Interoffice

National Radio Astronomy Observatory

Charlottesville, Virginia

To: Addressee September 4, 1973

From: J. Lichtenberger

Subject:

Plating sequences for finishing waveguide and other related parts.

For corrosion resistance and general appearance with no electrical requirements, the following cycle is used:

1. Clean the part thoroughly in perchlorethylene or a similar solvent, ultrasonically or by vapor degreasing.
2. Electroclean, making the part cathodic at a current density of 40-60 amperes per square foot (asf) in an alkaline cleaner, pH of 8-9.5 for soldered parts, higher if no solder is present.
3. Cold water rinse (the part should be inspected for a water-break free surface at this point).
4. HCl dip, 10-20%, 30-60 seconds.
5. Cold water rinse.
6. Fluoboric acid dip, 20% (for soldered parts only).
7. Cold water rinse.
8. Cyanide copper strike, 8-20 asf until part is covered (pulse-plating produces a brighter finish).
9. Cold water rinse.
10. HCl dip, 10-20%.
11. Cold water rinse.
12. Nickel plate, 10-40 asf, 1-2 minutes.
13. Cold water rinse.

14. Cyanide nickel activation (make part cathodic in potassium nickel cyanide, 6-10 volts, 30-60 seconds).

15. Cold water rinse.

16. HCl dip, 10-20%.

17. Cold water rinse.

18. Gold strike (5 asf, until complete coverage, usually 30-60 seconds).

19. Distilled water rinse.

20. Gold plate (5-10 asf).

21. Cold water rinse.

22. Hot water rinse.

For electrical applications, those steps involving nickel should be omitted (11-16), but the current must be on before the part is placed in the gold strike solution.

These steps may require modification to accommodate some parts or combinations of metals. The most important step is the copper strike; this assures good adhesion and coverage, especially over solder.

Pulse-plating is currently being used since it produces a brighter, harder plated gold and also provides a convenient means of measuring the total amount of electricity (and metal) applied to the part. The shape and duration of the pulse seems to be non-critical; further experience may prove otherwise. Pulse-plating also permits higher voltages to be applied, overcoming resistance due to the oxide films, and producing a more consistent coating.

Anode to cathode ratio is important in plating depending on the type of metal to be plated. For gold and copper the ratio should be at least 2:1. For nickel and chromium especially, it should be higher still. For complex shapes, anode placement is critical, and conforming electrodes are necessary for complete coverage. In gold plating, these must be either gold or platinum, increasing the cost of plating substantially.

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