COMMON SYSTEMS "N1" & "ON" CARRIER TELEPHONE APPLICATION SCHEMATIC FOR "N1", "ON1" & "ON2" REPEATER

CHANGES

A. CHANGED AND ADDED FUNCTIONS

A.1 To provide for transmission of power to 240-type amplifiers installed in a carrier line.

B. CHANGES IN APPARATUS

B.1 Added

In Fig. AE

1 - Resistor R25
KS-8512 L2
5900 ohms

D. DESCRIPTION OF CHANGES

D.1 Lead "G" or "N" was added,in Fig. 21, and shown connecting to Fig. 1, 13, or 14 to be used under conditions covered in added Notes 128 and 222. Corresponding connecting information was added, in Fig. 1, 13, and 14. Use of the lead passes power current around a span adjusting pad.

D.2 Fig. AC through AN were added.

D.3 Notes 126 and 127 were added to cover the use of Fig. AC through AJ in furnishing power to 240-type amplifiers.

D.4 Fig. 159 through 170 were added.

D.5 The sentence "Use 22BP wire to connect Fig. 13 or 14 to the ON/K-ON connecting circuit" was added to Note 214.

D.6 Fig. 16, 19, 9, 10, and 5 were rated "Mfr Disc." and replaced by Fig. 11, 12, 13, 14, and 15, respectively, on SD-95224-01.

D.7 Note 129 was added to explain figure changes, above.

D.8 Sheets were renumbered because of the addition of sheets.

All other headings, no change.

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DEPT 2169-JWM-EHP

COMMON SYSTEMS "N" & "ON" CARRIER TELEPHONE APPLICATION SCHEMATIC FOR "N1", "ON", & "ON2" REPEATER

SECTION I - GENERAL DESCRIPTION

1. PURPOSE OF CIRCUIT

1.1 This circuit shows the components required for a type N1 or ON repeater installation and the interconnections between them. Included are the line, power supply, repeater mounting jack, test jacks, deviation equalizers, span adjusting pads, slope networks, and alarm arrangements.

SECTION II - DETAILED DESCRIPTION

1. TRANSMISSION

1.1 N Carrier

1.11 The outside cable pairs are connected to repeater jack (J1) through a cable terminal, terminal block, or protector frame, Fig. 2, or high-frequency (HF) cross-connecting and line-build-out frame, and through test jack (J2), which is multiplied to test jack (J3). A circuit connector, Fig. 6, must always be installed in test jack (J2) for normal transmission. A plug is also inserted in test jack (J3) providing parallel contacts. When required, deviation equalizers are inserted either in the input leads, Fig. 3, or in the output leads, Fig. 4. The equalizers (EQ1) and (EQ2) are inserted between repeating coils (T41) and (T42) across which are shunted impedance improving capacitors (C41) to (C44). Pad (SPAN ADJ), Fig. 5, is also provided, when required, to adjust the received signal level at the repeater to a value independent of repeater span length. It consists of resistors (R1) to (R5). Capacitor (C1) blocks the dc path between the cable pairs. When required, artificial line, Fig. 9, 10, 18, or 19, is provided to build out short cable spans. When the HF cross-connecting and line-build-out circuit is provided, span pads, artificial lines, and noise control circuit, Fig. 21, are provided on that equipment. A deviation regulator, options "BK" and "BK", can be connected for one or both directions of transmission for N systems appreciably longer than 100 miles, depending on temperature variations. A manually adjustable deviation equalizer, options "CY" and "CX", can be connected at the output of an N low-high (L-H) repeater for one or both directions of transmission to be used to equalize transmission level deviations.

1.2 ON Carrier

1.21 The ON repeater differs from the type N repeater in that only one end connects to cable pairs via protector frame, connector, terminal block, or high-frequency cross-connecting and line-build-out circuit. The other end connects to a type ON1 or ON2 terminal, ON1 junction, or ON/K to ON connecting circuit. After the carrier frequency paths go through the protector frame, terminal block, connector, or high-frequency cross-connecting frame, they connect to leads "T1", "R1" and "T2", "R2", Fig. 13, or "T3", "R3" and "T4", "R4", Fig. 14. Span-adjust pads, Fig. 5, and/or artificial lines, Fig. 9, 10, 18, or 19, may be inserted in these paths to build out the cable spans. In addition, a noise control circuit per Fig. 21 may be used in leads "T1", "R1", Fig. 13, or "T4", "R4", Fig. 14, to provide suitable suppression of longitudinal disturbances from the cable pairs. (Where the high-frequency cross-connecting and line-build-out circuit is provided, the span pads, artificial lines, and noise control circuits will be mounted on that unit.) The transmission paths then pass through switching jacks, (J2) and (J3), in parallel, in which connectors, per Fig. 6, are plugged. From this point, the transmission leads connect to repeater jack (J1). The transmission leads on the other end of (J1) "T3", "R3" and "T4", "R4" for Fig. 14 and "T1" "R1" and "T2", "R2" for Fig. 13 connect, via the multiplied switching jacks (J2) and (J3) in which connectors are plugged, toward the ON terminal, junction, or ON/K to ON connecting circuit.

1.22 CD Fig. 1 and 2 illustrate, in single-line block diagram form, the arrangement of slope networks and span pads in the transmission paths between ON repeater and ON terminal or junction. CD Fig. 1 shows arrangements rated "Mfr Disc.", employing options "BA", "BB", "BC", and "BD". CD Fig. 2 shows the replacing "A&M Only" or "Standard" arrangements, using options "BW", "BF", "BY", "BZ", "CA", and "CB". The differences are discussed below.

1.23 For ordinary ON applications (see CD Fig. 1 and 2), the "Mfr Disc." arrangement used unbalanced 7-db slope networks, -7 db built into the low-low (L-L) subassemblies, and +7 db (per Fig. 17) external to the L-H or high-low (H-L) subassemblies, while the

"A&M Only" of "Standard" arrangements use balanced slope networks, external to the L-L and M-L subassemblies, plus a 12-db span pad. The balanced slope network affords appreciable type, and the 12-db pad adjusts the level of input to the repeater transmitting toward the cable to compensate for the reduced loss of the balanced slope network.

1.3 ON Carrier at Junction with ON/K Carrier

1.31 ON repeaters used at points where ON/K joins an ON cable system connect between cable at one end and ON/K to ON connecting circuit at the other end. CD Fig. 3 and 4 illustrate, in single line block diagram form, the arrangements of slope network and span pads in the transmission paths between repeater and ON/K connecting circuit. CD Fig. 3 shows arrangements rated "Mfr Disc.", employing options "BM" and "BQ". CD Fig. 4 shows the replacing "A&M Only" or "Standard", using options "BN", "BP", "CE", or "CF". The differences are discussed below.

1.32 For ON/K to ON connections, the difference between Fig. 3 and 4 involves removing an 18-db span pad from the path between the ON/K to ON connecting circuit and the input of the L-L repeater subassembly, this loss being provided by a pad within the L-L subassembly now generally used for these applications.

1.33 Operation of ON/K to ON is otherwise the same as described under 1.2.

2. MAINTENANCE

2.1 Normal transmission is obtained by insertion of connectors, Fig. 6, in test jacks (J2) and (J3). For maintenance purposes, the connector in test jack (J3) is removed, and this jack is used for connecting to a test circuit in which a spare repeater is plugged. The connector is then removed from test jack (J2), and transmission becomes under the control of the test circuit so that it can be switched from the regular repeater to the spare repeater.

3. POWER SUPPLY

3.1 Repeater power supply is obtained from a positive battery +130 volts, and a negative battery -130 volts. The positive battery may be nominally 130 volts, 136 volts, or 152 volts. The negative battery may be nominally 130 volts or 138 volts.

3.2 Local Source, Fig. A for N1, T or V for ON

3.21 For a repeater located at the source of power, only the positive battery is required. The +130 volts and ground leads are connected to terminals 9 and 11, respectively, of the repeater jack.

3.3 Local Source and Power Transmitted to Adjacent Repeater Stations over the Line, Fig. B, C, or D for N1, W or X for ON

3.31 In addition to the connections mentioned in 3.1 for supply of the local repeater, +130 volt power is fed over the output pairs in either one or both directions through resistors (R13) and/or (R23). The -130 volt power is fed to the input pairs through resistors (R11) and rheostat (R12), and/or (R21) and (R22). The rheostats are adjusted to compensate for different lengths of the adjacent line section so that the required voltage of 140 volts is received at the distant station.

3.4 Repeater Power Received from W or E, Fig. E or F

3.41 When power is received from W, the connections to be made on the repeater mounting terminal plate are shown in Fig. E for type N repeater and in Fig. AA for type ON repeater. When power is received from E, the connections are shown in Fig. F for N repeaters and Fig. AB for ON repeaters.

3.5 Surge Protection, Fig. 11

3.51 Capacitors (C11), (C13), (C21), and (C23) in Fig. 11 together with resistors (R11), (R13), (R21), or (R23) in Fig. B, C, D, L, M, N, R, S, W, X, Y, or Z, act as surge filters. When a momentary protector block operation occurs due to a lightning hit, the resulting current surge comes from the capacitors, and the capacitors are recharged through the resistors at a moderate rate. Thus less current flows through the fuse, and unnecessary fuse blowing is avoided.

4. BATTERY ALARM CIRCUIT, Fig. P

4.1 One Fig. P is required per fuse panel in connection with Fig. A, B, C, D, L, M, N, R, S, T, V, W, X, Y, or Z.

4.2 Option "YX", "Mfr Disc."

4.21 The blowing of a fuse will connect battery through resistor (R33) or (R34) to one of the windings of relay (K1). Lamp (+130 volts) or (-130 volts) will light to provide visual indication of the location of the fuse panel involved.

4.3 Option "YW", "AT&TCo Standard"

4.31 Option "YW" was added and rated "AT&TCo Standard" to make this circuit compatable with the transistorized repeater alarm circuit. The +130 volt alarm circuit remains the same but the -130 volt circuit is through resistors (R32) and (R34). Lead "A3" is for connection to a -48 volt fuse which may be used with transistorized repeaters.

4.4 The operation of relay (K1) also supplies ground on leads "1", "2", and "3" for operation of office or open-wire alarms. The alarm ground on lead "2" may be removed externally by means of lead "2" for disabling visual alarm in certain partially attended offices.

SECTION III - REFERENCE DATA

1. WORKING LIMITS

1.1 None.

2. FUNCTIONS

2.01 Provides connections between repeater and line.

2.02 Provides connections between ON repeater and ON terminal or junction equipment.

2.03 Provides for repeater testing and maintenance without interruption of service.

2.04 Provides for supplementary equalization when required.

2.05 Provides means of building out any particular line loss.

2.06 Provides for power supply to the repeater, either from a local source or from a distant source over the line. Also provides for power from local source to adjacent repeater stations. This power supply to the adjacent repeater stations is adjustable.

2.07 Provides for an alarm in case of fuse failure.

2.08 Provides protection in line circuit when required.

2.09 Provides supplementary regulation when required.

2.10 Provides connections between ON repeater and ON/K to ON connecting circuit.

2.11 Provides means for draining off longitudinal impulse noise that has been coupled to the K or ON pair on the receiving side.

2.12 Provides connection to MF cross-connecting and line-build-out circuit.

2.13 Provides adjustable deviation equalizers when required.

3. CONNECTING CIRCUITS

3.01 N1 High-Low Repeater - SD-95122-01 (Mfr Disc.)

3.02 N1 High-Low Repeater - SD-95178-01

3.03 N1 Low-High Repeater - SD-95123-01 (Mfr Disc.)

3.04 N1 Low-High Repeater - SD-95179-01

3.05 ON L-L & L-H Repeater - SD-95192-01 (A&M Only)

3.06 ON L-L & H-L Repeater - SD-95193-01 (A&M Only)

3.07 ON L-H & L-L Repeater - SD-95194-01 (A&M Only)

3.08 ON H-L & L-L Repeater - SD-95195-01 (A&M Only)

3.09 ON Terminal Application Schematic - SD-95150-01

3.10 ON1 Junction Application Schematic - SD-95196-01

3.11 Annunciator Circuit - SD-90202-01

3.12 Audible Alarm and Pilot Lamp Circuit - SD-90614-01

3.13 Audible and Visual Alarm Circuit - SD-96188-01, SD-95063-01

3.14 Pilot Lamp Circuit - SD-31548-011

3.15 Pilot Lamp and Power Alarm Lamp Circuit - SD-31573-01

3.16 Misc Alarm Circuit & Aisle Pilot - SD-31970-01, SD-32192-01

3.17 Misc Alarm Circuit, Alarm Control and Sender Circuit - SD-31980-01, SD-32192-01

3.18 Floor Alarm Frame, Misc and Aux Alarm Circuit - SD-26047-01

3.19 Floor Alarm Board, Misc and Aux Alarm Circuit - SD-21203-01

3.20 Misc Alarm Circuit - ED-226189

3.21 Misc Alarm Circuit, 350A SXS Office - SD-31209-01

3.22 Audible Alarm Circuit, 350A SXS Office - SD-31661-02

3.23 No. 1 Pilot Lamp Circuit, SXS Offices - SD-30437-01

3.24 VF Alarm System - SD-95143-01

3.25 Application Schematic for N1 Deviation Regulator - SD-95186-01

3.26 Adjustable Frequency Repeater - SD-95219-01

3.27 ON/K to ON Connecting Circuit - SD-95248-01

3.28 ON L-L & L-H Repeater - SD-95215-01

3.29 ON L-L & H-L Repeater - SD-95216-01

3.30 ON L-H & L-L Repeater - SD-95217-01

3.31 ON H-L & L-L Repeater - SD-95218-01

3.32 ON Slope Network, Span Pad, & Artificial Line Circuits - SD-95224-01

3.33 HF Cross Connecting and Line Build Out Circuit - SD-97030-01

3.34 N & ON Adjustable Deviation Equalizer - SD-97055-01

SECTION IV - REASONS FOR REISSUE

CHANGES

A. CHANGED OR ADDED FUNCTIONS

A.1 Connections to the N and ON adjustable deviation equalizer are specified which is used as required to equalize transmission level deviations.

B. APPARATUS CHANGES

B.1

Superseded	Superseded by
In Fig. F	
1 - Res (R31) KS-8512, L2A 3010 ohms	1 - Res (R31) KS-8512, L2A 2260 ohms
1 - Res (R32) KS-8512, L2A 3010 ohms	1 - Res (R32) KS-8512, L2A 1780 ohms
1 - Res (R34) KS-13492, L1 11,000 ohms	1 - Res (R34) KS-13491, L1 2700 ohms

D. DESCRIPTION OF CIRCUIT CHANGES

D.01 Fig. 22 was added.

D.02 Connections to Fig. 22 were shown in Fig. 1.

D.03 Options "CV", "CW", "CX" and "CY" were added to cover D.02, above.

D.04 Notes 124 and 220 were added to cover D.02, above.

D.05 Fig. 153 was added to show cross connect information for Fig. 22.

D.06 Reference to Fig. 153 was added to Fig. 51, 52, 64, 65, 67, 68, 74, 75, and 89.

D.07 Reference to Note 213 was removed from Fig. 1.

D.08 Reference to Fig. 152 was added to Fig. 64, 65, 75, 93, 94, 95, 96, 97, 98, 99 and 100.

D.09 Connecting information to the A side of Fig. 152 was changed.

D.10 Option "BB" was previously shown under network H in Fig. 14 in error.

D.11 Note 103 was expanded to include component information for 26- 28- and 30-db pads.

D.12 Note 125 and Options "YW", "YX" "YY" and "YZ" were added to cover B.1, above.

D.13 Fig. 80 was modified to cover B.1, above.

D.14 The list number was added to rheostat (R12) in Fig. D.

D.15 Connecting information was added to Note 104.

D.16 Note 221 was added.

All other headings under Changes, no change

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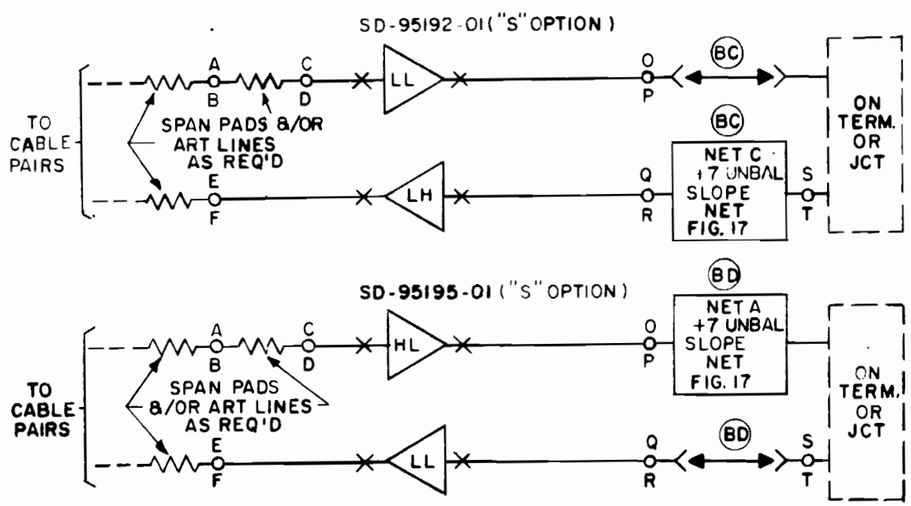
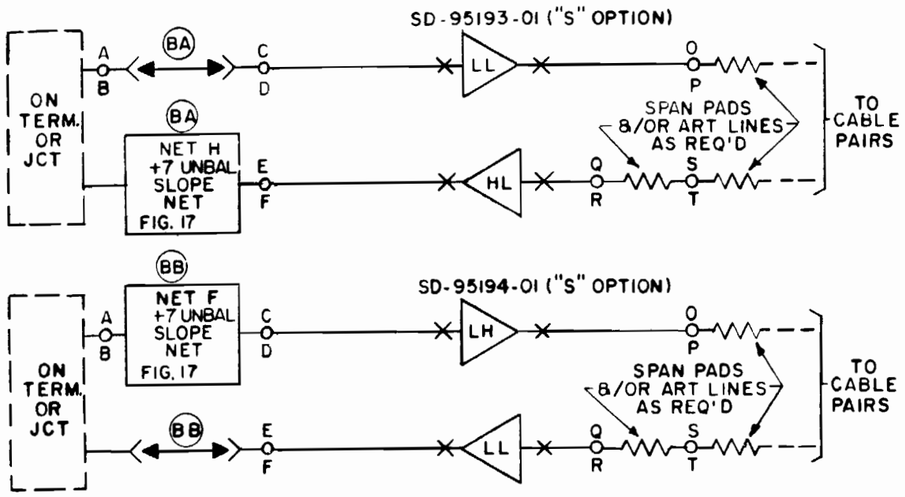
Attachments:
Pages 1 and 2

FOR FIG. 13 - "ON" - "BC" & "BD" OPTIONS (MFR DISC)

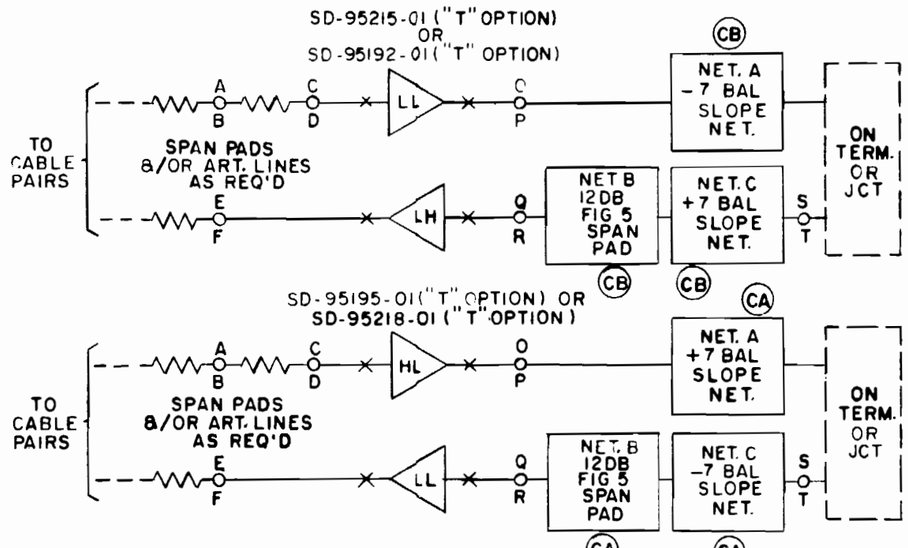


FOR FIG 14 - "ON" - "BA" & "BB" OPTIONS (MFR DISC)

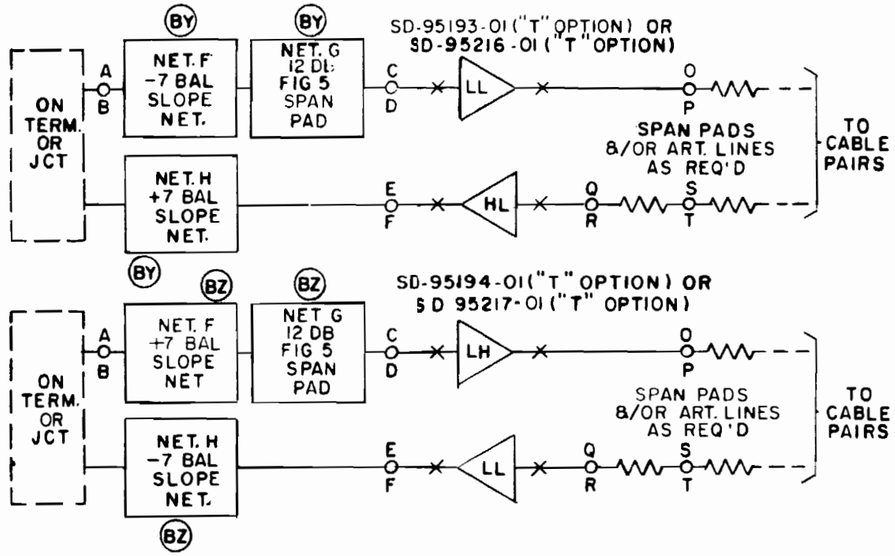


CD - FIG. 1 "MFR DISC" ARRANGEMENTS
FOR ON TERM. OR JUNCTION APPLICATIONS

FOR FIG 13 - "ON" - "CB" & "CA" OPTIONS (STD)



FOR FIG 14 - "ON" - "BY" & "BZ" OPTIONS (STD)



CD-FIG. 2 "A&M ONLY" OR "AT&TCO STD" ARRANGEMENTS
FOR ON TERM OR JUNCTION APPLICATIONS

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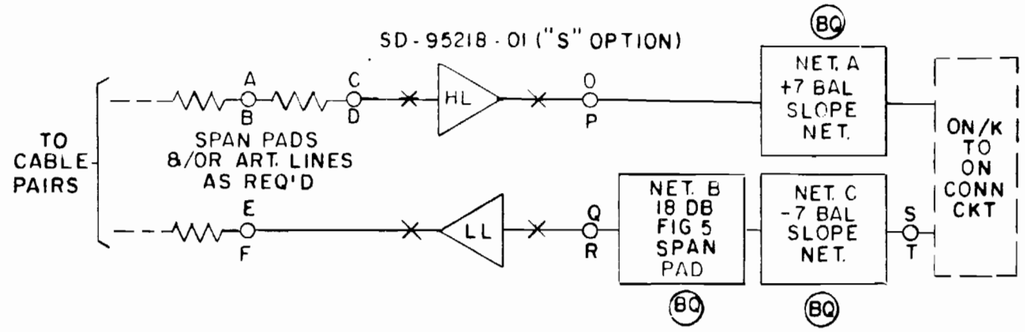
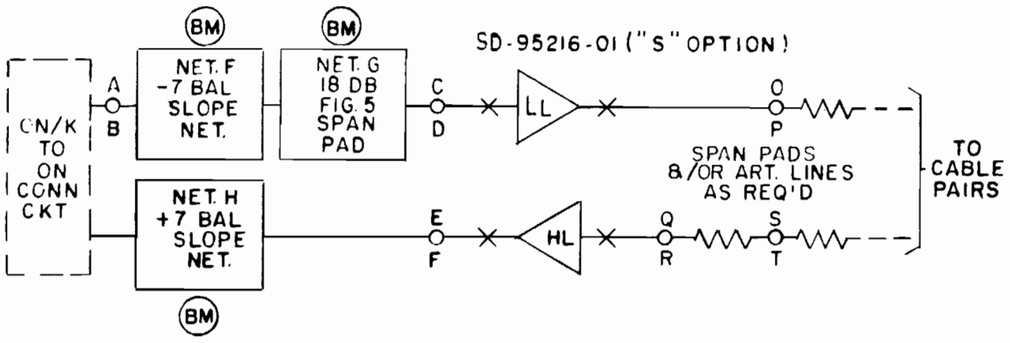
FOR FIG. 13 - ON/K TO ON CONN - "BQ" OPTION (MFR DISC)



FOR FIG. 14 - ON/K TO ON CONN - "BM" OPTION (MFR DISC)



CD-FIG 3 "MFR DISC" ARRANGEMENTS
FOR ON/K TO ON APPLICATIONS

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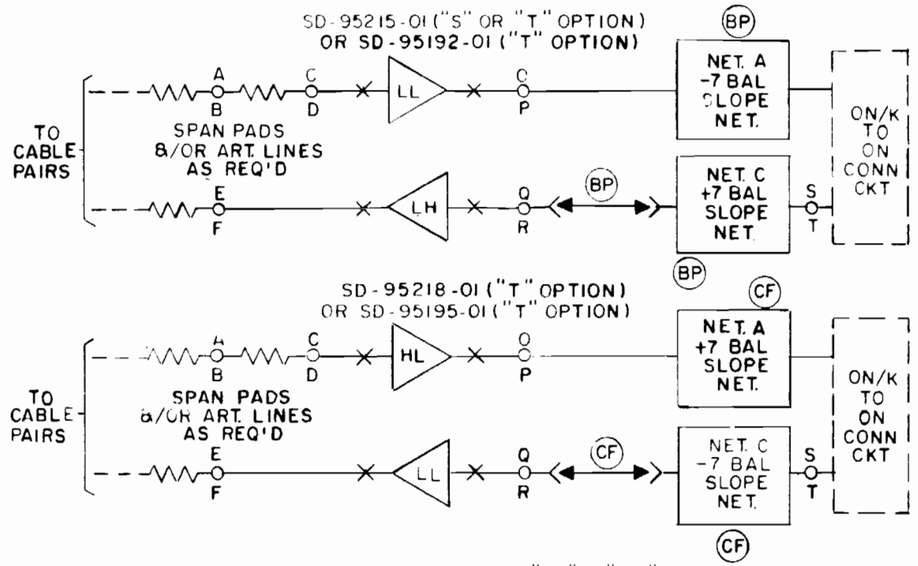
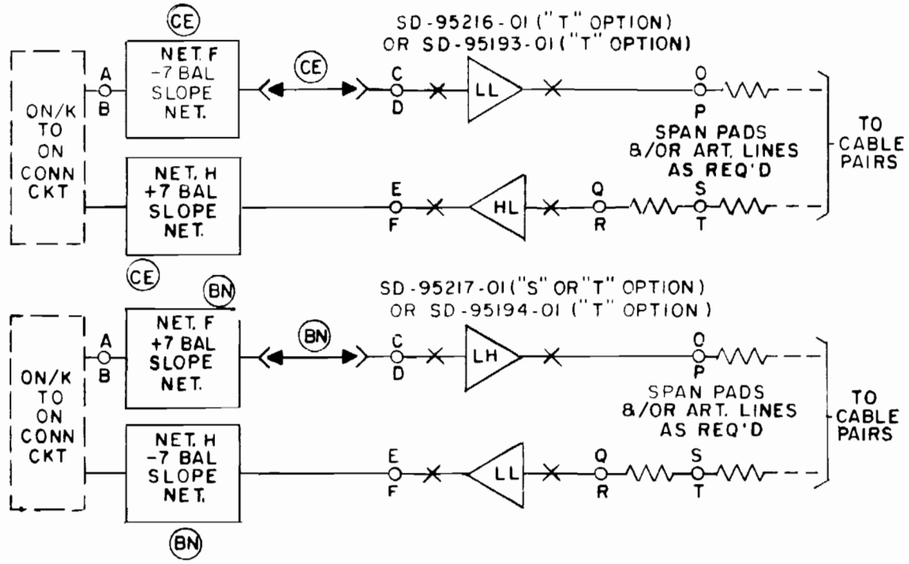
FOR FIG 13 - ON/K TO ON CONN - "BP" & "CF" OPTIONS (STD)



FOR FIG 14 - ON/K TO ON CONN - "CE" & "BN" OPTIONS (STD)



CD-FIG 4 "A&M ONLY" OR "AT&TCO STD" ARRANGEMENTS
FOR ON/K TO ON APPLICATIONS

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