DIGITAL INSTRUMENT
Warranty

SIMPSON ELECTRIC COMPANY warrants each digital instrument manufactured by it to be free from defects in material and workmanship under normal use and service, its obligation under this warranty being limited to making good at its factory any digital instrument which shall within one (1) year after delivery of such instrument or other article of equipment to the original purchaser be returned intact to it, or to one of its authorized service stations, with transportation charges prepaid, and which its examination shall disclose to its satisfaction to have been thus defective, this warranty being expressly in lieu of all other warranties expressed or implied and of all other obligations or liabilities on its part, and SIMPSON ELECTRIC COMPANY neither assumes nor authorizes any other persons to assume for it any other liability in connection with the sale of its products.

This warranty shall not apply to any digital instrument which shall have been repaired or altered outside the SIMPSON ELECTRIC COMPANY factory or authorized service stations, nor which has been subject to misuse, negligence or accident, incorrect wiring by others, or installation or use not in accord with instructions furnished by the manufacturer.

SIMPSON ELECTRIC COMPANY
A Katy Industries, Inc. Subsidiary
853 Dundee Ave., Elgin, Illinois 60120-3090
(312) 697-2260 • Telex 72-2416 • Cable SIMELCO
IN CANADA: Bach-Simpson, Ltd., London, Ontario
IN ENGLAND: Bach-Simpson (U.K.) Ltd., Wadebridge, Cornwall
IN INDIA: Ruttonsha-Simpson Private, Ltd., Vikhroli, Bombay

OPERATOR'S MANUAL

SIMPSON 383 DIGITAL TEMPERATURE TESTER

Simpson
INSTRUMENTS THAT STAY ACCURATE

(123.05)
EFFECTIVE DATE: 0984
EDITION: 2nd
Part No. 6-113330

Figure 1-1. Simpson 383 Digital Temperature Tester

SECTION I
INTRODUCTION

1.1 GENERAL

1.1.1 The Simpson 383 (hereinafter referred to as the 383 or the Instrument) is a compact, portable 3½ digit, digital temperature tester suitable for both general purpose type temperature measurements and the special requirements of the appliance servicing field. This Instrument achieves ease of operation, true portability, reliability and ruggedness, at low cost and high accuracy. It uses a single, readily available 9V battery; large LCD display; and pushbutton switching for range and function selection.

1.1.2 The 383 features switch-selectable, dual thermocouple inuts, centigrade and Fahrenheit readouts, both normal and differential temperature measuring ability, a DC millivolt measuring mode, recorder output provision and automatic indication of low battery condition.

1.1.3 Analog-to-Digital (A/D) conversion circuitry contained in one Large Scale Integration (LSI) module provides high reliability and a compact design.

1.1.4 The numerical display is a 3½ digit, high contrast 7-segment liquid crystal display (LCD). The numerals are 0.5 inches high and are in a single plane for easy distant and wide angle viewing.

1.1.5 Optional accessories include an oven cleaner test kit (with low cost, throw-away thermocouples), a % relative humidity kit and extra thermocouple probes (a second probe is required for 2-probe and differential temperature measurements).

1.2 SUPPLIES AND ACCESSORIES

1.2.1 All supplies and accessories required for the operation of the 383 are furnished with the Instrument, and listed in Table 1-1. Available replacement parts are listed in Table 7-2.

Table 1-1. Items And Accessories Furnished With This Instrument

Quantity	Description	Part No.
1	Operator's Manual	6-113330
1	Battery, 9 V Alkaline	5-114907*
1	Test Lead Set: One black and one red insulated lead having probe tips with provisions for screw-on alligator clips (one red and one black supplied).	6-112092
1	Temperature Sensor Probe: Thermocouple, iron-constantan (J-type), bead, 4 ′ long.	D00391

*Readily available through local retail stores.

1.3 SAFETY CONSIDERATIONS

1.3.1 This Operator's Manual contains CAUTION and WARNING information (where applicable), to alert the user to possible hazardous operating and service conditions. Also included are the precautions necessary for personal safety and to avoid damage to the Instrument. Carefully adhere to these instructions.

SAFETY SYMBOLS

WARNING

The WARNING sign denotes a hazard. It calls attention to a procedure, practice or the like, which if not correctly performed or adhered to, could result in personal injury.

CAUTION

The CAUTION sign denotes a hazard. It calls attention to a procedure, practice or the like, which if not correctly adhered to, could result in damage to or destruction of part or all of the Instrument.

1.4. TECHNICAL DATA

1.4.1 Table 1-2 lists the technical specifications for the 383.

Table 1-2. Technical Data

1. TEMPERATURE	
Ranges:	−30° thru +200°F (−34° thru +93°C) +200° thru +1200°F (+93° thru +650°C)
Instrument Accuracy (at reference conditions):	
0° thru +1000°F: (−18° thru +538°C)	±[0.2% of reading +1°C(1.8°F)]
−30° thru 0°F: (−34° thru −18°C), +1000° thru +1200°F (+538° thru +650°C)	Chart correctable to ±[0.2% of reading +1°C (1.8F)] See Figure 4-1 and 4-2.
Resolution:	
−30° thru +200°F range: (−34° thru +93°C)	0.1°F (0.1°C)
+200° thru +1200°F range: (+93° thru +650°C)	1°F (1°C)
Temperature Sensor:	Thermocouple, J-type (iron-constantan), bead, 4 ′ long
Maximum Allowable Thermocouple Lead Resistance:	50 ohms
Cold Junction Compensation:	Automatic, from 32° thru 122°F (0° thru 50°C)

Compensation Accuracy:	0.1 °F per 1 °F ambient temperature change (or °C equivalent)
Inputs:	Two, switch-selected
Modes of Operation:	
Normal:	Probe 1 or Probe 2, switch-selected.
Differential:	Two probes are used. Probe 1 is reference. Instrument indicates temperature difference between Probe 1 and Probe 2.

2. DC MILLIVOLTS

Range:	0 to 199.9 mV
Accuracy: (from +20° thru +30°C)	±(0.1% of reading +1 count)
Input Resistance:	10 megohms
Resolution:	100 microvolts
Polarity Selection:	Automatic. Display indicates "−" for negative polarity; positive polarity implied.
Conversion Rate:	3 readings per second, nominal.

3. RECORDER OUTPUT

Output:	1 millivolt per degree F or C (open circuit)
Minimum Load Resistance:	1000 ohms recommended (accurate readings possible down to 100 ohms, but with decreased battery life).

Accuracy (less recorder):	Same as instrument accuracy.

4. RELATIVE HUMIDITY

Relative humidity measurements can be provided using differential mode and wet/dry bulb temperature measurements. Optional relative humidity kit includes nomograph for converting wet/dry bulb readings to relative humidity, and cloth sleeves (wicking material) for wet bulb sensor.

5. RATED CIRCUIT-TO-GROUND VOLTAGE

30 volts AC (41 V peak) or 60 volts DC from thermocouple measuring or recording terminal to power line (earth) ground terminal.

6. DISPLAY

3½ digit, 7 segment, ½" high, liquid crystal display (LCD) with "low battery" indication.

7. POWER REQUIREMENTS

Battery Type:	One 9-volt "transistor" battery, Alkaline NEDA 1604A (or carbon-zinc NEDA 1604)
Battery Life:	100 hours with Alkaline battery

8. ENVIRONMENTAL (Instrument)

Temperature:	
Operating:	+41° to +104°F (+5° to +40°C)
Storage:	−40° to +158°F (−40° to +70°C) less battery

Humidity:	90% max., to +95°F (to 35°C)
	70% max., to +131°F (to 55°C)
	50% max., to +158°F (to 70°C)

9. REFERENCE CONDITIONS (for rated performance):

Temperature:	+23°C (+73°F), ±1°C (1.8°F)
Relative Humidity:	30 to 60%
Atmospheric Pressure:	575 to 800 mmHg

10. DIMENSIONS

Height:	2" (50.8 mm)
Width:	5.63" (143 mm)
Depth:	4.6" (117 mm)

11. WEIGHT: 1.0 lb. (.453 kg)

SECTION II
PREPARATIONS FOR USE

2.1 GENERAL

2.1.1 This section contains instructions for preparing the new Instrument for use. Included are unpacking and inspection procedures, warranty, shipping, power source requirements and operating positions.

2.2 UNPACKING AND INSPECTION

2.2.1 Examine the shipping carton for obvious signs of damage. If damage is suspected open the carton and

inspect the Instrument for possible damage. If damage is noted, notify the carrier and supplier prior to using the Instrument. If the Instrument appears to be in good condition, read this Operator's Manual in its entirety. Then run a series of familiarity tests as instructed in this manual. Also check that all items are included with the Instrument (Table 1-1).

2.3 WARRANTY

2.3.1 The Simpson Electric Company warranty policy is printed on the inside front cover of this manual. Read it carefully prior to requesting a warranty repair.

NOTE: For assistance of any kind, including help with the Instrument under warranty, contact the nearest Simpson Authorized Service Center (listed on the last pages of this manual). If it is necessary to contact the factory directly, give full details of any difficulty and include the Instrument model number, serial number (at the back of this Instrument) and date of purchase. Service data or shipping instructions will be mailed promptly. If an estimate of charges for non-warranty or other service work is required, an estimate will be quoted. This charge will not be exceeded without prior approval.

2.4 SHIPPING

2.4.1 Pack the Instrument carefully and ship prepaid and insured to the proper destination.

2.5 POWER SOURCE REQUIREMENTS

2.5.1 The 383 is a battery-operated Instrument. An Alkaline 9 V "transistor" battery is factory installed in the Instrument. (See item 7, Table 1-2 for battery type and paragraph 6.3 for installation.)

2.6 OPERATING POSITIONS

2.6.1 The Instrument may be operated in a horizontal (on its rubber feet) or vertical (on its back) position. It can also be set at an inclined angle by positioning the stand under the unit.

SECTION III
CONTROLS, CONNECTORS AND INDICATORS

3.1 GENERAL

3.1.1 Before attempting any operation of the 383, become familiar with each control. A thorough understanding of how the Instrument operates will avoid undue mistakes and minimize measurement errors, instrument damage and the possibility of personal injury.

3.2 FRONT AND SIDE PANEL DESCRIPTION

3.2.1 This section, consisting of Table 3-1 and Figures 3-1 and 3-2, will describe the proper function of the 383.

Table 3-1. Front and Side Panel Description

1. **POWER Switch:**
   - OFF ▀ ON ▄ — Pushbutton switch used to apply or remove power to the Instrument.
2. **°F/°C Switch:**
   - °F ▀ °C ▄ — Selects appropriate circuit to display temperature in degrees Fahrenheit or degrees centigrade.
3. **TC-1/TC-2 Switch:**
   - TC-1 ▀ TC-2 ▄ — Connects temperature measuring circuit to Input 1 (TC-1) or Input 2 (TC-2), depending on position of the pushbutton switch.
4. **LO/HI Switch:**
   - LO ▀ HI ▄ — Selects appropriate circuits for low or high temperature range measurements.

   LO: −30° to +200°F (−34° to +93°C)
   HI: +200° to +1200°F (+93° to +650°C)

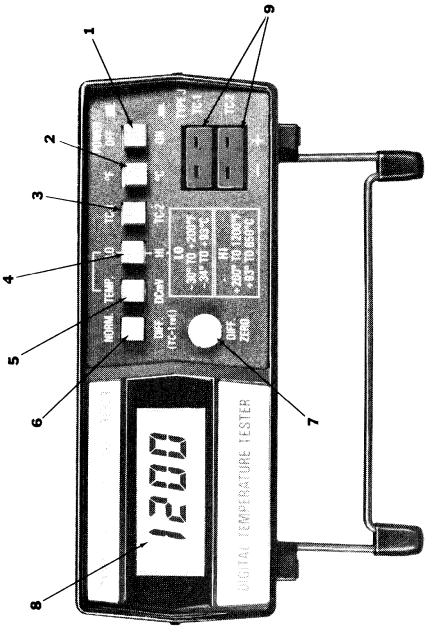


Figure 3-1. Front Panel Description

5. **TEMP./DC mV Switch:**
   TEMP. ▀ DC mV ▄ Selects appropropriate circuit to provide temperature mode via TC-1 or TC-2 (front panel) input jacks or DC mV mode via COM, DC mV (side of Instrument) input jacks.

6. **NORM./DIFF. Switch:**
   NORM. ▀ DIFF. ▄ Selects appropriate circuit to provide normal temperature measurements (via separate selection of input TC-1 or TC-2) or differential temperature measurements (via differential connection of TC-1, TC-2 inputs).

7. **DIFF. ZERO Control:**
   This control is used in the differential mode to null out (zero indication on the display) the differences between TC-1, TC-2 thermocouples at the temperature of interest (for better accuracy).

8. **Numerical Display:**
   AN LCD type display is used and includes a "−" polarity sign, ("+" sign is implied), a "1" digit, three 7-segment 0 to 9 digits and a decimal point, to indicate the polarity and value of the signal being measured. The decimal point is properly positioned by the LO/HI pushbutton switch. Overrange (or out of range) conditions are indicated by a blank display, except for the most significant "1" digit.

Low battery condition is indicated by an arrow (◄—) located in the upper left-hand corner of the display. The first appearance of the arrow signifies a remaining battery life of approximately 20 hours.

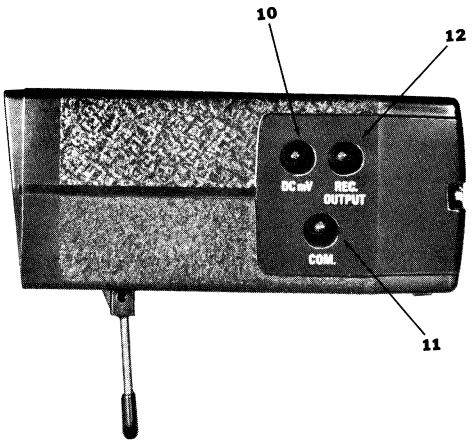


Figure 3-2. Right Side Panel Description

9. TC-1 and TC-2 Input Jacks: These jacks provide the interconnection between the temperature sensor probe output and the Instrument internal temperature measuring circuit. Depending on the position of switches TC-1/TC-2 and NORM./DIFF., TC-1, TC-2 or both inputs may be "active."

10. DC mV Jack: This jack is used to connect, via the red test lead, the "high" or "+" side of the circuit being measured to the internal DC mV measuring circuit.

11. COM Jack: This jack is used to connect, via the black test lead, the "Low" or "−" side of the circuit being measured or recorded to the internal circuit common.

WARNING

Do not float this terminal more than 40 (DC plus peak AC) volts away from power line (earth) ground.

12. REC Jack: This jack is used to connect, via the red test lead, the "high" or "+" side of the recorder input to the 383 recorder output circuit. (The "low" or "−" side of the recorder input connects to the COM jack.)

SECTION IV
OPERATION

4.1 GENERAL

4.1.1 Although the 383 is a temperature measuring instrument, it is likely to be used in proximity to electrical circuits. Thermocouples are electrically conductive and if their exposed metal tips are placed in contact with an electrically energized object, this potential will appear at the REC, COM and DC mV jacks of the 383 as well.

WARNING

To avoid electric shock, do not apply thermocouples to surfaces electrically energized at a voltage exceeding 30 V AC (41 V peak) or 60 V DC. The thermocouple is not isolated from the DC mV input, REC output or common (COM) jacks.

4.2 SAFETY PRECAUTIONS

4.2.1 General Precautions

a. Never attempt to use electrical or electronic measuring instruments in the presence of explosive gases. A minor spark, such as from operating a switch, or connecting or disconnecting test leads, may cause an explosion.

b. The 383 is intended for indoor or sheltered use only. Do not allow the Instrument or the thermocouple leads to become damp or wet, particularly if working in or near electrical circuits.

c. Do not use test leads or temperature probe assemblies which differ from those supplied by the factory for the Instrument.

d. Do not float any external connections more than 30 volts AC (41 V peak) or 60 V DC with respect to the power line or earth ground.

WARNING

A difference of potential between a thermocouple lead and the recording millivolt or common jack of the 383 may damage the 383 circuitry or cause personal injury. When connecting a recorder to the 383, make certain that no such potential difference will occur between a thermocouple and any recorder connection.

4.3 GENERAL FUNCTION TEST

a. Connect the black test lead to the COM jack and the red test lead to the DC mV jack. Short the test prods together.

b. Set the POWER switch ON (in).

c. Set the TEMP/DC mV switch to the DC mV position (in).

d. The display should indicate 00.0 ±1 digit.

e. If the display is not satisfactory, refer to Section VII, SERVICING INSTRUCTIONS.

4.4 TEMPERATURE MEASUREMENTS, NORM MODE

a. **Refer to SAFETY PRECAUTIONS in paragraph 4.2.**

b. Connect temperature sensor probe(s) to input TC-1, TC-2 or both (with optional second probe), if desired.

c. Set the probe selector switch (TC-1/TC-2) to the probe TC-1 (out) or TC-2 (in) position.

d. Set the NORM/DIFF switch to the NORM position (out).

e. Set the TEMP/DCmV switch to the TEMP position (out).

f. Select the desired temperature scale: switch OUT for degree Fahrenheit; switch IN for degree centigrade.

g. Select the desired temperature range: switch OUT for the −30° to +200°F (−34° to +93°C) range; switch IN for the +200° to +1200°F (+93° to +650°C) range.

NOTE: Instrument accuracy applies only when temperature being measured is within selected range.

h. Set the POWER ON/OFF switch to the ON position (in).

i. Position the thermocouple junction of the temperature probe(s) to the location/item under test. Allow sufficient time for the digital indication to stabilize. The reading may be considered stabilized when little or no further changes are noted.

NOTE: When measuring temperatures from −30° thru 0°F (−34° thru −18°C) and from +1000° thru +1200°F (+538° thru +650°C) corrections can be made to the temperature indicated (for improved measurement accuracy) using the correction charts shown in Figures 4-1 and 4-2.

j. Temperature measurements using the disposable temperature probes (for oven cleaner temperatures) are identical to the sequence noted above.

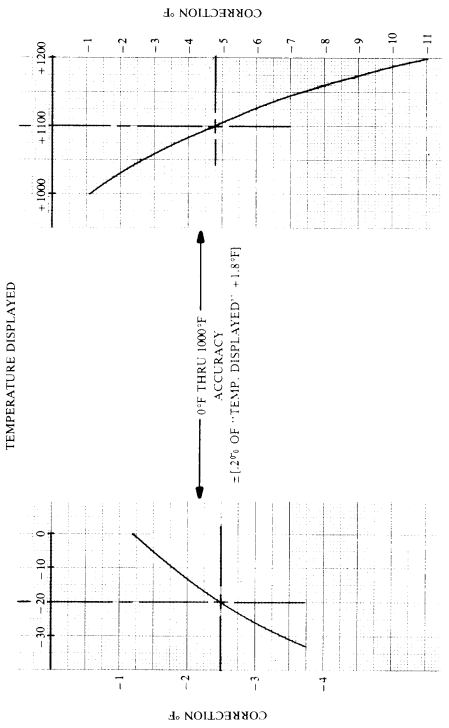
NOTE: The front panel thermocouple jacks are polarized, having one wide slot and one narrow slot. These will accept standard J-type subminiature thermocouple plugs or the factory supplied disposable thermocouples with polarized pins.

k. Set the POWER ON/OFF switch to the OFF position (out) between measurements to conserve battery life.

4.5 TEMPERATURE MEASUREMENTS, DIFFERENTIAL MODE

a. **Refer to SAFETY PRECAUTIONS in paragraph 4.2.**

b. Connect temperature sensor probes to inputs TC-1 and TC-2. (Either disposable oven cleaner probes or the probe type supplied with the Instrument may be used.).



"CORRECTED TEMP." = "TEMP. DISPLAYED" + ("CORRECTION") ± .2% x "TEMP. DISPLAYED" ± 1.8°F

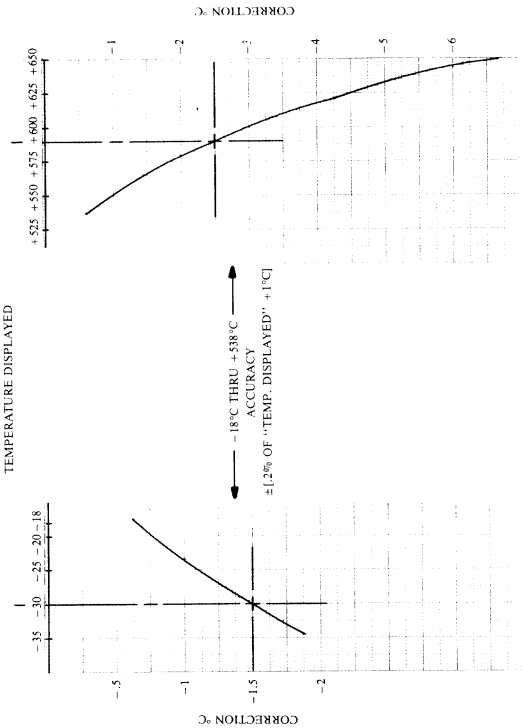
EXAMPLE:

"CORRECTED TEMP." = −20°F +(−2.5°F) ± .002 x (−20°F) ±1.8°F
= −20°F −2.5°F ± .04°F ±1.8°F
= −22.5 ±1.84°F

EXAMPLE:

"CORRECTED TEMP." = 1100°F +(−4.7°F) ± .002 x (1100°F) ±1.8°F
= 1100°F −4.7°F ± 2.2°F ±1.8°F
= 1095.3 ± 4°F

Figure 4-1. Type J Thermocouple Correction Chart, Degrees Fahrenheit



"CORRECTED TEMP." = "TEMP. DISPLAYED" + ("CORRECTION") ± .2% x "TEMP. DISPLAYED" ± 1.°C

EXAMPLE:

"CORRECTED TEMP." = +590°C + (−2.5°C) ± .002 x (590°C) ±1°C
= +590°C −2.5°C ± 1.18°C ±1°C
= +587.5 ± 2.18°C

EXAMPLE:

"CORRECTED TEMP." = −30°C +(−1.5°C) ± .002 x (−30°C) ±1°C
= −30°C −1.5°C ± .06°C ±1°C
= −31.5 ±1.06°C

Figure 4-2. Type J Thermocouple Correction Chart, Degrees Centigrade

c. The probe selector switch may be in either position TC-1 (out) or TC-2 (in).

d. Set the NORM/DIFF switch to the DIFF position (in).

e. Set the TEMP/DCmV switch to the TEMP position (out).

f. Select the desired temperature scale: switch OUT for degree Fahrenheit; switch IN for degree centigrade.

g. Select the desired temperature range: switch OUT for the −30° to +200°F (−34° to +93°C) range; switch IN for the +200° to +1200°F (+93° to +650°C) range.

NOTE: Differential temperature readings may be obtained only when both temperatures are within the same, single preset temperature range, low or high, not both.

h. Set the POWER ON/OFF switch to the ON position (in).

i. Position the thermocouple junction tips of the temperature probes into the same temperature environment (isolate from air currents) but do not short them together. Allow display to stabilize; then, adjust the DIFF. ZERO control for a zero indication on the display.

NOTE: Do not attempt to measure a differential temperature gradient between two points on an electrically conductive surface. The TC probe tips will be electrically shorted-out and result in an incorrect indication on the digital display.

j. Position the temperature probes at the locations under test.

k. Read the differential temperature. The difference shown, plus or minus, will always be with respect to that of the TC-1 probe temperature.

Example 1:
Temperature range selected: −30° to +200°F.
Temperature at probe TC-1: +165°F.
Temperature at probe TC-2: +45°F.
Reading displayed: −120°F.

Example 2:
Temperature range selected: +93 to +650°C.
Temperature at probe TC-1: +70°C.
Temperature at probe TC-2: +120°C.
Reading displayed: 50°C.

l. Set the POWER ON/OFF switch to the OFF position (out) between measurements to conserve battery life.

4.6 DC MILLIVOLT MEASUREMENT MODE

WARNING

This mode is intended only for the measurement of millivolt output of thermocouples, flame rods, similar sensing devices or millivolt sources. Do not attempt to measure electrical circuits containing voltages that may exceed the Instrument's measuring range of 199.9 millivolts or voltages, with respect to earth ground, that may exceed 30 V AC or 60 V DC (a shock hazard).

a. **Refer to the SAFETY PRECAUTIONS in paragraph 4.2.**

b. Disconnect any thermocouples from the 383.

c. Connect the red test lead to the DC mV jack (+) and the black test lead to the COM jack (−)

d. Set the TEMP/DC mV switch to the DC mV position (in).

e. Connect the test leads to the voltage to be measured.

f. Set the POWER ON/OFF switch to the ON position (in).

g. The Instrument will indicate the value directly in millivolts and polarity with respect to the test lead connections. A "−" indication means that the polarity of the voltage is opposite that of the test lead connections. No polarity indication implies "+" polarity and means that the polarity of the voltage is the same as that of the test lead connections.

h. Set the POWER ON/OFF switch to the OFF position (out) between measurements to conserve battery life.

4.7 TEMPERATURE RECORDING MODE

WARNING

When using an AC line powered recorder, observe the grounding requirements specified by the manufacturer.

CAUTION

If the recorder is operated with one input terminal earth-grounded, the thermocouple must not come into contact with an electrically energized object or surface.

a. **Refer to SAFETY PRECAUTIONS in paragraph 4.2.**

b. Connect the "+" terminal of the recorder to the REC jack and the "−" terminal to the COM jack.

c. The output of the 383 is 1 mV/°F or °C. To measure a temperature varying between 0° and 25° (either F or C), for example, the recorder must be capable of accurately recording over the range of 0-25 mV.

d. The recorder should have an input resistance of 1000 ohms or greater.

NOTE: Recorders with input resistances as low as 100 ohms may be used, but the battery life of the 383 will be greatly reduced.

SECTION V
THEORY OF OPERATION

5.1 OVERALL SYSTEM

5.1.1 The basic system block diagram for the 383 is shown in Figure 5-1.

5.1.2 Signal Input Conditioning and Switching Section: This section provides the function/range selection and signal conditioning for the temperature (thermocouple output) or DC millivolt input signals. The output from this section is applied to the A/D Converter Section and also available at the REC, COM output connectors for recording purposes. The cold junction compensation circuit monitors the ambient temperature and generates a suitable offset voltage in series with the thermocouple output (TC input) so as to keep this output voltage independent of ambient temperature variations.

5.1.3 Analog-to-Digital (A/D) Converter Section: The Analog-to-Digital (A/D) Converter Section converts the DC output voltage from the Signal Input Conditioning and Switching Section into an equivalent BCD signal. This BCD signal is then decoded into a "7 line" output for directly driving the Readout Section.

5.1.4 Readout Section: The Readout Section consists of a 3½ digit, digital display (LCD) which converts the "7 line" signal from the A/D Converter Section into a numeral indication equal to the value of the parameter (temperature or DC millivolts) being measured.

5.2 INPUT CIRCUITS

5.2.1 Normal Temperature Measurement Mode: The basic circuit is shown in Figure 5-2. The thermocouple output voltage (function of the temperature being measured) is connected to input jacks TC-1 or TC-2, conditioned according to the range selected (LO/HI and °F/°C) and applied as a proportional DC voltage to the A/D Converter Section. This section converts the DC voltage into a "7 line" code to directly drive a 7 segment type 3½ digit, digital display (LCD).

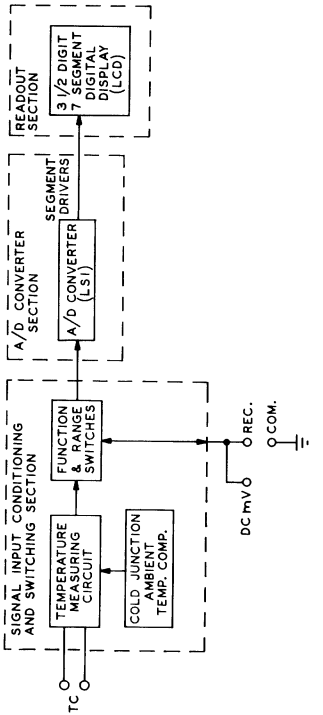


Figure 5-1. Basic System Diagram

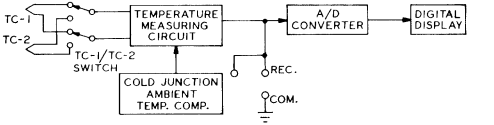


Figure 5-2. Normal Temperature Measurement Mode

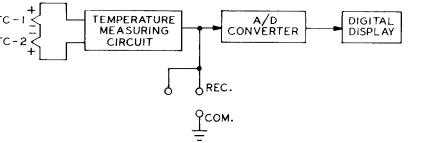


Figure 5-3. Differential Temperature Measurement Mode

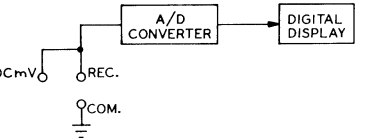


Figure 5-4. DC mV Measurement Mode

5.2.2 Differential Temperature Measurement Mode: The basic circuit is shown in Figure 5-3. The temperatures being "compared" are connected, as thermocouple output voltages (DC), to input jacks TC-1 and TC-2. These jacks connect the thermocouple output voltages in a series, polarity opposing arrangement. The resultant voltage is conditioned according to the range selected (LO/HI and F°/°C) and applied to the A/D Converter. (See paragraph 5.2.1, last sentence.)

5.2.3 DC mV Measurement Mode: The basic circuit is shown in Figure 5-4. The DC voltage being measured is connected to the "DC mV" and "COM" jacks and via funciton selection switching applied directly to the A/D Converter. (See paragraph 5.2.1, last sentence.)

SECTION VI
OPERATOR MAINTENANCE

6.1 GENERAL

6.1.1 This section will describe the necessary procedures needed to effectively maintain performance of the 383.

6.2 COVER REMOVAL

6.2.1 The rear cover can be removed by using the following procedure :

WARNING

Remove all connections to the Instrument before removing the case cover. DO NOT operate the Instrument with the rear cover removed.

a. Set POWER ON/OFF switch to the OFF position.

b. Turn the two screws on the back of the Instrument counterclockwise until the rear cover is detached. (The two screws will remain in the cover. Reverse this procedure when replacing the cover.)

6.3 BATTERY INSTALLATION/ REPLACEMENT PROCEDURES

a. Remove the rear cover in accordance with paragraph 6.2 above.

b. Lift the battery from the compartment and remove the battery connector.

c. Press the battery connector onto the new battery and return the battery to the compartment.

d. Replace the rear cover.

NOTE: When a battery reaches the end of its useful life, replace it promptly. Failure to do so may result in corrosion at the battery contacts.

6.4 CARE

a. Remove all connections to the 383 before attempting to clean it.

b. Immediately clean all spilled materials from the Instrument and wipe dry. If necessary, moisten a cloth with a mild detergent and water to clean plastic surfaces.

c. Whenever possible, avoid exposure to or usage in areas which are subject to temperature and humidity extremes, vibration or mechanical shock, dust or corrosive fumes, or strong electrical or electromagnetic interferences.

6.4.1 Verify Instrument calibration by performing operational checks on a monthly basis, using known value sources. If a need for calibration is indicated, contact the nearest Simpson Authorized Service Center.

6.4.2 It is recommended that the Instrument be returned annually to a Simpon Authorized Service Center or to the factory for a complete overall check and calibration.

6.4.3 When the Instrument is not in use, store it in a location free from temperature extremes, dust, corrosive fumes, and mechanical vibration or shock.

WARNING

The following Servicing Instructions are for use by qualified repair personnel only. To avoid electrical shock to the user, do not perform any servicing other than that contained in the OPERATOR MAINTENANCE instructions unless you are qualified to do so.

SECTION VII
SERVICING INSTRUCTIONS

7.1 GENERAL

7.1.1 This Instrument contains no operator-serviceable parts except the battery. Improper procedures or parts may create a hazard to the operator. Do not attempt any repairs beyond those given in the OPERATOR MAINTENANCE instructions (Section VI). Refer servicing to one of the Simpson Authorized Service Centers listed on the last pages of this manual.

7.2 TROUBLESHOOTING

7.2.1 If the Instrument does not yield satisfactory results, follow these procedures before attempting maintenance on the Instrument.

a. Review and comply with paragraph 4.3, General Function Test.

b. Check that all switches are positioned correctly for the parameter and range of the value being measured and that the measurement situation is within the rating of the Instrument.

c. Be sure that the battery is in good condition and properly installed (paragraph 6.3).

d. Ensure that the environment in which the Instrument is being used is within the Instrument Environmental Sepcifications, Table 1-2, item 8.

7.2.2 If the steps taken in paragraph 7.2.1 do not yield satisfactory results, refer to the troubleshooting chart (Table 7-1). If further assistance is needed, contact a Simpson Authorized Service Center.

Table 7-1. Troubleshooting Chart

Symptom:
Arrow (◄—) appears on display.

Probable Cause:
Battery reached the end of its useful life.

Cure:
Replace the battery as noted in paragraph 6.3.

Symptom:
No display or faded display when the Instrument is turned "ON".

Probable Cause:
Battery defective, not installed properly, making poor contact, or missing.

Cure:
Remove cover and check that the battery is intalled correctly and making good contact. (Refer to paragraph 6.3.)

Symptom:
Accuracy not within specifications when checked with a stable, high accuracy temperature source.

Probable Cause:
Instrument is out of calibration.

Cure:
Contact the nearest Simpson Authorized Service Center.

7.3 REPLACEMENT PARTS AND SCHEMATIC DIAGRAM

7.3.1 This section contains information for ordering replacement parts and shows the Schematic Diagram (Figure 7-1). Table 7-2 lists parts in alphanumeric order of their reference symbols and includes the description. Refer to Table 1-1 for Items And Accessories Furnished With This Instrument.

7.3.2 To obtain replacement parts, address order to the nearest Simpson Authorized Service Center (listed on the last pages of this manual). Refer to paragraph 2.3.1 for ordering instructions.

Table 7-2. Replacement Parts

Symbol	Description	Part No.
	Battery, 9 V Alkaline (NEDA 1604A)	5-114907
	Thermocouple Probe Lead Assy.	D00391

Symbol	Description	Part No.
	Disposable Thermocouple Kit,	D00392
	Test Lead Set	6-112092
	Accessory Kit	10-864240
	Red/Black Ins. Alligator Clips	
C1	Capacitor, 0.1 μF, 10 V, Ceramic	5-113214
C2	Capacitor, 100 pF, 1000 V, Ceramic	5-113217
C3	Capacitor, 0.01 μF, 100 V, Ceramic	51-111523
C4	Capacitor, 220 pF, 500 V, Mica	5-114992
C5	Capacitor, 15 μF, 16 V, Tantalum	5-115534
C6, 8	Capacitor, 0.47 μF, 100 V, Polyester	6-111168
C7	Capacitor, 0.22 μF, 250 V, Mylar	6-110364
C9	Capacitor, 0.047 μF, 100 V, Polyester	5-117202
D1, 2, 5	Diode, 1N4001, Rectifier	5-113200
D4	Diode, LM385Z, Voltage Ref.	6-112221
IC1	IC OP Amp	6-113295
IC2	IC A/D Converter	6-110920
IC3	IC CMOS Quad, 2 Input, EXOR Gate	6-111150
Q1	Transistor 2N4123	5-115931
R1	Resistor, 22.3 kΩ, 1%, 1/8 W	6-113320
R2	Resistor, 150 Ω (Special)	6-113452
R3	Resistor, 5.41 kΩ, 0.1%, 1/4 W	6-113321
R4	Resistor, 3.48 kΩ, 1%, 1/8 W	6-112951
R5	Resistor, 150 Ω, 1%, 1/8 W	5-117412
R6	Resistor, 9.76 kΩ, 1%, 1/8 W	5-115626
R7, 40	Potentiometer, 5 kΩ	6-112275
R8	Resistor, 23.2 kΩ, 0.1%, 1/4 W	6-113323
R9	Potentiometer, 500 Ω	6-113309
R10	Resistor, 10 kΩ, 1%, 1/8 W	5-114962

R12	Resistor, 421.8 kΩ, 0.1%, 1W	6-113324
R14	Resistor, 447.5 kΩ, 0.1%, 1W	6-113325
R15, 18	Potentiometer, 3 kΩ	6-113319
R16, 17	Potentiometer, 2 kΩ	6-113383
R20	Resistor, 805.4 kΩ, 0.1%, 1W	6-113304
R22	Resistor, 41.2 kΩ, 1%, 1/8W	5-114442
R23	Potentiometer, 20 kΩ	6-113294
R24	Resistor, 175 kΩ, 1%, 1/8 W	6-113311
R25	Potentiometer, 2 kΩ	6-113293
R26	Resistor, 20 kΩ, 1%, 1/8W	5-112688
R27, 28, R29, 33	Resistor, 1 MΩ, 5%, 1/4W	5-118305
R30	Resistor, 47 kΩ, 5%, 1/4W	5-119647
R31	Resistor, 220 kΩ, 5%, 1/4W	5-119707
R32	Resistor, 43.2 kΩ, 1%, 1/8W	6-111254
R34	Resistor, 160 kΩ, 5%, 1/4W	6-112360
R35	Resistor, 10 MΩ, 5%, 1/4W	5-116632
R36	Resistor, 3.3 kΩ, 5%, 1/4W	5-119638
R38	Resistor, 759.3 kΩ, 0.1%, 1W	6-113312
R39	Resistor, 6.7 kΩ, 1%, 1/8/W	6-113326
	Board Assy., Battery	10-865179
	Board, P.C. Assy. Differential/ Connector	10-865183
	Board, P.C. Assy. Display	10-864189
	Board, P.C. Assy. Function/ Range	10-865178
	Button, White	3-261155
	Button, Grey	3-261156
	Button, Red	3-261157
	Case Assy., Black	10-865171
	Connector Assy., Input	10-864761
	Connector, Battery Snap	5-116771
	Connector, Female, 34 PIN	6-111159
	Cover Assy., Black	10-560336
	Knob Assy., White	60-108013
	Shield Assy., Heat Sink-Terminal	10-865181
	Socket, IC, 40 PIN DIP	6-112228
	Switch, Range, 6 Position, Pushbutton	6-113298
	Transistor Assy., Temp. Sensor	10-865182

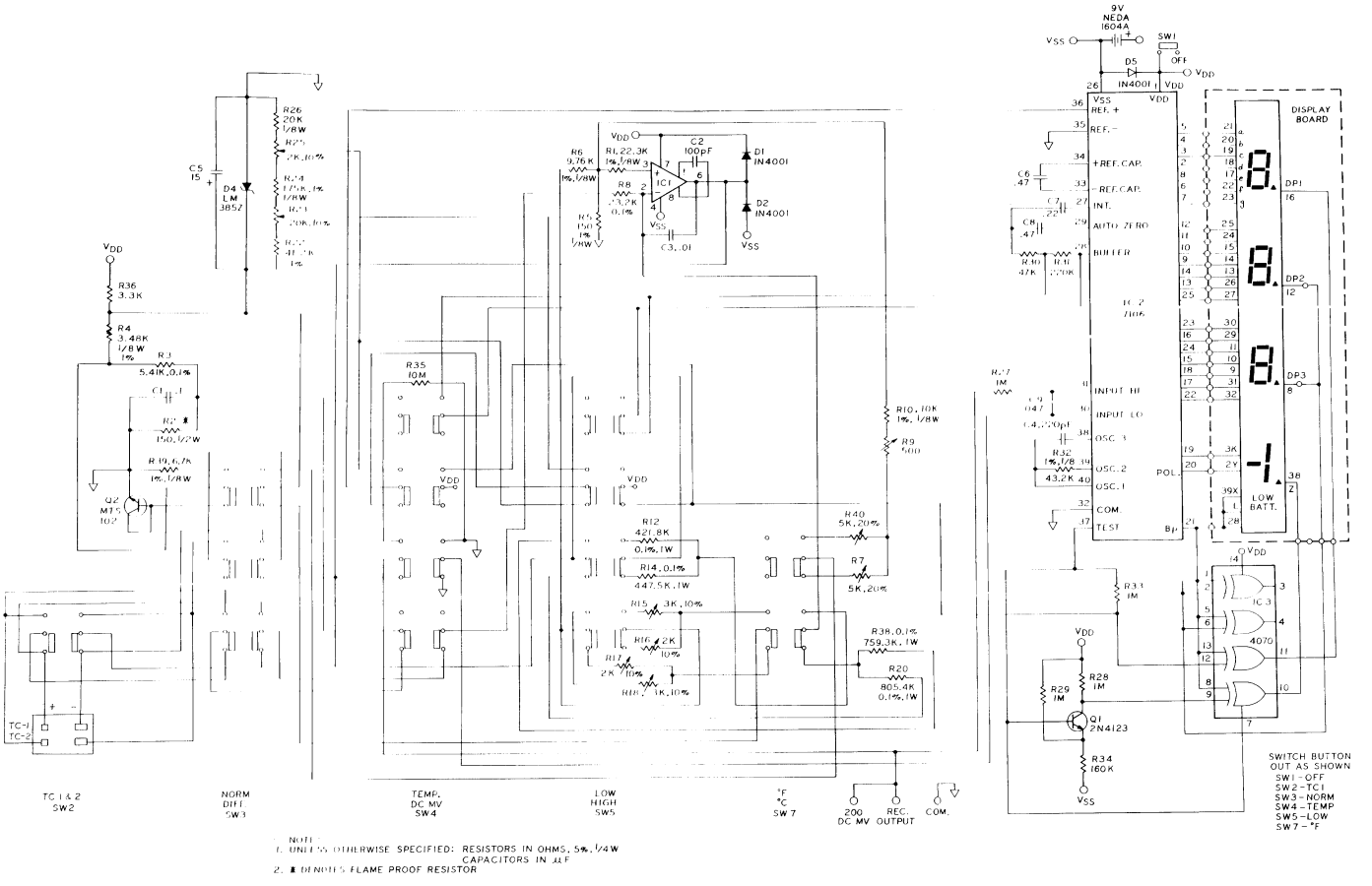


Figure 7-1. Schematic Diagram, Simpson 383 Digital Temperature Tester