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CIRCUIT DESCRIPTION

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PBX SYSTEMS
NO. 756A
BUSY VERIFICATION
AUXILIARY TRUNK CIRCUIT

CHANGES

D. Description of Changes

D.1 The rating of this circuit is changed from AT&T
Standard to A&M Only.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 3224-WVS-RVL

PBX SYSTEMS
NO. 756A
BUSY VERIFICATION
AUXILIARY TRUNK CIRCUIT

TABLE OF CONTENTS	PAGE	
<u>SECTION I - GENERAL DESCRIPTION</u>	1	<u>6. ALARM INFORMATION</u> 5
<u>1. PURPOSE OF CIRCUIT</u>	1	<u>7. TAKING EQUIPMENT OUT OF SERVICE</u> 5
<u>2. GENERAL DESCRIPTION OF OPERATION</u>	1	<u>SECTION IV - REASONS FOR REISSUE</u> 5
<u>A. General</u>	1	<u>SECTION I - GENERAL DESCRIPTION</u>
<u>B. Attendant Action</u>	1	<u>1. PURPOSE OF CIRCUIT</u>
<u>SECTION II - DETAILED DESCRIPTION</u>	2	1.01 The busy verification auxiliary trunk provides a method, auxiliary to attendant trunk 2, for establishing a talking connection between a PBX attendant and an idle, busy, or busy and camped-on station.
<u>1. SELECTION AND DIALING (SC1)</u>	2	<u>2. GENERAL DESCRIPTION OF OPERATION</u>
<u>A. General</u>	2	<u>A. General</u>
<u>B. Activating Busy Verification Auxiliary Trunk</u>	2	2.01 The busy verification feature is associated with attendant trunk 2 only. It is activated by first operating the pick-up key for attendant trunk 2 and then operating the associated DIAL BACK key.
<u>C. Marker Action</u>	2	2.02 Operation of the DIAL BACK key causes insertion of the busy verification auxiliary trunk circuit between the attendant trunk and the marker and also transfers the tens-units registration of the attendant trunk to U0.
<u>D. Verification Denied - Messages Registration Pulsing On Sleeves</u>	2	2.03 Transfer of tens-units registration to U0 gives the busy verification circuit a trunk class of service during marker action so that a connection may be established to a busy station.
<u>2. COMPLETING BUSY VERIFICATION CALL</u>	3	2.04 Connections between the marker and the busy verification circuits are arranged to ignore the camp-on stop action of the marker so that a connection may be established to a station which is busy and
<u>A. Call To Idle Station (SC2)</u>	3	
<u>B. Call To Busy Station (SC3)</u>	3	
<u>C. Call To Busy And Camped-On Station</u>	4	
<u>3. RELEASE OF BUSY VERIFICATION CONNECTION (SC4)</u>	4	
<u>SECTION III - REFERENCE DATA</u>	4	
<u>1. WORKING LIMITS</u>	4	
<u>2. FUNCTIONAL DESIGNATIONS</u>	4	
<u>3. FUNCTIONS</u>	4	
<u>4. CONNECTING CIRCUIT</u>	5	
<u>5. MANUFACTURING TESTING REQUIREMENTS</u>	5	

camped on.

B. Attendant Action

- 2.05 Activation of the busy verification feature by operation of the pickup and DIAL BACK keys results in the attachment of a register and return of dial tone to attendant.
- 2.06 With the register attached, the attendant dials the number of the station to be verified. Because of the trunk class indication and disregard of camp-on stop signals, the attendant is connected to the station regardless of an idle, busy, or busy and camped-on condition.
- 2.07 With a connection established to an idle station, the busy verification circuit furnishes ringing and, when the station answers, furnishes talking battery.
- 2.08 When the connection is established to a busy or busy and camped-on station, the attendant's taking path bridges the busy circuit through capacitors and neither ringing supply nor talking battery is furnished.
- 2.09 If option Z is provided, cut-through by the busy verification auxiliary trunk to a busy station activates a warning tone generator. This applies periodic bursts of tone (beeps) to the busy circuit as a warning that the attendant has established a monitoring connection.
- 2.10 With option R, the attendant will be able to talk on a busy connection.

SECTION II - DETAILED DESCRIPTION

I. SELECTION AND DIALING (SC1)

A. General

- 1.01 Attendant trunk 2 is picked up by operating the associated pickup key in the cordless position circuit. This results in the attachment of the marker, and in the case of marker action, attachment of a dial pulse register. At this time the attendant trunk functions as if the busy verification auxiliary trunk features were not provided.
- 1.02 If after operation of the pickup key, the attendant momentarily operates the DIAL BACK key. Talking and control circuits between the marker and attendant trunk 2 are rerouted via the busy verification auxiliary trunk circuit to provide busy verification features.

B. Activating Busy Verification Auxiliary Trunk

1.03 Momentary operation of the cordless position circuit DIAL BACK key operates relay NT in the cordless position circuit. This operates relay ST which performs the following functions:

- (a) Locks operated via released relay HM and operated relay ON in the attendant trunk circuit.
- (b) Operates relays BV and MKBV.

1.04 Relay BV operated:

- (a) Releases relay OUT in the attendant trunk circuit.
- (b) Transfers marker lead S from the attendant trunk circuit to a path for operating relay SL via released relays BY, RS, and RT.
- (c) Prepares locking paths for relays EY, RS, RT, and HM.
- (d) Locks via relay AC in the attendant trunk circuit.
- (e) Releases trunk hold magnet THM06 which releases the register.
- (f) Opens lead U6 to the marker and connects lead U6 of attendant trunk 2 to marker lead U0 via relay HM released.
- (g) Opens attendant trunk circuit lead IT07 to the marker and prepares a new operating path for trunk hold magnet THM06.
- (h) Opens lead NN to the marker, preventing the operation of relay IR-- in the inward restriction circuit, when the called station is inward restricted (option V).
- (i) Provides ground to the tone generator to make it operate as a free running generator.

1.05 Relay MKBV operated:

- (a) Opens marker lead ST90-1 preventing central office trunk 0 from being seized by the marker while the busy verification connection is being set up.
- (b) Prepares a path for operating relay HM and trunk hold magnet THM06 from marker lead ST90-1.

- (c) Locks to ground on marker lead LK.

C. Marker Action

1.06 Release of magnet THM06 operates marker relay TR0 starting marker action. With marker relay U0 operated, relay COT in the dial pulse register will operate. This establishes a trunk class for the busy verification call.

1.07 In completing a connection to a register, the marker applies ground to lead ST90-1. This operates relay HM and reoperates magnet THM06.

1.08 Relay HM operated:

- (a) Opens lead U0 to the marker.
- (b) Opens the original operating path for relay MKBV.
- (c) Releases relay ST.
- (d) Locks operated via released relay MC and operated relay BV.

1.09 When a connection between the attendant trunk and the dial pulse register is established, the marker releases and relay SL is held operated by a 100-ohm ground from the dial pulse register circuit.

1.10 Relay SL operated prepares a path for operating relay P in the ring lead of the trunk circuit.

1.11 When attachment of the dial pulse register is completed, the attendant receives dial tone as an indication that dialing may start.

1.12 Relays BV, SL, and HM are operated and relays RT, RS, P, ST, MC, BY, and MKBV are released at this time.

2. COMPLETING BUSY VERIFICATION CALL

A. Call to Idle Station (SC2)

2.01 When dialing is completed the register recalls the marker. During the marker action which follows, register relay RV is operated, reversing battery and ground to tip and ring, thus operating relay P. Relay P in operating operates relay MC.

2.02 Relay MC operated:

- (a) Prepares operating paths for relays RS and BY.
- (b) Releases relay P.

(c) Operates marker relay NT which inhibits the hunting feature of the marker.

(d) Holds relay HM and magnet THM06 operated via marker lead ME.

(e) Locks to ground on marker lead RLSE.

(f) Opens ringing supply leads to prevent application of ringing when relay RS operates.

(g) Applies battery to resistor SL1.

2.03 In the process of connecting the trunk to a station, the marker operates relay RS, which performs the following functions:

(a) Locks operated via released relay RT and operated relay BV.

(b) Releases relay SL and applies a 1000 ohm battery - 100 ohm ground voltage divider network to the S lead of the marker.

(c) Opens the tip and ring talking path toward the attendant and prepares paths for applying ringing voltage and ground toward the station. The ring side of this path includes the primary winding of relay RT.

(d) Completes audible ringing feedback path to the attendant for an indication that the called line is being rung.

(e) With relay BY released connects talking battery and ground leads from the cordless position circuit to the tip and ring.

2.04 When the marker has completed a connection to the called station, it releases relay MC, completing the path for ringing the station.

2.05 When the station answers (goes off-hook) relay RT is operated on its primary winding and performs the following functions:

(a) Locks operated on its secondary winding via operated relay BV.

(b) Prepares a path for continuing the 1000-ohm battery - 100-ohm ground voltage divider network on lead S toward the link when relay RS releases.

- (c) Releases relay RS to cut through the tip and ring connections to the attendant.
- (d) Provides a path for maintaining talking battery and ground connections to the tip and ring after the release of relay RS.

2.06 Connection between the attendant and the called station has now been established and will continue until the station goes on-hook or the attendant releases attendant trunk 2.

2.07 At this time relays RT, BV, and HM are operated and relays RS, P, ST, MC, SL, BY, and MKBV are released.

B. Call to Busy Station (SC3)

2.08 Circuit action during a busy verification call to a busy station is the same as on a call to an idle station up to the point at which relay MC is operated by the marker.

2.09 When the marker is recalled to complete the connection, a busy condition at the called station causes the marker to operate relay BY.

2.10 Relay BY operated:

- (a) With relay MC operated, applies ground to the warning tone generator.
- (b) Closes paths from the output of the tone generator (if provided) to the tip and ring of the talking path.
- (c) Opens the path via relay RS for connecting talking battery and ground to the tip and ring conductors.
- (d) Locks operated via operated relay BV.
- (e) Opens the metallic connection and inserts capacitors T and R in the tip and ring talking paths.
- (f) Releases relay SL and connects a 1000-ohm battery - 100-ohm ground voltage divider network to the sleeve.
- (g) Operates relay MKBV via released relay RS.
- (h) Operates relay BVT.

2.11 Continuing action of the marker removes ground from lead ME which releases relay HM and trunk hold magnet THM06.

2.12 Continued marker action reapplies ground ME to reoperate relay HM and hold magnet THM06. Closure of the T and R crosspoints applies a warning tone (Z option) for approximately 0.1 second to the busy station as an indication that the talking path has been bridged.

2.13 Further action by the marker results in operation of relay RS and release of relay MKBV. This is followed by release of the marker.

2.14 The marker in releasing releases relay MC. Relay MC released:

- (a) Transfers the tone generator ground to a 7.5-IPM ground. This causes the tone generator to produce the warning tone (beep) at a 7.5-IPM rate (Z option).
- (b) Transfers relay HM and magnet THM06 from the operating and holding paths to a locking path via relay BV.
- (c) Releases marker relay NT.
- (d) Removes battery from resistor SL1.

2.15 A monitoring connection is now completed (via capacitors T and R) between the attendant and the busy station. If option Z is provided, the warning tone is audible to all parties on the busy connection as well as to the attendant.

2.16 With option R, the attendant will be able to talk on a busy connection.

2.17 At this time busy verification auxiliary trunk relays BV, BY, RS, and HM are operated and relays ST, P, MC, SL, RT, and MKBV are released.

C. Call to Busy and Camped-On Station

2.18 The camp-on stop condition set up in the marker during an attempt to make a connection to a station which is busy and camped-on has no effect on the busy verification circuit. The busy verification auxiliary trunk does not recognize the camp-on stop condition and directs the marker to make a double connection to the busy circuit.

2.19 If a busy station goes on-hook during busy verification, cut through of the camping trunk is prevented by the presence of 100-ohm sleeve ground in the busy verification auxiliary trunk. When the attendant releases the busy verification connection, a connection between the camping trunk and the camped on station is established.

D. Verification Denied - Message Registration Pulsing on Sleeve

2.20 During message registration pulsing, the link test function of the marker is disabled for calls to a busy station. With message register relay COD operated, the operation of marker relays HMKA,B:

(a) Operates relay H in place of relays CONA,B,AA,BA (marker provided with option XK) or relays CONAA,BA (marker provided with option WV).

(b) Operates marker relays COA,AA,B,BA.

2.21 Relay ST operated:

(a) Locks operated under control of relay BY.

(b) Operates relay FB in the cordless position circuit.

(c) Completes a path to provide a 120-IPM tone to the attendant as indication of an incomplete verification.

2.22 The release of the attendant pickup key will remove the 120-IPM tone and restore the busy verification trunk to normal.

3. RELEASE OF BUSY VERIFICATION CONNECTION (SC4)

3.01 The busy verification connection is released by operation of the RELEASE key in the cordless position circuit. This mechanically releases the pickup key which in turn releases relays AC and ON in the attendant trunk circuit.

3.02 Release of the attendant trunk circuit relay AC releases relay BV. Relay BV, in releasing, releases all operated relays in the busy verification auxiliary trunk circuit. This releases trunk hold magnet THM06 in the marker and restores the busy verification auxiliary trunk to the idle condition.

SECTION III - REFERENCE DATA

1. WORKING LIMITS

1.01 Voltage limits 45-52 volts.

2. FUNCTIONAL DESIGNATIONS

2.01 Relays

<u>Designation</u>	<u>Meaning</u>
BV	Busy Verification
BVT	Busy Verification Tone

Designation

Meaning

ST	Start
HM	Hold Magnet
MC	Magnet Control
BY	Busy
RS	Ring Start
RT	Ring-Trip
P	Polarized
SL	Sleeve
MKBV	Marker Busy Verification

3. FUNCTIONS

3.01 To permit seizure by the attendant when the pickup key of attendant trunk 2 and the DIAL BACK key are operated in sequence.

3.02 To seize PBX common equipment and provide a dialing path for the attendant.

3.03 To supply ringing current to an idle called station and an audible ringing tone to the attendant.

3.04 To recognize answer by an idle station and cut through the transmission path and supply talking battery to the station and attendant trunk.

3.05 To recognize a busy condition at the called station and cut through the attendant talking path via capacitive coupling to the busy connection.

3.06 To supply an interrupted tone signal (7.5 IPM) to the busy or busy and camped-on station (option Z).

3.07 To release connection when the RELEASE key in the cordless position is operated.

3.08 Option V is added to disable the inward restriction circuit when busy verification is applied.

3.09 Resistor T is added to provide a load to the tone generator.

3.10 Option W is added to return a 120-IPM tone to the attendant if busy verification is not completed because of message registration pulsing over a sleeve.

3.11 Provision is made to permit the at-

tendant to talk on a busy connection.

4. CONNECTING CIRCUITS

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

- (a) Line, Link, and Marker Circuit - SD-65741-01
- (b) Attendant Trunk Circuit - SD-65753-01
- (c) Cordless Position Circuit - SD-65757-01
- (d) Ringing and Interrupter Circuit - SD-81577-01
- (e) Station Message Register Pulse and Surcharge Circuit - SD-5E021-01

5. MANUFACTURING REQUIREMENTS

5.01 The busy verification circuit shall be capable of performing all of the functions given in this circuit description; the relays with which it is equipped shall meet all requirements of the Circuit Requirements tables.

6. ALARM INFORMATION

6.01 An operated fuse supplying the busy verification trunk circuit results in visual and audible signals at the attendant position and in the alarm, transfer, and test circuit. Also, if alarm sending is provided, a major alarm is transmitted to the plant service center.

6.02 Replacing the operated fuse silences the audible alarm and extinguishes the alarm lamps.

7. TAKING EQUIPMENT OUT OF SERVICE

7.01 When maintenance tests and adjustments are to be made on the busy verification auxiliary trunk, both attendant trunk 2 and the busy verification auxiliary trunk must be taken out of service by grounding lead IT02 toward the line, link, and marker circuit. This is accomplished by:

- (a) Determining that no select magnet is operated.
- (b) Insulating 11M of relay B in attendant trunk No. 2.
- (c) Operating and blocking relay B in attendant trunk No. 2.

SECTION IV - REASONS FOR REISSUE

A. Changed and Added Functions

A.1 Provision is added to permit the attendant to talk on a busy connection.

D. Description of Changes

- D.1 Circuit Note 102 is revised.
- D.2 Circuit Note 104 is revised to reflect Issue 7D.
- D.3 Option R is added to the Option Index.
- D.4 The value of capacitance is added to capacitors T, R, and A.
- D.5 Relay RT is designated as slow-operate.
- D.6 Reference to the 402C tone generator is added to option Z.
- D.7 Option R is added as a standard option to permit the attendant to talk on a busy connection.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 3221-WVS-RGP