

**PROVISION OF ANI OPERATION IN CAMA OFFICES  
MODIFICATION PROCEDURES  
EQUIPMENT DESIGN REQUIREMENTS  
TANDEM CROSSBAR SYSTEM**

**1. GENERAL**

**Scope**

**1.01** This specification, together with the supplementary information listed herein, covers the general information for providing automatic number identification operation in existing CAMA tandem crossbar offices.

**1.02** This specification is reissued to add ED-27158-10, Groups 1 to 6 per SD-27078-01, Issue 1 and to make changes in descriptive information.

**Description**

**1.03** Automatic number identification (ANI) provides automatic means of obtaining the number of the calling subscriber in local offices, and for transmitting this number to the CAMA tandem office where it is perforated along with the called number on the AMA tape. This system handles calls from PBX trunks and individual and 2-party lines. Operator identification of the calling number still is required, however, on calls from 4-party lines and whenever an automatic identification failure occurs.

**1.04** When the called number has been received by the CAMA sender, the sender signals the local office to identify the calling number. After identification, this number is out-pulsed to the CAMA sender using MF pulsing. Information digits are transmitted to indicate that an operator is required if the call originated on a 4-party line or if trouble has been encountered in automatic identification.

**1.05** The changes required for over-all ANI operation in an area involve a tandem crossbar CAMA office and the local dial offices which it serves. Coordination is essential at cut-over and, to some degree in installation effort,

between the tandem office and the individual local offices. The modification work could be done concurrently or in either order in the case of the tandem and local offices, but cutover to the ANI trunks in the local office would depend on completion of the changes at both ends. Since the tandem office is common to the local offices and it may be more desirable to change the latter sequentially rather than concurrently, the requirements covered herein are set up on the basis of modifying the tandem crossbar office as the first step in an area changeover. Temporary transfer arrangements are provided to permit the changes and testing required for the ANI features while continuing non-ANI operation with any or all local offices during the interim period until cutover. A definite sequence for the changes in the tandem office must be followed as covered in Table A.

**1.06** The tandem CAMA equipment modifications involve changes to provide means to recognize an incoming call as automatic or operator identified, to send back a start pulsing instruction for the former, and to receive the MF pulsed calling number in the DP and PCI senders not already so arranged. These changes require major modifications in the senders, transverters, some trunks, sender test and trunk test frame, and CAMA switchboard position and suspension units. The changes in the remaining equipments listed in Table A are minor.

**1.07** Trunk modifications for ANI operation range from minor wiring changes to complete replacement depending on the tandem trunk type and the connecting offices. Non-ANI CAMA traffic from a step-by-step office in the same building, for example, is served by 3-wire tandem trunks connecting directly to the selector bank multiple. For ANI traffic, 2-wire tandem trunks must be furnished instead for connection to step-by-step outgoing trunk relay

equipment. Also, no arrangements have been made in the No. 5 local offices for outpulsing ANI calls on a DP or PCI basis. CAMA traffic (formerly handled this way) must be outpulsed MF when the office is modified for ANI operation. Therefore, for PCI trunks or some E & M signaling DP trunks, trunk unit replacement would be necessary; whereas loop signaling DP or MF trunks could be readily modified for MF-ANI operation. Since cutover to ANI operation must be made without service impairment, the new trunks must be installed and tested and the old trunks kept in operation until cutover. The new trunks, therefore, will require separate link frame, test connector, and recorder appearances. (See 5.17.) Where spare terminations are available in the recorder group, they should be used for new trunks from offices already assigned to that group, thus avoiding the need for recorder assignment cutover changes in the accounting center.

**1.08** Due to the trunk arrangement of tandem crossbar where a mark per decade in the sender link alerts the sender to expect an ANI call, ANI and non-ANI trunks cannot be included in the same decade. For offices with such a mixture requiring trunk reassignment, every effort should be made to limit it to within the same recorder group to avoid the extensive recabling required and the possible office assignment inefficiencies.

**1.09** All CAMA senders arranged for ANI require the use of an MF receiver in order to accept the calling number digits. For PCI and DP senders, this receiver must be added unless it is already provided for use with standard remote positions. ANI modified senders can serve both automatic and operator-identified calls. If more than one type of CAMA sender is in an office but not all types are to be arranged for ANI, the non-ANI senders must be modified to operate with ANI positions and transverters. If any senders of a particular type within a sender link multiple are changed for ANI operation, all of that type must be changed; otherwise, they can be rearranged in two separate sender link multiples with ANI senders in one and non-ANI in the other.

**1.10** Dc CAMA positions or outgoing trunks to CAMA position when arranged for ANI require the addition of identification fail-

ure equipment. All positions and trunks must be modified when any ANI traffic is handled by the tandem office.

## 2. SUPPLEMENTARY INFORMATION

817-000-000 — Tandem Crossbar System Index  
J29253 (817-010-100) — General Outline —  
Tandem Crossbar System

## 3. DRAWINGS

ED-27158-10—ANI Transition Equipment  
SD-25435-01—Tandem Office Key Sheet  
SD-27078-01—Auxiliary Circuit to Facilitate  
ANI Cutover and Precutover  
Trunk Testing

## 4. EQUIPMENT

### New Equipment

**4.01** Assuming there is no growth, the only new equipment components required for the ANI modifications consist of applique units for the dc CAMA positions, an MF receiver for PCI and DP senders, a replacing unit for the CAMA suspension circuit and, when required, replacing trunk units as covered in Table A. Since these replacing trunks require separate appearances as described in 1.07, there may be cases where new trunk and sender link and recorder frames will be required. A new sender test frame may be required as outlined in 5.02.

### ED-27158-10 — ANI Transition Equipment

Equipment — ED-27158-10

**Group 1** — Temporary apparatus and equipment required for one or more tandem office ANI conversions includes two keys, mounting plate, and 19 relays per Fig. 3 and 6 of ED-27158-10. (See 5.03.)

**Group 2** — Temporary apparatus and equipment required in addition to group 1 when any MF reserve trunks are involved in ANI cutover includes one mounting plate and 19 relays per Fig. 1 of ED-27158-10. (See 5.04.)

- Group 3** — Temporary apparatus and equipment required in addition to group 1 for each sender link frame serving any MF trunks from panel offices not arranged for ANI includes four mounting plates and 40 toggle switches per Fig. 4 of ED-27158-10. (See 5.06.)
- Group 4** — Temporary apparatus and equipment required in addition to group 1 for each sender link frame serving DP, PCI, or MF trunks from offices other than panel offices not arranged for ANI includes four mounting plates and 20 toggle switches per Fig. 4 of ED-27158-10. (See 5.06.)
- Group 5** — Temporary apparatus required in addition to group 1 for each MF reserve trunk associated with trunks involved in ANI cutover and with trunks arranged not to return off-hook supervision includes one relay per Fig. 2 of ED-27158-10. (See 5.13.)
- Group 6** — Temporary apparatus required in addition to group 1 for each 40 PCI service trunks arranged not to return off-hook supervision includes one mounting plate and 40 toggle switches per Fig. 5 of ED-27158-10. (See 5.12.)

## 5. MODIFICATION NOTES

- 5.01** Modify the existing equipments to provide the options indicated in the step sequence shown in Table A. There are no engineering requirements for the sequence of modification of the components grouped together within the various steps.
- 5.02** The application of the ANI features to the sender test frame as covered in Table A assumes that it is equipped for testing MF senders. Where it is arranged for DP and PCI senders only, modifications which include a supplementary bay must be made for this purpose. On jobs arranged to test PCI senders only, a complete new sender test frame and supplementary bay should be furnished to replace the old frame. In either case, the preferred location for the supplementary bay is adjacent to the sender test frame.
- 5.03** The extent of the ANI modifications for the trunk test frame will vary according to the vintage of the test frame and associated connectors as to the arrangements for testing trunks arranged for PCI only, PCI or DP, or PCI, DP, or MF. The options as shown in Table A and all transition equipment modifications assume the latter condition, and any earlier versions will require the additional modifications covered in the specific trunk test specifications. In order to permit precutover testing of the ANI modified trunks while continuing to operate from a particular office on an operator-identified basis, the test connectors must be arranged to provide the ANI class marks for the former, and the existing class marks for the latter. This requires means to transfer the CG and PC cross-connections from the non-ANI to ANI condition and is provided as a temporary arrangement shown on the transition circuit. Relays mounted on the connector frame under control of a cutover key located in the test frame provide the necessary transfer contacts. In order to establish the quantity of relays required for a particular cutover, the number of cross-connection jumpers involved per trunk test connector unit must be obtained from information furnished by the telephone company. This information should include details on the assignment of trunks to the various classes at the beginning and end of the conversion and their groupings for the different cutovers when sequential conversion of the local offices is planned. Where more than one cross-connection jumper is presently used at a test connector unit for a group of trunks with the same class marks and is to be cut over simultaneously, the installer shall rearrange the strapping to permit wiring only one transfer per unit for such groups. After cutover, the ANI class mark cross-connections must be installed in the test connector units on a permanent basis.
- 5.04** Under ANI operation, only PCI trunks will maintain reserve trunk testing on a standard basis. For the cases where any MF trunks in a recorder are to be cut over to ANI, a temporary arrangement is provided to maintain reserve trunk testing of both ANI and non-ANI trunks until such time when the trunk test multiple can be revised. This will require the addition in the test frame of an AK-type relay per MF reserve trunk to control the ANI and non-ANI marks to the sender link frame.

An AK-type relay is also required for each remaining non-ANI reserve trunk in the associated decade to control the AMA mark to the sender link. For each reserve trunk serving any trunks arranged not to return off-hook supervision, an added relay is required in the trunk unit. The relays added to the test frame shall be mounted on a plate located below the bottom casing.

**5.05** The J21350AE unit, listed in Table A for the modifications of the CAMA suspension circuit, is a unit requiring one more mounting plate space on the miscellaneous relay rack than the 2-plate, J21350K unit it replaces.

**5.06** The modification of the sender link frame for service trunks only includes the temporary transfer of trunk decade marks from non-ANI to ANI, PAS to NPAS, and the removal of the AMA mark at the trunk group multicontact relays. In order to permit installation testing and to expedite the cutover to ANI, toggle switches shall be provided as shown on the transition circuit to make the necessary mark transfers and removals. When MF trunks from panel offices not arranged for ANI are involved, two switches per group relay (HA and HB) are required. For other MF trunks or for DP and PCI trunks involved in cutover, one switch per group relay is required. These switches are located adjacent to their associated group relays on an added vertical plate which has a capacity for ten toggle switches. For the group relays associated with any reserve trunks involved in ANI cutover, the "AMA" lead, "YK" option must be disconnected. This mark is retained, however, for the remaining reserve trunks not involved in cutover by the use of the added BAA relays in the trunk test frame.

**5.07** The PCI and MF senders shall be changed for ANI operation or for non-ANI operation in an ANI office, as required, before the associated trunks are modified. However, before the DP senders can be changed, their trunks must be partially modified as covered by Step 2 in Table A.

**5.08** In offices with CAMA positions arranged for dc local operation, applique units J21350C, List 4 or J21350G, List 3 must be furnished per position, as required, and mounted on the miscellaneous relay rack with direct cabling to their associated position relay units.

CAMA switchboards arranged for MF local or remote operation require minor wiring changes in their position units to provide the ANI options.

**5.09** The modification of ANI operation for the transverters includes the provision of the local call intercept feature which is applicable only to offices equipped with DP senders. To utilize this feature, changes must be installed in the associated circuits listed in 5.10.

**5.10** *Circuits Requiring Change to Utilize the Local Call Intercept Feature*

DP Sender	SD-25999-01
Transverter Connector	SD-25967-01
Marker Connector	SD-25488-01
Marker	SD-25361-01
Marker Trouble Indicator	SD-25363-01
Transverter Trouble Indicator	SD-25980-01
Trouble Recorder Connector	SD-27046-01
Billing Indexer	SD-25970-01
Sender Test	SD-25963-01
Marker Test	SD-27048-01

**5.11** The final step before cutover to ANI operation involves the modification or replacement of the trunk relay equipments as covered in Table A. Except as noted in the subsequent paragraphs, the modified trunks will operate satisfactorily with the existing non-ANI connecting equipment in the local offices.

**5.12** For PCI trunks not arranged to return off-hook supervision to panel offices, a temporary transfer arrangement employing a toggle switch per trunk is required. This permits precutover ANI testing and simultaneous cutover to ANI operation with the local office cutover.

**5.13** MF trunks of the early design (J27251F per SD-27015-01) must be modified to agree with the ANI design (J27251J per SD-27061-01) except that the non-ANI reserve trunk feature of the latter must be temporarily maintained until cutover. The circuit and equipment design of the latter was made with such conversion in mind and it can be made in place on the J27251C frame. Modified and unmodified trunks can work together in service within a decade provided that they are both working as operator-identified trunks. If the MF reserve trunk per SD-27061-01 must serve any service

trunk arranged not to repeat off-hook supervision, it must be equipped with an NS relay as shown on the transition circuit. Final changes to complete ANI operation for either modified or initially furnished ANI design trunks consist of removing the reserve test feature at some time after cutover.

**5.14** For MF service trunks arranged not to return off-hook supervision and serving panel offices whose districts do not have a talking no charge position, the modifications shall be made as outlined in 5.13. However, the RV relay shall be blocked in the nonoperate position until cutover and minor wiring changes are made as indicated in Table A.

**5.15** DP, 2-wire trunks from step-by-step offices can be modified for ANI operation in place on the trunk frame by the application of the options listed in Table A. In order to temporarily maintain operator identification, coordination on a trunk basis with the application of a minor wiring change in the connecting trunks SD-32199-01 at the step-by-step office is required. The cutover to ANI operation requires the substitution of a new trunk at the local office, but no further work on the tandem trunks. If it is preferable for the telephone company to replace SD-32199-01 with the new ANI trunk SD-32245-01 to eliminate the interim modification in the local office, operator identification can still be temporarily provided by blocking the SP relay operated in the replacing trunk.

**5.16** DP, 3-wire trunks arranged for ANI operation have not been made available, so the DP, 2-wire trunks must be provided instead. This requires the establishment of new trunk decades which can be substituted for the replaced groups at cutover by means of standard main frame trunk cutover devices.

**5.17** This establishment of new trunk decades with the necessity for additional trunk terminations and even, perhaps, new link and recorder frames can be avoided by a pre-ANI replacement of the 3-wire trunks. This would involve replacement of the trunks in the tandem office on a 2-decade basis coordinated with the

addition of the 2-wire trunks in the connecting step-by-step office or offices as required with the latter arranged for operator identification as outlined in 5.16. This could be accomplished by furnishing one additional frame of twenty 2-wire trunks which could be substituted progressively for each frame of 3-wire trunks during the time the units on it were being replaced by 2-wire units. These interim 2-wire trunks can be cabled to permanent assignments on the trunk and sender link frames, but the cabling to the recorders should be run in such a way that the cabling can be swung from one to another as required by the replaced trunk assignments.

**5.18** DP or PCI CAMA traffic from No. 5 offices cannot be handled on an ANI basis, but must be converted to MF for this feature. From an equipment arrangement, loop signaling DP trunk units and E and M signaling trunk units per J27251H can be readily converted to MF by application of options shown in features and option table of the circuit. However, a major cable revision is necessary to associate these modified trunks with MF senders. E and M signaling DP trunks from No. 5 offices per J27251G must be replaced by MF trunks involving new trunk decades, as in the conditions outlined in 5.16 and new cabling to associate them with MF senders.

## **6. GENERAL**

**6.01** After cutover, permanent wiring should be substituted for any of the modifications which were made on a temporary transfer basis to facilitate testing and cutover. This includes sender link decade and trunk test connector class marks, reserve trunk multiple arrangement, etc.

**6.02** Where MF reserve trunks need not be retained for connecting offices which will not be modified for ANI operation, they can be modified for ANI and used as service trunks. However, since they appear as decades on the incoming links and sender links but are spread over the recorder groups, the trunk to recorder cabling must be changed to make them serviceable.

Table A – Modification Procedure Required for In-service CAMA Equipment to Provide ANI Operation						
FRAME OR UNIT	CIRCUIT	OPTIONS REQUIRED	SPECIFICATION	REMARKS	REFERENCE	STEP
Sender Test Frame	SD-25963-01	“VV,” see note A	J23351	Frame must be arranged for testing MF senders.	5.02	1
Trunk Test and Connector Frames	SD-25960-01	“ZR,” Fig. 155	J24350	One C relay per ED-27158-10, Fig. 3 is required for maximum ten “CG” and two “PC” cross-connection jumpers, each of which is common to a group of “CG” and “PC” punchings and the connections of which must be changed from non-ANI marks to ANI. (See SD-27078-01, Fig. 2 and 3.)	5.03	1
				One C key per ED-27158-10, Fig. 6 is required to control operation of all C relays involved in a cutover.		
				If all trunks of a type in the office are involved in ANI cutover at the same time, a simpler transfer can be accomplished by switching the class marks at the multiple side of the cross-connection field. (See SD-27078-01, Fig. 1.) One CO key per ED-27158-10, Fig. 6, is required for each cutover.		
				When reserve trunk testing of MF-ANI trunks is to be temporarily maintained, one AK-type relay designated BAA-MANI per reserve trunk serving these ANI trunks, and half of an AK-type relay designated BAA for each remaining reserve trunk in the associated decade serving non-ANI		

Table A (Cont)						
FRAME OR UNIT	CIRCUIT	OPTIONS REQUIRED	SPECIFICATION	REMARKS	REFERENCE	STEP
				trunks must be installed in the test frame. (See SD-27078-01, Fig. 4 and 9.) Relays are provided per ED-27158-10, Fig. 1.		
Trans-verter Connector Frame	SD-25967-01	"S"	J22154	Added CNM lead.		1
Trans-verter Trouble Indicator Frame	SD-25980-01	"Q"	J28257			1
CAMA Suspension Unit	SD-27018-01	See note A	J21350	New unit (J21350AE) required.	5.05	1
Sender Link and Controller Frame	SD-25358-01	See note A	J28450	See transition circuit SD-27078-01, Fig. 5 and 6 and equipment per ED-27158-10, Fig. 4.	5.06	1
				Two switches, TD and TD1, are required for each HA and HB group relay associated with MF service trunks involved in cutover from panel offices not arranged for ANI.		
				One switch, TD, is required for each HA and HB relay associated with other types of MF service trunks and for each group relay associated with DP or PCI service trunks involved in cut-over.		
Incoming Trunk Unit (DP-2W)	SD-27010-01	"YG"	J27251	Options indicated should be installed in these DP trunks before "XV" option is added to the associated DP senders.	5.07	2

Table A (Cont)						
FRAME OR UNIT	CIRCUIT	OPTIONS REQUIRED	SPECIFICATION	REMARKS	REFERENCE	STEP
Incoming Trunk Unit (DP-3W)	SD-27014-01	"G"	J27251	DP-3W trunks are not arranged for ANI and must be replaced by DP-2W when required.	5.07, 5.16	2
Incoming Trunk Unit (DP-E&M)	SD-27036-01	"ZH"	J27251		5.07	2
DP Sender Unit	SD-25999-01	See notes A and B	J27969	Mount MF receiver on J95102 frame. "YN" option is required if local call intercept is specified.	1.09 5.07	3
PCI Sender Unit	SD-25961-01	See notes A and B	J27961	Mount MF receiver on J95102 frame.	1.09 5.07	3
MF Sender Unit	SD-27024-01	See notes A and B	J27969		1.09 5.07	3
Position and Telephone Unit (DC)	SD-25965-01	"H," see note A	J21350	J21350C, List 4 applique unit is added.	1.10 5.08	4
Position Unit for DSA Switchboard	SD-27002-01	"X," see note A	J21350	J21350G, List 4 applique unit is added.	1.10 5.08	4
Outgoing Trunk to CAMA Position Unit	SD-96481-01	See note A	J21350		1.10	4
Transverter Frame	SD-25968-01	Circuit note 118, see note A	J22465		5.09	4
Incoming Trunk Unit (PCI)	SD-25956-01	Circuit note 109	J27251	See transition circuit SD-27078-01, Fig. 8. One cutover switch (NSPCI) required for each PCI trunk arranged not to return off-hook supervision ("ZU"). See ED-27158-10, Fig. 5.	5.12	5

Table A (Cont)						
FRAME OR UNIT	CIRCUIT	OPTIONS REQUIRED	SPECIFICATION	REMARKS	REFERENCE	STEP
Incoming Trunk Unit (DP-2W)	SD-27010-01	"T," "YD," circuit note 106	J27251	Connecting trunk in local step-by-step office SD-32199-01 requires minor change to enable operator-identified traffic to be maintained temporarily until cutover.	5.15	5
Incoming Trunk Unit (DP-E&M)	SD-27044-01	Remove "W," add "V"	J27251	DP trunk not arranged for ANI. Equipment unit easily converted to MF pulsing and ANI operation.		
Incoming Trunk Unit (MF)	SD-27015-01	See SD-27061-01	J27251	This trunk is not arranged for ANI. However, the equipment layout J27251F is easily converted to ANI trunk J27251J per SD-27061-01.	5.13, 5.14	5
Incoming Trunk Unit (MF)	SD-27061-01	"ZH," "ZG," "ZB," "ZI," see note A	J27251	Reserve trunk testing must be temporarily retained. This requires the retention of "ZH" and "ZG" options as shown on circuit.	5.04, 5.13, 5.14	5
				An added relay is required in the reserve trunk when it serves any service trunk arranged not to return off-hook supervision. (See transition circuit SD-27078-01, Fig. 7.)		
				One NS relay per SD-27078-01, Fig. 7 is required for each RSV trunk that serves trunks arranged not to repeat off-hook supervision. (See ED-27158-10, Fig. 2.)		
				When RSV trunk per SD-27015-01 is changed to SD-27061-01, its NS relay can be retained if required.		

Table A (Cont)						
FRAME OR UNIT	CIRCUIT	OPTIONS REQUIRED	SPECIFICATION	REMARKS	REFERENCE	STEP
				<p>“ZB” and “ZI” options must be added to the RV relay in both service and RSV trunks when arranged not to repeat off-hook supervision. In addition, the RV relay in service trunks must be held normal with the use of a blocking tool.</p>		
				<p>The “ZI” option and blocking tool shall be removed after cutover.</p>		
<p><b>Notes</b></p> <p>A. Unless otherwise specified, these are the options covering ANI features listed in the feature and option table of the associated circuit.</p> <p>B. If any of the following senders are not arranged for ANI operation but are provided in an ANI office, they must be equipped with options as listed.</p> <p style="text-align: center;">SD-25961-01    “YO” SD-25999-01    “ZM” SD-27024-01    “C”</p>						

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