12

COMMON SYSTEMS
VOICE FREQUENCY TRANSMISSION
SWITCHED MAINTENANCE ACCESS SYSTEM
NO. 3A, 3B, 3C AND NO. 5( )
TYPE 2 AND 2B MAINTENANCE CONNECTOR CIRCUIT
AND TYPE 2BX CORD ACCESS
MAINTENANCE CONNECTOR CIRCUIT

CHANGES

B. Changes in Apparatus (Components)

B.1	Superseded	Superseded By
	A,B,C,D,E,F,G, H,M1 Relays, BJ18 Relay, Fig. 1	A,B,C,D,E,F,G,H,M1 Relays, BJ518 Relay, Fig. 1
	ALM Relay, BF33 Relay, Fig. 1	ALM Relay, BF533 Relay, Fig. 1
	GT1,2,M2 Relays, BJ23 Relay, Fig. 1	GT1,2,M2 Relays, BJ523 Relay, Fig. 1
	LT Relay, BF24 Relay, Fig. 1	LT Relay, BF524 Relay, Fig. 1
	M3 Relay, BJ19 Relay, Fig. 1	M3 Relay, BJ519 Relay, Fig. 1
	SD Relay, BJ20 Relay, Fig. 1	SD Relay, BJ520 Relay, Fig. 1
	SL Relay, BJ21 Relay, Fig. 1	SL Relay, BJ521 Relay, Fig. 1
	SS Relay, BF34 Relay, Fig. 1	SS Relay, BF534 Relay, Fig. 1
	TM( ) Relays, BJ16 Relay, Fig. 1	TM( ) Relays, BJ516 Relay, Fig. 1
	All 446F Diodes, Fig. 1	533F Diodes, Fig. 1
	All 446AH Diodes, Fig. 1	808DB Diodes, Fig. 1

D. Description of Changes

D.1 Note 103 is corrected.

D.2 Note 105 is expanded.

D.3 Note 203 is added.

D.4 Note 306 is corrected.

D.5 In CAD3, option reference is corrected

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 9232-FBD-EGS

Printed in U.S.A.

COMMON SYSTEMS
VOICE FREQUENCY TRANSMISSION
SWITCHED MAINTENANCE ACCESS SYSTEM
NO. 3A, 3B, AND 3C
TYPE 2 AND 2B MAINTENANCE CONNECTOR CIRCUIT
AND TYPE 2BX CORD ACCESS
MAINTENANCE CONNECTOR CIRCUIT

CHANGES

B. Changes in Apparatus (Components)

B.1 Removed	Replaced By
ALM Lamp, M1 Lamp, Option N - App Fig. 1	ALM Diode, 552A LED, Option M - App Fig. 1

D. Description of Changes

D.1 Note 102 is modified for SMAS 5( ).

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 9232-FBD-EGS

CD-1C454-01
ISSUE 2A
APPENDIX 4AC
DWG ISSUE 6AC
DISTN CODE 1N21

COMMON SYSTEMS
VOICE FREQUENCY TRANSMISSION
SWITCHED MAINTENANCE ACCESS SYSTEM
NO. 3A, 3B, AND 3C
TYPE 2 AND 2B MAINTENANCE CONNECTOR CIRCUIT
AND TYPE 2BX CORD ACCESS
MAINTENANCE CONNECTOR CIRCUIT

CHANGES

B. Changes in Apparatus (Components)

B.1 Removed	Replaced By
TPB Lamp, M1 Lamp, Option R - App Fig. 1	TPB Diode, 552C LED, Option P - App Fig. 1

D. Description of Changes

D.1 Note 109 is added, and notes 102 and 306 are modified for SMAS 5( ).

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 9232-FHD-EGS

CD-1C454-01
ISSUE 2A
APPENDIX 3B
DWG ISSUE 5B
DISTN CODE 1N21

COMMON SYSTEMS
VOICE FREQUENCY TRANSMISSION
SWITCHED MAINTENANCE ACCESS SYSTEM
NO. 3A, 3B, AND 3C
TYPE 2 AND 2B MAINTENANCE CONNECTOR CIRCUIT
AND TYPE 2BX CORD ACCESS
MAINTENANCE CONNECTOR CIRCUIT

CHANGES

A. Changed and Added Functions

A.1 An additional class mark, T option, has been added.

A.2 Straps have been added, S option, to short the compensation resistors for noncompensated or indirectly compensated applications.

B. Changes in Apparatus (Components)

B.1

Superseded	Superseded By
CR1-10 Diodes, 446F diodes, App Fig. 1	CR1-10 Diodes, 533F diodes, App Fig. 1

B.2 Added

CM Resistor, KS-20289 L6C 1.96K ohm resistor, App Fig. 1 T option.

D. Description of Changes

D.1 Note 107 added to clarify wire gauge for signaling leads.

D.2 Note 108 added to clarify wire gauge for transmission leads.

D.3 Note 305 added to indicate availability of insulating plug for test purposes.

D.4 Note 306 added to specify proper use of available options.

D.5 Connecting circuit information expanded to include SD-1P106-01.

D.6 Through transmission directionality corrected.

D.7 Options S and T added.

F. Changes in CD Sections

F.1 Add the following to SECTION II - DETAILED DESCRIPTION OF OPERATION, after 3.09:

3.10 In some applications, because of variations in compensation plans or the presence of DC signaling currents in the transmission pairs, the use of resistors R1, R2, R5, and R6 is undesirable. Therefore, T option is provided as a shorting option.

3.11 Three class marks are provided to identify the type and use of the type 2( ) maintenance connector. These are T option, Y option, and neither option. The use of these class marks is outlined in Note 306.

F.2 Add the following to SECTION II - REFERENCE DATA after 4.01(d):

(e) LTP and Distribution Circuit - SD-1P106-01

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 4131-FBD-EGS

COMMON SYSTEMS
VOICE FREQUENCY TRANSMISSION
SWITCHED MAINTENANCE ACCESS SYSTEM
NO. 3A, 3B, 3C
TYPE 2 AND 2B MAINTENANCE CONNECTOR CIRCUIT
AND TYPE 2BX CORD ACCESS
MAINTENANCE CONNECTOR CIRCUIT

CHANGES

A. Changed and Added Functions

A.1 The type 2BX cord access maintenance connector has been added to provide access to the voice-frequency (VF) circuits for non-SMAS applications.

A.2 To access a VF circuit, a patch cord is inserted into one of the 24 jacks provided which correspond to the appropriate VF circuit. Testing may then be performed with the use of a Type 2BX Manual Access Circuit.

D. Description of Changes

D.1 Circuit Notes 102 and 103 are changed.

D.2 On FS4, terminals for the LOM lead are corrected.

D.3 The V option is added to FS1 and CADs 2 and 3.

D.4 CAD 15 is assigned a -Z option and is rated Mfr Disc.

D.5 On FS2 and FS4, punching references are deleted.

D.6 Sheet B5 is added.

D.7 The drawing title is changed.

D.8 App Fig. 2 is modified.

D.9 CADs 21 through 25 are added.

D.10 CADs 16, 17, 18, 19, and 20 modified to refer to new CADs 21 through 25.

D.11 New equipment codes are added to Supporting Information.

D.12 References to "Bay Minor Alarm" are changed to read "Fuse and Alarm Ckt."

D.13 To correct spelling and drafting errors.

F. Changes in Description of Operation

F.1 In SECTION I - GENERAL DESCRIPTION, add the following to 1.01 after the last sentence: "The type 2BX cord access maintenance connector provides for VF circuit access for non-SMAS applications."

F.2 In SECTION I - GENERAL DESCRIPTION, change 1.02 to read:

1.02 This circuit provides connection to a type 2( ) metallic/manual access circuit or a type 2( ) nonmetallic manual access circuit for manual maintenance access.

F.3 Add the following to SECTION I - GENERAL DESCRIPTION, after 2.06:

TYPE 2BX CORD ACCESS MAINTENANCE CONNECTOR

2.07 The type 2BX maintenance connector provides 24 jacks which are associated with 24 VF circuits. Access is established with the use of the SMAS patch cords (SD-1C492-01).

F.4 Add the following to SECTION II - DETAILED DESCRIPTION OF OPERATION, after 1.04:

1.05 The type 2BX cord access maintenance connector circuit is provided for non-SMAS application.

F.5 Add the following to SECTION II - DETAILED DESCRIPTION OF OPERATION, after 8.01:

9. CORD ACCESS MAINTENANCE CONNECTOR CIRCUIT

9.01 The cord access maintenance connector circuit provides 24 jacks corresponding to 24 individual VF circuits. A patch cord is inserted into the appropriate jack to access a VF circuit. With the use of a type 2BX manual access circuit, the accessed VF circuit can be tested.

Printed in U.S.A.

F.6 Add the following to SECTION III - REFERENCE DATA, after 3.10:

3.11 The type 2B maintenance connector is a connectorized version of the type 2 maintenance connector.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 4131-EPT-EGS

COMMON SYSTEMS
VOICE FREQUENCY TRANSMISSION
SWITCHED MAINTENANCE ACCESS SYSTEM
NO. 3A, 3B, AND 3C
TYPE 2 MAINTENANCE CONNECTOR CIRCUIT

CHANGES

D. Description of Changes

D.1 In FS2, an SG relay contact going to ground is shown in a connecting circuit, Carrier Group Conditioning Circuit (Typical).

D.2 The title of this circuit is changed. It formerly read:

COMMON SYSTEMS
VOICE FREQUENCY TRANSMISSION
SWITCHED MAINTENANCE ACCESS SYSTEM
NO. 3A, 3B, AND 3C
MAINTENANCE CONNECTOR CIRCUIT

D.3 Circuit Note 102 is changed.

D.4 Information Note 302 is added.

D.5 CADs 1, 2, 5, 8, and 15 are changed.

D.6 CADs 16 through 20 are added.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 4131-RAK-EGS

COMMON SYSTEMS
VOICE FREQUENCY TRANSMISSION
SWITCHED MAINTENANCE ACCESS SYSTEM
NO. 3A, 3B, AND 3C
TYPE 2 MAINTENANCE CONNECTOR CIRCUIT

TABLE OF CONTENTS

SECTION I - GENERAL DESCRIPTION

1. PURPOSE OF CIRCUIT

1.01 This Maintenance Connector Circuit is an integral part of a Switched Maintenance Access System (SMAS) of the No. 3 type. It provides through transmission and signaling connections or performs the switching function in those paths between the external Maintenance Concentrator and Control Circuit of the SMAS No. 3 and the 24 VF office terminal circuits which constitute a maintenance bus group.

1.02 This circuit provides connection to the Type 2 Metallic Manual Access Circuit or the Type 2 Nonmetallic Manual Access Circuit for manual maintenance access.

2. GENERAL DESCRIPTION OF OPERATION

2.01 This circuit is primarily designed to be used on a consolidated bay of office equipment using F-type signaling units. It is designed for use with A6 carrier bays and includes optional decentralized VF patch jacks, but is flexible enough to allow its use with standard A5 and certain other type carrier bays.

2.02 It provides through connections in the transmission and signaling paths of 24 unaccessed VF office terminal circuits or provides remote or manual access to any one (one at a time) of the 24 office circuits for purposes of maintenance. The transmission path may be split in either direction (but not both simultaneously) for measurements which are equivalent to measurements at the VF patch bay to a high degree of accuracy. Signaling leads may be split to form a side loop.

2.03 The circuit allows a special mark to be applied to any (or all) of the 24 VF circuits which should have minimum disruption.

2.04 Connections from this circuit may be made to (external +7 or -16 TLP) VF patch jacks only if essentially contiguous with the maintenance connector.

2.05 The manual control circuit permits connection to a local Type 2 ( ) Manual Access Circuit which provides test jacks and simple measurement capability as well as circuit selection selector switches.

2.06 The circuit provides control and/or sensing connections to an external Carrier Group Conditioning Circuit which normally provides a through transmission path but isolates the carreir group in case of trouble.

SECTION II - DETAILED DESCRIPTION

1. INTRODUCTION

1.01 The Maintenance Connector Circuit in its present application is designed to be inserted typically into the transmission path of 24 VF office terminal circuits between the associated signaling units and the carrier equipment and into the signaling path between the associated trunk circuits and the signaling units.

1.02 It provides through connections or remote or manual access to the 24 VF office terminal circuits, called VF circuits. These

24 circuits constitute a maintenance bus group.

1.03 SMAS No. 3 has three versions: A, B, and C. They vary only in total circuit capacity. The basic circuit unit, the maintenance bus group of 24 VF circuits, is the same in all cases. Its corresponding basic equipment unit, the maintenance connector unit, is used in all cases in different quantities as required.

1.04 A VF circuit which is part of an SMA No. 3 system is identified by six digits, XXXXYY. The first four digits (0000-9999) identify the maintenance bus group or maintenance connector (one out of 10,000 for the largest or C version) with which the circuit is associated. The last two digits identify the particular VF circuit in the maintenance bus group of 24.

2. UNACCESSED CONDITION - FS1

2.01 The connector circuit of FS1 in its unaccessed condition provides through connections in the transmission path from the SF signal unit to the transmission facility, and the signaling path from the trunk circuit to the SF signal unit through the unoperated TM relay. Note that one TM relay is provided per VF circuit (24 per maintenance bus group or per maintenance connector unit). The remainder of this circuit is functional only during access.

3. REMOTE ACCESS - FS1, FS5

3.01 One external Maintenance Connector and Control Circuit may be multipled to the matrix portion of a maximum of ten matrix control circuits (ten Maintenance Connector Circuits) with the restriction that these ten circuits must have the same first three digits in their maintenance bus identification.

3.02 The GTB and GTG leads from the external Maintenance Concentrator and Control Circuit are used to identify a specific maintenance connector unit. The GTB lead is a 1-out-of-100 selection controlled by the first two digits of the maintenance bus number, and the GTG lead is a 1-out-of-100 selection controlled by the last two digits of the maintenance bus number. One and only one GT1 relay is between any pair of GTB and GTG leads.

3.03 The GT1 (gating) relay of the matrix control circuit of FS5 is operated by the external Maintenance Concentrator and Control Circuit. The GT1 relay in turn operates the GT2 (gating) relay. These are controlled from the external circuit by the first four digits (maintenance bus group number) of the circuit 6-digit identification. By means of the last two digits (circuit number), ground is applied from the external circuit through the GT2 relay to two of the eight A-H leads of FS5. The corresponding 2-out-of-8 A-H relays will operate providing a ground to 1-out-of-24 TM relays in a maintenance connector per FS2. The associated VF circuit has then been accessed.

3.04 Operation of a TM relay opens the T,R, and T1,R1 leads between the signaling unit and the VF patch jack (App Fig. 2), and the E&M leads between the trunk circuit and the signaling unit via the VF patch jack (App Fig. 2). If no other relays are operated, all paths still have continuity through various unoperated relays.

3.05 In the transmission path, operation of the SD relay (under control of the external concentrator circuit) connects the concentrator to the drop side of the circuit (toward the switch); operation of the SL relay connects it to the line side (toward the facility).

3.06 Resistors R1, R2, R5, and R6 are fixed buildout pads in lieu of an adjustable pad which would otherwise be required to simulate the 600-ohm measurement made at the VF patch jacks. Use of such fixed pads assumes that the VF patch jack measurement point is internal using App Fig. 2, or, if external, does not exceed 2 ohms of lead resistance from the maintenance connector. This implies that this Maintenance Connector Circuit may not be used with centralized VF patch jacks except when the maintenance connector is essentially located at the centralized VF patch jack location.

3.07 In the signaling path, operation of the SS (split signaling) relay through the concentrator connects the line and drop sides of the E&M leads to the concentrator.

3.08 The LOOP TEST jacks J25 and J26 provide a looped-back transmission path through the operated LT relay for testing the test facilities at the maintenance line control panel (MLCP). The operated LT relay also provides a looped-back path in the E&M leads.

3.09 The T( ) transformer provides monitoring at the MLCP when the TM relay has been operated but the splitting function has not been performed.

4. MANUAL ACCESS - FS1, FS5

4.01 With manual access, control is provided by the M1, M2, and M3 relays of FS5 and the manual control circuit, along with the proper operation of the Type 2 ( ) Manual Access Circuit, SD-1C491-01 or SD-96612-01, rather than by the external Maintenance Concentrator and Control Circuit. The maintenance tests are performed at a particular consolidated bay rather than at a remote test location. In general, the consolidated bay holds more than one maintenance connector (24 VF circuits each) and is associated with an A6 bay furnished with eight channel bank circuits (12 VF

circuits each). Each maintenance connector is associated with two particular channel bank circuits.

4.02 When the ACS NL key (Type 2 ( ) Manual Access Circuit) is operated, a ground derived from the IDL lead (FS2), operates the M1 relay. The M1 relay in operating:

(a) Places a ground on the IDL lead, locking up its holding path.

(b) Operates the M2 relay.

(c) Places a ground on the H lead.

4.03 The M2 relay in operating:

(a) Connects the operating path for the 2-out-of-8 A-H relays which provide a ground to 1-out-of-24 TM relays (FS2). The associated VF circuit has been accessed for maintenance.

(b) Operates the M3 relay.

4.04 The M3 relay in operating:

(a) Provides a ground to hold the M1 and M2 relays up.

(b) Lights the MAN ACS lamp (Type 2 ( ) Manual Access Circuit).

(c) Splits the transmission and signaling leads manually and connects them to manual access jacks in the Type 2 ( ) Manual Access Circuit which are equivalent to the VF patch jacks.

4.05 To return the circuit to normal, the RLS NL key (Type 2 ( ) Manual Access Circuit) is operated releasing the M3 relay, which in turn releases relays M1 and M2 and the MAN ACS lamp (Type 2 ( ) Manual Access Circuit) which returns the circuit to an idle condition.

5. ACCESS CONTROL CIRCUIT - FS2

5.01 The portion of this circuit in which operation of some two of the A-H matrix control relays operate one TM relay has been described in 3.03.

5.02 Jacks J1 through J24 are located on the front face of the maintenance connector and accept the plug-in diodes used to identify special circuits, ie, high priority circuits which must be subject to a minimum of disruption. The diode is used to steer a ground from an activated TM relay to an SC lead common to a maintenance connector. The SC lead is gated by the GT function during initial access.

5.03 Four states of the A-H matrix are available for control of external Carrier Group Conditioning Circuits. These states are for digits 25, 26, 27, and 28. If control of external carrier group conditioning is possible, leads 25, 26, 27, and 28 and option Z are provided. If control is not provided, option -Z should be used and leads 25 and 27 then used if sensing is needed.

6. ALARM CIRCUIT - FS2

6.01 The ALM relay is designed as a slow-operate relay so that operation of the first of some two matrix control relays will not actuate the alarm. If for some reason operation of the second matrix control relay is delayed or if three matrix control relays operate, the ALM relay will operate the bay minor alarm and a local lamp.

6.02 When two matrix relays have operated but the ALM relay has not operated, a ground will be supplied to operate the test-position-busy (TPB) lamp. Another circuit trying to access at the same time will receive this TPB signal through the GT1 relay.

6.03 The operated ALM relay will be released by operation of the ALM RLS key.

6.04 If none of the A-H relays and the alarm relay are operated, the IDL lead to FS5 is at ground. Furthermore, if the GT1 relay in FS5 is not operated, then a grounded IDL lead is available for activation of a Manual Access Circuit.

7. MAINTENANCE BUS CIRCUIT - FS3

7.01 The CM1 and CM2 leads furnish control from the external concentrator circuit to the splitting (SD, SL, and SS) relays and the loop test (LT) relay.

8. CHAIN CIRCUIT - FS4

8.01 This circuit provides a through path for a lockout (LO) control lead to an accessed circuit on a 1-out-of-24 basis. LO leads 1-24 must only be connected to trunk circuits that are capable of single lead lockout control and sensing. Operation of the M1 relay in the chain permits lockout control of an accessed circuit from the manual access panel.

SECTION III - REFERENCE DATA

1. WORKING LIMITS

1.01 The nominal current drain of the maintenance connector unit is 0.265 ampere. With the manual access control portion of the circuit in operation, the nominal current drain is 0.440 ampere.

1.02 The ambient temperature shall be between +40 and +125°F. Somewhat inferior performance may be expected outside of this

temperature range. In no case shall the ambient temperature exceed +140°F.

1.03 The circuit shall look like 600 ohms at the VF patch jacks during access.

1.04 During access, it is important that the circuit continue to look like 600 ohms at the VF patch jacks. External patch jacks, if any, must be within 2 ohms lead resistance of the maintenance connector.

2. FUNCTIONAL DESIGNATIONS

2.01 Relays

Designation	Meaning
ALM	Alarm
GT1,GT2	Gating
LT	Loop test
M1,M2,M3	Manual
SD	Split drop
SL	Split line
SS	Signaling split
TM	Trunk maintenance

2.02 Jack

Designation	Meaning
GT1 TEST	Gating test

2.03 Key

Designation	Meaning
ALM RLS	Alarm release

2.04 Lamps

Designation	Meaning
ALM	Alarm
TPB	Test position busy

2.05 Leads

Designation	Meaning
ALM1,ALM2,ALM2R	Alarm
CM1,CM2	Control matrix
ED	E lead - drop side
EL	E lead - line side
FGB	First group busy
GTB	Gating battery
GTG	Gating ground
HO	Hold
IDL	Idle
LO,LO1-LO24	Lockout
LOM	Lockout manual
MAN	Manual
MB	Manual busy
MD	M lead - drop side
ML	M lead - line side
R,R1	Ring
RD,R1D	Ring - drop side
RL,R1L	Ring - line side
SC	Special circuit
SEL	Select magnet
SGB	Second group busy
SPL	Special
T,T1	Tip
TD,T1D	Tip - drop side
TL,T1L	Tip - line side
TPB	Test position busy

3. FUNCTIONS

3.01 Provides circuitry to gain access to monitor and split transmission and signaling leads of 4-wire E&M lead trunks.

3.02 Provides through connections in transmission and signaling paths in the nonaccessed condition.

3.03 Provides access from a remote position to 1-out-of-24 circuits of a maintenance bus group through a relay matrix on a 2-out-of-8 basis.

3.04 Provides manual access through the same relay matrix to 1-out-of-24 circuits of one or two maintenance bus groups.

3.05 Provides VF patch (multipin access connectors).

3.06 Provides for loop testing of the maintenance access circuitry from a maintenance line control panel.

3.07 Provides for a mark to be furnished to one or more of the 24 circuits of the maintenance bus group to designate it as a

special circuit which must be subjected to a minimum of distrubance.

3.08 Provides control to an External Carrier Group Conditioning Circuit.

3.09 Provides local alarm if matrix relays malfunction.

3.10 Provides signal to the concentrator that the particular maintenance connector is busy.

4. CONNECTING CIRCUITS

4.01 When this circuit is listed on a keysheet, the connecting information thereon is to be followed.

(a) 2600-Hz Signaling Circuit - SD-1C225-01.

(b) Maintenance Concentrator and Control Circuit - SD-99500-01.

(c) Carrier Group Conditioning Circuit - SD-1C295-01.

(d) Type 2 ( ) Manual Access Circuit - SD-1C491-01 or SD-96612-01.

5. MANUFACTURING TESTING REQUIREMENTS

5.01 This circuit shall be capable of performing in accordance with SECTION III - REFERENCE DATA and of meeting all the requirements of the Circuit Requirements Table.

SECTION IV - REASONS FOR REISSUE

D. Description of Changes

D.1 In FS1, lead designations E1, M1, E2, and M2 are added for use with F signaling auxiliary units.

D.2 In FS1, the loop test jack terminal numbers are corrected.

D.3 Connecting information is modified to include "Type 2 ( ) Manual Access Circuit, SD-1C491-01 or SD-96612-01."

D.4 In FS4, the LOM lead is multipled to show connection to "Max 6 other Mtce Conn, in same bay."

D.5 In FS5, the Y lead multiple is added.

D.6 Circuit Note 102 is changed.

D.7 Information Notes 304 and 305 are added.

D.8 CADs 1, 2, 3, 4, 5, 8, 9, 10, 13, and 14 are changed.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 4131-RAK-EGS