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THE 1281 SELFCAL DIGITAL MULTIMETER

+19.99999

± 1.5 ⎓ +19.999999

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THE BEST DIGITAL MULTIMETER IN THE WORLD

The late 1970's represented a landmark in the evolution of precision Digital Multimeters, for with the introduction of its Autocal range, Datron Instruments emerged as a world leader in the design and manufacture of State of the Art calibration instruments.

Improving on such exacting standards has not been easy, but now Datron has reached yet another significant milestone with its $8\frac{1}{2}$ digit 1281 Selfcal Digital Multimeter. Put very simply, the 1281 is, without exception, the best DMM in the world.

Consider these outstanding features:

Measurement Capability

- The world's fastest **$8\frac{1}{2}$ digit** DMM
- **DCV** from 10nV to 1100V, 1 year specifications to **±3ppm**
- **True RMS ACV** from 100nV to 1100V, 1 year specifications to **±80ppm**
- **Spot calibrated ACV** 1 year performance to **±65ppm**
- Simultaneous display of **Frequency** and True RMS ACV
- **2-wire and 4-wire Resistance** from 1μΩ to 2GΩ, 1 year specifications to **±8ppm**
- **Low Current Ω** mode – ideal for resistance thermometry
- **DC and AC current** option
- **Ratio** measurements

Calibration & Test

- **Selfcal** – internal calibration
- **Autocal** – covers-on external calibration
- Comprehensive **Selftest**

Programmability

- **IEEE-488.2** – compatible with IEEE-488 (1978)
- Flexible and easy to use **Menu Control**
- Extensive **Math**, Limit testing, Spec and Max/Min computations

Designed with Standards and Calibration laboratories in mind, the 1281 provides the ultimate in electrical measurement, outperforming all rivals in accuracy, functional capability, and ease of use.

2 WIRE AND
4 WIRE OHMS

OHMS GUARD TO MINIMIZE PARALLEL
PATH EFFECTS FOR IN-CIRCUIT
RESISTANCE MEASUREMENTS

ANALOG OUTPUT FOR XY PLOTTERS
AND CHART RECORDERS

READING RESOLUTION FROM
8½ DIGITS TO 4½ DIGITS

199,999,999 FLOATING POINT HIGH
BRIGHTNESS VACUUM FLUORESCENT
DISPLAY, WITH FULL FUNCTION
ANNUNCIATION

TWO REAR INPUTS

FULLY PROGRAMMABLE
IEEE-488.2 INTERFACE

INSTANTANEOUS
DISPLAY OF
INSTRUMENT STATUS

CONFIGURE EACH FUNCTION FOR
RESOLUTION, FILTER, AND SPEED

AUTORANGING ON ALL FUNCTIONS
INCLUDING RATIO, UP AT 200%
RANGE, DOWN AT 18.8% RANGE

40 CHARACTER DOT MATRIX
MENU DISPLAY

SELECT FROM MENU
USING SOFT KEYS

DUAL PURPOSE KEYS
ALLOW KEYBOARD ENTRY

SELFCAL ENHANCED
ACCURACIES

FULL FRONT PANEL
CALIBRATION WITH
AUTOCAL

RETRACTABLE LOW THERMAL INPUT
TERMINALS OF GOLD PLATED COPPER

FULLY FLOATING & GUARDED INPUT,
LO GUARD – 250V RMS
GUARD-GROUND – 650V RMS

INHIBITS INTERNAL TRIGGERS,
ENABLES IEEE-488.2, REAR
OR FRONT PANEL TRIGGERS

FRONT PANEL SINGLE
SHOT TRIGGER

FRONT PANEL GENERATION
OF SRQ's

CALIBRATION
TRIGGER

AUTOMATIC INPUT ZERO.
ZEROS ALL RANGES WITH
'AUTO' SELECTED

DCV,
10nV-1100V

TRUE RMS ACV,
100nV-1100V, WITH
1Hz-1MHz AND
DC COUPLED AC
FACILITY

RESISTANCE, 1μΩ-2GΩ,
WITH TRUE 4 WIRE MODE,
LOW CURRENT MODE AND
AUTOMATIC ELIMINATION
OF ZERO OFFSETS

DCI, 100pA-2A
TRUE RMS ACI
1nA-2A, 1Hz-5kHz

CHOICE OF THREE
INDEPENDENT INPUTS,
RATIO, DIFFERENCE
AND DEVIATION

MONITOR PROVIDES
SPECIFICATION READOUT,
MAX/MIN/PEAK-PEAK,
LIMITS, AND SIMULTANEOUS
FREQUENCY AND RMS ACV
DISPLAYS

SELFTEST DIAGNOSTICS
WITH COMPREHENSIVE
DISPLAY OF ERROR CODES

COMPUTATION CAPABILITY
FOR OFFSETS, SCALING, dBs
AND AVERAGING

SELFCAL-INTERNAL CALIBRATION

The impressive specifications of the 1281, achieved through a blend of innovation, design experience and new component technology, are further enhanced by 'Selfcal' – Datron's unique method of accurate internal calibration.

Embedded within the 1281's normal measurement circuits is a multifunction standard – not just a simple extra voltage or resistance reference, but a compact and accurate internal calibrator composed of highly stable zener diodes, reference resistors, and a precision transformer multiplier. During a 'Selfcal', the inherently stable turns-ratio of the transformer multiplier is used to derive different levels of very high accuracy calibration signals from the zener references, which are then routed via an internal signal bus to all of the various instrument functions. Over 150 calibration measurements are used by the microprocessor to compute and store corrections for the effects of time and temperature drift in the 1281's circuits, significantly enhancing its long term performance and temperature coefficient specifications.

Protected from misuse by a key lock and optional passnumber, this sophisticated enhancement technique is simple to use and can be activated by a single front panel key press or IEEE-488 command.

When the 1281 is being calibrated against external standards (using Autocal – Datron's electronic technique for covers-on external calibration), the internal calibrator is also automatically calibrated against the same external standards. In effect, the DMM is calibrated first and then used as a transfer to calibrate the internal calibrator. Exactly the same circuit,configurations and timing are used for the calibration of the internal calibrator by the DMM during an external calibration as for the calibration of the DMM by the internal calibrator during a Selfcal. This makes Selfcal not only totally traceable to National Standards but also highly repeatable. The integrity of the process is even further enhanced through the automatic intercomparison of the zener and resistance references of the internal calibrator during both external calibration and Selfcal.

The potential benefits of Selfcal include an overall accuracy improvement, longer recalibration cycles, excellent performance outside of a temperature controlled environment, and an extremely comprehensive selftesting ability.

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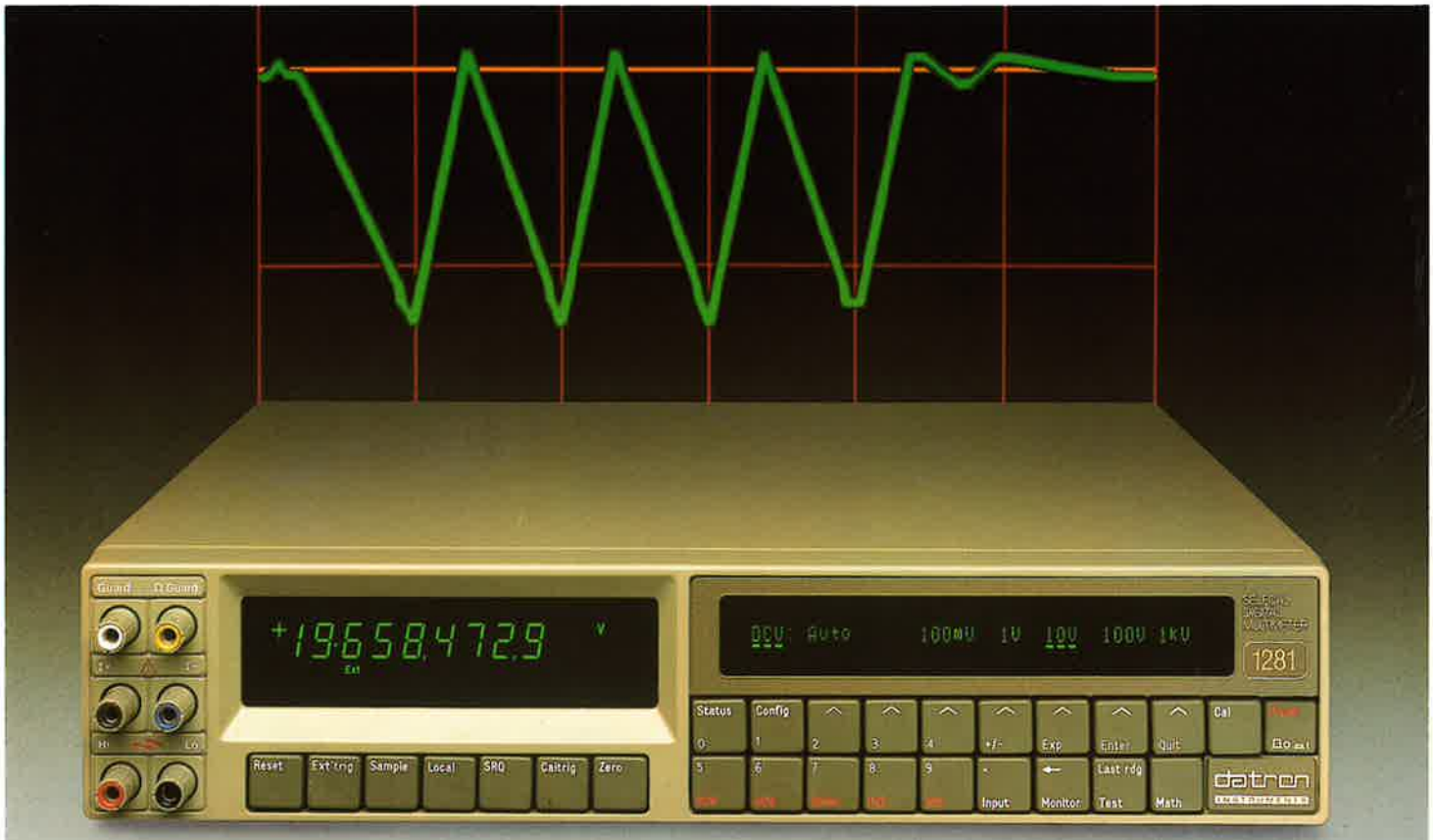


$8\frac{1}{2}$ DIGIT DC VOLTAGE

The 1281's DCV specifications represent the State of the Art for calibration DMM's, providing 1 year accuracies of ±5ppm and resolutions selectable from $4\frac{1}{2}$ digits up to a full $8\frac{1}{2}$ digits. The stability, resolution, low noise and excellent linearity of the 1281 are derived from the design of the DC input amplifier, the quality of its gain defining resistors, the analog to digital converter, and the characteristics of the instrument's zener references.

Taking advantage of the low current input and ultra low noise characteristics of a differential FET amplifier stabilized by a chopper configuration, the input stage provides a sensitivity to 10nV and very low drift. Its gain is defined by highly stable, metal cased, compensated foil resistors with tracking temperature coefficients of better than 0.2ppm/°C.

Complementing the DC amplifier design, the Datron hermetically encapsulated zener reference modules are highly stable at better than 3ppm drift per $\sqrt{\text{year}}$, and maintain their very low temperature coefficient of better than 0.1ppm/°C over an extremely wide temperature band (0°C-50°C). This combination ensures that the 1281's performance under difficult ambient measurement conditions is unequalled, and can be even further enhanced through the use of a 2 pole analog filter and user selectable average modes to reduce the effects of noise on the signal to be measured.

Both the conditioned input signal and the reference are applied to Datron's latest multi-ramp, multi-cycle integrating analog to digital converter which, utilizing a custom ASIC for control, provides user selectable resolutions from $8\frac{1}{2}$ digits down to $4\frac{1}{2}$ digits, with a full 100% overrange and a linearity to within 0.2ppm. As both the signal and the reference are applied simultaneously to the integrator, repeatable and accurate $8\frac{1}{2}$ digit readings can be obtained at speeds of up to 1 reading every six seconds – a fraction of the time required by other techniques.

1281 SELFCAL

TRUE RMS AC VOLTAGE

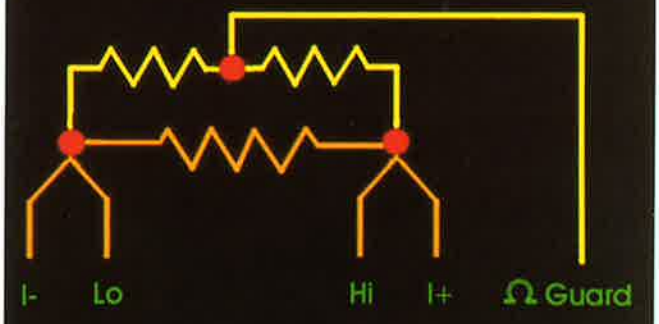
The 1281's excellent performance does not end at DCV; no other DMM can match the breadth and quality of its ACV capability either. With 1 year true RMS ACV accuracies to ±90ppm, up to 1000V RMS maximum input, 100nV resolution and a frequency response from 1Hz to 1MHz, the 1281 is the world's most accurate and versatile AC DMM.

The 1281's AC RMS conversion is based on the Datron Instruments 'log-feedback' method – a totally electronic technique which does not suffer from the problems of slow speed, limited dynamic range and frequency restrictions normally associated with its thermal counterparts. Specified for inputs from 1% to 200% of range, and accommodating high crest factor signals, the RMS converter provides accurate $6\frac{1}{2}$ digit readings at an unequalled rate of 1 per second.

The basic AC performance is optimized using several innovative techniques, including an internal AC/DC transfer method which can be applied to each measurement to automatically correct the gain of the RMS section. In addition, each ACV range can be spot calibrated at up to 6 independent user defined frequencies, such that when measurements are being taken of signals at frequencies which lie within ±10% of these points, flatness errors are reduced improving accuracy to an unbeatable ±65ppm for a whole year. To provide even more information about the signal of interest, the 1281 also has a reciprocal counter function designed into one of its custom ASICs which can display the frequency of an ACV signal at the same time as its RMS value is being shown on the main display. Frequency accuracy is ±10ppm and the user has the choice of either $4\frac{1}{2}$ or $6\frac{1}{2}$ digits frequency resolution.

RESISTANCE AND CURRENT

The full multifunction capability of the 1281 is completed with the addition of a highly accurate and flexible resistance function along with a set of precision internal current shunts which provide accurate DC and AC current measurements up to a maximum of 2A. Resistance is offered in ranges from 10Ω to 1GΩ, with resolution to 1μΩ and scale lengths from $4\frac{1}{2}$ digits to $8\frac{1}{2}$ digits. True four wire sensed measurements can be made with very high lead resistance rejection – up to 100Ω in any lead – with no degradation in accuracy. Furthermore, errors caused in external leakage paths can be eliminated using an Ohms Guard terminal which is also useful for in-circuit measurement of components in parallel with other resistive elements. In addition, through flexible control of the floating constant current sources used by the 1281 for resistance measurements, the effects of induced or thermal emfs as well as resistor self-heating can be greatly reduced.



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AUTOCAL

A high confidence calibration technique is vital to achieving the outstanding accuracy of the 1281 and so for external calibration Autocal – Datron's covers-on calibration technique – is used. At the time of calibration, zero and gain errors along with AC hf corrections are determined by the microprocessor through comparison of the instrument readings with the actual values of the traceable sources being offered to the DMM. These corrections are stored in non-volatile memory and are subsequently used to correct all readings.

The minimal transfer uncertainty associated with Autocal is coupled with high speed because the ability to fully calibrate with covers on means that the thermal balances within the instrument are not disturbed during the process, eliminating the need for additional stabilization time.

For ultimate precision, the numeric keyboard can be used to enable calibration at non-cardinal point sources such as standard cells, removing uncertainties due to any additional transfer equipment. Of particular interest to users in Standards and Calibration laboratories is a facility which can, at a single key press, restandardize all ranges and functions, correcting either for any change in the instrument's reference circuitry or in the Standards lab prime reference.

Simple to use, Autocal may be actioned either through the front panel keys or IEEE-488 commands, and is protected from unauthorized use by key lock and optional passnumber.

RATIO AND MATH

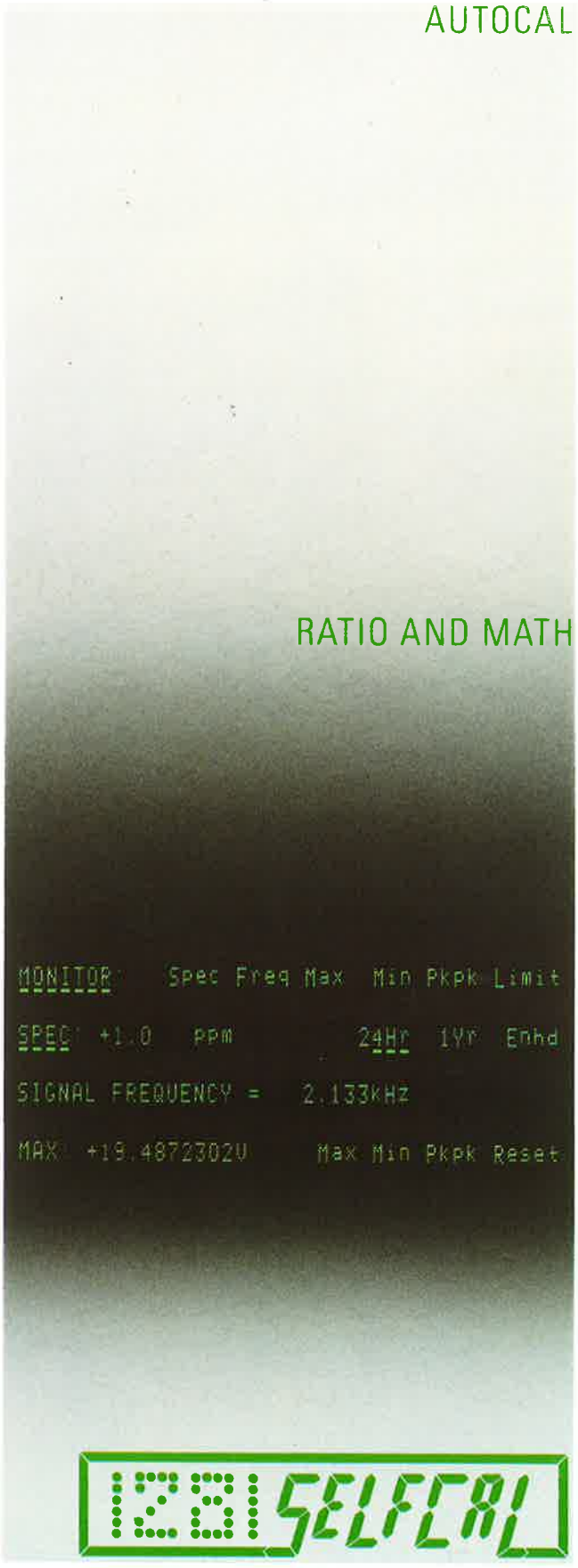
Three sets of analog inputs are provided with the instrument: one front and two rear. All inputs are fully floating and isolated, and are selectable from the front panel or programmable over the IEEE-488 interface. Each channel has its own separate input zero correction, and is independently guarded with provision for remote guard connection to reduce errors due to common mode signals.

The two rear inputs may be automatically switched, allowing the ratio, difference or deviation of the signals on these channels to be displayed. Particular care has been taken to closely match both rear input channels, eliminating errors in the input switching circuitry, while autoranging on each measurement made in this mode provides high accuracy comparative measurements where widely differing inputs are involved.

A comprehensive Math computation facility is provided to give the user access to rolling and block reading averages, linear mathematics, and logarithmic dB calculations. Previous readings or keyboard entered values can be used as constants in the calculations, and these facilities are useful for a wide variety of applications including linear scaling of transducer outputs to provide a display in engineering units, or direct dBm measurements referenced to any user defined value.

At the time of external calibration, the 1281 allows operators to enter their own values for the calibration uncertainty, traceable to National Standards, for each range. These figures are used by the 1281's patented Spec facility which, to save effort and time in calculating measurement uncertainties, can provide an instantaneous display of the total uncertainty associated with the latest measurement at the press of a key. The Spec readout changes dynamically with signal input, and the calculations take function, range, size and frequency of signal, time since last calibration, and calibration uncertainty all into account.

Apart from Spec the monitoring capabilities of the 1281 also include the capture of peak input signal values and the checking of readings against predefined limits. Internal stores are constantly updated with the latest maximum and minimum readings, providing a useful way of measuring such factors as the drift of a source over a period of time. These stores may be interrogated at any time to display maximum, minimum, or peak to peak values, and the displays are dynamically updated to allow constant monitoring of the parameter of interest. In addition, user defined high and low limits may be set from the front panel or over the IEEE-488 interface, causing an appropriate



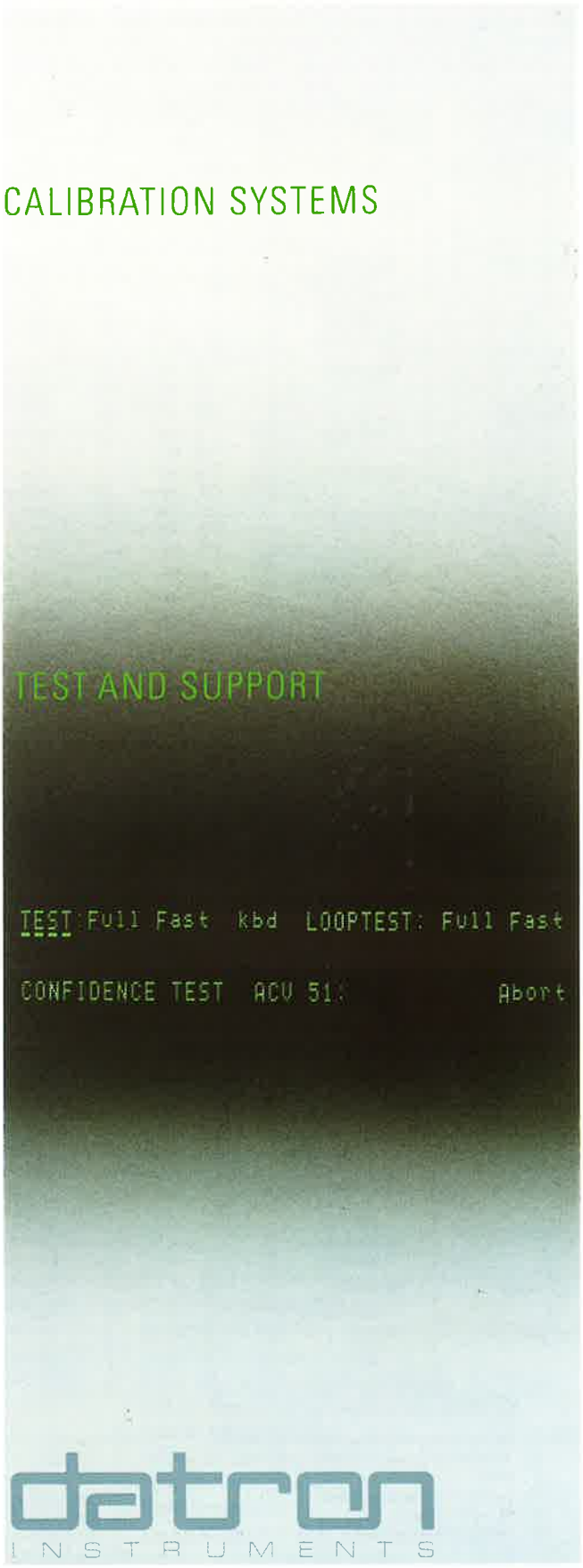
message to be displayed when the reading crosses either of these limits. Furthermore, the instrument can be programmed to generate a service request (SRQ) on the IEEE-488 bus as well as a signal on a special rear panel connector in order to automatically trigger some appropriate action when a limit condition occurs.

Every 1281 is provided with an interface which conforms to the new IEEE-488.2 standard. This interface, totally compatible with IEEE-488 (1978), provides the officially recognized codes and formats designed to reduce the effort required for test programme generation and maintenance, opening up the way to the use of high level languages for programming and for transportation of such programs across systems.
Easy to identify English language device dependent commands are coupled with an extensive array of IEEE-488.2 common commands and standard status reporting facilities to produce a powerful systems instrument ideal for use in automated calibration systems for the calibration of calibrators, precision voltage sources, and resistance boxes, or alternatively for monitoring the output of sources used to calibrate other DMMs.
In addition to its IEEE-488.2 interface, the 1281 possesses other features useful in systems such as complete programmable isolation of input terminals from analog connections, and a special ancillary rear panel connector which provides signals to indicate when the DMM is sampling – useful for scanner synchronization and trigger control.

Another benefit of Selfcal is that the circuits needed to implement it also provide the perfect means for an extremely comprehensive selftest. The instrument makes more than 150 internal measurements using its highly accurate internal calibrator to locate errors in any of its performance areas. This super selftest, representing the best available on any DMM, is combined with a rigorous check of the calibration memory, lending very high confidence to the instrument's serviceability. In addition to the main selftest, the instrument provides a keyboard test, a comprehensive display check, and a fast confidence test for rapid functional checking. Error codes for an extensive range of failure conditions can be displayed, and if service becomes necessary, simple access is provided for all major circuit cards.
The 1281 has been designed to the most exacting quality standards and carries the Datron comprehensive warranty. This, together with the complete back-up support and recalibration facilities provided by our service centers worldwide, means that customers can continue to enjoy the high level of service they have come to expect from Datron Instruments.

CALIBRATION SYSTEMS

TEST AND SUPPORT



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1281 SPECIFICATIONS

FUNCTION	RANGE [1]	FREQUENCY (Hz) MODE	ACCURACY RELATIVE TO CALIBRATION STANDARDS [2] [3] ±(ppmR+ppmFS) [4]			CALIBRATION UNCERTAINTY (ppm) [7]	TEMPERATURE COEFFICIENT (ppm/°C) 13°C–18°C 28°C–33°C	
			24 Hour 23°C±1°C	1 Year 23°C±5°C				
				Normal	Enhanced [5] [6]		Normal	Enhanced [5]
DC VOLTAGE	100.000 00mV		1.0 + 0.5	7 + 0.5	6 + 0.5	4.5	0.6	0.3
	1.000 000 00V		0.5 + 0.2	6 + 0.2	3 + 0.2	3.5	0.5	0.25
	10.000 000 0V		0.5 + 0.1	6 + 0.1	3 + 0.1	2.5	0.5	0.25
	100.000 000V		1.0 + 0.2	10 + 0.2	6 + 0.2	4.5	0.8	0.4
	1000.000 00V [7]		1.0 + 0.2	10 + 0.2	6 + 0.2	4.5	0.8	0.4
AC VOLTAGE [8] [9] 1Hz to 1MHz	100.000 0mV	40 – 10k	60 + 20	200 + 20	100 + 20	40	15	5
		10k – 30k	250 + 30	400 + 40	300 + 40	170	20	10
		30k – 100k	400 + 100	700 + 100	700 + 100	450	50	40
	1.000 000V to 100.000 0V [10]	40 – 100	50 + 10	150 + 10	80 + 10	30	10	5
		100 – 2k	30 + 10	130 + 10	60 + 10	30	10	5
		2k – 10k	50 + 10	150 + 10	80 + 10	30	10	5
		10k – 30k	100 + 20	250 + 20	200 + 20	30	15	10
		30k – 100k	250 + 100	500 + 100	500 + 100	70	50	40
		100k – 300k	0.15% + 0.1%	0.3% + 0.1%	0.3% + 0.1%	200	50	40
		300k – 1M	1% + 0.5%	1% + 1%	1% + 1%	500	50	40
	1000.000V [10] [11]	40 – 10k	50 + 10	150 + 10	80 + 10	100	10	10
		10k – 30k	100 + 20	250 + 20	200 + 20	100	15	10
		30k – 100k	250 + 100	500 + 100	500 + 100	200	50	40
SPOT FREQUENCY AC VOLTAGE [8] [9] [12] [13] 1Hz to 1MHz	100.000 0mV	40 – 10k	40 + 10	200 + 10	100 + 10	40	15	5
		10k – 30k	60 + 25	250 + 25	150 + 25	170	20	10
		30k – 100k	100 + 100	500 + 100	500 + 100	450	60	20
	1.000 000V to 100.000 0V [10]	40 – 10k	30 + 5	130 + 5	60 + 5	30	10	5
		10k – 30k	50 + 15	200 + 15	150 + 15	30	15	10
		30k – 100k	100 + 50	400 + 50	400 + 50	70	50	40
		100k – 300k	0.1% + 0.05%	0.2% + 0.05%	0.2% + 0.05%	200	50	40
		300k – 1M	0.2% + 0.3%	0.5% + 0.3%	0.5% + 0.3%	500	50	40
	1000.000V [10] [11]	40 – 10k	30 + 5	130 + 5	60 + 5	100	10	10
		10k – 30k	50 + 15	200 + 15	150 + 15	100	15	10
		30k – 100k	100 + 50	400 + 50	400 + 50	200	50	40
RESISTANCE [14]	10.000 000Ω [15]	Normal 10mA	3.0 + 1	13 + 1	12 + 1	4.5	1.2	0.8
	100.000 000Ω	Current 10mA	1.5 + 0.3	11 + 0.3	8 + 0.3	4.5	1.0	0.5
	1.000 000 00kΩ	1mA	1.0 + 0.3	9 + 0.3	6 + 0.3	4.5	1.0	0.5
	10.000 000 0kΩ	100µA	1.0 + 0.3	9 + 0.3	6 + 0.3	4.5	1.0	0.5
	100.000 000kΩ	100µA	1.0 + 0.3	9 + 0.3	6 + 0.3	8	1.0	0.8
	1.000 000 00MΩ	10µA	2.0 + 0.7	14 + 0.7	11 + 0.7	12	1.5	1.0
	10.000 000 0MΩ	1µA	4.0 + 4	28 + 4	25 + 4	15	2.0	1.5
	100.000 0MΩ	100nA	30 + 45	300 + 45	300 + 45	100	20	15
	1.000 000GΩ	10nA	300 + 450	0.3% + 450	0.3% + 450	1000	200	150
	10.000 000Ω [15]	Low 10mA	3 + 1	13 + 1	12 + 1	4.5	1.2	0.8
	100.000 000Ω	Current 1mA	5 + 1	13 + 1	12 + 1	4.5	1.2	0.8
	1.000 000 00kΩ	100µA	5 + 1	13 + 1	12 + 1	4.5	1.2	0.8
	10.000 000 0kΩ	10µA	5 + 1	16 + 1	15 + 1	4.5	1.5	1.0
	100.000 000kΩ	1µA	50 + 3	70 + 3	70 + 3	8	2.5	2.0
	1.000 000 00MΩ	100nA	200 + 10	400 + 10	400 + 10	12	20	15
DC CURRENT	100.000 0µA		20 + 2	100 + 20	25 + 2	20	10	8
	1.000 000mA		20 + 2	100 + 20	25 + 2	20	10	8
	10.000 00mA		20 + 2	100 + 20	25 + 2	20	10	8
	100.000 0mA		30 + 5	100 + 20	50 + 5	20	10	8
	1.000 000A		100 + 10	200 + 20	150 + 10	50	10	10
AC CURRENT [8]	100.000µA	10 – 5k	150 + 50	300 + 100	200 + 100	200	20	15
	1.000 00mA to 100.000mA	10 – 5k	150 + 50	300 + 100	200 + 100	130	20	15
	1.000 00A	10 – 1k	400 + 100	600 + 200	500 + 200	130	20	15
		1k – 5k	0.1% + 0.03%	0.2% + 0.05%	0.15% + 0.04%	130	20	15

NOTES:
[1] 100% overrange on all ranges (except 1kV DC & AC).
[2] Specifications for max resolution in each function, normal read mode.
[3] Assumes 4 hour warm up period.
[4] FS = 2 × Full Range.
[5] Valid for 24 hours after Selfcal, and ±1°C of Selfcal Temperature.
[6] Specification equivalent to 90 day performance (23°C±1°C) without Selfcal.
[7] Relative to National Standards. Better uncertainties are available – contact factory for details.
[8] Valid for signals > 1% FS.
[9] Assumes transfer mode on.
[10] Max Volt. Hertz 3×10^7
[11] >300V, add $\pm 0.0024 (R-300)^2$ppm R
[12] Valid within ±10% of calibrated RMS value and Spot Frequency.
[13] Instrument normally shipped with Spot Frequencies uncalibrated. Contact factory for special calibration prices.
[14] True Ohms mode available from 10Ω to 100kΩ ranges.
[15] 10Ω range available only in True Ohms mode.

To provide the user with a full understanding, the main specifications of the 1281 are shown under the following headings. 'Accuracy relative to calibration standards' includes all the effects of stability, temperature coefficient, noise and linearity under worst case line and load conditions. 'Calibration uncertainty' shows the traceability of Datron's calibration of the 1281. After re-calibration the traceability of the users standards should be substituted. Absolute accuracy is expressed by a summation of 'accuracy relative to calibration standards' plus 'calibration uncertainty' and National Standards uncertainty.

OTHER SPECIFICATIONS

DCV

Type	Multi-slope, multi-cycle A-D converter.
CMRR (1kΩ unbalance):	140dB at DC >80dB + NMRR at 1-60Hz
NMRR: filter out	60dB at 50/60Hz±0.09%
[1] filter in	110dB at 50/60Hz
Protection: all ranges	1kV rms
Input Impedance:	
0.1V to 10V ranges	>10,000MΩ
100V & 1000V ranges	10MΩ±0.1%
Max Input Current:	50pA
Ratio Accuracy:	±(Net ChA Accuracy + Net ChB Accuracy)
Settling Time:	
To 10ppm step size	
filter out	<50ms
filter in	<1s

ACV

Type:	True RMS, AC coupled measures AC component with up to 1000V DC bias on any range. DC coupled gives $\sqrt{(AC^2 + DC^2)}$.
CMRR (1kΩ unbalance):	>90dB at DC-60Hz
Crest Factor:	5:1 at Full Range (10:1 at 25% of range)
Protection: all ranges	1kV rms
Input Impedance:	1MΩ in parallel with 150pF.
LF Accuracy:	
(DC Coupled)	
DC	Add ±(50ppmR + 20ppmFS + 20μV)
1Hz – 10Hz	Add ±(20ppmR + 50ppmFS)
10Hz – 40Hz	Add ±20ppmR
Ratio Accuracy:	±(Net ChA Accuracy + Net ChB Accuracy)
Settling Time:	
To 100ppm step size	
100Hz	<0.5s
40Hz	<1.25s
10Hz	<5s
1Hz	<50s
Frequency Accuracy:	
(1 year, 13°C – 33°C, typical)	±(10ppmR + 2 digits)
Frequency Resolution:	Selectable, $4\frac{1}{2}$ digits or $6\frac{1}{2}$ digits.
Sample Interval:	
Fast Gate	50ms ($4\frac{1}{2}$ digits , 200Hz-1MHz)
Normal Gate	1s ($6\frac{1}{2}$ digits , 10Hz-1MHz)
Frequency range:	10Hz-1MHz, from 5% of range to limits set by Max Volt × Herz.

RESISTANCE

Type:	True 4 wire with Ohms guard. 2 wire selectable.
Max Lead Resistance:	100Ω in any or all leads.
Protection: all ranges	250Vrms
Ratio Accuracy:	±(Net ChA Accuracy + Net ChB Accuracy)
Settling Time:	Up to 100kΩ range generally the same as DCV, but depends on external connections.

DCI

Type:	Multi-slope, multi-cycle A-D converter.
Protection:	<2A, internally clamped >2A, rear panel fuse
Ratio Accuracy:	±(Net ChA Accuracy + Net ChB Accuracy)
Settling Time:	As DCV

ACI

Type:	True RMS AC coupled, DC coupled gives $\sqrt{(AC^2 + DC^2)}$.
Crest Factor:	3:1 at Full Range
Protection:	<2A, internally clamped >2A, rear panel fuse
Ratio Accuracy:	±(Net ChA Accuracy + NetChB Accuracy)
Settling Time:	As ACV

NOTE: [1] Not valid for $5\frac{1}{2}$ & $4\frac{1}{2}$ digit Fast mode.

FUNCTION	MODE	RESOLUTION (Digits)	READ RATE (Readings/s)	ADDITIONAL ERRORS ±(ppmR + ppmFS) 23°C±5°C
DCV RESISTANCE [1] DCI [2]	NORMAL	8	1/25	0 + 0
		7	1/6	0 + 0.1
		6	2	0 + 0.5
		5	35	0 + 5
		4	35	0 + 50
	FAST	8	1/6	0 + 0.1
		7	1/2	0 + 0.4
		6	35	0 + 3
		5	150	0 + 30
		4	150	0 + 50
ACV [3] ACI [4]	100Hz	6 Tfer on	1	0 + 0
		Tfer off	3	200 + 20
		5 Tfer on	2	0 + 5
		Tfer off	4	200 + 20
		4 Tfer on	2	0 + 50
		Tfer off	4	200 + 20
	40Hz	6 Tfer on	1/2	0 + 0
		Tfer off	1	200 + 20
		5 Tfer on	1/2	0 + 5
		Tfer off	1	200 + 20
		4 Tfer on	1/2	0 + 50
		Tfer off	1	200 + 20
	10Hz	6 Tfer on	1/5	0 + 0
		Tfer off	1/5	200 + 20
		5 Tfer on	1/5	0 + 5
		Tfer off	1/5	200 + 20
		4 Tfer on	1/5	0 + 50
		Tfer off	1/5	200 + 20
	1Hz	6 Tfer on	1/50	0 + 0
		Tfer off	1/50	200 + 20
		5 Tfer on	1/50	0 + 5
		Tfer off	1/50	200 + 20
		4 Tfer on	1/50	0 + 50
		Tfer off	1/50	200 + 20

NOTES: [1] Excluding True Ohms.
[2] Max DCI resolution is $6\frac{1}{2}$ digits.
[3] Assumes frequency monitor set to Fast Gate.
[4] Max ACI resolution is $5\frac{1}{2}$ digits. Read rate as for ACV Tfer off. Additional error is 0+0.

GENERAL	
POWER SUPPLY	100-130V or 200-260V, 47-63Hz
POWER CONSUMPTION	37VA
OPERATING TEMP.	0°C to +50°C
STORAGE TEMP.	−40°C to + 70°C
DIMENSIONS (H×W×D)	88mm (3.5") × 427mm (16.8") × 487mm (19.2")
WEIGHT	13.5kg (30 lbs)
SAFETY	Designed to UL1244, IEC 348, BS4743
WARRANTY	1 Year

ORDERING INFORMATION

Model 1281:	$8\frac{1}{2}$ Digit Selfcal Digital Multimeter (Includes DCV, Ratio, Rear Inputs and IEEE-488.2 Interface)
Option 10:	True RMS AC Converter
Option 20:	2 wire and 4 wire Resistance Converter
Option 30:	Current Converter (Only available with Option 20)
Option 70:	Isolated Analog Output
Option 80:	115V, 60Hz Line Operation
Option 81:	115V, 50Hz Line Operation
Option 90:	Rack Mounting Kit

Datron Instruments reserves the right to alter specifications without notice.

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