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COMMON SYSTEMS
AUXILIARY SENDER LINK CIRCUIT
PANEL AND NO. 1 CROSSBAR OFFICES

CHANGES

B. Changes in Apparatus

B.1 Added

ABP- 185A Network - F Option, Fig. 2

D. Description of Changes

D.1 In FS6 and App Fig. 2 network ABP- is added for the AB- relay primary windings under option F to prevent pitting of contact 4M of the AP- relay. Option F is also added to Circuit Note 104.

D.2 CADs 22 and 23 are added on a D no-record basis.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 5245-LCB

WE DEPT 367-KGC-EER-PKM

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COMMON SYSTEMS
AUXILIARY SENDER LINK CIRCUIT
PANEL AND NO. 1 CROSSBAR OFFICES

CHANGES

D. Description of Changes

D.1 This circuit is changed to remove some of the plant register wiring that was provided to implement the service results plan. This is to reduce the cost of the plan.

D.2 The registers removed were scored by the link and controller (key pulse sender), auxiliary sender link, and subscriber sender link circuits for registration of seizures of their associated senders.

D.3 Similar information obtained from registers and wiring previously provided for other purposes and scored by other circuits, will be used to replace the information provided by the registers scored by the wiring removed by this change.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 5144-UKS-PK

WECo DEPT 335-DWW-PKP

COMMON SYSTEMS
AUXILIARY SENDER LINK CIRCUIT
PANEL AND NO. 1 CROSSBAR OFFICES

CHANGES

D. Description of Changes

D.1 This circuit drawing is changed to bring the CAD figures into agreement with manufacturing drawings on a "D" no-record basis.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 5144-DWW-UKS-JF

WECo - DEPT 335-DWW-PKP

COMMON SYSTEMS
AUXILIARY SENDER LINK CIRCUIT
PANEL AND NO. 1 CROSSBAR OFFICES

CHANGES

D. Description of Changes

D.1 This circuit is changed to clarify CADS 2 and 7.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 5615-DWW-UKS-BH

COMMON SYSTEMS
AUXILIARY SENDER LINK CIRCUIT
PANEL AND NO. 1 CROSSBAR OFFICES

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SECTION I - GENERAL DESCRIPTION

1. GENERAL OPERATION

1.01 In the direct distance dialing program the function of the subscriber sender in the Panel and No. 1 Crossbar Systems is supplemented by an auxiliary sender, which effectively increases the 8-digit storage capacity of the subscriber sender to a total of 10 digits on calls to points outside of the customers home numbering area. Since the auxiliary sender pulses the circuit order forward on a multifrequency basis, it is used on 7-digit local area calls when multifrequency outpulsing is required.

1.02 On a 10-digit call, the subscriber sender is required of a 0 or 1 registered as the second digit. In order to save holding time in the auxiliary sender, the subscriber sender waits until the seventh digit is registered before grounding the start lead to the auxiliary sender link

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circuit. A fast-acting link circuit is required to insure that an auxiliary sender is connected before the start of dialing of the ninth digit since this digit must be registered in the auxiliary sender.

1.03 On a 7-digit call, class information from the decoder or marker indicates the need for an auxiliary sender. In this case, the subscriber sender grounds the start lead to the auxiliary sender link circuit after the seventh digit is registered and class information is received. The time required to make the connection to an auxiliary sender in this case is not critical since no dialing is done into the auxiliary sender.

1.04 The auxiliary sender link frame serves a maximum of 100 subscriber senders which may be served by one to four groups of auxiliary senders, each group having a maximum of ten senders. A group of auxiliary senders may be multipled to more than one link frame, and provision is made to prevent two or more frames from connecting to the same auxiliary sender simultaneously. Only one connection can be set up by the link circuit at a time, but as soon as that one is established, the circuit is able to start to set up another connection. The link circuit is able to connect a maximum of 12 leads between the subscriber and auxiliary senders through 6-wire 200-point crossbar switches. The switches are split at the center with each half accommodating six of these connecting leads. The leads from each auxiliary sender are connected to like numbered horizontals on all crossbar switches associated with a group of auxiliary senders. The leads from each subscriber sender are connected to two verticals, one on each half of the switch. Each switch accommodates ten subscriber senders.

1.05 The auxiliary sender link extension frame is used in offices equipped with the sender recycle feature where compressed coin traffic is routed to traffic service positions. This frame is installed on a one-for-one basis with its associated link frame. The horizontals of the extension frame will terminate leads from the same auxiliary sender connected to the corresponding horizontals in the link frame. The verticals on the extension frame terminate the sender recycle circuits of the subscriber senders connected to corresponding verticals on the link frame. Operation of the extension frame is controlled by relays on the link frame. The extension frame has a capacity of 10 link extension units which accommodate 10 sender recycle circuits each. The crossbar switches of the link extension units are 6-wire, 100-point switches for connecting six leads between the sender recycle circuits and the auxiliary senders. Leads CC-0, -1, -2, -4, -7 indicate the code compressed digit to the auxiliary sender on a 2-out-of-5 basis where reconstruction of this digit to the 3-digit area code is accomplished.

2. CIRCUIT ACTION

2.01 The request for connection to an auxiliary sender is a ground on the start lead from the subscriber sender. The link circuit denies service to other subscriber senders while setting up this connection. An idle auxiliary sender is selected and its corresponding preference relay is operated. This causes the proper select and hold magnets to operate connecting the subscriber sender to the selected auxiliary sender. If the auxiliary sender link extension frame is used, corresponding select and hold magnets operate on the link extension unit connecting the sender recycle circuit to the auxiliary sender.

2.02 The operated hold magnets lock up to the grounded start lead from the subscriber sender and return a ground to the subscriber sender indicating that an auxiliary sender is attached. The link circuit is not ready to set up another connection until it receives a ground from the auxiliary sender indicating that the auxiliary sender is busy. When the auxiliary sender is no longer required, ground is removed from the start lead by the subscriber sender. This releases the link circuit which in turn breaks the connection between the two senders (and sender recycle circuit, if used) and causes the auxiliary sender to restore to normal.

3. TIMING FEATURES

3.01 The maximum allowable time between the selection of an idle auxiliary sender and the release of the link control relays on the same connection is covered by a slow-release relay. If the link circuit has not established the connection by the time the slow-release relay releases, the link circuit is released to attempt another connection, and the auxiliary sender is made busy by circuit action until released by the alarm release key.

SECTION II - DETAILED DESCRIPTION

1. CONNECTION OF SUBSCRIBER SENDER TO AUXILIARY SENDER

A. Link Circuit Seizure

1.01 When a subscriber sender requires connection to an auxiliary sender, it grounds its ST lead. This ground operates the associated ST- relay (FS1) in the link through break contacts on the hold magnets, the higher numbered ST- relays in the same group of ten, a group make-busy jack, and the GA relay. This ground also activates the link start peg count relays as covered in 4. Any ST- relay operating:

(a) Locks up to direct battery.

(b) Removes operating battery from low numbered ST- relays in the same group of ten.

(c) Operates the G relay serving this ST- relay. Each group of ten ST- relays is associated with one G relay and one 200-point crossbar switch.

(d) Operates the GA relay (FS3), which removes operating battery from all ST- relays in the circuit.

(e) Sets up a path to operate the proper hold magnets.

(f) Operates TM relay through break contacts of all AP- relays.

1.02 More than one ST- relay may be operated at one time; but when the GA relay operates, none of the remaining ST- relays associated with the same group of auxiliary senders can operate until all operated ST- relays release.

1.03 If the GA relay should falsely operate, all calls in the link circuit may be blocked. Relay GAA is provided to guard against this condition by remaining normal when the ST- operates, followed by the operation of GA relay. If GA relay should operate falsely, GAA relay will operate and operate a minor alarm.

B. Group Relay Operation

1.04 A G relay (FS2) will operate through break contacts on all AP- relays, break contacts on all G relays in higher numbered group circuits, a make contact on any ST- relay in the group of ten served by this relay, and break contacts on all G relays in lower numbered group circuits. An operated G relay:

(a) Removes operating battery from G relays in higher numbered group circuits and ground from G relays in lower numbered group circuits to insure that no other G relay can operate.

(b) Locks up on its ground side through a transfer chain on the ST- relays to a break contact on a hold magnet corresponding to the lowest numbered ST- relay operated in that group. This ST- relay is served first.

(c) Operates an AP- relay if an idle auxiliary sender is available.

(d) A peg count is provided over the ASPC lead to the miscellaneous circuit for sender make-busy frame for recording auxiliary sender seizures. This is different than the peg count in 5.01.

C. Auxiliary Sender Selection and Preference Circuit

1.05 An auxiliary sender busy relay AB- (FS6) and auxiliary sender preference relay AP- (FS5) are provided in each circuit for each auxiliary sender furnished.

1.06 The AB- relay is operated when the corresponding auxiliary sender is busy. An operated G relay supplies battery to transfer contacts of an AB- relay. If this AB- relay is normal the corresponding AP- relay operates. If this AB- relay is operated, battery is passed on to transfer contacts on another AB- relay and continues around a circular chain until the first released AB- relay is reached. Then battery is supplied to the corresponding AP- relay. The operated AP- relay determines which auxiliary sender is selected. The AP- relay operates from direct ground or from ground through break contacts on AP- relays associated with the same auxiliary sender on other link frames as shown in FS5 and FS101. This permits only one link circuit to operate an AP- relay for a particular idle auxiliary sender.

1.07 In order to equalize wear on the auxiliary senders, each G relay places battery at a different point in the chain of AB- transfer contacts so that each

auxiliary sender will be first choice to one or more groups of ten subscriber senders. The AB- relays appear in the chain in the following order: AB0, AB6, AB3, AB7, AB1, AB8, AB4, AB9, AB2, AB5, AB0. This order of appearance insures that each auxiliary sender will be first choice to approximately the same number of subscriber senders regardless of the number of auxiliary senders or G relays furnished.

1.08 An operated AP- relay:

(a) locks up to battery supplied through break contacts on the LR relay and corresponding AB- relay, and

(b) removes ground from winding of slow-release relay TM.

1.09 During the time a G relay is operated, all operated AB- relays in the link circuit lock to ground on their secondary winding through their own make contacts, a break contact on an unoperated AB- relay in the same circuit, and a make contact on any one of the G relays. This is done to prevent the release of an AB- relay while an auxiliary sender is being selected since the release of an AB- relay might permit more than one AP- relay to operate at a time. The locking feature is not effective if all AB- relays in the circuit are operated since no selection can be made until at least one AB- relay releases.

D. Auxiliary Sender Busy Indication

1.10 To make the selected auxiliary sender busy as soon as possible after it is seized, the corresponding AB- relay in any other link circuit having access to the same auxiliary sender is operated by the AP- relay in the link circuit that seized the auxiliary sender. Ground is supplied through a make contact on this AP- relay and a break contact on the corresponding AP- relay in another link circuit associated with the same auxiliary senders to the primary winding of the AB- relay. The AB- relay in the link circuit that seized this auxiliary sender does not operate until the auxiliary sender off-normal relays operate.

E. Operation of Crossbar Switch (Option R)

1.11 An AP- relay operating supplies battery to all correspondingly numbered select magnets in the link circuit. The operated G relay has previously operated the G1 relay supplying ground to all select magnets on the switch associated with that relay. Thus, only one select magnet can operate. The operated select magnet closes ground to the two hold magnets associated with the lowest numbered ST- relay that is operated in the group as shown in FS1. The path is through the make contact on one of the select magnets, a make contact on the G relay for that group, and a transfer chain on the ST- relays. If more than one ST- relay in a group is operated the lowest numbered is served first. The operated hold magnets:

(a) lock up to the grounded start lead from the subscriber sender,

(b) close the leads from the subscriber sender through to the auxiliary sender,

(c) place ground on the SA lead to the subscriber sender to indicate that an auxiliary sender is attached, and

(d) extend a lead from the auxiliary transverter link to the auxiliary sender link as part of a pilot lead indicating to the auxiliary transverter link which auxiliary sender is associated with the call being processed (in local AMA offices).

2. CONNECTION OF SUBSCRIBER SENDER RECYCLE CIRCUIT TO AUXILIARY SENDER

A. Operation of Crossbar Switch on Link Extension Frame (Option Q)

2.01 When the link extension frame is provided, the crossbar switch on the link extension unit (FS11) is operated at the same time as the switch on the link frame, in order to connect the CC-0, -1, -2, -4, -7 (compressed code) leads and the LC (link closed) lead from the sender recycle circuit to the auxiliary sender. Operation of relay G1 on the link frame supplies ground to operate the select magnet on the link extension frame in parallel with the select magnet on the link frame. The operated select magnet on the extension frame provides ground over lead HMG to the link frame, through the operated select magnet contacts on the link frame to operate the two hold magnets on the link frame and one hold magnet on the link extension frame, (FS12). Operation of the

hold magnet on the link extension frame:

(a) Connects leads CA- and CB- which complete the path for ground lead SA to the subscriber sender as an indication that an auxiliary sender is attached.

(b) Closes the link extension crosspoints to connect the code compressed indicating leads CC-0, -1, -4, -7 from the subscriber sender recycle circuit (when provided) to the auxiliary sender and:

Option L: closes lead LC which indicates link closure to the auxiliary sender.

Option M: closes lead CL which indicates link closure to the auxiliary sender.

Option N: closes lead LC to lead CL which indicates link closure to the auxiliary sender.

(c) Is held operated from the ground start lead from the subscriber sender.

3. RESTORATION OF CIRCUIT TO NORMAL

A. Release of Select Magnets and ST- and G Relays

3.01 Operation of the hold magnet on the right side of the switch on the link frame starts the release of the link control circuit by releasing relays G and G1. Relay G1, in releasing, removes ground from the select magnets which release. The G relay was locked to ground furnished through break contacts on the hold magnet. The operating path for the G relay is also open at this time since it is through break contacts on all AP- relays. Two parallel break contacts on the hold magnets open the operate path for the ST- relay. These contacts are shunted by a make contact on the G relay through two transfer chains on the ST- relays of that group to prevent the release of the ST- relay until the G relay releases and breaks the hold magnet operating path. This is done so that a second pair of hold magnets cannot falsely operate if another ST- relay is operated waiting for service and the G relay is slow to release.

B. Operation of ST- Relays for Subsequent Connections

3.02 If no other ST- relay is operated, the GA relay releases and permits one or more ST- relays to operate. Then the GA relay operates and locks out any other ST- relays until the operated relays are served. However, a G relay cannot operate until the AP- relay from the previous connection has released since the operating path for the G relay is through all AP- relays normal.

C. Normal Release of AP- Relays

3.03 When the off-normal relays in the auxiliary sender operate, lead B to the link is grounded. This ground operates the AB- relay that is located in the link circuit that seized this auxiliary sender and holds operated similar AB- relays located on other link frames that were previously operated by the AP- relay. The AB- relay operating releases the AP- relay which closes the operating path to the G relays if a ST- relay is operated, so that the next connection may be completed. The operation of the G relay must be delayed until the AB- relay operates so that the next call cannot choose the same auxiliary sender.

D. Timing and Trouble Release of AP- Relays

3.04 If the auxiliary sender does not go off-normal because of trouble in the link or auxiliary sender circuit, the AB- relay in the link circuit cannot operate. This will cause the link circuit to block. Relays TM and LR (FS7) cause the release of the link circuit when it is blocked in this manner.

3.05 Whenever a ST- relay is operated and all AP- relays are released, slow-release relay TM operates. An AP- relay operating removes ground from the TM relay causing its slow-release. If the link circuit functions normally the AP- relay releases before the TM relay, and the LR relay does not operate. If another start relay is wating for service, the TM relay reoperates and repeats the cycle just described.

3.06 If the AB- relay is not operated by the auxiliary sender the AP- relay does not release. The LR relay then operates through a make contact on the AP-

relay when the slow-release relay TM closes its break contact. Relay LR operating opens the locking path to all AP- relays thereby releasing the one that is stuck. All AP- relays normal cause the LR relay to release. The operation of the LR relay closes ground over lead LRA to operate an alarm. The LR resistor across the winding of the LR relay provides a minimum release time to insure the operation of the alarm. Until the trouble is cleared or the auxiliary sender is made busy, any call selecting this auxiliary sender will be lost but the release feature permits the link circuit to complete calls that select other auxiliary senders.

3.07 If the APA- relays are furnished (App Fig. 8) the slow-release relay TM closes its break contacts to partially complete a path, along with the operate AP- relay, for operating LR relay, and to operate an APA- relay corresponding to the AP- relay that cannot release. Relay APA- operating causes LR relay to operate which in turn releases the stuck AP- relay. The APA- relay locks over lead AR to AR key in the miscellaneous circuit for the auxiliary sender link frame. The operation of the APA- relays causes the operation of the MB relay in the auxiliary sender. This prevents any other call choosing this auxiliary sender until the APA- relay is released by the operation of the AR key. The battery side of the APA- relays is chained so that only one relay can be operated at one time to prevent one trouble locking all auxiliary senders out of service.

4. RELEASE OF CONNECTION

4.01 The subscriber sender removes the ground from the ST- lead when the auxiliary sender is no longer required. The hold magnets release and disconnect the subscriber sender and sender recycle circuit, if used, from the auxiliary sender. When the auxiliary sender off-normal relays release, the ground is removed from the B lead releasing the AB- relay in each of the link frames served by this auxiliary sender unless the relay is temporarily locked up to an operated G relay as described in 1.08.

5. LINK START PEG COUNT

5.01 A peg count of the number of bids for an auxiliary sender is determined by operating the register once when a ST- lead is grounded and then once again every 120 milliseconds as long as at least one ST- lead is still grounded. If only one ST- lead is activated, the ground is removed from the PC lead to the peg count relays within 120 milliseconds giving one count on the register. If more than one ST- lead is grounded the grounds are removed from the PC lead one at a time approximately every 115 milliseconds giving one count for each auxiliary sender request. A separate count is made for each auxiliary sender group and for panel and crossbar subscriber senders even though associated with the same auxiliary sender group.

5.02 A ground on any ST- lead from a subscriber sender (with App Fig. 6 and option T) operates the PC relay which locks through a break contact on the PT relay. The operation of the PC relay operates the register on the traffic register rack. A make contact on this register operates the PT relay which releases the PC relay, releasing the register, which releases the PT relay. This last relay is slow-release with the release time being adjusted by means of a potentiometer PT and strapping around either half of the PT resistance. The total resistance should be adjusted to give between 80 and 86 counts in 10 seconds. When the PT relay releases the cycle can begin again if one of the ST- leads is still grounded.

5.03 A ground on any ST- lead from a subscriber sender (with App Fig. 7 and option S) operates the relays as above except that relay PT is operated directly from relay PC and the traffic register operates from a make contact on relay PT. This is done because with Traffic Register Circuit - SD-25942-01, the registers are not permanently connected to any one circuit but are connected as required with plugs.

SECTION III - REFERENCE DATA

1. WORKING LIMITS

1.01 None

2. FUNCTIONAL DESIGNATIONS

Desig	Meaning	Primary Functions
AB- (0-9)	Auxiliary Sdr Busy Relay	To make an auxiliary sender busy to the selecting circuit.
AP - (0-9)	Auxiliary Sdr Preference Relay	To operate a select magnet and prevent a second call from beginning until the previous call is completed.

Desig	Meaning	Primary Functions
APA - (0-9)	Auxiliary Sdr Preferece Advance Relay	To advance sender preference in certain trouble conditions.
G	Group Relay	To lock out all other groups, insuring that ST- relays in only one group are effective.
Gl	Auxiliary Group Relay	To supply ground to the select magnets.
G Jack	Group Make-Busy Jack	To make a crossbar switch and associated equipment busy.
GA	Gate Relay	To aid in handling calls in the order received by insuring that simultaneous calls are handled before a subsequent call is recognized.
GAA	Gate Relay Alarm	To provide a minor alarm if the gate relay falsely operates.
H-L (0-9) H-R (0-9)	Hold Magnets on Left or Right Half of Switch on Link Frame	To hold the connection through the link frame crossbar switch.
HE (0-9)	Extension Hold Magnets on link extension frame.	To hold the connection through the link extension frame crossbar switch.
LR	Link Release	To release an AP relay that does not release in the normal length of time so that the link may handle other calls.
PC	Panel Peg Count	To count the number of ST- leads grounded.
PT	Panel Peg Count Timing	
S- (0-9)	Select Magnets on Link Frame	To prepare the connection through the link frame crossbar switch.
SE (0-9)	Select Magnets on Link Extension Frame	To prepare the connection through the link extension frame crossbar switch.
ST- (0-9)	Start Relay	To start the link circuit when a ground is received from subscriber sender.
TM	Timing Relay	To measure the time between operation and release of AP- relays.

3. FUNCTIONS

3.01 To recognize when a subscriber sender grounds its start lead to request an auxiliary sender.

3.02 To insure that simultaneous requests for service will be served before a subsequent request is handled.

3.03 To select an idle auxiliary sender and make it busy to any other link circuit that has access to this sender.

3.04 To operate the select and hold magnets of the crossbar switch, which connect a maximum of 12 leads from the subscriber sender to the auxiliary sender.

3.05 To operate the select and hold magnets of the crossbar switch on the link extension frame when this frame is provided, to connect six leads from the sender recycle circuits to the auxiliary senders.

3.06 To return a sender attached signal to the subscriber sender when the auxiliary sender is attached.

3.07 To recognize a signal from the auxiliary sender indicating that it is off-normal.

3.08 To release the link control relays to handle the next request for service after the auxiliary sender is off-normal.

3.09 To hold the connection between the subscriber and auxiliary senders and if extension frames are provided, between the recycle circuits and auxiliary senders as long as ground remains on the start lead from the subscriber sender.

3.10 To release the connection when ground is removed from the start lead by the subscriber sender.

3.11 To make the auxiliary sender busy to the link that seized it before this link handles another call.

3.12 To free the link circuit if it becomes stuck on a call.

3.13 To provide an indication to the sender make-busy frame that all auxiliary senders are busy.

3.14 To hold an auxiliary sender busy to the link circuit until the sender has restored to normal at the completion of a call.

3.15 To provide a means for removing a group of start circuits from service.

3.16 To arrange the preference so that each auxiliary sender is first choice to a portion of the subscriber senders.

3.17 To insure that an auxiliary sender is not simultaneously seized by two link frames.

3.18 To provide for the operation of a maximum of four auxiliary sender link circuits with the same group of auxiliary senders.

3.19 To extend a lead from the auxiliary transverter link to the auxiliary sender link as part of a pilot lead indicating to the auxiliary transverter link which auxiliary sender is associated with the call being processed by a certain transverter.

3.20 To provide a peg count of requests by subscriber senders for an auxiliary sender.

3.21 To provide a feature to make an auxiliary sender busy if a call encounters difficulty in completing a connection to that auxiliary sender.

3.22 To provide a guard circuit and minor alarm in case of false operation of the gate relay which could block all calls in the link circuit.

4. CONNECTING CIRCUITS

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

4.02 This circuit will function with the following circuits.

COMMON SYSTEMS

(a) Auxiliary Sender Circuit - SD-96479-01.

(b) Miscellaneous Circuit for Auxiliary Sender Link and Auxiliary Sender Link Extension Frames - SD-96492-01.

(c) Subscriber Sender Recycle Circuit - SD-96525-01.

NO. 1 CROSSBAR SYSTEM

(d) Subscriber Sender - SD-25012-01.

(e) Miscellaneous Circuit for Sender Make Busy Frame - SD-25076-01.

(f) Traffic Register Circuit - SD-25942-01 and SD-25317-01.

(g) Transverter Connector Circuit - SD-25804-01.

(h) Auxiliary Transverter Link Circuit - SD-26211-01.

PANEL SYSTEMS

(i) Subscriber Sender - SD-21193-01 (Typical).

(j) Miscellaneous Circuit for Sender Make Busy Frame - SD-21236-01.

(k) Miscellaneous Register Circuit - SD-20141-01 and SD-21537-01.

5. ALARM INFORMATION

A. All Senders Busy Time Alarm

5.01 When all auxiliary senders are busy, make contacts on the AB- relays close ground to the miscellaneous circuit for the sender make-busy frame over the ASB

lead. If all auxiliary senders are busy for 15 through 30 seconds, the minor alarm sounds and the ASB lamp for this group of auxiliary senders lights on the sender make-busy frame. Both the lamp and alarm lock to the ALM RLS key on the sender make-busy frame. Operation of this key silences the alarm but the lamp remains lighted until at least one AB- relay releases.

B. Link Times Release Alarm

5.02 Whenever the LR relay operates it closes ground over the LRA lead to the miscellaneous circuit for the auxiliary sender link frame. This operates the LRA relay which locks to the AR key. The operation of this relay causes the minor alarm to sound and the LR lamp to light. The LRA relay, AR key, and LR lamp are located on the miscellaneous circuit. Operation of the AR key silences the alarm and extinguishes the lamp.

C. Transfer of Alarms

5.03 When the office alarms are transferred to another location, the all-senders-busy time alarm and release key are transferred and the link trouble release alarm is eliminated.

D. Gate Relay Alarm

5.04 Whenever the GA relay operates falsely, GAA relay will have the same false ground applied to its operating winding. Relay GAA operating closes ground over the LRA lead to the miscellaneous circuit for the auxiliary sender link frame. This causes the minor alarm to sound as covered in 5.02.

6. MANUFACTURING TEST REQUIREMENTS

6.01 The auxiliary sender link circuit shall be capable of performing all functions listed in the circuit description and shall meet the requirements listed in the circuit requirements table and circuit notes.

6.02 All operation tests shall be made with the test voltage within the following limits.

Maximum	Minimum
50 volts	45 volts

7. TAKING EQUIPMENT OUT OF SERVICE

A. Crossbar Switch and Associated Relays

7.01 A "G" jack is located on the link frame with each crossbar switch and its associated relays. A No. 310 make-busy plug in this jack will disable the start circuits for the ten subscriber senders served by that switch and the ten sender recycle circuits served by the associated link extension switch.

B. Frame

7.02 Make-busy plugs in all G jacks on the link frame are necessary to take a complete link frame and associated link extension frame out of service.

C. Individual ST- Relay

7.03 To remove an individual ST- relay from service make the corresponding subscriber sender busy.

D. Relay AP-

7.04 To remove an AP- relay from service without making the entire circuit busy, the corresponding auxiliary sender must be made busy and break contacts 7 and 8 on the AP- relay must be shorted so that the chains for operating the G relay and the TM relay are not broken.

E. Relay AB-

7.05 To remove an AB- relay from service without making the entire circuit busy, the corresponding auxiliary sender must be made busy, the corresponding AP- relay blocked in the unoperated position, and make contact 8 of the AB- relay shorted, so that the AB- transfer contact chain will not be broken.

7.06 When the B- lead is strapped to corresponding AB- relays in other link circuits served by the same group of auxiliary senders, and it is desired to remove the 20-amp feeder fuse for a sender link frame, the 1-1/3 amp "E" fuses for the same frame should be removed to prevent feedback.

SECTION IV - REASONS FOR REISSUE

D. Description of Changes

D.1 This CD is reissued to redesignate option G to option F in Fig. FS-5 only A "D" no-record basis. Minor CAD Fig. changes were also made on a "D" no-record basis.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 5615-DWW-AJE-SN