

# INDIVIDUAL MODULE AVAILABILITY:

## THERMOELEMENTS: (TE)

P/N 90081A	2.5 mA rated current
P/N 90081B	5.0 mA rated current
P/N 90081C	10.0 mA rated current
Input Resistance:	4 0 0 $\Omega \pm 10\%$ .
Output Resistance:	8 $\Omega \pm 10\%$ .
Output Voltage:	7 mV $\pm 12\%$ at rated current.
DC Reversal Difference:	0.1% maximum.
Size: Diameter:	4" (overall plus 1/2" connector)
Length:	3" (overall including connector)
Weight:	2 lb. each.

## RESISTORS:

P/N 90080A	800 $\Omega \pm 10\%$	12 volts Full Scale
P/N 900808	3,600 $\Omega \pm 10\%$	40 volts Full Scale
P/N 90080C	11,600 $\Omega \pm 10\%$	120 volts Full Scale
P/N 90080D	39,600 $\Omega \pm 10\%$	400 volts Full Scale
P/N 90080E	119,600 $\Omega \pm 10\%$	1200 volts max.
Size: Diameter:	4"	
Length:	7 3/4" (overall including connector)	
Weight:	4 1/4 lb. each.	

### Voltage Ranges:

RESISTOR P/N	USED WITH TE P/N 90081A	USED WITH TE P/N 900818	USED WITH TE P/N 90081C
No Resistor	1.0 volt	<b>2.0</b> volts	<b>4 0</b> volts
90080A	<b>3.0</b> volts	<b>6.0</b> volts	12.0 volts
900808	10.0 volts	<b>20</b> volts	40 volts
90080C	<b>30</b> volts	<b>60</b> volts	120 volts
90080D	100 volts	<b>200</b> volts	400 volts
90080E	<b>300</b> volts	<b>600</b> volts	1200 volts

UPPER FIGURE — Typical AC-DC difference corrections of resistor-thermoelement combinations.

LOWER FIGURE — Estimated uncertainty, based on normal distribution curve, inherent in a Holt Test Report due to reading non-repeatability, voltage co-efficients, etc.

	20 Hz to 20 kHz	20 kHz to 50 kHz	50 kHz to 100 kHz	100 kHz to 1 MHz	1 MHz to 3 MHz	3 MHz to 10 MHz	10 MHz to 30 MHz
<b>1 V</b> 2 v 4 v	$\pm .001\%$ $.0007\%$	$\pm .002\%$ $.0007\%$	$\pm .003\%$ $.001\%$	$\pm .03\%$ $.01\%$	$\pm .06\%$ $.02\%$	$\pm .2\%$ $.04\%$	$\pm 1.2\%$ $.08\%$
3 v 6 V 12 v	$\pm .001\%$ $.0007\%$	$\pm .002\%$ $.0007\%$	$\pm .003\%$ $.001\%$	$\pm .03\%$ $.01\%$	$\pm .06\%$ $.02\%$	$\pm .2\%$ $.04\%$	$\pm 1\%$ $.08\%$
10 v 20 v 40 v	$\pm .001\%$ $.0007\%$	$\pm .002\%$ $.0007\%$	$\pm .003\%$ $.001\%$	$\pm .03\%$ $.01\%$	$\pm .12\%$ $.02\%$	4 .4% .04%	$\pm 1\%$ $.08\%$
30 v 60 V 120 v	$\pm .001\%$ $.0007\%$	$\pm .002\%$ $.0007\%$	$\pm .004\%$ $.001\%$	$\pm .05\%$ $.01\%$	$\pm .12\%$ $.02\%$	Corrections on the 400 volt range are determined with 100 volts applied for all frequencies above 100 kHz.	
<b>100 V</b> 200 v 400 v	$\pm .001\%$ $.0007\%$	$\pm .004\%$ $.002\%$	$\pm .01\%$ $.01\%$	$\pm .05\%$ $.01\%$	$\pm .12\%$ $.02\%$		
300 v 600 V 1200 v	$\pm .001\%$ $.0007\%$	$\pm .004\%$ $.002\%$	$\pm .02\%$ $.01\%$	Corrections on the 1200 volt range are determined with 600 volts applied at all frequencies and with 1000 volts applied at all frequencies.			

I-Corrections Supplied to 0.001% precision  $\longleftrightarrow$  Corrections Supplied to 0.005% precision-4

Except where indicated, corrections are supplied at 100% of rated voltage.

Corrections supplied by Holt are also subject to the best NBS traceability available which is presently:

	Voltage	Uncertainty
20 Hz to 20 kHz	.25 V to 600 V	± .002%
20 kHz to 50 kHz	.25 V to 600 V	± .003%
100 kHz	.25 V to 600 V	± .005%
1 MHz	.25 V to 100 V	± .03%
3 MHz and 10 MHz	.25 V to 200 V	± .1%
30 MHz	.25 V to 200 V	± .2%

The Model 11 set is tested and reorted by Holt at the test points starred below. The cost of these tests is included in the price of the Model 11. Any other test points or any other voltage range can

be tested at additional cost but should be specified at the time of the order.

VOLTAGE RANGE	REQUIRED MODULES	50 Hz	20 kHz	50 kHz	100 kHz	1 MHz	3 MHz	10 MHz	30 MHz
1V	90081 A 84980	*	*	*	*	*		*	*
2v	90081 B 84980	*	*	*	*	*		*	*
4v	90081 C 84980	*	*	*	*	*		*	*
X 12V	X 90080A		*	*	*	*		*	*
X 40V	X 90080B		*	*	*	*		*	*
X 120V	X 90080C		*	*	*	*	*		
X 400v	X 90080D		*	*	*	*	*		
1200V at 600V	X 90080E		*	*	*				
1200V at 1000V	90081 C 90080E		*	*	*				

X Partial sets will include tests of each resistor module purchased with the highest thermolement module purchased

At a given frequency there is a high probability that the AC-DC difference corrections of resistor-thermolement combinations that are not test reported will not differ from the reported correction of

the same resistor combined with a different thermolement by greater than the following amounts:

Resistor	Thermo-element	DC to 20 kHz	50 kHz	100 kHz
80A	81 A,B,C	20 ppm	20 ppm	40 ppm
80B	81 A,B,C	20 ppm	20 ppm	40 ppm
80C	81 A,B,C	20 ppm	20 ppm	60 ppm
80D	81 A,B,C	20 ppm	50 ppm	100 ppm
80E	81 A,B,C	30 ppm	100 ppm	300 ppm

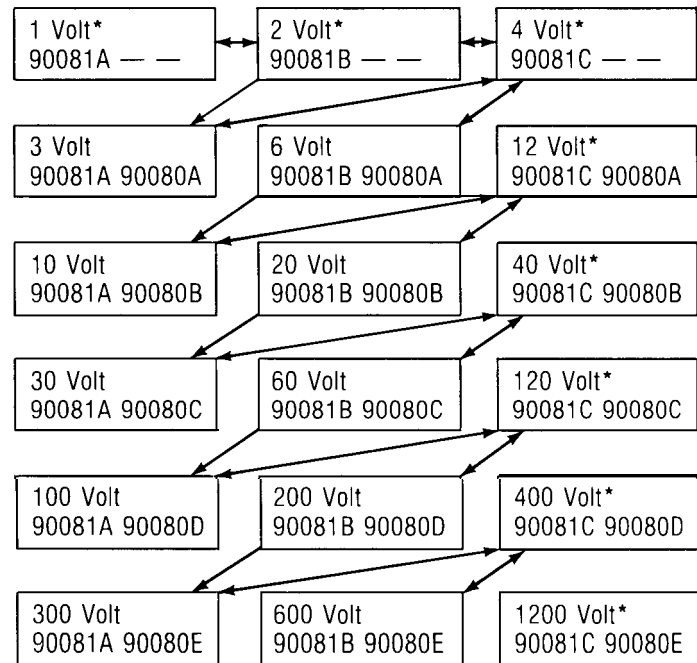
However, the actual AC-DC difference should be determined by intercomparison with other elements in the set if the highest accuracy is desired.

## INTERCOMPARATIVE CALIBRATION:

There is sufficient overlapping of the voltage ranges to allow removal of a module for calibration or round-robin checking with minimum reduction of capability. An uninterrupted chain of intercomparisons can be made between the modules of the set beginning at the 2 volt range and progressing to the 600 volt range. By purchasing an additional thermoelement adapter, Holt P/N 84980, intercomparisons can be extended down to the 1 volt range. These intercomparisons can provide an easy check on the stability of the AC-DC difference corrections assigned to each module of the set and can be used to determine the uncertainty associated with the user's calibration services. The thermal stability of the output emf of each module is adequate to allow the use of ppm resolution when making intercomparisons within the set. No external cooling is required.

Following the intercomparison, correction factors for each voltage range will be known. The appropriate elements may be connected to achieve any desired voltage range. The desired converter range may be connected in parallel with unknown voltmeters to determine the unknown's response to signals of constant amplitude over the full frequency range.

## Intercomparison Pattern (Model 11):



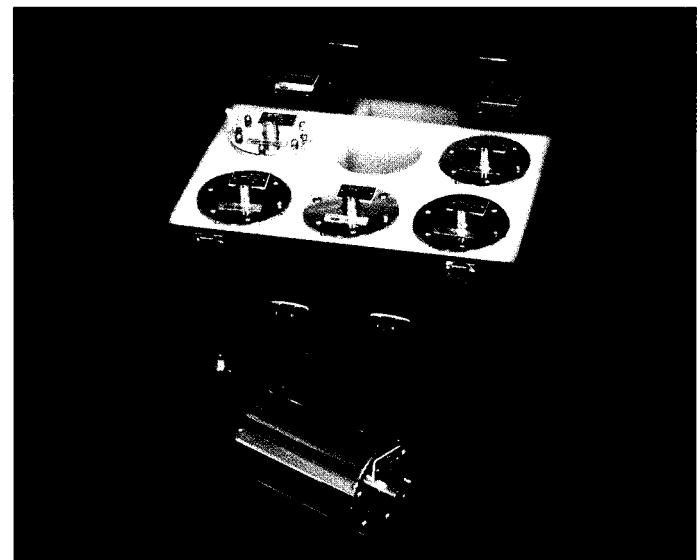
\*Indicates Factory Tested Ranges.

## MECHANICAL

Individual Modules:	All modules are supplied with gold plated Type 874 connectors.
Thermoelements:	(P/N 90081A, 90081 B or 90081C)
Resistors:	(P/N 90080A, 90080B, 90080C, 90080D and 90080E)
Calibration Data (Holt):	Holt Certificate showing AC-DC difference data per table above is included in the price of each module.
Special Test Points:	Special test points (each individual voltage and frequency) should be specified at time of order.

## ACCESSORIES:

- Output Cable, Thermo-element to lugs. P/N 84823
- Output Cable, Thermo-element to Holt 6B Thermal Transfer Voltmeter. P/N 82770
- Adapter, Thermoelement input to Type 874 for making measurements without range resistor. P/N 84980
- Transfer Switch Assembly (Bench mounting) P/N 85071-I
- Transfer Switch Assembly (Rack) P/N 85072-2
- Tee Connector, Type 874 compatible, gold plated, no mechanical junctions. P/N 86913
- Input cable, 36'', Type 874 compatible, gold plated Connectors. P/N 86915



## FULL SET — MDEL11

- Thermoelements (3) P/N 90081 A, B, C.
- Resistor Modules (5) P/N 90080 A, B, C, D, E
- Thermoelement Adapter (1) P/N 84980
- Carrying Case (1) P/N 8401-007

Technical Bulletin No. 8601. Specifications subject to change.

# HOLT