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AEROSPACE INFORMATION REPORT

SAE AIR4365

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Submitted for recognition as an American National Standard

400 Hz CONNECTION AIRCRAFT ELECTRICAL MAINTENANCE PROCEDURES

1. SCOPE:

This SAE Aerospace Information Report (AIR) describes field-level procedures to determine if 400 Hz electrical connections for external power may have been subjected to excessive wear, which may result in inadequate disengagement forces.

2. REFERENCES:

MS 90362 (AN 3114)	110 Volt, AC, Aircraft Receptacle
MS 90328 (AN 3430)	Cable Assembly, External Electric Power, Aircraft, 115/200 Volts, 400 Hertz
MIL-C-7974	Cable Assemblies and Attachable Plugs, External Electrical Power, Aircraft

3. PROBLEM:

The aircraft receptacle is configured to MS 90362 (AN 3114). The plug end of the cable from the 400 Hz external source is configured to MS 90328 (AN 3430). With today's widespread use of external 400 Hz systems, plug and receptacle wear has increased resulting in problems with the electrical connection.

A worn or loose contact on one or more of the pins in the connector can cause high contact resistance which results in a hot plug, in some cases a fire, or loss of a phase, or control voltage (E&F), which causes the aircraft to reject the external 400 Hz power.

The plug presents the bigger problem because the combined grip of the pins must be sufficient to prevent the plug from coming loose from the aircraft receptacle. This grip must be sufficient to support the weight of the plug and about 10 ft of cable. In the case of wide body aircraft, the receptacle on board the aircraft should have the pin diameters checked.

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3. (Continued):

Military Standard MIL-C-7974 specifies 80 lb ± 20 lb insertion force and maximum 100 lb extraction force.

In an effort to establish procedures for checking the plug and receptacle, several methods have been tried.

Tests conducted by various manufacturers and airlines on plugs in-service show mixed results. If you adopt the 60 to 100 lb insertion and extraction forces, it is reasonable to assume that 15 to 25 lb on each pin would indicate a good pin. Experience shows that 4 pins x 25 lb results in a total force required of over 100 lb. This total force has not been fully investigated but could be as high as 150 lb due to misalignment. Some tests have shown four pins that measured low individually but show high collective readings because of misaligned contacts.

4. RECOMMENDATION:

While the aforementioned results may not show a reliable test method, the following procedures are recommended to increase plug and receptacle life and safety:

4.1 Receptacle:

The individual pin diameters and alignment shall be checked on a schedule basis. Pin diameters should be as shown in Figure 1 using the tools shown in Figure 2.

4.2 Plug:

Since testing the total insertion and extraction forces would probably require two people or a special fixture because of the force involved (100 lb), we recommend that a tool for checking individual sockets and pins be used as shown in Figure 2. The forces and procedures are as shown in Figure 2.

4.3 Summary:

These recommended checks should reduce the incidence of failure in these two components. Recommendations for proper handling and care that will extend plug life as shown in Figure 3.

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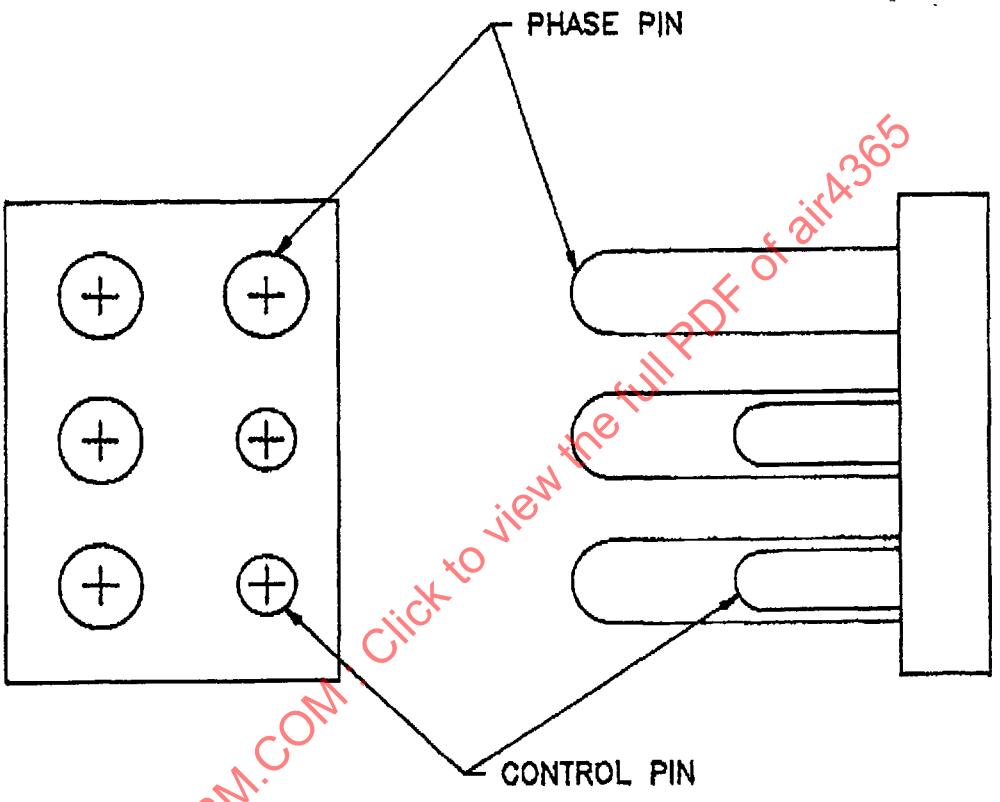
PREPARED BY SAE SUBCOMMITTEE AGE-2C, VEHICLE MAINTENANCE AND AIRCRAFT SERVICING OF COMMITTEE AGE-2, AIR CARGO AND AIRCRAFT GROUND EQUIPMENT AND SYSTEMS

THE RECEPTACLE FACE AND PINS
SHOULD BE CLEANED BEFORE CHECKING



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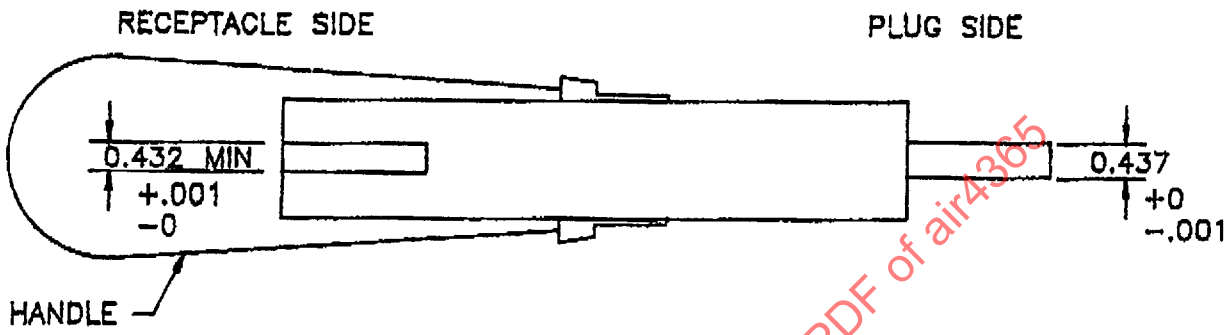
INSPECTION FREQUENCY: AS ROUTINELY SCHEDULED

NOTE: WHEN THE PINS ARE WORN TO THE MINIMUM DIAMETER (LOOSE) OR THE PINS ARE BENT THE RECEPTACLE SHOULD BE REPLACED.

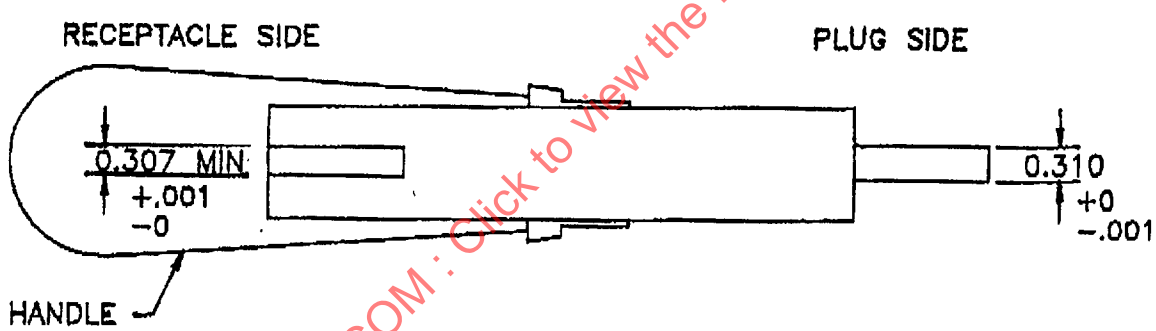
	New Diameter	Minimum Diameter
Phase Pin	0.437	0.432
Control Pin	0.310	0.307

FIGURE 1 - Aircraft Receptacle

PHASE PIN GAUGE



CONTROL PIN GAUGE



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NOTES:

1. TOOLS FOR PERFORMING THIS FUNCTION ARE AVAILABLE FROM COMMERCIAL SOURCES.
2. THE PLUG CONTACTS SHOULD BE CLEANED PER FIGURE 3 BEFORE TESTING.
3. RECOMMENDED FREQUENCY MAXIMUM 4000 INSERTIONS.
4. EXTRACTION FORCE TO BE MINIMUM 15 LB PER PHASE PIN.
5. EXTRACTION FORCE TO BE MINIMUM 3 LB PER CONTROL PIN.

FIGURE 2 - Wear Gauge for Plug and Receptacle