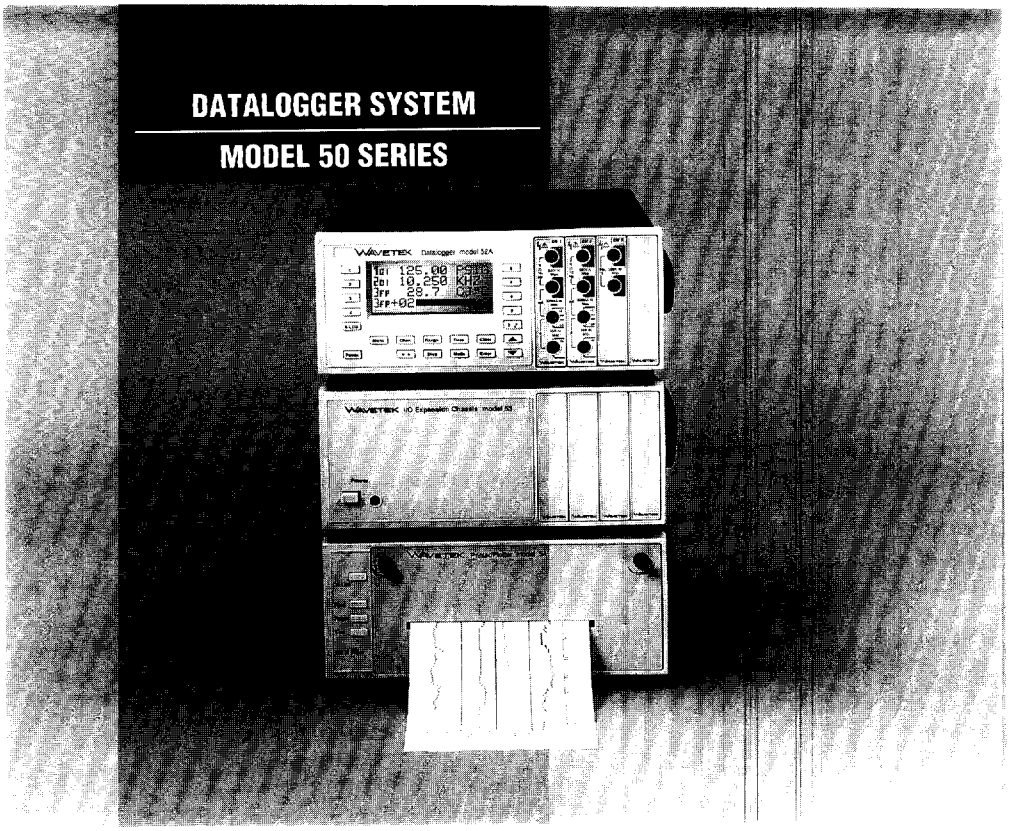


Datalogger System

Dataloggers
A datalogger is an instrument or system capable of making one or more measurements over a period of time and storing the results for later recall and analysis. Some dataloggers include built-in clocks to turn themselves on and off at preselected times. Alarms are often included in order to indicate out-of-the ordinary conditions and to provide conditional programming. Dataloggers should be capable of operating as a self-contained unit, as opposed to data acquisition systems which require connections to computers or controllers. Wavetek's Series 50 Datalogger System meets all these requirements.

Numerous Functions
Most dataloggers measure only DC voltage and temperature. More versatile dataloggers will measure AC voltages, current, resistance, frequency, period, event counting, pulse width, time interval and power. This type of datalogger gives you more measurement flexibility. One 52A measurement module permits you to measure 24 functions. Another measurement module measures the standard datalogger functions of DC volts and temperature.

Expanded Inputs
Multiplexers expand a datalogger's input/channel capacity. The Series 50 offers three different multiplexers; two multiplexers are part of a Model 53 Expansion Chassis and a third multiplexer is a stand-alone module. The Series 50 allows you to combine multiplexers to measure up to 260 inputs.

Time Control
Model 52A's internal real-time clocks allow measurement programs to start and stop automatically at real or delta times and at preset intervals.

Mathematical Operations
The ability to perform an internal mathematical operation on a channel or between channels without the use of an external computer can be a real asset. One application would be to scale the output of a pressure transducer using a user-defined equation to display and store the actual physical parameter, such as psi. The 52A permits you to create up to 99 mathematical operations which can be used for inter-channel calculations or to modify a single channel's reading.

Data Storage
The Series 50 can store up to 12,000 readings. You can increase the systems memory capacity to 1 megabyte, which stores up to 100,000 readings.

Data Displayed
Series 50 contains a dot-matrix LCD which permits four lines of alphanumeric or bargraph data to be displayed simultaneously.

Alarm Functions
Series 50 permits you to program up to 99 alarm setups. Each alarm has its own set of conditions, setpoints, and responses.

Control of Events
Series 50 digital I/O cards provide you with eight digital lines for event control, plus an analog output voltage, which can be used as a tracking output.

Portable
The Series 50 can operate from low DC or AC voltages, or an optional internal battery which allows you to take your datalogger system into the field.

Interfaces
Series 50 Model 52A Datalogger contains a built-in RS-232C interface, plus you can add another RS-232C or an IEEE-488 interface.

Series 50 Datalogger System
The Series 50 Datalogger System constitutes a complete datalogging system of up to 260 channels. The series can include:

- Model 52A Mainframe,
- Option 50-1 Full Function Measurement Module,
- Option 50-2 DC Volts and Temperature Measurement Module,
- Option 50-11A Rechargeable Battery,
- Option 50-12A-128K and -256K Expansion RAM,
- Option 50-13A IEEE-488 GPIB Interface,
- Option 50-14A Digital I/O/Analog Output,
- Accessory 50-31 Digital I/O/Analog Output Breakout Module,
- Option 50-15 Second RS-232C Serial Port,
- Option 50-20 8/16 Channel High Voltage Multiplexer,
- Model 53 I/O Expansion Chassis,
- Option 53-1 32/64 Channel Multiplexer,
- Option 53-2 16/32 Channel Multiplexer.

All these models, options, and accessories can be configured in several different ways to form a Series 50 Datalogger System. The following table illustrates four typical system configurations. All Series 50 Datalogger Systems must include the Model 52A mainframe and one measurement module. The numbers in

Typical Configurations A, B, C, and D

Components	A	B	C	D	Featured on Page
Model 52A Mainframe	1	1	1	1	125
Option 50-1 Module, Full Function	4	1	1		125
Option 50-2 Module, DC/Temp		4			125
Option 50-11A Rechargeable Battery	1	1	1	1	127
Option 50-12B-256 RAM	2	2	1		127
Option 50-13A GPIB	1				127
Option 50-14A Digital I/O & Analog Out	1				127
Option 50-20 Multiplexer	16	1	4	1	128
Option 53-2: 16/32 Channel Mux (190V Max)	1	1	1		128
Option 53-1: 32/64 Channel Mux (3.2V Max)	8				128
Model 54 Printer/Plotter	1	1	1		128
No. of Channels (Differential)	260	260	33	2	
No. of Stored Readings	512K	512K	256K	128K	

the configuration table tell you the quantity of that option or accessory that is installed for the example configuration. Also, the table tells you where to find more information on the item.

MODEL 52A DATALOGGER

- **More Measurement Functions and Wider Dynamic Range**
- **Up to a Megabyte of RAM**
- **Four Isolated A/D Converters**
- **Ultimate in Portability**
- **Powerful Programming**

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 52A 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 bar graph 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 Closed-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 Megabyte permits storage of over 100,000 measurements. Stored data can be sent to any computer via the standard RS-232 C 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. 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

The Model 52A can gather data continuously or at user defined scan intervals. Data is 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 frameworks 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.

Printer Formatting

Model 52A can format print to provide alphanumeric, bargraph, strip-chart or X-Y plotting. The 52A provides control of readings/line (1 to 99) and lines/page (1 to 255 or continuous).

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.

Measurement Module

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:

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°C to 28°C (64°F to 82°F) and a relative humidity of 80% or less.

DC VOLTS

Resolution and Accuracy:

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

Resolution vs Data Rate and Noise Rejection (1 kΩ 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

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

* Not specified

Resolution

Range	Max Res
30 mV	1mV
300 mV	100 mV
30V	1mV
300V	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.
CMRR: >60 dB at 50 or 60 Hz (1 kΩ Unbalance).
Maximum Input Voltage: Same as DC Volts except 20s max on the 3V, 300 mV, and 30 mV ranges. Volt-Hertz product $\leq 10^7$.

dB MEASUREMENTS

Relative dB, dBm, and dBW measurements are calculated in software. Assumes external reference load and a two-wire bridging mode.
Selectable Reference Impedance:
dBm: 50, 75, 90, 93, 115, 125, 135, 150, 250, 300, 500Ω, 600Ω (default), 600Ωrn, 800, 900Ω, 900Ωrn, 1000Ω (dBV), 1200Ω.
dBW: 2, 4, 8, 16Ω.

TEMPERATURE

Thermocouple linearizations are provided by software for types J, K, E, T, B, S, R. Linearizations for "385" and "392" 100Ω platinum RTD's are included.

COLD JUNCTION TEMPERATURE

Readable at +2° to +50° ±1.0°C with 0.01° resolution. Can be used to determine ambient temperature with no TC attached.

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 2.5	3.5	4.5	Accuracy ± (% Rdg + % of Rng)	FS Vout	I OUT
30Ω	0.1Ω	10mΩ	1mΩ	0.08 +0.02	30mV	1mA
300Ω	1Ω	100mΩ	10mΩ		2V	1mA
3kΩ	10Ω	1Ω	100mΩ		3V	1mA
30kΩ	100Ω	10Ω	1Ω	0.07 +0.005	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: <10V at 1 mA or less.

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

HIGH MEGOHMS

The 52A can measure resistances up to 3200 MΩ by calculating parallel resistance.
Ranges: 300 MΩ, 3000 MΩ.

DIODE TEST

Measures forward biased junction voltage with any of five reference currents.
Range: 0 to 3.2V.

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 inputs 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 2.5	3.5	4.5	Accuracy ± (% Rdg + % of Rng)	MAX V Burden
30mV	100µA	10µA	1µA	0.07 + 0.02	40mV
300mA	1mA	100µA	10µA	0.07 + 0.005	400mV
3A	10mA	1mA	100µA	0.01 + 0.02	150mV
10A	100mA	10mA	1mA	0.1 + 0.005	500mV

Overload Protection: 300 mA fuse (3AG) fuse protects the low current input. The 10A input is not fused. Up to 30 A can be measured for a maximum of 20s 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 Reading +% of Range) 20-45	45-1K	1K-10K	10K-30K	MAX V Burden
30mA	1 +0.3	0.5 +0.2	1 +0.3	5 +0.3	40mV
3A	1 +0.2	0.5 +0.3	1 +0.3	5 +0.3	150mV
300mA	1 +0.04	0.5 +0.04	1 +0.04	5 +0.1	400mV
10A: 1A-10A	1+0.04	0.5+0.04	1+0.04	5+0.1	500mV
10A:<1A	1+0.4	0.5+0.4	1+0.4	5+0.4	500mV

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

FREQUENCY

Frequency is measured by a period average counting method. Resolution is 6 digits per 1.3 sec (7 digits max). Typical frequency response to 8 MHz (4 MHz guaranteed).
Accuracy and Resolution:

Maximum Range	Accuracy	Resolution
10 Hz		0.000001 Hz
100 Hz		0.00001 Hz
1 kHz		0.0001 Hz
10 kHz	0.0025%	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 µs	10 ps	99.99999	µs	±100 ps
1000 µs	100 ps	999.9999	µs	±100 ps
10 ms	1 ns	9999.999	ms	±1 ns
100 ms	10 ns	99999.99	ms	±10 ns
1000 ms	100 ns	999999.9	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.
Resolution and Accuracy:

Range	Resolution	Maximum Reading	Units	Accuracy
100 ms	1 µs	99.999	ms	±2 µs
1000 ms	1 µs	999.99	ms	±2 µs
10 s	1 µs	9999.9	s	±2 µs
100 s	10 µs	99999	s	±10 µs
360 s	100 µs	360.0000	s	±100 µs

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	DC Threshold -Trig
TTL	+2V	+0.8V
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.

Range and Resolution:

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

Range: 0 to 655.35 sec in 0.01 sec interval.

Track: The Track function produces voltage output proportional to 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. Combined with a Digital I/O option the alarms can be used in control applications.

Alarm Responses: An alarm response can be any or all of the following:

- Tone (up to 9 sounds).
- Store and/or transmit reading, alarm number, and time.
- Store and/or transmit all current scan data with time.
- Output a digital word in any desired pattern.
- Output an analog voltage.
- Display, store, or transmit a user entered message.

DISPLAY MODIFIERS

Delta: Either the current reading or a numeric entry offsets the displayed data.

Delta %: Similar to the Delta modifier except the reading is expressed in Delta %.

Min/Max: Stores and displays the minimum or maximum reading and updates the memory and display.

Average: From 1 to 65535 readings can be averaged.

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

Bargraph: A segmented bargraph representation of the measurement shows the channel number and polarity, but range and function is not displayed. There are two bargraph types available: the Full range bargraph, and the high resolution bargraph.

Scale/Math Channel 0: 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 can be entered. Typical applications include scaling transducers, efficiency measurements, and ratio calculations.

Math Functions: +, -, x, =, √, ( ).

Labels: Up to four characters can be defined per Math channel, allowing custom labels.

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.

Display: 32 by 84 dot matrix liquid crystal graphics display.

Isolation: Chassis common is fully isolated from earth ground but is 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: ±500V 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 and Storage Temperatures:

	Without Battery	With Battery
Operating	0° to +50°C	0° to +40°C
Storage	-20° to +70°C	-15° to +40°C

Temperature Coefficient: For operating temperatures <+18°C or >+28°C multiply the applicable accuracy specification times 0.1 per °C.

Humidity: ≤70% RH to +50°C, ≤80% RH to +35°C, except on the 3 MΩ, 30 MΩ, 300 MΩ, and 3000 MΩ ranges: ≤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 ±12 to 24V or any isolated AC source from 9 to 18V can be used to power the 52A. Current drain ranges from 10 µA at standby to 0.5A running an IEEE-488 option.

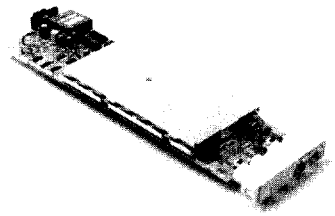
Dimensions: 21.5 cm (8.5 in.) wide w/o handle, 22.6 cm (8.9 in.) with handle; 8.8 cm (3.5 in.) high w/o feet, 10.8 cm (4 in.) with feet; 30.7 cm (12.1 in.) deep.

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 FOR MODEL 52A



50-1: Measurement Module: Full function.

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

50-11A: Rechargeable Battery: Rechargeable battery and charging circuitry.

Battery Type: 12V, 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 50 hr depending on channel and function configuration.

50-12B-256: Ram Expansion Board: Expands data and program memory. In direct data storage, each 256K of expansion memory adds approximately 24,000 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.

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

50-13A IEEE-488 GPIB Interface Board: GPIB Option follows IEEE-488 1978 conventions. Full talk and listen capability.

50-14A: 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.

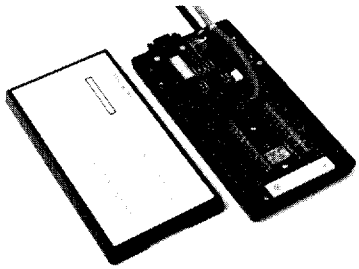
Digital Input Section: The digital read inputs are parallel polled under program control at up to a 20 ms rate. All eight inputs can be used as triggers to read contract closures and can be read independently or masked and read in any combination. The inputs are lightly pulled up (normally high) for 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 2.55V 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 Model 52A.

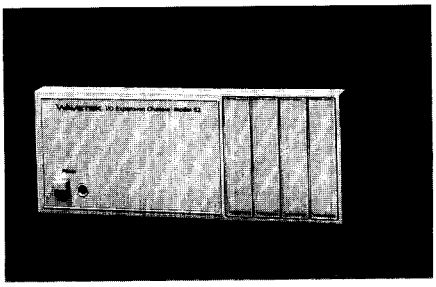
50-20: 8/16 Channel HI-V Multiplexer with Thermocouple Compensation: Multiplexes input signals to the Model 52A thereby expanding the total channel count. One option 50-20 will expand an A/D channel to 16 inputs single ended or 8 channels differential (internally selectable).



Maximum Input V: ±190 Vdc or peak AC between any two input terminals. Transient protected to 6 kV peak <10 µs.
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, ≤60Ω single ended. ≤120Ω 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 100 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.

MODEL 53 I/O EXPANSION CHASSIS & MULTIPLEXERS



The Model 53 with multiplexer options expands the capacity of the Model 52A Datalogger to as many as 260 channels. Temperatures can be logged with thermocouples, with TC types mixed in any order. Each MX module provides cold junction temperature compensation for accurate measurements. All Datalogger functions can be multiplexed, including DC and AC volts, ohms, frequency and current (with external shunts).
odel 53 has five slots. Multiplexer options provide up to 64 channels of multiplexed input to each of up to four Model 52A measurement channels. For in-system use, the Model 53 can be mounted side by side with the Model 52A in 5.25 inches of rack space.

Options 53-1 and 53-2: 32/64 and 16/32 Channel Multiplexers. Options 53-1 and 53-2 Multiplexers multiplex input signals to the Model 52A Datalogger and thereby increase the number of measurement channels.

Measurement Module	Available Channels 53-1	53-2
Single-Ended	64	32
Differential	32	16
Four-Terminal	16	8

The 53-1 and 53-2 Multiplexers provide low thermal emf, low channel-to-channel leakage and infinite switch life. They utilize solid state relays which give relay performance without the limitations. Each channel can be user configured with a shunt (for current-to-voltage conversion), divider or filter for additional flexibility. All closures are break before make.
An isothermal block with temperature sensor is integral to each multiplexer option to allow software compensation of thermocouples. Thermocouple types can be mixed in any order.

MULTIPLEXERS

Max Input Volts
53-1: ±3.2 Vdc or 4.8V peak AC on any input terminal relative to circuit ground.
53-2: ±190 V peak AC of DC between terminal and ground.

Max Switch Current
53-1: ±200 µA peak.
53-2: ±180 mA peak single ended, ±140 mA peak differential.

Thermal EMF
53-1: ≤1.5 µV single ended, ≤3 µV differential.
53-2: ≤800 mA peak single ended, ≤1.6 µV differential.

Closed Channel Resistance
53-1: From 0° to +50°C; ≤1.1 kΩ single ended, ≤2.2 kΩ differential or four-terminal.
53-2: From 0° to +50°C; ≤60Ω single ended, ≤120 Ω differential.

Open Channel Leakage Current
53-1: 100 pA at +18° to +28°C, ≤5 µA at 0° to +50°C.
53-2: $0.5\text{ nA} \times (V_{in} - V_{off1}) + 0.5\text{ nA} \times (V_{in} - V_{off2}) + 0.5\text{ nA}$ at $(V_{in} - V_{off3})$ Where V_{off} represents the amplitude of unselected channels in each group of four inputs, and V_{in} represents the amplitude of the selected channels.

Switching Rate
53-1: 1000 channels/sec max. Measurement module limits switching rate to 15 readings/sec.
53-2: 500 channels/sec max. Measurement module limits switching rate to 15 readings/sec.

Functions: All Model 52A functions are supported except current (can be added by the use of an external shunt). Ohms requires operation in the four-terminal mode with half the mux being used to switch the excitation current. Ohms ranges are limited to greater than 3 kΩ.
53-1: AC specifications are degraded by 2% and bandwidth limited to 5 kHz.
53-2: AC specifications are degraded by 0.1% and bandwidth limited to 100 kHz.

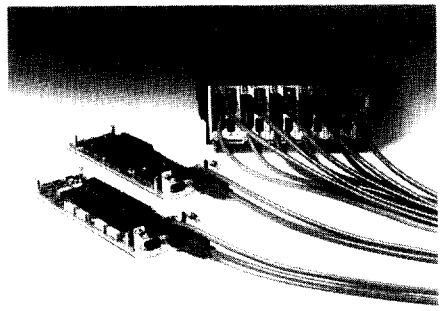
Current Source (53-2 Only): A precision 1 mA current source is available for ohms measurements or transducer excitation. Can be switched in the 4 terminal mode for 8 channels of ohms measurements. The Model 52A math function can be used to scale the readings to ohms using the formula

$$\frac{\text{Voltage Reading}}{0.001} = \text{Ohms}$$

Current Source Compliance (53-2 Only): +3.2 Vdc.

Cables: A three foot (0.9 meter) analog and digital cable set is included to connect an Option 53-1 or 53-2 to the host model. See **Accessories** (page 165) for other cables.

OPTIONS FOR MODEL 53



53-1: 32/64 Channel Multiplexers
53-2: 16/32 Channel Multiplexers
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.

MODEL 54 PRINTER/PLOTTER

Up to 16 channels of stripchart output, as well as alphanumerics and X-Y plotting can be produced by the Model 54 Printer. The Model 54 is normally driven by the Model 52A Datalogger. However, the printer can be used as a high-speed, 42-column, self-contained thermal printer with a variety of systems from other manufacturers.

Stripchart printing can be done on up to four sets of labeled axes with continuous output. If straight X-Y plotting of data is desired, any data that has been stored by the 52A can be printed as an X-Y plot upon command. These features provide major advantages over numeric or alphanumeric printing. Trends can be identified. Out-of-tolerance conditions become obvious. Data can be scaled as desired to expand areas of interest for easy viewing.

In addition to stripchart and X-Y graphics, the Model 54 also offers barchart generation.

Printing at 5.8 lines/second, the Model 54 is fast enough for most data logging applications. Containing a 7168 byte FIFO buffer, the printer offers the ability to print either in TEXT or LIST mode. TEXT prints each line below the previous line and LIST prints each line above the previous line.

Four different print fonts can be displayed on the Model 54. Automatic shuttling allows viewing of the last line printed without missing readings. Up to 10,000 lines can be printed on each roll of 4.4 inch wide paper.

Front panel controls and indicators are provided for on/off line, paper feed, end of paper, and test mode. It can be stacked with the Models 52A and 53 to make a very compact package when space is limited. Model 54 can also be rack mounted.

Print
Printhead: Fixed Thermal Dot Row.
Print Rate: 5.8 lines/sec, typical.
Print Time: 0.17 sec./line, typical.
Line Density: 8.0 lines/inch, typical.

Line Width
No. of Columns: 42
No. of Dots: 256
Print Width: 3.5 in. (89.6 mm)

Paper Roll
Width: 4.4 in. (112 mm)
Length: 92 ft. (28 m)
Diameter: 2 in. (50.8 mm), max.
Data Capacity: 8800 lines/roll (92 ft. roll).

Characters
Height (all fonts): 0.097 in. (2.4 mm), nominal.

Fonts, Matrices, Char/Line

Fonts	Matrix	Char/Line
Normal	5 x 7	42
Expanded	10 x 7	21
Condensed	4 x 7	51
Condensed/ Expanded	8 x 7	25

RS-232 C Interface
Baud Rate: 110 to 9600 Baud.
Word Length: 10 bits including parity (1 start, 8 data, 1 or 2 stop or 1 start, 7 data, 2 stop).
Handshake Mode: Xon/Xoff (Tx Data).
Tx Data: Odd/Even Parity.

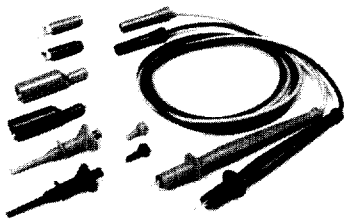
Environmental
Operating Temperature: 0° to +50°C.
Operating Humidity: 20 to 90% (non-condensing).
Dimensions: 8.9 cm (3.5 in.) high, 21.6 cm (8.5 in.) wide, 30.7 cm (12.1 in.) deep.
Weight: 3.6 kg (8 lb) net, 4.8 kg (10.5 lb) shipping.

Power:
115 Vac ±10% (Internally switch selectable), 50/60 Hz.

Power Consumption:
Idle: 20W, nominal.
Printing: 45W, nominal.
Printing Black: 120W.

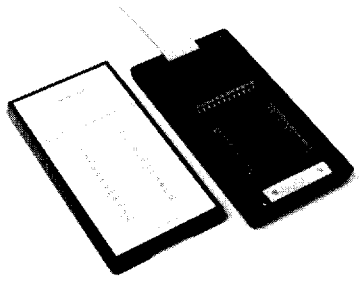
ACCESSORIES FOR MODELS 52A, 53, & 54

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.)

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



Convenient terminal strip connections for Digital I/O channels.

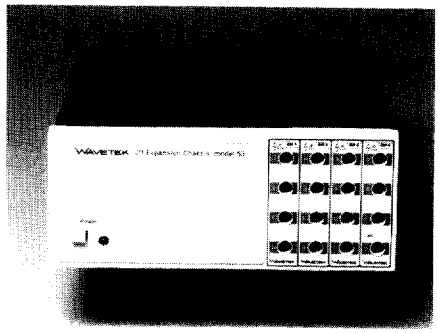
50-33: Three-Foot Multiplexer Module Interconnecting Cable Set
A 3 ft. (0.9 meter) analog signal cable and digital control cable set to connect an Option 53-1 or 53-2 to the host Model. (Same as cable set furnished with Option 53-1 or 53-2.)

50-34: Ten-Inch Multiplexer Module Jumper Cable
A 10 in. (0.25 meter) digital control jumper cable used to distribute control signals when multiplexer modules are daisy chained together.

50-35: Twenty-five Foot Multiplexer Module Interconnecting Cable Set

50-36: Two-Instrument Coupling Kit
Two strips couple a Series 50 instrument with any other Series 50 instrument. Two kits couple 52A, 53, and 54 together.

50-40: Jack Panel Kit



Installed in the Model 53 front panel to provide 16 safety-type banana jacks which terminate in 24 in. stripped and tinned, insulated wires.

3000-00-0181: Printer Paper
10 roles of paper for Model 54.

Style 18: 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 5.25 inches high.

ORDER INFORMATION

Model 52A	**$2,195**
Model 53	**$495**
Model 54	**$1,695**
Option 50-1	**$1,095**
Option 50-2	**$695**
Option 50-11A	**$295**
Option 50-12A-128	**$470**
Option 50-12B-256	**$795**
Option 50-13A	**$495**
Option 50-14	**$395**
Option 50-15	**$395**
Option 50-20	**$795**
Option 50-120	**NC**
Option 50-220	**NC**
Option 53-1	**$895**
Option 53-2	**$1,395**
Accessory 50-30	**$50**
Accessory 50-32	**$195**
Accessory 50-33	**$75**
Accessory 50-34	**$45**
Accessory 50-35	**$195**
Accessory 50-36	**$75**
Accessory 50-40	**$195**
Accessory 3000-00-0181	**$65**
Rack Adapter, Style 18	**$115**
Dual Rack Adapter, Style 19	**$195**

Factory/FOB: San Diego, CA

For full specification or a demonstration, contact you nearest Wavetek representative (page 146).