

EXPLANATION  
OF  
CONNECTOR CIRCUIT - P.A.B.X.  
REVERSE BATTERY  
SWITCH THROUGH ON SPECIFIED LEVELS  
1 AND 2 DIGIT TRUNKS  
BATTERY OR GROUND CONNECTED GENERATOR  
H-580089

FEATURES

1. Provides calling party release.
2. Provides code call service.
3. Provides conference call service.
4. Provides single digit trunk hunting service with or without switch through.
5. Provides restricted service on certain levels with single digit trunk hunting.
6. Provides discriminating service at line equipment with single digit trunk hunting service.
7. Provides trunk hunting in a group after the second digit is dialed.
8. Provides answer and disconnect supervision except on switch through levels.

OPERATION

1. Station to Station Calls (Regular Service Levels)

1.1 Seizure (Operated: V.O.N. springs)

Absence-of-ground on lead C marks this switch idle to preceding equipment. When this switch is seized, a loop is closed over leads +L and -L to relay A. Relay A operates and closes B and #2C. Relay B operates, grounds lead C to hold preceding switches operated and to mark this switch busy, closes lead CHAIN IN to lead CHAIN OUT, and grounds lead MOT. ST. Relay C operates, closes lead DIAL TONE to lead +L, and prepares a circuit to #1C and the VERT magnet in series.

1.2 Vertical Stepping (Operated: Relays A, B, and C and V.O.N. springs)

Relay A follows the pulses and, when at normal, opens B and closes #1C and the VERT magnet in series. The VERT magnet operates and steps the wipers to the desired level. Relays B and C remain operated during pulsing due to their slow-to-release characteristic. On the first vertical step the V.O.N. springs restore and open #2C.

After the last pulse of the digit, relay A reoperates, closes B and opens #1C and the VERT magnet. The VERT magnet restores. After its slow-to-release interval relay C restores, removes lead DIAL TONE from lead +L, and prepares a circuit to relay E and the ROT magnet in series.

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### 1.3 Rotary Stepping (Operated: Relays A and B)

Relay A follows the pulses of the next digit and, when at normal, opens B and closes E and the ROT magnet in series. Relay E operates, short-circuits contacts of relay G to lock the pulsing circuit, and removes #1K from wiper C to prevent relay K from operating when the wipers pass over free lines. The ROT magnet operates and steps the wipers to the desired bank contacts. Relays B and E remain operated during pulsing due to their slow-to-release characteristic. After the last pulse of the digit, relay A reoperates, closes B, and opens E and the ROT magnet. The ROT magnet restores. During the slow-to-release interval of relay E the called line is tested.

### 1.4 Testing the Called Line (Operated: Relays A, B, and E)

#### 1.41 Called Line Idle

If the called line is idle resistance battery is encountered on wiper C. After its slow-to-release interval, relay E restores and closes #1K to wiper C. Relay K operates, locks through its #2 winding, replaces resistance ground to wiper C with direct ground to mark the called line busy, closes lead INT. GEN. through #1F to wiper "-" and lead GEN. GRD. to wiper "+" ("X" wiring), or closes battery through #1F to wiper "-" and lead INT. GEN. to wiper "+" ("Y" wiring). Part of the generator current completes a circuit through capacitor M to the calling line to provide ringback tone. Relay F does not operate on alternating ringing current due to its slow-to-operate characteristic.

#### 1.42 Called Line Busy

If the called line is busy ground is encountered on wiper C. Relay G is closed to ground on wiper C. Relay G operates, prepares its locking circuit, and closes lead BUSY TONE through capacitor M to lead +L. After its slow-to-release interval, relay E restores and locks G.

### 1.5 Called Party Answers (Operated: Relays A, B, and K)

When the called party answers a direct current loop is closed via wipers "+" and "-" to #1F. Relay F operates its "X" contacts, locks through its #2 winding, operates completely, opens lead MOT. ST., opens leads INT. GEN. and GEN. GRD. (if used), closes leads +L and -L through to their respective wipers, and closes both windings of D via the called subscriber's loop. Relay D operates and closes H. Relay H operates and reverses battery polarity to the calling line for answer supervision. Transmission battery is supplied to the calling party through relay A and to the called party through relay D.

### 1.6 Release

#### 1.61 From a Completed Call (Operated: Relays A, B, D, F, H, and K)

If the calling party disconnects first the loop to A is opened. Relay A restores and opens B. Relay B restores, and opens relays D, F, H, and #2K. Relay H restores and removes ground from lead C to mark this switch idle and to release the preceding switches. Relay D restores and reverses battery polarity to the calling line. Relay F restores and opens leads +L and -L from their respective wipers. Relay K restores and closes the RLS magnet.

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The RLS magnet operates and releases the switch shaft. When the shaft returns to normal, the V.O.N. springs operate, disconnect lead CHAIN IN from lead CHAIN OUT, and open the RLS magnet. The RLS magnet restores. The switch is now at normal.

If the called party disconnects first, the loop to D is opened. Relay D restores and opens H. Relay H restores and reverses battery polarity to the calling line for disconnect supervision. When the calling party disconnects, the loop to A is opened. Relay A restores and opens B. Relay B restores, removes ground from lead C to release the preceding switches and to mark this switch idle, and opens relays F and K. Relay F restores and removes leads +L and -L from their respective wipers. Relay K restores and closes the RLS magnet. The RLS magnet operates and the switch returns to normal as described above.

## 1.62 From a Busy Condition (Operated: Relays A, B, and G)

When the calling party disconnects, the loop to A is opened. Relay A restores and opens B. Relay B restores, removes ground from lead C to release the preceding switches and to mark this switch idle, opens G, and closes the RLS magnet. Relay G restores and opens lead BUSY TONE. The RLS magnet operates and the switch returns to normal as described in Section 1.61.

## 2. Code Call Service (Regular Service Levels)

### General

When code call equipment is provided, it is connected to the tenth bank contact of some level (usually the seventh). To call someone over the code call system, the calling party dials the code call access number and the code number assigned to the desired party. The first two digits dialed into this switch cause this switch to step its wipers to the code call equipment and the last two digits are repeated by this switch and cause the code call equipment to operate the code call signals. To answer the call, the desired party dials a code call answer number from any telephone, causing the associated equipment to operate and complete the connection to the calling party through the code call equipment.

### 2.1 Seizure (Operated: V.O.N. springs)

Operation is the same as described in Section 1.1.

### 2.2 Vertical Stepping (Operated: Relays A, B, and C and V.O.N. springs)

Operation is the same as described in Section 1.2.

### 2.3 Rotary Stepping (Operated: Relays A and B)

Operation is the same as described in Section 1.3 except that on the tenth rotary step CAM SPGS 1-2-3 operate and prepare the circuit for repeating the succeeding pulses over wiper "+" to the equipment ahead.

### 2.4 Testing the Code Call Equipment (Operated: Relays A, B, and E and CAM SPGS 1-2-3)

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### 2.41 Code Call Equipment Idle

Operation is the same as described in Section 1.41 except that when relay K operates the pulsing circuit is transferred from relay E and the ROT magnet to wiper "+" via CAM SPGS 2-3.

### 2.42 Code Call Equipment Busy

Operation is the same as described in Section 1.42.

### 2.5 Repeating Impulses (Operated: Relays A, B, and K and CAM SPGS. 1-2-3)

Relay A follows the pulses of the next two digits and, when at normal, closes ground to the code call equipment via wiper "+". The code call equipment follows the pulses from A, moves its wipers to the desired bank contact, and causes the code bells to ring the desired code.

### 2.6 Called Party Answers (Operated: Relays A, B, and K and CAM SPGS 1-2-3)

When the called party dials the code call answer number, a connector steps its wipers to the code call answer bank contact. The "+" and "-" code call and code call answer bank contacts are multiplied, but reversed. The answering connector closes #1F via wiper "-" of this switch. Relay F operates, locks through #2F, closes both windings of D across wipers "+" and "-" to operate the ring cut-off relay in the answering connector, and connects leads +L and -L through to their respective wipers. Relay D operates in series with the back bridge relay of the answering connector and closes #1H. Relay H operates and reverses battery polarity to the calling line.

### 2.7 Release

#### 2.71 From a Completed Call (Operated: Relays A, B, D, F, H, and K and CAM SPGS.)

Operation is the same as described in Section 1.61 except that when the switch shaft is released, the CAM SPGS. restore.

#### 2.72 From a Busy Condition (Operated: Relays A, B, and G and CAM SPGS.)

Operation is the same as described in Section 1.62 except that when the switch shaft is released the CAM SPGS. restore.

## 3. Conference Call Service (Regular Service Levels)

### General

Conference service is provided for on any one bank contact of any level. The line leads of the conference number are multiplied from bank to bank on all connectors, but the C bank contact of the conference number is connected to lead CONF. PRIV. of the connector having access to that bank, making it possible for any number of connectors to switch through on the conference number.

#### 3.1 Seizure (Operated: V.O.N. Springs)

Operation is the same as described in Section 1.1.

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### 3.2 Vertical Stepping (Operated: Relays A, B, and C and V.O.N. Springs)

Operation is the same as described in Section 1.2.

### 3.3 Rotary Stepping (Operated: Relays A and B)

Operation is the same as described in Section 1.3.

### 3.4 Extending the Connection to the Conference (Operated: Relays A,B, and E)

After its slow-to-release interval, relay E restores and closes both windings of K in series via wiper C and lead CONF. PRIV. Relay K operates, locks through its #2 winding, and closes #1F and lead INT. GEN. to the conference "line" via wipers "+" and "-". An impedance bridged across the conference "line" closes #1F. Relay F operates its "X" contacts, locks through its #2 winding, operates completely, opens lead INT. GEN. to prevent ringing current from being sent out on the conference line, closes leads +L and -L to their respective wipers, and closes both windings of D via wipers "+" and "-". Relay D operates in series with the conference line impedance bridge and closes H. Relay H operates and reverses battery polarity to the calling line.

### 3.5 Release (Operated: Relays A, B, D, F, H, and K)

Operation is the same as described in Section 1.61.

## 4. Single Digit Trunk Hunting

### 4.1 Switch Through Service

#### 4.11 Seizure (Operated: V.O.N. Springs)

Operation is the same as described in Section 1.1.

#### 4.12 Vertical Stepping (Operated: Relays A,B, and C and V.O.N. Springs)

Operation proceeds as described in Section 1.2 except when the shaft reaches the desired level, the RIGHT NOR. POST SPGS. operate, close #1D and #2J in series, and prepare a circuit to #1J. During the slow-to-release interval of relay C, D operates, and closes G. Relay G operates, locks, closes lead BUSY TONE to lead +L, and prepares a circuit to relay E and the ROT. magnet in series via lead EC.

#### 4.13 Rotary Stepping (Operated: Relays A,B,C,D, and G and RIGHT NOR. POST SPGS.) (Leads C and EC or Jacks 9 and 15 strapped)

After its slow-to-release interval, relay C restores and closes E and the ROT. magnet in series via ground on lead EC. Relay E operates and closes O to wiper C. The ROT. magnet operates, steps the wipers onto the first bank contact, and opens its interrupter springs. The interrupter springs open G. Idle trunks are marked by battery on the associated C bank contact. If ground is encountered on the C bank contact the trunk is busy. Relay G restores, opens E and the ROT. magnet, and opens lead BUSY TONE. The ROT. magnet restores and closes G. Relay G operates and closes E and the ROT. magnet. The ROT. magnet operates, steps the wipers onto the next bank contact, and opens G. Relay E is slow-to-release and holds operated during stepping. Relay interrupted rotary stepping continues until an idle trunk is found or the eleventh rotary step is taken. (All-Trunks-Busy).

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#### 4.14 Switch Through (Operated: Relays A,B,D, and E and RIGHT NOR. POST SPGS)

When an idle trunk is found, resistance battery on the associated C bank contact via wiper C prevents G from re-operating. After its slow-to-release interval, E restores and closes #1K to wiper C. Relay K operates its "X" contacts, locks through its #2 winding, operates completely, grounds wiper C, closes #1J, and opens #2J and #1D in series. Relay J operates, attaches lead CONF. PRIV. to lead C, closes leads +L and -L through to their respective wipers, opens A and B, and opens lead MOT. ST. Relays A, B, and D restore. Ground returned via wiper C from the succeeding switch holds K and J operated, and maintains ground on lead C.

#### 4.15 All-Trunks-Busy Condition

(Operated: Relays A, B, D, E, and G and RIGHT NOR. POST SPGS)

When all trunks on the desired level are busy, the ROT magnet operates, opens G, and steps the wipers to the eleventh rotary position. On the eleventh rotary step, CAM SPGS 4-5-6 operate, prepare a circuit to G, and open E and the ROT magnet. Relay G restores. The ROT magnet restores and closes G. Relay G operates, closes lead BUSY TONE to lead +L, and prepares its locking circuit. After its slow-to-release interval, relay E restores and closes the locking circuit to G.

#### 4.16 Release

##### 4.161 Release After Switch Through

(Operated: Relays K and J and RIGHT NOR. POST SPGS)

When the calling party disconnects and releases succeeding equipment ground is removed from wiper C to open K and J. Relay J restores. Relay K restores and closes the RLS magnet. The RLS magnet operates and releases the switch shaft. The RIGHT NOR. POST SPGS. restore. When the shaft returns to normal the V.O.N. springs operate and opens the RLS magnet. The RLS magnet restores. The switch is now at normal.

##### 4.162 Release from All-Trunks-Busy Condition

(Operated; Relays A, B, D, and G and RIGHT NOR. POST SPGS)

When the calling party disconnects, the loop to A is opened. Relay A restores and opens B. Relay B restores, opens D and G, and closes the RLS magnet. Relay D restores. Relay G restores and opens lead BUSY TONE. The RLS magnet operates and releases the switch shaft. The RIGHT NOR. POST SPGS restore. When the shaft returns to normal, the V.O.N. springs operate and open the RLS magnet. The RLS magnet restores. The switch is now at normal.

#### 4.17 Restricted Service

If restricted service is required on certain lines, leads C and EC are not strapped. The switch is seized and stepped vertically as previously described, but rotary stepping cannot take place when relay G operates, and busy tone is returned to the calling party.

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#### 4.2 Non-Switch Through Service

##### 4.21 Seizure (Operated: V.O.N. Springs)

Operation is the same as described in Section 1.1.

##### 4.22 Vertical Stepping (Operated: Relays A, B, and C and V.O.N. Springs)

Operation is the same as described in Section 1.2 except when the shaft reaches the desired level, the LEFT NOR. POST SPGS. operate and close #1D and #2J. Relay D operates and operation proceeds as described in Section 4.12.

##### 4.23 Rotary Stepping

(Operated: Relays A, B, C, D, and G, and LEFT NOR. POST SPGS.)

Operation is the same as described in Section 4.13.

##### 4.24 Idle Trunk Found

(Operated: Relays A, B, D, and E and LEFT NOR. POST SPGS.)

When an idle trunk is found, resistance battery on the associated C bank contact prevents G from re-operating. After its slow-to-release interval, relay E restores and closes #1K to wiper C. Relay K operates its "X" contacts, locks through its #2 winding, operates completely, opens #1D and #2J, grounds wiper C, and closes lead INT. GEN. and lead GEN GRD ("X" wiring only) to the called line via #1F. Part of the ringing current completes a circuit through capacitor M to the calling line for ringback tone. Relay D restores.

##### 4.25 All-Trunks-Busy Condition

(Operated: Relays A, B, D, E, and G and LEFT NOR. POST SPGS.)

Operation is the same as described in Section 4.15.

##### 4.26 Called Party Answers (Operated: Relays A, B, and K and LEFT NOR. POST SPGS.)

Operation is the same as described in Section 1.5.

##### 4.27 Release

##### 4.271 Release from Completed Call

(Operated: Relays A, B, D, F, H, and K and LEFT NOR. POST SPGS.)

Operation is the same as described in Section 1.61 except, when the shaft returns to normal, the LEFT NOR. POST SPGS. restore.

##### 4.272 Release from All-Trunks-Busy Condition

(Operated: Relays A, B, D, and G and LEFT NOR. POST SPGS.)

Operation is the same as described in Section 4.162 except, when the shaft returns to normal, the LEFT NOR. POST SPGS. restore.

##### 4.28 Restricted Service

When restricted service is required, LEFT NOR. POST SPGS. 3-4 are adjusted

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not to operate when the wipers are stepped to the restricted level. Rotary stepping cannot take place when relay G operates, and busy tone is returned to the calling party.

## 5. Trunk Hunting In a Group After Second Digit is Dialed

NOTE: On 2 digit trunk hunting numbers, the EC and G bank contacts are strapped on each trunk of the group except the last.

### 5.1 Seizure (Operated: V.O.N. Springs)

Operation is the same as described in Section 1.1.

### 5.2 Vertical Stepping (Operated: Relays A, B, and C and V.O.N. Springs)

Operation is the same as described in Section 1.2.

### 5.3 Rotary Stepping (Operated: Relays A and B)

Operation is the same as described in Section 1.3.

### 5.4 Testing the Called Line (Operated: Relays A, B, and E)

#### 5.41 Called Line Idle

Operation is the same as described in Section 1.41.

#### 5.42 Called Line Busy (Operated: Relays A, B, and E)

If the first line is busy, ground is encountered on wiper C. Relay G operates, prepares a circuit to #1Z, and closes lead BUSY TONE to lead +L. After its slow-to-release interval, relay E restores and closes #2Z to ground on wiper EC. Relay Z operates, locks, closes #1D in series with #2J, closes #1Z, removes lead BUSY TONE from lead +L, and prepares a circuit to E and the ROT. magnet. Relay D operates and closes E and the ROT. magnet. The ROT. magnet operates, steps the wipers to the next line, and opens G. Relay E operates. Relay G restores, opens #1Z, and opens E and the ROT. magnet. The ROT. magnet restores and closes G to wiper C. Relay interrupted rotary stepping continues as described in Section 4.13 until an idle trunk is found or the last trunk in the group is reached.

### 5.5 Idle Trunk Encountered (Operated: Relays A, B, D, E, and Z)

When an idle trunk is found, resistance battery is encountered on wiper C (and wiper EC). Relay Z restores and opens #1D. Relay D restores. After its slow-to-release interval, relay E restores and closes #1K to wiper C. Further operation is described in Section 1.41.

### 5.6 Last Trunk In a Group Busy (Operated: Relays A, B, D, E, and Z)

On the last trunk in a group the C and EC bank contacts are not strapped. The ROT. magnet operates, opens G, and steps the wipers to the last trunk of the group. Relay G restores and opens E and the ROT. magnet. Absence-of-ground on wiper EC opens #2Z. Relay Z restores and opens #1D. Relays E and D restore. The ROT. magnet restores and closes G. Relay G operates. Further operation is as described in Section 1.42.

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# 5.7 Called Party Answers (Operated: Relays A, B, and K)

Operation is the same as described in Section 1.5.

# 5.8 Release

Operation is the same as described in Section 1.6.

- (5) RGB:pak
- (6) RKE:rn