

BASIC SPECIFICATIONS

Selectable Frequency Bands (38):

Band 1 (1):	890–940 MHz (500 kHz resolution)
Band 2 (1):	2.400–2.500 GHz (1 MHz resolution)
Band 3 (15):	3.400–4.200 GHz (1 MHz resolution)
Band 4 (21):	4.900–6.000 GHz (1 MHz resolution)

Bandwidth:	2 MHz
Sensitivity:	-103 dBm, typical
Overload Point:	-30 dBm
Damage Level:	+10 dBm
Marker Resolution:	0.3 dB (power); 1 MHz (frequency)
Operating Temperature:	-15°C to 50°C (5°F to 122°F) limited by battery req.
Storage Temperature:	-40°C to 71°C (-40°F to 160°F) without battery
Battery:	-15°C to 40°C (5°F to 104°F)
Battery Charging Temp.:	0°C to 40°C (32°F to 104°F)
Battery:	12 V, 2.3 Ah, rechargeable sealed Lead-Acid
Operation Time (approx.):	5–6 hours continuous
Charge Time (approx.):	3 hour
Battery Status LEDs on:	
LOW:	Approx. 1 hour operating time remains
CHARGED:	AC Charger connected, Battery charged
AC MAINS:	AC Charger connected, Battery charging

Record-R™ Data Logger

Data Recorded:	Received Signal Level (dBm per channel / peak or average), Frequency, Date, Time, Model No. & Serial No.; and (if GPS is locked): Latitude & Longitude.
Record Time:	Band sweep ≤2 sec.; single freq. ≈20 ms.
Max. No. of Records:	255 single frequency or band sweep records

GPS:

Frequency:	L1 (1575.42 MHz), C/A code (SPS), 8-channel cont. tracking, 32 correlators.
Position Accuracy:	±2 meters.
Timing Accuracy:	±95 nano-seconds.
Position Fix Update:	1 second.
Time to Lock:	Cold Start: <130 seconds (90%); Warm Start: <45 seconds (90%); Hot Start: <20 seconds (90%).
Reacquisition Time:	<2 seconds (90%) after loss of signal.

Analyze-R™, Record-R™, & Log View-R™ are Trade Marks of Pendulum Instruments, Inc.

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Incorporating XL Microwave

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Analyze-R™

Model 2261A, Spectrum Monitor / Analyzer Test Set

User Information Card

The following information is provided to aid the user in the operation of the Analyze-R™ Test Set. For more in-depth information, as well as service and repair information, consult the Operation Manual included with each instrument.

NOTE: This instrument is not waterproof. To minimize weather related problems, keep instrument within its Weather-resistant Back-pack.

The *Analyze-R™* is specifically designed for those doing site surveying, installing, maintaining, and troubleshooting of the latest wireless communication systems, at a fraction of the cost of a full-featured general-purpose spectrum analyzer...and *far easier to use*.

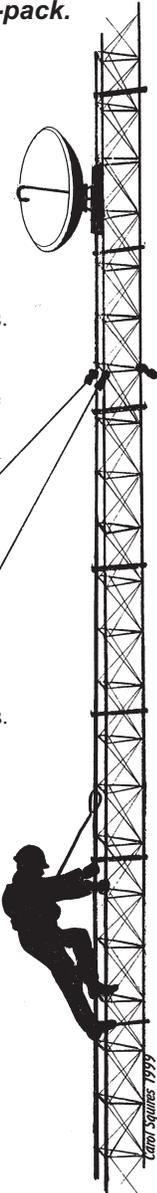
Because unlicensed wireless systems often operate slightly above the ambient noise level and ISM transmissions are allowed greater EIRP power than U-NII systems, identifying possible interference sources prior to system design and installation is *critically* important. The *Analyze-R™* is the only application specific instrument on the market designed to *identify* and *record* these spectral problems.

The *Analyze-R™* allows you to quickly acquire and document accurate test measurements for site analysis. Applications include: verifying geographical site coordinates and antenna centerline elevations for precise analysis of system engineering; measuring and documenting the RF signature of the received signal to capture any possible signal distortion; measuring and documenting the RF signature of any potential interfering source; differentiating path-induced problems from equipment problems; confirming optimum antenna locations.

The proposed site/antenna location can be analyzed by sweeping the band of interest. This sweep measures possible interfering transmissions within the Band and displays their power spectrum. Any one of 38 bands can be swept and the received signal level (RSL) power recorded, in 1 MHz-wide steps. This power-to-frequency information can be used to customize radio and antenna design and location to accommodate interfering signals from other transmissions.

The *Analyze-R™* can also be used to align the site's antenna. By measuring the received signal level power of the specific frequency being used by the link, the antenna can be located and adjusted for maximum received signal level and the results recorded for verification.

The *Analyze-R™* also contains XL's *Record-R™* Data Logger, with embedded GPS receiver, for recording specific single frequency information or an entire 100 MHz ISM / U-NII band sweep. Recorded information includes frequency, peak or average power, longitude, latitude, and UTC date & time. Recording a Band Sweep will yield individual 1 MHz-wide peak or average power steps through the entire 100 MHz band along with location and date/time information. The instrument includes both RS-232 and USB interfaces. Using the *Log View-R™* companion software (included) provides for transferring information from the instrument to a PC for saving, viewing, analyzing, archiving, and printout of the recorded data. Automatic C/I calculation and programming Unattended Data Recording are also done in *Log View-R™*.



Operating Procedure

Prior to operation, establish that the 2261A has a fully charged battery installed.

CAUTION: Use only the Battery Charger supplied with the 2261A, another charger may damage the 2261A and/or the Battery!

1. Select an appropriate antenna for the band of interest.
2. Connect a coax cable, with the appropriate connectors (and adapters, if required), from the 'ANTENNA RF IN' type 'N' connector on the *Analyze-R™* to the antenna.
3. Power-up the *Analyze-R™*. Using the 'Select' pushbutton and 'Marker / Frequency Tuning' knob, select one of the 38 bands.
4. Push the 'Select' pushbutton again and set the marker separation to coincide with the channel bandwidth of the radio you are using, e.g. 20 MHz, 27 MHz, etc.
Note: This is an optional feature (option 01, Total Channel Power) and may not be activated in your instrument. Push the 'Select' pushbutton again to display the entire 100-MHz-wide frequency band.
5. Using the 'Display' pushbuttons, select 'Band Sweep' (the default); and either 'Average' or 'Peak Hold' power.

The 'Marker/Frequency Tuning' knob can be used to move the marker(s) across the display. When a single marker is displayed (Marker Separation: 0 MHz) the frequency and power of the intercepted frequency will be displayed at the top of the display. With a marker separation setting >0 MHz, two markers will be displayed at the selected separation (Band Sweep is activated). The knob moves the locked pair of markers across the display. The numeric values shown at the top of the display represent the center frequency and the Total Channel Power of the signal captured between the markers.

When the display is in 'Average' power mode, the Received Signal Level (RSL) displayed will vary as the spectrum power varies in real-time. In the 'Peak Hold' mode, the RSL display will retain the highest power level received, for each 1-MHz channel, for as long as the *Analyze-R™* is in this hold mode. The display is continuously updated every 300 msec.

If 'Single Freq.' is selected (Marker Separation must be 0 MHz), the display will switch from a graphic display to a numeric display and show a specific frequency and its associated RSL power. This frequency can be tuned (to a resolution of 1 MHz), within the selected band, by using the 'Marker / Frequency Tuning' knob. Both peak and average power selection are operational in this mode.

Warning

To insure the integrity of the backpack to instrument connection, a safety wire connecting the instrument to the backpack 'D' ring is included. This safety wire connection is designed to prevent the instrument separating from the backpack. **This safety wire connection should never be removed or defeated when the unit is being used in the field.** Whenever the instrument is taken up a tower, the unit should always be attached to the tower's superstructure. The recommended attachment method is a carabiner through the backpack's 'D' ring and a nylon runner looped around the superstructure, with the free end attached to the carabiner.

Record-R™ Data Logging Information

The *Record-R™* allows the results of band sweeps or single frequency information from the *Analyze-R™*, to be saved in internal memory. The *Record-R™* contains an embedded GPS receiver, which provides accurate date/time and position information to be added to the above data. The data is saved in non-volatile memory and is not affected by turning the instrument off. Up to 255 band sweeps or single frequency records can be saved in the field.



When the [*Record-R™*] pushbutton is pressed, an individual data record is created and stored in the instrument's memory, provided the MEMORY OK LED is continuously illuminated. The memory used for this storage is non-volatile; it is not affected by turning the instrument off. The *Record-R™* LED illuminates for 1–2 seconds when a data record is being recorded. When logging a data record, the data recorded will be identical to the data displayed on the instrument the moment the *Record-R™* pushbutton is pressed (a 100 MHz-wide span in Band Sweep).

Recording data without GPS Lock. If the GPS LOCK is flashing (no lock), position is not known and cannot be recorded. If the [*Record-R™*] button is pressed and held for three seconds, until the *Record-R™* LED illuminates, a data record will be recorded with date/time, frequency(ies), and RSL. The data recorded is the information displayed at the instant the *Record-R™* LED illuminates.

'MEMORY OK' LED illuminates to indicate that there is room in the instrument's memory to store additional records. If this LED is not illuminated, internal memory is full and records must be downloaded, via the instrument's USB or RS-232 ports, a PC and the *Log View-R™* software utility, before further data records can be recorded. *Note:* There may be no room for a band sweep record but a single frequency data record could be accommodated, the LED will indicate this, based on the mode the instrument is in (band sweep or single freq.).

'GPS LOCK' LED has two 'ON' states. (1) The LED illuminates *continuously* when the internal GPS receiver is locked to three or more satellites, giving a two-dimensional solution: latitude and longitude with date/time (this could take 2–3 minutes from a 'cold' start) and indicates that date/time and position will be added to the recorded data. (2) The LED *flashes briefly once every second* when the GPS receiver is attempting to acquire satellites, indicating that there are not enough satellites locked-on to provide a fix. Data may be recorded without GPS lock but will lack position information. Date and time will always be recorded (there is an internal real-time clock). If this LED is not illuminated in one of the previously described ways it indicates a failure of the GPS receiver.

Note: The GPS antenna, the small plastic block located on the front panel of the instrument, should face up to the sky for best signal acquisition and GPS lock.

The latest version of the *Log View-R™* software utility is available for free download from our website at: www.pendulum-instruments.com