Keithley 1483
LOW THERMAL CONNECTION KIT

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This short article presents the LOW THERMAL CONNECTION KIT kit for Keithley nanovolt meters such as 181 and 182. The kit came in its black plastic case with the original note PA-1 10/84 Rev. C containing the parts list and seems to be genuine and complete. Below are some impressions what the kit was fitted with.

KEITHLEY

PA-1
10/84
Rev. C

Model 1483 Low Thermal Connection Kit

Thermoelectric voltages are generated when junctions of dissimilar metals are at different temperatures. They can occur unintentionally, such as when solder is applied to a connection. The potential generated is a function of the metals, their impurities and the temperature difference between junctions. In general, it is not practical to construct an entire circuit of only one material. The thermal EMF or ordinary solder against copper is 3μ V/°C. Low thermal cadmium-tin solder, will reduce this thermal EMF by nearly ten times (see Table 1.) Connections made by crimping copper sleeves and lugs, such as that supplied in this kit, are even better. When properly constructed, the resulting junction is cold-welded copper to copper and will generate very little thermal EMF.

Once the number of dissimilar metal junctions has been reduced as much as possible, circuit performance can be further improved by reducing the temperature gradients within the circuit. This can be done by placing the remaining junctions near one another, and by providing good thermal contact with a common heat sink. Do not place the test equipment or connections in direct sunlight, air currents from heating system vents, fan exhausts, etc. Most good electrical insulators are good thermal insulators as well, that is why they have very low thermal conductivity.

The following procedures provide instruction on how to replace the gold pins of a low thermal connector, twin lead shield preparation and preparation of a triax cable to reduce thermal EMFs in connectors.

Table 1. Materials and Their Thermal EMF Potential

Materials	Potential
Cu – Cu (copper to copper junction)	<<0.2μV/°C
Cu – Ag (copper to silver junction)	0.3μV/°C
Cu – Au (copper to gold junction)	0.3μV/°C
Cu – Cd/Sn (copper to cadmium/tin junction)	0.3μV/°C
Cu – Pb/Sn (copper to lead/tin junction)	1-3μV/°C
Cu – Kovar (copper to kovar junction)	40μV/°C
Cu – Si (copper to silicon junction)	400μV/°C
Cu – CuO (copper to copper oxide junction)	1000μV/°C

1. Replacement of gold pins (refer to Figure 1 and 2).

NOTE

When disassembling any low thermal connector always wear gloves so as not to contaminate any part of the connector with body oil, grease, etc.

A. Remove the connector from the cable.
B. Remove the cable clamp from the connector.
C. Remove the locking ring from the rest of the connector.

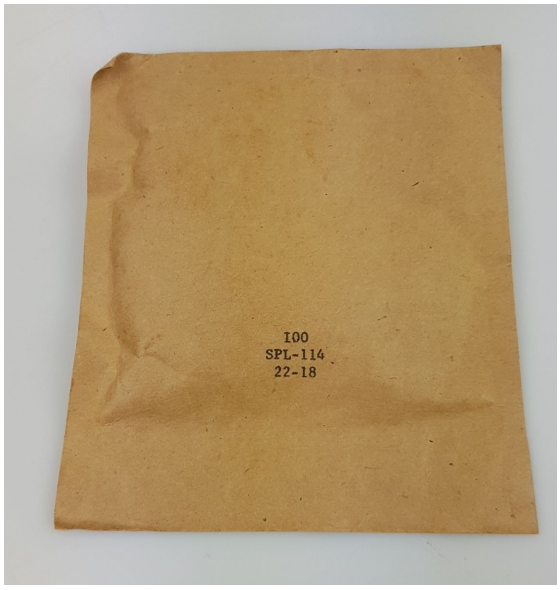
Consolidated
Electronic Wire & Cable

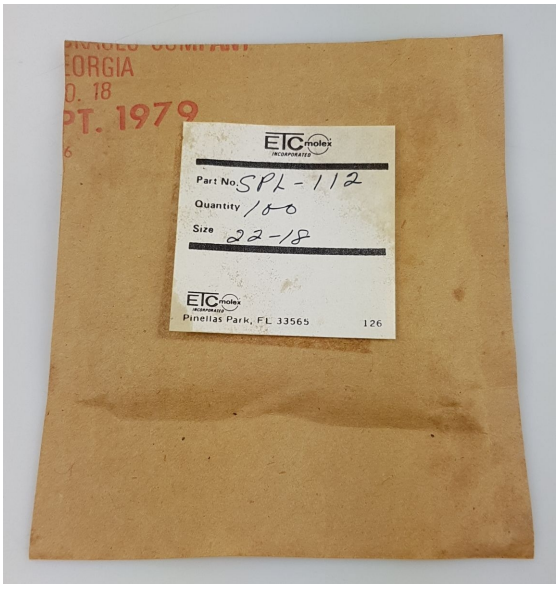
100
SPL-114
22-18

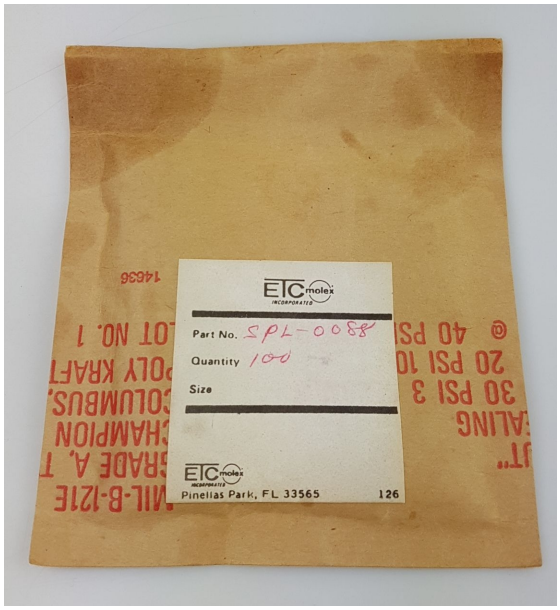

KEITHLEY
PA-1
10/84
Rev. C
Model 1483 Low Thermal Connection Kit
Consolidated
Part No. SPL-112
Quantity 100
Size 22-18
Part No. SPL-114
Quantity 100
Size 22-18
Part No. SPL-137
Quantity 100
Size 22-18

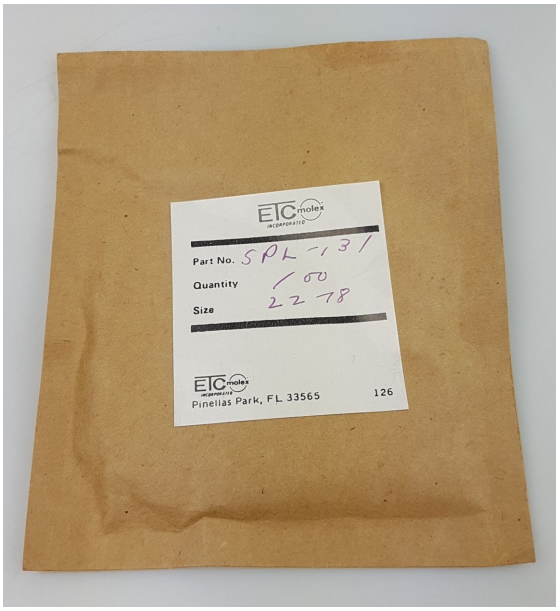
Crimping tool

Nylon Hex Nuts and Nylon Screws









Copper Lugs, Copper Splice Tubes, Copper Spade Lugs, Copper Spade Lugs

Copper Alligator Clips

Non-Metallic Abrasive and Thermal Compound

Jumper Wire, Triax Cable, Coax Cable

Twin Lead Shielded Cable

No. 20 AWG Insulated Solid Copper Wire

Male Pins, Copper Rivets, Female Pins, Clips

A good accessory is for sure the Keithley1488 Low Thermal Shorting Plug.


1488 LOW THERMAL
SHORTING PLUG