

MODEL 7200 Integrating Multimeter



FEATURES

- True integrating technique provides maximum noise rejection. The 100 ms and 1 second time bases are ideal for both 50 Hz and 60 Hz power line noise rejections.
- Resolution to 1 part in 110,000 with standard 6 digit display.
- Accuracy of $\pm 0.005\%$ of reading ± 1 digit.
- Automatic comparison to internal standard during each measurement cycle eliminates need for front panel calibration adjustments.
- Three manual and programable integrating time base periods allow optimum combination of speed and resolution, to 30 readings per second.
- $>1,000$ megohm input impedance on 1V, 10V, 100V ranges.
- DC ratio input impedance >1000 megohms for both unknown signal and external reference voltage inputs.
- Power consumption $\bullet <30$ watts — no fan required.

DESCRIPTION

The Fairchild Model 7200 represents the new generation of $5\frac{1}{2}$ digit integrating digital voltmeters. It is an all solid state instrument, making maximum use of integrated circuits and combines the extreme precision, stability, and measurement flexibility ex-

pected from a laboratory instrument with the programing and electrical output features necessary for automated systems use. Special design features virtually eliminate errors due to extraneous noise without imposing any restrictions on the grounding of the signal source, recording device, or programing source. The principle of operation is based on a unique measurement concept where high accuracy and long term stability is achieved by a Fairchild developed approach called "Digital Time Base Memory." (Pat Pending)

The instrument is fully guarded for high common mode rejection, and the basic unit provides three functions: (1) DC volts, (2) DC ratio, and (3) count. A plug-in board (optional) provides a time base for frequency measurements. Optional plug-in units provide AC, mV, and $K\Omega$ measurement capabilities.

The controls and input/output features of the 7200 are designed to permit maximum versatility of application, yet the instrument is simple and straightforward to use. An example of the amount of "human engineering" designed into the 7200 is that all controls have a logic interlock which minimizes human error in the operation of the instrument.

Readout is in-line, with polarity and function indicators, and space is provided for several options: various output decoders, remote programing, and special input filters.

SPECIFICATIONS

NOTE: All specifications are published in the recommended American Standards format. Reference conditions, rated operating conditions and extreme operating conditions per A.S.A. C39 recommendations.

DC VOLTAGE

Ranges Manual (and remote) — Four ranges:

- 1.00000 V f.s. + 10% overrange.
- 10.0000 V f.s. + 10% overrange.
- 100.000 V f.s. + 10% overrange.
- 1000.00 V f.s.

Auto Range — Three ranges:

- 10.0000 V f.s.
- 100.000 V f.s.
- 1000.00 V f.s.

Accuracy (one second integrating time base)

At Reference Condition (7 hours) —

- 10V, 100V and 1000V ranges: $\pm 0.005\%$ Rdg $\pm 0.001\%$ f.s.
- 1V range: $\pm 0.01\%$ Rdg $\pm 0.002\%$ f.s.

Short Term Stability (24 hours) — $\pm 0.01\%$ Rdg $\pm 0.002\%$ f.s.

Long Term Stability (6 months) —

- At reference conditions: $\pm 0.01\%$ Rdg $\pm 0.002\%$ f.s.

Long Term Stability (6 months) —

- At rated operating conditions: $\pm 0.02\%$ Rdg $\pm 0.003\%$ f.s.

Resolution — 0.001% f.s., regardless of reading.

Integrating Time Base —

- Manual and programmable: 1.0 sec., 0.1 sec., 0.01 sec.

Polarity — Automatic.

Range Response Time — 30 ms, regardless of range.

Input Impedance — Manual range:

- 1V > 1K Ω
- 10V > 1K Ω
- 100V > 1K Ω
- 1000V > 10M Ω
- Auto range: All ranges—10M Ω

DC RATIO

Range — 1: 1.00000 +10% overrange.

Accuracy at Reference Condition (7 hours)—At reference voltages

- of 10V, 30V, 60V and 100V: $\pm 0.005\%$ Rdg $\pm 0.001\%$ f.s.

Short Term Stability (24 hours) — $\pm 0.005\%$ Rdg $\pm 0.002\%$ f.s.

Long Term Stability (6 months) — $\pm 0.008\%$ Rdg $\pm 0.002\%$ f.s.

Resolution — 0.001% f.s.

Polarity — Automatic.

Input Impedance for unknown signal input — $> 1\text{K}\Omega$.

Input Impedance for external reference voltage — $> 1\text{K}\Omega$.

Maximum Input Signal — $\pm 110\text{V}$.

External Reference Voltage Range — $\pm 0.5\text{V}$ to 110V DC.

COUNTER

Manual (and programmable) start, stop and reset, for totalizer applications. Through separate BNC connector on front panel.

Maximum Count Rate — 1 MHz.

Maximum Display — 199999.

Minimum Input Level — 100mV rms.

Maximum Input Level — 100V rms.

Input Impedance — 500K Ω , shunted by $< 100\text{pf}$.

GENERAL

Common Mode Rejection

(With 1K Ω unbalance in either input lead.)

DC: $> 140\text{ Db}$.

AC: 60 Hz $> 120\text{ Db}$.

Maximum Common Mode Voltage — 750V DC or 500V rms AC.

Normal Mode Rejection

True integrating technique provides maximum noise rejection. The 100 ms and 1 sec. time bases are ideal for both 50 Hz and 60 Hz power line noise rejections.

Notch Filter —The standard instrument has a 60 Hz Twin-T input filter (front panel switch, and programmable). Provisions are made for other types of input filters, e.g., 50 Hz Twin-T.

Signal Circuit

Insulated and guarded connectors provide for signal input from front or rear. Automatic signal switching to plug-in unit or DVM is controlled internally by the function switch. One additional connector is provided on the rear panel for a four-wire Ω -input. This connector can also be used as a direct input (by passing the input selector) to the Lo-level preamplifier. This eliminates the effects of thermal emf's in the input selector.

Display Time

Five position switch: min., med., max., hold and remote. In the "hold" position the instrument displays the last reading until a new "Read" command is issued (front panel push-button, also remotely programmable).

Readout Storage — Slide switch on rear panel to disable storage.

Size — 17" x 5 $\frac{1}{4}$ " front panel, 20" deep.

Power — 117-220V, 50-400Hz $< 30\text{W}$, No fan.

Price — Model 7200 \$3500.00

OPTIONS

Print Output

All functions, decimal points, polarity, numbers and print command are available through a plug-in harness. Digital output is BCD, 1-2-4-8. Available logic levels are: +30V, +12V, +4V, -30V.

Programming

All switches of the instrument are programmable through a plug-in harness. Two modes of programming are available.

- a) Isolated contact closure to the internal +12V logic level (approximately 5 mA each), resistive load;
- b) Provisions are made for two standard size plug-in cards. These cards accommodate level shifts and gates for programming by contact closure or saturated NPN to logic common. Open circuit voltage: +12V, contact load: $< 1\text{mA}$, resistive.

Frequency Time Base —(optional plug-in board) Provides time base for frequency measurements.

Display — in KHz.

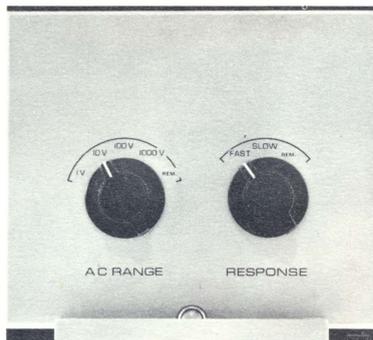
Maximum Frequency — 1 MHz.

Minimum Frequency — 10 Hz.

Time Base — 1 sec., 0.1 sec., 0.01 sec., front panel and remote control.

Accuracy — $\pm 0.005\%$ Rdg ± 1 count.

MODEL DM-10 AC/DC Converter



DESCRIPTION

This AC converter is designed to operate as a plug-in unit in the 7200 Integrating Multimeter. It is completely guarded for high common mode rejection. All circuitry is solid state. Power supplies are self-contained so that the unit can be adapted into a AC/AC ratiometer.

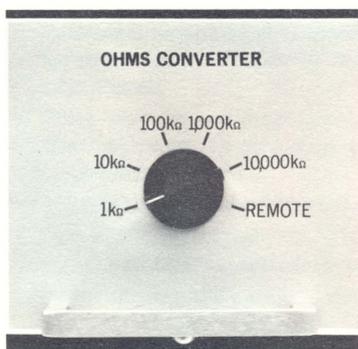
Excellent frequency response, high accuracy and good stability make it an ideal instrument for laboratory and systems use.

SPECIFICATIONS

Ranges — Four ranges, manual and programmable:

- 1.00000 V f.s. + 10% overrange.
- 10.0000 V f.s. + 10% overrange.
- 100.000 V f.s. + 10% overrange.
- 1000.00 V f.s.

MODEL DM-11 OHMS Converter



DESCRIPTION

The DM-11 is a four-wire ohms-converter, designed to operate as a plug-in unit in the 7200 Integrating Multimeter. It is completely guarded for high common mode rejection. All circuitry is solid

Combined Accuracy and Frequency Response (when plugged into 7200) — 10V, 100V and 1000V ranges:

- 30Hz—10KHz $\pm 0.05\%$ Rdg $\pm 0.02\%$ f.s.
- 10KHz—20KHz $\pm 0.1\%$ Rdg $\pm 0.03\%$ f.s.
- 20KHz—50KHz $\pm 0.2\%$ Rdg $\pm 0.05\%$ f.s.
- 50KHz—100KHz $\pm 0.5\%$ Rdg $\pm 0.1\%$ f.s.

1V range:

- 30Hz—10KHz $\pm 0.1\%$ Rdg $\pm 0.05\%$ f.s.
- 10KHz—20KHz $\pm 0.2\%$ Rdg $\pm 0.1\%$ f.s.
- 20KHz—50KHz $\pm 0.5\%$ Rdg $\pm 0.2\%$ f.s.
- 50KHz—100KHz $\pm 1.0\%$ Rdg $\pm 0.5\%$ f.s.

Temperature Coefficient — $\pm 0.005\%/^{\circ}\text{C}$.

Maximum Input Voltage —

- 30Hz—10KHz 1000 V.
- 10KHz—20KHz 750 V.
- 20KHz—50KHz 500 V.
- 50KHz—100KHz 350 V.

Voltage Coefficient — $\pm 0.001\%/V$ if input exceeds 750V.

Input Impedance (measured at the DM-10 rear connector) — 5 M Ω , shunted by < 50 pf.

Note: Standard input cable and 7200 internal wiring will add approximately 200pf. As a special, a DM-10 can be built with terminals or connector on its front panel to provide low shunt capacity.

Response Time — Manual and programmable: fast/slow with cross-over at approximately 400Hz.

Fast: 500ms; Slow: 5 sec.

Size — Approximately 4" x 4", 12" deep.

Power — 117-220V, 50-400Hz, $< 5W$.

Price — Model DM-10 \$995.00

state. Power supplies are self-contained so that the unit can be adapted into low-ohms measurement systems.

SPECIFICATIONS

Ranges — Five, manual and programmable:

- 1.00000 K Ω f.s. + 10% overrange.
- 10.0000 K Ω f.s. + 10% overrange.
- 100.000 K Ω f.s. + 10% overrange.
- 1000.00 K Ω f.s. + 10% overrange.
- 10000.0 K Ω f.s. + 10% overrange.

Combined Accuracy (when plugged into 7200) —

- 1 K—100 K Ω $\pm 0.02\%$ Rdg $\pm 0.002\%$ f.s.
- 1 M Ω $\pm 0.05\%$ Rdg $\pm 0.003\%$ f.s.
- 10 M Ω $\pm 0.10\%$ Rdg $\pm 0.005\%$ f.s.

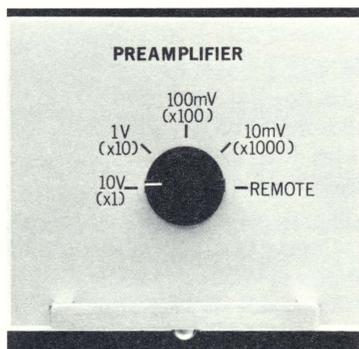
Termination — Special input cable with four-wire Kelvin clips.

Size — Approximately 4" x 4", 12" deep.

Power — 117-220V, 50-400Hz, 5W.

Price — Model DM-11 \$995.00

MODEL DM-12 Low Level Preamplifier



DESCRIPTION

The DM-12 is designed to operate as a plug-in unit in the 7200 Integrating Multimeter. It is completely guarded for high common mode rejection. All circuitry is solid state. Power supplies are self-contained so that the unit can be adapted into low- Ω systems.

Low drift, low noise and good stability are achieved with Fairchild Photochoppers. When the DM-12 is operated in conjunction with the 7200, it extends the measurement ranges to 100.000 mV and 10.0000 mV f.s.

SPECIFICATIONS

Ranges — Four manual and programmable gain settings $\times 1$, $\times 10$, $\times 100$, $\times 1000$.

Accuracy —

$\times 1$ $\pm 0.01\%$ Rdg $\pm 0.005\%$ f.s.

$\times 10$ $\pm 0.01\%$ Rdg $\pm 0.005\%$ f.s.

$\times 100$ $\pm 0.02\%$ Rdg $\pm 0.01\%$ f.s.

$\times 1000$ $\pm 0.03\%$ Rdg $\pm 0.02\%$ f.s.

Input Impedance — $\times 1$, $\times 10$ $> 1K \Omega$; $\times 100$ $> 100 M\Omega$;
 $\times 1000$ $> 10 M\Omega$.

Offset Current — $< 1pA$.

Size — Approximately 4" x 4", 12" deep.

Power — 117-220 V, 50-400 Hz, $< 5 W$.

Price — Model DM-12 \$995.00

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