1A SWITCH UNIT
LEAKAGE TEST OF 443A (PNPN)
DIODES
NO. 101 ELECTRONIC SWITCHING SYSTEM

1. GENERAL

1.01 This section describes a method of performing a current leakage test on the 443A diodes in order to detect a possible cause of crosstalk in the 1A switch unit of the No. 101 Electronic Switching System (ESS).

1.02 ***Lettered Steps:*** The letters a, b, c, etc., added to a step number in Part 4 of this section indicate an action which may or may not be required. The condition under which a lettered step or series of lettered steps should be made is given in the ACTION column, and all steps governed by the same conditions are designated by the same letter within a test. When a condition does not apply, all steps designated by that letter should be omitted.

1.03 Tests covered are:

*A. **Individual Circuit Pack (CP) PNPN Diode Leakage Test:*** This test checks the 443A diodes used in the individual CPs.

*B. **Switch Unit PNPN Diode Leakage Test:*** This test checks all of the 443A diodes in most of the various line and trunk CPs while they are in place in the switch unit.

Caution: With this test, the switch unit must be completely removed from service. Therefore, this test should be performed during the installation period or during off hours when complete service can be interrupted. Control unit personnel must be notified whenever an inadvertent disruption of service occurs as a result of testing. This applies to blown fuses in both on-line and off-line circuits.

2. APPARATUS

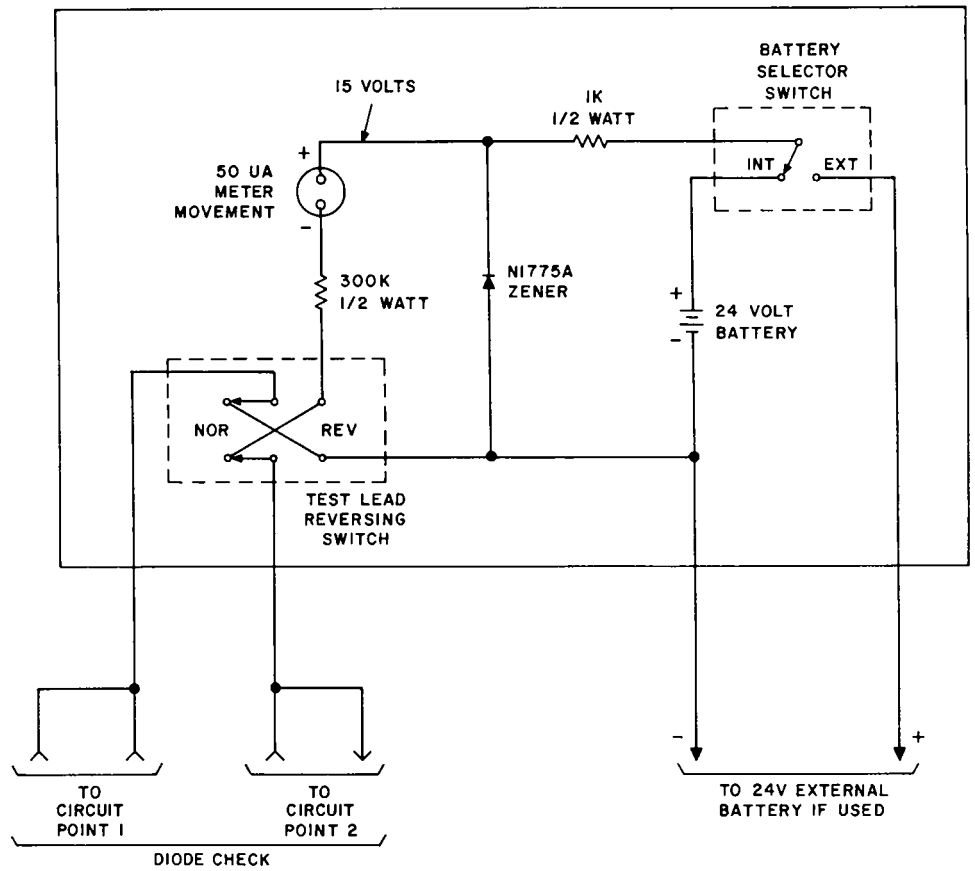
2.01 The following is a list of apparatus used in making tests:

- PNPN test set (see Fig. 1) or equivalent
- 731A (key extractor) tool for CP removal
- 728A tool (extender board).

3. PREPARATION

STEP	ACTION	VERIFICATION
1	At PNPN test set— Operate battery selector switch to INT if using internal battery or to EXT if using external battery for the diode leakage test.	

STEP	ACTION	VERIFICATION



NOTE:
UNIT WILL BE NORMALLY USED WITH INTERNAL BATTERY. RETURN THE INT/EXT SWITCH TO EXTERNAL POSITION WHEN SET IS NOT IN USE TO AVOID UNNECESSARY DRAIN ON THE ENTERNAL BATTERY.

Fig. 1—Electronic Switching System PNPN Diode Test Set

4. METHOD

STEP	ACTION	VERIFICATION
A. Individual Circuit Pack PNPN Leakage Test		
2	Connect PNPN test set leads to CP to be tested as indicated in Table A.	Indication at test set should be less than 10 μa (microamperes).
	Note: Connect to both circuit point 1 terminals, if indicated, and to any one of indicated points for circuit point 2.	
3a	If meter indication is greater than 10 μa— Do not use this CP. (See Notes 1, 2, and 3.)	

STEP ACTION VERIFICATION

TABLE A

CIRCUITS AND TEST POINTS FOR THE PNPN LEAKAGE TEST

CIRCUIT PACK ED-1H	CONNECTION POINTS FOR PNPN TEST SET LEADS			
	TERMINALS FOR CIRCUIT POINT 1	TEST POINT OR	TERMINAL OR	TRANSFORMER TERMINAL FOR CIRCUIT POINT 2
002	5 and 21	TP3		*9 of T3 or T4
003	5 and 21	TP4	19	*9 of T2 or T3
004	5 and 21	TP1	19	*9 of T2 or T3
**011	5 and 21	TP1	19	*9 of T2 or T3
**012 Card 1	5 and 21	TP4	19	*9 of T1 or T3
**012 Card 2	5 and 21		19	*9 of T6 or T8
110	5 and 21	TP5	19	*9 of T2 or T3
245	24 and 25		17	*9 of T1 or T2
**269	5 and 21			*9 of T1 or T2
**279	5 and 21			*9 of T1 or T2
**281	5 and 21			*9 of T1 or T2
289	5 and 21	TP1		*9 of T1 or T2
**296	5		9	
315	5 and 21		19	*9 of T2 or T3
318	5 and 21	TP3	19	*9 of T4 or T5
327	5 and 21	TP1	19	*9 of T2 or T3
328	5 and 21		19	*9 of T1 or T2
329	5 and 21	TP1	19	*9 of T2 or T3
**330	5 and 21		19	*9 of T1 or T2
335 Card 1	5 and 21	TP5		*9 of T1 or T3
335 Card 2	5 and 21	TP5		*9 of T6 or T8

* These circuit connections are internal on circuit pack.

** These circuits are not tested in switch unit test.

4 At PNPN test set—
Operate test lead reversing switch.

Indication at test set should be less than 10 μa.

5b If meter indication is greater than 10 μa—
Do not use the CP. (See Notes 1, 2, and 3.)

Note 1: A 443A diode may be found which initially has low leakage but increases to a higher value. Generally this will occur after the test circuit has been connected to the diode for about one minute. A diode with this characteristic may be used in the switch

STEP	ACTION	VERIFICATION

unit, ***if desired,*** since dc voltage is not constantly applied to the diode in the switch unit as it is when using the diode test set.

Note 2: A diode may be found which has excessive leakage when first tested but with subsequent testing does not show leakage. If this diode does not show leakage after the one minute mentioned in Note 1, it is probably intermittent and should not be used in the switch unit.

Note 3: If a diode is found which causes erratic meter readings (±several microamperes), it is recommended that it not be used even though the leakage may be less than 10 μa.

B. Switch Unit PNPN Diode Leakage Test

2 Request control unit personnel inhibit switch unit maintenance to switch unit that is to be tested.

3 Remove the bus clamp CP234 at location 30D7 in bay 3 and at location 30A16 in bay 4.

4 Disable translator circuits by removing fuses 92B and 93B.

5 Replace the line or trunk CP, with the extender board, at the location for the first bus to be tested as follows:

BUS	CP LOCATION	BAY	SCAN POINT
1	26C2	3	58
2	26C2	4	158

Note: It is not necessary to place the removed CP on the extender board.

6 At test set—
Connect test leads to the terminal of the extender board for the bus being tested as follows:

BUS	TEST LEAD CONNECTION POINTS
1	Extender board pin 21 and ground
2	Extender board pin 5 and ground

Indication at test set should be less than 30 μa.
If indication exceeds 30 μa, perform Step 7 first then proceed to Step 8a.

STEP	ACTION	VERIFICATION
7	Operate test lead reversing switch.	Indication at test set should be less than 30 μa. If indication exceeds 30 μa, proceed to Step 8a.
8a	If meter indication in Step 6 and/or 7 exceeds 30 μa— Monitor the leakage current detected in Step 6 and/or 7 as CPs are removed one at a time. (CP need only be removed far enough to disengage the connector.) ***Note:*** **If the meter indication exceeds 30 μa in both Steps 6 and 7, it will be necessary to take both forward and reverse meter reading while removing CPs.**	When indication at test set drops below 30 μa, the defective CP has been located; or, if any significant change in meter indication is detected, the CP just removed should be checked as directed in Test A.
9b	If a defective CP was located— Replace it with a good CP.	
10c	Reinsert the remaining CP(s).	Indication less than 30 μa.
11	Repeat Steps 5 through 10c for the other bus if necessary.	
12	Remove connection between diode test set and switch unit.	
13	Place INT-EXT switch on test set in EXT position to prevent drain on internal battery.	
14	Remove extender board from location 26C2 and reinsert line or trunk CPs.	
15	Enable translator circuits by replacing fuses 92B and 93B.	
16	Replace the bus clamps CP 234 at location 30D7 in bay 3 and location 30A16 in bay 4.	
17	Request control unit personnel make teletypewriter (TTY) type-in to enable switch unit maintenance to switch unit under test.	Switch unit maintenance restored.
18	Refer to Table A— Test all the CPs individually (as directed in Test A) that were not tested in the switch unit test.	