INBAND METHOD OF COIN CONTROL STEP-BY-STEP AND NO. 5 CROSSBAR SYSTEMS AND NO. 1 AND NO. 3 TYPE SWITCHBOARDS

CONTENTS PAGE

1. INTRODUCTION

As a result of the general program of centralizing switchboard locations, a need has arisen for arrangements which would reduce the number of trunk conductors or signaling channels required per toll connecting trunk to handle coin traffic to and from operators and for increasing the operating range of these trunks. A separate or third conductor is now provided per coin trunk to carry the coin control information from the switchboard to the local office. To eliminate this separate conductor and reduce outside plant cost, a new method of transmitting coin and ringing control signals has been devised. The new signaling technique permits the coin and ringing control signals to be sent over the same conductors, or channels, used for voice. Pulsing and supervisory signals are also sent over the same channels.

AC signals within the voice band are used. Consequently, the new method of signaling has become known as the "inband method of coin control". AC signals are used to send coin collect and coin return indications as well as the ringing control signals. The signals used are:

700 and 1100 cycles	coin collect
1100 and 1700 cycles	coin return
700 and 1700 cycles	ring signal

The 1700 cycle signal serves to balance the sending circuits at the switchboard. The local office circuits are not arranged to recognize this frequency.

Arrangements have been made available for using the inband method of coin control on recording completing and toll switching trunks for the step-by-step and the No. 5 crossbar local systems. In addition, inband arrangements have been made available for use on two-way operator office trunks for the step-by-step system. Connecting trunk circuits for the No. 1 and No. 3 type toll switchboards have also been made available.

The new arrangements are for use at switchboards arranged for the positional method or the associated jack method of operation. With the positional method, an operator, desiring to collect or return coins on an established connection operates the appropriate keys on her position; with the associated jack method, she inserts a coin control cord into the proper jack and then operates the appropriate key. Either operation causes the switchboard trunk circuit involved, to connect AC signals to the line. A receiver circuit in the local office detects the AC signals and converts them to DC indications which are used to direct the associated local office equipment to apply the proper control potential to the line.

In order to reduce the possibility of erroneous receiver operation, due to conversation on the line, or crosstalk, an enabling signal is used. The switchboard trunk circuit generates a short on-hook indication of 70 to 130 milliseconds duration prior to application of tone. Receipt of this signal causes the receiver circuit to be connected to the line.

Provision has been made for using the new signaling technique on trunks arranged for either loop or E and M lead signaling except for loop signaling recording completing trunks. A two-wire, loop signaling, coin recording completing trunk circuit has been available for a number of years for use in No. 5 crossbar offices. This circuit, SD-26091-01, is arranged to work with DC coin control signals sent over the transmission pair. A similar circuit, SD-32300-01 has been designed for the step-by-step system.

2. APPLICABILITY TO PRESENT SIGNALING SYSTEMS

There are many types of signaling arrangements currently in use on toll connecting trunks in the Bell System, e.g. duplex (DX), composite (CX) and single frequency (SF), signaling arrangements. Arrangements of both Bell System and independent company design are in use. Analysis indicates that the new method of sending coin and ringing control signals is suitable for use on toll

connecting trunks equipped with most of the signaling arrangements designed by the Bell System. Compatibility of these signaling arrangements with the new inband method of coin control is shown on the attached Table A.

The signaling arrangements designed by independent companies and used by the Bell System are of many different types. The predominant types are of Lenkurt Company design. They are the signaling arrangements associated with the 33- and 45-type carrier systems. These signaling arrangements are similar to the built-in signaling units of the N1 carrier system and are considered suitable for use with the new method of sending coin control information.

3. STEP-BY-STEP SYSTEM

3.01 General

New arrangements for handling coin traffic over both one-way and two-way toll connecting trunks have been provided for step-by-step offices of the Nos. 1, 350, 355, 360 and 35E97 types. Trunking arrangements covered by this development are listed below. Sketches showing the various arrangements in block diagram form are attached.

(a) Trunking arrangements for completing incoming and outgoing traffic over loop and E & M lead signaling facilities in offices requiring one-way trunks and equipped with local type incoming switch train - Fig. 1.

(b) Trunking arrangements for completing incoming and outgoing traffic over loop and E & M lead signaling facilities in offices requiring one-way trunks and equipped with toll type incoming switch train - Fig. 2.

(c) Trunking arrangements for completing incoming and outgoing traffic over loop and E & M lead signaling facilities in offices requiring two-way trunks and equipped with local type incoming switch trains - Fig. 3.

(d) Trunking arrangements for completing incoming and outgoing traffic over loop and E & M lead signaling facilities in offices requiring two-way trunks and equipped with toll type incoming switch trains - Fig. 4.

Except for the one-way loop arrangements referred to in (a) and (b) above for handling outgoing traffic, provision has been made for using the new inband method of control on all the trunking arrangements. In this case the primary objective of eliminating the third conductor per coin trunk, has been attained by utilizing DC control signals instead of AC control signals. A step-by-step coin recording completing trunk circuit has been available which has been designed to receive DC signals from the switchboard

over the transmission pair for coin and ringing control. Its operation is similar to that of the standard No. 5 crossbar coin recording completing trunk circuit SD-26091-01 and will work with the same incoming switchboard circuits. It is arranged to handle calls from coin lines only.

3.02 Operating Features

The general operating features of the trunking arrangements are as follows:

3.021 Originating Traffic

(a) Handle calls from both coin and noncoin lines over the same trunk group.

(1) Coin lines are identified by direct or resistance ground indications over a fourth conductor from the preceding selector bank multiple.

(2) The operator is informed of the type of line originating a call by class of service tones. Provision has been made for sending two class of service tones. Absence of tone provides a third indication. The three classes of lines identified are: noncoin, public and semipublic coin lines.

(b) On calls from coin lines, automatically return an initial deposit upon operator answer (optional).

(c) On calls from coin lines, permit the operator to collect or return coins. The local office circuits are not arranged to send a coin present signal towards the switchboard. It is simulated in the switchboard trunk circuits.

(d) On calls from either type of line:

(1) Place the connection under control of originating subscriber until operator answers. Following operator answer, dual control operation is utilized.

(2) Permit the calling party to recall the operator.

(3) Permit the operator to ring-back the calling party against both off-hook and on-hook supervision.

3.022 Terminating Traffic

(a) Handle calls to coin and noncoin lines.

(b) Place the connection under control of the operator.

(c) Return paths busy or line busy indication to operator if these conditions are encountered.

(d) Ring the called station, providing it is idle, immediately after receipt of last (units) digit. This is immediate start of ring operation. Controlled start of ring operation cannot be used. Provision has not been made for receiving a start ring signal from the switchboard for the initial ring. Provision for rering has been made, see (g) below.

(e) Permit called party to flash the operator.

(f) Permit the operator to collect or return coins. The local office circuits are not arranged to send a coin present signal towards the switchboard. It is simulated in the switchboard trunk circuits.

(g) Rering

(1) In offices equipped with toll type incoming switch trains, permit the operator to rering the called station against off-hook and on-hook supervision on all lines.

(2) In offices equipped with local type incoming switch trains, permit the operator to rering the called station against off-hook and on-hook supervision only on lines in coin hundreds group.

3.03 Equipment Arrangements

It is expected that the inband method of control will be used primarily in existing offices and that the majority of these offices will be of the CDO type. Consequently, the arrangements have been designed to keep the required changes in existing offices to a minimum. The apparatus required to convert the inband signals to the appropriate local office control signals has been incorporated into applique units. Existing circuits for most applications, have been modified to work with these units. A complete list of circuits involved is given in Table B.

As shown on the attached sketches a coin control circuit and a receiver circuit are provided in each of the arrangements. This combination of circuits, working in conjunction with a trunk or connector circuit, receives the wink and AC signals from the switchboard and performs the indicated ringing or coin control functions.

3.04 Equipment Units

3.041 Coin Control Trunks

Due to the diversity of functions to performed and the differences in the connecting circuits, three coin control trunk circuits have been designed:

(a) Coin control trunk circuit SD-32288-01 - This circuit has been designed to handle originating traffic and to work with the following circuits:

(1) Recording completing trunk - SD-31888-01*.

(2) Two-way operator office trunks arranged for local train completion - SD-31775-01*.

(b) Coin control trunk circuit SD-32289-01 - This circuit has been designed to handle terminating traffic and to work with the following circuits:

(1) Incoming E and M lead toll switching trunk arranged to connect to toll type switches - SD-31887-01.

(2) Toll transmission selector - SD-31841-01.

(3) Local connector - SD-33022-01.

(c) Coin control trunk circuit SD-32298-01 - This circuit has been designed to handle both originating and terminating traffic and to work with the following circuits:

(1) Two-way operator office trunks arranged for toll train completion - SD-32340-01*.

3.042 Receiver

The receiver circuit is a transistorized unit designed to mount on two 23-inch mounting plates and arranged to work from a central office battery supply of -45 to -52 volts. It is intended for use in both step-by-step and No. 5 crossbar offices and has been given a common system number, SD-95956-01.

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*Typical circuits

Two equipment arrangements have been provided: one for use in step-by-step offices, the other for No. 5 crossbar offices. In step-by-step offices the receiver is connected to the associated control circuit by means of a plug and cord arrangement. In No. 5 crossbar offices the receiver is connected to the associated trunk circuit by means of switchboard cabling. The arrangement for No. 5 crossbar offices is described in Part 4.

For the step-by-step application, the receiver is equipped with a 7 prong male connector. It is connected to the associated coin control circuit by means of cord having a female connector on one end, with the other end, factory wired to a terminal strip on the coin control trunk circuit. To minimize the cord length and also to permit the use of a uniform cord length for all applications, the receiver circuit is mounted on the same frame as the coin control trunk it is serving and directly above this unit.

To facilitate maintenance, a three foot patch cord (W7C) has been provided. This cord is equipped with a female connector on one end and a male connector on the other. Its purpose is to provide means for substituting a receiver circuit which is known to be functioning properly for a receiver suspected of malfunctioning. One patch cord should be provided per office.

3.043 Connector

A new connector circuit per SD-33022-01, has been designed for use in offices equipped with local type incoming switch trains. It is a 1-ring, 100 point local type connector, designed to operate with coin control trunk circuit SD-32289-01 for serving incoming collect calls to and outward delayed calls from coin stations. This connector may be used without the coin control circuit to serve calls which do not require the collection or return of coin deposits or which do not require an operator to rering the called line for example, intraoffice or interlocal type calls.

This connector has been designed to mount on the standard type connector shelf, and it requires the same vertical spacing on a frame as a standard 1-ring local type connector. The connector has the same range limitations as standard connectors having their tripping relays connected to ring side of line. It can be used in offices arranged for either AC-DC or superimposed ringing.

To permit flashing the operator when a coin is in the box, the talking battery connection in the new connector has been reversed toward the called party as compared with existing local connectors. Consequently, only intercept circuits arranged for tube tripping should be used with this circuit.

The new connector has been arranged, on an optional basis, for automatic timed release of calling party permanents. This feature, however, should not be specified when the connector is associated with coin control trunk SD-32289-01.

3.044 Trunk Circuits

Various types of step-by-step trunk circuits have been arranged for inband coin control. These include, recording completing, toll switching and two-way operator office trunk circuits. In all cases, provision has been made for modifying existing circuits. The changes involved on the various circuits with one exception, are considered to be of a minor nature, mainly wiring changes. Accordingly, the circuit drawings have been reissued to show the required changes. The circuits covered are listed in the attached Table B and reference is made to the drawing issue which shows the required changes.

Two-way operator office trunk circuit, SD-31749-01, is the exception. Due to the fact that more extensive changes were required to arrange this circuit for inband coin control, a new circuit per SD-32340-01 has been designed. The new circuit replaces the old for all uses except additions to existing trunk groups where tandem operation is involved. This type of operation, which entails the connecting of two trunk links via a intermediate switching

point between a class 5 end office and a class 4 office, in this case a toll switchboard, does not meet present transmission requirements. Consequently, arrangements for using inband coin control on trunks operated in this manner have not been provided. Provision, however, has been made for modifying existing two-way operator office trunk circuits per SD-31749-01 for inband coin control for those cases where tandem operation is not used. Information for this modification is shown on circuit drawing SD-32340-01.

3.045 Toll Transmission Selectors

These switches perform the functions of an incoming trunk circuit and an incoming selector in offices equipped with toll type switching trains which are connected to a toll point by means of loop signaling facilities. There are several types of toll transmission selectors in use today, namely, reverse battery type, wet-dry type, repeated dialing type, and those designed specifically to work in 360A type step-by-step offices. All except the reverse-battery type, have been rated "A&M only" for several years. Consequently, only one, SD-31841-01, which is arranged for reverse battery operation, has been modified for inband coin control.

3.05 Maintenance

No new maintenance facilities are required for the new coin control arrangements. Due to the similarity of operation between the new and existing arrangements, both

can be tested by current testing techniques and equipment. As an aid to maintenance, the receiver is connected to the associated coin control circuit by means of a plug and chord arrangement. It can be removed and taken to location where the necessary test equipment is available.

4. NO. 5 CROSSBAR

4.01 General

Arrangements for using the inband method of sending coin and ringing control signals over toll connecting trunks have been made available for use in No. 5 crossbar local dial offices. Provision has been made for using the new method of signaling on recording completing and toll switching trunks.

Marker pulse conversion circuit (MPC)* arranged for the new method of signaling have also been made available. Both one-way and two-way trunks of this type have been developed for use at No. 3C and 3CL switchboards.

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*Marker Pulse Conversion Circuits - These are trunk circuits, toll switching or two-way operator office, designed for use at installations having a switchboard equipped with MF keysets located in the same building with a No. 5 crossbar office equipped with MF registers and DP senders. They are used on toll connecting trunks to local offices arranged to receive dial pulses.

The new inband arrangements replace, but are not interchangeable with, the out-of-band* coin control arrangements previously available for use on toll connecting trunks equipped with N1 and O carrier facilities from No. 5 crossbar local dial offices.

The various arrangements for the No. 5 crossbar system are shown in block diagram form on Figures 5, 6 and 7. The circuits involved are listed in Table C.

4.02 Operating Features

4.021 Recording Completing and Toll Switching Trunks

The recording completing and toll switching trunk circuits which have been arranged for inband coin control have, for the most part, the same operating features as the existing trunk circuits which are arranged to receive coin control signals over a separate or third conductor.

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*Out-of-band Coin Control - This signaling technique was developed specifically to work with the built-in signaling arrangements of the N1 and O carrier systems. To transmit the necessary supervisory information, the signaling units of these carrier systems make use of an AC signal which is outside the voice band. A 3700 cycle signal is used. As a result, the coin control arrangements designed to work with these signaling units have become known as the out-of-band coin control arrangements.

The primary difference between the out-of-band coin control system and the inband system, is the type of enabling signal used. The inband system utilizes a short on-hook signal while the out-of-band system makes use of a steady on-hook signal. Both systems, however, use the same AC signals, 700 and 1100 cycles, for conveying the coin and ringing control indications over the trunk facilities.

These circuits, however, are not arranged to send back a coin present signal towards the switchboard. To permit uniformity in the operating procedures at the associated switchboard, the inband switchboard trunk circuits are arranged to simulate this signal.

The inband toll switching trunks are arranged for immediate start of ring operation with rering capability. A start of ring signal is not sent from the switchboard end for the initial ring.

4.022 Marker Pulse Conversion Trunks

These circuits have the same operating features as the equivalent switchboard toll switching and two-way operator office trunk circuits described in the switchboard section of this practice.

4.03 Equipment Arrangements

4.031 Recording Completing and Toll Switching Trunks

A trunk circuit a receiver circuit are required at the local office end of a toll connecting trunk arranged for inband coin control. The trunk circuit, either recording completing or toll switching depending upon the direction of the traffic handled, performs the normal signaling and supervising functions. It also recognizes the enabling signal and calls in the associated receiver. The receiver circuit converts the AC control signals to the appropriate

DC indications. The latter signals are extended back to the trunk circuits where the proper coin control or ringing potential is placed on the subscriber line.

4.032 Marker Pulse Conversion Trunks

At the switchboard end of a toll connecting trunk arranged for inband coin control, a trunk circuit in this case, a marker pulse conversion trunk, and a source of MF current are required. The trunk circuits, are arranged to perform the normal signaling and supervisory functions. They are also arranged to generate a wink-signal and to connect to the line the proper AC signals under control of the operator's key.

4.04 Equipment Units

4.041 Recording Completing Trunk

The standard E&M lead signaling coin recording completing trunk circuit, SD-26099-01, has been modified for inband coin control. The out-of-band features of this circuit have been rated "MD". The standard loop signaling recording completing trunk circuit, SD-26091-01, has not been modified. It is presently arranged to receive coin control and ringing signals over the tip and ring conductors. DC control signals are used in this case.

4.042 Toll Switching Trunks

A new incoming coin trunk circuit, SD-26123-01, has been made available. It is arranged for loop or E&M lead signaling and to work with inband coin and ringing control signals. A new loop signaling coin incoming trunk circuit, SD-26149-01, arranged to receive coin control signals over a separate conductor has also been made available. These two circuits have replaced trunk circuit SD-26083-01.

4.043 Receivers

Two receiver circuits, SD-26118-01 and SD-95956-01 have been made available. Receiver circuit SD-26118-01 employs vacuum tubes to detect the AC signals and requires +130 volts for its operation. It was designed originally for the out-of-band coin control operation, however, it can also be used with No. 5 crossbar trunk circuits arranged for the inband method of operation. It is not arranged to work with the inband circuits designed for use in step-by-step offices.

Receiver circuit SD-95956-01 is intended for use in both No. 5 crossbar and step-by-step offices. It was designed specifically for inband operation and should not be used with the out-of-band coin control arrangements. As mentioned previously in the step-by-step section of this practice,

two equipment arrangements have been provided, one for step-by-step office use, the other for No. 5 crossbar offices. For a description of the step-by-step arrangement, reference should be made to that section.

For No. 5 crossbar offices, the receiver circuit SD-95956-01 is connected to its associated trunk circuit by means of switchboard cabling. It can be mounted on the same frame as the associated trunk circuit or on a different frame. Like the step-by-step unit, it requires two 23-inch mounting plates.

4.044 Marker Pulse Conversion Trunks

Four new marker pulse conversion (MPC) trunk circuits arranged for inband coin control have been made available. They have been designed to work with No. 3C and 3CL switchboards equipped with MF key sets located in the same building with a No. 5 crossbar office. One-way and two-way versions, arranged for loop and E&M lead signaling have been made available. The trunk circuit numbers and additional pertinent information are given in Table C. It is planned to furnish equivalent circuits for the No. 1 type switchboard as required.

4.05 Maintenance

No new maintenance facilities are required for the new coin control arrangements.

5. SWITCHBOARDS

5.01 General

Provision has been made for using the new method of sending coin control and ringing signals over toll connecting trunks terminated at No. 1 and No. 3 type toll switchboards. The new inband arrangements replace but are not interchangeable with the out-of-band* coin control arrangements previously available for use on toll connecting trunks equipped with N1 and O carrier facilities from No. 5 crossbar offices.

5.02 Operating Features

The inband circuits have been designed to operate in essentially the same manner as the existing standard switchboard coin trunk circuits arranged to send coin control signals over a separate or third conductor. Therefore, inclusion of the new circuits in an existing switchboard multiple should not appreciably affect the operating procedure at the switchboard.

The salient differences are:

(a) All of the inband switchboard trunk circuits are arranged to simulate the coin present signal.

(b) All of the inband switchboard trunk circuits have been designed to insure application of coin and ringing control signals (tones) to the line for a minimum period of time. A 900 ms period is used.

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*See No. 5 Crossbar Section.

This minimum interval will insure that the local office equipment will apply coin control potential to the customer's line long enought to properly operate the coin magnet at the station even though the transmission path of the trunk is open for up to 300 ms following the wink signal. This open interval occurs when certain types of Single Frequency (SF) signaling equipment are used on the toll connecting trunks.

(c) The switchboard toll switching trunk circuits and the two-way operator office trunk circuits are arranged for immediate start of ringing operation with rering. The switchboard circuits are not arranged to send a start ring signal for the initial ring. Delayed ringing operation (controlled-start), therefore, cannot be used.

5.03 Equipment Arrangements

A trunk circuit, and a source of MF current are required at the switchboard. Recording completing, toll switching, and two-way operator office trunk circuits arranged for the inband method of sending coin and ringing control signals have been designed for the No. 1 and No. 3 type toll switchboards. Existing MF current supplied have been used. A list of the circuits which have been made available is given in Table D.

5.04 Equipment Units

5.041 Trunk Circuits

As shown on the attached Table D, the circuits made available to date, are primarily No. 3 type toll switchboard circuits. It is planned to furnish, if a demand materializes, equivalent circuits for the No. 1 type switchboard.

5.042 MF Supply

Since MF signals are used to convey the control information over the connecting trunk facilities, a source of MF current is required at the switchboard. The switchboard trunk circuits have been arranged to connect to either of the standard MF supply circuits, the building supply J98609 per SD-95391-01 and the unit supply J99235AW per SD-95867-01. For switchboards located in buildings having a building MF supply, J98609, the inband trunk circuits may be connected to the existing supply. For switchboard installations not equipped with a building MF supply, the unit MF supply, J99235AW, may be used. In this case, one MF supply unit is required per trunk circuit. For those installations not equipped with building MF supplies, and where the number of inband trunks is expected to exceed 10 in the ultimate, consideration should be given to installing a building MF supply.

5.05 Maintenance

No new maintenance facilities are required for the new coin control arrangements.

6. LIST OF TABLES AND FIGURES

TABLE A

Bell System Signaling Arrangements
DP or MF Pulsing
Compatibility With Inband Method of Sending
Coin and Ringing Control Signals

Designation	Drawing No.	Compatibility	
		Approved	Not Approved
Simplex (SX)	SD-95051-01*	✓	
Duplex (DX)	SD-95487-01	✓	
Composite (CX)	SD-95032-01*	✓	
Single Frequency (SF)			
1600 Cycle	SD-55954-02		✓
	SD-56202-01		✓
2600 Cycle			
(a) Tube version	SD-56202-02	✓	
	SD-56292-01	✓	
(b) Transistorized			
E1A	SD-96499-01	✓	
E1B	SD-98085-01	✓	
E1C	SD-98086-01		✓
E1D	SD-98087-01		✓
E2B	SD-98090-01	✓	
E3B	SD-98124-01	✓	
3700 Cycle			
N1 Carrier	SD-95121-01	✓	
O Carrier	SD-95150-01	✓	

*Typical

TABLE B

Step-By-Step Circuits

Description	Ckt. Dwg. No.	Iss.	Rating	Type of Office	Eqpt. No. and J Spec. No.	Notes
2-Way Trk., Loop, Local Train Compl.	SD-30900-01	8	A&M	35E97	ED-30900-01 J39210	(1)
2-Way Trk., E&M Local Train Compl.	SD-30901-01	10	A&M	35E97	J39210T	(1)
2-Way Trk., E&M Toll Train Compl.	SD-30915-01	7	A&M	35E97	J39210W	(1)
2-Way Trk., Loop Toll Train Compl.	SD-30916-01	7	A&M	35E97	ED-30916-01 J39210	(1)
2-Way Trk., E&M Local Train Compl.	SD-31685-01	9	Std. A&M	350 360	J33014E	(1)
2-Way Trk., Loop, Local Train Compl.	SD-31709-01	6	Std. A&M	350 360	J33014S	(1)
2-Way Trk., Loop, Toll Train Compl.	SD-31712-01	9	Std.	350	J33014A	(1)
2-Way Trk., Loop Local Train Compl.	SD-31747-01	19	Std.	355	ED-31747-01 J32312	(1)
2-Way Trk., E&M, Toll Train Compl.	SD-31749-01	14	A&M	350,355	J33014F	(2)
2-Way Trk., E&M Local Train Compl.	SD-31775-01	16	Std.	1,355	J33014G	(1)
Toll Trans. Sel, Loop	SD-31841-01	18	Std.	1,350,355	ED-31841-01 J32310	(3)
2-Way Trk., Loop Toll Train Compl.	SD-31874-01	9	Std.	355	ED-31874-01 J32312	(1)
Inc. Toll Trk, E&M, Toll Train Compl.	SD-31887-01	11	Std.	1,350,355	J33013N	(3)
Rec. Com., E&M	SD-31888-01	10	Std. A&M	1,350,355 360	J33013C	(1)

Table B (Cont'd)

Description	Ckt. Dwg. No.	Iss.	Rating	Type of Office	Eqpt. No. and J Spec. No.	Notes
Coin Control Trk- For Use With: (a) CLR Trk, E&M (b) 2-Way Trks, Loop and E&M Local Train Compl.	SD-32288-01	1	Std. A&M	1,350,355 360,35E97	J33015T	(1)
Coin Control Trk- For Use With: (a) Local Conn., Local Train Compl. (b) Toll Trans Sel. and Inc. Toll Trk. Toll Train Compl.	SD-32289-01	1	Std. A&M	1,350,355 360,35E97	J33015U	(1)
Coin Control Trk- For Use With: (a) 2-Way Trks. Loop and E&M, Toll Train Compl.	SD-32298-01	1	Std. A&M	1,350,355 35E97	J33015X	(1)
Rec. Com., Loop	SD-32300-01	1	Std. A&M	1,350,355 360,35E97	J33013AW	(4)
Rec. Com., E&M	SD-32301-01	1	A&M	35E97	J39210AP	(1)
2-Way Trk, E&M Toll Train Compl.	SD-32340-01	1	A&M	350,355	J33014AP	(1),(2)
Local Conn., Local Train Compl.	SD-33022-01	1	Std. A&M	1,350,355 360,35E97	ED-33022-01 J32311	(1)
Receiver (Transitor)	SD-95956-01	1	Std.	Common Systems	J33015Y	(1)

Notes

(1) Arranged for Inband Coin Control

(2) 2-W Opr. Off Trk. SD-31749-01 has not been arranged for Inband Coin Control. It has been replaced by the new 2-Way Trk. SD-32340-01, which has been arranged for Inband Coin Control, for all uses except for additions to existing Trk. grps. where tandem operation is involved.

(3) Arranged for Inband Coin Control and Third Wire Coin Control.

(4) Arranged to operate with DC Coin Control Signals sent over the Tip and Ring Trunk Conductors.

TABLE C

No. 5 Crossbar Circuits

Description	Ckt. Dwg. No.	Iss.	Rating	Eqpt. No. or Replacing Ckt. No. for "MD" Ckt.	Notes
Rec. Com. Trk, E&M	SD-26099-01	3	Std.	J23057BE	(4),(5)
Inc. Trk, DP or MF, Loop or E&M	SD-26123-01	1	Std.	J23062AY	(1)
Inc. Trk, RP, DP or MF, Loop	SD-26149-01	1	Std.	J23062BC	(2)
Inc. Trk, RP, DP or MF, Loop or E&M	SD-26083-01	5	MD	SD-26123-01 SD-26149-01	(3)
Receiver (Tube)	SD-26118-01	3	Std.	J23058X	(4)
Receiver (Trans)	SD-95956-01	1	Std.	J23058AJ	(1)
MPC Trk, 2-Way, E&M	SD-26124-01	1	Std.	J23055AY	(1)
MPC Trk, 2-Way, Loop	SD-26125-01	1	Std.	J23055BA	(1)
MPC Trk, 1-Way, E&M	SD-26126-01	1	Std.	J23055BB	(1)
MPC Trk, 1-Way, Loop	SD-26127-01	1	Std.	J23055BC	(1)

Notes

(1) Arranged for Inband Coin Control.

(2) Arranged for Third Wire Coin Control.

(3) Arranged for Out-of-Band Coin Control and Third Wire Coin Control.

(4) Arranged for Out-of-Band Coin Control and Inband Coin Control.

(5) Out-of-Band feature has been rated "MD".

TABLE D

No. 1 and No. 3 Type Switchboard Circuits

Description	Ckt. Dwg. No.	Iss.	Rating	Type of Swbd.	Eqpt. No. or Replacing Ckt. No. for "MD" Ckts.	Notes
Rec. Com. Trk, E&M	SD-56479-01	1	A&M	Toll No. 1	J61573AP	(1)
Rec. Com. Trk, E&M	SD-56478-01	1	Std. A&M	No. 3C,3CL No. 3	J61573AN	(1)
Toll Sw. Trk, DCKP, E&M	SD-56481-01	1	Std. A&M	No. 3C,3CL No. 3	J61572CE	(1)
Toll Sw. Trk, DCKP, Loop	SD-56480-01	1	Std. A&M	No. 3C,3CL No. 3	J61572CF	(1)
Toll Sw. Trk, MFKP, E&M	SD-56407-01	1	A&M	Toll No. 1	J61572CJ	(1)
Toll Sw. Trk Dial, E&M	SD-56509-01	1	Std. A&M	No. 3C,3CL No. 3	J61572CK	(1)
Toll Sw. Trk, MFKP, E&M	SD-56483-01	1	Std. A&M	No. 3C,3CL No. 3	J61572CG	(1)
Toll Sw. Trk, MFKP, Loop	SD-56482-01	1	Std. A&M	No. 3C,3CL No. 3	J61572CH	(1)
2-Way Trk, DCKP, E&M	SD-56475-01	1	Std. A&M	No. 3C,3CL No. 3	J61575AB	(1)
2-Way Trk, DCKP, Loop	SD-56474-01	1	Std. A&M	No. 3C,3CL No. 3	J61575AC	(1)
2-Way Trk, Dial, E&M	SD-56477-01	1	Std. A&M	No. 3C, 3CL No. 3	J61575AD	(1)
2-Way Trk, Dial, Loop	SD-56476-01	1	Std. A&M	No. 3C,3CL No. 3	J61575AE	(1)
2-Way Trk, DCKP, E&M	SD-56521-01	1	A&M	Toll No. 1	J61575AG	(1)
MF Current Supply	SD-95391-01	21	Std.	Common System System	J98609	(6)
MF Signal Gen. Unit	SD-95867-01	2	Std.	Common System	J99235AW	(7)
Rec. Com. Trk, E&M	SD-56413-01	3	MD	Toll No. 1	SD-56479-01	(3),(4)

Table D (Cont'd)

Description	Ckt. Dwg. No.	Iss.	Rating	Type of Swbd.	Eqpt. No. or Replacing Ckt. No. for "MD" Ckts.	Notes
Rec. Com. Trk, E&M	SD-56414-01	3	MD	No. 3,3C, 3CL	SD-56478-01	(3),(4)
Toll Sw. Trk, MFKP, E&M	SD-56415-01	2	MD	Toll No. 1	SD-56507-01	(3),(4)
Toll Sw. Trk, MFKP, E&M	SD-56416-01	5	MD	No. 3,3C, 3CL	SD-56483-01	(3),(4)
Toll Sw. Trk, DCKP, E&M	SD-56422-01	2	MD	Toll No. 1	SD-56510-01	(3),(4),(5)
Toll Sw. Trk, DCKP, E&M	SD-56423-01	2	MD	No. 3,3C 3CL	SD-56481-01	(3),(4)
Toll Sw. Trk, Dial, E&M	SD-56420-01	2	MD	Toll No. 1	SD-56508-01	(3),(4),(5)
Toll Sw. Trk. Dial, E&M	SD-56421-01	2	MD	No. 3,3C 3CL	SD-56509-01	(3),(4),(5)
Rec. Com. Trk, Loop	SD-55873-01	6	A&M	Toll No. 1	J61573H,T	(2)
Rec. Com. Trk, Loop	SD-56127-01	8	A&M	No. 3	J61573AG	(2)
Rec. Com. Trk, Loop	SD-55875-01	15	Std.	No. 3C,3CL	J61573N	(2)

Notes

(1) Arranged for Inband Coin Control.

(2) Arranged to send DC Coin Control Signals over Tip and Ring Trunk Conductors.

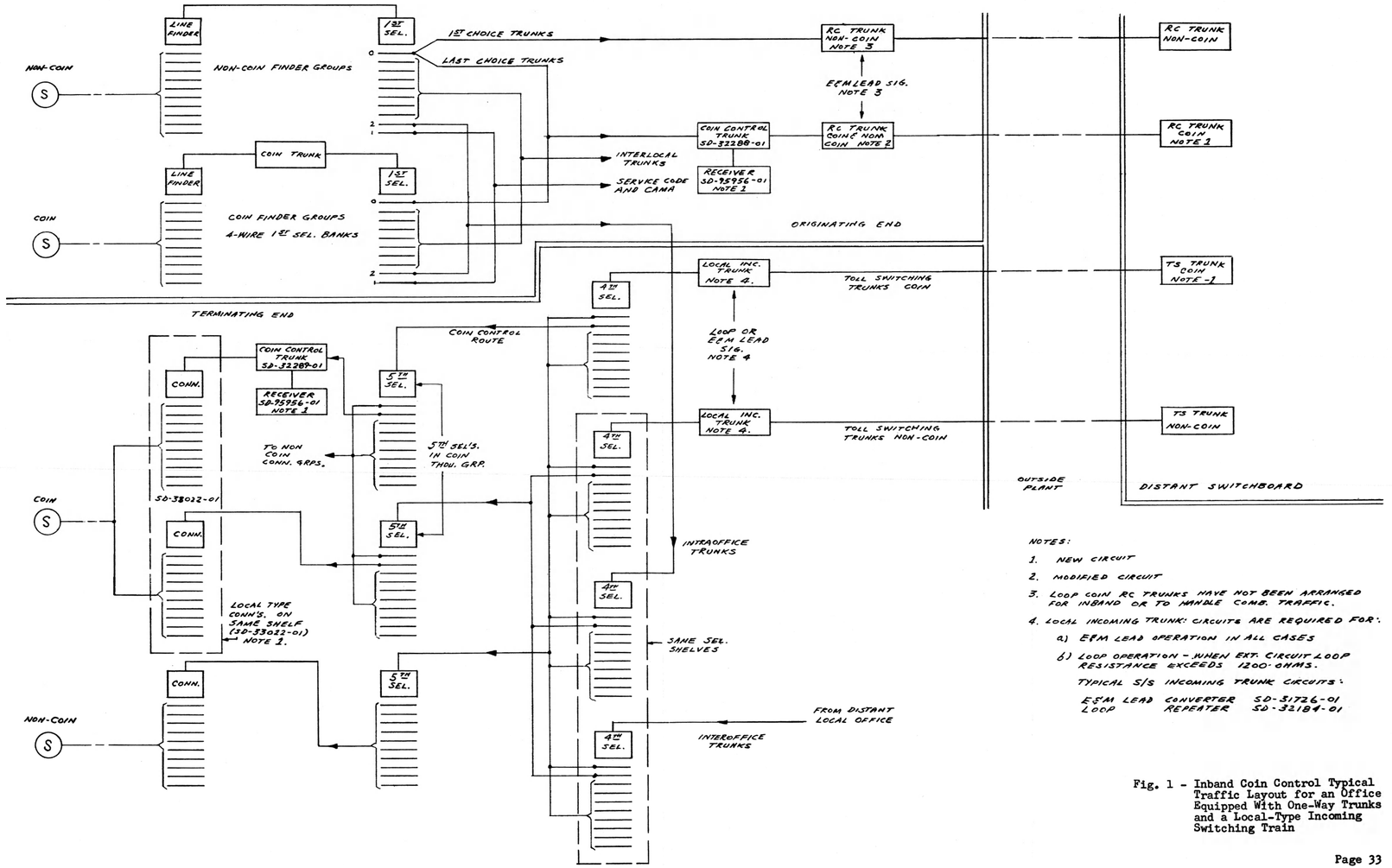
(3) Arranged for Out-of-Band Coin Control.

(4) Replacing ckt., supersedes, but is not a direct replacement for the old ckt. On a particular trunk connection, both Switchboard and Local office ends must be arranged for the same method of Coin Control.

(5) Replacing circuit drawing is not issued. Circuit will be developed only on order.

(6) Building MF Supply.

(7) Unit MF Supply - one per Inband trunk circuit.



NOTES:

1. NEW CIRCUIT
2. MODIFIED CIRCUIT
3. LOOP COIN RC TRUNKS HAVE NOT BEEN ARRANGED FOR INBAND OR TO HANDLE COMB. TRAFFIC.
4. LOCAL INCOMING TRUNK CIRCUITS ARE REQUIRED FOR:
   a) E&M LEAD OPERATION IN ALL CASES
   b) LOOP OPERATION - WHEN EXT. CIRCUIT LOOP RESISTANCE EXCEEDS 1200 OHMS.

   TYPICAL S/S INCOMING TRUNK CIRCUITS:

   E&M LEAD CONVERTER SD-51726-01
   LOOP REPEATER SD-32184-01

Fig. 1 - Inband Coin Control Typical Traffic Layout for an Office Equipped With One-Way Trunks and a Local-Type Incoming Switching Train

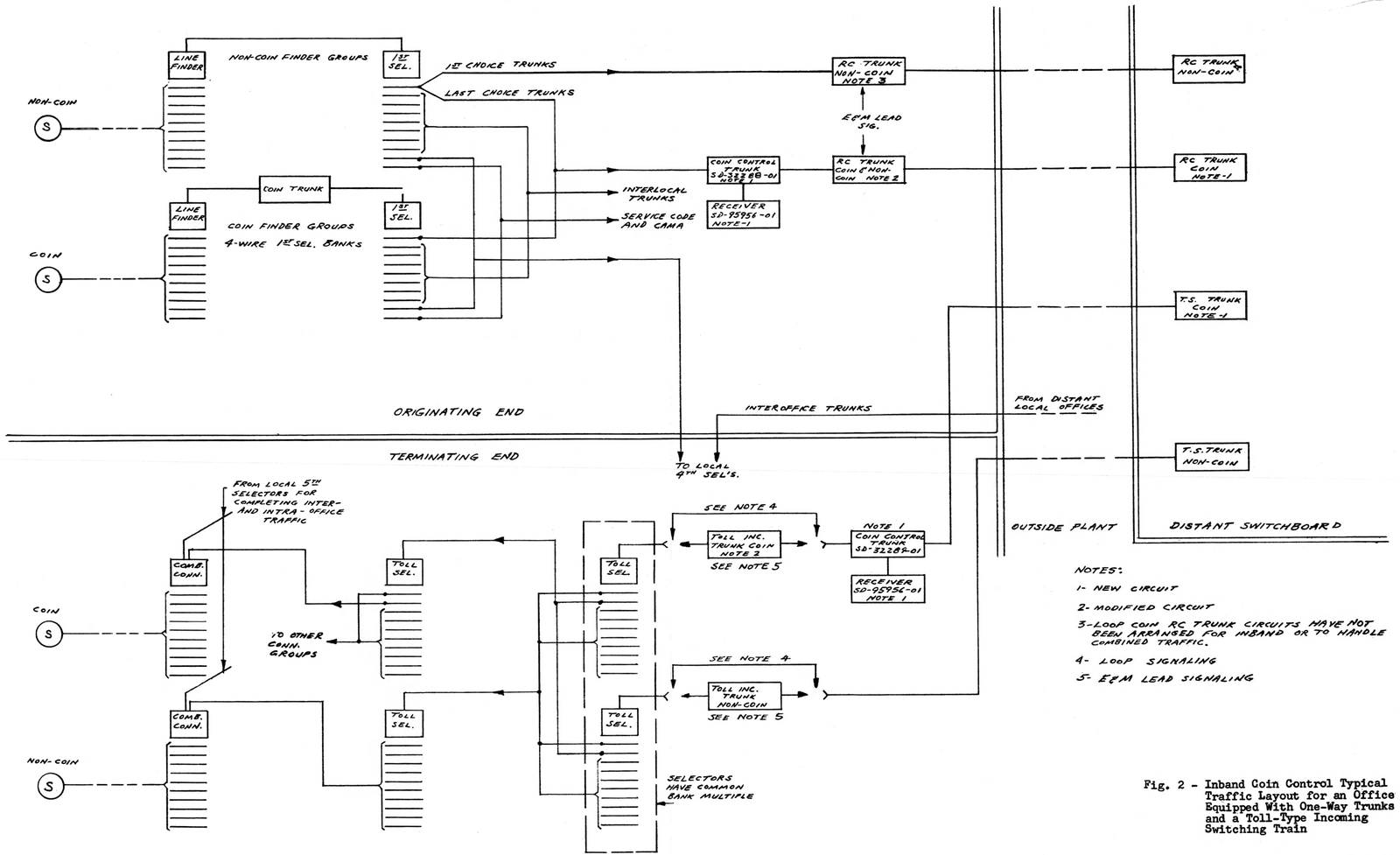


Fig. 2 - Inband Coin Control Typical Traffic Layout for an Office Equipped With One-Way Trunks and a Toll-Type Incoming Switching Train

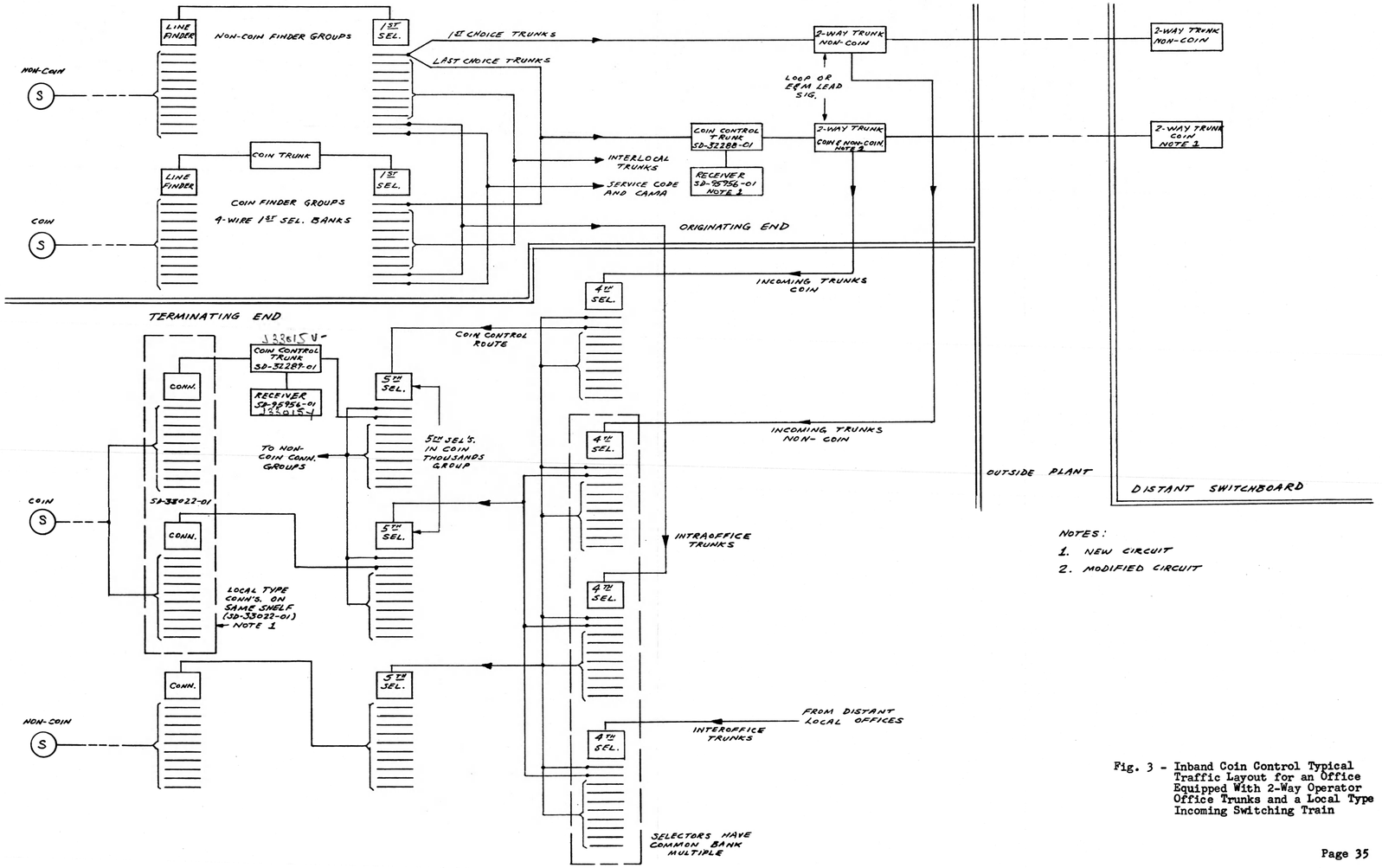


Fig. 3 - Inband Coin Control Typical Traffic Layout for an Office Equipped With 2-Way Operator Office Trunks and a Local Type Incoming Switching Train

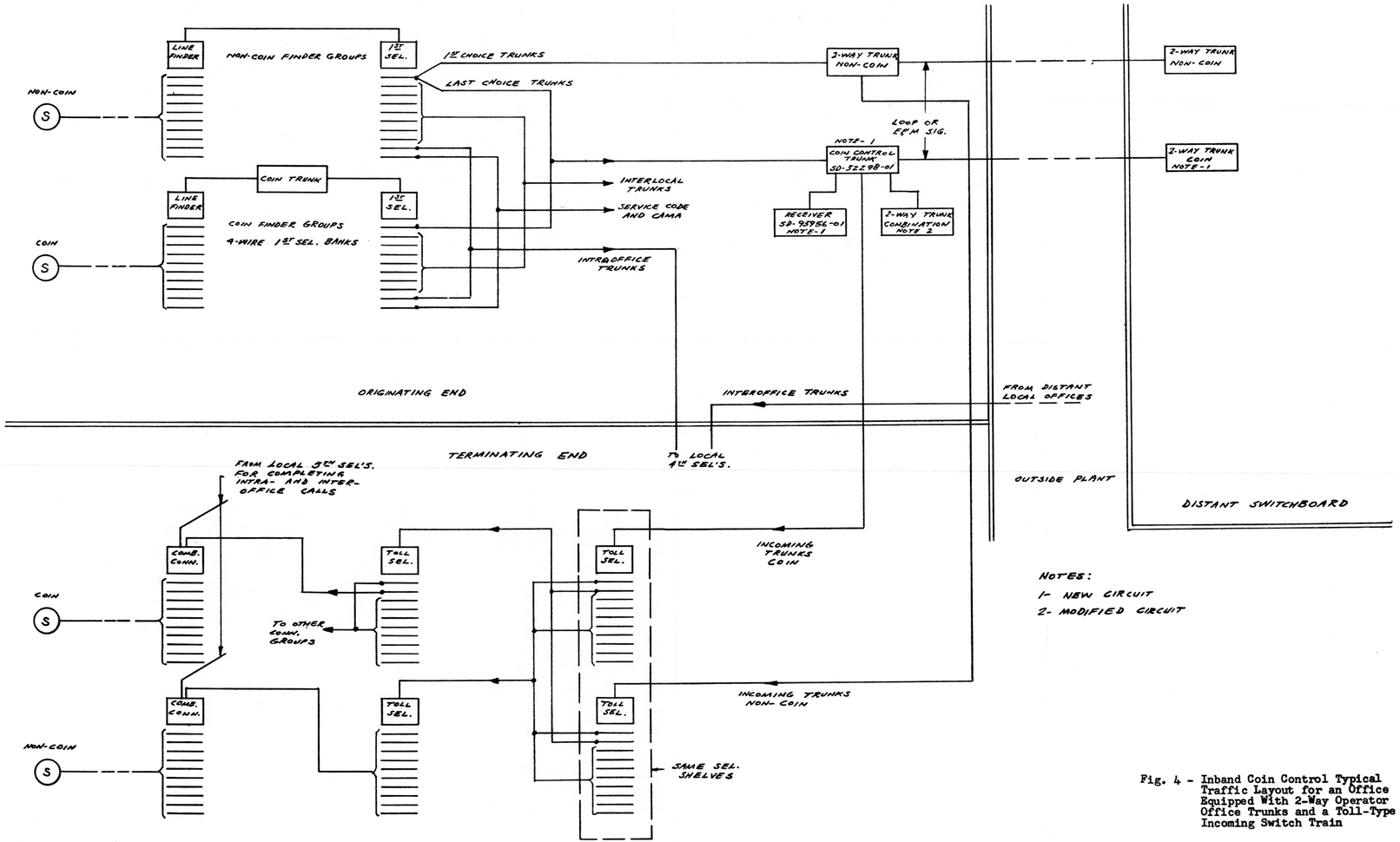


Fig. 4 - Inband Coin Control Typical Traffic Layout for an Office Equipped With 2-Way Operator Office Trunks and a Toll-Type Incoming Switch Train

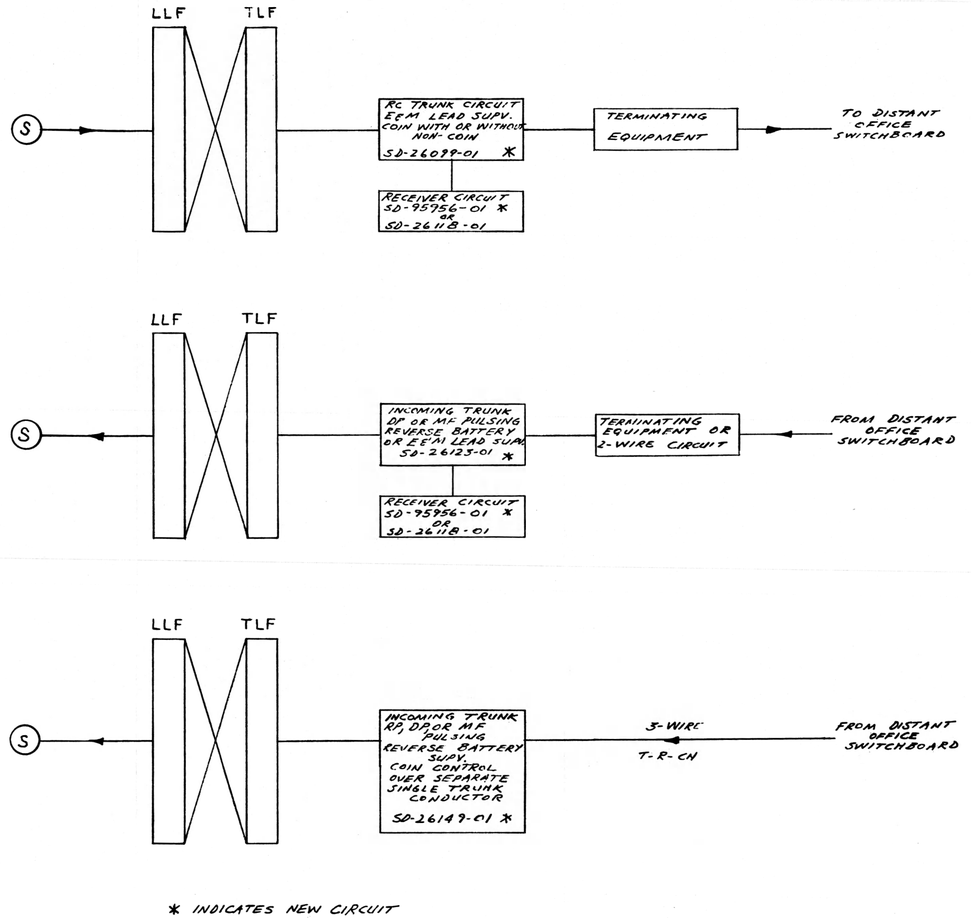


Fig. 5 - Recording Completing and Incoming Trunks

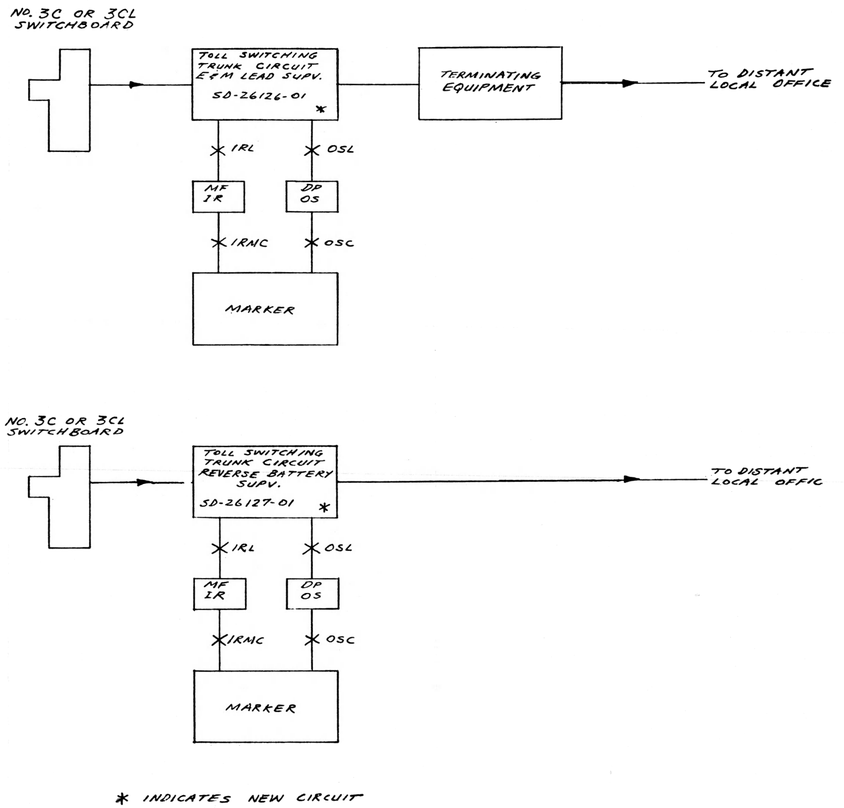
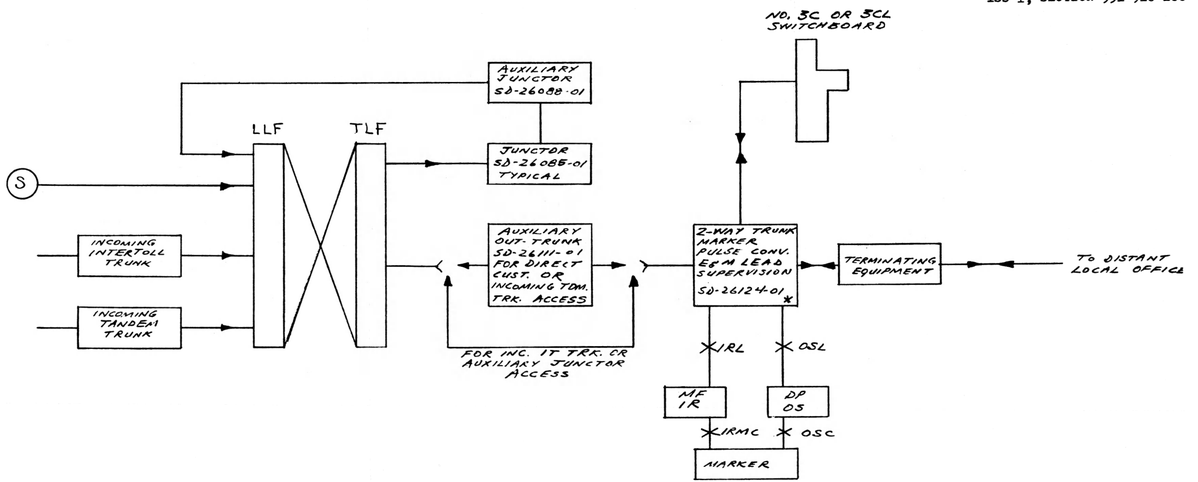


Fig. 6 - Toll Switching Marker Pulse Conversion Trunks



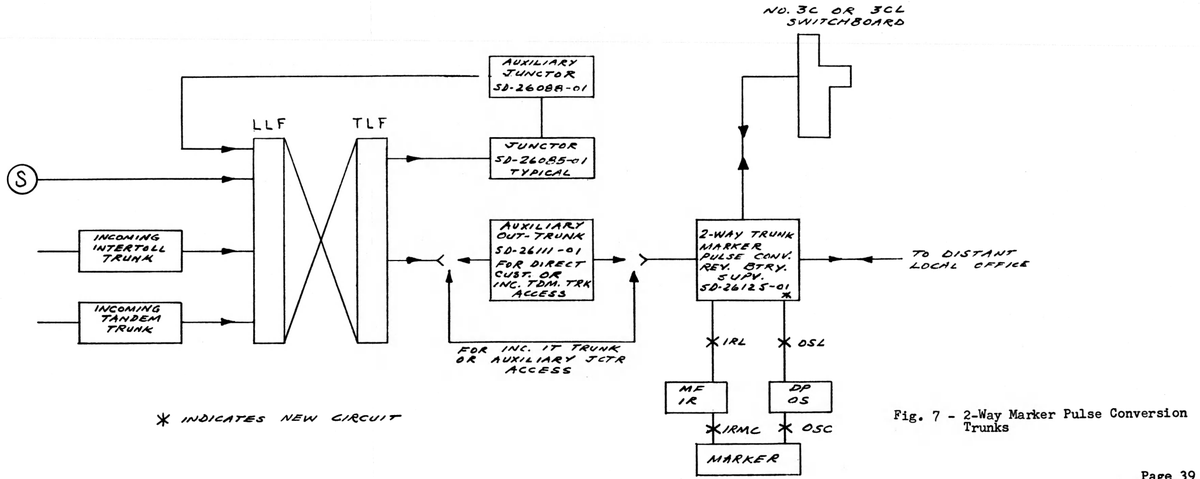


Fig. 7 - 2-Way Marker Pulse Conversion Trunks