L3 AND L4 CARRIER
COMMON EQUIPMENT
J68820 AUTOMATIC LINE SWITCHING
TESTS
TRANSMITTING SWITCH OPERATION

PURPOSE OF TESTS

To verify the transfer and release of an automatic switch at the transmitting end.

REASON FOR ISSUE

This section is reissued to include information on the noise guard feature added to the LPSS-1 switching system and to correct errors. Arrows are used to indicate significant changes. Equipment Test Lists are not affected.

SPECIAL CONSIDERATIONS

Early installations of switching equipment in the L3 Carrier System may be affected adversely by an unfavorable signal-to-noise ratio in the switching signal band. This noise problem can be corrected by transmitting the switching signals at a higher power level and restoring them to the proper level at the distant end. Unmodified early installations of switching equipment (before August 8, 1966) are referred to as ***Condition A.*** Early installations of switching equipment modified for improved signal-to-noise ratio or newly manufactured switching equipment (including L4) are referred to as ***Condition B.*** The L3 switching equipment must be physically inspected to determine if the equipment under test is unmodified ***(Condition A)*** or modified ***(Condition B).***

The switch tone amplifiers shown in Fig. 1 and Fig. 2 are provided as standard equipment with new production L3 and L4 systems and as options in existing L3 and L4 systems. The need for modifying existing systems is determined by measuring the level of the switching signals in accordance with Section 359-100-509.

APPARATUS:

Transmission Test Equipment: Refer to Section 356-010-500 and select, from available equipment, a sending and a receiving unit having the following capabilities:

Sending Test Equipment (STE) capable of delivering into 75-ohm circuits, signals between 200 and 400 kHz at a level from zero to -90 dBm.

APPARATUS (Contd):

Receiving Test Equipment (RTE) capable of detecting, from 75-ohm circuits, signals between 200 and 300 kHz at a level from zero to -120 dBm.

In addition to the above, the following are required:

KS-14510, L( ) Volt-Ohm-Milliameter (VOM)

P2BJ Cords, as required

11B Attenuator (used for bridging measurements)

Adjustable Attenuator with the following characteristics:

(a) 75-ohm input and output

(b) Loss from zero to 85 dB

(c) Adjustable in increments of at least 0.1 dB

(d) 3-Port, 75-ohm hybrid or equivalent.

STEP	PROCEDURE
1	Insure that all transmitting switches under test are normal. ***Requirement:*** No lamps should be lighted in the L3 miscellaneous or L4 control connecting bay.
2	Request the receive end of the switching section under test to lock out all switches being tested. ***Note:*** Local procedure may require notifying the Regional Facility Management Center.
3	At the transmitting terminal on the jack strip in the switch control bay, remove the patch plugs as follows: • ***L3:*** SW FIL OUT to SW AMP IN jack • ***L4:*** LVL COM OUT to SW AMP IN or SW FIL OUT to SW AMP IN jack.
4	If a switch tone amplifier is provided in the director and transmitting switch control (TSC) panel, record the S1 setting of each amplifier. Then set the switch to the 0 position. ***Note:*** The switch tone amplifier provides an adjustable gain of ±10 dB in 5-dB steps for the 296-kHz verification signal.
5	Prepare the VOM to measure approximately -24 Vdc.

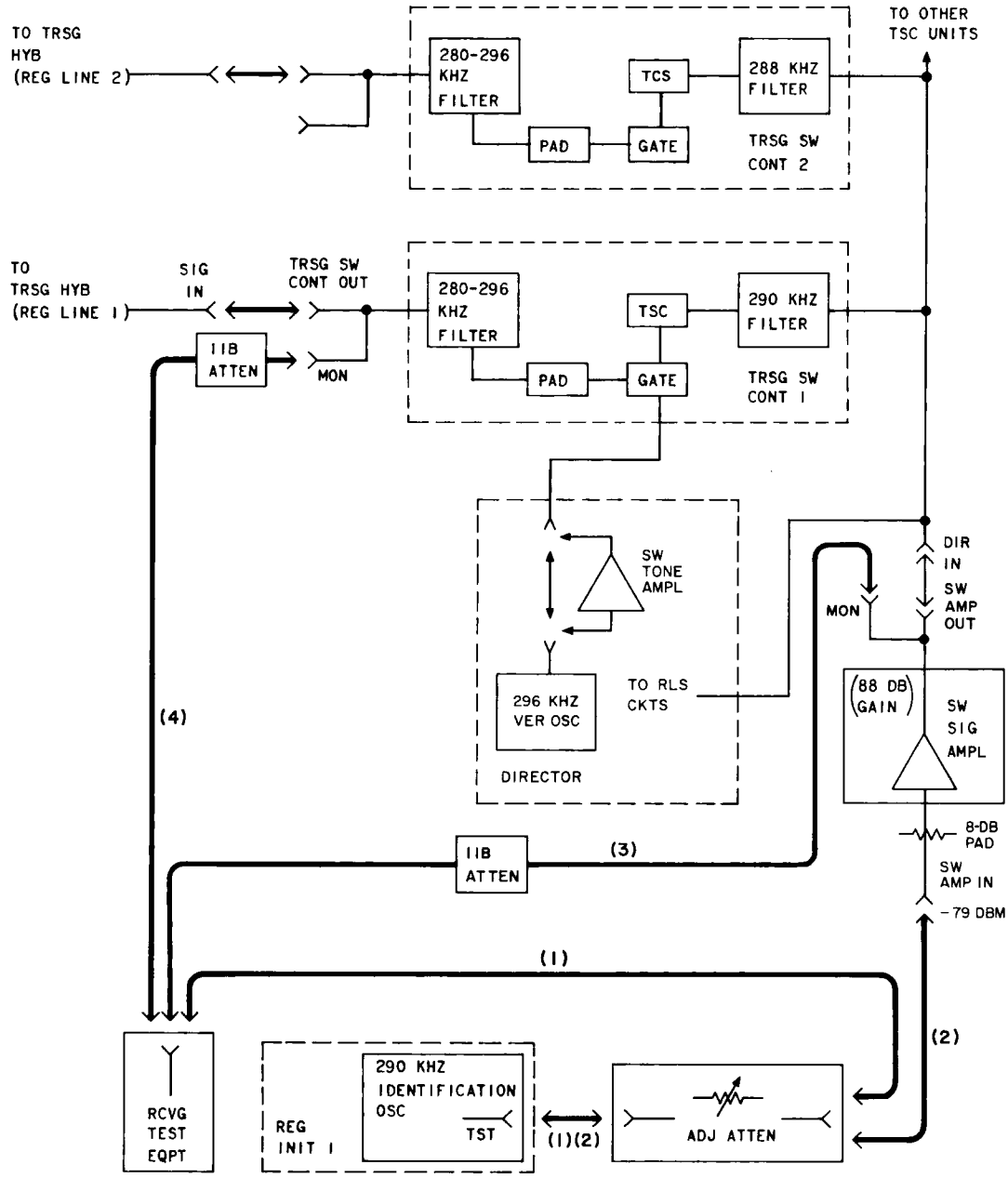

Fig. 1—Patching Arrangement to Observe the Switch Initiation at the Transmit Terminal

6 At the terminal strip on the left rear of the transmitting switch control unit, measure the voltage on terminal 4 of the transmitting switch under test.

Requirement: Approximately -24 Vdc.

Note 1: A voltage drop below -21 volts may imply a TSC unit has defective diodes.

Note 2: If a defective diode is replaced, readjustment of the TSC unit panel may be necessary.

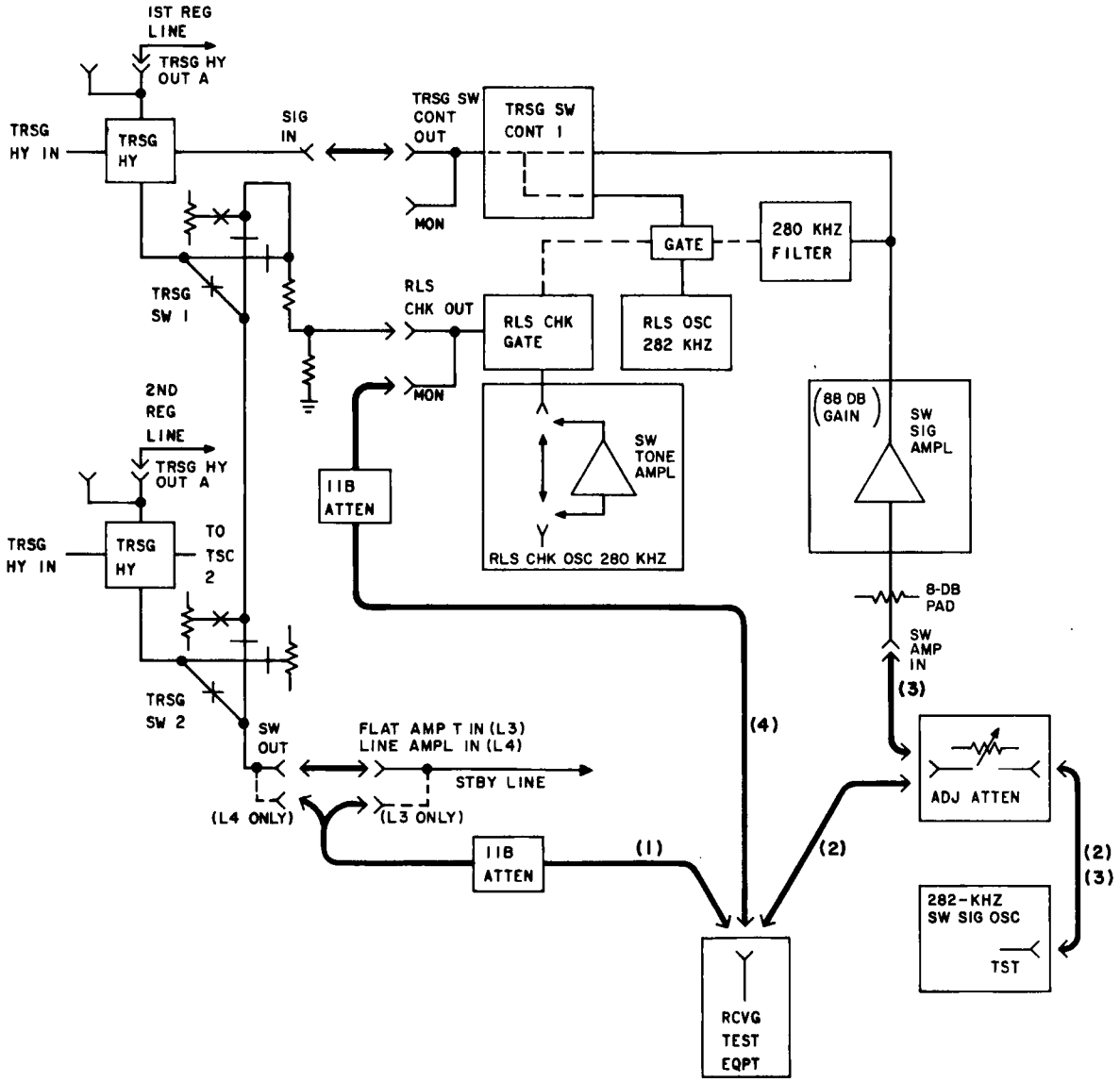

Fig. 2—Switch Control Circuits and Test Connections

A. Simulated Transmit Switch

7 At the regular initiator (REG INT 1), insert a patch cord and an adjustable attenuator between the 290-kHz oscillator TST jack and the RTE [patch (1), Fig. 1].

STEP	PROCEDURE

Note: The 290-kHz signal is the line identification signal for regular line #1. Other line identification signals are 288 kHz, 286 kHz, and 284 kHz.

8 Adjust the adjustable attenuator until the 290-kHz signal power measures -79 dBm on the RTE.

9 Remove the patch cord from the RTE.

10 At the jack strip in the switch control bay, input the 290-kHz signal (-79 dBm) into the SW AMP IN jack [patch (2), Fig. 1].

Requirement 1: TS OPR lamp is lighted in the L3 miscellaneous bay or L4 control connecting bay.

Requirement 2: The transmitting switch associated with the line under test operates.

Requirement 3: A verification signal (296 kHz) is transmitted over the protection line and the affected regular line at the TRMTG LINE TST jack.

11 Insert a patch cord and an 11B attenuator from the SW AMP MON jack into the RTE [patch (3), Fig. 1].

12 Measure the 290-kHz signal power.

Requirement: Approximately -29 dBm.

Note 1: Adjustment of the FLAT GAIN control of the switching signal amplifier may be necessary to obtain correct level.

Note 2: For detail tube tests and gain measurements for the switching signal amplifier, see Section 359-100-504.

13 Remove the 11B attenuator and RTE from the SW AMP MON jack.

14 Prepare the VOM to measure approximately 3 Vdc.

15 At the terminal strip on the left rear of the TSC unit under test, measure the voltage in terminal 4.

Requirement 1: Approximately -0.7 Vdc ±0.4 Vdc for intermediate offices.

Requirement 2: -24 Vdc for terminal offices.

16 At the director panel (J68820N), measure the voltage on terminal E1 of the printed wiring board ED-52314.

Requirement: -0.2 Vdc ±0.2 Vdc.

STEP	PROCEDURE

Note: ED-52314 is the release tone blocking circuit used for noise guard application. It is controlled by the TSC circuit and provides a means of blocking the release signal detector while the line identification signal is present.

17 At the front of the transmitting switch control unit under test, operate the TRSG SW key to the DISC position.

Requirement 1: The TRSG SW DISC lamp lights.

Requirement 2: Terminal 4 of TSC units not under test should measure approximately -24 Vdc.

18 At the rear of the switch signal filter unit, momentarily connect ground to terminal E38 of the printed wiring board ED-52315.

Requirement: TS OPR lamp remains lighted.

Note: The steering circuit assembly (ED-52315) and equipment is required for noise protection features and helps prevent the false operation of any transmitting switch.

19 At the front of the transmitting switch control unit, restore the TRSG SW key to normal.

Requirement: TRSG SW DISC lamp extinguishes.

20 Prepare the RTE for a bridged measurement of 296 kHz at -54 dBm.

Note: When a switch is made, a verification signal (296 kHz) is transmitted over the protection and the affected regular line to the receive end of the switching section.

21 At the jack strips in the control bay, insert a patch cord and an 11B attenuator from the TRSG SW CONT ( ) MON jack of the line under test into the RTE [patch (4), Fig. 1].

22 Measure the power of the 296-kHz verification signal.

Requirement: -54 dBm.

23 Remove the patch cord from the TRSG SW CONT ( ) MON jack.

24 At the line transmitting bay (protection line) or control connecting bay, connect the RTE, via the 11B attenuator, as follows [patch (1), Fig. 2]:

- ***L3:*** Multiple FLAT AMP IN jack
- ***L4:*** Multiple SW OUT jack.

25 Measure the power of the 296-kHz verification signal.

Requirement:

STEP	PROCEDURE

Condition A: Approximately -103 dBm.

Condition B: Approximately -90 dBm.

Note: Loss of the 223-type switch is less than 0.5 dB.

26 At the jack strip in the switch control bay, remove the patch cord (290-kHz signal) from the SW AMP IN jack.

Requirement:

Condition A: Approximately -103 dBm.

Condition B: Approximately -90 dBm.

B. Release Simulated Transmit Switch

27 At the common switch control panel, insert a patch cord from the 282-kHz switch signal oscillator TST jack, via an adjustable attenuator, into an RTE [patch (2), Fig. 2].

Note: The 282-kHz signal is the release signal sent to the transmit end to release the transmitting switch when a failed line returns to normal. A gate circuit at the transmit end releases a 280-kHz release check signal when the 282-kHz release signal is detected.

28 Adjust the attenuator until the 282-kHz signal power measures -79 dBm on the RTE.

29 Remove the patch cord from the RTE.

30 At the jack strip in the switch control bay, insert the 282-kHz signal (-79 dBm) into the SW AMP IN jack [patch (3), Fig. 2].

Requirement 1: TS OPR lamp is extinguished in the L3 miscellaneous control bay or L4 control connecting bay.

Requirement 2: The transmitting switch under test returns to normal.

Requirement 3: The 296-kHz verification signal is removed from the TRSG SW CONT ( ) MON jack and the protection line [FLAT AMP IN jack (L3) or SW OUT jack (L4)].

31 Prepare the RTE for a bridged measurement of 280 kHz at -54 dBm.

32 At the (Group A) switch control bay, insert a patch cord and an 11B attenuator from the RLS CHK MON jack into the RTE [patch (4), Fig. 2].

33 Observe the 280-kHz signal power on the RTE.

Requirement: -54 dBm.

STEP	PROCEDURE

34 At the jack strip in the switch control bay, remove the patch cord (282-kHz signal) from the SW AMP IN jack.

Requirement: The 280-kHz signal is removed from the RLS CHK MON jack.

35 At the (Group A) switch control bay, remove the patch cord and 11B attenuator from the RLS CHK MON jack.

36 At the director and transmitting switch control panel, restore the S1 switch to its original setting (see Step 4).

Test Inhibiting Features of the Transmitting Switch

37 At the regular initiator (REG INT 1), insert a patch cord and an adjustable attenuator from the 290-kHz signal oscillator TST jack into the RTE [patch (1), Fig. 3].

38 Adjust the attenuator until the 290-kHz signal power measures approximately -67 dBm on the RTE.

39 Prepare the STE to send a 282-kHz signal at -60 dBm.

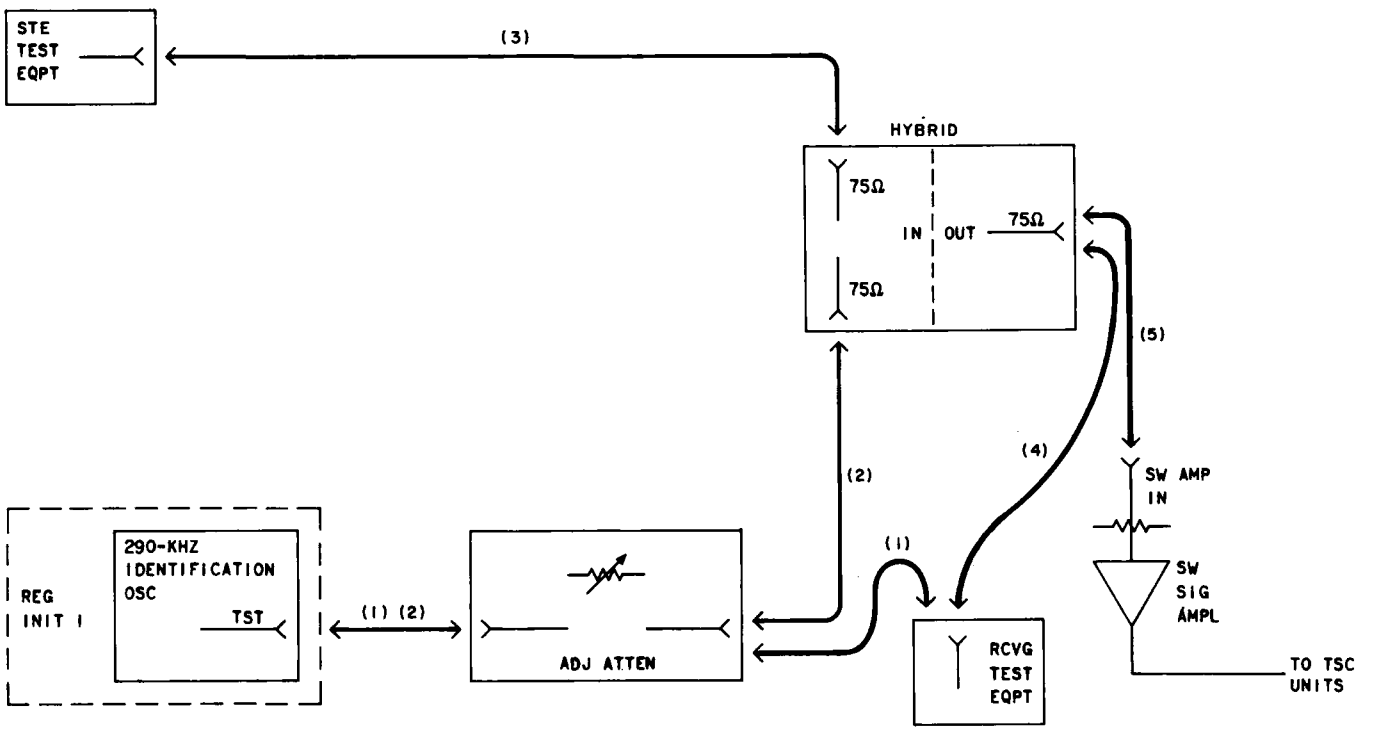

Fig. 3—Test for Inhibiting the Release of a Transmitting Switch

STEP	PROCEDURE
40	At the ***free*** 3-port, 75-ohm test hybrid (2 inputs and 1 output), insert the 290-kHz signal (-67 dBm) into one of the inputs. Then insert the 282-kHz signal (-60 dBm) into the other input [patches (2) and (3), Fig. 3]. ***Note:*** The hybrid must be ***free*** of service-affecting equipment.
41	Insert a patch cord from the RTE into the test hybrid OUT jack, and measure the signal power of the following frequencies [patch (4), Fig. 3]: • 282 kHz (-63 dBm) • 290 kHz (-70 dBm). ***Note 1:*** Adjustment of the STE may be necessary to obtain correct level (-63 dBm) of the 282-kHz signal. ***Note 2:*** Adjustment of the adjustable attenuator may be necessary to obtain correct level (-70 dBm) of the 290-kHz signal.
42	Remove the RTE from the test hybrid OUT jack.
43	Remove the 282-kHz signal at the test hybrid IN jack, and immediately insert a 75-ohm termination plug. ***Note:*** Hybrids with built-in termination will not require a 75-ohm termination plug.
44	Insert a patch cord from the test hybrid OUT jack into the SW AMP IN jack [patch (5), Fig. 3]. ***Requirement 1:*** TS OPR lamp is lighted in the L3 miscellaneous control bay or L4 control connecting bay. ***Requirement 2:*** The transmitting switch associated with the line under test operates.
45	Remove the 75-ohm termination plug at the test hybrid IN jack and reinsert the 282-kHz signal from the STE (see Step 43). ***Requirement 1:*** TS OPR lamp remains lighted. ***Requirement 2:*** The transmitting switch under test remains switched. ***Note:*** Both test signals (282 kHz and 290 kHz) are present at the test hybrid OUT jack and the SW AMP IN jack.
46	Remove the 290-kHz signal from the test hybrid IN jack. ***Requirement 1:*** TS OPR lamp extinguishes. ***Requirement 2:*** The transmitting switch under test returns to normal.

STEP	PROCEDURE
47	At the jack strip in the transmitting switch control bay, remove the patch cord from the SW AMP IN jack to the hybrid OUT jack.
48	At the regular initiator of the line under test, remove the patch cord from the TST jack of the 290-kHz oscillator.
49	Remove the STE signal (282 kHz) from the hybrid IN jack.
50	Repeat Steps 3 through 49 for each transmitting switch under test.
51	At the jack strip in the transmitting switch control bay, reinsert the patch plugs as follows: • ***L3:*** SW FIL OUT to SW AMP IN jack • ***L4:*** LVL COM OUT to SW AMP IN or SW FIL OUT to SW AMP IN jack.
52	Have the receive end of the switching section under test unlock all associated switching sections.