GROUP, SUPERGROUP, AND MASTERGROUP DISTRIBUTION FRAMES

DESCRIPTION

COMMON EQUIPMENT

ANALOG MULTIPLEX TERMINAL EQUIPMENT

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1. GENERAL

A. Introduction

1.01 Distribution frames provide cross-connection points for signals in the basic group band (60 to 108 kHz), basic supergroup band (312 to 552 kHz), and basic mastergroup band (up to 3084 kHz). Test procedures for the distribution frames are explained in Section 356-005-501.

1.02 This section is reissued to add information for later features of the group distribution frame equipment, to correct errors, to expand the explanations for trunks between distribution frames, and to improve the drawings and include a new drawing (Fig. 12). Arrows are used to indicate significant changes. Equipment Test Lists are not affected.

1.03 Distribution frames provide an economical, short-interval, in-service means for changing the various multiplex transmission paths from one pattern to another.

1.04 In the newer distribution frames, all connection points are multipled or derived via hybrids, which provide the signal splitting and combining functions required for in-service reassignments. Standard transmission levels have been established for the frames.

B. General Information

1.05 All L-type multiplex distribution frames consist of cross-connection terminal blocks or panels that can be mounted miscellaneously on a frame or mounted in a double-door cabinet. The same basic cabinet structure is employed for all the frames. Transmitting and receiving supergroup and mastergroup panels can be mounted in separate or combined cabinets without restriction. The standard way of mounting transmitting and receiving group panels is in separate cabinets to avoid noise and crosstalk. Experience with the new group panels may show that some combined transmitting and receiving arrangements will be satisfactory in small offices.

1.06 Standard transmission levels assigned for the frames are compatible with existing arrangements and with planned changes to existing arrangements. ▶In all cases except one, the cable equalizers for trunks to the frames are contained in trunk equipment or in connecting transmission bays. The one exception is the mastergroup distribution frame which includes an adjustable equalizer for each trunk on the line side.◀

2. GROUP DISTRIBUTION FRAMES

A. General

2.01 A group distribution frame (GDF) ▶ED-52428 (SD-50717)◀ provides a common location for connecting all group equipment such as channel banks, group connectors, ▶analog/digital connectors or transmultiplexers, N3/L junctions,◀ carrier program combiners, and group data equipment. Two types of the GDF have been developed.

Type I Group Distribution Frame

2.02 The type I GDF, developed in conjunction with LMX-2 equipment, consists of terminal blocks (panels) that can be mounted miscellaneously or mounted in a double-door cabinet. Cross-connections are made with unshielded pairs that are wire-wrapped to terminals. The cross-connection points are not multipled, and in-service reassignments are difficult.

Type II Group Distribution Frame

2.03 The type II GDF, developed in conjunction with LMX-3 equipment, consists of cross connection panels that can be mounted miscellaneously or mounted in a double-door cabinet. Cross-connections are made with connectors rather than by wire-wrapping, and the cross-connection cords are shielded. All connection points are multipled so in-service reassignments can be performed.

Trunks

2.04 Zero-loss trunks up to 1200 feet long may be provided between GDFs.

(a) An ***active*** trunk between two transmitting GDFs includes a 231W amplifier; an active trunk between two receiving GDFs includes a 231Y amplifier. Amplifier gain is set, according to trunk length, by means of an optional strap and/or resistor ▶on the rear of amplifier shelf ED-54538. Amplifier shelves can be mounted in GDF trunk amplifier bay ED-54545.

(b) A ***passive*** trunk ED-52717 between two GDFs includes only a 2666AC transformer

(135 ohms to 135 ohms). The transformers are mounted in mounting panel ED-52718 which serves 20 trunks.◀

B. Equipment Description

Type I Group Distribution Frame

2.05 The GDF developed in conjunction with LMX-2 is shown in Fig. 1. The cabinets are available in four heights: 7 foot, 9 foot, 10.5 foot, and 11.5 foot. The number of groups that can be accommodated by one cabinet is fixed by the ultimate cabling density. Each GDF cabinet, regardless of height, has a maximum capacity of 1260 one-way cross-connections from channel banks or group connectors to 1260 points connecting to LMX group multiplex equipment. These points are distributed over nine panels per cabinet. Each panel provides for 140 cross connections.

2.06 Cables in and out of the frame are run on the left and right sides of the cabinet and terminate at the back of the panels. All cross-connections are made on the front of the panels with unshielded cable pairs that are wire-wrapped to terminals on the panels. Insulated tubing is placed over each connection to facilitate locating a desired pair and to reduce the risk of interfering with adjacent pairs when changes are made.

2.07 To locate a particular pair in a fully loaded cabinet requires an identification scheme that includes appropriate stenciling on the equipment and adequate record maintenance. In type I frames, the panels in a fully equipped cabinet are normally numbered 1 to 9 from bottom to top. ▶Offices with more than one cabinet have panels in the second cabinet designated 10 to 18; and panels in the third cabinet, designated 19 to 27.◀ The identifiers normally used on each panel in a cabinet are shown in Fig. 1. Each horizontal row of terminals is designated alphabetically, with A at the bottom of the panel, and G at the top. The pairs are designated numerically.

2.08 The grounding scheme for a type I GDF is different from that for a type II frame. Cables between the GDF and channel banks are grounded at the channel bank, while cables between LMX group equipment and the GDF are grounded at the GDF. A small terminal block at the front left of the GDF (Fig. 1) is used for terminating the cable shields. Connections are made to lugs at the rear of the block during installation. Two shields can be connected to each lug.

Type II Group Distribution Frame

2.09 The type II GDF cabinet, which is a newer design and is narrower than cabinets for type I frames, is available at present only in a 7-foot height. Individual panels can be mounted in existing 9-foot, 10.5-foot, and 11.5-foot cabinets. The number of

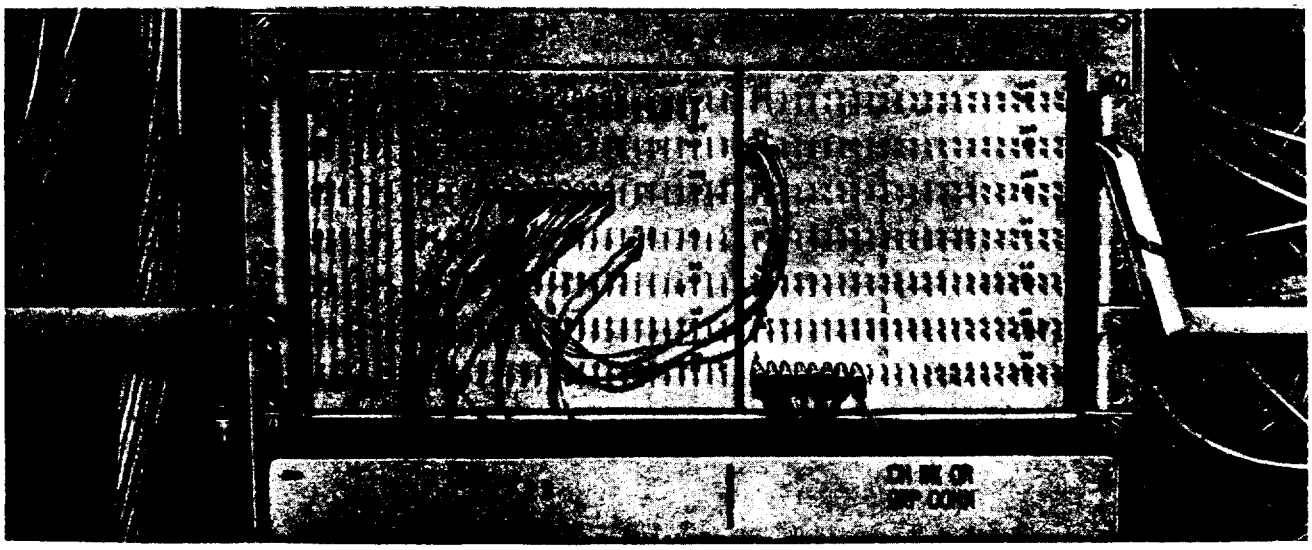


Fig. 1—Type I Group Distribution Frame Installed in Cabinet

groups that can be accommodated by one cabinet is fixed by the ultimate cabling density. ⧫Older cabinets had 1000 connection points on 10 panels. Later cabinets, regardless of height, have a maximum capacity of 800 one-way cross-connections from channel banks, group connectors, or transmultiplexers, to 800 points connecting to LMX group multiplex equipment. The connection points are mounted on 8 panels per cabinet; each panel provides for 100 cross connections. The GDF panels are 19 inches wide and 7 inches high (Fig. 2).

2.10 Cables in and out of the frame are run on both sides of the cabinet and conductors are wire-wrapped, with strict requirements, to terminals at the back of the panels.⧫ All front panel connections are made with miniature 3-wire jacks and plugs.

2.11 To locate a particular cross connection in a fully loaded cabinet, an identification scheme is used that includes color coding, numbers, and letters. ⧫A fully equipped cabinet can hold eight panels. The panels normally are numbered 1 to 8 from bottom to top. Offices with more than one cabinet have panels in the second cabinet designated 9 to 16, and panels in the third cabinet designated 17 to 24.⧫ The identifiers used on each panel in a cabinet are shown

TYPE II PANEL COLOR CODES		
GREEN	GREEN	BLACK
GREEN	GREEN	BLACK
YELLOW	YELLOW	BLACK
YELLOW	YELLOW	BLACK
ORANGE	ORANGE	BLACK
ORANGE	ORANGE	BLACK
BLUE	BLUE	BLACK
BLUE	BLUE	BLACK
BROWN	BROWN	BLACK
BROWN	BROWN	BLACK

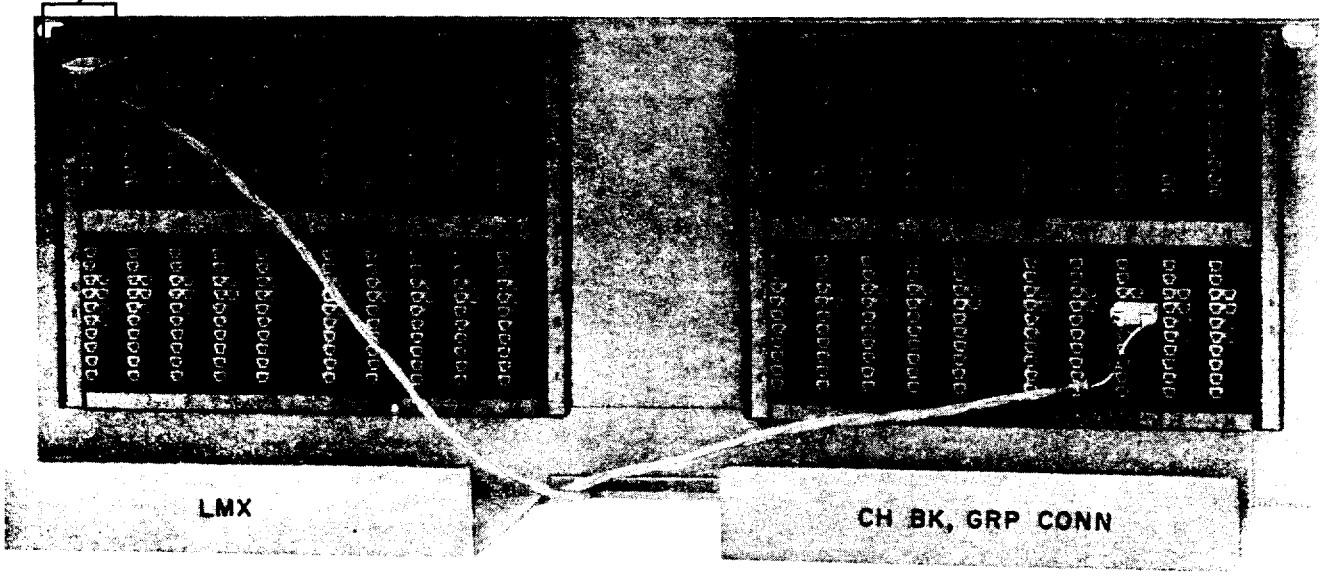


Fig. 2—Type II Group Distribution Frame Cross Connection Panel

in Fig. 2. Each multipled pair of connector sockets is identified horizontally with a letter of the alphabet, while the vertical rows are designated with numbers. Also, each multipled pair of connector sockets is color-coded (Fig. 2).

2.12 ▶A cabling diagram, showing recommended cable paths to avoid conjestion, is provided inside the cabinet doors.◀

2.13 The grounding scheme for the type II GDF requires that all cables in and out of the frame be grounded at the cabinet. This decreases crosstalk and minimizes the coupling of office ground noise into the transmission paths. The shields of the connector cords used with the type II GDF are grounded at both ends to provide circuit-to-circuit isolation. This, in combination with other grounding devices in the type II GDF, assures minimum ground plane potential differences. The overall grounding plan is called centerpoint grounding.

C. Other Considerations

Modified Type I Group Distribution Frame

2.14 Type I frames normally have the input and output cables grounded at the equipment connected. However, the frame panels can be modified to permit grounding the cables at the GDF only. The cross-connection cords used with the modified GDF panels are the same as for type I: unshielded pairs with wire-wrapped connections. The grounding modification is generally for use where there are noise problems due to ground plan coupling.

Mix of Type I and Type II GDF Panels

2.15 Cross-connection panels developed for type II frames can also be used to fill out existing type I frames. Other than cross-connection cords, the mixture of grounding schemes requires no special arrangements. A cross-connection between type I and type II panels is shown in Fig. 3. The cords used in this arrangement are shielded, have a connector at one end, and must be wire-wrapped at the other end. ▶At the wire-wrapped end, the shield is butted near the edge of the type I panel (Fig. 3).◀ This provides reasonable shielding benefits without causing excessive cross-connection conjestion in the type I panel.

GDF Cabling Limitations and Transmission Levels

2.16 The cable length limitations and normal transmission levels at test jacks for equipment connected to a GDF are shown in Fig. 4.

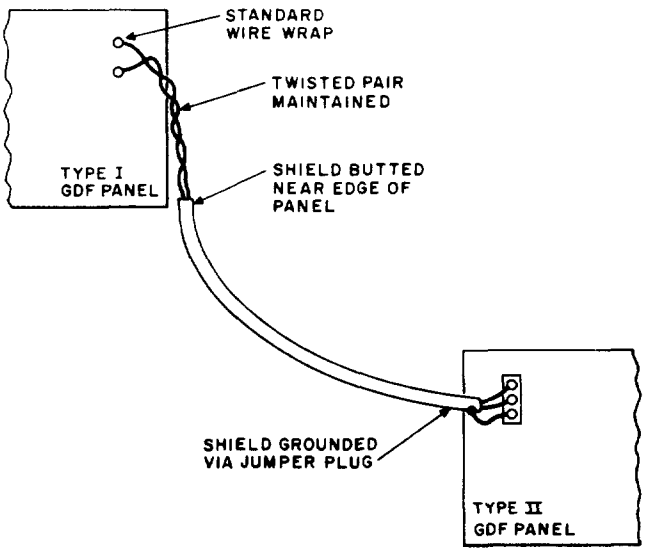


Fig. 3—Cross-Connection Between Type I and Type II Group Distribution Frames

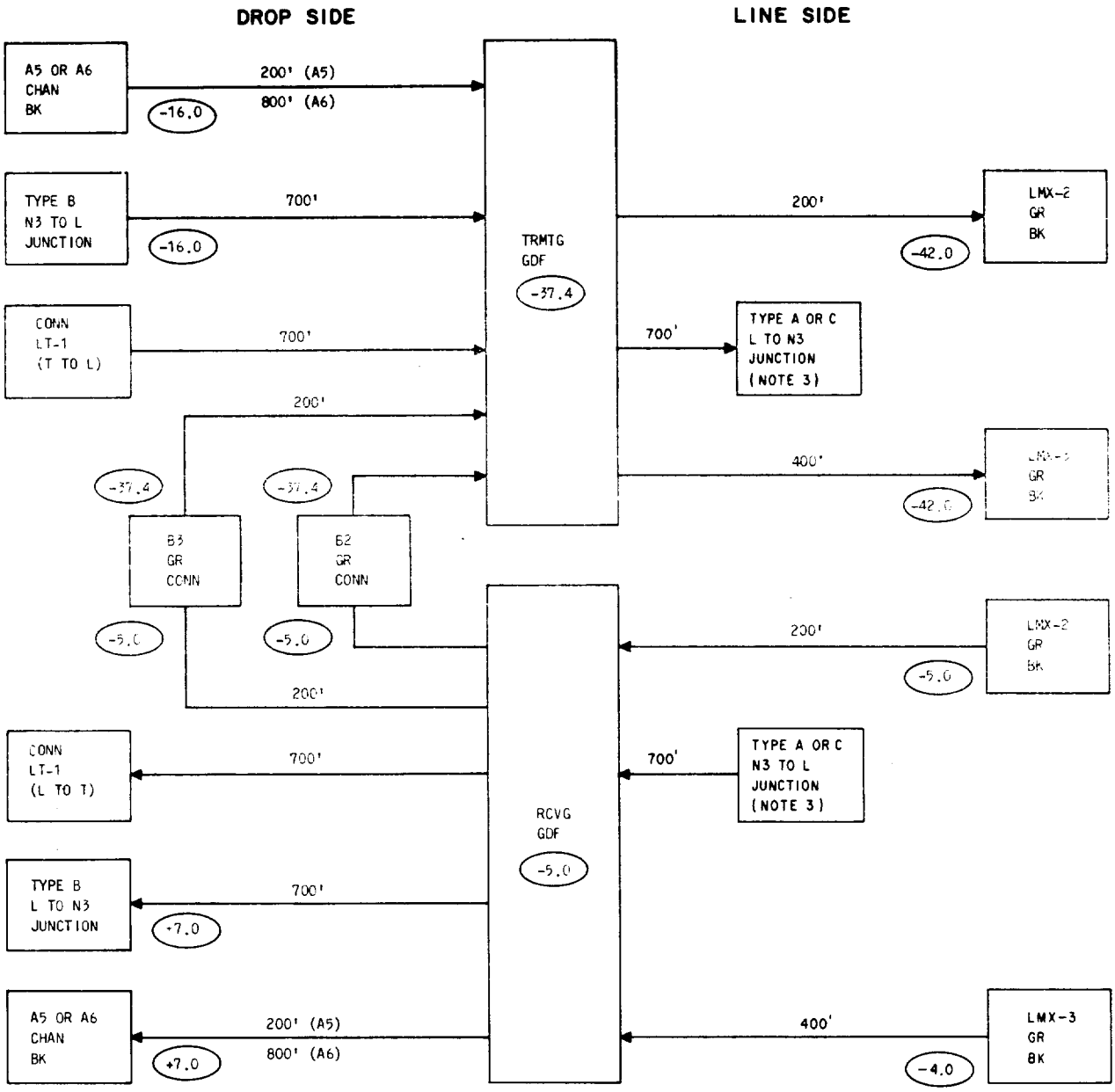
3. SUPERGROUP DISTRIBUTION FRAMES

A. General

3.01 A supergroup distribution frame (SGDF) ▶ED-52429 (SD-50718)◀ provides a common location for connecting group bank and supergroup bank multiplex equipment, supergroup connectors, and supergroup data equipment. Two generations of the SGDF have been developed: type I, developed for LMX-1/LMX-2 equipment; and type II, developed in conjunction with LMX-3 equipment. Both frames consist of transmitting and receiving panels that can be mounted miscellaneously or mounted in a double-door cabinet. Cross-connections are made with miniature coaxial cable with a snap-on connector at each end. Cross-connection points on the type II frame are multipled so in-service reassignments can be performed. This feature is not available on the type I frames.

B. Equipment Description

3.02 The type I SGDF panel is shown in Fig. 5. The cabinet that houses the frame is available in four heights: 7 foot, 9 foot, 10.5 foot, and 11.5 foot cabinets. The number of supergroups that can be accommodated by one cabinet is dictated by the cabling



NOTES:
1. LEVELS ARE EXPRESSED IN DBTLP.
2. ALL INTERCONNECTING CABLE IS TYPE 761.
3. TERMINAL CONNECTIONS ARE REVERSED BECAUSE GROUP CONNECTORS ARE REQUIRED.

Fig. 4—Group Distribution Frame Cable Length Limitations and Transmission Levels

density, not cabinet height. Each type I SGDF cabinet has a maximum capacity of 560 one-way cross-connections, distributed over seven panels per cabinet. Each panel is 19 inches wide, 10.5 inches high, and provides for 80 cross-connections.

3.03 The type II SGDF panel is shown in Fig. 6. Cabinets for the type II frame are narrower than cabinets which house type I frames and are available at present only in the 7-foot height. Individual type II panels may be mounted in existing type I 9-foot, 10.5-foot, and 11.5-foot cabinets. The type II frame has a maximum capacity of 10 cross-connection panels, each of which provides for 50 one-way cross-connections. Each panel is 19 inches wide and 7 inches high.

3.04 In both types of SGDF, cables in and out of the frame are run on both sides of the cabinet, and connections are made to coaxial connectors which mount in holes in the panels. All front panel connections are made with miniature snap-on connectors.

3.05 The cross-connection points on both types of panels are identified by letters and numbers.

C. Other Considerations

3.06 The type II SGDF panels are the same width as the type I panels and, thus, may be used to fill existing cabinets. Cross-connections between type I and type II panels are mechanically compatible.

3.07 The cable length limitations and normal transmission levels at test jacks for equipment connected to an SGDF are shown in Fig. 7.

3.08 Changes must be made in LMX-2 terminals connected to an SGDF. For a transmitting group bank, a hybrid is removed to increase the signal level 3.3 dB; the transmitting intermediate amplifier gain is increased 3.6 dB; and transmitting supergroup trunk adjust unit ED-52716 is added to permit signal level adjustment. For a receiving group bank, receiving trunk amplifier module J68858CR is provided at the receiving group bank shelf. This module includes an adjustable 231T amplifier to permit signal level adjustment.

4. MASTERGROUP DISTRIBUTION FRAMES

A. General

4.01 A mastergroup distribution frame (MGDF) ▶ED-52541 (SD-50719)◀ provides a common location for connecting LMX and MMX equipment, mastergroup translators, mastergroup connectors, and single-mastergroup wire line entrance links. The MGDF also provides access for other functions such as the Carrier Transmission Maintenance System (CTMS) and basic mastergroup restoration. The panels which make up the MGDF can be mounted miscellaneously or mounted in double-door cabinets. Cross-connections are made with miniature coaxial cables with standard, miniature coaxial plugs at each end. All connection points are multipled or derived via hybrids so in-service reassignments and other functions can be performed.

B. Equipment Description

4.02 An MGDF (Fig. 8), when housed in a newer narrow cabinet, is available only in the 7-foot height. Bay extenders are available where heights of 9 feet, 10.5 feet, and 11.5 feet are required. The MGDF utilizes two types of panels: a mastergroup distribution frame panel ED-52542-30 for trunk cross-connections, and a mastergroup restoration and pilot trunk panel ED-52543-30 for trunks to and from the restoration patch bays.

4.03 ***Mastergroup distribution frame panel ED-52542:*** This panel, 3.5 inches high and 19 inches wide, is used to mount up to ten trunk cross-connection networks which are inserted as needed. The components which make up a network are enclosed in a can and are secured to the panel and grounded by a screw at the back of the panel. The functions of the networks are as follows:

982A and B Equalizers: These networks (Fig. 9 and 10) contain cross-connection jacks, an adjustable cable equalizer, and interbay cable connection points for one MGDF line side trunk. The 982A equalizer compensates for up to 600 feet of cable. The 982B equalizer compensates for up to 300 feet of cable and is intended for use only with MMX-2RA12 receiving mastergroup 1. All other applications use the 982A equalizer.

▶***982C and D Equalizers:*** A 982C (transmitting) or 982D (receiving) equalizer may be provided for combining or splitting signals on the line side of the MGDF. The overall loss of the cable, 982C or 982D equalizer, and associated 263A amplifier is 0 dB. The trunk to a mastergroup multiplex terminal includes a

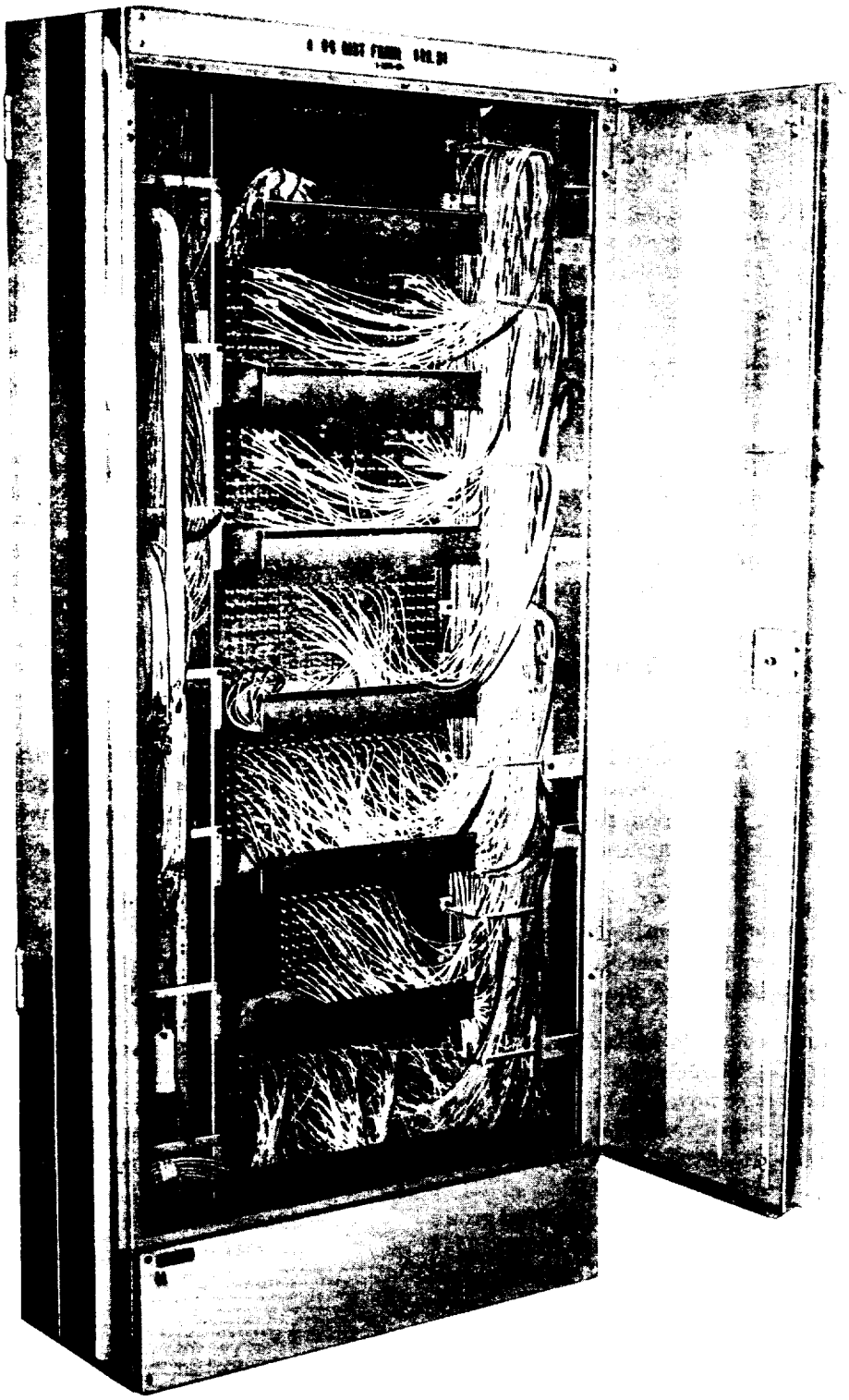


Fig. 5—Type I Supergroup Distribution Frame Installed in Cabinet

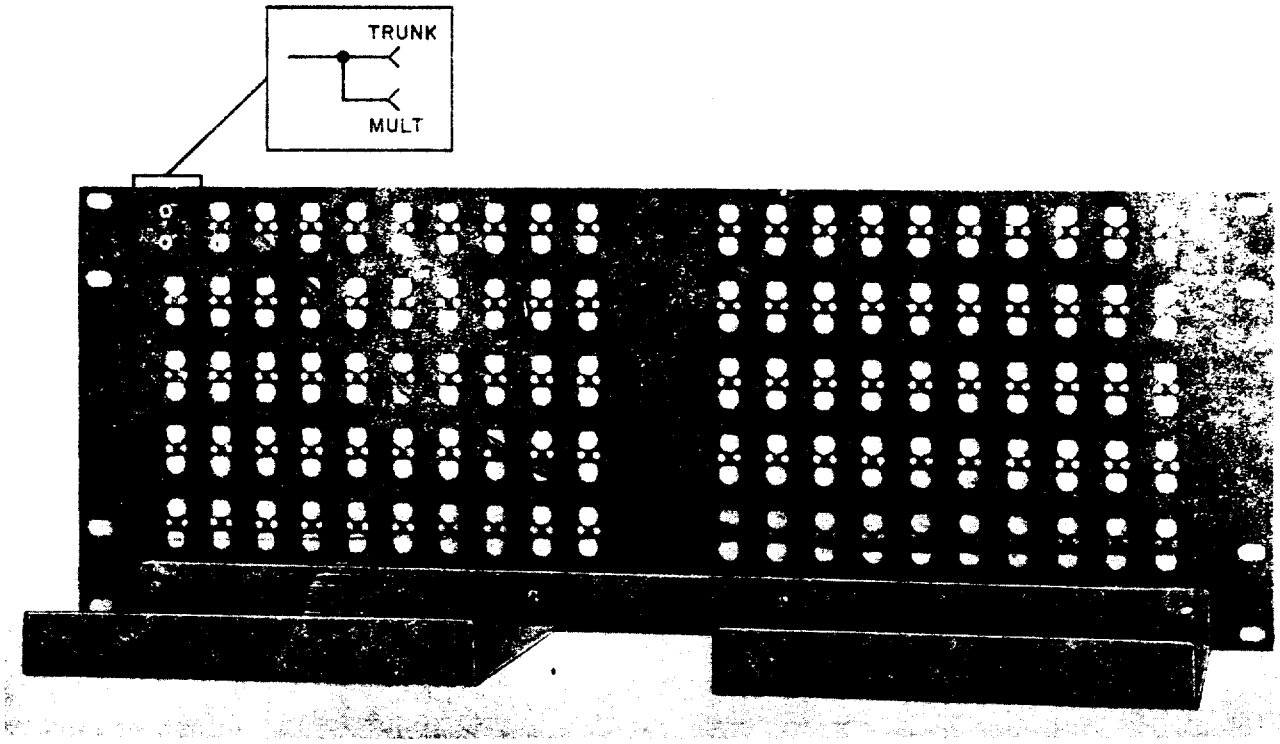


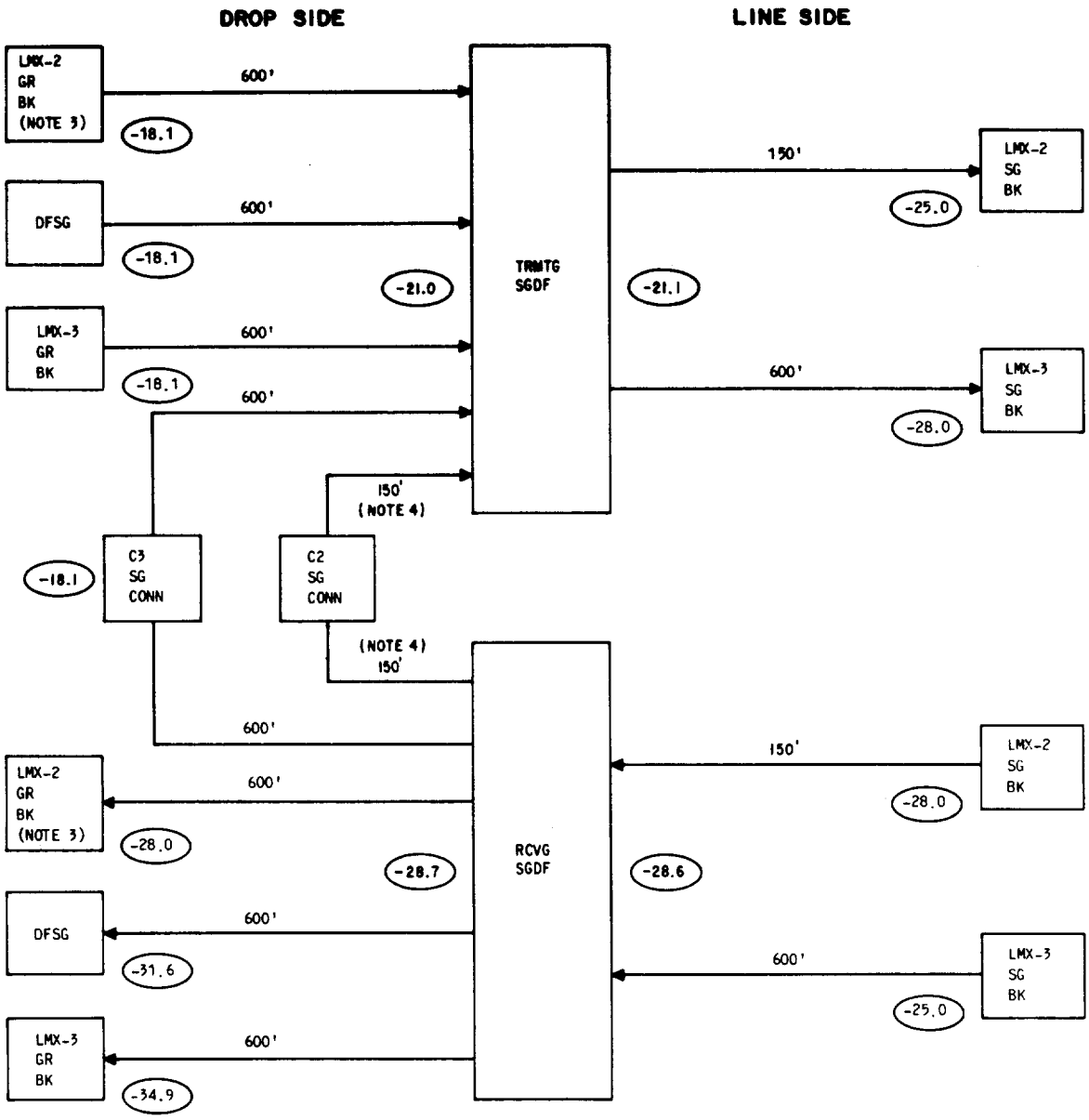
Fig. 6—Type II Supergroup Distribution Frame Cross Connection Panel

263A amplifier with a fixed gain of 20 dB. Amplifier mounting panel ED-50997 or mastergroup trunk amplifier panel ED-54585 includes up to six 263A amplifiers and may be mounted in mastergroup trunk amplifier bay ED-52635.◀

4255A Network: This network (Fig. 9) contains cross-connection jacks, pads, hybrids, and interbay cable connection points for one transmitting drop side trunk. The network also contains some hybrid-derived access points which are physically located at the rear of the network. Jack J4 provides a connection for a trunk to the Carrier Transmission Maintenance System or for a similar function. Jack J5 can be used to detect a continuity pilot or other signals. An unused jack J4 or J5 requires a 75-ohm termination. Jack J6 provides a point to insert a possible future mastergroup continuity pilot or other test signals into the transmitting mastergroup path.

▶***4255B Network:*** A 4255B network is provided, when required, in the line side signal path at a transmitting MGDF to block 2.048 MHz, which is used as a Bell System reference frequency. This network includes a band-elimination filter, an adjustable pad, and a hybrid to provide two equal-level outputs.◀

4254A Network: This network (Fig. 10) contains cross-connection jacks, hybrids, and interbay cable connection points for one receiving drop side trunk. As in the 4255A network, access points are also provided at the rear of the unit. Jack J4 provides a connection for a trunk to the Carrier Transmission Measuring System or for a similar function. Jack J5 can be used to detect a continuity pilot or other signals. Jack J6 provides a point to insert test signals into the receiving path. An unused jack J4, J5, or J6 (Fig. 10) requires a 75-ohm termination.



NOTES:
1. LEVELS ARE EXPRESSED IN DBTLP.
2. ALL INTERCONNECTING CABLE IS TYPE 730A.
3. LEVELS AT MODIFIED LMX-2 GROUP BANK ARE COMPATIBLE WITH SGDF.
4. C2B SUPERGROUP CONNECTOR WITHOUT DELAY EQUALIZER MAY HAVE MAXIMUM CABLE LENGTH OF 400 FEET IF 512F NETWORK IS SUBSTITUTED FOR 512D NETWORK.

Fig. 7—Supergroup Distribution Frame Cable Length Limitations and Transmission Levels

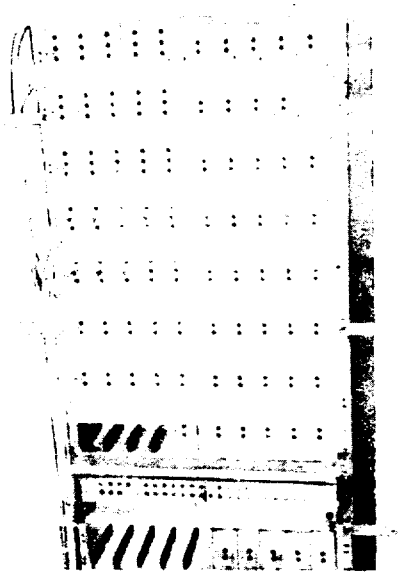


Fig. 8—Mastergroup Distribution Frame

4.04 ***Mastergroup Restoration and Pilot Trunk Panel ED-52543:*** This trunk terminating panel, available for field mounting, includes standard self-terminating coaxial jacks on an as-required basis. Two jacks are required for each restoration trunk terminated at the MGDF. For a transmitting MGDF (Fig. 9), a message signal trunk connects to the restoration patch bay, and another trunk connects the restoration pilot signal from the restoration patch bay. For a receiving MGDF (Fig. 10), two trunks connect signals to and from the restoration switch. An optional arrangement omits the switch. One panel can accommodate 12 two-way trunks or 24 one-way trunks.

C. Other Considerations

4.05 An MGDF (Fig. 11) can provide up to 85 one-way cross-connections. The exact number depends on the number of restoration and pilot trunk panels provided and the number of spare trunk appearances cabled to LMX and MMX equipment. A combined MGDF normally will be used only in small offices or where future needs are expected to be satisfied by a maximum of two frames. Larger offices normally require separate transmitting and receiving MGDFs in order to achieve orderly growth and better cross-connection layouts.

4.06 Cross-connections for the MGDF consist of coaxial cable assembly ED-52589 which is available in lengths up to 15 feet. To keep cross-connections short, panels and networks with similar functions normally are grouped together in the MGDF.

4.07 ▶Trunks, as shown in Fig. 12, are provided for connections between MGDFs at different locations in a station. A zero-loss trunk up to 1200 feet long may be provided between two transmitting MGDFs or between two receiving MGDFs. Each trunk includes a 263A amplifier, 210B equalizer, and a pad. Dual jacks are arranged so that a trunk can be used for either direction of transmission simply by inserting a patch plug between the proper pair of jacks. A trunk up to 325 feet long may be provided between a transmitting MGDF and a receiving MGDF. This trunk includes a 982A equalizer and a 263A amplifier.◀

4.08 The cable length limitations and normal transmission levels at test jacks for equipment connected to an MGDF are shown in Fig. 13.

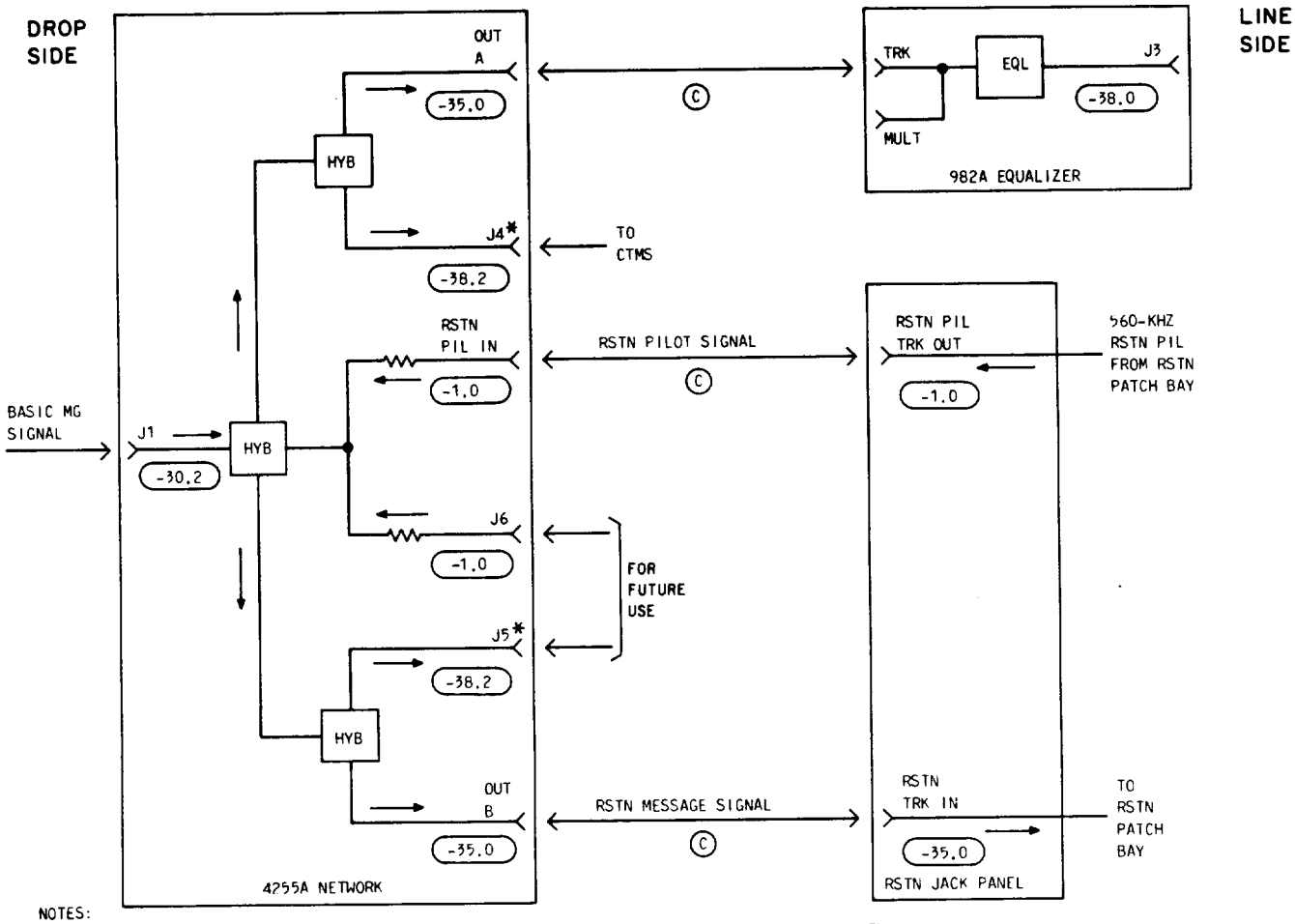
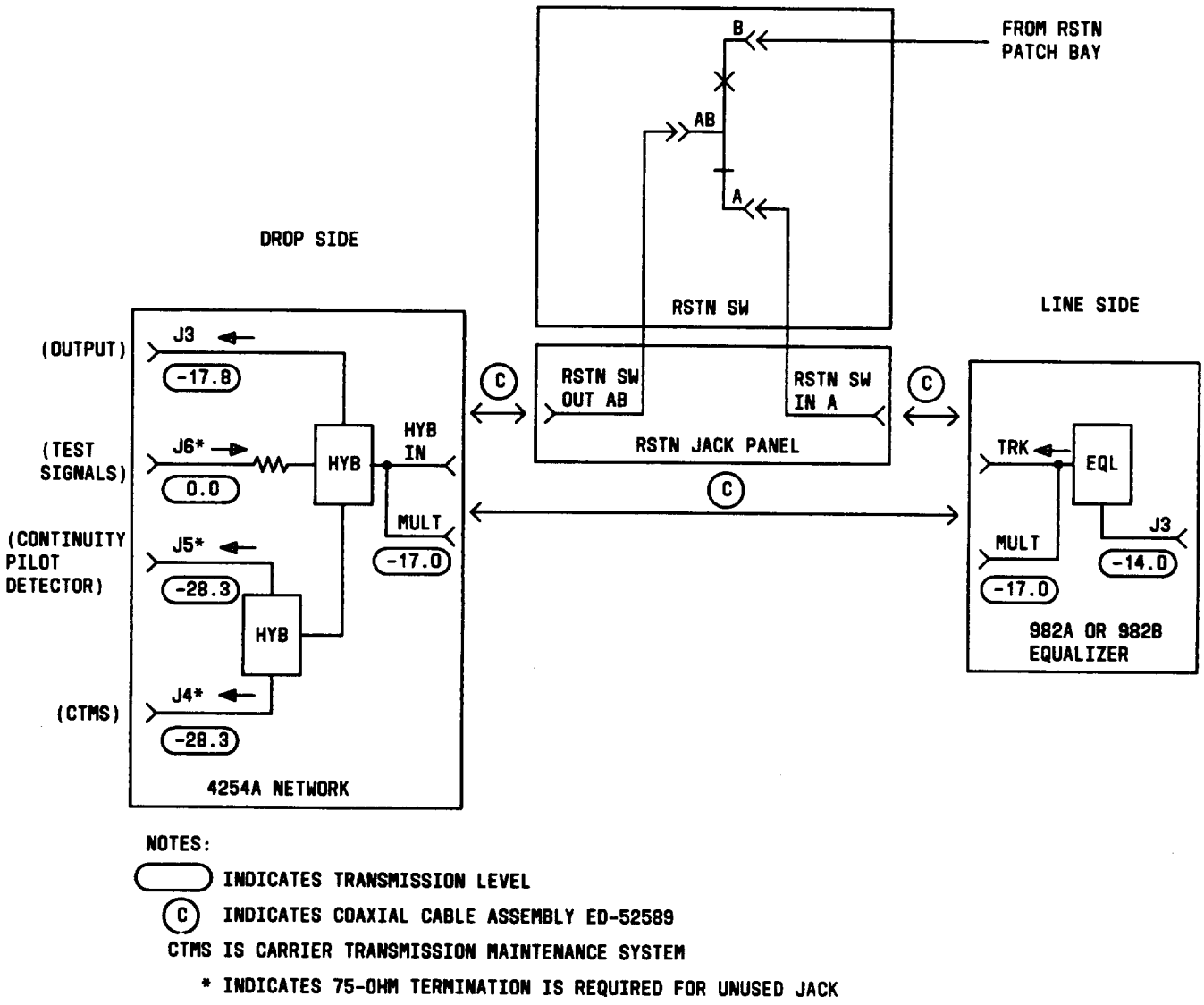


Fig. 9—Transmitting Mastergroup Distribution Frame



NOTES:

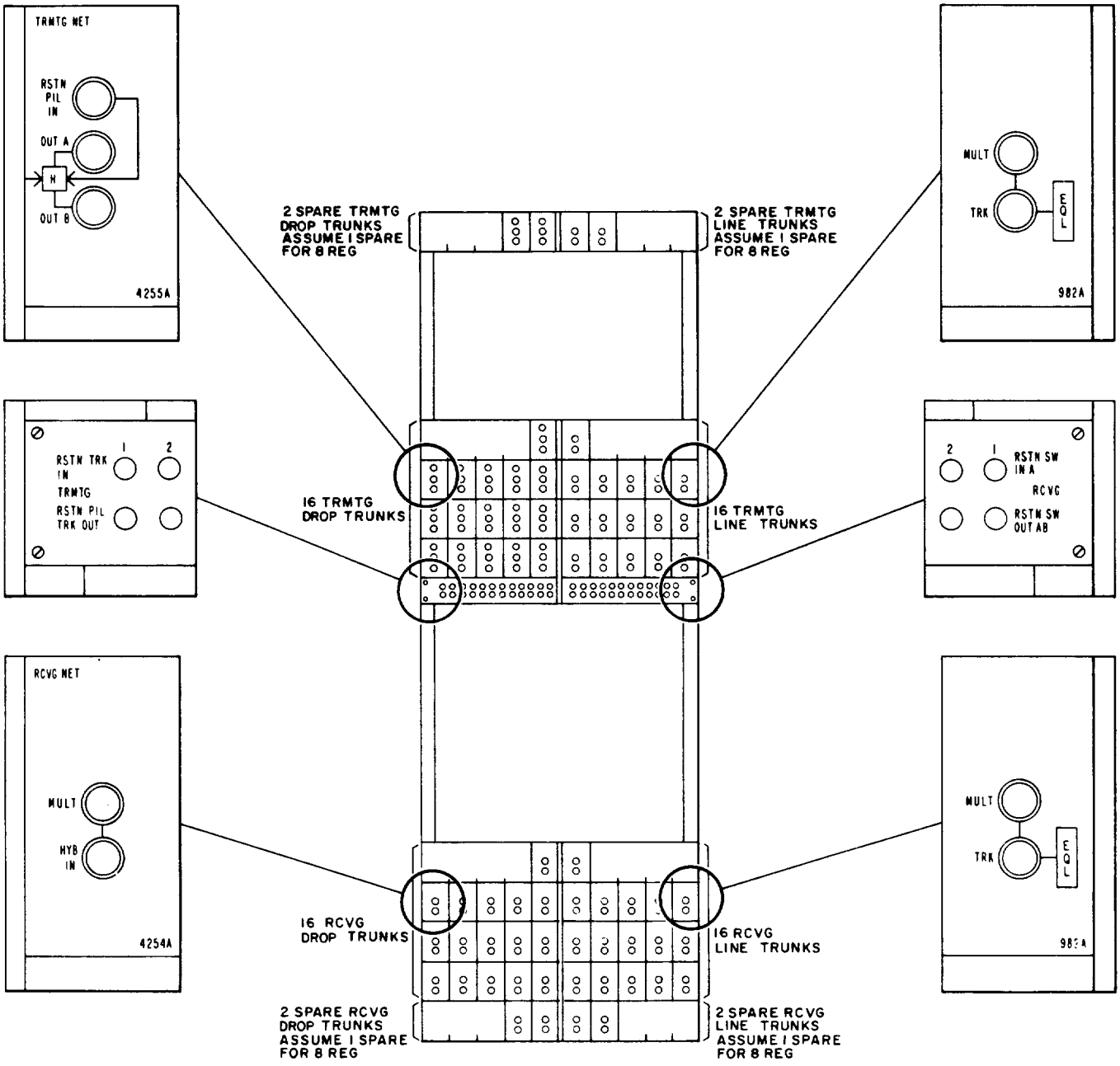
( ) INDICATES TRANSMISSION LEVEL

(C) INDICATES COAXIAL CABLE ASSEMBLY ED-52589

CTMS IS CARRIER TRANSMISSION MAINTENANCE SYSTEM

* INDICATES 75-OHM TERMINATION IS REQUIRED FOR UNUSED JACK

Fig. 10—Receiving Mastergroup Distribution Frame



NOTE:
FIGURE REPRESENTS TYPICAL COMBINED MGDF EQUIPPED FOR 16 REGULAR AND 2 SPARE TWO-WAY CROSS CONNECTIONS.

Fig. 11—Unit Locations in Mastergroup Distribution Frame

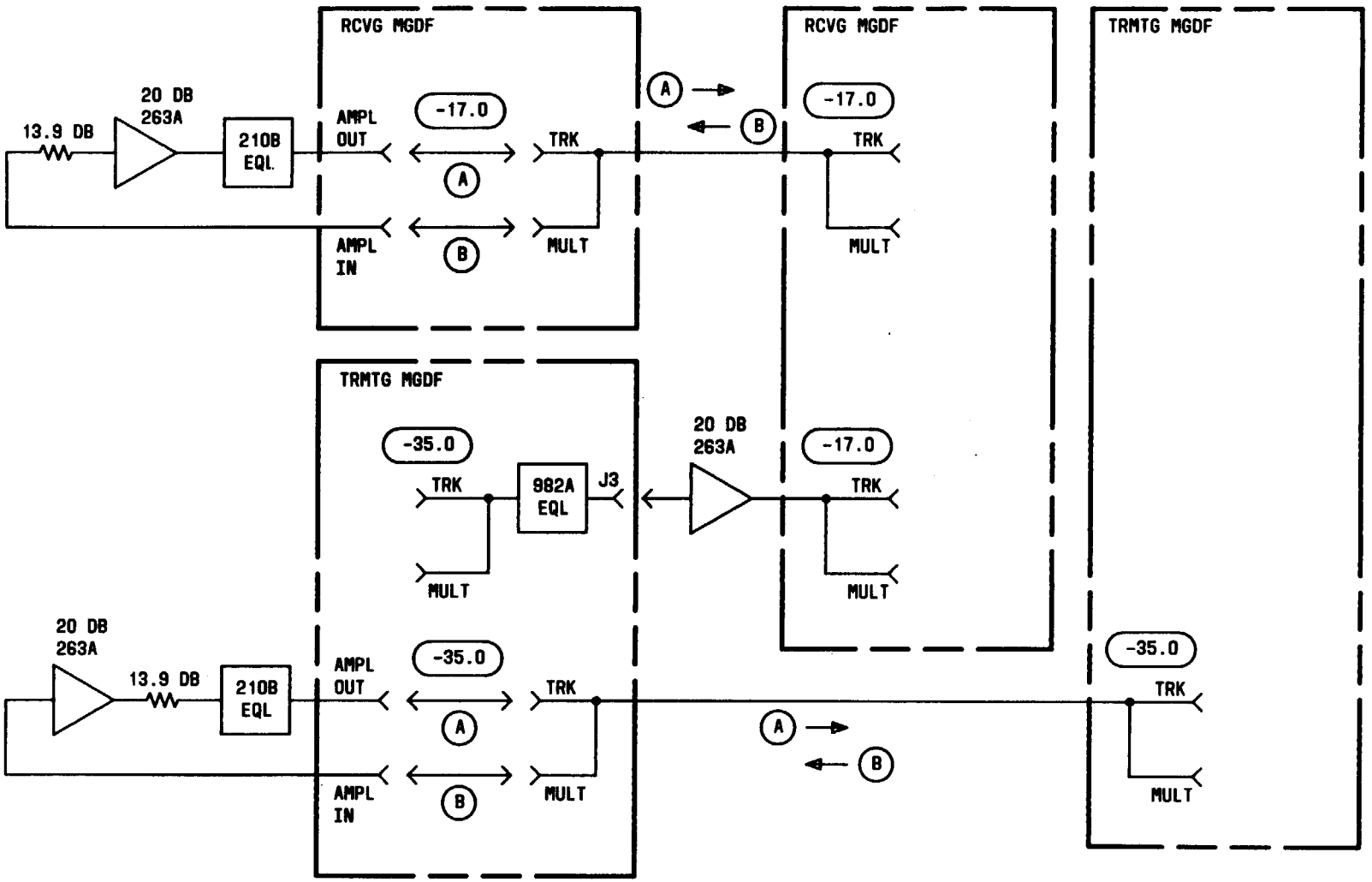
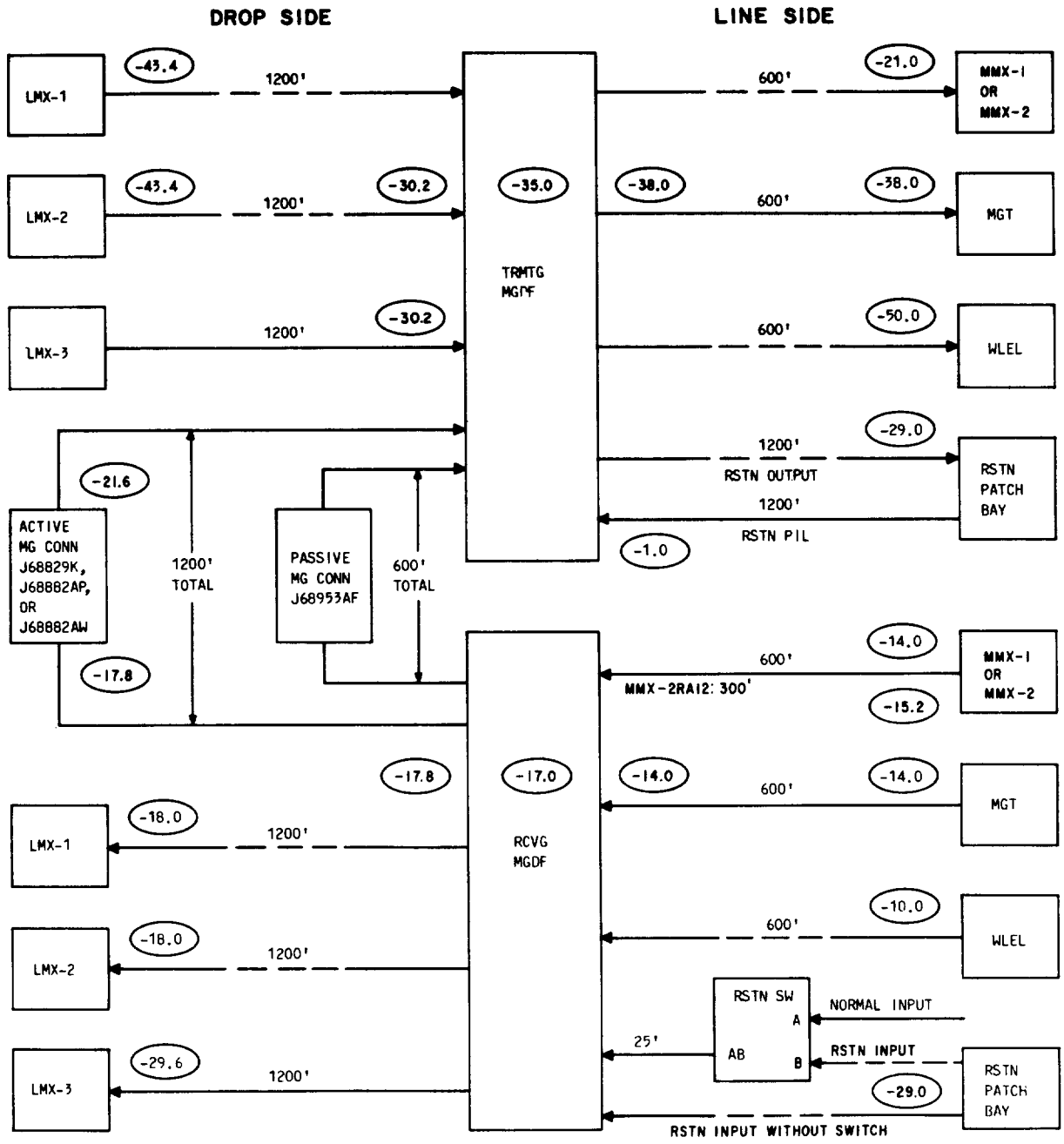


Fig. 12—Trunks Between Mastergroup Distribution Frames



NOTES:
1. LEVELS ARE EXPRESSED IN DTLP.
2. ALL INTERCONNECTING CABLE IS TYPE 724 OR 728.

Fig. 13—Mastergroup Distribution Frame Cable Length Limitations and Transmission Levels