

Obsolete  
AC-Power  
Connectors

## Obsolete AC-Power Equipment Connectors

The IEC standard AC power connectors for light-duty detachable cordsets (C13/C14 combination) started showing up on equipment in the early 1970's. Prior to this, in addition to awful fixed power cords, a variety of power connectors were in use on equipment, some specific to a manufacturer, others more widely used.

Most of these old types are obsolete and not often encountered. This article serves primarily to document the '163' type which was prevalent enough and used on enough equipment of high calibre (esp. HP) that there is still some demand for missing cordsets. A few other types are thrown in as examples of the earlier diversity.



The modern standard:  
IEC C13 cord outlet and C14 chassis inlet.

- [163](#)
- [Japanese Calculator](#)
- [NEMA 5-15](#)
- [Hart-Lock Special](#)
- [European Giant Pin](#)
- [Hermes Calculator \(solitary\)](#)
- [Monroe Calculator \(solitary\)](#)

### Replacement of Chassis Inlet Connectors

It is often possible to replace an obsolete chassis inlet with a modern IEC type, rather than attempting to find and keep around an unusual cordset. [See below](#).

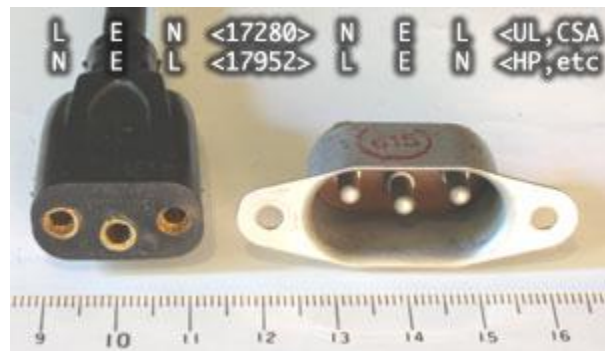
### Nomenclature

There is some confusion over terms in the arena of connectors: for example, is a 'plug' any connector with male pins or any connector on the end of a cord? I'm going to try to stick to 4 words here: *cord* vs. *chassis* to indicate where the connector is located, and *outlet* vs. *inlet* to indicate the direction of energy flow. This article then, deals primarily with cord outlets and chassis inlets.

A *cordset* is a combination of a cord inlet, cord and cord outlet.

### 163

To my observation, the most popular of the predecessors to the IEC C13/C14 standard is that shown in the photo to the right. This is sometimes referred to as an "oval" connector, although the shape is not really oval or elliptical. It was used extensively by Hewlett-Packard and many other manufacturers in the 1960's. The earliest instances of use I have noted are on a HP-3440A DVM from 1965 and a Friden SBT10 mechanical calculator,



manufactured in 1964 but introduced in 1959. Connectors of this type were still being installed on new equipment up to at least the late 1970's.

Some documentation indicates the cord outlet was designated as PH-163. For purposes here I'm going to refer to the format as the '163' type, for lack of any better designation.

Belden manufactured cordsets with these connectors. Apparently the power-cord division of Belden is now part of Volex. The Belden/Volex part numbers for North American cordsets (common NEMA 5-15P cord inlet (plug) on the other end) are 17952 and 17280, the two having different polarisation (more on this below).

Most of the cordsets I have encountered with this connector have the Belden name on them, even those which also have a more prominent equipment manufacturer label. Perhaps it was a Belden design that they successfully marketed to many equipment manufacturers, to become a de-facto standard.

See also the [Japanese Calculator](#) type to add to any confusion.

### Polarisation

Somehow the 163 connectors ended up being used with both possible orientations of the Line and Neutral connections, as indicated in the photo. Earth managed to stay in the middle. All the instances of use in Hewlett-Packard and other equipment I have run across are connected one way, consistent with the Belden 17952 cordset. Of course, UL and CSA had to designate the opposite way, reflected in the Belden 17280 cordset.

How much of a crisis this is depends upon how much of a stickler one is for such safety issues. It is primarily a concern when servicing or working inside equipment, it is not likely to be an issue for basic operation. Here's one take on it: [DOE-Hanford - Lesson Learned](#).

Ain't standards great.

### Dimensions & Rating

- Pin diameter: 0.12in (3mm)
- Separation of outer two pins: 5/8in (16mm) center-to-center
- Housing: 1/2in (13mm) by 15/16-1in (24-25mm) (nominal)
- Rating: 125V / 7A.

### Other Information and Sources

- [Electro-Sonic catalog \(top of 2nd page\)](#)
- [Sigma Volex 17280 catalog sheet](#)
- [Volex 17280 catalog sheet](#)
- [Sphere surplus sales](#)

Web searches with the Belden/Volex part numbers or "PH-163 power" may turn up sellers of cordsets. Alternatively, [replacement of the chassis inlet](#) may be possible.

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## Japanese Calculator

Some Japanese equipment from the 1960's and early 1970's, notably desktop calculators, have a connector very similar, but not identical, to the 163 type ([comparison photo](#)).



The pin spacing seems to be the same as the 163 type, but the male pins are of smaller diameter and the housing corners are square. The male pins also have a tensioning slot cut in them, visible in the photo.



163 cord outlets fit in the Japanese equipment chassis inlets, but the pins may not grip well. The Japanese cord outlets do not fit in 163 chassis inlets due to the square corners.

Who knows how or why this situation came about, but it reminds me of the integrated circuits Sony made for it's calculators in the late 60's/early 70's: they appear to be a standard 14-pin DIP package, but are a little wider. Just enough such that they are not interchangeable.

[Replacement of the chassis inlets](#) of this type in many cases is trivial: IEC chassis inlets differ in size only nominally.

### NEMA 5-15

This one is obvious, standard NEMA 5-15 connectors in cord outlet and chassis inlet form.



Makes a lot of sense one might think: just use an ordinary extension cord. The difficulty is a lot of ordinary extension cords will not fit in the recessed chassis inlet, so cordset availability is still an issue. It also requires a lot of panel space, making it undesirable for use on smaller or lighter equipment.

### Hart-Lock Special

This cord outlet came with a Systron Donner 1037-5 Counter from 1967. There is a label "Hart-Lock" on the housing. "Hart-Lock" is a tradename, they make many connectors, I'm not sure where this one lies between standard and proprietary.



This connector is kind of like a down-sized NEMA industrial connector, it twists to lock. The round center pin is used in the Systron Donner as Earth but this may be a non-standard use. The housing is bakelite, it is polarised by the different blade sizes, and is rated for 15A/125V, 10A/250V.

Seems like a nice design, too bad it didn't catch on. Although, this may be it: [TWL-6](#) or [Hubbell 7484 to 7487](#), declared as 3-wire, non-grounding, however.

### European Giant Pin

The cord outlet came with a Lagomarsino mechanical calculator. The chassis inlet is from a Philips PW-4032 electronic counter. These would date from somewhere in the late-1950's to early-1960's. These instances of use and the design suggest the format was



European, perhaps it was common there, although it also looks similar to the old kettle and kitchen appliance connectors of North America.



The pins on these are about 6mm in diameter.

Note the cord outlet is only two-wire, while the chassis inlet has a third contact for Earth on the top and bottom edges; presumably there was a corresponding grounded cord outlet.

### Hermes Calculator (solitary)

This is from a Hermes mechanical calculator from the late 1960's.



### Monroe Calculator (solitary)

This was found with a Monroe 610 desktop calculator from 1971.

This one came chopped up, with only a few inches of cord remaining, thankfully enough that a new cord could be patched onto it.



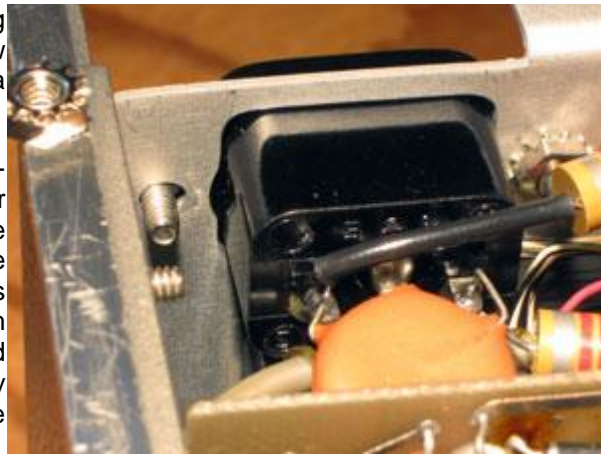
## Replacement of Obsolete Chassis Inlet Connectors

If one doesn't mind modifying the equipment, it is often possible to fit an IEC standard C14 chassis inlet in place of an old type. Sometimes the location of the connector in the corner of a panel or proximity to other chassis parts inhibits such a modification.

For some old types, a permanent modification can be avoided by constructing an adapting bezel from some sheet plastic or

aluminum. Snap-in IEC chassis inlets - being smaller as they do not have the screw mounting wings - may help in avoiding a permanent modification.

Shown in the photo is the interior of an HP-5216A Counter with an IEC connector replacing the original 163 connector. The chassis opening had to be enlarged in one dimension and the screw holes in the chassis were 'moved out' about 1/32-inch or 1mm each. Note the remaining curve where the old opening was slightly wider than required by the IEC connector, and how the screw hole has been adjusted (nut removed).



IEC chassis inlet replacing that of a 163 type.

Sometimes while doing these modifications I envision someone in the distant future looking at the equipment and being deceived into believing the IEC connector was around years before it in fact was. I try not to lose sleep over the thought.

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