# TELEGRAPH SYSTEMS
# TELEGRAPH TEST BOARD NO. 9
# TELEGRAPH SERVICE BOARDS NOS. 2 AND 9B
# TOLL TEST BOARDS NOS. 5, 16 AND 18B
# MORSE BOARD NO. 4
# INTERCONNECTION CIRCUIT
# FOR CARRIER TELEGRAPH
# BETWEEN VF TELEGRAPH LINE BD.
# AND VOICE FREQUENCY FACILITY

CHANGES

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 Title formerly read:

TELEGRAPH SYSTEMS
TELEGRAPH TEST BOARD NO. 9
TELEGRAPH SERVICE BOARDS NOS. 2 AND 9B
TOLL TEST BOARDS NOS. 5, 16 AND 18B
MORSE BOARD NO. 4
INTERCONNECTION CIRCUIT
FOR 40 TYPE CARRIER TELEGRAPH
BETWEEN VF TELEGRAPH LINE BD.
AND VOICE FREQUENCY FACILITY

D.2 The connecting information on Figures 2, 3, 4, 5, 6, 7, 8, 9, 10, 13, 15, 18, 20, 21, 51, 52, 56, 57, 58, 60, 62, 63, 67, 68, 69, 70, 73, and 76 is changed from "V.F. Teleg. Line JK CKT" to "CARR. TELEG. LINE JK CKT".

D.3 The connecting information on Figures 101, 102, 103, 104, 105, 106, 148, 149 150, 151, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 185, 197, 198, 199, is changed from "40C system or 40A or 40B system" to "Carrier Telegraph System".

D.4 Part of Note 1, reading: "51 is test level when -10 dbm is sent at transmitting Telegraph Line Board" is removed.

D.5 In Figures 100 through 200, all test levels applying to send level of -10 dbm at transmitting Telegraph Line Board are removed.

D.6 Changes are made in cross-connection Figures 51, 52, 53, 54, 55, 56, 57, 58, 60, 61, 62, 63, 64, 67, 68, 69, 70, 72, 73, 75, 76 and Figure 77 is added.

All other headings, no change.

BELL TELEPHONE LABORATORIES, INC.

DEPT. 3410-JLH-WTR-MP

# TELEGRAPH SYSTEMS
# TELEGRAPH TEST BOARD NO. 9
# TELEGRAPH SERVICE BOARDS 2 & 9B
# TOLL TEST BOARDS 5, 16 & 18B
# MORSE BOARD NO. 4
# INTERCONNECTION CIRCUIT
# FOR 40 TYPE CARRIER TELEGRAPH
# BETWEEN VF TELEGRAPH LINE BD.
# AND VOICE FREQUENCY FACILITY

CHANGES

B. CHANGES IN APPARATUS

B.1 Added

Figure 20
2 - 19PC Resistances (A1) and (B1)
1 - 1C Pad (REC)

Figure 21
2 - 19PU Resistances (A) and (B)

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 In order to conform to the requirement that all voice frequency carrier telegraph layouts should be suitable for either telegraph or message circuit use, it was found necessary to use the present -21 db specific telegraph level in the "high level" and "low level" tie cables. On this basis the single channel telegraph level would be -17 dbm at the +4 db point and -34 dbm at the -13 db point for segregated tie cables. This change is necessary in order to arrange the interconnecting circuit for joint use either for telegraph or message circuits used as traffic release emergency layouts.

D.2 The former level of a single telegraph channel at the input to "high level" tie cable pairs could be as high as -6 dbm and at the input to "low level" tie cable pairs as high as -26 dbm. These levels were satisfactory from a telegraph interference standpoint but when the interconnecting circuit is used for a voice circuit, these levels would probably interfere with other message circuits in the same cable.

D.3 Figures 20 and 21 were added.

D.4 Extensive changes were made in Figures 101 to 187 and Figures 188 to 200 were added to arrange for the levels outlined in paragraph D.1.

D.5 The present test levels from the voice frequency telegraph line board were added to Figures 101 to 187.

D.6 The levels of +4 db, -13 db and +7 db, -16 db in the titles of Figures 101 to 187 were formerly shown as +4 dbm, -13 dbm and +7 dbm, -16 dbm.

D.7 Notes 106 and 107 were added.

D.8 The connecting information on Figures 1,2,3,4,5,7,8,9,10,11,12,13, 14,15,16,17 and 19 was changed.

D.9 The rating of the Telegraph Service Boards Nos. 2 and 9B was previously shown as A.T.&T.CO.STANDARD.

D.10 No record of these changes in the Information Figures is being kept on the drawing as all circuit layouts are either in accordance with the revised information or will be changed to agree with it.

4. CONNECTING CIRCUITS

4.5 V3 Telephone Repeater Battery Supply and Connecting Circuits - SD-95113-01.

All other headings, No Change.

BELL TELEPHONE LABORATORIES, INC.

DEPT. 3440-CCM-EFW-WY

# TELEGRAPH SYSTEMS
# TELEGRAPH TEST BOARD NO. 9
# TELEGRAPH SERVICE BOARD NOS. 2 & 9B
# TOLL TEST BOARDS NOS. 5, 16 & 18B
# MORSE BOARD NO. 4
# INTERCONNECTION CIRCUIT
# FOR 40 TYPE CARRIER TELEGRAPH
# BETWEEN V.F. TELEGRAPH LINE BOARD
# AND VOICE FREQUENCY FACILITY

## CHANGES

### A. CHANGED AND ADDED FUNCTIONS

A.1 Provision for the use of Type H1 carrier telephone channels as a facility for 40-type carrier telegraph operation has been added.

### B. CHANGES IN APPARATUS

B.1 Added

Fig. 16

2 - 19PE Resistances (A1) and (B1)
1 - 1C Pad (REC)

Fig. 17

2 - 19PF Resistances (A1) and (B1)
1 - 1C Pad (REC)

Fig. 19

4 - 19WR Resistances
(A), (B), (C) and (D)

B.2

| Superseded | Superseded By |
|---|---|
| Fig. 6 | Fig. 18 |
| 4 - 19LL Resistances (A),(C),(D) and (F) | 4 -19PE Resistances (A) (B) (C) and (D) |
| 2 - 19JY Resistances (B) and (E) | |

### D. DESCRIPTION OF CIRCUIT CHANGES

D.01 Figure 6 was rated "MFR DISC" on this issue.

D.02 Figures 16, 17, 18 and 19 were added on this issue.

D.03 Figures 183, 184, 185, 186 and 187 were added on this issue.

D.04 The table of 89-type resistances in Note 102 was extended from 12.0-db loss to 23-db loss.

D.05 The connecting circuit information for Figure 12 has been supplemented to show connections to the 4-wire telephone repeater circuit or the 4-wire voice frequency patching jack circuit.

D.06 In Figures 14 and 15, additional connecting information has been provided.

D.07 In Figure 113, the locations of the pads and repeaters were changed in order to provide lower levels through the tie cables. Transmission levels were added in this figure.

D.08 Prior to this issue, the tie cables in Figures 103, 104, 105, 106, 113, 114, 115, 116, 119, 120, 121, 122, 123, 124, 125, 126, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181 and 182 were not designated "High Level" and "Low Level".

D.09 Prior to this issue, the pads in Figures 107, 127, 140, and 141 were referred to as "PADS SHOWN ON 4W PTCH JK CKT." instead of being shown as Figure 12.

D.10 Prior to this issue the pads, in Figures 108, 128, 142 and 143, were referred to as "PADS SHOWN ON 4W PTCH JK CKT." instead of being shown as Figure 19.

D.11 Prior to this issue, Figures 3 and 17 were not shown in Figures 115, 133, 136, 137 and 138. The pads in these figures were referred to as "PADS SHOWN ON 4W PTCH JK CKT."

D.12 Prior to this issue, Figures 3 and 16 were not shown in Figures 114, 116, 132, 134, 135 and 139. The pads in these figures were referred to as "PADS SHOWN ON 4W PTCH JK CKT."

D.13 Prior to this issue, Figure 9 was not shown in Figures 129, 130, 131, 176, 177, 178, 179 and 180. Two Figures 7 were formerly shown in these figures.

D.14 Reference to Figure 18 was added in Figures 111, 112, 119, 120, 121, 122, 123, 124, 125, 126, 129, 130, 131, 144, 145, 146 and 147.

D.15 Extensive changes were made in the cross-connection information as a result of the tie cable level changes.

D.16 In Figures 164 and 165 the location of Fig. 9 was changed to change levels in tie cables.

D.17 The title of Fig. 104 was changed to provide for tie cable losses greater than 3 db.

D.18 Fig. 15 was removed from Figures 172, 173, 174, 175, 181 and 182.

D.19 The changes made in connection with the standardization of tie cable arrangements, were made to reduce the possibility of noise and crosstalk. These changes assign all low level transmission circuits in a low level tie cable, while high level transmission circuits are assigned in a high level tie cable. The Telephone Companies have been following this plan and requested that the information be changed to agree with the standard practices.

Provision for operation over Type H1 carrier telephone channels was added on this issue.

The change to use figures on this circuit instead of the pads shown on the 4-wire patching jack circuit was made in order to obtain better separation of high and low transmission levels and also better separation from other circuits.

No record of the changes in the Information Figures is being kept on the drawing as all circuit layouts affected are either in accordance with the revised information or will be changed to agree with it.

All other headings, No Change.

BELL TELEPHONE LABORATORIES, INC.

DEPT. 3480-CCM-EFW-CF



F-2698X
R-1

# TELEGRAPH SYSTEMS
# TELEGRAPH TEST BOARD NO. 9
# TOLL TEST BOARDS 5, 16 & 18B
# MORSE BOARD NO. 4
# INTERCONNECTION CIRCUIT
# FOR 40 TYPE CARRIER TELEGRAPH
# BETWEEN VF TELEGRAPH LINE BD.
# AND VOICE FREQUENCY FACILITY

CHANGES

D. DESCRIPTION OF CIRCUIT CHANGES

D.1 Notes 103 and 104 were added.

D.2 Reference to C2 Bridge and Note 103 was added in Figures 8 and 10.

D.3 "Replacing SD-70377-01" was added.

D.4 Prior to this issue the maximum loss of tie cable in Figures 105, 121, 125, 135, 137, 141, 145, 158, 163 170 and 176 was 8 db.

D.5 Prior to this issue the maximum loss of tie cable in Figure 106, 122, 126, 129, 130, 131, 138, 139, 143, 147, 159, 162, 164, 165, 171, 176, 177 and 178 was 11 db.

D.6 Prior to this issue Figure 9 was shown on the line side of the C2 bridge (Fig. 10) in Figures 150, 151 and 182 and the second Figure 9 was not shown.

D.7 Reference to the C2 bridge and Note 103 was added on all information figures showing Figures 8 or 10.

D.8 In Fig. 8 the connecting circuits have been changed and additional information added.

D.9 In Fig. 10 the connecting circuits have been changed and additional information added.

D10 In Fig. 9 the connecting circuits were changed and additional information added.

D.11 Changes were made in cross-connection Figures 52, 55, 56, 57, 60, 61, 65 and 70.

All other headings, No change.

BELL TELEPHONE LABORATORIES, INC.

DEPT. 3480-CCM-EFW-KM

# TELEGRAPH SYSTEMS
# TELEGRAPH TEST BOARD NO. 9
# TOLL TEST BOARDS NOS. 5, 16 & 18B
# MORSE BOARD NO. 4
# INTERCONNECTION CKT..
# FOR 40 TYPE CARRIER TELEGRAPH
# BETWEEN VF TELEGRAPH LINE BD.
# AND VOICE FREQUENCY FACILITY

## 1. PURPOSE OF CIRCUIT

1.1 This circuit provides the necessary arrangements to interconnect the 40 type carrier telegraph terminals connected to a voice frequency carrier telegraph line board to its assigned voice frequency facility.

## 2. WORKING LIMITS

2.1 None.

## 3. FUNCTIONS

3.1 This circuit provides the proper received level at the voice frequency carrier telegraph line board.

3.2 This circuit provides the proper sending level at the 4 wire voice frequency patching jack bay or repeater bay.

3.3 This circuit provides arrangements for regular and full or part time emergency facilities for voice frequency carrier telegraph.

3.4 This circuit provides an arrangement for night release of voice frequency facilities.

3.5 This circuit provides for traffic release emergency facilities for voice frequency carrier telegraph.

3.6 This circuit provides arrangements dropping channels at an intermediate junction point.

3.7 This circuit provides arrangements for voice frequency carrier telegraph where circuit links terminate in a different office than that where the voice frequency carrier telegraph line board or voice frequency carrier telegraph terminal is located.

## 4. CONNECTING CIRCUITS

4.1 Voice Frequency Carrier Telegraph Line Jack Circuit - SD-70358-01.

4.2 4 Wire Voice Frequency Patching Jack Circuit - SD-64303-01.

4.3 44A1 Telephone Repeater Circuit - SD-61306-01.

4.4 Application Schematic V1 Repeater - SD-64903-01.

## DESCRIPTION OF OPERATION

5. This circuit is arranged to provide the necessary attenuation or amplification between the termination of the 4 wire voice frequency facility, either 4 wire cable or Type C, J, K or L carrier telephone channel, and the voice frequency carrier telegraph line board in order that the received level at the voice frequency line board and the sending level at the 4 wire patching jack bay or 4 wire repeater bay will be the same for all 40 type carrier telegraph facilities which may be routed through a given office. The received level at the voice frequency telegraph line board is -17 dbm per channel in a steady marking condition. The sending level at the 4 wire patching jack bay or 4 wire repeater bay is -34 dbm per channel in a steady marking condition in an office having nominal telephone levels of +4 db receiving and -13 db transmitting. It is -37 dbm per channel in an office having nominal telephone levels of +7 db receiving and -16 db transmitting.

6. Arrangements have been provided so that voice frequency facilities used for regular or full or part time emergency layouts may be split at intermediate junction offices when desirable.

7. Arrangements have been provided for dropping channels at an intermediate junction point or office and also at the terminal for the separate patching of the dropped channels.

8. Provisions have been made for so terminating the voice frequency telegraph facility that it may be patched at the 4 wire patching jack bay or 4 wire repeater bay to make up a toll message circuit at night. This is known as a night release layout.

9. Arrangements have been provided for using a toll message circuit released by traffic for use as a voice frequency telegraph facility.

10. Information figures on this drawing, show the interconnection of

the 4 wire patching jack or 4 wire repeater circuit, the voice frequency telegraph line board and the 40 type carrier telegraph terminal. They also show the arrangement for splitting at intermediate points and for dropping channels at intermediate points. Provision for correction for tie cable attenuation is shown in these figures for cases where circuit links terminate in different offices from that where the voice frequency carrier telegraph line board or carrier telegraph terminal is located.

BELL TELEPHONE LABORATORIES, INC.

DEPT. 3130-CCM-WTR-UI