

CROSSBAR SYSTEMS
 NO. 3
 2 WAY PLUG ENDED TRUNK
 CIRCUIT
 DIAL OR MULTIFREQUENCY PULSING
 REVERSE BATTERY SUPERVISION

TABLE OF CONTENTS	PAGE	TABLE OF CONTENTS (Cont)	PAGE
<u>SECTION I - GENERAL DESCRIPTION . . .</u>	1	<u>7. OUTGOING CALL - CALLED CUSTOMER</u>	
<u>1. PURPOSE OF CIRCUIT</u>	1	<u>DISCONNECTS FIRST - SC7.</u>	16
<u>2. GENERAL DESCRIPTION OF OPERATION</u>	1	<u>8. TESTING.</u>	18
<u>SECTION II - DETAILED DESCRIPTION . .</u>	1	<u>9. MISCELLANEOUS.</u>	19
<u>1. INCOMING SEIZURE AND CALL COMPLE-</u>		<u>SECTION III - REFERENCE DATA</u>	1
<u>TION - SC1</u>	1	<u>1. WORKING LIMITS</u>	1
<u>2. LINE-BUSY OR FAILURE TO MATCH -</u>		<u>2. FUNCTIONAL DESIGNATIONS.</u>	1
<u>SC2.</u>	3	<u>3. FUNCTIONS.</u>	1
<u>3. INCOMING CALL - CALLING CUSTOMER</u>		<u>4. CONNECTING CIRCUITS.</u>	1
<u>DISCONNECTS FIRST - SC3.</u>	5	<u>5. MANUFACTURING TESTING REQUIRE-</u>	
<u>4. INCOMING CALL - CALLED CUSTOMER</u>		<u>MENTS.</u>	1
<u>DISCONNECTS FIRST - SC4.</u>	8	<u>6. TAKING EQUIPMENT OUT OF SERVICE.</u>	1
<u>5. OUTGOING CALL - SC5.</u>	11		
<u>6. OUTGOING CALL - CALLING CUSTOMER</u>			
<u>DISCONNECTS FIRST - SC6.</u>	13		

SECTION I - GENERAL DESCRIPTION

1. PURPOSE OF CIRCUIT

1.01 This trunk circuit is used to provide 2-way traffic between offices. It utilizes either dial pulsing or multifrequency pulsing in either direction and reverse battery supervision.

2. GENERAL DESCRIPTION OF OPERATION

2.01 Incoming Call:

- (a) This trunk circuit is seized by an off-hook signal from the originating office.
- (b) An off-hook signal is sent back to the originating office to acknowledge seizure.
- (c) An incoming register is connected to this trunk via the incoming register link.
- (d) The incoming register sends an on-hook signal back to the originating office to indicate that it is ready to receive digits.
- (e) The originating office pulses the required digits to this office using either dial pulsing or multifrequency pulsing as required.
- (f) The received digits are stored in the incoming register.
- (g) The incoming register transfers the received digits to the marker, associates the marker with this trunk, and then releases the incoming register link connection between itself and this trunk.
- (h) If the called line is busy, the marker will connect this trunk to line-busy tone on level nine of the trunk switch. The calling customer will then hang up restoring all circuits to normal.
- (i) If the marker is unable to set up a channel to the called line, it will connect this trunk to overflow tone on level nine of the trunk switch. The calling customer will then hang up restoring all circuits to normal.
- (j) If the called line is idle and a channel is available, the marker will connect this trunk to the called line and set this trunk up for the required ringing.

- (k) This trunk will ring the called line.
 - (l) If the call is not answered, the calling customer will hang up restoring all circuits to normal.
 - (m) If the call is answered, ringing will be tripped and an off-hook answer signal will be sent back to the originating office.
 - (n) The customers can now talk.
 - (o) If the calling customer disconnects first, an on-hook signal is sent from the originating office which restores all circuits to normal and drops the called line to line lockout. The called line will return to its idle state when the called customer hangs up.
 - (p) If the called customer disconnects first, an on-hook signal is sent to the originating office. All circuits will restore to normal when the calling party hangs up, or if the calling party should fail to hang up within a maximum of 32 seconds, a timed release circuit will release the channel. The trunk will then return to its idle state when the calling customer hangs up or is time released.
- 2.02 Outgoing Call:
- (a) When this trunk circuit is seized by the marker for an outgoing call, this trunk sends an off-hook signal to the terminating office.
 - (b) The marker transfers the required dialed digits to an outgoing sender, connects the outgoing sender to this trunk via the outgoing sender link, connects this trunk to the calling line, and then releases itself.
 - (c) The terminating office sends an off-hook signal to this office to acknowledge seizure.
 - (d) The terminating office sends an on-hook signal to this office as a start pulsing signal when the incoming register is attached.
 - (e) If the outgoing sender is unable to pulse the digits, it will send a reorder signal to this trunk. This will cause all circuits to restore to normal and drop the calling line to line lockout. The calling line will return to its idle state when the calling party hangs up.

(f) If the outgoing sender is able to pulse the digits, it will do so using either dial pulsing or multifrequency pulsing as required.

(g) The terminating office will connect this trunk to line-busy tone if the called line is busy, to overflow tone if a channel is not available, or to the called line if it is idle and a channel is available. In the latter case, the terminating office will ring the called line.

(h) If the calling party hangs up due to line-busy, overflow, or no answer, all circuits will be restored to normal.

(i) If the call is answered, ringing will be tripped and an off-hook answer signal will be sent back to the originating office.

(j) The customers can now talk.

(k) If the calling customer disconnects first, an on-hook signal is sent to the terminating office and all circuits restore to normal.

(l) If the called customer disconnects first, an on-hook signal is sent from the terminating office. All circuits will restore to normal when the calling customer hangs up, or if the calling customer should fail to hang up within a maximum of 32 seconds, a timed release circuit will restore all circuits to normal and drop the calling line to line lockout. The calling line will return to its idle state when the calling customer hangs up.

SECTION II - DETAILED DESCRIPTION

1. INCOMING SEIZURE AND CALL COMPLETION -
SC1

- 1.01 This circuit is seized for an incoming call by a loop closure on the T and R leads which operates the A relay.
- 1.02 The operation of relay A:
- (a) Operates the A1 relay.
 - (b) Opens the FT lead.
- 1.03 The operation of relay A1:
- (a) Disables the TMB timer.
 - (b) Opens the TF lead.
 - (c) Opens the TG and TT lead loop.
 - (d) Operates the AA relay.
 - (e) Operates the IN relay.
- 1.04 The operation of relay AA:
- (a) Partially closes resistance battery on the ST lead.
 - (b) Partially closes an operating path for the SA relay.
 - (c) Partially closes the B lead.
 - (d) Opens a TMA timer control path.
 - (e) Transfers an operating path of the RL thermal relay.
- 1.05 The operation of relay IN:
- (a) Partially closes the RC relay lock path.
 - (b) Partially closes the C2 lead.
 - (c) Partially closes resistance battery on the ST lead.
 - (d) Transfers a TMA timer control path.
 - (e) Operates the SA relay.
 - (f) Opens an S lead holding path.
 - (g) Changes the TMB timing from 750 to 920 milliseconds to 460 to 545 milliseconds.
- (h) Operates the BSY relay.
- 1.06 The operation of relay SA:
- (a) Reverses the T and R leads as an off-hook signal to acknowledge seizure.
 - (b) Transfers a TMA timer control ground and provides a lock path for the MRP relay.
 - (c) Transfers an operating path of the RL thermal relay.
 - (d) Provides a control ground for the TMB timer.
- 1.07 The operation of relay BSY:
- (a) Connects the G relay to the TMB timer.
 - (b) Provides its own locking ground.
 - (c) Connects resistance battery to the ST lead.
 - (d) Opens the FT lead.
 - (e) Opens the TG and TT lead loop.
 - (f) Opens the TF lead.
- 1.08 The activated ST lead causes an incoming register to be connected to this trunk via the incoming register link.
- 1.09 The incoming register grounds the CO lead operating the CO relay.
- 1.10 The operation of relay CO:
- (a) Opens the ST lead and provides a holding path for the CT relay.
 - (b) Transfers the incoming T and R leads from this circuit to the incoming register.
 - (c) Closes a TMB timer control path.
 - (d) Provides a lock path for the BSY relay.
 - (e) Grounds the BL lead.
- 1.11 The transfer of the T and R leads releases the A, A1, AA, and SA relays in tandem.
- 1.12 The incoming register reverses the T and R leads as an on-hook start pulsing signal to the originating office.

- 1.13 The originating office pulses the required digits to this office using either dial pulsing or multifrequency pulsing as required.
- 1.14 The received digits are stored in the incoming register.
- 1.15 The incoming register transfers the received digits to the marker, associates the marker with this trunk, and grounds the CT lead operating the CT relay.
- 1.16 The operation of relay CT:
- (a) Transfers the T and R leads from the incoming register back to this circuit.
 - (b) Transfers an SA relay operating lead.
 - (c) Grounds the S lead.
 - (d) Removes a control ground from the TMA timer.
 - (e) Provides its own locking ground.
 - (f) Opens a control path of the TMB timer.
- 1.17 The transfer of the T and R leads re-operates the A, A1, and AA relays in tandem.
- 1.18 The marker seizes this trunk by grounding the F lead operating the LF relay.
- 1.19 The operation of relay LF:
- (a) Grounds the SW lead.
 - (b) Connects the R3 relay to the R3 lead.
 - (c) Connects the R2 relay to the R2 lead.
 - (d) Connects the TPR relay to the TPR lead.
 - (e) Grounds the JC lead.
 - (f) Opens the RC relay lock path and partially grounds the RA lead.
 - (g) Connects the RC relay to the RC lead.
 - (h) Grounds the TTI lead.
 - (i) Transfers the S lead from this circuit to the SL lead.
 - (j) Transfers the T and R leads from this circuit to the T1 and R1 leads, respectively.
 - (k) Opens the PU relay operating path.
 - (l) Operates the DS relay.
- 1.20 The marker sets up the connection from this trunk to the called line and operates the RC relay and also operates the R2, R3, and TPR relays if they are required.
- 1.21 The operation of relay R2 and/or R3:
- (a) Close their own lock paths.
 - (b) Set up the required ringing code.
 - (c) Delay the operation of the PU relay until the PU lead is grounded if required.
- 1.22 The operation of relay TPR:
- (a) Reverses the ringing and ground applied to the R and T leads.
 - (b) Closes its own lock path.
- 1.23 The operation of relay RC:
- (a) Transfers a CH relay ground from the RL thermal relay to itself.
 - (b) Transfers the T and R leads to the ringing circuit.
 - (c) Provides a locking ground for the R2, R3, and TPR relays.
 - (d) Grounds the RA lead.
 - (e) Closes a ground for later use by the S lead.
 - (f) Provides an operating ground (if required) and locking ground for the PU relay.
 - (g) Closes the C3 ringing lead.
- 1.24 When the marker is completed it releases the LF relay.
- 1.25 The release of relay LF operates the PU relay directly or after the PU lead is grounded as required.
- 1.26 The operation of relay PU:
- (a) Applies ringing to the line.
 - (b) Closes the C1 ringing lead.
 - (c) Transfers its locking circuit in place of its operating circuit.
- 1.27 If the call is not answered, the calling customer will hang up releasing the A, A1, and AA relays in tandem.
- 1.28 The release of the A1 relay activates the TMB timer which operates the G relay.

- 1.29 The operation of relay G:
- (a) Releases the IN relay.
 - (b) Opens a BSY relay operating and lock path.
 - (c) Opens the ST lead.
- 1.30 The release of relay IN releases the RC and CT relays.
- 1.31 The release of relay RC releases the PU relay and also the R2, R3, and TPR relays if they are operated.
- 1.32 The release of relay CT releases the CO and DS relays. Released relay DS releases the channel.
- 1.33 The release of relay CO releases the BSY relay.
- 1.34 The release of relay BSY releases the G relay restoring the trunk to its idle state.
- 1.35 If the call is answered, the RT relay will operate over the line loop.
- 1.36 The operation of relay RT releases the RC relay.
- 1.37 The release of relay RC releases the RT and PU relays and also the R2, R3, and TPR relays if they are operated. It also connects the calling customer to the called customer.
- 1.38 The S relay operates over the line loop which:
- (a) Operates the SA relay.
 - (b) Partially closes a lock path for the SI relay.
- 1.39 The operation of relay SA:
- (a) See 1.06.
 - (b) Sends an off-hook signal to the originating office.
 - (c) Activates the TMA timer which operates the CH relay.
- 1.40 The operation of relay CH:
- (a) Transfers a ground from the MRP relay locking path to the RL thermal relay locking path.
 - (b) Opens the TF lead.
 - (c) Opens an S lead grounding path.
 - (d) Replaces direct ground with message register potential on the S lead when the MRP relay is also operated.
 - (e) Grounds the A lead.
- 1.41 The trunk is now in the talking state.
2. LINE-BUSY OR FAILURE TO MATCH - SC2
- 2.01 This circuit is seized for an incoming call by a loop closure on the T and R leads which operates the A relay.
- 2.02 The operation of relay A:
- (a) Operates the AI relay.
 - (b) Opens the FT lead.
- 2.03 The operation of relay AI:
- (a) Disables the TMB timer.
 - (b) Opens the TF lead.
 - (c) Opens the TG and TT lead loop.
 - (d) Operates the AA relay.
 - (e) Operates the IN relay.
- 2.04 The operation of relay AA:
- (a) Partially closes resistance battery on the ST lead.
 - (b) Partially closes an operating path for the SA relay.
 - (c) Partially closes the B lead.
 - (d) Opens a TMA timer control path.
 - (e) Transfers an operating path of the RL thermal relay.
- 2.05 The operation of relay IN:
- (a) Partially closes the RC relay lock path.
 - (b) Partially closes the C2 lead.
 - (c) Partially closes resistance battery on the ST lead.

- (d) Transfers a TMA timer control path.
 - (e) Operates the SA relay.
 - (f) Opens an S lead holding path.
 - (g) Changes the TMB timing from 750 to 920 milliseconds to 460 to 545 milliseconds.
 - (h) Operates the BSY relay.
- 2.06 The operation of relay SA:
- (a) Reverses the T and R leads as an off-hook signal to acknowledge seizure.
 - (b) Transfers a TMA timer control ground and provides a lock path for the MRP relay.
 - (c) Transfers an operating path of the RL thermal relay.
 - (d) Provides a control ground for the TMB timer.
- 2.07 The operation of relay BSY:
- (a) Connects the G relay to the TMB timer.
 - (b) Provides its own locking ground.
 - (c) Connects resistance battery to the ST lead.
 - (d) Opens the FT lead.
 - (e) Opens the TG and TT lead loop.
 - (f) Opens the TF lead.
- 2.08 The activated ST lead causes an incoming register to be connected to this trunk via the incoming register link.
- 2.09 The incoming register grounds the CO lead operating the CO relay.
- 2.10 The operation of relay CO:
- (a) Opens the ST lead and provides a holding path for the CT relay.
 - (b) Transfers the incoming T and R leads from this circuit to the incoming register.
 - (c) Closes a TMB timer control path.
- (d) Provides a lock path for the BSY relay.
 - (e) Grounds the BL lead.
- 2.11 The transfer of the T and R leads releases the A, A1, AA, and SA relays in tandem.
- 2.12 The incoming register reverses the T and R leads as an on-hook start pulsing signal to the originating office.
- 2.13 The originating office pulses the required digits to this office using either dial pulsing or multifrequency pulsing as required.
- 2.14 The received digits are stored in the incoming register.
- 2.15 The incoming register transfers the received digits to the marker, associates the marker with this trunk, and grounds the CT lead operating the CT relay.
- 2.16 The operation of relay CT:
- (a) Transfers the T and R leads from the incoming register back to this circuit.
 - (b) Transfers an SA relay operating lead.
 - (c) Grounds the S lead.
 - (d) Removes a control ground from the TMA timer.
 - (e) Provides its own locking ground.
 - (f) Opens a control path of the TMB timer.
- 2.17 The transfer of the T and R leads reoperates the A, A1, and AA relays in tandem.
- 2.18 The marker seizes this trunk by grounding the F lead operating the LF relay.
- 2.19 The operation of LF:
- (a) Grounds the SW lead.
 - (b) Connects the R3 relay to the R3 lead.

- (c) Connects the R2 relay to the R2 lead.
 - (d) Connects the TPR relay to the TPR lead.
 - (e) Grounds the JC lead.
 - (f) Opens the RC relay lock path and partially grounds the RA lead.
 - (g) Connects the RC relay to the RC lead.
 - (h) Grounds the TTI lead.
 - (i) Transfers the S lead from this circuit to the SL lead.
 - (j) Transfers the T and R leads from this circuit to the T1 and R1 leads, respectively.
 - (k) Opens the PU relay operating path.
 - (l) Operates the DS relay.
- 2.20 The marker sets up the channel from this trunk to line-busy tone if the called line is busy, or to overflow tone if a channel is not available to complete the call.
- 2.21 When the marker is completed, it releases the LF relay which connects the tone to the calling line.
- 2.22 When the calling customer hangs up, the A, A1, and AA relays release in tandem.
- 2.23 The release of the A1 relay activates the TMB timer which operates the G relay.
- 2.24 The operation of relay G:
- (a) See 1.29.
 - (b) Releases the IN relay.
- 2.25 The release of relay IN releases the CT relay.
- 2.26 The release of relay CT releases the CO and DS relays and the tone channel.
- 2.27 The release of relay CO releases the BSY relay.
- 2.28 The release of relay BSY releases the G relay restoring the trunk to its idle state.
3. INCOMING CALL - CALLING CUSTOMER DIS-CONNECTS FIRST - SC3
- 3.01 This circuit is seized for an incoming call by a loop closure on the T and R leads which operates the A relay.
- 3.02 The operation of relay A:
- (a) Operates the A1 relay.
 - (b) Opens the FT lead.
- 3.03 The operation of relay A1:
- (a) Disables the TMB timer.
 - (b) Opens the TF lead.
 - (c) Opens the TG and TT lead loop.
 - (d) Operates the AA relay.
 - (e) Operates the IN relay.
- 3.04 The operation of relay AA:
- (a) Partially closes resistance battery on the ST lead.
 - (b) Partially closes an operating path for the SA relay.
 - (c) Partially closes the B lead.
 - (d) Opens a TMA timer control path.
 - (e) Transfers an operating path of the RL thermal relay.
- 3.05 The operation of relay IN:
- (a) Partially closes the RC relay lock path.
 - (b) Partially closes the C2 lead.
 - (c) Partially closes resistance battery on the ST lead.
 - (d) Transfers a TMA timer control path.
 - (e) Operates the SA relay.
 - (f) Opens an S lead holding path.
 - (g) Changes the TMB timing from 750 to 920 milliseconds to 460 to 545 milliseconds.
 - (h) Operates the BSY relay.
- 3.06 The operation of relay SA:
- (a) Reverses the T and R leads as an off-hook signal to acknowledge seizure.
 - (b) Transfers a TMA timer control ground and provides a lock path for the MRP relay.
 - (c) Transfers an operating path of the RL thermal relay.

- (d) Provides a control ground for the TMB timer.
- 3.07 The operation of relay BSY:
 - (a) Connects the G relay to the TMB timer.
 - (b) Provides its own locking ground.
 - (c) Connects resistance battery to the ST lead.
 - (d) Opens the FT lead.
 - (e) Opens the TG and TT lead loop.
 - (f) Opens the TF lead.
- 3.08 The activated ST lead causes an incoming register to be connected to this trunk via the incoming register link.
- 3.09 The incoming register grounds the CO lead operating the CO relay.
- 3.10 The operation of relay CO.
 - (a) Opens the ST lead and provides a holding path for the CT relay.
 - (b) Transfers the incoming T and R leads from this circuit to the incoming register.
 - (c) Closes a TMB timer control path.
 - (d) Provides a lock path for the BSY relay.
 - (e) Grounds the BL lead.
- 3.11 The transfer of the T and R leads releases the A, A1, AA, and SA relays in tandem.
- 3.12 The incoming register reverses the T and R leads as an on-hook start pulsing signal to the originating office.
- 3.13 The originating office pulses the required digits to this office using either dial pulsing or multifrequency pulsing as required.
- 3.14 The received digits are stored in the incoming register.
- 3.15 The incoming register transfers the received digits to the marker, associates the marker with this trunk, and grounds the CT lead operating the CT relay.
- 3.16 The operation of relay CT:
 - (a) Transfers the T and R leads from the incoming register back to this circuit.
 - (b) Transfers an SA relay operating lead.
 - (c) Grounds the S lead.
 - (d) Removes a control ground from the TMA timer.
 - (e) Provides its own locking ground.
 - (f) Opens a control path of the TMB timer.
- 3.17 The transfer of the T and R leads reoperates the A, A1, and AA relays in tandem.
- 3.18 The marker seizes this trunk by grounding the F lead operating the LF relay.
- 3.19 The operation of LF:
 - (a) Grounds the SW lead.
 - (b) Connects the R3 relay to the R3 lead.
 - (c) Connects the R2 relay to the R2 lead.
 - (d) Connects the TPR relay to the TPR lead.
 - (e) Grounds the JC lead.
 - (f) Opens the RC relay lock path and partially grounds the RA lead.
 - (g) Connects the RC relay to the RC lead.
 - (h) Grounds the TTI lead.
 - (i) Transfers the S lead from this circuit to the SL lead.
 - (j) Transfers the T and R leads from this circuit to the T1 and R1 leads, respectively.
 - (k) Opens the PU relay operating path.
 - (l) Operates the DS relay.
- 3.20 The marker sets up the connection from this trunk to the called line and operates the RC relay and also operates the R2, R3, and TPR relays if they are required.

- 3.21 The operation of relay R2 and/or R3:
- (a) Close their own lock paths.
 - (b) Set up the required ringing code.
 - (c) Delay the operation of the PU relay until the PU lead is grounded if required.
- 3.22 The operation of relay TPR:
- (a) Reverses the ringing and ground applied to the R and T leads.
 - (b) Closes its own lock path.
- 3.23 The operation of relay RC:
- (a) Transfers a CH relay ground from the RL thermal relay to itself.
 - (b) Transfers the T and R leads to the ringing circuit.
 - (c) Provides a locking ground for the R2, R3, and TPR relays.
 - (d) Grounds the RA lead.
 - (e) Closes a ground for later use by the S lead.
 - (f) Provides an operating ground (if required) and locking ground for the PU relay.
 - (g) Closes the C3 ringing lead.
- 3.24 When the marker is completed it releases the LF relay.
- 3.25 The release of relay LF operates the PU relay directly or after the PU lead is grounded as required.
- 3.26 The operation of relay PU:
- (a) Applies ringing to the line.
 - (b) Closes the CI ringing lead.
 - (c) Transfers its locking circuit in place of its operating circuit.
- 3.27 If the call is not answered, the calling customer will hang up releasing the A, A1, and AA relays in tandem.
- 3.28 The release of the A1 relay activates the TMB timer which operates the G relay.
- 3.29 The operation of relay G:
- (a) Releases the IN relay.
 - (b) Opens a BSY relay operating and lock path.
 - (c) Opens the ST lead.
- 3.30 The release of relay IN releases the RC and CT relays.
- 3.31 The release of relay RC releases the PU relay and also the R2, R3, and TPR relays if they are operated.
- 3.32 The release of relay CT releases CO and DS relays and drops the called customer to line lockout.
- 3.33 The release of relay CO releases the BSY relay.
- 3.34 The release of relay BSY releases the G relay restoring the trunk to its idle state.
- 3.35 If the call is answered, the RT relay will operate over the line loop.
- 3.36 The operation of relay RT releases the RC relay.
- 3.37 The release of relay RC releases the RT and PU relays and also the R2, R3, and TPR relays if they are operated. It also connects the calling customer to the called customer.
- 3.38 The S relay operates over the line loop which:
- (a) Operates the SA relay.
 - (b) Partially closes a lock path for the S1 relay.
- 3.39 The operation of relay SA:
- (a) See 1.06.
 - (b) Sends an off-hook signal to the originating office.
 - (c) Activates the TMA timer which operates the CH relay.
- 3.40 The operation of relay CH:
- (a) Transfers a ground from the MPR relay locking path to the RL thermal relay locking path.

- (b) Opens the TF lead.
- (c) Opens an S lead grounding path.
- (d) Replaces direct ground with message register potential on the S lead when the MRP relay is also operated.
- (e) Grounds the O lead.
- 3.41 The trunk is now in the talking state.
- 3.42 When the calling customer disconnects, relays A, Al, and AA release in tandem.
- 3.43 The release of the Al relay activates the TMB timer which operates the G relay.
- 3.44 The operation of relay G:
 - (a) See 1.29.
 - (b) Releases the IN relay.
- 3.45 The release of relay IN releases the CT relay.
- 3.46 The release of relay CT:
 - (a) Releases the CO relay.
 - (b) Releases the DS relay.
 - (c) Releases the channel connecting the trunk to the line, and drops the called line to line lockout.
 - (d) Releases the S relay.
- 3.47 The release of the S relay releases relay SA.
- 3.48 The release of relay SA:
 - (a) Sends an on-hook disconnect signal to the originating office.
 - (b) Releases the CH relay.
- 3.49 The release of relay CO releases the BSY relay.
- 3.50 The release of relay BSY releases the G relay restoring the trunk to its idle state.
- 3.51 The called line will return to its idle state when the called customer hangs up.
- 4. INCOMING CALL - CALLED CUSTOMER DISCONNECTS FIRST - SC4
- 4.01 This circuit is seized for an incoming call by a loop closure on the T and R leads which operates the A relay.

- 4.02 The operation of relay A:
 - (a) Operates the Al relay.
 - (b) Opens the FT lead.
- 4.03 The operation of relay Al:
 - (a) Disables the TMB timer.
 - (b) Opens the TF lead.
 - (c) Opens the TG and TT lead loop.
 - (d) Operates the AA relay.
 - (e) Operates the IN relay.
- 4.04 The operation of relay AA:
 - (a) Partially closes resistance battery on the ST lead.
 - (b) Partially closes an operating path for the SA relay.
 - (c) Partially closes the B lead.
 - (d) Opens a TMA timer control path.
 - (e) Transfers an operating path of the RL thermal relay.
- 4.05 The operation of relay IN:
 - (a) Partially closes the RC relay lock path.
 - (b) Partially closes the C2 lead.
 - (c) Partially closes resistance battery on the ST lead.
 - (d) Transfers a TMA timer control path.
 - (e) Operates the SA relay.
 - (f) Opens an S lead holding path.
 - (g) Changes the TMB timing from 750 to 920 milliseconds to 460 to 545 milliseconds.
 - (h) Operates the BSY relay.
- 4.06 The operation of relay SA:
 - (a) Reverses the T and R leads as an off-hook signal to acknowledge seizure.
 - (b) Transfers a TMA timer control ground and provides a lock path for the MRP relay.

- (c) Transfers an operating path of the RL thermal relay.
 - (d) Provides a control ground for the TMB timer.
- 4.07 The operation of relay BSY:
- (a) Connects the G relay to the TMB timer.
 - (b) Provides its own locking ground.
 - (c) Connects resistance battery to the ST lead.
 - (d) Opens the FT lead.
 - (e) Opens the TG and TT lead loop.
 - (f) Opens the TF lead.
- 4.08 The activated ST lead causes an incoming register to be connected to this trunk via the incoming register link.
- 4.09 The incoming register grounds the CO lead operating the CO relay.
- 4.10 The operation of relay CO:
- (a) Opens the ST lead and provides a holding path for the CT relay.
 - (b) Transfers the incoming T and R leads from this circuit to the incoming register.
 - (c) Closes a TMB timer control path.
 - (d) Provides a lock path for the BSY relay.
 - (e) Grounds the BL lead.
- 4.11 The transfer of the T and R leads releases the A, A1, AA, and SA relays in tandem.
- 4.12 The incoming register reverses the T and R leads as an on-hook start pulsing signal to the originating office.
- 4.13 The originating office pulses the required digits to this office using either dial pulsing or multifrequency pulsing as required.
- 4.14 The received digits are stored in the incoming register.
- 4.15 The incoming register transfers the received digits to the marker, associates the marker with this trunk, and grounds the CT lead operating the CT relay.
- 4.16 The operation of relay CT:
- (a) Transfers the T and R leads from the incoming register back to this circuit.
 - (b) Transfers an SA relay operating lead.
 - (c) Grounds the S lead.
 - (d) Removes a control ground from the TMA timer.
 - (e) Provides its own locking ground.
 - (f) Opens a control path of the TMB timer.
- 4.17 The transfer of the T and R leads reoperates the A, A1, and AA relays in tandem.
- 4.18 The marker seizes this trunk by grounding the F lead operating the LF relay.
- 4.19 The operation of LF:
- (a) Grounds the SW lead.
 - (b) Connects the R3 relay to the R3 lead.
 - (c) Connects the R2 relay to the R2 lead.
 - (d) Connects the TPR relay to the TPR lead.
 - (e) Grounds the JC lead.
 - (f) Opens the RC relay lock path and partially grounds the RA lead.
 - (g) Connects the RC relay to the RC lead.
 - (h) Grounds the TTI lead.
 - (i) Transfers the S lead from this circuit to the SL lead.
 - (j) Transfers the T and R leads from this circuit to the T1 and R1 leads, respectively.
 - (k) Opens the PU relay operating path.
 - (l) Operates the DS relay.
- 4.20 The marker sets up the connection from this trunk to the called line and operates the RC relay and also operates the R2, R3, and TPR relays if they are required.
- 4.21 The operation of relay R2 and/or R3:
- (a) Close their own lock paths.
 - (b) Set up the required ringing code.

- (c) Delay the operation of the PU relay until the PU lead is grounded if required.
- 4.22 The operation of relay TPR:
- (a) Reverses the ringing and ground applied to the R and T leads.
 - (b) Closes its own lock path.
- 4.23 The operation of relay RC:
- (a) Transfers a CH relay ground from the RL thermal relay to itself.
 - (b) Transfers the T and R leads to the ringing circuit.
 - (c) Provides a locking ground for the R2, R3, and TPR relays.
 - (d) Grounds the RA lead.
 - (e) Closes a ground for later use by the S lead.
 - (f) Provides an operating ground (if required) and locking ground for the PU relay.
 - (g) Closes the C3 ringing lead.
- 4.24 When the marker is completed it releases the LF relay.
- 4.25 The release of relay LF operates the PU relay directly or after the PU lead is grounded as required.
- 4.26 The operation of relay PU:
- (a) Applies ringing to the line.
 - (b) Closes the C1 ringing lead.
 - (c) Transfers its locking circuit in place of its operating circuit.
- 4.27 If the call is not answered, the calling customer will hang up releasing the A, A1, and AA relays in tandem.
- 4.28 The release of the A1 relay activates the TMB timer which operates the G relay.
- 4.29 The operation of relay G:
- (a) Releases the IN relay.
 - (b) Opens a BSY relay operating and lock path.
 - (c) Opens the ST lead.
- 4.30 The release of relay IN releases the RC and CT relays.
- 4.31 The release of relay RC releases the PU relay and also the R2, R3, and TPR relays if they are operated.
- 4.32 The release of relay CT releases the CO and DS relays. Released relay DS releases the channel.
- 4.33 The release of relay CO releases the BSY relay.
- 4.34 The release of relay BSY releases the G relay restoring the trunk to its idle state.
- 4.35 If the call is answered, the RT relay will operate over the line loop.
- 4.36 The operation of relay RT releases the RC relay.
- 4.37 The release of relay RC releases the RT and PU relays and also the R2, R3, and TPR relays if they are operated. It also connects the calling customer to the called customer.
- 4.38 The S relay operates over the line loop which:
- (a) Operates the SA relay.
 - (b) Partially closes a lock path for the SI relay.
- 4.39 The operation of relay SA:
- (a) See 1.06.
 - (b) Sends an off-hook signal to the originating office.
 - (c) Activates the TMA timer which operates the CH relay.
- 4.40 The operation of relay CH:
- (a) Transfers a ground from the MRP relay locking path to the RL thermal relay locking path.
 - (b) Opens the TF lead.
 - (c) Opens an S lead grounding path.
 - (d) Replaces direct ground with message register potential on the S lead when the MRP relay is also operated.
 - (e) Grounds the A lead.
- 4.41 The trunk is now in the talking state.
- 4.42 When the called customer disconnects, relays S and SA release in tandem.

- 4.43 The release of the SA relay:
- (a) Sends an on-hook disconnect signal to the originating office.
 - (b) Starts the RL thermal relay timing.
- 4.43 If the calling customer hangs up before the RL thermal relay operates, the A, A1, and AA relays will release in tandem.
- 4.44 The release of the A1 relay activates the TMB timer which operates the G relay.
- 4.45 The release of the AA relay deactivates the RL thermal relay timing.
- 4.46 The operation of relay G:
- (a) See 1.29.
 - (b) Releases the IN relay.
- 4.47 The release of relay IN releases the CT relay.
- 4.48 The release of relay CT:
- (a) Releases the CO and CH relays.
 - (b) Releases the DS relay.
 - (c) The released relay DS releases the channel connecting the trunk to the line.
- 4.49 The release of relay CO releases the BSY relay.
- 4.50 The release of relay BSY releases the G relay restoring the trunk to its idle state.
- 4.51 If the RL thermal relay operates before the calling customer hangs up, it will operate the RC relay.
- 4.52 The operation of relay RC:
- (a) See 1.23.
 - (b) Releases the RL thermal relay.
 - (c) Releases the channel connecting the trunk to the called line.
- 4.53 When the calling customer hangs up or is time released, the A, A1, and AA relays will release in tandem.
- 4.54 The release of the A1 relay activates the TMB timer which operates the G relay.
- 4.55 The operation of relay G:
- (a) See 1.29.
 - (b) Releases the IN relay.
- 4.56 The release of relay IN releases the CT relay.
- 4.57 The release of relay CT releases the CO, DS, and CH relays.
- 4.58 The release of relay CH releases the RC relay.
- 4.59 The release of relay CO releases the BSY relay.
- 4.60 The release of relay BSY releases the G relay restoring the trunk to its idle state.
5. OUTGOING CALL - SC5
- 5.01 When the marker selects this trunk for an outgoing call, it operates the F relay.
- 5.02 The operation of relay F:
- (a) Transfers the T and R leads from the A relay to the CS relay. This sends an off-hook signal to the terminating office as a seizure signal.
 - (b) Opens the CH relay operating path.
 - (c) Operates the SG relay.
 - (d) Grounds the VG lead.
 - (e) Operates the S1 relay.
 - (f) Opens the F lead and operates the LF relay.
 - (g) Locks itself to the TF lead.
 - (h) Operates the MRP relay.
 - (i) Connects the SS lead to the SSB lead.
 - (j) Grounds the TMB timer control lead.
 - (k) Operates the TPC relay if the calling customer is the tip party on a 2-party line.
 - (l) Opens the DS relay operating path.
- 5.03 The operation of relay LF:
- (a) See 1.19.
- 5.04 The operation of relay S1:
- (a) Provides a ground for later use on the S lead.

- (b) Bypasses the SA relay contacts on the T and R leads.
 - (c) Transfers the T and R leads from the A relay to the CS relay.
 - (d) Partially connects ground to the B lead.
 - (e) Closes its own lock path.
 - (f) Transfers a TMA timer control path.
 - (g) Operates the RLS relay.
- 5.05 The operation of relay MRP:
- (a) Partially closes the MRS-RP lead.
 - (b) Replaces direct ground with message register potential on the S lead when the CH relay is also operated.
 - (c) Opens the F relay operating path.
 - (d) Provides its own lock path.
- 5.06 The operation of relay TPC:
- (a) Replaces MRS-RP with MRS-TP message register potential.
 - (b) Provides its own lock path.
- 5.07 The operation of relay SG:
- (a) Provides locking ground for the TPC relay.
 - (b) Opens the IN relay operating path.
 - (c) Transfers a TMB timer control path.
 - (d) Provides its own lock path and operates the BSY relay.
- 5.08 The operation of relay BSY:
- (a) See 1.07.
- 5.09 The marker associates an outgoing sender with this trunk via the outgoing sender link.
- 5.10 The outgoing sender operates the D relay.
- 5.11 The operation of relay D:
- (a) Transfers the T and R leads from this circuit to the outgoing sender.
 - (b) Transfers the S lead from the AB lead to the SL lead.
 - (c) Grounds the AB lead.
 - (d) Grounds the TMB timer control lead.
 - (e) Opens the AA relay operating path.
- 5.12 When the marker has set up the channel between this trunk and the calling line, it releases the F and LF relays in tandem and then releases itself.
- 5.13 The release of relay LF operates the S relay over the line loop.
- 5.14 The operation of relay S:
- (a) Closes a locking path for the S1 relay.
 - (b) Operates the SA relay.
- 5.15 The operation of relay SA:
- (a) See 1.06.
- 5.16 The terminating office sends an off-hook signal to this office to acknowledge seizure.
- 5.17 The terminating office sends an on-hook signal to this office as a start pulsing signal when the incoming register is attached.
- 5.18 If the outgoing sender is unable to pulse the digits, it will perform its reorder function which removes ground from the S lead, releasing the channel between this trunk and the calling line.
- 5.19 The release of the channel:
- (a) Drops the calling line to line lock-out.
 - (b) Releases the S relay.
- 5.20 The release of relay S releases the SA and S1 relays.
- 5.21 The release of relay SA releases the MRP relay.
- 5.22 The release of relay S1 removes ground from the AB lead, which causes the outgoing sender to release the D relay.
- 5.23 The release of relay D:
- (a) Sends an on-hook signal to the distant office.
 - (b) Activates the TMB timer operating the G relay.
- 5.24 The operation of relay G:
- (a) See 1.29.

- (b) Releases the SG, RLS, and BSY relays.
- 5.25 The release of relay SG releases the TPC relay if it is operated.
- 5.26 The release of relay BSY releases the G relay, restoring the trunk to its idle state.
- 5.27 The calling line will return to its idle state when the calling customer hangs up.
- 5.28 If the outgoing sender is able to pulse the digits, it will do so using either dial pulsing or multifrequency pulsing as required.
- 5.29 Upon completion of outpulsing, the outgoing sender will release the D relay and then release itself.
- 5.30 The release of relay D will connect the trunk to the line.
- 5.31 The terminating office will connect this trunk to line-busy tone if the called line is busy, to overflow tone if a channel is not available, or to the called line if it is idle and a channel is available. In the latter case, the terminating office will ring the called line.
- 5.32 If the calling customer hangs up due to line-busy, overflow, or no answer, the S relay will release.
- 5.33 The release of relay S releases the SA and S1 relays.
- 5.34 The release of relay S1:
 - (a) Releases the channel between this trunk and the calling line.
 - (b) Sends an on-hook signal to the distant office.
- 5.35 The release of relay SA:
 - (a) Releases the MRP relay.
 - (b) Activates the TMB timer operating the G relay.
- 5.36 The operation of relay G:
 - (a) See 1.29.
 - (b) Releases the SG, RLS, and BSY relays.
- 5.37 The release of relay SG releases the TPC relay if it is operated.
- 5.38 The release of relay BSY releases the G relay, restoring the trunk to its idle state.
- 5.39 If the call is answered, ringing will be tripped and an off-hook answer signal will operate the CS relay.
- 5.40 The operation of relay CS operates the AA relay.
- 5.41 The operation of relay AA:
 - (a) See 1.04.
 - (b) Activates the TMA timer operating the CH relay.
- 5.42 The operation of relay CH:
 - (a) See 1.40.
 - (b) Places message register potential on the S lead.
 - (c) Releases the MRP relay.
- 5.43 The trunk is now in the talking state.
- 6. OUTGOING CALL - CALLING CUSTOMER DISCONNECTS FIRST - SC6
- 6.01 When the marker selects this trunk for an outgoing call, it operates the F relay.
- 6.02 The operation of relay F:
 - (a) Transfers the T and R leads from the A relay to the CS relay. This sends an off-hook signal to the terminating office as a seizure signal.
 - (b) Opens the CH relay operating path.
 - (c) Operates the SG relay.
 - (d) Grounds the VG lead.
 - (e) Operates the S1 relay.
 - (f) Opens the F lead and operates the LF relay.
 - (g) Locks itself to the TF lead.
 - (h) Operates the MRP relay.
 - (i) Connects the SS lead to the SSB lead.
 - (j) Grounds the TMB timer control lead.
 - (k) Operates the TPC relay if the calling customer is the tip party on a 2-party line.
 - (l) Opens the DS relay operating path.
- 6.03 The operation of relay LF:
 - (a) See 1.19.

- 6.04 The operation of relay S1:
- (a) Provides a ground for later use on the S lead.
 - (b) Bypasses the SA relay contacts on the T and R leads.
 - (c) Transfers the T and R leads from the A relay to the CS relay.
 - (d) Partially connects ground to the B lead.
 - (e) Closes its own lock path.
 - (f) Transfers a TMA timer control path.
 - (g) Operates the RLS relay.
- 6.05 The operation of relay MRP:
- (a) Partially closes the MRS-RP lead.
 - (b) Replaces direct ground with message register potential on the S lead when the CH relay is also operated.
 - (c) Opens the F relay operating path.
 - (d) Provides its own lock path.
- 6.06 The operation of relay TPC:
- (a) Replaces MRS-RP with MRS-TP message register potential.
 - (b) Provides its own lock path.
- 6.07 The operation of relay SG:
- (a) Provides locking ground for the TPC relay.
 - (b) Opens the IN relay operating path.
 - (c) Transfers a TMB timer control path.
 - (d) Provides its own lock path and operates the BSY relay.
- 6.08 The operation of relay BSY:
- (a) See 1.07.
- 6.09 The marker associates an outgoing sender with this trunk via the outgoing sender link.
- 6.10 The outgoing sender operates the D relay.
- 6.11 The operation of relay D:
- (a) Transfers the T and R leads from this circuit to the outgoing sender.
 - (b) Transfers the S lead from the AB lead to the SL lead.
 - (c) Grounds the AB lead.
 - (d) Grounds the TMB timer control lead.
 - (e) Opens the AA relay operating path.
- 6.12 When the marker has set up the channel between this trunk and the calling line, it releases the F and LF relays in tandem and then releases itself.
- 6.13 The release of relay LF operates the S relay over the line loop.
- 6.14 The operation of relay S:
- (a) Closes a locking path of the S1 relay.
 - (b) Operates the SA relay.
- 6.15 The operation of relay SA:
- (a) See 1.06.
- 6.16 The terminating office sends an off-hook signal to this office to acknowledge seizure.
- 6.17 The terminating office sends an on-hook signal to this office as a start pulsing signal when the incoming register is attached.
- 6.18 If the outgoing sender is unable to pulse the digits, it will perform its reorder function which removes ground from the S lead, releasing the channel between this trunk and the calling line.
- 6.19 The release of the channel:
- (a) Drops the calling line to line lock-out.
 - (b) Releases the S relay.
- 6.20 The release of relay S releases the SA and S1 relays.
- 6.21 The release of relay SA releases the MRP relay.
- 6.22 The release of relay S1 removes ground from the AB lead, which causes the outgoing sender to release the D relay.
- 6.23 The release of relay D:
- (a) Sends an on-hook signal to the distant office.
 - (b) Activates the TMB timer operating the G relay.

- 6.24 The operation of relay G:
- (a) See 1.29.
 - (b) Releases the SG, RLS, and BSY relays.
- 6.25 The release of relay SG releases the TPC relay if it is operated.
- 6.26 The release of relay BSY releases the G relay, restoring the trunk to its idle state.
- 6.27 The calling line will return to its idle state when the calling customer hangs up.
- 6.28 If the outgoing sender is able to pulse the digits, it will do so using either dial pulsing or multifrequency pulsing as required.
- 6.29 Upon completion of outpulsing, the outgoing sender will release the D relay and then release itself.
- 6.30 The release of relay D will connect the trunk to the line.
- 6.31 The terminating office will connect this trunk to line-busy tone if the called line is busy, to overflow tone if a channel is not available, or to the called line if it is idle and a channel is available. In the latter case, terminating office will ring the called line.
- 6.32 If the calling customer hangs up due to line-busy, overflow, or no answer, the S relay will release.
- 6.33 The release of relay S releases the SA and S1 relays.
- 6.34 The release of relay S1:
- (a) Releases the channel between this trunk and the calling line.
 - (b) Sends an on-hook signal to the distant office.
- 6.35 The release of relay SA:
- (a) Releases the MRP relay.
 - (b) Activates the TMB timer operating the G relay.
- 6.36 The operation of relay G:
- (a) See 1.29.
 - (b) Releases the SG, RLS, and BSY relays.
- 6.37 The release of relay SG releases the TPC relay if it is operated.
- 6.38 The release of relay BSY releases the G relay, restoring the trunk to its idle state.
- 6.39 If the call is answered, ringing will be tripped and an off-hook answer signal will operate the CS relay.
- 6.40 The operation of relay CS operates the AA relay.
- 6.41 The operation of relay AA:
- (a) See 1.04.
 - (b) Activates the TMA timer operating the CH relay.
- 6.42 The operation of relay CH:
- (a) See 1.40.
 - (b) Places message register potential on the S lead.
 - (c) Releases the MRP relay.
- 6.43 The trunk is now in the talking state.
- 6.44 When the calling customer disconnects, relay S releases.
- 6.45 The release of relay S releases the S1 and SA relays.
- 6.46 The release of relay S1:
- (a) Releases the CS and CH relays.
 - (b) Releases the channel between this trunk and the calling line.
 - (c) Sends an on-hook signal to the distant office.
- 6.47 The release of relay CS releases the AA relay.
- 6.48 The release of relay SA activates the TMB timer and operates the G relay.
- 6.49 The operation of relay G:
- (a) See 1.29.
 - (b) Releases the SG, RLS, and BSY relays.
- 6.50 The release of relay SG releases the TPC relay if it is operated.
- 6.51 The release of relay BSY releases the G relay, restoring the trunk to its idle state.

7. OUTGOING CALL - CALLED CUSTOMER DIS-CONNECTS FIRST - SC7

- 7.01 When the marker selects this trunk for an outgoing call, it operates the F relay.
- 7.02 The operation of relay F:
- (a) Transfers the T and R leads from the A relay to the CS relay. This sends an off-hook signal to the terminating office as a seizure signal.
 - (b) Opens the CH relay operating path.
 - (c) Operates the SG relay.
 - (d) Grounds the VG lead.
 - (e) Operates the S1 relay.
 - (f) Opens the F lead and operates the LF relay.
 - (g) Locks itself to the TF lead.
 - (h) Operates the MRP relay.
 - (i) Connects the SS lead to the SSB lead.
 - (j) Grounds the TMB timer control lead.
 - (k) Operates the TPC relay if the calling customer is the tip party on a 2-party line.
 - (l) Opens the DS relay operating path.
- 7.03 The operation of relay LF:
- (a) See 1.19.
- 7.04 The operation of relay S1:
- (a) Provides a ground for later use on the S lead.
 - (b) Bypasses the SA relay contacts on the T and R leads.
 - (c) Transfers the T and R leads from the A relay to the CS relay.
 - (d) Partially connects ground to the B lead.
 - (e) Closes its own lock path.
 - (f) Transfers a TMA timer control path.
 - (g) Operates the RLS relay.
- 7.05 The operation of relay MRP:
- (a) Partially closes the MRS-RP lead.
 - (b) Replaces direct ground with message register potential on the S lead when the CH relay is also operated.
 - (c) Opens the F relay operating path.
 - (d) Provides its own lock path.
- 7.06 The operation of relay TPC:
- (a) Replaces MRS-RP with MRS-TP message register potential.
 - (b) Provides its own lock path.
- 7.07 The operation of relay SG:
- (a) Provides locking ground for the TPC relay.
 - (b) Opens the IN relay operating path.
 - (c) Transfers a TMB timer control path.
 - (d) Provides its own lock path and operates the BSY relay.
- 7.08 The operation of relay BSY:
- (a) See 1.07.
- 7.09 The marker associates an outgoing sender with this trunk via the outgoing sender link.
- 7.10 The outgoing sender operates the D relay.
- 7.11 The operation of relay D:
- (a) Transfers the T and R leads from this circuit to the outgoing sender.
 - (b) Transfers the S lead from the AB lead to the SL lead.
 - (c) Grounds the AB lead.
 - (d) Grounds the TMB timer control lead.
 - (e) Opens the AA relay operating path.
- 7.12 When the marker has set up the channel between this trunk and the calling line, it releases the F and LF relays in tandem and then releases itself.
- 7.13 The release of relay LF operates the S relay over the line loop.
- 7.14 The operation of relay S:
- (a) Closes a locking path for the S1 relay.
 - (b) Operates the SA relay.
- 7.15 The operation of relay SA:
- (a) See 1.06.

- 7.16 The terminating office sends an off-hook signal to this office to acknowledge seizure.
- 7.17 The terminating office sends an on-hook signal to this office as a start pulsing signal when the incoming register is attached.
- 7.18 If the outgoing sender is unable to pulse the digits, it will perform its reorder function which removes ground from the S lead, releasing the channel between this trunk and the calling line.
- 7.19 The release of the channel:
- (a) Drops the calling line to line lockout.
 - (b) Releases the S relay.
- 7.20 The release of relay S releases the SA and S1 relays.
- 7.21 The release of relay SA releases the MRP relay.
- 7.22 The release of relay S1 removes ground from the AB lead, which causes the outgoing sender to release the D relay.
- 7.23 The release of relay D:
- (a) Sends an on-hook signal to the distant office.
 - (b) Activates the TMB timer operating the G relay.
- 7.24 The operation of relay G:
- (a) See 1.29.
 - (b) Releases the SG, RLS, and BSY relays.
- 7.25 The release of relay SG releases the TPC relay if it is operated.
- 7.26 The release of relay BSY releases the G relay restoring the trunk to its idle state.
- 7.27 The calling line will return to its idle state when the calling customer hangs up.
- 7.28 If the outgoing sender is able to pulse the digits, it will do so using either dial pulsing or multifrequency pulsing as required.
- 7.29 Upon completion of outpulsing, the outgoing sender will release the D relay and then release itself.
- 7.30 The release of relay D will connect the trunk to the line.
- 7.31 The terminating office will connect this trunk to line-busy tone if the called line is busy, to overflow tone if a channel is not available, or to the called line if it is idle and a channel is available. In the latter case, the terminating office will ring the called line.
- 7.32 If the calling customer hangs up due to line-busy, overflow, or no answer, the S relay will release.
- 7.33 The release of relay S releases the SA and S1 relays.
- 7.34 The release of relay S1:
- (a) Releases the channel between this trunk and the calling line.
 - (b) Sends an on-hook signal to the distant office.
- 7.35 The release of relay SA:
- (a) Releases the MRP relay.
 - (b) Activates the TMB timer operating the G relay.
- 7.36 The operation of relay G:
- (a) See 1.29.
 - (b) Releases the SG, RLS, and BSY relays.
- 7.37 The release of relay SG releases the TPC relay if it is operated.
- 7.38 The release of relay BSY releases the G relay restoring the trunk to its idle state.

7.39 If the call is answered, ringing will be tripped and an off-hook answer signal will operate the CS relay.

7.40 The operation of relay CS operates the AA relay.

7.41 The operation of relay AA:

- (a) See 1.04.
- (b) Activates the TMA timer operating the CH relay.

7.42 The operation of relay CH:

- (a) See 1.40.
- (b) Places message register potential on the S lead.
- (c) Releases the MRP relay.

7.43 The trunk is now in the talking state.

7.44 When the called customer disconnects, relays CS and AA release in tandem.

7.45 The release of the AA relay starts the RL thermal relay timing.

7.46 If the calling customer hangs up before the RL thermal relay operates, the S relay will release.

7.47 The release of relay S releases the S1 and SA relays.

7.48 The release of relay S1:

- (a) Releases the channel between this trunk and the calling line.
- (b) Sends an on-hook signal to the distant office.

7.49 The release of relay SA:

- (a) Deactivates the RL thermal relay timing.
- (b) Activates the TMB timer and operates the G relay.
- (c) Releases the CH relay.

7.50 The operation of relay G:

- (a) See 1.29
- (b) Releases the SG, RLS, and BSY relays.

7.51 The release of relay SG releases the TPC relay if it is operated.

7.52 The release of relay BSY releases the G relay, restoring the trunk to its idle state.

7.53 If the RL thermal relay operates before the calling customer hangs up, it will operate the RC relay.

7.54 The operation of relay RC:

- (a) See 1.23.
- (b) Releases the RL thermal relay.
- (c) Releases the channel connecting the trunk to the calling line.

7.55 The release of the channel:

- (a) Drops the calling line to line lock-out.
- (b) Releases the S relay.

7.56 The release of relay S releases the S1 and SA relays.

7.57 The release of relay S1 sends an on-hook signal to the distant office.

7.58 The release of relay SA:

- (a) Releases the RC and CH relays.
- (b) Activates the TMB timer which operates the G relay.

7.59 The operation of relay G:

- (a) See 1.29.
- (b) Releases the SG, RLS, and BSY relays.

7.60 The release of relay SG releases the TPC relay if it is operated.

7.61 The release of relay BSY releases the G relay, restoring the trunk to its idle state.

7.62 The calling line will return to its idle state when the calling customer hangs up.

8. TESTING

8.01 Testing of the outgoing features of this trunk is performed by setting up a test connection to this trunk from a test line. Routine operations are performed from the test line in the same manner as for a regular service call.

8.02 Testing of the incoming features of this trunk is performed by accessing the T and R leads through jack T1. This enables the test employee to control the supervisory circuits of this trunk and to dial pulse, multifrequency pulse, and talk into it.

9. MISCELLANEOUS

9.01 The T and R capacitors are provided to isolate the input and output circuits.

9.02 The T1 and R1 capacitors are provided to transmit some ringing energy to the calling customer.

9.03 The C and D capacitors and S, T, and T1 resistors are the timing elements of the TMA and TMB timer circuits.

9.04 The ST resistor is used to limit the current on the ST lead.

9.05 The MB and A diodes are used as unidirectional current control elements.

9.06 The S network is provided to protect the diodes in the line circuits.

SECTION III - REFERENCE DATA

1. WORKING LIMITS

- 1.01 See the No. 3 crossbar keysheet for customer line supervision limits.
- 1.02 2500-ohm maximum trunk loop.
- 1.03 30,000-ohm minimum insulation resistance.

2. FUNCTIONAL DESIGNATIONS

2.01 Relays

<u>Designation</u>	<u>Meaning</u>
A	Calling Supervisory
AI	Auxiliary Calling Supervisory
AA	Auxiliary Supervisory
BSY	Busy
CH	Charge
CO	Cut Off
CS	Called Supervisory
CT	Cut Through
D	Sender Connected
DS	Delay Seizure
F	Frame
G	Trunk Release
IN	Incoming
LF	Auxiliary Frame
MRP	Message Register Pulse
PU	Pickup
R2	Auxiliary Ringing
R3	Auxiliary Ringing
RC	Ringing Control
RL	Timed Release
RLS	Release
RT	Ring Trip
S	Supervisory
S1	Sleeve

Designation

Meaning

- SA Auxiliary Supervisory
- SG Outgoing Call
- TPC Tip Party Charge
- TPR Tip Party Ringing

3. FUNCTIONS

- 3.01 See SECTIONS I and II for functions of this circuit.

4. CONNECTING CIRCUITS

- 4.01 When this circuit is listed on a key-sheet, the connecting information thereon shall be followed.

- (a) Trunk Switch and Connector Circuit - SD-26383-01.
- (b) Incoming Register Link Circuit - SD-26394-01.
- (c) Outgoing Sender Link Circuit - SD-26395-01.
- (d) Traffic Usage Recorder Circuit - SD-96494-01.
- (e) PRTD Circuit - SD-26414-01.
- (f) Test Circuit - SD-26411-01.
- (g) Time Delay Control Circuit - SD-94820-01.

5. MANUFACTURING TESTING REQUIREMENTS

- 5.01 This circuit shall be capable of performing all the functions listed in this Circuit Description and meeting the requirements listed in the Circuit Requirements Tables.

6. TAKING EQUIPMENT OUT OF SERVICE

- 6.01 If it is desired to remove this trunk from service for trouble or other reasons, the test circuit is arranged to ground the MB lead which operates the BSY relay. This sets the trunk in the busy state.

- 6.02 The test circuit can ground the MB lead by either of the following methods:

- (a) Insertion of a make-busy plug in the associated TRK MB- jack.

(b) Operation of the remote make-busy facilities if they are provided.

6.03 Removal of ground from the MB lead will restore this circuit to service.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 5245-GFC

WE DEPT-25820-JRF-KLF-MH