1. GENERAL

1.01 This section describes a method of testing transverter connectors in No. 5 crossbar offices arranged for CAMA.

1.02 This section is reissued for the following reasons:

(a) To include test procedures required when the No. 5 Crossbar office is arranged with the Electronic Translation System (ETS) and the CAMA feature is provided.

(b) To make minor changes as required.

Revision arrows are used to emphasize the more significant changes.

This reissue does not affect Equipment Tests Lists.

1.03 The tests covered are:

A. Transverter Preference and Lockout Feature—CB Relay Chain: This test checks that selection of transverters in each transverter preference chain is made in the order of preference. It also checks that transverter preference is changed on alternate tests.

B. Transverter Preference and Lockout Feature—TS Relay Chain: This test checks that all transverter connectors have access to one transverter and that only one transverter connector at a time is connected to this transverter.

C. Sender Preference and Lockout Feature: This test checks the order of preference of the SS relays and that only one sender at a time is served by the transverter connector. It also checks the continuity of the TM lead between the sender and transverter connector control relays.

D. Transverter Busy to Transverter Connector: This test checks that the transverter is made busy to the transverter connector from the master test frame. It also checks the locking circuit of the CB relays.

E. Timeout Features: This test checks that the TRS timer operates in approximately 1 second to transfer the start lead if a transverter is not connected within that time. It also checks that the TM overall timer operates and brings in an alarm in 5 to 10 seconds if the transverter connector fails to seize a transverter.

F. False Ground Feature: This test checks that, if a ground appears on the PRL, RL, ROP, TRI, or TR leads while the transverter connector is normal, a major alarm sounds. It also checks that the false ground detection feature is disabled whenever the connector is seized.

G. Second Trial Features: This test checks that a trouble release signal during first trial will cause the transverter connector to advance to the
next transverter and give this transverter a second trial indication.

1.04 All tests require that all senders serving the transverter connector under test be made busy. Tests B, D, F, and G require that transverters be made busy.

1.05 Lettered Steps: A letter a, b, c, etc, added to step number in Parts 3 and 4 of this section indicates an action which may or may not be required depending on local conditions. This condition under which a lettered step or a 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.

1.06 The manner of selecting some circuits and test conditions at the master test frame (MTF) and its associated circuits varies depending on the apparatus options furnished with these circuits. Therefore, where variable means of selection are provided, precise instructions for the selection of circuits and test conditions are not given. Precise instructions for the use of these variable means are given in Section 218-106-301.

1.07 The location statement, At MTF—, is used to refer to all apparatus located on the four basic bays of the MTF.

2. APPARATUS

2.01 The apparatus required for each test is listed in Table A. The details of each item are covered in the paragraph indicated by the number in parentheses.

2.02 67C test set or equivalent, equipped with one KS-6278 connecting clip (for checking the presence or absence of battery or ground).

2.03 Testing cord, 893 cord, 6 feet long, equipped with two 360A tools (1W13B cord), one KS-6278 connecting clip, and one 419A (test connector) tool (for establishing ground test connections).

2.04 Testing cord, 893 cord, 6 feet long, equipped with two 360A tools (1W13B cord), one KS-6278 connecting clip, and one 624A tool (for connecting to winding terminals of wire-spring-type relays).

2.05 Testing cord, 893 cord, 6 feet long, equipped with two 360A tools (1W13B cord), one KS-6278 connecting clip, and one 639A (relay contact connector) tool and one 651D (relay contact connector holder) tool (for connecting to relay springs of wire-spring-type relays).

2.06 Patching cord, P3D cord, 9 inches long, equipped with two 309 plugs (3P3D cord) (for patching the TRR-AR jack and RC-AR-SP jack at the MTF).

2.07 Blocking and insulating tools as required. Use tools and apply as covered in Section 069-020-801.
3. PREPARATION

Test B

3.01 If the SP jacks of the transverter connector frame have been cross-connected to the RC-AR-SP jack of the MTF, the minor alarm may be restored by remote control instead of by operating the TRR-AR key at the MTF. Using the P3D cord, patch the TRR-AR jack to the RC-AR-SP jack on the MTF. To restore the alarm, momentarily insert a 349A plug into the SP jack associated with the frame at which the test is being made.

3. PREPARATION (CONT)

STEP ACTION VERIFICATION

Tests A, C, E, F, G

Note: Refer to paragraphs 1.06 and 1.07.

1 At MTF—
Insert make-busy plugs into SMB_ jacks for all senders served by transverter connector under test.

Note: Wait approximately 1 minute for senders to become idle.

Tests B, E, F

2a If alarm transfer is provided—
Operate alarm transfer key to NTR.

3a Momentarily operate RS key.

TR lamp lighted.

TR lamp extinguished.

4. METHOD

STEP ACTION VERIFICATION

A. Transverter Preference and Lockout Feature—CB_ Relay Chain

2 At transverter connector under test—
Manually release W relay if operated.

3 Block nonoperated Z, TRS, all TS_, all CB_ relays.

4 Connect battery to 4F of Z relay.

First preferred TS_ relay associated with STA lead energized.

5 Block operated CB_ relay associated with first preferred TS_ relay.

First preferred TS_ relay not energized.
Next preferred TS_ relay energized.

6 Block operated CB_ relay associated with energized TS_ relay.

TS_ relay not energized.
Next preferred TS_ relay in chain energized.
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STEP ACTION

7 Repeat Step 6 until all CB_ relays are blocked operated.

8 Change battery connection from 4F to 2F of Z relay.

9 Block nonoperated all CB_ relays.

10 Block operated Z relay.

11 Block operated CB_ relay associated with first preferred TS_ relay.

12 Block operated CB_ relay associated with energized TS_ relay.

13 Repeat Step 12 until all CB_ relays are blocked operated.

14 Remove battery connection from 2F of Z relay.

15 Remove blocking tools from Z, TRS, all TS_, all CB_ relays.

16 At MTF—Remove make-busy plugs from SMB_ jacks.

B. Transverter Preference and Lockout Feature—TS_ Relay Chain

4 Insert make-busy plug into TVMB_ jack of any CAMA transverter or PCTV-C (Program Controlled Transverter for CAMA).

5 At MTF—Insert make-busy plug into TRMB TV_ jack of same CAMA or PCTV-C transverter.

6 Insert make-busy plugs into SMB_ jacks of all senders served by transverter connector having first preference in TS_ relay chain for transverter made busy.

Note: Allow approximately 1 minute for senders to become idle before proceeding to next step.

7 At transverter connector frame—Connect battery to lower winding terminal of TS_ relay having first preference for transverter made busy.

VERIFICATION

First preferred TS_ relay associated with STB lead energized.

First preferred TS_ relay not energized. Next preferred TS_ relay energized.

TS_ relay not energized. Next preferred TS_ relay in chain energized.

At transverter connector frame—CB_ relay associated with transverter made busy operated in all connectors.

TS_, TVA_, TVB_, TVC_, TVD_, TVE_, TVF _ relays operated.

CB_ relay released.
STEP | ACTION | VERIFICATION
--- | --- | ---
8 | At transverter connector having next preference in TS_ relay chain for transverter made busy—Connect battery to lower winding terminal of TS_ relay. |  
| | Note: Allow approximately 1 minute for senders to become idle before proceeding to next step. |  
| 9 | At MTF—Insert make-busy plugs into SMB_ jacks of senders served by next preferred transverter connector in TS_ relay chain. | TS_ relay remains nonoperated.  
| | Note: The operation of the TS_ relay for 2 to 4 seconds causes the transverter to time out and sound the minor alarm. If the TS_ relay is operated for 14 to 24 seconds, the major alarm sounds. After the TS_ relay is released, momentarily operate the TRR-AR key at the transverter frame to silence the major alarm. Momentarily operate the TRR-AR key at the MTF to silence the minor alarm or refer to paragraph 3.01. |  
| 10 | At transverter connector frame—Remove battery connection from more preferred TS_ relay. | TS_, TVA_, TVB_, TVC_, TVD_, TVE_, TVF_ relays released.  
| | CB_ relay operated.  
| | At transverter connector having next preference in TS_ relay chain—TS_, TVA_, TVB_, TVC_, TVD_, TVE_, TVF_ relays operated.  
| | CB_ relay released. |  
| 11 | At MTF—Remove make-busy plugs from SMB_ jacks of senders served by more preferred transverter connector in TS_ relay chain. | TS_ relay operated.  
| | TVA_, TVB_ relays remain released. |  
| 12 | At transverter connector frame—Reconnect battery to lower winding terminal of more preferred TS_ relay in chain. | TS_ relay released. |  
| 13 | Remove test connection from more preferred TS_ relay in chain. |  
| 14 | Repeat Steps 8 through 13 for all remaining TS_ relays in chain associated with transverter made busy. |  
| 15 | Remove test connection from TS_ relay tested last. |
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STEP  ACTION  VERIFICATION

16  At MTF—  Remove make-busy plugs from CAMA or  
PCTV-C● TVMB● CAMA TRMB TV● SMB●  
jacks.  

17  Repeat Steps 2 through 16 for each of remaining  
CAMA transverters to check the TS_ relay  
chains.  

18a  If alarm transfer is provided—  
Restore alarm transfer key to position prior  
to test.  

C. Sender Preference and Lockout Feature

At transverter connector under test—  
Manually release W relay if operated.  

At sender frame—  
At sender associated with lowest numbered  
SS_ relay of transverter connector under test—  
Block operated STT, LR relays.  

At sender frame—  
At sender associated with second lowest  
numbered SS_ relay of transverter connector  
under test—  
Block operated STT, LR relays.  

At sender associated with lowest numbered  
SS_ relay of transverter connector under test—  
Remove blocking tools from STT, LR relays.  

At sender frame—  
At sender associated with lowest numbered  
SS_ relay of transverter connector under test—  
Block operated STT, LR relays.  

At sender associated with third lowest numbered  
SS_ relay of transverter connector under test—  
Block operated STT, LR relays.  

At sender frame—  
At sender associated with lowest numbered  
SS_ relay of transverter connector under test—  
Block operated STT, LR relays.  

W, Z relays released if operated.  

Lowest numbered SS_ relay operated.  
SA●, SB●, SC●, SD●, SE●, SF_ relays associated  
with lowest numbered SS_ relay operated.  
At transverter connector under test—  
TM relay energized.  

SS_ relay associated with this sender operated.  

Lowest numbered SS_ relay, SA●, SB●, SC●, SD●,  
SE●, SF_ relays released.  
Next highest numbered SS_ relay, SA●, SB●, SC●, SD●,  
SE●, SF_ relays operated.  
At transverter connector under test—  
TM relay remains energized.  

SS_ relay associated with this sender remains  
nonoperated.  

SS_ relay associated with this sender operated.
### Step 11
**Action:**
- At sender associated with second lowest numbered SS_ relay of transverter connector under test—
  - Remove blocking tool from STT, LR relays.

**Verification:**
- Second lowest numbered SS_, SA_, SB_, SC_, SD_, SE_, SF_ relays released.
- Third lowest numbered SA_, SB_, SC_, SD_, SE_, SF_ relays operated.
- At transverter connector under test—TM relay remains energized.
- SS_ relay associated with this sender remains nonoperated.

### Step 12
**Action:**
- At sender frame—
  - At sender associated with second lowest numbered SS_ relay of transverter connector under test—
  - Block operated STT, LR relays.

### Step 13
**Action:**
- Remove blocking tools from STT, LR relays.

### Step 14
**Action:**
- Block in succession STT, LR relays in numerical sequence as indicated in Steps 5 through 13 until entire chain of SS_ relays has been tested.

### Step 15
**Action:**
- Remove all blocking tools from STT, LR relays.

### Step 16
**Action:**
- Remove insulator from 4B of Z relay.

### Step 17
**Action:**
- Remove blocking tools from TM, TRS relays.

### Step 18
**Action:**
- At MTF—
  - Remove make-busy plugs from SMB_ jacks.

### D. Transverter Busy to Transverter Connector

1. **At MTF—**
   - Insert make-busy plug into CAMA _or PCTV-C_ TVC-MB jack for first transverter associated with transverter connector under test.

2. **At MTF—**
   - Remove make-busy plug from CAMA _or PCTV-C_ TVC-MB jack.

3. **Repeat Steps 1 and 2 for all remaining CAMA _or PCTV-C_ transverters associated with transverter connector under test.**

4. **At MTF—**
   - Insert make-busy plug into any CAMA _or PCTV-C_ TV-MB jack.

5. **At MTF—**
   - Remove make-busy plug from CAMA _or PCTV-C_ TV-MB jack.
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<tr>
<th>STEP</th>
<th>ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Repeat Steps 4 and 5 for each CAMA or PCTV-C transverter.</td>
</tr>
<tr>
<td>7</td>
<td>At MTF— Insert make-busy plugs into SMB jacks for all senders served by transverter connector under test.</td>
</tr>
<tr>
<td>8</td>
<td>At transverter connector under test— Connect ground to punching 51, 52, 53, or 54 on terminal strip A on CAMA or PCTV-C transverter preference control unit for transverter connector 0, 1, 2, or 3, respectively.</td>
</tr>
<tr>
<td>9</td>
<td>At transverter connector under test— Manually operate any CB relay.</td>
</tr>
<tr>
<td>10</td>
<td>Manually operate all remaining CB relays except one.</td>
</tr>
<tr>
<td>11</td>
<td>Manually operate remaining CB relay.</td>
</tr>
</tbody>
</table>

**Note:** When any CB relay except the last fails to release, it may be caused by the associated transverter being busy on a call at the instant the last CB relay was operated, or by the transverter being plugged busy. To check the first condition, repeat Steps 9 through 11 and if trouble is repeated, check for transverter plugged busy.

<table>
<thead>
<tr>
<th></th>
<th>ACTION</th>
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</thead>
<tbody>
<tr>
<td>12</td>
<td>Remove ground connection from terminal strip A on CAMA or PCTV-C transverter preference control unit.</td>
</tr>
<tr>
<td>13</td>
<td>At MTF— Remove make-busy plugs from SMB jacks.</td>
</tr>
</tbody>
</table>

**E. Timeout Features**

<table>
<thead>
<tr>
<th>STEP</th>
<th>ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>At transverter connector under test— Connect ground to 6F of TV relay; <strong>start timing.</strong></td>
</tr>
</tbody>
</table>

**Verification**

- **At sender frame—**
  - Ground present on 14F of any SC relays associated with transverter connector under test.
  - CB relay remains operated.
  - CB relays remain operated.
  - Last CB relay operated, remains operated. All other CB relays released.

- **At MTF—**
  - Last CB relay released.
  - No ground present on 14F of all SC relays associated with transverter under test.

- **TM relay operated.**
  - In approximately 1 second—
    - TRS relay operated.
  - In 5 to 10 seconds—
    - Major alarm sounds.
    - Red aisle pilot lamp lighted.
    - Ground present on 10F of each TVC relay.
  - At MTF—
    - TVC lamp lighted.
5. At transverter connector under test—Block operated TV relay.

6. Remove ground connection from 6F of TV relay.

7. At MTF—
   Momentarily operate TVC-AR key.

8. At transverter connector under test—
   Remove blocking tool from TV relay.

9. Remove make-busy plugs from SMB_ jacks.

10a. If alarm transfer is provided—
    Restore alarm transfer key to position prior to test.

F. False Ground Feature

4. Insert make-busy plug into any CAMA or PCTV-C or TVMB- jack.

5. At transverter connector under test—
   Connect ground to 4F of GT relay.

6. At transverter connector under test—
   Remove ground connection from 4F of GT relay.

7. At MTF—
   Momentarily operate TVC-AR key.

8. At transverter connector under test—
   Block operated TV relay.

9. At transverter connector under test—
   Temporarily ground in succession 20F, 22F, 23F, 24F of TVC_ relay associated with transverter made busy.

10. Remove blocking tool from TV relay.
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G. Second Trial Features

2 Insert make-busy plug into any TVMB_ jack associated with any CAMA ♦ or PCTV-C♦ transverter.

3 At CAMA ♦ or PCTV-C♦ transverter make busy—
   Block nonoperated XRL, TM1, TM2 relays.

4 At transverter connector under test—
   Block operated TVA_ relay associated with CAMA ♦ or PCTV-C♦ transverter made busy.

5 Insulate 13M, 14M of operated TVA_ relay.

6 Insulate 12M of operated TV_ relay.

7 Connect ground to 4F of GT relay.

8 Remove ground from 4F of GT relay.

9 Remove blocking tool from TVA_ relay.

VERIFICATION

At transverter connector under test—
   CB_ relay associated with CAMA ♦ or PCTV-C♦ transverter made busy operated.

CB_ relay associated with CAMA ♦ or PCTV-C♦ transverter made busy released.
   TVC_, TVD_ relays associated with CAMA ♦ or PCTV-C♦ transverter made busy operated.
   TV, GT relays operated.

TR relay operated.
   TR1 relay remains released.
   CB_ relay associated with CAMA ♦ or PCTV-C♦ transverter made busy operated.
   Ground present on 13F of all TVA_ relays.

TR relay remains operated.
   TR1 relay operated.
   CB_ relay associated with CAMA ♦ or PCTV-C♦ transverter made busy operated.
   Ground present on 14F of all TVA_ relays.
   No ground present on 13F of any TVA_ relays.
   Ground present on 11F of all TVC_, SC_ relays.

TVC_, TVD_, TV, TR, TR1, GT relays released.
   CB_ relay associated with transverter made busy operated.
   Ground present on 13F of all TVA_ relays.
   No ground present on 14F of any TVA_ relays.
   No ground present on 11F of any TVC_, SC_ relays.
<table>
<thead>
<tr>
<th>STEP</th>
<th>ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Remove insulators from TVA_, TVC_ relays.</td>
</tr>
<tr>
<td>11</td>
<td>At transverter made busy— Remove blocking tools from XRL, TM1, TM2 relays.</td>
</tr>
<tr>
<td>12</td>
<td>At MTF— Remove make-busy plugs from CAMA or PCTV-C, TVMB_, SMB_ jacks.</td>
</tr>
</tbody>
</table>