10A DATA LINE CONCENTRATOR

MAINTENANCE

1. GENERAL

1.01 This section covers the procedures to be followed when a trouble condition in the Data Line Concentrator System has been isolated to the 10A Data Line Concentrator, as described in the section entitled Data Line Concentrator System—Maintenance (591-810-300). In the following text, the word "module" will refer to a functional unit such as a data mounting equipped with its associated circuit packs.

1.02 This section is reissued to:

(a) Revise 1.10

(b) Add 1.11

(c) Revise Part 2

(d) Revise (2), (3), (4), and (5) of 3.10(b)

(f) Revise Step (7) of 3.10(c)

(g) Add Steps (8) and (9) to 3.10(c)

(h) Revise Fig. 1, 2, 3, and 4.

All changes are denoted by arrows.

1.03 The following procedures assume the reader has a general familiarity with the operation and physical arrangement of the concentrator. This information is found in the section entitled 10A Data Line Concentrator—Description (591-811-100).

1.04 There is no routine maintenance required for any of the modules which make up the concentrator. When a trouble condition is found to exist, repair is achieved by the replacement of the defective unit (ie, circuit pack, data mounting, etc).

1.05 Testing procedures for a concentrator suspected of being in trouble, or where a defective unit has been replaced, should be performed in accordance with the section entitled 10A Data Line Concentrator—Test Procedures (591-811-500).

1.06 The tests referred to in the text and troubleshooting flowcharts of this section (eg, Test A, Test B) should be performed in accordance with the test section referenced in 1.05.

1.07 Removal of defective units and installation of replacement units should be in accordance with the section entitled 10A Data Line Concentrator—Installation and Connections (591-811-200).

1.08 Exercise care in handling and transporting circuit packs, data mountings, etc. If possible, use original cartons to store, transport, or ship all units.

1.09 If maintenance spares are stocked, verify that they are checked and ready for immediate installation.

1.10 ▶It is recommended that the following circuit packs be stocked as maintenance spares.

(a) One AR370 clock and pulser circuit pack (essential)

(b) One AR371 alarms and registers circuit pack (optional)

(c) One AR374 trunk or line scanner circuit pack (essential)

(d) One AR375 addition to line scanner (concentrators of more then 32 lines only)

(e) One AR384 camp-on signal generator circuit pack (essential)

(f) One AR365 line circuit pack for every 5 line circuits required in the concentrator (essential)

(g) One AR368 turnk circuit pack for every 5 trunk circuits required in the concentrator (essential).◀

1.11 ▶Since the pulsing transistor, transformer, etc, are mounted on the 23A1 Data Mounting, it is recommended that one 23A1 Data Mounting be stocked as a maintenance spare. This is because field replacement of these units (pulsing transistor, transformer, etc,) is not recommended. In addition, it is recommended that one KS-20575-type rectifier be kept at the concentrator, one at the multiple data set arrangement for the port, and one at the interconnection arrangement site as maintenance spares.◀

2. ▶MAINTENANCE AIDS◀

2.01 ▶The following circuit description (CD), schematic drawing (SD), and Bell System Practices (BSPs) may be useful as maintenance aids when troubleshooting a defective concentrator.

SD- & CD-73055-01	Data Systems—No. 10A Data Line Concentrator and 803E1 Data Auxiliary Set
591-810-300	10-Type Data Line Concentrator System—Maintenance Procedures
591-811-200	10A Data Line Concentrator—Installation
591-811-500	10A Data Line Concentrator—Test Procedures

2.02 At KS-14510-L1 (or equivalent) volt-ohm-milliammeter (VOM) may be required for the performance of these maintenance procedures.◀

3. ▶MAINTENANCE ACTIVITIES◀

3.01 This part describes the procedures to be followed when attempting to isolate a multiple station or single station reported trouble in the concentrator.

3.02 Troubles within the concentrator can generally be isolated to one of four areas by analyzing the trouble report. These areas and the symptoms which indicate trouble in them are as follows:

Multiple Station Reported Troubles

(a) Access troubles (Fig. 1)—

(1) Line scanner (LS), trunk scanner (TS), clock (CLK), and/or pulser (PLSR) alarm lamps on AR371 circuit pack lighted.

(2) All stations in system report they cannot establish a connection to the computer.

(b) Trunk circuit troubles (Fig. 2)—

(1) A number of stations report occasional lack of answer-back and camp-on when service is requested.

(2) A number of local stations report that teletypewriter (TTY) occasionally runs open when service is requested.

(3) The computer tabulation (if available) of port usage indicates that one or more ports have a much lower usage than most of the other ports.

(4) A number of stations repeatedly report an unusually long camp-on before being connected to a trunk.

Single Station Reported Troubles

(c) Line circuit troubles (Fig. 3)—

(1) Station reports no answer-back or camp-on when service is requested.

(2) Local station reports that TTY runs open when service is requested.

(3) Station receives permanent camp-on.

(d) Switching matrix network troubles (Fig. 4)—

(1) Station reports occasional lack of response when service is requested.

(2) Local station reports that TTY occasionally runs open when service is requested.

3.03 Once a trouble has been localized to a particular area, it is recommended that all power supplies, fuses, and connector cables be checked first. Then the troubleshooting flowcharts (Fig. 1, 2, 3, and 4) are to be used for an organized trouble investigation with a minimum amount of time spent in locating the cause of trouble.

When a data mounting must be replaced, power to the concentrator must be turned off. This will cause all calls in progress to be dropped.

3.04 When a trouble has been isolated to a particular circuit pack, data mounting, etc, and that unit is replaced, repeat the test of the unit to determine if the trouble is cleared. Then have the station(s) reporting the trouble request service to verify that the trouble is cleared.

Note: The following paragraphs (3.05 through 3.10) are to be referred to when troubleshooting with Fig. 1, 2, 3, and 4. Instructions on the figures will refer to these paragraphs.

3.05 When an alarm lamp on the AR371 circuit pack is lighted, replace the control module circuit packs as follows.

(a) PLSR lamp lighted—Replace AR370 (slot 21) circuit pack. If the alarm lamp is still lighted, replace the AR371 circuit pack. If, after replacing both the AR370 and AR371 circuit packs, the alarm lamp is still lighted, the 23A1 Data Mounting should be replaced.

(b) CLK lamp lighted—Replace AR370 (slot 21) circuit pack. (If the LS and TS lamps are also lighted, replace the AR370 circuit pack before replacing any others. Replacing AR370 may cause the other lamps to extinguish.)

(c) LS lamp lighted—Replace AR374 (slot 01) and/or AR375 (slot 03) line scanner circuit pack(s).

(d) TS lamp lighted—Replace AR374 (slot 05) trunk scanner circuit pack.

3.06 When a line has been connected to a trunk and that connection meets the requirements of Test B (see 1.06), connect the line to the next trunk and repeat Test B until the faulty crosspoint is detected. If all the crosspoints for the line in trouble meet the requirements of Test B, the trouble may be caused by an excess of line padding in the interconnection arrangement concentrator-side data set or local station data set.

3.07 In order to determine if the concentrator is continuously pulsing, condition the VOM to measure 24 volts dc, connect the negative VOM lead to a good signal ground, and connect the positive VOM lead to TP14 of the AR370 circuit pack. The meter should indicate 18 to 24 volts dc with a negative voltage spike present each time the concentrator pulses.

3.08 If the meter indicates the concentrator is continuously pulsing, replace the AR370 circuit pack and recheck for the continuous pulsing. If the continuous pulsing still persists, remove the line circuits from the line and switch module (18A1, 19A1, or 20A1 Data Mounting), as follows:

(1) While monitoring for the presence of continuous pulsing, ensure that both lines served by the line circuit are idle and then remove that line circuit from the data mounting.

(2) Repeat (1) for each line circuit, in turn, until the continuous pulsing stops.

(3) Replace the line circuit that was removed immediately preceding the cessation of the pulsing with one that is known to be operating properly.

(4) Still monitoring for the continuous pulsing, reinstall the line circuits one at a time.

(5) If the continuous pulsing returns after the reinstallation of a line circuit, replace that line circuit with one that is known to be operating properly.

If, after removing all of the line circuits, the continuous pulsing is still present, replace the 23A1 Data Mounting (control module).

If the trouble is in the line circuits and it is found to be a recurring problem (ie, this happens on more than one occasion), there is probably a defective component on the 23A1 Data Mounting and this mounting should be replaced with one that is known to be operating properly.

3.09 If a computer center tabulation of the trunk usage traffic pattern is available, it should be analyzed to determine:

(a) If any trunk(s) have a much lower usage rate than the other trunks.

(b) If any trunk(s) are continuously having a much shorter holding time than the other trunks.

If either (a) or (b) is evident, troubleshooting should begin with the low usage or short holding time trunk(s).

3.10 If a computer center tabulation of the trunk usage traffic pattern is not available, one of the following three procedures may be used to make a tabulation at the concentrator.

(a) This procedure requires the use of a KS-14510-L1 VOM, or equivalent, and should be made during the busy hour.

(1) Connect negative VOM lead to TB2-3 of the 21A1 or 22A1 Data Mounting.

(2) Connect positive VOM lead to TP10 of the AR368 circuit pack to be monitored for status.

Note: When the trunk circuit is in use (connected to a line), the meter will indicate zero or near zero volts.

(3) Monitor the trunk circuit and note whether it is selected for use and how long it remains in use each time it is selected.

(4) Repeat (2) and (3) for each trunk circuit.

(5) Troubleshooting ▶with Fig. 2◀ should be ▶continued◀ with any trunk circuit(s) which is found to have a much shorter holding time than the others or appear to be ▶used◀ less often than the others.

(b) This procedure requires the use of a KS-14510-L1 VOM, or equivalent, and should be performed during the nonbusy hour.

This procedure requires that trunk circuits be taken out of service for maintenance purposes. If local policy prescribes that this NOT be done, this procedure should be omitted.

(1) Connect negative VOM lead to TB2-3 of the 21A1 or 22A1 Data Mounting.

(2) ▶See if trunk number 1 is idle or busy by checking TP10 on AR368. If the trunk is idle, remove the circuit pack from the data mounting.◀

Note: TP10 of busy trunk circuits will be at or near zero volts.

(3) Repeat (2) ▶with all other trunks.◀

(4) Replace one of the AR368 circuit packs that were removed from the data mounting and check to see that it is ▶eventually used.◀

(5) Repeat ▶(4)◀ until all trunk circuits have been ▶reinstalled or replaced.◀ Troubleshooting ▶with Fig. 2◀ should be ▶continued◀ with any trunk circuit which is not selected or which has an extremely short holding time.

(c) This procedure requires the availability of a model 33- or 35-type TTY equipped with a Data Set 109-type, and an unused line circuit at the concentrator. In addition, a KS-14510-L1 VOM, or equivalent, and the manual test set (DAS 803E1 and AR464 CP) are required.

(1) At the intermediate distribution frame (IDF) or connector block for the concentrator line circuits, connect the TTY to the unused line circuit.

(2) Connect the negative VOM lead to TB2-3 of the 21A1 or 22A1 Data Mounting.

(3) Turn on the TTY, note which trunk ▶circuits are busy,◀ and then turn off the TTY.

Note: Use positive VOM lead to check TP10 of trunk circuits. Busy trunk circuits will have TP10 at or near zero volts.

(4) Repeat (3) for 10 to 15 minutes.

(5) If any trunk circuits are found to which a connection cannot be made, use the manual test set to connect the TTY line to that trunk circuit.

(6) Turn on the TTY. ▶If the TTY runs open it means it is not properly terminated from the trunk loop. Troubleshooting should continue with Fig. 2 on all trunk with which

this happens. If the TTY does not run open, perform Step (7).◀

(7) Disconnect the manual test set from the line and trunk circuits. If the connection ▶does not◀ hold up, the trunk circuit is ▶not◀ good ▶and should be replaced.◀

(8) ▶If the connection holds up, repeat (3) for about 5 minutes. If the trunk still does not get selected, replace the trunk circuit (AR368).

(9) If the new trunk does not get selected, replace the trunk scanner (AR374, slot 05 of 23A1 Data Mounting).◀

(10) ▶Repeat Step (3) for 5 minutes. If some trunk circuits still do not get used, continue troubleshooting these trunks with Fig. 2.◀

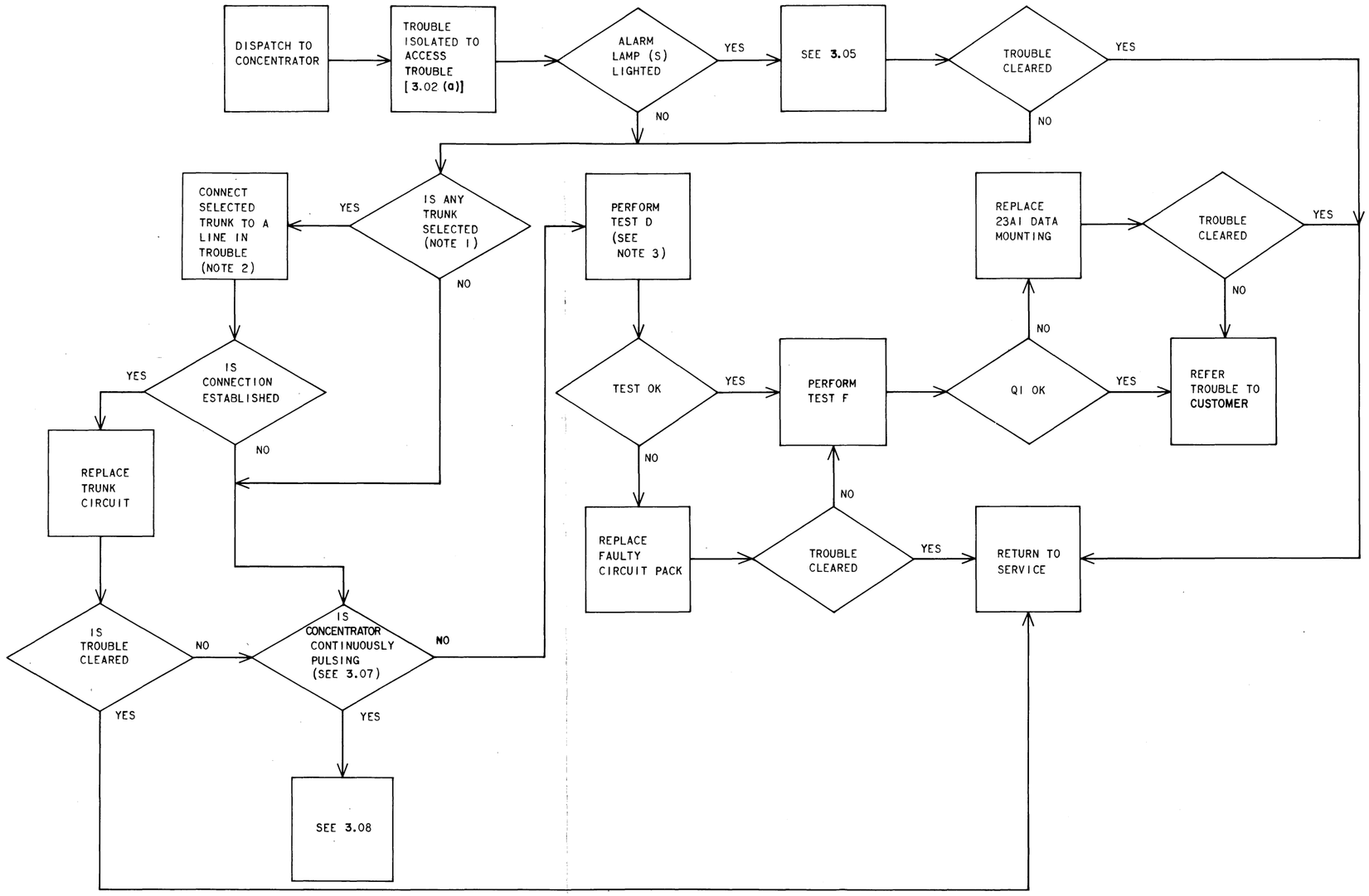
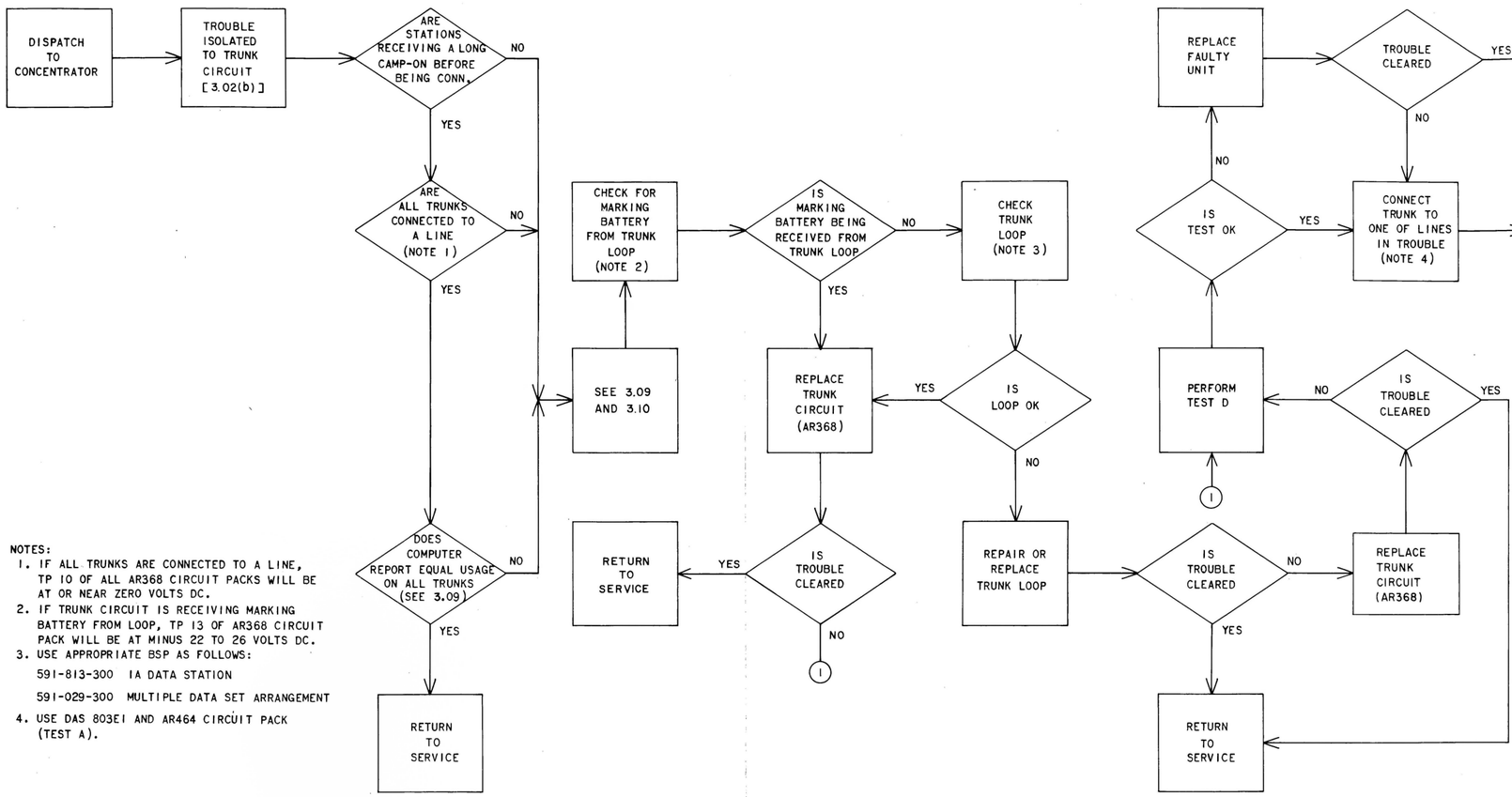


Fig. 1—Troubleshooting Flowchart for Control Circuit [3.02 (a)]



NOTES:
1. IF ALL TRUNKS ARE CONNECTED TO A LINE, TP 10 OF ALL AR368 CIRCUIT PACKS WILL BE AT OR NEAR ZERO VOLTS DC.
2. IF TRUNK CIRCUIT IS RECEIVING MARKING BATTERY FROM LOOP, TP 13 OF AR368 CIRCUIT PACK WILL BE AT MINUS 22 TO 26 VOLTS DC.
3. USE APPROPRIATE BSP AS FOLLOWS:

   591-813-300 1A DATA STATION

   591-029-300 MULTIPLE DATA SET ARRANGEMENT

4. USE DAS 803E1 AND AR464 CIRCUIT PACK (TEST A).

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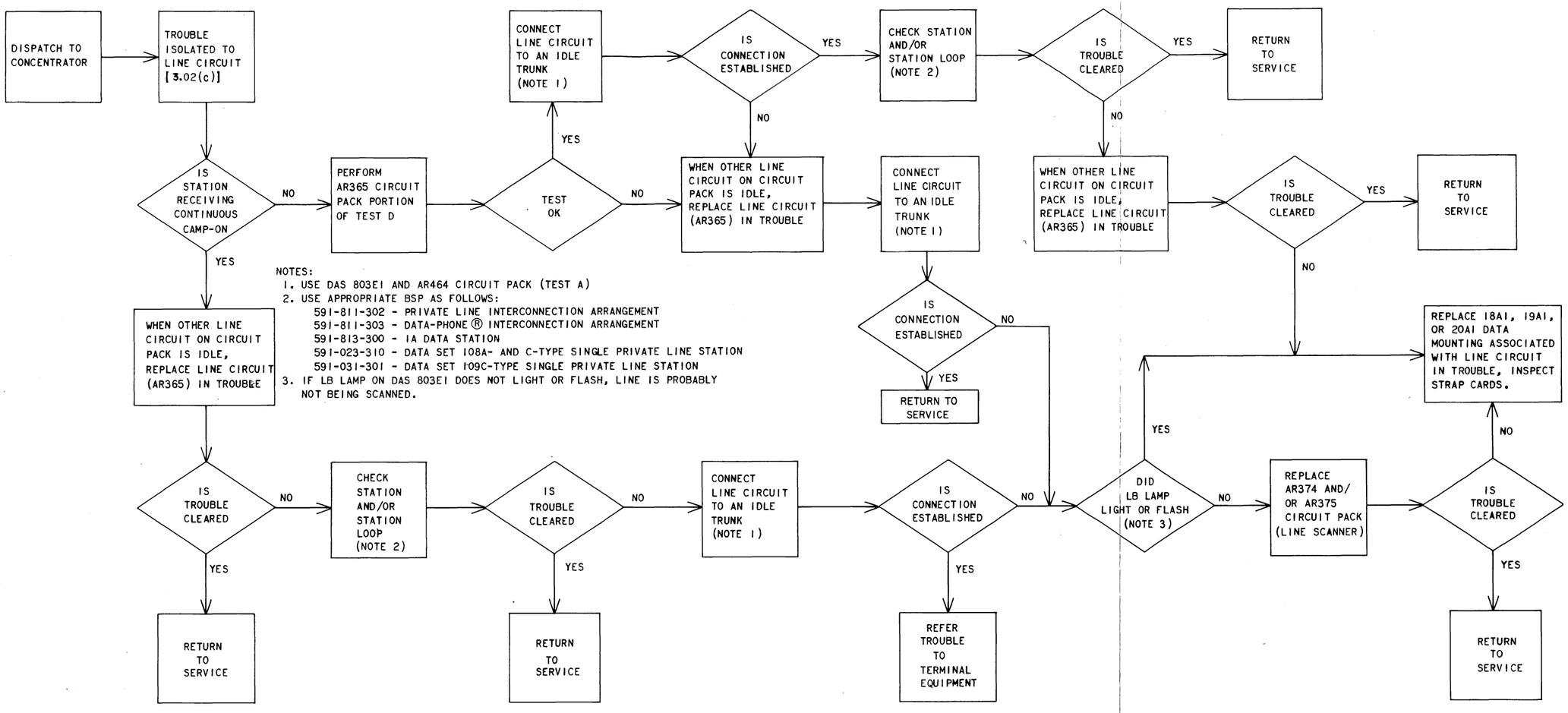
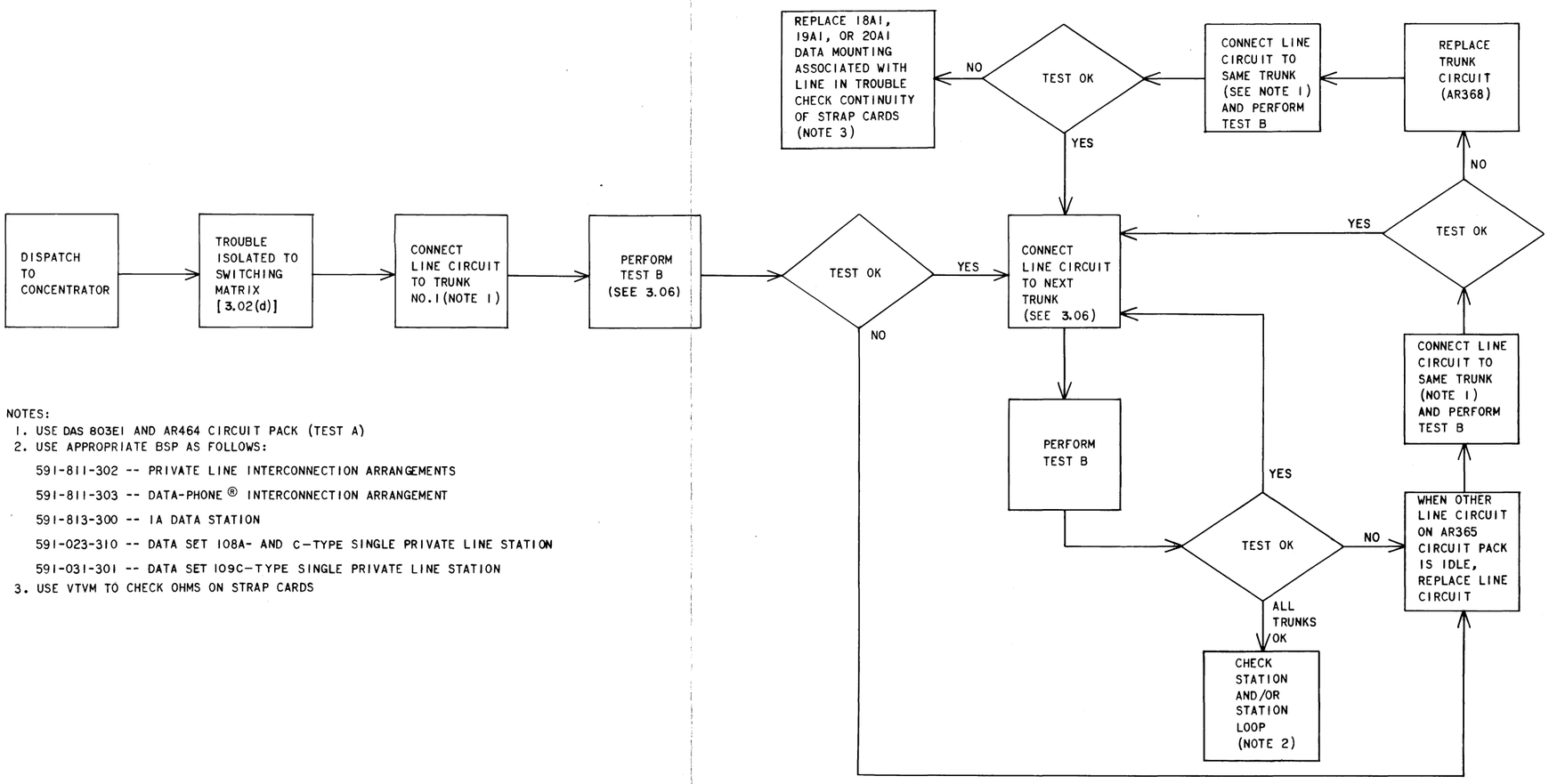
Fig. 2—Troubleshooting Flowchart for Trunk Circuit [3.02 (b)]



NOTES:
1. USE DAS 803E1 AND AR464 CIRCUIT PACK (TEST A)
2. USE APPROPRIATE BSP AS FOLLOWS:
   591-811-302 - PRIVATE LINE INTERCONNECTION ARRANGEMENT
   591-811-303 - DATA-PHONE® INTERCONNECTION ARRANGEMENT
   591-813-300 - 1A DATA STATION
   591-023-310 - DATA SET 108A- AND C-TYPE SINGLE PRIVATE LINE STATION
   591-031-301 - DATA SET 109C-TYPE SINGLE PRIVATE LINE STATION
3. IF LB LAMP ON DAS 803E1 DOES NOT LIGHT OR FLASH, LINE IS PROBABLY NOT BEING SCANNED.

Fig. 3—Troubleshooting Flowchart for Line Circuit [3.02 (c)]



NOTES:
1. USE DAS 803E1 AND AR464 CIRCUIT PACK (TEST A)
2. USE APPROPRIATE BSP AS FOLLOWS:

   591-811-302 -- PRIVATE LINE INTERCONNECTION ARRANGEMENTS

   591-811-303 -- DATA-PHONE® INTERCONNECTION ARRANGEMENT

   591-813-300 -- 1A DATA STATION

   591-023-310 -- DATA SET 108A- AND C-TYPE SINGLE PRIVATE LINE STATION

   591-031-301 -- DATA SET 109C-TYPE SINGLE PRIVATE LINE STATION
3. USE VTVM TO CHECK OHMS ON STRAP CARDS

Fig. 4—Troubleshooting Flowchart for Switching Matrix Network [3.02 (d)]