

2712
2711

Spectrum Analyzers

Versatile, Low-Cost

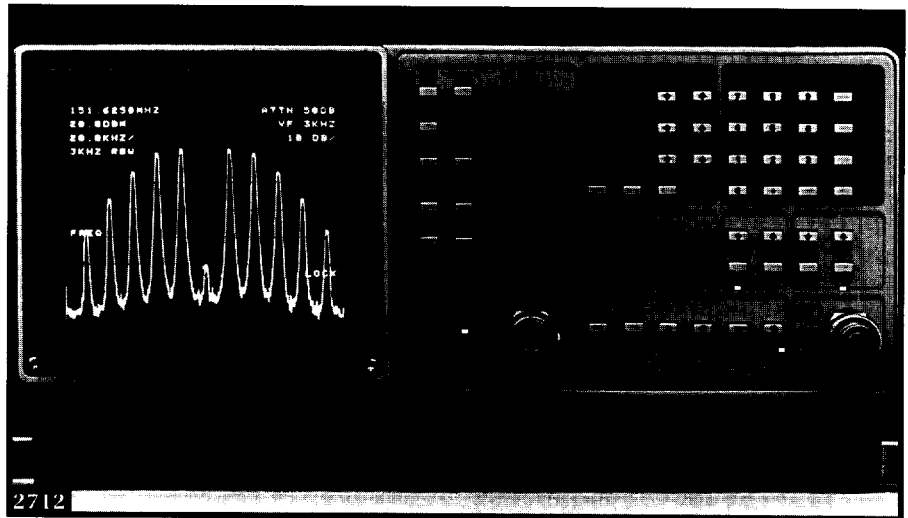
*Lightweight,
portable
spectrum
analyzers –
packed with
affordable
measurement
power.*

2712

- High Value, Low Cost
- 5×10^{-7} Frequency Accuracy
- Sensitivity to -139 dBm (-92 dBm V) with Built-in Preamp
- Internal Frequency Counter
- 4 Trace Digital Plus True Analog Display
- 124 K of RAM
- Easy to Use
- Dedicated Numeric Keypad Plus Logically Grouped Menu Keys
- Powerful Built-in Measurement Routines
- EMC Measurements with Optional Quasi-peak Detector
- Swept Measurements to 1.8 GHz with Optional Internal or External Tracking Generator
- UL Listed 1244, Certified CSA C22.2 No. 231-M89

2711

- Economical, Can Be Configured to Meet Most Budgets
- High Portability
- Internal or External Tracking Generator Option
- Internal Frequency Counter (Option 02)
- GPIB or RS-232 Interface Option
- Excellent Frequency Accuracy and Sensitivity
- 3-Control Operation for Most Measurements
- UL Listed 1244, CSA Bulletin 556B



2712 Spectrum Analyzer

The Tektronix 2712 Spectrum Analyzer provides excellent RF performance, a built-in frequency counter, full programmability, digital and true analog displays, high portability, enough non-volatile memory for 108 saved displays, and much more.

A straightforward human interface, with conveniently-grouped, dedicated front-panel keys and simple, menu-driven functions makes the 2712 easy to learn and use. You can set frequency, span, and reference level directly from the front panel. A real-time clock provides an on-screen date and time display, plus date/time stamp capability for waveform printouts.

Frequency-corrected tuning and phaselock stabilization enhance the ability to resolve close-in signals and reliably demodulate narrowband signals. Sensitivity up to -127 dBm (-80 dBm V) at 300 Hz resolution bandwidth (RBW) lets you see weak signals. The built-in preamp can improve sensitivity another 12 dB, up to -139 dBm (-92 dBm V). Up to 80 dB on-screen dynamic range ensures visibility of weak signals in the presence of strong ones.

A 300 Hz RBW filter with a shape factor $\leq 7:1$ means you'll see many close-in sidebands and spurious, or unexpected signals you might otherwise miss. At the other end of the spectrum, the 5 MHz RBW filter is useful when demodulating wideband signals such as actively modulated video carriers.

The built-in signal counter, with 0.5 ppm ± 10 Hz accuracy, offers added power for rapidly identifying signals. The capability to choose between digital and true analog displays lets you examine signals for characteristics that are not visible on digital-only displays.

Sweep speeds of 1 μ sec/div, TV Line and TV Field triggering, an internal audio amplifier and AM/FM detectors, and the optional Video Monitor Mode all make video communications measurements easier.

Bandwidth, Carrier-to-Noise, Noise Power, Signal Search, and FM Deviation modes provide additional measurement power and convenience. Occupied Bandwidth Mode, with percent settable from 1 to 99%, aids in broadcast radio measurements.

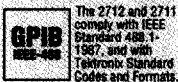
The optional internal or external tracking generator provides high dynamic range swept measurements to 1.8 GHz.

SELECTION GUIDE

Capability	2712	2711
Frequency Range	9 kHz to 1.8 GHz	9 kHz to 1.8 GHz
± 0.5 ppm Freq. Accuracy	Std.	NA
Signal Counter	Std.	Opt. 02
GPIB Interface	Std.	Opt. 03
Internal Tracking Gen.	Opt. 04	Opt. 04
External Tracking Gen.	Opt. 05	Opt. 05
RS-232C Interface (replaces GPIB)	Opt. 08 (no charge)	Opt. 08
Video Monitor Mode	Opt. 10	Opt. 10
EMC Pre-Certification Measurements	Opt. 12	NA
TV Sideband Adapter Interface	Opt. 15	Opt. 15
Nonvolatile Memory	124 K	28 K (124 K with Opt. 03 or 08)
High Portability	Yes	Yes
Both Digital and True Analog Displays	Yes	Yes
Dedicated Numeric Keypad	Yes	Yes
Real-Time Clock	Std.	With Opt. 03 or 08

Continued on next page.

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SPECTRUM ANALYZERS

EMC MEASUREMENT

To help simplify your EMC measurements, the 2712 offers an optional quasi-peak detector, EMI resolution bandwidth filters, and fully-corrected E-field intensity measurements to assist in pre-certification and troubleshooting. EMC ancillary devices are available to provide a complete measurement solution. See page 235.

2711 Spectrum Analyzer

The 2711 offers a wide range of features at an extremely affordable price. This value leader is well-suited for checking broadcast transmitter performance and communications system operations, looking for unwanted RF emissions, testing two-way communications equipment, maintaining industrial security, and teaching frequency domain concepts in the classroom, plus a wide variety of other applications.

The standard 2711 shares many of the 2712's valuable features such as compact size and light weight (9.5 kg, about 21 lb.). Both instruments can also be quickly converted to rack operation with optional rack-mount adapters.

Frequency accuracy is 1×10^{-5} and sensitivity is up to -117 dBm (-70 dBm V) at 3 kHz RBW. The built-in preamp can add another 12 dB, up to -129 dBm (-82 dBm V). Up to 80 dB on-screen dynamic range helps see weak signals, even when strong ones are present.

True analog display capability, along with fast sweep speeds and TV Line and TV Field triggering provide convenient demodulation of video carriers for making depth-of-modulation checks or looking at special baseband data, VITS, and many other signals.

An internal audio amplifier and AM/FM detectors let you hear demodulated signals, using either the built-in speaker or headphone jack, for fast signal identification and troubleshooting in communications applications.

With the Video Monitor (Option 10) installed, you can view broadcast (AM) TV signals or down-converted satellite (FM) signals.

The 2711 can also be used with a set of near-field probes as a handy EMC diagnostic tool.

Characteristics

The following characteristics apply to both the 2712 and 2711 after a 15-minute warm-up period, unless otherwise noted.

FREQUENCY RELATED

Frequency Range – 9 kHz to 1800 MHz.

Center Frequency Accuracy – 2712: 5×10^{-7} of CF ± 700 Hz; 2711: 1×10^{-5} of CF ± 5 kHz.

Frequency Counter Accuracy (Std. 2712, Option 02 2711) – 2712: 5×10^{-7} of CF ± 10 Hz, ± 1 LSB. 2711: 1×10^{-5} of CF ± 10 Hz, ± 1 LSB.

Dot Marker Frequency Accuracy*1 – CF Accuracy $\pm 3\%$ of span.

Long-term Drift*1 – 2712: 2 ppm/yr.; 2711: 10 ppm/yr.

Short-term Drift – 2712: ≤ 400 Hz maximum drift between correction cycles; 2711: ≤ 20 kHz maximum drift between correction cycles.

Residual FM – 2712: ≤ 100 Hz p-p/20 msec at ≤ 20 kHz span/div; ≤ 2 kHz p-p/20 msec at > 20 kHz span/div; 2711: ≤ 2 kHz p-p/20 msec.

Resolution Bandwidth (-6 dB) – 2712: 5 MHz, 300 kHz, 30 kHz, 3 kHz, 300 Hz; 2711: 5 MHz, 300 kHz, 30 kHz, 3 kHz; 2712 with Option 14: Add 1 MHz, 100 kHz, 10 kHz, and 1 kHz; 2712 with Option 12: add 1 MHz, 120 kHz, 9 kHz, 1 kHz – 200 Hz replaces 300 Hz filter.

Resolution Bandwidth Shape Factor – (60 dB/6 dB) – $\leq 7:1$ for RBW ≤ 1 MHz.

Noise Sidebands – ≤ 70 dBc at $30 \times$ RBW.

Video Filter – Approx. $1/100$ (Auto) of RBW. Manual Selection: 3 Hz to 300 kHz in 1-3 sequence.

Freq. Span/Div Range – 2712: 180 MHz to 1 kHz. 2711: 180 MHz to 10 kHz selected in 1-2-5 sequence or within two significant digits via menu.

Span Accuracy – $\pm 3\%$ over the center eight divisions.

AMPLITUDE RELATED

Flatness – ± 1.5 dB measured with 10 dB internal RF attenuation (preamp off).

Vertical Display Modes – 10, 5, 1 dB/div, Linear.

Measurement Range – 2712: -139 (preamp on) to $+20$ dBm (-92 to $+67$ dBm V); 2711: -129 (preamp on) to $+20$ dBm (-82 to $+67$ dBm V).

Display Dynamic Range – 80 dB max (limited to 40 dB in optional 2712 Quasi-peak Detector mode).

Reference Level Range – LOG Mode: -70 to $+20$ dBm (-23 to $+67$ dBm V), or to -90 dBm with preamp on. LINEAR Mode: 8.8 μ V to 280 mV.



Reference Level Steps – LOG Mode: 1 dB or 10 dB. LINEAR Mode: 1-2-5 sequence.

Mixer Input Level – Automatically controlled by instrument for on-screen signals. Level selectable between -20 to -50 dBm ($+27$ to -3 dBm V).

Display Amplitude Accuracy – 10 dB/div: ± 1.0 dB/10 dB to max. cum. error of ± 2 dB over 70 dB range; ± 2.0 dB/10 dB over 70-80 dB range. 5 dB/div: ± 1.0 dB/10 dB to max. cum. error of ± 2 dB over 40 dB range; 1 dB/div: 1 dB max. error over 8 dB range. Linear Mode: $\pm 5\%$ of full scale.

RF Attenuation Range – 0 to 50 dB, 2 dB steps.

Sensitivity – 2712: -127 dBm (-80 dBm V) at 300 Hz RBW, -139 dBm (-92 dBm V) at 300 Hz RBW with preamp on (to 600 MHz); 2711: -117 dBm (-70 dBm V) at 3 kHz RBW, -129 dBm (-82 dBm V) at 3 kHz RBW with preamp on (to 600 MHz).

SPURIOUS RESPONSE (PREAMP OFF)

Residual Spurious Response – ≤ -100 dBm referenced to input of 1st mixer.

3rd Order IM Distortion – ≤ -70 dBc, from any two on-screen signals within any frequency span measured with 1st mixer input level of ≤ -30 dBm ($+17$ dBm V).

2nd Harmonic Distortion – ≤ -66 dBc measured with 1st mixer input level of ≤ -40 dBm ($+7$ dBm V).

INPUT RELATED

LO Emission – ≤ -70 dBm with 0 dB RF attenuation.

RF Input – Type N connector, 50 Ω .

VSWR with 10 dB or More RF Attenuation – 1.5:1 max.

Maximum Safe Input – $+20$ dBm ($+67$ dBm V) (0.1 W) continuous peak with 0 dB RF attenuation; 100 VDC (initially applied with full attenuation).

1 dB Compression Point – ≥ -15 dBm ($+32$ dBm V) with 0 dB RF attenuation.

*1 Typical but nonwarranted performance parameters.

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SWEEP RELATED

Sweep Times – 1 μ sec to 2 sec/div in 1-2-5 seq. (7-decade range); AUTO SWEEP mode; MANUAL SWEEP select.

Sweep Time Accuracy – $\pm 10\%$ over the center eight divisions.

Trigger – Free run, internal, external, line, TV field, TV line, single sweep, manual scan.

Trigger Amplitude – Internal: One division or more of signal. External: min. 1.0 V peak, (15 Hz to 1 MHz).

INPUT/OUTPUT CHARACTERISTICS

External Trigger*1 – BNC connector, 10 k Ω impedance, DC coupled 0.1 μ s min. pulse width. 35 V max.

External Video Input*1 – DC coupled. 0-50 kHz, 0-1.4 V (175 mV/div typical) signal input for vertical deflection of CRT beam.

Sweep Gate Out – TTL level, HI while CRT beam sweeps.

Sweep Output – +1.3 to -1.3 V, negative-going ramp, proportional to the horizontal sweep. Source impedance $\leq 50 \Omega$.

Video Output – 0 to +1.6 V of video signal, proportional to vertical display amplitude. 0 V is top of screen. 1 k Ω impedance.

ENVIRONMENTAL SPECIFICATIONS

Temperature – Operating: 0° to 50°C (MIL-T-28800D). Nonoperating: -55° to +75°C.

Humidity – Nonoperating: Five cycles (120 hours) per MIL-T-28800D, Class 5.

Shock – Operating and Nonoperating: Three guillotine-type shocks of 30 g, one-half sine, 11 ms duration each direction along each major axis; total of 18 shocks.

Electromagnetic Compatibility –

EC92 EMC Directive 89/336/EEC:

Emissions: EN50081-1.

Radiated Emissions, 30 MHz to 1 GHz,

EN55022 Class B (CISPR 22 B).

Conducted Emissions, 150 kHz to 30 MHz,

EN55022 Class B (CISPR 22 B).

Conducted Emissions, power line harmonics. 0 to 2 kHz, IEC 555-213.

Immunity: EN50082-1.

Electrostatic Discharge, 8 kV, IEC 801-2.

Radiated Immunity, 27 MHz to 500 MHz, IEC 801-3. No response above -90 dBm in a 3 V/meter field.

Fast Transients, capacitive clamp, 1 kV power leads, 500 V control leads, IEC 801-4.

Power Line Surge, 1 kV differential mode, 2 kV Common mode, IEC 801-5.

Vibration – Meets MIL-T-28800E, Paragraph 4.5.5.3.1 (modified).

GENERAL CHARACTERISTICS

Power Requirements – 90 W max. (1.2 A) at 115 V, 60 Hz. Operates 48 Hz to 440 Hz, 90 to 132 VAC, or 48 Hz to 63 Hz to 250 VAC. Battery power (Option 07) available.

PHYSICAL CHARACTERISTICS

Dimensions	mm	in.
Height	137*1	5.4*1
Width	361*1	14.2*1
Depth	445*1	17.5*1
Weight	kg	lb.
Net	9.5*2	<21*2

*1 With feet, handle, and front panel cover.

*2 Nominal for basic configuration.

OTHER CAPABILITIES

Markers – Single marker/delta marker; next right, next left peaks; next lower, next higher peaks; (highest) peak find; marker to center frequency and reference level.

Non-volatile Memory – Lithium battery backup. 2712: 124 kB available; up to 108 displays saved; 36 front-panel setups, large user-definable key routines, and antenna tables (exact number and size depends on NV RAM utilization). 2711: 28 kB available; Up to 18*2 displays saved and 9*2 front-panel setups, user-definable key routines, and antenna tables.

Digital Storage Display – Selectable acquisition modes of positive peak only, positive/negative peak. SAVE A, B, C and active D trace; up to four traces on screen; MAX HOLD A, B; MIN HOLD A, B, C, B, C MINUS A; WATERFALL display mode; digital storage off provides analog sweep.

Ensemble Averaging – Provides weighted continuous or discrete averaging of display resulting in reduction of random noise.

Internal Preamp – Preamp can be switched in/out of circuit (flatness degrades above 600 MHz, provides approximately 12 dB sensitivity improvement).

Alternative Reference Level Units – dBm, dBm V, dB V, dB μ V, dB μ W, dB μ V/m.

User-Definable Power-on Status – Instrument powers up to user-definable state or factory default condition.

Center Measure – Signal is centered with frequency and peak amplitude automatically read out (not a marker mode). The signal is counted in the 2712 or 2711 with Option 02.

Signal Track – Drifting signal is kept at display center with correct frequency and peak amplitude displayed.

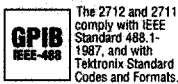
Graticule Illumination – For CRT photography.

Direct Plot/Print – Supports Epson FX and LQ Series Printers and Tektronix HC100 Printer/Plotter via built-in GPIB interface (std. 2712, 2711 Option 03), RS-232C interface (Option 08, 2712 and 2711).

*1 Typical but nonwarranted performance parameters.

*2 Up to 108 saved displays, 36 front-panel setups available with Option 03 or 08.

Product(s) available through your local Tektronix representative (listed in the back of this catalog) or call 1-800-426-2200.



The 2712 and 2711 comply with IEEE Standard 488.1-1987, and with Tektronix Standard Codes and Formats.



Tektronix Measurement products are manufactured in ISO registered facilities.

ORDERING INFORMATION

2712

Spectrum Analyzer **\$11,950**
Includes: Power Cord (U.S. 115 V/60 Hz), Operator's Manual, Pocket Reference Guide, Programmers Manual, Front Cover, and N-to-BNC Adapter.

2711

Spectrum Analyzer **\$8,750**
Includes: Power Cord (U.S. 115 V/60 Hz), Operator's Manual, Pocket Reference Guide, Front Cover, and N-to-BNC Adapter.

Opt. 02 – (2711 only) Add Internal Frequency Counter with Selectable 1 kHz/1 Hz Readout Resolution. **+\$820**

Opt. 03 – (2711 only) GPIB Interface. Full Programmability, Direct Print, additional NV RAM, and Real-time Clock. Cannot combine with Opt. 08 **+\$790**

Opt. 04 – Add Internal Tracking Generator, 100 kHz-1800 MHz, 0 dBm to -48 dBm in 0.1 dB steps. (Not compatible with Opt. 12 or 14/2712 only – order External Tracking Generator Opt. 05 instead.) **+\$3,150**

Opt. 05 – External Tracking Generator with Active Probe Power Jack. Not compatible with Opt. 04 **+\$3,950**

Opt. 07 – Add 2704 Inverter/2705 Battery Pack **+\$1,350**

Opt. 08 – (2712 only) Replace GPIB with RS-232C Interface. **NC**

Opt. 08 – (2711 only, Not compatible with Opt. 03.) RS-232 Interface, Full Programmability, Direct Print, additional NV RAM, and Real-time Clock **+\$790**

Opt. 10 – Video Monitor Mode **+\$650**

Continued on next page.

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ORDERING INFORMATION

- Opt. 12** – (2712 only) Add Quasi-peak Detector (built-in).
Includes: 200 Hz, 9 kHz, and 120 kHz EMC Filters;
1 kHz and 1 MHz RBW Filters.
Not compatible with Opt. 04 or 14. **+\$1,480**
- NOTE:** 200 Hz EMC Filter replaces standard 300 Hz RBW Filter.
- Opt. 14** – (2712 only) Add 1 kHz, 10 kHz, 100 kHz,
and 1 MHz RBW Filters.
Not compatible with Opt. 04 or 12. **+\$600**
- Opt. 15** – 1st LO output for use with
Tektronix 1405 TV Sideband Adapter Interface
or 2707 Internal Tracking Generator. **+\$280**
- Opt. 20** – EMC Antenna Set plus Tripod and Coax suitable
for tests to 1 GHz (contact Tektronix sales engineer
for more information) **+\$3,290**
- Opt. 21** – Add 2706 Stepping RF Preselector. **+\$4,250**
- Opt. 30** – Rackmount for 19 in. rack width, 5.25 in. height. **+\$250**
- Opt. 33** – Travel Line Package. Includes: Accessory Pouch,
Carrying Strap, Vinyl Rain Cover **+\$100**
- Opt. 34** – Portable-to-Rackmount Adapter for 19 in.
rack width, 7 in. height **+\$590**

INTERNATIONAL POWER PLUG OPTIONS

- Opt. A1** – Universal Euro 220 V, 50 Hz **NC**
- Opt. A2** – United Kingdom 240 V, 50 Hz **NC**
- Opt. A3** – Australian 240 V, 50 Hz **NC**
- Opt. A4** – North American 240 V, 60 Hz **NC**
- Opt. A5** – Switzerland 220 V, 50 Hz **NC**
See Customer Information Section for additional description.
- Opt. B1** – Service Manual **+\$135**
- Opt. B2** – Additional Set of Manuals **+\$215**

SERVICE ASSURANCE OPTIONS

- Opt. R2** – Adds two years of post-warranty Repair Protection. **+\$400**
- Opt. C5** – Adds five years of Calibration Services **+\$1,050**

SOFTWARE

- See pages 230 and 233 for additional information.
- 271x PC Utility Software** – Order S26UT10 **\$650**
- EMI Commercial Test Software** – Order S26EMI2 **\$1,785**
- EMI Ancillary Devices** – See page 235.

RECOMMENDED ACCESSORIES

- See page 446 for complete Selection Information.
- PROBES**
- Active** – All require 1103 Power Supply
4 GHz, 0.4 pF/100 k Ω , 1 m. Order P6217 **\$3,595**
750 MHz, 2 pF/1 M Ω , 1.5 m. Order P6205 **\$595**
TEKPROBE™ Power Supply. Order 1103 **\$655**

CAMERAS/PLOTTERS/PRINTERS

- Camera** – Low Cost. Order C-9 Opt. 1A and Opt. 20 **\$925**
- Plotter** – Four Color. (GPIB) Order HC100 Opt. 01 **\$1,380**
(RS-232). Order HC100 Opt. 03 **\$1,250**
- CART** – K212 Instrument Cart **\$420**

POWER SPLITTER

- 75 Ω /50 Ω BNC Output, 50 Ω BNC Input.
Order 067-1232-00 **\$350**

CABLES, PADS, AND ADAPTERS

- 50 Ω Coaxial Cable** –
BNC to BNC, 5.5 in. Order 012-0214-00 **\$80**
BNC to BNC, 18 in. Order 012-0076-00 **\$34**
BNC to BNC, 42 in. Order 012-0057-01 **\$31**
- 75 Ω Coaxial Cable** – BNC to BNC, 42 in.
Order 012-0074-00 **\$34**
- GPIB Cables** –
0.5 m. Order 012-1282-00 **\$170**
1 m. Order 012-0991-01 **\$195**
2 m. Order 012-0991-00 **\$195**
4 m. Order 012-0991-02 **\$315**
- RS-232 Modem Cables** –
9-Pin Female to 25-Pin Male. Order 012-1241-00 **\$85**
9-Pin Female to 9-Pin Female. Order 012-1379-00 **\$80**
9-Pin Female to 25-Pin Female. Order 012-1380-00 **\$75**
- 75 Ω to 50 Ω Minimum Loss Adapter** – With DC block,
5.7 dB loss. Order 011-0112-00 **\$110**
- 75 Ω BNC to 50 Ω Type N Minimum Loss Attenuator** –
Order 131-4199-00 **\$75**
- 75 Ω to 50 Ω Matching Attenuator** – With 11.25 dB
conversion factor from dBm to dBV with DC block.
Order 011-0118-00 **\$140**
- "F" Female to BNC Male Adapter** – Order 013-0126-00 **\$25**
- BNC Female to "F" Male Adapter** – Order 103-0158-00 **\$15.50**
- "N" Female to BNC Male Adapter** – Order 103-0058-00 **\$19.75**
- 75 Ω to 50 Ω Matching Transformer** – 0.5 dB loss.
50 kHz to 300 MHz. Order 120-1883-00 **\$250**
5 MHz to 1 GHz. Order 120-1884-00 **\$250**

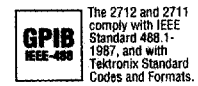
GPIB CARDS

- PC-GPIB Card** – IBM PC, AT, and compatibles.
Order S3FG210 **\$395**
- AT-GPIB Card** – IBM AT Bus (High-speed Card).
Order S3FG220 **\$495**
- MC-GPIB Card** – IBM PS/2 with Microchannel Bus.
Order S3FG230 **\$450**

ADDITIONAL ACCESSORIES

- Service Manual** –
2712. Order 070-8130-01 **\$165**
2711. Order 070-8130-01 **\$165**
- Front Panel Cover** – Order 200-2520-00 **\$18**
- Transit Case** – Order 016-0792-02 **\$520**
- Soft Side Case** – Order 016-1158-00 **\$140**
- Rain Cover** – Order 200-2500-00 **\$4.50**
- Accessory Pouch** – Mounts on top. Order 016-0677-03 **\$50**
- Carrying Strap** – Order 346-0199-00 **\$30**
- Viewing Hoods** –
Collapsible. Order 016-0592-00 **\$20**
Binocular. Order 016-0566-00 **\$30**
Polarized. Order 016-0180-00 **\$100**
- CRT Filter** – Smoke Gray. Order 337-2775-02 **\$14.25**

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