

L3 AND L4 CARRIER
COMMON EQUIPMENT
J68820 AUTOMATIC LINE SWITCHING
TESTS
EXPANDOR AND TRIGGER CIRCUIT

The J68820M expander and trigger circuit (Fig. 1) is provided in both the regular and standby initiators. This circuit monitors the dc output voltage of the L3 7266-kHz regulator or the L4 pilot indicator circuit. If this dc output voltage deviates from a predetermined limit (+ or -), the expander and trigger circuit is activated.



Fig. 1—Expander and Trigger Circuit (J68820M)

The primary functions of the expander and trigger circuit are as follows:

- (a) **Regular initiator:** To determine almost instantaneously the need for a switch and, if a switch occurs, to help control the operations involved in making the switch.
- (b) **Standby initiator:** To determine the condition of the standby line on an instantaneous basis.

This section is reissued to add information in Chart 3 to clarify the test procedure when making bias adjustments. Arrows are used to indicate the additional information. **Equipment Test Lists are not affected.**

NOTICE

Not for use or disclosure outside the
Bell System except under written agreement

Caution: Before performing the following tests, notify the personnel at the distant end of the associated switching section.

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CHART 1

TUBE TESTS

APPARATUS

KS-14510 Volt-Ohm-Milliammeter (VOM)

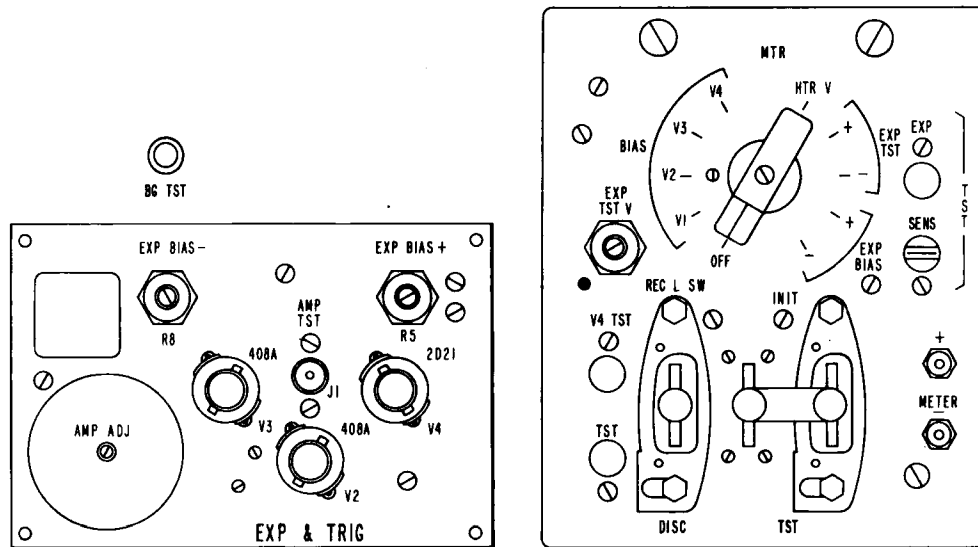
Note: No substitute should be used.

STEP	PROCEDURE
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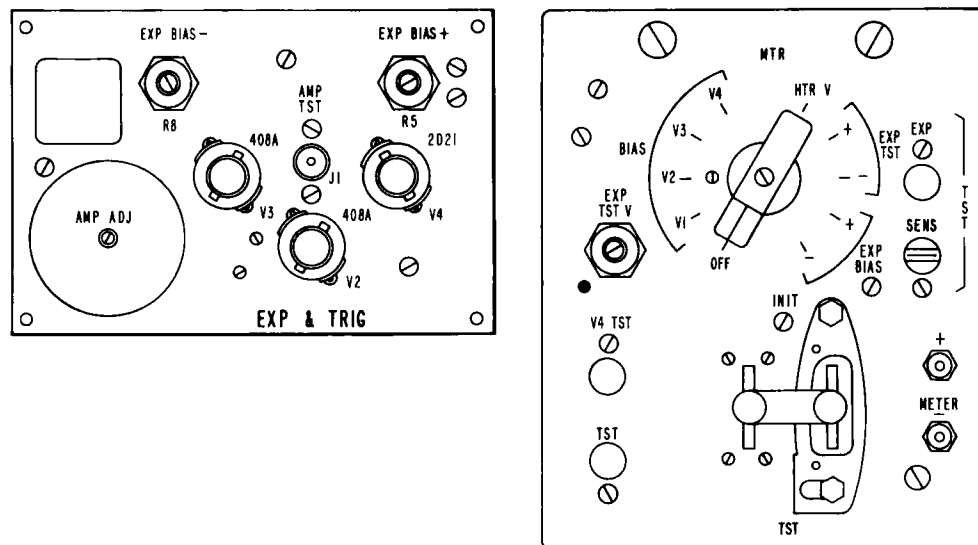
Heater Tests

- Set the selector switch on the VOM to the 0.3 DC VOLT position.
- Set the MTR selector switch of the initiator under test to the HTR V position (Fig. 2).
Note: A series resistor in the MTR circuit makes the full-scale reading equal to 30 volts.
- Connect the VOM to the test jacks designated METER + and -.
- Measure the heater voltage.
Requirement: Maximum: 20 volts
Minimum: 19.5 volts
- If the requirement of Step 4 is met, proceed to Step 9. If it is not met, resistor strapping may be incorrect. Proceed to Step 6.

Caution: Before attempting to change the strapping on the resistors, the switching system under test must be locked normal at the L3 miscellaneous bay or at the L4 control connecting bay.



(a) REGULAR INITIATOR



(b) STANDBY INITIATOR

Fig. 2—Part of Initiator Units Showing MTR Circuit and EXP & TRIG Circuit

CHART 1 (Cont)

- | STEP | PROCEDURE |
|------|---|
| 6 | At the rear of the switch control bay, remove the initiator cover. |
| 7 | Locate the resistors as follows:
(a) Regular initiator: Under tubes V6 and V7.
(b) Standby initiator: To the left of V6 and V7. |
| 8 | Add or remove straps on resistors R105 through R113 to meet the requirement of Step 4.

Note: Refer to SD-59464-02-7 for additional information.

Cathode Activity Test

Aged-Tube Test |
| 9 | With the VOM remaining in the 0.3 DC VOLT position, set the MTR switch and INIT key to the positions shown in Table A.

Note: A series resistor in the circuit under test makes the full-scale meter reading equal to 3 volts. |
| 10 | Measure the bias voltage (cathode activity) of V2 and V3.

Requirement (a): Aged tube without recorded value: The tube requirement is 80 percent of the new tube minimum requirement in Table A.

Requirement (b): Aged tube with recorded value: The tube requirement is equal to or greater than the associated recorded value. |
| 11 | If the requirement of Step 10 is met, proceed to Chart 2. If the requirement is not met, proceed to Step 12. |

TABLE A
EXPANDOR AND TRIGGER CATHODE ACTIVITY REQUIREMENTS

UNIT DESIGNATION	TEST JACK DESIGNATION	MTR SWITCH POSITION	INIT KEY POSITION	NEW TUBE MIN REQ
REG or STBY SW INIT	METER METER	V2 BIAS V3 BIAS	TST TST	1.0V 0.4V

CHART 1 (Cont)

STEP

PROCEDURE

Tube Replacement

Caution: Before attempting to replace a tube, the switching system under test must be locked normal at the L3 miscellaneous bay or at the L4 control connecting bay.

- 12 On the initiator under test, operate the INIT key to TST and the REC L SW key (regular initiator only) to DISC.

Requirement (a): TST lamp lights on metering panel.

Requirement (b): INIT TST lamp lights on the L3 miscellaneous bay or the L4 control connecting bay.

- 13 Replace the aged tube.

Caution: Allow sufficient time for the tube to reach a stable operating temperature.

- 14 Place the INIT key and REC L SW key in a normal condition.

- 15 Unlock the switching section.

New Tube Test

- 16 Measure the bias voltage (cathode activity) of V2 and V3.

Requirement: Minimum value as shown in Table A.

- 17 If the requirement of Step 16 is met, leave the tube in service for two days and remeasure the voltage.

Requirement: Same minimum requirement as shown in Table A.

- 18 Temporarily record the value measured in Step 16.

- 19 Multiply the recorded value of Step 18 by 80 percent and permanently record the calculated voltage.

Note: This is the minimum voltage requirement used when the tube is tested at a later date.

CHART 2

MEASUREMENT OF GATING LOSS

The expander unit contains two crystal diodes which form a gate circuit for the output of the switching signal oscillator. When these diodes are in a nonconducting state, a very minute amount of power will leak by the diodes and will pass on to the next stage. This leakage should not exceed a certain level as it will affect the operation of the circuit.

APPARATUS

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

Receiving Test Equipment capable of detecting, from 75-ohm circuits, signals between 200 kHz and 300 kHz at a level from zero to -70 dBm.

In addition, the following are required:

11B Attenuator (30 dB) or equivalent

P2BJ Cord

STEP	PROCEDURE
1	Prepare the RTE (receiving test equipment) for a bridging measurement at the frequency and level shown in Table B.
2	On the initiator under test, operate the INIT key to TST and the REC L SW key (regular initiator only) to DISC. Requirement (a): TST lamp lights on metering panel. Requirement (b): INIT TST lamp lights on the L3 miscellaneous bay or the L4 control connecting bay.
3	Connect the 11B attenuator to the AMP TST jack on the associated EXP & TRIG panel (Fig. 3).
4	Connect the RTE to the 11B attenuator [patch (1), Fig. 3].
5	Turn the AMP ADJ control (Fig. 3) until a maximum reading on the RTE is observed. Requirement: No greater than -70 dBm (-69 dBm is unsatisfactory).
	Note: Requirement includes 11B attenuator (30 dB).

TABLE B
EXPANDOR AND TRIGGER CIRCUIT TEST REQUIREMENTS

GROUP	EXPANDOR AND TRIGGER LOCATION	TEST JACK DESIGNATION	FREQ (KHZ)	LEVEL* (DBM)
A	Standby Initiator	AMP TST	290	-70
A,AA,AB	1st Regular Initiator	AMP TST	290	-70
A,AA,AB	2nd Regular Initiator	AMP TST	288	-70
A,AA,AB	3rd Regular Initiator	AMP TST	286	-70
A,AA,AB†	4th Regular Initiator	AMP TST	284	-70

* Level includes 11B attenuator (30 dB).

† 11-foot 6-inch bay only

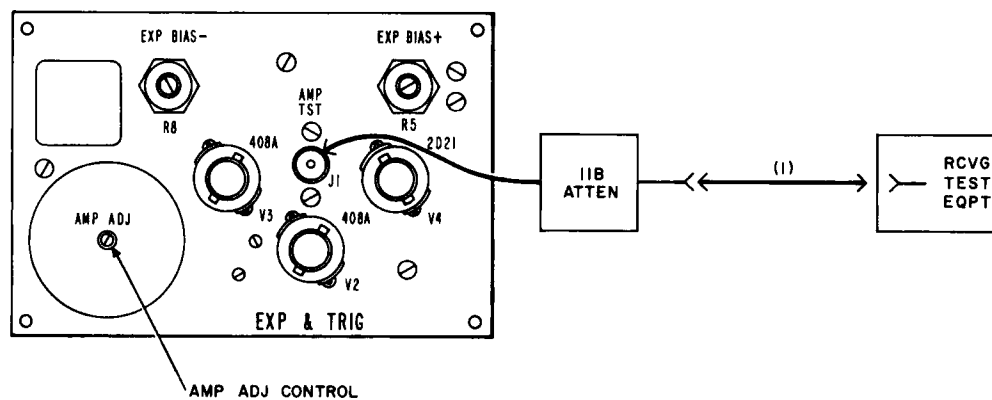


Fig. 3—Patching Arrangement to Measure Diode Linkage

CHART 2 (Cont)

STEP	PROCEDURE
6	If the requirement of Step 5 cannot be met, the diodes in the expander circuit may be defective or are not biased to cutoff. Perform the bias test as prescribed in Chart 3 of this section. Upon completion, repeat Steps 1 through 5 in this chart.
7	When the requirement of Step 5 is met, restore the REC L SW key and the INIT keys to their normal positions.

CHART 3

BIAS ADJUSTMENT

This test consists of applying first a positive test voltage and then a negative test voltage to the expander and trigger circuit by using the MTR test panel. The test circuit arrangement is shown in Fig. 4. With switches S5 and S7 operated, the positive or negative voltage from the test circuit is applied to the expander and trigger circuit by pressing S8. The EXP BIAS- control or the EXP BIAS+ control on the expander and trigger circuit can be adjusted to meet the test requirements.

STEP	PROCEDURE
	Caution (a): If a failure occurs on an associated line during a test in this chart, discontinue the test and restore the INIT keys and REC L SW key (if used) to their normal positions. Caution (b): When a standby initiator is under test, the switching system under test must be locked normal at the L3 miscellaneous bay or at the L4 control connecting bay.
1	On the initiator under test, operate the INIT key to TST and the REC L SW key (regular initiator only) to DISC. Requirement (a): TST lamp lights on metering panel. Requirement (b): INIT TST lamp lights on the L3 miscellaneous bay or the L4 control connecting bay.
2	Ensure that the gas tubes V6 and V7 in the initiator under test are fired. Note (a): These tubes are located under the rear cover of the initiator under test. Note (b): A small scratch may be made through the black coating to allow a visual inspection.

CHART 3 (Cont)

STEP

PROCEDURE

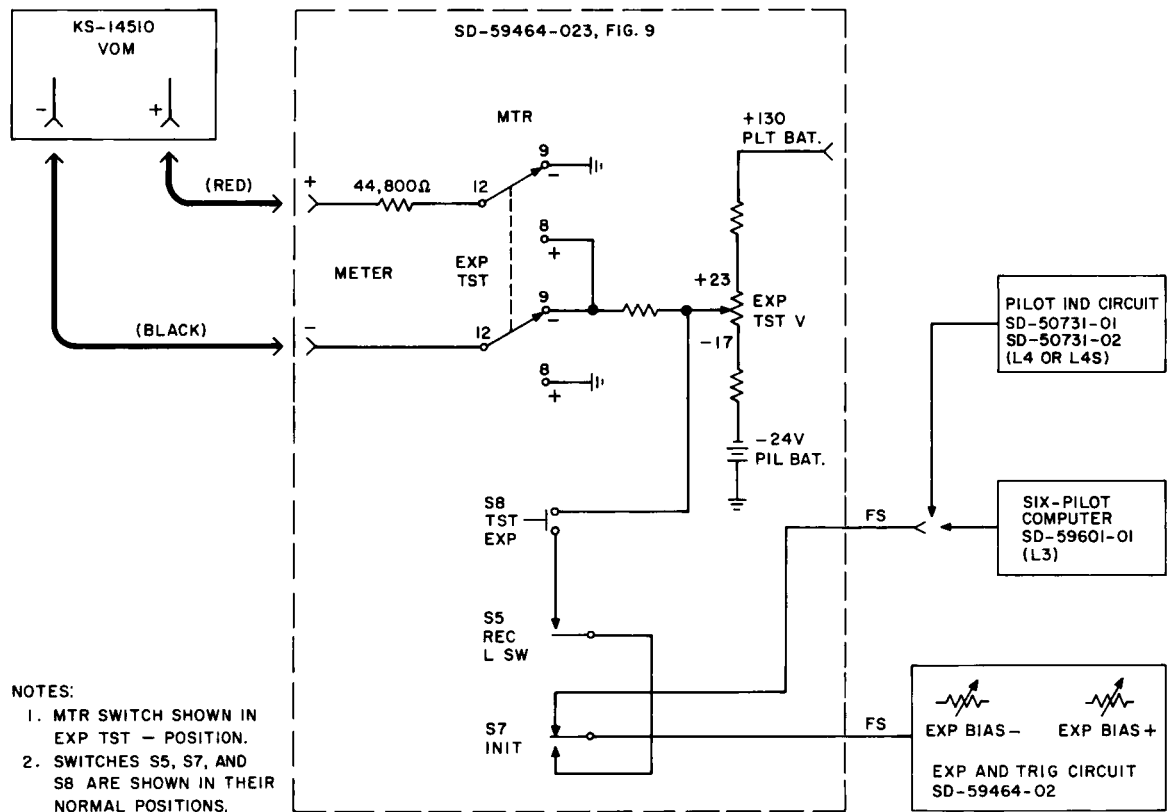


Fig. 4—Calibration Circuit for Adjusting Expander and Trigger Circuit

- 3 If the tubes are not fired, interchange or replace the tubes.
- 4 Set the selector switch on the VOM to the 0.3 DC VOLT position.
- 5 Connect the VOM leads to the METER jacks on the initiator unit under test (Fig. 4).

Note: A resistor in series with the MTR switch makes the VOM full-scale reading equal to 30 volts.

CHART 3 (Cont)

STEP	PROCEDURE
Positive Bias Adjustment	
6	Insert a dummy plug into the initiator BG TST jack (regular initiators only) for all arrangements except 2-line.
7	Operate the MTR switch to the EXP TST+ position (Fig. 4).
8	Rotate the EXP BIAS+ control on the initiator under test to the maximum clockwise position.
9	On the MTR panel, depress and hold the TST EXP key. Note: An initial reverse meter reading may be caused by a previous adjustment of the EXP TST V potentiometer. Do not reverse the meter leads. A correct adjustment will give an on-scale meter reading.
10	Adjust the EXP TST V control (MTR panel) while observing the VOM. Requirement: 17 volts
11	Release the TST EXP key.
12	Operate the MTR switch to the BIAS V4 position. Note: The VOM will now read up to 3 volts. Caution: When performing Steps 14 and 15, the meter reading will tend to jump suddenly to a midscale reading.
13	Depress and hold the V4 TST and TST EXP keys.
14	Rotate the EXP BIAS+ control counterclockwise very slowly until the meter pointer starts to move; then stop rotation.
15	Read the VOM. Requirement: A steady reading of not less than 1 volt.
16	Release the V4 TST and TST EXP keys.
17	If a regular initiator was tested, operate the LO relay momentarily to release the circuit.
18	Operate the MTR switch to the EXP TST+ position. Note: The VOM will now read 30 volt scale.
19	Depress and hold the TST EXP key.

CHART 3 (Cont)

STEP**PROCEDURE**

Note: If circuit has reoperated, operate the LO relay momentarily to release the circuit.

- 20 Adjust the EXP TST V control while observing the VOM.

Requirement: 16 volts

- 21 Release the TST EXP key and remove the dummy plug from the BG TST jack, if used.

- 22 Operate the MTR switch to the BIAS V4 position.

Note: The VOM will now read up to 3 volts.

- 23 Depress the V4 TST and TST EXP keys and read the VOM.

Requirement: 0 volts (V4 is nonconducting).

- 24 If the requirement of Step 23 is not met, repeat Steps 6 through 23.

Negative Bias Adjustment

- 25 Insert a dummy plug into the initiator BG TST jack (regular initiators only) for all arrangements except 2-line.

- 26 Operate the MTR switch to the EXP TST- position (Fig. 4).

- 27 Rotate the EXP BIAS- control to the maximum clockwise position.

Note: The VOM will now read up to 30 volts.

- 28 Depress and hold the TST EXP key.

- 29 Adjust the EXP TST V control while observing the VOM.

Requirement: 12 volts

- 30 Release the TST EXP key.

- 31 Operate the MTR switch to the BIAS V4 position.

Note: The VOM will now read up to 3 volts.

Caution (a): When performing Steps 33 and 34, the meter reading will tend to jump suddenly to a midscale reading.

Caution (b): If a standby initiator is under test, read the meter and release the keys immediately. If held, relay chatter may occur.

CHART 3 (Cont)

STEP	PROCEDURE
32	Depress and hold the V4 TST and TST EXP keys.
33	Rotate the EXP BIAS- control counterclockwise very slowly until the meter pointer starts to move; then stop rotation.
34	Read the VOM. Requirement: A steady reading of not less than 1 volt
35	Release the V4 TST and TST EXP keys.
36	If a regular initiator was tested, operate the LO relay momentarily to release the circuit.
37	Operate the MTR switch to the EXP TST- position. Note: The VOM will now read up to 30 volts.
38	Depress and hold the TST EXP key. Note: If circuit has reoperated, operate the LO relay momentarily to release the circuit.
39	Adjust the EXP TST V control while observing the VOM. Requirement: 11 volts
40	Release the TST EXP key and remove the dummy plug from the BG TST jack if used.
41	Operate the MTR switch to the BIAS V4 position. Note: The VOM will now read up to 3 volts.
42	Depress the V4 TST and TST EXP keys and read the VOM. Requirement: 0 volts (V4 is nonconducting).
43	If the requirement of Step 42 is not met, repeat Steps 25 through 42.
44	Restore the REC L SW key (regular initiator) and INIT key to their normal positions. Requirement: As soon as the associated lamps are extinguished, the switching circuit is normal.