GENERAL REQUIREMENTS FOR CIRCUIT PACKS USED IN TSPS, ETS AND ANCILLARY EQUIPMENT

This index lists the information that forms a part of, or supplements this specification, and indicates the authorized issues thereof.

PAGE 1 , ISSUE	1												
DATE	8/25/78												
NUMBER	ISSUES AUTHORIZED ON ABOVE DATE												TITLE
PAGE 2	1												
PAGE 3	1												
PAGE 4	1												
PAGE 5	1												
PAGE 6	1												
PAGE 7	1												
SUPL. SPEC.													
BSRS 350.002													CIRCUIT PACK & PRINTED WIRING BOARD ASSEMBLIES GENERAL REQUIREMENTS
BSRS 470.001													ELECTRONIC EQUIPMENT AND APPARATUS GENERAL REQUIREMENTS

c—Information in accordance with that currently authorized.

File In Handbook RS 573,Tab C
RS 576,Book 50,Tab W

1. GENERAL

1.01 This specification provides General Requirements applicable to the repair of A, AA, AR, AG, AJ, AXXXXXX, B, D, ED, FB, FC, FE, HS, J, JD, JG, JK, JL, JW, NA, P, R, SL, SN, TA, TN, UD and similar codes used in TSPS, ETS and Ancillary Equipment.

1.02 These requirements shall be applied to the aforementioned families of circuit packs unless specifically excluded in the individual BSRS.

2. GENERAL REQUIREMENTS

2.01 All Bell System Standard requirements concerning the handling, packing, inspection, repair, etc., of customer-owned circuit packs are to be observed.

2.02 The circuit pack electrical test requirements are contained in the A-XXXXX drawing (Circuit Pack Test Requirements) for the particular pack code. Where an A-XXXXX Test Requirement has not been issued, local manufacturing test instructions which have been developed from LDI's shall be used.

2.03 Requirements are based on the use of measuring equipment having the minimum accuracies indicated in Table A and power supplies within the limits specified in Table B, unless otherwise specified in the individual BSRS's.

TABLE A

Function	Accuracy Per Cent	
DC Voltage	± 2	Per Cent of
DC Current	± 2	Full Scale
AC Voltage	± 2	Reading
DC Resistance	± 5	
Impedance	± 5	
Capacitance	± 5	
Time	± 5	
Waveform Voltage	± 5	
Frequency	± .001	

TABLE B

Power Supply Volts	Tolerance
-48	± 1.0
+24	± 1.0
+4.5	± 1.0
+5	± 2.0
±12	± 2.0
±15	± 2.0
+19	± 2.0

2.04 Electrical contact with the printed wiring board contact surface should be made with a non-wiping connector.

2.05 All electrical connections to the printed wiring board shall be made or broken with no voltage applied.

2.06 All electrical measurements shall be made with respect to ground, unless otherwise specified in the individual BSRSs or test requirements.

2.07 A. Circuit pack may show normal signs of wear and superfluous marking on the board need not be removed.

B. There shall be no evidence of corrosion on any gold-plated area. Packs showing evidence of such corrosion shall not be repaired.

2.08 Gold-plated areas shall not be scratched or worn so as to expose the base metal. This requirement can be verified by visual observation by a trained observer with a 7X Bausch & Lomb eye loupe. An approved chemical test (see Appendix A for process description) may be used for reference only should additional verification be necessary.

2.09 Assemblies in which the copper is exposed may be repaired by an approved method such as brush plating, gold finger inlay and high energy bonding.

2.10 Gold-plated areas shall be cleaned with alcohol, petroleum spirits or an approved method prior to insertion into test connectors. After all tests, wax contacts with KS-19416 List 2 or OS-124 lubricant.

2.11 Abrasives shall not be used to clean gold plated areas.

Note 1: When cleaning, care shall be taken to avoid contaminating the contact area with dissolved 642A finish from other areas.

Note 2: Gold-plated contact areas shall not be touched with bare fingers after cleaning and lubrication.

2.12 Each repaired circuit pack shall be stored and shipped in a dust free, noncorrosive container packaged per the repair location packing engineer's instructions.

2.13 A. Changes classified as "A" shall be made on all repaired packs. Other classifications of changes will be made if specifically requested by the Operating Telephone Company.

B. It is not intended that all components on a repaired circuit pack be checked against the stock list of the associated assembly drawing.

C. Unless otherwise specified by the telephone company, repaired circuit packs shall be equipped with certain standard options when specified in the applicable RS.

2.14 If a circuit pack is determined to be defective the replacement component shall be of the type specified in the stock list or an approved substitute.

2.15 Printed wiring boards displaying discoloration due to heat may be retained in use. Those boards bearing evidence of charring may be repaired by removing the charred material and filling in the cavity with epoxy compound. The cavity to be repaired may not exceed a depth of .050". A charred board that cannot be repaired shall be scrapped.

The epoxy compound used in repair shall be per Material Specification 58456, Type 5A, or equivalent. Repaired areas shall not be coated, cleaned, handled, or otherwise disturbed until the epoxy compound has cured.

NOTE: Curing time at room temperature ($70^{o}F$) is approximately twenty-four hours, at $120^{o}F$ approximately two hours.

2.16 Gold-plated contact areas shall be suitably protected against abrasion, contamination, and dust at all times except when exposure is necessary for processing, inspection, or testing.

2.17 All components having visible corrosion shall be removed and replaced.

2.18 Each potentiometer adjustment screw shall be sealed with glyptol after adjustment unless stated otherwise in the applicable RS specification or Schematic Drawing.

3. REFERENCE BSRS

3.01 The BSRS associated with the various categories is as indicated below.

421.002 - AC Gates and Transformers
421.003 - Amplifiers
421.004 - Component Boards
421.005 - Delay Generators
421.006 - Detectors

421.007 - Discriminators and Directors
421.008 - Drivers and Scanners
421.009 - LLL and MCL and Not Gates
421.010 - MF Boards
421.011 - Pulse Generators and Flip-Flops
421.012 - Registers
421.013 - Regulator and Reference Boards
421.014 - Relay Boards
421.015 - Switches and Markers
421.016 - Timer and Converters
421.017 - Touch-Tone Boards
421.018 - A-Type Circuit Packs - No. 1 ESS, No. 2 ESS
421.019 - A-Type Circuit Packs - No. 1 ESS, No. 2 ESS
421.020 - A-Type Circuit Packs - No. 1 ESS, No. 2 ESS
421.021 - A-Type Circuit Packs - No. 1 ESS
421.023 - MWSR Boards - TSPS
421.050 - P-Type Circuit Packs
421.051 - No. 1 ESS Lines and Trunks
421.066 - No. 1 ESS High Current Pulser and Path Check Circuit
350.002 - Circuit Packs and Printed Wiring Board Assemblies

4. MARKING

4.01 Repaired circuit packs shall be rubber stamped with the date of repair and a repair location symbol. One of the following legends shall be stamped adjacent to the repair date as applicable:

(1) ATP - This legend identifies a circuit pack which passes all the test Specifications for that code and no repair was necessary.

Note: Prior to 1972, NTF (No Trouble Found) was used in place of ATP.

(2) RPD - This legend identifies a circuit pack which required component replacement or soldering to meet its end requirements.

(3) UPD - This legend identifies a circuit pack which was updated only and which was not returned for repair.

(4) UNR - This legend identifies a circuit pack which is unrepairable and will be stamped on the face plate if possible.

4.02 If a returned circuit pack passes all tests which has been stamped twice with any combination of ATP or NTF, it shall be scrapped.

4.03 Circuit packs shall display the two most recent chronological repair markings.

4.04 Series updating will be designated by the use of a dash (-) or a slash (/). The dash between the series numbers denotes the updating from the previous series number to a new series number with all intermediate changes, if any. The slash between series numbers denotes updating from the previous series to the latest series number only. (i.e., it does not include any intermediate changes).

* An (X) shall be placed between series numbers to mean that the previous series is repaired and made electrically the same as the current series, but may differ by board layout and/or components or current series. When all room adjacent to original series number is used, updating of series shall start below original number and as far to the left on face plate as is possible.

4.05 On circuit packs with metal face plates, the new series number shall be placed right after the original series number stamped on the PWB by the manufacturer, separated by a dash or slash. On the metal face plate, itself, all series updating information shall be stamped in a vertical line below the original series number.

On circuit packs with plastic face plates, the series updating information shall begin to the right of the series number when viewed as if looking at the plastic face plate with the color block at the top of the face plate.

The new stamped series number shall be the same size as the original number. When all room adjacent to the original series number is used, updating series numbers shall start below the original series number and as far to the left as is practical.

* This is applicable only to "A" codes

APPENDIX A

AN OBJECTIVE TEST FOR THE PRESENCE OF EXPOSED COPPER

ON THE CONTACT FINGERS OF RETURNED CIRCUIT PACKS

EXAMINATION TECHNIQUE

The examination technique is based on the use of cadmium diethyl dithio carbamate indicating paper (A. Eichhorn, 230 Parker Road, Elizabeth, New Jersey) which is wet with a dilute solution of ammonia water and then applied to the suspect contact fingers. If copper is exposed, the paper will indicate the area of exposure by turning a brownish-yellow color in the corresponding area.

The test technique consists of the following steps:

1. Prepare a 3.0% by volume concentration of CP ammonia (28% solution) in deionized water. Store in a closed glass container.

2. Preparatory to the test, wipe the suspected contact fingers with the ammonia solution.

3. Using Fluorowave tweezers, dip a strip of indicating paper into the ammonia solution and then drain the strip of paper onto blotter paper.

4. Apply the indicating paper to a glass slide and then lay the slide paper side down, across the contact fingers for 60 seconds with moderate pressure.

5. Pick up the slide, remove the paper and let it dry by laying it on a blotter. Exposed copper will cause a color indication on the paper. Follow-up cleaning of the contact fingers, though not essential, may be accomplished by wiping with a clean cloth and ammonia solution.