



AEROSPACE INFORMATION REPORT

AIR4365™**REV. C**

Issued 1994-12
Reaffirmed 2021-09
Revised 2026-07

Superseding AIR4365B

115/200 Volt, 400 Hz Aircraft External Electrical Power Connector
Contact Maintenance Procedures

RATIONALE

Revise to include missing bore depth dimensions in drawings of contact gauge tools. Add usage notes to Section 5.

1. SCOPE

This SAE Aerospace Information Report (AIR) describes procedures for use in the field to determine if 115/200 Volt, 400 Hz aircraft external electrical power connectors are excessively worn, which may result in the inability of the external power plug to be retained, intermittent electrical performance, and arcing.

2. APPLICABLE DOCUMENTS

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

2.1 SAE Publications

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AS7974	Cable Assemblies and Attachable Plugs, External Electrical Power, Aircraft, General Specification For
AS81790/3	Inspection Gage, for AS81790/1 Connectors, Aircraft External Electric Power
AS90328	Cable Assembly, External Electric Power, Aircraft 115/200 Volt, 400 Hertz
AS90362	Connector, Receptacle, External Electric Power, Aircraft, 115/200 Volt, 400 Hertz

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2.2 U.S. Government Publications

Copies of these documents are available online at <https://quicksearch.dla.mil>.

AN3430 Cable Assembly, Power, Electrical 115/200 Volts, 3 Phase (Cancelled after 23 Feb 1981. Use MS90368.)

MIL-C-7974 Cable Assemblies and Attachable Plugs, External Electrical Power, Aircraft, General Specification for (Superseded by AS7974)

3. PROBLEM

The problem with 115/200 Volt, 400 Hz external power connectors is wear due to repeated mating and unmating. External power plugs are typically manufactured with high force socket contacts. The high force socket contacts are required to hold the plugs in the mated condition when mated. Surface material is removed from the receptacle pins and the tines (fingers) of the socket contacts opened each time an external power plug is attached to an airplane receptacle. The design of external power plug connectors causes material to be removed from the surfaces of the contacts each time the external power plug is attached and removed.

Since the early 1950s, use of 115/200 Volt, 400 Hz external power has increased. With increased aircraft usage, plug and receptacle contact wear has increased, resulting in problems with the electrical connection. One or more worn or loose contacts in either a plug or receptacle can cause:

- Loss of electrical connectivity or intermittency resulting in loss of a phase or loss of control voltage (contacts E and F), which causes the aircraft to reject external 400 Hz power.
- High resistance and arcing, which can result in a hot plug and, in some cases, a fire.

Both connector halves contribute to the problem. Receptacle locations on modern commercial airliners necessitate external power cables to extend upward of 7 to 8 feet (2.13 to 2.44 m) to the attach point. The forces exerted by the external power plug must be sufficient to provide good low-resistance electrical contact and prevent the plug from coming loose from the aircraft receptacle. Contact wear due to repeated mating and unmating causes the diameter of the pin contacts to get smaller, while repeated mating and unmating, physical abuse, and wear cause the sockets to open up losing gripping force.

Aircraft external power receptacles are connectors having pins and plug connectors, sockets. The airplane receptacle has physical interfaces corresponding to AS90362. This interface is commonly used on both military and commercial airplanes. External power plug connectors have been derived from plugs originally defined in AS90328 and AN3430.

Military specification MIL-C-7974, now AS7974, specified engaging (mating) forces not exceed 100 pounds (445 N) when the external power plugs and cable assemblies covered by it were mated to special test receptacle. External power plugs and assemblies not covered by MIL-C-7974 or AS7974 and used by both the military and commercial airline industry are not required to meet this criteria and often exhibit engaging forces in excess of 100 pounds. It is argued that these forces are required to provide cable life. In actuality, the higher engaging forces make it difficult to fully and properly mate external power connectors and wear out pin contacts on the airplane side connector quicker.

Also covered by MIL-C-7974 and AS7974 are attachable external power plug connectors. These connectors contain individually terminated and installed contacts. MIL-C-7974 specified the individual engaging and disengaging force values for contacts as 24 pounds maximum for engaging and 16 to 24 pounds for disengaging. It was erroneously assumed in AIR4365A that a force of 25 pounds in each large socket contact would indicate a good contact. Socket contacts in external power plugs, both molded and attachable, wear and open up over time, reducing the forces exerted by each socket. In addition, there are other factors that affect the forces exerted by the plug on the receptacle. These include, but are not limited to:

- Amount of wear on contacts, both pins and sockets
- How the external power plug was molded and the alignment of the socket contacts in assembled, wired cable assemblies