

HALF-GROUPBAND DATA SYSTEMS

2-POINT PRIVATE LINE

DESCRIPTION

CONTENTS	PAGE	
1. GENERAL	1	private line service. The circuit arrangements and transmission objectives given in this section are limited to 2-point private line service.
2. SIGNAL TREATMENT	2	1.02 This section is reissued to add information on the WRR-1 regenerative repeater and add examples of various system arrangements. In addition, minor changes are made throughout the section. Since this reissue constitutes a general revision, arrows normally used to show changes have been omitted.
3. 303-TYPE DATA STATIONS	2	
4. DESCRIPTION OF HALF-GROUP BANDWIDTH DATA TRANSMISSION SYSTEM . . .	4	
A. Loop And Station Arrangements . . .	4	
B. Interexchange Facilities	5	
C. Alternate Use Arrangement L-Type Multiplex	5	1.03 The half-group data transmission system described in this section is designed to provide 2-way transmission of voice and data between customer data stations. These customer data stations are located within exchange area distances of each other and interconnected through a single office, or separated by long distance and interconnected through two or more toll offices. The transmission facilities for exchange area systems will consist of repeatered wire loops or T1 carrier. Longer transmission facilities may be made up of N or T carrier facilities or L-type multiplex systems. A simplified block diagram of a half-groupband channel containing six voice frequency channels, one voice frequency (VF) coordination channel, and one wideband data channel is shown in Fig. 1.
D. Voice Coordination Channels	7	
5. SYSTEM DESIGN	7	
A. Facility Arrangements	7	
B. Special Arrangement for Accessing the 50-kbps Switched Network	7	
C. WRR-1 Wideband Regenerative Repeater	7	
D. Roll-Off-Filters—Data Sets and Regenerative Repeater	8	1.04 Full-duplex operation is provided over 4-wire wideband facilities. Data station interface arrangements permit the station to be connected to a variety of customer-provided business machines, including on-line printers. An arrangement of a wideband loop and station is shown in Fig. 2.
E. Line Connecting Networks—T1 Modems	8	
6. REFERENCES	8	1.05 Certain variations in system arrangement depend on customer requirements. A typical arrangement permits the use of the groupband as one wideband data channel, associated VF coordination channel, and six voice frequency channels. An alternative arrangement permits switching the six voice frequency channels to an additional wideband data channel. This alternate arrangement may include circuits permitting alternate use control
1. GENERAL		
1.01 This section describes the operation of, provides transmission parameters for, and gives design considerations in meeting the transmission objectives of a half-groupband data system in 2-point		

SECTION 314-608-100

from customer premises. Additional system arrangements are given in Part 4C.

2. SIGNAL TREATMENT

2.01 Two types of standard signal format—baseband and passband—are found in overall transmission systems equipped with data sets for half-group service. Either of these signal formats may be produced by a 303-type data station, depending on the options selected. The baseband signal format is called restored polar and is similar to the 2-level signals produced by business machines, except that the dc component and lowest frequencies are removed. Normally this signal occupies a frequency band extending from approximately 100 Hz to 20 kHz. The passband signal format (28 to 44 kHz) is the result of a vestigial sideband modulation of the baseband signal against a carrier frequency at 29.6 kHz within data auxiliary set (DAS) 809B1. The passband signal format is normally used when N carrier or L-type multiplex facilities are involved. For example, it is the signal format for the system shown in Fig. 1, 2, and Parts B and C of Fig. 3. The baseband signal format is used in passing the signal through T carrier facilities. In certain situations, the baseband format is used over repeatered loops. In these cases, DAS 809B() would then be used at points other than at the data station.

2.02 The passband signal, transmitted from and delivered to the data sets, requires a frequency band extending from 28 kHz to 44 kHz. This passband signal, represented in Parts B and C of Fig. 3, has been modified so that the lowest frequencies are attenuated in the transmitting data set and then restored in the receiving data set. This process, called the restored polar technique, permits satisfactory transmission of data without transmitting the dc component and the very lowest frequencies. The signal, as modified, suffers minimum degrading from the low-frequency distortions encountered in the transmission facilities; and the attenuation of low frequencies prevents interference with the carrier recovery operations of the vestigial sideband modems used in the data station.

2.03 Parts A and B of Fig. 3 show the signal waveform and associated frequencies for the VF and wideband signals as they would appear in the basic high group of an N-carrier line.

2.04 Part C of Fig. 3 shows that signal waveform and associated frequencies for the VF and wideband signal as they would appear in the basic groupband of the L-type multiplex.

3. 303-TYPE DATA STATION

3.01 Data set 303-type is used to couple any one of several types of business machines to transmission facilities. Data sets 303B and 303H are available for half-groupband data transmission. The letter B identifies the 19.2 kilobit-per-second speed capability, and the code letter H identifies the 18.75 kilobit-per-second speed capability. The remainder of the code designation of the data set type identifies the customer interface arrangements and the mode of operation, for example, data set 303B3.

3.02 Two interface arrangements are available. For general commercial purposes, cable drivers and terminators are provided for operations into and from unbalanced coaxial cable having a characteristic impedance of 90 to 120 ohms. For special purposes, an arrangement is available for operation into and from a balanced 135-ohm line. When a synchronous data set is used with the balanced interface, sync recovery and signal regeneration are normally provided in both directions of transmission.

3.03 In addition to data set 303-type, the wideband data station may require a combination of auxiliary units depending on the application. The auxiliary units are as follows:

- (a) DAS 806B()—Provides access for local and remote testing
- (b) DAS 804A()—contains a telephone handset and means for controlling operating modes
- (c) Data set 103F2—Required for certain facsimile machines for transmitting low-speed serial control signals over a 2-wire voice frequency coordination channel
- (d) Data set 404B()—Required by those facsimile machines transmitting low-speed parallel control signals over a 4-wire voice frequency coordination channel
- (e) DAS 809B1—Translates the modified baseband signal output of the data set to the 28-

44-kHz passband when the system design requires this format.

Typical arrangements of the station equipment and a wideband station line are shown in Fig. 2. Data sets 303-type used in half-group data services (restored polar) are listed in Table A.

3.04 A synchronous data set 303-type employs a scrambler to spread the energy of the signal across the bandwidth of the wideband channel. This is done to suppress the transmission of undesirable single tones. A descrambler at the receiver restores the signal to the original pattern. In addition to data set 303-type, a typical synchronous half-group data station consists of DAS 806B(), DAS 809B1, and DAS 804A(). DAS 809B1 converts the baseband data signal from data set 303-type into a vestigial sideband (VSB) form. From the DAS 809B1 the data in the VSB form is coupled back to data set 303B. In data set 303B the signal is merely strapped through and onto DAS 806B. The VSB form of signal transmission is defined as that portion of the signal which remains when the sidebands are filtered by a symmetrical filter (having a gradual cutoff in the region of the carrier frequency), resulting in one sideband being transmitted without suppression. The upper sideband of the 29.6-kHz carrier of the DAS 809B1 is transmitted along with a vestige of the lower sideband. DAS 806B provides test access to the

customer loop facilities and capability for remote testing of the data station. DAS 806B also provides remote testing of data stations through the use of loop-back relays. Voice communication over the voice frequency coordination channel and control of the data station operations are provided by DAS 804A. There may be some applications where voiceband data set 404B1 is used over VF coordination channels for providing low-speed data to control business machine equipment.

3.05 In addition, the use of a half-group also covers direct connection to customer-owned equipment (such as FAX). Channels used for such service can be terminated in either DAS 803A or 806B for loop tests from the WSB. However, due to noise and other interference usually present in the half group, transmission of signals is guaranteed to only two level applications. If an analog signal is modulated on a transmitted carrier, the frequency of the carrier must be 32 kHz for VSB or 36 kHz for double sideband transmission. This will result in locating the carriers midway between the voice carriers used in L-type multiplex voice channels. T1 carrier wideband channels cannot carry these signals.

3.06 All wideband data station equipment may be installed in a KS-20018 type cabinet or a relay rack, as required.

TABLE A
HALF-GROUP DATA SETS 303-TYPE (RESTORED POLAR)

INTERFACE	UNBALANCED	BALANCED	NOTES
Line Filter	100% Roll-Off	100% Roll-Off	
Nonsynchronous	303B2	303B4	
{ Internal	303B6	303B8	1
{ Transmit	—	303H8	1, 3
{ Clock	303B10	303B12	2
Synchronous	—	303H12	2, 3

Notes:

1. With scrambler
2. Without scrambler
3. 18.75 kbps

4. DESCRIPTION OF HALF-GROUP BANDWIDTH DATA TRANSMISSION SYSTEM

4.01 A half-group data system consists of a full-duplex wideband data channel and a full-duplex voiceband coordination channel. Data set 303-type accepts high-speed binary signals from the customer business machine and conditions the signals for optimum transmission over available facilities. The signals may be 2-level nonsynchronous signals with a minimum signal element duration of 52 microseconds for operation in the nonsynchronous mode, or at a fixed speed of 19.2 (or for special applications 18.75) kilobits per second for synchronous operation. This requires the removal of the dc component from the signal and the attenuation of the low frequencies. The conditioned data signals are modified baseband signals but are sometimes referred to simply as baseband signals. The signals are reconstituted or restored to their original form by the receiving data set and applied to the customer terminal equipment. The transmission of signals conditioned in this manner is called restored polar transmission.

A. Loop and Station Arrangements

4.02 The baseband data signals, as conditioned by data set 303-type, are usually modulated by a DAS 809B1 into the 28- to 44-kHz passband using a vestigial sideband carrier at 29.6 kHz. A typical arrangement is shown in Fig. 2. They may also be applied to a T1 carrier line through the proper modem, and in some applications, the modified baseband signal may be transmitted directly over an equalized local loop facility. In this case, DAS 809B() would not be used. This is a special case and will be discussed later.

4.03 Systems using data sets 303-type are designed to operate at zero net loss between monitoring jacks at the transmitting data station and monitoring jacks at the receiving data station. The transmitted and received power levels at the DAS 806-types are 0 dBm.

4.04 The station arrangement using the DAS 809B1 to translate the modified baseband signals from data set 303-type into the passband format is unique to the half-group data system. The DAS 809B1 modulates the output of the data set with a 29.6-kHz carrier producing a vestigial sideband signal in the 28- to 44-kHz band. The data signals are returned to the modified baseband

format by a DAS 809B1 at the receiving station, or if the translation occurs in an intermediate office, by a DAS 809B2. In the latter case, the DAS 809B2 is associated with a wideband regenerative repeater.

Repeatered Cable Pairs

4.05 Wideband loop repeaters or T1 carrier are used between the data station and the central office (or between two data stations) for distances of up to a maximum of 50 miles. WLR-5 (pilot regulated) or WLR-3 or WLR-5 (nonregulated) wideband loop repeaters are used. The repeaters include adjustable equalization. Either the baseband or passband signals can be carried by the WLR-5 repeatered lines. If the station line consists partly of WLR repeatered lines and partly of T carrier, the baseband signal is transmitted over the repeatered line so that it is not necessary to translate to that signal format before entering the T carrier system. An example of this is shown in the block diagram of Fig. 2.

N2 Carrier

4.06 Other station lines may require the use of the N carrier system. This system may be used over cable for distances up to about 100 miles. The N system may consist of a standard N2 terminal equipped with N2WM-1 wideband modems, or it may consist of an N2WT-1 wideband terminal. The N2WT-1 terminal may be equipped either with the N2WM-1 wideband modem for transmission of 10.2- to 51-kHz signals or with the N2WM-2 wideband modem for transmission of 0.1- to 38-kHz signals. When the N2WM-1 modem is used, the signal must be in the passband form. When the N2WM-2 modem is used, the signal may be in the baseband form. An N2WM-1 or N2WM-2 modem when installed in an N2WT-1 terminal provides a half-group data channel, a VF coordinating channel for customer use as control and voice coordination, and a VF control channel for telephone company use. The N2WM-1 modem when installed in an N2 terminal provides six voice frequency channels, including the VF coordinating channel, and one wideband data channel. Where required by tariffs, an additional voice frequency channel must be supplied using other facilities.

T1 Carrier

4.07 At distances up to approximately 50 miles, the T1 carrier system may be used over cable facilities. Appropriate wideband data modems are required in conjunction with the T1 system. These are selected from the complement of the 50-kilobit modems. A group rate within a supergroup rate channel is used. However, the line connecting networks must be those designed for half-group rate transmission. When T carrier is used, the signal format applied to and received from the T carrier system is the baseband signal. In these instances, it is necessary to provide converters [for example, a WRR-1 plus an 809B()] at connections between T carrier and other transmission facilities.

4.08 The wideband station line may consist of a T1 carrier line or a T1 carrier line in tandem with repeatered cable pairs. The T1 carrier lines may be equipped with T1WM-1 or -4 modems or T1WB-1, -2, or -3 banks normally used by 50-kbps channels since equivalent equipment is not available or planned for half-group service.

B. Interexchange Facilities

4.09 If offices are separated by relatively short distances, interexchange facilities may use the N carrier system or the T1 carrier system. Generally, these systems are not used for transmission distances over 100 miles. The wideband modems and wideband data terminals discussed in 4.06 and 4.08 are used.

4.10 Over longer distances, radio and coaxial systems using L-type multiplex facilities are used. This is an analog, frequency-division system of transmission whereby LWM-3 and/or LWM-4 wideband modems and LWA-1 alternate use panel are used.

4.11 Certain group and supergroup assignments in L-type multiplex facilities are not presently recommended for data transmission because of envelope delay distortion in group and supergroup connectors and other equipment.

L-Type Multiplex

4.12 The LWM-3 and LWM-4 wideband modems, designed to translate half-group data signals into the basic groupband, are modulator-demodulator units which place the 28- to 44-kHz passband signals

from the wideband loop and a single 4-kHz voice-frequency channel into the 60- to 108-kHz basic groupband at the transmitting end and return the signals to these frequency bands at the receiving end of the L-type multiplex system.

4.13 The LWM-3 wideband modem translates a 16-kHz wide half-group data signal into the upper half of the basic groupband and the LWM-4 wideband modem translates a like signal into the lower half of the basic group band. When required, both modems may be used to provide two wideband data channels in an L-type multiplex group bank. If only one wideband data channel is provided, the use of the LWM-4 wideband modem is recommended, since it is not affected by spurious 96-kHz tones which result from intermodulation of group carriers.

C. Alternate Use Arrangement L-Type Multiplex

4.14 A half group, as the name implies, requires only one-half of a groupband in a long-haul L-type multiplex system. Arrangements are provided by which the remainder of the group channel can be used for either an additional wideband data channel with its voice coordination circuit or for six voice-frequency services. Also, arrangements are available for the alternate use of the group channels for several combinations of wideband data and voice frequency services. These arrangements require the use of LWA-1 alternate use panels as combining units and for the control of the various modes of operation.

4.15 The input circuits of the LWA-1 accommodate line signals from both voice-frequency apparatus and/or wideband input equipment. Modes of half-group operation are varied and provide the services listed in Table B. The LWA-1 controls the half-group wideband position by allocating either the upper half or lower half of the available group frequency band for a wideband channel and one voice channel, and the remaining frequency band for six voice channels.

4.16 Wideband input signals into the LWA-1 alternate use panel can be supplied from an LWM-3 and/or LWM-4 wideband modem (both 16-kHz wide input sources); however, the LWM-4 is preferred since it is less sensitive to tone interference from the line. Voice-frequency inputs from the customer PBX plant are supplied to the LWA-1 from an A5 channel bank. Components in

TABLE B

MODES OF OPERATION FOR HALF-GROUP SERVICE USING LMX

SERVICE	LWA-1 SOURCE	INPUT FREQUENCY	TRANSLATED FREQUENCY
12 VF Channels	A5 Channel Bank	0 to 4 kHz per Channel	60 to 108 kHz
16-kHz Wideband Modem	LWM-3 Modem	28 to 44 kHz	86 to 102 kHz
VF Coordination Channel (1)	A5 Modem*	0 to 4 kHz	104 to 108 kHz
16-kHz Wideband Modem	LWM-4 Modem	28 to 44 kHz	66 to 82 kHz
VF Coordination Channel (12)	A5 Modem*	0 to 4 kHz	60 to 64 kHz
16-kHz Wideband Modem	LWM-4 Modem	28 to 44 kHz	66 to 82 kHz
1 VF Coordination Channel (12)	7 Voice Channels on A5 Channel Bank	0 to 4 kHz per Channel	60 to 64 kHz
6 VF Channels (1 to 6)			84 to 108 kHz
6 VF Channels (7 to 12)	A5 Channel Bank	0 to 4 kHz per Channel	60 to 84 kHz
1 VF Coordination Channel (1)	A5 Channel Bank	0 to 4 kHz per Channel	104 to 108 kHz
16-kHz Wideband Modem	LWM-3 Modem	28 to 44 kHz	86 to 102 kHz

* If a wideband modem is to alternate with an A5 channel bank, the voice coordinating modem is located on the A5 channel bank.

the LWA-1 control the output signals by completing the path for the customer-selected signals. Customer requirements determine the input sources. The control signal from the customer premises selects the modes for 2-way transmission in the 60- to 108-kHz group frequency band.

4.17 Figure 4 shows three typical connections using the LWA-1 as a controlling device. The first (top) section of Fig. 4 shows that the 16-kHz wideband channel and the voice-frequency coordination channel are received at the WSB, and that normal voice channels from the customer PBX are brought into a voice frequency patching panel. Six PBX voice channels and the VF coordination channel are fed to the A5 channel bank. The coordination channel is not normally connected to the A5 unit in the LWM-4 in this case. Since the A5 channel unit in the LWM-4 is not used, it may be replaced by a terminating unit. Only wideband signals from the WSB are connected into the LWM-4 modem. The LWA-1 accepts and combines the two input signals to make one composite output

signal for application to L-type multiplex group bank. The LWA-1 provides full-duplex transmission in both directions.

4.18 The second (center) section of Fig. 4 shows the arrangement of the LWA-1 in receiving two wideband signals and their VF coordination channels from two half-group modems. The LWA-1 combines the wideband data signals, and the corresponding VF coordination channel for both directions of transmission. More information on the LWM-3 and LWM-4 wideband half-group modems is given in Section 356-410-100.

4.19 The third (bottom) section of Fig. 4 shows the alternate use of the two half-group modems. Control signals provide selection between the possible electives. Using the configuration of the equipment shown in this section, the customer can select all the services shown in Table B. The relays within the LWA-1 are arranged to provide independent control of the half groups, which

allows alternation of a half-group with its corresponding voice channels (independent of the other half group).

D. Voice Coordination Channels

4.20 Edge-of-band channels are used as voice frequency coordination channels associated with wideband data channels. If one wideband data channel is provided, voice channel 12 (A5 channel bank assignment) is used as the coordination channel. If two wideband channels are provided, voice channels 1 and 12 are used as coordination channels. If no A5 channel bank is provided, the channel units are placed in the LWM-() wideband modems. VF coordination channels are provided on a nonalternate basis even when part of an alternate-use arrangement. The voice-frequency channels are usually terminated at a PBX on the customer premises. The design of voice-frequency channels is covered in other sections. However, voice frequency coordination channels may be used to control the transfer by TOUCH-TONE®, especially when a mixture of transmission facilities is involved. Hence, channels used in this manner cannot be used by the customer as PBX trunks.

5. SYSTEM DESIGN

A. Facility Arrangements

5.01 A typical arrangement of a half-group data system using combined analog (band-limited) and digital interexchange facilities and repeatered wideband station lines is shown in Fig. 5. When the half-group bandwidth data signals are to be transmitted over an N2 carrier system equipped with N2WM-1 wideband modems or over an L-type multiplex system equipped with LWM-3 and/or LWM-4 wideband modems, the signals must be in the passband (28- to 44-kHz) format. Both of these facilities are used in the system shown. A DAS 809B1 at the upper data station translates the modified baseband signals from data set 303B into this format. The signals are then returned, by a DAS 809B2 in the intermediate office at the far end of the L-type multiplex link, back to the modified baseband signal format (100 Hz to 20 kHz). The data signals are transmitted over the T1 carrier system and wideband repeatered station line to the lower data station in this format. In the system shown, the N2 carrier system uses N2WM-1 wideband modems because the connecting L-type multiplex link requires the passband signal format. If the L-type multiplex link were omitted

and the N2 carrier system were equipped with N2WM-2 wideband modems, the data signals could be transmitted station-to-station in the modified baseband format and the DAS 809B frequency conversions could be omitted. The applications of the wideband regenerative repeater (WRR-1), the roll-off filters in data sets and the WRR-1, and the line connecting networks in the T1 wideband modems are discussed in subsequent paragraphs.

5.02 The output of the transmitting data station is defined as a zero system level point (0 SLP). Accordingly, the input to the receiving data station is also a 0 SLP. The system level at a wideband service bay (WSB) is determined by the format of the input signal. If the signal is in the modified baseband format (100 Hz to 20 kHz, approximately), the WSB is a 0 SLP. If the signal is in the passband format (28 to 44 kHz), the WSB is a -10 SLP. Occasionally, both levels are used at a WSB where the signal format changes from baseband to passband through a central office-mounted DAS 809B2 at a regenerator location.

5.03 A half-group data system in which the facilities are comprised of wideband repeatered station lines and T1 carrier is shown in Fig. 6. In this system the data signals can be transmitted station-to-station in the modified baseband format.

B. Special Arrangement for Accessing the 50-kbps Switching Network

5.04 A special arrangement which may be used to access the 50-kbps switched network is shown in Fig. 7. Where access from a 19.2-kbps system to a 50-kbps switched system is desired, it is necessary to use 50-kbps facility design throughout and 50-kbps (303C) data sets modified to contain 19.2-kbps transmit clock and sync recovery boards. The data sets must be modified locally. Since such sets are nonstandard, the usual maintenance and repair procedures may not apply. If a large number of such applications is requested, a series of data set codes for this application will be issued.

C. WRR-1 Wideband Regenerative Repeater

5.05 The WRR-1 is a 2-way wideband regenerative repeater. Overall transmission impairment can be reduced between two data sets by placing a WRR-1 somewhere near the middle of the facilities and regenerating the signals before impairment is sufficient to introduce errors. The repeater is

SECTION 314-608-100

inserted into the circuit at a point where the data signals are in the baseband format or at a junction between passband and modified baseband signals. If the point is a junction point between the two signal formats, the regenerative repeater is associated with a DAS 809B2 which performs the translation between the signal formats (see Fig. 5). At present, for half-group applications the WRR-1 wideband regenerative repeater can be used in synchronous-only operation or nonsynchronous-only operation but not in alternate synchronous-nonsynchronous operation. If the system is operated nonsynchronously, the sync recovery boards should be omitted from the regenerator.

D. Roll-Off-Filters—Data Sets and Regenerative Repeater

5.06 The receive circuits for the data sets 303-type and WRR-1 repeater (if used) are equipped with roll-off filters. The 100-percent roll-off filter eliminates out-of-band noise while shaping the signal to reduce intersymbol interference. Specific loss-frequency data is given on the circuit pack schematic for the filters.

5.07 If a regenerative repeater is used, it is equipped with two 100-percent roll-off filters (one for each direction of transmission). The application of roll-off filters in some typical circuits are shown in Figs. 6 and 7.

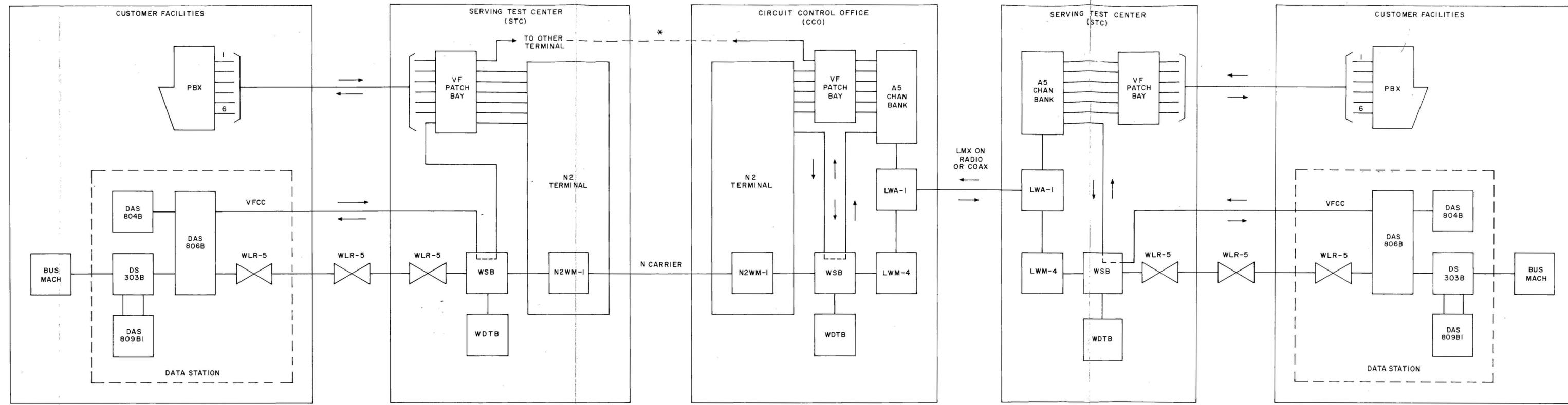
E. Line Connecting Networks—T1 Modems

5.08 Line connecting networks which are installed in the transmit circuits of T1 modems perform signal shaping functions similar to the roll-off filters installed in the data sets and regenerative repeater. The 4020R network, providing 100-percent roll-off is required for the same reasons as the roll-off filters in the data sets. A 4020N network, which provides no shaping, is used when proper signal shaping has already been provided a short (intraoffice) distance away.

6. REFERENCES

6.01 The following sections contain more complete descriptive information on equipment mentioned in this section.

SECTION	TITLE
314-601-120	Data Systems J70168 Wideband Service Bay (WSB)
314-641-100	50-KC Wideband Loop 1 to 50 KC WLR-3 Repeater—Description
314-643-100	50-Kilobit Wideband Loop 1 Through 50 kHz WLR-5 Repeater—Description
314-644-100	Data Systems—Central Office Wideband Regenerative Repeater (WRR-1), J70174—Description and Operation
356-410-100	Toll Systems—L-Type Multiplex LWM-3 Wideband Modem and LWM-4 Wideband Modem (28 To 44 KC)
356-411-100	Toll Systems—L-Type Multiplex LWA-1 Alternate Use Panel—Description
362-811-100	N2 Carrier Telephone System—N2WM-1 Wideband Modem (10 to 51 KC)—Description
362-812-100	N2 Carrier Telephone System—N2WT-1 Wideband Terminal Equipped with N2WM-1 or N2WM-2 Wideband Modem—Description
365-119-100	Digital Transmission Systems—T1MW-1 Wideband Modem—Terminal Description
365-120-100	T1 Carrier System Terminal—T1WB-3 Wideband Data Bank—Terminal Description
593-012-100	Data Set 303-Type—Identification
593-800-100	Wideband Data Station Using Data Set 303 Four Wire Point-to-Point Private Line (Commercial Service)—Description and Operation

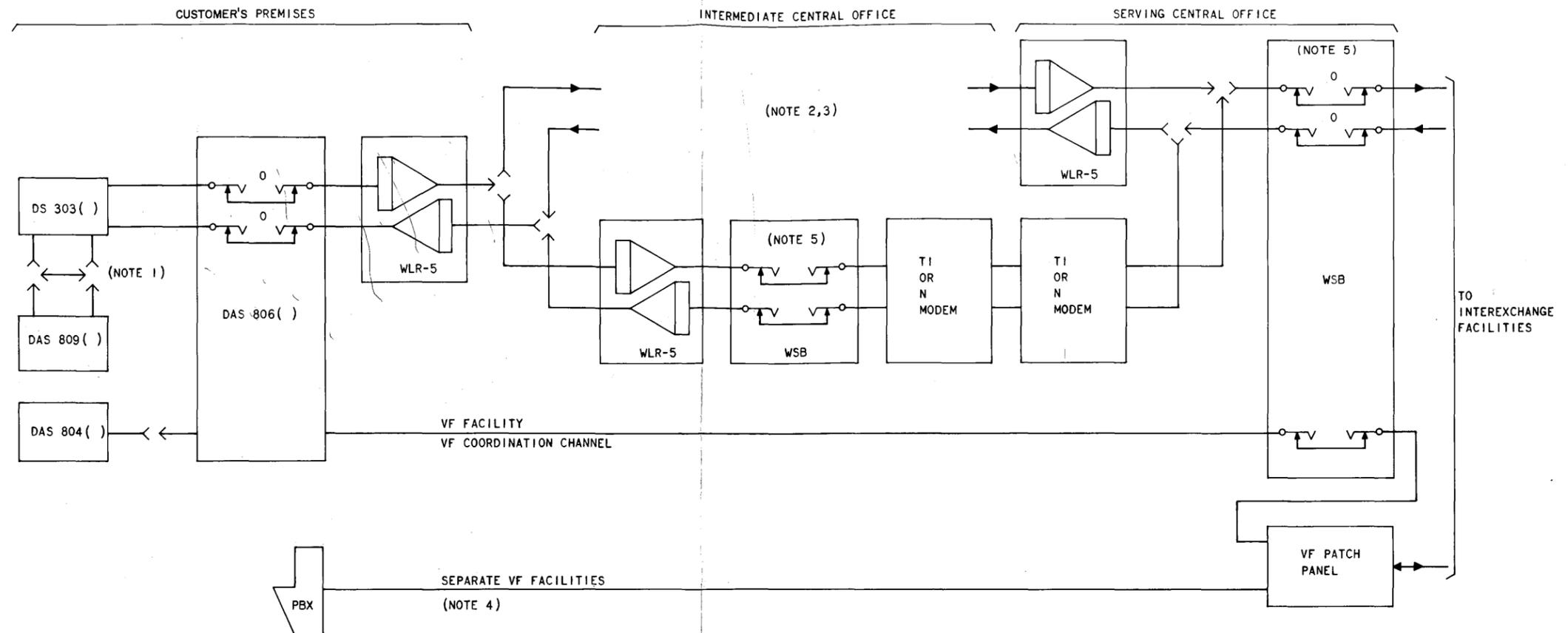


LEGEND

DAS - DATA AUXILIARY SET
 WSB - WIDEBAND SERVICE BAY
 WLR - WIDEBAND LOOP REPEATER
 WDTB - WIDEBAND DATA TEST BAY
 PBX - PRIVATE BOARD EXCHANGE
 VFCC - VOICE FREQUENCY COORDINATION CHANNEL
 DS - DATA SET

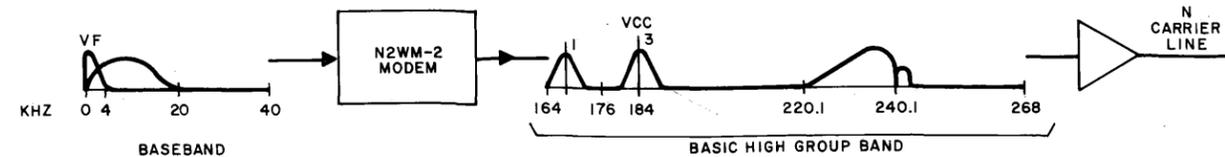
VF - VOICE FREQUENCY
 N2WM - N2 WIDEBAND MODEM
 LWA - L WIDEBAND ALTERNATE USE PANEL
 LWM - L WIDEBAND MODEM
 * - ADDITIONAL CHANNEL IS ON SEPARATE FACILITY

Fig. 1—Half-Groupband Data Circuit, Voice and Wideband Channel, 2-Point Private Line, Nonalternate Use—Block Diagram

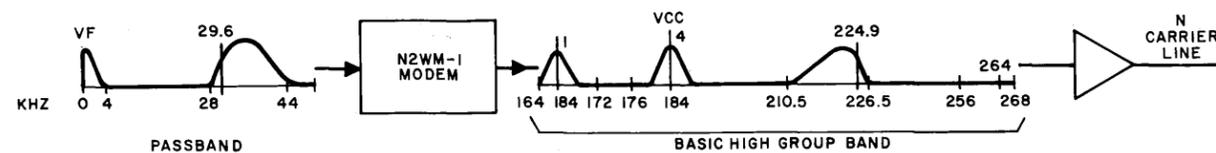


- NOTES:
1. THE DAS 809 () IS USED WHEN THE TRANSMITTED SIGNAL IS IN THE PASSBAND FORMAT (28 TO 44 KHZ).
 2. LOOP FACILITIES MAY BE REPEATERED CABLE, T OR N CARRIER, OR ANY COMBINATION OF THE THREE TYPES OF FACILITIES. A WSB IS REQUIRED AT THE JUNCTION OF UNLIKE FACILITIES.
 3. DUPLICATE WIDEBAND LOOP FACILITIES ARE REQUIRED IF A SECOND WIDEBAND DATA SYSTEM IS TO BE ASSIGNED TO THE INTEREXCHANGE (LMX) FACILITIES. DUPLICATE INTEREXCHANGE FACILITIES MUST ALSO BE ASSIGNED EXCEPT WHEN LMX FACILITIES ARE USED. THE LMX SYSTEM IS THE ONLY FACILITY HAVING MODEMS AVAILABLE FOR DIVIDING A GROUP CHANNEL INTO TWO HALF-GROUP CHANNELS.
 4. A MAXIMUM OF 11 VF CIRCUITS, EACH REQUIRING A SEPARATE FACILITY ASSIGNMENT, MAY TERMINATE IN THE CUSTOMER'S PBX WHEN THE ALTERNATE ARRANGEMENT SELECTED DOES NOT INVOLVE TWO WIDEBAND SYSTEMS. THE TWELFTH AVAILABLE VF CHANNEL, FROM THE A5 CHANNEL BANK, IS USED AS A COORDINATION CHANNEL AND WILL TERMINATE AT THE WIDEBAND DATA STATION. WHEN TWO WIDEBAND DATA SYSTEMS ARE PROVIDED, A MAXIMUM OF 10 VF CHANNELS MAY BE MADE AVAILABLE AT THE PBX SINCE ONE VF COORDINATION CHANNEL IS REQUIRED FOR EACH WIDEBAND DATA SYSTEM.
 5. WHEN WIDEBAND SIGNALS ENTER THE WSB IN A PASSBAND FORMAT, THE WSB SLP IS -10 DB. WHEN WIDEBAND SIGNALS ENTER THE WSB IN A RESTORED POLAR FORMAT, THE WSB SLP IS 0 DB.

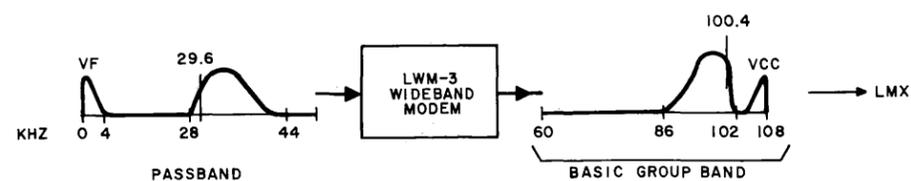
Fig. 2—Arrangements of Wideband Loop and Station Equipment



A. N2-CARRIER USING N2WT-1 TERMINAL



B. N2-CARRIER USING N2WT-1 TERMINAL



C. L-TYPE MULTIPLEX

Fig. 3—Half-Group Data System, Signal Structure on Carrier Facilities

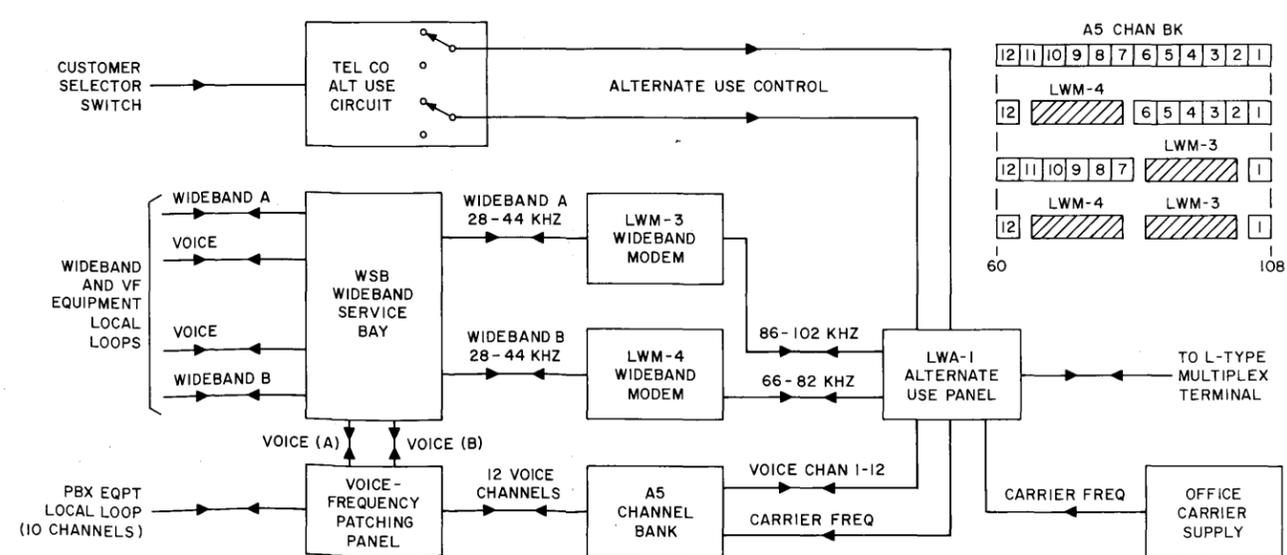
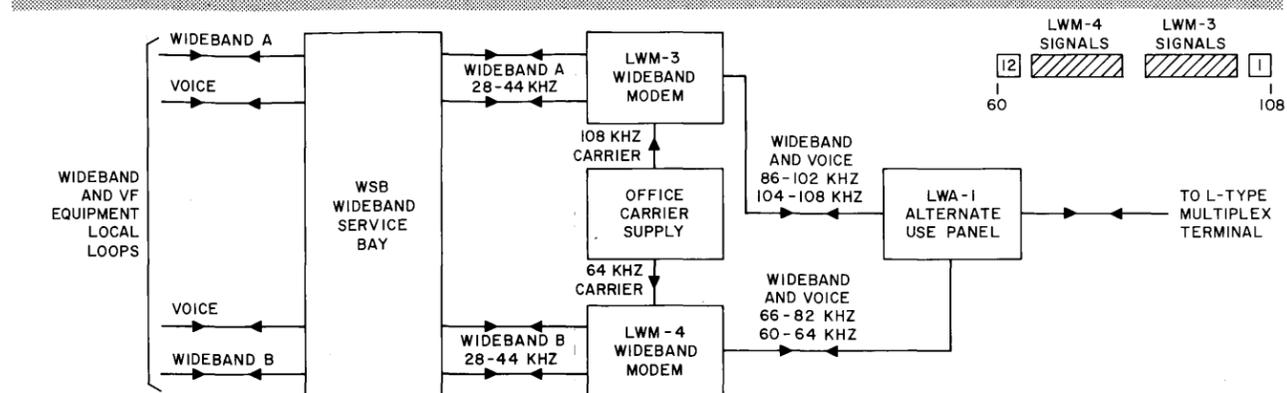
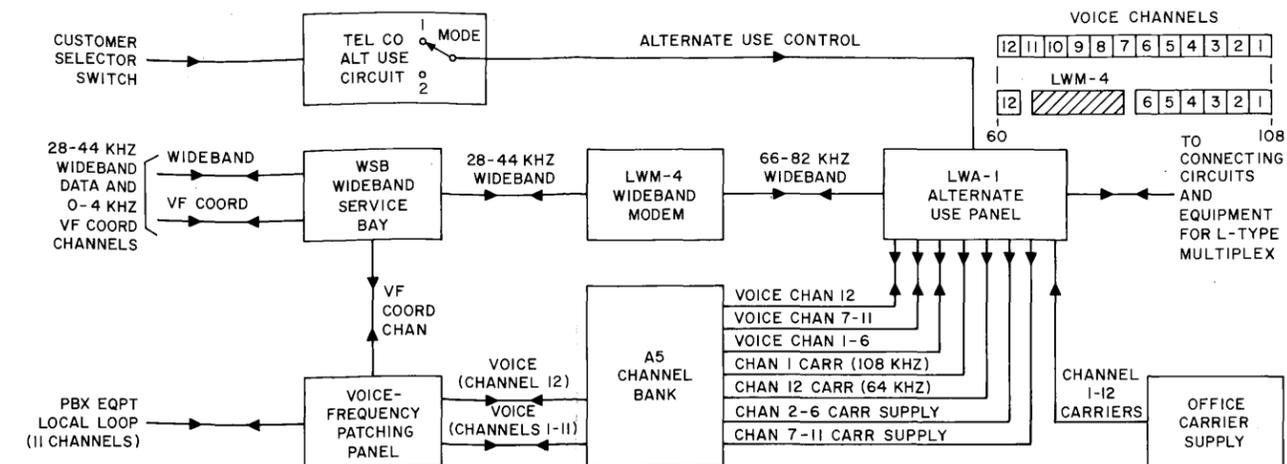
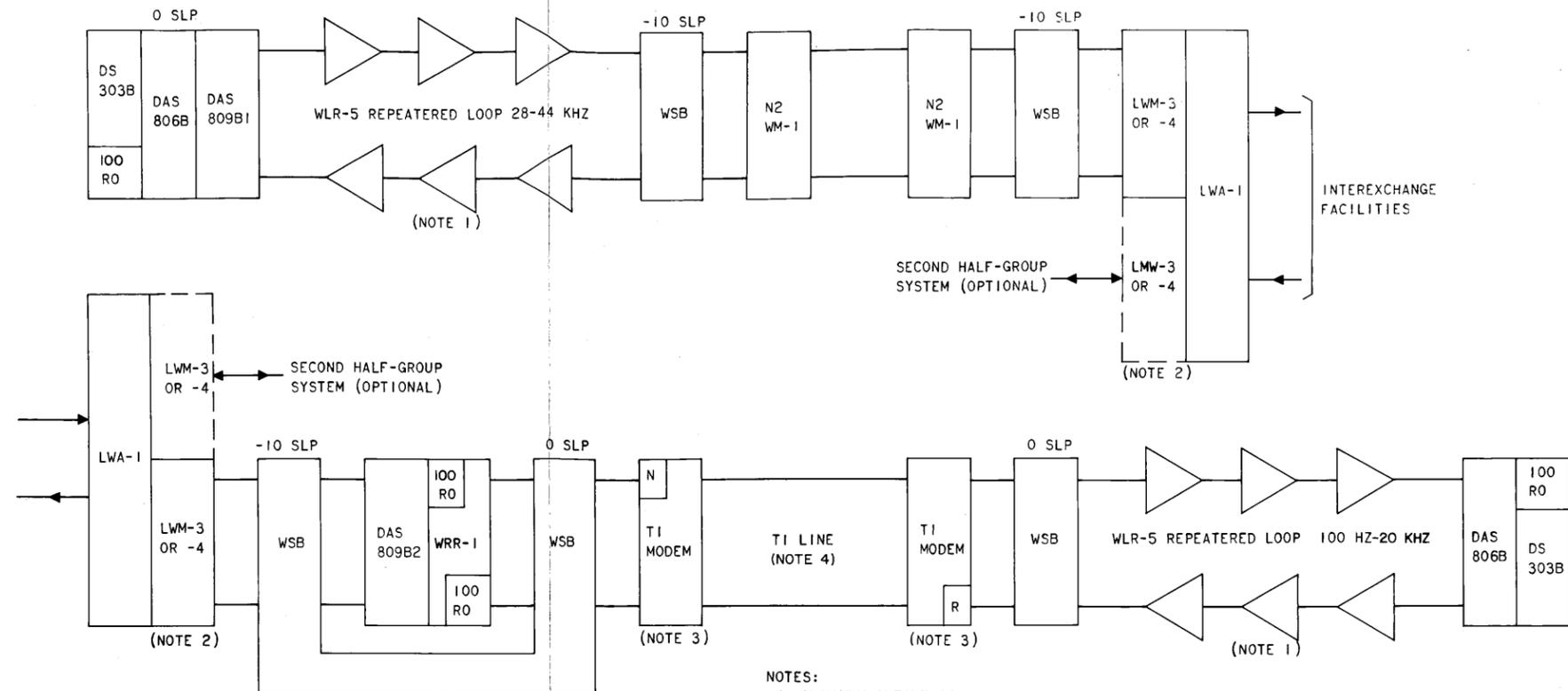


Fig. 4—Typical Connections for Alternate Use



- NOTES:
1. MAXIMUM OUTPUT OF WLR IS +6 DBM. MINIMUM INPUT TO WLR, DAS, OR DS IS -24DBM. INPUT LEVELS TO WSB MUST BE MAINTAINED AS SHOWN.
 2. ONE LWM-3 OR -4 IS REQUIRED IF ONE HALF-GROUP DATA CHANNEL WILL OCCUPY AN LMX GROUP ASSIGNMENT. ONE LWM-3 AND ONE LWM-4 ARE REQUIRED IF TWO HALF-GROUP DATA CHANNELS WILL OCCUPY AN LMX GROUP ASSIGNMENT.
 3. ONE HALF-GROUP DATA CHANNEL OCCUPIES A 50-KBS ASSIGNMENT IN THE T1 MODEM OR BANK.
 4. AN N2 LINE EQUIPPED WITH N2WM-2 MODEMS COULD BE USED HERE.

LEGEND:

- 100
RO 100 PERCENT ROLL-OFF RECEIVING FILTER
- N 4020N LINE-CONNECTING NETWORK (NO SHAPING)
- R 4020R LINE-CONNECTING NETWORK (100 PERCENT ROLL-OFF)

Fig. 5—Typical Half-Group Data System Using Combined Analog and Digital Facilities

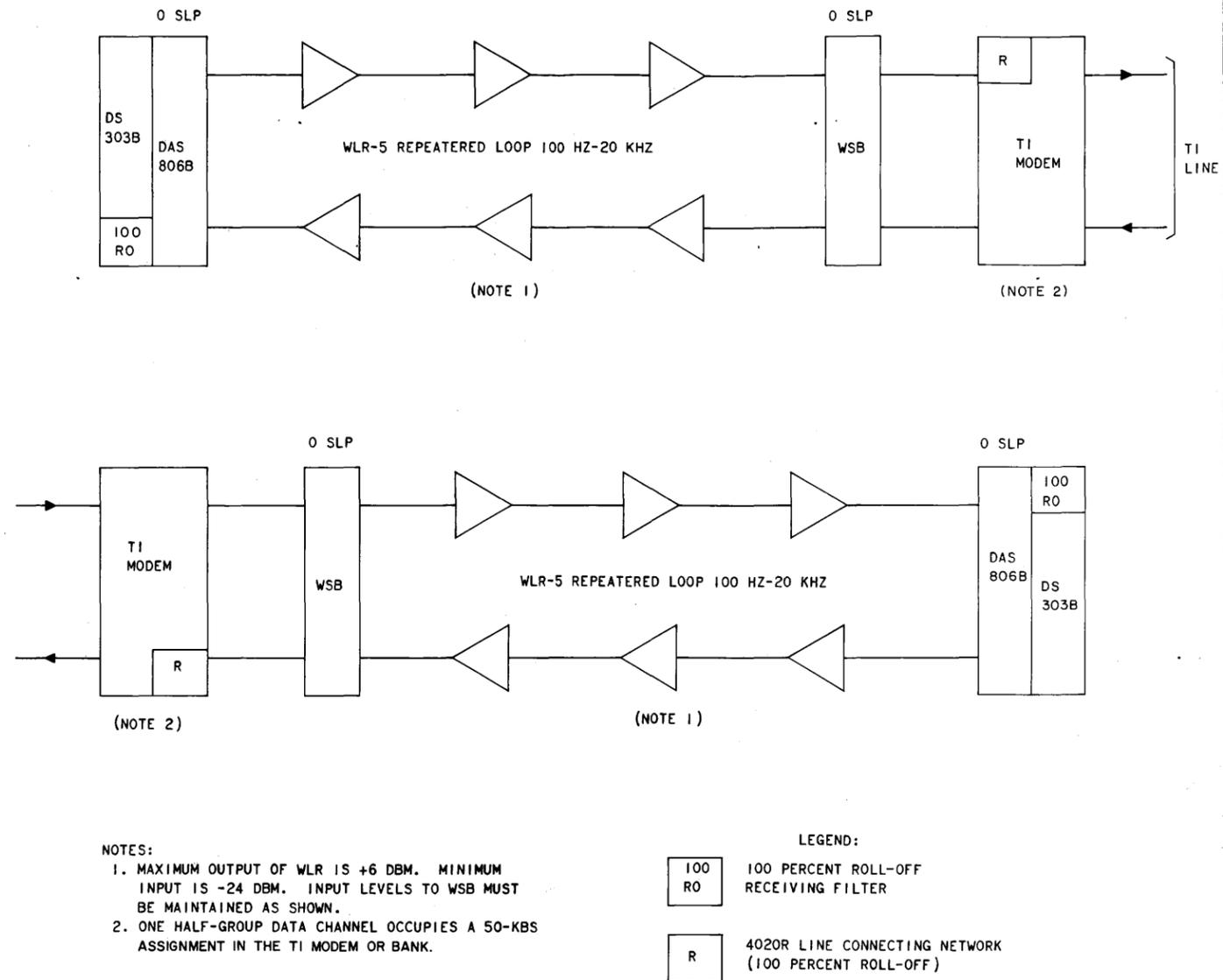


Fig. 6—Typical Half-Group Data System Using Digital Facilities

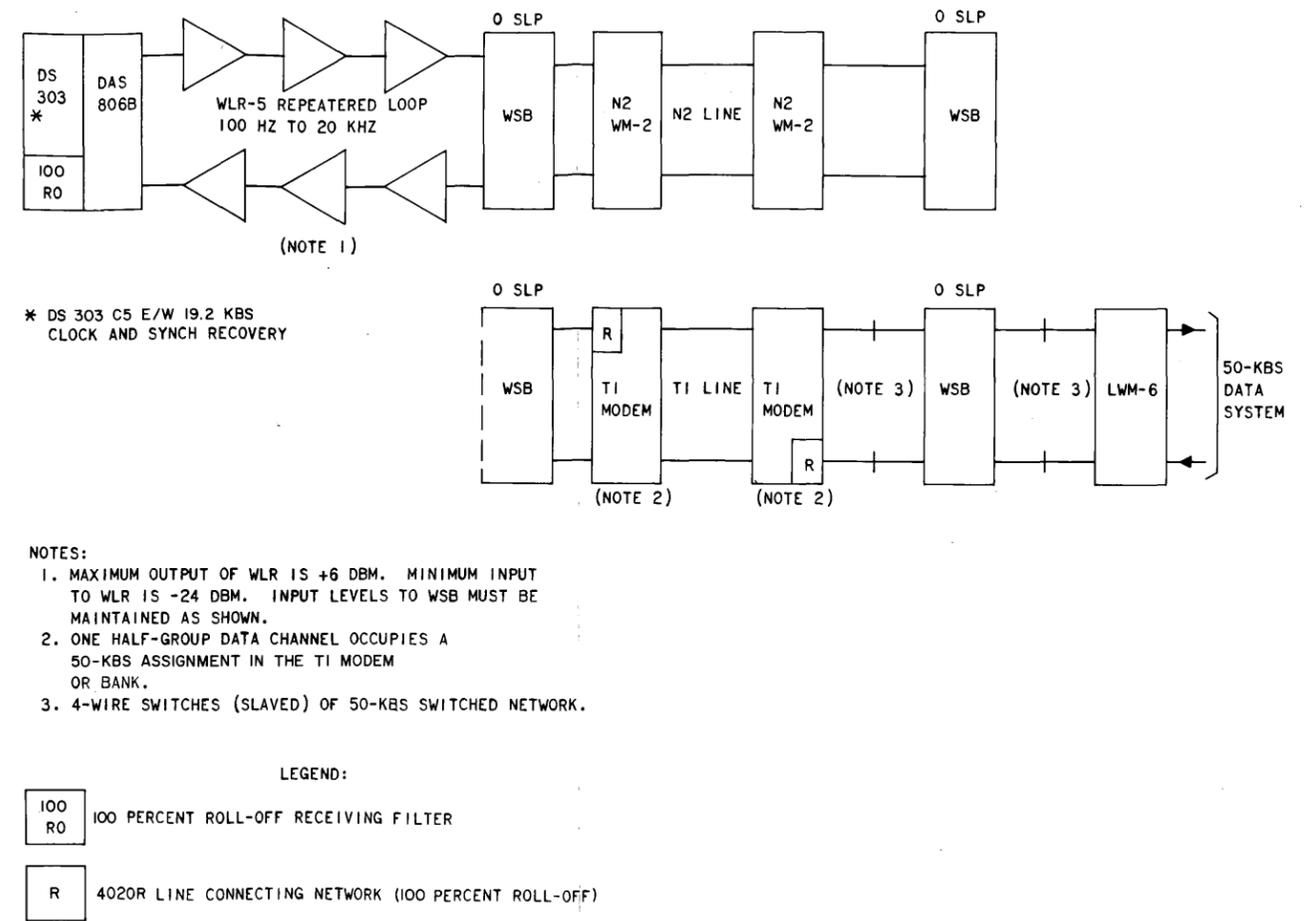


Fig. 7—Special Arrangement for Accessing the 50-kbps Switched Network