BEECH AIRCRAFT CORPORATION
October 17, 1939, Revised: February 8, 1940
Revised: February 11, 1941
Revised: May 6, 1941
Revised: December 8, 1941

SPECIFICATIONS FOR BONDING AND SHIELDING OF BEECHCRAFT MODELS 17 - 18

By "Bonding" is meant the connecting of all metal parts of the airplane by means of electrical conductors. This should be done during the process of manufacture.

A. Reasons for Bonding.

1) To eliminate disturbances resulting from rubbing and vibrating contacts or on metal parts.

2) To prevent electrically isolated metal parts from absorbing energy radiated by the transmitter.

3) To increase the electrical capacity between metal mass of the airplane and antenna.

4) To eliminate the danger of sparks arcing between unconnected metal members of the airplane.

Bonds shall be made by one of the following methods, which are listed in order of their desirability:

1) Soldering

2) Bolting

3) Clamping

In making bond the metal parts shall be free of protective coating or finish, except that of metal plating, before the two parts are joined. After the bond is made, a protective coating shall be applied to structural members.

Procedure: At locations where bonds are required, a copper braid with terminals on the ends will be installed except when the part to be bonded is an aluminum line. Aluminum lines will be bonded with aluminum jumpers.

Bond made from the above may be used at locations requiring bonding, except bolts and such other places as require maximum strength.

In the above cases, terminals should be used on the end of the bonding strip.
See P.S. 3379. PAGE 5

CLASSIFICATION OF BONDING

A. In structural parts of the airplane, the following type joints are considered good electrical connections and require no further bonding:

1) Welding

A. (Continued)

2) Soldering (using noncorrosive flux)

3) Sweating

4) Riveting (when the metal parts are free from insulating protective coating at joint)

B. Machine metal surfaces held in contact:

1) Threaded mating metallic parts

2) Machine screws with lock washers or equivalent

3) Socket fittings, like flying wires

4) Pinned fittings, wherever driven tight

5) Pinned fittings, which are under continuously heavy tension

6) Clamp fittings, normally permanent after installation, when fastened to structure before a protective insulating finish is applied.

C. Parts to be bonded. Metal parts of an airplane which do not make good electrical contact with the airplane structure shall be bonded to the structure. All metal parts shall be bonded to the nearest main metal part of the airplane:

1) Small masses of metal. At one point, by a single bonding strip which shall connect the parts at the point of nearest approach.

2) Conduit. At each end and at intervals of 36". These bonds are very important, as it is by these connections to the mass of the airplane that shielding can neutralize electrostatic radiation.

(a) Rigid and flexible conduit. The use of clean clamp on conduit is sufficient, conduit must be clean.

3) Fuel and oil lines. Only at points of supports. A supporting member shall make good bond between line and structure.

4) Long metal members mounted on ball bearings shall be provided with bond at each end only.

D. Metal parts which are permanently isolated from other metallic structures and the following require no bonding:

1) Hose connectors and hose clamps

2) Aileron, rudder, and elevator trim tabs.

3) Fuselage, brace wires, landing wires, flying wires, pinned fittings between fuselage and wing.

D. (Continued)

4) Fuel and oil lines using threaded fittings.

5) Surfaces of less than 1.5 square feet.

6) Metal members not exceeding 36 inches in length which are movable to a certain extent.

7) Control Cables

E. Cylindrical tanks may be considered as three side (wall and two sides), an elliptical tank as four surfaces (two walls and two ends). A bond located within two inches of a tank corner may be considered a bond for surfaces meeting at that corner.

F. When bonding is impractical, parts likely to vibrate should be insulated.

G. Make all bonding leads as short as possible.

POINTS TO BOND ON BEECHCRAFTS

1) Bond pitot static tube to fuselage.

2) Bond wing fittings. See P.S. 3379. PAGE 5

3) Bond motor mount at three points.

4) Gas Tanks. See Section E.

5) Landing light wires in wing; bond shielding at light end to Belden bond. Strip bond "pigtail" to ground terminal at fuselage.

6) Control surfaces. Bond across all roller or ball bearing hinges to an effective ground to fuselage. Rudder horn to fuselage - solder.

7) Hose clamps at gas selector valve not necessary to ground.

8) Gas tank vents bond to fuselage. (Model 17 belly tanks only.)

9) Landing gear motor and flap motor mountings. Clean paint from hole used for ground.

10) Ground pigtail on shielding on gas gauge wires.

11) Bond ends of rigid conduit.

12) Bond flap shaft at inner end to bonding strip in wing.

13) Gas line connector at wing root to fuselage.

14) Flexible conduit across instrument panel bond at both ends.

15) Pigtail on flap limit switch wire shielding to an effective ground at fuselage.

16) Present bonding of wings O.K. Add bond to pitot and static lines.

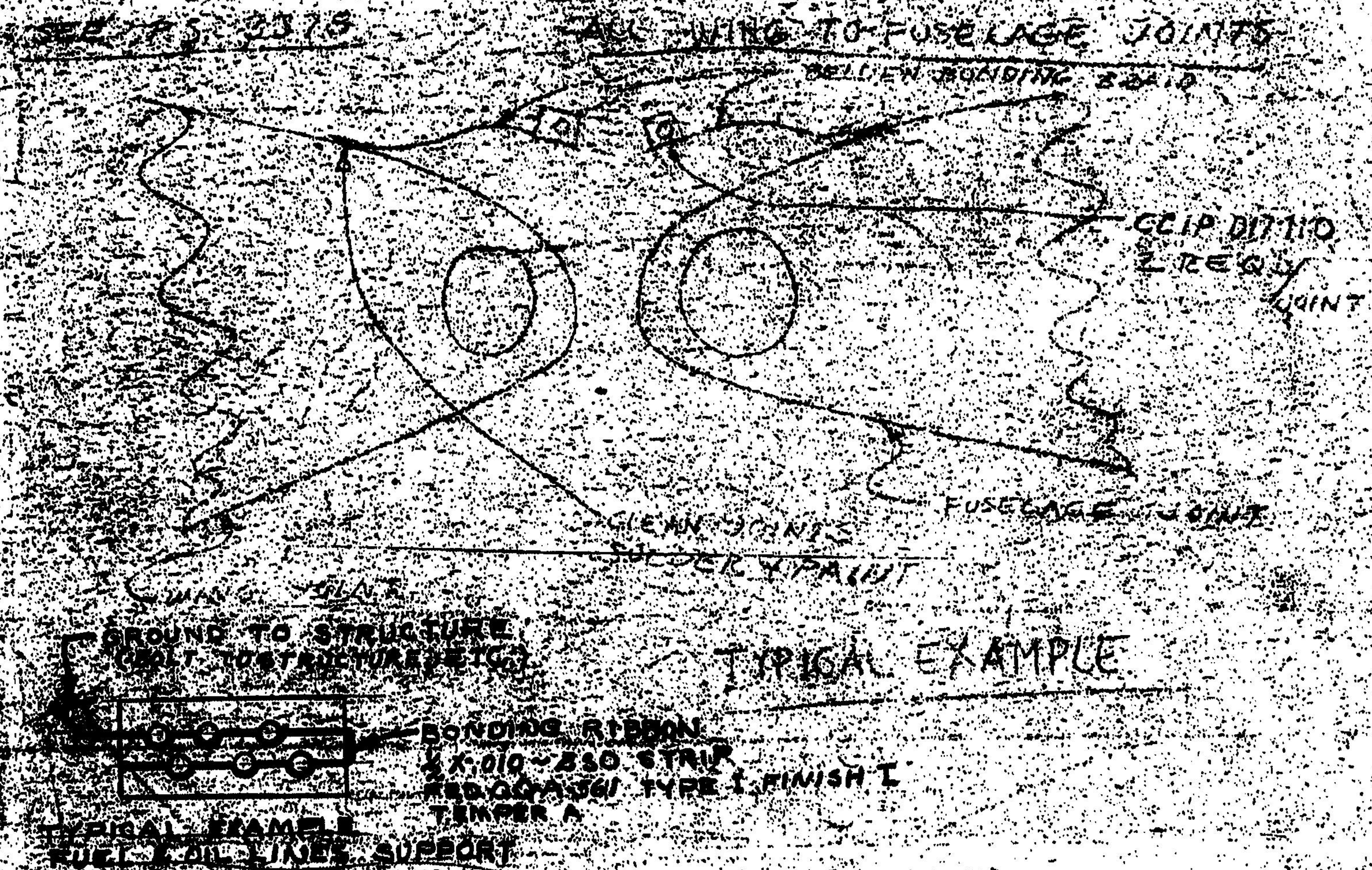
17) When pitot heat used ground shielding to bond strip.

18) When metal wing tank cover is used bond to bonding strip.

19) Bond ignition switch to fuselage - clean paint from fitting on switch before putting shielding on switch.

20) Crossing point of brace rods, wires, cables, etc. The rubbing or vibration should be eliminated by insulating.

Approved by _____
M. A. Chester


SEE TS 2373
ALL WING TO FUSELAGE JOINTS
BELDEN BONDING BRAID
CLIP D17110
2 REQ/JOINT
FUSELAGE JOINT
CLEAN JOINTS
SOLDER & PAINT
WING JOINT
TYPICAL EXAMPLE
GROUND TO STRUCTURE
(BOLT TO STRUCTURE, ETC.)
BONDING RIBBON
1/2 X .010 ~ .250 STRIP
FED QQ-A-561 TYPE I FINISH I
TEMPER A
TYPICAL EXAMPLE
FUEL & OIL LINES SUPPORT

REVISION OF 2-8-40

Page 2 Paragraph D-3 stating 'control cables not to be bonded' was removed.

Page 3, Paragraph 6 information concerning 'vibrational contact of control cables' was added.

REVISION OF 2-11-41

Page 1, Paragraph A, Procedure was, Belden braid is satisfactory, Ends of braid shall be dipped in solder to prevent fraying, then holes are punched.

REVISION OF 5-6-41

Paragraph 6, Page 3 deleted bonding requirements for control cables (see Army T. O. 08-5-1 in Air Corps Maintenance Manual).

Page 3 add paragraph 7 control cables added to list of parts not to be bonded.

REVISION OF 12-8-41 (by G. Jones)

Page 5, added, typical example of bonding fuel and oil lines.