

## NUMBER GROUP AND CONNECTOR FRAME TAKING EQUIPMENT OUT OF SERVICE NO. 5 CROSSBAR OFFICES

### 1. GENERAL

1.01 This section covers the method to be followed in taking the number group and connector circuit and individual pieces of apparatus of this circuit out of service in No. 5 crossbar offices.

1.02 This section is reissued to add methods and precautions for relays ABT, AN, B, SA, SCK, TBA, TBT and XSC and to revise the section generally. Since this is a general revision, the arrows ordinarily used to indicate the changes have been omitted.

1.03 Part 3 of this section covers the method of taking number group and connector equipment out of service and Part 4 covers the general precautions to be followed when working on the apparatus associated with the number group and connector circuit.

1.04 Whenever it is necessary to take all or part of a number group out of service, the Traffic Department should be advised as soon as practicable in accordance with local instructions.

### 2. APPARATUS

2.01 No. 349A Plug.

2.02 No. 310 Plug.

2.03 No. 603A Tool.

2.04 No. 893 Cord, 3 feet long, equipped with two No. 360 Tools (1WL3A Cord) and two No. KS-6278 Tools.

### 3. METHOD OF TAKING EQUIPMENT OUT OF SERVICE

#### Number Group and Connector Circuit

3.01 To remove the number group and connector circuit from service, plug the No. 349A plug into the NMB jack at the number group frame. This will bring in a major alarm.

Caution: Removing the number group and connector from service stops terminating traffic to all the numbers of the number group. For this reason a number group should be made busy only when it will greatly expedite clearing a trouble.

#### Number Group Connector

MCA, MCB and MCC Relays

3.02 To remove the MCA, MCB or MCC relays from service, make busy the associated marker in the approved manner.

Note: If the contacts of these relays are crossed or falsely grounded and this condition appears on the number group side of the connector, it should be cleared or isolated immediately to prevent interference with traffic through the number group from other markers.

MP, E, CH, TR and TRO to TR3 Relays (MTR Key Furnished)

3.03 MP Relays: The MP relays are out of service if the TR relay is operated. To remove the MP relays from service if the TR relay is non-operated, momentarily operate the MTR key. This will cause the TR and TRO to TR3 relays to operate if the preference circuit is idle. To silence the alarm operate the AR key.

Note: Before operating the MTR key consult the local records to determine whether the circuit has been transferred because of trouble conditions or routine.

3.04 E Relays: The E relays are out of service if the TR relay is non-operated. To remove the E relays from service if the TR relay is operated, momentarily operate the MTR key. This will cause the TR and TRO to TR3 relays to release if the preference circuit is idle. To silence the alarm restore the AR key to normal. See note under Paragraph 3.03.

3.05 CH Relay: This relay is removed from service by blocking it non-operated. The TRO to TR3 relays should then either all be left operated or non-operated depending upon whether the AR key is in its operated or its normal position respectively, otherwise these relays require blocking in the required position.

Note: When the TRO to TR3 relays are blocked the connector preference chain transfer feature is out of service. Therefore, prompt

## SECTION 218-165-303

action is necessary in restoring these relays to service in order to reduce to a minimum the elapsed time that the connector transfer feature is out of service.

**3.06 TR Relay:** To remove the TR relay from service block the TRO to TR3 relays operated or non-operated depending upon whether the MP or E relays are in use. See note under Paragraph 3.05.

**3.07 TRO to TR3 Relays:** Any of the TRO to TR3 relays are removed from service by blocking them either operated or non-operated. They should be blocked in the same position and in agreement with the position of the TR relay and this relay should also be blocked. See note under Paragraph 3.05.

MP, E, CH, TR and TRO to TR3 Relays (TR Key Furnished)

**3.08 MP Relays:** The MP relays are out of service if the TR relays are operated. To remove the MP relays from service operate the TR key. This will cause the TR and TRO to TR3 relays to operate.

**Note:** Before operating the TR key consult the local records to determine whether the circuit has been transferred because of trouble conditions or routine.

**3.09 E Relays:** The E relays are out of service if the TR relays are non-operated. To remove the E relays from service if the TR relays are operated, restore the TR key. This will cause the TRO to TR3 relays to release. See note under Paragraph 3.08.

**3.10 CH Relay:** This relay is removed from service by blocking it non-operated. The TRO to TR3 relays should then either all be left operated or non-operated depending upon whether the TR key is in its operated or its normal position respectively, otherwise these relays require blocking in the required position.

**Note:** When the TRO to TR3 relays are blocked the connector preference chain transfer feature is out of service. Therefore, prompt action is necessary in restoring these relays to service in order to reduce to a minimum the elapsed time that the connector transfer feature is out of service.

**3.11 TR Relay:** To remove the TR relay from service block the TRO to TR3 relays operated or non-operated depending upon whether the MP or E relays are in use. See note under Paragraph 3.10.

**3.12 TRO to TR3 Relays:** Any of the TRO to TR3 relays are removed from service by blocking them either operated or non-operated. They should be blocked in the same position. See note under Paragraph 3.10.

MBO to MBL Relays

**3.13** To remove the MBO and MBL relays from service, block the particular relay non-operated.

Number Group

HB and U Relays

**3.14** To remove the HB or U relays from service block the relay non-operated. These relays can not be removed from service without seriously affecting terminating service to 100 numbers, hence the trouble should be cleared immediately. Furthermore, blocking these relays will cause the marker to time out and bring in the trouble recorded on each call to the group of numbers associated with the relay blocked non-operated. Should this operation be undesirable it will be necessary to remove the number group from service as covered in Paragraph 3.01.

TB Relays

**3.15** To remove the TB relay from service, block the relay non-operated. This relay can not be removed from service without seriously affecting terminating service to 10 numbers, hence the trouble should be cleared immediately. Blocking the relay non-operated will cause the marker to route calls for these numbers to the blank number trunks except where trunk numbers and in some cases where terminal hunting numbers are involved as covered in Paragraphs 3.16 and 3.17.

**3.16** Where the TB relay blocked non-operated serves trunk numbers, the marker will time out and bring in a trouble recorded. The marker will go to second trial and attempt to complete the trunk call in the alternate number group.

**3.17** Where the TB relay blocked non-operated serves terminal hunting numbers and it is either the first or only TB relay for a hunting group, the marker will route the calls for this tens group to the blank number trunks. Where the TB relay is the intermediate or last one of the hunting group, the marker will time out and bring in a trouble recorder. To avoid this and to minimize tying up service to a hunting group it will be necessary to make these numbers test busy. This may be done by either disconnecting the leads at the associated SO-S9 punchings at

the distributing frame or insulating the contacts at associated SC relay. Consult the office records for the association of the TB and SC relays and the association of SO-S9 punchings with the sleeve of terminal hunting numbers.

#### SC, A and TBA Relays

3.18 When removing the relay, consideration should be given to either removing part of or all of the hunting group by changing cross-connections, or by transferring to spare equipment on the frame in order to avoid affecting service. Determine from the local records the numbers affected and advise the Traffic Department. If the SC relay is associated with a tens block select hunting group, block the associated TBT relay operated.

#### OF and POF Relays

3.19 To remove the OF relay from service transfer the cross-connection from punchings G and VHG of the OF relay to spare equipment. If no equipment is available disconnect the cross-connections from punchings G and VHG of the OF relay and make a direct cross-connection between the G and VHG punching associated with the number and the line link location.

3.20 To remove the POF relay from service transfer the cross-connections from the AF punching of the POF relay to spare equipment. If no equipment is available disconnect the cross-connection from the AF punching and transfer it to the EG punching.

3.21 Advise the Traffic Department when the overflow registration has been changed or removed from the associated number.

#### FN Relay

3.22 To remove the FN relay from service, remove the F, RF and FNK cross-connection leads originally made to punchings at the E terminal strip. Connect these leads to the punchings associated with a spare FN relay. Consult the office records for these cross-connections.

Note: It is important that the free line service indications remain operative in order to avoid charging subscribers for these calls.

#### TN Relay

3.23 When removing the relay, consideration should be given to either changing cross-connections to a spare TN relay or making the associated trunks busy.

#### B, SA and TBT Relays

3.24 When removing the relay, consideration should be given to transferring to spare equipment.

Note: Blocking the B, SA or TBT relay will make the associated numbers busy to restrict terminating service. Work in these relays shall only be performed during periods of light load.

3.25 If spare equipment is not available to remove the SA relay from service, block the TBT relay operated. See note under Paragraph 3.24.

3.26 If spare equipment is not available to remove the TBT relay from service block the SA relay non-operated and short the 3-4B springs of the TBT relay with a No. 893 cord. See note under Paragraph 3.24.

3.27 If spare equipment is not available to remove the B relay from service, block the B relay operated. See note under Paragraph 3.24.

#### SCK Relay

3.28 To remove the SCK relay from service, remove it from its socket with a No. 603A tool. Work shall be done during a light load period. Removing the SCK relay will cause a failure on every ten block select hunting group call. After removing the SCK relay, it shall be replaced with another relay.

#### XSC Relay

3.29 To remove the XSC relay from service, the XSC relay feature should be temporarily removed. Remove the cross-connection from the XSC punching of the XSC relay and transfer the cross-connection to a ground punching.

#### AN Relay

3.30 When removing the relay consideration should be given to transferring to spare equipment.

3.31 If no equipment is available block the AN relay non-operated. This will cause the marker to time out and bring in the trouble recorder on all calls to this number in this number group.

#### ABT Relay

3.32 When removing the relay consideration should be given to transferring to spare equipment.

## SECTION 218-165-303

3.33 If no equipment is available block the ABT relay operated. This will cause the associated lines to appear busy.

### 4. GENERAL PRECAUTIONS WHEN WORKING ON THE APPARATUS

#### Number Group Connector

4.01 Due to multiple wiring and common equipment, it is desirable when working on the individual pieces of apparatus to make busy equipment and take other precautions as indicated below. Crossing or grounding any of the associated leads may cause a marker to time out and bring in the trouble recorder.

#### MCA, MCB and MCC Relays

4.02 Make busy the associated marker in the approved manner. Work on any of these relays shall only be performed during periods of light traffic when momentary interference to terminating calls to the number group will not cause serious reaction.

#### MP, E, CH, TR and TRO to TR3 Relays (MTR Key Furnished)

4.03 MP Relays: Before working on these relays it will be necessary to transfer to the E relay preference chain. The circuit is transferred if the TR relay is operated. If it is necessary to transfer, determine from the local records whether it will be satisfactory to make the transfer. To transfer momentarily operate the MTR key. To silence the alarm operate the AR key.

4.04 E Relays: Before working on these relays it will be necessary to transfer to the MP relay preference chain. The circuit is transferred if the TR relay is non-operated. If it is necessary to transfer, determine from the local records whether it will be satisfactory to make the transfer. To transfer, momentarily operate the MTR key. To silence the alarm restore the AR key to normal.

4.05 CH Relay: Remove the blocking tool if the relay has been removed from service. Block the TR relay operated if operated or non-operated if non-operated. Also insulate the 2T and 5T of the TR relay. On completion of tests remove the blocking tool and insulator from contacts of the relay.

4.06 TR Relay: Block the TRO to TR3 relays non-operated if the MP relays are in use and block them operated if the E relays are in use. Also operate the AR key and insulate the 2T of CH relay. While working on this relay an intermittent minor alarm may sound. On

completion of test, if the MP relays are in use, restore the AR key to normal and remove insulation from 2T of CH relay. If the E relays are in use remove the insulation from 2T of CH relay, leave the AR key operated and manually operate and lock the TR relay.

4.07 TRO to TR3 Relays: When only a TRO relay is provided take the number group and connector circuit out of service by plugging a No. 349A plug into the NMB jack at the number group frame. This will bring in a major alarm. Insulate the 4B of TR relay if the TR relay is operated. Remove the blocking tool from the TRO relay if this relay had been removed from service.

Caution: Removing the number group and connector from service stops terminating traffic to all the numbers in the number group. For this reason a number group should be made busy only as required to work on equipment and should be restored to service immediately.

4.08 When two or more TRO to TR3 relays are provided, take the markers associated with the particular TRO to TR3 relay under test out of service in the approved manner provided the remaining markers are sufficient to handle the traffic. Then proceed as covered in Paragraph 4.09. If it is undesirable from a traffic standpoint to remove the markers from service, it will be necessary to take the number group and connector circuit out of service as covered in Paragraph 4.07 and proceed as covered in Paragraph 4.09 with the exception that blocking relays TRO to TR3 will not be required.

4.09 Block the TRO to TR3 relays not under test either operated or non-operated depending upon whether the TR is operated or non-operated. Insulate the 4B of the TR relay. Remove the blocking tool from the TRO to TR3 relay under test if this relay had been removed from service. When tests are completed first remove the insulation from 4B contact and then the blocking tools from relays TRO to TR3.

#### MP, E, CH, TR and TRO to TR3 Relays (TR Key Furnished)

4.10 MP Relays: Before working on these relays it will be necessary to transfer to the E relay preference chain. The circuit is transferred if the TR relays are operated. If it is necessary to transfer, determine from the local record whether it will be satisfactory to make the transfer. To transfer momentarily operate the TR key.

4.11 E Relays: Before working on these relays it will be necessary to transfer to the MP relay preference chain. The circuit is transferred if the TR relays are non-operated. If it is necessary to transfer, determine from the local records whether it will be satisfactory to make the transfer. To transfer, operate the TR key to the normal position.

4.12 CH Relay: Remove the blocking tool if the relay has been removed from service. Block the TR relay operated or non-operated if non-operated. Also insulate the 2T and 5T of the TR relay. On completion of test remove insulation from contacts of the TR relay.

4.13 TR Relay: Block the TRO to TR3 relays non-operated if the MP relays are in use and block them operated if the E relays are in use. While working on this relay an intermittent minor alarm may sound. On completion of test remove the blocking tools.

#### TRO to TR3 Relays

4.14 When only a TRO relay is provided take the number group and connector circuit out of service by plugging a No. 349A plug into the NMB jack at the number group frame. This will bring in a major alarm. Insulate the 2B of the TR relay if the TR relay is operated. Remove the blocking tool from the TRO relay if this relay has been removed from service.

Caution: Removing the number group and connector from service stops terminating traffic to all the numbers in the number group. For this reason a number group should be made busy only as required to work on equipment and should be restored to service immediately.

4.15 When two or more TRO to TR3 relays are provided, take the markers associated with the particular TRO to TR3 relay under test out of service in the approved manner provided the remaining markers are sufficient to handle the traffic. Then proceed as covered in Paragraph 4.16. If it is undesirable from a traffic standpoint to remove the markers from service, it will be necessary to take the number group and connector circuit out of service as covered in Paragraph 4.14 and proceed as covered in Paragraph 4.16 with the exception that blocking relays TRO to TR3 will not be required.

4.16 Block the TRO to TR3 relays not under test either operated or non-operated depending upon whether the TR key or relay is operated or non-operated. Insulate the 2B of the TR relay. Remove the blocking tool from the TRO to TR3 relay under test if this relay

had been removed from service. When tests are completed first remove the insulation from 2B contact and then the blocking tools from relays TRO to TR3.

#### MBO and MBL Relays

4.17 Remove the MBO to MBL relays from service by removing the B fuse on the number group connector frame. Block non-operated the relay not being worked on. Also insert a 310 plug in the NMB jack. Work on either the MBO or the MBL relay only during periods of light traffic when momentary opening of the start leads may not interfere with service.

4.18 If interference occurs and only the MBO relay is provided proceed in the following manner. Prepare the circuit as covered in Paragraph 4.17. Short-circuit with No. 893 cords the following MBO relay springs: 1-2T, 4-5T, 7-8T, 1-2B, 4-5B and 7-8B. Insulate contacts 2B, 8B and 5T of the TRO and TR1 relays. This removes the number group from service. Note the caution under Paragraph 4.07 or 4.14. On completion of tests remove insulation from contacts and No. 893 cords from springs of the relays.

4.19 If interference occurs, and both the MBO and MBL relays are provided proceed in the following manner after preparing the circuit as covered in Paragraph 4.17. If working on the MBO relay short-circuit with No. 893 cords the following MBO relay springs: 1-2T, 4-5T, 7-8T, 1-2B, 4-5B and 7-8B. Insulate contacts 2B, 8B, and 5T of the TRO and TR1 relays. If working on the MBL relay short-circuit with No. 893 tools the following MBL relay springs: 1-2T, 4-5T, 7-8T, 1-2B, 4-5B and 7-8B. Insulate 2B, 8B and 5T of the TR2 and TR3 relays. It should be noted that this procedure denies access to the number group by part of the markers and that some of the calls to the number group can not be completed. On completion of tests remove insulation from contacts and No. 893 cords from springs of the relays.

#### Number Group

##### HB, TB and U Relays

4.20 Remove the number group and connector circuit from service by plugging a No. 349A plug into NMB jack at the number group frame if a current flow test is to be made. This brings in a major alarm. Remove the blocking tool if the relay has been removed from service. See note under Paragraph 4.07 or 4.14.

## SECTION 218-165-303

4.21 If the primary winding of an HB or U relay is defective, substitute the secondary winding and transfer the protection. When replacing the relay, take care to avoid falsely grounding or crossing any of the leads. If the winding of the TB is defective replace the coil. Any relay connected in parallel with the TB relay should be blocked non-operated.

Note: When replacing defective apparatus, it should not be necessary to remove the number group and connector circuit from service provided reasonable care is exercised to avoid falsely grounding or crossing leads. However, it should be recognized that terminating traffic is blocked to 100 numbers in the case of the HB and U relays and at least 10 numbers in the case of the TB relay. Also, the marker calling these numbers will time out and bring in a trouble recorder.

### SC, A and TBA Relays

4.22 If the relay is in service, remove part or all of the hunting group by changing cross-connections or by transferring to spare equipment in order to avoid affecting service. Insulate the 2T contact of the A relay, the 12T and 12B contacts of the SC relay, or the 12T and 12B contacts of the TBA relay under test. On completion of tests remove insulation from contacts of the relays.

### OF and POF Relays

4.23 If the relay is in service, the associated number should be transferred to spare equipment. If no equipment is available disconnect the overflow registration. Insulate the 2T contact of the relay under test. On completion of tests remove insulation from contacts of the relay.

### FN Relay

4.24 If this relay is in service, the associated number should be transferred to spare equipment.

4.25 If spare equipment is not available, work on this relay shall only be performed during periods of light traffic when momentary interference will not cause a serious reaction. Insulate the 2T contact of the relay under test. On completion of tests remove insulation from the relay.

### TN Relay

4.26 If the relay is in service, the TN relay should be transferred to spare equipment or the associated trunks made busy. Insulate

the 2T contact of the relay under test. On completion of tests remove insulation from the relay.

### SA Relay

4.27 If the relay is in service, consideration should be given to transferring to spare equipment. If the work being done does not warrant transferring equipment block the associated TBT relay operated. When testing short-circuit the 1-3T springs with a No. 893 cord and insulate the 4B, 5T and 7T contacts of the SA relay. On completion of tests remove insulation from contacts and No. 893 cords from springs of the relay.

Note: Work on this relay shall be done during periods of light load when momentary interference will not cause a serious reaction.

### TBT Relay

4.28 If the relay is in service, consideration should be given to transferring to spare equipment. If the work being done does not warrant transferring equipment block the associated SA relay non-operated and short-circuit the 3-4B springs of the TBT relay under test with a No. 893 cord. On completion of tests remove the blocking tools and the No. 893 cords from the springs of the relay. See note under Paragraph 3.27.

### B Relay

4.29 If the relay is in service, consideration should be given to transferring to spare equipment. If the work being done does not warrant transferring to spare equipment short-circuit the 1-2T springs with a No. 893 cord. On completion of tests remove the No. 893 cord from the springs of the relay.

### SCK Relay

4.30 See Section 040-263-501 for testing and procedure for extracting the relay from its socket.

### XSC Relay

4.31 If the XSC relay is in service remove the XSC relay feature temporarily. Short-circuit the 4-7 springs of the relay under test with a No. 893 cord. On completion of tests remove the No. 893 cords from springs of the relay.

## ABT Relay

- 4.32 If the relay is in service, the associated lines should be transferred to spare equipment.
- 4.33 If spare equipment is not available work should be performed during periods of light load. With a No. 893 cord short-circuit the 3-4B springs of the relay under test. This will cause all associated lines to appear busy. Also insulate 2T contact of an associated B relay. On completion of tests remove insulation from contacts and No. 893 cords from springs of the relay.

## AN Relay

- 4.34 If the relay is in service, the associated lines should be transferred to spare equipment.
- 4.35 If spare equipment is not available work on this relay shall be performed during periods of light loads. Insulate the 2T contact of the relay under test. On completion of tests remove insulation from contacts of the relay.

5. REPORTS

- 5.01 Any required record of the equipment removed from service should be entered on the proper form.



7

1

4



7

1

