USER'S HANDBOOK

for

THE DATRON AUTOCAL 1072 and 1071 1062 1061A and 1061 DIGITAL MULTIMETERS

(The 1061A and 1071 specifications and operating instructions in this Handbook apply identically to the Autocal 1062 and 1072 respectively. All references to "1061A" should be read as "1061A and 1062", and all references to "1071" should be read as "1071 and 1072". For maintenance procedures refer to the related Calibration and Servicing Handbook.)

850040 Issue

For any assistance contact your nearest Datron Sales and Service center.
Addresses can be found at the back of this handbook.

Due to our policy of continuously updating our products, this handbook may contain minor differences in specification, components and circuit design to the instrument actually supplied. Amendment sheets precisely matched to your instrument serial number are available on request.

AC VOLTAGE (TRUE RMS — OPTION 10)

Full Range Count : 100,000
Full Scale Count : 199,999 on all ranges except 1000V range

ACCURACY (Signals $< 2 \times 10^7$ Volt Hz, $>$ 0.25% Full Scale).

	DC + 45Hz[2] to 5kHz	DC + 5kHz to 100kHz
24 HOURS (23°C ± 1°C)	Relative to calibration standards.	
0.1V and 1000V ranges:	± 0.04% of reading ± 40 digits	± 0.1% of reading ± 100 digits
1 to 100V ranges:	± 0.02% of reading ± 20 digits	± 0.05% of reading ± 50 digits
90 DAYS (23°C ± 5°C)		
0.1V and 1000V ranges:	± 0.08% of reading ± 40 digits	± 0.2% of reading ± 100 digits
1 to 100V ranges:	± 0.04% of reading ± 20 digits	± 0.1% of reading ± 50 digits
1 YEAR (23°C ± 5°C)		
0.1V and 1000V ranges:	± 0.12% of reading ± 40 digits	± 0.3% of reading ± 100 digits
1 to 100V ranges:	± 0.06% of reading ± 20 digits	± 0.15% of reading ± 50 digits

HF ACCURACY[3] (1 and 10V ranges)
Option 10: 100kHz to 1MHz ± 2% of reading ± 2000 digits (typical)

LF ACCURACY
Filter out, at line frequency add: ±0.6% of reading
Filter in, 10Hz: ±2.0% of reading

CREST FACTOR
7 : 1 typically, at full range

TEMPERATURE COEFFICIENT
$<$ 1/10th of 90 DAY specification/°C

COMMON MODE REJECTION
1kΩ unbalance $>$ 90 dB @ DC – 60Hz

READ RATE (with full scale input) : 2 readings/second.
Continuous and Block Average modes : As DC Volts.
No digital filtering on 'Input filter'.

INPUT IMPEDANCE
1MΩ shunted by 150pF

CONVERSION TYPE
True RMS AC coupled (measures AC component with up to 1000V DC bias on any range, subject to the constraints of Section 2, Table 2.1).
or
True RMS DC coupled (measures $\sqrt{AC^2 + DC^2}$)

SETTLING TIME (DC coupled)
(i) To 0.1% of step size
Filter out $<$ 150mS
Filter in $<$ 500mS

(ii) From DC bias input (AC coupled) or severe overload:
Depends on change of DC bias
(CR time constant 0.22 seconds)

DC CURRENT
(applicable only if Option 12 is not fitted)

Full Range Count : ± 100,000
Full Scale Count : ± 199,999

ACCURACY

24 HOURS (23°C ± 1°C)	Relative to calibration standards.
0.1 to 100mA ranges:	± 50ppm of reading ± 4 digits
1000mA range:	± 100ppm of reading ± 4 digits
90 DAYS (23°C ± 5°C	
0.1 to 100mA ranges:	± 100ppm of reading ± 4 digits
1000mA range:	± 200ppm of reading ± 4 digits
1 YEAR (23°C ± 5°C)	
0.1 to 100mA ranges:	± 150ppm of reading ± 4 digits
1000mA range:	± 300ppm of reading ± 4 digits

TEMPERATURE COEFFICIENT
1/10th of 90 DAY specification/°C

READ RATE : As DC Volts

SETTLING TIME : As DC Volts

SHUNT RESISTANCE
0.1mA range : 1kΩ
1mA range : 100Ω
10mA range : 10Ω
100mA range : 1Ω
1000mA range : 0.1Ω

Internal lead resistance: $<$ 20% of shunt resistance + 1Ω.

INPUT PROTECTION
Overloads : $<$ 2A, internally clamped
$\geq$ 2A, rear panel fuse

AC CURRENT (TRUE RMS)
(in conjunction with option 10 only)

Full Range Count: 100,000
Full Scale Count : 199,999

ACCURACY DC + 45Hz[2] to 5kHz
(Signals $>$ 0.1% Full Scale).

24 HOURS (23°C ± 1°C)	Relative to calibration standards
0.1 to 1000mA ranges:	± 0.1%[4] of reading ± 100 digits
90 DAYS (23°C ± 5°C)	
0.1 to 1000mA ranges:	± 0.2%[4] of reading ± 100 digits
1 YEAR (23° ± 5°C)	
0.1 to 1000mA ranges:	± 0.3%[4] of reading ± 100 digits

CREST FACTOR
3 : 1 typically, at full range

TEMPERATURE COEFFICIENT
$<$ 1/10th of 90 DAY specification/°C

READ RATE : As AC volts

SETTLING TIME : As AC volts

SHUNT RESISTANCE : As DC current

CONVERSION TYPE
True r.m.s. AC coupled or DC coupled

INPUT PROTECTION
As DC Current but large DC bias may cause protection to operate as the AC coupling is provided after current shunts.

[2] Read 360Hz instead of 45Hz if 'Input Filter' not selected.

[3] Spec read-out invalid above 100kHz.

[4]

1061 and 1061A [5] Specifications

DC VOLTAGE

Full Range Count (FR) : ± 100,000 (1,000,000)
Full Scale Count (FS) : ± 199,999 (1,999,999) on all ranges except 1000V range
Superfast Mode Full Scale Count : 19,999 on all ranges except 1000V range

ACCURACY

24 HOURS (23°C ± 1°C) Relative to calibration standards.			
*0.1V range:	± 10ppm of reading	± 2 digits	(16)
1 and 10V ranges:	± 5ppm of reading	± 1 digit	(8)
100 and 1000V ranges:	± 10ppm of reading	± 1 digit	(8)
90 DAYS (23°C ± 5°C)			
*0.1V range:	± 30ppm of reading	± 2 digits	(16)
1 and 10V ranges:	± 20ppm of reading	± 1 digit	(8)
100 and 1000V ranges:	± 30ppm of reading	± 1 digit	(8)
1 YEAR (23°C ± 5°C)			
*0.1V range:	± 45ppm of reading	± 2 digits	(16)
1 and 10V ranges:	± 30ppm of reading	± 1 digit	(8)
100 and 1000V ranges:	± 45ppm of reading	± 1 digit	(8)

Superfast Mode (all ranges) : ± above ppm of reading ± 1 digit

TEMPERATURE COEFFICIENT : (10°C to 35°C)
1/10th of 90 DAY specification ± 0.2μV/°C

READ RATE
Normal Mode
All DC ranges : 3/second (internal trigger) with full scale input
30/35 per second (external trigger) with full range input at 50/60Hz

Superfast Mode
All ranges: 200/second (external trigger) with full range input.

SETTLING TIME (to 10 ppm of step size) [1]
Filter out : < 5mS
Filter in : < 350mS

SERIES MODE REJECTION
Filter out : 66dB @ line frequency
Filter in : add 34dB @ 50Hz increasing at 18dB/octave

COMMON MODE REJECTION
1kΩ source unbalance
> 140dB at DC
> 80dB + series mode at 1Hz to 60Hz

AUTORANGE SPEED (No filter)
Typically 100mS per range between top and bottom ranges.

INPUT RESISTANCE
0.1 to 10 Volt ranges (< 20 volts) : > 10,000 MΩ
100 and 1000 Volt ranges : 10MΩ ± 0.1%.

INPUT CURRENT (1 year)
< 50pA drifting at < 2pA/°C.

RESISTANCE

Full Range Count : 100,000 (1,000,000)
Full Scale Count : 199,999 (1,999,999)
Superfast Mode Full Scale Count : 19,999

ACCURACY

24 HOURS (23°C ± 1°C)			
*10Ω range:	± 15ppm of reading	± 2 digits	(16)
0.1kΩ, 1kΩ, 10kΩ ranges:	± 10ppm of reading	± 1 digit	(8)
100kΩ range:	± 15ppm of reading	± 1 digit	(8)
1000kΩ range:	± 30ppm of reading	± 1 digit	(8)
10MΩ range:	± 150ppm of reading	± 1 digit	(8)
90 DAYS (23°C ± 5°C)			
*10Ω range:	± 40ppm of reading	± 2 digits	(16)
0.1kΩ, 1kΩ, 10kΩ ranges:	± 30ppm of reading	± 1 digit	(8)
100kΩ range:	± 40ppm of reading	± 1 digit	(8)
1000kΩ range:	± 100ppm of reading	± 1 digit	(8)
10MΩ range:	± 300ppm of reading	± 1 digit	(8)
1 YEAR (23°C ± 5°C)			
*10Ω range:	± 60ppm of reading	± 2 digits	(16)
0.1kΩ, 1kΩ, 10kΩ ranges	± 45ppm of reading	± 1 digit	(8)
100kΩ range:	± 60ppm of reading	± 1 digit	(8)
1000kΩ range:	± 200ppm of reading	± 1 digit	(8)
10MΩ range:	± 500ppm of reading	± 1 digit	(8)

Superfast Mode : As DC Volts

TEMPERATURE COEFFICIENT : (10°C to 35°C)
1/10th of 90 DAY specification ± 100μΩ/°C

READ RATE
Normal Mode
All ranges : As DC Volts.
Superfast Mode : As DC Volts

TYPE
True 4-wire with active guard (can be switched to 2-wire on the front panel).
Measurement technique is independent of the internal reference voltage.

OPEN CIRCUIT VOLTAGE
< 10 volts on all ranges

LEAD RESISTANCE
Up to 100Ω may be tolerated in any or all the leads on any range. (Rejection of lead resistance is 100dB on any range).

RESPONSE TIME
Depends on external capacitance and guarding/shielding techniques used.
Generally up to 10kΩ response as DC Volts.
Higher resistances take longer to settle.
OHMS GUARD may be used to guard out stray capacitance.

CURRENT THROUGH UNKNOWN (± 1%)
10Ω, 0.1kΩ ranges : 10mA
1kΩ range : 1mA
10kΩ range : 100μA
100kΩ range : 10μA
1000kΩ range : 1μA
10MΩ range : 100nA

OHMS GUARD
Drive Capability: I+ or I– to OHMS GUARD, 250Ω minimum (up to 10Ω lead resistance)
Guarding Accuracy : See Section 2 - 'Resistance measurement'.

*Within 15 minutes of 'Input Zero' correction and 'Input Filter' selected or add 5μV per year
[1] or <3 digits or 1ppm of step size (whichever is greater) following a range change
[5] Count and Accuracy figures in brackets refer to 1061A in 'Filter' Mode (6½ digits)
NOTE: SUPERFAST selected by remote programming only