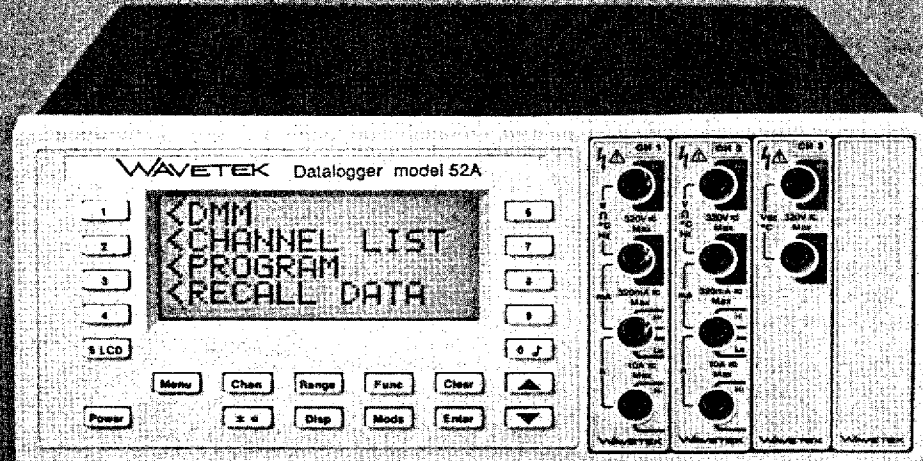




DATALOGGER SYSTEM

MODEL 52A



Datalogger

Model 52A Datalogger combines the features of up to four digital multimeters with full-featured datalogging/data acquisition capability. Each measurement channel contains a fully isolated dual slope analog-to-digital converter. Each input is expandable with multiplexers to provide up to 260 channels, any four of which can be displayed at one time. Data on the high resolution liquid-crystal display can be shown in alphanumeric and bargraph form. All standard multimeter functions such as resistance and DC and true rms AC voltage and current are included, in addition to special measurement functions such as temperature, frequency, period, pulse width, time interval, volt-amperes, dB, continuity, and diode checking. Built-in math functions compute and display delta, delta %, minimum, maximum, or average values. Complex functions between channels may be calculated with user-defined math. Unique Close-Box "Flex-Cal" automatic calibration allows calibration at any value.

Standard datalogging capability allows all measured data to be stored in internal RAM memory. Optional memory expansion to over 1 Meg permits storage of over 100 thousand measurements. Stored data can be sent to any computer via the standard RS-232 interface. An IEEE-488 interface is also available. Nested menus, channel list programming and a real time-clock facilitate selection of functions, ranges, start and stop conditions, scan intervals, delays, alarms, etc. A digital I/O option which is combined with an analog output feature is also available for closed-loop and tracking applications.

All this measurement and data logging capability is contained in a very small portable package made possible through the use of an application-specific integrated circuit and surface-mounted devices. The Model 52A can be operated from a vehicle battery or any other low-voltage AC or DC source. An internal rechargeable battery option provides even more versatility.

DATALOGGING FUNCTIONS

Model 52A Dataloggers support a number of data logging modes. Data can be gathered continuously or at user defined scan intervals and logged into memory or sent out the Comm port (either RS-232-C or IEEE-488). All setups are menu driven and no programming language is required.

CHANNEL LISTS

A group of channels are organized into "Channel Lists" that predefine channel function, range, and any modifiers such as deltas, alarms, averaging, etc. Each channel list is assigned up to an eight character name for later recalling. Channels can be entered individually or as groups. Channel lists are used in the program mode to define what data is logged.

PROGRAMS

Programs are defined as a framework for datalogging. A program consists of a user defined program name, a start condition, a scan interval, a stop condition, an end condition and one or more channel lists.

MONITOR MODE

The monitor mode defines what the Datalogger does in between scans. There are three monitor modes available:

- Display the time until the next scan; both the real time and a countdown timer are displayed.
- Power-down between scans to conserve battery life.
- Run a monitor channel list. Any predefined channel list can be scanned between data scans. Alarms are still active and can be used to jump out of the current program and change to a new program. This feature allows full time process control with intermittent datalogging.

MEASUREMENT MODULES

Up to four Measurement Modules can be installed in the Datalogger. Each module provides one set of front-panel input connectors and one pair of rear panel multiplex input connectors. Auto-ranging is standard.

Two Measurement Module versions are available. They may be specified in any combination and channel location, up to a maximum of four.

50-1: All specifications and functions listed below apply.

50-2: A lower-cost module limited to DC volts and temperature functions.

Accuracy specifications are for 1 year with an operating temperature of 18° to 28°C (64° to 82°F) and a relative humidity of 80% or less.

DC VOLTS

Resolution and Accuracy

Range	Resolution For Digits Displayed			Accuracy ± (% Rdg + % of Rng)	Input Impedance
	2.5	3.5	4.5		
30mV	0.1mV	10µV	1µV	0.04 + 0.02	>1000MΩ
300mV 3V	1mV 10mV	100µV 1mV	10µV 100µV		
30V 300V	100mV 1V	10mV 100mV	1mV 10mV	0.04 + 0.005	10MΩ ± 1% < 50 pF

Resolution vs Data Rate and Noise Rejection (1kΩ Unbalance)

Display Mode	50/60 Hz NMR	60 Hz ECMR	50 Hz ECMR	Data Rate
4.5 digits	70 dB	150 dB	145 dB	5/sec
3.5 digits	50 dB	130 dB	125 dB	12/sec
2.5 digits	50 dB	130 dB	125 dB	12/sec

System Throughput: 20 channels/sec max. (Vdc measurement.)

Max Input Voltage: ±450 Vdc or peak AC continuous. Inputs protected against 6 kV transients <10 µs wide. Max voltage to chassis ground: ±500 V peak.

AC VOLTS (RMS AC AND RMS AC+DC) Accuracy (AC Coupled)

Range	Max Res	Input Voltage	Accuracy ± (% of Rdg + % of Rng)					
			For Frequency Ranges (Hz)					
			20-45	45-10K	10K-30K	30K-100K	100K-3M	3M-1M
30mV	1µV	3-32mV	1+2	.5+2	1+2	3+2	5+5 Typ.	*
300mV 3V 30V 300V	10µV 100µV 1mV 10mV	30-320mV 3-3.2V 3-32V 30-320V	1+.04	.5+.04	1+.07	2+.1	3+.2	5+5 Typ.

*Not specified

Resolution

Range	Max Res
20 mV	1µV
200 mV	100µV
30 V	1 mV
300 V	10 mV

AC+DC Accuracy: Add 2% of range to the AC coupled specifications.

Input Impedance: 1 MΩ shunted by less than 50 pF.

Crest Factor: Up to 3 for rated specifications. Up to crest factor 11 achievable at 1/3 scale with 2% additional error.

CMRR: >60 dB at 50 or 60 Hz (1 kΩ Unbalance).

Maximum Input Voltage: Same as DC Volts except 20 sec max on the 3 V, 300 mV, and 30 mV ranges. Volt-Hertz product ≤ 10⁷.

dB MEASUREMENTS

Relative dB, dBm, and dBW measurements are calculated in software. Measurements assume

the reference load is external and are made in a two-wire bridging mode.

Selectable Reference Impedance: 50Ω, 75Ω, 90Ω, 93Ω, 115Ω, 125Ω, 135Ω, 150Ω, 250Ω, 300Ω, 500Ω, 600Ω (default), 600Ωrn, 800Ω, 900Ω, 900Ωrn, 1000Ω (dBV), 1200Ω.

TEMPERATURE

Thermocouple linearizations provided by software for types J, K, E, T, B, S, R. Cold-junction temperature is available to calculate temperature from other types of thermocouples. Linearizations for 385 and 392 100Ω platinum RTD's.

COLD JUNCTION TEMPERATURE

Readable at 2° to +70° ± 0.4°C with 0.01° resolution. Can be used to determine ambient temperature with no TC attached. Useful for linearizing TC's not covered by the 52A built-in linearization tables. Separate cold junction readings are found on each multiplexer.

OHMS

Measurements are made two-terminal from the front inputs or four-terminal using the front panel inputs to source and the rear panel inputs to sense.

Resolution and Accuracy

Range	Resolution For Digits Displayed			Accuracy ± (% Rdg + % of Rng)	FS Vout	I OUT
	2.5	3.5	4.5			
30Ω	0.1Ω	10mΩ	1mΩ	0.08 + 0.02	30mV	1mA
300Ω	1Ω	100mΩ	10mΩ	0.07 + 0.005	2V	1mA
3kΩ	10Ω	1Ω	100mΩ		3V	1mA
30kΩ	100Ω	10Ω	1Ω		2V	100µA
300kΩ	1kΩ	100Ω	10Ω		3V	10µA
3MΩ	10kΩ	1kΩ	100Ω	0.1 ± 0.01	3V	1µA
30MΩ	100kΩ	10kΩ	1kΩ	0.15 + 0.02	3V	0.1µA

Open Circuit Voltage: <10 V at 1 mA or less.

Overload Protection: 280 Vrms or ±400V peak continuous.

HIGH MEGOHMS

The 51/52 can measure resistances up to 3200 MΩ's by a process which calculates parallel resistance.

Ranges: 300 MΩ, 3000 MΩ.

DIODE TEST

Provides a means of measuring forward biased junction voltage with any of five reference currents.

Range: 0 to 3.2 V.

CONTINUITY

Range: All Ohms ranges, 3200 count resolution.

Threshold: 3Ω in the 30Ω range. 10% of range in all other ranges.

Indication: Internal tone generator, 1 kHz. Ohms on display.

Response Time: 50 ms, stretched to 300 ms.

All other **Continuity** specifications are the same as **Ohms** specifications.

DC CURRENT

Separate front panel inputs are provided for low current (up to 320 mA) and high current (up to 10A) measurements. Not available on the MPLX/rear panel input.

Resolution and Accuracy

Range	Resolution For Digits Displayed			Accuracy ± (% Rdg + % of Rng)	MAX V Burden
	2.5	3.5	4.5		
30mV	100µA	10µA	1µA	0.07 + 0.02	4 mV
300mA 3A	1mA 10mA	100µA 1mA	10µA 100µA	0.07 + 0.005 0.01 + 0.02	40mV 10mV
10A	100mA	10mA	1mA	0.1 + 0.005	5.0mV

Overload Protection: 300 mA fuse (3AG) fuse protects the low current input. The 10A input is unfused. Up to 30 A can be measured for a maximum of 2 sec before any damage is sustained.

AC CURRENT: (True RMS, Shunt DC Coupled) AC Current specifications are the same as DC Current specifications except:

Range	Accuracy ± (% of Rdg + % of Rng)				MAX V Burden
	20-45	45-1K	1K-10K	10K-30K	
30mA	1+0.3	0.5+0.2	1+0.3	5+0.3	4 mV
3A	1+0.2	0.5+0.3	1+0.3	5+0.3	15 mV
300mA 10A	1+0.04	0.5+0.04	1+0.04	5+0.1	40 mV 50 mV

AC + DC Current: Add 1% of range to above specifications.

FREQUENCY

Frequency is measured by a period average counting method allowing high resolution and rapid update rates. Resolution is 6 digits per 1.3 sec (7 digits max). Typical frequency response to 8 MHz (4 MHz guaranteed).

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MODEL 52A

Accuracy and Resolution

Range	Accuracy	Maximum Resolution
10 Hz	0.0025%	0.000001 Hz
100 Hz		0.00001 Hz
1 kHz		0.0001 Hz
10 kHz		0.001 Hz
100 kHz		0.01 Hz
1 MHz		0.1 Hz to 300k
4 MHz		1 Hz to 1M

EVENTS (TOTALIZE)

Count Rate: 0 to 800 kHz.

Capacity: 0 to 9,999,999 counts.

Triggering: Positive or negative edge, selectable.

All other **Events** specifications same as the **Frequency** specifications.

PERIOD

Resolution and Accuracy

Range	Resolution	Maximum Reading	Units	Accuracy
100 μ s	10 ps	100.00000	μ s	± 100 ps
1000 μ s	100 ps	1000.0000	μ s	± 100 ps
10 ms	1 ns	10.000000	ms	± 1 ns
100 ms	10 ns	100.00000	ms	± 10 ns
1000 ms	100 ns	1000.0000	ms	± 100 ns

All other **Period** specifications same as the **Frequency** specifications.

PULSE WIDTH, TIME INTERVAL

Time intervals are measured from the negative edge of the optional rear panel counter inputs to either the positive or negative edge of the front panel input or multiplexed input. All other specifications are the same as the **Period** modes.

Range	Resolution	Maximum Reading	Units	Accuracy
100 ms	1 μ s	100.000	ms	± 2 μ s
1000 ms	1 μ s	1000.000	ms	± 2 μ s
10 s	1 μ s	10.000000	s	± 2 μ s
100 s	10 μ s	100.00000	s	± 10 μ s
360 s	100 μ s	360.0000	s	± 100 μ s

Triggering: Positive or negative edge, selectable.

All other **Pulse Width, Time Interval** specifications same as the **Frequency** specifications.

LOGIC

Provides an easy check of logic levels and activity.

Indication: '1', '0'.

Trigger Levels

Logic Family	DC Threshold	
	+Trig	-Trig
TTL	+2V	+8V
CMOS 5	+3.5V	+1.5V
CMOS 12	+8V	+4V

AC VOLT-AMPERES, DC WATTS

The 52A measures volt-amperes AC or watts DC by taking alternate readings of current and voltage and multiplying them together. When setting a range both the

voltage range and current range are selected separately. The current and voltage inputs are hooked up simultaneously and both must-sense relative to the current low input. VA AC and watts DC are available only on the front panel inputs.

Range and Resolution

Current Range	V Range		Resolution			Max VA
	32 V	320 V	9999999	999999	99999	
320 mA	X	—	1 μ W	10 μ W	100 μ W	10
320 mA	—	X	10 μ W	100 μ W	1mW	100
3.2 A	X	—	10 μ W	100 μ W	1mW	100
3.2 A	—	X	100 μ W	1mW	10mW	1k
10 A	X	—	100 μ W	1mW	10mW	320
10 A	—	X	1mW	10mW	100mW	3.2k

Accuracy: Equal to the accuracy of the volts input plus the accuracy of the current input.

Overload: Equal to the ratings of the respective volts and current ranges.

FUNCTION MODIFIERS

Delay: User programmable delays can be inserted in front of any function to allow measurements of slow settling signals.

Range: 0 to 655.35 sec in 0.01 sec interval.

Track: The Track function causes the voltage output of the D/A converter on the optional I/O plugins to track the channel reading.

Alarms: Up to 99 alarms are user programmable. Each alarm can have up to two setpoints allowing window comparisons or out of limits alarms. By calling multiple alarms any channel could have up to 198 different alarm thresholds assigned to it. Combined with a Digital I/O option the alarms can be used in control applications.

Alarm Modes: The alarm response is triggered when $X \geq T1$, and $X \leq T1$, $X \geq T1$ or $X \leq T2$ (out of limits), $T1 \leq X \leq T2$ (X is channel data and T1 and T2 are user entered thresholds). The response can be latched on if desired, or only respond to a threshold transition. Hysteresis (dead-zone) can be added to any threshold.

Alarm Responses: When an alarm is triggered the response is programmable to any or all of the following: Tone (up to nine distinct sounds user selectable). Store and/or transmit the reading, alarm number and time. Store and/or transmit all the current scan data with time. Output a digital word in any desired pattern to any digital I/O board. Output a single bit. Output an analog voltage. Display, store or transmit a user entered message.

In addition to the above alarm responses, the user can cause a channel list or program to be started as a result of an alarm. Therefore any analog parameter can be used to trigger a new set of data to be looked at, or when a given parameter is exceeded, data can be stored on up to 260 channels to determine what caused the alarm to be triggered.

DISPLAY MODIFIERS

Delta: When the Delta modifier is applied, either the current reading or a numeric entry can be used to offset the displayed data.

Delta %: Similar to the Delta modifier except the reading is expressed in Delta % calculated by: $\text{displayed reading} = 100 (\text{current reading} - \text{stored reading}) / \text{stored reading}$.

Min/Max: Stores and displays the minimum or maximum reading and updates the memory and display only when CLEAR is pressed or when the current reading exceeds the stored value (MAX) or when the current reading is less than the stored value (MIN).

Average: From 1 to 65535 readings can be averaged. The display and memory is updated only when all the readings have been taken and averaged.

Resolution: Display resolution is selectable to all functions except Events.

Bargraph: A segmented bargraph representation of the measurement is selectable from the RES menu. The display shows the channel number and polarity, but is otherwise unitless (range and function not displayed). There are two bargraph types available: the Full range Bargraph, and the High Resolution Bargraph.

Scale/Math Channel: All channels can be scaled by a user constant or by another channel's data allowing interactive display of complex measurements. Up to 99 formulas (Chan \sqrt to Chan 0₉₉) can be entered directly with the keyboard or via the RS-232-C or IEEE-488 ports. Typical applications include scaling transducers, efficiency measurements, and ratio calculations.

Math Functions: +, -, x, =, \sqrt , ().

Labels: Up to four characters can be defined per Math channel, allowing custom labels or engineering units to be displayed. For example 'PSI' could be entered for the current output of a pressure transducer.

PRINTER FORMATTING

Model 52A can format data to a printer to provide alphanumeric, bargraph, strip-chart or XY plotting. The 52A provides control of readings/line (1 to 99) and lines/page (1 to 255 or continuous). One or two columns of data per line can be printed on the Model 54 Printer/Plotter. Four columns of data per line can be printed on an 80-column printer. Each data field is 20 characters wide. Headers and footers can be programmed to print before and after the data. Control characters can be included in headers and footers.

PLOTTING

Model 52A combined with Model 54 Printer/Plotter can plot up to 16 channels simultaneously in 1, 2 or 4 "plot windows" to provide strip chart recorder capability. Each channel can have a unique plot symbol and independent plot scale values.

Time stamping of plots is easily added and full annunciation of channel function, scaling and plot symbols is provided at the beginning of each plot. XY plots can be generated with stored data from up to 16 channel pairs, each of which can have up to 65,535 data points plotted.

GENERAL

RS-232-C Serial Port

Connector: DB-25 (female) on rear panel with DCE or DTE configuration user selectable by internal header.

Mode: Full duplex with CTS/RTS or XON/XOFF handshaking.

Data Format: 8 bits, no parity, one stop bit.

Data Rate: 300, 1,200, 9,600 and 76,800 baud, user selected by rear panel switch (51 and 52) or by menu (52 only).

Display: 32 by 84 dot matrix liquid crystal graphics display. Full annunciation of channel, range, mode, and function is available on all displayed channels.

Isolation: The 51/52 chassis common is fully isolated from earth ground but common to RS-232-C or IEEE-488 ground. A banana jack connected to chassis common is provided to ground the chassis if so desired.

Input Low to Chassis Common: ± 500 V peak max.

Channel Low to Any Other Channel Low: ± 500 V peak max.

Chassis Common to Earth Ground: ± 500 V peak max. (AC transformer connected; no earth connections through I/O, RS-232-C, or IEEE-488).

Data Memory: Up to 12,000 readings can be stored in an unexpanded 52A. Memory can be expanded up to 1 megabyte allowing a maximum of approximately 100,000 stored readings.

Environmental

Operating: 0° to 50°C.

Storage: -20° to 70°C.

Temperature Coefficient: For operating temperatures $< 18^\circ\text{C}$ or $> 28^\circ\text{C}$ multiply the applicable accuracy specification times 0.1 per °C.

Humidity: $\leq 70\%$ RH to 50°C, $\leq 80\%$ RH to 35°C, except on the 3M Ω , 30M Ω , 300M Ω , and 3000M Ω ranges: $\leq 70\%$ RH to 35°C.

Power

50-120 Line Transformer: 90 to 132 Vac, 50/60 Hz ≤ 16 VA.

50-220 Line Transformer: 180 to 260 Vac, 50/60 Hz ≤ 16 VA.

External Power: Any DC source from ± 8 to 24V or any isolated AC source from 6 to 20V can be used to power the 51/52. Current drain ranges from 10 μA at standby to 0.5A running an IEEE-488 option. Maximum drain without IEEE-488 is 300 mA with all four channels running any of the AC functions. Typical drain is approximately 100 mA.

When the internal battery option is installed, the power will automatically switch to the battery option if the line input fails or falls below 7.5V (6 Vac).

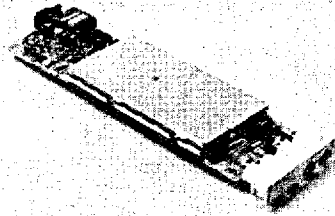
Dimensions: 21.5 cm (8.5 inch) wide w/o handle, 22.6 cm (8.9 in.) with handle; 8.8 cm (3.5 in.) high w/o feet, 10.8 cm (4.0 in.) with feet; 30.7 cm (12.1 inch) deep.

Weight

Net: 3.3 kg (7.25 lb) plus 0.45 kg (1 lb) Wall Transformer. Option 50-11 Battery adds 1.47 kg (3.25 lb).

Shipping: 4.4 kg (9.7 lb). Option 50-11 Battery adds 1.47 kg (3.25 lb).

OPTIONS



50-1: Measurement Module: Full function.

50-2: Measurement Module: DC volts and temperature.

50-11: Rechargeable Battery: Rechargeable battery and charging circuitry. Charging is in three phases: a bulk charge, overcharge, and trickle charge. This advanced charging method provides a fast charging rate and long battery life.

Battery Type: 12 V, 2.9 AH sealed lead acid (provided).

Charging Time:

From Deep Discharge to Full Charge: 12 hr.
From 1/2 Discharge to Full Charge: 4 hr.

Approximate Continuous Operating Time: Up to 70 hr depending on channel and function configuration.

50-12A-X: Ram Expansion Board: Expands data and program memory. In direct data storage, each 128K of expansion memory adds approximately 12,000 data points. Model 52A can hold up to 4 RAM boards (excluding other option boards) each of which can hold up to 256 kbytes. The RAM is backed up by an on board lithium battery.

50-12A-128: 128K RAM Expansion Board.

50-12A-256: 256K RAM Expansion Board.

50-13A IEEE-488 GPIB Interface Board:

GPIB Option follows IEEE-488-1978 conventions. Full talk and listen capability.

Port Interface: Isolated from A/D channel cards, common to chassis ground, double buffered.

Address: 0 to 15, internal switch selected on initial power up, software selectable via front panel (52 only).

Subsets: SH1, AH1, T6, TEO, L4, SR1, RLI, PPO, DC1, CO, E1.

Power: Requires 7 to 20 V AC or DC at 500 mA. Must be supplied externally either by the standard line transformer or by an external battery. Will not run from the internal battery option. For external battery operation without GPIB (to preserve battery life), a switch is provided to turn off the GPIB board.

50-14: Digital I/O + Analog Out Board:

Provides 8 bits of digital read, 8 bits of digital write, and an 8 bit digital to analog converter for monitor and control applications. This option board is fully isolated from the four A/D channels and is common to chassis ground. Mating connector included.

Digital Output Section: Open drain outputs can be used to switch up to 50 Vdc at 250 mA.

Digital Input Section: The digital read inputs are parallel polled under program control at up to a 20 ms rate. All eight inputs can be used as triggers to read contact closures and can be read independently or masked and read in any combination. The inputs are lightly pulled up (normally high) for reading contact closures to ground.

Analog Output Section: The analog output provides a controllable DC voltage for proportional control, driving chart recorders, and

anything else requiring a linear output voltage.
Range: 0 to +2.55 V in 256 steps.

50-15: Second RS-232-C Serial Port: A second, fully implemented serial port; it is an alternate to Option 50-13, either of which may be added to expansion slot 8 in Mode 52A.

Connector: DB-25 (female) on rear panel with DCE or DTE configuration user selectable by internal header.

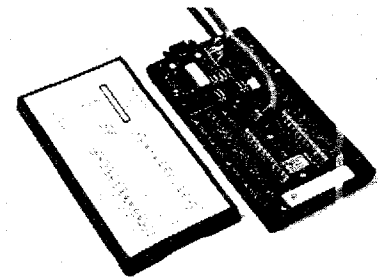
Mode: Full duplex with CTS, XON/XOFF and modem handshaking.

Data Format: 7 or 8 bits, even or odd mark/space parity checking, one stop bit.

Data Rate: 300, 600, 1200, 2400, 4800, 9600, 19,200 and 76,800 baud, user selectable by menu.

Break Character: Programmable break character provides 52A program interruption.

50-20: 8/16 Channel HI-V Multiplexer with Thermocouple Compensation. Multiplexes input signals to the Model 52A thereby expanding the total channel count. One option 50 will expand an A/D channel to 16 inputs; single ended or 8 channels differential (iraternally selectable).



Maximum Input V: ± 300 Vdc or peak AC between any two input terminals. Transient protected to 6kV peak $< 10\mu\text{s}$.

Maximum Current: ± 180 mA peak single ended. ± 140 mA peak differential.

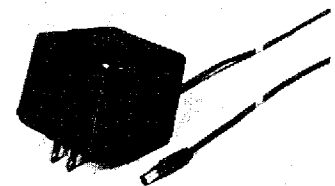
Thermal EMF: ≤ 400 nV single ended, ≤ 800 nV differential.

Closed Channel Resistance: From 0 to 50°C, $\leq 60\Omega$ single ended. $\leq 120\Omega$ differential.

Open Channel Leakage Current: 0.5 nA.

Functions: All functions are supported except current and VA. (Each channel can be fitted with a shunt for current measurements, including 4 to 20 mA loops.) Ohms requires the addition of a parallel 50-20 multiplexer to switch the test current (4 terminal). Degrade AC specifications by 1.00% and limit bandwidth to 10 kHz.

50-XXX: Line Transformer.



50-120: Line Transformer. 90 to 132 Vac, 50/60 Hz ≤ 16 VA.

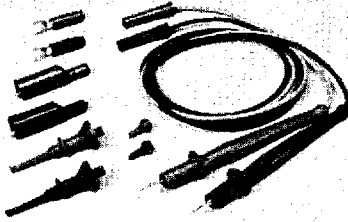
50-220: Line Transformer. 180 to 260 Vac, 50/60 Hz ≤ 16 VA.

DATALOGGER SYSTEM

MODEL 52A

ACCESSORIES

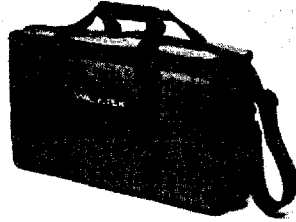
50-30: Test Lead Set



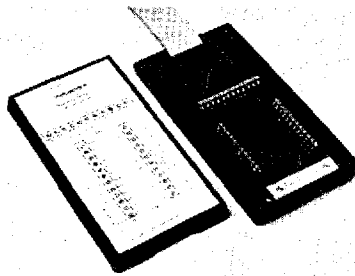
A deluxe test lead set consisting of a safety designed pair of test leads 48 in. long with banana plugs on one end and needle tips on the other. The tip shafts are threaded to accept the following included screw-on parts: alligator clips, spring hook adapters, spade lugs and tip covers. (Each 52A is shipped with this accessory.)

50-31: Soft Carrying Case

Versatile, rugged and handsome soft carrying case for the Model 52A, 53 or 54 for field or portable applications. Has space for manual, test leads, multiplexers and more. Comes with a shoulder strap and handles.



50-32: Digital I/O and Analog Output Breakout Module



Convenient terminal strip connections for Digital I/O channels.

Style 17: Rack Adapter

Style 19: Dual Rack Adapter

Dual Rack Style 19 allows a Model 52A to be mounted side by side with a Model 53 or Model 54 in a standard 19 inch rack. It is 5 1/4 inches high.

**FACTORY/FOB
San Diego, CA**

Model 52A

Option 50-1

Option 50-2

Option 50-11

Option 50-12A-128

Option 50-12A-256

Option 50-13A

Option 50-14

Option 50-15

Option 50-20

Option 50-120

Option 50-220

Accessory 50-30

Accessory 50-31

Accessory 50-32

Style 17

Style 19