

A. E. CO. TYPE 101 DIRECTOR  
OPERATION

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1. GENERAL

1.01 This Section replaces Section 240-205-105, Issue 1. Remove and destroy all copies of Section 240-205-105, Issue 1.

1.02 In this Section various types of calls such as local, EAS, and SATT are traced through the Type 101 Director. Additional

types of calls can be processed by the system and more translations made than are presented in this Section; however, the calls presented are the most common.

2. REGISTER-SENDER ACCESS EQUIPMENT

2.01 The operation of the register-sender access equipment will not vary with the type of call and therefore is covered only once in this Section. Refer to Figure 1.

2.02 The calling party lifts the handset off hook. Relay L of the calling party's line equipment is operated via the loop closed through the hookswitch. Relay L in operating grounds the linefinder start lead (ST).

2.03 Ground, from the linefinder distributor, on the linefinder start lead (FSA) is

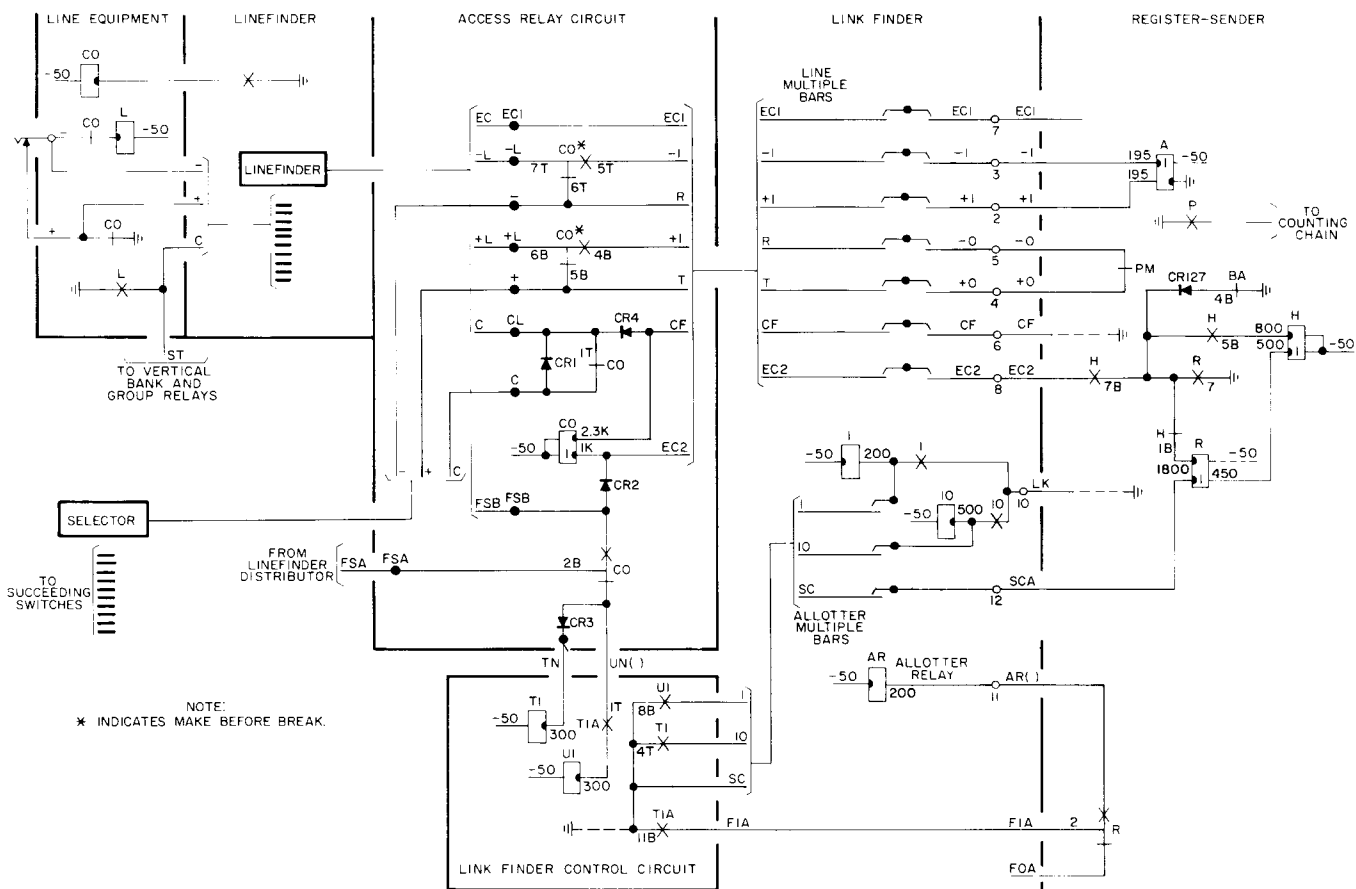


Figure 1. Calling Party Loop Switched Through the Register-Sender.

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extended by the TN and UN leads of the access relay circuit to the link finder control circuit to operate the proper tens and units relays to mark the access relay circuit desiring service on the allotter multiple bars of the link finders. The tens relay also extends ground, via lead FIA, to find an idle register-sender.

2.04 When an idle register-sender is found, ground is extended to the allotter relay of its associated link finders. The allotter relay, in operating, closes ground from the marked allotter multiple bars to the proper unit and tens relays to connect the access relay circuit desiring service to the register-sender.

2.05 Connecting a register-sender to the access relay circuit will operate relay CO of the access relay circuit from ground on lead EC2. Relay CO will close linefinder start lead (FSA) to the linefinder (via linefinder start lead FSB), release the link finder control circuit, and close the pulsing loop from the linefinder to the register-sender.

2.06 Operated, relay CO in the access relay circuit closes ground to the linefinder start lead (FSB) which marks the vertical bank and operates a C relay in the group relays, Figure 1. The linefinder begins

vertical stepping, and stops on the marked vertical bank contact. The linefinder hunts rotary for the marked bank contact. When the marked bank contact is found, the linefinder has found the line calling for service and the line equipment CO relay will operate. The + and - leads are switched through to the access relay circuit which is connected to the register-sender. The dialing loop is to the A relay in the register-sender, Figure 1.

### 3. LOCAL CALLS

3.01 In the original switchtrain of this office, local calls were made by dialing the office code 334, 335, or 336, plus the four terminal digits. The first two digits, 3-3, were absorbed in the local selector, the third digit, 4, 5, or 6, positioned the local selector to the corresponding level and the remaining four digits positioned the fourth selector, the fifth selector, and the connector. See Figure 2. The following paragraphs, 3.02 through 3.08, describe how a local call is processed with the Type 101 Director equipment.

3.02 The first dialed digit (3) is counted by the counting chain and stored on code-reeds in the register-sender, Figure 3. In the register-sender's time slot, timed battery is closed through operated contacts of the code-reeds and extended to the translator

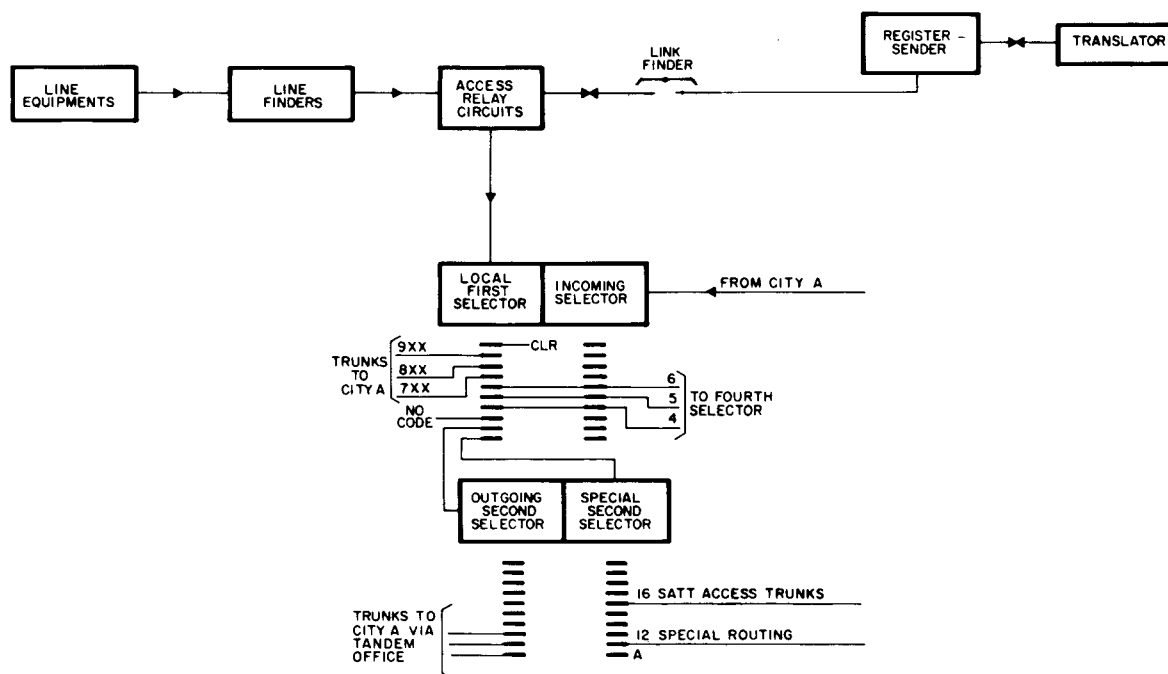


Figure 2. Trunking Diagram.

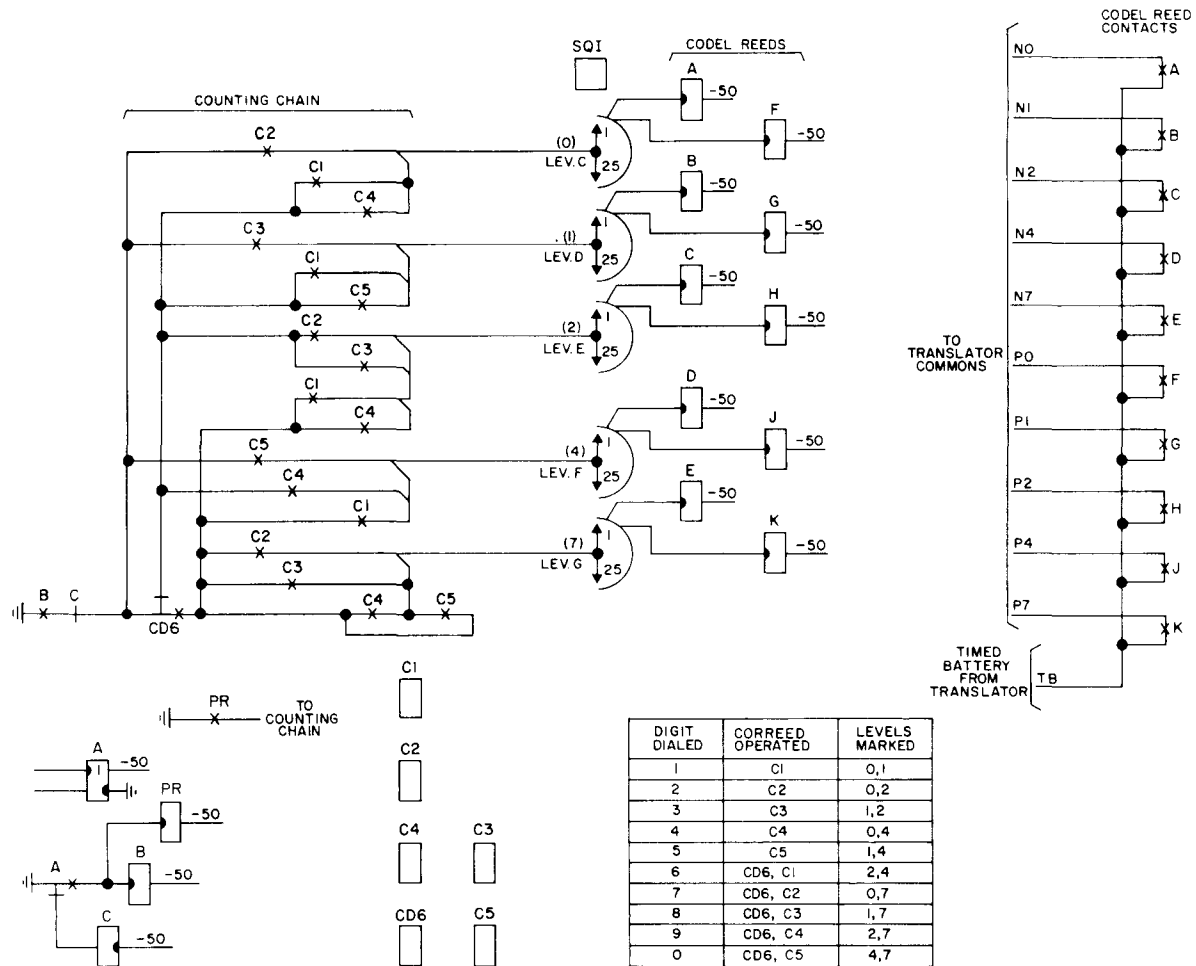


Figure 3. Receiving and Extending Dialed Digits.

via the translator commons. Timed battery appears on translator commons N1 and N2, Figure 4. Code converter AND gate 6 therefore has the timed battery on both inputs causing it to exhibit an output to inverter 54. The inverter extends its output on lead N3 to the "A" digit program panel where it is routed, via shorting pins and leads A1, A2, A4, A5, A6, and A8 to their associated code AND gates.

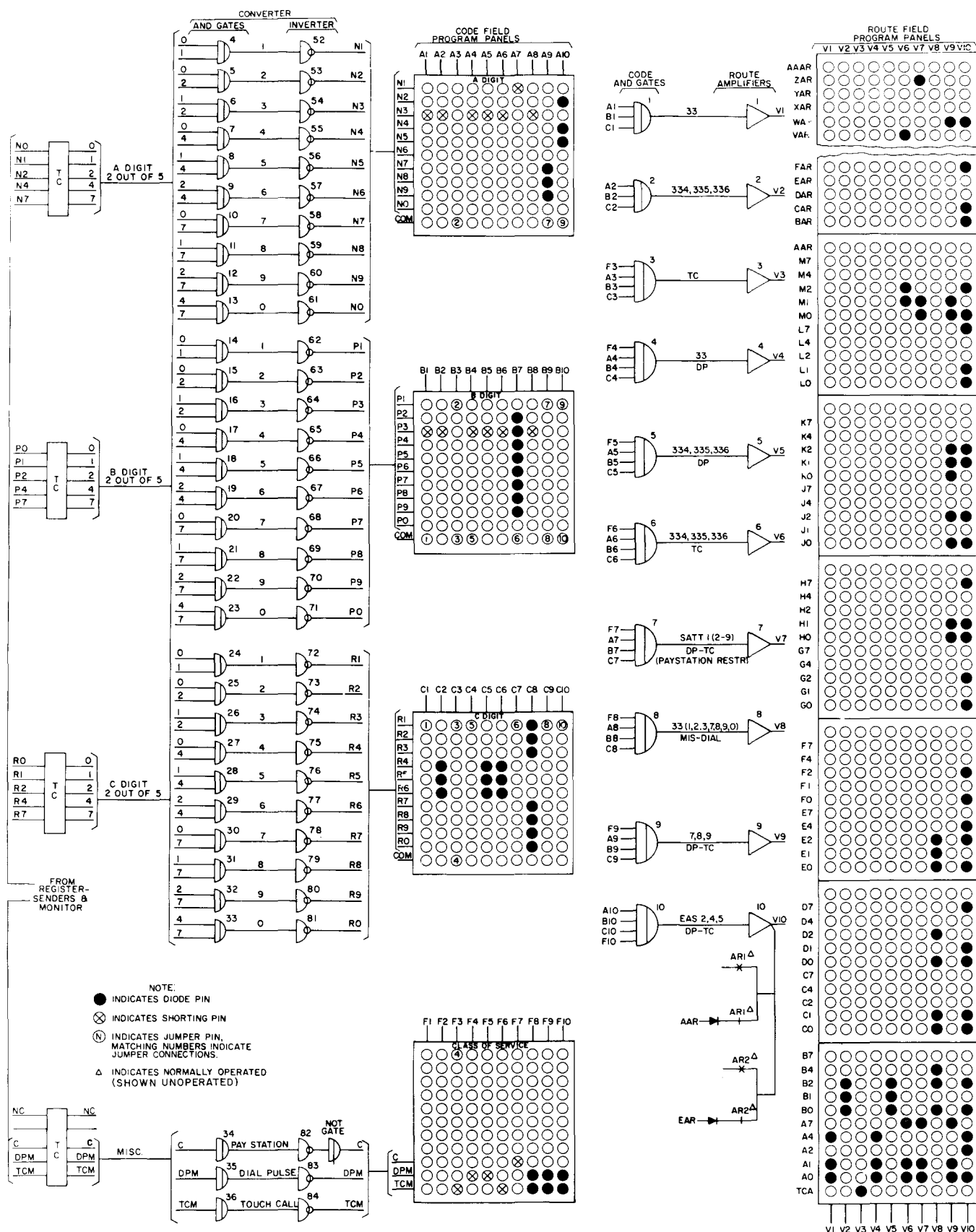
3.03 Code AND gates 1 and 2 are of the type supplied in a translator used for three-digit translation with no class-of-service and are shown for example only. Code AND gates 3 through 10 are the type supplied with a translator used for three-digit translation with class-of-service. For this example we will look at code AND gate 4 and assume this is a dial pulse call.

3.04 When the calling party dials the second digit (3) it is stored on code reeds, and in this register-sender's time slot the two

digits (3-3) are sent to the translator. Timed battery is closed through contacts of the operated code reeds to translator commons on leads N1, N2, and P1, P2 to the code converters. Code converter AND gates 6 and 16 have timed battery on both inputs causing them to exhibit an output to their associated inverters. The output of inverter 54 is extended to lead N3, and the output of inverter 64 is extended to lead P3. These leads are in turn extended to code AND gate 4, along with DP indication and the P jumpered output to the C digit program panel.

3.05 Code AND gate 4 extends the potential to route amplifier 4. Route amplifier 4 extends the potential to vertical row V4 of the route field program panels. The route diode pins extend the output to the route commons, marking levels 0, 1, 4 of position A on rotary switch SGO.

3.06 Route code 0, 1, 4 indicates "repeat next dialed digit to selector." The



battery on levels 0, 1, 4 operates relays T0, T1 and T4 which in turn operate relay DS, Figure 5. The operation of relay DS will cause the next dialed digit to be repeated to the selector through contacts of relay PR. Rotary switch SQO steps to position B.

3.07 The calling party dials the third digit, which on a local call is either 4, 5, or 6. For this example, we will assume the digit dialed is 4. The digit 4 is counted and stored on the codelreeds, and in this register-sender's time slot the digits 3, 3, 4 will be sent to the translator. Timed battery is extended through contacts of the operated codelreeds to the translator commons N1, N2, P1, P2, R0, and R4. Code converter AND gates 6, 16, and 27 have the timed battery potential on both inputs. The outputs of these gates are extended to their associated inverters, 54, 64, and 75. The outputs of these inverters along with the DP class mark, are extended over leads N3, P3, and R4 to code AND gate 5.

3.08 The output of AND gate 5 is extended to route amplifier 5 which extends negative battery via vertical row V5, the route diode pins, and route commons to levels 0, 1, 2 of rotary switch SQO, Figure 5. Route code 0, 1, 2 indicates "release the register-sender." The code 0, 1, 2 causes relays T0, T1, and T2 to operate. Relays T0, T1, and T2, in operating, close ground to relay RL. Relay RL operates and initiates the release of the register-sender.

3.09 The third digit, the digit 4 in this case, was also repeated to the local first selector, stepping it to the fourth level. The register-sender releases and the calling party dials the remaining digits into the switchtrain. See Figure 2.

#### 4. SATT CALLS

4.01 The office trunking plan for SATT calls (Figure 2) requires that SATT access code 160 be dialed. The digit 1 positions the local selector to the first level where the special second selector is seized. The digit 6 positions the special second selector to level 6 where it hunts rotary for an idle SATT trunk. The 0 is dialed into the ticketer, located in another office.

4.02 With the dialing loop closed to the register-sender as shown in Figure 1, the calling party receives dial tone and dials the digit 1. The digit 1 is counted by the

counting chain and is stored on codelreeds. In this register-sender's time slot, timed battery is extended from the translator to the register-sender through the contacts of the operated codelreeds to the translator commons, Figure 3. Since the digit 1 has been stored, the timed battery is extended on N1 and N0. With timed battery on N1 and N0, converter AND gate 4 has a potential on both inputs, causing it to exhibit an output to its associated inverter, Figure 4. The two-out-of-five code has now been converted to a single potential and extended to inverter 52. The "A" digit program panel extends the mark via the shorting pin at N1/A7 to code gate 7.

4.03 The second digit dialed by the calling party, in this case 6, is stored on codelreeds. In this register-sender's time slot, timed battery is extended from the translator through operated contacts of the codelreeds. The digits 1 and 6 are now extended to the translator. The digit 1 is extended on leads N1 and N0, and the digit 6 is extended on leads P2 and P4, Figure 4. The two-out-of-five codes (negative battery) are converted by gates 4 and 19 to single positive outputs and extended to their associated inverters. The negative outputs of the inverters are extended on leads N1 and P6 to the code field program panels and then to code gate 7. In this example, we can process both TOUCH CALLING and dial pulse calls, but will restrict calls from paystations. Assume this is not a call from a paystation so there will also be negative battery on input F7 from the output of NOT gate 85. Jumper wire 6 will extend an output to the code AND gate input C7. Code gate 7, therefore, extends a positive output to route amplifier 7. Route amplifier 7 extends the potential, now negative battery, to the route field diode pins in vertical row V7 which extend the output to the route commons. The negative battery is extended to levels 0, 1, 7 at position A of rotary switch SQO. Routing code 0, 1, 7 indicates "routing complete, advance rotary switch SQO to position M."

4.04 When rotary switch SQO is in position "M," negative battery extended to levels 0 and 1 indicates "send all dialed digits."

4.05 As shown in Figure 5, terminals N through BB of rotary switch SQO are connected to the codelreed card terminals. When the timed battery is extended from the translator through the operated codelreed contacts, the digits are extended, one at a time, through the operated codelreeds' contacts to the various levels of rotary switch SQO. As each digit is outputted, rotary switch SQO

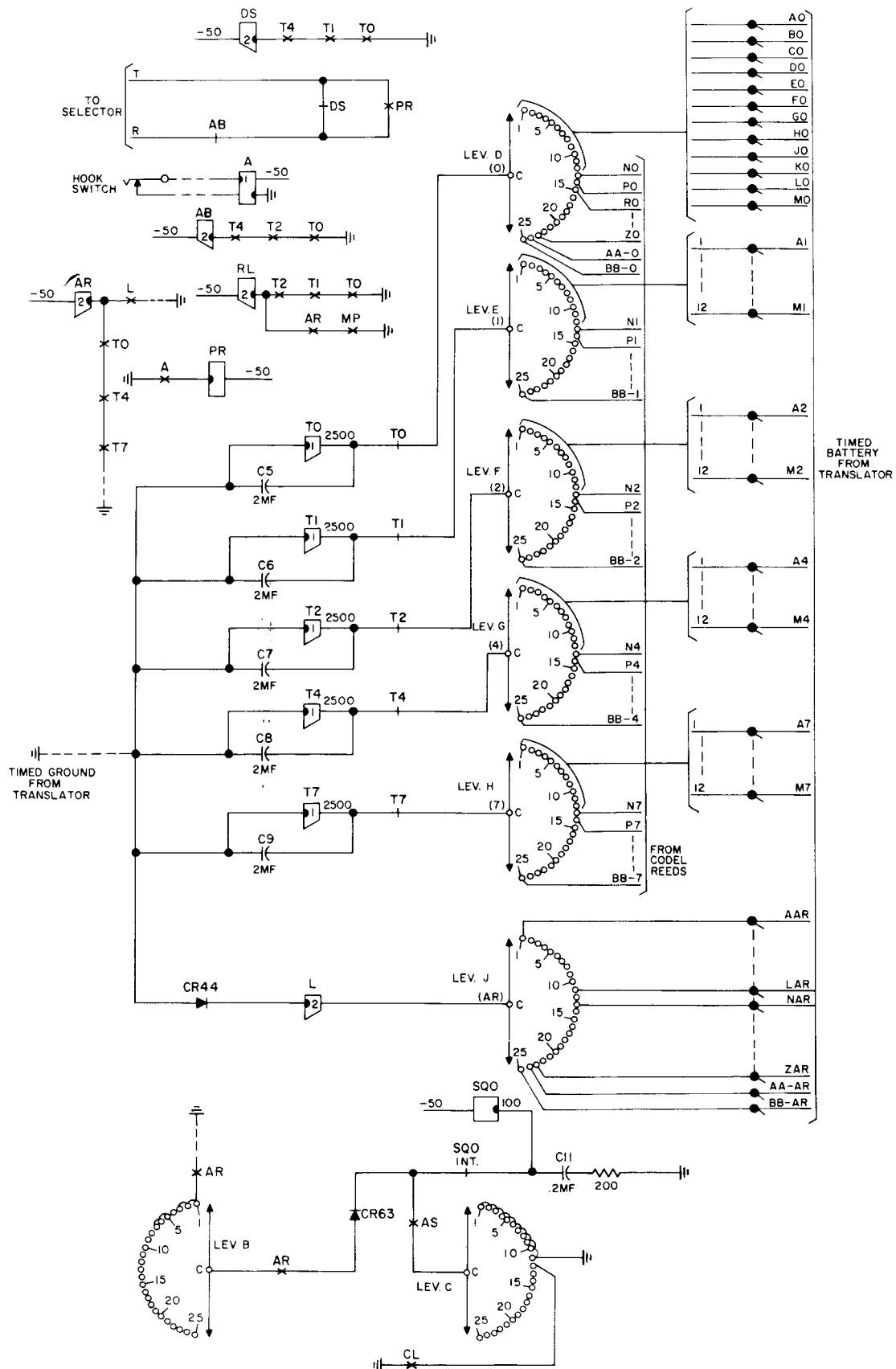


Figure 5. Receiving Translated Digits.



steps to the next position. In position Y the last digit is outpulsed and rotary switch SQO steps to position Z. In the register-sender's time slot the route diode pin at the intersection of V7/Z-AR extends negative battery to level AR, at position Z, Figure 4. Negative battery extended to level AR operates relays L and AR (relay MP already operated), which in turn operate relay RL, Figure 5. Relay RL initiates the release of the register-sender.

## 5. EAS CALLS

5.01 With the trunking plan shown in Figure 2, there are two arrangements for handling EAS calls. From levels 7, 8, and 9 of the local first selector, direct trunks to city A can be seized. The second arrangement provides trunks from levels 1, 2, and 3 of the outgoing second selector to tandem office B which in turn provides trunks that access office A.

5.02 Direct trunking. The calling party dials the digit 7, 8, or 9 to seize a direct trunk to city A. For this example, we will assume the digit 7 is the first digit dialed.

5.03 With the dialing loop of the calling party switched into the register-sender, Figure 1, dial tone is returned and the calling party dials the digit 7. The digit 7 is counted by the counting chain and stored on the codelreeds. In the register-sender's time slot, timed battery is extended from the translator through operated codelreed contacts. The timed battery is extended to leads N0 and N7 and appears as a two-out-of-five code at the translator commons, Figure 4. Code converter AND gate 10, with negative battery on both inputs, extends a positive output to inverter 58. Inverter 58, with a positive input, exhibits a negative output. The two-out-of-five code has been converted to a single potential on lead N7, and extended to the "A" digit program panel. The code diode pin inserted at the intersection N7/A9 extends the output to code gate 9, input A. Whether dial pulse or Touch Calling, the code diode pins inserted at DP, TC/F9 will extend an output to code AND gate 9 input F. Jumper wires 7 and 8 supply negative battery to inputs B and C of code AND gate 9.

5.04 With negative battery on all inputs, code AND gate 9 exhibits a positive output to route amplifier 9. Route amplifier 9 will extend negative battery to vertical row V9 of the route field. The route diode pins at the intersection V9/A0, A1, and A7 extend negative battery to the route commons which mark levels 0, 1, and 7 of rotary switch SQO,

position A. Routing code 0, 1, 7 indicates "routing complete, advance rotary switch SQO to position M."

5.05 When rotary switch SQO is in position "M" negative battery extended from the route field to levels 0 and 1 indicates "send all dialed digits." The digits will be outpulsed as described in paragraph 4.05 except that the last digit will be outpulsed from position V and the AR mark is in position W.

5.06 Tandem switching. If the digit 2, 4, or 5 is dialed, the call will be switched to city A via the tandem office. For this example we will assume the digit 2 is dialed, and six digits must be outpulsed to the tandem office. The operation of the alternate route relays will also be explained.

5.07 Primary route. With the calling party switched through to the register-sender, Figure 1, dial tone is returned. The calling party dials the digit 2. The digit 2 is counted by the counting chain and stored on codelreeds, Figure 3. During this register-sender's time slot, timed battery is extended to the register-sender from the translator. The timed battery is closed through contacts of the operated codelreeds to the translator commons. The timed battery in this case is closed to leads N0 and N2, Figure 4. Converter AND gate 5, therefore, has negative battery on both inputs and exhibits a positive output to its inverter. With a positive input, inverter 53 extends negative battery on lead N2 to the "A" digit program panel. The code diode pin at the intersection N2/A10 extends the output to code AND gate 10, input A. Whether dial pulse or Touch Calling, the code diode pins inserted at DP, TC/F10 will extend an output to code AND gate 10, input F. Jumper wires 9 and 10 supply negative battery to inputs B and C of code AND gate 10.

5.08 With negative battery on all inputs, code AND gate 10 exhibits a positive output to route amplifier 10. Route amplifier 10 will extend negative battery to vertical row V10 of the route field. Route diode pins at the intersections V10/A0, A2, and A4 extend negative battery to the route commons which mark levels 0, 2, and 4 of rotary switch SQO, position A. The routing code 0, 2, 4 indicates "drop selector," thus absorbing the digit. The timed battery on leads 0, 2, 4 operates relays T0, T2, and T4 which close a path to the AB relay, Figure 5. Operation of the AB relay opens the outpulsing loop for about 600 milliseconds. Rotary switch SQO steps to position B. As can be seen in Figure 4, negative battery is extended from the route diode pins to position B, levels 0 and 2. The

two-out-of-five code marking 0, 2 causes the register-sender to output the digit 2, stepping the local first selector to the second level. Rotary switch SQO steps to position C. In the register-sender's next time slot negative battery is extended from the route diode pins to levels 0 and 1 at position C of rotary switch SQO. This causes relays T0 and T1 to operate and the digit 1 is output from the register-sender. The digit 1 output from the register-sender steps the outgoing second selector to level 1. The outgoing second selector hunts for and seizes a trunk to the tandem office. Rotary switch SQO steps to position D. The translator extends negative battery to levels 0, 1, 7. The code 0, 1, 7 indicates "routing completed, step to position M."

5.09 When rotary switch SQO is in position M the translator extends the code 0, 2, which indicates "delete the first dialed digit." Rotary switch SQO steps past position N. Beginning with position P, the last six customer dialed digits are read from code-reed storage and output as described in paragraph 4.05 except that the last digit is output from position V and the AR mark is in position W.

5.10 Alternate route. As shown in Figure 4, the positions of route commons that are marked for routing digits also have a diode pin marking the AR level of that position (BAR, CAR, FAR). In the event a selector fails to find an idle trunk and steps to the 11th rotary position, the AR mark will cause the register-sender to drop the switchtrain and advance SQO to the next alternate route. In this manner pocketed calls are prevented. A call will not receive busy tone until all possible routes out of the office have been checked.

5.11 First alternate. As shown in Figure 4, the output of route amplifier 10 is extended to position A levels 0, 2, and 4. Relay AR1 is normally operated and remains operated as long as a trunk in the primary group is idle. The primary trunk group in this office consists of the trunks accessed from level 1 of the outgoing second selector. If all the trunks in the primary route are busy, relay AR1 releases, marking the AR level via the route commons. For this example we will assume the calling party dials the digit 4, and that relay AR1 is restored.

5.12 The calling party is switched through to the register-sender and receives dial tone, Figure 1. The calling party dials the digit 4 which is counted by the correct counting chain and stored on code-reeds, Figure 3. In this register-sender's time slot, timed battery

is extended from the translator through contacts of the operated code-reeds to the translator commons on leads N0 and N4. Code converter AND gate 7, Figure 4, has negative battery on both inputs causing it to exhibit a positive output to inverter 55, which in turn exhibits a negative output. The output of inverter 55 is extended on lead N4 to the code field program panel and then to code AND gate 10. Code AND gate 10 extends a positive output, to route amplifier 10. With a positive input, route amplifier 10 extends negative battery at its output, through the route field to levels 0, 2, 4, position A, of rotary switch SQO. The loop to the switchtrain is opened and the digit is absorbed as described previously. At the same time, negative battery is supplied to the AR level via the route commons through unoperated contacts of relay AR1. The combination of 0, 2, 4 plus the AR mark indicates that the primary route is busy and causes the rotary switch to step to the next alternate route (position E).

5.13 Position E levels 0, 2, and 4 are marked through the route diode pins. The loop to the switchtrain is opened and rotary switch SQO is stepped to position F. (In the event this route was busy the 0, 2, 4 would be needed to combine with an AR mark to step the rotary switch to the next alternate route.)

5.14 The translator marks position F levels 0 and 2 through the route diode pins. The register-sender outputs the digit 2 causing the local first selector to step to level 2. The rotary switch steps to position G. The translator marks position G with the code 0, 2. This causes the register-sender to output digit 2, which causes the outgoing second selector to step to level 2. On the primary route, the outgoing second selector was stepped to level 1. Since the trunks accessed from level 1 are all busy, the alternate route instructions from the translator have caused the register-sender to step the outgoing second selector to level 2.

5.15 Rotary switch SQO steps to position H and is once again under control of the T relays. The translator marks position H with the code 0, 1, 7. Relays T0, T1, and T7 operate, and rotary switch SQO steps to position M. The translator marks position M with the code 0, 2 which means delete the first dialed digit. Rotary switch SQO steps past position N. Beginning with position P, the last six customer dialed digits are read from code-reed storage and output as described in paragraph 4.05 except that the last digit is output from position V and the AR mark is in position W.



5.16 Second alternate.In this office, trunks have been provided from the third level, as well as the first and second levels; therefore, a second alternate route is possible.

5.17 If the primary route and the first alternate route trunks are busy, normally operated relays AR1 and AR2 will be restored. These two relays are normally operated as long as at least 1 trunk in the primary or 1 trunk in the first alternate route trunk group is idle.

5.18 When the calling party is switched through to the register-sender, dialtone is returned. For this example, we will assume the party dials the digit 2. The digit 2 is counted on the counting chain and stored on codelreeds, Figure 3. In this register-sender's time slot, timed battery is extended from the translator and closed through contacts of the operated codelreeds. Timed battery on leads N0 and N2 is extended through the translator commons to converter AND gate 5, Figure 4. The positive output of converter AND gate 5 is extended to inverter 53. Inverter 53, therefore, extends a negative output on lead N2 to the "A" digit program panel and then to code AND gate 10. Code AND gate 10, with negative battery on all its inputs, extends a positive output to route amplifier 10. Route amplifier 10 extends negative battery through the route field to levels 0, 2, 4, position A, of rotary switch SQO. Negative battery is also supplied to the AR level through unoperated contacts of relay AR1. The combination of 0, 2, 4 plus the AR mark causes the selector to be released, and rotary switch SQO to step to position E.

5.19 Position E, levels 0, 2, 4 are marked through the route diode pins and level AR through the unoperated contacts of relay AR2. The combination of 0, 2, 4 plus the AR mark causes rotary switch SQO to step to position J.

5.20 The translator marks position J with the code 0, 2, which causes the register-sender to output the digit 2 and the local first selector to be stepped to the second level. Rotary switch SQO steps to position K. The translator marks position K with the code 1, 2 which causes the register-sender to output the digit 3 and step the outgoing second selector to the third level. The selector hunts for and seizes an idle trunk to the tandem office. Rotary switch SQO steps to position L.

5.21 The translator marks position L with the code 0, 1, 7, which operates relays

T0, T1, and T7. Rotary switch SQO is stepped to position M.

5.22 The translator marks position M with the code 0, 2, which indicates delete the first dialed digit. Rotary switch SQO now steps to position P and begins outputting the last six dialed digits stored on the codelreeds as described in paragraph 4.05. When the sixth digit has been outputted, rotary switch SQO is stepped to position W. The translator marks the AR level at position W. Relays L and AR operate (relay MP already operated) and in turn operate relay RL which initiates release of the register-sender.

## 6. MIS-DIALED CALLS

6.01 When placing a local call, the calling party in this particular office must dial one of three codes, 334, 335, or 336. We will assume the calling party mis-dials the office code by dialing 337.

6.02 The registering and translation of the first two digits is as covered in paragraphs 3.02 through 3.06. When the calling party dials the third digit (7), timed battery is extended from the translator through operated contacts of the codelreeds to leads N1, N2, P1, P2, R0, and R7. Negative battery is extended to both inputs of converter AND gates 6, 16, and 30. These three AND gates extend positive outputs to their associated inverters 54, 64, and 78. The negative outputs of these inverters are extended on leads N3, P3, and R7 to the code field. The pins at the intersections N3/A8, P3/B8, R7/C8, and DP, TC/F8 extend the negative battery to the A, B, C, and F inputs of code AND gate 8. Code AND gate 8 now has a negative potential on all its inputs and extends a positive output to route amplifier 8.

6.03 Since this would be the second translation, rotary switch SQO is in position B. Route amplifier 8, via the route field, marks levels 0, 2, 4 of rotary switch SQO indicating "drop selector." Relays T0, T2, and T4 operate. Rotary switch SQO steps to position C. The translator marks position O with the code 0, 1. This causes the register-sender to output the digit 1 which steps the local first selector to level 1.

6.04 Rotary switch SQO steps to position D. The translator marks position D with the code 0, 2. This causes the special second selector to be stepped to level 2. From level 2, busy tone can be returned or the call

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can reach a recorder-announcer (depends upon the particular central-office policy). Rotary switch SQO steps to position E. The translator marks position E with the code 0, 1, 2, which means release the register-sender.

6.06 It is important to remember that although the calling party mis-dialed,

the third digit (7) was repeated to the local first selector. However, when levels 0, 2, 4 of rotary switch SQO are marked, the established switchtrain is released in order to re-route the call to the special second selector. Any subsequent digits dialed would be absorbed by the register-sender or the intercept facilities.