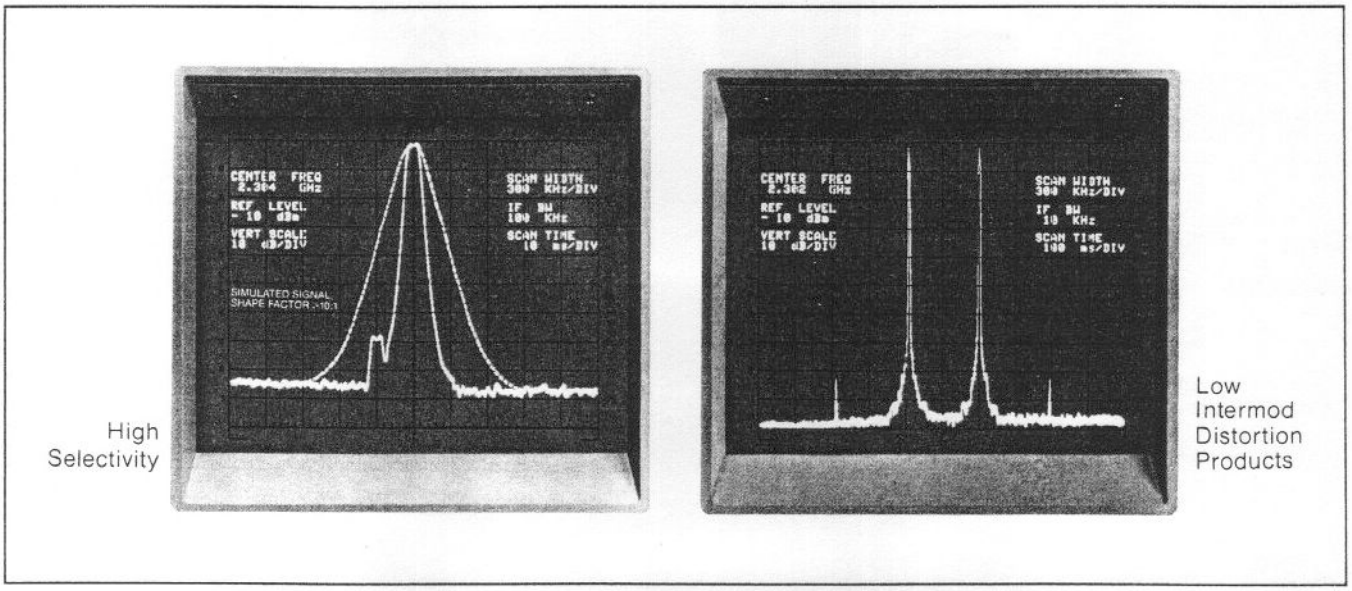




spectrum analyzer

100 dB ON-SCREEN DYNAMIC RANGE

Total 100 dB on-screen performance is attainable with the 757 Spectrum Analyzer. Low level noise and spurious signals, originating in oscillators, amplifiers, receiving systems, etc., can be viewed simultaneously with their high power fundamental output. Consequently, the effect of circuit changes can readily be observed on both the high and low power outputs.



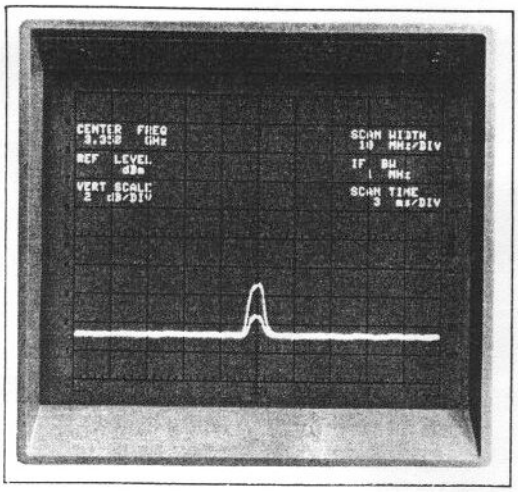
HIGH SELECTIVITY

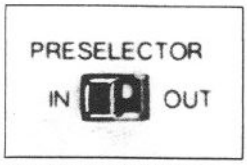
The highly selective IF filters in the 757 (shape factor $< 5{:}1$) give the user two important advantages:

1. They minimize the possibility of overlooking a weak signal in the presence of a strong one, and
2. The nulls in a $(\sin x)/x$ spectral display of a pulsed signal are more clearly defined.

LOW INTERMOD DISTORTION PRODUCTS

Exact signal analysis can be more easily achieved using the 757 Spectrum Analyzer because of its extended dynamic range. As an example, the third order IMP's are guaranteed to be 100 dB below two —30 dBm signals from 1.8 GHz to 22 GHz. Thus, any small distortion products observed on screen will normally originate in the system under test.





Preselector By-Pass

Amplitude Expansion
Reference/Noise

PRESELECTOR BY-PASS

An increase in sensitivity of approximately 10 dB is attainable with the preselector by-pass. The average noise level is typically lowered to:

FREQUENCY	AVG. NOISE LEVEL
1.8-4.0 GHz	-120 dBm/kHz
3.3-8.3 GHz	-115 dBm/kHz
5.4-12.4 GHz	-110 dBm/kHz
10-22 GHz	-100 dBm/kHz

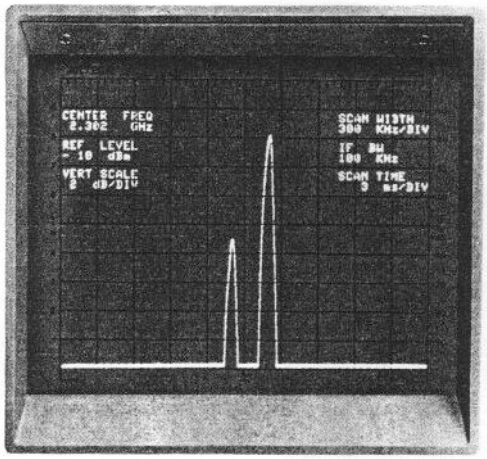
For many measurements, the cost and inconvenience of an external preamplifier can be saved.

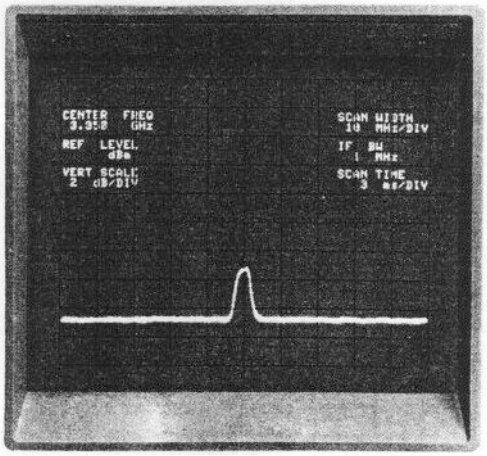
AMPLITUDE EXPANSION REFERENCE/NOISE

The amplitude expansion capability of an analyzer is usually required to satisfy either of the following needs:

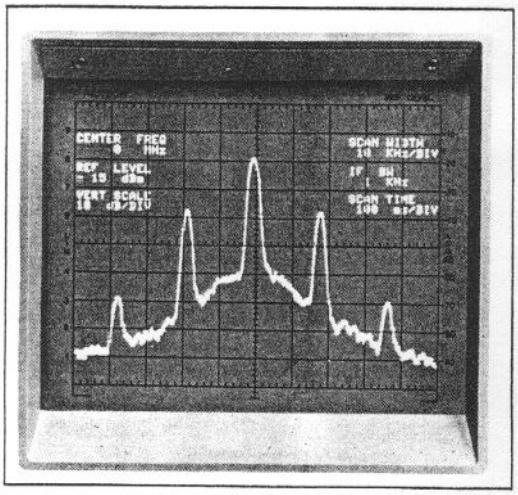
1. Accurately determine the difference between two strong signals (See photo below on left).
2. Amplify a very weak signal close to the noise threshold of the analyzer (See photo below on right).

Each of these needs is best satisfied with the 757, by offering the operator the choice of expanding from a Reference at the top of the display, or from the noise level at the bottom.





Low Frequency Measurements



LOW FREQUENCY MEASUREMENTS

A microwave engineer's occasional need to examine a low frequency signal can readily be satisfied with the 757.

Using the LO feedthru as a zero frequency marker, and the calibrated Scan Width switch, any signal below 1 MHz can be analyzed. The photo illustrates the typical sensitivity at 20 kHz is -87 dBm.

FREQUENCY SPECIFICATIONS

Frequency Range

Tuning Range: 0.001* to 22 GHz covered in 5 Bands.

Band 1	0.001*-2.0 GHz
Band 2	1.8-4.0 GHz
Band 3	3.3-8.3 GHz
Band 4	5.4-12.4 GHz
Band 5	10-22 GHz

*Usable down to 1.0 kHz.

Range Extension: With external converter to 60 GHz.

Frequency Dispersion

Fixed Scan: 14 Calibrated positions from 1 kHz/Div. to 700 MHz/Div.

Variable Scan: Additional control for selection of scan widths in between calibrated values. Reduction to zero scan possible.

Full Range Scan: The entire frequency range of each band can be displayed with a frequency marker positioned by the TUNING control. A signal identified by the marker becomes the center frequency when switched out of this mode.

Time Domain: Analyzer becomes fixed tuned (zero scan width) receiver. The demodulated signal is displayed as a function of time. Usable over entire frequency range.

Frequency Accuracy

Digital Frequency Readout: 0.2% from 2 to 22 GHz, ±6 MHz from 1 MHz to 1 GHz, ±8 MHz from 1 GHz to 2 GHz can be set to ±1 MHz at 100 MHz calibration intervals by Calibration Frequency Adjust control.

Scan Accuracy: Frequency span between any two points on the display is typically within ±10% of the indicated separation.

Residual FM: Less than 200 Hz peak to peak over entire frequency range of 0.001 to 22 GHz when phase locked.

Less than 10 KHz peak to peak for fundamental mixing (1 MHz to 4 GHz) non phase locked.

Noise Sidebands: For fundamental mixing with a 1 kHz IF bandwidth and 10 Hz video bandwidth.

Separation from Signal	Level below CW Signal
30 kHz	70 dB
90 kHz	80 dB
300 kHz	90 dB
1 MHz	95 dB

Frequency Resolution IF Bandwidth

Ranges: 1, 10, 100 and 1000 kHz.

Accuracy: 1 kHz typically 1.3 kHz ±20%; 10 kHz ±10%; 100 kHz ±10%; 1 MHz typically 1.5 MHz ±20%.

Selection Method: Automatic selection as a function of Scan Width and Scan Time. Manual override also provided.

Selectivity: 60 dB to 3 dB ratio of all filters <5:1, 100 dB to 3 dB ratio of all filters <10:1. Off resonance rejection of all filters >100 dB.

Video Bandwidth

Ranges: Variable from 10 Hz to 1000 kHz, or Fixed at 1, 10, 100, 1000 kHz.

Selection Method: Automatic selection of 1, 10, 100 and 1000 kHz filters with variable selector in OFF position.

Specifications subject to change without notice.

Frequency Drift

Long Term: 3 kHz per 10 min., typical in phase lock, after 1 hour warm-up.

AMPLITUDE SPECIFICATIONS

Full Screen Display Range

Logarithmic: 100, 50 and 20 dB (10 DIVISIONS).

Linear: 1 μV to 10 volts (10 DIVISIONS).

Sensitivity

Average Noise Level in 1 kHz Bandwidth:

RF Range (GHz)	Avg. Noise Level (dBm)
0.001-2.0	-105*
1.8-4.0	-110
3.3-8.3	-105
5.4-12.4	-100
10-22	-90

*-125 dBm with 001Option

Residual Responses: Less than -90 dBm referred to signal level at RF input.

Preselector: Three pole filter normally 18 dB/octive, with 3 dB bandwidth typically varying between 25 MHz (at 1.8 GHz) to 90 MHz (at 22 GHz).

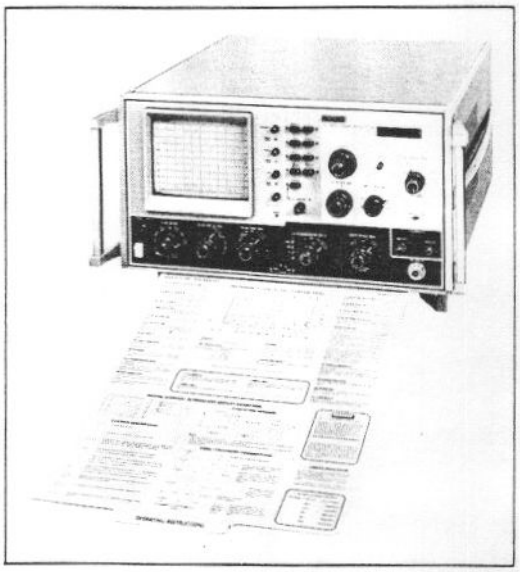
Frequency Response: (Flatness)

RF Range (GHz)	Response (dB)—Includes Preselector
0.001-2.0	±1.5
1.8-4.0	±2.0
3.3-8.3	±2.5
5.4-12.4	±2.5
10-22	±3.0

Out of Range Blanking: CRT trace is automatically blanked whenever the band edges are exceeded.

ABSOLUTE CALIBRATION

Internal calibration reference signals every 100 MHz. Power level specified at 1, 3, 5.8, 8.9 and 16 GHz. With amplitude adjust of Ref level accurate to ±1 dB.



Pull-Out Information Card

Maximum Input Power: +20 dBm (0.1 watt) with 0 RF attenuation +33 dBm (2.0 watts) with 20 dB or more RF attenuation.

Relative Gain Variation Between RF Ranges: ±1.0 dB maximum.

IF Gain Variation with Different Bandwidth Settings: ±1.0 dB maximum.

RF Attenuator: 0-60 dB in 10 dB steps. Frequency response typically ±0.7 dB from 0.001 to 22 GHz.

IF Attenuator: 0-110 dB in 1 dB steps. Accuracy ±0.25 dB per 10 dB steps but not more than ±1.5 dB over full range.

Log Display Accuracy: ±0.2 dB/dB but not more than ±2 dB over 100 dB range.

Input Impedance: With RF attentuator at 0 dB. Typically
SWR: <1.5 0.001 to 2.0 GHz
<1.6 1.8 to 22 GHz at analyzer tuned frequency.

Spurious Responses

Second Harmonic Distortion

Frequency	Power Input	Distortion Level
0.001 to 1.8 GHz	-30 dBm	-70 dB
1.8-22 GHz	0 dBm	-120 dB

Specifications are continued on the following page.

Third Order Intermodulation Distortion

Frequency	Signal Separation	Power Input	Distortion Level
0.001-1.8 GHz	200 kHz	-30 dBm	-90 dB
1.8-22 GHz	200 kHz	-30 dBm	-100 dB
1.8-22 GHz	100 MHz	0 dBm	-120 dB

Image Response:

Frequency	Power Input	Distortion Level
0.001-2.0 GHz	Any	Non Existent
2.0-22 GHz	Any	-70 dB

Local Oscillator Emission at RF Input Port (RF Attenuator Set to 0 dB):

Frequency	Emission Level
0.001-2.0 GHz	-70 dBm typical
2.0-22 GHz	-75 dBm typical

LO Output: Swept LO typically from 1.7 to 4.5 GHz; Level typically 0 dBm.

Scan Time Specifications

Sweep Time: 11 calibrated sweep times from .01 msec to 10 sec with time domain/freq. domain switch which allows selection of time domain for all 11 positions and frequency domain for 8 positions.

Scan Time Accuracy: ±10% from 10 sec to .01 msec.

Display Specifications

CRT Phosphor: Aluminized P31 phosphor.

Graticule: 10 x 10 divisions, internal (parallax free).

Viewing Area: Horizontal 4.4 in. (11.18 cm)—Vertical 3.35 in. (8.51 cm).

Digitizing Sweep Rates: 10 sec/div through 3 ms/div.

Horizontal Resolution: 1024 data points.

Vertical Resolution: 512 data points.

Digitized Waveform Display: One or two waveforms which may be in an active, stored or normalized mode.

Readout Parameters Displayed: Center Frequency, Reference Level, Vertical Scale, Scan Width, IF Bandwidth, Scan Time.

Readout Enable: The readout may be enabled in all digitized modes and in the analog mode for a sweep of 3 msec/div.

Digital Waveform Bypass: The digital waveform may be disabled on any range, however, it will automatically be disabled on sweeps of 1 msec/div through .01 msec/div.

External Digital Output: Two rear panel connectors provide the digitized waveform data and the spectrum analyzer control positions.

The waveform data is available on one connector. Ten (10) bits of horizontal position data and nine (9) bits of vertical position data are presented in a binary weighted format with open collector outputs.

The six sets of control position data are in binary format with open collector output.

Three additional data lines are provided to indicate whether waveform data is:

1. From Channel A or B
2. From Input Memory or Recall Memory
3. Valid or Invalid

A strobe line clocks the output data.

Remote Tuning Voltage: DC voltage ±6 volts permits tuning to any frequency in any band.

GENERAL CHARACTERISTICS

TEMPERATURE RANGE

Operating: 0° to 55° C.

Storage: -40° to +75° C.

Humidity: 95% R.H. 0° to 40° C.

POWER REQUIREMENTS

Line Voltage: 115/230 VAC ±10%.

Line Frequency: 50/60 Hz—400 Hz Optional.

Line Power: Less than 220 watts.

DIMENSIONS

Height: 8¾ inches (222 mm).

Width: 16¾ inches; (425 mm). Rack mount adaptor available for 19" rack (P/N 757-49).

Depth: 21⅞ inches; (530 mm).

Weight: 65 pounds (29.5 kg.).

Options

001 Increased Sensitivity Option: A 20 dB gain amplifier is added at the first IF frequency reducing the noise figure of the analyzer over the full 0.001 to 2 GHz range, to 19 dB maximum. This permits a sensitivity with the 1 KHz bandwidth of better than −125 dBm.

002 Receiver Option: The 227 MHz first IF is brought out to a BNC Type connector on the rear panel with a bandwidth of 10 MHz. The conversion loss between the RF input signal and IF signal is typically 10 dB for fundamental mixing. This output is fixed tuned when the Time Domain mode is selected or the analyzer is operated in the phase lock mode.

014 Low Band Range Extension: The Low Band Range Extension to 1 KHz Option consists of 100 Hz IF Filter for improvement of signal to noise ratio and the low band 001 option to increase sensitivity from 1 KHz to 2.0 GHz.

—80 400 Hz Line Frequency: Permits operation of analyzer at line frequencies between 50 and 400 Hz.

—100 100 Hz IF Filter: The addition of a 100 Hz IF filter for narrow band applications. A signal to noise improvement of approximately 10 dB is achieved. The filter is selected manually via a front panel switch.

—300 300 MHz IF Filter: The addition of a 300 Hz IF Filter for narrow band applications. A signal to noise improvement of approximately 10 dB is achieved. The filter is selected manually via a front panel switch.

—46 Camera An economical, easy to use Tektronix C5A camera with a fixed focus lens, an aperture of f-16 (fixed), and an adaptable magnification of .67 or .85. A variable intensity flash lamp provides graticule illumination. The camera attaches directly to the display. It accepts 3000 speed pack film and operates on two AA penlight batteries.

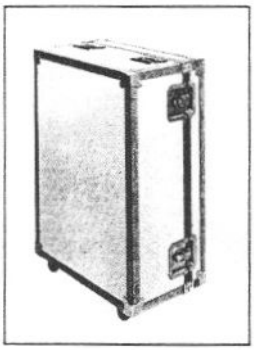
—47 Rack Mount: For rack mounting the 70726/70727 Tracking Generator. Consists of two angle tabs and required hardware. P/N 70747.

—49 Rack Mounting Adaptor: Consists of mounting brackets to provide a convenient means of mounting the spectrum analyzer in a standard 19 inch rack.

—50 Slide Mounting Adaptor: Consists of two sides and −49 Rack Mounting Adaptor which allow the slides to be mounted. The recommended slides are Jonathan Mfg. Co. P/N 310-L-18-22.

—51 Transit Case: Allows unit to be easily shipped.

Transit Case



Display Camera