

**J1H011A SWITCH UNIT**  
**MANUAL TESTS**  
**NO. 101 ELECTRONIC SWITCHING SYSTEM**

**1. GENERAL**

**1.01** This section describes methods for manually testing the duplicated portions of the transfer and alarms circuit. Also tested is the ability of the switch unit to transmit alarm messages to the control unit in the event of equipment failure. Other tests check the features that function in the event of a total power failure.

**1.02** This section is reissued to change Tests A, B, and C.

**1.03** The tests covered are:

**A. Diode Cards:** This test checks the battery feed diodes that supply battery to clock circuit 1, scanner circuits 1 and 2, and the fuse alarm circuit within the transfer and alarms circuit. All relay contact protection diodes are also tested.

**B. Scanner Power Path:** This test checks the operation of the parallel gating paths that supply power to both scanner circuits. (Test A checks the battery feed diode portion of this circuit.)

**C. Clock Disabling:** This test checks the operation of the parallel gating paths that supply power to clock circuit 1. (Test A checks the diode battery feed portion of this circuit.)

**D. Power Failure Detector:** This test checks the operation of the power failure detectors for the 12, 24, 48, and ac voltages. It also checks that a failure of any one of the four voltages will remove battery from the scanner circuits.

**E. Attendant Transfer:** This test checks the operation of the redundant paths used to initiate a transfer of the attendant consoles from one data distributor circuit to the other.

**F. Fuse Alarm Scan Point:** This test checks that scan point 266 is wetted whenever the 12-, 24-, or 48-volt battery alarm bus is activated.

**G. Attendant Multiple Time Slot Scan Point:** This test checks that scan points 260 and 261 are wetted if the attendant message should occupy more than one time slot in bus 1 or bus 2, respectively.

**H. Ringing Voltage Scan Point:** This test checks that scan point 268 is wetted in the absence of ringing voltage.

**I. Ringing Sync Signal Scan Point:** This test checks that scan point 268 is wetted in the absence of the 12.5-kc ringing sync signal derived from the switch store binary counter. It also checks that both ringing sync signal amplifiers are working.

**J. Parity Failure Scan Point:** This test checks that scan point 264 is wetted when a bad parity message is simulated in the data distributor circuit.

**K. Station Line Transfer Circuit:** This test checks that in the event of a total power failure, certain station lines are connected to central office trunks for emergency service. Also, a check is made to confirm the operation of the power failure relay via digit trunk 3.

**Caution:** Call completion will be denied during the performance of Tests D and K. A partial disruption of service may occur during Tests E, F, G, H, I, and J. Therefore, local instructions should be observed while performing these tests.

**1.04** Tests A through G, J, and K check parts of the transfer and alarms circuit. Tests H and I check parts of the ringing generator circuit.

1.05 All tests require that the control unit be notified of impending tests and a request made for an inhibit of the switch unit maintenance program.

*Caution: While the switch unit maintenance program is inhibited, the detection of equipment failures by test line messages is not possible. Therefore, it is important that the maintenance program be enabled immediately upon completion of these tests.*

1.06 In all tests, references to tray locations are in bay 2 unless otherwise specified.

1.07 **Lettered Steps:** A letter a, b, c, etc., added to a step number in Part 4 of this section, indicates an action which may or may not be required depending on test conditions. 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 condition are designated by the same letter within a test. Where a condition does not apply, all steps designated by that letter should be omitted.

**2. APPARATUS**

**Tests A and B**

2.01 KS-14510, List 2 meter leads equipped with test pick ends.

2.02 Three 737A tools (test leads with pin clutch on each end).

**Tests A, B, D, and E**

2.03 KS-14510 volt-ohm-milliammeter.

**Tests A, C, E, and I**

2.04 731A (key, extractor) tool (for CP removal).

**3. PREPARATION**

STEP	ACTION	VERIFICATION
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**All Tests**

1	Request a control unit print-in to inhibit maintenance program to this switch unit.	
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**Tests B and D**

2.05 Blocking and insulating tools for wire spring relays. Use tools and apply as covered in Section 069-020-801.

**Tests D and E**

2.06 KS-14510, List 3 meter leads equipped with alligator ends.

**Tests D, E, G, H, and J**

2.07 Three 735A tools (test leads with test point contact spring on each end).

**Test F**

2.08 736A tool (test lead with pin clutch on one end, bare at other end).

2.09 Test cord, W1AF, 8 feet 6 inches long equipped with two 360A tools, one KS-6278 connecting clip, and one 411A (test pick) tool (for use in connecting battery to alarm terminal of 70-type fuses).

*Note:* The W1AF test cord provides a protective resistance of 188 ohms. To apply test battery to the alarm terminal of a 70-type fuse (from the front of the equipment and without dismounting the fuse cap), connect the test battery to the KS-6278 connecting clip via the 736A test probe, then carefully insert the 411A tool alongside the colored bead of the fuse to a point where contact is made with the alarm surface of the fuse cap.

**Test K**

2.10 Handset (dial hand test set) equipped with connecting clips.

2.11 Cord equipped with connecting clips (for grounding handset).

STEP	ACTION	VERIFICATION
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## Tests A and B

- |   |   |                               |
|---|---|-------------------------------|
| 2 | Using KS-14510 meter on 12-volt dc scale —<br>Measure dc voltages to ground at following locations: | Meter reads 12 volts nominal. |
|   | Terminal 2 at 13C2  |                               |
|   | Terminal 4 at 13C2  |                               |
|   | Terminal 2 at 13C5  |                               |
|   | Terminal 4 at 13C5  |                               |

## 4. METHOD

STEP	ACTION	VERIFICATION
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## A. Diode Cards

- |     |  |   |
|-----|--|---|
| → 3 | Using KS-14510 meter on 12-ma scale —<br>Connect positive meter lead to terminal 4 at 13C2, negative lead to terminal B1 at TB13 (bay 2).  | Meter reads between 5 and 12 ma.  |
|     | <i>Caution: Make certain the meter leads are secure. If the meter bridges an open diode and the parallel diode is removed, the meter is required to carry the current for clock circuit 1.</i> |   |
| → 4 | Remove CP286 at 13C17.   | Meter reads between 5 and 12 ma.  |
| 5   | Remove meter connections.  |   |
| 6   | Using meter on X10 resistance scale —<br>Measure resistance of all diodes on CP286 in both directions.   | Meter reads more than 10,000 ohms in one direction and less than 200 ohms in the other. |
| 7   | Replace CP286 in 13C17.  |   |
| → 8 | Using meter on 12-ma scale —<br>Connect positive meter lead to terminal 4 at 13C5, negative meter lead to terminal B1 at TB13 (bay 2).   | Meter reads between 5 and 12 ma.  |
| → 9 | Remove CP286 at 13C23.   | Meter reads between 5 and 12 ma.  |
| 10  | Remove meter connections.  |   |
| 11  | Using meter on X10 resistance scale —<br>Measure resistance of all diodes on CP286 in both directions.   | Meter reads more than 10,000 ohms in one direction and less than 200 ohms in the other. |
| 12  | Replace CP286 in 13C23.  |   |

STEP	ACTION	VERIFICATION
13a	If no further tests are to be made at this time — Request restoration of switch unit maintenance.	
<b>B. Scanner Power Path</b>		
↗ 3	Using meter on 12-ma scale — Connect positive meter lead to terminal 2 at 13C5, negative meter lead to terminal E6 at TB9 (bay 2).	Meter reads between 5 and 12 ma.
4	Disconnect (but do not remove) CP286 at 13C23.	Meter reads between 5 and 12 ma.
↘ 5	Manually open make contact 9 on SLR1 relay for as long as it takes to verify meter reading.	Meter reads between 5 and 12 ma.
6	Replace CP286 at 13C23.	
7	Disconnect (but do not remove) CP286 at 13C17.	
8	Move positive meter lead to terminal 2 at 13C2.	
→ 9	Manually open make contact 9 on SLR2 relay for as long as it takes to verify meter reading.	Meter reads between 5 and 12 ma.
10	Replace CP286 in 13C17.	
11a	If no further tests are to be made at this time — Request restoration of switch unit maintenance.	

### C. Clock Disabling

2	Disconnect (but do not remove) CP286 at 13C23.	
3	Observe that both clock circuits are functioning and that clock circuit 1 is on line.	On transfer and alarms circuit lamp module — CLKD1, CLKD2 lamps extinguished.
→ 4	On transfer and alarms circuit key module — Depress S6 key momentarily.	CLKD1 lamp lighted. At control unit — A TTY printout indicates scan point 265 went off-hook.
5	Replace CP286 in 13C23.	

STEP	ACTION	VERIFICATION
6	Disconnect (but do not remove) CP286 at 13C17.	CLKD1 lamp remains lighted.
7	Depress S7 key momentarily.	CLKD1 lamp extinguished.
8	Replace CP286 in 13C17.	
9a	If no further tests are to be made at this time — Request restoration of switch unit maintenance.	

#### D. Power Failure Detector

2	Using meter on 12-volt dc scale — Measure voltage on TP3 at 13C2 (CP267) to ground.	Meter reads 12 volts nominal.
3	Block operated DTR1, DTR2 relays.	
4	In bay 4 — Remove 90B fuse.	Meter reads 12 volts nominal.
5	Remove 91B fuse.	Meter reads less than 1 volt.
6	Replace 90B fuse.	Meter reads 12 volts nominal.
7	Replace 91B fuse.	Meter reads 12 volts nominal.
8	Move meter to TP3 at 13C5.	Meter reads 12 volts nominal.
9	Repeat Steps 4, 5, 6, 7.	Same as Steps 4, 5, 6, 7, respectively.
10	Remove 59B and 60B fuses.	Meter reads less than 1 volt.
11	Replace 59B and 60B fuses.	Meter reads 12 volts nominal.
12	Remove 34B and 35B fuses.	Meter reads less than 1 volt.
13	Replace 34B and 35B fuses.	Meter reads 12 volts nominal.
14	On ringing generator circuit — Remove F2 fuse (PWR FAIL DET, right).	Meter reads 12 volts nominal.
15	Remove F3 fuse (PWR FAIL DET, left).	Meter reads less than 1 volt.
16	Replace F2 fuse (PWR FAIL DET, right).	Meter reads 12 volts nominal.
17	Replace F3 fuse (PWR FAIL DET, left).	
18	Remove meter from circuit.	
19	Remove blocks from DTR1, DTR2 relays.	

STEP	ACTION	VERIFICATION
20a	If no further tests are to be performed at this time — Request restoration of switch unit maintenance.	
<b>E. Attendant Transfer</b>		
2	Observe that the attendant circuit is connected to data distributor circuit 1.	ATDD1 lamp is lighted.
3	Using meter on 12-volt dc scale — Measure dc voltage, to ground, on TP1 at 17A14 (CP74).  <i>Note:</i> Maintain meter connections for remainder of this test.	Meter reads more than 0 but less than 1 volt.
4	Disconnect (but do not remove) CP90 at 17A17.	Meter remains at less than 1 volt.
→ 5	On transfer and alarms circuit key module — Depress S9 key momentarily.	ATDD1 lamp extinguished. ATDD2 lamp lighted. Meter jumps to an approximate midscale reading, then drops to less than 1 volt.
6	Manually open make contact 6 on ATR1 relay for as long as it takes to verify.	ATDD2 lamp remains lighted.
7	Repeat Step 6 for make contact 8.	Same as Step 6.
8	Replace CP90 at 17A17.	
9	Connect ground to TP5 at 17A14 (CP74).	Meter remains at less than 1 volt.
→ 10	Depress S8 key momentarily.	ATDD2 lamp extinguished. ATDD1 lamp lighted. Meter jumps to an approximate midscale reading, then drops to less than 1 volt.
11	Remove ground on TP5 at 17A14.	
12	Remove meter from circuit.	
13a	If no further tests are to be performed at this time — Request restoration of switch unit maintenance.	

#### F. Fuse Alarm Scan Point

2	In bay 1 — Using W1AF cord and 736A tool — Connect clip end of cord to terminal C1 at TB37 (+12 volts).	
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STEP	ACTION	VERIFICATION
3	In bay 3 — Touch test pick end of cord to alarm surface of fuse cap of fuse number 1A momentarily.	On transfer and alarms circuit lamp module — FA1 lamp lighted. At control unit — TTY printout indicates scan point 266 went off-hook.
4	Repeat Steps 2, 3 according to connections listed in Table A.	Tests on bay 3 fuses light FA1 lamp; Bay 4 fuses light FA2 lamp. At control unit — For each alarm, a TTY printout indicates scan point 266 went off-hook.

TABLE A

TERMINAL BLOCK (TB-) LOCATION FOR TEST CLIP	FUSE NO. FOR TEST PICK	FUSED POTENTIAL
Terminal A8 at TB42 (bay 1)	49A (bay 3)	+24
Terminal C15 at TB42 (bay 1)	73A (bay 3)	-48
Terminal F1 at TB37 (bay 2)	1B (bay 4)	+12
Terminal H8 at TB42 (bay 2)	49B (bay 4)	+24
Terminal F15 at TB42 (bay 2)	73B (bay 4)	-48

5	Request print-in at control unit to change on-line scanner circuit.	S1, S2 lamps exchange states.
6	Repeat Steps 2, 3.	Same as Steps 2, 3.
7	Remove test cord from circuit.	
8	Request print-in at control unit to restore scanner status.	S1, S2 lamps exchange states.
9a	If no further tests are to be performed at this time — Request restoration of switch unit maintenance.	

#### G. Attendant Multiple Time Slot Scan Point

*Note:* This test may cause the removal of a line from service by the control unit. Should this occur, return the line to service via a TTY print-in.

2	In bay 2 — Ground TP3 at 25C5.	
3	In bay 3 — Ground, for approximately 3 seconds, TP5 at 30D16.	At control unit — TTY printout indicates scan point 260 went off-hook.

SECTION 240-226-501

STEP	ACTION	VERIFICATION
4	In bay 2 — Remove ground from TP3 at 25C5.	
5a	If console 2 is furnished — In bay 2 — Ground TP3 at 25C11.	
6a	In bay 3 — Ground, for approximately 3 seconds, TP2 at 30D16.	At control unit — TTY printout indicates scan point 260 went off-hook.
7a	In bay 2 — Remove ground from TP3 at 25C11.	
8b	If console 3 is furnished — In bay 2 — Ground TP3 at 25C17.	
9b	In bay 3 — Ground, for approximately 3 seconds, TP3 at 30D16.	At control unit — TTY printout indicates scan point 260 went off-hook.
10b	In bay 2 — Remove ground from TP3 at 25C17.	
11	In bay 2 — Ground TP1 at 25C5.	
12	In bay 4 — Ground, for approximately 3 seconds, TP5 at 30A10.	At control unit — TTY printout indicates scan point 261 went off-hook.
13	In bay 2 — Remove ground from TP1 at 25C5.	
14a	In bay 2 — Ground TP1 at 25C11.	
15a	In bay 4 — Ground, for approximately 3 seconds, TP2 at 30A10.	At control unit — TTY printout indicates scan point 261 went off-hook.
16a	In bay 2 — Remove ground from TP1 at 25C11.	
17b	In bay 2 — Ground TP1 at 25C17.	
18b	In bay 4 — Ground, for approximately 3 seconds, TP3 at 30A10.	At control unit — TTY printout indicates scan point 261 went off-hook.
19b	In bay 2 — Remove ground from TP1 at 25C17.	

STEP	ACTION	VERIFICATION
20	Request control unit to change on-line scanner circuit.	On transfer and alarms circuit — S1, S2 lamps exchange states.
21	Repeat Steps 2, 3.	Same as Steps 2, 3.
22	In bay 2 — Move ground from TP3 at 25C5 to TP1 at 25C5.	
23	In bay 4 — Ground, for approximately 3 seconds, TP5 at 30A10.	At control unit — TTY printout indicates scan point 261 went off-hook.
24	Remove ground from TP1 at 25C5.	
25	Request control unit print-in to restore scanner status.	S1, S2 lamps exchange states.
26c	If no further tests are to be performed at this time — Request restoration of switch unit maintenance.	

#### H. Ringing Voltage Scan Point

2	In bay 2 — Ground TP4 at 13D2 (CP288) for about 5 seconds.	At control unit — TTY printout indicates scan point 268 went off-hook.
	<i>Note:</i> An arc may be drawn at moment of contact.	
3	Request control unit print-in to place off-line scanner circuit on line.	On transfer and alarms circuit lamp module — S1, S2 lamps exchange states.
4	Repeat Step 2.	Same as Step 2.
5	Request control unit print-in to restore scanner status.	
6a	If no further tests are to be performed at this time — Request restoration of switch unit maintenance.	

#### I. Ringing Sync Scan Point

2	In bay 4 — Disconnect (but do not remove) CP289 at 14D12 and 14D17, momentarily.	At control unit — TTY printout indicates scan point 268 went off-hook.
	<i>Note:</i> These removals must be made in such a way that both cards are briefly removed at the same time.	

STEP	ACTION	VERIFICATION
3	Replace both CP289s.	
4	Request control unit print-in to change on-line scanner circuit.	On transfer and alarms circuit lamp module — S1, S2 lamps exchange states.
5	Repeat Steps 2, 3.	Same as Steps 2, 3.
6	Disconnect (but do not remove) CP289 at 14D12.	At control unit — TTY does not print out scan point 268.
7	Replace CP289 at 14D12.	
8	Disconnect (but do not remove) CP289 at 14D17.	Same as Step 6.
9	Replace CP289 at 14D17.	
10	Request control unit print-in to restore scanner status.	
11a	If no further tests are to be performed at this time — Request restoration of switch unit maintenance.	

#### J. Parity Failure Scan Point

2	Request control unit print-in to inhibit print-out flood control.	
3	Request control unit print-in to remove bus 1 from service.	
	<i>Note:</i> The bus must remain powered.	
4	In bay 1 — Connect following test points to ground: TP2 at 33A5 (CP87) TP6 at 33B14 (CP157) TP1 at 33B14 (CP157)	At control unit — TTY printout indicates scan point 264 went off-hook.
5	Remove grounds made in Step 4.	
6	Request control unit print-in to restore bus 1 to service.	
7	Request control unit print-in to remove bus 2 from service.	
	<i>Note:</i> The bus must remain powered.	

STEP	ACTION	VERIFICATION
8	In bay 2 — Connect following test points to ground:  TP2 at 33A5 (CP87) TP6 at 33B14 (CP157) TP1 at 33B14 (CP157)	At control unit — TTY printout indicates scan point 264 went off-hook.
9	Remove grounds made in Step 8.	
10	Request control unit print-in to change on-line scanner circuit.	S1, S2 lamps exchange states.
11	Repeat Steps 8, 9.	Same as Steps 8, 9.
12	Request control unit print-in to restore bus 2 to service.	SS1, SS2 lamps extinguished.
13	Request control unit print-in to restore scanner status.	S1, S2 lamps exchange states.
14	Request control unit print-in to enable print-out flood control.	
15a	If no further tests are to be performed at this time — Request restoration of switch unit maintenance.	
<b>K. Station Line Transfer Circuit</b>		
→ 2	On ringing generator — Remove F2, F3 fuses (PWR FAIL DET).	In transfer and alarms circuit — DTR1, DTR2, SLR1, SLR2 relays release. At control unit — Major alarm sounds after approximately 2 minutes. TTY printout indicates total power failure. In control unit data link transfer circuit — PF- relay operates.
3	Operate handset key to MON.	
4	After waiting approximately 40 seconds — In cross-connecting terminal box — Connect handset to tip, ring terminals designated A.	
5	Operate handset key to TALK.	
6	Connect ground to one side of the handset momentarily.	Central office dial tone heard.
7	Operate handset key to MON.	
8	Disconnect handset.	

SECTION 240-226-501

STEP	ACTION	VERIFICATION
9	Connect handset to tip, ring terminals designated B.	
10	Repeat Steps 5, 6, 7, 8.	Same as Steps 5, 6, 7, 8.
11	Connect handset to tip, ring terminals designated C.	
12	Repeat Steps 5, 6, 7, 8.	Same as Steps 5, 6, 7, 8.
13	Connect handset to tip, ring terminals designated D.	
14	Repeat Steps 5, 6, 7, 8.	Same as Steps 5, 6, 7, 8.
15	Connect handset to tip, ring terminals designated E.	
16	Repeat Steps 5, 6, 7, 8.	Same as Steps 5, 6, 7, 8.
17	Connect handset to tip, ring terminals designated F.	
18	Repeat Steps 5, 6, 7, 8.	Same as Steps 5, 6, 7, 8.
19a	When one or more 229B key telephone units are supplied to provide extra emergency station line transfers to central office trunks — On 229B KTU terminal punching — Connect handset to tip, ring punchings 11, 12.	
20a	Repeat Steps 5, 6, 7, 8.	Same as Steps 5, 6, 7, 8.
21a	Repeat Steps 19a, 20a for each pair of tip, ring punchings as follows:  Punchings 15, 16 Punchings 19, 20	Same as Steps 19a, 20a.
22a	Repeat Steps 19a through 21a for other 229 KTUs.	Same as Steps 19a through 21a.
23	On ringing generator — Replace F2, F3 fuses (PWR FAIL DET).	In transfer and alarms circuit — DTR1, DTR2, SLR1, SLR2 relays operate. At control unit data link transfer circuit — PF- relay releases.
24	Request restoration of switch unit maintenance.	